Hearing Date: December 4, 2026

ITEM 2

TEST CLAIM

PROPOSED DECISION

California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, as modified by Order No. R2-2023-0019, NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022

22-TC-07

Union City, Claimant

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Exhibit A

STATE of CALIFORNIA
COMMISSION ON STATE MANDATES

For CSM Use Only
Filing Date: RECEIVED June 30, 2023 Commission on State Mandates
TC #: 22-TC-07

TEST CLAIM FORM AND TEST CLAIM AMENDMENT FORM (Pursuant to Government Code section 17500 et seq. and Title 2, California Code of Regulations, section 1181.1 et seq.)

Section 1

Proposed Test Claim Title:

Municipal Regional Stormwater Permit

Section 2

Local Government (Local Agency/School District) Name:

City of Union City

Name and Title of Claimant's Authorized Official pursuant to CCR, tit.2, § 1183.1(a)(1-5):

Joan Malloy, City Manager

Street Address, City, State, and Zip:

34009 Alvarado-Niles Road, Union City, CA 94587

Telephone Number: (510) 675-5344

Email Address: joanm@unioncity.org

Section 3 – Claimant designates the following person to act as its sole representative in this test claim. All correspondence and communications regarding this claim shall be sent to this representative. Any change in representation must be authorized by the claimant in writing, and e-filed with the Commission on State Mandates. (CCR, tit.2, § 1183.1(b)(1-5).)

Name and Title of Claimant Representative:

Gregory J. Newmark

Organization: Meyers Nave

Street Address, City, State, Zip:

707 Wilshire Blvd., 24th Floor, Los Angeles, CA 90017

Telephone Number: (213) 626-2906

Email Address: gnewmark@meyersnave.com

Section 4 – Identify all code sections (include statutes, chapters, and bill numbers; e.g., Penal Code section 2045, Statutes 2004, Chapter 54 [AB 290]), regulatory sections (include register number and effective date; e.g., California Code of Regulations, title 5, section 60100 (Register 1998, No. 44, effective 10/29/98), and other executive orders (include effective date) that impose the alleged mandate pursuant to Government Code section 17553 and check for amendments to the section or regulations adopted to implement it:

California Regional Water Quality Control Board, San Francisco Bay Region, Municipal Regional Stormwater NPDES Permit; Order No. R2-2022-0018, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; issued May 11, 2022; effective date July 1, 2022; MRP3 Provisions C.3.b.ii.(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b

☑ Test Claim is Timely Filed on [Insert Filing Date] [select either A or B]: 06 / 30 / 2023

☑ A: Which is not later than 12 months (365 days) following [insert effective date] 07 / 01 / 2022, the effective date of the statute(s) or executive order(s) pled; or

☐ B: Which is within 12 months (365 days) of [insert the date costs were *first* incurred to implement the alleged mandate] ___/___/_____, which is the date of first incurring costs as a result of the statute(s) or executive order(s) pled. *This filing includes evidence which would be admissible over an objection in a civil proceeding to support the assertion of fact regarding the date that costs were first incurred.*

(Gov. Code § 17551(c); Cal. Code Regs., tit. 2, §§ 1183.1(c) and 1187.5.)

Section 5 – Written Narrative:

☑ Includes a statement that actual or estimated costs exceed one thousand dollars ($1,000). (Gov. Code § 17564.)

☑ Includes all of the following elements for each statute or executive order alleged **pursuant to Government Code section 17553(b)(1)**:

☑ Identifies all sections of statutes or executive orders and the effective date and register number of regulations alleged to contain a mandate, including a detailed description of the *new* activities and costs that arise from the alleged mandate and the existing activities and costs that are *modified* by the alleged mandate;

☑ Identifies *actual* increased costs incurred by the claimant during the fiscal year for which the claim was filed to implement the alleged mandate;

☑ Identifies *actual or estimated* annual costs that will be incurred by the claimant to implement the alleged mandate during the fiscal year immediately following the fiscal year for which the claim was filed;

☑ Contains a statewide cost estimate of increased costs that all local agencies or school districts will incur to implement the alleged mandate during the fiscal year immediately following the fiscal year for which the claim was filed;

Following FY: 2023 - 2024 Total Costs: $68,200,880

☑ Identifies all dedicated funding sources for this program;

State: None

Federal: None

Local agency's general purpose funds: General Fund and Clean Water Fund

Other nonlocal agency funds: None

Fee authority to offset costs: None

☑ Identifies prior mandate determinations made by the Board of Control or the Commission on State Mandates that may be related to the alleged mandate:

7/31/09 Statement of Decision in Test Claim Nos. 03-TC-04, 03-TC-19, 03-TC-20 and 03-TC-21; 3/26/10 Statement of Decision in Test Claim No. 07-TC-09; and the Commission's 3/24/23 adoption of the proposed decision regarding Test Claim 09-TC-03

☑ Identifies any legislatively determined mandates that are on, or that may be related to, the same statute or executive order: None

Section 6 – The Written Narrative Shall be Supported with Declarations Under Penalty of Perjury Pursuant to Government Code Section 17553(b)(2) and California Code of Regulations, title 2, section 1187.5, as follows:

☑ Declarations of actual or estimated increased costs that will be incurred by the claimant to implement the alleged mandate.

☑ Declarations identifying all local, state, or federal funds, and fee authority that may be used to offset the increased costs that will be incurred by the claimant to implement the alleged mandate, including direct and indirect costs.

☑ Declarations describing new activities performed to implement specified provisions of the new statute or executive order alleged to impose a reimbursable state-mandated program (specific references shall be made to chapters, articles, sections, or page numbers alleged to impose a reimbursable state-mandated program).

☐ If applicable, declarations describing the period of reimbursement and payments received for full reimbursement of costs for a legislatively determined mandate pursuant to Government Code section 17573, and the authority to file a test claim pursuant to paragraph (1) of subdivision (c) of Government Code section 17574.

☑ The declarations are signed under penalty of perjury, based on the declarant's personal knowledge, information, or belief, by persons who are authorized and competent to do so.

Section 7 – The Written Narrative Shall be Supported with Copies of the Following Documentation Pursuant to Government Code section 17553(b)(3) and California Code of Regulations, title 2, § 1187.5:

☑ The test claim statute that includes the bill number, and/or executive order identified by its effective date and register number (if a regulation), alleged to impose or impact a mandate.
Pages PDF 536 to PDF 1524 (all pages below are to PDF).

☑ Relevant portions of state constitutional provisions, federal statutes, and executive orders that may impact the alleged mandate. Pages 2166 to 2282.

☑ Administrative decisions and court decisions cited in the narrative. (Published court decisions arising from a state mandate determination by the Board of Control or the Commission are exempt from this requirement.) Pages 2284 to 2383.

☐ Evidence to support any written representation of fact. *Hearsay evidence may be used for the purpose of supplementing or explaining other evidence but shall not be sufficient in itself to support a finding unless it would be admissible over objection in civil actions.* (*Cal. Code Regs., tit. 2, § 1187.5.*) Pages 39 to 533.

Section 8 – TEST CLAIM CERTIFICATION Pursuant to Government Code section 17553

☑ The test claim form is signed and dated at the end of the document, under penalty of perjury by the eligible claimant, with the declaration that the test claim is true and complete to the best of the declarant's personal knowledge, information, or belief.

Read, sign, and date this section. Test claims that are not signed by authorized claimant officials pursuant to California Code of Regulations, title 2, section 1183.1(a)(1-5) will be returned as incomplete. In addition, please note that this form also serves to designate a claimant representative for the matter (if desired) and for that reason may only be signed by an authorized local government official as defined in section 1183.1(a)(1-5) of the Commission's regulations, and not by the representative.

This test claim alleges the existence of a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution and Government Code section 17514. I hereby declare, under penalty of perjury under the laws of the State of California, that the information in this test claim is true and complete to the best of my own personal knowledge, information, or belief. All representations of fact are supported by documentary or testimonial evidence and are submitted in accordance with the Commission's regulations. (Cal. Code Regs., tit.2, §§ 1183.1 and 1187.5.)

Joan Malloy

Name of Authorized Local Government Official
pursuant to Cal. Code Regs., tit.2, § 1183.1(a)(1-5)

City Manager

Print or Type Title

Joan Malloy
Joan Malloy (May 22, 2024 12:47 PDT)

Signature of Authorized Local Government Official
pursuant to Cal. Code Regs., tit.2, § 1183.1(a)(1-5)

Test Claim Form

Final Audit Report 2024-05-22

Created:	2024-05-21
By:	CSM Sign (csmsign@csm.ca.gov)
Status:	Signed
Transaction ID:	CBJCHBCAABAAcRJuoHIsZynSbCfGDhAQpXuWRetr1pZ8

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Signature Date: 2024-05-22 - 7:47:41 PM GMT - Time Source: server

Agreement completed.
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Adobe Acrobat Sign

UNION CITY TEST CLAIM

IN RE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

ORDER NO. R2-2022-0018
AS MODIFIED BY ORDER NO. R2-2023-0019
NPDES PERMIT NO. CAS612008
MAY 11, 2022

5. WRITTEN NARRATIVE

IN SUPPORT OF UNION CITY TEST CLAIM

IN RE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

ORDER NO. R2-2022-0018
AS MODIFIED BY ORDER NO. R2-2023-0019
NPDES PERMIT NO. CAS612008
MAY 11, 2022

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NARRATIVE STATEMENT IN SUPPORT OF TEST CLAIM

I. INTRODUCTION

The City of Union City ("City" or "Union City") seeks the Commission on State Mandate's ("Commission") approval of claims to recover costs associated with obligations mandated by several provisions of the Municipal Regional Stormwater Permit issued on May 11, 2022, ("MRP3") by the California Regional Water Quality Control Board, San Francisco Bay Region ("Regional Water Board"), effective July 1, 2022, and amended in October 2023 by Order No. R2-2023-0019.[1] The MRP3 regulates the discharge of stormwater runoff from the municipal separate storm sewer systems ("MS4s") maintained by a total of 79 cities, counties, and flood control districts within the jurisdiction of six Bay Area regional stormwater programs.

The Test Claim cures the Test Claim filed by Union City on June 30, 2023 and is responsive to the Commission's February 23 , 2024, Second Notice of Duplicate and Incomplete Test Claim**.**

This Test Claim addresses several broad categories of new mandates imposed by the MRP3:

- Union City seeks reimbursement for costly MRP3 requirements to achieve greater levels of trash load reduction than previously required. Under the MRP3, the state mandates that the City achieve a 100% trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025. Also, for the first time, the state requires control of trash from private lands.

---

[1] A copy of the MRP3 is attached to Section7 as Exhibit 1; an "unofficial version" of the MRP3, as modified, is attached to Section 7 as Exhibit 2. This version states: "**Important Note:** The current permit, MRP 3, comprises Order Nos. R2-2022-0018 and R2-2023-0019. The following is an unofficial version of MRP 3 (without the Fact Sheet and other Attachments) that incorporates amendments to MRP 3 adopted in October 2023, and that has been compiled for convenience purposes only. Please refer to the adopted orders for a complete and accurate copy of MRP 3. In the event of a conflict between the adopted orders and this unofficial version of MRP 3, the adopted orders shall control." (Section 7, Ex. 2 at S7-0727) None of the provisions of the MRP3 at issue in this Test Claim are affected by the October 2023 modifications.

- The City seeks reimbursement for costly mercury and PCB control programs, including the implementation of treatment control measures to treat old industrial land use at 70% efficiency. The MRP3 also now requires Permittees to quantify the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures.
- Permittees are required to implement low impact development ("LID") source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for certain road projects.
- The permit requires additional "green infrastructure" retrofits and requires Permittees to update their Green Infrastructure Plans as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure.
- The MRP3 requires Permittees to collectively convene a regionwide Firefighting Discharges Working Group to reduce the impacts of emergency discharges to the MS4 associated with firefighting.
- The MRP3 requires Permittees to develop and submit a best management practice report that identifies effective practices to address discharges associated with unsheltered homeless populations.
- Permittees must develop a cost reporting framework and methodology to perform an annual fiscal analysis and develop an asset management plan.
- Additional costly water monitoring requirements, including the collection and analysis of the amount of trash discharged from MS4 outfalls and the implementation of a trash monitoring pilot program, monitoring of low impact development ("LID") controls and monitoring pollutants of concern.
- Finally, and as a precaution, Union City seeks reimbursement for trash control, green infrastructure and monitoring requirement costs the MRP3 continues from the prior permits. These requirements were initially imposed in the prior permits, MRP2 and MRP1,[2] and are pending before the Commission in Test Claim 16-

[2] Prior to the effective date of the MRP3, Permittees were regulated by NPDES No. CAS612008, issued as Order No. R2-2015-0049 (November 19, 2015) ("MRP2"), which is attached to Section 7 as Exhibit 3. Prior to the effective date of the MRP2, Union City was regulated by Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009,

TC-03 and Consolidated Test Claims 10-TC-02, 10-TC-03 and 10-TC-05. The City does not believe it is or should be required to raise those same issues in this Test Claim, but does so in an abundance of caution.

On March 24, 2023, the Commission heard a municipal stormwater Test Claim 09-TC-03 involving Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2009-0030, and on that date adopted a decision finding the permit terms in the MS4 permit at issue were not federal mandates. This is in line with the California Supreme Court in *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749 ("*Dep't of Finance I*"). The High Court upheld the Commission's determination that the challenged storm water provisions are state mandates rather than federal mandates. In addition, the Supreme Court clarified that opponents of the test claim, not the claimant, bear the burden of proving the applicability of any exceptions to the "general rule requiring reimbursement of all state-mandated costs." (*Id*. at 769.)

Further, under existing law and Supreme Court authority, the new activities and increased services Union City must undertake to comply with the MRP3 are state mandates subject to subvention. The City respectfully requests that the Commission approve this Test Claim so that the MRP3 mandates are effectively funded and the City can continue its cooperation and collaboration with the Regional Water Board to improve water quality in the San Francisco Bay region with the necessary funding. Union City is committed to the improvement and maintenance of the quality of waters of the Bay and its tributaries, and will comply with the MRP3 to the best of its ability. Further, the City supports the objectives that the MRP3 is intended to achieve. The City submits this Test Claim only to address the fundamental issue of the limited financial ability of the City and its taxpayers to pay for the necessary activities to accomplish the objectives of the MRP3.

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amended by Order No. R2-2011-0083 on November 28, 2011 ("MRP1"), a copy of which is attached to Section 7 as Exhibit 4.

II. LEGAL AND PROCEDURAL BACKGROUND

A. Regional Stormwater Permits

When a Regional Water Board issues a stormwater permit, it is implementing both federal and state law:

> Part of the federal Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), "[t]he primary means" for enforcing effluent limitations and standards under the Clean Water Act. (*Arkansas v. Oklahoma, supra,* 503 U.S. at 101, 112 S.Ct. 1046.) The NPDES sets out the conditions under which the federal EPA or a state with an approved water quality control program can issue permits for the discharge of pollutants in wastewater. (33 U.S.C. § 1342(a) & (b).) In California, wastewater discharge requirements established by the regional boards are the equivalent of the NPDES permits required by federal law. (§ 13374.)

(*City of Burbank v. State Water Res. Control Bd.* (2005) 35 Cal.4th 613 at 619-621.) Section 402(p) of the federal Clean Water Act establishes that an MS4 permit:

> (i) may be issued on a system or jurisdiction-wide basis;
>
> (ii) shall include a requirement to effectively prohibit non-storm water discharges into the storm sewers; and
>
> (iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

(33 U.S.C. § 1342(p)(3)(B).)[3]

California is among the states that are authorized to implement the NPDES permit program. (33 U.S.C. § 1342(b).) Permits issued by the regional water boards under this authority must impose conditions that are at least as stringent as those required under the federal act. (33 U.S.C. § 1371; Cal. Water Code § 13377.)

However, relying on its state law authority or discretion, the regional water boards are free to issue permits that impose limits or conditions in excess of those required under the federal law where necessary to achieve higher water quality standards and objectives established under state law:

> In California, the controlling law is the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), which was enacted in 1969. Its goal is "to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." The task of accomplishing this belongs to the State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards; together the State Board and the regional boards comprise "the principal state agencies with primary responsibility for the coordination and control of water quality."
>
> Whereas the State Board establishes statewide policy for water quality control, the regional boards "formulate and adopt water quality control plans for all areas within [a] region." The regional boards' water quality plans, called "basin plans," must address the beneficial uses to be protected as well as water quality objectives, and they must establish a program of implementation. Basin plans must be consistent with "state policy for water quality control."

(*City of Burbank v. State Water Res. Control Bd.* (2005) 35 Cal.4th 613 at 619 (internal citations omitted).) The California Water Code

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[3] The relevant provisions of the Clean Water Act are included with the documentation in Section 7, Exhibit 4, of this Test Claim.

expressly anticipates that the uses and objectives set forth in basin plans and the need to prevent nuisance will require permits issued by regional water boards to impose more stringent regulatory controls than would otherwise result from federal law:

> Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.

(Cal. Water Code § 13377.)

B. MRP3 and the MRP2 (the Prior Permit)

The MRP3 was issued by the Regional Water Board, an executive agency of the State of California. It governs stormwater discharges in some 79 different municipal entities (e.g., cities, counties, and flood control and water conservation districts). (Section 7, Ex. 1 at S7-00002.) Union City is one of the Permittees participating in the Alameda Countywide Clean Water Program (the "Alameda Countywide Program" or "Program"). Union City was formerly governed by the MRP2. (Section7, Ex. 3.) For purposes of establishing that the provisions of the MRP3 constitute new programs, the MRP3's provisions are compared to the MRP2.

Additionally, this Test Claim also includes the continuation of MRP3 Provisions C.8 (water monitoring), C.10.b (trash reduction) and C.11.a. C.11.e, C.12.f and C.12.h (green infrastructure) that were first imposed in the MRP1 and MRP2 and maintained as requirements in the MRP3. These provisions are pending before the Commission in Consolidated Test Claims 10-TC-02, 10-TC-03 and 10-TC-05 and Test Claim 16-TC-03, respectively.

C. State Mandate Law

The Commission is familiar with the basic legal framework that governs its consideration of test claims. Union City will, therefore, provide only a brief summary of the major legal principles. Article XIII B section 6 of the California Constitution provides in relevant part:

> Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local governments for the cost of the program or increased level of service….

The purpose of section 6 "is to preclude the state from shifting financial responsibility for carrying out governmental functions to local agencies, which are 'ill equipped' to assume increased financial responsibilities because of the taxing and spending limitations that articles XIII A and XIII B impose." (*County of San Diego v. State of California* (1997) 15 Cal.4th 68, 81; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487.) The section "was designed to protect the tax revenues of local governments from state mandates that would require expenditure of such revenues." (*County of Fresno, supra,* at 487; *Redevelopment Agency v. Comm'n on State Mandates* (1997) 55 Cal.App.4th 976, 984-85.) The Legislature implemented section 6 by enacting a comprehensive administrative scheme to establish and pay mandate claims. (Cal. Gov't Code §§ 17500 *et seq.*; *Kinlaw v. State of California* (1991) 54 Cal.3d 326, 331, 333 [statute establishes "procedure by which to implement and enforce section 6"].)

The California Supreme Court in *Dep't of Finance I* summarized the basic principle that governs the issues raised in this Test Claim: "Under our state Constitution, if the Legislature or a state agency requires a local government to provide a new program or higher level of service, the local government is entitled to reimbursement from the state for the associated costs." (1 Cal.5th at 754.)

1. Parties Opposing Union City Bear the Burden of Proving Exceptions to the General Constitutional Subvention Requirement

For the purposes of future test claim proceedings, one of the most important aspects of *Dep't of Finance I* is the Court's discussion of the

burdens of proof of the parties before the Commission. Under *Dep't of Finance I*, once claimants demonstrate new programs or increased levels of service are being imposed, the burden of proof shifts to test claim opponents (such as the Regional Water Board), if any appear, to prove that the requirements at issue are excepted from the general subvention requirement:

> Section 6 establishes a **general rule requiring reimbursement** of all state-mandated costs. Government Code section 17556, subdivision (c), codifies an exception to that rule. Typically, **the party claiming the applicability of an exception bears the burden of demonstrating that it applies**. [Citations.] Here, the State must explain why federal law mandated these requirements, rather than forcing the Operators to prove the opposite.

(*Dep't of Finance I*, 1 Cal.5th at 769, citing *Simpson Strong-Tie Co., Inc. v. Gore* (2010) 49 Cal.4th 12, 23 and *Long Beach Police Officers Assn. v. City of Long Beach* (2014) 59 Cal.4th 59, 67, emphasis added.) Thus, for Union City's test claim, the City must establish that the MRP3 requires new programs and/or higher levels of service, but the applicability of any exceptions to the "general rule requirement reimbursement" must be proven, if at all, by a test claim opponent.

Moreover, the Supreme Court's reasoning regarding the federal mandates exception must apply with equal force to all the "exception[s] to that [general] rule" listed in Government Code section 17556, not just the federal mandates exception in subdivision (c). For example, to the extent the Regional Water Board contends that the fee authority exception in section 17556, subdivision (d), is applicable to Union City's test claim, the Regional Water Board bears the burden of proving the exception applies and Union City cannot be forced to "prove the opposite."

2. Statutory Exceptions to the General Rule Requiring Subvention Must Be Construed Narrowly and the Constitution Must Be Construed Broadly

Furthermore, in evaluating the applicability of statutory exceptions to the constitutional "general rule," the Commission must

construe the exceptions narrowly. (*National City v. Fritz* (1949) 33 Cal.2d 635, 636–37 (applying "the rule that exceptions in a statute are to be strictly construed … [citations]."); *Dept. of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Board* (2017) 7 Cal.App.5th 628, 641 (applying the "well-established rule that [a]n exception to a statute is to be narrowly construed," internal quotations and citations omitted); *Corey v. Knight* (1957) 150 Cal.App.2d 671, 680 (statutory "exceptions are to be narrowly, not broadly, construed").) Accordingly, when considering anticipated arguments from the Regional Water Board about the applicability of section 17556 exceptions, only narrow interpretations of the exceptions are permissible and appropriate.

The rule requiring narrow construction of statutory exceptions dovetails with the principle that ballot initiatives amending the Constitution must be interpreted broadly to implement the will of the voters. The exceptions listed in section 17556 do not appear anywhere in Article XIII B, section 6. As the court in *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1564 observed, "[t]he constitutional subvention provision and the statutory provisions which preceded it do not expressly say that the state is not required to provide a subvention for costs imposed by a federal mandate." (*Id*. at p. 1593.)[4] Rather, these exceptions were developed by the legislature and the courts rather than the voters.

In interpreting the scope of exceptions to the general rule requiring subvention, the corollary rule is that the Constitution "is not to be interpreted according to narrow or supertechnical principles, but liberally and on broad general lines, so that it may accomplish in full measure the objects of its establishment and so carry out the great principles of government." (*Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization* (1978) 22 Cal. 3d 208, 244-45, quoting *Stephens v. Chambers* (1917) 34 Cal.App. 660, 663-664.) In light of the objectives of Proposition 4, the plain language of the Constitution

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[4] Article XIII B, section 9, mentions federal mandates as excluded from definition of "appropriations subject to limitation," but they are not mentioned in section 6. The Supreme Court declined to address the "question whether 'federal' and 'state' mandates are mutually exclusive for purposes of state subvention" in *City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 71, fn. 16.

requiring subvention whenever the state imposes new programs or higher levels of service must be broadly construed.

3. The Federal Mandates Exception Does Not Apply to the Challenged Requirements Because the Regional Water Board Exercised its Discretion by Virtue of a "True Choice"

In *Dep't of Finance I*, the Supreme Court also confirmed that application of the federal mandates exception turns on whether a state requirement was imposed because it was compelled by federal law, or whether it was "imposed as a result of the state's discretionary action." (1 Cal.5th at 754.) If it is compelled by federal law, the state must implement a federal mandate and no reimbursement is required. On the other hand, if the requirement is imposed as a result of the state's discretionary action, reimbursement is required.

The Supreme Court summarized applicable case law on the matter, and opined that, "if federal law gives the state discretion whether to impose a particular implementing requirement, and the state exercises its discretion to impose the requirement by virtue of a 'true choice,' the requirement is not federally mandated" and reimbursement is required. (*Dep't of Finance I*, 1 Cal.5th at 765.) In applying this rule to the County of Los Angeles claims in that case, the Court analyzed the Clean Water Act, the Porter-Cologne Act, and related regulations. The Court found that the regional board in that case was given discretionary power to fashion requirements which it determined would meet the Clean Water Act's maximum extent practicable ("MEP") standard. (*Id.* at 767-68.) Federal law did not compel these requirements, because the State's NPDES program is undertaken on a voluntary basis. (*Id.* at 767.) As the Court noted, the State was not compelled to operate its own permitting system. (*Id.*) The Supreme Court further found that the federal regulations gave the regional board discretion to develop and issue municipal storm water permits and determine which specific controls would be required. (*Id.* at 767-68.) Accordingly, the regional board's exercise of a "true choice" in developing the County of Los Angeles permit conditions at issue constituted a state mandate with respect to the contested permit provisions. (*Id.* at 769, 770-72 [analyzing whether inspection and trash receptacle conditions were mandated by CWA].) Accordingly, none of the four permit conditions at issue in *Dept. of Finance I* were found to be federal mandates.

The Third Appellate District's subsequent 2017 decision in *Dept. of Finance v. Commission on State Mandates* (2017) 18 Cal.App.5th 661 (*Dept. of Finance II*), involved ten permit requirements in San Diego County's MS4 permit stemming from the federal CWA's MEP and water quality standard requirements relating to street sweeping and cleaning stormwater conveyances, a hydromodification plan, low impact development practices, education programs, urban runoff management programs, effectiveness assessments and permittee collaboration. The court "follow[ed] the analytical regime established by [the Supreme Court in *Dept. of Finance I*]," and found that "[n]o federal law, regulation, or administrative [or] case authority expressly required" any of these ten permit requirements:

> Under the test announced in [*Dept. of Finance I*], we conclude federal law did not compel imposition of the permit requirements, and they are subject to subvention under section 6. This is because the requirement to reduce pollutants to the "maximum extent practicable" was not a federal mandate for purposes of section 6. Rather, it vested the San Diego Regional Board with discretion to choose how the permittees must meet that standard, and the exercise of that discretion resulted in imposing a state mandate. We also find no federal law, regulation, or administrative [or] case authority that, under the test provided by [*Dept. of Finance I*], expressly required the conditions the San Diego Regional Board imposed.

(18 Cal.App.5th at 676; see also *id*. at 667.) Describing the Supreme Court's decision, the court states that the MEP standard "by its nature is discretionary and does not by itself impose a federal mandate for purposes of section 6." (*Id*. at 681.) Furthermore, "[t]he high court stated that, to be a federal mandate for purposes of section 6, the federal law or regulation must 'expressly' or 'explicitly' require the specific condition imposed in the permit." (*Id*. at 682.)

On March 24, 2023, the Commission heard a municipal stormwater Test Claim 09-TC-03 involving *Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2009-0030*, and on that date adopted a decision finding that none of the conditions at issue in that test claim are federal mandates.

Thus, **none** of the MS4 permit provisions at issue in *Dept. of Finance I*, *Dept. of Finance II* or the Commission's decision regarding Test Claim 09-TC-03 were found to be federal mandates. The same conclusion must be made here because the Regional Water Board exercised its discretion to impose each of the MRP3 requirements at issue in this Test Claim by virtue of a "true choice" and the Clean Water Act does not expressly or explicitly require the specific conditions imposed in the MRP3 conditions at issue.

III. STATEMENT THAT MANDATED COSTS EXCEED $1,000

Union City states that the actual and/or estimated costs resulting from the mandates imposed by the MRP3 exceed one thousand dollars ($1,000), as set forth in this Written Narrative and in the declarations included in Section 6 of this Test Claim.

IV. THE UNFUNDED MANDATES AT ISSUE IN THIS TEST CLAIM AND FISCAL YEAR 2022/2023 COSTS

The MRP3 establishes the prohibitions, limitations, and obligations of Claimants and other Permittees. This Test Claim pertains to the following mandates: MRP3 Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b.

In addition, and in an abundance of caution, this Test Claim also includes the continuation of MRP3 Provisions C.8 (water monitoring), C.10.b (trash reduction) and C.11.a. C.11.e, C.12.f and C.12.h (green infrastructure) requirements that were first imposed in the MRP1 and MRP2 and maintained as requirements in the MRP3. These provisions are pending before the Commission in Consolidated Test Claims 10-TC-02, 10-TC-03 and 10-TC-05 and Test Claim 16-TC-03, respectively. Union City does not believe it is or should be required to reassert these requirements in this Test Claim, but does so in an abundance of caution. Union City would be willing to withdraw these pending issues from this Test Claim with assurances from the Commission that no waiver, forfeiture, or abandonment of rights to subvention would result.

The requirements addressed in this Test Claim, as explained in more detail below, are "programs" within the meaning of Article XIII B, section 6, in that they require Union City to provide certain specified

services to the public. The requirements in this Test Claim are unique to public entities like Union City because they arise from the operation of a municipal separate storm sewer system under NPDES permits issued only to municipalities and which require activities that are not required of private non-governmental dischargers. These requirements include the development and amendment of government planning documents, the development and construction of public works projects and other purely governmental functions.[5]

A test claim must be filed with the Commission "not later than 12 months (365 days) following the effective date of a statute or executive order, or within 12 months (365 days) of first incurring increased costs as a result of a statute or executive order, whichever is later." (Cal. Code Regs., tit. 2, § 1183.1, subd. (c).)

Union City first incurred costs to comply with the MRP3 on July 1, 2022, the effective date of the MRP3, during fiscal year ("Fiscal Year" or "FY") 2022-2023 which ended on June 30, 2023. (Section 6 Declaration of Farooq Azim ("Azim Decl."), ¶ 12; Declaration of Sandra Mathews ("Mathews Decl."), ¶ 16; Section 7 at S7-0009.) As such, this Test Claim is timely filed.

A. <u>MRP3 New Programs and/or Higher Levels of Service</u>

As the Third District of the Court of Appeal has recently confirmed in *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 559, which involved San Diego County's stormwater permit:

> [T]he application of Section 6 … does not turn on whether the underlying obligation to abate pollution remains the same…. To determine whether a program imposed by the permit is new, we compare the legal requirements imposed

[5] Orders issued by the Regional Water Board such as the MRP are "executive orders" within the meaning of Government Code section 17516 and thus properly subject to test claim proceedings. (*County of Los Angeles v. Commission on State Mandates* (2007) 150 Cal.App.4th 898, 920.)

by the new permit with those in effect before the new permit became effective.

1. New Development and Redevelopment

(a) Road Projects

New Requirements. Provision C.3.b of the MRP3 requires Permittees to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for certain "regulated projects," including the following:

(1) New or widening roads (Provision C.3.b.ii.(4)).

(2) Road reconstruction projects (Provision C.3.b.ii.(5)).

(MRP3 at C.3-8 – 10, Section 7 at S7-0029-0031.)

As the Fact Sheet to the MRP3 concedes, "[w]hile substantial portions of Provision C.3 are the same as during MRP2, the provision includes updated expectations for Regulated Projects, including roads, that are expected to result in additional municipal costs. Those include changes to Regulated Project definitions, including roads." (MRP3 Fact Sheet at A-30, Section 7 at S7-0289.) For new or widening roads, under the MRP3, these requirements apply to "road projects that create 5,000 square feet or more of newly constructed contiguous impervious surface, that are both public and private road projects." (MPR3 at C.3-8, Section 7 at S7-0029.) Under the MRP2, the requirement applied only to "road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface." (MRP2 at C.3.b.ii.(4), Section 7 at S7-1010-1011.) "Road reconstruction projects" was not a regulated category under the MRP2 and, therefore, this is a new program.

The Program's expenditures for complying with new requirements under Provisions C.3.b.ii.(4) and (5) for Fiscal Year 22/23 was $41,419, of which Union City's share was $2,199. These efforts included revising the C.3 Technical Guidance Manual, the preparation of informational factsheets on the changes to regulated projects, a training workshop, and preparing and provision of guidance to member agencies on the new and higher levels of services required by Provisions C.3.b.ii.(4) and C.3.b.ii.(5)). (Mathews Decl., ¶ 9.a.) In addition, the

City attended the Program's New Development Subcommittee meetings in Fiscal Year 22/23 related, in part, to these new requirements for costs that totaled $440. (Azim Decl., ¶ 8.a.) The total Union City Fiscal Year 22/23 costs for complying with new requirements under Provisions C.3.b.ii.(4) and (5) were **$2,639**. (Azim Decl., ¶ 8.a; Mathews Decl., ¶ 10.)

(b) Green Stormwater Infrastructure (GSI)

Modified Higher Levels of Service Requirement. Provision C.3.j.ii.(1)(a)-(g) of the MRP3 requires Permittees to re-evaluate, update and/or supplement their Green Infrastructure Plans (completed under the MRP2) as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned. This includes revising implementation mechanisms; continuing to update related municipal plans; developing funding mechanisms; updating guidance, details and specifications as appropriate; implementing tracking/mapping tools; adopting/amending legal mechanisms as necessary; and conducting outreach and education. (MRP3 at C.3-45 – 47, Section 7 at S7-0066-0068.) To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(1)(a)-(g), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with this new requirement. (Mathews Decl., ¶ 9.i.) In Fiscal Year 22/23, the City commenced the process of updating its Green Infrastructure Plan. (Azim. Decl., ¶ 8.b.)

New Requirement. Provision C.3.j.ii.(4) of the MRP3 requires Permittees to form a regional Technical Working Group to discuss long term GSI goals and recommend long term percentage reductions. (MRP3 at C.3-49, Section 7 at S7-0070.) These are new requirements not included in the MRP2. To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(4), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with this new requirement. (Mathews Decl., ¶ 9.i.)

Modified Higher Levels of Service Requirement. Provision C.3.j.ii.(2)(a)-(j) of the MRP3 requires Permittees to implement, or cause to be implemented, green infrastructure projects within their

jurisdictions which are not already defined as Regulated Projects such that impervious surface numeric retrofits are achieved. (MRP3 at C.3-47 – 49, Section 7 at S7-0068-0070.) These numeric targets were not in the MRP2 and therefore were not required in the .Green Infrastructure Plans completed under the MRP2. The imposition of the numeric targets is new and will require Permittees to implement more retrofit projects in the MRP3 term than would have been required in the MRP2. The Permittees may meet the numeric retrofit requirements on a countywide basis. Though Permittees may meet their total individual numeric retrofit requirements on a countywide basis, each Permittee shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction, where that project is not already defined as a regulated project. *(Id.*at C.3-47, Section 7 at S7-0068.*)* Alternatively, a Permittee may contribute substantially to such a green infrastructure project(s) outside of its jurisdiction and within its County. (*Id.*) The Fact Sheet acknowledges that these new requirements could cost Permittees up to $181 million of additional costs. (MRP3 Fact Sheet at A-28, Section 7 at S7-0287.) To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(2)(a)-(j), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with new requirement. (Mathews Decl., ¶ 9.i.) In Fiscal Year 22/23, the City attended meetings with the Program regarding these Provision C.3 requirements, including municipal staff training. (Azim. Decl., ¶ 8.b.) In Fiscal Year 23/24, the City expects to expend approximately $520,000 in implementing bioretention treatment areas in compliance with this increased requirement which would not have been required under the MRP2. (*Id.*)

The Program's expenditures for complying with the new and higher levels of service requirements under Provisions C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j) for Fiscal Year 22/23 was $5,522, of which Union City's share was $293. (Mathews Decl., ¶ 10.) The City's expenditures for complying with the higher levels of service requirements under Provisions C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j) for Fiscal Year 22/23 was $1,245. (Azim Decl., ¶ 8.b.) The total Union City Fiscal Year 22/23 costs for all the increased programs under Provisions C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j) was **$1,538**. (Azim Decl., ¶ 8.b; Mathews Decl., ¶ 10.)

2. Illicit Discharge Detection and Elimination

New Requirement. Provision C.5.f of the MRP3 requires Permittees to identify information missing from the current MS4 Maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction and condition. (MRP3 at C.5-7, Section 7 at S7-0090.) These are new requirements not included in the MRP2.

The total Union City Fiscal Year 22/23 Union City costs for new Provision C.5 programs was **$117**, which included consulting with the Program regarding this new requirement. (Azim Decl., ¶ 8.c.)

3. Water Quality Monitoring

Modified Higher Levels of Service Requirements. The MPR3 includes the following new water quality monitoring requirements that were not included in the MRP2. The MRP2 included a monitoring program that included creek status monitoring intended to assess the chemical, physical, and biological impacts of urban runoff on receiving waters (MRP2 at Section 7 at S7-1065 *et seq*.); however, the MRP2 did not include the new requirements described below.

Provision C.8.d of the MRP3 now requires Permittees to conduct LID monitoring to measure compliance and effectiveness of LID controls. "The Permittees shall, at the regional or countywide level, develop LID Monitoring Plans to implement the requirements in Provision C.8.d.iii-iv." (MRP3 at C.8-2, Section 7 at S7-0104.) Further, "Permittees shall implement no later than … the approved or conditionally approved LID Monitoring Plans." (*Id*. at C.8-3, Section 7 at S7-0105.) Permittees are required to implement a monitoring program to measure compliance and the effectiveness of LID facilities. This is a wholly new type of monitoring than what was required under the MRP2 which was limited to creek status monitoring. To support this new MRP3 requirement, in Fiscal Year 22/23 the Program collaborated with the other four countywide programs to form and fund the MRP3-required Technical Advisory Group ("TAG") with the necessary expertise related to LID monitoring, developed a regional quality assurance plan, identified monitoring locations, developed a monitoring plan for LID facilities in Alameda County, revised the monitoring and quality assurance plans based on feedback from the

TAG, and submitted the plans to the Regional Water Board. (Mathews Decl., ¶ 9.c.)

Provision C.8.e requires Permittees to collect and analyze the amount of trash discharged from MS4 outfalls to answer the questions of whether (1) Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters, and (2) are discharges of trash from within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters. Specifically, Permittees must:

> (1) [C]ollect and analyze the amount of trash discharged from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system (Provision C.8.e.ii.(1)).
>
> (2) [I]mplement a pilot program to directly (in-stream) sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system (Provision C.8.e.ii.(2)).

(MRP3 at C.8-7 – 13, Section 7 at S7-0109-0115.) Trash monitoring was not included in the Provision C.8 water monitoring program under the MRP2. Thus, this is a wholly new type of monitoring than what was required under the MRP2. Permittees now are required to implement a monitoring program to assess the effectiveness of trash control actions and, evaluate whether areas determined to be controlled are contributing to trash impacts. To support this effort, in Fiscal Year 22/23 the Program collaborated with the other four countywide programs to form and fund a separate MRP3-required TAG (with wholly different expertise than the MRP3-required TAG for the new LID monitoring program described above), developed a regional quality assurance plan, identified trash monitoring locations and developed a monitoring plan for the selected sites in Alameda County, revised the monitoring and quality assurance plans based on feedback from the TAG, and submitted the plans to the Regional Water Board. (Mathews Decl., ¶ 9.c.)

Provision C.8.f requires Permittees to conduct Pollutants of Concern ("POC") monitoring to "assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to assess compliance with receiving water limitations, support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants." (MRP3 at C.8-13 – 21, Section 7 at S7-0115-0123.) POC monitoring with receiving water limitations was not included in the Provision C.8 water monitoring program under the MRP2. Thus, this is additional monitoring than what was required under the MRP2 (see Table 8-1 in the MRP3 which describes the onerous new requirements [MRP3 at Section 7 at S7-0117]). Under this higher level of service requirement, Permittees now are required to implement a monitoring program to assess inputs of select POCs to the Bay from local tributaries and urban runoff. To support its member agencies in complying with this new requirement, in Fiscal Year 22/23 the Program developed and submitted a POC monitoring plan and initiated the required monitoring. (Mathews Decl., ¶ 9.d.)

The total Union City Fiscal Year 22/23 Union City costs for these increased Provision C.8 programs was **$15,374**. (Mathews Decl., ¶ 10.)

4. <u>Trash Load Reduction</u>

(a) Trash Load Reduction Levels

<u>Modified Higher Levels of Service Requirement.</u> The MRP3 requires higher levels of trash load reduction than the MRP2. Permittees are required to implement trash load reduction control actions and demonstrate attainment of trash discharge reduction requirements of 90% by June 30, 2023; and 100% trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025 (Provision C.10.a.i). (MRP3 at C.10-1, Section 7 at S7-0141.) If the 90% benchmark is not attained by June 30, 2023, Permittees must submit revised trash load reduction plan and an implementation schedule of additional trash load reduction control actions to achieve 90% and 100% benchmarks by September 30, 2023. This is a higher level of service than required by the MRP2 which required 70% by July 1, 2017 and 80% by July 1, 2019. (MRP2 at C.10.a(i), Section 7 at S7-1091.) According to the MRP3 Fact Sheet, "Permittees will incur additional costs to proceed from MRP2's required 80 percent reduction

in trash discharges to the Permit's required 100 percent reduction, to be achieved using a combination of measures determined by each Permittee, and consisting of full trash capture, or implementation of a range of controls equivalent to full trash capture…. Statewide, the economic analysis estimates that between $2.93 and $7.77 more per resident might need to be spent each year for the next ten years to implement the proposed Trash Amendments." (MRP3 Fact Sheet at A-31, Section 7 at S7-0290.) To support this higher level of service requirement, in Fiscal Year 22/23 the Program held subcommittee meetings and prepared guidance for members on the new requirements, updates and modifications were made to GIS maps to support members, and GIS-based inspection applications were developed. (Mathews Decl., ¶ 9.e.) The City expended costs on pre-design and planning in Fiscal Year 22/23 associated with this higher level of service requirements. (Azim Decl., ¶ 8.d.)

(b) Private Lands and Trash Generation Map

Modified Higher Levels of Service Requirements. Provision C.10.a.ii of the MRP3 requires that Permittees ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems by July 1, 2025. (MRP3 at C.10-3, Section 7 at S7-0143.) This is a very significant new undertaking for Permittees that was not required under the MRP2. Provision C.10.a.ii of the MRP3 also requires Permittees to submit a revised Trash Generation Area Map by September 30, 2024 that includes trash management areas and private land drainage areas that will be retrofitted with full trash capture devices, or equivalent, by the June 30, 2025 compliance date. (MRP3 at C.10-2, Section 7 at S7-0142.) The MRP2 did require a Trash Generation Map but under the MRP3 those Maps have to be completely redone to depict private land areas that generate trash.

To support these Provision C.10.a.ii higher levels of service requirements, in Fiscal Year 22/23 the Program held subcommittee meetings and prepared guidance for members on the new requirements, updates and modifications were made to GIS maps to support members, and GIS-based inspection applications were developed. (Mathews Decl., ¶ 9.e.) In addition, in Fiscal Year 22/23,

the City attended the Program's Trash Subcommittee meetings and used a consultant to update its Trash Generation Area Map, an activity that continued into Fiscal Year 23/24. (Azim Decl., ¶ 8.d.)

(c) Impracticability Report

New Requirement. Provision C.10.e of the MRP3 requires Permittees to collectively develop a Trash Impracticability Report that includes a process for both evaluating impracticability and implementing partial benefit actions to the maximum extent practicable by March 31, 2023. (MRP3 at C.10-9-10, Section 7 at S7-0149-0150.) The Report was submitted to the Regional Water Board on March 27, 2023. (Mathews Decl., ¶ 9.f.) Further, Provisions C.10.d and C.10.e.iv require Permittees to use an approved Trash Impracticability Report in developing updated Trash Load Reduction Work Plans. (MRP3 at C.10-10, Section 7 at S7-0150.) These are new requirements for which the State acknowledges "Permittees would incur costs to prepare an impracticability report." (MRP3 Fact Sheet at A-32, Section 7 at S7-0291.) The Program worked collaboratively with the four other countywide programs to fund the development of the Trash Impracticability Report. The Trash Impracticability Report was submitted to the Regional Water Board on March 27, 2023. (Mathews Decl., ¶ 9.f.)

For Fiscal Year 22/23, the Program's expenditures for complying with the new and higher levels of service requirements under Provisions C.10.a. as described above was $52,362, of which Union City's share was $2,780. (Mathews Decl., ¶ 10.) For Fiscal Year 22/23, the Program's expenditures for complying with the new requirements under Provisions C.10.e. as described above was $11,977, of which Union City's share was $636. (*Id.*) For Fiscal Year 22/23, the City's expenditures for complying with the new and higher levels of service requirements under Provisions C.10.a. as described above was $18,348. (Azim Decl., ¶ 8.e.) The total Union City Fiscal Year 22/23 costs for all the increased programs under Provisions C.10.e was $265. (Azim Decl., ¶ 8.e.; Mathews Decl., ¶ 10.) The total Union City Fiscal Year 22/23 costs for new Provision C.10.a and C.10.e programs was **$22,029**. (Azim Decl., ¶ 8.d; Mathews Decl., ¶ 10.)

5. Mercury and PCBs Controls

(a) Old Industrial Land

Modified Higher Levels of Service Requirements. Provision C.11.c of the MRP3 requires Permittees to implement or cause to be implemented stormwater control measures to treat old industrial land use at 70% efficiency, or by demonstrating an equivalent mercury load reduction. (MRP3 at C.11-4 – 6, Section 7 at S7-0159-0161.) Additionally, Provision C.12.c of the MRP3 requires Permittees to implement or cause to be implemented treatment control measures to treat old industrial land use at 70% efficiency, or by demonstrating an equivalent PCBs load reduction. These are new requirements than required by the MRP2 which did not require implement stormwater control measures to treat old industrial land. The Fact Sheet for the MRP3 notes that Permittees implement GSI retrofit to achieve mercury and PCBs reductions and the increased cost of achieving such reductions may be up to $2 billion. (MRP3 Fact Sheet at A-34 – 35, Section 7 at S7-0293-0294.) To support these increased requirements, in Fiscal Year 22/23 the Program developed the Old Industrial Area Control Measure Plan that included plans and schedules for implementing the required control measures. The Plan was submitted in March 2023. Subsequent to submittal, the Program members and consultants met with Regional Water Board staff and planned revisions to the plan, which are due in March 2024. (Mathews Decl., ¶ 9.g.) Additionally, in Fiscal Year 22/23, the City engaged in planning activities with the Program regarding these increased Provision C.11.c and C.12.c requirements. (Azim Decl., ¶ 8.e.)

For Fiscal Year 22/23, the Program's expenditures for complying with the higher levels of service requirements under Provisions C.11.c and C.12.c. as described above was $59,430, of which Union City's share was $3,156. (Mathews Decl., ¶ 10.) For Fiscal Year 22/23, the City's expenditures for complying with the higher levels of service requirements under Provisions C.11.c and C.12.c. as described above was $331. (Azim Decl., ¶ 8.e.) The total Union City Fiscal Year 22/23 costs for the higher levels of service requirements under Provisions C.11.c and C.12.c. as described above was **$3,487**. (Azim Decl., ¶ 8.e; Mathews Decl., ¶ 10.))

(b) Quantify and Report PCBs Load Reductions

Modified Higher Levels of Service Requirement. Provision C.12.a of the MRP3 requires Permittees to quantify and report the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures and submit documentation annually confirming that all control measures effectuated during the previous Permit term for which PCB load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction. The MRP3 requires annual assessment of loads reduced with documentation of the implementation level to justify the method (credits). This is a higher level of effort than MRP2 requirements which did not have this requirement and results in additional costs. Further, two additional requirements in this provision are new: a cumulative report loads reduced and refinements to the assessment methodology. To support member agencies' compliance with this increased requirement, the Program consultants tracked and analyzed data on control measure implementation to calculate loads reduced. (Mathews Decl., ¶ 9.h.)

The Union City Fiscal Year 22/23 costs for increased requirements under Provision C.12.a program were **$351** (Mathews Decl., ¶ 10.)

6. Exempted and Conditionally Exempted Discharges

New Requirement. Provision C.15.b.iii. of the MRP3 requires Permittees to collectively convene a regionwide Firefighting Discharges Working Group with Water Board staff and other stakeholders to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting water and foam. (MRP3 at C.15-6 – 7, Section 7 at S7-0209-0210.) This is a new requirement that was not in the MRP2, which only required Permittees to implement or require firefighting personnel to implement BMPs for emergency discharges of potable water. (MRP2 at C.15.b.iii, Section 7 at S7-1131-1132.)

The Union City Fiscal Year 22/23 Union City costs for new Provision C.15.b.iii. programs were **$280**. (Mathews Decl., ¶ 10.)

7. Discharges Associated with Unsheltered Homeless Populations

New Requirement. Provision C.17.a of the MRP3 requires Permittees to collectively develop and submit a best management practice report that identifies practices to address non-storm water discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges. (MRP3 at C.17-1 – 3, Section 7 at S7-0218-0220.) Provision C.17.a of the MRP3 also requires Permittees to report on the programmatic efforts being implemented within Permittee's jurisdiction, or at the countywide or regional level, to address MS4 discharges associated with homelessness. (*Id.*) The MRP3 Fact Sheet acknowledges these are new programs. (MRP3 Fact Sheet at A-38, Section 7 at S7-0297.)

Permittees are required to develop and submit a regional best management practice report to identify control measures to address non-stormwater discharges associated with unsheltered homeless populations and identify milestones to reduce such discharges. To meet this new MRP3 requirement, the Program collaborated with the other four countywide programs on a regional project to develop the required best management practice report, which was submitted with each Permittee's Fiscal Year 22/23 annual report. (Mathews Decl., ¶9.j.) Additionally, each Permittee is required to submit a map identifying, the approximate locations of unsheltered homeless populations, including encampments and other areas where other unsheltered homeless people live relative to storm drains, creeks, and flood control channels. To support its members, the Program worked with County officials to obtain the required geo-located point in time count data, developed an approach for creating the maps, and updated its GIS system to produce the required maps for each of its members. (*Id.*) The City submitted the maps with its Fiscal Year 22/23 annual report.

The Union City Fiscal Year 22/23 Union City costs for new Provision C.17 programs were **$2,455**. (Mathews Decl., ¶ 10; Azim Decl., ¶ 8.g.)

8. Cost Reporting

New Requirement. Provision C.20.b of the MRP3 requires Permittees to develop a cost reporting framework and methodology to perform an annual fiscal analysis. Permittees are encouraged to

collaboratively develop the framework and methodology for purposes of efficiency, cost-savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with the Permit's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time. (MRP3 at C.20-1 – 2, Section 7 at S7-0238-0239.) The MRP3 Fact Sheet acknowledges these are wholly new programs and Permittees "are expected to incur costs to collectively develop the methodology and then to implement it." (MRP3 Fact Sheet at A-38 – 39, Section 7 at S7-0297-0298.) To meet this new requirement, the Program collaborated with the other four countywide programs on a regional project to develop the cost reporting framework and methodology, which was submitted on June 26, 2023. (Mathews Decl., ¶ 9.k.) Updates to the cost reporting framework and methodology based on Regional Water Board comments are in process. The Program will additionally provide training for its members on the use of the cost reporting framework and methodology. (*Id.*)

The Union City Fiscal Year 22/23 Union City costs for new Provision C.20 programs were **$2,878**. (Mathews Decl., ¶ 10.)

9. <u>Asset Management</u>

<u>New Requirement.</u> Provision C.21.b of the MRP3 requires Permittees to Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of Permittees' inventoried hard assets over the next 50 years, and identify approaches that Permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale. (MRP3 at C.21-1 – 2, Section 7 at S7-0240-0241.) The MRP3 Fact Sheet acknowledges these are wholly new programs and that will result in additional costs. (MRP3 Fact Sheet at A-38, 40, Section 7 at S7-0297, 0299.) Permittees are required to develop and implement an asset management plan to ensure the satisfactory condition of all hard assets constructed during MRP3 and the pervious permit terms pursuant to provisions C.2, C.3, C.10, C.11, C.12, C.13, and C.17.

Mathews Decl., ¶9.l.) Additionally, Permittees are required to develop and submit a climate change adaptation report to identify potential climate change-related threats to assets and appropriate adaptation strategies. To help Permittees meet these new requirements the Program initiated work on a framework to guide the development of the asset management plans by individual members. (*Id.*)

The Union City Fiscal Year 22/23 Union City costs for new Provision C.21.b programs were **$469**. (Mathews Decl., ¶ 10.)

10. Total Amount of Increased Costs for New Programs or Higher Levels of Service in MP3 for Fiscal Year 22/23

As set forth in the Azim Declaration at Paragraph 8 and in the Mathews Declaration at Paragraph 10, the total amount of Union City's increased costs for Fiscal Year 22/23 for the new programs or higher levels of service for MRP3 Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b was **$51,619.**

B. Continuing MRP1 and MRP2 Test Claim Programs

The following are programs in the pending MRP1 and MRP2 Test Claims which are continuing in the MRP3 term and for which Permittees have incurred costs in the MRP3 term. As explained above, out of an abundance of caution, the City is seeking reimbursement in this Test Claim for the continuation of costs that are already before the Commission in Consolidated Test Claims 10-TC-02, 10-TC-03, regarding the MRP1, and Test Claim 16-TC-03, regarding the MRP2. To avoid unnecessary duplication, Union City hereby incorporates by this reference all of the portions of the record in these MRP1 and MRP2 proceedings regarding these continuing mandates in the MRP3. As noted above, these proceedings are pending before the Commission.

1. Continuing Water Quality Monitoring

Permittees were required to implement a number of water quality monitoring programs under Provision C.8. These requirements are discussed in Claimant's MRP1 Test Claim, which is currently pending. Permittees continue to incur costs necessary to comply with

these provisions. The Program's expenditures for complying with the continuing Provision C.8 programs in Fiscal Year 22/23 were $203,255, and Union City's share of those costs was **$11,107**. (Mathews Decl., ¶ 10.)

2. Continuing Trash Capture Maintenance

Provision C.10.b. of the MRP2 required Permittees to "maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system." (MRP2 at C.10.b, Section 7 at S7-1093-1096.) This provision specified detailed full trash capture system installation and maintenance instructions. Provision C.10.b. in the MRP2 required increased activities by Union City that are best characterized as a higher level of service in comparison to the MRP1. The MRP3 continues these requirements. (MRP3 at C.10-3 *et seq*., Section 7 at S7-0143–0148.) These requirements were first raised in the Test Claim for the MRP1 (Consolidated Test Claims 10-TC-02, 10-TC-03 and 10-TC-05, which are pending before the Commission) and were continued or increased in the MRP2 Permit Term (Test Claim 16-TC-03, which is pending before the Commission).

For Fiscal Year 22/23, the total Union City Costs for these continuing programs were **$217,017**. (Mathews Decl., ¶ 10; Azim Decl., ¶ 9.)

3. Mercury and PCBs Control

Provision C.11.b. of the MRP2 required Permittees to "develop and implement an assessment methodology and data collection program to quantify in a technically sound manner mercury loads reduced through implementation of pollution prevention, source control and treatment control measures" required by the provisions of the Permit or load reductions achieved through other relevant efforts. (MRP2 at C.11.b, Section 7 at S7-1102-1103.) This program is continuing under Provision C.11.a. of the MRP3. (MRP3 at C.11-1 – 2, Section 7 at S7-0156-0157.) These requirements were first raised in the Test Claim for the MRP2 (Test Claim 16-TC-03, which is pending before the Commission).

Provision C.11.c. of the MRP2 required Permittees to implement green infrastructure projects during the term of the permit to achieve mercury load reductions of 48 g/year by June 30, 2020. (MRP2 at C.11.c, Section 7 at S7-1103-1105.) Provision C.11.e of the MRP3 requires Permittees to "implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j." (MRP3 at C.11-6 – 7, Section 7 at S7-0161-0162.) These requirements were first raised in the Test Claim for the MRP2 (Test Claim 16-TC-03, which is pending before the Commission).

Provision C.12.c. of the MRP2 required Permittees to "implement green infrastructure projects during the term of the Permit to achieve PCBs load reductions" of 120 g/year by June 30, 2020. (MRP2 at C.12.c, Section 7 at S7-1110-1112.) Provision C.12.f of the MRP3 requires Permittees to "implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j." (MRP3 at C.12-8, Section 7 at S7-0172.) These requirements were first raised in the Test Claim for the MRP2 (Test Claim 16-TC-03, which is pending before the Commission).

Provision C.12.d. of the MRP2 required Permittees to "prepare a plan and schedule for PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030." (MRP2 at C.12.d, Section 7 at S7-1113.) In 2020, Permittees submitted a Reasonable Assurance Analysis and plan ("RAA") demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030. Provision C.12.h of the MRP3 requires Permittees to "update, as necessary, their PCBs control measures implementation plan and RAA." (MRP3 at C.12-11 – 12, Section 7 at S7-0175-0176.) These requirements were first raised in the Test Claim for the MRP2 (Test Claim 16-TC-03, which is pending before the Commission).

For Fiscal Year 22/23, the total Union City Costs for these continuing programs was **$66,489.** (Mathews Decl., ¶ 10; Azim Decl., ¶ 9.)

V. CLAIMANT COST ESTIMATE OF INCREASED COSTS FOR FISCAL YEAR 2023/2024

Government Code section 17553, subdivision (b)(1)(D), requires the actual or estimated annual costs that will be incurred by the claimant to implement the alleged mandate during the fiscal year immediately following the fiscal year for which the claim was filed. For Fiscal Year 2023/2024,[6] the total estimated Union City costs for new or increased programs under MRP3 Provisions C.3.b.ii.(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b are as follows:[7]

Task	Estimated Union City FY 23/24 Costs	Union City Share of FY 23/24 Program Costs (5.31%)	Total Estimated Union City FY 23/24 Costs
MPR3 New or Increased Programs	$803,415	$49,334	**$852,749**

(Azim Decl., ¶ 8; Mathews Decl., ¶ 13.)

VI. STATEWIDE COST ESTIMATE OF INCREASED COSTS FOR FISCAL YEAR 2023/2024

Government Code section 17553, subdivision (b)(1)(E), requires a statewide cost estimate of increased costs that all local agencies incurred or will incur to implement the alleged mandate during the fiscal year immediately following the fiscal year for which the claim was filed. Since this Test Claim is based on the MRP3, the statewide impact of the permit is limited to those Bay Area jurisdictions that are subject to the MRP3. Neither Union City nor the Program has access

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[6] Fiscal Year 22/23 is the fiscal year for which the claim was filed. Fiscal Year 23/24 is the fiscal year immediately following the fiscal year for which the claim was filed.

[7] As Fiscal Year 23/24 is ongoing through June 30, 2024, the costs provided are estimates.

to detailed cost information for each jurisdiction subject to the MRP3. As explained in the attached Mathews Declaration, the City has used its own cost information and population size, combined with information available to the Program, to project estimated cost impacts for all jurisdictions subject to the MRP3. For Fiscal year 2023/2024, the estimated statewide costs are as follows:

	Total Estimated FY 23/24 Union City Costs	**Estimated FY 23/24 Statewide Costs (80 x Union City)**
MPR3 New or Increased Programs	**$852,749**	**$68,200,880**

(Mathews Decl., ¶ 15.) Thus, in compliance with Government Code section 17553(b)(1)(E), the total estimated amount of statewide costs (i.e., the statewide cost estimate of increased costs that all local agencies will incur to implement the new programs and higher levels of service) for Fiscal Year 23/24 for the new programs and higher levels of service in the MRP3 is **$68,200,880**.

VII. DATES ON WHICH COSTS WERE FIRST INCURRED AFTER THE EFFECTIVE PERIOD

All costs were incurred after July 1, 2022, the effective date of the MRP3. (Azim Decl., ¶ 12; Mathews Decl., ¶ 16; Section 7 at S7-0009.) The start of MRP3 coincided with the start of the Program's fiscal year, July 1, 2022, which is the same date that consultant invoices indicate incurred costs as a result of implementing the new activities and modified existing activities mandated by MRP3. (Mathews Decl., ¶ 16.)

VIII. IDENTIFICATION OF FUNDING SOURCES

Government Code section 17553, subdivision (b)(1)(F), requires the City to identify available funding sources for these MRP3 programs. Union City is not aware of any dedicated state, federal or non-local agency funds that are or will be available to fund the MRP3 new activities at issue in this Test Claim. The City has a Clean Water Fund, which obtains revenue from property tax assessments, and is supplanted by the General Funds. The salaries and benefits identified in the Azim Declaration in Section 6 are paid from general funds which include the City's General Fund and the Clean Water Fund. The other

costs identified in the Azim Declaration in Section 6 are funded by the City's General Fund and the Clean Water Fund. The City's share of the Program's costs identified in the Mathews Declaration in Section 6 are funded by the Clean Water Fund. The City has no fee authority to increase these revenue sources without seeking voter approval under Proposition 218. Thus, the City does not have authority to increase these fees – only the voters have that authority.[8] Further, the City is not confident that it will be able to avail itself of future grant opportunities. The City has no grant applications pending for the stormwater program. Furthermore, multiple jurisdictions must compete for limited funding sources, creating stiff competition among municipalities. (See Azim Decl., ¶¶ 12-14.)

IX. PRIOR MANDATE DETERMINATIONS

Government Code section 17553, subdivision (b)(1)(G), requires Test Claimants to identify prior mandate determinations that may be related to the mandates at issue. The Commission's July 31, 2009, Statement of Decision in Test Claim Nos. 03-TC-04, 03-TC-19, 03-TC-20 and 03-TC-21 (*Los Angeles Regional Water Quality Control Board Order No. 01-182*), the Commission's March 26, 2010, Statement of Decision in Test Claim No. 07-TC-09 (*San Diego Regional Water Quality Control Board Order No. R9-2007-0001*) and the Commission's March 24, 2023, adoption of the proposed decision regarding Test Claim 09-TC-03 (*Santa Ana Regional Water Quality Control Board Order No. R8-2009-0030*), include analyses that are related to the mandates at issue in Union City's Test Claim.

X. NO LEGISLATIVELY DETERMINED MANDATE APPLICABLE TO THE MRP3

Under Government Code section 17573, the Department of Finance and a local agency association may jointly request of the chairpersons of the committees in each house of the Legislature that consider appropriations, and the chairpersons of the committees and appropriate subcommittees in each house of the Legislature that

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[8] See *Howard Jarvis Taxpayers Association v. City of Salinas* (2002) 98 Cal.App.4th 1351, holding that a stormwater fee was a property related fee governed by Article XIII D of the California Constitution and that such a fee could not be imposed unless it was approved by the voters.

consider the State Budget, that the Legislature determine that a statute or executive order, or portion thereof, mandates a new program or higher level of service requiring reimbursement of local governments. There is no legislatively determined mandate applicable to the MRP3 and this Test Claim.

XI. NO DUPLICATE TEST CLAIM

This Test Claim is the first filed test claim for the following MRP3 Provisions as set forth herein: Provisions C.3.b.ii.(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b. (Govt. Code § 17521.) According to the Commission's October 11, 2023, Notice of Duplicate and Incomplete Test Claim ("Notice"), Union City's Test Claim is the first filed Test Claim related to these MRP3 provisions and therefore nothing additional needs to be included herein related to this aspect of the Notice.

XII. CONCLUSION

For the reasons set forth in this Test Claim package, Union City respectfully requests that the Commission approve the City's Test Claim.

5720994.1

6. DECLARATIONS

IN SUPPORT OF UNION CITY TEST CLAIM

IN RE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

ORDER NO. R2-2022-0018
AS MODIFIED BY ORDER NO. R2-2023-0019
NPDES PERMIT NO. CAS612008
MAY 11, 2022

DECLARATION OF FAROOQ AZIM IN SUPPORT OF TEST CLAIM

I, FAROOQ AZIM, declare as follows:

1. I make this declaration in support of the Test Claim submitted by the City of Union City ("Union City" or "City") to the Commission on State Mandates. Except where otherwise indicated, the facts set forth below are of my own personal knowledge and, if called upon to testify, I could and would competently testify to the matters set forth herein.

2. I have received the following credentials: In 1981, I received a Bachelor of Science degree in Civil Engineering from the Mapua Institute of Technology, Manila, Philippines. In 1982, I received a Bachelor of Science degree in Engineering (BSE), with concentration in Civil Engineering from Indiana Institute of Technology, Fort Wayne, IN. In 1985, I received a Master of Science in Civil Engineering (MSCE), specializing in Geotechnical (Soils and Foundation) Engineering. In 2005, I received a Master of Business Administration (MBA), with concentration in Finance from California State University, East Bay. In 1995, I received a Professional Engineer License from the California Board for Professional Engineers, Land Surveyors, and Geologists.

3. I am employed by the City as the City Engineer. I was appointed by the City Manager and have held this position since 2018. I supervise a staff of six, consisting of three Inspectors and three Engineers. I am responsible for designing, managing, and implementing all aspects (e.g., sampling, design, field work, analytical analysis, quality control, data management, O&M reports, interpretation and reporting) of water quality monitoring and other compliance actions required by regional municipal stormwater National Pollutant Discharge Elimination System ("NPDES") permits issued to the City.

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4. I have a total of 34 years of experience as a civil engineer. I started my civil engineering career with W.H. Gordon Associates in Reston, VA, a suburb of Washington DC, where I designed and reviewed new development projects, including housing tract developments. My second job was with a private Geotechnical Engineering firm in Pleasanton, CA. I joined the City in 1991 as a junior engineer (Engineer I) and was introduced to municipal engineering. I have been promoted since then and have been the City Engineer since 2018. I have been involved with various aspects of municipal engineering including the capital improvement program ("CIP") and the Land Development aspect of municipal engineering, which includes the review and approval of all new private developments in the City, including the storm water aspects of new development. I have also been attending a variety of Alameda Countywide Clean Water Program ("Program") meetings, including representing the City at various quarterly meetings which are attended by all member agencies of the Program, for more than 10 years.

5. Union City is subject to the Municipal Regional Stormwater ("MRP") NPDES Permit, issued by the California Regional Water Quality Control Board, San Francisco Bay Region ("Regional Board"), Order No. R2-2022-0018 (NPDES Permit No. CAS612008), issued by the Regional Board on May 11, 2022 ("MRP3" [Section. 7 p. S7-0002]) with an effective date of July 1, 2022, and amended on October 11, 2023. I have reviewed the MRP3 and am familiar with its requirements.

6. I have also reviewed and am familiar with the requirements of Order No. R2-2015-0049 (NPDES Permit No. CAS612008), issued by the Regional Board on November 19, 2015 ("MRP2" [Section 7 p. S7-0992]), under which the City was a Permittee, and with Order No. R2-2009-0074 (NPDES Permit No. CAS612008) issued by the Regional Board on October 14, 2009,

amended by Order No. R2-2011-0083 on November 28, 2011 ("MRP1" [Section 7 p. S7-1352]), under which the City was a Permittee.

7. Based on my understanding of the MRP2 and the MRP3, I believe the MRP3 requires Permittees, including Union City, to perform new activities that are unique to local governmental entities that were not required by the MRP2.

8. The MRP3's new activities and higher levels of service include the following. The City's actual costs for FY 22/23 are identified herein; the City's actual share of Program costs for FY 22/23 are identified in the Declaration of Sandra Mathews in support of this Test Claim ("Mathews Declaration). The costs herein for FY 22/23 are actual for the entire FY 22/23. The estimated costs for FY 23/34 herein, which ends on June 30, 2024, and therefore is ongoing, are estimated based on activities to-date and anticipated activities. Unless otherwise noted, the employee rates provided below are rounded to the nearest dollar and are based on my discussions with Jackie Acosta, Finance Director for Union City, which were developed based on salaries plus benefits.

(a) New Development and Redevelopment.

i. New Requirements. Provision C.3.b of the MRP3 requires Permittees to implement low impact development ("LID") source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for certain "regulated projects," including the following:

(1) New or widening roads (Provision C.3.b.ii.(4)).

FY 22/23 Actual Costs: Applicable Regulated Projects are unknown at this time. Union City attended the Program's New Development Subcommittee meetings in FY 22/23. There were four 2-hour quarterly meetings in FY 22/23, with approximately 1/8 of the time spent on Provision C.3.b.ii.(4).

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FY22/23 Provision C.3.b.ii.(4) Actual Costs			
Person	**Time (Hours)**	**FY22/23 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	1	$117	$117
Tommy Cho (Principal Civil Engineer)	1	$103	$103
TOTAL			**$**220

FY 23/24 Estimated Costs: Applicable Regulated Projects are unknown at this time. Union City has attended and will attend the Program's New Development Subcommittee meetings in FY 23/24. It is anticipated there will be four 2-hour quarterly meetings in FY 23/24, with approximately 1/8 of the time spent on Provision C.3.b.ii.(4).

FY23/24 Provision C.3.b.ii.(4) Estimated Costs			
Person	**Time (Hours)**	**FY23/34 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	1	$129	$129
Tommy Cho (Principal Civil Engineer)	1	$111	$111
TOTAL			**$240**

(2) Road reconstruction projects (Provision C.3.b.ii.(5)).

FY 22/23 Actual Costs: Applicable Regulated Projects are unknown at this time. Union City attended the Program's New Development Subcommittee meetings in FY 22/23. There were four 2-hour quarterly meetings in FY 22/23, with approximately 1/8 of the time spent on Provision C.3.b.ii.(5).

FY22/23 C.3.b.ii.(5) Actual Costs			
Person	**Time (Hours)**	**FY22/23 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	1	$117	$117
Tommy Cho (Principal Civil Engineer)	1	$103	$103
TOTAL			**$220**

FY 23/24 Estimated Costs: Applicable Regulated Projects are unknown at this time. Union City has attended and will attend the Program's New Development Subcommittee meetings in FY 23/24. It is anticipated there will

be four 2-hour quarterly meetings in FY 23/24, with approximately 1/8 of the time spent on Provision C.3.b.ii.(5).

FY23/24 C.3.b.ii.(5) Estimated Costs			
Person	**Time (Hours)**	**FY 23/24 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	1	$129	$129
Tommy Cho (Principal Civil Engineer)	1	$111	$111
TOTAL			**$240**

(b) Green Stormwater Infrastructure (GSI)

i. Modified Higher Levels of Service Requirements.

Provision C.3.j.ii.(1)(a)-(g) of the MRP3 requires Permittees to update and/or supplement their Green Infrastructure Plans as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned. This includes revising implementation mechanisms; continuing to update related municipal plans; developing funding mechanisms; updating guidance, details and specifications as appropriate; implementing tracking/mapping tools; and adopting/amending legal mechanisms as necessary.

FY22/23 Actual Costs: I contacted HDR Consultants in June 2023 requesting it provide a quote to update the Green Infrastructure Plan that HDR had prepared in 2019. We discussed the need and scope for the Plan and exchanged emails and engaged in telephone conversations.

FY22/23 Provision C.3.j.ii.(1)(a)-(g) Actual Costs			
Person	**Time (Hours)**	**FY22/23 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	2	$117	$234
TOTAL			**$234**

FY 23/24 Estimated Costs: The HDR proposal was received in July 2023 and was reviewed by me. Given the relatively large amount of the HDR proposal, it was determined that the City would have to go through the request for proposal (RFP) process which would allow other prospective consultants to

provide a proposal for this task. I do not anticipate this activity to occur in FY 23/24, however.

FY23/24 Provision C.3.j.ii.(1)(a)-(g) Costs		
Activity: Update and/or supplement their Green Infrastructure Plans		
Person	**Hours x FY23/24 Rate**	**Rate/Hour**
Farooq Azim (City Engineer)	18 x 129	$2,222
TOTAL		**$2,322**

ii. Modified Higher Level of Service Requirements.

Provision C.3.j.ii.(2)(a)-(j) of the MRP3 requires Permittees to implement, or cause to be implemented, green infrastructure projects within their jurisdictions which are not already defined as Regulated Projects. The Permittees may meet the numeric retrofit requirements on a countywide basis. Though Permittees may meet their total individual numeric retrofit requirements on a countywide basis, each Permittee shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction, where that project is not already defined as a Regulated Project. Alternatively, a Permittee may contribute substantially to such a green infrastructure project(s) outside of its jurisdiction and within its County.

FY 22/23 Actual Costs: The City has attended meetings with the Program regarding these Provision C.3.j.ii.(2)(a)-(j) requirements, including municipal staff training, and incurred the following costs implementing C.3.j.ii.(2)(a)-(j) programs in FY 22/23.

FY 22/23 Actual Costs C.3.j.ii.(2)(a)-(j)			
Person	**Time (Hours)**	**FY22/23 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	6	$117	$702
Tommy Cho (Principal Civil Engineer)	3	$103	$309
TOTAL			**$1,011**

Although the Second Incomplete Letter states "no fiscal year 2023-2024 costs are provided" (p. 10), those estimate costs are provided in the next table.

FY 23/24 Estimated Costs: Union City has attended and will attend the Program's New Development Subcommittee meetings in FY 23/24. It is anticipated there will be four 2-hour quarterly meetings in FY 23/24, with approximately 1/4 of the time spent on Provision C.3.j.ii.(2)(a)-(j) . Additionally, the Union City Bike Lane Improvement Project includes approximately 2.5 miles of improvements on Union City Blvd. from Smith Street to the southern City limits. Union City Blvd., a major arterial, has two traffic lanes in each direction. The project involves widening the roadway by reducing the existing median to accommodate the installation of bicycle lanes alongside the existing two traffic lanes. The MRP3 mandates municipalities to meet the numeric retrofit requirements listed in Table H-1 of Attachment H in the MRP3. Union City, in compliance with this, is required to implement green infrastructure to treat a total of 4.45 acres throughout the City. The City has chosen to incorporate stormwater treatment into the Bike Lane Improvement Project to meet the numeric retrofit requirements. A total of 12 landscaping areas were identified for bioretention installation in the project, providing a total of 6,970 square feet to treat roughly 4.16 acres of impervious area. The estimated total cost for implementing these bioretention treatment areas is approximately $520,000 which includes the design and construction management. These costs are expected to be incurred in FY23/24.

Additionally, the Program recently initiated an Alternative Compliance and Numeric GSI Target workgroup to develop approaches for Permittees to meet the C.3.j numeric targets. In addition to the costs below, the City may incur additional costs is FY 23/24 participating in these meetings.

/ / /

Y23/24 Provisions C.3.j.ii.(2)(a)-(j) Estimated Costs			
Program Meeting Attendance			
Person	**Time (Hours)**	**FY23/24 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	2	$129	$258
Tommy Cho (Principal Civil Engineer)	2	$111	$222
Provision C.3.j.ii.(2)(a)-(j) Retrofits			**520,000**
TOTAL			**$520,480**

(c) Illicit Discharge Detection and Elimination.

i. New Requirements. Provision C.5.f of the MRP3 requires Permittees to identify information missing from the current municipal separate storm sewer systems ("MS4") maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition. I have analyzed and coordinated with Sandra Mathews, consultant for the Program, to discuss the implementation of this requirement. In FY22/23, I spent a total of one hour for such coordination at a cost of **$117** per hour; therefore, these are the actual costs for Provision C.5.f for FY 22/23. For FY23/24, I estimate spending additional time to identify what maps are available, what information is missing and work to fill in gaps in information.

FY23/24 Provision C.5.f Estimated Costs			
Person	**Time (Hours)**	**FY 23/24 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	10	$117	$1,170
Eddie Yu (Principal Civil Engineer)	70	$78	$5,460
TOTAL			**$6,630**

(d) Trash Load Reduction

i. Modified Higher Levels of Service Requirements.

(1) The MRP3 requires Permittees to implement trash load reduction control actions and demonstrate attainment of trash discharge reduction requirements of 90% by June 30, 2023; and 100% trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025 (Provision C.10.a.i.).

FY 22/23 Actual Costs: The City expended the following costs on pre-design and planning in FY 22/23 associated with these higher level of service requirements:

FY 22/23 Provision C.10.a.i. Actual Costs			
Person/Activity	**Time (Hours)**	**FY 22/23 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	10	$117	$1,170
Eddie Yu (Civil Engineer II)	15	$78	$1,170
TOTAL			**$2,340**

FY 23/24 Estimated Costs: Union City anticipates expending costs to develop a bid package to install trash capture devices ("TCDs") to meet the increased trash load reduction benchmarks. Additionally, the engineer's estimate for installation of the TCDs is $250,000 for FY 23/24 (this is 1/4 of estimated costs for purchase and installation of new TCDs to comply with this requirement which the City anticipates will take four years to complete). Additionally, I anticipate staff costs to include working with a consultant to finalize a report regarding the effort needed to achieve 100% load reduction, staff support for installation of TCDs and work with City attorney office to explore ability to install TCDs on private property (see Provision C.10.a.ii, discussed below).

FY23/24 Provision C.10.a.i. Estimated Costs			
Develop Bid Package			
Staff Costs	**Time (Hours)**	**FY23/24 Rate/Hour**	**Cost**
Eddie Yu (Civil Engineer II)	80	78	$6,240

Install TCDs			
Install TCDs to meet new benchmarks under Provision C.10.a.i.			$250,000
TOTAL			**$256,240**

(2) If 90% benchmark is not attained by June 30, 2023, submit revised trash load reduction plan and implementation schedule of additional trash load reduction control actions to achieve 90% and 100% benchmarks by June 30, 2023 and June 30, 2025 (Provision C.10.a.i.).

FY 22/23 Actual Costs: The City used consultant Schaaf & Wheeler to perform this activity as the benchmark was not achieved. The following costs in FY 22/23 are associated with this requirement.

FY 22/23 Provision C.10.a.i. Actual Costs			
Consultant/Person	**Time (Hours)**	**FY22/23 Rate/Hour**	**Cost**
Schaaf & Wheeler (Exhibit 1)	n/a	n/a	$13,458[1]
Farooq Azim (City Engineer)	10	$117	$1,170
Eddie Yu (Civil Engineer II)	15	$78	$1,170
TOTAL			**$15,798**

FY 23/24 Costs: The City paid the remainder of the Schaaf & Wheeler contract in FY 23/24.

FY Provision C.10.a.i. 23/24 Costs			
Consultant			**Cost**
Schaaf & Wheeler (Exhibit 1)	n/a	n/a	$16,452
TOTAL			**$16,452**

(3) New Requirements. Provision C.10.a.ii requires that Permittees ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with

[1] The Schaaf & Wheeler contract amount is for $29,910. The remainder was paid in FY 23/24.

trash discharge control actions equivalent to or better than full trash capture systems by July 1, 2025.

FY 22/23 Actual Costs: City staff attended the Program's Trash Subcommittee meetings in FY 22/23. There were four 2-hour quarterly meetings in FY 22/23, with approximately 12.5% of time spent on Provision C.10.a (or 1 hour).

FY22/23 Provision C.10.a.ii Actual Costs			
Person	**Time (Hours)**	**FY 22/23 Rate/Hour**	**Cost**
Mark Camfield (Public Works Superintendent)	1	$117	$117
Paul Roman (Streets Supervisor)	1	$93	$93
TOTAL			**$210**

FY 23/24 Estimated Costs: To date in FY 23/24, Union City has not attended the Program's Trash Subcommittee meetings, but I anticipate there will be two additional 2-hour quarterly meetings in FY 23/24, with approximately 12.5% of the time spent on Provision C.10.a.ii.

FY23/24 Provision C.10.a.ii Estimated Costs			
Person	**Time (Hours)**	**FY 23/24 Rate/Hour**	**Cost**
Public Works Superintendent	0.5	$117	$59
Paul Roman (Streets Supervisor	0.5	$93	$47
TOTAL			**$106**

ii. New Requirements. Provision C.10.e of the MRP3 requires Permittees to:

(1) Use an approved Trash Impracticability Report in developing updated Trash Load Reduction Work Plans (Provisions C.10.d, C.10.e.iv).

FY 22/23 Actual Costs: The City engaged in planning activities with the Program regarding the new Provision C.10.e requirements. Additionally, City staff attended the Program's Trash Subcommittee meetings in FY 22/23.

There were four 2-hour quarterly meetings in FY 22/23, with approximately 12.5% of time spent on Provision C.10.e (or 1 hour).

FY 22/23 Provision C.10.e Actual Costs			
Person	**Time (Hours)**	**Fy22/23 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	0.25	$117	$29
Tommy Cho (Principal Civil Engineer)	0.25	$103	$26
Mark Camfield (Meeting Attendance)	1	$117	$117
Paul Roman (Meeting Attendance)	1	$93	$93
TOTAL			**$265**

FY 23/24 Estimated Costs: To date in FY 23/24, Union City has not attended the Program's Trash Subcommittee meetings, but I anticipate there will be two additional 2-hour quarterly meetings in FY 23/24, with approximately 12.5% of the time spent on Provision C.10.e.

FY23/24 Provision C.10.e Estimated Costs			
Person	**Time (Hours)**	**FY23/24 Rate/Hour**	**Cost**
Public Works Superintendent	0.5	$117	$59
Paul Roman (Streets Supervisor)	0.5	$93	$47
TOTAL			**$106**

(e) Mercury Controls

i. Modified Higher Levels of Service Requirements.

Provision C.11.c of the MRP3 requires Permittees to implement or cause to be implemented treatment control measures to treat old industrial land use at 70% efficiency, or by demonstrating an equivalent mercury load reduction.

(f) PCB Controls

i. Modified Higher Levels of Service Requirements.

Provision C.12.a of the MRP3 requires Permittees to quantify the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures and submit documentation annually confirming that all control measures effectuated during the previous Permit term for which PCB load reduction credit was

recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

ii. Modified Higher Levels of Service Requirements. Provision C.12.c of the MRP3 requires Permittees to implement or cause to be implemented treatment control measures to treat old industrial land use at 70% efficiency, or by demonstrating an equivalent PCBs load reduction.

FY 22/23 Actual Costs: The City engaged in planning activities with the Program regarding the new Provision C.11 and C.12 requirements described above as follows. According to the MRP3 Fact Sheet, "Because PCBs are more concentrated in some locations, the choice of where to implement control measures may be more influenced by known areas of PCBs contamination. However, the mercury removal benefit can be an important contribution to overall mercury load reductions, and available data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances." (MRP3 at A-255 [Section 7 p. S7-0514].) Thus, as planning was conducted concurrently on these requirements, the time cannot be separated by provision.

FY 22/23 Provisions C.11., C.12.a C.12.c Actual Costs			
Person/Activity	**Time (Hours)**	**FY22/33 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	1.5	$117	$176
Tommy Cho (Principal Civil Engineer)	1.5	$103	$155
TOTAL			**$331**

FY 22/23 Estimated Costs: The City anticipates engaging in planning activities with the Program regarding the new Provision C.11 and C.12 requirements described above as follows in FY 23/24. According to the MRP3 Fact Sheet, "Because PCBs are more concentrated in some locations, the choice of where to implement control measures may be more influenced by known areas of PCBs contamination. However, the mercury removal benefit can be an important contribution to overall mercury load reductions, and available

data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances." (MRP3 at A-255 [Section 7 p. S7-0514].) Thus, as planning was conducted concurrently on these requirements, the time cannot be separated by provision.

FY 23/24 Provisions C.11.a, C.12.a C.12.c Estimated Costs			
Person/Activity	**Time (Hours)**	**FY23/24 Rate/Hour**	**Cost**
Farooq Azim (City Engineer)	1.5	$129	$194
Tommy Cho (Principal Civil Engineer)	1.5	$111	$167
TOTAL			**$361**

(g) Discharges Associated with Unsheltered Homeless Populations (see Mathews Declaration).

i. New Requirements. Provision C.17.a of the MRP3 requires Permittees to collectively develop and submit a best management practice report that identifies practices to address non-storm water discharges associated with unsheltered homeless populations into MS4s that impact water quality and specific milestones for reducing such discharges. Permittees are required to develop and submit a regional best management practice report to identify control measures to address non-stormwater discharges associated with unsheltered homeless populations and identify milestones to reduce such discharges. To meet this new MRP3 requirement, the Program collaborated with the other four countywide programs on a regional project to develop the required best management practice report, which was submitted with each Permittee's Fiscal Year 22/23 annual report. (See Mathews Decl., ¶9.j.) Additionally, each Permittee is required to submit a map identifying, the approximate locations of unsheltered homeless populations, including encampments and other areas where other unsheltered homeless people live relative to storm drains, creeks, and flood control channels. To support its members, the Program worked with County officials to obtain the required

geo-located point in time count data, developed an approach for creating the maps, and updated its GIS system to produce the required maps for each of its members. (See *id.*) The City submitted the maps identifying, the approximate locations of unsheltered homeless populations, including encampments and other areas where other unsheltered homeless people live relative to storm drains, creeks, and flood control channels, with its FY 22/23 annual report.

FY 22/23 Provision C.17.a Actual Costs			
Person/Activity	**Time (Hours)**	**FY22/33 Rate/Hour**	**Cost**
Jesus Garcia (Homeless Prog. Coordinator)	3	$75	$225
TOTAL			**$225**

ii. The City will incur additional costs throughout the MRP3 term to implement the best management practices.

(h) Cost Reporting (see Mathews Declaration).

i. New Requirements. Provision C.20.b of the MRP3 requires Permittees to develop a cost reporting framework and methodology to perform an annual fiscal analysis. Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost-savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with the Permit's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time. The City had no actual costs for FY22/23 but the Program did have actual costs inn FY22/23. As set forth in paragraph 10 the Mathews Declaration, the City's share of these costs $2,877.86. In FY 23/24, I anticipate attending the Program's training for

Provision C.20.b for two hours at a $119 per hour for a total of $238; therefore, these are estimated costs FY for 23/24.

(i) Asset Management (see Mathews Declaration).

i. Requirements. Under C.21.b, Permittees must develop and implement an asset management plan to ensure the satisfactory condition of all hard assets constructed during this and Previous Permit terms pursuant to Provisions C.2, C.3, C.10, C.11, C.12, C.13, C.14, C.17, C.18, and C.19. In addition to the City's share of Program costs in the Mathews Declaration, in FY 23-24 the Program is convening an Asset Management Workgroup to develop framework outline and draft asset management framework methodology. Four Program workgroup meetings, likely one hour each, and three regional meetings to discuss consistent approaches for aspects of the plans are anticipated. The City may participate in these meetings.

9. Continuing Requirements from the MRP1 and MRP2 Test Claims

The requirements below were raised in our MRP1 and MRP2 test claims, which are currently pending before the Commission, and are continuing in the MRP3.

(a) Permittees were required to implement a number of water quality monitoring programs under Provision C.8. These requirements are discussed in our MRP1 test claim, which is currently pending before the Commission. Permittees continue to incur costs necessary to comply with this Provision, as discussed in the Declaration of Sandra Mathews in support of this Test Claim. Costs associated with these continuing activities are contained in the Mathews Declaration in support of this Test Claim.

(b) Provision C.10.b. required Permittees to "maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system."

(MRP2 at C.10.b [Section 7 p. S7-1093.) This provision specified detailed full trash capture system installation and maintenance instructions. Provision C.10.b. in the MRP2 required increased activities by Union City that are best characterized as a higher level of service in comparison to the MRP1. MRP3 continues these requirements. Additionally, Provision C.10.a of the MRP2 required 70% trash load reduction by July 1, 2017, and 80% by July 1, 2019. (MRP2 at C.10.a [Section 7 p. S7-1091].) Continuing costs associated with these requirements include maintenance of trash capture devices and maintenance and parts associated with the City's existing three sweepers as summarized as follows:

FY22/23 Continuing Costs			
Activity	**Rate x Est. Hours/Year**	**Hours x Cost per Hour**	**Costs (Exhibit 1)**
Trash Capture Device Maintenance			
Maintenance Crew 1	$45 x 17		$765
Maintenance Crew 2	$40 x 37		$1,480
Vacuum Truck		182 x $237.50	$43,255
Sweeper Maintenance			$162,833
Sweeper Parts			$7,076
TOTAL			**$215,409**

(c) Provision C.11.b. required Permittees "to develop and implement an assessment methodology and data collection program to quantify mercury loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts." (MRP2 at C.11.b [Section 7 p. S7-1259.]) This program is continuing under Provision C.11.a. of the MRP3.

(d) Provision C.11.c. required Permittees to implement green infrastructure projects during the term of the permit to achieve mercury load reductions of 48 g/year by June 30, 2020. (MRP2 at C.11.c [Section 7 p. S7-1103 – S7-1105].) Provision C.11.e of the MRP3 requires Permittees to

"implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j." (MRP3 C.11-6 [Section 7 p. S7-0161].)

(e) Provision C.12.c. required Permittees to "implement green infrastructure projects during the term of the Permit to achieve PCBs load reductions of 120 g/year by June 30, 2020." (MRP2 at C.12.c [Section 7 p. S7-1273].) Provision C.12.f of the MRP3 requires Permittees to "implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j." (MRP3 at C.12-8 [Section 7 p. S7-0172].)

Continuing costs associated with requirements C.11.c and C.12.c include maintenance of the Green Street Infrastructure ("GSI") in the following table. Rates were provided to me by Jesus Banuelos, Public Works Streets Supervisor.

FY22/23 Continuing Costs		
GSI Maintenance by City Maintenance Crews	**FY22/23 Rate x Hours/Year**	**Costs (Indirect)**
Maintenance 1 Crew	$45 x 400	$18,000
Maintenance 2 Crew	$40 x.1,200	$48,000
TOTAL		**$66,000**

(f) Provision C.12.d. required Permittees to "prepare a plan and schedule for PCBs control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations." (MRP2 at C.12.d [Section 7 p. S7-1273.) In 2020, Permittees submitted a Reasonable Assurance Analysis and plan ("RAA") demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030. Provision C.12.h of the MRP3 requires Permittees to "update, as necessary, their PCBs control measures implementation plan and RAA." (MRP3 at C.12-11 [Section 7 p. S7-0175].)

10. As set forth in paragraph 8 above, the total amount of Union City's actual increased costs for Fiscal Year 22/23 for the new programs or higher levels of service for MRP3 Provisions as set forth in this this Declaration is $20,971 As set forth in paragraph 8 above and in the Mathews Declaration at paragraph 10, the total amount of Union City's actual increased costs for Fiscal Year 22/23 for the new programs or higher levels of service for MRP3 Provisions MRP3 Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b. **$51,619**.

11. As set forth in paragraph 8 above, the total amount of Union City's estimated costs for Fiscal Year 23/24 for the new programs or higher levels of service for MRP3 Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b is $803,415. As set forth in paragraph 8 above and in the Mathews Declaration at paragraph 13, the total amount of Union City's estimated increased costs for Fiscal Year 23/24 for the new programs or higher levels of service for MRP3 Provisions MRP3 Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j),

C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b is **$852,511**.

12. I am confident from my own knowledge of the MRP3, MRP2 and MRP1 and the City's stormwater program that the actual and/or estimated costs resulting from the MRP3 mandates at issue in this Test Claim will exceed one thousand dollars ($1,000). All costs identified in this Declaration as incurring in FY 22/23 were incurred after the effective date of the MRP3 (July 1, 2022).

13. I am not aware of any state or federal funds that will be available to pay for these increased costs.

14. I am not aware of any other local or non-local agency funds that are or will be available to pay for these increased costs. The City has a Clean Water Fund, which obtains revenue from property tax assessments, and is supplanted by the General Funds. The salaries and benefits identified in this Declaration are paid from general funds, which include the City's General Fund and the Clean Water Fund. The other costs identified in this Declaration are funded by the City's General Fund and the Clean Water Fund. The City's share of the Program's costs as identified in the Declaration of Sandra Mathews are funded by the Clean Water Fund. The City has no authority to increase these revenue sources without complying with Proposition 218. Thus, the City does not have authority to increase these fees – only the voters have that authority. Furthermore, the money from the Clean Water Fund is already consumed by existing stormwater compliance costs and is insufficient to cover increased activities required by the MRP3.

15. The City is not confident that it will be able to avail itself of future grant opportunities. The City has no grant applications pending for the stormwater program. Furthermore, multiple jurisdictions must compete for limited funding sources, creating stiff competition among municipalities.

16. I have personally reviewed the costs provided in this Declaration and I am satisfied that the information is accurate and was correctly compiled according to my instructions.

I declare under penalty of perjury under the laws of the state of California that the foregoing is true and correct.

Executed on May 20, 2024, at Union City, California.

Farooq Azim

5721830.3

EXHIBI T 1
to Section 6.1
(Azim Dec)

CONSULTING SERVICES AGREEMENT BETWEEN THE CITY OF UNION CITY AND SCHAAF AND WHEELER FOR UNION CITY TRASH CAPTURE FEASIBILITY STUDY, CITY PROJECT NO. 23-22

This Agreement for consulting services is made by and between the City of Union City, a municipal corporation, ("City") and **Schaaf & Wheeler** a California corporation, with offices located at 4699 Old Ironside Dr., Suite 350 Santa Clara, CA 95054 ("Consultant"), (together referred to as the "Parties") as of March 24, 2023 (the "Effective Date").

Section 1. **Services**. Subject to the terms and conditions set forth in this Agreement, Consultant shall provide to City the services described in the Scope of Work attached as Exhibit A and incorporated herein, at the time and place and in the manner specified therein. In the event of a conflict in or inconsistency between the terms of this Agreement and Exhibit A, the Agreement shall prevail.

1.1 **Term of Services.** The term of this Agreement shall begin on the Effective Date and shall end on March 24, 2024, and Consultant shall complete the work described in Exhibit A on or before that date, unless the term of the Agreement is otherwise terminated or extended, as provided for in Section 8. The time provided to Consultant to complete the services required by this Agreement shall not affect the City's right to terminate the Agreement, as referenced in Section 8.

1.2 **Standard of Performance.** Consultant shall perform all services required pursuant to this Agreement according to the standards observed by a competent practitioner of the profession in which Consultant is engaged.

1.3 **Assignment of Personnel.** Consultant shall assign only competent personnel to perform services pursuant to this Agreement. In the event that City, in its sole discretion, at any time during the term of this Agreement, desires the reassignment of any such persons, Consultant shall, immediately upon receiving notice from City of such desire of City, reassign such person or persons.

1.4 **Time is of the Essence.** Time is of the essence. Consultant shall devote such time to the performance of services pursuant to this Agreement as may be reasonably necessary to timely finish the Scope of Work, to meet the standard of performance provided in Section 1.1 above and to satisfy Consultant's obligations hereunder.

1.5 **Public Works Requirements.** Because the services described in Exhibit A constitute a public works within the definition of Section 1720(a)(1) of the California Labor Code. As a result, Consultant is required to comply with the provisions of the Labor Code applicable to public works, to the extent set forth in Exhibit B. Consultant shall waive, indemnify, hold harmless, and defend City concerning any liability arising out of Labor Code Section 1720 *et seq.*

Section 2. **COMPENSATION.** City hereby agrees to pay Consultant a sum not to exceed **_Twenty-Nine Thousand Nine Hundred and Ten Dollars ($29,910),** notwithstanding any contrary indications that may be contained in Consultant's proposal for services to be performed and reimbursable costs incurred under this Agreement. In the event of a conflict between this Agreement and Consultant's proposal, attached as Exhibit A, regarding the amount of compensation, the

Agreement shall prevail. City shall pay Consultant for services rendered pursuant to this Agreement at the time and in the manner set forth herein. The payments specified below shall be the only payments from City to Consultant for services rendered pursuant to this Agreement. Consultant shall submit all invoices to City in the manner specified herein. Except as specifically authorized by City in writing, Consultant shall not bill City for duplicate services performed by more than one person.

Consultant and City acknowledge and agree that compensation paid by City to Consultant under this Agreement is based upon Consultant's estimated costs of providing the services required hereunder, including salaries and benefits of employees and subcontractors of Consultant. Consequently, the parties further agree that compensation hereunder is intended to include the costs of contributions to any pensions and/or annuities to which Consultant and its employees, agents, and subcontractors may be eligible. City therefore has no responsibility for such contributions beyond compensation required under this Agreement.

2.1 **Invoices.** Consultant shall submit invoices, not more often than once a month during the term of this Agreement, based on the cost for services performed and reimbursable costs incurred prior to the invoice date. Invoices shall contain the following information:

- Serial identifications of progress bills; i.e., Progress Bill No. 1 for the first invoice, etc.;
- Project name & number if applicable;
- Purchase Order number to expedite payment;
- The beginning and ending dates of the billing period;
- A task summary containing the original contract amount, the amount of prior billings, the total due this period, the balance available under the Agreement, and the percentage of completion;
- At City's option, for each work item in each task, a copy of the applicable time entries or time sheets shall be submitted showing the name of the person doing the work, the hours spent by each person, a brief description of the work, and each reimbursable expense;
- The total number of hours of work performed under the Agreement by Consultant and each employee, agent, and subcontractor of Consultant performing services hereunder;
- The Consultant's signature;

2.2 **Monthly Payment.** City shall make monthly payments, based on invoices received, for services satisfactorily performed, and for authorized reimbursable costs incurred. City shall have 30 days from the receipt of an invoice that complies with all of the requirements above to pay Consultant.

2.3 **Final Payment.** N/A

2.4 **Total Payment.** City shall pay for the services to be rendered by Consultant pursuant to this Agreement. City shall not pay any additional sum for any expense or cost whatsoever incurred

by Consultant in rendering services pursuant to this Agreement. City shall make no payment for any extra, further, or additional service pursuant to this Agreement.

In no event shall Consultant submit any invoice for an amount in excess of the maximum amount of compensation provided above either for a task or for the entire Agreement, unless the Agreement is modified prior to the submission of such an invoice by a properly executed change order or amendment.

2.5 Hourly Rate/Fees. Unless the services provided are for a lump sum or flat fee, fees for work performed by Consultant on an hourly basis shall not exceed the amounts shown on the compensation cost proposal attached hereto as Exhibit A. In the event of a conflict in or inconsistency between the terms of this Agreement and Exhibit A, the Agreement shall prevail.

2.6 Reimbursable Expenses. Reimbursable expenses are specified in Exhibit A, attached hereto and incorporated herein. Reimbursable expenses not listed in Exhibit A are not chargeable to City. Reimbursable expenses shall not include a mark-up and are billed as a direct costs. In no event shall expenses be advanced by the City to the Consultant. Reimbursable expenses are included in the total amount of compensation provided under this Agreement that shall not be exceeded.

2.7 Payment of Taxes. Consultant is solely responsible for the payment of employment taxes incurred under this Agreement and any similar federal or state taxes.

2.8 Payment upon Termination. In the event that the City or Consultant terminates this Agreement pursuant to Section 8, the City shall compensate the Consultant for all outstanding costs and reimbursable expenses incurred for work satisfactorily completed as of the date of written notice of termination. Consultant shall maintain adequate logs and timesheets to verify costs incurred to that date.

2.9 Authorization to Perform Services. The Consultant is not authorized to perform any services or incur any costs whatsoever under the terms of this Agreement until receipt of authorization from the Contract Administrator.

2.10. Business License. The Consultant is not authorized to perform services or incur costs whatsoever under the terms of this Agreement until Consultant applies for and has been issued a business license from the City pursuant to Title 5 of the Union City Municipal Code.

Section 3. FACILITIES AND EQUIPMENT. Except as set forth herein, Consultant shall, at its sole cost and expense, provide all facilities and equipment that may be necessary to perform the services required by this Agreement. City shall make available to Consultant only the facilities and equipment listed in this section, and only under the terms and conditions set forth herein.

City shall furnish physical facilities such as desks, filing cabinets, and conference space, as may be reasonably necessary for Consultant's use while consulting with City employees and reviewing records and the information in possession of the City. The location, quantity, and time of furnishing those facilities shall be in the sole discretion of City. In no event shall City be obligated to furnish any facility that may involve incurring any direct expense, including but not limited to computer, long-distance telephone or other communication charges, vehicles, and reproduction facilities.

Section 4. **INSURANCE REQUIREMENTS.** Before beginning any work under this Agreement, Consultant, at its own cost and expense, unless otherwise specified below, shall procure the types and amounts of insurance listed below against claims for injuries to persons or damages to property that may arise from or in connection with the performance of the work hereunder by the Consultant and its agents, representatives, employees, and subcontractors. Consistent with the following provisions, Consultant shall provide proof satisfactory to City of such insurance that meets the requirements of this section and under forms of insurance satisfactory in all respects, and that such insurance is in effect prior to beginning work to the City. Consultant shall maintain the insurance policies required by this section throughout the term of this Agreement. The cost of such insurance shall be included in the Consultant's bid. Consultant shall not allow any subcontractor to commence work on any subcontract until Consultant has obtained all insurance required herein for the subcontractor(s) and provided evidence that such insurance is in effect to City. Verification of the required insurance shall be submitted and made part of this Agreement prior to execution.

4.1 **Required Coverage**. Consultant shall maintain all required insurance listed herein for the duration of this Agreement.

COVERAGE	TYPE OF INSURANCE	MINIMUM LIMITS
A	**Commercial General Liability** Premises Liability; Products and Completed Operations; Contractual Liability; Personal Injury and Advertising Liability	$1,000,000 per occurrence; Bodily Injury and Property Damage $2,000,00 in the aggregate; Commercial general coverage shall be at least as broad as Insurance Services Office Commercial General Liability occurrence form CG 0001 (most recent edition) covering comprehensive General Liability on an "occurrence" basis
B	**Commercial or Business Automobile Liability** All owned vehicles, hired or leased vehicles, non-owned, borrowed and permissive uses. Personal Automobile Liability is acceptable for individual contractors with no transportation or hauling related activities	$1,000,000 per occurrence; Any Auto; Bodily Injury and Property Damage. Automobile coverage shall be at least as broad as Insurance Services Office Automobile Liability form CA 0001 (most recent edition), Code 1 (any auto). No endorsement shall be attached limiting the coverage.
C	**Workers' Compensation (WC) and Employers Liability (EL)** Required for all contractors with employees	WC: Statutory Limits EL: $100,000 per accident for bodily injury or disease. Consultant may rely on a self-insurance program to meet

		those requirements, but only if the program of self-insurance complies fully with the provisions of the California Labor Code. The insurer shall waive all rights of subrogation against the City and its officers, officials, employees, and volunteers for loss arising from work performed under this Agreement
D	**Professional Liability/Errors & Omissions** Includes endorsements of contractual liability	$1,000,000 per occurrence $2,000,000 policy aggregate; Any deductible or self-insured retention shall not exceed $150,000 per claim

4.2 **<u>Additional requirements.</u>** Each of the following shall be included in the insurance coverage or added as a certified endorsement to the policy:

a. All required insurance shall be maintained during the entire term of the Agreement with the following exception: Insurance policies and coverage(s) written on a claims-made basis shall be maintained during the entire term of the Agreement and until three (3) years following termination and acceptance of all work provided under the Agreement, with the retroactive date of said insurance (as may be applicable) concurrent with the commencement of activities pursuant to this Agreement

b. All insurance required above with the exception of Professional Liability, Personal Automobile Liability, Workers' Compensation and Employers Liability, shall be endorsed to name as additional insured: City of Union City, its City Council, and all City officers, agents, employees, volunteers and representatives.

c. For any claims related to this Agreement or the work hereunder, the Consultant's insurance covered shall be primary insurance as respects the City, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees, or volunteers shall be excess of the Consultant's insurance and shall not contribute with it.

d. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be canceled by either party, except after 30 days' prior written notice has been provided to the City.

e. Certificates of Insurance**:** Before commencing operations under this Agreement, Consultant shall provide Certificate(s) of Insurance and applicable insurance endorsements, in form and satisfactory to City, evidencing that all required insurance coverage is in effect. The City reserves the rights to require the Consultant to provide complete, certified copies of all required insurance policies.

f. Subcontractors**:** Consultant shall include all subcontractors as an insured (covered party) under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

g. Claims-made limitations. The following provisions shall apply if the professional liability coverage is written on a claims-made form:

i. The retroactive date of the policy must be shown and must be before the date of the Agreement.

ii. Insurance must be maintained and evidence of insurance must be provided for at least five years after completion of the Agreement or the work, so long as commercially available at reasonable rates.

iii. If coverage is canceled or not renewed and it is not replaced with another claims-made policy form with a retroactive date that precedes the date of this Agreement, Consultant must purchase an extended period coverage for a minimum of three (3) years after completion of work under this Agreement.

iv. A copy of the claim reporting requirements must be submitted to the City for review prior to the commencement of any work under this Agreement.

4.3 All Policies Requirements.

a. Acceptability of insurers. All insurance required by this section is to be placed with insurers with a Bests' rating of no less than A:VII. Insurance shall be maintained through an insurer with a minimum A.M. Best Rating of A- or better, with deductible amounts acceptable to the City. Acceptance of Consultant's insurance by City shall not relieve or decrease the liability of Consultant hereunder. Any deductible or self-insured retention amount or other similar obligation under the policies shall be the sole responsibility of the Consultant.

b. Deductibles and Self-Insured Retentions. Consultant shall disclose to and obtain the written approval of City for the self-insured retentions and deductibles before beginning any of the services or work called for by any term of this Agreement. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, employees, and volunteers; or the Consultant shall provide a financial guarantee satisfactory to the City guaranteeing payment of losses and related investigations, claim administration and defense expenses.

c. Wasting Policies. No policy required by this Section 4 shall include a "wasting" policy limit (i.e. limit that is eroded by the cost of defense).

d. Waiver of Subrogation. Consultant hereby agrees to waive subrogation which any insurer or contractor may require from vendor by virtue of the payment of any loss. Consultant agrees to obtain any endorsements that may be necessary to affect this waiver of subrogation. The Workers' Compensation policy shall be endorsed with a waiver of subrogation in favor of the entity for all work performed by the consultant, its employees, agents, and subcontractors.

4.4 **Remedies.** In addition to any other remedies City may have if Consultant fails to provide or maintain any insurance policies or policy endorsements to the extent and within the time herein required, City may, at its sole option exercise any of the following remedies, which are alternatives to other remedies City may have and are not the exclusive remedy for Consultant's breach:

- Obtain such insurance and deduct and retain the amount of the premiums for such insurance from any sums due under the Agreement;
- Order Consultant to stop work under this Agreement or withhold any payment that becomes due to Consultant hereunder, or both stop work and withhold any payment, until Consultant demonstrates compliance with the requirements hereof; and/or
- Terminate this Agreement.

Section 5. INDEMNIFICATION AND CONSULTANT'S RESPONSIBILITIES.

Consultant shall indemnify, defend with counsel acceptable to City, and hold harmless City and its officers, officials, employees, agents and volunteers from and against any and all liability, loss, damage, claims, expenses, and costs (including without limitation, attorney's fees and costs and fees of litigation) (collectively, "Liability") of every nature arising out of or in connection with Consultant's performance of the Services or its failure to comply with any of its obligations contained in this Agreement, except such Liability caused by the sole negligence or willful misconduct of City.

The Consultant's obligation to defend and indemnify shall not be excused because of the Consultant's inability to evaluate Liability or because the Consultant evaluates Liability and determines that the Consultant is not liable to the claimant. The Consultant must respond within 30 days, to the tender of any claim for defense and indemnity by the City, unless this time has been extended by the City. If the Consultant fails to accept or reject a tender of defense and indemnity within 30 days, in addition to any other remedy authorized by law, so much of the money due the Consultant under and by virtue of this Agreement as shall reasonably be considered necessary by the City, may be retained by the City until disposition has been made of the claim or suit for damages, or until the Consultant accepts or rejects the tender of defense, whichever occurs first.

With respect to third party claims against the Consultant, the Consultant waives any and all rights of any type to express or implied indemnity against the Indemnitees.

Notwithstanding the forgoing, to the extent this Agreement is a "construction contract" as defined by California Civil Code Section 2782, as may be amended from time to time, such duties of consultant to indemnify shall not apply when to do so would be prohibited by California Civil Code Section 2782.

In the event that Consultant or any employee, agent, or subcontractor of Consultant providing services under this Agreement is determined by a court of competent jurisdiction or the California Public Employees Retirement System (PERS) to be eligible for enrollment in PERS as an employee of City, Consultant shall indemnify, defend, and hold harmless City for the payment of any employee and/or employer contributions for PERS benefits on behalf of Consultant or its employees, agents, or subcontractors, as well as for the payment of any penalties and interest on such contributions, which would otherwise be the responsibility of City.

Section 6. STATUS OF CONSULTANT.

6.1 **Independent Contractor.** At all times during the term of this Agreement, Consultant shall be an independent contractor and shall not be an employee of City. City shall have the right to control Consultant only insofar as the results of Consultant's services rendered pursuant to this Agreement and assignment of personnel pursuant to Subparagraph 1.3; however, otherwise City shall not have the right to control the means by which Consultant accomplishes services rendered pursuant to this Agreement. Notwithstanding any other City, state, or federal policy, rule, regulation, law, or ordinance to the contrary, Consultant and any of its employees, agents, and subcontractors providing services under this Agreement shall not qualify for or become entitled to, and hereby agree to waive any and all claims to, any compensation, benefit, or any incident of employment by City, including but not limited to eligibility to enroll in the California Public Employees Retirement System (PERS) as an employee of City and entitlement to any contribution to be paid by City for employer contributions and/or employee contributions for PERS benefits.

6.2 **Consultant Not an Agent.** Except as City may specify in writing, Consultant shall have no authority, express or implied, to act on behalf of City in any capacity whatsoever as an agent. Consultant shall have no authority, express or implied, pursuant to this Agreement to bind City to any obligation whatsoever.

Section 7. LEGAL REQUIREMENTS.

7.1 **Governing Law.** The laws of the State of California shall govern this Agreement.

7.2 **Compliance with Applicable Laws.** Consultant and any subcontractors shall comply with all laws applicable to the performance of the work hereunder.

7.3 **Other Governmental Regulations.** To the extent that this Agreement may be funded by fiscal assistance from another governmental entity, Consultant and any subcontractors shall comply with all applicable rules and regulations to which City is bound by the terms of such fiscal assistance program.

7.4 **Licenses and Permits.** Consultant represents and warrants to City that Consultant and its employees, agents, and any subcontractors have all licenses, permits, qualifications, and approvals of whatsoever nature that are legally required to practice their respective professions. Consultant represents and warrants to City that Consultant and its employees, agents, any subcontractors shall, at their sole cost and expense, keep in effect at all times during the term of this Agreement any licenses, permits, and approvals that are legally required to practice their respective professions. In addition to the foregoing, Consultant and any subcontractors shall obtain and maintain during the term of this Agreement valid Business Licenses from City.

7.5 **Nondiscrimination and Equal Opportunity.** Consultant shall not discriminate, on the basis of a person's race, religion, color, national origin, age, physical or mental handicap or disability, medical condition, marital status, sex, or sexual orientation, against any employee, applicant for employment, subcontractor, bidder for a subcontract, or participant in, recipient of, or applicant for any services or programs provided by Consultant under this Agreement. Consultant shall comply with all applicable federal, state, and local laws, policies, rules, and requirements related to equal opportunity and nondiscrimination in employment, contracting, and the provision of any services that are the subject of this Agreement, including but not limited to the satisfaction of any positive obligations required of Consultant thereby.

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Consultant shall include the provisions of this Subsection in any subcontract approved by the Contract Administrator or this Agreement.

Section 8. TERMINATION AND MODIFICATION.

8.1 **Termination.** City may cancel this Agreement at any time and without cause upon written notification to Consultant. Consultant may cancel this Agreement upon thirty (30) days' written notice to City and shall include in such notice the reasons for cancellation.

In the event of termination, Consultant shall be entitled to compensation for services performed to the effective date of termination; City, however, may condition payment of such compensation upon Consultant delivering to City any or all work product, including, but not limited to documents, photographs, computer software, video and audio tapes, and other materials provided to Consultant or prepared by or for Consultant or the City in connection with this Agreement.

8.2 **Extension.** City may, in its sole and exclusive discretion, extend the end date of this Agreement beyond that provided for in Subsection 1.1. Any such extension shall require a written amendment to this Agreement, as provided for herein.

8.3 **Amendments.** The parties may amend this Agreement only by a writing signed by all the parties.

8.4 **Assignment and Subcontracting.** City and Consultant recognize and agree that this Agreement contemplates personal performance by Consultant and is based upon a determination of Consultant's unique personal competence, experience, and specialized personal knowledge. Moreover, a substantial inducement to City for entering into this Agreement was and is the professional reputation and competence of Consultant. Consultant may not assign this Agreement or any interest therein without the prior written approval of the Contract Administrator. Consultant shall not subcontract any portion of the performance contemplated and provided for herein, other than to the subcontractors noted in the proposal, without prior written approval of the Contract Administrator.

8.5 **Survival.** All obligations arising prior to the termination of this Agreement and all provisions of this Agreement allocating liability between City and Consultant shall survive the termination of this Agreement.

8.6 **Options upon Breach by Consultant.** If Consultant materially breaches any of the terms of this Agreement, City's remedies shall include, but not be limited to, the following:

8.6.1 Immediately terminate the Agreement;

8.6.2 Retain the plans, specifications, drawings, reports, design documents, and any other work product prepared by Consultant pursuant to this Agreement;

8.6.3 Retain a different consultant to complete the work described in Exhibit A not finished by Consultant; or

8.6.4 Charge Consultant the difference between the cost to complete the work described in Exhibit A that is unfinished at the time of breach and the amount that City would have paid Consultant pursuant to Section 2 if Consultant had completed the work.

Section 9. KEEPING AND STATUS OF RECORDS.

9.1 Records Created as Part of Consultant's Performance. All reports, data, maps, models, charts, studies, surveys, photographs, memoranda, plans, studies, specifications, records, files, or any other documents or materials, in electronic or any other form, that Consultant prepares or obtains pursuant to this Agreement and that relate to the matters covered hereunder shall be the property of the City. Consultant hereby agrees to deliver those documents to the City upon termination of the Agreement. It is understood and agreed that the documents and other materials, including but not limited to those described above, prepared pursuant to this Agreement are prepared specifically for the City and are not necessarily suitable for any future or other use. City and Consultant agree that, until final approval by City, all data, plans, specifications, reports and other documents are confidential and will not be released to third parties without prior written consent of both parties.

9.2 Consultant's Books and Records. Consultant shall maintain any and all ledgers, books of account, invoices, vouchers, canceled checks, and other records or documents evidencing or relating to charges for services or expenditures and disbursements charged to the City under this Agreement for a minimum of 3 years, or for any longer period required by law, from the date of final payment to the Consultant to this Agreement.

9.3 Inspection and Audit of Records. Any records or documents that Section 9.2 of this Agreement requires Consultant to maintain shall be made available for inspection, audit, and/or copying at any time during regular business hours, upon oral or written request of the City. Under California Government Code Section 8546.7, if the amount of public funds expended under this Agreement exceeds $10,000.00, the Agreement shall be subject to the examination and audit of the State Auditor, at the request of City or as part of any audit of the City, for a period of 3 years after final payment under the Agreement.

Section 10 MISCELLANEOUS PROVISIONS.

10.1 Attorneys' Fees. If a party to this Agreement brings any action, including an action for declaratory relief, to enforce or interpret the provision of this Agreement, the prevailing party shall be entitled to reasonable attorneys' fees in addition to any other relief to which that party may be entitled. The court may set such fees in the same action or in a separate action brought for that purpose.

10.2 Venue. In the event that either party brings any action against the other under this Agreement, the parties agree that trial of such action shall be vested exclusively in the state courts of California in the County of Alameda or in the United States District Court for the Northern District of California.

10.3 Severability. If a court of competent jurisdiction finds or rules that any provision of this Agreement is invalid, void, or unenforceable, the provisions of this Agreement not so adjudged shall remain in full force and effect. The invalidity in whole or in part of any provision of this Agreement shall not void or affect the validity of any other provision of this Agreement.

10.4 **No Implied Waiver of Breach**. The waiver of any breach of a specific provision of this Agreement does not constitute a waiver of any other breach of that term or any other term of this Agreement.

10.5 **Successors and Assigns.** The provisions of this Agreement shall inure to the benefit of and shall apply to and bind the successors and assigns of the parties.

10.6 **Use of Recycled Products.** Consultant shall prepare and submit all reports, written studies and other printed material on recycled paper to the extent it is available at equal or less cost than virgin paper.

10.7 **Conflict of Interest.** Consultant may serve other clients, but none whose activities within the corporate limits of City or whose business, regardless of location, would place Consultant in a "conflict of interest," as that term is defined in the Political Reform Act, codified at California Government Code Section 81000 *et seq*.

Consultant shall not employ any City official in the work performed pursuant to this Agreement. No officer or employee of City shall have any financial interest in this Agreement that would violate California Government Code Sections 1090 *et seq*. Consultant hereby warrants that it is not now, nor has it been in the previous 12 months, an employee, agent, appointee, or official of the City. If Consultant was an employee, agent, appointee, or official of the City in the previous twelve months, Consultant warrants that it did not participate in any manner in the forming of this Agreement. Consultant understands that, if this Agreement is made in violation of Government Code § 1090 *et seq.*, the entire Agreement is void and Consultant will not be entitled to any compensation for services performed pursuant to this Agreement, including reimbursement of expenses, and Consultant will be required to reimburse the City for any sums paid to the Consultant. Consultant understands that, in addition to the foregoing, it may be subject to criminal prosecution for a violation of Government Code § 1090 and, if applicable, will be disqualified from holding public office in the State of California.

10.8 **Solicitation.** Consultant agrees not to solicit business at any meeting, focus group, or interview related to this Agreement, either orally or through any written materials.

10.9 **Contract Administration.** This Agreement shall be administered by the City Manager, or his designee, identified as **Marilou Ayupan** ("Contract Administrator"). All correspondence, meeting documation, invoices and project deliverables shall be directed to or through the Contract Administrator.

Marilou Ayupan, P.E.
Public Works Director
City of Union City
34009 Alvarado-Niles Road
Union City, CA 94587
MarilouA@unioncity.org

10.10 Notices. Any written notice to Consultant shall be sent to:

Caitlin Tharp, PE
Vice President
Schaaf and Wheeler Consulting Civil Engineers
10232 Donner Pass Road #4, Truckee, CA 96161
CTharp@swsv.com

All other written notices to City shall be sent to:

Joan M. Malloy City Manager City of Union City 34009 Alvarado Niles Rd. Union City, CA 94587	with a copy to	Kristopher J. Kokotaylo, City Attorney City of Union City 34009 Alvarado Niles Rd. Union City, CA 94587

10.12 Professional Seal. Where applicable in the determination of the contract administrator, the first page of a technical report, first page of design specifications, and each page of construction drawings shall be stamped/sealed and signed by the licensed professional responsible for the report/design preparation. The stamp/seal shall be in a block entitled "Seal and Signature of Registered Professional with report/design responsibility," as in the following example.

_____ Seal and Signature of Registered Professional with report/design responsibility.

10.13 Integration. This Agreement, including the scope of work attached hereto and incorporated herein as Exhibit A represents the entire and integrated agreement between City and Consultant and supersedes all prior negotiations, representations, or agreements, either written or oral.

Exhibit A	Schaaf and Wheeler Proposal
Exhibit B	Public Works Requirements

10.14 Counterparts. This Agreement may be executed in multiple counterparts, each of which shall be an original and all of which together shall constitute one agreement.

SIGNATURES ON FOLLOWING PAGE

The Parties have executed this Agreement as of the Effective Date.

CITY OF UNION CITY

DocuSigned by:
City Manager- Joan Malloy
6A883797FA684C9...

JOAN MALLOY, CITY MANAGER

ATTEST:

DocuSigned by:
Anna Brown
48AF7211F71E45C...

ANNA M. BROWN, CITY CLERK

APPROVED AS TO FORM:

DocuSigned by:
kristopher J. kototaylo
4A33379A6B054E1...

KRISTOPHER J. KOKOTAYLO
CITY ATTORNEY

SCHAAF AND WHEELER

CAITLIN THARP, VICE PRESIDENT

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Version 3.2.21

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EXHIBIT A

SCHAAF AND WHEELER PROPOSAL

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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

10232 Donner Pass Road, Unit #4
Truckee, CA 96161
(415) 823-4964
ctharp@swsv.com

PROPOSAL MEMO

VIA EMAIL

DATE: March 17, 2023
TO: Eddie Yu, City of Union City
FROM: Caitlin Tharp, PE
SUBJECT: Union City Trash Capture Feasibility Study Proposal

Schaaf & Wheeler is providing you with this scope and fee to perform a full trash capture feasibility study for Union City.

Our work will provide the City with a road map to meet the MRP trash capture requirements of 90% by June 30, 2023 and 100% by June 30, 2025. Or, if not feasible, a strategic plan to meet 90% as required by the Water Board.

Schaaf & Wheeler will review the City's existing trash capture devices and identify potential new small-scale and large-scale opportunities utilizing State Approved full trash capture devices.

We understand that the city currently has approximately 72% trash credit through 562 City owned small trash capture device and privately owned treatment devices. The city is currently utilizing offset credits of 10% which will no longer be allowed. Schaaf & Wheeler will prioritize additional small scale trash capture installations to meet the 90% deadline with full capture devices only. Large scale devices will be considered where economically preferrable for the 100% goal, or where funding may be available from Caltrans for their installation.

Task 1: Data Collection/Review

Schaaf & Wheeler will review the City's GIS database (assumed to be provided by the City or County) for existing trash devices, storm drain system, storm drain catchments, and trash generation areas.

Task 2: Identify Small and Large Trash Capture Device Opportunities

Schaaf & Wheeler will identify small trash capture device locations to obtain 90% and 100% full trash capture. Large trash capture device alternatives will be reviewed for watersheds which cannot be treated with small devices alone, where Caltrans ROW may be treated and therefore possibly obtain Caltrans construction funding, or where a large device may be more cost effective. Drainage areas to each TCD will be delineated, based on larger storm drain catchments provided by the city. Note, some devices may be identified for private properties in order to obtain the trash capture goals. It may not be feasible to obtain 90% or 100% with trash capture devices on city property alone. This scope assumes a desktop analysis only. It is recommended that the preferred device locations be reviewed in the field for additional feasibility confirmation.

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Task 3: Feasibility Study Report

Schaaf & Wheeler will summarize the results of Tasks 1 and 2 in a report. The reoprt will include figures and tables of the recommended device installation locations. Engineer's cost estimates will be included. A schedule for implementation will be included. This assumes one draft and one final version of the report.

Task 4: Strategic Plan to Meet 90% Goal

If the City is unable to meet the 90% goal by June 30th 2023, Schaaf & Wheeler will create a Strategic Plan to meet the 90% trash capture reduction goal for submission to the Water Board. This will be a memorandum taken from data provided within the Feasibility Report which provides specific actions and a schedule for completion.

Task 5: Coordination and Project Management

Schaaf & Wheeler will be made available to the city throughout this project via email and telephone. Face-to-face meetings will not be necessary.

Schedule and Fee

After notice to proceed and receipt of GIS data, this study is estimated to take 4 weeks to complete following notice to proceed.

Table 1 – Project Fee

Union City Trash Feasibility Schaaf & Wheeler (3/17/23)		Schedule of Hours and Rates by Task			
		Schaaf & Wheeler			Schaaf & Wheeler Total
	Task	Principal Project Manager	Assistant Engineer	GIS Analyst	
	Hourly Rate	$275	$195	$195	
TASK 1	DATA COLLECTION/REVIEW	2	8	8	$ 3,670
TASK 2	IDENTIFY TRASH DEVICE OPPORTUNITIES	4	60	8	$ 14,360
TASK 3	FEASIBILITY STUDY REPORT	4	24	8	$ 7,340
TASK 4	STRATEGIC PLAN	2	12		$ 2,890
TASK 5	COORDINATION AND PROJECT MANAGEMENT	6			$ 1,650
	TOTAL	18	104	24	$ 29,910

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Schaaf & Wheeler proposes to complete this work on a time and materials basis for a fee not to exceed $29,910. Work will be billed in accordance with our 2023 charge rate (attached). Standard provisions dated April, 2017 (attached) apply. If you have any questions regarding this scope and budget, do not hesitate to contact me at (415) 823-4964 or ctharp@swsv.com.

Best regards,

SCHAAF & WHEELER

\Caitlin Tharp, PE
CPSWQ, LEED AP, QSD/QSP
Vice President
RCE 76810

I DO HEREBY AUTHORIZE SCHAAF & WHEELER TO PROCEED FORWARD WITH THE EXECUTION OF THIS SCOPE OF WORK AS DESCRIBED HEREIN.

Name, Title Date

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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
4699 Old Ironsides Dr., Suite 350
Santa Clara, CA 95054-1860
408-246-4848

Hourly Charge Rate Schedule

Personnel Charges

Charges for personnel engaged in professional and/or technical work are based on the actual hours directly chargeable to the project.

Current rates by classification are listed below:

Classification	Rate/Hr	Classification	Rate/Hr
Principal Project Manager	$275	Construction Manager	$250
Senior Project Manager	$250	Senior Resident Engineer	$235
Senior Engineer	$235	Resident Engineer	$210
Associate Engineer	$210	Assistant Resident Engineer	$190
Assistant Engineer	$195		
Junior Engineer	$185		
Designer	$175		
GIS Analyst	$175		
Technician	$160		
Engineering Trainee	$135		

Litigation Charges

Work done in preparation for litigation and other very high level-of-expertise assignments is charged at $400 per hour. Court or deposition time as an expert witness is charged at $500 per hour.

Materials and Services

Subcontractors, special equipment, outside reproduction, data processing, computer services, etc., will be charged at 1.10 times cost.

Effective 1/1/23

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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
4699 Old Ironsides Dr., Suite 350
Santa Clara, CA 95054-1860
408-246-4848
Fax 408-246-5624

Standard Provisions

April 2017

Conditions set forth below are incorporated as part of this Agreement. These Standard Provisions and the accompanying proposal constitute the full and complete Agreement between the parties and may be changed, amended, added to, superseded, or waived only if both parties specifically agree in writing to such amendment of the Agreement. In the event of any inconsistency between these Standard Provisions and any proposal, contract, purchase order, requisition, notice to proceed, or like document, these Standard Provisions shall govern.

1. PROFESSIONAL STANDARDS OF CARE - Schaaf & Wheeler, its employees, subconsultants, and subcontractors (hereinafter referred to as "CONSULTANT") shall perform its services under this Agreement in accordance with the degree of care and skill ordinarily practiced at the same point in time and under similar circumstances by professionals providing similar services. No other warranty, express or implied, shall apply to the services performed by CONSULTANT.
2. INDEMNITY – CONSULTANT shall indemnify and hold harmless CLIENT (including its officers and employees) against claims, losses, damages, liabilities (including the reimbursement of reasonable attorney's fees), and liability for injury or harm to persons or property to the extent caused by the negligence, recklessness, or willful misconduct of CONSULTANT for professional services performed under this Agreement. The duty to defend obligation of the CONSULTANT shall be limited to the proportionate percentage of any claim arising directly from the services performed by the CONSULTANT under this Agreement.
3. FORCE MAJEURE – Neither party shall be deemed in default of this Agreement to the extent that any delay or failure in the performance of its obligations results from any cause beyond its reasonable control and without its negligence.
4. DISPUTE RESOLUTION – CLIENT and CONSULTANT agree that they shall first submit any and all unsettled claims, counterclaims, disputes, and other matters in question between them arising out of or relating to this Agreement to non-binding mediation in accordance with the Construction Industry Mediation Rules of the American Arbitration Association, effective as of the date of this agreement. This provision shall survive completion or termination of this Agreement; however, neither party shall seek mediation of any claim or dispute arising out of this Agreement beyond the period of time that would bar the initiation of legal proceedings to litigate such claim or dispute under the applicable law.
5. APPLICABLE LAWS – CONSULTANT shall perform its services in accordance with the laws, rules, regulations, and codes that are applicable to the project and in force at the time of the completion of the documents.
6. HAZARDOUS MATERIALS - The scope of CONSULTANT's services for this Agreement does not include any responsibility for detection, remediation, accidental release, or services relating to waste, oil, asbestos, lead, or other hazardous materials, as defined by Federal, State, and local laws or regulations.

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7. RIGHT OF ENTRY - When entry to property is required for the CONSULTANT to perform its services, the CLIENT agrees to obtain legal right-of-entry on the property.

8. RELIANCE ON INFORMATION PROVIDED BY OTHERS – CONSULTANT shall be entitled to rely, without liability, on the accuracy and completeness of any and all information provided by CLIENT, CLIENT's consultants and contractors, and information from public records, without the need for independent verification.

9. THIRD PARTIES - Nothing contained in this Agreement shall create a contractual relationship with, or a cause of action in favor of, a third party against either the CLIENT or CONSULTANT. CONSULTANT's services hereunder are being performed solely for the benefit of the CLIENT, and no other entity shall have any claim against CONSULTANT because of this Agreement or CONSULTANT's performance of services hereunder.

10. OWNERSHIP OF DOCUMENTS - The CLIENT agrees not to use CONSULTANT-generated documents for marketing purposes, for projects other than the project for which the documents were prepared by CONSULTANT, or for future modifications to this project, without CONSULTANT's express written permission. Any reuse or distribution to third parties without such express written permission or project-specific adaptation by CONSULTANT will be at the CLIENT's sole risk and without liability to CONSULTANT or its employees, independent professional associates, subconsultants, and subcontractors. CLIENT shall, to the fullest extent permitted by law, defend, indemnify, and hold harmless CONSULTANT from and against any and all costs, expenses, fees, losses, claims, demands, liabilities, suits, actions, and damages whatsoever arising out of or resulting from such unauthorized reuse or distribution.

11. SUSPENSION OR TERMINATION OF CONTRACT – CLIENT may suspend or terminate this Agreement with seven days prior written notice to CONSULTANT for convenience or cause. CONSULTANT may terminate this Agreement for cause with seven days prior written notice to CLIENT. Failure of CLIENT to make payments when due shall be cause for suspension of services, or, ultimately, termination, unless and until CONSULTANT has been paid in full all amounts due for services, expenses, and other related charges.

12. SITE VISITS - In the event that CONSULTANT's scope of services shall include site visits during the construction phase, CONSULTANT shall be serving only in the capacity as a consultant to advise CLIENT on issues involving progress and general design compliance. CONSULTANT does not assume any responsibility for the quality, sequences, techniques, or timeliness of any contractor's work, job site safety, continuous onsite inspections, or any issues that fall outside of the CONSULTANT's scope of services as defined herein.

13. GOVERNING LAWS - The laws of the state of California shall govern the validity and interpretation of the Agreement.

14. INSURANCE - During the performance of work covered by this Agreement, CONSULTANT shall maintain the following insurance coverage:

a) Workers' Compensation	Statutory
b) Commercial General Liability (includes Products & Completed Operations)	$2,000,000 each occurrence; $4,000,000 aggregate
c) Automobile Liability	$1,000,000 combined single limit each accident
d) Professional Liability	$5,000,000 each claim; $5,000,000 aggregate

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15. PREVAILING WAGE OBLIGATIONS - The Client shall notify Schaaf & Wheeler in writing if the Work contemplated by this Agreement constitutes a "public work" under any and all federal, state and/or local prevailing wage laws, and/or living wage laws, including but not limited to the Davis-Bacon Act and the provisions of California Labor Code §§ 1720 et seq. In the event that Schaaf & Wheeler must adhere to federal, state and/or local prevailing wage obligations for the Work performed, the Client shall notify and provide Schaaf & Wheeler with any and all applicable prevailing wage determinations prior to the Work to being performed under this Agreement. Any prevailing wage obligations might affect the payment terms contemplated by this Agreement and thus constitute a changed condition mandating renegotiation and/or termination of this Agreement. The Client understands and agrees that Schaaf & Wheeler will rely on the representations made by the Client with regard to prevailing wage obligations and the Client agrees to indemnify Schaaf & Wheeler, its officers, directors, employees, agents and/or subcontractors against any and all claims, liabilities, suits, demands, losses, costs and expenses, including but not limited to reasonable attorney's fees and legal costs, arising from Schaaf & Wheeler's reliance upon the Client's representations regarding prevailing wage obligations.

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EXHIBIT B

PROVISIONS REQUIRED FOR PUBLIC WORKS CONTRACTS PURSUANT TO CALIFORNIA LABOR CODE SECTION 1720 *ET SEQ.*

HOURS OF WORK:

A. In accordance with California Labor Code Section 1810, 8 hours of labor in performance of the services described in Exhibit A shall constitute a legal day's work under this contract.

B. In accordance with California Labor Code Section 1811, the time of service of any worker employed in performance of the services described in Exhibit A is limited to eight hours during any one calendar day, and forty hours during any one calendar week, except in accordance with California Labor Code Section 1815, which provides that work in excess of eight hours during any one calendar day and forty hours during any one calendar week is permitted upon compensation for all hours worked in excess of eight hours during any one calendar day and forty hours during any one calendar week at not less than one-and-one-half times the basic rate of pay.

C. The Consultant and its subcontractors shall forfeit as a penalty to the City $25 for each worker employed in the performance of the services described in Exhibit A for each calendar day during which the worker is required or permitted to work more than 8 hours in any one calendar day, or more than 40 hours in any one calendar week, in violation of the provisions of California Labor Code Section 1810 and following.

WAGES:

A. In accordance with California Labor Code Section 1773.2, the City has determined the general prevailing wages in the locality in which the services described in Exhibit A are to be performed for each craft or type of work needed to be as published by the State of California Department of Industrial Relations, Division of Labor Statistics and Research, a copy of which is on file in the City Public Works Office and shall be made available on request. The Consultant and subcontractors engaged in the performance of the services described in Exhibit A shall pay no less than these rates to all persons engaged in performance of the services described in Exhibit A,.

B. In accordance with Labor Code Section 1775, the Consultant and any subcontractors engaged in performance of the services described in Exhibit A shall comply Labor Code Section 1775, which establishes a penalty of up to $50 per day for each worker engaged in the performance of the services described in Exhibit A that the Consultant or any subcontractor pays less than the specified prevailing wage. The amount of such penalty shall be determined by the Labor Commissioner and shall be based on consideration of the mistake, inadvertence, or neglect of the Consultant or subcontractor in failing to pay the correct rate of prevailing wages, or the previous record of the Consultant or subcontractor in meeting applicable prevailing wage obligations, or the willful failure by the Consultant or subcontractor to pay the correct rates of prevailing wages. A mistake, inadvertence, or neglect in failing to pay the correct rate of prevailing wages is not excusable if the Consultant or subcontractor had knowledge of their obligations under the California Labor Code. The Consultant or subcontractor shall pay the

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difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate. If a subcontractor worker engaged in performance of the services described in Exhibit A is not paid the general prevailing per diem wages by the subcontractor, the Consultant is not liable for any penalties therefore unless the Consultant had knowledge of that failure or unless the Consultant fails to comply with all of the following requirements:

1. The contract executed between the Consultant and the subcontractor for the performance of part of the services described in Exhibit A shall include a copy of the provisions of California Labor Code Sections 1771, 1775, 1776, 1777.5, 1813, and 1815.

2. The Consultant shall monitor payment of the specified general prevailing rate of per diem wages by the subcontractor by periodic review of the subcontractor's certified payroll records.

3. Upon becoming aware of a subcontractor's failure to pay the specified prevailing rate of wages, the Consultant shall diligently take corrective action to halt or rectify the failure, including, but not limited to, retaining sufficient funds due the subcontractor for performance of the services described in Exhibit A.

4. Prior to making final payment to the subcontractor, the Consultant shall obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor has paid the specified general prevailing rate of per diem wages for employees engaged in the performance of the services described in Exhibit A and any amounts due pursuant to California Labor Code Section 1813.

C. In accordance with California Labor Code Section 1776, the Consultant and each subcontractor engaged in performance of the services described in Exhibit A shall keep accurate payroll records showing the name, address, social security number, work, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed in performance of the services described in Exhibit A. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating both of the following:

1. The information contained in the payroll record is true and correct.

2. The employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by the employer's employees on the public works project.

The payroll records required pursuant to California Labor Code Section 1776 shall be certified and shall be available for inspection by the Owner and its authorized representatives, the Division of Labor Standards Enforcement, the Division of Apprenticeship Standards of the Department of Industrial Relations and shall otherwise be available for inspection in accordance with California Labor Code Section 1776.

D. In accordance with California Labor Code Section 1777.5, the Consultant, on behalf of the Consultant and any subcontractors engaged in performance of the services described in Exhibit A, shall be responsible for ensuring compliance with California Labor Code Section 1777.5 governing employment and payment of apprentices on public works contracts.

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E. In case it becomes necessary for the Consultant or any subcontractor engaged in performance of the services described in Exhibit A to employ for the services described in Exhibit A any person in a trade or occupation (except executive, supervisory, administrative, clerical, or other non manual workers as such) for which no minimum wage rate has been determined by the Director of the Department of Industrial Relations, the Contractor shall pay the minimum rate of wages specified therein for the classification which most nearly corresponds to services described in Exhibit A to be performed by that person. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

DIR REGISTRATION

Consultant shall be currently registered with the Department of Industrial Relations and qualified to perform public work consistent with Labor Code section 1725.5, except in limited circumstances as set forth in Labor Code section 1771.1. No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to California Labor Code Section 1725.5. Consultant agrees, in accordance with Section 1771.4 of the California Labor Code, that if the work under this Agreement qualifies as public work, it is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

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Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS
4699 Old Ironsides Drive, Suite 350
Santa Clara, CA 95054
Tel: 408-246-4848

Offices
Santa Clara
San Francisco
Salinas
Santa Rosa
Truckee

Invoice

City of Union City Attn:
Finance Department
34009 Alvarado - Niles Road
Union City, CA 94587

Invoice Date: Apr 30, 2023
Invoice Num: 37464
Billing Through: Apr 30, 2023

Trash Capture Feasibility Study-City Project No. 23-22 (CUCX.01.23:001) - **PO#:** 1050375 - Managed by (CJT)

Contract Amount: $29,910.00	**Amount Billed:** $13,457.50	**Amount Remaining:** $16,452.50

Professional Services:

Classification	Hours	Rate	Amount
SENIOR Project MANAGER	16.00	$250.00	$4,000.00
ASSISTANT ENGINEER	48.50	$195.00	$9,457.50
		Total Services:	**$13,457.50**
		Project (CUCX.01.23:001) Total Amount Due:	**$13,457.50**
		Amount Due This Invoice:	**$13,457.50**

This invoice is due upon receipt

PO 1050375
Approved to pay:

DocuSigned by:
Eddie Yu 5/31/2023
B7690B069591409...

Approved by:

DocuSigned by:
Farooq Azim 5/31/2023
F3B858078E234AF...

Farooq Azim, City Engineer

DocuSign Envelope ID: BD8598FA-E89E-44DF-8FA1-BD6FD1A2F704

Union City Trash Feasibility April 2023 Invoice		Contract Total	Current Invoice	Previously Invoiced	Remaining in Contract
	Task				
TASK 1	DATA COLLECTION/REVIEW	$ 3,670	$ 3,670.00		$ -
TASK 2	IDENTIFY TRASH DEVICE OPPORTUNITIES	$ 14,360	$ 9,137.50		$ 5,222.50
TASK 3	FEASIBILITY STUDY REPORT	$ 7,340			$ 7,340.00
TASK 4	STRATEGIC PLAN	$ 2,890			$ 2,890.00
TASK 5	COORDINATION AND PROJECT MANAGEMENT	$ 1,650	$ 650.00		$ 1,000.00
	TOTAL	$ 29,910	$13,457.50	$ -	$16,452.50

Cost Data Summary - RD

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Unit Cost Summary as of 6/13/2023

Coordinated Universal Time

Item	Range	Life
Miles Run	5,454.0	38,997.0
Fuel Used	2,699.9	18,886.6
Fuel Cons MPG	2.02	2.06
Oil Used	0	0
Oil Cons MPQ	0	0

Acquired	3/2017
Book Value	29882.23
Condition	New
Fuel Type	Diesel
License	1495633
Year	2016

Unit Number	472
Category	STREETS
Start Miles	80
Current Miles	39077
Serial Number	516M1DB22GH221707
Vehicle Make	AUTOCAR
Vehicle Model	XPERT
Vehicle Type	Elgin Crosswind "J"
Body Type	Street Sweeper
Location Garaged	Corp Yard
Engine Make	Cummins
Engine Model	ISB 6.7
Engine Oil	15W40
Transmission Make	Allison

Operating Cost Analysis

Accident Damage	0%	6%
Breakdown	2%	1%
Campaign	0%	0%
Fuel Cost	17%	14%
Meeting	0%	0%
New Vehicle Prep	0%	0%
PM Services	0%	1%
Service Call	1%	1%
Verbal Report	34%	25%
Warranty	0%	0%
Other	47%	53%

Maintenance	**Range**				**Life Cost**			
VMRS System	**Parts**	**Labor**	**Total**	**CPM**	**Parts**	**Labor**	**Total**	**CPM**
001 - Air Conditioning, Heating & Ventilating	0	0	0	0.00	0	1,260	1,260	0.03
002 - Cab & Sheet Metal	0	0	0	0.00	0	0	0	0.00
003 - Instruments, Gauges, Warning &	0	0	0	0.00	0	0	0	0.00
013 - Brakes	0	0	0	0.00	0	1,050	1,050	0.03
015 - Steering	0	0	0	0.00	46	210	256	0.01
016 - Suspension	0	0	0	0.00	0	0	0	0.00
017 - Tires, Tubes, Liners & Valves	1,007	105	1,112	0.20	8,278	945	9,223	0.24
019 - Automatic/Manual Chassis Lubricator	0	0	0	0.00	0	0	0	0.00
022 - Axles - Driven, Rear	0	0	0	0.00	0	0	0	0.00
025 - Transfer Case	0	0	0	0.00	0	0	0	0.00
038 - Electric Power Management - Electric	0	0	0	0.00	0	0	0	0.00
039 - Electric Drive Components - Electric	0	0	0	0.00	0	0	0	0.00
042 - Cooling System	0	0	0	0.00	3	105	108	0.00
043 - Exhaust System	0	0	0	0.00	0	0	0	0.00
049 - Power Train - Hydraulic, Hybrid	0	0	0	0.00	0	0	0	0.00
053 - Expendable Items	0	0	0	0.00	0	0	0	0.00
055 - Cargo Handling, Restraints, & Lift	0	0	0	0.00	0	0	0	0.00
065 - Hydraulic Systems - Multi-Function	0	0	0	0.00	0	0	0	0.00
121 - Final Drive	0	0	0	0.00	0	0	0	0.00
142 - LNG Engine Fuel System	0	0	0	0.00	0	0	0	0.00
143 - CNG Engine Fuel System	0	0	0	0.00	0	0	0	0.00
154 - Medical Devices	0	0	0	0.00	0	0	0	0.00
176 - Chassis Shipping Unit	0	0	0	0.00	0	0	0	0.00
178 - Roll-Off & Lugger Bodies	0	0	0	0.00	0	0	0	0.00
199 - Processing Screens	0	0	0	0.00	0	0	0	0.00
292 - Concrete Pumping Equipment	0	0	0	0.00	0	0	0	0.00
293 - Oil Shaker Box	0	0	0	0.00	0	0	0	0.00
294 - Fuel Metering	0	0	0	0.00	0	0	0	0.00
368 - Milling	0	0	0	0.00	0	0	0	0.00
369 - Crushing	0	0	0	0.00	0	0	0	0.00
462 - Insulating Lift Equipment	0	0	0	0.00	0	0	0	0.00
463 - Insulating Drilling and Boring Equipment	0	0	0	0.00	0	0	0	0.00
464 - Digging	0	0	0	0.00	0	0	0	0.00
465 - Compacting	0	0	0	0.00	0	0	0	0.00
90A - Sublet	0	15,683	15,683	2.88	0	110,614	110,614	2.84
INV - INVOICING	0	0	0	0.00	0	210	210	0.01

Cost Data Summary - RD

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Unit Cost Summary as of 6/13/2023

Coordinated Universal Time

Maintenance	Range				Life Cost			
VMRS System	**Parts**	**Labor**	**Total**	**CPM**	**Parts**	**Labor**	**Total**	**CPM**
MTR - Meeting & Training	0	0	0	0.00	0	315	315	0.01
OFC - Other Fixed Cost	0	0	0	0.00	0	0	0	0.00
PMS - Preventative Maintenance	0	0	0	0.00	439	1,680	2,119	0.05
TOW - TOWING	0	0	0	0.00	0	0	0	0.00
WAS - Wash & Appearance	0	0	0	0.00	0	0	0	0.00
Other Operational	9,177	5,198	14,375	2.64	38,230	26,685	64,915	1.66
Sub-Total	**10,184**	**20,986**	**31,170**	**5.72**	**46,995**	**143,074**	**190,069**	**4.87**
DE0 - Depreciation	34,213	0	34,213	6.27	236,381	0	236,381	6.06
INS - Insurance	0	0	0	0.00	0	0	0	0.00
LIC - Licenses	0	0	0	0.00	941	105	1,046	0.03
Other Fixed	0	0	0	0.00	0	0	0	0.00
Sub-Total	**34,213**	**0**	**34,213**	**6.27**	**237,322**	**105**	**237,427**	**6.09**
FL0 - Fuel	13,468	0	13,468	2.47	66,937	0	66,937	1.72
Sub-Total	**13,468**	**0**	**13,468**	**2.47**	**66,937**	**0**	**66,937**	**1.72**
Total	**57,866**	**20,986**	**78,851**	**14.46**	**351,254**	**143,179**	**494,433**	**12.68**

Cost Data Summary - RD

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Unit Cost Summary as of 6/13/2023

Coordinated Universal Time

Item	Range	Life
Miles Run	6,430.0	77,993.0
Fuel Used	3,726.6	39,802.8
Fuel Cons MPG	1.73	1.96
Oil Used	0	0
Oil Cons MPQ	0	0

Acquired	1/2013
Book Value	5000.00
Condition	New
Fuel Type	Diesel
License	1409701
Year	2012

Unit Number	475
Category	STREETS
Start Miles	185
Current Miles	78178
Serial Number	1FVACXDT4CHBP0741
Vehicle Make	Freightliner
Vehicle Model	Business Class M2
Vehicle Type	Elgin Crosswind
Body Type	Street Sweeper
Location Garaged	Corp Yard
Engine Make	Cummins
Engine Model	ISB 6.7
Engine Oil	15W40
Transmission Make	Allison

Operating Cost Analysis

Breakdown	0%	4%
Campaign	0%	0%
Fuel Cost	34%	18%
Meeting	0%	0%
New Vehicle Prep	0%	0%
PM Follow-up	0%	1%
PM Services	0%	1%
Service Call	0%	0%
Verbal Report	62%	38%
Warranty	0%	0%
Other	5%	38%

Maintenance	**Range**				**Life Cost**			
VMRS System	**Parts**	**Labor**	**Total**	**CPM**	**Parts**	**Labor**	**Total**	**CPM**
001 - Air Conditioning, Heating & Ventilating	0	0	0	0.00	37	1,628	1,665	0.02
002 - Cab & Sheet Metal	0	0	0	0.00	0	0	0	0.00
003 - Instruments, Gauges, Warning &	0	0	0	0.00	0	525	525	0.01
013 - Brakes	0	0	0	0.00	1,302	3,675	4,977	0.06
015 - Steering	0	0	0	0.00	32	210	242	0.00
016 - Suspension	0	0	0	0.00	0	420	420	0.01
017 - Tires, Tubes, Liners & Valves	0	0	0	0.00	6,151	1,313	7,463	0.10
019 - Automatic/Manual Chassis Lubricator	0	0	0	0.00	0	0	0	0.00
022 - Axles - Driven, Rear	0	0	0	0.00	0	0	0	0.00
025 - Transfer Case	0	0	0	0.00	0	0	0	0.00
038 - Electric Power Management - Electric	0	0	0	0.00	0	0	0	0.00
039 - Electric Drive Components - Electric	0	0	0	0.00	0	0	0	0.00
042 - Cooling System	0	0	0	0.00	147	1,155	1,302	0.02
043 - Exhaust System	0	0	0	0.00	207	735	942	0.01
049 - Power Train - Hydraulic, Hybrid	0	0	0	0.00	0	0	0	0.00
053 - Expendable Items	0	0	0	0.00	0	0	0	0.00
055 - Cargo Handling, Restraints, & Lift	0	0	0	0.00	0	0	0	0.00
065 - Hydraulic Systems - Multi-Function	0	0	0	0.00	50	105	155	0.00
121 - Final Drive	0	0	0	0.00	0	0	0	0.00
142 - LNG Engine Fuel System	0	0	0	0.00	0	0	0	0.00
143 - CNG Engine Fuel System	0	0	0	0.00	0	0	0	0.00
154 - Medical Devices	0	0	0	0.00	0	0	0	0.00
176 - Chassis Shipping Unit	0	0	0	0.00	0	0	0	0.00
178 - Roll-Off & Lugger Bodies	0	0	0	0.00	0	0	0	0.00
199 - Processing Screens	0	0	0	0.00	0	0	0	0.00
292 - Concrete Pumping Equipment	0	0	0	0.00	0	0	0	0.00
293 - Oil Shaker Box	0	0	0	0.00	0	0	0	0.00
294 - Fuel Metering	0	0	0	0.00	0	0	0	0.00
368 - Milling	0	0	0	0.00	0	0	0	0.00
369 - Crushing	0	0	0	0.00	0	0	0	0.00
462 - Insulating Lift Equipment	0	0	0	0.00	0	0	0	0.00
463 - Insulating Drilling and Boring Equipment	0	0	0	0.00	0	0	0	0.00
464 - Digging	0	0	0	0.00	0	0	0	0.00
465 - Compacting	0	0	0	0.00	0	0	0	0.00
90A - Sublet	0	22,125	22,125	3.44	717	154,493	155,210	1.99
INV - INVOICING	0	0	0	0.00	0	0	0	0.00

Cost Data Summary - RD

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Unit Cost Summary as of 6/13/2023

Coordinated Universal Time

Maintenance	Range				Life Cost			
VMRS System	**Parts**	**Labor**	**Total**	**CPM**	**Parts**	**Labor**	**Total**	**CPM**
MTR - Meeting & Training	0	0	0	0.00	0	735	735	0.01
OFC - Other Fixed Cost	0	0	0	0.00	0	0	0	0.00
PMS - Preventative Maintenance	0	0	0	0.00	3,472	7,035	10,507	0.13
TOW - TOWING	0	0	0	0.00	0	0	0	0.00
WAS - Wash & Appearance	0	0	0	0.00	0	0	0	0.00
Other Operational	10,908	4,725	15,633	2.43	102,981	80,865	183,846	2.36
Sub-Total	**10,908**	**26,850**	**37,757**	**5.87**	**115,095**	**252,893**	**367,988**	**4.72**
DE0 - Depreciation	0	0	0	0.00	231,563	0	231,563	2.97
INS - Insurance	0	0	0	0.00	0	0	0	0.00
LIC - Licenses	0	0	0	0.00	0	0	0	0.00
Other Fixed	0	0	0	0.00	0	0	0	0.00
Sub-Total	**0**	**0**	**0**	**0.00**	**231,563**	**0**	**231,563**	**2.97**
FL0 - Fuel	18,887	0	18,887	2.94	128,557	105	128,662	1.65
Sub-Total	**18,887**	**0**	**18,887**	**2.94**	**128,556**	**105**	**128,661**	**1.65**
Total	**29,794**	**26,850**	**56,644**	**8.81**	**475,214**	**252,998**	**728,212**	**9.34**

Cost Data Summary - RD

6/13/2023 9:11:58 PM

Unit Cost Summary as of 6/13/2023

Coordinated Universal Time

Item	Range	Life
Miles Run	5,137.0	86,250.0
Fuel Used	2,150.1	38,163.8
Fuel Cons MPG	2.39	2.26
Oil Used	0	0
Oil Cons MPQ	0	0

Operating Cost Analysis

Accident Damage	0%	0%
Breakdown	0%	2%
Campaign	0%	0%
Fuel Cost	41%	18%
New Vehicle Prep	0%	0%
PM Follow-up	0%	2%
PM Services	0%	2%
Service Call	0%	1%
Verbal Report	48%	34%
Other	11%	42%

Acquired	4/2011
Book Value	5000.00
Condition	Used
Fuel Type	Diesel
License	1309043
Year	2010

Unit Number	476
Category	STREETS
Start Miles	2826
Current Miles	89076
Serial Number	JNAPC81L1AAF80048
Vehicle Make	NISSAN UD
Vehicle Model	3300
Vehicle Type	Elgin Crosswind "J"
Body Type	Street Sweeper
Location Garaged	Corp Yard
Engine Make	NISSAN
Engine Model	J08E-UJ
Engine HP	230
Engine Oil	15W40

Maintenance	**Range**				**Life Cost**			
VMRS System	**Parts**	**Labor**	**Total**	**CPM**	**Parts**	**Labor**	**Total**	**CPM**
001 - Air Conditioning, Heating & Ventilating	536	105	641	0.12	544	315	859	0.01
002 - Cab & Sheet Metal	0	0	0	0.00	0	0	0	0.00
003 - Instruments, Gauges, Warning &	0	0	0	0.00	2	525	527	0.01
013 - Brakes	0	0	0	0.00	1,273	2,678	3,950	0.05
015 - Steering	0	0	0	0.00	0	210	210	0.00
016 - Suspension	0	0	0	0.00	0	0	0	0.00
017 - Tires, Tubes, Liners & Valves	0	0	0	0.00	11,165	1,711	12,876	0.15
019 - Automatic/Manual Chassis Lubricator	0	0	0	0.00	0	0	0	0.00
022 - Axles - Driven, Rear	0	0	0	0.00	0	0	0	0.00
025 - Transfer Case	0	0	0	0.00	0	0	0	0.00
038 - Electric Power Management - Electric	0	0	0	0.00	0	0	0	0.00
039 - Electric Drive Components - Electric	0	0	0	0.00	0	0	0	0.00
042 - Cooling System	0	0	0	0.00	35	1,155	1,190	0.01
043 - Exhaust System	0	0	0	0.00	0	0	0	0.00
049 - Power Train - Hydraulic, Hybrid	0	0	0	0.00	0	0	0	0.00
053 - Expendable Items	0	0	0	0.00	0	0	0	0.00
055 - Cargo Handling, Restraints, & Lift	0	0	0	0.00	0	0	0	0.00
065 - Hydraulic Systems - Multi-Function	0	0	0	0.00	311	2,468	2,778	0.03
121 - Final Drive	0	0	0	0.00	0	0	0	0.00
142 - LNG Engine Fuel System	0	0	0	0.00	0	0	0	0.00
143 - CNG Engine Fuel System	0	0	0	0.00	0	0	0	0.00
154 - Medical Devices	0	0	0	0.00	0	0	0	0.00
176 - Chassis Shipping Unit	0	0	0	0.00	0	0	0	0.00
178 - Roll-Off & Lugger Bodies	0	0	0	0.00	0	0	0	0.00
199 - Processing Screens	0	0	0	0.00	0	0	0	0.00
292 - Concrete Pumping Equipment	0	0	0	0.00	0	0	0	0.00
293 - Oil Shaker Box	0	0	0	0.00	0	0	0	0.00
294 - Fuel Metering	0	0	0	0.00	0	0	0	0.00
368 - Milling	0	0	0	0.00	0	0	0	0.00
369 - Crushing	0	0	0	0.00	0	0	0	0.00
462 - Insulating Lift Equipment	0	0	0	0.00	0	0	0	0.00
463 - Insulating Drilling and Boring Equipment	0	0	0	0.00	0	0	0	0.00
464 - Digging	0	0	0	0.00	0	0	0	0.00
465 - Compacting	0	0	0	0.00	0	0	0	0.00
90A - Sublet	0	7,787	7,787	1.52	0	129,753	129,753	1.50
INV - INVOICING	0	0	0	0.00	0	0	0	0.00
MTR - Meeting & Training	0	0	0	0.00	0	0	0	0.00

Cost Data Summary - RD

6/13/2023 9:11:58 PM

Unit Cost Summary as of 6/13/2023

Coordinated Universal Time

Maintenance	Range				Life Cost			
VMRS System	**Parts**	**Labor**	**Total**	**CPM**	**Parts**	**Labor**	**Total**	**CPM**
OFC - Other Fixed Cost	0	0	0	0.00	0	0	0	0.00
PMS - Preventative Maintenance	0	0	0	0.00	3,719	9,574	13,293	0.15
TOW - TOWING	0	0	0	0.00	0	0	0	0.00
WAS - Wash & Appearance	0	0	0	0.00	68	210	278	0.00
Other Operational	4,417	3,360	7,777	1.51	107,397	82,602	189,998	2.20
Sub-Total	**4,953**	**11,252**	**16,206**	**3.15**	**124,513**	**231,199**	**355,711**	**4.12**
DE0 - Depreciation	0	0	0	0.00	212,435	0	212,435	2.46
INS - Insurance	0	0	0	0.00	0	0	0	0.00
LIC - Licenses	0	0	0	0.00	0	0	0	0.00
Other Fixed	0	0	0	0.00	0	0	0	0.00
Sub-Total	**0**	**0**	**0**	**0.00**	**212,435**	**0**	**212,435**	**2.46**
FL0 - Fuel	11,132	0	11,132	2.17	124,229	0	124,229	1.44
Sub-Total	**11,132**	**0**	**11,132**	**2.17**	**124,229**	**0**	**124,229**	**1.44**
Total	**16,086**	**11,252**	**27,338**	**5.32**	**461,176**	**231,199**	**692,375**	**8.03**

OWEN EQUIPMENT

ENVIRONMENTAL SALES · SERVICE · PARTS · RENTALS

Please Remit Payment to:
Owen Equipment Sales
PO Box 515458
Los Angeles, CA 90051 - 6758
Federal ID No: 27-0306529
(800) 992-3656

Account#	Order #	Brc	Sls
C10132	56705	12	370

I N V O I C E

Date	Invoice #	Page
10-24-22	00058045	1

Sold To: 001
CITY OF UNION CITY
34009 ALVARADO NILES ROAD
ATTN: AP - 510.487.9361
UNION CITY CA 94587

Ship To:
CITY OF UNION CITY
34650 SEVENTH ST
ATTN: AP - 510.487.9361

UNION CITY CA 94587
Ship Via GROUND FREIGHT

Entered By	Customer Purchase Order	Customer Contact	Ord Date
Miller	350	PAUL ROMAN	10-21-22

		Equip ID	Customer Job #	Customer Phone #
				510.675.5444

Ord	Ship	B/O	Part Number	Description	Unit Price	UM	Extended
20	20		7873222	SB SEGMENT SET	150.00	Ea	3,000.00
	1		CALIFORNIA FREIGHT (NON-TAXABLE)		222.87		222.87
			GLS FREIGHT TRACKING# 308476170				
				Sub Total			3,222.87
			CA	California Sales Tax			322.50

ENTERED
NOV 08 2022
BY: 1048334

PLEASE NOTE OUR NEW REMITTANCE ADDRESS
PO BOX 515458
LOS ANGELES, CA 90051-6758

Total Invoice
Due By:
11/23/22

3,545.37

SELLER EXPRESSLY DISCLAIMS ALL EXPRESS WARRANTIES ON PRODUCTS IT SELLS. ANY WARRANTY IS THAT OF THE MANUFACTURER ONLY AND NOT OF OWEN EQUIPMENT.

NO GOODS RETURNED WITHOUT RETURNED GOODS AUTHORIZATION. A RESTOCKING CHARGE OF 15% (20% FOR SPECIAL ORDERS) WILL BE APPLIED ON ITEMS ORDERED IN ERROR AND RETURNED WITHIN 30 DAYS.

PAYMENT TERMS:
PARTS INVOICES - NET 30 DAYS FROM DATE OF INVOICE
EQUIPMENT SALES & RENTAL INVOICES – NET 10 DAYS FROM DATE OF INVOICE. 1.5% FINANCE CHARGE PER MONTH (18% ANNUAL RATE).

ENVIRONMENTAL SALES • SERVICE • PARTS • RENTALS

Please Remit Payment to:
Owen Equipment Sales
PO Box 515458
Los Angeles, CA 90051 - 6758
Federal ID No: 27-0306529
(800) 992-3656

Account#	Order #	Brc	Sls
C10132	58669	12	370

I N V O I C E

Date	Invoice #	Page
04-06-23	00059609	1

Sold To: 001
CITY OF UNION CITY
34009 ALVARADO NILES ROAD
ATTN: AP - 510.487.9361
UNION CITY CA 94587

Ship To:
CITY OF UNION CITY
34650 SEVENTH ST
ATTN: AP - 510.487.9361
UNION CITY CA 94587
Ship Via GROUND FREIGHT

Entered By	Customer Purchase Order	Customer Contact	Ord Date
Miller	VERBAL	PAUL ROMAN	04-06-23

		Equip ID	Customer Job #	Customer Phone #
				510.675.5444

Ord	Ship	B/O	Part Number	Description	Unit Price	UM	Extended
20	20		7873222	SB SEGMENT SET	150.00	EA	3,000.00
	1		SHIPPING CLS TRACKING # 303040390		208.11		208.11
				Sub Total			3,208.11
			CA	California Sales Tax			322.50

ENTERED
10/28
1048334

NEW REMITTANCE ADDRESS EFFECTIVE IMMEDIATELY!
PO BOX 30640
LOS ANGELES, CA 90030-0640

Total Invoice Due By: 05/06/23 — 3,530.61

SELLER EXPRESSLY DISCLAIMS ALL EXPRESS WARRANTIES ON PRODUCTS IT SELLS. ANY WARRANTY IS THAT OF THE MANUFACTURER ONLY AND NOT OF OWEN EQUIPMENT.

NO GOODS RETURNED WITHOUT RETURNED GOODS AUTHORIZATION. A RESTOCKING CHARGE OF 15% (20% FOR SPECIAL ORDERS) WILL BE APPLIED ON ITEMS ORDERED IN ERROR AND RETURNED WITHIN 30 DAYS.

PAYMENT TERMS:
PARTS INVOICES - NET 30 DAYS FROM DATE OF INVOICE
EQUIPMENT SALES & RENTAL INVOICES – NET 10 DAYS FROM DATE OF INVOICE. 1.5% FINANCE CHARGE PER MONTH (18% ANNUAL RATE)

Parts Receipt History

By Part - 6/21/2022 to 6/13/2023

6/13/2023 9:02:03 PM

Coordinated Universal Time

Part Number: 7873222 (Main Shop) **Description: SEGMENT SET**

Date Received	PO Number	Invoice Number	Notes	Quantity	Per Unit Cost	Total Cost	Vendor Name	Receipt Notes
4/6/2023		00059609		20	$150.0000	$3000.00	Owen Equipment Company	
10/24/2022		00058045		20	$150.0000	$3000.00	Owen Equipment Company	
6/30/2022		00056859		20	$145.0000	$2900.00	Owen Equipment Company	
			Total Quantity/Cost	**60**		**$8,900.00**		

Total Extended Cost For All Parts **$8,900.00**

2022 & 2023 Vac Truck Operations for Catch Basins

DATE	MAINT 2	MAINT 1	VAC TRUCK HRS	CLEAN OUT C.B.	LOADS	H2O FILLS
1/31/22	1	2	8	9	1	1
2/1/22	1	2	8	8	1	1
2/11/22	1	1	8	9	1	1
2/14/22	1	2	4	2	1	3
3/25/22	1	2	8	8	1	1
3/30/22	1	2	6	5	1	1
4/5/22	1	2	8	13	1	1
4/11/22		2	8	7	4	1
4/17/22	1	1	8	5	1	1
6/27/22	1	3	8	6	2	2
7/25/22		2	8	6	1	1
7/29/22	1	1	8	7	1	1
8/11/22		2	8	9	2	2
8/25/22	1	2	8	5	1	1
10/24/22		3	8	6	1	1
10/31/22	1	2	8	3	1	1
11/1/22	1	1	8	7	1	1
11/2/22	1	1	8	10	2	2
12/12/22	1	1	8	15	2	2
12/13/22	1	1	8	15	2	2

2022 & 2023 Vac Truck Operations for Catch Basins

DATE	MAINT 2	MAINT 1	VAC TRUCK HRS	CLEAN OUT C.B.	LOADS	H2O FILLS
1/4/23	1		4	3	1/2	1
1/5/23	1	1	8	15	4	1
1/13/23	1	1	8	15	1	1
1/18/23		2	8	12	1	1
1/19/23		2	8	10	1	1
2/14/23	1	2	8	10	1	1
2/15/23		2	8	10	1	1
3/8/23	1	1	6	4	`1	1
3/10/23	1	2	8	8	1	1
3/13/23		2	4	2	1	1
3/20/23	1	1	8	9	1	1
3/28/23	1	1	8	6	1	1
4/6/23	1	2	8	20	1	2
4/7/23	1	2	8	5	1	1
DAY TOTALS	MAINT #2	MAINT #1	VAC TRUCK HRS	CLEAN OUT C.B.	LOADS	H2O FILLS
34	25	56	256 hrs	284	44 1/2	42

2022 & 2023 Vac Truck Operations for Catch Basins

DATE	MAINT 2	MAINT 1	VAC TRUCK HRS	CLEAN OUT C.B.	LOADS	H2O FILLS
DAY TOTALS	MAINT #2	MAINT #1	VAC TRUCK HRS	CLEAN OUT C.B.	LOADS	H2O FILLS
34	25	56	256 hrs	284	44 1/2	42
3	2	4	4hrs			
2	2	3	6hrs			
29	21	49	8hrs			
2022	15	35	154	155	28	27
2023	10	21	102	129	16 1/2	15
Street Maint. #2	$ 46.40 Hr					
Street Maint. #1	$ 41.92 Hr					
Vac Truck	$ 1,900 Day					

DECLARATION OF SANDRA MATHEWS IN SUPPORT OF TEST CLAIM

I, SANDRA MATHEWS, declare as follows:

1. I make this declaration in support of the Test Claim submitted by the City of Union City ("Union City" or "City"). Except where otherwise indicated, the facts set forth below are of my own personal knowledge and, if called upon to testify, I could and would competently testify to the matters set forth herein.

2. I have received the following degrees and credentials: Bachelor of Arts in Liberal Arts, History of Science, Technology and Society, and Linguistics, State University of New York at Stony Brook; Master's Program in Environmental and Waste Management, State University of New York at Stony Brook; Certified Professional in Erosion and Sediment Control, EnviroCert International.

3. I am employed by Larry Walker Associates as Vice President. In that position, I been the project manager for three consecutive five-year contracts supporting the Alameda Countywide Clean Water Program ("Alameda Countywide Program," or "Program"). Since January 2022, I have served as the Program's Interim Program Manager.

4. The Alameda Countywide Program is a consortium made up of the Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City; the County of Alameda; the District, and the Zone 7 Water Agency (collectively, the "Consortium"). The Program was created in 1991 through a Memorandum of Agreement ("MOA"). Among other things, the MOA established a General Program, which carries out activities in common on behalf of the Consortium. The MOA also established a management structure and funding mechanism to carry out general Program activities. I am aware of these facts in my role as Interim Program Manager.

5. I have served as the Program's Interim Program Manager since January 2022. In this role, I have primary responsibility on behalf of the Program for coordination of Alameda Countywide Program activities and support of its Management Committee leaders. My duties include preparing and modifying annual budgets and coordinating and submitting required program reports to the Regional Water Quality Control Board (San Francisco Bay Region) ("Regional Water Board"), serving as liaison to region-wide committees and workgroups, and advising the Consortium on compliance with federal and state laws, regulations, and orders.

6. Union City is subject to the Municipal Regional Stormwater NPDES Permit, Regional Water Board, San Francisco Bay Region, Order No. R2-2022-0019 (NPDES Permit No. CAS612008), issued by the Regional Water Board on May 11, 2022 ("MRP3") and effective on July 1, 2022. The MRP3 was amended in October 2023 by Order No. R2-2023-0019. I have reviewed the MRP3, as modified, and am familiar with its requirements.

7. I have also reviewed and am familiar with the requirements of Order No. R2-2015-0049 (NPDES Permit No. CAS612008), issued by the Regional Water Board on November 19, 2015 ("MRP2"), under which the City was also a Permittee. I have also reviewed and am familiar with the requirements of Order No. R2-2009-0074 (NPDES Permit No. CAS612008) issued by the Regional Water Board on October 14, 2009, amended by Order No. R2-2011-0083 on November 28, 2011 ("MRP1")

8. In order to provide the information required under Government Code section 17553, subdivision (b)(1)(E), I have been asked by the Program to provide a statewide cost estimate of increased costs that all local agencies will incur to implement the mandates of the MRP3 during the 23/24 fiscal year ("fiscal year" or "FY") – the fiscal year immediately following the fiscal year for which the claim was filed as required by Government Code section

17553(b)(1)(E). . The statewide costs are extrapolated from the Union City costs as set forth below. The Union City costs include individual Permittee costs (see Declaration of Farooq Azim ("Azim Declaration") in support of this Test Claim) *plus* Union City's share of the Program Costs. I provide actual FY 22/23 costs Program costs and estimated FY 23/24 (which ends June 30, 2024) costs and associated methodology below.

9. Union City Share of Program Costs. The Program incurred costs on behalf of the Consortium members in order to comply with MRP3 mandates. In my role as Interim Program Manager, I track and coordinate compliance actions taken by the Program on behalf of Consortium members. I investigated the Program's files and records, including consultant invoices, and interviewed Consortium members leading Program workgroups and subcommittees responsible for implementation of the MRP3, as necessary, to estimate the Program costs. The Program supports compliance work through subcommittees that are facilitated by a team of technical consultants. These consultants also provide technical services, such as the preparation of required reports and implementation of monitoring programs. Consultant invoices represent a mix of specific and general tasks. To estimate the Program costs associated with the specific provisions included in the Test Claim, the following assumptions were made based on my knowledge of the subcommittee work and/or by interviewing the Consortium members who oversee the work of the subcommittees.

a. C.3.b.ii(4) and C.3.b.ii.(5) – Consultant invoices characterize support in four general support functions: meetings; training; permittee support; and technical material updates. The MRP3 changes were a significant part of the effort for the permittee support and technical material updates in FY 22/23. I estimate two-thirds of the cost of these subtasks were related to the C.3.b.ii(4) and C.3.b.ii.(5) and are included in the summary.

Permittees are required to implement changes to the regulated projects in their new and redevelopment programs. To support this work, the Program revised the C.3 Technical Guidance Manual, prepared informational factsheets on the changes to regulated projects, held a training workshop, and provided technical guidance to members on the changes.

b. C.8.d – Consultant support for the planning and implementation of LID Monitoring is separately distinguished on the invoices. One of the consultants supporting this work is sub-consultant to another firm. For these invoices, the sub-consultant breaks out the C.8.d costs, but the prime firm roles up all the C.8 costs and applies a 10% mark-up fee (this is a standard mark-up used by all the prime firms working for the Program). Because sub-task costs are not distinguished on the prime firm's invoice, the costs were taken from the sub-consultant invoices and the 10% mark-up was added. Permittees are required to implement a monitoring program to measure compliance and the effectiveness of LID facilities. To meet this requirement, the Program collaborated with the other four countywide programs to form and fund the MRP3 required technical advisory group ("TAG"), developed a regional quality assurance plan, identified monitoring locations for permittees in Alameda County, developed a monitoring plan for LID facilities in Alameda County, revised the monitoring and quality assurance plans based on feedback from the TAG, and submitted the plans to the Regional Water Board. The plans were submitted to the Regional Water Board on May 1, 2023. The Program will incur additional costs throughout the MRP3 term to continue LID monitoring.

c. C.8.e – See the explanation for C.8.d, which also applies here. Permittees are required to implement a monitoring program to assess the effectiveness of trash control actions and evaluate whether areas determined to be controlled are contributing to trash impacts. To meet this

requirement, the Program collaborated with the other four countywide programs to form and fund the MRP3-required TAG, developed a regional quality assurance plan, identified trash monitoring locations and developed a monitoring plan for the selected sites in Alameda County, revised the monitoring and quality assurance plans based on feedback from the TAG, and submitted the plans to the Regional Water Board. The plans were submitted to the Regional Water Board on July 31, 2023. The Program will incur additional costs throughout the MRP3 term to continue trash monitoring.

d. C.8.f – See the explanation for C.8.d, which also applies here. Permittees are required to implement a monitoring program to assess inputs of select POCs to the Bay from local tributaries and urban runoff. To meet this requirement, the Program developed and submitted a POC monitoring plan as part of the Urban Creeks Monitoring Report on March 31, 2023, and initiated the required monitoring. The Program will incur additional costs throughout the MRP3 term to continue POC monitoring.

e. C.10.a.i and C.10.a.ii – Consultant invoices characterize support under one general support task. The MRP3 new requirements and modified higher levels of service were a portion of the support provided in FY 22/23 and I estimate 25% of the cost of the general work was in support of the new MRP3 C.10.a.i and C.10.a.ii Trash Reduction Requirements. Additionally, the Geographical Information System ("GIS") consultant breaks out costs by technical tasks, not permit provisions. The Consortium member who oversees this work estimates that 60% of the GIS support is for C.10 support, and in FY 22/23, 70% of that work was related to C.10.a.i and C.10.a.ii . Permittees are required to implement changes to their trash control programs, in particular, the addition of implementing controls for private land drainage areas. To support this work, the Program held subcommittee meetings and prepared guidance for members on the new requirements,

updates and modifications were made to GIS maps to support members, and GIS-based inspection applications were developed. The Program will incur additional costs throughout the MRP3 term to continue providing guidance to permittees.

f. C.10.e – Provision C.10.e of the MRP3 requires Permittees to collectively develop a Trash Impracticability Report that includes a process for both evaluating impracticability and implementing partial benefit actions to the maximum extent practicable by March 31, 2023. Consultant invoices characterize support under one general support task. The MRP3 new requirements and modified higher levels of service were a portion of the support provided and I estimate 25% of the cost of the general work was in support of the development of the C.10.e Trash Impracticability Report. The Alameda Countywide Program worked collaboratively with the four other countywide programs to fund the development of the Trash Impracticability Report. The Trash Impracticability Report was submitted to the Regional Water Board on March 27, 2023.

g. C.11.c/C.12.c – See the explanation for C.8.d, which also applies here. Permittees in Alameda County are collectively required to implement treatment controls on 664 acres of old industrial areas to reduce mercury and PCBs loads over the course of the permit term. According to the MRP3 Fact Sheet at A-255 [Section 7 p. S7-0514], "Because PCBs are more concentrated in some locations, the choice of where to implement control measures may be more influenced by known areas of PCBs contamination. However, the mercury removal benefit can be an important contribution to overall mercury load reductions, and available data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances." Thus, the Program conducted these two requirements concurrently and the costs cannot be separated by provision. To meet these

requirements, the Program developed the Old Industrial Area Control Measure Plan that included plans and schedules for implementing the required control measures to reduce PCBs and mercury. The plan was submitted in March 2023. Subsequent to submittal, the Program met with Regional Water Board staff and planned revisions to the plan, which are due in March 2024. The Program and Permittees will incur additional costs throughout the MRP3 term to implement the Old Industrial Area Control Measure Plan and to treat 664 acres of old industrial areas in Alameda County.

h. C.12.a – See the explanation for C.8.d, which also applies here. Permittees are required to quantify mercury and PCBs loads reduced through the implementation of pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented. To meet this requirement, the Program consultants tracked and analyzed data on control measure implementation to calculate loads reduced. The Program will incur additional costs throughout the MRP3 term to track load reductions for Permittees.

i. C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j) – The Consortium member who oversees the GIS work estimates that 30% of the GIS support is for C.3 support, and in FY 22/23, 20% of that work was related to C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j). As a modified higher level of service requirement, Permittees are required to implement the Green Infrastructure Plans that they developed under MRP2. To meet this requirement, the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects. The Program will incur additional costs throughout the MRP3 term to maintain the GIS system and Permittees will incur additional cost to update and implement their Green Infrastructure Plans.

j. C.17.a – This special project is identified individually on consultant invoices. Permittees are required to develop and submit a regional best management practice report to identify control measures to address non-stormwater discharges associated with unsheltered homeless populations and identify milestones to reduce such discharges. To meet this new MRP3 requirement, the Program collaborated with the other four countywide programs on a regional project to develop the required best management practice report, which was submitted with each Permittee's FY 22/23 annual report. Additionally, each Permittee is required to submit a map identifying, the approximate locations of unsheltered homeless populations, including encampments and other areas where other unsheltered homeless people live relative to storm drains, creeks, and flood control channels. To support its members, the Program worked with County officials to obtain the required geo-located point in time count data, developed an approach for creating the maps, and updated its GIS system to produce the required maps for each of its members. Members submitted the maps with their FY 22/23 annual report. The Permittees will incur additional costs throughout the MRP3 term to implement the best management practices.

k. C.20.b – This special project is identified individually on consultant invoices. Permittees are required to develop and submit a cost reporting framework and methodology to guide the preparation of a fiscal analysis of the capital and operation and maintenance costs incurred to comply with MRP3. To meet this new requirement, the Program collaborated with the other four countywide programs on a regional project to develop the cost reporting framework and methodology, which was submitted on June 26, 2023. Updates to the cost reporting framework and methodology based on Regional Water Board comments are in process. The Program will additionally provide training for its members on the use of the cost reporting

framework and methodology. The Permittees will incur additional costs throughout the MRP3 term to track and report permit implementation costs.

l. C.21.b – This special project is identified individually on consultant invoices. Permittees are required to develop and implement an asset management plan to ensure the satisfactory condition of all hard assets constructed during MRP3 and the pervious permit terms pursuant to provisions C.2, C.3, C.10, C.11, C.12, C.13, and C.17. Additionally, Permittees are required to develop and submit a climate change adaptation report to identify potential climate change-related threats to assets and appropriate adaptation strategies. To help Permittees meet these new requirements the Program initiated work on a framework to guide the development of the asset management plans by individual members. The Permittees will incur additional costs throughout the MRP3 term to develop and implement their asset management plans. The Program and Permittees will incur additional costs to develop the climate change adaptation report.

m. C.8 continuing costs (MRP1 Test Claim) – See the explanation for C.8.d. However, for some of the subtasks, I estimated that one-half of the effort for Program and Regional meetings was related to C.8 so the effort for these subtasks was reduced by fifty percent. Permittees are required to implement monitoring programs. To meet these requirements, the Program develops and implements an area-wide monitoring program on behalf of its members. The Program develops and implements the required monitoring program and participates in regional monitoring planning meetings and discussions on behalf of its members.

n. C.10.b continuing costs (MRP2 Test Claim) – Consultant invoices characterize support under one general support task. The continuing costs were a portion of the support provided and I estimate that 25% of the general work was in support of the continuing costs. Permittees are required

to install and maintain full trash capture systems. To support this work, the Program continued support for members by holding subcommittee meetings and providing guidance on the inspection and maintenance of full trash capture system, visual assessments, calculation of discharge reductions and source controls.

o. C.11/C.12 continuing costs (MRP2 Test Claim) – There were continuing costs associated with the GIS system to support compliance with these provisions. The Consortium member who oversees this work estimates that 10% of the GIS support is for C.11/C.12 support, and in FY 22/23 100% of that work was related to C.11.e and C.12.f. Permittees are required to implement green infrastructure projects to reduce mercury and PCBs loads. To support its members, the Program continued to maintain a GIS platform for members to track their green infrastructure projects. The GIS platform provides a centralized method to track projects and calculate load reductions.

10. Below is summary of the Program's actual FY 22/23 costs incurred regarding the MRP3 and continuing MRP1 and MRP2 mandates at issue in Union City's Test Claim. These costs cover the entire FY 22/23. The documentation for the Program costs is set forth in **Exhibit 1** hereto. Union City's share of Program costs (5.31%) was derived from a formula based in part on the relative area and population of the Program member agencies. The Program sets the annual member contribution based on the MRP implementation costs handled by the Program. The annual member contribution level for FY 22/23 was $2,535,000 for all Program costs regarding the MRP3, for which Union City's paid 5.31% or $134,609. Union City's share of actual Program costs FY 22/23 (which is the same one-year period of the first year of the MRP3 term) are as follows:

Task	Applicable Invoice (see **Exhibit 1**)	Program Costs	Union City Share of Program Costs (5.31%)
MRP3 New / Increased Programs			
C.3.b.ii(4) and C.3.b.ii.(5)(New or Widening Roads and Road Reconstruction) [New Requirements]	LWA: 436.14-22, 436.14-23, 436.14-24, 436.14-25, 436.14-26, 436.14-27, 436.14-28, 436.14-29, 436.14-30, 436.14-31	$41,418.96	$2,199.35
C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j) (Green Infrastructure Retrofits and update their Green Infrastructure Plans) [New and Modified Requirements]	Psomas: 233-187476, 233-188514, 236-188514, 236-189563, 233-189563, 236-189861, 236-190853, 236-192070, 236-193162, 236-193892, 236-195324	$5,522.16	$293.23
C.5.f (MS4 Maps) [New Requirement]		None	$0
C.8.d, C.8.e and C.8.f (New Water Monitoring Requirements) [Modified Higher Levels of Service Requirements]	AMS: 430-21/20, 430-21/21, 430-21/22, 430-21/23, 430-21/24, 430-21/25, 430-21/26, 430-21/27, 430-21/28, 430-21/29, 430-21/30, 430-21/31 LWA: 436.14-22, 436.14-23 ,436.14-24, 436.14-25, 436.14-26, 436.14-27, 436.14-28, 436.14-29, 436.14-30, 436.14-31	$289,528.06	$15,373.94
C.10.a.i and C.10.a.ii (Trash Load Reduction and Trash Control on Private Lands) [Both New Requirements and Modified Higher Levels of Service Requirements]	EOA: AL22X-0123, AL22X-0223 AL22X-0323, AL22X-0423, AL22X-0523, AL22X-0623, AL22X-0722, AL22X-0822, AL22X-0922, AL22X-1022, AL22X-1122, AL22X-1222 Psomas: 233-187476, 233-188514, 236-	$52,362.35	$2,780.44

Task	Applicable Invoice (see **Exhibit 1**)	Program Costs	Union City Share of Program Costs (5.31%)
	188514, 236-189563, 233-189563, 236-189861, 236-190853, 236-192070, 236-193162, 236-193892, 236-195324		
C.10.e (Impracticability Report) [New Requirement]	EOA: AL22X-0123, AL22X-0223, AL22X-0323, AL22X-0423, AL22X-0523, AL22X-0623, AL22X-1022, AL22X-1122, AL22X-1222	$11,977.25	$635.99
C.11.c and C.12.c. (Mercury and PCBs Controls on Old Industrial Lands) [Modified Higher Levels of Service Requirements]	LWA: 436.14-22, 436.14-23, 436.14-24, 436.14-25, 436.14-26, 436.14-27, 436.14-28, 436.14-29, 436.14-30, 436.14-31	$59,429.70	$3,155.72
C.12.a (Quantify PCBs Reductions) [Modified Higher Levels of Service Requirement]	LWA: 436.14-20, 436.14-21	$6,619.25	$351.48
C.15.b.iii(Firefighting Discharges Working Group) [New Requirement]	EOA: AL22X-0223, AL22X-0323, AL22X-0423, AL22X-0523, AL22X-0623,	$5,275.75	$280.14
C.17.a Homelessness) [New Requirement]	AMS: 430-21/24, 430-21/25, 430-21/26, 430-21/27, 430-21/28, 430-21/29, 430-21/30, 430-21/31	$42,002.97	$2,230.36
C.20.b. (Cost Reporting Framework) [New Requirement]	EOA: AL22X-0123, AL22X-0223, AL22X-0323, AL22X-0423, AL22X-0523, AL22X-0623, AL22X-0822, AL22X-0922, AL22X-1022, AL22X-1122, AL22X-1222	$54,197.00	$2,877.86
C.21.b (Asset Management Plan) [New Requirement]	AMS: 430-21/28, 430-21/29, 430-21/30, 430-21/31	$8,833.84	$469.08

Task	Applicable Invoice (see **Exhibit 1**)	Program Costs	Union City Share of Program Costs (5.31%)
TOTAL MRP3 New/Increased FY22/23 Actual Costs			**$30,647.59**
Continuing MRP1 and MRP2 Test Claims Provisions			
C.8 (Water Quality Monitoring)	LWA: 436.14-20, 436.14-21, 436.14-22, 436.14-23, 436.14-24, 436.14-25, 436.14-26, 436.14-27, 436.14-28, 436.14-29, 436.14-30, 436.14-31 AMS: 430.21/20, 430.21/21, 430.21/22, 430.21/23, 430.21/24, 430.21/25, 430.21/26, 430.21/27, 430.21/28, 430.21/29, 430-21/30, 430-21/31	$209,164.61	$11,106.64
C.10.b (Trash Capture Maintenance)	EOA: AL22X-0123, AL22X-0223, AL22X-0323, AL22X-0423, AL22X-0523, AL22X-0623, AL22X-0722, AL22X-0822, AL22X-0922, AL22X-1022, AL22X-1122, AL22X-1222	$30,273.72	$1,607.53
C.11.e, C.12.f (C.11.c,C.12.c of the MRP2) (Green Infrastructure Projects)	Psomas: 233-187476, 233-188514, 236-188514, 236-189563, 233-189563, 236-189861, 236-190853, 236-192070, 236-193162, 236-193892, 236-195324, 197552, 198218	$9,203.60	$488.71
C.12.h (C.12.d in the MRP2) (RAA Plans)		None	$0

11. As set forth in paragraph 10 above, the total amount of Union City's share of actual Program costs for fiscal year 22/23 for the new programs

or higher levels of service for the MRP3 Provisions pled in this Test Claim (Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b) is $30,648. As set forth in paragraph 10 above and in the Azim Declaration at paragraph 8, the total amount of Union City's actual increased costs for fiscal year 22/23 for the new programs and higher levels of service for the MRP3 Provisions pled in this Test Claim (C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b) **$51,619.**

12. The continuing monitoring required under Provision C.8 (i.e., monitoring requirements that are not new in the MRP3) is allocated to the countywide programs roughly based on the relative populations of the counties.

13. The costs for implementation of MRP3 will continue in FY 23/24. The Program has approved a budget for FY 23/24 and this budget was used to extrapolate test claim costs. Similar assumptions were made regarding apportioning non-specific costs as are described in paragraph 9 above. The Union City share of the estimated FY 23/24 new and continuing Program costs for MRP3 is **$49,334.**

New or Modified Higher Levels of Service for MRP3	Estimated FY 23/24 Costs	Brief Description	Anticipated Activities FY 23/24	Basis of FY 23/24 Cost Estimates	Union City Cost Share (5.31%)
C.10.a.i and C.10.a.ii	$67,750	Trash Reduction Support	Program member support and guidance materials on trash load reductions. GIS support for work.	Program Approved 23/24 Revised Budget	$3,598
C.10.e	$0	Regional Trash Impracticability Report	Report was submitted in 22/23.	Program Approved 23/24 Revised Budget	$0.00

New or Modified Higher Levels of Service for MRP3	Estimated FY 23/24 Costs	Brief Description	Anticipated Activities FY 23/24	Basis of FY 23/24 Cost Estimates	Union City Cost Share (5.31%)
C.11c/C.12.c	$41,250	Old Industrial Area Plan and Support	Annual progress accounting, revisions to the Old Industrial Area Control Measure Plan, initial planning for development of regional control projects.	Program Approved 23/24 Revised Budget	$2,190
C/11.a/C.12.a	$16,500	Pollutant of Concern (POC) Load Reduction Report	Annual progress accounting.	Program Approved 23/24 Revised Budget	$876
C.15.b.iii	$26,000	Firefighting Discharges work group	Participate in regional workgroup meetings, contribution to regional tasks, collaborating with other organizations. and Program member guidance and support.	Program Approved 23/24 Revised Budget	$1,381
C.17.a	$25,000	Unsheltered Homeless work group	Regional coordination and updates to final report, coordination and support for Program member mapping, annual report assistance.	Program Approved 23/24 Revised Budget	$1,328
C.20.b	$37,000	Cost Reporting Framework	Revise final framework, Program workgroup meetings, Program member support and training, and regional workgroup meetings.	Program Approved 23/24 Revised Budget	$1,965
C.21.b	$68,000	Asset Management Framework	Draft and finalize a framework, Program workgroup meetings, regional coordination, Program member support, coordination.	Program Approved 23/24 Revised Budget	$3,611
C.3.b.ii(4) and C.3.b.ii.(5)	$34,980	C.3 Regulated Project Support	Program member support and guidance materials on regulated projects, new factsheets, revisions to C.3 Technical Guidance Manual.	Program Approved 23/24 Revised Budget	$1,857
C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4) and C.3.j.ii.(2)(a)-(j)	$22,800	Green Infrastructure Planning and Implementation	Special project to evaluate options for alternative compliance programs; initiate regional project for long term green	Program Approved 23/24 Revised Budget	$1,211

New or Modified Higher Levels of Service for MRP3	Estimated FY 23/24 Costs	Brief Description	Anticipated Activities FY 23/24	Basis of FY 23/24 Cost Estimates	Union City Cost Share (5.31%)
			stormwater infrastructure numeric targets and form TAG, and GIS support for Program members.		
C.8.d	$258,800	LID Monitoring	Monitoring plan revisions, TAG meetings, equipment purchase and installation, conduct sampling events.	Program Approved 23/24 Revised Budget	$13,742
C.8.e	$189,000	Trash Monitoring	Monitoring plan revisions, TAG meetings, equipment purchase and installation, conduct sampling events, match for Water Quality Improvement Fund grant.	Program Approved 23/24 Revised Budget	$10,036
C.8.f	$142,000	POC Monitoring Support	Planning support, conduct sampling events, contribution to Regional Monitoring Program (RMP).	Program Approved 23/24 Revised Budget	$7,540
Total	**$929,080**				**$49,334**

14. As set forth in paragraph 13 above, the total amount of Union City's share of estimated Program costs for fiscal year 23/24 for the new programs or higher levels of service for the MRP3 Provisions pled in this Test Claim (Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21.b) is $49,334. As set forth in paragraph 13 above and in the Azim Declaration at paragraph 8, the total estimated amount of Union City's increased costs for fiscal year 23/24 for the new programs and higher levels of service for the MRP3 Provisions pled in this Test Claim (Provisions C.3.b.ii(4), C.3.b.ii.(5), C.3.j.ii.(1)(a)-(g), C.3.j.ii.(4), C.3.j.ii.(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b and C.21) is **$852,749**.

15. Estimated Statewide Costs. MRP3 requirements apply to the 79 cities, counties, and flood control districts subject to MRP3. Costs for each of the Permittees will vary depending on a number of factors specific to each of the Permittees. However, the population of each Permittee is a primary determining factor in the cost to comply with MRP3 requirements. In the MRP3, for example, the required mercury and PCBs load reductions are explicitly determined by each agency's population. (MRP3 Provision C.11.a.ii at C.11-1 – 2 and Provision C.12.a.ii at C.12-1 – 2.) Entities with higher populations will tend to have higher levels of trash reduction required to meet the MRP3's required trash reductions. These higher population entities tend to have higher levels of unsheltered homeless populations requiring more engagement by the MS4s to implement best management practices to control associated pollutants. The more extensive municipal infrastructure associated with larger entities will increase costs and effort associated with other new MRP provisions including asset management, cost reporting, and implementing best management practices associated with emergency firefighting discharges. Monitoring requirements in Provision C.8 vary generally based upon the relative populations of the countywide programs. As Union City is a fairly typical Bay Area city, it is reasonable to extrapolate from Union City costs to the entire MRP3 area based upon the relative population of Union City compared to the population of the entire area covered by MRP3. According to the MRP3, Union City's population is 74,107 (MRP3 at Attachment H-2). According to the MRP3, the population for the entire MRP area is 5,917,090 (MRP3 at Attachment H-5). The population of the entire MRP population is approximately 80 times the population of Union City. Based on information obtained from Union City (see Azim Declaration) and extrapolating statewide costs based on the relative population of Union City as compared to the MRP area, I estimate the FY 23/24 statewide costs as follows:

Task	Estimated Union City FY 23/24 Costs [1]	Union City Share of FY 23/24 Program Costs (5.31%)	Total Union City Costs	**Estimated FY 23/24 Statewide Costs (80 x Union City)**
MRP3 New or Modified Higher Levels of Service Programs	$803,415	$49,334	$852,749	**$68,200,880**

16. I investigated the pertinent consultant invoices that were provided by the District and consulted with the Consortium members who oversee the work of the subcommittees to determine the precise date that the Program, acting on behalf of Union City and other members, first incurred increased costs as a result of the new activities and modified existing activities mandated by MRP3. The start of MRP3 coincided with the start of the Program's fiscal year, July 1, 2022, which is the same date that consultant invoices indicate incurred costs as a result of implementing the new activities and modified existing activities mandated by MRP3.

17. I have personally compiled the information in the tables above related to actual FY 22/23 Program costs for the entire fiscal year and estimates of FY 23/24 Program costs and believe that the information they contain is accurate.

I declare under penalty of perjury under the laws of the state of California that the foregoing is true and correct to the best of my knowledge.

Executed on May 20, 2024, at Berkeley, California.

SANDRA MATHEWS

5721835.3

[1] The estimated Union City costs for FY 23/24 are set forth the Azim Declaration in support of this Test Claim.

EXHIBI T 1
to Section 6.2
(Mathews Dec)

APPLIED marine SCIENCES

August 31, 2022

Invoice No. 430-21/20

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: July 1-31, 2022

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$53,592.07	$6,407.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support	$0	$22,501.00	$14,175.00	$8,326.00
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$5,779.59	$330,000.00	$50,866.77	$279,133.23
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$6,105.00	$107,000.00	$6,105.00	$100,895.00
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$215.00	$42,000.00	$215.00	$41,785.00
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$215.00	$54,000.00	$215.00	$53,785.00
				Total:	$12,314.59	$1,106,551.00	$614,206.23	$492,344.77

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Invoice No. 430-21/20

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
7/1/22-7/31/22

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1		Task Total
Labor	**Rate**	**Hours**	**Charges**	
Principal Scientist-JJ	$231.75			
Program Manager-PS	$215.00	24	$5,160.00	$9,780.00
Principal Scientist-MB	$165.00			
Principal Scientist-AM	$185.00			
Staff Scientist-ES	$110.00			
Staff Scientist-EG	$110.00			$27.50
Staff Scientist-CH	$115.00			
Adminstrative-DS	$110.00			
Adminstrative-DC	$125.00			
Subcontractors				
Kinnetic Environmental (ADH)				$31,220.09
Bioassessment Services				$4,251.89
San Jose State University				$1,000.00
Benjamin Salop			$360.00	$360.00
Direct Expenses			$194.42	$473.12
G&A 10% (Subs only)			$36.00	$3,683.20
G&A 15% (ODC's only)			$29.17	$70.97
Total Invoiced			$5,779.59	$50,866.77
TOTALS:				
Authorized Budget			$330,000.00	$330,000.00
Prior Invoiced Amount			$45,087.18	$45,087.18
Current Invoice			$5,779.59	$5,779.59
Budget Remaining			$279,133.23	$279,133.23

Task 7 Amount Due:	$5,779.59

Invoice No. 430-21/20

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
7/1/22-7/31/22

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	18.5	$3,977.50				$3,977.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00	11.5	$2,127.50				$2,127.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$6,105.00				$6,105.00
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount							
Current Invoice			$6,105.00				$6,105.00
Budget Remaining			$100,895.00				$100,895.00

Task 8 Amount Due:	$6,105.00

Invoice No. 430-21/20

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
7/1/22-7/31/22

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	1	$215.00				$215.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$215.00				$215.00
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount							
Current Invoice			$215.00				$215.00
Budget Remaining			$41,785.00				$41,785.00

Task 9 Amount Due:	$215.00

Invoice No. 430-21/20

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
7/1/22-7/31/22

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	1	$215.00				$215.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$215.00				$215.00
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount							
Current Invoice			$215.00				$215.00
Budget Remaining			$53,785.00				$53,785.00

Task 10 Amount Due:	$215.00

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Sunday, August 14, 2022
Page 1

Name: Paul Salop
Description: 430 Dry Season P&T Monitoring
Notes: Charged on AMEX

Report Dates:
Begin Date 7/12/2022
End Date 7/12/2022

Report Amounts:
Advance Amount 0.00
Total Amount 194.42

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
7/12/2022	430	ACCWP	Creek Status Monitoring - Implementation	Travel	U-Haul	0.00	132.8400	132.84		American Express	☐	☐
7/12/2022	430	ACCWP	Creek Status Monitoring - Implementation	Lab Supply	Safeway	0.00	0.0000	19.81		American Express	☐	☐
7/12/2022	430	ACCWP	Creek Status Monitoring - Implementation	Travel	South Front Gas	0.00	41.7700	41.77		American Express	☐	☐
							Total:	**194.42**				
							Advance:	**0.00**				
							Credit Card:	**-194.42**				
							Personal:	**0.00**				
							Net Due:	**0.00**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	08/01/22
Accounting:	Dovlynn Cammack	08/14/22

U-HAUL® Receipt

In-Town Return (In)

Contract No: 24794913
Tuesday, July 12, 2022 4:42 PM

U-HAUL MOVING & STORAGE OF LIVERMORE
815048

3429 GARDELLA PLAZA
LIVERMORE, CA 94550

(925) 455-1100

Customer Name:
Paul Salob
4749 Bennett Drive STE L
LIVERMORE, CA 94551

Cust Ph - EMail:
(510) 323-6523
stafford@amarine.com

Authorized Driver(s): Paul Salob

Corporate Account: APPLIED MARINE SCIENCES, INC

Rental Date/Time: 7/12/2022 8:24 AM
Return Date/Time: 7/12/2022 4:40 PM
Chargeable Rental Periods: 1

Equipment	MI Out	MI In	MI Rate	MI Charge	Coverage	Missing/Damage Charge	Rental Rate	Rental Charge	Actual Charges
BE - Cargo Van BE2058G AL08601-AZ	13444.0	13570.0	$0.79 x 126.00	$99.54	--	$0.00	$19.95	$19.95	$119.49

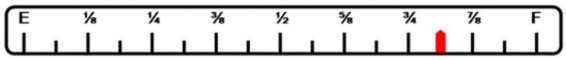

Environmental Fee:	$1.00
Subtotal:	$120.49
Rental Tax:	$12.35
Total Rental Charges	$132.84
Corporate Move Payment:	$132.84
Net Paid Today:	$132.84

Corporate Account # 744599224471
PONumber:
Auth: 621001

- I confirm that during the term of my rental there was not an accident involving the rented U-Haul equipment and no incidence where this equipment struck or otherwise caused damage to any person or property either while on a public road or private property. There was no injury or damage sustained by me or any other drivers or passengers of this equipment.
- **Pickup and Van Best Rate Guarantee:** At the end of your rental we will calculate the best deal for you. Be it our most popular ($19.95 plus mileage rate) or (a combination of the daily, weekly, and monthly rental rates with included mileage). Monthly rate is for 28 days.

Zachary Acton

X _____

Paul Salob

U-Haul Signature - (Zachary Acton)

MobileContractClose

430-7
RENTAL VAN
FUEL

4904 Southfront Rd
Livermore CA 94551

DBA SOUTH FRONT GAS
09480831
4904 SOUTH FRONT S
LIVERMORE , CA
94551
07/12/2022 787241455
06:03:51 PM

XXXX XXXXXX X2027
AMEX
INVOICE 180159
AUTH 00-806260
REF0712180159027

PUMP# 5

REGULAR	6.963G
PRICE/GAL	$5.999

FUEL TOTAL $ 41.77

TOTAL = $ 41.77

CREDIT $ 41.77

AMERICAN EXPRESS
AID: A0000000025010801
TC: 6B6068915AFE8F2DC
COMPLETION
Entry: CHIP
Batch: 39 Seq Num: 13
Term ID: 5
ZIP ENTERED
Workstation ID: 00
Tell us about
your visit for a
chance to win
a gas gift card!
Gasfeedback.com

Cardholder Copy

TO SUBMIT A RESUME!

430-7
ICE

SAFEWAY

Store 1257 Dir Denise Medina
Main:(925) 455-2520 Rx:(925) 455-2522
4495 First Street
LIVERMORE CA 94550

REFRIG/FROZEN

3 QTY ARTIC GLAC	17.97 B
TAX	1.84
**** BALANCE	19.81

Credit Purchase 07/12/22 09:16
CARD # **********2027
REF: 901643420270 AUTH: 00824487

PAYMENT AMOUNT 19.81

AL AMERICAN EXPRESS
AID A000000025010801
TVR 0800008000
TSI E800

AMEX 19.81

CHANGE 0.00
TOTAL NUMBER OF ITEMS SOLD = 3
07/12/22 09:16 1257 6 39 0653

Now Hiring!
Inquire at Customer Service

POINTS EARNED TODAY
Base Points 17
Total 17

Points Towards Next Reward 5 of 100

REWARDS AVAILABLE 8

YOUR CASHIER TODAY WAS YADIRA

July 13, 2022

INVOICE
PSA # 2022-0002

Diane Stafford
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551

Re: Sampling Support for ACCWP Dry Season Pesticides and Toxicity Monitoring

My expenses associated with monitoring conducted on July 12, 2022 are identified below.

Conduct Monitoring (9 hrs @ $40.00 per hr) ..... $ 360.00

Expense reimbursement
None

TOTAL DUE THIS INVOICE.....$360.00

Make check payable to: Benjamin Salop

Remit payment to: 121 Glen Eden Ave
Oakland, CA 94611

Please contact me with any questions on this invoice.

Best,

Benjamin Salop

Benjamin Salop

APPLIED marine SCIENCES

October 3, 2022

Invoice No. 430-21/21

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: August 1-31, 2022

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$53,592.07	$6,407.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support	$0	$22,501.00	$14,175.00	$8,326.00
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$6,692.50	$330,000.00	$57,559.27	$272,440.73
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$4,285.35	$107,000.00	$10,390.35	$96,609.65
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$1,505.00	$42,000.00	$1,720.00	$40,280.00
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$215.00	$54,000.00	$430.00	$53,570.00
				Total:	$12,697.85	$1,106,551.00	$626,904.08	$479,646.92

okay to pay G33

SG

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Invoice No. 430-21/21

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
8/1/22-8/31/22

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	31	$6,665.00				$16,445.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00	0.25	$27.50				$55.00
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							$31,220.09
Bioassessment Services							$4,251.89
San Jose State University							$1,000.00
Benjamin Salop							$360.00
Direct Expenses							$473.12
G&A 10% (Subs only)							$3,683.20
G&A 15% (ODC's only)							$70.97
Total Invoiced			$6,692.50				$57,559.27
TOTALS:							
Authorized Budget			$330,000.00				$330,000.00
Prior Invoiced Amount			$50,866.77				$50,866.77
Current Invoice			$6,692.50				$6,692.50
Budget Remaining			$272,440.73				$272,440.73

Task 7 Amount Due:	$6,692.50

Invoice No. 430-21/21

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
8/1/22-8/31/22

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	17.5	$3,762.50				$7,740.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00	0.5	$92.50				$2,220.00
Senior Scientist-TV	$120.00	3.5	$420.00				$420.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses			$9.00				$9.00
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$1.35				$1.35
Total Invoiced			$4,285.35				$10,390.35
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$6,105.00				$6,105.00
Current Invoice			$4,285.35				$4,285.35
Budget Remaining			$96,609.65				$96,609.65

Task 8 Amount Due:	$4,285.35

Invoice No. 430-21/21

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
8/1/22-8/31/22

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	7	$1,505.00				$1,720.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$1,505.00				$1,720.00
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$215.00				$215.00
Current Invoice			$1,505.00				$1,505.00
Budget Remaining			$40,280.00				$40,280.00

Task 9 Amount Due:	$1,505.00

Invoice No. 430-21/21

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
8/1/22-8/31/22

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	1	$215.00				$430.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$215.00				$430.00
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$215.00				$215.00
Current Invoice			$215.00				$215.00
Budget Remaining			$53,570.00				$53,570.00

Task 10 Amount Due:	$215.00

APPLIED marine SCIENCES

October 12, 2022

Invoice No. 430-21/22

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: September 1-30, 2022

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$53,592.07	$6,407.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support	$0	$22,501.00	$14,175.00	$8,326.00
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$26,121.04	$330,000.00	$83,680.31	$246,319.69
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$9,871.29	$107,000.00	$20,261.64	$86,738.36
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$537.50	$42,000.00	$2,257.50	$39,742.50
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$3,553.97	$54,000.00	$3,983.97	$50,016.03
				Total:	$40,083.80	$1,106,551.00	$666,987.88	$439,563.12

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

okay to pay G33
SG

Invoice No. 430-21/22

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
9/1/22-9/30/22

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	25.5	$5,482.50				$21,927.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00	12.25	$1,347.50				$1,402.50
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							$31,220.09
Bioassessment Services							$4,251.89
San Jose State University							$1,000.00
Benjamin Salop							$360.00
Caltest			$17,488.30				$17,488.30
Direct Expenses			$46.88				$520.00
G&A 10% (Subs only)			$1,748.83				$5,432.03
G&A 15% (ODC's only)			$7.03				$78.00
Total Invoiced			$26,121.04				$83,680.31
TOTALS:							
Authorized Budget			$330,000.00				$330,000.00
Prior Invoiced Amount			$57,559.27				$57,559.27
Current Invoice			$26,121.04				$26,121.04
Budget Remaining			$246,319.69				$246,319.69

Task 7 Amount Due:	$26,121.04

Invoice No. 430-21/22

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
9/1/22-9/30/22

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	30	$6,450.00				$14,190.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00	16.25	$1,950.00				$2,370.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00	8.25	$907.50				$907.50
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses			$490.24				$499.24
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$73.55				$74.90
Total Invoiced			$9,871.29				$20,261.64
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$10,390.35				$10,390.35
Current Invoice			$9,871.29				$9,871.29
Budget Remaining			$86,738.36				$86,738.36

Task 8 Amount Due:	$9,871.29

Invoice No. 430-21/22

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
9/1/22-9/30/22

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	2.5	$537.50				$2,257.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$537.50				$2,257.50
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$1,720.00				$1,720.00
Current Invoice			$537.50				$537.50
Budget Remaining			$39,742.50				$39,742.50

Task 9 Amount Due:	$537.50

Invoice No. 430-21/22

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
9/1/22-9/30/22

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	16.5	$3,547.50				$3,977.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses			$5.63				$5.63
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$0.84				$0.84
Total Invoiced			$3,553.97				$3,983.97
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$430.00				$430.00
Current Invoice			$3,553.97				$3,553.97
Budget Remaining			$50,016.03				$50,016.03

Task 10 Amount Due:	$3,553.97

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Sunday, September 25, 2022
Page 1

Name: Ellen Goldenberg
Description: 430 ACCWP temp logger retrieval
Notes: Travel to eight sites in Alameda County

Report Dates:
Begin Date 9/20/2022
End Date 9/20/2022

Report Amounts:
Advance Amount 0.00
Total Amount 46.88

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Print
9/20/2022	430	ACCWP	Creek Status Monitoring - Implementation	Mileage		75.00	0.6250	46.88			£	£
							Total:	46.88				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	46.88				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor:	Paul Salop	09/23/22
Accounting:	Dovlynn Cammack	09/25/22

NELAP/ORELAP Certification 4036

Caltest

ENVIRONMENTAL ANALYSES

CA-ELAP Certification 1664

Invoice

Invoice No: 636520

Lab Order : X070521
Project : ACCWP - DRY SEASON CHEMISTRY
Sampled : CLIENT

Invoice Date : 9/21/2022
Received : 7/13/2022
Invoice Terms ** : Net 30
Purchase Auth/PO : 3377

Invoice To : Diane Stafford
Applied Marine Sciences
4749 Bennett Dr
Suite L
Livermore, CA 94551

Report To : Paul Salop 925-373-7142
Applied Marine Sciences, Inc.
4749 Bennett Dr
Suite L
Livermore, CA 94551

Description	TAT	Qty	PerUnit	Total Cost
8321 Pesticides by HPLC (3 sample min)	Standard	2 @	459.00	918.00
Electronic Deliverable	Standard	2 @	45.00	90.00
Grain Size Analysis	Standard	2 @	140.00	280.00
PAH Extended List, LL (3 sample min)	Standard	2 @	535.00	1,070.00
Pyrethroids & Fipronil (3 sample min)	Standard	2 @	535.00	1,070.00
Total Organic Carbon (3 sample minimum)	Standard	2 @	95.00	190.00
Total,6020,SO,ICPMS	Standard	2 @	286.00	572.00

Please reference the invoice number on your remittance. **Invoice Total** **$4,190.00**

Remit To: CALTEST ANALYTICAL LABORATORY
1885 North Kelly Road
Napa, California 94558
(707) 258-4000

AMS
Project # 430 -7
Contract
Review
DS
Paul Salop 9/27/22

** Payment due 30 days from Invoice Date – Past Due Balances subject to a FINANCE CHARGE of 1.5% per month **
*** Securely pay invoices online using VISA, Master Card or American Express at CaltestLabs.com ***

Wednesday, September 21, 2022

1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

NELAP/ORELAP Certification 4036

Caltest

ENVIRONMENTAL ANALYSES

CA-ELAP Certification 1664

Invoice

Invoice No: 635454

Lab Order : X040037
Project : ACCWP - RMC CREEK STATUS MONIT
Sampled : CLIENT

Invoice Date : 8/8/2022
Received : 4/26/2022
Invoice Terms ** : Net 30
Purchase Auth/PO : 3281

Invoice To : Diane Stafford
Applied Marine Sciences
4749 Bennett Dr
Suite L
Livermore, CA 94551

Report To : Paul Salop 925-373-7142
Applied Marine Sciences, Inc.
4749 Bennett Dr
Suite L
Livermore, CA 94551

Description	TAT	Qty	PerUnit	Total Cost
Ammonia as Nitrogen (NH3-N)	Standard	22 @	43.35	953.70
Ash-Free Dry Weight	Standard	22 @	48.00	1,056.00
Chloride, by Ion Chromatography	Standard	22 @	46.75	1,028.50
Chlorophyll	Standard	22 @	98.00	2,156.00
Electronic Deliverable	Standard	22 @	15.00	330.00
Nitrate as N (NO3-N)	Standard	22 @	46.75	1,028.50
Nitrite as N (NO2-N),Low Level	Standard	22 @	59.50	1,309.00
Nitrogen, Total Kjeldahl (TKN)	Standard	22 @	68.85	1,514.70
Phosphate as P, Ortho, Dissolved (LL)	Standard	24 @	53.55	1,285.20
Silica, Total, ICPMS-CM Analysis	Standard	22 @	62.90	1,383.80
Total Phosphorus as P (LL)	Standard	22 @	56.95	1,252.90

Please reference the invoice number on your remittance. **Invoice Total** **$13,298.30**

Remit To: CALTEST ANALYTICAL LABORATORY
1885 North Kelly Road
Napa, California 94558
(707) 258-4000

AMS
Project # 430-7
Contract Review
DS
Signature/Date
Pro... Review
Paul Salop 8/15/22
Signature/Date

** Payment due 30 days from Invoice Date -- Past Due Balances subject to a FINANCE CHARGE of 1.5% per month **
*** Securely pay invoices online using VISA, Master Card or American Express at CaltestLabs.com ***

Monday, August 08, 2022

1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

8 ✓

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Sunday, September 25, 2022
Page 1

Name: Ellen Goldenberg
Description: 430 ACCWP POCx Sampling
Notes: Travel from Livermore to and around Oakland and back.

Report Dates:
Begin Date 9/22/2022
End Date 9/22/2022

Report Amounts:
Advance Amount 0.00
Total Amount 50.00

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Print
9/22/2022	430	ACCWP	FY23 POCs	Mileage		80.00	0.6250	50.00			£	£
							Total:	50.00				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	50.00				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor	Paul Salop	09/23/22
Accounting	Dovlynn Cammack	09/25/22

8 ✓

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Saturday, September 24, 2022
Page 1

Name: Theresa Venello
Description: 430 ACCWP POC sampling
Notes: Travel to and from Oakland 9/22-9/23 and parking. The PDF has all receipts for both days.

Report Dates:
Begin Date 9/22/2022
End Date 9/23/2022

Report Amounts:
Advance Amount 0.00
Total Amount 15.00

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Pnnl
9/22/2022	430	ACCWP	FY23 POCs	Travel		0.00	0.0000	7.50			£	£
9/23/2022	430	ACCWP	FY23 POCs	Travel		0.00	0.0000	7.50			£	£
							Total:	15.00				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	15.00				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor	Paul Salop	09/23/22
Accounting	Dovlynn Cammack	09/24/22

Name: Theresa Venello
Notes

Date	ID	Project Description	Phase	Expense Item	Payee	Credit Card	Personal
9/22/2022	430	ACCWP	FY23 POCs	Travel			£
Employee Notes: *Bart parking and to/from Concord and Oakland*							
9/23/2022	430	ACCWP	FY23 POCs	Travel			£
Employee Notes: *Bart parking and to/from Concord and Oakland*							

4:19

$2.25

Concord Station → MacArthur Station

Train

9/22/22, 8:28 AM

Paid with Clipper card

Cash Value	$2.25

Concord Station → MacArthur Station

Merchant location was determined from transaction details. Allow Wallet to use your precise location to improve merchant information. Go to Settings...

4:19

$2.25

MacArthur Station → Concord Station
Train
9/22/22, 4:33 PM

Paid with Clipper card

Cash Value	$2.25

MacArthur Station → Concord Station

Merchant location was determined from transaction details. Allow Wallet to use your precise location to improve merchant information. Go to Settings...

4:19

$2.25

Concord Station → MacArthur Station

Train

9/23/22, 8:35 AM

Paid with Clipper card

Cash Value	$2.25

Concord Station → MacArthur Station

Merchant location was determined from transaction details. Allow Wallet to use your precise location to improve merchant information. Go to Settings...

4:19

$2.25

MacArthur Station → Concord Station
Train
9/23/22, 2:41 PM

Paid with Clipper card

Cash Value	$2.25

MacArthur Station → Concord Station

Merchant location was determined from transaction details. Allow Wallet to use your precise location to improve merchant information. Go to Settings...

4:20

Back BART | Bay Area Rapid Transit

PAYMENT HISTORY

PAYMENT TYPE
All

Sep 23, 2022
SINGLE PAYMENT **$3.00**

VISA ENDING IN 3281 $3.00
ORDER ID 09232022-DLY621711-33-2582

DAILY PARKING Concord | #2582
TRANSACTION ID jqjfp44k

Sep 22, 2022
SINGLE PAYMENT **$3.00**

VISA ENDING IN 3281 $3.00
ORDER ID 09222022-DLY618919-33-2449

DAILY PARKING Concord | #2449
TRANSACTION ID 6cbe19y9

1

Home Stations Plan Trip Parking More

8 V

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Sunday, September 25, 2022
Page 1

Name: Paul Salop
Description: 430 ACCWP POCx Sampling
Notes:

Report Dates:
Begin Date 9/22/2022
End Date 9/23/2022

Report Amounts:
Advance Amount 0.00
Total Amount 18.75

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Print
9/22/2022	430	ACCWP	FY23 POCs	Mileage	Salop	16.00	0.6250	10.00			£	£
9/23/2022	430	ACCWP	FY23 POCs	Mileage	Salop	14.00	0.6250	8.75			£	£
							Total:	18.75				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	18.75				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor:	Paul Salop	09/23/22
Accounting:	Dovlynn Cammack	09/25/22

8 ✓

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Sunday, October 2, 2022
Page 1

Name: Paul Salop
Description: 430 POCx shipping
Notes: Ice for shipping samples to lab

Report Dates:
Begin Date 9/26/2022
End Date 9/26/2022

Report Amounts:
Advance Amount 0.00
Total Amount 6.60

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Print
9/26/2022	430	ACCWP	FY23 POCs	Lab Supply	Safeway	1.00	6.6000	6.60		American Express	£	£
							Total:	6.60				
							Advance:	0.00				
							Credit Card:	-6.60				
							Personal:	0.00				
							Net Due:	0.00				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Dovlynn Cammack	10/02/22
Accounting:	Dovlynn Cammack	10/02/22

SAFEWAY

Store 1257 Dir Denise Medina
Main:(926) 466-2620 Rx:(926) 466-2622
4496 First Street
LIVERMORE CA 94550

REFRIG/FROZEN

ARTIC GLACIER ICE	6.99 B
TAX	0.61
**** BALANCE	6.60

Credit Purchase 09/26/22 08:02
CARD # **********2027
REF: 360260420270 AUTH: 00846001

PAYMENT AMOUNT 6.60

AL AMERICAN EXPRESS
AID A000000025010801
TVR 0800008000
TSI E800

AMEX	6.60
CHANGE	0.00
TOTAL NUMBER OF ITEMS SOLD =	1

09/26/22 08:02 1257 96 31 8896

Now Hiring at this Store Location!
Inquire at Customer Service

POINTS EARNED TODAY
Base Points 5
Total 5

Points Towards Next Reward 5 of 100

YOUR CASHIER TODAY WAS SELF

0012570960031220926080 2

Thank you for shopping Safeway!
For SAFEWAY FOR U questions call
877-276-9637 or Safeway.com/foru

430-8

FedEx Billing Online

View Cart 0.00 | Printer-friendly | Logout | Help

Account Summary | Search/Download | My Options | Message Center

Tracking ID Details

Back

Tracking ID Summary

Help Hide

Billing Information

Tracking ID no.	770036580052
Invoice no.	5-509-47248
Account no.	1448-0745-6
Bill date	09/26/2022
Total Billed	$399.89
Tracking ID Balance due	$0.00
Status	Paid CC

View Invoice History
View signature proof of delivery

Messages

Distance Based Pricing, Zone 4
Fuel Surcharge - FedEx has applied a fuel surcharg Read More

Transaction Details

Help Hide

Sender Information

Dovlynn Cammack
APPLIED MARINE SCIENCES, INC
4749 Bennett Drive
Suite L
LIVERMORE CA 94551
US

Recipient Information

Kelley Lovejoy
ALS Global
1317 S 13TH AVE
KELSO WA 98626
US

Shipment Details

Ship date	09/26/2022
Tendered date	09/26/2022
Payment type	Shipper
Service type	FedEx Priority Overnight
Zone	04
Package type	Customer Packaging
Rated weight	50.00lbs
Pieces	1
Rated method	1
Meter No.	4857903
Declared value	

Charges

Transportation Charge	347.27
Fuel Surcharge	62.43
DAS Comm	3.55
Courier Pickup Charge	4.00
Discount	-17.36
Total charges	**$399.89**

Original Reference

Customer reference no.	430-8
Department no.	
Reference #2	
Reference #3	

Proof of Delivery

Delivery date	2022-09-27T09:54:00:09:54
Service area code	AA
Signed by	Z.HALLANDER

View signature proof of delivery

Notify user | Dispute

Back

OUR COMPANY

10 ✓

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Saturday, September 24, 2022
Page 1

Name: Paul Salop
Description: 430 ACCWP LID site recons
Notes: within Oakland

Report Dates:
Begin Date 9/15/2022
End Date 9/15/2022

Report Amounts:
Advance Amount 0.00
Total Amount 5.63

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Print
9/15/2022	430	ACCWP	FY 23 LID	Mileage		9.00	0.6250	5.63			E	E
							Total:	5.63				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	5.63				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor:	Paul Salop	09/15/22
Accounting:	Dovlynn Cammack	09/15/22

November 21, 2022

Invoice No. 430-21/23

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: October 1-31, 2022

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$53,592.07	$6,407.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support	$0	$22,501.00	$14,175.00	$8,326.00
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$61,614.02	$330,000.00	$145,294.33	$184,705.67
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$2,833.81	$107,000.00	$23,095.45	$83,904.55
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$1,182.50	$42,000.00	$3,440.00	$38,560.00
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$9,791.42	$54,000.00	$13,775.39	$40,224.62
				Total:	$75,421.76	$1,106,551.00	$742,409.64	$364,141.36

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

okay to pay G33

Sg

Invoice No. 430-21/23

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
10/1/22-10/31/22

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	11.5	$2,472.50					$24,400.00
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00							
Staff Scientist-ES	$110.00							
Staff Scientist-EG	$110.00							$1,402.50
Staff Scientist-TV	$120.00	15.75	$1,890.00					$1,890.00
Adminstrative-DS	$110.00							
Adminstrative-DC	$125.00							
Subcontractors								
Kinnetic Environmental			$1,371.84					$32,591.93
Bioassessment Services								$4,251.89
San Jose State University			$1,037.50					$2,037.50
Benjamin Salop								$360.00
Ecoanalysts			$31,437.00					$31,437.00
Caltest								$17,488.30
Pacific Ecorisk			$18,200.50					$18,200.50
Direct Expenses								$520.00
G&A 10% (Subs only)			$5,204.68					$10,636.71
G&A 15% (ODC's only)								$78.00
Total Invoiced			$61,614.02					$145,294.33
TOTALS:								
Authorized Budget			$330,000.00					$330,000.00
Prior Invoiced Amount			$83,680.31					$83,680.31
Current Invoice			$61,614.02					$61,614.02
Budget Remaining			$184,705.67					$184,705.67

Task 7 Amount Due:	$61,614.02

Invoice No. 430-21/23

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
10/1/22-10/31/22

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	13	$2,795.00				$16,985.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00						$2,370.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
San Jose State University							
Kinnetic Environmental							
Pacific Ecorisk							
Direct Expenses			$33.75				$532.99
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$5.06				$79.96
Total Invoiced			$2,833.81				$23,095.45
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$20,261.64				$20,261.64
Current Invoice			$2,833.81				$2,833.81
Budget Remaining			$83,904.55				$83,904.55

Task 8 Amount Due:	$2,833.81

Invoice No. 430-21/23

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
10/1/22-10/31/22

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	5.5	$1,182.50				$3,440.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							
G&A 10% (Subs only)							
G&A 15% (ODC's only)							
Total Invoiced			$1,182.50				$3,440.00
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$2,257.50				$2,257.50
Current Invoice			$1,182.50				$1,182.50
Budget Remaining			$38,560.00				$38,560.00

Task 9 Amount Due:	$1,182.50

Invoice No. 430-21/23

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
10/1/22-10/31/22

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	41	$8,815.00				$12,792.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00	2.5	$462.50				$462.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental Bioassessment Services			$448.90				$448.90
Direct Expenses			$17.50				$23.13
G&A 10% (Subs only)			$44.89				$44.89
G&A 15% (ODC's only)			$2.63				$3.47
Total Invoiced			$9,791.42				$13,775.39
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$3,983.97				$3,983.97
Current Invoice			$9,791.42				$9,791.42
Budget Remaining			$40,224.62				$40,224.62

Task 10 Amount Due:	$9,791.42

Expense Report

Applied Marine Sciences, Inc.

Tuesday, November 22, 2022
Page 1

Name: Paul Salop
Description: 430-8 P&T Recons
Notes: Recon 3 prospective monitoring sites

Report Dates:
Begin Date 10/5/2022
End Date 10/5/2022

Report Amounts:
Advance Amount 0.00
Total Amount 33.75

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
10/5/2022	430	ACCWP	FY23 POCs	Mileage		54.00	0.6250	33.75			£	£
							Total:	**33.75**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**33.75**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Dovlynn Cammack	10/06/22
Accounting:	Dovlynn Cammack	10/06/22

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Tuesday, November 22, 2022
Page 1

Name: Paul Salop
Description: 430-10 recons
Notes: Site visits within Oakland for LID monitoring

Report Dates:
Begin Date 10/21/2022
End Date 10/21/2022

Report Amounts:
Advance Amount 0.00
Total Amount 17.50

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
10/21/2022	430	ACCWP	FY 23 LID	Mileage	Paul Salop	28.00	0.6250	17.50			£	£
							Total:	**17.50**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**17.50**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	10/27/22
Accounting:	Dovlynn Cammack	10/28/22

SJSU | RESEARCH FOUNDATION
210 N. Fourth Street, 3rd Floor, San Jose, CA 95112
https://www.sjsu.edu/researchfoundation/

INVOICE

199 Task 3 $1,037.50
430 Task 7 $1,037.50

Bill to:	**Invoice #: AR023750**
Applied Marine Sciences	**Invoice Date: 10/10/2022**
Attn: Paul Salop <salop@amarine.com>	**Customer ID: C0001138**
4749 Bennett Dr., Ste. L	**SJSURF A/C #: 34-1509-0010**
Livermore, CA 94551	**Object Code: 06100**

QT	Description	Rate $	Acct #	Amount in US $
1.0	Quarterly Data Management Services	$ 2,075.00		$ 2,075.00
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
	CCLEAN and ACCWP RMC Data Management Services - 2022 Q3			
	P.I. Marco Sigala			
1.0	**T/Hrs**		**TOTAL AMOUNT DUE**	**$ 2,075.00**

Prepared by: Michael Lok, AR Accountant

DocuSigned by:
Hoang Tran
EE0334651304 40D...

10/12/2022

Approved by: **Hoang Tran**
Controller, 408-924-1420
Hoang.Tran@sjsu.edu

Date

TO PAY BY WIRE TRANSFER OR ACH		***TO PAY BY CHECK***
Bank Name:	**Wells Fargo**	**Make Checks Payable & Mail to :**
Bank Address	**420 Montgomery St., San Francisco, CA 94104**	**SJSU Research Foundation**
		210 N. Fourth Street, 3rd Floor
Account Name:	**San Jose State University Research Foundation**	San Jose, CA 95112
Bank Account #:	**4692248859**	
ABA #:	**121000248**	**Total Amount Due: $2,075.00**
Swift #:	**WFBIUS6S**	

***Finance charges of .833% per month (.00833) will be added to unpaid balances 30 days from billing date.**

Terms: Net 30 Days

Invoice: MLML D146
Date: 10/8/2022
Applied Marine Sciences
4749 Bennett Dr., Ste. L
Livermore, CA 94551
925-373-7142

Attention:
Paul Salop (salop@amarine.com)
Diane Stafford (stafford@amarine.com)

Project: CCLEAN and ACCWP RMC Data Management Services - 2022 Q3
MPSL-MLML Contact: Marco Sigala (marco.sigala@sjsu.edu)
SJSURF Account: 34-1509-0010 (OC 06100)

Task	# Units	Per Unit Cost	Total	Description
Quarterly Data Management Services	1	$2,075.00	$2,075.00	Data management tasks including vocabulary review, loading of bioassessment (physical habitat, benthic and algae taxonomy) and water quality (field, habitat, chemistry, toxicity) data, GIS watershed delineations and metric calculations, and bioassessment metric and index (IPI, CSCI, ASCI) calculations.

Total $2,075.00

ECO ANALYSTS, INC.

1420 S. Blaine Street, Suite 14
Moscow, ID 83843

Applied Marine Sciences, Inc.; Livermore
Diane Stafford
4749 Bennett Drive
Suite L
Livermore, CA 94551

Invoice number 3662
Date 10/11/2022

Project 7936 AMS Kinnetic (ADH) SWAMP Algae 2018-2022

Direct Questions to: (208) 882-2588 or accounting@ecoanalysts.com

Description		Contract Amount	Prior Billed	Total Billed	Remaining	Current Billed
2022 Alameda ACCWP SWAMP Soft Algae	Units	22.00	0.00	22.00	0.00	22.00
Unit Price: $1,400.00	Amount	30,800.00	0.00	30,800.00	0.00	30,800.00
2022 Alameda ACCWP Data Report Submittal	Units	1.00	0.00	1.00	0.00	1.00
Unit Price: $175.00	Amount	175.00	0.00	175.00	0.00	175.00
2022 Alameda ACCWP Storage/Year	Units	264.00	0.00	264.00	0.00	264.00
Unit Price: $1.75	Amount	462.00	0.00	462.00	0.00	462.00
	Units	287.00	0.00	287.00	0.00	287.00
Total	Amount	31,437.00	0.00	31,437.00	0.00	31,437.00

Invoice total **31,437.00**

Invoice Payment Terms: Net 30 days

PACIFIC ECORISK

Environmental Consulting and Testing
2250 Cordelia Road, Fairfield, CA 94534
Ph: (707) 207-7760 Fax: (707) 207-7916

INVOICE

Date	Invoice #
9/15/22	18460

Invoice to	Prepared for
Applied Marine Sciences Attn: Diane Stafford 4749 Bennett Dr., Suite L Livermore, CA 94551 stafford@amarine.com	Applied Marine Sciences Attn: Paul Salop 4749 Bennett Dr., Suite L Livermore, CA 94551 salop@amarine.com

PER PROJECT NO.	TERMS	PO/CONTRACT NO.
36647	Net 30	3060

Service	Qty	Unit	Unit Fee	Net Fee
Dry Weather Monitoring - Alameda County (ACCWP)				
Samples collected Jul 12, 2022				
ID: 204R01380-W-06				
ID: 204ADV010-W-06				
Ambient Water - Toxicity Testing - (100% concentration only)				
Chronic algal growth test with Selenastrum capricornutum	2	ea.	1,113.00	2,226.00
6-8 day chronic Ceriodaphnia dubia survival and reproduction test	2	ea.	1,113.00	2,226.00
7-day chronic fathead minnow survival and growth test	2	ea.	1,113.00	2,226.00
10-day Hyalella azteca (Water exposure)	2	ea.	828.00	1,656.00
96-hr Chironomus dilutus (Water exposure)	2	ea.	1,153.00	2,306.00
Subtotal				10,640.00
Reference Toxicant Testing				
Concurrent reference toxicant test with fathead minnows	0.25	ea.	1,765.00	441.25
Concurrent reference toxicant test with Hyalella azteca (one for water and one for sediment)	0.25	ea.	2,212.00	553.00
Concurrent reference toxicant test with Chironomus dilutus	0.25	ea.	977.00	244.25
Subtotal				1,238.50
Ambient Sediment - Toxicity Testing - (100% concentration only)				
10-day Hyalella azteca survival and growth test	2	ea.	1,540.00	3,080.00
10-day Chironomus dilutus survival and growth test	2	ea.	1,621.00	3,242.00
Subtotal				6,322.00
	Total			$18,200.50

KINNETIC ENVIRONMENTAL
9057C Soquel Drive, Suite B
Aptos, California 95003
Ofc. (831) 457-3950

Invoice No. 13072

Invoice Date: 10/24/22
Billing Cycle: 09/01/22 - 09/30/22

Project 430 - ACCWP

Bill To:
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551
Attn: Diane Stafford, Paul Salop

Contract No.: 2022-0001
Task Order No.: 430-002

Remit Payment To:
Kinnetic Environmental, Inc.
9057C Soquel Drive, Ste B
Aptos, CA 95003

KEI Project No.: 5880.00

ACCWP - Bioassessment and Continuous Monitoring

Employee / Item	Title/Description	Hours / Qty	Rate	Amount
Task 2 - Continuous Monitoring				
Kevin Lewis	Project Scientist I	10.25	122.74	1,258.09
Travel Expenses				113.75
Total Task 2 - Continuous Monitoring			Subtask 7 - CSM	**1,371.84**
Task 3 - As-requested Technical Support				
Christian Kocher	Project Manager	2.50	179.56	448.90
Total Task 3 - As-requested Technical Support			Subtask 10 - LID	**448.90**

BALANCE DUE **$ 1,820.74**

Total Amount Authorized	45,000.00
Total Billed as of Last Period	31,220.09
Billed this Period	1,820.74
Total Billed to Date	33,040.83
Total Budget Remaining	11,959.18
Percent Complete	73%

KINNETIC ENVIRONMENTAL

Time Log
09/01/22 - 09/30/22

Date	Employee	Project	Hours
Task 1 - Continuous Monitoring			
09/06/2022	Lewis, Kevin	5880.02 - Continuous Monitoring	0.25
09/16/2022	Lewis, Kevin	5880.02 - Continuous Monitoring	1.00
09/19/2022	Lewis, Kevin	5880.02 - Continuous Monitoring	0.25
09/20/2022	Lewis, Kevin	5880.02 - Continuous Monitoring	8.00
09/21/2022	Lewis, Kevin	5880.02 - Continuous Monitoring	0.75
	Lewis, Kevin Total		**10.25**
Task 3 - As-resquested Technical Support			
09/16/2022	Kocher, Christian	5880.03 - As-requested Technical Support	1.00
09/19/2022	Kocher, Christian	5880.03 - As-requested Technical Support	0.50
09/20/2022	Kocher, Christian	5880.03 - As-requested Technical Support	1.00
	Kocher, Christian Total		**2.50**

Non-Labor Expense Summary

Invoice No. **13072**

Invoice Date 10/24/22

Date	Vendor	Description	Payee	Qty.	Rate	Amount
Task 2 - Continuous Monitoring						
Travel Expenses - Mileage						
09/01-09/30		Mileage	Kevin Lewis	182	0.625	113.75
Total Travel Expenses - Mileage						**113.75**
Total Task 2 - Continuous Monitoring						**113.75**

TOTAL NON-LABOR EXPENSE **$ 113.75**

Travel Expense Claim

KINNETIC ENVIRONMENTAL

Name: Kevin Lewis **Reporting Period:** September 2022

Date	Project Description	Task Code	Location	Lodging	Meals				Living Incidental	Travel Expenses					Total
										Transportation			Mileage	0.625	
					Bfast	Lunch	Dinner	Daily Meal Total		Type	Cost	Prkg/ Toll	Miles	Cost	
09/20/22	Continuous Monitoring	5880.02	Alameda					-		PV			182	113.75	113.75
			Task Total	**-**	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**182**	**113.75**	**113.75**
			Subtotals	**-**	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**182**	**113.75**	**113.75**
													Total:		**113.75**

Transportation Types:

- FT = Ford Transit
- FV = Ford Utility Van
- SC = Subaru Crosstrek
- RV = Rental Vehicle
- PV = Personal Vehicle
- OV = Cabs, Uber, etc.

Employee Signature:

Supervisor Signature:

10/24/2022 | 11:15 AM

S6.2.068

APPLIED marine SCIENCES

December 20, 2022

Invoice No. 430-21/24

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: November 1-30, 2022

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$53,592.07	$6,407.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support	$7,260.00	$22,501.00	$21,435.00	$1,066.00
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$26,887.50	$330,000.00	$172,181.83	$157,818.17
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$5,403.91	$107,000.00	$28,499.36	$78,500.64
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$3,676.64	$42,000.00	$7,116.64	$34,883.36
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$7,717.58	$54,000.00	$21,492.97	$32,507.03
50201	Task 11 - Task CW17-22-23	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$4,607.90	$48,081.00	$4,607.90	$43,473.10
				Total:	$55,553.53	$1,154,632.00	$797,963.16	$356,668.84

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

okay to pay G33
SG

Invoice No. 430-21/24

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
11/1/22-11/30/22

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	35.5	$7,632.50					$32,032.50
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00							
Staff Scientist-ES	$110.00							
Staff Scientist-EG	$110.00							$1,402.50
Staff Scientist-TV	$120.00	47.25	$5,670.00					$7,560.00
Adminstrative-DS	$110.00							
Adminstrative-DC	$125.00							
Subcontractors								
Kinnetic Environmental								$32,591.93
Bioassessment Services			$12,350.00					$16,601.89
San Jose State University								$2,037.50
Benjamin Salop								$360.00
Ecoanalysts								$31,437.00
Caltest								$17,488.30
Pacific Ecorisk								$18,200.50
Direct Expenses								$520.00
G&A 10% (Subs only)			$1,235.00					$11,871.71
G&A 15% (ODC's only)								$78.00
Total Invoiced			$26,887.50					$172,181.83
TOTALS:								
Authorized Budget			$330,000.00					$330,000.00
Prior Invoiced Amount			$145,294.33					$145,294.33
Current Invoice			$26,887.50					$26,887.50
Budget Remaining			$157,818.17					$157,818.17

Task 7 Amount Due:	$26,887.50

Invoice No. 430-21/24

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
11/1/22-11/30/22

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	16.5	$3,547.50				$20,532.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00	11.25	$1,350.00				$3,720.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00	2	$220.00				$220.00
Adminstrative-DC	$125.00						
Subcontractors							
San Jose State University							
Kinnetic Environmental							
Pacific Ecorisk							
Direct Expenses			$249.05				$782.04
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$37.36				$117.32
Total Invoiced			$5,403.91				$28,499.36
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$23,095.45				$23,095.45
Current Invoice			$5,403.91				$5,403.91
Budget Remaining			$78,500.64				$78,500.64

Task 8 Amount Due:	$5,403.91

Invoice No. 430-21/24

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
11/1/22-11/30/22

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	15	$3,225.00				$6,665.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00	3.5	$420.00				$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses			$27.51				$27.51
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$4.13				$4.13
Total Invoiced			$3,676.64				$7,116.64
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$3,440.00				$3,440.00
Current Invoice			$3,225.00				$3,225.00
Budget Remaining			$35,335.00				$35,335.00

Task 9 Amount Due:	$3,676.64

Invoice No. 430-21/24

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
11/1/22-11/30/22

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	28	$6,020.00				$18,812.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental Bioassessment Services			$1,526.26				$1,975.16
Direct Expenses			$16.25				$39.38
G&A 10% (Subs only)			$152.63				$197.52
G&A 15% (ODC's only)			$2.44				$5.91
Total Invoiced			$7,717.58				$21,492.97
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$13,775.39				$13,775.39
Current Invoice			$7,717.58				$7,717.58
Budget Remaining			$32,507.03				$32,507.03

Task 10 Amount Due:	$7,717.58

Invoice No. 430-21/24

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
11/1/22-11/30/22

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$4,189.00				$4,189.00
Direct Expenses							
G&A 10% (Subs only)			$418.90				$418.90
G&A 15% (ODC's only)							
Total Invoiced			$4,607.90				$4,607.90
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount							
Current Invoice			$4,607.90				$4,607.90
Budget Remaining			$43,473.10				$43,473.10

Task 11 Amount Due:	$4,607.90

Expense Report

Applied Marine Sciences, Inc.

Wednesday, December 21, 2022
Page 1

Name: Theresa Venello
Description: 430-8 Ice for stormwater samples
Notes: 60 lbs of ice for sample storage.

Report Dates:
Begin Date 11/7/2022
End Date 11/7/2022

Report Amounts:
Advance Amount 0.00
Total Amount 26.42

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
11/7/2022	430	ACCWP	FY23 POCs	Lab Supply		0.00	0.0000	26.42			£	£
							Total:	**26.42**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**26.42**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	11/18/22
Accounting:	Dovlynn Cammack	11/18/22

Name: Theresa Venello
Notes

Date	ID	Project Description	Phase	Expense Item	Payee	Credit Card	Personal
11/7/2022	430	ACCWP	FY23 POCs	Lab Supply			£

Employee Notes: *60 lb of ice for samples*

SAFEWAY

Store 1257 Dir Denise Medina
Main:(925) 455-2520 Rx:(925) 455-2522
4495 First Street
LIVERMORE CA 94550

REFRIG/FROZEN

4 QTY ARTIC GLAC	23.96 B
TAX	2.46
**** BALANCE	26.42

Debit Purchase 11/07/22 13:16
CARD # **********5305 PRIMARY
TOTAL TRANSACTION AMOUNT: 26.42
CASH BACK AMOUNT: 0.00
REF: 381639153050 AUTH: 00625921

AL US DEBIT
AID A0000000980840
TVR 8000048000
TSI 6800

Debit	26.42
CHANGE	0.00

TOTAL NUMBER OF ITEMS SOLD = 4
11/07/22 13:16 1257 93 148 8893

Join the Safeway Club today.
Membership is Free and Instant

YOUR CASHIER TODAY WAS SELF

00125709301482211071316

Thank you for shopping Safeway!
For SAFEWAY FOR U questions call
877-276-9637 or Safeway.com/foru

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Wednesday, December 21, 2022
Page 1

Name: Paul Salop
Description: 430-8 P&T Sampling
Notes: 11/4/22 - Site recon with DPR
11/8/22 - Sampling

Report Dates:
Begin Date 11/4/2022
End Date 11/8/2022

Report Amounts:
Advance Amount 0.00
Total Amount 222.63

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
11/4/2022	430	ACCWP	FY23 POCs	Mileage	Paul Salop	35.00	0.6250	21.88			£	£
11/8/2022	430	ACCWP	FY23 POCs	Fuel & Maintenance	Green Gas 76	0.00	0.0000	40.00		American Express	£	£
11/8/2022	430	ACCWP	FY23 POCs	Auto Lease & Rental	U-Haul	0.00	0.0000	153.75		American Express	£	£
11/8/2022	430	ACCWP	FY23 POCs	Parking & Tolls	FasTrak	0.00	0.0000	7.00			£	£
							Total:	**222.63**				
							Advance:	**0.00**				
							Credit Card:	**-193.75**				
							Personal:	**0.00**				
							Net Due:	**28.88**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Dovlynn Cammack	11/18/22
Accounting:	Dovlynn Cammack	11/18/22

GREEN GAS 76
4904 S.Frount Rd.
Livermore CA 94551

DBA SOUTH FRONT GAS
SOUTHFRONT RD
LIVERMORE CA 94551
09480831

11/08/22 7:05:35 PM
Register: 1 Trans #: 6334 Op ID: 1
Your cashier: S

*** PREPAID RECEIPT ***

REGULAR CR	PUMP# 6	$40.00	NT

Subtotal	=	$40.00
Tax	=	$0.00
Total	=	$40.00
Change Due	=	$0.00
Credit		$40.00

XXXX XXXXXX X2027 AMEX
INVOICE: 190623
AUTH 00-807680
AMERICAN EXPRESS
AID: A000000025010801
ARQC: AA128ABF24811A9B

REMIT TO:
U-Haul
PO BOX 52128
Phoenix AZ 85072-2128
PH:800-345-5876, Option 2
HOURS: MON-FRI 8AM - 4PM MST
e-mail:Credit_Administration@uhaul.com

INVOICE

INVOICE #	5402338721
INVOICE DATE	10-NOV-22
PURCHASE ORDER	
SALES ORDER	815048 26203108
CORPORATE ACCT #	99224471

BILL TO:
ATTN:DOVLYNN CAMMACK
APPLIED MARINE SCIENCES, INC
4749 BENNETT DRIVE STE L
STE L
LIVERMORE,CA,94551

Please include Corporate Acct # and invoice numbers with your payment. Your business is appreciated.

TERMS	DUE DATE	SALES MANAGER	DATE OUT	DATE IN	DAYS ALLOWED	MILES ALLOWED
NET 30	10-DEC-22	RYAN MOORE		08-NOV-22		

Line#	LOCAL RENTAL	QTY	UNIT PRICE	AMOUNT
1	CARGO VAN (BE2893F) ODOM OUT: 4994 ODOM IN: 5144	1	19.95	$ 19.95
2	MILEAGE CHARGE ODOM OUT: 4994 ODOM IN: 5144	1	118.50	$ 118.50
3	ENVIRONMENTAL FEE	1	1.00	$ 1.00
4	TAX	1	14.30	$ 14.30

Location:LIVERMORE, CA
Name: PAUL SALOP

TOTAL: $ 153.75

Expense Report

Applied Marine Sciences, Inc.

Wednesday, December 21, 2022
Page 1

Name: Theresa Venello
Description: 430 ACCWP trash site visit
Notes: mileage from office for travel to sites for trash monitoring

Report Dates:
Begin Date 11/10/2022
End Date 11/10/2022

Report Amounts:
Advance Amount 0.00
Total Amount 10.63

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
11/10/2022	430	ACCWP	FY23 Trash	Mileage		17.00	0.6250	10.63			£	£
							Total:	**10.63**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**10.63**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	11/18/22
Accounting:	Dovlynn Cammack	11/18/22

Expense Report

Applied Marine Sciences, Inc.

Wednesday, December 21, 2022
Page 1

Name: Paul Salop
Description: 430-9 site recon
Notes: Potential trash outfall monitoring site recon

Report Dates:
Begin Date 11/16/2022
End Date 11/16/2022

Report Amounts:
Advance Amount 0.00
Total Amount 7.50

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
11/16/2022	430	ACCWP	FY23 Trash	Mileage	Paul Salop	12.00	0.6250	7.50			£	£
							Total:	**7.50**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**7.50**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Dovlynn Cammack	11/18/22
Accounting:	Dovlynn Cammack	11/18/22

Expense Report

Applied Marine Sciences, Inc.

Wednesday, December 21, 2022
Page 1

Name: Paul Salop
Description: 430 site recon mileage
Notes: Visit 5 prospective trash sites (Livermore / Dublin) and 1 LID monitoring site

Report Dates:
Begin Date 11/10/2022
End Date 11/10/2022

Report Amounts:
Advance Amount 0.00
Total Amount 15.63

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
11/10/2022	430	ACCWP	FY23 Trash	Mileage	Paul Salop	15.00	0.6250	9.38			£	£
11/10/2022	430	ACCWP	FY 23 LID	Mileage	Paul Salop	10.00	0.6250	6.25			£	£
							Total:	**15.63**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**15.63**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	11/10/22
Accounting:	Dovlynn Cammack	11/10/22

Expense Report

Applied Marine Sciences, Inc.

Wednesday, December 21, 2022
Page 1

Name: Paul Salop
Description: 430-10 site recon
Notes: Burma Rd site recon, within Oakland

Report Dates:
Begin Date 11/18/2022
End Date 11/18/2022

Report Amounts:
Advance Amount 0.00
Total Amount 10.00

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
11/18/2022	430	ACCWP	FY 23 LID	Mileage	Paul Salop	16.00	0.6250	10.00			£	£
							Total:	**10.00**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**10.00**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	11/18/22
Accounting:	Dovlynn Cammack	11/18/22

430-6

formula

Formula Design
888-231-0694

1038 Ash Avenue
Cottage Grove, Oregon
97424
United States

Billed To
Paul Salop
Clean Water Program
4749 Bennett Dr., Ste. L
Livermore, California
94551
United States

Date of Issue
12/15/2022

Due Date
12/31/2022

Invoice Number
0000350

Amount Due (USD)
$600.00

Description	Rate	Qty	Line Total
Hosting Hosting for January 1, 2023 to December 31, 2023. This should be paid by the 1st of January.	$50.00	12	$600.00

Subtotal	600.00
Tax	0.00
Total	600.00
Amount Paid	0.00
Amount Due (USD)	$600.00

Notes
This invoice is for hosting in 2021.

Terms
Please, pay invoice in net 30 days to avoid a 10% late fee.

430-6

formula

Formula Design
888-231-0694

1038 Ash Avenue
Cottage Grove, Oregon
97424
United States

Billed To
Paul Salop
Clean Water Program
4749 Bennett Dr., Ste. L
Livermore, California
94551
United States

Date of Issue
12/16/2022

Due Date
12/31/2022

Invoice Number
0000351

Amount Due (USD)
$6,000.00

Description	Rate	Qty	Line Total
Web Design and Development 3rd Payment: Due upon Clean Water Program WordPress CMS content move.	$6,000.00	1	$6,000.00

Subtotal	6,000.00
Tax	0.00
Total	6,000.00
Amount Paid	0.00
Amount Due (USD)	$6,000.00

Notes
This invoice is for the 3rd payment due upon content move. The next step is to go live. This is not the final payment.

Terms
Please, pay invoice in net 30 days to avoid a 10% late fee.

Joseph T. King, dba BioAssessment Services
PO Box 0752
Folsom, CA 95763-0752
(916) 838-3846
jtkbioassess@gmail.com

430-7

August 5, 2022

INVOICE

No. 00537
Project: ACCWP
PO Number: 3361
Accounting Code: 430-7

Diane Stafford
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551

Re: Costs associated with laboratory processing of benthic samples for the Alameda Countywide Clean Water Program (ACCWP)

In June and July of 2022, 22 benthic samples were processed for the macroinvertebrate bioassessment component of the ACCWP. Tasks included subsampling a minimum of 600 organisms when possible, identification of subsampled organisms to a standard taxonomic level, and archiving organisms in a voucher collection. Work completed to date represents approximately 88% of total anticipated for project.

Benthic sample processing (22 samples @ $525 per sample).....$ 11,550.00
Data management/coordination (10 hours @ $80.00 per hour).....$ 800.00

TOTAL DUE THIS INVOICE.....$ 12,350.00

Make check payable to: Joseph T. King

Remit payment to: BioAssessment Services
PO Box 0752
Folsom, CA 95763-0752

430-10

KINNETIC ENVIRONMENTAL

9057C Soquel Drive, Suite B
Aptos, California 95003
Ofc. (831) 457-3950

Invoice No. 13122

Invoice Date: 11/28/22
Billing Cycle: 10/01/22 - 10/31/22

Bill To:
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551
Attn: Diane Stafford, Paul Salop

Contract No.: 2022-0001
Task Order No.: 430-003

Remit Payment To:
Kinnetic Environmental, Inc.
9057C Soquel Drive, Ste B
Aptos, CA 95003

KEI Project No.: 5880.00

ACCWP - Low Impact Development Monitoring Planning and Preparation

Employee / Item	Title/Description	Hours / Qty	Rate	Amount
Task 1 - Support LID Monitoring Planning				
Christian Kocher	Project Manager	8.50	179.56	1,526.26
Total Task 1 - Support LID Monitoring Planning				**1,526.26**

BALANCE DUE $ 1,526.26

Total Amount Authorized	15,000.00
Total Billed as of Last Period	-
Billed this Period	1,526.26
Total Billed to Date	1,526.26
Total Budget Remaining	13,473.74
Percent Complete	10%

KINNETIC ENVIRONMENTAL

Time Log
10/01/22-10/31/22

Date	Employee	Task	Hours
Task 1 - Support LID Monitoring Planning			
10/20/22	Kocher, Christian	5880.04 Support LID Monitoring Planning	1.00
10/21/22	Kocher, Christian	5880.04 Support LID Monitoring Planning	7.50
	Kocher, Christian Total		**8.50**

430-11

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

Invoice Date: Oct 5, 2022
Invoice Num: AMS001-0822
Billing From: Aug 01, 2022
Billing To: Aug 31, 2022

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	1.25	$291.00	$363.75
		Total Services:	**$363.75**
		Amount Due This Invoice:	**$363.75**

This invoice is due upon receipt

Ray Goebel

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	$ 0.00	$ 363.75	$ 363.75	$ 43,346.25

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430-11

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

Invoice Date: Nov 29, 2022
Invoice Num: AMS001-1022
Billing From: Sep 01, 2022
Billing To: Oct 31, 2022

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	1.00	$291.00	$291.00
Senior Engineer/Scientist III	9.00	$242.00	$2,178.00
Associate Engineer/ScientistII	4.25	$183.00	$777.75
Technician	1.00	$121.00	$121.00
		Total Services:	**$3,367.75**

Draft BMP Report (AMS001:02) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Associate Engineer/ScientistII	2.50	$183.00	$457.50
		Total Services:	**$457.50**

Amount Due This Invoice: **$3,825.25**

This invoice is due upon receipt

Ray Goebel

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	$ 363.75	$ 3,825.25	$ 4,189.00	$ 39,521.00

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APPLIED marine SCIENCES

January 18, 2023

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: December 1-31, 2022

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$1,720.00	$60,000.00	$55,312.07	$4,687.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support	$107.50	$22,501.00	$21,542.50	$958.50
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$5,698.75	$330,000.00	$177,880.58	$152,119.42
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$29,724.18	$107,000.00	$58,223.54	$48,776.46
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$1,612.50	$42,000.00	$8,729.14	$33,270.86
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$8,442.14	$54,000.00	$29,935.11	$24,064.89
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$8,809.35	$48,081.00	$13,417.25	$34,663.75
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$0	$66,671.00	$0	$66,671.00
				Total:	$56,114.42	$1,221,303.00	$854,077.58	$367,225.42

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

okay to pay G33

SG

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 4 - Arroyo Las Positas SSID Study

Task C8E-21-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	8	$1,720.00				$21,565.00
Principal Scientist-MB	$165.00						$1,732.50
Principal Scientist-AM	$186.00						$1,200.00
Staff Scientist-ES	$110.00						$330.00
Staff Scientist-EG	$110.00						$11,550.00
Staff Scientist-CH	$115.00						$6,135.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						$375.00
Subcontractors							
Caltest							$92.00
University of Hawaii							$675.00
SLAB SOEST Laboratory							$1,493.00
San Francisco Estuary Institute							$396.20
Direct Expenses							$8,263.26
G&A 10% (Subs only)							$265.62
G&A 15% (ODC's only)							$1,239.49
Total Invoiced			$1,720.00				$55,312.07
TOTALS:							
Authorized Budget			$60,000.00				$60,000.00
Prior Invoiced Amount			$53,592.07				$57,612.07
Current Invoice			$1,720.00				$1,720.00
Budget Remaining			$4,687.93				$667.93

Task 4 Amount Due:	$1,720.00

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 6 - Website Support

Task PRC-22-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	0.5	$107.50				$422.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$186.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Formula Design							$19,200.00
Direct Expenses							
G&A 10% (Subs only)							$1,920.00
G&A 15% (ODC's only)							
Total Invoiced			$107.50				$21,542.50
TOTALS:							
Authorized Budget			$22,501.00				$22,501.00
Prior Invoiced Amount			$21,435.00				$21,435.00
Current Invoice			$107.50				$107.50
Budget Remaining			$958.50				$958.50

Task 6 Amount Due:	$107.50

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	12.5	$2,687.50				$34,720.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$1,402.50
Staff Scientist-TV	$120.00						$7,560.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental							$32,591.93
Bioassessment Services			$1,700.00				$18,301.89
San Jose State University			$1,037.50				$3,075.00
Benjamin Salop							$360.00
Ecoanalysts							$31,437.00
Caltest							$17,488.30
Pacific Ecorisk							$18,200.50
Direct Expenses							$520.00
G&A 10% (Subs only)			$273.75				$12,145.46
G&A 15% (ODC's only)							$78.00
Total Invoiced			$5,698.75				$177,880.58
TOTALS:							
Authorized Budget			$330,000.00				$330,000.00
Prior Invoiced Amount			$172,181.83				$172,181.83
Current Invoice			$5,698.75				$5,698.75
Budget Remaining			$152,119.42				$152,119.42

Task 7 Amount Due:	$5,698.75

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	1	$215.00				$20,747.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00						$3,720.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00						$220.00
Adminstrative-DC	$125.00						
Subcontractors							
ALS			$5,425.00				$5,425.00
Kinnetic Environmental			$2,851.53				$2,851.53
Pacific Ecorisk			$18,550.00				$18,550.00
Direct Expenses							$782.04
G&A 10% (Subs only)			$2,682.65				$2,682.65
G&A 15% (ODC's only)							$117.32
Total Invoiced			$29,724.18				$58,223.54
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$28,499.36				$28,499.36
Current Invoice			$29,724.18				$29,724.18
Budget Remaining			$48,776.46				$48,776.46

Task 8 Amount Due:	$29,724.18

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	7.5	$1,612.50				$8,277.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							$27.51
G&A 10% (Subs only)							
G&A 15% (ODC's only)							$4.13
Total Invoiced			$1,612.50				$8,729.14
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$7,116.64				$7,116.64
Current Invoice			$1,612.50				$1,612.50
Budget Remaining			$33,270.86				$33,270.86

Task 9 Amount Due:	$1,612.50

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	35.5	$7,632.50				$26,445.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental Bioassessment Services			$729.50				$2,704.66
Direct Expenses			$6.25				$45.63
G&A 10% (Subs only)			$72.95				$270.47
G&A 15% (ODC's only)			$0.94				$6.85
Total Invoiced			$8,442.14				$29,935.11
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$21,492.97				$21,492.97
Current Invoice			$8,442.14				$8,442.14
Budget Remaining			$24,064.89				$24,064.89

Task 10 Amount Due:	$8,442.14

Invoice No. 430-21/25

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
12/1/22-12/31/22

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$8,008.50				$12,197.50
Direct Expenses							
G&A 10% (Subs only)			$800.85				$1,219.75
G&A 15% (ODC's only)							
Total Invoiced			$8,809.35				$13,417.25
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$4,607.90				$4,607.90
Current Invoice			$8,809.35				$8,809.35
Budget Remaining			$34,663.75				$34,663.75

Task 11 Amount Due:	$8,809.35

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Thursday, January 19, 2023
Page 1

Name: Paul Salop
Description: 430-10 site recon
Notes: Wet weather recon

Report Dates:
Begin Date 12/1/2022
End Date 12/1/2022

Report Amounts:
Advance Amount 0.00
Total Amount 6.25

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Print
12/1/2022	430	ACCWP	FY 23 LID	Mileage	Paul Salop	10.00	0.6250	6.25			£	£
							Total:	6.25				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	6.25				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor:	Paul Salop	12/01/22
Accounting:	Dovlynn Cammack	12/01/22

430-8

PACIFIC ECORISK

Environmental Consulting and Testing
2250 Cordelia Road, Fairfield, CA 94534
Ph: (707) 207-7760 Fax: (707) 207-7916

INVOICE

Date	Invoice #
12/31/22	18697

Invoice to	Prepared for
Applied Marine Sciences Attn: Diane Stafford 4749 Bennett Dr., Suite L Livermore, CA 94551 stafford@amarine.com	Applied Marine Sciences Attn: Paul Salop 4749 Bennett Dr., Suite L Livermore, CA 94551 salop@amarine.com

PER PROJECT NO.	TERMS	PO/CONTRACT NO.
37033	Net 30	3060

Service	Qty	Unit	Unit Fee	Net Fee
Dry Weather Monitoring - Alameda County (ACCWP)				
Samples collected Nov 8, 2022				
ID: Z4LA				
ID: 204ACA200				
ID: SANLORCRCUP				
Ambient Water - Toxicity Testing - (100% concentration only)				
Chronic algal growth test with Selenastrum capricornutum	3	ea.	1,202.00	3,606.00
6-8 day chronic Ceriodaphnia dubia survival and reproduction test	3	ea.	1,202.00	3,606.00
7-day chronic fathead minnow survival and growth test	3	ea.	1,202.00	3,606.00
10-day Hyalella azteca (Water exposure)	3	ea.	894.00	2,682.00
96-hr Chironomus dilutus (Water exposure)	3	ea.	1,245.00	3,735.00
Subtotal				17,235.00
Reference Toxicant Testing				
Concurrent reference toxicant test with fathead minnows	0.25	ea.	1,906.00	476.50
Concurrent reference toxicant test with Hyalella azteca	0.25	ea.	2,236.00	559.00
Concurrent reference toxicant test with Chironomus dilutus	0.25	ea.	1,118.00	279.50
Subtotal				1,315.00
	Total			$18,550.00

right solutions.
right partner.

430-8

Remit To: ALS Group USA, Corp.
PO Box 975444
Dallas, TX 75397-5444
Attn: Accounts Receivable
TEL: +1 281 530 5656
FAX: +1 281 561 6125
T.I.N.: 76-0606679

INVOICE

Service Request: K2211209
Customer No.: 207712-01

Invoice No.: 36-51-603406-0
Invoice Date: 1/11/23

Project Name: Accup POCX
Project Number:

Attn: Paul Salop
Applied Marine Sciences, Incorporated
salop@amarine.com
4749 Bennett Dr. Suite L
Livermore, CA 94551

Report To: Paul Salop
Applied Marine Sciences, Incorporated
4749 Bennett Dr. Suite L
Livermore, CA 94551

ALS Project Manager: Kelley Lovejoy(Kelley.Lovejoy@alsglobal.com)
Phone: +1 360 577 7222
ALS Sales Rep: Howard Boorse

Samples submitted on: 9/27/22

Analytical Services

Sediment

Method	Test Description	QTY	Unit Price	TAT Surcharge	Adj Unit Price	Extended Price	
160.3 Modified	Total Solids, Modified for Solids [Residue, Total (Gravimetric, Dried at 103-105 Deg C)]	20	$10.00	0%	$10.00	$200.00	K
7471B	Mercury in Solid or Semisolid Waste (Manual CVAA)	10	$40.00	0%	$40.00	$400.00	K
8082A	Polychlorinated Biphenyl (PCB) Congeners by GC/ECD	10	$280.00	0%	$280.00	$2,800.00	K
Archive	Archive at 4 Degrees Celcius	10	$10.00	0%	$10.00	$100.00	K
ASTM D4129-82M	Total Organic Carbon by High Temperature Oxidation and by Coulometric Detection Modified for Matrix	10	$65.00	0%	$65.00	$650.00	K
ASTM D422M	Particle-Size Analysis of Soils, Condensed Breakout	10	$75.00	0%	$75.00	$750.00	K
ASTM E1109-86	Bulk Density	10	$15.00	0%	$15.00	$150.00	K
Sieve	Sieve	10	$35.00	0%	$35.00	$350.00	K

Other Services and Supplies

Description	QTY	Unit Price	Unit Percent	Tax Rate	Extended Price	
Sustainability Fee - Cost per work order SDG/CoC	1.00	$25.00	0.00		$25.00	K

Subtotals

Analytical Services:	$5,400.00
Other Charges:	$25.00
Applicable Tax:	$0.00
Amount Due (USD):	$5,425.00

Penalty of $150, plus 1.5% interest per month (18% per year) charge on past due accounts. Clients are also responsible for any collection costs.

Subject to ALS Terms & Conditions

DocuSign Envelope ID: B9E64EA3-31C4-4584-91F7-2D85EDCA504E

$1037.50 - 199-3
$1037.50 - 430-7

SJSU | RESEARCH FOUNDATION

210 N. Fourth Street, 3rd Floor, San Jose, CA 95112
https://www.sjsu.edu/researchfoundation

INVOICE

Bill to:	Invoice #: AR024068
Applied Marine Sciences	Invoice Date: 1/4/2023
Attn: Paul Salop <salop@amarine.com>	Customer ID: C0001138
4749 Bennett Dr., Ste. L	SJSURF A/C #: 34-1509-0010
Livermore, CA 94551	Object Code: 06100

QT	Description	Rate $	Acct #	Amount in US $
1.0	Quarterly Data Management Services	$ 2,075.00		$ 2,075.00
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
				$ -
	CCLEAN and ACCWP RMC Data Management Services - 2022 Q4			
	P.I. Marco Sigala			
1.0	T/Hrs		TOTAL AMOUNT DUE	$ 2,075.00

Prepared by: Michael Lok, AR Accountant

DocuSigned by:
Hoang Tran
E9B13CE2B0A4C0...

Approved by: Hoang Tran
Controller, 408-924-1420
Hoang.Tran@sjsu.edu

1/6/2023
Date

TO PAY BY WIRE TRANSFER OR ACH		TO PAY BY CHECK
Bank Name:	Wells Fargo	Make Checks Payable & Mail to:
Bank Address:	420 Montgomery St., San Francisco, CA 94104	SJSU Research Foundation 210 N. Fourth Street, 3rd Floor San Jose, CA 95112
Account Name:	San Jose State University Research Foundation	
Bank Account #:	4692248859	
ABA #:	121000248	Total Amount Due: $2,075.00
Swift #:	WFBIUS6S	

*Finance charges of .833% per month (.00833) will be added to unpaid balances 30 days from billing date.

Terms: Net 30 Days

Invoice: MLML D162
Date: 1/3/2023
Applied Marine Sciences
4749 Bennett Dr., Ste. L
Livermore, CA 94551
925-373-7142

Attention:
Paul Salop (salop@amarine.com)
Diane Stafford (stafford@amarine.com)

Project: CCLEAN and ACCWP RMC Data Management Services - 2022 Q4
MPSL-MLML Contact: Marco Sigala (marco.sigala@sjsu.edu)
SJSURF Account: 34-1509-0010 (OC 06100)

Task	# Units	Per Unit Cost	Total	Description
Quarterly Data Management Services	1	$2,075.00	$2,075.00	Data management tasks including vocabulary review, loading of bioassessment (physical habitat, benthic and algae taxonomy) and water quality (field, habitat, chemistry, toxicity) data, GIS watershed delineations and metric calculations, and bioassessment metric and index (IPI, CSCI, ASCI) calculations

Total $2,075.00

Joseph T. King, dba BioAssessment Services
PO Box 0752
Folsom, CA 95763-0752
(916) 838-3846
jtkbioassess@gmail.com

430-7

October 3, 2022

INVOICE

No. 00542
Project: ACCWP
PO Number: 3361
Accounting Code: 430-7

Diane Stafford
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551

Re: Costs associated with laboratory processing of benthic samples for the Alameda Countywide Clean Water Program (ACCWP)

BioAssessment Services completed data entry/reporting compilation and inter-laboratory quality control. Work to date represents 100% of total anticipated for project.

Data management/coordination (10 hours @ $80.00 per hour).....$ 800.00
Inter-lab quality control (2 samples @ $450 per sample).....$ 900.00

TOTAL DUE THIS INVOICE.....$ 1,700.00

Make check payable to: Joseph T. King

Remit payment to: BioAssessment Services
PO Box 0752
Folsom, CA 95763-0752

430-11

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

Invoice Date: Jan 6, 2023
Invoice Num: AMS001-1122
Billing From: Nov 01, 2022
Billing To: Nov 30, 2022

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAR)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	4.50	$293.00	$1,318.50
Senior Engineer/Scientist III	19.50	$244.00	$4,758.00
Associate Engineer/ScientistII	9.00	$184.00	$1,656.00
		Total Services:	**$7,732.50**

Draft BMP Report (AMS001:02) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAR)

Professional Services:

Employee Title	Hours	Rate	Amount
Associate Engineer/ScientistII	1.50	$184.00	$276.00
		Total Services:	**$276.00**

Amount Due This Invoice: **$8,008.50**

This invoice is due upon receipt

Ray Goebel

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	$ 4,189.00	$ 8,008.50	$ 12,197.50	$ 31,512.50

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KINNETIC ENVIRONMENTAL
9057C Soquel Drive, Suite B
Aptos, California 95003
Ofc. (831) 457-3950

Task 8

Invoice No. 13156

Invoice Date: 01/19/23

Bill To:
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551
Attn: Diane Stafford, Paul Salop

Remit Payment To:
Kinnetic Environmental, Inc.
9057C Soquel Drive, Ste B
Aptos, CA 95003

KEI Project No.: 5880.06

POC Monitoring Action Plan

Employee / Item	Title/Description	Hours / Qty	Rate	Amount
Laboratory Services				
Caltest Analytical Laboratory				2,851.53

BALANCE DUE $ 2,851.53

NELAP/ORELAP Certification 4036

Caltest ANALYTICAL LABORATORY
ENVIRONMENTAL ANALYSES

CA-ELAP Certification 1664

Invoice

Invoice No: 703046

Lab Order: X110572
Project: BAMSC PESTICIDES
Sampled: PAUL SALOP

Invoice Date: 12/12/2022
Received: 11/09/2022
Invoice Terms **: Net 30
Purchase Auth/PO:

Invoice To:
Cathy Dobbins
Kinnetic Environmental
3065 Porter St. #101
Soquel, CA 95073

Report To:
Kevin Lewis
Kinnetic Environmental
3065 Porter Street #101
Soquel, CA 95073
831/477-2003

CC:

Description	TAT	Quantity	Unit Price	Total Cost
Electronic Deliverable for CEDEN	Standard	11	$10.00	$110.00
Pyrethroids and Fipronil, EPA 625.1	Standard	11	$498.60	$5,484.60
Imidacloprid by HPLC (3 sample minimum)	Standard	11	$355.50	$3,910.50
			Total	**$9,505.10**

Invoice Notes

Please reference the invoice number on your check and remit to:

Caltest Analytical Laboratory
1885 North Kelly Road
Napa, California 94558
(707) 258-4000

CCCWP 5886.05 = $1901.02
AMS POC 5880.06 = $2851.53
EOASCVURPPP 5764.12 = $2851.53
EOA SMWPPP 5765.12 = $1901.02

****Payment due NET days from Invoice Date or Prior to Release of results if COD**
Past Due Balances subject to a FINANCE CHARGE of 1.5% per month.

***** Securely pay invoices online at CaltestLabs.com *****

1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • (707) 226-1001 • e-mail: info@caltestlabs.com

KINNETIC ENVIRONMENTAL

9057C Soquel Drive, Suite B
Aptos, California 95003
Ofc. (831) 457-3950

Task 10

Invoice No. 13218

Invoice Date: 01/19/23
Billing Cycle: 11/01/22 - 11/30/22

Bill To:
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551
Attn: Diane Stafford, Paul Salop

Contract No.: 2022-0001
Task Order No.: 430-003

Remit Payment To:
Kinnetic Environmental, Inc.
9057C Soquel Drive, Ste B
Aptos, CA 95003

KEI Project No.: 5880.00

ACCWP - Low Impact Development Monitoring Planning and Preparation

Employee / Item	Title/Description	Hours / Qty	Rate	Amount
Task 1 - Support LID Monitoring Planning				
Christian Kocher	Project Manager	0.75	179.56	134.67
Kevin Lewis	Project Scientist I	4.50	122.74	552.33
Travel Expenses				42.50
Total Task 1 - Support LID Monitoring Planning				**729.50**

BALANCE DUE **$ 729.50**

Total Amount Authorized	15,000.00
Total Billed as of Last Period	1,526.26
Billed this Period	729.50
Total Billed to Date	2,255.76
Total Budget Remaining	12,744.24
Percent Complete	15%

Non-Labor Expense Summary

Invoice No. **13218**

Invoice Date 01/19/23

Date	Vendor	Description	Payee	Qty.	Rate	Amount
Task 1 - Support LID Monitoring Planning						
Travel Expenses - Mileage						
11/10/22	Kevin Lewis	Mileage		68	0.625	42.50
Total Travel Expenses - Mileage						**42.50**
Total Task 1 - Support LID Monitoring Planning						**42.50**

TOTAL NON-LABOR EXPENSE **$ 42.50**

KINNETIC ENVIRONMENTAL

Time Log
11/01/22 - 11/30/22

Date	Employee	Project	Hours
Task 1 - Support LID Monitoring Planning			
11/09/22	Kocher, Christian	5880.04 Support LID Monitoring Planning	0.25
11/22/22	Kocher, Christian	5880.04 Support LID Monitoring Planning	0.50
	Kocher, Christian Total		**0.75**
11/09/22	Lewis, Kevin	5880.04 Support LID Monitoring Planning	0.50
11/10/22	Lewis, Kevin	5880.04 Support LID Monitoring Planning	3.00
11/11/22	Lewis, Kevin	5880.04 Support LID Monitoring Planning	0.25
11/14/22	Lewis, Kevin	5880.04 Support LID Monitoring Planning	0.25
11/17/22	Lewis, Kevin	5880.04 Support LID Monitoring Planning	0.25
11/18/22	Lewis, Kevin	5880.04 Support LID Monitoring Planning	0.25
	Lewis, Kevin Total		**4.50**

Travel Expense Claim

KINNETIC ENVIRONMENTAL

Name: Kevin Lewis **Reporting Period:** November 2022

Date	Project Description	Task Code	Location	Lodging	Meals				Living Incidental	Travel Expenses					Total
										Transportation			Mileage	0.625	
					Bfast	Lunch	Dinner	Daily Meal Total		Type	Cost	Prkg/ Toll	Miles	Cost	
11/10/22	Task 1_Support LID Monitoring	5880.04	Alameda County					-					68	42.50	42.50
			Task Total	**-**	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**68**	**42.50**	**42.50**
			Subtotals	**-**	**-**	**-**	**-**	**-**	**-**		**-**	**-**	**68**	**42.50**	**42.50**
													Total:		**42.50**

Transportation Types:

- FT = Ford Transit
- FV = Ford Utility Van
- SC = Subaru Crosstrek
- RV = Rental Vehicle
- PV = Personal Vehicle
- OV = Cabs, Uber, etc.

Employee Signature:

Supervisor Signature:

12/15/2022 | 3:53 PM

S6.2.111

APPLIED marine SCIENCES

February 10, 2023

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: January 1-31, 2023

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$1,485.00	$60,000.00	$56,797.07	$3,202.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support - CLOSED	$958.50	$22,501.00	$22,501.00	$0.00
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$16,802.50	$330,000.00	$194,683.08	$135,316.92
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$5,638.53	$107,000.00	$63,862.07	$43,137.93
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$2,150.00	$42,000.00	$10,879.14	$31,120.86
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$2,150.00	$54,000.00	$32,085.11	$21,914.89
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$7,087.58	$48,081.00	$20,504.83	$27,576.18
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$0	$66,671.00	$0	$66,671.00
50201	Task 13 - PRC-23-1	F15W81	PM1	Website Support	$1,846.50	$6,000.00	$1,846.50	$4,153.50
				Total:	$38,118.61	$1,227,303.00	$892,196.19	$335,106.81

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Okay to pay G33
2/17/2023
SG

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 4 - Arroyo Las Positas SSID Study

Task C8E-21-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						$21,565.00
Principal Scientist-MB	$165.00						$1,732.50
Principal Scientist-AM	$186.00						$1,200.00
Staff Scientist-ES	$110.00						$330.00
Staff Scientist-EG	$110.00	13.5	$1,485.00				$13,035.00
Staff Scientist-CH	$115.00						$6,135.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						$375.00
Subcontractors							
Caltest							$92.00
University of Hawaii							$675.00
SLAB SOEST Laboratory							$1,493.00
San Francisco Estuary Institute							$396.20
Direct Expenses							$8,263.26
G&A 10% (Subs only)							$265.62
G&A 15% (ODC's only)							$1,239.49
Total Invoiced			$1,485.00				$56,797.07
TOTALS:							
Authorized Budget			$60,000.00				$60,000.00
Prior Invoiced Amount			$55,312.07				$55,312.07
Current Invoice			$1,485.00				$1,485.00
Budget Remaining			$3,202.93				$3,202.93

Task 4 Amount Due:	$1,485.00

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 6 - Website Support

Task PRC-22-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						$422.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$186.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Formula Design			$871.36				$20,071.36
Direct Expenses							
G&A 10% (Subs only)			$87.14				$2,007.14
G&A 15% (ODC's only)							
Total Invoiced			$958.50				$22,501.00
TOTALS:							
Authorized Budget			$22,501.00				$22,501.00
Prior Invoiced Amount			$21,542.50				$21,542.50
Current Invoice			$958.50				$958.50
Budget Remaining			$0.00				$0.00

Task 6 Amount Due:	$958.50

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	69	$14,835.00					$49,555.00
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00	3.5	$647.50					$647.50
Staff Scientist-ES	$110.00							
Staff Scientist-EG	$110.00							$1,402.50
Staff Scientist-TV	$120.00	11	$1,320.00					$8,880.00
Adminstrative-DS	$110.00							
Adminstrative-DC	$125.00							
Subcontractors								
Kinnetic Environmental								$32,591.93
Bioassessment Services								$18,301.89
San Jose State University								$3,075.00
Benjamin Salop								$360.00
Ecoanalysts								$31,437.00
Caltest								$17,488.30
Pacific Ecorisk								$18,200.50
Direct Expenses								$520.00
G&A 10% (Subs only)								$12,145.46
G&A 15% (ODC's only)								$78.00
Total Invoiced			$16,802.50					$194,683.08
TOTALS:								
Authorized Budget			$330,000.00					$330,000.00
Prior Invoiced Amount			$177,880.58					$177,880.58
Current Invoice			$16,802.50					$16,802.50
Budget Remaining			$135,316.92					$135,316.92

Task 7 Amount Due:	$16,802.50

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	25.5	$5,482.50				$26,230.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00	1.25	$150.00				$3,870.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00						$220.00
Adminstrative-DC	$125.00						
Subcontractors							
ALS							$5,425.00
Kinnetic Environmental							$2,851.53
Pacific Ecorisk							$18,550.00
Direct Expenses			$5.24				$787.28
G&A 10% (Subs only)							$2,682.65
G&A 15% (ODC's only)			$0.79				$118.11
Total Invoiced			$5,638.53				$63,862.07
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$58,223.54				$58,223.54
Current Invoice			$5,638.53				$5,638.53
Budget Remaining			$43,137.93				$43,137.93

Task 8 Amount Due:	$5,638.53

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	10	$2,150.00				$10,427.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							$27.51
G&A 10% (Subs only)							
G&A 15% (ODC's only)							$4.13
Total Invoiced			$2,150.00				$10,879.14
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$8,729.14				$8,729.14
Current Invoice			$2,150.00				$2,150.00
Budget Remaining			$31,120.86				$31,120.86

Task 9 Amount Due:	$2,150.00

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	10	$2,150.00				$28,595.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental Bioassessment Services							$2,704.66
Direct Expenses							$45.63
G&A 10% (Subs only)							$270.47
G&A 15% (ODC's only)							$6.85
Total Invoiced			$2,150.00				$32,085.11
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$29,935.11				$29,935.11
Current Invoice			$2,150.00				$2,150.00
Budget Remaining			$21,914.89				$21,914.89

Task 10 Amount Due:	$2,150.00

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$6,443.25				$18,640.75
Direct Expenses							
G&A 10% (Subs only)			$644.33				$1,864.08
G&A 15% (ODC's only)							
Total Invoiced			$7,087.58				$20,504.83
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$13,417.25				$13,417.25
Current Invoice			$7,087.58				$7,087.58
Budget Remaining			$27,576.18				$27,576.18

Task 11 Amount Due:	$7,087.58

Invoice No. 430-21/26

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
1/1/23-1/31/23

Task Website Support

Task 13 - PRC-23-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Formula Design			$1,678.64				$1,678.64
Direct Expenses							
G&A 10% (Subs only)			$167.86				$167.86
G&A 15% (ODC's only)							
Total Invoiced			$1,846.50				$1,846.50
TOTALS:							
Authorized Budget			$6,000.00				$6,000.00
Prior Invoiced Amount							
Current Invoice			$1,846.50				$1,846.50
Budget Remaining			$4,153.50				$4,153.50

Task 13 Amount Due:	$1,846.50

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Friday, February 10, 2023
Page 1

Name: Paul Salop
Description: 430-10 site recon
Notes: storm event site visit

Report Dates:
Begin Date 1/13/2023
End Date 1/13/2023

Report Amounts:
Advance Amount 0.00
Total Amount 5.24

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prani
1/13/2023	430	ACCWP	FY23 POCs	Mileage		8.00	0.6550	5.24			£	£
							Total:	5.24				
							Advance:	0.00				
							Credit Card:	0.00				
							Personal:	0.00				
							Net Due:	5.24				

Employee Signature _____ Date _____

Manager Signature _____ Date _____

Approval:	Name	Approved
Supervisor:	Paul Salop	01/13/23
Accounting:	Dovlynn Cammack	01/19/23

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Task 430-11

Invoice

Invoice Date: Jan 27, 2023
Invoice Num: AMS00-1222
Billing From: Dec 01, 2022
Billing To: Dec 31, 2022

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	6.25	$293.00	$1,831.25
Senior Engineer/Scientist III	14.00	$244.00	$3,416.00
Associate Engineer/ScientistII	5.50	$184.00	$1,012.00
		Total Services:	**$6,259.25**

Draft BMP Report (AMS001:02) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Associate Engineer/ScientistII	1.00	$184.00	$184.00
		Total Services:	**$184.00**

Amount Due This Invoice: **$6,443.25**

This invoice is due upon receipt

Ray Goebel

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	$ 12,197.50	$ 6,443.25	$ 18,640.75	$ 25,069.25

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430-13

formula

Formula Design
888-231-0694
1038 Ash Avenue
Cottage Grove, Oregon
97424
United States

Billed To
Paul Salop
Clean Water Program
4749 Bennett Dr., Ste. L
Livermore, California
94551
United States

Date of Issue
02/06/2023

Due Date
02/21/2023

Invoice Number
0000358

Amount Due (USD)
$2,550.00

Description	Rate	Qty	Line Total
Web Design and Development Final Payment for Scope of work per proposal for Clean Water Project website redevelopment.	$1,600.00	1	$1,600.00
Web Design and Development 1/12/2023 Added new Stormwater Resource Plan documents to the website and links.	$100.00	1	$100.00
Web Design and Development 1/18/2023 uploaded annual report (large file) and changed graphics on home page and added links.	$100.00	2	$200.00
Web Design and Development 1/18/2023 Set up MailPoet for mass emails from within the administration area.	$100.00	1.5	$150.00
Administration 2/3/2023 Training on how to use the new site.	$100.00	2	$200.00
Web Design and Development Purchased pro version of WP Event Manager ($100 yearly), and set up recurring events for front and backend.	$100.00	3	$300.00

$871.36- TASK 6
$1678.64- TASK 13

Subtotal	2,550.00
Tax	0.00
Total	2,550.00

Amount Paid	0.00
Amount Due (USD)	$2,550.00

Terms
Please, pay invoice in net 15 days to avoid a 10% late fee.

APPLIED marine SCIENCES

March 9, 2023

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: February 1-28, 2023

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$56,797.07	$3,202.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support - CLOSED	$0	$22,501.00	$22,501.00	$0
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$9,430.00	$330,000.00	$204,113.08	$125,886.92
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$3,020.88	$107,000.00	$66,882.95	$40,117.05
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$5,818.56	$42,000.00	$16,697.70	$25,302.30
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$3,443.90	$54,000.00	$35,529.01	$18,470.99
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$3,405.05	$48,081.00	$23,909.88	$24,171.12
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$0	$66,671.00	$0	$66,671.00
50201	Task 13 - PRC-23-1	F15W81	PM1	Website Support	$107.50	$6,000.00	$1,954.00	$4,046.00
				Total:	$25,225.89	$1,227,303.00	$917,422.08	$309,880.92

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Okay to pay G33
SG

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
2/1/23-2/28/23

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	34	$7,310.00					$56,865.00
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00							$647.50
Staff Scientist-ES	$110.00							
Staff Scientist-EG	$110.00	4	$440.00					$1,842.50
Staff Scientist-TV	$120.00	14	$1,680.00					$10,560.00
Adminstrative-DS	$110.00							
Adminstrative-DC	$125.00							
Subcontractors								
Kinnetic Environmental								$32,591.93
Bioassessment Services								$18,301.89
San Jose State University								$3,075.00
Benjamin Salop								$360.00
Ecoanalysts								$31,437.00
Caltest								$17,488.30
Pacific Ecorisk								$18,200.50
Direct Expenses								$520.00
G&A 10% (Subs only)								$12,145.46
G&A 15% (ODC's only)								$78.00
Total Invoiced			$9,430.00					$204,113.08
TOTALS:								
Authorized Budget			$330,000.00					$330,000.00
Prior Invoiced Amount			$194,683.08					$194,683.08
Current Invoice			$9,430.00					$9,430.00
Budget Remaining			$125,886.92					$125,886.92

Task 7 Amount Due:	$9,430.00

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
2/1/23-2/28/23

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	11	$2,365.00				$28,595.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00	4.75	$570.00				$4,440.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00						$220.00
Adminstrative-DC	$125.00						
Subcontractors							
ALS							$5,425.00
Kinnetic Environmental							$2,851.53
Pacific Ecorisk							$18,550.00
Direct Expenses			$74.68				$861.96
G&A 10% (Subs only)							$2,682.65
G&A 15% (ODC's only)			$11.20				$129.31
Total Invoiced			$3,020.88				$66,882.95
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$63,862.07				$63,862.07
Current Invoice			$3,020.88				$3,020.88
Budget Remaining			$40,117.05				$40,117.05

Task 8 Amount Due:	$3,020.88

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
2/1/23-2/28/23

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	27	$5,805.00				$16,232.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses			$11.79				$39.30
G&A 10% (Subs only)							
G&A 15% (ODC's only)			$1.77				$5.90
Total Invoiced			$5,818.56				$16,697.70
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$10,879.14				$10,879.14
Current Invoice			$5,805.00				$5,805.00
Budget Remaining			$25,315.86				$25,315.86

Task 9 Amount Due:	$5,818.56

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
2/1/23-2/28/23

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	14.5	$3,117.50				$31,712.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental Bioassessment Services			$269.34				$2,974.00
Direct Expenses			$26.20				$71.83
G&A 10% (Subs only)			$26.93				$297.40
G&A 15% (ODC's only)			$3.93				$10.78
Total Invoiced			$3,443.90				$35,529.01
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$32,085.11				$32,085.11
Current Invoice			$3,443.90				$3,443.90
Budget Remaining			$18,470.99				$18,470.99

Task 10 Amount Due:	$3,443.90

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
2/1/23-2/28/23

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$3,095.50				$21,736.25
Direct Expenses							
G&A 10% (Subs only)			$309.55				$2,173.63
G&A 15% (ODC's only)							
Total Invoiced			$3,405.05				$23,909.88
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$20,504.83				$20,504.83
Current Invoice			$3,405.05				$3,405.05
Budget Remaining			$24,171.12				$24,171.12

Task 11 Amount Due:	$3,405.05

Invoice No. 430-21/27

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
2/1/23-2/28/23

Task - Website Support

Task 13 - PRC-23-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	0.5	$107.50				$107.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Formula Design							$1,678.64
Direct Expenses							
G&A 10% (Subs only)							$167.86
G&A 15% (ODC's only)							
Total Invoiced			$107.50				$1,954.00
TOTALS:							
Authorized Budget			$6,000.00				$6,000.00
Prior Invoiced Amount			$1,846.50				$1,846.50
Current Invoice			$107.50				$107.50
Budget Remaining			$4,046.00				$4,046.00

Task 13 Amount Due:	$107.50

Expense Report

Applied Marine Sciences, Inc.

Thursday, March 9, 2023
Page 1

Name: Paul Salop
Description: 430-8 WQ sample
Notes: Sample POCs WQ

Report Dates:
Begin Date 2/24/2023
End Date 2/24/2023

Report Amounts:
Advance Amount 0.00
Total Amount 24.89

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
2/24/2023	430	ACCWP	FY23 POCs	Mileage	Paul Salop	38.00	0.6550	24.89			£	£
							Total:	**24.89**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**24.89**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	02/25/23
Accounting:	Dovlynn Cammack	02/26/23

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Thursday, March 9, 2023
Page 1

Name: Theresa Venello
Description: 430 ACCWP Oakland Sampling
Notes: mileage to and from pump sampling stormwater for 430 ACCWP task 8 in oakland

Report Dates:
Begin Date 2/24/2023
End Date 2/24/2023

Report Amounts:
Advance Amount 0.00
Total Amount 42.58

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
2/24/2023	430	ACCWP	FY23 POCs	Mileage		65.00	0.6550	42.58			£	£
							Total:	**42.58**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**42.58**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	02/27/23
Accounting:	Dovlynn Cammack	02/27/23

Expense Report

APPLIED marine SCIENCES

Applied Marine Sciences, Inc.

Thursday, March 9, 2023
Page 1

Name: Paul Salop
Description: 430 recons
Notes: POC WQ Recon in Oakland
Trash recons in Dublin

Report Dates:
Begin Date 2/22/2023
End Date 2/22/2023

Report Amounts:
Advance Amount 0.00
Total Amount 19.00

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
2/22/2023	430	ACCWP	FY23 POCs	Mileage	Paul Salop	11.00	0.6550	7.21			£	£
2/22/2023	430	ACCWP	AC Tasks (FY23 Trash)	Mileage	Paul Salop	18.00	0.6550	11.79			£	£
							Total:	**19.00**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**19.00**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	02/22/23
Accounting:	Dovlynn Cammack	02/26/23

Expense Report

Applied Marine Sciences, Inc.

Thursday, March 9, 2023
Page 1

Name: Paul Salop
Description: 430-10 equipment transfer
Notes: Retrieve ISCO samplers from ACPWA

Report Dates:
Begin Date 2/14/2023
End Date 2/14/2023

Report Amounts:
Advance Amount 0.00
Total Amount 26.20

Date	ID	Project Description	Phase	Expense Item	Payee	Units	Rate	Amount	Reference	Credit Card	Import	Prsnl
2/14/2023	430	ACCWP	FY 23 LID	Mileage	Paul Salop	40.00	0.6550	26.20			£	£
							Total:	**26.20**				
							Advance:	**0.00**				
							Credit Card:	**0.00**				
							Personal:	**0.00**				
							Net Due:	**26.20**				

Employee Signature **Date**

Manager Signature **Date**

Approval:	Name	Approved
Supervisor:	Paul Salop	02/14/23
Accounting:	Dovlynn Cammack	02/18/23

KINNETIC ENVIRONMENTAL
9057C Soquel Drive, Suite B
Aptos, California 95003
Ofc. (831) 457-3950

Invoice No. 13267

430-10

Invoice Date: 02/17/23
Billing Cycle: 01/01/23 - 01/31/23

Bill To:
Applied Marine Sciences
4749 Bennett Drive, Suite L
Livermore, CA 94551
Attn: Diane Stafford, Paul Salop

Contract No.: 2022-0001
Task Order No.: 430-003

Remit Payment To:
Kinnetic Environmental, Inc.
9057C Soquel Drive, Ste B
Aptos, CA 95003

KEI Project No.: 5880.00

ACCWP - Low Impact Development Monitoring Planning and Preparation

Employee / Item	Title/Description	Hours / Qty	Rate	Amount
Task 1 - Support LID Monitoring Planning				
Christian Kocher	Project Manager	1.50	179.56	269.34
Total Task 1 - Support LID Monitoring Planning				**269.34**

BALANCE DUE **$ 269.34**

Total Amount Authorized	15,000.00
Total Billed as of Last Period	2,255.76
Billed this Period	269.34
Total Billed to Date	2,525.10
Total Budget Remaining	12,474.90
Percent Complete	17%

KINNETIC ENVIRONMENTAL

Time Log
01/01/23 - 01/31/23

Date	Employee	Task	Hours
Task 1 - LID Monitoring Prep			
01/15/2023	Kocher, Christian	5880.05 LID Monitoring Prep	1.50
	Kocher, Christian Total		**1.50**

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

430-11

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Invoice Date: Mar 1, 2023
Invoice Num: AMS001-0123
Billing From: Jan 01, 2023
Billing To: Jan 31, 2023

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	1.50	$293.00	$439.50
Senior Engineer/Scientist III	9.00	$244.00	$2,196.00
Associate Engineer/ScientistII	2.50	$184.00	$460.00
		Total Services:	**$3,095.50**
		Amount Due This Invoice:	**$3,095.50**

This invoice is due upon receipt

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	**$ 18,640.75**	**$ 3,095.50**	**$ 21,736.25**	**$ 21,973.75**

BillQuick Standard Report Copyright © BQE Software, Inc.

March 9, 2023

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda County Public Works Agency
399 Elmhurst St
Hayward, CA 94544

Subject: AMS Invoice 430-21/27 Activities

Dear Sharon,

This project summary describes activities conducted by AMS in February 2023 associated with invoice 430-21/27. Only subtasks for which work was conducted during the invoice period are shown.

Subtask 7 – Creek Status Monitoring - Implementation

- Participation on BAMSC Receiving Water Limitations (RWL) workgroup
- Editing of sections of draft RWL Monitoring Report
- Development / delivery of draft sections of WY 2022 Urban Creeks Monitoring Report (UCMR)

Subtask 8 – Pollutants of Concern Monitoring

- Conducted wet season water quality monitoring in San Leandro Creek

Subtask 9 – Receiving Water Monitoring - Trash

- Coordinated with Zone 7 and City of Dublin staff on location and permitting of target trash monitoring sites
- Researched and conducted reconnaissance of two alternative monitoring locations along Alamo Canal
- Coordinated with Water Board and CDFW staff re: required permitting of target trash monitoring sites
- Coordinated with BAMSC representatives on approach to regional Quality Assurance Project Plan (QAPP) and monitoring plan

Subtask 10 – Low Impact Development Monitoring Planning

- Performed field recon with City of Oakland staff re: redevelopment activities at site of proposed LID monitoring locations
- Performed storm event site recons at proposed monitoring locations
- Continued development / delivery of ACCWP Draft LID Monitoring Plan
- Coordinated with monitoring consultants re: WY 2023 monitoring implementation at proposed sampling sites

Subtask 11 – Facilitate Unsheltered Homeless Work Group

- Attended BAMSC C.17 Work Group meeting on January 24, 2023, on behalf of the ACCWP C.17 Work Group.
- Continued to coordinate with Caltrans staff on C.17 Work Group related topics.

4749 Bennett Drive, Suite L, Livermore, CA 94551 925.373.7142 Fax 925.373.7834

- Continued to coordinate with the Deputy Director of the Homeless Division of the Alameda County Community Development Agency, Housing & Community
- Development Department on sharing data from 2022 Point-In-Time Count.
- Coordinated with ACCWP Data Management – GIS Subcommittee on mapping task.
- Attended ACCWP Management Committee meeting on January 25, 2023, and presented an overview of the MRP 3.0 C.17 requirements and tasks.
- Reviewed final C.17 BMP data collection guidance document and final BMP survey.

APPLIED marine SCIENCES

April 18, 2023

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: March 1-31, 2023

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$56,797.07	$3,202.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support - CLOSED	$0	$22,501.00	$22,501.00	$0
50201	Task 7- C8CD-22-1	F15W81	CW5	Creek Status Monitoring - Implementation	$3,759.13	$330,000.00	$207,872.21	$122,127.80
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$1,436.42	$107,000.00	$68,319.37	$38,680.63
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$11,932.50	$42,000.00	$28,630.20	$13,369.80
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$9,030.00	$54,000.00	$44,559.01	$9,440.99
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$2,686.48	$48,081.00	$26,596.36	$21,484.65
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$1,571.63	$66,671.00	$1,571.63	$65,099.38
50201	Task 13 - PRC-23-1	F15W81	PM1	Website Support	$0	$6,000.00	$1,954.00	$4,046.00
				Total:	$30,416.16	$1,227,303.00	$947,838.24	$279,464.76

Okay to pay G33
Sg

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
3/1/23-3/31/23

Task 7 - Creek Status Monitoring - Implementation

Task PRC-22-1

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	11	$2,365.00					$59,230.00
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00							$647.50
Staff Scientist-ES	$110.00							
Staff Scientist-EG	$110.00							$1,842.50
Staff Scientist-TV	$120.00							$10,560.00
Adminstrative-DS	$110.00							
Adminstrative-DC	$125.00	1	$125.00					$125.00
Subcontractors								
Kinnetic Environmental								$32,591.93
Bioassessment Services								$18,301.89
San Jose State University								$3,075.00
Benjamin Salop								$360.00
Ecoanalysts								$31,437.00
Caltest								$17,488.30
Coastal Conservation & Research			$1,153.75					$1,153.75
Pacific Ecorisk								$18,200.50
Direct Expenses								$520.00
G&A 10% (Subs only)			$115.38					$12,260.84
G&A 15% (ODC's only)								$78.00
Total Invoiced			$3,759.13					$207,872.21
TOTALS:								
Authorized Budget			$330,000.00					$330,000.00
Prior Invoiced Amount			$204,113.08					$204,113.08
Current Invoice			$3,759.13					$3,759.13
Budget Remaining			$122,127.80					$122,127.80

Task 7 Amount Due:	$3,759.13

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
3/1/23-3/31/23

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	2	$430.00				$29,025.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00						$4,440.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00	0.5	$55.00				$275.00
Adminstrative-DC	$125.00						
Subcontractors							
ALS			$643.00				$6,068.00
Kinnetic Environmental							$2,851.53
Pacific Ecorisk							$18,550.00
Direct Expenses			$212.28				$1,074.24
G&A 10% (Subs only)			$64.30				$2,746.95
G&A 15% (ODC's only)			$31.84				$161.15
Total Invoiced			$1,436.42				$68,319.37
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$66,882.95				$66,882.95
Current Invoice			$1,436.42				$1,436.42
Budget Remaining			$38,680.63				$38,680.63

Task 8 Amount Due:	$1,436.42

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
3/1/23-3/31/23

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	55.5	$11,932.50				$28,165.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							$39.30
G&A 10% (Subs only)							
G&A 15% (ODC's only)							$5.90
Total Invoiced			$11,932.50				$28,630.20
TOTALS:							
Authorized Budget			$42,000.00				$42,000.00
Prior Invoiced Amount			$16,697.70				$16,697.70
Current Invoice			$11,932.50				$11,932.50
Budget Remaining			$13,369.80				$13,369.80

Task 9 Amount Due:	$11,932.50

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
3/1/23-3/31/23

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	42	$9,030.00				$40,742.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental Bioassessment Services							$2,974.00
Direct Expenses							$71.83
G&A 10% (Subs only)							$297.40
G&A 15% (ODC's only)							$10.78
Total Invoiced			$9,030.00				$44,559.01
TOTALS:							
Authorized Budget			$54,000.00				$54,000.00
Prior Invoiced Amount			$35,529.01				$35,529.01
Current Invoice			$9,030.00				$9,030.00
Budget Remaining			$9,440.99				$9,440.99

Task 10 Amount Due:	$9,030.00

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
3/1/23-3/31/23

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$2,442.25				$24,178.50
Direct Expenses							
G&A 10% (Subs only)			$244.23				$2,417.86
G&A 15% (ODC's only)							
Total Invoiced			$2,686.48				$26,596.36
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$23,909.88				$23,909.88
Current Invoice			$2,686.48				$2,686.48
Budget Remaining			$21,484.65				$21,484.65

Task 11 Amount Due:	$2,686.48

Invoice No. 430-21/28

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
3/1/23-3/31/23

Task 12 - Asset Management Framework

Task CW21-23 EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$1,428.75				$1,428.75
Direct Expenses							
G&A 10% (Subs only)			$142.88				$142.88
G&A 15% (ODC's only)							
Total Invoiced			$1,571.63				$1,571.63
TOTALS:							
Authorized Budget			$66,671.00				$66,671.00
Prior Invoiced Amount							
Current Invoice			$1,571.63				$1,571.63
Budget Remaining			$65,099.38				$65,099.38

Task 12 Amount Due:	$1,571.63

FedEx

FedEx Billing Online

Tracking ID Details

Back

Tracking ID Summary

Help Hide

Billing Information

Tracking ID no.	771441962418
Invoice no.	5-670-67995
Account no.	1448-0745-6
Bill date	03/01/2023
Total Billed	$212.28
Tracking ID Balance due	**$0.00**
Status	Paid CC

View Invoice History
View signature proof of delivery

Messages

We calculated your charges based on a dimensional Read More..
Distance Based Pricing, Zone 4
Fuel Surcharge - FedEx has applied a fuel surcharg Read More..

Transaction Details

Help Hide

Sender Information

Dovlynn Cammack
APPLIED MARINE SCIENCES, INC
4749 Bennett Drive
Suite L
LIVERMORE CA 94551
US

Recipient Information

Karen Melerine
ALS Global
1317 S 13TH AVE
KELSO WA 98626
US

Shipment Details

Ship date	03/01/2023
Tendered date	03/01/2023
Payment type	Shipper
Service type	FedEx Priority Overnight
Zone	04
Package type	Customer Packaging
Actual weight	10.00lbs
Rated weight	16.00lbs
Pieces	1
Rated method	1
Meter No.	4857903
Declared value	

Charges

Transportation Charge	184.12
Discount	-9.21
DAS Comm	3.70
Courier Pickup Charge	4.00
Fuel Surcharge	29.67
Total charges	**$212.28**

Original Reference

Customer reference no.	430-8
Department no.	
Reference #2	
Reference #3	

Proof of Delivery

Delivery date	2023-03-02T10:16:0010:16
Service area code	AA
Signed by	H.HALLANDER

View signature proof of delivery

Back

right solutions.
right partner.

Remit To: ALS Group USA, Corp.
PO Box 975444
Dallas, TX 75397-5444
Attn: Accounts Receivable
TEL: +1 281 530 5656
FAX: +1 281 561 6125
T.I.N.: 76-0606679

INVOICE

Service Request: K2302487
Customer No.: 207712-01

Invoice No.: 36-51-611777-0
Invoice Date: 4/14/23
P.O. Number: 3411
Payment Terms: Net 30

430-8

Project Name: AMS-ACCWP
Project Number:

Attn: Paul Salop
Applied Marine Sciences, Incorporated
salop@amarine.com
4749 Bennett Dr. Suite L
Livermore, CA 94551

Report To: Paul Salop
Applied Marine Sciences, Incorporated
4749 Bennett Dr. Suite L
Livermore, CA 94551

ALS Project Manager: Karen Melerine(karen.melerine@ALSGlobal.com)
Phone: +1 360 577 7222
ALS Sales Rep: Howard Boorse

Samples submitted on: 3/ 2/23

Analytical Services

Storm Water

Method	Test Description	QTY	Unit Price	TAT Surcharge	Adj Unit Price	Extended Price	
1631E	Total Mercury by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry	2	$100.00	0%	$100.00	$200.00	K
8082A	Polychlorinated Biphenyl (PCB) Congeners by GC/ECD	1	$325.00	0%	$325.00	$325.00	K
SM 2540 D	Total Suspended Solids Dried at 103-105 Deg C 20th Ed.	1	$20.00	0%	$20.00	$20.00	K
SM 5310 C	Total Organic Carbon (TOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.	1	$48.00	0%	$48.00	$48.00	K

Other Services and Supplies

Description	QTY	Unit Price	Unit Percent	Tax Rate	Extended Price	
Sustainability Fee - Cost per work order/SDG/CoC	1.00	$50.00	0.00		$50.00	K

Subtotals

Analytical Services:	$593.00
Other Charges:	$50.00
Applicable Tax:	$0.00
Amount Due (USD):	$643.00

Client Sample IDs: 204SLE020-W-01 to -04, Field Blank

Penalty of $150, plus 1.5% interest per month (18% per year) charge on past due accounts. Clients are also responsible for any collection costs.

Subject to ALS Terms & Conditions

Coastal Conservation & Research, Inc.
PO Box 543
Moss Landing, CA 95039
www.ccandr.org

INVOICE

Invoice # **2164**
Date: 4/10/2023
Billing Period: 1/1/23-3/31/23

$1,153.75 - 430-7

$1,153.75 - 199-3

To:
Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Dr, Ste L
Livermore, CA 94551

Project: ACCWP RMC and CCLEAN Data Management Services - 2023 Q1

Task	Cost/ Task	Total Tasks	Task Cost
Data management tasks including vocabulary review, loading of bioassessment (physical habitat, benthic and algae taxonomy) and water quality (field, habitat, chemistry, toxicity) data, GIS watershed delineations and metric calculations, and bioassessment metric and index (IPI, CSCI, ASCI) calculations.	$2,307.50	1	$2,307.50
		Total Cost	**$2,307.50**

Invoice Amount: $2,307.50

INVOICE IS PAYABLE UPON RECEIPT
Make checks payable to CCR, Inc.
Fed ID# 91-2081300

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

430-11

Invoice Date: Mar 30, 2023
Invoice Num: AMS001-0223
Billing From: Feb 01, 2023
Billing To: Feb 28, 2023

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	1.25	$293.00	$366.25
Senior Engineer/Scientist III	7.00	$244.00	$1,708.00
Associate Engineer/ScientistII	2.00	$184.00	$368.00
		Total Services:	**$2,442.25**
		Amount Due This Invoice:	**$2,442.25**

This invoice is due upon receipt

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	**$ 21,736.25**	**$ 2,442.25**	**$ 24,178.50**	**$ 19,531.50**

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EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

Invoice Date: Mar 30, 2023
Invoice Num: AMS002-0223
Billing From: Feb 01, 2023
Billing To: Feb 28, 2023

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

430-12

Project: ACCWP Asset Management Framework

Draft Framework (AMS002:02) - **PO#:** TO #2022-0002 (430-002) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	1.25	$303.00	$378.75
Senior Engineer/Scientist I	5.00	$210.00	$1,050.00
		Total Services:	**$1,428.75**
		Amount Due This Invoice:	**$1,428.75**

This invoice is due upon receipt

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 60,610.00	$ 72.75	$ 1,428.75	$ 1,501.50	$ 59,108.50

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April 18, 2023

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda County Public Works Agency
399 Elmhurst St
Hayward, CA 94544

Subject: AMS Invoice 430-21/28 Activities

Dear Sharon,

This project summary describes activities conducted by AMS in March 2023 associated with invoice 430-21/28. Only subtasks for which work was conducted during the invoice period are shown.

Subtask 7 – Creek Status Monitoring - Implementation

- Participation on BAMSC Receiving Water Limitations (RWL) workgroup
- Review and editing sections of draft RWL Monitoring Report
- Revision of draft sections of WY 2022 Urban Creeks Monitoring Report (UCMR)
- Participation in coordination meetings with Geosyntec and Jim Scanlin
- Review and comment on 2024 303(d) listings for Alameda County

Subtask 8 – Pollutants of Concern Monitoring

- Coordination with analytical laboratory
- Invoice for WQ analyses (ALS)

Subtask 9 – Receiving Water Monitoring - Trash

- Conducted site recons of drainage management area upstream of alternative monitoring site near Dublin Public Safety Complex.
- Coordinated with Oldcastle re: cost estimate and engineering design
- Coordinated with Zone 7 and City of Dublin staff on location and permitting of target trash monitoring sites
- Coordinated with Water Board and CDFW staff re: Streambed Alteration Agreement submittal
- Developed outline for Trash Monitoring Plan and began drafting sections
- Initiated work on BAMSC regional project to develop Trash Quality Assurance Project Plan

Subtask 10 – Low Impact Development Monitoring Planning

- Coordinated with City of Oakland staff re: redevelopment of property adjacent to proposed LID monitoring location and potential replacement sites
- Performed storm event site recons at proposed and alternative monitoring locations
- Continued development / delivery of ACCWP Draft LID Monitoring Plan
- Participated in planning for Technical Advisory Group (TAG) meeting #2
- Developed and presented status update for ACCWP at TAG meeting #2
- Began planning and development of cost estimates for conduct of monitoring

Subtask 11 – Facilitate Unsheltered Homeless Work Group

- Prepared agenda and coordinated ACCWP C.17 Work Group meeting on February 27, 2023

4749 Bennett Drive, Suite L, Livermore, CA 94551 925.373.7142 Fax 925.373.7834

- Continued to coordinate with Caltrans staff on C.17 Work Group related topics.
- Continued to coordinate with Alameda County Public Works Agency staff on
- acquiring GIS data from the 2022 Point-In-Time Count from the Deputy Director of the Homeless Division of the Alameda County Community Development Agency, Housing & Community Development Department.
- Coordinated with ACCWP Data Management – GIS Subcommittee on mapping task.
- Attended ACCWP Management Committee meeting on February 22, 2023 and provided summary bullets for January meeting summary.
- Emailed BMP report survey to Management Committee representatives on February 13, 2023
- Emailed ACCWP C.17 Work Group on February 13, 2023 and notified the Work Group that the BMP survey had been sent out to the MC representatives.
- Began tracking and collecting completed BMP report surveys from Permittees.

Subtask 12 – ACCWP Asset Mnnagement Framework

- Reviewed regulatory requirements and background materials.
- Developed draft list of assets required to be managed.

APPLIED marine SCIENCES

May 9, 2023

Invoice No. 430-21/29

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: April 1-30, 2023

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$56,797.07	$3,202.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support - CLOSED	$0	$22,501.00	$22,501.00	$0
50201	Task 7- C8CD-23-1	F15W81	CW5	Creek Status Monitoring - Implementation	$1,133.13	$210,000.00	$209,005.34	$994.66
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$0	$107,000.00	$68,319.37	$38,680.63
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$1,827.50	$86,000.00	$30,457.70	$55,542.30
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$7,507.19	$130,000.00	$52,066.20	$77,933.80
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$3,223.28	$48,081.00	$29,819.64	$18,261.37
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$1,947.28	$66,671.00	$3,518.91	$63,152.10
50201	Task 13 - PRC-23-1	F15W81	PM1	Website Support	$0	$6,000.00	$1,954.00	$4,046.00
				Total:	$15,638.38	$1,227,303.00	$963,476.62	$263,826.38

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Okay to pay G33 SG

Invoice No. 430-21/29

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
4/1/23-4/30/23

Task 7 - Creek Status Monitoring - Implementation

Task PRC-23-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	2	$430.00				$59,660.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$647.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$1,842.50
Staff Scientist-TV	$120.00						$10,560.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						$125.00
Subcontractors							
Kinnetic Environmental							$32,591.93
Bioassessment Services							$18,301.89
San Jose State University							$3,075.00
Benjamin Salop							$360.00
Ecoanalysts							$31,437.00
Caltest							$17,488.30
Coastal Conservation & Research							$1,153.75
Pacific Ecorisk							$18,200.50
Direct Expenses			$611.42				$1,131.42
G&A 10% (Subs only)							$12,260.84
G&A 15% (ODC's only)			$91.71				$169.71
Total Invoiced			$1,133.13				$209,005.34
TOTALS:							
Authorized Budget			$210,000.00				$210,000.00
Prior Invoiced Amount			$207,872.21				$207,872.21
Current Invoice			$1,133.13				$1,133.13
Budget Remaining			$994.66				$994.66

Task 7 Amount Due:	$1,133.13

Invoice No. 430-21/29

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
4/1/23-4/30/23

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	8.5	$1,827.50				$29,992.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							$39.30
G&A 10% (Subs only)							
G&A 15% (ODC's only)							$5.90
Total Invoiced			$1,827.50				$30,457.70
TOTALS:							
Authorized Budget			$86,000.00				$86,000.00
Prior Invoiced Amount			$28,630.20				$28,630.20
Current Invoice			$1,827.50				$1,827.50
Budget Remaining			$55,542.30				$55,542.30

Task 9 Amount Due:	$1,827.50

Invoice No. 430-21/29

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
4/1/23-4/30/23

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	19.5	$4,192.50					$44,935.00
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00							$462.50
Staff Scientist-TV	$120.00	2	$240.00					$240.00
Staff Scientist-EG	$110.00							
Staff Scientist-CH	$115.00							
Adminstrative-DS	$110.00							
Adminstrative-DC	$125.00							
Subcontractors								
Kinnetic Environmental								$2,974.00
San Francisco Estuary Institute			$2,795.17					$2,795.17
Direct Expenses								$71.83
G&A 10% (Subs only)			$279.52					$576.92
G&A 15% (ODC's only)								$10.78
Total Invoiced			$7,507.19					$52,066.20
TOTALS:								
Authorized Budget			$130,000.00					$130,000.00
Prior Invoiced Amount			$44,559.01					$44,559.01
Current Invoice			$7,507.19					$7,507.19
Budget Remaining			$77,933.80					$77,933.80

Task 10 Amount Due:	$7,507.19

Invoice No. 430-21/29

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
4/1/23-4/30/23

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$2,930.25				$27,108.75
Direct Expenses							
G&A 10% (Subs only)			$293.03				$2,710.89
G&A 15% (ODC's only)							
Total Invoiced			$3,223.28				$29,819.64
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$26,596.36				$26,596.36
Current Invoice			$3,223.28				$3,223.28
Budget Remaining			$18,261.37				$18,261.37

Task 11 Amount Due:	$3,223.28

Invoice No. 430-21/29

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
4/1/23-4/30/23

Task 12 - Asset Management Framework

Task CW21-23 EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$1,770.25				$3,199.00
Direct Expenses							
G&A 10% (Subs only)			$177.03				$319.91
G&A 15% (ODC's only)							
Total Invoiced			$1,947.28				$3,518.91
TOTALS:							
Authorized Budget			$66,671.00				$66,671.00
Prior Invoiced Amount			$1,571.63				$1,571.63
Current Invoice			$1,947.28				$1,947.28
Budget Remaining			$63,152.10				$63,152.10

Task 12 Amount Due:	$1,947.28

avantor delivered by VWR

100 Matsonford Road
Radnor, PA 19087
t: +1 800 932 5000 f: +1 866 329 2897

430-7

Order Confirmation

Click your order number 8367457717 to view current order status

Sold-To-Party
APPLIED MARINE SCIENCES
4749 BENNETT DR STE L
LIVERMORE CA 94551-4858

Ship-To-Party
Theresa Venello
APPLIED MARINE SCIENCES
4749 BENNETT DR STE L
LIVERMORE CA 94551-4858

Information

Order	8367457717
Date	03/23/2023
Sold To Customer No.	80213468
Ship To Customer No.	80213468
Contact Name	Dovlynn Cammack
Telephone	
Email	cammack@amarine.com
Currency	USD
Sales Rep	DI INSDSLS-West 2 DIMITRI FAILLA
Cust ref	
Reference	W30931453
PO No	3416
PO Date	03/23/2023

Information

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Item	Ref.	Catalog Number	Quantity	Unit Price	Ext. Amount
100		28145-142	1 PK	554.58	554.58
		FILTER AQUAPREP 600 PK10			
		Shipping From Visalia Distribution Center, Estimated Delivery Date 05/17/2023			
		Item Total			554.58
		Tax			56.84
		Total			**611.42**

Unless governed by a separate written agreement, sales are subject to VWR's standard terms and conditions of sale.
Visit www.vwr.com for complete details.

Invoice

San Francisco Estuary Institute
4911 Central Ave.
Richmond, CA 94804
EIN 94-2951373

430-10

April 13, 2023
Project No: 1140.00
Invoice No: 1140001

Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94550

Project 1140.00 ACCWP_POC Implementatioin TAG
AMS Contract No.21346
Task Order # 2002-003 (430-002)

Professional Services from February 23, 2023 to March 31, 2023

Task 001 Year 1 TAG Participation (FY23)

Professional Personnel

	Hours	Rate	Amount	
Manager/Sr Scientist I-IV/Sr Tech Spec I				
Gilbreath, Alicia	18.25	153.16	2,795.17	
Totals	18.25		2,795.17	
Total Labor				**2,795.17**
		Total this Task		**$2,795.17**

Billing Limits	**Current**	**Prior**	**To-Date**	
Total Billings	2,795.17	0.00	2,795.17	
Limit			8,000.00	
Remaining			5,204.83	
		Total this Invoice		**$2,795.17**

Project Manager DocuSigned by: Alicia Gilbreath 21F175AB06F940B... Date: 4/26/2023
Alicia Gilbreath

Contact Meredith Lofthouse at 510-746-7357 or contracts@sfei.org for questions.

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

430-11

Invoice

Invoice Date: Apr 24, 2023
Invoice Num: AMS001-0323
Billing From: Mar 01, 2023
Billing To: Mar 31, 2023

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	1.25	$293.00	$366.25
Senior Engineer/Scientist III	6.50	$244.00	$1,586.00
Associate Engineer/ScientistII	2.00	$184.00	$368.00
		Total Services:	**$2,320.25**

Draft BMP Report (AMS001:02) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK)

Professional Services:

Employee Title	Hours	Rate	Amount
Senior Engineer/Scientist III	2.50	$244.00	$610.00
		Total Services:	**$610.00**

Amount Due This Invoice: **$2,930.25**

This invoice is due upon receipt

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 43,710.00	**$ 24,178.50**	**$ 2,930.25**	**$ 27,108.75**	**$ 16,601.25**

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EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

430-12

Invoice

Invoice Date: Apr 24, 2023
Invoice Num: AMS002-0323
Billing From: Mar 01, 2023
Billing To: Mar 31, 2023

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Project: ACCWP Asset Management Framework

Draft Framework (AMS002:02) - **PO#:** TO #2022-0002 (430-002) - Managed by (KAK)

Professional Services:

Employee Title		Hours	Rate	Amount
Senior Manager I		2.50	$307.00	$767.50
Managing Eng./Sci. III	Text	1.75	$303.00	$530.25
Senior Engineer/Scientist I		2.25	$210.00	$472.50
			Total Services:	**$1,770.25**

Amount Due This Invoice: **$1,770.25**

This invoice is due upon receipt

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$ 60,610.00	$ 1,501.50	$ 1,770.25	$ 3,271.75	$ 57,338.25

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May 8, 2023

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda County Public Works Agency
399 Elmhurst St
Hayward, CA 94544

Subject: AMS Invoice 430-21/29 Activities

Dear Sharon,

This project summary describes activities conducted by AMS in April 2023 associated with invoice 430-21/29. Only subtasks for which work was conducted during the invoice period are shown.

Subtask 7 – Creek Status Monitoring - Implementation

- Participation in coordination meetings with Geosyntec and Jim Scanlin
- Participation in ACCWP MPC meeting
- Purchase in-line filters for upcoming Receiving Water Limitations (RWL) trace metals sampling

Subtask 9 – Receiving Water Monitoring - Trash

- Conducted site visits with Oldcastle at four proposed monitoring locations to develop plans for site work
- Coordinated with Oldcastle re: cost estimate and engineering design
- Coordinated with Zone 7 and City of Dublin staff on location and permitting of target trash monitoring sites
- Coordinated with BAMSC workgroup and developed sections of regional Trash Monitoring Plan
- Developed first draft of Trash Quality Assurance Project Plan (QAPP)

Subtask 10 – Low Impact Development Monitoring Planning

- Coordinated with City of Oakland staff re: target monitoring locations
- Performed storm event site recons at revised monitoring locations
- Prepared revised ACCWP LID Monitoring Plan to address changes in study design
- Prepared revised BAMSC LID Monitoring QAPP
- Participated in regional planning meetings for LID workgroup
- Incorporates SFEI subcontractor invoice for Year 1 participation on LID Technical Advisory Group

Subtask 11 – Facilitate Unsheltered Homeless Work Group

- Prepared meeting summary for February 2023 ACCWP C.17 Work Group meeting
- Attended BAMSC C.17 Work Group meeting on March 13, 2023, on behalf of the ACCWP C.17 Work Group.
- Continued to coordinate with Caltrans staff on C.17 Work Group related topics.
- Met with Alameda County Public Works Agency staff on March 15, 2023 to discuss coordination with the Deputy Director of the Homeless Division of the Alameda County Community

4749 Bennett Drive, Suite L, Livermore, CA 94551 925.373.7142 Fax 925.373.7834

Development Agency, Housing & Community Development Department on sharing data from 2022 Point-In-Time Count.

- Provided summary bullets for ACCWP Management Committee meeting on March 22, 2023 and February meeting summary.
- Collected BMP report surveys from Permittees. All permittees responded except Zone 7. Eleven permittees returned completed surveys.

Subtask 12 – ACCWP Asset Management Framework

- Began work on development of draft framework.
- Met with ACCWP Interim Program Manager and Management Committee Chair on March 16 to discuss updated project schedule and approach.
- Developed estimated budget for FY 23-24.

LARRY WALKER
ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

August 24, 2022

Anita Franklin
Alameda Countywide Clean Water Program
and Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: Invoice #20
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	Description		
436.14	ACCW - Municipal Regional Stormwater Permit Compliance Services	$	56,783.00
	Invoice #20 Total	**$**	**56,783.00**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

August 17, 2022

Project No. - Invoice No: 00436.14-20

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 7/31/2022

Contract # 21344

Task: 06 MRP 3 & PCBs Implementation Support (POCs-22-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
8/3/2022 Geosyntec Consultants	Inv. #479836	11,975.00	1.100	$13,172.50
Total Consultants				**$13,172.50**
Total This Task				**$13,172.50**

Task: 07 Monitoring Support (MPC-22-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
8/3/2022 Geosyntec Consultants	Inv. #479836	12,757.50	1.100	$14,033.25
Total Consultants				**$14,033.25**
Total This Task				**$14,033.25**

Task: 09.1 NDS Baseline Support (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	16.50	315.00	$5,197.50
VanCarpels, Tina	1.25	135.00	$168.75
Total Labor			**$5,366.25**

Total This Task **$5,366.25**

Task: 09.2 C3TG Update (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.50	315.00	$787.50
McFadin, Sophie	19.75	126.00	$2,488.50
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$3,377.25**
Total This Task			**$3,377.25**

Task: 10 GI SOP Development (MM-22-3)

Professional Personnel

Employee	Hours	Rate	Amount
Constantinescu, Alina	2.00	224.00	$448.00
Fulton, Ryan	11.50	202.00	$2,323.00
Mathews, Sandra	1.50	315.00	$472.50
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$3,344.75**
Total This Task			**$3,344.75**

Task: 11 Annual Report Support (PRC-22-3)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	34.00	126.00	$4,284.00
Mathews, Sandra	.25	315.00	$78.75
VanCarpels, Tina	1.50	135.00	$202.50
Warren, Rachel	9.75	260.00	$2,535.00
Total Labor			**$7,100.25**
Total This Task			**$7,100.25**

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	9.25	315.00	$2,913.75
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$3,048.75**
Total This Task			**$3,048.75**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Cholico Santoyo, Zaida	7.25	160.00	$1,160.00

Mathews, Sandra	10.50	315.00	$3,307.50
VanCarpels, Tina	.50	135.00	$67.50
Total Labor			**$4,535.00**
Total This Task			**$4,535.00**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.50	315.00	$472.50
Total Labor			**$472.50**
Total This Task			**$472.50**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.50	135.00	$67.50
Yin, Elizabeth	7.50	260.00	$1,950.00
Total Labor			**$2,017.50**
Total This Task			**$2,017.50**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.00	315.00	$315.00
Total Labor			**$315.00**
Total This Task			**$315.00**

Invoice Amount **$56,783.00**

Billing Limits	Current	Prior	To-date
Total Billings	56,783.00	371,706.12	428,489.12
Limit			1,800,000.00
Remaining			1,371,510.88

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 20 BILLING PERIOD: July 1 - 31, 2022
INVOICE DATE: July 12, 2022

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	-$1,369.75
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88		22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	69,582.13	13,172.50	82,754.63	16,245.37
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	24,967.25	14,033.25	39,000.50	6,999.50
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50		39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	18,014.25	8,743.50	26,757.75	33,242.25
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	19,519.25	3,344.75	22,864.00	7,136.00
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$15,000.00	2,301.00	7,100.25	9,401.25	5,598.75
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	-	8,056.25	8,056.25	60,943.75
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	-	-	-	10,000.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	-	2,332.50	2,332.50	86,867.50
TOTALS					**$703,800.00**	**$371,706.12**	**$56,783.00**	**$428,489.12**	**$275,310.88**

Geosyntec consultants

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
707 4TH STREET, SUITE 200
DAVIS, CA 95616

Project: 436.14
517
Task 6: $11,975.00
Task 7: $12,757.50
Total: $24,732.50

Invoice # : 479836
Project : CWR0649A
Invoice Date : 8/3/2022
Project Name : ACCWP ON-CALL FY2022

For Professional Services Rendered through transaction date: 7/31/2022

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA AUSTIN AT (510) 285-2757

LWA PROJECT NO. 436.14 Task 6

Professional Services	$24,582.50
Reimbursable Expenses	$150.00
Current Invoice	**$24,732.50**
****Amount Due This Invoice ****	**$24,732.50**

Statement		***Statement***	
Prior Billings	$97,993.75	Project Budget	$155,660.00
Current Invoice	$24,732.50	Expended to Date	$122,726.25
Billed To Date	$122,726.25	Contract Balance	$32,933.75
Paid To Date	$65,091.25	****Amount Due This Invoice ****	**$24,732.50**

Phase : **01) TASK 6 MRP3 & POCS IMPLEMENTATI**

Task : **01) SOURCE PROPERTY REFERRALS**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	07/02/2022	0.25	150.00	37.50
	07/05/2022	0.50	150.00	75.00
	07/06/2022	0.75	150.00	112.50
Total: STAFF PROFESSIONAL		1.50		225.00
PROJECT PROFESSIONAL				
WELSH, LISA	07/01/2022	4.50	230.00	1,035.00
	07/05/2022	3.25	230.00	747.50
	07/06/2022	0.75	230.00	172.50
	07/18/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		9.00		2,070.00
SENIOR PRINCIPAL				
AUSTIN, LISA	07/05/2022	0.50	300.00	150.00
	07/06/2022	0.75	300.00	225.00
Total: SENIOR PRINCIPAL		1.25		375.00

Total Task : 01) SOURCE PROPERTY REFERRALS **Task Labor** **2,670.00**

Task : 03) POC LOAD REDUCTION REPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	07/18/2022	0.50	150.00	75.00
	07/19/2022	2.00	150.00	300.00
	07/20/2022	4.00	150.00	600.00
	07/21/2022	3.25	150.00	487.50
	07/25/2022	1.50	150.00	225.00
	07/26/2022	0.50	150.00	75.00
	07/27/2022	1.75	150.00	262.50
	07/28/2022	3.50	150.00	525.00
Total: STAFF PROFESSIONAL		17.00		2,550.00
PROJECT PROFESSIONAL				
WELSH, LISA	07/13/2022	0.50	230.00	115.00
	07/14/2022	0.25	230.00	57.50
	07/18/2022	1.25	230.00	287.50
	07/19/2022	0.25	230.00	57.50
	07/20/2022	0.75	230.00	172.50
	07/25/2022	0.50	230.00	115.00
	07/25/2022	0.25	230.00	57.50
	07/26/2022	0.50	230.00	115.00
	07/27/2022	0.25	230.00	57.50
	07/28/2022	0.25	230.00	57.50
	07/29/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		5.50		1,265.00
SENIOR PRINCIPAL				
AUSTIN, LISA	07/17/2022	1.50	300.00	450.00
	07/18/2022	0.25	300.00	75.00

Phase : **01) TASK 6 MRP3 & POCS IMPLEMENTATI**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	07/24/2022	1.00	300.00	300.00
	07/26/2022	0.25	300.00	75.00
	07/29/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		3.25		975.00

Total Task : 03) POC LOAD REDUCTION REPORT **Task Labor** **4,790.00**

Task : 04) WORKGROUP MEETINGS

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	07/19/2022	2.00	150.00	300.00
PROJECT PROFESSIONAL				
WELSH, LISA	07/05/2022	0.25	230.00	57.50
	07/06/2022	1.00	230.00	230.00
	07/08/2022	0.50	230.00	115.00
	07/11/2022	0.25	230.00	57.50
	07/19/2022	4.25	230.00	977.50
	07/20/2022	0.75	230.00	172.50
	07/22/2022	0.25	230.00	57.50
	07/27/2022	0.50	230.00	115.00
	07/28/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		8.00		1,840.00
SENIOR PRINCIPAL				
AUSTIN, LISA	07/08/2022	0.25	300.00	75.00
	07/19/2022	2.25	300.00	675.00
Total: SENIOR PRINCIPAL		2.50		750.00

Total Task : 04) WORKGROUP MEETINGS **Task Labor** **2,890.00**

Task : 06) COMPILE AC BUILDING MATERIAL D

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	07/29/2022	1.25	150.00	187.50
PROJECT PROFESSIONAL				
WELSH, LISA	07/06/2022	0.50	230.00	115.00
	07/11/2022	0.25	230.00	57.50
	07/13/2022	2.50	230.00	575.00
	07/15/2022	0.25	230.00	57.50
	07/20/2022	0.75	230.00	172.50
	07/21/2022	0.25	230.00	57.50
	07/25/2022	0.25	230.00	57.50
	07/26/2022	0.75	230.00	172.50
	07/27/2022	0.25	230.00	57.50
	07/28/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		6.25		1,437.50

Phase : 01) TASK 6 MRP3 & POCS IMPLEMENTATI

Total Task : 06) COMPILE AC BUILDING MATERIAL D Task Labor 1,625.00

Total Phase : 01) TASK 6 MRP3 & POCS IMPLEMENTATI Phase Labor 11,975.00

Phase : 04) TASK 7 MONITORING SUPPORT AP

Task : 05) MRP 3.0 MONITORING PLANNING

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	07/05/2022	4.00	150.00	600.00
	07/06/2022	3.75	150.00	562.50
	07/07/2022	3.00	150.00	450.00
	07/08/2022	0.75	150.00	112.50
	07/13/2022	4.00	150.00	600.00
	07/14/2022	2.00	150.00	300.00
	07/15/2022	2.50	150.00	375.00
	07/18/2022	2.00	150.00	300.00
	07/18/2022	2.00	150.00	300.00
	07/21/2022	1.50	150.00	225.00
	07/28/2022	1.00	150.00	150.00
Total: STAFF PROFESSIONAL		26.50		3,975.00
PROJECT PROFESSIONAL				
WELSH, LISA	07/07/2022	1.50	230.00	345.00
	07/08/2022	1.50	230.00	345.00
	07/13/2022	1.25	230.00	287.50
	07/14/2022	2.50	230.00	575.00
	07/15/2022	0.25	230.00	57.50
	07/18/2022	0.75	230.00	172.50
	07/19/2022	0.25	230.00	57.50
	07/20/2022	0.75	230.00	172.50
	07/21/2022	1.50	230.00	345.00
	07/22/2022	0.25	230.00	57.50
	07/25/2022	0.50	230.00	115.00
	07/26/2022	0.25	230.00	57.50
	07/27/2022	1.50	230.00	345.00
	07/28/2022	1.50	230.00	345.00
	07/29/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		14.75		3,392.50
PRINCIPAL				
PERKINS, RINTA	07/28/2022	1.25	280.00	350.00
	07/29/2022	0.75	280.00	210.00
Total: PRINCIPAL		2.00		560.00
SENIOR PRINCIPAL				
AUSTIN, LISA	07/07/2022	1.25	300.00	375.00
	07/08/2022	0.75	300.00	225.00
	07/13/2022	1.00	300.00	300.00
	07/14/2022	1.25	300.00	375.00
	07/18/2022	0.25	300.00	75.00
	07/21/2022	0.25	300.00	75.00
	07/22/2022	0.25	300.00	75.00

Phase : **04) TASK 7 MONITORING SUPPORT AP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	07/28/2022	1.00	300.00	300.00
Total: SENIOR PRINCIPAL		6.00		1,800.00

Vendor / Employee Name	*Doc Nbr*	*Date*	*Units*	*Rate*	*Amount*
GIS COMPUTER TIME					
YAO, GRACE	005646	07/05/2022	4.00	10	40.00
	005646	07/06/2022	3.75	10	37.50
	005646	07/07/2022	3.00	10	30.00
	005646	07/08/2022	0.75	10	7.50
	005646	07/18/2022	2.00	10	20.00
	005646	07/21/2022	1.50	10	15.00
			15.00		150.00

Total Task : **05) MRP 3.0 MONITORING PLANNING**

Task Labor	**9,727.50**
Task Expense	**150.00**

Task : **06) ON-CALL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT ADMINISTRATOR				
DUONG, DAVID	07/05/2022	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	07/22/2022	1.50	230.00	345.00
	07/25/2022	1.75	230.00	402.50
	07/27/2022	1.50	230.00	345.00
	07/28/2022	1.00	230.00	230.00
	07/29/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		6.50		1,495.00
PRINCIPAL				
PERKINS, RINTA	07/28/2022	0.50	280.00	140.00
SENIOR PRINCIPAL				
AUSTIN, LISA	07/05/2022	1.00	300.00	300.00
	07/18/2022	0.50	300.00	150.00
	07/21/2022	0.25	300.00	75.00
	07/22/2022	0.50	300.00	150.00
	07/25/2022	0.50	300.00	150.00
	07/27/2022	0.50	300.00	150.00
	07/28/2022	0.75	300.00	225.00
Total: SENIOR PRINCIPAL		4.00		1,200.00

Total Task : **06) ON-CALL SUPPORT** **Task Labor** **2,880.00**

Total Phase : **04) TASK 7 MONITORING SUPPORT AP**

Phase Labor	**12,607.50**
Phase Expense	**150.00**

Total Project Labor	**24,582.50**
Total Project Expense	**150.00**

Total Project: CWR0649A -- ACCWP ON-CALL FY2022 **24,732.50**

LARRY WALKER
ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

September 26, 2022

Anita Franklin
Alameda Countywide Clean Water Program
and Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: Invoice #21
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	Description		
436.14	ACCW - Municipal Regional Stormwater Permit Compliance Services	$	53,644.60
	Invoice #21 Total	**$**	**53,644.60**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

September 14, 2022

Project No. - Invoice No: 00436.14-21

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 8/31/2022

Contract # 21344

Task: 06 MRP 3 & PCBs Implementation Support (POCs-22-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
9/7/2022 Geosyntec Consultants	Inv. #483408	5,812.50	1.100	$6,393.75
Total Consultants				**$6,393.75**
Total This Task				**$6,393.75**

Task: 07 Monitoring Support (MPC-22-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
9/7/2022 Geosyntec Consultants	Inv. #483408	6,143.50	1.100	$6,757.85
Total Consultants				**$6,757.85**
Total This Task				**$6,757.85**

Task: 09.1 NDS Baseline Support (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	9.00	315.00	$2,835.00
McFadin, Sophie	2.75	126.00	$346.50
VanCarpels, Tina	.50	135.00	$67.50

Total Labor	**$3,249.00**
Total This Task	**$3,249.00**

Task: 09.2 C3TG Update (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	4.75	315.00	$1,496.25
McFadin, Sophie	4.00	126.00	$504.00
VanCarpels, Tina	1.50	135.00	$202.50
Total Labor			**$2,202.75**
Total This Task			**$2,202.75**

Task: 10 GI SOP Development (MM-22-3)

Professional Personnel

Employee	Hours	Rate	Amount
Constantinescu, Alina	3.50	224.00	$784.00
Fulton, Ryan	1.50	202.00	$303.00
Mathews, Sandra	3.50	315.00	$1,102.50
VanCarpels, Tina	.50	135.00	$67.50
Total Labor			**$2,257.00**
Total This Task			**$2,257.00**

Task: 11 Annual Report Support (PRC-22-3)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	27.00	126.00	$3,402.00
Mathews, Sandra	5.00	315.00	$1,575.00
VanCarpels, Tina	2.00	135.00	$270.00
Warren, Rachel	19.25	260.00	$5,005.00
Total Labor			**$10,252.00**
Total This Task			**$10,252.00**

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	15.00	315.00	$4,725.00
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$4,860.00**
Total This Task			**$4,860.00**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	12.00	315.00	$3,780.00
VanCarpels, Tina	1.25	135.00	$168.75
Total Labor			**$3,948.75**
Total This Task			**$3,948.75**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	5.00	315.00	$1,575.00
Total Labor			**$1,575.00**
Total This Task			**$1,575.00**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Warren, Rachel	1.25	260.00	$325.00
Total Labor			**$325.00**
Total This Task			**$325.00**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	4.00	260.00	$1,040.00
Total Labor			**$1,073.75**
Total This Task			**$1,073.75**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Constantinescu, Alina	.25	224.00	$56.00
Mathews, Sandra	.25	315.00	$78.75
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	6.00	260.00	$1,560.00
Total Labor			**$1,728.50**
Total This Task			**$1,728.50**

Task: 19.1 Grant Application Support

Professional Personnel

Employee	Hours	Rate	Amount
Mani, Amir	18.75	260.00	$4,875.00
Mathews, Sandra	.75	315.00	$236.25
VanCarpels, Tina	2.00	135.00	$270.00
Yin, Elizabeth	14.00	260.00	$3,640.00
Total Labor			**$9,021.25**
Total This Task			**$9,021.25**

Invoice Amount **$53,644.60**

Billing Limits	Current	Prior	To-date
Total Billings	53,644.60	428,489.12	482,133.72
Limit			1,800,000.00
Remaining			1,317,866.28

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 21 BILLING PERIOD: August 1 - 31, 2022
INVOICE DATE: September 14, 2022

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	-$1,369.75
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88		22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	82,754.63	6,393.75	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	39,000.50	6,757.85	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	26,757.75	5,451.75	32,209.50	27,790.50
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	22,864.00	2,257.00	25,121.00	4,879.00
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	9,401.25	10,252.00	19,653.25	346.75
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	8,056.25	10,383.75	18,440.00	50,560.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	-	325.00	325.00	9,675.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	2,332.50	2,802.25	5,134.75	84,065.25
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	-	-	-	116,270.00
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	-	-	-	113,850.00
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	-	9,021.25	9,021.25	22,978.75
TOTALS					**$970,920.00**	**$428,489.12**	**$53,644.60**	**$482,133.72**	**$488,786.28**

Geosyntec consultants

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
707 4TH STREET, SUITE 200
DAVIS, CA 95616

Project: 436.14
517
Task 6: $ 5,812.50
Task 7: $ 6,143.50
Total: $11,956.00

Invoice # : 483408
Project : CWR0649A
Invoice Date : 9/7/2022
Project Name : ACCWP ON-CALL FY2022

For Professional Services Rendered through transaction date: 8/31/2022

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA AUSTIN AT (510) 285-2757

LWA PROJECT NO. 436.14 Task 6

Professional Services	$11,860.00
Reimbursable Expenses	$96.00
Current Invoice	**$11,956.00**
****Amount Due This Invoice ****	**$11,956.00**

Statement		***Statement***	
Prior Billings	$122,726.25	Project Budget	$155,660.00
Current Invoice	$11,956.00	Expended to Date	$134,682.25
Billed To Date	$134,682.25	Contract Balance	$20,977.75
Paid To Date	$77,461.25	****Amount Due This Invoice ****	**$11,956.00**

Phase : **01) TASK 6 MRP3 & POCS IMPLEMENTATI**

Task : **03) POC LOAD REDUCTION REPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	08/01/2022	1.25	150.00	187.50
	08/05/2022	0.50	150.00	75.00
	08/10/2022	0.75	150.00	112.50
	08/11/2022	1.00	150.00	150.00
Total: STAFF PROFESSIONAL		3.50		525.00
PROJECT PROFESSIONAL				
WELSH, LISA	08/01/2022	1.00	230.00	230.00
	08/02/2022	0.25	230.00	57.50
	08/05/2022	0.25	230.00	57.50
	08/26/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.75		402.50
SENIOR PRINCIPAL				
AUSTIN, LISA	08/10/2022	1.00	300.00	300.00

Total Task : 03) POC LOAD REDUCTION REPORT **Task Labor** **1,227.50**

Task : **04) WORKGROUP MEETINGS**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	08/10/2022	1.25	150.00	187.50
PROJECT PROFESSIONAL				
WELSH, LISA	08/24/2022	2.75	230.00	632.50
	08/25/2022	2.25	230.00	517.50
Total: PROJECT PROFESSIONAL		5.00		1,150.00
SENIOR PRINCIPAL				
AUSTIN, LISA	08/08/2022	0.50	300.00	150.00
	08/09/2022	1.00	300.00	300.00
	08/10/2022	1.50	300.00	450.00
	08/15/2022	0.75	300.00	225.00
	08/23/2022	0.25	300.00	75.00
	08/25/2022	2.25	300.00	675.00
	08/30/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		6.50		1,950.00

Total Task : 04) WORKGROUP MEETINGS **Task Labor** **3,287.50**

Task : **06) COMPILE AC BUILDING MATERIAL D**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	08/18/2022	0.75	150.00	112.50
	08/19/2022	2.00	150.00	300.00
	08/20/2022	0.50	150.00	75.00
	08/22/2022	0.25	150.00	37.50
	08/23/2022	0.50	150.00	75.00
	08/30/2022	0.25	150.00	37.50

Phase : 01) TASK 6 MRP3 & POCS IMPLEMENTATI

Class / Employee Name	Date	Hours	Rate	Amount
Total: STAFF PROFESSIONAL		4.25		637.50
PROJECT PROFESSIONAL				
WELSH, LISA	08/01/2022	0.50	230.00	115.00
	08/10/2022	0.25	230.00	57.50
	08/23/2022	0.25	230.00	57.50
	08/26/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		1.50		345.00

Total Task : 06) COMPILE AC BUILDING MATERIAL D **Task Labor** **982.50**

Task : 07) ON-CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	08/04/2022	1.00	90.00	90.00
STAFF PROFESSIONAL				
YAO, GRACE	08/16/2022	0.75	150.00	112.50
	08/30/2022	0.75	150.00	112.50
Total: STAFF PROFESSIONAL		1.50		225.00

Total Task : 07) ON-CALL SUPPORT **Task Labor** **315.00**

Total Phase : 01) TASK 6 MRP3 & POCS IMPLEMENTATI **Phase Labor** **5,812.50**

Phase : 04) TASK 7 MONITORING SUPPORT AP

Task : 03) BAMSC MPC

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	08/25/2022	0.25	300.00	75.00

Total Task : 03) BAMSC MPC **Task Labor** **75.00**

Task : 05) MRP 3.0 MONITORING PLANNING

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	08/16/2022	1.00	150.00	150.00
	08/20/2022	3.00	150.00	450.00
	08/24/2022	5.00	150.00	750.00
	08/25/2022	3.50	150.00	525.00
	08/25/2022	0.25	150.00	37.50
	08/29/2022	0.75	150.00	112.50
	08/30/2022	1.50	150.00	225.00
Total: STAFF PROFESSIONAL		15.00		2,250.00
PROJECT PROFESSIONAL				
WELSH, LISA	08/01/2022	1.50	230.00	345.00
	08/02/2022	0.50	230.00	115.00
	08/03/2022	1.50	230.00	345.00
	08/05/2022	0.50	230.00	115.00

Phase : **04) TASK 7 MONITORING SUPPORT AP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	08/22/2022	1.25	230.00	287.50
	08/23/2022	0.25	230.00	57.50
	08/29/2022	0.75	230.00	172.50
	08/30/2022	1.25	230.00	287.50
Total: PROJECT PROFESSIONAL		7.50		1,725.00
SENIOR PRINCIPAL				
AUSTIN, LISA	08/16/2022	1.00	300.00	300.00
	08/22/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		1.50		450.00

Vendor / Employee Name	*Doc Nbr*	*Date*	*Units*	*Rate*	*Amount*
GIS COMPUTER TIME					
YAO, GRACE	005646	08/16/2022	1.00	24	24.00
	005646	08/20/2022	3.00	24	72.00
			4.00		96.00

Total Task : **05) MRP 3.0 MONITORING PLANNING**

Task Labor	**4,425.00**
Task Expense	**96.00**

Task : **06) ON-CALL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT ADMINISTRATOR				
DUONG, DAVID	08/03/2022	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	08/02/2022	0.75	230.00	172.50
	08/03/2022	1.50	230.00	345.00
	08/04/2022	0.25	230.00	57.50
	08/05/2022	0.50	230.00	115.00
	08/10/2022	0.50	230.00	115.00
	08/21/2022	0.50	230.00	115.00
	08/22/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		4.25		977.50
SENIOR PRINCIPAL				
AUSTIN, LISA	08/03/2022	0.50	300.00	150.00
	08/05/2022	0.50	300.00	150.00
	08/07/2022	0.25	300.00	75.00
	08/11/2022	0.25	300.00	75.00
	08/12/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.75		525.00

Total Task : **06) ON-CALL SUPPORT** **Task Labor** **1,547.50**

Total Phase : **04) TASK 7 MONITORING SUPPORT AP**

Phase Labor	**6,047.50**
Phase Expense	**96.00**

Total Project Labor	**11,860.00**
Total Project Expense	**96.00**

Total Project: CWR0649A -- ACCWP ON-CALL FY2022 **11,956.00**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

November 02, 2022

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #22**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$44,427.38
	Invoice #22 Total	**$44,427.38**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

October 12, 2022

Project No. - Invoice No: 00436.14-22

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 9/30/2022

Contract # 21344

Task: 09.1 NDS Baseline Support (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	16.25	315.00	$5,118.75
VanCarpels, Tina	1.25	135.00	$168.75
Total Labor			**$5,287.50**
Total This Task			**$5,287.50**

Task: 09.2 C3TG Update (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Constantinescu, Alina	6.25	224.00	$1,400.00
Mathews, Sandra	19.50	315.00	$6,142.50
McFadin, Sophie	23.75	126.00	$2,992.50
VanCarpels, Tina	2.75	135.00	$371.25
Total Labor			**$10,906.25**
Total This Task			**$10,906.25**

Task: 10 GI SOP Development (MM-22-3)

Professional Personnel

Employee	Hours	Rate	Amount
Fulton, Ryan	1.00	202.00	$202.00

Mathews, Sandra	.25	315.00	$78.75
Total Labor			**$280.75**
Total This Task			**$280.75**

Task: 11 Annual Report Support (PRC-22-3)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	5.00	126.00	$630.00
Warren, Rachel	1.50	260.00	$390.00
Total Labor			**$1,020.00**
Total This Task			**$1,020.00**

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	10.00	315.00	$3,150.00
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$3,251.25**
Total This Task			**$3,251.25**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	11.25	315.00	$3,543.75
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$3,645.00**
Total This Task			**$3,645.00**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	4.75	315.00	$1,496.25
VanCarpels, Tina	.25	135.00	$33.75
Total Labor			**$1,530.00**
Total This Task			**$1,530.00**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	2.50	260.00	$650.00
Total Labor			**$650.00**
Total This Task			**$650.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Constantinescu, Alina	8.00	224.00	$1,792.00
Mathews, Sandra	.50	315.00	$157.50
VanCarpels, Tina	2.25	135.00	$303.75
Yin, Elizabeth	26.50	260.00	$6,890.00
Total Labor			**$9,143.25**

Reimbursable Expenses

Payee		Cost	Markup	Amount
9/30/2022 First Northern Bank	Panera Bread Catering	218.63		$218.63
Total Reimbursables				**$218.63**
Total This Task				**$9,361.88**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
10/6/2022 Geosyntec Consultants	Inv. #486749	5,710.00	1.100	$6,281.00
Total Consultants				**$6,281.00**
Total This Task				**$6,281.00**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
10/6/2022 Geosyntec Consultants	Inv. #486749	420.00	1.100	$462.00
Total Consultants				**$462.00**
Total This Task				**$462.00**

Task: 19.1 Grant Application Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.75	315.00	$866.25
Total Labor			**$866.25**

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
10/6/2022 Geosyntec Consultants	Inv. #486749	805.00	1.100	$885.50
Total Consultants				**$885.50**

Total This Task **$1,751.75**

Invoice Amount **$44,427.38**

Billing Limits	**Current**	**Prior**	**To-date**
Total Billings	44,427.38	482,133.72	526,561.10
Limit			1,800,000.00
Remaining			1,273,438.90

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 22 BILLING PERIOD: September 1 - 30, 2022
INVOICE DATE: October 12, 2022

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	82,754.63	-	82,754.63	16,245.37
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	39,000.50	-	39,000.50	6,999.50
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	26,757.75	16,193.75	42,951.50	17,048.50
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	22,864.00	280.75	23,144.75	6,855.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	9,401.25	1,020.00	10,421.25	9,578.75
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	8,056.25	8,426.25	16,482.50	52,517.50
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	-	-	-	10,000.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	2,332.50	10,011.88	12,344.38	76,855.62
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	-	6,281.00	6,281.00	109,989.00
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	-	462.00	462.00	113,388.00
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	-	1,751.75	1,751.75	30,248.25
TOTALS					**$970,920.00**	**$428,489.12**	**$44,427.38**	**$472,916.50**	**$498,003.50**

From: Panera Bread <do-not-reply@panerabread.com>
Sent: Thursday, September 22, 2022 7:46 AM
To: Operations
Subject: Final Order Confirmation: #19854268

PROJECT 436.14 T16.2
EXP 753.00
DATE 9/22/2022
AMT$218.63
Approved S. Mathews

Panera BREAD

Thanks for your order!

Order number:
19854268

Business:
Catering

Expected Delivery Time:
09/22/2022 07:45 AM

Order Started:
09/20/2022 02:31 PM

Order Received/Modified:
09/22/2022 07:45 AM

To make changes to your order, please call (510)732-0279

Customer Information

Name:
Larry Walker Associates

Phone Number:
5307536400

Email Address:
operations@lwa.com

Company:
Alameda County Public Works

Order Details

Order Type:
Delivery

No. of People: 25

Delivery Address:
951 Turner Court
Hayward, CA 94545

Delivery Instructions: Lori Pettegrew 5107109970

Order Summary

3 100 Colombian Dark Roast Coffee Tote	65.97
1 Decaf Coffee Tote	21.99
3 Bagels Morning Pastries	108.87

3 Plain Bagel
3 Asiago Bagel
3 Everything Bagel
3 Cinnamon Crunch Bagel
3 Bear Claw
3 Pecan Braid
3 Chocolate Croissant
3 Vanilla Cinnamon Roll
3 Orange Scone
3 Blueberry Muffin
12 Plain Cream Cheese

Included in your order: Napkins, utensils, plates for 25 people.

Subtotal	$ 196.83
Tax	$ 2.12
***Delivery Charge**	$ 19.68
Total	$ 218.63

Please consume, or refrigerate promptly

*Our curbside fee and delivery charge is not a tip or gratuity provided to the driver. Please consider tipping your driver and cafe staff in appreciation of great service.

Payment Information

Type	Amnt.
Visa 5859	$ 218.63

MyPanera Rewards

MyPanera Number: 623362807421

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Geosyntec consultants

436.14
Task 17: $ 5,710.00
Task 18: $ 420.00
Task 19.1: $ 805.00
Total: $ 6,935.00

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
707 FOURTH STREET
SUITE 200
DAVIS, CA 95616
Attention: SANDY MATHEWS

Invoice # : 486749
Project : CWR0649B
Invoice Date : 10/6/2022
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 9/30/2022

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$6,935.00
Current Invoice	**$6,935.00**
****Amount Due This Invoice ****	**$6,935.00**

Statement		***Statement***	
Prior Billings	$0.00	Project Budget	$216,200.00
Current Invoice	$6,935.00	Expended to Date	$6,935.00
Billed To Date	$6,935.00	Contract Balance	$209,265.00
Paid To Date	$0.00	****Amount Due This Invoice ****	**$6,935.00**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 01) ACCWP MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/21/2022	0.75	230.00	172.50

Total Task : 01) ACCWP MPC **Task Labor** **172.50**

Task : 02) BAMSC MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/07/2022	1.00	230.00	230.00
SENIOR PRINCIPAL				
AUSTIN, LISA	09/06/2022	0.25	300.00	75.00
	09/07/2022	2.50	300.00	750.00
Total: SENIOR PRINCIPAL		2.75		825.00

Total Task : 02) BAMSC MPC **Task Labor** **1,055.00**

Task : 03) RMP

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/21/2022	0.25	230.00	57.50

Total Task : 03) RMP **Task Labor** **57.50**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	09/16/2022	0.25	150.00	37.50
PROJECT PROFESSIONAL				
WELSH, LISA	09/01/2022	0.50	230.00	115.00
	09/06/2022	0.25	230.00	57.50
	09/09/2022	0.25	230.00	57.50
	09/16/2022	0.25	230.00	57.50
	09/19/2022	0.25	230.00	57.50
	09/20/2022	0.25	230.00	57.50
	09/22/2022	0.25	230.00	57.50
	09/23/2022	0.50	230.00	115.00
	09/26/2022	0.50	230.00	115.00
	09/27/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		3.25		747.50
SENIOR PRINCIPAL				
AUSTIN, LISA	09/16/2022	0.25	300.00	75.00
	09/22/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		0.75		225.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **1,010.00**

Task : 06) LID MONITORING PLAN

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	09/16/2022	0.25	150.00	37.50
PROJECT PROFESSIONAL				
WELSH, LISA	09/01/2022	0.25	230.00	57.50
	09/15/2022	0.50	230.00	115.00
	09/16/2022	0.50	230.00	115.00
	09/19/2022	0.75	230.00	172.50
	09/20/2022	1.25	230.00	287.50
	09/22/2022	0.50	230.00	115.00
	09/23/2022	0.25	230.00	57.50
	09/28/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		4.25		977.50
SENIOR PRINCIPAL				
AUSTIN, LISA	09/15/2022	0.25	300.00	75.00
	09/16/2022	0.25	300.00	75.00
	09/22/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		0.75		225.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **1,240.00**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/08/2022	0.75	230.00	172.50
	09/16/2022	0.75	230.00	172.50
	09/18/2022	0.75	230.00	172.50
	09/22/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		2.75		632.50

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **632.50**

Task : 08) POCS RWL PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/22/2022	0.50	230.00	115.00
	09/28/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		1.25		287.50
SENIOR PRINCIPAL				
AUSTIN, LISA	09/19/2022	0.25	300.00	75.00
	09/22/2022	0.25	300.00	75.00
	09/28/2022	1.25	300.00	375.00
Total: SENIOR PRINCIPAL		1.75		525.00

Total Task : 08) POCS RWL PLAN **Task Labor** **812.50**

Task : 09) ON CALL SUPPORT

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	09/07/2022	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	09/07/2022	1.50	230.00	345.00
	09/08/2022	0.25	230.00	57.50
	09/16/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		2.00		460.00
SENIOR PRINCIPAL				
AUSTIN, LISA	09/07/2022	0.25	300.00	75.00
	09/29/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		0.75		225.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **730.00**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **5,710.00**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/23/2022	0.50	230.00	115.00
	09/27/2022	1.00	230.00	230.00
Total: PROJECT PROFESSIONAL		1.50		345.00
SENIOR PRINCIPAL				
AUSTIN, LISA	09/08/2022	0.25	300.00	75.00

Total Task : 03) OLD INDUSTRIAL CONTROL MEASURE **Task Labor** **420.00**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **420.00**

Phase : 03) TASK 19 REGIONAL PROJECT SUPPOR

Task : 01) GRANT PROJECT SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	09/06/2022	1.00	230.00	230.00
	09/07/2022	0.25	230.00	57.50
	09/08/2022	1.50	230.00	345.00
	09/09/2022	0.25	230.00	57.50
	09/12/2022	0.25	230.00	57.50
	09/19/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		3.50		805.00

Total Task : 01) GRANT PROJECT SUPPORT **Task Labor** **805.00**

Total Phase : 03) TASK 19 REGIONAL PROJECT SUPPOR **Phase Labor** **805.00**

Total Project Labor **6,935.00**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **6,935.00**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

November 18, 2022

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #22**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$42,352.26
	Invoice #23 Total	**$42,352.26**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

November 15, 2022

Project No. - Invoice No: 00436.14-23

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 10/31/2022

Contract # 21344

Task: 09.1 NDS Baseline Support (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	5.00	224.00	$1,120.00
Mathews, Sandra	14.00	315.00	$4,410.00
VanCarpels, Tina	1.25	135.00	$168.75
Total Labor			**$5,698.75**
Total This Task			**$5,698.75**

Task: 09.2 C3TG Update (NDS-22-1)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	7.25	224.00	$1,624.00
Constantinescu, Alina	1.50	224.00	$336.00
Mathews, Sandra	7.75	315.00	$2,441.25
McFadin, Sophie	15.50	126.00	$1,953.00
VanCarpels, Tina	1.50	135.00	$202.50
Total Labor			**$6,556.75**
Total This Task			**$6,556.75**

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	8.75	224.00	$1,960.00
Mathews, Sandra	9.50	315.00	$2,992.50
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$5,053.75**
Total This Task			**$5,053.75**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	5.50	224.00	$1,232.00
Mathews, Sandra	5.75	315.00	$1,811.25
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$3,144.50**
Total This Task			**$3,144.50**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	6.00	315.00	$1,890.00
VanCarpels, Tina	.50	135.00	$67.50
Total Labor			**$1,957.50**
Total This Task			**$1,957.50**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	.50	315.00	$157.50
Warren, Rachel	2.00	260.00	$520.00
Total Labor			**$677.50**
Total This Task			**$677.50**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	3.50	260.00	$910.00
Total Labor			**$910.00**
Total This Task			**$910.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	4.00	260.00	$1,040.00
Total Labor			**$1,073.75**
Total This Task			**$1,073.75**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
11/8/2022 Geosyntec Consultants	Inv. #490525	11,876.25	1.100	$13,063.88
Total Consultants				**$13,063.88**
Total This Task				**$13,063.88**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
11/8/2022 Geosyntec Consultants	Inv. #490525	3,546.25	1.100	$3,900.88
Total Consultants				**$3,900.88**
Total This Task				**$3,900.88**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.00	315.00	$315.00
Total Labor			**$315.00**
Total This Task			**$315.00**

Invoice Amount **$42,352.26**

Billing Limits	Current	Prior	To-date
Total Billings	42,352.26	526,561.10	568,913.36
Limit			1,800,000.00
Remaining			1,231,086.64

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 22 BILLING PERIOD: October 1 - 31, 2022
INVOICE DATE: November 15, 2022

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	48,403.25	12,255.50	60,658.75	(658.75)
GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	26,866.25	10,155.75	37,022.00	31,978.00
2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	325.00	677.50	1,002.50	8,997.50
Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	15,146.63	1,983.75	17,130.38	72,069.62
Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	6,281.00	13,063.88	19,344.88	96,925.12
C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	462.00	3,900.88	4,362.88	109,487.12
Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	10,773.00	315.00	11,088.00	20,912.00
				$970,920.00	**$526,561.10**	**$42,352.26**	**$568,913.36**	**$402,006.64**

Geosyntec consultants

436.14
Task 17 $11,876.25
Task 18 $3,546.25
SM - 11/8/2022

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 490525
Project : CWR0649B
Invoice Date : 11/8/2022
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 10/31/2022

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$15,422.50
Current Invoice	**$15,422.50**
****Amount Due This Invoice ****	**$15,422.50**

Statement		***Statement***	
Prior Billings	$6,935.00	Project Budget	$216,200.00
Current Invoice	$15,422.50	Expended to Date	$22,357.50
Billed To Date	$22,357.50	Contract Balance	$193,842.50
Paid To Date	$0.00	****Amount Due This Invoice ****	**$15,422.50**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 01) ACCWP MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/07/2022	0.50	230.00	115.00
	10/11/2022	0.25	230.00	57.50
	10/12/2022	0.50	230.00	115.00
	10/17/2022	1.75	230.00	402.50
	10/18/2022	3.00	230.00	690.00
	10/19/2022	1.50	230.00	345.00
Total: PROJECT PROFESSIONAL		7.50		1,725.00
SENIOR PRINCIPAL				
AUSTIN, LISA	10/12/2022	0.25	300.00	75.00
	10/18/2022	2.25	300.00	675.00
	10/20/2022	0.50	300.00	150.00
	10/24/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		3.25		975.00

Total Task : 01) ACCWP MPC **Task Labor** **2,700.00**

Task : 03) RMP

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/03/2022	2.75	230.00	632.50
	10/13/2022	0.25	230.00	57.50
	10/19/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		3.25		747.50
SENIOR PROFESSIONAL				
HAVENS, KELLY	10/12/2022	0.25	255.00	63.75
	10/20/2022	1.50	255.00	382.50
Total: SENIOR PROFESSIONAL		1.75		446.25
SENIOR PRINCIPAL				
AUSTIN, LISA	10/13/2022	1.00	300.00	300.00
	10/27/2022	0.75	300.00	225.00
Total: SENIOR PRINCIPAL		1.75		525.00

Total Task : 03) RMP **Task Labor** **1,718.75**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/07/2022	0.25	230.00	57.50
	10/10/2022	0.25	230.00	57.50
	10/21/2022	0.25	230.00	57.50
	10/27/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		1.25		287.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/05/2022	0.50	300.00	150.00

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	10/24/2022	0.25	300.00	75.00
	10/27/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.00		300.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **587.50**

Task : 06) LID MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/19/2022	0.25	150.00	37.50
	10/21/2022	5.00	150.00	750.00
	10/22/2022	1.50	150.00	225.00
	10/26/2022	1.25	150.00	187.50
Total: STAFF PROFESSIONAL		8.00		1,200.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/07/2022	0.25	230.00	57.50
	10/10/2022	0.25	230.00	57.50
	10/11/2022	0.50	230.00	115.00
	10/17/2022	0.25	230.00	57.50
	10/18/2022	0.75	230.00	172.50
	10/19/2022	0.50	230.00	115.00
	10/20/2022	0.25	230.00	57.50
	10/21/2022	4.75	230.00	1,092.50
	10/27/2022	1.25	230.00	287.50
	10/28/2022	0.50	230.00	115.00
	10/31/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		9.75		2,242.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/05/2022	0.50	300.00	150.00
	10/12/2022	0.50	300.00	150.00
	10/19/2022	0.25	300.00	75.00
	10/27/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		1.75		525.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **3,967.50**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/27/2022	0.25	230.00	57.50

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **57.50**

Task : 08) POCS RWL PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/08/2022	1.00	150.00	150.00
	10/10/2022	4.00	150.00	600.00
Total: STAFF PROFESSIONAL		5.00		750.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/10/2022	0.25	230.00	57.50
	10/11/2022	1.25	230.00	287.50
	10/12/2022	0.75	230.00	172.50
	10/19/2022	0.25	230.00	57.50
	10/20/2022	1.00	230.00	230.00
	10/27/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		3.75		862.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/12/2022	1.50	300.00	450.00
	10/19/2022	0.25	300.00	75.00
	10/20/2022	0.50	300.00	150.00
	10/27/2022	0.25	300.00	75.00
	10/28/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		2.75		825.00

Total Task : 08) POCS RWL PLAN **Task Labor** **2,437.50**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	10/06/2022	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/05/2022	0.50	230.00	115.00
	10/07/2022	0.50	230.00	115.00
	10/22/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.25		287.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/27/2022	0.25	300.00	75.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **407.50**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **11,876.25**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/04/2022	0.75	150.00	112.50
	10/12/2022	0.75	150.00	112.50
	10/13/2022	0.25	150.00	37.50
	10/14/2022	0.25	150.00	37.50
	10/28/2022	1.00	150.00	150.00

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	10/31/2022	1.00	150.00	150.00
Total: STAFF PROFESSIONAL		4.00		600.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/04/2022	0.75	230.00	172.50
	10/06/2022	0.25	230.00	57.50
	10/12/2022	0.50	230.00	115.00
	10/13/2022	0.25	230.00	57.50
	10/20/2022	0.25	230.00	57.50
	10/28/2022	0.75	230.00	172.50
	10/31/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		3.50		805.00
SENIOR PROFESSIONAL				
HAVENS, KELLY	10/04/2022	0.25	255.00	63.75
PRINCIPAL				
PERKINS, RINTA	10/04/2022	0.25	280.00	70.00
SENIOR PRINCIPAL				
AUSTIN, LISA	10/04/2022	0.25	300.00	75.00
	10/05/2022	1.75	300.00	525.00
	10/17/2022	2.00	300.00	600.00
	10/21/2022	0.75	300.00	225.00
	10/28/2022	1.25	300.00	375.00
	10/31/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		6.50		1,950.00

Total Task : 03) OLD INDUSTRIAL CONTROL MEASURE **Task Labor** **3,488.75**

Task : 06) ON CALL SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	10/22/2022	0.25	230.00	57.50

Total Task : 06) ON CALL SUPPORT **Task Labor** **57.50**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **3,546.25**

Total Project Labor **15,422.50**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **15,422.50**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

December 15, 2022

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #24**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$51,856.70
	Invoice #24 Total	**$51,856.70**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

December 14, 2022

Project No. - Invoice No: 00436.14-24

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 11/30/2022

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	7.75	224.00	$1,736.00
Mathews, Sandra	11.50	315.00	$3,622.50
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$5,493.50**
Total This Task			**$5,493.50**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	23.00	315.00	$7,245.00
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$7,380.00**
Total This Task			**$7,380.00**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	3.00	315.00	$945.00
Total Labor			**$945.00**

Total This Task **$945.00**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	3.25	126.00	$409.50
Mathews, Sandra	2.25	315.00	$708.75
VanCarpels, Tina	.75	135.00	$101.25
Warren, Rachel	7.50	260.00	$1,950.00
Total Labor			**$3,169.50**
Total This Task			**$3,169.50**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	4.50	260.00	$1,170.00
Total Labor			**$1,203.75**
Total This Task			**$1,203.75**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.50	135.00	$67.50
Yin, Elizabeth	10.00	260.00	$2,600.00
Total Labor			**$2,667.50**
Total This Task			**$2,667.50**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
12/7/2022 Geosyntec Consultants	Inv. #493765	8,392.50	1.100	$9,231.75
Total Consultants				**$9,231.75**
Total This Task				**$9,231.75**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
12/7/2022 Geosyntec Consultants	Inv. #493765	7,004.50	1.100	$7,704.95
Total Consultants				**$7,704.95**
Total This Task				**$7,704.95**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	3.75	315.00	$1,181.25
VanCarpels, Tina	.25	135.00	$33.75
Total Labor			**$1,215.00**
Total This Task			**$1,215.00**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	4.50	315.00	$1,417.50
VanCarpels, Tina	.25	135.00	$33.75
Total Labor			**$1,451.25**
Total This Task			**$1,451.25**

Task: 20.4 C3TG Update/Technical Materials

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	8.75	224.00	$1,960.00
Constantinescu, Alina	4.25	224.00	$952.00
Mathews, Sandra	14.75	315.00	$4,646.25
McFadin, Sophie	27.50	126.00	$3,465.00
VanCarpels, Tina	2.75	135.00	$371.25
Total Labor			**$11,394.50**
Total This Task			**$11,394.50**

Invoice Amount **$51,856.70**

Billing Limits	Current	Prior	To-date
Total Billings	51,856.70	568,913.36	620,770.06
Limit			1,800,000.00
Remaining			1,179,229.94

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 24 BILLING PERIOD: November 1 - 30, 2022
INVOICE DATE: November 15, 2022

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	48,403.25	-	48,403.25	11,596.75
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	26,866.25	13,818.50	40,684.75	28,315.25
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	325.00	3,169.50	3,494.50	6,505.50
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	15,146.63	3,871.25	19,017.88	70,182.12
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	6,281.00	9,231.75	15,512.75	100,757.25
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	462.00	7,704.95	8,166.95	105,683.05
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	10,773.00	1,215.00	11,988.00	20,012.00
NDS-23-1	Regional Project Support	F15W81	CW2	436.14 - Task 20	$62,000.00	-	12,845.75	12,845.75	49,154.25
TOTALS					**$1,032,920.00**	**$526,561.10**	**$51,856.70**	**$578,417.80**	**$454,502.20**

Geosyntec consultants

Project 436.14
517
Task 17 $8392.50
Task 18 $7,004.50
Total $15,397.00

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 493765
Project : CWR0649B
Invoice Date : 12/7/2022
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 11/30/2022

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$15,325.00
Reimbursable Expenses	$72.00
Current Invoice	**$15,397.00**
****Amount Due This Invoice ****	**$15,397.00**

Statement		***Statement***	
Prior Billings	$22,357.50	Project Budget	$216,200.00
Current Invoice	$15,397.00	Expended to Date	$37,754.50
Billed To Date	$37,754.50	Contract Balance	$178,445.50
Paid To Date	$0.00	****Amount Due This Invoice ****	**$15,397.00**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 01) ACCWP MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	11/04/2022	0.50	230.00	115.00
	11/07/2022	0.50	230.00	115.00
	11/21/2022	0.25	230.00	57.50
	11/30/2022	0.25	230.00	57.50
	11/30/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		2.00		460.00

Total Task : 01) ACCWP MPC **Task Labor** **460.00**

Task : 02) BAMSC MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	11/02/2022	2.00	230.00	460.00
SENIOR PRINCIPAL				
AUSTIN, LISA	11/02/2022	2.25	300.00	675.00

Total Task : 02) BAMSC MPC **Task Labor** **1,135.00**

Task : 04) UCMR SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	11/30/2022	0.25	230.00	57.50

Total Task : 04) UCMR SUPPORT **Task Labor** **57.50**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	11/14/2022	0.50	150.00	75.00
	11/16/2022	0.50	150.00	75.00
	11/18/2022	0.25	150.00	37.50
Total: STAFF PROFESSIONAL		1.25		187.50
SENIOR STAFF PROFESSIONAL				
HWANG, SAMUEL	11/16/2022	0.50	175.00	87.50
	11/21/2022	3.00	175.00	525.00
	11/23/2022	7.00	175.00	1,225.00
	11/30/2022	1.50	175.00	262.50
Total: SENIOR STAFF PROFESSIONAL		12.00		2,100.00
PROJECT PROFESSIONAL				
WELSH, LISA	11/14/2022	0.50	230.00	115.00
	11/16/2022	1.25	230.00	287.50
	11/17/2022	0.25	230.00	57.50
	11/18/2022	0.75	230.00	172.50
	11/21/2022	0.25	230.00	57.50
	11/29/2022	0.50	230.00	115.00

Phase : **01) TASK 17 MONITORING SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
Total: PROJECT PROFESSIONAL		3.50		805.00
SENIOR PRINCIPAL				
AUSTIN, LISA	11/11/2022	0.25	300.00	75.00
	11/14/2022	0.75	300.00	225.00
	11/15/2022	0.25	300.00	75.00
	11/18/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.50		450.00

Total Task : **05) TRASH MONITORING PLAN** **Task Labor** **3,542.50**

Task : **06) LID MONITORING PLAN**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	11/22/2022	1.25	150.00	187.50
	11/23/2022	0.50	150.00	75.00
Total: STAFF PROFESSIONAL		1.75		262.50
PROJECT PROFESSIONAL				
WELSH, LISA	11/01/2022	0.25	230.00	57.50
	11/02/2022	0.25	230.00	57.50
	11/03/2022	0.25	230.00	57.50
	11/04/2022	0.25	230.00	57.50
	11/07/2022	0.25	230.00	57.50
	11/11/2022	0.50	230.00	115.00
	11/16/2022	0.25	230.00	57.50
	11/17/2022	0.25	230.00	57.50
	11/18/2022	0.25	230.00	57.50
	11/21/2022	1.25	230.00	287.50
	11/22/2022	0.75	230.00	172.50
	11/23/2022	0.50	230.00	115.00
	11/29/2022	0.50	230.00	115.00
	11/30/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		5.75		1,322.50
SENIOR PRINCIPAL				
AUSTIN, LISA	11/09/2022	0.25	300.00	75.00
	11/11/2022	0.25	300.00	75.00
	11/11/2022	0.25	300.00	75.00
	11/18/2022	0.25	300.00	75.00
	11/21/2022	1.00	300.00	300.00
Total: SENIOR PRINCIPAL		2.00		600.00

Total Task : **06) LID MONITORING PLAN** **Task Labor** **2,185.00**

Task : **08) POCS RWL PLAN**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	11/09/2022	0.75	230.00	172.50
	11/14/2022	0.25	230.00	57.50

Phase : **01) TASK 17 MONITORING SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	11/21/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		1.75		402.50
SENIOR PRINCIPAL				
AUSTIN, LISA	11/09/2022	0.75	300.00	225.00
	11/14/2022	0.25	300.00	75.00
	11/21/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		1.50		450.00

Total Task : 08) POCS RWL PLAN **Task Labor** **852.50**

Task : 09) ON CALL SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT ADMINISTRATOR				
DUONG, DAVID	11/08/2022	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	11/08/2022	0.50	230.00	115.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **160.00**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **8,392.50**

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Task : **03) OLD INDUSTRIAL CONTROL MEASURE**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
STAFF PROFESSIONAL				
YAO, GRACE	11/04/2022	0.75	150.00	112.50
	11/07/2022	0.50	150.00	75.00
	11/09/2022	1.00	150.00	150.00
	11/10/2022	1.00	150.00	150.00
	11/11/2022	0.25	150.00	37.50
	11/17/2022	0.25	150.00	37.50
	11/18/2022	0.25	150.00	37.50
Total: STAFF PROFESSIONAL		4.00		600.00
SENIOR STAFF PROFESSIONAL				
GALLO, ELIZABETH	11/04/2022	0.75	175.00	131.25
	11/15/2022	0.50	175.00	87.50
	11/17/2022	0.75	175.00	131.25
	11/18/2022	2.00	175.00	350.00
	11/21/2022	1.50	175.00	262.50
	11/23/2022	1.00	175.00	175.00
	11/28/2022	1.50	175.00	262.50
	11/29/2022	3.25	175.00	568.75
	11/30/2022	2.00	175.00	350.00
HWANG, SAMUEL	11/22/2022	0.25	175.00	43.75
	11/30/2022	1.50	175.00	262.50
Total: SENIOR STAFF PROFESSIONAL		15.00		2,625.00

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	11/03/2022	0.25	230.00	57.50
	11/04/2022	0.75	230.00	172.50
	11/06/2022	0.25	230.00	57.50
	11/07/2022	0.75	230.00	172.50
	11/08/2022	1.50	230.00	345.00
	11/09/2022	0.50	230.00	115.00
	11/10/2022	1.00	230.00	230.00
	11/11/2022	0.25	230.00	57.50
	11/14/2022	0.25	230.00	57.50
	11/16/2022	1.00	230.00	230.00
	11/18/2022	0.50	230.00	115.00
	11/22/2022	0.50	230.00	115.00
	11/28/2022	0.25	230.00	57.50
	11/29/2022	0.25	230.00	57.50
	11/30/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		8.75		2,012.50
SENIOR PRINCIPAL				
AUSTIN, LISA	11/03/2022	0.25	300.00	75.00
	11/04/2022	0.50	300.00	150.00
	11/07/2022	0.50	300.00	150.00
	11/08/2022	0.50	300.00	150.00
	11/10/2022	1.50	300.00	450.00
	11/15/2022	0.25	300.00	75.00
	11/17/2022	0.50	300.00	150.00
	11/18/2022	0.25	300.00	75.00
	11/22/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		4.50		1,350.00

Vendor / Employee Name	*Doc Nbr*	*Date*	*Units*	*Rate*	*Amount*
GIS COMPUTER TIME					
GALLO, ELIZABETH	005470	11/21/2022	1.50	24	36.00
	005470	11/23/2022	1.00	24	24.00
			2.50		60.00
YAO, GRACE	005646	11/17/2022	0.25	24	6.00
	005646	11/18/2022	0.25	24	6.00
			0.50		12.00
Total: Billable Unit Pricing					72.00

Total Task : **03) OLD INDUSTRIAL CONTROL MEASURE**

Task Labor	**6,587.50**
Task Expense	**72.00**

Task : **04) AGOL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	11/10/2022	0.25	230.00	57.50
	11/13/2022	0.50	230.00	115.00

Project : **CWR0649B -- ACCWP ON CALL FY2022 2023** **Invoice # :493765**

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	11/14/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.00		230.00

Total Task : 04) AGOL SUPPORT **Task Labor** **230.00**

Task : 06) ON CALL SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	11/08/2022	0.50	230.00	115.00

Total Task : 06) ON CALL SUPPORT **Task Labor** **115.00**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Phase Labor	**6,932.50**
Phase Expense	**72.00**

Total Project Labor	**15,325.00**
Total Project Expense	**72.00**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **15,397.00**

1480 Drew Avenue, Suite 100
Davis, CA 95618

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www.lwa.com

January 19, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #25**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$47,609.48
	Invoice #25 Total	**$47,609.48**

LARRY WALKER ASSOCIATES
science | policy | solutions

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Suite 100
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ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

January 12, 2023

Project No. - Invoice No: 00436.14-25

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 12/31/2022

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	4.50	224.00	$1,008.00
Mathews, Sandra	14.25	315.00	$4,488.75
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$5,631.75**
Total This Task			**$5,631.75**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	1.25	126.00	$157.50
Mathews, Sandra	4.50	315.00	$1,417.50
Total Labor			**$1,575.00**
Total This Task			**$1,575.00**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	3.25	315.00	$1,023.75
Total Labor			**$1,023.75**

Total This Task **$1,023.75**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	6.50	126.00	$819.00
Total Labor			**$819.00**
Total This Task			**$819.00**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	2.00	260.00	$520.00
Total Labor			**$520.00**
Total This Task			**$520.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.50	135.00	$67.50
Yin, Elizabeth	7.50	260.00	$1,950.00
Total Labor			**$2,017.50**
Total This Task			**$2,017.50**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Trouchon, Michael	.50	288.00	$144.00
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	3.50	260.00	$910.00
Total Labor			**$1,087.75**
Total This Task			**$1,087.75**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
1/5/2023 Geosyntec Consultants	Inv. #496671	6,292.50	1.100	$6,921.75
Total Consultants				**$6,921.75**
Total This Task				**$6,921.75**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
1/5/2023 Geosyntec Consultants	Inv. #496671	13,419.75	1.100	$14,761.73
Total Consultants				**$14,761.73**
Total This Task				**$14,761.73**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Indiresan, Shruti	9.75	160.00	$1,560.00
Mathews, Sandra	3.00	315.00	$945.00
VanCarpels, Tina	.50	135.00	$67.50
Total Labor			**$2,572.50**

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
1/5/2023 Geosyntec Consultants	Inv. #496671	57.50	1.100	$63.25
Total Consultants				**$63.25**
Total This Task				**$2,635.75**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	4.25	315.00	$1,338.75
Total Labor			**$1,338.75**
Total This Task			**$1,338.75**

Task: 20.3 Trainings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	.50	315.00	$157.50
Total Labor			**$157.50**
Total This Task			**$157.50**

Task: 20.4 C3TG Update/Technical Materials

Professional Personnel

Employee	Hours	Rate	Amount
Constantinescu, Alina	9.00	224.00	$2,016.00
Mathews, Sandra	20.75	315.00	$6,536.25
McFadin, Sophie	4.50	126.00	$567.00

Total Labor	**$9,119.25**
Total This Task	**$9,119.25**

Invoice Amount	**$47,609.48**

Billing Limits	**Current**	**Prior**	**To-date**
Total Billings	47,609.48	620,770.06	668,379.54
Limit			1,800,000.00
Remaining			1,131,620.46

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 25 BILLING PERIOD: December 1 - 31, 2022
INVOICE DATE: January 12, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	50,840.50	8,230.50	59,071.00	9,929.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	4,172.00	819.00	4,991.00	5,009.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	21,001.63	3,625.25	24,626.88	64,573.12
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	28,576.63	6,921.75	35,498.38	80,771.62
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	12,067.83	14,761.73	26,829.56	87,020.44
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	12,303.00	2,635.75	14,938.75	17,061.25
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	12,845.75	10,615.50	23,461.25	38,538.75
TOTALS					**$1,032,920.00**	**$620,770.06**	**$47,609.48**	**$668,379.54**	**$364,540.46**

Task 17 $11,876.25
Task 18 $3,546.25

Geosyntec consultants

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 490525
Project : CWR0649B
Invoice Date : 11/8/2022
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 10/31/2022

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$15,422.50
Current Invoice	**$15,422.50**
****Amount Due This Invoice ****	**$15,422.50**

Statement		***Statement***	
Prior Billings	$6,935.00	Project Budget	$216,200.00
Current Invoice	$15,422.50	Expended to Date	$22,357.50
Billed To Date	$22,357.50	Contract Balance	$193,842.50
Paid To Date	$0.00	****Amount Due This Invoice ****	**$15,422.50**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 01) ACCWP MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/07/2022	0.50	230.00	115.00
	10/11/2022	0.25	230.00	57.50
	10/12/2022	0.50	230.00	115.00
	10/17/2022	1.75	230.00	402.50
	10/18/2022	3.00	230.00	690.00
	10/19/2022	1.50	230.00	345.00
Total: PROJECT PROFESSIONAL		7.50		1,725.00
SENIOR PRINCIPAL				
AUSTIN, LISA	10/12/2022	0.25	300.00	75.00
	10/18/2022	2.25	300.00	675.00
	10/20/2022	0.50	300.00	150.00
	10/24/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		3.25		975.00

Total Task : 01) ACCWP MPC **Task Labor** **2,700.00**

Task : 03) RMP

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/03/2022	2.75	230.00	632.50
	10/13/2022	0.25	230.00	57.50
	10/19/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		3.25		747.50
SENIOR PROFESSIONAL				
HAVENS, KELLY	10/12/2022	0.25	255.00	63.75
	10/20/2022	1.50	255.00	382.50
Total: SENIOR PROFESSIONAL		1.75		446.25
SENIOR PRINCIPAL				
AUSTIN, LISA	10/13/2022	1.00	300.00	300.00
	10/27/2022	0.75	300.00	225.00
Total: SENIOR PRINCIPAL		1.75		525.00

Total Task : 03) RMP **Task Labor** **1,718.75**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/07/2022	0.25	230.00	57.50
	10/10/2022	0.25	230.00	57.50
	10/21/2022	0.25	230.00	57.50
	10/27/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		1.25		287.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/05/2022	0.50	300.00	150.00

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	10/24/2022	0.25	300.00	75.00
	10/27/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.00		300.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **587.50**

Task : 06) LID MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/19/2022	0.25	150.00	37.50
	10/21/2022	5.00	150.00	750.00
	10/22/2022	1.50	150.00	225.00
	10/26/2022	1.25	150.00	187.50
Total: STAFF PROFESSIONAL		8.00		1,200.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/07/2022	0.25	230.00	57.50
	10/10/2022	0.25	230.00	57.50
	10/11/2022	0.50	230.00	115.00
	10/17/2022	0.25	230.00	57.50
	10/18/2022	0.75	230.00	172.50
	10/19/2022	0.50	230.00	115.00
	10/20/2022	0.25	230.00	57.50
	10/21/2022	4.75	230.00	1,092.50
	10/27/2022	1.25	230.00	287.50
	10/28/2022	0.50	230.00	115.00
	10/31/2022	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		9.75		2,242.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/05/2022	0.50	300.00	150.00
	10/12/2022	0.50	300.00	150.00
	10/19/2022	0.25	300.00	75.00
	10/27/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		1.75		525.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **3,967.50**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/27/2022	0.25	230.00	57.50

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **57.50**

Task : 08) POCS RWL PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/08/2022	1.00	150.00	150.00
	10/10/2022	4.00	150.00	600.00
Total: STAFF PROFESSIONAL		5.00		750.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/10/2022	0.25	230.00	57.50
	10/11/2022	1.25	230.00	287.50
	10/12/2022	0.75	230.00	172.50
	10/19/2022	0.25	230.00	57.50
	10/20/2022	1.00	230.00	230.00
	10/27/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		3.75		862.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/12/2022	1.50	300.00	450.00
	10/19/2022	0.25	300.00	75.00
	10/20/2022	0.50	300.00	150.00
	10/27/2022	0.25	300.00	75.00
	10/28/2022	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		2.75		825.00

Total Task : 08) POCS RWL PLAN **Task Labor** **2,437.50**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	10/06/2022	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/05/2022	0.50	230.00	115.00
	10/07/2022	0.50	230.00	115.00
	10/22/2022	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.25		287.50
SENIOR PRINCIPAL				
AUSTIN, LISA	10/27/2022	0.25	300.00	75.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **407.50**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **11,876.25**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/04/2022	0.75	150.00	112.50
	10/12/2022	0.75	150.00	112.50
	10/13/2022	0.25	150.00	37.50
	10/14/2022	0.25	150.00	37.50
	10/28/2022	1.00	150.00	150.00

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	10/31/2022	1.00	150.00	150.00
Total: STAFF PROFESSIONAL		4.00		600.00
PROJECT PROFESSIONAL				
WELSH, LISA	10/04/2022	0.75	230.00	172.50
	10/06/2022	0.25	230.00	57.50
	10/12/2022	0.50	230.00	115.00
	10/13/2022	0.25	230.00	57.50
	10/20/2022	0.25	230.00	57.50
	10/28/2022	0.75	230.00	172.50
	10/31/2022	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		3.50		805.00
SENIOR PROFESSIONAL				
HAVENS, KELLY	10/04/2022	0.25	255.00	63.75
PRINCIPAL				
PERKINS, RINTA	10/04/2022	0.25	280.00	70.00
SENIOR PRINCIPAL				
AUSTIN, LISA	10/04/2022	0.25	300.00	75.00
	10/05/2022	1.75	300.00	525.00
	10/17/2022	2.00	300.00	600.00
	10/21/2022	0.75	300.00	225.00
	10/28/2022	1.25	300.00	375.00
	10/31/2022	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		6.50		1,950.00

Total Task : 03) OLD INDUSTRIAL CONTROL MEASURE **Task Labor** **3,488.75**

Task : 06) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	10/22/2022	0.25	230.00	57.50

Total Task : 06) ON CALL SUPPORT **Task Labor** **57.50**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **3,546.25**

Total Project Labor **15,422.50**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **15,422.50**

1480 Drew Avenue, Suite 100
Davis, CA 95618

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530.753.7030 fax

www.lwa.com

February 21, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #26**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$63,778.13
	Invoice #26 Total	**$63,778.13**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

February 14, 2023

Project No. - Invoice No: 00436.14-26

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 1/31/2023

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	7.00	224.00	$1,568.00
Mathews, Sandra	20.00	315.00	$6,300.00
Total Labor			**$7,868.00**
Total This Task			**$7,868.00**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Ashby, Karen	11.75	315.00	$3,701.25
Bardsley, Audra	2.50	224.00	$560.00
Mathews, Sandra	12.25	315.00	$3,858.75
Total Labor			**$8,120.00**
Total This Task			**$8,120.00**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	5.00	315.00	$1,575.00
Total Labor			**$1,575.00**

Total This Task	**$1,575.00**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	.50	260.00	$130.00
Total Labor			**$130.00**
Total This Task			**$130.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	5.50	126.00	$693.00
Yin, Elizabeth	22.75	260.00	$5,915.00
Total Labor			**$6,608.00**

Reimbursable Expenses

Payee	Cost	Markup	Amount
Software			
1/3/2023 Yin, Elizabeth	108.00		$108.00
Total Reimbursables			**$108.00**
Total This Task			**$6,716.00**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	1.50	260.00	$390.00
Total Labor			**$390.00**
Total This Task			**$390.00**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
2/7/2023 Geosyntec Consultants	Inv. #500730	14,696.25	1.100	$16,165.88
Total Consultants				**$16,165.88**
Total This Task				**$16,165.88**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
2/7/2023 Geosyntec Consultants	Inv. #500730	13,062.50	1.100	$14,368.75
Total Consultants				**$14,368.75**

Total This Task **$14,368.75**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	5.50	315.00	$1,732.50
Total Labor			**$1,732.50**
Total This Task			**$1,732.50**

Task: 20.1 NDS Meetings

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	4.75	224.00	$1,064.00
Mathews, Sandra	6.50	315.00	$2,047.50
Total Labor			**$3,111.50**
Total This Task			**$3,111.50**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	2.00	224.00	$448.00
Indiresan, Shruti	1.00	160.00	$160.00
Mathews, Sandra	1.75	315.00	$551.25
Total Labor			**$1,159.25**
Total This Task			**$1,159.25**

Task: 20.4 C3TG Update/Technical Materials

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	3.75	315.00	$1,181.25
McFadin, Sophie	10.00	126.00	$1,260.00
Total Labor			**$2,441.25**
Total This Task			**$2,441.25**

Invoice Amount **$63,778.13**

Billing Limits	Current	Prior	To-date
Total Billings	63,778.13	668,379.54	732,157.67
Limit			1,800,000.00
Remaining			1,067,842.33

Larry Walker Associates Team
Progress Report for Work in January 2023

Municipal Regional Stormwater Permit Compliance Services for the Alameda Countywide Clean Water Program (ACCWP)

Task 14 Management Committee and PLS Support (PRC1-22/23)

Task: 14.1 MC/PLS Meeting Support

- Prepared Management Committee and Policy Level Subcommittee agenda packages.
- Participated in the January Management Committee and Policy Level Subcommittee meetings.
- Prepared and distributed action items and meeting summaries for the Management Committee and Policy Level Subcommittee meetings.

Task 14.2 MC/PLS As-needed Support

- Prepared agenda, meeting notes, and participated in the Planning and Budget Workgroup meeting.
- Coordinated and participated in the ACCWP Strategic Planning and Budget Project meeting; prepared and distributed the meeting summary.
- Updated subcommittee summary table.
- Program Management Support: tracked regional projects; updated Management Committee SharePoint site; began learning the new website; provided support for subcommittee facilitators; responded to public requests submitted via the website.
- Prepared technical information for the ACCWP legal counsel to support ACCWP's response on the State Water Board's Own Motion Review of MRP.

TASK 14.3 BAMSC

- Prepared for and participated in the January BAMSC internal and external steering committee meetings on behalf of the program.

Task 16 Data Management Support (PRC3-22/23)

Task 16.1 DMSC Subcommittee Support

- Coordinated with subcommittee members.

Task 16.3 Data Program Support

- Purchased Vimeo subscription at the direction of the subcommittee leaders and ACCWP.
- Coordinated with the GIS consultant.
- Participated in the ACCWP Strategic Planning and Budget Project meeting.
- Coordinated the ACCWP PLDA online training session planned for early February.
- Began uploading recent and archived recorded training sessions to the Vimeo site.

Task 16.3 Data Management Plan

- Continued with the development of the ACCWP Information Management Plan.

Task 17 Monitoring Support (MPC-23-1)

- Prepared and facilitated ACCWP MPC January quarterly meeting; drafted ACCWP MPC FY23-24 budget; drafted ACCWP MPC update for Management Committee meeting.
- Participated in BASMC MPC; transitioned to BASMC MPC co-chair.
- Participated in a regional meeting to discuss CEC monitoring.
- Reviewed UCMR cover letter and SSID report.
- Assisted the Program in planning for trash monitoring, site selection, and trash capture device sizing; participated in the monthly coordination call; participated in the internal TAG meeting.
- Assisted the Program in planning for LID monitoring and site selection; coordinated with the project team; participated in the monthly coordination call.
- Assisted ACCWP in planning for POCs monitoring.
- Participated in the monthly POCs RWL regional workgroup call; drafted the POCs PWL assessment report; coordinated and participated in the meeting with Regional Water Board staff.
- Coordinated with the project team; participated in Strategic Planning Meeting.

Task 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

- Continued development of the Old Industrial Control Measure Plan; continued analysis of project data and evaluated regional project potential; coordinated and facilitated meetings with Permittees to discuss planned projects.
- Reviewed Annual Report forms; compiled old industrial area layer for Oakland.

TASK 19 Regional Project Support (POC-Imp-23-2)

TASK 19.2 PCBs Demolition Guidance

- Continued work drafting the construction site program enhancements document and coordinating with the regional workgroup.

TASK 20 New Development Subcommittee Support (NDS 23-1)

Task 20.1 NDS Meetings

- Prepared NDS agenda package.
- Participated in the January NDS meeting.
- Prepared and distributed the NDS action items and meeting summary.

Task 20.2 As Needed Support

- Responded to member information requests.

Task 20.4 C3TG Update/Technical Materials

- Continued with the update of the C.3 Technical Guidance Manual.3

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 24 BILLING PERIOD: January 1 - 31, 2023
INVOICE DATE: January 12, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$69,000.00	59,071.00	17,563.00	76,634.00	(7,634.00)
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	4,991.00	-	4,991.00	5,009.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$89,200.00	24,626.88	7,236.00	31,862.88	57,337.12
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	35,498.38	16,165.88	51,664.26	64,605.74
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	26,829.56	14,368.75	41,198.31	72,651.69
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	14,938.75	1,732.50	16,671.25	15,328.75
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	23,461.25	6,712.00	30,173.25	31,826.75
TOTALS					**$1,032,920.00**	**$668,379.54**	**$63,778.13**	**$732,157.67**	**$300,762.33**

Expense Report

Larry Walker Associates

For Period Ending 1/31/2023

Mileage Rate: $0.655/mile

Project: **00436.14**

TASK	DATE	EMPLOYEE	TYPE	DETAILS	MILES	AMOUNT
						$108.00
16.2	01/03/2023	Yin, Elizabeth	Software			$108.00

vimeo

Hi, ACCWP Program Manager!

Thanks for your purchase! Your support helps us do amazing things. Below is the receipt for your transaction on Jan 3, 2023:

Billing Information

Elizabeth Yin

94804 US

Payment Information

Card ending in **5224**

Your Purchase (Invoice #VIM67750678)

Vimeo Starter	$108.00
Tax	$0.00
Total	**$108.00**

LOVE,
Vimeo

VIMEO, Inc.
555 West 18th Street, 2nd Floor.
New York, NY 10011

U.S. TIN: 26-2816886

Geosyntec consultants

Project 436.14
517
Task 17 $14696.25
Task 18 $13062.50
Total $127758.75

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 500730
Project : CWR0649B
Invoice Date : 2/7/2023
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 1/31/2023

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$27,758.75
Current Invoice	**$27,758.75**
****Amount Due This Invoice ****	**$27,758.75**

Statement		***Statement***	
Prior Billings	$57,524.25	Project Budget	$216,200.00
Current Invoice	$27,758.75	Expended to Date	$85,283.00
Billed To Date	$85,283.00	Contract Balance	$130,917.00
Paid To Date	$22,357.50	****Amount Due This Invoice ****	**$27,758.75**

Phase : **01) TASK 17 MONITORING SUPPORT**

Task : **01) ACCWP MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	01/03/2023	0.25	230.00	57.50
	01/05/2023	1.75	230.00	402.50
	01/06/2023	0.75	230.00	172.50
	01/09/2023	0.25	230.00	57.50
	01/10/2023	1.50	230.00	345.00
	01/11/2023	0.25	230.00	57.50
	01/13/2023	2.00	230.00	460.00
	01/16/2023	0.25	230.00	57.50
	01/17/2023	4.00	230.00	920.00
	01/18/2023	1.25	230.00	287.50
	01/19/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		12.50		2,875.00
SENIOR PRINCIPAL				
AUSTIN, LISA	01/16/2023	0.50	300.00	150.00
	01/17/2023	2.50	300.00	750.00
	01/18/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		3.50		1,050.00

Total Task : 01) ACCWP MPC **Task Labor** **3,925.00**

Task : **02) BAMSC MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	01/04/2023	1.50	230.00	345.00
SENIOR PRINCIPAL				
AUSTIN, LISA	01/03/2023	0.25	300.00	75.00
	01/04/2023	2.00	300.00	600.00
	01/24/2023	1.00	300.00	300.00
	01/26/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		3.75		1,125.00

Total Task : 02) BAMSC MPC **Task Labor** **1,470.00**

Task : **03) RMP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	01/16/2023	0.25	300.00	75.00
	01/18/2023	1.00	300.00	300.00
Total: SENIOR PRINCIPAL		1.25		375.00

Total Task : 03) RMP **Task Labor** **375.00**

Task : **04) UCMR SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	01/09/2023	0.25	230.00	57.50
	01/11/2023	0.75	230.00	172.50
	01/12/2023	1.00	230.00	230.00
	01/16/2023	0.25	230.00	57.50
	01/18/2023	0.25	230.00	57.50
	01/20/2023	1.00	230.00	230.00
Total: PROJECT PROFESSIONAL		3.50		805.00
SENIOR PRINCIPAL				
AUSTIN, LISA	01/16/2023	2.00	300.00	600.00

Total Task : 04) UCMR SUPPORT **Task Labor** **1,405.00**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	01/20/2023	0.25	150.00	37.50
SENIOR STAFF PROFESSIONAL				
HWANG, SAMUEL	01/05/2023	0.75	175.00	131.25
	01/06/2023	2.50	175.00	437.50
	01/09/2023	2.50	175.00	437.50
	01/12/2023	0.50	175.00	87.50
	01/18/2023	0.50	175.00	87.50
	01/31/2023	1.00	175.00	175.00
Total: SENIOR STAFF PROFESSIONAL		7.75		1,356.25
PROJECT PROFESSIONAL				
WELSH, LISA	01/05/2023	0.25	230.00	57.50
	01/06/2023	0.50	230.00	115.00
	01/08/2023	0.75	230.00	172.50
	01/11/2023	0.75	230.00	172.50
	01/12/2023	0.25	230.00	57.50
	01/13/2023	0.25	230.00	57.50
	01/18/2023	0.75	230.00	172.50
	01/19/2023	0.25	230.00	57.50
	01/20/2023	0.50	230.00	115.00
	01/25/2023	0.25	230.00	57.50
	01/26/2023	1.00	230.00	230.00
	01/30/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		5.75		1,322.50
SENIOR PRINCIPAL				
AUSTIN, LISA	01/06/2023	0.25	300.00	75.00
	01/13/2023	0.25	300.00	75.00
	01/26/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		0.75		225.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **2,941.25**

Task : 06) LID MONITORING PLAN

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	01/03/2023	0.25	230.00	57.50
	01/05/2023	0.25	230.00	57.50
	01/06/2023	0.75	230.00	172.50
	01/09/2023	0.25	230.00	57.50
	01/13/2023	0.25	230.00	57.50
	01/19/2023	0.50	230.00	115.00
	01/26/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		2.50		575.00
SENIOR PRINCIPAL				
AUSTIN, LISA	01/06/2023	0.25	300.00	75.00
	01/13/2023	0.25	300.00	75.00
	01/20/2023	0.25	300.00	75.00
	01/26/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.00		300.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **875.00**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	01/12/2023	1.00	230.00	230.00
	01/20/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		1.50		345.00
SENIOR PRINCIPAL				
AUSTIN, LISA	01/12/2023	0.50	300.00	150.00
	01/26/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		0.75		225.00

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **570.00**

Task : 08) POCS RWL PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	01/11/2023	0.50	230.00	115.00
	01/20/2023	0.25	230.00	57.50
	01/23/2023	0.75	230.00	172.50
	01/26/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.75		402.50
SENIOR PRINCIPAL				
AUSTIN, LISA	01/03/2023	0.50	300.00	150.00
	01/04/2023	0.75	300.00	225.00
	01/06/2023	0.25	300.00	75.00
	01/09/2023	0.50	300.00	150.00
	01/11/2023	0.50	300.00	150.00
	01/19/2023	0.75	300.00	225.00
	01/20/2023	0.25	300.00	75.00

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	01/23/2023	1.00	300.00	300.00
	01/24/2023	0.25	300.00	75.00
	01/25/2023	0.25	300.00	75.00
	01/26/2023	0.25	300.00	75.00
	01/27/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		5.50		1,650.00

Total Task : 08) POCS RWL PLAN **Task Labor** **2,052.50**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	01/05/2023	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	01/04/2023	0.50	230.00	115.00
	01/09/2023	0.25	230.00	57.50
	01/10/2023	0.25	230.00	57.50
	01/24/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.25		287.50
SENIOR PRINCIPAL				
AUSTIN, LISA	01/05/2023	2.50	300.00	750.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **1,082.50**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **14,696.25**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	01/03/2023	0.25	150.00	37.50
	01/11/2023	0.25	150.00	37.50
	01/13/2023	0.50	150.00	75.00
	01/16/2023	1.00	150.00	150.00
	01/20/2023	0.25	150.00	37.50
	01/27/2023	0.75	150.00	112.50
Total: STAFF PROFESSIONAL		3.00		450.00
SENIOR STAFF PROFESSIONAL				
GALLO, ELIZABETH	01/03/2023	3.25	175.00	568.75
	01/04/2023	1.50	175.00	262.50
	01/05/2023	3.50	175.00	612.50
	01/06/2023	2.00	175.00	350.00
	01/09/2023	0.25	175.00	43.75
	01/10/2023	2.75	175.00	481.25
	01/11/2023	0.25	175.00	43.75
	01/12/2023	0.50	175.00	87.50
	01/16/2023	3.50	175.00	612.50

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
GALLO, ELIZABETH	01/17/2023	0.50	175.00	87.50
	01/18/2023	2.50	175.00	437.50
	01/19/2023	2.25	175.00	393.75
	01/20/2023	1.25	175.00	218.75
	01/23/2023	0.50	175.00	87.50
	01/24/2023	0.75	175.00	131.25
	01/25/2023	0.50	175.00	87.50
	01/27/2023	1.00	175.00	175.00
	01/30/2023	0.50	175.00	87.50
	01/31/2023	1.75	175.00	306.25
HWANG, SAMUEL	01/05/2023	0.50	175.00	87.50
Total: SENIOR STAFF PROFESSIONAL		29.50		5,162.50
PROJECT PROFESSIONAL				
WELSH, LISA	01/05/2023	0.75	230.00	172.50
	01/06/2023	1.00	230.00	230.00
	01/07/2023	0.50	230.00	115.00
	01/08/2023	2.00	230.00	460.00
	01/09/2023	0.50	230.00	115.00
	01/10/2023	0.50	230.00	115.00
	01/13/2023	0.25	230.00	57.50
	01/16/2023	0.50	230.00	115.00
	01/19/2023	2.50	230.00	575.00
	01/20/2023	0.50	230.00	115.00
	01/24/2023	0.75	230.00	172.50
	01/25/2023	4.50	230.00	1,035.00
	01/27/2023	2.50	230.00	575.00
	01/29/2023	0.25	230.00	57.50
	01/30/2023	0.75	230.00	172.50
	01/31/2023	1.00	230.00	230.00
Total: PROJECT PROFESSIONAL		18.75		4,312.50
SENIOR PRINCIPAL				
AUSTIN, LISA	01/05/2023	0.50	300.00	150.00
	01/13/2023	0.25	300.00	75.00
	01/18/2023	0.50	300.00	150.00
	01/20/2023	0.25	300.00	75.00
	01/25/2023	4.00	300.00	1,200.00
	01/26/2023	3.50	300.00	1,050.00
	01/27/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		9.50		2,850.00

Total Task : **03) OLD INDUSTRIAL CONTROL MEASURE** **Task Labor** **12,775.00**

Task : **06) ON CALL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	01/08/2023	0.75	230.00	172.50
	01/10/2023	0.50	230.00	115.00

Project : **CWR0649B -- ACCWP ON CALL FY2022 2023** **Invoice # :500730**

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
Total: PROJECT PROFESSIONAL		1.25		287.50

Total Task : 06) ON CALL SUPPORT **Task Labor** **287.50**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **13,062.50**

Total Project Labor **27,758.75**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **27,758.75**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

March 16, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #27**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$54,409.88
	Invoice #27 Total	**$54,409.88**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

March 14, 2023

Project No. - Invoice No: 00436.14-27

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 2/28/2023

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	8.75	224.00	$1,960.00
Mathews, Sandra	13.50	315.00	$4,252.50
VanCarpels, Tina	1.50	135.00	$202.50
Total Labor			**$6,415.00**
Total This Task			**$6,415.00**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	12.75	315.00	$4,016.25
VanCarpels, Tina	1.50	135.00	$202.50
Total Labor			**$4,218.75**
Total This Task			**$4,218.75**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.50	315.00	$787.50
VanCarpels, Tina	.25	135.00	$33.75

Total Labor	**$821.25**
Total This Task	**$821.25**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	3.50	260.00	$910.00
Total Labor			**$943.75**
Total This Task			**$943.75**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	2.25	126.00	$283.50
VanCarpels, Tina	1.00	135.00	$135.00
Yin, Elizabeth	16.00	260.00	$4,160.00
Total Labor			**$4,578.50**
Total This Task			**$4,578.50**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	1.00	260.00	$260.00
Total Labor			**$260.00**
Total This Task			**$260.00**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
3/7/2023 Geosyntec Consultants	Inv. #503891	16,166.25	1.100	$17,782.88
Total Consultants				**$17,782.88**
Total This Task				**$17,782.88**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
3/7/2023 Geosyntec Consultants	Inv. #503891	10,017.50	1.100	$11,019.25
Total Consultants				**$11,019.25**
Total This Task				**$11,019.25**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Indiresan, Shruti	2.00	160.00	$320.00
Mathews, Sandra	2.00	315.00	$630.00
VanCarpels, Tina	.25	135.00	$33.75
Total Labor			**$983.75**
Total This Task			**$983.75**

Task: 20.1 NDS Meetings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	.50	315.00	$157.50
McFadin, Sophie	1.50	126.00	$189.00
Total Labor			**$346.50**
Total This Task			**$346.50**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.50	315.00	$787.50
Total Labor			**$787.50**
Total This Task			**$787.50**

Task: 20.3 Trainings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.00	315.00	$315.00
McFadin, Sophie	.75	126.00	$94.50
Total Labor			**$409.50**
Total This Task			**$409.50**

Task: 20.4 C3TG Update/Technical Materials

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	5.75	315.00	$1,811.25
McFadin, Sophie	32.00	126.00	$4,032.00
Total Labor			**$5,843.25**
Total This Task			**$5,843.25**

Invoice Amount **$54,409.88**

Billing Limits	Current	Prior	To-date
Total Billings	54,409.88	732,797.67	787,207.55
Limit			1,800,000.00
Remaining			1,012,792.45

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 27 BILLING PERIOD: February 1-28, 2023
INVOICE DATE: March 14, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$138,000.00	77,274.00	11,455.00	88,729.00	49,271.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	4,991.00	-	4,991.00	5,009.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$95,200.00	31,862.88	5,782.25	37,645.13	57,554.87
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	51,664.26	17,782.88	69,447.14	46,822.86
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	41,198.31	11,019.25	52,217.56	61,632.44
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	16,671.25	983.75	17,655.00	14,345.00
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	30,173.25	7,386.75	37,560.00	24,440.00
TOTALS					**$1,107,920.00**	**$732,797.67**	**$54,409.88**	**$787,207.55**	**$320,712.45**

Larry Walker Associates Team
Progress Report for Work in February 2023

Municipal Regional Stormwater Permit Compliance Services for the Alameda Countywide Clean Water Program (ACCWP)

Task 14 Management Committee and PLS Support (PRC1-22/23)

Task: 14.1 MC/PLS Meeting Support

- Prepared the Management Committee and Policy Level Subcommittee agenda packages.
- Participated in the February Management Committee and Policy Level Subcommittee meetings.
- Prepared and distributed action items and meeting summaries for the Management Committee and Policy Level Subcommittee meetings.

Task 14.2 MC/PLS As-needed Support

- Prepared agenda, meeting notes, and participated in the Planning and Budget Workgroup meeting.
- Updated subcommittee summary table.
- Program Management Support: tracked regional projects; updated Management Committee SharePoint site; updated the website calendar; provided support for subcommittee facilitators; responded to public requests submitted via the website.
- Finalized technical information for the ACCWP legal counsel to support ACCWP's response on the State Water Board's Own Motion Review of MRP.
- Prepared progress report.

TASK 14.3 BAMSC

- Prepared for and participated in the February BAMSC internal and external Steering Committee meetings on behalf of the program.

Task 16 Data Management Support (PRC3-22/23)

Task 16.1 DMSC Subcommittee Support

- Prepared for and participated in the subcommittee meeting.

Task 16.3 Data Program Support

- Drafted the subcommittee FY 2023-24 budget.
- Prepared for and participated in the PLDA online training session.
- Continued uploading recent and archived recorded training sessions to the Vimeo site.

Task 16.3 Data Management Plan

- Continued development of the ACCWP Information Management Plan.

Task 17 Monitoring Support (MPC-23-1)

- Attended website training; drafted ACCWP MPC update for the Management Committee meeting; drafted ACCWP MPC FY 2023-24 budget.
- Drafted BASMC MPC meeting agenda and January summary; participated in BAMSC Steering Committee external meeting.
- Reviewed UCMR reports; coordinated Permittee review of the UCMR.
- Assisted the Program in planning for trash monitoring, site selection, and trash capture device sizing; participated in the monthly coordination call; participated in the internal TAG meeting.
- Assisted the Program in planning for LID monitoring and site selection; coordinated with the project team; participated in the monthly coordination call; participated in the internal TAG meeting; reviewed and facilitated Permittee review of the LID Monitoring Plan and QAPP.
- Assisted the Program in planning for POCs monitoring; drafted plan for WY2023 monitoring.
- Participated in the monthly POCs RWL regional workgroup call; revised the POCs PWL assessment report.
- Coordinated with the project team.

Task 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

- Continued analysis of project data and evaluated regional project potential; drafted the Old Industrial Control Measure Plan; coordinated Permittee review of the Old Industrial Control Measure Plan.
- Coordinated with the project team.

TASK 19 Regional Project Support (POC-Imp-23-2)

TASK 19.2 PCBs Demolition Guidance

- Continued work on the construction site program enhancements document.
- Responded to Permittee questions on the documents.
- Summarized comments received and prepared responses for discussion at the workgroup meeting.
- Prepared for the regional workgroup planned for early March.

TASK 20 New Development Subcommittee Support (NDS 23-1)

Task 20.1 NDS Meetings

- Followed-up on NDS meeting actions.

Task 20.2 As Needed Support

- Responded to member information requests.
- Provided C.3 information to members and distributed regional workgroup information to NDS members.

Task 20.3 Training

- Prepared for and participated in the NDS training workgroup meeting to plan the 2023 C.3 workshop.

Task 20.4 C3TG Update/Technical Materials

- Prepared for and participated in the NDS C.3TG workgroup meeting to review comments on the manual.
- Continued with the update of the C.3 Technical Guidance Manual addressing comments and preparing appendices.

Geosyntec consultants

436.14
517
Task 17 $16,166.25
Task Task 18 $10,017.50

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
) Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
el (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # :	503891
Project :	CWR0649B
Invoice Date :	3/7/2023
Project Name :	ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 2/28/2023

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$26,183.75
Current Invoice	**$26,183.75**
****Amount Due This Invoice ****	**$26,183.75**

Statement		***Statement***	
Prior Billings	$85,283.00	Project Budget	$216,200.00
Current Invoice	$26,183.75	Expended to Date	$111,466.75
Billed To Date	$111,466.75	Contract Balance	$104,733.25
Paid To Date	$37,754.50	****Amount Due This Invoice ****	**$26,183.75**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 01) ACCWP MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	02/02/2023	0.50	230.00	115.00
	02/15/2023	0.50	230.00	115.00
	02/28/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		1.75		402.50

Total Task : 01) ACCWP MPC **Task Labor** **402.50**

Task : 02) BAMSC MPC

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	02/21/2023	3.00	300.00	900.00
	02/23/2023	2.00	300.00	600.00
	02/27/2023	1.00	300.00	300.00
Total: SENIOR PRINCIPAL		6.00		1,800.00

Total Task : 02) BAMSC MPC **Task Labor** **1,800.00**

Task : 04) UCMR SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	02/06/2023	0.25	230.00	57.50
	02/07/2023	0.25	230.00	57.50
	02/10/2023	0.25	230.00	57.50
	02/13/2023	0.25	230.00	57.50
	02/14/2023	0.75	230.00	172.50
	02/15/2023	0.50	230.00	115.00
	02/16/2023	4.25	230.00	977.50
	02/17/2023	1.00	230.00	230.00
	02/18/2023	1.50	230.00	345.00
	02/21/2023	3.50	230.00	805.00
	02/22/2023	1.50	230.00	345.00
	02/28/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		14.75		3,392.50
SENIOR PRINCIPAL				
AUSTIN, LISA	02/15/2023	5.00	300.00	1,500.00

Total Task : 04) UCMR SUPPORT **Task Labor** **4,892.50**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	02/03/2023	0.25	150.00	37.50
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	02/28/2023	0.25	175.00	43.75
HWANG, SAMUEL	02/06/2023	1.00	175.00	175.00

Phase : **01) TASK 17 MONITORING SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
Total: SENIOR STAFF PROFESSIONAL		1.25		218.75
PROFESSIONAL				
CHARNEY, RYAN	02/14/2023	0.50	200.00	100.00
	02/15/2023	0.50	200.00	100.00
	02/16/2023	4.00	200.00	800.00
Total: PROFESSIONAL		5.00		1,000.00
PROJECT PROFESSIONAL				
WELSH, LISA	02/01/2023	1.00	230.00	230.00
	02/03/2023	0.25	230.00	57.50
	02/06/2023	1.00	230.00	230.00
	02/14/2023	0.50	230.00	115.00
	02/15/2023	0.25	230.00	57.50
	02/16/2023	2.50	230.00	575.00
	02/22/2023	1.75	230.00	402.50
	02/23/2023	1.00	230.00	230.00
	02/24/2023	0.50	230.00	115.00
	02/27/2023	0.25	230.00	57.50
	02/28/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		9.25		2,127.50
SENIOR PRINCIPAL				
AUSTIN, LISA	02/14/2023	0.25	300.00	75.00
	02/22/2023	0.50	300.00	150.00
	02/28/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		1.25		375.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **3,758.75**

Task : 06) LID MONITORING PLAN

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	02/01/2023	1.00	230.00	230.00
	02/02/2023	0.50	230.00	115.00
	02/03/2023	0.75	230.00	172.50
	02/07/2023	0.25	230.00	57.50
	02/10/2023	0.75	230.00	172.50
	02/21/2023	0.25	230.00	57.50
	02/23/2023	0.50	230.00	115.00
	02/24/2023	0.25	230.00	57.50
	02/28/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		4.75		1,092.50
SENIOR PRINCIPAL				
AUSTIN, LISA	02/24/2023	0.50	300.00	150.00
	02/28/2023	2.00	300.00	600.00
Total: SENIOR PRINCIPAL		2.50		750.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **1,842.50**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	02/16/2023	0.75	230.00	172.50
	02/20/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		1.50		345.00
SENIOR PRINCIPAL				
AUSTIN, LISA	02/16/2023	3.50	300.00	1,050.00
	02/17/2023	0.50	300.00	150.00
	02/20/2023	1.25	300.00	375.00
Total: SENIOR PRINCIPAL		5.25		1,575.00

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **1,920.00**

Task : 08) POCS RWL PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	02/08/2023	0.50	230.00	115.00
SENIOR PRINCIPAL				
AUSTIN, LISA	02/07/2023	2.00	300.00	600.00
	02/08/2023	0.75	300.00	225.00
	02/13/2023	0.25	300.00	75.00
	02/17/2023	1.00	300.00	300.00
	02/28/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		4.25		1,275.00

Total Task : 08) POCS RWL PLAN **Task Labor** **1,390.00**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	02/07/2023	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	02/06/2023	0.25	230.00	57.50
	02/07/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		0.50		115.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **160.00**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **16,166.25**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Class / Employee Name	Date	Hours	Rate	Amount
STAFF PROFESSIONAL				
YAO, GRACE	02/03/2023	0.25	150.00	37.50
	02/24/2023	0.25	150.00	37.50

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
Total: STAFF PROFESSIONAL		0.50		75.00
SENIOR STAFF PROFESSIONAL				
GALLO, ELIZABETH	02/01/2023	4.00	175.00	700.00
	02/02/2023	4.00	175.00	700.00
	02/03/2023	1.50	175.00	262.50
	02/06/2023	1.25	175.00	218.75
	02/07/2023	2.25	175.00	393.75
	02/09/2023	0.50	175.00	87.50
	02/13/2023	2.50	175.00	437.50
	02/14/2023	1.00	175.00	175.00
	02/15/2023	1.00	175.00	175.00
	02/16/2023	1.00	175.00	175.00
	02/22/2023	0.50	175.00	87.50
	02/24/2023	0.75	175.00	131.25
	02/27/2023	2.75	175.00	481.25
	02/28/2023	2.00	175.00	350.00
Total: SENIOR STAFF PROFESSIONAL		25.00		4,375.00
PROJECT PROFESSIONAL				
WELSH, LISA	02/01/2023	0.25	230.00	57.50
	02/02/2023	1.25	230.00	287.50
	02/03/2023	1.75	230.00	402.50
	02/04/2023	1.00	230.00	230.00
	02/08/2023	0.75	230.00	172.50
	02/09/2023	0.25	230.00	57.50
	02/10/2023	0.50	230.00	115.00
	02/13/2023	0.25	230.00	57.50
	02/14/2023	0.25	230.00	57.50
	02/15/2023	2.00	230.00	460.00
	02/16/2023	0.25	230.00	57.50
	02/21/2023	0.50	230.00	115.00
	02/22/2023	0.50	230.00	115.00
	02/24/2023	0.75	230.00	172.50
	02/28/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		11.00		2,530.00
PRINCIPAL				
PERKINS, RINTA	02/08/2023	3.00	280.00	840.00
SENIOR PRINCIPAL				
AUSTIN, LISA	02/03/2023	1.00	300.00	300.00
	02/07/2023	1.00	300.00	300.00
	02/08/2023	0.25	300.00	75.00
	02/09/2023	2.50	300.00	750.00
	02/13/2023	0.25	300.00	75.00
	02/22/2023	1.50	300.00	450.00
	02/24/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		6.75		2,025.00

Total Task : **03) OLD INDUSTRIAL CONTROL MEASURE** **Task Labor** **9,845.00**

Project : **CWR0649B -- ACCWP ON CALL FY2022 2023** **Invoice # :503891**

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Task : **06) ON CALL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	02/06/2023	0.25	230.00	57.50
	02/07/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		0.75		172.50

Total Task : 06) ON CALL SUPPORT **Task Labor** **172.50**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **10,017.50**

Total Project Labor **26,183.75**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **26,183.75**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

April 20, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #28**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$46,081.88
	Invoice #28 Total	**$46,081.88**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

April 13, 2023

Project No. - Invoice No: 00436.14-28

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 3/31/2023

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	6.75	224.00	$1,512.00
Mathews, Sandra	22.25	315.00	$7,008.75
VanCarpels, Tina	2.00	135.00	$270.00
Total Labor			**$8,790.75**
Total This Task			**$8,790.75**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	8.00	315.00	$2,520.00
VanCarpels, Tina	.50	135.00	$67.50
Total Labor			**$2,587.50**
Total This Task			**$2,587.50**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	5.00	315.00	$1,575.00
VanCarpels, Tina	.25	135.00	$33.75

Total Labor	**$1,608.75**
Total This Task	**$1,608.75**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	5.75	260.00	$1,495.00
Total Labor			**$1,528.75**
Total This Task			**$1,528.75**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	2.00	260.00	$520.00
Total Labor			**$520.00**
Total This Task			**$520.00**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	16.75	126.00	$2,110.50
VanCarpels, Tina	.75	135.00	$101.25
Yin, Elizabeth	4.00	260.00	$1,040.00
Total Labor			**$3,251.75**
Total This Task			**$3,251.75**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
4/4/2023 Geosyntec Consultants	Inv. #507174	13,445.00	1.100	$14,789.50
Total Consultants				**$14,789.50**
Total This Task				**$14,789.50**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
4/4/2023 Geosyntec Consultants	Inv. #507174	6,218.75	1.100	$6,840.63
Total Consultants				**$6,840.63**
Total This Task				**$6,840.63**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Indiresan, Shruti	1.25	160.00	$200.00
Mathews, Sandra	9.50	315.00	$2,992.50
VanCarpels, Tina	.75	135.00	$101.25
Total Labor			**$3,293.75**
Total This Task			**$3,293.75**

Task: 20.1 NDS Meetings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.25	315.00	$393.75
Total Labor			**$393.75**
Total This Task			**$393.75**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.75	315.00	$866.25
Total Labor			**$866.25**
Total This Task			**$866.25**

Task: 20.3 Trainings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.00	315.00	$630.00
Total Labor			**$630.00**
Total This Task			**$630.00**

Task: 20.4 C3TG Update/Technical Materials

Professional Personnel

Employee	Hours	Rate	Amount
McFadin, Sophie	5.75	126.00	$724.50
Sawdaye, Hayleigh	2.00	128.00	$256.00
Total Labor			**$980.50**
Total This Task			**$980.50**

Invoice Amount **$46,081.88**

Billing Limits	Current	Prior	To-date
Total Billings	46,081.88	787,207.55	833,289.43

Limit	1,800,000.00
Remaining	966,710.57

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 27 BILLING PERIOD: March 1-31, 2023
INVOICE DATE: April 13, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$138,000.00	88,729.00	12,987.00	101,716.00	36,284.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	4,991.00	-	4,991.00	5,009.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$95,200.00	37,645.13	5,300.50	42,945.63	52,254.37
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	69,447.14	14,789.50	84,236.64	32,033.36
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	52,217.56	6,840.63	59,058.19	54,791.81
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	17,655.00	3,293.75	20,948.75	11,051.25
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	37,560.00	2,870.50	40,430.50	21,569.50
TOTALS					**$1,107,920.00**	**$787,207.55**	**$46,081.88**	**$833,289.43**	**$274,630.57**

Larry Walker Associates Team
Progress Report for Work in March 2023

Municipal Regional Stormwater Permit Compliance Services for the Alameda Countywide Clean Water Program (ACCWP)

Task 14 Management Committee and PLS Support (PRC1-22/23)

Task: 14.1 MC/PLS Meeting Support

- Finalized the Management Committee and Policy Level Subcommittee agenda packages.
- Participated in the March Management Committee and Policy Level Subcommittee meetings.
- Prepared and distributed action items and summaries for the Management Committee and Policy Level Subcommittee meetings and followed up on action items from the meetings, including trash non-compliance reporting and support for the CASQA letter on the water bond.
- Prepared agenda, meeting notes, and participated in the Planning and Budget workgroup meeting.
- Participated in the meeting to discuss information for the final WQIF grant agreement.
- Prepared progress report.

Task 14.2 MC/PLS As-needed Support

- Participated in program management discussion with EOA regarding asset management and cost reporting tasks.
- Worked with graphic designer to update the ACCWP letterhead.
- Updated subcommittee list and finalized the subcommittee leadership responsibilities document.
- Updated the ACCWP website and SharePoint site.
- Responded to public requests submitted via the website.
- Prepared a list of ACCWP contracts for the program management fiscal agent transition.
- Worked with the MPC facilitator to finalize the transmittal letters for signature by the Management Committee Chair.
- Observed the Unfunded Mandate hearing.
- Participated in meetings with the Regional Water Board on the road reconstruction in DACs amendments.

TASK 14.3 BAMSC

- Prepared for and participated in the March BAMSC internal and external Steering Committee meetings.
- Participated in the road reconstruction in DACs regional workgroup .

Task 16 Data Management Support (PRC3-22/23)

Task 16.1 DMSC Subcommittee Support

- Prepared for and participated in the subcommittee meeting.
- Provided updates for the Management Committee agenda package and input on the FY 2023-24 subcommittee budget.

Task 16.3 Data Program Support

- Prepared and distributed meeting notes and materials.

Task 16.3 Data Management Plan

- Continued development of the ACCWP Information Management Plan.
- Participated in meeting to discuss the Information Management Plan.

Task 17 Monitoring Support (MPC-23-1)

- Drafted the MPC update for Management Committee meeting; participated in ACCWP Management Committee meeting; revised ACCWP MPC FY 2023-24 budget.
- Facilitated BAMSC MPC meeting and participated in BAMSC SC external meeting.
- Coordinated Permittee review of the WY2022 UCMR; finalized and submitted WY2022 UCMR.
- Assisted the Program in planning for trash monitoring; participated in the monthly coordination call; participated in Trash TAG Meeting #1.
- Assisted the Program in planning for LID monitoring; participated in the monthly coordination call; participated in LID TAG Meeting #2; prepared a response to TAG comments.
- Assisted the Program in planning for POCs monitoring.
- Finalized the POCs RWL assessment report.
- Coordinated with the project team.

Task 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

- Revised, finalized, and submitted the Old Industrial Control Measure Plan; reviewed regional project screening analysis.
- Reviewed requirements for PCBs in Electrical Utilities and Bridges as they apply to ACCWP.
- Coordinated with the project team.

TASK 19 Regional Project Support (POC-Imp-23-2)

TASK 19.2 PCBs Demolition Guidance

- Completed updates to the construction site program enhancements document in response to comments and prepared a response to comments table.
- Reviewed updates to the applicant package.
- Participated in the final PCBs regional workgroup meetings.
- Presented an update on the regional project at the BAMSC Development Committee meeting.

TASK 20 New Development Subcommittee Support (NDS 23-1)

Task 20.1 NDS Meetings

- Prepared the NDS agenda package and updated the workplan.

Task 20.2 As Needed Support

- Responded to member information requests on C.3 implementation.
- Distributed regional workgroup information to NDS members and provided updates to the NDS.
- Prepared updates to the NDS FY2023-24 budget.

Task 20.3 Training

- Drafted the C.3 workshop agenda and registration flyer.

Task 20.4 C3TG Update/Technical Materials

- Completed the update of the C.3 Technical Guidance Manual, compiled the final document, and posted it to the website.

Geosyntec consultants

PLEASE REMIT PAYMENT TO:
Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 507174
Project : CWR0649B
Invoice Date : 4/4/2023
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 3/31/2023

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$19,663.75
Current Invoice	**$19,663.75**
****Amount Due This Invoice ****	**$19,663.75**

Statement		***Statement***	
Prior Billings	$111,466.75	Project Budget	$216,200.00
Current Invoice	$19,663.75	Expended to Date	$131,130.50
Billed To Date	$131,130.50	Contract Balance	$85,069.50
Paid To Date	$57,524.25	****Amount Due This Invoice ****	**$19,663.75**

Project # 436.14
517
Task 17 $13,445
Task 18 $ 6,218.75
Total $19,663.75

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 01) ACCWP MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	03/06/2023	0.25	230.00	57.50
	03/15/2023	1.00	230.00	230.00
	03/16/2023	0.25	230.00	57.50
	03/20/2023	0.50	230.00	115.00
	03/21/2023	0.75	230.00	172.50
	03/22/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		3.50		805.00

Total Task : 01) ACCWP MPC **Task Labor** **805.00**

Task : 02) BAMSC MPC

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	03/01/2023	1.75	230.00	402.50
SENIOR PRINCIPAL				
AUSTIN, LISA	03/01/2023	2.50	300.00	750.00
	03/03/2023	0.25	300.00	75.00
	03/23/2023	2.00	300.00	600.00
Total: SENIOR PRINCIPAL		4.75		1,425.00

Total Task : 02) BAMSC MPC **Task Labor** **1,827.50**

Task : 04) UCMR SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	03/09/2023	0.25	230.00	57.50
	03/10/2023	0.75	230.00	172.50
	03/14/2023	1.50	230.00	345.00
	03/15/2023	0.50	230.00	115.00
	03/17/2023	0.75	230.00	172.50
	03/22/2023	0.50	230.00	115.00
	03/23/2023	0.75	230.00	172.50
	03/29/2023	1.00	230.00	230.00
	03/30/2023	1.00	230.00	230.00
Total: PROJECT PROFESSIONAL		7.00		1,610.00
SENIOR PRINCIPAL				
AUSTIN, LISA	03/10/2023	0.25	300.00	75.00
	03/15/2023	2.25	300.00	675.00
	03/29/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		2.75		825.00

Total Task : 04) UCMR SUPPORT **Task Labor** **2,435.00**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount

Phase : **01) TASK 17 MONITORING SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	03/06/2023	0.25	175.00	43.75
	03/07/2023	5.00	175.00	875.00
	03/08/2023	0.25	175.00	43.75
	03/17/2023	0.50	175.00	87.50
	03/21/2023	1.00	175.00	175.00
	03/23/2023	2.00	175.00	350.00
Total: SENIOR STAFF PROFESSIONAL		9.00		1,575.00
PROJECT PROFESSIONAL				
WELSH, LISA	03/02/2023	0.50	230.00	115.00
	03/03/2023	0.75	230.00	172.50
	03/06/2023	0.25	230.00	57.50
	03/07/2023	0.50	230.00	115.00
	03/08/2023	0.25	230.00	57.50
	03/09/2023	0.50	230.00	115.00
	03/10/2023	0.25	230.00	57.50
	03/13/2023	0.75	230.00	172.50
	03/14/2023	0.50	230.00	115.00
	03/15/2023	0.25	230.00	57.50
	03/16/2023	0.25	230.00	57.50
	03/17/2023	0.25	230.00	57.50
	03/27/2023	0.50	230.00	115.00
	03/28/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		5.75		1,322.50
SENIOR PRINCIPAL				
AUSTIN, LISA	03/03/2023	0.75	300.00	225.00
	03/07/2023	0.25	300.00	75.00
	03/10/2023	0.25	300.00	75.00
	03/14/2023	0.25	300.00	75.00
	03/15/2023	1.50	300.00	450.00
	03/16/2023	0.25	300.00	75.00
	03/17/2023	0.25	300.00	75.00
	03/27/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		4.00		1,200.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **4,097.50**

Task : 06) LID MONITORING PLAN

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	03/17/2023	1.00	230.00	230.00
	03/20/2023	0.75	230.00	172.50
	03/21/2023	1.50	230.00	345.00
	03/27/2023	1.00	230.00	230.00
	03/29/2023	1.00	230.00	230.00
	03/30/2023	0.25	230.00	57.50
	03/31/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		5.75		1,322.50

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	03/08/2023	0.50	300.00	150.00
	03/17/2023	0.25	300.00	75.00
	03/20/2023	1.50	300.00	450.00
	03/21/2023	1.50	300.00	450.00
	03/27/2023	1.00	300.00	300.00
	03/28/2023	0.25	300.00	75.00
	03/29/2023	1.00	300.00	300.00
	03/30/2023	1.50	300.00	450.00
Total: SENIOR PRINCIPAL		7.50		2,250.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **3,572.50**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	03/28/2023	0.25	230.00	57.50
	03/31/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		0.75		172.50

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **172.50**

Task : 08) POCS RWL PLAN

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR PRINCIPAL				
AUSTIN, LISA	03/09/2023	0.25	300.00	75.00
	03/10/2023	0.25	300.00	75.00
	03/13/2023	0.50	300.00	150.00
	03/14/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.25		375.00

Total Task : 08) POCS RWL PLAN **Task Labor** **375.00**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	03/07/2023	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	03/06/2023	0.25	230.00	57.50
	03/07/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		0.50		115.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **160.00**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **13,445.00**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
GALLO, ELIZABETH	03/01/2023	2.00	175.00	350.00
	03/02/2023	2.00	175.00	350.00
	03/03/2023	1.00	175.00	175.00
	03/08/2023	1.25	175.00	218.75
	03/09/2023	0.50	175.00	87.50
	03/13/2023	0.50	175.00	87.50
	03/14/2023	2.00	175.00	350.00
	03/17/2023	0.50	175.00	87.50
	03/21/2023	0.50	175.00	87.50
	03/30/2023	0.50	175.00	87.50
	03/31/2023	0.50	175.00	87.50
YAO, GRACE	03/10/2023	0.50	175.00	87.50
	03/24/2023	3.00	175.00	525.00
	03/25/2023	0.50	175.00	87.50
	03/31/2023	1.50	175.00	262.50
Total: SENIOR STAFF PROFESSIONAL		16.75		2,931.25
PROJECT PROFESSIONAL				
WELSH, LISA	03/02/2023	1.50	230.00	345.00
	03/03/2023	1.00	230.00	230.00
	03/07/2023	0.75	230.00	172.50
	03/10/2023	0.50	230.00	115.00
	03/13/2023	1.00	230.00	230.00
	03/14/2023	0.50	230.00	115.00
	03/15/2023	0.75	230.00	172.50
	03/16/2023	0.50	230.00	115.00
	03/21/2023	0.25	230.00	57.50
	03/22/2023	0.50	230.00	115.00
	03/30/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		8.00		1,840.00
SENIOR PRINCIPAL				
AUSTIN, LISA	03/02/2023	0.50	300.00	150.00
	03/07/2023	1.00	300.00	300.00
	03/14/2023	1.75	300.00	525.00
	03/29/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		3.75		1,125.00

Total Task : **03) OLD INDUSTRIAL CONTROL MEASURE** **Task Labor** **5,896.25**

Task : **05) OTHER C11 C12 SUBPROVISIONS**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	03/31/2023	0.50	300.00	150.00

Total Task : **05) OTHER C11 C12 SUBPROVISIONS** **Task Labor** **150.00**

Task : **06) ON CALL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*

Project : **CWR0649B -- ACCWP ON CALL FY2022 2023** **Invoice # :507174**

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	03/06/2023	0.50	230.00	115.00
	03/16/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		0.75		172.50

Total Task : 06) ON CALL SUPPORT **Task Labor** **172.50**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **6,218.75**

Total Project Labor **19,663.75**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **19,663.75**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

May 24, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #29**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$49,677.88
	Invoice #29 Total	**$49,677.88**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

May 16, 2023

Project No. - Invoice No: 00436.14-29

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 4/30/2023

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	7.25	224.00	$1,624.00
Mathews, Sandra	12.00	315.00	$3,780.00
VanCarpels, Tina	1.25	135.00	$168.75
Total Labor			**$5,572.75**
Total This Task			**$5,572.75**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	13.50	315.00	$4,252.50
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$4,387.50**
Total This Task			**$4,387.50**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	10.50	315.00	$3,307.50
VanCarpels, Tina	.75	135.00	$101.25

Total Labor	**$3,408.75**
Total This Task	**$3,408.75**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Warren, Rachel	.25	260.00	$65.00
Total Labor			**$65.00**
Total This Task			**$65.00**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	2.50	260.00	$650.00
Total Labor			**$650.00**
Total This Task			**$650.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	.50	260.00	$130.00
Total Labor			**$130.00**
Total This Task			**$130.00**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	.50	126.00	$63.00
VanCarpels, Tina	.25	135.00	$33.75
Yin, Elizabeth	4.00	260.00	$1,040.00
Total Labor			**$1,136.75**
Total This Task			**$1,136.75**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
5/5/2023 Geosyntec Consultants	Inv. #510582	18,957.50	1.100	$20,853.25
Total Consultants				**$20,853.25**
Total This Task				**$20,853.25**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
5/5/2023 Geosyntec Consultants	Inv. #510582	3,993.75	1.100	$4,393.13
Total Consultants				**$4,393.13**
Total This Task				**$4,393.13**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	2.75	315.00	$866.25
Total Labor			**$866.25**
Total This Task			**$866.25**

Task: 20.1 NDS Meetings

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	4.75	224.00	$1,064.00
Mathews, Sandra	5.75	315.00	$1,811.25
Total Labor			**$2,875.25**
Total This Task			**$2,875.25**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	7.75	315.00	$2,441.25
Total Labor			**$2,441.25**
Total This Task			**$2,441.25**

Task: 20.3 Trainings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	7.50	315.00	$2,362.50
McFadin, Sophie	4.25	126.00	$535.50
Total Labor			**$2,898.00**
Total This Task			**$2,898.00**

Invoice Amount **$49,677.88**

Billing Limits	Current	Prior	To-date
Total Billings	49,677.88	833,289.43	882,967.31

Limit	1,800,000.00
Remaining	917,032.69

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 27 BILLING PERIOD: April 1-30, 2023
INVOICE DATE: May 16, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$138,000.00	101,716.00	13,369.00	115,085.00	22,915.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$10,000.00	4,991.00	65.00	5,056.00	4,944.00
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$95,200.00	42,945.63	1,916.75	44,862.38	50,337.62
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	84,236.64	20,853.25	105,089.89	11,180.11
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	59,058.19	4,393.13	63,451.32	50,398.68
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	20,948.75	866.25	21,815.00	10,185.00
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	40,430.50	8,214.50	48,645.00	13,355.00
TOTALS					**$1,107,920.00**	**$833,289.43**	**$49,677.88**	**$882,967.31**	**$224,952.69**

Larry Walker Associates Team
Progress Report for Work in April 2023

Municipal Regional Stormwater Permit Compliance Services for the Alameda Countywide Clean Water Program (ACCWP)

Task 14 Management Committee and PLS Support (PRC1-22/23)

Task: 14.1 MC/PLS Meeting Support

- Prepared and finalized the Management Committee and Policy Level Subcommittee agenda packages.
- Participated in the April Management Committee and Policy Level Subcommittee meetings.
- Prepared and distributed action items and summaries for the Management Committee and Policy Level Subcommittee meetings.
- Prepared agenda, meeting notes, and participated in the Planning and Budget workgroup meeting.
- Prepared progress report.

Task 14.2 MC/PLS As-needed Support

- Finalized and submitted the ACCWP comment letter on the proposed MRP C.3 amendments.
- Coordinated with the ACCWP website designer and subcommittee facilitators to troubleshoot issues with posting documents to the website.
- Updated the ACCWP website and SharePoint site.
- Responded to public requests submitted via the website.
- Provided information to the ACCWP legal counsel to support a decision on a potential MRP 3 unfunded mandate test claim.
- Began drafting the Management Committee roles and responsibilities document.

TASK 14.3 BAMSC

- Prepared for and participated in the April BAMSC internal and external Steering Committee meetings.
- Participated in regional workgroups related to the proposed MRP C.3 amendments.

Task 15 Annual Report (PRC2-22/23)

- Began planning for the ACCWP Program Annual Report.

Task 16 Data Management Support (PRC3-22/23)

Task 16.1 DMSC Subcommittee Support

- Prepared the subcommittee meeting summary.
- Coordinated with the subcommittee.

Task 16.2 DMSC Program Support

- Coordinated with ACCWP subcommittees.

Task 16.3 Data Management Plan

- Continued development of the ACCWP Information Management Plan.

Task 17 Monitoring Support (MPC-23-1)

- Drafted the ACCWP MPC update for Management Committee meeting and participated in ACCWP Management Committee meeting;
- Reviewed the draft 2024 303(d) list.
- Prepared for the BAMSC MPC meeting.
- Participated in the ECWG/SPLWG meeting.
- Assisted ACCWP in planning for trash monitoring;
- Prepared report sections for the regional Trash Monitoring Plan and participated in the monthly coordination call.
- Revised, finalized, and submitted the ACCWP LID Monitoring Plan.
- Assisted the ACCWP in planning for LID monitoring and participated in the monthly coordination call.
- Assisted ACCWP in planning for POCs monitoring.
- Coordinated with the project team.

Task 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

- Prepared regional project screening analysis.
- Assisted the ACCWP with the PCBs in Bridges and Electrical Utilities and mercury recycling requirements.
- Coordinated with the project team.

TASK 19 Regional Project Support (POC-Imp-23-2)

TASK 19.2 PCBs Demolition Guidance

- Revised the construction site program enhancements document in response to comments from the Countywide programs and revised the response to comments table.
- Reviewed the final updates to the applicant package.
- Review the PCBs regional workgroup meeting summary.

TASK 20 New Development Subcommittee Support (NDS 23-1)

Task 20.1 NDS Meetings

- Prepared and finalized the NDS agenda package.
- Participated in the April NDS meeting.
- Prepared and distributed action items and the summary for the NDS meeting. .

Task 20.2 As Needed Support

- Responded to member information requests on C.3 implementation.
- Facilitated the development of comments on the proposed MRP C.3 amendments.

Task 20.3 Training

- Continued planning for the May 16, 2023, C.3 workshop.
- Participated in training workgroup meeting.
- Began preparation of training materials.

Geosyntec consultants

436.14
517
Task 17 $ 18,957.50
Task 18 $ 3,993.75
Total $ 22,951.25

Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 510582
Project : CWR0649B
Invoice Date : 5/5/2023
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 4/30/2023

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$22,951.25
Current Invoice	**$22,951.25**
****Amount Due This Invoice ****	**$22,951.25**

Statement		***Statement***	
Prior Billings	$131,130.50	Project Budget	$216,200.00
Current Invoice	$22,951.25	Expended to Date	$154,081.75
Billed To Date	$154,081.75	Contract Balance	$62,118.25
Paid To Date	$111,466.75	****Amount Due This Invoice ****	**$22,951.25**

When making payment via bank, please include our invoice number in ACH information; Please email invoice payment remittance/details to CorporateAR@Geosyntec.com.

Bank Details: Citibank N.A.
Coconut Creek Branch 0529
4807 Coconut Creek Pkwy
Coconut Creek, FL 33063

Account #: 2195223812
ABA/Routing: 067004764 (ACH)
Swift: CITI US 33

When making payment via check, please remit payment to: **Mail Code 11160**
P.O. Box 70280
Philadelphia, PA 19176-0280

Phase : **01) TASK 17 MONITORING SUPPORT**

Task : **01) ACCWP MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	04/14/2023	0.75	175.00	131.25
	04/15/2023	0.75	175.00	131.25
	04/17/2023	1.50	175.00	262.50
Total: SENIOR STAFF PROFESSIONAL		3.00		525.00
PROJECT PROFESSIONAL				
WELSH, LISA	04/03/2023	0.75	230.00	172.50
	04/04/2023	0.50	230.00	115.00
	04/07/2023	0.25	230.00	57.50
	04/10/2023	0.25	230.00	57.50
	04/11/2023	0.25	230.00	57.50
	04/12/2023	0.50	230.00	115.00
	04/13/2023	0.50	230.00	115.00
	04/14/2023	2.25	230.00	517.50
	04/16/2023	0.75	230.00	172.50
	04/17/2023	1.50	230.00	345.00
	04/18/2023	2.50	230.00	575.00
	04/19/2023	0.75	230.00	172.50
	04/20/2023	1.00	230.00	230.00
	04/26/2023	0.75	230.00	172.50
	04/27/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		13.00		2,990.00
SENIOR PRINCIPAL				
AUSTIN, LISA	04/17/2023	0.25	300.00	75.00
	04/18/2023	2.50	300.00	750.00
Total: SENIOR PRINCIPAL		2.75		825.00

Total Task : **01) ACCWP MPC** **Task Labor** **4,340.00**

Task : **02) BAMSC MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	04/17/2023	0.25	230.00	57.50
	04/21/2023	0.50	230.00	115.00
	04/25/2023	0.50	230.00	115.00
	04/26/2023	0.25	230.00	57.50
	04/27/2023	0.25	230.00	57.50
	04/28/2023	1.25	230.00	287.50
Total: PROJECT PROFESSIONAL		3.00		690.00
SENIOR PRINCIPAL				
AUSTIN, LISA	04/19/2023	0.75	300.00	225.00
	04/20/2023	2.25	300.00	675.00
	04/21/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		3.50		1,050.00

Total Task : **02) BAMSC MPC** **Task Labor** **1,740.00**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 03) RMP

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	04/06/2023	0.25	230.00	57.50
	04/12/2023	0.25	230.00	57.50
	04/17/2023	0.25	230.00	57.50
	04/20/2023	2.00	230.00	460.00
Total: PROJECT PROFESSIONAL		2.75		632.50
SENIOR PRINCIPAL				
AUSTIN, LISA	04/12/2023	1.50	300.00	450.00
	04/20/2023	1.50	300.00	450.00
Total: SENIOR PRINCIPAL		3.00		900.00

Total Task : 03) RMP **Task Labor** **1,532.50**

Task : 05) TRASH MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	04/13/2023	0.25	175.00	43.75
	04/14/2023	0.75	175.00	131.25
	04/28/2023	1.50	175.00	262.50
Total: SENIOR STAFF PROFESSIONAL		2.50		437.50
PROJECT PROFESSIONAL				
WELSH, LISA	04/05/2023	0.25	230.00	57.50
	04/12/2023	0.75	230.00	172.50
	04/19/2023	0.75	230.00	172.50
	04/24/2023	0.75	230.00	172.50
	04/25/2023	0.50	230.00	115.00
	04/26/2023	1.50	230.00	345.00
	04/27/2023	0.50	230.00	115.00
	04/28/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		5.50		1,265.00
SENIOR PRINCIPAL				
AUSTIN, LISA	04/05/2023	0.50	300.00	150.00
	04/19/2023	1.00	300.00	300.00
Total: SENIOR PRINCIPAL		1.50		450.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **2,152.50**

Task : 06) LID MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROFESSIONAL				
URIAS, HORACIO	04/11/2023	1.00	200.00	200.00
PROJECT PROFESSIONAL				
WELSH, LISA	04/03/2023	0.25	230.00	57.50
	04/05/2023	0.75	230.00	172.50
	04/06/2023	0.50	230.00	115.00

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	04/07/2023	0.25	230.00	57.50
	04/11/2023	3.00	230.00	690.00
	04/12/2023	1.75	230.00	402.50
	04/13/2023	6.50	230.00	1,495.00
	04/14/2023	0.75	230.00	172.50
	04/16/2023	1.00	230.00	230.00
	04/17/2023	0.25	230.00	57.50
	04/18/2023	0.50	230.00	115.00
	04/19/2023	0.50	230.00	115.00
	04/20/2023	1.25	230.00	287.50
	04/21/2023	1.25	230.00	287.50
	04/22/2023	0.75	230.00	172.50
	04/25/2023	0.25	230.00	57.50
	04/26/2023	0.25	230.00	57.50
	04/27/2023	0.25	230.00	57.50
	04/28/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		20.50		4,715.00
PRINCIPAL				
PERKINS, RINTA	04/14/2023	1.75	280.00	490.00
SENIOR PRINCIPAL				
AUSTIN, LISA	04/04/2023	0.75	300.00	225.00
	04/05/2023	1.00	300.00	300.00
	04/06/2023	0.50	300.00	150.00
	04/11/2023	2.50	300.00	750.00
	04/12/2023	2.50	300.00	750.00
	04/13/2023	1.00	300.00	300.00
	04/14/2023	1.00	300.00	300.00
	04/17/2023	0.50	300.00	150.00
	04/18/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		10.25		3,075.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **8,480.00**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	04/05/2023	0.25	230.00	57.50
	04/26/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		0.50		115.00

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **115.00**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	04/04/2023	0.50	90.00	45.00
PROJECT PROFESSIONAL				

Phase : 01) TASK 17 MONITORING SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	04/04/2023	0.25	230.00	57.50
	04/06/2023	0.25	230.00	57.50
	04/14/2023	0.25	230.00	57.50
	04/24/2023	0.25	230.00	57.50
	04/27/2023	0.25	230.00	57.50
	04/28/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		1.75		402.50
SENIOR PRINCIPAL				
AUSTIN, LISA	04/14/2023	0.50	300.00	150.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **597.50**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **18,957.50**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 03) OLD INDUSTRIAL CONTROL MEASURE

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR STAFF PROFESSIONAL				
GALLO, ELIZABETH	04/03/2023	0.50	175.00	87.50
YAO, GRACE	04/04/2023	2.00	175.00	350.00
	04/05/2023	0.50	175.00	87.50
	04/11/2023	0.50	175.00	87.50
	04/12/2023	1.50	175.00	262.50
	04/13/2023	1.50	175.00	262.50
	04/14/2023	0.25	175.00	43.75
Total: SENIOR STAFF PROFESSIONAL		6.75		1,181.25
PROJECT PROFESSIONAL				
WELSH, LISA	04/04/2023	0.25	230.00	57.50
	04/05/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		0.50		115.00
SENIOR PRINCIPAL				
AUSTIN, LISA	04/05/2023	0.25	300.00	75.00

Total Task : 03) OLD INDUSTRIAL CONTROL MEASURE **Task Labor** **1,371.25**

Task : 05) OTHER C11 C12 SUBPROVISIONS

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	04/14/2023	0.25	175.00	43.75
	04/15/2023	0.50	175.00	87.50
	04/19/2023	1.00	175.00	175.00
	04/20/2023	1.25	175.00	218.75
	04/21/2023	0.25	175.00	43.75
Total: SENIOR STAFF PROFESSIONAL		3.25		568.75
PROJECT PROFESSIONAL				
WELSH, LISA	04/14/2023	0.25	230.00	57.50

Project : CWR0649B -- ACCWP ON CALL FY2022 2023 **Invoice # :510582**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	04/19/2023	0.25	230.00	57.50
	04/20/2023	0.25	230.00	57.50
	04/24/2023	0.50	230.00	115.00
	04/25/2023	1.75	230.00	402.50
Total: PROJECT PROFESSIONAL		3.00		690.00
PRINCIPAL				
PERKINS, RINTA	04/24/2023	0.50	280.00	140.00

Total Task : 05) OTHER C11 C12 SUBPROVISIONS **Task Labor** **1,398.75**

Task : 06) ON CALL SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	04/04/2023	0.25	230.00	57.50
	04/06/2023	0.25	230.00	57.50
	04/14/2023	0.25	230.00	57.50
	04/18/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.00		230.00
SENIOR PROFESSIONAL				
HAVENS, KELLY	04/21/2023	1.50	255.00	382.50
	04/26/2023	0.25	255.00	63.75
	04/27/2023	0.50	255.00	127.50
Total: SENIOR PROFESSIONAL		2.25		573.75
PRINCIPAL				
PERKINS, RINTA	04/27/2023	0.50	280.00	140.00
	04/27/2023	1.00	280.00	280.00
Total: PRINCIPAL		1.50		420.00

Total Task : 06) ON CALL SUPPORT **Task Labor** **1,223.75**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **3,993.75**

Total Project Labor **22,951.25**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **22,951.25**

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Oakland Office

March 2, 2023

Anita Franklin
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Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

Invoice # AL22X-0123

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: January 2023

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 33,573.00	$ 17,334.50	$ 50,907.50	$ 14,092.50
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 15,436.75	$ 5,976.00	$ 21,412.75	$ 31,697.25
AL224	IIDC-23-2	50201	F15W81	CW03	$ 40,000.00	$ 16,799.25	$ 4,950.50	$ 21,749.75	$ 18,250.25
					$ 158,110.00	$ 65,809.00	$ 28,261.00	$ 94,070.00	$ 64,040.00

TOTAL DUE $ 28,261.00

Okay to pay G33
SG

Ray Goebel
EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

March 2, 2023

Anita Franklin
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Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

AL22X-0123

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: January 2023

Labor

Total Staff Labor Costs	$	28,261.00
Subtotal Labor	$	28,261.00

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0
TOTAL DUE	**$**	**28,261.00**

EOA Project Labor Cost Summary by Employee

Start Date: 1/1/2023
End Date: 1/31/2023

Printed on: 2/28/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	Christopher Somm	8.00	X	$301.00	=	$2,408.00
	Kristin Kerr	5.50	X	$293.00	=	$1,611.50
	John Fusco	7.50	X	$244.00	=	$1,830.00
	Ileana Alvarado	34.25	X	$204.00	=	$6,987.00
	Nicola Cook	0.25	X	$204.00	=	$51.00
	Katherine Woo	23.50	X	$184.00	=	$4,324.00
	Lianne Fong	1.00	X	$123.00	=	$123.00
	Task Total	**80.00**				**$17,334.50**
	Project Total	**80.00**				**$17,334.50**

Start Date: 1/1/2023
End Date: 1/31/2023

Printed on: 2/28/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL223						
AL223:01 Cost Reporting Framework						
	Jill Bicknell	13.00	X	$293.00	=	$3,809.00
	Kristin Kerr	2.00	X	$293.00	=	$586.00
	Ileana Alvarado	7.75	X	$204.00	=	$1,581.00
	Task Total:	**22.75**				**$5,976.00**
	Project Total:	**22.75**				**$5,976.00**

Start Date: 1/1/2023
End Date: 1/31/2023

Printed on: 2/28/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL224						
AL224:01 IIDC Subcommittee Assistance						
	Kristin Kerr	6.50	X	$293.00	=	$1,904.50
	Eliza Perkins	2.00	X	$184.00	=	$368.00
	Task Total	**8.50**				**$2,272.50**
AL224:03 IIDC Training Assistance						
	Kristin Kerr	6.00	X	$293.00	=	$1,758.00
	Eliza Perkins	5.00	X	$184.00	=	$920.00
	Task Total	**11.00**				**$2,678.00**
	Project Total	**19.50**				**$4,950.50**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-0123

Work Description for January 2023

AL222 Trash Control Program Activities

- Attended ACCWP Strategic Planning Meeting on January 5th.
- Reviewed preliminary five-year budget for ACCWP Trash Subcommittee.
- Developed agenda and presentation for February 2nd AGOL Training.
- Prepared summary of ACCWP Trash Subcommittee activities and priorities for Trash Subcommittee Chair.
- Continued with development of the Regional Trash Impracticability Report.
- Provided technical support to Permittees on C.10 trash load reduction. requirements.

AL223 Cost Reporting Framework

- For BAMSC Regional Project, completed first draft Framework and Guidance Manual and distributed them to countywide stormwater programs for review.
- Prepared agenda, prepared materials and facilitated January 18th ACCWP Cost Reporting Work Group meeting.
- Prepared January 18th meeting summary.

AL224 IIDC Program Assistance

- Provide updates and information for Management Committee meeting agenda
- Collected information from Subcommittee on inspection fees
- Collected information from Subcommittee on SB205 implementation
- Updated ACCWP Outreach Resource List with new website links
- Began registration process for Training Workshop
- Held ACCWP IIDC Training Work Group meeting and conducted follow-up
- Coordinated with Training Workshop speakers
- Began development of Training Workshop presentation

Environmental and Public Health Engineering
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Oakland Office

March 31, 2023

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Invoice # AL22X-0223

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: February 2023

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 50,907.50	$ 4,076.00	$ 54,983.50	$ 10,016.50
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 21,412.75	$ 8,382.00	$ 29,794.75	$ 23,315.25
AL224	IIDC-23-2	50201	F15W81	CW~~0~~3	$ 40,000.00	$ 21,749.75	$ 9,346.75	$ 31,096.50	$ 8,903.50
AL225	IIDC-23-3	50201	F15W81	PM1~~a~~	$ 6,900.00	$ -	$ 366.25	$ 366.25	$ 6,533.75
					$ 165,010.00	$ 94,070.00	$ 22,171.00	$ 116,241.00	$ 48,769.00

TOTAL DUE $ 22,171.00

Okay to pay G33
SG

Ray Goebel
EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
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March 31, 2023

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AL22X-0223

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: February 2023

Labor

Total Staff Labor Costs	$	22,171.00
Subtotal Labor	$	22,171.00

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0

TOTAL DUE	**$**	**22,171.00**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-0223

Work Description for February 2023

AL222 Trash Control Program Activities

- Prepared meeting summary for December Subcommittee meeting.
- Prepared presentation for and facilitated February 2nd AGOL Training.
- Discussed preliminary five-year budget for ACCWP Trash Subcommittee with Trash Subcommittee Chair on February 9th.
- Continued with development of the Regional Trash Impracticability Report.
- Provided technical support to Permittees on C.10 trash load reduction requirements.
- Provide updates and information for Management Committee meeting agenda.

AL223 Cost Reporting Framework

- Received and discussed ACCWP comments on the first draft BAMSC Regional Cost Reporting Framework and Guidance Manual.
- Completed the following tasks for the BAMSC Regional Cost Reporting Project:
    - Received and compiled all countywide program and permittee comments on the first draft products into a comment table.
    - Began making changes and adding features to the Framework and Guidance Manual to address the comments provided.
    - Held a meeting of the Regional Cost Reporting Work Group on February 27, 2023 to discuss comments received and get direction on cost reporting approach and product improvements.
- Provide updates and information for Management Committee meeting agenda.

AL224 IIDC Program Assistance

- Attended February 2nd AGOL Training and presented on PLDA inspection program.
- Attended February 2nd training on updating Clean Water Program website and updated IIDC Subcommittee calendar information on website
- Developed presentation for IIDC workshop
- Updated IIDC outreach material reference list
- Organized, facilitated and presented at February 23rd IIDC training workshop
- Drafted a Workshop Report, summarized evaluations received, provided certificates of completion to attendees and conducted other workshop follow-up tasks
- Provided past IIDC training workshop presentations for Vimeo website
- Responded to municipal staff questions and request for information
- Began developing March agenda packet
- Provided draft graffiti removal Tip Sheet to Subcommittee for review and comment

- Requested review and updates of Clean Water Program Spill Reporting webpage
- Provided updates and information for Management Committee meeting agenda and attend meeting
- Revised December and January invoices with new project summary format
- Overall invoice, project and contract management tasks

AL225 Regional Firefighting Discharges Work Group

- Provide new Task Order for work related to Regional Work Group
- Provide updates and information for Management Committee meeting agenda

EOA Project Labor Cost Summary by Employee

Start Date: 2/1/2023
End Date: 2/28/2023

Printed on: 3/29/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	Christopher Somm	4.00	X	$301.00	=	$1,204.00
	John Fusco	6.25	X	$244.00	=	$1,525.00
	Ileana Alvarado	5.25	X	$204.00	=	$1,071.00
	Katherine Woo	1.50	X	$184.00	=	$276.00
	Task Total:	**17.00**				**$4,076.00**
	Project Total:	**17.00**				**$4,076.00**

Start Date: 2/1/2023
End Date: 2/28/2023

Printed on: 3/29/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL223						
AL223:01 Cost Reporting Framework						
	Jill Bicknell	11.50	X	$293.00	=	$3,369.50
	Kristin Kerr	0.50	X	$293.00	=	$146.50
	Ileana Alvarado	23.25	X	$204.00	=	$4,743.00
	Lianne Fong	1.00	X	$123.00	=	$123.00
	Task Total:	**36.25**				**$8,382.00**
	Project Total:	**36.25**				**$8,382.00**

Start Date: 2/1/2023
End Date: 2/28/2023

Printed on: 3/29/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		15.25	X	$293.00	=	$4,468.25
		Task Total	**15.25**				**$4,468.25**
AL224:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		2.00	X	$293.00	=	$586.00
		Task Total	**2.00**				**$586.00**
AL224:03 IIDC Training Assistance							
	Kristin Kerr		5.50	X	$293.00	=	$1,611.50
	Ileana Alvarado		4.00	X	$204.00	=	$816.00
	Eliza Perkins		7.50	X	$184.00	=	$1,380.00
	Justin Huber		1.00	X	$184.00	=	$184.00
	Alma Lynn Pinell		3.50	X	$86.00	=	$301.00
		Task Total	**21.50**				**$4,292.50**
		Project Total	**38.75**				**$9,346.75**

Start Date: 2/1/2023
End Date: 2/28/2023

Printed on: 3/29/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL225							
AL225:01 Regional Firefighting Discharges WG							
	Kristin Kerr		1.25	X	$293.00	=	$366.25
		Task Total:	**1.25**				**$366.25**
		Project Total:	**1.25**				**$366.25**

Environmental and Public Health Engineering
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Oakland Office

April 26, 2023

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Invoice # AL22X-0323

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: March 2023

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 54,983.50	$ 4,751.50	$ 59,735.00	$ 5,265.00
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 29,794.75	$ 10,067.50	$ 39,862.25	$ 13,247.75
AL224	IIDC-23-2	50201	F15W81	CW●3	$ 40,000.00	$ 31,096.50	$ 4,732.50	$ 35,829.00	$ 4,171.00
AL225	IIDC-23-3	50201	F15W81	PM1●	$ 6,900.00	$ 366.25	$ 1,173.75	$ 1,540.00	$ 5,360.00
					$ 165,010.00	$ 116,241.00	$ 20,725.25	$ 136,966.25	$ 28,043.75

TOTAL DUE $ 20,725.25

Okay to pay G33

SG

Ray Goebel

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☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
1410 Jackson Street
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April 26, 2023

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AL22X-0323

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: March 2023

Labor

Total Staff Labor Costs	$	20,725.25
Subtotal Labor	$	20,725.25

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0
TOTAL DUE	**$**	**20,725.25**

EOA Project Labor Cost Summary by Employee

Start Date: 3/1/2023
End Date: 3/31/2023

Printed on: 4/24/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	Kristin Kerr	0.50	X	$293.00	=	$146.50
	John Fusco	6.75	X	$244.00	=	$1,647.00
	Ileana Alvarado	14.50	X	$204.00	=	$2,958.00
	Task Total:	**21.75**				**$4,751.50**
	Project Total:	**21.75**				**$4,751.50**

Start Date: 3/1/2023
End Date: 3/31/2023

Printed on: 4/24/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL223							
AL223:01 Cost Reporting Framework							
	Jill Bicknell		19.00	X	$307.00	=	$5,833.00
	Kristin Kerr		1.50	X	$293.00	=	$439.50
	Ileana Alvarado		18.00	X	$204.00	=	$3,672.00
	Lianne Fong		1.00	X	$123.00	=	$123.00
		Task Total:	**39.50**				**$10,067.50**
		Project Total:	**39.50**				**$10,067.50**

Start Date: 3/1/2023
End Date: 3/31/2023

Printed on: 4/24/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		5.25	X	$293.00	=	$1,538.25
		Task Total	**5.25**				**$1,538.25**
AL224:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		5.25	X	$293.00	=	$1,538.25
	Eliza Perkins		9.00	X	$184.00	=	$1,656.00
		Task Total	**14.25**				**$3,194.25**
		Project Total	**19.50**				**$4,732.50**

Start Date: 3/1/2023
End Date: 3/31/2023

Printed on: 4/24/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL225							
AL225:01 Regional Firefighting Discharges WG							
	Kristin Kerr		2.75	X	$293.00	=	$805.75
	Eliza Perkins		2.00	X	$184.00	=	$368.00
		Task Total:	**4.75**				**$1,173.75**
		Project Total:	**4.75**				**$1,173.75**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-0323

Work Description for March 2023

AL222 Trash Control Program Activities

- Prepared for and attended March 15th Trash Subcommittee meeting.
- Conducted follow-up from March Trash Subcommittee meeting.
- Assisted with development of the Regional Trash Impracticability Report.
- Provided technical support to Permittees on C.10 trash load reduction requirements.
- Developed FY 23/24 budget
- Provided updates and information for Management Committee meeting agenda.

AL223 Cost Reporting Framework

- Compiled and responded to comments on the First Draft Cost Reporting Framework and Guidance Manual
- Developed Revised Draft Cost Reporting Framework and Guidance Manual and distributed them to countywide programs, including ACCWP, for review on March 31.
- Held a meeting with the ACCWP Cost Reporting Work Group on March 29.
- Developed FY 23/24 budget for this task.
- Provided updates and information for Management Committee meeting agenda.

AL224 IIDC Program Assistance

- Finalized agenda packet for March subcommittee meeting
- Organized and participated in March subcommittee meeting. Prepared Draft meeting summary.
- Finalized graffiti removal Tip Sheet
- Coordinated updates to Report a Spill webpage from subcommittee representatives
- Coordinated transition of subcommittee chair
- Surveyed subcommittee regarding SB205 implementation
- Develop FY 23/24 budget
- Provided past subcommittee chairs as requested by Policy committee
- Respond to municipal staff questions and requests
- Provide updates and information for Management Committee meeting agenda
- Reviewed invoices and prepared work summaries
- Began coordination of contract transfer to a new fiscal agent

AL225 Regional Firefighting Discharges Work Group

- Participated in March 14th Regional Firefighting Discharges Work Group
- Provided updates and information for Management Committee meeting agenda

Environmental and Public Health Engineering
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June 8, 2023

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Invoice # AL22X-0423

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: April 2023

Alameda County Clean Water Program

EOA Job #	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 59,735.00	$ 1,635.00	$ 61,370.00	$ 3,630.00
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 39,862.25	$ 4,658.00	$ 44,520.25	$ 8,589.75
AL224	IIDC-23-2	50201	F15W81	CW03	$ 40,000.00	$ 35,829.00	$ 1,143.83	$ 36,972.83	$ 3,027.17
AL225	IIDC-23-3	50201	F15W81	PM1a	$ 6,900.00	$ 1,540.00	$ 293.00	$ 1,833.00	$ 5,067.00
					$ 165,010.00	$ 136,966.25	$ 7,729.83	$ 144,696.08	$ 20,313.92

TOTAL DUE $ 7,729.83

EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

June 8, 2023

Anita Franklin
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AL22X-0423

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: April 2023

Labor

Total Staff Labor Costs	$	7,704.75
Subtotal Labor	$	7,704.75

Direct Expenses

Expenses	$	25.08
Subtotal Expenses	$	25.08

TOTAL DUE	**$**	**7,729.83**

EOA Project Labor Cost Summary by Employee

Start Date: 4/1/2023
End Date: 4/30/2023

Printed on: 6/8/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL22						
AL222:01	**Trash Control Program Activities**					
	Kristin Kerr	1.00	X	$293.00	=	$293.00
	John Fusco	5.50	X	$244.00	=	$1,342.00
	Task Total:	**6.50**				**$1,635.00**
AL223:01	**Cost Reporting Framework**					
	Jill Bicknell	5.75	X	$307.00	=	$1,765.25
	Kristin Kerr	0.75	X	$293.00	=	$219.75
	Ileana Alvarado	12.50	X	$204.00	=	$2,550.00
	Lianne Fong	1.00	X	$123.00	=	$123.00
	Task Total:	**20.00**				**$4,658.00**
AL224:01	**IIDC Subcommittee Assistance**					
	Kristin Kerr	2.50	X	$293.00	=	$732.50
	Task Total:	**2.50**				**$732.50**
AL224:02	**IIDC Subcommittee Facilitation**					
	Kristin Kerr	0.25	X	$293.00	=	$73.25
	Eliza Perkins	1.00	X	$184.00	=	$184.00
	Alma Lynn Pinell	1.50	X	$86.00	=	$129.00
	Task Total:	**2.75**				**$386.25**
AL225:01	**Regional Firefighting Discharges WG**					
	Kristin Kerr	1.00	X	$293.00	=	$293.00
	Task Total:	**1.00**				**$293.00**
	Project Total:	**32.75**				**$7,704.75**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-0423

Work Description for April 2023

AL222 Trash Control Program Activities

- Drafted Updated Long-Term Trash Load Reduction Plan Guidance Document to Chair
- Met with Subcommittee Chair to review approach for updating Plans
- Provided updates and information for Management Committee meeting agenda

AL223 Cost Reporting Framework

- Met with State Water Board STORMS staff on April 10 to receive an update on their cost reporting project and coordinate with Bay Area efforts
- Held informational meetings with Regional Water Board staff and EPA staff on April 12 and 25, respectively, to brief them on the status of the Bay Area Cost Reporting project and demonstrate the Framework Tool
- Began to organize comments received on the revised draft products
- Provided updates and information for Management Committee meeting agenda

AL224 IIDC Program Assistance

- Updated material on IIDC members only webpage
- Provided CASQA SB205 training survey to the Subcommittee
- Provided hardcopy outreach material as requested by municipal staff
- Coordinated with Alameda County Green Business contact to attend next IIDC meeting
- Responded to municipal staff questions and requests
- Provided updates and information for Management Committee meeting agenda and at the meeting.
- Reviewed invoices and prepared work summaries
- Began coordination of contract transfer to a new fiscal agent

AL225 Regional Firefighting Discharges Work Group

- Provided updates and information for Management Committee meeting agenda and at the meeting.

Environmental and Public Health Engineering
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Oakland Office

September 12, 2022

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Invoice # AL22X-0722

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: July 2022

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL221	IIDC-22-1	50201	F15W81	CW3	$ 40,000.00	$ 38,769.43	$ 416.00	$ 39,185.43	$ 814.57
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 9,734.00	$ 1,159.00	$ 10,893.00	$ 54,107.00
					$ 105,000.00	$ 48,503.43	$ 1,575.00	$ 50,078.43	$ 54,921.57

TOTAL DUE $ 1,575.00

okay to pay G33
SG

Ray Goebel
EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
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September 12, 2022

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AL22X-0722

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: July 2022

Labor

Total Staff Labor Costs	$	1,575.00
Subtotal Labor	$	1,575.00

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0

TOTAL DUE	**$**	**1,575.00**

EOA Project Labor Cost Summary by Employee

Start Date: 7/1/2022
End Date: 7/31/2022

Printed on: 8/23/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL221							
AL221:01 IIDC Subcommittee Assistance							
	Lianne Fong		1.00	X	$123.00	=	$123.00
		Task Total:	**1.00**				**$123.00**
AL221:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		1.00	X	$293.00	=	$293.00
		Task Total:	**1.00**				**$293.00**
		Project Total:	**2.00**				**$416.00**

Start Date: 7/1/2022
End Date: 7/31/2022

Printed on: 8/23/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL222							
AL222:01 Trash Control Program Activities							
	John Fusco		4.75	X	$244.00	=	$1,159.00
		Task Total:	**4.75**				**$1,159.00**
		Project Total:	**4.75**				**$1,159.00**

Environmental and Public Health Engineering
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Oakland Office

September 29, 2022

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Invoice # AL22X-0822

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: September 2022

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL221	IIDC-22-1	50201	F15W81	CW3	$ 40,000.00	$ 39,185.43	$ 732.50	$ 39,917.93	$ 82.07
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 10,893.00	$ 1,379.75	$ 12,272.75	$ 52,727.25
AL222	Trash-22-1	50201	F15W81	CW6	Credit for Duplicate Labor charged		$ (439.50)		
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ -	$ 805.75	$ 805.75	$ 52,304.25
AL224	IIDC-23-2	50201	F15W81	CW3	$ 40,000.00	$ -	$ 2,441.25	$ 2,441.25	$ 37,558.75
					$ 198,110.00	$ 50,078.43	$ 4,919.75	$ 55,437.68	$ 142,672.32

Credit Double Charge

TOTAL DUE $ 4,919.75

okay to pay G33

SG

Ray Goebel

EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
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September 29, 2022

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AL22X-0822

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: August 2022

Labor

Total Staff Labor Costs	$	5,359.25
Subtotal Labor	$	5,359.25

Direct Expenses

Credit for Duplicate Labor Charged in May	$	(439.50)
Subtotal Expenses	$	(439.50)

TOTAL DUE	**$**	**4,919.75**

EOA Project Labor Cost Summary by Employee

Start Date: 8/1/2022
End Date: 8/31/2022

Printed on: 9/28/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL221						
AL221:02 IIDC Subcommittee Facilitation						
	Kristin Kerr	2.50	X	$293.00	=	$732.50
	Task Total:	**2.50**				**$732.50**
	Project Total:	**2.50**				**$732.50**

Start Date: 8/1/2022
End Date: 8/31/2022

Printed on: 9/28/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL222							
AL222:01 Trash Control Program Activities							
	Kristin Kerr		0.75	X	$293.00	=	$219.75
	John Fusco		4.25	X	$244.00	=	$1,037.00
	Lianne Fong		1.00	X	$123.00	=	$123.00
		Task Total:	**6.00**				**$1,379.75**
		Project Total:	**6.00**				**$1,379.75**

Start Date: 8/1/2022
End Date: 8/31/2022

Printed on: 9/28/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL223							
AL223:01 Cost Reporting Framework							
	Jill Bicknell		2.50	X	$293.00	=	$732.50
	Kristin Kerr		0.25	X	$293.00	=	$73.25
		Task Total	**2.75**				**$805.75**
		Project Total	**2.75**				**$805.75**

Start Date: 8/1/2022
End Date: 8/31/2022

Printed on: 9/28/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		2.25	X	$293.00	=	$659.25
	Eliza Perkins		6.50	X	$184.00	=	$1,196.00
		Task Total	**8.75**				**$1,855.25**
AL224:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		2.00	X	$293.00	=	$586.00
		Task Total	**2.00**				**$586.00**
		Project Total	**10.75**				**$2,441.25**

Environmental and Public Health Engineering
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Oakland Office

October 25, 2022

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Invoice # AL22X-0922

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: September 2022

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 11,833.25	$ 4,381.25	$ 16,214.50	$ 48,785.50
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 805.75	$ 879.00	$ 1,684.75	$ 51,425.25
AL224	IIDC-23-2	50201	F15W81	CW●3	$ 40,000.00	$ 2,441.25	$ 4,583.00	$ 7,024.25	$ 32,975.75
					$ 158,110.00	$ 15,080.25	$ 9,843.25	$ 24,923.50	$ 133,186.50

TOTAL DUE $ 9,843.25

okay to pay G33

SG

Ray Goebel

EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
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October 25, 2022

Anita Franklin
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Hayward, CA 94544
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AL22X-0922

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: September 2022

Labor

Total Staff Labor Costs	$	9,843.25
Subtotal Labor	$	9,843.25

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0
TOTAL DUE	**$**	**9,843.25**

EOA Project Labor Cost Summary by Employee

Start Date: 9/1/2022
End Date: 9/30/2022

Printed on: 10/21/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	Kristin Kerr	0.25	X	$293.00	=	$73.25
	John Fusco	9.00	X	$244.00	=	$2,196.00
	Ileana Alvarado	9.75	X	$204.00	=	$1,989.00
	Lianne Fong	1.00	X	$123.00	=	$123.00
	Task Total:	**20.00**				**$4,381.25**
	Project Total:	**20.00**				**$4,381.25**

Start Date: 9/1/2022
End Date: 9/30/2022

Printed on: 10/21/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL223							
AL223:01 Cost Reporting Framework							
	Jill Bicknell		3.00	X	$293.00	=	$879.00
		Task Total:	**3.00**				**$879.00**
		Project Total:	**3.00**				**$879.00**

Start Date: 9/1/2022
End Date: 9/30/2022

Printed on: 10/21/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL224						
AL224:01 IIDC Subcommittee Assistance						
	Kristin Kerr	4.00	X	$293.00	=	$1,172.00
	Eliza Perkins	5.00	X	$184.00	=	$920.00
	Task Total:	**9.00**				**$2,092.00**
AL224:02 IIDC Subcommittee Facilitation						
	Kristin Kerr	6.00	X	$293.00	=	$1,758.00
	Eliza Perkins	4.00	X	$184.00	=	$736.00
	Task Total:	**10.00**				**$2,494.00**
	Project Total:	**19.00**				**$4,586.00**

Environmental and Public Health Engineering
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Oakland Office

December 1, 2022

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Invoice # AL22X-1022

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: October 2022

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 16,214.50	$ 4,918.50	$ 21,133.00	$ 43,867.00
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 1,684.75	$ 3,511.50	$ 5,196.25	$ 47,913.75
AL224	IIDC-23-2	50201	F15W81	CW03	$ 40,000.00	$ 7,024.25	$ 1,906.25	$ 8,930.50	$ 31,069.50
					$ 158,110.00	$ 24,923.50	$ 10,336.25	$ 35,259.75	$ 122,850.25

TOTAL DUE $ 10,336.25

okay to pay G33
SG

Ray Goebel
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Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
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December 1, 2022

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AL22X-1022

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: October 2022

Labor

Total Staff Labor Costs	$	10,336.25
Subtotal Labor	$	10,336.25

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0

TOTAL DUE	**$**	**10,336.25**

EOA Project Labor Cost Summary by Employee

Start Date: 10/1/2022
End Date: 10/31/2022

Printed on: 11/29/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	Christopher Somm	3.00	X	$301.00	=	$903.00
	Kristin Kerr	2.50	X	$293.00	=	$732.50
	John Fusco	3.25	X	$244.00	=	$793.00
	Ileana Alvarado	9.50	X	$204.00	=	$1,938.00
	Katherine Woo	3.00	X	$184.00	=	$552.00
	Task Total:	**21.25**				**$4,918.50**
	Project Total:	**21.25**				**$4,918.50**

Start Date: 10/1/2022
End Date: 10/31/2022

Printed on: 11/29/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL223						
AL223:01 Cost Reporting Framework						
	Jill Bicknell	4.50	X	$293.00	=	$1,318.50
	Ileana Alvarado	10.75	X	$204.00	=	$2,193.00
	Task Total:	**15.25**				**$3,511.50**
	Project Total:	**15.25**				**$3,511.50**

Start Date: 10/1/2022
End Date: 10/31/2022

Printed on: 11/29/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		3.75	X	$293.00	=	$1,098.75
	Eliza Perkins		2.00	X	$184.00	=	$368.00
		Task Total	**5.75**				**$1,466.75**
AL224:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		1.50	X	$293.00	=	$439.50
		Task Total	**1.50**				**$439.50**
		Project Total	**7.25**				**$1,906.25**

Environmental and Public Health Engineering
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December 27, 2022

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Invoice # AL22X-1122

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: November 2022

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 21,133.00	$ 2,938.00	$ 24,071.00	$ 40,929.00
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 5,196.25	$ 3,760.00	$ 8,956.25	$ 44,153.75
AL224	IIDC-23-2	50201	F15W81	CW~~8~~3	$ 40,000.00	$ 8,930.50	$ 5,228.25	$ 14,158.75	$ 25,841.25
					$ 158,110.00	$ 35,259.75	$ 11,926.25	$ 47,186.00	$ 110,924.00

okay to pay G33

TOTAL DUE $ 11,926.25

SG

Ray Goebel

EOA, Inc.
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December 27, 2022

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AL22X-1122

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: November 2022

Labor

Total Staff Labor Costs	$	11,926.25
Subtotal Labor	$	11,926.25

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0

TOTAL DUE	**$**	**11,926.25**

EOA Project Labor Cost Summary by Employee

Start Date: 11/1/2022
End Date: 11/30/2022

Printed on: 12/22/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	John Fusco	0.25	X	$244.00	=	$61.00
	Ileana Alvarado	12.75	X	$204.00	=	$2,601.00
	Katherine Woo	1.50	X	$184.00	=	$276.00
	Task Total:	**14.50**				**$2,938.00**
	Project Total:	**14.50**				**$2,938.00**

Start Date: 11/1/2022
End Date: 11/30/2022

Printed on: 12/22/2022

Projects/Tasks	Employees	Hours		Rates		Costs
AL223						
AL223:01 Cost Reporting Framework						
	Jill Bicknell	5.00	X	$293.00	=	$1,465.00
	Ileana Alvarado	11.25	X	$204.00	=	$2,295.00
	Task Total:	**16.25**				**$3,760.00**
	Project Total:	**16.25**				**$3,760.00**

Start Date: 11/1/2022
End Date: 11/30/2022

Printed on: 12/22/2022

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		6.25	X	$293.00	=	$1,831.25
	Eliza Perkins		7.50	X	$184.00	=	$1,380.00
		Task Total	**13.75**				**$3,211.25**
AL224:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		3.75	X	$293.00	=	$1,098.75
		Task Total	**3.75**				**$1,098.75**
AL224:03 IIDC Training Assistance							
	Kristin Kerr		1.25	X	$293.00	=	$366.25
	Eliza Perkins		3.00	X	$184.00	=	$552.00
		Task Total	**4.25**				**$918.25**
		Project Total	**21.75**				**$5,228.25**

Environmental and Public Health Engineering
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Oakland Office

January 30, 2023

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Attn: Sharon Gosselin - sharon@acpwa.org

Invoice # AL22X-1222

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: December 2022

Alameda County Clean Water Program

EOA Jo	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 24,071.00	$ 9,502.00	$ 33,573.00	$ 31,427.00
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 8,956.25	$ 6,480.50	$ 15,436.75	$ 37,673.25
AL224	IIDC-23-2	50201	F15W81	CW03	$ 40,000.00	$ 14,158.75	$ 2,640.50	$ 16,799.25	$ 23,200.75
					$ 158,110.00	$ 47,186.00	$ 18,623.00	$ 65,809.00	$ 92,301.00

TOTAL DUE $ 18,623.00

okay to pay G33
SG

Ray Goebel
EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

January 30, 2023

Anita Franklin
Alameda County Flood Control & Water C.D.
399 Elmhurst Street
Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

AL22X-1222

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: December 2022

Labor

Total Staff Labor Costs	$	18,623.00
Subtotal Labor	$	18,623.00

Direct Expenses

Expenses	$	0
Subtotal Expenses	$	0
TOTAL DUE	**$**	**18,623.00**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-1222

Work Description for December 2022

AL222 Trash Control Program Activities

- Prepare for and attend December Subcommittee meeting.
- Conduct follow-up from December Subcommittee meeting including preparing draft meeting summary.
- Assist with development of the Regional Trash Impracticability Report.
- Provided technical support to Permittees on C.10 trash load reduction requirements.

AL223 Cost Reporting Framework

- BAMSC Project of Regional Benefit Tasks
  - Continued to work on development of the Draft Cost Reporting Framework and Guidance Manual.
  - Coordinated and held the third BAMSC Regional Cost Reporting Work Group meeting on December 8, 2022.

AL224 IIDC Program Assistance

- Follow-up actions from ACCWP IIDC Training Work Group meeting on 11/29
- Follow-up with potential guest speakers for training
- Finalize small construction site contractors Tip Sheet
- Draft graffiti removal BMPs into Tip Sheet format
- Survey subcommittee regarding inspection fees
- Respond to municipal staff questions

EOA Project Labor Cost Summary by Employee

Start Date: 12/1/2022
End Date: 12/31/2022

Printed on: 1/26/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	John Fusco	11.75	X	$244.00	=	$2,867.00
	Ileana Alvarado	8.50	X	$204.00	=	$1,734.00
	Nicola Cook	1.25	X	$204.00	=	$255.00
	Katherine Woo	18.25	X	$184.00	=	$3,358.00
	William Pearce	7.00	X	$184.00	=	$1,288.00
	Task Total:	**46.75**				**$9,502.00**
	Project Total:	**46.75**				**$9,502.00**

Start Date: 12/1/2022
End Date: 12/31/2022

Printed on: 1/26/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL223							
AL223:01 Cost Reporting Framework							
	Jill Bicknell		11.50	X	$293.00	=	$3,369.50
	Ileana Alvarado		15.25	X	$204.00	=	$3,111.00
		Task Total:	**26.75**				**$6,480.50**
		Project Total:	**26.75**				**$6,480.50**

Start Date: 12/1/2022
End Date: 12/31/2022

Printed on: 1/26/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		5.25	X	$293.00	=	$1,538.25
	Eliza Perkins		1.50	X	$184.00	=	$276.00
		Task Total:	**6.75**				**$1,814.25**
AL224:03 IIDC Training Assistance							
	Kristin Kerr		1.25	X	$293.00	=	$366.25
	Eliza Perkins		2.50	X	$184.00	=	$460.00
		Task Total:	**3.75**				**$826.25**
		Project Total:	**10.50**				**$2,640.50**

For: As Needed GIS Support Services FY2021-2022 - UR 1051066
Psomas Project No. 4ALA010232

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	5.00	196.97	984.85	
Totals	5.00		984.85	
Total Labor				**984.85**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	984.85	6,046.85	7,031.70
Limit			30,000.00
Remaining			22,968.30

Total this Project **$984.85**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Labor	984.85	6,046.85	7,031.70
Totals	**984.85**	**6,046.85**	**7,031.70**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *August 1, 2022 – August 31, 2021*

Date Prepared: *October 3, 2022*

Alameda County Project Reference: *UR 1054027*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010233*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Meetings to review action items and develop punch list items and priorities
- Hayward TCD and Drainage Area new data process and incorporation
- Fremont reporting support
- C3 application QA and user documentation update

PLANNED ACTIVITIES FOR NEXT MONTH

- None.

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

Keith Palmer

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Project Manager

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www.psomas.com

For: As Needed GIS Support Services FY2021-2022 - UR 1051066
Psomas Project No. 4ALA010232

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	6.00	196.97	1,181.82	
Totals	6.00		1,181.82	
Total Labor				**1,181.82**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,181.82	7,031.70	8,213.52
Limit			30,000.00
Remaining			21,786.48

Total this Project **$1,181.82**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Labor	1,181.82	7,031.70	8,213.52
Totals	**1,181.82**	**7,031.70**	**8,213.52**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *September 1, 2022 – September 30, 2021*

Date Prepared: *November 1, 2022*

Alameda County Project Reference: *UR 1054027*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010233*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- C3 application QA and user documentation update
- Review User Documentation Needs for C10 & C3 training.
- Data extract request from Michael Sinor of San Leandro.

PLANNED ACTIVITIES FOR NEXT MONTH

- None.

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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PSOMAS

Project Name: *Clean Water Program*

Report Period: *July 1, 2022 – July 30, 2021*

Date Prepared: *August 31, 2022*

Alameda County Project Reference: *UR 1054027*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010233*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Meetings to review action items and develop punch list items and priorities
- Time estimates on punch list items
- Training planning
- PLDA App updates
- Export Dublin data layers for EOC per Shannon's request
- Configure data for PLDA updates.
- Create data editing map service
- PLDA App updates

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- C.3 Web App training.

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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For: 2021-2022 Clean Water Program PLDA and Data Support - UR 1054027
Psomas Project No. 4ALA010233

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Project Director	3.00	247.61	742.83	
GIS/Application Developer	8.00	196.97	1,575.76	
Totals	11.00		2,318.59	
Total Labor				**2,318.59**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	2,318.59	21,562.03	23,880.62
Limit			23,895.00
Remaining			14.38

Total this Task **$2,318.59**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	6.00	196.97	1,181.82	
Senior GIS Specialist	.50	163.20	81.60	
Totals	6.50		1,263.42	
Total Labor				**1,263.42**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,263.42	1,742.61	3,006.03
Limit			7,840.00
Remaining			4,833.97

Total this Task **$1,263.42**

Task 00003 System Maintenance and Support

Professional Personnel

	Hours	Rate	Amount	
Project Director	3.00	247.61	742.83	
GIS/Application Developer	11.00	196.97	2,166.67	
Totals	14.00		2,909.50	
Total Labor				**2,909.50**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	2,909.50	0.00	2,909.50
Limit			3,016.00
Remaining			106.50

Total this Task **$2,909.50**

Total this Project **$6,491.51**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Labor	6,491.51	23,304.64	29,796.15
Totals	**6,491.51**	**23,304.64**	**29,796.15**

For: 2021-2022 Clean Water Program PLDA and Data Support - UR 1054027
Psomas Project No. 4ALA010233

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
Senior GIS Specialist	9.00	163.20	1,468.80	
Totals	9.00		1,468.80	
Total Labor				**1,468.80**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,468.80	3,006.03	4,474.83
Limit			7,840.00
Remaining			3,365.17

Total this Task **$1,468.80**

Total this Project **$1,468.80**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Labor	1,468.80	29,796.15	31,264.95
Totals	**1,468.80**	**29,796.15**	**31,264.95**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *August 1, 2022 – August 31, 2021*

Date Prepared: *October 3, 2022*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Meetings to review action items and develop punch list items and priorities
- Training planning
- Configure data for PLDA updates.
- Export data to EOA for Dublin per Shannon's request
- Fix issue with C3 Inspection report cause by ESRI AGS limitations

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- Meetings

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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PSOMAS

Project Name: *Clean Water Program*

Report Period: *December 1, 2022 – December 30, 2021*

Date Prepared: *January 25, 2022*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Merge PLDA data into TCDDA layer.
- Update apps and web maps to use merged PLDA data.
- ACCWP workgroup meeting.
- Alameda City TCD and TCDDA data replacement

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- MeetingsW

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Senior GIS Specialist	3.00	163.20	489.60	
Totals	3.00		489.60	
Total Labor				**489.60**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	489.60	13,869.40	14,359.00
Limit			14,598.00
Remaining			239.00

Total this Task **$489.60**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	14.00	196.97	2,757.58	
Totals	14.00		2,757.58	
Total Labor				**2,757.58**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	2,757.58	10,208.67	12,966.25
Limit			19,150.00
Remaining			6,183.75

Total this Task **$2,757.58**

Total this Project **$3,247.18**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Fee	0.00	7,900.00	7,900.00
Labor	3,247.18	33,307.22	36,554.40
Totals	**3,247.18**	**41,207.22**	**44,454.40**

Total this Invoice **$5,807.79**

Outstanding Invoices

Number	Date	Balance
188514	9/29/2022	11,035.27
189563	10/26/2022	32,872.66
189861	11/8/2022	4,102.54
190853	12/6/2022	5,481.39
Total Outstanding		**53,491.86**
Account Balance		**$59,299.65**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *February 1, 2023 – February 28, 2023*

Date Prepared: *March 26, 2023*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- ACCWP meetings.
- Help Elizabeth Frantz @ S2S setup AGOL users. Export PLDA data to John Fusco for Dublin
- Debug Trash App report based on issues identified by Elise.

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- Meetings

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Senior GIS Specialist	4.00	163.20	652.80	
Totals	4.00		652.80	
Total Labor				**652.80**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	652.80	13,359.95	14,012.75
Limit			14,598.00
Remaining			585.25

Total this Task **$652.80**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	14.50	196.97	2,856.07	
Totals	14.50		2,856.07	
Total Labor				**2,856.07**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	2,856.07	7,648.06	10,504.13
Limit			19,150.00
Remaining			8,645.87

Total this Task **$2,856.07**

Task 00003 System Maintenance and Support

Professional Personnel

	Hours	Rate	Amount	
Project Director	9.00	247.61	2,228.49	
Totals	9.00		2,228.49	
Total Labor				**2,228.49**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	2,228.49	18,862.42	21,090.91
Limit			33,134.00
Remaining			12,043.09

Total this Task **$2,228.49**

Total this Project **$5,737.36**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Fee	0.00	7,900.00	7,900.00
Labor	5,737.36	31,970.43	37,707.79
Totals	**5,737.36**	**39,870.43**	**45,607.79**

Total this Invoice **$6,623.73**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *January 1, 2023 – January 31, 2023*

Date Prepared: *March 02, 2023*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- ACCWP Workgroup meeting.
- Historic PDA data research.
- Help Elizabeth Frantz @ S2S setup AGOL users. Export PLDA data to John Fusco for Dublin
- Fix filter issue with TCD layer that was preventing some TCD and inlet points from displaying.
- Revise SOW for remainder of FY.

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- MeetingsW

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Senior GIS Specialist	1.50	163.20	244.80	
Totals	1.50		244.80	
Total Labor				**244.80**

Billing Limits	**Current**	**Prior**	**To-Date**	
Total Billings	244.80	14,359.00	14,603.80	
Limit			14,598.00	
Adjustment				**-5.80**
			Total this Task	**$239.00**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	4.00	196.97	787.88	
Totals	4.00		787.88	
Total Labor				**787.88**

Billing Limits	**Current**	**Prior**	**To-Date**	
Total Billings	787.88	12,966.25	13,754.13	
Limit			19,150.00	
Remaining			5,395.87	
			Total this Task	**$787.88**

Task 00003 System Maintenance and Support

Professional Personnel

	Hours	Rate	Amount	
Project Director	7.00	247.61	1,733.27	
Totals	7.00		1,733.27	
Total Labor				**1,733.27**

Billing Limits	**Current**	**Prior**	**To-Date**	
Total Billings	1,733.27	17,129.15	18,862.42	
Limit			33,134.00	
Remaining			14,271.58	
			Total this Task	**$1,733.27**
			Total this Project	**$2,760.15**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Fee	0.00	7,900.00	7,900.00
Labor	2,760.15	36,554.40	39,314.55
Totals	**2,760.15**	**44,454.40**	**47,214.55**

Total this Invoice **$6,798.04**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *March 1, 2023 – March 31, 2023*

Date Prepared: *May 8, 2023*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- ACCWP meetings.
- Debug PLDA editing issue for Jim Scanlin
- Update Stored Procedure to auto populate PLDA score on inspections and PLDA TCDDA polygons. Update Trash report for PLDA polygons.
- Write new Task Order.

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- Meetings

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Project Director	1.00	247.61	247.61	
Senior GIS Specialist	1.50	163.20	244.80	
Totals	2.50		492.41	
Total Labor				**492.41**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	492.41	14,012.75	14,505.16
Limit			14,598.00
Remaining			92.84

Total this Task **$492.41**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	15.00	196.97	2,954.55	
Totals	15.00		2,954.55	
Total Labor				**2,954.55**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	2,954.55	10,504.13	13,458.68
Limit			19,150.00
Remaining			5,691.32

Total this Task **$2,954.55**

Task 00003 System Maintenance and Support

Professional Personnel

	Hours	Rate	Amount	
Project Director	5.00	247.61	1,238.05	
Totals	5.00		1,238.05	
Total Labor				**1,238.05**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,238.05	21,090.91	22,328.96
Limit			33,134.00
Remaining			10,805.04

Total this Task **$1,238.05**

Total this Project **$4,685.01**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Fee	0.00	7,900.00	7,900.00
Labor	4,685.01	37,707.79	42,392.80
Totals	**4,685.01**	**45,607.79**	**50,292.80**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *November 1, 2022 – November 30, 2021*

Date Prepared: *December 27, 2022*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Merge PLDA data into TCDDA layer.
- Update apps and web maps to use merged PLDA data.
- ACCWP subcommittee meeting.

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- Meetings

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

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For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Senior GIS Specialist	1.00	163.20	163.20	
Totals	1.00		163.20	
Total Labor				**163.20**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	163.20	13,706.20	13,869.40
Limit			14,598.00
Remaining			728.60

Total this Task **$163.20**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	8.00	196.97	1,575.76	
Totals	8.00		1,575.76	
Total Labor				**1,575.76**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,575.76	8,632.91	10,208.67
Limit			19,150.00
Remaining			8,941.33

Total this Task **$1,575.76**

Total this Project **$1,738.96**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Fee	0.00	7,900.00	7,900.00
Labor	1,738.96	31,568.26	33,307.22
Totals	**1,738.96**	**39,468.26**	**41,207.22**

Total this Invoice **$5,481.39**

Outstanding Invoices

Number	Date	Balance
187476	8/25/2022	8,871.96
188514	9/29/2022	11,035.27
189563	10/26/2022	32,872.66
189861	11/8/2022	4,102.54
Total Outstanding		**56,882.43**
Account Balance		**$62,363.82**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *October 1, 2022 – October 31, 2021*

Date Prepared: *November 30, 2022*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Fix C.3 Inspection report to highlight polygon properly. Issue with ESRI Rest API that limits the # of vertices for a polygon.
- Test PLDA App for demo. Review PLDA logic, process, inspection, and reporting and meet with ACCWP staff.
- Setup Field users for Dublin.
- ACCWP subcommittee meeting.

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- Meetings
- Deploy PLDA merged drainage area data and app updates.

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

Keith Palmer

Keith Palmer
Project Manager

1650 Spruce St
Ste 400
Riverside, CA 92507
951.787.8421
Fax 951.682.3379

www.psomas.com

For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	5.00	196.97	984.85	
Senior GIS Specialist	1.00	163.20	163.20	
Totals	6.00		1,148.05	
Total Labor				**1,148.05**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,148.05	12,558.15	13,706.20
Limit			14,598.00
Remaining			891.80

Total this Task **$1,148.05**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	3.00	196.97	590.91	
Senior GIS Specialist	1.00	163.20	163.20	
Totals	4.00		754.11	
Total Labor				**754.11**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	754.11	7,878.80	8,632.91
Limit			19,150.00
Remaining			10,517.09

Total this Task **$754.11**

Task 00003 System Maintenance and Support

Professional Personnel

	Hours	Rate	Amount	
Project Director	6.50	247.61	1,609.47	
Totals	6.50		1,609.47	
Total Labor				**1,609.47**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,609.47	15,519.68	17,129.15
Limit			33,134.00
Remaining			16,004.85

Total this Task **$1,609.47**

Total this Project **$3,511.63**

Billings to Date

	Current Billing	Prior Billing	Total Billed To Date
Fee	0.00	7,900.00	7,900.00
Labor	3,511.63	28,056.63	31,568.26
Totals	**3,511.63**	**35,956.63**	**39,468.26**

Total this Invoice **$4,102.54**

PSOMAS

Project Name: *Clean Water Program*

Report Period: *August 1, 2022 – August 31, 2021*

Date Prepared: *October 3, 2022*

Alameda County Project Reference: *UR 1072481*

Alameda County PM Contact: *Sharon Gosselin*

Psomas Project Number: *4ALA010236*

CURRENT PERIOD PROJECT STATUS

Providing enhancements to the Alameda County Cleanwater Program

WORK ACCOMPLISHED DURING PAST PERIOD

- Meeting with Jim, Alex, and Shannon to discuss Drainage Area layer in C.3 and Trash Apps. Update Trash app to add C.3 Projects that are Full Trash Capture equivalent. C3 AGOL Training.
- Finish C.3 Field Maps web maps per feedback from Jim and Shannon
- Finish C.3 Facility Inspection report based on feedback.
- Review San Leandro Trash report and try to identify differences between 20-21 and 21-22 reports. Test all apps for training.
- Fix C.3 Inspection report to highlight polygon property. Issue with ESRI Rest API that limits the # of vertices for a polygon.
- C3 and C10 training. User data questions and support.

PLANNED ACTIVITIES FOR NEXT MONTH

- Support CWP users
- Meetings

ISSUES AND COMMENTS:

- None

For any questions, please contact me at (206) 503-3836 or keith.palmer@psomas.com

Keith Palmer

Keith Palmer
Project Manager

1650 Spruce St
Ste 400
Riverside, CA 92507
951.787.8421
Fax 951.682.3379

www.psomas.com

For: 2022-2023 Clean Water Program GIS Support Services - UR 1072481
Psomas Project No. 4ALA010236

Task 00001 Application Enhancements

Professional Personnel

	Hours	Rate	Amount	
Project Director	2.00	247.61	495.22	
GIS/Application Developer	47.50	196.97	9,356.08	
Senior GIS Specialist	9.00	163.20	1,468.80	
Totals	58.50		11,320.10	
Total Labor				**11,320.10**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	11,320.10	1,238.05	12,558.15
Limit			14,598.00
Remaining			2,039.85

Total this Task **$11,320.10**

Task 00002 Data Management

Professional Personnel

	Hours	Rate	Amount	
GIS/Application Developer	9.00	196.97	1,772.73	
Totals	9.00		1,772.73	
Total Labor				**1,772.73**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	1,772.73	6,106.07	7,878.80
Limit			19,150.00
Remaining			11,271.20

Total this Task **$1,772.73**

Task 00003 System Maintenance and Support

Fee

Billing Task	**Fee**	**% Comp**	**Earned**	**Previous Fee Billing**	**Current Fee Billing**
Server Hosting Fee	7,900.00	100.00	7,900.00	0.00	7,900.00
Total Fee	7,900.00		7,900.00	0.00	7,900.00

Total Fee **7,900.00**

Professional Personnel

	Hours	Rate	Amount	
Project Director	26.00	247.61	6,437.86	
GIS/Application Developer	6.00	196.97	1,181.82	
Totals	32.00		7,619.68	
Total Labor				**7,619.68**

Billing Limits	**Current**	**Prior**	**To-Date**
Total Billings	15,519.68	0.00	15,519.68
Limit			33,134.00
Remaining			17,614.32

Total this Task **$15,519.68**

Total this Project **$28,612.51**

Protecting Alameda County Creeks, Wetlands & the Bay

cleanwater PROGRAM

399 Elmhurst St.
Hayward, CA
94544
p. 510-670-5543

MEMBER AGENCIES:
Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

October 17, 2022

Marylou Ayupan
Director of Public Works
City of Union City
34009 Alvarado Niles Road
Union City, CA 94587

SUBJECT: INVOICE FOR ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM COSTS FOR FISCAL YEAR 2022/23

Dear Ms. Ayupan:

Please find the attached invoice for your city's share of the Alameda Countywide Clean Water Program Costs for FY 2022/23. The invoice is based on the attached cost allocation. If you have any questions, please contact me at (510) 670-6547.

Sincerely yours,

Sharon Gosselin

Sharon Gosselin
Management Committee Chair

Attachments 2

THE COUNTY OF ALAMEDA
PUBLIC WORKS AGENCY
FISCAL DIVISION
399-A Elmhurst Street, 3rd Floor
Hayward, CA 94544
Tax ID 946000501

INVOICE 22M10:14
October 17, 2022

Customer No: 1316
CITY OF UNION CITY
Attn: MARYLOU AYUPAN
34009 ALAVARDO NILES ROAD
UNION CITY, CA 94587

Description of Services

Coverage Period: 07/01/2022 - 06/30/2023

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM CONTRIBUTION.

ANNUAL INVOICE FY 2022/2023 $134,608.00

Please make remittance payable to "Treasurer of Alameda County"

Please expedite payment so that it can be received by November 30, 2022.

Send to: Alameda County Public Works Agency
Fiscal Division
399-A Elmhurst Street
Hayward, CA 94544

Revenue Account No: 270301-459520-50201 $134,608.00

Invoice Total: 134,608.00

PLEASE MAKE REMITTANCE PAYABLE TO "TREASURER OF ALAMEDA COUNTY"
SEND TO THE ABOVE ADDRESS
PLEASE REFERENCE ABOVE INVOICE # ON PAYMENT
PAYMENT DUE UPON RECEIPT

The undersigned hereby certifies that the above claim is true and correct.

Maria Araujo (510) 670-6452
MARIA ARAUJO

Alameda Countywide Clean Water Program Charges for Fiscal Year 2022/23

Member Agency	Cost Share %	Obligation	Adjustment (+/-)	Invoice Amount
Alameda	4.42%	$ 112,047		$ 112,047
Alameda County	10.77%	$ 273,020		$ 273,020
Albany	1.85%	$ 46,898		$ 46,898
Berkeley	5.13%	$ 130,046		$ 130,046
Dublin	3.42%	$ 86,697		$ 86,697
Emeryville	1.69%	$ 42,842		$ 42,842
Fremont*	14.03%	$355,661	-$142,166	$213,495
Hayward	10.14%	$ 257,049		$ 257,049
Livermore	6.09%	$ 154,381		$ 154,381
Newark	3.45%	$ 87,457		$ 87,457
Oakland	18.51%	$ 469,228		$ 469,228
Piedmont	1.80%	$ 45,630		$ 45,630
Pleasanton	5.64%	$ 142,974		$ 142,974
San Leandro	5.15%	$ 130,552		$ 130,552
Union City	5.31%	$ 134,608		$ 134,608
ACFCD	1.30%	$ 32,955		$ 32,955
Zone 7	1.30%	$ 32,955		$ 32,955
TOTAL	100%	$ 2,535,000	-$142,166	$2,392,834

Adjustment represent FY 2022/2023 credit of $179,336. to the City of Fremont for contracted legal services as approved in budget by the Program Management Committee on May 25, 2022 and prior year (FY2021/2022) credit balance of $37,170 credited back to ACCWP

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

June 26, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #30**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$44,638.63
	Invoice #30 Total	**$44,638.63**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

June 13, 2023

Project No. - Invoice No: 00436.14-30

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 5/31/2023

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	9.00	224.00	$2,016.00
Mathews, Sandra	19.00	315.00	$5,985.00
Total Labor			**$8,001.00**
Total This Task			**$8,001.00**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	16.50	315.00	$5,197.50
Smith, Rebecca	2.50	190.00	$475.00
Total Labor			**$5,672.50**
Total This Task			**$5,672.50**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	6.50	315.00	$2,047.50
Total Labor			**$2,047.50**
Total This Task			**$2,047.50**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	18.00	126.00	$2,268.00
Mathews, Sandra	6.50	315.00	$2,047.50
Warren, Rachel	11.75	260.00	$3,055.00
Total Labor			**$7,370.50**
Total This Task			**$7,370.50**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	7.25	260.00	$1,885.00
Total Labor			**$1,885.00**
Total This Task			**$1,885.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	1.00	260.00	$260.00
Total Labor			**$260.00**
Total This Task			**$260.00**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	1.50	126.00	$189.00
Yin, Elizabeth	.25	260.00	$65.00
Total Labor			**$254.00**
Total This Task			**$254.00**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
6/7/2023 Geosyntec Consultants	Inv. #514207	5,532.50	1.100	$6,085.75
Total Consultants				**$6,085.75**
Total This Task				**$6,085.75**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
6/7/2023 Geosyntec Consultants	Inv. #514207	3,656.25	1.100	$4,021.88
Total Consultants				**$4,021.88**
Total This Task				**$4,021.88**

Task: 19.2 PCBs Demolition Guidance

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	.50	315.00	$157.50
Total Labor			**$157.50**
Total This Task			**$157.50**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.00	315.00	$315.00
Total Labor			**$315.00**
Total This Task			**$315.00**

Task: 20.3 Trainings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	15.50	315.00	$4,882.50
McFadin, Sophie	29.25	126.00	$3,685.50
Total Labor			**$8,568.00**
Total This Task			**$8,568.00**

Invoice Amount **$44,638.63**

Billing Limits	Current	Prior	To-date
Total Billings	44,638.63	882,967.31	927,605.94
Limit			1,800,000.00
Remaining			872,394.06

Larry Walker Associates Team
Progress Report for Work in May 2023

Municipal Regional Stormwater Permit Compliance Services for the Alameda Countywide Clean Water Program (ACCWP)

Task 14 Management Committee and PLS Support (PRC1-22/23)

Task: 14.1 MC/PLS Meeting Support

- Prepared and finalized the Management Committee and PLS agenda packages.
- Participated in the May Management Committee and PLS meetings.
- Prepared and distributed action items and summaries for the Management Committee and PLS meetings.
- Prepared agenda, meeting notes, and participated in the Planning and Budget workgroup meeting.
- Prepared progress report.

Task 14.2 MC/PLS As-needed Support

- Updated the ACCWP website and SharePoint site.
- Responded to public requests submitted via the website.
- Prepared electronic vote to approve pursuing a MRP 3 unfunded mandate test claim.
- Continued drafting the Management Committee roles and responsibilities document.
- Prepared list of MRP 3 provisions to include in a test claim.
- Distributed the customized the ACCWP annual report forms.
- Distributed the final work products from the PCBs Demolition Update regional project.
- Evaluated pursuit of a grant to develop the MRP required climate change plan.

TASK 14.3 BAMSC

- Prepared for and participated in the May BAMSC internal and external Steering Committee meetings.

Task 15 Annual Report (PRC2-22/23)

- Drafted the Program Annual Report template and distributed it to the subcommittee facilitators.
- Customized the permittee report forms for ACCWP.

Task 16 Data Management Support (PRC3-22/23)

Task 16.1 DMSC Subcommittee Support

- Prepared and finalized the Subcommittee agenda.
- Participated in the May Subcommittee meeting.
- Prepared the meeting summary.
- Updated the Subcommittee information for the Management Committee agenda.

Task 16.2 DMSC Program Support

- Coordinated with the Subcommittees.

Task 16.3 Data Management Plan

- Continued development of the ACCWP Information Management Plan.

Task 17 Monitoring Support (MPC-23-1)

- Drafted ACCWP MPC update for Management Committee meeting.
- Coordinated review of the BAMSC Trash Monitoring Plan and QAPP with the ACCWP MPC subcommittee.
- Reviewed proposed FY23-24 budget with AMS.
- Facilitated the May BAMSC MPC meeting, drafted the meeting summary.
- Participated in the BAMSC External Steering Committee meeting.
- Participated in the 2023 Annual RMP SPLWG meeting.
- Assisted the Program in planning for trash monitoring.
- Reviewed the BAMSC Trash Monitoring Plan.
- Participated in the Trash TAG Meeting #2.
- Submitted the ACCWP LID Monitoring Plan and the BAMSC LID Monitoring QAPP to the Regional Water Board.
- Uploaded the LID Monitoring Plan and QAPP to the ACCWP website.
- Coordinated with the project team.

Task 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

- Prepared schedule and outline for the ACCWP FY2022-23 Annual Report.
- Assisted the Program in PCBs in Bridges and Electrical Utilities and mercury recycling requirements.
- Participated in PCBs in Electrical Utilities Workgroup Meeting #1.
- Facilitated call with the Cities of Berkeley and Oakland to discuss Program support for their respective proposed regional projects.
- Coordinated with the project team.

TASK 19 Regional Project Support (POC-Imp-23-2)

TASK 19.2 PCBs Demolition Guidance

- Finalized the construction site program enhancements document.

TASK 20 New Development Subcommittee Support (NDS 23-1)

Task 20.1 NDS Meetings

Task 20.2 As Needed Support

- Updated the NDS information for the Management Committee agenda.
- Responded to member information requests on C.3 implementation.
- Responded to SMCWPPP request to use the ACCWP Roads factsheet.

Task 20.3 Training

- Continued planning for the May 16, 2023, C.3 workshop.
- Prepared presentations for the workshop.
- Facilitated and presented sessions at the workshop.
- Began preparation of post workshop report.

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 27 BILLING PERIOD: May 1-31, 2023
INVOICE DATE: June 13, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$154,000.00	115,085.00	15,721.00	130,806.00	23,194.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$12,500.00	5,056.00	7,370.50	12,426.50	73.50
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$95,200.00	44,862.38	2,399.00	47,261.38	47,938.62
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	105,089.89	6,085.75	111,175.64	5,094.36
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	63,451.32	4,021.88	67,473.20	46,376.80
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	21,815.00	157.50	21,972.50	10,027.50
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	48,645.00	8,883.00	57,528.00	4,472.00
TOTALS					**$1,126,420.00**	**$882,967.31**	**$44,638.63**	**$927,605.94**	**$198,814.06**

436.14
517
Task 17 $5,532.50
Task 18 $3,656.25
Total $9,188.75

Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 514207
Project : CWR0649B
Invoice Date : 6/7/2023
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 5/31/2023

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$9,188.75
Current Invoice	**$9,188.75**
****Amount Due This Invoice ****	**$9,188.75**

Statement		***Statement***	
Prior Billings	$154,081.75	Project Budget	$216,200.00
Current Invoice	$9,188.75	Expended to Date	$163,270.50
Billed To Date	$163,270.50	Contract Balance	$52,929.50
Paid To Date	$111,466.75	****Amount Due This Invoice ****	**$9,188.75**

When making payment via bank, please include our invoice number in ACH information; Please email invoice payment remittance/details to CorporateAR@Geosyntec.com.

Bank Details: Citibank N.A.
Coconut Creek Branch 0529
4807 Coconut Creek Pkwy
Coconut Creek, FL 33063

Account #: 2195223812
ABA/Routing: 067004764 (ACH)
Swift: CITI US 33

When making payment via check, please remit payment to: **Mail Code 11160**
P.O. Box 70280
Philadelphia, PA 19176-0280

Phase : **01) TASK 17 MONITORING SUPPORT**

Task : **01) ACCWP MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	05/15/2023	1.00	230.00	230.00
	05/22/2023	0.75	230.00	172.50
	05/23/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		2.00		460.00

Total Task : 01) ACCWP MPC **Task Labor** **460.00**

Task : **02) BAMSC MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	05/02/2023	1.00	230.00	230.00
	05/03/2023	2.25	230.00	517.50
	05/19/2023	1.50	230.00	345.00
Total: PROJECT PROFESSIONAL		4.75		1,092.50
SENIOR PRINCIPAL				
AUSTIN, LISA	05/17/2023	0.50	300.00	150.00
	05/25/2023	2.25	300.00	675.00
Total: SENIOR PRINCIPAL		2.75		825.00

Total Task : 02) BAMSC MPC **Task Labor** **1,917.50**

Task : **03) RMP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	05/23/2023	2.50	230.00	575.00
SENIOR PRINCIPAL				
AUSTIN, LISA	05/19/2023	1.25	300.00	375.00
	05/22/2023	0.25	300.00	75.00
	05/23/2023	2.50	300.00	750.00
Total: SENIOR PRINCIPAL		4.00		1,200.00

Total Task : 03) RMP **Task Labor** **1,775.00**

Task : **05) TRASH MONITORING PLAN**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	05/01/2023	1.25	230.00	287.50
	05/04/2023	0.50	230.00	115.00
	05/22/2023	1.00	230.00	230.00
Total: PROJECT PROFESSIONAL		2.75		632.50
SENIOR PRINCIPAL				
AUSTIN, LISA	05/22/2023	1.00	300.00	300.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **932.50**

Phase : 01) TASK 17 MONITORING SUPPORT

Task : 06) LID MONITORING PLAN

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT PROFESSIONAL				
WELSH, LISA	05/01/2023	0.25	230.00	57.50

Total Task : 06) LID MONITORING PLAN **Task Labor** **57.50**

Task : 09) ON CALL SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
PROJECT ADMINISTRATOR				
DUONG, DAVID	05/05/2023	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	05/03/2023	0.25	230.00	57.50
	05/10/2023	0.25	230.00	57.50
	05/12/2023	0.25	230.00	57.50
	05/15/2023	0.50	230.00	115.00
	05/24/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		1.50		345.00

Total Task : 09) ON CALL SUPPORT **Task Labor** **390.00**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **5,532.50**

Phase : 02) TASK 18 POCS IMPLEMENTATION SUP

Task : 01) ANNUAL PROGRESS SUPPORT

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	05/22/2023	0.25	175.00	43.75
PROJECT PROFESSIONAL				
WELSH, LISA	05/26/2023	0.50	230.00	115.00
SENIOR PRINCIPAL				
AUSTIN, LISA	05/26/2023	0.50	300.00	150.00

Total Task : 01) ANNUAL PROGRESS SUPPORT **Task Labor** **308.75**

Task : 05) OTHER C11 C12 SUBPROVISIONS

Class / Employee Name	Date	Hours	Rate	Amount
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	05/22/2023	0.25	175.00	43.75
	05/23/2023	1.00	175.00	175.00
	05/26/2023	0.25	175.00	43.75
	05/30/2023	0.25	175.00	43.75
Total: SENIOR STAFF PROFESSIONAL		1.75		306.25
PROJECT PROFESSIONAL				
WELSH, LISA	05/01/2023	0.25	230.00	57.50
	05/02/2023	0.75	230.00	172.50
	05/04/2023	0.25	230.00	57.50
	05/10/2023	0.25	230.00	57.50
	05/11/2023	0.25	230.00	57.50

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	05/12/2023	0.25	230.00	57.50
	05/15/2023	0.50	230.00	115.00
	05/17/2023	0.75	230.00	172.50
	05/19/2023	0.50	230.00	115.00
	05/22/2023	0.50	230.00	115.00
	05/25/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		4.75		1,092.50
PRINCIPAL				
PERKINS, RINTA	05/04/2023	0.50	280.00	140.00
	05/08/2023	0.50	280.00	140.00
	05/15/2023	0.75	280.00	210.00
	05/16/2023	0.50	280.00	140.00
	05/22/2023	0.25	280.00	70.00
Total: PRINCIPAL		2.50		700.00
SENIOR PRINCIPAL				
AUSTIN, LISA	05/16/2023	0.50	300.00	150.00

Total Task : **05) OTHER C11 C12 SUBPROVISIONS** **Task Labor** **2,248.75**

Task : **06) ON CALL SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	05/04/2023	0.75	230.00	172.50
	05/05/2023	0.50	230.00	115.00
	05/26/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		1.75		402.50
SENIOR PROFESSIONAL				
HAVENS, KELLY	05/05/2023	0.75	255.00	191.25
PRINCIPAL				
PERKINS, RINTA	05/05/2023	0.50	280.00	140.00
	05/08/2023	0.50	280.00	140.00
Total: PRINCIPAL		1.00		280.00
SENIOR PRINCIPAL				
AUSTIN, LISA	05/26/2023	0.75	300.00	225.00

Total Task : **06) ON CALL SUPPORT** **Task Labor** **1,098.75**

Total Phase : **02) TASK 18 POCS IMPLEMENTATION SUP** **Phase Labor** **3,656.25**

Total Project Labor **9,188.75**

Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023 **9,188.75**

1480 Drew Avenue, Suite 100
Davis, CA 95618

530.753.6400
530.753.7030 fax

www.lwa.com

July 20, 2023

Anita Franklin
Alameda Countywide Clean Water Program
And Water Conservation District
399 Elmhurst Street
Hayward, CA 94544

Re: **Invoice #31**
For Approval By Sharon Gosselin
Reference P.O. PBWKS 7573
Program #: 50201

Invoice Transmittal

LWA Project #	**Description**	
436.14	ACCW – Municipal Regional Stormwater Permit Compliance Services	$50,608.25
	Invoice #31 Total	**$50,608.25**

LARRY WALKER ASSOCIATES
science | policy | solutions

1480 Drew Avenue
Suite 100
Davis, CA 95618

530.753.6400
ar@lwa.com
lwa.com

Alameda Countywide Clean Water Program
Attn: Sharon Gosselin
399 Elmhurst Street
Hayward, CA 94544

July 14, 2023

Project No. - Invoice No: 00436.14-31

MUNICIPAL REGIONAL STORMWATER PERMIT COMPLIANCE SERVICES

Project: 00436.14

PO # 7573

For Services Rendered Through 6/30/2023

Contract # 21344

Task: 14.1 MC/PLS Meeting Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Bardsley, Audra	2.75	224.00	$616.00
Mathews, Sandra	10.75	315.00	$3,386.25
Total Labor			**$4,002.25**
Total This Task			**$4,002.25**

Task: 14.2 MC/PLS As-needed Support (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Ashby, Karen	.50	315.00	$157.50
Mathews, Sandra	47.25	315.00	$14,883.75
Wilson, Nicole	.50	161.00	$80.50
Total Labor			**$15,121.75**
Total This Task			**$15,121.75**

Task: 14.3 BAMSC (PRC1-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	12.00	315.00	$3,780.00
Total Labor			**$3,780.00**

Total This Task	**$3,780.00**

Task: 15 2022-23 Annual Report (PRC2-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	.50	126.00	$63.00
Total Labor			**$63.00**
Total This Task			**$63.00**

Task: 16.1 DMSC Subcommittee Support (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Yin, Elizabeth	7.00	260.00	$1,820.00
Total Labor			**$1,820.00**
Total This Task			**$1,820.00**

Task: 16.2 DMSC Program Support (PRC3-22/23

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	3.75	126.00	$472.50
Mathews, Sandra	1.00	315.00	$315.00
VanCarpels, Tina	1.00	135.00	$135.00
Yin, Elizabeth	1.50	260.00	$390.00
Total Labor			**$1,312.50**
Total This Task			**$1,312.50**

Task: 16.3 Data Management Plan (PRC3-22/23)

Professional Personnel

Employee	Hours	Rate	Amount
Celniker, Chloe	13.75	126.00	$1,732.50
VanCarpels, Tina	1.00	135.00	$135.00
Total Labor			**$1,867.50**
Total This Task			**$1,867.50**

Task: 17 Monitoring Support (MPC-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
7/7/2023 Geosyntec Consultants	Inv. #517797	3,307.50	1.100	$3,638.25
Total Consultants				**$3,638.25**
Total This Task				**$3,638.25**

Task: 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

Consultants

Payee		Cost	Markup	Amount
Environmental Consultant				
7/7/2023 Geosyntec Consultants	Inv. #517797	14,870.00	1.100	$16,357.00
Total Consultants				**$16,357.00**
Total This Task				**$16,357.00**

Task: 20.2 On-Call Support

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	5.00	315.00	$1,575.00
Total Labor			**$1,575.00**
Total This Task			**$1,575.00**

Task: 20.3 Trainings

Professional Personnel

Employee	Hours	Rate	Amount
Mathews, Sandra	1.00	315.00	$315.00
McFadin, Sophie	6.00	126.00	$756.00
Total Labor			**$1,071.00**
Total This Task			**$1,071.00**

Invoice Amount **$50,608.25**

Billing Limits	Current	Prior	To-date
Total Billings	50,608.25	927,605.94	978,214.19
Limit			1,800,000.00
Remaining			821,785.81

Larry Walker Associates Team
Progress Report for Work in June 2023

Municipal Regional Stormwater Permit Compliance Services for the Alameda Countywide Clean Water Program (ACCWP)

Task 14 Management Committee and PLS Support (PRC1-22/23)

Task: 14.1 MC/PLS Meeting Support

- Prepared and finalized the Management Committee and PLS agenda packages.
- Participated in the June Management Committee and PLS meetings.
- Prepared and distributed action items and summaries for the Management Committee and PLS meetings.
- Reviewed invoices and prepared progress report.

Task 14.2 MC/PLS As-needed Support

- Updated the ACCWP website and SharePoint site.
- Responded to public requests submitted via the website.
- Prepared electronic vote to approve final Cost Reporting Framework and Guidance.
- Prepared supporting information for the unfunded mandate test claim.
  - Reviewed consultant invoices to develop estimates for the program costs by relevant sub-provisions included in the unfunded mandate test claim.
  - Drafted and finalized declaration of program costs.
  - Participated in meetings with the legal team to discuss the development of the costs and declaration.
- Distributed the revised sections of the customized the ACCWP annual report forms.
- Distributed the final work products from the Cost Reporting regional project.
- Distributed trash reporting instructions from the Regional Water Board.
- Set up the Management Committee and Policy Level Subcommittee 2023-2024 meetings.
- Responded to member questions on SMARTS reporting.
- Began evaluating creating a cross walk of the program budget for cost reporting.
- Began review of action plans and setting up tracking for program costs for FY 2023-2024.

TASK 14.3 BAMSC

- Prepared for and participated in the June BAMSC internal and external Steering Committee meetings.
- Reviewed and commented on the Regional Water Board draft SMARTS guide.
- Tracked and reported on BAMSC action items for the ACCWP Management Committee.
- Updated the SharePoint site with BAMSC agendas and meeting summaries.
- Coordinated with the workgroup focused on improving communication with Regional Water Board staff.

Task 15 Annual Report (PRC2-22/23)

- Tracked responses from subcommittee facilitators.

Task 16 Data Management Support (PRC3-22/23)

Task 16.1 DMSC Subcommittee Support

- Prepared and finalized the Subcommittee agenda.
- Participated in the June Subcommittee meeting.
- Prepared the meeting summary.
- Updated the Subcommittee information for the Management Committee agenda.
- Prepared the FY 2023-2024 meeting schedule.
- Finalized work plans for FY 2023-2024.

Task 16.2 DMSC Program Support

- Uploaded training videos to Vimeo.
- Participated in the C.17 workgroup.
- Staff support for subcommittee meeting.

Task 16.3 Data Management Plan

- Continued development of the ACCWP Information Management Plan.

Task 17 Monitoring Support (MPC-23-1)

- Participated in the BAMSC External Steering Committee meeting.
- Reviewed RMP projects.
- Assisted the Program in planning for trash monitoring.
- Revised the BAMSC Trash Monitoring Plan per TAG, stakeholder, and permittee comments.
- Participated in call with Regional Water Board on LID Monitoring Plan approval.
- Assisted the Program in planning for POCs monitoring.
- Drafted Section C.8 of the Program's Annual Report; coordinated with the project team; invoicing.

Task 18 C.11/C.12 Implementation Support (POC-IMP-23-1)

- Prepared PCBs in Building Demolition Applicable Structure data request.
- Prepared outline for the POCs Control Measure Update.
- Reviewed permittee annual report forms.
- Assisted the Program with planning for old industrial area/source property investigations.
- Assisted the Program in PCBs with the Bridges (all Permittees) and Electrical Utilities (City of Alameda) and mercury recycling requirements.
- Participated in PCBs in Electrical Utilities Workgroup Meeting #2.
- Assisted the City of Oakland with regional project funding support.
- Coordinated with the project team.

TASK 19 Regional Project Support (POC-Imp-23-2)

TASK 19.2 PCBs Demolition Guidance

- Finalized the construction site program enhancements document.

TASK 20 New Development Subcommittee Support (NDS 23-1)

Task 20.1 NDS Meetings

- Began planning for the July meeting.

Task 20.2 As Needed Support

- Updated the NDS information for the Management Committee agenda.
- Responded to member information requests on C.3 implementation.
- Responded to public inquiries on the C3TG.
- Tracked C3TG errata.
- Tracked proposed MRP C.3-related amendments.

Task 20.3 Training

- Processed workshop knowledge survey and evaluation results.
- Updated the workshop report based on feedback from the training workgroup.
- Shared training video with the DM-G subcommittee to upload to Vimeo.

Clean Water Program - Alameda County

CONSULTANT PROJECT CODES: 436.14
CONSULTANT INVOICE #: 31 BILLING PERIOD: June 1-30, 2023
INVOICE DATE: July 14, 2023

ACCW - Municipal Regional Stormwater Permit Compliance Services
Contract No. 21344
For approval by Sharon Gosselin, Ref. P.O. PBWKS-7573
Program #: 50201

CWP TASK ID	TASK DESCRIPTION	Job/Work Order #	Activity Code	(Consultant) Project ID)	BUDGET (approved Action Plan)	PRIOR INVOICED AMOUNT	CURRENT INVOICE AMOUNT	CUMUL. INVOICE AMOUNT	BUDGET BALANCE
NDS-21-X	New Development Subcommittee Support	F15W81	CW2	436.14 - Task 1	$60,000.00	61,369.75	-	61,369.75	(1,369.75)
POC-Imp-21-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 2	$99,000.00	98,734.36	-	98,734.36	265.64
POC-Mon-21-1	POCs Monitoring Support	F15W81	CW5	436.14 - Task 3	$22,000.00	22,127.88	-	22,127.88	(127.88)
POC-Imp-21-2	POCs Regional Projects Support	F15W81	CW7	436.14 - Task 4	$11,000.00	1,925.00	-	1,925.00	9,075.00
PRC-22-1	SMARTS Support	F15W81	PM1	436.14 - Task 5	$3,600.00	1,617.75	-	1,617.75	1,982.25
POCs-22-1	MRP 3 and PCBs Implementation Support	F15W81	CW7	436.14 - Task 6	$99,000.00	89,148.38	-	89,148.38	9,851.62
MPC-22-1	Monitoring Support	F15W81	CW7	436.14 - Task 7	$46,000.00	45,758.35	-	45,758.35	241.65
PRC-22-2	Management and PLS Support	F15W81	PM1	436.14 - Task 8	$42,000.00	39,290.50	-	39,290.50	2,709.50
NDS-22-1	NDS Baseline and Project Support	F15W81	CW2	436.14 - Task 9	$60,000.00	60,658.75	-	60,658.75	(658.75)
MM-22-3	GI SOP Development	F15W81	CW1	436.14 - Task 10	$30,000.00	25,401.75	-	25,401.75	4,598.25
PRC-22-3	Annual Report Support	F15W81	PM1	436.14 - Task 11	$20,000.00	20,673.25	-	20,673.25	(673.25)
PRC-22-4	Cost Reporting Framework	F15W81	PM1	436.14 - Task 12	$20,000.00	3,042.00	-	3,042.00	16,958.00
PRC-22-5	Asset Management Framework	F15W81	PM1	436.14 - Task 13	$28,000.00	9,215.00	-	9,215.00	18,785.00
PRC1-22/23	Management and PLS Support	F15W81	PM1	436.14 - Task 14	$154,000.00	130,806.00	22,904.00	153,710.00	290.00
PRC2-22/23	2022-23 Annual Report	F15W81	PM1	436.14 - Task 15	$12,500.00	12,426.50	63.00	12,489.50	10.50
PRC3-22/23	Data Management Support	F15W81	PM1	436.14 - Task 16	$95,200.00	47,261.38	5,000.00	52,261.38	42,938.62
MPC-23-1	Monitoring Support	F15W81	CW7	436.14 - Task 17	$116,270.00	111,175.64	3,638.25	114,813.89	1,456.11
POC-Imp-23-1	C.11/C.12 Implementation Support	F15W81	CW7	436.14 - Task 18	$113,850.00	67,473.20	16,357.00	83,830.20	30,019.80
POC-Imp-23-2	Regional Project Support	F15W81	CW7	436.14 - Task 19	$32,000.00	21,972.50	2,646.00	24,618.50	7,381.50
NDS-23-1	NDS Support	F15W81	CW2	436.14 - Task 20	$62,000.00	57,528.00	-	57,528.00	4,472.00
TOTALS					**$1,126,420.00**	**$927,605.94**	**$50,608.25**	**$978,214.19**	**$148,205.81**

Geosyntec consultants

Task 17	$	3,307.50
Task 18	$	14,870.00
Total	$	**$18,177.50**

Geosyntec Consultants, Inc.
900 Broken Sound Parkway NW, Suite 200
Boca Raton, Florida 33487-3575 USA
Tel (561) 995-0900 Fax (561) 995-0925

LARRY WALKER ASSOCIATES
1480 DREW AVENUE
SUITE 100
DAVIS, CA 95618
Attention: SANDY MATHEWS

Invoice # : 517797
Project : CWR0649B
Invoice Date : 7/7/2023
Project Name : ACCWP ON CALL FY2022 2023

For Professional Services Rendered through transaction date: 6/30/2023

IF YOU HAVE QUESTIONS ABOUT THIS INVOICE, PLEASE CONTACT LISA WELSH

TASK ID NO. MPC-23-1
TASK ID NO. POC-IMP-23-1
TASK ID NO. MPC-23-2

Professional Services	$18,177.50
Current Invoice	**$18,177.50**
****Amount Due This Invoice ****	**$18,177.50**

Statement		***Statement***	
Prior Billings	$163,270.50	Project Budget	$216,200.00
Current Invoice	$18,177.50	Expended to Date	$181,448.00
Billed To Date	$181,448.00	Contract Balance	$34,752.00
Paid To Date	$131,130.50	****Amount Due This Invoice ****	**$18,177.50**

When making payment via bank, please include our invoice number in ACH information; Please email invoice payment remittance/details to CorporateAR@Geosyntec.com.

Bank Details: Citibank N.A.
Coconut Creek Branch 0529
4807 Coconut Creek Pkwy
Coconut Creek, FL 33063

Account #: 2195223812
ABA/Routing: 067004764 (ACH)
Swift: CITI US 33

When making payment via check, please remit payment to: **Mail Code 11160**
P.O. Box 70280
Philadelphia, PA 19176-0280

Phase : **01) TASK 17 MONITORING SUPPORT**

Task : **01) ACCWP MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	06/01/2023	1.00	175.00	175.00
	06/02/2023	1.00	175.00	175.00
Total: SENIOR STAFF PROFESSIONAL		2.00		350.00

Total Task : 01) ACCWP MPC **Task Labor** **350.00**

Task : **02) BAMSC MPC**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	06/22/2023	1.00	300.00	300.00

Total Task : 02) BAMSC MPC **Task Labor** **300.00**

Task : **03) RMP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PROFESSIONAL				
HAVENS, KELLY	06/21/2023	1.50	255.00	382.50
SENIOR PRINCIPAL				
AUSTIN, LISA	06/02/2023	0.25	300.00	75.00

Total Task : 03) RMP **Task Labor** **457.50**

Task : **05) TRASH MONITORING PLAN**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
YAO, GRACE	06/09/2023	0.25	175.00	43.75
	06/13/2023	0.25	175.00	43.75
Total: SENIOR STAFF PROFESSIONAL		0.50		87.50
PROJECT PROFESSIONAL				
WELSH, LISA	06/01/2023	0.25	230.00	57.50
	06/02/2023	0.25	230.00	57.50
	06/05/2023	0.25	230.00	57.50
	06/09/2023	0.25	230.00	57.50
	06/10/2023	1.25	230.00	287.50
	06/12/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		2.50		575.00
SENIOR PRINCIPAL				
AUSTIN, LISA	06/07/2023	1.00	300.00	300.00
	06/09/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.25		375.00

Total Task : 05) TRASH MONITORING PLAN **Task Labor** **1,037.50**

Task : **06) LID MONITORING PLAN**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*

Phase : **01) TASK 17 MONITORING SUPPORT**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	06/05/2023	0.75	300.00	225.00
	06/09/2023	0.25	300.00	75.00
Total: SENIOR PRINCIPAL		1.00		300.00

Total Task : 06) LID MONITORING PLAN **Task Labor** **300.00**

Task : 07) POC MONITORING SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	06/01/2023	1.00	300.00	300.00

Total Task : 07) POC MONITORING SUPPORT **Task Labor** **300.00**

Task : 09) ON CALL SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT ADMINISTRATOR				
DUONG, DAVID	06/07/2023	0.50	90.00	45.00
PROJECT PROFESSIONAL				
WELSH, LISA	06/01/2023	1.00	230.00	230.00
	06/07/2023	1.00	230.00	230.00
	06/16/2023	0.25	230.00	57.50
Total: PROJECT PROFESSIONAL		2.25		517.50

Total Task : 09) ON CALL SUPPORT **Task Labor** **562.50**

Total Phase : 01) TASK 17 MONITORING SUPPORT **Phase Labor** **3,307.50**

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Task : 01) ANNUAL PROGRESS SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROFESSIONAL				
GALLO, ELIZABETH	06/02/2023	0.25	200.00	50.00
PROJECT PROFESSIONAL				
WELSH, LISA	06/01/2023	0.75	230.00	172.50
	06/02/2023	2.00	230.00	460.00
	06/04/2023	0.25	230.00	57.50
	06/05/2023	0.25	230.00	57.50
	06/07/2023	0.75	230.00	172.50
	06/08/2023	1.50	230.00	345.00
	06/11/2023	0.25	230.00	57.50
	06/15/2023	0.25	230.00	57.50
	06/20/2023	0.25	230.00	57.50
	06/22/2023	0.25	230.00	57.50
	06/26/2023	0.25	230.00	57.50
	06/30/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		7.50		1,725.00

SENIOR PRINCIPAL

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	06/01/2023	0.50	300.00	150.00
	06/05/2023	0.25	300.00	75.00
	06/05/2023	0.50	300.00	150.00
	06/06/2023	1.00	300.00	300.00
	06/07/2023	1.00	300.00	300.00
	06/08/2023	0.25	300.00	75.00
	06/09/2023	0.75	300.00	225.00
Total: SENIOR PRINCIPAL		4.25		1,275.00

Total Task : 01) ANNUAL PROGRESS SUPPORT **Task Labor** **3,050.00**

Task : 02) SOURCE PROPERTY REFERRAL SUPPOR

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
PROJECT PROFESSIONAL				
WELSH, LISA	06/15/2023	0.50	230.00	115.00
SENIOR PRINCIPAL				
AUSTIN, LISA	06/14/2023	1.00	300.00	300.00
	06/15/2023	1.50	300.00	450.00
Total: SENIOR PRINCIPAL		2.50		750.00

Total Task : 02) SOURCE PROPERTY REFERRAL SUPPOR **Task Labor** **865.00**

Task : 05) OTHER C11 C12 SUBPROVISIONS

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
MEYERS, EMILY	06/06/2023	0.50	175.00	87.50
	06/07/2023	0.75	175.00	131.25
	06/09/2023	2.75	175.00	481.25
	06/21/2023	1.50	175.00	262.50
	06/23/2023	4.00	175.00	700.00
	06/28/2023	0.50	175.00	87.50
Total: SENIOR STAFF PROFESSIONAL		10.00		1,750.00
PROJECT PROFESSIONAL				
WELSH, LISA	06/02/2023	0.25	230.00	57.50
	06/04/2023	0.75	230.00	172.50
	06/06/2023	1.25	230.00	287.50
	06/07/2023	0.75	230.00	172.50
	06/09/2023	0.25	230.00	57.50
	06/11/2023	0.75	230.00	172.50
	06/12/2023	1.00	230.00	230.00
	06/13/2023	0.50	230.00	115.00
	06/14/2023	0.50	230.00	115.00
	06/15/2023	0.25	230.00	57.50
	06/16/2023	0.25	230.00	57.50
	06/20/2023	0.75	230.00	172.50
Total: PROJECT PROFESSIONAL		7.25		1,667.50

Phase : **02) TASK 18 POCS IMPLEMENTATION SUP**

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR PRINCIPAL				
AUSTIN, LISA	06/07/2023	0.75	300.00	225.00
	06/08/2023	0.50	300.00	150.00
	06/23/2023	0.25	300.00	75.00
	06/28/2023	0.50	300.00	150.00
Total: SENIOR PRINCIPAL		2.00		600.00

Total Task : 05) OTHER C11 C12 SUBPROVISIONS **Task Labor** **4,017.50**

Task : 06) ON CALL SUPPORT

Class / Employee Name	*Date*	*Hours*	*Rate*	*Amount*
SENIOR STAFF PROFESSIONAL				
MEYERS, EMILY	06/14/2023	3.00	175.00	525.00
	06/19/2023	2.00	175.00	350.00
	06/20/2023	0.50	175.00	87.50
	06/21/2023	0.50	175.00	87.50
	06/26/2023	0.25	175.00	43.75
	06/29/2023	0.75	175.00	131.25
Total: SENIOR STAFF PROFESSIONAL		7.00		1,225.00
PROJECT PROFESSIONAL				
WELSH, LISA	06/01/2023	0.25	230.00	57.50
	06/02/2023	0.25	230.00	57.50
	06/06/2023	0.75	230.00	172.50
	06/09/2023	0.75	230.00	172.50
	06/13/2023	2.00	230.00	460.00
	06/14/2023	2.50	230.00	575.00
	06/15/2023	0.50	230.00	115.00
Total: PROJECT PROFESSIONAL		7.00		1,610.00
SENIOR PROFESSIONAL				
HAVENS, KELLY	06/02/2023	0.50	255.00	127.50
	06/09/2023	1.00	255.00	255.00
	06/12/2023	0.25	255.00	63.75
	06/14/2023	0.75	255.00	191.25
	06/15/2023	0.50	255.00	127.50
	06/26/2023	1.75	255.00	446.25
	06/29/2023	0.75	255.00	191.25
Total: SENIOR PROFESSIONAL		5.50		1,402.50
SENIOR PRINCIPAL				
AUSTIN, LISA	06/14/2023	2.25	300.00	675.00
	06/19/2023	0.50	300.00	150.00
	06/27/2023	0.75	300.00	225.00
	06/28/2023	5.50	300.00	1,650.00
Total: SENIOR PRINCIPAL		9.00		2,700.00

Total Task : 06) ON CALL SUPPORT **Task Labor** **6,937.50**

Total Phase : 02) TASK 18 POCS IMPLEMENTATION SUP **Phase Labor** **14,870.00**

Total Project Labor	18,177.50
Total Project: CWR0649B -- ACCWP ON CALL FY2022 2023	18,177.50

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

Oakland Office

June 27,2023

Anita Franklin
Alameda County Flood Control & Water C.D.
399 Elmhurst Street
Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

Invoice # AL22X-0523

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: May 2023

Alameda County Clean Water Program

EOA Job #	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 61,370.00	$ 1,704.25	$ 63,074.25	$ 1,925.75
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 44,520.25	$ 6,452.50	$ 50,972.75	$ 2,137.25
AL224	IIDC-23-2	50201	F15W81	CW03	$ 40,000.00	$ 36,972.83	$ 1,245.25	$ 38,218.08	$ 1,781.92
AL225	IIDC-23-3	50201	F15W81	PM1a	$ 6,900.00	$ 1,833.00	$ 805.75	$ 2,638.75	$ 4,261.25
AL226	CW20-22-23	50201	F15W81	PM1	$ 23,000.00	$ -	$ 18,512.00	$ 18,512.00	$ 4,488.00
					$ 188,010.00	$ 144,696.08	$ 28,719.75	$ 173,415.83	$ 14,594.17

TOTAL DUE $ 28,719.75

Okay to pay G33

SG

EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

June 27, 2023

Anita Franklin
Alameda County Flood Control & Water C.D.
399 Elmhurst Street
Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

AL22X-0523

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: May 2023

Labor

Total Staff Labor Costs	$	10,514.75
Subtotal Labor	$	10,514.75

Direct Expenses

Expenses (April and May)	$	18,205.00
Subtotal Expenses	$	18,205.00

TOTAL DUE	**$**	**28,719.75**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-0523

Work Description for May 2023

AL222 Trash Control Program Activities

- Provided Updated Long-Term Trash Load Reduction Plan Guidance Document
- Worked with Subcommittee Chair to develop meeting agenda packet and organize May meeting
- Provide updates and information for Management Committee meeting agenda

AL223 Cost Reporting Framework

- Reviewed comments received on the revised draft Framework and Guidance Manual and prepared a response-to-comments table
- Began making revisions to the Framework and Guidance Manual to address comments received
- Provide updates and information for Management Committee meeting agenda

AL224 IIDC Program Assistance

- Prepared draft June Subcommittee agenda packet for Chair review
- Respond to municipal staff questions and requests
- Continued coordination of contract transfer to a new fiscal agent
- Provide updates and information for Management Committee meeting agenda.

AL225 Regional Firefighting Discharges Work Group

- Provide updates and information for Management Committee meeting.
- Reviewed invoices and prepared work summaries

AL226 BAHM Regional Updates

- Prepared Action Plan and set up process for ACCWP to participate in funding the BAHM Regional Updates project per the BAMS Collaborative project profile approved on 2-23-23.
- Oversaw subcontractor Clear Creek Solutions' work to update the model and User Manual.
- Conducted BAHM Regional Work Group meeting on May 18.

EOA Project Labor Cost Summary by Employee

Start Date: 5/1/2023
End Date: 5/31/2023

Printed on: 6/27/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL22						
AL222:01	**Trash Control Program Activities**					
	John Fusco	6.75	X	$244.00	=	$1,647.00
	Lauren Phillips	0.25	X	$229.00	=	$57.25
	Task Total:	**7.00**				**$1,704.25**
AL223:01	**Cost Reporting Framework**					
	Jill Bicknell	12.00	X	$307.00	=	$3,684.00
	Kristin Kerr	0.50	X	$293.00	=	$146.50
	Ileana Alvarado	12.25	X	$204.00	=	$2,499.00
	Lianne Fong	1.00	X	$123.00	=	$123.00
	Task Total:	**25.75**				**$6,452.50**
AL224:01	**IIDC Subcommittee Assistance**					
	Kristin Kerr	4.00	X	$293.00	=	$1,172.00
	Task Total:	**4.00**				**$1,172.00**
AL224:02	**IIDC Subcommittee Facilitation**					
	Kristin Kerr	0.25	X	$293.00	=	$73.25
	Task Total:	**0.25**				**$73.25**
AL225:01	**Regional Firefighting Discharges WG**					
	Kristin Kerr	2.75	X	$293.00	=	$805.75
	Task Total:	**2.75**				**$805.75**
AL226:01	**BAHM Regional Updates**					
	Jill Bicknell	1.00	X	$307.00	=	$307.00
	Task Total:	**1.00**				**$307.00**
	Project Total:	**40.75**				**$10,514.75**

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852

Expense Details

Filters Used:

- Expense Log Date: 4/1/2023 to 5/31/2023
- Project ID: AL222: to AL226:01
- Expense Log Billed: Selected Items (1)

Project ID-Name: AL226:01 - *BAHM Regional Updates*

Client ID: Alameda County - *Alameda County Flood Control & Water C.D.*

Date	Emp/Vendor	Reference	Description	Expense ID	Units	Cost
4/11/2023	ClearCreekSolutions		BAHM Software & Manual Update	Subcontractor:	1.00	$1,800.00
4/28/2023	ClearCreekSolutions		BAHM Software & Manual Update	Subcontractor:	1.00	$5,250.00
5/31/2023	ClearCreekSolutions		Bay Area Hydrology Model Sofware and User Manual Update	Subcontractor:	1.00	$9,500.00
					Billable Total:	**$16,550.00**
					AL226:01 Total:	**$16,550.00**
					Grand Billable Total:	**$16,550.00**

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Invoice

Clear Creek Solutions, Inc.
8847 Marlene Ct. Sw.
Olympia, WA 98512
360-943-0304
www.clearcreeksolutions.com
FEIN 20-2380586

Date	Invoice #
4/28/2023	1746

Bill To:
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

Ship To:
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

P.O. No.	Terms	Due Date
		5/31/2023

Description	Qty	Rate	Amount
BAHM Subcontract Bay Area Hydrology Model Software and User Manual Update Billing Period: April 1, 2023 through April 30, 2023			
Joe Brascher, Senior Hydrologist, Scope Tasks 1, 3,4,5 and 6	60	200.00	12,000.00
Joe Brascher Jr, Junior Hydrologist, Scope Tasks 1, 3,4,5 and 6	60	150.00	9,000.00

Approved for payment 5-23-23
Subcontractor
CC08.12 $5,250.00
SCV232.11 $5,250.00
AL226.01 $5,250.00
C/CAG $5,250.00 (paid as vendor)

Jill C. Bicknell

Please remit payment to Clear Creek Solutions, Inc., at the address above.

Subtotal	$21,000.00
Sales Tax (0.0%)	$0.00
Total	$21,000.00
Payments/Credits	$0.00
Balance Due	$21,000.00

Phone #
360-943-0304

Stormwater ~ Hydrologic Modeling ~ Software Development

Invoice

Clear Creek Solutions, Inc.
8847 Marlene Ct. Sw.
Olympia, WA 98512
360-943-0304
www.clearcreeksolutions.com
FEIN 20-2380586

Date	Invoice #
4/11/2023	1742

Bill To:
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

Ship To:
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

P.O. No.	Terms	Due Date
		4/11/2023

Description	Qty	Rate	Amount
BAHM Subcontract Bay Area Hydrology Model Software and User Manual Update Billing Period: March 1, 2023 through March 31, 2023			
Joe Brascher, Senior Hydrologist, Tasks 3.1, 4.1, 4.2, 4.3	24	200.00	4,800.00
Joe Brascher Jr, Junior Hydrologist, Task 4.2, 5.1	16	150.00	2,400.00

Approved for payment 5-23-23
Subcontractor
CC08.12 $1,800.00
SCV232.11 $1,800.00
AL226.01 $1,800.00
C/CAG $1,800.00 (paid as vendor)

Jill C. Bicknell

Please remit payment to Clear Creek Solutions, Inc., at the address above.

Subtotal	$7,200.00
Sales Tax (0.0%)	$0.00
Total	$7,200.00
Payments/Credits	$0.00
Balance Due	$7,200.00

Phone #
360-943-0304

Stormwater ~ Hydrologic Modeling ~ Software Development

INVOICE

CLEAR CREEK SOLUTIONS, INC.
6200 Capitol Blvd SE
Tumwater, WA 98012-5847

brascher@clearcreeksolutions.com
+1 (360) 890-1728
Clear Creek Solutions

EOA, Inc.

Bill to
Jill Bicknell
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

Ship to
Jill Bicknell
EOA, Inc.
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

Invoice details
Invoice no.: 1753
Invoice date: 06/01/2023
Terms: Net 30
Due date: 07/01/2023

	Product or service		Amount
1.	BAHM Subcontract Bay Area Hydrology Model Software and User Manual Update Billing Period: May 1, 2023 through May 31, 2023		$0.00
2.	**Services** Joseph Brascher Sr.	100 × $200.00	$20,000.00
3.	**Services** Joseph Brascher Jr.	120 × $150.00	$18,000.00
		Total	**$38,000.00**

Approved for payment 6-1-23
Subcontractor
CC08.12 $9,500.00
SCV232.11 $9,500.00
AL226.01 $9,500.00
C/CAG $9,500.00 (paid as vendor)

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

Oakland Office

July 13,2023

Anita Franklin
Alameda County Flood Control & Water C.D.
399 Elmhurst Street
Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

Invoice # AL22X-0623

INVOICE FOR CONSULTING SERVICES- Contract#C-21382, PO# PBWKS-7574

Billing Period: June 2023

Alameda County Clean Water Program

EOA Job #	Task #	Program #	W.O.#	Activity#	Total Budget	Previous	Current Billed	Total Billed	Remaining
AL222	Trash-22-1	50201	F15W81	CW6	$ 65,000.00	$ 63,074.25	$ 1,049.25	$ 64,123.50	$ 876.50
AL223	CW20-22-23	50201	F15W81	PM1	$ 53,110.00	$ 50,972.75	$ 3,224.25	$ 54,197.00	$ (1,087.00)
AL224	IIDC-23-2	50201	F15W81	CW03	$ 40,000.00	$ 38,218.08	$ 1,758.00	$ 39,976.08	$ 23.92
AL225	IIDC-23-3	50201	F15W81	PM1	$ 6,900.00	$ 2,638.75	$ 2,637.00	$ 5,275.75	$ 1,624.25
AL226	CW20-22-23	50201	F15W81	PM1	$ 23,000.00	$ 18,512.00	$ 4,562.50	$ 23,074.50	$ (74.50)
					$ 188,010.00	$ 173,415.83	$ 13,231.00	$ 186,646.83	$ 1,363.17

TOTAL DUE $ 13,231.00

Okay to pay G33
SG

Ray Goebel

EOA, Inc.
Ray Goebel

☒ Oakland Office

☐ Sunnyvale Office

Environmental and Public Health Engineering
1410 Jackson Street
Oakland, CA 94612

July 13, 2023

Anita Franklin
Alameda County Flood Control & Water C.D.
399 Elmhurst Street
Hayward, CA 94544
Attn: Sharon Gosselin - sharon@acpwa.org

AL22X-0623

INVOICE FOR CONSULTING SERVICES - Contract #C-12788, PO# PBWKS-6231

Period: June 2023

Labor

Total Staff Labor Costs	$	9,436.00
Subtotal Labor	$	9,436.00

Direct Expenses

Expenses	$	3,795.00
Subtotal Expenses	$	3,795.00
TOTAL DUE	**$**	**13,231.00**

EOA, Inc
Alameda County Clean Water Program – Contract #C-21382
EOA Invoice No. AL22X-0623

Work Description for June 2023

AL222 Trash Control Program Activities

- Respond to municipal staff questions and requests

AL223 Cost Reporting Framework

- Completed revisions to the Framework and Guidance Manual
- Distributed the final draft Framework and Guidance Manual to the countywide programs, including ACCWP, for approval
- Followed up with ACCWP to determine if a final ACCWP Work Group meeting was needed (meeting was determined to not be needed)
- Assisted the BAMS Collaborative with transmittal of the final approved Framework and Guidance Manual to the Water Board
- Provide updates and information for Management Committee meeting agenda

AL224 IIDC Program Assistance

- Finalized Agenda packet and attended June Subcommittee meeting. Prepared meeting summary and addressed follow-up action items.
- Continued coordination of contract transfer to a new fiscal agent

AL225 Regional Firefighting Discharges Work Group

- Attended June BAMSC Regional Work Group meeting
- Respond to municipal staff questions and requests
- Provide updates and information for Management Committee meeting
- Reviewed invoices and prepared work summaries

AL226 BAHM Regional Updates

- Oversaw subcontractor Clear Creek Solutions' work to complete model and User Manual updates.
- Developed summary of BAHM updates for Countywide FY 22-23 Annual Reports.
- Conducted BAHM Regional Work Group meeting on June 21.

INVOICE

Approved for payment 6-30-23
Subcontractor
CC08.12 $3,450.00
SCV232.11 $3,450.00
AL226.01 $3,450.00
C/CAG $3,450.00 (paid as vendor)

CLEAR CREEK SOLUTIONS, INC.
6200 Capitol Blvd SE
Tumwater, WA 98012-5847

brascher@clearcreeksolutions.com
+1 (360) 890-1728
Clear Creek Solutions

EOA, Inc.

Bill to
Jill Bicknell
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

Ship to
Jill Bicknell
EOA, Inc.
EOA, Inc.
1410 Jackson St
Oakland, CA 94612

Invoice details
Invoice no.: 1759
Terms: Net 30
Invoice date: 06/29/2023
Due date: 07/29/2023

	Product or service		Amount
1.	**Regional BAHM Updates** Updates for the BAHM2023 model.	39 hrs × $200.00	$7,800.00
2.	**Regional BAHM Updates** Updates for the BAHM2023 model.	40 hrs × $150.00	$6,000.00
		Total	**$13,800.00**

EOA Project Labor Cost Summary by Employee

Start Date: 6/1/2023
End Date: 6/30/2023

Printed on: 7/13/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL222						
AL222:01 Trash Control Program Activities						
	Kristin Kerr	0.25	X	$293.00	=	$73.25
	John Fusco	4.00	X	$244.00	=	$976.00
	Task Total:	**4.25**				**$1,049.25**
	Project Total:	**4.25**				**$1,049.25**

Start Date: 6/1/2023
End Date: 6/30/2023

Printed on: 7/13/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL223						
AL223:01 Cost Reporting Framework						
	Jill Bicknell	7.25	X	$307.00	=	$2,225.75
	Kristin Kerr	0.50	X	$293.00	=	$146.50
	Ileana Alvarado	3.25	X	$204.00	=	$663.00
	Craig Johnson	1.50	X	$126.00	=	$189.00
	Task Total:	**12.50**				**$3,224.25**
	Project Total:	**12.50**				**$3,224.25**

Start Date: 6/1/2023
End Date: 6/30/2023

Printed on: 7/13/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL224							
AL224:01 IIDC Subcommittee Assistance							
	Kristin Kerr		2.00	X	$293.00	=	$586.00
		Task Total:	**2.00**				**$586.00**
AL224:02 IIDC Subcommittee Facilitation							
	Kristin Kerr		4.00	X	$293.00	=	$1,172.00
		Task Total:	**4.00**				**$1,172.00**
		Project Total:	**6.00**				**$1,758.00**

Start Date: 6/1/2023
End Date: 6/30/2023

Printed on: 7/13/2023

Projects/Tasks	Employees	Hours		Rates		Costs
AL225						
AL225:01 Regional Firefighting Discharges WG						
	Kristin Kerr	9.00	X	$293.00	=	$2,637.00
	Task Total:	**9.00**				**$2,637.00**
	Project Total:	**9.00**				**$2,637.00**

Start Date: 6/1/2023
End Date: 6/30/2023

Printed on: 7/13/2023

Projects/Tasks	Employees		Hours		Rates		Costs
AL226							
AL226:01 BAHM Regional Updates							
	Jill Bicknell		2.50	X	$307.00	=	$767.50
		Task Total:	**2.50**				**$767.50**
		Project Total:	**2.50**				**$767.50**

APPLIED marine SCIENCES

June 13, 2023

Invoice No. 430-21/30

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: May 1-31, 2023

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$56,797.07	$3,202.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support - CLOSED	$0	$22,501.00	$22,501.00	$0
50201	Task 7- C8CD-23-1	F15W81	CW5	Creek Status Monitoring - Implementation	$0	$210,000.00	$209,005.34	$994.66
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$4,730.00	$107,000.00	$73,049.37	$33,950.63
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$6,166.25	$86,000.00	$36,623.95	$49,376.05
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$1,935.00	$130,000.00	$54,001.20	$75,998.80
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$2,174.15	$48,081.00	$31,993.79	$16,087.21
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$202.40	$66,671.00	$3,721.31	$62,949.69
50201	Task 13 - PRC-23-1	F15W81	PM1	Website Support	$0	$6,000.00	$1,954.00	$4,046.00
				Total:	$15,207.80	$1,227,303.00	$978,684.43	$248,618.57

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Okay to pay G33
SG

Invoice No. 430-21/30

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
5/1/23-5/31/23

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1						Task Total
Labor	**Rate**	**Hours**	**Charges**					
Principal Scientist-JJ	$231.75							
Program Manager-PS	$215.00	22	$4,730.00					$33,755.00
Principal Scientist-MB	$165.00							
Principal Scientist-AM	$185.00							$2,220.00
Senior Scientist-TV	$120.00							$4,440.00
Staff Scientist-ES	$110.00							
Staff Scientist-EG	$110.00							$907.50
Adminstrative-DS	$110.00							$275.00
Adminstrative-DC	$125.00							
Subcontractors								
ALS								$6,068.00
Kinnetic Environmental								$2,851.53
Pacific Ecorisk								$18,550.00
Direct Expenses								$1,074.24
G&A 10% (Subs only)								$2,746.95
G&A 15% (ODC's only)								$161.15
Total Invoiced			$4,730.00					$73,049.37
TOTALS:								
Authorized Budget			$107,000.00					$107,000.00
Prior Invoiced Amount			$68,319.37					$68,319.37
Current Invoice			$4,730.00					$4,730.00
Budget Remaining			$33,950.63					$33,950.63

Task 8 Amount Due:	$4,730.00

Invoice No. 430-21/30

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
5/1/23-5/31/23

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	28.25	$6,073.75				$36,066.25
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00	0.5	$92.50				$92.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							$39.30
G&A 10% (Subs only)							
G&A 15% (ODC's only)							$5.90
Total Invoiced			$6,166.25				$36,623.95
TOTALS:							
Authorized Budget			$86,000.00				$86,000.00
Prior Invoiced Amount			$30,457.70				$30,457.70
Current Invoice			$6,166.25				$6,166.25
Budget Remaining			$49,376.05				$49,376.05

Task 9 Amount Due:	$6,166.25

Invoice No. 430-21/30

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
5/1/23-5/31/23

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	9	$1,935.00				$46,870.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-TV	$120.00						$240.00
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental							$2,974.00
San Francisco Estuary Institute							$2,795.17
Direct Expenses							$71.83
G&A 10% (Subs only)							$576.92
G&A 15% (ODC's only)							$10.78
Total Invoiced			$1,935.00				$54,001.20
TOTALS:							
Authorized Budget			$130,000.00				$130,000.00
Prior Invoiced Amount			$52,066.20				$52,066.20
Current Invoice			$1,935.00				$1,935.00
Budget Remaining			$75,998.80				$75,998.80

Task 10 Amount Due:	$1,935.00

Invoice No. 430-21/30

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
5/1/23-5/31/23

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$1,976.50				$29,085.25
Direct Expenses							
G&A 10% (Subs only)			$197.65				$2,908.54
G&A 15% (ODC's only)							
Total Invoiced			$2,174.15				$31,993.79
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$29,819.64				$29,819.64
Current Invoice			$2,174.15				$2,174.15
Budget Remaining			$16,087.21				$16,087.21

Task 11 Amount Due:	$2,174.15

Invoice No. 430-21/30

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
5/1/23-5/31/23

Task 12 - Asset Management Framework

Task CW21-23 EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$184.00				$3,383.00
Direct Expenses							
G&A 10% (Subs only)			$18.40				$338.31
G&A 15% (ODC's only)							
Total Invoiced			$202.40				$3,721.31
TOTALS:							
Authorized Budget			$66,671.00				$66,671.00
Prior Invoiced Amount			$3,518.91				$3,518.91
Current Invoice			$202.40				$202.40
Budget Remaining			$62,949.69				$62,949.69

Task 12 Amount Due:	$202.40

EOA, Inc.
1410 Jackson St.
Oakland, CA 946124010
Tel: (510) 832-2852
www.eoainc.com

Invoice

Invoice Date: Jun 6, 2023

Invoice Num: AMS001-0423

Billing From: Apr 01, 2023

Billing To: Apr 30, 2023

Mr Paul Salop
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551

Facilitate Unsheltered Homeless Work Group (AMS001:01) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK) Task 11

Professional Services:

Employee Title	Hours	Rate	Amount
Managing Eng./Sci. III	0.50	$293.00	$146.50
Senior Engineer/Scientist III	7.50	$244.00	$1,830.00
		Total Services:	**$1,976.50**

Draft BMP Report (AMS001:02) - **PO#:** TO #2022-0002 (430-001) - Managed by (KAK) Task 12

Professional Services:

Employee Title	Hours	Rate	Amount
Associate Engineer/ScientistII	1.00	$184.00	$184.00
		Total Services:	**$184.00**

Amount Due This Invoice: **$2,160.50**

This invoice is due upon receipt

EOA, Inc.
Ray Goebel

ACCOUNT SUMMARY

Total Budget	Prior Billings	Current Billings	Total Billings	Remaining Balance
$43,710.00	**$27,108.75**	**$2,160.50**	**$29,269.25**	**$14,440.75**

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June 14, 2023

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda County Public Works Agency
399 Elmhurst St
Hayward, CA 94544

Subject: AMS Invoice 430-21/30 Activities

Dear Sharon,

This project summary describes activities conducted by AMS in May 2023 associated with invoice 430-21/30. Only subtasks for which work was conducted during the invoice period are shown.

Subtask 7 – Creek Status Monitoring - Implementation

- Participation in coordination meetings with Geosyntec and Jim Scanlin

Subtask 8 – Pollutants of Concern Monitoring

- Conducted QA and data management for lab deliverables for Feb 2023 POC water quality monitoring event
- Developed and submitted field report and lab results summary / interpretation for Feb 2023 monitoring event
- Conducted QA and data management for chemistry and toxicity lab deliverables for wet season regional Pesticides and Toxicity monitoring event conducted Nov 2022

Subtask 9 – Receiving Water Monitoring - Trash

- Coordinated with Oldcastle re: cost estimate and engineering design
- Conducted site visits with City of Dublin, Oldcastle, and potential concrete and maintenance subcontractors at four proposed monitoring locations to review trash controls in place, finalize full trash capture design, generate cost estimates for pre-installation site work and for support to deploy and retrieve netting.
- Coordinated with USACE, Zone 7, and City of Dublin staff on location and permitting of target trash monitoring sites
- Participated in / presented for regional TAG meeting #2 and associated internal TAG prep meetings
- Submitted first draft of Trash Quality Assurance Project Plan (QAPP)

Subtask 10 – Low Impact Development Monitoring Planning

- Coordinated with City of Oakland staff re: target monitoring location and schedule / LOE of planned maintenance activities
- Continued project scoping re: equipment needs and timing

4749 Bennett Drive, Suite L, Livermore, CA 94551 925.373.7142 Fax 925.373.7834

Subtask 11 – Facilitate Unsheltered Homeless Work Group

- Coordinated with Psomas and ACCWP Data Management Subcommittee on
- mapping task
- Coordinated with Alameda County staff on mapping task
- Researched BMPs for flood management agencies and outside of the Bay Area
- Provided summary for ACCWP Management Committee meeting.

Subtask 12 – ACCWP Asset Management Framework

- Followed-up with remaining municipalities to receive BMP survey information

APPLIED marine SCIENCES

July 18, 2023

REVISED Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

ACCWP

Invoice for Consulting Services - Procurement Contract No. 21346

PO#7572

Period: June 1-30, 2023

For Approval by Sharon Gosselin

Program No.	Task Numbers	Work Order	Activity Code		Current Invoice	Budgeted	Cumulative	Remaining
50201	Task 1 - C8CD-21-1	F15W81	CW5	Creek Status Monitoring - Implementation-CLOSED	$0	$420,000.00	$420,000.00	$0
50201	Task 2 - C8F-21-21a	F15W81	CW5	Pollutants of Concern Monitoring-CLOSED	$0	$62,250.00	$62,134.89	$115.11
50201	Task 3 - PRC-21-1	F15W81	CW5	Website Support-CLOSED	$0	$4,400.00	$4,345.00	$55.00
50201	Task 4 - C8E-21-1	F15W81	CW5	Arroyo Las Positas SSID Study	$0	$60,000.00	$56,797.07	$3,202.93
50201	Task 5 - C.8-22-1	F15W81	CW5	Monitoring Subcommittee Workgroup Support-CLOSED	$0	$4,400.00	$2,557.50	$1,842.50
50201	Task 6 - PRC-21-1	F15W81	PM1	Website Support - CLOSED	$0	$22,501.00	$22,501.00	$0
50201	Task 7- C8CD-23-1	F15W81	CW5	Creek Status Monitoring - Implementation	$537.50	$210,000.00	$209,542.84	$457.16
50201	Task 8 - CW8.-22-23	F15W81	CW5	Pollutants of Concern Monitoring	$1,995.00	$107,000.00	$75,044.37	$31,955.63
50201	Task 9 - CW8.e-22-23	F15W81	CW5	Receiving Water Monitoring - Trash	$4,192.50	$86,000.00	$40,816.45	$45,183.55
50201	Task 10 - CW8.d.i.22-23	F15W81	CW5	Low Impact Development Monitoring Planning	$34,673.44	$130,000.00	$88,674.64	$41,325.36
50201	Task 11 - Task CW17-22-23-	F15W81	PM1	Facilitate Unsheltered Homeless Work Group	$10,009.18	$48,081.00	$42,002.97	$6,078.03
50201	Task 12 - Task CW21-22-23 EOA	F15W81	PM1	Asset Management Framework	$5,112.53	$66,671.00	$8,833.84	$57,837.16
50201	Task 13 - PRC-23-1	F15W81	PM1	Website Support	$0	$6,000.00	$1,954.00	$4,046.00
				Total:	$56,520.15	$1,227,303.00	$1,035,204.57	$192,098.43

Please remit payment to:
Applied Marine Sciences, Inc.
4749 Bennett Drive, Suite L
Livermore, CA 94551
(925) 373-7142

Okay to pay G33
Sg

Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
6/1/23-6/30/23

Task 7 - Creek Status Monitoring - Implementation

Task PRC-23-1

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	2.5	$537.50				$60,197.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$647.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$1,842.50
Staff Scientist-TV	$120.00						$10,560.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						$125.00
Subcontractors							
Kinnetic Environmental							$32,591.93
Bioassessment Services							$18,301.89
San Jose State University							$3,075.00
Benjamin Salop							$360.00
Ecoanalysts							$31,437.00
Caltest							$17,488.30
Coastal Conservation & Research							$1,153.75
Pacific Ecorisk							$18,200.50
Direct Expenses							$1,131.42
G&A 10% (Subs only)							$12,260.84
G&A 15% (ODC's only)							$169.71
Total Invoiced			$537.50				$209,542.84
TOTALS:							
Authorized Budget			$210,000.00				$210,000.00
Prior Invoiced Amount			$209,005.34				$209,005.34
Current Invoice			$537.50				$537.50
Budget Remaining			$457.16				$457.16

Task 7 Amount Due:	$537.50

Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
6/1/23-6/30/23

Task 8 - Pollutants of Concern Monitoring

Task CW8.f-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	9	$1,935.00				$35,690.00
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$2,220.00
Senior Scientist-TV	$120.00	0.5	$60.00				$4,500.00
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						$907.50
Adminstrative-DS	$110.00						$275.00
Adminstrative-DC	$125.00						
Subcontractors							
ALS							$6,068.00
Kinnetic Environmental							$2,851.53
Pacific Ecorisk							$18,550.00
Direct Expenses							$1,074.24
G&A 10% (Subs only)							$2,746.95
G&A 15% (ODC's only)							$161.15
Total Invoiced			$1,995.00				$75,044.37
TOTALS:							
Authorized Budget			$107,000.00				$107,000.00
Prior Invoiced Amount			$73,049.37				$73,049.37
Current Invoice			$1,995.00				$1,995.00
Budget Remaining			$31,955.63				$31,955.63

Task 8 Amount Due:	$1,995.00

Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
6/1/23-6/30/23

Task 9 - Receiving Water Monitoring - Trash

Task CW8.e.22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	19.5	$4,192.50				$40,258.75
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$92.50
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-TV	$120.00						$420.00
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
Kinnetic Environmental (ADH)							
Bioassessment Services							
Direct Expenses							$39.30
G&A 10% (Subs only)							
G&A 15% (ODC's only)							$5.90
Total Invoiced			$4,192.50				$40,816.45
TOTALS:							
Authorized Budget			$86,000.00				$86,000.00
Prior Invoiced Amount			$36,623.95				$36,623.95
Current Invoice			$4,192.50				$4,192.50
Budget Remaining			$45,183.55				$45,183.55

Task 9 Amount Due:	$4,192.50

Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: CW5
Project Number #50201

Payment Schedule
6/1/23-6/30/23

Task 10 - Low Impact Development Monitoring Planning

Task CW8.d.i-22-23

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00	20.5	$4,407.50				$51,277.50
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						$462.50
Staff Scientist-TV	$120.00						$240.00
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00	2	$250.00				$250.00
Subcontractors							
Kinnetic Environmental			$23,856.10				$26,830.10
San Francisco Estuary Institute							$2,795.17
Coastal Conservation and Research			$1,153.75				$1,153.75
Direct Expenses			$2,178.34				$2,250.17
G&A 10% (Subs only)			$2,501.00				$3,077.92
G&A 15% (ODC's only)			$326.75				$337.53
Total Invoiced			$34,673.44				$88,674.64
TOTALS:							
Authorized Budget			$130,000.00				$130,000.00
Prior Invoiced Amount			$54,001.20				$54,001.20
Current Invoice			$34,673.44				$34,673.44
Budget Remaining			$41,325.36				$41,325.36

Task 10 Amount Due:	$34,673.44

Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
6/1/23-6/30/23

Task 11 - Facilitate Unsheltered Homeless Work Group

Task CW17-22-23-EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$9,099.25				$38,184.50
Direct Expenses							
G&A 10% (Subs only)			$909.93				$3,818.47
G&A 15% (ODC's only)							
Total Invoiced			$10,009.18				$42,002.97
TOTALS:							
Authorized Budget			$48,081.00				$48,081.00
Prior Invoiced Amount			$31,993.79				$31,993.79
Current Invoice			$10,009.18				$10,009.18
Budget Remaining			$6,078.03				$6,078.03

Task 11 Amount Due:	$10,009.18

Invoice No. 430-21/31

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, CA 94544

Work Order#: F15W81
Activity Code: PM1
Project Number #50201

Payment Schedule
6/1/23-6/30/23

Task 12 - Asset Management Framework

Task CW21-23 EOA

		Subtask 1					Task Total
Labor	**Rate**	**Hours**	**Charges**				
Principal Scientist-JJ	$231.75						
Program Manager-PS	$215.00						
Principal Scientist-MB	$165.00						
Principal Scientist-AM	$185.00						
Staff Scientist-ES	$110.00						
Staff Scientist-EG	$110.00						
Staff Scientist-CH	$115.00						
Adminstrative-DS	$110.00						
Adminstrative-DC	$125.00						
Subcontractors							
EOA, Inc.			$4,647.75				$8,030.75
Direct Expenses							
G&A 10% (Subs only)			$464.78				$803.09
G&A 15% (ODC's only)							
Total Invoiced			$5,112.53				$8,833.84
TOTALS:							
Authorized Budget			$66,671.00				$66,671.00
Prior Invoiced Amount			$3,721.31				$3,721.31
Current Invoice			$5,112.53				$5,112.53
Budget Remaining			$57,837.16				$57,837.16

Task 12 Amount Due:	$5,112.53

APPLIED marine SCIENCES

July 19, 2023

Ms. Sharon Gosselin
ACCWP Program Manager
Alameda County Public Works Agency
399 Elmhurst St
Hayward, CA 94544

Subject: AMS Invoice 430-21/31 Activities

Dear Sharon,

This project summary describes activities conducted by AMS in June 2023 associated with invoice 430-21/31. Only subtasks for which work was conducted during the invoice period are shown.

Subtask 7 – Creek Status Monitoring

- Coordination with BAMSC Programs on July dry season monitoring

Subtask 8 – Pollutants of Concern Monitoring

- Planning for FY 2024 Pesticides and Toxicity and POCs water quality monitoring
- Contracting and bottle order for Caltest and PER for Pesticides and Toxicity and POCs monitoring

Subtask 9 – Receiving Water Monitoring - Trash

- Participated in monthly planning meeting with Jim Scanlin and Geosyntec
- Review and responded to MPC and TAG comments on ACCWP Trash Outfall Monitoring Plan
- Attended internal BAMSC Trash coordinating meeting
- Meeting with Keith Lichten / Derek Beaudy of WB to resolve remaining questions before purchase of durable equipment.
- Coordinated with Zone 7 on CDFW permitting issues
- Participated in several meetings and developed responses to comments of TAG members to monitoring plan and QAPP
- Revised precipitation model to predict number of sampleable storms based on hindcast of precip data

Subtask 10 – Low Impact Development Monitoring Planning

- Participated in monthly planning meeting with Jim Scanlin and Geosyntec
- Coordinated with KEI on equipment purchases and staffing planning
- Coordinted with Enthalpy on cost estimate and QA for organics analyses for WY 2024 LID monitoring
- Attended internal BAMSC LID coordinating meeting
- Purchasing of LID monitoring equipment
- Meeting with Keith Lichten / Derek Beaudy of WB to resolve remaining questions before purchase of durable equipment

4749 Bennett Drive, Suite L, Livermore, CA 94551 925.373.7142 Fax 925.373.7834

- Site visit to LID facility to meet with City of Oakland staff and maintenance contractors re: permitting of site, planning for equipment installation, and coordination with maintenance contractor on required initial and ongoing site work

Subtask 11 – Facilitate Unsheltered Homeless Work Group

- Continued to coordinate with Psomas and DM-G Subcommittee on mapping task
- Coordinated ACCWP C.17 Work Group Meeting on June 27 and provided information, guidance and updates on mapping, evaluation effectiveness, Annual Report and Regional BMP report
- Presented at ACCWP Policy Committee meeting on June 28
- Attended ACCWP Management Committee meeting on June 28 and provided updates

Subtask 12 – ACCWP Asset Management Framework

- Continued to review and provide content for draft Regional BMP report

7. DOCUMENTATION

IN SUPPORT OF UNION CITY TEST CLAIM

IN RE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

ORDER NO. R2-2022-0018
AS MODIFIED BY ORDER NO. R2-2023-0019
NPDES PERMIT NO. CAS612008
MAY 11, 2022

EXHIBIT 1
to Section 7

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order No. R2-2022-0018
NPDES Permit No. CAS612008
May 11, 2022

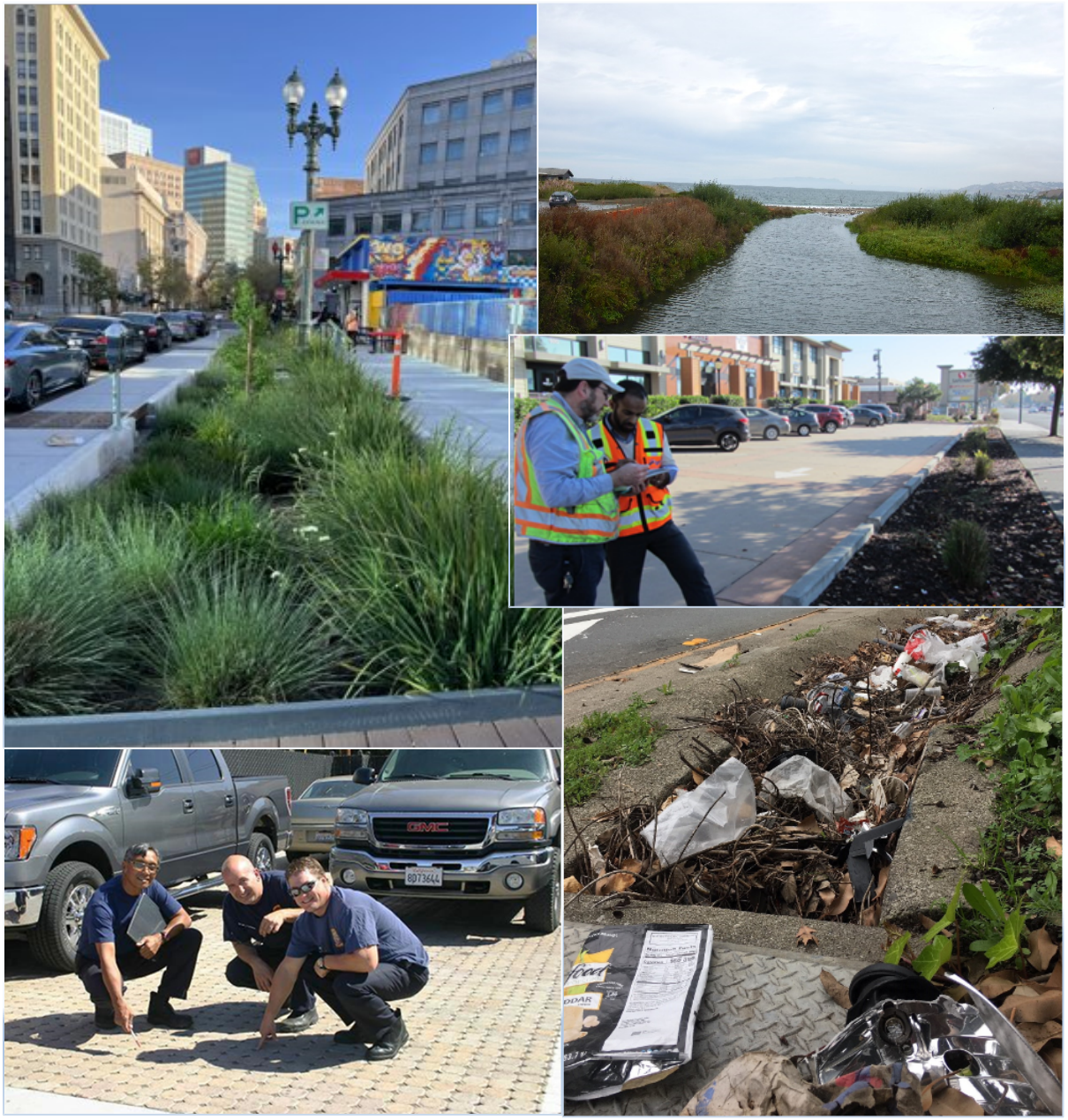

S7-0002

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER No. R2-2022-0018
NPDES PERMIT No. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance (Solano Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Attachment A) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. The Fact Sheet, including any supplements thereto, is hereby incorporated by reference.

Existing Permit

2. **Alameda County—**The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 1, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.
3. **Contra Costa County—**The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 1, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.
4. **San Mateo County—**The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City,

San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County have joined together to form the San Mateo Countywide Water Pollution Prevention Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 2, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County—**The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 2, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun—**The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 3, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo—**The City of Vallejo and Vallejo Flood & Wastewater District (hereinafter referred to as the Vallejo Permittees) have submitted permit applications (Report of Waste Discharge), dated June 25 and June 29, 2020, respectively, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions. The Vallejo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

8. The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater

District have joined together to form the Solano Stormwater Alliance (hereinafter referred to as the Solano Permittees). The Alameda, Contra Costa, San Mateo, Santa Clara, and Solano Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, U.S. EPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, U.S. EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and U.S. EPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, trash, and selenium in San Francisco Bay segments; pesticide associated toxicity, and trash in urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

13. Stormwater runoff is generated from various land uses in all the hydrologic sub-basins in the Basin and discharges into watercourses, which in turn flow into Central,

Lower and South San Francisco Bay, and Suisun and San Pablo Bays.

14. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not limited to, support for aquatic life; and other pollutants that can cause aquatic toxicity in the receiving waters.

15. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to U.S. EPA stormwater regulations.

16. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

17. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

18. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments and recommendations.

19. The Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

20. This Order supersedes and rescinds Order Nos. R2-2015-0049 as amended by R2-2019-0004.
21. This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective July 1, 2022, provided the Regional Administrator, U.S. EPA, Region 9, has no objections.

THEREFORE, IT IS HEREBY ORDERED that Order No. R2-2015-0049, as amended by Order No. R2-2019-0004, is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Permittees shall comply with the following requirements in this Order. This action in no way prevents the Water Board from taking enforcement action for past violations of the previous order.

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. Permittees are also subject to the trash discharge prohibition in the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California and the Water Quality Control Plan for Ocean Waters of California.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

B.1.a. Floating, suspended, or deposited macroscopic particulate matter, or foam;

B.1.b. Bottom deposits or aquatic growths;

B.1.c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

B.1.d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

B.1.e. Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are

adopted and approved by the State Water Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.24. Compliance with Provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), bacteria, sediment, diazinon and chlorpyrifos, and methylmercury, shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provision C.10 which prescribes requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of WQS, except for exceedances of WQS for pesticides, trash, mercury, PCBs, bacteria, sediment, diazinon and chlorpyrifos, and methylmercury that are managed pursuant to Provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f, persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:

C.1.a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable (WQS), the Permittee(s) shall notify, within no more than 30 days, and thereafter submit a report to the Water Board that describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

C.1.b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring

exceedances of the same receiving water limitations unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. Task Description – Asphalt/Concrete Removal, Cutting, Installation, and Repair

The Permittees shall implement appropriate BMPs, such as those described in the California Stormwater Quality Association (CASQA) Municipal Stormwater BMP Handbook and Construction Stormwater BMP Handbook, at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving, repair, or maintenance activities.

ii. Implementation Levels

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if wastewater generated from road construction, repair, and maintenance activities may be discharged to the sanitary sewer system, provided appropriate approvals are obtained and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from work sites upon completion of work. The Permittees shall require cleanup of all construction debris, spills, and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association (BASMAA) Blueprint for a Clean Bay or the CASQA Municipal Stormwater BMP Handbook.

iii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. **Task Description** – The Permittees shall implement and require to be implemented BMPs that prevent the discharge of polluted wash water and non- stormwater to storm drains from pavement, sidewalk and plaza cleaning, mobile cleaning, outdoor pressure washing operations, and washing down of trash areas and gas station or mobile fueling service areas. BMPs for washing down outside areas of human habitation shall include sanitizing procedures. The Permittees shall implement BMPs such as those included in the BASMAA Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. **Reporting**

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. **Task Description**

(1) The Permittees shall implement appropriate BMPs to prevent the discharge of polluted stormwater and non-stormwater from bridges and structural maintenance activities directly into surface waters or storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. **Implementation Levels**

(1) The Permittees shall prevent all debris and pollutants, including structural materials and coating debris, such as paint chips, generated in bridge and structure maintenance or graffiti removal, from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks, or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste, or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall use proper disposal methods for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts the proper capture and disposal methods for the wastes generated.

iii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.d. Stormwater Pump Stations

i. Task Description –The Permittees shall implement measures to operate, inspect, and maintain stormwater pump stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in stormwater discharges to comply with WQS.

ii. Implementation Levels – The Permittees shall comply with the following at Permittee-owned or -operated pump stations:

(1) Upon becoming aware that the discharge from a pump station has a dissolved oxygen (DO) concentration below 3.0 mg/L, implement corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 milligrams per liter (mg/L) and verify the effectiveness of the corrective actions with monitoring. Corrective actions are not necessary for discharges from pump stations that remain in the stormwater collection system or infiltrate into a dry creek immediately downstream.

(2) Ensure that pump stations are free of debris and trash, replace any oil-absorbent booms, as needed, and investigate and abate illicit discharges. Pump stations excluded from C.2.d.ii.(1) above are not excluded from this requirement.

(3) The Permittees shall maintain records of inspection, maintenance, implementation of corrective actions, and any monitoring records at Permittee-owned or -operated pump stations. These records shall be made available to Water Board staff or its representatives during inspections and audits, or otherwise upon request.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance

For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing, or open space uses. Rural roads include paved, unpaved, utility, and access roads in rural areas. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, such as those in the CASQA Construction Stormwater BMP Handbook, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Wildlife (CDFW), and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

San Mateo County has additional rural road requirements for the Pescadero-Butano Sediment TMDL described in Provision C.18 and shall also implement that provision.

ii. Implementation Level

(1) The Permittees shall continue to implement erosion and sediment control BMPs, in addition to those described in Provision C.2.a, during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities.

(2) The Permittees shall implement appropriate BMPs to minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities by:

(a) Selecting road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identifying and prioritizing rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Constructing roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Implementing an inspection program to maintain rural roads' structural integrity and prevent impacts to water quality;

(e) Maintaining rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, and address excessive erosion;

(f) Re-grading unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacing existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall incorporate information about the importance of planning and construction in avoiding water quality impacts into existing training and guidance on permitting requirements for rural public works activities.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for rural public works construction and maintenance activities, including reporting on increased maintenance in priority areas, in the Annual Report.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle and heavy equipment maintenance yards and parking areas, and material storage facilities, to comply with water quality standards. Each SWPPP shall incorporate all appropriate BMPs, such as those described in the current versions of the CASQA Municipal Stormwater BMP Handbook or the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, and addenda, as applicable.

(2) The requirements in this provision shall apply only to facilities that are not covered under the State Water Board's Industrial Stormwater NPDES General Permit.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters from street sweepers, vactor trucks, or other related equipment. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that non-stormwater discharges are not entering the storm drain system and that pollutant discharges are prevented to the maximum extent practicable. At a minimum, each corporation yard shall be fully inspected each year between August 1 and September 30. Permittees shall cease or cause to be ceased any active non-stormwater discharges immediately after they are discovered. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency. In areas where a sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to an alternative sanitary sewer connection or municipal wastewater treatment plant, or implement appropriate BMPs to collect, properly treat, and reuse wash water onsite without any discharge.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where a sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting

(1) In each Annual Report, Permittees shall list activities conducted in the corporation yards that have BMPs in the site-specific SWPPP, the date(s) of inspections, the results of inspections, and any follow-up actions, including the date of any necessary corrective actions implemented. The information may be reported in a narrative or tabular format.

(2) In the 2023 Annual Report, Permittees shall make their corporation yard SWPPPs available to the Water Board by providing links to online documents or submitting the documents as part of the Annual Report.

C.2.g. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as “No dumping, drains to Bay” or equivalent. For newly approved, privately maintained streets, Permittees shall require storm drain inlet markings with an appropriate stormwater pollution prevention message by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings on the storm drain inlets shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain storm drain inlet markings of at least 80 percent of municipality-maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Storm drain inlet markings of newly developed, privately maintained streets shall be verified prior to acceptance of the project. Permittees shall require maintenance of the storm drain inlet markings through the development maintenance entity.

(3) Certify that all privately maintained streets had storm drain inlet markings verified prior to acceptance of the project and were required to maintain the storm drain inlet markings through the development maintenance entity.

iii. **Reporting** – In the 2026 Annual Report, each Permittee shall (1) state how many municipally-maintained storm drain inlets it has, (2) certify that at least 80 percent of municipality-maintained storm drain inlet markings are legibly labeled with an appropriate stormwater pollution prevention message during the permit term; and (3) include a picture of a labeled municipality-maintained inlet.

C.2.h. Staff Training

i. **Task Description** – Permittees shall ensure municipal maintenance staff conducting routine repair and maintenance activities of municipal facilities and infrastructure, or activities related to the implementation of corporation yard SWPPPs, are appropriately trained on the requirements of Provision C.2 and methods of implementation. Trainings may be program-wide, region-wide, or Permittee-specific.

ii. **Implementation Level** – At a minimum, provide training at least once within the 5-year term of this Permit to municipal staff on the following topics as relevant to municipal staff responsible for maintenance activities:

(1) Stormwater pollution prevention;

(2) Appropriate BMPs for maintenance and cleanup activities;

(3) Street and Road Repair and Maintenance BMPs;

(4) Sidewalk/Plaza Maintenance and Pavement Washing;

(5) Bridge and Structure Maintenance and Graffiti Removal;

(6) Corporation Yard SWPPPs and BMPs; and

(7) Spill and discharge response and notification procedures and contacts.

iii. **Reporting** – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Total number of Permittee maintenance staff;

(4) Number and percentage of Permittee maintenance staff who attended training;

(5) If there was no training in a given year, so state.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and significant redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. Task Description – At a minimum, each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; and protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable

review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain inlet stenciling.
- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs, such as ReScape California.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:
    - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
    - Dumpster drips from covered trash and food compactor enclosures.
    - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
    - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
    - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the ReScape California Guidelines).

ii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1) - (8) in the 2023 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and

stormwater treatment onsite or at a joint stormwater treatment facility[1] in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked. For Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

(1) Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d. under a previous MS4 permit is exempt from the requirements of Provision C.3.c. (low impact development requirements).

(2) Any Regulated Project that was approved with no Provision C.3. stormwater treatment requirements under a previous MS4 permit and that has not begun construction by the effective date of this Permit, shall be required to fully comply with the requirements of Provisions C.3.c. and C.3.d. Permittees may grant exemptions from this requirement as follows:

(a) An exemption may be granted to:

(i) Any Regulated Project that was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the ordinances, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law.

(ii) Any Regulated Project for which the Permittee has no legal authority to require changes to previously granted approvals, such as projects that have been granted building permits.

(b) An exemption from the LID requirements of Provision C.3.c. may be granted to any such Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.

(3) Any pending Regulated Project that has not yet been approved as of June 30, 2023, and for which a Permittee has no legal authority to require new requirements under Government Code sections 66474.2 or 65589.5., subd. (o), is subject to the Provision C.3 requirements in effect on the Permit's effective date.

[1] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee, including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the project:[2]

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv):

(i) The following interior and exterior practices are excluded:

a. Interior remodels; and

b. Routine maintenance or repair such as roof or exterior wall surface replacement.

(ii) The following pavement maintenance practices are excluded;

a. Pothole and square cut patching;

b. Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage;

[2] This does not include separate additional portions of the public right of way that Permittees require treatment of, which the Regulated Project is not disturbing. This is typically enforced through local ordinance, such as what is described in Provision C.3.j.ii.(2)(j).

c. Shoulder grading;

d. Reshaping/regrading drainage systems;

e. Crack sealing;

f. Pavement preservation activities that do not expand the road prism;

g. Upgrading from a bituminous surface treatment (e.g., chip seal)[3] with an overlay of asphalt or concrete, without expanding the area of coverage;[4]

h. Applying a bituminous surface treatment to existing asphalt or concrete pavement, without expanding the area of coverage; and

i. Vegetation maintenance.

j. Layering gravel over an existing gravel road, without expanding the area of coverage.

(iii) The following pavement maintenance practices are not excluded. For Road Reconstruction Projects, these practices are included only if they trigger <u>all</u> criteria specified in Provision C.3.b.ii.(5), including the criteria regarding contiguousness.

a. Removing and replacing an asphalt or concrete pavement to the top of the base course[5] or lower, or repairing the pavement base (including repair of the pavement base in preparation for bituminous surface treatment, such as chip seal), as these are considered replaced impervious surfaces;

b. Extending the pavement edge without increasing the size of the road prism, or paving graveled shoulders, as these are considered new impervious surfaces; and

c. Resurfacing by upgrading from dirt to gravel, to a bituminous surface treatment (e.g., chip seal),[3] to asphalt, or to concrete; or upgrading from gravel to a bituminous surface treatment, to asphalt, or to concrete, as these are considered new impervious surfaces.

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[3] This is defined further in the Glossary

[4] This includes wedge grinding that is implemented as part of the upgrade project, so long as the area of coverage is not expanded. See definition of wedge grinding in Glossary.

[5] See definition in Glossary.

(iv) For a project consisting of a combination of exempted pavement maintenance practices (pursuant to Provision C.3.b.ii.(1)(b)(ii)), non-exempted pavement maintenance practices (pursuant to Provision C.3.b.ii.(1)(b)(iii)), and/or practices that fall under any other Regulated Project category (pursuant to Provision C.3.b.ii.(1)-(6)), the parts of the project that are not exempt shall be evaluated as a Regulated Project.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(e) The calculations in Provision C.3.b.ii.(1)(c)-(d) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(2) **Other Development Projects**

New development projects that create 5,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects (other than public road projects), including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the projects.[2] This category includes development projects on public or private land that fall under the planning and building authority of a Permittee.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, new and reconstructed private roads and private trails, and public projects (other than public road and trail projects),[6] including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the projects.[2] Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions that apply to this category are listed in Provision C.3.b.ii.(1)(b). Public works projects that are additionally excluded from this category – unless they create and/or replace 5,000 contiguous[8] square feet or more of impervious surface – include the following examples: sidewalk gap closures,[7] sidewalk section replacement, and ADA curb ramps. However, as noted above, portions of the public right of way that are developed or redeveloped as part of Regulated Projects (e.g., curb extensions, pavement replacement, and curb and gutter replacement) shall be included in the total created and/or replaced impervious surface that must be treated by those Regulated Projects.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in

[6] Examples of such public projects are construction/reconstruction of: streetlights, signals, and signs; curb extensions, sidewalks, and medians; crosswalk enhancements, bulb-outs, curb ramps, and ADA improvements; and sidewalk extensions.

[7] The filling of gaps between sections of sidewalks, with pavement (e.g., where a block has a sidewalk, but it is not continuous because it is missing across a parcel, completing the sidewalk across that parcel).

the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(c) The calculations in Provision C.3.b.ii.(3)(a)-(b) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(4) **New or Widening Road Projects**

Any of the following types of road projects that create 5,000 square feet or more of newly constructed contiguous[8] impervious surface, that are both public and private road projects, and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

[8] Project areas interrupted by cross streets or intersections are considered contiguous.

(c) Construction of impervious[9] trails that are greater than or equal to 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

(i) Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.

(ii) Bicycle lanes built as part of new streets or roads, but that are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.

(iii) Impervious trails that direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area.

(iv) Sidewalks, bicycle lanes, or trails constructed as pervious pavement systems.[10]

(v) Caltrans highway projects and associated facilities.

(5) **Road Reconstruction Projects**

Road projects that involve the reconstruction of existing streets or roads,[11] which create and/or replace greater than or equal to one contiguous[8] acre of impervious surface and that are public road projects and/or fall under the building and planning authority of a Permittee, including sidewalks and bicycle lanes that are built or rebuilt as part of the existing streets or roads. This Regulated Project category includes utility trenching projects which are - on average, over the entire length of the project - greater than or equal to 8 feet wide. It also includes public pavement maintenance practices listed in Provision C.3.b.ii.(1)(b)(iii)(b).

Project activities that are included and excluded, which apply to this category, are listed in Provision C.3.b.ii.(1)(b)(ii)-(iv). Pavement maintenance practices that are not excluded (as detailed in Provision C.3.b.ii.(1)(b)(iii)) are considered Road Reconstruction Projects if they meet the other definitions therein.

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[9] Gravel layers are considered impervious, excluding gravel layers that are included in pervious pavement systems (as defined in the Glossary).

[10] As defined in the Glossary.

[11] The definition of roads includes roads on levees.

(a) Where the reconstruction project results in an alteration of greater than or equal to 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that was reconstructed).

(b) Where the reconstruction project results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new and/or replaced impervious surface within the project footprint). However, if the stormwater runoff from the existing impervious surface and the added impervious surface cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added impervious surface.

(c) Road Reconstruction Projects shall comply with Provision C.3.d. However, with cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the Provision C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019, to size Road Reconstruction Projects. If so, Permittees must comply with the Water Board's June 21, 2019, conditional approval of that submittal, which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used.

(d) Permittees may credit the acreage of impervious surface created or replaced for Road Reconstruction Projects towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

(6) **Large Detached Single-Family Home Projects**

Detached single-family home projects that create and/or replace 10,000 ft^2 or more of impervious surface (collectively over the entire project site) and are not part of a larger development or redevelopment plan regulated under Provision C.3.b.ii.(2)-(3).

(a) Where a single family home project results in an alteration of **50 percent or more** of the impervious surface of a previously existing project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire project).

(b) Where a single family home project results in an alteration **of less than 50 percent** of the impervious surface of a previously existing project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(c) The calculations in Provision C.3.b.ii.(6)(a)-(b) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(d) Included in this Regulated Project category is the addition of an accessory dwelling unit (ADU) on an existing parcel with one single-family home, without a subdivision.

iii. Implementation Level

(1) Provision C.3.b.i shall be effective immediately.

(2) Beginning July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii are effective.

(3) Prior to July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii in Attachment I are effective, which are definitions from the Previous Permit.

(4) For Provisions C.3.b.iii.(1)-(3), this shall include a database or equivalent tabular format that contains all the information under Reporting (Provision C.3.b.iv.).

iv. Reporting

(1) **C.3.b.i.(2) Reporting**

In the 2023 Annual Report, each Permittee shall provide a complete list of the development projects that are subject to the requirements of Provision C.3.b.i.(2). For each such project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). If a Permittee has no projects subject to Provision C.3.b.i.(2), it shall so state in the 2023 Annual Report.

(2) **Annual Reporting – C.3.b.ii. Regulated Projects**

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the Provision C.3.b. Sample Reporting Table included in Attachment B):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date), and whether the project has been completed. If not, the estimated project completion date;

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project;

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

(i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.iv.(2)(a) – (l) for the offsite project; and

(ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.iv.(2)(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g) – If not required, state why not. If required, state control method used.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

i. Task Description – The Permittees shall, at a minimum, implement the following LID requirements:

(1) Source Control Requirements

Require all Regulated Projects to implement source control measures onsite that, at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste, and compactor enclosures;

- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) Site Design and Stormwater Treatment Requirements

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.

- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with pervious pavement systems.[12]
- Construct driveways, bike lanes, and/or uncovered parking lots with pervious pavement systems.

(b) Permittees shall implement the design specifications for pervious pavement systems contained within their countywide stormwater handbooks.

(c) Require each Regulated Project and all projects implemented pursuant to Provision C.3.j to treat 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's or Provision C.3.j project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment.

(ii) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour, and maximize infiltration to the native soil during the life of the Regulated Project. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in the Revised Model Biotreatment Soil Media Specifications submitted by BASMAA on behalf of the Permittees on February 5, 2016, and approved on April 18, 2016, pursuant to the requirements of Provision C.3.c.i.(2)(c)(ii) of MRP 2. Permittees may collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the soil media minimum specifications, subject to the Executive Officer's approval.

a. The Permittees may convene a workgroup with Water Board staff to discuss and investigate the pollutant removal

[12] Pervious pavement systems include pervious asphalt, pervious concrete, pervious pavers, and grid pavers, and are defined in the Glossary.

effectiveness and hydrologic equivalency of – and suggested criteria for – high flow-rate media treatment systems in combination with retention/detention measures, such as silva cells and structural soils, as compared to conventional bioretention. The workgroup should consider issues including: the MEP standard in relation to the use of such systems; the pollutant removal benefits and hydrologic criteria associated with the Permit's LID design approach and which are included in other MS4 permits, such as the Western Washington Phase II Municipal Stormwater Permit (NPDES Permit No. WAR045717) and the Los Angeles Regional MS4 Permit (NPDES Permit No. CAS004004); and additional issues, such as the feasibility of obtaining high flow rate media at construction and, as needed, for the life of a project.

(iii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. Permittees shall ensure that green roofs installed at Regulated Projects meet the following minimum specifications:

a. The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).

b. The green roof system planting media shall be sufficiently deep to support the long-term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(d) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(c) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Reporting

(1) For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.iv, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects and for projects implemented pursuant to Provision C.3.j meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flow rate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.iv.(2).

iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects and for all projects implemented pursuant to Provision C.3.j, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil.

Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project and for any project implemented pursuant to Provision C.3.j that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by

highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

iv. Tree Runoff Reduction and Tree-Based Stormwater Treatment Systems

(1) The Permittees collectively may submit a proposal, subject to the Executive Officer's approval, which evaluates the benefit and associated criteria of runoff reduction associated with trees with respect to treatment control sizing, which evaluates and includes as appropriate the findings of the Healthy Watersheds, Resilient Baylands project,[13] and which will be considered for incorporation into a subsequent Permit. Such a proposal shall characterize the multiple benefits of green infrastructure beyond standard designs (e.g., urban forestry), develop recommendations for Permittees to achieve the benefits (e.g., beneficial modifications to GI designs, guidelines for coordinating with work such as stream restoration, parks and urban forestry), and suggest opportunities to modify Provision C.3 language in a future Permit to better recognize broader benefits.

The proposal may include treatment control sizing and design criteria for tree-based stormwater treatment systems in combination with systems that provide additional hydrologic benefit (such as structural soils, suspended pavement systems, or other methods to provide tree rooting volume), which provide water quality and hydrologic benefit equivalent to bioretention.

(2) Tree Interceptor Credits, as described in the 2011 BASMAA Feasibility/Infeasibility Criteria Report submitted pursuant to Provision C.3.c.i.(2)(b)(iv) of MRP 1, shall not be used to reduce the stormwater treatment required pursuant to Provision C.3.

v. Reporting

(1) If the Permittees collectively submit a proposal pursuant to Provision C.3.d.iv, the proposal shall be submitted by no later than with the 2025 Annual Report.

[13] The San Francisco Estuary Partnership (SFEP) and Association of Bay Area Governments (ABAG) along with several other partners (including Water Board staff) secured a U.S. EPA Water Quality Improvement Fund (WQIF) grant to pursue the Healthy Watersheds, Resilient Baylands project, which in part investigates the stormwater treatment benefit provided by trees within the urban landscape.

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.b in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**

Treat a portion (this portion may be zero; Permittees should treat as much onsite as possible) of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an Offsite Project[14] in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provisions C.3.d and C.3.g, as appropriate) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**

Treat a portion (this portion may be zero; Permittees should treat as much onsite as possible) of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[15] to treat the remaining portion of the Provision C.3.d runoff (and comply with Provision C.3.g, as appropriate) with LID treatment measures at a Regional Project[16] or Offsite Project. The Regional Project must achieve a net environmental benefit, through a net increase in impervious surface treated, and/or a net reduction in flow and/or pollutant load.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above (Options 1 and 2), all Offsite Projects and Regional Projects must be completed within three years after the end of construction of the

[14] **Offsite Project** – A stormwater treatment facility that discharges into the same watershed as the Regulated Project and is located at a different public or private parcel or property (e.g., right-of-way) from the Regulated Project.

[15] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Offsite Project or Regional Project.

[16] **Regional Project –** A regional or municipal stormwater treatment facility that captures runoff from a drainage area larger than the parcel on which it is located and discharges into the same watershed as the Regulated Project.

Regulated Project. However, the timeline for completion of an Offsite Project or Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Offsite Project or Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

(4) Reporting

(a) Annual reporting on Alternative Compliance projects shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth or high density can either reduce existing impervious surfaces or create less “accessory” impervious areas and automobile-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d for the Special Project’s drainage area that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.v, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85 percent coverage for the entire project site by permanent structures. The remaining 15 percent portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100 percent LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1).

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85 percent coverage for the entire project site by permanent structures. The remaining 15 percent portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs[17]) for commercial development projects, in Dwelling Units[18] per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50 percent Maximum LID Treatment Reduction Credit

a. For any commercial Category B Special Project with an FAR of at least 2:1, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two

[17] **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

[18] **Dwelling Unit** – A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

types of non-LID treatment systems listed in Provision C.3.e.ii.(1).

b. For any residential Category B Special Project with a gross density[19] of at least 50 DU/Ac, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75 percent Maximum LID Treatment Reduction Credit

a. For any commercial Category B Special Project with an FAR of at least 3:1, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

b. For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed-use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100 percent Maximum LID Treatment Reduction Credit

[19] **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public rights-of-way, recreational, civic, commercial, and other non-residential uses.

a. For any commercial Category B Special Project with an FAR of at least 4:1, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

b. For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed-use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Affordable Housing)

(a) For the purposes of attributing Affordable Housing Credits, affordable housing is defined as preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income, and which meets the following income levels specified in the Federal Department of Housing and Urban Development's (HUD's) definition of affordable housing in metropolitan areas: For metropolitan areas, HUD defines Extremely Low household incomes as 0 - 30 percent of area median household income (AMI), Very Low household incomes as 31 - 50 percent of AMI, Low household incomes as 51-80 percent of AMI, and Moderate household incomes as 81-120 percent of AMI.

To be considered a Category C Special Project, a Regulated Project must additionally meet both of the following criteria:

(i) Be primarily a residential development project.

(ii) Achieve at least a gross density of 40 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of four different types of credits that the Category C Special Project may qualify for, namely: Affordable Housing, Location, Density, and Minimized Surface Parking Credits.

(c) Affordable Housing Credits: A Category C Special Project may qualify for Affordable Housing Credits, according to the following criteria. The income limits that shall be used for these criteria are the most current Official State Income Limits (adjusted for household size), which are defined on the California Department of Housing and Community Development's website.[20,21] All qualifying affordable housing DUs must be preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income.

(i) To qualify for 70 percent Affordable Housing Credit:

100 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 75 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 25 percent of the project's DU's must have monthly rent/mortgage rates[22] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).

(ii) To qualify for 50 percent Affordable Housing Credit:

At least 75 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 15 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).

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[20] https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml

[21] As of December 31, 2021, they are: https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf

[22] Including utilities.

(iii) To qualify for 25 percent Affordable Housing Credit:

At least 50 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 15 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 5 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).

AMI	Minimum Percentage of DUs		
	70% credit	50% credit	25% credit
Moderate (≤120% of AMI)	100	75	50
Low (≤80% of AMI)	75	50	25
Very Low (≤50% of AMI)	50	25	15
Extremely Low (≤30% of AMI)	25	15	5

(d) Location Credits: To qualify for any Location Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Location Credits:

a. 5 percent Location Credit: Located within a ¼-mile radius of an existing or planned transit hub.

b. 10 percent Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's/Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional

incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) One hundred percent of a Category C Special Project's site must be located within the ¼-mile radius of an existing or planned transit hub to qualify for the corresponding Location Credit listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised September 2008), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(e) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits listed in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Density Credits:

a. 5 percent Density Credit: Achieve a gross density of at least 40 DU/Ac.

b. 10 percent Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 15 percent Density Credit: Achieve a gross density of at least 100 DU/Ac.

(ii) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(f) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits listed in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 5 percent Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(g) Category C Special Projects receiving final discretionary approval prior to July 1, 2022, may use the Category C Special Project criteria included in the Previous Permit.

(6) Any Regulated Project that meets the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

(3) Prior to July 1, 2023, Permittees shall implement Provision C.3.e.ii in Attachment I, which are requirements from the Previous Permit.

(4) Beginning July 1, 2023, Permittees shall implement Provision C.3.e.ii.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100 percent LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications, but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end

of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100 percent LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Total Impervious Surface Created/Replaced: The total impervious surface in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

(e) Gross Density in DU/Ac: Number of dwelling units per acre.

(f) Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, and Extremely Low area median household income levels specified in Provision C.3.e.ii.(5)(c).

(g) Density in FAR: Floor Area Ratio.

(h) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(i) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits applied.

(j) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(k) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. **Task Description** – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third-party reviewer must be a Civil Engineer, or a Licensed Architect or Landscape Architect registered in the State of California or staff of another Permittee subject to the requirements of this Permit.

ii. **Implementation Level** – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any

consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, CASQA, or the equivalent, may be considered qualifying training.

iii. **Reporting** – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. **Hydromodification Management (HM) Projects** are Regulated Projects that create and/or replace one acre or more of impervious surface except where one of the following applies.

(1) The post-project impervious surface area is less than, or the same as, the pre-project impervious surface area.

(2) The project is located in a catchment that drains to a hardened (e.g., continuously lined with concrete) engineered channel or channels or enclosed pipes, which extend continuously to the Bay, Delta, or flow-controlled reservoir, or, in a catchment that drains to channels that are tidally influenced.

(3) The project is located in a catchment or subwatershed that is highly developed (i.e., that is 70 percent or more impervious).[23]

All HM Projects shall meet the HM Standard of either Provision C.3.g.ii or Provision C.3.g.iii.

The Hydromodification Applicability Maps developed by the Permittees in the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Programs, and the

[23] The Permittees' maps accepted for Order No. R2-2009-0074 were prepared using this standard, adjusted to 65 percent imperviousness to account for the presence of vegetation on the photographic references used to determine imperviousness. Thus, the maps for Order No. R2-2009-0074 are accepted as meeting the 70 percent requirement.

City of Vallejo, under Order No. R2-2009-0074 remain in effect and are provided in Attachment C to this Permit.

Permittees that do not have the location-based applicability criteria (Provision C.3.g.i.(2) – (3)) shown on existing maps shall develop, or cause to be developed, new maps, overlays to existing maps, or other equivalent information that demonstrates whether a project falls under one of those two criteria (whether or not areas are subject to HM requirements). Such maps, overlays, or other equivalent information shall be acceptable to the Executive Officer and shall not be effective until accepted by the Executive Officer.

ii. HM Standard

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, and the City of Vallejo, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[24] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

[24] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include U.S. EPA's Hydrologic Simulation Program—Fortran (HSPF), the U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and U.S. EPA's Storm Water Management Model (SWMM).

(3) **Standard HM Modeling:** Permittees shall use, or shall cause to be used, a continuous simulation hydrologic computer model to simulate pre-project and post-project runoff, or sizing factors or charts developed using such a model, to design onsite or regional HM controls. The Permittees shall compare, or shall cause to be compared, the pre-project and post-project model output for a long-term rainfall record and shall show that applicable performance criteria in Provision C.3.g.ii.(1)-(3) are met. HM controls designed using the Bay Area Hydrology Model (BAHM) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual. Modifications to the BAHM shall be acceptable to the Executive Officer, shall be consistent with the requirements of this Provision, and shall be reported as required below:

- **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.
- **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

iii. HM Standard – Direct Simulation of Erosion Potential

HM control shall be achieved by maintaining the erosion potential in receiving streams at a value of equal to or less than 1.0. In order to use the Provision C.3.g.iii HM Standard – Direct Simulation of Erosion Potential, for their HM Projects, the CCCWP Permittees shall distinguish the range of situations present within their jurisdictions and incorporate an associated range of sizing factors for HM controls (described below in Provision C.3.g.vi.(2)) to address that range of situations, sufficient to demonstrate that appropriately-sized HM controls in those respective situations would achieve the HM Standard. The CCCWP Permittees shall submit a Technical Report describing and justifying these criteria, subject to the Executive Officer's approval.

iv. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof:

(1) **Onsite HM controls** are flow duration control structures, LID features and facilities, and hydrologic source controls that collectively result in the HM

Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[25]

v. Implementation Level

(1) For Alameda, Santa Clara, San Mateo, and Solano Permittees, HM Projects shall meet the HM Standard in Provision C.3.g.ii immediately.

(2) For CCCWP Permittees, HM Projects receiving final planning entitlements prior to Executive Officer approval of CCCWP's submittal pursuant to Provisions C.3.g.iii and C.3.g.vi.(2) shall use the methods and criteria specified in CCCWP's Stormwater C.3 Guidebook, 7th Edition (2017), or most current version. Subsequent to Executive Officer approval of CCCWP's submittal pursuant to Provisions C.3.g.iii and C.3.g.vi.(2), HM

[25] In-stream control projects require a Stream Alteration Agreement from CDFW, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

Projects shall use the methods and criteria specified (and/or acknowledged and approved) in the Executive Officer's approval or conditional approval of that submittal; CCCWP Permittees may alternatively implement the HM Standard in Provision C.3.g.ii.

vi. Reporting

(1) New HM Applicability Maps or equivalent information prepared pursuant to Provision C.3.g.i, for those Permittees who do not have an approved Map, shall be submitted, acceptable to the Executive Officer, not later than with the 2023 Annual Report.

(2) With the 2023 Annual Report, the CCCWP Permittees shall submit a Technical Report subject to the Executive Officer's approval, consisting of a HM Management Plan describing how the CCCW Permittees will implement the HM Standard specified in Provision C.3.g.iii. The Technical Report shall include:

(a) A complete suite of sizing factors – for each type of HM control that may be used in the County – that is protective of all likely site and watershed characteristics, for sites with soils in Hydrologic Soil Groups (HSG) A, B, C, and D, with equations for adjustments to the sizing factors based on geographic differences (including, but not limited to, annual rainfall intensity and frequency, land use, and other hydrologic characteristics), based on the methods and criteria in the CCCWP Hydromodification Technical Report (September 29, 2017), and pursuant to the recommendations provided in the Water Board's Response to CCCWP's Hydromodification Management Memo of November 4, 2020 (March 19, 2021). The complete suite of sizing factors shall ensure each type of HM control achieves the Provision C.3.g.iii HM Standard.

For the complete suite of sizing factors, the base case sizing factor for HM controls at sites with HSG D soils shall be 6.5 percent.[26]

(b) The Technical Report may optionally identify geographic areas or criteria for site-by-site determination, where the use of the prescribed methods, criteria, and suite of sizing factors may result in HM Projects failing to comply with the Provision C.3.g.iii HM Standard. For those areas, the Technical Report shall propose additional onsite mitigation measures, which when implemented in addition to the complete suite

[26] This is a conservative value, based on sites with project-scale built-out imperviousness in the upper watershed for the Lower Control Threshold of 0.1Q2, for soil percolation rates of 0.024 inches per hour, as presented in Table 5-7 on page 58 of the CCCWP Hydromodification Technical Report (September 29, 2017).

of sizing factors specified in Provision C.3.g.vi.(2)(a), ensure that HM controls achieve the Provision C.3.g.iii HM Standard.

The additional onsite mitigation measures include, but are not limited to: site grading to produce self-retaining areas, specific guidance on augmentation of HM control design (e.g., increasing the size of the storage layer), and increases to the HM control sizing factors.

The additional mitigation measures shall not include: reliance on land development restrictions, or on open space preservation, or on the presence of existing or future HM and LID controls located elsewhere within the catchment.

The Technical Report may additionally propose alternative or supplemental methods of compliance with the Provision C.3.g.iii HM Standard, including any combination of: undersized onsite HM controls, additional new HM controls located offsite within the same catchment as the receiving stream, and in-stream controls (e.g., as described in SCVURPPP's 2005 Hydromodification Management Plan Final Report), which when implemented together achieve the Provision C.3.g.iii HM Standard.

(3) Reporting of HM projects shall be as described in Provision C.3.b.

(4) Permittees allowing the use of BAHM shall report collectively, with each Annual Report, a listing, summary, and date of modifications made to the BAHM, including the technical rationale. This shall be prepared at the countywide program level and submitted on behalf of participating Permittees.

(5) In addition, for each HM Project approved during the reporting period, Permittees shall collect and make available the following information. Information shall be reported electronically, and, where appropriate, in tabular form.

- Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control(s);
- Method used by the project proponent to design and size the device or method used to meet the HM Standard;
- Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;
- For projects using standard sizing charts, a summary of sizing calculations used;

- For projects using the BAHM, a listing of model inputs; and
- For projects using custom modeling, a summary of the modeling calculations with a corresponding graph showing curve matching (existing, post-project, and post-project-with HM controls curves).

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. Task Description – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. Implementation Level – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects and for all projects implemented pursuant to Provision C.3.j that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the operation and maintenance of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the operation and maintenance of the pervious pavement system(s) (if any), onsite, joint, and/or offsite installed stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the operation and maintenance responsibility for the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing operation and maintenance inspections of the installed pervious pavement system(s) (if any), stormwater treatment system(s) and HM control(s) (if any).

(4) A database or equivalent tabular format of the following:

(a) All pervious pavement system(s) that total 3,000 square feet or more installed at Regulated Projects, offsite, or at a Regional Project. The total square footage should not include pervious pavement systems installed as private-use patios for single family homes, townhomes, or condominiums.

(b) All stormwater treatment systems installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(c) All HM controls installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(5) The database or equivalent tabular format required in Provision C.3.h.ii.(4) shall include the following information for each Regulated Project, offsite project, and Regional Project, and shall be made available to Water Board staff upon request:

(a) Name and address of the project;

(b) Names of the owner(s) and responsible operator(s) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and/or HM control(s);

(c) Specific description of the location (or a map showing the location) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and HM control(s) (if any);

(d) Date(s) that the pervious pavement system(s) (if any), stormwater treatment system(s), and HM controls (if any) was/were installed;

(e) Description of the type and size of the pervious pavement systems (if any), stormwater treatment system(s), and HM control(s) (if any) installed;

(f) Detailed information on operation and maintenance inspections. For each inspection, include the following:

(i) Date of inspection.

(ii) Type of inspection (e.g., installation, annual, followup, spot).

(iii) Type(s) of pervious pavement systems inspected (e.g., pervious concrete, pervious asphalt, pervious pavers).

(iv) Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well) and an indication of whether the treatment system is an onsite, joint, or offsite system.

(v) Type of HM controls inspected.

(vi) Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation or maintenance, maintenance required immediately).

(vii) Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, compliance schedule, administrative citation, administrative order).

(6) A prioritized O&M Inspection Plan for inspecting all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems and HM controls installed at Regulated Projects, offsite locations, and/or at joint or Regional Projects. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient.

At a minimum, the O&M Inspection Plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls (at Regulated Projects, offsite locations, and/or at joint or Regional Projects) at the completion of installation to ensure approved plans have been followed. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(b) Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal

year) of Regulated Projects, offsite projects, or Regional Projects. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(c) Inspection by the Permittee of all Regulated Projects, offsite projects, or Regional Projects at least once every five years. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; and

(d) For vault-based stormwater treatment systems, Permittees may accept 3rd party inspection reports in lieu of conducting Permittee operation and maintenance inspections only if the 3rd party inspections are conducted at least annually. Information from each 3rd party inspection shall be included in the database or tabular format required in Provision C.3.h.ii.(5) and each inspection shall be clearly identified as a 3rd party inspection.

Each 3rd party inspection report must clearly document the following:

(i) Name of 3rd party inspection company.

(ii) Date of inspection.

(iii) Condition of the treatment unit(s) at the time of inspection.

(iv) Description of maintenance activities performed during the inspection.

(v) Date- and time-stamped photographs of the inside of the vault unit(s) before and after maintenance activities.

(7) An Enforcement Response Plan (ERP) for all operation and maintenance inspections that serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. At a minimum, the ERP must contain the following:

(a) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for recognizing common problems with the different types of pervious pavement systems, stormwater treatment systems, and/or HM controls, remedies for the problems, and appropriate enforcement actions, follow-up inspections, and appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(b) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools appropriate for different field scenarios of problems identified with the pervious pavement systems, stormwater treatment systems, and/or HM controls as well as for different types of inadequate response to enforcement actions taken.

(c) Timely Correction of Identified Problems – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all identified problems with the pervious pavement systems, stormwater treatment systems, and/or HM controls.

Corrective actions shall be implemented no longer than 30 days after a problem is identified by an inspector. Corrective actions can be temporary, in which case more time may be allowed for permanent corrective actions. If more than 30 days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

iii. Due Date for Implementation: Immediate.

iv. Maintenance Approvals: The Permittees shall ensure that all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed onsite, offsite, or at a joint or Regional Project by development proponents are properly operated and maintained for the life of the projects. In cases where the responsible party for a pervious pavement system, stormwater treatment system, or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities, but these approvals are not granted, the Permittees shall be deemed to be in compliance with Provision C.3.h. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of

Constructed Wetlands for Urban Runoff Pollution Control and the operation and maintenance requirements contained therein.

v. Reporting

(1) The database or equivalent tabular format required in Provisions C.3.b.ii.(4) and (5) shall be maintained by the Permittees. Upon request from the Executive Officer, information from this database or equivalent tabular format shall be submitted to Water Board staff for review. The requested information may include specific details on each inspection conducted within particular timeframes, such as several fiscal years.

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency, and include a copy of that communication with the Annual Report. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) Total number of Regulated Projects in the Permittee's database or tabular format as of the end of the reporting period (fiscal year).

(b) Total number of Regulated Projects, offsite projects, and Regional Projects inspected during the reporting period (fiscal year).

(c) Percentage of the total number of Regulated Projects that were inspected during the reporting period (fiscal year).

(d) A discussion of the inspection findings for the year and any common problems encountered with various types of pervious pavement systems, treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(e) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

C.3.i. Required Site Design Measures for Small Development and Redevelopment Projects and Smaller Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development and redevelopment projects, which create and/or replace $\geq$ 2,500 ft^2 to < 5,000 ft^2

of impervious surface, and detached single-family home projects,[27] which create and/or replace ≥ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[10]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[10]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. Implementation Level

(1) Beginning July 1, 2023, Permittees shall implement Provision C.3.i.

(2) Prior to July 1, 2023, Permittees shall implement Provision C.3.i in Attachment I, which are requirements from the Previous Permit.

iii. Reporting – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

C.3.j. Green Infrastructure Planning and Implementation

i. Task Description – The Permittees shall continue to implement their Green Infrastructure Plans (completed during the term of the Previous Permit), as may be updated and/or supplemented to comply with this Order, for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm

[27] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

drains, parking lots, building roofs, and other storm drain infrastructure elements.

(1) The Plans are intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs and the Urban Creeks Pesticides TMDL) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

(2) Over the long term, the Plans are intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

(3) Green infrastructure project prioritization is described in the Green Infrastructure Plans based on local characteristics and priorities, and therefore green infrastructure projects will typically be designed to achieve multiple benefits in addition to mercury and PCBs load reduction. Furthermore, this Provision establishes a separate impervious surface retrofit requirement for other-than Regulated Projects.

ii. Implementation Level

(1) **Programmatic Implementation**

The Permittees shall, individually or in a coordinated manner, update and/or supplement their Green Infrastructure Plans as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned, by:

(a) Revising implementation mechanisms to include consideration, or reconsideration, of cooperation with non-municipal entities such as schools on green infrastructure implementation, and otherwise updating implementation mechanisms as appropriate.

(b) Following through with the development or updates of general plans, specific plans, urban forestry plans, climate change adaptation plans, complete streets plans and other planning documents with a green infrastructure nexus to include language which is more supportive of green infrastructure implementation, as identified by Permittees in

their Green Infrastructure Plans. Upon request by Water Board staff, Permittees shall provide justifications for planning documents that they assert do not need to be updated to further support green infrastructure implementation.

(c) Developing funding and funding mechanisms identified in the Green Infrastructure Plans, such as by working with the relevant agencies to expand the scope of transportation grants to include allocation for green infrastructure; establishing green infrastructure-based or green infrastructure-incorporating stormwater fees, including work that sets the foundation for additional future stormwater fees; establishing or increasing application review fees, and evaluating other opportunities to leverage municipal approval of private development to fund green infrastructure implementation.

(d) Reviewing countywide green infrastructure implementation guidance documents and adapting them as necessary to account for local considerations if this has not already been completed during the Previous Permit term, and otherwise reviewing and updating general guidelines and standard specifications as appropriate.

(e) Continuing to implement the tools developed during the Previous Permit term to track and map completed public and private green infrastructure projects, and making the information publicly available.

(f) Continuing to adopt or amend policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this Provision, as necessary.

(g) Continuing to conduct outreach and education as follows:

(i) Conduct public outreach on the requirements of this Provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design.

(ii) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this Provision and methods of implementation.

(iii) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on

the requirements of this Provision and methods of implementation.

(2) **Numeric Implementation**

(a) By June 30, 2027, the Permittees shall implement, or cause to be implemented, green infrastructure projects within their jurisdictions which are not already defined as Regulated Projects pursuant to Provision C.3.b, such that the impervious surface retrofits listed in Table H-1 of Attachment H are achieved.

(b) The Permittees may meet the numeric retrofit requirements listed in Table H-1 of Attachment H on a countywide basis. If Permittees within a given county do not collectively achieve their numeric retrofit requirements, each Permittee within that county shall be separately responsible for achieving its individual retrofit requirement.

(c) Though Permittees may meet their total individual numeric retrofit requirements on a countywide basis, each Permittee shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction, where that project is not already defined as a Regulated Project pursuant to Provision C.3.b. Alternatively, a Permittee may contribute substantially to such a green infrastructure project(s) outside of its jurisdiction and within its County.

(d) Impervious surfaces treated by non-Regulated Projects may be counted towards the numeric requirements in Table H-1 of Attachment H.

Impervious surfaces treated by Regulated Projects, beyond the minimum required by Provisions C.3.c-d for such Regulated Projects, may be counted towards the numeric requirements in Table H-1 of Attachment H.

If a portion of the impervious surface treated by such a Non-Regulated Project or by Regulated Projects (beyond the minimum required by Provisions C.3.c-d for such Regulated Projects) is later used as part of an Alternative Compliance exchange to offset the treatment required by a Regulated Project pursuant to Provision C.3.e.i, then that portion may no longer be counted towards the Provision C.3.j.ii.(2) retrofit requirements listed in Table H-1 of Attachment H.

(e) Projects completed after January 1, 2021, shall be counted towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

(f) Projects completed by June 30, 2027, shall be counted towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

If a project is not completed by June 30, 2027, it may still count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded. Permittees that count such projects towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements shall certify in their Annual Reports that the projects are approved and funded by June 30, 2027.

(g) Controls implemented to satisfy Provision C.3 requirements, including the numeric retrofit requirements specified in Provision C.3.j.ii.(2), may also be used to satisfy Provision C.11 Mercury Controls requirements, and Provision C.12 PCBs Controls requirements, as long as they satisfy the other aspects of those requirements, such as location (i.e., for PCBs, controls that are implemented in areas of old industrial land use or otherwise in areas with identified relatively high concentrations of PCBs).

(h) Permittees may credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects, specified in Provision C.3.b.ii.(5), towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

(i) Permittees with small rural jurisdictions (e.g., whose stormwater conveyance systems are dominated by roadside ditches) may collectively submit a proposal, subject to the Executive Officer's approval, for pilot projects investigating the use of alternative green infrastructure techniques to comply with the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, with construction completed by June 30, 2027. If a project is not completed by June 30, 2027, it may still count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded. Permittees that count such projects towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements shall certify in their Annual Reports that the projects are approved and funded by June 30, 2027.

The proposal shall include a discussion describing the small rural jurisdiction, including density, developed versus undeveloped areas, and piped stormwater conveyances versus roadside ditches.

(j) Permittees with existing ordinances (or that adopt new ordinances by June 30, 2023) that require Regulated Projects to treat significantly more impervious surface than the minimum required by Provision C.3.c-d, may offset their Numeric Implementation retrofit requirements

specified in Provision C.3.j.ii.(2) by a one-time credit of up to 25 percent, and by no greater than one acre. The claimed offset shall not reduce Permittees' Numeric Implementation retrofit requirements below 0.2 acres as specified in Provision C.3.j.ii.(2)(c).

In order to claim this offset, Permittees shall submit a report subject to Executive Officer approval estimating the benefit that will be realized by the adopted ordinance(s) in the current Permit term and the subsequent Permit terms (i.e., until June 30, 2032), as specified in Provision C.3.j.v.(5). The offset claimed shall be no greater than the benefit of the offset estimated in the report. Permittees shall not use the offset prior to Executive Officer approval of the report.

(3) **Design and Other Criteria** - Green infrastructure projects built pursuant to Provision C.3.j shall:

(a) Comply with Provision C.3.c and Provisions C.3.e-h.

(b) Comply with Provision C.3.d. With cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019, to size Non-Regulated green streets projects. If so, Permittees must comply with the Water Board's June 21, 2019, conditional approval of that submittal, which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used for Non-Regulated green streets projects.

(4) **Long-Term Green Infrastructure Implementation**

(a) The Permittees and their representatives may, together with Water Board staff and impartial science experts (e.g., SFEI, SFEP, U.S. EPA Region 9), collectively form a Technical Working Group (TWG) to discuss long-term green infrastructure goals and recommend long-term percentage reductions in Permittees' impervious surfaces, at individual, countywide and regional scales. The TWG should prioritize discussion of long-term green infrastructure goals for development and redevelopment projects not already captured by Provision C.3.b, and in particular, public road and right of way reconstruction projects that are not already defined as Regulated Projects by Provision C.3.b.ii.(5). The TWG should additionally review BMPs and

performance metrics, and should consider linkages to climate change impacts and resiliency.

(b) Prior to the submittal of a report containing the TWG's recommendations for long-term percentage reductions in Permittees' impervious surfaces – as prescribed by Provision C.3.j.v.(6) – the TWG should meet at a minimum biannually, and subsequent to that submittal should meet at a minimum annually.

iii. No Missed Opportunities

Each Permittee shall:

(1) Continue to maintain a list of green infrastructure projects, public and private, that are planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures.

(2) Submit the list with each Annual Report and a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

iv. Participate in Processes to Promote Green Infrastructure

(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.

(2) In each Annual Report, Permittees shall report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

v. Tracking and Reporting Progress

(1) The Permittees shall continue to implement the existing regionally-consistent tracking and mapping tools developed pursuant to Provision C.3.j.i.(2).(d) of the Previous Permit to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met. The tracking and mapping tools shall be used by Permittees to inform issues relevant to program management, such as life cycle costs, asset management, operation and maintenance frequency, and beneficial design changes.

(a) Non-regulated green infrastructure projects built pursuant to Provision C.3.j shall be tracked and mapped in the same manner as Regulated Projects. These projects shall be reported in a separate table from Regulated Projects.

(b) The tracking and mapping tools shall include a component that is available to the public, which is advertised on individual Permittee websites and on County stormwater program websites, and as appropriate is advertised in other locations. This component must include the following basic information: a brief description of design (e.g., whether bioretention or bioswale), location, land use type, and area treated. If the tools contain additional information which has not been made available to the public such as detailed design information, incurred or planned O&M costs and O&M frequency, condition assessments, and pollutant loads treated, that information shall be made available to Water Board staff upon request.

(c) The Permittees shall certify in the 2023 Annual Reports that the tracking and mapping tools have been completed and are being implemented.

(d) In each Annual Report, Permittees shall provide summary reports on the implementation of the tracking and mapping tools and shall provide a link to the component which is available to the public.

(2) In the 2024 and 2026 Annual Reports, report on updates, addenda, and changes to their programmatic implementation, including, but not limited to, the items listed in Provision C.3.j.ii.(1).

(3) In each Annual Report, Permittees shall report on progress made towards the retrofit requirements described in Provision C.3.j.ii.(2).

(4) With the 2026 Annual Reports, Permittees shall provide a summary of lessons learned to-date with regard to Provision C.3.j.ii.(1), including topics such as operation and maintenance, sizing, infiltration and other design criteria for stormwater treatment controls, implementation of tracking and mapping tools, cooperation with non-municipal entities, regional project efforts, funding initiatives and opportunities to leverage municipal approval of private development, education and outreach, and development or updates of plan documents with a green infrastructure nexus. In the summary, Permittees shall also discuss attainment of the numeric retrofit requirements prescribed in Provision C.3.j.ii.(2).

In that summary, as applicable, Permittees shall report on how they have addressed deficiencies identified in Provision C.3.j.ii.(1).

(5) Pursuant to Provision C.3.j.ii.(2)(i), Permittees whose jurisdictions are dominated by rural areas may collectively submit a proposal, subject to the Executive Officer's approval, for the use of alternative green infrastructure techniques. This proposal shall be submitted by no later than with the 2023 Annual Reports.

(6) Each Permittee that wishes to use the one-time offset specified in Provision C.3.j.ii.(2)(j) shall submit a report estimating the benefit realized by the adopted ordinance(s) in the current Permit term, and until June 30, 2032, by no later than with the 2023 Annual Report, subject to Executive Officer approval. Permittees shall not use the offset prior to Executive Officer approval of the Report. The benefit of the estimated offset shall be no less than the offset claimed during the current Permit term.

In each Annual Report, each Permittee claiming the offset shall report on the acreage of retrofit produced by the implementation of the offset in that Fiscal Year, as well as the cumulative acreage of retrofit produced by the implementation of the offset up to that point in time during the current Permit term.

(7) By no later than with the 2025 Annual Reports, the Permittees shall collectively submit a report summarizing any TWG efforts and recommendations, as specified in Provision C.3.j.ii.(4).

(8) Pursuant to Provision C.3.j.ii.(2)(f) and Provision C.3.j.ii.(2)(i), Permittees shall certify in the 2027 Annual Report that any projects counting towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, which have not been completed by June 30, 2027, have been approved and fully funded by June 30, 2027.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Total Impervious Surface Created/ Replaced	Gross Density DU/Ac	Category C Projects: Number of DUs in each AMI Category	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No.: Number of the Special Project as it appears in Table 3.1.

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Total Acreage: Total site area in acres.

Total Impervious Surface Created/Replaced: The total impervious surfaced in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

Gross Density in DU/Ac: Number of dwelling units per acre.

Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities)

no less than 30 percent of the Moderate, Low, Very Low, and Extremely Low area median household income levels specified in Provision C.3.e.ii.(5)(c).

FAR: Floor Area Ratio.

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites that could reasonably be considered to cause or contribute to pollution of stormwater runoff. Permittees shall conduct inspections, effective follow-up, and enforcement to abate potential and actual non-stormwater discharges, consistent with each respective Enforcement Response Plan. These combined efforts will prevent the discharge of pollutants and impacts to beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have sufficient legal authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. **Implementation Level** – Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites that may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial facilities to address pollutant sources associated with outdoor process and manufacturing areas; outdoor material storage areas; outdoor waste storage and disposal areas; outdoor vehicle and equipment storage and maintenance areas; outdoor parking areas and access roads; outdoor wash areas, for example, areas used to wash restaurant equipment and mats,; outdoor drainage from indoor areas; rooftop equipment; vehicle fueling activities; contaminated and erodible surface areas; and other sources determined by the Permittees or the Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. **Task Description** – Permittees shall continue to update and implement an Inspection Plan that will serve as a prioritized inspection workplan. This Inspection Plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

ii. Implementation Level

(1) Facilities to Prioritize for Inspection

Commercial and industrial facilities with the functional aspects and types described below, and other facilities identified by the Permittees as reasonably likely to contribute to pollution of stormwater runoff, shall be prioritized for inspection on the basis of the potential for water quality impact using criteria such as pollutant sources on site, use of pollutants of concern, proximity to a waterbody, and the enforcement history of potential discharges and actual discharges at the facility. Permittees may use a variety of sources to develop and update the business inspection prioritization, including, but not limited to, business license applications, tax records, and inspectors' observations. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plan:

(a) Sites with the following functions or facilities that may be sources of pollutants when exposed to stormwater:

(i) Outdoor process and manufacturing areas

(ii) Outdoor material storage areas

(iii) Outdoor waste storage, handling, and disposal areas

(iv) Outdoor vehicle and equipment storage and maintenance areas

(v) Outdoor wash areas

(vi) Outdoor drainage from indoor areas

(vii) Fueling Areas

(viii) Rooftop equipment

(ix) Other sources determined by the Permittee or Water Board as reasonably likely to contribute to pollution of stormwater runoff.

(b) Sites that support industrial and commercial activities that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges, including:

(i) Industrial facilities, as defined at 40 CFR 122.26(b)(14), including facilities subject to the Statewide NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);

(ii) Vehicle Salvage yards;

(iii) Metal and other recycled materials collection facilities, and waste transfer facilities;

(iv) Vehicle mechanical repair, maintenance, fueling, or cleaning facilities;

(v) Nurseries and greenhouses;

(vi) Restaurants and other food service businesses at which food is prepared or that have onsite eating and drinking areas for customers;

(vii) Supermarkets or large grocery stores with outdoor waste storage or cardboard compacting areas;

(viii) Building trades facilities or yards, corporation yards;

(ix) Building material retailers and storage;

(x) Plastics manufacturers; and

(xi) Other facilities designated by the Permittee or Water Board to be reasonably likely to contribute to pollution of stormwater runoff.

(2) Inspection Plan – The Inspection Plan shall be updated annually and shall contain the following information:

(a) A description of the process for prioritizing inspections and frequency of inspections. The prioritization criteria shall assign a more frequent inspection schedule to the highest priority facilities per Provision C.4.b.ii.(1). If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan.

(b) Assign appropriate inspection frequency for each industrial and commercial facility based on the priority established in Provision C.4.b.ii.(2)(a), potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(c) A mechanism to include new businesses that warrant inspections.

(d) Total number and a list of all industrial and commercial facilities requiring inspections, within each Permittee's jurisdiction, based on the prioritization criteria established in Provision C.4.(b)ii.(2)(a). This list shall be updated annually.

(e) List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual

update. Previous fiscal years' inspection lists shall remain in the Inspection Plan.

(f) If a Permittee relies on multiple entities to perform business and commercial inspections, a list of the entities and their responsibilities with regard to this Permit. Describe how the Permittee oversees and coordinates the entities performing inspections and assures that all sites with the potential to pollute stormwater are inspected.

(3) Record Keeping – For each facility identified in Provision C.4.b.ii.(2)(d), the Permittee shall maintain a database or equivalent tabular system of at least the following information:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity or pollutant source, including SIC or NAICS code. Examples: outdoor process/manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, rooftop equipment, outdoor drainage from indoor areas, and use of mobile businesses for outdoor fueling, washing, etc.;

(c) Inspection priority and inspection frequency; and

(d) Whether facility requires coverage under the Industrial General Permit.

iii. Reporting

(1) Permittees shall include the following information in the 2023 Annual Report:

(a) A brief description of which Permittee entity or entities are responsible for reviewing and approving business license applications or a link to the Permittee's website for business license applications.

(2) Permittees shall make the list required by Provision C.4.b.ii.(2)(d) available upon Water Board request.

C.4.c. Enforcement Response Plan

i. Task Description – Each Permittee shall implement and update, as needed, its Enforcement Response Plan (ERP), a reference document to guide inspection staff in achieving timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's enforcement and compliance procedures, from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual non-stormwater discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.4.d. Inspections

i. Task Description – Each Permittee shall conduct inspections according to the Inspection Plan in Provision C.4.b.ii.(2) and the ERP in Provision C.4.c.ii. to enforce its ordinance to prevent stormwater pollution.

ii. Implementation Level

(1) Inspections – Inspections shall be conducted to include at least the following activities:

(a) Observations for appropriate BMPs to prevent stormwater runoff pollution, or unauthorized or illicit discharge;

(b) Observations for evidence of unauthorized or illicit discharges, illicit connections, and potential discharge of pollutants to stormwater by the Discharger or contractors, such as and including mobile businesses, that operate on the facility;

(c) Observations for noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(2) Record Keeping – Permittees shall maintain adequate records to demonstrate compliance and appropriate follow-up enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial and commercial site inspections:

(a) Name of facility/site inspected

(b) Inspection date

(c) Industrial General Permit coverage required (Yes or No)

(d) Compliance status

(e) Specific problems, including inadequate and ineffective BMPs

(f) Type of enforcement (if applicable)

(g) Problem resolution date

(h) Additional comments

The electronic database or equivalent tabular system and any supporting documentation shall be made readily available to Water Board staff or its representative during inspections, audits, or upon request.

(3) Data Evaluation – Permittees shall evaluate the frequency of potential and actual non-stormwater discharges by business category. Note trends and, as needed, implement focused inspections or education in subsequent years to address trends.

iii. Reporting

(1) Permittees shall include the following information in each Annual Report:

(a) Number of inspections conducted;

(b) Number of each type of enforcement action, as listed in each Permittee's ERP, issued;

(c) Number of enforcement actions or discrete number of potential and actual discharges fully resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner; and

(d) Frequency of potential and actual non-stormwater discharges by business category.

(2) Permittees shall make the list of facilities required to have coverage under the Industrial General Permit, but that have not filed for coverage, available upon Water Board request. For facilities added to the list or re-inspected during this Permit term, the list shall include the date when the facility was first identified and the date when it was most recently inspected or evaluated.

C.4.e. Staff Training

i. Task Description – Permittees shall provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee- specific.

ii. Implementation Level – At a minimum, provide inspection training, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Business Inspection Plan;

(4) Enforcement Response Plan;

(5) Illicit Discharge Detection and Elimination; and

(6) Appropriate BMPs to be used at different industrial and commercial facilities.

iii. Reporting – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Total number and percentage of industrial and commercial site inspectors attending training; and

(4) Total number and percentage of illicit discharge detection and elimination inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to detect and control illicit discharges not otherwise controlled under Provisions C.4. – Industrial and Commercial Site Controls, C.6. – Construction Site Controls, and C.17 – Discharges Associated with Unsheltered Homeless Populations. Permittees shall implement an illicit discharge program that includes active surveillance and centralized complaint collection and follow-up to detect and eliminate illicit discharges into the MS4. Permittees shall maintain a complaint tracking and follow-up data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. **Task Description** – Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.

ii. **Implementation Level**

(1) Permittees shall have adequate legal authority to address illicit discharges to the MS4, including, but not limited to, the following:

(a) Discharges of sewage, trash, or other potentially polluting or hazardous materials;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces, pavement, equipment, and other facilities of any commercial business, or any other public or private facility, including discharges from mobile businesses;

(c) Discharges of runoff from material storage areas, including those containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes;

(f) Discharges of food-related wastes (e.g., grease, fish processing wastes, restaurant kitchen mat and trash bin wash water); and

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to the MS4.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than stormwater to the MS4.

(4) Permittees shall have adequate legal authority to hold mobile businesses, and the businesses, property managers, property owners, and other associated entities that hire a mobile business, responsible for stormwater pollution discharged by the mobile business operating at their location.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges and compliance from responsible parties.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and/or actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.5.c. Spill, Dumping, and Complaint Response Program

i. Task Description – Each Permittee shall implement a program to respond to spills, dumping, and complaints.

ii. Implementation Level

(1) Each Permittee shall have a central contact point for the public and Permittee's staff to report spills, dumping, and complaints. At a minimum, this central contact point shall include a phone number. Permittees shall also include, as feasible, a user-friendly web address for reporting for spills and dumping or a link to a web-based reporting application.

(2) Each Permittee shall publicize the phone number on its website, and, if used, a web reporting address or link to a web-based reporting application, to the Permittee's staff and the public. The contact information on the Permittee's website shall be kept up-to-date, and updated at least annually when changed. This central contact point shall be readily searchable and accessible on the Permittee's website.

(3) Each Permittee shall require the municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point so that illicit discharge staff can investigate and track.

(4) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and/or phone tree for the staff responsible for the spill and dumping response program. At a minimum, this flow chart and/or phone tree shall identify staff or positions responsible for receiving the complaints and investigating and abating the complaints.

(5) Each Permittee shall also maintain and update, as needed, a spill, dumping, and complaint response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittee's immediate capabilities.

(6) Each Permittee shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct follow-up inspections, as needed, to ensure that corrective measures have been effectively implemented to achieve and maintain compliance. The start of the investigation of a spill or discharge shall not exceed 3 business days from the date the complaint was received by the Permittee. If additional time is required, the Permittee shall document the rationale for the delay.

iii. Reporting

(1) Permittees shall provide the following information in the 2024 and 2026 Annual Reports:

(a) The spill, dumping, and complaint reporting phone number and, if used, a web reporting address or a link to a web-based reporting application;

(b) A screen shot of the Permittee's website showing the central contact point; and

(c) A discussion of how the central contact point – spill and dumping reporting phone number and, if used, the web address or web-based reporting application – is being publicized to Permittees' staff and the public.

(2) Copies of the phone trees and contact lists required in Provision C.5.c.ii (4) and (5) shall be provided as attachments to, or links in, the 2026 Annual Report. The lists may be redacted to remove references to private cell phone numbers. The unredacted phone trees and contact lists shall be made available to Water Board staff or representatives during audits or inspections, and upon request

C.5.d. Tracking and Case Follow-up

i. Task Description – All incidents or discharges reported to the spill, dumping, and complaints central contact point, that might discharge into the MS4, shall be logged to track follow-up and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems and inter/intra-agency coordination, where appropriate. It is not necessary to track and report data according to this provision if they are tracked and reported according to State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

ii. Implementation Level – Maintain records for tracking and follow-up to water quality spills, dumping, and complaints that might discharge into the MS4 in an electronic database or equivalent tabular system.

The water quality spills, dumping, and complaint tracking system shall contain the following information:

(1) Complaint information:

(a) Date that complaint is received by the Permittee;

(b) Type of pollutant; and

(c) Problem Status (potential or actual discharge).

(2) Investigation information:

(a) Date and time investigation of spill or discharge started;

(b) Date and time response to illegal dumping report or complaint started;

(c) Agency, department, or other entities responding to the complaint or discharge;

(d) Type of pollutant;

(e) Identify the entered storm drain or approximate location, and/or receiving water;

(f) Date and time abated; and

(g) Type of enforcement based on the Permittee's ERP.

(3) Responses to discharges or dumping associated with unsheltered populations, including those living in homeless encampments or vehicles, shall be coordinated with the Permittee's Provision C.10 Trash Control efforts, Provision C.17 Homeless Encampment Discharge Control efforts, and other agencies and entities addressing homelessness issues, as appropriate.

iii. Reporting

(1) Permittees shall provide the following information in the Annual Report:

(a) Number of discharges reported;

(b) Number of discharges reaching storm drains and/or receiving waters;

(c) Number of discharges resolved in a timely manner; and

(2) The electronic database or equivalent tabular system and supporting documentation shall be made available to Water Board staff or representatives during audits or inspections, and upon request.

C.5.e. Control of Mobile Sources

i. **Task Description** – Permittees shall have oversight and control of pollutants associated with mobile businesses.

ii. **Implementation Level** – Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, including, but not limited to, automobile washing, vehicle fueling, power washing, steam cleaning, graffiti removal, and carpet cleaning;

(b) Implementation of an enforcement strategy that specifically addresses mobile businesses;

(c) Updating and maintaining a mobile business inventory at least annually;

(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction; and

(e) Inspection of mobile businesses.

(2) Permittees may cooperate countywide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business information, BMP requirements, enforcement action information, and educational materials.

iii. **Reporting**

(1) In the 2026 Annual Report, each Permittee shall provide the following:

(a) Minimum standards and BMPs for each of the various types of mobile businesses;

(b) Enforcement strategy;

(c) A list and summary of the countywide or regional activities conducted, including BMP requirements, enforcement action information, and educational materials (Permittees' annual reports may refer to the countywide or regional reports for this information);

(d) A list and summary of specific outreach events and education conducted for each type of mobile business operating within the Permittee's jurisdiction; and

(e) A copy of the most recent version of the mobile business inventory.

(2) In each Annual Report, each Permittee shall include at least the following:

(a) The total number of inspections conducted of mobile businesses;

(b) The number of each type of mobile business inspected; and

(c) A summary of the enforcement actions taken against mobile businesses during the reporting year.

C.5.f. Municipal Separate Storm Sewer System (MS4) Map

i. Task Description – Each Permittee shall make the current map(s) of its MS4 available to the public.

Permittees shall identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition. This information will be used to update Permittee maps and databases.

ii. Implementation Level

(1) Current MS4 Maps – Permittees shall make current maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web-accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

(2) Updates to MS4 Maps – During the current Permit term, each Permittee shall complete the following:

(a) Determine information missing from the Permittee's current MS4 map(s), which may include Oakland Museum watershed maps, existing MS4 maps or drawings in the Permittee files, or other storm sewer system information databases.

(b) Identify and make available upon Water Board request maps of the storm sewer system and other stormwater controls installed after publication of the Oakland Museum watershed maps within the Permittee's jurisdictional area.

(c) Develop a plan and schedule for updating the Permittee's storm sewer system information. Permittees or countywide stormwater programs may work together or with the Oakland Museum of California to develop a plan and schedule for updating existing information, maps, drawings, and databases. The plan will consider the potential to identify storm sewer system component locations, size or specifications, materials of construction, and condition.

iii. Reporting

(1) In the 2024 Annual Report, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.

(2) Submit a plan and schedule with the 2026 Annual Report to update existing storm sewer system information as described above.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan, to prevent construction site discharges of pollutants into the storm drains. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers. Each Permittee shall in its reporting demonstrate the effectiveness of its inspections and enforcement activities to prevent polluted construction site discharges into storm drains.

C.6.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have the authority to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and to implement progressive enforcement to achieve expedient compliance and cleanup at all public and private construction sites.

ii. **Implementation Level**

(1) Permittees shall have the legal authority to require, at all construction sites year-round, effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non-stormwater management through all phases of construction (including, but not limited to, grubbing, clearing, site grading, filling, excavation, leveling, building, landscaping, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and cleanup at all construction sites year-round.

C.6.b. Enforcement Response Plan (ERP)

i. **Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance at all public and private construction sites.

ii. **Implementation Level –** The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from discovery of problems through confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site-specific, and seasonally- and phase-appropriate, effective BMPS in the following six categories:

(1) Erosion Control

(2) Run-on and Runoff Control

(3) Sediment Control, including entrance/exit and perimeter controls

(4) Active Treatment Systems, as necessary

(5) Good Site Management, including materials and waste management

(6) Non-Stormwater Management

ii. Implementation Level

The BMPs targeting specific construction site pollutants within the six categories listed in Provision C.6.c.i. shall be site-specific. Permittees may select site-specific BMPs, or BMP combinations, from resources such as:

(1) CASQA BMP Handbook, Construction, December 2019

(2) Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, May 2017, and addenda

(3) Other BMPs shown to provide equivalent or better protection

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs for each site before issuing grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction Stormwater General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in Provision C.6.c.i. are planned.[28]

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction Stormwater General Permit.

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in Provision C.6.c.i. in

[28] If SWPPPs do not include erosion control plan drawings for use by construction workers and managers at the site, erosion, sediment, and site control plans and drawings must also be submitted and reviewed.

preventing the discharge of construction pollutants into the storm drain. Permittees shall require timely corrections of all actual and potential discharges observed.

ii. Implementation Level

(1) Wet Season Notification

By September 1 of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season.

(2) Frequency of Inspections

Inspections shall be conducted monthly during the wet season[29] at the following sites:

(a) All construction sites disturbing one or more acre of land;

(b) All hillside projects (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with ≥15 percent slope) disturbing greater than or equal to 5,000 square feet; and

(c) High Priority Sites – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

(iii) Project size and type;

(iv) Sensitivity of receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

[29] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

(3) Contents of Inspections

Inspections shall focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in Provision C.6.c.i.

Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from Provision C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in Provision C.6.c.i;

(c) Visual observations for:

(i) Actual discharges of sediment and/or construction-related materials into storm drains and/or waterbodies.

(ii) Evidence of sediment and/or construction-related materials discharges into storm drains and/or waterbodies.

(iii) Illicit connections, and

(iv) Potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) Tracking

All inspections shall be recorded on a written or electronic inspection form. Inspectors shall follow the ERP for all actual and potential discharges discovered during the inspection.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) The department, agency, or other entity performing the inspection.

(e) Enforcement Response Level (Use ERP);

(f) Problem(s) observed using Illicit Discharge and the six BMP categories listed in Provision C.6.c.i;

(g) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(h) Comments, which shall include all rationale for longer compliance times, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) Each Permittee shall summarize the following information in the Annual Report:

(a) Total number of construction sites requiring inspections during at least part of the Permit year;

(b) Total number of active hillside sites disturbing less than one acre of soil requiring inspection;

(c) Total number of active sites disturbing one acre or more of soil;

(d) Total number of active sites disturbing less than one acre of soil identified as High Priority sites in Provision C.6.e.ii.(2)(c) requiring inspections;

(e) Total number of inspections conducted;

(f) Number of enforcement actions taken by type, organized by the categories in each Permittee's ERP;

(g) Number of illicit discharges, actual and potential, of sediment or other construction-related materials; and

(h) Number of enforcement actions or discrete number of potential and actual discharges fully corrected prior to the next rain event, but no longer than 10 business days after the potential and actual discharges[30] are discovered or otherwise considered corrected in a timely, though longer period.

(2) In the 2027 Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in Provision C.6.e.ii.(4). This evaluation shall include findings on the

[30] Permittees who track by discrete potential and actual discharges shall report by discrete discharges. Permittees who track by enforcement actions shall report by enforcement actions

program's strength, comparison to previous years' results, as well as areas that need more focused education for site owners, operators, and developers the following year.

(3) An electronic copy of the construction site and inspection database(s) shall be made available to the Water Board during inspections, audits, or upon request.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for all staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to staff responsible for conducting construction site stormwater inspections. Training topics shall include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and the ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information:

(1) Dates of training;

(2) Training topics covered;

(3) Total number of inspectors, including both municipal and non-municipal staff; and

(4) The number of inspectors attending each training, including both municipal and non-municipal staff.

If there was no training in that year, so state.

C.7. Public Information and Outreach

Each Permittee shall increase the awareness of the community, including diverse socioeconomic groups, government elected officials and staff, and ethnic communities, regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate these impacts; positively influence the public's waste disposal and runoff pollution generation behavior; and involve various citizens in mitigating the impacts of stormwater pollution. Outreach required in other provisions may be conducted under Provision C.7.

C.7.a. Outreach Campaigns

i. **Task Description** – Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences.

ii. **Implementation Level**

(1) Target a broad audience with a minimum of one outreach campaign with specific stormwater runoff pollution prevention messages. The outreach campaign(s) should utilize various electronic and print media, and paid and free media, including social media, as practicable, to best reach different demographics. The outreach campaign(s) may be coordinated regionally or countywide.

(2) Permittees shall conduct timely evaluations to measure the effectiveness of the outreach campaigns. Effectiveness assessment/evaluation may be done regionally or countywide.

C.7.b. Stormwater Pollution Prevention Education

i. **Task Description** – Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information.

ii. **Implementation Level**

(1) Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively, and Permittees may combine this function with the spill and dumping complaint central contact point required in Provision C.5 – Illicit Discharge Detection and Elimination.

(2) Each Permittee shall place and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website. In lieu of posting the detailed informational pages directly on their individual websites, Permittees may choose to

provide links from their websites to the countywide program's websites and/or websites for other collaborative efforts between Permittees. Each Permittee shall publicize its website.

C.7.c. Public Outreach and Citizen Involvement Events

i. **Task Description** – Public outreach shall include a variety of pollution prevention messages such as for car washing; proper use, storage, and disposal of vehicle waste fluids; household waste materials disposal; pesticide use; and trash. Public outreach events may include venues such as fairs, shows, workshops, and household waste collection events. Citizen involvement events may include venues such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, storm drain inlet marking, riparian restoration activities, and community grants.

ii. **Implementation Level** – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events according to its population, as shown in the table below:

Table 7.1 Public Outreach and Citizen Involvement Events[31]

Permittee Population	Number of Events
< 10,000	2
10,001– 40,000	4
40,001 – 100,000	5
100,001 – 175,000	7
175,001 – 250,000	8
> 250,000	10
Non-population-based Permittees	6

C.7.d. Watershed Stewardship Collaboration

i. **Task Description** – Permittees shall individually or collectively collaborate with other organizations to encourage and support community watershed stewardship activities. This may include collaborating with community groups such as local watershed forums and "friends of creek" groups; encouraging and supporting the development of grassroots watershed groups; or engaging

[31] Permittees may claim individual credits for events in which their Countywide Program participates, that the County Program supports or hosts, or other collaborative efforts, provided such events are publicized in the Permittee's jurisdiction.

existing groups, such as neighborhood associations, in watershed stewardship activities. This may also include collaboration with other organizations that benefit the health of the watershed, such as ReScape California, or collaboration to introduce community watershed stewardship activities into organizations focused on other environmental or sustainability efforts.

ii. **Implementation Level** – Annually demonstrate effort.

C.7.e. School-Age Children Outreach

i. **Task Description** – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-aged children (K through 12).

ii. **Implementation Level** – Implement annually and demonstrate effectiveness of efforts through assessment.

C.7.f. Outreach to Municipal Officials

i. **Task Description** – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. **Implementation Level** – At least once per permit cycle, or more often.

C.7.g. Tracking and Reporting

i. **Task Description** – Permittees shall electronically track outreach efforts in a table or spreadsheet. The tracking document should include, at a minimum:

(1) Outreach event or campaign type;

(2) Dates;

(3) Target Audience;

(4) Number of participants and number of participants compared to previous events, if applicable;

(5) Location(s) or website address, as applicable;

(6) Contact information for venues and coordinators, if applicable;

(7) Materials and activities, as applicable;

(8) Level of effort;

(9) Evaluation of effectiveness;

(10) Lessons learned; and

(11)Planned changes in approach or implementation, if any.

ii. Implementation Level – The tracking document shall be made available to the Water Board staff during inspections, audits, or upon request.

iii. Reporting

(1) In each Annual Report, each Permittee (or the Countywide Program, if the tracking was done countywide or regionally) shall submit a table listing the types of outreach programs implemented during that Permit year along with a brief description. The table should be a cumulative table showing the number, if applicable, of each type of outreach campaigns or events occurring during each Permit year.

(2) In the 2023 Annual Report, each Permittee shall list the Permittee's point of contact and the URL for its stormwater pollution website. The Permittee shall discuss how the point of contact and website are publicized and maintained and certify that it has a website dedicated to providing and maintaining information on stormwater issues, watershed characteristics, and stormwater pollution prevention approaches. Changes in this information shall be reported in the Annual Report for the year in which the change occurs.

(3) In the 2027 Annual Report, each Permittee (or the Countywide Program, if the effectiveness assessment/evaluation was done countywide or regionally) shall submit a summary of the effectiveness assessments/evaluations by type of outreach described in Provisions C.7.a through C.7.f. The summary shall include plans for continuing or modifying each outreach type during the next permit term.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

All Permittees shall comply with all the monitoring requirements in this Provision. Permittees may choose any of the following mechanisms, or a combination of these mechanisms, to meet the monitoring requirements:

i. **Regional Collaboration.** Permittees are encouraged to continue contributing to the Regional Monitoring Collaborative (RMC), which coordinates water quality monitoring conducted by all the Permittees. Permittees are encouraged to consider and assign additional duties to the RMC for purposes of increased efficiencies, particularly, but not limited to, reporting duties.

ii. **Area-wide Stormwater Program.** Permittees may contribute to their countywide or area-wide Stormwater Program, so that the Stormwater Program conducts monitoring on behalf of its members.

iii. **Third-party Monitoring.** Permittees may use data collected by a third-party organization, such as the Water Board or Department of Pesticide Regulation, to fulfill a monitoring requirement, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.b.

C.8.b. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Program Plan (QAPrP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

C.8.c. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[32] such as:

- Are chemical concentrations in the Estuary potentially at levels of potential concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?

[32] https://www.sfei.org/sites/default/files/biblio_files/MYP%202021%20FINAL.pdf (SF Bay Regional Monitoring Program (RMP) Multi-Year Plan, January 2021). While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

The Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program by contributing their fair share financially on an annual basis.

C.8.d. Low Impact Development (LID) Monitoring

LID Monitoring is intended to measure compliance and effectiveness of LID controls. It will improve the understanding of the benefit of LID implementation, in particular, green stormwater infrastructure, on pollutant loading and hydrology of receiving waters within Permittees' jurisdictions, at different space and time scales, and inform the design, construction, operation and maintenance (O&M) and future implementation of LID. LID Monitoring may also be used to calibrate and validate models that estimate pollutant removal effectiveness and inform sizing of LID facilities (e.g., countywide C.3 technical guidance documents, reasonable assurance analysis models, and other sizing and assessment models).

LID Monitoring is intended to answer both of the following two management questions:

- What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, at different spatial scales (e.g., single control vs watershed or catchment scale), and how do they change over time?
- What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?

i. LID Monitoring Plans

(1) The Permittees shall, at the regional or countywide level, develop LID Monitoring Plans to implement the requirements in Provision C.8.d.iii-iv. The LID Monitoring Plans shall, at a minimum:

(a) Explain how the study(s) will address both management questions and propose monitoring questions necessary that will address both management questions.

(b) Describe the LID facility(s) or system(s) and study area(s), including the characteristics, land use and management actions within the tributary drainage area to the LID facility(s) or system(s) that will be monitored.

(c) List the monitoring stations, monitoring parameters, and associated measurement, sample and analytical methods that will be utilized.

(d) Establish a monitoring schedule, including number and type (wet weather and dry weather) of monitoring events for each site, that may result in a greater number of total and/or annual monitoring events than the minimum required in Table 8.d.2, and including a discussion of the allocation of samples between and within sites.

(e) Describe the data evaluation methods, such as statistical analyses to test whether differences in concentrations are statistically significant.

(f) Include study-specific Quality Assurance Project Plans (QAPPs), which, at a minimum, are comparable to the SWAMP QAPrP.

(g) Provide annual cost estimates for the implementation of the LID Monitoring Plan.

(h) Explain how sampling and analytical methodologies will be regionally consistent.

(2) Permittees shall implement no later than the deadline set forth in Provision C.8.d.v, the approved or conditionally approved LID Monitoring Plans as meeting the requirements herein (including consideration of countywide and regional representativeness and whether the information generated will reliably address the LID Monitoring management questions).

ii. Regional Collaboration

To assist with the development and implementation of scientifically-sound LID Monitoring Plans, to facilitate regional consistency with respect to sampling and analytical methodology, and to make recommendations about allocation of samples between and within different sites, the Permittees shall form and convene a Technical Advisory Group (TAG) which includes impartial science advisors (e.g., SFEI, SCCWRP) and Water Board staff, to review and make recommendations regarding the LID Monitoring Plans (including their study design, analysis methods, results, and conclusions) prior to submission of the LID Monitoring Plans to the Executive Officer. In order to effectuate this review, the Permittees shall submit their draft LID Monitoring Plans to the TAG by March 1, 2023. Prior to the Executive Officer's approval or conditional approval of the LID Monitoring Plans, the TAG shall be convened at least biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation of Provision C.8.d, including but not limited to study design, sample locations, and analysis methods.

iii. Methods

The Permittees shall implement or cause to be implemented the LID effectiveness monitoring methods listed in Table 8.d.1.

iv. Parameters and Intensities

(1) Permittees shall conduct LID Monitoring consistent with the parameters and intensities specified in Table 8.d.2.

(2) Monitoring must be conducted according to test procedures in 40 CFR part 136 for analyses of pollutants unless another method is required under 40 CFR chapter 1, subchapter N. For PFAS, if there are no standard methods in 40 CFR part 136, Permittees may use other methods, such as those recommended by U.S. EPA for non-potable water and other environmental media.

(3) In a given water year, if there are not enough storm events for Permittees to sample (i.e., due to weather/climate), Permittees may certify that in their subsequent LID Monitoring Status Report and perform the missed sample events in the subsequent water year.

v. Implementation Level – Permittees shall begin implementation of the approved or conditionally approved LID Monitoring Plans by no later than the start of the 2024 Water Year, which is October 1, 2023.

vi. Reporting – The Permittees shall submit their LID Monitoring Plans for Executive Officer approval by May 1, 2023.

Table 8.d.1 LID Monitoring Methods

	Management Question	Monitoring Methods
1	What are the pollutant removal and hydrologic benefits of LID components, facilities and/or systems (and of different combinations of components, facilities and/or systems), including variations in design and how do they change over time?	Monitoring methods to investigate pollutant removal benefits shall consist of: • Required: Collection and analysis of the parameters listed in Table 8.d.2, in stormwater influent and effluent (simultaneously) – using automated samplers to collect flow-weighted composite EMCs (time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites) – at the component, facility, site, and/or watershed scale; and • Optional: sampling of sediment and other technically sound and accepted monitoring methods designed to investigate pollutant removal benefits. Monitoring methods to investigate hydrologic performance (flow) shall consist of: • Required: Measurement of stormwater runoff quantity and/or flow at the component, facility, site and/or watershed scale, in both the influent and effluent of the LID BMP(s). • Optional: Measurement of stream flow to evaluate watershed scale benefits; development of runoff hydrographs; water balance monitoring; collection and analysis of infiltration rates or water depth at the facility and/or site scale; or other technically sound and accepted monitoring methods designed to investigate hydrologic performance. Monitoring methods to investigate changes over time include: • Longitudinal study(s), using the above monitoring methods applied at the component, facility, and/or system scales, over different time scales.
2	What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?	• Monitoring methods assigned to Management Question 1 above, applied at the component, facility, system, and/or site scale; and • Condition assessments at the component, facility, system, and/or site scale.

Table 8.d.2 LID Monitoring Intensities and Parameters

Countywide Stormwater Program	Anticipated Type(s) of LID Facilities Monitored	Total Minimum Number of Water Quality Sample Events During Permit Term (Annual Minimum)[33]	Parameters[34,35]
Alameda	High flow rate tree well filters and/or a combination of several LID measures.	25 (3)	**Required:** • Total Hg; • Total PCBs; • TSS • PFAS; • TPH; • Total and Dissolved Copper; • Flow; • Total Hardness; and • pH. **Optional:** • Other emerging contaminants;[36] and • Other ancillary parameters.[37]
Contra Costa	Bioretention and/or other infiltration-based LID measures.	25 (3)	
San Mateo	Regional multi-benefit stormwater capture facility(s).	25 (3)	
Santa Clara	Bioretention and/or other LID measures.	25 (3)	
Solano	Bioretention and/or other LID measures.	12 (1)	

[33] This column indicates the total minimum number of sample events that must take place during the Permit term, and the minimum number of sample events that must take place during each year of the Permit term. Samples shall be collected via automated sampler as flow-weighted composite event mean concentrations (EMCs); time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites. In order to assess performance, each sample event must include simultaneous sampling of the influent and effluent. The Permittees are encouraged to additionally collect sediment samples (e.g., to analyze for total PCBs and total mercury), however such sediment sample collection shall not count towards the required water quality samples specified in this column. The LID Monitoring Plans shall propose how to address both of the Management Questions, by specifying the locations of sampling stations, the matrix (surface water, bedded sediment, etc.), the number of samples to be collected at each site each year in the dry season versus in the wet season, and analytical methods.

[34] Each flow-weighted (or time-weighted) composite EMC sample shall be analyzed for all of the required parameters listed in this column. LID Monitoring Plans may include additional parameters not listed in this column.

[35] Data must be SWAMP comparable.

[36] Other emerging contaminants may include but are not limited to: microplastics and tire compounds such as 6PPD-quinone.

[37] Other ancillary parameters may include, but are not limited to: zinc (and other metals), temperature, conductivity, polycyclic aromatic hydrocarbons (PAHs), turbidity, pathogens (FIB), total methylmercury, total organic carbon (TOC), dissolved organic carbon (DOC), pesticides of concern to water quality (e.g., pyrethroids, fipronil and its degradants, and neonicotinoids such as imidacloprid), major cations (Ca, Mg, Na, K), and major anions (SO_4, Cl).

C.8.e. Trash Monitoring

Trash Monitoring is intended to: 1) verify whether Permittees' trash control actions to-date have effectively prevented trash from their jurisdictions from discharging to receiving waters, and 2) evaluate whether discharges of trash from areas of Permittees' jurisdictions where full trash capture equivalency (full trash capture devices or other actions verified with on-land visual trash assessments, as referenced in Provision C.10.b.iii) has been achieved are causing and/or contributing to adverse trash impacts in receiving waters.

Trash monitoring shall address the following management and monitoring questions:

Management Questions

- Have Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?

Monitoring Questions

- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

i. Monitoring Components

The Permittees shall implement or cause to be implemented the monitoring components as described below, to address each management and monitoring question. Permittees should use comparable assessment methods to facilitate regional consistency.

To ensure comparable data, for each monitoring site, Permittees and the TAG shall consider incorporating the implementation of steps 1-6 as specified in the Statewide Trash Monitoring Methods Project Trash Monitoring Playbook[38] into the Trash Monitoring Plan. Permittees and the TAG shall consider adapting and repeating these six steps for all methods specified in Provision C.8.e.ii, to

[38] https://sites.google.com/sfei.org/trash

reflect site information that can be collected regardless of method and can increase comparability between methods. The six steps are as follows:

(1) Event Preparation

(2) Gather Standard Equipment

(3) Set up the Assessment Area

(4) Record the Site Information and Assessment Area Dimensions

(5) Record Assessment Area Photographs

(6) Determine, Document, and Map the Locations of Storm Drain Outfalls, Homeless Encampments, and Illegal Dumping Hotspots Which May Impact the Assessment Area.

ii. Monitoring Methods

(1) Permittees shall collect and analyze the amount of trash discharged from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.

Sampling of MS4 outfalls includes the use of netting devices attached to the end of the outfall pipe (that capture trash discharging through the MS4), or other equivalent end-of-pipe (or in-line) devices and structures, whether existing, modified, or new. The device used to monitor the trash at the end of the MS4 outfall (or in-line, within the MS4) shall not be used itself as the trash control that grants the Low trash generation status to the tributary drainage area; the monitored tributary drainage area may only be controlled to the Low trash generation level by controls upstream of the monitoring device.

(2) Permittees shall implement a pilot program to directly (in-stream) sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system. Permittees should not select in-stream sites that are downstream of direct discharge sites (e.g., homeless encampments and illegal dumping sites).

To the extent feasible, in-stream monitoring sites should be co-located with MS4 outfall monitoring sites, as follows: They should be no further than 300 feet downstream or upstream of them; failing that, they should be no further than 300 feet downstream of them, or, any distance upstream of them; failing that, they should be anywhere within the same receiving

water; failing that, in-stream monitoring sites do not have to be co-located with MS4 outfall monitoring sites.

Sampling a receiving water directly (in-stream) involves the use of trawls, nets, or other equivalent devices, that are designed to capture as much of the width and depth of the receiving water's cross section (especially the thalweg) as is feasible and safe, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.

Indirect methods (on-land), such as shoreline and/or streambank assessments, are not a satisfactory surrogate or replacement for these direct measurements of trash within receiving waters.

(3) Permittees may additionally implement shoreline and/or streambank assessment methods (with an appropriate frequency, timing, and assessment length), not to indirectly measure trash loading in MS4 outfalls and receiving waters, but instead to gain a synoptic view of on-land trash conditions adjacent to MS4 outfall and in-stream monitoring sites. Such methods include: the riverine volumetric method, the riverine quantitative tally method, the unoccupied aerial system (UAS) method,[39] or other equivalent methods. The riverine qualitative visual assessment method may be merited but requires additional study, refinement, and calibration, and its use is subject to the Executive Officer's approval.

(4) In order to be able to characterize loading rather than only concentration, Permittees shall directly measure flow at both MS4 outfall sites (flow through the MS4 pipe) and at in-stream receiving water sites (flow through the receiving water). Examples of methods to collect flow data include stream gages, manning's equation, and other methods recommended in Chapter 3.2 of the International Stormwater BMP Database's October 2009 Urban Stormwater BMP Performance Monitoring document.[40]

(5) All methods shall include collection of data on material type. For example, the volume or tally of cigarette butts collected.

[39] https://sites.google.com/sfei.org/trash

[40] https://bmpdatabase.org/monitoring

iii. Monitoring Sites, Events, Frequency, and Intervals

(1) Permittees shall conduct MS4 outfall monitoring annually, starting October 1, 2023, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan.

County	MS4 Outfall Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	3	3
Contra Costa	2	3
Solano	1	3
San Mateo	2	3
Santa Clara	3	3

(2) Permittees shall implement a pilot program for direct in-stream monitoring. Permittees shall conduct this monitoring annually, starting October 1, 2024, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan.

County	Direct In-Stream Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	2	3
Contra Costa	1	3
Solano	0	0
San Mateo	1	3
Santa Clara	2	3

(3) Permittees should monitor storm events that trigger trash discharge and transport trash through the MS4 (e.g., 0.25 inches of rain over 24 hours), and that are preceded by at least 48 hours of limited or no trash discharge from the tributary drainage area. Each wet season, Permittees should sample the first forecasted significant storm event, and at least one storm event that is forecast to be greater than the one-year, one-hour storm event (i.e., full capture design standard).

(4) To the extent possible, Permittees should monitor the same monitoring sites during each year of the Permit term. With cause, justification, and reporting in the Annual Trash Monitoring Progress Report, they can change monitoring sites.

(5) Tributary drainage areas to monitoring sites should be representative with respect to the types of trash controls present across the region.

For example, some monitoring sites receive runoff from areas controlled primarily by one type of full trash capture device (e.g., an inlet-based device) while other monitoring sites receive runoff from areas controlled primarily by another type of full trash capture device (e.g., a HDS unit). And/or, some monitoring sites receive runoff from areas controlled primarily by full trash capture devices while other monitoring sites receive runoff from areas controlled primarily by Other Actions.

(6) Permittees are exempt from outfall and receiving water sampling during dangerous and unsafe weather conditions.

(7) In a given water year, if there are not enough qualifying storm events for Permittees to sample (i.e., due to weather/climate) – or if safety concerns preclude sampling during a qualifying storm event such that Permittees would not achieve the mandatory minimums set forth in Provisions C.8.e.iii.(1)-(2) – the Permittees may certify that in their subsequent Annual Trash Monitoring Progress Report, and perform the missed sample events in the subsequent water year.

(8) Permittees shall use the results of Trash Monitoring to inform and investigate their trash management actions. If Trash Monitoring results indicate that discharges are causing or contributing to adverse impacts in receiving waters, Permittees shall implement new or enhanced actions to comply with the trash discharge prohibition and receiving water limitations. Examples of results that could trigger follow up actions are provided in the Fact Sheet.

iv. Regional Trash Monitoring Technical Advisory Group

(1) To assist with the development and implementation of scientifically-sound trash monitoring, the Permittees shall form and convene a Technical Advisory Group (TAG), which includes impartial science advisors (e.g., SFEI) and Water Board staff, to review and provide input on ongoing trash monitoring, site selection, analysis methods, results, and conclusions.

Prior to the submission of the Trash Monitoring Plan, the TAG shall meet at least biannually. Subsequent to the submission of the Trash Monitoring Plan, the TAG shall meet at least annually.

(2) The Permittees shall solicit input and feedback from the TAG on:

(a) The spatial representativeness of each site;

(b) The adequacy of the methods employed at each site;

(c) The recommended minimum intensity, size, and/or recurrence interval for storms that are sampled;

(d) The number of sites and monitoring events, as described in the monitoring schedule in the Trash Monitoring Plan;

(e) The timing of sampling during storm events. For example, it is likely that Permittees should prioritize sampling during the rising limb of the hydrograph (and towards the beginning of the rising limb, at that), because that is when most of the trash load is mobilized and discharged to MS4 outfalls and receiving waters;

(f) Implementation of Provision C.8.e.iii.(8);

(g) Permitting; and

(h) Recommendations for alternative approaches to answering the management and monitoring questions.

v. Trash Monitoring Plan - Permittees shall collectively submit a Trash Monitoring Plan by July 31, 2023, subject to Executive Officer approval, that, at a minimum, includes the following information:

(1) Selected site locations (latitudinal and longitudinal coordinates), including maps and characteristics (e.g., type of outfall, receiving water);

(2) For each site, describe the land use, trash conditions/levels, trash controls present, and other relevant characteristics (trash generation rates, types of controls present, etc.) of the tributary drainage areas of the MS4, and also delineate the tributary drainage areas of the MS4;

(3) A description of factors that were considered when selecting monitoring sites and events, including spatial and temporal representativeness;

(4) For each site, a description of the monitoring methods and protocols that will be used;

(5) A monitoring schedule, which shall include the timing (of sampling during and between storm events), number and type of monitoring events at each site;

(6) Plans for implementation of Provision C.8.e.iii.(8);

(7) A summary of permitting efforts;

(8) Opportunities provided for input and participation by interested parties and scientific experts other than those participating in the TAG; and

(9) Input, feedback, and recommendations from the TAG on the capacity of the Trash Monitoring Plan to answer the management and monitoring questions.

C.8.f. Pollutants of Concern Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to assess compliance with receiving water limitations, support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants.

In particular, monitoring required by this provision must be directed toward addressing the following six priority POC management information needs:

(1) **Source Identification** - identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

(2) **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

(3) **Management Action Effectiveness** - evaluating the effectiveness or impacts of existing management actions, including compliance with TMDLs and other POC requirements and providing support for planning future management actions;

(4) **Loads and Status -** providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges;

(5) **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time; and

(6) **Compliance with Receiving Water Limitations –** providing information to assess whether receiving water limitations (RWLs) are achieved.

Not all information needs apply to all POCs (see Table 8.2 below for details).

i. Sampling Methods – The Permittees shall implement or cause to be implemented the monitoring components shown in Table 8.1 to address each of the six POC management information needs.

Table 8.1 POC Monitoring Methods

Monitoring Type	Information Need	Monitoring Methods
1	Identify Source Areas	Monitoring methods to identify watershed sources of POCs shall include: • Collection and analysis of POCs (in dissolved phase or on suspended sediment particles as appropriate for pollutant) in urban stormwater runoff transported through MS4s or receiving waters during stormwater runoff events; or • Collection and analysis of POCs (in dissolved phase or on suspended sediment particles as appropriate for pollutant) in urban stormwater runoff at outfall locations (i.e., as runoff from MS4 enters receiving waters) during stormwater runoff events; or • Collection and analysis of POCs on bedded sediments deposited in MS4s, treatment facilities, or receiving waters; or • Collection and analysis of POCs in stormwater runoff or bedded sediments on source area properties (e.g. private property) or public rights of way; or • Other monitoring methods designed to identify specific sources or uses of POCs (e.g., caulk in roadways or building materials) or watershed source areas.
2	Identify watershed areas contributing most to Bay impairment	Monitoring methods to identify watershed areas contributing most to Bay impairment shall include: • Methods described for Monitoring Type #1; or • Collection and chemical analysis of small fish tissue (or other relevant indicator) near tributary confluences with the Bay; or • Collection of bedded sediments near tributary confluences with the Bay and analysis for POCs.
3	Effective-ness of, and provide support for future, management actions	Monitoring methods to evaluate effectiveness of, and provide support for future, management actions shall include: • Methods described for Monitoring Type #1, but focused on characterizing the effectiveness of specific management actions in reducing or avoiding POCs in MS4 discharges; or • Collection of information to characterize or develop models of control measure performance

Monitoring Type	Information Need	Monitoring Methods
		(e.g., treatment controls, demolition debris program, green infrastructure, etc.). This information could include data for model calibration and validation, or other information needed to estimate or compute model parameters.
4	Provide information on POC loads, concentra-tions, or presence/ absence	Monitoring methods to provide information on POC loads, concentrations, or presence/absence shall include: • Methods described for Monitoring Type #1, in combination with quantitative modeling associated with quantifying POC loads from MS4s or small tributaries to the Bay; or • Collection of information to support development of conceptual models of watershed fate and transport; or • Collection of information to support watershed loading models such as data for model calibration and validation or other information needed to estimate or compute model parameters.
5	Evaluate POC trends	Monitoring methods to provide information on trends in POC loads and concentrations over time shall include methods described for Monitoring Type #1 or #2
6	RWLs Assessment	Monitoring in receiving waters to assess compliance with RWLs. Monitoring methods shall include: • Collection and analysis of analytes during the wet season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by urban stormwater runoff. • Collection and analysis of analytes during the dry season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by dry season urban runoff. • Sampling locations for RWLs assessment monitoring shall be spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types.

ii. **Parameters and Monitoring Frequency –** The Permittees shall conduct POC monitoring consistent with the monitoring intensity and frequency specified in Table 8.2. Monitoring frequencies are described as the total and minimum number of samples that Permittees within a countywide Stormwater Program shall collectively collect and analyze in a Water Year (October 1- September 30). Minimum number of samples that Permittees within a countywide Stormwater Program shall collect by the end of the Permit term to address each monitoring type are also specified.

Table 8.2 POC Monitoring Parameters, Effort and Type

Pollutant of Concern	Total Samples[a] Collected /Analyzed (yearly minimum) for each Countywide Program: Alameda, Contra Costa, Santa Clara, and San Mateo	Minimum Number of Samples for each Monitoring Type[b]
Polychlorinated Biphenyls (PCBs)	75 (8) Alameda, Santa Clara 65 (8) Contra Costa, San Mateo	8 samples minimum for monitoring types 1-3 and 16 samples minimum for monitoring types 4-5
Total Mercury	60 (8) Alameda, Santa Clara 50 (8) Contra Costa, San Mateo	8 samples minimum for monitoring types 1-5
Copper	5	all samples for monitoring type 4
Emerging Contaminants [c] Must include but not limited to: • contaminants likely in stormwater and associated with vehicles; • per- and polyfluoroalkyl substances (PFAS); • organophosphate ester plastic additives/flame retardants; • bisphenol plastic additives; and • ethoxylated surfactants	25 See footnote c	all samples for monitoring type 4 See footnote c
Ancillary Parameters[d]: • Total organic carbon • Suspended sediments (SSC) • Hardness	as necessary to address management questions for other POCs – see footnote d	
RWLs Assessment: copper, zinc, fecal indicator bacteria, and additional analytes determined under Provision C.8.h.iv	4 wet season samples 1 dry season sample	5 samples for monitoring type 6

[a] This column indicates the total number of samples, across all applicable monitoring types (i.e., monitoring types 1-5 from Table 8.1), that must be collected during the Permit term. The number in parentheses indicates the minimum number of samples that must be collected, across all applicable monitoring types, during each of the five years of the permit. For example, 75 total samples must be collected for total PCBs and 60 total samples for mercury by each set of Santa Clara County and Alameda County during the term of the permit. San Mateo and Contra Costa Counties, because of smaller program size, must collect 65 PCBs and 50 total samples for mercury. Permittees must collect a minimum of 8 PCBs and 8 mercury samples every year of the Permit term, including the final year. It is possible that data can satisfy multiple monitoring types. However, the intent of the Permit is to achieve a distribution of monitoring effort across all applicable monitoring information needs. Therefore, no more than 25 percent of samples for any pollutant may be used to satisfy requirements for multiple monitoring categories for that pollutant. This requirement is intended to ensure that monitoring is focused to provide the best information to answer specific management questions.

[b] This column indicates the monitoring types from Table 8.1 that are applicable to this POC along with the minimum number of samples that shall be collected by each set of Permittees (i.e., Santa Clara County, San Mateo County, Alameda County, and Contra Costa County) by the end of the Permit term. The applicable monitoring type(s) is also stated to illustrate the management information need(s) motivating the collected data. For example, each set of Permittees (i.e., the Countywide Programs for Santa Clara, San Mateo, Alameda, and Contra Costa counties) must collect and analyze at least 8 samples to address monitoring types 1-5 in Table 8.1 for both total PCBs and total mercury. Some collected samples may address multiple management questions.

[c] Permittees, collectively, shall produce or cause to be produced a stormwater monitoring strategy for emerging contaminants (ECs) April 1, 2023 that prioritizes ECs for stormwater monitoring listed in this table and possibly others and establishes an approach for sampling stormwater ECs based on specific or likely physico-chemical properties, sources, transport pathways, and fate of prioritized ECs. Permittees must conduct or cause to be conducted ECs stormwater monitoring to execute the ECs stormwater monitoring strategy at a level of effort indicated in the table. This level of effort can be satisfied either through sampling and analysis of the number of samples indicated in this table or through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.

[d] Total Organic Carbon (TOC) data are not used independently. Rather, TOC can be useful for normalizing PCBs data collected in water and sediment. TOC shall be collected concurrently with PCBs data that should be normalized to TOC. Similarly, suspended sediment concentrations (SSC) samples should be collected and analyzed when water samples are collected that will be used to assess loads, loading trends, or BMP effectiveness for PCBs and Mercury. Hardness data are used in conjunction with copper concentrations collected in fresh water.

iii. **POC Parameters and Analytical Methods –** Samples collected consistent with Table 8.2 shall be analyzed for parameters listed in Table 8.3. Where no laboratory method is listed in Table 8.3, Permittees shall use U.S. EPA or SWAMP-approved methods. There are no analytical methods listed in Table 8.3 for ECs as there are not U.S. EPA-approved methods for most of these contaminants. Monitoring for ECs is investigatory monitoring to provide information on EC loads, concentrations, and presence/absence rather than compliance determination. Accordingly, specification of analytical method is not mandatory. Moreover, the sampling and analysis is likely to be conducted through the San Francisco Bay Regional Monitoring Program, which has a robust and well-established quality assurance process, and the laboratories chosen for the EC analyses will be applying state-of-the-science analytical methods for the detection and quantification of ECs in stormwater samples.

Table 8.3 POC Analytes and Analytical Methods

Pollutant of Concern	Matrix	Analyte(s) or Test Species	Laboratory Analytical Methods
Polychlorinated Biphenyls (PCBs)	Water	Total PCBs	U.S. EPA 1668 (RMP 40)
		Total Organic Carbon	SM5310B
		Suspended sediments (SSC)	ASTM D3977-97
	Bedded Sediment	Total PCBs	As appropriate to address the management information need: U.S. EPA 1668 (RMP 40), 8082A, or 8270D modified by Method 1625
		Total organic carbon	U.S. EPA 9060
Mercury	Water	Total Mercury	U.S. EPA 1631 Rev E
	Bedded Sediment	Total Mercury	U.S. EPA 7473
Copper	Water	Total Copper	U.S. EPA 200.7
		Dissolved Copper	U.S. EPA 200.8
		Hardness	U.S. EPA 130.1 or 130.2

C.8.g. Pesticides and Toxicity Monitoring

Permittees shall conduct wet and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides-related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Water Board modify, reduce or eliminate this monitoring requirement, provided the resultant change would result in overall improvement of pesticide monitoring data collection.

In fulfilling the requirements of Provision C.8.g, Permittees may collaborate with the California Department of Pesticide Regulation (CDPR) for data collection and analysis. For data collected through such collaboration, CDPR's standard operating procedures and quality assurance/quality control methods

may be used in place of the SWAMP comparability requirements in subprovisions C.8.b and in C.8.g.

i. Toxicity in Water Column - Dry Weather

(1) Field and Laboratory Method – Permittees shall collect grab samples of receiving water using applicable SWAMP comparable methodology. These samples shall be analyzed for the test organisms listed, and by the methods described, in Table 8.4.

Toxicity shall be evaluated using the Test of Significant Toxicity (TST) statistical approach.[41] Each sample shall be subject to determination of "Pass" or "Fail" and shall indicate "Percent Effect" from toxicity using nondiluted samples. The TST null hypothesis shall be "mean sample response ≤ 0.75 × mean control response." A test result that rejects this null hypothesis shall be reported as "Pass." A test result that does not reject this null hypothesis shall be reported as "Fail." The relative "Percent Effect" of the sample is defined and reported as: ((Mean control response – Mean sample response) ÷ Mean control response)) × 100.

(2) Sample Design/Locations – Sample locations may be selected by Permittees to monitor locations where toxicity could be likely; to coincide with creek restoration sites; or to resample a location where toxicity has been found in the past.

(3) Frequency, Timeframe and Number of Sites – Permittees shall annually collect in the dry season at least the minimum number of samples as shown below.

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

[41] *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A, Figure A-1, and Table A-1.

Table 8.4 Water Column Aquatic Toxicity Analytical Procedures

Test Species	Test Endpoint(s)	Units	U.S. EPA Method
Pimephales promelas (Fathead Minnow)	Larval Survival and Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013[42] EPA 833-R-10-003[43]
Ceriodaphnia dubia (Freshwater Crustacean)	Survival[a]	Pass or Fail, % Effect <25% Passes, >25% Fails	EPA-821-R-02-013 EPA 833-R-10-003
Ceriodaphnia dubia (Freshwater Crustacean)	Reproduction	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Selenastrum capricornutum (Green Algae)	Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Hyalella azteca (Freshwater Amphipod)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012[44] EPA 833-R-10-003
Chironomus dilutus (midge)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012 EPA 833-R-10-003

[a] The *Ceriodaphnia dubia* chronic toxicity test design for the survival endpoint is not amenable to the TST, Welch's t-test so the survival endpoint will be determined as a percent effect using the TST approach. A percent effect less than 25 percent will be considered a "pass," and a percent effect equal to or greater than 25 percent will be considered a "fail."

[b] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent.

[42] Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136.

[43] National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003) 2010.

[44] *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). See Appendix B, page 238, for *H.azteca* and *C.dilutus* methods.

ii. Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of creek sediment using applicable SWAMP-comparable methodology. These samples shall be analyzed for the pollutants and organisms listed and by the methods described on Table 8.5. Where no laboratory method is listed in Table 8.5, Permittees shall use U.S. EPA- or SWAMP-approved methods.

(2) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, or to resample a location where toxicity has been found in the past, for example.

Table 8.5 Sediment Toxicity & Pollutants Analytical Procedures

Test Species or Pollutant	Units	Laboratory Method
Hyalella azteca and Chironomus dilutus survival[a]	Pass/Fail using TST, % Effect[a]	EPA-600/R-99-064[45]
Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin		EPA 3540C followed by EPA 8270D by NCI-GCMS
Fipronil and its degradates (fipronil-sulfone, fipronil-desulfinyl, fipronil sulfide)		
Total PAHs		
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc		
Total organic carbon		
Grain size		

[a] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent. The false positive rate (beta error) is 0.05 and the negative rate (alpha error) is 0.25 for these test methods.

[45] *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (EPA 600/R-99-064) Second Edition. March 2000.

(3) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past, for example.

(4) Frequency, Timeframe, and Number of Sites – Permittees shall collect at least the minimum number of samples annually as shown:

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

iii. Wet Weather Pesticides and Toxicity Monitoring

(1) Field and Laboratory Method – Permittees shall collect water column samples and analyze them for the following parameters using the methods specified in Tables 8.4 and 8.5. For imidacloprid, Permittees shall specify an analytical method that achieves a reporting level of 0.01 ppb.

- Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin
- Imidacloprid
- Fipronil and its degradates fipronil-sulfone, fipronil-desulfinyl, fipronil sulfide and fipronil amide (amide is optional – do it if lab offers the suite)
- Toxicity

(2) Sample Design/Locations – Permittees shall collect samples annually during storm events. Sample locations shall be representative of urban watersheds (i.e., bottom of watershed locations).

(3) Frequency, Timeframe, and Number of Sites – If this (Provision C.8.g.iii) sampling is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term, with a minimum

of six (6) samples collected by the end of the third water year of the permit term. If this (Provision C.8.g.iii) sampling is conducted by Countywide Stormwater Programs, Permittees shall collect at least the minimum number of samples as shown below:

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

iv. **Follow-up** – Permittees shall provide notification in the next Urban Creeks Monitoring Report when analytical results indicate any of the following:

(1) A toxicity test of growth, reproduction, or survival of any test organism is reported as "fail" in both the initial sampling and a second, follow-up sampling, and both have ≥ 50% Percent Effect;

(2) A pollutant is present at a concentration exceeding its water quality objective in the Basin Plan; or

(3) For pollutants without water quality objectives, results exceed Probable Effects Concentrations or Threshold Effects Concentrations.[46]

C.8.h. Reporting

i. **Water Quality Standard Exceedance –** When data collected pursuant to Provisions C.8.a.-C.8.g. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. This reporting requirement shall not apply to continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are addressed pursuant to

[46] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31. More recent TECs and PECs may be used if lower than stated in MacDonald 2000.

Provisions C.9 through C.12, C.14, C.18, and C.19, consistent with Provision C.1.

ii. **Electronic Reporting –** The Permittees shall submit to the California Environmental Data Exchange Network (CEDEN) all results from monitoring conducted pursuant to Provisions C.8.d LID Monitoring, C.8.e Trash Monitoring, C.8.f Pollutants of Concern Monitoring, and C.8.g Pesticides and Toxicity Monitoring. Data that CEDEN cannot accept are exempt from this requirement.

(1) Data shall be submitted in SWAMP formats and with the quality controls required by CEDEN.

(2) Data collected during the previous October 1–September 30 period shall be submitted by March 31 of each year.

iii. **Urban Creeks Monitoring Report –** The Permittees shall submit a comprehensive Urban Creeks Monitoring Report at the countywide level no later than March 31 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Each Urban Creeks Monitoring Report shall contain summaries of C.8.d LID Monitoring, C.8.e Trash Monitoring, C.8.f Pollutants of Concern Monitoring, and C.8.g Pesticides and Toxicity Monitoring, including the following:

(1) **A LID Monitoring Status Report**, which, at a minimum, includes the following information:

(a) A summary of the LID Monitoring Methods and study designs used in the preceding water year, at each sampled LID component, facility or system.

(b) A summary table that lists monitoring samples collected during the preceding water year during the Permit term, including at a minimum, the following information for each sample location: Site ID; the name or ID of the LID component, facility or system name; latitude and longitude of the LID component, facility or system; type of LID component, facility or system (e.g., bioretention); characteristics and land use of the tributary drainage area of the LID component, facility or system; other management actions and controls present in the tributary drainage area of the LID component, facility or system; sample dates; and concentrations of parameters measured.

(c) A summary of lessons learned, progress made, and interim conclusions, for all samples collected during the previous water year.

(d) For all data generated during the preceding water year, a statement of data quality.

(e) The raw data generated by the preceding water year, made available to the Water Board and third parties.

(f) An outline of steps (including but not limited to study designs, methods and sites) for the upcoming water year.

(g) An analysis of the data, including the following:

(i) Identification and analysis of any trends in stormwater or receiving water quality.

(ii) A discussion of the data for each monitoring program component, which includes:

a. Monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, the California Toxics Rule, and other applicable water quality control plans;

b. Where appropriate, hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

c. Identification and prioritization of water quality problems;

d. Identification of potential sources of water quality problems;

e. Description of follow-up actions;

f. Evaluation of the effectiveness of existing control measures; and

g. Identification of management actions needed to address water quality problems.

(2) **An Annual Trash Monitoring Progress Report,**[47] which, at a minimum, includes the following information:

(a) Narrative description of monitoring conducted, including the number of sites monitored and the number of monitoring events completed;

(b) Description of storms events that were sampled, including the date(s) and times when samples were collected, intensity and duration of the storm event, a description of where along the hydrograph the storm event was sampled, and justification used to determine the storm event was of appropriate size to displace and/or mobilize the transport of trash though the MS4 system;

[47] The Annual Trash Monitoring Progress Report shall be a single collective regionwide report. With their UCMRs, all Permittees shall include a copy of the Annual Trash Monitoring Progress Report.

(c) Narrative description, including maps, of any MS4 outfalls, homeless encampments and illegal dumping sites, located upstream of each Outfall Monitoring sample site;

(d) Description and the results of data analysis methods, including statistical analyses;

(e) Results and lessons learned;

(f) Data quality assurance procedures that were implemented for samples collected;

(g) Monitoring events (including locations and methods) planned for the subsequent fiscal year(s);

(h) A comprehensive detailed discussion of implementation of Provision C.8.e.iii.(8); and

(i) Updates of required Trash Monitoring Plan elements.

(3) **A Pesticides and Toxicity Monitoring Status Report**, which includes the following information:

(a) A complete Water Year Summary Table that lists the monitoring sites, with a row for each site. The table columns contain: Site ID; creek name; latitude; longitude; permittee jurisdiction(s); water column toxicity (acute); water column toxicity (chronic); sediment toxicity (acute); sediment toxicity (chronic); and sediment chemistry. For each site, list the site information and check the parameters sampled at that site. Provide a statement of the data quality and an analysis of the data, including:

(i) Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, Ocean Plan, and California Toxics Rule and other applicable water quality control plans;

(ii) Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

(iii) Identify and prioritize water quality impairments;

(iv) Identify and potential sources (and actual, if known) of water quality impairments, and provide sufficient justification for those potential sources;

(v) Describe follow-up actions;

(vi) evaluate the effectiveness of existing management actions; and

(vii) identify additional management actions needed to address water quality impairments.

iv. Pollutants of Concern Monitoring Reports

(1) In each Urban Creeks Monitoring Report, the Permittees shall submit a report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year. The report shall include (for preceding year and projected for forthcoming year): monitoring locations, number and types of samples collected, purpose of sampling (management question addressed), and analytes measured. Any data not reportable to CEDEN should also be included in the Urban Creeks Monitoring Report due annually on March 31.

(2) Receiving Water Limitations Assessment Report

(a) By no later than March 31, 2023, Permittees shall submit a report with the following information:

(i) Relevant water quality objectives against which to compare monitoring data;

(ii) Analytes in addition to those listed in Table 8.2 to monitor based on assessment of the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination; and

(iii) Identification of waterbodies to be sampled, sampling locations within those waterbodies, and sampling schedule consistent with the requirements in Tables 8.1 and 8.2.

(b) The report shall be subject to approval by the Executive Officer for compliance and technical adequacy. Upon approval by the Executive Officer, Permittees shall augment the RWLs assessment monitoring required in Tables 8.1 with the analytes identified in the report.

(c) By no later than March 31, 2026, or as part of the Integrated Monitoring Report, Permittees shall submit an updated Receiving Water Limitations Assessment Report with proposed monitoring to be conducted during the next permit term.

v. Integrated Monitoring Report – By no later than March 31, 2026, Permittees shall submit an Integrated Monitoring Report in lieu of the annual Urban Creeks Monitoring Report. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit. The Integrated Monitoring Report

shall report on all the data collected since the previous Integrated Monitoring Report[48] and shall contain the following:

(1) The information described in Provisions C.8.h.iii.(1)-(3), pertaining to the monitoring data collected during the preceding (third) water year of the Permit term;

(2) A comprehensive analysis of all data collected pursuant to Provision C.8. since the previous Integrated Monitoring Report,[48] and may include other pertinent studies.

For LID Monitoring and Trash Monitoring, this shall additionally include a summary of the methods and study designs used in all preceding water years, at each sample location. And, a summary of lessons learned, progress made, data, results, analyses, and conclusions, for all samples collected during all prior water years during the Permit term;

(3) For POCs, methods, data, calculations, load estimates, and source estimates for each POC parameter, as applicable;

(4) A budget summary for each monitoring requirement (for each year of the Permit term); and

(5) With cause and justification, recommendations for changes to any of the elements of Provision C.8 in future Permit terms.

vi. Comprehensive Bioassessment Final Report – By no later than March 31, 2024, the Permittees shall collectively submit a comprehensive analysis of all bioassessment monitoring conducted by the RMC during MRP 1 and MRP 2, for Water Years 2012-2021.

vii. Standard Report Content – All monitoring reports shall be clear, concise, and well-organized, and shall include the following information:

(1) An Executive Summary;

(2) The purpose of the monitoring and brief description of the study design rationale;

(3) Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data;

(4) Brief descriptions of sampling protocols and analytical methods;

(5) Sample location description, including water body name and segment and latitude and longitude coordinates;

[48] Excluding Creek Status Monitoring conducted subsequent to the submittal of the Integrated Monitoring Report during the Previous Permit.

(6) Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue);

(7) Concentrations detected, measurement units, and detection limits;

(8) Assessment, analysis, and interpretation of the data for each monitoring program component;

(9) A listing of volunteer and other non-Permittee entities whose data are included in the report; and

(10) Assessment of compliance with applicable water quality standards.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system.

This provision implements requirements of the TMDL for Diazinon and Pesticide-Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Urban-use pesticides of concern (Pesticides of Concern) to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin); carbamates (e.g., carbaryl and aldicarb); and neonicotinoids (e.g., imidacloprid, acetamiprid, and dinotefuran).

C.9.a. Maintain and Implement an Integrated Pest Management Policy or Ordinance and Standard Operating Procedures

All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of Integrated Pest Management (IPM)[49] and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance.

[49] The Glossary attached to this Permit includes IPM definitions adapted from the draft UP Provisions.

i. **Task Description** – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides does not cause or contribute to pesticide-related toxicity in receiving waters.

ii. **Implementation** – Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property.

iii. **Reporting**

(1) In each Annual Report, Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of Pesticides of Concern to water quality.

(2) In each Annual Report, Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and integration of several strategies, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term.

(3) In their 2023 Annual Reports, the Permittees shall provide links to their IPM policies or ordinances and IPM standard operating procedures. Permittees shall submit updated links in subsequent Annual Reports, if those links change.

C.9.b. Train Municipal Employees

i. **Task Description** – The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy and/or ordinance and standard operating procedures. This training may also include other training opportunities, such as the ReScape California Landscape Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided.

ii. Reporting

(1) In each Annual Report, Permittees shall report the percentage of municipal employees who apply pesticides who have received training in the Permittees' IPM policy and/or ordinance and IPM standard operating procedures within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc.

(2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.

C.9.c. Require Contractors to Implement IPM

i. Task Description – The Permittees shall include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall monitor contractor pesticide applications to ensure that contractors implement their contract specifications in accordance with the Permittee's IPM policies and/or ordinances and standard operating procedures. Contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee that an individual employee will always use IPM strategies. Thus, periodic Permittee observation and verification of contractor performance is necessary.

ii. Implementation – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used.

iii. Reporting – In each Annual Report, Permittees shall describe how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.

C.9.d. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (https://www.cdpr.ca.gov/docs/legbills/calcode/040501.htm#a6970).

ii. Reporting – In each Annual Report, Permittees shall briefly describe the communications they have had with county agricultural commissioners and report follow-up actions to correct violations of pesticide regulations.

C.9.e. Public Outreach

i. Task Description – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.

ii. Implementation – The Permittees shall conduct each of the following:

(1) **Point of Purchase Outreach**: The Permittees shall:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.

(2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

(3) **Outreach to Pest Control Professionals:** The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by EcoWise Certified or a functionally equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BAMSC; CASQA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators.

iii. Reporting – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that

respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience.

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description** – The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting** – In each Annual Report, Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

C.9.g. Evaluate Implementation of Pesticide Source Control Actions

i. **Task Description** – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.

ii. **Implementation** – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors,

evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule.

iii. **Reporting** – In their 2025 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-f (including the effectiveness of outreach efforts required by Provision C.9.e); a discussion of any improvements made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges, Discharge Prohibition A.2, and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of this provision. Flood management agencies are not subject to these trash reduction requirements except for those included in Provision C.10.c.

C.10.a. Trash Reduction Requirements

Permittees shall implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025.

i. **Schedule** - Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule:

(1) 90 percent by June 30, 2023; and

(2) 100 percent by June 30, 2025.

Permittees that do not attain the 90 percent compliance benchmark by June 30, 2023, shall submit a revised trash load reduction plan as described in Provision C.10.d and a schedule of implementation of additional trash load reduction control actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent compliance benchmark by June 30, 2025.

ii. **Trash Generation Area Management** - Permittees shall demonstrate attainment of the Provision C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long-Term Trash Reduction Plans, submitted in February 2014, in accordance with the requirements and accounting set forth in this provision. The February 2014 maps provide the 2009 trash levels and delineate trash generation areas within Permittees' jurisdictions into the following trash generation rate categories:

Low = less than 5 gal/acre/yr;

Moderate = 5-10 gal/acre/yr;

High = 10-50 gal/acre/yr; and

Very High = greater than 50 gal/acre/yr.

Permittees also designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, within which they will implement trash control actions. With the 2024 Annual Report, Permittees shall submit a revised Trash Generation Area Map that includes trash management areas, as well as private land drainage areas (See Provision C.10.a.ii.b) that will be retrofitted with full trash capture devices, or equivalent, by June 30, 2025. The updated trash generation map(s) shall include GIS layers and appropriate metadata (including tables etc.) that identify locations and associated drainage areas of full trash capture systems, and other trash control actions, and shall highlight any revisions or changes from the previous map(s). Permittees may provide access to multilayered GIS maps that account for other trash control action details and locations rather than submitting that information in a document. Maps and data generated through this effort may be used to illustrate progress toward achieving the trash reduction requirements in Provision C.10.a.i.

(a) Permittees shall implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better.

A full capture device or system is a treatment control, or series of treatment controls, including, but not limited to, a multi-benefit project (as defined in the Trash Amendments) or a low-impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain. The device(s) must also have a trash reservoir large enough to contain a reasonable amount of trash safely without overflowing trash into the overflow outlet between maintenance events. Types of systems certified by the State Water Resources Control Board are deemed full capture systems. A stormwater treatment facility implemented in accordance with Provision C.3 is also deemed a full capture system if the facility, including its maintenance, prevents the discharge of trash to the downstream MS4 and receiving waters and discharge points from the facility, including overflows, are appropriately screened or otherwise configured to meet the full trash capture screening specification for storm flows up to the full trash capture one-year, one-hour storm hydraulic specification.

Actions equivalent to full trash capture are actions that send no more trash down the storm drain system than a full trash capture device would allow, which is essentially no trash discharge except in very large storm flows. The Provision C.10.a.i percent reductions shall be demonstrated by percent of 2009 Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation by the Provision C.10.a.i mandatory deadlines.

(b) By July 1, 2025, Permittees shall ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of actions equivalent to or better than full trash capture systems shall be assessed with visual assessments in accordance with Provision C.10.b.iii. If there is a full trash capture device downstream of these private lands that is designed, operated, and maintained to control trash discharges from that land area, no other trash control is required.

C.10.b. Demonstration of Trash Reduction Outcomes

i. Full Trash Capture Systems – Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each full trash capture system, including the mapped location and drainage area served by each system. Permittees shall provide their respective vector control agencies with the names and locations of new and existing full trash capture devices.

(a) **Inspection and Maintenance** – Permittees shall inspect and maintain full trash capture devices to ensure that they are operating appropriately and have sufficient operating capacity to capture trash consistent with the requirements of this Provision. The inspection and maintenance of each full capture device shall be at a frequency sufficient to prevent plugging, including plugging of the 5 mm screen leading to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. At a minimum, all full trash capture devices shall be inspected and maintained once per year. In High and Very High trash generation areas, all full trash capture devices shall be inspected at least twice per year (and maintained as necessary), with the inspections spaced at least three months or more apart.

(b) For catch basin insert type full capture systems, if any such device is found to have a plugged or blinded screen, or is 50 percent full or greater, during an inspection or a maintenance event, the inspection and maintenance frequency shall be increased so that the device is neither plugged nor 50 percent or more full of trash at the next inspection or maintenance event. For high-flow capacity devices, if any such device is found to have a plugged or blinded screen, or exhibits a condition that exceeds the manufacturer's guidelines for requiring maintenance, the inspection and maintenance frequency shall be increased so that the device is neither plugged nor exceeds the manufacturer's guidelines during the next inspection or maintenance event.

ii. Maintenance Records – Permittees shall retain device-specific maintenance records, including, at a minimum: device type, date of installation, location, drainage area, date(s) of inspection and maintenance, the capacity condition of the device at the time of inspection and maintenance (full and overflowing or with storage capacity remaining), any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, any damage reducing function, or other negative conditions. A summary of this information shall be reported in each Annual Report and may be limited to the number of full capture devices maintained that exhibited a plugged, 50 percent or more full, or overflowing condition upon inspection or maintenance.

(a) **Certification** – Permittees shall certify annually that each full trash capture system is operated and maintained to meet full trash capture system requirements. Drainage areas served by an adequately maintained full trash capture system will be considered equivalent to or better than a Low trash generation rate area.

iii. Other Trash Management Actions – Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.

(a) **Implementation Documentation** – Permittees shall maintain documentation of trash control actions that describes each action or combination of actions, the level of implementation, the timing and frequency of implementation, standard operating procedures if applicable, location(s) of implementation actions including mapped location(s) and drainage area(s) affected or description of areal extent, tracking and enforcement procedures if applicable, and other

information relevant to effective implementation of the action or combination of actions.

(b) **Visual Assessment of Outcomes of Other Trash Management Actions** – Permittees shall conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see ProvisionC.10.b.iii.(b)(iv)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions. Permittees may assess and account for one or more trash generation areas in a single trash management area within which a control action or combination of control actions is implemented. The visual on-land assessment method used shall meet or exceed the following criteria:

(i) Conduct observations of the sidewalk, curb and gutter within each trash management area, or locations associated with sources of trash.

(ii) Conduct observations at randomly selected locations covering at least ten percent of a trash management area's street miles or at strategic locations, provided they are representative of trash generation in the management area and they will represent the effectiveness of the control action(s) implemented or planned in the management area.

(iii) Conduct observations at a frequency consistent with known or estimated trash generation rate(s) within a trash management area and the time frequency of the control action(s) implemented or planned in the management area. Conduct observations for effectiveness approximately at the halfway point of the interval between instances of recurring trash control actions such as street sweeping and on-land cleanup.

(iv) Permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Permittees shall submit such evidence to the Executive Officer as a submittal separate from any other submittals or reports. If this evidence is accepted by the Executive Officer, the Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these management actions at the specified performance standard.

iv. **Percentage Discharge Reduction** – Percentage discharge reduction from 2009 from Very High generation areas reduced to High, Moderate, and Low, High generation areas reduced to Moderate and Low, and Moderate trash generation areas reduced to Low trash generation category to meet the required total percent reduction (% Reduction) shall be calculated based on the following formula:

$$\% \text{ Reduction} = 100\,[(12A_{VH(2009)} + 4A_{H(2009)} + A_{M(2009)}) - (12A_{vh} + 4A_h + A_M)]\,/(12A_{VH2009} + 4A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$ = total amount of the 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of the 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of the 2009 moderate trash generation category jurisdictional area

A_{VH} = total amount of very high trash generation category jurisdictional area in the reporting year

A_H = total amount of high trash generation category v jurisdictional area in the reporting year

A_M = total amount of moderate trash generation category jurisdictional area in the reporting year

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

100 = fraction to percentage conversion factor

v. **Source Control** – Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items other than those addressed under previous Permits (foam foodware and single-use plastic bags) may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions. To claim a load percentage reduction value, Permittees must provide substantive and credible evidence that new source control actions are being implemented jurisdiction-wide and reduce trash by the claimed value. A Permittee may support its claimed source reduction value with reference studies from other jurisdictions provided that it also provide credible evidence that the chosen source control action would achieve comparable trash reduction if implemented in the Permittee's jurisdiction.

A jurisdiction-wide source control load reduction value cannot be claimed after June 30, 2025. However, Permittees may demonstrate and claim full trash capture equivalence of a source control in specific trash generation areas or in combination with other controls in an area if the control or combination of controls are documented, assessed, and verified in accordance with Provision C.10.b.iii.

vi. **Partial Trash Reduction – Curb Inlet Screens** – Studies conducted by the Permittees during MRP 2 assessed the benefit of other control measures, such as curb inlet screens in combination with street sweeping, in reducing the amount of trash discharged through MS4s. However, additional information is needed to determine the effectiveness of curb inlet screens in reducing trash within a given trash management area. Permittees may demonstrate through further assessment and study, as described below, that the installation and appropriate maintenance of curb inlet screens, accompanied by street sweeping at an appropriate frequency, within Moderate trash generation areas can effectively reduce the trash generation rate to Low under the following conditions:

(a) Permittees shall propose an acceptable method to verify that the area where curb inlet screens have been or will be installed are Moderate trash generating. Permittees shall also propose an appropriate method and frequency of verification, post installation, on the change (if any) in the trash generation rate following the installation of curb inlet screens.

(b) Permittees shall propose an appropriate street sweeping frequency where curb inlet screens are installed that, when implemented, effectively reduces the area's trash generation rate to Low.

(c) At a minimum, Permittees shall evaluate street sweeping effectiveness based on multiple factors other than frequency, and sufficient to allow a determination of proper and effective street sweeper access. Examples of additional evaluations that could be completed include effectiveness associated with enhanced street/curb accessibility via proper signage, ticketing, and towing vehicles when appropriate.

(d) The inspection and maintenance of each curb inlet screen shall be conducted at a frequency sufficient to ensure the screen is functioning appropriately, e.g., a screen is not stuck in an open position or plugged, including plugging of the screen leading to opening of the screen under flows less than those described in Provision C.10.a.ii.(a).

(e) Permittees shall propose an appropriate method of covering/blocking horizontal surface grates during street sweeping events (to prevent

trash from being swept into the grates), and an appropriate method for capturing smaller pieces of trash/debris from entering the MS4 via the horizontal surface grates.

(f) Permittees shall submit the results of the additional study, as described above, for Executive Officer approval. The report must appropriately describe and demonstrate the conditions under which the combined use of curb inlet screens and street sweeping effectively reduce the trash generation rate of an area from Moderate to Low.

C.10.c. Requirements for Flood Management Agencies

Flood management agencies must continue to implement requirements for trash capture systems, as specified in Table 10-1, below. Flood management agencies must also implement trash control measures such as trash pickups and installation of trash receptacles, to control Moderate, High, and Very High trash generation areas within their jurisdiction including, but not limited to, parking lots, trailhead areas, and along recreational paths and trails, and demonstrate effectiveness of these trash control measures as specified in Provision C.10.b.iii.

Table 10-1. Requirements for Flood Management Agencies

Flood Management Agency	Trash Capture Requirement
Santa Clara Valley Water District	4 trash booms or 8 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda County Flood Control Agency	3 trash booms or 6 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda Co. Zone 7 Flood Control Agency	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Contra Costa County Flood Control Agency	2 trash booms or 4 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
San Mateo County Flood and Sea Level Rise Resiliency District	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Vallejo Flood & Wastewater District	1 trash boom or 2 outfall capture devices or equivalent measures (minimum 2 ft. diameter outfall)

C.10.d. Trash Load Reduction Plans

i. Permittees shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the Provision C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report. The Plan shall describe trash load reduction control actions being implemented or planned and the trash generation areas or trash management areas where the actions are or will be implemented, including jurisdiction-wide actions such as source control ordinances. The Plans may include actions to control sources outside of the Permittees' jurisdictions that are causing or contributing to adverse trash impacts in the receiving water(s). Permittees that choose to implement such control actions may account for them towards meeting the Provision C.10.a Trash Load Reduction requirements as long as they can demonstrate the controls will be sustained, and they quantify the sustained load reduction benefit (relative to control actions in the trash generation areas or trash management areas in their jurisdiction that drained to the affected receiving water).

ii. Permittees shall calculate their trash load reduction, relative to 2009 baseline conditions, without the trash load reduction offsets described in Provision C.10.f, as of June 30, 2023. If that reduction is less than 90 percent, then Permittees shall develop and implement an updated Trash Load Reduction Plan. Pursuant to Provision C.22.c, the updated Trash Load Reduction Plan shall include a schedule of additional trash load reduction implementation actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent reduction from 2009 levels, achieved through implementation of full trash capture, or other equivalent actions, consistent with the requirements of this Provision, by June 30, 2025. Permittees shall submit their updated Trash Load Reduction Plans with their 2023 Annual Report.

iii. Permittees unable to attain 100 percent trash load reduction, relative to 2009 baseline conditions, by June 30, 2025, while accounting for credits from new source controls (as described in Provision C.10.b.v) may be granted additional time until December 31, 2025, and East Contra Costa County Permittees until June 30, 2026, to achieve 100 percent reduction via full trash capture, or equivalent, contingent on developing and implementing an approved Direct Discharge Control Plan as described in Provision C.10.f.ii.

C.10.e. Impracticability Report

Permittees may collectively submit a programmatic report by March 31, 2023, for the approval of the Executive Officer, that describes conditions under which

it is impracticable to control trash via full trash capture devices. The impracticability report shall include, but not be limited to, the following:

i. A description of the engineering constraints that prevent the installation of full trash capture devices.

ii. A process for evaluating and determining impracticability of full trash capture devices.

iii. Alternative Controls: The report shall include alternative controls or a combination of controls that may be implemented to reduce trash loads to meet the requirements and deadlines in Provision C.10.a. Examples of alternative controls include, but are not limited to, requiring businesses or property owners to pick up litter, successful implementation of excess trash receptacles and collection services, increased code enforcement or parking enforcement/ticketing/towing, additional trash pick-ups, street sweeping, assessment and execution of cooperative implementation opportunities with Caltrans or neighboring Permittees, curb inlet screens, and long term measures such as pump station or storm drain retrofits, implementation of green stormwater infrastructure that controls trash, or changes to the catchment to allow effective implementation of full trash capture measures.

iv. Permittees shall use an approved trash impracticability report in developing the updated Trash Load Reduction Workplans required by Provision C.10.d.

C.10.f. Optional Trash Load Reduction Offset Opportunities

i. **Creek and Shoreline Cleanup** – A Permittee may offset part of its Provision C.10.a trash load percent reduction requirement by conducting cleanup of creek and shoreline areas. The creek and shoreline cleanup efforts should be conducted at a minimum frequency of twice per year, and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent. Offsets for creek and shoreline cleanups will no longer be applicable after June 30, 2025.

A Permittee may claim a load reduction offset of one percent for the June 30, 2023 mandatory trash reduction compliance benchmark for each total of trash volume removed from cleanups that is ten percent of the Permittees' 2009 trash load volume estimates, based on its trash generation maps and average categorical trash generation rates (see Provision C.10.a.ii), in accordance with the following formula:

1% Reduction Offset (Volume) = $(12 + 4\ A_{H(2009)} + A_{M(2009)})\ OF$

where:

$A_{VH(2009)}$ = total amount of 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of 2009 moderate trash generation category jurisdictional area

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

OF = offset factor equal to (7.5 x 0.1) for the 2023 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

ii. **Direct Trash Discharge Controls** – Permittees with an approved Direct Discharge Control Plan (DDCP) may claim up to fifteen percent using the Provision C.10.f.i formula towards offsetting their Provision C.10.a trash load percent reduction requirement. The DDCP shall include a detailed description of control measures the Permittee will implement to control the direct discharge of trash to receiving waters from non-storm drain system sources. Offsets for direct discharge controls will no longer be applicable after June 30, 2025.

Permittees wishing to submit a new DDCP pursuant to Provision C.10.d.iii shall submit the DDCP for approval no later than April 1, 2024. Permittees with an existing DDCP approved during the Previous Permit shall submit an updated DDCP for approval no later than January 3, 2023, in order to continue claiming trash load percent reduction offsets. DDCPs shall be sufficient to provide trash reduction benefits equivalent to or greater than the areas not yet in compliance, as calculated using the formula in Provision C.10.b.iv, and shall include:

(a) A description of sources of the directly discharged trash;

(b) A description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads, including those associated with unsheltered homeless populations and illegal dumping, in a systematic and comprehensive manner;

(i) For Permittees whose DDCPs address significant discharges from populations experiencing unsheltered homelessness,

systematic and comprehensive implementation of control actions shall include a commitment to, and a plan for, increasing the provision of emergency, transitional, and/or permanent housing, and the following services: trash and sanitary services, and other services which are necessary to reduce discharges associated with unsheltered homelessness, such as RV safe parking areas and pump out services, and social services that can help the unsheltered homeless transition to housing.

The DDCP shall prioritize providing housing and services to people experiencing unsheltered homelessness who are living near receiving waters.

The DDCP shall document the existing capacities for housing and services as of the time of the DDCP's submittal, and include projections of changes to those capacities for each subsequent year during the Permit term.

(ii) For Permittees whose DDCPs address significant discharges from illegal dumping, systematic and comprehensive implementation of control actions shall include a commitment to, and a plan for, actions that will prevent direct discharges of trash to receiving waters from illegal dumping. Such actions include, but are not limited to, abating illegal dumping sites, providing dumping vouchers (particularly to socioeconomically disadvantaged communities), holding free waste drop-off events, and implementing onsite structural BMPs to prevent direct discharges from illegal dumping sites to receiving waters.

The DDCP shall prioritize addressing illegal dumping that occurs near receiving waters.

The DDCP shall document existing sites where illegal dumping occurs, controls at illegal dumping sites, voucher and free waste drop-off programs, and include projections for reductions in illegal dumping, increases of controls at illegal dumping sites, and expansions of (or the creation of) programs to control illegal dumping, such as dumping voucher programs and waste drop-off events, for each subsequent year during the Permit term.

(iii) For Permittees whose DDCPs address significant discharges from both unsheltered homeless populations and illegal dumping sites, Permittees shall submit DDCPs in compliance with both Provisions C.10.f.ii.b.(i) and C.10.f.ii.b.(ii).

(c) A map of the affected receiving water area and associated watershed; and

(d) A description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.

C.10.g. Reporting

Each Permittee shall provide the following in each Annual Report or otherwise by the date specified:

i. With each Annual Report, a summary of trash control actions within each trash management area, including the types of actions, levels of implementation, areal extent of implementation, and whether the actions are ongoing or new, including initiation date.

ii. With their 2024 Annual Report, Permittees shall submit a revised trash generation area map or maps, as described in Provision C.10.a.ii.

iii. With each Annual Report, a summary of implementation actions and progress toward meeting the July 1, 2025, requirement for all private lands to implement full trash capture systems, or be managed with trash discharge control actions equivalent to or better than full trash capture systems, as required in Provision C.10.a.ii.(b).

iv. With each Annual Report, certification that each of its full trash capture systems is operated and maintained to meet full trash capture system requirements; a description of any system(s) that did not meet full trash capture system requirements (e.g., due to plugging or overflowing); and any corrective actions taken.

v. With each Annual Report, an accounting of its non-full trash capture system trash control actions assessments by providing a summary description of assessments in each of its trash management areas, including the number and dates of observations.

vi. Permittees unable to attain the 90 percent mandatory trash reduction compliance benchmark by June 30, 2023, via full trash capture, or equivalent, shall, by June 30, 2023, submit a notice of noncompliance, pursuant to Provision C.22.c and an updated Trash Load Reduction Plan as described in Provision C.10.d.ii.

vii. With their 2023 Annual Report, Permittees shall submit a report evaluating their trash reduction, relative to 2009 baseline conditions, as of June 30, 2023, without including offsets. Permittees unable to meet the 90 percent mandatory trash reduction compliance benchmark without the trash load reduction offsets

described in Provision C.10.f shall submit, with their 2023 Annual Report, an updated Trash Load Reduction Plan as described in Provision C.10.d.ii.

viii. Permittees unable to attain 100 percent trash load reduction, relative to 2009 baseline conditions, by June 30, 2025, while accounting for credits from new source control (as described in Provision C.10.b.v) shall, by June 30, 2025, submit a notice of noncompliance pursuant to Provision C.22.c, including a plan to come into compliance with the 100 percent trash load reduction requirement. Permittees may be granted additional time until December 31, 2025, and East Contra Costa County Permittees until June 30, 2026, to achieve 100 reduction via full trash capture, or equivalent, contingent on developing and implementing a direct discharge control plan (DDCP) as described in Provision C.10.f.ii.

Permittees, except East Contra Costa County Permittees, that are granted additional time until December 31, 2025, to attain 100 percent reduction via full trash capture, or equivalent, shall submit by December 31, 2025, either a report that confirms that they reached 100 percent trash load reduction by December 31, 2025, or a notice of noncompliance pursuant to Provision C.22.c.

ix. By March 31, 2023, Permittees may collectively submit a programmatic report for the approval of the Executive Officer, that describes typical conditions where it may be impracticable to control trash via full trash capture devices, as described in Provision C.10.e.

x. With the 2024 Annual Report, Permittees that offset part of their Provision C.10.a trash load percent reduction requirement through additional cleanup of creek and shoreline areas, as described in Provision C.10.f.i, shall submit a summary of the additional cleanup actions implemented, and the benefit to water quality achieved through those actions.

xi. Starting with the 2023 Annual Report, Permittees with approved DDCPs shall provide the following information in each Annual Report for which they use an offset from the implementation of Provision C.10.f.ii towards their trash load percent reduction:

(1) For Permittees whose DDCPs address significant discharges from unsheltered homeless populations, the following information for the current year, and for each prior year of the Permit term:

The estimated number of people experiencing unsheltered homelessness in their jurisdiction; the estimated number of people experiencing unsheltered homelessness living within approximately 500 feet of receiving waters; the estimated portion of those populations provided housing as described in Provision C.10.f.ii.b.(i); the estimated portion of

those populations served with the services described in Provision C.10.f.ii.b.(i); the number and scope of sanitation controls and services provided to homeless encampments; the number and scope of trash controls and services provided to homeless encampments; and the number and scope of sanitary cleanouts and other services provided to RVs. Each of these reporting elements shall be accompanied by a narrative description.

(2) For Permittees whose DDCPs address significant discharges from illegal dumping sites, the following information for the current year, and for each prior year of the Permit term:

The total number of active illegal dumping sites; the number of active illegal dumping sites within approximately 500 feet of receiving waters; the number of illegal dumping sites where trash was collected and the amount of material collected; dumping vouchers provided (and who they are provided to); dumping vouchers used; and outreach and education provided to the public regarding illegal dumping and the availability of dumping vouchers. Each of these reporting elements shall be accompanied by a narrative description.

(3) For Permittees whose DDCPs address significant discharges from both unsheltered homeless populations and illegal dumping sites, the Permittees shall report on both Provision C.10.g.xi.(1) and C.10.g.xi.(2) in each Annual Report.

C.11. Mercury Controls

The Permittees shall implement the following control program for mercury. This control program consists of load reduction assessment, source control measures, treatment control measures, measures to reduce risk to consumers of Bay fish, and reporting on all these measures according to the provisions below. The provisions implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs for those waters identified therein and reduce mercury loads by approximately 10 kg/yr, making substantial progress toward achieving the urban runoff mercury load allocations established for the TMDLs. The San Francisco Bay mercury TMDL implementation plan calls for attainment of the regionwide, urban runoff wasteload allocation of 82 kg/yr by February 2028. This mercury wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 78 kg/yr compared to loads estimated using data collected prior to development of the TMDL. To measure progress, the TMDL implementation plan calls for attainment of an interim loading milestone by February 2018 of 120 kg/yr, halfway between the 2003 estimated load, 160 kg/yr, and the aggregate allocation. This interim loading milestone has been achieved. The Permittees may comply with any requirement of this Provision through a collaborative effort and are encouraged to do so.

C.11.a. Assess Mercury Load Reductions from Stormwater

i. **Task Description** – The Permittees shall implement an assessment methodology and data collection program to quantify, in a technically sound manner, mercury loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the mercury control program defined by this provision. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area mercury TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

ii. **Implementation Level** – The Permittees shall quantify the mercury load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented

during this Permit term as described in Provisions C.11.b through C.11.e. For this Permit term, the Permittees will achieve a regionwide total load reduction of approximately 10 kg mercury/yr if they implement effective mercury control measures consistent with all requirements of Provisions C.11.b through C.11.g. The Permittee-specific portion of the regionwide mercury load reduction estimate shall be based on the proportion of county population in each municipality.

iii. Reporting

(1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

(2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

(3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.

C.11.b. Program for Source Property Identification and Abatement

i. Task Description – Permittees shall investigate, using both conventional sampling and laboratory analysis techniques, land areas that likely contribute mercury to municipal separate storm sewer system (MS4s). These investigations will likely focus on land areas where industrial activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). For those properties or land areas found to be contributing substantial amounts of mercury or where high mercury concentrations are found (generally areas with sediment concentrations greater than 0.5 mg Hg/kg), Permittees shall take action to abate the mercury sources into their MS4s or refer the properties to the Water Board for follow-up measures. Historical monitoring data suggest that mercury concentrations on or near source properties are similar to those found in urban areas in general so identification of source properties for referral may be based on presence of high PCBs concentrations (generally 0.5 mg PCBs/kg) alone. For each source property referred to the Water Board,

Permittees shall implement interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implement a stormwater treatment system downstream of the property. These enhanced O&M measures shall be sufficient to intercept historically deposited contaminated sediment in the vicinity of the source area and prevent further contaminated sediment from being discharged from the source area to the storm drain system.

ii. Implementation Level – Permittees shall investigate the following acreage of likely mercury source properties (accomplished through C.12.b investigations) during the permit term.

- Alameda County: 2,620 acres
- Contra Costa County: 1,700 acres
- San Mateo County: 1,411 acres
- Santa Clara County: 913 acres
- Solano County: 21 acres

If high mercury concentrations associated with a likely source property are detected, Permittees may submit monitoring information to support estimation of the aerial yield to receive mercury load reduction credit, contingent upon implementation of interim enhanced O&M measures in the street or storm drain infrastructure adjacent to the source property or implementation of a stormwater treatment system downstream of the property.

iii. Reporting

(1) In each of the 2022 through 2026 Annual Reports, Permittees shall report progress on the acreage of land areas investigated, including progress toward investigation of 100 percent of the old industrial land use indicated above. The reporting shall indicate what action was taken for the parcels investigated (e.g., abatement, referral, enforcement, etc.). Permittees shall submit all supporting data and information including referral reports.

(2) Permittees shall report annually on ongoing enhanced O&M activities associated with all past contaminated property referrals. Prior to all new referrals, Permittees shall submit, for staff review and comment, a detailed description of the enhanced O&M plan for the referred properties.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.11.a.iii(2) on total acreage of land area investigated, area and description of properties referred, description of enhanced O&M measures, and the estimated total mercury mass load reduced (consistent with the approved accounting procedures) resulting from implementing this control measure.

C.11.c. Program for Control Measure Implementation in Old Industrial Areas

i. **Task Description** – Permittees shall implement or cause to be implemented treatment control measures, stormwater diversion to wastewater treatment facilities, redevelopment (provided GSI is implemented in compliance with C.3.b), or other control measures to achieve mercury load reductions. Permittees have substantial (totaling over 33,100 acres) areas of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure or other treatment controls.

- Alameda County: 9,374 acres
- Contra Costa County: 11,199 acres
- San Mateo County: 4,450 acres
- Santa Clara County: 6,647 acres
- Solano County: 1,426 acres

Implementation of treatment control measures on 2,580 acres (which is nearly 8 percent of the land area shown above) will result in a total estimated load reduction of about 108 g mercury/yr (2,580 acres x 70% efficiency x 60 mg mercury/acre/yr estimated yield from old industrial areas, see Fact Sheet) in the area covered by the Permit. Implementation of control measures with efficiency lower than 70% will result in reduced acreage credit (for those lower efficiency control measures) toward fulfillment of the total acreage requirement shown below. The acres credited will be proportional to the ratio of implemented control measure efficiency relative to the efficiency of treatment controls (see Fact Sheet for more explanation and examples). The old industrial land use acreages to be addressed by control measure implementation by the end of the permit term and the estimated mercury load reductions (for 70% control measure efficiency) are shown below. Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on implementation of 70% efficient control measures, or through accounting for the mass reduction of mercury shown in parentheses. If control measures are less than 70% efficient, the required acreage shall be calculated as set forth above.

- Alameda County: 664 acres (28 grams/yr)
- Contra Costa County: 664 acres (28 grams/yr)
- San Mateo County: 445 acres (19 grams/yr)
- Santa Clara County: 664 acres (28 grams/yr)
- Solano County: 142 acres (6 grams/yr)

ii. Implementation Level – Permittees shall, within the permit term, implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) to comply with the performance metrics in Provision C.11.c.i. Use of conditionally-approved sizing criteria cited in section C.3.j(3)(b) for treatment control systems will be considered provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria. If a Permittee chooses to comply by demonstrating mercury load reductions, it shall use accounting methods consistent with Provision C.11.a. Implementation of treatment controls and stormwater diversion in mercury-contaminated catchments not designated as old industrial may count toward fulfillment of the required acreage. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence of moderate to high mercury or PCBs soil concentrations (generally soil/sediment concentrations greater than 0.3 mg mercury/kg or 0.2 mg PCBs/kg). Treatment control systems must be designed and sized consistent with Provision C.3.d – (Numeric Sizing Criteria for Stormwater Treatment Systems). Permittees may choose to implement diversions to wastewater treatment systems to address this requirement. Because of the higher removal efficiency of wastewater treatment facilities, each acre addressed by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements provided that the diversion facilities are sized and operated consistent with the sizing requirements used for non-diversion treatment facilities.

iii. Reporting

(1) By March 31, 2023, Permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address mercury load reduction requirements included in this provision. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report Permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of

catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.11.a.iii(2) on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total mercury mass load reduced resulting from this implementation.

C.11.d. Mercury Collection and Recycling Implemented throughout the Region

i. Task Description – Permittees shall promote, facilitate, and/or participate in collection and recycling of mercury containing consumer products, devices, and equipment (e.g., thermometers, thermostats, switches, bulbs). Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermostats, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and Provision C.11.d requires promotion, facilitation and/or participation in these region-wide recycling efforts to increase effectiveness and public participation.

ii. Implementation Level – Permittees shall promote recycling of mercury-containing products and make efforts to increase effectiveness of these recycling efforts throughout the region. Recycling of mercury-containing bulbs and thermostats alone results in a regionwide load reduction of approximately 10 kg mercury per year.[50]

iii. Reporting

(1) In each of the 2023 through 2026 Annual Reports, Permittees shall report on efforts to promote recycling of mercury-containing products and efforts to increase effectiveness of these recycling efforts. Permittees shall also report on the mass of mercury-containing material collected throughout the region along with an estimate of the mass of mercury contained in recycled material using the methodology contained in load reduction accounting system described and cited in the Fact Sheet.

C.11.e. Plan and Implement Green Stormwater Infrastructure to Reduce Mercury Loads

i. Task Description – Permittees shall implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j. Implementation of green

[50] Geosyntec Consultants and San Francisco Estuary Institute. 2010. “Desktop Evaluation of Controls for Polychlorinated Biphenyls and Mercury Load Reduction.”

stormwater infrastructure will result in a total estimated load reductions of 108 g mercury/yr (see Fact Sheet for basis of estimate).

ii. **Implementation Level** – The level of implementation is determined by the requirements of Provision C.3.j.

iii. **Reporting**

(1) In their 2026 Annual Report, Permittees shall report as part of Provision C.11.a.iii(2)) on all green stormwater projects (e.g., parcel-based, street ROW, and regional projects) implemented during the permit term and provide the total acreage treated and an estimate of the total mercury mass load reduced resulting from this implementation. This reporting shall include summary descriptions of the implemented projects including GSI type, location, and area.

C.11.f. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. **Task Description** – In 2020, Permittees submitted a Reasonable Assurance Analysis and plan (RAA) demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028. Permittees shall evaluate the effectiveness of all mercury control measures and update the RAA as necessary. Updates can be focused on those control measures for which new information is available and for control measures not evaluated in previous efforts. Permittees shall also prepare detailed implementation plans for all control measures to be implemented in and inform permit requirements for the subsequent permit term.

ii. **Implementation level** – Permittees shall update, as necessary, their mercury control measures implementation plan and corresponding reasonable assurance analysis from the previous permit term (2015-2020, MRP 2). The update may be focused on control measures for which new information is available or for those control measures not previously evaluated. The long-term plan must:

(1) Identify all technically and economically feasible mercury control measures to be implemented (including GSI projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Additionally, Permittees shall identify all specific control measures to be implemented, the intensity of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term. This implementation plan must include:

(4) Identification of all control measures implemented during the current permit term and any additional control measures to be implemented in the subsequent permit term;

(5) A description of the intensity or extent of control measure implementation (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.);

(6) Identification of accountability metrics to track during the subsequent permit corresponding to the proposed implementation intensity; and

(7) Estimates for load reductions to be achieved through implementation of control measures during subsequent permit term at the proposed intensity.

iii. Reporting – Permittees shall submit the updated plan and schedule no later than March 31, 2026.

C.11.g. Fate and Transport Study of Mercury: Urban Runoff Impact on San Francisco Bay Margins

i. Task Description – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of mercury discharged from urban runoff to San Francisco Bay margin areas. The studies should focus on near-shore areas contaminated with mercury from historical activity and the expected trajectory of recovery as sources from local watersheds are reduced.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the sediment and food web mercury concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, especially in Bay margins, and the identification of drainages where urban runoff mercury are particularly important in food web accumulation.

iii. Reporting – The Permittees shall submit in their 2023 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2023 Annual Report. The Permittees shall report in the March 15, 2026, Integrated Monitoring Report the findings and results of the studies completed, planned,

or in progress as well as implications of studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.11.h. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence anglers and their families. The risk reduction framework developed in the previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level** – At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2026 Annual Report.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control program for PCBs. This control program consists of load reduction assessment, source control measures, treatment control measures, measures to reduce risk to consumers of Bay fish, and reporting on all these measures according to the provisions below. The provisions implement the urban runoff requirements of the PCBs TMDL for those waters identified therein. By implementing the PCBs control measure program requirements, Permittees will make substantial progress (an estimated 1.47 kg/yr of additional load reduction) toward achieving the urban runoff PCBs wasteload allocation from the TMDL. Of the 2 kg/yr overall load allocation for urban runoff sources for the entire region, 1.47 kg/yr has been allocated to Permittees, and loads must be reduced to this level by March 2030. This PCBs wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 18 kg/yr (14.4 kg/yr from Permittees) compared to loads estimated using data collected in 2003. The Permittees may comply with any requirement of this Provision through a collaborative effort and are encouraged to do so.

C.12.a. Assess PCBs Load Reductions from Stormwater

i. **Task Description** – The Permittees shall implement an assessment methodology and data collection program to quantify, in a technically sound manner, PCBs loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the PCBs control program defined by this provision. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area PCBs TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

ii. **Implementation Level** – The Permittees shall quantify the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented during this Permit term as described in Provisions C.12.b through C.12.g. For this Permit term, the Permittees will achieve an estimated regionwide total load reduction of 1.47 kg/yr PCBs if they implement effective PCBs control measures consistent with all requirements of Provisions C.12.b through

C.12.g. The Permittee-specific portion of the regionwide PCBs load reduction estimate shall be based on the proportion of county population in each municipality.

iii. Reporting

(1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

(2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

(3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.

C.12.b. Program for Source Property Identification and Abatement

i. Task Description – Permittees shall investigate, using both conventional sampling and laboratory analysis techniques, land areas that likely contribute PCBs to MS4s. These investigations will likely focus on land areas where industrial activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). For those properties or land areas found to be contributing substantial amounts of PCBs or where high PCBs concentrations are found (generally areas with sediment concentrations greater than 0.5 mg PCBs/kg), Permittees shall take actions to abate the PCB sources into their MS4s or refer the properties to the Water Board for follow-up measures. For each source property referred to the Water Board, Permittees should implement interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implement a stormwater treatment system downstream of the property. These enhanced O&M measures shall be sufficient to intercept historically deposited contaminated sediment in the vicinity of the source area and prevent further contaminated sediment from being discharged from the source area to the storm drain system.

ii. Implementation Level – Permittees shall investigate the following acreage of likely PCBs source properties during the permit term.

- Alameda County: 2,620 acres
- Contra Costa County: 1,700 acres
- San Mateo County: 1,411 acres
- Santa Clara County: 913 acres
- Solano County: 21 acres

Based on data collected through investigating land areas for the presence of source properties during the previous permit terms, this level of implementation will result in PCBs load reductions of approximately 740 g PCBs/yr, 50 percent of which would be credited during this permit term contingent upon implementation of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implementation of a stormwater treatment system downstream of the property.

iii. Reporting

(1) In each of the 2022 through 2026 Annual Reports, Permittees shall report progress on the acreage of land areas investigated, including progress toward investigation of 100 percent of the old industrial land use indicated above. The reporting shall indicate what action was taken for the parcels investigated (e.g., abatement, referral, enforcement, etc.). Permittees shall submit all supporting data and information including referral reports.

(2) Permittees shall report annually on ongoing enhanced O&M activities associated with all past contaminated property referrals. Prior to all new referrals, Permittees shall submit, for staff review and comment, a detailed description of the enhanced O&M plan for the referred properties.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii(2) on total acreage of land area investigated, area and description of properties referred, description of enhanced O&M measures, and the estimated total PCBs mass load reduced (consistent with the approved accounting procedures) resulting from implementing this control measure.

C.12.c. Program for Control Measure Implementation in Old Industrial Areas

i. Task Description – Permittees shall implement or cause to be implemented treatment control measures, stormwater diversion to wastewater treatment facilities, redevelopment (provided GSI is implemented in compliance with

Provision C.3.b), or other control measures to achieve PCBs load reductions. Permittees have substantial (totaling over 33,100 acres) areas of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure or other treatment controls.

- Alameda County: 9,374 acres
- Contra Costa County: 11,199 acres
- San Mateo County: 4,450 acres
- Santa Clara County: 6,647 acres
- Solano County: 1,426 acres

Implementation of treatment control measures on 2,580 acres (which is about 8 percent of the land area shown above) will result in a total estimated load reduction of about 467 g PCBs/yr (2,580 acres x 10% of area x 70% efficiency x 259 mg PCBs/acre/yr estimated yield from old industrial areas, see Fact Sheet) in the area covered by the Permit. Implementation of control measures with efficiency lower than 70 percent will result in reduced acreage credited (for those lower efficiency control measures) toward fulfillment of the total acreage requirement shown below. The acres credited will be proportional to the ratio of implemented control measure efficiency relative to the efficiency of treatment controls (see Fact Sheet for more explanation and examples). The old industrial land use acreages to be addressed by control measure implementation by the end of the permit term and the estimated PCBs load reductions (for 70 percent control measure efficiency) are shown below. Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on implementation of 70 percent efficient control measures, or through accounting for the mass reduction of PCBs shown in parentheses. If control measures are less than 70 percent efficient, the required acreage shall be calculated as set forth above.

- Alameda County: 664 acres (121 grams/yr)
- Contra Costa County: 664 acres (121 grams/yr)
- San Mateo County: 445 acres (81 grams/yr)
- Santa Clara County: 664 acres (121 grams/yr)
- Solano County: 142 acres (26 grams/yr)

ii. **Implementation Level** – Permittees shall, within the permit term, implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) to comply with the performance metrics in Provision C.12.c.i. If a Permittee chooses to comply by demonstrating PCBs load

reductions, it shall use accounting methods consistent with Provision C.12.a. Implementation of treatment controls and stormwater diversion in PCBs-contaminated catchments not designated as old industrial may count toward fulfillment of the required acreage. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence of moderate to high PCBs soil concentrations (generally soil/sediment concentrations greater than 0.3 mg mercury/kg or 0.2 mg PCBs/kg). Treatment control systems must be designed and sized consistent with Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems). Use of conditionally-approved sizing criteria cited in section C.3.j(3)(b) for treatment control systems will be considered provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria. Permittees may choose to implement diversions to wastewater treatment systems to address this requirement. Because of the higher removal efficiency of wastewater treatment facilities, each acre addressed by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements provided that the diversion facilities are sized and operated consistent with the sizing requirements used for non-diversion treatment facilities.

iii. Reporting

(1) By March 31, 2023, Permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address PCBs load reduction requirements included in this provision. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report Permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii(2) on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total PCBs mass load reduced resulting from this implementation.

C.12.d. Program for Controlling PCBs from Bridges and Overpasses

i. **Task Description** – Permittees shall implement a Caltrans specification (to be developed through proposed requirement in Caltrans stormwater permit, see Fact Sheet for details) to manage, as part of bridge and overpass roadway replacement or major repair, potential PCBs-containing material in bridge roadway expansion joints. Implementation of this specification will result in a total estimated load reductions of 300 g PCBs/yr (see Fact Sheet for calculation details in the program area). Countywide programs and their member municipalities will be credited with a portion of this total load reduction in proportion to their share of population. Load reduction credit for this program will begin upon submittal of documentation demonstrating full implementation of the Caltrans specification for applicable roadway structures.

ii. **Implementation Level** – Permittees shall track the development of the Caltrans specification and develop an inventory of bridges in their jurisdictions that includes bridge ownership and a replacement/repair schedule. Finally, Permittees shall, by December 31, 2022, or six months after availability of the specification, implement or cause to be implemented the Caltrans specification during applicable replacement activities that are under the direction of the Permittee.

iii. **Reporting**

(1) In their 2022 Annual Report or the Annual Report immediately following availability of the specification, Permittees shall include a description of the Caltrans specification for managing PCBs-containing materials in bridge or roadway expansion joints during roadway replacement or repair.

(2) In their 2023 Annual Report, Permittees shall submit an inventory of bridges in the program area that includes bridge ownership and the bridge roadway replacement schedule.

(3) In their 2022 through 2026 Annual Reports, Permittees shall submit documentation confirming the use of the Caltrans specification (once it is available) during all instances of bridge roadway replacement or repair in their jurisdiction during that reporting year and provide an estimate of the volume of material managed and total PCBs mass load reduced resulting from implementation of the specification.

(4) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii.(2) an estimate of the total PCBs mass load reduced, consistent with approved accounting procedures, resulting from implementing this control measure.

C.12.e. Program for Controlling PCBs from Electrical Utilities

i. **Task Description** – Permittees shall (1) develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for municipally-owned electrical utilities in the MRP program area and (2) collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities.

ii. **Implementation Level** – Permittees shall do the following:

(1) Develop or improve standard operating procedures to respond to, clean up, and report spills and releases from municipally owned OFEE and fully implement these procedures.

(2) Develop and implement a plan to maintain and upgrade municipally owned OFEE.

(3) Document the PCBs loads avoided through existing and ongoing OFEE removal and replacement programs.

(4) Collaborate with the Water Board to request information from non-municipally owned electrical utilities. Permittees shall utilize the information to (a) determine the locations of PCBs-containing OFEE, (b) improve estimates of the total baseline mass of PCBs in OFEE in the MRP permit area, (c) evaluate the actions the non-municipally owned electrical utilities are taking to reduce or prevent the release of PCBs from their equipment and to respond to potential releases of PCBs from their equipment; and (d) identify opportunities to improve the response and cleanup protocols.

iii. **Reporting**

(1) Permittees shall submit in their 2023 Annual Report the estimated PCBs loads avoided (along with supporting documentation) resulting from the removal of municipally-owned PCBs-containing OFEE through maintenance programs and system upgrades for the period 2002 to the beginning of this permit term (2023).

(2) Permittees shall submit in their 2023 Annual Report a description of the improved spill response and reporting practices implemented by municipally owned electrical utilities.

(3) Permittees shall submit in their 2024 Annual Report a summary of their plans to maintain and upgrade OFEE for municipally owned electrical utilities.

(4) Permittees shall submit in every Annual Report, beginning with the 2023 report, a summary of the actions undertaken during that reporting year

that remove municipally owned PCBs-containing OFEE along with the loads avoided and the details of the calculations and assumptions used to estimate the load reduced.

(5) Permittees shall submit in their 2026 Annual Report, as part of reporting under Provision C.12.a.iii(2), the estimated PCBs loads reduced during the permit term associated with municipally owned OFEE removal resulting from maintenance programs and system upgrades.

(6) Within 12-months of the Water Board transmitting to the Permittees information from the non-municipally owned electrical utilities, Permittees shall submit a report discussing the following, to the extent possible given any data limitations: (a) locations of the PCBs-containing OFEE still in service, (b) previous locations of PCBs-containing OFEE, and (c) opportunities to improve non-municipally owned electrical utilities' standard operating procedures for spill response, reporting, cleanup, and sampling and analysis.

C.12.f. Plan and Implement Green Stormwater Infrastructure to reduce PCBs loads

i. Task Description – Permittees shall implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j. Implementation of green stormwater infrastructure will result in a total estimated load reductions of 200 g PCBs/yr (see Fact Sheet for basis of estimate).

ii. Implementation Level – The level of implementation is determined by the requirements of Provision C.3.j.

iii. Reporting

(1) In their 2026 Annual Report, Permittees shall report as part of Provision C.12.a.iii(2)) on all green stormwater projects (e.g., parcel-based, street right-of-way, and regional projects) implemented during the permit term and provide the total acreage treated and an estimate of the total PCBs mass load reduced resulting from this implementation. This reporting shall include summary descriptions of the implemented projects including GSI type, location, and area.

C.12.g. Manage PCB-Containing Materials and Wastes During Building Demolition Activities

i. Task Description – Prior to issuing a demolition permit, Permittees shall implement the protocol developed during the previous permit term (see Fact Sheet for protocol description) for managing PCB-containing materials and wastes during building demolition so that PCBs do not enter MS4s. Permittees

shall also ensure construction sites are inspected during demolition and obtain verification that materials from demolished buildings are appropriately disposed.

Provision C.12.g. applies to applicable structures containing building materials with PCBs concentrations of 50 ppm or greater at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, or stormwater runoff. Applicable structures include, at a minimum, commercial, public, institutional, and industrial structures constructed or remodeled between the years 1950 and 1980. Single-family residential and wood frame structures are exempt.

Structures that are constructed or remodeled between the years 1950 and 1980 and require emergency demolition to protect public health and/or safety are exempt from implementing the protocol, but they must be reported in accordance to Provision C.12.g.iii.(3)(d)

The Town of Clayton is exempt from the requirements of Provision C.12.g. because it has demonstrated it has no applicable structures. Other Permittees may be exempted from the requirements in Provision C.12.g. if they provide evidence acceptable to the Executive Officer in their 2023 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

Implementation of this protocol will result in a total estimated load reduction of 2 kg PCBs/yr (see Fact Sheet for calculation details) in the program area. This constitutes an ongoing rather than a new load reduction.

ii. Implementation Level

(1) Permittees shall implement their established protocol prior to issuing a demolition permit.

(2) For demolition of applicable structures containing building materials with PCBs concentrations of 50 ppm or greater approved beginning July 1, 2023, Permittees shall require demolition contractors to provide notification to the Permittees, the Water Board, and U.S. EPA at least one week before any demolition is to occur.

(3) Beginning the 2023 rainy season, Permittees shall inspect demolition sites with applicable structures containing building materials with PCBs concentrations of 50 ppm or greater pursuant to Provision C.6 to ensure that effective construction pollutant controls are used to prevent discharge into the MS4.

(4) Permittees shall enhance their construction site control program to minimize migration of PCBs into the MS4 from applicable structures containing building materials with PCBs concentrations of 50 ppm or greater during demolition activities. Enhancements may include inspecting demolition sites monthly during demolition activities in the dry season (May – September) and requiring the demolition contractors to sweep the project sites and the streets around the property with street sweepers that will effectively remove sediment and dust. Implementation of enhancements shall begin no later than July 1, 2023.

(5) For demolition of applicable structures containing building materials with PCBs concentrations of 50 ppm or greater approved after July 1, 2023, Permittees shall verify that PCBs in demolished buildings are properly managed to minimize transport to the MS4 by obtaining official documentation that the building materials with PCBs concentrations of 50 ppm or greater in these demolished applicable structures were disposed appropriately according to state and federal regulations.

(6) Permittees may elect to update for use in the subsequent permit term the assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

iii. Reporting

(1) Each Permittee seeking exemption from Provision C.12.g requirements based on lack of applicable structures must submit in its 2023 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 were single-family residential and/or wood-frame structures.

(2) In their 2023 Annual Report, Permittees shall discuss enhancements to their construction site control program to minimize migration of PCBs from demolition activities into the MS4.

(3) Beginning with their 2023 Annual Report, the Permittees shall provide each of the following items:

(a) The number of applicable structures that applied for a demolition permit during the reporting year;

(b) A running list of the applicable structures that applied for a demolition permit since July 1, 2019, the number of samples each structure collected, and the concentration of PCBs in each sample.

(c) For each applicable structure, with PCBs concentrations of 50 mg/kg or greater, include the following: the project address, the demolition date, and a brief description of the PCBs-containing materials.

(d) For each structure that was constructed or remodeled between the years 1950 and 1980 and requires emergency demolition to protect public health and/or safety, provide the following: address, date building was constructed, and date of demolition.

(4) Beginning with their 2024 Annual Report, Permittees shall provide the following: whether the site was inspected during demolition, and for those cases where notification and advance approval from the U.S. EPA is not required and were approved for demolition after June 30, 2023, the hazardous waste manifest prepared for transportation of the material to a disposal facility.

(5) In their 2026 Annual Report, Permittees shall submit an evaluation of the effectiveness of the protocol for controlling PCBs during building demolition as well as supporting data. This should be conducted and reported at the regional level on behalf of all Permittees and shall be considered the Report of Waste Discharge for Provision C.12.g for the next permit reissuance.

(6) In their 2026 Annual Report, Permittees may submit for use in the subsequent permit term an updated assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs-containing materials and wastes during demolition of applicable structures.

C.12.h. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. Task Description – In 2020, Permittees submitted a Reasonable Assurance Analysis and plan (RAA) demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030. Permittees shall evaluate the effectiveness of all PCBs control measures and update the RAA as necessary. Updates can be focused on those control measures for which new information is available and for control measures not evaluated in previous efforts. Permittees shall also prepare detailed implementation plans for all control measures to be implemented in and inform permit requirements for the subsequent permit term.

ii. Implementation level – Permittees shall update, as necessary, their PCBs control measures implementation plan and RAA. The update may be focused on control measures for which new information is available or for those control measures not previously evaluated. The long-term plan must:

(1) Identify all technically and economically feasible PCBs control measures to be implemented (including GSI projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Additionally, Permittees shall identify all specific control measures to be implemented, the intensity of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term. This implementation plan must include:

(a) Identification of all control measures implemented during the current permit term and any additional control measures to be implemented in the subsequent permit term;

(b) A description of the intensity or extent of control measure implementation (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied);

(c) Identification of accountability metrics to track during the subsequent permit corresponding to the proposed implementation intensity; and

(d) Estimates for load reductions to be achieved through implementation of control measures during subsequent permit term at the proposed intensity.

iii. Reporting – Permittees shall submit the updated plan and schedule no later than March 31, 2026.

C.12.i. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

i. Task Description – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. The studies should focus on near-shore areas contaminated with PCBs from historical activity and the expected trajectory of recovery as sources from local watersheds are reduced.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban

runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2023 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2023 Annual Report. The Permittees shall report in the March 15, 2026, Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.12.j. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence anglers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level** – At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2026 Annual Report.

C.13. Copper Controls

The Permittees shall implement the following control program for copper. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of Provision C.13 through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. **Task Description** – The Permittees shall prohibit the discharge of wastewater to storm drains generated from installing, cleaning, treating, or washing copper architectural features, including copper roofs.

ii. **Implementation Level**

(1) The Permittees shall require, when issuing building permits, use of appropriate BMPs for managing copper-containing waste during and post-construction.

(2) The Permittees shall educate installers and operators on appropriate BMPs for managing copper-containing wastes.

(3) The Permittees shall enforce against noncompliance.

iii. **Reporting**

(1) In the 2022 Annual Report, those Permittees that have not previously done so shall certify that legal authority currently exists to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of copper architectural features, including copper roofs.

(2) In the 2022 Annual Report, the Permittees shall report how copper architectural features are addressed through the issuance of building permits.

(3) The Permittees shall report annually permitting and enforcement activities.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. **Task Description** – Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. Implementation Level – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. Reporting

(1) In the 2022 Annual Report, the Permittees that have not previously done so shall certify that legal authority currently exists to prohibit the discharges to storm drains of water containing copper-based chemicals from pools, spas, and fountains.

(2) In the 2022 Annual Report, the Permittees shall report how copper-containing discharges from pools, spas, and fountains are addressed to accomplish the prohibition of the discharge.

(3) The Permittees shall report annually on any enforcement activities.

C.13.c. Industrial Sources

i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. Implementation Level

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site.

iii. Reporting

The Permittees shall highlight copper reduction results in the industrial inspection component in the Provision C.13 portion of each Annual Report.

C.14. Bacteria Control for Impaired Water Bodies

Provisions C.2 through C.7 contain requirements to control sources of pollutants to the Permittees' MS4s. Implementation of these requirements should control sources of bacteria[51]; still, exceedances of bacteria water quality objectives occur in some water bodies that receive urban runoff. Permittees identified in this Provision shall demonstrate compliance with bacteria related Receiving Water Limitations during this Permit term through the timely implementation of control measures and other actions to reduce bacteria discharges from their municipal separate storm sewer systems in accordance with the requirements of this Provision. Provision C.14.a applies to the cities of Mountain View and Sunnyvale for their discharges that are causing or contributing to exceedances of bacteria water quality objectives in Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough, water bodies without bacteria TMDLs. Provision C.14.b applies to Permittees with San Pedro Creek and Pacifica State Beach Indicator Bacteria TMDL wasteload allocations, Provision C.14.c applies to Permittees with San Francisco Bay Beaches Bacteria TMDL wasteload allocations, and Provision C.14.d applies to Permittees with Pillar Point Harbor Beaches and Venice Beach Bacteria TMDL wasteload allocations.

C.14.a. Enhanced Bacteria Control

Enhanced bacteria control requirements are applicable to the cities of Mountain View and Sunnyvale for discharges that are causing or contributing to exceedances of applicable bacteria water quality objectives in Stevens Creek (both cities), Calabazas Creek (Sunnyvale), and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale).[52] "Cities" as used in this Provision C.14.a refers to these cities.

The actions described in this Provision shall be implemented where controllable bacteria sources are located within the Cities' jurisdiction, in order to reduce bacteria inputs to the water body with bacteria exceedances.

i. Municipal Operations Bacteria Control

(1) **Task Description** – Evaluate the potential for municipal operations to generate and cause bacteria to be transported to surface waters. Where such potential is determined to exist, develop and implement BMPs to minimize the transport of bacteria.

[51] Bacteria as used herein refers to fecal indicator bacteria.

[52] The geometric mean of indicator bacteria levels in a waterbody shall not be greater than the applicable geometric mean water quality objective in any six-week interval, calculated weekly. The indicator bacteria levels shall not be greater than the applicable statistical threshold value water quality objective in more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

(2) **Implementation Level** – The Cities shall develop and implement BMPs to minimize potential bacteria sources, including, but not limited to, trash, human and animal fecal sources, and excessive biofilm, for the following municipal operations:

(a) Street and road cleaning

(b) Parks and municipal open space maintenance

(c) Sidewalk, plaza, and pavement cleaning

(d) MS4 component maintenance, such as cleaning biofilm from catch basins, piping, and pump stations.

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, frequency and location for actions taken to reduce bacteria sources related to municipal operations.

ii. Industrial/Commercial Site Bacteria Control and Illicit Discharge Detection and Elimination

(1) **Task Description** – Train municipal staff responsible for inspecting and enforcing industrial and commercial site controls and for detecting and eliminating illicit discharges to enhance their focus on potential bacteria sources. The Cities shall use enforcement authorities to ensure bacteria sources are controlled.

(2) **Implementation Level** – The Cities shall enhance their efforts to ensure transport to surface waters from the following potential bacteria sources is minimized:

(a) Roof and exterior washoff of commercial and industrial structures and surfaces, where these sources are likely to contain bacteria, such as from rodent and bird wastes, and are likely to be discharged to receiving water

(b) Outdoor garbage and recycle bins

(c) Outdoor floor-mat washoff

(d) Portable toilets

(e) Illicit discharges to the MS4

(3) **Reporting** –In each Annual Report, the Cities shall describe BMP, frequency, and location for actions taken to reduce bacteria sources related to Industrial and Commercial Site Bacteria Control and Illicit Discharge Detection and Elimination.

iii. Control of Bacteria Sources Related to Unsheltered Homeless Populations

(1) **Task Description** – Evaluate the potential for bacteria transport to surface waters from areas inhabited by unsheltered homeless persons. Where such potential is determined to exist develop and implement BMPs to minimize such bacteria sources and transport.

(2) **Implementation Level** – The Cities shall minimize the transport of bacteria from areas inhabited by unsheltered homeless persons by taking actions that may include, but are not limited to, the following:

(a) Provide pump-out stations, mobile pumping services, or voucher programs for proper disposal of sanitary sewage where unsheltered homeless persons reside in recreational vehicles

(b) Provide sanitation services, including access to running water, where feasible, at locations where homeless people live or congregate

(c) Establish and update sidewalk, street, and/or plaza cleaning standards for the cleanup and appropriate disposal of human waste

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, numbers or frequency (as applicable), and locations of actions taken to reduce bacteria discharges from areas inhabited by unsheltered persons.

iv. Pet and Livestock Bacteria Source Control

(1) **Task Description** – Evaluate the potential for domestic animal sources, such as pet waste, kennels, horse boarding facilities and trails, to generate and cause to be transported to surface waters. Where such potential is determined to exist, develop and implement BMPs to minimize such bacteria sources and prevent transport.

(2) **Implementation Level** – The Cities shall ensure transport of bacteria from domestic animal sources to surface waters is minimized by taking the following actions:

(a) Enhance numbers of, and maintenance of, pet waste stations

(b) Inspect pet boarding facilities to ensure pet waste is managed to prevent offsite discharges

(c) Inspect horse boarding facilities, if any, to ensure manure is managed to prevent offsite discharges. Notify Water Board staff of facilities that should enroll in the Confined Animal Facility program.

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, numbers or frequency (as applicable), and locations of actions taken to reduce bacteria from domestic animal sources.

v. Public Outreach on Bacteria Source Control

(1) **Task Description** – Evaluate public outreach currently conducted to encourage bacteria pollution prevention and determine how to improve such outreach, such as, for example, by focusing outreach on certain populations or at certain locations.

(2) **Implementation Level** – The Cities shall enhance public outreach where it is likely to improve human behavior regarding bacteria pollution prevention practices, such as, but not limited to, the following:

(a) Cleaning up pet waste

(b) Eliminating litter

(c) Eliminating outdoor restaurant floor mat washdown

(d) Using proper BMPs for sidewalk cleaning

(e) Covering trash storage areas

(f) Maintaining porta-potties properly.

(3) **Reporting** – In each Annual Report, the Cities shall describe the outreach messages, methods of delivery, audiences, and number of repetitions.

vi. Coordination with Sanitary Sewerage System Entities

(1) **Task Description** – Overflows and leaks from sanitary sewage conveyance systems can cause bacteria to be transported to MS4s, and commonly the Cities are not responsible for maintenance and repair of the sanitary sewerage system. This task encourages the Cities to collaborate with the entities responsible for the sanitary sewerage system to minimize overflows and leaks.

(2) **Implementation Level** – The Cities shall, to the extent necessary and within the limits of their authorities, collaborate with their counterparts who are responsible for maintenance of the sanitary sewerage system to assist with the following:

(a) Prioritize maintenance and repair in areas contributing to bacteria loads to surface waters with elevated bacteria

(b) Ensure rapid and thorough response to cleanup sanitary sewer system overflows

(c) Develop lateral maintenance and replacement programs for consideration by the appropriate legal authority.

(3) **Reporting** – In each Annual Report, the Cities shall describe the status of any actions taken to coordinate with sanitary sewer entities.

vii. Prioritize Trash Removal to Control Bacteria Sources

(1) **Task Description** – Evaluate the potential bacteria-reduction benefit of prioritizing trash control efforts required in Provision C.10 in areas where trash generation may be contributing to bacteria exceedances in local surface waters. Where such benefit appears significant, reprioritize trash control actions accordingly.

(2) **Implementation Level** – The Cities shall focus some of their trash reduction efforts to areas where trash generation likely contributes to bacteria exceedances in local surface waters.

(3) **Reporting** – In each Annual Report, the Cities shall describe how the bacteria-reduction benefit of focused trash-control efforts was evaluated, the conclusions reached, and any actions taken during the reporting period to reprioritize trash control areas.

viii. Water Quality Monitoring

(1) **Task Description** – The Cities shall develop and implement a monitoring program to identify and characterize potential bacteria sources to receiving waters that have been found to exceed bacteria water quality objective(s), to help focus source control efforts and evaluate effectiveness of controls, and to ultimately demonstrate attainment of bacteria receiving water limitations. The monitoring program shall be designed and adapted to answer the following questions:

(a) What is the spatial and temporal extent of dry weather flows in the MS4?

(b) Are indicators of human fecal material present in both dry and wet weather flows observed in the MS4?

(i) If so, in which stormwater catchments are sources most prominent?

(ii) Where are the likely locations of these sources in the catchments?

(iii) What measures can be implemented to control these sources?

(c) Are water quality objectives being achieved during dry weather?

(d) Are water quality objectives being achieved during wet weather?

(2) **Implementation Level** – At a minimum, the monitoring program shall include the following:

(a) Sampling of all MS4 outfalls with flow during three dry weather creek walks. One to be scheduled during July / August 2022, one to be scheduled January / February 2023, and one in April / May 2023;

(b) Desktop and field methods based on elements described in the California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (Griffith et al. 2013);

(c) Geographic information system analysis of potential sources and existing bacteria control action locations to evaluate existing and identify and optimize additional bacteria controls;

(d) MS4 bacteria characterization monitoring at least monthly through September 2023, including two events that coincide with wet weather discharges, at a minimum of 14 sites each year to identify sources of bacteria discharges to and from the MS4 using microbial source tracking techniques to detect human genetic markers (i.e., HF183) and to evaluate effectiveness of bacteria controls, including the following:

(i) Identification of stormwater catchments where monitoring will be conducted;

(ii) Characterization of indicator bacteria, i.e., E coli, densities in subwatersheds, storm drains, outfalls, and pump stations that drain to receiving waters with excessive levels of indicator bacteria; and

(iii) Determination of baseline (or current) conditions against which future monitoring results can be compared following new, enhanced, or ongoing control measure implementation.

(e) Receiving water monitoring at least monthly, from October 2023 through September 2024, including two events that coincide with, or within 48 hours, of a storm event forecasted to be at least 0.5 inch in 24 hours, to determine E. coli densities, where salinity is less than 1 ppt, and Enterococci densities, where salinity is greater than 1 ppt, at a minimum total of 5 sites in Stevens Creek, 3 sites in Calabazas Creek, and 1 site in Sunnyvale East Channel, including the following:

(i) Stevens Creek immediately downstream of Homestead;

(ii) Stevens Creek La Avenida;

(iii) Sunnyvale East Channel upstream of Tasman (above tidal influence);

(iv) Calabazas Creek downstream of Homestead; and

(v) Calabazas Creek upstream of Tasman.

(3) **Reporting** – In each Annual Report, the Cities submit the results of all monitoring conducted the previous year, including parameters analyzed, frequencies, and locations, and planned monitoring for the current year, including parameters, frequencies, and locations.

ix. Compliance with Receiving Water Limitations

(1) **Task Description** – The Cities shall determine whether discharges from their MS4s are causing or contributing to exceedances of bacteria water quality objectives in receiving waters after implementation of control measures required by C.14.a.i-vii. The Cities are expected to meet Receiving Water Limitations B.2 for applicable bacteria water quality objectives by June 30, 2027. If receiving water limitations are not met, despite a diligent effort to quantify levels and the sources of bacteria in MS4 discharges and documentation of completion of controls required by C.14.a.i-vii, then the Cities shall submit a plan for additional actions to attain the receiving water limitations.

(2) **Implementation Level** – The Cities shall provide a comprehensive assessment of bacteria sources and bacteria controls to demonstrate compliance with receiving water limitations for applicable bacteria water quality objectives. If compliance cannot be achieved by June 30, 2027, the assessment shall describe additional control measures or increased levels of implementation for existing control measures, with an implementation schedule, and proposed milestones, that will be implemented to attain bacteria receiving water limitations as soon as possible.

(3) **Reporting** – The Cities shall submit a Mid-Permit Interpretive Report and a Final Interpretive Report.

(a) The Mid-Permit Interpretive Report shall be submitted by March 31, 2025, which includes the following:

(i) All data collected through September 2024 and description of data validation and quality;

(ii) Description of progress towards answering questions in C.14.a.viii.(1);

(iii) Description of specific bacteria sources and/or specific geographic areas that receive implementation of existing control

measures, as well as. recommended new, modified, or enhanced control that will be evaluated or implemented;

(iv) Description of monitoring, subject to approval by the Water Board through a Permit amendment, to be conducted through the remainder of the Permit term to answer the questions in C.14.a.viii.(1). The monitoring shall be as comprehensive, systematic, and robust as what is required in Provision C.14.a.viii while being commensurate with the need to address and resolve bacteria exceedances in the receiving waters.

(b) The Final Interpretive Report shall be submitted by December 31, 2026, which includes the following:

(i) All data collected through September 2026 and description of data validation and quality;

(ii) Description of progress towards answering questions in C.14.a.viii.(1);

(iii) Description of specific bacteria sources and/or specific geographic areas that received implementation of existing control measures, as well as. new, modified, or enhanced control that were evaluated or implemented;

(iv) Determination if bacteria receiving water limitations have or will be met, by June 30, 2027; and

(v) If bacteria receiving water limitations will not be met by June 30, 2027, description of additional control measures or increased levels of implementation for existing control measures, with an implementation schedule, and proposed milestones, that will be implemented to attain bacteria receiving water limitations as soon as possible, and a proposed monitoring program designed to answer the questions in C.14.a.viii.(1) that will be implemented in the next permit term.

C.14.b. City of Pacifica and San Mateo County Bacteria Controls

The City of Pacifica (City) and San Mateo County (County) Permittees shall implement the actions in this subprovision to control fecal indicator bacteria. The City and County shall focus implementation of bacteria control measures in areas where benefits are most likely to accrue. The goal of this subprovision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek and Pacifica State Beach Indicator Bacteria TMDL. In accordance with the TMDL, the City and County are required to meet the wasteload allocations for Pacifica State Beach by August

1, 2021, and for San Pedro Creek by August 1, 2028. The City and County may comply with any requirement of this provision through a collaborative effort.

i. Control Measures to Achieve Indicator Bacteria Wasteload Allocations

(1) **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to meet the stormwater TMDL wasteload allocations in the San Pedro Creek (Creek) watershed and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL Project Area).

(2) **Implementation Level** – To comply with this element:

(a) The City and County, as appropriate, shall prohibit potential illicit discharges into their storm sewer system from sanitary sewer overflows or the sanitary sewer lines within their jurisdictions as follows:

(i) Ensure all sanitary sewer lines within a 2,000-foot radius of the Creek and Beach are inspected, assessed, and repaired, as needed, within 60 months of the Permit effective date;

(ii) Ensure at least 20 percent of the storm sewer system discharging to San Pedro Creek or Pacifica State Beach is evaluated and addressed for illicit sanitary sewer connections each year to prevent discharges from the sanitary sewer lines; and

(iii) Coordinate with the responsible sanitary sewer collection agency to identify and implement BMPs to prevent sanitary sewer overflows, such as developing or enhancing a spill response plan for significant sanitary sewer overflow incident areas to decrease potential sewage discharges into the storm sewer system.

(b) The County shall continue to address bacteria discharges from commercial horse and dog kennel facilities (facilities) into its storm sewer system as follows:

(i) Inspect each facility annually for code compliance by June 30 of each year.

(ii) Review each facility's current manure, stormwater, and drainage management plans for code compliance by June 30 of each year.

(iii) Provide a copy of the facilities inspection and review reports to the Water Board in each annual report.

(iv) Take progressive enforcement, as needed, for facilities found to be noncompliant with the County's Confined Animal Ordinance.

(c) The City shall continue to address bacteria discharges from commercial horse facilities (facilities) into its storm sewer system as follows:

(i) Review each facility's compliance with the City's Administrative Policy on "Standards for Keeping Animals."

(ii) Review each facility's compliance with the City's Municipal Code on "Animal Excreta."

(iii) Conduct annual compliance review and inspection of each facility by June 30 of each year.

(iv) Provide a copy of the facilities inspection and review reports to the Water Board in each annual report.

(v) Take progressive enforcement action(s), as needed, to bring noncompliant facilities into compliance with the City's Administrative Policy on "Standards for Keeping Animals" and Municipal Code on "Animal Excreta."

(d) The City shall continue to maintain existing and any new dog waste clean-up signs, waste bag dispensers, and trash cans within the TMDL Project Area.

(e) The City shall continue to implement a visual inspection and cleanup plan for high dog waste accumulation areas along the Creek and its tributaries. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteorological Station, or comparable site), and at a frequency of no less than once a month.

(f) The City shall continue to implement a pet waste public outreach and education campaign that, at a minimum, includes all the following:

(i) Establish a public pet waste management stakeholder group (e.g., formal or informal dog owners club).

(ii) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Creek and Beach to play on the local television station and to include in print ads in the Pacifica Tribune.

(iii) Distribute a mailer with an informational brochure to residents and businesses describing proper pet waste management, the linkage of the watershed to the Creek and Beach, and the adverse impact on those water bodies and those recreating in them from improper pet waste management.

(iv) Maintain a web page to the City website with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Creek and Beach and public health.

(v) Create and implement a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Creek and Beach.

(vi) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(g) The City and County, based on the results of the source characterization and BMP effectiveness, and wasteload allocation attainment analyses described in Provision C.14.b-iii, shall modify or refocus control measure implementation efforts as appropriate, at a frequency of no less than every two years.

(3) **Reporting –** No later than March 15 of each year, the City and County shall submit a comprehensive TMDL Status and Monitoring Report, reporting on the specific control measures (as listed in Provision C.14.b.1.ii) that have been implemented in the TMDL Project Area during the foregoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description, scope, and start date of pollution prevention measures; and

(c) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

ii. Water Quality Monitoring to Assess Attainment of Wasteload Allocations

(1) **Task Description** – Permittees shall determine whether the TMDL wasteload allocations are attained.

(2) **Implementation Level** – The City and County shall conduct attainment water quality monitoring activities as follows:

(a) Sample Locations – Two stations shall be monitored: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (the original station, as of the TMDL's adoption date of November 2012, which was located approximately 300 feet north of the Creek mouth, and at shin depth, originally referred to as Linda Mar #5 in the TMDL Staff Report, but currently referred to as Linda Mar #7). The locations of these stations are shown in the TMDL Staff Report.

(b) Sampling Frequency – The two attainment stations shall be monitored weekly on an ongoing basis for fecal indicator bacteria. The weekly sampling shall occur year-round regardless of weather conditions, provided the conditions are safe for field staff to collect the samples.

(c) Sampling Constituents – Samples collected from the Creek Mouth shall be analyzed for *E. coli* and total coliform. Samples collected from Linda Mar #5 station shall be analyzed for *Enterococcus*, fecal coliform, and total coliform.

(d) The City and County shall analyze the results of the attainment monitoring and compare the results to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL.

(3) **Reporting** – In Annual TMDL Status and Monitoring Reports submitted on March 15 each year, the City and County shall analyze, summarize, and report the results of the ongoing attainment monitoring, as follows:

(a) The City and County shall complete a data evaluation, which shall focus on determining whether the TMDL wasteload allocations are being attained in the Creek and at the Beach.

(b) The indicator bacteria results from the attainment monitoring stations (Creek Mouth and original Linda Mar #5 station (currently called Linda Mar #7), located 300 feet north of the Creek mouth at shin depth) shall be compared to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL (Total Maximum Daily Load for Bacteria in San Pedro Creek and at Pacifica State Beach: Final Staff Report for Proposed Basin Plan Amendment. Water Board, 2012. Accessible at:

https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/pacificabacteria/Final%20Staff%20Report.pdf).

(c) The data evaluation shall include tabulation and review of local rainfall data to determine whether the weekly attainment monitoring sampling events occurred during dry weather or wet weather.

(d) An ongoing quantitative analysis of trends (from initial year) in bacteria densities and exceedances of applicable water quality objectives at the two attainment stations shall be conducted and reported annually.

(e) A detailed and comprehensive assessment of wasteload allocation attainment by the end of year 4 of the Permit term shall be completed. If wasteload allocations are not achieved by the end of the Permit term, no later than 180 days prior to Permit expiration, the City and County shall submit a plan in their Report Of Waste Discharge, acceptable to the Executive Officer, that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm sewer systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.

iii. Water Quality Monitoring – Characterize Bacteria Sources, Assess BMP Effectiveness

(1) **Task Description** – The purpose of characterization monitoring is to better characterize indicator bacteria contributions from specific sources and to evaluate control measure effectiveness. The characterization monitoring shall provide data to:

(a) Characterize indicator bacteria densities in subwatersheds, storm drain outfalls, and pump stations that have not been sampled in the past. Results of the investigation may be used to drive future control measure actions.

(b) Establish baseline (or current) conditions against which future monitoring results can be compared following new or ongoing control measure implementation.

(c) Characterization monitoring shall be conducted every other year on a water year basis (i.e., October 1 through September 30), continuing on the existing ongoing monitoring schedule. Characterization monitoring shall assess E. coli densities throughout the San Pedro Creek watershed. Human-, horse-, and dog-specific genetic markers shall be analyzed for a subset of the samples to investigate whether these species contribute fecal contamination to the Creek. The

characterization monitoring shall be iterative in nature and allow for flexibility of design and details in future years. Subsequent years of characterization monitoring, at a minimum, shall have the same level of effort as previous years; however, in future years, based on the results of the previous monitoring, alternative sampling stations may be targeted, sampling intensities may be modified, sampling frequencies may be adjusted, and/or the species-specific genetic marker sampling may be revised.

(2) **Implementation Level** – The City and County shall conduct characterization monitoring activities as follows:

(a) Sampling Locations – while based on the previous year's results appropriate sampling locations can be selected for each monitoring year, the "Creek Mouth" site shall always be sampled during events when species-specific genetic marker samples are collected.

(b) Number of Samples – in each monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(c) Sampling Frequency – the characterization stations shall be sampled a minimum of eight times over the course of the water year, as follows:

(i) Wet season – four sampling events shall be conducted during the wet season months (November through March). To the extent possible, wet season sampling events shall occur during wet weather, which as defined in the TMDL is any day (e.g. 24-hour period) with 0.1 inch of rain or more and the following three days;

(ii) Dry season – four sampling events shall be conducted during the dry season months (May through September).

(iii) In subsequent monitoring years, based on the results of the previous year's monitoring, the sampling frequency may be modified, as appropriate, to provide the most useful results.

(d) Constituents – All samples shall be analyzed for *E. coli*. In addition, during each monitoring year, at a minimum, samples collected at four stations during four sampling events (two wet season, two dry season) shall be analyzed for human-, horse-, and dog-specific genetic markers to assess temporal and spatial fecal waste contributions from the targeted host species to the Creek and Beach.

(e) Monitoring Protocols and Data Quality – Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance

Project Plan (QAPP) for applicable parameters, including data quality objectives, field, equipment, and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

(f) Future Revisions – Any and all changes to the characterization monitoring plan in future years shall be submitted to the Executive Officer for review and acceptance no later than 90 days prior to implementation.

(3) **Reporting**

(a) In their Annual TMDL Status and Monitoring Reports the City and County shall submit a comprehensive Characterization Monitoring Report reporting on any data collected during the preceding October 1 through September 30 monitoring period.

(b) Data evaluation shall focus on addressing the following questions:

(i) Which land uses and/or sources contribute most to bacteria impairments in San Pedro Creek watershed?

(ii) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed?

(iii) What are the multi-year indicator bacteria density trends in the Creek and at the Beach (i.e., do control measures appear to be reducing bacteria)?

(c) As appropriate, the Report shall include the following:

(i) Immediately following the Table of Contents, a Data Tables section that includes all the data collected pursuant to Provision C.14.b.iii. and contains the following information pertaining to the foregoing monitoring period:

a. A map showing all monitoring locations;

b. Immediately following the map, a single completed Locations and Parameters Table containing the following columns or rows for each location sampled: numeric site identifier, a short-hand site name such as “Creek Mouth,” latitude, longitude, and parameters assessed;

c. Immediately following the Locations and Parameters Table, a single completed Results Table containing the following columns or rows for each location sampled: the short-hand site name and datum/result for each constituent analyzed. Constituents that exceed applicable water quality objectives shall be highlighted.

(ii) For all data, a statement of the data quality.

(iii) An analysis of the data, which includes the following:

a. Basic descriptive statistics using indicator bacteria data;

b. Identification and evaluation of any controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed;

c. Identification and analysis of any trends in stormwater or receiving water quality; and

d. Consideration of variability in the data sets.

(iv) A discussion of the data, which shall:

a. Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin or the Ocean plans;

b. Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

c. Identify and prioritize water quality problems;

d. Identify potential sources of water quality problems;

e. Describe follow-up actions;

f. Evaluate the effectiveness of existing control measures; and

g. Identify management actions needed to address water quality problems.

C.14.c. City of San Mateo Marina Lagoon Beaches Bacteria Controls

The City of San Mateo (City) shall implement the actions in this subprovision to control fecal indicator bacteria. For each requirement, the City shall focus implementation in areas where benefits are most likely to accrue, i.e., where bacteria reduction is likely to reduce bacteria densities in San Mateo Lagoon and particularly at Parkside Aquatic Park Beach and Lakeshore Park Beach. Many of the required implementation actions are described in the City's TMDL Basin Plan Amendment Implementation Plan, 2018 (TMDL Implementation Plan). This subprovision implements the urban runoff requirements of the San Francisco Bay Beaches Bacteria TMDL (TMDL) applicable to the City.

i. Control Measures to Achieve Indicator Bacteria Wasteload Allocations

(1) **Task Description** – The City shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to San Mateo Lagoon to the maximum extent practicable.

(2) **Implementation Level** – In order to comply with this element:

(a) The City shall enhance its efforts to prohibit potential illicit discharges into its storm sewer system.

(b) The City shall expand or enhance dog waste management strategy, including installing and/or maintaining dog waste clean-up signs, waste bag dispensers, and trash cans at a minimum of two parks/open spaces near San Mateo Lagoon beaches.

(c) The City shall enhance its public outreach and education regarding proper management of pet waste management, dumpsters and garbage bins; proper outdoor washdown procedures (restaurant mats, dining areas, commercial areas, mobile cleaner operations) by taking a minimum of three of the following actions:

(i) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Lagoon.

(ii) Distribute a mailer to residents and businesses describing the adverse impact on water quality and recreation of improper pet waste management.

(iii) Add information to the City website about the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Lagoon and public health.

(iv) Create and broadcast a pre-rain pet waste cleanup public service announcement to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Lagoon.

(v) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(d) The City shall continue its goose control program, as described in its TMDL Implementation Plan.

(e) The City shall continue implementing its “Illegal Dumping Screening Program,” its “Spill, Dumping, and Complaint Response Program,” and its “Commercial/Industrial Business Inspection Plans,” including implementing associated enforcement, with a focus near the beaches as appropriate.

(f) Once during the Permit term, determine if boaters in San Mateo Lagoon could be a source of bacteria; if yes, conduct or enhance outreach to improved boaters’ behaviors regarding bacteria sources (e.g., litter and human waste).

(3) **Reporting**

(a) In each Annual Report, the City shall summarize the actions it took to satisfy the requirements in Provision C.14.c.i.(2). during the foregoing October 1 through September 30 period. This report shall include:

(i) The number, type, and locations and/or frequency (if applicable) of control measures; and

(ii) The description and scope of pollution prevention measures; and

(iii) A data table and graphs showing Enterococcus data collected during the reporting year for the two San Mateo Lagoon beaches, Parkside Aquatic Park Beach and Lakeshore Park Beach.

(b) For the Annual Report due in 2023, quantitatively and qualitatively evaluate the effectiveness of the City’s actions toward wasteload allocation attainment and modify or refocus control measure implementation efforts as appropriate.

ii. Phase Two Measures

(1) **Task Description** – If wasteload allocations are not met by December 13, 2021, the City shall implement additional bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to San Mateo Lagoon.

(2) **Implementation Level** – In order to comply with this element:

(a) By July 1, 2022, the City shall submit a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include all actions described in Provision C.14.a that are likely to reduce bacteria loads to San Mateo Lagoon and particularly at Parkside Aquatic Park Beach and Lakeshore Park Beach. The plan also shall include an implementation schedule and milestones.

(b) By July 1, 2022, the City shall implement this plan.

(c) By September 30, 2022, the City shall submit a supplemental monitoring plan (supplemental to ongoing beach monitoring) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.

(3) **Reporting** – Starting with the 2023 Annual Report and for Annual Reports submitted in following years, the City shall summarize the actions it took to satisfy the requirements in Provision C.14.c.ii.(2) during the foregoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description and scope of pollution prevention measures; and

(c) A data table and graphs showing enterococcus data collected during the reporting year for the two San Mateo Lagoon beaches, Parkside Aquatic Park Beach and Lakeshore Park Beach.

iii. Planning for Future Actions

(1) **Task Description** – If wasteload allocations are not met by December 13, 2026, Permittees shall prepare a plan for additional actions to attain the water quality objective in the next permit term.

(2) **Implementation Level** – Permittees shall prepare a plan that includes an assessment of bacteria sources and describes additional control

measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. The plan shall include an implementation schedule and proposed milestones. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

(3) **Reporting** – Submit the plan no later than 180 days prior to Permit expiration.

C.14.d. City of Half Moon Bay and San Mateo County Bacteria Controls

The City of Half Moon Bay (City) and San Mateo County (County) shall implement the actions in this subprovision to control bacteria. The City and County shall focus implementation of bacteria control measures in areas where benefits are most likely to accrue, i.e., where controls are likely to reduce bacteria mass in Pillar Point Harbor and Venice Beach. The goal of this subprovision is to implement the municipal stormwater runoff requirements of the Pillar Point Harbor and Venice Beach Bacteria TMDL and achieve the TMDL wasteload allocations. The City and County may comply with any requirement of this subprovision through a collaborative effort.

i. Control Measures to Achieve Bacteria Wasteload Allocations

(1) **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies within their respective jurisdictions to prevent or reduce discharges of bacteria from storm drain systems to meet the municipal stormwater runoff TMDL wasteload allocations listed in the Pillar Point Harbor and Venice Beach Bacteria TMDL.

(2) **Implementation Level** – To comply with this element:

(a) The City and County each shall prepare an Initial Report acceptable to the Water Board Executive Officer that describes actions they are taking and will take to prevent or reduce discharges of bacteria to and from storm sewer systems. This report shall be submitted to the Water Board **by July 1, 2022**. The report shall include a schedule, timeline, or frequency of implementation activities for all actions, including, but not limited to, the actions described in Provision C.14.d.i.(2).(b), below.

(b) The City and County shall prohibit and prevent, to the maximum extent possible, discharges of bacteria into the storm sewer system within five years of the effective date of the TMDL as follows:

(i) Illicit sanitary sewer connections: The City and County shall train the staff responsible for enforcing industrial and commercial site

control and for detecting and eliminating illicit discharges to investigate potential connections of sanitary sewer lines to stormwater lines. The City and County shall ensure that staff conduct illicit sanitary sewer connection investigations and include such investigations in their routine inspections as well. The City and County shall use enforcement authorities to ensure transport to surface waters of the following potential bacteria sources is minimized:

(ii) Illicit discharges to the MS4, by increasing illicit discharge investigations in the vicinity of Pillar Point Harbor and Venice Beach

a. Roof and exterior washoff of commercial and industrial structures and surfaces, where these sources are likely to contain bacteria, such as from rodent and bird wastes, that are likely to be discharged to receiving water

b. Outdoor garbage and recycle bins

c. Outdoor floor mat washoff

d. Portable toilet spills and leakage

(iii) Human waste from homeless encampments, by implementing Provision C.14.a.iii in areas likely to discharge to the beaches;

(iv) Pet waste

a. Develop and implement a visual inspection program to identify high pet waste accumulation areas and develop a cleanup plan for these areas, including specific actions before winter rains;

b. Install new or additional dog waste cleanup signs, waste bag dispensers, and trash bins in high dog waste accumulation areas;

c. Evaluate and improve the service frequency of dog waste bins, as needed; and

d. Enhance pet waste public outreach and education campaign that includes at least three of the following:

- Prepare and broadcast public service announcements regarding pet waste management and associated impacts to the beaches and their catchments on social media, local television, and/or local newspapers;

- Distribute a mailer to residents and businesses describing proper pet waste management, and the adverse impact to the beaches and those recreating on them from improper pet waste management;
- Add to or maintain web pages on the City and County websites with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality and public health;
- Broadcast a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the beaches; and
- Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

e. The City and County shall include additional actions described in Provision C.14.a. in their Initial Reports and in their actions to prohibit and prevent discharges of bacteria into the storm sewer system to the extent and in the locations they deem helpful for achieving the TMDL wasteload allocation.

(3) **Reporting** – No later than March 30 of each year, the City and County shall submit a comprehensive TMDL Implementation Status and Monitoring Report, reporting on the specific control measures (as listed in Provision C.14.d.i.(2)) that have been implemented in the TMDL Project Area during the foregoing July 1 through June 30 period. This report shall include:

(a) The number, type, and locations and/or frequency of control measures;

(b) The description, scope, and start date of pollution prevention measures;

(c) Listing, timeline, and discussion of the actions scheduled for implementation during the upcoming year; and

(d) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

ii. Water Quality Monitoring

(1) **Task Description** – The City and County shall ensure the beaches are sampled weekly (i.e., that current bacteria sampling continues) and shall evaluate beach monitoring data. The purposes of the water quality monitoring are to determine whether the TMDL wasteload allocations are attained; further identify and characterize the source areas or land uses with the greatest bacteria contributions; and direct adaptive implementation of controls to reduce or eliminate bacteria discharges from different sources over time.

(2) **Implementation Level** – At a minimum, the City and County shall continue monitoring the beaches as required under California Health and Safety Code section 115880 and evaluate the resulting data. The City and County may collaboratively or individually develop and conduct a source assessment study to better characterize sources and spatial and temporal extent of bacteria impairment at the beaches and to evaluate the contribution of bacteria from natural sources.

(3) **Reporting** -- No later than March 30 of each year, the City and County shall submit a comprehensive TMDL Implementation Status and Monitoring Report describing the monitoring that has been conducted in the TMDL Project Area during the foregoing October 1 through September 30 period. The City and County are encouraged to collaborate so as to prepare a single report on all the data. This report shall include:

(a) Data evaluation that addresses the following questions:

(i) Are the TMDL targets and allocations met at the beaches?

(ii) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) being contained and do control measures appear to be effective in reducing bacteria loads?

(iii) Which land uses and/or sources contribute most to bacteria impairments?

(b) The Report shall include the following:

(i) Information about the sampling locations, timing and frequency of sampling, analytical method(s), and a map of monitoring sites

(ii) An analysis of the data, which includes the following:

a. Basic descriptive statistics using indicator bacteria data

b. Identification and evaluation of available data that indicate the presence of controllable sources of fecal contamination (e.g., human, horses, and dogs)

c. Identification and analysis of any trends in stormwater or receiving water quality

d. Consideration of variability in the data sets.

(iii) A discussion of the data, which shall:

a. Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Pillar Point Harbor and Venice Beach Bacteria TMDL;

b. Identify potential sources of water quality problems;

c. Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

d. Evaluate the effectiveness of existing control measures; and

e. Identify and describe the follow-up management actions needed to address water quality problems.

iii. Planning for Phase Two Actions

(1) **Task Description** – If wasteload allocations are not met within five years of the TMDL effective date, Permittees shall develop a Phase Two Report that describes the actions being implemented and additional actions that will be taken to reduce the discharge of bacteria to the beaches.

(2) **Implementation Level** – In preparing the Phase Two Report, Permittees shall assess bacteria sources; describe control actions taken; and describe additional control measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. The report shall contain an implementation schedule and proposed milestones. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

(3) **Reporting** – Submit the Phase Two Report within five years of the TMDL effective date.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. **Discharge Type** – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers (excludes well development); and

(8) NPDES permitted discharges (individual or general permits).

ii. **Implementation Level** – The non-stormwater discharges listed in Provision C.15.a.i, above, are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b, below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed

and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-vi, below.

i. Discharge Type – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non-Drinking Water Aquifers**

Groundwater pumped from a monitoring well, used for groundwater basin management, which is owned and/or operated by a Permittee is allowed if the following requirements are met:

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards, including effluent limitations in the VOC and Fuel General Permit, NPDES Permit No. CAG912002.

(ii) The water samples shall be analyzed using approved U.S. EPA methods: (a) U.S. EPA Method 8015 Modified for total petroleum hydrocarbons; (b) U.S. EPA Method 624.1 and 625.1 or equivalent for volatile and semi-volatile organic compounds, respectively; and (c) approved U.S. EPA methods to meet the triggers for the metals listed in the General Permit discussed in Provision C.15.b.i.(1)(a)(i), above.

(iii) The water samples shall be analyzed for pH and turbidity.

If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs and Monitoring** – When greater than 2,500 gallons per day of uncontaminated (meeting the criteria in Provision C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of banks, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of the discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(vii) The pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(c) If the Permittee is unable to comply with the criteria in Provision C.15.b.i.(1)(b)(i)-(vii), discharge shall cease immediately and the Permittee shall employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES VOC and Fuel General Permit, or Groundwater General Permit, as appropriate.

(d) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[53] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements. Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(b) If the groundwater cannot be discharged to a landscaped area or bioretention unit and the discharge is greater than 2,500 gallons per day, it can only be considered for discharge once the following sampling is done to verify that the discharge is uncontaminated:

(i) The discharge shall meet water quality standards, including effluent limitations in the VOC and Fuel General Permit, NPDES Permit No. CAG912002.

(ii) The Permittees shall require that water samples from these discharge types be analyzed using the following approved U.S. EPA methods:

- U.S. EPA Method 8015 Modified for total petroleum hydrocarbons, and U.S. EPA Method 624.1 and 625.1 for volatile and semi-volatile organic compounds, respectively.
- The sufficiently sensitive (as identified in Attachment G of NPDES Permit No. CAG912002) approved U.S. EPA Methods (40 C.F.R Part 136) for the constituents listed below that meet the corresponding Reporting Limits:

[53] Pumped groundwater not exempted in Provision C.15.a, or conditionally exempted in Provision C.15.b.i.(1).

Constituent	Reporting Limit
Antimony	6 µg/l
Arsenic	10 µg/l
Beryllium	4 µg/l
Cadmium	0.90 µg/l
Chromium III	50 µg/l
Chromium VI	8.1 µg/l
Copper	3.4 µg/l
Lead	2.6 µg/l
Manganese	50 µg/l
Mercury	4 ng/l
Nickel	10 µg/l
Selenium	4.1 µg/l
Silver	1.1 µg/l
Thallium	1.7 µg/l
Zinc	47 µg/l
Cyanide	2.9 µg/l
Chlorine, total residual	0.05 µg/l
Total Petroleum Hydrocarbons	50 µg/l

(c) **Monitoring and Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in Provision C.15.b.i.(2)(b), above, the Permittees shall require the following:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream or if accessing the sampling points poses safety to personnel.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of bank, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(vii) The pH of discharged water shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(d) If a Permittee determines that a discharger or a project proponent is unable to comply with the criteria in Provision C.15.b.i.(2)(c)(i)-(vii), the Permittee shall require the discharge to cease immediately and require that the discharger employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES VOC and Fuel General Permit (NPDES Permit No. CAG912002), or Groundwater General Permit (NPDES Permit No. CAG912004), as appropriate.

(e) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be reused or directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Type – Emergency Discharges of Firefighting Water and Foam

(1) Emergency Discharges – Discharges resulting from emergency firefighting activities.

(2) Regional Coordination

(a) Permittees shall collectively convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff – and other stakeholders identified in Provision C.15.b.iii.(2)(vi), below – to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated

with firefighting activity. The Permittees shall collectively (e.g., through the Working Group):

(i) Prior to the submittal of the Firefighting Discharges Report, convene the Working Group at least twice per year. Thereafter, convene the Working Group at least annually.

(ii) Assess the adequacy of existing BMPs and standard operating procedures (SOPs) to address the potential adverse water quality impacts of firefighting water and foam discharged during emergencies (e.g., containment and cleanup),[54] including coordination within and between municipal departments, districts and jurisdictions, coordination between firefighting personnel and containment and cleanup crews, coordination with contracted staff, and coordination with relevant agencies (e.g., CalFire), as appropriate.

If the existing BMPs and SOPs need updates or are otherwise inadequate, suggest changes to those BMPs and SOPs so that they are updated and adequate. If new BMPs and SOPs are needed, recommend model BMPs and SOPs.

(iii) Assess the adequacy of existing resources (e.g., MS4 maps and maps that identify environmentally sensitive areas) used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters,[55] in order to address pollutant discharges (e.g., by facilitating containment and cleanup).

(iv) Investigate which firefighting foams are the least environmentally harmful (i.e., have the least adverse water quality and beneficial use effects, including those related to biodegradation, biomagnification, bioaccumulation, and acute and chronic toxicity), both for Class A foams and Class B foams. Then, develop SOPs to use the least environmentally harmful firefighting foams (and dispose of the more environmentally harmful foams) and to reduce the use of firefighting foams, without jeopardizing the protection of life or property, during emergencies.

[54] The Working Group does not necessarily have to review every single Permittee's BMPs and SOPs. It may review a representative subset.

[55] The Working Group does not necessarily have to review every single Permittee's resources. It may review a representative subset.

(v) Prepare outreach materials on containment and cleanup BMPs and SOPs for contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities within their jurisdictions. Additionally, prepare outreach materials – regarding good housekeeping practices and preventive measures – for sites that are prone to firefighting emergencies. Distribute those outreach materials to all such contractors and sites by September 30, 2025.

Subsequently, if it is identified that the outreach materials need to be revised or updated, they shall be revised or updated, and then redistributed.

(vi) Pursue coordination, information sharing, feedback and Working Group participation, from relevant agencies and organizations such as the California Department of Forestry and Fire Protection (Cal Fire), the California Department of Toxic Substances Control (DTSC), the U.S. Forest Service (USFS), the State and Regional Water Boards, permittees of other NPDES municipal stormwater permits, other state and federal agencies, and external workgroups (such as Petro-Chemical Mutual Aid), regarding interagency coordination and communication, BMPs, SOPs, and the least environmentally harmful firefighting foams.

(vii) Discuss reporting on emergency discharges of firefighting water and foam. The purpose of this reporting is first to provide transparency about the usage and water quality impacts of firefighting water and foam, and second to track reductions in those impacts over time, which is an anticipated outcome of the implementation of Provision C.15.b.iii.

This shall include discussion of the timing of such reporting, and how that reporting will be submitted to the Water Board. This shall additionally include discussion of how reporting is triggered (e.g., if a certain level of discharge enters the MS4 system, if any level of discharge enters a receiving water, and if any level of PFAS foam is used pursuant the exemptions in SB 1044), as well as the content of the reporting (e.g., the date and time of the discharge, Material Safety Data Sheet (MSDS) and any supplemental information for that foam, the quantity of water and foam concentrate used, the quantity and rate of water and foam concentrate discharged to the MS4 and/or receiving water, the point of discharge to the MS4 and/or receiving water, and

controls implemented to contain and/or mitigate discharges and impacts).

(b) Reporting – The Permittees shall collectively submit a Firefighting Discharges Report by September 30, 2025, that describes progress on, and recommendations regarding, the implementation of the items listed in Provision C.15.b.iii.(2)(a)(i)-(vii). The Firefighting Discharges Report shall be updated as needed on an ongoing basis, to incorporate recommendations by the Working Group.

(3) Ongoing Implementation Practices

(a) When the Firefighting Discharges Report is submitted, the Permittees shall begin implementation of the recommendations included therein.

(b) Permittees shall ensure proper BMPs and SOPs are included in contracts for non-municipal (contracted) staff hired by Permittees to assist with containment and cleanup, and to assist with prevention and mitigation of adverse impacts, of discharges associated with firefighting emergencies.

(c) For large industrial sites within Permittees' jurisdictions – such as IGP sites, gas plants, gas concentration facilities, and chemical plants – Permittees shall evaluate the adequacy of those sites' BMPs and SOPs for the prevention, containment and cleanup of emergency firefighting discharges into storm drains and receiving waters within Permittees' jurisdictions, and cause those BMPs and SOPs to be improved as appropriate.

(d) By June 30, 2027, Permittees shall require all municipal staff and contracted staff hired by Permittees that participate in the containment and cleanup of (and as appropriate, that assist with any other activities associated with mitigating the adverse environmental impacts of) discharges of firefighting water and foam from firefighting emergencies within their jurisdictions to attend at least one training on containment and cleanup BMPs and SOPs (and other BMPs and SOPs, as appropriate). Trainings may be region-wide, program wide, or Permittee-specific. Permittees are encouraged to make these trainings available to contractors hired by private parties.

(e) Reporting

(i) In their Annual Reports, Permittees shall report on the implementation of Provisions C.15.b.iii.(3).(a)-(c).

(ii) In the 2027 Annual Reports, Permittees shall report on trainings conducted pursuant to Provision C.15.b.iii.(3)(d), including the

date(s) of training(s), topics covered, and the percentage of applicable municipal and contracted staff involved in containment and cleanup activities in attendance.

(4) Required BMPs

(a) The Permittees shall implement and/or require firefighting personnel acting within their jurisdictions to implement BMPs and SOPs for emergency discharges – in order to reduce potential and actual water quality impacts – to the extent that the implementation of such BMPs does not interfere with immediate emergency response operations or impact public health and safety.[56]

(b) During emergency firefighting situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). Permittee staff, contractors, or firefighting personnel shall control the pollution threat from their activities during emergency firefighting situations to the extent that time and resources allow.

(5) Reporting

(a) Upon submittal of the Firefighting Discharges Report, Permittees shall implement the reporting recommendations and guidance therein.

(b) Otherwise, reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

(1) Required BMPs

(a) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their storm drain systems.

(b) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, or wash cars at commercial car wash facilities.

[56] Examples of BMPs to be considered are listed in the Fact Sheet. Where firefighting personnel may not be under the direct control of a Permittee, implement BMPs and SOPs, such as coordination and communication, identified in the Firefighting Discharges Report.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) Required BMPs

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[57] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from Provision C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa, and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

[57] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and

(e) Implementing the Illicit Discharge Enforcement Response Plan from Provision C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their storm drain systems.

(2) **Reporting** – The Permittees shall provide implementation summaries in each Annual Report.

C.16. Discharges to Areas of Special Biological Significance

This Provision applies to stormwater discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve Area of Special Biological Significance (ASBS). As set forth in the Fact Sheet, the State Water Board granted an exception to the ASBS discharge prohibition (ASBS Exception) in the Ocean Plan to applicants, including the County of San Mateo, for their existing stormwater discharges into ASBSs, provided they receive authorization to discharge by an NPDES permit; the discharges comply with all applicable terms, prohibitions, and special conditions of Attachment B - Special Protections (Special Protections) attached to and part of the ASBS Exception; and the discharges are essential for flood control or slope stability, designed to prevent soil erosion, occur only during wet weather, and are composed of only stormwater runoff. (See State Water Board Resolution No. 2012-0012, as amended by Resolution No. 2012-0031.) This Provision serves as the NPDES authorization for the County of San Mateo to discharge stormwater into the ASBS, provided the discharge meets the requirements below.

C.16.a. Discharges to the James V. Fitzgerald Marine Reserve ASBS

i. If the County of San Mateo meets all of the conditions set forth in Provision C.16.a.i. and C.16.a.ii., its stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS from MS4 outfalls that were constructed or were under construction prior to January 1, 2005, are permitted. Permitted discharges must comply with the following:

(1) Be essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

(2) Be managed or controlled to prevent soil erosion;

(3) Occur only during wet weather; and

(4) Be composed only of stormwater runoff, except as provided in the Special Protections of the ASBS Exception.

ii. The County of San Mateo shall comply with all applicable terms, prohibitions, and special conditions of the Special Protections of the ASBS Exception, including monitoring requirements, as they apply to stormwater. The Special Protections are hereby incorporated by reference into this Order and attached hereto as Attachment F. Notwithstanding anything to the contrary in this Order, the County of San Mateo shall not alter the natural ocean quality of the ASBS; shall not discharge trash into the ASBS; and shall not discharge non-stormwater into the ASBS except as provided in the Special Protections. As required by the Special Protections, the County of San Mateo shall address the preceding requirements (other than trash) in an ASBS Compliance Plan to

be approved by the Regional Water Board Executive Officer and comply with the compliance schedule set forth in the Special Protections.

iii. Reporting

(1) In addition to the monitoring requirements of the Special Protections, the County of San Mateo shall submit a copy of its ASBS Compliance Plan for approval by the Regional Water Board Executive Officer.

(2) If the results of any monitoring required under the Special Protections indicate that stormwater runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the County of San Mateo shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results according to the guidelines provided in the Special Protections.

(a) Within 30 days of the approval of the report by Regional Water Board Executive Officer, the County of San Mateo shall revise its ASBS Compliance Plan according to the guidelines provided in the Special Protections.

C.17. Discharges Associated with Unsheltered Homeless Populations

The purpose of this Provision is to identify and ensure the implementation of appropriate control measures, by all Permittees, to address non-stormwater discharges into MS4s associated with unsheltered homeless populations, including discharges from areas where unsheltered people congregate (e.g., formal and informal encampments including, but not limited to, informal tent or small cabin encampments, areas where people living in vehicles park, and safe parking areas). This Provision refers to such discharges collectively as discharges associated with homelessness.

C.17.a. Permittee Requirements

i. Task Description

(1) Permittees shall use results from biennial point-in-time census surveys and related information, such as municipal reports, databases, complaint logs, and other efforts, to gain a better understanding of unsheltered homeless population numbers within the Permittee's jurisdiction, the locations of unsheltered homeless residents, discharges and water quality-related impacts associated with homelessness, and associated sanitation-related needs.

(2) To encourage ongoing regional, countywide, and municipal coordination efforts, Permittees shall collectively develop a best management practice report that identifies effective practices to address non-storm water discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges within a given timeframe. The report shall:

(a) Describe practices that may be implemented by Permittees, including those currently being implemented, to address discharges associated with homelessness that are impacting water quality;

(b) Identify regional and/or countywide efforts and implementation actions to address discharges associated with homelessness (including how those efforts and actions have been affected by unsheltered homeless population growth). Include recommendations for engaging in these efforts and incorporating discharge-reduction strategies that also help meet the unsheltered population's clean water needs; and

(c) Identify actions taken during the COVID-19 pandemic to reduce the spread of the virus in homeless populations, such as temporarily housing homeless people in hotels, that may have reduced discharges associated with homelessness. Permittees shall consider the practicability of such actions for longer-term implementation.

This task's broader goals are to recognize non-stormwater pollutant sources associated with unsheltered homeless populations, reasons for discharges, and means by which they occur, and develop useful information that can be used toward prioritizing individual Permittee and collaborative best management practices for reducing or managing such discharges, while ensuring the protection of public health. Examples of collaborative implementation programs could include collaborative efforts between Permittees, Caltrans, sanitary sewer agencies, railroads, non-governmental organizations (NGOs), social service agencies and organizations, and other agencies.

ii. Implementation Level

(1) Each Permittee shall submit a map identifying, within its jurisdiction, the approximate location(s) of unsheltered homeless populations, including homeless encampments and other areas where other unsheltered homeless people live. The map shall identify those location(s) in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface water bodies within the Permittee's jurisdiction. The map shall be updated once during the Permit term, in 2025. Where Permittees are working collaboratively to address discharges associated with homelessness, they may collaborate to submit a joint map that covers their respective jurisdictions.

(2) Permittees shall report on the programmatic efforts being implemented within their jurisdiction, or at the countywide or regional level, to address MS4 discharges associated with homelessness. Examples of these efforts may include, but are not limited to: funding initiatives; adoption of ordinances to implement service programs; coordination with social services departments and NGOs; efforts to establish relationships with homeless populations; and alternative actions to reduce discharges to surface waters associated with homelessness, such as efforts towards providing housing, jobs, and related services for residents experiencing homelessness.

(3) Each Permittee shall identify and implement appropriate best management practices to address MS4 discharges associated with homelessness that impact water quality, including those impacts that can lead to public health impacts. In addition, Permittees shall also evaluate and assess the effectiveness of those practices, specifically by reporting on the BMP control measures being implemented, the approximate portion of the Permittee's unsheltered homeless population and locations being served by those control measures, and the portion and locations of the Permittee's unsheltered homeless population not reached, or not fully reached by the implemented control measures. Examples of actions that

may be implemented include, but are not limited to, access to emergency shelters; the provision of social services and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV "safe parking" areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing trash and waste cleanup or pickup programs within the Permittee's jurisdiction, or at the countywide or regional level.

(4) Permittees shall use the information generated through the biennial point-in-time census surveys and related information, and the regional coordination tasks (as described above) to review and update their implementation practices.

iii. Reporting

(1) With the 2023 Annual Report, Permittees shall collectively submit, acceptable to the Executive Officer, a best management practice report as described in Provision C.17.a.i.(2).

(2) With the 2023 and 2025 Annual Reports, Permittees shall submit a map as described in Provision C.17.a.ii.(1).

With the 2023 and 2025 Annual Reports, each Permittee shall report on the best management practices being implemented and include the effectiveness evaluation reporting required in Provision C.17.a.ii.(3) and additional actions or changes to existing actions that the Permittee will implement to improve existing practices.

C.18. Control of Sediment Discharges from Coastal San Mateo County Roads

San Mateo County shall implement the following control program for sediment. San Mateo County shall perform and report on the control measures according to this Provision, which implements requirements of the Pescadero-Butano Sediment TMDL and actions being taken on San Gregorio Creek to reduce sediment delivery from road-related erosion on San Mateo County-maintained roads to stream channels. For the purpose of this Provision, road-related erosion includes, but is not limited to, erosion of the road surface, road shoulder, road drainage structures such as ditches and culverts, and erosional features such as gullies, landslides, or sloughing that are road-related. Road-related means either i) the road is the primary cause of an observed erosion feature that, without the road, would not have formed or ii) the road is significantly increasing erosion rates from an erosion feature that existed prior to road construction.[58] This Provision does not apply to erosion sites that are not road-related, such as erosion from a private property that discharges onto a County-maintained road during a rain event. This Provision applies to San Mateo County-maintained roads in the Pescadero and Butano Creek watersheds (Pescadero-Butano Creek watershed), and in the San Gregorio Creek watershed in San Mateo County. This Provision is in addition to and does not supersede Provision C.2.e for Rural Road and Public Works Construction and Maintenance.

C.18.a. Road Erosion Inventory

i. **Task Description** – San Mateo County shall prepare a road erosion inventory to identify and prioritize actions to reduce road-related erosion from hydrologically connected County roads. Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. A hydrologically connected road is any road or road segment that has a continuous surface flow path to a natural stream channel during a storm runoff event.[59] A suitable design runoff event for most purposes is a 1-year 6-hour storm, with antecedent moisture conditions corresponding to the wettest month of the year. Connectivity usually occurs through road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces.

[58] For example, a landslide that existed prior to road construction would not be a road-related erosion feature, but a significant increase in erosion from the landslide caused by a poorly located road cross-drain would be a road-related erosion feature. Only the increased erosion caused by the cross-drain would need to be addressed under this provision.

[59] Weaver, W.E., Weppner, E.M. and Hagans, D.K. 2015. *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Rev. 1st ed.),* prepared by Pacific Watershed Associates for Mendocino County Resource Conservation District, Ukiah, California, pp. 8 – 10, 50 – 51, and 332.

ii. Implementation Level – To comply with this subprovision, San Mateo County shall:

(1) Inventory all San Mateo County roads and include the following information: i) road location; ii) road segments that are hydrologically connected, iii) type of road (e.g., all-weather, seasonal, or abandoned); and iv) type of road surface (e.g., paved, gravel, or native soil).

For hydrologically connected road segments only, the Permittee shall comply with (2), (3), and (4) as follows:

(2) All road-related erosion sites with the potential to discharge at least 5 cubic yards of sediment to streams or other water bodies shall be documented. At a minimum, the location, type, and approximate dimensions of the erosion feature, an estimate of the sediment volume that could erode, its potential for delivery to a waterbody (e.g., high, moderate, or low), a site photo, a brief description of the proposed treatment for erosion repair, and permits required for the repair shall be documented.

(3) The location, shape (e.g., circular, elliptical, arch, box), size, and condition of all culverts along the roadway shall be documented. The following shall also be assessed:

(a) whether the culvert opening is clear and free of debris or sediment,

(b) the potential for the culvert to plug with debris carried from upstream during future runoff events; and

(c) the potential for flow diversion onto the roadway if the culvert is overtopped during a future runoff event.

Culvert plugging and flow diversion potential shall at a minimum be documented as 'none,' 'low,' 'moderate,' or 'high,' consistent with appropriate standards.[60,61,62]

(4) For culverts with a moderate to high plugging potential, the Permittee shall develop a brief description of the proposed improvement(s), priority for treatment, and required permits.

iii. Reporting – The road erosion inventory for the Pescadero-Butano Creek watershed shall be submitted to the Water Board in the 2023 Annual Report. The road erosion inventory for the San Gregorio Creek watershed shall be submitted to the Water Board in the 2025 Annual Report. The road erosion inventory shall be submitted in ArcGIS and Google Earth KML format with an accompanying report that provides all the information listed in the subprovision above, in addition to:

(1) A summary table for both the Pescadero-Butano Creek and San Gregorio Creek watersheds that lists the total drainage area, the total length of all San Mateo County roads, the total length of all hydrologically connected San Mateo County roads; and the percentage of unpaved San Mateo County roads that are hydrologically connected.

(2) Summary tables documenting the results of the road erosion inventory by watershed, where watershed means either the Pescadero-Butano Creek watershed or the San Gregorio Creek watershed.

New erosion sites identified during routine patrols shall be added to the road erosion inventory. San Mateo County shall provide a status update of these new erosion sites each year as part of its Annual Report.

C.18.b. Prioritized List and Schedule of Actions

i. Task Description – Based on the results of the road erosion inventory (C.18.a), San Mateo County shall develop a prioritized list and schedule of

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[60] Weaver, W.E., Weppner, E.M. and Hagans, D.K. 2015. *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Rev. 1st ed.),* prepared by Pacific Watershed Associates for Mendocino County Resource Conservation District, Ukiah, California, pp. 99 – 106 and 136 – 150.

[61] Cafferata, P., Lindsay, D., Spittler, T., Wopat, M., Bundros, G., Flanagan, S., Coe, D. and Short, W. 2017. *Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood and Sediment (Updated 2017)*, California Forestry Report No. 1 (revised), State of California Department of Forestry and Fire Protection, Sacramento, California, pp. 23 - 43.

[62] Furniss, M.J, Flanagan, S. and McFadin, B. 2000. *Hydrologically-connected roads: an indicator of the influence of roads on chronic sedimentation, surface water hydrology, and exposure to toxic chemicals*, Stream Notes, July 2000. Stream Systems Technology Center, U.S. Forest Service, Rock Mountain Research Station, Fort Collins, Colorado.

actions to reduce road-related erosion and sediment delivery to stream channels. The goal of these efforts is to attain the following performance standards for San Mateo County roads identified in the Pescadero-Butano Sediment TMDL implementation plan:

(1) **For Roads**: Design, construct, and maintain roads to reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; or i) limit the length of unpaved roads that are hydrologically connected to 25 percent of total road length; ii) ensure culvert inlets have low plugging potential; and, iii) install appropriate best management practices, such as critical dips,[63] at culverted crossings that have a diversion potential; and

(2) **For Gullies and/or shallow landslides**: Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas. Manage existing roads and other infrastructure to prevent additional erosion of legacy sediment delivery sites and/or delivery from potentially unstable areas.

ii. Implementation Level – To comply with this provision element, San Mateo County shall:

(1) Develop a prioritized list of control measures and pollution prevention strategies for all road-related erosion sites and for all culvert crossings to achieve the performance standards described in C.18.b.i(1). The list shall include a brief description of the control measure(s) to be taken and a projected completion date for each control measure. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standards.

(2) Develop a schedule to implement the prioritized list of control measures such that twenty percent (20%)[64] of the control measures for the Pescadero-Butano Creek watershed are scheduled for completion by June 30, 2027. Implementation of control measures for San Gregorio Creek is not required during this Permit term.

(3) If the length of hydrologically connected unpaved roads identified in C.18.a exceeds 25 percent of the total San Mateo County unpaved road length in a watershed,[65] then the prioritized list and schedule shall include

[63] A critical dip is a low berm and/or a dip in the road surface constructed across the roadway, used to divert flow off the road that would otherwise flow down the road surface.

[64] 20 percent means 20 percent of the total estimated cubic yards of potential sediment erosion identified in the road erosion inventory required by Provision C.18.a. .

[65] 25 percent is measured from road segments located within the watershed. It excludes road segments located outside the watershed.

an implementation plan and schedule of actions to reduce the percentage of hydrologically connected unpaved roads to 25 percent or less. Examples of treatments to reduce overall hydrologic connectivity of roads are provided by Weaver et al. (2015, Chapter 4).

iii. **Reporting** – The prioritized list and schedule for the Pescadero-Butano watershed shall be completed and submitted to the Water Board in the 2023 Annual Report. The prioritized list and schedule for the San Gregorio Creek watershed shall be completed and submitted to the Water Board in the 2025 Annual Report. San Mateo County shall update the prioritized list and schedule annually thereafter and submit it each year with its Annual Report. The submittal shall include a list of completed, in-progress, and scheduled control measure and pollution prevention strategies and shall include at a minimum the following information for each control measure:

(1) The project name

(2) The project location and a brief project description

(3) Authorizations required to implement the project, including status

(4) The actual or estimated project start and end dates

C.18.c. Implement Control Measures to Attain Performance Standards

i. **Task Description** – San Mateo County shall implement control measures and pollution prevention strategies to reduce road-related sediment delivery from County roads to stream channels in the Pescadero-Butano Creek and San Gregorio Creek Watersheds. At least twenty percent (20%) of the control measures identified in Provision C.18.b.ii shall be implemented and completed in the Pescadero-Butano Creek watershed by 2027.

ii. **Implementation Level** – To comply with this subprovision, San Mateo County shall:

(1) Continue to follow all the requirements of Provision C.2.e for Rural Road and Public Works Construction and Maintenance.

(2) Based on the priority list and schedule of actions developed in C.18.b, implement the control measures and pollution prevention strategies for road related erosion sites and culvert crossings to achieve the road performance standards described in C.18.b.i.(1).

(3) New County-maintained roads constructed on hillslopes exceeding 5 percent shall be constructed as storm-proofed roads, as defined by Weaver et al. (2015, Chapter 6), and shall meet the following specifications where applicable:

(a) Stream crossings have a drainage structure designed for the 100-year flood flow including woody debris and sediment (Cafferata, et al., (2017)).

(b) Stream crossings do not have the potential for flow diversion onto the roadway if the culvert is overtopped during a future runoff event.

(c) Culvert inlets have a low plug potential (trash barriers or deflectors are installed where needed).

(d) Culverts are installed at the base of the fill and in line with the natural channel.

(e) Emergency overflow culverts that emerge higher in the fill have full round, anchored downspouts that extend to the natural channel.

(f) Deep fills (deeper than a backhoe can reach from the roadbed) with undersized culverts or culverts with high plugging potential are fitted with an emergency overflow culvert.

(g) Bridges have stable, non-eroding abutments and do not significantly restrict 100-year flood flow.

(h) Stream crossing fills are stable.

(i) Approaching road surfaces and ditches are hydrologically disconnected from streams and stream crossing culverts to the maximum extent feasible using road shaping and road drainage structures.

(j) Class I (fish-bearing) stream crossings meet California Department of Fish and Wildlife and National Marine Fisheries Service fish passage criteria.

(k) Road surfaces and ditches are hydrologically disconnected from streams and stream crossing culverts to the maximum extent feasible. Road surface runoff is dispersed, rather than collected and concentrated.

(l) Ditches are drained by functional ditch relief culverts and/or rolling dips.

(m) Outflow from ditch relief culverts does not discharge to streams.

(n) Ditches and road surfaces drainage does not discharge (through culverts and/or rolling dips) onto active or potential landslides and/or into gullies.

(o) Fine sediment contributions from roads, cutbanks, and ditches are minimized by utilizing seasonal closures and installing a variety of

surface drainage techniques including road surface shaping (outsloping, insloping, or crowning), rolling dips, ditch relief culverts, water bars, and other measures to disperse road surface runoff and reduce or eliminate sediment delivery to the stream.

New County-maintained roads that are under construction within one year of the start of this Permit term shall be exempt from this requirement (C.18.c.ii.(3)).

iii. **Reporting** – A report documenting project status shall be submitted with the Annual Report each year starting the first year of project implementation. The report shall include a list of projects from the priority list and schedule of actions in Provision C.18.b that have been completed or are in-progress, including:

(1) An estimate of the potential sediment delivery to stream channels prevented by the implemented control measure or pollution prevention strategy.

(2) The percent of control measures in the prioritized list completed to date so that progress in achieving the implementation of 20 percent of the control measures for the Pescadero-Butano Creek watershed by June 30, 2027, is documented.

(3) A summary of projects scheduled for completion since the last Annual Report submittal that were delayed or not completed and an explanation of why they were delayed or not completed.

C.18.d. Monitoring

i. **Task Description** – San Mateo County shall conduct implementation, effectiveness, and forensic monitoring to assess the performance of implemented control measures.

ii. **Implementation Level** – To comply with this provision element, San Mateo County shall:

(1) Conduct implementation monitoring to assess whether the implemented control measure from C.18.c was fully and properly carried out as specified. Monitoring shall be performed once and conducted via a visual observation of the completed project.

(2) Conduct effectiveness monitoring to assess whether each of the implemented control measure(s) from C.18.c is adequately protective of water quality. Effectiveness monitoring shall be performed once and conducted via a visual inspection of the construction or repair site and the adjacent area. It shall be performed after the control measure has gone

through one year or one winter season in order to evaluate the effectiveness of the control measure during winter rain events.

(3) Conduct forensic monitoring in cases where an implemented control measure has failed. Forensic monitoring shall be conducted via a visual inspection of the failed control measure. Site photos shall be taken to adequately document the failure and a brief description of the mechanism and/or circumstances of failure shall be documented.

(4) Conduct routine monitoring of San Mateo County roads per the guidelines set forth in the County of San Mateo Routine Maintenance Program Manual (San Mateo County 2020, as may be amended).

iii. Reporting – San Mateo County shall document the results of the implementation, effectiveness, and forensic monitoring in a monitoring report submitted with the Annual Report each year starting in the first year of project implementation. If preferred, implementation monitoring information may be included with the implementation reporting required pursuant to Provision C.18.c.iii. The report shall include the following:

(1) Results of implementation and effectiveness monitoring, including:

(a) The monitoring point location and description of the project, or a reference to the specific project in the completed projects report.

(b) A brief description of the visual observations made during the monitoring inspection.

(c) The date the monitoring inspection was conducted.

(2) Results of any forensic monitoring conducted in the past year, including:

(a) The monitoring point location and description of the project, or a reference to the specific project in the completed projects report.

(b) Site photos documenting the failed control measure

(c) A brief description of the mechanism and/or circumstances of failure

(d) Proposed corrective measures to be taken and timeline for completion

(e) The date the monitoring inspection was conducted

(3) Results of annual monitoring conducted in the past year, including:

(a) A summary of all unpaved roads inspected at the end of the rainy season.

(b) A brief description of general road conditions and any specific problems noted, particularly with regard to sediment delivery to stream

channels. These observations will be used to make annual updates to the Road Erosion Inventory as required by Provision C.18.a. Any new road-related erosion sites identified during this effort shall be documented in the report and added to the Road Erosion Inventory required by Provision C.18.a.

(c) The date(s) the monitoring inspections were conducted.

C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements

The cities of Antioch, Brentwood, and Oakley, unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District (collectively, East County Permittees), located in the Central Valley Regional Water Quality Control Board's (Central Valley Water Board's) geographic jurisdiction, are included in the definition of "Permittees" as used throughout and shall comply with all requirements of this Order No. R2-2022-0018 except as provided for in this Provision. This Provision also incorporates requirements from Central Valley Water Board's TMDLs and control programs applicable to the East County Permittees.

C.19.a. Mercury Controls

The East County Permittees are exempt from Provision C.11, Mercury Controls.

C.19.b. Polychlorinated Biphenyls (PCBs) Controls

The East County Permittees are exempt from Provision C.12, PCBs Controls.

C.19.c. Diazinon and Chlorpyrifos Controls

i. **Task Description** – The East County Permittees shall continue compliance with the Central Valley Water Board's Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL and continue to meet wasteload allocations for diazinon and chlorpyrifos.

ii. **Implementation Level –** The East County Permittees shall implement Provision C.9.

C.19.d. Methylmercury Control Measure Plan and Monitoring

The methylmercury wasteload allocations for the East County Permittees in the Sacramento-San Joaquin Delta Methylmercury TMDL (Resolution No. R5-2010-0043) by Delta subarea are as follows:

- Central Delta subarea: 0.75 grams/year
- Marsh Creek subarea: 0.30 grams/year
- West Delta subarea: 3.2 grams/year

Methylmercury wasteload allocations shall be met as soon as possible, but no later than the final compliance date of January 1, 2030. As part of the Delta Mercury Control Program Review, the Central Valley Water Board may adopt revised wasteload allocations and a new final compliance date.

i. **Task Description** – Pursuant to the Central Valley Water Board's Water Quality Control Plan for the Sacramento San Joaquin Basins' Delta Mercury Control Program and associated Methylmercury TMDL, the East County Permittees were required to develop, conduct, and report on a methylmercury control study for urban runoff. The submitted control study[66] proposed conducting a Reasonable Assurance Analysis (RAA) to determine the achievable methylmercury load reduction. The control study also stated that monitoring will be conducted to answer the management questions outlined in Provision C.19.d.ii(2)a-e. Therefore, the East County Permittees shall submit a control measure plan and conduct a corresponding RAA as well as implement methylmercury monitoring as described below. With the Central Valley Water Board's Executive Officer's approval, the East County Permittees may participate in the Delta Regional Monitoring Program (Delta RMP) or other collective monitoring efforts in lieu of some or all of the individual monitoring requirements required by this Provision. Participation in the Delta RMP or other collective monitoring efforts shall consist of providing funds and/or in-kind services to the Delta RMP or other collective monitoring effort at least equivalent to the discontinued monitoring efforts in order for the Central Valley Water Board Executive Order to approve the alternative monitoring.

ii. **Implementation Level** – The East County Permittees shall:

(1) Prepare and submit by November 1, 2022, a Control Measure Plan and schedule to achieve the TMDL wasteload allocations. The Plan shall include a corresponding RAA for total mercury and methylmercury demonstrating that sufficient control measures will be implemented during this Permit term to attain the methylmercury Delta Mercury Control Plan wasteload allocations by January 1, 2030, or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review. The Control Measure Plan, including RAA, shall comply with the following:

(a) The Plan shall identify all technically and economically feasible mercury and methylmercury MS4 control measures to be implemented (including green stormwater infrastructure (GSI) projects).

(b) The Plan shall include a schedule according to which these technically and economically feasible control measures will be fully implemented.

(c) The Plan shall provide an evaluation and quantification of mercury and methylmercury load reductions of such measures as well as an

[66] *Contra Costa Clean Water Program Methylmercury Control Study Final Report (Rev. 1),* September 2020.

evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

(d) The RAA for total mercury must be evaluated using the California Toxics Rule for mercury (0.05 µg/L).

(e) The RAA for methylmercury must be evaluated using the methylmercury load allocations specific to each Delta subarea within Contra Costa County subject to the DMCP (i.e., the Central Delta, Marsh Creek, and West Delta subareas).

(f) The RAA shall demonstrate quantitatively that the plan will result in mercury and methylmercury load reductions sufficient to attain the methylmercury wasteload allocations by January 1, 2030, (or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review) and address the following questions:

(i) What are the annual mercury and methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?

(ii) Do the mercury and methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?

(iii) What is the achievable mercury and methylmercury load reduction in discharges from the MS4 by implementation of reasonable, foreseeable controlmeasures?

(iv) What controllable MS4 water quality factors affect methylmercury production and transport in the MS4 discharge and in the receiving waters draining to the Delta?

(v) Are there MS4 design features that increase or decrease mercury methylation.

(vi) Are there reasonable and foreseeable managementactions to reduce methylmercury concentrations within the MS4 boundary?

(g) Permittees shall ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill Provision C.19.ii.(1)(a)-(f) have been validated through a peer review process. The East County Permittees may use the approach developed by the Contra Costa Clean Water Program or an equivalent approach developed by another program during the previous permit term.

(2) Conduct annual monitoring in waterways within the East County Permittees' MS4 boundary to answer the questions in Provision

C.19.d.ii(2)(a)-(e). Monitoring shall include, but is not limited to, Marsh Creek, downstream of Marsh Creek Reservoir, and Central and West Delta Subarea tributaries within the MS4 boundary. Permittees shall collect fifty (50) samples throughout the Permit term, with at least eight (8) samples annually, for aqueous methylmercury analysis. Samples shall be collected in each subarea to be representative of the discharge during wet and dry year conditions and analyzed using U.S. EPA- or SWAMP-approved methods.

(a) What are the annual methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?

(b) Do the methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?

(c) Are there any MS4 design features that increase mercury methylation in the discharge?

(d) What MS4 water quality controls have been implemented or are planned to be implemented to reduce methylmercury production and transport in the MS4 discharge?

(e) By January 1, 2024, address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March and mid-November), and, if so:

(i) Under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta?

(ii) Are there reasonable and foreseeable management actions to ameliorate increased methylmercury concentrations?

(3) Prepare an Annual Mercury Monitoring Plan and submit it to the Central Valley Water Board for Executive Officer approval. The monitoring plan shall describe the annual monitoring design and specify the proposed sampling locations for methylmercury sampling required under Provision C.19.d.ii.(2).

iii. Reporting

(1) Annual Mercury Monitoring Plan – by October 1, 2022, and annually thereafter with the Urban Creeks Monitoring Report due March 31.

(2) Annual Report **–** The East County Permittees shall provide the following:

(a) Monitoring and assessment results answering the questions required under Provision C.19.d.ii.(2), and

(b) Upon completion by the deadline in Provision C.19.d.ii.(1), submit the Control Measure Plan, including RAA.

A copy of each Annual Report shall also be submitted to the Central Valley Water Board.

(3) Pollutants of Concern Monitoring Report **–** The East County Permittees shall report monitoring and assessment activities relevant to the Delta Methylmercury TMDL from the past water year and planned for the next water year as a separate section within the Pollutants of Concern Monitoring Report required under Provision C.8.h.iv. A copy of each Pollutants of Concern Monitoring Report shall also be submitted to the Central Valley Water Board.

(4) Integrated Monitoring Report **–** The East County Permittees shall report the monitoring and assessment results as a separate section within the Integrated Monitoring Report as required under Provision C.8.h.v. A copy of each Integrated Monitoring Report shall also be submitted to the Central Valley Water Board.

(5) The East County Permittees shall report progress on the Delta Methylmercury TMDL and recommendations for the next permit re-issuance as a separate section within the Report of Waste Discharge (ROWD) required by Provision C.25. A copy of the ROWD shall also be submitted to the Central Valley Water Board.

C.19.e. Delta Mercury Control Program Minimum BMPs

i. Task Description – The East County Permittees shall implement inorganic mercury reduction BMPs as well as provide ongoing education and outreach to address mercury pollution prevention and risk reduction.

ii. Implementation Level – At a minimum, the East County Permittees shall implement the following inorganic mercury reduction BMPs, consistent with the Delta Methylmercury TMDL.

(1) **Mercury Collection and Recycling** - To minimize mercury in storm water the East County Permittees shall continue implementing:

(a) Collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs); and

(b) Collection, recycling and/or diversion of mercury-containing waste products (e.g., gauges, batteries, fluorescent and other lamps, switches, relays and sensors) from the waste stream from industrial and commercial entities (e.g., auto dismantlers), and municipal facilities.

(2) **Enhanced Municipal Management Practices to Reduce Sediment Discharges** - The East County Permittees shall continue to implement BMPs to minimize sediment discharges during municipal operations and municipal maintenance activities. Municipal operations and municipal maintenance activities include but are not limited to the following: storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning.

(3) **Public Education and Risk Reduction** - The East County Permittees shall continue to conduct ongoing education to the public on mercury pollution prevention and mercury risk reduction. The East County Permittees shall continue to:

(a) Provide mercury pollution prevention messages to residents, commercial businesses, and industrial facilities with mercury-containing products or emissions. This may be implemented as part of Provision C.7; and

(b) Provide notices to communities on the health risk associated with eating mercury contaminated fish. These notices shall also include the Office of Environmental Health Hazard Assessment's fish consumption advisories.

(4) **Methylmercury Controls** – the East County Permittees shall implement control measures that reduce mercury methylation potential and retrofit existing BMPs that show an increase of mercury methylation.

(a) New development projects shall use BMPs that either prevent an increase of methylmercury or have been shown to decrease methylmercury.

(b) For existing BMPs that increase methylmercury within subareas that are meeting the assigned wasteload allocation, retrofitting of these BMPs may occur as part of any capital improvement, redevelopment, operation, or maintenance plan as resources are available.

(c) For existing BMPs that increase methylmercury within subareas that are not meeting the assigned wasteload allocation, retrofitting of these BMPs shall occur as soon as feasibly possible, but no later than the final compliance date of January 1, 2030 (or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review).

iii. Reporting – In each Annual Report, the East County Permittees shall:

(1) Describe Mercury Collection and Recycling efforts.

(2) List the municipal operations and municipal maintenance activity BMPs that are implemented to minimize sediment discharges.

(3) Discuss the mercury pollution prevention messages provided and

(4) Summarize tasks implemented to provide notices on the health risk associated with eating mercury contaminated fish.

(5) Report on implementation of methylmercury controls required in C.19.2.ii.(4).

C.19.f. Pyrethroid Control Program

i. Task Description – The East County Permittees shall comply with the Central Valley Water Board's conditional prohibition of the discharges of pyrethroid pesticides and associated monitoring and reporting requirements established in the Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the control of Pyrethroid Pesticide Discharges (Resolution No. R5-2017-0057).

ii. Implementation Level – The East County Permittees shall:

(1) Continue to implement a pesticide control program as required by Provision C.9, which is consistent with Central Valley Water Board requirements for a pyrethroid management plan.

(2) Continue pesticides and toxicity monitoring as specified in Provision C.8.g. In addition to the pollutants and organisms listed in Table 8-5, the East County Permittees shall also analyze total and particulate organic carbon, as required by the Central Valley Water Board's Basin Plan Amendment (R5-2017-0057).

(3) Submit a baseline monitoring report by September 19, 2022, that:

(a) Summarizes the pyrethroid and toxicity monitoring results from 2012 through 2019;

(b) Assesses the compliance of the discharge with the conditional prohibition triggers in the Basin Plan established by Resolution No. R5-2017-0057;

(c) Summarizes toxicity of water and sediment samples to the test organism Hyalella azteca; and

(d) Summarizes any other pyrethroid monitoring data collected by the East County Permittees during the above period.

iii. Reporting – The East County Permittees shall:

(1) With the 2024 and subsequent Annual Reports, provide a progress report to document the management practices that have been implemented, evaluate pyrethroid concentrations with respect to the pyrethroid triggers, and identify effective control actions to be taken in the future. A copy shall be provided to the Central Valley Water Board.

(2) Urban Creeks Monitoring Report (UCMR) – The East County Permittees shall report monitoring, assessment results, relevant to the Pyrethroids Control Program as a separate Pyrethroid Trend Monitoring section within the 2024 UCMR required under Provision C.8.h.iii. A copy of the 2024 UCMR shall also be submitted to the Central Valley Water Board. The Pyrethroid Trend Monitoring section of the 2024 UCMR, shall include an analysis of data collected in East County Permittees receiving waters for pesticides and toxicity from 2019 through 2024 to assess the following:

(a) Whether discharges from MS4s are exceeding the acute and chronic pyrethroid triggers set forth in the Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges (Resolution No. R5-2017-0057);

(b) Whether pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for toxicity in surface waters or bed sediments.

(c) The effectiveness of management practices that are implemented to reduce pyrethroid levels in discharges;

(d) Whether alternatives to pyrethroid pesticides are being discharged at concentrations with the potential to cause or contribute to exceedances of applicable water quality objectives.

C.20. Cost Reporting

C.20.a. Task Description – Each Permittee shall annually prepare and submit a fiscal analysis of the capital and operation and maintenance costs incurred to comply with this Order's requirements listed in Provision C.20.b.(iii).

C.20.b. Implementation Level

i. The Permittees shall develop a cost reporting framework and methodology to perform the fiscal analysis. Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost-savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with this Order's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time.

ii. The analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds, and identify any funding resources shared on a regional or countywide basis. The analysis shall include the costs incurred to comply with this Permit, and an estimate of costs for the upcoming Permit year.

iii. The analysis shall include the following program areas, specifically as required under this Order**:**

(1) Program management

(2) Municipal operations

(3) New development and redevelopment

(4) Industrial and commercial site controls

(5) Illicit discharge detection and elimination

(6) Construction site controls

(7) Public information and outreach

(8) Water quality monitoring

(9) Pesticides toxicity control

(10) Trash load reduction

(11) Mercury controls

(12) PCBs controls

(13)Copper controls

(14)Bacteria controls

(15)Discharges associated with unsheltered homeless populations

(16)Asset management plan development and implementation

iv. The costs reported for each program area shall address the following categories:

(1) Total cost

(2) Capital expenditures

(3) Land costs

(4) Personnel costs

(5) Consultant costs

(6) Overhead costs

(7) Construction costs

(8) Operation and maintenance costs

(9) Other costs

C.20.c. Reporting

i. The Permittees shall submit the cost reporting framework and methodology, acceptable to the Regional Water Board Executive Officer, by June 30, 2023.

ii. The Permittees shall submit their fiscal analyses annually according to the accepted cost reporting framework and methodology starting with the 2025 Annual Report.

C.21. Asset Management

C.21.a. Task Description – Each Permittee shall develop and implement an Asset Management Plan in order to ensure the satisfactory condition of all hard assets[67] constructed during this and Previous Permit terms pursuant to Provisions C.2 Municipal Operations, C.3 New Development and Redevelopment, C.10 Trash Load Reduction, C.11 Mercury Controls, C.12 PCBs Controls, C.13 Copper Controls, C.14 Bacteria Controls for Impaired Water Bodies, C.17 Discharges Associated with Unsheltered Homeless Populations, C.18 San Mateo County Sediment Controls, and C.19 Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements.

C.21.b. Implementation Level – Each Permittee shall:

i. Develop an Asset Management Plan by June 30, 2025, which, at a minimum, shall include the following:

(1) A description of the asset categories to be included.

(2) An inventory (or link to such an inventory) of Permittees' existing hard assets built pursuant to the Provisions cited in Provision C.21.a, including at a minimum all LID/GSI systems and trash capture devices.

(3) An Operation, Maintenance, Rehabilitation, and Replacement Plan (Asset Management O&M Plan), to evaluate data obtained through asset assessment in order to inform a strategy for prioritizing and scheduling maintenance, rehabilitation, and replacement of inventoried assets, including:

(a) A process for prioritizing and scheduling operation and maintenance activities.

(b) A process(es) for evaluating the current condition, and identifying the need for and carrying out, as appropriate, the rehabilitation and replacement of inventoried assets. The process(es) shall account for:

(i) The minimum condition necessary to achieve minimum performance level(s) for each type of hard asset, including an assessment of stormwater volume and pollutant load reduction, necessary to comply with applicable Permit Provisions and TMDLs.

[67] Hard assets are structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash receptacles, and pet waste stations.

(ii) Current performance level and effectiveness, as indicated by condition. Permittees may implement a risk-based condition assessment, or comparable assessment method, to cost-effectively and -efficiently assess condition. Permittees shall base the effectiveness evaluation on, at a minimum, factors such as design, capacity, and condition and function relative to the asset's design, intended operating conditions, and intended function.

(iii) Consequence of failure and likelihood of failure.

(c) An evaluation or forecast of costs necessary for the implementation of (a)-(b) above, at least through the end of the current permit term. On an ongoing basis, the Permittees shall compare these projections with available funding sources to determine the best manner in which to fund the operation, maintenance, rehabilitation, and replacement of inventoried assets. This evaluation or forecasting may supplement Permittees' compliance with Provision C.20 Cost Reporting.

(4) Recommendations for a reporting strategy, which may have a nexus with the tracking systems referenced in Permittees' Green Infrastructure Plans, to include:

(a) Municipality-specific reporting;

(b) Assessment of the programmatic benefit from countywide or regional roll-up of collected information.

ii. Begin implementation of the Asset Management Plan no later than July 1, 2025.

iii. Reassess and update their Asset Management Plan on an as-needed basis, to address changing conditions and resources.

iv. Provide the latest version of the Asset Management Plan to Water Board staff during inspections and audits, or otherwise upon request.

v. Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of Permittees' inventoried hard assets over the next 50 years, and identify approaches that Permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale.

C.21.c. Reporting

i. The Permittees shall submit their Asset Management Plans with the 2025 Annual Reports.

ii. The Permittees shall report on the implementation of their Asset Management Plans annually, starting with the 2026 Annual Reports, as follows:

(1) Provide (or link to) an inventory of all assets accounted for in the Asset Management Plan.

(a) Different categories of assets (e.g., trash controls, LID/GSI controls, bacteria controls) may be maintained in separate inventories.

(2) At a minimum, for each asset in the inventory, provide the following: category or type of water quality control; relevant design information; tributary drainage area; location; condition based on periodic inspections either by municipal or contracted staff; and operation and maintenance need (for example, while most assets may require normal operation & maintenance, Permittees may identify a subset of assets in need of rehabilitation or replacement).

This information does not have to be submitted in tabular format in the Annual Report; it may be provided externally, at the linked location identified in Provision C.21.c.ii.(1) above.

iii. The Permittees shall submit the Climate Change Adaptation Report described in Provision C.21.b.v with their 2026 Annual Reports. The Permittees may submit the Climate Change Adaptation Report(s) on an all-Permittee (regional) scale or countywide scale.

C.22. Annual Reports

C.22.a. The Permittees shall submit Annual Reports electronically, including a verified electronic signature (e.g., Adobe e-signature, DocuSign, or equivalent), in all cases by September 30 of each year, in the manner specified by the Water Board. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.21, with the exception of the 2022 annual reporting requirements for Provisions C.2 – C.9, which are set forth in Provisions C.2 - C.9 of the previous Permit, Order No. R2-2015-0049, as amended. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.

C.22.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by March 1, 2023. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by March 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.21, with the agreement of the Permittees and by the approval of the Executive Officer.

C.22.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit, in the cover letter of the Annual Report, the reason for its failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.23. Modifications to this Order

The Water Board may modify or reopen this Order, or alternatively, revoke or reissue it, before the expiration date in any of the following circumstances or as authorized by law:

C.23.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.23.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Water Board or amendments to the Basin Plans for the San Francisco Bay and the Sacramento and San Joaquin River Basins approved by the State Water Board;

C.23.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) or other applicable provision of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order;

C.23.d. To provide an alternative compliance program for exchanges of impervious surface treatment credits in Provision C.3.e.i; or

C.23.e. To incorporate applicable requirements from the Central Valley Regional Water Board's Phase 1 Delta Mercury Control Program Review under the Basin Plan for the Sacramento and San Joaquin River Basin.

C.24. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment G of this Order.

C.25. Expiration Date

This Order expires on June 30, 2027, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.26. Rescission of Old Order

Order No. R2-2015-0049, as amended by Order No. R2-2019-0004, is hereby rescinded, except for enforcement purposes, on the effective date of this Order, which shall be July 1, 2022, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

C.27. Effective Date

The Effective Date of this Order and Permit shall be July 1, 2022, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

I, Thomas Mumley, Interim Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on May 11, 2022.

Thomas Mumley
Interim Executive Officer

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
Central Valley Water Board	California Regional Water Quality Control Board, Central Valley Region
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CSCI	California Stream Condition Index
CWA	Federal Clean Water Act
CWC or Water Code	California Water Code
DCIA	Directly Connected Impervious Area
DDCP	Direct Discharge Control Plan
DPR	California Department of Pesticide Regulation

East County Permittees or East Contra Costa Permittees	The cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County and the Contra Costa County Flood Control and Water Conservation District that are in the Central Valley Water Board's region
ERP	Enforcement Response Plan
FR	Federal Register
FSURMP	Fairfield-Suisun Urban Runoff Management Program
GI or GSI	Green Stormwater Infrastructure
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
ISWEBE	Inland Surface Waters, Enclosed Bays, and Estuaries Plan
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable
MRP	Municipal Stormwater Regional Permit (see Glossary for MRP 1, MRP 2, MRP 3)
MSDS	Material Safety Data Sheet
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
NAFSMA	National Association of Flood & Stormwater Management Agencies
NAICS	North American Industry Classification System
NGO	Non-governmental Organization
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System

NRDC	Natural Resources Defense Council
Ocean Plan	California Water Quality Control Plan for Ocean Waters of California
OFEE	Oil Filled Electrical Equipment
O&M	Operation and Maintenance
PAHs	Polynuclear Aromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ether
PCA	Pest Control Advisor
PCBs	Polychlorinated Biphenyls
PHAB	Physical Habitat (e.g., of streams)
POTW	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan
RAA	Reasonable Assurance Analysis
RCRA	Federal Resource Conservation and Recovery Act
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
ROW	Right of Way
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Federal Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SIC	Standard Industrial Classification
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SSA	Solano Stormwater Alliance
SSID	Stressor Source Identification

SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
State Water Board	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Federal Toxic Substances Control Act
TST	Test of Significant Toxicity
TU	Toxicity Units
UCMR	Urban Creeks Monitoring Report
U.S. EPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations
WQBEL	Water Quality Based Effluent Limitation
WQS	Water Quality Standards

GLOSSARY

Actual Discharge	Observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4.
Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the State protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Base Course	A layer of constructed material (typically aggregate base – a construction aggregate typically composed of crushed rock or of recycled asphalt or concrete, capable of passing through a sieve with a certain pore diameter) located above the subbase course and/or subgrade course, and below the surface layer (which consists of a wearing course, and sometimes an extra binder course), applied to serve one or more functions, such as supporting the surface layer and distributing load.
Bituminous Surface Treatment	A thin protective wearing surface, which can provide, among other services, a waterproof layer to protect underlying pavement and a filler for existing cracks or raveled surfaces. This includes, but is not limited to: • Chip seal – a single layer of asphalt emulsion binder that is covered by embedded aggregate; • Slurry seal – a thick, cold mix paving treatment that contains aggregates, asphalt emulsion, binder and fines, water, and additives; and • Seal coat – an emulsion containing liquid asphalt and/or coal tar, mineral fillers and other anti-oxidation additives and admixtures. • Cape seal – a chip seal covered with a slurry or micro-surface, applied to existing pavements. Micro-surfacing is a polymer-modified cold-mix paving system that begins as a mixture of dense-graded aggregate, asphalt emulsion, water and mineral fillers.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.

Construction Site	Any project, including projects requiring coverage under the Construction General Permit, that involves soil-disturbing activities including, but not limited to, grubbing, clearing, grading, paving, disturbances to ground such as stockpiling, leveling, fill, and excavation. Construction sites include all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit. Construction sites are considered active until site surfaces are permanently stabilized to control erosion and other polluted stormwater discharges effectively.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this Permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of WQS because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge.
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size.
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.
Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Floor Area Ratio	The ratio of the total floor area on all floors of all buildings at a project site (except structures or floors dedicated to parking) to the total project site area.

Full Trash Capture Device	A Full Capture Device or System is a treatment control, or series of treatment controls, including, but not limited to, a multi-benefit project (as defined in the Trash Amendments) or a low-impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Green Infrastructure	Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.
Gross Density	The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.
Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, State, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Executive Officer.

Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes french drains).
Integrated Pest Management[68]	An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines (and when it has been concluded that the use of non-chemical controls is insufficient), and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment (DPR, 2018).

[68] Roadmap for Integrated Pest Management, CDPR 2018, https://www.cdpr.ca.gov/docs/pestmgt/ipm_roadmap.pdf

Integrated Pest Management, Biological Controls	Biological controls are the beneficial action of predators, parasites, pathogens, and competitors to control pests and pest damage. These controls rely on predation, parasitism, herbivory, or other natural mechanisms, but typically require active human intervention, such as releasing ladybugs.
Integrated Pest Management, Least Hazardous Chemical Controls	Chemical controls involve targeted application of traditional chemical pesticides, as well as alternative products, such as oils and soaps.
Integrated Pest Management, Cultural Controls	Cultural controls reduce pest establishment, reproduction, dispersal, and survival. Examples include scheduling planting, irrigation, and fertilization; soil solarization; and planting native vegetation and xeriscape to reduce water, pesticide, and fertilizer needs. Changing irrigation practices can reduce pest problems, since too much water can increase root disease and weeds.
Integrated Pest Management, Mechanical and Physical Controls	Mechanical and physical controls kill pests directly, exclude pests, or make the environment unsuitable for pests. Physical controls may involve manual removal of pests or mowing. Barriers (screens, mesh, caulk and other sealants) are physical controls that keep pests out of buildings and structures, and may be used to enclose sensitive plants. Mulch is a physical control that inhibits weed growth. Rodent traps are mechanical controls.
Integrated Pest Management, Pest Action Threshold	The point at which pest populations or environmental conditions indicate that one or more pest control actions must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic or health threat is critical to guide appropriate, least toxic pest control decisions.
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other.
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.
Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. CWA 402(p)(3)(B)(iii) requires that municipal stormwater permits “shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the state determines appropriate for the control of such pollutants.” Also see State Water Board Order WQ 2000-11.

Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
MRP 1	Order No. R2-2009-0074, as amended by Order No. R2-2011-0083.
MRP 2 or Previous Permit	Order No. R2-2015-0049, as amended by Order No. R2-2019-0004.
MRP 3, Permit, or Order	Order No. R2-2022-0018.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law...including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in 40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; and/or (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA sections 307, 402, 318, and 405.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, or other date as specified, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.

Pervious Pavement	A pavement system consisting of permeable interlocking concrete pavement (PICP), pervious or permeable concrete unit pavers, pervious grid pavements, pervious concrete, porous asphalt, turf block, grasscrete, and bricks and stones, set on a gravel base with gravel joints, which stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and PAHs; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste); and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Potential Discharge	Conditions with the potential to result in unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4. These include, but are not limited to, housekeeping issues, inadequate waste or materials management, evidence of actual discharges that are not ongoing, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.

Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by the San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).
Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMPs	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain WQS. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet WQS even after application of technology-based controls, more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.

Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the State, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and U.S. EPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the WQS that must be met to protect designated uses. Water quality standards also include the federal and State anti-degradation policy.
Water Year	The Water Year spans twelve months and begins on October 1 of each year. It is designated by the calendar year in which it ends. For example, the 2023 Water Year starts on October 1, 2022, and ends on September 30, 2023.

Wedge Grinding	The process of milling the asphalt areas directly adjacent to concrete curbs, gutter pans and metal structures (e.g., manhole covers) to a specified width and depth. To tie into the elevations of the existing concrete and metal structures, asphalt is removed along the perimeter to allow proper depth of asphalt on the edge and to preserve the appropriate drainage patterns on the asphalt surface.
Wet Season	October 1 of a given year through April 30 of the following year.

ATTACHMENT A

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2022-0018

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield, Suisun City, and Vallejo, and the Vallejo Sanitation & Flood Control District which have joined together to form the Solano Stormwater Alliance (Solano Permittees)

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I. CONTACT INFORMATION

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II. PERMIT GOALS AND PUBLIC PROCESS

A. Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) include:

(1) Continue regulating six Phase I municipal stormwater NPDES permits in one consistent permit that is regional in scope.

(2) Include concrete, rigorous, and enforceable requirements building on the expertise gained during the previous permit cycle. Continue requiring (A) stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.

(3) Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.

(4) Implement and enhance actions to control federal Clean Water Act (CWA) section 303(d)-listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.

(5) Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d)-listed pollutants.

B. Public Process

Water Board staff conducted stakeholder meetings with the Permittees and other interested parties to develop this Permit. These meetings included Water Board staff, representatives of the Permittees, the U.S. Environmental Protection Agency (U.S. EPA), and representatives of environmental groups.

C. Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to

occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in CWA section 402(p). In addition, this Permit contains water quality-based effluent limitations to implement TMDLs. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is considered compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and C.18 to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

A. Early Permitting Approach

The CWA was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations that would implement the amendment), the Water Board issued municipal stormwater Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, pool resources and expertise, and share information, public outreach, and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics that were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the Plans for implementation details. Often specific

aspects of permit and Plan implementation evolved during the five-year permit cycle without significant public review and comment.

B. Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

U.S. EPA stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the permits, due to the lack of specific requirements and measurable outcomes of some required actions in the plans.

Moreover, these stormwater management plans and amendments thereto made by the Permittees were not subject to public input, contrary to the U.S. Ninth Circuit Court's decision in the Phase II stormwater context that public participation is required for a stormwater management plan, because the substantive information about how an operator will reduce pollutants to the maximum extent possible was found in the stormwater management plan rather than the permit itself (*Environmental Defense Center v. EPA* (9th Cir. 2003) 344 F.3d 832, 857.).

This Permit continues to modify these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the permit development process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the CWA and the California Water Code (CWC). An advantage for Permittees and the public is that the permit requirements are known at the time of permit issuance and not determined later through an iterative review and approval of stormwater management plan amendments, during which time was spent more on getting an acceptable plan than on-the-ground actions. While it may still be necessary to amend the Permit prior to expiration where allowed, any need to do this should be minimized.

This Permit does not require approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require significantly increased staff resources. Instead, minimum measures have been established to simplify compliance determinations for the Water Board and make Permittees' performance more transparent to the public. Each Permit provision and its reporting requirements are written with transparency and

(comparative) administrative efficiency in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to set the rigorous enforceable baseline described above, while still allowing flexibility to numerous Permittees with a range of sizes and resources. To achieve this, the Permit frequently prescribes minimum measurable outcomes, while allowing Permittees to tailor the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. A balance between flexibility and enforceability has been crafted into the Permit.

C. Current Permit Approach

This Permit specifies the following: 1) requirements to effectively prohibit non-stormwater discharges into the storm drain system, pursuant to CWA § 402(p)(3)(B)(ii); 2) technology-based effluent limitations that require controls to reduce the discharge of pollutants to the "maximum extent practicable" (MEP)[1] pursuant to CWA § 402(p)(3)(B)(iii); and 3) water quality-based effluent limitations (WQBELs) pursuant to CWA § 402(p)(3)(B)(iii), which authorizes the inclusion of "such other provisions as the Administrator or the State determines appropriate for the control of…pollutants," for pesticides, trash, mercury, PCBs, bacteria, and sediment, in addition to technology-based effluent limitations. WQBELs for these pollutants are appropriate for control because water quality standards are not being met and these pollutants have impaired waters. The Permit includes requirements for the following components:

- Provision A. Discharge Prohibitions

[1] The CWA and its regulations have not specifically defined "MEP"; rather, it is a flexible and evolving standard. Congress established this flexible MEP standard so that administrative bodies would have "the tools to meet the fundamental goals of the Clean Water Act in the context of stormwater pollution"(*Building Industry Ass'n of San Diego County v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866, 884.). This standard was designed to allow permit writers flexibility to tailor permits to the site-specific nature of MS4s and to use a combination of pollution controls that may be different in different permits (*In re City of Irving, Texas, Municipal Storm Sewer System* (July 16, 2001) 10 E.A.D. 111 (E.P.A.).). The MEP standard is also expected to evolve in light of programmatic improvements, new source control initiatives, and technological advances that serve to improve the overall effectiveness of stormwater management programs in reducing pollutant loading to receiving waters. This is consistent with U.S. EPA's interpretation of stormwater management programs. As explained by U.S. EPA in its 1990 rulemaking, "EPA anticipates that storm water management programs will evolve and mature over time" (55 Fed.Reg. 47990, 48052 (Nov. 16, 1990)).

- Provision B. Discharge Prohibitions and Receiving Water Limitations
- Provision C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations
- Provision C.2. Municipal Operations
- Provision C.3. New Development and Redevelopment
- Provision C.4. Industrial and Commercial Site Controls
- Provision C.5. Illicit Discharge Detection and Elimination
- Provision C.6. Construction Site Control
- Provision C.7. Public Information and Outreach
- Provision C.8. Water Quality Monitoring
- Provision C.9. Pesticides Toxicity Control
- Provision C.10. Trash Load Reduction
- Provision C.11. Mercury Controls
- Provision C.12. PCBs Controls
- Provision C.13. Copper Controls
- Provision C.14. Bacteria Control for Impaired Water Bodies
- Provision C.15. Exempted and Conditionally Exempted Discharges
- Provision C.16. Discharges to Areas of Special Biological Significance
- Provision C.17. Discharges Associated with Unsheltered Homeless Populations
- Provision C.18. San Mateo County Sediment Controls
- Provision C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements
- Provision C.20. Cost Reporting
- Provision C.21. Asset Management
- Provision C.22. Annual Reports
- Provision C.23. Modifications to this Order
- Provision C.24. Standard Provisions

- Provision C.25. Expiration Date
- Provision C.26. Rescission of Old Order
- Provision C.27. Effective Date

IV. ECONOMIC ISSUES AND WATER CODE SECTION 13241

CWC section 13241 requires the Water Board to consider certain factors, including economic considerations, in the adoption of water quality objectives. CWC section 13263 requires the Water Board to take into consideration the provisions of CWC section 13241 in adopting waste discharge requirements.

In *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, the California Supreme Court considered whether regional water boards must comply with CWC section 13241 when issuing waste discharge requirements under CWC section 13263(a) by taking into account the costs a permittee will incur in complying with the permit requirements. The Court concluded that whether it is necessary to consider such cost information "depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act" (*Id*. at p. 627.). The Court ruled that regional water boards may not consider the factors in CWC section 13241, including economics, to justify imposing pollutant restrictions that are less stringent than applicable federal law requires (*Id*. at pp. 618, 626-627 ["[Water Code section 13377 specifies that…discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act.... Because CWC section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a…discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards."]). However, when pollutant restrictions in an NPDES permit are more stringent than federal law requires, CWC section 13263 requires that the regional water boards consider the factors described in CWC section 13241 as they apply to those specific restrictions.

As discussed in Section V.C, State Mandates, the Water Board finds that the requirements in this Order are not more stringent than the minimum federal requirements. Among other requirements, federal law (CWA section 402(p)(3)(B)(ii)) requires MS4 permits to include requirements to effectively prohibit non-storm water discharges into the MS4s, in addition to requiring controls to reduce the discharge of pollutants in stormwater to the MEP, and other provisions as U.S. EPA or the State determines are appropriate for the control of pollutants in MS4 discharges. The permitting agency must therefore include provisions when it finds it is appropriate to do so and to determine what permit conditions are necessary to control pollutants in a specific geographic area.

MS4 discharges in the San Francisco Bay region are a continuing and significant source of pollutants to receiving waters, many of them impaired. As such, the Water Board finds that inclusion of all of the requirements in the Order are necessary and appropriate to control pollutants in MS4 discharges including, but not limited to, requirements for non-stormwater discharges, technology and water quality-based effluent limitations, TMDLs, receiving water limitations, and monitoring and reporting to ensure that the requirements of the Order are being met.

The requirements in this Order may be more specific or detailed than those enumerated in federal regulations under 40 CFR 122.26 and guidance; however, the requirements have been designed to be consistent with and within the federal statutory mandates described in CWA section 402(p)(3)(B)(ii) and (iii) and the related federal regulations and guidance. The conditions in this Order are no more stringent than federal law (See *Defenders of Wildlife v. Browne*r (9th Cir. 1999) 191 F.3d 1159, 1166.). Each of the requirements in the Order, especially when implemented together, constitute the critical means towards achieving the requirements and goals of the CWA.

Moreover, the inclusion of numeric WQBELs in this Order does not cause this Order to be more stringent than federal law (See State Water Board Order No. WQ2021-0052-EXEC, p. 72.). Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The inclusion of WQBELs as discharge specifications in an NPDES permit in order to achieve compliance with water quality standards is not a more stringent requirement than the inclusion of BMP-based permit limitations to achieve water quality standards (*Ibid.*; State Water Board Order No. WQ 2006-0012 (Boeing)). This is supported by U.S. EPA in its guidance on incorporating TMDL WLAs for stormwater in NPDES permits, which explains that the permit's administrative record needs to demonstrate that WQBELs will achieve the WLAs, whether the WQBEL is expressed numerically or as a BMP.[2]

In light of the foregoing, consideration of the factors set forth in CWC section 13241 is not required for permit requirements to implement the effective prohibition on the discharge of non-stormwater discharges into the MS4 or for controls to reduce the discharge of pollutants in stormwater to the MEP, or other provisions that the Water Board has determined appropriate to control such pollutants, as those requirements are mandated by federal law.

While the Water Board need not consider the CWC section 13241 factors, the Water Board nevertheless considers them below, namely the past, present, and probable future beneficial uses of water; the environmental characteristics of the

[2] U.S. EPA, Memorandum, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs,'" (Nov. 26, 2014), p. 6; U.S. EPA, Memorandum, "Establishing Total Maximum Daily Load Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" (Nov. 22, 2002) (2002 U.S. EPA Memorandum).

hydrographic unit under consideration, including the quality of water available thereto; the water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area; economic considerations; the need for developing housing within the region; and the need to develop and use recycled water.

Water Code section 13241 "does not specify how a water board must go about considering the specified factors. Nor does it require the board to make specific findings on the factors" (*City of Arcadia et al v. State Water Resources Control Board and Los Angeles Regional Water Quality Control Board* (2011) 191 Cal.App.4th 156, 177.). In *City of Duarte v. State Water Resources Control Board* (2021) 60 Cal.App.5th 258, 272, the Court of Appeal held that the "manner in which the Water Control Boards consider and comply with Water Code section 13241 is within their discretion" and that "the Water Control Boards are charged with taking into account economic considerations, not merely costs of compliance with a permit.… [E]conomic considerations also include, among other things, the costs of not addressing the problems of contaminated water" (*Id*. at p. 276.). Lastly, consideration of section 13241 does not require a "cost-benefit analysis" (*See* State Water Board Order WQ 2020-0038 (*In the Matter of Review of Approval of Watershed Management Programs and an Enhanced Watershed Management Program Submitted Pursuant to Los Angeles Regional Water Quality Control Board Order R4-2012-0175*) at p. 31.).

The Water Board finds that the requirements in the Order are necessary to ensure the reasonable protection of beneficial uses of waterbodies and the prevention of nuisance. None of the factors of section 13241, including costs of compliance, is sufficient to justify failing to protect those beneficial uses. Nor is it sufficient to justify omitting any requirement in the Order, as the Board finds that doing so would unreasonably affect the designated beneficial uses of the region's waters. Additionally, it would be wholly inconsistent with federal requirements not to include the requirements in the Order, as the Board has deemed them necessary for the control of MS4 discharges. Where appropriate, the Board has provided Permittees with additional time to implement control measures to achieve final WQBELs and/or receiving water limitations and provided significant flexibility where appropriate. The Order builds on the knowledge gained from implementing the Previous Permit. In addition, the Board has provided significant flexibility for Permittees to choose how to implement the requirements of the Order, including by working with other Permittees to implement cost-effective control measures. The Order allows Permittees the flexibility to address critical water quality priorities, particularly discharges to waters subject to TMDLs, but aims to do so in a focused and cost-effective manner while maintaining the level of water quality protection mandated by the CWA.

The CWC section 13241 factors are considered as follows:

A. Past, Present, and Probable Future Uses of Water and Environmental Characteristics of the Hydrographic Unit Under Consideration

With respect to the "past, present, and probable future uses of water" and "environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto": the beneficial uses of the region's waters affected by MS4 storm water discharges are set forth in the Basin Plan, the Ocean Plan, and the Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) Plan, (as well as the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, applicable to the East County Permittees), which the Water Board has considered. The environmental characteristics of the waters under consideration, including water quality, have been affected by MS4 discharges of stormwater and non-stormwater, which convey myriad pollutants to surface waters, including hydrocarbons, heavy metals, pesticides, trash, mercury, PCBs, bacteria, and sediment, which have impaired waters in the regions, ultimately impacting present and probable future beneficial uses. For example, this has led to fish consumption advisories, adverse ecosystem and recreational impacts from trash and debris, and toxic conditions for aquatic life, among others. The requirements of the Order are necessary to protect and restore the past, present, and probable future beneficial uses of surface waters in the region.

B. Water Quality Conditions Reasonably Achievable

The "water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area" are not reconsidered when issuing waste discharge requirements, as water quality objectives have already been established and the purpose of permitting is to regulate a particular type of discharge or a discharge from a specific source, not all possible sources of pollutants to a receiving water. The water quality objectives implemented by the Order have already been subject to separate regulatory processes, and those water quality objectives were deemed reasonable and achievable when they were promulgated. The Water Board has found that water quality objectives can reasonably be achieved, in many cases over time in accordance with implementation schedules, such as those in TMDLs, through the coordinated control of all factors which affect water quality in the area. Achieving and maintaining water quality objectives is a coordinated effort and all regulated dischargers must contribute, including the Permittees, since MS4 discharges are a significant source of pollutants in receiving waters. The requirements in this Order are key to ensuring reasonable achievement of water quality objectives.

C. Housing Needs

With respect to the "need to develop housing within the region," the Water Board is mindful that housing demands have not kept up with population growth in the Bay Area. An increase in population creates a higher demand for water, exacerbates usage of natural resources, and increases generation of waste and pollution. In order to conserve and protect the quantity and quality of our natural resources, development must be done systematically. To protect human health and the environment, create economic opportunities, and provide attractive and affordable neighborhoods, U.S. EPA encourages smart growth and low impact development.[3] Stormwater management is an essential smart growth strategy. According to U.S. EPA, using smart growth and low impact development strategies, communities and developers can reduce runoff quantity, protect water quality, and conserve water by developing compactly, preserving ecologically critical open space, and using green infrastructure strategies.[4]

The Order helps to address the water needs associated with the need for housing by controlling the quality and quantity of MS4 discharges, and requiring some stormwater to be recycled and re-used. The low impact development requirements of the Order help to balance growth with the protection of water quality, by requiring new development to implement cost effective, lot-level strategies that replicate the natural hydrology of the site and reduce the negative impacts of development. By avoiding the installation of more costly conventional stormwater management strategies and harnessing runoff at the source, LID practices enhance the environment while providing cost savings to both developers and local governments.

The Order also incentivizes much-needed affordable housing in the Bay Area by providing regulatory flexibility for affordable housing projects in meeting low impact development requirements. The new requirements to address discharges associated with unsheltered homelessness may also encourage the development of housing, as Permittees may control discharges associated with homelessness by providing and expanding access to temporary or permanent housing.

D. Recycled Water Needs

On the "need to develop and use recycled water" factor, the Order allows Permittees, via their green infrastructure planning and alternative compliance

[3] According to U.S. EPA, "'[s]mart growth' covers a range of development and conservation strategies that help protect our health and natural environment and make our communities more attractive, economically stronger, and more socially diverse." Principles of smart growth include, but are not limited to, use of compact building design, creating a range of housing opportunities and choices, and preserving open space and critical environmental areas. United States Environmental Protection Agency. About Smart Growth. https://www.epa.gov/smartgrowth/about-smart-growth. Accessed on June 23, 2020.

[4] U.S. EPA. Smart Growth and Water. https://www.epa.gov/smartgrowth/smart-growth-and-water

processes in Provision C.3, to support or implement multi-benefit projects that capture and use runoff. During MRP 2, the City of South San Francisco and the San Mateo Countywide Water Pollution Prevention Program developed the Orange Memorial Park design, which incorporates water capture and use and is expected to be constructed during the Permit term. Permittees, in their Green Infrastructure Plans and Stormwater Resource Plans completed during MRP 2, have identified additional opportunities for such projects, and Order Provision C.3.j allows credit for their implementation.

E. Economic Considerations

Finally, with respect to the "economic considerations" factor, the Water Board has considered cost of compliance, especially since it is a consideration in the implementation of technology controls to the MEP. In 2000, the State Water Board issued a precedential order (State Water Board Order WQ 2000-11 (*Cities of Bellflower, et al*.) stating that cost of compliance with the programs and requirements of a municipal stormwater permit is a relevant factor in determining MEP. The Order also explicitly stated that a cost benefit analysis is not required. The State Water Board discussed costs as follows:

> *While the standard of MEP is not defined in the stormwater regulations or the Clean Water Act, the term has been defined in other federal rules....*
>
> *These definitions focus mostly on technical feasibility, but cost is also a relevant factor. There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis.*

(State Water Board Order WQ 2000-11, *supra*, p.20; see also State Water Board Order WQ 2020-0038, *supra*, p. 31.) The cost of complying with TMDL waste load allocations is not required to be considered since TMDLs are not subject to the MEP standard. Federal law requires that NPDES permits contain effluent limitations consistent with the assumptions of any applicable wasteload allocation in a TMDL

(40 C.F.R. §122.44(d)(1)(vii)(B).). Nevertheless, for purposes of CWC section 13241, these costs are considered.

Economic discussions of urban runoff management programs focus primarily on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, the true cost of implementation of the Permittees' urban runoff management programs is difficult to ascertain because reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin.[5] Permittees do not have a standardized approach to reporting costs, and in some cases attribute the full cost of pre-existing programs, program elements that serve purposes other than stormwater control, and grant-funded projects to the cost of complying with the stormwater permit. Below, we discuss these challenges in more detail, consider cost estimates from other regions, and provide estimates of both past and projected costs of this region's identify urban runoff management programs. In addition, we have also attempted to quantify both costs that would be incurred by not fully implementing the programs, as well as the benefits that result from program implementation.

1. Difficulties in Estimating Costs

Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, and stormwater pollution reduction approaches and costs are difficult to standardize. There are appropriate grounds for differences among municipal stormwater permits: what is practicable and prudent in one community may not work in another because of differences in population, hydrology, pollution sources, water uses, and municipal infrastructure, among other factors. In addition, Permittees have discretion in deciding how to comply with permit requirements, including requirements to implement TMDL wasteload allocations and achieve full-trash capture equivalency. Nevertheless, differences of a very wide margin are not easily explained.[6] While Permittees may be in a better position than Water Board staff to estimate the costs of compliance, they may have incentives to over-report costs or report costs they would have incurred regardless of the permit requirements. Thus, it continues to be difficult to ascertain the cost, for planning purposes, of fully implementing decades-long stormwater and urban runoff management programs, especially where significant flexibility has been provided to the Permittees to comply, both with regard to the manner of compliance and the timeframes for achieving compliance.

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[5] LA Regional Water Board, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. p.2

[6] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Board, January 2003. p. 2. Web. June 20, 2019.

In addition, challenges in projecting costs include:

- Innovations in BMPs over time may reduce costs and/or increase pollutant removal;
- Changes in consumer products, land use, and demographics may increase, reduce or eliminate pollutants in MS4 discharges;
- Limitations of modeling used to identify appropriate BMPs to achieve required water quality outcomes, requiring water quality data for verification and periodic recalibration;
- Imprecise data at the planning stage on site-specific conditions for siting BMPs, which can significantly affect BMP sizing requirements as well as the types of BMPs that can be used at a site;
- Evolving science and evaluation of local conditions that may support site-specific water quality objectives; and
- Infrastructure age and condition, which may require significant rehabilitation or reconstruction projects to which Permit-required BMPs could be added at a reduced incremental cost relative to a standalone BMP retrofit project;[7]
- BMP implementation drivers outside the Permit, such as climate change, which may result in changes to the depth, duration, and frequency of precipitation events, as well as changes to urban temperatures and water availability; urban land use changes such as densification or multi-modal ("active") transportation design implementation; modified urban designs to improve air quality around transportation infrastructure; or modified street tree planting designs to improve street tree health, size, and longevity, leading to green stormwater infrastructure implementation for other purposes, that coincidentally satisfies Permit requirements.

Several ongoing initiatives seek to address the challenges described above, including efforts by the State Water Board's Office of Research, Planning, and Performance (ORPP)[8] to provide guidance on estimating TMDL implementation costs, and a project of the Environmental Finance Center (EFC) at California State

[7] As an example, in its 2019 stormwater fee funding initiative, the City of Alameda noted that "on average, the industry-standard life expectancy of a storm drain system is approximately 60 years. The majority of the City's storm drainage pipes were installed more than 50 years ago, leaving the City with a system that is approaching the end of its useful life." (City of Alameda, July 2019. *Fee Report: Water Quality and Flood Protection Fee*. p. 1). Many of the MRP Permittees own and operate MS4s that were built prior to or shortly after WWII and, as such, are systems due for significant rehabilitative or restorative maintenance. This has been one driver for MS4 master planning efforts by Permittees including the cities of Alameda (2008), Oakland (bids solicited in 2020), Palo Alto (2015 update), San Jose (2017), and Vallejo.

[8] State Water Board, ORPP, 2019. *Guidance for Future Total Maximum Daily Load (TMDL) Municipal Storm Water Cost Estimation,* p.2.

University, Sacramento's to compile existing resources on stormwater infrastructure costs and develop best practices for estimating costs. EFC's effort is evolving from CSU Sacramento's 2005 work, presented below in part, and will include estimates of costs for permit compliance activities, technical resources that assist stormwater managers, and project costs for both green and grey stormwater infrastructure.

ORPP's guidance describes methods for obtaining information on compliance approaches and associated costs and for completing an independent analysis of costs. The guidance promotes greater consistence and transparency related to estimation of costs to implement TMDLs. ORPP notes that, even with improved guidance, precise cost estimation remains challenging and the level of precision possible may be low in many cases. For example, industry-wide, there is no uniform database of projects' components and costs to date. [9]

The Permit specifies expectations for cost reporting in Provision C.20, Cost Reporting, which is intended to improve the Board's understanding of Permittee costs to comply with the Permit. The Water Board hopes that in conjunction with ORPP's guidance and the EFC's resources, Provision C.20 will provide valuable cost information that will improve the Water Boards' consideration of economic factors in issuing future permits.

a. Differentiating Stormwater Program Costs from Other Municipal Program Costs

Reported program costs are not all attributable to compliance with MS4 permits. Many program components and associated costs predate the MS4 permitting program, while other program components serve multiple purposes, only one of which is stormwater control, or would have been implemented irrespective of a permitting requirement. Therefore, true program cost resulting from MS4 permit requirements is sometimes some fraction of reported costs.

In the San Francisco Bay Region, most costs that will be incurred to implement the Order will not be new. Urban runoff management programs have been in place in this region for over 25 years. Municipalities have funded street sweeping and trash collection for decades, so their costs are not solely or even principally attributable to MS4 permit compliance. Some municipalities' source control ordinances, such as Berkeley's 1988 ban on Styrofoam, predated the stormwater permit's source control credits. Many municipalities had creek cleanup initiatives, long before doing so was eligible for a credit under the stormwater permit. Thus, any increase in cost to the Permittees as a result of this Order's requirements will be incremental in nature. This incremental increase may be quite low. A California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to

[9] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Board, January 2003. p. 2. Web.

MS4 permits. The remainder of program costs were either preexisting or resulted from enhancement of preexisting programs.[10] The County of Orange found that an even smaller percentage, 20 percent, of its total stormwater management program budget was attributable to MS4 permit compliance. The remaining 80 percent is attributable to preexisting programs.[11]

In some cases, stormwater control is only one element of a larger project. For instance, stormwater control measures may be integrated into multi-benefit projects serving many objectives, such as green stormwater infrastructure elements of sidewalks and bike paths that also reduce the urban heat island effect and improve pedestrian and cyclist safety. Another example is the stormwater filtration pond at Northside Drive in Dublin, Alameda County, which filters runoff from upstream residential and commercial land use while serving as a significant urban park amenity. Other measures may start out as stormwater control measures only to become expected by residents for their other benefits (e.g., dog waste bags along trails or in public parks, trash receptacles at trailheads and parking areas, and restrooms or portable toilets at trailheads and in public parks). As for the costs associated with upgrading existing programs, only a fraction of the cost of a multi-benefit project should be attributed to MS4 permit implementation.

2. Current Permit Costs - Estimates from Other Regions

Despite the challenges in quantifying permit implementation costs, past efforts to identify urban runoff management program costs have produced useful information.

Studies on urban runoff management program costs and have found annual per-household costs ranging from about $15 – 67 (2021 dollars).[12]

For example, in 1999, U.S. EPA reported on multiple studies it conducted to determine the cost of urban runoff management programs.[13] A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 ($14.58)[14] per household per year. U.S. EPA also studied 35

[10] State Water Board, 2005. NPDES Stormwater Cost Survey. p. 58.

[11] County of Orange, 2000. A NPDES Annual Progress Report. p. 60. More current data from the County of Orange is
not used in this discussion because the County of Orange no longer reports such information.

[12] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. pp. 68791-68792.
State Water Board, 2005. NPDES Stormwater Cost Survey. p. ii

[13] U.S. EPA, 1999. *Preliminary Data Summary of Urban Storm Water Best Management Practices, EPA 821-R99-012*. Web.

[14] Figures in parentheses reflect adjustments for inflation to 2021 dollars using the U.S. Bureau of Labor Statistics' CPI Inflation Calculator: https://www.bls.gov/data/inflation_calculator.htm

Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 ($14.46) per household per year.[15]

The Los Angeles Regional Water Board also conducted a study on program cost based on costs reported in the municipalities' annual reports.[16] The Los Angeles Regional Water Board estimated that average per-household cost to implement the MS4 program in Los Angeles County was $12.50 ($18.18) per year.

The State Water Board commissioned a study by CSU Sacramento to assess costs of the Phase I MS4 program. Annual cost per household in the study ranged from $18 to $46 ($25.98 to $66.51) with the City of Encinitas in San Diego County representing the upper end of the range.[17] The higher cost of the City of Encinitas' program reflects its coastal location, reliance on tourism, consent decree with environmental groups, and overall superior program. In a separate review, the Central Coast Regional Water Board estimated that the costs imposed by its Phase I MS4 Permit for the City of Salinas (Order No. R3-2012-0005) were similar to those for Encinitas, since the Salinas permit's requirements were similar to those for Encinitas. Other MS4s assessed in the CSU Sacramento study were the cities of Corona and Santa Clarita, which were found to expend $32 ($46.76) and $39 ($40.53) per household on their stormwater programs, respectively. The range of costs for broadly similar programs in Southern California is likely representative of Permittees' costs to implement the programs.

3. Estimates of Permit Costs in the San Francisco Bay Region

Because the Permittees have not been required to report comprehensively on program implementation costs, estimates like those developed in CSU Sacramento's study are not available for the San Francisco Bay Region. Nevertheless, stormwater management fees implemented by certain Permittees provide some indication of the previous permit's implementation costs. The MRP Permittees' generally successful implementation of their urban runoff management programs for the past 25 years demonstrates that they have the resources available to implement them. We consider these costs below:

In 2019, the City of Alameda property owners approved the Water Quality and Flood Protection Initiative, which increased Alameda's existing Clean Water Program fee, originally adopted in 1992, to comply with state and federal clean

[15] National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Dischargers, Final Rule. Federal Register 64 (December 8, 1999): 68791. Web.

[16] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Quality Control Board, January 2003. p. 2. Web.

[17] State Water Board, 2005. Currier, Brian K., et al. *NPDES Storm Water Cost Survey Final Report.* Office of Water Programs, CS Sacramento, January 2005. pp. ii, iv

water requirements (28 percent); operate and maintain Alameda's MS4 (56 percent); and complete capital improvements to protect flooding (16 percent).[18] The initiative increased Alameda's existing fee revenues to $5.45 million per year from $2.89 million per year, and to $69.40 per capita from about $36.80 per capita. While the allocation of the fee funds suggests Alameda's costs to implement Permit requirements may not be more than about $20 per capita per year ($69.40 x 28 percent). However, because costs are not clearly separated and because Alameda incurs other costs that are recovered outside of the fee (e.g., costs for plan review for Provision C.3 projects, inspection of commercial, industrial, and construction facilities pursuant to Provisions C.4 and C.6, with recovery of those costs via fees for plan review or inspection), the true program cost is greater.

In April 2017, Palo Alto property owners approved a Storm Water Management Fee of about $164 per year for a typical single-family residence. This new fee replaced Palo Alto's then-existing Storm Drainage Fee, increasing it by about 2.3 percent. The fee was originally established in 1989 at $39 per year per "equivalent residential unit" and was raised to $51 per year in 1994-95, for a typical single-family residence.[19] The 2017 fee was to fund: storm drain system construction projects; green stormwater infrastructure projects; commercial and residential rebate programs to encourage installation of green stormwater infrastructure; floodplain management programs; debris and litter reduction; and public and residential integrated pest management activities. Palo Alto noted that the funding necessary to support "a minimum level of storm drainage service" would cost approximately $3.5 million per year, consisting of $2.5 million in baseline staff and expenses, and $1 million in annual debt service for past storm drain capital project revenue bonds, or about $52.60 per capita.[20]

Both fee increases provide a Bay Area estimate of current program costs and indicate the challenges of determining stormwater program-specific costs. While the fees include costs to comply with Permit, they also include other costs associated with MS4 construction, operation, and maintenance, which are not required by the Permit. At the same time, the fees do not cover all costs to implement the Permit. For example, the cities incur costs under Provision C.3 associated with plan review and approval, inspection of urban runoff treatment, and in some cases hydromodification control systems. In addition, they may incur costs for Permit-required inspections of construction sites and commercial and industrial businesses, and actions to address illicit discharges pursuant to Provisions C.4, C.5, and C.6. These costs are recovered through other fees, e.g., for plan review, permitting, and inspections, and business licenses. Permit-required work such as commercial and

[18] City of Alameda, 2019. *City of Alameda Water Quality & Flood Protection Initiative Official Ballot Information Guide.* Web. July 22, 2021.

[19] https://www.paloaltoonline.com/weekly/morgue/cover/2000_Sep_13.SIDEBAR.html

[20] City of Palo Alto, Sept. 22, 2015. *Finance Committee Staff Report: Storm Drainage Fee Renewal.* p.7.

industrial business inspections may be combined with inspections for purposes not required by the Permit, such as hazardous materials inspections completed by the local Certified Unified Program Agency (CUPA).

Similarly, Permittees may use General Fund revenues for purposes such as capital improvement projects, which could include provision of matching funds for grant-funded green stormwater infrastructure projects. The City of East Palo Alto experienced budget surpluses of up to $17.2 million per year from 2011 to 2019, and in 2019 transferred a portion of the surplus to provide cost match for grant-funded water infrastructure projects. Other cities experiencing surpluses in 2019 included Palo Alto ($76 million) and Mountain View ($118 million).[21] These expenditures may not be reflected in storm water fees.

Palo Alto's and Alameda's fees are similar to the reported costs for other municipalities to implement broadly similar MS4 permits. Given the significant limits noted herein, the Water Board concludes that the discussion describes costs that are generally representative of costs to implement the Previous Permit.

4. Program Costs

Below, we consider in greater detail the costs associated with compliance with the renewed Permit.

This economic analysis combines cost estimates at a macro level (e.g., per capita costs based on typical implementation costs compiled from multiple sources) and, where possible, estimated costs for Permittees to comply with specific Permit provisions.

For estimates of the projected costs to comply with the Permit, Water Board staff sought examples from published sources and experts, including:

- Permittees' stormwater program managers and staff
- Stormwater program managers around the State
- Stormwater staff at the Regional and State Water Boards
- Grant funding applications (e.g., Props. 1 and 84) and reports submitted to the State Water Board's Division of Financial Assistance (e.g., Storm Water Resource Plans)
- Information on projects implemented cooperatively with the California Department of Transportation (Caltrans)

[21] East Palo Alto Daily Post, Feb. 5, 2020. *East Palo Alto Posts a $15.6 million surplus.* Web. July 25, 2021.

- Total Maximum Daily Loads adopted by the Water Board and other Regional Water Boards
- Economic analyses conducted for other Regional and State Water Board orders and amendments to Water Quality Control Plans (e.g., the Trash Amendments)
- Available peer-reviewed and gray literature on the implementation of measures similar to those that are reasonably foreseeable under the Permit (e.g., reports on green stormwater infrastructure implementation for Philadelphia's Green City, Clean Waters program and others; collected cost information available at the International Stormwater BMP Database; and published reports and articles from the American Society of Civil Engineers and the Water Environment Federation)

Possible errors in cost estimates can result from extrapolating costs from other jurisdictions to the Permittees' on a per capita or per area basis because of differences in regional economies, population density, and other factors. A more accurate estimation of costs would seek to normalize cost factors before extrapolating in this manner. However, as discussed herein, because of limitations in the available data and uncertainties regarding Permittees' methods of compliance with the Permit, further effort to refine the estimates provided here would not necessarily improve them.

The Permittees' determination of a method of compliance will also affect cost. Permittees can choose to implement the least expensive measures that are effective in meeting the Permit requirements. The Permit also does not require Permittees to fully implement all requirements within a single permit term. Where appropriate, the Water Board has provided Permittees with additional time to implement control measures to achieve water quality objectives. In addition, changes to the Permit are typically incremental in nature, expanding upon or better defining existing programs or requirements. Estimates of new program costs can be inflated if they reflect the unit costs for grant-funded projects, often pilots being completed for the first time, that include measures that would be excluded if they were not being subsidized by grant funding.

The Permit generally maintains existing requirements, such that many MS4 program costs are continuing costs that may be well represented by the discussion above. At the same time the Permit's continuing requirements may result in additional implementation actions, which can result in new costs. In addition, the Permit includes new or revised expectations as described below, which may result in program costs not captured by the above analysis.

a. Continuing Requirements

Provisions for which requirements are substantially continuing, or continuing in a manner likely to result in similar costs to Permittees as under MRP 2, include:

- C.1 – Compliance with discharge prohibitions
- C.2 – Municipal operations
- C.4 – Industrial and commercial site controls
- C.5 – Illicit discharge detection and elimination
- C.6 – Construction site control
- C.7 – Public information and outreach
- C.9 – Pesticides toxicity control
- C.13 – Copper controls
- C.14.b – City of Pacifica and San Mateo County bacteria controls
- C.15 – Exempted and conditionally exempted discharges
- C.16 – Discharges to areas of special biological significance
- C.19 – East Contra Costa County Permittees

Provision C.5 includes a continuing requirement that Permittees maintain their MS4 maps, along with a requirement to develop a plan and schedule to update their existing maps. Permittees are likely to incur modest costs to develop this plan and schedule. Those permittees who have recently updated maps are likely to incur lower costs.

In addition, while Provision C.8, Monitoring, incorporates certain revised monitoring expectations, they are expected to result in costs similar to those incurred by the Permittees during MRP 2, including for monitoring conducted pursuant to Provision C.10, which has been moved into Provision C.8. That is because while some monitoring has been maintained (e.g., pesticides and pollutants of concern monitoring) or added (e.g., green stormwater infrastructure monitoring), other monitoring expectations were removed (e.g., creek status monitoring) and replaced with monitoring that is expected, overall, to have similar total costs. In addition, the provision incorporates flexibility to allow Permittees to complete monitoring efforts collectively and/or collaboratively, or in coordination with other efforts, such as the San Francisco Bay Regional Monitoring Program. All monitoring requirements are relevant and necessary to demonstrate compliance with permit requirements and to answer or to inform answer to critical specified management questions related to pollutant source identification, effectiveness of pollutant controls and management practices and actions, and attainment of water quality objectives in receiving waters. The monitoring requirements reflect a balance between minimizing monitoring costs and ensuring monitoring is scientifically sound and sufficient to provide usable

results. Any increased costs associated with new or revised monitoring requirements are modest compared to the costs of implementation of pollutant controls and management practices and actions, and the benefit of better-informed basis for cost-effective pollutant controls and management practices and actions, which will cost hundreds of millions of dollars over time, far outweigh any additional monitoring costs. In addition, reduced or inadequate monitoring efforts that do not produce usable results is a consequential waste of resources.

Further, trash monitoring requirements have been moved to Provision C.8 from Provision C.10. While they have been updated to reflect next steps based on work the Permittees completed during MRP 2, they are expected to involve a similar level of effort and cost.

Provision C.15 includes a continuing requirement to implement appropriate BMPs for non-stormwater discharges, including emergency firefighting discharges. This includes a requirement to convene a workgroup to update practices for emergency firefighting discharges and to implement training on the updated practices once during the permit term. This may result in costs to attend workgroup meetings, prepare updated BMPs and outreach materials, and train affected municipal staff.

Provision C.19 incorporates changes reflecting that subject East Contra Costa County Permittees, who were added to MRP 2 during the MRP 2 permit term, were granted time during MRP 2 to come up to speed with requirements of other Order provisions. Those Permittees are thus expected to be affected similarly to the other Permittees with respect to costs, as described elsewhere in this analysis. In addition, Provision C.19 incorporates requirements to achieve applicable wasteload allocations for mercury, in part by completing a study on Marsh Creek. However, those costs are roughly offset by reduced costs associated with work completed during MRP 2 that is now no longer required.

b. Continuing Requirements with additional costs

The Permit includes a number of provisions with requirements that may increase program costs. In many cases, these costs may be offset in whole or in part through collection of additional fees (e.g., for plan review and inspections), grant funding, completion of cooperative projects with other entities (e.g., Caltrans), or other sources.

The Permit would require additional costs as compared to MRP 2 to implement updated requirements for the following Provisions:

- C.3 – New and Redevelopment
- C.10 – Trash Control

- C.11 – Mercury Control and
- C.12 – PCBs Control

For Provisions C.3, C.10, C.11, and C.12, substantial portions of the Provisions' expectations are continuing requirements and expected to have costs similar to MRP 2. They also incorporate updated requirements, and the costs to implement those updated requirements are likely to be dominated by costs for green stormwater infrastructure implementation and implementation of full trash capture devices or measures equivalent to full trash capture, as described below. That is in part because building projects on the ground is more expensive than implementing municipal planning processes to require others to do so, to evaluate contaminated sites for referral to other agencies for cleanup, etc.

Green stormwater infrastructure implementation costs have a substantial potential range, depending on factors including project type, size, location, and constraints. In general, larger district- or regional-scale projects may have lower unit costs (i.e., costs per acre of impervious surface treated, or per unit of pollutants reduced) than smaller green street or parcel-scale projects.[22] In their Green Infrastructure planning processes and in comments on the Order's Administrative Draft, Permittees expressed the expectation that they would seek to implement a cost-efficient combination of measures sufficient to address Order requirements. Thus, it is likely that Permittees will choose to implement a combination of projects that is below the highest-cost analysis considered here.

To the extent these provisions contain updated measures that would impose additional costs on Permittees to implement, it is likely that those additional costs are within the range of implementation costs for green stormwater infrastructure and trash capture.

c. Continuing provisions with updated requirements

The Order includes post-construction stormwater requirements, including requirements to reduce discharges of mercury and PCBs, which green stormwater infrastructure will help achieve. Low impact development (LID), as a mode of implementing post-construction requirements, has been shown to be cost-effective and compares favorably to conventional stormwater management. "As LID was [originally] developed by a local government, it is sensitive to addressing local government's unique environmental and regulatory needs in the most economical manner possible by reducing costs associated with stormwater infrastructure design, construction, maintenance, and enforcement. LID also provides for local governments' need for economic vitality through reasonable and continued growth and redevelopment. LID allows for greater development potential with less environmental impact using smarter designs and

[22] WEF, Dec. 2, 2015. *Spotlight: The Real Cost of Green Infrastructure.*

advanced technologies to achieve a better balance between conservation, growth, ecosystem protection, and public health/quality of life."[23]

Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced cost. Other LID techniques, such as grassed swales, can be sued to infiltrate roadway runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. LID techniques can reduce creek and flood control channel maintenance needed due to erosion and sedimentation, and reduce the size and cost of flood control structures.[24]

The Water Board considered costs of implementing LID measures. In comments on the Administrative Draft of the Permit, the Permittees submitted an estimated average cost of $215,000 per impervious acre treated by bioretention.[25] However, the ACCWP noted a per-acre cost of approximately $660,000 for a single high-cost project, Union City's grant-funded H Street Green Street retrofit pilot project,[26] which incorporated substantial amounts of relatively more-expensive pervious pavement and concrete work. It is likely that increased municipal experience over time will reduce unit costs from this high number. Additionally, it is unlikely that municipalities implementing retrofit projects would incorporate cost drivers like large areas of pervious pavers and substantial underlying concrete work, when less-expensive options (e.g., bioretention bulb-outs, district- or regional-scale projects) are available.

In addition, costs to implement GSI include operation and maintenance costs. The Water Board reviewed available estimates of annual O&M costs, including general estimates about $1,120 – 2,240 (2021 dollars) per treated acre of impervious surface for bioretention cells, with somewhat higher numbers for porous and pavement and porous pavers (about $1,680 – 2,800 per acre

[23] Coffman, Larry. *Low Impact Development: Smart Technology for Clean Water, Definitions, Issues, Roadblocks, and Next Steps.* American Society of Civil Engineers, 2004. Web. August 3, 2021. p.1.

[24] U.S. EPA. *Reducing Stormwter Costs Through Low Impact Development (LID) Strategies and Practices*. EOA 841-F-07-006, December 2007.

[25] E.g., SCVURPPP and CCCWP comment letters of April 8, 2021, on MRP 3.0 Administrative Draft.

[26] ACCWP comment letter on MRP 3 Administrative Draft, April 8, 2021. p.7 of 31.

treated, 2021 dollars).[27] An ASCE survey of maintenance costs found that annual bioretention maintenance costs varied substantially, from $70 – 5,450 per acre treated, but averaged about 5-7 percent of capital costs, which was consistent with U.S. EPA guidance.[28] O&M costs may be borne by a Permittee or an implementing private party. The costs are incremental; in the absence of an O&M cost for GSI, a Permittee or private party typically would incur an O&M cost for the landscaping or other surface that would have been present if the GSI had not been built.

Further cost estimates are discussed below. This analysis considers a range of costs running from $50,000 per treated impervious acre as a potentially low cost for larger district- or regional-scale projects; $213,000 per treated acre as a potentially typical cost, and $660,000 per treated acre as a potentially high-end implementation cost for implementation of green stormwater infrastructure.

Provision C.3 would require Permittees to implement green stormwater infrastructure retrofit of up to 216.92 ac, while providing flexibility to include projects that may already be under way but not yet constructed (pursuant to Provision C.3.j.ii.(2)(e)), as well as certain projects that have not been completed by the end of the Permit term (pursuant to Provision C.3.j.ii.(2)(f)). In addition, it allows a reduction in GSI retrofit requirements for Permittees who implement ordinances to more broadly incorporate retrofit requirements into their planning and approval processes for C.3 Regulated Projects.

As a result, Permittees would be expected to incur costs ranging from $13.7 million to $181 million, with a more-typical expectation of about $58 million, to comply with the Permit's GSI retrofit requirements during the coming Permit term. As noted above, those costs are likely overstated because of flexibility provided within the Permit.

In a 2013 study,[29] the County of Orange, on behalf of the Orange County Stormwater Program, partnered with the Construction Industry Coalition on Water Quality to develop estimates of the costs of incorporating different combinations of LID BMPs into several of the most commonly encountered Orange County development scenarios. The study examined four different development project scenarios in Orange County, ranging in size from a small urban mixed-use commercial retail and residential property with no parking provided (0.14 ac), up to a large "big-box" type commercial retail center on 12.4

[27] WEF, Dec. 2, 2015. *Spotlight: The Real Cost of Green Infrastructure.*

[28] U.S. EPA, 199. *Preliminary data summary of urban stormwater best management practices.* EPA-821-R-99-012, Washington, DC.
Clary and Piza, 2017. *Cost of Maintaining Green Infrastructure*. EWRI of the American Society of Civil Engineers, ch. 3.

[29] Grey et al., March-April 2013. *The costs of LID: low-impact-development BMP installation and operation and maintenance costs in Orange County, CA.* Stormwater Magazine.

ac. In three of four scenarios, the percentage of impervious area assumed was 90 percent, with LID BMPs sited predominantly within landscaping and parking areas. The study considered five different LID BMPs for application within four categories of LID BMPs: infiltration basins and concrete pavers, harvest and use cisterns, green roofs, and biofiltration systems.

The study found that "infiltration and biofiltration systems were the least-cost practice to manage the Design Capture Volume for a given project, and the least costly BMPs to operate and maintain over a 20-year period. This finding is generally consistent with a small amount of published literature and reports on LID BMP costs in the U.S." Specific costs for LID BMP installation and O&M "ranged from just over $50,000 for an infiltration paver system serving the small urban mixed-use residential and commercial scenario (0.14 ac, 2,800-gal design capture volume) up to $4.7 million for a cistern and green roof combination serving the 12.4-ac big-box commercial project.

The Orange County study found: "Assuming no technical infeasibility constraints, the least-cost LID BMPs are infiltration and biofiltration systems, regardless of volume managed or project type…. Where space is available within a project site (the case studies assumed 3 percent or less of the total site area) to install an infiltration basin or biofiltration system, the cost of installing these two types of LID BMPs is under…$2 per square foot [about $87,000 per acre] of [impervious area]."

A 2011 study from the Minnesota Pollution Control Agency[30] reported data on 69 BMP projects and illustrates a wide variability in costs of different LID BMPs (Table A-1). In addition, costs are with a given BMP type are expected to vary substantially depending on factors described above.

Table A-1. BMP scost estimates.

Stormwater BMP	Dollars/Cubic Foot of Runoff
Large wet detention basin	$3.20 (treating more than 100,000 cubic feet)
Small detention basin	$231.67 (treating less than 10,000 cubic feet)
Constructed wetland	$1.60
Infiltration trench	$17.58
Bioretention basin	$92.67
Underground infiltration	$12.78
Pervious pavement	$25.56

Finally, Alcosan completed a GSI cost literature review that found an estimated cost of about $311,500 (2021 dollars) per acre of impervious surface treated for

[30] Minnesota Pollution Control Agency, 2011. *Best Management Practices Construction Costs, Maintenance Costs, and Land Requirements.* Prepared by Barr Engineering Company.

a range of projects that included BMPs including bioretention, infiltration trenches, pervious pavements, underground storage, and tree trenches.[31] Together, these estimates support the range of estimates used to estimate Permittee costs during the Permit term.

While substantial portions of Provision C.3 are the same as during MRP 2, the provision includes updated expectations for Regulated Projects, including roads, that are expected to result in additional municipal costs. Those include changes to Regulated Project definitions, including roads. To the extent those create additional oversight costs, the costs should be recoverable through fees including permitting, plan review, and inspection fees. To the extent they create additional construction costs for municipal road projects, the costs are likely to be funded through funding sources including Prop 1 gas tax funding and through reprioritization of work that excludes water quality measures.

SCVURPPP estimated that the road reconstruction requirements would cost Santa Clara County Permittees up to $300 million during the Permit term to treat about 1,400 acres of new or reworked impervious surface at an average cost of $213,000 per acre treated.[32] That estimate was prepared based on an expansive identification of what might qualify as a Regulated Project in this category, including ADA curb cuts, and particularly included a significant number of maintenance projects, as well as distributed, non-contiguous projects, that would not be expected to be regulated. That cost estimate is conservative and well in excess of Provision C.3's effect. Other commenters noted that the road reconstruction requirements would apply primarily, if not exclusively, to full-street reconstruction projects, such as active transportation/complete streets projects. While the total cost is unknown because the range of municipal projects that would be completed during the Permit term is unknown, costs are expected to be incremental relative to the total costs of those projects and within the range of unit costs described above.

Provision C.3 includes updated expectations for Special Project category C that are expected to result in minimal costs to Permittees, because implementing the category is optional, costs to implement it can be recovered via plan review and related fees, and because it replaces a similar, but more-expansive, category from MRP 2.

Provision C.3 includes an option for the Contra Costa Permittees to submit a hydromodification management report that would consist of refinements to work largely completed during MRP 2. This is expected to result in a modest cost for staff and consultant time.

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[31] Alcosan, 2012. *Starting at the Source: How our Region Can Work Together for Clean Water.* Appendix C: GSI Cost Literature Review. Pittsburgh.

[32] SCVURPPP, April 8, 2021. Comment letter on Administrative Draft. p.4.

Finally, Provision C.3 includes expectations that Permittees implement and, as appropriate, update the Green Infrastructure Plans they completed during MRP 2. This represents a lower level of effort from MRP 2, with likely some level of cost savings relative to MRP 2. Overall, it is continuing implementation, including programmatic work generally tied to ongoing practices (e.g., no missed opportunities, specific and general planning, policy review, outreach to elected officials and policy makers), and work that is consistent with what the Permittees determined was feasible in their GI Plans. Green infrastructure planning expectations include the retrofit requirement discussed above.

Provision C.10 will require Permittees to incur costs to control discharges of trash. These are largely continuing costs to implement controls required under MRP 2. Permittees will incur additional costs to proceed from MRP 2's required 80 percent reduction in trash discharges to the Permit's required 100 percent reduction, to be achieved using a combination of measures determined by each Permittee, and consisting of full trash capture, or implementation of a range of controls equivalent to full trash capture.

Absent more information on the specific costs the Permittees would incur for trash reduction, this economic analysis presents a range of costs from the economic analysis completed for the Trash Amendments.[33] Statewide, the economic analysis estimates that between $2.93 and 7.77 more per resident might need to be spent each year for the next ten years to implement the proposed Trash Amendments. The economic analysis provides estimates of compliance costs and considers the incremental costs (those beyond current costs) MS4 dischargers may incur based on implementation provisions and time scheduled in the Trash Amendments.

Permittees typically use a combination of full trash capture devices and equivalent measures. The economic analysis calculated an average per capita cost of $9.68 for a mix of measures implemented by MS4 permittees outside the Los Angeles Region. The economic analysis also found that a broad range of compliance options is available to permittees. For example, the selection of full capture systems depends on many site-specific factors and conditions. The analysis reports that capital cost per unit ranges from $300 per catch basin insert for installation and $330 for annual maintenance, to $80,000 per vortex separator system for installation (capital costs) and $30,000 for annual maintenance. Different methods may cover different areas. For example, a drop inlet filter may cover only one acre, whereas a vortex separator system may

[33] State Water Board Resolution No. 2015-0019. Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

cover many acres, and therefore a normalized cost per acre was estimated at $800 in capital cost and $342 in annual O&M.[34]

Large full trash capture devices may have substantially lower per-acre capital and O&M costs. For example, Permittees have successfully executed 18 cooperative implementation agreements (CIAs) with Caltrans as of the end of FY 2021, with a total funding contribution of over $55 million. These municipal partnership projects could potentially treat approximately 2,000 acres and 30,500 acres of Caltrans' and municipalities' significant trash generating areas, respectively.

In addition, Permittees may claim the benefit from other implemented controls, such as GSI, that also control trash. Thus, this estimate is conservative because there would not be additional cost to implement trash controls where GSI has been implemented, and in many cases the GSI will be implemented by a private party, so that Permittees will not incur the cost of construction, operation, or maintenance, although they would incur recoverable costs for plan review and inspection.

Water Board staff's December 2019 analysis of Permittee trash control found that as of July 1, 2019, Permittees reported having controlled trash from 65,900 acres with a moderate, high, or very high trash generation rate, and that 52,600 acres remained to be controlled.[35] Permittee work has continued since July 1, 2019, including substantial areas controlled by cooperative projects implemented in part with Caltrans funding (Table A-2). Caltrans funding will continue to be available to Permittees for qualifying projects, partly offsetting project costs.

In addition, Permittees would incur costs to prepare an impracticability report and to complete continuing reporting. These costs are expected to be within the estimate above.

[34] State Water Bboard, June 2014. Draft Staff Report Including the Draft Substitute Environmental Documentation, Draft Amendments to Statewide Water Quality Control Plans to Control Trash, Appendix C: Economic Considerations for the Proposed Amendments to Statewide Water Quality Control Plans to Control Trash, p.C-44.

[35] Kalyan, December 11, 2019. Staff Summary Report: Item 8. Municipal Regional Stormwater NPDES Permit, Permittee Compliance with the 80 Percent Trash Load Reduction Requirement – Information Item. Water Board meeting of December 11, 2019.

Table A-2. Caltrans-funded cooperative projects by FY 2021.

County	Permittee	Location/Project Name	Funding Agreement Year	Estimated Caltrans Acres Treated	Estimated Permittee Acres Treated	Caltrans Contribution
San Mateo	San Mateo	Memorial Park - Phase 1	2017/2018	234.0	6,336.0	$9,500,000
San Mateo	San Mateo	Memorial Park - Phase 2	2018/2019			$6,000,000
Contra Costa	Richmond	Parkway and S. 8th Street	2017/2018	74.0	960.0	$2,500,000
San Mateo	San Mateo	Poplar/Dore (implemented in 2019) and Coyote Point	2017/2018	42.0	765.0	$2,123,000
Contra Costa	Richmond	Meeker Slough	2018/2019	41.4	2,265.0	$3,000,000
Santa Clara	San Jose	Various	2017/2018	480.0	2,728.0	$5,500,000
Alameda	Hayward	2 locations - Tennyson Arf funded	2020	119.0	1,128.0	$1,841,000
Solano	Vallejo Waste Water	3 locations- BW Williams and Solano Ave + Austin Creek (amended)	2020	379.4	7,992.0	$3,338,000
San Mateo	City of San Mateo	Poplar Golf Course	2019/2020	16.0	333.0	$830,000
San Mateo	East Palo Alto	O'Connor Pump Station	2019/2020	39.0	864.0	$521,000
Alameda	Alameda County	Estudillo Canal	2019/2020	256.0	2,620.0	$2,175,000
San Mateo	Daly City	Vista Grande	2019/2020	154.0	1,915.8	$3,440,000

County	Permittee	Location/Project Name	Funding Agreement Year	Estimated Caltrans Acres Treated	Estimated Permittee Acres Treated	Caltrans Contribution
Contra Costa	Concord	Hillcrest Park Regional Project	2019/2020	90.0	509.3	$4,300,000
Contra Costa	Contra Costa County	Tara Hills	2019/2020	41.0	457.8	$3,945,000
Contra Costa	Richmond/El Cerrito	Bayview	2020/2021	31.0	840.0	$2,300,000
Alameda	Oakland	Mandela & 24th	2020/2021	16.8	583.9	$2,900,000
Alameda	Emeryville	MacArthur	2020/2021	3.8	77.0	$680,000
Santa Clara	Palo Alto	Embarcadero	2020/2021	20.5	189.0	$598,000
Total				2,038	30,563	$55,491,000

Provision C.11 will require Permittees will incur costs to control discharges of mercury. Those costs are largely for continuing requirements and, thus, are expected to be broadly similar to MRP 2. To the extent that Permittees implement GSI retrofit to achieve mercury reductions, that work would also reduce PCBs loads. Because the same control action is likely to reduce both mercury and PCBs, estimated costs for implementation have been considered below, under the Provision C.12 discussion.

Provision C.12 will require Permittees to continue to implement measures to reduce discharges of PCBs consistent with the applicable TMDL. Key aspects of this provision are consistent, or roughly consistent, with expectations under MRP 2. Lower costs should be incurred for some expectations. For example, in MRP 2, the Permittees developed a demolition debris control program, which they are now implementing. The cost to develop the program was likely higher than the implementation cost, which consists significantly of outreach and education using materials prepared during MRP 2. There are some small additional costs (relative to the current cost of implementing the current demolition debris program) associated with enhanced requirements for the demolition debris program. These include small costs for additional efforts to obtain official

documentation to ensure that building materials from demolished buildings containing PCBs concentrations greater than 50 ppm were properly disposed. There will also be small additional costs for demolition site inspection to ensure implementation of control measures at project sites to minimize off-site migration of PCBs. These inspection costs should be minor as economies of scale can be realized by integrating these inspections into the inspection program required pursuant to Provision C.6. Permittees will continue to investigate contaminated sites for referral to the Water Board, DTSC, or U.S. EPA for cleanup. While that may result in continuing costs or somewhat increased costs as compared to MRP 2, overall the requirements are expected to be roughly equivalent.

Permittees are expected to continue to implement actions to reduce discharges of PCBs to the MS4. These include implementing controls to capture PCBs before they can discharge to the MS4, which could include GSI, diversion of flows to the sanitary sewer for treatment, or other controls. To demonstrate progress towards achieving the wasteload allocation during the Permit term, Permittees are expected to address discharges from about 3,000 ac of impervious surface in old industrial areas using a combination of measures that they determine.

Based on the above GSI unit cost estimates, the cost to accomplish that reduction is likely to range from about $150 million to $2 billion, with a typical cost of about $639 million. This estimate is likely to be conservative (i.e., likely greater than the actual cost incurred) because GSI or treatment control measures implemented by private parties would reduce Permittee costs to self-implement controls; Permittees can account for benefit from other actions, including their GSI retrofit work pursuant to Provision C.3 and implementation of trash controls pursuant to Provision C.10, and Permittees are likely to implement a mix of BMPs that is less costly than the maximum, and to include less-costly district-scale or regional BMPs. In addition, costs for diversion to sanitary sewers may be lower on a unit cost basis than GSI costs. A portion of project funding will be available from Caltrans pursuant to alternative compliance associated with its MS4 permit, and Caltrans ROW is constrained, so off-ROW implementation is a preferred path for Caltrans, which has indicated its intent to continue to support cooperative projects, including through its Clean California initiative.

Provision C.12 also requires the creation of a two new program to control PCBs. The first program is to control PCBs when bridge and overpass roadways are replaced or undergo major repair. The costs associated with creation of this new program will be small because the effort consists in ensuring that roadway crews follow a protocol (to be developed by Caltrans) to ensure proper management and disposal of PCB-containing caulk in roadway expansion joints when bridge and overpass roadways are replaced or substantially repaired. Small additional

costs should be expected associated with the creation of the second new program Permittees must develop to ensure proper management of PCBs in oil-filled electrical equipment (OFEE) for municipally owned electrical utilities and collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities. Costs for both of these new programs is expected to be small because both involve simply making sure that proper procedures are being followed.

Provision C.14 requires Permittees to control discharges of bacteria consistent with applicable TMDLs or to address identified exceedances of water quality objectives.

Provision C.14.a requires two Permittees, the cities of Mountain View and Sunnyvale, to implement measures to control bacteria to address identified exceedances of water quality objectives. While this work is being called out in a subprovision that was not present in MRP 2, the expectations largely reflect continuation of work the cities were implementing during MRP 2 pursuant to MRP 2's, and the Permit's, prohibition on discharges of non-stormwater to the MS4. That includes evaluation of municipal operations for bacteria discharges, inspect for illicit connections of sanitary flows to the storm sewer system, incorporation of bacteria concerns into commercial and industrial business inspections, provision of pet waste stations, collection of trash, control of bacteria sources associated with unsheltered homeless populations, and public outreach. C.14.a requires the Permittees to focus or increase these actions, which are also conducted across municipalities broadly, in areas near the known bacteria water quality exceedance locations. The cities may incur additional incremental costs associated with additional inspections, coordination with the sanitary sewer agencies on collection system operation and maintenance, and greater levels of effort in each of the categories. These costs are expected to be recoverable through inspection fees with existing staff resources. Where new actions are required, their unit costs are expected to be similar to those presented in the San Pedro Creek and Pacifica State Beach Bacteria TMDL Staff Report, Section 12.3: Economic Considerations,[36] and with estimates presented above for green stormwater infrastructure implementation.

Provision C.14.c requires the City of San Mateo to control discharges of bacteria to its Marina Lagoon beaches. Similar to Provision C.14.a, the initial measures are continued effort, with incremental expansion, of existing work required under MRP 2, like illicit discharge detection and elimination, trash control, and public information and outreach. The City is expected to incur some additional costs for a potentially elevated level of effort, including monitoring. If water quality objectives are not achieved, then the City will incur costs to complete a report

[36] San Francisco Bay Regional Water Board, Nov. 2012. *TMDL for Bacteria in San Pedro Creek and at Pacifica State Beach: Staff Report.* pp.105-110).

evaluating additional actions sufficient to achieve the objectives, which may lead to costs in this permit term. Depending on the report content, an outside contractor may charge approximately $70,000 – 200,000 to complete this report (assuming a contractor rate of $150/hr).

Provision C.14.d requires the City of Half Moon Bay and San Mateo County to control bacteria discharging to Pillar Point Harbor and Venice Beach. Similar to Provision C.14.a, the initial measures are continued effort, with incremental expansion, of existing work required under MRP 2, like beach bacteria monitoring, illicit discharge detection and elimination, trash control, and public information and outreach. Expansion of work includes, for example, including bacteria control in staff training. The City and County may incur some additional costs for a potentially elevated level of effort. If water quality objectives are not achieved, then the City and County will incur costs to complete a report evaluating additional actions sufficient to achieve the objectives, which may lead to costs in a subsequent permit term.

The Permittees covered by the above C.14 subprovisions could implement green stormwater infrastructure to eliminate discharges and reduce bacteria concentrations in remaining discharges. Where GSI is implemented pursuant to Provision C.3 requirements, there is not expected to be an additional cost to the Permittees for a bacteria control benefit to be realized. Similarly, trash control measures implemented pursuant to Provision C.10 may provide some bacteria control benefit, but would not result in additional incremental costs to the Permittees. However, where the Permittees undertake control actions, such as green stormwater infrastructure retrofit, that go beyond Provision C.3 requirements, then the cost of that work would be expected to be consistent with the estimates presented above for Provisions C.3 and C.12.

Provision C.18 requires the County of San Mateo to control discharges of sediment in the Pescadero-Butano watershed consistent with the applicable TMDL. Specifically, the County would be required to create a prioritized list of road projects with the potential to contribute sediment to the Pescadero-Butano and San Gregorio watersheds. The County would be required to take measures to reduce sediment delivery from County roads in the Pescadero-Butano watershed. The Water Board staff report for the TMDL economic analysis estimated such costs at about $35,000 per mile for unpaved roads, and $60,000 per mile per paved roads. The total lengths of roads to be controlled under the TMDL are 325 (unpaved) and 325 (paved), and the total costs for the work were estimated at about $37 million over a 20-year implementation period.[37] The Permit requires implementation of actions in 20 percent of the Pescadero-Butano watershed, but none in the San Gregorio Creek watershed during this

[37] San Francisco Bay Regional Water Quality Control Board, Dec. 11, 2018. *TMDL for Sediment and Habitat Enhancement Plan for Pescadero-Butano Watershed: Staff Report.*

Permit term. As a result, implementation costs are estimated conservatively at about $7.2 million during the Permit term. However, projects may be completed as part of other prioritized maintenance projects or otherwise such that the Permittee does not incur that full level of costs, but rather a reduced amount that is offset by the Permittee's costs for projects it would have completed anyway. In addition, the Permittee may incur costs associated with creating the prioritized list and with monitoring the effectiveness of completed projects.

d. New provisions

Although C.17, C.20, and C.21 are new provisions, their substantive requirements generally reflect work that was already required or already being completed, as described further below. Permittees may incur costs for going beyond required or continuing work.

Provision C.17 requires Permittees to coordinate internally and use existing resources to report on the locations of homeless populations in their jurisdictions. Permittees already have this information at different levels of detail. Some permittees, such as Fremont, Oakland, and San Jose, have detailed databases or maps of populations; other Permittees are small enough that municipal staff are familiar with where the populations are located; others rely on heat maps for a general understanding. The Permit allows flexibility in this reporting, but Permittees would be expected to incur a modest cost to collect and report this information.

Permittees must collectively prepare a BMP report that identifies what Permittees and stakeholders are doing to control discharges associated with unsheltered homelessness, and the effectiveness of these controls. Permittees are likely to incur costs for coordination and report preparation. In addition, Permittees must prepare two reports on their implementation of BMPs, including the portion(s) of the population reached and the gap—that is, the work left to be done.

MRP 2 required the Permittees to control illicit non-stormwater discharges, including discharges of trash and human waste from unsheltered homeless populations. To the extent that Provision C.17 simply refines and clarifies the pre-existing mandate, it is a continuing requirement, with an additional expectation for coordination and reporting as noted above.

Overall, the solutions to homelessness are broadly outside Permit requirements. A 2015 report found that effective implementation of such solutions, such as providing housing to unsheltered individuals, could reduce costs to government, because shifting costs from emergency services and the justice system use to housing and jobs would be cheaper and generate more revenue than the *status*

quo.[38] Thus, while there is a cost to implementing measures to address unsheltered homelessness, the overall effect of implementing effective measures, including those to control discharges of trash and human waste, could be to reduce costs to government.

Provision C.20 requires Permittees to develop a cost reporting methodology by December 31, 2022, and then to submit fiscal analyses annually starting in 2024. Permittees are expected to incur costs to collectively develop the methodology and then to implement it. In general, this provision requires tracking and reporting of information that should be available, but for which there will be needed internal coordination. The work to prepare a methodology allows flexibility to understand the form that cost information is available and develop efficient means for reporting. The work likely to be completed using existing Permittee staff resources and consulting assistance available within the programs.

Provision C.21 requires development of an asset management program to manage Permittee (i.e., public) hard assets (e.g., bioretention cells, pervious pavements, trash capture devices). The asset management plan is expected to improve the Permittees' understanding of the condition and performance of their stormwater infrastructure, to account for additional stressors related to climate change, and to identify cost factors to support more-accurate forecasting and budget development.

U.S. EPA's Water Finance Clearinghouse and the CSU Sacramento Office of Water Program's Environmental Finance Center (EFC) are conducting work to support stormwater asset management. The EFC has developed draft stormwater finance and asset management guidance and toolkits, including resources for estimating stormwater costs, and is supporting California municipal stormwater programs to test and refine the toolkit with the intent of using the results of asset management planning to support the development of stormwater utilities to fund stormwater programs.[39]

The Permittees have implemented measures to support asset management planning. They have mapped many of their hard assts (e.g., structural stormwater control measures) and regularly inspected them to determine their condition. They use modern data collection tools, including databases and GIS systems, to improve information collection and tracking efficiencies and improve their understanding of the condition and performance of their stormwater assets. The Water Board expects the Permittees' costs to comply with the Permit's

[38] Flaming et al., 2015. *Home not found: The cost of homelessness in Silicon Valley.* Destination Home and the County of Santa Clara.

[39] Odusoga, March 28, 2019. "Asset Management Storm Water Roundtable Presentation," U.S. EPA, slide 28.

asset management requirements to be mitigated to some degree by these efforts.

Asset management results in potential cost savings over time and may provide a sound basis for establishing utility fees to support sustained funding of stormwater programs, but the initial investment of resources and time can be high. The City of San Diego's much more comprehensive asset management plan (including, for example, hard assets like flood management infrastructure and soft assets like outreach materials) was developed over a period of about five years and cost approximately $2 million, not including staff time.[40] Since 2013, when the plan was finished, San Diego has spent as much or more on follow-up work, like expanding its asset inventory. $4 million is a significant investment, but for context, San Diego has a roughly $3 billion stormwater quality and flood management program over 18 years. There are also cost-saving benefits for an effective asset management program.[41]

San Diego's asset management plan is significantly larger in scope than that required by the Permit, which focuses on publicly owned hard assets. As a result, Permittee costs to develop asset management plans are expected to be substantially less, in part because, as noted above, they are primarily tracking and reporting on existing controls for which MRP 2 already required tracking and reporting efforts, and for which the Permittees have established systems to accomplish that work. As such, the asset management approach primarily will require organization of existing efforts with an additional incremental cost.

5. Costs of Not Implementing the Permit

While it is important to consider the cost of compliance, it is also important to consider the costs that would be incurred by not fully regulating or controlling MS4 discharges to receiving waters. The Water Boards have long recognized that water quality impairment negatively impacts the economy, while improved water quality can have a positive impact (see, for example, Order WQ 2000-11). The costs of not implementing the Permit are likely to be significant and could include adverse impacts to public health associated with illness from water contact recreation and ingestion of water with harmful levels of pathogens; increased threat of disease, including cancer, from consumption of fish containing harmful levels of mercury and PCBs; threats to public and private infrastructure, properties, and aquatic habitat from erosion and sedimentation; impacts to contact and non-contact water recreation, including swimming, boating, surfing, wind- and kite-surfing, wading, birding, walking, and hiking, associated with discharges of trash; impacts to property

[40] Region 3 Water Board Fact Sheet for Order No. R3-2019-0073, Citing personal communication with Drew Kleis, Deputy Director, City of San Diego Transportation and Storm Water Department Storm Water Division, April 22, 2019.

[41] URS Corporation. July 19, 2013. Transportation and Storm Water Department Storm Water Division: Watershed Asset Management Plan, City of San Diego. p.7.

values associated with the short- or long-term presence of pollutants in receiving waters, and associated impacts to the Bay Area quality of life, that includes a significant outdoor component engaged with the Bay Area's water bodies. Below, a few of these costs are discussed in more detail.

Impairments in water quality can lead directly to increased health care costs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[42] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[43] These numbers can likely be extrapolated to the Bay Area, where many beaches support significant contact recreation while at the same time exhibiting bacteria impairments. Thus, failure to bacteria controls could result in significant health expenses to the public, while implementing such controls could result in significant savings.

Urban runoff and its impact on receiving waters also place a cost on tourism. The California Division of Tourism has estimated that each out-of-state visitor spends $101 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999 due to bacteria exceedances, impacting beach visitation and undoubtedly impacting the local economy.

Similarly, proper trash management can save a municipality significant amounts of money in addition to providing water quality benefits. Even with the changes in recycling markets over the past few years, certain items, such as metals, remain profitable to divert from residential waste streams.[44] Similarly, adequate trash pickup and collection can cut down on complaints by residents and the resources associated with responding to them[45] and can also reduce the costs of maintaining full-trash capture devices.[46] Finally, source control methods, such as bans, taxes, or fees that reduce the use of certain items, can generate an income stream for local

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[42] Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa
Monica Bay. Santa Monica Bay Restoration Project.

[43] Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of
Treatment and Lost Wages for Beachgoers Who Get Sick.

[44] Brosnahan, Cori. "Despite Recycling Success, S.F.'s Zero Waste Goal Remains Elusive," *San Francisco Public Press* (Nov. 6, 2020).

[45] Daly, Clara-Sophia. "Newsom's experiment to get rid of public trash bins in San Francisco seems to have failed," *Mission Local* (March 21, 2021).

[46] San Francisco Estuary Partnership, "Bay Area-wide Trash Capture Demonstration Project," (May 8, 2014), pp. 39-40.

governments, reduce full trash capture maintenance costs, and reduce tipping fees for disposing of the materials removed from the devices.[47]

As noted above, the costs of not implementing the Permit are likely to be significant, including economic and non-economic: adverse impacts to public health associated with illness from water contact recreation and ingestion of water with harmful levels of pathogens; increased threat of disease, including cancer, from consumption of fish containing harmful levels of mercury and PCBs; threats to public and private infrastructure, properties, and aquatic habitat from erosion and sedimentation; impacts to contact and non-contact water recreation, including swimming, boating, surfing, wind- and kite-surfing, wading, birding, walking, and hiking, associated with discharges of trash; impacts to property values associated with the short- or long-term presence of pollutants in receiving waters, and associated impacts to the Bay Area quality of life, that includes a significant outdoor component engaged with the Bay Area's water bodies.

The Santa Clara Valley Open Space Authority, focusing on open space, estimated that ecosystem services in Santa Clara County provide an estimated benefit of $1.6 to 3.8 billion annually, or about $1,900 to 4,600 per acre, noting they were provided by "natural capital like…wetlands, rivers and streams…as well as urban parks and open spaces.[48] In the absence of the Permit, as noted above, those services are likely to be impaired, resulting in reduced economic value to Santa Clara County and the Bay Area. Extrapolating that estimate to the other four counties with MRP Permittees shows a potentially even more significant economic impact from not implementing the Permit.

The Center for Neighborhood Technology issued a 2010 guide to recognizing the value of one component of the Permit's program, green infrastructure.[49] The guide includes descriptions of impacts in the absence of GI implementation, including higher costs for alternate means of accomplishing the benefits, reduced community livability, and impacts to public health.

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[47] EOA, City of Milpitas Trash Capture Feasibility Study, 2017, pp. 1, 13 (estimating reduction achieved by plastic bag ban and achievable by polystyrene ban.); see also Stieb, Matt. "Maine Makes U.S. Recycling Actually Work Again," *New York Magazine* (July 21, 2021).

[48] Santa Clara Valley Open Space Authority, 2014. *Healthy Lands and Healthy Economies: Nature's Value in Santa Clara County.* https://www.openspaceauthority.org/system/user_files/Documents/NaturesValue_SCC_int.pdf. Santa Clara Valley Open Space Authority, 2018. *Healthy Lands and Healthy Economies: Natural Capital in Santa Clara, Santa Cruz, and Sonoma Counties.* https://www.openspaceauthority.org/system/user_files/Documents/HLHE%20-%20Regional%20Report.pdf.

[49] Center for Neighborhood Technology, 2010. *The Value of Green Infrastructure: A guide to recognizing its economic, environmental and social benefits. https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf.*

6. Benefits associated with implementing the Permit

Permit implementation must also be viewed in terms of its value, both quantitative and qualitative, to the public. One way of measuring this value quantitatively is by estimating how willing residents are to pay for improvements to water quality. However, benefits from stormwater controls go beyond improving water quality. They include reducing the urban heat island effect, helping to make the water supply more reliable and cost effective, and supplying ecosystem services. These benefits are discussed in more detail below.

a. Public Willingness to Pay for Water Quality Improvement

U.S. EPA estimated household willingness to pay for such improvements to be $158 - 210 annually or $13 - $17.50 monthly.[50] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento, study corroborates U.S. EPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180, or $15 monthly.[51] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Los Angeles voters' 2018 approval of Measure W, which imposes a parcel tax that is projected to raise approximately $300 million per year to clean stormwater runoff, promote capture and use projects, and add urban green space, is another indication of willingness to pay for water quality improvement. Measure W, which imposes an impervious surface-based fee, was estimated to cost a typical household about $83/year.[52] That cost is necessarily in addition to existing expenditures in LA for clean water, which include, but are not limited to, urban runoff management program costs of up to $67 per household. This is consistent with the U.S. EPA and California State University, Sacramento findings above.

A study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to

[50] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. p. 68793.

[51] State Water Board, 2005. NPDES Stormwater Cost Survey. p. iv.

[52] McNary, Oct. 19, 2018. *Measure W: A needless tax on rain, or LA's best solution to drought?* LAist. https://laist.com/news/measure-w-a-new-tax-on-landowners-to-catch-las-rain.

$7.4 billion, while benefits could reach $18 billion.[53] Costs are anticipated to be borne over many years – probably ten years at least. Thus, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by U.S. EPA, which found that the benefits of implementation of its Phase II stormwater rule would also outweigh the costs.[54]

b. Urban Heat Island Mitigation

Installing green infrastructure mitigates urban heat island effects, with greater returns on investment for installations located in areas lacking tree canopies and green spaces. In urban areas, buildings and pavement retain heat, making them hotter than surrounding non-urban areas, known as the urban heat island effect. Climate change will continue to exacerbate urban heat island effects, but trees and vegetation can decrease local temperatures, particularly if they are distributed throughout an area. Reduced temperatures during hot weather not only make it more comfortable for people to recreate outside, but can also save lives during extreme heat events. The San Francisco Estuary Institute found that if Los Angeles County had tree coverage at 40 percent, as opposed to the baseline of 16 percent, during a September 2010 dry Santa Ana event, there would have been a 29 percent reduction in mortality, equivalent to saving 23 lives. In Los Angeles, De Guzman et al. (2020) found that relative to the average mortality rate, during an average five-day heat wave in Los Angeles County there are 4.1 percent more deaths on the first day and 11.9 percent more deaths on the fifty day.[55] While the study only modeled mortality, it can reasonably be expected that hospitalizations and health conditions brought on by heat stress would be reduced, as well. In addition to trees, other GSI, such as bioswales, rain gardens, and green roofs can also reduce temperatures.[56]

Installing green infrastructure in economically disadvantaged areas may have additional benefits. In metropolitan areas nationwide, neighborhoods with lower median household incomes are associated with less urban tree cover.[57] In areas where the federal government historically redlined, current average incomes tend to be lower and temperatures tend to be hotter because of historic

[53] LA Regional Water Board, 2004. Alternative Approaches to Stormwater Control.

[54] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

[55] De Guzman, et al., 2020. *Rx for Hot Cities: Climate Resilience Through Urban Greening and Cooling in Los Angeles.* TreePeople. https://www.treepeople.org/wp-content/uploads/2020/09/RX-for-hot-cities-report.PDF

[56] Georgetown Climate Center. ND. Green infrastructure strategies and techniques. https://www.gerogetownclimate.org/adaptation/toolkits/green-infrastructure-toolkit/green-infrastructure-strategies-and-techniques.html

[57] Schwarz et al., 2015. *Trees grow on money: Urban tree canopy cover and environmental justice.* PLoS ONE 10(4): e0122051. https://doi.org/10.1371/journal.pone.0122051

disinvestment in those neighborhoods.[58] Deaths from heat waves are disproportionately suffered by the poor.[59] Accordingly, green infrastructure projects in economically disadvantaged areas could help to alleviate longstanding inequities and improve health outcomes for particularly vulnerable populations.

c. Water Supply Cost Savings and Co-Benefits

Stormwater capture can be an effective way for Permittees to achieve the goals of the CWA and Permit requirements by preventing stormwater and associated pollutants from discharging to receiving waters, although Bay Area soils with limited infiltration rates can limit the applicability of measures that rely substantially on infiltration. Stormwater capture has also become the focus of intense interest during California's current drought and in the wake of California's most-recent 2012-2019 drought. The Water Boards have recognized the importance of treating stormwater as a valuable resource where capture and use can result in water supply cost savings, as well as multiple other benefits within a watershed. Among other efforts, the State Water Board's Strategy to Optimize Resource Management of Stormwater (STORMS) seeks to promote stormwater capture and use. STORMS' recent 2018 report, *Enhancing Urban Runoff Capture and Use*, points out that among a variety of benefits, "stormwater capture can also reduce reliance on imported water from distant sources, which reduces inter-basin (or inter-region) transfers and polluted runoff. Stormwater supports the fit-for-purpose water supply concept by satisfying less-sensitive water demands, such as certain household, landscaping, and commercial needs, with mildly polluted water. Runoff from roads and driveways can be captured and harvested locally using distributed hybrid systems (for example, bioretention with an underdrain that feeds a cistern used for irrigation) configured to provide non-potable water for human use."[60]

The Permit supports investment in infrastructure to create a resilient local water supply. The potential for water usage from stormwater is significant, with Diringer et al. (2020) from the Pacific Institute estimating that stormwater capture from paved surfaces and rooftops in the urbanized Bay Area and Southern

[58] Hoffman, et al., 2020. *The effects of historical housing policies on resident exposure to intra-urban heat: a study of 108 U.S. urban areas.* Climate. https://www.mdpi.com/2225-1154/8/1/12/htm

[59] Kesslen, Ben. "Heat waves fall hardest on poor and elderly, experts say," *NBC News* (July 20, 2019); Kaplan, Sarah, "Heat waves are dangerous. Isolation and inequality make them deadly," *Washington Post* (July 21, 2021).

[60] State Water Board, April 10, 2018. STORMS: Projects 1a Promote Stormwater Capture and Use and 1b Identify and Eliminate Barriers to Stormwater Capture and Use. Products 1 – CSU Sacramento. Final Report: Enhancing Urban Runoff Capture and Use. pp. 18-19/

California could add 420,000 to 630,000 acre-feet in average annual water supply, or about 6 to 10 percent of annual water usage in those areas in 2014.[61]

The Permit gives Permittees the flexibility to develop multi-benefit stormwater management projects that will improve water quality while also providing benefits such as recharging of groundwater basins for local water supply and implementation of LID and green streets policies. Shimabaku et al. (2018) from the Pacific Institute emphasizes that effective urban stormwater capture provides an opportunity to address multiple benefits, including flood control, water quality impairments, improving water supply reliability, providing habitat, reducing urban temperatures, reducing energy use, creating community recreation spaces, and increasing property values.[62]

Diringer et al. analyzed stormwater capture project costs and benefits as they affect the cost of an acre-foot of water. They found that failing to consider the effects of co-benefits results in inflated net project costs. They gathered data from rounds 1 and 2 of Prop 1E and Prop 84 project proposals. Of a total of fifty projects, 26 addressed urban runoff and 24 dealt with non-urban runoff. The authors found that after accounting for the projects' benefits, the net levelized cost for urban stormwater capture projects decreased from $1,030/acre-foot to $150/acre-foot, with some projects yielding net benefits. Monetized benefits considered in their calculation included flood damage reduction, water quality, energy savings, community recreation, public use, property values, habitat value, CO_2 equivalents, and avoided costs. Because many projects reported limited benefits categories, the overall cost per acre-foot would likely be even lower than $150 when other cobenefits are considered.

d. Ecosystem Services Benefits

In addition to the foregoing, there are various other environmental benefits resulting from the Permit. For example, the 2018 STORMS report describes a range of benefits of capture and use, suggesting that "designing stormwater infrastructure to directly support ecosystems broadens the traditional approach to stormwater management. In this broader sense, retained stormwater can be put into soil where soil biota, macrophytes, and stream interflow systems improve water quality and ecosystems supported by baseflow or high groundwater. Ecosystem benefits include habitat improvement, increased food sources, carbon sequestration, pollutant uptake, reduced ozone, and reduced heat island effects…. Improved baseflow results in decreased water temperatures and prolonged dry weather flows, and increased amounts and

[61] Diringer et al., March 24, 2020. *Economic evaluation of stormwater capture and its multiple benefits in California.* PLoS ONE 15(3): e0230549.

[62] Shimabuku et al., June 2018. *Stormwater capture in California: Innovative policies and funding opportunities.* Pacific Institute. p.2.

types of soil biota will aid in carbon sequestration and pollutant uptake. Local stormwater capture can also lead to energy-saving schemes that (1) capture water before it becomes contaminated with the pollutants on streets and in sewers; (2) rely on energy-efficient processes for removing contaminants; (3) treat water only to the extent necessary for intended use (fit-for-purpose water); and (4) obviate the need for diversion and large, centralized, energy-intensive treatment and distribution approaches."[63]

e. Other Benefit Considerations

The Pacific Institute and the University of Santa Barbara's Bren School of Environmental Science and Management framed the topic of moving towards multiple benefit approaches for water management. The organizations plan to develop a systematic framework for identifying and incorporating the costs and benefits of water management strategies into decision making. They find a broader consideration of the benefits associated with water management decisions will achieve broader project support, avoid unintended consequences, optimize resources and cost sharing, and increase transparency."[64]

Such a framework would support a more robust consideration of potential economic benefits of stormwater management projects not considered in this economic analysis, such as:

- Reduced frequency, area, and impact of flooding. Stormwater BMPs that reduce runoff volumes and consequently flood volumes. The decrease in potential damage provides economic benefit.
- Reduced cost of public infrastructure. On-site volume control and stormwater BMPs can downsize or eliminate stormwater conveyance infrastructure, and reduce costs to address downstream erosion and sedimentation, resulting in reduced costs.
- Reduced water treatment costs. A reduction in runoff volume can reduce downstream costs of water treatment, while also increasing the value of riparian properties and the utility of recreational visitors. Stormwater BMPs that include infiltration can improve and sustain stream baseflow conditions to better maintain downstream habitat.65
- Increased property values where GSI and LID projects are implemented. In a series of studies listed in a 2013 U.S. EPA report, the benefit-to-cost ratios of

[63] State Water Board, April 10, 2017. *Enhancing Urban Runoff Capture and Use.* STORMS Projects 1a and 1b.

[64] Pacific Institute and Bren School, April 2019. *Executive Summary: Moving toward a multi-benefit approach for water management.* UCSB. pp. II-III.

[65] WERF, 2010. *Using rainwater to grow livable communities.* Web.

> four LID/GSI projects in Sun Valley were listed. All four showed a ratio of greater than 1, indicating that, over the 50-year evaluation period, the benefits of these projects are higher than their cost.66

Considering the foregoing, the Water Board finds that the requirements in this Order are reasonably necessary to protect beneficial uses and the economic cost information supports protecting those beneficial uses.

V. RELEVANT STATUTES, REGULATIONS, PLANS AND POLICIES

A. Legal Authorities

This Order is issued pursuant to CWA section 402 and implementing regulations adopted by the U.S. EPA and CWC chapter 5.5, division 7 (commencing with section 13370). This Order serves as an NPDES permit for point source discharges to surface waters. This Order also serves as waste discharge requirements pursuant to CWC article 4, chapter 4, division 7 (commencing with section 13260).

In addition to the legal authority citations below, they are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: (A) Control through ordinance …or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity; (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate

[66] U.S. EPA, August 2013. *Case studies analyzing the economic benefits of low impact development and green infrastructure programs*, EPA 841-R-13-004.

storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "[n]otwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

B. State and Federal Regulations, Policies, and Plans

1. Water Quality Control Plans – San Francisco Bay and Sacramento and San Joaquin River Basins

The CWA requires the Water Board to establish water quality standards for each water body in its region. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect beneficial uses, and an antidegradation policy to prevent degrading of waters. The Water Board adopted the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), which designates beneficial uses, establishes water quality

objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan.

Section 4.14, the Urban Runoff Management, Comprehensive Control Program section, of the Basin Plan, requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan's comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. Pursuant to CWC sections 13263 and 13377, the requirements in this Order implement the Basin Plan.

Section 4.8 - Stormwater Discharges of the Basin Plan established the Water Board's phased approach towards attainment of water quality objectives in waters that receive stormwater discharges and recurrent permit term consideration of water quality based effluent limitations, wherein the Water Board will first require entities subject to NPDES permits for stormwater discharges to complete implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the maximum extent practicable. NPDES permits for stormwater discharges will require completion of technically and economically feasible control measures as soon as possible. If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions which may require implementation of additional control measures. In such circumstances, the Water Board may consider dischargers' proposed schedules for identification and implementation of additional control measures designed to attain water quality objectives. Such schedules shall be as short as practicable and will only be considered for inclusion in permits when a discharger has demonstrated the following:

(a) A diligent effort to quantify pollutant levels and the sources of the pollutant in stormwater discharges; and

(b) Documentation of completion of implementation of all technically and economically reasonable control measures.

The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Region 5 Basin Plan) similarly includes water quality standards for each water body it covers, including total maximum daily loads. It contains requirements for MS4 permittees that discharge into waters covered by the plan, such as the East Contra Costa Permittees.

2. Ocean Plan

In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amended Ocean Plan on October 16, 2012, and it was approved by the Office of Administrative Law and U.S. EPA. The Ocean Plan is applicable, in its entirety, to ocean waters of the state. In order to protect beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Pursuant to CWC sections 13263 and 13377, the requirements of this Order implement the Ocean Plan.

The Ocean Plan prohibits the discharge of waste to designated Areas of Special Biological Significance (ASBS). ASBS are ocean areas designated by the State Water Board as requiring special protection through the maintenance of natural water quality. The California Ocean Plan states that the State Water Board may grant an exception to California Ocean Plan provisions where the State Water Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served. In 2012, the State Water Board adopted Resolutions 2012-0012 and 2012-0031 (ASBS Exception), which grant an exception to the Ocean Plan prohibition on discharges to ASBS for a limited number of applicants, including San Mateo County for stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS. The ASBS Exception contains “Special Protections” to maintain natural water quality and protect the beneficial uses of the ASBS. In order to legally discharge into an ASBS, San Mateo County must comply with the terms of the Special Protections and obtain coverage under this Order. This Order incorporates the terms of the Special Protections for San Mateo’s discharges into the ASBS.

3. Inland Surface Waters, Enclosed Bays, and Estuaries Plan

The State Water Board adopted various provisions that collectively which make up the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) of California. Part 1 Trash Provisions was adopted by the State Water Board on April 7, 2015 through Resolution No. 2015-0019. OAL approved it on December 2, 2015 and U.S. EPA approved it on January 12, 2016. Part 2 Tribal Subsistence Beneficial Uses and Mercury Provisions was adopted by State Board on May 2, 2017 through Resolution No. 2017-0027. OAL approved it on June 28, 2017 and U.S. EPA approved it on July 14, 2017. Part 3 Bacteria Provisions and Variance Policy was adopted by State Board on August 7, 2018 through Resolution No. 2018-0038. OAL approved it on February 4, 2019 and U.S. EPA approved it on March 22, 2019. This Order implements the ISWEBE.

4. Statewide Trash Provisions

To control trash, the State Water Board on April 7, 2015, adopted trash provisions into both the Ocean Plan and the ISWEBE. Together, they are collectively referred

to as "the Trash Amendments." The Trash Amendments: (1) establish a narrative water quality objective for trash, (2) establish a prohibition on the discharge of trash, (3) provide implementation requirements for permitted storm water and other discharges, (4) set a time schedule for compliance, and (5) provide a framework for monitoring and reporting requirements. The Water Board is required to implement the new Trash Provisions through NPDES permits for MS4 permits. The water quality objective established by the Trash Provisions serves as a water quality standard federally mandated under CWA section 303(c) and the federal regulations (33 U.S.C. § 1312, 40 CFR § 131.). This water quality standard was specifically approved by U.S. EPA following adoption by the State Water Board and approval by the Office of Administrative Law. This Order implements the Trash Amendments.

5. Enclosed Bays and Estuaries Plan

In 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality Provisions. It is was most recently amended on June 5, 2018 and became effective on March 11, 2019. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries. This Order implements the Sediment Quality Provisions to the extent they are applicable.

6. National Toxics Rule (NTR) and California Toxics Rule (CTR)

U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995 and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, U.S. EPA adopted the CTR. The CTR promulgated new toxics criteria for California and incorporated the previously adopted NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001. These rules contain water quality criteria for priority pollutants. This Order is consistent with NTR and CTR

7. Antidegradation Policy

Federal regulations at 40 CFR section 131.12 require that state water quality standards include an antidegradation policy consistent with federal requirements. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California"). Where the federal antidegradation policy is applicable, the State Water Board has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy.[67] The Basin Plan implements both the State and federal antidegradation policies. A permitted discharge must be consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16. These policies require that

[67] State Water Board Order WQ 86-17 (Fay), pp. 16-19.

high quality waters be maintained unless degradation is justified based on specific findings. The Water Board finds that the permitted discharges authorized by this Order are consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16, as set forth herein.

In the context of this Order, a federal NPDES permit, compliance with the federal antidegradation policy requires consideration of the following. First, the Water Board must ensure that "existing instream uses and the level of water quality necessary to protect the existing uses" are maintained and protected.[68] Second, if the baseline quality of a waterbody for a given constituent "exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected" through the requirements of the Order unless the Water Board makes findings that: (1) any lowering of the water quality is "necessary to accommodate important economic or social development in the area in which the waters are located"; (2) "water quality adequate to protect existing uses fully" is assured; and (3) "the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control" are achieved.[69] Under this second tier review, the Board may identify the waters for protection through the public process of a permitting action, as it is here. Before allowing any lowering of high quality water, the Board must conduct an analysis of alternatives that evaluates practicable alternatives that would prevent or lessen the degradation associated with the discharges permitted. In the context of 40 CFR § 131.12(a)(2)(ii), practicable means "technologically possible, able to be put into practice, and economically viable."[70]

The Order must also comply with any requirements of State Water Board Resolution No. 68-16 beyond those imposed through incorporation of the federal antidegradation policy.[71] Resolution No. 68-16 requires findings that any lowering of water quality is "consistent with the maximum benefit to the people of the State" and "will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies" and further that the discharge is subject to "waste discharge requirements which will

[68] 40 CFR § 131.12(a)(1). This provision has been interpreted to mean that, "[i]f baseline water quality is equal to or less than the quality as defined by the water quality objective, water quality shall be maintained or improved to a level that achieves the objectives." (State Water Board, Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), p. 4.)

[69] 40 CFR § 131.12(a)(2).

[70] 40 CFR § 131.3(n).

[71] See State Water Board Order WQ 86-17 (Fay), p. 23, fn. 11.

result in the best practicable treatment or control of the discharge."[72] The baseline quality considered in making the appropriate findings is the best quality of the water since 1968, the year of adoption of Resolution No. 68-16, or a lower level if that lower level was allowed through a permitting or other regulatory action, such as establishing a water quality objective, that was consistent with the federal and state antidegradation policies.[73]

Here, the baseline water quality is the level authorized under the previous permit consistent with federal and state antidegradation policies. To the extent some water bodies are high quality waters with regard to some constituents, the Water Board allowed limited degradation of such waters in the Previous Permit. This Order does not authorize lowering water quality as compared to the level of discharge authorized in the Previous Permit such that no antidegradation analysis is required. The Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), provides that no antidegradation analysis is required where the regional water board has no expectation that water quality will be reduced by the permitting action. Nevertheless, the Water Board undertakes herein an antidegradation analysis, assuming, without deciding, that the baseline for antidegradation analysis is the best water quality since 1968.[74]

a. The Board Is Not Required to Make Waterbody by Waterbody and Pollutant by Pollutant Antidegradation Findings:

The Water Board finds that it is not required to conduct a waterbody by waterbody and pollutant by pollutant antidegradation analysis for this Order. The Water Board makes this finding for two reasons. First, APU 90-004, which

[72] State Water Board Resolution No. 68-16, Resolve 2. Best practicable treatment or control is not defined in Resolution No. 68-16; however, the State Water Board has evaluated what level of treatment or control is technically achievable using "best efforts" (See State Water Board Orders WQ 81-5 (City of Lompoc), WQ 82-5 (Chino Basin Municipal Water District), WQ 90-6 (Environmental Resources Protection Council).). A Questions and Answers document on Resolution No. 68-16 by the State Water Board states as follows: "To evaluate the best practicable treatment or control method, the discharger should compare the proposed method to existing proven technology; evaluate performance data, e.g. through treatability studies; compare alternative methods of treatment or control; and/or consider the method currently used by the discharger or similarly situated dischargers . . .The costs of the treatment or control should also be considered . . . " (Questions and Answers, Resolution No. 68-16, State Water Board (Feb. 16, 1995), pp. 5-6.).

[73] APU 90-004, p.4. The baseline for application of the federal antidegradation policy is 1975, which is the date used in 40 CFR § 131.3(e) to define existing uses of a waterbody. For state antidegradation requirements, see also *Asociacion de Gente Unida por el Agua (AGUA) v. Central Valley Water Board* (2012) 210 Cal.App.4th 1255,1270. The baseline for the application of the state antidegradation policy is generally the highest water quality achieved since 1968, the year the policy was adopted.

[74] For ease of analyses, 1968 is used herein. As stated above, a permitting action with appropriate antidegradation findings allowing degradation may establish a new baseline, as occurred under the Previous Permit. In addition, the appropriate baseline is determined by the date on which a policy establishing the level of water quality to protect was effective (Resolution No. 68-16, Resolve 1.). The Basin Plan has been updated and amended several times since it was first adopted to include new or revised water quality objectives.

specifies a waterbody by waterbody and pollutant by pollutant analysis for some permitting actions, does not address permitting for diffuse MS4 discharges. Second, APU 90-004 itself indicates that a waterbody by waterbody and pollutant by pollutant analysis is only required when conducting a "complete" antidegradation analysis; a complete analysis is not required where any reduction in water quality is temporally limited and would not result in any long-term deleterious effects on water quality."[75] Here, the Order requires compliance with the non-stormwater discharge prohibition, receiving water limitations, TMDL requirements designed to bring MS4 discharges and receiving waters into compliance with water quality objectives, and other requirements for pollutants of concern. The discussion below elaborates on these two reasons.

i. APU 90-004 is a State Water Board internal guidance document establishing methods for implementing the federal and state antidegradation policies in NPDES permits. APU 90-004 suggests that an antidegradation analysis requires a pollutant by pollutant and waterbody by waterbody analysis in certain contexts, specifically where the discharge at issue is a discrete discharge from a singular facility. However, APU 90-004 has limited value when considering antidegradation in the context of MS4 discharges from diffuse sources, conveyed through multiple outfalls, with multiple pollutants impacting multiple water bodies within region.[76] This interpretation is sensible for this Order, given that reliable data on the baseline water quality is not readily available since 1968 for a region that spans about 4,600 square miles, including hundreds of miles of coastline, hundreds of rivers and streams, tens of thousands of acres of wetlands, lakes, and impoundments, and the 1,600-square-mile San Francisco Bay Estuary. The Water Board estimates that there are thousands or tens of thousands of combinations of waterbodies and pollutants that could potentially require individual consideration in the Region.[77] The antidegradation analysis for

[75] APU 90-004, p. 2.

[76] The State Water Board held so in Order WQ 2021-0052-EXEC. In *Natural Resources Defense Council v. State Water Resources Control Board*, the superior court did not invalidate this particular conclusion. (Super. Ct. Los Angeles County, No. BS156962, Order, March 29, 2021). The State Water Board's interpretation of its own guidance is entitled to deference. See also State Water Board Order WQ 2018-0002, p. 77 (reaching the same conclusion for agricultural discharges).

[77] See Basin Plan Chapter 2, Beneficial Uses; Surface Water Body Beneficial Use Tables at: https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/amendments/WaterBodies/Documt%20tables%20FINAL%20new%20cover%20BOOKMARKS%204-6-2012.pdf**;** and Chapter 3, Water Quality Objectives. While the Basin Plan designates beneficial uses for many waterbodies in the Region, there are thousands or tens of thousands of water bodies (e.g., headwaters creeks, isolated seasonal wetlands, seeps, and ponds) for which beneficial uses have not been specifically designated. Thus, the number of potential combinations of waterbodies and pollutants that could require individual consideration could be substantially higher than estimated here. If it could be done at all, a waterbody by waterbody antidegradation analysis would be extremely time-consuming and take years to complete.

this Order instead relies on a general assessment of the existing water quality data that is reasonably available and makes findings regarding the social and economic benefits and costs of permitting stormwater and non-stormwater MS4 discharges in accordance with the Order terms.

ii. The Water Board additionally finds that even if APU 90-004 applies to the issuance of this Order, it requires at most a "simple" antidegradation analysis. APU 90-004 contemplates that a "simple" antidegradation analysis is appropriate under specified circumstances. In particular, as stated above, APU 90-004 states that a simple antidegradation analysis is allowed when a "Regional Board determines the reduction in water quality is temporally limited and will not result in any long-term deleterious effects on water quality" or where a "Regional Board determines the proposed action will produce minor effects which will not result in a significant reduction of water quality."[78] Here, the Order continues the requirements of the Previous Permit or imposes equivalent or more protective requirements such that the water quality established under the prior permit is expected to be maintained and improved. Generally, the Previous Permit instituted controls such as a prohibition on non-stormwater discharges that are a source of pollutants through the MS4s, receiving water limitations, WQBELs based on TMDLs, and monitoring programs to help ensure that water quality will be maintained at the level it is now, or improve it, and this new Order institutes further controls. Any degradation permitted while controls are continuing to be implemented and refined will be temporally limited and will not result in any long-term deleterious effects on water quality.[79] Such a finding would not be appropriate if, for example, the Order declined to require long-term compliance with water quality objectives, but that is not the case here.

APU 90-004 does not provide guidance on the scope and content of a simple antidegradation analysis. The Water Board determines that the findings made below meet the requirements of a simple antidegradation analysis and are also consistent with an antidegradation analysis done at a generalized level, as appropriate for this Order. With these findings, based on the information available to it and using its best professional judgment, the Water Board concludes that the discharge will not be adverse to the intent and purpose of the State and federal antidegradation policies.

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[78] APU 90-004, p. 2. In an unpublished decision, the Second District Court of Appeal affirmed that a simple antidegradation analysis applied to the 2012 Los Angeles County MS4 permit (*Natural Resources Defense Council v. State Water Resources Control Board* (2018) 2018 WL 6735201, at *6).

[79] The Order's requirements put the Permittees on a path to achieving TMDL wasteload allocations for impairing pollutants and meet water quality objectives, consistent with what the TMDL implementation schedules established as feasible and appropriate. For impairing pollutants like trash for which there is no TMDL, the Order requires 100 percent trash load reduction or no adverse impact to receiving waters from trash within the term of the Order.

b. The Water Board Makes the Following Antidegradation Findings:

The discharges permitted in the Order are consistent with the antidegradation provisions of 40 CFR section 131.12 and Resolution No. 68-16. The Water Board's conclusion is based on the following analysis.

i. Water bodies that do not meet water quality objectives (water bodies that are not high quality):

Many of the waters within the area covered by this Order are impaired by multiple pollutants discharged through MS4s and are not high quality waters with respect to these pollutants. They are not attaining water quality objectives necessary to protect beneficial uses. This is evidenced in part by the fact that many of these waterbodies are listed on the State's CWA section 303(d) List of impaired waters and the Water Board has established numerous TMDLs to address many of the impairments.[80] Under both federal and state antidegradation policies, these receiving waters are not considered "high quality" waters for these pollutants. In most cases, there are insufficient data to determine whether the waters addressed by this Order were impaired as early as 1968, but limited available data shows impairment dating back for more than several decades.[81]

For receiving waters that are not high quality waters, the federal antidegradation policy requires that regulatory actions ensure that existing instream uses and the level of water quality necessary to protect the existing uses is maintained and protected (40 CFR § 131.12(a)(1).). The Order ensures that existing instream (beneficial) uses and the level of water quality necessary to protect the existing uses is maintained and protected through requirements to not cause or contribute to exceedances of water quality

[80] It should be noted that impaired waters, or waters that are not high quality, are not confined to those listed only on the 303(d) List. There are several reasons for this, including, but not limited to, the fact that the Water Board's ability to comprehensively evaluate the water quality of each of the substantial numbers of waterbodies and waterbody segments within the Region's 4,600 square miles is limited by available staff resources and data sufficient to justify a 303(d) listing. Accordingly, the 303(d) List itself does not reflect all of the waterbodies in the Region that are impaired or fail to meet water quality standards.

[81] For example, the 1975 Water Quality Control Plan San Francisco Bay Basin Part II points to poor water quality in the Bay for numerous parameters. (See p. 14-5 to 14-18.) There was, among other problems, widespread toxicity, heavy metals, periodic fish kills, and low dissolved oxygen. (*Ibid*.) The South Bay had some of the poorest bacteriological quality, with a mean coliform concentration of 20,000 MPN/ml (the then-water quality objective for total coliform for contact recreation was 240 MPN/ml). (*Id*, p. 14-9; 1975 Water Quality Control Plan San Francisco Bay Basin Abstract, p. 21.)

objectives in the receiving water and to restore impaired water bodies.[82] This is achieved through the following provisions:

(1) The Order requires compliance with receiving water limitations to meet water quality standards in the receiving water through timely implementation of control measures and other actions specified in Provisions C.2 through C.24. The Order requires implementation of specific structural and non-structural stormwater and non-stormwater controls, consistent with TMDL implementation plans, including an adaptive implementation strategy, that are demonstrated to have a reasonable assurance of achieving compliance with receiving water limitations and that must be implemented in accordance with the deadlines set forth in the Permit.

(2) The Order requires Permittees to comply with WQBELs and/or receiving water limitations consistent with the assumptions and requirements of TMDL WLAs assigned to MS4 discharges established in TMDLs to restore water quality sufficient to protect the beneficial uses of the impaired water bodies.

(3) The Order requires Permittees to effectively prohibit non-stormwater discharges that are a source of pollutants through the MS4 to receiving waters.

(4) The Order includes requirements for monitoring and reporting designed to identify pollutants in receiving waters and the effectiveness of implemented measures to meet water quality objectives.

These provisions are collectively designed to halt any further degradation of impaired water bodies and improve the quality of such waters to a level protective of existing uses over a time schedule that is as short as possible. The antidegradation policies do not explicitly or implicitly override the authority and discretion the Clean Water Act and the Water Code grant to the Water Board as to how it structures a permit to ensure water quality necessary to protect beneficial uses. The law does not require immediate restoration of impaired water bodies nor does it require an immediate prohibition of discharges that contribute to an exceedance in the waterbody. Rather, federal regulations at 40 CFR section 122.47 allow NPDES permits, including MS4 permits, to have compliance schedules. Similarly, Water Code section 13263, subdivision (c), authorizes the Water Board to include a time schedule for achieving water quality objectives in waste discharge requirements. Where a TMDL has been established, CWC section 13242

[82] These actions also ensure that discharges will not unreasonably affect present and anticipated beneficial uses and will not result in water quality less than water quality objectives, as required by Resolution No. 68-16.

states that the TMDL implementation plan, as incorporated into the water quality control plan, shall include a time schedule for actions to be taken. When issuing waste discharge requirements, CWC section 13263 requires regional boards to implement any relevant water quality control plans that have been adopted. Certainly, water quality objectives must be achieved; but the law, as cited above, recognizes and allows for the fact that it can take time to restore or achieve the objectives.[83] This period of time before improvement may be as long as multiple years. This is not contrary to the authorities for compliance schedules stated above and is not contrary to the antidegradation policies.[84]

ii. High quality water bodies:

Some of the waterbodies within the area covered by the Order may be high quality waters with regard to some pollutants. Some of these waterbodies may be currently high quality as compared to currently applicable objectives. Others of these waterbodies may be currently impaired, but may be classified as high quality waters because they were historically high quality for certain pollutants. MS4 discharges of stormwater and non-stormwater into such water bodies may have resulted in lowering of the quality of the water bodies since 1968 with regard to the pollutants in the discharge.

For high quality water bodies,[85] the Water Board finds as follows:

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[83] Additionally, while MS4 permits must include a technology-based standard of effectively prohibiting non-storm water discharges through the MS4 and reducing pollutants in the discharge to the MEP, requiring strict compliance with water quality standards (e.g., by requiring immediate compliance with receiving water limitations or water quality based effluent limitations) is at the discretion of the permitting agency (33 U.S.C. § 1342(p)(3)(B); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166-67). This Order imposes water quality-based effluent limitations to implement TMDL WLAs and requires compliance with receiving water limitations for all constituents in the MS4 discharges. The fact that the Board also allows reasonable time schedules to achieve compliance with the effluent limitations and receiving water limitations is not contrary to the law for this additional reason.

[84] With regard to waterbodies that are not high quality, the antidegradation policies do not require socioeconomic findings justifying any continued degradation of such waterbodies that may occur while the Permittees implement requirements in accordance with a compliance schedule. Even if such findings were required, the Water Board finds that this potential, limited, and temporary further lowering of water quality is justified for the same reasons articulated below related to high quality water bodies.

[85] The quality of some currently high quality waters that are close to or at objectives may degrade below water quality objectives temporarily while Permittees implement appropriate controls in accordance with the compliance schedules in the Order and some historically high quality waters may stagnate or continue to degrade below water quality objectives during the same period. The Water Board finds that the potential, limited, and temporary lowering of water quality below the objectives is authorized by 40 CFR § 122.47 and the time schedule provisions of the Water Code set out above in the subsection entitled "Water bodies that do not meet the water quality objectives (water bodies that are not high quality)" , and, to the extent any findings are required under the antidegradation policies, is justified for the same reasons articulated in this subsection entitled "High quality water bodies."

(1) Practicable Alternatives: The Water Board has evaluated a range of practicable alternatives that would prevent or lessen any degradation associated with permitted MS4 discharges to high quality waters. These alternatives are discussed below.

(a) Alternative 1 - Complete prohibition on some or all pollutants in MS4 non-stormwater discharges to high quality waters: This alternative would prohibit MS4 discharges of some or all pollutants in non-stormwater to high quality receiving waters. By eliminating these discharges, pollutants from non-stormwater discharges would not reach high quality receiving waters during dry weather and thus not cause any degradation. In high quality water areas, this alternative could require the Permittees to either divert all non-stormwater to a facility for treatment, or retain all non-stormwater through retention basins, infiltration galleries, and other controls that would prevent non-stormwater from reaching surface waters through storage, infiltration, or reuse. Alternatively, Permittees could install specific pollutant control measures that prevent specific pollutants from being discharged through the MS4.

(b) Alternative 2 – Complete prohibition on some or all pollutants in MS4 stormwater discharges to high quality waters: This alternative would prohibit MS4 discharges of some or all pollutants in stormwater to high quality receiving waters. By eliminating these discharges, pollutants from stormwater would not reach high quality receiving waters during wet weather and not cause any degradation. As wet weather will always occur, this alternative could require the permittees to either divert all stormwater in the MS4 to a facility for treatment, or retain all stormwater through retention basins, infiltration galleries, and other controls that would prevent stormwater from reaching surface waters through storage, infiltration, or reuse. Permittees could also install pollutant control measures that are specific to preventing specific pollutants from being discharged through the MS4.

(c) Alternative 3 – Implement controls consistent with Permit requirements, applicable TMDL Implementation Plans, and adaptive management. This alternative would require Permittees to implement a mix of structural and non-structural controls and associated actions sufficient to achieve receiving water limitations, WQBELs, and other requirements, with flexibility to allow implementation of controls that are relatively more effective with respect to pollutant control, feasibility, or cost, while still achieving

required outcomes. Alternative 3 includes, or may include, controls that could be implemented under Alternatives 1 and 2.

(i) Alternative 3, Option A:

Under Alternative 3, where requirements and controls reflect those established in applicable TMDLs, the controls would constitute compliance with receiving water limitations for the waterbody-pollutant combinations addressed by the relevant TMDL, but Option A would not allow for implementation of control measures to constitute compliance with receiving water limitations for waterbody-pollutant combinations not addressed by a TMDL.

(ii) Alternative 3, Option B:

Option B would add one component to Alternative 3. Under Option B, implementation of the controls would additionally constitute compliance with receiving water limitations for a narrow set of waterbody-pollutant combinations not subject to a TMDL where the pollutant of concern is addressed in a comparable TMDL applicable to other water bodies and the controls reflect the controls and timeline of the comparable TMDL.

(d) Alternative 4 – Establish WQBELs for MS4 discharges to high quality waters: This alternative includes the Board establishing WQBELs for MS4 discharges of certain pollutants to high quality waters. These WQBELs would apply to both stormwater and non-stormwater discharges. MRP 2 only includes WQBELs where they are based on either TMDL wasteload allocations applicable to MS4 discharges (i.e., for impaired waters and not high quality waters) or the trash provisions in the Ocean Plan and ISWEBE. This alternative would require the Board to establish WQBELs where no TMDLs have been established.

(2) Economic and Social Development Considerations and Consistency with Maximum Benefit to the People of the State: The Water Board incorporated Alternative 3, Option B, and included aspects of Alternatives 1 and 2, into the Permit. This alternative could allow limited degradation of high quality water bodies by MS4 discharges, but ultimately requires MS4 discharges to meet and not fall below water quality standards.

Such degradation of high quality waters is necessary to accommodate important economic or social development in the area and is consistent

with the maximum benefit to the people of the state for the following reasons:

(a) Alternatives 1 and 2, if implemented as full prohibitions, would hamper important social and economic development.

(i) The MS4 discharges of stormwater and non-stormwater in certain circumstances are to the maximum benefit to the people of the state because they may be necessary for flood control and public safety. MS4 discharges also can assist with maintaining, or comprise the flows necessary to maintain, instream flows that support beneficial uses.[86] In addition, complete diversion or retention of MS4 discharges that would reach the MS4 and receiving water would require extensive structural controls that are not technologically feasible in many locations, for example due to: lack of available space at those sites; soils with limited infiltration capacity or landslide proclivity; challenging topography; conflicts with utilities and existing infrastructure; lack of available sanitary sewer collection system connections or capacity; typical Bay Area MS4 system designs, which involve relatively short runs of storm drain that discharge into local creeks, streams, or the Bay. That system would require substantial replumbing, often against available grades, to direct flows to controls or the sanitary sewer system.[87]

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[86] The Permittees' MS4 systems are frequently relatively short, discharging into headwaters or low-order creeks and providing all or substantial portions of those creeks' flows. Diversion of flows to the sanitary sewer could substantially reduce flows, impacting beneficial uses, including associated riparian habitat and vegetation. While use of infiltration basins could recharge local groundwater, beneficially increasing creek baseflows, that benefit is likely to be most-pronounced in the limited areas of Bay Area soils that are more infiltrative, and less so in the majority of the Bay Area that is comprised of less-infiltrative C and D soils. In an example in the Los Angeles Region, the Los Angeles River Flows Project studied the impacts of reduced flows on beneficial uses in the Los Angeles River as a pilot application of the California Environmental Flows Framework. At the beginning of this project, Los Angeles Water Board staff presented on the importance of minimum flows for recreation and wildlife in both concrete and soft-bottom channels of the river (https://www.waterboards.ca.gov/water_issues/programs/docs/lar/002_r4_la_river_info_item_20171103rev.pdf) Wading shorebirds, for example, rest and feed in the shallow waters of the concrete lined portion of the lower Los Angeles River. The final report for the project, "Process and Decision Support Tools for Evaluating Flow Management Targets to Support Aquatic Life and Recreational Beneficial Uses of the Los Angeles River," quantified the flow ranges associated with different species, habitats, and recreational uses in the river and evaluated the impacts of various combinations of reductions in wastewater, stormwater, and non-stormwater discharges. In general, if all discharges were eliminated, there would not be enough flow to protect beneficial uses including habitat for local plant and animal species.

[87] E.g., SCVURPPP, August 2019. *Santa Clara Basin Stormwater Resource Plan*; CCAG, January 2021. *San Mateo Countywide Sustainable Streets Master Plan*, App. B, pp. 27-28.

(ii) The vast majority of the Permittees are cities and counties that provide essential and valuable public services. This Fact Sheet considers economics, including Permittees' compliance costs associated with meeting the requirements of the Order. Controlling storm water discharges to the point that there is no potential degradation of any potentially high quality waters by requiring complete diversion or retention would be an enormous opportunity cost that could preclude MS4 permittees from spending substantial funds on other important social and economic needs. This may manifest itself in the reduction of some public services or prevent other public services from being provided in the first place. Permittees have previously provided public comments (on the Administrative Draft of the Permit and during consideration of MRP 2) that spending limited municipal resources on immediately addressing all pollutants in MS4 discharges (all stormwater and non-stormwater discharges) will adversely impact municipal budgets, public health priorities, such as implementing active transportation projects including Safe Routes to Schools or measures to reduce unsheltered homelessness, such as provision of housing and supportive services, and other social services.[88]

(iii) As another example, unsheltered homelessness, in a context of limited municipal budgets, the high Bay Area cost of living, driven in part by local land use planning decisions that have produced insufficient affordable housing, and limited supportive services, results in substantial public expenditures including emergency medical care, and police and justice system engagement.[89] Those public expenditures can be significant, without reducing unsheltered homelessness or preventing discharges of trash and human waste associated with it. Municipal efforts to provide affordable housing, supportive services, and related needs, while expensive, can

[88] For example, in comments on the February 2021 Administrative Draft of the Permit, many Permittees identified that limited resources are available to protect water quality, and some Permittees expressed concern that Permit requirements could lead to a reduction in needed road maintenance (Santa Clara Valley Urban Runoff Pollution Protection Program comment letter of April 8, 2021) or reduced implementation of active transportation (multi-modal) projects (City of San Pablo comment letter of April 6, 2021, Town of Danville comment letter of April 7, 2021), and that a focus on addressing the water quality impacts associated with unsheltered homelessness could reduce resources used for housing or provision of supportive services (Contra Costa Countywide Clean Water Program letter of April 8, 2021), and that fiscal impacts associated with the COVID-19 pandemic emphasized the need to prioritize certain actions to protect water quality (e.g., Alameda Countywide Clean Water Program comment letter of April 8, 2021).

[89] Flaming et al., 2015. *Home Not Found: The Cost of Homelessness in Silicon Valley.*

be relatively much less expensive than jail and emergency services. In addition, by reducing homelessness, they have the potential to reduce associated discharges of trash and human waste. Alternatives 1 and 2, by prohibiting non-stormwater or stormwater discharges, respectively, would preclude this kind of equivalent benefit weighing analysis and the more-efficient achievement of water quality goals.

The Los Angeles Water Board conducted an analysis that estimates the equivalent public benefit that may be provided through affordable housing and services if full retention and diversion were not required under Region's MS4 permit. The results of the analysis support the finding that the social and economic benefits of a society where there would be significantly fewer unhoused residents would be far greater than the additional benefits created by taking water quality from the point where water quality standards are achieved to a level of higher quality that may only be achieved with full retention.[90] The same funds that would have to be used to

[90] In 2012, Los Angeles County projected that it would cost $120B, or $134.8B in 2019 dollars, for complete diversion or retention of MS4 discharges, whereas the cost of implementing enhanced watershed management programs (EWMPs), which require addressing the 85th percentile, 24-hour storm event or otherwise reducing or treating stormwater discharges to attain water quality standards, was estimated by Board staff to be $21.0B - $21.3B (see Section XIII, Economic Considerations). Instead of using this cost differential of $113.5B - $113.8B to further improve waters that would already have achieved water quality standards, thereby already being able to support designated beneficial uses, this money could be better spent addressing the homeless problem in the region. In 2020, there were an estimated 66,436 unhoused residents in Los Angeles County (Los Angeles Homeless Services Authority. 2021. 2020 Greater Los Angeles Homeless Count – Total Point-In-Time Homeless Population by Geographic Areas. https://www.lahsa.org/documents?id=4692-2020-greater-los-angeles-homeless-count-total-point-in-time-homeless-population-by-geographic-areas.pdf.). The median cost in Los Angeles County of constructing a permanent housing unit for the homeless is about $531,000 (Galperin, Ron. 2019. The High Cost of Homeless Housing: Review of Proposition HHH. Ron Galperin LA Controller. https://lacontroller.org/audits-and-reports/high-cost-of-homeless-housing-hhh/.). Supportive services to address the homeless housing gap were estimated in 2016 to be $428.8M per year, or $455.3M in 2019 dollars (Los Angeles Homeless Services Authority. 2016. Report on Homeless Housing Gaps in the County of Los Angeles. https://homeless.lacounty.gov/wp-content/uploads/2019/02/Report-on-Homeless-Housing-Gaps-in-the-County-of-Los-Angeles-1-2016-1....pdf). Adjusting for the increase in the homeless population since then yields an estimated annual cost in supportive services of $1.2B in 2019 dollars. (Assuming the same supportive services cost per person estimated in 2016, multiplied by the number of homeless residents in LA County in 2020.) The stormwater capture cost differential could build enough units to house every homeless person in Los Angeles County and pay for supportive services for the next 67 years, even with the conservative assumption of one person per housing unit. Housing a homeless person in Los Angeles County results in average cost savings of about $2,731 per person per month in 2019 dollars in terms of reduced need for public services, such as medical and policing expenses (Economic Roundtable. 2008. Where We Sleep: Costs when Homeless and Housed in Los Angeles. https://economicrt.org/wp-content/uploads/2009/11/Where_We_Sleep_2009.pdf). This means that there

prevent all MS4 discharges (as opposed to only 85 percent of those discharges) could be invested instead in addressing homelessness, and could support affordable housing and several decades of supportive services for a significant number of residents at-risk of being unhoused. The Bay Area faces similar challenges and drivers associated with unsheltered homelessness, as well as similar costs associated with pollution control. Permittees are currently facing the kinds of tradeoffs described above because they are implementing a range of measures to address unsheltered homelessness as described in the Fact Sheet section for Provision C.17, and which provide an indirect benefit to water quality, including provision of permanent supportive housing, job programs, and services. Those are in addition to measures, like trash collection and provision of sanitary waste services, that provide a direct water quality benefit. As a result, the Los Angeles Regional Water Board's conclusion is expected to be generally applicable to the Bay Area.

(iv) The prohibition on discharges of pollutants in Alternatives 1 and 2 is not practicable without substantial diversion to the sanitary sewer. Stormwater BMPs that do not fully retain, evapotranspire, and/or infiltrate all flows into the groundwater generally will discharge low, but non-zero, amounts of pollutants downstream.[91] Those kinds of controls (e.g., bioretention cells, flow-through planters) are common in the Bay Area because of the preponderance of Bay Area soils with

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would be annual cost savings of about $2.2B from housing all homeless residents in Los Angeles County, and over 67 years the cost savings would be about $145.1B-$145.8B, greater than the storm water capture cost differential of $113.5B-$113.8B. An analysis of Ventura County finds similar results where each of its 1,743 unhoused residents could be provided permanent housing for at least 55 years with its stormwater capture cost differential, assuming that Ventura County's cost of full capture would be their estimated MS4 compliance costs multiplied by the same ratios of Los Angeles County's E/WMP costs to cost of full stormwater capture, yielding cost differentials ranging from $2.5B-$23.4B (https://www.vcstar.com/story/news/2020/12/12/covid-ventura-county-continuum-of-care-2021-homeless-count/3868785001/). This analysis was also based on an average cost per unit of $480,000 for housing the homeless in Ventura County in 2019 and the same supportive services cost per person as in LA County (https://humanimpact.org/wp-content/uploads/2020/10/HIP-Ventura-County-Lets-Invest-Sources-2020.pdf). It can be expected that there would be substantial additional benefits for these housed residents and for the local economy from being more fully able to engage in society.
A similar opportunities analysis for unsheltered homeless populations in the South San Francisco Bay Area can be found in Flaming et al., 2015. *Home Not Found: The Cost of Homelessness in Silicon Valley.*

[91] Clary, et al., 2020. *International Stormwater BMP Database: Summary Statistics.* Water Research Foundation.

limited infiltration rates. As such, they would not achieve the Alternative 1 or 2 goals.

(v) The significantly higher cost of complete storm water diversion or retention could lead to increased fees for residents with little benefit in return after water quality standards have been met. To achieve retention, stormwater control sizes would need to increase substantially over the post-construction stormwater treatment control sizing in Provision C.3.d. That sizing is based on work by Urbonas and Guo that determined a point of diminishing returns for control sizing. That work found that, while larger controls could control larger storms, the size increased out of proportion to the declining marginal benefit gained, in part because of the need to capture the larger storms that are relatively infrequent and comprise a relatively small portion of average annual rainfall. As noted above, storm water diversion would require substantial replumbing of existing systems.

The literature is sparse on the impact of MS4 project costs on user fees, but Kea et al. (2016) found higher rates of user fee establishment in the years directly before and after MS4 permit deadlines,[92] indicating that utilities often rely on user fees to meet permit requirements.

It is also possible that higher costs could be passed down to residents through increased housing prices driven by higher impact fees, which cities often charge developers to help fund public services, or higher construction costs. The literature finds that overall impact fees lead to higher home prices.[93] Requiring complete storm water diversion or retention from properties could also lead to higher construction costs for

[92] Kea, Kandace, Randel Dymond, Warren Campbell. 2016. An Analysis of Patterns and Trends in United States Stormwater Utility. Journal of the American Water Resources Association, 52(6). See, also, Comment Letter on 2012 Los Angeles MS4 Permit from City of Lakewood, Lisa A. Rapp, Director of Public Works, July 23, 2012, Comment Letter from City of La Verne, Daniel W. Keesey, Director of Public Works, July 23, 2012, and Comment Letter from LA Permit Group, July 23, 2012 (discussing the need to, and difficulty of, levying additional special taxes to pay for the permit).

[93] Mathur, Shishir, Paul Waddell, and Hilda Blanco. 2004. The Effect of Impact Fees on the Price of New Single-family Housing. Urban Studies, 41(7); Ihlanfeldt, Keith R. and Timothy M. Shaughnessy. 2004. An empirical investigation of the effects of impact fees on housing and land markets. Regional Science and Urban Economics, 34(6); Mathur, Shishir. 2013. Do All Impact Fees Affect Housing Prices the Same? Journal of Planning Education and Research, 33(4).

housing, which is one of the drivers of higher home prices.[94] There is extensive literature showing that higher housing prices are associated with proximity to cleaner waterbodies,[95] which provide benefits to society. However, higher housing prices driven by higher impact fees or construction costs that do not contribute toward discernible improvements in water quality would likely provide lower marginal benefits compared to a scenario where residents could avoid additional housing costs by not having to pay higher impact fees or construction costs in a region where housing costs are already high, or a scenario where this cost could be spent on more pressing public services or societal problems.

(vi) Because waterbodies may be high quality for some pollutants and not others it is difficult, if not impossible, to designate specific areas as high quality waters. As a result, Alternatives 1 and 2 are inconsistent with achieving the maximum benefit to the people of the state because they may require broader-than-necessary implementation of measures to ensure their prohibitions are met. The inconsistency stems from potential impacts to other municipal and public services associated with those increased expenditures.

(b) Aspects of Alternatives 1 and 2 that are practicable are part of Alternative 3 and have been incorporated into this Order. The Order generally implements a prohibition on trash discharges through the installation of full capture systems or controls to achieve full capture equivalency. The Order also largely prohibits the discharge of non-stormwater into and through the MS4 to receiving waters. While there are some limited exceptions where the non-stormwater discharge is expected not to be a source of pollutants, where the discharge is determined to be a source of pollutants it must be prohibited. The Order, through its green infrastructure planning and implementation provision (Provision C.3.j) and its alternative compliance provision (Provision C.3.e), also supports efforts to maximize the capture of stormwater through retention basins, infiltration galleries, and other controls.

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[94] Emmons, William R. 2019, Sept. 5. Construction Costs, Not Another Housing Bubble, Are Driving House Prices Higher. St. Louis Fed On the Economy Blog. https://www.stlouisfed.org/on-the-economy/2019/september/construction-costs-housing-bubble-driving-housing-prices-higher

[95] See, e.g., Guignet, Dennis, Matthew T. Heberling, Michael Papenfus, Olivia Griot, and Ben Holland. 2020. Property values, water quality, and benefit transfer: A nationwide meta-analysis. Working Papers 20-04, Department of Economics, Appalachian State University. https://ideas.repec.org/p/apl/wpaper/20-04.html

(c) Alternative 3, if implemented, could result in limited degradation of high quality water bodies. Any degradation that would occur under the alternative is consistent with the maximum benefit to the people of the state because the combination of structural and non-structural controls implemented under the alternative will ultimately be effective at maintaining and restoring water quality protective of beneficial uses, and allow a greater benefit to the people of the state than full prohibitions of discharge when considering social and economic parameters that could be affected, such as employment, housing, community services, income, tax revenues, and land value.

The Permit terms require implementation of objective technical solutions that must be designed to meet the Permit's maximum extent practicable- or water quality standards-based regulatory standards. Such controls necessarily take time to design and construct, but it is to the maximum benefit of the people of the state that such controls be designed and implemented properly so as to be protective of water quality in the long run. These measures that control impacts from stormwater and non-stormwater discharges in the Order are typically effective across multiple pollutants. The alternatives would concurrently address other constituents of concern that may not be causing impairment, but may still be leading to degradation, resulting in improvements in levels of all pollutants, including those for which the receiving water may be high quality.

(d) Alternative 3 avoids the high economic and social costs associated with decreased public services associated with Alternatives 1 and 2. At the same time, Alternative 3 is still structured to encourage retention of stormwater and non-stormwater. As incorporated into the Permit, Alternative 3 provides additional economic and social benefits to the people of the state by incentivizing and incorporating multi-benefit and green infrastructure projects that include benefits beyond water quality protection such as increased local water supplies, beautified streets, plazas, and parking areas, facilities that support habitat and recreation, and climate change resiliency, such as reduced flood flows and reduced temperatures on the urban surface. For example, both the regional stormwater treatment wetland in the City of Fremont's Pacific Commons project and the stormwater pond in the city park downhill of the City of Dublin's Dublin Ranch protect clean water while providing an opportunity for recreation and urban connections with nature. Bioretention cells along streets and in parking lots can reduce the urban heat island

effect, help calm traffic, and protect cyclists and pedestrians, increasing the benefit of active transportation designs.

Multi-benefit projects are projects that provide multiple benefits, which may include not just runoff treatment, but water capture and use, climate change resilience, encouragement of active transportation and protection of multi-modal users, greenhouse gas reductions, and improvements to urban quality of life– are actively encouraged by the State of California, which administers Proposition 1 funds ($200 million in grant funds) for such multi-benefit projects. In the Bay Area, such projects have received funding through Proposition 1 and other state and federal grant programs, as well as Caltrans, pursuant to requirements of its statewide MS4 NPDES permit, and through its cooperative funding program for projects that also provide benefit for discharges from Caltrans rights of way. For example, the Rumrill Boulevard green street retrofit in San Pablo, which will control pollutants of concern, improve pedestrian safety, and provide climate change resilience.[96] Table A-3 provides further examples of multi-benefit grant-funded projects completed by the Permittees. While Prop 1 funding has been expended, construction of multi-benefit projects from Permittee Green Infrastructure Plans and Stormwater Resource Plans will likely qualify for these types of grant monies in the future. Additionally, the construction of these projects also creates good-paying jobs that do not require advanced degrees, accessible to those in disadvantaged communities.[97]

Capacity-building projects are projects that build Permittee understanding of and the allow for planning or increase the toolbox of measures available to address pollutants in MS4 discharges. As shown in Table A-3, funded projects have included the

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[96] U.S. EPA, *Rumrill Boulevard: Complete Green Street* (web). Accessed August 2, 2021. https://www.epa.gov/sfbay-delta/rumrill-boulevard-complete-green-street
City of San Pablo, *Rumrill Boulevard Complete Streets Project* (web). Accessed August 2, 2021. https://www.sanpabloca.gov/2590/Rumrill-Boulevard-Complete-Streets-Proje

[97] Sustainable Business Network, May 2021. *Green Stormwater Infrastructure (GSI): A tool for economic recovery and Growth in Pennsylvania*, reviewed ten years of GSI implementation in Pennsylvania, and found that GSI was supporting 34,000 jobs in Philadelphia, with more than half paying at least $15 per hour, even without requiring a high school diploma. Building on the findings by Economic Roundtable, Los Angeles Alliance for a New Economy estimated that over 30 years, the Safe, Clean Water Program (Measure W) in the Los Angeles Water Board region will create about 6,530 construction jobs and 1,347 O&M jobs, as well as about 1,559 annual indirect and induced jobs. This would yield about $14B in overall regional economic benefits from $9B in investment. Furthermore, many of these jobs created would be good-paying jobs that do not require an advanced degree, accessible to those in disadvantaged communities (Los Angeles Alliance for a New Economy (LAANE). Liquid Assets. How Stormwater Infrastructure Builds Resilience, Health, Jobs, and Equity. March 2018.).

development of Permittee stormwater resource plans, efforts to enact building code changes to support low impact development and green stormwater infrastructure implementation, and the Tracking California's trash project. It is likely that such projects could qualify for funds from similar grant programs in the future.

Table A-3. Multi-benefit and capacity-building grant-funded projects

Grant Program	Permittee	Project	Funded Amount
Prop 84 2011 Stormwater Implementation Grants	San Jose	Park Avenue: Green Avenue Pilot Project	$859,128
(same)	San Jose	Martha Gardens Green Alleys Pilot Project	$945,180
(same)	Union City	South Decoto Green Streets Project (Implementing LID)	$3,000,000
(same)	Alameda County Public Works Agency	Alameda County Public Works Agency Low Impact Development Implementation and Demonstration Project: Parking Lot Stormwater Treatment Improvements	$1,600,000
Prop 84 2011 Stormwater Planning and Monitoring Grants	Contra Costa County	Bay Area Green Infrastructure Master Planning Project	$597,901
(same)	Multiple counties in Water Board Regions 2 and 4	Tracking California's Trash	$870,000
(same)	Statewide	Removing Barriers to LID in Local and State Codes: Technical Assistance for Municipal Code Updates and Evaluation of the California Building Standards Code	$996,135
Prop 84 2013 Stormwater Implementation Grants	Albany	Brighton Avenue Pilot Green Street Project	$296,000

Grant Program	Permittee	Project	Funded Amount
(same)	San Jose	Ocala Avenue Green Street Project	$1,429,355
(same)	Town of San Anselmo	SADPW Stormwater LID Demonstration	$546,517
(same)	Union City	H Street - Green Street Improvements	$3,000,000
(same)	Bay Area Rapid Transit District	BART Lafayette Station Parking Lots Improvement Project	$2,245,259
2014 Drought Response Outreach Program for Schools	StopWaste	DROPS - OPS (Oakland and Piedmont Schools)	$1,491,503
Prop 1 2016 Stormwater Implementation Grants	City of San Mateo	City of San Mateo Sustainable Streets and Parking Lot	$630,031
2016 Storm Water - Proposition 1 - Implementation Grants - Round 1	Daly City	Vista Grande Drainage Basin Improvement Project	$10,000,000
2016 Storm Water - Proposition 1 - Implementation Grants - Round 1	Redwood City	Redwood City Sustainable Streets	$608,099
2016 Storm Water - Proposition 1 - Planning Grants	Santa Clara County	SWRP for the Santa Clara Basin in Santa Clara County	$471,708
2016 Storm Water - Proposition 1 - Planning Grants	Contra Costa County Flood Control & Water Conservation District	Contra Costa Watersheds Storm Water Resource Plan	$499,420

Grant Program	Permittee	Project	Funded Amount
2020 Prop 1 Round 2 Storm Water Grant Program	San Pablo	Sutter Avenue Green Street Project	$1,560,000

As discussed above, Alternative 3 provides important socioeconomic benefits such as creation of new jobs, increased local water supplies, beautified streets, plazas, and parking areas, and facilities that support habitat and recreation, while allowing the local governments to maintain important public services. This alternative therefore has the greatest chance of success, within the shortest time frame, and furthers the goal of maintaining and achieving water quality standards.

(e) Alternative 3 could result in limited degradation of high quality waters, in particular currently impaired waters that may nevertheless be considered high quality waters based on a historic baseline. The federal antidegradation policy does not require consideration of economic and social costs associated with degradation; it only requires findings that "allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located." The state antidegradation policy does not define the exact factors that must be considered in determining "maximum benefit to the people of the state." APU 90-004 states that factors to be considered in a complete antidegradation analysis include economic and social costs of the discharge compared to its benefits, but this Order is subject only to a simple antidegradation analysis.[98] The Water Board has nevertheless considered the costs associated with water quality degradation that may occur under Alternative 3, but has done so necessarily at a generalized level. Specifically, in choosing Alternative 3, the Water Board finds as follows:

(i) There are significant environmental, public health, and economic costs associated with exceedances of water quality objectives. The Bay Area economy thrives on a healthy environment, as does the health of its population. By way of

[98] Outside of the complete antidegradation analysis context, APU 90-004 states only that the "findings should indicate . . . [t]he socioeconomic and public benefits that result from lowered water quality" (APU 90-004, p. 1.).

example, the failure to control stormwater runoff (which would result in exceedances of water quality objectives) would, among other things, negatively impact Bay and ocean water quality, which would negatively impact tourism and the fishing industry. Similarly, the failure to meet water quality objectives in Bay and ocean waters would negatively impact recreation and public health of beachgoers. These costs are discussed in detail in the Economic Analysis section of this Fact Sheet.

(ii) The considered costs are associated with exceedances of water quality objectives rather than limited degradation of high quality waters to a level that remains better than objectives. This is because the objectives are set to protect beneficial uses in the first place.

(iii) Where Alternative 3 may allow a currently high quality waterbody to degrade below water quality objectives, or where it will allow a currently impaired, but historically high quality waterbody to stagnate or worsen in quality, even for multiple years, this allowance is for a finite period of time defined by the compliance schedule specified in the Permit. The Water Board finds that the temporary degradation is justified based on the social and economic benefits discussed in these findings, notwithstanding the potential costs of degradation. In particular, the Water Board anticipates that the combination of non-structural controls and structural controls that are designed and built over a longer timeframe are more likely to lead to water quality improvements than other measures.

(iv) Alternative 3 Option A, as compared to Option B, could potentially avoid some of the costs discussed above if some Permittees are able to correct some exceedances earlier if required to comply immediately with receiving water limitations for all waterbody-pollutant combinations with no applicable TMDL. From a practical perspective, however, the Water Board finds that immediate compliance, particularly for those waters that may have been high quality historically but are not high quality currently, is unrealistic even if required, given the technical and financial constraints faced by Permittees. There are no known specific sources of bacteria that can be controlled immediately. There are also no viable means to control bacteria in discharges by treating discharges. Some stormwater treatment or retention systems may reduce levels of bacteria in discharges, but they cannot be implemented

immediately and there are constraints that affect locating them where they would intercept discharges from bacteria sources, e.g., land availability and underground utilities. Most importantly, even though they may have viability due other benefits, such as control of other pollutants and water supply augmentation using captured stormwater, none are able to reduce levels of bacteria equivalent to water quality objectives.[99] They also have hydraulic capacity constraints that result in bypassing of untreated runoff during large storm events. Even municipal wastewater treatment systems cannot reduce bacteria to such low levels of bacteria without disinfection of the treated wastewater through chlorination/dichlorination, ozone disinfection, or ultra-violet light disinfection, which are not feasible for episodic stormwater discharges. Since it is unrealistic for Permittees to comply immediately, any costs avoided would be non-existent to minimal. Further, the Permit limits application of Option B to the receiving water limitations for bacteria in water bodies (specifically, Stevens Creek, Calabazas Creek and Sunnyvale East Channel/Guadalupe Slough) receiving discharges from Mountain View and Sunnyvale and monitoring demonstrates that these water bodies are not currently high quality for bacteria.[100]

(f) Regarding Alternative 4, WQBELs are for the most part set to be protective of beneficial uses, which is the floor of the level of protection required under the antidegradation policies and may not be protective of water quality higher than necessary to protect beneficial uses. Therefore, this alternative is not more protective of high quality water bodies than requiring compliance with receiving water limitations, which already require permittees' MS4 discharges to not cause or contribute to exceedances of water quality objectives. This alternative would impose a significant analytical hurdle on development and adoption of a permit by requiring the Water Board to spend extensive efforts to analyze tens or hundreds of thousands of waterbody-pollutant combinations and then further

[99] Clary et al., 2020. International Stormwater BMP Database: 2020 Summary Statistics. Water Research Foundation, pp. 21-33. Accessed at: https://www.waterrf.org/system/files/resource/2020-11/DRPT-4968_0.pdf

Clary, Pitt, and Steets, August 2014. Pathogens in Urban Stormwater Systems. ASCE. Accessed at: https://collaborate.ewrinstitute.org/ewri/ourlibrary/viewdocument?DocumentKey=fffe8a76-18b2-4f85-9b54-b0eac23f12a0

[100] See, e.g., Exhibit A of Baykeeper Notices of Violation and Intent to File Suit Under the Clean Water Act to the cities of Mountain View and Sunnyvale, December 4, 2019.

conduct an infeasible set of reasonable potential analyses to determine whether the permittees' discharges are impacting high quality waters and for what pollutants. Ultimately, the alternative would divert staff resources from oversight of the implementation of potentially more effective and practical permit requirements, as well diverting staff from the Water Board's other programs.

(3) Requirement for Highest Statutory and Regulatory Requirements and Best Practicable Treatment and Control: The Order requires the highest statutory and regulatory requirements and requires that the Permittees meet best practicable treatment or control.

(a) The Order prohibits all non-stormwater discharges, with a few enumerated exceptions, through the MS4 to all receiving waters.

(b) The Permittees must comply with the "maximum extent practicable" technology-based standard set forth in CWA section 402(p)(3)(B)(iii) and implement control measures under the program elements of a stormwater management program.

(c) As required by CWA section 402(p)(3)(B)(iii) and 40 CFR section 122.44(d)(1)(vii)(B), the Permittees must comply with applicable WQBELs based on TMDL WLAs.

(d) The Order also contains provisions to require treatment of stormwater from the 85th percentile, 24-hour storm event and, via the Permit's low impact development design philosophy, to implement measures that will reduce and retain runoff. This stormwater design standard is based on robust engineering and technical evaluations to determine state-of-the-art design standards for post-construction site scale BMPs and catchment scale regional BMPs.[101]

(e) The measures that control impacts from stormwater and non-stormwater discharges in the Order are typically effective across multiple pollutants.[102] For example, retention basins, low-impact development controls, and low flow diversions can prevent stormwater and non-stormwater from reaching the receiving water at all—preventing degradation to the receiving water from all types of constituents. The Order's provisions are designed to achieve

[101] See, for example, State Water Board Order WQ 2000-11, the "LA SUSMP Order" and Concept Development: Design Storm for Water Quality in the Los Angeles Region (SCCWRP, Technical Report 520, October 2007).

[102] Clary, et al., 2020. *International Stormwater BMP Database: Summary Statistics.* Water Research Foundation.

water quality standards for those constituents that are impairing the receiving water, as well as to address other constituents of concern that may not be causing impairment as defined in CWA section 303(d) and State policy. The measures implemented pursuant to these provisions will likely result in improvements in levels of all pollutants, including those for which the receiving water may be high quality.

As a final backstop against degradation, the Order includes an extensive monitoring and reporting program, including:

(i) Stormwater control monitoring to ensure controls implemented pursuant to Provision C.3 are installed and operating consistent with their design and intended function;

(ii) Participation in a San Francisco Estuary monitoring program to answer the management questions identified in Provision C.8.c;

(iii) Specified low impact development (LID) control measure monitoring pursuant to Provision C.8.d, intended to measure the compliance and effectiveness of LID controls.

(iv) Trash monitoring pursuant to Provision C.8.e, intended to verify whether Permittees' trash control actions have effectively prevented trash from their jurisdictions from discharging to receiving waters, and to evaluate whether a no adverse effect condition in receiving waters has been achieved where controls have been installed;

(v) Pollutants of concern monitoring pursuant to Provision C.8.f., intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants;

(vi) Pesticides and toxicity monitoring pursuant to Provision C.8.g, on wet and dry weather pesticide discharges and toxicity in receiving waters;

(vii) Monitoring of full trash capture devices installed pursuant to Provision C.10 to ensure that they are installed and operating consistent with their design and intended function;

(viii) Visual monitoring of measures equivalent to full trash capture implemented pursuant to Provision C.10, to ensure their effectiveness;

(ix) Bacteria monitoring pursuant to applicable subprovisions of Provision C.14, intended to assess progress toward achieving wasteload allocations for TMDLs and inform adaptive management to achieve them; and

(x) Monitoring and reporting on populations experiencing unsheltered homelessness, and the portion(s) of those populations receiving services, as a proxy for control of discharges of associated materials, such as trash and human waste, to the MS4.

8. Anti-backsliding Regulations

The CWA contains both statutory anti-backsliding provisions in section 402(o) and regulatory anti-backsliding provisions in 40 CFR section 122.44(l). The CWA's statutory prohibition against backsliding applies under a narrow set of criteria specified in section 402(o). Section 402(o)(1) prohibits relaxing technology based effluent limitations (TBELs) originally established based on best professional judgment (BPJ) to reflect subsequently promulgated effluent limitation guideline. This section is inapplicable here since none of the WQBELs in the Order are TBELs based on BPJ. Section 402(o)(1) also prohibits relaxing of WQBELs imposed pursuant to CWA sections 301(b)(1)(C) or 303(d) or (e), unless an exception in CWA section 402(o)(2) applies. Relaxation of WQBELs may also be allowed if such backsliding is consistent with the provisions in CWA section 303(d)(4). CWA section 303(d)(4) allows backsliding in the following circumstances. First, "CWA section 303(d)(4)(A) allows the establishment of a less stringent effluent limitation when the receiving water has been identified as not meeting applicable water quality standards (i.e., a nonattainment water)" if: (a) the existing WQBEL is based on a TMDL or other WLA ; (b) the cumulative effect of such revisions assures attainment of water quality standards; or (c) the designated use is removed." Second, section 303(d)(4)(B) applies to "waters where the water quality equals or exceeds levels necessary to protect the designated use, or to otherwise meet applicable water quality standards (i.e., an attainment water). Under CWA section 303(d)(4)(B), a WQBEL may be relaxed as long as relaxation complies with the state's antidegradation policy." "U.S. EPA has consistently interpreted CWA section 402(o)(1) to allow relaxation of WQBELs and effluent limitations based on state standards if the relaxation is consistent with the provisions of CWA section 303(d)(4) or if … [certain] of the exceptions in CWA section 402(o)(2)… [apply]. The two provisions [303(d)(4) and 402(o)(2)] constitute independent exceptions to the prohibition against relaxation of effluent limitations. If either is met, relaxation is

permissible." This Order complies with anti-backslidin[g] requirements because no WQBEL has been relaxed from the Previous Permit.

9. Impaired Waters on CWA 303(d) List

CWA section 303(d)(1) requires each state to identify specific water bodies within its boundaries where water quality standards are not being met or are not expected to be met after implementation of technology-based effluent limitations on point sources. Water bodies that do not meet water quality standards are considered impaired and are placed on the state's "303(d) List." Periodically, U.S. EPA approves the state's 303(d) List. In June 2021, U.S. EPA approved a revised list of impaired waters prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met af[t]er implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for nonpoint sources, and are established to achieve the water quality standards for the impaired waters.

The Water Board has established TMDLs or Water Quality Improvement Plans for pesticide-related toxicity, mercury, PCBs, pathogens (bacteria), and sediment to remedy water quality impairments in water bodies in and around San Francisco Bay. These TMDLs identify MS4 discharges as a source of pollutants to these water bodies, and, as required, establish wasteload allocations (WLAs) for MS4 discharges to reduce the amount of pollutant discharged to receiving waters. CWA section 402(p)(3)(B)(iii) requires the Water Board to impose permit conditions, including: "management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Federal regulations also require that NDPES permits contain WQBELs consistent with the assumptions and requirements of all available WLAs (40 CFR 122.44(d)(1)(vii)(B)). CWC sections 13263 and 13377 also require that permits include limitations necessary to implement water quality control plans. Therefore, this Order includes WQBELs and other provisions to implement the TMDL WLAs assigned to Permittees regulated by this Order.

10. California Environmental Quality Act

The action to adopt an NPDES Permit is exempt from the provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) pursuant to CWC section 13389, since the adoption or modification of a NPDES permit for an existing source is statutorily exempt and this Order only serves to implement a NPDES permit (County of Los Angeles v. State Water Resources Control Board (2006) 143 Cal.App.4th 985; Pacific Water Conditioning Assn, Inc. v. City Council of City of Riverside (1977) 73 Cal.App.3d 546, 555-556.).

11. Endangered Species Act Requirements

This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with discharge prohibitions, receiving water limits, and other requirements to protect the beneficial uses of waters of the state, including protecting rare, threatened, or endangered species. Permittees remain independently responsible for meeting all applicable federal and state Endangered Species Act requirements.

12. Climate Change

The observed and predicted impacts of climate change in Northern California include an increase in temperatures, heightened frequency of extreme weather conditions including extreme precipitation, flooding, and droughts, wildfires, and sea level rise. Sea level rise threatens to drown the tidal marshes that sustain the health of the Bay and Delta, increase the risk of catastrophic floods in low-lying neighborhoods, inundate crucial shoreline infrastructure, including wastewater treatment plants and storm sewers, and increase erosion and beach/land loss along the Pacific Coast. The combined impacts of climate change will affect water quality and many beneficial uses of waters.

The State Water Board adopted on March 7, 2017, a resolution that requires a proactive approach to climate change in all State Water Board actions, including drinking water regulation, water quality protection, and financial assistance (Resolution No. 2017-0012). The resolution lays the foundation for a response to climate change that is integrated into all State Water Board actions, by giving direction to the State Water Board divisions and encouraging coordination with the regional water boards. In addition, Executive Order N-10-19, signed on April 29, 2019, directs the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture to prepare a water resilience portfolio that meets the needs of California's communities, economy, and environment, and expand and/or reassess the priorities in the California Water Action Plan.

This Order follows the guiding principles of the State Water Board Resolution and well as Executive Order N-10-19 by contributing to an adaptive climate change and water resilience strategy. Through low impact development and green infrastructure projects, stormwater and non-stormwater runoff can be captured, infiltrated, and used to mitigate periodic drought conditions, reduce flood hazards and erosion rates, and recharge depleted groundwater aquifers and other water supply sources, all while reducing pollutant loads, maintaining beneficial uses in receiving waters and improving community health.

13. Human Right to Water

The Order is consistent with CWC section 106.3, which establishes the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. The Order implements CWC section 106.3 and promotes the State Water Board's resolution adopting the human right to water as a core value and directing its implementation in Water Board programs and activities (Resolution No. 2016-0010) by requiring receiving waters to meet adopted water quality standards that are designed to protect human health and ensure that water is safe for domestic use and by regulating discharges to minimize loading to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved (Wat. Code, §§13000, 13050, subdivisions (i)-(m), 13240, 13241, 13263; State Water Board Resolution No. 68-16.).

C. State Mandates

Article XIII B, section 6(a) of the California Constitution provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service." No provision of the Order constitutes an unfunded state mandate subject to subvention under Article XIII B, section (6)(a) of the California Constitution.

1. Renewal of the Permit Is Not a New Program or Higher Level of Service.

As a threshold matter, MS4 permitting is not a "program" as that term is used in Article XIII B, section 6. The California Supreme Court has defined a "program" for purposes of Article XIII B, section 6, as: (1) programs that carry out the governmental function of providing services to the public, or (2) laws which, to implement a state policy, impose unique requirements on local governments and do not apply generally to all residents and entities in the state (*San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874 (reaffirming the test set forth in County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 56); Lucia Mar Unified School District v. Honig (1988) 44 Cal.3d 830, 835.).

Although a requirement can be a program if it meets either prong (see *Dept. of Finance v. Comm'n on State Mandates* (2021) 59 Cal.App.5th 546,557; *County of Los Angeles v. Dept. of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1545), the two prongs are interrelated. As the California Supreme Court put it, "the intent underlying section 6 was to require reimbursement to local agencies for the costs involved in carrying out functions peculiar to government, not for expenses incurred by local agencies as an incidental impact of laws that apply generally to all state residents and entities" (*San Diego Unified School Dist. v. Com. on State Mandates* (2004) 33 Cal.4th 859, 875 [citing *County of Los Angeles v. State of Cal*. (1987) 43 Cal.3d 46, 56–57.]). Thus, the applicability of a requirement to entities other than local governments can indicate that the requirement does not carry out a governmental function that provides services to the public (See *County of Los Angeles v. Dept. of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1546 [Requirement that all elevators, including county elevators, be equipped with fire and earthquake safety features "simply [was] not a governmental function of providing services to the public," even if county elevators, specifically, were used to obtain governmental services.]; see also *San Diego Unified School Dist., supra,* 33 Cal.4th at 876 [noting that state-mandated requirements applicable to both private- and public-sector employers to provide employee benefits did not increase or enhance government services, even if such requirements could indirectly improve the public employee applicant pool].).

Here, updated low impact development (LID) and trash provisions do not discharge a governmental service or apply only to local government. The LID requirements, including the reduced impervious surface threshold for implementing LID, do not, in any direct way, mandate the provision of a service to the public. LID will contribute in a general way to the overall reduction of pollution in stormwater, but its primary benefits will be localized, in many cases sited on private property and not shared broadly with the public.

LID provisions do not impose unique requirements on local governments, either. Other permits impose similar size thresholds on both public and private permittees as a way of reducing runoff or generating other water quality benefits. See Fact Sheet for Provision C.3, *infra* (listing other permits containing a 5,000 sf impervious surface threshold); see also, e.g., Construction Stormwater General Permit (Order No. 2009-0009-DWQ) (imposing 1-acre threshold); Overwater Structures WDRs (Order No. R2-2018-0009) (imposing general permit requirements for small overwater structure construction projects).

Similarly, the green infrastructure requirements are not unique to local agencies. The Regional Water Board imposes stormwater treatment requirements on independently-permitted development projects (See, *e.g.,* Order No. R2-2018-0019, pp. 7-8 [requiring stormwater treatment proportionate to amount of impervious surface constructed]; see also Order No. R2-2015-0020, pp. 4-5 [establishing

WDRs for voluntary habitat restoration, including low impact/green erosion control measures].). The Regional Water Board also requires stormwater control measures to be installed on roads maintained by private parties in multiple permits (See generally, *e.g.*, Order No. R2-2017-0033 [requiring erosion control measures for roads on vineyards]; Order No. R2-2016-0031 [requiring erosion-control measures for roads at confined animal facilities].).

As with the adjusted LID thresholds, changes in trash provisions do not discharge a governmental function that provides services to the public. As demonstrated by the statewide applicability of the Trash Amendments and the regionwide applicability of the Water Board's prohibition on the discharge of trash, the elimination of trash discharges is not a uniquely governmental function, but a responsibility that private and public entities, as well as individuals, collectively share.

Indeed, the requirements of the Trash Amendments apply to private and public entities across California. The Amendments require Caltrans, a state agency, private industrial dischargers, private or public operators of recreational facilities, and municipalities alike to comply with the prohibitions on trash discharges by implementing full trash capture systems or their equivalent.[103] Cease and Desist Order No. R2-2019-0007, which determined that Caltrans was out of compliance with its NPDES MS4 Permit requirement to timely implement trash control measures in all high trash generating areas in the San Francisco Bay Region, requires Caltrans to "implement structural and non-structural trash controls to meet full trash capture equivalency" in all significant trash-generating areas within its right-of-way by 2030 (Order No. R2-2019-0007, pp 5-6.). This requirement and its deadlines are comparable to the requirements and deadlines with which Permittees must comply. Indeed, as discussed further below, Caltrans and numerous permittees have jointly implemented full-trash capture projects that meet both of their permit requirements.[104]

Even if MS4 requirements could be considered a "program," the requirements of the Order do not constitute a *new* program or a *higher level of service* as compared to the requirements contained in the previous permits issued by the Water Board to the Permittees. The overarching requirement to impose controls to reduce the pollutants in discharges from MS4s is dictated by the CWA (33 U.S.C. § 1342(p)(3)(B)) and is not new to this permit cycle. The Permittees have been required to have stormwater permits for the past three decades, and to comply with

[103] State Water Board, Final Part I Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, p. E-2 – E-4; see also Basin Plan, Table 4-1, Prohibitions 7 & 8 (prohibiting the discharge of all "rubbish, refuse…or other solid wastes" and "floating materials" by any discharger, public or private, in the San Francisco Bay Region).

[104] Yan, Qi. *Summary of Caltrans' Trash Control Cooperative Implementation Agreement Projects* (July 2021).

prohibitions on the discharge of trash, sediment, untreated human waste, spills, pesticides, and toxic substances, like PCBs and mercury, for a half-century. (Basin Plan, Table 4-1, Prohibitions 6, 7, 8, 9, 11, 13 & 15.) Similarly, Permittees carried out tasks like street sweeping, pollution prevention, public education about litter and illegal dumping, and elimination of illicit connections, long before MS4 permits required it. The MRP's LID provisions have been in place for four permit cycles. The inclusion of improved measures as the MS4 programs evolve and mature over time is specifically anticipated under the CWA (55 Fed. Reg. 47990, 48052 (Nov. 16, 1990); 61 Fed. Reg. 43761 (Aug. 26, 1996); U.S. EPA "*Interim Permitting Approach for Water Quality Based Effluent Limitations in Storm Water Permits*," EPA 833-D-96-001 (September 1996)) because the experience gained in implementation of existing permits and ongoing technological developments help direct appropriate adaptation of the programs to better address pollution. Such refinements improve the effectiveness of the ongoing program and do not constitute a new program or higher level of service. And while the new or advanced measures may result in additional costs to the Permittees, resulting new costs is not the test for a higher level of service. "If the Legislature had intended to continue to equate 'increased level of service' with 'additional costs,' then the provision would be circular: 'costs mandated by the state' are defined as 'increased costs' due to 'an increased level of service,' which, in turn would be defined as 'additional costs'" (*County of Los Angeles v. Com. on State Mandates* (2003) 110 Cal.App.4th 1176, 1191, quoting *Workers' Compensation Mandates Decision*, *supra*, 43 Cal.3d. at p. 55.).

2. The Permit Requirements Fall Under Several Exceptions to Mandates Rules

Even if some of the requirements imposed on the Permittees with this reissuance could be considered to be new programs or higher levels of service, the following exceptions to a finding of unfunded mandates preclude subvention here:

a. The permit provisions are required by the CWA and its implementing regulations:

Where a law imposes a requirement that is mandated by a federal law or regulation and results in costs mandated by the federal government, no subvention is required unless the statute or executive order mandates costs that exceed the mandate in that federal law or regulation (Gov. Code, § 17556(c).). The MRP implements federally mandated requirements under the CWA and implementing regulations, so its requirements are therefore not subject to subvention of funds. This includes federal requirements to: (i) effectively prohibit non-storm water discharges through the MS4 to receiving waters; (ii) reduce the discharge of pollutants in stormwater to the maximum extent practicable; (iii) include such other provisions as the permitting authority (here, the Water Board) determines appropriate for the control of such pollutants; (iv) attain applicable TMDL wasteload allocations; and (v) conduct monitoring and reporting.

i. Non-stormwater discharge prohibition: Federal law requires that an MS4 permit effectively prohibit non-stormwater discharges through the MS4 to receiving waters (33 U.S.C. § 1342(p)(3)(B)(ii).). The Order's requirements to achieve the effective prohibition of non-stormwater discharges are thus compelled by federal law. For instance, firefighting foam and water discharges are non-stormwater discharges that can have significant impacts on water quality. The requirements to control these discharges, which include the development and implementation of BMPs to prevent firefighting foam and water from entering storm drains, implement the prohibition on non-stormwater discharges.

Other permit requirements implement the federal mandate to reduce pollutants to the maximum extent practicable and the effective prohibition on non-stormwater discharges at different times of year. For instance, trash enters waterways as a non-stormwater discharge during dry weather, when it can reach storm drains by direct discharge or in non-stormwater, and as a pollutant in stormwater discharges during wet weather. On-land trash control efforts, such as pollution prevention, street-sweeping, source control initiatives, and controls applicable to private lands apply in both dry and wet weather, and are necessary both to reduce pollutants in stormwater to the maximum extent practicable and to eliminate non-stormwater discharges of trash to the storm drain system (See *Environmental Protection Information Center v. Pacific Lumber* Co. (N.D. Cal. 2004) 301 F.Supp.2d 1102, 1111 [where stormwater runoff was mixed with pollutants, it was "not 'composed entirely of stormwater']).

Similarly, new controls to manage discharges from unsheltered homeless populations largely implement the non-stormwater discharge prohibition by supplementing Permittees' existing Direct Discharge Programs, and by targeting illicit discharges of human waste and trash to the storm drain system. To the extent that enhanced bacteria controls require Sunnyvale and Mountain View to intensify efforts to discover leaks and illicit connections, manage municipal operations to prevent dry-weather discharges to the storm drain, and reduce illegal dumping, these provisions also implement the prohibition on non-stormwater discharges.

ii. TMDL requirements:

The CWA requires TMDLs to be established for waterbodies that do not meet federal water quality standards (33 U.S.C. § 1313(d).). The CWA also requires that MS4 permits include "such other provisions as the Administrator or the State determines appropriate for the control of [] pollutants" (33 U.S.C. § 1342(p)(3)(B)(iii).). U.S. EPA interprets this provision to mandate "controls to reduce the discharge of pollutants to the

maximum extent practicable, *and where necessary water quality-based controls*."[105]

Once U.S. EPA or a state establishes a TMDL, federal law requires that NPDES permits must contain water quality-based effluent limitations (WQBELs) consistent with the assumptions and requirements of any applicable wasteload allocation. (40 C.F.R. § 122.44(d)(1)(vii)(B); see also State Water Board Order No. WQ 2021-0052-EXEC, p. 73.) Indeed, TMDLs are developed for the purpose of specifying requirements for the achievement of water quality standards in impaired waters (33 U.S.C. § 1313(d); 40 C.F.R. § 130.7). The Order's requirements for attainment of TMDL wasteload allocations are therefore compelled by federal law.

Several generations of the MS4 permits issued in California have prohibited discharges that cause or contribute to exceedances of water quality standards in the receiving water. TMDL provisions, including WQBELs, simply add a process for meeting this requirement, generally based on a compliance schedule.

iii. Monitoring and reporting requirements:

Federal law requires that NPDES permits incorporate monitoring and reporting provisions (33 U.S.C. §§ 1318(a); 1342(a)(2); 40 C.F.R. §§ 122.26(d)(2)(i)(F); 122.41(h), (j)-(l); 122.42(c); 122.44(i); 122.48.). The Order's monitoring and reporting requirements are thus imposed pursuant to federal law.

iv. Maximum Extent Practicable (MEP) standard:

The CWA mandates that the Order "require controls to reduce the discharge of pollutants to the maximum extent practicable" (33 U.S.C. § 1342(p)(3)(B)(iii).). *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, as modified on denial of rehearing (Nov. 16, 2016) (*Department of Finance*) analyzed whether the CWA's MEP standard required four particular provisions concerning trash receptacles and inspections in the 2001 Los Angeles County MS4 permit. In concluding that the provisions were not required by federal law, the Supreme Court stated that, "[h]ad the Regional Board found when imposing the disputed permit conditions, that those conditions were the only means by which the maximum extent practicable standard could be implemented, deference to the board's expertise in reaching that finding would be appropriate" (*Department of Finance, supra*, 1 Cal.5th at p. 768.). The Supreme Court

[105] Phase I Stormwater Regulations, Final Rule, 55 Fed. Reg. 47990, 47994 (Nov. 16, 1990) (emphasis added); see also *Building Industry Ass'n of San Diego County v. State Water Resources Control Bd*. (2004) 124 Cal.App.4th 866, 882-887; Phase II Stormwater Regulations, Final Rule, 64 Fed. Reg. 68722, 68737.

further stated that "[s]uch findings are "case specific, based among other things on factual circumstances" (*Id*., fn. 15.).

To be entitled to deference, regional water boards must make an express finding that the particular set of permit conditions in a given permit is required to meet that federal standard and must support that finding with evidence. The Water Board expressly finds that the Order specifies requirements necessary for the Permittees to reduce the discharge of pollutants in MS4 discharges to the MEP. The requirements relate to municipal operations, new development and redevelopment, industrial and commercial controls, construction controls, and public information and outreach. The mix of program elements in the Order reflects the necessary pollutant reduction expected by the demanding federal MEP standard, but also represents a balancing of competing interests such as effectiveness, ease of implementation, and practicability. To the extent there may be multiple means of achieving pollutant reductions and that there could be trade-offs between program areas with potentially higher costs and greater pollutant reductions, the permit programs are structured to provide the optimum reduction of pollutants necessary to reduce pollutants to MEP. This finding is the expert conclusion of the principal state agency charged with implementing the NPDES program in California and therefore entitled to deference under *Department of Finance*.

The Order's requirements represent structural and non-structural water quality control measures that are effective, technically feasible, and generally accepted as appropriate. They are necessary to meet the MEP standard, an ever evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge and technology regarding controlling stormwater runoff continue to evolve, so too must the actions that are taken to comply with the standard.[106]

For example, based on advancing knowledge and technology related to limiting stormwater pollutants from impervious surfaces through low impact development strategies, economic considerations, and consideration of the evolving MEP standard, this Order contains new requirements for smaller new developments and redevelopments, including roads, and green infrastructure. They are necessary to meet the federal MEP standard and consistent with other U.S. EPA-issued municipal storm water permits, as explained in the Fact Sheet for Provision C.3. The Supreme Court in

[106] See also 55 Fed. Reg. 47990, 48052 ("EPA anticipates that storm water management programs will evolve and mature over time."); 64 Fed. Reg. 68722, 68754; Dec. 8, 1999 ("EPA envisions application of the MEP standard as an iterative process."); and Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits (Sept. 1, 1996) ("The interim permitting approach uses BMPs in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.").

Department of Finance suggested that the inclusion of equivalent or substantially similar provisions by the U.S. EPA in other permits may support a finding that the provisions are necessary to achieve MEP (*Dept. of Finance*, supra, 1 Cal.5th at p. 772.).

Similarly, enhanced bacteria provisions do not require affected Permittees to implement sweeping new programs or state-of-the-art technologies. Instead, they require Permittees whose stormwater discharges contribute to bacteria exceedances to ensure that streets are clean, storm drain catchments are clean, and that litter and pet waste laws are enforced. The fact that all elements of enhanced bacteria controls are already in place demonstrates that these elements are practicable. Intensifying use of these existing controls ensures that they do, in fact, reduce bacteria pollution to the MEP.

b. Permittees have authority to fund the costs through service charges, fees, or assessments:

Even if any of the permit provisions could be considered unfunded state mandates, under Government Code section 17556, subdivision (d), a state mandate is not subject to reimbursement if the local agency has the authority to fund the costs through service charges, fees, or assessments (*Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 398.). Here, Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with the Order. Permittees certainly have fee authority under their police powers (See, Cal. Const., art. XI, § 7; *Freeman v. Contra Costa County Water Dist.* (1971) 18 Cal.App.3d 404, 408 ("It cannot be denied that prevention of water pollution is a legitimate governmental objective, in furtherance of which the police power may be exercised."); *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 561-62 (holding in part that local governments have the authority sufficient to pay for inspection requirements for commercial and industrial facilities and construction sites to ensure compliance with various environmental regulations in an MS4 permit under their police powers for the prevention of water pollution).

This Fact Sheet demonstrates that numerous activities contribute to the pollutant loading from the MS4. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership (See, e.g., *Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 842 (upholding inspection fees associated with renting property).). The authority of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention (*Clovis Unified School Dist. v. Chiang* (2010) 188 Cal.App.4th 794, 812 ["To the extent a local agency or school district 'has the authority' to charge for the mandated program or increased level of service, that charge cannot be recovered as a state-mandated cost."], quoting *Connell v. Superior Court* (1997)

59 Cal.App.4th 382, 401; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487-488.).

Permittees have argued in the past that their fee or taxation authority is constrained by California Constitution article XIII D, section 6, also known as Proposition 218 (Cal. Const., art. XIII D, § 6, subd. (c); *see also Howard Jarvis Taxpayers Association v. City of Salinas* (2002) 98 Cal.App.4th 1351, 1358-1359.). However, Proposition 218 is not an impediment to this Permittees' fee authority.[107] The Constitution has an exception to the voter approval requirements of Proposition 218, "for fees or charges for sewer, water, and refuse collection services" (Cal. Const. Article XIII D, section 6, subd. (c).).

The Legislature recently enacted two important pieces of legislation confirming fee authority without the need for voter approval. In Assembly Bill 2043 (2014), effective January 1, 2015, the Legislature amended the definition of "water" for purposes of articles XIII C and XIII D to mean "water from any source" (Gov. Code, § 53750, subd. (n), amended by Assembly Bill 2043 (Stats. 2014, ch. 78, § 2.). In doing so, the Legislature stated that its act "is declaratory of existing law." (Stats. 2014, ch. 78, § 1(c).) With Senate Bill 231 (2017), effective January 1, 2018, the Legislature "reaffirm[ed] and reiterate[d]" that the definition of "sewer" for purposes of article XIII D includes: systems, all real estate, fixtures, and personal property owned, controlled, operated, or managed in connection with or to facilitate sewage collection, treatment, or disposition for sanitary or drainage purposes, including lateral and connecting sewers, interceptors, trunk and outfall lines, sanitary sewage treatment or disposal plants or works, drains, conduits, outlets for surface or storm waters, and any and all other works, property, or structures necessary or convenient for the collection or disposal of sewage, industrial waste, or surface or storm waters (Gov. Code, § 53750, subd. (k); see also Gov. Code § 53751, subds. (h) and (i), added by Senate Bill 231, Stats. 2017, ch. 536, § 2.). These legislative actions confirm that the Permittees have authority to raise fees or charges, without voter approval, for costs related to their MS4s (See *Paradise Irrigation Dist. v. Com. on State Mandates* (2019) 33 Cal.App.5th 174, 197 [noting that effect of Senate Bill 231 was to exempt stormwater systems from voter approval requirement].).

In addition, Health and Safety Code section 5471, subdivision (a), gives dischargers fee authority for "services and facilities furnished…in connection with its water, sanitation, *storm drainage*, or sewerage system" (Health & Safety Code, § 5471, subd. (a) (emphasis added).). Similarly, Public Resources Code section 40059, subdivision (a)(1), also confers fee authority on counties, cities, districts, or other local governmental agencies for "[a]spects of solid waste

[107] Such authority is also undiminished by Proposition 26, which specifically excludes assessments and property-related fees imposed in accordance with Proposition 218 from the definition of taxes (Cal. Const., art. XIII C, § 1, subd. (e)(7).).

handling which are of local concern, including, but not limited to, frequency of collection, means of collection and transportation, level of services, charges and fees, and nature, location, and extent of providing solid waste handling services."

The ability of the Permittees to levy fees, assessments, or service charges to pay for compliance with the requirements of the Order cannot be disputed. In addition to the general authority above, some of the Permittees have specific authority to levy funds to pay for permit compliance through many means, including inspection fees, stormwater fees, development impact fees, trash fees, parks fees, and business improvement districts. Thus, the City of Palo Alto adopted an increased Storm Water Management Fee in 2017 to help pay for both routine maintenance of stormwater infrastructure, as well as new initiatives, including stormwater recycling and green infrastructure.[108] Voters in the City of Berkeley approved an increased stormwater fee in 2018 with provisions for annual increases of no more than 3 percent.[109] Voters in the City of Alameda adopted a stormwater management fee in 2019 for capital improvement, operation, and maintenance of the storm drain system, including clean water controls.[110] The City of Moraga included as part of its increased development impact fee schedule a "Storm Drainage Fee" to be "assessed on all types of development (within Town boundaries) that results in the addition of impervious surface, and which thereby increases demand on the Town's storm drainage facilities."[111] Many permittees impose park admissions fees or parks fees as a component of their development impact fees, which can help ensure improvements to park infrastructure (e.g., installation of pet waste stations) or operational costs (e.g., implementation of integrated pest management to comply with the pesticides TMDL).[112] Many, if not all, other municipalities and counties assess trash collection fees, which help cover the costs of implementing the trash provisions[113] and homeless encampment BMPs.[114] The

[108] City of Palo Alto, Storm Water Management Fee (2021); accessed at: https://www.cityofpaloalto.org/Departments/Public-Works/Engineering-Services/Storm-Water-Management-Fee

[109] City of Berkeley, Approval and Levy of 2018 Clean Stormwater Fee in FY 2020, p. 4 (July 16, 2019).

[110] City of Alameda, 2019 Water Quality & Flood Protection: Frequently Asked Questions (alamedaca.gov).

[111] Town of Moraga, 2016 Comprehensive Development Impact Fee Update (May 2016), p. 36.

[112] See, e.g., Sunnyvale Municipal Code, § 18.10.020, subd. (d).

[113] See, e.g., Alameda County Department of Environmental Health Fee Schedule (2021), pp. 6-8 (Several pages of waste managmement-related fees, including fees for inspections), accessed at: https://deh.acgov.org/deh-assets/docs/General-Fees.pdf

[114] City of San Jose, "BeautifySJ Trash and Waste Services Expand" (November 20, 2020) (City Council approved $3 million to pay for trash pickup at homeless encampments); see also Wipf, Carly. "Update:

City of Oakland has ten business improvement districts, or BIDs, in which businesses help to fund maintenance costs, including the costs of trash pickup and graffiti removal, in their respective districts.[115] The Permittees have authority to levy fees for firefighting and prevention.[116] In short, Permittees have multiple sources of fee funding to implement permit requirements.

Even if voter approval may be required prior to levying fees, that does not mean that a local agency lacks the authority to levy fees. In *Paradise Irrigation Dist. v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 182, the Court considered whether the majority protest procedure added by Proposition 218 deprived local agencies of authority to impose fees for water service. Article XIII D, section 6(a) requires a local agency to identify parcels subject to a new fee, calculate the fee amount, and provide notice to affected property owners (Cal. Const., art. XIII D, § 6, subd. (a)(1).). If a majority of the property owners submit written protests against the fee, the fee may not be imposed (*Id*., subd. (a)(2).). The Court held that the "majority protest procedures are properly construed as a power-sharing arrangement between the districts and their customers, rather than a deprivation of fee authority" (33 Cal.App.5th at p. 182.). It explained that, when considering how voter powers affect the ability of local governments to impose fees, courts "presume local voters will give appropriate consideration and deference to state mandated requirements . . . " (*Id*. at p. 194, citing *Bighorn Desert View Water Agency v. Verjil* (2006) 39 Cal.4th 205, 220.). "Although this power-sharing arrangement has the potential for conflict, we must presume that both sides will act reasonably and in good faith" (Id., at p. 192.) Further, the fact that, "as a matter of practical reality, the majority protest procedure allows water customers to defeat the District's authority to levy fees" was not dispositive; "the inquiry into fee authority constitutes an issue of law rather than a question of fact." (Id. at p. 195, citing Connell, supra, 59 Cal.App.4th at p. 401.). "Fee authority is a matter governed by statute rather than by factual considerations of practicality;" it is not controlled by whether municipalities have tried and failed to levy fees (Id.). If there is statutory authority to levy fees, then there is no right to subvention (Id.).

Grants, both state and federal, can also offset the costs of stormwater implementation. For instance, the State of California administers the Clean Water State Revolving Fund, which the 2021-2022 Intended Use Plan

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Spend $3 million more to pick up San Jose trash, officials recommend," *San Jose Spotlight* (Sept. 14, 2020); see also Bond Graham, Darwin. "Oakland's new budget doesn't 'defund' the police, but it boosts funding for alternatives," *The Oaklandside* (June 25, 2021) (Oakland approving extension of sanitation services to 107 homeless encampments.)

[115] See, e.g., maintenance services performed by Downtown Oakland Association (https://downtownoakland.org/clean-safe/).

[116] Markovich, Ally. "Berkeley firefighters get $12.7M to tackle growing wildfire threat," *Berkleyside* (July 1, 2021) (Measure FF funds to pay for additional staff, ambulances, vegetation management, and training);

specifically notes may be used to fund "[s]tormwater and dry weather runoff reduction from Municipal Separate Storm Sewer Systems" in the San Francisco Bay Region.[117] Proposition 1 authorized $200 million for "green infrastructure, rainwater and stormwater capture projects, and stormwater treatment facilities," and stormwater project planning.[118] The City of San Pablo is a recipient of a 2021 Proposition 1 grant award. Caltrans also provides significant funding for cooperative implementation of trash control projects. Atherton, Richmond, Vallejo, Hayward, Emeryville, San Jose, Palo Alto, East Palo Alto, San Mateo, Oakland and unincorporated Alameda County have all completed or received funding to implement full trash capture projects jointly with Caltrans.[119] The 2021 Clean California program expands Caltrans' funding for litter abatement and public education and incorporates a nearly $300 million local grant program.[120]

U.S. EPA also administers grant programs for various activities that this permit requires, such as TMDL implementation, nonpoint source control, and training.[121]

D. Statewide Industrial and Construction Stormwater General Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

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[117] State Water Resources Control Board, CWSRF, Prop 1, and Prop 68 Intended Use Plan (June 15, 2021), p. 12.

[118] Wat. Code § 79747.

[119] Correspondence with Qi Yan (July 23, 2021).

[120] Caltrans, Clean California (2021), p. 2; see also, Governor's Office, "Governor Newsom Kicks Off Clean California Day of Action Highlighting New Initiative to Clean and Revitalize Neighborhoods Across the State" (July 7, 2021).

[121] See generally, U.S. EPA Water Infrastructure and Resiliency Finance Center, "Federal and State Funding Programs -Stormwater &Green Infrastructure Projects" (April 2017).

E. Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region and, with respect to the East Contra Costa County Permittees, the Sacramento and San Joaquin River basins. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

F. Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, state or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities. Most of these facilities are regulated under the State Water Resources Control Board's general permit for stormwater discharges from small municipal separate storm sewer systems (WQ Order 2013-0001-DWQ, as amended) and are required to control the discharge of pollutants from their systems. The Water Board will consider additional such facilities for coverage under that NPDES permit or otherwise pursuant to U.S. EPA Phase II stormwater regulations..

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Neither the CWA nor federal regulations specifically define "non-stormwater." The definition of "non-storm water" is derived from the definition of "storm water." Federal regulations define "storm water" as "storm water runoff, snow melt runoff, and surface runoff and drainage" (40 CFR § 122.26(b)(13).). While "surface runoff and drainage" is not defined in federal law, U.S. EPA's preamble to the federal regulations demonstrates that the term is related to precipitation events such as rain and/or snowmelt (55 Fed.Reg. 47990, 47995-96 (Nov. 16, 1990)). For example, U.S. EPA states:

"In response to the comments [on the proposed rule] which requested EPA to define the term 'storm water' broadly to include a number of classes of discharges which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation under the NPDES program of such non-storm water discharges . . . . Consequently, the final definition of storm water has not been expanded from what was proposed."

(*Ibid*.) The storm water regulations themselves identify numerous categories of discharges including landscape irrigation, diverted stream flows, discharges from drinking water supplier sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, and street wash water as "non-storm water." While these types of discharges may be regulated under storm water permits, they are not considered storm water discharges (40 CFR §122.26(d)(2)(iv)(B)). This review of the storm water regulations and U.S. EPA's discussion of the definition of storm water in its preamble to these regulations strongly supports the interpretation that storm water includes only precipitation-related discharges. Therefore, non-precipitation related discharges are not storm water discharges and are not subject to the MEP standard in CWA section 402(p)(3)(B)(iii). Rather, non-storm water discharges are effectively prohibited pursuant to CWA section 402(p)(3)(B)(ii).

While federal regulations have no definition for "non-storm water discharges," "illicit discharges" is defined and the terms are often used interchangeably (See, e.g., 40 CFR § 122.26(d)(2)(iv)(B)(1).). "Illicit discharge" is defined by U.S. EPA as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit . . . and discharges

resulting from firefighting activities"[122] (40 CFR § 122.26(b)(2).). The federal regulations require that non-stormwater discharges be controlled if they are a significant source of pollutants and the permitting authority is expected to include permit conditions to prohibit or control specified categories of non-stormwater discharges if they are determined to be a source of pollutants to waters of the United States (40 CFR § 122.26(d)(2)(iv)(B)(1).).

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, Chapter 4 Implementation, Table 4-1, Prohibition 7, and the trash discharge prohibitions in the ISWEBE and Ocean Plan.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – San Francisco Bay Basin Plan, Chapter 3, Water Quality Objectives.

Receiving Water Limitation B.2. Legal Authority – CWA section 402(p)(3)(B)(iii) requires MS4 permits to include "such other provisions as the Administrator or the State determines appropriate for the control of [] pollutants." EPA interprets this provision to mandate "controls to reduce the discharge of pollutants to the maximum extent practicable, and *where necessary water quality-based controls*."[123]U.S. EPA has reiterated that MS4 "permit conditions must provide for attainment of applicable water quality standards (including designated uses), allocations of pollutant loads established by a TMDL, and timing requirements for implementation of a TMDL."[124] The State Water Board has also determined that limitations necessary to meet water quality standards are appropriate for the control of pollutants discharged by MS4s and must be included in MS4 permits (State Water Board Orders WQ 91-03, 98-01, 99-05, 2001-15,2021-0052-EXEC), and 2020-0038.). This Order accordingly requires that discharges shall not cause or contribute to violations of water quality standards. The receiving water limitations are necessary and appropriate to control MS4 discharges because storm water discharges can cause or contribute to excursions above water quality standards. The inclusion of receiving water limitations is also consistent with the Ninth Circuit Court of Appeal's ruling in *Defenders of Wildlife v. Browner* (191 F.3d 1159, 1166 (1999)) that the permitting authority has discretion regarding the nature and timing of requirements that it includes as MS4 permit conditions to attain water quality standards.

[122] While not illicit discharges, discharges from firefighting activities may be regulated where they contribute significantly to pollution in stormwater. 40 C.F.R. 122.26(d)(2)(iv)(B)(1); see also 64 Fed. Reg. 68722, 68756, 68758.

[123] Phase I Stormwater Regulations, Final Rule, 55 Fed. Reg. 47990, 47994 (Nov. 16, 1990) (emphasis added); see also Building Industry Ass'n of San Diego County v. State Water Bd. (2004) 124 Cal.App.4th 866, 882-887).

[124] See, e.g., Phase II Stormwater Regulations, Final Rule, 64 Fed. Reg. 68722, 68737.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains water quality objectives, as well as the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in [CWC] Section 13050, is prohibited."

CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

CWC section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

CWC section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

CWC Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires NPDES permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(vii) requires water quality-based effluent limits that are consistent with the assumptions and requirements of any available wasteload allocation.

State Water Board Orders WQ 98-01 and 99-05 are precedential orders that require municipal stormwater permits to not cause or contribute to exceedances of water quality standards in the receiving water. State Water Board Order WQ 99-05 specifically requires that Provision C.1 include language that Permittees shall comply with discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges and adopted an iterative approach to complying with the limitations where there are exceedances. Courts have held that compliance with the iterative process does not excuse liability for violations of water quality standards (*Building Industry Assn. of San Diego v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866; *City of Rancho Cucamonga v. Regional Water Quality Control Bd*. (2006) 135 Cal.App.4th 1377; *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2011) 673 F.3d. 880, rev'd on other grounds sub nom; *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2013) 133 S.Ct. 710, mod. by *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2013) 725 F.3d 1194, cert. den. *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2014) 134 S.Ct. 2135.).

State Water Board Order WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, also affirmed that good faith implementation of the iterative process does not excuse liability for violations of water quality standards. It, however, allowed an alternative path to permit compliance that allows MS4 dischargers that are willing to pursue significant undertakings to be deemed in compliance with the receiving water limitations. It specifically directs regional water boards to follow the principles stated below when issuing a municipal stormwater permit, unless a board makes a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons.

The receiving water limitations provisions of Phase I MS4 permits should continue to require compliance with water quality standards in the receiving water and should not deem good faith engagement in the iterative process to constitute such compliance. The Phase I MS4 permits should therefore continue to use the receiving water limitations provisions as directed by State Water Board Order WQ 99-05.

(1) The Phase I MS4 permits should include a provision stating that, for water body-pollutant combinations with a TMDL, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination.

(2) The Phase I MS4 permits should incorporate an ambitious, rigorous, and transparent alternative compliance path that allows permittees appropriate time to come into compliance with receiving water limitations without being in violation of the receiving water limitations during full implementation of the compliance alternative.

(3) The alternative compliance path should encourage watershed-based approaches, address multiple contaminants, and incorporate TMDL requirements.

(4) The alternative compliance path should encourage the use of green infrastructure and the adoption of low impact development principles.

(5) The alternative compliance path should encourage multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply.

(6) The alternative compliance path should have rigor and accountability. Permittees should be required, through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions. Permittees should be further required, again through a transparent process, to monitor the results and return to their analysis to verify assumptions and update the solutions. Permittees should be required to conduct this type of adaptive management on their own initiative without waiting for direction from the regional water board.

In State Water Board Order WQ 2020-0038, the State Water Board applied and further explained the alternate compliance path principles in Order WQ 2015-0075 when it reviewed the Los Angeles Regional Water Board's Los Angeles County MS4 permittees' watershed management plans and an enhanced watershed management program (LA County MS4 Permit), which were used as alternative paths to compliance. The State Water Board directed changes to those plans, reiterating State Board Order WQ 2015-0075's standards for rigor, transparency, and accountability for alternate compliance. The State Water Board referred regional water boards using alternative compliance approaches to ensure consistency with certain additional principles in Order

WQ 2020-0038, including "ensuring plans approved clearly explain their development process, identify enforceable milestones, and detail the water body-pollutant combinations to which the plans apply and, to the extent limiting-pollutant or similar approaches are used, that their use is justified such that there is confidence treatment of the limiting pollutant will address the other water body-pollutant combinations to be addressed" (State Water Board Order WQ 2020-0038 [Los Angeles County], p. 164.). At the same time, the State Water Board recognized its order is not intended to curtail the flexibility of the regional water boards to adopt alternative compliance approaches that best fit their particular regions or to restrain the evolution of the regional water boards' approaches to alternative compliance.

Alternative Path to Compliance with Receiving Water Limitations for Certain Pollutants and Consistency with State Water Board Precedent

This Order, as did the previous order, goes beyond requiring an open-ended iterative approach to compliance with water quality standards by including pollutant-specific provisions, C.9 through C.12. C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f, with numerical or narrative WQBELs with milestones and deadlines. These provisions, other than C.10, which implements the statewide Trash Amendments, and C.14.a, which address bacteria exceedances in two water bodies that have not been listed as impaired for bacteria, implement adopted TMDL wasteload allocations or Water Quality Improvement Plans and the associated implementation plans in the Basin Plan and the Water Quality Control Plan for the Sacramento and San Joaquin Basins and specify what Permittees must do during the term of the Order to manage discharges of the specific pollutants that may cause or contribute to violations of water quality standards. Provision C.10 requires controls to meet water quality objectives applicable to trash in the Basin Plan, ISWEBE, and Ocean Plan.

Provision C.1 provides a bridge between the receiving water limitations, which state that discharges shall not cause or contribute to a violation of any applicable water quality standard, and these pollutant-specific provisions that include enforceable water quality-based requirements that Permittees must meet during the term of this Order to manage their contributions to violations or to prevent violations of water quality standards in receiving waters. In accordance with Basin Plan Section 4.8 – Stormwater Discharges and the applicable TMDL implementation requirements specified in the implementation plans adopted into the Basin Plan for and with TMDLs associated with these provisions, the requirements in these pollutant specific provisions are based on an updated assessment and consideration of technically and economically feasible control measures to reduce pollutants in stormwater discharges. As such, each of these provisions establishes a path to compliance with associated receiving water limitations. These requirements are a direct outgrowth of knowledge and experience with the presence of these pollutants in receiving waters (e.g., San Francisco Bay segments and urban tributaries) based on monitoring and special studies conducted by the San Francisco Bay Regional Monitoring Program, required monitoring from previous permits,

special studies conducted by municipalities, and other studies conducted by the San Francisco Estuary Institute.

The alternative path to compliance in the Permit is structured differently than the LA County MS4 Permit's watershed management program-based alternative compliance path reviewed by the State Water Board in State Water Board Orders WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, and 2020-0038. Specifically, an alternative compliance path is incorporated into the permit as follows:

- The requirements constituting the alternative compliance path are spelled out in sections C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f. In the LA County MS4 Permit, permittees were required to propose and develop watershed management programs with structural and non-structural controls that would then be approved by the Los Angeles Water Board as appropriate for alternative compliance. Here, Permittee requirements and controls are specified in the Permit itself rather than proposed by the Permittees in a plan.
- With one exception,[125] the alternative compliance path is available only for waterbody-pollutant combinations for which there is an established TMDL or Water Quality Improvement Plan (WQIP). The requirements and controls specified in the relevant alternative compliance sections closely track the requirements and controls specified in the TMDL or WQIP implementation plans including, as consistent with the implementation plans, refinements and updates based on the experience of the Board and the Permittees in implementing the TMDLs in prior permit terms. Sections C9 through C12, C.14, C.18, and C.19 of this Fact Sheet include a thorough discussion of the bases for these requirements and controls. Because the alternative compliance path follows established TMDLs or WQIP, milestones and deadlines in those TMDLs that occur within the term of the Permit are incorporated into the Permit. In this sense, the alternative compliance path in the Permit is largely the implementation of TMDLs or WQIPs that were duly adopted by the Board and incorporated into the Basin Plan, as is already required by the law even in the absence of an alternative compliance option. (Water Code §13263(a) (waste discharge requirements must implement the Basin Plan); 40 CFR 122.44(d)(1)(vii) (NPDES permits must include water quality-based effluent limits that are consistent with the assumptions and requirements of any available wasteload allocation).)
- The Permit allows alternative compliance where there is no established TMDL or WQIP for one set of waterbody-pollutant combinations. This alternative compliance path is specified in Section C.14.a. The section applies to "the cities of Mountain View and Sunnyvale for discharges that are causing or contributing to exceedances

[125] Although there is no TMDL for trash, Provision C.10 implements the statewide Trash Amendments, which establish a framework for coming into compliance with the statewide prohibition on trash discharges.

of applicable bacteria water quality objectives in Stevens Creek (both cities), Calabazas Creek (Sunnyvale), and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale)." The requirements, controls, and timelines in Section C.14.a. mirror the requirements, controls, and timelines in bacteria TMDLs established for other waterbody segments in the region. (See Sections C.14.b.-14.d.) Accordingly, the Board relied on the analysis and planning that supported the development of those TMDLs as support for provisions in Section C.14.a.

- The Permit incorporates requirements and incentives for the use of green infrastructure, the adoption of low impact development principles, and multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply. Some of the alternative compliance path provisions specifically identify such projects as means of compliance with the provisions, including Provision C.11 for mercury discharges to San Francisco Bay and Provision C.12 for PCBs discharges to San Francisco Bay. Generally, however, the requirements are layered on top of the alternative compliance provisions, rather than built into provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f. Specifically, all Permittees, and not only Permittees with discharges subject to the alternative compliance path provisions, must comply with section C.3.

As stated above, State Water Board Orders WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, and 2020-0038 acknowledge that there is more than one acceptable approach to providing for an alternative compliance path in an MS4 Permit. (See, e.g. State Water Board Order WQ 2021-0052-EXEC, p. 64 ("[W]e acknowledge that regional differences may dictate a variation on the [watershed management program] approach."); State Water Board Order WQ 2020-0038, p. 164 ("This order is not intended to curtail the flexibility of the regional water boards. . . to adopt and develop alternative compliance plans that best fit their particular regions, and does not require modification of programs adopted by other regional water boards.") While structured differently than the alternative compliance path in the LA County MS4 Permit, the alternative compliance path in provisions C.9 through C.12, C.14, C.18, and C.19.c-f, is nevertheless consistent with the direction in State Water Board Orders WQ 2015-0075, as amended, and 2020-0038 as described below and in the sections of the Fact Sheet discussing the bases for the requirements and controls in those sections.

The requirements of provisions C.9 through C.12, C.14, C.18, and C.19.c-f are ambitious and rigorous because they require Permittees to fully commit to and implement challenging, but achievable, tasks to ultimately meet water quality objectives, including objective interim narrative or numeric effluent limitations. Accordingly, this Order explicitly applies principles 1, 2, and 3 (above) of State Water Board Order WQ 2015-0075, as amended, and provides an alternative path to compliance with Discharge Prohibitions and Receiving Water Limitations for the following pollutant – water body combinations: pesticides and pesticide-caused toxicity in all receiving waters (Provision

C.9); trash in all receiving waters (Provision C.10); mercury in all San Francisco Bay segments and receiving waters in the Guadalupe River watershed (Provision C.11); polychlorinated biphenyls (PCBs) in all San Francisco Bay segments (Provision C.12); fecal indicator bacteria in various impaired water bodies (Provision C.14); sediment in Pescadero and Butano creeks (Provision C.18); and diazinon and chlorpyrifos in the Sacramento/San Joaquin River Delta (Provision C.19.c), methylmercury in the Sacramento/San Joaquin River Delta (Provision C.19.d-e), and pyrethroid pesticides in the Sacramento and San Joaquin river systems (Provision C.19.f).

This rigorous compliance alternative also applies Order WQ 2015-0075, as amended, principle 4. It implements all applicable TMDL requirements and calls for or allows for implementation of trash, mercury, and PCBs controls in watershed and drainage areas where they are most needed and most likely to be effective and promotes and allows use of controls with multiple pollutant benefits. In particular, Provision C.10 allows compliance through use of low impact development and green infrastructure controls that may be implemented for other pollutants, e.g., mercury and PCBs, upon a demonstration that such controls provide full trash capture system equivalency, and alternatively Permittees may use full trash capture systems as a means of meeting provisions C.11 (mercury) and C.12 (PCBs) requirements. Also, by design, provisions C.11 (mercury) and C.12 (PCBs) include consistent categorical control measure requirements, e.g., Source Property Identification and Abatement, Control Measure Implementation in Old Industrial Areas, and Plan and Implement Green Stormwater Infrastructure, based on recognition of the multipollutant benefits of these actions.

However, the watershed-based approach addressing multiple pollutants is less or not appropriate for the pesticides and pesticide-caused toxicity requirements. Consistent with the TMDL wasteload allocation and implementation plan, these requirements are pollution prevention management practices specific to urban use pesticides and apply to all watersheds and drainage areas since urban use pesticides are used everywhere. Similarly, Provision C.14 fecal indicator bacteria requirements for discharges to receiving waters that are or may be impaired by bacteria implement or, where there is no TMDL, are consistent with TMDL requirements, and call for fecal indicator bacteria-specific pollution prevention controls consistent with current knowledge of sources and activities in the watersheds of these receiving waters. Provision C.14 does recognize there will be bacteria reduction benefits associated with control of some trash sources. Although there may be some pesticides and bacteria reduction benefits of low impact development and green infrastructure controls that may be implemented for other pollutants, those benefits are likely minimal.

Order Provision C.3 calls for adoption and implementation of low impact development consistent with Order WQ 2015-0075, as amended, principles 5 and 6. The mercury and PCBs provisions (C.11 and C.12) explicitly recognize and call for use of green infrastructure to meet pollutant load reduction requirements. The trash provisions in C.10 allow use of low impact development green infrastructure as full trash capture

systems, if appropriately designed, operated, and maintained. Although not directly required in the pesticides and fecal indicator bacteria provisions, low impact development principles and development and implementation of green infrastructure plans, including consideration of multi-benefit regional projects, could also have pesticides and bacteria load reduction benefits. However, there are no current available and viable treatment controls, including green infrastructure, that can reduce concentrations of pesticides or fecal bacteria to low levels consistent with applicable water quality objectives.

Consistent with Order WQ 2015-0075, as amended, principle 7, each of the pollutant-specific provisions also contain concrete milestones and deadlines and reporting requirements that provide rigor and accountability. Unlike the MS4 permit evaluated in Order WQ 2015-0075, as amended, where water quality objectives were to be achieved through watershed management plans or programs to be submitted, this Order explicitly sets forth the requirements for achieving over time receiving water limitations instead of relying on plans. As such, it is abundantly transparent as to what is required. The pollutant-specific requirements track the controls and the timelines for attaining the wasteload allocations established in adopted TMDLs; therefore, the analyses supporting the requirements for achieving receiving water limitations over time were provided in the first instance, in a transparent, public process, through the adoption of the TMDLs. Additionally, this Fact Sheet summarizes data and information collected under the prior permit's implementation of the TMDL and additional requirements and provides the analyses supporting additions and adjustments made to the pollutant-specific requirements and controls in this Permit. Moreover, as implementation of the Permit's alternative compliance provisions proceeds, all reports, plans, and other required submittals will be made available to all interested parties and input and feedback from interested parties will be considered in the evaluation of all submittals. State Water Board Order WQ 2015-0075, as amended, requires that an MS4 permit show "through a transparent process" that it has "analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions," but it does not require a specific type or form of analytical exercise to meet this principle. (See, e.g., State Water Board Order WQ 2020-0038, p. 81, acknowledging that evaluations other than modeling are acceptable.) The analyses supporting the TMDLs implemented in the Permit, as well as the additional analyses provided or referred to in this Fact Sheet, meet the direction provided by the State Water Board in principle 7.

The Order also includes monitoring requirements (Provision C.8 and Provision C.14) to assess water body and watershed conditions and effectiveness of control actions towards attainment of water quality standards and to inform selection and implementation of new control actions or adaptive improvements of control actions.

Consistent with the TMDLs, more time than the term of the Order will be necessary to attain water quality standards for mercury, PCBs, and fecal bacteria. In these cases, the associated Order provision includes an additional requirement for the Permittees to

submit updated plans of additional or improved control actions and schedule of implementation to attain water quality standards and TMDL wasteload allocations for the Water Board's consideration of numerical or narrative WQBELs in the subsequent order. It also requires updates to corresponding reasonable assurance analyses demonstrating sufficient control measures will be implemented to attain the TMDLs and water quality standards.

With respect to compliance with the trash discharge prohibition, the Trash Amendments provide that Permittees "with NPDES permits that contain specific requirements for the control of Trash that are consistent with these Trash Provisions shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements." The requirements of this Order are consistent with the Trash Provisions, which include the water quality objective for trash, the discharge prohibition, and the implementation requirements of the Trash Amendments (see Fact Sheet for Provision 10).

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii) and 402(a), California Water Code (CWC) sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires "[a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires "[a] description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires "[a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires "[a] description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways [sic] and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Discharges from paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, can contain many pollutants, such as sediment, copper, petroleum products, trash, and pathogens. Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention. This Provision sets the minimum implementation level for such preventive measures, but does not bar Permittees from implementing additional pollution prevention actions.

Municipal maintenance personnel play a vital role in minimizing stormwater pollution because they work directly on municipal storm drains and at other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in identifying, reporting, and cleaning up illicit discharges.

C.2-2 Road construction and other municipal activities can disturb soil and drainage patterns in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, degrading water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b) Identifying and prioritizing rural roads maintenance on the basis of soil erosion potential, slope steepness, and receiving water habitat resources; (c) Developing and implementing road and road crossing (e.g., bridge and culvert) construction designs that do not impact creek functions, do not create a migratory fish passage barrier, where migratory fish are present, and do not lead to stream bank instability; (d) Developing and implementing an inspection program to maintain road structural integrity and prevent impacts to water quality; and (e) Adequately maintaining rural roads adjacent to streams and riparian habitat to reduce erosion, such as by replacing damaging shotgun culverts, re-grading roads to slope outward where consistent with road engineering safety standards, and installing water bars.

Specific Provision C.2 Requirements

Provision C.2.a-e. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities, such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations). Stormwater pump stations can be sources of pollutants including low dissolved oxygen, oxygen-demanding substances, and trash to receiving waters. As described below, the Permit requires Permittees to continue to inspect their pump stations and, as needed, take corrective actions to prevent adverse water quality impacts.

Water Board staff investigated the occurrence of low salinity and dissolved oxygen (DO) conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Water Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Wildlife in Alameda County.

Discharge of black-colored water from the Alvarado pump station to Old Alameda Creek was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L (DO) water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The (DO) sag was detected from surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Inspections of stormwater pump stations, which transport water from the storm drain system to receiving waters and operate during both dry and wet weather, indicate that pump stations may represent an overlooked source of controllable pollution, in particular low dissolved oxygen (DO) and trash, to the San Francisco Bay Estuary and its tidal sloughs. The discharges of dry weather urban runoff from these pump stations were historically not managed to protect water quality and surveillance monitoring detected measurable negative water quality consequences of this current state of pump station management.

Previous iterations of the MRP required Permittees to inventory and inspect pump stations during the dry season to identify and correct low-DO discharges. Permittees

now have inventories of pump stations, and this permit continues the requirements to inspect pump stations and implement corrective action if receiving water is found to have low DO. Pump stations within the storm drain system and pump stations that discharge to dry creeks are excluded because any low DO in discharges will not impact water quality.

This permit also continues to require Permittees to inspect all pump stations for trash and evidence of illicit discharges, and maintain or replace oil-absorbent booms, in order to comply with the prohibition on non-stormwater discharges.

40 CFR 122.26(d)(2)(I)(f) requires Permittees to carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with permit conditions, including the prohibition on illicit discharges to the MS4. Pump stations cannot contribute discharges with dissolved oxygen (DO) level below 3 mg/L. Previous pump station reporting shows that implementing corrective actions (i.e., BMPs) prior to the pumps, combined activating the pumps to discharge collected water, as opposed to simply allowing it to overflow, aerates the water to a DO level of at least 3 mg/L. Thus, this Permit removes the specific DO monitoring requirements and allows the Permittees greater flexibility to ensure that all water discharged from pumps stations is at least 3 mg/l. The reporting requirement has also been removed from this Permit, but Permittees must maintain any sampling records and make them available upon request.

Provision C.2.f. (Corporation Yard BMP Implementation). This provision continues the requirement for Permittees to implement BMPs in site-specific Stormwater Pollution Prevention Plans (SWPPPs) to minimize pollutant discharges in stormwater and non-stormwater discharges in municipal corporation yards. SWPPPs, which Permittees have been required to have in place since 2010, should have specific BMPs for different functions of the corporation yard and provide guidance for regular inspections to ensure that appropriate BMPs are implemented. After Water Board staff and U.S. EPA staff inspections indicated that despite the use of SWPPPs, corporation yards had actual and/or potential discharges, the Water Board required Permittees to customize their SWPPPs and conduct routine inspections in different areas of the corporation yard and at least one inspection prior to the start of the rainy season. However, subsequent annual reports indicated that Permittees' inspections were not consistently scheduled at times when they would detect potential discharges or runoff issues prior to the start of the rainy season. In addition, Permittees' reporting on corrective actions was too spotty for the Water Board to make compliance determinations. Therefore, this Permit clearly identifies the timeframe for the annual inspections to occur and requires corrective actions to be implemented before the next rain event, but no later than 10 business days after the potential and/or actual discharges are discovered. This is consistent with the timeframe for implementation of corrective actions in provisions C.4. and C.5.

Provision C.2.g. Storm Drain Inlet Marking. This requirement has been moved from Provision C.7, Public Information and Outreach, of the Previous Permit (Order No. R2-

2015-0049, as amended). Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, the Permit continues to require all municipally maintained inlets to be legibly labeled with a “no dumping” message. Volunteer storm drain marking events have additional public involvement value and may further raise awareness and compliance.

Provision C.2.h. Staff Training. This provision continues to require Permittees to conduct annual trainings for municipal staff. Trainings are necessary to keep staff current on implementation and maintenance of BMPs for municipal operations to control stormwater discharges. Since municipal employees are largely responsible for implementing Provision C.2, staff training is an essential component of controlling discharges from municipal operations.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires "a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) requires "[a] description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires "[a] description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires "[a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the premise that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions for new development and redevelopment, including road improvement projects, and determining how to operate and maintain streets, roads, and highways, including reducing pollutants discharged from them. The goal of Provision C.3. is for Permittees to use their planning authority to reduce

pollutant discharges and runoff flow into the storm drain system primarily through the implementation of low impact development (LID) techniques.

C.3-3 To accomplish this goal, Permittees must require new development and redevelopment projects to implement appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from these projects. Permittees are also required to implement their Green Infrastructure Plans for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs and other storm drain infrastructure elements. Provision C.3. is not intended to restrict or control local land use decision-making authority.

C.3-4 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-5 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to regulation pursuant to CWA Sections 401 or 404. This is consistent with the stayed 2015 Clean Water Rule exempting stormwater control features from the definition of “waters of the U.S.” (80 Fed. Reg. 37054 (June 29, 2015).) This Permit requires Permittees to ensure that constructed wetlands installed by Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-6 The Permit requires Permittees to ensure that pervious pavement systems of 3,000 square feet or more, onsite, joint, and offsite stormwater treatment systems, and HM controls installed by Regulated Projects are properly operated and maintained for the life of the Projects.

<u>Specific Provision C.3 Requirements</u>

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) continues the requirements related to having adequate legal authority to address storm water, development review and permitting, environmental review, training, and outreach requirements of MRP 1.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

This permit is a 4th generation permit containing stormwater treatment requirements for development projects. Past permits have grandfathered development projects approved prior to those permits' effective dates, essentially exempting the projects and allowing them to provide no or insufficient stormwater treatment. The Water Board believes a small number of these development projects that were approved more than a decade ago have still not begun construction. A decade is sufficient time to justify requiring the Permittees to revise and update these stagnant development permits to include current LID treatment requirements. Therefore, this provision does not grandfather development projects approved with no stormwater treatment requirements and that have not begun construction. However, this provision allows exemptions for some of these previously approved projects in situations where the Permittees lack legal authority to retroactively change their previous approvals. For a pending Regulated project that has not been approved as of June 30, 2023, and a Permittee has no legal authority to require changes under Government Code sections 66474.2 or 65589.5, subd. (o), this provision does not require the Permittee to require compliance with the new requirements of this Order, because it cannot.

To confirm that the total number of projects previously approved without any Provision C.3-compliant stormwater treatment is indeed small, Provision C.3.b.iv.(1) includes a requirement for Permittees to provide in their 2023 Annual Report a complete list of these types of development projects. For each such Project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). This reporting requirement only applies to Permittees that have Projects subject to Provision C.3.b.i.(2).

Regulated Projects approved under previous permits with non-LID stormwater treatment measures in compliance with the hydraulic sizing criteria of Provision C.3.d. will continue to be grandfathered.

Provision C.3.b clarifies that sidewalks and any other portions of the public right of way that are developed or redeveloped as part of a Regulated Project must be included in the total impervious surface count when evaluating whether projects meet the Regulated Project thresholds, and when evaluating the area that must be treated by the Regulated Project. These impervious surfaces generate urban stormwater pollutants in

the form of aerially-deposited particulates and pollutants deposited by bicyclists (e.g., bicycle tire wear particles, and petroleum products) and pedestrians (e.g., PAH loading from adjacent roadways, and trash), they are a source of thermal pollution of runoff (which may contribute to adverse impacts threatening cold water wildlife habitat), and they contribute to hydromodification of receiving waters.[126]

The pavement maintenance practices defined in Provision C.3.b.ii.(1)(b) are adapted from Appendix 1 of the current (effective August 1, 2019) Western Washington Phase II MS4 Permit.[127] These definitions clarify which rehabilitative road maintenance/reconstruction practices do and do not qualify as Regulated Projects. For additionally clarity, bituminous surface treatments have been defined in the Glossary.

- Upgrading from a bituminous surface treatment with a layer of asphalt or concrete is an excluded pavement maintenance practice because a bituminous surface treatment itself results in an impervious surface, and therefore that upgrade will not produce a new impervious surface (as long as it does not also involve the removal or replacement of the pavement to the base course or lower). For example, if there is an existing dirt or gravel surface, over which there is an existing bituminous surface treatment, then the subsequent application of a new asphalt or concrete layer above the existing bituminous surface treatment is considered an excluded pavement maintenance practice because it does not produce a new impervious surface.

To preclude confusion, Provision C.3.b.ii.(1)(b)(iii) provides a redundant caveat that the listed pavement maintenance practices are included (i.e., not excluded) in the Road Reconstruction Projects category only if they trigger all the criteria specified in Provision C.3.b.ii.(5), including the criteria regarding contiguousness.

Provision C.3.b.ii.(1)(b)(iv) clarifies that, in the scenario in which a project includes a portion of work that is exempted (e.g., applying a bituminous surface treatment to an existing asphalt layer) and a portion of work that is *not* exempted (e.g., removing and replacing asphalt pavement to the base course, or reconstructing a sidewalk), the portion of work that is not exempted must be evaluated as to whether it meets the criteria for a Regulated Project. In other words, a Permittee may not exclude such a project altogether by categorizing it as the exempted portion; what must be evaluated is whether the non-exempted portion meets the criteria for a Regulated Project.

Public right of way projects (other than public road projects) are explicitly included within the definitions for Other Development Projects and Other Redevelopment Projects. Public right of way projects (other than public road projects) do not have the same constraints and challenges that public road projects have.

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[126] *The pollution conveyed by urban runoff: A review of sources*. December 2019. Alexandra Muller, Helene Osterlund, Jiri Marsalek, Maria Viklander. https://doi.org/10.1016/j.scitotenv.2019.136125

[127] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Western-Washington-Phase-II-Municipal-Stormwater

- Language has been added which clarifies that piecemeal public works projects which are not part of Regulated Projects – examples given are sidewalk gap closures, sidewalk section replacement, and ADA curb ramps (certain pavement maintenance practices within the road prism, such as pothole patching, are already excluded pursuant to Provision C.3.b.ii.(1)(b)(ii)) – are excluded from the Other Redevelopment Projects category, unless they create and/or replace 5,000 contiguous square feet or more of impervious surface. These types of public works projects are typically included in municipalities' CIPs as a budget line item for small patchwork projects to be completed through their jurisdictions, which individually may not create and/or replace 5,000 contiguous square feet of impervious surface, but which may (if combined together) create and/or replace 5,000 non-contiguous square feet of impervious surface. As we do not intend to consider the latter a Regulated Project, we have added clarifying language to Provision C.3.b.ii.(5) Other Redevelopment Projects, because this is the category under which these projects would likely qualify.
    - Sidewalk gap closures typically consist of the filling of gaps between sections of sidewalks, with pavement. For example, where a block has a sidewalk, but it is not continuous because it is missing across a parcel, completing the sidewalk across that parcel.
    - Sidewalk section replacement typically consists of repairing or replacing sidewalk sections that have been damaged or buckled by tree roots, tectonic action, etc.

Private road reconstruction projects are explicitly included within the definition for Other Redevelopment Projects. Permittees do not bear the burden of the design and capital construction costs of private road projects, and Permittees are able to recoup all or a significant portion of the cost of accounting for private road projects, for example, by charging project application review fees. Therefore, private road reconstruction projects are treated the same as all other types of private non-road reconstruction projects.

The Regulated Project category for Road Projects has been renamed from the Previous Permit to New or Widened Road Projects, and applies to both public and private projects.

The impervious surface thresholds for Other Development Projects, Other Redevelopment Projects, and New and Widened Road Projects are set at 5,000 square feet. These thresholds are MEP for this Permit and its Permittees, because:

(1) They align with the impervious surface area threshold of 5,000 square feet in Provision C.3.b.ii.(1) Special Land Use Categories, which has been in place since the Previous Permit term (Order No. R2-2015-0049).

(2) The 5,000 square foot threshold (or lower thresholds) for Regulated Projects is consistent with numerous other MS4 permits, including, but not limited to: the California State Water Board's NPDES Permit for WDRs for Stormwater

Discharges from Small MS4s (effective July 1, 2013),[128] the California Regional Water Quality Control Board Central Valley Region's NPDES and WDR General Permit for Discharges from MS4s (effective October 1, 2016),[129] the California Regional Water Quality Control Board Los Angeles Region's Regional MS4 NPDES Permit for Los Angeles and Ventura Counties,[130] the California Regional Water Quality Control Board Central Coast Region's NPDES MS4 Permit for the City of Salinas (effective October 1, 2019),[131] the City of Portland's NPDES MS4 Permit (effective January 31, 2011),[132] the State of Oregon's NPDES MS4 General Permit (effective March 1, 2019),[133] the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019),[134] Eastern Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[135] Western Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[136] the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010),[137] the City of Chicago's Stormwater Management Plan[138] for the State of Illinois's General Permit for Discharges from Small MS4s (effective March 1, 2016),[139] U.S. EPA's NPDES Stormwater Permit for the Boise/Garden City Area (effective October 1, 2021),[140] the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010),[141] U.S. EPA's

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[128] https://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.html

[129] https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2016-0040_ms4.pdf

[130] Order No. R4-2021-0105, NPDES Permit No. CAS004004, https://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/

[131] https://www.waterboards.ca.gov/centralcoast/water_issues/programs/stormwater/salinas.html

[132] https://www.portlandoregon.gov/bes/37485

[133] https://www.oregon.gov/deq/FilterPermitsDocs/ms4ph2genpermit.pdf

[134] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Municipal-Stormwater-Phase-I-Permit#:~:text=The%20Phase%20I%20Municipal%20Stormwater,populated%20areas%20in%20the%20state

[135] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Eastern-Washington-Phase-II-Municipal-Stormwat-(1)

[136] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Western-Washington-Phase-II-Municipal-Stormwater

[137] https://www.cityofsalem.net/Pages/ms4-permits-and-annual-reports.aspx#:~:text=The%20City%20of%20Salem%20operates,directly%20to%20our%20local%20streams

[138]https://www.chicago.gov/content/dam/city/depts/water/general/Engineering/MS4/MS4_Stormwater_Plan.pdf

[139] https://www2.illinois.gov/epa/topics/forms/water-permits/storm-water/Pages/ms4.aspx

[140] https://www.epa.gov/npdes-permits/npdes-stormwater-permit-boisegarden-city-area-ms4s-idaho

[141] https://www.eugene-or.gov/476/NPDES-Municipal-Stormwater-Permit

Washington, D.C. NPDES MS4 Permit (effective June 22, 2018),[142] and the State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 31, 2018).[143] The 5,000 square feet threshold is, therefore, consistent with reducing the discharge of pollutants from storm water to the MEP.

(3) The Permittees submitted a report[144] that the benefit provided by additionally capturing Regulated Projects in the 5,000-10,000 square foot range would likely provide similar benefit (with respect to acres of impervious surface treated) and similar cost (with respect to the burden on Permittees to review project applications and conduct inspections as well as other administrative burdens) as compared to Regulated Projects already captured, such as the 10,000-15,000 square foot range and the 15,000-20,000 square foot range.

(4) According to the Permittees' 2019 Green Infrastructure Plans,[145] existing and future Regulated Projects and Non-Regulated, public and private, development and redevelopment projects under the Previous Permit will result in about 2 percent of impervious surface collectively retrofitted in the five Permittee counties with clean water controls by 2020, 4 percent by 2030, and 6 percent by 2040. That pace of retrofit would not address stormwater pollutants discharged from Permittees' jurisdictions to the MEP. Therefore, in combination with other changes proposed for Provision C.3, this expansion of the Regulated Project threshold provides a significant incremental step towards increasing the amount of impervious surface within Permittees' jurisdictions retrofitted by clean water controls, regionwide.

(5) Permittees are able to recoup all or a significant portion of the cost of accommodating additional Regulated Projects in the 5,000-10,000 square foot range, for example, by charging fees for project application review and inspection.

(6) U.S. EPA supports the 5,000 square foot threshold for impervious surface area, as it is well understood that untreated stormwater contributes to the degradation of the San Francisco Bay and local creeks and streams, and dense urbanization,

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[142] https://www.epa.gov/npdes-permits/dc-municipal-separate-storm-sewer-system-ms4

[143] https://mde.maryland.gov/programs/water/stormwatermanagementprogram/pages/npdes_ms4_new.aspx

[144] "'White Paper' on Provision C.3 in MRP 2.0," Final Report, Bay Area Stormwater Management Agencies Association, February 27, 2015.

[145] https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/GIPlans2019.html

infrastructure, and impervious surfaces ring San Francisco Bay and contribute to an increase of contaminants that degrade receiving waters.[146,147]

The Permit includes language in Provision C.3.b.ii.(4) clarifying that a gravel surface is an impervious surface, except when it is constructed as part of appropriately designed pervious pavement system. Provision C.3.b.ii.(4) also identifies situations when a gravel surface may be excluded from treatment requirements, reflecting their landscape context, which is expected to often allow drainage to a vegetated area or other pervious area that is at least half the size of the contributing graveled surface. Gravel is considered impervious because it is typically compacted by design or by use. U.S. EPA has defined as impervious surfaces "…areas such as gravel roads…that will be compacted through design or use to reduce their impermeability."[148] It further has defined impervious surfaces as "[a]ny surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil."[149] The Ohio EPA includes gravel roads in its required calculations for impervious surfaces.[150] Municipalities including Asheville and Durham, North Carolina, and Avon, Ohio, consider gravel driveways impervious for the purpose of calculating those cities' stormwater utility fees, because compaction results in increased runoff from those surfaces.[151]

The Road Reconstruction Projects category (projects creating or replacing greater than or equal to one contiguous acre of impervious surface) is distinct from the New and Widening Road Projects category (which addresses only new road projects) because it addresses the significant reconstruction of existing public roads (reconstruction of private roads is addressed separately, in the Other Development Projects category). The definition of contiguous includes project areas interrupted by cross streets or intersections. Provision C.3.b.ii.(1)(b) distinguishes which public road reconstruction projects are and are not excluded.

- The treatment requirements for Road Reconstruction Projects are consistent with other MS4 permits, including, but not limited to: the City of Portland's NPDES MS4 Permit (effective January 31, 2011),[132] the State of Oregon's NPDES MS4 General

[146] SFEI, Wu, J., Trowbridge, P., Yee, D., McKee, L., and Gilbreath, A., 2018.

[147] Regional Monitoring Program Small Tributaries Loading Strategy: SFEI, McKee et al., 2006.

[148] U.S. EPA, July 2016. Summary of State Post Construction Stormwater Standards, p.13.

[149] Ibid., p.19

[150] Ohio EPA, Oct. 2018. Post-Construction Storm Water Questions and Answers, p.1. "What surfaces should be considered impervious? (…) rooftops, paved or gravel roads…."
and Ohio EPA, Oct. 2019. Guidance on Post-Construction Storm Water Controls for Solar Panel Arrays, p.1, "Paved or gravel roads…must also include post-construction storm water management."

[151] https://www.ashevillenc.gov/department/public-works/stormwater-services-utility/stormwater-fees/
https://www.durhamnc.gov/864/Impervious-Surface. Durham specifically references compacted gravel.

https://www.cityofavon.com/DocumentCenter/View/4298/Exhibit-A---Ordinance-No-105-17-Chapter-1056-FINAL?bidId=. "Impervious surfaces include…compacted gravel surface[s]" (p.2).

Permit (effective March 1, 2019),[133] the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019),[134] Eastern Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[135] Western Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[136] the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010),[137] the City of Chicago's Stormwater Management Plan[138] for the State of Illinois's General Permit for Discharges from Small MS4s (effective March 1, 2016),[139] U.S. EPA's NPDES Stormwater Permit for the Boise/Garden City Area (effective October 1, 2021),[140] the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010),[141] U.S. EPA's NPDES MS4 Permit for Washington, D.C. (effective June 22, 2018),[142] and the State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 31, 2018).[143]

The Road Reconstruction Regulated Projects category – in addition to the Numeric Implementation retrofit requirements in Provision C.3.j.ii.(2) – is intended to address the significant pollutant loading and hydrologic impact to receiving waters from Permittees' existing public roads and to clarify the amount of road reconstruction that is redevelopment justifying an investment of resources to retrofit the road with clean water controls.

In subsequent Permits, the Water Board may consider removing or revising Provision C.3.b.ii.(5)(c), which allows the Permittees to use alternative sizing criteria for Road Reconstruction Projects, as well as Provision C.3.b.ii.(5)(d), which allows the Permittees to credit the acreage of impervious surface created or replaced for Road Reconstruction Projects towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

This Regulated Project category includes utility trenching projects which are - on average, over the entire length of the project - greater than or equal to 8 feet wide. This is intended to include utility trenching projects that alter a portion of the roadway sufficient to warrant retrofit with clean water controls. The Water Board will use information collected during the Permit term to consider modifying the utility trenching criteria in a subsequent permit.

The Large Detached Single-Family Home Projects category for Regulated Projects captures such projects that create and or replace 10,000 square feet or more of impervious surface, collectively over the entire project site, and that are not part of a larger development or redevelopment plan. This Regulated Project category coincides with Provision C.3.i, which prescribes site design measures for small detached single-family home projects which create and/or replace 2,500-10,000 square feet of impervious surface. Recognizing that SB 9 also allows for the construction of an

accessory dwelling unit (ADU) on a lot with an existing single-family home, without subdividing the lot, C.3.b.ii.(6)(d) clarifies that such an action would fall under the large single-family home threshold of 10,000 sq. ft. of impervious surface. This category for Regulated Projects is necessary and MEP because:

(1) Large Detached Single-Family Home Projects can cause the same urban runoff pollutant and hydromodification impacts that projects of similar sizes in any of the other Regulated Projects categories can produce, because of the created/replaced impervious surface, because those surfaces are similar in nature to other pollutant-generating surfaces in the urban environment, and because aerially deposited urban pollutants are deposited and discharged from those projects to the MS4. Additionally, when flows from these projects flow on-land (e.g., along public streets, ditches and gutters) prior to entering the MS4 system and discharging to receiving waters, they can mobilize stormwater pollutants from those surfaces, eventually transporting them to receiving waters.

(2) In certain Permittees' jurisdictions, a significant portion of development and redevelopment projects consists of large detached single-family home projects because a significant portion of those Permittees' land use is large lot single-family residential.[152] Therefore, this new category has been added to control the pollutant discharges associated with this category of development and redevelopment.

(3) Permittees are able to recoup all or a significant portion of the cost of accommodating this new category of Regulated Projects, for example, by charging project application review and inspection fees.

[152] For example: The City of Los Altos' zoning map is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of 20,000 to 40,000 square feet: (https://www.losaltosca.gov/sites/default/files/fileattachments/community_development/page/39021/los_altos-land_use_final_w_labels-24x36-20181026.pdf); the Town of Los Altos Hills's zoning map is dominated by residential zoning, and all residential lots have a minimum lot size of one acre: (http://www2.lynxgis.com/Html5Viewer/Index.html?configBase=http://www2.lynxgis.com/Geocortex/Essentials/REST/sites/Los_Altos_Hills/viewers/LAH/virtualdirectory/Resources/Config/Default); the Town of Atherton's zoning map (other than park space) is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of one acre, and the remainder have a minimum lot size of 10,000-15,000 square feet: (https://www.ci.atherton.ca.us/209/Maps); the Town of Woodside's zoning map (ignoring conservation areas and park space) is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of one or three acres, and the remainder have a minimum lot size of 20,000 square feet: (https://www.woodsidetown.org/planning/town-woodside-zoning-map); the Town of Portola Valley's zoning map is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of at least one acre, and the remainder have a minimum lot size of 15,000-20,000 square feet: (https://www.portolavalley.net/home/showpublisheddocument/6770/635634073606070000; https://library.municode.com/ca/portola_valley/codes/code_of_ordinances); and the Town of Hillsborough's zoning map is dominated by a single residential zone, which has a minimum lot size of half an acre: (https://isd.smcgov.org/gis-data-download).

(4) There are many other MS4 Permits that consider it MEP to include analogous treatment requirements for large detached single-family home projects, including, but not limited to: the Los Angeles Regional Water Board's Regional MS4 NPDES Permit (effective September 11, 2021),[153] the City of Portland's NPDES MS4 Permit (effective January 31, 2011),[132] the State of Oregon's NPDES MS4 General Permit (effective March 1, 2019),[133] the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019),[134] Western Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[136] the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010),[137] the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010),[141] U.S. EPA's NPDES MS4 Permit for Washington, D.C. (effective June 22, 2018),[142] and the State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 30, 2018).[143] The 10,000 square foot threshold for this category is, therefore, consistent with reducing the discharge of pollutants from stormwater to the MEP.

(5) U.S. EPA Region 9 supports the expansion of these Regulated Project categories, as it is well understood that untreated stormwater contributes to the degradation of the San Francisco Bay and local creeks and streams, and dense urbanization, infrastructure and impervious surfaces ring San Francisco Bay and contribute to an increase of contaminants that degrade receiving waters.[146,147]

Provision C.3.b.iii Implementation Level directs the Permittees to implement the Regulated Project definitions in Provision C.3.b.ii beginning July 1, 2023.

Prior to July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii in Attachment I, which are requirements from the Previous Permit, are effective and apply.

The purpose of this delayed implementation date for Provision C.3.b.ii is to allow Permittees the time needed to arrange all relevant planning authorities and municipal processes, train their staff, etc., regarding changes to Provision C.3.b.ii relative to the Previous Permit.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy.[154] The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed

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[153] https://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/regional_permit.html

[154] U.S. EPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* **(**Publication Number EPA 841-F-07-006, December 2007) http://water.epa.gov/polwaste/green/upload/2008_01_02_NPS_lid_costs07uments_reducingstormwatercosts-2.pdf**)**

areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, pervious pavement systems, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes. This is a standard, current, ordinary, and regular practice being implemented in numerous jurisdictions in California, the U.S., and internationally, including: the Permittees' jurisdictions, Los Angeles, San Diego, San Francisco, Portland, OR, Seattle, Minneapolis, Milwaukee, Kansas City, Chicago, New York City, Philadelphia, Auckland, New Zealand, Chinese "sponge cities" such as Wuhan and Changde, and others.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

- **Provision C.3.c.i.(1)** lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff.
- **Provision C.3.c.i.(2)(a)** lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. One design element requires each Regulated Project to include at least one site design measure from a list of six that includes recycling of roof runoff, directing runoff into vegetated areas, and installation of pervious pavement systems instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.
- **Provision C.3.c.i.(2)(b)** requires the Permittees to implement design specifications for pervious pavement systems. Design specifications are necessary because improperly designed and engineered pervious pavement systems may cause flooding and the discharge of insufficiently treated stormwater runoff.
- **Provision C.3.c.i.(2)(c)** requires each Regulated Project and all projects implemented pursuant to Provision C.3.j to treat 100 percent of the Provision C.3.d.

runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

- **Provision C.3.c.i.(2)(c)(i)** defines LID treatment measures as harvesting and use, infiltration, evapotranspiration, or biotreatment.

  The Permittees completed a "White Paper" on Provision C.3. on February 27, 2015.[155] The White Paper concluded that the pollutant removal performance of biotreatment facilities, overall and on average, is equivalent or better than the likely real-world performance of harvest and use facilities and as good as the likely performance of infiltration facilities when considered over the long term. The White Paper also noted that biotreatment facilities require less maintenance and are less prone to failure than harvest and use facilities, and in some cases, are also preferable to direct infiltration facilities.

- **Provision C.3.c.i.(2)(c)(ii)** requires biotreatment systems to meet minimum performance specifications in order to be considered as LID treatment. This subprovision also requires biotreatment soil media to meet the current minimum specifications developed and included in MRP 1.[156] However, this subprovision recognizes that the current soil media specifications may need to be modified because of variability in climate, rainfall, and compost composition among the different counties. Therefore, this subprovision allows for the Permittees to collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the current soil media minimum specifications, subject to the Executive Officer's approval.

- **Provision C.3.c.i.(2)(c)(ii)(a)** prompts the formation of a workgroup to discuss and investigate the pollutant removal effectiveness and hydrologic equivalency of – and suggested criteria for – high flow-rate media treatment systems in combination with retention/detention measures such as silva cells and structural soils, as compared to conventional bioretention, specifically for use in projects with significant technical site constraints. The workgroup should consider issues including: the MEP standard in relation to the use of such systems; the pollutant removal benefits and hydrologic criteria associated with the MRP's LID design approach and which are included in other MS4 permits, such as the Western Washington Phase II Municipal Stormwater Permit and the Los Angeles Regional MS4 Permit (NPDES Permit No. CAS004004).

  The outcomes of this workgroup may inform modifications to the Permit in a subsequent term.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) sets forth the hydraulic sizing design criteria that the stormwater treatment systems installed for

[155] BASMAA, February 27, 2015. "White Paper" on Provision C.3 in MRP 2.0: Final Report.

[156] Attachment L of Board Order No. R2-2009-0074, adopted October 14, 2009, and revised November 27, 2011.

Regulated Projects must meet. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects.

- **Provision C.3.d.iii**. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices. The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites.
- **Provision C.3.d.iv** is optional and allows the Permittees to collectively submit a proposal which evaluates the benefit of runoff reduction associated with trees and treatment control sizing of tree-based stormwater treatment in combination with structural soils and suspended pavement systems (or other methods which provide tree rooting volume), which will be considered for incorporation into a subsequent permit. This proposal is intended to learn from the findings of the ongoing Healthy Watersheds, Resilient Baylands project,[157] a San Francisco Estuary Partnership-led U.S. EPA Water Quality Improvement Fund (WQIF) project that is investigating similar criteria, and which has a technical action committee (TAC) that Water Board staff and Permittee representatives are participating in, to support the Permittees' submittal, and to ensure it has regional application. The purpose of this subprovision is to characterize the stormwater treatment and hydrologic benefit that new tree-based treatment systems provide when designed and maintained to a defined standard, not to credit existing trees that provide little water quality and hydrologic benefit because of the capacity and manner of treatment provided.

  This subprovision clarifies the status of the Permittees' collectively-submitted 2011 Feasibility/Infeasibility Criteria Report, submitted pursuant to Provision C.3.i.(2)(b)(iv) of MRP 1 (Order No. R2-2009-0074), in which the Permittees proposed to grant Interceptor Tree Credits for Regulated Projects. The credits would have allowed Regulated Projects to reduce the calculated amount of impervious surface that has to be treated by LID, thus reducing treatment control sizing. Interceptor Tree Credits are not allowed during the current Permit term because the 2011 Feasibility/Infeasibility Criteria Report did not sufficiently justify them, because they have not yet been sufficiently studied, and because the Water Board has not approved their use. In addition, this subprovision allows the Permittees to submit a report on this issue as described above that could be incorporated into a subsequent permit.

[157] https://www.sfei.org/projects/healthy-watersheds-resilient-baylands

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.b.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

- **Provision C.3.e.i.** This Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite or Regional Project is in the same watershed as the Regulated Project and constructed within three years of the end of construction of the Regulated Project. The three years of additional time are allowed because more time may be required to complete construction of offsite and Regional projects because of administrative, legal, and/or construction delays. The Water Board acknowledges, in some instances, an even longer time may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended up to 5 years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

  Provision C.3.e.i language noting that Offsite Projects or Regional Projects must comply with Provision C.3.g “as appropriate” means that those projects (either Provision C.3.e.i.(1) or Provision C.3.e.i.(2)) must comply with Provision C.3.g if the original site seeking alternative compliance would otherwise be required to comply with Provision C.3.g.

  To increase the flexibility available to Permittees, Provision C.3.e.i.(1) alternative compliance projects may provide 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area at Offsite Projects in the same watershed. Likewise, Provision C.3.e.i.(2) alternative compliance projects may provide 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area at Offsite Projects or Regional Projects through payment to an in-lieu fee program. However, Provision C.3.e.i.(1) and Provision C.3.e.i.(2) qualify that by requiring Permittees to include as much LID onsite as possible, to the MEP.

  During the Permit term, the Permittees may submit new information for an alternative compliance program for exchanges of impervious surface treatment credits at the regional, county, and/or municipal level, resulting in offsite treatment or payment for equivalent offsite compliance for 100 percent of the required Provision C.3.c-d stormwater runoff (and Provision C.3.g, as appropriate).

Any such program should include at least the following: a clear organizational framework; demonstration of the treatment of an equivalent quantity of both stormwater runoff and pollutant loading (e.g., through the equivalent or net increase in impervious surface treated, and the equivalent or net reduction in flow and/or pollutant load, but not necessarily in the same watershed) and the achievement of net environmental benefit; an accounting and reporting system; a process for collection and timely use of funds; compliance with Provisions C.3.c-d and C.3.f-h; program oversight by an entity or entities; and expectations for timing and location. If or when such a program proposal is submitted, the Water Board will consider the new information and may consider amending the Permit to include a third option in Provision C.3.e.i that formally recognizes and allows the program specified in the proposal. This is in part a response to the City of San Pablo-led U.S. EPA Water Quality Improvement Fund (WQIF)-funded Regional Compliance for a Sustainable Bay project, which is investigating such a program that would facilitate alternative compliance exchanges between Permittees within Contra Costa County, but may be of interest in other counties and regionally.

As Permittees implement Provision C.3.e.i – which increases the flexibility available to Permittees when planning LID required by Regulated Projects – over the course of this Permit term, they will further incorporate their implementation of it into their municipal administrative and planning processes. Over the course of the Permit term, as Permittees become more accustomed to using Provision C.3.e.i, the Permittees will not be as reliant on Provision C.3.e.ii during their planning processes. Therefore, the Water Board will consider removing Provision C.3.e.ii in the subsequent Permit term, whose utility will be replaced by the Permittees' increased implementation of Provision C.3.e.i.

- **Provision C.3.e.ii. (Special Projects)** When considered at the watershed scale, certain types of smart growth and high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts, to the extent they replace or reduce development projects that do not have those characteristics. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these types of Special Projects.

  This Provision includes specific criteria for determining which types of Regulated Projects may be considered Special Projects and establishes different categories of Special Projects based on size, land use type, and density. Except for Category A, which represents the smallest Special Projects, Category B and C also use location, density, and parking criteria to establish a tiered approach for determining the total LID Treatment Reduction Credit available for any given Special Project.

  Category C additionally includes affordable housing criteria for determining the total LID Treatment Reduction Credit available for Category C Special Projects. Affordable housing criteria are included in Category C, for two primary reasons.

First, affordable housing projects typically have high DUs/acre (as further incentivized by the Density Credits) and are typically located near public transportation (as further incentivized by the Location Credits), and thus they likely produce less automobile traffic (i.e., less pollutant loading to the MS4) compared to other development and redevelopment projects that do not have those characteristics. Second, affordable housing credited by this Provision will help reduce unsheltered homelessness, which will reduce pollutant discharges (e.g., of trash and sewage) from homeless encampments and other sources (e.g., RVs) into MS4s.[158] The Water Board recognizes that whether to allow for affordable housing is entirely within the Permittee's land use and zoning authority and discretion. Since such development can reduce pollutants from MS4 systems, the Affordable Housing Credits are provided in the Permit. It will benefit the unhoused population, as follows: The affordable housing criteria are structured in such a way that significant portions of the allowable rent/mortgage rates are capped for Extremely Low income households (0-30% of AMI), Very Low income households (31-50% of AMI), and Low income households (51-80% of AMI), rather than allowing all affordable housing units to qualify even if they only are affordable for Moderate income households (81-120% of AMI) which limit affordability to a significant portion of the population. The link to water quality improvement is expected to decline as rent/mortgage rates increase, as rent/mortgage rates as high as the Moderate level are likely to reduce unsheltered homelessness and its associated impacts at a much lower rate.

The other Category C credits (location, density, and parking criteria) are maintained from the Previous Permit, but reduced so that Affordable Housing Credits are the dominant credit for Category C projects while still recognizing the benefits provided by location, density, and parking criteria, and so that the total possible credit available for Category C Special Projects remains 100 percent. Category C of the Previous Permit primarily credited transit-oriented development (via Location Credits) and resulted in the treatment of approximately 324 acres of impervious surface by non-LID measures region-wide, most of which is attributable to projects for which the Permittees' reporting did not clearly demonstrate that it would have been infeasible to incorporate onsite LID or contribute to offsite LID, as allowed by Provision C.3.e.i. Therefore, Category C has been revised to solely target affordable housing development and redevelopment projects, as Provision C.3.e.i in this Permit already provides sufficient flexibility for other non-affordable housing development and redevelopments that would have qualified as Category C Special Projects in the Previous Permit.

[158] Batko, Oneto, and Shroyer, Dec. 2020. Unsheltered Homelessness: Trends, Characteristics, and Homeless Histories. Urban Institute, pp. 12-13.

Area Household Median Income (AMI) uses the most current Official State Income Limits (adjusted for household size), which are defined on the California Department of Housing and Community Development's website.[159,160]

The definitions included in Category C for affordable housing are adapted from the Metropolitan Transportation Commission (MTC),[161] the Association of Bay Area Governments (ABAG),[162] the East Bay Housing Organizations (EBHO),[163] and the Federal Department of Housing and Urban Development (HUD).[164] For example, HUD defines Affordable Housing as housing for which rent or mortgage costs (including utilities) are no greater than 30 percent of total household income;[165,166] for metropolitan areas, HUD defines Moderate household incomes as 81-120 percent of area median household income (AMI), Low household incomes as 51-80 percent of AMI, Very Low household incomes as 31-50 percent of AMI, and Extremely Low household incomes as 0-30 percent of AMI.[167,168,169,170] Furthermore, Affordable Housing is defined by the Metropolitan Transportation Commission (MTC) as housing with deed restrictions running at least 55 years.[171,172]

To be considered a Category C Special Project, the Regulated Project must be primarily a residential development project, achieve at least a gross density of 40 DU/acre, and the project's DUs must comply with the criteria outlined in Provision C.3.e.ii.(5)(c), which are: for 70 percent Affordable Housing Credit, 100 percent of the DUs within a Category C Special Project must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 75 percent of the DUs must have rent/mortgage rates

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[159] https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml

[160] As of December 31, 2021, they are: https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf

[161] https://mtc.ca.gov/whats-happening/news/mtc-offers-cities-counties-big-carrot-spur-affordable-housing

[162] https://abag.ca.gov/sites/default/files/rhna_methodology_technical_documentation.pdf

[163] http://ebho.org/resources/what-is-affordable-housing/

[164] https://www.hud.gov/topics/rental_assistance

[165] https://archives.hud.gov/local/nv/goodstories/2006-04-06glos.cfm#:~:text=Affordable%20Housing%3A%20Affordable%20housing%20is,Reference%3A%20www.hud.gov

[166] https://www.hud.gov/program_offices/administration/hudclips/acts/nah-ac

[167] https://www.ffiec.gov/

[168] https://www.spur.org/news/2018-06-21/what-we-talk-about-when-we-talk-about-affordable-housing-primer

[169] https://www.planbayarea.org/2050-plan/plan-bay-area-2050-blueprint/plan-bay-area-2050-final-blueprint-documents

[170] https://abag.ca.gov/sites/default/files/rhna_methodology_technical_documentation.pdf

[171] https://mtc.ca.gov/whats-happening/news/mtc-offers-cities-counties-big-carrot-spur-affordable-housing

[172] https://mtc.ca.gov/our-work/fund-invest/investment-strategies-commitments/focused-growth/affordable-housing/housing

(including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 50 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 25 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). Likewise, for 50 percent Affordable Housing Credit, 75 percent of the affordable housing DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 50 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). These criteria, when implemented for Category C Special Projects, will reduce pollutant discharges from unhoused peoples into MS4s when they are housed by the newly-provided affordable housing. Finally, for 25 percent Affordable Housing Credit, 50 percent of the affordable housing DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 5 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI).

Density Credits for Category C may only use DU/acre, whereas in MRP 2 they could also use FAR. This is because Category C may only be used by primarily residential projects rather than also by nonresidential and mixed development projects.

In MRP 1 and MRP 2, applicable Category C Special Projects were required to first qualify for Location Credits before qualifying for any Density Credits or Minimized Surface Parking Credits. In the current Permit Term, applicable projects must first qualify for Affordable Housing Credits before qualifying for any Location Credits, Density Credits, or Minimized Parking Credits. This is because the primary credit by which Category C Special Projects are allowed to qualify is the Affordable Housing Credit – if a project does not meet any of the criteria required to achieve one of the Affordable Housing Credits, it does not qualify as a Category C Special Project.

The gross density required for 5 percent Density Credit for Category C Special Projects has been reduced from 45 DU/ac to 40 DU/ac, to match the required minimum density included for Category C Affordable Housing Projects.

Definitions of Gross Density and Floor Area Ratio are included in Provision C.3.b.ii to facilitate consistent implementation of this Provision by all Permittees. Gross

Density is defined as the total number of residential units divided by the acreage of the entire site area, including land occupied by public rights-of-way, recreational, civic, commercial and other non-residential uses. Floor Area Ratio (FAR) is defined as the ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area. Gross Density and FAR have been purposely defined to include public rights-of-way, recreational, civic, commercial, and other non-residential uses so as to raise the bar for Regulated Projects to qualify for the LID Reduction Credits allowed in Provision C.3.e.ii. That is, these more conservative Gross Density and FAR values may result in some Regulated Projects qualifying for less LID Reduction Credits or not qualifying at all.

The reporting data for Special Projects under the Previous Permit showed that “lack of space to provide full LID stormwater treatment” is among the most frequent reason invoked for why 100 percent LID treatment onsite is infeasible. Therefore, it is appropriate that the space reserved for public rights-of-way, recreation, civic, commercial, and other non-residential uses are included in the calculations for gross density and FAR, especially since many of these areas may be used for installation of LID treatment measures.

Density LID Treatment Reduction Credits are allowed for mixed use development projects, which consist of a mix of residential and commercial land uses, based on density measured by either DU/acre or FAR for Category B Special Projects and by DU/acre for Category C Special Projects. A prior permit (R2-2009-0074) did not accommodate this variability and penalized dense mixed-use projects that are mostly residential by restricting density LID Treatment Reduction Credits to only floor area ratio criteria.

The total available LID Treatment Reduction Credit may be used to reduce the amount of stormwater runoff that must be treated with LID stormwater treatment systems. The remaining amount of stormwater runoff must be treated with one or a combination of the following two specific non-LID treatment systems:

(1) Tree-box-type high flowrate biofilters

(2) Vault-based high flowrate media filters

An additional reporting requirement has been added to Provision C.3.e.v.(3) and to Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects, Total Impervious Surface Created/Replaced: The total impervious surface in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1). The purpose of this additional reporting requirement is to better characterize the extent and lost opportunity (regarding no or reduced LID treatment) of Special Projects.

To reduce the burden of reporting, the semi-annual reporting of Special Projects that are being considered by Permittees prior to the Permittees granting final planning approval has been reduced to annual, within the Annual Report. Although the frequency of reporting has been reduced, the current reporting requirements for this Provision are not diminished because the data is necessary for Water Board staff to validate the Permittees' analysis of the number and size of potential Special Projects that may be approved during this permit term, and to ensure Permittees are taking all reasonable steps to ensure that the Special Projects Provision is only used when they certify that neither onsite nor offsite LID are feasible. The Water Board intends to use the data collected in the reporting requirements to revise the Special Projects criteria as appropriate for the next permit term.

The narrative summaries included in Permittees' Annual Reports generally have not properly justified the need for the Category C Special Projects Provision as it existed in MRP 2, because those narrative summaries have not sufficiently demonstrated the infeasibility of onsite or offsite LID. This further supports the change that has been made to Category C.

Provision C.3.e.ii Special Projects is temporarily retained in this Permit term, and will be considered for removal in subsequent permit terms. This is because Permittees will have had three Permit terms (Order Nos. R2-2009-0074, R2-2015-0049, and R2-2022-0018) to develop the alternative compliance programs allowed by Provision C.3.e.i. Provision C.3.e.ii Special Projects is intended to serve as an interim measure while Permittees further develop their Provision C.3.e.i alternative compliance programs, because Provision C.3.e.i is capable of providing the flexibility needed to accommodate the technical infeasibility of onsite LID for Regulated Projects, without foregoing the water quality and hydrologic benefits provided by LID. The non-LID treatment measures allowed by Provision C.3.e.ii Special Projects do not provide those benefits to the same degree, although that reduction may be somewhat offset by the water quality benefits associated with avoidance of or potential reductions in unsheltered homelessness.

Provision C.3.e.iii. Implementation Level directs the Permittees to implement Provision C.3.e.ii beginning July 1, 2023. Prior to July 1, 2023, Provision C.3.e.iii.(5) directs Permittees to implement Provision C.3.e.ii in Attachment I, which are requirements from the Previous Order, with dates adjusted for consistency. The rationale for these requirements is set forth in the Previous Permit's Fact Sheet and is incorporated herein. The purpose of the delayed implementation date for Provision C.3.e.ii is to allow Permittees the time needed to arrange all relevant planning authorities and municipal processes to implement changes to Provision C.3.e.ii relative to the Previous Permit.

Provision C.3.f. (Alternative Certification of Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the

staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed.

Provision C.3.g. (Hydromodification Management) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Those HM requirements are stated in Provision C.3.g., and Attachment C includes maps prepared by the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees showing areas where HM requirements apply.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[173] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[174] All Permittees may use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. MRP 1 allowed the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices and to identify whether streams to which Contra Costa Permittees discharge may have a different susceptibility to HM impacts, thus justifying a different threshold for control of flows resulting in those impacts. The Contra Costa Permittees submitted an IMP Monitoring Report,[175] which

[173] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals/Western-Washington-Hydrology-Model

[174] See www.bayareahydrologymodel.org, Resources.

[175] Contra Costa Clean Water Program, September 15, 2013. IMP Monitoring Report: IMP Model Calibration and Validation Project.

found that Contra Costa HM measures generally, but not entirely, met MRP 1's HM requirements for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. The Contra Costa Permittees did not submit information showing that Contra Costa creeks had a different susceptibility to erosion. That is, they did not submit a justification for using erosion thresholds different than those accepted for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. Under MRP 1, the Water Board had accepted a higher threshold for control of HM effects (i.e., controlling the range of flows beginning at 20 percent of the 2-year pre-project peak flow, as opposed to 10 percent of the 2-year pre-project peak flow). Because this additional information was not submitted, and Contra Costa streams are generally similar to other Bay Area streams, MRP 2 extended the 10 percent standard to Contra Costa, and included requirements for Contra Costa to complete modifications to its HM approach to ensure that projects implement that consistent approach within a specified time.

Pursuant to Provision C.3.g.iii of MRP 2, the Contra Costa Permittees submitted a HM Technical Report[176] with the 2017 Annual Report, which suggested changes to sizing factors for an array of HM controls used by Contra Costa Permittees to comply with the HM Standard in Provision C.3.g.ii. Water Board staff's review of the 2017 HM Technical Report[177] and subsequent discussion with the Contra Costa Permittees culminated in modifications to Provision C.3.g.iii of this Permit, which requires the Contra Costa Permittees to revise their 2017 HM Technical Report so that HM Projects comply with the HM Standard of Provision C.3.g.iii, by excluding data that are not representative and assumptions that are not supported, and by producing a complete suite of sizing factors that are protective of all likely site and watersheds characteristics within Contra Costa County, for all types of HM controls that may be used in the County and for sites with Hydrologic Soil Group A, B, C, and D soils.

The CCCWP Permittees are required to use a base case sizing factor of 6.5 percent for the complete suite of sizing factors, which is a conservative sizing factor based on sites with project-scale built-out imperviousness in the upper watershed for the Lower Control Threshold of 0.1Q2, for soil percolation rates of 0.024 inches per hour, as presented in Table 5-7 on page 58 of the 2017 HM Technical Report. In developing the complete suite of sizing factors, the CCCWP Permittees are required to justify deviations from the base case as conditions of exception that could allow alternative sizing while still being protective (adhering to the HM Standard of maintaining EP ≤ 1) – for different soil types and different applicable geographic characteristics.

This requirement in Provision C.3.g.iii is attached to the reporting requirement in Provision C.3.g.vi.(2).

[176] Contra Costa Clean Water Program Hydromodification Technical Report. September 29, 2017.

[177] Lichten, March 19, 2021. Response to CCCWP's Hydromodification Management Memo of November 4, 2020, and next steps. SF Bay Water Board.

Within Provision C.3.g.vi.(2)(b): (A) "The additional mitigation measures shall not include: reliance on… the presence of existing or future HM and LID controls located elsewhere within the catchment," is distinct from: (B) "The Technical Report may additionally propose alternative or supplemental methods of compliance with Provision C.3.g.iii. HM Standard, including any combination of: ...additional new HM controls located offsite within the same catchment as the receiving stream..."

A) refers to hydromodification management controls that are outside the control of a project proponent and may be speculative or below the point of discharge to a receiving water body (e.g., a creek).

(B) refers to controls constructed concurrently and in combination with other controls specified in C.3.g.vi.(2)(b), as an alternative or supplemental method of compliance with the C.3.g.ii. HM Standard: "undersized onsite HM controls... and in-stream controls... which when implemented together achieve the C.3.g.iii HM Standard."

Provision C.3.g.v. of MRP 1 required the City of Vallejo to complete a hydrograph modification management plan (HMP) by July 1, 2013, in lieu of complying with that order's Provision C.3.g.i-iv. The City submitted its Final HMP on April 24, 2013,[178] and the HMP was subsequently accepted by Board staff. The Final HMP incorporates the same requirements as for the Alameda, Santa Clara, and San Mateo Permittees. The Permit requires the City to comply with those requirements.

The Fairfield-Suisun Permittees are required to comply with the HM criteria established in this Permit. However, they have a threshold for control of erosive flows that is greater than the other Permittees: 20 percent of the 2-year peak flow. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data.

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal stormwater Permittees jointly conduct investigations as appropriate. Any future proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

(1) Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;

(2) The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;

[178] City of Vallejo (Geosyntec), April 2013. Final Hydromodification Management Plan (HMP).

(3) The effectiveness of self-retaining areas for management of post-project flows and durations; and/or

(4) The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

- **Provision C.3.g.i**. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded by the conditions expressed in C.3.g.i.(1)-(3). Those conditions identify areas where the potential for single-project and/or cumulative development hydromodification impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[179] The Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees have developed maps showing where HM controls are required (Attachment C).

  This Provision requires Permittees that have not previously submitted an HM Applicability Map or equivalent information to prepare and submit that information, acceptable to the Executive Officer, consistent with the requirements of Provision C.3.g. This targets the Contra Costa Permittees, who submitted a HM Applicability Map[180,181] with the 2017 Annual Report, which was not satisfactory because it included areas that were not yet resolved (whether or not projects in those areas would be HM Projects), and it claimed certain channels are not hardened, which are in fact hardened. This requirement is attached to the reporting requirement in Provision C.3.g.vi.(1), which requires submittal of new or revised HM Applicability Maps by no later than with the 2023 Annual Report.

- **Provision C.3.g.ii.** establishes the standard HM controls that all HM Projects must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

- **Provision C.3.g.iii.** provides a procedure for the Permittees to propose an additional method for demonstrating compliance with HM requirements. This method would

[179] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or sub-catchments that are 70 percent impervious or more.

[180] Attachment 3.1 to 2017 CCCWP Annual Report: Hydromodification Applicability Mapping Methodology Technical Memorandum. September 11, 2017.

[181] Attachment 3.2 to 2017 CCCWP Annual Report: Hydromodification Applicability Map. September 28, 2017.

directly simulate erosion potential, and would be required to ensure that projects implementing HM controls with this method, if accepted by the Executive Officer, meet the Permit's HM criteria. This provision requires submittal of appropriate analyses (with the 2023 Annual Report, pursuant to the reporting requirement in Provision C.3.g.vi.(2)) demonstrating that the method will substantively comply with HM requirements; it may not be implemented on projects until accepted by the Executive Officer.

- **Provision C.3.g.iv.** identifies and defines three methods of hydromodification management.
- **Provision C.3.g.v.** establishes the timeframes for meeting the HM Standard defined in Provision C.3.g.ii.
- **Provision C.3.g.vi.** describes the information required to be collected and/or submitted in the Permittees' Annual Reports regarding HM Projects. This Provision also describes specific required information for Contra Costa Permittees to submit with the 2023 Annual Report, which follows from the requirements in Provision C.3.g.i (HM Applicability Map) and in Provision C.3.g.iii (revised HM Technical Report).

  Regarding the information to be submitted by the Contra Costa Permittees, Provision C.3.g.vi.(2)(b) includes two distinct criteria:

  (A) "The additional mitigation measures shall not include: reliance on… the presence of existing or future HM and LID controls located elsewhere within the catchment which do or will satisfy other NPDES or CWA requirements," is distinct from:

  (B) "The Technical Report may additionally propose alternative or supplemental methods of compliance with Provision C.3.g.iii. HM Standard, including any combination of: ...additional new HM controls located offsite within the same catchment as the receiving stream..."

  That's because (A) refers to existing and potential/future controls that have been (or that may or will be) implemented to satisfy other NPDES or CWA (e.g., mitigation required for 401 certification) requirements. For example, new bioretention cells that will be constructed for an anticipated or upcoming Regulated Project, or existing bioretention cells that were constructed several years ago for a Regulated Project, or potential bioretention cells that would be constructed if a potential Regulated Project becomes an actual Regulated Project at some point in the future.

  On the other hand, (B) refers to controls constructed concurrently and in combination with other controls specified in Provision C.3.g.vi.(2)(b), as an alternative or supplemental method of compliance with the Provision C.3.g.ii.

HM Standard: "undersized onsite HM controls... and in-stream controls... which when implemented together achieve the Provision C.3.g.iii HM Standard." This *does not* include taking credit for controls that are required for other NPDES or other CWA requirements; it's referring to new controls that are implemented specifically to mitigate hydromodification impacts for a given HM Project, that are not double-counted.

Provision C.3.h. (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the Regulated Project is provided for all pervious pavement systems of 3,000 square feet or more; onsite, joint, and offsite stormwater treatment systems; and HM controls installed.

This Provision adds a requirement for Permittees to include pervious pavement systems of 3,000 square feet or more in their Operation and Maintenance Agreements, database of Regulated Projects, and inspection checklists. Pervious pavement systems serve as site design measures that directly reduce the amount of impervious surface area and therefore, the size of the stormwater treatment system(s) required to comply with Provision C.3.d. Adequate routine maintenance of pervious pavement systems is essential because clogged systems become impervious and may result in untreated stormwater runoff or additional load on stormwater treatment systems that result in inadequately treated stormwater runoff. To lessen the burden of inspecting so many pervious pavement systems, only those of 3,000 square feet or more are required to be inspected and patios for private-use at single-family homes, townhomes, or condominiums are specifically excluded. In the case of large subdivisions where the total pervious pavement system area is equal to or greater than 3,000 square feet, but the pervious pavement installations are on individual driveways that are less than 3,000 square feet, inspection of a representative number of driveways will suffice.

- **Provision C.3.h.ii.(6).** MRP 1 required Permittees to inspect at least 20 percent of all stormwater treatment systems annually, at least 20 percent of all vault-based systems annually, and every treatment system at least once every 5 years. Permittees have indicated that each inspection of a Regulated Project routinely includes inspection of pervious pavement systems, stormwater treatment systems and HM controls installed at the Project. Therefore, this Provision requires the inspection frequency requirements such that the minimum number of inspections required annually is tied to a percentage of the total number of Regulated Projects, instead of the total number of individual treatment systems and HM controls. This lessens the tracking burden for the Permittees and better reflects the way actual inspections are conducted.

  This Provision requires each Permittee to inspect all its Regulated Projects at least once every 5 years and inspect an average of 20 percent, but no less than 15 percent of the total number of Regulated Projects annually. This requirement serves to prevent failed or improperly maintained pervious pavement systems, stormwater treatment systems, or HM controls from going undetected until the 5th year. Neither

of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor-maintained systems, maintenance history, past compliance problems at certain Projects, etc.

- **Provision C.3.h.ii.(6)(d)** This Provision allows Permittees to accept third party inspection reports for vault-based stormwater treatment systems in lieu of conducting Permittee inspections, but only if the third party inspections are conducted at least annually, which is the normal frequency for maintenance of these systems. Each third party inspection must be included in the database or tabular format required in Provision C.3.h.ii.(4) and (5) and clearly identified as a third party inspection. Each third party inspection report must document the third party inspection company, date of inspection, condition of the treatment unit(s) at the time of inspection, maintenance activities performed, and appearance of the inside of the vault units (with photos) before and after maintenance.
- **Provision C.3.h.ii.(7)** As the number of Regulated Projects grows, the Permittees' O&M inspection programs must grow as well. Therefore, this Provision requires each Permittee to develop and implement an Enforcement Response Plan (ERP) for O&M inspections. The ERP serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. This Provision establishes minimum requirements for the ERPs. One of these requirements is that corrective actions must be implemented within 30 days after a problem is identified by an inspector. Thirty days is more than adequate time, considering that many of the problems identified in past O&M inspection reports have been lack of maintenance service or build-up of sediment or debris. The correction of such deficiencies should not take more than 30 days. This Provision also allows for greater than 30 days to complete permanent corrective actions, such as installing additional curb cuts and making grading or vegetation improvements.
- **Provision C.3.h.iv.** This Provision requires Permittees to ensure that pervious pavement systems that total 3,000 square feet or more, stormwater treatment systems, and hydromodification controls are appropriately operated and maintained for the life of those systems and controls, which maintenance is necessary to ensure the systems and controls are operating effectively and protecting water quality consistent with their designs. It recognizes situations where maintenance may be delayed due to the need to obtain certain federal or state permits (e.g., special status species take authorization from a state or federal agency), and sets expectations regarding how Permittees should proceed. Specifically, Permittees should ensure a system's or controls' responsible party is working in good faith to obtain those authorizations. It directs Permittees to abide by the expectations set in the Water Board's Resolution No. 94-102 for applicable systems, including the maintenance thereof.

- **Provision C.3.h.v.** As in MRP 1 and MRP 2, this Provision requires the Permittees to maintain a database or equivalent tabular format with detailed information on each O&M inspection and any necessary enforcement actions against Regulated Projects. To lessen the burden of reporting, this Provision only requires summary data on inspections conducted each fiscal year to be reported in the Annual Report, instead of detailed information on each O&M inspection. However, upon request by the Executive Officer, detailed information from the database or tabular format must be submitted.

Provision C.3.i. (Required Site Design Measures for Small Projects and Detached Single-Family Homes Projects) contains requirements for detached single-family home projects that create and/or replace ≥ 2,500 ft^2 to <10,000 ft^2 of impervious surface and small development and redevelopment projects that create and/or replace ≥ 2,500 ft^2 to <5,000 ft^2 of impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development. Projects with new or replaced impervious surface of this size transport storm water pollutants that can be controlled through basic site design measures.

This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small relative to other types of development and redevelopment projects; however, the cumulative impacts are likely to be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees.

Provision C.3.i.ii. Implementation Level directs the Permittees to implement Provision C.3.i beginning July 1, 2023.

Provision C.3.i.ii.(2) is as follows: Prior to July 1, 2023, it directs Permittees to implement Provision C.3.i in Attachment I, which are requirements from the Previous Permit. The rationale for these requirements is set forth in the Previous Permit's Fact Sheet and is incorporated herein. The purpose of this delayed implementation date for Provision C.3.i is to allow Permittees the time needed to arrange all relevant planning authorities and municipal processes, train their staff, etc., regarding changes made to Provision C.3.i relative to the Previous Permit.

Provision C.3.j. (Green Infrastructure Planning and Implementation) MRP 2 required Permittees to complete and begin implementation of a Green Infrastructure Plan (GI Plan) for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements. In particular, green infrastructure sited in the public right of way that collects stormwater from adjacent tributary parcels can be a more efficient use of public and private resources than treatment of individual parcels, and can also result in additional treatment compared to parcel-based treatment.[182] As such, Permittees have used green infrastructure approaches when siting treatment systems for Regulated Projects, such as for Provision C.3.e.i Alternative Compliance projects.

Public Law 115-436 Water Infrastructure Improvement Act approved on January 14, 2019, established section 402(s) of the CWA authorizing integrated plans that address both municipal wastewater and stormwater management as a potential compliance path that may be incorporated into an NPDES permit. Integrated planning is designed to help municipalities identify efficiencies in implementing requirements that arise from distinct permitting programs, particularly how best to make capital investments (Integrated Municipal Stormwater and Wastewater Planning Approach Framework, U.S. EPA, June 5, 2012). Under this law, an integrated plan can be used to implement any requirements relating to a combined sewer overflow, sanitary sewer collection system, municipal stormwater discharge, municipal wastewater discharge, and a water quality-based effluent limitation to implement an applicable wasteload allocation in a total maximum daily load. The integrated planning approach does not relax or change regulatory permitting standards, but rather recognizes existing flexibilities in the CWA to sequence and schedule compliance projects that may be relevant to multiple permitting programs (33 U.S.C. § 1342(s)(5).). Notably, Congress recognized the value of green infrastructure in meeting CWA requirements in allowing green infrastructure in integrated plans (*Id*. at subd. (s)(3)(b)(ii).). While this Order is not an integrated plan under CWA section 402(s), it shares the same principle of promoting integrated

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[182] For example, see:

WEF, Dec. 2, 2015. *The Real Cost of Green Infrastructure*. WEF Stormwater Report. Web. July 24, 2021.

McGlynn, Dec. 2019. *Clock Ticking for Cities to Commit to Urban Greening*. Estuary News, the San Francisco Estuary Partnership.

CCAG, January 2021. *San Mateo Countywide Sustainable Streets Master Plan.*

Clary et al., 2020. *International Stormwater BMP Database: 2020 Summary Statistics.* The Water Research Foundation.

Sustainable Business Network, May 2021. *Green Stormwater Infrastructure (GSI): A Tool for Economic Recovery and Growth in Pennsylvania.*

Sustainable Business Network, 2021. *Excellence in GSI Awards,* Philadelphia, PA.

Stutz, Bruce, March 29, 2018. *With a Green Makeover, Philadelphia is Tackling Its Stormwater Problem.* Yale Environment 360.

planning in meeting various regulatory requirements, especially with regard to green infrastructure.

The GI Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For MRP 2, the development of the GI Plan was in lieu of expanding the definition of Regulated Projects prescribed in Provision C.3.b.ii to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. However, this Permit includes (and subsequent Permits may further include) different impervious surface thresholds or other criteria for Regulated Projects. The GI Plan also provides a mechanism to establish and implement alternative or in lieu compliance options for Regulated Projects.

Over the long term, the GI Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

The GI Plan also identifies means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it includes means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it incorporates plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash and PCBs, mercury, and other pollutants. Permittees may comply with the requirements of this Provision through collaborative efforts.

MRP 2 specified minimum elements that each GI Plan must contain to ensure that each GI Plan is robust and appropriately identifies the means and methods that each Permittee will employ to implement green infrastructure over time. These minimum elements are not overly prescriptive, so as to allow Permittees flexibility in developing their GI Plans. They are repeated here, to guide the Permittees' ongoing updates and addenda to their Plans as prescribed by Provision C.3.j.ii.(1):

(1) A mechanism to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area specific basis. Implementation of these projects is required to be projected over the same timeframes as specified

in Provisions C.11. and C.12. for assessing mercury and PCB load reductions because green infrastructure and projects are an acknowledged means of pollutant load reductions. Each Permittee has flexibility in choosing the mechanism as long as it includes criteria for prioritization and outputs that can be incorporated into its long-term planning and capital improvement processes.

(2) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the same timeframes as specified in Provisions C.11. and C.12. for assessing mercury and PCB load reductions. These self-determined targets represent the green infrastructure work that each Permittee has proactively identified will be completed beyond what would be completed in its community anyway.

(3) A process for tracking and mapping completed projects, public and private, and making the information publicly available. Again, each Permittee has flexibility in what they use to comply with this Provision.

(4) General guidelines and standard specifications for overall streetscape and project design and construction to ensure that projects have a unified, complete design that implements the range of functions associated with the projects. These guidelines and standard specifications, while crucial to a Green Infrastructure Plan, already exist in many reference documents for green infrastructure design and are readily available.

(5) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. In recognition of space and drainage constraints that may occur for public green infrastructure road projects not subject to Provision C.3.b.ii (i.e., non-Regulated Projects), this Provision allows Permittees to collectively propose a single approach for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements. The single approach can include different options to address specific issues, constraints, or scenarios.

(6) A summary of the planning documents the Permittee has updated or otherwise modified as well as how the Permittee will ensure that green infrastructure requirements will be included in future plans. The purpose of this element is to show that each Permittee is considering green infrastructure in all aspects of its urban planning.

(7) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation.

(8) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, state, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.

In addition to the development of the GI Plans, MRP 2 required each Permittee to:

(1) Prepare a framework or workplan that describes specific tasks and timeframes for developing its GI Plan. The framework or workplan was required to be approved by each Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. This approval process provided assurance to the Water Board that Permittees are committed to the development and implementation of the GI Plan and green infrastructure.

(2) Document in its 2017 Annual Report that the framework or workplan for development of its GI Plan was approved by June 30, 2017, as required by Provision C.3.j.i.(1) of MRP 2. This Provision also required each Permittee to submit its GI Plan and documentation of the legal mechanisms to implement the GI Plan with the 2019 Annual Report.

(3) Prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation that have potential for green infrastructure measures.

The Permittees were required to submit the list with each Annual Report along with a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project under Provision C.3.b.ii. This Provision also required each Permittee to include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, the Permittee was required to submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

The purpose was to ensure that each Permittee is proactively developing green infrastructure projects and including green infrastructure elements into already planned infrastructure projects as much as possible, both while the GI Plan was being developed, and subsequent to its development.

This requirement is retained in the Permit, in Provision C.3.j.iii, No Missed Opportunities.

(4) Individually or collectively, to track processes, assemble and submit information, and provide information, materials, and presentations as needed to assist relevant regional, state, and federal agencies to plan, design, and fund green infrastructure measures in local infrastructure projects, including public transportation projects.

(5) Individually or collectively, to develop and implement regionally consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.

The GI Plans were completed during MRP 2; therefore, the focus of Provision C.3.j in the Permit shifts from planning to implementation. U.S. EPA supports the Permit's movement from planning to implementation of green infrastructure on a more regional basis.[183] Provision C.3.j.i. Task Description requires the Permittees to (continue to) implement their GI Plans, as may be updated and supplemented to comply with this Order.

Provision C.3.j.ii Implementation Level, prescribes programmatic requirements, numeric requirements, and design criteria that Permittees must comply with when implementing their GI Plans during the Current Permit Term.

Provision C.3.j.ii.(1) describes the Programmatic Implementation requirements requiring Permittees to update and supplement their GI Plans to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned, by:

(1) Revising the implementation mechanisms in the GI Plans to include consideration or reconsideration of cooperation with non-municipal entities such as schools on green infrastructure implementation, and otherwise updating implementation mechanisms as appropriate.

This is necessary because Permittees may need to update their implementation mechanisms as certain processes are refined or adapted to better support green infrastructure implementation. Cooperation with non-municipal entities like school districts is required to be considered or reconsidered because schools can offer excellent opportunities for green infrastructure implementation for a number of reasons, including their likely coverage under the California Small MS4 General Permit, which is expected to clarify the clean water role they can play going forward; their role in climate change adaptation planning efforts; their often substantial impervious surface coverage; and the ability of municipalities to

[183] U.S. EPA provides many resources at a national level that document the multiple benefits that green infrastructure can have on water quality and community well-being: https://www.epa.gov/green-infrastructure/benefits-green-infrastructure

regulate discharges from schools into their MS4s.[184] Often, schools have some of the most-available area for green infrastructure implementation, along with budget needs that can facilitate cooperation when municipalities or others contribute sources of funding. Because of the opportunities for implementation, funding, and shared need, GI Plans should be revised to include, in their prioritization approaches, green infrastructure projects that may be implemented in a joint or cooperative manner, including not only those coordinated with schools, but also those coordinated with Bay Area Rapid Transit (BART), Caltrans, and others as appropriate.

(2) Following through with the development or updates of general plans, specific plans, urban forestry plans, climate change adaptation plans, complete streets plans and other planning documents with a green infrastructure nexus to include language which is more supportive of green infrastructure implementation, as identified by the Permittees in their GI Plans. Upon request by Water Board staff, Permittees are required to provide justifications for planning documents that they assert do not need to be updated to further support green infrastructure implementation.

This is necessary because not all Permittees sufficiently updated their planning documents as required in the Previous Permit term to demonstrate that they are considering green infrastructure in all aspects of urban planning. In many cases, it was unclear how the planning documents supported green infrastructure implementation. Water Board staff's complete review of the GI Plans, which provides guidance on this and other facets of Provision C.3.j.ii.(1), is detailed in an October 2020 memo.[185]

GI Plans that identify overarching policy or planning documents are worthwhile for other Permittees to consider. For example, San Mateo County references the City/County Association of Governments of San Mateo County's (C/CAG's) Sustainable Streets Master Plan, which prioritizes locations to integrate green infrastructure into street rights of way and considers how those projects may contribute to climate change resilience. This opportunity to more legibly consider and coordinate the multiple benefits of green infrastructure could facilitate implementation over time.

Several GI Plans reference specific plans, neighborhood plans, street master plans, or similar documents, which can allow municipalities to focus their green infrastructure implementation in an intentional and targeted manner. Examples

[184] For example, L.A. Unified School District: Storm Water Management and Low Impact Development. http://learninggreen.laschools.org/stormwater-management.html. Accessed July 26, 2021.
Sharon Danks, *A vision for green schoolyards across California*. Green Technology Magazine, Web. accessed July 26, 2021. https://www.green-technology.org/magazinenews/a-vision-for-green-schoolyards-across-california/

[185] *Water Board Staff's Review of the 2019 Green Infrastructure Plans.* October 1, 2020.

include the City of El Cerrito's 2014 San Pablo Avenue Specific Plan, which, among other things, charges private development with impact fees to fund frontage improvements on San Pablo Avenue, and the City of Berkeley's 2019 Adeline Corridor Specific Plan, which has identified several promising green infrastructure opportunities. Master planning efforts like those framed in specific plans have long been tools for effective green infrastructure implementation. More than twenty years ago, Fremont's plan for the 840-acre Pacific Commons site enabled comprehensive district-scale stormwater planning and expectation setting in advance of development of parcels within the district. The Water Board supports the use of specific plans and related plans to facilitate green infrastructure implementation, and as part of a range of green infrastructure implementation tools that should be applied throughout Permittee jurisdictions.

The expectation of this Provision is that Permittees continue to update existing plans to include, as appropriate, and to incorporate into new plans, low impact development and green infrastructure expectations, including implementation. Similar to El Cerrito's and Berkeley's approaches, Permittees' updated and new specific plans and similar documents should incorporate green infrastructure requirements for the plan areas. For example, the City of Campbell's GI Plan noted several neighborhood and street master plans that could be updated to incorporate and coordinate green infrastructure expectations, and referenced development by this year of a schedule to complete those updates. That was similar to other municipality plans in western Santa Clara County, and is a reasonable model for addressing updates during the Permit term.

(3) Developing funding and funding mechanisms identified in the GI Plans, such as by working with the relevant agencies to expand the scope of transportation grants to include allocation for green infrastructure; establishing green infrastructure-based or green infrastructure-incorporating stormwater fees, including work that sets the foundation for additional future stormwater fees; establishing or increasing application review fees, and evaluating other opportunities to leverage municipal approval of private development to fund green infrastructure implementation.

The most common existing funding sources identified in the GI Plans are State grants and internal revenues. Many GI Plans commit to incorporating consideration of green infrastructure into the Permittees' Capital Improvement Plans (CIP) so that green infrastructure funding may be tied to CIP projects where incorporation of green infrastructure has been identified as otherwise feasible. Given existing funding constraints, most Permittees are prioritizing maintenance of existing infrastructure over addressing pollutant discharges (from yet-untreated impervious surfaces) with clean water controls.

To overcome this challenge, the GI Plans describe widespread interest in establishing new long-term funding sources, such as alternative compliance

programs, Prop. 218- and SB 231-compliant stormwater utility fees, and permit fees. A few GI Plans describe existing stormwater utility fees enacted prior to Prop. 218, and others note how these fees are currently being pursued. Oakland's GI Plan includes a useful summary letter (App. F, Oakland 100RC Stormwater Program Financing Memo) that describes a range of available funding opportunities, in addition to citing BASMAA's 2018 Roadmap of Funding Solutions for Sustainable Streets.[186] Nearly every GI Plan that expressed hesitance in pursuing such fees now stresses 1) the risk associated with legal challenges, and 2) the need to wait for another Permittee to be the legal test subject for this approach.

Permittees such as the Cities of San Mateo and Redwood City are leading the way by more fully recognizing the extent of development project urban runoff impacts and requiring developers to fund green infrastructure that is either beyond the Permit's minimum requirements or based on a reinterpretation of the Permit's requirements as a condition of approval.

During the Permit term, Permittees with regulated projects should evaluate opportunities to pursue approaches similar to those being implemented by the Cities of San Mateo and Redwood City.

Funding approaches that the Water Board did not see broadly considered in the GI Plans include: impervious surface fees targeting all impervious surface, including single- and multi-family residential parcels, tied to the operation and maintenance of the storm drain system; and maintaining or increasing development application review and post-construction green infrastructure operation and maintenance inspection fees to a level sufficient to allow for a self-sustaining program. The Water Board welcomes opportunities to discuss and support Permittees' funding approaches.

There are some interesting countywide proposals unique to certain counties. For example, the GI Plans for Permittees within Contra Costa County include a discussion of legislative constraints to the use of Contra Costa Transportation Authority Sales Tax Revenue for green infrastructure implementation, and of pursuing a ruling from MTC on the Highway User Gas Tax Account. The GI Plans for Permittees within San Mateo County include a discussion of the planned Flood and Sea Level Rise Resiliency Agency, which would help fund regional green infrastructure projects. The Water Board looks forward to working with the Permittees to support these and any other new or similar countywide efforts. Most GI Plans also, appropriately, reference BASMAA's 2018 Roadmap of Funding Solutions for Sustainable Streets.[186]

[186] https://basmaa.org/wp-content/uploads/2021/01/roadmap_funding_solutions_sustainable_streets_final.pdf

(4) Reviewing countywide green infrastructure implementation guidance documents and adapting them as necessary to account for local considerations if this has not already been completed during the Previous Permit term, and otherwise reviewing and updating general guidelines and standard specifications as appropriate.

The primary goal of this requirement is to ensure that there are no barriers to green infrastructure implementation based on the availability and status of guidance documents and standard specifications and details during the Permit term. In addition, some Permittees did not demonstrate that they adapted guidance documents to local considerations in the Previous Permit.[185]

(5) Continuing to implement the tools developed during the Previous Permit to track and map completed public and private green infrastructure projects, and making the information publicly available.

Nearly all GI Plans reference tracking tools currently in development by the County stormwater programs, with a statement that the tools include or will include components to make certain information publicly available. However, some GI Plans suggest that green infrastructure implementation information submitted in tabular format in Annual Reports satisfies this subprovision. It does not. The tools in development generally appear appropriate to meet this Provision, but additional information is needed as discussed below. Each GI Plan that references a County stormwater program's tracking tool, many of which are based on ArcGIS online or AGOL, and a few of which utilize GreenPlan-IT, appropriately commits to contributing data to it once the tool is ready, and many GI Plans discuss local tracking tools that will likely be discontinued once the County tracking tools are ready. However, most GI Plans do not say when the respective County tracking tool will be completed, or whether or how the tools will be available to the public, and if yes, what information will be made available. Some GI Plans say only that the tools have or will have mapping capabilities accessible at least by Permittee staff, but not necessarily by the public. Some plans say that "non-regulated project installations of green infrastructure are tracked as feasible in the same manner as regulated projects."

The requirements for the tracking tool during the Current Permit term are further specified in Provision C.3.j.v. (see below).

(6) Continuing to adopt or amend policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Plan in accordance with the requirements of this Provision, as necessary.

This requirement ensures implementation of green infrastructure and is based on the need to reduce the discharge of pollutants in storm water in a more resilient, sustainable way as described above.

(7) Continuing to conduct outreach and education.

Education and outreach, both internally and externally, are important to realizing green infrastructure projects to reduce the discharge of pollutants in storm water.

Provision C.3.j.ii.(2) describes the Numeric Implementation requirements, which are summarized below followed by a rationale for the requirements:

(1) By June 30, 2027, the Permittees are required to implement, or cause to be implemented, green infrastructure retrofit projects within their jurisdictions in the acreages set forth in Table H-1 of Attachment H. The retrofit acreages cannot encompass Regulated Projects under Provision C.3.b.

For Table H-1 of Attachment H, Permittees were assigned three acres of non-Regulated Project impervious surface retrofit per 50,000 population using the 2019 U.S. Census Bureau Population Estimate, prorated, with a minimum requirement of 0.2 acres and a maximum requirement of five acres. That retrofit expectation, to be accomplished during the Permit term as described in Provision C.3.j.ii, is far below the ultimate need for retrofit in the Permittees' jurisdictions, considering drivers such as the need to accomplish TMDL wasteload allocations and to reduce the discharge generally of urban runoff pollutants through the MS4. However, the retrofit requirement ensures each Permittee builds capacity by completing or meaningfully participating in at least one project. Permittees are expected to use their GI Plans to help inform the selection of retrofit projects. In addition, the retrofit requirement uses population as a rough proxy for Permittee capacity to complete retrofit work. In combination with the acreage maximum of five acres, the retrofit requirement is intended to be a flexible and doable goal during this Permit term. The minimum retrofit requirement ensures that each Permittee uses that experience to build its institutional capacity for implementing green infrastructure within its jurisdiction. The maximum retrofit requirement reduces the retrofit requirements only for a handful of the larger Permittees, one of which (the City of San Jose) will likely exceed five acres of non-Regulated Project retrofit in any case because of its consent decree with San Francisco Baykeeper, as discussed in the subsequent paragraph. These retrofit assignments, when summed regionally for the Permittees will result in about 217 acres of non-Regulated Project impervious surface retrofitted by the expiration date of the Permit, which will make a significant incremental step towards addressing the otherwise unaddressed adverse stormwater quality impacts of Permittee's rights of way, particularly those smaller public streets projects that are not otherwise subject to the same clean water controls as Provision C.3.b. Regulated Projects.

(2) The retrofit acreages are required to address pollutants discharges from MS4s because the Permittees have substantial areas of impervious surface—

comprised in large part of their existing public roads and parking areas—that discharge urban runoff pollutants to the MS4, but on which projects are not being completed that fall into Regulated Project categories. As such, they are unlikely to be retrofitted with clean water controls and will continue to discharge urban runoff pollutants in the absence of a retrofit requirement. Regulated Projects addressed in Provision C.3.b are only a fraction of the thousands of acres of impervious surfaces in the area covered by this Order. All impervious surfaces contribute pollutants to stormwater runoff, with those in higher density land uses contributing more pollutants. Accordingly, in order to reduce the discharge of storm water pollutants from MS4s to the maximum extent practicable and help attain TMDL wasteload allocations, additional impervious surface areas must be addressed beyond the Regulated Projects. As explained below, other jurisdictions in the State of California and elsewhere in the United States have MS4 NPDES Permits with similar non-Regulated Project numeric retrofits requirements that supplement their retrofit requirements for Regulated Projects.

(3) Pursuant to its consent decree with San Francisco Baykeeper (effective August 11, 2016),[187] and through projected rates of public and private development and redevelopment, as reported in its GI Plan,[188] the City of San Jose is required to appropriate $100 million over the next ten years, subject to meet and confer and other terms of the consent decree, to implement the projects in its Green Stormwater Infrastructure Plan. The Green Stormwater Infrastructure Plan forecasts retrofit of roughly 1750 acres of impervious surface between 2020 and 2030, and roughly an additional 8,500 acres of impervious surface between 2030 and 2040, much of which will necessarily be comprised of non-Regulated Projects. Therefore, San Jose alone is likely to satisfy 100 percent of the Santa Clara County Permittees' Provision C.3.j.ii.(2) Numeric Implementation retrofit requirement (other than the minimum 0.2 acres required for each Permittee).

(4) The San Mateo County Permittees' Orange Memorial Park Regional Project is located in the City of South San Francisco, and will address runoff from over 6,500 acres of land from six neighboring jurisdictions: portions of the City of Colma, the City of Daly City, the City of Pacifica, South San Francisco, Caltrans ROW, and Unincorporated San Mateo County.[189] This regional project may satisfy a portion of the San Mateo County Permittees' Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, depending on the outcome of

[187] https://baykeeper.org/sites/default/files/press_release/Baykeeper-San%20Jose%20Stormwater%20suit%20settlement%20agreement.pdf

[188] https://www.sanjoseca.gov/your-government/environment/our-creeks-rivers-bay/green-infrastructure

[189] https://www.ssf.net/departments/public-works/engineering-division/capital-improvement-program/orange-memorial-park-regional-storm-water-capture-project

Provision C.3.c.i.(2)(c)(ii).a. (e.g., if it results in a Permit amendment allowing the crediting of certain alternative treatment systems).

(5) A study in Washington State found that imperviousness could serve as a proxy for aquatic system health.[190] It found that ten percent impervious area was a threshold at or above which there was demonstrable, and probably irreversible, loss of aquatic system function, reflected by measured changes in channel morphology, fish and amphibian populations, vegetation succession, and water chemistry. Even lower levels of urban development were observed to cause significant degradation in sensitive waterbodies and a reduced, but less well quantified, degree of loss throughout the system as a whole. This suggests that successful corrective measures must not simply protect or restore the structure of individual stream or wetland elements; buffers around waterbodies must be combined with watershed-level restrictions on the rate and duration of stormwater discharge, as loss of instream fish habitat cannot be repaired by in-stream engineered structures alone. The study did not establish an imperviousness threshold for degradation of San Francisco Bay Area streams. However, in finding significant degradation of waters in Washington State at levels of imperviousness that are well below those of many Bay Area watersheds, the study suggested that there is a need for substantial reductions over time from current levels of directly connected impervious surface. This adds support for the Permit's requirements to implement measures to control discharges from both existing and new impervious surfaces, including public roads.

Many Permittees' jurisdictions have untreated impervious area cover that is substantially larger than ten percent. The Permittees' GI Plans' projected retrofit by Regulated Projects and non-Regulated Projects by 2020 (the existing condition), 2030, and 2040, demonstrate that this amount is expected to continue during this and future Permit terms. Therefore, the requirements included in Provision C.3.j.ii.(2) are intended to increase the pace at which Permittees address the pollutant loading and hydromodification impacts from their impervious surfaces.

(6) The Permittees' existing commitments for green infrastructure implementation in GI Plans are insufficient to address the problem associated with impervious surfaces. With few exceptions, the GI Plans do not commit to accelerate the existing rate of green infrastructure implementation, or to retrofit existing impervious surfaces (particularly, in the public right of way), with clean water controls to address urban runoff discharges, beyond what MRP 2 already required for Regulated Projects using an LID approach. Consequently, the GI

[190] Consequences of Urbanization on Aquatic Systems – Measured Effects, Degradation Thresholds, and Corrective Strategies. Derek B. Booth and Lorin E. Reinelt. King County Surface Water Management Division, Seattle, WA. 1993.

Plans are limited in the extent to which they would reduce the adverse water quality impacts of urban runoff on receiving waters over time.

For example, one Permittee's Capital Improvement Plan indicates consideration of numerous projects with potential for green infrastructure implementation, including miles of street projects, but its GI Plan sets a retrofit target of only 0.8 acres of public impervious surface by 2040, for both Regulated and non-Regulated public projects. Another Permittee's GI Plan sets a retrofit target of only one acre of public impervious surface by 2040.

These outcomes represent a missed opportunity, in that the Previous Permit's green infrastructure planning requirement was included as an alternative to expanding the Regulated Project definitions to include all new and redevelopment projects that create or replace 5,000 square feet of impervious surface, and road projects that just replace existing impervious surface area. That is, in the Previous Permit, green infrastructure planning was included in part to provide municipalities the opportunity to evaluate and account for smaller area regulated projects and road replacement projects as part of their GI Plans, and develop commitments to implementation that would be more efficient and effective for them than a Permit requirement to include all such projects.

(7) Many GI Plans do include some public projects in their green infrastructure retrofit targets, but among those public projects, most are Regulated Projects. One GI Plan, the City of San Jose's, includes substantial public non-Regulated Project green infrastructure implementation, but as described previously, that is largely an outcome of San Jose's 2016 consent decree with the San Francisco Baykeeper, demonstrating that municipal commitment of funding to green infrastructure retrofit has the potential to result in substantial implementation. Overall, the contribution to the retrofits targets presented in the GI Plans by non-Regulated (public) Projects is small relative to the contribution by Regulated (private) Projects.

(8) When the green infrastructure retrofit targets as presented in the GI Plans are summed and considered against estimates of county and regional impervious surface cover, the resulting data describes the relative retrofit that is projected to take place through 2040 at the regional scale. According to the GI Plans, based on the Regulated Project definitions from the Previous Permit and without the numeric implementation requirements included in this Provision in the Permit, for private and public, Regulated and non-Regulated, parcel based, green streets and regional projects, the projected retrofits by 2020, 2030, and 2040 by county stormwater programs are summarized in Table A-4:

Table A-4. GI Plan-estimated retrofit

Permittees	2020	2030	2040
Alameda	2%	3%	3%
Contra Costa	1%	2%	3%
San Mateo	1%	2%	4%
Santa Clara	2%	5%	12%
Solano	6%	8%	10%
Total	2%	4%	6%

GI Plan Long-Term Retrofit. The numbers in each County's row in this table have the respective County's total impervious surface as a denominator, based on the NLCD 2016 Developed Imperviousness Descriptor (CONUS).[191] The numbers in the final row of this table, Total, has the five Counties' total impervious surface as a denominator; since these numbers are percentages of the total five-County impervious surface, they do not sum the above columns.

This shows that despite the opportunity given to flexibly capture smaller projects in GI Plans in lieu of a numeric permit requirement in MRP 2, the Permittees have not committed to accelerating the existing rate of green stormwater infrastructure implementation, or to retrofit existing impervious surfaces with clean water controls to address urban runoff pollutant discharges from existing impervious surfaces, beyond what MRP 2 already required for Regulated Projects.

(9) The inclusion of numeric retrofit acreages is consistent with other relevant NPDES Stormwater Permits, which include similar non-Regulated Project numeric retrofits requirements that supplement their retrofit requirements for Regulated Projects.

The City of Portland's MS4 NPDES Discharge Permit (effective January 31, 2011)[132] requires each co-permittee to implement one non-regulated public right-of-way project before the end of the permit term. Analogous requirements for the completion of at least one public retrofit project are included in the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010)[137] and the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010).[141]

The State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019)[134] requires Permittees to achieve 300 Structural Stormwater Control (SSC)

[191] https://www.mrlc.gov/data

Program Points (225 points from projects in the design stage and 75 points from completed projects) by the third year of the permit term. Appendix 12[192] of that permit provides instructions regarding which types of projects are qualifying, and regarding how to calculate the SSC Program Points that those projects are worth (starting with Table 3 of Appendix 12).

The points system offers a flexible approach to retrofit. It requires implementation of retrofit actions that are beyond work that would otherwise be required under that permit. However, it allows implementation of a range of actions to protect and improve water quality, such as new LID BMPs, retrofit of existing controls to expand capacity, permanent removal of impervious surfaces, and landscape restoration to reduce hydromodification impacts.

Similar to the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s,[134] in U.S. EPA's Draft NPDES Stormwater Permit for the City of Tacoma's MS4,[193] the permittee is required to implement a Structural Stormwater Controls Program to prevent or reduce impacts to receiving waters caused by discharges from the MS4 that are not adequately controlled by other existing actions required by the permittee's Stormwater Management Program (SWMP) Plan;[194] towards that end the permittee's SWMP Plan requires it to achieve 300 SSC Program Points by December 31, 2022, to address impacts that are not adequately controlled by the other required actions of the SWMP Plan. Structural stormwater control program points are calculated per Appendix 12[192] of the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s.[134]

Likewise, in U.S. EPA's Draft NPDES Stormwater Permit for Pierce County's MS4,[195] the permittee is required to implement a Structural Stormwater Controls Program to prevent or reduce impacts to receiving waters caused by discharges from the MS4 that are not adequately controlled by other existing actions required by the permittee's Stormwater Management Program (SWMP) Plan;[196] towards that end the permittee's SWMP Plan requires it to achieve 300 SSC Program Points by December 31, 2022 (225 design-stage retrofit incentive

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[192] Accessed on July 30, 2021, from: https://apps.ecology.wa.gov/paris/DownloadDocument.aspx?id=279051

[193] U.S. EPA NPDES Permit No. WAS026689, accessed on July 30, 2021, from: https://www.epa.gov/npdes-permits/draft-npdes-stormwater-permit-city-tacoma-ms4-washington

[194] City of Tacoma, Stormwater Management Program (SWMP) Plan, March 2021. Accessed on July 30, 2021, from: https://www.cityoftacoma.org/UserFiles/Servers/Server_6/File/cms/Surfacewater/SWMPUpdates/Final%20Draft%20SWMP%20Update_2021.pdf

[195] https://www.epa.gov/npdes-permits/proposed-stormwater-permit-pierce-county-ms4

[196] Pierce County, Stormwater Management Program Plan, 2020. Accessed on July 30, 2021, from: https://www.piercecountywa.gov/DocumentCenter/View/92121/2020-SWMP?bidId=

points; 75 complete or maintenance stage incentive points), to address impacts that are not adequately controlled by the other required actions of the SWMP Plan. Structural stormwater control program points are calculated per Appendix 12[192] of the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s.[134]

The State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 31, 2018)[143] makes progress towards the nutrient and sediment load reductions required to address the Chesapeake Bay TMDL, as specified in Maryland's Watershed Implementation Plan, by requiring its permittees to commence restoration efforts for twenty percent of existing developed lands that have little or no stormwater management by 2025, such as by requiring its permittees to perform watershed assessments, identify water quality improvement opportunities, secure appropriate funding, and develop an implementation schedule to show the twenty percent impervious area restoration requirement will be achieved by 2025. Such restoration efforts may include the use of environmental site design practices, structural stormwater BMPs, retrofitting, stream restoration, or other alternative restoration practices. The actions taken by those Maryland permittees to address the Chesapeake Bay TMDL are similar in nature to actions the Permittees could take to achieve wasteload allocations for pollutants including mercury and PCBs. Though it is likely that the Permittees will implement actions similar to those in Maryland because they are reasonable and cost effective given the suite of available options, they have alternative options, such as diversion to the sanitary sewer.

Driven by Chesapeake Bay and Anacostia River TMDLs, the 2010 MS4 permit issued to Montgomery County by the State of Maryland required the County to retrofit 20 percent (4,292 acres) of its "older, untreated, or poorly-treated impervious surfaces by 2015."[197,198] Those retrofits may consist of the use of environmental site design and other nonstructural techniques, structural stormwater practice retrofitting, and stream channel restoration. The permit's retrofit requirement was primarily a TMDL-driven goal. Provision C.3.j.ii.(2)'s retrofit requirement is based both on reducing pollutants to the MEP and achieving the Hg and PCBs TMDL WLAs (see, e.g., Provisions C.11.e and C.12.f). Montgomery County's permit indicates a level of retrofit effort that exists elsewhere, which is far above what Provision C.3.j cumulatively requires (216.92 acres) for multiple jurisdictions.

U.S. EPA's NPDES Permit for Washington, D.C. (effective June 22, 2018)[142] requires the permittee – in order to achieve pollutant reductions, demonstrate progress toward achieving applicable TMDL WLAs by achieving a collective

[197] https://www.montgomerycountymd.gov/water/stormwater/ms4.html

[198] Cameron, et al., 2011. *Green Stormwater Retrofits: Objectives and Costing.* In Low Impact Development Technology: Design Methods and Case Studies, ASCE, Clar et al., eds.

reduction in all TMDL pollutants of concern in stormwater other than trash per the permit's retention requirements, and meeting other water quality objectives – to implement a total of 1,038 new Acres Managed by the end of the Permit term beyond the existing Acres Managed at the time of the Permit effective date, divided between three major basins, of which at least 62 acres must be located in public rights of way. One "Acre Managed" is one acre of land treated by stormwater control measures to the applicable standard established in the permittee's stormwater regulations or consistent with the relevant voluntary program. Further explanation of this concept is provided in the Washington, D.C., NPDES MS4 Permit. For example, a development project required to meet the 1.2 inch retention standard for development and redevelopment greater than or equal to 5,000 square feet, which will implement 1.2 inches of retention across five acres through any combination of onsite and/or offsite retention controls, is equivalent to five "Acres Managed." The permittee is also required to install 350,000 square feet of new green roofs by the end of the permit term, and plant 6,705 trees annually during the permit term. Like the Montgomery County permit, the Washington D.C. permit also indicates a level of retrofit effort that exists elsewhere, which is far above what Provision C.3.j cumulatively requires (216.92 acres) for multiple jurisdictions.

Provision C.3.j.ii.(2)(b)-(c) allows Permittees to meet the retrofit requirements in Table H-1 of Attachment H on a countywide basis or outside their jurisdictions, but requires them provide no less than 0.20 acres of green infrastructure within their jurisdictions, or contribute substantially to such a green infrastructure project outside of their jurisdictions (but within their County). A substantial contribution could mean that Permittees are providing a significant portion of project funding, including in-kind funding or staff services such as development of designs, provision of land, or contracting for project implementation.

- This affords Permittees flexibility in meeting the retrofit acreages, and ensures that a minimum amount of green infrastructure is implemented in the Permittees' jurisdictions to address storm water pollutants. It also ensures that Permittees build the institutional capacity necessary to implement green infrastructure projects within their jurisdictions. There is also a requirement to ensure that countywide total retrofit acreages are met.

Provision C.3.j.ii.(2)(d) allows non-Regulated Projects and green infrastructure beyond the minimum required by Provision C.3.d for a Regulated Project to be counted towards the numeric requirements in Table H-1 of Attachment H. If any portion of such projects is later used as a part of an Alternative Compliance exchange to offset the treatment required by a Regulated Project pursuant to Provision C.3.e.i, then that portion may no longer be counted towards the retrofit acreage requirements in Table H-1 of Attachment H. This allows Permittees to benefit from requiring more than the minimum requirements to achieve cleaner storm water.

Provision C.3.j.ii.(2)(e)-(f) provides the timeframe for counting projects for the acreage requirements in Table H-1. Including projects completed after January 1, 2021, accounts for and encourages early green infrastructure projects completed by Permittees. June 30, 2027, is used as the end of the timeframe because that is when the Permit expires. For project not yet completed by this date, funding them by this date provides the necessary assurance of their completion; in the subsequent permit term, the Water Board may consider requiring such projects to be completed by the end of that permit term.

Provision C.3.j.ii.(2)(g) explains that Numeric Implementation pursuant to Provision C.3.j.ii.(2) can be counted towards analogous Provision C.12 numeric implementation retrofit requirements for old industrial areas, as long as they satisfy other aspects of the Provision C.12 requirement. This ensures that the Permittees get credit for work done under Provision C.3.j.

Provision C.3.j.ii.(2)(h) allows Permittees to credit the acreage of impervious surface created or replaced as part of Provision C.3.b.ii.(5) Road Reconstruction Projects to count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

- This allowance is temporary, for this Permit term, as by the end of the Permit term, the Permittees will have further developed the institutional capacity necessary for continued green infrastructure implementation and, as such, may have a future-looking plan that will incorporate regulated road projects into the Permittees' broader retrofit expectations.

Provision C.3.j.ii.(2)(i) recognizes the unique challenges inherent in the implementation of green infrastructure in small rural Permittee jurisdictions by allowing those Permittees to collectively submit an optional proposal for pilot projects investigating alternative green infrastructure techniques. If approved (or conditionally approved) by the Executive Officer, this proposal will allow (or conditionally allow) Permittees with small rural jurisdictions to meet part or all of their Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements via alternative green infrastructure techniques.

Provision C.3.j.ii.(2)(j) allows Permittees to submit reports pursuant to Provision C.3.j.v.(5) estimating the benefit provided by new or existing ordinances that require Regulated Projects to treat significantly more impervious surface than the minimum required by Provision C.3, where such additional treatment may count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements. Permittees whose reports are approved by the Executive Officer may use the benefit estimated for the current Permit term in the reports to offset up to 25 percent – but by no more than 1 acre – of their individual Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

- The offset is a one-time credit and its purpose is to help Permittees complete the planning and policy work sufficient to leverage private development and redevelopment projects within their jurisdictions to assist Permittees with achieving

compliance with the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements. The Provision C.3.j.ii.(2)(j) offset is temporary, for this Permit term.

Provision C.3.j.ii.(3) describes the Design and Other Criteria that all green infrastructure projects built pursuant to Provision C.3.j must comply with Provisions C.3.c and C.3.e-h because they represent the Water Board's determination of maximum extent practicable-compliant designs that appropriately address identified water quality impacts.

- All green infrastructure projects built pursuant to Provision C.3.j are also required to comply with Provision C.3.d. However, with cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by the Permittees), and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects, submitted in June 2019[199] as allowed by Provision C.3.j.i.(2)(g) of the Previous Permit, to size non-Regulated green streets projects (green infrastructure projects sited in the public road right of way). If they do so, the Permit requires Permittees to comply with the Water Board's June 21, 2019, conditional approval of that submittal,[200] which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used for non-Regulated green streets projects.

Provision C.3.j.ii.(4) describes a Technical Working Group (TWG) that Water Board encourages Permittees to participate in, along with staff and impartial science experts, to discuss and recommend long-term green infrastructure goals, targeting, in particular, Permittees' public streets. The goals will likely inform subsequent Permit terms, with the idea that each subsequent Permit term would make significant progress towards the goals. The purpose of this Provision is therefore to, over the long-term, address pollutant loading and hydrologic impact from areas of Permittees' jurisdictions that are not otherwise addressed by Provision C.3.b Regulated Projects. The goals will likely inform changes to Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements. The long-term goal may include consideration of crediting public and private projects that implement non-bioretention stormwater controls which provide water quality and hydrologic benefit that are reasonably comparable to the Permit's expectations in

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[199] *Guidance for Sizing Green Infrastructure Facilities in Street Projects with companion Analysis: Green Infrastructure Facility Sizing for Non-Regulated Street Projects*. BASMAA, June 2019. https://www.ccleanwater.org/userfiles/kcfinder/files/BASMAA_Guidance%20for%20Sizing%20Green%20Infrastructure%20Facilities%20in%20Street%20Projects%20with%20companion%20Analysis%20June%202019.pdf. Accessed on July 27, 2021. Or: https://basmaa.org/wp-content/uploads/2021/08/BASMAA-Guidance-for-Sizing-Green-Infrastructure-Facilities-in-Street-Projects-with-Companion-Analysis.pdf; accessed on August 8, 2021

[200] *Conditional Acceptance of Guidance for Sizing Green Infrastructure Facilities in Street Projects*. June 21, 2019.

Provisions C.3.c-d and C.3.g. The long-term goal may include consideration of other LID practices such as those proposed pursuant to Provision C.3.d.iv.

Provisions C.3.j.iii-iv. (No Missed Opportunities and Participate in Processes to Promote Green Infrastructure) are required to ensure green infrastructure projects remain a critical part of the Permittees' storm water control and outreach efforts.

Provision C.3.j.v. (Tracking and Reporting Progress) is necessary to track the progress of green infrastructure projects and Permit compliance. It requires Permittees to track and map non-Regulated green infrastructure projects built pursuant to Provision C.3.j, in the same manner as Regulated Projects, using the tracking and mapping tools developed during the Previous Permit. This Provision requires that the tools must include a component that is available to the public, which is advertised on individual Permittee websites and on County stormwater program websites and as appropriate is advertised in other locations. This Provision lists the minimum level of detail that must be provided by the tracking and mapping tool for each project built pursuant to Provision C.3.j. If the tools contain additional information which has not been made available to the public such as detailed design information, incurred or planned operation and maintenance costs and operation and maintenance frequency, condition, and pollutant loads treated, that information is required be made available to Water Board staff upon request. The tracking and mapping tools were required to be completed in the Previous Permit, and therefore the Permit requires the Permittees to certify in the 2023 Annual Reports that the tracking and mapping tools have been completed and are being implemented. Reporting by the Permittees on the implementation of non-Regulated Projects may inform modifications to Provision C.3.j in future permits.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires "[a] description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system." Other specific legal authority is cited below.

Specific Provision C.4. Requirements

Provision C.4.a (Legal Authority) Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Provision C.4.b (Inspection Plan) Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit continues to require Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "[p]rovide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

The Water Board has added to this Permit additional types of businesses for Permittees to include in their Industrial and Commercial Business Inspection Plan (Inspection Plan). These are restaurants and other food service businesses, as well as supermarkets or large grocery stores with outdoor waste storage or cardboard compacting areas. Waste from these types of businesses is reasonably likely to contribute stormwater runoff pollution, and they are a common focus area of other stormwater program inspection requirements. Restaurants and other food service businesses have the potential to discharge pollutants associated with their activities such as food debris, trash, and other

wastes, including those from disposable food packaging and utensils. Similarly, supermarkets and large grocery stores have an elevated threat of potential discharges of trash, fluid milk products, food debris, and other wastes.

Vehicle fueling facilities were previously included in MRP 2 due to the reasonable likelihood to contribute to stormwater discharges of hydrocarbons, heavy metals and other chemicals used as fuel additives. The Water Board has now specified sites with "fueling activities" as a type of business to include in Permittees' Inspection Plans. This is to clarify that sites with those activities are still considered a fueling facility, even if found in business types that perform other activities, and they have the same associated pollutants with the potential to discharge in stormwater.

These additional business types and similar activities are also components of business inspection requirements in other Phase I MS4 permits, including Los Angeles, Salinas, the City of South Lake Tahoe, El Dorado County, Placer County, and Seattle, WA.

The Permit continues to require Permittees to identify industrial sites and sources subject to the Industrial General Permit or other individual NPDES permit. U.S. EPA recognized that stormwater from industrial facilities would be regulated by both municipal and industrial stormwater programs, finding that:

> 1. *Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.*[201]

and:

> 2. *Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, U.S. EPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are*

[201] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48056

> *responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.*[202]

This Permit does not require the Permittees to submit the list of facilities scheduled for inspection each year with annual reports. Instead, Permittees are to add each year's inspection list to the Inspection Plan as part of the annual update to the Inspection Plan. Permittees may choose to keep their annual lists in their databases or in electronic form. The annual lists must be made readily available to Water Board staff or its representatives upon request.

Water Board staff reviewed about 20 percent of the Permittees' Inspection Plans during the MRP 1 term. A few of those Inspection Plans also provide detailed flow charts or instructions on how to conduct inspections, fill out the inspect forms, execute enforcement actions, conduct follow-up, and fulfill tracking and reporting for the MRP. These comprehensive Inspection Plans help ensure inspection consistency and serve as excellent training documents for new inspection staff.

Provision C.4.c (Enforcement Response Plan) requires the Permittees to implement and update, as needed, their Enforcement Response Plan (ERP) that serves as a reference for inspection staff to take consistent and timely responses to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP.

Because ERPs are unique to each Permittee, this Permit continues to allow each Permittee flexibility to customize the ERP to fit its legal authority and its regulatory program. However, all ERPs must require corrective actions to be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered; and short timeframes for implementing corrective actions encourage businesses to prevent potential discharges from becoming actual discharges. Permittees must also require active non-stormwater discharges to cease immediately, timely implementation of corrective actions to clean up the discharge, and timely implementation of measures to prevent future active discharges.

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[202] Ibid

This Permit standardizes and clarifies the ERP requirements in provisions C.4, C.5, and C.6. to eliminate ambiguity in the requirements.

Provision C.4.d (Inspections) continues MRP 2's consolidation of the inspection requirements from MRP 1's Provision C.4.b. Inspection Plan and C.4.c. ERP together into this Provision. Inspection frequencies are determined by each Permittee in its Inspection and Enforcement Response Plans.

U.S. EPA guidance states "management programs should address minimum frequency for routine inspections." The U.S. EPA Fact Sheet—Visual Inspection says "[t]o be effective, [visual] inspections must be carried out routinely." [203]

The Water Board has declined to reduce the record keeping and reporting requirements of this permit. The Permit requires that only basic information be recorded for each inspection. This information is necessary to document each inspection to develop a history for the facility.

This information is also needed for Water Board staff to evaluate MS4 programs. Annual reports need to provide enough detail to show compliance with the Permit terms. For instance, during the MRP 1 term, annual reports showed few violations relative to the number of inspections completed. This did not match with the field inspection experience of Water Board staff. Further investigation showed that some Permittees did not consider potential discharges to be violations. Such investigation by Water Board staff would be made more difficult without the required information about inspections.

MRP 1 exempted verbal warnings from being reported in the annual reports. Water Board staff expected verbal warnings to have very limited use and only given for very minor issues that do not warrant anything in writing. However, from Water Board inspections, and annual report and ERP reviews, we concluded that many Permittees issue warnings in response to potential discharges, such as housekeeping issues, evidence of actual non-stormwater discharges that are not ongoing during an inspection, lack of BMPs, inadequate BMPs, and inappropriate BMPs. Even though potential discharges need timely corrective actions, it was unclear if these potential discharges were corrected in a timely manner because there was no written documentation on the potential discharges or verbal warnings issued. Only observed non-stormwater discharges were considered violations and issued some type of written enforcement action. Examples of potential discharges.

MRP 2 required, and this Permit continues to require, reporting of all potential and actual non-stormwater discharges based on the enforcement levels in each Permittee's ERP, so that Water Board staff can evaluate whether Permittees are conducting appropriate follow-up.

[203] U.S. EPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection."

Some Permittees feel that a 10-business day window to implement corrective action is not necessary and even unreasonable during the dry months for potential discharges and especially for minor potential discharges. Permittees have the discretion to add a rationale for allowing a longer time period, especially for corrective actions that require things such as capital improvements, revisions to standard operating procedures, and staff training. However, prompt implementation of corrective actions for most potential discharges minimizes the risk of potential discharges becoming actual discharges. A number of Permittees communicated that they prefer shorter corrective action timeframes because sites tend to take care of them right away versus forgetting about the corrective actions when given a longer corrective action timeframe. Throughout the MRP 1 term, Water Board staff asked Permittees for a list of minor potential discharges. The only minor issue listed was open dumpster/garbage can lids. Water Board staff concurred that open dumpster/garbage can lids is minor, can be corrected immediately, and would not require any additional follow-up. Water Board industrial and construction inspectors consider open dumpster/garbage can lids and small amounts of trash/debris on the ground to be minor violations that can quickly be corrected, because staff at the industrial or construction sites can immediately cover the dumpsters and pick up and appropriately dispose of the trash. Water Board inspectors note those issues and corrective actions in their inspection reports.

Provision C.4.f (Staff Training) requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application "[t]he location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have adequate legal authority to "[p]rohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(F) provides that the Permittee shall have adequate legal authority to "[c]arry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires that the Permittee have a " description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires a "program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires a "description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires a "description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires a "description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires a "description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires a "description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Discharges not comprised entirely of stormwater, not authorized by another NPDES permit, and neither exempted nor conditionally exempted in Provision C.15 are not authorized to enter the MS4 and are considered to be illicit discharges

C.5-2 Every Permittee must have the ability to effectively prohibit non-stormwater discharges to its MS4 by detecting and eliminating illicit discharges and disposal into its MS4.

C.5-3 Illicit discharges to the storm drain system may be detected in several ways. Permittee staff may detect discharges incidentally, and members of the public may report suspected discharges. The Permittee must have a direct means to receive, investigate, respond to, and track these reports.

Removal of Routine Collection System Screening Requirement

MRP 1 required the Permittees to perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets, and catch basins, to seek and eliminate illicit connections and discharges. The results of the screenings were reported in annual reports. No illicit connections were reported. However, Permittees have found illicit discharges during the screenings and they were cleaned up. It is unclear if personnel conducting the screenings reported these illicit discharges to the illicit discharge staff for investigation and tracking. In MRP 2, we added language to C.5.c. – Spill, Dumping, and Complaint Response Program to ensure that illicit discharges found by municipal staff conducting routine maintenance and inspection activities on the collection system are reported to the illicit discharge staff for investigation and tracking. This is based on the federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3), which requires "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to prohibit illicit discharges to storm sewers as required by federal regulations at 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in a discharge into the MS4 that is not comprised entirely of stormwater. Every Permittee must have the ability to discover, inspect, enforce its ordinance, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (Enforcement Response Plan) continues to require Permittees to implement and update, as needed, their Enforcement Response Plans (ERPs) to ensure consistent and timely responses to illicit discharges and connections to the MS4. The ERP provides guidance on (1) progressively strict enforcement to achieve timely compliance, (2) follow-up inspection, (3) referral to another agency, (3) appropriate time periods for implementation of corrective actions, and (4) the roles and responsibilities of staff responsible for implementing the ERP. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Permittees must also require immediate cessation of active discharges, and timely implementation of corrective actions to clean up the discharge and implementation of measures to prevent future active discharges.

Water Board staff reviewed more than half of the Permittees' ERPs during MRP 1. Almost all of those Permittees have one ERP to satisfy the ERP requirements in provisions C.4, C.5, and C.6. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in MRP 1. Therefore, the ERP requirements in this Permit are standardized in provisions C.4, C.5, and C.6.

Provision C.5.c (Spill, Dumping, and Complaint Response Program) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spills, dumping, and complaints reporting. Reports from the public and other Permittee staff are an essential tool in discovering and investigating illicit discharge activities into the MS4. Maintaining contact points helps ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a means to adequately track suspected polluted discharges from the time they are reported until they are resolved.

Provision C.5.d (Tracking and Case Follow-up) implements the requirement in 40 CFR 122.26(d)(2)(iv)(B)(4) for permittees to have procedures to "respond to spills" by requiring Permittees to substantiate, track, and monitor illicit discharges reported to the spills, dumping, and complaint response system (Provision C.5.c). This requirement is included so Permittees can demonstrate compliance with the ERP requirements in

Provision C.5.b and to ensure that illicit discharge reports receive adequate follow-up and resolution.

All municipalities, counties, district, and other public entities that own or operate sanitary sewer systems greater than one mile in length that collect and/or convey untreated or partially treated wastewater to a publicly owned treatment facility in California are required to report sanitary sewer overflows to the California Integrated Water Quality System Project pursuant to the State Water Board's Order No. 2006-003-DWQ (Statewide General Waste Discharge Requirements for Sanitary Sewer Systems) and Order WQ 2013-0058-EXEC (Adopting Amended Monitoring Requirements for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems order. Sewage discharges that are reported to the California Integrated Water Quality System Project do not need to be tracked and reported in Provision C.5.

Provision C.5.e (Control of Mobile Sources) requires each Permittee to implement a program to reduce the discharge of pollutants from mobile businesses. Examples of mobile businesses include mobile cleaners that wash vehicles, building exteriors, sidewalks, and plazas, cleaners that wash restaurant smoke hood filters, mats, and other equipment, and mobile fueling businesses that fill up gas tanks for vehicles owned by carshare companies or certain technology company employees. The purpose of this section is to implement oversight and control of pollutants associated with mobile business sources to the MEP.

MRP 2 required Permittees to develop and implement a program to reduce the discharge of pollutants from mobile businesses and to develop an inventory of mobile businesses. Permittee experience during the previous permit term showed that it is difficult to track and register mobile businesses. Mobile businesses may have a business license from another municipality, another county, or have no business license. They often work outside of normal business hours (e.g., restaurant cleaners may work late at night when restaurants are closed), and so are difficult to observe and inspect. This Permit shifts the enforcement approach focus from developing an inventory of mobile businesses and direct observation of mobile business activities to reiterating that the entity hiring the mobile business and the mobile business themselves are responsible for any polluted discharge from the business or property.

This Permit keeps the outreach requirement to develop and distribute educational materials about stormwater pollution prevention to mobile businesses. Permittees may develop their own education and outreach materials, or may participate in a countywide or regional program. In order to understand what Permittees are doing to control pollutants from mobile sources, this Permit continues most requirements of MRP 2 and collects data on each Permittee's implementation of the provision.

Provision C.5.f (Municipal Separate Storm Sewer System (MS4) Map) As part of the permit application process, federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of

any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[204] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[205] All Permittees have complied with this requirement. This Permit continues to require the Permittees to advertise the availability of the maps of their MS4 system and to make available these maps to the public upon request.

In addition to the mapping information previously submitted, this Permit also requires Permittees to identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information. Previous permits did not require Permittees to submit regular updates to their MS4 system maps, so the current status of the overall MS4 systems as compared to previous maps is unknown. To effectively manage and respond to illicit discharges, as well as potential impacts from conditionally exempted discharges like emergency firefighting discharges, it is essential for Permittees to understand their current MS4 system layout and conditions, as well as how discharge sources are connected to outfalls that discharge to their system.

The proposed updates that this Permit requires are consistent with the requirements of other stormwater permits in the state. For instance, the California Permit for Small MS4s,[206] the City of Long Beach MS4 Permit,[207] and the City of Salinas MS4 Permit[208] also require Permittees to keep their MS4 system maps up to date by submitting annual revisions or verifying that no modifications to the system occurred during the annual reporting period.

The City of Salinas MS4 Permit requires the city to maintain a Stormwater Information Management System that includes a map of MS4 system components with information

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[204] 40 CFR 124.3 (applicable to state programs, see section 123.25).

[205] 40 CFR 122.26(d)(1)(iv)(E).

[206] California State Water Board, NPDES Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), NPDES Permit No. CAS000004, Order No. 2013-0001-DWQ, as amended.

[207] Los Angeles Regional Water Board, Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges from the City of Long Beach, NPDES Permit No. CAS004003, Order No. R4-2014-0024.

[208] Central Coast Regional Water Board, NPDES Permit and WDR for the City of Salinas Municipal Stormwater Discharges, NPDES Permit No. CA0049981, Order No. R3-2019-0073, adoption date: September 20, 2019, effective date: October 1, 2019.

such as the name, type, location, and discharge information. The map must identify open channels and other conveyance features, inlets to the MS4, and connections over 8 inches in diameter to MS4 conveyances. The map must also include components that influence maintenance capacity and conveyance, such as cleanouts, pump stations, diversion structures, and trash capture devices.

The City of Long Beach MS4 Permit requires an electronic map that includes the location and length of all open channel and underground pipes 18 inches in diameter or greater, as well as storm drain outfall catchment areas for each major outfall. The Los Angeles County MS4 Permit also requires an up-to-date and accurate electronic map of the county's MS4.[209] In addition to outfalls, the required map components include the location and length of open channels and underground storm drain pipes with a diameter of 36 inches or greater.

[209] Los Angeles Regional Water Board, NPDES Permit for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach, NPDES Permit No. CAS004001, Order No. R4-2012-0175, as amended.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires "[a] description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires "[a] description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires "[a] description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires "[a] description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires "[a] description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "[t]he following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed the natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants, such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as stop work orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into the MS4 and then into receiving waters. According to the 2004 National Water Quality Inventory,[210] States and tribes report that sediment is a major cause of impairment of assessed rivers and streams. The Inventory found that sediment impairs 35,177 river and stream miles (14 percent of the impaired river and stream miles). Sediment runoff rates from construction sites are typically 10 to 20 times greater than runoff rates from agricultural lands, and 1,000 to 2,000 times greater than runoff rates from forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[211]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management,

[210] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[211] U.S. EPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure*. EPA 833-F-00-008. Fact Sheet 2.6.

and non-stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority.

In its Phase II Compliance Assistance Guidance, U.S. EPA says that "[i]nspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[212] To issue warnings and assess penalties during inspections to achieve timely corrective actions from sites, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to implement and update, as needed, its Enforcement Response Plan (ERP), which serves as a reference for inspection staff to take consistent actions and timely response to achieve effective, timely corrective compliance from all public and private construction site owners/operators.

U.S. EPA supports enforcement of ordinances and permits at construction sites, stating "[e]ffective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[213] In addition, U.S. EPA expects permits issued to municipalities to address "weak inspection and enforcement."[214] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program. Prior to the issuance of MRP 1, Water Board staff had noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. Therefore, MRP 1 required Permittees to develop ERPs. MRP 2 required Permittees to implement the ERPs, and the Permit continues to require Permittees to implement the ERPs.

ERPs are unique to each Permittee. As such, this Permit continues to frame ERP requirements broadly. For instance, at minimum, an ERP must include: (1) progressively strict enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP. The broad framework allows each Permittee flexibility to customize the ERP to fit its legal authority and ordinary business practices. However, for an ERP to be effective, Permittees must require immediate cessation of active non-stormwater discharges, timely implementation of corrective actions to clean up the discharge, and implementation of measures to prevent future active discharges. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are

[212] U.S. EPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, pp.4-31

[213] U.S. EPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.

[214] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p.48058.

discovered. Construction sites are required by the statewide NPDES General Permit for Stormwater Discharges Associated with Construction Activities (Construction General Permit) to keep supplies on hand to address BMP issues rapidly. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access an eroded area. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. The Permittees' tracking data needs to provide a rationale for the longer compliance timeframe.

Water Board staff reviewed more than half of the Permittees' ERPs during the MRP 1 term. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in MRP 1. Therefore, this Permit standardizes and clarifies the ERP requirements in provisions C.4, C.5, and C.6 to eliminate any ambiguity in the requirements.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round and seasonally appropriate and effective BMPs in the following six categories: (1) erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories match those listed in the Construction General Permit and reflect the nature of the potential water quality threats posed by construction sites, as well as the means of addressing those potential threats. Because sites' terrain, soil type, soil disturbance, and proximity to waterbodies differ, it would be unduly prescriptive and inappropriate to require all sites to implement a specific set of BMPs. This Permit, like the Construction General Permit, allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate and to change BMPs quickly to prevent discharges into storm drains, waterways, and rights-of-way. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals, such as CASQA's Construction BMP Handbook.[215]

Sediment runoff at construction sites without adequate BMP implementation greatly exceeds natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This is because the vegetation clearing, mass grading, lot leveling, and excavation at construction sites expose soil to wind and water, increasing sediment mobilization, runoff into the MS4, and deposition in receiving waters. This occurs in both the wet season and in unexpected rain events during the dry season (defined as May 1 through September 30), which can be significant. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the whole year, including during the dry season.

Provision C.6.c.ii.(1).d requires "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent

[215] CASQA, 2019. *Construction BMP Online Handbook. https://www.casqa.org/resources/bmp-handbooks/construction*

feasible." If grading does occur during the wet season, Permittees must require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

"Steep slopes are the most highly erodible surface of a construction site,"[216] and unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. Therefore, this Permit requires slope stabilization on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. As noted by U.S. EPA, "slope length and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[217] Where vegetation preservation or replanting is not possible, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[218] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, this Permit requires Permittees to ensure that sites implement slope stabilization techniques that are appropriate for the grade and height of the affected slopes.

This Permit also requires Permittees to ensure that construction sites permanently stabilize disturbed soils, e.g., by revegetation, at the conclusion of each phase of construction.[219] To maximize the degree to which vegetation can effectively stabilize soils, Permittees must ensure that construction sites are revegetated as early as feasible. Revegetation reduces the threat of polluted stormwater discharges from construction sites. A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[220] U.S. EPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[221]

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[216] Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.

[217] U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.

[218] Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection*. p. 5.

[219] Ibid.

[220] Ibid. p. 11.

[221] U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.

To ensure the MEP standard and water quality standards are met, active treatment systems may be necessary at some construction sites. Requirements for active system requirements are located in the Construction General Permit, Attachment F.

Provision C.6.d. Plan Approval Process. U.S. EPA guidance emphasizes the importance of good site planning,[222] early incorporation of stormwater controls into a construction project, and implementation of a comprehensive stormwater management system—that is, an effective combination of controls appropriate to the project and site.[223] This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures before ground is broken on a construction project, and during the site plan review process or earlier, as recommended by U.S. EPA.[224] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[225]

Provision C.6.e. Inspections. This Provision requires permittees to ensure accountability of construction site managers through a program of regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the storm drain and waterbodies.

The level of effort required by this section remains unchanged from the previous permit. The monthly or more frequent inspections during the wet season of all construction sites disturbing one or more acre of land, all hillside projects, and all high priority sites reflects the need to ensure that potentially changing conditions on sites are appropriately being addressed during the part of the year when there is a greater threat associated with a greater probability of precipitation, and has been shown during previous permit terms to adequately identify problem sites. Inspections must focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six BMP categories. Each Permittee must implement its ERP and require timely corrections of all actual and potential problems observed. All corrective actions must be implemented before the next rain event, but no longer than 10 business days after the violations are discovered. A longer time period to implement corrective actions is allowed with a reasonable rationale. All inspections must be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format.

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[222] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.

[223] Ibid.

[224] U.S. EPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 4.6.2.4,
pp. 4–30.

[225] Ibid. pp. 4–31.

MRP 1 required Permittees to have the legal authority to require effective construction stormwater controls at all construction sites, regardless of the amount of soil disturbed. Water Board staff has observed disturbed construction sites where minimal BMPs were being implemented, and has seen stormwater transport construction site pollutants into the storm drain. For these reasons, ideally, all construction sites with a grading permit from a Permittee should have stormwater inspections during the rainy season to ensure adequate BMPs are implemented and construction pollutants are not entering the storm drain. Construction sites with steeper slopes pose a more-significant threat of discharging construction-related pollutants to the storm drain because they are likely to have higher runoff velocities and because their BMPs must be more robust and more-robustly installed and maintained in order to control pollutants, as compared to less-steep sites. Water Board staff has observed stormwater move sediment and other construction-related pollutants into storm drains at sites ranging from those with flat slopes to those with slopes greater than 15 percent. Because of the relatively greater threat posed by steeper sites, MRP 2 added, and this Permit continues a specific requirement to inspect all hillside projects disturbing greater than or equal to 5,000 square feet of soil. For those Permittees that do not have a hillside development map or definition, this Permit defines hillside development as development occurring on land with a slope greater than or equal to 15 percent.

MRP 1 required Permittees to report the number of violations fully corrected prior to the next event, but no longer than 10 business days after the potential and actual discharges are discovered or otherwise considered corrected in a timely, though longer period. This proved challenging for many Permittees because they track enforcement actions and not discreet violations. While information on how many potential and actual discharges are discovered and resolved would be valuable, the Water Board recognizes that such reporting requirements would require significant changes in databases for some Permittees. Therefore, this Permit allows Permittees to either report by enforcement actions or discrete number of potential and actual discharges.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct staff trainings for municipal staff at least every other year. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways [sic] and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires "[a] description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Findings in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.[226]

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.

[226] U.S. EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[227]

Specific Provision C.7 Requirements

Provision C.7.a. Outreach Campaigns. Permittees have long implemented outreach campaigns to educate their residents on different stormwater runoff pollution prevention messages. The Permit continues to require a minimum of one public outreach campaign. It is anticipated that Permittees will continue cooperatively implementing the *Our Water, Our World* pesticide use reduction outreach campaign developed by BASMAA. Individual Permittees, their respective countywide programs, and cooperative inter-Permittee efforts, will either continue existing public outreach campaigns or start new ones. This Permit removes specificity regarding the expected public outreach campaigns and how they must be conducted, recognizing that the Permittees have decades of public outreach experience and allowing flexibility to determine how best reach their residents. Permittees can utilize various electronic and print media, and paid and free media to target different audiences. This Permit still requires an effectiveness assessment/evaluation after each outreach campaign to enable Permittees to determine whether stormwater messaging has reached residents and resulted in behavior changes.

Provision C.7.b. Stormwater Pollution Prevention Education. The public needs information on how to minimize stormwater pollution. MRP 1 and MRP 2 required Permittees to have and publicize a centralized stormwater point of contact to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives. The Permittees list this point of contact on the brochures, pamphlets, and fact sheets they circulate on stormwater pollution prevention issues. Some Permittees provide these materials in languages other than English. Many Permittees have also placed these pollution prevention materials on their websites. Since citizens increasingly use the internet to search for information, this Permit continues to require all Permittees to place information on watershed characteristics and stormwater pollution prevention on their websites.

Provision C.7.c. Public Outreach and Citizen Involvement Events. This Permit continues to require Permittees to host citizen involvement events to ensure that pollution prevention messaging reaches a broad spectrum of citizens. Long-established outreach mechanisms, such as staffing tables or booths at fairs, street fairs, and other community events, help to ensure that citizens who do not actively search for information on Permittees' website may still have access to information. Permittees shall continue utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events, such as the Bringing Back the Natives Garden Tour. It is important to provide opportunities for citizens to actively practice being good stewards of our

[227] Ibid.

environment. The combined specified numbers of events for Public Outreach and Citizen Involvement in this Permit are, for the most part, slightly less than the combined specified numbers in MRP 1. However, many Permittees claimed credit for both public outreach and citizen involvement for a number of events each year.

Provision C.7.d. Watershed Stewardship Collaboration. Community watershed groups are comprised of active citizens, but they function best when they receive support from and can coordinate actions with Permittees.

Provision C.7.e. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision-makers and consumers.

Provision C.7.f. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform municipal officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA §§ 308(a), 402(a)(2); Federal NPDES regulations 40 CFR §§122.26(d)(2)(i)(F), 122.41(h), (j), (l), 122.42(c), 122.44(i), and 122.48.

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program and submit reports as required under the laws cited above. CWC Section 13383 further authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements.

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of WQBELs that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, U.S. EPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[228]

According to U.S. EPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

(1) Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;

(2) Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;

(3) Identifying potential sources of pollutants; and

(4) Eliminating or controlling identified sources more specifically through permit conditions.[229]

[228] U.S. EPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. In it, U.S. EPA recognizes that storm water discharges are highly variable both in terms of flow and pollutant concentrations and the relationships between discharges and water quality can be complex.

[229] U.S. EPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

C.8-2 A workshop held by U.S. EPA Region 9[230] identified key attributes of a more effective approach to monitoring, and how that monitoring may intersect with other evaluation, tracking, and reporting efforts:

(1) Clear management questions related to water quality outcomes and activity implementation.

(2) A process for conducting effectiveness assessment that is tailored to the program element and the management questions being asked.

(3) Use of improved monitoring designs (location, scale, frequency, methods) to detect a "signal" or change in pollutant loading in stormwater or receiving waters for POCs.

(4) Monitoring efforts that complement activity tracking and assessment to better evaluate effectiveness of treatment or source controls (e.g., are they implemented correctly, receiving proper maintenance, and operating as expected?) and improve the basis for assessing cause and effect.

(5) Documented monitoring and evaluation designs coupled with identification of program modifications envisioned to improve effectiveness, inform program adjustment and new stormwater management initiatives, and achieve intended outcomes.

The workshop recommended elements to be included in a national-level guide on monitoring and assessing program effectiveness; in the meantime, those elements on their own are a useful guide for monitoring and evaluation programs:

(1) Framing key monitoring/evaluation questions and designing approaches to fit the questions. This could include alternative program designs with advice on assembling the components (e.g., receiving water, outfall, and in-system water monitoring; BMP effectiveness evaluation; activity tracking of treatment and source controls; modeling) to inform assessment of the overall program and demonstrate effectiveness. This should show how to build a sound analytical framework up front to demonstrate why a set of approaches will likely succeed in assisting program management and defining or tracking compliance and effectiveness.

(2) Considerations for adapting monitoring/evaluation questions over time, with a reasonable limit on the creation of new questions.

[230] Improving Stormwater Program Monitoring, Evaluation, Tracking, and Reporting: Workshop Report and Recommendations. U.S. EPA Region 9, October 12, 2018. https://www.epa.gov/sites/production/files/2018-10/documents/improving_stormwater_program_monitoring-10-12-2018.pdf

(3) Examples of successful local approaches that better associate monitoring/evaluation design with program effectiveness, compliance assessment, and the ability for program managers to make management decisions.

(4) Suggested evaluation methods to assess BMP effectiveness over time.

(5) Available monitoring technologies and best practices that clearly link the monitoring objectives with the experimental design, including all aspects of data collection, data management, data analysis, and reporting formats.

(6) Compiling monitoring program costs to help show the wide range of program expenditures, how monitoring data are used to inform program decisions, and how to better articulate the value of the data.

(7) Explanations of modeling approaches and how they can relate to monitoring and adaptive management.

The workshop identified the following performance metrics to establish more meaningful MS4 program evaluation and monitoring:

(1) Percent of impervious areas addressed for stormwater management.

(2) Condition or “cleanliness” of streets as an indicator of potential pollution from runoff.

(3) Percent of impervious surface areas directly connected to the storm drain system.

(4) Modeled volume of flow to the storm drain system used as a surrogate for pollutant contributions.

(5) Percent of waterbodies in a community that are fishable and swimmable.

(6) Loss of beneficial use of a waterbody (e.g., beach closure downtimes).

(7) Measured level of awareness of citizens regarding stormwater pollution and the community’s program.

(8) Increasing number of illicit discharges reported annually; indicating heightened awareness.

(9) Budget for stormwater infrastructure improvements.

The workshop identified an overall need for permitting authorities to improve the clarity of monitoring and evaluation permit requirements and to use thoughtful methods/designs that will yield actionable data. Further, some participants noted that permits may be able to provide choices or flexibility for monitoring approaches and help incentivize better designs. Flexible permit requirements can support adaptation of monitoring to evolve with program

needs, with the potential questions to be addressed changing over time. Critically, for such an approach to succeed, it may be necessary to discontinue some monitoring efforts to redirect resources to more pertinent or valuable monitoring. The Water Board intends to pursue that recommended approach, as this Permit has replaced the Creek Status Monitoring and Stressor/Source Identification Projects Subprovisions with LID Monitoring which has been identified as a more useful program at this point in time, and the Water Board will consider changes to LID Monitoring in the subsequent permit to further increase its utility.

C.8-3 Provision C.8 requires Permittees to conduct water quality monitoring, including ambient monitoring, MS4 outfall monitoring and monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management actions pursuant to this Permit and, accordingly, demonstrate compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

(1) Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;

(2) Characterize stormwater discharges;

(3) Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;

(4) Assess progress toward reducing receiving water concentrations of impairing pollutants;

(5) Assess compliance with numeric and narrative water quality objectives and standards;

(6) Identify sources of pollutants;

(7) Assess stream channel function and condition, as related to urban stormwater discharges;

(8) Assess the overall health and evaluate long-term trends in receiving water quality; and

(9) Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-4 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the Maximum Extent

Practicable (MEP) standard where applicable. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1 related to water quality standards exceedances could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-5 Under the CWA, NPDES permits must contain conditions that require both monitoring and reporting of monitoring results to ensure compliance (see 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i).). The regulations provide, in pertinent part:

> *In addition to the conditions established under §122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable. . . .*
>
> *(i) Monitoring requirements. In addition to § 122.*48, the following monitoring requirements:
>
> *(1) To assure compliance with permit limitations, requirements to monitor:*
>
> *(i) The mass (or other measurement specified in the permit) for each pollutant* limited in the permit;
>
> *(ii) The volume of effluent discharged from each outfall;*
>
> *(iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f);* frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.
>
> *(iv) According to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR part 136 for the analysis of pollutants or pollutant parameters or required under* 40 CFR chapter 1, subchapter N or O. . . .

> *(2) Except as provided in paragraphs (i)(4) and (i*)(5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. . . .

40 C.F.R. § 122.44(i)(1)-(2). This section allows "for monitoring other than mass or volume, namely some 'other measurement specified in the permit [ ] for each pollutant limited in the permit'" (*NRDC v. U.S.EPA*, (2nd Cir. 2015) 808 F3d 556, 582.). The regulations at 40 C.F.R. § 122.48 state that all permits specify the "[r]equired monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring."

Consistent with the federal regulations, water quality monitoring requirements in Provision C.8 require specific monitoring that will yield data that is both representative of the monitored activity and necessary to assure compliance with the requirements of the Permit, as described below.

C.8 includes monitoring[231]:

(1) At or near outfalls during storm events to determine the concentrations (mass) of pollutants of concern and to obtain information to identify source areas or contaminated watersheds. These concentration data, in combination with other information, are used to provide modeled loading estimates to assess progress on attaining TMDLs, including assuring compliance with the required load reductions in the permit (C.8.f. Pollutants of Concern Monitoring). This monitoring supports estimates of MS4 pollutant loads to receiving waters and requires data collection to support planning for control actions (e.g., identification of source areas or contaminated watersheds). The latter includes monitoring effectiveness of control measures and identifying pollutant source areas; and

(2) In receiving waters, during wet and dry weather, to assess the extent to which LID controls and trash controls mitigate the physical, chemical and biological impacts of MS4 discharges to those receiving waters, and to therefore guide the management and implementation of existing and future LID controls and trash controls (C.8.d. LID Monitoring and C.8.e Trash Receiving Water Monitoring).

Provision C.8.d LID Monitoring requires monitoring of LID facilities, systems, components, including different LID design variations, in order to measure compliance and determine the effectiveness of LID controls, including the

[231] Provisions C.14, C.16, C.18, and C.19 contain additional monitoring and reporting requirements to assure compliance with the requirements therein.

extent to which LID controls address the physical, chemical and biological impacts to receiving waters caused by MS4 discharges. Provision C.8.d outlines the minimum requirements that Permittees' LID Monitoring programs must comply with and what must be included in LID Monitoring Plans. A Technical Advisory Group (TAG) consisting of Permittee representatives will guide the development and implementation of the LID Monitoring Plans.

Provision C.8.e Trash Monitoring requires monitoring of MS4 outfalls, direct monitoring of receiving waters, and indirect monitoring of receiving waters (adjacent on-land areas, when direct in-stream monitoring is not practicable). The types, frequencies, and intervals of monitoring are expected to yield information that will verify whether implemented full trash capture systems or equivalent trash controls result in no or low levels of trash discharges from MS4s.

Receiving water monitoring is specified here in addition to, and in some cases as a substitute for, outfall monitoring, for the following reasons. First, there are no end-of-pipe limits in the Permit to measure. Instead, the Permit requires, for example, PCB load reductions; outfall monitoring would not allow the Water Board to assess whether the PCB limits are met. Second, there are hundreds if not thousands of outfalls in the Permittees' jurisdictions and it is impractical to monitor every single outfall due to both cost and safety concerns. Monitoring a subset of outfalls would provide information about MS4 discharges at those specific locations at only one limited point in time, which leads to the third point that outfall monitoring is time- and spatially limited. In contrast, the required receiving water monitoring integrates the physical, biological and chemical effects to the water body of all MS4 discharges from multiple outfalls over multiple storms (i.e., time and space), yielding more useful data than outfall monitoring to determine compliance with the Permit. Receiving water monitoring is done in a probabilistic or rotating basis, depending on the parameter, again yielding more useful data than fixed-location monitoring. Also, both dry weather and storm flows are addressed in receiving water monitoring, whereas outfall monitoring is normally conducted only during storm events. Dry weather discharges can constitute a significant portion of annual pollutant loadings from storm systems in urban areas (NRC 2008).

To provide an example of how receiving water monitoring better captures permit compliance, consider an illicit discharge of chloramine from a swimming pool to an MS4. Both outfall and receiving water monitoring could detect the discharge. However, outfall monitoring would need to be done at the exact location and time of an illicit discharge; otherwise it would go undetected, because the discharge would have moved through the outfall and into receiving waters.

Receiving water monitoring as a means to evaluate compliance with permit conditions is supported by the National Research Council (NRC). In *Urban Stormwater Management in the United States*, NRC states that the quality of stormwater from urbanized areas has been well-characterized.[232] Continuing MS4 end-of-pipe monitoring produces data of limited usefulness because of a variety of shortcomings (as detailed in the report). The NRC strongly recommends[233] that MS4 programs modify their evaluation metrics and methods to include biological and physical monitoring and an increased emphasis on watershed scale analyses to ascertain what is actually going on in receiving waters, much like what is required in the permit. Further, NRC finds that biological assessments respond to the range of non-chemical stressors identified as being important in urban waterways including habitat degradation, hydrological alterations, and sediment and siltation impacts, as well as to the influence of nutrients and other chemical stressors where chemical criteria do not exist or where their effects are difficult to measure directly (e.g., episodic stressors).

Prior to the current Permit, Permittees completed substantial biological and physical creek status monitoring to evaluate MS4 impacts on streams. Continuing creek status monitoring will not generate substantial new actionable information. Baseline monitoring of all creeks has been completed and there is no near-term expectation for change. Consideration of additional or updated biological and physical monitoring will be relevant in future permit terms to evaluate long-term management actions that would cause a measurable change in creek conditions. Creek status monitoring and the associated stressor source Identification monitoring have been replaced in the current Permit with LID systems and trash control effectiveness monitoring, which are high priorities due to the high benefit costs of those actions, and more specific and near-term relevant pollutants of concern receiving water monitoring requirements.

U.S. EPA Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits notes that:

> *…storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in*

[232] National Research Council. 2008. Urban Stormwater Management in the United States.

[233] U.S. EPA has endorsed the NRC's recommendation (See, e.g., EPA's District of Columbia MS4 Permit No. DC0000221 Fact Sheet, 2011.).

reducing contaminants and making improvements in water quality.

Permit Provision C.8 satisfies these two objectives by requiring monitoring that will provide Permittees with sufficient data to pinpoint sources of pollutants and assess the effectiveness of efforts to reduce pollutants, both at the source and in receiving waters.

C.8-6 The Water Quality Monitoring Provision is intended to provide answers to fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, management questions that include the following:

(1) Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?

(2) What is the extent and magnitude of the current or potential receiving water problems?

(3) What is the relative urban runoff contribution to the receiving water problem(s)?

(4) What are the sources of urban runoff that contribute to receiving water problem(s)?

(5) Are conditions in receiving waters getting better or worse?

(6) What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time?

(7) What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance?

C.8-7 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Water Board staff requested major permit holders in the region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program (RMP), which produces world-class datasets on estuarine

contaminants.[234] The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. Because the RMP monitors waters in each Permittee's jurisdiction and gathers data on the pollutants controlled in this Permit, the Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-8 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Boards, and to coordinate with other monitoring programs. Provision C.8 contains a framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources. In working cooperatively with SWAMP, Permittees can develop a monitoring program that evaluates waters in its jurisdiction and gathers data on each of the pollutants of concern discussed in this Permit.

C.8-9 In 1998, BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[235] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> *BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.*

In a prior permit, Permittees were given the option to implement this same concept by forming a regional monitoring collaborative, which they did. In conducting some of the monitoring required in this Provision, the Regional Monitoring Collaborative (RMC) provides efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level on behalf

[234] https://www.sfei.org/programs/sf-bay-regional-monitoring-program

[235] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

of all Permittees. Further benefits are expected as more monitoring requirements are fulfilled through the RMC.

C.8-10 This Permit includes monitoring requirements to ensure compliance with adopted TMDL WLAs and to provide data needed for TMDL implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-11 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local water bodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to achieve the following:

- Promote cost savings through economies of scale and eliminate redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality; and
- Simplify reporting.

In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

C.8.b. Monitoring Protocols and Data Quality. CWA regulations (40 CFR 122.41(j)(1)) require that data submitted pursuant to a NPDES permit meet certain quality standards. To achieve this, and to obtain data of known quality that can be compared to data collected in other California urban creeks, the permit requires monitoring data be collected and analyzed in accordance with the SWAMP Quality Assurance Project Plan and Standard Operating Procedures or U.S. EPA methods. The BASMAA Regional Monitoring Coalition's Creek Status Monitoring Program Quality Assurance Project Plan (January 2014) and Standard Operating Procedures (January

2014) have been deemed to be SWAMP comparable. These two BASMAA documents may be updated to reflect the changing state-of-the-science with Executive Officer's approval.

C.8.c. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.c requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the RMP. Provision C.8.c requires such monitoring to continue. The monitoring conducted through the RMP is an important component of determining compliance with receiving water limit (RWLs) in the MRP, and this monitoring complements the tributary-focused RWL and other monitoring required in Provision C.8 along with the tracking and accounting of required Permittee control actions.

RMP monitoring includes both wet season and dry season data collection in San Francisco Bay water, sediment, fish, shellfish, and birds. The analytes monitored in these media provide a comprehensive assessment of water quality in the estuary. Data are collected both in the sub-tidal (deeper) region as well as the shallow areas of the Bay where tributaries (many influenced by urban runoff) enter the Bay. The contaminant concentrations in Bay water, sediment and biota integrate all sources of contaminants (e.g., urban runoff, atmospheric deposition, wastewater treatment). Comparison of RMP data to water quality objectives allows water quality managers to determine if RWLs are achieved in the ultimate receiving water, San Francisco Bay.

C.8.d. Low Impact Development (LID) Monitoring. LID Monitoring is intended to measure compliance and effectiveness of LID implementation. It will improve the understanding of the following two management questions (which are repeated in Finding C.8-6 above) related to the implementation of LID controls:

(1) What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time?

(2) What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance?

The purpose of the first management question is to confirm that Permittees' LID controls are functioning as expected over time. Perhaps some design variations provide greater performance than others. The purpose is not only to compare relative performance between different types of MRP Permittee controls but also to compare their performance against the publicly-available databases of LID performance data, such as

those of the International Stormwater BMP Database[236] and SCCWRP's California BMP Effectiveness Calculator.[237]

The purpose of the second management question is straightforward: to assess whether LID controls that receive relatively insufficient O&M perform relatively poorly compared to LID controls that receive relatively sufficient O&M, which will directly inform management actions (such as, what O&M activities to perform, and how much of it to perform how frequently).

The Permittees are required to submit LID Monitoring Plans subject to review by a Technical Advisory Group and Executive Officer approval during the first year of the Permit term, detailing how exactly they will answer these two management questions, guided by the confines and structure of Provision C.8.d.i which describes what must be included in the LID Monitoring Plans, Provision C.8.d.ii which outlines a process for ongoing Regional Collaboration, Provision C.8.d.iii which outlines the Methods to be used to answer the Management Questions, and Provision C.8.d.iv which prescribes the Parameters that must be sampled and analyzed as well as the sampling Intensities. Once their LID Monitoring Plans have been approved or conditionally approved, the Permittees will begin implementing them by no later than the beginning of the second Water Year to occur during the Permit term, which is October 1, 2023. LID Monitoring during the first Water Year of the Permit term is not required because Permittees will need that time to develop their LID Monitoring Plans.

C.8.d.i. This Provision sets forth the minimum contents of the LID Monitoring Plans to ensure that they are properly designed to address the two management questions and to implement the requirements in Provisions C.8.d.iii-v. Executive Officer approval will ensure the LID Monitoring Plans conform to Provision C.8.d's requirements.

C.8.d.ii. Regional Collaboration requires the Permittees to form a Technical Advisory Group (TAG) to review and make recommendations on the drafting of the LID Monitoring Plans so that they are scientifically sound, and to ensure that the Permittees' sampling and analytical methodologies are regionally consistent. To further this, Water Board staff and impartial science advisors (e.g., SFEI, SCCWRP) may participate in the TAG. As the approved or conditionally approved LID Monitoring Plans are implemented, it is necessary for the TAG to provide ongoing feedback because LID Monitoring is new and therefore may need adjustments and ongoing improvements to (and adaptive management of) study design and methodology in real time during the Permit term. Impartial science advisors participating in the TAG will support these needs and will also provide feedback on lessons learned from LID Monitoring as it occurs, which will culminate in recommendations for changes to the LID Monitoring in the subsequent Permit. This Provision requires that the Permittees submit the draft LID Monitoring Plans to the TAG by March 1, 2023, so that the TAG can provide feedback, and so that

[236] https://bmpdatabase.org/get-data

[237] https://sccwrp.shinyapps.io/bmp_eval/

the Permittees can incorporate that feedback, before the final LID Monitoring Plans are required to be submitted to the Water Board for Executive Officer approval (or conditional approval) by May 1, 2023, pursuant to Provision C.8.d.vi.

C.8.d.iii. Methods describes the methods that, when implemented by the Permittees, will address the LID Monitoring Management Questions. Permittees are required to use automated samplers to collect flow-weighted composite EMCs (time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites), simultaneously at both the inlet and outlet of each control/site (this is needed to calculate both geomean and percent reduction), because this will generate the highest quality data, and because this is the same data type as the data in the databases used to perform the power analysis (see below). Flow- or time-weighted composite EMCs involve the collection of a sample aliquot at a certain increment of flow passing through the monitored orifice, or at a certain increment of time, which is then added to a storage container to form a single composite sample. These are explained in greater detail, including different types of flow-weighted composite EMC methodologies (e.g., volume proportional to flow rate, volume proportional to flow volume increment, and time proportional to flow volume increment), in the International Stormwater BMP Database's 2009 monitoring guidance document.[241] Because this method is required, flow data can be collected using the same automated samplers.

C.8.d.iv. Parameters and Intensities defines the parameters that are fundamental to characterizing the pollutant and hydrologic mitigation that LID facilities, systems, components and design variations provide. There are two types of parameters, those that are required and those that are optional. The required parameters are: Total Hg, Total PCBs, TSS, PFAS, TPH, Total and Dissolved Copper, Flow, Total Hardness, and pH. The optional parameters are: Other Emerging Contaminants (e.g., microplastics and 6PPD-quinone) and Other Ancillary Parameters. Other Ancillary Parameters may include, but are not limited to: zinc (and other metals), temperature, conductivity, polycyclic aromatic hydrocarbons (PAHs), turbidity, pathogens (FIB), total organic carbon (TOC), dissolved organic carbon (DOC), pesticides of concern to water quality (e.g., pyrethroids, fipronil and its degradants, and neonicotinoids such as imidacloprid),[238] major cations (Ca, Mg, Na, K), and major anions (SO_4, Cl). These parameters are typically found in and are of particular concern for urban stormwater discharges within the Permittees' jurisdictions. The LID Monitoring Plans must implement monitoring for the required parameters.

The LID Monitoring Plans may or may not implement monitoring for the optional parameters at each site, for example, depending on whether they will inform the relevant LID Monitoring Management Questions, and whether they are appropriate for a given site due to the characteristics of the tributary drainage area. Characteristics that

[238] And other pesticides of concern to water quality, listed in Provision C.9, Pesticides Toxicity.

Permittees may consider include soil type, land use, types and loading from actual and potential sources of stormwater pollution (e.g., IGP sites and traffic loading), existing management actions and stormwater controls (both natural and engineered), and imperviousness.

Provision C.8.d.iv also specifies the minimum total number of sample events that must be collected during the Permit term as well as the minimum number of sample events that must be collected annually. The minimum annual samples are set at a level that ensures satisfactory annual progress towards the total number of required sample events, that ensures a certain minimum frequency of data collection which is important for the quality of the dataset, but that also allows for additional flexibility and cost savings by Permittees in their planning of sample events.

The total number of samples events are based on power analysis. Water Board staff utilized a method from Helsel (2020)[239] to compute the power of a nonparametric test of differences between geometric means of two distributions. Water Board staff adapted an R script (power.WMW from Chapter 13) provided on a website[240] providing supporting material for Helsel (2020). For more information on the method, please see Chapter 13 of Helsel (2020). The existing data were for total copper (combined data from SCCWRP California BMP Effectiveness Tracker and the International Stormwater BMP Database), TSS (International Stormwater BMP Database), TSS (SCCWRP California BMP Effectiveness Calculator) and Dissolved Zinc (SCCWRP California BMP Effectiveness Calculator). No data filtering was performed on these data (which possibly include outliers and instances where input:output is < 1). No transformations of the data were required because the nonparametric method does not require the data to be normally distributed.

The power analysis runs a series of t-tests to estimate how many sample events of the Permittees' LID BMPs during MRP 3 would need to be collected to determine whether such BMPs – and to the extent that those BMPs are a representative sample of the population of LID BMPs in the region, then this may be extrapolated to that regional population – belong (statistically) to the data population represented by the existing data in the databases of the International Stormwater BMP Database and the SCCWRP California BMP Effectiveness calculator.

The null hypothesis is that the geomean of the Permittees' sample data is the same as the geomean of the population of the databases, and the alternative hypothesis is the converse. A significance level and power level are specified, which are recommended as 5% and 80%, respectively, by the International Stormwater BMP Database's 2009

[239] Helsel, D.R., Hirsch, R.M., Ryberg, K.R., Archfield, S.A., and Gilroy, E.J., 2020, Statistical methods in water resources: U.S. Geological Survey Techniques and Methods, book 4, chap. A3, 458 p., https://doi.org/10.3133/tm4a3.

[240] https://www.sciencebase.gov/catalog/item/5bf30260e4b045bfcae0c205

monitoring guidance document.[241] The significance level is the probability (5%) of incorrectly rejecting the null hypothesis, and 100% percent minus the power level of 80% is the probability that a significant change will be overlooked (i.e., 20% chance that the null hypothesis will not be rejected when it should have been).

Next, the power analysis explores how many sample events are needed to reject the null hypothesis for a given magnitude of difference in the geomeans, for a given power level, using different combinations of a sample event size and the difference to detect.

For each dataset that is tested, the geomean of the performance ratios (input:output) of each sample event is calculated, which consists of a flow-weighted (or time-weighted) composite event mean concentration (EMC) taken simultaneously at an inlet and outlet of a particular bioretention cell, for a particular storm event.

Flow- or time-weighted composite EMCs involve the collection of a sample aliquot at a certain increment of flow passing through the monitored orifice, or at a certain increment of time, which is then added to a storage container to form a single composite sample. These are explained in greater detail, including different types of flow-weighted composite EMC methodologies (e.g., volume proportional to flow rate, volume proportional to flow volume increment, and time proportional to flow volume increment), in the International Stormwater BMP Database's 2009 monitoring guidance document.[241] These are the sample collection methodologies used for the data in the two aforementioned databases, and they are as well what the Permittees are required to use pursuant to Provision C.3.d.iii.

After the distributions (principally, the geomean) of the performance ratios of each sample event in a dataset are calculated, the power analysis tests for the differences between that ratio of the geometric mean of the database data to the geometric mean of the future to-be-collected data, where each such geometric mean is the geometric mean of the ratios of input:output ratios for each sample event.

For each number of total sample events to be collected over the five-year permit term (e.g., 10, 15, 20, 25…), this produces a range at 80% power, which if the geomean of future sample events falls within that range, would confirm the null hypothesis. The upper and lower bounds of the range are the ratios of the future geomean (of input:output ratios) to the database geomean (of input:output ratios); geomeans closer to the upper bound represent overperformance relative to the distribution of the database, while geomeans closer to the lower bound represent underperformance relative to the distribution of the database. In the center of the range, where the ratio of future geomean to database geomean = 1, their performance is identical. Each range represents a given number of sample events, and the range constricts incrementally as the number of sample events increases. What that translates to is that, as the number

[241] https://bmpdatabase.org/monitoring

of sample events increases, it is less likely to incorrectly affirm the null hypothesis, though there are diminishing returns, which is discussed next.

The next step in power analysis involves assessing diminishing returns in the constriction of the geomean ranges with increasing numbers of sample events. For example, whereas an increase in sample events from N=10 to N=100 would correspond with a very large constriction in the lower and upper bounds of the geomean ratio (performance) range, an increase in sample events from N=100 to N=110 would correspond with a dramatically lesser constriction.

For the TSS, Copper and Zinc data that were tested, the sweet spot for the number of water quality sample events to be collected during the upcoming Permit term is N=30. However, N=25 has a significant but relatively acceptable consequence with respect to the size of the geomean range (particularly for the TSS data from the International Stormwater BMP Database) relative to N=30, and therefore it has been used as a modest reduction in effort (from N=30 down to N=25) for the ACCWP, CCCWP, SCVURPPP, and SMCWPPP Permittees. Above N=30, successive constrictions in the geomean range suffer increasingly dramatic diminishing returns. Below N=25, the opposite is true because the geomean range becomes much larger, and therefore the efficacy and utility of the monitoring program drops off dramatically.

Following are the tabular data and visualizations for each of the four datasets that were produced by the power analysis. Diminishing returns can be visualized as the point at which the slope of the rate of change in geomean range (x-axis = number of sample events; y-axis = change in geomean range), starts to flatten out as it approaches a horizontal asymptote.

International Stormwater BMP Database, TSS

N	GM ratio		Future GM	
	low	high	low	high
10	0.174	5	0.858864	24.68
15	0.248	4.026	1.224128	19.87234
20	0.302	3.306	1.490672	16.31842
25	0.344	2.905	1.697984	14.33908
30	0.378	2.645	1.865808	13.05572
50	0.468	2.137	2.310048	10.54823
100	0.573	1.743	2.828328	8.603448

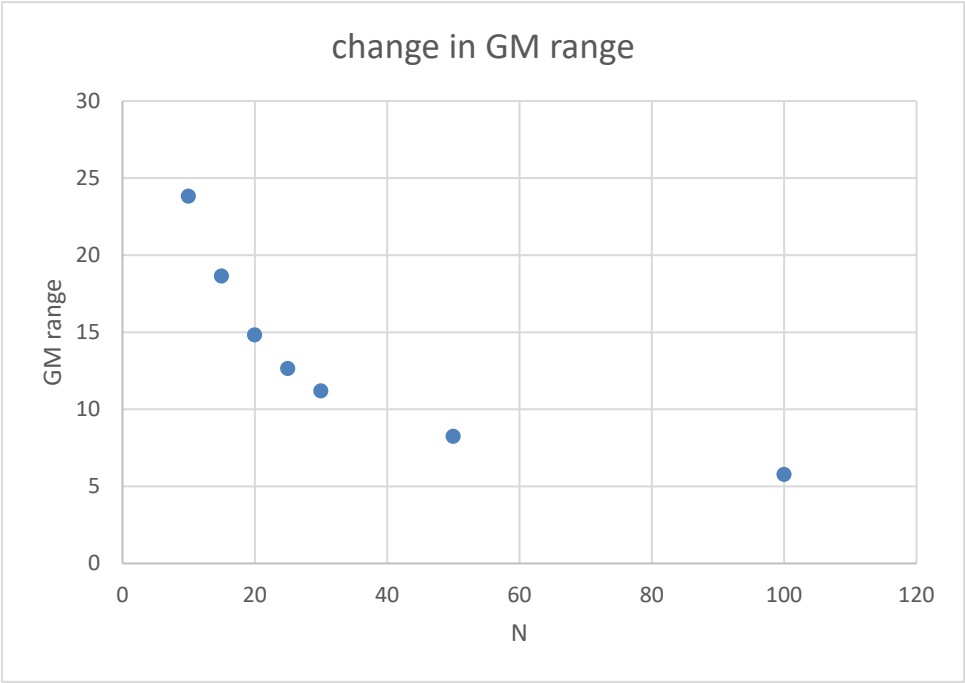

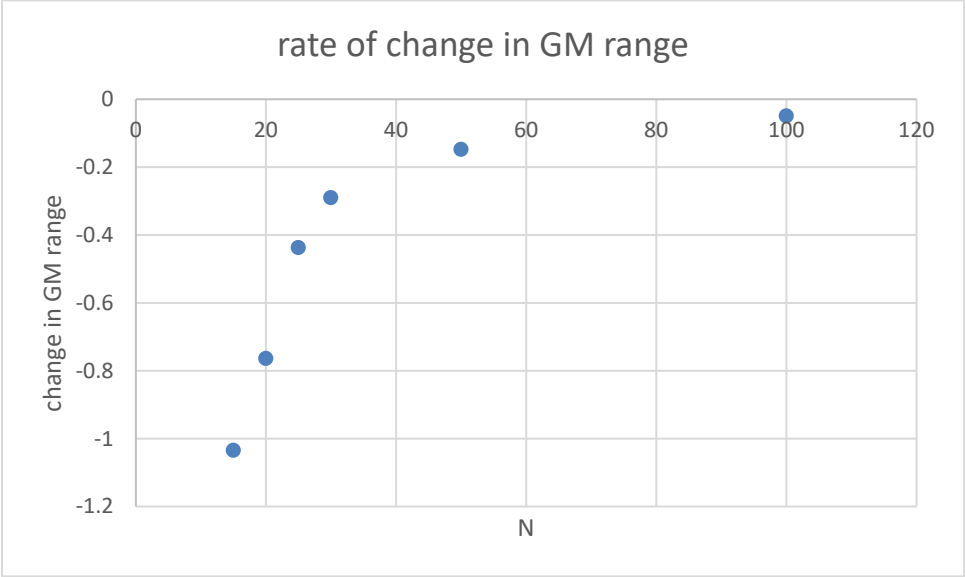

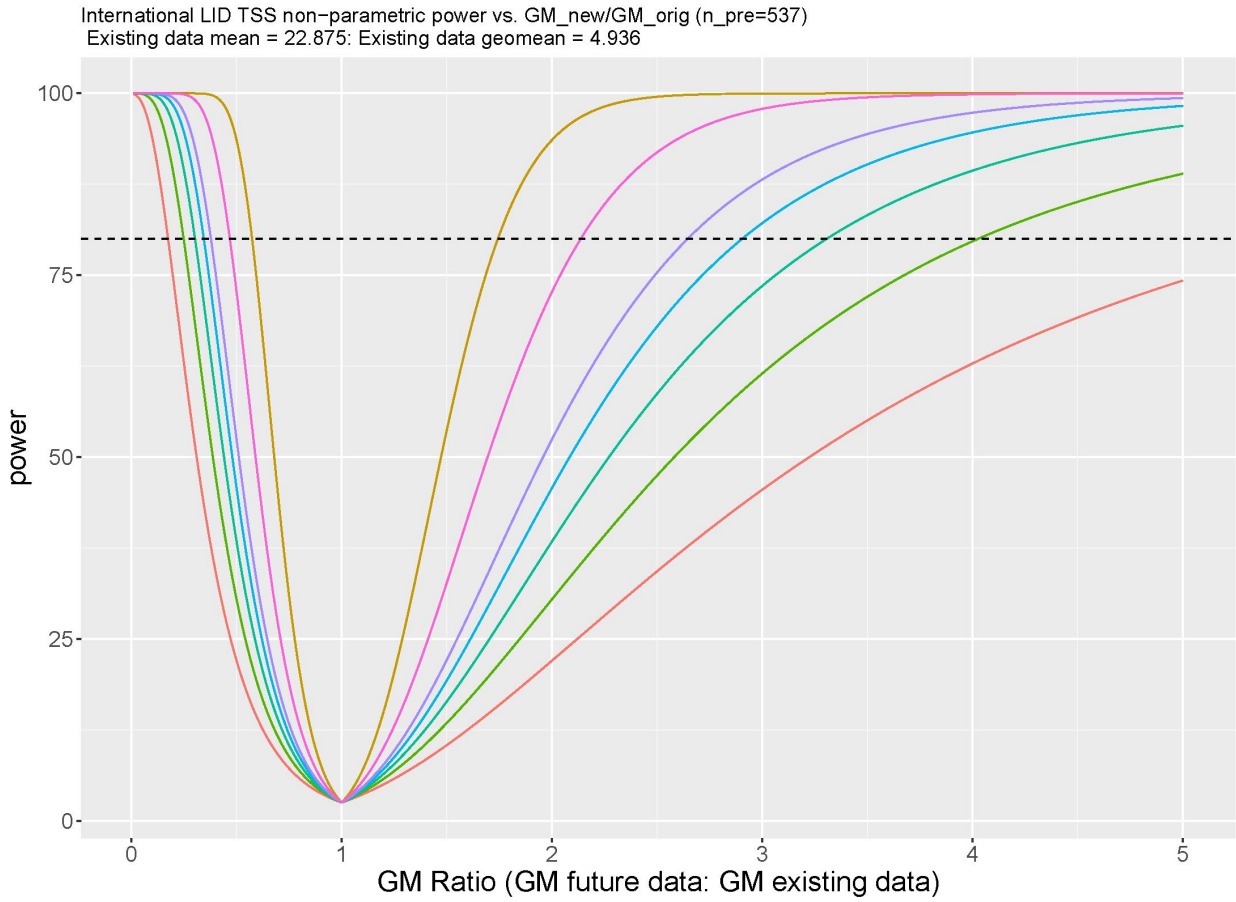

SCCWRP California BMP Effectiveness Calculator, TSS

N	GM ratio		Future GM	
	low	high	low	high
10	0.222	4	4.189584	75.488
15	0.29	3.442	5.47288	64.95742
20	0.334	2.991	6.303248	56.44615
25	0.365	2.735	6.88828	51.61492
30	0.389	2.57	7.341208	48.50104
50	0.445	2.246	8.39804	42.38651
100	0.498	2.005	9.398256	37.83836

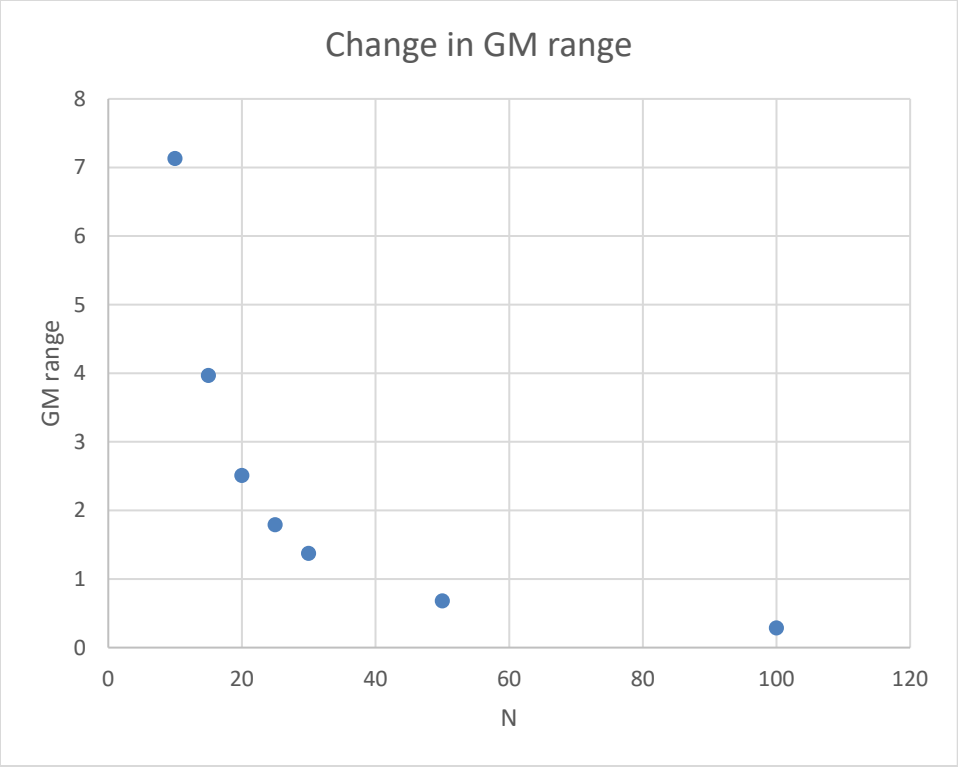
Change in GM range
GM range
N
0
1
2
3
4
5
6
7
8
0
20
40
60
80
100
120

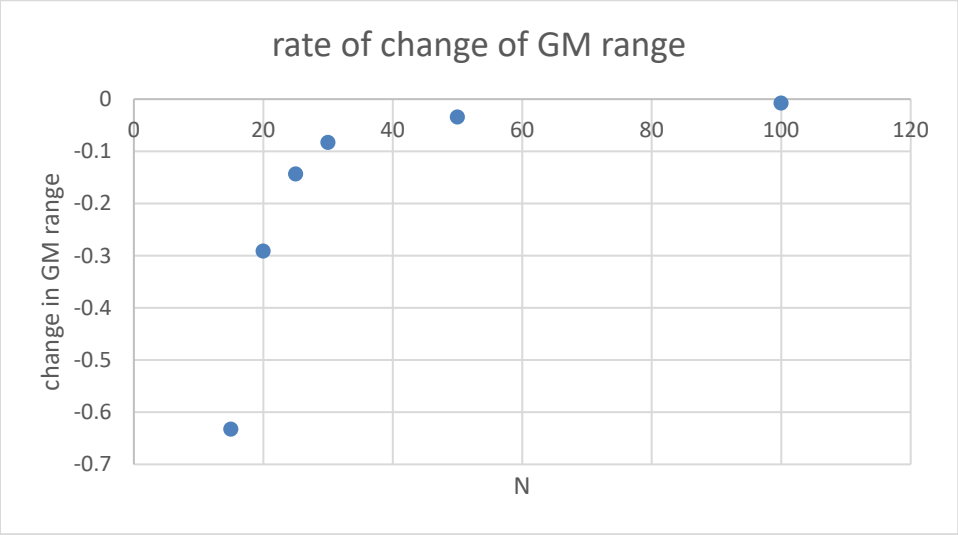
rate of change of GM range
change in GM range
N
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
0
20
40
60
80
100
120

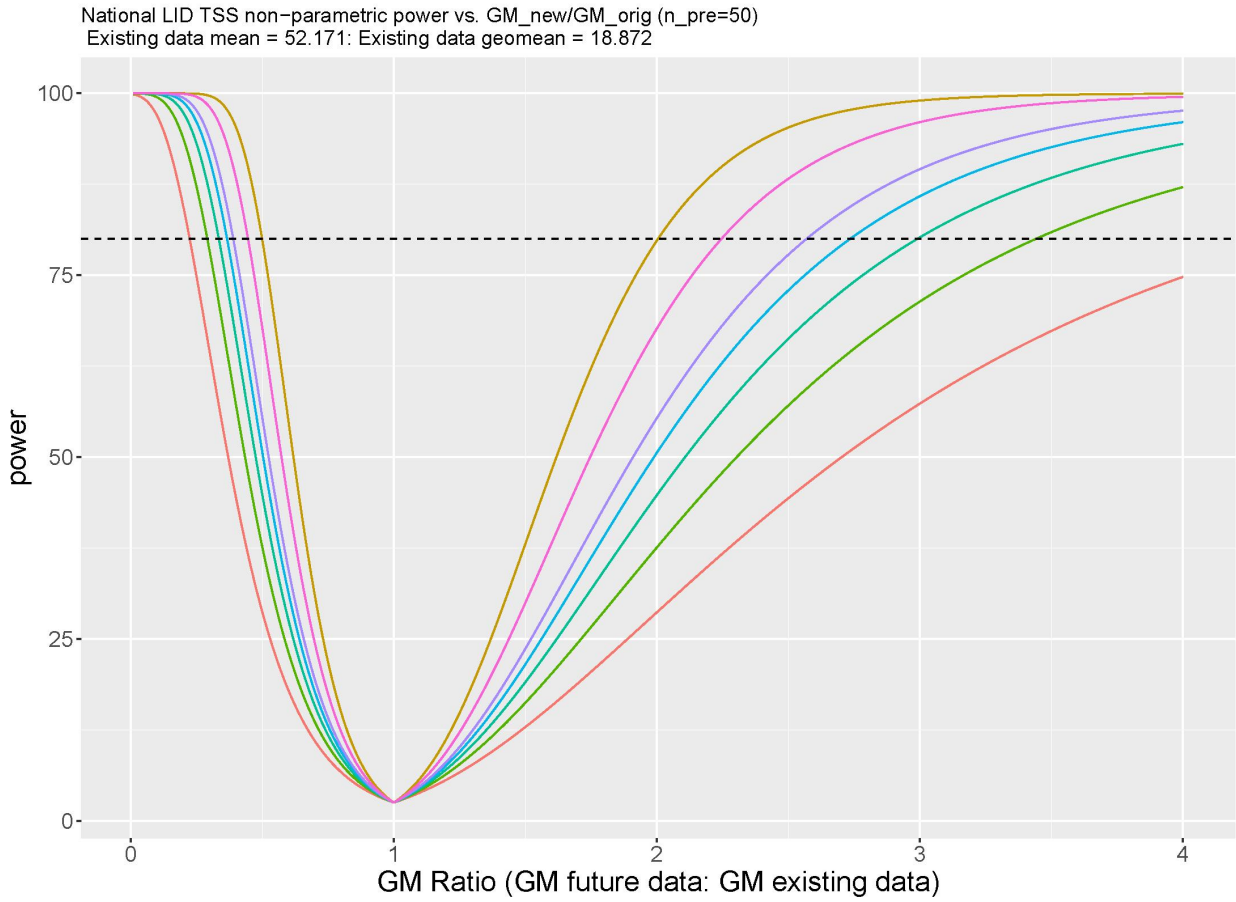

SCCWRP California BMP Effectiveness Calculator, Dissolved Zn

N	GM ratio		Future GM	
	low	high	low	high
10	0.316	3.165	1.54524	15.47685
15	0.365	2.741	1.78485	13.40349
20	0.392	2.552	1.91688	12.47928
25	0.409	2.445	2.00001	11.95605
30	0.421	2.376	2.05869	11.61864
50	0.446	2.243	2.18094	10.96827
100	0.466	2.146	2.27874	10.49394

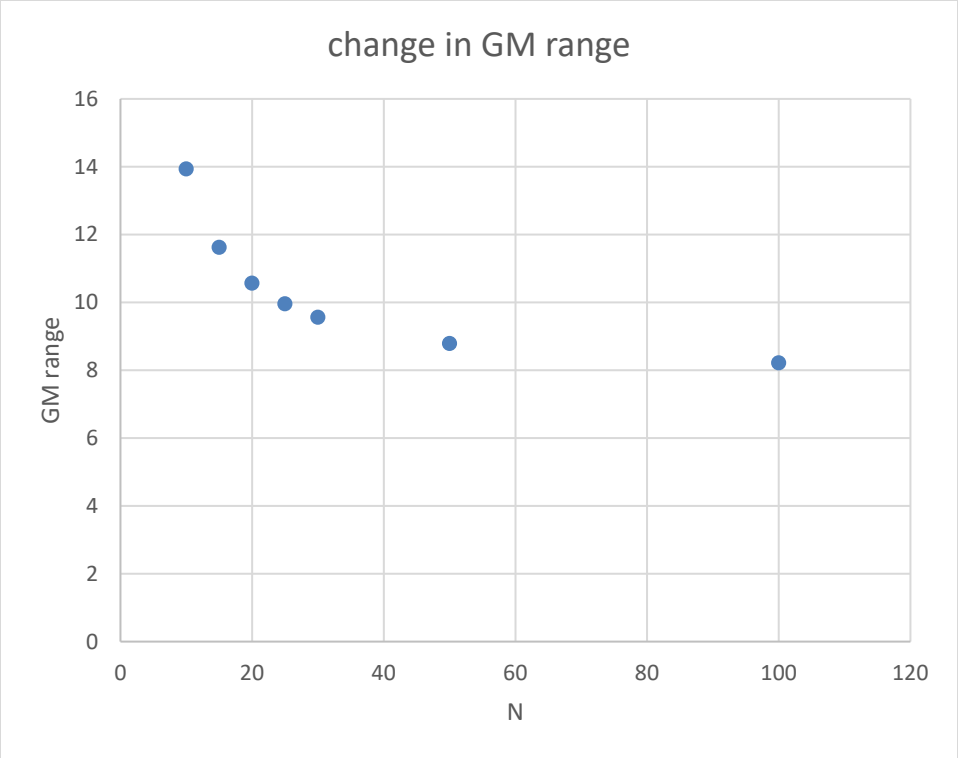
change in GM range
GM range
N
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120

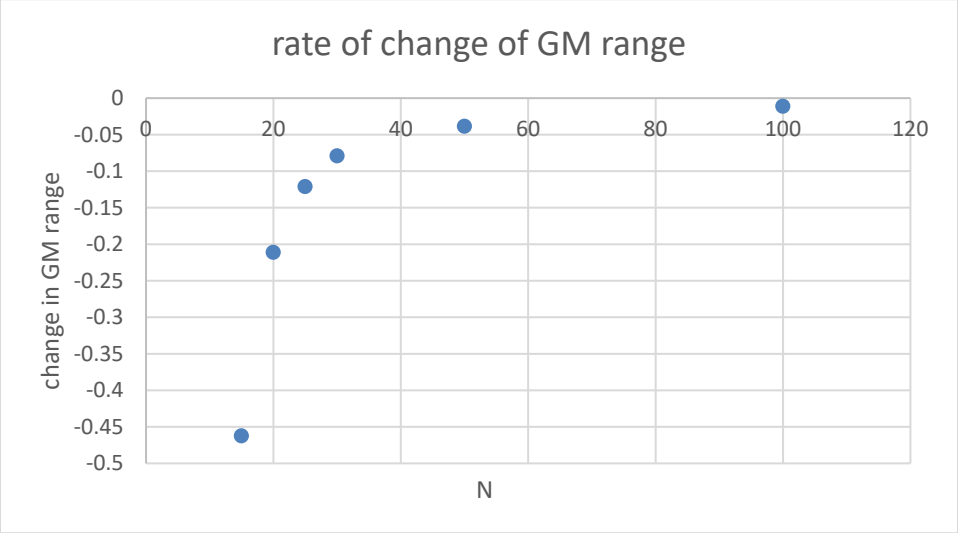
rate of change of GM range
change in GM range
N
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
-0.45
-0.5
0
20
40
60
80
100
120

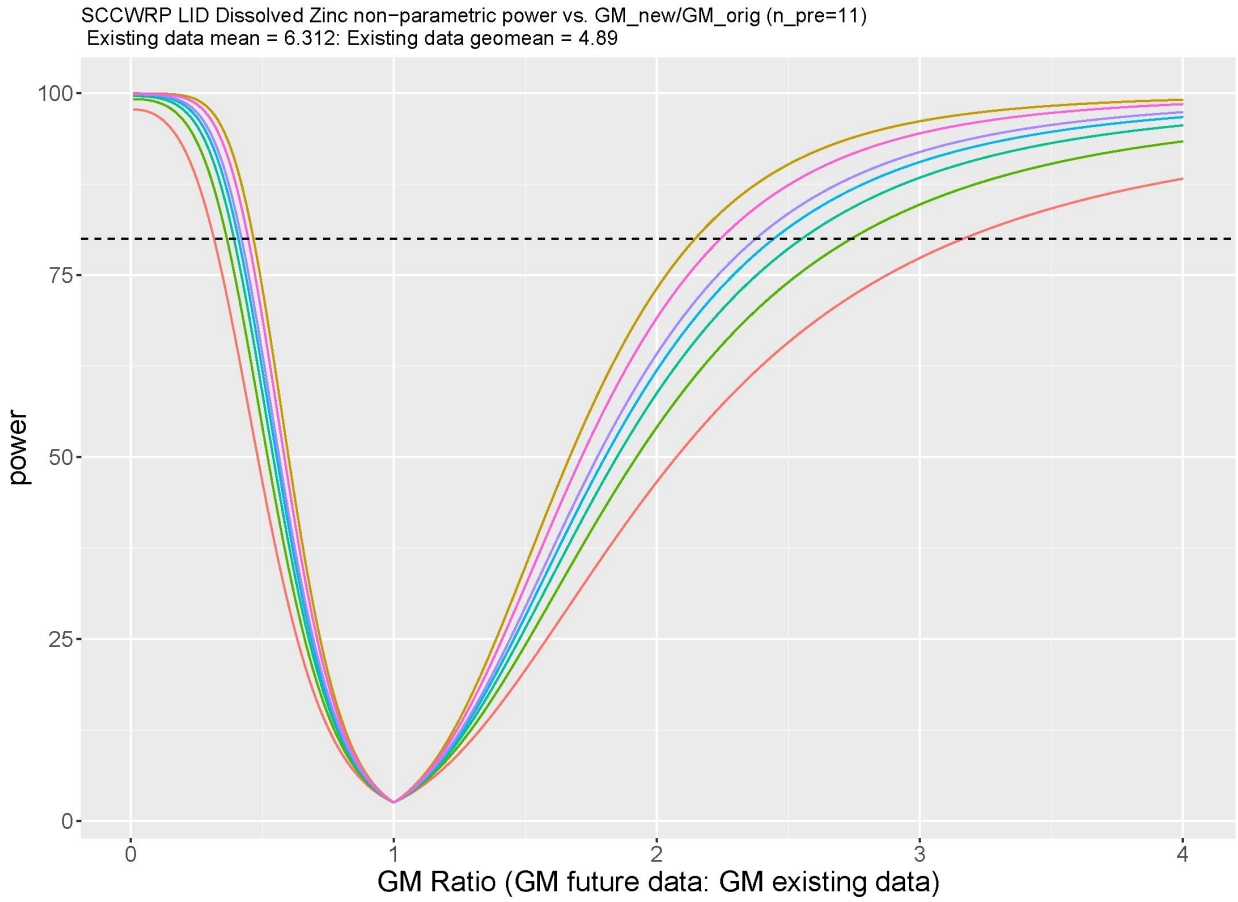

International Stormwater BMP Database & SCCWRP California BMP Effectiveness Calculator, Total Copper

N	GM ratio		Future GM	
	low	high	low	high
10	0.496	2.014	2.346576	9.528234
15	0.56	1.785	2.64936	8.444835
20	0.597	1.673	2.824407	7.914963
25	0.623	1.606	2.947413	7.597986
30	0.641	1.561	3.032571	7.385091
50	0.681	1.468	3.221811	6.945108
100	0.717	1.394	3.392127	6.595014

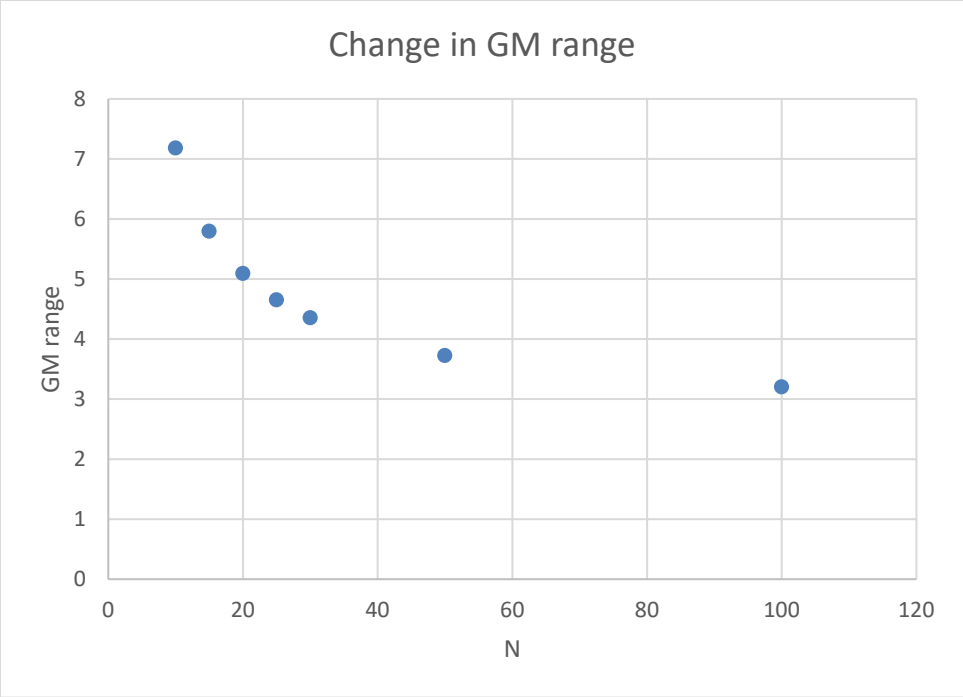
Change in GM range
GM range
N
0
1
2
3
4
5
6
7
8
0
20
40
60
80
100
120

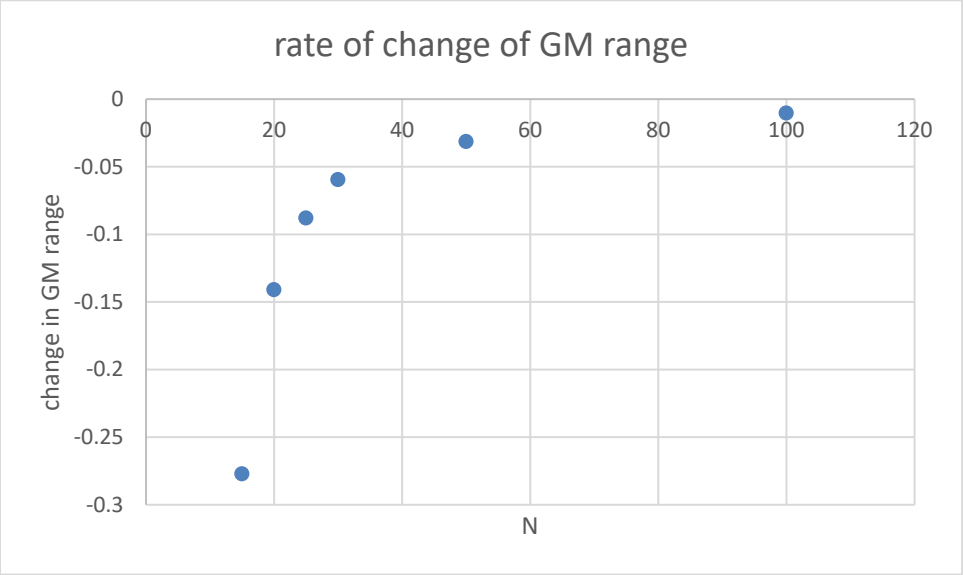
rate of change of GM range
change in GM range
N
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
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60
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100
120

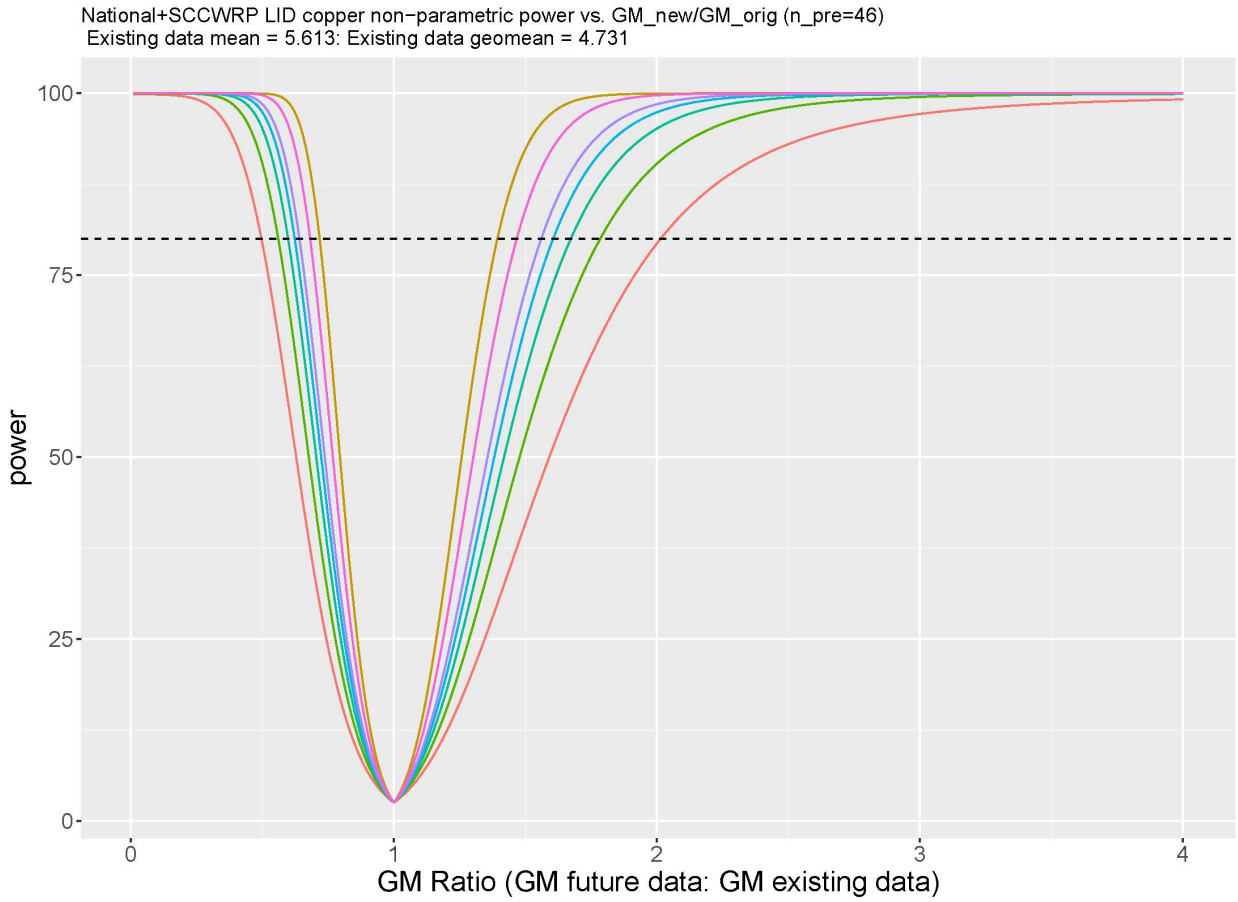

C.8.d.v. Implementation Level requires the Permittees to begin implementing their LID Monitoring Plans by no later than October 1, 2023, which is the beginning of the 2024 Water Year, the second Water Year of the Permit term. This start date provides five months from the submittal date of the final LID Monitoring Plans (May 1, 2023) for the Water Board to approve or conditionally approve the final LID Monitoring Plans, and will allow the Permittees sufficient time after that approval or conditional approval to prepare to monitor storm events starting in the 2024 Water Year, including the first storm event of that wet season.

C.8.d.vi. Reporting requires the Permittees to submit their LID Monitoring Plans to the Water Board, subject to Executive Officer approval, by no later than May 1, 2023. This is two months after the March 1, 2023, required submittal date of the LID Monitoring Plans to the TAG, which will provide the Permittees sufficient time to make changes to their LID Monitoring Plans based on feedback from the TAG, prior to the submittal date to the Water Board. As explained for Provision C.8.d.v above, it will also provide five months for the Water Board to approve or conditionally approve the LID Monitoring Plans, and subsequently for the Permittees to incorporate any changes including in any conditional approvals, and to prepare to begin implementing their LID Monitoring Plans, prior to the October 1, 2023, LID Monitoring start date.

C.8.e. Trash Monitoring. Trash monitoring at MS4 outfalls or adjacent receiving waters provides a viable method to determine whether control actions implemented by Permittees (full trash capture systems or the implementation of other management actions equivalent to full trash capture) have been effective in preventing trash from discharging to receiving waters. Additionally, trash monitoring can be used to determine whether additional actions may be necessary and associated with sources within a Permittee's jurisdiction. Trash monitoring can also inform whether direct (non-MS4) discharges of trash are causing and/or contributing to adverse trash impacts in the receiving water(s).

The purpose of this trash monitoring is to answer the following management questions and monitoring questions:

Management Questions

- Have Permittees' trash control actions effectively prevented trash within Permittees' jurisdiction from discharging into receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?

Monitoring Questions

- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

There are currently no regulatory standard methods and protocols for monitoring trash exiting (or traveling through) MS4 outfalls/pipes or in receiving waters. However, there are numerous examples of trash capture devices attached to the end of MS4 outfall pipes, and "in-line" trash capture devices which are within the MS4 prior to discharge into a receiving water (e.g., hydrodynamic separators), and if such monitoring sites satisfy all other criteria included in Provision C.8.e (namely, that the tributary drainage areas are already controlled to the Low trash generation level), then it is reasonable that such devices can be used to monitor trash loading, simply by cleaning them out prior to the sample event, then performing a maintenance event after the sample event. For example, the vendor Stormwater Systems cites uses of such trash capture (monitoring) systems in Carrolton, Texas at Josey Ranch Lake, St. Louis, Missouri, and the Anacostia River Watershed in Maryland.[242] There are many other examples of

[242] https://stormwatersystems.com/stormx-netting-trash-trap/

implementation of end-of-pipe and in-line systems, such as The Sock in the City of Kwinana, south of Perth, Australia,[243] the TrashTrap in Oxnard, CA, and in Narragansett Bay, RI,[244] Los Angeles County,[245] a large device controlling flows from a pump station prior to discharge into San Francisquito Creek and the Bay in the City of East Palo Alto,[246] HDS units in the Cities of Livermore and Vallejo, and others. The San Francisco Estuary Partnership implemented, tested, and monitored 42 high-capacity trash control devices (both end-of-pipe and in-line) in more than 60 Bay Area municipalities, in a project that concluded in November 2013, many of which could be adapted as trash monitoring systems if they satisfy the other criteria included in Provision C.8.e.[247] Here is a presentation that includes lessons learned for implementation in Philadelphia, PA (knowing the stormwater outfalls was an important consideration): https://delawareestuary.s3.amazonaws.com/pdf/Summit15/BallA/W-O'DayDel_Summit_Monit_Stormwater_Trash.pdf. Regarding in-stream monitoring, as discussed below, methods have been successfully piloted by 5 Gyres.[248] Caltrans installed trash capture devices at four trash capture pilot site locations in 2018,[249] which are examples of devices that could readily be modified and used as monitoring devices for Provision C.8.e Trash Monitoring.

In March 2017, BASMAA published a final version of a report titled “Tracking CA’s Trash: On-land Visual Assessments[17]” that was funded in part via a California Proposition 84 grant funded project (Agreement # 12-420-550). The primary objectives of this project were to: test trash trends monitoring methods for a) trash in lowing receiving waters and b) on-land visual trash assessments; evaluate the effectiveness and costs of trash control measures; and develop a web-based portal to disseminate related information. More recently, in December 2020, the San Francisco Estuary Institute published the “California Trash Monitoring Methods and Assessments

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[243] https://www.abc.net.au/news/2019-06-09/drain-sock-kwinana-pollution-solution-takes-world-by-storm/11190266?nw=0&r=HtmlFragment

[244] https://stormtrap.com/products/trashtrap/#trashtrap-Projects

[245] https://www.pw.lacounty.gov/wmd/irwmp/docs/Prop%2084%20Round%202%20Implementation%20Grant%20Application/Attachment%207%20Technical%20Justification%202%20of%2015.pdf#page=97

[246] https://www.waterboards.ca.gov/sanfranciscobay/board_info/agendas/2019/February/7b_ssr.pdf

[247] https://www.sfestuary.org/trashcapture/

[248] https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/58dd932f414fb5663b5a4f79/1490916184178/TCT+Creek+Monitoring+Report_FINAL.pdf

[249] Caltrans Site Identification Number: 4-430, Post Mile: 04-Ala-880-PM 23.73, Interchange: Davis Street, Device Type: StormTrap (FreshCreek), Construction Completion Date: 07/05/2018; Caltrans Site Identification Number: 4-431, Post Mile: 04-Ala-880-PM 16.58, Interchange: Highway 880/State Route 92, Device Type: Old Castle (KriStar), Construction Completion Date: 07/05/2018; Caltrans Site Identification Number: 4-432, Post Mile: 04-Ala-880-PM 7.37, Interchange: Mowry Avenue, Device Type: Modified Old Castle (KriStar), Construction Completion Date: 12/20/2018; Caltrans Site Identification Number: 4-433, Post Mile: 04-Ala-880-PM 6.29, Interchange: Stevenson Boulevard, Device Type: StormTrap (FreshCreek), Construction Completion Date: 12/04/2018.

Playbook."[250] The objective of this report was to create a foundation for developing a consistent, standardized approach to trash monitoring statewide. The project team identified four trash monitoring methods and then performed a method comparison analysis based on two seasons of fieldwork, culminating in numerous conclusions, including the following: some methods are more accurate than others, some methods are more subjective than others, some methods are more labor-intensive than others, and some methods are more expensive than others. Water Board staff have reviewed both of these reports and the information presented within them has been used towards developing the trash monitoring requirements of this Order.

Though we do not yet have evidence that those on-land methods are reliable indirect indicators of trash loading through MS4s and receiving waters, we think many of those methods are well-suited for characterizing on-land trash conditions, including on-land areas adjacent to MS4 outfalls and receiving waters. When combined with direct measurements of trash loading in MS4s and receiving waters, these on-land methods may help provide a synoptic view of trash loading within Permittees' jurisdictions.

Factors such as feasibility, location logistics, types of trash, complexity, and costs, provide a means for Permittees to focus and limit the number of monitoring locations while still providing spatial and temporal representativeness of the impact of implemented trash controls on the receiving water.

The Trash Monitoring program to be implemented by the Permittees during this Permit term essentially constitutes a pilot project, and the Water Board may consider expanding the scope of the program in a future Permit term by increasing the number of sites and/or events.

- **C.8.e.i. Monitoring Components** calls for the Trash Monitoring program to address the specified management and monitoring questions, and to the extent possible, requests for regional consistency in methods employed to answer those management and monitoring questions. trash monitoring method components demonstrated and implemented in the Statewide Trash Monitoring Methods Project (Trash Monitoring Playbook[250]) ensure the use of comparable data for each monitoring site. These components entail six steps which include 1) event preparation; 2) gathering standard equipment; 3) setup of the assessment area; 4) recording of site information and assessment area dimensions; 5) recording assessment areas photos; and 6) determining the location of storm drain outfalls, homeless encampments, and illegal dumping hotspots that can impact the assessment area.

  The establishment of a technical advisory group (TAG) that includes Water Board staff, Permittees, and impartial science advisors (e.g. SFEI, SCCWRP, etc.) is crucial in order to provide the necessary guidance needed to answer the

[250] https://sites.google.com/sfei.org/trash/

management questions and to provide peer review sufficient to ensure that work is appropriately science-based.

- **C.8.e.ii. Monitoring Methods** describes the monitoring methods that may be used to address the management and monitoring questions. The methods described provide flexibility with respect to siting and methodology.
- **C.8.e.ii.(1)** calls for the direct monitoring of MS4 outfalls that drain tributary drainage areas that are controlled to the Low level, via full trash capture devices, other actions verified by on-land visual trash assessments, and any combination thereof. Several possible methods are listed.
- **C.8.e.ii.(2)** calls for direct (in-stream) monitoring of receiving waters. Several possible methods are listed. It also requests (but does not require) that such monitoring be co-located with MS4 outfall sites, which (to the extent possible and realized) would help to distinguish between background levels of trash in the receiving water and the relative contribution of trash discharging through the respective MS4 outfall. This could help answer questions such as:
  - Are discharges from MS4 service areas controlled to the Low trash generation level, nevertheless, causing or contributing to adverse impacts in receiving waters?
  - Failing an adverse impact definition, how does the loading from the MS4 outfall compare to loading present in the receiving water? Is it greater or lesser by an order of magnitude?
  - How does trash loading from the sampled MS4 outfall compare to the estimated contribution of other nearby sources of trash loading to the receiving water, such as other upstream/downstream MS4 outfalls, homeless encampments, and illegal dumping sites, relative to the background level present in the receiving water?

  The answers to these questions could help inform/prioritize/trigger management actions. For example, given the loading measured in a given receiving stream, perhaps an upstream MS4 outfall is a greater priority than the sampled MS4 outfall, or vice-versa.

  However, recognizing that such questions are not easily answered, that the end-of-pipe/in-line and in-stream trash monitoring methods are relatively new to the Permittees, and that it is difficult to site both MS4 outfall sites and receiving water sites (not to mention the difficulty in siting them close together), co-location is not required in this Permit term.

  Permittees may use methods which only partially screen and capture the cross section of a receiving water, such as the methods piloted by 5 Gyres.[248] This means they will need to extrapolate the sample to the remainder of the cross section.

Extrapolation may be more appropriate (/accurate) for channels experiencing supercritical flow (which are likely to have good mixing of trash because of the higher turbulence), which is more likely for a hardened channel. Conversely, the opposite is likely the case for natural channels. Natural channels are more likely to have subcritical flows (less turbulence) which means there will be less mixing of trash, more concentration of trash in the thalweg, and samples will be less easily extrapolated to the rest of the cross section.

- **C.8.e.ii.(3)** recommends, but does not require, the implementation of on-land methods coincident with MS4 outfall and receiving water sites. The purpose of this is to gain a synoptic view of on-land trash conditions adjacent to outfall and/or in-stream monitoring sites. However, recognizing the cost and level of effort associated with MS4 outfall and receiving water monitoring, this monitoring element is optional, as it is not as high of a priority as MS4 outfall and receiving water monitoring.
- **C.8.e.ii.(4)** requires that all trash monitoring sites additionally characterize flow rates and recommends methods that can be used.
- **C.8.e.ii.(5)** explains that all methods must include collection of data on material type collected, which is important for assessing the water quality impact caused by different types of trash because different kinds of trash may cause different types of impacts to aquatic life and may create different types of pollution.[250,251] This may additionally inform the eventual definition of no adverse impact to receiving waters, as different types of trash are likely to cause different levels of impact. Data collected on material type will also inform the Permittees' implementation of source controls and other management actions for controlling trash.
- **C.8.e.iii**. describes the minimum number of sites and monitoring events that Permittees are required to sample (and analyze) on an annual basis, which will be revised based on review by the Technical Advisory Group. Although these trash monitoring methods are not new to the world, they are relatively new to the Permittees, and therefore we do not want to overtask the Permittees while they are learning and piloting these methods. However, it is reasonable that in a future Permit term, the Water Board may consider increasing the Trash Monitoring level of effort, with cause. For example, if statistical analysis (i.e. power analysis) suggests that more sites and samples are needed to be able to assess whether data from a future monitoring program (e.g., a revised Trash Monitoring Provision in MRP 4) belongs to the same distribution as the data collected during MRP 3, MRP 2, or some other dataset, then Water Board staff will make that recommendation. Towards that end,

[251] *A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams*. San Francisco Bay Regional Water Quality Control Board, April 2007. Accessed on September 2, 2021, from: https://www.waterboards.ca.gov/sanfranciscobay/docs/swampthrashreport.pdf

Water Board staff may perform power analysis during MRP 3 on the data collected by that time, to inform, support, and justify changes to Provision C.8.e for MRP 4.

- There are two required components of monitoring, MS4 outfall monitoring and (direct) in-stream monitoring. Permittees are allotted one year of planning before they must begin MS4 outfall monitoring, and two years before they must begin in-stream monitoring, to choose monitoring sites, secure permits, and practice/refine sample methodologies. It is appropriate that they are given an additional year for in-stream monitoring (relative to MS4 outfall monitoring) because that may take more time to find sites and secure permits. The number of sites is also reduced for in-stream monitoring, because it is a pilot project, and to reduce the overall level of effort for Permittees.
- There is no minimum requirement for number of sites or events for on-land monitoring, as that monitoring component is optional (though recommended).
- Pursuant to Provision C.8.e.iii.(8), Permittees are required to use the results of Trash Monitoring to inform and investigate their trash management actions. If Trash Monitoring results indicate that discharges are causing or contributing to adverse trash impacts in receiving waters, Permittees shall implement new or enhanced actions to comply with the trash discharge prohibition and receiving water limitations. For example, if the amount of trash discharged from an MS4 outfall exceeds 5 gallons/acre/year, then that should trigger an investigation into why trash loading from that MS4 outfall is greater than expected (based on trash generation rates and controls present in the tributary drainage area), be it inadequate/poor O&M, design, and/or construction of FTCDs, short-circuiting of trash controls, or a number of other potential causes/contributors. Other examples of what might trigger Permittee investigations include the discharge of trash items that should be prohibited by credited source control ordinances, and the discharge of trash items greater than 5mm (e.g., cigarette butts) during storm events which are less than or equal to the design storm (i.e., when bypass should not be occurring). Provision C.8.e.iv.(2)(f) requires the Permittees to solicit feedback from the TAG on the implementation of Provision C.8.e.iii.(8), Provision C.8.e.v.(6) requires the Permittees to discuss in the Trash Monitoring Plan their plans for implementation of Provision C.8.e.iii.(8), and Provision C.8.h.iii.(2)(h) requires the Permittees to report on implementation of Provision C.8.e.iii.(8).
- **C.8.e.iv.** calls for formation of a Technical Advisory Group (TAG), which includes impartial science advisors (e.g., SFEI, SCCWRP, etc.) and Water Board staff, to review and provide input, feedback, and recommendations on Trash Monitoring, including site selection, methods and analyses, results, and conclusions. The TAG is also critical to determining the adequacy of the methods and minimum storm size, number of sites, events, frequencies, and intervals, and recommendations for alternatives, to answer the management and monitoring questions.

The TAG is required to meet biannually during the development of the Trash Monitoring Plan, to aid in its development. Subsequently, the TAG is required to meet at a minimum annually, which is sufficient for the TAG to – on an ongoing basis – review and provide feedback on the Permittees' implementation of Provision C.8.e. However, the TAG should meet more frequently as needed, especially during the beginning of the Permit term when the Permittees' implementation of the Trash Monitoring program is being carried out for the first time.

Among the tasks assigned to the TAG is to discuss the timing of sampling during storm events; a recent publication by the 5 Gyres Institute recommends that sampling is prioritized during the rising limb of the hydrograph, as that is when most of the trash load is mobilized through the MS4 system.[248] Another task is discussion of permitting, which is intended to help the Permittees secure permits; the TAG can strategize how best to secure permits, and can even invite participation and input from permitting agencies such as CDFW and the Corps.

- **C.8.e.v.** calls for the development and submittal of a Trash Monitoring Plan prior to the inception of trash monitoring.

  The Trash Monitoring Plan includes a requirement that the Permittees submit a monitoring schedule that includes the timing, number, and type of monitoring events at each site. Timing encompasses, but is not limited to, decisions such as at which point in the water year that storms are sampled (e.g., whether near in the beginning, middle, or end of a given water year), the time during individual storms that samples are taken (e.g., during the rising limb of the hydrograph, the peak of the hydrograph, or the falling limb of the hydrograph, which decision is influenced by factors such as the delineation of the tributary drainage area to the MS4 outfall and the time of concentration), and consideration of antecedent dry periods (trash accumulation) and timing of sampling relative to cleanup activities in the assessment area and/or in the tributary drainage area to the MS4 outfall.

C.8.f. Pollutants of Concern[252] Monitoring. Provision C.8.f. requires monitoring for the following select pollutants of concern (POC): PCBs, mercury, copper, zinc, fecal indicator bacteria and certain emerging contaminants. The emerging contaminants to be monitored have been characterized as moderate concern for the Bay (SF Bay occurrence data suggest a high probability of a low-level effect on wildlife) and are likely transported in stormwater. The monitoring requirements for these emerging contaminants will support RMP efforts to better characterize concentrations in stormwater. The PCBs and mercury TMDLs require monitoring to measure loads reduced and the progress the water body is making toward attaining water quality objectives. The Basin Plan requires Permittees to monitor copper loading to the Bay to track loading. Provision C.8.f. monitoring is intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff; provide information to support

[252] See sections C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

implementation of TMDLs and other pollutant control strategies; assess progress toward achieving wasteload allocations (WLAs) for TMDLs; assess compliance with receiving water limitations (RWLs), and help resolve uncertainties in loading estimates and impairments associated with these pollutants.

In particular, POC monitoring addresses six priority POC management information needs:

(1) Source Identification - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

(2) Contributions to Bay Impairment - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

(3) Management Action Effectiveness - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;

(4) Loads and Status/Trends - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and

(5) Status/Trends - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

(6) Compliance with Receiving Water Limitations – providing information to assess whether receiving water limitations (RWLs) are achieved.

The Permit specifies monitoring methods that can be used to address these information needs and which information needs apply to each pollutant of concern. The Permit provides flexibility in the number of samples, or level of effort, but requires minimums to be met annually and over the Permit term. The level of effort (expressed as required number of samples collected and analyzed) is identical to the manner in which the level of sampling and analysis effort for pollutants of concern monitoring was specified in the Previous Permit.

The approach for POC monitoring does not pre-determine specific monitoring locations. Rather, the Permit requires that monitoring be intelligently and flexibly directed toward answering the management information needs (that apply to a given pollutant), and this flexibility allows the monitoring strategy to be adapted and improved based on information obtained from monitoring conducted early in the Permit term. The flexibility also allows the Permittees to continue collecting useful information even during drought years in which conditions limit some types of data collection (e.g., storm event sampling) but not others (e.g., collection of bed sediment). In fact, bed sediment data collected at all times of the year offers a valuable and efficient means of locating source areas and characterizing contamination in watersheds. During storm events of sufficient

intensity, the pollutants attached to sediment are mobilized and transported from source areas, but some of this contaminated sediment is often deposited near the source area so there is a “fingerprint” of the source that can be detected through sampling this bed sediment.

It is impractical to sample all of the urban runoff outfalls in the region. Monitoring at outfalls can provide valuable information and be an important component of an overall pollutants of concern monitoring strategy. For example, strategic outfall sampling for pollutants of concern is necessary to identify source areas and contaminated portions of watersheds near the outfalls (to support control measure implementation). However, these outfall data (obtained at great expense) cannot address all management information needs for pollutants of concern. By strategically sampling the sediment and water column, the Permittees can better address the six information needs stated above.

There are two components that address assessing compliance with RWLs (sixth management information need). First, Provision C.8.e requires receiving water monitoring in the San Francisco Estuary, which is conducted through the RMP. The RMP monitoring provides a comprehensive assessment of water quality in the estuary. San Francisco Bay is the ultimate receiving water for the tributaries in the region. The contaminant concentrations in Bay water, sediment and biota thus represent an integration of all the sources of contaminants (e.g., urban runoff, atmospheric deposition, wastewater treatment). Comparison of RMP data to water quality objectives allows water quality managers to determine if RWLs are achieved in the ultimate receiving water, San Francisco Bay. The RMP monitoring in San Francisco Bay includes both wet season and dry season data collection in water, sediment, fish, shellfish, and birds. The suite of analytes monitored in these media adaptively change over time in response to available information about evolving water quality threats. For example, initial RMP efforts in the early 1990s focused on metals contamination. Improvements in wastewater treatment and banning lead from gasoline led to sharp declines in Bay metals concentrations. Accordingly, the RMP adapted to focus more attention on mercury, PCBs, organic contaminants and, today, a wide range of emerging contaminants. However, the program continues to monitor for many metals to maintain appropriate surveillance and monitor for trends. Thus, the RMP provides valuable information on a large number of pollutants that can be used to assess compliance with RWLs at the level of San Francisco Bay.

The second component of RWL monitoring is required through Provision C.8.f and C.8.h.iv and is focused on tributaries to the Bay, which are directly influenced by discharges from MS4s.This monitoring will consist of sampling during the wet season (primarily) and dry season to generate water quality data to assess compliance with RWLs. Because it is not possible to sample all waterbodies in the region, waterbodies will be selected to be representative of the range of waterbody types in the region. It is also not possible to collect data at all times and locations in a waterbody so sampling

locations in this subset of waterbodies will be selected to obtain water quality data spatially and temporally representative of the water bodies being sampled.

It is also not possible to sample for every one of the thousands of possible analytes. It would be an expensive and even impossible undertaking to monitor for all possible analytes, and not a good use of resources. Monitoring should be focused on those pollutants for which there is a reasonable risk of an exceedance of applicable water quality objectives and for which stormwater discharges cause or contribute to such exceedances. Table 8.2 in Provision C.8.f contains a list of candidate pollutants to monitor, but the Water Board, at present, lacks reliable and comprehensive information to determine the suite of analytes for tributary-focused monitoring to assess RWLs. Accordingly, the waterbodies to sample, the locations in those waterbodies, and the full list of analytes to quantify will be specifically determined, based on criteria set forth in the permit, through a report required by Provision C.8.h.iv(2).a due no later than March 31, 2023. Requiring focused pollutant monitoring based on water quality impacts is consistent with the monitoring approach used in NPDES permits for wastewater. The report required under Provision C.8.h.iv(2).a requires Permittees to use existing information to identify the suite of analytes that have the potential to exceed water quality objectives. Sources of information relevant for identifying candidate analytes include RMP data, monitoring data collected in Bay Area tributaries through the MRP and other programs. If local RMP or tributary monitoring data are not available, Permittees should review monitoring data collected in tributaries in other urban areas as well as relevant information from the literature. Once the report is approved by the Executive Officer for compliance with the requirement and technical adequacy, Permittees will then execute the monitoring specified in the report for the representative waterbodies in a manner to collect temporally and spatially representative data and report these data under Provision C.8.h(ii) (Electronic Reporting) and in the Integrated Monitoring Report required by Provision C.8.h.v.

Pollutants of concern broadly, and PCBs and mercury in particular, present special challenges for the design of an effective management strategy because they are widely distributed in the urban landscape, and they are transported to receiving waters on sediment particles mobilized from watersheds during intermittent precipitation events. These challenges led to the identification of the first five of six broad management information needs mentioned above that could be addressed through monitoring, and monitoring data can certainly provide useful information to address these questions. However, it is also important to be aware of the limitations of monitoring data in addressing all management information needs, especially with respect to pollutants like PCBs and mercury. Mercury is distributed widely throughout the urban landscape through a combination of presence in consumer products (lightbulbs and thermometers) and also because it can be deposited from the atmosphere. Therefore, although one does occasionally find elevated concentrations in some locations, one generally finds moderately elevated concentrations spread over a wide geographic area. PCBs are distributed somewhat differently because they were used in industrial activity so one

finds high concentrations associated with historical land uses (generally old industrial) where PCBs were used intensively.[284]

Despite the differences in their distribution and chemical properties, both PCBs and mercury tend to be associated with sediment particles (slightly more so for PCBs).[253] This means that these contaminants are transported through watersheds to receiving waters attached to sediment particles during precipitation events. However, contaminant transport is a very complicated and highly variable process that depends on the features of the source area, the slope of the watershed where the contamination exists, the soil and other land use features, the intensity of the rainfall event, antecedent soil moisture conditions, and other factors.[253]

For pollutants like methyl mercury that are transported in the aqueous phase (not attached to particles) and whose aqueous concentrations do not vary substantially across monitoring events during a monitoring season, one can generate reasonable load estimates using a simple method of multiplying runoff volume by the average of the measured aqueous pollutant concentrations. This method requires the average of the concentrations to represent reasonably well the typical pollutant concentration in the flowing stormwater. However, for particle-bound pollutants that have more complex source release and transport processes, more intensive monitoring strategies making use of continuous monitoring of turbidity in conjunction with grab samples (during storm events of sufficient size to mobilize sediment particles containing PCBs and mercury) of suspended sediment along with contaminant concentrations must be employed to accurately measure the amount of PCBs or mercury moving past some monitoring location in a receiving water during a particular time period (e.g., during the months of a single wet season).[254] This intensive method of generating load estimates from continuous turbidity and grab sampled concentrations is called the turbidity surrogate method because the continuously-measured turbidity serves as a surrogate for suspended sediment concentrations established through regression relationships with measured suspended sediment collected via grab samples during storms.[254] The Bay Area climate is among the most variable of any in the world so the pattern and amounts of rainfall vary substantially from year-to-year because of this variability. Therefore, in order to obtain an estimate of the typical load through monitoring, this intensive continuous monitoring activity would need to be employed over several years.

This measurement difficulty also applies to the scale of an individual control measure or a single watershed where control measures are implemented. For example, if a control measure were put in place to address PCBs or mercury loads in a single watershed,

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[253] McKee, Lester; Leatherbarrow, Jon; Pearce, Sarah; Davis, Jay (2003) *A Review of Urban Runoff Processes in the Bay Area – Existing Knowledge, Conceptual Models, and Monitoring Recommendations*. San Francisco Estuary Institute Contribution 66.

[254] McKee, Lester et al. (2017). *Long-term variation in concentrations and mass loads in a semi-arid watershed influenced by historic mercury mining and urban pollutant sources.* Science of the Total Environment Volumes 605-606, pages 482-497.

some portion of the PCBs or mercury load from that site may be reduced. However, there could be other pollutant sources in the watershed and the pollutants from the controlled source may already be distributed somewhat through the watershed awaiting transport to the receiving water. In any case, the actual load reduction effect from any one or group of control measures is likely to be small and the impact on downstream loads would take time to manifest as the residual contamination was transported through the watershed. Individual control measures likely result in small incremental changes in loads.

In order to detect (through monitoring) these small load reductions in a watershed where control measures are implemented, one should attempt to measure all of the pollutant load flowing out of the watershed. This is practically impossible. Instead, the same intensive monitoring procedure (turbidity surrogate method) described above should be employed for several years after implementation in order to attempt to capture enough storm events over several years to account for the climatic variability. This intensive monitoring procedure can provide a reasonable estimate (with moderate uncertainty) for the amount of sediment moving past the monitoring location through use of continuous turbidity monitoring and establishing the relationship with suspended sediment.[254] The PCBs and mercury concentrations, by contrast, are measured through grab samples during storms for which field crews can be mobilized. It is impossible to mobilize field crews for *all* storms in a single watershed, much less for every storm in every watershed (there are potentially hundreds) where control measures may be implemented. These pollutant concentrations from individual storms are used to develop estimates for the pollutant concentrations (attached to sediment particles since these pollutants move with sediment) for the storms that are not measured. Finally, the estimated PCBs or mercury sediment concentrations (from the grab sample data) are multiplied by the estimate of the suspended sediment (from continuous turbidity versus suspended sediment regressions) to arrive at an estimate for the total mass load of mercury or PCBs that flowed past the site during the storm season.

Because of the way the pollutant concentrations are estimated based on the data collected from a few storms, the calculated mass load has moderate to considerable uncertainty for that storm season. The scale of the uncertainty is likely greater than the scale of the load reduction resulting from any single control action, even if the load reduction occurred immediately upon implementation (which is unlikely because of how pollutants are distributed and transported in watersheds). What is worse, the actual loads can vary from year to year by at least a factor of ten and often more. Therefore, if one wanted to be sure to assess the load reduction effects of control measures through monitoring, one would need to carry out this turbidity surrogate method over several years to arrive at a long-term average mass load. This amount of effort would be needed just to measure the impacts of control measures in a single watershed. There are hundreds of watersheds in the Bay Area where control measures may be implemented. Implementing the turbidity surrogate method on even a single watershed is not a practical means of assessing the impact of control measures on loads. An

intensive program of continuous monitoring at hundreds of locations upstream and downstream of control measure implementation over several years would be required to correctly measure PCBs and mercury loads. The effort and expense to undertake such a monitoring program would consume all or nearly all available resources that would be better spent on control measure implementation.

Using watershed models to estimate loads and changes in loads offers an alternative, practical approach instead of trying to assess loads through monitoring alone. The general idea is that the watershed model simulates sediment and water movement through watersheds in order to estimate sediment and pollutant mass loading at times and places where data are not available because the model is calibrated against available monitoring data from the turbidity surrogate method and also pollutant concentrations measured from grab samples in multiple watersheds during storm events. The models can therefore predict water, sediment, and contaminant transport to estimate PCBs and mercury loads and changes in loads due to management intervention and land use changes over time. The modeled estimates have uncertainty associated with them so they would also not be able to reliably demonstrate small changes in loading. Because the models are using data collected over several watersheds (over the entire Bay Area) collected over several years, they generally perform better in predicting loads at larger spatial scales. In order to understand why, consider the case of modeling the load for a single watershed. The modeled load estimate for a small watershed area would be highly uncertain because the monitoring data used to calibrate the model may not be available for that watershed. In other words, monitoring data from the entire Bay Area is being used for model calibration, and these data may not be applicable for any single watershed. At the aggregated level of multiple watersheds or the entire Bay Area, these uncertainties (a set of over predictions and under predictions of watershed loads compared to monitoring data) tend to cancel out so the aggregated load estimate from the model at the regional scale is usually more certain than the estimate for any single watershed.

The problems associated with climate variability impacting load variability cannot be entirely avoided by using models, but the models can be used to simulate loading over multiple years to generate an average load over several years where rainfall amounts (and hence loads) may have varied. In this way, the models can smooth out climate variability and generate something like an average loading. The models ultimately rely on monitoring data for their calibration and validation, however. If actual loading changes have not manifested in monitoring data, then the models will not show loading changes either. Because control measures for PCBs and mercury, even if effective, result in relatively small loading changes during any particular year or even five-year period (e.g., about 1.6 kg/yr estimated PCBs load reduction during this permit term), the monitoring data on which the models rely are highly unlikely to detect the impact of these load reduction changes in measured concentrations. Therefore, modeled loading estimates are not likely to be sensitive enough to confirm this level of change. The models will be more useful with longer time scales such that enough land use change

and concentration change has occurred such that model can detect the change. In other words, the model works best at large spatial and temporal scales.

Both the mercury and PCBs TMDLs anticipated the challenges associated with using either monitoring alone or a combination of modeling and monitoring to assess how loading responds to control measure implementation. The mercury TMDL requires that Permittees "*develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts",* and the PCBs TMDL requires stormwater Permittees *"to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions."* Consistent with these TMDL requirements and in recognition of the difficulty of assessing control measure loading changes through monitoring or modeling, the Permit employs an accountability strategy known as the programmatic approach to confirm the sufficiency of control measure implementation and provide estimates of the load reductions likely occurring as a result of these control measures. This accountability strategy is described later in this Fact Sheet.

Provisions C.8.g. Pesticides and Toxicity Monitoring. Toxicity testing provides a tool for assessing toxic effects (acute and chronic) of all the chemicals in samples of stormwater, receiving waters or sediments and allows the cumulative effect of the pollutants present in the sample to be evaluated, rather than the toxic responses to individual chemicals. Toxicity in water and on sediment also are monitored in order to determine whether the numeric targets of the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL are being achieved, and to help provide evidence on whether pesticide-related toxicity is decreasing in urban creek waters.

This subprovision combines all the pesticide and toxicity into one place. This format is intended to provide for more thoughtful dry weather and wet weather sampling designs that may provide more meaningful data for the region and potentially for statewide studies. Since the Urban Creeks TMDL was adopted by the Water Board in 2005, it has become more apparent that pesticide related toxicity water quality problems are similar in urban waterways across the State. At this time, efforts have begun to develop a statewide coordinated pesticides and pesticide-related toxicity monitoring program. In addition, pesticide-related water quality issues are subject to change as different pesticide products gain market share and increase in urban usage. For these reasons, Permittees may request the Water Board modify, reduce or eliminate the requirements of this subprovision during the Permit term, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

This Permit describes type, interval and frequency of pesticides and toxicity monitoring sufficient to yield data which are representative of both dry weather and wet weather urban runoff. Required analytes include toxicity and pesticides that are being found at or near concentrations that cause chronic or acute effects to aquatic organisms. Required

test methods include the relatively recent Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136) for chronic toxicity. The test species are selected as the most sensitive species to pollutants currently known or suspected to be present in stormwater discharges. All required methods and test species are consistent with those used by SWAMP as well as those required in other California MS4 permits, including the statewide Caltrans permit.

The non-pesticide pollutants arsenic, cadmium, chromium, copper, lead, nickel, and zinc are included in this subprovision in order to facilitate the synoptic collection of these pollutants in sediment with toxicity in sediment during the dry season.

C.8.h. Reporting. Provision C.8.h. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14, C.18, C.19. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14, C.18, and C.19.c-f pertain to pollutants of concern, including those for which TMDLs have been adopted.

Legal Authority

The following legal authority applies to provisions C.9 through C.14, C.18, and C.19.c-f:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13383, and Federal NPDES regulations 40 CFR § 122.26(d)(2)(i)(A, B, C, E, and F) and 40 CFR § 122.26(d)(2)(iv).

Specific Legal Authority: The TMDL-based requirements for pesticides, mercury, methylmercury, PCBs, bacteria, and sediment (in the Pescadero-Butano watershed only) have been imposed in accordance with 40 CFR 122.44(d)(1)(vii)(B), which requires the effluent limitations in NPDES permits to be consistent with the assumptions and requirements of any available waste load allocation (WLA) for the discharge. Water Code section 13263, subdivision (a), requires that waste discharge requirements implement any relevant water quality control plans (basin plans), including TMDL requirements that have been incorporated into the basin plans. In addition, under CWA section 402(p)(3)(B)(iii), MS4 discharges "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants" (33 U.S.C. § 1342(p)(3)(B)(iii).). Under this provision, the Water Board may include requirements for reducing pollutants in stormwater discharges as necessary for compliance with water quality standards (*See Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166.). This includes requirements to meet TMDLs since TMDL targets are an interpretation of water quality standards.

The Water Board may impose WQBELs that are BMPs or numeric effluent limitations (see, e.g., 40 CFR. §122.44(k)(2) and (3)). This is consistent with U.S. EPA's November 26, 2014, "Revision to the November 22, 2002, Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs'" (2014 U.S. EPA Memo.). This memorandum, while not binding authority, states "[w]here the TMDL includes WLAs for stormwater sources that provide numeric pollutant loads, the WLA should, where feasible, be translated into effective, measurable WQBELs that will achieve this objective. This could take the form of a numeric limit, or of a measurable, objective BMP-based limit that is projected to achieve the WLA." The 2014 U.S. EPA Memo further acknowledges that the permitting authority should consider the schedules in the TMDL as it decides whether and how to establish enforceable interim requirement and interim dates in the permit. The interim deadlines in the Provisions are consistent with and in furtherance of the deadlines in the TMDLs.

The Trash Amendments updated the Ocean Plan and the Inland Surface Waters and Enclosed Bays and Estuaries Plan to include a narrative water quality objective for trash, a trash prohibition, and a framework for implementation of the water quality objective and prohibition in municipal stormwater permits. This framework sets up two tracks for permittees to implement the prohibition; the San Francisco Bay Region Permittees are in Track 2, which means that they implement the prohibition through a combination of full-trash capture devices and other control measures deemed equivalent to full-trash capture.

For copper, the Permit requires best management practices and copper control measures to prevent urban runoff discharges from causing or contributing to exceedances of copper site-specific water quality objectives for the Bay, consistent with the Basin Plan. Water Code section 13263 requires that waste discharge requirements implement the Basin Plan.

Basin Plan Requirements:

Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) states that NPDES stormwater permits issued to municipalities will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. The Water Board has been taking a phased approach of first requiring technically and economically feasible controls to reduce pollutant discharges to the maximum extent practicable. Where this does not result in attainment of water quality objectives, the Basin Plan states the Water Board will require implementation of additional control measures to meet water quality objectives. The Basin Plan also contains urban stormwater TMDL implementation requirements at sections 7.1.1, 7.2.2, 7.7.1, 7.2.3, 7.4.1, and 7.4.2 for pesticide-related toxicity, mercury, PCBs, bacteria, and sediment. The Basin Plan also requires urban stormwater requirements for copper in section 7.2.1.The Basin Plan Table 4-1 includes Prohibition 7, which prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas." The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins also contain requirements related to pesticides and methylmercury relevant to Permittees in eastern Contra Costa County.

General Strategy for Sediment-Bound Pollutants (Mercury and PCBs):

The control measures for mercury and PCBs are intended to implement the urban runoff requirements stemming from TMDLs for these pollutants. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an implementation of controls to reduce PCBs, and that is the intended approach of the required provisions for all pollutants of concern. Control actions addressing PCBs and mercury are expected to reduce loadings of other sediment-

bound pollutants, including legacy pesticides and PBDEs. Permittees can achieve multiple water quality benefits by strategically siting PCB and mercury controls. The POC strategy also includes a phased approach that provides for pilot scale testing (in MRP 1) and for identifying areas with pollutants of concern other than PCBs and mercury. The overall strategy for addressing sediment bound POCs uses the following framework, which is to implement controls more widely as Permittees test measures and gain confidence in their efficacy:

(1) Pilot-testing in a few specific locations.

(2) Focused implementation in areas where benefits are most likely to accrue.

(3) Full-scale implementation throughout the region.

(4) Additional Work. Permittees may also try out experimental control measures and devote resources to research and development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during a permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. Conversely, the benefits of other control measures may be well known, and these control measures should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering additional information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions.

During the MRP 1 permit term, Permittees focused on gathering necessary information about control measure effectiveness. In effect, most of the control measures were implemented at the pilot scale. During the MRP 2 term, the emphasis shifted toward focused and some full-scale implementation of the most effective control measures, and progress was measured through accounting for specific load reductions. In this Permit term, the mercury and PCBs provisions require specific programmatic control measures deemed effective based on implementation experience and analyses in previous Permit terms (a "programmatic approach").

Experience implementing PCBs and mercury control measures in the first two versions of the MRP along with monitoring data and other information, including modeling, informs the design of the programmatic approach. Permittees use a load reduction accounting system (see Provisions C.11.a and C.12.a) to estimate mercury and PCBs load reductions for each type of programmatic control measure consistent with an expected level of control measure implementation intensity. Permittees are required to

track and report on their level of implementation through enforceable control measure-specific performance metrics that are associated with the estimated load reductions. In subsequent permit terms, control measures will be implemented based on what is learned in this term, resulting in even more refined, improved, and effective controls.

Fact Sheet section C.8.f, above, describes the challenge of measuring (through monitoring) PCBs and mercury loads and load reductions due to how these pollutants are distributed in watersheds and transported during storm events and the variability of the Bay Area's climate. These challenges in measuring load reductions through monitoring data also necessitate a programmatic approach to control measure implementation. Over the past two decades, however, Water Board staff has compiled and analyzed a large quantity of monitoring data and other information to understand the relationship between control measure implementation and load reductions and thereby establish a solid technical foundation for the programmatic approach.

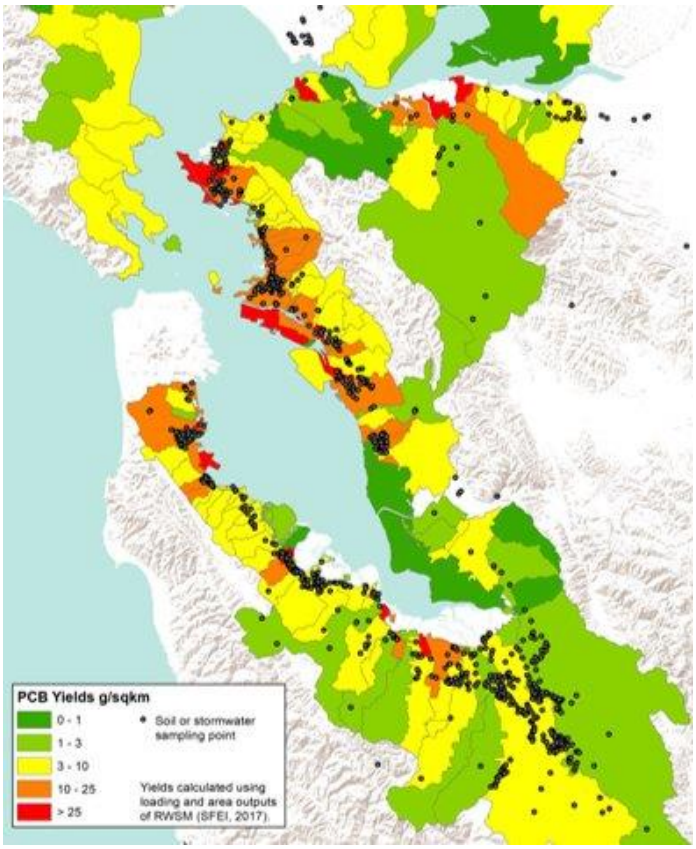

PCBs and mercury data in bedded sediment (i.e., in storm drains or street sediment) and flowing stormwater have been collected through the RMP and also by the stormwater programs over the last two decades. Through the RMP and Permittee sampling, over 100 Bay Area watersheds have been sampled. In these watersheds, over 1,500 sediment samples have been taken, and samples have been taken at over 140 locations for flowing stormwater (see dots on figure, personal communication Alicia Gilbreath, San Francisco Estuary Institute). These monitoring data provide a clear picture about how PCBs and mercury are distributed in Bay Area watersheds and what type of watersheds contribute more or less pollutant load. Notice in the figure that the highest PCBs-yielding watersheds (mass loading of PCBs per unit area) are concentrated largely along the shore of San Francisco Bay. These high yielding watersheds are generally old industrial areas. These yields were estimated through models calibrated and validated with the monitoring information from those dots on the map along with information about hydrology and sediment transport.

The knowledge gained through monitoring and illustrated in this figure is the foundation for the programmatic control measure approach employed in this permit term to reduce PCBs and mercury loads. Because we now know that old bayside industrial lands are generally where we find higher PCBs concentrations, this helps to refine the control measures in the permit. Thus, we have required Permittees to search for contaminated source properties (see Provisions C.11/12.b) in old industrial areas and to focus implementation of control measures in the moderately contaminated portions of old industrial land use (see Provisions C.11/12.c). Finding contaminated properties and addressing ongoing moderate contamination in these formerly old industrial bayside areas is an important element in reducing PCBs loads to the Bay. Moreover, addressing these areas has an environmental justice dimension as well. These old industrial areas are often near where historically disadvantaged communities have been compelled to live because of the unaffordability of less contaminated upland areas. Removing contamination from these areas helps improve the quality of life for these communities. Additionally, the PCBs and other contaminants from these older industrial areas are transported to the Bay and can cause some popular fish species caught from nearby shoreline fishing locations used by local anglers to be unsafe to consume.

The Water Board also uses the available monitoring data to develop mathematical relationships between a unit of control measure implementation activity (e.g., a referral of a source property or a treatment device installed in old industrial land use) and an estimated load reduction. This accounting program is fully described in work produced and refined by the programs during the MRP 2 permit term.[286] These data were also used to calibrate and validate a variety of watershed loading models to generate estimates of the PCBs and mercury load reductions from green stormwater infrastructure (GSI) implementation as part of the Reasonable Assurance Analyses prepared by the Permittees during the MRP 2 permit term.

In addition to monitoring data, the programmatic approach is also informed by other information related to control measure implementation. For example, Permittees (as part of their 2019-2020 Annual Reports) estimated the PCBs and mercury load reductions that will be realized as GSI is implemented through time. In order to do this, Permittees estimated the pace of GSI implementation and used information about GSI performance, concentrations of PCBs and mercury in watersheds (from monitoring data), combined with information about rainfall, hydrology, soil type, slope, amount of impervious area, and other inputs.

Permittees also gathered information that allowed the Water Board to estimate the magnitude of PCBs load reductions by implementing BMPs when buildings containing PCBs (in caulks and sealants) are demolished. There is information on the typical amount of PCBs in such buildings and the effectiveness of control measures and the number of buildings that are demolished in a typical year.[290, 286] This information is used to establish factors to estimate the load reduction benefit of this program. It is too difficult, impractical, and time-consuming to implement monitoring efforts in the vicinity

of these demolition sites to generate these load reduction estimates, as previously described. A similar approach is used to derive a mathematical relationship between the number of bridges whose roadways are replaced and the amount of PCBs load reduction achieved through removal of the PCBs-containing caulk. Permittees developed the relationship by measuring the amount of PCBs in such caulk and calculating how much caulk is removed during a typical bridge refurbishment project.[286]

The programmatic approach for PCBs and mercury control measures is a practical means of ensuring accountability for control measure implementation. This approach relies on the above-described monitoring data and other information, which are used in a technically sound manner to derive the mathematical relationships between units of control measure implementation activity and load reduction. While it is theoretically possible to assess load reductions through an intensive program of monitoring (see discussion under Provision C.8.f, above) at hundreds of locations upstream and downstream of control measure implementation, the effort and expense to undertake such a monitoring program would consume all or nearly all available resources that would be better spent on control measure implementation, as discussed above in the Fact Sheet for Provision C.8. The Permit's more practical and resource-efficient approach is to use monitoring data to inform control measure design and accountability metrics, as well as to calibrate and validate quantitative models to estimate loads and changes in loads. In this way, we use models to extrapolate from those places and times for which we have monitoring data to those times and places where we do not.

Background on Specific Provisions:

Pursuant to CWA§ 402(p)(3)(B)(ii)-(iii) and 40 CFR § 122.44(d)(1)(vii)(B), Provisions C.9 through C.14, C.18, and C.19 contain technology-based requirements to control pollutants to the MEP, such other provisions the Water Board has determined appropriate for the control of pollutants under CWA, water quality-based requirements consistent with the assumptions and requirements of any WLAs in the applicable TMDLs, and requirements to effectively prohibit non-stormwater discharges into storm sewers. Provision C.9 contains requirements to implement the TMDL for pesticide-related toxicity in urban creeks. Provision C.10 contains requirements to implement narrative water quality objectives related to trash in all receiving water and water quality control plan prohibitions on trash discharges. Provision C.11 contains requirements to implement the San Francisco Bay mercury TMDL WLAs and the TMDL WLAs for mercury in the Guadalupe River Watershed. Provision C.12 contains requirements to implement the San Francisco Bay PCBs TMDL WLAs. Provision C.13 contains requirements to implement the copper site-specific objectives for San Francisco Bay. Provision C.14 contains requirements to implement the TMDL WLAs for bacteria at San Pedro Creek and Pacifica State Beach; San Francisco Bay Beaches (in the City of San Mateo); and Pillar Point Harbor and Venice Beach. It also contains requirements for the cities of Mountain View and Sunnyvale for their discharges that are causing or contributing to exceedances of water quality standards in Stevens Creek (both cities),

Calabazas Creek (Sunnyvale) and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale) for which there are no TMDLs. These requirements are consistent with these bacteria TMDL WLA implementation requirements. Provision C.18 contains requirements to implement the Pescadero-Butano Watershed Sediment TMDL and the Water Quality Improvement Plan for sediment in the San Gregorio Creek watershed. Provision C.19 contains requirements to implement the pesticides and methylmercury TMDLs and other requirements in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins applicable to Permittees in eastern Contra Costa County.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9

C.9-1 This Permit implements the TMDL and Water Quality Attainment Strategy for diazinon and pesticide-related toxicity for all Bay Area urban creeks, as defined in the Basin Plan Amendment adopted by the Water Board on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Attainment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, lead monitoring efforts, and take actions related to pesticide regulatory programs. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff.

C.9-2 The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

This provision is consistent with 2014 U.S. EPA Memo [255] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve pesticide load reductions as well as other requirements (see Provision C.9.f) necessary to achieve receiving water limits. The timeline for achieving the TMDL is not a fixed date for the following reasons. Pesticide-related toxicity continues to occur because state and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. The TMDL implementation plan recognizes that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and state law; and (2) because a realistic date for achieving allocations cannot be discerned given the current pesticide regulatory framework. Thus, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline.

Specific Provision C.9 Requirements

Provision C.9 implements the TMDL for Urban Creeks Pesticide Toxicity. All C.9 subprovisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with other agencies and organizations. The list of urban-use pesticides of concern to water quality includes pesticides for which local

[255] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

area monitoring data exceed or approach benchmarks and pesticides currently linked to toxicity in surface waters.

Pesticides monitoring is specified in Provision C.8.g. Pesticides and Toxicity Monitoring.

C.9.a through C.9.d are designed to ensure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of complementary techniques such as biological control (e.g., natural predators and parasites), habitat manipulation, modification of cultural practices, use of resistant varieties, various physical techniques, and considers pesticide treatments as a last resort. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. The implementation of IPM will be assured through training of municipal employees and contractor requirements. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. IPM techniques could include biological controls (e.g., ladybugs and other natural enemies or predators); physical or mechanical controls (e.g., hand labor or mowing, caulking entry points to buildings); cultural controls (e.g., mulching, alternative plant type selection, and enhanced cleaning and containment of food sources in buildings); and reduced risk chemical controls (e.g., soaps or oils). IPM is defined broadly by the University of California Agriculture & Natural Resources Statewide IPM Program,[256] and an example IPM plan is provided by UC Davis.[257] University of California Agriculture and Natural Resources provides guidance to public agencies on the development of IPM policies and programs.[258] More resources are provided by the California Department of Pesticide Regulation[259] and by the National Pesticide Information Center.[260] The Glossary attached to this Permit includes expanded IPM definitions adapted from the UP Provisions.

C.9.e directs the municipalities to conduct outreach to consumers at point of purchase, to residents who contract for pest control, and to pest control professionals. Such targeted outreach is intended to make the public and pest control professionals aware of the water quality impacts of current-use pesticides that are impacting or have potential to negatively impact urban creeks.

C.9.f requires that municipalities (through cooperation or participation with BAMSC and CASQA) track and participate in pesticide regulatory processes like the U.S. EPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation pesticide evaluation activities. The goal of

[256] https://www2.ipm.ucanr.edu/What-is-IPM/

[257] https://ucdavis.app.box.com/v/UCDavisIPMPlan2014PDF

[258] https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8093

[259] https://www.cdpr.ca.gov/docs/schoolipm/

[260] http://npic.orst.edu/pest/ipm.html

these efforts is to provide pertinent water quality data and encourage both the state and federal pesticide regulatory agencies to fully evaluate aquatic impacts and to mitigate for impacts to urban water bodies within the pesticide regulation or registration process. Accomplishing this goal would represent the most efficient and effective means to prevent pesticide-related water quality problems in the future.

C.9.g requires Permittees to evaluate the effectiveness of their pesticide source control actions and is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the Permit. The particulars of assessment will depend on the nature of the control measure.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Clean Water Act: CWA sections 402(p)(3)(B)(ii) and (iii) require municipal stormwater permits to effectively prohibit non-stormwater discharges and to reduce the discharge of pollutants in stormwater to the maximum extent practicable. Trash can be considered both a non-stormwater discharge (see 40 CFR 122.26, subd. (b)(2)) and a pollutant. Accordingly, the Order's requirements to reduce trash loading are required to implement both the non-stormwater discharge prohibition and the reduction of pollutants to the maximum extent practicable.

Basin Plan: Trash load reductions are also required to protect beneficial uses and achieve water quality objectives in the receiving water. Basin Plan Prohibition 7 prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters, or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. The Basin Plan also contains narrative water quality objectives applicable to trash: floating material (waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses); settleable material (waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses); and suspended material (waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses).

Trash Amendments: The trash load reduction provisions of this Order are also consistent with the State Water Board's 2015 amendments to the Ocean Plan and Inland Surface Waters and Enclosed Bays to control trash (Trash Amendments). The Trash Amendments establish a narrative water quality objective for trash; prohibit "the discharge of Trash to surface waters of the State or the deposition of Trash where it may be discharged into surface waters of the State;" provide implementation requirements for permitted storm water dischargers; set a time schedule for compliance and provide a framework for monitoring and reporting requirements.

Because trash overwhelmingly reaches receiving waters via stormwater, the Trash Amendments anticipate that NPDES stormwater permits will implement the trash prohibitions. NPDES stormwater Permittees have two "tracks," or alternative pathways, for achieving compliance with this prohibition. Permittees in Track 1 must install, operate, and maintain full capture systems for all storm drains that captures runoff from the priority land uses in their jurisdictions;" while Permittees in Track 2 must install, operate, and maintain any combination of full capture systems, multi-benefit projects, other treatment controls, and/or institutional controls within either the jurisdiction of the MS4 permittee or within the jurisdiction of the MS4 permittee and contiguous MS4 permittees." The State Water Board determined that the Trash Load Reduction

requirements of the previous MRP were “substantially equivalent” to Track 2 (Trash Amendments, p. D-5, fn. 2.).

Permittees in Track 2 are required to demonstrate that the combination of methods achieves full capture system equivalency. The C.10 requirements of this Permit are consistent with the Statewide Trash Amendments and the trash controls Permittees are required to implement are designed to achieve full trash equivalency. Permittees are required to implement a trash control plan using a combination of controls, such as full capture systems, or other controls (e.g., street sweeping, on-land pickups) that are equivalent to trash full capture systems and that can be verified through visual assessment as described in Provision C.10.b.iii, below. The Statewide Trash Amendments require Track 2 Permittees to fully comply with the Trash Amendments (trash water quality objective, trash prohibition, and implementation requirements) within ten years of the effective date of the first implementing NPDES MS4 permit. MRP 2 became effective on January 1, 2016, and is the first permit implementing the Trash Amendments. Therefore, MRP Permittees must fully comply with the Trash Amendments no later than December 31, 2025, except the East Contra Costa County Permittees, which were not subject to MRP 2 when it became effective in 2016.

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(i) requires “a demonstration that the [Permittee] can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the [Permittee] at a minimum to . . . (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water . . . .”

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1) requires “a description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires “shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires “a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens.”

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires “a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water.”

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR § 122.44(d)(1)(i) requires limitations for pollutants which are or may be discharged at a level which has the reasonable potential to cause or contribute to an excursion above any water quality standard, including any narrative criteria for water quality.

Trash is being discharged at levels that have the reasonable potential to cause or contribute to excursions of these narrative water quality objectives. There are currently 27 waterbodies in the Region impaired by trash on the Clean Water Act section 303(d) list; most of these receiving waters receive discharges from Permittees' municipal storm drain systems. Elsewhere, trash is being discharged at levels that have the reasonable potential to cause or contribute to excursions of these narrative water quality objectives. U.S. EPA recommends that for MS4 discharges with reasonable potential to cause or contribute to a water quality excursion, a permitting authority exercises its discretion to include clear, specific, and measurable requirements and, where feasible, numeric effluent limitations as necessary to meet water quality standards.[261] In Water Quality Order Nos. 2015-0075, amended by 2021-0052-EXEC, and 2020-0038, the State Water Board affirmed the obligation of stormwater permittees to comply with receiving water limitations, including the requirement that discharges not cause or contribute to water quality standards exceedances. Where a permit allows alternative, or deemed, compliance with receiving water limitations, the alternative compliance pathway must have "appropriate rigor, transparency, and accountability," and be "designed to ultimately achieve receiving water limitations."[262] More specifically, "any alternative compliance path should 'encourage watershed-based approaches, address multiple contaminants, . . . incorporate TMDL requirements,' 'encourage the use of green infrastructure and the adoption of low impact development principles,' 'have rigor and accountability,' and require Permittees, 'through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions.'"[263] The State Water Board also reaffirmed the requirement to require adequate monitoring "to verify assumptions and update the solutions." This permit's alternative compliance measures contain the elements required by Order Nos. 2020-0038 and 2015-0075, amended by 2021-0052-EXEC are designed to meet water quality standards as quickly as possible and to implement the trash discharge prohibition by 2025.

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[261] U.S. EPA, November 26, 2014, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load Waste Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs.'"

[262] Order No. 2020-0038, p. 13.

[263] Order No. 2020-0038, p. 14, citing Order No. 2015-0075.

Fact Sheet Findings in Support of Provision C.10

C.10-1 The State Water Board's Trash Amendments define trash to encompass "all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials."

C.10-2 Trash is a pervasive problem within the San Francisco Bay, as well as in creeks and shoreline areas throughout the Bay Area. Controlling trash from municipalities' jurisdictions continues to be a priority for this Permit reissuance, not only because implementation of the trash discharge prohibition is imminent, but because trash adversely impacts the public's enjoyment of the Bay, Ocean, and their watersheds and poses a serious threat to aquatic life and habitat. Plastic has pernicious effects in the ocean environment, where it can persist for hundreds of years, if not longer; can serve as a substrate for organic toxins; and can entangle or be ingested by aquatic life.

C.10-3 The levels of trash in the waters of the San Francisco Bay Region were and are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[264] over the 2003–2005 timeframe,[265] suggested that then-existing approaches to managing trash in waterbodies were not reducing the adverse impact on beneficial uses. In 85 surveys conducted at 26 sites throughout the Bay Area, staff found an average of 2.93 pieces of trash for every foot of stream. All the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with significantly higher trash in waters relative to other counties—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Neighborhoods at the bottom of the watershed, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-4 Trash generation in the United States has increased in the years since the SWAMP RTA trash assessments. For instance, figures from the U.S. EPA indicate that overall and per capita municipal solid waste generation have increased between 2005 and 2018, the last year for which data are

[264] SWAMP Rapid Trash Assessment Protocol, Version 8

[265] SWAMP S.F. Bay Region Trash Report, January 23, 2007

available.[266] Packaging waste generation has increased by 7 percent, while plastic packaging waste generation, specifically, has increased 14 percent, during that same time period.[267] Furthermore, the plastic going into the oceans is on course to rise from 11 million tons now to 29 million by 2040, according to a study published in June by Pew Trusts, an independent public interest group.[268] It is reasonable to assume that trash generation in the Bay Area has increased in parallel with national trends, and that when overall trash generation is higher, more trash ends up in stormwater.

C.10-5 A number of key conclusions can be made on the basis of the trash measurement in streams:

(1) Lower watershed sites have higher densities of trash.

(2) All watersheds studied in the San Francisco Bay Region have high levels of trash.

(3) There are trash source hotspots (usually associated with parks, schools, or poorly kept commercial facilities located near creek channels) that appear to contribute a significant portion of the trash deposition at lower watershed sites.

(4) Homeless encampments and creekside litter from a variety of sources are a significant source of trash directly dumped and placed in the riparian zone where it can be swept into receiving waters by storm flows.

(5) Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.

(6) Most trash is plastic at lower watershed sites where trash accumulates in the wet season. This is likely the result of several factors, including the increase in use of plastic as a packaging material and the material's persistence in the environment. The accumulation of plastic in downstream areas indicates that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris.

(7) Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

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[266] Advancing Sustainable Materials Management: 2018 Fact Sheet; accessed at: https://www.epa.gov/sites/production/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf

[267] U.S. EPA, 2018. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific-data

[268] Verdon, Joan, April 27, 2021. "Global E-Commerce Sales To Hit $4.2 Trillion As Online Surge Continues, Adobe Reports," Fortune.

C.10-6 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-7 Trash in urban waterways of coastal areas can become marine debris, known to harm fish and wildlife and cause adverse economic impacts.[269] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-8 Trash adversely affects numerous beneficial uses of waters, particularly recreation, wildlife and estuarine habitats, and rare and endangered species preservation. Besides the obvious negative aesthetic effects, trash can threaten the health and safety of beachgoers or other recreators. Medical waste, pet waste, and discarded diapers can spread disease, while metal and broken glass can cause injury.[270] Entanglement in trash and marine debris is a major hazard to marine wildlife,[271] affecting at least 115 species of animals in the United States alone.[272] Marine species, including turtles and sea birds, are also widely known to ingest marine debris, particularly small pieces of plastic, causing injury, illness, and death,[273] In addition, trash can contaminate water and sediments, as some household and industrial wastes contain toxic batteries, pesticide residues, and mercury and other heavy metals. Large trash items, such as discarded appliances, can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash hotspots where illegal dumping, littering, and/or accumulation of trash occur.

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[269] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. Mar. Poll. Bull. 40:83-88.

[270] Sheavly, S.B. 2004. Marine Debris: an Overview of a Critical Issue for our Oceans. 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

[271] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs*. Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.

[272] Entanglement of Marine Species in Marine Debris with and Emphasis on the United States, https://marinedebris.noaa.gov/sites/default/files/mdp_entanglement.pdf; see also Oceana, Choked, Strangled and Drowned (2020) https://usa.oceana.org/sites/default/files/2020/11/25/report_single_pagesdoi_choked_strangled_drowned_final.pdf

[273] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol*. 13(4):925-929; Gilbert, J.M. et al. 2016. Plastic Ingestion in Marine and Coastal Bird Species of Southeastern Australia, *Marine Ornithology.* 44: 21-26. https://sora.unm.edu/sites/default/files/44_1_21-26.pdf

C.10-9 The Water Board, at its February 11, 2009, hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment E - 303(d) Trash Resolution and Staff Report, February 2009.

C.10-10 The trash control strategies, monitoring requirements, and mandatory deadlines for trash reductions meet the "Maximum Extent Practicable" (MEP) standard contemplated by the CWA and include such other provisions as the Board determines appropriate for control to ultimately meet the narrative water quality objectives for floating material, settleable material, and suspended material (CWA §402(p)(3)(B)(iii)). This Permit builds on the data and information collected in the last permit term and increases expectations of Permittees in this Permit. In particular, this Permit requires that the Permittees make significant progress toward having no trash impact on receiving waters by increasing implementation of full trash capture devices and ensuring that other trash reduction and elimination measures have similar effects to full trash capture. This is consistent with the statewide amendment to the Ocean Plan and the Inland Surface Waters, Bays and Estuaries Plan relating to trash controls. This Permit includes trash generation source identification and control, visual assessment data collection, and development of trash monitoring protocols. These requirements reflect the most current knowledge and data available concerning effectiveness of trash control strategies such as full trash capture, enhanced maintenance methods and current thinking regarding the best methods to assess trash reduction outcomes for the various trash reduction methods.

C.10-11 The COVID-19 pandemic has produced a surge in trash from multiple sources, including discarded personal protective equipment, shipping materials, and takeout containers.[274] Some of this trash has made it into waterways,[275] and the Coastal Commission found that masks were one of the top 15 discarded items at its coastal cleanups.[276]

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[274] See, e.g., 2020 Beach Cleanup Annual Report, Surfrider (July 2021), p. 5; Ford, Don. "COVID In Oakland: Pandemic Sending Additional Trash Into Bay Area Waterways," CBS San Francisco (Nov. 18, 2020); Kramer, Anna. "Eco-conscious Bay Area reckons with flood of plastic waste as coronavirus wears on," *San Francisco Chronicle* (July 20, 2020); Chua, Jasmin Malik. "Online shopping has boomed in the pandemic. But what about all the packaging?" Vox (Jan. 8, 2021). Takeout orders increased 127% from March 2020 through March 2021. NPD, "U.S. Restaurant Carry-Out and Delivery Digital Orders Soar During the Pandemic" (May 11, 2021).

[275] See, e.g., 2020 Beach Cleanup Annual Report, Surfrider, *supra*; "COVID In Oakland: Pandemic Sending Additional Trash Into Bay Area Waterways," CBS San Francisco (Nov. 18, 2020); Alexander, Curtis. "First rain of season unveils a new pollution problem: masks and gloves - pandemic PPE," *San Francisco Chronicle* (Nov. 18, 2020).

[276] Alexander, Curtis. "First rain of season unveils a new pollution problem: masks and gloves - pandemic PPE," *San Francisco Chronicle* (Nov. 18, 2020).

Even before the pandemic, the United States was the largest generator, per capita, of plastic packaging waste.[277] Americans' packaging consumption has only grown during the pandemic, [278] as some plastic bag bans, including California's, were suspended, grocery pickup and delivery soared, and online shopping increased in the United States by approximately 32 percent from 2019 to 2020.[279] Shipping materials waste in particular has ballooned.[280] Of the 465 million pounds of packaging waste that Amazon, alone, was estimated to have generated worldwide pre-pandemic, approximately 4.8 percent, or 22.4 million pounds, went into waterways.[281] In 2020, these figures can be assumed to have grown, as Amazon's profits soared by 84 percent.[282]

C.10-12 While some pandemic-related trash increases may subside during this permit term, other sources of increased trash may not. For instance, online shopping is projected to continue growing,[283] and the concomitant heaps of shipping waste can be expected to keep growing, too. To accommodate this projected increase in waste, successful implementation of trash controls, particularly full-trash capture devices, is critical.

Specific Provision C.10 Requirements

C.10.a. Trash Reduction Requirements

C.10.a.i. Trash Reduction Schedule – This provision includes compliance benchmarks of 90 percent trash load reduction by June 30, 2023, and 100 percent trash load reduction by June 30, 2025. The 100 percent deadline represents a three-year extension of the 100 percent trash load reduction (or no adverse trash impact) target in MRP 2 of July 1, 2022. This extension is appropriate because it recognizes the Permittees' economic challenges associated with the COVID-19 pandemic, as well as

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[277] Parker, Laura. "Plastic Bag Bans Are Spreading. But Are They Truly Effective?" *National Geographic* (April 17, 2019).

[278] Flexible Plastic Packaging Global Market Report 2021: COVID-19 Growth And Change (July 2021) (despite plastic bag bans and growing concern about the environmental impacts of packaging waste, the flexible plastic packaging sector grew 5.7% in 2020 due to the e-commerce boom.); Kickham, Victoria. "Strong Demand, Rising Costs Affect Packaging Strategies." DC Velocity (July 9, 2021) (shipments of corrugated cardboard reached a record high in 2020, an increase of 3.5 percent over 2019.)

[279] Palmer, Annie. "Groceries and sporting goods were big gainers in the Covid e-commerce boom of 2020," CNBC (Feb. 19, 2021).

[280] See Chua (2021), supra; see also Corkery, Michael. With 3 Billion Packages to Go, Online Shopping Faces Tough Holiday Test." *New York Times* (Dec. 5, 2020) (estimating that 800 million more holiday packages would be shipped in 2020 versus 2019).

[281] Oceana, Amazon's Plastic Problem Revealed (Dec. 15, 2020), pp.14-15.

[282] Kohan, Shelley, "Amazon's Net Profit Soars 84% With Sales Hitting $386 Billion," Forbes (Feb. 2, 2021); Thomas, Lauren. "As e-commerce sales proliferate, Amazon holds on to top online retail spot." CNBC (June 18, 2021).

[283] Verdon, Joan. "Global E-Commerce Sales To Hit $4.2 Trillion As Online Surge Continues, Adobe Reports," *Fortune* (April 27, 2021).

challenges associated with controlling trash from the Permittees' remaining uncontrolled areas. Permittees have appropriately prioritized controlling trash from the highest trash generation areas in MRP 1 and MRP 2 and must now address a large area of moderate-level significant trash generating areas from which trash must be controlled.

C.10.a.ii. Trash Generation Area Management – The overarching strategy for reducing trash involves mapping trash generation areas within a Permittee's jurisdiction, then applying effective trash reduction actions to the areas of trash generation and assessing the effectiveness of those actions in delineated trash generation areas, until trash generation is reduced to the no impact level over a Permittee's entire jurisdiction. The Permittees reported these trash generation maps with their Long Term Trash Reduction Plans February, 2014, and these maps provide the 2009 trash generation levels, which were required under MRP 1. Permittees that found inaccuracies in their submitted maps had the opportunity to submit corrected 2009 trash generation maps with their 2016 Annual Reports. Permittees developed their maps by dividing their jurisdiction into Very High, High, Moderate, and Low trash generation areas based on the following ranges of trash generation rates:

- Low = less than 5 gal/acre/yr;
- Moderate = 5-10 gal/acre/yr;
- High = 10-50 gal/acre/yr; and
- Very High = greater than 50 gal/acre/yr.

C.10.a.ii.a. Actual trash loading values, particularly in areas of high and very high trash generation areas, may vary significantly, but these delineated ranges provide a frame of reference for tracking and demonstrating trash load reductions and provide relative trash generation weight of these four categories. Permittees will likely need to reduce trash generation to at least Low to attain the ultimate required water quality-based outcome of no trash loads that cause or contribute to adverse trash impacts in receiving waters by June 30, 2025. Whether attainment of Low trash generation rates will be sufficient will be evaluated and considered in the development of requirements in the next permit. Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to a Low trash generation rate during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the June 30, 2023, and June 30, 2025, 90 and 100 percent trash load reduction requirements, respectively. Permittees are required to implement trash prevention and control measures, including full trash capture systems (as defined in Provision C.10.a.ii.a), or other trash management actions, or a combination of actions equivalent to or better than full trash capture systems, to meet the required load reductions as described above in section C.10.a.i and to achieve the trash reduction outcomes required by the Trash Amendments.

C.10.a.ii.b. Permittees are responsible for trash discharges from their storm drain systems, including trash generated and discharged from private land areas that are either moderate, high, or very high trash generating and plumbed to the Permittees MS4 system. Permittees have direct control over their properties and right of way, but must also exert control over the private lands described above, such as commercial parking lots, that are plumbed to municipal storm sewer systems, since trash washed into such conveyances by stormwater directly impacts receiving waters without encountering trash controls on public rights of way. Permittees may use a variety of means to ensure that either full trash capture devices are installed at storm drain inlets on private land prior to intersection with the public storm drain system, or that other control actions, equivalent to full trash capture, are implemented on those private lands and such actions are verified through assessment, similar to the on-land visual assessment. Also, if there is a full trash capture device downstream of these lands that is designed, operated, and maintained to control trash discharges from that land area, no other trash control would be necessary.

C.10.b Demonstration of Trash Reduction Outcomes

C.10.b.i.(a-b) Full Trash Capture Systems - Full trash capture systems must be appropriately maintained to be effective. If a full trash capture system enters the wet season clogged with leaves or trash, trash will bypass the device, preventing it from functioning appropriately. During device inspections over the course of the previous permit term, Water Board staff observed roughly 20 percent of the inspected full trash capture devices required cleaning and/or repair or replacement. This Permit maintains the MRP 2 requirement for Permittees to inspect and maintain their full trash capture devices at a minimum frequency of once per year and, sufficient to prevent plugging (including plugging of the 5 mm screen) that could otherwise lead to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. Within High and Very High trash generation areas, Permittees are expected to inspect (and maintain if necessary) their full trash capture devices at a minimum frequency of twice per year, with the inspections spaced at least three months apart. Justification for the higher maintenance frequency within High and Very High trash generation areas is due to the increased speed with which full trash capture devices are expected to get plugged with trash and/or debris if not maintained. Permittees are required to maintain adequate maintenance records and report any full trash capture devices found to be not adequately maintained or improperly functioning. Permittees are also required to certify annually that all their full trash capture devices are adequately operated and maintained.

C.10.b.iii. Other Trash Management Actions

C.10.b.iii.a. Implementation Documentation – Documentation of trash management or control actions implemented and areas of implementation is essential to support trash reduction effectiveness and trash condition improvement.

C.10.b.iii.b.((i)-(iv)) Visual Assessment of Outcomes of Other Trash Management Actions – The primary tool currently available for determining trash reduction action success and positive outcomes is visual assessment, with photo documentation of trash generation and conditions in areas that drain to storm drains. Visual assessment involves observing a sufficient portion of each, e.g., sidewalk and curb area, at a frequency that adequately represents the trash management area condition relative to the type(s) of management actions implemented in the area. The frequency of required visual assessments depends on the rate of trash generation, the sources and types of trash, trash management actions deployed, and time of year. During the wet season, October through April, visual assessments in a trash management area must be conducted at a frequency that determines whether there may be trash discharges to the storm drain system from sources or areas of trash accumulations before a trash management action or combination of actions is implemented or between recurring trash management actions. The degree of trash reduction that a Permittee claims may also affect the frequency of visual assessment necessary to make the claim.

Permittees, with justification, may conduct fewer frequent visual assessments for claims that a trash generation area has been reduced from what was a very high trash generation area to a high or moderate trash generation area or from what was a high trash generation area to a moderate trash generation area. Frequency of visual assessments during the dry season, May through September, should be at least once per quarter, including, and preferably, within the month (September) before the wet season begins. Higher frequencies of visual assessments than those illustrated above may be required to demonstrate effectiveness of trash control actions and claimed trash reduction. Lower frequencies than those illustrated above may also be acceptable with justification.

Visual assessment is an effective, simple, and comparatively inexpensive method of monitoring to assure compliance with the Permit's requirements to implement trash management actions to reduce trash discharges into municipal storm drains (See 40 CFR § 122.44(i).). The required amount, type, interval and frequency of on-land visual trash assessments should yield data that is representative of the monitored activity, as required by 40 CFR § 122.48(b). This graphic demonstrates four trash visual conditions that correspond to the four trash generation categories of Low (A), Moderate (B), High (C), and Very High (D).

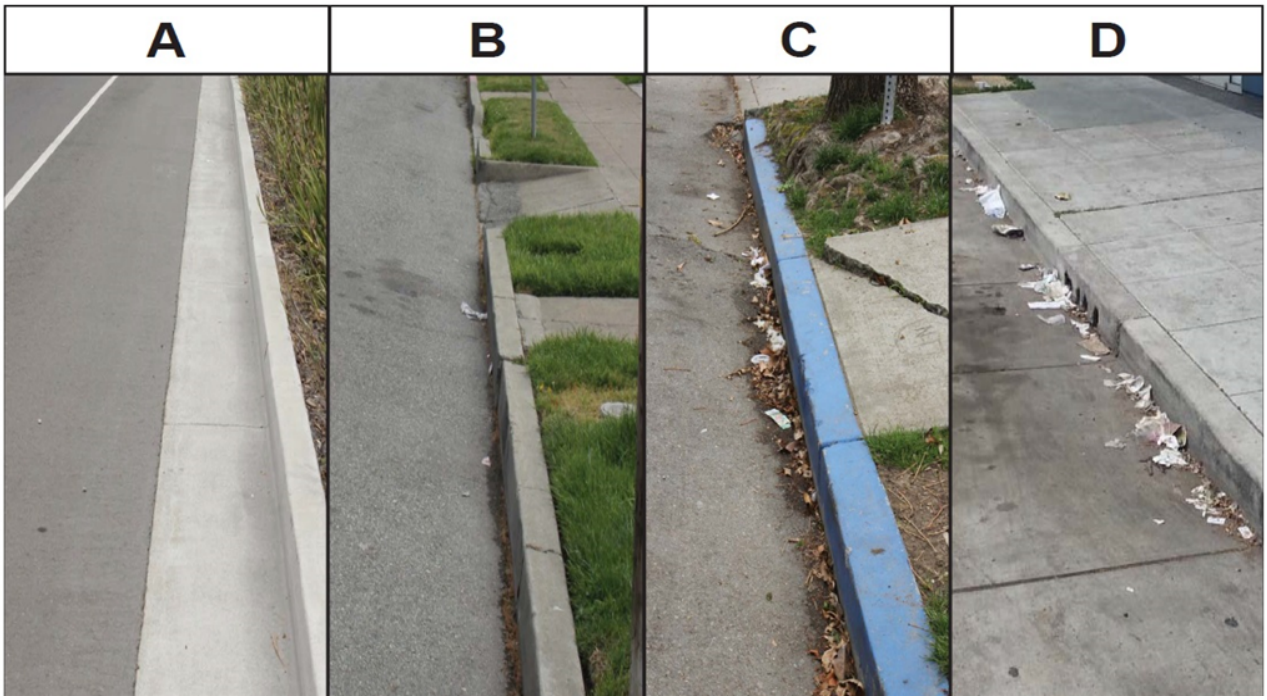

It is also possible to assess trash reduction outcome by documenting and verifying that trash management actions in a trash management area are equivalent to trash management actions implemented in an equivalent trash management area, and the actions in the equivalent trash management area have been assessed to be effective in accordance with a specified performance standard and the assessment results are reproducible. In such cases, it may be possible to extrapolate the performance assessment results to the equivalent trash management area with some verification. If this evidence is proposed by Permittees and accepted by the Executive Officer after public review, Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within similar trash management areas to the same performance standard.

C.10.b.iv. Percentage Discharge Reduction – Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to lower trash generation categories and the Low generation status during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the 90 and 100 percent trash load reduction requirements (Provision C.10.a.ii.a)**.** However, trash management actions within Very High and High trash generation areas will result in more trash load reduction than actions within Moderate trash generation areas. Accordingly, a trash reduction demonstration methodology that provides weighted benefit to actions in Very High and High areas is preferable to one that just considers percentage change in Very High, High, and Moderate trash generation areas. The trash generation rates used by Permittees to delineate and map their 2009 trash generation area maps have been used to provide a weighted benefit to the demonstrated

reductions in the areas of Very High and High trash generation, even if they are not reduced all the way to Low trash generation.

The delineation of trash generation areas were based on ranges of trash generation rates (Provision C.10.a.ii). Therefore, the ratios of the approximate midpoints of the categorical trash generation ranges provides a means of weighing relative benefit to actions in Very High and High areas compared to actions in Moderate areas. The Moderate range is 5-10 gal/acre/yr, with a midpoint of 7.5 gal/acre/yr. The High range is 10-50 gal/acre/yr with a midpoint of 30 gal/acre/yr. Therefore, the weighed ratio of High to Moderate is 30/7.5 = 4. The Very High range, greater than 50 gal/acre/yr, does not have a specified upper bound that allows calculation of a midpoint. An alternative that provides reasonable weighing of Very High is 90 gal/acre/yr, which is 40 percent higher than the low end of the Very High range. This results in a weighed ratio of Very High to Moderate of 90/7.5 = 12.

The following formula provides a means of calculating the percent trash load reduction achieved (relative to the 2009 baseline conditions) with assigned weighted benefit factors for Very High and High trash generation areas relative to Moderate trash generation areas:

$$\% \text{ Reduction} = 100\,[(12\,A_{VH(2009)} + 4\,A_{H(2009)} + A_{M(2009)}) - (12\,A_{VH} + 4\,A_{H} + A_{M})] / (12\,A_{VH2009} + 4\,A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$ = total amount of the 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of the 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of the 2009 moderate trash generation category jurisdictional area

A_{VH} = total amount of very high trash generation category jurisdictional area in the reporting year

A_{H} = total amount of high trash generation category jurisdictional area in the reporting year

A_{M} = total amount of moderate trash generation category jurisdictional area in the reporting year

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

100 = fraction to percentage conversion factor

C.10.b.v. Source Control – Permittee jurisdiction-wide actions to reduce trash at the source, e.g. through ordinances banning or taxing certain waste items, have trash generation and load reduction benefits. beyond what can be accounted for in trash management area specific assessment-based percentage discharge reductions (Provision C.10.b.iii). For example, persistent floating litter and other particularly difficult types of trash that are easily blown by the wind or clog full trash capture devices (such as polystyrene food ware, plastic bags, fragmented plastic, etc.) have been documented to be a significant percentage of the trash collected in full trash capture devices. Permittees that have implemented source control measures have documented a decrease in such items within their trash management area. Permittees will be allowed to claim up to ten percent load reduction for implementing appropriate source control actions to reduce persistent trash items other than those addressed under previous Permits (foam foods are and single-use plastic bags). The 10 percent credit stems from a study done by Santa Clara Valley Urban Runoff Pollution Prevention (SCVURPP) program in 2015 that looked at pre- and post-ordinance characteristics of trash. The study found that approximately 70 percent fewer single use bags were observed in stormwater after the source control ordinance went into effect. Based on these results, the City estimated that an approximate 70 percent reduction in the number of single use bags in stormwater equates to an offset benefit of up to 10 percent in the overall volume

of trash discharged through the City's MS4 system. This is an interim credit (added to the percent Reduction amount calculated by the Provision C.10.b.iv - Percentage Discharge Reduction formula) that will be phased out at the end of the permit term. To claim the ten percent load percentage reduction value, Permittees must provide substantial and credible evidence that the source control actions implemented reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides credible evidence that the source control actions implemented would achieve comparable trash reduction if implemented in the Permittee's jurisdiction.

Permittees may no longer claim a jurisdiction-wide source control load reduction value after June 30, 2025, because they must comply with the 100 percent reduction after that date through full trash capture or full trash capture equivalent controls. Furthermore, applying a jurisdiction-wide source control load reduction value to areas managed with full trash capture or full trash capture equivalent controls would result in an unrealistic claim of greater than 100 percent trash load reduction in those areas. However, Permittees may demonstrate and claim full trash capture equivalence of a source control in specific trash generation areas or in combination with other controls in an area if the control or combination of controls are documented, assessed, and verified in accordance with Provision C.10.b.iii.

C.10.b.vi. Partial Trash Reduction – Curb Inlet Screens – During MRP 2, Permittees assessed the benefit of curb inlet screens, in combination with street sweeping, in reducing the amount of trash discharged through MS4s. The study showed that curb inlet screens, when paired with a appropriate street sweeping program, can be effective in blocking larger trash items (such as bottles or plastic bags) from discharging through the MS4 system. However, the study also showcased several drawbacks of curb inlet screens. For instance, the effectiveness of curb inlet screens in preventing larger trash items from discharging through the MS4 was dependent on the presence of horizontal surface grates installed to support the device. In the absence of horizontal surface grates, the study concluded that the increase in hydraulic pressure from stormwater flows could potentially force open the retractable screens and thus allow more trash and/or debris to enter the curb inlet and negate the benefit of the installed device. In addition, the study did not evaluate the use of a 5mm screen, within the horizontal surface grate, to prevent trash items greater than 5 mm in diameter from discharging into the MS4. As a result, smaller persistent trash items (e.g., cigarette butts, straws, fragmented plastic, and polystyrene foodware) could readily enter the MS4 through the unscreened horizontal surface grate despite the installation of a curb inlet screen. These smaller trash items are more effectively removed from storm drain inlets that have a full trash capture device (due to the 5 mm minimum screen threshold requirement). Finally, the effectiveness of curb inlet screens was contingent upon the proper implementation of a street sweeping program that collected trash items that would otherwise have accumulated in the streets and washed into the curb inlet. Inadequate street sweeping in areas with high levels of trash generation can lead to

trash accumulation against the screen and reduce screen performance. However, the study did not evaluate the effects of street sweeping on curb inlet screen performance.

Despite the promise of curb inlet screens for trash control in areas where full trash capture devices cannot be installed, there is a need for further investigation into the deficiencies of curb inlet screens and the complementary actions, such as street sweeping, that can help overcome these deficiencies. The Water Board supports: 1) recognizing the potential benefit curb inlet screens may provide, 2) characterizing that benefit appropriately (e.g., whether it gets Moderate areas all the way to Low, or whether it only gets part of the way there), and 3) better understanding how curb inlet screens can fit into Permittees' long-term trash control strategies. The requirement in C.10.b.vi. for additional study of the effectiveness of curb inlet screens will help to substantiate their benefits.

C.10.c. Requirements for Flood Management Agencies

Flood management agencies are required to continue implementing trash contol measures such as trash pickups and installation of trash receptacles to control Moderate, High, and Very High trash generation areas within their jurisdiction, as well as the continued implementation of trash capture requirements as specified in Table 10-1 of Provision C.10.c.

C.10.d. Trash Load Reduction Plans

Similar to the previous permit requirement, Permittees are required to maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the 90 percent trash load reduction requirement by June 30, 2023 and the 100 percent trash load reduction requirement by June 30, 2025. A Trash Load Reduction Plan provides a means for Permittees to determine and account for appropriate trash management actions in their trash management areas and their schedule of implementation, and it provides documentation of planned actions that can be referenced if annual performance guidelines are not met. It also provides a basis for justifying and accounting for the types and locations of Permittees' assessments of trash management actions, and for optional trash load offset opportunities allowed by Provision C.10.f

C.10.e. Impracticability Report

In some areas within a Permittees' jurisdiction, engineering constraints such as flood risk, flat pipe grade, and/or safety concerns may make it impracticable to control trash to a Low generation rate via a full trash capture device. This Provision allows Permittees to develop an impracticability report to document the constraints in installing full trash capture devises and focus their efforts on planning for alternative control actions to meet the requirements and deadlines in Provision C.10.a.. Once approved, the trash impracticability report shall be used in developing the updated Trash Load Reduction plan as described in Provision C.10.d. An impracticability report is an optional submittal to assist with compliance.

C.10.f. Optional Trash Load Reduction Offset Opportunities

C.10.f.i. Creek and Shoreline Cleanup - Permittees may offset part of their Provision C.10.a trash load percent reduction requirement by conducting cleanup of creek and shoreline areas. These creek and shoreline cleanups are of value in the interim until full trash capture or equivalency is implemented by removing trash from shorelines and creeks or creek banks that are causing or may cause adverse impacts to receiving waters. Permittees conduct some of these additional cleanups with community volunteers, which creates additional public outreach and participation benefits.

One way to recognize the value of these additional cleanups and to account for the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume /time) is to use an offset ratio of ten to one for the mandatory 90 percent compliance benchmark by June 30, 2023. The following formula generates a Permittee-specific trash volume amount, based on its 2009 categorical trash generation areas and a ten to one offset ratio, which may be used to offset one percent of a required percent load reduction value:

1% Reduction Offset (volume) = $(12\ A_{VH(2009)} + 4\ A_{H(2009)} + A_{M(2009)})\ OF$

where:

$A_{VH(2009)}$ = total amount of 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of 2009 moderate trash generation category jurisdictional area

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

OF = offset factor equal to (7.5 x 0.1) for the 2023 mandatory trash load reduction deadline performance guideline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

A Permittee can compare the volume of trash collected from additional cleanups to this calculated offset volume and apply one percent offset to a Provision C.10.a.i percent load reduction requirement for each collected volume that equals the 1 percent Reduction Offset (volume). However, the total offset that can be claimed to avoid over-compensation associated with the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume/time) is limited to ten percent. Furthermore, to justify the offset the associated cleanups must occur more than once per year and preferably at a frequency sufficient to demonstrate sustained improvement of a creek or shoreline area. Offset values for creek and shoreline cleanups will no longer be applicable after June 30, 2025, when compliance with the 100 percent trash load reduction requirement is required through implementation of full trash capture systems or equivalent controls. The State Trash Amendments do not allow offset credit for creek or shoreline cleanups in lieu of implementing MS4 controls to meet the Trash Discharge Prohibition.

C.10.f.ii. **Direct Trash Discharge Controls -** Some Permittees are faced with the challenge that large amounts of trash are discharged to receiving waters in their jurisdiction from homeless encampments and direct dumping. These trash discharges are separate from and in addition to discharges from Permittee storm drain systems. Elimination and prevention of adverse water quality impacts due to trash and attainment of water quality standards in receiving waters will require management of these non-storm drain system discharges in addition to control of storm drain system trash discharges by Permittees. In MRP 2, several Permittees developed Direct Discharge Control Plans (DDCPs), which are comprehensive plans that describe actions the Permittee will implement to control these other sources of trash discharged to receiving

waters in their jurisdiction. Accordingly, Permittees should be allowed to offset some of their percent load reduction requirements if they control these other sources, both by removing trash after it has already impacted receiving waters, and by taking steps to permanently reduce direct discharges of trash through the provision of housing and services to unsheltered homeless populations (particularly those located near receiving waters) and by abating and implementing controls at illegal dumping sites (particularly those located near receiving waters).

When Permittees meet the needs for housing and associated services of people experiencing unsheltered homelessness, they are likely to reduce the number of people experiencing homelessness, and the presence of homeless encampments from which direct discharges may occur. Therefore, a key best management practice for mitigating the adverse water quality impacts associated with homelessness is to provide housing and services. If Permittees provide housing, but not services, unsheltered homeless people whose needs for services are not met may leave the provided housing and re-establish homeless encampments. If Permittees provide services, but not housing, it is likely that there will be ongoing direct discharges of trash at homeless encampments, because services provided at homeless encampments have often insufficiently prevented direct discharges. If the needs for both housing and services by people experiencing unsheltered homelessness *are* satisfied, those people are less likely to re-establish homeless encampments, and therefore they are less likely to directly discharge trash from homeless encampments.

Likewise, providing dumping vouchers and holding free waste drop-off events, especially to socioeconomically disadvantaged communities, is likely to avoid and reduce direct discharges at illegal dumping sites.

Examples of sanitary controls include opening restrooms in public buildings, porta potties, hand washing stations and showers that are provided at a sufficient number and provisioned and cleaned at a sufficient rate. Examples of trash controls include trash receptacles that are sufficiently large depending on the homeless encampment, and that are emptied at a sufficient rate.

The Permit's expectation is that housing and services provided to populations experiencing unsheltered homelessness, and structural and institutional mitigation of illegal dumping sites, will increase over the course of the Permit term. This will be tracked by the reporting required in Provision C.10.g.xi.

Because the criteria for what is an acceptable DDCP have changed from the Previous Permit, and because Permittees may have updated their DDCPs over the course of the Previous Permit, this Permit requires Permittees with existing DDCPs to submit their updated DDCPs for approval before the first new water year during the Permit term, in order to continue claiming trash load percent reduction offsets.

Permittees have and likely will continue to demonstrate the benefit of controlling these additional sources by accounting for the volume of trash collected. As with additional

creek and shoreline cleanups, the volume of trash removed cannot be compared directly with trash load discharge rate (volume/time).The simplest, and possibly only way to account for these additional control actions, until more rigorous assessment and accountability methods are developed, is to allow a Permittee to offset part of its Provision C.10.a trash load percent reduction requirement using the Provision C.10.f.i formula to determine an offset from additional creek and shoreline cleanup. However, since control of these other sources by Permittees will be through implementation of a comprehensive and sustained program, Permittees that implement a comprehensive plan approved by the Executive Officer merit a higher offset cap than that allowed by Provision C.10.f.i for additional creek and shoreline cleanup. A fifteen percent offset-cap based on the Provision C.10.f.i formula provides a balance between incentive and reward for control of these non-storm drain system sources and the uncertainties associated with the simple formula.

This offset will no longer be applicable after June 30, 2025, when compliance with the 100 percent trash load reduction requirement is required through implementation of full trash capture systems or equivalent controls. The State Trash Amendments do not allow offset credit for direct discharge controls in lieu of implementing MS4 controls to meet the Trash Discharge Prohibition.

Permittees that develop and implement DDCPs are generally challenged with greater volumes and areas of trash to control, so it is reasonable to allow those Permittees additional time to reach the 100 percent trash load reduction compliance benchmark as they continue to implement their DDCPs. Those Permittees, other than the East Contra Costa County Permittees, that implement an approved DDCP may be granted additional time until December 31, 2025, which is the latest compliance date allowed by the Statewide Trash Amendments, to attain 100 percent trash load reduction. Permittees that are allowed until December 31, 2025, to attain 100 percent trash load reduction must report compliance status as described in C.10.g.viii. The East Contra Costa County Permittees that implement an approved DDCP may be granted until June 30, 2026, to attain 100 percent trash load reduction, because they are not subject to the same December 31, 2025, deadline under the Trash Amendments. These permittees were subject to MRP 2 after its effective date in 2016.

C.10.g. Reporting - The reporting requirements reflect the minimum amount of information needed to demonstrate compliance with all Provision C.10 requirements.

C.11. Mercury Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay and Guadalupe River watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury wasteload allocations established for the TMDLs.

The C.11 provisions follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)) and accordingly, build on understanding gained from control measure implementations during the previous permit terms. During the Previous Permit, Permittees were required to implement mercury control measures (source control, treatment control and/or pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and to report on the loads reduced through implementation of those control measures.

In this permit term, the mercury control provision requires specific programmatic control measures deemed effective based on implementation experience and analyses in previous permit terms implemented at full-scale (a “programmatic approach”). For mercury, these control measures include: mercury collection and recycling, source property identification and abatement, control measure implementation in old industrial areas, and green stormwater infrastructure implementation.

The “programmatic approach” to mercury control measures means that the Permit provisions estimate anticipated mercury load reductions for each of these programmatic control measures consistent with an expected level of control measure implementation intensity along with trackable implementation performance metrics to be reported consistent with the stipulated load reductions. Load reductions will be calculated based on the technically sound load reduction accounting methods[286] developed and refined during previous permit terms. Many of the control measures may be chosen primarily for the purpose of achieving PCBs load reductions, but mercury load reductions will often result as a tangential benefit (because of possible co-located PCBs and mercury contamination) and should be accounted for.

As discussed below, based on information gained during control measure pilot testing and reported during the previous permit term, mercury load reductions on the order of those anticipated (approximately 10 kg mercury/year) through implementation of control measures required by this Permit are achievable and necessary in order to make progress toward achieving the regionwide urban runoff wasteload allocation of 82 kg/yr (representing a load reduction from all urban runoff sources of approximately 80 kg/yr compared to loads estimated using data collected in 2003) within the 20-year TMDL timeframe. In the sections below, the mercury-specific control measures will be described along with estimates of load reductions resulting from each.

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. C.11 includes components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 On October 8, 2008, the Water Board adopted a Basin Plan amendment including a TMDL for mercury in the Guadalupe River Watershed (GRW) and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. The GRW mercury TMDL assigns an urban stormwater runoff allocation proportionally equivalent to the mass allocation in the San Francisco Bay mercury TMDL. Accordingly, the GRW urban stormwater runoff mercury allocation is simply the fraction of the Santa Clara Valley Urban Runoff Pollution Prevention Program allocation attributed to the Guadalupe River watershed. The urban stormwater runoff allocation implicitly includes all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The 2003 load of mercury from urban runoff was estimated to be 160 kg/yr, and the aggregate WLAs for urban runoff is 82 kg/yr. The mercury TMDL provides as follows:

> *"[The WLAs] shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and [Caltrans]. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, 'source category') including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.*
>
> *The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between*

the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff and remain consistent with the section of the Basin Plan chapter titled, Surface Water Protection and Management—Point Source Control—Stormwater Discharges. The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

Continue to develop and implement a mercury source control program;

Implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

Monitor levels of methylmercury in discharges [Note: this requirement was satisfactorily accomplished during MRP 1 and is not included in the Permit.];

Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

Develop an equitable allocation-sharing scheme in consultation with Caltrans to address Caltrans roadway and non-roadway facilities in the program area, and

report the details to the Water Board [Note: Caltrans has mercury-related requirements in its draft permit pursuant to this requirement.]);

Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in [individual WLAs (see Table 4-w of the Basin Plan)], by using one of the following methods:

Quantify the annual average mercury load reduced by implementing

Pollution prevention activities, and

Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an

allocation, load reduction, and/or other regulatory requirements for the source in question."

C.11-4 Loading estimates using recently available data suggest that the urban runoff mercury loading to San Francisco Bay is on the order of 115 kg/yr (McKee and Yee 2015[284]). While this figure is based on environmental data and thus has inherent uncertainty associated with it, it suggests that current mercury loading is approximately equal to the interim TMDL loading milestone (to be reached at the half-way point of TMDL implementation, 2017) of 120 kg/yr. If mercury loads can be reduced by approximately 35 additional kg/yr, urban runoff loading would meet the TMDL wasteload allocation.

C.11-5 Mercury is distributed more uniformly throughout the urban landscape than PCBs. For example, loading from older industrial and other polluted source areas accounts for only 6% of the average annual mercury load, but these areas account for over 50% of the average annual PCBs load (McKee and Yee 2015). The likely stronger role of atmospheric deposition in the case of mercury, which may account for up to 50% of the mercury found in urban runoff, is part of the reason for the more uniform mercury distribution in the landscape (McKee and Yee 2015).

C.11-6 Monitoring data indicate that, while not always the case, watersheds with high PCBs concentrations often contain high or moderately high mercury concentrations (McKee and Yee 2015). Therefore, control strategies focused on finding and managing PCBs-contaminated drainages will often yield mercury load reduction benefits as well.

C.11-7 This provision is consistent with a 2014 U.S. EPA memorandum[285] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear and concrete milestones and deadlines (see Provision C.11.a.iii) for the activities associated with achieving mercury load reductions as well as other requirements (see Provision C.11.b-h.), necessary to achieve receiving water limits of this permit term relative to the mercury TMDL WLA.

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[284] McKee, L.J. and Yee, D., 2015. *Sources, Pathways and Loadings: Multi-Year Synthesis. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS)*. San Francisco Estuary Institute, Richmond, California.

[285] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

Specific Provision C.11 Requirements

Background: The specific requirements in C.11 require Permittees to implement effective control measures to implement the urban runoff requirements from the San Francisco Bay mercury TMDL and achieve mercury load reductions. Permittees must quantitatively document the estimated load reductions achieved through use of the accounting scheme developed and refined during the Previous Permit.

The largest reductions in mercury loads in the urban environment will come from the collection of and recycling of mercury-containing devices, and these activities are, in fact, required by household hazardous waste and producer responsibility laws. Most of the *readily controllable* mercury loads one finds in the urban environment originate in these products, and so eliminating these sources of mercury for subsequent transport is an important and effective strategy for mercury load reductions.[289]

As previously mentioned (in Fact Sheet section C.8), mercury is much more evenly distributed in watersheds than are PCBs so there are fewer opportunities to find and address heavily contaminated (with mercury) sites to achieve substantial, short-term load reductions. Both PCBs and mercury are, however, transported attached to sediment particles so many of the same control measures that capture sediment (e.g., green stormwater infrastructure, other treatment control, trash capture devices, routing stormwater to treatment facilities) will be effective in reducing loads for both contaminants. Consequently, much of the additional benefit to reduce mercury urban runoff loads will come from a combination of proper disposal and management of mercury containing products as well as much more extensive treatment elements (e.g., green infrastructure) incorporated into the stormwater infrastructure.[289] Because PCBs are more concentrated in some locations, the choice of where to implement control measures may be more influenced by known areas of PCBs contamination. However, the mercury removal benefit can be an important contribution to overall mercury load reductions, and available data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances.

Another reason that control measure implementation tends to focus on addressing PCBs is that the scale of urban runoff load reductions required by the PCBs TMDL (about 90 percent) is far greater than that required by the mercury TMDL (about 50 percent). Moreover, recent loading estimates suggest that current mercury loading to the Bay is at or below the interim loading milestone established in the TMDL.

Provision C.11.a requires Permittees to assess mercury load reductions through use of a previously-developed assessment methodology and data collection program[286] to quantify mercury loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required

[286] *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* (January 2022). Prepared for Bay Area Storm Water Management Agencies by Geosyntec Consultants.

by the provisions of this Permit. As Permittees gain implementation experience and collect information on this implementation, they may request refinement of the accounting system for use in subsequent permit terms.

Permittees are encouraged to build on the loads assessment framework developed in previous permit terms and refine the load assessment methodologies if appropriate. This could include updating and, in some cases, extending the framework presented in that document, justifying assumptions and selected parameters used for each type of control measure, and indicating what information will be collected and submitted to calculate the load reduction for each implemented control measure. The accounting scheme submitted (if necessary) near the end of the permit term (for use in subsequent permits) must be submitted for Executive Officer approval. For more information, please see the discussion under Provision C.12.a, below.

Provision C.11.a also requires Permittees to submit documentation confirming that that all control measures initiated or implemented during the previous permit term for which ongoing load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction. Examples of this include the enhanced operation and maintenance activities associated with source property referrals, green stormwater infrastructure implementation, trash collection devices with mercury and PCBs-reduction benefit, and other control measures. Appropriate documentation may include dated photographic evidence, maintenance records, and other types of relevant records showing that the control measures continue to be implemented in a manner consistent with the load reduction credit established when they were initiated.

Provision C.11.b requires Permittees to investigate land areas (general older industrial land use areas) that may contribute mercury to MS4s. For those properties or land areas found to be contributing substantial amounts of mercury or where high mercury concentrations are found (generally areas with sediment concentrations greater than 0.5 mg mercury/kg), this provision element requires Permittees to take actions to abate the mercury sources into their MS4s or refer the properties to the Water Board for follow-up measures. Historical monitoring data suggest that mercury concentrations on or near source properties are similar to those found in urban areas in general so identification of source properties for referral is more likely to be based on presence of high PCBs concentrations (generally 0.5 mg PCBs/kg) alone. Please see the discussion under C.12.b for more information about development of the accountability and load reduction estimate methodology.

A logical performance metric for the source area investigations required by Provision C.11.b is the number of acres of investigated relevant (old industrial) land area. These types of investigations have been performed by the programs for over a decade so there is a basis to establish a reasonable pace for investigations.

In selecting a performance metric for the pace of source property investigations during MRP 3, the following criteria are applied:

- Take into consideration the pace of past investigative efforts. This is consistent with the Basin Plan's requirement that the permit must include TMDL WLA implementation provisions based on an updated assessment of best management practices and control measures intended to reduce mercury in urban stormwater runoff to the maximum extent practicable.
- Endeavor to bring the countywide programs to similar levels of completion (of source property investigation) by the end of the permit term.
- Establish regular, clearly presented, enforceable, non-contingent milestones and deadlines for compliance.

All countywide programs have performed desktop screening of their old industrial land use to remove low-likelihood areas from consideration. Thus, the remaining acres of old industrial land use must be actively investigated, often requiring sampling of sediment or stormwater to find possible source properties. The programs have been, over the last (approximately) 10 years, performing active investigations (Landuse Summary[287]) at varying paces. These amounts of land area actively screened can be compared to the amount of land area that originally required investigation, and a percent completion can be computed. The percent completion of these active investigations ranges from 11 to 98 percent among the countywide programs.

- Santa Clara: 4,214 acres investigated (of 5,127, 82 percent of total requiring investigation)
- San Mateo: 2,869 acres investigated (of 4,280, 67 percent of total requiring investigation)
- Alameda: 753 acres investigated (of 6,746, 11 percent of total requiring investigation)
- Contra Costa: 976 acres investigated (of 5,005, 20 percent of total requiring investigation)
- Solano: 1,075 acres investigated (of 1,096, 98 percent of total requiring investigation)

From these data, the average of the investigatory pace of the two fastest programs is 1700 acres in a period of five years, and this pace constitutes the baseline pace for source property investigations for MRP 3. Provision C.11.b requires a slightly faster pace for those programs that would not reach at least 50 percent completion by the end

[287] Source Property Investigation Summary with Performance Metric Calculation (5-14-21). Data Submitted by BASMAA.

of the permit term if they merely achieved the baseline pace. Therefore, the required pace for source property investigations during MRP 3 is the greater of:

(1) A number of acres such that at least 50 percent of the initial amount of old industrial land use requiring investigation (desktop excluded) will be investigated, OR

(2) a baseline pace of 1,700 acres.

According to this performance metric, the programs will complete the following investigations and have the following percent completion by end of MRP 3.

- Santa Clara: 913 acres during MRP 3
    - for total of 5,127 acres, 100 percent of total requiring investigation by end of MRP 3
- San Mateo: 1,411 acres
    - for total of 4,280 acres, 100 percent of required by end of MRP 3
- Alameda: 2,620 acres
    - for total of 3,373 acres, 50 percent of required by end of MRP 3
    - requires pace above baseline
- Contra Costa: 1,700 acres
    - for total of 2,676 acres, 53 percent of required by end of MRP 3
- Solano: 21 acres
    - for total of 1,096, 100 percent of required by end of MRP 3

Summing the required acreage for source property investigations for the countywide programs results in a total of 5,752 acres to be investigated during MRP 3. Making the conservative assumption that the rate of referral (acres referred:acres investigated) will be one-third of the historical ratio of acres referred:acres investigated for each program during MRP 3, approximately 147 acres of source properties will be referred for follow-up action during the MRP 3 permit term.

A simple approach for estimating the load reductions associated with certain control measures involves use of a land-use pollutant yield. A land-use yield is an estimate of the mass of a contaminant contributed by an area of a particular land-use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historical or ongoing use of pollutants in those land uses. For example, PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas where PCBs

were never intensively used. However, this is generally not the case for mercury, where uses were more widespread. This more widespread use and the greater role of atmospheric deposition for mercury in determining the distribution of contamination reduces the likelihood of finding areas with high concentrations of mercury.

Estimated load reductions for source property referral are based on the expectation that the source property will yield less mercury upon cleanup such that the mercury yield will be more like the yield from older commercial areas rather than older industrial areas. For example, when contaminated areas are newly or redeveloped, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). There may be some mercury load reduction from source property referral (which is mainly based on PCBs contamination), but this can be determined on a case-by-case basis provided that pre-cleanup sediment concentration data are available and greater than the typical yield in old industrial, old commercial, and old residential areas of about 50 mg mercury/acre/year.[286]

Contaminated properties often have a “halo” of contamination in the vicinity of the property, and contaminated sediments in this halo can be transported to receiving waters through the stormwater conveyance system. Further, pollutants from the source area may continue to be transported offsite while remediation occurs. Therefore, implementing enhanced O&M both in areas immediately adjacent to the source area and onsite (to prevent offsite migration) while the source property is being remediated is a priority to prevent PCBs or mercury transport to receiving waters. If enhanced O&M measures are not implemented in the immediate vicinity of the referred property, the calculated load reduction will be recognized upon completion of the cleanup project. In order to confirm effective implementation of enhanced O&M plans to address the prevention of pollutants migrating offsite and the “halo” of contamination in the vicinity of the contaminated property, the Permit requires that these plans be submitted to Water Board staff for review and acceptance prior to the referral.

Provision C.11.c requires Permittees to implement control measures (treatment controls, diversion to wastewater treatment plants, or enhanced operation and treatment controls) on 2,580 acres of old industrial land use (see below for more information on this performance metric). Note that this provision is identical to Provision C.12.c, and that the choice of locations for control measures will often be based on PCBs concentrations, and that mercury-related load reduction benefits will, therefore, be largely coincidental. However, there are locations of high mercury concentrations that provide good opportunities for control measure implementation. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence moderate to high PCBs soil concentrations (generally sediment concentrations greater than 0.3 mg Hg/kg or greater than 0.2 mg PCBs/kg, approximately the 75th percentile concentrations of these pollutants in old industrial areas). These concentrations should not be considered a “bright line” as there are likely

areas of moderate contamination for these pollutants just under these concentrations that would still be good locations for implementation, especially if these locations have a large reservoir of readily transportable, moderately contaminated sediment. Moreover, the available data have uncertainty so a measured concentration under but near 0.3 mg Hg/kg or 0.2 mg PCBs/kg may indicate an area of moderate contamination such that additional monitoring would reveal concentrations higher than these thresholds. Permittees have discretion to choose control measures appropriate to the circumstances. The reason that PCBs concentrations will be generally be more useful for selecting locations is that it is easier to find old industrial areas that are highly elevated in PCBs concentrations than it is to find areas highly elevated in mercury. As an illustration, in over 1,200 sediment samples collected in old industrial areas, the 90th percentile PCBs concentration was 22 times higher than the median. In other words, the more contaminated areas are much more contaminated than the typical (median concentration) value. By contrast, the 90th percentile mercury concentration in over 1,000 samples collected in old industrial areas was only five times higher than the median.[286] See Fact Sheet section for Provision C.12.c for more information and background on this provision element.

As stated previously, all countywide programs have performed desktop screening of their old industrial land use areas. From this information, we can estimate the extent of old industrial land use that may benefit from treatment or other control measures to address the moderately high PCBs and mercury contamination. In the information submitted by the counties, this area is the amount of old industrial land use in 2002 minus the amount redeveloped since 2002 minus the amount not draining to MS4 (see Landuse Summary[287]). The sum of these areas for each county is as follows.

- Santa Clara: 6,647 acres
- San Mateo: 4,450 acres
- Alameda: 9,374 acres
- Contra Costa: 11,199 acres
- Solano: 1,426 acres

These sum to 33,100 acres for the MRP Permit area. The performance metric for MRP 3 is to implement treatment or other controls on 2,580 acres (which represents just less than 8 percent as currently understood) of this old industrial land use across the entire MRP area. Applying the mercury yield from old industrial area (60 mg mercury/acre/year) to this area and a 70 percent treatment efficiency (efficiency factor for green infrastructure or retrofit treatment control[288]), the expected mercury load reduction by the end of the permit is 108 grams/year. It is important to note that the

[288] Geosyntec Consultants (2017). *Interim Accounting Methodology for TMDL Loads Reduced*. Prepared for Bay Area Stormwater Management Agencies Association.

performance metric is expressed as an amount of old industrial land use to address with control measure implementation or, equivalently, the calculated amount of load reduction from this implementation. With our current understanding of the amount of old industrial land use in the region, the areal performance metric is 2,580 acres of old industrial land use throughout the region. The expected scale of implementation (2,580 acres throughout the region) is very similar to the anticipated level of effort for Caltrans in the SF Bay Region, in which Caltrans will implement treatment controls on approximately 11 percent of their 27,000 acres of right-of-way for a total of more than 2,900 acres (draft Caltrans permit). Permittees may provide updated information concerning the actual amount of old industrial land use, and this amount may differ from the 33,100-acre estimate used here. For example, some of this land use may drain directly to the Bay or may not drain to MS4s. If the amount of old industrial land use is reduced with such new information, it may be the case that the old industrial acreage performance metric may constitute greater than 8 percent of the remaining old industrial land use. The performance metric was designed in part based on the level of effort expected of Caltrans in their draft permit and also to make meaningful progress in addressing old industrial land use, thereby reducing loads of mercury and PCBs. The fact that the acreage represents 8 percent of old industrial land use (as currently understood) is coincidental.

The performance metric (acreage to be addressed by the end of the permit term or corresponding estimated load reduction) can also be shown by county along with the estimated mercury load reductions (for 70 percent control measure efficiency, e.g., retrofit treatment control measures) are as follows:

- Alameda County: 664 acres (28 grams/yr)
- Contra Costa County: 664 acres (28 grams/yr)
- San Mateo County: 445 acres (19 grams/yr)
- Santa Clara County: 664 acres (28 grams/yr)
- Solano County: 142 acres (6 grams/yr)

Compliance with the provision element can be accomplished in one of two ways. Permittees within the county can implement control measures on the listed amount of old industrial land use (assuming 70 percent control measure efficiency, amounts could vary depending on efficiencies of control measures actually implemented) or account for the mass reduction of mercury shown in parentheses. These are equivalent performance metrics because the mass reductions were calculated using the listed old industrial acreage multiplied by the old industrial mass yield and 70 percent efficiency for control measures. For example, consider a county that must address 1,000 acres of old industrial land use when implementing control measures with an efficiency of 70 percent (for a load reduction of 42 grams of mercury). If this county chose instead to implement only control measures with 20 percent efficiency (e.g., efficiency of

hydrodynamic separators), the required acreage would be: 1,000 acres x (70% / 20%) = 3,500 acres. However, the load reduction would be calculated as 3,500 acres x 60 mg mercury/acre/year) x 20% treatment efficiency, or 42 grams of mercury.

If treatment control systems are used, they must be designed and sized consistent with Provision C.3.d(2) (Numeric Sizing Criteria for Stormwater Treatment Systems). Because of the higher removal efficiency of wastewater treatment facilities, each acre treated by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements. This factor is based on the fact[295] that wastewater treatment facilities remove well over 90 percent of suspended sediment particles (to which mercury and PCBs are attached), and the ratio of 0.9 to 0.7 is 1.3. Conversely, if control measures having less than 70 percent efficiency are implemented, the acreage credited will be proportional to the ratio of efficiencies (e.g., acreage credited in the ratio of 0.5/0.7 for control measures with 50 percent efficiency – see example calculation above).

Provision C.11.d requires Permittees to promote, facilitate, and/or participate in collection and recycling of mercury containing consumer products, devices, and equipment (e.g., thermometers, thermostats, switches, bulbs) and report on the amount of material recycled and approximate mass of mercury in this material. The load reduction accounting system[286] contains methodologies developed for estimation of such quantities. Collection and recycling of mercury containing devices are vital to reducing urban runoff mercury loads from the urban environment because of the large amount of mercury contained within such devices.

In the Bay Area, households and small businesses use about 1.8 million fluorescent bulbs annually, and large businesses use 10.2 million annually.[289] The number of bulbs available for recycling each year ranges from 3 to 16 million. Recycled bulbs are estimated to be largely tube lamps, which have an average amount of mercury per tube of 21.4 mg. If fluorescent bulbs, which contain mercury, are broken, it is possible for some of the mercury to volatilize and enter the environment. Some of the volatilized mercury may later become attached to particulates and be deposited, via wet and dry deposition, onto the ground or directly onto the Bay. During wet weather, some of this sediment containing mercury can be mobilized, enter the stormwater system, and potentially be conveyed to the Bay. If bulbs are properly disposed of and recycled, much less mercury enters the Bay.[289] Thermostats are a smaller potential source of mercury in that there is approximately 9.3 kg of mercury contained in the 1,500 thermostats recycled in 2006. However, if these devices are not properly disposed of, the mercury from thermostats can also be transported to receiving waters via the same processes described for fluorescent bulbs. Since 2006, California's Universal Waste Rule has

[289] Geosyntec Consultants (2010). *Desktop Evaluation of Controls for Polychlorinated Biphenyls and Mercury Load Reduction*. SFEI Contribution 613

prohibited landfill disposal of mercury-containing products (fluorescent tubes, switches, and thermostats). These waste products must be separated and properly recycled.

The Desktop Evaluation[289] estimates that the amount of mercury load reduction (mercury prevented from reaching receiving waters) achieved through recycling fluorescent bulbs increases from about 2.4 kg mercury/yr in 2010 to 13 kg mercury/yr by 2030. The same report estimates that the amount of mercury load reduction from thermometer recycling increases from 0.8 to 2.4 kg mercury/yr between 2010 and 2030. Interpolating these load reduction estimates, one calculates that, by the end of MRP3, approximately 8.8 kg mercury/yr load reduction will result from fluorescent tube recycling and 1.3 kg mercury/yr load reduction from thermostat recycling.

Provision C.11.e requires Permittees to implement green infrastructure projects during the term of the Permit at a level consistent with the requirements in Provision C.3.j. The Previous Permit required Permittees "to develop RAAs to estimate the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040." The analysis and resulting estimates for acres treated and mercury load reductions are contained in the Annual Reports for the countywide programs submitted in Fall 2020. Interpolating between the 2020 and 2030 results provides an estimate for the acreage and mercury load reductions resulting from green infrastructure implementation by 2025:

- Alameda County: 1,230 acres 35 g/yr
- Contra Costa County: 950 acres 25 g/yr
- San Mateo County 314 acres 8 g/yr
- Santa Clara County 856 acres 21 g/yr
- Solano County Permittees 821 acres 19 g/yr

The Santa Clara County and San Mateo RAAs did not include green stormwater infrastructure load reduction estimates for mercury. The average mercury load reduction per acre of implemented green infrastructure from Alameda, Contra Costa, and Solano was multiplied by the acres of planned green stormwater infrastructure implemented in these two counties to generate an estimated load reduction. Summing these estimated load reductions across countywide programs results in a regionwide total estimated mercury load reduction from green stormwater implementation of about 108 g/yr by the end of the permit term. Please see the discussion under Provision C.12.f for more information how modeling was used to develop the accountability and load reduction estimate methodology for GSI.

Available information suggests that mercury is distributed more uniformly throughout the Bay Area landscape than is the case for PCBs. Therefore, a focus on highly or even moderately contaminated areas (with mercury) may not be enough to achieve the TMDL-required load reductions. A significant component of the overall strategy to

reduce urban runoff mercury loads will be the implementation of green infrastructure control measures to intercept mercury-containing sediment and stormwater before it is discharged to receiving water. However, the planning, financing and implementation of green infrastructure is going to take a long time, perhaps as much as 25 years or more. This also means that the load reduction benefits of such implementation will also be realized over an extended time frame.

Provisions C.11.f requires Permittees to update (as needed) the plans and schedules prepared during the previous permit for mercury control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations. The updates should focus on those control measures for which new information is available and for control measures not evaluated in previous efforts. The Permit requires that these plans must: identify all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented; include a schedule according to which these technically and economically feasible control measures will be fully implemented; and provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

Provision C.11.f also requires Permittees to submit information to inform mercury-related requirements in the subsequent permit term. Namely, Permittees must identify all specific control measures to be implemented along with the expected intensity (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.) of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term.

The mercury TMDL anticipated the challenge of achieving the urban runoff mercury load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that:

> 3. *"the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:*
>
> - *A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;*
> - *Documentation has been prepared that demonstrates that all technically and economically feasible and cost-*

effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;

- *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
- *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate."*

Provision C.11.f provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. The load reductions for mercury are difficult and time-consuming to achieve because mercury is distributed relatively uniformly throughout the urban landscape, and there are few areas of substantial contamination to address in an aggressive fashion. Proper recycling and disposal of mercury-containing materials (Provision C.11.d) will continue to play an important role in reducing mercury loads in urban runoff. The RAAs submitted during the previous Permit Term emphasize that expected mercury load reductions will come from long-term implementation of control strategies (like source control, cleanup of contaminated sites, green infrastructure, and others) that extend beyond the current implementation timeframe of the TMDL. The updates to the long-term plans and schedules required by this provision could potentially support an amendment to TMDL implementation timeframe.

Provision C.11.g. There are still uncertainties surrounding the magnitude and nature of mercury reaching the Bay in urban runoff and the ultimate fate of such mercury, including biological uptake. Provision C.11.g requires that Permittees ensure that fate and transport studies of mercury in urban runoff are completed. The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the sediment and food web mercury concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, especially in Bay margins, and the identification of drainages where urban runoff mercury are particularly important in food web accumulation.

Provision C.11.h requires actions to mitigate human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish to be aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in a previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.12. PCBs Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs wasteload allocations established for the TMDL. In order to make substantial progress, Permittees must implement PCBs control measures strategically during this permit term. Moreover, aggressive control measure implementation combined with thoughtful planning for the future (see Provision C.12.h) are conditions that must be satisfied before the Water Board can consider an implementation timeframe longer than the 20 years provided in the TMDL.

The C.12 requirements follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)). Accordingly, they build on understanding gained during the Previous Permit term, during which Permittees were required to implement PCBs control measures (source control, treatment control and/or pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and to report on the loads reduced through implementation of those control measures.

In this Permit term, the PCBs provision requires specific programmatic control measures deemed effective based on implementation experience and analyses in previous permit terms implemented at full-scale (a “programmatic approach”). For PCBs, these control measures include: source property identification and abatement, control measure implementation in old industrial areas, controlling PCBs in stormwater infrastructure, controlling PCBs from electrical utilities, green stormwater infrastructure, and managing PCBs-containing material during building demolition.

The programmatic approach to PCBs control measures means that the Permit provisions estimate, based on calculations, anticipated PCBs load reductions for each of these programmatic control measures consistent with an expected level of control measure implementation intensity along with trackable implementation performance metrics to be reported consistent with the estimated load reductions. Load reductions will be calculated based on the technically sound load reduction accounting methods[286] developed and refined during previous permit terms.

As discussed below, based on information gained during control measure pilot testing and reported during the Previous Permit term, load reductions on the order of those anticipated (approximately 1.47 kg PCBs/year) through implementation of control measures required by this Permit are achievable and necessary in order to make progress toward achieving the regionwide urban runoff wasteload allocation of 2 kg/yr (representing a load reduction from all urban runoff sources of approximately 18 kg/yr compared to loads estimated using data collected in 2003) within the 20-year TMDL timeframe. Further, load reductions resulting from a variety of PCBs control measures may be feasibly calculated in a straightforward manner (see below) and a clear

accountability metric against which to evaluate the sufficiency of control measure implementation can be applied.

The area covered by the Permit (permit area) is smaller than the region that discharges to the Bay. The discharges in the permit area have been allocated 1.6 kg/yr of the total 2 kg/yr wasteload allocation and the total load reductions required from Permittees in the permit area during TMDL implementation is 14.4 kg/yr of the 18 kg/yr regionwide total.

Fact Sheet Findings in Support of Provision C.12

C.12-1 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. U.S. EPA approved the TMDL on March 29, 2010.

C.12-2 The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit:

> *"The 2003 load of PCBs from urban runoff is* 20 kg/yr, and the aggregate WLAs for urban runoff total 2 kg/yr. Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.
>
> *Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of* best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities … shall reduce PCBs in stormwater runoff to the maximum extent practicable….
>
> *In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot*

*scale to determin*e their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost-efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

*In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through tr*eatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section."

C.12-3 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question. If these sources are contributing to urban runoff loads (as opposed to direct Bay discharge), load reductions from these sources will count toward meeting the urban runoff wasteload allocations.

C.12-4 Some PCB congeners have dioxin-like properties. Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions

targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

C.12-5 Estimates using the latest available data suggest that the urban runoff PCBs loading to San Francisco Bay is on the order of 19 kg/yr (McKee and Yee 2015). While this figure is based on environmental data and thus has inherent uncertainty associated with it, it agrees very well with the regional urban runoff load estimate of 20 kg/yr provided in the TMDL report.

C.12-6 Studies suggest that PCBs load reductions of approximately 6 kg/yr are possible by 2030 through control measures like street sweeping, control of PCBs during building demolition and renovation, drop inlet cleaning, treatment retrofits, redevelopment of contaminated areas, pump station diversion, and street flushing (McKee and Yee 2015[284]). While there are substantial uncertainties associated with these estimates, these results suggest that a substantial portion of the additional load reductions (~ 12 kg/yr) necessary to achieve the PCBs TMDL may need to come from identification and cleanup of PCBs-contaminated properties.

C.12-7 The distribution of PCBs in the urban landscape is much more variable than it is for mercury. For example, data indicate that PCBs-contaminated land uses yield perhaps 800 times more PCBs per unit area compared to the least contaminated land uses. By contrast, there is a 70-fold difference between the highest and lowest yielding land uses for mercury (McKee and Yee 2015). A large proportion (about 53 percent) of annual average urban runoff PCB loading is likely coming from old industrial or other contaminated areas (McKee and Yee 2015).

C.12-8 A significant recent accomplishment of the Sources, Pathways, and Loadings workgroup (SPLWG) of the Regional Monitoring Program has been the development and refinement of a Regional Watershed Spreadsheet Model (RWSM). This GIS-based model estimates relative land use and source area yields, and integrates them to provide a transparent, mutually accepted, and peer-reviewed analysis of relative watershed scale yield. Outputs from model runs to date suggest yields for the most polluted watershed in excess of 1,000 g/km^2 for PCBs and mercury and a variation between watersheds of ~100,000-fold for PCBs and ~200-fold for mercury. To date, modeling results have a large amount of uncertainty in terms of absolute magnitude, but the results are capturing the patterns of contaminant distribution and transport. The model output is generally consistent with what is known about the distribution of these contaminants in the landscape from stormwater and bedded sediment data. The results are also consistent with what monitoring data tell us about the relative mercury and PCBs loads from land use and source area categories. The SPLWG is currently developing a more sophisticated dynamic watershed loading model that will provide a much better modeling tool to predict

watershed scale loads of PCBs and other contaminants under a variety of management scenarios.

C.12-9 Sufficient information is available to establish default factors for PCBs load reduction credit resulting from foreseeable control measures implemented during this permit term (see information under Provision C.12.a, below). For treatment controls, the estimated load reductions can be calculated by multiplying the assumed land-use PCB yearly mass yield by the treated area and by a treatment efficiency factor. The load reduction resulting from cleaning up contaminated properties can be estimated by recognizing that the yield of the contaminated property will be reduced to an assumed background level over the course of site cleanup. The load reduction resulting from controlling PCBs in building materials during demolition can be estimated by estimating the amount of PCBs in the building, the fraction of those PCBs that would enter the storm drain system in the absence of controls, and the efficiency of control measures applied to the demolished building to prevent such PCBs release.

C.12-10 Limited sampling data from Bay Area structures built between 1950 and 1980 suggest that PCB concentrations in caulks here are similar to those in other parts of North America and Europe. Samples collected in about 1,350 buildings in Switzerland constructed between 1950 and 1980 found almost half the buildings contained PCBs in caulk, with most samples containing >100 ppm and 20 percent containing 10,000 ppm or more. In Bay Area samples, 40 percent contained > 50 ppm PCBs and 20 percent contained > 10,000 ppm PCBs. The study estimates that certain types of Bay Area structures built 1950-1980 contain a mid-range average of 4.7 kg PCBs per building. An estimated 6,300 currently standing non-residential buildings in the MRP area were built between 1954 and1974. The mid-range estimate of the total PCB mass in caulk in these buildings is 10,500 kg.[290]

C.12-11 During the Previous Permit, Permittees were required to develop and implement protocols for identifying PCBs-containing structures at the time of demolition so that PCBs do not enter municipal storm drains. Some demolition sites, especially high-profile sites such as hospitals, bridges and sports arenas, comply with federal law (Toxic Substances Control Act) and State regulations (California Code of Regulations Title 22) that require a project proponent to determine the presence of PCBs and other hazardous substances and to follow applicable disposal requirements. Soil sampling data from such demolition projects indicate that significant concentrations of PCBs can be present in site soils. Such PCB-laden sediment, particularly at a demolition site without adequate controls, is transported by vehicle tracking, wind erosion or precipitation runoff to the storm drain. PCBs entering the storm drain system

[290] Klosterhaus S. and McKee L. et al. 2014. *Polychlorinated Biphenyls in the exterior caulk of San Francisco Bay Area buildings, California, USA*. Environment International 66 (2014) 38–43.

during dry weather are non-stormwater discharges that must be effectively prohibited pursuant to CWA § 402(p)(3)(B)(ii). PCBs that are discharged into storm drain systems and waters of the U.S. through stormwater runoff are appropriate for control in order to make progress in achieving the PCBs TMDL wasteload allocations for urban runoff, pursuant to CWA § 402(p)(3)(B)(iii).

C.12-12 The protocol for requiring applicable structures to sample for PCBs prior to receiving a demolition permit, developed during the Previous Permit term, allowed for identification of structures that contain PCBs. But the Previous Permit did not allow for collection of information that could demonstrate PCBs were properly disposed so they are not transported to water bodies via the MS4. That shortcoming is addressed in this Permit, for those structures where notification and advance approval from the U.S. EPA is not required. This Permit includes a requirement for Permittees to include in their annual reports verification, such as the hazardous waste manifest prepared for transportation of the material to a disposal facility, that demonstrates proper disposal of the building materials with PCBs concentrations of 50 ppm or greater.

C.12-13 U.S. EPA has developed guidelines, available at its "Steps to Safe Renovation and Abatement of Buildings That Have PCB-Containing Caulk" website, for identifying and removing PCBs in building materials that can help in the effort to manage PCBs so that they do not enter municipal storm drains. In addition, during the MRP 1 term, starting in 2009, the Permittees participated in the grant-funded "PCBs in Caulk Project", which addressed potential impacts of PCBs released into stormwater runoff during demolition or remodeling projects in the San Francisco Bay Area. This project fulfilled the permit requirement to investigate the costs, effectiveness, and technical feasibility of PCBs control measures to minimize the release of PCBs in caulks and sealants to stormwater runoff during demolition or remodeling projects. Products developed through this grant-funded project include a fact sheet for developers; a fact sheet on sampling methods; BMPs to control PCBs in caulk at demolition or renovation sites; a Model Implementation Process to incorporate a requirement to use BMPs into the municipal demolition permitting process; a training strategy to train and deploy municipal staff, such as hazardous material or building inspectors, to ensure proper implementation of BMPs; and a technical memorandum on relevant regulations and policies.

C.12-14 This provision is consistent with a recent U.S. EPA memorandum[291] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear and concrete accountability metrics and deadlines for the achievement of specific anticipated PCBs load reductions

[291] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs."

from effective control measures as well as other requirements, necessary to achieve receiving water limits of this permit term relative to the PCBs TMDL WLAs.

Specific Provision C.12 Requirements

Provision C.12.a requires Permittees to assess PCBs load reductions through use of a previously-developed assessment methodology and data collection program[286] to quantify PCBs loads reduced through implementation of any and all pollution prevention, source control, and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required by the provisions of this Permit. The load reduction assessment methodology is consistent with the PCBs TMDL requirement that *"stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions"* (there is a similar requirement in the SF Bay mercury TMDL). As Permittees gain implementation experience and collect information on this implementation, they may request refinement of the accounting system for use in subsequent permit terms.

The goals of the assessment methodology required in this provision element are two-fold. First, it establishes a system of accountability for control measure implementation with which to measure the sufficiency of control measure implementation intensity. Second, it provides an accounting system that relates control measure implementation intensity with estimated PCBs and mercury load reductions. This allows tracking of implementation intensity to assess compliance rather than having to measure actual load reductions to assess compliance, which is impractical. See discussion above under Provision C.8.f on the special challenges of monitoring PCBs and mercury and also in the introduction to pollutants of concern provisions where we describe the for PCBs and mercury control measure implementation. For each provision element, the Fact Sheet describes how data and information are used to develop the trackable accountability metric and load reduction estimate corresponding to the trackable metric.

Permittees are encouraged to build on the loads assessment framework developed in previous permit terms and refine the load assessment methodologies if appropriate. This could include updating and, in some cases, extending the framework presented in that document, justifying assumptions and selected parameters used for each type of control measure, and indicating what information will be collected and submitted to calculate the load reduction for each implemented control measure. The accounting scheme submitted (if necessary) near the end of the Permit term (for use in subsequent permits) must be submitted for Executive Officer approval.

Provision C.12.a also requires Permittees to submit documentation confirming that that all control measures initiated or implemented during the Previous Permit term for which ongoing load reduction credit was recognized continue to be implemented at an

intensity sufficient to maintain the credited load reduction. Examples of this include the enhanced operation and maintenance activities associated with source property referrals, GSI implementation, trash collection devices with mercury and PCBs-reduction benefit, and other control measures. Appropriate documentation may include dated photographic evidence, maintenance records, and other types of relevant records showing that the control measures continue to be implemented in a manner consistent with the load reduction credit established when they were initiated.

Many of the legacy sources of PCBs are found in Bay margins contaminated by historical industrial activity. These legacy sources may be contributing to storm drain runoff conveyances, but Permittees may have jurisdictional challenges in addressing the sources in private property. In addition, Permittees are responsible for contamination in public rights of way. Permittees are expected to make diligent efforts both to address contamination on public property and to refer source properties to the Water Board for possible cleanup and abatement.

Provision C.12.b requires Permittees to investigate land areas (generally older industrial land use areas) that likely contribute PCBs to MS4s. For those properties or land areas found to be contributing substantial amounts of PCBs or where high PCBs concentrations are found (generally areas with sediment concentrations greater than 0.5 mg PCBs/kg), this provision requires Permittees to take actions to abate the PCB sources into their MS4s or refer the properties to the Water Board for follow-up measures.

Permittees have developed a systematic investigatory process (described in appendix C of the load reduction accounting report[286]) to identify source properties, and this process includes the following steps:

(1) Identify areas that should be considered for source area investigations (completed);

(2) Conduct screening-level investigations using desktop analyses or monitoring data in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;

(3) Conduct targeted source area investigations (e.g., records review, ROW surveys, site visits, sampling) in areas prioritized as high or moderate likelihood source areas in (2) to identify and confirm source areas; and

(4) Determine next steps for confirmed source areas.

A useful performance metric for the source area investigations required by Provision C.12.b is the number of acres of investigated relevant (old industrial) land area. These types of investigations have been performed by the programs for over a decade so there is a basis to establish a reasonable pace for investigations. The reason why the Permit uses the acres investigated rather than the acres referred for follow-up action as

the performance metric is that it is not known in advance if the investigation is going to reveal a contaminated property suitable for referral.

In selecting a performance metric for the pace of source property investigations during MRP 3, the following criteria are applied:

- Take into consideration the pace of past investigative efforts. This is consistent with the Basin Plan's requirement that the permit must include TMDL WLA implementation provisions based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff to the maximum extent practicable.
- Endeavor to bring the countywide programs to similar levels of completion (of source property investigation) by the end of the permit term.
- Establish regular, clearly presented, enforceable, non-contingent milestones and deadlines for compliance.

All countywide programs have performed desktop screening of their old industrial land use to remove low-likelihood areas from consideration. Thus, the remaining acres of old industrial land use must be actively investigated, often requiring sampling of sediment or stormwater to find possible source properties. The programs have been, over the last (approximately) 10 years, performing active investigations (Landuse Summary[287]) at varying paces. These amounts of land area actively screened can be compared to the amount of land area that originally required investigation, and a percent completion can be computed. The percent completion of these active investigations ranges from 11 to 98 percent among the countywide programs.

- Santa Clara: 4,214 acres investigated (of 5,127, 82 percent of total requiring investigation)
- San Mateo: 2,869 acres investigated (of 4,280, 67 percent of total requiring investigation)
- Alameda: 753 acres investigated (of 6,746, 11 percent of total requiring investigation)
- Contra Costa: 976 acres investigated (of 5,005, 20 percent of total requiring investigation)
- Solano: 1,075 acres investigated (of 1,096, 98 percent of total requiring investigation)

From these data, the average of the investigatory pace of the two fastest programs is 1,700 acres in a period of five years, and this pace constitutes the baseline pace for source property investigations for MRP 3. Provision C.12.b requires a slightly faster pace for those programs that would not reach at least 50 percent completion by the end

of the permit term if they merely achieved the baseline pace. Therefore, the required pace for source property investigations during MRP 3 is the greater of:

- A number of acres such that at least 50 percent of the initial amount of old industrial land use requiring investigation (desktop excluded) will be investigated, OR
- a baseline pace of 1,700 acres.

According to this performance metric, the programs will complete the following investigations and have the following percent completion by end of MRP3.

- Santa Clara: 913 acres during MRP 3
  - for total of 5,127 acres, 100 percent of total requiring investigation by end of MRP 3
- San Mateo: 1,411 acres
  - for total of 4,280 acres, 100 percent of required by end of MRP 3
- Alameda: 2,620 acres
  - for total of 3,373 acres, 50 percent of required by end of MRP 3
  - requires pace above baseline
- Contra Costa: 1,700 acres
  - for total of 2,676 acres, 53 percent of required by end of MRP 3
- Solano: 21 acres
  - for total of 1,096, 100 percent of required by end of MRP 3

Summing the required acreage for source property investigations for the countywide programs results in a total of 5,752 acres to be investigated during MRP 3. Making the conservative assumption that the rate of referral (acres referred:acres investigated) will be one-third of the historical ratio of acres referred:acres investigated for each program during MRP 3, approximately 147 acres of source properties will be referred for follow-up action during the MRP 3 permit term. The ratio of acres referred:acres investigated was assumed to be one-third the historical ratio to account for the fact that the easier to find source properties may have already been identified. Therefore, the success rate of finding new source properties as old industrial acres are investigated may decline. The outcome of investigations during MRP 3 can confirm this assumption.

A simple approach for estimating the load reductions associated with certain control measures involves use of a land-use pollutant yield. A land-use yield is an estimate of the mass of a contaminant contributed by an area of a particular land-use per unit time. Essentially, different types of land uses yield different amounts of pollutants because

land use types differ in their degree of contamination resulting from differing intensities of historical or ongoing use of pollutants in those land uses. PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas where PCBs were never intensively used.

The land use-specific yields were developed by matching the predictions of a watershed model against monitoring data.[292] The inputs to the model include: 1) GIS layers identifying the composition of various types of land use in Bay Area watersheds (e.g., old industrial, old commercial, old residential, new urban, agriculture/open space), 2) information about the volume of water and sediment transported to receiving waters from these watersheds, and 3) PCBs and mercury monitoring data in a subset of these watersheds. The adjustable parameters in the model are the concentrations of pollutants in stormwater or sediment from the various types of land uses, and the final values for these concentrations are selected through an iterative process where the model predictions are matched against the actual data, and the values of the land use-specific concentrations are modified until a best solution is found for the water and sediment pollutant concentrations from various land uses that results in the best match with the monitoring data. This process is known as calibration. The resulting yields for water and sediment are simply the model-selected concentrations divided by the total volume of water or sediment originating from each land use type during a typical year divided by the total acreage of that land use type, and these yields are shown in Tables A-5 and A-6 below.

[292] Wu, J., Gilbreath, A.N., McKee, L.J., 2016. Regional Watershed Spreadsheet Model (RWSM): Year 5 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 788. San Francisco Estuary Institute, Richmond, California.

Table A-5. Average PCBs and Mercury Yields by Land Use Category

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

1 The model calibration for PCBs is reasonable but there remains a lower confidence in the calibration for mercury.[292]

Table A-6. Total PCBs and Mercury by Land Use Category

Land Use Category	Total PCBs (mg/ac/yr)	Total Mercury[1] (mg/ac/yr)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1 The model calibration for PCBs is reasonable but there remains a lower confidence in the calibration for mercury.[292]

Because source properties represent a small fraction of the total Bay Area land use, the above calibration procedure will not work so a separate procedure was used to estimate the PCBs yield from source properties. There are no mercury source properties from which to develop a yield so the yield value for old industrial/source areas will be used for load reduction accounting. The PCBs source property yield (5,078 mg PCBs/acre*year) was derived as the product of a representative PCBs concentration from over 670 PCBs surface soil samples collected at known source properties multiplied by a representative soil/sediment yield for old industrial areas obtained through watershed modeling.

Estimated load reductions for source property abatement or referral are based on the expectation that the source property will yield less PCBs upon cleanup such that the PCBs yield will be more like the yield from older commercial areas rather than older industrial areas. For example, when contaminated areas are newly or redeveloped, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). Accordingly, the amount of reduction can be calculated as the referred-acres multiplied by the difference between the source property yield (5,078 mg PCBs/acre*year[286]) minus the old commercial yield (49 mg PCBs/acre*year). Therefore, controlling the load from the expected acreage of abated or referred properties will ultimately result in an estimated load reduction of 740 g/yr, one-half of which (370 g/yr) can be recognized during MRP 3 provided that effective enhanced operation and measurement (O&M) measures are implemented to prevent off-site migration and address the contamination in the vicinity of the property due do historical off-site migration of PCBs.

PCBs-contaminated properties often have a “halo” of contamination in the vicinity of the property, and contaminated sediments in this halo can be transported to receiving waters through the stormwater conveyance system. Further, pollutants from the source area may continue to be transported offsite while remediation occurs. Therefore, implementing enhanced O&M both in areas immediately adjacent to the source area and onsite (to prevent offsite migration) while the source property is being remediated is a priority to prevent PCBs transport to receiving waters. If enhanced O&M measures are not implemented in the immediate vicinity of the referred property, the calculated load reduction will be recognized upon completion of the cleanup project. In order to confirm effective implementation of enhanced O&M plans to address the prevention of PCBs migrating offsite and the halo of contamination in the vicinity of the contaminated property, the Permit requires that these plans be submitted to Water Board staff for review and acceptance prior to the referral.

Provision C.12.c requires Permittees to implement control measures (treatment controls, diversion to wastewater treatment plants, or enhanced operation and treatment controls) on 2,580 acres of old industrial land use (see below). In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence moderate to high PCBs soil concentrations (generally sediment concentrations greater than 0.3 mg Hg/kg or greater than 0.2 mg PCBs/kg, approximately the 75th percentile concentrations in old industrial areas). These concentrations should not be considered a “bright line” as there are likely situations of moderate contamination for these pollutants just under these concentrations that would still be good locations for implementation, especially if these locations have a large reservoir of readily transportable sediment at these moderate concentrations. Moreover, the available data have uncertainty so a measured concentration under but near 0.3 mg Hg/kg or 0.2 mg PCBs/kg may indicate an area of moderate contamination such that additional

monitoring would reveal concentrations higher than these thresholds. Permittees have discretion to choose control measures appropriate to the circumstances.

In addition to finding and remediating source areas, there is also a need to address the moderate contamination that exists now and will remain even if source properties are identified and abated or referred for additional action. Below is a plot of data representing more than 1,500 PCBs samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019.[286] These data establish a contextual framework to interpret new monitoring data to determine if the new data represent areas of high or moderately high PCBs concentrations. This helps guide decision making for site selection for control measure implementation, especially in old industrial areas. One can see from the figure that there were about 500 of the 1,500 samples with PCBs concentrations over 0.1mg/kg (approximately 70th percentile of the data) and about 200 samples exceeding 0.5 mg/kg (86th percentile of the data). Areas with moderately high PCBs concentrations (e.g., 0.1-0.5 mg/kg) were found throughout areas where historical industrial activity involved use of PCBs[284]). In general, Permittees will search for source properties in areas with measured concentrations at or above 0.5 mg/kg and will implement control measures to address residual moderate contamination in areas with measured PCBs concentrations of about 0.2 mg/kg.

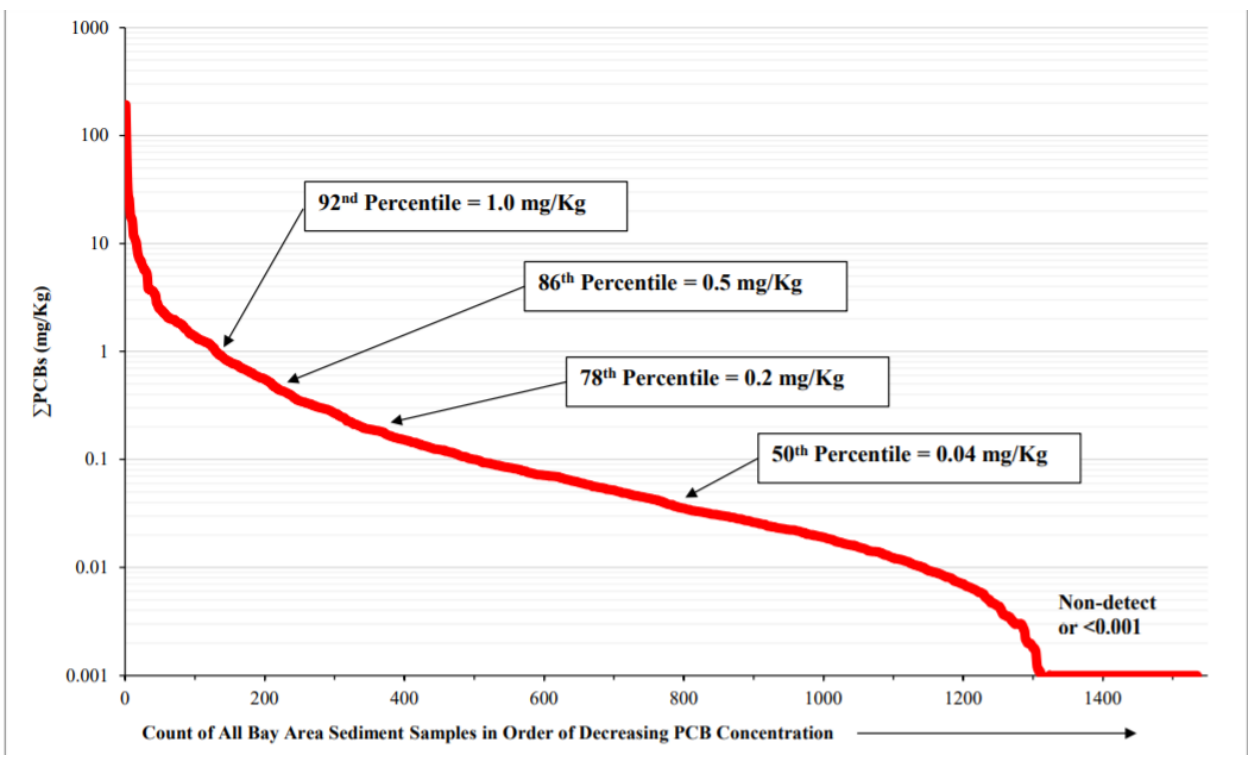

Treatment and other control measures focusing on these highly- and moderately contaminated areas form an important element in achieving the PCBs TMDL-required load reductions. It is also important to attend to these old industrial areas because they are generally located near historically disadvantaged communities and reducing PCBs

and other contamination promotes better health for the residents and helps improve quality of life for these communities. Additionally, PCBs from these old industrial areas are transported to the Bay near many popular shoreline fishing locations so popular fish species caught and consumed by anglers fishing from shoreline fishing locations near these old industrial areas generally have high PCBs concentrations.

As stated previously, all countywide programs have performed "desktop" screening of their old industrial land use areas. From this information, we can estimate the extent of old industrial land use that may benefit from treatment or other control measures to address the moderately high PCBs and mercury contamination. In the information submitted by the Permittees, this area is the amount of old industrial land use in 2002 minus the amount redeveloped since 2002 minus the amount not draining to MS4 (see Landuse Summary[287]). The sum of these areas for each county is as follows.

- Santa Clara: 6,647 acres
- San Mateo: 4,450 acres
- Alameda: 9,374 acres
- Contra Costa: 11,199 acres
- Solano: 1,426 acres

These sum to 33,100 acres for the MRP Permit area. The performance metric for MRP3 is to implement treatment or other controls on 2,580 acres of old industrial land use (which represents slightly less than 8 percent of this old industrial land use area as currently understood) across the entire MRP area. Applying the PCBs yield from old industrial area (259 mg PCBs/acre/year, see discussion under C.12.b for details of derivation) to this area and a 70 percent treatment efficiency (efficiency factor for green infrastructure or retrofit treatment control[288]), the expected PCBs load reduction by the end of the permit term is 467 g/yr.

It is important to note that the performance metric is expressed as an amount of old industrial land use to address with control measure implementation or, equivalently, the calculated amount of load reduction from this implementation. With our current understanding of the amount of old industrial land use in the region, the areal performance metric is 2,580 acres of old industrial land use throughout the region. Permittees may provide updated information concerning the amount of old industrial land use, and this amount may differ from the 33,100-acre estimate used for this requirement. For example, some old industrial land use may drain directly to the Bay or may not drain to MS4s and thus not properly counted in the total. If the amount of old industrial land use is reduced with such new information, it may be the case that the old industrial acreage performance metric may constitute greater than 8 percent of the remaining old industrial land use. However, it should be clearly understood that the performance metric was designed to make meaningful progress in addressing old industrial land use in terms of the calculated amount of load reduction. The acreage

requirement is the performance metric, not the percentage of remaining old industrial land use addressed.

The performance metric of 2,580 acres of old industrial land use throughout the region is very similar to the anticipated level of effort for Caltrans in the SF Bay Region, in which Caltrans will implement treatment controls on approximately 11 percent of their 27,000 acres of right-of-way for a total of more than 2,900 acres (draft Caltrans permit). The performance metric (acreage to be addressed by the end of the permit term or corresponding estimated load reduction) can also be shown by county along with the estimated PCBs load reductions (for 70 percent control measure efficiency, e.g., retrofit treatment control measures) are as follows:

- Alameda County: 664 acres (121 grams/yr)
- Contra Costa County: 664 acres (121 grams/yr)
- San Mateo County: 445 acres (81 grams/yr)
- Santa Clara County: 664 acres (121 grams/yr)
- Solano County: 142 acres (26 grams/yr)

The performance metrics presented in the draft of this Order resulted in large disparities in required implementation effort among the four major countywide stormwater management programs. The Alameda and Contra Costa county performance metrics were substantially greater than those for Santa Clara and San Mateo counties. In order to reduce these disparities in level of effort, the greater of the performance metrics for San Mateo and Santa Clara 664 acres) was assigned both to Alameda and Contra Costa counties. The performance metrics for Solano, Santa Clara and San Mateo counties remain unchanged. With this change, the four large countywide programs have performance metrics of a similar magnitude.

The reduced performance metrics in this Order represent a substantial amount of control measure implementation and PCBs load reduction. According to McKee et al. (2015[284]), about 1.5 kg PCBs/yr loading originates from old industrial landuse. The original C.11/12.c performance metric acreage in the draft of this Order (3,300 acres) would have resulted in about 600 g/yr load reductions, which represents about 40% of the total from McKee et al. 2015. The revised performance metric (2580 acres of old industrial landuse for entire MRP area) represents about a 31% reduction.

The RMP has funded special studies in four representative “Priority Margin Units”, or PMUs. A PMU is a high priority margin area for management and monitoring. The four PMUs are San Leandro Bay (SLB), Emeryville Crescent, Steinberger Slough, and Richmond Harbor. The PMU studies develop conceptual and quantitative models of how PCBs is transported into and through these PMUs. These studies also provide analysis of how the PMUs would respond to load reductions. Because the loads to the PMUs enter a relatively isolated (from Bay influence), the trajectory of recovery is

dominated by what happens to loading directly to the PMU, rather than the overall loading to the Bay as a whole.

The plot below (from the SLB PMU report[293]) shows the modeled recovery of PCBs mass in the system, which is a useful proxy for the scale of reductions in biota. The plot shows the trajectory in PCBs mass in SLB if loads to the system are perturbed but suspended sediment concentrations and tidal export rate parameters remain unchanged. For this representative PMU, the one-box model shows substantial declines in the mass of PCBs in the subembayment. For SLB, reducing loads by 50% resulted in about a 50% reduction in the PCBs mass in SLB in about five years according to the model. If other San Francisco Bay margin areas receiving loads (from local urban runoff sources) respond similarly to SLB, load reductions of this magnitude should manifest in reductions in total mass (in local embayments) of approximately the same order of magnitude. This would result in substantially less PCBs available in these receiving waters for uptake into biota, including the fish caught by local anglers. For the Emeryville Crescent PMU, the recovery is not as dramatic according to the modeling, but the Emeryville Crescent PMU report suggests that the dynamic transport in Emeryville Crescent may not be as amenable to application of a box model[294].

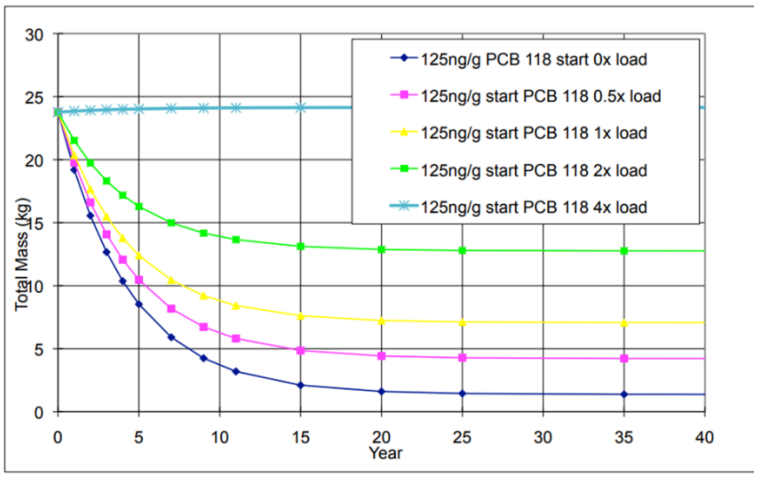

- Figure showing modeled PCBs recovery trajectory in SLB as a function of reduced PCBs loading to SLB subembayment[293]

Compliance with the performance metrics of this provision element can be accomplished in one of two ways. Permittees within the county can implement control measures on the listed amount of old industrial land use (assuming 70 percent control

[293] Conceptual Model to Support PCB Management and Monitoring in the San Leandro Bay Priority Margin Unit – Final Report. Prepared by Donald Yee, Alicia N. Gilbreath, Lester J. McKee, and Jay Davis. San Francisco Estuary Institute. Contribution No. 928. November 2019.

[294] Conceptual Model to Support PCB Management and Monitoring in the Emeryville Crescent Priority Margin Unit – Final Report. Prepared by Jay Davis, Donald Yee, Alicia N. Gilbreath, and Lester J. McKee. San Francisco Estuary Institute. Contribution No. 824. April 2017.

measure efficiency, amounts could vary depending on efficiencies of control measures actually implemented) or account for the mass reduction of PCBs shown in parentheses. Control measure efficiencies are stated in the accounting document along with supporting information for the value. These are equivalent performance metrics because the mass reductions were calculated using the listed old industrial acreage multiplied by the old industrial mass yield and 70 percent efficiency for control measures. For example, consider a county that must address 1,000 acres of old industrial land use when implementing control measures with an efficiency of 70 percent (for a load reduction of 181 grams of PCBs). If this county chose instead to implement only control measures with 20 percent efficiency (e.g., efficiency of hydrodynamic separators), the required acreage would be: 1,000 acres x (70% / 20%) = 3500 acres. However, the load reduction would be calculated as 3,500 acres x 259 mg PCBs/acre/year x 20% treatment efficiency, or 181 grams of PCBs.

If treatment control systems are used, they must be designed and sized consistent with Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems). Because of the higher removal efficiency of wastewater treatment facilities, each acre treated by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements. This factor is based on the fact that wastewater treatment facilities remove well over 90 percent[295] of suspended sediment particles (to which mercury and PCBs are attached), and the ratio of 0.9 to 0.7 is 1.3. Conversely, as previously stated, if control measures having less than 70 percent efficiency are implemented, the acreage credited will be proportional to the ratio of efficiencies (e.g., acreage credited in the ratio of 0.5/0.7 for control measures with 50 percent efficiency). As an example, full-trash capture systems will remove some particles (and hence PCBs), and these have an efficiency of about 20 percent so the acreage credited for these systems will be in the ratio of 0.2/0.7). The PCBs in sediment data described above were also analyzed to determine land-use specific sediment concentrations. For example, the average PCBs concentration in old industrial areas was found to be 790 ppb, and the average concentration in new urban areas was just 66 ppb. These average landuse-specific PCBs and mercury concentrations are used in the loads reduction accounting for control measures where the amount of sediment removed can be determined such as in pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting. All of these load reduction accounting methods[286] have been reviewed by Water Board staff and approved by the Executive Officer.

Provision C.12.d requires Permittees to ensure proper management of potential PCBs-containing material in bridge and overpass roadway expansion joints when these facilities are replaced or repaired. They will do so through implementation of a Caltrans specification (to be developed through proposed requirement in Caltrans stormwater permit, likely adopted by late 2022). The requirement for Caltrans to develop this

[295] TSS Removal data for EBMUD and EBDA facilities from May 2016 through April 2021 (spreadsheet of data).

specification is included in the draft version of the statewide Caltrans permit currently under development. The standard operating procedure (SOP) for dealing with the material will likely be similar to that used for the 2018 demolition of the old eastern span of San Francisco Bay Bridge and will involve the removal and proper disposal of PCBs-containing caulk prior to the rehabilitation of existing roadways containing such material. The accountability metric is, therefore, demonstration by Permittees that the Caltrans SOP is applied to management of PCBs-containing material when bridge and overpass roadway surfaces are replaced or repaired.

In order to generate data to develop the load reduction estimate resulting from SOP implementation, the Bay Area Stormwater Management Agencies Association (BASMAA) evaluated PCBs in caulk and sealants in public roadways and storm drain infrastructure by sampling caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area.[286] The sample locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970s, the most recent time period PCBs were still in widespread use. This effort resulted in 54 caulk or sealant samples from public infrastructure in these locations. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges, and these ranged in concentration from non-detect to 5,000 mg PCB/kg. Through a maximum likelihood statistical approach applied to the data after estimating values for non-detects, a technically defensible value for the PCBs concentration was derived as 184 mg PCB/kg. The total amount of PCBs in roadway caulk or sealant was estimated using this concentration along with information about the dimensions of Bay Area bridges. The report estimates that the total amount of PCBs in the roadway caulk and longitudinal seal material on the 1,477 bridges in the MRP area is 39 kg.[286]

There are no available data in the literature for the rate at which PCBs leach from this caulk and sealing material, so the report authors evaluated a range of scenarios for the rate at which the PCBs in the material would leach from the joint and sealant material over time. The load reduction associated with this control measure occurs when this leaching process is interrupted through the removal of the material. A high (1% per year) and low (0.5 percent per year) leaching rate were evaluated.[286] Based on the expected replacement rate of bridges, the expected load reduction ranged from 195 to 390 g PCBs/year, assuming that joints and longitudinal seal material would be removed. The estimated load reduction resulting from implementation of this provision element assumes an intermediate leaching rate (0.75 percent per year) and is thus 300 g PCBs/year.

The load reduction calculation method involves generating an estimate of the typical concentration of PCBs in roadway caulking and multiplying this by an estimate for the amount of material removed each year and an estimate for the PCBs leach rate is a sound and practical method for estimating the load reduction. As previously discussed,

attempts to use monitoring data or even modeling to estimate the load reduction resulting from removal of this PCBs-containing caulk would involve great expense and effort and would, despite these efforts, still yield a load reduction estimate with considerable uncertainty. The Water Board has reviewed the data collected, the statistical approach used to generate the typical PCBs concentration, as well as the analytical approach used to generate the load reduction estimate from the concentration data. These data are reliable and the statistical and calculation methodologies are logically consistent and technically sound.

Provision C.12.e requires Permittees to develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for municipally owned electrical utilities and collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities. The Water Board is committed to collaborating with Permittees to request and obtain the needed information from these non-municipally owned electrical utilities. The reporting requirements are contingent upon the Water Board formally transmitting the requested information from the non-municipally owned electrical utilities to the Permittees.

Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may have elevated concentrations of PCBs in surface soils that can be released to the MS4. The cumulative releases of PCBs-laden soils from these properties was investigated by McKee et al. (2006[296]), and McKee estimated the net mass input of PCBs to MS4s in the Bay Area in 2005 was approximately 28 kg per year. Of this total, roughly 29 percent (8 kg/yr) was estimated to have originated from controlled closed systems (transformers and large capacitors). This estimate suggests that because of both current and past use, transformers and large capacitors, which are both electrical utility applications, may continue to contribute nearly one-third of the net PCBs mass to MS4s in the Bay Area. Therefore, this potential source warrants further investigation and control**.**

BASMAA[286] estimates the annual load reductions from removing OFEE as the estimated annual load of PCBs that entered the MS4 from OFEE at the start of the PCBs TMDL (1.1 kg in 2005) multiplied by the estimated annual percentage of remaining OFEE equipment removed. In other words, all existing OFEE in 2005 were, combined, contributing 1.1 kg PCBs/yr loading to MS4s. Further, a permanent yearly load reduction is realized when a unit of OFEE is removed. The report provides a low, medium, and high estimate for the annual load reduction based on low, medium, and high estimates for the annual removal rate of OFEE (the percentage of remaining equipment removed each year since the start of the PCBs TMDL (in 2005). Using the starting point of 1.1 kg PCBs per year from OFEE in 2005 along with the medium estimate (2.3 percent per year) for the equipment removal rate, there would be 758

[296] McKee, L., Mangarella, P., Williamson, B., Hayworth, J., and Austin, L., 2006. *Review of methods used to reduce urban stormwater loads: Task 3.4. A Technical Report of the Regional Watershed Program*: SFEI Contribution #429. San Francisco Estuary Institute, Oakland, CA.

grams PCB/year mass loading from OFEE entering the MS4 at the start of MRP 3. Using this same 2.3 percent per year removal rate, the estimated cumulative load reduction by the end of MRP 3 is 90 g PCBs/year in consideration of the development of improved standard operating procedures to address spill response and reporting required by the Permit.

The load reduction calculation method for OFEE involves relying on a technically sound PCBs mass loading estimate from 2005 and applying reasonable factors for the removal rate of such equipment. As for other control measures, attempts to use monitoring data or even modeling to estimate the load reduction resulting from OFEE removal would involve great expense and effort and would, despite these efforts, still yield a load reduction estimate with considerable uncertainty. Water Board staff concurs with the calculation method used to generate the load reduction estimate and accept it as logically consistent and technically sound.

Provision C.12.f requires Permittees to implement green infrastructure projects during the term of the Permit at a level consistent with the requirements in Provision C.3.j. Provisions C.11.c and C.12.c of MRP 2 required Permittees "to develop RAAs to estimate the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040." The analysis and resulting estimates for acres treated and PCBs load reductions are contained in the Annual Reports for the countywide programs submitted in Fall 2020.

The Permittees developed a variety of approaches (using models) to estimate the future PCBs and mercury load reductions resulting from future GSI implementation. The approaches were all consistent with guidance developed for the RAA modeling.[297] In addition, all countywide programs' modeling approaches were peer reviewed, and the peer review packages and final Reasonable Assurance Analysis modeling reports are contained in the FY 2019-2020 Annual Reports. There were some differences in the modeling approaches among the countywide programs, but the approach used by Alameda County and Contra Costa County illustrates the general concepts.

Baseline pollutant loading (prior to the application of land use changes or GSI implementation) was accomplished through a continuous simulation hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across a county during the TMDL baseline period (i.e., 2003 – 2005).[297] The baseline model depends on a hydrology model component that produces average annual runoff across an area (e.g., Alameda County) for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (e.g., imperviousness, underlying soil characteristics, slope) present within each county for a unit area drainage catchment. The hydrology output is combined with average annual concentrations estimated by the

[297] Bay Area Stormwater Management Agencies Association (BASMAA, June 2017). *Bay Area Reasonable Assurance Analysis Guidance Document.* Prepared for BASMAA by Geosyntec Consultants.

Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM[292]) developed by SFEI to produce average annual PCBs and mercury loading for the period of record. To obtain pollutant loading, average annual concentrations estimated by the RWSM, for each land use category (i.e., Old Industrial, Old Urban Commercial/Transportation, Old Urban Residential, New Urban, and Open Space) are multiplied by the calibrated average annual runoff volume estimated using the HRU approach. The average annual PCBs and mercury loading for the baseline period of record was validated using available in-stream concentration data, as described in Appendix E.

After baseline modeling, future load reduction modeling scenarios were developed to predict how future land use changes and control measure implementation would reduce pollutant loading. Future land use changes resulting from new development and redevelopment often reduce pollutant loading through use of newer building materials and improved runoff management practices. The POC load reductions through GSI implementation were developed through a combination of hydraulic modeling of GSI facilities combined with empirically derived effluent concentration estimates. Loads reduced from baseline are estimated based on projected land use changes and control measure implementation. To calculate pollutant load reductions associated with land use changes and GSI and source control implementation for future scenarios, the difference between the pollutant loading in the baseline scenario and the total pollutant loading associated with each future implementation scenario were calculated. Future scenarios included implementation in years 2030, 2040, and beyond 2040.

Interpolating between the 2020 and 2030 results presented in the RAA GSI modeling documentation for each countywide program (contained in RAA documentation in the FY 2019-20 Annual Reports) provides an estimate for the acreage and PCBs load reductions resulting from green infrastructure implementation by 2025:

- Alameda County: 1,230 acres 75 g/yr
- Contra Costa County: 950 acres 20 g/yr
- San Mateo County 314 acres 20 g/yr
- Santa Clara County 856 acres 13.5 g/yr
- Solano County Permittees 821 acres 76 g/yr

Summing these estimated load reductions across countywide programs results in a regionwide total estimated load reduction from green stormwater implementation of about 200 g/yr by the end of the permit term.

GSI are often watershed-based approaches that can be effective at reducing loads of PCBs and mercury. Because GSI uses a variety of physical removal mechanisms to filter water and remove particles, these control measures will also be effective at reducing loads of most other contaminants in urban stormwater. Thus, GSI implementation provides an effective multi-contaminant benefit in addition to the

benefits of reducing peak runoff and ameliorating the effects of hydromodification. The load reduction credit for GSI implementation will encourage watershed-based approaches, address multiple contaminants encourage the use of green infrastructure and the adoption of low impact development principles.

Some Bay Area drainages contain notably elevated PCBs concentrations in suspended or bedded sediment (e.g., > 500 ppb in bedded sediment). A recent analysis of soil PCBs and mercury data collected in the Bay Area identifies 15 sites where maximum concentrations exceed 3.8 mg/kg for PCBs and 1.6 mg/kg for total mercury. Areas with moderately high PCBs concentrations (e.g., 100-500 ppb) were found throughout areas where historical industrial activity involved use of PCBs (McKee and Yee 2015). Decisions guiding placement of green stormwater infrastructure depend on many factors involving opportunity and feasibility. Contaminant concentrations represent one factor among many and, thus, may not be the chief consideration in many circumstances. Nevertheless, placing green infrastructure in highly- and moderately contaminated areas may form an important element in achieving the PCBs TMDL-required load reductions. However, green infrastructure implementation is a long-term proposition and there is also value in placing green infrastructure across the broader landscape to intercept PCBs before they are discharged to receiving water.

Provision C.12.g requires Permittees to require applicable structures to sample for PCBs prior to receiving a demolition permit, inspect demolition projects during demolition activities, enhance their construction site controls for demolition projects, and for those cases where notification and advance approval from the U.S. EPA is not required, submit a copy of the hazardous waste manifest prepared for transportation of the material to a disposal facility.

After a year of requiring applicable structures to sample for PCBs in five priority building materials (caulk, fiberglass insulation, thermal insulation, adhesive mastic, and rubber window gasket or bulk product waste) prior to issuing a demolition permit, the Permittees' 2019-2020 Annual Reports show that 18 applicable structures had bulk product waste with PCBs concentrations of 50 ppm or greater. As of January 2022, U.S. EPA's database indicated that eight of those applicable structures have submitted hazardous wastes manifest to U.S. EPA, thus demonstrating that the bulk wastes with PCBs concentrations of 50 ppm or greater were disposed appropriately. U.S. EPA was overseeing the demolition and site remediation for all eight structures. For the remaining 10 sites that are undergoing demolition without U.S. EPA oversight, we have no information on whether bulk product wastes with PCBs concentrations of 50 ppm or greater were handled and disposed appropriately. This Provision requires the Permittees to submit a copy of the hazardous waste manifest to document that the PCBs-containing materials were disposed consistent with federal and state regulations, thus ensuring the PCBs in the bulk product waste will not be available to be discharged into the MS4. The hazardous waste manifests can be used as supporting data for the effectiveness of the protocol for controlling PCBs during building demolition.

PCBs can readily migrate to storm drains through vehicle track out of contaminated soils, airborne releases, soil erosion or stormwater runoff during or after demolition. Provision C.6 requires monthly inspections of construction sites, through all phases of construction, during the rainy season to determine the effectiveness of BMPs in preventing the discharge of pollutants into the MS4. Demolition is a phase of construction. This Provision requires the Permittees to enhance their construction site control programs to minimize the migration of PCBs from demolition sites into the MS4. Enhancement of construction site control programs could include dry season monthly inspections, street sweeping during active work hours at demolition sites, post-demolition of surrounding streets after any airborne releases are likely to have settled, and use of street sweepers that are designed to effectively remove sediment and dust from paved surfaces.

Soil and sediment characterizations at demolition sites with bulk product waste, including the Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project in Oakland, show that soils up to 10 feet from the building and up to 4 feet deep, and sediment in storm drains can have PCBs concentrations between 0.24 ppm and 50 ppm. If an applicable structure does not require notification and advance approval from U.S. EPA for disposal, soil and storm drain sediments may not be tested for PCBs. Contaminated soils and sediment in the storm drains may not be removed and properly disposed during the demolition of the applicable structure. As such, they will continue to be sources of PCBs to the MS4. For this Permit term, the requirement to demonstrate proper disposal of PCB-containing wastes is a proxy to demonstrate that the entire demolition project, including surrounding soils, is managed properly. However, the Permittees are encouraged to take additional steps as needed to prevent PCBs-containing soils from demolition sites from entering the MS4.may want to consider a special project designed to characterize, at demolition projects, the concentration of PCBs in soils near the applicable structures and in the sediment in the storm drains.

Klosterhaus et al.(2014)[290] estimated that 10,500 kg of PCBs remain in interior and exterior caulk in buildings located in the permit area, which equates to an average of 4.7 kg PCBs per building with PCBs. The 2013 Integrated Monitoring Report (IMR)[298] presents estimates of the mass of PCBs per building (constructed or renovated prior to 1979) ranging from 0.6-16 kg and contribution to stormwater ranging from 0.8 to 4000 grams/year. PCBs from building materials is one of the largest known sources of PCBs and it is distributed throughout the region. For a building containing the average amount of 4.7 kg of PCBs and control measures of medium effectiveness, there may be 280 grams of PCBs released to stormwater during demolition, assuming control measures are only moderately effective. If only control measures of low effectiveness were in place, such a building would release 560 grams PCBs during demolition.[298]

[298] Integrated Monitoring Report Part B: PCB and Mercury Loads Avoided and Reduced via Stormwater (IMR). Prepared by Geosyntec Consultants for the Bay Area Stormwater Management Agencies Association. 2013.

The PCBs load reductions expected through this control measure will be the same as those estimated for MRP2 because the same control measures are in place, and the method for calculating the load reductions remains the same. In other words, no additional load reductions are expected. The PCBs load reductions resulting from implementing control measures to prevent discharge to storm drains of PCBs in building materials during demolition can be computed as: the mass of PCBs contained in applicable buildings multiplied by the fraction of PCBs entering stormwater conveyances in the absence of controls multiplied by the effectiveness of controls preventing PCBs from entering stormwater conveyances. Each term in this calculation can be represented by a range of values, and information is limited on some of these terms (particularly the fraction of PCBs entering storm drains). However, reasonable values, derived from information available from Klosterhaus,[290] are:

- Mass of PCBs per building = 5 kg
- Number of regulated buildings demolished/year = 50
- Average fraction of PCBs in building material that enters MS4s during demolition without controls = 1 percent
- Average effectiveness of controls at preventing PCBs from entering storm drains = 80 percent

Multiplying these parameters suggests that about 2 kg/yr of PCBs loads can be reduced by effectively controlling PCBs-containing material during demolition. The actual number of demolitions will vary, but 2 kg represents a reasonable estimate for the load reduction in the Bay Area during a typical year and is the basis for establishing the yearly estimated load reduction for controlling the release of PCBs to storm drains from such demolitions.

As previously discussed, using monitoring data or even modeling to estimate the load reduction resulting from controlling the PCBs-containing demolition debris would be a complex and expensive undertaking. Despite these efforts, the monitoring data would still yield a load reduction estimate with considerable uncertainty. The Water Board has reviewed and approved the method to estimate the PCBs load reduction using information from the Klosterhaus technical paper. The calculation methodology is logically consistent and technically sound.

The Previous Permit allowed Permittees to seek exemption from implementing Provision C.12.f – Manage PCB-Containing Materials and Wastes During Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains (Provision C.12.f). For this exemption, Permittees were required to provide documentation acceptable to the Executive Officer in their 2017 Annual Reports that the only structures that existed pre-1980 within their jurisdiction are single-family residential and/or wood-frame structures. Only the Town of Clayton requested and received exemption form Provision C.12.f. This Permit extends the deadline for requesting and receiving this

exemption to the 2023 Annual Report, because there are a few Permittees who were unable to gather the needed documentation by the exemption deadline. The Water Board does not anticipate another extension of this exemption deadline.

Provision C.12.h requires Permittees to update (as needed) the plans and schedules prepared during MRP2 for PCBs control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations. The updates should focus on those control measures for which new information is available and for control measures not evaluated in previous efforts. The Permit requires that these plans must: identify all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented; include a schedule according to which these technically and economically feasible control measures will be fully implemented; and provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

Provision C.12.h also requires Permittees to submit information to inform PCBs-related requirements in the subsequent permit term. Namely, Permittees must identify all specific control measures to be implemented along with the expected intensity (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.) of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term.

The PCBs TMDL anticipated the challenge of achieving the urban runoff load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that

> 4. *"... achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:*
>
> - *A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;*
> - *Documentation has been prepared that demonstrates that all technically and economically feasible and cost-effective control measures recognized by the Water Board have been fully implemented, and evaluates and quantifies the PCBs load reduction of such measures;*

- *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
- *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate."*

Provision C.12.h provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. The load reductions for PCBs are difficult and time-consuming to achieve because of the distribution of sources in the landscape; challenges associated with finding and reducing these existing sources; and unpredictability related to demolition of PCBs containing structures. The RAAs submitted during MRP 2 emphasize that expected PCB load reductions will come from long-term implementation of control strategies (like source control, cleanup of contaminated sites, green infrastructure, and others) that extend beyond the current implementation timeframe of the TMDL. The updates to the long-term plans and schedules required by this provision could potentially support an amendment to the TMDL implementation timeframe.

Provision C.12.i. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.g requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed. The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

Provision C.12.j requires actions to mitigate human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish to be aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in a previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes three types of actions for urban runoff management agencies. These actions are implemented through this Permit as provisions to control urban runoff sources of copper.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[299] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the Permit provisions target major sources of copper including architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 SSOs for dissolved copper have been adopted for all segments of San Francisco Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the SSOs.

C.13-5 One of the major sources of copper to urban runoff has been addressed through passage of Senate Bill 346 in 2010, which requires brake pad manufacturers to reduce the use of copper in brake pads sold in California to no more than 5 percent by weight by 2021, and no more than 0.5 percent by 2025. The law also provides an objective process to ensure that any new brake materials meet all applicable safety and performance standards. To make sure that new materials will not cause future environmental problems, the law requires brake manufacturers to screen potential alternatives for their impacts on human health and the environment using the Toxic Information Clearinghouse, and to select less hazardous options.

C.13-6 A scientific uncertainty regarding sediment toxicity was identified during the development of SSOs for copper. Bay sediment copper concentrations are somewhat elevated above the natural background (from native soils). Local

[299] TDC (TDC Environmental), 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

soils contain 30- 35 ppm (DW, dry weight) based on deep (> 2 meter) sediment core results for SF Bay. The copper ERL (effects range low) is 34 ppm (DW) and the ERM (effect range median) is 240 ppm (DW). Thus, the natural concentration of local soils is very close to the ERL. There has never been an exceedance of the ERM in the 975 samples collected and analyzed through RMP data. The maximum copper sediment concentration ever recorded in RMP samples (94 ppm DW) is well below the LC50 (concentration that kills 50 percent of test organisms) of the amphipod *Eohaustorius estaurius* (534 ppm) or the amphipod crustacean *Hyalella azteca* (260 ppm). Surface sediment copper concentrations have trended lower over the last 25 years according to monitoring in the Bay. The median surface concentration of copper was 40 ppm (DW) during the period 1993-2004 and dropped to 36 ppm in 2009-2018 (data from SFEI's Contaminant Data Download and Display system, https://cd3.sfei.org/). This reduced concentration occurred despite significant population increases in the Bay Area and increased sampling in the shallower parts of the Bay (where copper concentrations would be expected to be higher due to human activities and urban sources) during the latter period because of a re-design of RMP sampling strategies. There was some evidence of possible copper-related toxicity in the late 1990s, but there has not been additional evidence of this phenomenon. Possible sediment toxicity occurred in the northern portions of San Francisco Bay (Suisun Bay and San Pablo Bay) where sediment copper concentrations are higher. However, the decrease in median sediment copper concentrations in the northern estuary from the time period 1993-2004 (52 ppm DW) to 2009-2018 (43 ppm DW) has been even more pronounced than the reduction for the Bay as a whole. Because there has not been additional evidence of copper sediment toxicity and copper concentrations in surface sediments appear to be decreasing over time, Permit requirements to further investigate copper sediment toxicity in San Francisco Bay were satisfied by information collected under MRP 1.0 and are no longer needed. If more evidence of such toxicity does appear, this requirement may be reinstated.

C.13-7 Scientific uncertainty regarding the olfactory impairment of salmonids was identified during development of SSOs for copper. Exposure to dissolved copper has been shown to cause olfactory impairment at relatively low concentrations in freshwater fish, resulting in an impaired avoidance response to predators. When the SSOs were established, studies were planned to address whether or not this phenomenon occurred in estuarine water. The studies[300] were supported in part through requirements under MRP 1 and were conducted by David Baldwin of NOAA's Northwest Fisheries Science Center.

[300] David Baldwin, NOAA Fisheries, Northwest Fisheries Science Center, 2015. *Impact of dissolved copper on the olfactory system of juvenile salmon, Phase II: Effect of estuarine salinity on olfactory toxicity.*

Dr. Baldwin measured the firing of neurons in response to exposure to odorant chemicals. The studies indicate that salmon in saline or moderately saline water are much less sensitive than salmon in freshwater, and that the potential effect of copper on salmon olfaction is not a concern in the Bay.

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. Provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. Provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, and auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

C.14. Bacteria Controls

Fact Sheet Findings in Support of Provision C.14

C.14-1 This Permit Provision implements the urban runoff requirements of TMDLs that contain wasteload allocations for MS4 discharges of bacteria. Each subprovision references applicable TMDL approval and effective dates. A separate subprovision (C.14.a) requires actions Permittees must take when MS4 discharges may be causing or contributing to exceedances of applicable bacteria water quality objectives in a receiving water for which a TMDL has not been established.

Specific Provision C.14 Requirements

C.14.a. Enhanced Bacteria Control

The provision applies to the cities of Sunnyvale and Mountain View (referred to as the Cities in C.14.a), which may be causing or contributing to exceedances of applicable bacteria water quality objectives in a receiving water (hereafter referred to as waters with elevated bacteria densities). The provision calls for strategic and enhanced implementation of BMPs that are required in other provisions of this Permit; thus, the authorities for Provision C.14.a. are stated in the fact sheet for Provisions C.2, C.4, C.7, C.10, and C.15. This Provision also requires the Cities to conduct additional water quality monitoring to identify sources of bacteria to the receiving water and to determine whether the applicable bacteria objectives have been achieved after implementation of BMPs. The monitoring and reporting requirements of Provision C.14.a. are authorized under Clean Water Act § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h), (j) and (l), 122.42(c), 122.44(i) and 122.48, and Water Code § 13383.

The pollution control and reporting requirements of this provision are consistent with the phased implementation strategies of the bacteria TMDLs adopted in the San Francisco Bay Region. This Provision requires implementation of the source control actions required in phase one of adopted TMDLs. The Cities are expected to meet Receiving Water Limitations B.2 for applicable bacteria water quality objectives by the June 30, 2027. If receiving water limitations are not met, despite a diligent effort to quantify levels and the sources of bacteria in MS4 discharges and documentation of completion of controls required by C.14.a.i-vii, then the Cities must submit a plan for additional actions to attain the receiving water limitations as soon as possible.

This Provision applies to the City of Mountain View for discharges to Stevens Creek and the City of Sunnyvale for discharges to Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough. Data collected by San Francisco Baykeeper indicated that discharges from these cities' MS4s may have caused or contributed to exceedances of the bacteria water quality objectives, and both Mountain View and Sunnyvale have submitted to the Water Board notification and a report of proposed actions as set forth in Provision C.1. The enhanced bacteria controls required

by this Provision are based on controls proposed by the Cities and phase one bacteria controls required of municipalities with bacteria wasteload allocations in adopted TMDLs. They are also consistent with management strategies for bacteria in stormwater described in the Minnesota Stormwater Manual.

Other Permittees that find their MS4 discharges may be causing or contributing to exceedances of applicable bacteria water quality objectives in a receiving water, in accordance with Provision C.1.a. of this Permit, must notify the Water Board and submit a report that describes controls or BMPs currently being implemented and the current level of implementation, and proposes additional controls or BMPs and/or an increased level of implementation, to prevent or reduce exceedances of bacteria water quality objectives. If such controls and BMPs are consistent with Provision C.1.a requirements, the Water Board will consider amending this Permit to require implementation of the controls and BMPs.

Path to Compliance with Bacteria Receiving Water Limitations

Provision C.14.a provides a directed path, with enforceable requirements, that allow the Cities appropriate time to come into compliance with receiving water limitations without being in violation of bacteria receiving water limitations during full implementation of the directed path to compliance. This directed path to compliance is consistent and conforms with State Board Orders WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, and WQ 2020-0038.

WQ 2015-0075, as amended, directs regional water boards to consider and allow a path to compliance with receiving water limitations guided by a set of principles unless a regional water board makes a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons. The path to compliance directed by Provision C.14.a meets each of the applicable principles (see further detail below).

In WQ 2020-0038, the State Water reiterated WQ 2015-0075's standards for rigor, transparency, and accountability for alternate compliance, and further emphasized that regional water boards must ensure any approved alternative compliance plans regional water boards using alternative compliance approaches to ensure plans approved clearly explain their development process and identify enforceable milestones. However, the State Water Board recognized WQ 2020-0038 is not intended to curtail the flexibility of the regional water boards to adopt alternative compliance approaches that best fit their particular regions or to restrain the evolution of the regional water boards' approaches to alternative compliance. The path to compliance directed by Provision C.14.a is based on rigorous and transparent consideration of the state of science and understanding of sources of fecal indicator bacteria and options to control them and includes enforceable requirements. However, rather than approval of compliance plans submitted by the Cities, Provision C.14.a directly specifies actions that must be implemented by the Cities that are consistent with bacteria TMDLs requirements in the region and informed

by the Water Board's knowledge and expertise regulating bacteria and the plans submitted by the Cities. These required actions are clear, transparent, and directly enforceable rather than reliance on a plan.

The path to compliance directed by Provision C.14.a is based on the following points that describe state of science and understanding of sources of fecal indicator bacteria and options to control them.

- Fecal indicator bacteria, E. coli and enterococci, are bacteria that are normally prevalent in the intestines and feces of warm-blooded animals.
- Levels of bacteria are measured as number of colony forming units (cfu) of bacteria in a 100 mL of sample. Maximum level (statistical threshold value) water quality objectives are 320 cfu/mL for E. coli and 100 cfu/100 mL for enterococci. Levels in the parts of the Cities' receiving waters have periodically been as high as about 4,000 cfu/mL during dry weather and 17,000 cfu/100mL, but they are substantially lower—about a billion times less—than levels of these bacteria in raw sewage (trillions of cfu/100mL). Accordingly, the levels in receiving waters are likely not associated with discrete ongoing discharges of untreated raw sewage.
- Bacteria sources and discharges in municipal stormwater runoff and dry weather discharges are episodic, not constant, except where there is an illicit connection from a sanitary sewer or other ongoing discharge of sewage.
- It is not possible to model sources and loading of bacteria in MS4s using watershed pollutant loading models due to the episodic and variable nature of bacteria sources. Some quantitative analysis of loading may be possible through monitoring; however, since bacteria discharge volumes are highly variable both spatially and temporally and difficult to measure, the analysis would inevitably involve a great deal of uncertainty and be unreliable for purposes of quantifying loads from drainage areas. However, mapping of potential sources areas and targeting of control efforts can be tracked and analyzed using geographic information systems.
- Controllable sources to the Cities' MS4s or surface waters located within the Cities' boundaries include the following:
    - Direct sources of human fecal matter (e.g., homeless encampments, recreational vehicle discharges, illegal dumping of human waste/diapers);
    - Sanitary sewer sources of human fecal matter (e.g., sanitary sewer overflows, exfiltration, illicit connections);
    - Pet waste (e.g., dogs, domestic and feral cats, backyard chickens, livestock);
    - Trash receptacle leachate. Trash bins may also contain discarded pet waste or diapers; and

  - Wildlife waste (e.g., birds, rodents, deer, raccoons, coyotes) if associated with human activities, such as littering and exposed trash receptacles, which can attract wildlife by creating scavenging areas. Some wildlife waste may be moderately controllable; however, most is uncontrollable.

- Uncontrollable sources to the Cities' MS4s or surface waters located within the Cities' boundaries include:
  - Wildlife waste (e.g., birds, rodents, deer, raccoons, squirrels, rabbits, skunks, opossums, coyotes, wild turkey, bobcats, mountain lions) from wildlife in open space, creek corridors, and in creeks and stormwater conveyance systems. Given these are predominantly natural corridors, elimination of natural wildlife from creeks would not be desirable; and
  - Bacteria naturally present in the environment, such as biofilms, organic matter, soils, and sediments in the watershed, and creeks.
- Effective control of bacteria sources and discharges requires a comprehensive surveillance and source identification and control program in drainages to creeks experiencing elevated bacteria.
- Existing efforts may or may not be sufficient. After initial source identification and control of the most likely or possible sources that contribute to segments of creeks experiencing elevated bacteria, there must be ongoing surveillance and discharge response and control actions, including outreach and enforcement, to maintain existing controls, and if necessary to identify additional sources and enhanced or additional controls.
- Treatment of runoff to reduce fecal indicator bacteria levels below water quality objectives is not feasible. While some treatment systems that provide biofiltration and bioretention and/or capture runoff will reduce levels of bacteria in runoff discharges, reduction to levels below water quality objectives requires disinfection, as in municipal wastewater treatment systems. Disinfection of stormwater runoff is not feasible with episodic and variable runoff discharges, and if chlorine were to be used for disinfection, due to its high toxicity, a system would also have to include dichlorination, which is also not feasible for episodic and variable runoff discharges. Strategic routing of contaminated runoff to the sanitary system may have some viability.
- Basin Plan Section 4-8 - Stormwater Discharges provides a phased approach towards attainment of water quality objectives in MS4 receiving waters, wherein if a first phase of actions does not result in attainment of water quality objectives, the Water Board will consider subsequent permit conditions that require implementation of additional control measures. In such circumstances, the Water Board may consider dischargers' proposed schedules for identification and implementation of additional control measures designed to attain water quality objectives. Such

schedules shall be as short as practicable and will only be considered for inclusion in permits when a discharger has demonstrated the following:

(a) A diligent effort to quantify pollutant levels and the sources of the pollutant in stormwater discharges; and

(b) Documentation of completion of implementation of all technically and economically reasonable control measures.

- The Water Board has adopted numerous TMDLs for bacteria and pathogens for select impaired waters. The TMDLs and wasteload allocations are based on rigorous analyses of the problems associated with these pollutants and the solutions to address them. Their implementation plans to achieve the MS4 wasteload allocations rely on source identification and control for MS4 discharges and a phased approach toward achieving water quality objectives, namely implementing source-specific controls and monitoring to find sources and determine effectiveness of controls. Where wasteload allocations are not met after the first phase of actions, additional and enhanced actions and monitoring are required.

Based on these points, the Order provides time for the Cities to comprehensively evaluate their existing bacteria control actions, systematically conduct surveillance and monitoring to identify sources, implement existing or appropriate new or enhanced controls where necessary, and monitor effectiveness of those controls to comply with bacteria receiving water limitations by the end of the permit term. The source identification and source control requirements are practical and robust and represent a logical first phase that could or should result in elimination of bacteria sources that result in MS4 discharges that cause or may cause or contribute to exceedances of bacteria water quality objectives in receiving waters. Given the completeness and thoroughness of what is required to find and control bacteria sources, the Water Board expects compliance with bacteria receiving water limitations by the end of the Permit term. However, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges and known and unknown uncertainties associated with identifying and controlling possible sources, it is impossible to assert with certainty at the onset of the Permit term that source identification and control actions will result in compliance by the end of the Permit term. For this reason, the expectation to comply with receiving water limitations by June 30, 2027, is not expressed in the Permit as an enforceable final deadline.

Given the challenges and uncertainties with bacteria source identification and control actions, there is the possibility that phase one actions will not result in compliance by the end of the permit term. As such, the Order calls for a mid-term report to document progress and communicate adaptation of efforts based on initial successes and challenges, and an end of Permit term report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term.

Phase two actions, if necessary, will depend on the actions taken during the permit term (phase one), and, therefore, cannot yet be specified. This adaptive phased implementation approach is consistent with bacteria TMDL wasteload allocation implementation requirements for municipal stormwater dischargers adopted by the Regional Water Board and approved by the State Water Board and is the most effective way to achieve compliance with bacteria receiving water limitations in a timely manner.

The path to compliance directed by Provision C.14.a meets each of the applicable principles in State Water Board WQ Order 2015-0075, as amended by Order 2021-0052-EXEC.

- In accordance with principle 1, this Order continues to use the receiving water limitations provisions as directed by State Water Board Order WQ 99-05 and does not deem good faith engagement in the iterative process to constitute compliance with receiving water limitations. Rather, it includes prescriptive requirements (Provision C.14.a) with deliverables and deadlines for the Cities to implement actions and controls to comply with receiving water limitations for bacteria, which are based on best available science and knowledge of bacteria sources and controls.
- Principle 2, that permits should include a provision stating that, for water body-pollutant combinations with a TMDL, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination, is not applicable. There is not a bacteria TMDL for any of the Cities' receiving waters; however, the requirements in Provision C.14.a are based on the requirements of adopted and approved bacteria TMDLs for other waterbodies. The requirements reflect the Water Board's determination in these TMDLs of the most effective way to resolve bacteria impairments in the region.
- In accordance with principle 3, this Order incorporates an ambitious, rigorous, and transparent alternative compliance path that allows the Cities appropriate time to come into compliance with receiving water limitations without being in violation of the receiving water limitations during full implementation of the compliance alternative. It includes requirements to implement a comprehensive monitoring and surveillance program and source control actions to identify all controllable sources of bacteria and to control them in a timely manner. The requirements necessarily involve planning and studying because it is unknown where the bacteria sources are.[301] As discussed previously, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges, at the onset of the Permit term, it

[301] The State Water Board has held that the "safe harbor" in the planning phase is appropriate if it is clearly constrained in a manner that sustains incentives to move on from planning to approval of plans in the case of the Los Angeles Regional Water Board's MS4 permit and is structured with clear, enforceable provisions. (WQ Order 2021-0052-EXEC, p. 62.) The evaluations that must be done here are clear and have enforceable deadlines. (See, e.g., Provision C.14.a.viii(2).) In addition, the requirements have built-in source control actions informed by the evaluations, such that progress can be made and compliance achieved.

is impossible to assert with certainty that specific water quality improvement milestones can be achieved during the Permit term. Furthermore, given the challenges and uncertainties with bacteria source identification and control actions, there is the possibility that phase one actions will not result in compliance by the end of the Permit term. The Order calls for a mid-Permit term report to adapt efforts based on initial successes and challenges, and an end of Permit report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term. The State Water Board supports this kind of adaptive management where compliance is not achieved. (WQ Order 2021-0052-EXEC, p. 65-66.)

- In accordance with principle 4, this Order calls for a watershed-based approach to identify and control likely or potential sources of bacteria in storm drain drainage areas that discharge to receiving waters. This Order partly conforms to the part of principle 4 to address multiple contaminants to the extent that source controls for other contaminants or pollutants, such as trash, may also control bacteria. The Provision C.14.a compliance path does not incorporate TMDL requirements as called for in principle 4, because there is not a bacteria TMDL for the affected receiving waters. However, the requirements are consistent with implementation requirements for other bacteria TMDLs.
- Partially in accordance with principle 5 and principal 6, this Order calls for use of green infrastructure and the adoption of low impact development principles and encourage multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply. The Provision C.3 New and Redevelopment requirements call for use of green infrastructure and low impact development principles, including multi-benefit regional projects that capture, infiltrate, and reuse stormwater, on projects and plans for implementing green infrastructure over time with a mandatory minimum during the permit term. These actions will result in some bacteria reduction. However, there are no current available and viable treatment controls, including green infrastructure, that can reduce concentrations of fecal bacteria to low levels consistent with applicable water quality objectives.
- Consistent with principle 7, the Provision C.14.a compliance path has rigor and accountability. The compliance path provided by this provision is based on the rigorous analyses done for other bacteria TMDLs and thus reflect the most effective way to address bacteria in MS4 discharges. The requirements also reflect rigor, accountability, and transparency in that the Cities are required to conduct a comprehensive monitoring and surveillance program based on watershed and drainage area characteristics to systematically identify bacteria sources and implement and assess control actions in a timely manner, and subsequently conduct further monitoring to evaluate the effectiveness of controls. This includes geographic

information analysis of potential sources and existing bacteria control action locations to optimize additional controls, which analysis is a form of quantitative analysis for bacteria (modeling and quantitative analyses of bacteria loading is infeasible or unreliable, as explained above). The Order calls for annual reporting on completed and planned actions and monitoring results, a mid-Permit term report to adapt efforts based on initial successes and challenges, and an end of Permit term report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term. Again, as discussed previously, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges, at the onset of the Permit term, it is impossible to assert with certainty that specific water quality improvement milestones can be achieved during the Permit term. **Provision C.14.a.**I. requires the Cities to evaluate the potential for municipal operations to generate bacteria that can be discharged in runoff and, where needed, to enhance existing BMPs to minimize the transport of bacteria. In this subprovision, “municipal operations” refers to street, sidewalk, and plaza cleaning; maintenance of parks and open spaces; and cleaning of catch basins, pump stations, and other storm sewer system components. Examples of enhanced maintenance activities that help to reduce bacteria loading include (Geosyntec Consultants 2012):

- Street Cleaning. Street Cleaning Measurements of fecal coliform bacteria on sediment collected during street cleaning have ranged up to 108 colonies per pound of sediment (Bannerman 1993, Snyder 2012). Street and parking lot cleaning reduces sediment, trash, and other pollutant loading to urban storm drains. High efficiency street sweepers, such as regenerative air sweepers and vacuum assisted sweepers, remove more sediment from roadways, and capture the fine particles with which bacteria are typically associated (UWRRC 2014).
- Storm Sewer Cleaning: Cleaning by jet spraying and vacuuming of wash water removes accumulated trash, sediment, organic matter and animal waste, thereby reducing both fecal indicator bacteria and other pollutants. Features and locations to be cleaned can be prioritized based on proximity to receiving waters, magnitude of threat, and similar considerations.
- Catch Basin Cleaning: The dark, humid environment and presence of wildlife (e.g., raccoons and rats in storm drain catch basins) provide conditions favorable to the persistence of bacteria in storm drain systems. A San Diego study found that commercial catch basins had significantly higher bacteria than residential catch basins (Weston Solutions 2010b); thus, prioritizing catch basin cleaning in commercial areas is expected to yield more significant bacteria reductions.

Provision C.14.a.ii. requires the Cities to enhance industrial and commercial site stormwater inspections such that illicit discharges and other bacteria sources are identified and controlled. Bacteria sources at these sites may include connection of

sanitary sewer lines to the stormwater system (indicated by evidence of dry weather flows); leaking or poorly maintained porta-potties; outdoor washing of floor mats; and overflowing garbage and recycle bins.

Provision C.14.a.iii. requires the Cities to evaluate the potential for bacteria transport to surface waters from areas inhabited by unsheltered homeless persons, and to implement BMPs to minimize such transport. This Provision is intended to require Permittees to implement or enhance BMPs described in the Fact Sheet and Permit for Provision C.17 in areas with unsheltered homeless populations that discharge to water bodies with elevated bacteria densities.

Provision C.14.a.iv. requires the Cities to evaluate the potential for bacteria transport from areas where domestic animals are present to surface waters with elevated bacteria densities. The waste from dogs, cats, horses, and other domestic animals can contain bacteria and parasites like *E. coli*, *Salmonella*, *Giardia*, and tape worms, which can infect and cause illness in humans, as well as wildlife and domestic animals. Pet waste left on the ground either passes through storm sewers untreated or washes directly into water bodies. Appropriate BMPs include inspections of pet and horse boarding facilities and installation and maintenance of pet waste stations.

Provision C.14.a.v. requires the Cities to enhance public outreach where it is likely to improve human behavior regarding bacteria pollution prevention practices. Such practices include cleaning up pet waste and litter, eliminating outdoor restaurant floor mat washdown, using proper BMPs for sidewalk cleaning, covering trash areas, and maintaining porta-potties properly.

Pet waste is a significant contributor to bacteria in runoff; in a study of the Patapsco River in Maryland, for instance, pet waste was estimated to contribute approximately 26% of bacteria pollution.[302] The degree of behavior change resulting from pet waste outreach campaigns has been measured in association with bacteria TMDLs in southern California and other places. A report on the Dog Waste Management Plan for Dog Beach and Ocean Beach found that public compliance with the “scoop the poop” policy was highly dependent on awareness of the policy and availability of waste disposal bags and trash cans (Weston 2004). In Bellingham, Washington, public outreach over two years increased respondents’ awareness of bacteria impacts from dog waste and was correlated with a 6% increase in the number of respondents who cleaned up their dogs’ waste at home.[303] Scoop the poop pledges can be successful; for instance, in Kirkland, Washington, a follow up survey of several hundred people who signed a pledge to scoop their pet waste indicated that 94% of them scooped their pets’

[302] Maryland Dept. of the Environment, Total Maximum Daily Loads of Fecal Bacteria for the Patapsco River Lower North Branch Basin in Anne Arundel, Baltimore, Carroll, and Howard Counties, and Baltimore City, Maryland (Aug. 2009) Fig. C-2, p. C14.

[303] Squalicum Residential Dog Waste Post-Program Survey Findings (2015)

poop all the time.[304] The City of Austin, Texas, conducted public surveys and found their educational campaign resulted in a 9% improvement in the number of pet owners who claim to regularly pick up waste (UWRRC 2014), and its twenty-year-old program of deploying poop bag dispensers and trash cans throughout the city has reduced bacteria levels in receiving waters. (*Austin Statesman* 2019[305]).Studies in San Diego have shown that installation of pet waste stations with trash cans and disposal bags has resulted in a 37% reduction in the total amount of pet waste in city parks (UWRRC 2014).

Where controllable wildfowl may be contributing to elevated bacteria densities in water bodies, control strategies have been developed by the University of Nebraska at Lincoln (Cleary 1994, Internet Center for Wildlife Damage Management 2015) and the U.S. Department of Agriculture APHIS (Preusser 2008), and some of these strategies are appropriate for waterfowl in general. In Alaska, a lake was delisted for bacteria after the state implemented goose management practices, including egg harvesting, habitat alteration, and hunting, and a pet waste campaign that included outreach and installation of pet waste stations.[306]

Provision C.14.a.vi. requires the Cities to collaborate with entities responsible for maintenance and repair of the sanitary sewerage system to minimize the transport of sanitary sewer overflows to surface waters with elevated bacteria densities. Sewer line backups, overflows and leaks commonly occur during periods of wet weather, creating a potential source of bacteria on land surface that may be transported to surface water via urban runoff. The Cities should work with sanitary sewerage system entities to prioritize maintenance and repair in areas contributing to bacteria loads in surface waters with elevated bacteria densities; ensure rapid response to cleaning up overflows; and developing sewer lateral maintenance and replacement programs for consideration by the appropriate local authority.

Provision C.14.a.vii requires the Cities to evaluate the potential bacteria-reduction benefit of prioritizing trash control efforts in areas discharging to waters with elevated bacteria densities. This Provision is intended to require Permittees to implement or enhance BMPs described in the Fact Sheet and Permit for Provision C.10 in areas that discharge to surface waters with elevated bacteria.

Provision C.14.a.viii. requires the Cities to monitor their receiving waters, outfalls, and stormwater catchments to identify sources of bacteria, i.e., through microbial source testing, observations, and fecal indicator bacteria measurements, and to evaluate effectiveness of controls and determine whether the bacteria water quality objectives

[304] City of Kirkland, Pet Waste Bacteria, Monitoring, Outreach and Education (2020), p. 11. Available at: https://www.kirklandwa.gov/files/sharedassets/public/public-works/2020-kcd-pet-waste-final-report.pdf)

[305] https://www.statesman.com/news/20190813/scoop-poop-dog-waste-on-greenbelts-affecting-more-than-bottom-of-your-shoes

[306] U.S. EPA, Reducing Animal Sources of Bacteria Restores Water Quality (2011).

and/or bacteria receiving water limitations are achieved. For the latter, it may be possible to show that bacteria water quality objectives exceedances occur but MS4 discharges do not cause or contribute to them. The regulatory authority and supporting information for monitoring are provided in the Fact Sheet for Provision C.8.

Identification of sources, evaluation of effectiveness of controls, and determination of compliance with bacteria receiving water limitations can be demonstrating through a monitor program designed to answer the following logical questions:

- What is the spatial and temporal extent of dry weather flows in the MS4?
- Are indicators of human fecal material present in both dry and wet weather flows observed in the MS4?
    - If so, in which stormwater catchments are sources most prominent?
    - Where are the likely locations of these sources in the catchments?
    - What measures can be implemented to control these sources?
- Are water quality objectives being achieved during dry weather?
- Are water quality objectives being achieved during wet weather?

The required levels of implementation to answer these questions, e.g., location and number of sites, sampling events, frequencies, and methods are based on the monitoring program and information provided by the Cities in their Fecal Indicator Bacteria Monitoring and Source Identification Program (April 2022). The required monitoring provides an initial comprehensive and robust means to identify sources, evaluate effectiveness of controls, and determine compliance or progress towards compliance with bacteria receiving water limitations. Monitoring at the required numbers of monitoring sites, events, and frequencies may be sufficient to answer some of the questions for some areas in the Cities' jurisdictions. It is likely that the monitoring will have to be adapted to respond to the results of the required surveillance and monitoring. For example, the results could show that the bacteria exceedances in the receiving waters have been resolved or are worse and more extensive than is currently understood. In either case, different monitoring will be needed to respond to the new information. Since it is not possible to prescribe new monitoring requirements until the results of the required monitoring are known, the Cities are required to include proposed monitoring in the Mid-Permit Interpretive Report to be conducted through the remainder of the Permit term to answer the questions in C.14.a.viii.(1). The proposed monitoring must be as comprehensive, systematic, and robust as what is currently required while being commensurate with the need to address and resolve bacteria exceedances in the receiving waters. The Water Board will subsequently amend the Permit to include approved second phase monitoring requirements.

Provision C.14.a.ix. requires the Cities to conduct a comprehensive assessment of their bacteria source identification and control actions and determine whether discharges from their MS4s are causing or contributing to exceedances of bacteria water quality objectives in receiving waters after implementation of control measures required by C.14.a.i-vii. It is possible that implementation of these requirements in conjunction with C.14.a.viii monitoring requirements will result in compliance with bacteria receiving water limitation requirements, as discussed above in this Fact Sheet under Path to Compliance with Bacteria Receiving Water Limitations, but it is not possible to justify a date by which compliance must be achieved due to the modeling or quantitative analysis limitations discussed above and known and unknown uncertainties associated with identifying and controlling possible sources. Accordingly, C.14.a.xi sets an expectation to achieve compliance by the end of the permit term, June 30, 2022, but if compliance will not be achieved despite diligent efforts to identify and control sources and compliance with C.14.a.i-viii, those efforts, successes, and lessons learned should inform determination of additional or enhanced efforts and a schedule to implement additional or enhanced efforts to achieve receiving water limitations as soon as possible.

The required Mid-Permit Interpretive Report and Final Interpretive Report provide a means to demonstrate progress towards answering the monitoring program questions and achieving bacteria receiving water limitations, based on monitoring results and description of source identification and control efforts, to provide justification for monitoring program revisions, and to either provide documentation that bacteria receiving water limitations have been or will be achieved by the end of the Permit term, or if not, documentation and justification for new or enhanced efforts to achieve compliance in a timely manner and a proposed monitoring program to further inform and evaluate those efforts.

C.14.b. City of Pacifica and San Mateo County Bacteria Controls

This Permit Provision implements the San Pedro Creek and Pacifica State Beach Bacteria TMDL adopted by the Water Board on November 14, 2012, and approved by the U.S. EPA on August 1, 2013, which is the effective date of the TMDL. The water quality attainment strategy included in this TMDL requires urban runoff management agencies to implement controls and take other actions to reduce bacteria loads in urban runoff.

The TMDL contains allocations for urban runoff, including urban runoff associated with MS4s and Caltrans facilities. The allocations are the same as the Numeric Targets and are expressed in terms of allowable exceedances of single-sample objectives.

This provision is consistent with 2014 U.S. EPA Memo[307] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve bacteria reductions necessary to achieve receiving water limits. The timeline for achieving wasteload allocations for Pacifica State Beach is by August 1, 2021 (8 years from the TMDL effective date) and by August 1, 2028 for San Pedro Creek (15 years from the TMDL effective date).

Provision C.14.b.i requires the Pacifica and San Mateo Permittees to implement control measures and education and outreach activities to achieve bacteria load reductions, such as: prohibit potential illicit discharges to the storm drain from the sanitary sewer collection system; repair the fence along the Crespi Canal and clean up trash from the Canal; address bacteria discharges from horse facilities; maintain dog waste-clean-up signs, waste bag dispensers, and trash receptacles; implement a visual inspection and clean-up plan for high dog waste accumulation areas; and implement an enhanced public outreach and education campaign for managing pet waste. This provision is critical to the successful implementation of the urban runoff requirements for the TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds or locations, 2) a commitment to an implementation schedule, and 3) the quantification of the benefit resulting from control measure implementation.

Provision C.14.b.ii requires the Pacifica and San Mateo Permittees to monitor water quality to assess attainment of wasteload allocations. To comply with this requirement, the Pacifica and San Mateo Permittees are required to monitor bacteria levels in San Pedro Creek and at Pacifica State Beach and report the results to the Water Board. Further, they must provide an annual report of the quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives. This provision is necessary to determine whether wasteload allocations are being attained, so additional or enhanced measures are implemented, if necessary.

Provision C.14.b.iii requires the Pacifica and San Mateo Permittees to conduct a water quality monitoring program to 1) better characterize bacteria sources and 2) evaluate the effectiveness of the bacteria control measures. The results of the monitoring shall be reported to the Water Board on an annual basis. The findings from these assessments will be used throughout this and future Permit terms to revise, refocus, and enhance bacteria control measures to make them as effective and efficient as possible. Future permits will be based on an updated assessment of bacteria sources and control measure effectiveness. This provision is necessary to allow the Pacifica and San Mateo Permittees to identify and implement effective BMPs in an efficient manner.

C.14.c. City of San Mateo Marina Lagoon Beaches Bacteria Controls

[307] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

This Permit Provision implements the San Francisco Bay Beaches Bacteria TMDL adopted by the Water Board April 13, 2016 and approved by the U.S. EPA on February 23, 2017. The State Office of Administrative Law approved the TMDL on December 13, 2016, which is the effective date of the TMDL. The implementation plan included in this TMDL requires urban runoff management agencies to implement controls and take other actions to reduce bacteria loads in urban runoff.

The TMDL contains allocations for urban runoff associated with MS4s in the City of San Mateo (City). The allocations are the same as the Numeric Targets and are expressed in terms of a geometric mean for Enterococcus. The Numeric Targets must be achieved in Parkside Aquatic and Lakeshore beaches on Marina Lagoon.

This provision is consistent with 2014 U.S. EPA Memo (see C.14.b) providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve bacteria reductions necessary to achieve receiving water limits. The TMDL requires the City to attain its wasteload allocation by taking a phased approach in which additional or enhanced actions are required if initial implementation actions do not result in attainment of the TMDL within five years.

Provision C.14.c.i. requires the City to implement control measures and education and outreach activities to achieve bacteria load reductions. The City is also required to report on the control measures on an annual basis. This provision is critical to the successful implementation of the urban runoff requirements for the TMDL. This provision requires the actions described above in this Fact Sheet for Provisions:

- C.14.a.1 and C.14.a.2, to control potential bacteria discharges from the sources as described above for these Provisions.
- C.14.a.4 and C.14.a.5, because pets and controllable wildlife were found to be significant sources to Parkside Aquatic and Lakeshore beaches.
- C.14.a.6, because sanitary sewer overflows were found to be the greatest potential source of bacteria to Parkside Aquatic and Lakeshore beaches.
- C.14.a.8, to monitor as describe in the Fact Sheet above.

Provision C.14.c.ii. requires the City to implement additional BMPs to reduce bacteria loads if the wasteload allocation is not met by December 13, 2021. The TMDL calls for a phased approach to achieving the wasteload allocation, wherein additional BMPs must be implemented if targets are not achieved after implementing Phase 1 actions within five years of the TMDL effective date. This provision calls for Phase 2 actions and is critical to the successful implementation of the urban runoff requirements for the TMDL.

Provision C.14.c.iii. requires the City to prepare a plan of additional actions to take if wasteload allocations are not met by December 13, 2026, six months before the end of the Permit Term. The plan shall include an assessment of bacteria sources with a schedule and description of additional control measures or increased levels of existing

control measures that will be implemented to attain bacteria water quality objectives. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

C.14.d. City of Half Moon Bay and San Mateo County Bacteria Controls

This Permit Provision implements the TMDL for Bacteria in Beaches in Pillar Point Harbor and Venice Beach adopted by the Water Board February 10, 2021. The implementation plan included in this TMDL requires urban runoff management agencies to implement controls and take other actions to reduce bacteria loads in urban runoff.

The TMDL contains wasteload allocations for urban runoff, including urban runoff associated with MS4s in the City of Half Moon Bay (City) and San Mateo County (County). The wasteload allocations are the same as the Numeric Targets and are expressed in terms of a geometric mean for Enterococcus. The Numeric Targets must be achieved in Venice Beach in the City and in the following beaches in Pillar Point Harbor (County): Inner Harbor Beach, Mavericks Beach, Pillar Point Marsh Beach, Yacht Club Beach, Capistrano Beach and Beach House Beach.

This provision is consistent with 2014 U.S. EPA Memo[308] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve bacteria reductions necessary to achieve receiving water limits. The TMDL requires the City and County to attain wasteload allocations by taking a phased approach in which additional or enhanced actions are required if initial implementation actions do not result in attainment of the TMDL within five years.

Provision C.14.d.i. requires the City of Half Moon Bay (City) and County of San Mateo (County) to submit a written plan for and to implement control measures and education and outreach activities to achieve bacteria load reductions, including the elements described in the Fact Sheet above for Provisions C.14.a.1 through C.14.a.8. The City and County are required to report on the control measures on an annual basis. This provision is critical to the successful implementation of the urban runoff requirements for the TMDL.

Provision C.14.d.ii. requires the City and County to obtain and evaluate water quality monitoring data for bacteria at the beaches included in this TMDL, and to submit a report on the data annually. The monitoring and reporting requirements of Provision C.14 are authorized under Clean Water Act § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h), (j) and (l), 122.42(c), 122.44(i) and 122.48, and Water Code § 13383.

Provision C.14.d.iii. requires the City and County to prepare a plan of additional actions to take if wasteload allocations are not met within five years of the TMDL effective date, as called for in the TMDL. The plan shall include an assessment of

[308] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

bacteria sources; a summary of control actions taken; and a schedule and description of additional control measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges. Illicit discharge means "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities" (40 CFR 122.26(b)(2)).

Fact Sheet Findings in Support of Provision C.15.

C.15-1 Prohibition A.1 effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1 if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

C.15-2 Removal of Conditional Exemption for Planned and Unplanned Discharges of the Potable Water System

MRP 1 contained requirements for planned and unplanned discharges from the potable water systems owned and/or operated by Permittees who are water purveyors. The discharges were conditionally exempted provided the Permittees complied with the BMP, monitoring, and reporting requirements in the Previous Permit. The requirements were necessary because potable water discharges contain chlorine and chloramines, two very toxic chemicals to aquatic life, and can cause erosion, scouring of stream and creek banks, and sedimentation. The conditional exemption and requirements were included as an interim measure until such time an NPDES permit regulating potable water discharges was adopted. The State Water Board adopted the statewide General NPDES Permit for Drinking Water System Discharges to Waters of the United States, Order WQ 2014-0194-DWQ (Potable Water General Permit) on

November 18, 2014.[309] Therefore, the conditional exemption and requirements for planned and unplanned discharges from the Permittees' potable water systems is no longer necessary. The Permittees should seek coverage under the Potable Water General Permit for their potable water system discharges. NPDES-permitted discharges, such as those permitted by the Potable Water General Permit, are exempt from Discharge Prohibition A.1.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1 if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1 if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b's requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

- **Provision C.15.b.i.(1). Pumped Groundwater from Non-Drinking Water Aquifers.** These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Discharges of pumped groundwater from nondrinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit. U.S. EPA Method 8260B and 8270C for volatile and semi-volatile organic compounds have been replaced with U.S. UPA Method 624.1 and 625.1, respectively, to be consistent with 40 C.F.R. Part 136 (p. 4).

[309] https://www.waterboards.ca.gov/water_issues/programs/npdes/general_permits.html

- **Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains.** This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

  Updates have been made to the Provision C.15.b.i.(2)(b)(ii). U.S. EPA Method 8260B and 8270C for volatile and semi-volatile organic compounds have been replaced with U.S. EPA Method 624.1 and 625.1, respectively, to be consistent with 40 C.F.R. Part 136 (p. 4). Several of the reporting limits in the Provision C.15.b.i.(2)(b)(ii) Constituent Reporting Limit table have been updated or modified, to reflect the latest reissuance of the VOC and Fuel General Permit, NPDES Permit No. CAG912002 (Order No. R2-2017-0048, as amended by Order No. R2-2018-0050), which covers discharges from groundwater treatment facilities that extract or treat groundwater polluted by volatile organic compounds (VOCs), fuel leaks, fuel additives, or other related wastes (e.g., semi-volatile organic compounds [SVOCs], polycyclic aromatic hydrocarbons [PAHs], and metals).

- **Provision C.15.b.ii. Air Conditioning Condensate.** Small air conditioning units are usually operated during the warm weather months. The condensate from these units is uncontaminated and unlikely to reach a storm drain or waters of the State because it tends to be low in volume and tends to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the condensate tends to be uncontaminated, it picks up contaminants on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

- **Provision C.15.b.iii. Emergency Discharges of Firefighting Water and Foam.** According to 40 C.F.R §122.26, MS4 Permits may address discharges or flows from firefighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States. Discharges from firefighting activities are excluded from the definition of illicit discharges, but may be regulated where they are

significant contributors to water pollution.[310] This is consistent with U.S. EPA's treatment of firefighting discharges to small MS4s.[311] U.S. EPA envisions that significance is determined with reference to the category of discharges, not individual fires.[312]

At the same time, water quality impacts from individual fires illustrate the significance of the category of discharges. For instance, in April 2019, the discharge of firefighting foam through the storm drain to Codornices Creek in Berkeley caused a fish kill of at least 60 fish, including steelhead.[313]

Potable water is also used to fight fires. In the Bay Area, chloramines are typically used to control pathogens in potable water, and they are toxic to aquatic life.[314] Discharges of chloraminated potable water to Bay Area receiving waters have caused fish kills.[315] As a result, discharges of chloraminated potable water used for firefighting have the potential to impact aquatic life, including by causing fish kills.

The Water Board observes the following: fish kills from potable water discharges almost every year; small volumes of potable water discharges (between 4,000 and 10,000 gallons) kill fish; and many species of fish (steelhead, rainbow trout, three-spine stickleback, Sacramento suckers, hitch, California roach, mosquitofish, green sunfish, bluegill, fathead minnows, sculpin, golden shiners) and crayfish have been killed by potable water discharges.

There are several recent examples of potable water discharges that resulted in fish kills (and fines) in the Bay Area, listed below. It is important to note that this list is inexhaustive. It includes all fines since 2007, but not all fish kills since 2007. That is because it excludes potable water discharges (resulting in fish kills) between 2018

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[310] 40 C.F.R. 122.26(d)(2)(iv)(B)(1)

[311] 64 Fed. Reg. 68722, 68756: "[D]ischarges or flows from fire fighting activities are excluded from the definition of illicit discharge and only need to be addressed where they are identified as significant sources of pollutants to waters of the United States."

[312] 64 Fed. Reg. 68722, 68758: "If an MS4 is concerned that flows from firefighting are, as a category, contributing substantial amounts of pollutants to their system, they could develop a program to address those flows prospectively. The program may include an analysis of the flow from several sources, steps to minimize the pollutant contribution, and a plan to work with the sources of the discharge to minimize any adverse impact on water quality. During the development of such a program, the MS4 may determine that only certain types of flows within a particular category are a concern, for example, fire fighting flows at industrial sites where large quantities of chemicals are present."

[313] McKenney, Hope. Fire Retardant Linked to Fish Deaths in Berkeley Creek Identified by State Fish and Wildlife, *KQED* April 12, 2019; accessed at https://www.kqed.org/news/11739651/fire-retardant-linked-to-fish-deaths-in-berkeley-creek-identified-by-state-fish-and-wildlife.

[314] SFPUC, September, 2010. *Questions and Answers Regarding Chloramine.* Accessed on August 30, 2020, from: https://www.sfdph.org/dph/files/EHSdocs/ehsWaterdocs/Chloramine/SFDPH_Chloramine_in_Drinking_Water_Document_Collection.pdf

[315] Aaron Kinney, November 18, 2014. "Cal Water hit with $3 million penalty for fish-killing San Mateo pipe leak." San Jose Mercury News.

and 2022 which normally would have resulted in fines, because the Water Board chose not to enforce; review of the Water Board's Enforcement Policy resulted in coordination with water purveyors to improve their asset management programs in lieu of penalties.

(1) Cal Water Service Company, $200,000 ACL, 137,640 gallon discharge to Polhemus Creek in September 2007, killed 21 steelhead + 2 stickleback (R2-2009-0006);

(2) EBMUD, $72,000 ACL, 4,200 gallon discharge to Sausal Creek in August 2010 killed 25+ rainbow trout and 23,400 gallon discharge to Reliez Valley Creek in January 2010 with unknown impact. (R2-2012-0008);

(3) CalTrans, $31,250 ACL, 8,250 gallon discharge to Bear Gulch Creek in May 2011, resulted in fish kill (R2-2012-0009);

(4) SFPUC, $608,310 ACL for 4 violations, including a 37,500 gallon discharge to San Mateo Creek in Jan 2011 killing 5 rainbow trout and 16,500 gallon discharge to San Mateo Creek in October 2012 killing 64 fish including 28 steelhead. (R2-2014-1003);

(5) CA Water Service Company, $1,020,000 ACL for 8,207,560-gallon discharge to Polhemus Creek and San Mateo Creek in October 2013 killing 231 fish including rainbow trout and 1 crayfish (R2-2016-1012);

(6) Town Hillsborough, $221,030 ACL for 153,000-gallon discharge to San Mateo Creek in September 2015 killing 505 fish including threatened species under the Endangered Species Act (R2-2017-1028);

(7) EBMUD, $893,190 ACL for 3 discharges: (1) a 72,000-gallon discharge to San Ramon Creek in October 2015 killing 104 fish including mosquitofish, Sacramento suckers, hitch, and California roach; (2) 2,200,000-gallon discharge to Las Trampas Creek in November 2015 killing 17 California roach and 2 Sacramento suckers; and (3) 191,400-gallon discharge to San Ramon Creek killing 140 California roach, 100 three-spined stickleback, 75 mosquitofish, 6 green sunfish, 4 bluegill, and 2 fathead minnows (R2-2017-1031);

(8) Marin Municipal Water District, $129,250 ACL for 105,000-gallon discharge to San Anselmo Creek in July 2016 killing an unquantified number of fish that included sculpin, California roach, and rainbow trout or steelhead (R2-2018-1004);

(9) Dublin-San Ramon Services District, $129,250 ACL for 61,000-gallon discharge to Alamo Creek in September 2017 killing 130 golden shiners and 1 bluegill (R2-2018-1006);

(10) San Jose Water Company, $75,000 ACL for 111,250-gallon discharge to Babb Creek in September 2017 killing 565 fish (R2-2018-1011); and

(11) City of San Mateo, $73,700 ACL for 7,720-gallon discharge to San Mateo Creek in May 2021 killing 44 steelhead, 26 prickly sulpin, 19 Sacramento suckers, 8 threespine stickleback, and 1 crayfish (R2-2022-1001).

The Berkeley incident and the use of chloraminated potable water for firefighting demonstrate that flows from firefighting activities can contribute substantial amounts of pollutants to receiving waters if not managed. As a result, the Water Board has determined that firefighting discharges can contribute significant pollution to receiving waters and require management by Permittees.

This Provision addresses discharges of firefighting water and foam associated with emergency firefighting activities. Discharges of firefighting water and foam associated with non-emergency firefighting activities such as training are neither exempted nor conditionally exempted by this Provision; they are prohibited pursuant to Discharge Prohibition A.1. If there are discharges to storm drain systems or watercourses of firefighting water and/or foam (or other non-stormwater) associated with non-emergency (e.g., training) firefighting activities, which would violate Discharge Prohibition A.1, then Permittees must comply with the reporting specified in Provision C.23.c.

This Provision acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs only when they do not interfere with immediate emergency response operations or impact public health and safety.

The requirements in Provision C.15.b.iii ensure that Permittees reduce or eliminate the significant pollution from firefighting foam and water discharged during firefighting emergencies, without compromising the ability of firefighting personnel to protect lives and property. Permittees are required to evaluate and improve the efficacy of their BMPs and SOPs for the containment and cleanup of firefighting water and foam discharged during firefighting emergencies. These discharges are significant contributors to pollution in waters of the U.S., for the following reasons:

(1) Potable water is used in emergency firefighting situations, often in combination with firefighting foams. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two chemicals that are toxic to aquatic life. Such discharges can also cause erosion and scouring of stream and creek banks and can result in sedimentation if effective BMPs are not implemented.

(2) Discharges of Class A firefighting foams contribute pollution to water quality in receiving waters, because they contain constituents that are acutely toxic to

aquatic species.[316,317,318,319] In April 2019, a vehicle fire in the City of Berkeley resulted in the discharge of 4,500-12,000 gallons of potable water and 20 gallons of a Class A firefighting foam (for which the primary/active ingredient is a hydrocarbon surfactant; 96-hr LC_{50} Rainbow Trout = 16.8 mg/L) into the City's MS4, which discharged to Codornices Creek and resulted in the deaths of at least 63 Central Coast California Steelhead Trout and 1 sculpin. Similar discharges of other Class A foams with comparable acute aquatic toxicity[316] are likely to cause similar impacts.

(3) Class B firefighting foams are generally divided into two types, fluorinated and fluorine-free. Discharges of both types of Class B firefighting foams[320] contribute pollution to water quality in receiving waters, because they contain constituents that are toxic to aquatic species. Fluorine-free Class B foams do not contain PFAS, but are still acutely toxic to aquatic species[321] because their primary active ingredient is typically a hydrocarbon surfactant.[322] Fluorinated Class B foams typically contain perfluoroalkyl and polyfluoroalkyl substances (PFAS), which are environmentally persistent and toxic to both human health and aquatic species.[323,324,325]

(4) California Senate Bill 1044,[326] approved by the Governor on September 29, 2020, and effective January 1, 2022, prohibits the sale and use of Class B firefighting foams that contain intentionally added PFAS chemicals, with phaseouts for certain continued applications of such foams. This Provision requires the Permittees to recommend reporting requirements (for example,

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[316] https://www.fs.fed.us/rm/fire/wfcs/sds.php

[317] https://www.fs.fed.us/rm/fire/wfcs/documents/NONCONFIDENTIAL-EcoRA-Foams%20June2020draft.pdf

[318]https://www.fs.fed.us/rm/fire/wfcs/documents/307b_Wildland%20Foam_Master%20Draft%20(for%20Public%20release).pdf

[319] https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/rotenone/appendix-f.pdf

[320] Class B firefighting foams are commercial surfactant solutions that are used for fire suppression (in particular, of flammable liquids like gasoline, oil and jet fuel) and flammable vapor suppression at military installations and civilian facilities and airports, as well as at petroleum refineries and bulk storage facilities, and chemical manufacturing plants and storage facilities. Municipal fire departments also use Class B firefighting foams for emergency response. Accessed on August 2, 2021, from: https://www4.des.state.nh.us/nh-pfas-investigation/?page_id=148

[321] https://store.danko.net/files/documents/SDS_PC-1-Fluorine-Free-OSHA-WHMIS-GHS_2019-09-13_EN-23.pdf. Web. Viewed <August 2, 2021>

[322] https://serdp-estcp.org/Program-Areas/Weapons-Systems-and-Platforms/Waste-Reduction-and-Treatment-in-DoD-Operations/WP-2738/WP-2738. Web. Viewed <August 2, 2021>

[323] https://www.epa.gov/pfas/basic-information-pfas

[324] https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201920200SB1044

[325] https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfas

[326]https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB1044

reporting if any of the exemptions in Senate Bill 1044 are invoked by parties acting within Permittees' jurisdictions, such that firefighting foams containing PFAS chemicals are used during firefighting emergencies) then implement those recommendations. Reporting on discharges of PFAS and other foams is necessary to ensure transparency about continued PFAS use within the Permit region, and transparency about discharges of other firefighting foams which also have adverse environmental impacts.

Provision C.15.b.iii.(2), Regional Coordination, requires the Permittees to convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff, to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activities. The Permittees will collectively (e.g., through the Working Group) evaluate the adequacy of existing BMPs, SOPs and resources used for the containment and cleanup of firefighting foam discharged during firefighting emergencies, culminating in a Firefighting Discharges Report by September 30, 2025, containing recommendations to the Permittees regarding the implementation of BMPs, SOPs, and resources used for the containment and cleanup of firefighting water and foam discharged during firefighting emergencies. A footnote in the Provision clarifies that the Working Group does not have to review every single Permittee's BMPs/SOPs/resources, but that the Working Group can review a representative subset of them. Regarding resources used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters (e.g., maps), the intent is not to task firefighting personnel with developing/providing/utilizing those resources at each emergency on the spot, but instead, to preemptively consider the availability, need, and utility of the resources, then incorporate the resources that will be helpful (i.e., helpful for mitigating adverse environmental impacts) into the collective municipality's BMPs and SOPs. The Fact Sheet, below, gives examples of BMPs and SOPs that the Working Group should consider. In addition, the Working Group should consider identifying areas where more information or effective BMPs and SOPs may be needed or desirable, if it or they are not yet otherwise available, and as noted above the Group is expected to include reporting recommendations associated with firefighting discharges, and particularly firefighting foams. The requirement for a region-wide Working Group and for the report will help to create administrative efficiencies by allowing Permittees to pool resources and avoid the duplication of work that might occur if they studied these issues individually. The Water Board may consider requiring the Working Group to continue to convene on an ongoing basis in subsequent permit terms, to update the recommendations in the Firefighting Discharges Report as needed.

The Permittees estimate that a portion of fires are responded to (for containment and cleanup) not with municipal resources, but by private contractors. Therefore, Provision C.15.b.iii.(2) additionally requires the Permittees to collectively (e.g., through the Working Group): 1) develop (and revise on an ongoing basis, as-

needed) outreach materials regarding BMPs and SOPs for the containment and cleanup of discharges of firefighting water and foam, for private contractors hired by either Permittees or by private parties to conduct firefighting, containment and cleanup within Permittees' jurisdictions, because a significant portion of fires on private properties are responded to (for containment and cleanup) by private contractors hired by the owners of those private properties. Separately, it is also true that there are some private firefighting crews within the region, such as at large industrial sites like the Chevron refinery in Richmond; the Working Group is encouraged to discuss coordination with these private firefighting crews, as needed (for example, if it is likely that there are emergency discharges from such sites to Permittees' MS4s).

This provision also requires the Permittees to collectively (e.g., through the Working Group) evaluate the environmental impacts of foams and make recommendations about which foams are least environmentally harmful while still performing well. Certain firefighting foams appear to be less environmentally harmful than others (within and between Class A and Class B foams).[327] Then the Permittees are instructed to collectively (e.g., through the Working Group) develop SOPs for the use of those foams, and coordinate with relevant federal, state and local entities, such as the California Department of Forestry and Fire Protection, because those entities may be undergoing similar exercises and may be able to share information that could inform these and other tasks required by Provision C.15.b.iii.(2).

The Working Group could consider addressing reasonably related issues that are beyond the scope of this Provision, such as addressing prohibited (not conditionally-exempted) discharges associated with non-emergency firefighting activities, such as training.

Provision C.15.b.iii.(3), Ongoing Implementation Practices, requires the Permittees to implement the recommendations, to the extent they apply to Permittees' individual firefighting programs, that are included in the Firefighting Discharges Report developed pursuant to Provision C.15.b.iii.(2)(b).

Provision C.15.b.iii.(4), Required BMPs, requires Permittees to implement BMPs and SOPs for the containment and cleanup of discharges of firefighting water and foam associated with emergency firefighting activities, only to the extent that the implementation of such BMPs and SOPs does not jeopardize the ability of firefighting personnel to protect public health and safety. If and when the recommended BMPs and SOPs are implemented, they are likely to prevent or

[327] Fluorine-free foams have been on the market for approximately twenty years, though even these foams have toxic effects, as the fish kill in Berkeley shows. Clean Production Action, a nonprofit based in Somerville, Massachusetts, has developed an environmental screening tool for firefighting foams, which could be a starting point for the Working Group. See Thorpe, Bev. "GreenScreen Certified for Fire Fighting Foam Launched" (Sept. 2020) (accessible at: https://www.cleanproduction.org/resources/entry/fff-launched).

reduce impacts to receiving waters that would otherwise be caused by the discharges associated with the emergency firefighting activities.

BMPs and SOPs may include, but are not limited to, the following:

(1) Plugging of the storm drain collection system for temporary storage;

(2) Dechlorination prior to discharge to the MS4 and receiving waters;

(3) Proper disposal of water and foam according to jurisdictional requirements;

(4) Use of the least environmentally harmful firefighting foams;

(5) Avoiding the use of firefighting foam when it is not necessary;

(6) Use of the proper firefighting foam depending on the type of fire;

(7) When firefighting foam is used, limiting the amount used;

(8) Communication and coordination between both municipal responding departments (e.g., fire, public works, environmental services) and external responding agencies (e.g., CalFire, special district fire departments);

(9) Categorizing fire types and establishing expectations for BMP and SOP implementation based on that categorization; and

(10) Discouraging the use of firefighting foam where it may discharge to receiving waters, particularly receiving waters that may have sensitive habitat, such as habitat for special status species, including certain salmonids.

These recommended BMPs and SOPs will be discussed in the Firefighting Discharges Working Group, including which scenarios they are appropriate for.

Provision C.15.b.iii.(5) requires the Permittees to implement the reporting that is recommended by the Firefighting Discharges Working Group in the Firefighting Discharges Report. Provision C.15.b.iii.(2)(a)(vii) specifies the reporting requirements that Permittees must consider, including what type of information will be reported, as well as how reporting will be triggered, such as: in the case that any amount of any firefighting foam discharges to a receiving water,[328] in the case that five or more gallons of any firefighting foam concentrate discharges to the MS4, regardless of whether or not it impacts a receiving water,[329] and in the case that any amount of PFAS-containing firefighting foam concentrate is used during an emergency, regardless of whether it discharges to the MS4 or a receiving water. The purpose of these additional reporting requirements is to increase transparency about

[328] Pursuant to California Fish and Game Code, Section 5650, there is no minimum reportable quantity for discharges of firefighting foam to waters of the state. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=FGC&sectionNum=5650

[329] For firefighting personnel, the reportable quantity of HAZMAT released to the environment is five gallons. Additionally, five gallons of firefighting foam is the size of a typical concentrated foam container.

the use of and discharges of non-stormwater to MS4s and receiving waters, as well as to provide direct feedback on the Permittees' implementation of Provision C.15.b.iii.

The Working Group should also discuss notification of the California State Warning Center and the California Department of Fish and Wildlife, for discharges to marine waters (pursuant to CGC 8670.25.5 and 8670.26, FWPCA 311, 33 CFR 153.203, and 40 CFR 302.6), and for discharges to non-marine waters (pursuant to 23 CCR 2250(a), HSC 5411, CWC 13271(a)).

The Water Board may consider including more specific reporting requirements in a future Permit term, based on the reporting recommendations (and the Permittees' implementation of those recommendations) in the Firefighting Discharges Report.

- **Provision C.15.b.iv. Individual Residential Car Washing.** Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.
- **Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges.** These types of discharges can contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or a waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This provision also requires Permittees to coordinate with local sanitary agencies in these efforts.
- **Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering.** Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the

use of fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

C.16. Discharges to Areas of Special Biological Significance

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amendment to the Ocean Plan on October 16, 2012, and the plan was subsequently approved by the State Office of Administrative Law and U.S. EPA. The State Water Board is responsible for reviewing the Ocean Plan water quality standards and for modifying and adopting standards in accordance with CWA section 303(c)(1) and CWC section 13170.2. Pursuant to CWA sections 13263 and 13377, this Permit implements the Ocean Plan. In accordance with the Ocean Plan, the State Water Board granted an exception to the prohibition of stormwater discharges to Areas of Special Biological Significance (ASBSs), as discussed further below.

Fact Sheet Findings in Support of Provision C.16.

C.16-1 The Ocean Plan prohibits the discharge of waste to designated ASBSs. ASBSs are designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. On March 20, 2012, the State Water Board approved Resolution No. 2012-0012, approving a general exception to the Ocean Plan prohibition against discharges to ASBSs for certain nonpoint source discharges and NPDES-permitted municipal storm water discharges (ASBS Exception), as long as those discharges are covered under an appropriate authorization to discharge, such as this Order and comply with the Special Protections contained in Attachment B (Special Protections) to that resolution, among other requirements. The ASBS Exception was subsequently amended by State Water Board Resolution No. 2012-0031, which required pollutant reductions to be achieved within six years, in accordance with ASBS Compliance Plans.

C.16-2 This provision applies to discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve ASBS. The provision authorizes the County of San Mateo's stormwater discharge as set forth in the provision and implements the Ocean Plan and the exceptions granted under it by the State Water Board to allow the County of San Mateo to discharge stormwater into the ASBS. The requirements of the Provision are from the ASBS Exception and its Special Protections, which are incorporated into the Order as Attachment F.

C.16-3 The County of San Mateo began development of the Fitzgerald ASBS Pollution Reduction Program in 2011 to comply with the ASBS Exception. The program

is led by the San Mateo County Department of Public Works in collaboration with the San Mateo County Resource Conservation District and the San Francisco Estuary Institute. The project includes implementation of targeted stormwater BMPs, water quality studies, BMP effectiveness monitoring, and education and outreach.

C.16-4 In addition to these efforts, the Water Board has developed a Water Quality Improvement Plan for Bacteria in San Vicente Creek,[330] which is tributary to the Fitzgerald ASBS. In 2016, the Water Board also delisted the Fitzgerald Marine Reserve Beach for bacteria from the 303(d) List based on water quality improvements from BMP implementation, identification and removal of illicit septic system connections, and education and outreach activities.

[330] San Francisco Bay Regional Water Board, "Supporting Implementing a Water Quality Improvement Plan to Achieve Water Quality Objectives for Bacteria in San Vicente Creek, and Recommending Delisting of the Fitzgerald Marine Reserve for Bacteria Pursuant to Section 303(d) of the Clean Water Act," Resolution No. R2-2016-0024.

C.17. Discharges Associated with Unsheltered Homeless Populations

Legal Authority

Broad and Specific Legal Authority: CWA §§ 308(a), 402(p)(3)(B)(ii-iii); CWC §§ 13377, 13263, and 13383; 40 CFR § 122.26(d)(1)(v)(B); 40 CFR § 122.26(d)(2)(i)(B, C, D, E, and F); and 40 CFR § 122.26(d)(2)(iv); Basin Plan Discharge Prohibitions 7, 8, and 15; and Statewide Prohibition on Trash: "The discharge of trash to surface waters of the State or the deposition of trash where it may be discharged into surface waters of the State is prohibited."

Fact Sheet Findings in Support of Provision C.17.

Driven in part by a lack of affordable housing and the high cost of living, a significant number of Bay Area residents are experiencing homelessness. That number increased markedly during MRP 2. For example, according to the latest Point-in-Time counts, between 2017 and 2019, the South Bay, East Bay, and the San Francisco Peninsula saw an approximate 25 percent increase (with individual increases of 17 to 43 percent) in their unsheltered homeless populations. Discharges associated with people experiencing unsheltered homelessness, including human waste and trash, are unauthorized discharges that are prohibited under the MRP. Such discharges are a significant water quality concern because they adversely impact water quality and public health (through the spread of disease). At the same time, these water quality and sanitation issues can be difficult to address because sanitation services can be challenging to provide and homeless populations may not always be receptive to the services being provided. In addition, while longer-term measures to address unsheltered homelessness, such as the provision of housing and supportive services may over time reduce problematic discharges, they do not effectively reduce ongoing discharges over the short term. Thus, actions to reduce and/or eliminate MS4 discharges associated with unsheltered homelessness are necessary to prevent and minimize impacts to water quality and public health. Such actions also can improve overall water quality and sanitary conditions for people experiencing unsheltered homelessness.

In 2015, the Water Board adopted Resolution No. R2-2015-0024, which identified discharges of trash and human waste from homeless encampments as significant water quality and public health concern. The resolution encouraged municipalities to consider water quality issues while addressing the broader social issue of homelessness and undertake efforts to prevent or eliminate discharges from homeless encampments. The resolution further recommended that municipal efforts "…include clear and measurable goals for preventing trash and human waste from discharging" to receiving waters. The resolution also affirmed the Board's authority to issue cleanup and abatement

orders or waste discharge requirements to regulate discharges associated with homeless encampments.

Since adoption of the resolution, some Bay Area municipalities have made progress towards controlling discharges associated with unsheltered homelessness under the Provision C.10 Direct Discharge Control Program. Although efforts under that program have provided benefit with respect to reducing discharges of trash and certain other pollutants, they have not fully addressed discharges associated with unsheltered homelessness that impact water quality. Furthermore, only five Permittees have an approved Direct Discharge Control Plan.

A number of Permittees are taking actions that help address problematic discharges. For example, East Palo Alto and Mountain View have established formalized RV encampments or RV safe parking areas where RV waste can be appropriately collected and disposed using mobile services. In Oakland, where the unsheltered homeless population increased to about 4,000 in 2020, an increase of about 63 percent from 2017,[331] the city has established formalized encampments and is directing resources into affordable housing with the aim of getting those who are willing into housing. In 2020, Oakland adopted a new ordinance regarding where homeless encampments could be located, and is also working to provide sanitary services and manage sites for RVs, and has been targeting services to encampments that are within 500 feet of waterways.[332] Similarly, San Jose has a dedicated outreach team that provides emergency shelter, meals, showers, and other basic needs while working to match individuals experiencing homelessness with an appropriate housing program. The City of San Jose also coordinates with Santa Clara Valley Water District to address discharges associated with unsheltered homelessness in and around creeks.

As noted above, the Bay Area population of people experiencing unsheltered homelessness has continued to grow, and is expected to grow further as eviction moratoria implemented during the COVID-19 pandemic expire. Meanwhile, outbreaks of *Shigella* and Hepatitis A, both spread through fecal-oral contact, among homeless people in California underscore the risks posed by unregulated discharges, particularly of untreated human waste, from encampments.[333] To encourage Permittees' efforts, gain a better understanding of populations experiencing unsheltered homelessness, the location of encampments in relation to storm drain inlets and receiving waters,

[331] Rodriguez, October 21, 2020. Oakland Approves Rules to Restrict Homeless Encampments. U.S. News.

[332] Ibid.

[333] Liu, et al. Communicable Disease Among People Experiencing Homelessness in California, in Epidemiology and Infection (2020).

water quality related impacts, and associated sanitation-related needs, and to better understand the portion of discharges that are being addressed by Permittee efforts, and the extent to which practices may be effective, Provision C.17 requires that Permittees use results from biennial point-in-time census surveys and related information (e.g., databases, complaint logs) to review and update municipalities' implementation practices.

To encourage regional coordination between cities, Caltrans, sanitary sewer agencies, flood control districts, and other agencies (e.g., railroads, non-governmental organizations), Provision C.17 requires that Permittees collectively develop a BMP report that identifies effective practices to address MS4 discharges associated with unsheltered homelessness that impact water quality. The clearing and abating of homeless encampments, in response to public complaints, can often result in the encampment simply moving to a different location and continuing the discharges in the new location. The intent of this BMP report is therefore to foster (and prioritize) regional collaboration that takes into account the transient nature of unsheltered homeless populations, and the inherent benefit to Permittees sharing knowledge and resources on proven and effective strategies to managing the associated discharges from homeless encampments that impact water quality. The three main components of this report include:

(1) Identifying practices (e.g., outreach, cleanup, sanitation) that could be implemented by Permittees to address discharges associated with unsheltered homelessness that are impacting water quality;

(2) Identifying regional and/or countywide efforts and implementation actions towards addressing discharges associated with unsheltered homelessness. Permittees should include recommendations for engaging in such efforts that aim to provide clean water and sanitation needs for the homeless population; and

(3) Identifying practices implemented by municipalities during the COVID-19 pandemic to reduce the spread of the virus in homeless populations (such as providing temporary housing, etc.) that may have contributed towards a water quality benefit.

The tasks identified above are intended to assist Permittees in developing a framework for controlling and eliminating MS4 discharges associated with homeless encampments, and refining individual and collaborative best management practices (associated with unsheltered homelessness) to ensure the protection of water quality and public health. Practices that harm or criminalize unsheltered homeless residents, such as encampment sweeps, are discouraged under this provision. To evaluate BMP effectiveness, Provision C.17 requires that Permittees report on the control measures being

implemented, the approximate portion and locations of the unsheltered homeless population being served by those measures, and the portion (number of people) and location not reached, or not fully served by those measures. Examples of control measures include, but are not limited to, access to emergency shelters; the provision of social services, clean drinking water, and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV “safe parking” areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing various cleanup or pickup programs within the Permittees jurisdiction, or at the countywide or regional level.

C.18. Control of Sediment Discharges from Coastal San Mateo County Roads

Legal Authority

This is a TMDL-derived Provision, for which the legal authority is cited in the Fact Sheet section on Provisions C.9-C.14.

Fact Sheet Findings in Support of Provision C.18

C.18-1 This Permit Provision implements the Pescadero and Butano Creeks Watershed Sediment TMDL adopted by the Water Board June 13, 2018 and approved by the U.S. EPA on June 24, 2019. The implementation plan included in this TMDL requires San Mateo County to complete a roads assessment, including a prioritized list of road repair projects, stormproof unpaved roads, and implement other BMPs to reduce sediment in runoff from County roads in the Pescadero Creek and Butano Creek watersheds. A similar strategy is being developed for the San Gregorio watershed to address sediment impairment; thus, this Permit Provision includes the San Gregorio watershed as well. For the San Gregorio Creek watershed, the Water Quality Improvement Plan calls for San Mateo County to complete twenty percent of the sediment reductions actions described above by June 30, 2029, and fifty percent by 2032.

C.18-2 The TMDL contains allocations for sediment loading from County road runoff expressed in tons per year and as a percentage of the natural background sediment load. Attainment of this allocation is required to achieve the Numeric Targets for the Pescadero and Butano Creek Watershed. Consequently, this provision is critical to the successful implementation of the sediment reduction requirements of the TMDL.

Specific Provision C.18 Requirements

Provision C.18.a Road Erosion Inventory requires the County to prepare a road erosion inventory to identify and prioritize actions to reduce road-related erosion from hydrologically connected County roads. Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. The County is required to report on the road erosion inventory as part of the 2023 Annual Report.

Provision C.18.b Prioritized List and Schedule of Actions requires the County to develop a prioritized list and schedule of actions, such as culvert repair or replacement, to reduce road related sediment delivery to stream channels, based on the results of the Road Erosion Inventory conducted in Provision C.18.a. The County is required to submit the prioritized list and schedule of actions as part of the 2023 Annual Report.

Provision C.18.c Implement Control Measures to Attain Performance Standards requires the County to implement control measures and pollution prevention strategies to reduce road related sediment delivery from County roads to stream channels, based on the Prioritized List and Schedule of Actions completed in Provision C.16.b. The County is required to implement and complete at least twenty percent (20%) of the control measures identified in the Prioritized List and Schedule of Actions by 2027. The County is required to report on the status of completed control measures in the Annual Report each year starting the first year of project implementation.

Provision C.18.d. Monitoring requires the County to conduct implementation, effectiveness and forensic monitoring to assess the performance of implemented control measures. The County is required to provide a monitoring report as part of the Annual Report each year starting in the first year of project implementation. The monitoring and reporting requirements of Provision C.18 are authorized under CWA § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h), (j) and (l), 122.42(c), 122.44(i) and 122.48, and CWC § 13383.

C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements

Findings in Support of Provision C.19

C.19-1 Contra Costa County watersheds are under two Regional Water Quality Control Boards' jurisdiction, the San Francisco Bay Water Board and the Central Valley Water Board. The cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County and the Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) (the East County Permittees) in Contra Costa County are in the Central Valley Water Board's jurisdiction.

C.19-2 The East County Permittees are member agencies of the Contra Costa Clean Water Program (CCCWP). CCCWP assists its member agencies – most of whom are within the San Francisco Bay Water Board's jurisdictional boundaries – with tasks that can be done consistently throughout the County.

C.19-3 In 1992, the San Francisco Bay Water Board issued the first NPDES permit with requirements for stormwater discharges from municipal separate storm sewer systems (MS4s) in Contra Costa County cities and towns, and the portions of the County and CCCFCWCD located in its jurisdiction. In 1993, the Central Valley Water Board used the permit issued by the San Francisco Bay Water Board as a model and issued an NPDES permit with waste discharge requirements for stormwater discharges from MS4s within the East County Permittees' jurisdictions. In subsequent permit reissuance cycles, each Regional Water Board adopted stormwater permits for Contra Costa County with similar provisions, exercising an inter-regional, collaborative approach for the East County Permittees.

C.19-4 On October 14, 2009, the San Francisco Bay Water Board issued its first region-wide NPDES permit, Order No. R2-2009-0074, NPDES Permit No. CAS612008, for stormwater discharges from MS4s in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District. The Central Valley Water Board used Order No. R2-2009-0074 as a model and adopted Order No. R5-2010-0102, reissuing NPDES Permit No. CAS083313 for the East County Permittees to discharge stormwater from MS4s in their jurisdictions on September 23, 2010. Where Order No. R2-2009-0074 provisions were sufficient to meet the requirements of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Central Valley Basin Plan) and other Central Valley Water Board policies, the provisions in Order No. R5-2010-0102 were the same as those in Order No. R2-2009-0074. Where different or additional provisions were required to meet

the requirements of the Central Valley Basin Plan or other Central Valley Water Board policies, including the Sacramento-San Joaquin Delta Estuary Methylmercury Total Maximum Daily Load (TMDL), those different or additional provisions were included in Order No. R2-2009-0074.

C.19-5 On November 19, 2015, the San Francisco Bay Water Board adopted Order No. R2-2015- 0049, updating and reissuing waste discharge requirements for stormwater discharges from MS4s in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District.

C.19-6 The East County Permittees submitted to the Central Valley Water Board a report of waste discharge, dated March 4, 2015, for reissuance of their waste discharge requirements under NPDES permit to discharge stormwater runoff from storm drains and watercourses within their jurisdictions. The East County Permittees anticipated that the Central Valley Water Board would reissue their stormwater permit with requirements consistent with the San Francisco Bay Water Board 's Order No. R2-2015-0049. However, the Central Valley Water Board was already preparing a region-wide General Waste Discharge Requirements and NPDES Permit for stormwater discharges from MS4s (General Permit) within the Central Valley region.

C.19-7 The Central Valley Water Board did not support adopting separate waste discharge requirements for stormwater discharges from the East County Permittees, which would be consistent with the San Francisco Bay Water Board's Order No. R2-2015-0049. The General Permit is significantly different from Order No. R2-2015-0049 and thus would not allow the East County Permittees to continue the collaborative approach through CCCWP. The Central Valley Water Board offered the East County Permittees two options: request a transfer of jurisdiction for stormwater permitting to the San Francisco Bay Water Board or obtain coverage under the General Permit.

C.19-8 In the fall of 2016, the East County Permittees asked the Central Valley Water Board to designate the San Francisco Bay Water Board as the permitting entity for stormwater discharges from their MS4s.

C.19-9 In a letter dated January 6, 2017, the San Francisco Bay Water Board and the Central Valley Water Board designated the San Francisco Bay Water Board to regulate MS4 discharges from the East County Permittees. The designation set forth the following conditions:

(1) The designation is only for MS4 permitting

(2) Each Regional Water Board reserves the right to take enforcement actions authorized by law against an East County Permittee for violations of an MS4 permit provision that affects that Regional Water Board's watershed

(3) The San Francisco Bay Water Board will consult and coordinate with the Central Valley Water Board in the development of MS4 permit provisions to ensure they adequately reflect and implement the Central Valley Water Board's Basin Plan and policies; and

(4) The Central Valley Water Board will approve any plans and/or studies required for compliance with the Central Valley Water Board's Basin Plan and policies.

C.19-10 Order No. R2-2019-0004 amended Order No. R2-2015-0049 to add the East County Permittees. It also allowed them extended timelines to come into compliance with specific Order No. R2-2015-0049 provisions and identified and exempted those Order No. R2-2015-0049 provisions that do not apply to the East County Permittees, and incorporated requirements for the Sacramento-San Joaquin Delta Estuary Methylmercury TMDL and the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL.

Specific C.19 requirements

Provision C.19.a (Mercury Controls) exempts the East County Permittees from Provision C.11, Mercury Controls, because the East County Permittees are not subject to the San Francisco Bay Mercury TMDL. Therefore, they do not have San Francisco Bay Mercury TMDL wasteload allocations (WLAs) for mercury (See Provision 19.d concerning compliance with the Delta Methylmercury TMDL).

Provision C.19.b (Polychlorinated Biphenyls (PCBs) Controls) exempts the East County Permittees from Provision C.12, PCBs Controls, because the East County Permittees are not subject to the San Francisco Bay PCBs TMDL. Therefore, they do not have San Francisco Bay PCBs TMDL WLAs.

Provision C.19.c (Diazinon and Chlorpyrifos Controls) implements the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. The Central Valley Water Board adopted a basin plan amendment including a TMDL for diazinon and chlorpyrifos in the Sacramento-San Joaquin Delta Waterways (Delta Waterways)[334] on June 23, 2006. The State Water Board and U.S. EPA both approved the basin plan amendment. The TMDL includes WLAs for diazinon and chlorpyrifos applicable to the East County Permittees.

(1) The TMDL states that levels of diazinon and chlorpyrifos shall not exceed the sum (S) of one (1) as defined below:

[334] The Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin Appendix 42 lists the Delta Waterways to which the site-specific diazinon and chlorpyrifos water quality objectives and implementation and monitoring provisions apply.

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1.0$$

where:

C_D = diazinon concentration in ug/L of point source discharge

C_C = chlorpyrifos concentration in ug/L of point source discharge

WQO_D = acute or chronic diazinon water quality criterion (0.160 and 0.100 ug/L, respectively)

WQO_C = acute or chronic chlorpyrifos water quality criterion (0.025 and 0.015 ug/L, respectively)

For the purpose of calculating the sum (S) above, non-detectable concentrations are considered to be zero.

The East County Permittees' previous permit included requirements for the Diazinon and Chlorpyrifos TMDL. The final compliance deadline for the TMDL was December 1, 2011.

The East County Permittees submitted a letter dated September 13, 2018, demonstrating their discharge has not exceeded the TMDL WLAs or water quality objective concentrations for diazinon and chlorpyrifos since 2008. The letter summarizes the results of diazinon and chlorpyrifos monitoring from 2012 - 2014 under the CCCWP's Pollutants of Concern Load Monitoring at Lower Marsh Creek. This sampling location is directly downstream from one of the largest continuous urbanized areas in East County and samples characterized critical storm runoff events.

In addition, the letter includes diazinon and chlorpyrifos summary monitoring data from other County locations, in areas with both urban and agricultural lands from 2001-2017 by three programs: the State of California's Surface Water Ambient Monitoring Program (SWAMP), the Department of Pesticide Regulation (DPR) Statewide Pesticide Monitoring Program, and the San Francisco Estuary Institute (SFEI) Small Tributaries Loading Strategy. The SWAMP monitoring data includes 16 chlorpyrifos samples with no detections or exceedances, and 16 diazinon samples with 9 detections and 9 exceedances from 2001 - 2005. The DPR monitoring data includes 13 chlorpyrifos samples with 1 detection and 1 exceedance, and 13 diazinon samples with 1 detection and 1 exceedance from 2008 - 2009 and 2017. The chlorpyrifos and diazinon exceedances occurred in 2009 and could have been from agricultural sources. The SFEI monitoring data includes 5 chlorpyrifos samples with no detections or exceedances, and 5 diazinon samples with no detections or exceedances from 2013 -

2014. The monitoring data from SWAMP, DPR, and SFEI show that water quality objectives for diazinon and chlorpyrifos have not been exceeded since 2009, providing additional data to reflect the trend of reduced diazinon and chlorpyrifos concentrations in urban runoff.

The decline in concentrations of diazinon and chlorpyrifos in the waters to which the East County Permittees discharge is consistent with observations of declines in urban runoff concentrations in the Central Valley Watershed following cancellation of urban uses of these chemicals. U.S. EPA cancelled the sale of nearly all non-agricultural diazinon and chlorpyrifos products by 2004. However, residents could still be storing diazinon and chlorpyrifos products, and old supplies remain legal to use. Because use of these products is still allowed and out of the direct control of the East County Permittees, there still is potential that such use could make consistent attainment of numeric effluent limits infeasible. The implementation of Provision C.9 by the East County permittees is consistent with the requirements of the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. Provision C.9 requirements are in the implementation plan for the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. The existing monitoring for toxicity and pesticides in Provision C.8. will be sufficient to demonstrate continued compliance with the diazinon and chlorpyrifos TMDL.

Provision C.19.d (Methylmercury Control Measure Plan and Monitoring) requires the East County Permittees to submit a methylmercury control plan and conduct a corresponding reasonable assurance analysis. The East County Permittees proposed completing these documents as part of their Delta Mercury Control Study Final Report that was submitted to meet Phase 1 of the Central Valley Water Board's Water Quality Control Plan for the Sacramento River and San Joaquin River Basin's Sacramento-San Joaquin River Delta Mercury Control Program and associated Methylmercury TMDL (see Fact Sheet for Provision C.19.e, below). Provision C.19.d requires methylmercury monitoring intended to assess inputs of methylmercury to the Delta from Marsh Creek and urban runoff; provide information to support implementation of pollutant control strategies; and assess progress toward achieving WLAs for the TMDL; and help resolve uncertainties in loading estimates and impairments associated with methylmercury. In particular, methylmercury monitoring addresses the management questions proposed by the CCCWP and set forth in Provision C.19.d.ii.(1)(f)

CWA section 402 (a)(2); 40 CFR sections 122.42(c)(4), 122.44(i), and 122.48(b); and CWC section 13383 provide authority for the Water Board to require monitoring and technical water quality reports. Provision C.19.d. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements and (2) provide information useful in evaluating compliance with all Permit requirements.

Provision C.19.e (Delta Mercury Control Program) implements the Delta Methylmercury TMDL in. the Water Quality Control Plan for the Sacramento River and

San Joaquin River Basins to address the mercury impairments (See Resolution No. R5-2010-0043.). The Delta Methylmercury TMDL was approved by the State Water Resources Control Board and the California Office of Administrative Law. Final approval by the U.S. EPA occurred on October 20, 2011.

The Delta is impaired because of elevated levels of methylmercury in fish. The Delta is on the CWA 303(d) list for mercury and the State Water Resources Control Board has designated the Delta as a toxic hot spot under the Bay Protection and Toxic Hot Spot Cleanup Program. Mercury problems are evident throughout the Central Valley watershed. The main concern with inorganic mercury is that it can develop into methylmercury, a powerful neurotoxin that bioaccumulates in the aquatic food chain to harmful levels. Health advisories have been issued which recommend limiting consumption of fish from the Bay/Delta, tributaries to the Delta, and many lakes and reservoirs in the Central Valley. Concentrations of mercury in fish in other water bodies approach or exceed National Academy of Science (NAS), U.S. EPA, and/or U.S. Food and Drug Administration (FDA) guidelines for wildlife and human protection. Mercury levels also exceed water quality objectives for the Delta and elsewhere. In addition to these concerns, fish-eating birds taken from some bodies of water in the basins have levels of mercury that can be expected to cause toxic effects. Bird-kills from mercury also have been documented in Lake Berryessa.

Components of the Delta Methylmercury TMDL relevant to municipal stormwater that are implemented through Provisions C.19.d and C.19.e are as follows:

(1) The methylmercury wasteload allocations for the East County Permittees, by Delta subarea, are:

   (a) Central Delta 0.75 grams/year;

   (b) Marsh Creek 0.30 grams/year; and

   (c) West Delta 3.2 grams/year

(2) Compliance with the methylmercury waste load allocations are required to be met as soon as possible, but no later than January 1, 2030, unless the Central Valley Regional Water Board modifies the TMDL implementation schedule and final compliance date. The wasteload allocations for the Central and West Delta subareas are associated with a 0% reduction requirement while the wasteload allocation for the Marsh Creek subarea is associated with a 73% reduction requirement.

(3) The NPDES permits for urban runoff management agencies shall require pollution prevention measures and the implementation of BMPs to minimize total mercury discharges, as well BMPs to control erosion and sediment discharges with the goal of reducing mercury discharges. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to human health and wildlife. Requirements in the permit issued or reissued

and applicable for the term of the permit shall be based on an updated assessment of pollution prevention measures and BMPs to minimize total (inorganic) mercury discharges.

(4) Annual methylmercury loads in urban runoff in MS4 service area within the Delta and Yolo Bypass may be calculated by the following method or by an alternate method approved the Central Valley Water Board Executive Officer. The annual methylmercury load in urban runoff for a given MS4 service area during a given year may be calculated by the sum of wet weather and dry weather methylmercury loads. To estimate wet weather methylmercury loads discharged by MS4 urban areas, the average of wet weather methylmercury concentrations observed at the MS4's compliance locations maybe multiplied by the wet weather runoff volume estimated for all urban areas within the MS4 service area within the Delta and Yolo Bypass. To estimate dry weather methylmercury loads, the average dry weather methylmercury concentrations observed at the MS4's compliance locations may be multiplied by the estimated dry weather urban runoff volume in the MS4 service area within the Delta and Yolo Bypass. This method is consistent with that used to develop load estimates in the Delta Methylmercury TMDL.

(5) Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury or methylmercury loads to the Delta or is outside the jurisdiction authority of any agency, the Central Valley Water Board may consider issuing additional allocations and regulatory requirements for the source in question.

Since a methylmercury reduction was not required for the West or Central subareas, the Delta Mercury Control Study Final Report did not identify any new mercury control measures beyond implementing green infrastructure in new and retrofitted urban developments and continuing to implement the control measures consistent with the Delta Methylmercury TMDL. The Delta Mercury Control Study Final Report states that additional information is required to determine if elevated methylmercury in Marsh Creek can be controlled as part of the actions to also prevent eutrophication conditions. This study will be completed as part of the methylmercury control plan and corresponding reasonable assurance analysis.

Provision C.19.e requires the East County Permittees to implement the following pollution prevention measures, BMPs, and risk reduction measures.

Mercury Collection and Recycling – Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and this Provision requires continued implementation of collection and recycling of

mercury containing devices and waste products and alternative procedures to improve proper handling, disposal, and recycling of mercury-containing products.

Enhanced Municipal Management Practices to Reduce Sediment Discharges – Unless appropriate BMPs are implemented, municipal operations and maintenance activities are potential sources of sediment discharges. Sediment accumulated on sidewalks, corporation yards, roads, parking lots, and landscaping, is a major source of point source pollutants found in urban runoff. The enhanced municipal management practices to reduce sediment discharges are intended to minimize total (inorganic) mercury discharges required by the Delta Methlymercury TMDL. Thus, Provision C.19.e requires the East County permittees to implement minimum BMPs for municipal facilities and activities as part of their ongoing pollution prevention efforts. Such prevention measures include, but are not limited to, storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning. The work of municipal maintenance personnel vital to minimize stormwater pollution because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting, and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain.

Public Education and Risk Reduction – An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues and its importance and influences positive stormwater pollution prevention behavior.

The East County Permittees have been implementing public outreach campaigns to educate their community on mercury pollution prevention. This Permit requires the East County Permittees to continue implementing a public education, outreach and participation program that is designed to reach residential, commercial, and industrial sources of mercury-containing products or emissions. The East County Permittees can utilize various electronic and print media and paid and free media to best reach the different various target audiences. Additionally, the East County Permittees need to continue communicating with a broad spectrum of citizens with stormwater pollution prevention information through long-established outreach mechanisms such as staffing tables or booths at fairs, street fairs, and other community events. An informed community ensures greater compliance with the stormwater program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of local waters.

Methylmercury is a toxicant that is harmful to the brain and nervous system of infants, children, and the developing fetus. Nearly all fish caught in the Delta contain traces of methylmercury, the methylated form of mercury. However, larger fish that have lived longer have the highest levels of methylmercury because they have had more time to

accumulate it. These large fish pose the greatest risk to children and pregnant women who eat them regularly. This Provision requires continual actions to manage human health risk due to mercury in Delta fish. This includes effort to communicate the health risks of eating Delta fish to high risk-communities.

Methylmercury Controls - In a previous permit (Order No. R5-2010-0102), the East County Permittees were required to implement Phase 1 of the Delta Methylmercury TMDL. Phase 1 required them to conduct methylmercury control studies to monitor and evaluate the effectiveness of existing BMPs to control methylmercury and to develop and evaluate additional BMPs effectiveness to control methylmercury. In October 2018, the East County Permittees submitted the Delta Methylmercury Control Study Final Report to the Central Valley Water Board documenting the results of their control studies. As was shown in bioretention cell LAU3, construction of bioretention cells with an underdrain in areas allowing tidal inundation of the media may lead to an increase in mercury methylation. Therefore, this Provision requires the Permittees to implement control measures that reduce mercury methylation potential and retrofit existing BMPs that show an increased potential for mercury methylation. This Provision is also intended to require the Permittees to implement any other methylmercury controls identified in the methylmercury control plan and corresponding reasonable assurance analysis.

The Central Valley Regional Water Board will use the results of the control studies to conduct a Phase 1 Delta Methylmercury TMDL Review that considers:

- Modification of methylmercury goals, objectives, allocations and/or the final compliance date;
- Implementation of management practices and schedules for methylmercury controls; and
- Adoption of a mercury offset program for dischargers who cannot meet their load and waste load allocations after implementing all reasonable load reduction strategies.

The findings of the control studies and other information will also be used to re-evaluate the fish tissue objectives, the linkage analysis between objectives and sources, and the attainability of the allocations. The linkage analysis, fish tissue objectives, allocations, and time schedules may also be adjusted. In addition, the Central Valley Water Board will use the Phase 1 Control Studies' results and other information to consider amendments to the Delta Methylmercury TMDL during the Phase 1 Delta Methylmercury TMDL Review.

Phase 2 of the Delta Methylmercury TMDL begins after the Phase 1 Delta Methylmercury TMDL Review. If Phase 2 begins during this Permit term, this Permit may be amended to include additional requirements.

C.19.f (Pyrethroid Control Program) implements the Central Valley Water Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins' conditional prohibition of the discharges of pyrethroid pesticides as well as monitoring and reporting requirements (adopted through Resolution No. R5-2017-0057). On August 31, 2020, the East Contra Costa Permittees submitted for approval as a pyrethroid management plan the actions required under Provision C.9. On December 30, 2020, the Central Valley Water Quality Board sent a letter to the East County Permittees stating that the elements of the Pesticide Control Program in Provision C.9 were consistent with the Pyrethroid Basin Plan Amendment requirements for a pyrethroid management plan and included all the management practices required to be considered for inclusion in a pyrethroid management plan. Additionally, this provision implements the requirement to submit a baseline monitoring report to the Central Valley Water Board as required in the Pyrethroid Basin Plan Amendment of municipal dischargers discharging to non-pyrethroid TMDL waters.

C.20. Cost Reporting

Legal Authority

The following legal authority applies to Provision C.20:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(1)(vi) requires "[for] each fiscal year to be covered by the permit, a description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs."

Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) requires "[for] each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2) (iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Fact Sheet Findings in Support of Provision C.20

C.20-1 Fiscal analysis and cost reporting provide a useful tool to evaluate program implementation and effectiveness. U.S. EPA has found that "examining the levels of proposed spending and funding allows the permitting authority to gauge the ability of the applicant to implement the program and predict its effectiveness. The fiscal analysis also will help determine whether the applicant has met the statutory requirement of reducing the discharge of pollutants to the MS4 to the maximum extent practicable. Finally, the estimates help the applicant evaluate the feasibility and cost-effectiveness of its program."[335]

C.20-2 Standardization and comparison of cost reporting is supported by the State Water Board-funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities."[336]

[335] "Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems," U.S. EPA 833-B-92-002, November 1992.

[336] "NPDES Storm Water Cost Survey Final Report. Office of Water Programs," California State University, Currier, Brian K., et al. 2005.

C.20-3 The State Water Board's Office of Research, Planning, and Performance (ORPP) has also developed guidance[337] for Water Board staff on obtaining MS4 Permit implementation costs from permittees. This guidance describes the benefits from greater detail and more standardization in cost reporting because stormwater issues vary from system to system, often making it difficult to compare compliance costs for individual MS4 permits. Collecting standardized data on what permittees spend to comply with their MS4 permits will allow the Water Boards and stakeholders to broadly compare across regions and systems and to identify trends over time.

C.20-4 The City of Salinas MS4 Permit provides another example of standardized cost reporting data being used to evaluate the effectiveness of program implementation.[338] It finds that "consistent and reliable cost information is critical for the Permittee to manage its assets, programs, funding strategies, and potential future credit programs and stormwater utility fees."

C.20-5 The cost reporting categories were developed considering the ORPP guidance, as well as the cost reporting requirements of the City of Salinas MS4 Permit and the Regional MS4 Permit for Los Angeles and Ventura Counties.[339]

C.20-6 To provide additional flexibility to Permittees in developing a reporting methodology that considers the unique aspects of each program, while also allowing for broad comparisons between program components and costs, the Permit allows Permittees to engage in a collaborative approach to developing a consistent framework.

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[337] "Guidance for Staff on Obtaining MS4 Permit Implementation Costs from Permittees and Factors Permittees Could Consider When Reporting to the Water Boards," State Water Board Office of Research, Planning, and Performance (ORPP), April 16, 2019.

[338] Central Coast Regional Water Board, NPDES Permit and WDR for the City of Salinas Municipal Stormwater Discharges, NPDES Permit No. CA0049981, Order No. R3-2019-0073, adoption date: September 20, 2019, effective date: October 1, 2019.

[339] Los Angeles Regional Water Board, NPDES Permit for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles and Ventura County, NPDES Permit No. CAS004004, Order No. R4-2021-0105, NPDES Permit No. CAS004004.

C.21. Asset Management

Legal Authority

The following legal authority applies to Provision C.21:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR section 122.26(d).

Specific Legal Authority: Federal NPDES regulation 40 CFR section 122.41(e) requires a permittee to properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with its permit.

Federal NPDES regulation 40 CFR section 122.26(d)(1)(v) requires permittees to supply information on implementation and operation and maintenance measures for structural controls.

Federal NPDES regulation 40 CFR section 122.26(d)(1)(iii)(B)(5) requires permittees to provide, "the location of major structural controls for stormwater discharge (retention basins, detention basins, major infiltration devices, etc.)."

Federal NPDES regulation 40 CFR section 122.26(d)(2)(iv) requires permittees to provide, "a description of structural control measures to reduce pollutants in runoff from commercial and residential areas." It also requires permittees to "describe priorities for implementing controls."

Federal NPDES regulation 40 CFR section 122.26(d)(1)(vi) requires permittees to provide, "A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs."

Federal NPDES regulation 40 CFR section 122.26(d)(2)(vi) requires an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under 40 CFR sections 122.26(d)(2)(iii) and (iv).

Fact Sheet Findings in Support of Provision C.21

C.21-1 This Order requires each Permittee to develop and implement an Asset Management Plan to ensure the satisfactory condition of all hard assets constructed during this and previous permit terms, by continuing to improve its understanding of its stormwater infrastructure condition and performance, by accounting for additional stressors on those assets, such as those related to climate change, and by identifying cost factors to support more accurate forecasting and budget development.

C.21-2 Asset management has been defined as an integrated optimization process of "managing infrastructure assets to minimize the total cost of owning and operating them, while continuously delivering the service levels customers desire, at an acceptable level of risk."[340]

C.21-3 Asset management is important to ensure proper operation and maintenance of all facilities and controls used to comply with an NPDES permit. U.S. EPA has also recognized the importance of incorporating asset management provisions into permits to ensure permittees implement sound system operation and maintenance practices, properly plan for needed system replacements and upgrades, and meet water quality protection requirements.[341]

C.21-4 An MS4 permittee must establish appropriate quality assurance procedures to ensure that its discharge meets MEP and water-quality based requirements. Asset management plans provide a framework for setting and operating these quality assurance procedures and ensure that the MS4 permittee has sufficient financial and technical resources to continually maintain a minimum performance level of its hard assets, in compliance with 40 CFR § 122.41(e).

C.21-5 40 CFR sections 122.26(d)(1)(iii)(B)(5) and 122.26(d)(2)(iv) support the inclusion of structural controls in the asset inventory.

C.21-6 The fiscal requirements at 40 CFR sections 122.26(d)(1)(vi) and 122.26(d)(2)(vi) are integral components of the Asset Management Plan required by this Order. They support the requirement to evaluate or forecast costs necessary for the implementation of the Operation, Maintenance, Rehabilitation, and Replacement plan, as well as the overall concept of the asset management program to identify assets and describe the financial plan to manage those assets.

C.21-7 U.S. EPA Support for Asset Management and Available Guidance and Examples: U.S. EPA has emphasized the development of asset management programs in recent years as a useful tool for ensuring consistent performance of water infrastructure systems while minimizing the costs associated with the operation of these systems. U.S. EPA has required stormwater utilities to develop and implement asset management plans to provide the tracking and planning framework needed to meet these requirements in their permitting.[342] The growing concern for aging infrastructure among entities responsible for

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[340] Association of Metropolitan Sewerage Agencies (AMSA), et al. 2002.

[341] "Asset Management: Incorporating Asset Management Planning Provisions into NPDES Permits," December 2014, U.S. EPA, Region 9.

[342] U.S. EPA issued NPDES Permit No. GUS040001, authorizing the Guam Department of Public Works to discharge under the National Pollutant Discharge Elimination System, issuance date: December 20, 2018. Provisions requiring an Asset Management Plan are found on page 38 of the Guam Permit.

operating, maintaining, and improving stormwater, wastewater, and drinking water systems has led to development and implementation of formal asset management programs to reduce unexpected and expensive repairs and increase overall system performance. The CWA specifies that NPDES permits must include requirements for discharging facilities to develop and implement operation and maintenance procedures and financial plans sufficient to ensure their future operational integrity and help them comply with permit discharge conditions. U.S. EPA has encouraged stormwater utilities to develop and implement asset management planning tools to provide the tracking and planning framework needed to meet these requirements. U.S. EPA has also encouraged water utilities to use modern analytical planning tools to support deployment of greener, more sustainable, better integrated water infrastructure improvements to help implement NPDES permit requirements. U.S. EPA anticipates formal asset management requirements in NPDES permits increasing in the future, as the benefits of asset management plans are realized.[343]

C.21-8 The City of San Diego (San Diego) provides an example of asset management planning for stormwater. San Diego developed an integrated Watershed Asset Management Plan for its stormwater management system in order to anticipate and justify current and projected costs of complying with federal, state, and local stormwater regulations.[344] San Diego took approximately five years to complete its Watershed Asset Management Plan. San Diego's Watershed Asset Management Plan identifies and prioritizes potential water quality and flood risk management. San Diego is currently developing the database capabilities to support its plan.

C.21-9 U.S. EPA's Water Finance Clearinghouse and the California State University Sacramento Office of Water Program's Environmental Finance Center (Region 9 U.S. EPA Environmental Finance Center) are conducting work to support stormwater asset management. For example, the U.S. EPA Region 9 Environmental Finance Center has developed draft stormwater finance and asset management guidance and toolkits, including resources for estimating stormwater costs, and is supporting a few California municipal stormwater programs to test out and refine the toolkit with the intent of using the asset management results to support the development of stormwater utilities to fund stormwater programs. Additionally, Region 9 U.S. EPA Environmental Finance Center is disseminating information through asset management forums, developing an asset management mobile assistance app, has supported the State Water Board's Strategy to Optimize Resource Management of Storm

[343] "Asset Management Programs for Stormwater and Wastewater Systems: Overcoming Barriers to Development and Implementation," March 6, 2017, p. ii. Prepared for U.S. EPA by PG Environmental.

[344] "Case Study: City of San Diego Watershed Asset Management Planning," p. 1, U.S. EPA, Region 9.

Water (STORMS) Stormwater Funding Report,[345] and is supporting other asset management-related tools and resources.[346]

C.21-10 The Order's asset management requirements are consistent with: U.S. EPA's asset management plan requirements in Guam's municipal stormwater Permit;[347] U.S. EPA, Region 9's 2014 guidance for incorporating asset management planning requirements into NPDES permits, which includes suggestions for an inventory of MS4 assets, an identification of the required performance, a plan for maintenance, rehabilitation and replacement of assets, cost projections, and an assessment of climate change impacts;[348] San Diego's Watershed Asset Management Plan;[349] and the California Regional Water Quality Control Board, Central Coast Region's asset management plan requirements in the City of Salinas' municipal stormwater permit.[350]

C.21-11 Many of the provisions in the Previous Permit (Order No. R2-2015-0049, as amended) required the Permittees to develop and maintain effective information management systems to track hard assets. It required, and this Order continues to require, Permittees to implement various measures which support the development and implementation of the Asset Management Plan. For example, in both this Order and the Previous Permit, Provision C.3.b requires Permittees to track and report on hard assets built pursuant to the requirements for Regulated Projects and Provision C.3.h requires Permittees to implement an Operation and Maintenance Verification Program, which compels, for example, inspections by Permittees or their agents. In both the current and Previous Permit, Provision C.10.b requires Permittees to maintain Full Trash Capture Systems within their jurisdictions, maintain records of those systems, and certify annually that those systems are operated and maintained to meet the requirements for Full Trash Capture Systems, and Provision C.10.f requires Permittees to retain and update trash generation maps depicting the location and tributary drainage area of all Full Trash Capture Systems within

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[345] "Strategy to Optimize Resource Management of Storm Water (STORMS): Project 4b: Eliminate Barriers to Funding Stormwater Programs and Identify Funding for Stormwater Capture and Use Projects," May 31, 2018.

[346] "Asset Management Storm Water Roundtable Presentation," by Bola Odusoga, U.S. EPA Region 9, March 28, 2019, slide 28.

[347] U.S. EPA issued NPDES Permit No. GUS040001, authorizing the Guam Department of Public Works to discharge under the National Pollutant Discharge Elimination System, issuance date: December 20, 2018.

[348] "Asset Management: Incorporating Asset Management Planning Provisions into NPDES Permits," December 2014, U.S. EPA, Region 9.

[349] "Transportation and Storm Water Department Storm Water Division: Watershed Asset Management Plan," July 19, 2013, Prepared for City of San Diego by URS Corporation.

[350] Central Coast Regional Water Quality Control Board, NPDES Permit and WDR for the City of Salinas Municipal Stormwater Discharges, NPDES Permit No. CA0049981, Order No. R3-2019-0073, adoption date: September 20, 2019, effective date: October 1, 2019.

their jurisdictions which they are receiving credit for towards their Trash Reduction Requirements.

C.21-12 This Order includes requirements in other provisions that support components of the Asset Management Plan. For example, Provision C.5.f requires Permittees to identify information missing from their current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, including component locations, size or specifications, materials of construction, and condition, which will be used to update Permittee maps and databases. The Permittees' implementation of Provision C.5.f will support the Permittees' implementation of Provision C.21 because it will help them understand where and how their hard assets are connected to their MS4s.

C.21-13 Provision C.20 requires Permittees to undertake a fiscal analysis of the capital and operation and maintenance costs incurred to comply with this Order's requirements listed in Provision C.20.b.(iv), which includes the capital, operation, and maintenance costs of hard assets. Therefore, some of the information generated by the Permittees' implementation of Provision C.20 is likely to directly inform the Permittees' implementation of and reporting on Provision C.21. This is further discussed below under the Specific Provision C.21 Requirements for Provision C.21.b, Implementation level.

Specific Provision C.21 Requirements

Provision C.21. Asset Management requires Permittees to develop, implement, and report on asset management programs. Each component of the asset management provision is necessary to address the objectives, information needs, and questions listed in findings C.21-1 through C.21-12, above.

Provision C.21.a. Task Description. Provision C.21.a requires Permittees to develop and implement an Asset Management Plan in order to ensure the satisfactory condition of all hard assets constructed during this and previous permit terms pursuant to Provisions C.2. Municipal Operations, C.3. New Development and Redevelopment, C.10. Trash Load Reduction, C.11. Mercury Controls, C.12. PCBs Controls, C.13. Copper Controls, C.14. Bacteria Control for Impaired Water Bodies, C.17. Discharges Associated with Unsheltered Homeless Populations, C.18. San Mateo County Sediment Controls, and C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements. These Provisions contain requirements to implement, track, operate and maintain hard assets (structural controls). The inclusion of the development and implementation of the Asset Management Plans in this Order is necessary to comply with the federal regulations cited above.

Provision C.21.b. Implementation Level. Provision C.21.b describes the Asset Management Plans, which Permittees must develop by June 30, 2025.[351]

An integral component of the Asset Management Plan is the development of an Operation, Maintenance, Rehabilitation, and Replacement Plan (Asset Management O&M Plan), which is prescribed in Provision C.21.b.i.(3), to effectuate sound asset management. The evaluation or forecasting of costs necessary for the implementation of the Asset Management O&M Plan is likewise necessary for this purpose. Such evaluation may supplement Permittees' compliance with Provision C.20. Cost Reporting, because Provision C.20 includes requirements for Permittees to report on the costs associated with their hard assets; however, it does not include the level of detail specified in Provision C.21.b.(i)(3)(c). Therefore, although the implementation of Provision C.21 may inform the cost reporting required in Provision C.20, the information that will be generated by the two Provisions is distinct.

Provision C.21.b further requires the Permittees to begin implementation of the Asset Management Plans no later than July 1, 2025,[352] to reassess and update the Asset Management Plans on an as-needed basis to address changing conditions and resources, to provide the latest version of the Asset Management Plans to Water Board staff during inspections and audits or otherwise upon request, and to complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. In subsequent permits, Permittees will likely be expected to reassess and update their Asset Management Plans at least once per permit term, likely by no later than the end of the fourth year of the Permit terms.

The purpose of the Climate Change Adaptation Report is to ensure that in the long term, as climate change impacts increase, Permittees are able to make any necessary adjustments to the design, operation, and maintenance of their hard assets to ensure their satisfactory condition and performance, in response to impacts to those assets associated with climate change. U.S. EPA, Region 9's 2014 guidance for incorporating asset management planning requirements into NPDES permits includes a requirement for the assessment of climate change impacts.[348]

Provision C.21.c. Reporting. Provision C.21.c requires Permittees to submit their individual Asset Management Plans with their 2025 Annual Reports, to report individually on the implementation of their Asset Management Plans starting with the 2026 Annual Reports,[353] as detailed in Provision C.21.c.ii, and to submit their Climate Change Adaptation Report(s) with the 2027 Annual Reports (on an all-Permittee scale or countywide scale). This schedule provides Permittees three years from the start of the Permit term to develop and ultimately submit the Asset Management Plans, an

[351] This date is the last day of the third fiscal year of the permit term.

[352] This date is the first day of the fourth fiscal year of the Permit term.

[353] By this reporting date, the Permittees will have had a full year of implementation of their Asset Management Plans, pursuant to Provision C.21.b.ii.

additional year after that submittal before they must implement the Asset Management Plans, and five years from the start of the Permit term to complete their Climate Change Adaptation Report(s). This timing is sufficient and necessary for the Permittees to develop robust Asset Management Plans, and will allow the Water Board and stakeholders enough time prior to the Permit's subsequent reissuance to consider necessary changes to Provision C.21.

VII. Attachment G: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment G includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with U.S. EPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment G.

ATTACHMENT B

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/14, Application deemed complete 1/30/15, Project approved 7/16/15	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/15, Application deemed complete 8/2/15, Project approved 12/12/15	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

S7-0612

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/16, Application deemed complete 4/10/16; Project approved 6/30/16; estimated completion date 9/30/17	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/15, Application deemed complete 10/6/15, Project approved 12/9/15, Construction scheduled to begin 2/10/16 and estimated to	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
						complete by 9/30/16							

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.iv.(2)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.iv.(2)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address** – Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description** – Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed** – State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area** – For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project –** Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date
   - Whether the project has been completed. If not, the estimated project completion date.

8. **Source Control Measures** – List all source control measures that have been or will be included in the project.

9. **Site Design Measures –** List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed** – List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism –** List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used** – List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1))** – On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2))** – On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

ATTACHMENT C

Provision C.3.g.
Hydromodification Applicability Maps

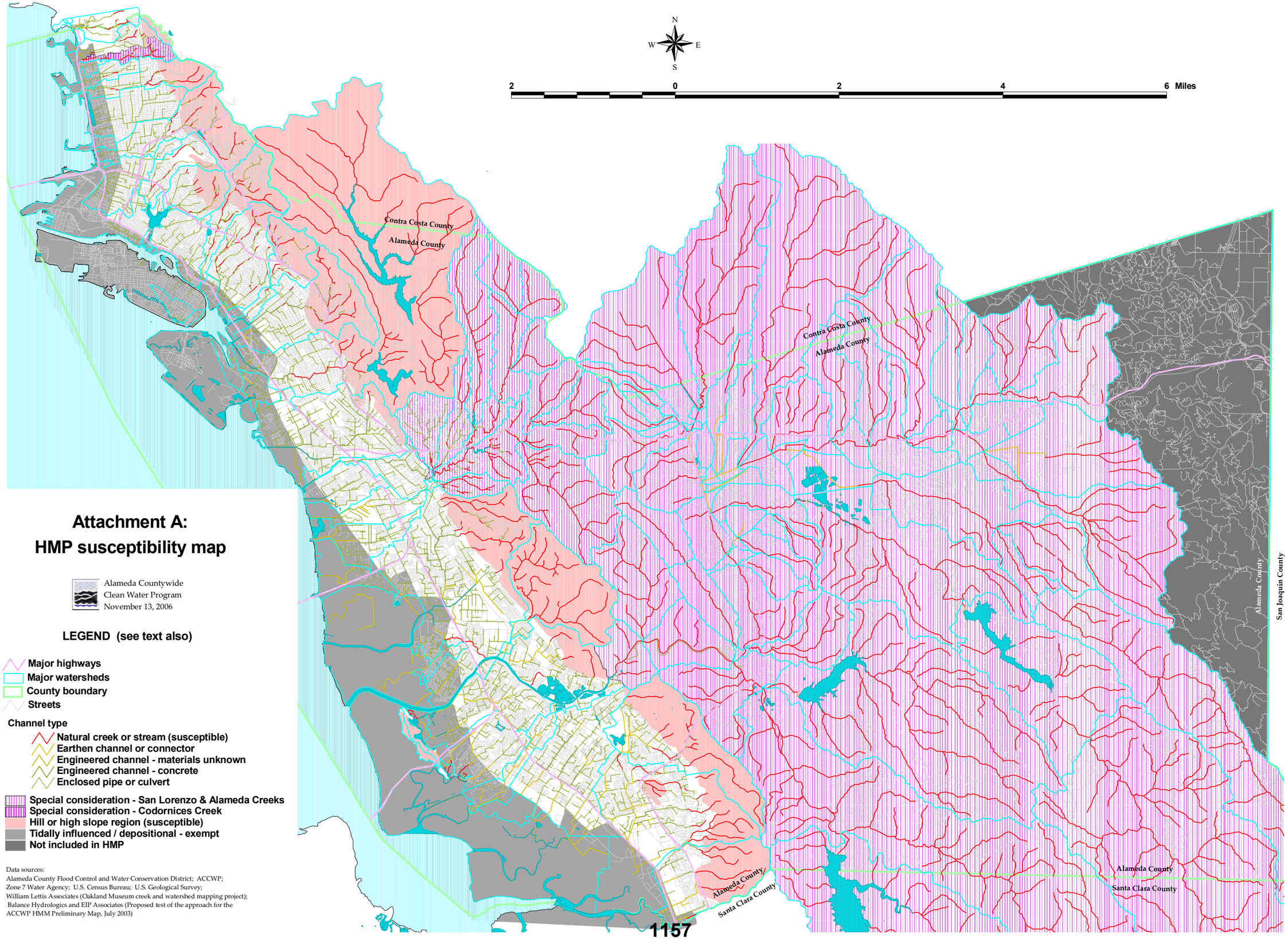

Attachment A:
HMP susceptibility map

Alameda Countywide
Clean Water Program
November 13, 2006

LEGEND (see text also)

- Major highways
- Major watersheds
- County boundary
- Streets

Channel type

- Natural creek or stream (susceptible)
- Earthen channel or connector
- Engineered channel - materials unknown
- Engineered channel - concrete
- Enclosed pipe or culvert

- Special consideration - San Lorenzo & Alameda Creeks
- Special consideration - Codornices Creek
- Hill or high slope region (susceptible)
- Tidally influenced / depositional - exempt
- Not included in HMP

Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the ACCWP HMM Preliminary Map, July 2003)

S7-0618

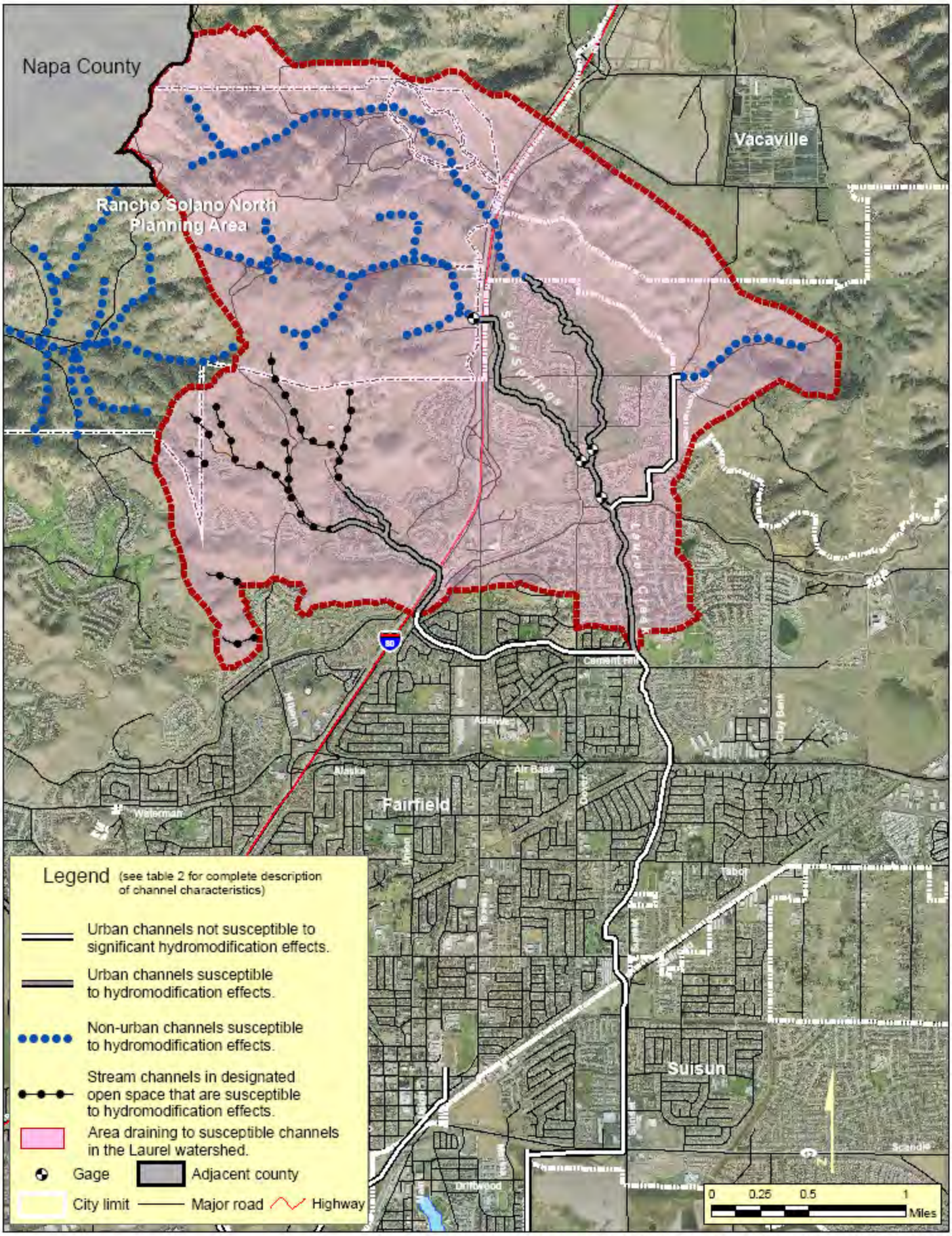

Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure2_edits.mxd

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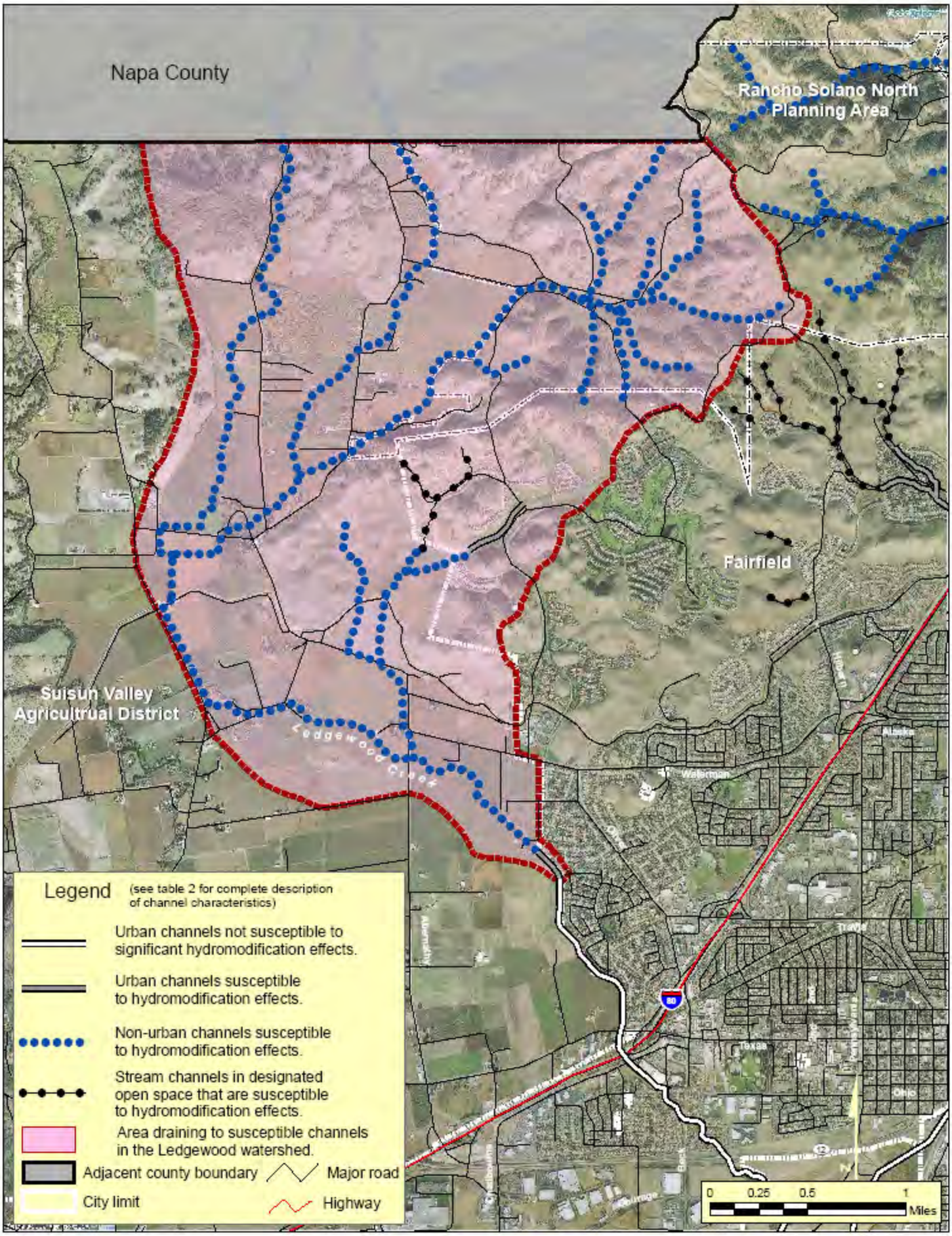

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

S7-0620

W:\Projects\204126 Fairfield HMP\204003\204126_Figure3_edits.mxd

©2006 Balance Hydrologics, Inc.

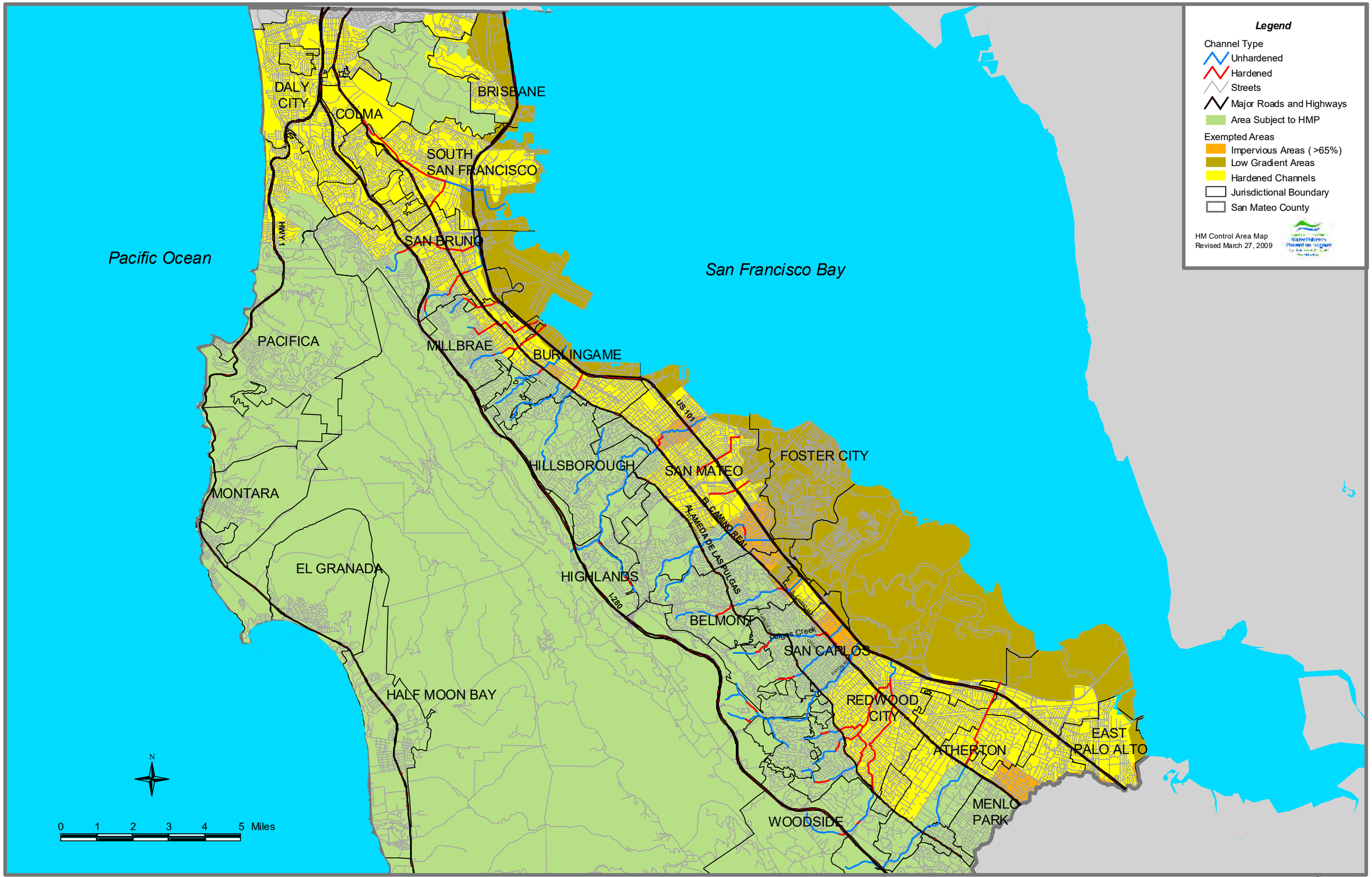
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
HILLSBOROUGH
SAN MATEO
FOSTER CITY
MONTARA
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
WOODSIDE
HWY 1
US 101
EL CAMINO REAL
ALAMEDA DE LAS PULGAS
I-280
Pulgas Creek
N
0 1 2 3 4 5 Miles

S7-0621

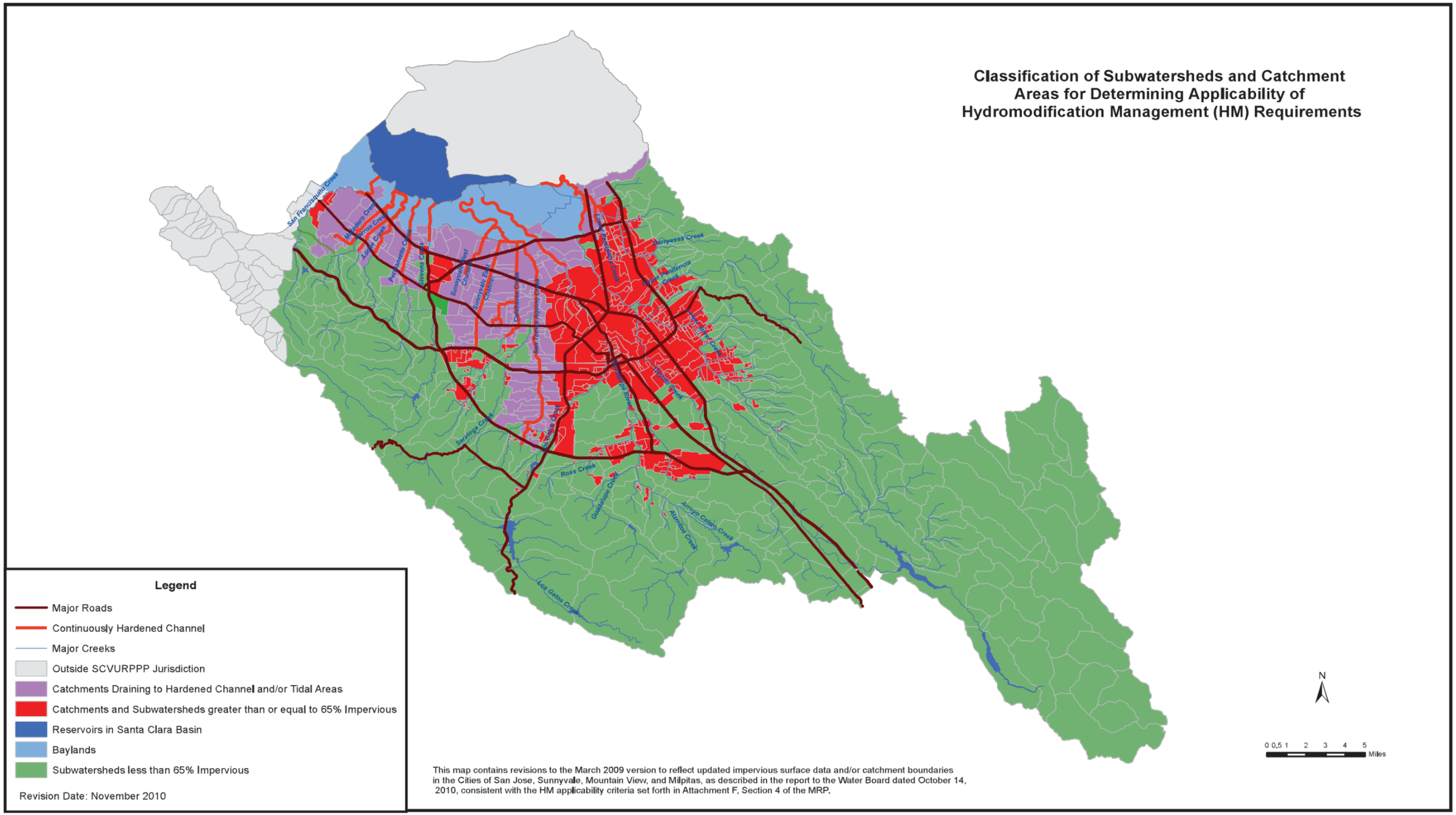
Classification of Subwatersheds and Catchment Areas for Determining Applicability of Hydromodification Management (HM) Requirements
San Francisquito Creek
Permanente Creek
Stevens Creek
Sunnyvale East Channel
Sunnyvale West Channel
Calabazas Creek
San Tomas Aquino Creek
Saratoga Creek
Ross Creek
Guadalupe Creek
Alamitos Creek
Arroyo Calaveras Creek
Los Gatos Creek
Berryessa Creek
Upper Penitencia Creek
Lower Penitencia Creek
Coyote Creek
Legend
Major Roads
Continuously Hardened Channel
Major Creeks
Outside SCVURPPP Jurisdiction
Catchments Draining to Hardened Channel and/or Tidal Areas
Catchments and Subwatersheds greater than or equal to 65% Impervious
Reservoirs in Santa Clara Basin
Baylands
Subwatersheds less than 65% Impervious
Revision Date: November 2010
This map contains revisions to the March 2009 version to reflect updated impervious surface data and/or catchment boundaries in the Cities of San Jose, Sunnyvale, Mountain View, and Milpitas, as described in the report to the Water Board dated October 14, 2010, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP.
N
0 0.5 1 2 3 4 5
Miles

S7-0622

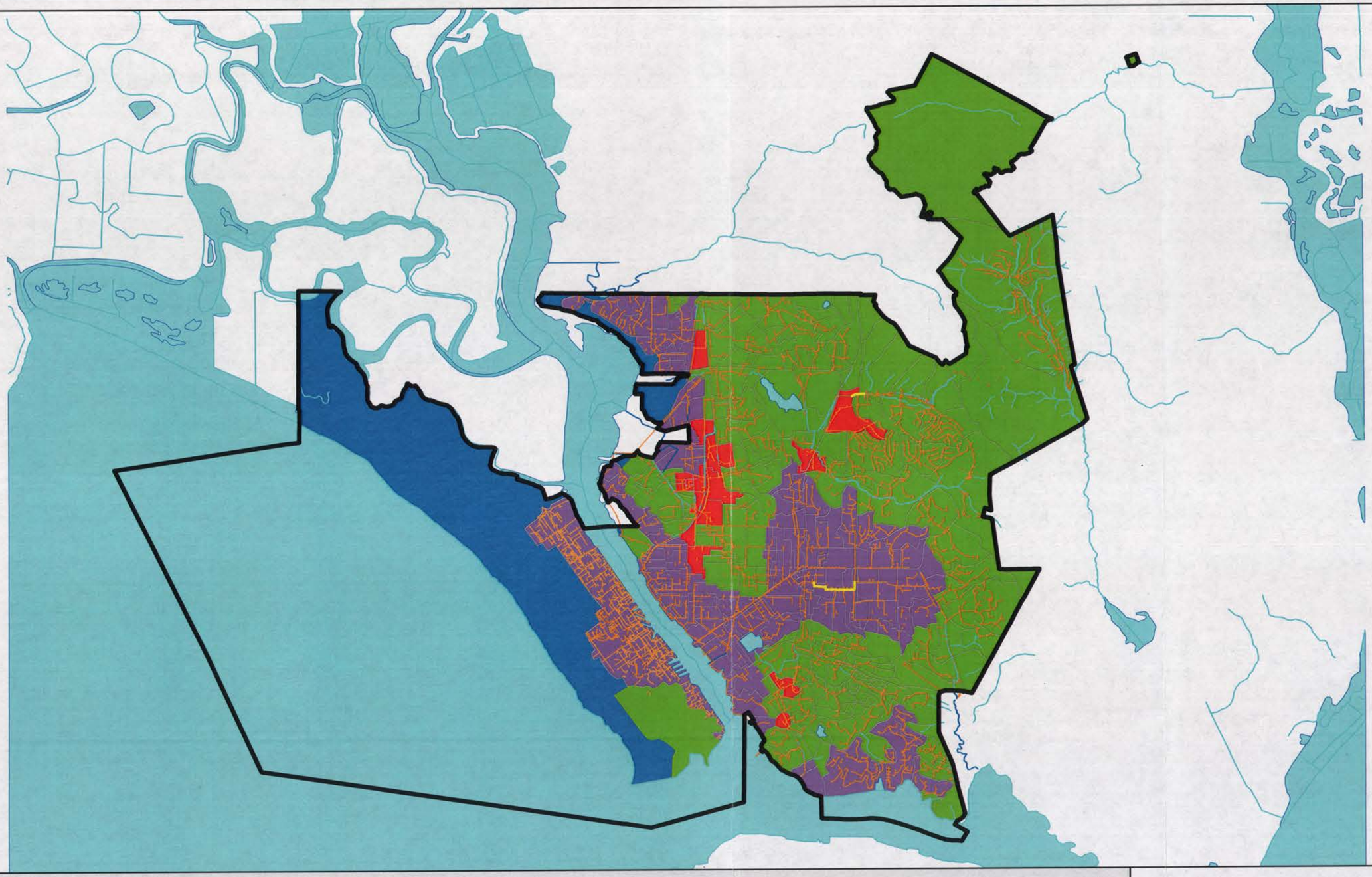

Legend

- HMP Boundary
- Fully Hardened Channels
- Non-Hardened Channels (Non-Tidal)
- Non-Hardened Channels (Tidal)
- Storm Drain System
- Open Water
- Areas Draining to Continuously Hardened Conveyances to the Bay
- HMP Applicable Areas
- Subcatchments with greater than or equal to 65% Impervious
- Baylands

N

0 1.25 2.5 3.75 Miles

HMP Applicability Map

Vallejo HMP

Geosyntec consultants

WW1538 | April 2013

Figure 3-1

P:\GIS\Vallejo_HMP\Projects\Figure3-1.mxd

S7-0623

ATTACHMENT D

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The

Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.

8. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]
9. If a Permittee monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT E

Supporting Information for Provision C.10.

Example Trash Generation Rate Map

303(d) Trash Resolution and Staff Report February 2009

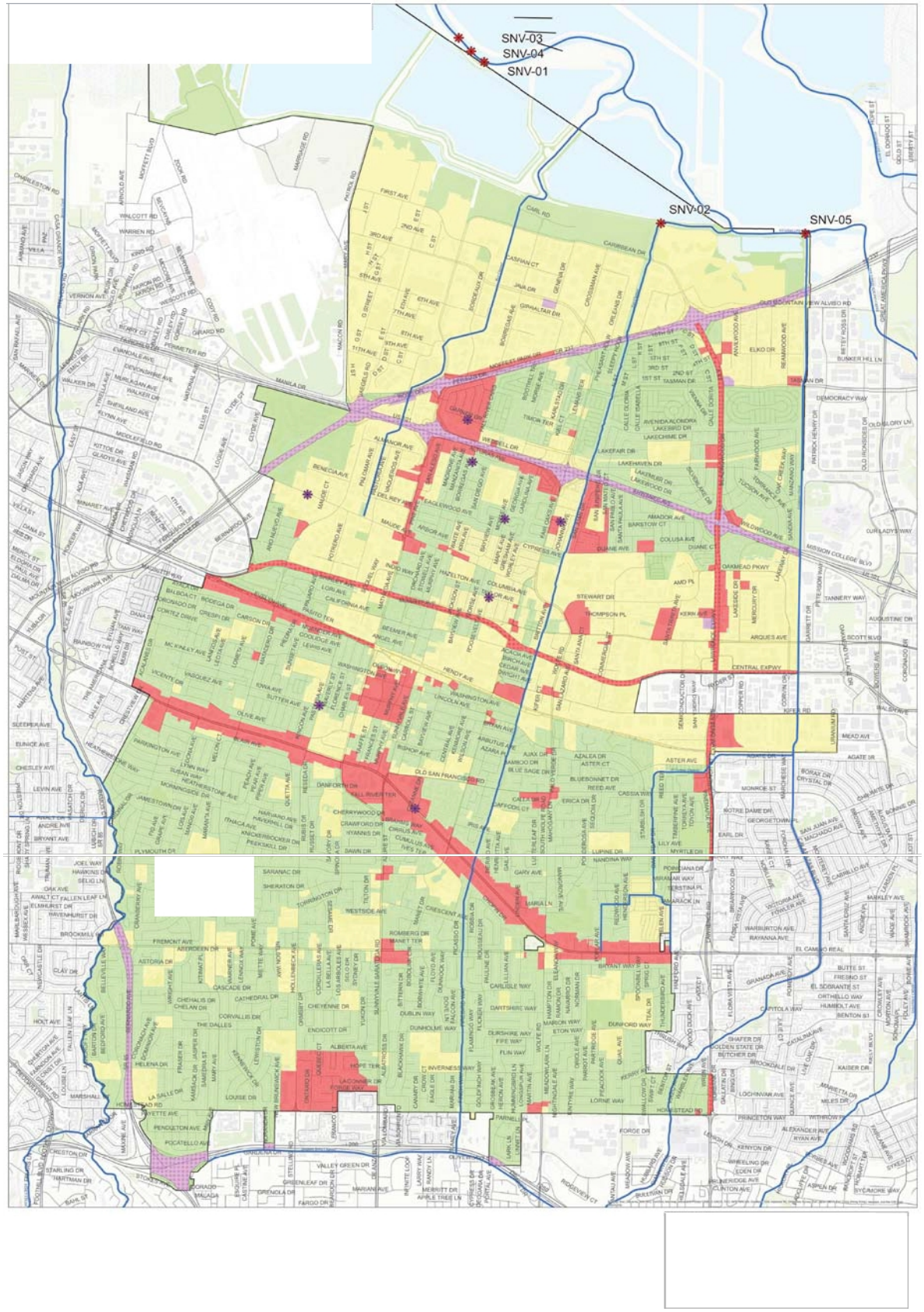
SNV-03
SNV-04
SNV-01
SNV-02
SNV-05

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

RESOLUTION NO. R2-2009-0008

RECOMMENDING CHANGES TO THE LIST OF WATER BODIES AS REQUIRED IN SECTION 303(d) OF THE CLEAN WATER ACT

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

1. Section 305(b) of the federal Clean Water Act requires the State to prepare a biennial update of an assessment of the waters within the State; and

2. Section 303(d) of the federal Clean Water Act requires the State to identify waters within the State for which water quality standards are not attained; and

3. The Water Board actively solicited water quality information from the public on December 4, 2006, and received 16 data and information submittals; and

4. Water Board staff assembled and considered all readily available data to assess water quality conditions and prepared fact sheets supporting recommendations for additions, deletions and changes to the existing list of impaired water bodies consistent with the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy); and

5. Water Board staff provided advanced notice and opportunity for public comment on the draft recommendations for public review during a 45-day public comment period commencing on October 30, 2008; and

6. Water Board staff developed written responses to all public comments received and revised the supporting staff report and water body fact sheets for the Water Board's consideration; and

7. The Listing Policy requires that the Water Board consider and approve each proposed list change as documented in a water body fact sheet; and

8. On January 14, 2009, the Water Board held a public hearing to consider the recommendations to change the 303(d) list; and

9. On February 11, 2009, the Water Board held a second public hearing to consider all testimony and comments, both oral and written, regarding the 2008 Water Quality Assessment and 303(d) list for the San Francisco Bay Region.

THEREFORE, BE IT RESOLVED that the Water Board approves each proposed 303(d) list addition, deletion or change as documented in the attached Staff Report.

BE IT FURTHER RESOLVED that the Water Board, in fulfillment of the requirements described in Sections 305(b) and 303(d) of the federal Clean Water Act, hereby authorizes the Executive Officer to transmit the Water Board's assessment, including recommended modifications to the section 303(d) list, as detailed in the attached Staff Report dated February 11, 2009, and associated water body Fact Sheets to the State Water Resources Control Board for approval of the 303(d) list and inclusion in the 2008 California Integrated Report on Water Quality.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the Water Board, San Francisco Bay Region, on February 11, 2009.

Digitally signed by Bruce Wolfe
Date: 2009.02.13 16:42:14 -08'00'

BRUCE H. WOLFE
Executive Officer

Attachment: Staff Report dated February 11, 2009, Evaluation of Water Quality Conditions for the San Francisco Bay Region - Proposed Revisions to Section 303(d) List

STAFF REPORT

EVALUATION OF WATER QUALITY CONDITIONS FOR THE SAN FRANCISCO BAY REGION

PROPOSED REVISIONS TO SECTION 303(d) LIST

February 2009

San Francisco Bay Regional
Water Quality Control Board

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1 Introduction

One of the San Francisco Bay Water Board's functions is to evaluate the water quality condition of waters in the San Francisco Bay Region. To accomplish this goal, staff gathers and evaluates data that are the basis of its water quality assessments. This staff report presents the results of staff's review and consideration of the available water quality data for the Region, including data submitted by the public. One important outcome of the assessment process is the identification of water bodies that are being proposed for inclusion on the list of impaired water bodies. Under federal Clean Water Act (CWA) regulations, the State is required every two years to report to the U.S. EPA on the status of water quality in the State (Section 305(b) water quality assessment), and provide a list of impaired water bodies (Section 303(d) list). Impaired water bodies are those where water quality standards are not met or expected to be met after implementation of technology based requirements of the CWA.

The 303(d) list of impaired waters must include a description of the pollutants causing the violation of water quality standards. As defined in CWA and federal regulations, water quality standards include the designated uses of a water body, the adopted water quality criteria, and the State's antidegradation policy. For water quality limited segments included on the 303(d) list, the State is required to develop a Total Maximum Daily Load (TMDL) to address the impairment. A TMDL is defined as the "sum of the individual waste load allocations for point sources and load allocations for non-point sources and natural background" (40 CFR130.2) such that the capacity of the water body to assimilate pollutant loadings (the loading capacity) is not exceeded. The federal requirement for setting priorities on which TMDLs will be developed is addressed in the State Board's *2004 Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List* (Listing Policy) by the establishment of schedules for TMDL development.

The last review of the 303(d) list and update occurred in 2006. The review was based on the Listing Policy developed in 2004. For the 2008 update, the Water Board is considering for approval, recommendations on the conditions of waters in the Region, applying the Listing Policy in the process.

This staff report presents the current status of water quality in the San Francisco Bay Region for water bodies with readily available data, and identifies the methods and data used to evaluate water quality status. The report identifies the proposed additions, deletions, and changes to the 2006 303(d) list. The water quality assessments also result in the identification of water bodies where water quality standards are met or where not enough information is available to accurately assess water quality. The results of the water quality assessments are compiled into a statewide integrated report referred to as the 303(d)/305(b) Integrated Report (Integrated Report) by the State Board.

The State Board will include the Water Boards' listing/delisting recommendations in its preparation of the statewide 303(d) list for submission to the U.S. EPA. The statewide 303(d) list will be part of the Integrated Report. The State Board's deliberative process will be conducted in 2009.

Appendix A of this staff report includes the public solicitation letters requesting that the public submit any and all available data to support the assessment of water quality in the Region. Appendix B provides a summary of the data received from the public and an assessment of data quality. Appendix C refers to the Fact Sheets supporting the 303(d) list change recommendations The Fact Sheets are available online at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml

Fact Sheets showing water bodies that support at least some beneficial uses, water bodies not listed due to insufficient information and revisions to the 2006 303(d) list are also available for viewing by following the link above.

2 Listing Policy and Evaluation Criteria

The proposed 2008 303(d) list of impaired water bodies in the San Francisco Bay Region was developed in accordance with the Listing Policy (SWRCB 2004). The Listing Policy establishes a standardized approach for developing California's section 303(d) list. It outlines an approach that provides the rules for making listing decisions based upon different kinds of data and establishes a systematic framework for statistical analysis of water quality data. The Listing Policy also establishes requirements for data quality, data quantity, and administration of the listing process. Decision rules for listing and delisting are provided for: chemical-specific water quality standards; bacterial water quality standards; health advisories; bioaccumulation of chemicals in aquatic life tissues; nuisances such as trash, odor, and foam; nutrients; water and sediment toxicity; adverse biological response; and degradation of aquatic life populations and communities.

Listing and delisting decisions were made in accordance with the Listing Policy, using all applicable narrative and numeric water quality criteria contained in the San Francisco Bay Basin Plan and in the California and National Toxic Rules. The Listing Policy specifies the frequency of exceedance of applicable water quality objectives that is necessary to make a determination that the water is impaired. When applying narrative water quality criteria, staff used guidelines developed by the U.S. EPA and other government agencies together with findings published in the scientific peer-reviewed literature to interpret data and evaluate the water quality conditions.

3 Information Received and Analyzed

3.1 Data solicitation

Federal regulation [(40 CFR § 130.7(b)(5)] states that "Each State shall assemble and evaluate all existing and readily available water quality-related data and information" when developing the 303(d) list. In December 2006, Water Board staff solicited the public to submit any and all water quality data to be considered in preparation of the 2008 303(d) list and 305(b) report.

This solicitation established a data submittal deadline of February 28, 2007. On January 30, 2007, staff transmitted a notice clarifying that there were no limits on the type or format of data and information that the public could provide to the Water Boards for their assessment. The notices provided to the public can be found in Appendix A of this report.

Appendix B contains a summary of the data and information submitted to the Water Board for consideration in the 2008 303(d) listing process. We received 15 submissions in response to the data solicitation, including multiple requests to list water bodies, two requests to delist and/or not to list water bodies as well as data sets without any accompanying request to list or delist. Water Board staff evaluated the submitted data in accordance with the Listing Policy, taking into account spatial and temporal representativeness and quality (Appendix B). The submissions and listing requests covered four major categories of pollutants and stressors including (1) trash; (2) general water quality parameters such as dissolved oxygen and temperature; (3) nutrients and biostimulatory substances; and (4) suspended solids, sedimentation /siltation.

3.2 Data analysis and recommendations

The assessment process began by identifying and compiling all readily available water quality data as described above. Then, staff systematically reviewed these data sets. Due to the relatively limited number of data sets identified through the solicitation process, much of the effort focused on reviewing the available data collected by the Surface Water Ambient Monitoring Program (SWAMP) and the Regional Monitoring Program (RMP). Staff also developed an approach for interpreting the photographic and narrative documentation for trash relative to applicable water quality standards, consistent with the Listing Policy. In addition, beach water quality data collected by county health departments and stored in the State Board Beach Water Quality Database were evaluated to determine whether the most recently collected data would result in new listing or de-listing decisions for our Region. No changes to the 2006 303(d) list were identified.

The SWAMP data include field surveys of water column chemistry, sediment chemistry, sediment toxicity, and water toxicity data as well as ancillary data on factors such as flows, biological community and physical habitat indicators. SWAMP was designed to provide information necessary to effectively manage the State's water resources and, subsequently, facilitate assessment of water quality under sections 305(b) and 303(d) of the Clean Water Act. Objectives of SWAMP include: (1) assessing the physical, chemical, and biological condition of water bodies in each region in order to determine if water bodies are impaired and beneficial uses are being protected; (2) generating data and information during different seasonal conditions; and (3) generating data and information that is somewhat evenly distributed across a water body to provide a screening level assessment of water quality. These objectives ensure that the SWAMP data meet all quality requirements of the Listing Policy.

For the purpose of analyzing the data and developing the proposed revisions to the 303(d) list, the Listing Policy recommends a "line of evidence" approach to establish both whether a water

body is impaired and what pollutant is causing the impairment. The lines of evidence in support of listing and/or delisting decisions for each affected water body are summarized in a water body-specific fact sheet. Fact sheets were developed for each water body for which sufficient data were available to evaluate during the review.

3.2.1 SWAMP data evaluation

Over the 5-year period (2001 – 2005) SWAMP conducted water quality monitoring in 37 watersheds in the Region (SFBRWQCB 2007c, 2007d). Data were collected at multiple locations within each water body over three hydrologic cycles including the wet season (January through March), the spring/decreasing flow season (April through May) and the dry season (June through October). Altogether data from over 190 sampling locations were evaluated. Selected sites in each water body were sampled to determine benthic macroinvertebrate assemblages, temperature, dissolved oxygen, nutrients, trace metals, trace organic compounds, toxicity, and coliforms. Temporal variability in basic water quality (temperature, dissolved oxygen (DO), pH, and specific conductance) was determined by continuous deployment of field measurement devices. These continuous deployments typically lasted one to two weeks and were conducted three to four times per year. Water, sediment and tissue samples that were collected were analyzed to determine concentrations of more than 230 constituents.

The first step of the water quality assessment involved screening all the data against the available water quality criteria and guidelines. For pollutants with applicable numeric water quality criteria, the impairment status was evaluated by comparing the concentration data with existing water and sediment objectives and standards contained chiefly in the San Francisco Bay Basin Plan, California and National Toxic Rules and U.S. EPA guidelines. When only narrative water quality objectives existed, staff identified evaluation guidelines protective of the beneficial use and specified the conditions above which impacts were minimal. Table 1 and Table 2 show a complete list of numeric criteria and evaluation guidelines used in this assessment.

Table 1: Water quality thresholds for 303(d) data screening of freshwater creeks for selected beneficial uses including aquatic life, municipal and domestic supply (MUN), agricultural supply (AGR) and water contact recreation (REC1)

Analyte	***Description of Standard***	***Numeric Limit***	***Units***	***Reference***
Field measures				
Temperature	Maximum, salmonid	24	° C	USEPA, 1977
	7-day mean, coho	14.8	° C	Sullivan *et al.*, 2000
	7-day mean, steelhead	17	° C	Sullivan *et al.*, 2000
Oxygen, dissolved	Minimum, warmwater	5	mg/L	Basin Plan, 2007b
	Minimum, coldwater	7	mg/L	Basin Plan, 2007b
pH	Range	6.5 to 8.5	S.U.	Basin Plan, 2007b
Specific conductance	Min for AGR	200	µS	Basin Plan, 2007b
	Max for AGR	3000	µS	Basin Plan, 2007b
	Max for MUN	900	µS	Basin Plan, 2007b
Salts – AGR only	***Salt thresholds apply only to waters with AGR beneficial use assigned.***			
Boron	Maximum	0.5	mg/L	Basin Plan, 2007b
Chloride	Maximum	142	mg/L	Basin Plan, 2007b
Metals	***Cadmium, copper, nickel, silver, and zinc values assume a hardness of 100 mg/L CaCO3. Values at other hardness levels must be calculated using formulas in the Basin Plan.***			
Arsenic, dissolved	1-hour average WQO	340	µg/L	Basin Plan, 2007b
	4-day average WQO	150		
Cadmium, total	1-hour average WQO	3.9	µg/L	Basin Plan, 2007b
	4-day average WQO	1.1		
Chromium VI, dissolved	1-hour average WQO	16	µg/L	Basin Plan, 2007b
	4-day average WQO	11		
Copper, dissolved	1-hour average WQO	13	µg/L	Basin Plan, 2007b
	4-day average WQO	9		
Lead, dissolved	1-hour average WQO	65	µg/L	Basin Plan, 2007b
	4-day average WQO	2.5		
Mercury, total	1-hour average WQO	2.4	µg/L	Basin Plan, 2007b
	4-day average WQO	0.025		
Nickel, dissolved	1-hour average WQO	470	µg/L	Basin Plan, 2007b
	4-day average WQO	52		
Selenium, total	4-day average WQO	5	µg/L	Basin Plan, 2007b
	1-hour average WQO	20		
Silver, dissolved	1-hour average WQO	3.4	µg/L	Basin Plan, 2007b
Zinc, dissolved	1-hour average WQO	120	µg/L	Basin Plan, 2007b
	4-day average WQO	120		
Metals -- MUN only	***These Metals thresholds apply only to waters with MUN beneficial use assigned.***			
Manganese, total	Maximum	50	µg/L	Basin Plan, 2007b
Mercury, total	Maximum	2	µg/L	Basin Plan, 2007b
Organics				
PCBs	Freshwater Criterion Continuous Concentration	0.014	µg/L	CTR
Chlorpyrifos	4-day average (chronic)	0.015	µg/L	CVRWQCB, 2006
Dacthal (DCPA)	Instantaneous maximum AWQC	14300	µg/L	CVRWQCB, 2008
Diazinon	1-hour average	0.1	µg/L	SFBRWQCB, 2005
Disulfoton (Disyston)	Instantaneous maximum	0.05	µg/L	CVRWQCB, 2008

Analyte	***Description of Standard***	***Numeric Limit***	***Units***	***Reference***
Field measures				
	AWQC			
Endosulfan	Continuous 4-day average	0.056	µg/L	CTR
	Instantaneous maximum	0.22		CTR
HCH, gamma- (gamma-BHC, Lindane)	Maximum 1-hour average	0.95	µg/L	CTR
Parathion, methyl	Instantaneous maximum AWQC	0.08	µg/L	CDFG
Thiobencarb	Instantaneous maximum AWQC	3.1	µg/L	CDFG
Pathogens – Water Contact Recreation (REC1)				
E. coli (freshwater)	Steady state (all areas)	126	MPN /100 mL	US EPA, 1986
	Designated beach (max)	235		
Fecal coliform	Geometric mean	200	MPN /100 mL	Basin Plan, 2007b
	90th percentile	400		
Total coliform	Median	240	MPN /100 mL	Basin Plan, 2007b
	Maximum	10000		
Coliforms – MUN only	***MUN thresholds are DOHS recommendations for surface water that serves as drinking water source.***			
Fecal coliform	Geometric mean	<20	MPN /100 mL	Basin Plan, 2007b
Total coliform	Geometric mean	<100		
Toxicity -- Basin Plan	***Two-sample t-tests (one-tailed, alpha = 0.05) were performed on station data versus control data.***			
For *Ceriodaphnia and Pimephales*, the null hypothesis tested was that the station response was less than (less growth, survival, etc) the control response.		80	%	Basin Plan (2007b) - "There shall be no chronic/acute toxicity in ambient waters." (3.3.18)
For Selenastrum, where we are testing that station responses are greater than (more growth) or less than (less growth) the control, these two-sample tests have an alpha of 0.10.		80	%	

CTR - (Federal Register, Part III; EPA; 40 CFR Part 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule. May 18, 2000)

CDFG - California Department of Fish and Game, Office of Spill Prevention and Emergency Response, Hazard Assessment and Water Quality Criteria documents for pesticides (various dates), http://www.cdpr.ca.gov/docs/sw/hazasm.htm

Table 2: Freshwater sediment quality pollutant thresholds for 303(d) data screening

SQG type: ***Analyte***	**Probable effect concentration** *mg/kg*	*µg/kg*	***Reference***
Metals			MacDonald et al. 2000
Arsenic	33		
Cadmium	4.98		
Chromium	111		
Copper	149		
Lead	128		
Mercury	1.06		
Nickel	48.6		
Zinc	459		
Organics			MacDonald et al. 2000
Anthracene		845	
Fluorene		536	
Naphthalene		561	
Phenanthrene		1170	
Benz(a)anthracene		1050	
Benzo(a)pyrene		1450	
Chrysene		1290	
Fluoranthene		2230	
Pyrene		1520	
PAH (total)		22800	
PCB (total)		676	
Chlordane		17.6	
Dieldrin		61.8	
DDD (sum op + pp)		28	
DDE (sum op + pp)		31.3	
DDT (sum op + pp)		62.9	
DDT (total)		572	
Endrin		207	
Heptachlor epoxide		16	
HCH, gamma		4.99	
Toxicity	***Two-sample t-tests (one-tailed, alpha = 0.05) were performed on station data versus control data.***		
For *Hyalella*, the null hypothesis tested was that the station response was less than (less growth, survival, etc) the control response. 80% of the control group was the threshold for sediment toxicity.			Basin Plan (2007b) - "There shall be no chronic/acute toxicity in ambient waters." (3.3.18)

3.2.2 Trash

Trash is not a new problem for the Bay Region, but it is a continuing problem both as an aesthetic nuisance, as a serious threat to aquatic life in tributaries, and as a threat to marine life in estuaries and oceans. Data suggest that plastic from trash persists for hundreds of years in the environment and can pose a threat to wildlife through ingestion, entrapment and entanglement, and this plastic can leach potentially harmful chemicals to the aquatic environment. During the 2002 303(d) listing update effort, Staff discussed the water quality impacts associated with trash at some length (SFRWQCB 2001). Water Board staff found that trash threatened water quality in all urban creeks, lakes, and shorelines. Rather than listing all urban creeks at that time, the Water Board urged municipalities to implement trash control measures, assess trash impairments in their jurisdictions and document these assessments in annual reports submitted to the Board. Since 2002, Water Board staff has developed, refined, and implemented (2002 through 2005) a rapid trash assessment method as part of SWAMP (SFBRWQCB 2007a). Other local entities, e.g., the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), also collected trash assessment data. The water quality assessments for trash conducted for this 303(d) update are based on the results of the rapid trash assessment method and interpretation of data submitted by the public using a similar approach.

The data solicitation for this update resulted in the submission of a large quantity of trash-related data and accompanying requests for 303(d) listings. These data consisted mainly of photographs and narrative documentation on the status of trash levels for specific water bodies. In addition to these data, staff compiled and considered rapid trash assessment data collected by SWAMP as well as similar trash assessment data collected by SCVURPPP. The two types of trash data, photographs and trash assessment results, required distinct evaluation methodologies described below. Because there are no numeric water quality criteria for trash, the trash data were reviewed according to the "weight of evidence" guidelines established in section 3.11 of the Listing Policy. After reviewing these data in accordance with the Listing Policy, there were several water bodies for which we did not have compelling evidence to place them on the 303(d) list. These water bodies are identified in Table 3 below. The water bodies recommended for placement on the 303(d) list for trash impairment are identified in Table 4 below, and the lines of evidence are described in detail in the Fact Sheets (Appendix C).

Relevant Beneficial Uses and Water Quality Objectives

Several beneficial uses may be adversely impacted by trash, including recreation, aquatic life, wildlife habitat, and navigation. However, data were not readily available to allow staff to evaluate all beneficial uses possibly impaired by trash. Instead, we focused our review on evaluating impairment of the non-contact water recreation (REC-2) and wildlife habitat (WILD) beneficial uses, because these uses can be most easily evaluated through review of available trash data. Impairment of REC-2 can be readily evaluated based on the level of trash present. Impairment of WILD can be evaluated based on the level of certain types of trash associated with threat to wildlife, a beneficial use that implicitly includes aquatic life.

Beneficial uses adversely impacted by trash are, in turn, supported by the following set of narrative water quality objectives and Basin Plan prohibitions. The Basin Plan (Table 4-1,

Prohibition Number 7) prohibits discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas." The Basin Plan (Section 3.3.6) also has a narrative objective for floating material, "waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses." Last, the Basin Plan (Section 3.3.13) has a narrative objective for settleable material, "waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses."

Table 3: List of water bodies with insufficient evidence to establish trash impairment

Water Body	Designated/Potential Uses	Supporting Data
Adobe Creek	Non-Contact Recreation and Wildlife Habitat	RTA [1], Photos
Alamitos Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Alhambra Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Arroyo Corte Madera del Presidio	Non-Contact Recreation and Wildlife Habitat	Photos
Arroyo Los Positas	Non-Contact Recreation and Wildlife Habitat	RTA
Arroyo Mocho	Non-Contact Recreation and Wildlife Habitat	RTA
Arroyo Seco	Non-Contact Recreation and Wildlife Habitat	Photos
Barron Basin	Non-Contact Recreation and Wildlife Habitat	RTA
Berryessa Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Calabazas Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Corte Madera Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Lagunitas Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Las Trampas Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Lafayette Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Ledgewood Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Los Gatos Creek	Non-Contact Recreation and Wildlife Habitat	RTA, Photos
McCoy Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Pacheco Slough	Non-Contact Recreation and Wildlife Habitat	Photos
Randall Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Rodeo Creek	Non-Contact Recreation and Wildlife Habitat	RTA
San Gregorio Creek	Non-Contact Recreation and Wildlife Habitat	RTA
San Ramon Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Sulphur Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Thompson Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Upper Penitencia Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Vista Grande Canal	Non-Contact Recreation and Wildlife Habitat	Photos
Walnut Creek	Non-Contact Recreation and Wildlife Habitat	Photos

Wildcat Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Yerba Buena Creek	Non-Contact Recreation and Wildlife Habitat	RTA

[1] RTA – Rapid Trash Assessment

Evaluation of Trash Assessment Results

The Water Board's rapid trash assessment method generates site-specific scores on a scale from 0 to 120, with higher scores indicating cleaner sites. The method also documents the number of pieces of trash per one hundred feet of stream or shoreline, and the rate of return of trash under different hydrologic conditions. The trash assessment protocol involves picking up and tallying all of the trash items found within the defined boundaries of a site. When repeated several times throughout a year, this procedure allows for the assessment of temporal changes in impairment, usage patterns, and trash deposition rates under wet and dry weather conditions (SFBRWQCB 2007a).

The Rapid Trash Assessment (RTA) method evaluates six parameters of trash impacts (level of trash, number of items found, threat to wildlife, threat to human health, illegal dumping, and trash accumulation). For purposes of determining impairment status, Water Board staff evaluated the magnitudes of the "level of trash" and "threat to aquatic life" parameters. If the "level of trash" parameter score fell in the 'poor condition category' (scores 0-5), REC-2 is deemed not supported. According to the RTA, the "poor condition" score corresponds to a level of trash that "distracts the eye on first glance. Stream, bank surfaces, and immediate riparian zone contain substantial levels of litter and debris (>100 pieces). This score suggests that the site is being used frequently by people: many cans, bottles, and food wrappers, blankets, clothing." SCVURPPP developed a similar "level of trash" parameter that can be interpreted similarly. Water Board staff reason that if there is sufficient trash to "distract the eye on first glance" and there are substantial levels of litter and debris, then the non-contact beneficial use would be impaired.

The second RTA parameter considered is the "threat to aquatic life" category. If this parameter score fell in the 'poor condition' category (scores 0-5), then WILD is deemed not supported. According to the RTA, the 'poor condition' score corresponds to a "large amount (>50 pieces) of transportable, persistent, buoyant litter (such as hard or soft plastics, balloons, styrofoam, cigarette butts); toxic items (such as batteries, lighters, or spray cans); large clumps of yard waste or dumped leaf litter; or large amount (>50 pieces) of settleable glass or metal."

Water Board staff used the "threat to aquatic life" parameter to assess impairment to wildlife habitat beneficial uses (WILD) because the type of trash measured by this parameter is particularly problematic for wildlife (including aquatic life). The two primary problems that trash poses to wildlife are entanglement and ingestion. Mammals, turtles, birds, fish, and crustaceans all have been affected by entanglement in or ingestion of floatable debris. Many of the species most vulnerable to the problems of floatable debris are endangered or threatened. Entanglement is harmful to wildlife because it can cause wounds that can lead to infections or loss of limbs and also cause strangulation, suffocation, drowning, or limited escape from predators (EPA 2002). Ingestion of trash can lead to starvation or malnutrition if the ingested items block the intestinal tract, preventing digestion, or accumulate in the digestive tract, making the animal feel "full" and lessening its desire to feed. Ingestion of sharp objects can damage the mouth, digestive tract and/or stomach lining and cause infection or pain. Ingested items can also block air passages and prevent breathing, thereby causing death (EPA 2002).

The Urban Rapid Trash Assessment (URTA) developed by SCVURPPP is a very slightly modified version of the original SWAMP RTA. It was modified to make it easier to apply in urban creeks, and the way in which category scores are interpreted was also modified. However, the URTA has an identical parameter assessing threat to aquatic life (wildlife) by characterizing the amount of "Transportable, Persistent, Buoyant Litter." If the raw score for this parameter fell in the marginal urban or poor condition category (scores 0-10, corresponding to a count of 76-200 pieces of such litter), then WILD is deemed not supported.

Although Water Board staff only considered the "level of trash" and "threat to aquatic life" parameters for determining impairment status, the SWAMP and SCVURPPP trash assessment methods have four additional parameters that can provide additional information about both the condition and cause of the trash encountered during assessment (SFBRWQCB 2007a). The assessments include a parameter indicating the total number of trash items counted on the 100-foot stream reach, both above and below the high water line. This is an efficient parameter to use to obtain a rough comparison of the trash impacts between sites, but it can be misleading because sometimes trash items are broken into many pieces, thus inflating the count.

The "threat to human health" parameter accounts for the number of items that are dangerous to humans who wade or swim in the water, and the presence of pollutants that could accumulate in fish in the downstream environment, such as mercury. The worst conditions for this parameter have the potential for the presence of dangerous bacteria or viruses, such as with medical waste, diapers, and human or pet waste. The "illegal dumping and littering" parameter relates to direct placement of trash items at a site, with "poor" conditions assigned to sites that appear to be dumping or littering locations based on adjacent land use practices or site accessibility. Finally, the "accumulation of trash" parameter can be used to distinguish trash that is transported from upstream locations from dumped trash. This is accomplished by noting indications of age and transport. Faded colors, silt marks, trash wrapped around roots, and signs of decay suggest downstream transport, indicating that the local drainage system facilitates conveyance of trash to water bodies.

Evaluation of Photographic Evidence for Trash

Nearly 900 photos of trash impacts were submitted and evaluated to make impairment determinations. These photos presented a fundamental impairment assessment challenge: how to interpret what can be seen in the photos relative to beneficial use impairment? The method we employed was to view the photos as if the water body was being assessed according to the RTA procedure. One of the co-authors of the RTA inspected every photograph and attempted to establish the RTA score for the "level of trash" and "threat to aquatic life" parameters, which relates to impairment of REC-2 and WILD, respectively. One of the first objectives of this photo inspection was to determine if the quantity and quality of the photos were sufficient to establish these parameter scores. Some photos were not clear enough to accomplish this.

In order to establish that the "Level of Trash" parameter was in the poor condition category, we required that reach-scale (i.e., showing most or all of the reach of the creek being photographed) and close-up photos of stream reaches must demonstrate a similar level of

trashiness as the 'poor condition' category of the RTA assessment parameter. In other words, we determined if the visual impression of the photos was consistent with the visual impression the evaluator might have experienced during actual RTA assessments for locations scoring in the 'poor condition" category. A similar determination was made for each photo relative to the "threat to aquatic life" parameter.

Spatial and Temporal Representativeness of Trash Impairment

As a general rule, water bodies recommended for inclusion on the 303(d) list for trash are those for which there is evidence of trash problems persisting through space and time. We applied this rule to trash assessment data and photographic data. In order to recommend listing, we typically required both that the water body contain two or more sites that show evidence of trash impairment (according to assessment or photo documentation) and that evidence of trash impairment existed on two or more occasions. There were instances in which a listing recommendation was made based on data for multiple occasions but only at one location if there were no other data available, but these were very rare exceptions. For San Francisco Bay listings, if shoreline or creek mouth sites satisfied these data sufficiency requirements, we recommended that the applicable bay segment be listed. In fact, for the bay segments recommended for listing (Central and Lower), there were at least two shoreline or creek mouth locations with unacceptably high levels of trash.

3.3 Fact sheet development

Water Board staff developed a Fact Sheet for each water body - pollutant combination that resulted in a listing or delisting recommendation, summarizing the data used to make the decision, the criteria used, and the basic water body characteristics. Figure 1 shows a template provided by the State Board and lists all categories of information required to develop a fact sheet and characterize the cause of impairment.

Region:
Water Body Segment:

Pollutant:
Decision: *List/De-List*

Weight of Evidence
RWQCB Staff Recommendation

Line of Evidence:

Fraction:	*Options for this field are none, not recorded, total, dissolved (does not include suspended), and total dissolved.*
Matrix:	*Options for this field are tissue, water, sediment, N/A. This is the monitoring data sample medium.*
Beneficial use(s):	*Find appropriate beneficial use in your Region's Basin Plan.*
Water Quality Objective/Criteria:	*Find in Basin Plan or use CTR or other appropriate water quality objective or criterion and completely cite it here and reference where you found it.*
Evaluation Guideline:	*If the objective is narrative, use the appropriate evaluation guideline and completely cite it here and reference where you found it.*
Data Used to Assess Water Quality:	*Summarize data assessed here. What is the total number of samples? How many of these samples exceed the objective/criterion/guideline?*
Data References:	*Cite the data reference used for this assessment.*
Spatial Representation:	*Where were the samples collected? How many stations, etc?*
Temporal Representation:	*When were the samples collected? What was the sampling timeframe, etc?*
Water Body Specific Information:	*Environmental conditions or factors that might effect data used in assessment [e.g. Fire/Flood/Dry Year event, etc.]*
Data Quality Assessment	*Excellent, good, fair, poor, unknown, and none*
QAPP Information:	*Clearly describe the quality assurance plan or document that applies to the data used for this assessment. Reference the QA plan that was used. For example: "Quality Control for the chemical analysis portion of this study was conducted in accordance with Standard Operating Procedure QAQC001.00 (Segawa, 1995)."*

Figure 1: Fact sheet template for the 303(d) List

4 Listing Decisions

4.1 Proposed additions to the 303(d) list of impaired water bodies

Table 4 shows all proposed additions to the 303(d) list. Much more comprehensive information is available regarding these new proposed listings in the Fact Sheets (Appendix C). Locations of the water bodies evaluated as impaired during the 2008 listing period are shown in Figure 2 and Figure 3.

Table 4: Proposed 2008 additions to 303(d) list of impaired water bodies

Water Body	Beneficial Uses	Pollutant/ Cause of impairment
Almaden Lake	Commercial and Recreational Collection of Fish, Shellfish, or organisms	Mercury (tissue)[1]
Almaden Reservoir	Commercial and Recreational Collection of Fish, Shellfish, or organisms	Mercury (tissue)[1]
Arroyo Las Positas Creek	Warm Freshwater Habitat	Nutrient/Eutrophication Biological Indicators
Arroyo Mocho Creek	Cold Freshwater Habitat (potential)	Temperature
Codornices Creek	Cold Freshwater Habitat	Temperature
Kirker Creek	Warm Freshwater Habitat	Pyrethroids[2] Water Toxicity
Mount Diablo Creek	Cold Freshwater Habitat	Water Toxicity
Permanente Creek	Cold Freshwater Habitat	Selenium Water Toxicity
San Mateo Creek Lower	Wildlife Habitat	Sediment Toxicity
Stevens Creek	Cold Freshwater Habitat	Temperature
Suisun Creek	Cold Freshwater Habitat	Dissolved Oxygen Temperature
Old Alameda Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Baxter Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Cerrito Creek	Non-Contact Recreation and Wildlife Habitat	Trash

[1] The Guadalupe River Watershed TMDL is expected to address this impairment

[2] San Francisco Bay Urban Creeks Diazinon and Pesticide-Related Toxicity TMDL approved by USEPA on 5/16/07 will address pyrethroids impairment in Kirker Creek.

Water Body	Beneficial Uses	Pollutant/ Cause of impairment
Codornices Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Colma Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Coyote Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Damon Slough	Non-Contact Recreation and Wildlife Habitat	Trash
Grayson Creek	Wildlife Habitat	Trash
Guadalupe River	Non-Contact Recreation and Wildlife Habitat	Trash
Kirker Creek	Wildlife Habitat	Trash
Matadero Creek	Wildlife Habitat	Trash
Permanente Creek	Wildlife Habitat	Trash
Petaluma River	Non-Contact Recreation and Wildlife Habitat	Trash
Rindler Creek	Non-Contact Recreation and Wildlife Habitat	Trash
San Francisco Bay (Central) shoreline	Non-Contact Recreation and Wildlife Habitat	Trash
San Francisco Bay (Lower) shoreline	Non-Contact Recreation and Wildlife Habitat	Trash
San Francisquito Creek	Non-Contact Recreation and Wildlife Habitat	Trash
San Leandro Creek Lower	Non-Contact Recreation and Wildlife Habitat	Trash
San Mateo Creek	Non-Contact Recreation and Wildlife Habitat	Trash
San Pablo Creek	Non-Contact Recreation	Trash
San Tomas Creek	Wildlife Habitat	Trash
Saratoga Creek	Wildlife Habitat	Trash
Sausal Creek	Wildlife Habitat	Trash
Silver Creek	Wildlife Habitat	Trash
Stevens Creek	Wildlife Habitat	Trash
Strawberry Creek	Non-Contact Recreation and Wildlife Habitat	Trash

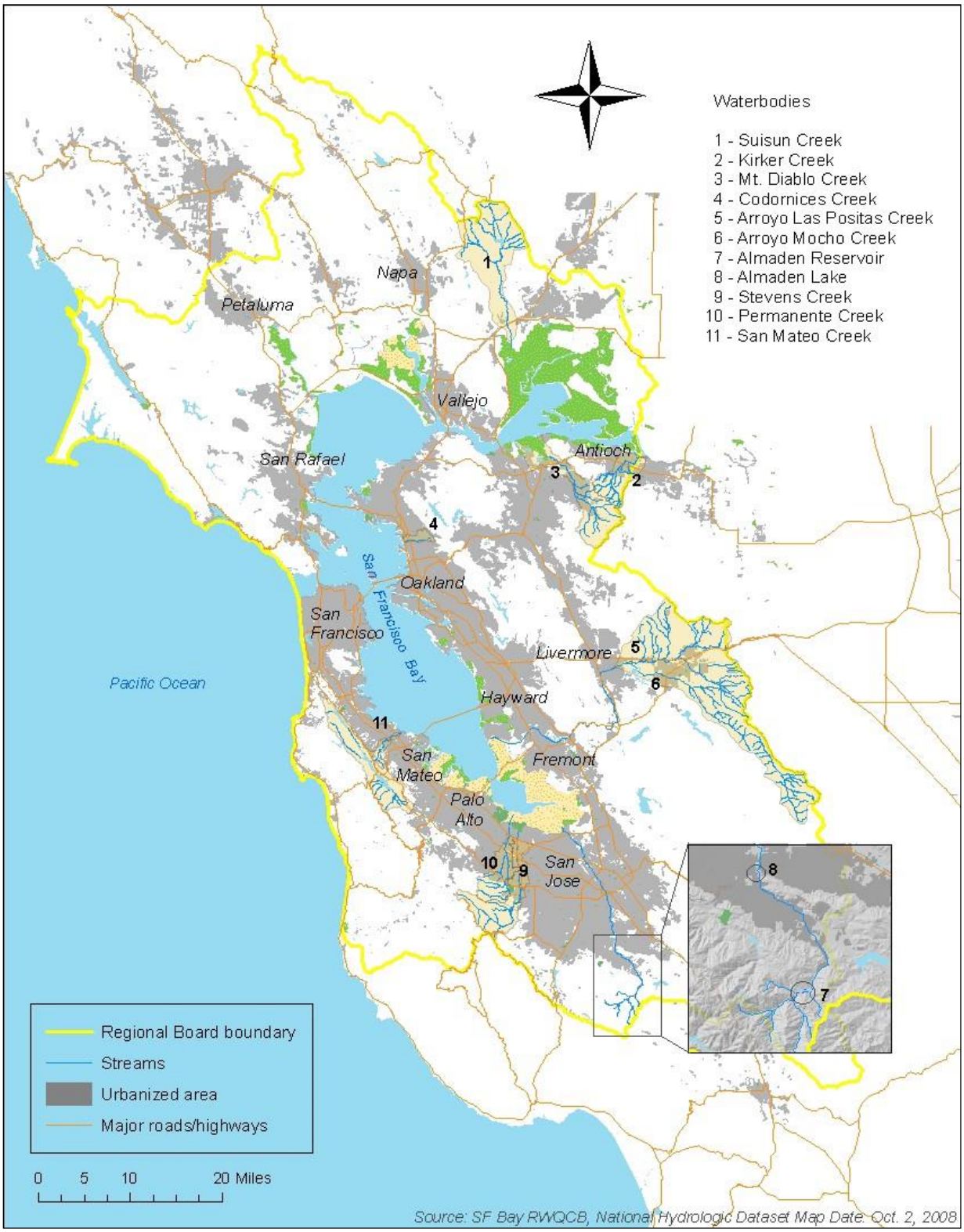

Figure 2: Proposed 2008 new 303(d) listings for toxicants and conventional pollutants

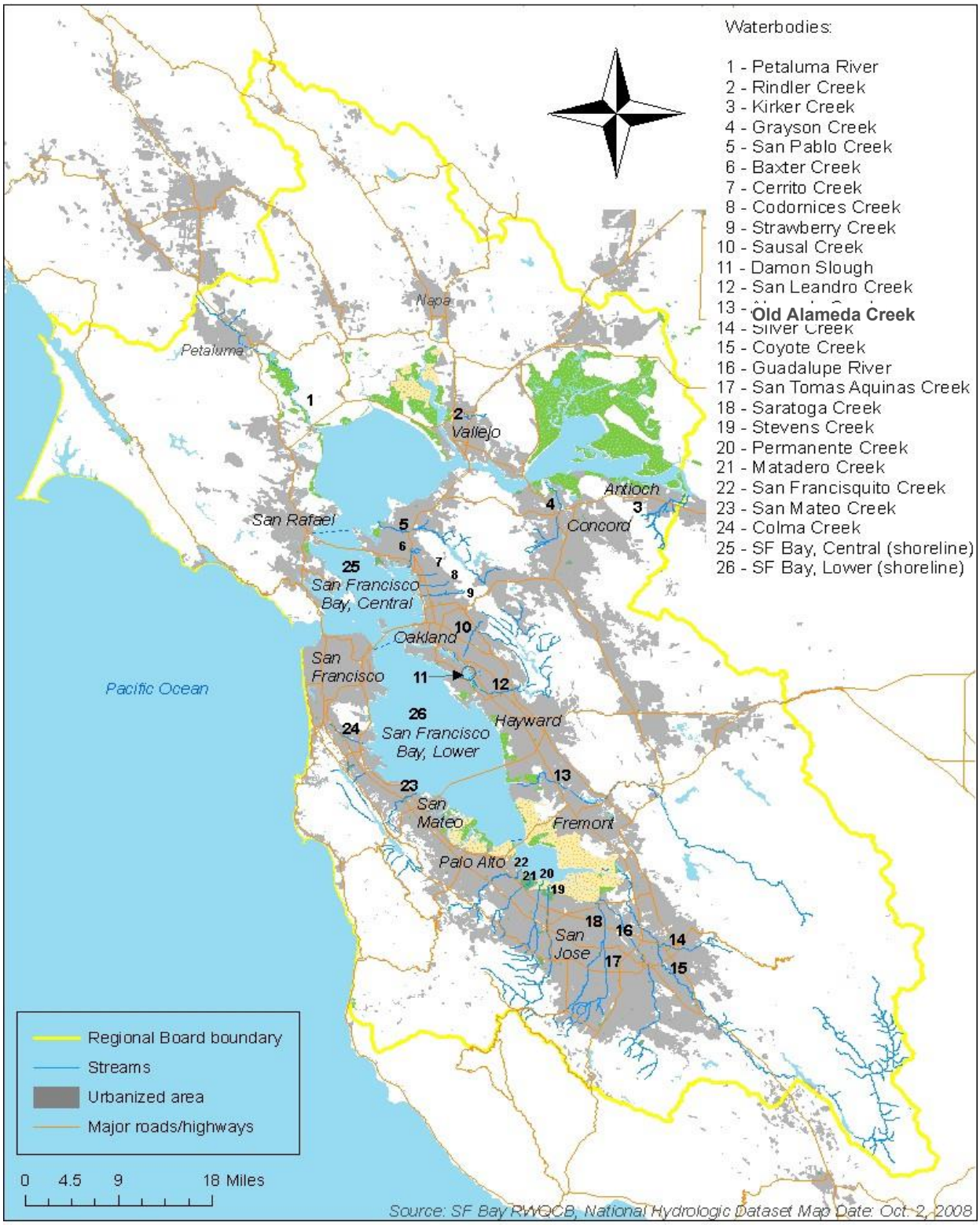

Figure 3: Proposed 2008 303(d) listings for trash

4.2 Proposed delisting and status change

Delist nickel in Sacramento San Joaquin Delta, San Pablo Bay, Suisun Bay

Based on the readily available data and information, there is strong justification for removing these water segment-pollutant combinations from the section 303(d) list in the Water Quality Limited Segments category. The Basin Plan contains nickel water quality objectives of 8.2µg/L as a 4-day average and 74µg/L as a 1-hour average. Data collected by the Regional Monitoring Program and Special Copper/Nickel study from 1993 through 2005 showed that none of the 59 analyzed water samples from the Sacramento San Joaquin Delta exceeded the water quality objectives, none of the 107 analyzed water samples from San Pablo Bay exceeded the water quality objectives, and none of the 96 analyzed water samples from Suisun Bay exceeded the objectives.

Change listing status: Castro Cove, Richmond (San Pablo Basin) - addressed by action other than TMDL

This water body was listed in 2006. Since that time a cleanup and abatement order (Order No. R2-2006-0078) requiring remediation of sediment contamination in the listed portion of Castro Cove was issued. The cleanup action involves removal of contaminated sediment and supports other abatement measures in place, such as the mercury TMDL approved by USEPA on February 12, 2008. Cleanup is underway and, upon its completion, it is expected that this water body will meet applicable water quality standards.

In November 2007, the Water Board received a Monitoring and Risk Management Plan that includes post-dredging confirmation monitoring to demonstrate that chemical contamination in the sediment has been reduced to levels that no longer pose unacceptable ecological risk. The cleanup completion is scheduled for 2010, and it is expected that this action will attain beneficial uses. Therefore, we recommend that Castro Cove be moved from the 303(d) list requiring a TMDL to the 303(d) list of water bodies being addressed by an action other than a TMDL.

4.3 TMDL schedule

All water body-pollutant combinations on the section 303(d) list are assigned with a proposed TMDL completion date. The maximum time that can elapse between 303(d) listing and TMDL completion is 13 years. Accordingly, we have assigned all new listings a TMDL completion date of 2021. This does not suggest that all new listings have the same priority, but rather that the factors determining TMDL priorities have not yet been evaluated as part of this listing process. These factors will be considered through our continuing planning process and with input from our Board and stakeholders. These factors include:

- Water body significance;
- Severity of pollution;
- Degree of impairment;

- Potential threat to human health and the environment;
- Water quality benefits of ongoing activities in the watershed;
- Potential for beneficial use protection and recovery;
- Degree of public concern;
- Availability of funding; and
- Availability of data and information to address the water quality problem.

4.4 Do-Not-List recommendations

This section presents two categories of water bodies for which a "do not list" decision was made. Table 5 lists good quality waters. For these waters there are sufficient data to determine that at least some beneficial uses are supported, and no data are available that suggest non-attainment of beneficial uses. Fact sheets for each of these recommendations are available online (Appendix C).

Table 5: Do Not List recommendations: Some beneficial uses supported

Water Body	Designated/Potential Uses	Supporting Data
Easkoot Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Pine Gulch Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Redwood Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Rodeo Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Tennessee Valley Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Webb Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen

Table 6 lists water body-pollutant combinations, for which there was insufficient information

to determine whether or not water quality standards are being attained. In some cases, there are a small number of water quality standard exceedances, but they are insufficient to demonstrate impairment in accordance with the Listing Policy. Thus, for these water body-pollutant combinations, more data should be collected to allow for a definitive determination ina subsequent listing cycle. The Fact Sheets for these water body-pollutant combinations, other than for trash assessment, are provided in Appendix C, online.

Table 6: Do Not List recommendations: Insufficient information to determine if beneficial uses are attained

Water Body	Designated/Potential Uses	Supporting Data
Arroyo Viejo Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity sediment Cr , Cu, As, Ni – sediment
Audubon Canyon Creek	Aquatic Life/ Cold Freshwater Habitat	Nitrate
Codornices Creek	Aquatic Life / Warm Freshwater Habitat	Dissolved oxygen
Glen Echo Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity sediment As, Cr, Cd, Cu, Pb, Hg, Ni – sediment Cu, Pb, Ni, Zn – water
Lion Creek	Aquatic Life/ Warm Freshwater Habitat	Dissolved oxygen
Lobos Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity water Toxicity sediment
Morses Gulch Creek	Aquatic Life/ Cold Freshwater Habitat	Nitrate
Mt Diablo Creek	Aquatic Life / Warm Freshwater Habitat	Dissolved oxygen Toxicity sediment
Peralta Creek	Aquatic Life / Warm Freshwater Habitat	Toxicity sediment Pyrethroids Diazinon
Permanente Creek	Aquatic Life / Cold Freshwater Habitat	Toxicity sediment
San Leandro Creek, Lower	Aquatic Life / Warm Freshwater Habitat	Chromium
Stevens Creek	Aquatic Life / Warm Freshwater Habitat	Dissolved oxygen
Temescal Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity water Cu, Pb, Ni, Zn – water
Walker Creek	Aquatic Life / Cold Freshwater Habitat	Temperature

4.5 Editorial revisions to the 2006 303(d) list

In addition to the proposed status changing actions, we reviewed and clarified the decision language for water bodies on the 303(d) list adopted in 2006. In particular, careful consideration was given to updating the expected schedules for TMDL completion. In addition, the updated list reflects U.S. EPA approval of TMDLs adopted since the 2006 303(d) list was approved. All of these revisions are editorial in nature and do not change the listing status of any water body. These revisions to the 2006 303(d) list of impaired water bodies are shown in Appendix C, online.

5 303(d)/305(b) Integrated Report

The 303(d)/305(b) Integrated Report will be prepared by State Board based on the information submitted in this report and similar information prepared by all the other Regions. The Integrated Report will then be submitted to the U.S. EPA. All of the assessments reflected in the Fact Sheets included in this report will be used to determine which category to assign to the evaluated water bodies. Additional Fact Sheets may be prepared for non-303(d) listed water bodies for inclusion in the Integrated Report.

The US EPA defines five non-overlapping categories for use in the integrated assessment (USEPA 2005). These categories include:

Category 1: All designated uses are supported, no use is threatened;

Category 2: Available data and/or information indicate that some, but not all of the designated uses are supported (see Table 5 above);

Category 3: There is insufficient available data and/or information to make a use support determination (see Table 6 above);

Category 4: Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed; and

Category 5: Available data and/or information indicate that at least one designated use is not being supported or is threatened, and a TMDL is needed (Table 4 above).

The 2008 Integrated Report adopted by State Board will include the 303(d) listing changes approved by each Regional Water Board. Categories 4 and 5 reflect those water bodies placed on the 303(d) list.

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APPENDIX A

PUBLIC SOLICITATION
for Water Quality Information

available online at

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml

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APPENDIX B

SUMMARY OF DATA RECEIVED AND DATA QUALITY EVALUATION

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Summary of Data Received as a Result of Solicitation Process in February 2007

REQUESTS TO LIST					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
Guadalupe River, Los Gatos Creek, Richmond Marsh, San Rafael Creek, Wildcat Creek, Stevens Creek	**Trash**	**Save the Bay** Photographic documentation and estimates of trash loads	1-4 locations on each water body	Data collected in January and February 2007	Medium – photographic documentation
Guadalupe River, Coyote Creek	**Trash**	**GCRCD**: Guadalupe-Coyote Resource Conservation District Photographic and narrative documentation of trash, debris, channel blockages, encampments and dumping	5 locations on Coyote Creek and 1 location on Guadalupe River	Data collected in March 2002, May 2005, and May 2006	Medium – photographic documentation
Bay area storm drain channels, creeks, wetlands and San Francisco Bay Damon Slough, Eastshore Park, Strawberry Creek, Temescal Creek, Adobe Creek, Alameda Creek, Alhambra Creek, Arroyo Seco, Coyote Creek, Richardson Bay shoreline, Aquatic Park Lagoon, Calabazas Creek, Colma Creek, Corte Madera Creek, Middle Harbor Park shoreline, Frontage Road Beach, Grayson Creek, Guadalupe River, Lafayette Creek, Lake Merritt,	**Trash/Gross pollutants**	Roger B. James & Lawrence P. Kolb Photographic and narrative documentation over a 10-year period	1-5 locations on each water body	Data collected mainly in winter months from 1997-2007, majority in 2006 and 2007	Medium – photographic documentation

REQUESTS TO LIST					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
Las Trampas Creek, Ledgewood Creek, Matadero Creek, McCoy Creek, Pacheco Slough, Rindler Creek, San Leandro Creek, San Mateo Creek, San Rafael Creek, San Pablo Creek, San Ramon Creek, San Tomas Aquino Creek, Sausal Creek, Stevens Creek, Sulphur Creek, Vista Grande Canal, Walnut Creek, 54th Ave. Creek (tidal near Oakport)					
Rodeo Creek	**Sediment**	**Muir Heritage Land Trust** No quantitative data, geomorphic assessment and creek analysis (*Geomorphic and Hydrologic Assessment of Fernandez Ranch* prepared by Watershed Sciences	N/A	N/A	No data submitted
Willow Creek (tributary of Wildcat Creek near Saratoga)	**Sediment**	Margaret Giberson of Los Gatos	Willow Creek	1985-1991, 2002	Law – old (1985-1991, 2002) photographic documentation of sediment runoff
San Francisco Bay – areas adjacent to dredge material disposal sites	**Suspended sediment**	Fred Krieger of Berkeley Narrative evidence and references to USGS mapping, SFEI assessments of sediment loadings, RMP data and a White Paper on	San Francisco Bay	N/A	No data submitted

REQUESTS TO LIST					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
		Herring			
Abbotts Lagoon and associated tributaries in Point Reyes National Park	**Biostimulatory substances, dissolved oxygen, un-ionized ammonia**	Fred Krieger of Berkeley Link to the USGS report http://pubs.usgs.gov/sir/2005/5261/sir_2005-5261.pdf *Assessment of Hydrologic and Water Quality Data Collected in Abbotts Lagoon Watershed, Point Reyes National Seashore, California, during Water Years 1999 and 2000*	Eleven monitoring locations including 3 locations in Abbotts Lagoon and 8 locations in unnamed tributaries draining into Abbotts Lagoon	Old data collected from November 1998 through August 1999. Quarterly sampling at the 3 lagoon sites and one perennial tributary and sampling of two storm events at several tributary sites	Old data. Medium quality – limited quality control procedures
Lake Chabot and its tributary Rindler Creek (Solano County)	**Trash, dissolved oxygen, sediment**	**Friends of Lake Chabot** Data not submitted, reference made to the data collected by the Vallejo Sanitation and Flood Control District	N/A	N/A	No data submitted
California Ocean Waters	**Carbon dioxide**	**Center for Biological Diversity** No data submitted. Scientific papers and supporting documentation on acidification of ocean waters	N/A	N/A	No numerical data submitted

REQUESTS NOT TO LIST / DE-LIST / OTHER					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
Urban Creeks – Santa Clara Basin Adobe Creek, Alamitos Creek, Barron Creek, Berryessa Creek, Calabazas Creek, Coyote Creek, El Camino Storm Drain Channel, Guadalupe River, Los Gatos Creek, Silver Creek, Matadero Creek, Penitencia Creek, Permanente Creek, Randall Creek, Rodeo Creek, San Francisquito Creek, San Tomas Creek, Saratoga Creek, Stevens Creek, Thompson Creek	**Trash and water quality data**	**SCVURPPP:** Santa Clara Valley Urban Runoff Pollution Prevention Program Photographic and narrative documentation of creeks impacted by trash including additional physical, chemical and biological data	1-3 locations on each water body	Data collected 1 to 3 times per location from 2004 through 2006	High Quantitative Trash Assessment Methodology documented in separate report
Lake Merced	**Dissolved oxygen, pH**	**San Francisco Public Utilities Commission** Data submitted in support of not listing Lake Merced on the 303(d) list	Four monitoring locations in Lake Merced including 2 locations in South Lake Merced and 1 location in North and 1 in North East section of the lake.	DO and pH measured from 4 to 8 times a year over a period from 05/27/2004 to 12/20/2006	Quality control procedures unknown
Lake Del Valle Reservoir	**Basic water quality, conventional chemistry, E. coli, Total coliform, Giardia and Cryptosporidium**	**Alameda Food Control and Water Conservation District** Data submitted to document good quality of the drinking water supply. Request to modify the current 303(d) listing of the	Seven monitoring locations at 3 water bodies - including 3 locations at the Lake Del Valle and 4 locations at major inputs to the South Bay Aqueduct	Samples collected from December 2005 through March 2006	Description of the QA/QC protocols not included

REQUESTS NOT TO LIST / DE-LIST / OTHER					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
		reservoir for Hg and PCBs to state that there is no threat to treated drinking water supply.			
San Francisco Bay	**Selenium**	**Western State Petroleum Association** Request to de-list Literature review and interpretation of selenium concentration data in San Francisco Bay and the likely toxicological effects of selenium.	N/A	N/A	RMP data available – high quality
Mount Diablo Creek	**Temperature, dissolved oxygen, pH, conductivity, bacteria**	**Friends of Mount Diablo Creek** Data provided for ongoing assessment of Mount Diablo Ck.	Six sampling locations (3 sites on the main stem of Mount Diablo Ck and 3 sites on the local tributaries)	Physico-chemical parameters measured monthly from March 2006 through February 2007. E coli and total coliforms measured at 3 sites in July and August 2006	QA/QC protocols included
N/A	**Pesticides**	**DPR**[1]: Department of Pesticide Regulation - links to the Surface Water Database containing pesticides data for California waterways. **No specific data submitted.**	Contra Costa, San Mateo, Solano and Santa Clara County,	Old data (1992-1998)	High

[1] The database comprises a limited amount of pesticide data (diazinon, chloropyrifos, diuron, metha diuron) collected more than 10 years ago from 12 creeks within Region 2 boundaries.

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APPENDIX C

WATER BODY FACT SHEETS

available online at

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml

ATTACHMENT F

State Water Resources Control Board
Resolution No. 2012-0031, Attachment B
Special Protections for Areas of Biological Significance

State Water Resources Control Board
Resolution No. 2012-0031
Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER ANDNONPOINT SOURCE WASTE DISCHARGES

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). “Existing storm water outfalls” are those that were constructed or under construction prior to January 1, 2005. “New contribution of waste” is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term “non-storm water discharges” means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) (i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.

(b) Foundation and footing drains.

(c) Water from crawl space or basement pumps.

(d) Hillside dewatering.

(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).

The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an

ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance plan for ASBS discharges. The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:

   (1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

   (2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

   (3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and

   (4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

   (1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider, and use where feasible, LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site, if LID practices would be the most effective at reducing pollutants from entering the ASBS.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger shall submit a draft written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type. The final ASBS Compliance Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe

the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

B. NONPOINT SOURCE DISCHARGES

1. General Provisions for Nonpoint Sources

   a. Existing nonpoint source waste discharges are allowed into an ASBS only under the following conditions:

      (1) The discharges are authorized under waste discharge requirements, a conditional waiver of waste discharge requirements, or a conditional prohibition issued by the State Water Board or a Regional Water Board.

      (2) The discharges are in compliance with the applicable terms, prohibitions, and special conditions contained in these Special Protections.

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only existing nonpoint source waste discharges are allowed. “Existing nonpoint source waste discharges” are discharges that were ongoing prior to January 1, 2005. “New nonpoint source discharges” are defined as those that commenced on or after January 1, 2005. A change to an existing nonpoint source discharge, in terms of relocation or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges from nonpoint sources (those not subject to an NPDES Permit) are prohibited except as provided below:

(1) The term “non-storm water discharges” means any waste discharges that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability, or occur naturally:

(i) Discharges associated with emergency fire fighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

f. At the San Clemente Island ASBS, discharges incidental to military training and research, development, test, and evaluation operations are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed in the two military closure areas in the vicinity of Wilson Cove and Castle Rock. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

g. At the San Nicolas Island and Begg Rock ASBS, discharges incidental to military research, development, testing, and evaluation of, and training with, guided missile and other weapons systems, fleet training exercises, small-scale amphibious warfare training, and special warfare training are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

h. All other nonpoint source discharges not specifically authorized above are prohibited.

2. Planning and Reporting

a. The nonpoint source discharger shall develop an ASBS Pollution Prevention ~~P~~lan, including an implementation schedule, to address storm water runoff and any other nonpoint source discharges from its facilities. The ASBS Pollution Prevention Plan must be equivalent in contents to an ASBS Compliance Plan as described in I (A)(2) in this document. The ASBS Pollution Prevention Plan is subject to approval by the Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements).

b. The ASBS Pollution Prevention Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff that are necessary to comply with these special conditions, will be achieved through Management Measures and associated Management Practices (Management Measures/Practices). Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director or Regional Water Board Executive Officer that such installation would pose a threat to health or safety. Management Measures to control storm water runoff during a design storm shall achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

c. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff or other nonpoint source pollution is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and the Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents that alter natural water quality and the sources of these constituents.

(2) The report shall describe Management Measures/Practices that are currently being implemented, Management Measures/Practices that are identified in the ASBS Pollution Prevention Plan for future implementation, and any additional Management Measures/Practices that may be added to the Pollution Prevention Plan to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the Management Measures/Practices.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements), the discharger shall revise its ASBS Pollution Prevention Plan to incorporate any new or modified Management Measures/Practices that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised ASBS Pollution Prevention Plan, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger~~s~~ shall submit a draft written ASBS Pollution Prevention Plan to the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) that describes its strategy to comply with these special conditions, including the requirement to maintain natural ocean water quality in the affected ASBS. The Pollution Prevention Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls to comply with these special conditions for inclusion in the discharger's Pollution Prevention Plan. The final ASBS Pollution Prevention Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these Special Protections shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Pollution Prevention Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with parks and recreation facilities shall comply with the following:

A. The discharger shall include a section in an ASBS Compliance Plan (for NPDES dischargers) or an ASBS Pollution Prevention Plan (for nonpoint source dischargers) to address storm water runoff from parks and recreation facilities.

1. The plan shall identify all pollutant sources, including sediment sources, which may result in waste entering storm water runoff. Pollutant sources include, but are not limited to, roadside rest areas and vistas, picnic areas, campgrounds, trash receptacles, maintenance facilities, park personnel housing, portable toilets, leach fields, fuel tanks, roads, piers, and boat launch facilities.

2. The plan shall describe BMPs or Management Measures/Practices that will be implemented to control soil erosion (both temporary and permanent erosion controls) and reduce or eliminate pollutants in storm water runoff in order to achieve and maintain natural water quality conditions in the affected ASBS. The plan shall include BMPs or

Management Measures/Practices to ensure that trails and culverts are maintained to prevent erosion and minimize waste discharges to ASBS.

3. The plan shall include BMPs or Management Measures/Practices to prevent the discharge of pesticides or other chemicals, including agricultural chemicals, in storm water runoff to the affected ASBS.

4. The plan shall include BMPs or Management Measures/Practices that address public education and outreach. The goal of these BMPs or Management Measures/Practices is to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The BMPs or Management Measures/Practices shall include signage at camping, picnicking, beach and roadside parking areas, and visitor centers, or other appropriate measures, which notify the public of any applicable requirements of these Special Protections and identify the ASBS boundaries.

5. The plan shall include BMPs or Management Measures/Practices that address the prohibition against the discharge of trash to ASBS. The BMPs or Management Measures/Practices shall include measures to ensure that adequate trash receptacles are available for public use at visitor facilities, including parking areas, and that the receptacles are adequately maintained to prevent trash discharges into the ASBS. Appropriate measures include covering trash receptacles to prevent trash from being wind blown and periodically emptying the receptacles to prevent overflows.

6. The plan shall include BMPs or Management Measures/Practices to address runoff from parking areas and other developed features to ensure that the runoff does not alter natural water quality in the affected ASBS. BMPs or Management Measures/Practices shall include measures to reduce pollutant loading in runoff to the ASBS through installation of natural area buffers (LID), treatment, or other appropriate measures.

B. Maintenance and repair of park and recreation facilities must not result in waste discharges to the ASBS. The practice of road oiling must be minimized or eliminated, and must not result in waste discharges to the ASBS.

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with waterfront and marine operations shall comply with the following:

A. For discharges related to waterfront and marine operations, the discharger shall develop a Waterfront and Marine Operations Management Plan (Waterfront Plan). This plan shall contain appropriate Management Measures/Practices to address nonpoint source pollutant discharges to the affected ASBS.

1. The Waterfront Plan shall contain appropriate Management Measures/Practices for any waste discharges associated with the operation and maintenance of vessels, moorings, piers, launch ramps, and cleaning stations in order to ensure that beneficial uses are protected and natural water quality is maintained in the affected ASBS.

2. For discharges from marinas and recreational boating activities, the Waterfront Plan shall include appropriate Management Measures, described in The Plan for California's Nonpoint Source Pollution Control Program, for marinas and recreational boating, or equivalent practices, to ensure that nonpoint source pollutant discharges do not alter natural water quality in the affected ASBS.

3. The Waterfront Plan shall include Management Practices to address public education and outreach to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The management practices shall include appropriate signage, or similar measures, to inform the public of the ASBS restrictions and to identify the ASBS boundaries.

4. The Waterfront Plan shall include Management Practices to address the prohibition against trash discharges to ASBS. The Management Practices shall include the provision of adequate trash receptacles for marine recreation areas, including parking areas, launch ramps, and docks. The plan shall also include appropriate Management Practices to ensure that the receptacles are adequately maintained and secured in order to prevent trash discharges into the ASBS. Appropriate Management Practices include covering the trash receptacles to prevent trash from being windblown, staking or securing the trash receptacles so they don't tip over, and periodically emptying the receptacles to prevent overflow.

5. The discharger shall submit its Waterfront Plan to the by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) within six months of the effective date of these special conditions. The Waterfront Plan is subject to approval by the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The plan must be fully implemented within 18 months of the effective date of the Exception.

B. The discharge of chlorine, soaps, petroleum, other chemical contaminants, trash, fish offal, or human sewage to ASBS is prohibited. Sinks and fish cleaning stations are point source discharges of wastes and are prohibited from discharging into ASBS. Anthropogenic accumulations of discarded fouling organisms on the sea floor must be minimized.

C. Limited-term activities, such as the repair, renovation, or maintenance of waterfront facilities, including, but not limited to, piers, docks, moorings, and breakwaters, are authorized only in accordance with Chapter III.E.2 of the Ocean Plan.

D. If the discharger anticipates that the discharger will fail to fully implement the approved Waterfront Plan within the 18 month deadline, the discharger shall submit a technical report as soon as practicable to the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The technical report shall contain reasons for failing to meet the deadline and propose a revised schedule to fully implement the plan.

E. The State Water Board or the Regional Water Board may, for good cause, authorize additional time to comply with the Waterfront Plan. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in Section III.A.5. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality. The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration of significant hardship by showing that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate.

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected during the same storm and at approximately the same time when post-

storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.

   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

      (3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates); and

      (3) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

c. For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. Ocean Receiving Water and Reference Area Monitoring Program

In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled prior to (pre-storm) and during (or immediately after) the same storm (post storm). Post storm sampling shall be during the same storm and at approximately the same time as when the runoff is sampled. Reference water quality shall also be sampled three times annually and analyzed for the same constituents pre-storm and post-storm, during the same storm seasons when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,

pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

   a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)

listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm during the same storm season that receiving water is sampled. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected during the same storm event when storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

Glossary

At the point of discharge(s) – Means in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

Areas of Special Biological Significance (ASBS) – Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of State Water Quality Protection Areas.

Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit.

Development – Relevant to reference monitoring sites, means urban, industrial, agricultural, grazing, mining, and timber harvesting land uses.

Higher threat discharges - Permitted storm drains discharging equal to or greater than 18 inches, industrial storm drains, agricultural runoff discharged through an MS4, discharges associated with waterfront and marina operations (e.g., piers, launch ramps, mooring fields, and associated vessel support activities, except for passive discharges defined below), and direct discharges associated with commercial or industrial activities to ASBS.

Low Impact Development (LID) – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which entails collecting and conveying storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID focuses on using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall.

Marine Operations – Marinas or mooring fields that contain slips or mooring locations for 10 or more vessels.

Management Measure (MM) - Economically achievable measures for the control of the addition of pollutants from various classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. For example, in the "marinas and recreational boating" land-use category specified in the Plan for California's Nonpoint Source Pollution Control Program (NPS Program Plan) (SWRCB, 1999), "boat cleaning and maintenance" is considered a MM or the source of a specific class or type of NPS pollution.

Management Practice (MP) - The practices (e.g., structural, non-structural, operational, or other alternatives) that can be used either individually or in combination to address a specific MM class or classes of NPS pollution. For example, for the "boat cleaning and maintenance" MM, specific MPs can include, but are not limited to, methods for the selection of environmentally sensitive hull paints or methods for cleaning/removal of hull copper anti-fouling paints.

Municipal Separate Storm Sewer System (MS4) – A municipally-owned storm sewer system regulated under the Phase I or Phase II storm water program implemented in compliance with Clean Water Act section 402(p). Note that an MS4 program's boundaries are not necessarily congruent with the permittee's political boundaries.

Natural Ocean Water Quality - The water quality (based on selected physical, chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of: (a) man-made constituents (*e.g.,* DDT); (b) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial), and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question; and (c) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man. Discharges "*shall not alter natural ocean water quality*" as determined by a comparison to the range of constituent concentrations in reference areas agreed upon via the regional monitoring program(s). If monitoring information indicates that *natural ocean water quality* is not maintained, but there is sufficient evidence that a discharge is not contributing to the alteration of natural water quality, then the Regional Water Board may make that determination. In this case, sufficient information must include runoff sample data that has equal or lower concentrations for the range of constituents at the applicable reference area(s).

Nonpoint source – Nonpoint pollution sources generally are sources that do not meet the definition of a point source. Nonpoint source pollution typically results from land runoff, precipitation, atmospheric deposition, agricultural drainage, marine/boating operations or hydrologic modification. Nonpoint sources, for purposes of these Special Protections, include discharges that are not required to be regulated under an NPDES permit.

Non-storm water discharge – Any runoff that is not the result of a precipitation event. This is often referred to as "dry weather flow."

Non-structural control – A Best Management Practice that involves operational, maintenance, regulatory (e.g., ordinances) or educational activities designed to reduce or eliminate pollutants in runoff, and that are not structural controls (i.e. there are no physical structures involved).

Physical impossibility - Means any act of God, war, fire, earthquake, windstorm, flood or natural catastrophe; unexpected and unintended accidents not caused by discharger or its employees' negligence; civil disturbance, vandalism, sabotage or terrorism; restrain by court order or public authority or agency; or action or non-action by, or inability to obtain the necessary authorizations or approvals from any governmental agency other than the permittee.

Representative sites and monitoring procedures – Are to be proposed by the discharger, with appropriate rationale, and subject to approval by Water Board staff.

Sheet-flow – Runoff that flows across land surfaces at a shallow depth relative to the cross-sectional width of the flow. These types of flow may or may not enter a storm drain system before discharge to receiving waters.

Storm Season – Also referred to as rainy season, means the months of the year from the onset of rainfall during autumn until the cessation of rainfall in the spring.

Structural control – A Best Management Practice that involves the installation of engineering solutions to the physical treatment or infiltration of runoff.

Surf Zone - The surf zone is defined as the submerged area between the breaking waves and the shoreline at any one time.

Surface Water Ambient Monitoring Program (SWAMP) comparable – Means that the monitoring program must 1) meet or exceed 2008 SWAMP Quality Assurance Program Management Plan (QAPP) Measurement Quality Objectives, or 2) have a Quality Assurance Project Plan that has been approved by SWAMP; in addition data must be formatted to match the database requirements of the SWAMP Information Management System. Adherence to the measurement quality objectives in the Southern California Bight 2008 ASBS Regional Monitoring Program QAPP and data base management comprises being SWAMP comparable.

Waterfront Operations - Piers, launch ramps, and cleaning stations in the water or on the adjacent shoreline.

Attachment 1
Special Protections Sections I(A)(3)(e) and I(B)(3)(e)
Flowchart to Deteremine Compliance with natural Water Quality

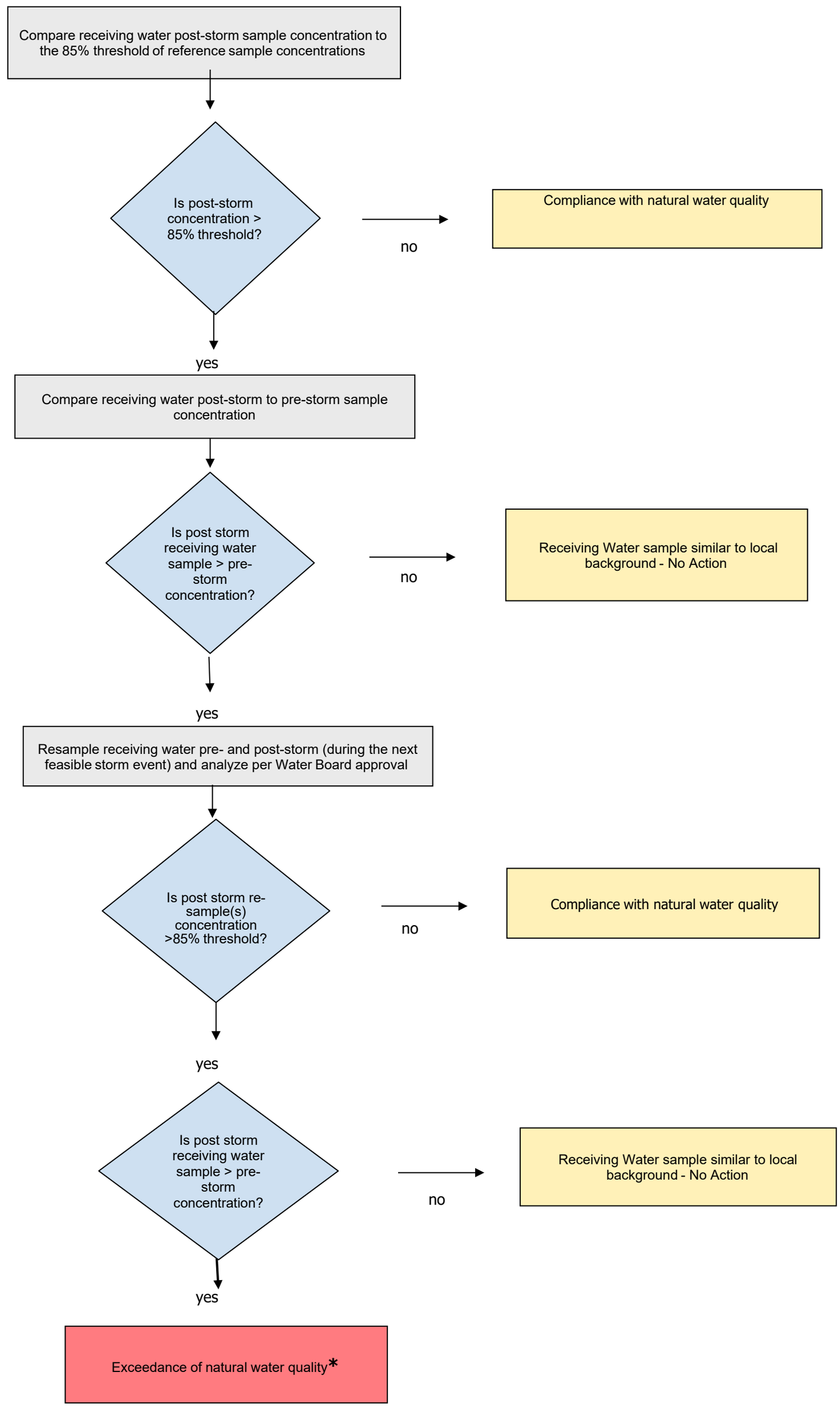

*** When an exceedance of natural water quality occurs, the discharger must comply with section I.A.2.h (for permitted storm water) or section I.B.2.c (for nonpoint sources). Note, when sampling data is available, end-of-pipe effluent concentrations will be considered by the Water Boards in making this determination.**

S7-0693

ATTACHMENT G

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements
for
NPDES Stormwater Discharge Permits

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Permittees (hereinafter individually referred to as Discharger) must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); California Water Code, §§ 13261, 13263, 13265, 13000, 13001, 13304, 13350, 13385.)

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violationof this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar

systems that are installed by a Discharger only when necessary to achieve compliance with theconditions of this Order. (40 C.F.R. § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)
2. The issuance of this Order does not authorize any injury to persons or property or invasionof other private rights, or any infringement of state or local law or regulations. (40 C.F.R. §122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be requiredby law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); California Water Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); California Water Code, § 13383);
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); CaliforniaWater Code, §13383);
3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); California Water Code, § 13383); and
4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); California Water Code, § 13383.)

G. Bypass

1. **Definitions**
   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)
   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur inthe absence of a bypass. Severe property damage does not mean economic loss

caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. (40 C.F.R. § 122.41(m)(2).)

3. **Prohibition of bypass.** Bypass is prohibited, and the Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

   c. The Discharger submitted notice to the Water Board as required under Standard Provisions notice requirements. (40 C.F.R.§ 122.41(m)(4)(i)(C).)

4. The Water Board may approve an anticipated bypass, after considering its adverse effects, if the Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance Part I.G.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

H. Notice

a. **Anticipated bypass.** If the Discharger knows in advance of the need for a bypass, itshall submit prior notice, if possible at least 10 days before the date of the bypass. The notice shall be sent to the Water Board. As of December 21, 2020, all notices must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

b. **Unanticipated bypass.** The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting Part V.E of this Attachment G (24-hour notice). The notice shall be sent to the Water Board. As of December 21, 2020, all notices must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40

C.F.R. part 127.(40 C.F.R. § 122.41(m)(3)(ii).)

I. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond thereasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance Part I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

2. **Conditions necessary for a demonstration of upset.** A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40C.F.R. § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 C.F.R. §122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. **Burden of proof.** In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration dateof this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Water Board. The Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as maybe necessary under the CWA and the Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative ofthe monitored activity. (40 C.F.R. § 122.41(j)(1).)

B. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or as required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, andeither the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapter N, monitoringmust be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3), 122.41(j)(4), 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order,

for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Water Board Executive Officer or U.S. EPA at any time. (40 C.F.R. § 122.41(j)(2);California Water Code § 13383(a))

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 C.F.R. §122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1));and

2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Water Board, State Water Board, or U.S. EPAwithin a reasonable time, any information which the Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking andreissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); California Water Code, §13383.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions – Reporting Parts V.B.2, V.B.3, V.B.4, V.B.5, and V.B.6 below. (40 C.F.R. § 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having

responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3)).

3. All reports required by this Order and other information requested by the Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting Part V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

e. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 C.F.R. § 122.22(b)(1));

f. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

g. The written authorization is submitted to the Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting Part V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting Part V.B.3 above must be submitted to the Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting Parts V.B.2 or V.B.3 above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared undermy direction or supervision in accordance with a system designed to assure that qualifiedpersonnel properly gather and evaluate the information submitted. Based on my inquiry ofthe person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowingviolations." (40 C.F.R. § 122.22(d).)

6. Any person providing the electronic signature for documents described in Standard Provisions – Parts V.B.1, V.B.2, or V.B.3 above that are submitted electronically shall meet all relevant requirements of this Standard Provisions – Reporting Part V.B, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R § 122.22(e).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the this Order. (40 C.F.R. § 122.41(l)(4).)
2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Water Board or State Water Board. As of December 21, 2020, all reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G and comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R.
§ 122.41(l)(4)(i).)
3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)
4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written report shall contain a description of the noncompliance and its cause; the period ofnoncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is

expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 C.F.R. § 122.41(l)(6)(i).)

For noncompliance events related to combined sewer overflows, sanitary sewer overflows,or bypass events, these reports must include the data described above (with the exceptionof time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 21, 2020, all reports related to combined sewer overflows, sanitary seweroverflows, or bypass events must be submitted to the Water Board and mustbe submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G. The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours underthis paragraph (40 C.F.R. § 122.41(l)(6)(ii)):

a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

c. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Water Board in this Order [40 CFR Section (l)(6)(ii)(C) and 122.44(g)].

3. The Water Board may waive the above-required written report under this provision on a case by case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i));or

2. The alteration or addition could significantly change the nature or increase the quantity ofpollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting Parts V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in StandardProvision – Reporting Part V.E above and the applicable required data in appendix A to 40 C.F.R. part 127. The Water Board may also require the Discharger to electronicallysubmit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Water Board, State Water Board, or U.S. EPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

J. Initial Recipient for Electronic Reporting Data

The owner, operator, or the duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient definedin 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. section 127.2(c)]. U.S. EPA will update and maintain this listing. (40 C.F.R. § 122.41(l)(9).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and13387.

B. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such Sections in a permit issued under Section 402, or any

requirement imposed in a pretreatment program approved under Sections 402(a)(3) or 402(b)(8) of the CWA is subject to a civil penalty not to exceed
$25,000 per day for each violation. The CWA provides that any person who negligently violatesSections 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such Sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8)of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more

than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such Sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit conditionor limitation implementing any of such Sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than
$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions [40 CFR Section 122.41(a)(2)] [California Water Code Sections 13385 and 13387].

C. Any person may be assessed an administrative penalty by the Water Board for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such Sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with themaximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for ClassII violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 [40 CFR Section 122.41(a)(3)].

D. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be

maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or both [40 CFR Section 122.41(j)(5)].

E. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, uponconviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both [40 CFR Section 122.41(k)(2)].

IV. CONTINUATION OF EXPIRED PERMIT

A. This Order continues in force and effect until the effective date of a new permit or the Water Board rescinds this Order. (40 C.F.R. section 122.6(d).) Only those dischargers authorized to discharge under the expiring Order are covered by the continued Order.

ATTACHMENT H

Provision C.3.j.ii.(2)

Numeric Implementation Retrofit Requirements

Table H-1. Numeric Retrofit Requirements

County	**Permittee**	2019 US Census Bureau Population Estimate	MRP 3 Provision C.3.j Retrofit Assignment (acres)	County Total (acres)
Alameda	Alameda	77,624	4.66	58.42
Alameda	Alameda County	147,218	5.00	
Alameda	Albany	19,696	1.18	
Alameda	Berkeley	121,363	5.00	
Alameda	Dublin	64,826	3.89	
Alameda	Emeryville	12,086	0.73	
Alameda	Fremont	241,110	5.00	
Alameda	Hayward	159,203	5.00	
Alameda	Livermore	90,189	5.41	
Alameda	Newark	49,149	2.95	
Alameda	Oakland	433,031	5.00	
Alameda	Piedmont	11,135	0.67	
Alameda	Pleasanton	81,777	4.91	
Alameda	San Leandro	88,815	5.00	
Alameda	Union City	74,107	4.45	
Contra Costa	Antioch	111,502	5.00	57.32
Contra Costa	Brentwood	64,474	3.87	
Contra Costa	Clayton	12,265	0.74	
Contra Costa	Concord	129,295	5.00	

Contra Costa	Contra Costa County	185,589	5.00	
Contra Costa	Danville	44,510	2.67	
Contra Costa	El Cerrito	25,508	1.53	
Contra Costa	Hercules	26,276	1.58	
Contra Costa	Lafayette	26,638	1.60	
Contra Costa	Martinez	38,297	2.30	
Contra Costa	Moraga	17,783	1.07	
Contra Costa	Oakley	42,543	2.55	
Contra Costa	Orinda	19,926	1.20	
Contra Costa	Pinole	19,250	1.16	
Contra Costa	Pittsburg	72,588	4.36	
Contra Costa	Pleasant Hill	34,839	2.09	
Contra Costa	Richmond	110,567	5.00	
Contra Costa	San Pablo	30,990	1.86	
Contra Costa	San Ramon	75,995	4.56	
Contra Costa	Walnut Creek	70,166	4.21	
Santa Clara	Campbell	41,793	2.51	46.09
Santa Clara	Cupertino	59,276	3.56	
Santa Clara	Los Altos	30,089	1.81	
Santa Clara	Los Altos Hills	8,423	0.51	
Santa Clara	Los Gatos	30,222	1.81	
Santa Clara	Milpitas	84,196	5.00	

Santa Clara	Monte Sereno	3,427	0.21	
Santa Clara	Mountain View	82,739	4.96	
Santa Clara	Palo Alto	65,364	3.92	
Santa Clara	San Jose	1,021,795	5.00	
Santa Clara	Santa Clara	130,365	5.00	
Santa Clara	Santa Clara County	98,110	5.00	
Santa Clara	Saratoga	30,153	1.81	
Santa Clara	Sunnyvale	152,703	5.00	
San Mateo	Atherton	7,137	0.43	43.31
San Mateo	Belmont	26,941	1.62	
San Mateo	Brisbane	4,671	0.28	
San Mateo	Burlingame	30,889	1.85	
San Mateo	Colma	1,489	0.20	
San Mateo	Daly City	106,280	5.00	
San Mateo	East Palo Alto	29,314	1.76	
San Mateo	Foster City	33,901	2.03	
San Mateo	Half Moon Bay	12,932	0.78	
San Mateo	Hillsborough	11,387	0.68	
San Mateo	Menlo Park	34,698	2.08	
San Mateo	Millbrae	22,394	1.34	
San Mateo	Pacifica	38,546	2.31	
San Mateo	Portola Valley	4,568	0.27	

San Mateo	Redwood City	85,925	5.00	
San Mateo	San Bruno	42,807	2.57	
San Mateo	San Carlos	30,185	1.81	
San Mateo	San Mateo	104,430	5.00	
San Mateo	San Mateo County	64,832	3.89	
San Mateo	South San Francisco	67,789	4.07	
San Mateo	Woodside	5,458	0.33	
Solano	Fairfield	117,133	5.00	11.78
Solano	Suisun City	29,663	1.78	
Solano	Vallejo	121,692	5.00	
Total		5,917,090.00	216.92	

Table H-1. The retrofit assignment is three acres per 50,000 population, prorated, with a minimum expectation of 0.20 acres and a maximum expectation of five acres. The population data in this table is from the 2019 U.S. Census Bureau Population Estimate.

ATTACHMENT I

Applicable C.3 Requirements from Previous Permit, Order No. R2-2015-0049

C.3. New Development and Redevelopment

C.3.b. Regulated Projects

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels; and

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement, and/or
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50**

percent of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

Interior remodels; and

Routine maintenance or repair such as:

roof or exterior wall surface replacement, and/or

pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing

development that was not subject to Provision C.3., only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.

- Bicycle lanes built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[1]
- Caltrans highway projects and associated facilities.

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth, high density, or transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems:

Tree-box-type high flowrate biofilters

Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the

[1] Permeable surfaces include pervious concrete, porous asphalt, unit pavers, and granular materials.

Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs[2]) for commercial development projects, in Dwelling Units per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density[3] of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the

[2] **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

[3] **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.

two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

- For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to

100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Transit-Oriented Development)

(a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria:

(i) Be characterized as a non-auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.

(ii) If a commercial development project, achieve at least an FAR of 2:1.

(iii) If a residential development project, achieve at least a gross density of 25 DU/Ac.

(iv) If a mixed use development project, achieve at least an FAR of 2:1 or a gross density of 25 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.

(c) Location Credits

(i) A Category C Special Project may qualify for the following Location Credits:

a. 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub.

b. 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub.

c. 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area

Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve an FAR of at least 2:1.

b. 20% Density Credit: Achieve an FAR of at least 4:1.

c. 30% Density Credit: Achieve an FAR of at least 6:1.

(ii) A Category C Special Project that is a residential or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve a gross density of at least 30 DU/Ac.

b. 20% Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 30% Density Credit: Achieve a gross density of at least 100 DU/Ac.

(iii) Commercial Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR. Mixed use Category C Projects may use Density Credits based on either DU/Ac or FAR, but not both.

(iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at-grade surface parking. The at-grade surface parking must be treated with LID treatment measures.

b. 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.

(6) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) The definitions of FAR and gross density applicable to Provisions C.3.e.ii.(4) and (5) are effective July 1, 2022, and shall apply to all Special Projects granted final discretionary approval on or after July 1, 2022.

(3) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Gross Density in DU/Ac: Number of dwelling units per acre.

(e) Density in FAR: Floor Area Ratio.

(f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(g) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied.

(h) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development projects, which create and/or replace $\geq$ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, and detached single-family home projects,[4] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.

[4] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[1]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[1]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. **Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

EXHIBIT 2
to Section 7

Important Note: The current permit, MRP 3, comprises Order Nos. R2-2022-0018 and R2-2023-0019. The following is an unofficial version of MRP 3 (without the Fact Sheet and other Attachments) that incorporates amendments to MRP 3 adopted in October 2023, and that has been compiled for convenience purposes only. Please refer to the adopted orders for a complete and accurate copy of MRP 3. In the event of a conflict between the adopted orders and this unofficial version of MRP 3, the adopted orders shall control.

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order No. R2-2022-0018, as amended by Order No. R2-2023-0019
NPDES Permit No. CAS612008
May 11, 2022

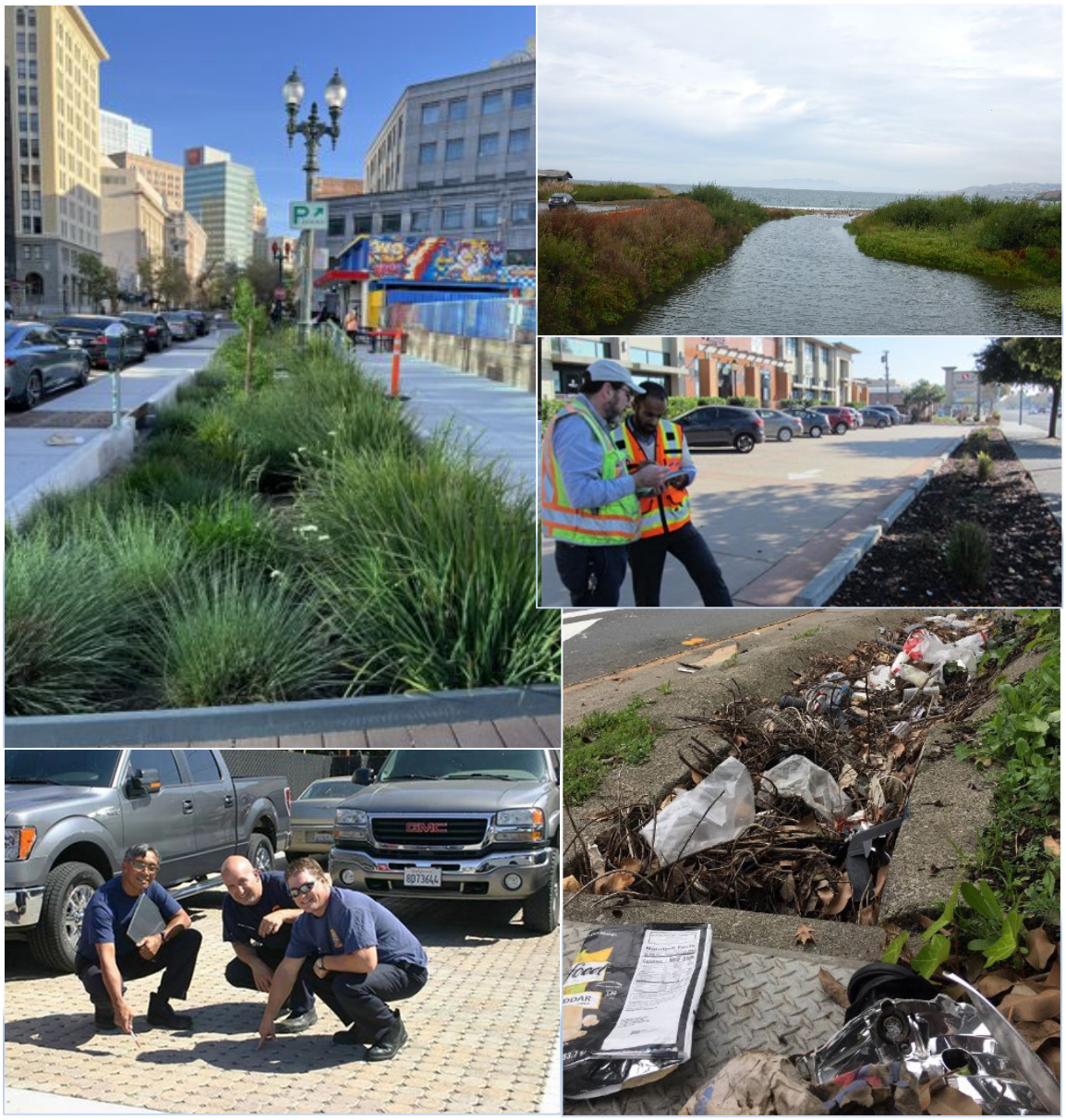

S7-0728

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER No. R2-2022-0018, as amended by Order No. R2-2023-0019
NPDES PERMIT No. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance (Solano Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Attachment A) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. The Fact Sheet, including any supplements thereto, is hereby incorporated by reference.

Existing Permit

2. **Alameda County—**The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 1, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.
3. **Contra Costa County—**The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 1, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.
4. **San Mateo County—**The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City,

San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County have joined together to form the San Mateo Countywide Water Pollution Prevention Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 2, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County—**The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 2, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun—**The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 3, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo—**The City of Vallejo and Vallejo Flood & Wastewater District (hereinafter referred to as the Vallejo Permittees) have submitted permit applications (Report of Waste Discharge), dated June 25 and June 29, 2020, respectively, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions. The Vallejo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

8. The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater

District have joined together to form the Solano Stormwater Alliance (hereinafter referred to as the Solano Permittees). The Alameda, Contra Costa, San Mateo, Santa Clara, and Solano Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, U.S. EPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, U.S. EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and U.S. EPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, trash, and selenium in San Francisco Bay segments; pesticide associated toxicity, and trash in urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

13. Stormwater runoff is generated from various land uses in all the hydrologic sub-basins in the Basin and discharges into watercourses, which in turn flow into Central,

Lower and South San Francisco Bay, and Suisun and San Pablo Bays.

14. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not limited to, support for aquatic life; and other pollutants that can cause aquatic toxicity in the receiving waters.

15. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to U.S. EPA stormwater regulations.

16. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

17. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

18. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments and recommendations.

19. The Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

20. This Order supersedes and rescinds Order Nos. R2-2015-0049 as amended by R2-2019-0004.
21. This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective July 1, 2022, provided the Regional Administrator, U.S. EPA, Region 9, has no objections.

THEREFORE, IT IS HEREBY ORDERED that Order No. R2-2015-0049, as amended by Order No. R2-2019-0004, is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Permittees shall comply with the following requirements in this Order. This action in no way prevents the Water Board from taking enforcement action for past violations of the previous order.

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. Permittees are also subject to the trash discharge prohibition in the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California and the Water Quality Control Plan for Ocean Waters of California.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

B.1.a. Floating, suspended, or deposited macroscopic particulate matter, or foam;

B.1.b. Bottom deposits or aquatic growths;

B.1.c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

B.1.d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

B.1.e. Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are

adopted and approved by the State Water Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.24. Compliance with Provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), bacteria, sediment, diazinon and chlorpyrifos, and methylmercury, shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provision C.10 which prescribes requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of WQS, except for exceedances of WQS for pesticides, trash, mercury, PCBs, bacteria, sediment, diazinon and chlorpyrifos, and methylmercury that are managed pursuant to Provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f, persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:

C.1.a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable (WQS), the Permittee(s) shall notify, within no more than 30 days, and thereafter submit a report to the Water Board that describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

C.1.b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring

exceedances of the same receiving water limitations unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. Task Description – Asphalt/Concrete Removal, Cutting, Installation, and Repair

The Permittees shall implement appropriate BMPs, such as those described in the California Stormwater Quality Association (CASQA) Municipal Stormwater BMP Handbook and Construction Stormwater BMP Handbook, at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving, repair, or maintenance activities.

ii. Implementation Levels

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if wastewater generated from road construction, repair, and maintenance activities may be discharged to the sanitary sewer system, provided appropriate approvals are obtained and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from work sites upon completion of work. The Permittees shall require cleanup of all construction debris, spills, and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association (BASMAA) Blueprint for a Clean Bay or the CASQA Municipal Stormwater BMP Handbook.

iii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. Task Description – The Permittees shall implement and require to be implemented BMPs that prevent the discharge of polluted wash water and non- stormwater to storm drains from pavement, sidewalk and plaza cleaning, mobile cleaning, outdoor pressure washing operations, and washing down of trash areas and gas station or mobile fueling service areas. BMPs for washing down outside areas of human habitation shall include sanitizing procedures. The Permittees shall implement BMPs such as those included in the BASMAA Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. Task Description

(1) The Permittees shall implement appropriate BMPs to prevent the discharge of polluted stormwater and non-stormwater from bridges and structural maintenance activities directly into surface waters or storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. Implementation Levels

(1) The Permittees shall prevent all debris and pollutants, including structural materials and coating debris, such as paint chips, generated in bridge and structure maintenance or graffiti removal, from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks, or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste, or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall use proper disposal methods for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts the proper capture and disposal methods for the wastes generated.

iii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.d. Stormwater Pump Stations

i. Task Description –The Permittees shall implement measures to operate, inspect, and maintain stormwater pump stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in stormwater discharges to comply with WQS.

ii. Implementation Levels – The Permittees shall comply with the following at Permittee-owned or -operated pump stations:

(1) Upon becoming aware that the discharge from a pump station has a dissolved oxygen (DO) concentration below 3.0 mg/L, implement corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 milligrams per liter (mg/L) and verify the effectiveness of the corrective actions with monitoring. Corrective actions are not necessary for discharges from pump stations that remain in the stormwater collection system or infiltrate into a dry creek immediately downstream.

(2) Ensure that pump stations are free of debris and trash, replace any oil-absorbent booms, as needed, and investigate and abate illicit discharges. Pump stations excluded from C.2.d.ii.(1) above are not excluded from this requirement.

(3) The Permittees shall maintain records of inspection, maintenance, implementation of corrective actions, and any monitoring records at Permittee-owned or -operated pump stations. These records shall be made available to Water Board staff or its representatives during inspections and audits, or otherwise upon request.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance

For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing, or open space uses. Rural roads include paved, unpaved, utility, and access roads in rural areas. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, such as those in the CASQA Construction Stormwater BMP Handbook, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Wildlife (CDFW), and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

San Mateo County has additional rural road requirements for the Pescadero-Butano Sediment TMDL described in Provision C.18 and shall also implement that provision.

ii. Implementation Level

(1) The Permittees shall continue to implement erosion and sediment control BMPs, in addition to those described in Provision C.2.a, during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities.

(2) The Permittees shall implement appropriate BMPs to minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities by:

(a) Selecting road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identifying and prioritizing rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Constructing roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Implementing an inspection program to maintain rural roads' structural integrity and prevent impacts to water quality;

(e) Maintaining rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, and address excessive erosion;

(f) Re-grading unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacing existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall incorporate information about the importance of planning and construction in avoiding water quality impacts into existing training and guidance on permitting requirements for rural public works activities.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for rural public works construction and maintenance activities, including reporting on increased maintenance in priority areas, in the Annual Report.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle and heavy equipment maintenance yards and parking areas, and material storage facilities, to comply with water quality standards. Each SWPPP shall incorporate all appropriate BMPs, such as those described in the current versions of the CASQA Municipal Stormwater BMP Handbook or the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, and addenda, as applicable.

(2) The requirements in this provision shall apply only to facilities that are not covered under the State Water Board's Industrial Stormwater NPDES General Permit.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters from street sweepers, vactor trucks, or other related equipment. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that non-stormwater discharges are not entering the storm drain system and that pollutant discharges are prevented to the maximum extent practicable. At a minimum, each corporation yard shall be fully inspected each year between August 1 and September 30. Permittees shall cease or cause to be ceased any active non-stormwater discharges immediately after they are discovered. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency. In areas where a sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to an alternative sanitary sewer connection or municipal wastewater treatment plant, or implement appropriate BMPs to collect, properly treat, and reuse wash water onsite without any discharge.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where a sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting

(1) In each Annual Report, Permittees shall list activities conducted in the corporation yards that have BMPs in the site-specific SWPPP, the date(s) of inspections, the results of inspections, and any follow-up actions, including the date of any necessary corrective actions implemented. The information may be reported in a narrative or tabular format.

(2) In the 2023 Annual Report, Permittees shall make their corporation yard SWPPPs available to the Water Board by providing links to online documents or submitting the documents as part of the Annual Report.

C.2.g. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as “No dumping, drains to Bay” or equivalent. For newly approved, privately maintained streets, Permittees shall require storm drain inlet markings with an appropriate stormwater pollution prevention message by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings on the storm drain inlets shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain storm drain inlet markings of at least 80 percent of municipality-maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Storm drain inlet markings of newly developed, privately maintained streets shall be verified prior to acceptance of the project. Permittees shall require maintenance of the storm drain inlet markings through the development maintenance entity.

(3) Certify that all privately maintained streets had storm drain inlet markings verified prior to acceptance of the project and were required to maintain the storm drain inlet markings through the development maintenance entity.

iii. **Reporting** – In the 2026 Annual Report, each Permittee shall (1) state how many municipally-maintained storm drain inlets it has, (2) certify that at least 80 percent of municipality-maintained storm drain inlet markings are legibly labeled with an appropriate stormwater pollution prevention message during the permit term; and (3) include a picture of a labeled municipality-maintained inlet.

C.2.h. Staff Training

i. **Task Description** – Permittees shall ensure municipal maintenance staff conducting routine repair and maintenance activities of municipal facilities and infrastructure, or activities related to the implementation of corporation yard SWPPPs, are appropriately trained on the requirements of Provision C.2 and methods of implementation. Trainings may be program-wide, region-wide, or Permittee-specific.

ii. **Implementation Level** – At a minimum, provide training at least once within the 5-year term of this Permit to municipal staff on the following topics as relevant to municipal staff responsible for maintenance activities:

(1) Stormwater pollution prevention;

(2) Appropriate BMPs for maintenance and cleanup activities;

(3) Street and Road Repair and Maintenance BMPs;

(4) Sidewalk/Plaza Maintenance and Pavement Washing;

(5) Bridge and Structure Maintenance and Graffiti Removal;

(6) Corporation Yard SWPPPs and BMPs; and

(7) Spill and discharge response and notification procedures and contacts.

iii. **Reporting** – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Total number of Permittee maintenance staff;

(4) Number and percentage of Permittee maintenance staff who attended training;

(5) If there was no training in a given year, so state.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and significant redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. **Task Description** – At a minimum, each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; and protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable

review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain inlet stenciling.
- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs, such as ReScape California.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:
    - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
    - Dumpster drips from covered trash and food compactor enclosures.
    - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
    - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
    - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the ReScape California Guidelines).

ii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1) - (8) in the 2023 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and

stormwater treatment onsite or at a joint stormwater treatment facility[1] in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked. For Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

(1) Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d. under a previous MS4 permit is exempt from the requirements of Provision C.3.c. (low impact development requirements).

(2) Any Regulated Project that was approved with no Provision C.3. stormwater treatment requirements under a previous MS4 permit and that has not begun construction by the effective date of this Permit, shall be required to fully comply with the requirements of Provisions C.3.c. and C.3.d. Permittees may grant exemptions from this requirement as follows:

    (a) An exemption may be granted to:

        (i) Any Regulated Project that was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the ordinances, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law.

        (ii) Any Regulated Project for which the Permittee has no legal authority to require changes to previously granted approvals, such as projects that have been granted building permits.

    (b) An exemption from the LID requirements of Provision C.3.c. may be granted to any such Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.

(3) Any pending Regulated Project that has not yet been approved as of June 30, 2023, and for which a Permittee has no legal authority to require new requirements under Government Code sections 66474.2 or 65589.5., subd. (o), is subject to the Provision C.3 requirements in effect on the Permit's effective date.

[1] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects.

ii. Regulated Projects are defined in the following categories:

(1) Special Land Use Categories

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee, including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the project:[2]

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv):

(i) The following interior and exterior practices are excluded:

a. Interior remodels; and

b. Routine maintenance or repair such as roof or exterior wall surface replacement.

(ii) The following pavement maintenance practices are excluded;

a. Pothole and square cut patching;

b. Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage;

[2] This does not include separate additional portions of the public right of way that Permittees require treatment of, which the Regulated Project is not disturbing. This is typically enforced through local ordinance, such as what is described in Provision C.3.j.ii.(2)(j).

c. Shoulder grading;

d. Reshaping/regrading drainage systems;

e. Crack sealing;

f. Pavement preservation activities that do not expand the road prism;

g. Upgrading from a bituminous surface treatment (e.g., chip seal)[3] with an overlay of asphalt or concrete, without expanding the area of coverage;[4]

h. Applying a bituminous surface treatment to existing asphalt or concrete pavement, without expanding the area of coverage; and

i. Vegetation maintenance.

j. Layering gravel over an existing gravel road, without expanding the area of coverage.

(iii) The following pavement maintenance practices are not excluded. For Road Reconstruction Projects, these practices are included only if they trigger <u>all</u> criteria specified in Provision C.3.b.ii.(5), including the criteria regarding contiguousness.

a. Removing and replacing an asphalt or concrete pavement to the top of the base course[5] or lower, or repairing the pavement base (including repair of the pavement base in preparation for bituminous surface treatment, such as chip seal), as these are considered replaced impervious surfaces;

b. Extending the pavement edge without increasing the size of the road prism, or paving graveled shoulders, as these are considered new impervious surfaces; and

c. Resurfacing by upgrading from dirt to gravel, to a bituminous surface treatment (e.g., chip seal),[3] to asphalt, or to concrete; or upgrading from gravel to a bituminous surface treatment, to asphalt, or to concrete, as these are considered new impervious surfaces.

[3] This is defined further in the Glossary

[4] This includes wedge grinding that is implemented as part of the upgrade project, so long as the area of coverage is not expanded. See definition of wedge grinding in Glossary.

[5] See definition in Glossary.

(iv) For a project consisting of a combination of exempted pavement maintenance practices (pursuant to Provision C.3.b.ii.(1)(b)(ii)), non-exempted pavement maintenance practices (pursuant to Provision C.3.b.ii.(1)(b)(iii)), and/or practices that fall under any other Regulated Project category (pursuant to Provision C.3.b.ii.(1)-(6)), the parts of the project that are not exempt shall be evaluated as a Regulated Project.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(e) The calculations in Provision C.3.b.ii.(1)(c)-(d) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(2) Other Development Projects

New development projects that create 5,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects (other than public road projects), including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the projects.[2] This category includes development projects on public or private land that fall under the planning and building authority of a Permittee.

(3) Other Redevelopment Projects

Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, new and reconstructed private roads and private trails, and public projects (other than public road and trail projects),[6] including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the projects.[2] Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions that apply to this category are listed in Provision C.3.b.ii.(1)(b). Public works projects that are additionally excluded from this category – unless they create and/or replace 5,000 contiguous[8] square feet or more of impervious surface – include the following examples: sidewalk gap closures,[7] sidewalk section replacement, and ADA curb ramps. However, as noted above, portions of the public right of way that are developed or redeveloped as part of Regulated Projects (e.g., curb extensions, pavement replacement, and curb and gutter replacement) shall be included in the total created and/or replaced impervious surface that must be treated by those Regulated Projects.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in

[6] Examples of such public projects are construction/reconstruction of: streetlights, signals, and signs; curb extensions, sidewalks, and medians; crosswalk enhancements, bulb-outs, curb ramps, and ADA improvements; and sidewalk extensions.

[7] The filling of gaps between sections of sidewalks, with pavement (e.g., where a block has a sidewalk, but it is not continuous because it is missing across a parcel, completing the sidewalk across that parcel).

the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(c) The calculations in Provision C.3.b.ii.(3)(a)-(b) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(4) New or Widening Road Projects

Any of the following types of road projects that create 5,000 square feet or more of newly constructed contiguous[8] impervious surface, that are both public and private road projects, and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

[8] Project areas interrupted by cross streets or intersections are considered contiguous.

(c) Construction of impervious[9] trails that are greater than or equal to 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

(i) Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.

(ii) Bicycle lanes built as part of new streets or roads, but that are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.

(iii) Impervious trails that direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area.

(iv) Sidewalks, bicycle lanes, or trails constructed as pervious pavement systems.[10]

(v) Caltrans highway projects and associated facilities.

(5) Road Reconstruction Projects

Road projects that involve the reconstruction of existing streets or roads,[11] which create and/or replace greater than or equal to one contiguous[8] acre of impervious surface and that are public road projects and/or fall under the building and planning authority of a Permittee, including sidewalks and bicycle lanes that are built or rebuilt as part of the existing streets or roads. This Regulated Project category includes utility trenching projects which are - on average, over the entire length of the project - greater than or equal to 8 feet wide. It also includes public pavement maintenance practices listed in Provision C.3.b.ii.(1)(b)(iii)(b).

Project activities that are included and excluded, which apply to this category, are listed in Provision C.3.b.ii.(1)(b)(ii)-(iv). Pavement maintenance practices that are not excluded (as detailed in Provision C.3.b.ii.(1)(b)(iii)) are considered Road Reconstruction Projects if they meet the other definitions therein.

[9] Gravel layers are considered impervious, excluding gravel layers that are included in pervious pavement systems (as defined in the Glossary).

[10] As defined in the Glossary.

[11] The definition of roads includes roads on levees.

(a) Where the reconstruction project results in an alteration of greater than or equal to 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that was reconstructed).

(b) Where the reconstruction project results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new and/or replaced impervious surface within the project footprint). However, if the stormwater runoff from the existing impervious surface and the added impervious surface cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added impervious surface.

(c) Road Reconstruction Projects shall comply with Provision C.3.d. However, with cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the Provision C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019, to size Road Reconstruction Projects. If so, Permittees must comply with the Water Board's June 21, 2019, conditional approval of that submittal, which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used.

(d) Permittees may credit the acreage of impervious surface created or replaced for Road Reconstruction Projects towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

(6) Large Detached Single-Family Home Projects

Detached single-family home projects that create and/or replace 10,000 ft^2 or more of impervious surface (collectively over the entire project site) and are not part of a larger development or redevelopment plan regulated under Provision C.3.b.ii.(2)-(3).

(a) Where a single family home project results in an alteration of **50 percent or more** of the impervious surface of a previously existing project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire project).

(b) Where a single family home project results in an alteration **of less than 50 percent** of the impervious surface of a previously existing project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(c) The calculations in Provision C.3.b.ii.(6)(a)-(b) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(d) Included in this Regulated Project category is the addition of an accessory dwelling unit (ADU) on an existing parcel with one single-family home, without a subdivision.

iii. Implementation Level

(1) Provision C.3.b.i shall be effective immediately.

(2) Beginning July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii are effective.

(3) Prior to July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii in Attachment I are effective, which are definitions from the Previous Permit.

(4) For Provisions C.3.b.iii.(1)-(3), this shall include a database or equivalent tabular format that contains all the information under Reporting (Provision C.3.b.iv.).

iv. Reporting

(1) C.3.b.i.(2) Reporting

In the 2023 Annual Report, each Permittee shall provide a complete list of the development projects that are subject to the requirements of Provision C.3.b.i.(2). For each such project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). If a Permittee has no projects subject to Provision C.3.b.i.(2), it shall so state in the 2023 Annual Report.

(2) Annual Reporting – C.3.b.ii. Regulated Projects

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the Provision C.3.b. Sample Reporting Table included in Attachment B):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date), and whether the project has been completed. If not, the estimated project completion date;

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project;

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

(i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.iv.(2)(a) – (l) for the offsite project; and

(ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.iv.(2)(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g) – If not required, state why not. If required, state control method used.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

i. Task Description – The Permittees shall, at a minimum, implement the following LID requirements:

(1) Source Control Requirements

Require all Regulated Projects to implement source control measures onsite that, at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste, and compactor enclosures;

- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) Site Design and Stormwater Treatment Requirements

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.

- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with pervious pavement systems.[12]
- Construct driveways, bike lanes, and/or uncovered parking lots with pervious pavement systems.

(b) Permittees shall implement the design specifications for pervious pavement systems contained within their countywide stormwater handbooks.

(c) Require each Regulated Project and all projects implemented pursuant to Provision C.3.j to treat 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's or Provision C.3.j project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment.

(ii) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour, and maximize infiltration to the native soil during the life of the Regulated Project. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in the Revised Model Biotreatment Soil Media Specifications submitted by BASMAA on behalf of the Permittees on February 5, 2016, and approved on April 18, 2016, pursuant to the requirements of Provision C.3.c.i.(2)(c)(ii) of MRP 2. Permittees may collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the soil media minimum specifications, subject to the Executive Officer's approval.

a. The Permittees may convene a workgroup with Water Board staff to discuss and investigate the pollutant removal

[12] Pervious pavement systems include pervious asphalt, pervious concrete, pervious pavers, and grid pavers, and are defined in the Glossary.

effectiveness and hydrologic equivalency of – and suggested criteria for – high flow-rate media treatment systems in combination with retention/detention measures, such as silva cells and structural soils, as compared to conventional bioretention. The workgroup should consider issues including: the MEP standard in relation to the use of such systems; the pollutant removal benefits and hydrologic criteria associated with the Permit's LID design approach and which are included in other MS4 permits, such as the Western Washington Phase II Municipal Stormwater Permit (NPDES Permit No. WAR045717) and the Los Angeles Regional MS4 Permit (NPDES Permit No. CAS004004); and additional issues, such as the feasibility of obtaining high flow rate media at construction and, as needed, for the life of a project.

(iii) Alternative Treatment Systems

Permittees may allow a Regulated Project to comply with the Provision C.3.d design volume and/or flow requirement for the approved portion (Approved Portion)[13] using an alternative treatment system (i.e., onsite non-LID treatment systems (e.g., media filters) in combination with systems providing flow control benefit), as follows:

a. Alternative treatment systems may be implemented in the following two geographic areas, as identified in a Countywide Hydromodification Applicability Map accepted by the Executive Officer:

1. Areas draining to channels that are hardened continuously from the point of discharge into the channel to San Francisco Bay or to the Pacific Ocean; and

2. Areas draining directly into the Bay, the Ocean, or channels that are tidally influenced at the point of discharge into the channel.

Before a Permittee may implement alternative treatment systems, the Permittee shall, among other requirements in this Provision C.3.c.i.(2)(c)(iii), re-submit the applicable portions of its respective Countywide Hydromodification Applicability Map to accurately identify the two geographic areas described above and the resubmitted applicable

[13] The Approved Portion is the portion of the Provision C.3.d design volume/flow that may be treated using non-LID treatment measures, as substantiated in the Demonstration of Technical Infeasibility and Demonstration of Commensurate Benefit that have been approved by the Executive Officer.

portions of the map must be accepted by the Executive Officer as accurate.

b. Alternative treatment systems in the two geographic areas listed in Provision C.3.c.i.(2)(c)(iii)a must have an active General Use Level Designation certification for Enhanced Treatment from the Washington State Department of Ecology's Technology Assessment Protocol – Ecology (TAPE) Program.[14]

c. Implementation of alternative treatment systems requires a Demonstration of Technical Infeasibility[15] that has been submitted by the Permittee to the Water Board and approved by the Executive Officer for each Regulated Project where an alternative treatment system is proposed. Permittees shall include the following documentation in the Demonstration of Technical Infeasibility:

1. The technical constraints (spatial, utility, or other) to treating 100 percent of the Provision C.3.d design volume and/or flow onsite and offsite using LID and that the Regulated Project maximizes LID treatment within those constraints. This must include an assessment of the technical feasibility of incorporating all potential types and configurations of LID, including, but not limited to, the following: runoff capture and use, suspended pavement systems with the approved biotreatment soil media (e.g., Silva cells), bioretention, green roofs, pervious pavement systems, and infiltration galleries.

   For onsite technical infeasibility, a demonstration that the Regulated Project will implement LID in or on all potential or actual onsite landscaping opportunities[16] and that there are no potential or actual onsite landscaping opportunities in or on which LID will not be implemented.

[14] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

[15] Examples for the Demonstrations of Technical Infeasibility and Commensurate Benefit are provided in the Fact Sheet.

[16] Landscaping opportunities include, but are not limited to: roofs, terraces, patios, courtyards, plazas, quadrangles, athletics areas, outdoor pool areas, playgrounds, parks, bike-separation strips, and adjacent public sidewalks, roads, and rights of way (ROWs).

For offsite technical infeasibility, demonstration that there are no opportunities to implement[17] an equivalent amount of LID in the adjacent or nearby public right of way (ROW) for the Regulated Project; elsewhere in the Permittee's jurisdiction (including opportunities identified in the Permittee's GI Plan); and elsewhere in the same county (including opportunities identified in the GI Plans of other Permittees in the county).

2. How LID was considered by both the project proponent and by the Permittee from the early stages of the project's planning and entitlement processes and how that resulted in the project's final design.

d. Implementation of alternative treatment systems requires a Demonstration of Commensurate Benefit[15] that has been submitted by the Permittee to the Water Board and approved by the Executive Officer for each Regulated Project where an alternative treatment system is proposed. Permittees shall include the following documentation in the Demonstration of Commensurate Benefit:

1. That the alternative treatment system includes TAPE-certified (pursuant to Provision C.3.c.i.(2)(c)(iii)(b)) treatment controls sized to accommodate the Provision C.3.d design volume and/or flow.

2. That the alternative treatment system includes flow controls that, based on monitoring and/or field studies, provide flow control benefit commensurate to the flow control benefit of LID measures had they been implemented for the project.

   At a minimum, this shall include consideration of vertical infiltration into soils (including soils with low infiltration rates), horizontal infiltration, evapotranspiration, and the effect of inter-event periods on antecedent soil conditions. In places where infiltration is not allowed because of permanent high groundwater (i.e., less than 10 feet below the surface) or documented existing significant soil and groundwater contamination, flow control benefits may be compared to those from lined bioretention cells.

[17] "Implement" in this paragraph is defined to include not only direct implementation by the project proponent, but also indirect implementation via contribution of funding and/or resources to another entity which will construct and/or maintain an equivalent amount of LID.

e. Implementation – Permittees may implement Provision C.3.c.i.(2)(c)(iii) after they have collectively submitted a Regional Guidance Document to facilitate Permittees' compliance with the Demonstration of Technical Infeasibility and with the Demonstration of Commensurate Benefit and the Executive Officer has approved the Regional Guidance Document.

At a minimum, the Permittees shall include the following in the Regional Guidance Document:

1. Regional guidance to ensure that Permittees and projects seeking to use alternative treatment systems comply with the requirements for the Demonstrations of Technical Infeasibility and Commensurate Benefit set forth in Provisions C.3.c.i.(2)(c)(iii)c-d;
2. Review of data from monitoring and/or field studies, and guidance on the use of that data sufficient to demonstrate commensurate benefit;
3. Guidance on how the Demonstrations of Technical Infeasibility and Commensurate Benefit apply to different types of projects; and
4. How Permittees will incorporate assessment of technical infeasibility and commensurate benefit into the early stages of their municipal planning processes.

If the Permittees choose to submit a Regional Guidance Document, they must do so on or before the deadline set forth in Provision C.3.c.i.(2)(c)(iii)f.2. The Regional Guidance Document is subject to the approval of the Executive Officer. If the Executive Officer determines that the Regional Guidance Document is sufficiently detailed to enable Permittee review of Demonstrations of Technical Infeasibility and Commensurate Benefits for Regulated Projects on a consistent, objective, and rigorous basis, the Executive Officer may, in the approval of the Regional Guidance Document, allow Permittee approval of the Demonstration of Technical Infeasibility and of the Demonstration of Commensurate Benefit for Regulated Projects in lieu of the requirement for Executive Officer approval of both demonstrations, contingent on Permittees implementing the approved Regional Guidance Document for those Regulated Projects.

f. Reporting

1. In each Annual Report, Permittees shall provide the following information for each Regulated Project that is implementing Provision C.3.c.i.(2)(c)(iii): the final percentage of LID treatment and non-LID treatment and all other information reported for Regulated Projects pursuant to Provision C.3.b.iv.

2. If the Permittees choose to submit the Regional Guidance Document—which is a prerequisite to their implementation of Provision C.3.c.i.(2)(c)(iii)—it shall be submitted no later than with the 2025 Annual Reports.

(iv) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. Permittees shall ensure that green roofs installed at Regulated Projects meet the following minimum specifications:

a. The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).

b. The green roof system planting media shall be sufficiently deep to support the long-term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(d) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(c) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Reporting

(1) For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.iv, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects and for projects implemented pursuant to Provision C.3.j meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flow rate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.iv.(2).

iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects and for all projects implemented pursuant to Provision C.3.j, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project and for any project implemented pursuant to Provision C.3.j that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with

hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

iv. Tree Runoff Reduction and Tree-Based Stormwater Treatment Systems

(1) The Permittees collectively may submit a proposal, subject to the Executive Officer's approval, which evaluates the benefit and associated criteria of runoff reduction associated with trees with respect to treatment control sizing, which evaluates and includes as appropriate the findings of the Healthy Watersheds, Resilient Baylands project,[18] and which will be considered for incorporation into a subsequent Permit. Such a proposal shall characterize the multiple benefits of green infrastructure beyond standard designs (e.g., urban forestry), develop recommendations for Permittees to achieve the benefits (e.g., beneficial modifications to GI designs, guidelines for coordinating with work such as stream restoration, parks and urban forestry), and suggest opportunities to modify Provision C.3 language in a future Permit to better recognize broader benefits.

The proposal may include treatment control sizing and design criteria for tree-based stormwater treatment systems in combination with systems that provide additional hydrologic benefit (such as structural soils, suspended pavement systems, or other methods to provide tree rooting volume), which provide water quality and hydrologic benefit equivalent to bioretention.

(2) Tree Interceptor Credits, as described in the 2011 BASMAA Feasibility/Infeasibility Criteria Report submitted pursuant to Provision C.3.c.i.(2)(b)(iv) of MRP 1, shall not be used to reduce the stormwater treatment required pursuant to Provision C.3.

v. Reporting

(1) If the Permittees collectively submit a proposal pursuant to Provision C.3.d.iv, the proposal shall be submitted by no later than with the 2025 Annual Report.

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

[18] The San Francisco Estuary Partnership (SFEP) and Association of Bay Area Governments (ABAG) along with several other partners (including Water Board staff) secured a U.S. EPA Water Quality Improvement Fund (WQIF) grant to pursue the Healthy Watersheds, Resilient Baylands project, which in part investigates the stormwater treatment benefit provided by trees within the urban landscape.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.b in accordance with one of the two options listed below:

(1) Option 1: LID Treatment at an Offsite Location

Treat a portion (this portion may be zero; Permittees should treat as much onsite as possible) of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an Offsite Project[19] in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provisions C.3.d and C.3.g, as appropriate) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) Option 2: Payment of In-Lieu Fees

Treat a portion (this portion may be zero; Permittees should treat as much onsite as possible) of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[20] to treat the remaining portion of the Provision C.3.d runoff (and comply with Provision C.3.g, as appropriate) with LID treatment measures at a Regional Project[21] or Offsite Project. The Regional Project must achieve a net environmental benefit, through a net increase in impervious surface treated, and/or a net reduction in flow and/or pollutant load.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above (Options 1 and 2), all Offsite Projects and Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of an Offsite Project or Regional Project may be extended, up to five years after the

[19] **Offsite Project** – A stormwater treatment facility that discharges into the same watershed as the Regulated Project and is located at a different public or private parcel or property (e.g., right-of-way) from the Regulated Project.

[20] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Offsite Project or Regional Project.

[21] **Regional Project –** A regional or municipal stormwater treatment facility that captures runoff from a drainage area larger than the parcel on which it is located and discharges into the same watershed as the Regulated Project.

completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Offsite Project or Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

(4) Reporting

(a) Annual reporting on Alternative Compliance projects shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth or high density can either reduce existing impervious surfaces or create less “accessory” impervious areas and automobile-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d for the Special Project’s drainage area that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with some

combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.v, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85 percent coverage for the entire project site by permanent structures. The remaining 15 percent portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100 percent LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1).

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85 percent coverage for the entire project site by permanent structures. The remaining 15 percent portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs[22]) for commercial development projects, in Dwelling Units[23] per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50 percent Maximum LID Treatment Reduction Credit

a. For any commercial Category B Special Project with an FAR of at least 2:1, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two

[22] **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

[23] **Dwelling Unit** – A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

types of non-LID treatment systems listed in Provision C.3.e.ii.(1).

b. For any residential Category B Special Project with a gross density[24] of at least 50 DU/Ac, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75 percent Maximum LID Treatment Reduction Credit

a. For any commercial Category B Special Project with an FAR of at least 3:1, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

b. For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed-use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100 percent Maximum LID Treatment Reduction Credit

[24] **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public rights-of-way, recreational, civic, commercial, and other non-residential uses.

a. For any commercial Category B Special Project with an FAR of at least 4:1, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

b. For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed-use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Affordable Housing)

(a) For the purposes of attributing Affordable Housing Credits, affordable housing is defined as preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the area median household income (AMI) limits adjusted for household size based on the maximum percentage of AMI for each income category, which are defined by the Federal Department of Housing and Urban Development (HUD) for affordable housing in metropolitan areas as follows: Acutely Low household incomes as 0-15 percent of AMI, Extremely Low household incomes as 16-30 percent of AMI, Very Low household incomes as 31-50 percent of AMI, Low household incomes as 51-80 percent of AMI, and Moderate household incomes as 81-120 percent of AMI.[25]

[25] Emergency homeless shelters constructed pursuant to and consistent with Government Code § 8698.4, including the definition of "homeless shelter" in subdivision (c), and that are temporary are not Regulated Projects under Provision C.3.b. As such, they are not subject to Provisions C.3.c (Low Impact Development) and C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) and shall instead comply with Provision C.3.i (Site Design Measures for Small Projects) and implement relevant best management practices developed under Provision C.17 (Discharges Associated with Unsheltered Homeless Populations). Should the homeless shelter become permanent and the impervious surfaces it created or replaced meet the thresholds for a Regulated Project, or if there is a new Regulated Project and/or Special Project at the site, the project shall comply with Provision C.3, including Provisions C.3.c and C.3.d.

To be considered a Category C Special Project, a Regulated Project must additionally meet both of the following criteria:

(i) Be primarily a residential development project,[26] and

(ii) Achieve at least a gross density of 40 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of four different types of credits that the Category C Special Project may qualify for, namely: Affordable Housing, Location, Density, and Minimized Surface Parking Credits. The total maximum LID Treatment Reduction Credit for any Category C Special Project may not exceed 100 percent.

(c) Affordable Housing Credits: A Category C Special Project may qualify for Affordable Housing Credits, according to the following criteria. The income limits that shall be used for these criteria are the most current Official State Income Limits (adjusted for household size, and specific to each county), which are defined on the California Department of Housing and Community Development's website.[27,28] All qualifying affordable housing DUs must be preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income.

In each Category C Special Project, up to three DUs that are used as building manager's DUs may be exempted from the deed restriction requirement and may be excluded from the calculations described below in Provision C.3.e.ii.(5)(c)(i)-(ii).

The following two steps shall be used to calculate Affordable Housing Credits:

(i) First, the percentage of the project's DUs in each affordability category are multiplied by the respective credit multipliers, according to the table below, and rounded to the nearest whole number.

AMI	Credit Multiplier
Moderate (≤120% of AMI)	0.20

[26] At least two-thirds of the square footage of the project must be designated for residential use.

[27] https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits

[28] As of June 6, 2023, they are: https://www.hcd.ca.gov/sites/default/files/docs/grants-and-funding/income-limits-2023.pdf

Low (≤ 80% of AMI)	1.00
Very Low (≤ 50% of AMI)	2.00
Extremely Low (≤30% of AMI)	3.00
Acutely Low (≤15% of AMI)[29]	4.00

(ii) Second, the credits generated from the table above in the first step in Provision C.3.e.ii.(5)(c)(i) are summed together to produce a weighted sum and rounded to the nearest whole number. Then Affordable Housing Credit is granted according to which weighted sum range (in the table below) that whole number (X) falls into:

Weighted Sum (whole number)	Affordable Housing Credit
X ≤ 9%	0%
10% ≤ X ≤ 20%	20%
21% ≤ X ≤ 30%	30%
31% ≤ X ≤ 40%	40%
41% ≤ X ≤ 50%	50%
51% ≤ X ≤ 60%	60%
61% ≤ X ≤ 70%	70%
71% ≤ X ≤ 80%	80%
81% ≤ X ≤ 90%	90%
91% ≤ X	100%

(d) Location Credits: To qualify for any Location Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Location Credits:

a. 5 percent Location Credit: Located within a ¼-mile radius of an existing or planned transit hub.

[29] DUs that are free to tenants, i.e., that do not charge tenants any rent/mortgage, are included in this category.

b. 10 percent Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's/Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) One hundred percent of a Category C Special Project's site must be located within the ¼-mile radius of an existing or planned transit hub to qualify for the corresponding Location Credit listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised September 2008), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(e) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits listed in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Density Credits:

a. 5 percent Density Credit: Achieve a gross density of at least 40 DU/Ac.

b. 10 percent Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 15 percent Density Credit: Achieve a gross density of at least 100 DU/Ac.

(ii) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(f) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits listed in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 5 percent Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(g) Category C Special Projects receiving final discretionary approval prior to July 1, 2022, may use the Category C Special Project criteria included in the Previous Permit.

(6) Any Regulated Project that meets the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

(3) Prior to July 1, 2023, Permittees shall implement Provision C.3.e.ii in Attachment I, which are requirements from the Previous Permit.

(4) Beginning July 1, 2023, Permittees shall implement Provision C.3.e.ii.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100 percent LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications, but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100 percent LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Total Impervious Surface Created/Replaced: The total impervious surface in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

(e) Gross Density in DU/Ac: Number of dwelling units per acre.

(f) Category C Projects: Number of DUs in each AMI Category and Number of Manager's DUs: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, Extremely Low, and Acutely Low area median household income levels specified in Provision C.3.e.ii.(5)(c), and the number of Manager's DUs (up to 3).

(g) Density in FAR: Floor Area Ratio.

(h) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(i) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits applied.

(j) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(k) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. **Task Description** – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third-party reviewer must be a Civil Engineer, or a Licensed Architect or

Landscape Architect registered in the State of California or staff of another Permittee subject to the requirements of this Permit.

ii. **Implementation Level** – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, CASQA, or the equivalent, may be considered qualifying training.

iii. **Reporting** – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. **Hydromodification Management (HM) Projects** are Regulated Projects that create and/or replace one acre or more of impervious surface except where one of the following applies.

(1) The post-project impervious surface area is less than, or the same as, the pre-project impervious surface area.

(2) The project is located in a catchment that drains to a hardened (e.g., continuously lined with concrete) engineered channel or channels or enclosed pipes, which extend continuously to the Bay, Delta, or flow-controlled reservoir, or, in a catchment that drains to channels that are tidally influenced.

(3) The project is located in a catchment or subwatershed that is highly developed (i.e., that is 70 percent or more impervious).[30]

[30] The Permittees' maps accepted for Order No. R2-2009-0074 were prepared using this standard, adjusted to 65 percent imperviousness to account for the presence of vegetation on the photographic references used to determine imperviousness. Thus, the maps for Order No. R2-2009-0074 are accepted as meeting the 70 percent requirement.

All HM Projects shall meet the HM Standard of either Provision C.3.g.ii or Provision C.3.g.iii.

The Hydromodification Applicability Maps developed by the Permittees in the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Programs, and the City of Vallejo, under Order No. R2-2009-0074 remain in effect and are provided in Attachment C to this Permit.

Permittees that do not have the location-based applicability criteria (Provision C.3.g.i.(2) – (3)) shown on existing maps shall develop, or cause to be developed, new maps, overlays to existing maps, or other equivalent information that demonstrates whether a project falls under one of those two criteria (whether or not areas are subject to HM requirements). Such maps, overlays, or other equivalent information shall be acceptable to the Executive Officer and shall not be effective until accepted by the Executive Officer.

ii. HM Standard

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, and the City of Vallejo, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[31] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow.

[31] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include U.S. EPA's Hydrologic Simulation Program—Fortran (HSPF), the U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and U.S. EPA's Storm Water Management Model (SWMM).

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

(3) **Standard HM Modeling:** Permittees shall use, or shall cause to be used, a continuous simulation hydrologic computer model to simulate pre-project and post-project runoff, or sizing factors or charts developed using such a model, to design onsite or regional HM controls. The Permittees shall compare, or shall cause to be compared, the pre-project and post-project model output for a long-term rainfall record and shall show that applicable performance criteria in Provision C.3.g.ii.(1)-(3) are met. HM controls designed using the Bay Area Hydrology Model (BAHM) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual. Modifications to the BAHM shall be acceptable to the Executive Officer, shall be consistent with the requirements of this Provision, and shall be reported as required below:

- **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.
- **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

iii. HM Standard – Direct Simulation of Erosion Potential

HM control shall be achieved by maintaining the erosion potential in receiving streams at a value of equal to or less than 1.0. In order to use the Provision C.3.g.iii HM Standard – Direct Simulation of Erosion Potential, for their HM Projects, the CCCWP Permittees shall distinguish the range of situations present within their jurisdictions and incorporate an associated range of sizing factors for HM controls (described below in Provision C.3.g.vi.(2)) to address that range of situations, sufficient to demonstrate that appropriately-sized HM controls in those respective situations would achieve the HM Standard. The CCCWP Permittees shall submit a Technical Report describing and justifying these criteria, subject to the Executive Officer's approval.

iv. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof:

(1) **Onsite HM controls** are flow duration control structures, LID features and facilities, and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[32]

v. Implementation Level

(1) For Alameda, Santa Clara, San Mateo, and Solano Permittees, HM Projects shall meet the HM Standard in Provision C.3.g.ii immediately.

[32] In-stream control projects require a Stream Alteration Agreement from CDFW, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

(2) For CCCWP Permittees, HM Projects receiving final planning entitlements prior to Executive Officer approval of CCCWP's submittal pursuant to Provisions C.3.g.iii and C.3.g.vi.(2) shall use the methods and criteria specified in CCCWP's Stormwater C.3 Guidebook, 7th Edition (2017), or most current version. Subsequent to Executive Officer approval of CCCWP's submittal pursuant to Provisions C.3.g.iii and C.3.g.vi.(2), HM Projects shall use the methods and criteria specified (and/or acknowledged and approved) in the Executive Officer's approval or conditional approval of that submittal; CCCWP Permittees may alternatively implement the HM Standard in Provision C.3.g.ii.

vi. Reporting

(1) New HM Applicability Maps or equivalent information prepared pursuant to Provision C.3.g.i, for those Permittees who do not have an approved Map, shall be submitted, acceptable to the Executive Officer, not later than with the 2023 Annual Report.

(2) With the 2023 Annual Report, the CCCWP Permittees shall submit a Technical Report subject to the Executive Officer's approval, consisting of a HM Management Plan describing how the CCCW Permittees will implement the HM Standard specified in Provision C.3.g.iii. The Technical Report shall include:

(a) A complete suite of sizing factors – for each type of HM control that may be used in the County – that is protective of all likely site and watershed characteristics, for sites with soils in Hydrologic Soil Groups (HSG) A, B, C, and D, with equations for adjustments to the sizing factors based on geographic differences (including, but not limited to, annual rainfall intensity and frequency, land use, and other hydrologic characteristics), based on the methods and criteria in the CCCWP Hydromodification Technical Report (September 29, 2017), and pursuant to the recommendations provided in the Water Board's Response to CCCWP's Hydromodification Management Memo of November 4, 2020 (March 19, 2021). The complete suite of sizing factors shall ensure each type of HM control achieves the Provision C.3.g.iii HM Standard.

For the complete suite of sizing factors, the base case sizing factor for HM controls at sites with HSG D soils shall be 6.5 percent.[33]

[33] This is a conservative value, based on sites with project-scale built-out imperviousness in the upper watershed for the Lower Control Threshold of 0.1Q2, for soil percolation rates of 0.024 inches per hour, as presented in Table 5-7 on page 58 of the CCCWP Hydromodification Technical Report (September 29, 2017).

(b) The Technical Report may optionally identify geographic areas or criteria for site-by-site determination, where the use of the prescribed methods, criteria, and suite of sizing factors may result in HM Projects failing to comply with the Provision C.3.g.iii HM Standard. For those areas, the Technical Report shall propose additional onsite mitigation measures, which when implemented in addition to the complete suite of sizing factors specified in Provision C.3.g.vi.(2)(a), ensure that HM controls achieve the Provision C.3.g.iii HM Standard.

The additional onsite mitigation measures include, but are not limited to: site grading to produce self-retaining areas, specific guidance on augmentation of HM control design (e.g., increasing the size of the storage layer), and increases to the HM control sizing factors.

The additional mitigation measures shall not include: reliance on land development restrictions, or on open space preservation, or on the presence of existing or future HM and LID controls located elsewhere within the catchment.

The Technical Report may additionally propose alternative or supplemental methods of compliance with the Provision C.3.g.iii HM Standard, including any combination of: undersized onsite HM controls, additional new HM controls located offsite within the same catchment as the receiving stream, and in-stream controls (e.g., as described in SCVURPPP's 2005 Hydromodification Management Plan Final Report), which when implemented together achieve the Provision C.3.g.iii HM Standard.

(3) Reporting of HM projects shall be as described in Provision C.3.b.

(4) Permittees allowing the use of BAHM shall report collectively, with each Annual Report, a listing, summary, and date of modifications made to the BAHM, including the technical rationale. This shall be prepared at the countywide program level and submitted on behalf of participating Permittees.

(5) In addition, for each HM Project approved during the reporting period, Permittees shall collect and make available the following information. Information shall be reported electronically, and, where appropriate, in tabular form.

- Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control(s);
- Method used by the project proponent to design and size the device or method used to meet the HM Standard;

- Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;
- For projects using standard sizing charts, a summary of sizing calculations used;
- For projects using the BAHM, a listing of model inputs; and
- For projects using custom modeling, a summary of the modeling calculations with a corresponding graph showing curve matching (existing, post-project, and post-project-with HM controls curves).

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. **Task Description** – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. **Implementation Level** – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects and for all projects implemented pursuant to Provision C.3.j that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the operation and maintenance of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the operation and maintenance of the pervious pavement system(s) (if any), onsite, joint, and/or offsite installed stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the operation and maintenance responsibility for the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing operation and maintenance inspections of the installed pervious pavement system(s) (if any), stormwater treatment system(s) and HM control(s) (if any).

(4) A database or equivalent tabular format of the following:

(a) All pervious pavement system(s) that total 3,000 square feet or more installed at Regulated Projects, offsite, or at a Regional Project. The total square footage should not include pervious pavement systems installed as private-use patios for single family homes, townhomes, or condominiums.

(b) All stormwater treatment systems installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(c) All HM controls installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(5) The database or equivalent tabular format required in Provision C.3.h.ii.(4) shall include the following information for each Regulated Project, offsite project, and Regional Project, and shall be made available to Water Board staff upon request:

(a) Name and address of the project;

(b) Names of the owner(s) and responsible operator(s) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and/or HM control(s);

(c) Specific description of the location (or a map showing the location) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and HM control(s) (if any);

(d) Date(s) that the pervious pavement system(s) (if any), stormwater treatment system(s), and HM controls (if any) was/were installed;

(e) Description of the type and size of the pervious pavement systems (if any), stormwater treatment system(s), and HM control(s) (if any) installed;

(f) Detailed information on operation and maintenance inspections. For each inspection, include the following:

(i) Date of inspection.

(ii) Type of inspection (e.g., installation, annual, followup, spot).

(iii) Type(s) of pervious pavement systems inspected (e.g., pervious concrete, pervious asphalt, pervious pavers).

(iv) Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well) and an indication of whether the treatment system is an onsite, joint, or offsite system.

(v) Type of HM controls inspected.

(vi) Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation or maintenance, maintenance required immediately).

(vii) Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, compliance schedule, administrative citation, administrative order).

(6) A prioritized O&M Inspection Plan for inspecting all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems and HM controls installed at Regulated Projects, offsite locations, and/or at joint or Regional Projects. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient.

At a minimum, the O&M Inspection Plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls (at Regulated Projects, offsite locations, and/or at joint or Regional Projects) at the completion of installation to ensure approved plans have been

followed. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(b) Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal year) of Regulated Projects, offsite projects, or Regional Projects. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(c) Inspection by the Permittee of all Regulated Projects, offsite projects, or Regional Projects at least once every five years. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; and

(d) For vault-based stormwater treatment systems, Permittees may accept 3rd party inspection reports in lieu of conducting Permittee operation and maintenance inspections only if the 3rd party inspections are conducted at least annually. Information from each 3rd party inspection shall be included in the database or tabular format required in Provision C.3.h.ii.(5) and each inspection shall be clearly identified as a 3rd party inspection.

Each 3rd party inspection report must clearly document the following:

(i) Name of 3rd party inspection company.

(ii) Date of inspection.

(iii) Condition of the treatment unit(s) at the time of inspection.

(iv) Description of maintenance activities performed during the inspection.

(v) Date- and time-stamped photographs of the inside of the vault unit(s) before and after maintenance activities.

(7) An Enforcement Response Plan (ERP) for all operation and maintenance inspections that serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. At a minimum, the ERP must contain the following:

(a) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for recognizing common problems with the different types of pervious pavement systems, stormwater treatment systems, and/or HM controls, remedies for the problems, and appropriate enforcement actions, follow-up inspections, and appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(b) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools appropriate for different field scenarios of problems identified with the pervious pavement systems, stormwater treatment systems, and/or HM controls as well as for different types of inadequate response to enforcement actions taken.

(c) Timely Correction of Identified Problems – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all identified problems with the pervious pavement systems, stormwater treatment systems, and/or HM controls.

Corrective actions shall be implemented no longer than 30 days after a problem is identified by an inspector. Corrective actions can be temporary, in which case more time may be allowed for permanent corrective actions. If more than 30 days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

iii. Due Date for Implementation: Immediate.

iv. Maintenance Approvals: The Permittees shall ensure that all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed onsite, offsite, or at a joint or Regional Project by development proponents are properly operated and maintained for the life of the projects. In cases where the responsible party for a pervious pavement system, stormwater treatment system, or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities,

but these approvals are not granted, the Permittees shall be deemed to be in compliance with Provision C.3.h. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the operation and maintenance requirements contained therein.

v. Reporting

(1) The database or equivalent tabular format required in Provisions C.3.b.ii.(4) and (5) shall be maintained by the Permittees. Upon request from the Executive Officer, information from this database or equivalent tabular format shall be submitted to Water Board staff for review. The requested information may include specific details on each inspection conducted within particular timeframes, such as several fiscal years.

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency, and include a copy of that communication with the Annual Report. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) Total number of Regulated Projects in the Permittee's database or tabular format as of the end of the reporting period (fiscal year).

(b) Total number of Regulated Projects, offsite projects, and Regional Projects inspected during the reporting period (fiscal year).

(c) Percentage of the total number of Regulated Projects that were inspected during the reporting period (fiscal year).

(d) A discussion of the inspection findings for the year and any common problems encountered with various types of pervious pavement systems, treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(e) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

C.3.i. Required Site Design Measures for Small Development and Redevelopment Projects and Smaller Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development and redevelopment projects, which create and/or replace ≧ 2,500 ft^2 to < 5,000 ft^2 of impervious surface, and detached single-family home projects,[34] which create and/or replace ≧ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[10]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[10]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. Implementation Level

(1) Beginning July 1, 2023, Permittees shall implement Provision C.3.i.

(2) Prior to July 1, 2023, Permittees shall implement Provision C.3.i in Attachment I, which are requirements from the Previous Permit.

iii. Reporting – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

C.3.j. Green Infrastructure Planning and Implementation

[34] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

i. **Task Description –** The Permittees shall continue to implement their Green Infrastructure Plans (completed during the term of the Previous Permit), as may be updated and/or supplemented to comply with this Order, for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements.

(1) The Plans are intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs and the Urban Creeks Pesticides TMDL) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

(2) Over the long term, the Plans are intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

(3) Green infrastructure project prioritization is described in the Green Infrastructure Plans based on local characteristics and priorities, and therefore green infrastructure projects will typically be designed to achieve multiple benefits in addition to mercury and PCBs load reduction. Furthermore, this Provision establishes a separate impervious surface retrofit requirement for other-than Regulated Projects.

ii. **Implementation Level**

(1) Programmatic Implementation

The Permittees shall, individually or in a coordinated manner, update and/or supplement their Green Infrastructure Plans as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned, by:

(a) Revising implementation mechanisms to include consideration, or reconsideration, of cooperation with non-municipal entities such as schools on green infrastructure implementation, and otherwise updating implementation mechanisms as appropriate.

(b) Following through with the development or updates of general plans, specific plans, urban forestry plans, climate change adaptation plans, complete streets plans and other planning documents with a green infrastructure nexus to include language which is more supportive of green infrastructure implementation, as identified by Permittees in their Green Infrastructure Plans. Upon request by Water Board staff, Permittees shall provide justifications for planning documents that they assert do not need to be updated to further support green infrastructure implementation.

(c) Developing funding and funding mechanisms identified in the Green Infrastructure Plans, such as by working with the relevant agencies to expand the scope of transportation grants to include allocation for green infrastructure; establishing green infrastructure-based or green infrastructure-incorporating stormwater fees, including work that sets the foundation for additional future stormwater fees; establishing or increasing application review fees, and evaluating other opportunities to leverage municipal approval of private development to fund green infrastructure implementation.

(d) Reviewing countywide green infrastructure implementation guidance documents and adapting them as necessary to account for local considerations if this has not already been completed during the Previous Permit term, and otherwise reviewing and updating general guidelines and standard specifications as appropriate.

(e) Continuing to implement the tools developed during the Previous Permit term to track and map completed public and private green infrastructure projects, and making the information publicly available.

(f) Continuing to adopt or amend policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this Provision, as necessary.

(g) Continuing to conduct outreach and education as follows:

    (i) Conduct public outreach on the requirements of this Provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design.

(ii) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this Provision and methods of implementation.

(iii) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on the requirements of this Provision and methods of implementation.

(2) Numeric Implementation

(a) By June 30, 2027, the Permittees shall implement, or cause to be implemented, green infrastructure projects within their jurisdictions which are not already defined as Regulated Projects pursuant to Provision C.3.b, such that the impervious surface retrofits listed in Table H-1 of Attachment H are achieved.

(b) The Permittees may meet the numeric retrofit requirements listed in Table H-1 of Attachment H on a countywide basis. If Permittees within a given county do not collectively achieve their numeric retrofit requirements, each Permittee within that county shall be separately responsible for achieving its individual retrofit requirement.

(c) Though Permittees may meet their total individual numeric retrofit requirements on a countywide basis, each Permittee shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction, where that project is not already defined as a Regulated Project pursuant to Provision C.3.b. Alternatively, a Permittee may contribute substantially to such a green infrastructure project(s) outside of its jurisdiction and within its County.

(d) Impervious surfaces treated by non-Regulated Projects may be counted towards the numeric requirements in Table H-1 of Attachment H.

Impervious surfaces treated by Regulated Projects, beyond the minimum required by Provisions C.3.c-d for such Regulated Projects, may be counted towards the numeric requirements in Table H-1 of Attachment H.

If a portion of the impervious surface treated by such a Non-Regulated Project or by Regulated Projects (beyond the minimum required by Provisions C.3.c-d for such Regulated Projects) is later used as part of an Alternative Compliance exchange to offset the treatment required by a Regulated Project pursuant to Provision C.3.e.i, then that portion

may no longer be counted towards the Provision C.3.j.ii.(2) retrofit requirements listed in Table H-1 of Attachment H.

(e) Projects completed after January 1, 2021, shall be counted towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

(f) Projects completed by June 30, 2027, shall be counted towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

If a project is not completed by June 30, 2027, it may still count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded. Permittees that count such projects towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements shall certify in their Annual Reports that the projects are approved and funded by June 30, 2027.

(g) Controls implemented to satisfy Provision C.3 requirements, including the numeric retrofit requirements specified in Provision C.3.j.ii.(2), may also be used to satisfy Provision C.11 Mercury Controls requirements, and Provision C.12 PCBs Controls requirements, as long as they satisfy the other aspects of those requirements, such as location (i.e., for PCBs, controls that are implemented in areas of old industrial land use or otherwise in areas with identified relatively high concentrations of PCBs).

(h) Permittees may credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects, specified in Provision C.3.b.ii.(5), towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

(i) Permittees with small rural jurisdictions (e.g., whose stormwater conveyance systems are dominated by roadside ditches) may collectively submit a proposal, subject to the Executive Officer's approval, for pilot projects investigating the use of alternative green infrastructure techniques to comply with the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, with construction completed by June 30, 2027. If a project is not completed by June 30, 2027, it may still count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded. Permittees that count such projects towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements shall certify in their Annual Reports that the projects are approved and funded by June 30, 2027.

The proposal shall include a discussion describing the small rural jurisdiction, including density, developed versus undeveloped areas, and piped stormwater conveyances versus roadside ditches.

(j) Permittees with existing ordinances (or that adopt new ordinances by June 30, 2023) that require Regulated Projects to treat significantly more impervious surface than the minimum required by Provision C.3.c-d, may offset their Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2) by a one-time credit of up to 25 percent, and by no greater than one acre. The claimed offset shall not reduce Permittees' Numeric Implementation retrofit requirements below 0.2 acres as specified in Provision C.3.j.ii.(2)(c).

In order to claim this offset, Permittees shall submit a report subject to Executive Officer approval estimating the benefit that will be realized by the adopted ordinance(s) in the current Permit term and the subsequent Permit terms (i.e., until June 30, 2032), as specified in Provision C.3.j.v.(5). The offset claimed shall be no greater than the benefit of the offset estimated in the report. Permittees shall not use the offset prior to Executive Officer approval of the report.

(3) **Design and Other Criteria** - Green infrastructure projects built pursuant to Provision C.3.j shall:

(a) Comply with Provision C.3.c and Provisions C.3.e-h.

(b) Comply with Provision C.3.d. With cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019, to size Non-Regulated green streets projects. If so, Permittees must comply with the Water Board's June 21, 2019, conditional approval of that submittal, which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used for Non-Regulated green streets projects.

(4) Long-Term Green Infrastructure Implementation

(a) The Permittees and their representatives may, together with Water Board staff and impartial science experts (e.g., SFEI, SFEP, U.S. EPA Region 9), collectively form a Technical Working Group (TWG) to discuss long-term green infrastructure goals and recommend long-

term percentage reductions in Permittees' impervious surfaces, at individual, countywide and regional scales. The TWG should prioritize discussion of long-term green infrastructure goals for development and redevelopment projects not already captured by Provision C.3.b, and in particular, public road and right of way reconstruction projects that are not already defined as Regulated Projects by Provision C.3.b.ii.(5). The TWG should additionally review BMPs and performance metrics, and should consider linkages to climate change impacts and resiliency.

(b) Prior to the submittal of a report containing the TWG's recommendations for long-term percentage reductions in Permittees' impervious surfaces – as prescribed by Provision C.3.j.v.(6) – the TWG should meet at a minimum biannually, and subsequent to that submittal should meet at a minimum annually.

iii. No Missed Opportunities

Each Permittee shall:

(1) Continue to maintain a list of green infrastructure projects, public and private, that are planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures.

(2) Submit the list with each Annual Report and a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

iv. Participate in Processes to Promote Green Infrastructure

(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria,

ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.

(2) In each Annual Report, Permittees shall report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

v. Tracking and Reporting Progress

(1) The Permittees shall continue to implement the existing regionally-consistent tracking and mapping tools developed pursuant to Provision C.3.j.i.(2).(d) of the Previous Permit to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met. The tracking and mapping tools shall be used by Permittees to inform issues relevant to program management, such as life cycle costs, asset management, operation and maintenance frequency, and beneficial design changes.

(a) Non-regulated green infrastructure projects built pursuant to Provision C.3.j shall be tracked and mapped in the same manner as Regulated Projects. These projects shall be reported in a separate table from Regulated Projects.

(b) The tracking and mapping tools shall include a component that is available to the public, which is advertised on individual Permittee websites and on County stormwater program websites, and as appropriate is advertised in other locations. This component must include the following basic information: a brief description of design (e.g., whether bioretention or bioswale), location, land use type, and area treated. If the tools contain additional information which has not been made available to the public such as detailed design information, incurred or planned O&M costs and O&M frequency, condition assessments, and pollutant loads treated, that information shall be made available to Water Board staff upon request.

(c) The Permittees shall certify in the 2023 Annual Reports that the tracking and mapping tools have been completed and are being implemented.

(d) In each Annual Report, Permittees shall provide summary reports on the implementation of the tracking and mapping tools and shall provide a link to the component which is available to the public.

(2) In the 2024 and 2026 Annual Reports, report on updates, addenda, and changes to their programmatic implementation, including, but not limited to, the items listed in Provision C.3.j.ii.(1).

(3) In each Annual Report, Permittees shall report on progress made towards the retrofit requirements described in Provision C.3.j.ii.(2).

(4) With the 2026 Annual Reports, Permittees shall provide a summary of lessons learned to-date with regard to Provision C.3.j.ii.(1), including topics such as operation and maintenance, sizing, infiltration and other design criteria for stormwater treatment controls, implementation of tracking and mapping tools, cooperation with non-municipal entities, regional project efforts, funding initiatives and opportunities to leverage municipal approval of private development, education and outreach, and development or updates of plan documents with a green infrastructure nexus. In the summary, Permittees shall also discuss attainment of the numeric retrofit requirements prescribed in Provision C.3.j.ii.(2).

In that summary, as applicable, Permittees shall report on how they have addressed deficiencies identified in Provision C.3.j.ii.(1).

(5) Pursuant to Provision C.3.j.ii.(2)(i), Permittees whose jurisdictions are dominated by rural areas may collectively submit a proposal, subject to the Executive Officer's approval, for the use of alternative green infrastructure techniques. This proposal shall be submitted by no later than with the 2023 Annual Reports.

(6) Each Permittee that wishes to use the one-time offset specified in Provision C.3.j.ii.(2)(j) shall submit a report estimating the benefit realized by the adopted ordinance(s) in the current Permit term, and until June 30, 2032, by no later than with the 2023 Annual Report, subject to Executive Officer approval. Permittees shall not use the offset prior to Executive Officer approval of the Report. The benefit of the estimated offset shall be no less than the offset claimed during the current Permit term.

In each Annual Report, each Permittee claiming the offset shall report on the acreage of retrofit produced by the implementation of the offset in that Fiscal Year, as well as the cumulative acreage of retrofit produced by the implementation of the offset up to that point in time during the current Permit term.

(7) By no later than with the 2025 Annual Reports, the Permittees shall collectively submit a report summarizing any TWG efforts and recommendations, as specified in Provision C.3.j.ii.(4).

(8) Pursuant to Provision C.3.j.ii.(2)(f) and Provision C.3.j.ii.(2)(i), Permittees shall certify in the 2027 Annual Report that any projects counting towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, which have not been completed by June 30, 2027, have been approved and fully funded by June 30, 2027.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Total Impervious Surface Created/ Replaced	Gross Density DU/Ac	Category C Projects: Number of DUs in each AMI Category & Number of Manager's DUs	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No.: Number of the Special Project as it appears in Table 3.1.

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Total Acreage: Total site area in acres.

Total Impervious Surface Created/Replaced: The total impervious surfaced in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

Gross Density in DU/Ac: Number of dwelling units per acre.

Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, Extremely Low, and Acutely Low area median household income levels specified in Provision C.3.e.ii.(5)(c), and the number of Manager's DUs (up to 3).

FAR: Floor Area Ratio.

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites that could reasonably be considered to cause or contribute to pollution of stormwater runoff. Permittees shall conduct inspections, effective follow-up, and enforcement to abate potential and actual non-stormwater discharges, consistent with each respective Enforcement Response Plan. These combined efforts will prevent the discharge of pollutants and impacts to beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have sufficient legal authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. **Implementation Level** – Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites that may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial facilities to address pollutant sources associated with outdoor process and manufacturing areas; outdoor material storage areas; outdoor waste storage and disposal areas; outdoor vehicle and equipment storage and maintenance areas; outdoor parking areas and access roads; outdoor wash areas, for example, areas used to wash restaurant equipment and mats,; outdoor drainage from indoor areas; rooftop equipment; vehicle fueling activities; contaminated and erodible surface areas; and other sources determined by the Permittees or the Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. **Task Description** – Permittees shall continue to update and implement an Inspection Plan that will serve as a prioritized inspection workplan. This Inspection Plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

ii. Implementation Level

(1) Facilities to Prioritize for Inspection

Commercial and industrial facilities with the functional aspects and types described below, and other facilities identified by the Permittees as reasonably likely to contribute to pollution of stormwater runoff, shall be prioritized for inspection on the basis of the potential for water quality impact using criteria such as pollutant sources on site, use of pollutants of concern, proximity to a waterbody, and the enforcement history of potential discharges and actual discharges at the facility. Permittees may use a variety of sources to develop and update the business inspection prioritization, including, but not limited to, business license applications, tax records, and inspectors' observations. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plan:

(a) Sites with the following functions or facilities that may be sources of pollutants when exposed to stormwater:

(i) Outdoor process and manufacturing areas

(ii) Outdoor material storage areas

(iii) Outdoor waste storage, handling, and disposal areas

(iv) Outdoor vehicle and equipment storage and maintenance areas

(v) Outdoor wash areas

(vi) Outdoor drainage from indoor areas

(vii) Fueling Areas

(viii) Rooftop equipment

(ix) Other sources determined by the Permittee or Water Board as reasonably likely to contribute to pollution of stormwater runoff.

(b) Sites that support industrial and commercial activities that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges, including:

(i) Industrial facilities, as defined at 40 CFR 122.26(b)(14), including facilities subject to the Statewide NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);

(ii) Vehicle Salvage yards;

(iii) Metal and other recycled materials collection facilities, and waste transfer facilities;

(iv) Vehicle mechanical repair, maintenance, fueling, or cleaning facilities;

(v) Nurseries and greenhouses;

(vi) Restaurants and other food service businesses at which food is prepared or that have onsite eating and drinking areas for customers;

(vii) Supermarkets or large grocery stores with outdoor waste storage or cardboard compacting areas;

(viii) Building trades facilities or yards, corporation yards;

(ix) Building material retailers and storage;

(x) Plastics manufacturers; and

(xi) Other facilities designated by the Permittee or Water Board to be reasonably likely to contribute to pollution of stormwater runoff.

(2) Inspection Plan – The Inspection Plan shall be updated annually and shall contain the following information:

(a) A description of the process for prioritizing inspections and frequency of inspections. The prioritization criteria shall assign a more frequent inspection schedule to the highest priority facilities per Provision C.4.b.ii.(1). If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan.

(b) Assign appropriate inspection frequency for each industrial and commercial facility based on the priority established in Provision C.4.b.ii.(2)(a), potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(c) A mechanism to include new businesses that warrant inspections.

(d) Total number and a list of all industrial and commercial facilities requiring inspections, within each Permittee's jurisdiction, based on the prioritization criteria established in Provision C.4.(b)ii.(2)(a). This list shall be updated annually.

(e) List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual

update. Previous fiscal years' inspection lists shall remain in the Inspection Plan.

(f) If a Permittee relies on multiple entities to perform business and commercial inspections, a list of the entities and their responsibilities with regard to this Permit. Describe how the Permittee oversees and coordinates the entities performing inspections and assures that all sites with the potential to pollute stormwater are inspected.

(3) Record Keeping – For each facility identified in Provision C.4.b.ii.(2)(d), the Permittee shall maintain a database or equivalent tabular system of at least the following information:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity or pollutant source, including SIC or NAICS code. Examples: outdoor process/manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, rooftop equipment, outdoor drainage from indoor areas, and use of mobile businesses for outdoor fueling, washing, etc.;

(c) Inspection priority and inspection frequency; and

(d) Whether facility requires coverage under the Industrial General Permit.

iii. Reporting

(1) Permittees shall include the following information in the 2023 Annual Report:

(a) A brief description of which Permittee entity or entities are responsible for reviewing and approving business license applications or a link to the Permittee's website for business license applications.

(2) Permittees shall make the list required by Provision C.4.b.ii.(2)(d) available upon Water Board request.

C.4.c. Enforcement Response Plan

i. Task Description – Each Permittee shall implement and update, as needed, its Enforcement Response Plan (ERP), a reference document to guide inspection staff in achieving timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's enforcement and compliance procedures, from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual non-stormwater discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.4.d. Inspections

i. **Task Description** – Each Permittee shall conduct inspections according to the Inspection Plan in Provision C.4.b.ii.(2) and the ERP in Provision C.4.c.ii. to enforce its ordinance to prevent stormwater pollution.

ii. **Implementation Level**

(1) Inspections – Inspections shall be conducted to include at least the following activities:

(a) Observations for appropriate BMPs to prevent stormwater runoff pollution, or unauthorized or illicit discharge;

(b) Observations for evidence of unauthorized or illicit discharges, illicit connections, and potential discharge of pollutants to stormwater by the Discharger or contractors, such as and including mobile businesses, that operate on the facility;

(c) Observations for noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(2) Record Keeping – Permittees shall maintain adequate records to demonstrate compliance and appropriate follow-up enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial and commercial site inspections:

(a) Name of facility/site inspected

(b) Inspection date

(c) Industrial General Permit coverage required (Yes or No)

(d) Compliance status

(e) Specific problems, including inadequate and ineffective BMPs

(f) Type of enforcement (if applicable)

(g) Problem resolution date

(h) Additional comments

The electronic database or equivalent tabular system and any supporting documentation shall be made readily available to Water Board staff or its representative during inspections, audits, or upon request.

(3) Data Evaluation – Permittees shall evaluate the frequency of potential and actual non-stormwater discharges by business category. Note trends and, as needed, implement focused inspections or education in subsequent years to address trends.

iii. Reporting

(1) Permittees shall include the following information in each Annual Report:

(a) Number of inspections conducted;

(b) Number of each type of enforcement action, as listed in each Permittee's ERP, issued;

(c) Number of enforcement actions or discrete number of potential and actual discharges fully resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner; and

(d) Frequency of potential and actual non-stormwater discharges by business category.

(2) Permittees shall make the list of facilities required to have coverage under the Industrial General Permit, but that have not filed for coverage, available upon Water Board request. For facilities added to the list or re-inspected during this Permit term, the list shall include the date when the facility was first identified and the date when it was most recently inspected or evaluated.

C.4.e. Staff Training

i. Task Description – Permittees shall provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee- specific.

ii. Implementation Level – At a minimum, provide inspection training, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Business Inspection Plan;

(4) Enforcement Response Plan;

(5) Illicit Discharge Detection and Elimination; and

(6) Appropriate BMPs to be used at different industrial and commercial facilities.

iii. **Reporting** – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Total number and percentage of industrial and commercial site inspectors attending training; and

(4) Total number and percentage of illicit discharge detection and elimination inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to detect and control illicit discharges not otherwise controlled under Provisions C.4. – Industrial and Commercial Site Controls, C.6. – Construction Site Controls, and C.17 – Discharges Associated with Unsheltered Homeless Populations. Permittees shall implement an illicit discharge program that includes active surveillance and centralized complaint collection and follow-up to detect and eliminate illicit discharges into the MS4. Permittees shall maintain a complaint tracking and follow-up data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. **Task Description** – Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.

ii. **Implementation Level**

(1) Permittees shall have adequate legal authority to address illicit discharges to the MS4, including, but not limited to, the following:

(a) Discharges of sewage, trash, or other potentially polluting or hazardous materials;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces, pavement, equipment, and other facilities of any commercial business, or any other public or private facility, including discharges from mobile businesses;

(c) Discharges of runoff from material storage areas, including those containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes;

(f) Discharges of food-related wastes (e.g., grease, fish processing wastes, restaurant kitchen mat and trash bin wash water); and

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to the MS4.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than stormwater to the MS4.

(4) Permittees shall have adequate legal authority to hold mobile businesses, and the businesses, property managers, property owners, and other associated entities that hire a mobile business, responsible for stormwater pollution discharged by the mobile business operating at their location.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges and compliance from responsible parties.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and/or actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.5.c. Spill, Dumping, and Complaint Response Program

i. Task Description – Each Permittee shall implement a program to respond to spills, dumping, and complaints.

ii. Implementation Level

(1) Each Permittee shall have a central contact point for the public and Permittee's staff to report spills, dumping, and complaints. At a minimum, this central contact point shall include a phone number. Permittees shall also include, as feasible, a user-friendly web address for reporting for spills and dumping or a link to a web-based reporting application.

(2) Each Permittee shall publicize the phone number on its website, and, if used, a web reporting address or link to a web-based reporting application, to the Permittee's staff and the public. The contact information on the Permittee's website shall be kept up-to-date, and updated at least annually when changed. This central contact point shall be readily searchable and accessible on the Permittee's website.

(3) Each Permittee shall require the municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point so that illicit discharge staff can investigate and track.

(4) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and/or phone tree for the staff responsible for the spill and dumping response program. At a minimum, this flow chart and/or phone tree shall identify staff or positions responsible for receiving the complaints and investigating and abating the complaints.

(5) Each Permittee shall also maintain and update, as needed, a spill, dumping, and complaint response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittee's immediate capabilities.

(6) Each Permittee shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct follow-up inspections, as needed, to ensure that corrective measures have been effectively implemented to achieve and maintain compliance. The start of the investigation of a spill or discharge shall not exceed 3 business days from the date the complaint was received by the Permittee. If additional time is required, the Permittee shall document the rationale for the delay.

iii. Reporting

(1) Permittees shall provide the following information in the 2024 and 2026 Annual Reports:

(a) The spill, dumping, and complaint reporting phone number and, if used, a web reporting address or a link to a web-based reporting application;

(b) A screen shot of the Permittee's website showing the central contact point; and

(c) A discussion of how the central contact point – spill and dumping reporting phone number and, if used, the web address or web-based reporting application – is being publicized to Permittees' staff and the public.

(2) Copies of the phone trees and contact lists required in Provision C.5.c.ii (4) and (5) shall be provided as attachments to, or links in, the 2026 Annual Report. The lists may be redacted to remove references to private cell phone numbers. The unredacted phone trees and contact lists shall be made available to Water Board staff or representatives during audits or inspections, and upon request

C.5.d. Tracking and Case Follow-up

i. Task Description – All incidents or discharges reported to the spill, dumping, and complaints central contact point, that might discharge into the MS4, shall be logged to track follow-up and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems and inter/intra-agency coordination, where appropriate. It is not necessary to track and report data according to this provision if they are tracked and reported according to State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

ii. Implementation Level – Maintain records for tracking and follow-up to water quality spills, dumping, and complaints that might discharge into the MS4 in an electronic database or equivalent tabular system.

The water quality spills, dumping, and complaint tracking system shall contain the following information:

(1) Complaint information:

(a) Date that complaint is received by the Permittee;

(b) Type of pollutant; and

(c) Problem Status (potential or actual discharge).

(2) Investigation information:

(a) Date and time investigation of spill or discharge started;

(b) Date and time response to illegal dumping report or complaint started;

(c) Agency, department, or other entities responding to the complaint or discharge;

(d) Type of pollutant;

(e) Identify the entered storm drain or approximate location, and/or receiving water;

(f) Date and time abated; and

(g) Type of enforcement based on the Permittee's ERP.

(3) Responses to discharges or dumping associated with unsheltered populations, including those living in homeless encampments or vehicles, shall be coordinated with the Permittee's Provision C.10 Trash Control efforts, Provision C.17 Homeless Encampment Discharge Control efforts, and other agencies and entities addressing homelessness issues, as appropriate.

iii. Reporting

(1) Permittees shall provide the following information in the Annual Report:

(a) Number of discharges reported;

(b) Number of discharges reaching storm drains and/or receiving waters;

(c) Number of discharges resolved in a timely manner; and

(2) The electronic database or equivalent tabular system and supporting documentation shall be made available to Water Board staff or representatives during audits or inspections, and upon request.

C.5.e. Control of Mobile Sources

i. **Task Description** – Permittees shall have oversight and control of pollutants associated with mobile businesses.

ii. **Implementation Level** – Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, including, but not limited to, automobile washing, vehicle fueling, power washing, steam cleaning, graffiti removal, and carpet cleaning;

(b) Implementation of an enforcement strategy that specifically addresses mobile businesses;

(c) Updating and maintaining a mobile business inventory at least annually;

(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction; and

(e) Inspection of mobile businesses.

(2) Permittees may cooperate countywide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business information, BMP requirements, enforcement action information, and educational materials.

iii. **Reporting**

(1) In the 2026 Annual Report, each Permittee shall provide the following:

(a) Minimum standards and BMPs for each of the various types of mobile businesses;

(b) Enforcement strategy;

(c) A list and summary of the countywide or regional activities conducted, including BMP requirements, enforcement action information, and educational materials (Permittees' annual reports may refer to the countywide or regional reports for this information);

(d) A list and summary of specific outreach events and education conducted for each type of mobile business operating within the Permittee's jurisdiction; and

(e) A copy of the most recent version of the mobile business inventory.

(2) In each Annual Report, each Permittee shall include at least the following:

(a) The total number of inspections conducted of mobile businesses;

(b) The number of each type of mobile business inspected; and

(c) A summary of the enforcement actions taken against mobile businesses during the reporting year.

C.5.f. Municipal Separate Storm Sewer System (MS4) Map

i. Task Description – Each Permittee shall make the current map(s) of its MS4 available to the public.

Permittees shall identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition. This information will be used to update Permittee maps and databases.

ii. Implementation Level

(1) Current MS4 Maps – Permittees shall make current maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web-accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

(2) Updates to MS4 Maps – During the current Permit term, each Permittee shall complete the following:

(a) Determine information missing from the Permittee's current MS4 map(s), which may include Oakland Museum watershed maps, existing MS4 maps or drawings in the Permittee files, or other storm sewer system information databases.

(b) Identify and make available upon Water Board request maps of the storm sewer system and other stormwater controls installed after publication of the Oakland Museum watershed maps within the Permittee's jurisdictional area.

(c) Develop a plan and schedule for updating the Permittee's storm sewer system information. Permittees or countywide stormwater programs may work together or with the Oakland Museum of California to develop a plan and schedule for updating existing information, maps, drawings, and databases. The plan will consider the potential to identify storm sewer system component locations, size or specifications, materials of construction, and condition.

iii. Reporting

(1) In the 2024 Annual Report, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.

(2) Submit a plan and schedule with the 2026 Annual Report to update existing storm sewer system information as described above.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan, to prevent construction site discharges of pollutants into the storm drains. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers. Each Permittee shall in its reporting demonstrate the effectiveness of its inspections and enforcement activities to prevent polluted construction site discharges into storm drains.

C.6.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have the authority to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and to implement progressive enforcement to achieve expedient compliance and cleanup at all public and private construction sites.

ii. **Implementation Level**

(1) Permittees shall have the legal authority to require, at all construction sites year-round, effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non-stormwater management through all phases of construction (including, but not limited to, grubbing, clearing, site grading, filling, excavation, leveling, building, landscaping, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and cleanup at all construction sites year-round.

C.6.b. Enforcement Response Plan (ERP)

i. **Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance at all public and private construction sites.

ii. **Implementation Level –** The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from discovery of problems through confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site-specific, and seasonally- and phase-appropriate, effective BMPS in the following six categories:

(1) Erosion Control

(2) Run-on and Runoff Control

(3) Sediment Control, including entrance/exit and perimeter controls

(4) Active Treatment Systems, as necessary

(5) Good Site Management, including materials and waste management

(6) Non-Stormwater Management

ii. Implementation Level

The BMPs targeting specific construction site pollutants within the six categories listed in Provision C.6.c.i. shall be site-specific. Permittees may select site-specific BMPs, or BMP combinations, from resources such as:

(1) CASQA BMP Handbook, Construction, December 2019

(2) Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, May 2017, and addenda

(3) Other BMPs shown to provide equivalent or better protection

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs for each site before issuing grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction Stormwater General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in Provision C.6.c.i. are planned.[35]

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction Stormwater General Permit.

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in Provision C.6.c.i. in

[35] If SWPPPs do not include erosion control plan drawings for use by construction workers and managers at the site, erosion, sediment, and site control plans and drawings must also be submitted and reviewed.

preventing the discharge of construction pollutants into the storm drain. Permittees shall require timely corrections of all actual and potential discharges observed.

ii. Implementation Level

(1) Wet Season Notification

By September 1 of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season.

(2) Frequency of Inspections

Inspections shall be conducted monthly during the wet season[36] at the following sites:

(a) All construction sites disturbing one or more acre of land;

(b) All hillside projects (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with ≥15 percent slope) disturbing greater than or equal to 5,000 square feet; and

(c) High Priority Sites – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

(iii) Project size and type;

(iv) Sensitivity of receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

[36] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

(3) Contents of Inspections

Inspections shall focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in Provision C.6.c.i.

Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from Provision C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in Provision C.6.c.i;

(c) Visual observations for:

(i) Actual discharges of sediment and/or construction-related materials into storm drains and/or waterbodies.

(ii) Evidence of sediment and/or construction-related materials discharges into storm drains and/or waterbodies.

(iii) Illicit connections, and

(iv) Potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) Tracking

All inspections shall be recorded on a written or electronic inspection form. Inspectors shall follow the ERP for all actual and potential discharges discovered during the inspection.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) The department, agency, or other entity performing the inspection.

(e) Enforcement Response Level (Use ERP);

(f) Problem(s) observed using Illicit Discharge and the six BMP categories listed in Provision C.6.c.i;

(g) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(h) Comments, which shall include all rationale for longer compliance times, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) Each Permittee shall summarize the following information in the Annual Report:

(a) Total number of construction sites requiring inspections during at least part of the Permit year;

(b) Total number of active hillside sites disturbing less than one acre of soil requiring inspection;

(c) Total number of active sites disturbing one acre or more of soil;

(d) Total number of active sites disturbing less than one acre of soil identified as High Priority sites in Provision C.6.e.ii.(2)(c) requiring inspections;

(e) Total number of inspections conducted;

(f) Number of enforcement actions taken by type, organized by the categories in each Permittee's ERP;

(g) Number of illicit discharges, actual and potential, of sediment or other construction-related materials; and

(h) Number of enforcement actions or discrete number of potential and actual discharges fully corrected prior to the next rain event, but no longer than 10 business days after the potential and actual discharges[37] are discovered or otherwise considered corrected in a timely, though longer period.

(2) In the 2027 Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in Provision C.6.e.ii.(4). This evaluation shall include findings on the

[37] Permittees who track by discrete potential and actual discharges shall report by discrete discharges. Permittees who track by enforcement actions shall report by enforcement actions

program's strength, comparison to previous years' results, as well as areas that need more focused education for site owners, operators, and developers the following year.

(3) An electronic copy of the construction site and inspection database(s) shall be made available to the Water Board during inspections, audits, or upon request.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for all staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to staff responsible for conducting construction site stormwater inspections. Training topics shall include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and the ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information:

(1) Dates of training;

(2) Training topics covered;

(3) Total number of inspectors, including both municipal and non-municipal staff; and

(4) The number of inspectors attending each training, including both municipal and non-municipal staff.

If there was no training in that year, so state.

C.7. Public Information and Outreach

Each Permittee shall increase the awareness of the community, including diverse socioeconomic groups, government elected officials and staff, and ethnic communities, regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate these impacts; positively influence the public's waste disposal and runoff pollution generation behavior; and involve various citizens in mitigating the impacts of stormwater pollution. Outreach required in other provisions may be conducted under Provision C.7.

C.7.a. Outreach Campaigns

i. **Task Description** – Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences.

ii. **Implementation Level**

(1) Target a broad audience with a minimum of one outreach campaign with specific stormwater runoff pollution prevention messages. The outreach campaign(s) should utilize various electronic and print media, and paid and free media, including social media, as practicable, to best reach different demographics. The outreach campaign(s) may be coordinated regionally or countywide.

(2) Permittees shall conduct timely evaluations to measure the effectiveness of the outreach campaigns. Effectiveness assessment/evaluation may be done regionally or countywide.

C.7.b. Stormwater Pollution Prevention Education

i. **Task Description** – Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information.

ii. **Implementation Level**

(1) Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively, and Permittees may combine this function with the spill and dumping complaint central contact point required in Provision C.5 – Illicit Discharge Detection and Elimination.

(2) Each Permittee shall place and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website. In lieu of posting the detailed informational pages directly on their individual websites, Permittees may choose to

provide links from their websites to the countywide program's websites and/or websites for other collaborative efforts between Permittees. Each Permittee shall publicize its website.

C.7.c. Public Outreach and Citizen Involvement Events

i. **Task Description** – Public outreach shall include a variety of pollution prevention messages such as for car washing; proper use, storage, and disposal of vehicle waste fluids; household waste materials disposal; pesticide use; and trash. Public outreach events may include venues such as fairs, shows, workshops, and household waste collection events. Citizen involvement events may include venues such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, storm drain inlet marking, riparian restoration activities, and community grants.

ii. **Implementation Level** – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events according to its population, as shown in the table below:

Table 7.1 Public Outreach and Citizen Involvement Events[38]

Permittee Population	Number of Events
< 10,000	2
10,001– 40,000	4
40,001 – 100,000	5
100,001 – 175,000	7
175,001 – 250,000	8
> 250,000	10
Non-population-based Permittees	6

C.7.d. Watershed Stewardship Collaboration

i. **Task Description** – Permittees shall individually or collectively collaborate with other organizations to encourage and support community watershed stewardship activities. This may include collaborating with community groups such as local watershed forums and "friends of creek" groups; encouraging and supporting the development of grassroots watershed groups; or engaging

[38] Permittees may claim individual credits for events in which their Countywide Program participates, that the County Program supports or hosts, or other collaborative efforts, provided such events are publicized in the Permittee's jurisdiction.

existing groups, such as neighborhood associations, in watershed stewardship activities. This may also include collaboration with other organizations that benefit the health of the watershed, such as ReScape California, or collaboration to introduce community watershed stewardship activities into organizations focused on other environmental or sustainability efforts.

ii. **Implementation Level** – Annually demonstrate effort.

C.7.e. School-Age Children Outreach

i. **Task Description** – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-aged children (K through 12).

ii. **Implementation Level** – Implement annually and demonstrate effectiveness of efforts through assessment.

C.7.f. Outreach to Municipal Officials

i. **Task Description** – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. **Implementation Level** – At least once per permit cycle, or more often.

C.7.g. Tracking and Reporting

i. **Task Description** – Permittees shall electronically track outreach efforts in a table or spreadsheet. The tracking document should include, at a minimum:

(1) Outreach event or campaign type;

(2) Dates;

(3) Target Audience;

(4) Number of participants and number of participants compared to previous events, if applicable;

(5) Location(s) or website address, as applicable;

(6) Contact information for venues and coordinators, if applicable;

(7) Materials and activities, as applicable;

(8) Level of effort;

(9) Evaluation of effectiveness;

(10) Lessons learned; and

(11)Planned changes in approach or implementation, if any.

ii. **Implementation Level** – The tracking document shall be made available to the Water Board staff during inspections, audits, or upon request.

iii. **Reporting**

(1) In each Annual Report, each Permittee (or the Countywide Program, if the tracking was done countywide or regionally) shall submit a table listing the types of outreach programs implemented during that Permit year along with a brief description. The table should be a cumulative table showing the number, if applicable, of each type of outreach campaigns or events occurring during each Permit year.

(2) In the 2023 Annual Report, each Permittee shall list the Permittee's point of contact and the URL for its stormwater pollution website. The Permittee shall discuss how the point of contact and website are publicized and maintained and certify that it has a website dedicated to providing and maintaining information on stormwater issues, watershed characteristics, and stormwater pollution prevention approaches. Changes in this information shall be reported in the Annual Report for the year in which the change occurs.

(3) In the 2027 Annual Report, each Permittee (or the Countywide Program, if the effectiveness assessment/evaluation was done countywide or regionally) shall submit a summary of the effectiveness assessments/evaluations by type of outreach described in Provisions C.7.a through C.7.f. The summary shall include plans for continuing or modifying each outreach type during the next permit term.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

All Permittees shall comply with all the monitoring requirements in this Provision. Permittees may choose any of the following mechanisms, or a combination of these mechanisms, to meet the monitoring requirements:

i. **Regional Collaboration.** Permittees are encouraged to continue contributing to the Regional Monitoring Collaborative (RMC), which coordinates water quality monitoring conducted by all the Permittees. Permittees are encouraged to consider and assign additional duties to the RMC for purposes of increased efficiencies, particularly, but not limited to, reporting duties.

ii. **Area-wide Stormwater Program.** Permittees may contribute to their countywide or area-wide Stormwater Program, so that the Stormwater Program conducts monitoring on behalf of its members.

iii. **Third-party Monitoring.** Permittees may use data collected by a third-party organization, such as the Water Board or Department of Pesticide Regulation, to fulfill a monitoring requirement, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.b.

C.8.b. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Program Plan (QAPrP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

C.8.c. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[39] such as:

- Are chemical concentrations in the Estuary potentially at levels of potential concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?

[39] https://www.sfei.org/sites/default/files/biblio_files/MYP%202021%20FINAL.pdf (SF Bay Regional Monitoring Program (RMP) Multi-Year Plan, January 2021). While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

The Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program by contributing their fair share financially on an annual basis.

C.8.d. Low Impact Development (LID) Monitoring

LID Monitoring is intended to measure compliance and effectiveness of LID controls. It will improve the understanding of the benefit of LID implementation, in particular, green stormwater infrastructure, on pollutant loading and hydrology of receiving waters within Permittees' jurisdictions, at different space and time scales, and inform the design, construction, operation and maintenance (O&M) and future implementation of LID. LID Monitoring may also be used to calibrate and validate models that estimate pollutant removal effectiveness and inform sizing of LID facilities (e.g., countywide C.3 technical guidance documents, reasonable assurance analysis models, and other sizing and assessment models).

LID Monitoring is intended to answer both of the following two management questions:

- What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, at different spatial scales (e.g., single control vs watershed or catchment scale), and how do they change over time?
- What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?

i. LID Monitoring Plans

(1) The Permittees shall, at the regional or countywide level, develop LID Monitoring Plans to implement the requirements in Provision C.8.d.iii-iv. The LID Monitoring Plans shall, at a minimum:

(a) Explain how the study(s) will address both management questions and propose monitoring questions necessary that will address both management questions.

(b) Describe the LID facility(s) or system(s) and study area(s), including the characteristics, land use and management actions within the tributary drainage area to the LID facility(s) or system(s) that will be monitored.

(c) List the monitoring stations, monitoring parameters, and associated measurement, sample and analytical methods that will be utilized.

(d) Establish a monitoring schedule, including number and type (wet weather and dry weather) of monitoring events for each site, that may result in a greater number of total and/or annual monitoring events than the minimum required in Table 8.d.2, and including a discussion of the allocation of samples between and within sites.

(e) Describe the data evaluation methods, such as statistical analyses to test whether differences in concentrations are statistically significant.

(f) Include study-specific Quality Assurance Project Plans (QAPPs), which, at a minimum, are comparable to the SWAMP QAPrP.

(g) Provide annual cost estimates for the implementation of the LID Monitoring Plan.

(h) Explain how sampling and analytical methodologies will be regionally consistent.

(2) Permittees shall implement no later than the deadline set forth in Provision C.8.d.v, the approved or conditionally approved LID Monitoring Plans as meeting the requirements herein (including consideration of countywide and regional representativeness and whether the information generated will reliably address the LID Monitoring management questions).

ii. Regional Collaboration

To assist with the development and implementation of scientifically-sound LID Monitoring Plans, to facilitate regional consistency with respect to sampling and analytical methodology, and to make recommendations about allocation of samples between and within different sites, the Permittees shall form and convene a Technical Advisory Group (TAG) which includes impartial science advisors (e.g., SFEI, SCCWRP) and Water Board staff, to review and make recommendations regarding the LID Monitoring Plans (including their study design, analysis methods, results, and conclusions) prior to submission of the LID Monitoring Plans to the Executive Officer. In order to effectuate this review, the Permittees shall submit their draft LID Monitoring Plans to the TAG by March 1, 2023. Prior to the Executive Officer's approval or conditional approval of the LID Monitoring Plans, the TAG shall be convened at least biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation of Provision C.8.d, including but not limited to study design, sample locations, and analysis methods.

iii. Methods

The Permittees shall implement or cause to be implemented the LID effectiveness monitoring methods listed in Table 8.d.1.

iv. Parameters and Intensities

(1) Permittees shall conduct LID Monitoring consistent with the parameters and intensities specified in Table 8.d.2.

(2) Monitoring must be conducted according to test procedures in 40 CFR part 136 for analyses of pollutants unless another method is required under 40 CFR chapter 1, subchapter N. For PFAS, if there are no standard methods in 40 CFR part 136, Permittees may use other methods, such as those recommended by U.S. EPA for non-potable water and other environmental media.

(3) In a given water year, if there are not enough storm events for Permittees to sample (i.e., due to weather/climate), Permittees may certify that in their subsequent LID Monitoring Status Report and perform the missed sample events in the subsequent water year.

v. Implementation Level – Permittees shall begin implementation of the approved or conditionally approved LID Monitoring Plans by no later than the start of the 2024 Water Year, which is October 1, 2023.

vi. Reporting – The Permittees shall submit their LID Monitoring Plans for Executive Officer approval by May 1, 2023.

Table 8.d.1 LID Monitoring Methods

	Management Question	Monitoring Methods
1	What are the pollutant removal and hydrologic benefits of LID components, facilities and/or systems (and of different combinations of components, facilities and/or systems), including variations in design and how do they change over time?	Monitoring methods to investigate pollutant removal benefits shall consist of: • Required: Collection and analysis of the parameters listed in Table 8.d.2, in stormwater influent and effluent (simultaneously) – using automated samplers to collect flow-weighted composite EMCs (time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites) – at the component, facility, site, and/or watershed scale; and • Optional: sampling of sediment and other technically sound and accepted monitoring methods designed to investigate pollutant removal benefits. Monitoring methods to investigate hydrologic performance (flow) shall consist of: • Required: Measurement of stormwater runoff quantity and/or flow at the component, facility, site and/or watershed scale, in both the influent and effluent of the LID BMP(s). • Optional: Measurement of stream flow to evaluate watershed scale benefits; development of runoff hydrographs; water balance monitoring; collection and analysis of infiltration rates or water depth at the facility and/or site scale; or other technically sound and accepted monitoring methods designed to investigate hydrologic performance. Monitoring methods to investigate changes over time include: • Longitudinal study(s), using the above monitoring methods applied at the component, facility, and/or system scales, over different time scales.
2	What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?	• Monitoring methods assigned to Management Question 1 above, applied at the component, facility, system, and/or site scale; and • Condition assessments at the component, facility, system, and/or site scale.

Table 8.d.2 LID Monitoring Intensities and Parameters

Countywide Stormwater Program	Anticipated Type(s) of LID Facilities Monitored	Total Minimum Number of Water Quality Sample Events During Permit Term (Annual Minimum)[40]	Parameters[41,42]
Alameda	High flow rate tree well filters and/or a combination of several LID measures.	25 (3)	**Required:** • Total Hg; • Total PCBs; • TSS • PFAS; • TPH; • Total and Dissolved Copper; • Flow; • Total Hardness; and • pH. **Optional:** • Other emerging contaminants;[43] and • Other ancillary parameters.[44]
Contra Costa	Bioretention and/or other infiltration-based LID measures.	25 (3)	
San Mateo	Regional multi-benefit stormwater capture facility(s).	25 (3)	
Santa Clara	Bioretention and/or other LID measures.	25 (3)	
Solano	Bioretention and/or other LID measures.	12 (1)	

[40] This column indicates the total minimum number of sample events that must take place during the Permit term, and the minimum number of sample events that must take place during each year of the Permit term. Samples shall be collected via automated sampler as flow-weighted composite event mean concentrations (EMCs); time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites. In order to assess performance, each sample event must include simultaneous sampling of the influent and effluent. The Permittees are encouraged to additionally collect sediment samples (e.g., to analyze for total PCBs and total mercury), however such sediment sample collection shall not count towards the required water quality samples specified in this column. The LID Monitoring Plans shall propose how to address both of the Management Questions, by specifying the locations of sampling stations, the matrix (surface water, bedded sediment, etc.), the number of samples to be collected at each site each year in the dry season versus in the wet season, and analytical methods.

[41] Each flow-weighted (or time-weighted) composite EMC sample shall be analyzed for all of the required parameters listed in this column. LID Monitoring Plans may include additional parameters not listed in this column.

[42] Data must be SWAMP comparable.

[43] Other emerging contaminants may include but are not limited to: microplastics and tire compounds such as 6PPD-quinone.

[44] Other ancillary parameters may include, but are not limited to: zinc (and other metals), temperature, conductivity, polycyclic aromatic hydrocarbons (PAHs), turbidity, pathogens (FIB), total methylmercury, total organic carbon (TOC), dissolved organic carbon (DOC), pesticides of concern to water quality (e.g., pyrethroids, fipronil and its degradants, and neonicotinoids such as imidacloprid), major cations (Ca, Mg, Na, K), and major anions (SO_4, Cl).

C.8.e. Trash Monitoring

Trash Monitoring is intended to: 1) verify whether Permittees' trash control actions to-date have effectively prevented trash from their jurisdictions from discharging to receiving waters, and 2) evaluate whether discharges of trash from areas of Permittees' jurisdictions where full trash capture equivalency (full trash capture devices or other actions verified with on-land visual trash assessments, as referenced in Provision C.10.b.iii) has been achieved are causing and/or contributing to adverse trash impacts in receiving waters.

Trash monitoring shall address the following management and monitoring questions:

Management Questions

- Have Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?

Monitoring Questions

- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

i. Monitoring Components

Permittees shall implement or cause to be implemented the monitoring components as described below, to address each management and monitoring question. Permittees should use comparable assessment methods to facilitate regional consistency.

To ensure comparable data, for each monitoring site, Permittees and the TAG shall consider incorporating the implementation of steps 1-6 as specified in the Statewide Trash Monitoring Methods Project Trash Monitoring Playbook[45] into the Trash Monitoring Plan. Permittees and the TAG shall consider adapting and repeating these six steps for all methods specified in Provision C.8.e.ii, to

[45] https://sites.google.com/sfei.org/trash

reflect site information that can be collected regardless of method and can increase comparability between methods. The six steps are as follows:

(1) Event Preparation

(2) Gather Standard Equipment

(3) Set up the Assessment Area

(4) Record the Site Information and Assessment Area Dimensions

(5) Record Assessment Area Photographs

(6) Determine, Document, and Map the Locations of Storm Drain Outfalls, Homeless Encampments, and Illegal Dumping Hotspots Which May Impact the Assessment Area.

ii. Monitoring Methods

(1) Permittees shall collect and analyze the amount of trash discharged from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.

Sampling of MS4 outfalls includes the use of netting devices attached to the end of the outfall pipe (that capture trash discharging through the MS4), or other equivalent end-of-pipe (or in-line) devices and structures, whether existing, modified, or new. The device used to monitor the trash at the end of the MS4 outfall (or in-line, within the MS4) shall not be used itself as the trash control that grants the Low trash generation status to the tributary drainage area; the monitored tributary drainage area may only be controlled to the Low trash generation level by controls upstream of the monitoring device.

(2) Permittees shall implement a pilot program to directly (in-stream) sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system. Permittees should not select in-stream sites that are downstream of direct discharge sites (e.g., homeless encampments and illegal dumping sites).

To the extent feasible, in-stream monitoring sites should be co-located with MS4 outfall monitoring sites, as follows: They should be no further than 300 feet downstream or upstream of them; failing that, they should be no further than 300 feet downstream of them, or, any distance upstream of them; failing that, they should be anywhere within the same receiving

water; failing that, in-stream monitoring sites do not have to be co-located with MS4 outfall monitoring sites.

Sampling a receiving water directly (in-stream) involves the use of trawls, nets, or other equivalent devices, that are designed to capture as much of the width and depth of the receiving water's cross section (especially the thalweg) as is feasible and safe, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.

Indirect methods (on-land), such as shoreline and/or streambank assessments, are not a satisfactory surrogate or replacement for these direct measurements of trash within receiving waters.

(3) Permittees may additionally implement shoreline and/or streambank assessment methods (with an appropriate frequency, timing, and assessment length), not to indirectly measure trash loading in MS4 outfalls and receiving waters, but instead to gain a synoptic view of on-land trash conditions adjacent to MS4 outfall and in-stream monitoring sites. Such methods include: the riverine volumetric method, the riverine quantitative tally method, the unoccupied aerial system (UAS) method,[46] or other equivalent methods. The riverine qualitative visual assessment method may be merited but requires additional study, refinement, and calibration, and its use is subject to the Executive Officer's approval.

(4) In order to be able to characterize loading rather than only concentration, Permittees shall directly measure flow at both MS4 outfall sites (flow through the MS4 pipe) and at in-stream receiving water sites (flow through the receiving water). Examples of methods to collect flow data include stream gages, manning's equation, and other methods recommended in Chapter 3.2 of the International Stormwater BMP Database's October 2009 Urban Stormwater BMP Performance Monitoring document.[47]

(5) All methods shall include collection of data on material type. For example, the volume or tally of cigarette butts collected.

[46] https://sites.google.com/sfei.org/trash

[47] https://bmpdatabase.org/monitoring

iii. Monitoring Sites, Events, Frequency, and Intervals

(1) Permittees shall conduct MS4 outfall monitoring annually, starting October 1, 2023, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan.

County	MS4 Outfall Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	3	3
Contra Costa	2	3
Solano	1	3
San Mateo	2	3
Santa Clara	3	3

(2) Permittees shall implement a pilot program for direct in-stream monitoring. Permittees shall conduct this monitoring annually, starting October 1, 2024, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan.

County	Direct In-Stream Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	2	3
Contra Costa	1	3
Solano	0	0
San Mateo	1	3
Santa Clara	2	3

(3) Permittees should monitor storm events that trigger trash discharge and transport trash through the MS4 (e.g., 0.25 inches of rain over 24 hours), and that are preceded by at least 48 hours of limited or no trash discharge from the tributary drainage area. Each wet season, Permittees should sample the first forecasted significant storm event, and at least one storm event that is forecast to be greater than the one-year, one-hour storm event (i.e., full capture design standard).

(4) To the extent possible, Permittees should monitor the same monitoring sites during each year of the Permit term. With cause, justification, and reporting in the Annual Trash Monitoring Progress Report, they can change monitoring sites.

(5) Tributary drainage areas to monitoring sites should be representative with respect to the types of trash controls present across the region.

For example, some monitoring sites receive runoff from areas controlled primarily by one type of full trash capture device (e.g., an inlet-based device) while other monitoring sites receive runoff from areas controlled primarily by another type of full trash capture device (e.g., a HDS unit). And/or, some monitoring sites receive runoff from areas controlled primarily by full trash capture devices while other monitoring sites receive runoff from areas controlled primarily by Other Actions.

(6) Permittees are exempt from outfall and receiving water sampling during dangerous and unsafe weather conditions.

(7) In a given water year, if there are not enough qualifying storm events for Permittees to sample (i.e., due to weather/climate) – or if safety concerns preclude sampling during a qualifying storm event such that Permittees would not achieve the mandatory minimums set forth in Provisions C.8.e.iii.(1)-(2) – the Permittees may certify that in their subsequent Annual Trash Monitoring Progress Report, and perform the missed sample events in the subsequent water year.

(8) Permittees shall use the results of Trash Monitoring to inform and investigate their trash management actions. If Trash Monitoring results indicate that discharges are causing or contributing to adverse impacts in receiving waters, Permittees shall implement new or enhanced actions to comply with the trash discharge prohibition and receiving water limitations. Examples of results that could trigger follow up actions are provided in the Fact Sheet.

iv. Regional Trash Monitoring Technical Advisory Group

(1) To assist with the development and implementation of scientifically-sound trash monitoring, the Permittees shall form and convene a Technical Advisory Group (TAG), which includes impartial science advisors (e.g., SFEI) and Water Board staff, to review and provide input on ongoing trash monitoring, site selection, analysis methods, results, and conclusions.

Prior to the submission of the Trash Monitoring Plan, the TAG shall meet at least biannually. Subsequent to the submission of the Trash Monitoring Plan, the TAG shall meet at least annually.

(2) The Permittees shall solicit input and feedback from the TAG on:

(a) The spatial representativeness of each site;

(b) The adequacy of the methods employed at each site;

(c) The recommended minimum intensity, size, and/or recurrence interval for storms that are sampled;

(d) The number of sites and monitoring events, as described in the monitoring schedule in the Trash Monitoring Plan;

(e) The timing of sampling during storm events. For example, it is likely that Permittees should prioritize sampling during the rising limb of the hydrograph (and towards the beginning of the rising limb, at that), because that is when most of the trash load is mobilized and discharged to MS4 outfalls and receiving waters;

(f) Implementation of Provision C.8.e.iii.(8);

(g) Permitting; and

(h) Recommendations for alternative approaches to answering the management and monitoring questions.

v. Trash Monitoring Plan - Permittees shall collectively submit a Trash Monitoring Plan by July 31, 2023, subject to Executive Officer approval, that, at a minimum, includes the following information:

(1) Selected site locations (latitudinal and longitudinal coordinates), including maps and characteristics (e.g., type of outfall, receiving water);

(2) For each site, describe the land use, trash conditions/levels, trash controls present, and other relevant characteristics (trash generation rates, types of controls present, etc.) of the tributary drainage areas of the MS4, and also delineate the tributary drainage areas of the MS4;

(3) A description of factors that were considered when selecting monitoring sites and events, including spatial and temporal representativeness;

(4) For each site, a description of the monitoring methods and protocols that will be used;

(5) A monitoring schedule, which shall include the timing (of sampling during and between storm events), number and type of monitoring events at each site;

(6) Plans for implementation of Provision C.8.e.iii.(8);

(7) A summary of permitting efforts;

(8) Opportunities provided for input and participation by interested parties and scientific experts other than those participating in the TAG; and

(9) Input, feedback, and recommendations from the TAG on the capacity of the Trash Monitoring Plan to answer the management and monitoring questions.

C.8.f. Pollutants of Concern Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to assess compliance with receiving water limitations, support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants.

In particular, monitoring required by this provision must be directed toward addressing the following six priority POC management information needs:

(1) **Source Identification** - identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

(2) **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

(3) **Management Action Effectiveness** - evaluating the effectiveness or impacts of existing management actions, including compliance with TMDLs and other POC requirements and providing support for planning future management actions;

(4) **Loads and Status -** providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges;

(5) **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time; and

(6) **Compliance with Receiving Water Limitations –** providing information to assess whether receiving water limitations (RWLs) are achieved.

Not all information needs apply to all POCs (see Table 8.2 below for details).

i. Sampling Methods – The Permittees shall implement or cause to be implemented the monitoring components shown in Table 8.1 to address each of the six POC management information needs.

Table 8.1 POC Monitoring Methods

Monitoring Type	Information Need	Monitoring Methods
1	Identify Source Areas	Monitoring methods to identify watershed sources of POCs shall include: • Collection and analysis of POCs (in dissolved phase or on suspended sediment particles as appropriate for pollutant) in urban stormwater runoff transported through MS4s or receiving waters during stormwater runoff events; or • Collection and analysis of POCs (in dissolved phase or on suspended sediment particles as appropriate for pollutant) in urban stormwater runoff at outfall locations (i.e., as runoff from MS4 enters receiving waters) during stormwater runoff events; or • Collection and analysis of POCs on bedded sediments deposited in MS4s, treatment facilities, or receiving waters; or • Collection and analysis of POCs in stormwater runoff or bedded sediments on source area properties (e.g. private property) or public rights of way; or • Other monitoring methods designed to identify specific sources or uses of POCs (e.g., caulk in roadways or building materials) or watershed source areas.
2	Identify watershed areas contributing most to Bay impairment	Monitoring methods to identify watershed areas contributing most to Bay impairment shall include: • Methods described for Monitoring Type #1; or • Collection and chemical analysis of small fish tissue (or other relevant indicator) near tributary confluences with the Bay; or • Collection of bedded sediments near tributary confluences with the Bay and analysis for POCs.
3	Effective-ness of, and provide support for future, management actions	Monitoring methods to evaluate effectiveness of, and provide support for future, management actions shall include: • Methods described for Monitoring Type #1, but focused on characterizing the effectiveness of specific management actions in reducing or avoiding POCs in MS4 discharges; or • Collection of information to characterize or develop models of control measure performance

Monitoring Type	Information Need	Monitoring Methods
		(e.g., treatment controls, demolition debris program, green infrastructure, etc.). This information could include data for model calibration and validation, or other information needed to estimate or compute model parameters.
4	Provide information on POC loads, concentra-tions, or presence/ absence	Monitoring methods to provide information on POC loads, concentrations, or presence/absence shall include: • Methods described for Monitoring Type #1, in combination with quantitative modeling associated with quantifying POC loads from MS4s or small tributaries to the Bay; or • Collection of information to support development of conceptual models of watershed fate and transport; or • Collection of information to support watershed loading models such as data for model calibration and validation or other information needed to estimate or compute model parameters.
5	Evaluate POC trends	Monitoring methods to provide information on trends in POC loads and concentrations over time shall include methods described for Monitoring Type #1 or #2
6	RWLs Assessment	Monitoring in receiving waters to assess compliance with RWLs. Monitoring methods shall include: • Collection and analysis of analytes during the wet season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by urban stormwater runoff. • Collection and analysis of analytes during the dry season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by dry season urban runoff. • Sampling locations for RWLs assessment monitoring shall be spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types.

ii. **Parameters and Monitoring Frequency –** The Permittees shall conduct POC monitoring consistent with the monitoring intensity and frequency specified in Table 8.2. Monitoring frequencies are described as the total and minimum number of samples that Permittees within a countywide Stormwater Program shall collectively collect and analyze in a Water Year (October 1- September 30). Minimum number of samples that Permittees within a countywide Stormwater Program shall collect by the end of the Permit term to address each monitoring type are also specified.

Table 8.2 POC Monitoring Parameters, Effort and Type

Pollutant of Concern	Total Samples[a] Collected /Analyzed (yearly minimum) for each Countywide Program: Alameda, Contra Costa, Santa Clara, and San Mateo	Minimum Number of Samples for each Monitoring Type[b]
Polychlorinated Biphenyls (PCBs)	75 (8) Alameda, Santa Clara 65 (8) Contra Costa, San Mateo	8 samples minimum for monitoring types 1-3 and 16 samples minimum for monitoring types 4-5
Total Mercury	60 (8) Alameda, Santa Clara 50 (8) Contra Costa, San Mateo	8 samples minimum for monitoring types 1-5
Copper	5	all samples for monitoring type 4
Emerging Contaminants [c] Must include but not limited to: • contaminants likely in stormwater and associated with vehicles; • per- and polyfluoroalkyl substances (PFAS); • organophosphate ester plastic additives/flame retardants; • bisphenol plastic additives; and • ethoxylated surfactants	25 See footnote c	all samples for monitoring type 4 See footnote c
Ancillary Parameters[d]: • Total organic carbon • Suspended sediments (SSC) • Hardness	as necessary to address management questions for other POCs – see footnote d	
RWLs Assessment: copper, zinc, fecal indicator bacteria, and additional analytes determined under Provision C.8.h.iv	4 wet season samples 1 dry season sample	5 samples for monitoring type 6

[a] This column indicates the total number of samples, across all applicable monitoring types (i.e., monitoring types 1-5 from Table 8.1), that must be collected during the Permit term. The number in parentheses indicates the minimum number of samples that must be collected, across all applicable monitoring types, during each of the five years of the permit. For example, 75 total samples must be collected for total PCBs and 60 total samples for mercury by each set of Santa Clara County and Alameda County during the term of the permit. San Mateo and Contra Costa Counties, because of smaller program size, must collect 65 PCBs and 50 total samples for mercury. Permittees must collect a minimum of 8 PCBs and 8 mercury samples every year of the Permit term, including the final year. It is possible that data can satisfy multiple monitoring types. However, the intent of the Permit is to achieve a distribution of monitoring effort across all applicable monitoring information needs. Therefore, no more than 25 percent of samples for any pollutant may be used to satisfy requirements for multiple monitoring categories for that pollutant. This requirement is intended to ensure that monitoring is focused to provide the best information to answer specific management questions.

[b] This column indicates the monitoring types from Table 8.1 that are applicable to this POC along with the minimum number of samples that shall be collected by each set of Permittees (i.e., Santa Clara County, San Mateo County, Alameda County, and Contra Costa County) by the end of the Permit term. The applicable monitoring type(s) is also stated to illustrate the management information need(s) motivating the collected data. For example, each set of Permittees (i.e., the Countywide Programs for Santa Clara, San Mateo, Alameda, and Contra Costa counties) must collect and analyze at least 8 samples to address monitoring types 1-5 in Table 8.1 for both total PCBs and total mercury. Some collected samples may address multiple management questions.

[c] Permittees, collectively, shall produce or cause to be produced a stormwater monitoring strategy for emerging contaminants (ECs) April 1, 2023 that prioritizes ECs for stormwater monitoring listed in this table and possibly others and establishes an approach for sampling stormwater ECs based on specific or likely physico-chemical properties, sources, transport pathways, and fate of prioritized ECs. Permittees must conduct or cause to be conducted ECs stormwater monitoring to execute the ECs stormwater monitoring strategy at a level of effort indicated in the table. This level of effort can be satisfied either through sampling and analysis of the number of samples indicated in this table or through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.

[d] Total Organic Carbon (TOC) data are not used independently. Rather, TOC can be useful for normalizing PCBs data collected in water and sediment. TOC shall be collected concurrently with PCBs data that should be normalized to TOC. Similarly, suspended sediment concentrations (SSC) samples should be collected and analyzed when water samples are collected that will be used to assess loads, loading trends, or BMP effectiveness for PCBs and Mercury. Hardness data are used in conjunction with copper concentrations collected in fresh water.

iii. **POC Parameters and Analytical Methods –** Samples collected consistent with Table 8.2 shall be analyzed for parameters listed in Table 8.3. Where no laboratory method is listed in Table 8.3, Permittees shall use U.S. EPA or SWAMP-approved methods. There are no analytical methods listed in Table 8.3 for ECs as there are not U.S. EPA-approved methods for most of these contaminants. Monitoring for ECs is investigatory monitoring to provide information on EC loads, concentrations, and presence/absence rather than compliance determination. Accordingly, specification of analytical method is not mandatory. Moreover, the sampling and analysis is likely to be conducted through the San Francisco Bay Regional Monitoring Program, which has a robust and well-established quality assurance process, and the laboratories chosen for the EC analyses will be applying state-of-the-science analytical methods for the detection and quantification of ECs in stormwater samples.

Table 8.3 POC Analytes and Analytical Methods

Pollutant of Concern	Matrix	Analyte(s) or Test Species	Laboratory Analytical Methods
Polychlorinated Biphenyls (PCBs)	Water	Total PCBs	U.S. EPA 1668 (RMP 40)
		Total Organic Carbon	SM5310B
		Suspended sediments (SSC)	ASTM D3977-97
	Bedded Sediment	Total PCBs	As appropriate to address the management information need: U.S. EPA 1668 (RMP 40), 8082A, or 8270D modified by Method 1625
		Total organic carbon	U.S. EPA 9060
Mercury	Water	Total Mercury	U.S. EPA 1631 Rev E
	Bedded Sediment	Total Mercury	U.S. EPA 7473
Copper	Water	Total Copper	U.S. EPA 200.7
		Dissolved Copper	U.S. EPA 200.8
		Hardness	U.S. EPA 130.1 or 130.2

C.8.g. Pesticides and Toxicity Monitoring

Permittees shall conduct wet and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides-related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Water Board modify, reduce or eliminate this monitoring requirement, provided the resultant change would result in overall improvement of pesticide monitoring data collection.

In fulfilling the requirements of Provision C.8.g, Permittees may collaborate with the California Department of Pesticide Regulation (CDPR) for data collection and analysis. For data collected through such collaboration, CDPR's standard operating procedures and quality assurance/quality control methods

may be used in place of the SWAMP comparability requirements in subprovisions C.8.b and in C.8.g.

i. **Toxicity in Water Colum**n - Dry Weather

(1) Field and Laboratory Method – Permittees shall collect grab samples of receiving water using applicable SWAMP comparable methodology. These samples shall be analyzed for the test organisms listed, and by the methods described, in Table 8.4.

Toxicity shall be evaluated using the Test of Significant Toxicity (TST) statistical approach.[48] Each sample shall be subject to determination of "Pass" or "Fail" and shall indicate "Percent Effect" from toxicity using nondiluted samples. The TST null hypothesis shall be "mean sample response ≤ 0.75 × mean control response." A test result that rejects this null hypothesis shall be reported as "Pass." A test result that does not reject this null hypothesis shall be reported as "Fail." The relative "Percent Effect" of the sample is defined and reported as: ((Mean control response – Mean sample response) ÷ Mean control response)) × 100.

(2) Sample Design/Locations – Sample locations may be selected by Permittees to monitor locations where toxicity could be likely; to coincide with creek restoration sites; or to resample a location where toxicity has been found in the past.

(3) Frequency, Timeframe and Number of Sites – Permittees shall annually collect in the dry season at least the minimum number of samples as shown below.

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

[48] *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A, Figure A-1, and Table A-1.

Table 8.4 Water Column Aquatic Toxicity Analytical Procedures

Test Species	Test Endpoint(s)	Units	U.S. EPA Method
Pimephales promelas (Fathead Minnow)	Larval Survival and Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013[49] EPA 833-R-10-003[50]
Ceriodaphnia dubia (Freshwater Crustacean)	Survival[a]	Pass or Fail, % Effect <25% Passes, >25% Fails	EPA-821-R-02-013 EPA 833-R-10-003
Ceriodaphnia dubia (Freshwater Crustacean)	Reproduction	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Selenastrum capricornutum (Green Algae)	Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Hyalella azteca (Freshwater Amphipod)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012[51] EPA 833-R-10-003
Chironomus dilutus (midge)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012 EPA 833-R-10-003

[a] The *Ceriodaphnia dubia* chronic toxicity test design for the survival endpoint is not amenable to the TST, Welch's t-test so the survival endpoint will be determined as a percent effect using the TST approach. A percent effect less than 25 percent will be considered a "pass," and a percent effect equal to or greater than 25 percent will be considered a "fail."

[b] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent.

[49] Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136.

[50] National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003) 2010.

[51] *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). See Appendix B, page 238, for *H.azteca* and *C.dilutus* methods.

ii. Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of creek sediment using applicable SWAMP-comparable methodology. These samples shall be analyzed for the pollutants and organisms listed and by the methods described on Table 8.5. Where no laboratory method is listed in Table 8.5, Permittees shall use U.S. EPA- or SWAMP-approved methods.

(2) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, or to resample a location where toxicity has been found in the past, for example.

Table 8.5 Sediment Toxicity & Pollutants Analytical Procedures

Test Species or Pollutant	Units	Laboratory Method
Hyalella azteca and Chironomus dilutus survival[a]	Pass/Fail using TST, % Effect[a]	EPA-600/R-99-064[52]
Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin		EPA 3540C followed by EPA 8270D by NCI-GCMS
Fipronil and its degradates (fipronil-sulfone, fipronil-desulfinyl, fipronil sulfide)		
Total PAHs		
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc		
Total organic carbon		
Grain size		

[a] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent. The false positive rate (beta error) is 0.05 and the negative rate (alpha error) is 0.25 for these test methods.

[52] *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (EPA 600/R-99-064) Second Edition. March 2000.

(3) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past, for example.

(4) Frequency, Timeframe, and Number of Sites – Permittees shall collect at least the minimum number of samples annually as shown:

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

iii. Wet Weather Pesticides and Toxicity Monitoring

(1) Field and Laboratory Method – Permittees shall collect water column samples and analyze them for the following parameters using the methods specified in Tables 8.4 and 8.5. For imidacloprid, Permittees shall specify an analytical method that achieves a reporting level of 0.01 ppb.

- Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin
- Imidacloprid
- Fipronil and its degradates fipronil-sulfone, fipronil-desulfinyl, fipronil sulfide and fipronil amide (amide is optional - do it if lab offers the suite)
- Toxicity

(2) Sample Design/Locations – Permittees shall collect samples annually during storm events. Sample locations shall be representative of urban watersheds (i.e., bottom of watershed locations).

(3) Frequency, Timeframe, and Number of Sites – If this (Provision C.8.g.iii) sampling is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term, with a minimum

of six (6) samples collected by the end of the third water year of the permit term. If this (Provision C.8.g.iii) sampling is conducted by Countywide Stormwater Programs, Permittees shall collect at least the minimum number of samples as shown below:

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

iv. **Follow-up** – Permittees shall provide notification in the next Urban Creeks Monitoring Report when analytical results indicate any of the following:

(1) A toxicity test of growth, reproduction, or survival of any test organism is reported as "fail" in both the initial sampling and a second, follow-up sampling, and both have ≥ 50% Percent Effect;

(2) A pollutant is present at a concentration exceeding its water quality objective in the Basin Plan; or

(3) For pollutants without water quality objectives, results exceed Probable Effects Concentrations or Threshold Effects Concentrations.[53]

C.8.h. Reporting

i. **Water Quality Standard Exceedance –** When data collected pursuant to Provisions C.8.a.-C.8.g. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. This reporting requirement shall not apply to continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are addressed pursuant to

[53] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31. More recent TECs and PECs may be used if lower than stated in MacDonald 2000.

Provisions C.9 through C.12, C.14, C.18, and C.19, consistent with Provision C.1.

ii. **Electronic Reporting –** The Permittees shall submit to the California Environmental Data Exchange Network (CEDEN) all results from monitoring conducted pursuant to Provisions C.8.d. LID Monitoring, C.8.e Trash Monitoring, C.8.f Pollutants of Concern Monitoring, and C.8.g. Pesticides and Toxicity Monitoring. Data that CEDEN cannot accept are exempt from this requirement.

(1) Data shall be submitted in SWAMP formats and with the quality controls required by CEDEN.

(2) Data collected during the previous October 1–September 30 period shall be submitted by March 31 of each year.

iii. **Urban Creeks Monitoring Report –** The Permittees shall submit a comprehensive Urban Creeks Monitoring Report at the countywide level no later than March 31 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Each Urban Creeks Monitoring Report shall contain summaries of C.8.d LID Monitoring, C.8.e Trash Monitoring, C.8.f Pollutants of Concern Monitoring, and C.8.g Pesticides and Toxicity Monitoring, including the following:

(1) **A LID Monitoring Status Report**, which, at a minimum, includes the following information:

(a) A summary of the LID Monitoring Methods and study designs used in the preceding water year, at each sampled LID component, facility or system.

(b) A summary table that lists monitoring samples collected during the preceding water year during the Permit term, including at a minimum, the following information for each sample location: Site ID; the name or ID of the LID component, facility or system name; latitude and longitude of the LID component, facility or system; type of LID component, facility or system (e.g., bioretention); characteristics and land use of the tributary drainage area of the LID component, facility or system; other management actions and controls present in the tributary drainage area of the LID component, facility or system; sample dates; and concentrations of parameters measured.

(c) A summary of lessons learned, progress made, and interim conclusions, for all samples collected during the previous water year.

(d) For all data generated during the preceding water year, a statement of data quality.

(e) The raw data generated by the preceding water year, made available to the Water Board and third parties.

(f) An outline of steps (including but not limited to study designs, methods and sites) for the upcoming water year.

(g) An analysis of the data, including the following:

(i) Identification and analysis of any trends in stormwater or receiving water quality.

(ii) A discussion of the data for each monitoring program component, which includes:

a. Monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, the California Toxics Rule, and other applicable water quality control plans;

b. Where appropriate, hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

c. Identification and prioritization of water quality problems;

d. Identification of potential sources of water quality problems;

e. Description of follow-up actions;

f. Evaluation of the effectiveness of existing control measures; and

g. Identification of management actions needed to address water quality problems.

(2) An Annual Trash Monitoring Progress Report,[54] which, at a minimum, includes the following information:

(a) Narrative description of monitoring conducted, including the number of sites monitored and the number of monitoring events completed;

(b) Description of storms events that were sampled, including the date(s) and times when samples were collected, intensity and duration of the storm event, a description of where along the hydrograph the storm event was sampled, and justification used to determine the storm event was of appropriate size to displace and/or mobilize the transport of trash though the MS4 system;

[54] The Annual Trash Monitoring Progress Report shall be a single collective regionwide report. With their UCMRs, all Permittees shall include a copy of the Annual Trash Monitoring Progress Report.

(c) Narrative description, including maps, of any MS4 outfalls, homeless encampments and illegal dumping sites, located upstream of each Outfall Monitoring sample site;

(d) Description and the results of data analysis methods, including statistical analyses;

(e) Results and lessons learned;

(f) Data quality assurance procedures that were implemented for samples collected;

(g) Monitoring events (including locations and methods) planned for the subsequent fiscal year(s);

(h) A comprehensive detailed discussion of implementation of Provision C.8.e.iii.(8); and

(i) Updates of required Trash Monitoring Plan elements.

(3) **A Pesticides and Toxicity Monitoring Status Report**, which includes the following information:

(a) A complete Water Year Summary Table that lists the monitoring sites, with a row for each site. The table columns contain: Site ID; creek name; latitude; longitude; permittee jurisdiction(s); water column toxicity (acute); water column toxicity (chronic); sediment toxicity (acute); sediment toxicity (chronic); and sediment chemistry. For each site, list the site information and check the parameters sampled at that site. Provide a statement of the data quality and an analysis of the data, including:

(i) Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, Ocean Plan, and California Toxics Rule and other applicable water quality control plans;

(ii) Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

(iii) Identify and prioritize water quality impairments;

(iv) Identify and potential sources (and actual, if known) of water quality impairments, and provide sufficient justification for those potential sources;

(v) Describe follow-up actions;

(vi) evaluate the effectiveness of existing management actions; and

(vii) identify additional management actions needed to address water quality impairments.

iv. Pollutants of Concern Monitoring Reports

(1) In each Urban Creeks Monitoring Report, the Permittees shall submit a report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year. The report shall include (for preceding year and projected for forthcoming year): monitoring locations, number and types of samples collected, purpose of sampling (management question addressed), and analytes measured. Any data not reportable to CEDEN should also be included in the Urban Creeks Monitoring Report due annually on March 31.

(2) Receiving Water Limitations Assessment Report

(a) By no later than March 31, 2023, Permittees shall submit a report with the following information:

(i) Relevant water quality objectives against which to compare monitoring data;

(ii) Analytes in addition to those listed in Table 8.2 to monitor based on assessment of the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination; and

(iii) Identification of waterbodies to be sampled, sampling locations within those waterbodies, and sampling schedule consistent with the requirements in Tables 8.1 and 8.2.

(b) The report shall be subject to approval by the Executive Officer for compliance and technical adequacy. Upon approval by the Executive Officer, Permittees shall augment the RWLs assessment monitoring required in Tables 8.1 with the analytes identified in the report.

(c) By no later than March 31, 2026, or as part of the Integrated Monitoring Report, Permittees shall submit an updated Receiving Water Limitations Assessment Report with proposed monitoring to be conducted during the next permit term.

v. Integrated Monitoring Report – By no later than March 31, 2026, Permittees shall submit an Integrated Monitoring Report in lieu of the annual Urban Creeks Monitoring Report. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit. The Integrated Monitoring Report

shall report on all the data collected since the previous Integrated Monitoring Report[55] and shall contain the following:

(1) The information described in Provisions C.8.h.iii.(1)-(3), pertaining to the monitoring data collected during the preceding (third) water year of the Permit term;

(2) A comprehensive analysis of all data collected pursuant to Provision C.8. since the previous Integrated Monitoring Report,[55] and may include other pertinent studies.

For LID Monitoring and Trash Monitoring, this shall additionally include a summary of the methods and study designs used in all preceding water years, at each sample location. And, a summary of lessons learned, progress made, data, results, analyses, and conclusions, for all samples collected during all prior water years during the Permit term;

(3) For POCs, methods, data, calculations, load estimates, and source estimates for each POC parameter, as applicable;

(4) A budget summary for each monitoring requirement (for each year of the Permit term); and

(5) With cause and justification, recommendations for changes to any of the elements of Provision C.8 in future Permit terms.

vi. Comprehensive Bioassessment Final Report – By no later than March 31, 2024, the Permittees shall collectively submit a comprehensive analysis of all bioassessment monitoring conducted by the RMC during MRP 1 and MRP 2, for Water Years 2012-2021.

vii. Standard Report Content – All monitoring reports shall be clear, concise, and well-organized, and shall include the following information:

(1) An Executive Summary;

(2) The purpose of the monitoring and brief description of the study design rationale;

(3) Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data;

(4) Brief descriptions of sampling protocols and analytical methods;

(5) Sample location description, including water body name and segment and latitude and longitude coordinates;

[55] Excluding Creek Status Monitoring conducted subsequent to the submittal of the Integrated Monitoring Report during the Previous Permit.

(6) Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue);

(7) Concentrations detected, measurement units, and detection limits;

(8) Assessment, analysis, and interpretation of the data for each monitoring program component;

(9) A listing of volunteer and other non-Permittee entities whose data are included in the report; and

(10) Assessment of compliance with applicable water quality standards.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system.

This provision implements requirements of the TMDL for Diazinon and Pesticide-Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Urban-use pesticides of concern (Pesticides of Concern) to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin); carbamates (e.g., carbaryl and aldicarb); and neonicotinoids (e.g., imidacloprid, acetamiprid, and dinotefuran).

C.9.a. Maintain and Implement an Integrated Pest Management Policy or Ordinance and Standard Operating Procedures

All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of Integrated Pest Management (IPM)[56] and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance.

[56] The Glossary attached to this Permit includes IPM definitions adapted from the draft UP Provisions.

i. **Task Description** – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides does not cause or contribute to pesticide-related toxicity in receiving waters.

ii. **Implementation** – Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property.

iii. **Reporting**

(1) In each Annual Report, Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of Pesticides of Concern to water quality.

(2) In each Annual Report, Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and integration of several strategies, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term.

(3) In their 2023 Annual Reports, the Permittees shall provide links to their IPM policies or ordinances and IPM standard operating procedures. Permittees shall submit updated links in subsequent Annual Reports, if those links change.

C.9.b. Train Municipal Employees

i. **Task Description** – The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy and/or ordinance and standard operating procedures. This training may also include other training opportunities, such as the ReScape California Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided.

ii. Reporting

(1) In each Annual Report, Permittees shall report the percentage of municipal employees who apply pesticides who have received training in the Permittees' IPM policy and/or ordinance and IPM standard operating procedures within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc.

(2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.

C.9.c. Require Contractors to Implement IPM

i. Task Description – The Permittees shall include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall monitor contractor pesticide applications to ensure that contractors implement their contract specifications in accordance with the Permittee's IPM policies and/or ordinances and standard operating procedures. Contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee that an individual employee will always use IPM strategies. Thus, periodic Permittee observation and verification of contractor performance is necessary.

ii. Implementation – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used.

iii. Reporting – In each Annual Report, Permittees shall describe how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.

C.9.d. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (https://www.cdpr.ca.gov/docs/legbills/calcode/040501.htm#a6970).

ii. **Reporting** – In each Annual Report, Permittees shall briefly describe the communications they have had with county agricultural commissioners and report follow-up actions to correct violations of pesticide regulations.

C.9.e. Public Outreach

i. **Task Description** – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.

ii. **Implementation** – The Permittees shall conduct each of the following:

(1) **Point of Purchase Outreach**: The Permittees shall:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.

(2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

(3) **Outreach to Pest Control Professionals:** The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by EcoWise Certified or a functionally equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BAMSC; CASQA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators.

iii. **Reporting** – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that

respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience.

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description** – The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting** – In each Annual Report, Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

C.9.g. Evaluate Implementation of Pesticide Source Control Actions

i. **Task Description** – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.

ii. **Implementation** – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors,

evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule.

iii. **Reporting** – In their 2025 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-f (including the effectiveness of outreach efforts required by Provision C.9.e); a discussion of any improvements made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges, Discharge Prohibition A.2, and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of this provision. Flood management agencies are not subject to these trash reduction requirements except for those included in Provision C.10.c.

C.10.a. Trash Reduction Requirements

Permittees shall implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025.

i. **Schedule** - Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule:

(1) 90 percent by June 30, 2023; and

(2) 100 percent by June 30, 2025.

Permittees that do not attain the 90 percent compliance benchmark by June 30, 2023, shall submit a revised trash load reduction plan as described in Provision C.10.d and a schedule of implementation of additional trash load reduction control actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent compliance benchmark by June 30, 2025.

ii. **Trash Generation Area Management** - Permittees shall demonstrate attainment of the Provision C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long-Term Trash Reduction Plans, submitted in February 2014, in accordance with the requirements and accounting set forth in this provision. The February 2014 maps provide the 2009 trash levels and delineate trash generation areas within Permittees' jurisdictions into the following trash generation rate categories:

Low = less than 5 gal/acre/yr;

Moderate = 5-10 gal/acre/yr;

High = 10-50 gal/acre/yr; and

Very High = greater than 50 gal/acre/yr.

Permittees also designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, within which they will implement trash control actions. With the 2024 Annual Report, Permittees shall submit a revised Trash Generation Area Map that includes trash management areas, as well as private land drainage areas (See Provision C.10.a.ii.b) that will be retrofitted with full trash capture devices, or equivalent, by June 30, 2025. The updated trash generation map(s) shall include GIS layers and appropriate metadata (including tables etc.) that identify locations and associated drainage areas of full trash capture systems, and other trash control actions, and shall highlight any revisions or changes from the previous map(s). Permittees may provide access to multilayered GIS maps that account for other trash control action details and locations rather than submitting that information in a document. Maps and data generated through this effort may be used to illustrate progress toward achieving the trash reduction requirements in Provision C.10.a.i.

(a) Permittees shall implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better.

A full capture device or system is a treatment control, or series of treatment controls, including, but not limited to, a multi-benefit project (as defined in the Trash Amendments) or a low-impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain. The device(s) must also have a trash reservoir large enough to contain a reasonable amount of trash safely without overflowing trash into the overflow outlet between maintenance events. Types of systems certified by the State Water Resources Control Board are deemed full capture systems. A stormwater treatment facility implemented in accordance with Provision C.3 is also deemed a full capture system if the facility, including its maintenance, prevents the discharge of trash to the downstream MS4 and receiving waters and discharge points from the facility, including overflows, are appropriately screened or otherwise configured to meet the full trash capture screening specification for storm flows up to the full trash capture one-year, one-hour storm hydraulic specification.

Actions equivalent to full trash capture are actions that send no more trash down the storm drain system than a full trash capture device would allow, which is essentially no trash discharge except in very large storm flows. The Provision C.10.a.i percent reductions shall be demonstrated by percent of 2009 Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation by the Provision C.10.a.i mandatory deadlines.

(b) By July 1, 2025, Permittees shall ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of actions equivalent to or better than full trash capture systems shall be assessed with visual assessments in accordance with Provision C.10.b.iii. If there is a full trash capture device downstream of these private lands that is designed, operated, and maintained to control trash discharges from that land area, no other trash control is required.

C.10.b. Demonstration of Trash Reduction Outcomes

i. **Full Trash Capture Systems** – Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each full trash capture system, including the mapped location and drainage area served by each system. Permittees shall provide their respective vector control agencies with the names and locations of new and existing full trash capture devices.

(a) **Inspection and Maintenance** – Permittees shall inspect and maintain full trash capture devices to ensure that they are operating appropriately and have sufficient operating capacity to capture trash consistent with the requirements of this Provision. The inspection and maintenance of each full capture device shall be at a frequency sufficient to prevent plugging, including plugging of the 5 mm screen leading to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. At a minimum, all full trash capture devices shall be inspected and maintained once per year. In High and Very High trash generation areas, all full trash capture devices shall be inspected at least twice per year (and maintained as necessary), with the inspections spaced at least three months or more apart.

(b) For catch basin insert type full capture systems, if any such device is found to have a plugged or blinded screen, or is 50 percent full or greater, during an inspection or a maintenance event, the inspection and maintenance frequency shall be increased so that the device is neither plugged nor 50 percent or more full of trash at the next inspection or maintenance event. For high-flow capacity devices, if any such device is found to have a plugged or blinded screen, or exhibits a condition that exceeds the manufacturer's guidelines for requiring maintenance, the inspection and maintenance frequency shall be increased so that the device is neither plugged nor exceeds the manufacturer's guidelines during the next inspection or maintenance event.

ii. **Maintenance Records** – Permittees shall retain device-specific maintenance records, including, at a minimum: device type, date of installation, location, drainage area, date(s) of inspection and maintenance, the capacity condition of the device at the time of inspection and maintenance (full and overflowing or with storage capacity remaining), any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, any damage reducing function, or other negative conditions. A summary of this information shall be reported in each Annual Report and may be limited to the number of full capture devices maintained that exhibited a plugged, 50 percent or more full, or overflowing condition upon inspection or maintenance.

(a) **Certification** – Permittees shall certify annually that each full trash capture system is operated and maintained to meet full trash capture system requirements. Drainage areas served by an adequately maintained full trash capture system will be considered equivalent to or better than a Low trash generation rate area.

iii. **Other Trash Management Actions** – Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.

(a) **Implementation Documentation** – Permittees shall maintain documentation of trash control actions that describes each action or combination of actions, the level of implementation, the timing and frequency of implementation, standard operating procedures if applicable, location(s) of implementation actions including mapped location(s) and drainage area(s) affected or description of areal extent, tracking and enforcement procedures if applicable, and other

information relevant to effective implementation of the action or combination of actions.

(b) **Visual Assessment of Outcomes of Other Trash Management Actions** – Permittees shall conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see ProvisionC.10.b.iii.(b)(iv)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions. Permittees may assess and account for one or more trash generation areas in a single trash management area within which a control action or combination of control actions is implemented. The visual on-land assessment method used shall meet or exceed the following criteria:

(i) Conduct observations of the sidewalk, curb and gutter within each trash management area, or locations associated with sources of trash.

(ii) Conduct observations at randomly selected locations covering at least ten percent of a trash management area's street miles or at strategic locations, provided they are representative of trash generation in the management area and they will represent the effectiveness of the control action(s) implemented or planned in the management area.

(iii) Conduct observations at a frequency consistent with known or estimated trash generation rate(s) within a trash management area and the time frequency of the control action(s) implemented or planned in the management area. Conduct observations for effectiveness approximately at the halfway point of the interval between instances of recurring trash control actions such as street sweeping and on-land cleanup.

(iv) Permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Permittees shall submit such evidence to the Executive Officer as a submittal separate from any other submittals or reports. If this evidence is accepted by the Executive Officer, the Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these management actions at the specified performance standard.

iv. **Percentage Discharge Reduction** – Percentage discharge reduction from 2009 from Very High generation areas reduced to High, Moderate, and Low, High generation areas reduced to Moderate and Low, and Moderate trash generation areas reduced to Low trash generation category to meet the required total percent reduction (% Reduction) shall be calculated based on the following formula:

$$\% \text{ Reduction} = 100\ [(12A_{VH(2009)} + 4A_{H(2009)} + A_{M(2009)}) - (12A_{vh} + 4A_{h} + A_{M})]\ /(12A_{VH2009} + 4A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$ = total amount of the 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of the 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of the 2009 moderate trash generation category jurisdictional area

A_{VH} = total amount of very high trash generation category jurisdictional area in the reporting year

A_{H} = total amount of high trash generation category v jurisdictional area in the reporting year

A_{M} = total amount of moderate trash generation category jurisdictional area in the reporting year

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

100 = fraction to percentage conversion factor

v. **Source Control** – Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items other than those addressed under previous Permits (foam foodware and single-use plastic bags) may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions. To claim a load percentage reduction value, Permittees must provide substantive and credible evidence that new source control actions are being implemented jurisdiction-wide and reduce trash by the claimed value. A Permittee may support its claimed source reduction value with reference studies from other jurisdictions provided that it also provide credible evidence that the chosen source control action would achieve comparable trash reduction if implemented in the Permittee's jurisdiction.

A jurisdiction-wide source control load reduction value cannot be claimed after June 30, 2025. However, Permittees may demonstrate and claim full trash capture equivalence of a source control in specific trash generation areas or in combination with other controls in an area if the control or combination of controls are documented, assessed, and verified in accordance with Provision C.10.b.iii.

vi. **Partial Trash Reduction – Curb Inlet Screens** – Studies conducted by the Permittees during MRP 2 assessed the benefit of other control measures, such as curb inlet screens in combination with street sweeping, in reducing the amount of trash discharged through MS4s. However, additional information is needed to determine the effectiveness of curb inlet screens in reducing trash within a given trash management area. Permittees may demonstrate through further assessment and study, as described below, that the installation and appropriate maintenance of curb inlet screens, accompanied by street sweeping at an appropriate frequency, within Moderate trash generation areas can effectively reduce the trash generation rate to Low under the following conditions:

(a) Permittees shall propose an acceptable method to verify that the area where curb inlet screens have been or will be installed are Moderate trash generating. Permittees shall also propose an appropriate method and frequency of verification, post installation, on the change (if any) in the trash generation rate following the installation of curb inlet screens.

(b) Permittees shall propose an appropriate street sweeping frequency where curb inlet screens are installed that, when implemented, effectively reduces the area's trash generation rate to Low.

(c) At a minimum, Permittees shall evaluate street sweeping effectiveness based on multiple factors other than frequency, and sufficient to allow a determination of proper and effective street sweeper access. Examples of additional evaluations that could be completed include effectiveness associated with enhanced street/curb accessibility via proper signage, ticketing, and towing vehicles when appropriate.

(d) The inspection and maintenance of each curb inlet screen shall be conducted at a frequency sufficient to ensure the screen is functioning appropriately, e.g., a screen is not stuck in an open position or plugged, including plugging of the screen leading to opening of the screen under flows less than those described in Provision C.10.a.ii.(a).

(e) Permittees shall propose an appropriate method of covering/blocking horizontal surface grates during street sweeping events (to prevent

trash from being swept into the grates), and an appropriate method for capturing smaller pieces of trash/debris from entering the MS4 via the horizontal surface grates.

(f) Permittees shall submit the results of the additional study, as described above, for Executive Officer approval. The report must appropriately describe and demonstrate the conditions under which the combined use of curb inlet screens and street sweeping effectively reduce the trash generation rate of an area from Moderate to Low.

C.10.c. Requirements for Flood Management Agencies

Flood management agencies must continue to implement requirements for trash capture systems, as specified in Table 10-1, below. Flood management agencies must also implement trash control measures such as trash pickups and installation of trash receptacles, to control Moderate, High, and Very High trash generation areas within their jurisdiction including, but not limited to, parking lots, trailhead areas, and along recreational paths and trails, and demonstrate effectiveness of these trash control measures as specified in Provision C.10.b.iii.

Table 10-1. Requirements for Flood Management Agencies

Flood Management Agency	Trash Capture Requirement
Santa Clara Valley Water District	4 trash booms or 8 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda County Flood Control Agency	3 trash booms or 6 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda Co. Zone 7 Flood Control Agency	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Contra Costa County Flood Control Agency	2 trash booms or 4 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
San Mateo County Flood and Sea Level Rise Resiliency District	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Vallejo Flood & Wastewater District	1 trash boom or 2 outfall capture devices or equivalent measures (minimum 2 ft. diameter outfall)

C.10.d. Trash Load Reduction Plans

i. Permittees shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the Provision C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report. The Plan shall describe trash load reduction control actions being implemented or planned and the trash generation areas or trash management areas where the actions are or will be implemented, including jurisdiction-wide actions such as source control ordinances. The Plans may include actions to control sources outside of the Permittees' jurisdictions that are causing or contributing to adverse trash impacts in the receiving water(s). Permittees that choose to implement such control actions may account for them towards meeting the Provision C.10.a Trash Load Reduction requirements as long as they can demonstrate the controls will be sustained, and they quantify the sustained load reduction benefit (relative to control actions in the trash generation areas or trash management areas in their jurisdiction that drained to the affected receiving water).

ii. Permittees shall calculate their trash load reduction, relative to 2009 baseline conditions, without the trash load reduction offsets described in Provision C.10.f, as of June 30, 2023. If that reduction is less than 90 percent, then Permittees shall develop and implement an updated Trash Load Reduction Plan. Pursuant to Provision C.22.c, the updated Trash Load Reduction Plan shall include a schedule of additional trash load reduction implementation actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent reduction from 2009 levels, achieved through implementation of full trash capture, or other equivalent actions, consistent with the requirements of this Provision, by June 30, 2025. Permittees shall submit their updated Trash Load Reduction Plans with their 2023 Annual Report.

iii. Permittees unable to attain 100 percent trash load reduction, relative to 2009 baseline conditions, by June 30, 2025, while accounting for credits from new source controls (as described in Provision C.10.b.v) may be granted additional time until December 31, 2025, and East Contra Costa County Permittees until June 30, 2026, to achieve 100 percent reduction via full trash capture, or equivalent, contingent on developing and implementing an approved Direct Discharge Control Plan as described in Provision C.10.f.ii.

C.10.e. Impracticability Report

Permittees may collectively submit a programmatic report by March 31, 2023, for the approval of the Executive Officer, that describes conditions under which

it is impracticable to control trash via full trash capture devices. The impracticability report shall include, but not be limited to, the following:

i. A description of the engineering constraints that prevent the installation of full trash capture devices.

ii. A process for evaluating and determining impracticability of full trash capture devices.

iii. Alternative Controls: The report shall include alternative controls or a combination of controls that may be implemented to reduce trash loads to meet the requirements and deadlines in Provision C.10.a. Examples of alternative controls include, but are not limited to, requiring businesses or property owners to pick up litter, successful implementation of excess trash receptacles and collection services, increased code enforcement or parking enforcement/ticketing/towing, additional trash pick-ups, street sweeping, assessment and execution of cooperative implementation opportunities with Caltrans or neighboring Permittees, curb inlet screens, and long term measures such as pump station or storm drain retrofits, implementation of green stormwater infrastructure that controls trash, or changes to the catchment to allow effective implementation of full trash capture measures.

iv. Permittees shall use an approved trash impracticability report in developing the updated Trash Load Reduction Workplans required by Provision C.10.d.

C.10.f. Optional Trash Load Reduction Offset Opportunities

i. Creek and Shoreline Cleanup – A Permittee may offset part of its Provision C.10.a trash load percent reduction requirement by conducting cleanup of creek and shoreline areas. The creek and shoreline cleanup efforts should be conducted at a minimum frequency of twice per year, and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent. Offsets for creek and shoreline cleanups will no longer be applicable after June 30, 2025.

A Permittee may claim a load reduction offset of one percent for the June 30, 2023 mandatory trash reduction compliance benchmark for each total of trash volume removed from cleanups that is ten percent of the Permittees' 2009 trash load volume estimates, based on its trash generation maps and average categorical trash generation rates (see Provision C.10.a.ii), in accordance with the following formula:

1% Reduction Offset (Volume) = $(12 + 4\ A_{H(2009)} + A_{M(2009)})\ OF$

where:

$A_{VH(2009)}$ = total amount of 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of 2009 moderate trash generation category jurisdictional area

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

OF = offset factor equal to (7.5 x 0.1) for the 2023 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

ii. **Direct Trash Discharge Controls** – Permittees with an approved Direct Discharge Control Plan (DDCP) may claim up to fifteen percent using the Provision C.10.f.i formula towards offsetting their Provision C.10.a trash load percent reduction requirement. The DDCP shall include a detailed description of control measures the Permittee will implement to control the direct discharge of trash to receiving waters from non-storm drain system sources. Offsets for direct discharge controls will no longer be applicable after June 30, 2025.

Permittees wishing to submit a new DDCP pursuant to Provision C.10.d.iii shall submit the DDCP for approval no later than April 1, 2024. Permittees with an existing DDCP approved during the Previous Permit shall submit an updated DDCP for approval no later than January 3, 2023, in order to continue claiming trash load percent reduction offsets. DDCPs shall be sufficient to provide trash reduction benefits equivalent to or greater than the areas not yet in compliance, as calculated using the formula in Provision C.10.b.iv, and shall include:

(a) A description of sources of the directly discharged trash;

(b) A description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads, including those associated with unsheltered homeless populations and illegal dumping, in a systematic and comprehensive manner;

(i) For Permittees whose DDCPs address significant discharges from populations experiencing unsheltered homelessness,

systematic and comprehensive implementation of control actions shall include a commitment to, and a plan for, increasing the provision of emergency, transitional, and/or permanent housing, and the following services: trash and sanitary services, and other services which are necessary to reduce discharges associated with unsheltered homelessness, such as RV safe parking areas and pump out services, and social services that can help the unsheltered homeless transition to housing.

The DDCP shall prioritize providing housing and services to people experiencing unsheltered homelessness who are living near receiving waters.

The DDCP shall document the existing capacities for housing and services as of the time of the DDCP's submittal, and include projections of changes to those capacities for each subsequent year during the Permit term.

(ii) For Permittees whose DDCPs address significant discharges from illegal dumping, systematic and comprehensive implementation of control actions shall include a commitment to, and a plan for, actions that will prevent direct discharges of trash to receiving waters from illegal dumping. Such actions include, but are not limited to, abating illegal dumping sites, providing dumping vouchers (particularly to socioeconomically disadvantaged communities), holding free waste drop-off events, and implementing onsite structural BMPs to prevent direct discharges from illegal dumping sites to receiving waters.

The DDCP shall prioritize addressing illegal dumping that occurs near receiving waters.

The DDCP shall document existing sites where illegal dumping occurs, controls at illegal dumping sites, voucher and free waste drop-off programs, and include projections for reductions in illegal dumping, increases of controls at illegal dumping sites, and expansions of (or the creation of) programs to control illegal dumping, such as dumping voucher programs and waste drop-off events, for each subsequent year during the Permit term.

(iii) For Permittees whose DDCPs address significant discharges from both unsheltered homeless populations and illegal dumping sites, Permittees shall submit DDCPs in compliance with both Provisions C.10.f.ii.b.(i) and C.10.f.ii.b.(ii).

(c) A map of the affected receiving water area and associated watershed; and

(d) A description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.

C.10.g. Reporting

Each Permittee shall provide the following in each Annual Report or otherwise by the date specified:

i. With each Annual Report, a summary of trash control actions within each trash management area, including the types of actions, levels of implementation, areal extent of implementation, and whether the actions are ongoing or new, including initiation date.

ii. With their 2024 Annual Report, Permittees shall submit a revised trash generation area map or maps, as described in Provision C.10.a.ii.

iii. With each Annual Report, a summary of implementation actions and progress toward meeting the July 1, 2025, requirement for all private lands to implement full trash capture systems, or be managed with trash discharge control actions equivalent to or better than full trash capture systems, as required in Provision C.10.a.ii.(b).

iv. With each Annual Report, certification that each of its full trash capture systems is operated and maintained to meet full trash capture system requirements; a description of any system(s) that did not meet full trash capture system requirements (e.g., due to plugging or overflowing); and any corrective actions taken.

v. With each Annual Report, an accounting of its non-full trash capture system trash control actions assessments by providing a summary description of assessments in each of its trash management areas, including the number and dates of observations.

vi. Permittees unable to attain the 90 percent mandatory trash reduction compliance benchmark by June 30, 2023, via full trash capture, or equivalent, shall, by June 30, 2023, submit a notice of noncompliance, pursuant to Provision C.22.c and an updated Trash Load Reduction Plan as described in Provision C.10.d.ii.

vii. With their 2023 Annual Report, Permittees shall submit a report evaluating their trash reduction, relative to 2009 baseline conditions, as of June 30, 2023, without including offsets. Permittees unable to meet the 90 percent mandatory trash reduction compliance benchmark without the trash load reduction offsets

described in Provision C.10.f shall submit, with their 2023 Annual Report, an updated Trash Load Reduction Plan as described in Provision C.10.d.ii.

viii. Permittees unable to attain 100 percent trash load reduction, relative to 2009 baseline conditions, by June 30, 2025, while accounting for credits from new source control (as described in Provision C.10.b.v) shall, by June 30, 2025, submit a notice of noncompliance pursuant to Provision C.22.c, including a plan to come into compliance with the 100 percent trash load reduction requirement. Permittees may be granted additional time until December 31, 2025, and East Contra Costa County Permittees until June 30, 2026, to achieve 100 reduction via full trash capture, or equivalent, contingent on developing and implementing a direct discharge control plan (DDCP) as described in Provision C.10.f.ii.

Permittees, except East Contra Costa County Permittees, that are granted additional time until December 31, 2025, to attain 100 percent reduction via full trash capture, or equivalent, shall submit by December 31, 2025, either a report that confirms that they reached 100 percent trash load reduction by December 31, 2025, or a notice of noncompliance pursuant to Provision C.22.c.

ix. By March 31, 2023, Permittees may collectively submit a programmatic report for the approval of the Executive Officer, that describes typical conditions where it may be impracticable to control trash via full trash capture devices, as described in Provision C.10.e.

x. With the 2024 Annual Report, Permittees that offset part of their Provision C.10.a trash load percent reduction requirement through additional cleanup of creek and shoreline areas, as described in Provision C.10.f.i, shall submit a summary of the additional cleanup actions implemented, and the benefit to water quality achieved through those actions.

xi. Starting with the 2023 Annual Report, Permittees with approved DDCPs shall provide the following information in each Annual Report for which they use an offset from the implementation of Provision C.10.f.ii towards their trash load percent reduction:

(1) For Permittees whose DDCPs address significant discharges from unsheltered homeless populations, the following information for the current year, and for each prior year of the Permit term:

The estimated number of people experiencing unsheltered homelessness in their jurisdiction; the estimated number of people experiencing unsheltered homelessness living within approximately 500 feet of receiving waters; the estimated portion of those populations provided housing as described in Provision C.10.f.ii.b.(i); the estimated portion of

those populations served with the services described in Provision C.10.f.ii.b.(i); the number and scope of sanitation controls and services provided to homeless encampments; the number and scope of trash controls and services provided to homeless encampments; and the number and scope of sanitary cleanouts and other services provided to RVs. Each of these reporting elements shall be accompanied by a narrative description.

(2) For Permittees whose DDCPs address significant discharges from illegal dumping sites, the following information for the current year, and for each prior year of the Permit term:

The total number of active illegal dumping sites; the number of active illegal dumping sites within approximately 500 feet of receiving waters; the number of illegal dumping sites where trash was collected and the amount of material collected; dumping vouchers provided (and who they are provided to); dumping vouchers used; and outreach and education provided to the public regarding illegal dumping and the availability of dumping vouchers. Each of these reporting elements shall be accompanied by a narrative description.

(3) For Permittees whose DDCPs address significant discharges from both unsheltered homeless populations and illegal dumping sites, the Permittees shall report on both Provision C.10.g.xi.(1) and C.10.g.xi.(2) in each Annual Report.

C.11. Mercury Controls

The Permittees shall implement the following control program for mercury. This control program consists of load reduction assessment, source control measures, treatment control measures, measures to reduce risk to consumers of Bay fish, and reporting on all these measures according to the provisions below. The provisions implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs for those waters identified therein and reduce mercury loads by approximately 10 kg/yr, making substantial progress toward achieving the urban runoff mercury load allocations established for the TMDLs. The San Francisco Bay mercury TMDL implementation plan calls for attainment of the regionwide, urban runoff wasteload allocation of 82 kg/yr by February 2028. This mercury wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 78 kg/yr compared to loads estimated using data collected prior to development of the TMDL. To measure progress, the TMDL implementation plan calls for attainment of an interim loading milestone by February 2018 of 120 kg/yr, halfway between the 2003 estimated load, 160 kg/yr, and the aggregate allocation. This interim loading milestone has been achieved. The Permittees may comply with any requirement of this Provision through a collaborative effort and are encouraged to do so.

C.11.a. Assess Mercury Load Reductions from Stormwater

i. **Task Description** – The Permittees shall implement an assessment methodology and data collection program to quantify, in a technically sound manner, mercury loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the mercury control program defined by this provision. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area mercury TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

ii. **Implementation Level** – The Permittees shall quantify the mercury load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented

during this Permit term as described in Provisions C.11.b through C.11.e. For this Permit term, the Permittees will achieve a regionwide total load reduction of approximately 10 kg mercury/yr if they implement effective mercury control measures consistent with all requirements of Provisions C.11.b through C.11.g. The Permittee-specific portion of the regionwide mercury load reduction estimate shall be based on the proportion of county population in each municipality.

iii. Reporting

(1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

(2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

(3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.

C.11.b. Program for Source Property Identification and Abatement

i. Task Description – Permittees shall investigate, using both conventional sampling and laboratory analysis techniques, land areas that likely contribute mercury to municipal separate storm sewer system (MS4s). These investigations will likely focus on land areas where industrial activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). For those properties or land areas found to be contributing substantial amounts of mercury or where high mercury concentrations are found (generally areas with sediment concentrations greater than 0.5 mg Hg/kg), Permittees shall take action to abate the mercury sources into their MS4s or refer the properties to the Water Board for follow-up measures. Historical monitoring data suggest that mercury concentrations on or near source properties are similar to those found in urban areas in general so identification of source properties for referral may be based on presence of high PCBs concentrations (generally 0.5 mg PCBs/kg) alone. For each source property referred to the Water Board,

Permittees shall implement interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implement a stormwater treatment system downstream of the property. These enhanced O&M measures shall be sufficient to intercept historically deposited contaminated sediment in the vicinity of the source area and prevent further contaminated sediment from being discharged from the source area to the storm drain system.

ii. **Implementation Level** – Permittees shall investigate the following acreage of likely mercury source properties (accomplished through C.12.b investigations) during the permit term.

- Alameda County: 2,620 acres
- Contra Costa County: 1,700 acres
- San Mateo County: 1,411 acres
- Santa Clara County: 913 acres
- Solano County: 21 acres

If high mercury concentrations associated with a likely source property are detected, Permittees may submit monitoring information to support estimation of the aerial yield to receive mercury load reduction credit, contingent upon implementation of interim enhanced O&M measures in the street or storm drain infrastructure adjacent to the source property or implementation of a stormwater treatment system downstream of the property.

iii. **Reporting**

(1) In each of the 2022 through 2026 Annual Reports, Permittees shall report progress on the acreage of land areas investigated, including progress toward investigation of 100 percent of the old industrial land use indicated above. The reporting shall indicate what action was taken for the parcels investigated (e.g., abatement, referral, enforcement, etc.). Permittees shall submit all supporting data and information including referral reports.

(2) Permittees shall report annually on ongoing enhanced O&M activities associated with all past contaminated property referrals. Prior to all new referrals, Permittees shall submit, for staff review and comment, a detailed description of the enhanced O&M plan for the referred properties.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.11.a.iii(2) on total acreage of land area investigated, area and description of properties referred, description of enhanced O&M measures, and the estimated total mercury mass load reduced (consistent with the approved accounting procedures) resulting from implementing this control measure.

C.11.c. Program for Control Measure Implementation in Old Industrial Areas

i. **Task Description** – Permittees shall implement or cause to be implemented treatment control measures, stormwater diversion to wastewater treatment facilities, redevelopment (provided GSI is implemented in compliance with C.3.b), or other control measures to achieve mercury load reductions. Permittees have substantial (totaling over 33,100 acres) areas of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure or other treatment controls.

- Alameda County: 9,374 acres
- Contra Costa County: 11,199 acres
- San Mateo County: 4,450 acres
- Santa Clara County: 6,647 acres
- Solano County: 1,426 acres

Implementation of treatment control measures on 2,580 acres (which is nearly 8 percent of the land area shown above) will result in a total estimated load reduction of about 108 g mercury/yr (2,580 acres x 70% efficiency x 60 mg mercury/acre/yr estimated yield from old industrial areas, see Fact Sheet) in the area covered by the Permit. Implementation of control measures with efficiency lower than 70% will result in reduced acreage credit (for those lower efficiency control measures) toward fulfillment of the total acreage requirement shown below. The acres credited will be proportional to the ratio of implemented control measure efficiency relative to the efficiency of treatment controls (see Fact Sheet for more explanation and examples). The old industrial land use acreages to be addressed by control measure implementation by the end of the permit term and the estimated mercury load reductions (for 70% control measure efficiency) are shown below. Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on implementation of 70% efficient control measures, or through accounting for the mass reduction of mercury shown in parentheses. If control measures are less than 70% efficient, the required acreage shall be calculated as set forth above.

- Alameda County: 664 acres (28 grams/yr)
- Contra Costa County: 664 acres (28 grams/yr)
- San Mateo County: 445 acres (19 grams/yr)
- Santa Clara County: 664 acres (28 grams/yr)
- Solano County: 142 acres (6 grams/yr)

ii. **Implementation Level** – Permittees shall, within the permit term, implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) to comply with the performance metrics in Provision C.11.c.i. Use of conditionally-approved sizing criteria cited in section C.3.j(3)(b) for treatment control systems will be considered provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria. If a Permittee chooses to comply by demonstrating mercury load reductions, it shall use accounting methods consistent with Provision C.11.a. Implementation of treatment controls and stormwater diversion in mercury-contaminated catchments not designated as old industrial may count toward fulfillment of the required acreage. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence of moderate to high mercury or PCBs soil concentrations (generally soil/sediment concentrations greater than 0.3 mg mercury/kg or 0.2 mg PCBs/kg). Treatment control systems must be designed and sized consistent with Provision C.3.d – (Numeric Sizing Criteria for Stormwater Treatment Systems). Permittees may choose to implement diversions to wastewater treatment systems to address this requirement. Because of the higher removal efficiency of wastewater treatment facilities, each acre addressed by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements provided that the diversion facilities are sized and operated consistent with the sizing requirements used for non-diversion treatment facilities.

iii. **Reporting**

(1) By March 31, 2023, Permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address mercury load reduction requirements included in this provision. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report Permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of

catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.11.a.iii(2) on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total mercury mass load reduced resulting from this implementation.

C.11.d. Mercury Collection and Recycling Implemented throughout the Region

i. **Task Description** – Permittees shall promote, facilitate, and/or participate in collection and recycling of mercury containing consumer products, devices, and equipment (e.g., thermometers, thermostats, switches, bulbs). Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermostats, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and Provision C.11.d requires promotion, facilitation and/or participation in these region-wide recycling efforts to increase effectiveness and public participation.

ii. **Implementation Level** – Permittees shall promote recycling of mercury-containing products and make efforts to increase effectiveness of these recycling efforts throughout the region. Recycling of mercury-containing bulbs and thermostats alone results in a regionwide load reduction of approximately 10 kg mercury per year.[57]

iii. **Reporting**

(1) In each of the 2023 through 2026 Annual Reports, Permittees shall report on efforts to promote recycling of mercury-containing products and efforts to increase effectiveness of these recycling efforts. Permittees shall also report on the mass of mercury-containing material collected throughout the region along with an estimate of the mass of mercury contained in recycled material using the methodology contained in load reduction accounting system described and cited in the Fact Sheet.

C.11.e. Plan and Implement Green Stormwater Infrastructure to Reduce Mercury Loads

i. **Task Description** – Permittees shall implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j. Implementation of green

[57] Geosyntec Consultants and San Francisco Estuary Institute. 2010. “Desktop Evaluation of Controls for Polychlorinated Biphenyls and Mercury Load Reduction.”

stormwater infrastructure will result in a total estimated load reductions of 108 g mercury/yr (see Fact Sheet for basis of estimate).

ii. **Implementation Level** – The level of implementation is determined by the requirements of Provision C.3.j.

iii. **Reporting**

(1) In their 2026 Annual Report, Permittees shall report as part of Provision C.11.a.iii(2)) on all green stormwater projects (e.g., parcel-based, street ROW, and regional projects) implemented during the permit term and provide the total acreage treated and an estimate of the total mercury mass load reduced resulting from this implementation. This reporting shall include summary descriptions of the implemented projects including GSI type, location, and area.

C.11.f. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. **Task Description** – In 2020, Permittees submitted a Reasonable Assurance Analysis and plan (RAA) demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028. Permittees shall evaluate the effectiveness of all mercury control measures and update the RAA as necessary. Updates can be focused on those control measures for which new information is available and for control measures not evaluated in previous efforts. Permittees shall also prepare detailed implementation plans for all control measures to be implemented in and inform permit requirements for the subsequent permit term.

ii. **Implementation level** – Permittees shall update, as necessary, their mercury control measures implementation plan and corresponding reasonable assurance analysis from the previous permit term (2015-2020, MRP 2). The update may be focused on control measures for which new information is available or for those control measures not previously evaluated. The long-term plan must:

(1) Identify all technically and economically feasible mercury control measures to be implemented (including GSI projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Additionally, Permittees shall identify all specific control measures to be implemented, the intensity of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term. This implementation plan must include:

(4) Identification of all control measures implemented during the current permit term and any additional control measures to be implemented in the subsequent permit term;

(5) A description of the intensity or extent of control measure implementation (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.);

(6) Identification of accountability metrics to track during the subsequent permit corresponding to the proposed implementation intensity; and

(7) Estimates for load reductions to be achieved through implementation of control measures during subsequent permit term at the proposed intensity.

iii. **Reporting** – Permittees shall submit the updated plan and schedule no later than March 31, 2026.

C.11.g. Fate and Transport Study of Mercury: Urban Runoff Impact on San Francisco Bay Margins

i. **Task Description** – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of mercury discharged from urban runoff to San Francisco Bay margin areas. The studies should focus on near-shore areas contaminated with mercury from historical activity and the expected trajectory of recovery as sources from local watersheds are reduced.

ii. **Implementation Level** – The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the sediment and food web mercury concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, especially in Bay margins, and the identification of drainages where urban runoff mercury are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2023 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2023 Annual Report. The Permittees shall report in the March 15, 2026, Integrated Monitoring Report the findings and results of the studies completed, planned,

or in progress as well as implications of studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.11.h. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence anglers and their families. The risk reduction framework developed in the previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level** – At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2026 Annual Report.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control program for PCBs. This control program consists of load reduction assessment, source control measures, treatment control measures, measures to reduce risk to consumers of Bay fish, and reporting on all these measures according to the provisions below. The provisions implement the urban runoff requirements of the PCBs TMDL for those waters identified therein. By implementing the PCBs control measure program requirements, Permittees will make substantial progress (an estimated 1.47 kg/yr of additional load reduction) toward achieving the urban runoff PCBs wasteload allocation from the TMDL. Of the 2 kg/yr overall load allocation for urban runoff sources for the entire region, 1.47 kg/yr has been allocated to Permittees, and loads must be reduced to this level by March 2030. This PCBs wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 18 kg/yr (14.4 kg/yr from Permittees) compared to loads estimated using data collected in 2003. The Permittees may comply with any requirement of this Provision through a collaborative effort and are encouraged to do so.

C.12.a. Assess PCBs Load Reductions from Stormwater

i. **Task Description** – The Permittees shall implement an assessment methodology and data collection program to quantify, in a technically sound manner, PCBs loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the PCBs control program defined by this provision. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area PCBs TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

ii. **Implementation Level** – The Permittees shall quantify the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented during this Permit term as described in Provisions C.12.b through C.12.g. For this Permit term, the Permittees will achieve an estimated regionwide total load reduction of 1.47 kg/yr PCBs if they implement effective PCBs control measures consistent with all requirements of Provisions C.12.b through

C.12.g. The Permittee-specific portion of the regionwide PCBs load reduction estimate shall be based on the proportion of county population in each municipality.

iii. Reporting

(1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

(2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

(3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.

C.12.b. Program for Source Property Identification and Abatement

i. Task Description – Permittees shall investigate, using both conventional sampling and laboratory analysis techniques, land areas that likely contribute PCBs to MS4s. These investigations will likely focus on land areas where industrial activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). For those properties or land areas found to be contributing substantial amounts of PCBs or where high PCBs concentrations are found (generally areas with sediment concentrations greater than 0.5 mg PCBs/kg), Permittees shall take actions to abate the PCB sources into their MS4s or refer the properties to the Water Board for follow-up measures. For each source property referred to the Water Board, Permittees should implement interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implement a stormwater treatment system downstream of the property. These enhanced O&M measures shall be sufficient to intercept historically deposited contaminated sediment in the vicinity of the source area and prevent further contaminated sediment from being discharged from the source area to the storm drain system.

ii. **Implementation Level** – Permittees shall investigate the following acreage of likely PCBs source properties during the permit term.

- Alameda County: 2,620 acres
- Contra Costa County: 1,700 acres
- San Mateo County: 1,411 acres
- Santa Clara County: 913 acres
- Solano County: 21 acres

Based on data collected through investigating land areas for the presence of source properties during the previous permit terms, this level of implementation will result in PCBs load reductions of approximately 740 g PCBs/yr, 50 percent of which would be credited during this permit term contingent upon implementation of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implementation of a stormwater treatment system downstream of the property.

iii. **Reporting**

(1) In each of the 2022 through 2026 Annual Reports, Permittees shall report progress on the acreage of land areas investigated, including progress toward investigation of 100 percent of the old industrial land use indicated above. The reporting shall indicate what action was taken for the parcels investigated (e.g., abatement, referral, enforcement, etc.). Permittees shall submit all supporting data and information including referral reports.

(2) Permittees shall report annually on ongoing enhanced O&M activities associated with all past contaminated property referrals. Prior to all new referrals, Permittees shall submit, for staff review and comment, a detailed description of the enhanced O&M plan for the referred properties.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii(2) on total acreage of land area investigated, area and description of properties referred, description of enhanced O&M measures, and the estimated total PCBs mass load reduced (consistent with the approved accounting procedures) resulting from implementing this control measure.

C.12.c. Program for Control Measure Implementation in Old Industrial Areas

i. **Task Description** – Permittees shall implement or cause to be implemented treatment control measures, stormwater diversion to wastewater treatment facilities, redevelopment (provided GSI is implemented in compliance with

Provision C.3.b), or other control measures to achieve PCBs load reductions. Permittees have substantial (totaling over 33,100 acres) areas of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure or other treatment controls.

- Alameda County: 9,374 acres
- Contra Costa County: 11,199 acres
- San Mateo County: 4,450 acres
- Santa Clara County: 6,647 acres
- Solano County: 1,426 acres

Implementation of treatment control measures on 2,580 acres (which is about 8 percent of the land area shown above) will result in a total estimated load reduction of about 467 g PCBs/yr (2,580 acres x 10% of area x 70% efficiency x 259 mg PCBs/acre/yr estimated yield from old industrial areas, see Fact Sheet) in the area covered by the Permit. Implementation of control measures with efficiency lower than 70 percent will result in reduced acreage credited (for those lower efficiency control measures) toward fulfillment of the total acreage requirement shown below. The acres credited will be proportional to the ratio of implemented control measure efficiency relative to the efficiency of treatment controls (see Fact Sheet for more explanation and examples). The old industrial land use acreages to be addressed by control measure implementation by the end of the permit term and the estimated PCBs load reductions (for 70 percent control measure efficiency) are shown below. Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on implementation of 70 percent efficient control measures, or through accounting for the mass reduction of PCBs shown in parentheses. If control measures are less than 70 percent efficient, the required acreage shall be calculated as set forth above.

- Alameda County: 664 acres (121 grams/yr)
- Contra Costa County: 664 acres (121 grams/yr)
- San Mateo County: 445 acres (81 grams/yr)
- Santa Clara County: 664 acres (121 grams/yr)
- Solano County: 142 acres (26 grams/yr)

ii. **Implementation Level** – Permittees shall, within the permit term, implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) to comply with the performance metrics in Provision C.12.c.i. If a Permittee chooses to comply by demonstrating PCBs load

reductions, it shall use accounting methods consistent with Provision C.12.a. Implementation of treatment controls and stormwater diversion in PCBs-contaminated catchments not designated as old industrial may count toward fulfillment of the required acreage. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence of moderate to high PCBs soil concentrations (generally soil/sediment concentrations greater than 0.3 mg mercury/kg or 0.2 mg PCBs/kg). Treatment control systems must be designed and sized consistent with Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems). Use of conditionally-approved sizing criteria cited in section C.3.j(3)(b) for treatment control systems will be considered provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria. Permittees may choose to implement diversions to wastewater treatment systems to address this requirement. Because of the higher removal efficiency of wastewater treatment facilities, each acre addressed by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements provided that the diversion facilities are sized and operated consistent with the sizing requirements used for non-diversion treatment facilities.

iii. Reporting

(1) By March 31, 2023, Permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address PCBs load reduction requirements included in this provision. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report Permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii(2) on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total PCBs mass load reduced resulting from this implementation.

C.12.d. Program for Controlling PCBs from Bridges and Overpasses

i. **Task Description** – Permittees shall implement a Caltrans specification (to be developed through proposed requirement in Caltrans stormwater permit, see Fact Sheet for details) to manage, as part of bridge and overpass roadway replacement or major repair, potential PCBs-containing material in bridge roadway expansion joints. Implementation of this specification will result in a total estimated load reductions of 300 g PCBs/yr (see Fact Sheet for calculation details in the program area). Countywide programs and their member municipalities will be credited with a portion of this total load reduction in proportion to their share of population. Load reduction credit for this program will begin upon submittal of documentation demonstrating full implementation of the Caltrans specification for applicable roadway structures.

ii. **Implementation Level** – Permittees shall track the development of the Caltrans specification and develop an inventory of bridges in their jurisdictions that includes bridge ownership and a replacement/repair schedule. Finally, Permittees shall, by December 31, 2022, or six months after availability of the specification, implement or cause to be implemented the Caltrans specification during applicable replacement activities that are under the direction of the Permittee.

iii. **Reporting**

(1) In their 2022 Annual Report or the Annual Report immediately following availability of the specification, Permittees shall include a description of the Caltrans specification for managing PCBs-containing materials in bridge or roadway expansion joints during roadway replacement or repair.

(2) In their 2023 Annual Report, Permittees shall submit an inventory of bridges in the program area that includes bridge ownership and the bridge roadway replacement schedule.

(3) In their 2022 through 2026 Annual Reports, Permittees shall submit documentation confirming the use of the Caltrans specification (once it is available) during all instances of bridge roadway replacement or repair in their jurisdiction during that reporting year and provide an estimate of the volume of material managed and total PCBs mass load reduced resulting from implementation of the specification.

(4) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii.(2) an estimate of the total PCBs mass load reduced, consistent with approved accounting procedures, resulting from implementing this control measure.

C.12.e. Program for Controlling PCBs from Electrical Utilities

i. **Task Description** – Permittees shall (1) develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for municipally-owned electrical utilities in the MRP program area and (2) collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities.

ii. **Implementation Level** – Permittees shall do the following:

(1) Develop or improve standard operating procedures to respond to, clean up, and report spills and releases from municipally owned OFEE and fully implement these procedures.

(2) Develop and implement a plan to maintain and upgrade municipally owned OFEE.

(3) Document the PCBs loads avoided through existing and ongoing OFEE removal and replacement programs.

(4) Collaborate with the Water Board to request information from non-municipally owned electrical utilities. Permittees shall utilize the information to (a) determine the locations of PCBs-containing OFEE, (b) improve estimates of the total baseline mass of PCBs in OFEE in the MRP permit area, (c) evaluate the actions the non-municipally owned electrical utilities are taking to reduce or prevent the release of PCBs from their equipment and to respond to potential releases of PCBs from their equipment; and (d) identify opportunities to improve the response and cleanup protocols.

iii. **Reporting**

(1) Permittees shall submit in their 2023 Annual Report the estimated PCBs loads avoided (along with supporting documentation) resulting from the removal of municipally-owned PCBs-containing OFEE through maintenance programs and system upgrades for the period 2002 to the beginning of this permit term (2023).

(2) Permittees shall submit in their 2023 Annual Report a description of the improved spill response and reporting practices implemented by municipally owned electrical utilities.

(3) Permittees shall submit in their 2024 Annual Report a summary of their plans to maintain and upgrade OFEE for municipally owned electrical utilities.

(4) Permittees shall submit in every Annual Report, beginning with the 2023 report, a summary of the actions undertaken during that reporting year

that remove municipally owned PCBs-containing OFEE along with the loads avoided and the details of the calculations and assumptions used to estimate the load reduced.

(5) Permittees shall submit in their 2026 Annual Report, as part of reporting under Provision C.12.a.iii(2), the estimated PCBs loads reduced during the permit term associated with municipally owned OFEE removal resulting from maintenance programs and system upgrades.

(6) Within 12-months of the Water Board transmitting to the Permittees information from the non-municipally owned electrical utilities, Permittees shall submit a report discussing the following, to the extent possible given any data limitations: (a) locations of the PCBs-containing OFEE still in service, (b) previous locations of PCBs-containing OFEE, and (c) opportunities to improve non-municipally owned electrical utilities' standard operating procedures for spill response, reporting, cleanup, and sampling and analysis.

C.12.f. Plan and Implement Green Stormwater Infrastructure to reduce PCBs loads

i. **Task Description –** Permittees shall implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j. Implementation of green stormwater infrastructure will result in a total estimated load reductions of 200 g PCBs/yr (see Fact Sheet for basis of estimate).

ii. **Implementation Level** – The level of implementation is determined by the requirements of Provision C.3.j.

iii. **Reporting**

(1) In their 2026 Annual Report, Permittees shall report as part of Provision C.12.a.iii(2)) on all green stormwater projects (e.g., parcel-based, street right-of-way, and regional projects) implemented during the permit term and provide the total acreage treated and an estimate of the total PCBs mass load reduced resulting from this implementation. This reporting shall include summary descriptions of the implemented projects including GSI type, location, and area.

C.12.g. Manage PCB-Containing Materials and Wastes During Building Demolition Activities

i. **Task Description** – Prior to issuing a demolition permit, Permittees shall implement the protocol developed during the previous permit term (see Fact Sheet for protocol description) for managing PCB-containing materials and wastes during building demolition so that PCBs do not enter MS4s. Permittees

shall also ensure construction sites are inspected during demolition and obtain verification that materials from demolished buildings are appropriately disposed.

Provision C.12.g. applies to applicable structures containing building materials with PCBs concentrations of 50 ppm or greater at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, or stormwater runoff. Applicable structures include, at a minimum, commercial, public, institutional, and industrial structures constructed or remodeled between the years 1950 and 1980. Single-family residential and wood frame structures are exempt.

Structures that are constructed or remodeled between the years 1950 and 1980 and require emergency demolition to protect public health and/or safety are exempt from implementing the protocol, but they must be reported in accordance to Provision C.12.g.iii.(3)(d)

The Town of Clayton is exempt from the requirements of Provision C.12.g. because it has demonstrated it has no applicable structures. Other Permittees may be exempted from the requirements in Provision C.12.g. if they provide evidence acceptable to the Executive Officer in their 2023 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

Implementation of this protocol will result in a total estimated load reduction of 2 kg PCBs/yr (see Fact Sheet for calculation details) in the program area. This constitutes an ongoing rather than a new load reduction.

ii. Implementation Level

(1) Permittees shall implement their established protocol prior to issuing a demolition permit.

(2) For demolition of applicable structures containing building materials with PCBs concentrations of 50 ppm or greater approved beginning July 1, 2023, Permittees shall require demolition contractors to provide notification to the Permittees, the Water Board, and U.S. EPA at least one week before any demolition is to occur.

(3) Beginning the 2023 rainy season, Permittees shall inspect demolition sites with applicable structures containing building materials with PCBs concentrations of 50 ppm or greater pursuant to Provision C.6 to ensure that effective construction pollutant controls are used to prevent discharge into the MS4.

(4) Permittees shall enhance their construction site control program to minimize migration of PCBs into the MS4 from applicable structures containing building materials with PCBs concentrations of 50 ppm or greater during demolition activities. Enhancements may include inspecting demolition sites monthly during demolition activities in the dry season (May – September) and requiring the demolition contractors to sweep the project sites and the streets around the property with street sweepers that will effectively remove sediment and dust. Implementation of enhancements shall begin no later than July 1, 2023.

(5) For demolition of applicable structures containing building materials with PCBs concentrations of 50 ppm or greater approved after July 1, 2023, Permittees shall verify that PCBs in demolished buildings are properly managed to minimize transport to the MS4 by obtaining official documentation that the building materials with PCBs concentrations of 50 ppm or greater in these demolished applicable structures were disposed appropriately according to state and federal regulations.

(6) Permittees may elect to update for use in the subsequent permit term the assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

iii. Reporting

(1) Each Permittee seeking exemption from Provision C.12.g requirements based on lack of applicable structures must submit in its 2023 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 were single-family residential and/or wood-frame structures.

(2) In their 2023 Annual Report, Permittees shall discuss enhancements to their construction site control program to minimize migration of PCBs from demolition activities into the MS4.

(3) Beginning with their 2023 Annual Report, the Permittees shall provide each of the following items:

(a) The number of applicable structures that applied for a demolition permit during the reporting year;

(b) A running list of the applicable structures that applied for a demolition permit since July 1, 2019, the number of samples each structure collected, and the concentration of PCBs in each sample.

(c) For each applicable structure, with PCBs concentrations of 50 mg/kg or greater, include the following: the project address, the demolition date, and a brief description of the PCBs-containing materials.

(d) For each structure that was constructed or remodeled between the years 1950 and 1980 and requires emergency demolition to protect public health and/or safety, provide the following: address, date building was constructed, and date of demolition.

(4) Beginning with their 2024 Annual Report, Permittees shall provide the following: whether the site was inspected during demolition, and for those cases where notification and advance approval from the U.S. EPA is not required and were approved for demolition after June 30, 2023, the hazardous waste manifest prepared for transportation of the material to a disposal facility.

(5) In their 2026 Annual Report, Permittees shall submit an evaluation of the effectiveness of the protocol for controlling PCBs during building demolition as well as supporting data. This should be conducted and reported at the regional level on behalf of all Permittees and shall be considered the Report of Waste Discharge for Provision C.12.g for the next permit reissuance.

(6) In their 2026 Annual Report, Permittees may submit for use in the subsequent permit term an updated assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs-containing materials and wastes during demolition of applicable structures.

C.12.h. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. **Task Description** – In 2020, Permittees submitted a Reasonable Assurance Analysis and plan (RAA) demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030. Permittees shall evaluate the effectiveness of all PCBs control measures and update the RAA as necessary. Updates can be focused on those control measures for which new information is available and for control measures not evaluated in previous efforts. Permittees shall also prepare detailed implementation plans for all control measures to be implemented in and inform permit requirements for the subsequent permit term.

ii. **Implementation level** – Permittees shall update, as necessary, their PCBs control measures implementation plan and RAA. The update may be focused on control measures for which new information is available or for those control measures not previously evaluated. The long-term plan must:

(1) Identify all technically and economically feasible PCBs control measures to be implemented (including GSI projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Additionally, Permittees shall identify all specific control measures to be implemented, the intensity of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term. This implementation plan must include:

(a) Identification of all control measures implemented during the current permit term and any additional control measures to be implemented in the subsequent permit term;

(b) A description of the intensity or extent of control measure implementation (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied);

(c) Identification of accountability metrics to track during the subsequent permit corresponding to the proposed implementation intensity; and

(d) Estimates for load reductions to be achieved through implementation of control measures during subsequent permit term at the proposed intensity.

iii. Reporting – Permittees shall submit the updated plan and schedule no later than March 31, 2026.

C.12.i. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

i. Task Description – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. The studies should focus on near-shore areas contaminated with PCBs from historical activity and the expected trajectory of recovery as sources from local watersheds are reduced.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban

runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2023 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2023 Annual Report. The Permittees shall report in the March 15, 2026, Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.12.j. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence anglers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level** – At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2026 Annual Report.

C.13. Copper Controls

The Permittees shall implement the following control program for copper. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of Provision C.13 through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. **Task Description** – The Permittees shall prohibit the discharge of wastewater to storm drains generated from installing, cleaning, treating, or washing copper architectural features, including copper roofs.

ii. **Implementation Level**

(1) The Permittees shall require, when issuing building permits, use of appropriate BMPs for managing copper-containing waste during and post-construction.

(2) The Permittees shall educate installers and operators on appropriate BMPs for managing copper-containing wastes.

(3) The Permittees shall enforce against noncompliance.

iii. **Reporting**

(1) In the 2022 Annual Report, those Permittees that have not previously done so shall certify that legal authority currently exists to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of copper architectural features, including copper roofs.

(2) In the 2022 Annual Report, the Permittees shall report how copper architectural features are addressed through the issuance of building permits.

(3) The Permittees shall report annually permitting and enforcement activities.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. **Task Description** – Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. **Implementation Level** – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. **Reporting**

(1) In the 2022 Annual Report, the Permittees that have not previously done so shall certify that legal authority currently exists to prohibit the discharges to storm drains of water containing copper-based chemicals from pools, spas, and fountains.

(2) In the 2022 Annual Report, the Permittees shall report how copper-containing discharges from pools, spas, and fountains are addressed to accomplish the prohibition of the discharge.

(3) The Permittees shall report annually on any enforcement activities.

C.13.c. Industrial Sources

i. **Task Description** – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. **Implementation Level**

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site.

iii. **Reporting**

The Permittees shall highlight copper reduction results in the industrial inspection component in the Provision C.13 portion of each Annual Report.

C.14. Bacteria Control for Impaired Water Bodies

Provisions C.2 through C.7 contain requirements to control sources of pollutants to the Permittees' MS4s. Implementation of these requirements should control sources of bacteria[58]; still, exceedances of bacteria water quality objectives occur in some water bodies that receive urban runoff. Permittees identified in this Provision shall demonstrate compliance with bacteria related Receiving Water Limitations during this Permit term through the timely implementation of control measures and other actions to reduce bacteria discharges from their municipal separate storm sewer systems in accordance with the requirements of this Provision. Provision C.14.a applies to the cities of Mountain View and Sunnyvale for their discharges that are causing or contributing to exceedances of bacteria water quality objectives in Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough, water bodies without bacteria TMDLs. Provision C.14.b applies to Permittees with San Pedro Creek and Pacifica State Beach Indicator Bacteria TMDL wasteload allocations, Provision C.14.c applies to Permittees with San Francisco Bay Beaches Bacteria TMDL wasteload allocations, and Provision C.14.d applies to Permittees with Pillar Point Harbor Beaches and Venice Beach Bacteria TMDL wasteload allocations.

C.14.a. Enhanced Bacteria Control

Enhanced bacteria control requirements are applicable to the cities of Mountain View and Sunnyvale for discharges that are causing or contributing to exceedances of applicable bacteria water quality objectives in Stevens Creek (both cities), Calabazas Creek (Sunnyvale), and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale).[59] "Cities" as used in this Provision C.14.a refers to these cities.

The actions described in this Provision shall be implemented where controllable bacteria sources are located within the Cities' jurisdiction, in order to reduce bacteria inputs to the water body with bacteria exceedances.

i. Municipal Operations Bacteria Control

(1) **Task Description** – Evaluate the potential for municipal operations to generate and cause bacteria to be transported to surface waters. Where such potential is determined to exist, develop and implement BMPs to minimize the transport of bacteria.

[58] Bacteria as used herein refers to fecal indicator bacteria.

[59] The geometric mean of indicator bacteria levels in a waterbody shall not be greater than the applicable geometric mean water quality objective in any six-week interval, calculated weekly. The indicator bacteria levels shall not be greater than the applicable statistical threshold value water quality objective in more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

(2) **Implementation Level** – The Cities shall develop and implement BMPs to minimize potential bacteria sources, including, but not limited to, trash, human and animal fecal sources, and excessive biofilm, for the following municipal operations:

(a) Street and road cleaning

(b) Parks and municipal open space maintenance

(c) Sidewalk, plaza, and pavement cleaning

(d) MS4 component maintenance, such as cleaning biofilm from catch basins, piping, and pump stations.

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, frequency and location for actions taken to reduce bacteria sources related to municipal operations.

ii. Industrial/Commercial Site Bacteria Control and Illicit Discharge Detection and Elimination

(1) **Task Description** – Train municipal staff responsible for inspecting and enforcing industrial and commercial site controls and for detecting and eliminating illicit discharges to enhance their focus on potential bacteria sources. The Cities shall use enforcement authorities to ensure bacteria sources are controlled.

(2) **Implementation Level** – The Cities shall enhance their efforts to ensure transport to surface waters from the following potential bacteria sources is minimized:

(a) Roof and exterior washoff of commercial and industrial structures and surfaces, where these sources are likely to contain bacteria, such as from rodent and bird wastes, and are likely to be discharged to receiving water

(b) Outdoor garbage and recycle bins

(c) Outdoor floor-mat washoff

(d) Portable toilets

(e) Illicit discharges to the MS4

(3) **Reporting** –In each Annual Report, the Cities shall describe BMP, frequency, and location for actions taken to reduce bacteria sources related to Industrial and Commercial Site Bacteria Control and Illicit Discharge Detection and Elimination.

iii. Control of Bacteria Sources Related to Unsheltered Homeless Populations

(1) **Task Description** – Evaluate the potential for bacteria transport to surface waters from areas inhabited by unsheltered homeless persons. Where such potential is determined to exist develop and implement BMPs to minimize such bacteria sources and transport.

(2) **Implementation Level** – The Cities shall minimize the transport of bacteria from areas inhabited by unsheltered homeless persons by taking actions that may include, but are not limited to, the following:

(a) Provide pump-out stations, mobile pumping services, or voucher programs for proper disposal of sanitary sewage where unsheltered homeless persons reside in recreational vehicles

(b) Provide sanitation services, including access to running water, where feasible, at locations where homeless people live or congregate

(c) Establish and update sidewalk, street, and/or plaza cleaning standards for the cleanup and appropriate disposal of human waste

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, numbers or frequency (as applicable), and locations of actions taken to reduce bacteria discharges from areas inhabited by unsheltered persons.

iv. Pet and Livestock Bacteria Source Control

(1) **Task Description** – Evaluate the potential for domestic animal sources, such as pet waste, kennels, horse boarding facilities and trails, to generate and cause to be transported to surface waters. Where such potential is determined to exist, develop and implement BMPs to minimize such bacteria sources and prevent transport.

(2) **Implementation Level** – The Cities shall ensure transport of bacteria from domestic animal sources to surface waters is minimized by taking the following actions:

(a) Enhance numbers of, and maintenance of, pet waste stations

(b) Inspect pet boarding facilities to ensure pet waste is managed to prevent offsite discharges

(c) Inspect horse boarding facilities, if any, to ensure manure is managed to prevent offsite discharges. Notify Water Board staff of facilities that should enroll in the Confined Animal Facility program.

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, numbers or frequency (as applicable), and locations of actions taken to reduce bacteria from domestic animal sources.

v. Public Outreach on Bacteria Source Control

(1) **Task Description** – Evaluate public outreach currently conducted to encourage bacteria pollution prevention and determine how to improve such outreach, such as, for example, by focusing outreach on certain populations or at certain locations.

(2) **Implementation Level** – The Cities shall enhance public outreach where it is likely to improve human behavior regarding bacteria pollution prevention practices, such as, but not limited to, the following:

(a) Cleaning up pet waste

(b) Eliminating litter

(c) Eliminating outdoor restaurant floor mat washdown

(d) Using proper BMPs for sidewalk cleaning

(e) Covering trash storage areas

(f) Maintaining porta-potties properly.

(3) **Reporting** – In each Annual Report, the Cities shall describe the outreach messages, methods of delivery, audiences, and number of repetitions.

vi. Coordination with Sanitary Sewerage System Entities

(1) **Task Description** – Overflows and leaks from sanitary sewage conveyance systems can cause bacteria to be transported to MS4s, and commonly the Cities are not responsible for maintenance and repair of the sanitary sewerage system. This task encourages the Cities to collaborate with the entities responsible for the sanitary sewerage system to minimize overflows and leaks.

(2) **Implementation Level** – The Cities shall, to the extent necessary and within the limits of their authorities, collaborate with their counterparts who are responsible for maintenance of the sanitary sewerage system to assist with the following:

(a) Prioritize maintenance and repair in areas contributing to bacteria loads to surface waters with elevated bacteria

(b) Ensure rapid and thorough response to cleanup sanitary sewer system overflows

(c) Develop lateral maintenance and replacement programs for consideration by the appropriate legal authority.

(3) **Reporting** – In each Annual Report, the Cities shall describe the status of any actions taken to coordinate with sanitary sewer entities.

vii. Prioritize Trash Removal to Control Bacteria Sources

(1) **Task Description** – Evaluate the potential bacteria-reduction benefit of prioritizing trash control efforts required in Provision C.10 in areas where trash generation may be contributing to bacteria exceedances in local surface waters. Where such benefit appears significant, reprioritize trash control actions accordingly.

(2) **Implementation Level** – The Cities shall focus some of their trash reduction efforts to areas where trash generation likely contributes to bacteria exceedances in local surface waters.

(3) **Reporting** – In each Annual Report, the Cities shall describe how the bacteria-reduction benefit of focused trash-control efforts was evaluated, the conclusions reached, and any actions taken during the reporting period to reprioritize trash control areas.

viii. Water Quality Monitoring

(1) **Task Description** – The Cities shall develop and implement a monitoring program to identify and characterize potential bacteria sources to receiving waters that have been found to exceed bacteria water quality objective(s), to help focus source control efforts and evaluate effectiveness of controls, and to ultimately demonstrate attainment of bacteria receiving water limitations. The monitoring program shall be designed and adapted to answer the following questions:

(a) What is the spatial and temporal extent of dry weather flows in the MS4?

(b) Are indicators of human fecal material present in both dry and wet weather flows observed in the MS4?

(i) If so, in which stormwater catchments are sources most prominent?

(ii) Where are the likely locations of these sources in the catchments?

(iii) What measures can be implemented to control these sources?

(c) Are water quality objectives being achieved during dry weather?

(d) Are water quality objectives being achieved during wet weather?

(2) **Implementation Level** – At a minimum, the monitoring program shall include the following:

(a) Sampling of all MS4 outfalls with flow during three dry weather creek walks. One to be scheduled during July / August 2022, one to be scheduled January / February 2023, and one in April / May 2023;

(b) Desktop and field methods based on elements described in the California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (Griffith et al. 2013);

(c) Geographic information system analysis of potential sources and existing bacteria control action locations to evaluate existing and identify and optimize additional bacteria controls;

(d) MS4 bacteria characterization monitoring at least monthly through September 2023, including two events that coincide with wet weather discharges, at a minimum of 14 sites each year to identify sources of bacteria discharges to and from the MS4 using microbial source tracking techniques to detect human genetic markers (i.e., HF183) and to evaluate effectiveness of bacteria controls, including the following:

(i) Identification of stormwater catchments where monitoring will be conducted;

(ii) Characterization of indicator bacteria, i.e., E coli, densities in subwatersheds, storm drains, outfalls, and pump stations that drain to receiving waters with excessive levels of indicator bacteria; and

(iii) Determination of baseline (or current) conditions against which future monitoring results can be compared following new, enhanced, or ongoing control measure implementation.

(e) Receiving water monitoring at least monthly, from October 2023 through September 2024, including two events that coincide with, or within 48 hours, of a storm event forecasted to be at least 0.5 inch in 24 hours, to determine E. coli densities, where salinity is less than 1 ppt, and Enterococci densities, where salinity is greater than 1 ppt, at a minimum total of 5 sites in Stevens Creek, 3 sites in Calabazas Creek, and 1 site in Sunnyvale East Channel, including the following:

(i) Stevens Creek immediately downstream of Homestead;

(ii) Stevens Creek La Avenida;

(iii) Sunnyvale East Channel upstream of Tasman (above tidal influence);

(iv) Calabazas Creek downstream of Homestead; and

(v) Calabazas Creek upstream of Tasman.

(3) **Reporting** – In each Annual Report, the Cities submit the results of all monitoring conducted the previous year, including parameters analyzed, frequencies, and locations, and planned monitoring for the current year, including parameters, frequencies, and locations.

ix. Compliance with Receiving Water Limitations

(1) **Task Description** – The Cities shall determine whether discharges from their MS4s are causing or contributing to exceedances of bacteria water quality objectives in receiving waters after implementation of control measures required by C.14.a.i-vii. The Cities are expected to meet Receiving Water Limitations B.2 for applicable bacteria water quality objectives by June 30, 2027. If receiving water limitations are not met, despite a diligent effort to quantify levels and the sources of bacteria in MS4 discharges and documentation of completion of controls required by C.14.a.i-vii, then the Cities shall submit a plan for additional actions to attain the receiving water limitations.

(2) **Implementation Level** – The Cities shall provide a comprehensive assessment of bacteria sources and bacteria controls to demonstrate compliance with receiving water limitations for applicable bacteria water quality objectives. If compliance cannot be achieved by June 30, 2027, the assessment shall describe additional control measures or increased levels of implementation for existing control measures, with an implementation schedule, and proposed milestones, that will be implemented to attain bacteria receiving water limitations as soon as possible.

(3) **Reporting** – The Cities shall submit a Mid-Permit Interpretive Report and a Final Interpretive Report.

(a) The Mid-Permit Interpretive Report shall be submitted by March 31, 2025, which includes the following:

(i) All data collected through September 2024 and description of data validation and quality;

(ii) Description of progress towards answering questions in C.14.a.viii.(1);

(iii) Description of specific bacteria sources and/or specific geographic areas that receive implementation of existing control

measures, as well as. recommended new, modified, or enhanced control that will be evaluated or implemented;

(iv) Description of monitoring, subject to approval by the Water Board through a Permit amendment, to be conducted through the remainder of the Permit term to answer the questions in C.14.a.viii.(1). The monitoring shall be as comprehensive, systematic, and robust as what is required in Provision C.14.a.viii while being commensurate with the need to address and resolve bacteria exceedances in the receiving waters.

(b) The Final Interpretive Report shall be submitted by December 31, 2026, which includes the following:

(i) All data collected through September 2026 and description of data validation and quality;

(ii) Description of progress towards answering questions in C.14.a.viii.(1);

(iii) Description of specific bacteria sources and/or specific geographic areas that received implementation of existing control measures, as well as. new, modified, or enhanced control that were evaluated or implemented;

(iv) Determination if bacteria receiving water limitations have or will be met, by June 30, 2027; and

(v) If bacteria receiving water limitations will not be met by June 30, 2027, description of additional control measures or increased levels of implementation for existing control measures, with an implementation schedule, and proposed milestones, that will be implemented to attain bacteria receiving water limitations as soon as possible, and a proposed monitoring program designed to answer the questions in C.14.a.viii.(1) that will be implemented in the next permit term.

C.14.b. City of Pacifica and San Mateo County Bacteria Controls

The City of Pacifica (City) and San Mateo County (County) Permittees shall implement the actions in this subprovision to control fecal indicator bacteria. The City and County shall focus implementation of bacteria control measures in areas where benefits are most likely to accrue. The goal of this subprovision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek and Pacifica State Beach Indicator Bacteria TMDL. In accordance with the TMDL, the City and County are required to meet the wasteload allocations for Pacifica State Beach by August

1, 2021, and for San Pedro Creek by August 1, 2028. The City and County may comply with any requirement of this provision through a collaborative effort.

i. Control Measures to Achieve Indicator Bacteria Wasteload Allocations

(1) **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to meet the stormwater TMDL wasteload allocations in the San Pedro Creek (Creek) watershed and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL Project Area).

(2) **Implementation Level** – To comply with this element:

(a) The City and County, as appropriate, shall prohibit potential illicit discharges into their storm sewer system from sanitary sewer overflows or the sanitary sewer lines within their jurisdictions as follows:

(i) Ensure all sanitary sewer lines within a 2,000-foot radius of the Creek and Beach are inspected, assessed, and repaired, as needed, within 60 months of the Permit effective date;

(ii) Ensure at least 20 percent of the storm sewer system discharging to San Pedro Creek or Pacifica State Beach is evaluated and addressed for illicit sanitary sewer connections each year to prevent discharges from the sanitary sewer lines; and

(iii) Coordinate with the responsible sanitary sewer collection agency to identify and implement BMPs to prevent sanitary sewer overflows, such as developing or enhancing a spill response plan for significant sanitary sewer overflow incident areas to decrease potential sewage discharges into the storm sewer system.

(b) The County shall continue to address bacteria discharges from commercial horse and dog kennel facilities (facilities) into its storm sewer system as follows:

(i) Inspect each facility annually for code compliance by June 30 of each year.

(ii) Review each facility's current manure, stormwater, and drainage management plans for code compliance by June 30 of each year.

(iii) Provide a copy of the facilities inspection and review reports to the Water Board in each annual report.

(iv) Take progressive enforcement, as needed, for facilities found to be noncompliant with the County's Confined Animal Ordinance.

(c) The City shall continue to address bacteria discharges from commercial horse facilities (facilities) into its storm sewer system as follows:

(i) Review each facility's compliance with the City's Administrative Policy on "Standards for Keeping Animals."

(ii) Review each facility's compliance with the City's Municipal Code on "Animal Excreta."

(iii) Conduct annual compliance review and inspection of each facility by June 30 of each year.

(iv) Provide a copy of the facilities inspection and review reports to the Water Board in each annual report.

(v) Take progressive enforcement action(s), as needed, to bring noncompliant facilities into compliance with the City's Administrative Policy on "Standards for Keeping Animals" and Municipal Code on "Animal Excreta."

(d) The City shall continue to maintain existing and any new dog waste clean-up signs, waste bag dispensers, and trash cans within the TMDL Project Area.

(e) The City shall continue to implement a visual inspection and cleanup plan for high dog waste accumulation areas along the Creek and its tributaries. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteorological Station, or comparable site), and at a frequency of no less than once a month.

(f) The City shall continue to implement a pet waste public outreach and education campaign that, at a minimum, includes all the following:

(i) Establish a public pet waste management stakeholder group (e.g., formal or informal dog owners club).

(ii) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Creek and Beach to play on the local television station and to include in print ads in the Pacifica Tribune.

(iii) Distribute a mailer with an informational brochure to residents and businesses describing proper pet waste management, the linkage of the watershed to the Creek and Beach, and the adverse impact on those water bodies and those recreating in them from improper pet waste management.

(iv) Maintain a web page to the City website with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Creek and Beach and public health.

(v) Create and implement a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Creek and Beach.

(vi) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(g) The City and County, based on the results of the source characterization and BMP effectiveness, and wasteload allocation attainment analyses described in Provision C.14.b-iii, shall modify or refocus control measure implementation efforts as appropriate, at a frequency of no less than every two years.

(3) Reporting – No later than March 15 of each year, the City and County shall submit a comprehensive TMDL Status and Monitoring Report, reporting on the specific control measures (as listed in Provision C.14.b.1.ii) that have been implemented in the TMDL Project Area during the foregoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description, scope, and start date of pollution prevention measures; and

(c) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

ii. Water Quality Monitoring to Assess Attainment of Wasteload Allocations

(1) **Task Description** – Permittees shall determine whether the TMDL wasteload allocations are attained.

(2) **Implementation Level** – The City and County shall conduct attainment water quality monitoring activities as follows:

(a) Sample Locations – Two stations shall be monitored: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (the original station, as of the TMDL's adoption date of November 2012, which was located approximately 300 feet north of the Creek mouth, and at shin depth, originally referred to as Linda Mar #5 in the TMDL Staff Report, but currently referred to as Linda Mar #7). The locations of these stations are shown in the TMDL Staff Report.

(b) Sampling Frequency – The two attainment stations shall be monitored weekly on an ongoing basis for fecal indicator bacteria. The weekly sampling shall occur year-round regardless of weather conditions, provided the conditions are safe for field staff to collect the samples.

(c) Sampling Constituents – Samples collected from the Creek Mouth shall be analyzed for *E. coli* and total coliform. Samples collected from Linda Mar #5 station shall be analyzed for *Enterococcus*, fecal coliform, and total coliform.

(d) The City and County shall analyze the results of the attainment monitoring and compare the results to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL.

(3) **Reporting** – In Annual TMDL Status and Monitoring Reports submitted on March 15 each year, the City and County shall analyze, summarize, and report the results of the ongoing attainment monitoring, as follows:

(a) The City and County shall complete a data evaluation, which shall focus on determining whether the TMDL wasteload allocations are being attained in the Creek and at the Beach.

(b) The indicator bacteria results from the attainment monitoring stations (Creek Mouth and original Linda Mar #5 station (currently called Linda Mar #7), located 300 feet north of the Creek mouth at shin depth) shall be compared to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL (Total Maximum Daily Load for Bacteria in San Pedro Creek and at Pacifica State Beach: Final Staff Report for Proposed Basin Plan Amendment. Water Board, 2012. Accessible at:

https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/pacificabacteria/Final%20Staff%20Report.pdf).

(c) The data evaluation shall include tabulation and review of local rainfall data to determine whether the weekly attainment monitoring sampling events occurred during dry weather or wet weather.

(d) An ongoing quantitative analysis of trends (from initial year) in bacteria densities and exceedances of applicable water quality objectives at the two attainment stations shall be conducted and reported annually.

(e) A detailed and comprehensive assessment of wasteload allocation attainment by the end of year 4 of the Permit term shall be completed. If wasteload allocations are not achieved by the end of the Permit term, no later than 180 days prior to Permit expiration, the City and County shall submit a plan in their Report Of Waste Discharge, acceptable to the Executive Officer, that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm sewer systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.

iii. Water Quality Monitoring – Characterize Bacteria Sources, Assess BMP Effectiveness

(1) **Task Description** – The purpose of characterization monitoring is to better characterize indicator bacteria contributions from specific sources and to evaluate control measure effectiveness. The characterization monitoring shall provide data to:

(a) Characterize indicator bacteria densities in subwatersheds, storm drain outfalls, and pump stations that have not been sampled in the past. Results of the investigation may be used to drive future control measure actions.

(b) Establish baseline (or current) conditions against which future monitoring results can be compared following new or ongoing control measure implementation.

(c) Characterization monitoring shall be conducted every other year on a water year basis (i.e., October 1 through September 30), continuing on the existing ongoing monitoring schedule. Characterization monitoring shall assess E. coli densities throughout the San Pedro Creek watershed. Human-, horse-, and dog-specific genetic markers shall be analyzed for a subset of the samples to investigate whether these species contribute fecal contamination to the Creek. The

characterization monitoring shall be iterative in nature and allow for flexibility of design and details in future years. Subsequent years of characterization monitoring, at a minimum, shall have the same level of effort as previous years; however, in future years, based on the results of the previous monitoring, alternative sampling stations may be targeted, sampling intensities may be modified, sampling frequencies may be adjusted, and/or the species-specific genetic marker sampling may be revised.

(2) **Implementation Level** – The City and County shall conduct characterization monitoring activities as follows:

(a) Sampling Locations – while based on the previous year's results appropriate sampling locations can be selected for each monitoring year, the "Creek Mouth" site shall always be sampled during events when species-specific genetic marker samples are collected.

(b) Number of Samples – in each monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(c) Sampling Frequency – the characterization stations shall be sampled a minimum of eight times over the course of the water year, as follows:

(i) Wet season – four sampling events shall be conducted during the wet season months (November through March). To the extent possible, wet season sampling events shall occur during wet weather, which as defined in the TMDL is any day (e.g. 24-hour period) with 0.1 inch of rain or more and the following three days;

(ii) Dry season – four sampling events shall be conducted during the dry season months (May through September).

(iii) In subsequent monitoring years, based on the results of the previous year's monitoring, the sampling frequency may be modified, as appropriate, to provide the most useful results.

(d) Constituents – All samples shall be analyzed for *E. coli*. In addition, during each monitoring year, at a minimum, samples collected at four stations during four sampling events (two wet season, two dry season) shall be analyzed for human-, horse-, and dog-specific genetic markers to assess temporal and spatial fecal waste contributions from the targeted host species to the Creek and Beach.

(e) Monitoring Protocols and Data Quality – Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance

Project Plan (QAPP) for applicable parameters, including data quality objectives, field, equipment, and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

(f) Future Revisions – Any and all changes to the characterization monitoring plan in future years shall be submitted to the Executive Officer for review and acceptance no later than 90 days prior to implementation.

(3) Reporting

(a) In their Annual TMDL Status and Monitoring Reports the City and County shall submit a comprehensive Characterization Monitoring Report reporting on any data collected during the preceding October 1 through September 30 monitoring period.

(b) Data evaluation shall focus on addressing the following questions:

(i) Which land uses and/or sources contribute most to bacteria impairments in San Pedro Creek watershed?

(ii) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed?

(iii) What are the multi-year indicator bacteria density trends in the Creek and at the Beach (i.e., do control measures appear to be reducing bacteria)?

(c) As appropriate, the Report shall include the following:

(i) Immediately following the Table of Contents, a Data Tables section that includes all the data collected pursuant to Provision C.14.b.iii. and contains the following information pertaining to the foregoing monitoring period:

a. A map showing all monitoring locations;

b. Immediately following the map, a single completed Locations and Parameters Table containing the following columns or rows for each location sampled: numeric site identifier, a short-hand site name such as “Creek Mouth,” latitude, longitude, and parameters assessed;

c. Immediately following the Locations and Parameters Table, a single completed Results Table containing the following columns or rows for each location sampled: the short-hand site name and datum/result for each constituent analyzed. Constituents that exceed applicable water quality objectives shall be highlighted.

(ii) For all data, a statement of the data quality.

(iii) An analysis of the data, which includes the following:

a. Basic descriptive statistics using indicator bacteria data;

b. Identification and evaluation of any controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed;

c. Identification and analysis of any trends in stormwater or receiving water quality; and

d. Consideration of variability in the data sets.

(iv) A discussion of the data, which shall:

a. Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin or the Ocean plans;

b. Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

c. Identify and prioritize water quality problems;

d. Identify potential sources of water quality problems;

e. Describe follow-up actions;

f. Evaluate the effectiveness of existing control measures; and

g. Identify management actions needed to address water quality problems.

C.14.c. City of San Mateo Marina Lagoon Beaches Bacteria Controls

The City of San Mateo (City) shall implement the actions in this subprovision to control fecal indicator bacteria. For each requirement, the City shall focus implementation in areas where benefits are most likely to accrue, i.e., where bacteria reduction is likely to reduce bacteria densities in San Mateo Lagoon and particularly at Parkside Aquatic Park Beach and Lakeshore Park Beach. Many of the required implementation actions are described in the City's TMDL Basin Plan Amendment Implementation Plan, 2018 (TMDL Implementation Plan). This subprovision implements the urban runoff requirements of the San Francisco Bay Beaches Bacteria TMDL (TMDL) applicable to the City.

i. Control Measures to Achieve Indicator Bacteria Wasteload Allocations

(1) **Task Description** – The City shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to San Mateo Lagoon to the maximum extent practicable.

(2) **Implementation Level** – In order to comply with this element:

(a) The City shall enhance its efforts to prohibit potential illicit discharges into its storm sewer system.

(b) The City shall expand or enhance dog waste management strategy, including installing and/or maintaining dog waste clean-up signs, waste bag dispensers, and trash cans at a minimum of two parks/open spaces near San Mateo Lagoon beaches.

(c) The City shall enhance its public outreach and education regarding proper management of pet waste management, dumpsters and garbage bins; proper outdoor washdown procedures (restaurant mats, dining areas, commercial areas, mobile cleaner operations) by taking a minimum of three of the following actions:

(i) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Lagoon.

(ii) Distribute a mailer to residents and businesses describing the adverse impact on water quality and recreation of improper pet waste management.

(iii) Add information to the City website about the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Lagoon and public health.

(iv) Create and broadcast a pre-rain pet waste cleanup public service announcement to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Lagoon.

(v) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(d) The City shall continue its goose control program, as described in its TMDL Implementation Plan.

(e) The City shall continue implementing its “Illegal Dumping Screening Program,” its “Spill, Dumping, and Complaint Response Program,” and its “Commercial/Industrial Business Inspection Plans,” including implementing associated enforcement, with a focus near the beaches as appropriate.

(f) Once during the Permit term, determine if boaters in San Mateo Lagoon could be a source of bacteria; if yes, conduct or enhance outreach to improved boaters’ behaviors regarding bacteria sources (e.g., litter and human waste).

(3) Reporting

(a) In each Annual Report, the City shall summarize the actions it took to satisfy the requirements in Provision C.14.c.i.(2). during the foregoing October 1 through September 30 period. This report shall include:

(i) The number, type, and locations and/or frequency (if applicable) of control measures; and

(ii) The description and scope of pollution prevention measures; and

(iii) A data table and graphs showing Enterococcus data collected during the reporting year for the two San Mateo Lagoon beaches, Parkside Aquatic Park Beach and Lakeshore Park Beach.

(b) For the Annual Report due in 2023, quantitatively and qualitatively evaluate the effectiveness of the City’s actions toward wasteload allocation attainment and modify or refocus control measure implementation efforts as appropriate.

ii. Phase Two Measures

(1) **Task Description** – If wasteload allocations are not met by December 13, 2021, the City shall implement additional bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to San Mateo Lagoon.

(2) **Implementation Level** – In order to comply with this element:

(a) By July 1, 2022, the City shall submit a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include all actions described in Provision C.14.a that are likely to reduce bacteria loads to San Mateo Lagoon and particularly at Parkside Aquatic Park Beach and Lakeshore Park Beach. The plan also shall include an implementation schedule and milestones.

(b) By July 1, 2022, the City shall implement this plan.

(c) By September 30, 2022, the City shall submit a supplemental monitoring plan (supplemental to ongoing beach monitoring) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.

(3) **Reporting** – Starting with the 2023 Annual Report and for Annual Reports submitted in following years, the City shall summarize the actions it took to satisfy the requirements in Provision C.14.c.ii.(2) during the foregoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description and scope of pollution prevention measures; and

(c) A data table and graphs showing enterococcus data collected during the reporting year for the two San Mateo Lagoon beaches, Parkside Aquatic Park Beach and Lakeshore Park Beach.

iii. Planning for Future Actions

(1) **Task Description** – If wasteload allocations are not met by December 13, 2026, Permittees shall prepare a plan for additional actions to attain the water quality objective in the next permit term.

(2) **Implementation Level** – Permittees shall prepare a plan that includes an assessment of bacteria sources and describes additional control

measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. The plan shall include an implementation schedule and proposed milestones. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

(3) **Reporting** – Submit the plan no later than 180 days prior to Permit expiration.

C.14.d. City of Half Moon Bay and San Mateo County Bacteria Controls

The City of Half Moon Bay (City) and San Mateo County (County) shall implement the actions in this subprovision to control bacteria. The City and County shall focus implementation of bacteria control measures in areas where benefits are most likely to accrue, i.e., where controls are likely to reduce bacteria mass in Pillar Point Harbor and Venice Beach. The goal of this subprovision is to implement the municipal stormwater runoff requirements of the Pillar Point Harbor and Venice Beach Bacteria TMDL and achieve the TMDL wasteload allocations. The City and County may comply with any requirement of this subprovision through a collaborative effort.

i. Control Measures to Achieve Bacteria Wasteload Allocations

(1) **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies within their respective jurisdictions to prevent or reduce discharges of bacteria from storm drain systems to meet the municipal stormwater runoff TMDL wasteload allocations listed in the Pillar Point Harbor and Venice Beach Bacteria TMDL.

(2) **Implementation Level** – To comply with this element:

(a) The City and County each shall prepare an Initial Report acceptable to the Water Board Executive Officer that describes actions they are taking and will take to prevent or reduce discharges of bacteria to and from storm sewer systems. This report shall be submitted to the Water Board **by July 1, 2022**. The report shall include a schedule, timeline, or frequency of implementation activities for all actions, including, but not limited to, the actions described in Provision C.14.d.i.(2).(b), below.

(b) The City and County shall prohibit and prevent, to the maximum extent possible, discharges of bacteria into the storm sewer system within five years of the effective date of the TMDL as follows:

(i) Illicit sanitary sewer connections: The City and County shall train the staff responsible for enforcing industrial and commercial site

control and for detecting and eliminating illicit discharges to investigate potential connections of sanitary sewer lines to stormwater lines. The City and County shall ensure that staff conduct illicit sanitary sewer connection investigations and include such investigations in their routine inspections as well. The City and County shall use enforcement authorities to ensure transport to surface waters of the following potential bacteria sources is minimized:

(ii) Illicit discharges to the MS4, by increasing illicit discharge investigations in the vicinity of Pillar Point Harbor and Venice Beach

a. Roof and exterior washoff of commercial and industrial structures and surfaces, where these sources are likely to contain bacteria, such as from rodent and bird wastes, that are likely to be discharged to receiving water

b. Outdoor garbage and recycle bins

c. Outdoor floor mat washoff

d. Portable toilet spills and leakage

(iii) Human waste from homeless encampments, by implementing Provision C.14.a.iii in areas likely to discharge to the beaches;

(iv) Pet waste

a. Develop and implement a visual inspection program to identify high pet waste accumulation areas and develop a cleanup plan for these areas, including specific actions before winter rains;

b. Install new or additional dog waste cleanup signs, waste bag dispensers, and trash bins in high dog waste accumulation areas;

c. Evaluate and improve the service frequency of dog waste bins, as needed; and

d. Enhance pet waste public outreach and education campaign that includes at least three of the following:

- Prepare and broadcast public service announcements regarding pet waste management and associated impacts to the beaches and their catchments on social media, local television, and/or local newspapers;

- Distribute a mailer to residents and businesses describing proper pet waste management, and the adverse impact to the beaches and those recreating on them from improper pet waste management;
- Add to or maintain web pages on the City and County websites with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality and public health;
- Broadcast a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the beaches; and
- Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

e. The City and County shall include additional actions described in Provision C.14.a. in their Initial Reports and in their actions to prohibit and prevent discharges of bacteria into the storm sewer system to the extent and in the locations they deem helpful for achieving the TMDL wasteload allocation.

(3) **Reporting** – No later than March 30 of each year, the City and County shall submit a comprehensive TMDL Implementation Status and Monitoring Report, reporting on the specific control measures (as listed in Provision C.14.d.i.(2)) that have been implemented in the TMDL Project Area during the foregoing July 1 through June 30 period. This report shall include:

(a) The number, type, and locations and/or frequency of control measures;

(b) The description, scope, and start date of pollution prevention measures;

(c) Listing, timeline, and discussion of the actions scheduled for implementation during the upcoming year; and

(d) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

ii. Water Quality Monitoring

(1) **Task Description** – The City and County shall ensure the beaches are sampled weekly (i.e., that current bacteria sampling continues) and shall evaluate beach monitoring data. The purposes of the water quality monitoring are to determine whether the TMDL wasteload allocations are attained; further identify and characterize the source areas or land uses with the greatest bacteria contributions; and direct adaptive implementation of controls to reduce or eliminate bacteria discharges from different sources over time.

(2) **Implementation Level** – At a minimum, the City and County shall continue monitoring the beaches as required under California Health and Safety Code section 115880 and evaluate the resulting data. The City and County may collaboratively or individually develop and conduct a source assessment study to better characterize sources and spatial and temporal extent of bacteria impairment at the beaches and to evaluate the contribution of bacteria from natural sources.

(3) **Reporting** -- No later than March 30 of each year, the City and County shall submit a comprehensive TMDL Implementation Status and Monitoring Report describing the monitoring that has been conducted in the TMDL Project Area during the foregoing October 1 through September 30 period. The City and County are encouraged to collaborate so as to prepare a single report on all the data. This report shall include:

(a) Data evaluation that addresses the following questions:

(i) Are the TMDL targets and allocations met at the beaches?

(ii) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) being contained and do control measures appear to be effective in reducing bacteria loads?

(iii) Which land uses and/or sources contribute most to bacteria impairments?

(b) The Report shall include the following:

(i) Information about the sampling locations, timing and frequency of sampling, analytical method(s), and a map of monitoring sites

(ii) An analysis of the data, which includes the following:

a. Basic descriptive statistics using indicator bacteria data

b. Identification and evaluation of available data that indicate the presence of controllable sources of fecal contamination (e.g., human, horses, and dogs)

c. Identification and analysis of any trends in stormwater or receiving water quality

d. Consideration of variability in the data sets.

(iii) A discussion of the data, which shall:

a. Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Pillar Point Harbor and Venice Beach Bacteria TMDL;

b. Identify potential sources of water quality problems;

c. Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

d. Evaluate the effectiveness of existing control measures; and

e. Identify and describe the follow-up management actions needed to address water quality problems.

iii. Planning for Phase Two Actions

(1) **Task Description** – If wasteload allocations are not met within five years of the TMDL effective date, Permittees shall develop a Phase Two Report that describes the actions being implemented and additional actions that will be taken to reduce the discharge of bacteria to the beaches.

(2) **Implementation Level** – In preparing the Phase Two Report, Permittees shall assess bacteria sources; describe control actions taken; and describe additional control measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. The report shall contain an implementation schedule and proposed milestones. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

(3) **Reporting** – Submit the Phase Two Report within five years of the TMDL effective date.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. **Discharge Type** – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers (excludes well development); and

(8) NPDES permitted discharges (individual or general permits).

ii. **Implementation Level** – The non-stormwater discharges listed in Provision C.15.a.i, above, are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b, below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed

and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-vi, below.

i. **Discharge Type** – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) Pumped Groundwater from Non-Drinking Water Aquifers

Groundwater pumped from a monitoring well, used for groundwater basin management, which is owned and/or operated by a Permittee is allowed if the following requirements are met:

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards, including effluent limitations in the VOC and Fuel General Permit, NPDES Permit No. CAG912002.

(ii) The water samples shall be analyzed using approved U.S. EPA methods: (a) U.S. EPA Method 8015 Modified for total petroleum hydrocarbons; (b) U.S. EPA Method 624.1 and 625.1 or equivalent for volatile and semi-volatile organic compounds, respectively; and (c) approved U.S. EPA methods to meet the triggers for the metals listed in the General Permit discussed in Provision C.15.b.i.(1)(a)(i), above.

(iii) The water samples shall be analyzed for pH and turbidity.

If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs and Monitoring** – When greater than 2,500 gallons per day of uncontaminated (meeting the criteria in Provision C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of banks, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of the discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(vii) The pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(c) If the Permittee is unable to comply with the criteria in Provision C.15.b.i.(1)(b)(i)-(vii), discharge shall cease immediately and the Permittee shall employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES VOC and Fuel General Permit, or Groundwater General Permit, as appropriate.

(d) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) Pumped[60] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements. Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(b) If the groundwater cannot be discharged to a landscaped area or bioretention unit and the discharge is greater than 2,500 gallons per day, it can only be considered for discharge once the following sampling is done to verify that the discharge is uncontaminated:

(i) The discharge shall meet water quality standards, including effluent limitations in the VOC and Fuel General Permit, NPDES Permit No. CAG912002.

(ii) The Permittees shall require that water samples from these discharge types be analyzed using the following approved U.S. EPA methods:

- U.S. EPA Method 8015 Modified for total petroleum hydrocarbons, and U.S. EPA Method 624.1 and 625.1 for volatile and semi-volatile organic compounds, respectively.
- The sufficiently sensitive (as identified in Attachment G of NPDES Permit No. CAG912002) approved U.S. EPA Methods (40 C.F.R Part 136) for the constituents listed below that meet the corresponding Reporting Limits:

[60] Pumped groundwater not exempted in Provision C.15.a, or conditionally exempted in Provision C.15.b.i.(1).

Constituent	Reporting Limit
Antimony	6 µg/l
Arsenic	10 µg/l
Beryllium	4 µg/l
Cadmium	0.90 µg/l
Chromium III	50 µg/l
Chromium VI	8.1 µg/l
Copper	3.4 µg/l
Lead	2.6 µg/l
Manganese	50 µg/l
Mercury	4 ng/l
Nickel	10 µg/l
Selenium	4.1 µg/l
Silver	1.1 µg/l
Thallium	1.7 µg/l
Zinc	47 µg/l
Cyanide	2.9 µg/l
Chlorine, total residual	0.05 µg/l
Total Petroleum Hydrocarbons	50 µg/l

(c) **Monitoring and Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in Provision C.15.b.i.(2)(b), above, the Permittees shall require the following:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream or if accessing the sampling points poses safety to personnel.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of bank, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(vii) The pH of discharged water shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(d) If a Permittee determines that a discharger or a project proponent is unable to comply with the criteria in Provision C.15.b.i.(2)(c)(i)-(vii), the Permittee shall require the discharge to cease immediately and require that the discharger employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES VOC and Fuel General Permit (NPDES Permit No. CAG912002), or Groundwater General Permit (NPDES Permit No. CAG912004), as appropriate.

(e) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be reused or directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Type – Emergency Discharges of Firefighting Water and Foam

(1) Emergency Discharges – Discharges resulting from emergency firefighting activities.

(2) Regional Coordination

(a) Permittees shall collectively convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff – and other stakeholders identified in Provision C.15.b.iii.(2)(vi), below – to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated

with firefighting activity. The Permittees shall collectively (e.g., through the Working Group):

(i) Prior to the submittal of the Firefighting Discharges Report, convene the Working Group at least twice per year. Thereafter, convene the Working Group at least annually.

(ii) Assess the adequacy of existing BMPs and standard operating procedures (SOPs) to address the potential adverse water quality impacts of firefighting water and foam discharged during emergencies (e.g., containment and cleanup),[61] including coordination within and between municipal departments, districts and jurisdictions, coordination between firefighting personnel and containment and cleanup crews, coordination with contracted staff, and coordination with relevant agencies (e.g., CalFire), as appropriate.

If the existing BMPs and SOPs need updates or are otherwise inadequate, suggest changes to those BMPs and SOPs so that they are updated and adequate. If new BMPs and SOPs are needed, recommend model BMPs and SOPs.

(iii) Assess the adequacy of existing resources (e.g., MS4 maps and maps that identify environmentally sensitive areas) used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters,[62] in order to address pollutant discharges (e.g., by facilitating containment and cleanup).

(iv) Investigate which firefighting foams are the least environmentally harmful (i.e., have the least adverse water quality and beneficial use effects, including those related to biodegradation, biomagnification, bioaccumulation, and acute and chronic toxicity), both for Class A foams and Class B foams. Then, develop SOPs to use the least environmentally harmful firefighting foams (and dispose of the more environmentally harmful foams) and to reduce the use of firefighting foams, without jeopardizing the protection of life or property, during emergencies.

[61] The Working Group does not necessarily have to review every single Permittee's BMPs and SOPs. It may review a representative subset.

[62] The Working Group does not necessarily have to review every single Permittee's resources. It may review a representative subset.

(v) Prepare outreach materials on containment and cleanup BMPs and SOPs for contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities within their jurisdictions. Additionally, prepare outreach materials – regarding good housekeeping practices and preventive measures – for sites that are prone to firefighting emergencies. Distribute those outreach materials to all such contractors and sites by September 30, 2025.

Subsequently, if it is identified that the outreach materials need to be revised or updated, they shall be revised or updated, and then redistributed.

(vi) Pursue coordination, information sharing, feedback and Working Group participation, from relevant agencies and organizations such as the California Department of Forestry and Fire Protection (Cal Fire), the California Department of Toxic Substances Control (DTSC), the U.S. Forest Service (USFS), the State and Regional Water Boards, permittees of other NPDES municipal stormwater permits, other state and federal agencies, and external workgroups (such as Petro-Chemical Mutual Aid), regarding interagency coordination and communication, BMPs, SOPs, and the least environmentally harmful firefighting foams.

(vii) Discuss reporting on emergency discharges of firefighting water and foam. The purpose of this reporting is first to provide transparency about the usage and water quality impacts of firefighting water and foam, and second to track reductions in those impacts over time, which is an anticipated outcome of the implementation of Provision C.15.b.iii.

This shall include discussion of the timing of such reporting, and how that reporting will be submitted to the Water Board. This shall additionally include discussion of how reporting is triggered (e.g., if a certain level of discharge enters the MS4 system, if any level of discharge enters a receiving water, and if any level of PFAS foam is used pursuant the exemptions in SB 1044), as well as the content of the reporting (e.g., the date and time of the discharge, Material Safety Data Sheet (MSDS) and any supplemental information for that foam, the quantity of water and foam concentrate used, the quantity and rate of water and foam concentrate discharged to the MS4 and/or receiving water, the point of discharge to the MS4 and/or receiving water, and

controls implemented to contain and/or mitigate discharges and impacts).

(b) Reporting – The Permittees shall collectively submit a Firefighting Discharges Report by September 30, 2025, that describes progress on, and recommendations regarding, the implementation of the items listed in Provision C.15.b.iii.(2)(a)(i)-(vii). The Firefighting Discharges Report shall be updated as needed on an ongoing basis, to incorporate recommendations by the Working Group.

(3) Ongoing Implementation Practices

(a) When the Firefighting Discharges Report is submitted, the Permittees shall begin implementation of the recommendations included therein.

(b) Permittees shall ensure proper BMPs and SOPs are included in contracts for non-municipal (contracted) staff hired by Permittees to assist with containment and cleanup, and to assist with prevention and mitigation of adverse impacts, of discharges associated with firefighting emergencies.

(c) For large industrial sites within Permittees' jurisdictions – such as IGP sites, gas plants, gas concentration facilities, and chemical plants – Permittees shall evaluate the adequacy of those sites' BMPs and SOPs for the prevention, containment and cleanup of emergency firefighting discharges into storm drains and receiving waters within Permittees' jurisdictions, and cause those BMPs and SOPs to be improved as appropriate.

(d) By June 30, 2027, Permittees shall require all municipal staff and contracted staff hired by Permittees that participate in the containment and cleanup of (and as appropriate, that assist with any other activities associated with mitigating the adverse environmental impacts of) discharges of firefighting water and foam from firefighting emergencies within their jurisdictions to attend at least one training on containment and cleanup BMPs and SOPs (and other BMPs and SOPs, as appropriate). Trainings may be region-wide, program wide, or Permittee-specific. Permittees are encouraged to make these trainings available to contractors hired by private parties.

(e) Reporting

(i) In their Annual Reports, Permittees shall report on the implementation of Provisions C.15.b.iii.(3).(a)-(c).

(ii) In the 2027 Annual Reports, Permittees shall report on trainings conducted pursuant to Provision C.15.b.iii.(3)(d), including the

date(s) of training(s), topics covered, and the percentage of applicable municipal and contracted staff involved in containment and cleanup activities in attendance.

(4) Required BMPs

(a) The Permittees shall implement and/or require firefighting personnel acting within their jurisdictions to implement BMPs and SOPs for emergency discharges – in order to reduce potential and actual water quality impacts – to the extent that the implementation of such BMPs does not interfere with immediate emergency response operations or impact public health and safety.[63]

(b) During emergency firefighting situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). Permittee staff, contractors, or firefighting personnel shall control the pollution threat from their activities during emergency firefighting situations to the extent that time and resources allow.

(5) Reporting

(a) Upon submittal of the Firefighting Discharges Report, Permittees shall implement the reporting recommendations and guidance therein.

(b) Otherwise, reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

(1) Required BMPs

(a) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their storm drain systems.

(b) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, or wash cars at commercial car wash facilities.

[63] Examples of BMPs to be considered are listed in the Fact Sheet. Where firefighting personnel may not be under the direct control of a Permittee, implement BMPs and SOPs, such as coordination and communication, identified in the Firefighting Discharges Report.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) Required BMPs

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[64] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from Provision C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa, and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

[64] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and

(e) Implementing the Illicit Discharge Enforcement Response Plan from Provision C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their storm drain systems.

(2) **Reporting** – The Permittees shall provide implementation summaries in each Annual Report.

C.16. Discharges to Areas of Special Biological Significance

This Provision applies to stormwater discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve Area of Special Biological Significance (ASBS). As set forth in the Fact Sheet, the State Water Board granted an exception to the ASBS discharge prohibition (ASBS Exception) in the Ocean Plan to applicants, including the County of San Mateo, for their existing stormwater discharges into ASBSs, provided they receive authorization to discharge by an NPDES permit; the discharges comply with all applicable terms, prohibitions, and special conditions of Attachment B - Special Protections (Special Protections) attached to and part of the ASBS Exception; and the discharges are essential for flood control or slope stability, designed to prevent soil erosion, occur only during wet weather, and are composed of only stormwater runoff. (See State Water Board Resolution No. 2012-0012, as amended by Resolution No. 2012-0031.) This Provision serves as the NPDES authorization for the County of San Mateo to discharge stormwater into the ASBS, provided the discharge meets the requirements below.

C.16.a. Discharges to the James V. Fitzgerald Marine Reserve ASBS

i. If the County of San Mateo meets all of the conditions set forth in Provision C.16.a.i. and C.16.a.ii., its stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS from MS4 outfalls that were constructed or were under construction prior to January 1, 2005, are permitted. Permitted discharges must comply with the following:

(1) Be essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

(2) Be managed or controlled to prevent soil erosion;

(3) Occur only during wet weather; and

(4) Be composed only of stormwater runoff, except as provided in the Special Protections of the ASBS Exception.

ii. The County of San Mateo shall comply with all applicable terms, prohibitions, and special conditions of the Special Protections of the ASBS Exception, including monitoring requirements, as they apply to stormwater. The Special Protections are hereby incorporated by reference into this Order and attached hereto as Attachment F. Notwithstanding anything to the contrary in this Order, the County of San Mateo shall not alter the natural ocean quality of the ASBS; shall not discharge trash into the ASBS; and shall not discharge non-stormwater into the ASBS except as provided in the Special Protections. As required by the Special Protections, the County of San Mateo shall address the preceding requirements (other than trash) in an ASBS Compliance Plan to

be approved by the Regional Water Board Executive Officer and comply with the compliance schedule set forth in the Special Protections.

iii. Reporting

(1) In addition to the monitoring requirements of the Special Protections, the County of San Mateo shall submit a copy of its ASBS Compliance Plan for approval by the Regional Water Board Executive Officer.

(2) If the results of any monitoring required under the Special Protections indicate that stormwater runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the County of San Mateo shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results according to the guidelines provided in the Special Protections.

(a) Within 30 days of the approval of the report by Regional Water Board Executive Officer, the County of San Mateo shall revise its ASBS Compliance Plan according to the guidelines provided in the Special Protections.

C.17. Discharges Associated with Unsheltered Homeless Populations

The purpose of this Provision is to identify and ensure the implementation of appropriate control measures, by all Permittees, to address non-stormwater discharges into MS4s associated with unsheltered homeless populations, including discharges from areas where unsheltered people congregate (e.g., formal and informal encampments including, but not limited to, informal tent or small cabin encampments, areas where people living in vehicles park, and safe parking areas). This Provision refers to such discharges collectively as discharges associated with homelessness.

C.17.a. Permittee Requirements

i. Task Description

(1) Permittees shall use results from biennial point-in-time census surveys and related information, such as municipal reports, databases, complaint logs, and other efforts, to gain a better understanding of unsheltered homeless population numbers within the Permittee's jurisdiction, the locations of unsheltered homeless residents, discharges and water quality-related impacts associated with homelessness, and associated sanitation-related needs.

(2) To encourage ongoing regional, countywide, and municipal coordination efforts, Permittees shall collectively develop a best management practice report that identifies effective practices to address non-storm water discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges within a given timeframe. The report shall:

(a) Describe practices that may be implemented by Permittees, including those currently being implemented, to address discharges associated with homelessness that are impacting water quality;

(b) Identify regional and/or countywide efforts and implementation actions to address discharges associated with homelessness (including how those efforts and actions have been affected by unsheltered homeless population growth). Include recommendations for engaging in these efforts and incorporating discharge-reduction strategies that also help meet the unsheltered population's clean water needs; and

(c) Identify actions taken during the COVID-19 pandemic to reduce the spread of the virus in homeless populations, such as temporarily housing homeless people in hotels, that may have reduced discharges associated with homelessness. Permittees shall consider the practicability of such actions for longer-term implementation.

This task's broader goals are to recognize non-stormwater pollutant sources associated with unsheltered homeless populations, reasons for discharges, and means by which they occur, and develop useful information that can be used toward prioritizing individual Permittee and collaborative best management practices for reducing or managing such discharges, while ensuring the protection of public health. Examples of collaborative implementation programs could include collaborative efforts between Permittees, Caltrans, sanitary sewer agencies, railroads, non-governmental organizations (NGOs), social service agencies and organizations, and other agencies.

ii. Implementation Level

(1) Each Permittee shall submit a map identifying, within its jurisdiction, the approximate location(s) of unsheltered homeless populations, including homeless encampments and other areas where other unsheltered homeless people live. The map shall identify those location(s) in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface water bodies within the Permittee's jurisdiction. The map shall be updated once during the Permit term, in 2025. Where Permittees are working collaboratively to address discharges associated with homelessness, they may collaborate to submit a joint map that covers their respective jurisdictions.

(2) Permittees shall report on the programmatic efforts being implemented within their jurisdiction, or at the countywide or regional level, to address MS4 discharges associated with homelessness. Examples of these efforts may include, but are not limited to: funding initiatives; adoption of ordinances to implement service programs; coordination with social services departments and NGOs; efforts to establish relationships with homeless populations; and alternative actions to reduce discharges to surface waters associated with homelessness, such as efforts towards providing housing, jobs, and related services for residents experiencing homelessness.

(3) Each Permittee shall identify and implement appropriate best management practices to address MS4 discharges associated with homelessness that impact water quality, including those impacts that can lead to public health impacts. In addition, Permittees shall also evaluate and assess the effectiveness of those practices, specifically by reporting on the BMP control measures being implemented, the approximate portion of the Permittee's unsheltered homeless population and locations being served by those control measures, and the portion and locations of the Permittee's unsheltered homeless population not reached, or not fully reached by the implemented control measures. Examples of actions that

may be implemented include, but are not limited to, access to emergency shelters; the provision of social services and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV “safe parking” areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing trash and waste cleanup or pickup programs within the Permittee’s jurisdiction, or at the countywide or regional level.

(4) Permittees shall use the information generated through the biennial point-in-time census surveys and related information, and the regional coordination tasks (as described above) to review and update their implementation practices.

iii. Reporting

(1) With the 2023 Annual Report, Permittees shall collectively submit, acceptable to the Executive Officer, a best management practice report as described in Provision C.17.a.i.(2).

(2) With the 2023 and 2025 Annual Reports, Permittees shall submit a map as described in Provision C.17.a.ii.(1).

With the 2023 and 2025 Annual Reports, each Permittee shall report on the best management practices being implemented and include the effectiveness evaluation reporting required in Provision C.17.a.ii.(3) and additional actions or changes to existing actions that the Permittee will implement to improve existing practices.

C.18. Control of Sediment Discharges from Coastal San Mateo County Roads

San Mateo County shall implement the following control program for sediment. San Mateo County shall perform and report on the control measures according to this Provision, which implements requirements of the Pescadero-Butano Sediment TMDL and actions being taken on San Gregorio Creek to reduce sediment delivery from road-related erosion on San Mateo County-maintained roads to stream channels. For the purpose of this Provision, road-related erosion includes, but is not limited to, erosion of the road surface, road shoulder, road drainage structures such as ditches and culverts, and erosional features such as gullies, landslides, or sloughing that are road-related. Road-related means either i) the road is the primary cause of an observed erosion feature that, without the road, would not have formed or ii) the road is significantly increasing erosion rates from an erosion feature that existed prior to road construction.[65] This Provision does not apply to erosion sites that are not road-related, such as erosion from a private property that discharges onto a County-maintained road during a rain event. This Provision applies to San Mateo County-maintained roads in the Pescadero and Butano Creek watersheds (Pescadero-Butano Creek watershed), and in the San Gregorio Creek watershed in San Mateo County. This Provision is in addition to and does not supersede Provision C.2.e for Rural Road and Public Works Construction and Maintenance.

C.18.a. Road Erosion Inventory

i. **Task Description** – San Mateo County shall prepare a road erosion inventory to identify and prioritize actions to reduce road-related erosion from hydrologically connected County roads. Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. A hydrologically connected road is any road or road segment that has a continuous surface flow path to a natural stream channel during a storm runoff event.[66] A suitable design runoff event for most purposes is a 1-year 6-hour storm, with antecedent moisture conditions corresponding to the wettest month of the year. Connectivity usually occurs through road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces.

[65] For example, a landslide that existed prior to road construction would not be a road-related erosion feature, but a significant increase in erosion from the landslide caused by a poorly located road cross-drain would be a road-related erosion feature. Only the increased erosion caused by the cross-drain would need to be addressed under this provision.

[66] Weaver, W.E., Weppner, E.M. and Hagans, D.K. 2015. *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Rev. 1st ed.),* prepared by Pacific Watershed Associates for Mendocino County Resource Conservation District, Ukiah, California, pp. 8 – 10, 50 – 51, and 332.

ii. Implementation Level – To comply with this subprovision, San Mateo County shall:

(1) Inventory all San Mateo County roads and include the following information: i) road location; ii) road segments that are hydrologically connected, iii) type of road (e.g., all-weather, seasonal, or abandoned); and iv) type of road surface (e.g., paved, gravel, or native soil).

For hydrologically connected road segments only, the Permittee shall comply with (2), (3), and (4) as follows:

(2) All road-related erosion sites with the potential to discharge at least 5 cubic yards of sediment to streams or other water bodies shall be documented. At a minimum, the location, type, and approximate dimensions of the erosion feature, an estimate of the sediment volume that could erode, its potential for delivery to a waterbody (e.g., high, moderate, or low), a site photo, a brief description of the proposed treatment for erosion repair, and permits required for the repair shall be documented.

(3) The location, shape (e.g., circular, elliptical, arch, box), size, and condition of all culverts along the roadway shall be documented. The following shall also be assessed:

(a) whether the culvert opening is clear and free of debris or sediment,

(b) the potential for the culvert to plug with debris carried from upstream during future runoff events; and

(c) the potential for flow diversion onto the roadway if the culvert is overtopped during a future runoff event.

Culvert plugging and flow diversion potential shall at a minimum be documented as 'none,' 'low,' 'moderate,' or 'high,' consistent with appropriate standards.[67,68,69]

(4) For culverts with a moderate to high plugging potential, the Permittee shall develop a brief description of the proposed improvement(s), priority for treatment, and required permits.

iii. Reporting – The road erosion inventory for the Pescadero-Butano Creek watershed shall be submitted to the Water Board in the 2023 Annual Report. The road erosion inventory for the San Gregorio Creek watershed shall be submitted to the Water Board in the 2025 Annual Report. The road erosion inventory shall be submitted in ArcGIS and Google Earth KML format with an accompanying report that provides all the information listed in the subprovision above, in addition to:

(1) A summary table for both the Pescadero-Butano Creek and San Gregorio Creek watersheds that lists the total drainage area, the total length of all San Mateo County roads, the total length of all hydrologically connected San Mateo County roads; and the percentage of unpaved San Mateo County roads that are hydrologically connected.

(2) Summary tables documenting the results of the road erosion inventory by watershed, where watershed means either the Pescadero-Butano Creek watershed or the San Gregorio Creek watershed.

New erosion sites identified during routine patrols shall be added to the road erosion inventory. San Mateo County shall provide a status update of these new erosion sites each year as part of its Annual Report.

C.18.b. Prioritized List and Schedule of Actions

i. Task Description – Based on the results of the road erosion inventory (C.18.a), San Mateo County shall develop a prioritized list and schedule of

[67] Weaver, W.E., Weppner, E.M. and Hagans, D.K. 2015. *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Rev. 1st ed.),* prepared by Pacific Watershed Associates for Mendocino County Resource Conservation District, Ukiah, California, pp. 99 – 106 and 136 – 150.

[68] Cafferata, P., Lindsay, D., Spittler, T., Wopat, M., Bundros, G., Flanagan, S., Coe, D. and Short, W. 2017. *Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood and Sediment (Updated 2017)*, California Forestry Report No. 1 (revised), State of California Department of Forestry and Fire Protection, Sacramento, California, pp. 23 - 43.

[69] Furniss, M.J, Flanagan, S. and McFadin, B. 2000. *Hydrologically-connected roads: an indicator of the influence of roads on chronic sedimentation, surface water hydrology, and exposure to toxic chemicals*, Stream Notes, July 2000. Stream Systems Technology Center, U.S. Forest Service, Rock Mountain Research Station, Fort Collins, Colorado.

actions to reduce road-related erosion and sediment delivery to stream channels. The goal of these efforts is to attain the following performance standards for San Mateo County roads identified in the Pescadero-Butano Sediment TMDL implementation plan:

(1) **For Roads**: Design, construct, and maintain roads to reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; or i) limit the length of unpaved roads that are hydrologically connected to 25 percent of total road length; ii) ensure culvert inlets have low plugging potential; and, iii) install appropriate best management practices, such as critical dips,[70] at culverted crossings that have a diversion potential; and

(2) **For Gullies and/or shallow landslides**: Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas. Manage existing roads and other infrastructure to prevent additional erosion of legacy sediment delivery sites and/or delivery from potentially unstable areas.

ii. Implementation Level – To comply with this provision element, San Mateo County shall:

(1) Develop a prioritized list of control measures and pollution prevention strategies for all road-related erosion sites and for all culvert crossings to achieve the performance standards described in C.18.b.i(1). The list shall include a brief description of the control measure(s) to be taken and a projected completion date for each control measure. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standards.

(2) Develop a schedule to implement the prioritized list of control measures such that twenty percent (20%)[71] of the control measures for the Pescadero-Butano Creek watershed are scheduled for completion by June 30, 2027. Implementation of control measures for San Gregorio Creek is not required during this Permit term.

(3) If the length of hydrologically connected unpaved roads identified in C.18.a exceeds 25 percent of the total San Mateo County unpaved road length in a watershed,[72] then the prioritized list and schedule shall include

[70] A critical dip is a low berm and/or a dip in the road surface constructed across the roadway, used to divert flow off the road that would otherwise flow down the road surface.

[71] 20 percent means 20 percent of the total estimated cubic yards of potential sediment erosion identified in the road erosion inventory required by Provision C.18.a. .

[72] 25 percent is measured from road segments located within the watershed. It excludes road segments located outside the watershed.

an implementation plan and schedule of actions to reduce the percentage of hydrologically connected unpaved roads to 25 percent or less. Examples of treatments to reduce overall hydrologic connectivity of roads are provided by Weaver et al. (2015, Chapter 4).

iii. **Reporting** – The prioritized list and schedule for the Pescadero-Butano watershed shall be completed and submitted to the Water Board in the 2023 Annual Report. The prioritized list and schedule for the San Gregorio Creek watershed shall be completed and submitted to the Water Board in the 2025 Annual Report. San Mateo County shall update the prioritized list and schedule annually thereafter and submit it each year with its Annual Report. The submittal shall include a list of completed, in-progress, and scheduled control measure and pollution prevention strategies and shall include at a minimum the following information for each control measure:

(1) The project name

(2) The project location and a brief project description

(3) Authorizations required to implement the project, including status

(4) The actual or estimated project start and end dates

C.18.c. Implement Control Measures to Attain Performance Standards

i. **Task Description** – San Mateo County shall implement control measures and pollution prevention strategies to reduce road-related sediment delivery from County roads to stream channels in the Pescadero-Butano Creek and San Gregorio Creek Watersheds. At least twenty percent (20%) of the control measures identified in Provision C.18.b.ii shall be implemented and completed in the Pescadero-Butano Creek watershed by 2027.

ii. **Implementation Level** – To comply with this subprovision, San Mateo County shall:

(1) Continue to follow all the requirements of Provision C.2.e for Rural Road and Public Works Construction and Maintenance.

(2) Based on the priority list and schedule of actions developed in C.18.b, implement the control measures and pollution prevention strategies for road related erosion sites and culvert crossings to achieve the road performance standards described in C.18.b.i.(1).

(3) New County-maintained roads constructed on hillslopes exceeding 5 percent shall be constructed as storm-proofed roads, as defined by Weaver et al. (2015, Chapter 6), and shall meet the following specifications where applicable:

(a) Stream crossings have a drainage structure designed for the 100-year flood flow including woody debris and sediment (Cafferata, et al., (2017)).

(b) Stream crossings do not have the potential for flow diversion onto the roadway if the culvert is overtopped during a future runoff event.

(c) Culvert inlets have a low plug potential (trash barriers or deflectors are installed where needed).

(d) Culverts are installed at the base of the fill and in line with the natural channel.

(e) Emergency overflow culverts that emerge higher in the fill have full round, anchored downspouts that extend to the natural channel.

(f) Deep fills (deeper than a backhoe can reach from the roadbed) with undersized culverts or culverts with high plugging potential are fitted with an emergency overflow culvert.

(g) Bridges have stable, non-eroding abutments and do not significantly restrict 100-year flood flow.

(h) Stream crossing fills are stable.

(i) Approaching road surfaces and ditches are hydrologically disconnected from streams and stream crossing culverts to the maximum extent feasible using road shaping and road drainage structures.

(j) Class I (fish-bearing) stream crossings meet California Department of Fish and Wildlife and National Marine Fisheries Service fish passage criteria.

(k) Road surfaces and ditches are hydrologically disconnected from streams and stream crossing culverts to the maximum extent feasible. Road surface runoff is dispersed, rather than collected and concentrated.

(l) Ditches are drained by functional ditch relief culverts and/or rolling dips.

(m) Outflow from ditch relief culverts does not discharge to streams.

(n) Ditches and road surfaces drainage does not discharge (through culverts and/or rolling dips) onto active or potential landslides and/or into gullies.

(o) Fine sediment contributions from roads, cutbanks, and ditches are minimized by utilizing seasonal closures and installing a variety of

surface drainage techniques including road surface shaping (outsloping, insloping, or crowning), rolling dips, ditch relief culverts, water bars, and other measures to disperse road surface runoff and reduce or eliminate sediment delivery to the stream.

New County-maintained roads that are under construction within one year of the start of this Permit term shall be exempt from this requirement (C.18.c.ii.(3)).

iii. **Reporting** – A report documenting project status shall be submitted with the Annual Report each year starting the first year of project implementation. The report shall include a list of projects from the priority list and schedule of actions in Provision C.18.b that have been completed or are in-progress, including:

(1) An estimate of the potential sediment delivery to stream channels prevented by the implemented control measure or pollution prevention strategy.

(2) The percent of control measures in the prioritized list completed to date so that progress in achieving the implementation of 20 percent of the control measures for the Pescadero-Butano Creek watershed by June 30, 2027, is documented.

(3) A summary of projects scheduled for completion since the last Annual Report submittal that were delayed or not completed and an explanation of why they were delayed or not completed.

C.18.d. Monitoring

i. **Task Description** – San Mateo County shall conduct implementation, effectiveness, and forensic monitoring to assess the performance of implemented control measures.

ii. **Implementation Level** – To comply with this provision element, San Mateo County shall:

(1) Conduct implementation monitoring to assess whether the implemented control measure from C.18.c was fully and properly carried out as specified. Monitoring shall be performed once and conducted via a visual observation of the completed project.

(2) Conduct effectiveness monitoring to assess whether each of the implemented control measure(s) from C.18.c is adequately protective of water quality. Effectiveness monitoring shall be performed once and conducted via a visual inspection of the construction or repair site and the adjacent area. It shall be performed after the control measure has gone

through one year or one winter season in order to evaluate the effectiveness of the control measure during winter rain events.

(3) Conduct forensic monitoring in cases where an implemented control measure has failed. Forensic monitoring shall be conducted via a visual inspection of the failed control measure. Site photos shall be taken to adequately document the failure and a brief description of the mechanism and/or circumstances of failure shall be documented.

(4) Conduct routine monitoring of San Mateo County roads per the guidelines set forth in the County of San Mateo Routine Maintenance Program Manual (San Mateo County 2020, as may be amended).

iii. Reporting – San Mateo County shall document the results of the implementation, effectiveness, and forensic monitoring in a monitoring report submitted with the Annual Report each year starting in the first year of project implementation. If preferred, implementation monitoring information may be included with the implementation reporting required pursuant to Provision C.18.c.iii. The report shall include the following:

(1) Results of implementation and effectiveness monitoring, including:

(a) The monitoring point location and description of the project, or a reference to the specific project in the completed projects report.

(b) A brief description of the visual observations made during the monitoring inspection.

(c) The date the monitoring inspection was conducted.

(2) Results of any forensic monitoring conducted in the past year, including:

(a) The monitoring point location and description of the project, or a reference to the specific project in the completed projects report.

(b) Site photos documenting the failed control measure

(c) A brief description of the mechanism and/or circumstances of failure

(d) Proposed corrective measures to be taken and timeline for completion

(e) The date the monitoring inspection was conducted

(3) Results of annual monitoring conducted in the past year, including:

(a) A summary of all unpaved roads inspected at the end of the rainy season.

(b) A brief description of general road conditions and any specific problems noted, particularly with regard to sediment delivery to stream

channels. These observations will be used to make annual updates to the Road Erosion Inventory as required by Provision C.18.a. Any new road-related erosion sites identified during this effort shall be documented in the report and added to the Road Erosion Inventory required by Provision C.18.a.

(c) The date(s) the monitoring inspections were conducted.

C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements

The cities of Antioch, Brentwood, and Oakley, unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District (collectively, East County Permittees), located in the Central Valley Regional Water Quality Control Board's (Central Valley Water Board's) geographic jurisdiction, are included in the definition of "Permittees" as used throughout and shall comply with all requirements of this Order No. R2-2022-0018 except as provided for in this Provision. This Provision also incorporates requirements from Central Valley Water Board's TMDLs and control programs applicable to the East County Permittees.

C.19.a. Mercury Controls

The East County Permittees are exempt from Provision C.11, Mercury Controls.

C.19.b. Polychlorinated Biphenyls (PCBs) Controls

The East County Permittees are exempt from Provision C.12, PCBs Controls.

C.19.c. Diazinon and Chlorpyrifos Controls

i. **Task Description** – The East County Permittees shall continue compliance with the Central Valley Water Board's Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL and continue to meet wasteload allocations for diazinon and chlorpyrifos.

ii. **Implementation Level –** The East County Permittees shall implement Provision C.9.

C.19.d. Methylmercury Control Measure Plan and Monitoring

The methylmercury wasteload allocations for the East County Permittees in the Sacramento-San Joaquin Delta Methylmercury TMDL (Resolution No. R5-2010-0043) by Delta subarea are as follows:

- Central Delta subarea: 0.75 grams/year
- Marsh Creek subarea: 0.30 grams/year
- West Delta subarea: 3.2 grams/year

Methylmercury wasteload allocations shall be met as soon as possible, but no later than the final compliance date of January 1, 2030. As part of the Delta Mercury Control Program Review, the Central Valley Water Board may adopt revised wasteload allocations and a new final compliance date.

i. **Task Description** – Pursuant to the Central Valley Water Board's Water Quality Control Plan for the Sacramento San Joaquin Basins' Delta Mercury Control Program and associated Methylmercury TMDL, the East County Permittees were required to develop, conduct, and report on a methylmercury control study for urban runoff. The submitted control study[73] proposed conducting a Reasonable Assurance Analysis (RAA) to determine the achievable methylmercury load reduction. The control study also stated that monitoring will be conducted to answer the management questions outlined in Provision C.19.d.ii(2)a-e. Therefore, the East County Permittees shall submit a control measure plan and conduct a corresponding RAA as well as implement methylmercury monitoring as described below. With the Central Valley Water Board's Executive Officer's approval, the East County Permittees may participate in the Delta Regional Monitoring Program (Delta RMP) or other collective monitoring efforts in lieu of some or all of the individual monitoring requirements required by this Provision. Participation in the Delta RMP or other collective monitoring efforts shall consist of providing funds and/or in-kind services to the Delta RMP or other collective monitoring effort at least equivalent to the discontinued monitoring efforts in order for the Central Valley Water Board Executive Order to approve the alternative monitoring.

ii. **Implementation Level** – The East County Permittees shall:

(1) Prepare and submit by November 1, 2022, a Control Measure Plan and schedule to achieve the TMDL wasteload allocations. The Plan shall include a corresponding RAA for total mercury and methylmercury demonstrating that sufficient control measures will be implemented during this Permit term to attain the methylmercury Delta Mercury Control Plan wasteload allocations by January 1, 2030, or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review. The Control Measure Plan, including RAA, shall comply with the following:

(a) The Plan shall identify all technically and economically feasible mercury and methylmercury MS4 control measures to be implemented (including green stormwater infrastructure (GSI) projects).

(b) The Plan shall include a schedule according to which these technically and economically feasible control measures will be fully implemented.

(c) The Plan shall provide an evaluation and quantification of mercury and methylmercury load reductions of such measures as well as an

[73] *Contra Costa Clean Water Program Methylmercury Control Study Final Report (Rev. 1),* September 2020.

evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

(d) The RAA for total mercury must be evaluated using the California Toxics Rule for mercury (0.05 µg/L).

(e) The RAA for methylmercury must be evaluated using the methylmercury load allocations specific to each Delta subarea within Contra Costa County subject to the DMCP (i.e., the Central Delta, Marsh Creek, and West Delta subareas).

(f) The RAA shall demonstrate quantitatively that the plan will result in mercury and methylmercury load reductions sufficient to attain the methylmercury wasteload allocations by January 1, 2030, (or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review) and address the following questions:

(i) What are the annual mercury and methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?

(ii) Do the mercury and methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?

(iii) What is the achievable mercury and methylmercury load reduction in discharges from the MS4 by implementation of reasonable, foreseeable controlmeasures?

(iv) What controllable MS4 water quality factors affect methylmercury production and transport in the MS4 discharge and in the receiving waters draining to the Delta?

(v) Are there MS4 design features that increase or decrease mercury methylation.

(vi) Are there reasonable and foreseeable managementactions to reduce methylmercury concentrations within the MS4 boundary?

(g) Permittees shall ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill Provision C.19.ii.(1)(a)-(f) have been validated through a peer review process. The East County Permittees may use the approach developed by the Contra Costa Clean Water Program or an equivalent approach developed by another program during the previous permit term.

(2) Conduct annual monitoring in waterways within the East County Permittees' MS4 boundary to answer the questions in Provision

C.19.d.ii(2)(a)-(e). Monitoring shall include, but is not limited to, Marsh Creek, downstream of Marsh Creek Reservoir, and Central and West Delta Subarea tributaries within the MS4 boundary. Permittees shall collect fifty (50) samples throughout the Permit term, with at least eight (8) samples annually, for aqueous methylmercury analysis. Samples shall be collected in each subarea to be representative of the discharge during wet and dry year conditions and analyzed using U.S. EPA- or SWAMP-approved methods.

(a) What are the annual methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?

(b) Do the methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?

(c) Are there any MS4 design features that increase mercury methylation in the discharge?

(d) What MS4 water quality controls have been implemented or are planned to be implemented to reduce methylmercury production and transport in the MS4 discharge?

(e) By January 1, 2024, address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March and mid-November), and, if so:

(i) Under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta?

(ii) Are there reasonable and foreseeable management actions to ameliorate increased methylmercury concentrations?

(3) Prepare an Annual Mercury Monitoring Plan and submit it to the Central Valley Water Board for Executive Officer approval. The monitoring plan shall describe the annual monitoring design and specify the proposed sampling locations for methylmercury sampling required under Provision C.19.d.ii.(2).

iii. Reporting

(1) Annual Mercury Monitoring Plan – by October 1, 2022, and annually thereafter with the Urban Creeks Monitoring Report due March 31.

(2) Annual Report **–** The East County Permittees shall provide the following:

(a) Monitoring and assessment results answering the questions required under Provision C.19.d.ii.(2), and

(b) Upon completion by the deadline in Provision C.19.d.ii.(1), submit the Control Measure Plan, including RAA.

A copy of each Annual Report shall also be submitted to the Central Valley Water Board.

(3) Pollutants of Concern Monitoring Report **–** The East County Permittees shall report monitoring and assessment activities relevant to the Delta Methylmercury TMDL from the past water year and planned for the next water year as a separate section within the Pollutants of Concern Monitoring Report required under Provision C.8.h.iv. A copy of each Pollutants of Concern Monitoring Report shall also be submitted to the Central Valley Water Board.

(4) Integrated Monitoring Report **–** The East County Permittees shall report the monitoring and assessment results as a separate section within the Integrated Monitoring Report as required under Provision C.8.h.v. A copy of each Integrated Monitoring Report shall also be submitted to the Central Valley Water Board.

(5) The East County Permittees shall report progress on the Delta Methylmercury TMDL and recommendations for the next permit re-issuance as a separate section within the Report of Waste Discharge (ROWD) required by Provision C.25. A copy of the ROWD shall also be submitted to the Central Valley Water Board.

C.19.e. Delta Mercury Control Program Minimum BMPs

i. Task Description – The East County Permittees shall implement inorganic mercury reduction BMPs as well as provide ongoing education and outreach to address mercury pollution prevention and risk reduction.

ii. Implementation Level – At a minimum, the East County Permittees shall implement the following inorganic mercury reduction BMPs, consistent with the Delta Methylmercury TMDL.

(1) **Mercury Collection and Recycling** - To minimize mercury in storm water the East County Permittees shall continue implementing:

(a) Collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs); and

(b) Collection, recycling and/or diversion of mercury-containing waste products (e.g., gauges, batteries, fluorescent and other lamps, switches, relays and sensors) from the waste stream from industrial and commercial entities (e.g., auto dismantlers), and municipal facilities.

(2) **Enhanced Municipal Management Practices to Reduce Sediment Discharges** - The East County Permittees shall continue to implement BMPs to minimize sediment discharges during municipal operations and municipal maintenance activities. Municipal operations and municipal maintenance activities include but are not limited to the following: storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning.

(3) **Public Education and Risk Reduction** - The East County Permittees shall continue to conduct ongoing education to the public on mercury pollution prevention and mercury risk reduction. The East County Permittees shall continue to:

(a) Provide mercury pollution prevention messages to residents, commercial businesses, and industrial facilities with mercury-containing products or emissions. This may be implemented as part of Provision C.7; and

(b) Provide notices to communities on the health risk associated with eating mercury contaminated fish. These notices shall also include the Office of Environmental Health Hazard Assessment's fish consumption advisories.

(4) **Methylmercury Controls** – the East County Permittees shall implement control measures that reduce mercury methylation potential and retrofit existing BMPs that show an increase of mercury methylation.

(a) New development projects shall use BMPs that either prevent an increase of methylmercury or have been shown to decrease methylmercury.

(b) For existing BMPs that increase methylmercury within subareas that are meeting the assigned wasteload allocation, retrofitting of these BMPs may occur as part of any capital improvement, redevelopment, operation, or maintenance plan as resources are available.

(c) For existing BMPs that increase methylmercury within subareas that are not meeting the assigned wasteload allocation, retrofitting of these BMPs shall occur as soon as feasibly possible, but no later than the final compliance date of January 1, 2030 (or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review).

iii. Reporting – In each Annual Report, the East County Permittees shall:

(1) Describe Mercury Collection and Recycling efforts.

(2) List the municipal operations and municipal maintenance activity BMPs that are implemented to minimize sediment discharges.

(3) Discuss the mercury pollution prevention messages provided and

(4) Summarize tasks implemented to provide notices on the health risk associated with eating mercury contaminated fish.

(5) Report on implementation of methylmercury controls required in C.19.2.ii.(4).

C.19.f. Pyrethroid Control Program

i. Task Description – The East County Permittees shall comply with the Central Valley Water Board's conditional prohibition of the discharges of pyrethroid pesticides and associated monitoring and reporting requirements established in the Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the control of Pyrethroid Pesticide Discharges (Resolution No. R5-2017-0057).

ii. Implementation Level – The East County Permittees shall:

(1) Continue to implement a pesticide control program as required by Provision C.9, which is consistent with Central Valley Water Board requirements for a pyrethroid management plan.

(2) Continue pesticides and toxicity monitoring as specified in Provision C.8.g. In addition to the pollutants and organisms listed in Table 8-5, the East County Permittees shall also analyze total and particulate organic carbon, as required by the Central Valley Water Board's Basin Plan Amendment (R5-2017-0057).

(3) Submit a baseline monitoring report by September 19, 2022, that:

(a) Summarizes the pyrethroid and toxicity monitoring results from 2012 through 2019;

(b) Assesses the compliance of the discharge with the conditional prohibition triggers in the Basin Plan established by Resolution No. R5-2017-0057;

(c) Summarizes toxicity of water and sediment samples to the test organism Hyalella azteca; and

(d) Summarizes any other pyrethroid monitoring data collected by the East County Permittees during the above period.

iii. **Reporting –** The East County Permittees shall:

(1) With the 2024 and subsequent Annual Reports, provide a progress report to document the management practices that have been implemented, evaluate pyrethroid concentrations with respect to the pyrethroid triggers, and identify effective control actions to be taken in the future. A copy shall be provided to the Central Valley Water Board.

(2) Urban Creeks Monitoring Report (UCMR) – The East County Permittees shall report monitoring, assessment results, relevant to the Pyrethroids Control Program as a separate Pyrethroid Trend Monitoring section within the 2024 UCMR required under Provision C.8.h.iii. A copy of the 2024 UCMR shall also be submitted to the Central Valley Water Board. The Pyrethroid Trend Monitoring section of the 2024 UCMR, shall include an analysis of data collected in East County Permittees receiving waters for pesticides and toxicity from 2019 through 2024 to assess the following:

(a) Whether discharges from MS4s are exceeding the acute and chronic pyrethroid triggers set forth in the Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges (Resolution No. R5-2017-0057);

(b) Whether pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for toxicity in surface waters or bed sediments.

(c) The effectiveness of management practices that are implemented to reduce pyrethroid levels in discharges;

(d) Whether alternatives to pyrethroid pesticides are being discharged at concentrations with the potential to cause or contribute to exceedances of applicable water quality objectives.

C.20. Cost Reporting

C.20.a. Task Description – Each Permittee shall annually prepare and submit a fiscal analysis of the capital and operation and maintenance costs incurred to comply with this Order's requirements listed in Provision C.20.b.(iii).

C.20.b. Implementation Level

i. The Permittees shall develop a cost reporting framework and methodology to perform the fiscal analysis. Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost-savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with this Order's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time.

ii. The analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds, and identify any funding resources shared on a regional or countywide basis. The analysis shall include the costs incurred to comply with this Permit, and an estimate of costs for the upcoming Permit year.

iii. The analysis shall include the following program areas, specifically as required under this Order**:**

(1) Program management

(2) Municipal operations

(3) New development and redevelopment

(4) Industrial and commercial site controls

(5) Illicit discharge detection and elimination

(6) Construction site controls

(7) Public information and outreach

(8) Water quality monitoring

(9) Pesticides toxicity control

(10) Trash load reduction

(11) Mercury controls

(12) PCBs controls

(13)Copper controls

(14)Bacteria controls

(15)Discharges associated with unsheltered homeless populations

(16)Asset management plan development and implementation

iv. The costs reported for each program area shall address the following categories:

(1) Total cost

(2) Capital expenditures

(3) Land costs

(4) Personnel costs

(5) Consultant costs

(6) Overhead costs

(7) Construction costs

(8) Operation and maintenance costs

(9) Other costs

C.20.c. Reporting

i. The Permittees shall submit the cost reporting framework and methodology, acceptable to the Regional Water Board Executive Officer, by June 30, 2023.

ii. The Permittees shall submit their fiscal analyses annually according to the accepted cost reporting framework and methodology starting with the 2025 Annual Report.

C.21. Asset Management

C.21.a. Task Description – Each Permittee shall develop and implement an Asset Management Plan in order to ensure the satisfactory condition of all hard assets[74] constructed during this and Previous Permit terms pursuant to Provisions C.2 Municipal Operations, C.3 New Development and Redevelopment, C.10 Trash Load Reduction, C.11 Mercury Controls, C.12 PCBs Controls, C.13 Copper Controls, C.14 Bacteria Controls for Impaired Water Bodies, C.17 Discharges Associated with Unsheltered Homeless Populations, C.18 San Mateo County Sediment Controls, and C.19 Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements.

C.21.b. Implementation Level – Each Permittee shall:

i. Develop an Asset Management Plan by June 30, 2025, which, at a minimum, shall include the following:

(1) A description of the asset categories to be included.

(2) An inventory (or link to such an inventory) of Permittees' existing hard assets built pursuant to the Provisions cited in Provision C.21.a, including at a minimum all LID/GSI systems and trash capture devices.

(3) An Operation, Maintenance, Rehabilitation, and Replacement Plan (Asset Management O&M Plan), to evaluate data obtained through asset assessment in order to inform a strategy for prioritizing and scheduling maintenance, rehabilitation, and replacement of inventoried assets, including:

(a) A process for prioritizing and scheduling operation and maintenance activities.

(b) A process(es) for evaluating the current condition, and identifying the need for and carrying out, as appropriate, the rehabilitation and replacement of inventoried assets. The process(es) shall account for:

(i) The minimum condition necessary to achieve minimum performance level(s) for each type of hard asset, including an assessment of stormwater volume and pollutant load reduction, necessary to comply with applicable Permit Provisions and TMDLs.

[74] Hard assets are structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash receptacles, and pet waste stations.

(ii) Current performance level and effectiveness, as indicated by condition. Permittees may implement a risk-based condition assessment, or comparable assessment method, to cost-effectively and -efficiently assess condition. Permittees shall base the effectiveness evaluation on, at a minimum, factors such as design, capacity, and condition and function relative to the asset's design, intended operating conditions, and intended function.

(iii) Consequence of failure and likelihood of failure.

(c) An evaluation or forecast of costs necessary for the implementation of (a)-(b) above, at least through the end of the current permit term. On an ongoing basis, the Permittees shall compare these projections with available funding sources to determine the best manner in which to fund the operation, maintenance, rehabilitation, and replacement of inventoried assets. This evaluation or forecasting may supplement Permittees' compliance with Provision C.20 Cost Reporting.

(4) Recommendations for a reporting strategy, which may have a nexus with the tracking systems referenced in Permittees' Green Infrastructure Plans, to include:

(a) Municipality-specific reporting;

(b) Assessment of the programmatic benefit from countywide or regional roll-up of collected information.

ii. Begin implementation of the Asset Management Plan no later than July 1, 2025.

iii. Reassess and update their Asset Management Plan on an as-needed basis, to address changing conditions and resources.

iv. Provide the latest version of the Asset Management Plan to Water Board staff during inspections and audits, or otherwise upon request.

v. Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of Permittees' inventoried hard assets over the next 50 years, and identify approaches that Permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale.

C.21.c. Reporting

i. The Permittees shall submit their Asset Management Plans with the 2025 Annual Reports.

ii. The Permittees shall report on the implementation of their Asset Management Plans annually, starting with the 2026 Annual Reports, as follows:

(1) Provide (or link to) an inventory of all assets accounted for in the Asset Management Plan.

(a) Different categories of assets (e.g., trash controls, LID/GSI controls, bacteria controls) may be maintained in separate inventories.

(2) At a minimum, for each asset in the inventory, provide the following: category or type of water quality control; relevant design information; tributary drainage area; location; condition based on periodic inspections either by municipal or contracted staff; and operation and maintenance need (for example, while most assets may require normal operation & maintenance, Permittees may identify a subset of assets in need of rehabilitation or replacement).

This information does not have to be submitted in tabular format in the Annual Report; it may be provided externally, at the linked location identified in Provision C.21.c.ii.(1) above.

iii. The Permittees shall submit the Climate Change Adaptation Report described in Provision C.21.b.v with their 2026 Annual Reports. The Permittees may submit the Climate Change Adaptation Report(s) on an all-Permittee (regional) scale or countywide scale.

C.22. Annual Reports

C.22.a. The Permittees shall submit Annual Reports electronically, including a verified electronic signature (e.g., Adobe e-signature, DocuSign, or equivalent), in all cases by September 30 of each year, in the manner specified by the Water Board. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.21, with the exception of the 2022 annual reporting requirements for Provisions C.2 – C.9, which are set forth in Provisions C.2 - C.9 of the previous Permit, Order No. R2-2015-0049, as amended. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.

C.22.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by March 1, 2023. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by March 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.21, with the agreement of the Permittees and by the approval of the Executive Officer.

C.22.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit, in the cover letter of the Annual Report, the reason for its failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.23. Modifications to this Order

The Water Board may modify or reopen this Order, or alternatively, revoke or reissue it, before the expiration date in any of the following circumstances or as authorized by law:

C.23.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.23.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Water Board or amendments to the Basin Plans for the San Francisco Bay and the Sacramento and San Joaquin River Basins approved by the State Water Board;

C.23.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) or other applicable provision of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order;

C.23.d. To provide an alternative compliance program for exchanges of impervious surface treatment credits in Provision C.3.e.i; or

C.23.e. To incorporate applicable requirements from the Central Valley Regional Water Board's Phase 1 Delta Mercury Control Program Review under the Basin Plan for the Sacramento and San Joaquin River Basin.

C.24. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment G of this Order.

C.25. Expiration Date

This Order expires on June 30, 2027, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.26. Rescission of Old Order

Order No. R2-2015-0049, as amended by Order No. R2-2019-0004, is hereby rescinded, except for enforcement purposes, on the effective date of this Order, which shall be July 1, 2022, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

C.27. Effective Date

The Effective Date of this Order and Permit shall be July 1, 2022, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

I, Thomas Mumley, Interim Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on May 11, 2022.

_____

Thomas Mumley
Interim Executive Officer

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
Central Valley Water Board	California Regional Water Quality Control Board, Central Valley Region
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CSCI	California Stream Condition Index
CWA	Federal Clean Water Act
CWC or Water Code	California Water Code
DCIA	Directly Connected Impervious Area
DDCP	Direct Discharge Control Plan
DPR	California Department of Pesticide Regulation

East County Permittees or East Contra Costa Permittees	The cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County and the Contra Costa County Flood Control and Water Conservation District that are in the Central Valley Water Board's region
ERP	Enforcement Response Plan
FR	Federal Register
FSURMP	Fairfield-Suisun Urban Runoff Management Program
GI or GSI	Green Stormwater Infrastructure
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
ISWEBE	Inland Surface Waters, Enclosed Bays, and Estuaries Plan
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable
MRP	Municipal Stormwater Regional Permit (see Glossary for MRP 1, MRP 2, MRP 3)
MSDS	Material Safety Data Sheet
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
NAFSMA	National Association of Flood & Stormwater Management Agencies
NAICS	North American Industry Classification System
NGO	Non-governmental Organization
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System

NRDC	Natural Resources Defense Council
Ocean Plan	California Water Quality Control Plan for Ocean Waters of California
OFEE	Oil Filled Electrical Equipment
O&M	Operation and Maintenance
PAHs	Polynuclear Aromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ether
PCA	Pest Control Advisor
PCBs	Polychlorinated Biphenyls
PHAB	Physical Habitat (e.g., of streams)
POTW	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan
RAA	Reasonable Assurance Analysis
RCRA	Federal Resource Conservation and Recovery Act
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
ROW	Right of Way
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Federal Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SIC	Standard Industrial Classification
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SSA	Solano Stormwater Alliance
SSID	Stressor Source Identification

SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
State Water Board	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Federal Toxic Substances Control Act
TST	Test of Significant Toxicity
TU	Toxicity Units
UCMR	Urban Creeks Monitoring Report
U.S. EPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations
WQBEL	Water Quality Based Effluent Limitation
WQS	Water Quality Standards

GLOSSARY

Actual Discharge	Observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4.
Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the State protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Base Course	A layer of constructed material (typically aggregate base – a construction aggregate typically composed of crushed rock or of recycled asphalt or concrete, capable of passing through a sieve with a certain pore diameter) located above the subbase course and/or subgrade course, and below the surface layer (which consists of a wearing course, and sometimes an extra binder course), applied to serve one or more functions, such as supporting the surface layer and distributing load.
Bituminous Surface Treatment	A thin protective wearing surface, which can provide, among other services, a waterproof layer to protect underlying pavement and a filler for existing cracks or raveled surfaces. This includes, but is not limited to: • Chip seal – a single layer of asphalt emulsion binder that is covered by embedded aggregate; • Slurry seal – a thick, cold mix paving treatment that contains aggregates, asphalt emulsion, binder and fines, water, and additives; and • Seal coat – an emulsion containing liquid asphalt and/or coal tar, mineral fillers and other anti-oxidation additives and admixtures. • Cape seal – a chip seal covered with a slurry or micro-surface, applied to existing pavements. Micro-surfacing is a polymer-modified cold-mix paving system that begins as a mixture of dense-graded aggregate, asphalt emulsion, water and mineral fillers.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.

Construction Site	Any project, including projects requiring coverage under the Construction General Permit, that involves soil-disturbing activities including, but not limited to, grubbing, clearing, grading, paving, disturbances to ground such as stockpiling, leveling, fill, and excavation. Construction sites include all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit. Construction sites are considered active until site surfaces are permanently stabilized to control erosion and other polluted stormwater discharges effectively.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this Permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of WQS because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge.
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size.
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.
Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Floor Area Ratio	The ratio of the total floor area on all floors of all buildings at a project site (except structures or floors dedicated to parking) to the total project site area.

Full Trash Capture Device	A Full Capture Device or System is a treatment control, or series of treatment controls, including, but not limited to, a multi-benefit project (as defined in the Trash Amendments) or a low-impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Green Infrastructure	Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.
Gross Density	The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.
Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, State, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Executive Officer.

Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes french drains).
Integrated Pest Management[75]	An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines (and when it has been concluded that the use of non-chemical controls is insufficient), and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment (DPR, 2018).

[75] Roadmap for Integrated Pest Management, CDPR 2018, https://www.cdpr.ca.gov/docs/pestmgt/ipm_roadmap.pdf

Integrated Pest Management, Biological Controls	Biological controls are the beneficial action of predators, parasites, pathogens, and competitors to control pests and pest damage. These controls rely on predation, parasitism, herbivory, or other natural mechanisms, but typically require active human intervention, such as releasing ladybugs.
Integrated Pest Management, Least Hazardous Chemical Controls	Chemical controls involve targeted application of traditional chemical pesticides, as well as alternative products, such as oils and soaps.
Integrated Pest Management, Cultural Controls	Cultural controls reduce pest establishment, reproduction, dispersal, and survival. Examples include scheduling planting, irrigation, and fertilization; soil solarization; and planting native vegetation and xeriscape to reduce water, pesticide, and fertilizer needs. Changing irrigation practices can reduce pest problems, since too much water can increase root disease and weeds.
Integrated Pest Management, Mechanical and Physical Controls	Mechanical and physical controls kill pests directly, exclude pests, or make the environment unsuitable for pests. Physical controls may involve manual removal of pests or mowing. Barriers (screens, mesh, caulk and other sealants) are physical controls that keep pests out of buildings and structures, and may be used to enclose sensitive plants. Mulch is a physical control that inhibits weed growth. Rodent traps are mechanical controls.
Integrated Pest Management, Pest Action Threshold	The point at which pest populations or environmental conditions indicate that one or more pest control actions must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic or health threat is critical to guide appropriate, least toxic pest control decisions.
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other.
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.
Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. CWA 402(p)(3)(B)(iii) requires that municipal stormwater permits “shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the state determines appropriate for the control of such pollutants.” Also see State Water Board Order WQ 2000-11.

Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
MRP 1	Order No. R2-2009-0074, as amended by Order No. R2-2011-0083.
MRP 2 or Previous Permit	Order No. R2-2015-0049, as amended by Order No. R2-2019-0004.
MRP 3, Permit, or Order	Order No. R2-2022-0018.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law...including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in 40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; and/or (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA sections 307, 402, 318, and 405.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, or other date as specified, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.

Pervious Pavement	A pavement system consisting of permeable interlocking concrete pavement (PICP), pervious or permeable concrete unit pavers, pervious grid pavements, pervious concrete, porous asphalt, turf block, grasscrete, and bricks and stones, set on a gravel base with gravel joints, which stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and PAHs; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste); and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Potential Discharge	Conditions with the potential to result in unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4. These include, but are not limited to, housekeeping issues, inadequate waste or materials management, evidence of actual discharges that are not ongoing, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.

Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by the San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).
Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMPs	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain WQS. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet WQS even after application of technology-based controls, more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.

Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the State, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and U.S. EPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the WQS that must be met to protect designated uses. Water quality standards also include the federal and State anti-degradation policy.
Water Year	The Water Year spans twelve months and begins on October 1 of each year. It is designated by the calendar year in which it ends. For example, the 2023 Water Year starts on October 1, 2022, and ends on September 30, 2023.

Wedge Grinding	The process of milling the asphalt areas directly adjacent to concrete curbs, gutter pans and metal structures (e.g., manhole covers) to a specified width and depth. To tie into the elevations of the existing concrete and metal structures, asphalt is removed along the perimeter to allow proper depth of asphalt on the edge and to preserve the appropriate drainage patterns on the asphalt surface.
Wet Season	October 1 of a given year through April 30 of the following year.

EXHIBIT 3
to Section 7

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order No. R2-2015-0049
NPDES Permit No. CAS612008
November 19, 2015

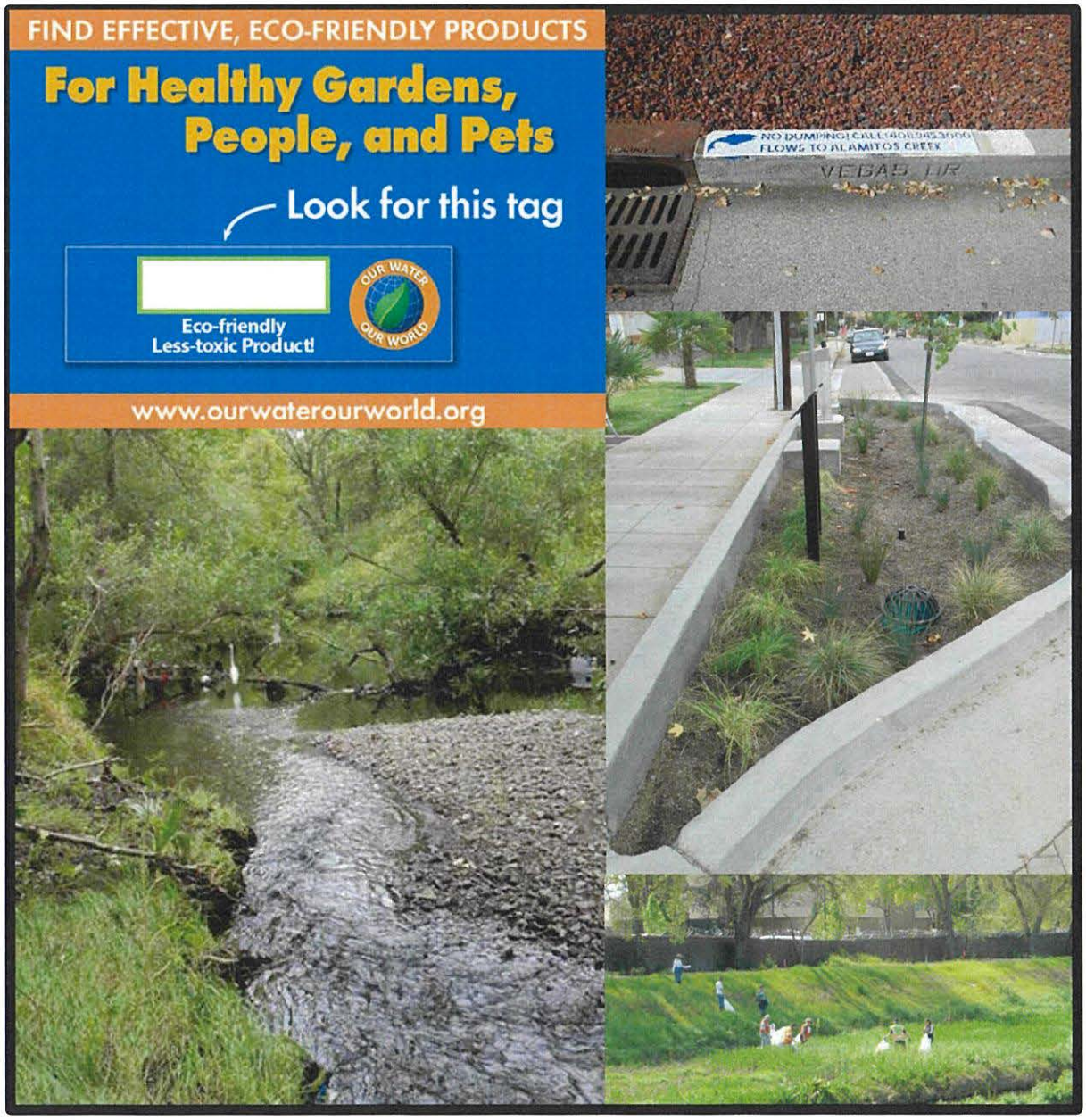

S7-0992

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER No. R2-2015-0049
NPDES PERMIT No. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Attachment A) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. The Fact Sheet, including any supplements thereto, is hereby incorporated by reference.

Existing Permit

2. **Alameda County**—The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated May 30, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

3. **Contra Costa County**—The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated June 2, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

4. **San Mateo County**—The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District and San Mateo County have joined together to form the San Mateo Countywide Water

Pollution Prevention Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated May 30, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County**—The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated May 29, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun**—The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated June 2, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo**—The City of Vallejo and the Vallejo Sanitary District (hereinafter referred to as the Vallejo Permittees) have submitted permit applications (Report of Waste Discharge), dated July 3 and June 2, 2014, respectively, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions. The Vallejo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083, to discharge stormwater runoff from storm drains and watercourses within the their jurisdictions.

8. The Alameda, Contra Costa, San Mateo, Santa Clara, Fairfield-Suisun, and Vallejo Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including

construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, USEPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, USEPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and USEPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, trash, and selenium in San Francisco Bay segments; pesticide associated toxicity, and trash in urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

13. Stormwater runoff is generated from various land uses in all the hydrologic sub-basins in the Basin and discharges into watercourses, which in turn flow into Central, Lower and South San Francisco Bay, and Suisun and San Pablo Bays.

14. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not

limited to, support for aquatic life; and other pollutants that can cause aquatic toxicity in the receiving waters.

15. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to USEPA stormwater regulations.

16. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

17. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

18. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments and recommendations.

19. The Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

20. This Order supersedes and rescinds Order Nos. R2-2009-0074 and R2-2011-0083.

21. This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective January 1, 2016, provided the Regional Administrator, USEPA, Region 9, has no objections.

THEREFORE, IT IS HEREBY ORDERED that Order No. R2-2009-0074 and R2-2011-0183 are rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Permittees shall comply with the following requirements in this Order. This action in no way prevents the Water Board from taking enforcement action for past violations of the previous orders.

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

- **a.** Floating, suspended, or deposited macroscopic particulate matter, or foam;
- **b.** Bottom deposits or aquatic growths;
- **c.** Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
- **d.** Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- **e.** Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Water Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.16.5. Compliance with Provisions C.9 through C.12, C.14, and C.16.5 of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), bacteria, diazinon and chlorpyrifos, and methylmercury shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provisions C.10 and C.16.5, which prescribe requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of WQS, except for exceedances of WQS for pesticides, trash, mercury, PCBs, bacteria, diazinon and chlorpyrifos, and methylmercury that are managed pursuant to Provisions C.9 through C.12, C.14, and C.16.5, persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:

a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable (WQS), the Permittee(s) shall notify, within no more than 30 days, and thereafter submit a report to the Water Board that describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. **Task Description** – Asphalt/Concrete Removal, Cutting, Installation, and Repair

The Permittees shall implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving, or repair maintenance activities, such as those described in the California Stormwater Quality Association's (CASQA's) Handbook for Municipal Operations.

ii. **Implementation Levels**

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer system is available for the wastewater generated from these activities provided that appropriate approvals are obtained and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from such work sites upon completion of work. The Permittees shall require cleanup of all construction debris, spills, and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) Blueprint for a Clean Bay.

iii. **Reporting** – The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. **Task Description** – The Permittees shall implement and require to be implemented BMPs that prevent the discharge of polluted wash water and non-stormwater to storm drains for pavement washing; sidewalk and plaza cleaning; mobile cleaning; pressure washing operations in locations such as parking lots and garages; trash areas; and gas station fueling areas. The Permittees shall implement the BMPs included in BASMAA's Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. **Reporting** – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. **Task Description**

(1) The Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. **Implementation Levels**

(1) The Permittees shall prevent all debris, including structural materials and coating debris, such as paint chips, and other debris and pollutants generated in bridge and structure maintenance or graffiti removal from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks, or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste, or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall use proper disposal methods for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts the proper capture and disposal methods for the wastes generated.

iii. **Reporting** – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.d. Stormwater Pump Stations

i. **Task Description** –The Permittees shall implement measures to operate, inspect, and maintain stormwater pump stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in stormwater discharges to comply with WQSs.

ii. **Implementation Levels** – The Permittees shall comply with the following at Permittee-owned or -operated pump stations:

(1) Upon becoming aware that the discharge from a pump station has a dissolved oxygen (DO) concentration below 3.0 mg/L, implement corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 milligrams per liter (mg/L) and verify the effectiveness of the corrective actions with monitoring. Corrective actions do not need to be implemented on discharges from pump stations that

remain in the stormwater collection system or infiltrate into a dry creek immediately downstream.

(2) Ensure that pump stations are free from debris and trash and replace any oil absorbent booms, as needed, and investigate and abate illicit discharges. Pump stations excluded from C.2.d.ii.(1) above are not excluded from this requirement.

(3) The Permittees shall maintain records of inspection, maintenance, implementation of corrective actions, and any monitoring records at Permittee-owned or -operated pumped stations. These records shall be made available to Water Board staff or its representatives during inspections and audits, or otherwise upon request.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance

For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing, or open space uses. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Wildlife (CDFW), and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

ii. Implementation Level

(1) The Permittees shall continue to implement BMPs for erosion and sediment control measures during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities.

(2) The Permittees shall implement appropriate BMPs for the following activities. BMPs shall minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities:

(a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identification and prioritization of rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Construction of roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Implementation of an inspection program to maintain rural roads' structural integrity and prevent impacts to water quality;

(e) Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, and address excessive erosion;

(f) Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacement of existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall incorporate existing training and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction to avoid water quality impacts.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for the rural public works construction and maintenance activities in their Annual Report, including reporting on increased maintenance in priority areas.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment, and maintenance vehicle parking areas, and material storage facilities, to comply with water quality standards. Each SWPPP shall incorporate all applicable BMPs that are described in the California Stormwater Quality Association's (CASQA's) Handbook for Municipal Operations and the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003, and its addenda, as appropriate.

(2) The requirements in this provision shall apply only to facilities that are not covered under the State Water Board's Industrial Stormwater NPDES General Permit.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters and street sweeper, vactor, and other related equipment wash water. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that non-stormwater discharges are not entering the storm drain system and pollutant discharges are prevented to the maximum extent practicable. At a minimum, each corporation yard shall be fully inspected each year between September 1 and September 30, beginning the 2016-2017 reporting year. Active non-stormwater discharges shall cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting

(1) In the 2015-2016 Annual Report, Permittees shall report on implementation of SWPPPs, the results of inspections, and any followup actions in their Annual Report.

(2) Beginning with the 2016-2017 Annual Report, Permittees shall list activities conducted in the corporation yards that have BMPs in the site-specific SWPPP, date of inspections, the results of inspections, and any followup actions, including the date of any necessary corrective actions implemented, in their Annual Report.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. **Task Description** – At a minimum, each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain inlet stenciling.

- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs, such as Bay-Friendly Landscaping.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:
  - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
  - Dumpster drips from covered trash and food compactor enclosures.
  - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
  - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
  - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the Bay-Friendly Landscape Guidelines).

ii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1) - (8) in the 2016 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility[1] in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked. For adjacent Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

(1) Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d. under a previous MS4

[1] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects.

permit is exempt from the requirements of Provision C.3.c. (low impact development requirements).

(2) Any Regulated Project that was approved with no Provision C.3. stormwater treatment requirements under a previous MS4 permit and that has not begun construction by the effective date of this permit, shall be required to fully comply with the requirements of C.3.c. and C.3.d. Permittees may grant exemptions from this requirement as follows:

(a) An exemption may be granted to:

(i) Any Regulated Project that was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the ordinance, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law.

(ii) Any Regulated Project for which the Permittee has no legal authority to require changes to previously granted approvals, such as projects that have been granted building permits.

(b) An exemption from the LID requirements of Provision C.3.c. may be granted to any Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.

(3) Regulated Projects, as they are defined in this Provision, do not include detached single-family home projects that are not part of a larger plan of development.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is

connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels; and

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement, and/or
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This

category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

- Interior remodels; and
- Routine maintenance or repair such as:
  - roof or exterior wall surface replacement, and/or
  - pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3., only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat

stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.
- Bicycle lanes built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[2]
- Caltrans highway projects and associated facilities.

iii. Implementation Level – All elements of Provision C.3.b.i.-ii. shall be fully implemented immediately, including a database or equivalent tabular format that contains all the information listed under Reporting (Provision C.3.b.iv.)

iv. Reporting

(1) **C.3.b.i.(2) Reporting**

In the 2017 Annual Report, each Permittee shall provide a complete list of the development projects that are subject to the requirements of Provision C.3.b.i.(2). For each such project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). If a Permittee has no projects subject to Provision C.3.b.i.(2), it shall so state in the 2017 Annual Report.

(2) **Annual Reporting – C.3.b.ii. Regulated Projects**

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the

[2] Permeable surfaces include pervious concrete, porous asphalt, unit pavers, and granular materials.

fiscal year Annual Report, in tabular form (as set forth in the attached Provision C.3.b. Sample Reporting Table):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date);

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project;

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

  (i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.iv.(2)(a) – (l) for the offsite project; and

  (ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.iv.(2)(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g.) – If not required, state why not. If required, state control method used.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing,

detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) **Source Control Requirements**

Require all Regulated Projects to implement source control measures onsite that, at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste, and compactor enclosures;
- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes

and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with pervious pavement systems.[3]
- Construct driveways, bike lanes, and/or uncovered parking lots with pervious pavement systems.

(b) Permittees shall collectively, on a regional or countywide basis, develop and adopt design specifications for pervious pavement systems, subject to the Executive Officer's approval. If countywide design specifications have been adopted and are contained in countywide stormwater handbooks, Permittees may reference these documents in the Annual Reports.

(c) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment.

(ii) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour, and maximize infiltration to the native soil during the life of the Regulated Project. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention

[3] Pervious pavement systems include pervious asphalt, pervious concrete, pervious pavers, and grid pavers.

and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in Attachment L of the previous permit (Order No. R2-2009-0074), dated November 28, 2011. Permittees may collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the soil media minimum specifications, subject to the Executive Officer's approval.

(iii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. Permittees shall ensure that green roofs installed at Regulated Projects meet the following minimum specifications:

(i) The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).

(ii) The green roof system planting media shall be sufficiently deep to support the long-term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(d) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(c) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Reporting

(1) Permittees shall collectively submit in the 2016 Annual Report, design specifications for pervious pavement systems that have been developed and adopted on a regional or countywide basis. If Permittees within a countywide program are using countywide design specifications that have been adopted and are contained in a countywide stormwater handbook, those Permittees may reference the countywide stormwater handbook in-lieu of submitting the actual design specifications.

(2) For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.iv, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. **Task Description** – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flow rate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. **Reporting** – Permittees shall use the reporting tables required in Provision C.3.b.iv.(2)

iii. **Limitations on Use of Infiltration Devices in Stormwater Treatment Systems**

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil.

Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the

level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.b in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[4] to treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at a Regional Project.[5] The Regional Project must achieve a net environmental benefit.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite and Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of a Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth, high density, or transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts.

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[4] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

[5] **Regional Project** – A regional or municipal stormwater treatment facility that discharges into the same watershed as the Regulated Project.

Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is

expressed in Floor Area Ratios (FARs[6]) for commercial development projects, in Dwelling Units per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density[7] of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100% Maximum LID Treatment Reduction Credit

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6 **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

7 **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.

- For any commercial Category B Special Project with an FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Transit-Oriented Development)

(a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria:

(i) Be characterized as a non-auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.

(ii) If a commercial development project, achieve at least an FAR of 2:1.

(iii) If a residential development project, achieve at least a gross density of 25 DU/Ac.

(iv) If a mixed use development project, achieve at least an FAR of 2:1 or a gross density of 25 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.

(c) Location Credits

(i) A Category C Special Project may qualify for the following Location Credits:

a. 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub.

b. 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub.

c. 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve an FAR of at least 2:1.

b. 20% Density Credit: Achieve an FAR of at least 4:1.

c. 30% Density Credit: Achieve an FAR of at least 6:1.

(ii) A Category C Special Project that is a residential or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve a gross density of at least 30 DU/Ac.

b. 20% Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 30% Density Credit: Achieve a gross density of at least 100 DU/Ac.

(iii) Commercial Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR. Mixed use Category C Projects may use Density Credits based on either DU/Ac or FAR, but not both.

(iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at-grade surface parking. The at-grade surface parking must be treated with LID treatment measures.

b. 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.

(6) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) The definitions of FAR and gross density applicable to Provisions C.3.e.ii.(4) and (5) are effective July 1, 2016, and shall apply to all Special Projects granted final discretionary approval on or after July 1, 2016.

(3) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the

Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Gross Density in DU/Ac: Number of dwelling units per acre.

(e) Density in FAR: Floor Area Ratio.

(f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(g) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied.

(h) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. **Task Description** – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third party reviewer must be a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California or staff of another Permittee subject to the requirements of this Permit.

ii. **Implementation Level** – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three

years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, CASQA, or the equivalent, may be considered qualifying training.

iii. **Reporting** – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. **Hydromodification Management (HM) Projects** are Regulated Projects that create and/or replace one acre or more of impervious surface except where one of the following applies. All HM Projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.

(1) The post-project impervious surface area is less than, or the same as, the pre-project impervious surface area.

(2) The project is located in a catchment that drains to a hardened (e.g., continuously lined with concrete) engineered channel or channels or enclosed pipes that extend continuously to the Bay, Delta, or flow-controlled reservoir, or drains to channels that are tidally influenced.

(3) The project is located in a catchment or subwatershed that is highly developed (i.e., that is 70% or more impervious).[8]

The Hydromodification Applicability Maps developed by the Permittees in the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Programs, and the City of Vallejo, under the Previous Permit remain in effect and are provided in Attachment C to this Permit. Permittees that do not have the location-based applicability criteria (Provision C.3.g.i.(2) – (3)) shown on existing maps shall develop, or require to be developed, new maps, overlays to existing maps, or other equivalent information that demonstrates whether a project falls under one of those two criteria. Such maps, overlays, or other equivalent information shall be acceptable to the Executive Officer and shall not be effective until accepted by the Executive Officer.

ii. **HM Standard**

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-

[8] The Permittees' maps accepted for the Previous Permit were prepared using this standard, adjusted to 65% imperviousness to account for the presence of vegetation on the photographic references used to determine imperviousness. Thus, the maps for the Previous Permit are accepted as meeting the 70% requirement.

project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, and the City of Vallejo, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[9] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

(3) **Standard HM Modeling:** Permittees shall use, or shall cause to be used, a continuous simulation hydrologic computer model to simulate pre-project and post-project runoff, or sizing factors or charts developed using such a model, to design onsite or regional HM controls. The Permittees shall compare, or shall cause to be compared, the pre-project and post-project model output for a long-term rainfall record and shall show that applicable performance criteria in C.3.g.ii.(1)-(3) above are met. HM controls designed using the Bay Area Hydrology Model (BAHM) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual. Modifications to the BAHM shall be acceptable to the Executive Officer, shall be consistent with the requirements of this Provision, and shall be reported as required below:

- **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.
- **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating

[9] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include U.S. EPA's Hydrologic Simulation Program—Fortran (HSPF), the U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and U.S. EPA's Storm Water Management Model (SWMM).

post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

iii. **HM Standard – Methodology for Direct Simulation of Erosion Potential**
The Permittees may, collectively, propose an additional method, using direct simulation of erosion potential, by which to meet the HM Standard in Provision C.3.g.ii. Such a method shall be submitted to the Water Board for review and shall not be effective until approved by the Executive Officer. At a minimum, a proposal to use this additional method shall demonstrate that stormwater discharges from HM Projects using the method will not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition, and that increases in runoff flow and volume will be managed so that post-project runoff does not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. Such demonstration shall include, but not be limited to:

(1) An appropriately detailed discussion of the theoretical approach behind the method and the results for the areas to which it is proposed to be applied;

(2) Appropriate continuous simulation hydrologic modeling using Region-specific field data, including creek data (cross sections, longitudinal data, etc.), precipitation data (a record of at least 30 years of hourly data that is appropriately representative of the areas where the method is to be applied), safety factor(s), and HM control designs; and

(3) A description of how the method will be applied, including any models produced and how they will be used by the Permittees and/or project proponents. Such description shall include a listing of HM controls that may be used to comply with the HM requirements of this Permit, a description, with appropriate technical support, of how they will be sized to comply and how the Permittees will ensure appropriate implementation of the method, and all other necessary information, as appropriate.

iv. **Types of HM Controls**

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof:

(1) **Onsite HM controls** are flow duration control structures, LID features and facilities, and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed

such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[10]

v. Implementation Level

All HM Projects shall meet the HM Standard in Provision C.3.g.ii immediately. For Contra Costa Permittees, Projects receiving final planning entitlements on or before January 3, 2018, may be allowed to use the Contra Costa design standards from the Previous Permit. After January 3, 2018, for Contra Costa Permittees, Projects shall comply with the Contra Costa design standards, including any modifications made.

vi. Reporting

(1) New HM Applicability Maps or equivalent information prepared pursuant to Provision C.3.g.i, for those Permittees who do not have an approved Map, shall be submitted, acceptable to the Executive Officer, not later than the second Annual Report following the Permit's effective date.

(2) Contra Costa Permittees shall, with the 2017 Annual Report , submit a technical report, acceptable to the Executive Officer, consisting of an HM Management Plan describing how Contra Costa will implement the Permit's HM requirements (e.g., how it will update or modify its practices to meet Permit requirements). At a minimum, the technical report shall

[10] In-stream control projects require a Stream Alteration Agreement from CDFW, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

provide additional analysis and discussion as to how existing data appropriately evaluates how existing practices available for use meet the Permit's HM requirements, including limit conditions. The report shall, as necessary, propose modifications to Contra Costa's current HM practices, or propose alternate practices that have been accepted by the Water Board, to meet the Permit's HM requirements. The report may also: provide additional data on monitored installations; provide additional analysis and discussion as to how existing and additional data appropriately evaluates existing practices, including limit conditions and the range of conditions present across Contra Costa County; and provide other information or discussion, as appropriate.

(3) Reporting of HM projects shall be as described in Provision C.3.b.

(4) Permittees shall report collectively, with each Annual Report, a listing, summary, and date of modifications made to the BAHM, including the technical rationale. This shall be prepared at the countywide program level and submitted on behalf of participating Permittees.

(5) In addition, for each HM Project approved during the reporting period, Permittees shall collect and make available the following information. Information shall be reported electronically, and, where appropriate, in tabular form.

- Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control(s);
- Method used by the project proponent to design and size the device or method used to meet the HM Standard;
- Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;
- For projects using standard sizing charts, a summary of sizing calculations used;
- For projects using the BAHM, a listing of model inputs; and
- For projects using custom modeling, a summary of the modeling calculations with a corresponding graph showing curve matching (existing, post-project, and post-project-with HM controls curves).

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. **Task Description** – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. **Implementation Level** – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the O&M of the pervious pavement system(s) (if any), onsite, joint, and/or offsite installed stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the O&M responsibility for the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing O&M inspections of the installed pervious pavement system(s) (if any), stormwater treatment system(s) and HM control(s) (if any).

(4) A database or equivalent tabular format of the following:

(a) All pervious pavement system(s) that total 3000 square feet or more installed at Regulated Projects, offsite, or at a Regional Project. The total square footage should not include pervious pavement systems installed as private-use patios for single family homes, townhomes, or condominiums.

(b) All stormwater treatment systems installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(c) All HM controls installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(5) The database or equivalent tabular format required in Provision C.3.h.ii.(4) shall include the following information for each Regulated Project, offsite project, and Regional Project:

(a) Name and address of the project;

(b) Names of the owner(s) and responsible operator(s) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and/or HM control(s);

(c) Specific description of the location (or a map showing the location) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and HM control(s) (if any);

(d) Date(s) that the pervious pavement system(s) (if any), stormwater treatment system(s), and HM controls (if any) was/were installed;

(e) Description of the type and size of the pervious pavement systems (if any), stormwater treatment system(s), and HM control(s) (if any) installed;

(f) Detailed information on O&M inspections. For each inspection, include the following:

(i) Date of inspection.

(ii) Type of inspection (e.g., installation, annual, followup, spot).

(iii) Type(s) of pervious pavement systems inspected (e.g., pervious concrete, pervious asphalt, pervious pavers).

(iv) Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well) and an indication of whether the treatment system is an onsite, joint, or offsite system.

(v) Type of HM controls inspected.

(vi) Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation or maintenance, maintenance required immediately).

(vii) Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, compliance schedule, administrative citation, administrative order).

(6) A prioritized O&M Inspection Plan for inspecting all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems and HM controls installed at Regulated Projects, offsite locations, and/or at joint or Regional Projects. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient.

At a minimum, the O&M Inspection Plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls (at Regulated Projects, offsite locations, and/or at joint or Regional Projects) at the completion of installation to ensure approved plans have been followed. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(b) Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal year) of Regulated Projects, offsite projects, or Regional Projects. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(c) Inspection by the Permittee of all Regulated Projects, offsite projects, or Regional Projects at least once every five years. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; and

(d) For vault-based stormwater treatment systems, Permittees may accept 3rd party inspection reports in lieu of conducting Permittee O&M inspections only if the 3rd party inspections are conducted at least annually. Information from each 3rd party inspection shall be included in the database or tabular format required in Provision C.3.h.ii.(5) and each inspection shall be clearly identified as a 3rd party inspection.

Each 3rd party inspection report must clearly document the following:

(i) Name of 3rd party inspection company.

(ii) Date of inspection.

(iii) Condition of the treatment unit(s) at the time of inspection.

(iv) Description of maintenance activities performed during the inspection.

(v) Date- and time-stamped photographs of the inside of the vault unit(s) before and after maintenance activities.

(7) An Enforcement Response Plan (ERP) for all O&M inspections that serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. At a minimum, the ERP must contain the following:

(a) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for recognizing common problems with the different types of pervious pavement systems, stormwater treatment systems, and/or HM controls, remedies for the problems, and appropriate enforcement actions, followup inspections, and appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(b) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools appropriate for different field scenarios of problems identified with the pervious pavement systems, stormwater treatment systems, and/or HM controls as well as for different types of inadequate response to enforcement actions taken.

(c) Timely Correction of Identified Problems – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all identified problems with the pervious pavement systems, stormwater treatment systems, and/or HM controls.

Corrective actions shall be implemented no longer than 30 days after a problem is identified by an inspector. Corrective actions can be temporary and more time may be allowed for permanent corrective actions. If more than 30 days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

iii. Due Date for Implementation: Immediate, except as follows:

(1) July 1, 2016, for Provision C.3.h.ii.(6) and all requirements pertaining to pervious pavement systems in Provisions C.3.h.ii.(1)-(5), C.3.h.iv., and C.3.h.v.

(2) July 1, 2017, for Provision C.3.h.ii.(7).

iv. Maintenance Approvals: The Permittees shall ensure that all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed onsite, offsite, or at a joint or Regional Project by development proponents are properly operated and maintained for the life of the projects. In cases where the responsible party for a pervious pavement system, stormwater treatment system or HM control has

worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities, but these approvals are not granted, the Permittees shall be deemed to be in compliance with this Provision. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the O&M requirements contained therein.

v. Reporting

(1) The database or equivalent tabular format required in Provisions C.3.b.ii.(4) and (5) shall be maintained by the Permittees. Upon request from the Executive Officer, information from this database or equivalent tabular format shall be submitted to Water Board staff for review. The requested information may include specific details on each inspection conducted within particular timeframes, such as several fiscal years.

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) Total number of Regulated Projects in the Permittee's database or tabular format as of the end of the reporting period (fiscal year).

(b) Total number of Regulated Projects, offsite projects, and Regional Projects inspected during the reporting period (fiscal year).

(c) Percentage of the total number of Regulated Projects that were inspected during the reporting period (fiscal year).

(d) A discussion of the inspection findings for the year and any common problems encountered with various types of pervious pavement systems, treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(e) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

(f) For the 2016 Annual Report, Permittees may report on the total number and percentage of treatment and HM controls inspected, and exclude discussion of inspection findings for pervious pavement systems.

(4) Each Permittee shall certify in the 2017 Annual Report that an Enforcement Response Plan has been completed by July 1, 2017.

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. **Task Description** – The Permittees shall require all development projects, which create and/or replace $\geq$ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, and detached single-family home projects,[11] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[2]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[2]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. **Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

C.3.j. Green Infrastructure Planning and Implementation

i. **Task Description** – The Permittees shall complete and implement a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements.

(1) The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is being required, in part, as an alternative to expanding the definition of Regulated Projects prescribed in Provision C.3.b to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace

[11] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

existing imperious surface area. It also provides a mechanism to establish and implement alternative or in-lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.

(2) Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

(3) The Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash, PCBs, mercury, and other pollutants.

(4) The Permittees may comply with any requirement of this Provision through a collaborative effort.

ii. Green Infrastructure Program Plan Development

Each Permittee shall:

(1) Prepare a framework or workplan that describes specific tasks and timeframes for development of its Green Infrastructure Plan. This framework or workplan shall be approved by the Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. At a minimum, the framework or workplan shall include a statement of purpose, tasks, and timeframes to complete the elements listed in Provision C.3.j.i.(2) below.

(2) Prepare a Green Infrastructure Plan, subject to Executive Officer approval, that contains the following elements:

(a) A mechanism (e.g., SFEI's GreenPlanIT tool or another tool) to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area-specific basis, for implementation over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12:

(i) By 2020;

(ii) By 2030; and

(iii) By 2040.

The mechanism shall include criteria for prioritization (e.g., specific logistical constraints, water quality drivers (e.g., TMDLs), opportunities to treat runoff from private parcels in retrofitted street right-of-way) and outputs (e.g., maps, project lists) that can be incorporated into the Permittee's long-term planning and capital improvement processes.

(b) Outputs from the mechanism described above, including, but not limited to, the prioritization criteria, maps, lists, and all other information, as appropriate. Individual project-specific reviews completed using these mechanisms are not required to be submitted with the Plan, but shall be made available upon request.

(c) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12:

(i) By 2020;

(ii) By 2030; and

(iii) By 2040.

(d) A process for tracking and mapping completed projects, public and private, and making the information publically available (e.g., SFEI's GreenPlanIT tool).

(e) General guidelines for overall streetscape and project design and construction so that projects have a unified, complete design that implements the range of functions associated with the projects. For example, for streets, these functions include, but are not limited to, street use for stormwater management, including treatment, safe pedestrian travel, use as public space, for bicycle, transit, vehicle movement, and as locations for urban forestry. The guidelines should call for the Permittee to coordinate, for example, street improvement projects so that related improvements are constructed simultaneously to minimize conflicts that may impact green infrastructure.

(f) Standard specifications and, as appropriate, typical design details and related information necessary for the Permittee to incorporate green infrastructure into projects in its jurisdiction. The specifications shall be sufficient to address the different street and project types within a Permittee's jurisdiction, as defined by land use and transportation characteristics.

(g) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. For street projects not subject to Provision C.3.b.ii. (i.e., non-Regulated Projects), Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d sizing

requirements. The single approach can include different options to address specific issues or scenarios. That is, the approach shall identify the specific constraints that would preclude meeting the sizing requirements and the design approach(es) to take in that situation. The approach should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate, plus all other information, as appropriate (e.g., how to account for load reduction for the PCBs or mercury TMDLs).

(h) A summary of the planning documents the Permittee has updated or otherwise modified to appropriately incorporate green infrastructure requirements, such as: General Plans, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure. Permittees are expected to complete these modifications as a part of completing the Green Infrastructure Plan, and by not later than the end of the permit term.

(i) To the extent not addressed above, a workplan identifying how the Permittee will ensure that green infrastructure and low impact development measures are appropriately included in future plans (e.g., new or amended versions of the kinds of plans listed above).

(j) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation.

(k) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, State, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.

(3) Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this provision.

(4) Conduct outreach and education in accordance with the following:

(a) Conduct public outreach on the requirements of this provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design.

(b) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this provision and methods of implementation.

(c) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on the requirements of this provision and methods of implementation.

(5) Report on Green Infrastructure Planning as follows:

(a) Each Permittee shall submit documentation in the 2017 Annual Report that its framework or workplan for development of its Green Infrastructure Plan was approved by its governing body, mayor, city manager, or county manager by June 30. 2017.

(b) Each Permittee shall submit its completed Green Infrastructure Plan with the 2019 Annual Report.

(c) Each Permittee shall submit documentation of its legal mechanisms to ensure implementation of its Green Infrastructure Plan with the 2019 Annual Report.

(d) Each Permittee shall submit a summary of its outreach and education efforts in each Annual Report.

iii. Early Implementation of Green Infrastructure Projects (No Missed Opportunities)

Each Permittee shall:

(1) Prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures.

(2) Submit the list with each Annual Report and a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

iv. Participate in Processes to Promote Green Infrastructure

(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding

from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.

(2) In each Annual Report, Permittees shall report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

(3) In the 2019 Annual Report, Permittees shall submit a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure.

v. Tracking and Reporting Progress

(1) The Permittees shall, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.

(2) In each Annual Report, Permittees shall report progress on development and implementation of the tracking methods.

(3) In the 2019 Annual Report, Permittees shall submit the tracking methods and report implementation of green infrastructure measures including treated area, and connected and disconnected impervious area on both public and private parcels within their jurisdictions.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Gross Density DU/Ac	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No: Number of the Special Project as it appears in Table 3.1

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Acreage: Total site area in acres.

Gross Density in DU/Ac: Number of dwelling units per acre.

FAR: Floor Area Ratio

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

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C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites that could reasonably be considered to cause or contribute to pollution of stormwater runoff. Permittees shall conduct inspections, effective followup, and enforcement to abate potential and actual non-stormwater discharges, consistent with each Permittee's respective Enforcement Response Plan. These combined efforts will prevent the discharge of pollutants and impacts to beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have sufficient legal authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. **Implementation Level** – Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial facilities to address pollutant sources associated with outdoor process and manufacturing areas; outdoor material storage areas; outdoor waste storage and disposal areas; outdoor vehicle and equipment storage and maintenance areas; outdoor parking areas and access roads; outdoor wash areas; outdoor drainage from indoor areas, rooftop equipment; and contaminated and erodible surface areas; and other sources determined by the Permittees or the Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. **Task Description** – Permittees shall continue to update and implement an Inspection Plan that will serve as a prioritized inspection workplan. This Inspection Plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

ii. **Implementation Level**

(1) Facilities For Prioritization Into Inspection Plan

Commercial and industrial facilities with the functional aspects and types described below, and other facilities identified by the Permittees as reasonably likely to contribute to pollution of stormwater runoff, shall be prioritized for inspection on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of

concern, proximity to a waterbody, potential and actual discharge history of the facility, and other relevant factors. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plan:

(a) Sites that include the following types of functions that may produce pollutants when exposed to stormwater include, but are not limited to:

- Outdoor process and manufacturing areas
- Outdoor material storage areas
- Outdoor waste storage and disposal areas
- Outdoor vehicle and equipment storage and maintenance areas
- Outdoor wash areas
- Outdoor drainage from indoor areas
- Rooftop equipment
- Other sources determined by the Permittee or Water Board as reasonably likely to contribute to pollution of stormwater runoff.

(b) The following types of industrial and commercial businesses that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges:

- Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the Statewide NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);
- Vehicle Salvage yards;
- Metal and other recycled materials collection facilities, and waste transfer facilities;
- Vehicle mechanical repair, maintenance, fueling, or cleaning facilities;
- Building trades central facilities or yards, corporation yards;
- Nurseries and greenhouses;
- Building material retailers and storage;
- Plastic manufacturers; and
- Other facilities designated by the Permittee or Water Board to be reasonably likely to contribute to pollution of stormwater runoff.

(2) Inspection Plan – The Inspection Plan shall be updated annually and shall contain the following information:

(a) A description of the process for prioritizing inspections and frequency of inspections. The prioritization criteria shall assign a more frequent inspection schedule to the highest priority facilities per Provision C.4.b.ii.(1). If any geographical areas are to be targeted for

inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan.

(b) Assign appropriate inspection frequency for each industrial and commercial facility based on the priority established in Provision C.4.b.ii.(2)(a) above, potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(c) A mechanism to include new businesses that warrant inspections.

(d) Total number and a list of all industrial and commercial facilities requiring inspections, within each Permittee's jurisdiction, based on the prioritization criteria established in Provision C.4.(b)ii.(2)(a). This list shall be updated annually.

(e) List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual update. Previous fiscal years' inspection lists shall remain in the Inspection Plan.

(3) **Record Keeping** – For each facility identified in Provision C.4.b.ii.(2)(d), the Permittee shall maintain a database or equivalent tabular system of at least the following information:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity or pollutant source, including SIC code. Examples: outdoor process/manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, rooftop equipment, and outdoor drainage from indoor areas;

(c) Inspection priority and inspection frequency; and

(d) If coverage under the Industrial General Permit is required.

iii. Reporting – The Permittees shall include the list of all industrial and commercial facilities requiring inspections identified in Provision C.4.b.ii.(2)(d) in each Annual Report.

C.4.c. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures, from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions,

and the roles and responsibilities of staff responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to potential discharges (e.g., housekeeping issues, evidence of actual non-stormwater discharges, lack of BMPs, inadequate BMPs, and inappropriate BMPs), actual non-stormwater discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual non-stormwater discharges.

(3) Timely Correction of Potential and Actual Non-stormwater Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all potential and actual non-stormwater discharges. Permittees shall require active non-stormwater discharges to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual non-stormwater discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business day are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual non-stormwater discharges required in Discharge Prohibition A.1. For cases in which Permittee enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement.

C.4.d. Inspections

i. Task Description – Each Permittee shall conduct inspections according to the Inspection Plan in Provision C.4.b.ii.(2) and the ERP in Provision C.4.c.ii. to enforce its ordinance to prevent stormwater pollution.

ii. Implementation Level

(1) Inspections – Inspections shall be conducted to include at least the following activities:

(a) Observations for appropriate BMPs to prevent stormwater runoff pollution or illicit discharge;

(b) Observations for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater;

(c) Observations for noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(2) Record Keeping – Permittees shall maintain adequate records to demonstrate compliance and appropriate followup enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial and commercial site inspections:

(a) Name of facility/site inspected

(b) Inspection date

(c) Industrial General Permit coverage required (Yes or No)

(d) Compliance status

(e) Specific problems

(f) Type of enforcement (if applicable)

(g) Problem resolution date

(h) Additional comments

The electronic database or equivalent tabular system shall be made readily available to Water Board staff or its representative during inspections and audits.

(3) Data Evaluation – Permittees shall evaluate the frequency of potential and actual non-stormwater discharges by business category. Note trends and, as needed, implement focused inspections or education in subsequent years to address trends.

iii. Reporting

(1) Permittees shall include the following information in the 2015-2016 Annual Report:

(a) Number of inspections conducted, Number of violations issued (excluding verbal warnings), Percentage of sites inspected in violation, and number and percent of violations resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner;

(b) Frequency and types/categories of violations observed, Frequency and type of enforcement conducted;

(c) Summary of types of violations noted by business category; and

(d) Facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

(2) Beginning with the 2016-2017 Annual Report, Permittees shall include the following information in each Annual Report:

(a) Number of inspections conducted;

(b) Number of each type of enforcement action, as listed in each Permittee's ERP, issued;

(c) Number of enforcement actions or discreet number of potential and actual discharges fully resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner;

(d) Frequency of potential and actual non-stormwater discharges by business category; and

(e) A list of facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

C.4.e. Staff Training

i. Task Description – Permittees shall provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee-specific.

ii. Implementation Level – At a minimum, provide inspection training, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Business Inspection Plan;

(4) Enforcement Response Plan;

(5) Illicit Discharge Detection and Elimination; and

(6) Appropriate BMPs to be used at different industrial and commercial facilities.

iii. Reporting – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Percentage of industrial and commercial site inspectors attending training; and

(4) Percentage of Illicit Discharge, Detection, and Elimination inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to ensure illicit discharges are detected and controlled that are not otherwise controlled under provisions C.4. – Industrial and Commercial Site Controls and C.6. – Construction Site Controls. Permittees shall implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and followup component to detect and eliminate illicit discharges into the MS4. Permittees shall maintain a complaint tracking and followup data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. **Task Description** – Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.

ii. **Implementation Level**

(1) Permittees shall have adequate legal authority to address illicit discharges to the MS4, including, but not limited to, the following:

(a) Sewage;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces and pavement, or the equipment and other facilities of any commercial business, or any other public or private facility, including discharges from mobile cleaning businesses;

(c) Discharges of runoff from material storage areas, including those containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(f) Discharges of food-related wastes (e.g., grease, fish processing wastes, restaurant kitchen mat and trash bin wash water).

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to the MS4.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than storm water to the MS4.

C.5.b. Enforcement Response Plan (ERP)

i. **Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to

achieve timely and effective abatement of illicit discharges and compliance from responsible parties.

ii. **Implementation Level** – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of a problem through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to potential discharges (e.g., housekeeping issues, evidence of actual discharges, lack of BMPs, inadequate BMPs, and inappropriate BMPs), actual discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and/or actual discharges. Active discharges shall be required to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

C.5.c. Spill, Dumping, and Complaint Response Program

i. **Task Description** – Each Permittee shall implement a program to respond to spills, dumping, and complaints.

ii. **Implementation Level**

(1) Each Permittee shall have a central contact point for the public and Permittee's staff to report spills, dumping, and complaints. At a minimum, this central contact point shall include a phone number. Permittee shall also include, as feasible, user friendly web reporting for spills and dumping.

(2) Each Permittee shall publicize the phone number and web reporting address, if used, to internal Permittee's staff and the public. The Permittee's website shall be one of the places the central contact point is publicized. The Permittee's website shall be updated with the central contact point to report spills and dumping by June 30, 2016. This central contact point shall be readily searchable on the Permittee's website.

(3) Each Permittee shall require its municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point so that illicit discharge staff can investigate and track.

(4) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and/or phone tree for the Permittee's staff responsible for the spill and dumping response program. At a minimum, this flow chart and/or phone tree shall identify staff or positions responsible for receiving the complaints and investigating and abating the complaints.

(5) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittee's immediate capabilities.

(6) Each Permittee shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct followup inspections, as needed, to ensure that corrective measures have been effectively implemented to achieve and maintain compliance.

iii. **Reporting** – Permittees shall provide the following information in the 2016 and 2020 Annual Reports:

(1) The spill and dumping reporting phone number and the web address, if used;

(2) A screen shot of the Permittee's website showing the central contact point; and

(3) A discussion of how the central contact point – spill and dumping reporting phone number and, if used, the web address – is being publicized to Permittees' staff and the public.

C.5.d. Tracking and Case Followup

i. **Task Description** – All incidents or discharges reported to the spill, dumping, and complaints central contact point, that might discharge into the MS4, shall be logged to track followup and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems and inter/intra-agency coordination, where appropriate. It is not necessary to track and report data according to this provision if they are tracked and reported according to State Water Resource Control Board Order No. 2006-0003-DWQ.

ii. **Implementation Level** – Maintain a water quality spills, dumping, and complaints tracking and followup in an electronic database or equivalent tabular system.

The spill and discharge complaint tracking system shall contain the following information:

(1) Complaint information:
   (a) Date and time of complaint,
   (b) Type of pollutant, and
   (c) Problem Status (potential or actual discharge.).

(2) Investigation information:
   (a) Date and time started,
   (b) Type of pollutant,
   (c) Entered storm drain and/or receiving water,
   (d) Date and time abated, and
   (e) Type of enforcement based on the Permittee's ERP.

The electronic database or equivalent tabular system shall be made available to Water Board staff or representatives during audits or inspections.

iii. Reporting – Permittees shall provide the following information in the Annual Report:

(1) Number of discharges reported;

(2) Number of discharges reaching storm drains and/or receiving waters; and

(3) Number discharges resolved in a timely manner.

C.5.e. Control of Mobile Sources

i. Task Description – Permittees shall have oversight and control of pollutants associated with mobile businesses.

ii. Implementation Level – Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:
   (a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.
   (b) Implementation of an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.
   (c) Regularly updating mobile business inventories.
   (d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.
   (e) Inspection of mobile businesses, as needed.

(2) Permittees may cooperate county-wide and/or region-wide with the implementation of their programs for mobile businesses, including sharing

of mobile business inventories, BMP requirements, enforcement action information, and education.

iii. Reporting

(1) In the 2017 Annual Report, each Permittee shall provide the following: (a) minimum standards and BMPs for each of the various types of mobile businesses; (b) its enforcement strategy; (c) a list and summary of the specific outreach events and education conducted to the different types of mobile businesses operating within the Permittee's jurisdiction; (d) the number of inspections conducted at mobile businesses and/or job sites in 2016-2017; (e) discuss enforcement actions taken against mobile businesses in 2016-2017; (f) Permittee's inventory of mobile businesses operating within the Permittee's jurisdiction; and (g) a list and summary of the county-wide or regional activities conducted, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education (Permittees' annual reports may refer to the county-wide or regional reports for this information.).

(2) In the 2019 Annual Report, each Permittee shall include at least the following: (a) changes to minimum standards and BMPs for each of the various types of mobile businesses since the 2017 Annual Report; (b) changes to the Permittee's enforcement strategy; (c) minimum standards and BMPs developed for additional types of mobile businesses; (d) a list and summary of specific outreach events and education conducted to each type of mobile businesses operating within the Permittee's jurisdiction during the Permit term; (e) a discussion of the inspections conducted at mobile businesses and/or job sites; (f) Permittee's inventory of mobile businesses operating within the Permittee's jurisdiction; and (g) a discussion of the enforcement actions taken against mobile businesses during the permit term.

C.5.f. Municipal Separate Storm Sewer System (MS4) Map

i. Task Description – Each Permittee shall make the map(s) of its MS4 available.

ii. Implementation Level – Permittees shall make maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

iii. Reporting – In the 2016 and 2019 Annual Reports, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with followup and enforcement consistent with each Permittee's respective ERP, to prevent construction site discharges of pollutants into the storm drains. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers. Each Permittee shall in its reporting demonstrate the effectiveness of its inspections and enforcement activities to prevent polluted construction site discharges into storm drains.

C.6.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have the ability to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and implement progressively stricter enforcement to achieve expedient compliance and cleanup at all public and private construction sites.

ii. **Implementation Level**

(1) Permittees shall have the legal authority to require at all construction sites year-round effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non-storm water management through all phases of construction (including, but not limited to, site grading, building, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and cleanup at all construction sites year-round.

C.6.b. Enforcement Response Plan (ERP)

i. **Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance at all public and private construction sites.

ii. **Implementation Level** – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of the problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, evidence of actual discharges, lack of ERP, inadequate BMPs, and inappropriate

BMPs), actual discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all potential and actual discharges. Permittees shall require actual non-stormwater discharges to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site-specific, and seasonally and phase-appropriate, effective BMPS) in the following six categories:

- Erosion Control
- Run-on and Run-off Control
- Sediment Control
- Active Treatment Systems, as necessary
- Good Site Management
- Non-Stormwater Management.

ii. Implementation Level

The BMPs targeting specific construction site pollutants within the six categories listed in C.6.c.i. shall be site-specific. Site-specific BMPs targeting specific pollutants from the six categories listed in C.6.c.i. may be a combination of BMPs from:

- CASQA, BMP Handbook, Construction, January 2009.
- Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, March 2003, and addenda.
- New BMPs available since the release of these handbooks.
- Other BMPs shown to provide equivalent protection.

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction General Permit.

ii. **Implementation Level** – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in C.6.c.i. are planned;

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction General Permit; and

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. **Task Description** – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in C.6.c.i. in preventing the discharge of construction pollutants into the storm drain; and Permittees shall require timely corrections of all actual and potential discharges observed.

ii. **Implementation Level**

(1) **Wet Season Notification**

By September 1 of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season.

(2) **Frequency of Inspections**

Inspections shall be conducted monthly during the wet season[12] at the following sites:

(a) All construction sites disturbing one or more acre of land;

(b) All hillside projects[13] (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with ≥15% slope) disturbing greater than or equal to 5,000 square feet; and

(c) High Priority Sites – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

[12] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

[13] Effective July 1, 2016.

(iii) Project size and type;

(iv) Sensitivity or receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

(3) **Contents of Inspections**

Inspections shall focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in C.6.c.i. Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in C.6.c.i.;

(c) Visual observations for:

- actual discharges of sediment and/or construction related materials into storm drains and/or waterbodies.
- evidence of sediment and/or construction related materials discharges into storm drains and/or waterbodies.
- illicit connections, and
- potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) **Tracking**

All inspections shall be recorded on a written or electronic inspection form. Inspectors shall follow the ERP for all actual and potential discharges discovered during the inspection.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) Enforcement Response Level (Use ERP);

(e) Problem(s) observed using Illicit Discharge and the six BMP categories listed in C.6.c.i.;

(f) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(g) Comments, which shall include all Rationales for Longer Compliance Time, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) In the 2016 Annual Report, each Permittee shall certify the criteria it uses to determine hillside developments. If the Permittee is using maps of hillside developments areas or other written criteria, include a copy in the Annual Report.

(2) In the 2015-2016 Annual Report, each Permittee shall summarize the following information:

(a) Total number of active sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing one acre or more of soil;

(c) Total number of inspections conducted;

(d) Number and percentage[14] of violations in each of the six categories listed in C.6.c.i.;

(e) Number and percentage[15] of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(g) Number of sites with discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(h) Number and percentage[16] of violations fully corrected prior to the next rain event but no longer than 10 business days after the violations are discovered or otherwise considered in a timely, though longer period; and

(i) Number and percentage[17] of violations not fully corrected 30 days after the violations are discovered.

(3) Beginning with the 2016-2017 Annual Report, each Permittee shall summarize the following information:

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[14] Percentage shall be calculated as number of violations in each category divided by total number of violations in all six categories.

[15] Percentage shall be calculated as number of each type of enforcement action divided by the total number of enforcement actions.

[16] Percentage shall be calculated as follows: number of violations fully corrected prior to the goal of the next rain event but no later than 10 business days after the violations are discovered divided by the total number of violations for the reporting year.

[17] Percentage shall be calculated as follows: number of violations not fully corrected 30 days after the violations are discovered divided by the total number of violations for the reporting year.

(a) Total number of active hillside sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing 1 acre or more of soil;

(c) Total number of active sites disturbing less than one acre of soil identified as High Priority sites in C.6.e.ii.(2)(c) requiring inspections;

(d) Total number of inspections conducted;

(e) Number of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of illicit discharges, actual and those inferred through evidence, of sediment or other construction-related materials;

(g) Number of enforcement actions or discrete number of potential and actual discharges fully corrected prior to the next rain event, but no longer than 10 business days after the potential and actual discharges[18] are discovered or otherwise considered corrected in a timely, though longer period.

(4) In each Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in C.6.e.ii.(4) above. This evaluation shall include findings on the program's strength, comparison to previous years' results, as well as areas that need more focused education for site owners, operators, and developers the following year.

(5) The Executive Officer may require that the information recorded and tracked by C.6.e.ii.(4) be submitted electronically or in a tabular format. Permittees shall submit the information within 10 working days of the Executive Officer's requirement. Submittal of the information in tabular form for the reporting year is not required in each Annual Report, but it is encouraged.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to municipal staff responsible for conducting construction site stormwater inspections. Training topics shall include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and the ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information: training topics covered, dates of training, and the number of the Permittees' inspectors attending each training. If there was no training in that year, so state.

[18] Permittees who track by discrete potential and actual discharges shall report by discrete discharges. Permittees who track by enforcement actions shall report by enforcement actions.

C.7. Public Information and Outreach

Each Permittee shall increase the awareness of a broad spectrum of the community, including a diversity of socioeconomic groups and ethnic communities, regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate the problems caused; positively influence the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution. Outreach required in other provisions may be conducted under Provision C.7.

C.7.a. Storm Drain Inlet Marking

i. **Task Description** – Permittees shall mark and maintain municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as "No dumping, drains to Bay" or equivalent. For newly-approved, privately maintained streets, Permittees shall require storm drain inlet markings with an appropriate stormwater pollution prevention message by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings on the storm drain inlets shall be verified prior to acceptance of the project.

ii. **Implementation Level**

(1) Inspect and maintain storm drain inlet markings of at least 80 percent of municipality-maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Storm drain inlet markings of newly developed privately-maintained streets shall be verified prior to acceptance of the project. Permittees shall require maintenance of the storm drain inlet markings through the development maintenance entity.

iii. **Reporting** – In the 2020 Annual Report, each Permittee shall (1) state how many municipally-maintained storm drain inlets it has, (2) certify that at least 80 percent of municipality-maintained storm drain inlet markings are legibly labeled with an appropriate stormwater pollution prevention message during the permit term; (3) include a picture of a labeled municipality-maintained inlet; and (4) certify that all privately-maintained streets had storm drain inlet markings verified prior to acceptance of the project and were required to maintain the storm drain inlet markings through the development maintenance entity.

C.7.b. Outreach Campaigns

i. **Task Description** – Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences.

ii. **Implementation Level**

(1) Target a broad audience with a minimum of one outreach campaign with specific stormwater runoff pollution prevention messages. The outreach

campaign(s) should utilize various electronic and print media, and paid and free media to best reach the different target audiences. The outreach campaign(s) may be coordinated regionally or county-wide.

(2) Permittees shall conduct a post-campaign effectiveness assessment/evaluation to identify and quantify the audiences' knowledge, trends, and attitudes and/or practices; and to measure the overall population's awareness of the messages and behavior changes achieved by the outreach campaigns. Effectiveness assessment/evaluation may be done regionally or county-wide.

iii. Reporting – In the Annual Report following the post-campaign effectiveness assessment/evaluation, each Permittee (or the Countywide Program, if the effectiveness assessment/evaluation was done county-wide or the regional program, if the effectiveness assessment/evaluation was done regionally) shall provide a report of the effectiveness assessment/evaluation completed, which, at minimum, shall include the following:

(1) A description of the outreach campaign.

(2) A summary of how the effectiveness assessment/evaluation was implemented.

(3) An analysis of the effectiveness assessment/evaluation results.

(4) A discussion of the measurable changes in awareness and behavior achieved.

(5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages.

C.7.c. Stormwater Pollution Prevention Education

i. Task Description – Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information.

ii. Implementation Level

(1) Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively and Permittees may combine this function with the spill and dumping complaint central contact point required in C.5.

(2) Each Permittee shall place and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website. In lieu of posting the detailed informational pages directly on their individual websites, Permittees may choose to provide links from their websites to the countywide program's and/or BASMAA's websites. Each Permittee shall publicize its website.

iii. **Reporting** – In the 2016 Annual Report, each Permittee shall list the point of contact, discuss how this point of contact and stormwater pollution website are publicized and maintained, and certify that it has a website dedicated to providing and maintaining information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives.

C.7.d. Public Outreach and Citizen Involvement Events

i. **Task Description** – Public outreach shall include a variety of pollution prevention message such as car washing; proper use, storage and disposal of vehicle waste fluids; household waste materials disposal; pesticide use; and trash. Public outreach events may include venues such as fairs, shows, and workshops. Citizen involvement events may include venues such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, storm drain inlet marking, riparian restoration activities, community grants.

ii. **Implementation Level** – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events according to its population, as shown in the table below:

Table 7.1 Public Outreach and Citizen Involvement Events[19]

Permittee Population	Number of Events
< 10,000	2
10,001– 40,000	4
40,001 – 100,000	5
100,001 – 175,000	7
175,001 – 250,000	8
> 250,000	10
Non-population-based Permittees[20]	6

iii. **Reporting** – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in; identity whether the event is public outreach or citizen involvement; and assess the effectiveness of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event effectiveness assessment/evaluation results, quantity/volume of materials cleaned up and comparisons to previous efforts).

C.7.e. Watershed Stewardship Collaborative Efforts

i. **Task Description** – Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts of community groups such as the Contra Costa Watershed Forum, the Santa Clara Basin Watershed

[19] Permittees may claim individual credits for all events in which their Countywide Program or BASMAA participates, supports, and/or hosts, which are publicized to reach the Permittee's jurisdiction.

[20] Alameda County Flood Control and Water Conservation District, Contra Costa Flood Control and Water Conservation District, Santa Clara Valley Water District, Vallejo Sanitation and Flood Control District, and Zone 7 of the Alameda County Flood Control and Water Conservation District

Management Initiative, "friends of creek" groups, and other organizations that benefit the health of the watershed, such as the Bay-Friendly Landscaping and Gardening Coalition. If no such organizations exist, encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. Coordinate with existing groups to further stewardship efforts.

ii. **Implementation Level** – Annually demonstrate effort.

iii. **Reporting** – In each Annual Report, each Permittee shall state the level of effort, describe the support given, state what efforts were undertaken and the results of these efforts, and provide an evaluation of the effectiveness of these efforts.

C.7.f. School-Age Children Outreach

i. **Task Description** – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12).

ii. **Implementation Level** – Implement annually and demonstrate effectiveness of efforts through assessment.

iii. **Reporting** – In each Annual Report, each Permittee shall state the level of effort, spectrum of children reached, and methods used, and provide an evaluation of the effectiveness of these efforts.

C.7.g. Outreach to Municipal Officials

i. **Task Description** – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. **Implementation Level** – At least once per permit cycle, or more often.

iii. **Reporting** – Permittees shall summarize efforts in the 2020 Annual Report.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

All Permittees shall comply with all the monitoring requirements in this Provision. Permittees may choose any of the following mechanisms, or a combination of these mechanisms, to meet the monitoring requirements:

i. **Regional Collaboration.** Permittees are encouraged to continue contributing to the Regional Monitoring Collaborative (RMC), which coordinates water quality monitoring conducted by all the Permittees. Permittees are encouraged to consider and assign additional duties to the RMC for purposes of increased efficiencies, particularly, but not limited to, reporting duties.

ii. **Area-wide Stormwater Program.** Permittees may contribute to their countywide or area-wide Stormwater Program, so that the Stormwater Program conducts monitoring on behalf of its members.

iii. **Third-party Monitoring.** Permittees may use data collected by a third-party organization, such as the Water Board or Department of Pesticide Regulation, to fulfill a monitoring requirement, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.b.

C.8.b. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPrP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

C.8.c. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[21] such as:

- Are chemical concentrations in the Estuary potentially at levels of potential concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?
- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?

[21] http://www.sfei.org/rmp/objectives (9/15/2014). While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

The Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program by contributing their fair-share financially on an annual basis.

C.8.d. Creek Status Monitoring

Creek status monitoring is intended to assess the chemical, physical, and biological impacts of urban runoff on receiving waters. In particular, the monitoring required by this provision is intended to answer the following questions:

- Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers and tributaries?
- Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

i. Biological Assessment including Nutrients and General Water Quality Parameters

(1) Field and Laboratory Method – The Permittees shall conduct biological assessments (also referred to herein as bioassessments) in accordance with SWAMP Standard Operating Procedures[22,23,24] and shall include collection and reporting of in-stream biological and physical habitat data according to the *SWAMP Standard Operating Procedures for Bioassessment,*[3] including benthic algae, benthic macroinvertebrates, water chemistry, and full characterization of physical habitat. The bioassessment sampling method shall be multihabitat reach-wide. For algae, the assessment shall include all analytes in the protocol, including diatom and soft algae taxonomy, biomass (ash-free dry weight), chlorophyll a, pebble count algae information, and reach-wide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP full physical habitat characterization method.

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22 Ode, P.R. 2007. *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California,* State Water Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised [http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp_sop_bio.pdf].

23 Current methods are documented in (1) *SWAMP Standard Operating Procedure (SOP) and Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, May 21, 2007*, and (2) *Amendment to SWAMP Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, September 17, 2008* both available at http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#methods.

24 The Standard Operating Procedure for algae sampling and evaluation is available in the following: Fetscher, A. and K. McLaughlin, May 16, 2008. *Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP).* Technical Report 563 and current SWAMP-approved updates to Standard Operating Procedures therein. Available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf.

(2) The sampling crew shall be trained by a SWAMP-approved trainer and possess a Scientific Collection Permit from the California Department of Fish and Wildlife and participate in a SWAMP-approved inter-calibration exercise at least once in the Permit term. The Permittee may, but is not required to, modify its sampling procedures if these referenced procedures change during the Permit term. In such case, the Permittee shall notify the Water Board and follow the updated SWAMP procedures.

(3) Macroinvertebrates shall be identified and classified according to the *Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT)*[25] (except Chironomids should be identified to subfamily) using a fixed count of 600 organisms per sample. The laboratory shall follow the *SWAMP Standard Operating Procedures for Laboratory Processing and Identification of Benthic Macroinvertebrates in California*.[26] Soft-bodied algae and diatom algae shall be identified to the species level. Algae identifications must be harmonized with the SWAMP master taxa list. All quality assurance and quality control steps specified in the *SWAMP Quality Assurance Program Plan*[1] shall be performed.

(4) The Permittees shall measure general water quality parameters using a sonde and collect nutrient samples at a site when biological samples are collected. The general water quality parameters shall include temperature, dissolved oxygen, pH, and specific conductance. Nutrients samples shall be analyzed for total ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen (calculated), dissolved orthophosphate and total phosphorous, silica, and chloride.

(5) In conducting the required bioassessment monitoring, the Permittees shall take precautions to prevent the introduction or spread of aquatic invasive species.

(6) Sample Design/Locations – The Permittees shall continue to use the probabilistic sample design developed in the previous Permit term to select sample locations. Also, Permittees shall continue to use the sampling site order and the rationale to exclude potential sites as previously defined by the sample design and reconnaissance standard operating procedures. After a statistically representative data set (i.e., approximately 30 samples) has been collected to address management questions related to condition of aquatic life, Permittees may select up to 20% of sample locations on a targeted basis to evaluate temporal trends in or other impacts to aquatic life condition.

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[25] The current SAFIT STEs (November 28, 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at http://www.waterboards.ca.gov/water_issues/programs/swamp/safit.shtml. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

[26] http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/bmi_lab_sop_final.pdf.

(7) Frequency, Timeframe and Number of Sites – Sampling shall occur once per year during the appropriate index period (April 15-June 30) with consideration of antecedent rainfall. Sampling is a one-time grab sample for biological communities, nutrients, and general water quality collected on the same day. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Samples
Alameda Permittees	20 per year
Santa Clara Permittees	20 per year
Contra Costa Permittees	10 per year
San Mateo Permittees	10 per year
Fairfield-Suisun Permittees	8 per 5-year period
Vallejo Permittees	4 per 5-year period

(8) Followup – Sites scoring less than 0.795 according to the California Stream Condition Index[27] (CSCI) are appropriate for a Stressor Source Identification (SSID) project as defined in C.8.e. Such a score indicates a substantially degraded biological community relative to reference conditions. Sites where there is a substantial difference in CSCI score observed at a location relative to upstream or downstream sites are also appropriate for a SSID project. If many samples show a degraded biological condition, sites where water quality is most likely to cause and contribute to this degradation may be prioritized by the Permittee for a SSID project.

ii. Chlorine

(1) Field and Laboratory Method – Permittees shall collect a grab sample and analyze for free and total chlorine using methods specified in the BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures.

(2) Sample Design/Locations – Sample locations may be selected by the Permittees to monitor locations near known or suspected potable water line breaks; to coincide with bioassessment sites; to coincide with creek restoration sites; or to resample a location where chlorine has been found in the past.

(3) Frequency, Timeframe, and Number of Samples – Samples shall be collected in spring or summer. Vallejo and Fairfield-Suisun Permittees each shall collect their samples by the end of the second year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

[27] Documentation for the CSCI and information on calculating scores can be found at http://www.swrcb.ca.gov/plans_policies/biological_objective.shtml.

Sampling Agency	Minimum Number of Locations Sampled
Alameda Permittees	20 per year
Santa Clara Permittees	20 per year
Contra Costa Permittees	10 per year
San Mateo Permittees	10 per year
Fairfield-Suisun Permittees	8 per 5-year period
Vallejo Permittees	4 per 5-year period

(4) Followup – The Permittees shall immediately resample if the chlorine concentration is greater than 0.1 mg/L. If the resample is still greater than 0.1 mg/L, then Permittees shall report the observation to the appropriate Permittee central contact point for illicit discharges so that the illicit discharge staff can investigate and abate the associated discharge in accordance with its Provision C.5.e - Spill and Dumping Complaint Response Program.

iii. Temperature

(1) Field Method – The Permittees shall monitor temperature of their streams using a digital temperature logger or equivalent.

(2) Sample Design/Locations – The Permittees shall monitor stream reaches that are documented to support cold water fisheries and where either past data or best professional judgment indicates that temperatures may negatively affect that beneficial use.

(3) Frequency, Timeframe and Number of Sites – Loggers shall be installed so that water temperatures are recorded at 60-minute intervals from April through September at the number of sites specified below. Vallejo and Fairfield-Suisun Permittees each shall collect their samples by the end of the second year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Stream Reaches Sampled
Alameda Permittees	8 per year
Santa Clara Permittees	8 per year
Contra Costa Permittees	4 per year
San Mateo Permittees	4 per year
Fairfield-Suisun Permittees	2 per 5-year period
Vallejo Permittees	2 per 5-year period

(4) Followup – The Permittees shall identify a site for which results at one sampling station exceed the applicable temperature trigger or demonstrate a spike in temperature with no obvious natural explanation as a candidate SSID project. The temperature trigger is defined as when two or more weekly average temperatures exceed the Maximum Weekly Average Temperature of 17.0°C for a Steelhead stream, or when 20% of the results

at one sampling station exceed the instantaneous maximum of 24°C.[28] Permittees shall calculate the weekly average temperature by breaking the measurements into non-overlapping, 7-day periods.

iv. Continuous Monitoring of Dissolved Oxygen, Temperature, and pH

(1) Field and Laboratory Method – The Permittees shall monitor general water quality parameters of streams using a water quality sonde or equivalent. Parameters shall include dissolved oxygen (mg/L and % saturation), pH, specific conductance (µS), and temperature (°C).

(2) Sample Design/Locations – The Permittees shall monitor stream reaches that are documented to support cold water fisheries or where either past data or best professional judgment indicates that temperature may negatively affect the cold water beneficial use.

(3) Frequency, Timeframe, and Number of Sites – The Permittees shall install sondes so that parameters are recorded at 15-minute intervals over 1-2 weeks in the spring concurrent with bioassessment sampling and 1-2 weeks in summer at the same sites. The Permittees shall monitor at least the minimum number of sites as shown below:

Sampling Agency	Minimum Number of Sample Sites in Spring	Minimum # of Sample Sites in Summer
Alameda Permittees	3 per year	3 per year
Santa Clara Permittees	3 per year	3 per year
Contra Costa Permittees	2 per year	2 per year
San Mateo Permittees	2 per year	2 per year
Fairfield-Suisun Permittees	2 per permit term	2 per 5-year period
Vallejo Permittees	2 per permit term	2 per 5-year period

(4) Followup – When results at one sampling station exceed the applicable temperature or dissolved oxygen trigger or demonstrate a spike in temperature or drop in dissolved oxygen with no obvious natural explanation, the Permittees shall identify that sample site as a candidate SSID project. The Permittees shall calculate the weekly average temperature and dissolved oxygen by separating the measurements into non-overlapping, 7-day periods. The temperature trigger is defined as any of the following:

a. Maximum Weekly Average Temperature exceeds 17.0°C for a Steelhead stream, or 20 percent of the instantaneous results exceed 24°C[8];

[28] This maximum weekly average temperature trigger corresponds to a 10% reduction in growth as listed in Table 7.3 in Sullivan K., Martin, D.J., Cardwell, R.D., Toll, J.E., Duke, S. 2000. *An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria, Sustainable Ecosystem Institute*). The 24° C acute lethal threshold is the more protective threshold cited on page 4-1 in Sullivan et al. (2000).

b. 20 percent of instantaneous pH results are < 6.5 or > 8.5;

c. 20 percent of the instantaneous specific conductance results are > 2000µS, or there is a spike in readings with no obvious natural explanation; or

d. 20 percent of instantaneous dissolved oxygen results are < 7 mg/L in a cold water fishery stream.

v. Pathogen Indicators

(1) Field and Laboratory Method – The Permittees shall collect and analyze samples for Enteroccoci and *E. coli* in accordance with the most recent U.S. EPA protocols.[29]

(2) Sample Design/Locations – The Permittees shall collect one or more samples in a creek and at an area where water-contact recreation is likely or at an opportunistic location where there is potential to detect leaking sewerage infrastructure.

(3) Frequency, Timeframe and Number of Sites – The Permittees shall collect samples in the dry season. Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	5 per year
Santa Clara Permittees	5 per year
Contra Costa Permittees	5 per year
San Mateo Permittees	5 per year
Fairfield-Suisun Permittees	3 per 5-year period
Vallejo Permittees	3 per 5-year period

(4) Followup – If U.S. EPA's statistical threshold value[30] for 36 per 1000 primary contact recreators is exceeded, the water body reach shall be identified as a candidate SSID project.

C.8.e. Stressor/Source Identification (SSID) Projects

When any monitoring result triggers a candidate for a SSID project followup as indicated within the provisions of C.8.d and C.8.g, the Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, the Permittee(s) shall take appropriate followup action to reduce the water quality stressor or source and count this action as a completed SSID Project.

SSID projects are intended to be oriented toward taking action(s) to alleviate stressors and reduce sources of pollutants; thus the Permittees shall attempt to

[29] U.S. EPA protocols available at http://water.epa.gov/scitech/methods/cwa/methods_index.cfm. Analytical methods listed here are also acceptable: http://water.epa.gov/grants_funding/beachgrants/chapter4.cfm

[30] U.S. EPA. 2012. *Recreational Water Quality Criteria*. Office of Water 820-F-12-058. Table 4.

complete all steps for half their required SSID projects, at a minimum, during the permit term.

i. Review monitoring (C.8.d and C.8.g) results annually and maintain a list of all results exceeding thresholds described therein. Pollutant of Concern Monitoring (C.8.f) results may be included on the list as appropriate.

ii. Select followup SSID projects from the list developed in C.8.e.i. based on criteria such as magnitude of threshold exceedance; parameter (for a variety of parameters); likelihood stormwater management action(s) could address the exceedance; and similar priorities.

(1) Permittees who conduct SSID projects through a regional collaborative shall collectively initiate a minimum of eight new SSID projects (minimum of one for toxicity) during the Permit term. Because these SSID projects are being conducted through a regional collaborative, all SSID project reports shall be presented in a unified, regional-level report when submitted to the Water Board. In the case that no sample exhibits toxicity, as defined within the method required in this section, during the permit term, a SSID project for toxicity is not required.

(2) If conducted through a countywide Stormwater Program, the Santa Clara and Alameda Permittees each shall be required to initiate five (minimum of one for toxicity) SSID projects; the Contra Costa and San Mateo Permittees each shall be required to initiate three SSID (one for toxicity) projects; and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate one SSID project(s) during the Permit term. In the case that no sample exhibits toxicity, as defined within the method required in this section, within a countywide program area during the permit term, a SSID project for toxicity is not required.

iii. The Permittees shall conduct site specific SSID project(s) (or non-site specific if the problem is wide-spread) in the stepwise process described below:

(1) Step 1: The Permittees shall develop a work plan for each SSID project and submit the work plans with the Urban Creeks Monitoring Report (UCMR) such that a minimum of half the required number of SSID projects are started (at a minimum, have a workplan) by the third year of the permit term, with the goal of completing Step 2, at a minimum, for half the required SSID projects within the permit term. The work plan shall:

(a) Define the problem (e.g., magnitude and temporal and geographic extent) to the extent known;

(b) Describe the SSID project objectives, including the management context within which the results of the investigation will be used;

(c) Consider the problem within a watershed context and look at multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);

(d) List candidate causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);

(e) Establish a schedule for investigating the cause(s) of the trigger stressor/source to begin upon completion of the workplan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data.

(f) Conduct a site specific study (or non-site specific if the problem is wide-spread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE) or Toxicity Identification Evaluations (TIE)[18]. A TRE, as adapted for urban stormwater, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE. For toxicity studies where there is no chemical pollutant associated with the creek status monitoring sample exhibiting toxicity, a TIE should be conducted. Where chemical data indicate a pollutant, such as fipronil or a pyrethroid, is present at adverse effects levels in the sample location, it is not necessary to conduct a TIE, and the SSID project would be considered complete;

(g) For physical habitat, physiochemical pollutants (dissolved oxygen, pH, conductivity, temperature), nutrients, metals, and other stressors, the investigation shall generally follow Step 5 (Identify Probably Causes) of the Causal Analysis/Diagnosis Decision Information System (CADDIS); [31]

(h) For pathogen indicators, the study shall generally follow the California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (2013) or equivalent process or method;[32] and

(i) The Permittees may modify the SSID Work Plan in subsequent years of the Permit term in order to address new Creek Status (or POC) results that exceed applicable thresholds and are of a higher priority based on the criteria in C.8.e.ii.

(2) Step 2: The Permittees shall conduct SSID investigations according to the schedule in each SSID project work plan and shall report on the status of SSID investigations annually in the UCMR. Local stormwater Permittees shall be advised of the SSID project and consulted regarding

[31] http://www.epa.gov/caddis/si_step5_overview.html

[32] http://www.swrcb.ca.gov/water_issues/programs/beaches/cbi_projects/docs/sipp_manual.pdf

possible local sources and potential management actions during the work plan phase and periodically throughout the SSID project.

(3) Step 3: Follow-up actions.

(a) When a Permittee(s) determines that discharges to its stormwater collection system(s) contribute to an exceedance of a water quality standard or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, the Permittee(s) shall submit a report in the UCMR that describes BMPs that are currently being implemented, and the current level of implementation, and additional BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report shall include an implementation schedule.

(b) If a Permittee(s) determines that discharges from its (their) stormwater collection system(s) are not contributing to an exceedance of a water quality standard, the Permittee(s) may end the SSID project. The Executive Officer must concur in writing before an SSID project is determined to be completed.

In cases where SSID investigations prove inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable methods do not reveal a stressor/source), the Permittee(s) may request that the Executive Officer consider the SSID project complete.

(c) Reporting: The Permittees shall submit an SSID status report in each UCMR which summarizes the actions taken in C.8.e.i-iii above. The SSID status report shall include a running summary of all SSID projects (C.8.e.ii), including start date, brief problem definition, and schedule for each project. As projects progress, the SSID report shall describe findings and monitoring results and outline steps for the upcoming year for each ongoing project. The Permittees shall submit the SSID status report with each UCMR.

iv. As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.

C.8.f. Pollutants of Concern Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants.

In particular, monitoring required by this provision must be directed toward addressing the following five priority POC management information needs:

1. **Source Identification** - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;
2. **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);
3. **Management Action Effectiveness** - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;
4. **Loads and Status** - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and
5. **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

Not all information needs apply to all POCs (see Table 8.2 below for details).

i. **Sampling Methods** – The Permittees shall implement or cause to be implemented the monitoring components shown in Table 8.1 in order to address each of the five POC management information needs.

Table 8.1 POC Monitoring Methods

Monitoring Type	Information Need	Monitoring Methods
1	Identify Source Areas	Monitoring methods to identify watershed sources of POCs should include: • Collection and analysis of POCs on sediments in urban stormwater runoff that are transported through MS4s or receiving waters during stormwater runoff events; or • Collection and analysis of POCs on bedded sediments deposited in MS4s or receiving waters; or • Collection and analysis of POCs in stormwater runoff or bedded sediments on source area properties (e.g. private property); or, • Other monitoring methods designed to identify specific sources or uses of POCs (e.g., caulk in roadways or building materials) or watershed source areas.
2	Identify watershed areas contributing most to Bay impairment	Monitoring methods to identify watershed areas contributing most to Bay impairment should include: • Methods described for Monitoring Type #1; or • Collection of small fish tissue (or equivalent indicator) near tributary confluences with the Bay and analysis for POCs; or • Collection of bedded sediments near tributary confluences with the Bay and analysis for POCs.
3	Provide support for future or existing management actions	Monitoring methods to support future or existing management actions should include: • Methods described for Monitoring Type #1, with a focus on monitoring the effectiveness of specific management actions in reducing or avoiding POCs in MS4 discharges.
4	Provide information on POC loads, concentrations, or presence / absence	Monitoring methods to provide information on POC loads, concentrations or presence/absence should include: • Methods described for Monitoring Type #1, in combination with quantitative modeling associated with quantifying POC loads from MS4s or small tributaries to the Bay.
5	Evaluate POC trends	Monitoring methods to provide information on trends in POC loads and concentrations overtime may include: Methods described for Monitoring Type #1 or #2.

ii. **Parameters and Monitoring Frequency** – The Permittees shall conduct POC monitoring consistent with the monitoring intensity and frequency specified in Table 8.2. Monitoring frequencies are described as the total and minimum number of samples that Permittees within a countywide Stormwater Program shall collectively collect and analyze in a Water Year (October 1 – September 30). Minimum number of samples that Permittees within a countywide Stormwater Program shall collect by the end of the Permit term to address each monitoring type are also specified.

Table 8.2 POC Monitoring Parameters, Effort and Type

Pollutant of Concern	Total Samples[a] Collected /Analyzed (yearly minimum) for each Countywide Program: Alameda, Contra Costa, Santa Clara, and San Mateo	Minimum Number of Samples for each Monitoring Type[b]
Polychlorinated Biphenyls (PCBs)	80 (8)	8 samples minimum for monitoring types 1-5
Total Mercury	80 (8)	8 samples minimum for monitoring types 1-5
Copper	20 (2)	4 samples minimum for monitoring types 4-5
Emerging Contaminants[c]: Must include but not limited to: Perfluorooctane Sulfonates (PFOS, in sediment) Perfluoroalkyl sulfonates (PFAS, in sediment) Alternative flame retardants	See footnote c	See footnote c
Ancillary Parameters[d]: Total organic carbon Suspended sediments (SSC) Hardness	as necessary to address management questions for other POCs – see footnote d	
Nutrients: Ammonium, Nitrate, Nitrite, Total Kjeldahl Nitrogen, Orthophosphate, Total Phosphorus (all nutrients collected together for each sample)	20 (2) for each nutrient species	20 samples for monitoring type 4 for each nutrient species.

[a] This column indicates the total number of samples, across all applicable monitoring types (i.e., monitoring types 1-5 from Table 8.1), that must be collected during the permit term. The number in parentheses indicates the minimum number of samples that must be collected, across all applicable monitoring types, during each of the five years of the permit. For example, 80 total samples must be collected for both total PCBs and mercury by each set of Santa Clara County, San Mateo County, Alameda County, and Contra Costa County Permittees during the term of the permit. Permittees must collect a minimum of 8 PCBs samples every year of the permit term, including the final year.

[b] This column indicates the monitoring types from Table 8.1 that are applicable to this POC along with the minimum number of samples that shall be collected by each set of Permittees (i.e., Santa Clara County, San Mateo County, Alameda County, and Contra Costa County) by the end of year four of the permit. The applicable monitoring type(s) is also stated to illustrate the management information need(s) motivating the collected data. For example, each set of Permittees (i.e., the Countywide Programs for Santa Clara, San Mateo, Alameda, and Contra Costa counties) must collect and analyze at least 8 samples to address monitoring types 1-5 in Table 8.1 for both total PCBs and total mercury. Some collected samples may address multiple management questions.

[c] The Permittees shall conduct or cause to be conducted a special study that addresses relevant management information needs for emerging contaminants. The special study must account for relevant CECs in stormwater and would address at least PFOS, PFAS, and alternative flame retardants being used to replace PBDEs.

[d] Total Organic Carbon (TOC) data are not used independently. Rather, TOC can be useful for normalizing PCBs data collected in water and sediment. TOC shall be collected concurrently with PCBs data that should be normalized to TOC. Similarly, suspended sediment concentrations (SSC) samples should be collected and analyzed when water samples are collected that will be used to assess loads, loading trends, or BMP effectiveness for PCBs and Mercury. Hardness data are used in conjunction with copper concentrations collected in fresh water.

iii. **POC Parameters and Analytical Methods** – Samples collected consistent with Table 8.2 shall be analyzed for parameters listed in Table 8.3. Where no laboratory method is listed in Table 8.3, Permittees shall use U.S. EPA or SWAMP-approved methods.

Table 8.3 POC Analytes and Analytical Methods

Pollutant of Concern	Matrix	Analyte(s) or Test Species	Laboratory Analytical Methods
Polychlorinated Biphenyls (PCBs)	Water	Total PCBs	U.S. EPA 1668 (RMP 40)
		Total Organic Carbon	
		Suspended sediments (SSC)	
	Bedded Sediment	Total PCBs	As appropriate to address the management information need: U.S. EPA 1668 (RMP 40), 8082A, or 8270D modified by Method 1625
		Total organic carbon	
Mercury	Water	Total Mercury	
	Bedded Sediment	Total Mercury	
Copper	Water	Total Copper	
		Dissolved Copper	
		Hardness	
Nutrients	Water	Ammonium	
		Nitrate	
		Nitrite	
		Total Kjeldahl Nitrogen	
		Orthophosphate	
		Total Phosphorus	

C.8.g. Pesticides and Toxicity Monitoring

The Permittees shall conduct wet weather and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides-related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Executive Officer modify, reduce or eliminate this monitoring requirement, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

i. Toxicity in Water Column - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of receiving water using applicable SWAMP comparable methodology. These samples shall be analyzed for the test organisms listed, and by the methods described, on Table 8.4.

Toxicity shall be evaluated using the Test of Significant Toxicity (TST) statistical approach.[33] Each sample shall be subject to determination of "Pass" or "Fail" and shall indicate "Percent Effect" from toxicity using nondiluted samples. The TST null hypothesis shall be "mean sample response $\leq 0.75 \times$ mean control response." A test result that rejects this null hypothesis shall be reported as "Pass." A test result that does not reject this null hypothesis shall be reported as "Fail." The relative "Percent Effect" of the sample is defined and reported as: ((Mean control response – Mean sample response) ÷ Mean control response)) × 100.

Table 8.4 Water Column Aquatic Toxicity Analytical Procedures

Test Species	Test Endpoint(s)	Units	U.S. EPA Method
Pimephales promelas (Fathead Minnow)	Larval Survival and Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013[34] EPA 833-R-10-003[35]
Ceriodaphnia dubia (Freshwater Crustacean)	Survival[a]	Pass or Fail, % Effect <25% Passes, >25% Fails	EPA-821-R-02-013 EPA 833-R-10-003
Ceriodaphnia dubia (Freshwater Crustacean)	Reproduction	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Selenastrum capricornutum (Green Algae)	Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Hyalella azteca (Freshwater Amphipod)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012[36] EPA 833-R-10-003
Chironomus dilutus (midge)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012 EPA 833-R-10-003

[33] National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003, 2010), Appendix A, Figure A-1, and Table A-1.

[34] *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136.

[35] *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003) 2010.

[36] *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). See Appendix B, page 238, for *H.azteca* and *C.dilutus* methods.

[a] The *Ceriodaphnia dubia* chronic toxicity test design for the survival endpoint is not amenable to the TST, Welch's t-test so the survival endpoint will be determined as a percent effect using the TST approach. A percent effect less than 25 percent will be considered a "pass," and a percent effect equal to or greater than 25 percent will be considered a "fail."
[b] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent.

(2) Sample Design/Locations – Sample locations may be selected by the Permittees to monitor locations where toxicity could be likely; to coincide with bioassessment sites; to coincide with creek restoration sites; or to resample a location where toxicity has been found in the past.

(3) Frequency, Timeframe and Number of Sites – The Permittees shall collect samples annually in the dry season. Vallejo and Fairfield-Suisun Permittees each shall collect their sample by the end of the second water year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	2 per year
Santa Clara Permittees	2 per year
Contra Costa Permittees	1 per year
San Mateo Permittees	1 per year
Fairfield-Suisun & Vallejo Permittees collectively	1 per 5-year period

ii. Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of creek sediment using applicable SWAMP comparable methodology. These samples shall be analyzed for the pollutants and organisms listed and by the methods described on Table 8.5. Where no laboratory method is listed in Table 8.5, Permittees shall use U.S. EPA or SWAMP-approved methods.

Table 8.5 Sediment Toxicity & Pollutants Analytical Procedures

Test Species or Pollutant	Units	Laboratory Method
Hyalella azteca and *Chironomus dilutus survival*[a]	Pass/Fail using TST, % Effect[a]	EPA-600/R-99-064[37]
Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin		EPA 3540C followed by EPA 8270D by NCI-GCMS
Carbaryl		
Fipronil		
Total PAHs		
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc		
Total organic carbon		
Grain size		

[37] *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (EPA 600/R-99-064).Second Edition. March 2000.

[a] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent. The false positive rate (beta error) is 0.05 and the negative rate (alpha error) is 0.25 for these test methods.

(2) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past, for example.

(3) Frequency, Timeframe, and Number of Sites – The Permittees shall collect samples annually during the dry season. Vallejo and Fairfield-Suisun Permittees each shall collect their sample by the end of the second year of the permit term. Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	2 per year
Santa Clara Permittees	2 per year
Contra Costa Permittees	1 per year
San Mateo Permittees	1 per year
Fairfield-Suisun & Vallejo Permittees collectively	1 per 5-year period

iii. Wet Weather Pesticides and Toxicity Monitoring

(1) Field and Laboratory Method – The Permittees shall collect water column samples and analyze them for the following parameters using the methods specified in Tables 8.4 and 8.5. For imidacloprid, Permittees shall specify an analytical method that achieves a reporting level as close to 0.05 ppb as possible, but in no case exceeds 0.1 ppb).

- Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin
- Imidacloprid
- Indoxacarb[38]
- Fipronil
- Toxicity

(2) Sample Design/Locations – The Permittees shall collect samples annually during storm events. Sample locations shall be representative of urban watersheds (i.e., bottom of watershed locations).

(3) Frequency, Timeframe, and Number of Sites – If this (C.8.g.iii) sampling is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term, with a minimum of six (6) samples collected by the end of the third water year of the permit term. If this (C.8.g.iii)

[38] Indoxacarb shall be a required analyte in the water year following notification by the Executive Officer that an analytical method with appropriate quality assurance and sensitivity is available. At the time of Permit issuance, an analytical method has not been developed.

sampling is conducted by Countywide Stormwater Programs, Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	1 per year
Santa Clara Permittees	1 per year
Contra Costa Permittees	1 per year
San Mateo Permittees	1 per year
Fairfield-Suisun & Vallejo Permittees collectively	1 per 5-year period

iv. **Followup** – The Permittees shall identify a site as a candidate SSID project when analytical results indicate any of the following:

(1) A toxicity test of growth, reproduction, or survival of any test organism is reported as "fail" in both the initial sampling and a second, followup sampling, and both have ≥ 50% Percent Effect;

(2) A pollutant is present at a concentration exceeding its water quality objective in the Basin Plan;

(3) For pollutants without WQOs, results exceed Probable Effects Concentrations or Threshold Effects Concentrations.[39]

C.8.h. Reporting

i. **Water Quality Standard Exceedence** – When data collected pursuant to C.8.a.- C.8.g. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a followup report in accordance with Provision C.1 requirements. This reporting requirement shall not apply to continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.9 through C.14 of this Order, consistent with Provision C.1.

ii. **Electronic Reporting** – The Permittees shall submit to the California Environmental Data Exchange Network (CEDEN) all results from monitoring conducted pursuant to Provisions C.8.d. Creek Status, C.8.e. SSID Projects (as applicable), C.8.f. Pollutants of Concern and C.8.g. Pesticides and Toxicity. Data that CEDEN cannot accept are exempt from this requirement.

(1) Data shall be submitted in SWAMP formats and with the quality controls required by CEDEN.

[39] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31. More recent TECs and PECs may be used if lower than stated in MacDonald 2000.

(2) Data collected during the previous October 1–September 30 period shall be submitted by March 31 of each year.

iii. **Urban Creeks Monitoring Report** – The Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 31 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Each Urban Creeks Monitoring Report shall contain summaries of Creek Status, SSID Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:

(1) Immediately following the Table of Contents, a completed Water Year Summary Table that lists each Program's monitoring sites, with a row for each site. The table columns contain: Site ID; creek name; land use; latitude; longitude; bioassessment, nutrient; chlorine; water column toxicity; sediment toxicity and chemistry; pathogens; temperature loggers; and general water quality (sonde data). For each site, list the site information and check the parameters sampled at that site. This will provide a summary of all Creek Status Monitoring conducted that water year.

(2) An SSID status report pursuant to Provision 0.

(3) For all data, a statement of the data quality.

(4) An analysis of the data, which shall include the following:

(a) Identification and analysis of any trends in stormwater or receiving water quality which shall include:

- Calculations of CSCI scores and physical habitat endpoints;
- Comparison of CSCI scores to:
  - Each other;
  - Any applicable, available reference site(s); and
  - Physical habitat endpoints.

(b) A discussion of the data for each monitoring program component, which shall:

- Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans;
- Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;
- Identify and prioritize water quality problems;
- Identify potential sources of water quality problems;
- Describe followup actions;
- Evaluate the effectiveness of existing control measures; and
- Identify management actions needed to address water quality problems.

iv. **Pollutants of Concern Monitoring Reports** – By October 15 of each year of the permit (beginning in 2016), the Permittees shall submit a report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year. The report shall include (for preceding year and projected for forthcoming year): monitoring locations, number and types of samples collected, purpose of sampling (management question addressed), and analytes measured. Any data not reportable to CEDEN should be included in the following Urban Creeks Monitoring Report due annually on March 31.

v. **Integrated Monitoring Report** – No later than March 31 of the fifth year of the Permit term, Permittees shall submit an Integrated Monitoring Report in lieu of the annual Urban Creeks Monitoring Report. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit. The Integrated Monitoring Report shall report on all the data collected since the previous Integrated Monitoring Report and shall contain the following:

(1) The Water Year Summary Table, as described in Provision C.8.g.iii, containing information pertaining to the fourth year monitoring data;

(2) A comprehensive analysis of all data collected pursuant to Provision C.8. since the previous Integrated Monitoring Report, and may include other pertinent studies;

(3) For POCs, the report shall include methods, data, calculations, load estimates, and source estimates for each POC parameter, as applicable; and

(4) The Integrated Monitoring Report shall include a budget summary for each monitoring requirement and recommendations for future monitoring.

vi. **Standard Report Content** – All monitoring reports shall include the following:

(1) The purpose of the monitoring and briefly describe the study design rationale;

(2) Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data;

(3) Brief descriptions of sampling protocols and analytical methods;

(4) Sample location description, including water body name and segment and latitude and longitude coordinates;

(5) Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue);

(6) Concentrations detected, measurement units, and detection limits;

(7) Assessment, analysis, and interpretation of the data for each monitoring program component;

(8) A listing of volunteer and other non-Permittee entities whose data are included in the report; and

(9) Assessment of compliance with applicable water quality standards.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system.

This provision implements requirements of the TMDL for Diazinon and Pesticide-Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur, because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Urban-use pesticides of concern to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin); and carbamates (e.g., carbaryl and aldicarb).

C.9.a. Maintain and Implement an Integrated Pest Management (IPM) Policy or Ordinance and Standard Operating Procedures

All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of IPM[40] and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance.

[40] IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. IPM techniques could include biological controls (e.g., ladybugs and other natural enemies or predators); physical or mechanical controls (e.g., hand labor or mowing, caulking entry points to buildings); cultural controls (e.g., mulching, alternative plant type selection, and enhanced cleaning and containment of food sources in buildings); and reduced risk chemical controls (e.g., soaps or oils).

i. **Task Description** – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides do not cause or contribute to pesticide-caused toxicity in receiving waters.

ii. **Implementation** - Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property.

iii. **Reporting**

(1) In their Annual Reports, the Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of pesticides of concern to water quality as listed in the introduction section of this Provision. Trends and quantities of pesticide active ingredient usage shall be reported beginning with the September 2017 Annual Report.

(2) In their Annual Reports, the Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and examples of integration of several strategies into a cohesive whole, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term.

(3) IPM policies or ordinances and IPM standard operating procedures shall be submitted to the Water Board upon request.

C.9.b. Train Municipal Employees

i. Task Description– The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy or ordinance and standard operating procedures. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided.

ii. **Reporting**

(1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in their IPM policy or ordinance and IPM standard operating procedures

within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc.

(2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.

C.9.c. Require Contractors to Implement IPM

i. **Task Description** – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall observe contractor pesticide applications to verify that contractors implement their contract specifications in accordance with the Permittee's IPM policies or ordinance and standard operating procedures. Permittees shall note that contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee an individual employee will always use IPM strategies. Thus, periodic Permittee observation of contractor performance is necessary.

ii. **Implementation** – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used.

iii. **Reporting** – In their Annual Reports, the Permittees shall state how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.

C.9.d. Interface with County Agricultural Commissioners

i. **Task Description** – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (http://www.cdpr.ca.gov/docs/legbills/rulepkgs/11-004/text_final.pdf).

ii. **Reporting** – In their Annual Reports, the Permittees shall briefly describe the communications they have had with county agricultural commissioners and report followup actions to correct violations of pesticide regulations.

C.9.e. Public Outreach

i. **Task Description** – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce their reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.

ii. **Implementation** – The Permittees shall conduct each of the following:

(1) **Point of Purchase Outreach**: The Permittees shall:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally-equivalent pesticide use reduction outreach program.

(2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

(3) **Outreach to Pest Control Professionals:** The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by Ecowise Certified or a functionally-equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BASMAA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators.

iii. **Reporting** – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f.).

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description** – The Permittees shall conduct the following activities, which may be done at a county, regional, or state wide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting** – In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or state wide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

C.9.g. Evaluate Implementation of Pesticide Source Control Actions

i. **Task Description** – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.

ii. **Implementation** – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule.

iii. **Reporting** – In their 2019 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-e and g; a discussion of any improvements

made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges, Discharge Prohibition A.2, and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of this provision. Flood management agencies are not subject to these trash reduction requirements except for continued implementation of requirements for trash full capture systems and Trash Hot Spot cleanups, as specified in subsections C.10.b.i and C.10.c.

C.10.a. Trash Reduction Requirements

Permittees shall implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by July 1, 2022.

i. **Schedule** – Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule:

a. 70 percent by July 1, 2017; and
b. 80 percent by July 1, 2019.

In addition, Permittees should achieve 60 percent reduction by July 1, 2016. This is not a mandatory deadline; rather, it shall be used as a performance guideline to meet the mandatory July 1, 2017 deadline. Permittees that do not attain the 60 percent performance guideline shall submit documentation of a plan and schedule of implementation of additional trash load reduction control actions that will attain the July 1, 2017 deadline.

ii. **Trash Generation Area Management** – Permittees shall demonstrate attainment of the C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long Term Trash Reduction Plans, submitted in February 2014, in accordance with the requirements and accounting set forth in this provision. The February 2014 maps provide the 2009 trash levels and delineate trash generation areas within Permittees' jurisdictions into the following trash generation rate categories

Low = less than 5 gal/acre/yr;
Moderate = 5-10 gal/acre/yr;
High = 10-50 gal/acre/yr; and
Very High = greater than 50 gal/acre/yr.

Permittees also designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, within which they will implement trash control actions. Permittees shall have an opportunity to correct and/or revise, based on improved information, the 2009 trash levels and trash generation areas in their February 2014 maps by submitting the correction and/or revision no later than the 2016 Annual Report deadline.

a. Permittees shall implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better. Actions equivalent to full trash capture means actions that send no more trash down the storm drain system than a full trash capture device would allow, which is essentially no trash discharge except in very large storm flows. The C.10.a.i percent reductions shall be demonstrated by percent of 2009 Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation by the C.10.a.i mandatory deadlines.

b. Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of the latter shall be assessed with visual assessments in accordance with C.10.b.ii. If there is a full trash capture device downstream of these lands, no other trash control is required. Permittees shall map the location, or otherwise record the location, of all such lands greater than 10,000 ft2 that are plumbed directly to their storm drain systems by July 1, 2018, including the trash control status of these areas. This information shall be retained by the Permittees for inspection upon request.

iii. **Mandatory Minimum Full Trash Capture Systems** - Permittees shall install and maintain a mandatory minimum number of full trash capture devices, to treat runoff from an area equivalent to 30 percent of retail/wholesale land area, as documented by the Association of Bay Area Governments, which drains to the storm drain system within their jurisdictions. A city Permittee with a population less than 12,000 and retail/wholesale land less than 40 acres, or a population less than 2,000, is exempt from this full trash capture requirement. Table 2 in Attachment E contains the minimum amount of drainage areas that must be treated with full trash capture devices by each city or county Permittee, and the minimum number of trash capture devices required to be installed and maintained by flood management agency Permittees.

A full capture system is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the sub-drainage area or designed to carry at least the same flow as the storm drain connected to the inlet. The device(s) must also have a trash reservoir large enough to contain a reasonable amount of trash safely without overflowing trash into the overflow outlet between maintenance events. Types of systems certified by the State Water Resources Control Board are deemed full capture systems. A stormwater treatment facility implemented in accordance with Provision C.3 is also deemed a full capture system if the facility, including its maintenance prevents the discharge of trash to the downstream MS4 and receiving waters

and discharge points from the facility, including overflows, are appropriately screened or otherwise configured to meet the full trash capture screening specification for storm flows up to the full trash capture one year, one hour storm hydraulic specification (C.10.a.iii.).

C.10.b. Demonstration of Trash Reduction Outcomes

i. **Full Trash Capture Systems** – Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system.

   a. **Maintenance** – The maintenance of each full capture device shall be adequate to prevent plugging, including plugging of the 5 mm screen leading to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. All full trash capture devices shall be inspected and maintained at least once per year. All such devices in high or very high trash generation areas shall be inspected at least two times per year, with the inspections spaced at least three months or more apart. If this frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year.

   b. If any such device is found to have a plugged or blinded screen or is greater than 50 percent full of trash during a maintenance event, the maintenance frequency shall be increased so that the device is neither plugged nor more than half full of trash at the next maintenance event.

   c. **Maintenance Records** – Permittees shall retain device specific maintenance records, including, at a minimum: the date(s) of maintenance, the capacity condition of the device at the time of maintenance (full and overflowing or with storage capacity remaining), any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, damage reducing function, or other negative conditions. A summary of this information shall be reported in each Annual Report which may be limited to the number of full capture devices maintained that exhibited a plugged, full or overflowing condition upon maintenance.

   d. **Certification** – Permittees shall certify annually that each of their full trash capture systems is operated and maintained to meet full trash capture system requirements. Drainage areas served by an adequately maintained full trash capture system will be considered equivalent to or better than a Low trash generation area.

ii. **Other Trash Management Actions** – Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.

a. **Implementation Documentation** – Permittees shall maintain documentation of trash control actions that describes each action or combination of actions, the level of implementation, the timing and frequency of implementation, standard operating procedures if applicable, location(s) of implementation actions including mapped location(s) and drainage area(s) affected or description of areal extent, tracking and enforcement procedures if applicable, and other information relevant to effective implementation of the action or combination of actions.

b. **Visual Assessment of Outcomes of Other Trash Management Actions** – Permittees shall conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see C.10.b.ii.b.(iv.)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions. Permittees may assess and account for one or more trash generation areas in a single trash management area within which a control action or combination of control actions is implemented. The visual on-land assessment method used shall meet or exceed the following criteria:

   (i) Conduct observations within a trash management area of the sidewalk, curb and gutter, or locations associated with trash generation sources.

   (ii) Conduct observations at randomly selected locations covering at least ten percent of a trash management area's street miles; or conduct observations at strategic locations with justification they are representative of trash generation in the management area and they will represent the effectiveness of the control action(s) implemented or planned in the management area.

   (iii) Conduct observations at a frequency consistent with known or estimated trash generation rate(s) within a trash management area and the time frequency of implementation of the control action(s) implemented or planned in the management area. Conduct observations for effectiveness approximately at the halfway point of the interval between instances of recurring trash control actions such as street sweeping and on-land cleanup.

   (iv) Permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Such a proposal shall be made to the Executive Officer as a submittal separate from any other submittals or reports. If this evidence is accepted by the Executive Officer, the Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within certain trash management areas to the same performance standard accepted by the Executive Officer.

iii. **Percentage Discharge Reduction** – Percentage discharge reduction from 2009 from Very High generation areas reduced to High, Moderate, and Low, High generation areas reduced to Moderate and Low, and Moderate trash generation areas reduced to Low trash generation category to meet the required total percent reduction ($\%_{Reduction}$) shall be calculated based on the following formula:

$$\% \text{ Reduction} = 100\ [(12A_{VH(2009)} + 4A_{H(2009)} + A_{M(2009)}) - (12A_{VH} + 4A_{H} + A_{M})] \\ / (12A_{VH2009} + 4A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$	=	total amount of the 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of the 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of the 2009 moderate trash generation category jurisdictional area
A_{VH}	=	total amount of very high trash generation category jurisdictional area in the reporting year
A_{H}	=	total amount of high trash generation category jurisdictional area in the reporting year
A_{M}	=	total amount of moderate trash generation category jurisdictional area in the reporting year
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
100	=	fraction to percentage conversion factor

iv. **Source Control** – Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items, may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions. To claim a load percentage reduction value, Permittees must provide substantive and credible evidence that these actions reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides evidence that the implementation of source control in its jurisdiction is similarly implemented as the source control assessed in the reference studies.

v. **Receiving Water Monitoring** – Permittees shall conduct receiving water monitoring and develop receiving water monitoring tools and protocols and a monitoring program designed, to the extent possible, to answer the following questions:

- Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
- Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
- Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
- Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?

The monitoring tools and protocols shall include direct measurements and/or observations of trash in receiving water(s), or in scenarios where direct measurements or observations are not feasible, surrogates for trash in receiving waters, such as measurement or observations of trash on stream banks or shorelines.

a. **Development and Testing Plan** – Permittees shall submit a plan acceptable to the Executive Officer by July 1, 2017, to develop and test a proposed receiving water monitoring program that includes the following:
   (i) Description of the tools and protocols;
   (ii) Description of discharge and receiving water scenarios, which will be considered, that accounts for the various receiving waters and watershed, community, and drainage characteristics within Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s);
   (iii) Description of factors, in addition to those in C.10.b.v.a.(ii), that will be considered and evaluated to determine scenarios and spatial and temporal representativeness;
   (iv) Identification of sites, representative of all the Permittees and discharge and receiving water scenarios, that will be monitored during this permit term;
   (v) Development of a system to manage and access monitoring results;
   (vi) Opportunity for input and participation by interested parties;
   (vii) Scientific peer review of the tools and protocols and testing results; and
   (viii) Schedule for development and testing; with monitoring at representative sites starting no later than October 2017.

   If the Permittees conduct this work through an independent third party, approved by the Executive Officer, the Plan may be submitted by July 2018, with monitoring to begin no later than October 2018.

b. **Report and Proposed Monitoring Program** – Permittees shall report progress in the 2018 Annual Report, and submit a preliminary report by July 1, 2019 and a final report by July 1, 2020 on the proposed trash receiving water monitoring program. The progress report is not required if the Permittees conduct this work through an independent third party, approved by the Executive Officer, that provides input and participation by interested parties and scientific peer review of the tools and protocols and testing results and proposed receiving monitoring program.

C.10.c. Trash Hot Spot Selection and Cleanup

Trash Hot Spots in receiving waters shall be cleaned annually to achieve the multiple benefits of abatement of impacts and to learn more about the sources and transport routes of trash loading.

i. **Trash Hot Spot Cleanup and Definition** – The Permittees shall clean selected Trash Hot Spots to a level of "no visual impact" at least one time per year for the

term of the permit. Trash Hot Spots shall be sections of creek or shoreline significantly impacted by trash of at least 100 yards of creek length or 200 yards of shoreline length.

ii. **Trash Hot Spot Selection** – Permittees shall maintain the same number of trash hot spots identified in the previous permit term, which are included in Attachment E. Permittees may select new trash hot spot locations if past locations are no longer trash hotspots or if other locations may better align with trash management areas.

iii. **Trash Hot Spot Assessments** – The Permittees shall quantify the volume of material removed from each Trash Hot Spot cleanup and attempt to identify sources to the extent readily feasible. Documentation of the cleanup activity to be retained by the Permittee shall include the trash condition before and after cleanup of the entire hot spot using photo documentation with a minimum of one photo per 100 feet of hot spot length and the total volume of trash and litter removed from the hot spot. Permittees shall report the volume removed for the most recent five years of hot spot cleanup in each Annual Report, or if a new trash hot spot location is selected, Permittees shall report the volume removed for the years of cleanup of that hotspot.

C.10.d. Trash Load Reduction Plans

Each Permittee shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report. The Plan shall describe trash load reduction control actions being implemented or planned and the trash generation areas or trash management areas where the actions are or will be implemented, including jurisdiction-wide actions, such as source control ordinances

The Plans may include actions to control sources outside of the Permittee's jurisdiction that are causing or contributing to adverse trash impacts in the receiving water(s). Permittees who choose to implement such control actions may account for them towards meeting the C.10.a Trash Load Reduction requirements as long as they can demonstrate the controls will be sustained and they quantify the sustained load reduction benefit relative to control actions in the trash generation areas or trash management areas in their jurisdiction that drained to the affected receiving water.

C.10.e. Optional Trash Load Reduction Offset Opportunities

i. **Additional Creek and Shoreline Cleanup** – A Permittee may offset part of its provision C.10.a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot cleanups required by C.10.c if the additional cleanup efforts are conducted at a frequency of at least twice per year and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent.

A Permittee may claim a load reduction offset of one percent for each total of trash volume removed from additional cleanups that is three and a third percent

for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, and ten percent for the 2019 mandatory trash load reduction deadline, of the Permittee's 2009 trash load volume estimates, based on its trash generation maps and average categorical trash generation rates (see C.10.a.ii), in accordance with the following formula:

$$1\% \text{ Reduction Offset (Volume)} = (12\ A_{VH(2009)} + 4\ A_{H(2009)} + A_{M(2009)})\ OF$$

where:

$A_{VH(2009)}$	=	total amount of 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of 2009 moderate trash generation category jurisdictional area
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
OF	=	offset factor equal to (7.5 x 0.033) for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.033 is the three to one offset ratio, or (7.5 x 0.1) for the 2019 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

ii. **Direct Trash Discharge Controls** – A Permittee may offset an additional part of its provision C.10.a trash load percent reduction requirement by implementing a comprehensive plan approved by the Executive Officer for control of direct discharges of trash to receiving waters from non-storm drain system sources. The maximum offset that may be claimed is fifteen percent using the C.10.e.i formula. The plan shall be submitted not later than February 1 of the first year in which the offset will be reported in the following Annual Report and shall include the following:

a. description of sources of the directly discharged trash;

b. description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads in a systematic and comprehensive manner;

c. map of the affected receiving water area and associated watershed; and

d. description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.

C.10.f. Reporting

Each Permittee shall provide the following in each Annual Report:

i. A summary of trash control actions within each trash management area, including the types of actions, levels of implementation, areal extent of implementation, and whether the actions are ongoing or new, including initiation date.

ii. Upon request by the Executive Officer, an updated trash generation area map or maps, which include trash management areas, including the locations and associated drainage areas and of full trash capture systems and other trash control actions, and the location of Trash Hot Spots, with highlight or other indication of any revisions or changes from the previous year map(s). These maps can be used to illustrate progress toward achieving the trash reduction requirements in C.10.a.i.

iii. Should a Permittee correct and/or revise its 2009 trash generation map submitted in February 2014, the corrected or revised 2009 trash generation map shall be submitted in the 2016 Annual Report, if the Permittee has not already submitted the corrected or revised map. Certification that each of its full trash capture systems is operated and maintained to meet full trash capture system requirements; a description of any systems that did not meet full trash capture system requirements (e.g., due to plugging or overflowing); and any corrective actions taken.

iv. An accounting of its non-full trash capture system trash control actions assessments by providing a summary description of assessments in each of its trash management areas, including the number and dates of observations.

v. An accounting of progress toward or attainment of C.10.a.i trash discharge reduction performance guidelines and mandatory deadlines using the C.10.a.ii trash generation area mapping methodology and formula.

   a. If a Permittee cannot demonstrate attainment of the 2016 performance guideline, it shall submit a detailed plan and schedule of implementation of additional trash load reduction control actions that will attain the 2017 mandatory deadline.

   b. If a Permittee cannot demonstrate attainment of the 2017 or 2019 mandatory trash load reduction deadline, it shall submit a report of non-compliance with the associated Annual Report, or in advance of the Annual Report, that describes actions to comply with the mandatory reduction deadline in a timely manner. The report shall include a plan and schedule for implementation of full trash capture systems sufficient to attain the required reduction. A Permittee may submit a plan and schedule for implementation of other trash management actions to attain the required reduction in an area where implementation of a full trash capture system is not feasible. In such cases, the report shall include identification of the area and documentation of the basis of the Permittee's determination that implementation of a full trash capture system is not feasible.

vi. In the 2018 Annual Report, progress on development and testing of the receiving water monitoring program.

vii. The volume removed for the most recent five years of hot spot cleanup for each of its trash hot spots, or for the years of cleanup if a new trash hot spot location has been selected.

viii. For Permittees claiming a C.10.e.i offset, based on additional cleanup of creek and shoreline areas, a summary description of the additional cleanup actions.

ix. For Permittees claiming a C.10.e.ii offset, based on non-storm drain system trash controls, a summary description of control actions receiving water assessment results, quantification of trash volume controlled, and assessment of resulting improvements in receiving water condition, the claimed offset and documentation of information used in the C.10.e.i formula.

C.11. Mercury Controls

The Permittees shall implement the following control program for mercury. The Permittees shall perform the control measures (source control, treatment control, and pollution prevention strategies) and report on those control measures according to the provisions below. The provisions implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury load allocations established for the TMDLs. The aggregate, regionwide, urban runoff wasteload allocation from the San Francisco Bay mercury TMDL is 82 kg/yr. The TMDL implementation plan calls for attainment of the allocation by February 2028 and, as a way to measure progress, attainment of an interim loading milestone by February 2018 of 120 kg/yr, halfway between the 2003 estimated load, 160 kg/yr, and the aggregate allocation. The Permittees may comply with any requirement of this provision through a collaborative effort.

C.11.a. Implement Control Measures to Achieve Mercury Load Reductions

i. **Task Description** – Permittees shall implement mercury source and treatment control measures and pollution prevention strategies to reduce mercury loads throughout the area covered by this Permit (permit-area).

ii. **Implementation level** – To comply with this provision element, Permittees shall:

(1) Identify the watersheds or portions of watersheds (management areas) in which mercury control measures are currently being implemented and those in which new control measures will be implemented during the term of this Permit (many or most may be the same watersheds as those identified for C.12.a.ii(1));

(2) Identify the control measures that are currently being implemented and those that will be implemented in each watershed and management area (may be the same as those identified for C.12.a.ii(2));

(3) Submit a schedule of control measure implementation; and

(4) Implement mercury source and treatment control measures and pollution prevention strategies and quantify mercury load reductions achieved by using the accounting methods established according to provision C.11.b.

iii. **Reporting**

(1) The Permittees shall report by April 1, 2016, progress toward developing a list of the watersheds and management areas where mercury control measures are currently being implemented and those in which control measures will be implemented (C.11.a.ii(1)) during the term of this Permit as well as the monitoring data and other information used to select these watersheds and management areas.

(2) The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit (C.11.a.ii(1)) along with the specific control measures (C.11.a.ii(2)) that are currently being implemented and those that will be implemented in these watersheds and management areas and an implementation schedule (C.11.a.ii(3)) for these control measures. In addition to the list of watersheds and management areas, this report shall include:

a. The number, type, and locations and/or frequency (if applicable) of control measures;

b. The description, scope, and start date of pollution prevention measures;

c. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural BMPs or other relevant implementation milestones for structural and non-structural BMPs) and a schedule for milestone achievement; and

d. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.11.a.ii(2).

(3) Beginning with the 2017 Annual Report and continuing in all Annual Reports, Permittees shall update all the information required under C.11.a.iii(2) as necessary to account for new control measures implemented, but not described, in the 2016 Annual Report.

C.11.b. Assess Mercury Load Reductions from Stormwater

i. **Task Description** – The Permittees shall develop and implement an assessment methodology and data collection program to quantify in a technically sound manner mercury loads reduced through implementation of pollution prevention, source control, and treatment control measures, including mercury source control, stormwater treatment, green infrastructure, and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations.

A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by the Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each control measure implemented.

ii. **Implementation Level** – The Permittees shall adequately quantify the mercury load reductions achieved through implementing pollution prevention, source control, and treatment control efforts.

iii. **Reporting**

(1) In their 2016 Annual Report the Permittees shall submit, for Executive Officer approval, the assessment methodology and data collection program required in C.11.b.i.

(2) Beginning with the 2017 Annual Report, Permittees shall report annually the loads reduced using the default (from Fact Sheet) or alternative approved assessment methodology to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates, including appropriate reference to the control measures described in the reporting required under C.11.a.

(3) In their 2018 and subsequent Annual Reports, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions in the subsequent permit.

C.11.c. Plan and Implement Green Infrastructure to reduce mercury loads

i. **Task Description** – Permittees shall implement green infrastructure projects during the term of the Permit to achieve the mercury load reductions performance criteria in Table 11.1. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, Permittees shall prepare a reasonable assurance analysis (see below and Fact Sheet) to demonstrate quantitatively that mercury load reductions of at least 10 kg/yr will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.

ii. **Implementation Level**

(1) The Permittees shall implement sufficient green infrastructure projects so that mercury loads are collectively reduced by 48 g/yr by June 30, 2020, which shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. Permittees shall demonstrate achievement of these load reductions by using the accounting methods approved under provision C.11.b.iii(1). Load reductions from green infrastructure projects implemented prior to the effective date of this Permit may be counted toward the required green infrastructure reductions of this Permit term if these projects were established and implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term.

The Permittees may meet the load reduction as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 11.1. If neither the permit-area-wide total load reduction nor the county-specific load reduction is achieved, Permittees shall achieve load reductions consistent with their share of the county total. The individual Permittee share of the county load reduction is the proportion of county population in each municipality.

If all the Permittees in a county wish to use an alternative method of distributing the county load reductions, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2017 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

Table 11.1 Mercury Load Reduction Performance Criteria via Green Infrastructure Implementation by County

County Permittees	**Mercury Load Reduction (g/yr) by June 30, 2020, through green infrastructure**
Alameda Permittees	15
Contra Costa Permittees	9
San Mateo Permittees	6
Santa Clara Permittees	16
Solano Permittees: Suisun City, Vallejo, Fairfield	2
Totals	**48**

(2) Permittees shall prepare a reasonable assurance analysis of future mercury load reductions by doing the following:

a. Quantify the relationship between areal extent of green infrastructure implementation and mercury load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies.

b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040.

c. Estimate the amount of mercury load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.

d. Quantitatively demonstrate that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects.

e. Ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill C.11.c.ii(2)(a-d) have been validated through a peer review process.

iii. Reporting

(1) The Permittees shall submit in their 2018 Annual Report, as part of reporting for C.11.b.iii(2), the quantitative relationship between green infrastructure implementation and mercury load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship.

(2) The Permittees shall submit in their 2020 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

(3) The Permittees shall submit in their 2020 Annual Report a reasonable assurance analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis.

(4) The Permittees shall submit as part of reporting for C.11.b.iii(2), beginning with their 2019 Annual Report, an estimate of the amount of mercury load reductions resulting from green infrastructure implementation during the term of the Permit. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

(5) All Permittees in a county may submit, in the 2017 Annual Report, an alternative (different from the population-based default described in C.11.c.ii(1)) and supporting information to derive Permittee-specific proportions of load reduction criteria.

C.11.d. Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

i. **Task Description** – Permittees shall prepare a plan and schedule for mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028. This plan may share many elements of a similar plan developed for PCBs according to Provision C.12.d.

ii. **Implementation level** – Permittees shall prepare a mercury control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028. The plan must:

(1) Identify all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented;

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

iii. **Reporting**

Permittees shall submit the plan and schedule in the 2020 Annual Report.

C.11.e. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

ii. **Implementation Level**

(1) At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement.

(2) In year four of the permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2020 Annual Report.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control program for PCBs. The Permittees shall implement PCBs control measures (source control, treatment control, and pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to the provisions below. The provisions implement the urban runoff requirements of the PCBs TMDL. Permittees shall reduce PCBs loads by a specified amount during the term of the Permit, thereby making substantial progress toward achieving the urban runoff PCBs wasteload allocation in the Basin Plan. The allocation, on an aggregate and regionwide basis, is 2 kg/yr (1.6 kg/yr allocated to Permittees) to be achieved by March 2030. This wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 18 kg/yr (14.4 kg/yr from Permittees) compared to loads estimated using data collected in 2003. The Permittees may comply with any requirement of this Provision through a collaborative effort.

C.12.a. Implement Control Measures to Achieve PCBs Load Reductions.

i. **Task Description** – Permittees shall implement PCBs source and treatment control measures and pollution prevention strategies to achieve PCBs load reductions in Table 12.1 throughout the area covered by this Permit (permit-area).

ii. **Implementation level** –To comply with this provision element, Permittees shall:

(1) Identify the watersheds or portions of watersheds (management areas) in which PCBs control measures are currently being implemented and those in which new control measures will be implemented during the term of this permit;

(2) Identify the control measures that are currently being implemented and those that will be implemented in each watershed and management area;

(3) Submit a schedule of control measure implementation; and

(4) Implement sufficient control measures to achieve the permit-area-wide reduction stated below or the county-specific load reduction performance criteria shown in Table 12.1. The Permittees shall demonstrate achievement of these load reductions as required in provision C.12.b. Load reductions from control measures implemented prior to the effective date of this Permit may be counted toward the required reductions of this Permit term if these control measures were established or implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term (e.g., they were implemented after the 2014 Integrated Monitoring Report was submitted).

For all Permittees combined, these county-specific average annual PCBs load reduction performance criteria shall total 0.5 kg/yr by June 30, 2018, and 3.0 kg/yr by June 30, 2020. The June 30, 2020, deadline shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. The Fact Sheet describes the amount of PCBs load reduction benefit associated with implementing a number of control measures.

The Permittees may meet the load reductions as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 12.1. If neither the permit-area-wide total load reduction criteria nor the county-specific load reduction criterion is achieved, Permittees shall achieve load reductions consistent with their share of the county total. The individual Permittee share of the county load reduction performance criteria is the proportion of county population in each municipality.

If all the Permittees in a county wish to use an alternative method of distributing the county load reductions, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2017 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

Table 12.1 PCBs Load Reductions Performance Criteria by County

County	PCBs load reduction (g/yr) by June 30, 2018	PCBs Load Reduction (g/yr) by June 30, 2020
Alameda Permittees	160	940
Contra Costa Permittees	90	560
San Mateo Permittees	60	370
Santa Clara Permittees	160	940
Solano Permittees: Suisun City, Vallejo, Fairfield	30	190
Totals	**500**	**3000**

iii. Reporting

(1) The Permittees shall report by April 1, 2016, progress toward developing a list of the watersheds and management areas where PCBs control measures are currently being implemented and those in which control measures will be implemented (C.12.a.ii(1)) during the term of this Permit as well as the monitoring data and other information used to select these watersheds and management areas. This list should include watersheds containing contaminated sites referred to the Water Board as well.

(2) The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit (C.12.a.ii(1)) along with the specific control measures (C.12.a.ii(2)) that are currently being implemented and those that will be implemented in these watersheds and management areas

and an implementation schedule (C.12.a.ii(3)) for these control measures. In addition to the list of watersheds and management areas, this report shall include:

a. The number, type, and locations and/or frequency (if applicable) of control measures;
b. A cumulative listing of all potentially PCB-contaminated sites Permittees have discovered and referred to the Water Board to date, with a brief summary description of each site and where to obtain further information;
c. The description, scope, and start date, of PCBs control measures;
d. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement; and
e. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.12.a.ii(2).

(3) Beginning with the 2017 Annual Report and continuing in all Annual Reports, Permittees shall update all the information required under C.12.a.iii(2) as necessary to account for new control measures implemented but not described in the 2016 Annual Report.

(4) All Permittees in a county may submit, in the 2017 Annual Report, an alternative (different from the default described in C.12.a.ii(4)) and supporting information to derive Permittee-specific proportions of load reduction criteria.

C.12.b. Assess PCBs Load Reductions from Stormwater

i. **Task Description** – The Permittees shall develop, document, and implement an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, including PCBs source control, stormwater treatment, green infrastructure and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations.

A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each unit of activity.

ii. **Implementation Level** – The Permittees shall adequately quantify the PCBs load reductions achieved through all the pollution prevention, source control, and

treatment control measures Permittees will implement in this Permit term, except for measures to manage PCB-containing materials and wastes during building demolitions (C.12.f).

For this Permit term, the Permittees will receive a total of 2000 g/yr (2 kg/yr) PCBs load reduction value if they have developed and implemented effective protocols for managing PCB-containing materials during demolition so that PCBs do not drain into the MS4 as required in provision C.12.f. The 2000 g/yr PCBs load reduction value shall be in furtherance of meeting the June 30, 2020, 3000 g/yr requirement in Table 12.1.

The Permittee-specific portion of the 2000 g/yr PCBs load reduction value shall be based on the proportion of county population in each municipality. If all the Permittees in a county wish to use an alternative method of distributing the county load reductions for managing PCB-containing materials during demolition, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2019 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

iii. Reporting

(1) In their 2016 Annual Report the Permittees shall submit for approval by the Executive Officer the assessment methodology and data collection program required in C.12.b.i. and described in C.12.b.ii.

(2) Beginning with the 2017 Annual Report, Permittees shall report annually the loads reduced using the default (from the Fact Sheet) or alternative approved assessment methodology to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates, including appropriate reference to the control measures described in the reporting required under C.12.a.

(3) In their 2018 and subsequent Annual Reports, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions in the subsequent Permit.

(4) All Permittees in a county may submit, in the 2019 Annual Report, an alternative (different from the default population-based method) and supporting information to derive Permittee-specific shares of load reduction value associated with implementation of C.12.f.

C.12.c. Plan and Implement Green Infrastructure to reduce PCBs loads

i. Task Description – Permittees shall implement green infrastructure projects during the term of the Permit to achieve PCBs load reduction performance criteria in Table

12.2 in furtherance of meeting the 3000 g/year load reduction criteria required in C.12.a.ii.(4) and Table 12.1. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, Permittees shall prepare a reasonable assurance analysis (see below and the Fact Sheet) to demonstrate quantitatively that PCBs load reductions of at least 3 kg/yr will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.

Table 12.2 PCBs Load Reduction Performance Criteria via Green Infrastructure Implementation by County

County Permittees	PCBs Load Reduction (g/yr) by June 30, 2020, through green infrastructure
Alameda Permittees	37
Contra Costa Permittees	23
San Mateo Permittees	15
Santa Clara Permittees	37
Solano Permittees: Suisun City, Vallejo, Fairfield	8
Totals	**120**

ii. Implementation Level

(1) The Permittees shall implement green infrastructure projects so that PCBs loads are collectively reduced by 120 g/yr by June 30, 2020, which shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. Permittees shall demonstrate achievement of these load reductions by using the accounting methods approved under provision C.12.b.iii(1). Load reductions from green infrastructure projects implemented prior to the effective date of this Permit may be counted toward the required green infrastructure reductions of this Permit term if these projects were established and implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term.

The Permittees may meet the load reduction as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 12.2. If neither the permit-area-wide total load reduction nor the county-specific load reduction is achieved, Permittees shall achieve load reductions consistent with their share of the county total under provision C.12.a.ii(4).

(2) Permittees shall prepare a reasonable assurance analysis that demonstrates how green infrastructure will be implemented in order to achieve a PCBs load reduction of 3 kg/yr across the permit-area by 2040. This analysis shall include the following:

a. Quantify the relationship between areal extent of green infrastructure implementation and PCBs load reductions, taking into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies;

b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040;

c. Estimate the amount of PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040;

d. Quantitatively demonstrate that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects; and

e. Ensure that the calculation methods, models, model inputs and modeling assumptions used to fulfill C.12.c.ii(2)a-d have been validated through a peer review process.

iii. Reporting

(1) The Permittees shall submit in their 2018 Annual Report, as part of reporting for C.12.b.iii(3), the quantitative relationship between green infrastructure implementation and PCBs load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship.

(2) The Permittees shall submit in their 2020 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

(3) The Permittees shall submit in their 2020 Annual Report a reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis.

(4) The Permittees shall submit as part of reporting for C.12.b.iii(4), beginning with their 2019 Annual Report an estimate of the amount of PCBs load reductions resulting from green infrastructure implementation during the term of the Permit. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

C.12.d. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. **Task Description** – Permittees shall prepare a plan and schedule for PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030.

ii. **Implementation level** – Permittees shall prepare a PCBs control measures implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan must:

(1) Identify all technically and economically feasible PCBs control measures to be implemented (including green infrastructure projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

iii. **Reporting**

Permittees shall submit the plan and schedule in the 2020 Annual Report.

C.12.e. Evaluate PCBs Presence in Caulks/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way

i. **Task Description** –Permittees shall collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era.

ii. **Implementation Level**

Permittees shall collect at least 20 composite samples (throughout the permit-area) of the caulks and sealants used in storm drains or roadway infrastructure in public rights-of-way and analyze this material for PCBs in such a way as to be able to detect a minimum PCBs concentration of 200 parts per billion. This sampling and analysis will count toward partial fulfillment of the monitoring effort aimed at finding PCBs sources (see management information need in C.8.f).

iii. **Reporting**

Permittees shall report on the results (including all data gathered) of this investigation no later than the 2018 Annual Report.

C.12.f. Manage PCB-Containing Materials and Wastes During Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains

i. **Task Description** – Permittees shall develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition so that PCBs do not enter MS4s. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, or stormwater runoff.

Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed or remodeled between the years 1950 and 1980 with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt.

A Permittee is exempt from this requirement if it provides evidence acceptable to the Executive Officer that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

ii. **Implementation Level**

(1) The Permittees shall develop a protocol by June 30, 2019, that includes each of the following components, at a minimum:

a. The necessary authority to ensure that PCBs do not enter MS4s from PCB-containing materials in applicable structures at the time such structures undergo demolition;

b. A method for identifying applicable structures prior to their demolition; and

c. Method(s) for ensuring PCBs are not discharged to the storm drain from demolition of applicable structures.

(2) By July 1, 2019, and thereafter, the Permittees shall implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to MS4s from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.

(3) By July 1, 2019, Permittees shall develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

iii. **Reporting**

(1) In their 2016, 2017, and 2018 Annual Reports, the Permittees shall summarize the steps they have taken to begin implementing this requirement, which could include working with State and local agencies on inter-agency coordination regarding building demolitions, developing ordinances or policies, obtaining information materials, updating or supplementing permit application materials, developing a tracking tool for potential PCB-containing structures, and training relevant staff as needed to comply with this sub-provision.

(2) Each Permittee seeking exemption from C.12.f requirements must submit in its 2017 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

(3) In their 2020 Annual Report, the Permittees shall provide documentation demonstrating implementation with each of the minimum requirements in C.12.f.ii(1)(a)-(c).

(4) In their 2020 Annual Report and thereafter, the Permittees shall provide documentation of each of the following items:

a. The number of applicable structures that applied for a demolition permit during the reporting year; and
b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

(5) In their 2020 Annual Report, Permittees shall submit an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition. This should be reported at the regional level on behalf of all Permittees.

C.12.g. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

i. **Task Description** – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas.

ii. **Implementation Level** – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2017 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2018 Annual Report. The Permittees shall report in the March 15, 2020, Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.12.h. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level**

(1) At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement.

(2) In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2020 Annual Report.

C.13. Copper Controls

The Permittees shall implement the following control program for copper. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of C.13 Provisions through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. **Task Description** – The Permittees shall prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of the surface of copper architectural features, including copper roofs.

ii. **Implementation Level**

(1) The Permittees shall require, when issuing building permits, use of appropriate BMPs for managing waste during and post-construction.

(2) The Permittees shall educate installers and operators on appropriate BMPs for managing copper-containing wastes.

(3) The Permittees shall enforce against noncompliance.

iii. **Reporting**

(1) In the 2016 Annual Report, the Permittees shall certify that legal authority currently exists to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of copper architectural features, including copper roofs.

(2) In the 2016 Annual Report, the Permittees shall report how copper architectural features are addressed through the issuance of building permits.

(3) The Permittees shall report annually permitting and enforcement activities.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. **Task Description** – Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. **Implementation Level** – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. Reporting

(1) In the 2016 Annual Report, the Permittees shall certify that legal authority currently exists to prohibit the discharges to storm drains of water containing copper-based chemicals from pools, spas, and fountains.

(2) In the 2016 Annual Report, the Permittees shall report how copper-containing discharges from pools, spas, and fountains are addressed to accomplish the prohibition of the discharge.

(3) The Permittees shall report annually on any enforcement activities.

C.13.c. Industrial Sources

i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. Implementation Level

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site.

iii. Reporting

The Permittees shall highlight copper reduction results in the industrial inspection component in the C.13 portion of each Annual Report.

C.14. City of Pacifica and San Mateo County Fecal Indicator Bacteria Controls

The City of Pacifica (City) and San Mateo County (County) Permittees shall implement Provision C.14 for fecal indicator bacteria. The City and County shall implement fecal indicator bacteria control measures in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to this provision. The goal of this provision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek (Creek) and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL) and reduce exceedances of the bacterial water quality objectives for the water contact recreation beneficial use during the term of the Permit, thereby making substantial progress toward achieving the TMDL wasteload allocations. The wasteload allocations and the dates they must be attained by are listed in Table 14.1 below. The City and County may comply with any requirement of this provision through a collaborative effort.

Table 14.1. Numeric Targets, TMDLs, and Allocations Based on Allowable Exceedances of Single-Sample Bacteria Objectives for San Pedro Creek and Pacifica State Beach

	San Pedro Creek		Pacifica State Beach		
	Dry Weather	Wet Weather	Summer Dry Weather (Apr. 1 to Oct. 31)	Winter Dry Weather (Nov. 1 to Mar. 31)	Wet Weather[4]
Allowable Exceedances of Single-Sample Objectives (assuming daily sampling is conducted) [1,2,]	4	26	0	2	30
Allowable Exceedances of Single-Sample Objectives (assuming weekly sampling is conducted) [3]	1	4	0	1	5
Attainment Date	August 1, 2028	August 1, 2028	August 1, 2021	August 1, 2021	August 1, 2021

1. Allowable exceedances are calculated by multiplying exceedance rates observed in the Reference System(s) by the Number of Days during each respective period in the reference year (1994).
2. To end up with whole numbers, where the fractional remainder for the calculated allowable exceedance days exceeds 0.1, the number of days is rounded up.
3. To determine the allowable number of exceedance events given a weekly sampling regime, as practiced for monitoring San Pedro Creek and Pacifica State Beach, the number of exceedance days was adjusted by solving for "X" in the following equation: X = (exceedance days x 52 weeks) / 365 days.
4. Wet weather is defined as any day with 0.1 inches of rain or more and the following three days.

C.14.a. Implement Control Measures to Achieve Indicator Bacteria Wasteload Allocations.

i. **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to meet the stormwater TMDL

wasteload allocations in the San Pedro Creek watershed and Pacifica State Beach Indicator Bacteria TMDL (TMDL Project Area).

ii. **Implementation Level** – In order to comply with this provision element:

(1) The County shall effectively prohibit potential illicit discharges into its storm sewer system from sanitary sewer overflows or the sanitary sewer lines within its jurisdiction.

(2) The County shall address bacteria discharges from the existing and future commercial horse and dog kennel facilities (facilities) into its storm sewer sytem within its jurisdiction as follows:

(a) Conduct annual site inspections of each facility for code compliance by June 30 of each year, beginning in 2016.

(b) Conduct an annual compliance review of each facility's current manure, stormwater, and drainage management plans by June 30 of each year, beginning in 2016.

(c) Enforcement actions for noncompliant facilities will be in line with the County's Confined Animal Ordinance.

(3) The City shall address bacteria discharges from the existing and future commercial horse facilities (facilities) within its jurisdiction as follows:

(a) Review each facility's compliance with the City's Administrative Policy on "Standards for Keeping Animals."

(b) Review each facility's compliance with the City's Municipal Code on "Animal Excreta."

(c) Conduct annual compliance review and inspection of each facility by June 30 of each year, beginning in 2016.

(d) Take progressive enforcement action(s), as needed, to bring noncompliant facilities into compliance with the City's Administrative Policy on "Standards for Keeping Animals" and Municipal Code on "Animal Excreta."

(4) The City shall install new dog waste clean-up signs, waste bag dispensers, and trash cans at a minimum of 10 (ten) high priority locations within the TMDL Project Area (each site to receive all three elements: sign, bag dispenser, and trash can, unless some of the elements are already in place) by June 30, 2016. The high priority sites for these installations shall be determined via visual inspections of popular dog walking areas and their potential to discharge improperly deposited dog waste to the Creek or Beach.

(5) The City shall develop and implement a visual inspection and cleanup plan for high dog waste accumulation areas along San Pedro Creek and its tributaries by June 30, 2016. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain

events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteorological Station), and at a frequency of no less than once a month.

(6) The City shall develop and implement an enhanced pet waste public outreach and education campaign by June 30, 2016, that, at a minimum, includes all the following:

(a) Explore the possibility of establishing a new public pet waste management stakeholder group (e.g., formal or informal dog owners club).

(b) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Creek and Beach to play on the local television station and to include in print ads in the Pacifica Tribune.

(c) Distribute a mailer with an informational brochure to residents and businesses describing proper pet waste management, the linkage of the watershed to the Creek and Beach, and the adverse impact on those water bodies and those recreating in them from improper pet waste management.

(d) Add a new web page to the City website with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Creek and Beach and public health.

(e) Create and implement a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Creek and Beach.

(f) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(7) The City and County, based on the results of the source characterization and BMP effectiveness, and wasteload allocation attainment analyses described in sections C.14.b-c, shall modify or refocus control measure implementation efforts as appropriate, at a frequency of no less than every two years.

iii. Reporting

(1) No later than March 15 of each year, the City and County shall submit a comprehensive TMDL Status and Monitoring Report, reporting on the specific control measures (as listed in section C.14.a.ii above) that have been implemented in the TMDL Project Area during the forgoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description, scope, and start date of pollution prevention measures; and

(c) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

(2) Beginning with the 2017 TMDL Status and Monitoring Report and continuing in all TMDL Status and Monitoring Reports, the City and County shall update all the information as necessary to account for new control measures implemented, but not described in the 2016 TMDL Status and Monitoring Report or revisions to control measures.

C.14.b. Conduct Water Quality Monitoring to Assess Attainment of Wasteload Allocations

i. **Task Description -** The purpose of the attainment monitoring is to determine whether or not the TMDL wasteload allocations are attained.

ii. **Implementation Level -** In order to comply with this provision element, the City and County shall conduct attainment water quality monitoring activities as follows:

(1) Sample Locations – Two stations shall be monitored to assess attainment of wasteload allocations for stormwater runoff and dry weather flows: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (Linda Mar #5).

(2) Sampling Frequency – The two attainment stations shall be monitored weekly on an ongoing basis for fecal indicator bacteria. The weekly sampling shall occur year-round regardless of weather conditions, provided the conditions are safe for field staff to collect the samples.

(3) Constituents –Fecal indicator bacteria species measured in freshwater samples collected from the Creek Mouth shall include E. coli and total coliform. Fecal indicator bacteria species measured in ocean water samples collected from Linda Mar #5 station shall include enterococci, fecal coliform, and total coliform.

iii. **Reporting**

(1) In their Annual TMDL Status and Monitoring Reports submitted on March 15 each year, the City and County shall analyze, summarize, and report the results of the ongoing attainment monitoring, as follows:

(a) The City and County shall complete a data evaluation, which shall focus on determining whether the TMDL wasteload allocations are being attained in San Pedro Creek and at Pacifica State Beach.

(b) The indicator bacteria results from the attainment monitoring stations (Creek Mouth and Linda Mar #5 stations) shall be compared to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL (Table 14.1).

(c) The data evaluation shall include tabulation and review of local rainfall data to determine whether the weekly attainment monitoring sampling events occurred during dry weather or wet weather.

(d) An ongoing quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives at the two attainment stations shall be conducted and reported annually.

(e) A detailed and comprehensive assessment of wasteload allocation attainment by the end of year 4 of the Permit term shall be completed. If wasteload allocations are not achieved by the end of the Permit term, no later than 180 days prior to Permit expiration, the City and County shall submit a plan in their Report Of Waste Discharge, acceptable to the Executive Officer, that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.

C.14.c. Conduct Water Quality Monitoring to Characterize Sources of Bacteria in The Project Area and to Assess BMP Effectiveness

i. **Task Description** – The purpose of characterization monitoring is to better characterize indicator bacteria contributions from specific sources and to evaluate control measure effectiveness. The characterization monitoring shall provide data to:

(1) Characterize indicator bacteria densities in subwatersheds, storm drain outfalls, and pump stations that have not been sampled in the past. Results of the investigation may be used to drive future control measure actions.

(2) Establish baseline (or current) conditions against which future monitoring results can be compared following new or ongoing control measure implementation.

Characterization monitoring shall be conducted every other year on a water year basis (i.e., October 1 through September 30) beginning with Water Year 2016 (WY2016) (i.e., October 1, 2015 – September 30, 2016). WY2016 characterization monitoring shall assess *E. coli* densities throughout the San Pedro Creek watershed, with a focus on the culverted branches of the North Fork. The City and County may elect to focus on other areas with potential or suspected bacteria sources during subsequent years. In WY2016, human-, horse-, and dog-specific genetic markers shall be analyzed for a subset of the samples to investigate whether these species contribute fecal contamination to the Creek. The characterization monitoring shall be iterative in nature and allow for flexibility of design and details in future years. Subsequent years of characterization monitoring, at a minimum, shall have the same level of effort as WY2016; however, in future years, based on the results of the WY2016 monitoring, alternative sampling stations may be targeted, sampling intensities may be modified, sampling frequencies may be adjusted, and/or the species-specific genetic marker sampling may be revised.

ii. **Implementation Level** – The City and County shall conduct characterization monitoring activities as follows:

(1) Sample Locations – in WY2016, a minimum of twelve sampling stations shall be monitored. The selected sampling stations for the WY2016 characterization monitoring are divided into three separate categories, as follows:

(a) Subwatersheds – Four subwatersheds shall be targeted in WY2016: the North Fork (three stations), Middle Fork (one station), Sanchez Fork (one station), and Main Stem (three stations);

(b) Pump stations – The Linda Mar and Anza pump stations shall be sampled during wet weather discharge events to the Beach (during dry weather, flows entering these stations are pumped to a wastewater treatment facility and do not discharge to the Creek or Beach);

(c) Stormwater outfalls – The Crespi Canal, which is an engineered and concrete-lined drainage ditch, shall be sampled if it has flowing water.

In addition to the above stations, the Creek mouth shall be also sampled during events when species-specific genetic marker samples are collected (see section C.14.c.ii.3).

In monitoring years subsequent to the WY2016 monitoring year, based on the results of the WY2016 monitoring, the sample locations and quantity may be modified. However, in each subsequent monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(2) Sampling Frequency – in WY2016, the characterization stations shall be sampled a minimum of ten times over the course of the water year, as follows:

(a) Characterization monitoring shall begin in WY2016 with the first sample collected in Winter 2016;

(b) Wet season – Five sampling events shall be conducted during each of the wet season months (November through March). To the extent possible, wet season sampling events shall occur during wet weather, which as defined in the TMDL is any day with 0.1 inch of rain or more and the following three days;

(c) Dry season – Five sampling events shall be conducted during the dry season on a monthly basis from May through September.

In subsequent monitoring years, based on the results of the WY2016 monitoring, the sampling frequency may be modified. However, in each subsequent monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(3) Constituents – All samples shall be analyzed for *E. coli*. In addition, during each monitoring year (i.e., WY2016, and every other water year thereafter), at a minimum, samples collected at four stations during four sampling events (two wet season, two dry season) shall be analyzed for

human-, horse-, and dog-specific genetic markers to assess whether the targeted host species contribute fecal contamination to the Creek and Beach.

(4) Monitoring Protocols and Data Quality – Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

(5) Future Revisions – Any and all changes to the characterization monitoring plan in subsequent years (e.g., WY2018, WY2020, etc.) shall be submitted to the Executive Officer for review and acceptance no later than 90 days prior to implementation.

iii. Reporting

(1) In their Annual TMDL Status and Monitoring Reports beginning with the 2016 report submitted on March 15, 2017, and every other year's report thereafter, the City and County shall submit a comprehensive Characterization Monitoring Report reporting on all data collected during the preceding October 1 through September monitoring period.

(2) Data evaluation shall focus on addressing the following questions:

(a) Which land uses and/or sources contribute most to bacteria impairments in San Pedro Creek watershed?

(b) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed?

(c) What are the multi-year indicator bacteria density trends in the Creek and at the Beach (i.e., do control measures appear to be reducing bacteria)?

(3) As appropriate, the Report shall include the following:

(a) Immediately following the Table of Contents, a Data Tables section that includes all the data collected pursuant to Provision C.14.d. and contains the following information pertaining to the foregoing monitoring period:

(i) A map showing all monitoring locations;

(ii) Immediately following the map, a single completed Locations and Parameters Table containing the following columns or rows for each location sampled: numeric site identifier, a short-hand site name such as "Creek Mouth," latitude, longitude, and parameters assessed;

(iii) Immediately following the Locations and Parameters Table, a single completed Results Table containing the following columns or rows for each location sampled: the short-hand site name and

datum/result for each constituent analyzed. Constituents that exceed applicable water quality objectives shall be highlighted.

(b) For all data, a statement of the data quality.

(c) An analysis of the data, which includes the following:

(i) Basic descriptive statistics using indicator bacteria data;

(ii) Identification and evaluation of any controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed;

(iii) Identification and analysis of any trends in stormwater or receiving water quality; and

(iv) Consideration of variability in the data sets.

(d) A discussion of the data, which shall:

(i) Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin or the Ocean plans;

(ii) Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

(iii) Identify and prioritize water quality problems;

(iv) Identify potential sources of water quality problems;

(v) Describe followup actions;

(vi) Evaluate the effectiveness of existing control measures; and

(vii) Identify management actions needed to address water quality problems.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. **Discharge Type** – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers (excludes well development); and

(8) NPDES permitted discharges (individual or general permits).

ii. **Implementation Level** – The non-stormwater discharges listed in Provision C.15.a.i above are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-vi below.

i. **Discharge Type** – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non-Drinking Water Aquifers**

Groundwater pumped from a monitoring well, used for groundwater basin management, which is owned and/or operated by a Permittee is allowed if the following requirements are met:

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards consistent with the existing effluent limitations or pollutant triggers in the Water Board's NPDES Groundwater General Permit, NPDES No. CAG912002.

(ii) The water samples shall be analyzed using approved U.S. EPA methods: (a) U.S. EPA Method 8015 Modified for total petroleum hydrocarbons; (b) U.S. EPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (c) approved U.S. EPA methods to meet the triggers for the metals listed in the general permit discussed in C.15.(b)i.(1)(a)(i) above.

(iii) The water samples shall be analyzed for pH and turbidity.

If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs and Monitoring** – When greater than 2,500 gallons per day of uncontaminated (meeting the criteria in C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of banks, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flowrate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of the discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(vii) The pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(c) If the Permittee is unable to comply with the criteria in Provision C.15.b.i.(1)(b)(i)-(vii), discharge shall cease immediately and the Permittee shall employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES Groundwater General Permits.

(d) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[41] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements. Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(b) If the groundwater cannot be discharged to a landscaped area or bioretention unit and the discharge is greater than 2,500 gallons per day, it can only be considered for discharge once the following sampling is done to verify that the discharge is uncontaminated:

(i) The discharge shall meet WQS consistent with the existing effluent limitations or pollutant triggers in theWater Board's NPDES Groundwater General Permit, NPDES No. CAG912002.

[41] Pumped groundwater not exempted in C.15.a or conditionally exempted in C.15.b.i.(1).

(ii) The Permittees shall require that water samples from these discharge types be analyzed using the following approved U.S. EPA methods:

- U.S. EPA Method 8015 Modified for total petroleum hydrocarbons, and U.S. EPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds.
- The approved U.S. EPA Methods for the metals listed below that meet the corresponding Reporting Limits:

Metal	Reporting Limit
Antimony	6 µg/l
Arsenic	10 µg/l
Beryllium	4 µg/l
Cadmium	1.1 µg/l
Chromium VI	11 µg/l
Copper[42]	5.9 µg/l
Copper[43]	3.4 µg/l
Copper[44]	4.7 µg/l
Lead	3.2 µg/l
Mercury	0.025 µg/l
Nickel	19 µg/l
Selenium	5 µg/l
Silver	2.2 µg/l
Thallium	1.7 µg/l
Zinc	86 µg/l
Cyanide	2.9 µg/l

(c) **Monitoring and Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in C.15.b.i.(2)(b) above, the Permittees shall require the following:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream or if accessing the sampling points poses safety to personnel.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of bank, nuisance, contamination, and excess sedimentation in the receiving waters.

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[42] Applicable to Suisun Bay and San Pablo Bay segments of San Francisco Bay.

[43] Applicable to Central Bay and Lower Bay segments of San Francisco Bay.

[44] Applicable to South San Francisco Bay segments of San Francisco Bay.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(vii) The pH of discharged water shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(d) If a Permittee determines that a discharger or a project proponent is unable to comply with the criteria in C.15.b.i.(2)(c)(i)-(vii), the Permittee shall require the discharge to cease immediately and require that the discharger employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES Groundwater General Permit.

(e) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be reused or directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Type – Emergency Discharges of Potable Water

(1) **Emergency Discharges** –Discharges resulting from firefighting activities.

(2) Required BMPs

(a) The Permittees shall implement or require firefighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located.

(b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). The

Permittees or firefighting personnel shall control the pollution threat from their activities to the extent that time and resources allow.

(3) **Reporting Requirements** – Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

Required BMPs

(1) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their storm drain systems.

(2) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, or wash cars at commercial car wash facilities.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) **Required BMPs**

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[45] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

[45] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa, and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and

(e) Implementing the Illicit Discharge Enforcement Response Plan from C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their storm drain systems.

(2) **Reporting** – The Permittees shall provide implementation summaries in their Annual Report.

C.16. Discharges to Areas of Special Biological Significance

This Provision applies to stormwater discharges from the County of San Mateo into James V. Fitzgerald Marine Reserve Area of Special Biological Significance (ASBS). As set forth in the Fact Sheet, the State Water Board granted an exception to the ASBS discharge prohibition (ASBS Exception) in the Ocean Plan to applicants including the County of San Mateo for their existing stormwater discharges into ASBSs, provided they receive authorization to discharge by an NPDES permit; the discharges comply with all applicable terms, prohibitions, and special conditions of Attachment B - Special Protections (Special Protections) attached to and part of the ASBS Exception; and the discharges are essential for flood control or slope stability, designed to prevent soil erosion, occur only during wet weather, and are composed of only stormwater runoff. This Provision serves as the authorization for the County of San Mateo to discharge stormwater into the ASBS in accordance with the requirements below.

C.16.a. Discharges to the James V. Fitzgerald Marine Reserve ASBS

i. If the County of San Mateo meets all of the conditions set forth in Provision C.16.a.i. and C.16.a.ii., its stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS from MS4 outfalls that were constructed or were under construction prior to January 1, 2005, are permitted for those discharges that:

(1) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

(2) Are designed to prevent soil erosion;

(3) Occur only during wet weather; and

(4) Are composed only of stormwater runoff.

ii. The County of San Mateo shall comply with all of the applicable terms, prohibitions, and special conditions of the Special Protections of the ASBS Exception set forth in State Water Board Resolution No. 2012-0012, as amended by State Water Board Resolution No. 2012-0031, including monitoring requirements, as they apply to stormwater. The Special Protections are hereby incorporated by reference into this Order and attached hereto as Attachment F. Notwithstanding anything to the contrary in this Order, the County of San Mateo shall not alter the natural ocean quality of the ASBS; shall not discharge trash into the ASBS; and shall not discharge non-stormwater into the ASBS except as provided in the Special Protections. As required by the Special Protections, the County of San Mateo shall address the preceding requirements (other than trash) in an ASBS Compliance Plan to be approved by the State Water Board Executive Director or the Regional Water Board Executive Officer and comply with the compliance schedule set forth in the Special Protections.

iii. Reporting – In addition to the monitoring requirements of the Special Restrictions, the County of San Mateo shall submit, upon approval by the State Water Board Executive Director, a copy of its approved ASBS Compliance Plan.

C.16.5. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Inclusion into NPDES Permit No. CAS612008

The cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District (East County Permittees), located in the Central Valley Water Board's geographic jurisdiction, are included in the definition of "Permittees" as used throughout and shall comply with all requirements of Order No. R2-2015-0049, except as provided for in this Provision. This Provision identifies those Order provisions that do not apply to the East County Permittees, and allows the East County Permittees additional time to come into compliance with the specific provisions listed below. Additionally, it incorporates requirements for the Central Valley Board's TMDLs that apply to the East County Permittees.

C.16.5.a. Green Infrastructure Planning and Implementation

i. **Implementation Level** – Each East County Permittee shall comply with Provision C.3.j. immediately, except for the deadlines listed below.

ii. **Due Dates**

The cities of Antioch, Brentwood, and Oakley shall:

(1) By November 30, 2019, have their Green Infrastructure framework or workplan for development of their Green Infrastructure Plan approved by their governing bodies, mayor, or city managers (as required by Order Provision C.3.j.i.(1));

(2) By December 31, 2019, submit documentation that their Green Infrastructure frameworks or workplans for development of their Green Infrastructure Plans were approved by their governing bodies, mayors, or city managers (as required by Order Provision C.3.j.i.(1)) by November 30, 2019;

(3) By December 31, 2020, submit their completed Green Infrastructure Plan (as described in Order Provision C.3.j.i.(2)); and,

(4) By December 31, 2020, submit documentation of their legal mechanisms to ensure implementation of its Green Infrastructure Plan.

C.16.5.b. Inspections for Construction Site Control at Hillside Projects

i. **Implementation Level** – Each East County Permittee shall comply with Provision C.6.e. immediately, except for the deadline for C.6.e.ii.(2)(b).

ii. **Due Dates**

(1) Beginning July 1, 2020, each East County Permittee shall inspect all hillside projects (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with >15% slope)

disturbing greater than or equal to 5,000 square feet monthly, during the wet season.

(2) In the 2020 Annual Report, each East County Permittee shall certify the criteria it uses to determine hillside developments. If the Permittee is using maps of hillside development areas or other written criteria, include a copy in the Annual Report.

C.16.5.c. Trash Load Reductions

i. Implementation Level – Each East County Permittee shall comply with Provision C.10. immediately, except for the following requirements and deadlines in Provisions C.10.a.i, C.10.a.ii, and C.10.f.v.b, which are modified as follows.

ii. Due Dates and Reporting

(1) C.10.a.i.

By December 31, 2019, each East County Permittee shall reduce trash discharges to receiving waters by 70 percent, from baseline trash loads as depicted in the Permittee's baseline trash generation rate maps submitted in its 2016 Annual Report, or 2019 Annual Report, if the Permittee submitted a corrected baseline trash generation rate map.

(2) C.10.a.ii.

The East County Permittees shall have an opportunity to correct and/or revise, based on improved information, the trash levels and trash generation areas maps that were submitted to Central Valley Regional Water Board in the 2016 Annual Report. Should an East County Permittee correct and/or revise its trash generation map(s) submitted in the 2016 Annual Report, the corrected or revised trash generation map(s) shall be submitted in the 2019 Annual Report.

(3) C.10.a.ii.a.

The C.10.a.i. percent reductions shall be demonstrated by percent of 2016 or 2019, if a revised baseline map was submitted, of Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation.

(4) C.10.a.ii.b.

The East County Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of the latter shall be assessed with visual assessments in accordance with C.10.b.ii. If there is a full trash capture device downstream of these lands, no other trash control is required. The East County Permittees shall (i) map the location or otherwise record the location, and (ii) provide the

trash control status of all such lands greater than 10,000 ft^2 that are plumbed directly to their storm drain systems by December 31, 2020. This information shall be retained by the East County Permittees for inspection upon request.

(5) C.10.f.v.b.

If an East County Permittee cannot demonstrate attainment of the 2019 mandatory trash load reduction by the deadline, it shall submit a report of non-compliance in advance of the deadline or with the submittal that describes actions to comply with the mandatory reduction in a timely manner. The report shall include a plan and schedule for implementation of full trash capture systems installation sufficient to attain the required reduction. An East County Permittee may submit a plan and schedule for implementation of other trash management actions to attain the required reduction in an area where implementation of a full trash capture system is not feasible. In such cases, the report shall include identification of the area and documentation for the basis of the East County Permittee's determination that implementation of a full trash capture system is not feasible.

C.16.5.d. Mercury Controls

East County Permittees are exempted from Provision C.11, Mercury Controls.

C.16.5.e. Polychlorinated Biphenyls (PCBs) Controls

East County Permittees are exempted from Provision C.12, PCBs Controls.

C.16.5.f. Diazinon and Chlorpyrifos Controls

Task Description – The East County Permittees shall maintain wasteload allocations for diazinon and chlorpyrifos.

Implementation Level – The East County Permittees shall implement Provision C.9.

C.16.5.g. Methylmercury Monitoring

Task Description – The East County Permittees shall implement methylmercury monitoring. With the Executive Officer's approval, the East County Permittees may participate in the Delta Regional Monitoring Program (Delta RMP) or other collective monitoring efforts in lieu of some or all of the individual monitoring requirements required by this Provision. Participation in the Delta RMP shall consist of providing funds and/or in-kind services to the Delta RMP at least equivalent to discontinued monitoring efforts.

Implementation Level – The East County Permittees shall:

(1) Conduct monitoring in Marsh Creek, downstream of Marsh Creek Reservoir, to analyze aqueous methylmercury in at least eight (8) samples each year using U.S. EPA or SWAMP-approved methods.

(2) Direct monitoring to address the following management questions:
- What is the annual average methylmercury load from the Marsh Creek watershed?
- How much of the Marsh Creek methylmercury load results from discharges from the MS4?
- What is the methylmercury load reduction from the MS4 by implementation of reasonable, foreseeable control measures to the maximum extent practicable?
- Do eutrophication and low dissolved oxygen increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March through mid-November), and if so:
  - Under what circumstances do those effects reach the Delta?
  - Are there reasonable and foreseeable management actions to ameliorate that condition?

iii. Reporting

(1) Urban Creeks Monitoring Report (UCMR) – The East County Permittees shall report monitoring and assessment results relevant to the Delta Mercury Control Program (Delta Methylmercury TMDL) as a separate section within the UCMR required under Provision C.8.h.iii. A copy of each UCMR shall also be submitted to the Central Valley Water Board.

(2) Pollutants of Concern Monitoring Report – The East County Permittees shall report monitoring and assessment activities relevant to the Delta Methylmercury TMDL from the past water year and planned for the next water year as a separate section within the Pollutants of Concern Monitoring Report required under Provision C.8.h.iv. A copy of each Pollutants of Concern Monitoring Report shall also be submitted to the Central Valley Water Board.

(3) Integrated Monitoring Report – The East County Permittees shall report the monitoring and assessment results as a separate section within the Integrated Monitoring Report as required under Provision C.8.h.v. A copy of each Integrated Monitoring Report shall also be submitted to the Central Valley Water Board.

(4) The East County Permittees shall report progress on the Delta Methylmercury TMDL and recommendations for the next permit re-issuance as a separate section within the Report of Waste Discharge (ROWD) required by Provision C.20. A copy of the ROWD shall also be submitted to the Central Valley Water Board.

C.16.5.h. Delta Mercury Control Program

The WLAs for methylmercury by Delta subarea are as follows:

- Central Delta subarea: 0.75 grams/year

- Marsh Creek subarea: 0.30 grams/year
- West Delta subarea: 3.2 grams/year

Methylmercury waste load allocations shall be met as soon as possible, but no later than the Final Compliance Date of December 31, 2030, unless the Central Valley Regional Water Board modifies the Delta Methylmercury TMDL implementation schedule and Final Compliance Date.

At a minimum, the East County Permittees shall implement the following BMPs to reduce inorganic mercury discharges and make substantial progress toward achieving the urban runoff methylmercury load allocation established for the Delta Methylmercury TMDL.

(1) **Mercury Collection and Recycling**

i. **Task Description** – This Provision requires ongoing implementation of mercury collection and recycling to minimize mercury in storm water.

ii. **Implementation Level** – The East County Permittees shall continue implementing:

(a) Collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs); and

(b) Collection, recycling and/or diversion of mercury-containing waste products (e.g., gauges, batteries, fluorescent and other lamps, switches, relays and sensors) from the waste stream from industrial and commercial entities (e.g., auto dismantlers), and municipal facilities.

iii. **Reporting** – The East County Permittees shall report on these efforts in their Annual Report.

(2) **Enhanced Municipal Management Practices to Reduce Sediment Discharges**

i. **Task Description** – This Provision requires the ongoing implementation of BMPs to minimize sediment discharges from municipal operations and municipal maintenance activities.

ii. **Implementation Level** – The East County Permittees shall continue to implement BMPs to minimize sediment discharges during municipal operations and municipal maintenance activities. Municipal operations and municipal maintenance activities include but are not limited to the following: storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning.

iii. **Reporting** – In each Annual Report, the East County Permittees shall list the municipal operations and municipal maintenance activities that BMPs are implemented for to minimize sediment discharges from.

(3) **Public Education and Risk Reduction**

i. **Task Description** – This Provision requires the East County Permittees to conduct ongoing education to the public on mercury pollution prevention and mercury risk reduction.

ii. **Implementation Level** – The East County Permittees shall continue to:

(a) Provide mercury pollution prevention messages to residents, commercial businesses, and industrial facilities with mercury-containing products or emissions. This may be implemented as part of Provision C.7; and

(b) Provide notices to communities on the health risk associated with eating mercury-contaminated fish. These notices shall also include the Office of Environmental Health Hazard Assessment's fish consumption advisories.

iii. **Reporting** – The East County Permittees shall:

(a) Discuss the mercury pollution prevention messages provided under Provision C.7; and

(b) Summarize tasks implemented to provide notices on the health risk associated with eating mercury-contaminated fish.

C.17. Annual Reports

C.17.a. The Permittees shall submit Annual Reports electronically in all cases by September 30 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.16.5. A paper copy of each Annual Report shall be submitted by October 15 of each year. The East County Permittees shall also submit an electronic copy of each Annual Report to the Central Valley Water Board. The Permittees shall retain documentation as necessary to support their Annual Reports. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.

C.17.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2016. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.16.5, with the agreement of the Permittees and by the approval of the Executive Officer.

C.17.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit, in the cover letter of the Annual Report, the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.18. Modifications to this Order

This Order may be modified, or alternatively, revoked or reissued, before the expiration date as follows:

C.18.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.18.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Water Board or amendments to the Basin Plan approved by the State Water Board;

C.18.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order. The Order as modified or reissued under this paragraph shall also contain any other requirements of the CWA then applicable; or

C.18.d. To approve and incorporate an alternative method or methods of distributing the county load reductions for mercury or PCBs on a Permittee-specific basis, as allowed by Provisions C.11 and C.12.

C.19. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment G of this Order.

C.20. Expiration Date

This Order expires on December 31, 2020, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.21. Rescission of Old Order

Order No. R2-2009-0074 is hereby rescinded on the effective date of this Order, which shall be January 1, 2016, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

C.22. Effective Date

The Effective Date of this Order and Permit shall be January 1, 2016, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 19, 2015.

Bruce H. Wolfe
Executive Officer

Attachment A: Municipal Regional Stormwater Permit Fact Sheet
Attachment B: Provision C.3.b. Sample Reporting Table
Attachment C: Provision C.3.g. Hydromodification Applicability Maps
Attachment D: Provision C.8. Standard Monitoring Provisions
Attachment E: Provision C.10. Supporting Information
Attachment F: Provision C.16. ASBS Special Protection Zone
Attachment G: Standard NPDES Stormwater Permit Provisions

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CSCI	California Stream Condition Index
CWA	Federal Clean Water Act
CWC or Water Code	California Water Code
DCIA	Directly Connected Impervious Area
DPR	California Department of Pesticide Regulation
ERP	Enforcement Response Plan
FR	Federal Register
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable

MRP	Municipal Stormwater Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
NAFSMA	National Association of Flood & Stormwater Management Agencies
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
O&M	Operation and Maintenance
PAHs	Polynuclear Aromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ether
PCA	Pest Control Advisor
PCBs	Polychlorinated Biphenyls
PHAB	Physical Habitat (e.g., of streams)
POTW	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan
RAA	Reasonable Assurance Analysis
RCRA	Federal Resource Conservation and Recovery Act
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Federal Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SIC	Standard Industrial Classification
SMWPPP	San Mateo Countywide Water Pollution Prevention Program
SSID	Stressor Source Identification
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan

State Water Board	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Federal Toxic Substances Control Act
TST	Test of Significant Toxicity
TU	Toxicity Units
UCMR	Urban Creeks Monitoring Report
U.S. EPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations
WQS	Water Quality Standards

GLOSSARY

Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the State protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.
Construction Site	Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, paving, disturbances to ground such as stockpiling, and excavation. Construction sites are all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this Permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of WQS because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff~~,~~ or a non-stormwater discharge~~.~~
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size~~.~~
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.

Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Floor Area Ratio	The ratio of the total floor area on all floors of all buildings at a project site (except structures or floors dedicated to parking) to the total project site area.
Full Trash Capture Device	Full trash capture systems are defined as "any device or series of devices that traps all particles retained by a 5mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area." Trash collection booms and sea curtains do not meet this definition, but are effective for removal of floating trash if properly maintained. Because these devices do not meet the Full Trash Capture Device definition, only ¼ of the catchment area treated by these measures is credited toward meeting the trash management area requirement of C.10.a.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Green Infrastructure	Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.
Gross Density	The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.

Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, State, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Executive Officer.
Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes french drains).
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other.
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.

Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. CWA 402(p)(3)(B)(iii) requires that municipal stormwater permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the state determines appropriate for the control of such pollutants." Also see State Water Board Order WQ 2000-11.
Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law...including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in 40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; and/or (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.

Pervious Pavement	Pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and PAHs; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste); and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.
Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by the San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).

Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMPs	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Standard Industrial Classification (SIC)	A federal system for classifying establishments by the type of activity in which they are engaged using a four-digit code.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain WQS. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet WQS even after application of technology-based controls, more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.
Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the State, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and U.S. EPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the WQS that must be met to protect designated uses. Water quality standards also include the federal and State anti-degradation policy.
Wet Season	October 1 through April 30 of each year

ATTACHMENT A

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2015-0049

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program

The City of Vallejo and the Vallejo Sanitation and Flood Control District

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I. CONTACT INFORMATION

Water Board Staff Contact: Dale Bowyer, 1515 Clay Street, Suite 1400, Oakland, CA 94612, 510-622-2323, 510-622-2501 (fax), email: dbowyer@waterboards.ca.gov

The Permit and other related documents can be downloaded from the Water Board website at:

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/mrp_sw_reissuance.shtml

Comments can be electronically submitted to mrp.reissuance@waterboards.ca.gov.

All documents referenced in this Fact Sheet and in the Order are available for public review at the Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 9:00 am to 4:00 pm, Monday through Friday, 12 - 1 pm excluded. To schedule an appointment to inspect public records, contact Melinda Wong at 510-622-2430.

II. PERMIT GOALS AND PUBLIC PROCESS

Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) include:

1. Continue regulating six Phase I municipal stormwater NPDES permits in one consistent permit that is regional in scope.
2. Include more specificity in NPDES permit requirements than the pre-2009 permits which lacked concrete requirements and thus did not result in the desired improvement of water quality. Continue requiring (A) stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.
3. Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.
4. Implement and enhance actions to control 303(d) listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.
5. Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d) listed pollutants.

Public Process

Water Board staff conducted stakeholder meetings with the Permittees and other interested parties to develop this Permit. These meetings included Water Board staff, representatives of the Permittees, and representatives of environmental groups.

Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in section 402(p) of the CWA. In addition, this Permit contains water quality-based effluent limitations to implement TMDLs. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is deemed compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and C.18 to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

Early Permitting Approach

The federal Clean Water Act (CWA) was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations that would implement the amendment), the Water Board issued municipal stormwater Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, pool

resources and expertise, and share information, public outreach and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics that were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the Plans for implementation details. Often specific aspects of permit and Plan implementation evolved during the five year permit cycle, with relatively significant changes approved at the Water Board staff level without significant public review and comment.

Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

U.S. Environmental Protection Agency (U.S. EPA) stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided maximum flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the permits, due to the lack of specific requirements and measurable outcomes of some required actions in the plans.

Moreover, these stormwater management plans and amendments thereto made by the Permittees were not subject to public input, contrary to the U.S. Ninth Circuit Court's decision in the Phase II stormwater context that public participation is required for a stormwater management plan, because the substantive information about how an operator will reduce pollutants to the maximum extent possible was found in the stormwater management plan rather than the permit itself. (*Environmental Defense Center v. EPA* (9th Cir. 2003) 344 F.3d 832, 857.)

This Permit continues to modify these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the Permit Development Process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the federal Clean Water Act and the California Water Code. An advantage for Permittees and the public of this approach is that the permit requirements are known at the time of permit issuance and not left to be determined later through an iterative review and approval of stormwater management plan process, during which time was spent more on getting an acceptable plan than on-the-ground actions. While it may still be necessary to amend the Permit prior to expiration where allowed, any need to do this should be minimized.

This Permit does not include approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require

significantly increased staff resources. Instead, minimum measures have been established to simplify assessment of compliance and allow the public to more easily assess each Permittee's compliance. Each Permit provision and its reporting requirements are written with this in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each individual Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to provide the flexibility described above considering the different sizes and resources of the numerous Permittees, while ensuring that the Permit is still enforceable. To achieve this, the Permit frequently prescribes minimum measurable outcomes, while providing Permittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. A balance between flexibility and enforceability has been crafted into the Permit.

Current Permit Approach

As stated above, because stormwater management plans were legally an integral part of the permits and were subject to complete public notice, review and comment, this permit reissuance continues to incorporate those plan level details in the Permit, thus merging the Permittees' stormwater management plans into the Permit in one document. This Permit specifies the following: 1) requirements to effectively prohibit non-stormwater discharges into the storm drain system, pursuant to CWA § 402(p)(3)(B)(ii); 2) technology-based effluent limitations that require controls to reduce the discharge of pollutants to the "maximum extent practicable" (MEP)[1] pursuant to CWA § 402(p)(3)(B)(iii); and 3) water quality-based effluent limitations (WQBELs) pursuant to CWA § 402(p)(3)(B)(iii), which authorizes the inclusion of "such other provisions as the Administrator or the State determines appropriate for the control of [] pollutants," for pesticides, trash, mercury, PCBs, and bacteria, in addition to technology-based effluent limitations. WQBELs for these pollutants are appropriate for control because water quality standards are not being met and these pollutants have impaired Bay Area waters. The Permit includes requirements for the following components:

- Discharge Prohibitions and Receiving Water Limitations

[1] The Clean Water Act and its regulations have not specifically defined "MEP"; rather, it is a flexible and evolving standard. Congress established this flexible MEP standard so that administrative bodies would have "the tools to meet the fundamental goals of the Clean Water Act in the context of storm water pollution."(*Building Industry Ass'n of San Diego County v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866, 884.) This standard was designed to allow permit writers flexibility to tailor permits to the site-specific nature of MS4s and to use a combination of pollution controls that may be different in different permits. (*In re City of Irving, Texas, Municipal Storm Sewer System* (July 16, 2001) 10 E.A.D. 111 (E.P.A.).) The MEP standard is also expected to evolve in light of programmatic improvements, new source control initiatives, and technological advances that serve to improve the overall effectiveness of storm water management programs in reducing pollutant loading to receiving waters. This is consistent with USEPA's interpretation of storm water management programs. As explained by USEPA in its 1990 rulemaking, "EPA anticipates that storm water management programs will evolve and mature over time" (55 Fed.Reg. 47990, 48052 (Nov. 16, 1990)).

- Municipal Operations
- New Development and Redevelopment
- Industrial and Commercial Site Controls
- Illicit Discharge and Elimination
- Construction Site Controls
- Public Information and Outreach
- Water Quality Monitoring
- Pesticides Toxicity Controls
- Trash Reduction
- Mercury Controls
- PCBs Controls
- Copper Controls
- Pacifica and San Mateo County Beach and San Pedro Creek Bacteria Controls for Beach and San Pedro Creek
- Exempt and Conditionally Exempt Discharges
- San Mateo County Discharges to ASBS

IV. ECONOMIC ISSUES

California Water Code (CWC) section 13241 requires the Water Board to consider certain factors, including economic considerations, in the adoption of water quality objectives. CWC section 13263 requires the Water Board to take into consideration the provisions of CWC section 13241 in adopting waste discharge requirements.

In *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, the California Supreme Court considered whether regional water boards must comply with CWC section 13241 when issuing waste discharge requirements under CWC section 13263(a) by taking into account the costs a permittee will incur in complying with the permit requirements. The Court concluded that whether it is necessary to consider such cost information "depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act." (*Id.* at p. 627.) The Court ruled that regional water boards may not consider the factors in CWC section 13241, including economics, to justify imposing pollutant restrictions that are less stringent than applicable federal law requires. (*Id.* at pp. 618, 626-627 ["[Water Code section 13377 specifies that [ ] discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act...Because CWC section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a [ ] discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards."]). However, when pollutant restrictions in an NPDES permit are more stringent than federal law requires, CWC section 13263 requires that the regional water boards consider the factors described in CWC section 13241 as they apply to those specific restrictions.

As discussed in Section V.C., State Mandates, the Water Board finds that the requirements in this Order are not more stringent than the minimum federal requirements. Among other requirements, federal law requires MS4 permits to include requirements to effectively prohibit non-storm water discharges into the MS4s, in addition to requiring controls to reduce the discharge of pollutants in stormwater to the MEP, and other provisions as USEPA or the State determines are appropriate for the control of pollutants in MS4 discharges.

The requirements in this Order may be more specific or detailed than those enumerated in federal regulations under 40 CFR 122.26 and guidance; however, the requirements have been designed to be consistent with and within the federal statutory mandates described in CWA section 402(p)(3)(B)(ii) and (iii) and the related federal regulations and guidance. Consistent with federal law, all of the conditions in this Order could have been included in a permit adopted by USEPA in the absence of the in lieu authority of California to issue NPDES permits.

Moreover, the inclusion of numeric WQBELs in this Order does not cause this Order to be more stringent than federal law. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The inclusion of WQBELs as discharge specifications in an NPDES permit in order to achieve compliance with water quality standards is not a more stringent requirement than the inclusion of BMP-based permit limitations to achieve water quality standards (State Water Board Order No. WQ 2006-0012 (Boeing)). Therefore, consideration of the factors set forth in CWC section 13241 is not required for permit requirements to implement the effective prohibition on the discharge of non-stormwater discharges into the MS4 or for controls to reduce the discharge of pollutants in stormwater to the MEP, or other provisions that the Water Board has determined appropriate to control such pollutants, as those requirements are mandated by federal law.

While the Water Board need not consider costs under CWC section 13241, the Water Board nevertheless has considered cost information, especially since it is a consideration in the implementation of technology controls to the MEP.

In 2000, the State Water Board issued a precedential order (Order WQ 2000-11 (Cities of Bellflower, et al.)) stating that cost of compliance with the programs and requirements of a municipal stormwater permit is a relevant factor in determining MEP. The Order also explicitly stated that a cost benefit analysis is not required. The State Water Board discussed costs as follows:

> While the standard of MEP is not defined in the storm water regulations or the Clean Water Act, the term has been defined in other federal rules. . . . .
>
> These definitions focus mostly on technical feasibility, but cost is also a relevant factor. There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective

> BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis.

(State Water Board Order WQ 2000-11, supra, p.20.) The cost of complying with TMDL waste load allocations is not required to be considered since TMDLs are not subject to the MEP standard. Federal law requires that NPDES permits contain effluent limitations consistent with the assumptions of any applicable wasteload allocation in a TMDL. (40 C.F.R. §122.44(d)(1)(vii)(B).) With that background, we turn to economic considerations.

Economic discussions of urban runoff management programs tend to focus on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, when considering the cost of implementing the urban runoff programs, it is also important to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits that result from program implementation.

It is very difficult to ascertain the true cost of implementation of the Permittees' urban runoff management programs because of inconsistencies in reporting by the Permittees. Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin that is not easily explained.[2] Despite these problems, efforts have been made to identify urban runoff management program costs, which can be helpful in understanding the costs of program implementation.

In 1999, U.S. EPA reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. U.S. EPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 per household annually.[3]

A study on program cost was also conducted by the Los Angeles Regional Water Quality Control Board (LARWQCB), where program costs reported in the municipalities' annual reports were assessed. The LARWQCB estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.

The State Water Board also commissioned a study by the California State University, Sacramento, to assess costs of the Phase I MS4 program. This study is current and includes an assessment of costs incurred by the City of Encinitas in implementing its program. Annual cost per household in the study ranged from $18-46, with the City of Encinitas representing the upper end of the range.[4] The cost of the City of Encinitas' program is understandable, given the City's coastal location, reliance on tourism, and consent decree with environmental groups regarding its program. For these reasons, as well as the general recognition the City of Encinitas receives for implementing a superior program, the City's program cost can be considered as the high end of the spectrum for Permittee urban runoff management program costs.

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[2] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003.p.2

[3] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.

[4] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38% of program costs are new costs fully attributable to MS4 permits. The remainder of program costs were either pre-existing or resulted from enhancement of pre-exiting programs.[5] The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement its Drainage Area Management Plan, its municipal stormwater permit requirements, is less than 20% of the total budget. The remaining 80% is attributable to pre-existing programs.[6]

It is also important to acknowledge that the vast majority of costs that will be incurred as a result of implementing the Order are not new. Urban runoff management programs have been in place in this region for over 25 years. Any increase in cost to the Permittees will be incremental in nature.

Urban runoff management programs cannot be considered in terms of their costs only. The programs must also be viewed in terms of their value to the public. For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by U.S. EPA to be $158-210 annually or $13 - $17.50 monthly.[7] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento, study corroborates U.S. EPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180 or $15 monthly.[8] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Another important way to consider urban runoff management program costs is to consider the implementation cost in terms of costs incurred by not improving the programs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[9] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8% among bathers at those beaches resulted in about $3 million annually in health-related expenses.[10] Extrapolation of such numbers to the beaches and other water contact recreation in San Francisco Bay and the tributary creeks of the region could result in huge expenses to the public.

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5 Ibid. P. 58.

6 County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

7 Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.

8 State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.

9 Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

10 Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.

Urban runoff and its impact on receiving waters also places a cost on tourism. The California Division of Tourism has estimated that each out-of-state visitor spends $101.00 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999, impacting beach visitation and undoubtedly impacting the local economy.

Finally, it is important to consider the benefits of urban runoff management programs in conjunction with their costs. A study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[11] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by U.S. EPA, which found that the benefits of implementation of its Phase II stormwater rule would also outweigh the costs.[12]

Considering the above, the Water Board finds that the requirements in this Order are reasonably necessary to protect beneficial uses identified in the Basin Plan and the economic information related to costs of compliance supports protecting those beneficial uses.

V. RELEVANT STATUTES, REGULATIONS, PLANS AND POLICIES

A. Legal Authorities.

This Order is issued pursuant to section 402 of the CWA and implementing regulations adopted by the U.S. EPA and chapter 5.5, division 7 of the CWC (commencing with section 13370). This Order serves as an NPDES permit for point source discharges to surface waters. This Order also serves as waste discharge requirements pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

In addition to the legal authority citations below, they are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

[11] LARWQCB, 2004. Alternative Approaches to Stormwater Control.

[12] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,D,E, and F) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: [...] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. [...] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. [...] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "[n]otwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

B. State and Federal Regulations, Policies, and Plans

1. Water Quality Control Plan. The CWA requires the Water Board to establish water quality standards for each water body in its region. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect beneficial uses, and an antidegradation policy to prevent degrading of waters. The Water Board adopted the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs

and policies to achieve those objectives for all waters addressed through the plan. The Urban Runoff Management, Comprehensive Control Program section of the Basin Plan requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan's comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. Pursuant to Water Code sections 13263 and 13377, the requirements in this Order implement the Basin Plan.

2. Water Quality Control Plan for Ocean Waters of California, California Ocean Plan

   In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amended Ocean Plan on October 16, 2012, and it was approved by the Office of Administrative Law and USEPA. The Ocean Plan is applicable, in its entirety, to ocean waters of the state. In order to protect beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Pursuant to Water Code sections 13263 and 13377, the requirements of this Order implement the Ocean Plan.

   The Ocean Plan prohibits the discharge of waste to designated Areas of Special Biological Significance (ASBS). ASBS are ocean areas designated by the State Water Board as requiring special protection through the maintenance of natural water quality. The California Ocean Plan states that the State Water Board may grant an exception to California Ocean Plan provisions where the State Water Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served. In 2012, the State Water Board adopted Resolutions 2012-0012 and 2012-0031 (ASBS Exception), which grant an exception to the Ocean Plan prohibition on discharges to ASBS for a limited number of applicants, including San Mateo County for stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS. The ASBS Exception contains "Special Protections" to maintain natural water quality and protect the beneficial uses of the ASBS. In order to legally discharge into an ASBS, San Mateo County must comply with the terms of the Special Protections and obtain coverage under this Order. This Order incorporates the terms of the Special Protections for San Mateo's discharges into the ASBS.

3. National Toxics Rule (NTR) and California Toxics Rule (CTR). U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995 and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, U.S. EPA adopted the CTR. The CTR promulgated new toxics criteria for California and incorporated the previously adopted NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001. These rules contain water quality criteria for priority pollutants.

4. Antidegradation Policy. Federal regulations (40 CFR 131.12) require that the state water quality standards include an antidegradation policy consistent with the federal antidegradation policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining the Quality of the Waters of the State"). State Water Board Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law.

   The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Resolution No. 68-16 and 40 CFR section 131.12 require the Water Board to maintain high quality waters of the State unless degradation is justified based on specific findings. First, the Water Board must ensure that "existing instream uses and the level of water quality necessary to protect the existing uses" are maintained and protected. Second, if the baseline quality of a water body for a given constituent exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected through the requirements of the Order unless the Water Board makes findings that (1) any lowering of the water quality is necessary to accommodate important economic or social development in the area in which the waters are located; (2) water quality adequate to protect existing uses fully is assured; and (3) the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control are achieved.

   The Water Board must also comply with any requirements of State Water Board Resolution No. 68-16 beyond those imposed through incorporation of the federal antidegradation policy. In particular, the Water Board must find that not only present, but also anticipated future uses of water are protected, and must ensure best practicable treatment or control of the discharges. The baseline quality considered in making the appropriate findings is the best quality of the water since 1968, the year of the adoption of Resolution No. 68-16, or a lower level if that lower level was allowed through a permitting action that was consistent with the federal and state antidegradation policies. The discharges permitted in this Order are consistent with the antidegradation provisions of 40 CFR section 131.12 and Resolution 68-16 as set out below:

   a. Many of the waters within the area covered by this Order are impaired and by multiple pollutants discharged through MS4s and are not high quality waters with regard to these pollutants. In most cases, there are insufficient data to determine whether these water bodies were impaired as early as 1968, but the limited available data shows impairment dating back for more than two decades. Many such water bodies are listed on the State's CWA Section 303(d) List and the Water Board has established TMDLs to address the impairments (see V.6). This Order ensures that instream (beneficial) water uses and the level of water quality necessary to protect the existing uses is maintained and protected. This Order requires the Permittees to comply with permit provisions to implement the wasteload allocations set forth in the TMDLs in order to restore the beneficial uses of the impaired water bodies

consistent with the assumptions and requirements of the TMDLs. This Order further requires compliance with receiving water limitations to meet water quality standards in the receiving water either by showing compliance or by implementing actions to comply with water-quality based requirements (limitations) set forth in specific pollutants of concern provisions.

b. To the extent that some of the water bodies within the area covered by this Order are high quality waters with regard to some constituents, the Board finds as follows:

   Allowing limited degradation of high quality water bodies through MS4 discharges is necessary to accommodate important economic or social development in the area and is consistent with the maximum benefit to the people of the state. The discharge of stormwater in certain circumstances is to the maximum benefit to the people of the State because it can assist with maintaining instream flows that support beneficial uses, may spur the development of multiple-benefit projects, and may be necessary for flood management, and public safety as well as to accommodate development in the area. The alternative – capturing all stormwater from all storm events – would be an enormous opportunity cost that would preclude MS4 permittees from spending substantial funds on other important social needs. The Order ensures that any limited degradation does not affect existing and anticipated future uses of the water and does not result in water quality less than established standards. The Order requires compliance with receiving water limitations that act as a floor to any limited degradation.

   The Order requires the highest statutory and regulatory requirements and requires that the Permittees meet best practicable treatment or control. The Order prohibits all non-stormwater discharges, with a few enumerated exceptions, through the MS4 to the receiving waters. As required by 40 CFR section 122.44(a), the Permittees must comply with the "maximum extent practicable" technology-based standard set forth in CWA section 402(p), and implement extensive minimum control measures in a stormwater management program. Recognizing that best practicable treatment or control may evolve over time, the Order includes new and more specific requirements as compared to Order No. R2-2009-0074.

5. Anti-backsliding Regulations. Section 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. While this Order allows implementation of alternative compliance paths in Provisions C.9 to C.12 and C.1 to comply with receiving water limitations for pollutants and receiving waters identified therein, the availability of the alternatives and the corresponding availability of additional time to come into compliance with receiving water limitations does not violate the anti-backsliding provisions.

The receiving water limitations provisions of this Order are imposed under section 402(p)(3)(B) of the Clean Water Act rather than based on best professional judgment, or based on section 301(b)(1)(C) or sections 303(d) or (e), and are, accordingly, not subject to the anti-backsliding requirements of section 402(o). Although the non-applicability is less clear with respect to the regulatory anti-backsliding provisions in 40 CFR 122.44(l), the regulatory history suggests that USEPA's intent was to establish the anti-backsliding regulations with respect to evolving technology standards for traditional point sources. (See, e.g., 44 Fed.Reg. 32854, 32864 (Jun. 7, 1979)). Assuming the regulatory anti-backsliding provisions apply, it is not violated for two reasons. First, the actual requirements in Provisions C.9 to C.12 and C.1 are as or more stringent than the requirements in the previous permit. Second, to the extent explicitly allowing compliance with the receiving water limitations through implementation of C.9 to C.12 and C.14 is comparable to and less stringent than what the previous permit required, the exception to backsliding based on new information and changed circumstances since the last permit applies.

The alternative compliance paths in Provisions C.9 to C.12 and C.14 of this Order were informed by new information available to the Board from experience and knowledge gained through implementation of actions required by the previous permit and results of source identification studies and control measure effectiveness studies since the adoption of the previous permit. In particular, the Water Board recognizes the need and significance of explicitly allowing time to plan, design, fund, operate and maintain controls necessary to attain water quality improvements and comply with receiving water limitations. This is especially true where, as here, the alternative compliance paths allowed by this Order requires implementation of controls that are more stringent than controls of the previous permit. Thus, even if the receiving water limitations are subject to anti-backsliding requirements, they were revised based on changed circumstances and new information that would support an exception to the anti-backsliding provisions. (40 C.F.R. § 122.44(l)(1); 40 C.F.R. § 122.62(a)(2); 40 C.F.R. §122.44(l)(2)(i)(B)(1)).

6. Impaired Waters on CWA 303(d) List. CWA section 303(d)(1) requires each state to identify specific water bodies within its boundaries where water quality standards are not being met or are not expected to be met after implementation of technology-based effluent limitations on point sources. Water bodies that do not meet water quality standards are considered impaired and are placed on the state's "303(d) List." Periodically, U.S. EPA approves the state's 303(d) List. In October 2011, U.S. EPA approved a revised list of impaired waters prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for non-point sources, and are established to achieve the water quality standards for the impaired waters.

The Water Board has established TMDLs for pesticide-related toxicity, mercury, PCBs, pathogens, among others, to remedy water quality impairments in various water bodies in and around San Francisco Bay. These TMDLs identify MS4 discharges as a source of pollutants to these water bodies, and, as required, establish wasteload allocations (WLAs) for MS4 discharges to reduce the amount of pollutant discharged to receiving waters. CWA section 402(p)(3)(B)(iii) requires the Water Board to impose permit conditions, including: "management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Federal regulations also require that NDPES permits contain WQBELs consistent with the assumptions and requirements of all available WLAs (40 CFR 122.44(d)(1)(vii)(B)). CWC sections 13263 and 13377 also require that permits include limitations necessary to implement water quality control plans. Therefore, this Order includes WQBELs and other provisions to implement the TMDL WLAs assigned to Permittees regulated by this Order.

7. California Environmental Quality Act. The action to adopt an NPDES Permit is exempt from the provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) ("CEQA") pursuant to Water Code section 13389, since the adoption or modification of a NPDES permit for an existing source is statutorily exempt and this Order only serves to implement a NPDES permit (*County of Los Angeles v. State Water Resources Control Board (2006) 143 Cal.App.4th 985*; *Pacific Water Conditioning Assn, Inc. v. City Council of City of Riverside* (1977) 73 Cal.App.3d 546, 555-556.).

8. Endangered Species Act Requirements. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. Each Permittee is responsible for meeting all applicable federal and State Endangered Species Act requirements.

C. State Mandates

Article XIII B, Section 6(a) of the California Constitution provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service." The requirements in this Permit do not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons.

First, this Permit implements federally-mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal

requirements to effectively prohibit non-stormwater discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held that these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (*Natural Resources Defense Council, Inc. v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.) The authority exercised under this Permit is not reserved state authority under the CWA's savings clause (cf. *Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements that are not less stringent than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for MS4. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, *City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region* (2006) 135 Cal.App.4th 1377, 1389; *Building Industry Association of San Diego County v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 882-883.)

The requirements of this Permit do not constitute a new program or a higher level of service as compared to the requirements contained in the previous permits. The overarching requirement to impose controls to reduce the pollutants in discharges from MS4s is dictated by the CWA and is not new to this permit cycle (33 USC section 1342(p)(3)(B)). The inclusion of new and advanced measures as the MS4 programs evolve and mature over time is anticipated under the CWA (55 FR 47990, 48052 (Nov. 16, 1990)), and to the extent requirements in this Permit are interpreted as new advanced measures, they do not constitute a new program or higher level of service.

The maximum extent practicable standard under CWA section 402(p)(3)(B)(iii) is a flexible standard that balances a number of considerations, including technical feasibility, cost, public acceptance, regulatory compliance, and effectiveness. (*Building Ind. Ass'n. of San Diego v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 873-874, 889.) Such considerations change over time with advances in technology and with experience gained in stormwater management (55 FR 47990, 48052 (Nov. 16, 1990)). Accordingly, the determination of whether the Permit conditions exceed the requirements of federal law cannot be based on a point by point comparison of the permit conditions and the six minimum measures that are required "at a minimum" to reduce pollutants to the maximum extent practicable and to protect water quality (40 C.F.R. §122.34). Likewise, individual permit provisions cannot be considered in isolation. When implementing the federal requirement to reduce pollutants to the maximum extent practicable, the entire permit must be evaluated as a whole. The Second Appellate District of the Court of Appeal has affirmed this approach in a case that is now pending before the California Supreme Court. (*State Department of Finance v. Commission on State Mandates* (2014) 316 P.3d 1218, review granted (2013) 220 Cal.App.4th 740.)

Furthermore, in the analogous Phase II MS4 context, U.S. EPA has issued an MS4 Permit Improvement Guide (April 2010, available at: http://www.epa.gov/npdes/pubs/ms4permit_improvement_guide.pdf) that

recommends many provisions for Phase II MS4 permits not explicitly specified in the six minimum measures established at Code of Federal Regulations, title 40, section 122.34.

The requirements of the Permit are necessary to reduce the discharge of pollutants to the MEP. The Water Board finds that the requirements of the Permit are practicable, do not exceed federal law, and thus do not constitute an unfunded mandate. These findings are the expert conclusions of the principal state agency charged with implementing the NPDES program in California (CWC sections 13001, 13370). The provisions in this to effectively prohibit non-stormwater discharges are also mandated by the CWA (33 USC section 1342(p)(3)(B)(ii)). Likewise, the provisions of this Permit to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for waterbodies that do not meet federal water quality standards. (33 U.S.C. § 1313(d).) Once U.S. EPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable WLA. (40 CFR 122.44(d)(1)(vii)(B).)

Second, the Permittees' obligations under this Permit are similar to the obligations of nongovernmental dischargers who are issued NPDES permits for stormwater discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342), and the Porter-Cologne regulates the discharge of waste (Water Code section 13263), both without regard to the source of the pollutant or waste. As a result, the costs incurred by local agencies to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

Third, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. To the extent Permittees have voluntarily availed themselves of the Permit, the program is not a state mandate. (Accord *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 107-108.) Likewise, the Permittees have voluntarily sought a program-based municipal stormwater permit in lieu of a numeric limits approach. (See *City of Abilene v. U.S. EPA* (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The Permittees' voluntary decision to file a Report of Waste Discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See *Environmental Defense Center v. U.S. EPA* (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fourth, the Permittees' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

Finally, even if any of this Permit's provisions could be considered unfunded mandates, under Government Code section 17556, subdivision (d), a state mandate is not subject to reimbursement if the local agency has the authority to charge a fee. The Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order, subject to certain voting requirements contained in the California Constitution. (See Cal. Const., Art. XIII D, section 6, subd. (c); see also *Howard Jarvis Taxpayers Ass'n v. City of Salinas* (2002) 98 Cal.App.4th 1351, 1358-1359.) The Fact Sheet demonstrates that numerous activities contribute to the pollutant loading in the MS4. Permittees can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., *Apartment Association of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (*County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487-488.)

D. Statewide General Industrial and Construction Stormwater Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

E. Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

F. Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered

by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under NPDES permitting pursuant to U.S. EPA Phase II stormwater regulations. Under Phase II, the Water Board intends to permit these federal, State, and regional entities through use of a statewide Phase II NPDES General Permit.

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, Chapter 4 Implementation, Table 4-1, Prohibition 7.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – San Francisco Bay Basin Plan, Chapter 3, Water Quality Objectives.

Receiving Water Limitation B.2. Legal Authority – Federal regulations require each NPDES permit to include limitations necessary to achieve water quality standards. 40 CFR 122.44(d)(1)(i). The State Water Board has previously determined that limitations necessary to meet water quality standards are appropriate for the control of pollutants discharged by MS4s and must be included in MS4 permits. (State Water Board Orders WQ 91-03, 98-01, 99-05, and 2001-15).). This Order accordingly requires that discharges shall not cause or contribute to violations of water quality standards.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

<u>Legal Authority</u>

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains water quality objectives as well as the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of

pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each water board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance [...]."

California Water Code Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires NPDES permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director

determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

State Water Board Orders WQ 98-01 and 99-05 are precedential orders that require municipal stormwater permits to not cause or contribute to exceedances of water quality standards in the receiving water. The State Water Board Order 95-01 specifically requires that Provision C.1 include language that Permittees shall comply with discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges, whereby adopting an iterative approach to complying with the limitations. Courts have held that compliance with the iterative process does not excuse liability for violations of water quality standards. (*Building Industry Assn. of San Diego v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866; *City of Rancho Cucamonga v. Regional Water Quality Control Bd.* (2006) 135 Cal.App.4th 1377; *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2011) 673 F.3d. 880, rev'd on other grounds sub nom. *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2013) 133 S.Ct. 710, mod. by *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2013) 725 F.3d 1194, cert. den. *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2014) 134 S.Ct. 2135.)

State Water Board Order WQ 2015-0075 directs regional water boards to consider reasonable alternative compliance options for meeting receiving water limitations. Order WQ 2015-0075 specifically directs regional water boards to follow the principles stated below when issuing a municipal stormwater permit, unless a board makes a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons.

1. The receiving water limitations provisions of Phase I MS4 permits should continue to require compliance with water quality standards in the receiving water and should not deem good faith engagement in the iterative process to constitute such compliance. The Phase I MS4 permits should therefore continue to use the receiving water limitations provisions as directed by State Water Board Order WQ 99-05.
2. The Phase I MS4 permits should include a provision stating that, for water body-pollutant combinations with a TMDL, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination.
3. The Phase I MS4 permits should incorporate an ambitious, rigorous, and transparent alternative compliance path that allows permittees appropriate time to come into compliance with receiving water limitations without being in violation of the receiving water limitations during full implementation of the compliance alternative.
4. The alternative compliance path should encourage watershed-based approaches, address multiple contaminants, and incorporate TMDL requirements.

5. The alternative compliance path should encourage the use of green infrastructure and the adoption of low impact development principles.
6. The alternative compliance path should encourage multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply.
7. The alternative compliance path should have rigor and accountability. Permittees should be required, through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions. Permittees should be further required, again through a transparent process, to monitor the results and return to their analysis to verify assumptions and update the solutions. Permittees should be required to conduct this type of adaptive management on their own initiative without waiting for direction from the regional water board.

Alternative Path to Compliance with Discharge Prohibitions and Receiving Water Limitations for Certain Pollutants

This Order, as did the previous order, goes beyond requiring an open-ended iterative approach to compliance with water quality standards by including pollutant-specific provisions, C.9 through C.12 and C.14, with numerical WQBELs or narrative WQBELs with milestones and deadlines. The provisions and limitations implement adopted TMDL wasteload allocations and the associated implementation plans in the Basin Plan and specify what Permittees must do during the term of the Order to manage discharges of the specific pollutants that may cause or contribute to violations of water quality standards. If complied with, the Permittees will be deemed in compliance with Receiving Water Limitations B.1 and B.2 for these pollutants. The requirements of C.9 through C.12 and C.14 are ambitious and rigorous because they will require Permittees to fully commit to and implement challenging but achievable tasks to ultimately meet water quality objectives, including objective interim numeric effluent limitations. Accordingly, this Order explicitly applies principles 1, 2, and 3 (above) of State Water Board Order WQ 2015-0075 and provides an alternative path to compliance with Discharge Prohibitions and Receiving Water Limitations for the following pollutant – water body combinations: pesticides and pesticide-caused toxicity in all receiving waters (Provision C.9); trash in all receiving waters (Provision C.10); mercury in all San Francisco Bay segments and receiving waters in the Guadaloupe River watershed (Provision C.11); polychlorinated biphenyls (PCBs) in all San Francisco Bay segments (Provision C.12); and fecal indicator bacteria in San Pedro Creek and Pacifica State Beach receiving waters (Provision C.14).

This rigorous compliance alternative also applies Order WQ 2015-0075 principle 4. It implements all applicable TMDL requirements and calls for or allows for implementation of trash, mercury, and PCBs controls in watershed and drainage areas where they are most needed and most likely to be effective and promotes and allows use of controls with multiple pollutant benefits. The watershed-based approach addressing multiple pollutants is not appropriate for the pesticides and pesticide-caused toxicity requirements. Consistent with the TMDL wasteload allocation and implementation plan, these requirements are pollution prevention management practices specific to urban use

pesticides and apply to all watersheds and drainage areas. The fecal indicator bacteria requirements for discharges to San Pedro Creek and Pacifica State Beach receiving waters implement TMDL requirements and call for fecal indicator bacteria-specific pollution prevention controls consistent with current knowledge of sources and activities in the watershed.

Provision C.3 of the Order calls for adoption and implementation of low impact development consistent with Order WQ 2015-0075 principles 5 and 6. The mercury and PCBs provisions (C.11 and C.12) explicitly recognize and call for use of green infrastructure to meet pollutant load reduction requirements. The trash provision allows use of low impact development green infrastructure as full trash capture systems, if appropriately designed, operated, and maintained. Although not directly required in the pesticides and fecal indicator bacteria provisions, low impact development principles and development and implementation of green infrastructure plans, including consideration of multi-benefit regional projects, could also have pesticides and bacteria load reduction benefits.

Consistent with Order WQ 2015-0075 principle 7, each of the pollutant-specific provisions also contain concrete milestones and deadlines and reporting requirements that provide rigor and accountability. All reports, plans, and other required submittals will be made available to all interested parties and input and feedback from interested parties will be considered in the evaluation of all submittals.

The Order also includes monitoring requirements (Provision C.8) to assess water body and watershed conditions and effectiveness of control actions towards attainment of water quality standards and to inform selection and implementation of new control actions or adaptive improvements of control actions.

Consistent with the TMDLs, more time than the term of the Order will be necessary to attain water quality standards for mercury and PCBs. In these cases, the associated Order provision includes an additional requirement for the Permittees to submit a proposed plan of additional or improved control actions and schedule of implementation to attain water quality standards or TMDL wasteload allocations for the Water Board's consideration of numerical or narrative WQBELs in the subsequent order.

This Order also includes specific requirements to control copper in discharges to all San Francisco Bay segments (Provision C.13) in accordance with the Basin Plan implementation plan of the site-specific water quality objectives for copper in these receiving waters. However, the Permittees already comply with Receiving Water Limitations for copper in all San Francisco Bay segments since these copper objectives are attained in these receiving waters.

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), California Water Code (CWC) sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires "[a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires "[a] description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires "[a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires "[a] description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Sediment accumulated on paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, is the major source of point source pollutants found in urban runoff. Thus, Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention efforts as set forth in this Permit. Such prevention measures include, but are not limited to, activities as described below. The work of municipal maintenance personnel is vital to minimize stormwater pollution because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges.

C.2-2 Road construction and other activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, impacting water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b) Identification and prioritization of rural roads maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources; (c) Road and culvert construction designs that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability; (d) Development and implementation of an inspection program to maintain road structural integrity and prevent impacts to water quality; (e) Provide adequate maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, re-grade roads to slope outward where consistent with road engineering safety standards, and install water bars; and (f) When replacing existing culverts or redesigning new culverts or bridge crossings use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

Road construction, culvert installation, and other rural maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly

designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other rural public works activities, including those the BMP approach would address, have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways. This Provision would help ensure that these impacts are appropriately controlled.

Specific Provision C.2 Requirements

Provision C.2.a-e. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities, such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations) Water Board staff investigated the occurrence of low salinity and dissolved oxygen (DO) conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Water Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Wildlife in Alameda County.

Discharge of black-colored water from the Alvarado pump station to Old Alameda Creek was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L (DO) water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The (DO) sag was detected from surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Investigations of these incidents found that stormwater pump stations, universally operated by automatic float triggers, have been confirmed as the cause in at least one instance and may represent an overlooked source of controllable pollution to the San Francisco Bay Estuary and its tidal sloughs. The discharges of dry weather urban runoff from these pump stations were not being managed to protect water quality and surveillance monitoring detected measurable negative water quality consequences of this current state of pump station management.

Pump station discharges are controllable point sources of pollution that are virtually unregulated, causing violations of water quality objectives. Therefore, the Previous Permit required (1) an inventory of pump stations, (2) inspection of pump stations twice a year during the dry season to collect (DO) data and implement corrective actions for DO

at or below 3 milligrams per liter (mg/l), and (3) inspection of pump stations after two storm events during the wet season to collect data on the presence of trash and other water quality parameters.

The Permittees have submitted a list of all pump stations. DO data in annual reports shows that turning on the pumps aerates the water, thereby increasing the DO of the water to at least 3 (mg/l), the minimum DO requirement.

40 CFR 122.26(d)(2)(I)(f) requires Permittees to carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with permit conditions, including the prohibition on illicit discharges to the MS4. Pump stations, which collect and discharge from the storm drain systems, cannot contribute discharges with dissolved oxygen (DO) level below 3 mg/L. Previous pump station reporting shows that implementation of corrective actions (i.e., BMPs) prior to the pumps, combined with using the pumps to discharge collected water, as opposed to simply allowing it to overflow, aerates the water to a DO level of at least 3 mg/L. Thus, this Permit removes the specific requirements for the monitoring of DO at pump stations and allows the Permittees greater flexibility to ensure that all water discharged from pumps stations is at least 3 mg/l. The reporting requirement has also been removed from this Permit, but Permittees must maintain any sampling records and make them available upon request.

The Previous Permit also wanted to explore the use of the pump stations for trash capture to protect the beneficial uses of the receiving waters. Information collected shows that pump stations as trash capture devices are inefficient because their reservoirs are too small to contain trash. At the same time, many municipalities have installed full and partial trash capture devices at select storm drain inlets.

Provision C.2.f. (Corporation Yard BMP Implementation) requires Permittees to implement the BMP in site-specific Stormwater Pollution Prevention Plans (SWPPPs) to minimize pollutant discharges in stormwater and non-stormwater discharges. The Previous Permit required SWPPPs to be developed and implemented by July 1, 2010. SWPPPs should have specific BMPs for different functions of the corporation yard and provide guidance for frequent mini inspections to ensure that appropriate BMPs are implemented. During the Previous Permit term, Water Board staff and U.S. EPA staff inspected a few of the Permittees' corporation yards and evaluated the corresponding SWPPPs. All inspected corporation yards had actual and/or potential discharges. Most of the countywide programs developed templates for the SWPPPs. Individual Permittees were supposed to customize the template to fit their corporation yards. Some Permittees did not fully customize the SWPPP template. A few Permittees have comprehensive, site-specific SWPPPs. Water Board staff also evaluated this Provision in annual reports. The Previous Permit required routine inspections in different areas of the corporation yard and at least one inspection prior to the start of the rainy season. The intent of the inspection requirement was to have regular mini-inspections and one full corporation yard inspection sometime in late August or in September, right before the start of the rainy season in October, to make sure the corporation yard was clean and all issues were resolved before the start of the rainy season. Some Permittees inspected in the spring or early summer and documented that as the inspection for the year to comply with this

Provision in the annual report due the following September. Other Permittees did not inspect until late fall or winter. Some Permittees documented issues but the annual reports either did not document the corrective actions or corrective actions were implemented weeks or months later. Therefore, this Permit clearly identifies the timeframe of when the annual inspections must occur and requires corrective actions to be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. This is consistent with the timeframe for implementation of corrective actions in provisions C.4. and C.5.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the premise that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions. The goal of Provision C.3. is for Permittees to use their planning authority to reduce pollutant discharges and runoff flow into the storm drain system primarily through the implementation of low impact development (LID) techniques.

C.3-3 To accomplish this goal, Permittees shall require new development and redevelopment projects to implement appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from these projects. Permittees shall also complete and implement a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs and other storm drain infrastructure elements. Neither Provision C.3. nor any of its requirements are intended to restrict or control local land use decision-making authority.

C.3-4 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-5 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to

regulation pursuant to Sections 401 or 404 of the federal Clean Water Act. This is consistent with the stayed 2015 Clean Water Rule exempting stormwater control features from the definition of "waters of the U.S." (80 Fed. Reg. 37054 (June 29, 2015).) Water Board staff is working with the California Department of Fish and (CDFW) and U.S. Fish and Wildlife Service (USFWS) to identify how maintenance for stormwater treatment controls required under permits such as this Permit can be appropriately streamlined, given CDFW and USFWS requirements, and particularly those that address special status species. This Permit requires Permittees to ensure that constructed wetlands installed by Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-6 The Permit requires Permittees to ensure that pervious pavement systems of 3000 square feet or more, onsite, joint, and offsite stormwater treatment systems, and HM controls installed by Regulated Projects are properly operated and maintained for the life of the Projects. In cases where the responsible parties for the treatment systems or HM controls have worked diligently and in good faith with the appropriate state and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment systems or HM controls, but these approvals are not granted, the Permittees shall be considered by the Water Board to be in compliance with Provision C.3.h.iv. of the Permit.

Specific Provision C.3 Requirements

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) sets forth essentially the same legal authority, development review and permitting, environmental review, training, and outreach requirements that are contained in the previous permit.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

This permit is a 3rd generation permit containing stormwater treatment requirements for development projects. Past permits have grandfathered development projects approved prior to those permits' effective dates, essentially exempting the projects and allowing them to provide no or insufficient stormwater treatment. Water Board staff believe a small number of these development projects that were approved more than a decade ago have still not begun construction. A decade is sufficient time to justify requiring the Permittees to revise and update these stagnant development permits to include current LID treatment requirements. Therefore, this provision removes the grandfathering of

development projects approved with no stormwater treatment requirements and that have not begun construction. However, this provision allows exemptions for some of these previously approved projects in situations where the Permittees lack legal authority to retroactively change their previous approvals. This provision also allows some of these previously approved projects to use non-LID stormwater treatment instead of LID treatment because of space constraints.

To confirm that the total number of Projects previously approved without any Provision C.3. compliant stormwater treatment is indeed small, Provision C.3.b.iv.(1) includes a requirement for Permittees to provide in their 2017 Annual Report a complete list of these types of development projects. For each such Project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). This reporting requirement only applies to Permittees that have Projects subject to Provision C.3.b.i.(2).

Regulated Projects approved with non-LID stormwater treatment measures in compliance with the hydraulic sizing criteria of Provision C.3.d. will continue to be grandfathered.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy.[13] The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, pervious pavement systems, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes. This is a standard, current, ordinary, and regular practice being implemented in numerous jurisdictions in California, the U.S., and internationally, including: the Permittees' jurisdictions, Los Angeles, San Diego, San Francisco, Portland, OR, Seattle, Minneapolis, Milwaukee, Kansas City, Chicago, New York City, Philadelphia, Auckland, New Zealand, Chinese "sponge cities" such as Wuhan and Changde, and others.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(1) lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of

[13] U.S. EPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) http://water.epa.gov/polwaste/green/upload/2008_01_02_NPS_lid_costs07uments_reducingstormwatercosts-2.pdf)

businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff.

Provision C.3.c.i.(2)(a) lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. One design element requires each Regulated Project to include at least one site design measure from a list of six that includes recycling of roof runoff, directing runoff into vegetated areas, and installation of pervious pavement systems instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.

Provision C.3.c.i.(2)(b) requires the Permittees to collectively develop and adopt design specifications for pervious pavement systems, subject to the Executive Officer's approval. However, this subprovision allows Permittees to reference pervious pavement design specifications previously developed by countywide programs and adopted into countywide stormwater handbooks. Design specifications are necessary because improperly designed and engineered pervious pavement systems may cause flooding and the discharge of insufficiently treated stormwater runoff.

Provision C.3.c.i.(2)(c) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

Provision C.3.c.i.(2)(c)(i) defines LID treatment measures as harvesting and use, infiltration, evapotranspiration, or biotreatment.

The Previous Permit required that a properly engineered and maintained biotreatment system may be considered only if it was infeasible to implement harvesting and use, infiltration, or evapotranspiration at a project site. Infeasibility may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

The Previous Permit also required the Permittees to produce two reports during the permit term. The first report[14] established criteria and procedures for Permittees to follow to implement the hierarchy of LID treatment measures listed above (i.e., harvesting and use, infiltration, and evapotranspiration must be considered prior to biotreatment). The second report[15] reviewed data from two years of the Permittees' Annual Reports to evaluate the results of applying the feasibility / infeasibility criteria. The conclusions of the second report were:

- Infiltration of some runoff is feasible on most projects, although in the clay soils typical of the Bay Area, the amount of runoff than can be infiltrated is unpredictable and highly variable.
- Very few development projects create the quantity and timing of non-potable water demand required to feasibly harvest and use the amount of runoff specified in Provision C.3.d.
- Bioretention facilities, when designed according to the criteria in current Permittee guidance, could infiltrate 40% - 80% of the total runoff, depending on rainfall patterns and facility size. However, the amount of runoff that would be infiltrated over the life of a particular project is variable and unpredictable because of uncertainty in the near-term and long-term infiltration performance of underlying soils. Infiltration can be maximized by ensuring project designs meet current design criteria and by ensuring treatment systems are constructed as designed.

The Permittees completed a "White Paper" on Provision C.3. on February 27, 2015.[16] The White Paper concluded that the pollutant removal performance of biotreatment facilities, overall and on average, is equivalent or better than the likely real-world performance of harvest and use facilities and as good as the likely performance of infiltration facilities when considered over the long term. The White Paper also noted that biotreatment facilities require less maintenance and are less prone to failure than harvest and use facilities, and in some cases, are also preferable to direct infiltration facilities.

Based on the data provided by the above Permittee reports, this Permit removes the Previous Permit's restriction on allowing properly engineered and maintained biotreatment systems only after an infeasibility analysis of harvesting and use, infiltration, or evapotranspiration treatment measures.

Provision C.3.c.i.(2)(c)(ii) requires biotreatment systems to meet minimum performance specifications in order to be considered as LID treatment. This subprovision also requires biotreatment soil media to meet the current minimum specifications developed and included in the Previous Permit.[17] However, this subprovision recognizes that the current soil media specifications may need to be

[14] *Harvest and Use, Infiltration and Evapotranspiration Feasibility/ Infeasibility Criteria Report (2011)*

[15] *Status Report on the Application of Feasibility / Infeasibility Criteria for Low Impact Development (2013)*

[16] BASMAA, February 27, 2015. "White Paper" on Provision C.3 in MRP 2.0: Final Report.

[17] Attachment L of Board Order No. R2-2009-0074, adopted October 14, 2009, and revised November 27, 2011.

modified because of variability in climate, rainfall, and compost composition among the different counties. Therefore, this subprovision allows for the Permittees to collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the current soil media minimum specifications, subject to the Executive Officer's approval.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) lists the hydraulic sizing design criteria that the stormwater treatment systems installed for Regulated Projects must meet. The volume and flow hydraulic design criteria are the same as those required in the Previous Permit. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects.

Provision C.3.d.iv. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices. The restriction that infiltration devices have to be deeper than wide has been removed to reflect current design practices. The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites.

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.b.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

Provision C.3.e.i. This Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite or Regional Project is in the same watershed as the Regulated Project and constructed within 3 years of the end of construction of the Regulated Project. The 3 years of additional time are allowed because more time may be required to complete construction of offsite and Regional projects because of administrative, legal, and/or construction delays. We acknowledge in some instances, an even longer time may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended up to 5 years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

Provision C.3.e.ii. (Special Projects) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these types of Special Projects. This Provision includes specific criteria for determining which types of Regulated Projects may be considered Special Projects and establishes different categories of Special Projects based on size, land use type, and density. Except for Category A, which represents the smallest Special Projects, this Provision also uses location, density, and parking criteria to establish a tiered approach for determining the total LID Treatment Reduction Credit available for any given Special Project. The total available LID Treatment Reduction Credit may be used to reduce the amount of stormwater runoff that must be treated with LID stormwater treatment systems. The remaining amount of stormwater runoff must be treated with one or a combination of the following two specific non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

This Provision is the same as in the Previous Permit except for the following three changes:

- Density LID Treatment Reduction Credits are allowed for mixed use development projects, which consist of a mix of residential and commercial land uses, based on density measured by either the dwelling units per acre or floor area ratio. This change acknowledges that mixed use development projects can vary from mostly commercial to mostly residential. The Previous Permit did not accommodate this variability and penalized dense mixed use projects that are mostly residential by restricting density LID Treatment Reduction Credits to only floor area ratio criteria.
- Definitions of gross density and floor area ratio have been included in Provision C.3.b.ii. to aid consistent implementation of this Provision by all Permittees. Gross Density is defined as the total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses. Floor Area Ratio (FAR) is defined as the ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area. Gross density and FAR have been purposely defined to include public rights-of-way, recreational, civic, commercial, and other non-residential uses so as to raise the bar for Regulated Projects to qualify for the LID Reduction Credits allowed in Provision C.3.e.ii. That is, these more conservative gross density and FAR values may result in some Regulated Projects qualifying for less LID Reduction Credits or not qualifying at all.

  The reporting data for Special Projects under the current permit shows that "lack of space to provide full LID stormwater treatment" is the most frequent reason invoked for why 100% LID treatment onsite is infeasible. Therefore, it is appropriate that the space reserved for public rights-of-way, recreation, civic,

commercial, and other non-residential uses are included in the calculations for gross density and FAR, especially since many of these areas may be used for installation of LID treatment measures.

- To reduce the burden of reporting, the semi-annual reporting of Special Projects that are being considered by Permittees prior to the Permittees granting final planning approval has been reduced to annual, within the Annual Report. Although the frequency of reporting has been reduced, the current reporting requirements for this Provision are unchanged because the data is necessary for Water Board staff to validate the Permittees' analysis of the number and size of potential Special Projects that may be approved during this permit term. Water Board staff intends to use the data collected in the proposed reporting requirements to revise the Special Projects criteria as appropriate for the next permit term.

Provision C.3.f (Alternative Certification of Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed.

Provision C.3.g. (Hydromodification Management) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Background for Provision C.3.g. Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Those HM requirements are stated in Provision C.3.g., and Attachment C includes maps prepared by the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees showing areas where HM requirements apply.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[18] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[19] All Permittees may

[18] http://www.ecy.wa.gov/programs/wq/stormwater/wwhm_training/wwhm/wwhm_v2/instructions_v2.html
[19] See www.bayareahydrologymodel.org, Resources.

use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. The Previous Permit allowed the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices and to identify whether streams to which Contra Costa Permittees discharge may have a different susceptibility to HM impacts, thus justifying a different threshold for control of flows resulting in those impacts. The Contra Costa Permittees submitted an IMP Monitoring Report,[20] which found that Contra Costa HM measures generally, but not entirely, met the Previous Permit's HM requirements for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. The Contra Costa Permittees did not submit information showing that Contra Costa creeks had a different susceptibility to erosion. That is, they did not submit a justification for using erosion thresholds different than those accepted for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. Under the Previous Permit, the Water Board had accepted a higher threshold for control of HM effects (i.e., controlling the range of flows beginning at 20% of the 2-year pre-project peak flow, as opposed to 10% of the 2-year pre-project peak flow). Because this additional information was not submitted, and Contra Costa streams are generally similar to other Bay Area streams, the Permit extends the 10% standard to Contra Costa, and includes requirements for Contra Costa to complete modifications to its HM approach to ensure that projects implement that consistent approach within a specified time.

The Previous Permit Provision C.3.g.v. required the City of Vallejo to complete a hydrograph modification management plan (HMP) by July 1, 2013, in lieu of complying with Previous Permit Provision C.3.g.i-iv. The City submitted its Final HMP on April 24, 2013,[21] and the HMP was subsequently accepted by Board staff. The Final HMP incorporates the same requirements as for the Alameda, Santa Clara, and San Mateo Permittees. The Permit requires the City to comply with those requirements.

The Fairfield-Suisun Permittees are required to comply with the HM criteria established in this Permit. However, they have a threshold for control of erosive flows that is greater than the other Permittees: 20 percent of the 2-year peak flow. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data.

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal

[20] Contra Costa Clean Water Program, September 15, 2013. IMP Monitoring Report: IMP Model Calibration and Validation Project.

[21] City of Vallejo (Geosyntec), April 2013. Final Hydromodification Management Plan (HMP).

stormwater Permittees jointly conduct investigations as appropriate. Any future proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

- Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;
- The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;
- The effectiveness of self-retaining areas for management of post-project flows and durations; and/or
- The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

Provision C.3.g.i. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded by the conditions expressed in C.3.g.i.(1)-(3). Those conditions identify areas where the potential for single-project and/or cumulative development hydromodification impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[22] The Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees have developed maps showing where HM controls are required (Attachment C). This Provision requires Permittees that have not previously submitted an HM Applicability Map or equivalent information to prepare and submit that information, acceptable to the Executive Officer, consistent with the requirements of Provision C.3.g.

Provision C.3.g.ii. establishes the standard HM controls that all HM Projects must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

Provision C.3.g.iii. provides a procedure for the Permittees to propose an additional method for demonstrating compliance with HM requirements. This method would directly simulate erosion potential, and would be required to ensure that projects implementing HM controls with this method, if accepted by the Executive Officer, meet the Permit's HM criteria. This provision requires submittal of appropriate analyses demonstrating that the method will substantively comply with HM requirements; it may not be implemented on projects until accepted by the Executive Officer.

[22] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or sub-catchments that are 70 percent impervious or more.

Provision C.3.g.iv. identifies and defines three methods of hydromodification management.

Provision C.3.g.v. establishes the timeframes for meeting the HM Standard defined in Provision C.3.g.ii.

Provision C.3.g.vi. describes the information required to be collected and/or submitted in the Permittees' Annual Reports regarding HM Projects. This Provision also describes specific required information for Contra Costa Permittees to submit with the 2017 Annual Report.

Provision C.3.h (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the Regulated Project is provided for all pervious pavement systems of 3,000 square feet or more; onsite, joint, and offsite stormwater treatment systems; and HM controls installed.

This Provision adds a requirement for Permittees to include pervious pavement systems of 3,000 square feet or more in their Operation and Maintenance Agreements, database of Regulated Projects, and inspection checklists. Pervious pavement systems serve as site design measures that directly reduce the amount of impervious surface area and therefore, the size of the stormwater treatment system(s) required to comply with Provision C.3.d. Adequate routine maintenance of pervious pavement systems is essential because clogged systems become impervious and may result in untreated stormwater runoff or additional load on stormwater treatment systems that result in inadequately treated stormwater runoff. To lessen the burden of inspecting so many pervious pavement systems, only those of 3,000 square feet or more are required to be inspected and patios for private-use at single-family homes, townhomes, or condominiums are specifically excluded. In the case of large subdivisions where the total pervious pavement system area is equal to or greater than 3,000 square feet, but the pervious pavement installations are on individual driveways that are less than 3,000 square feet, inspection of a representative number of driveways will suffice.

Provision C.3.h.ii.(6) The Previous Permit required Permittees to inspect at least 20% of all stormwater treatment systems annually, at least 20% of all vault-based systems annually, and every treatment system at least once every 5 years. Permittees have indicated that each inspection of a Regulated Project routinely includes inspection of pervious pavement systems, stormwater treatment systems and HM controls installed at the Project. Therefore, this Provision revises the inspection frequency requirements such that the minimum number of inspections required annually is tied to a percentage of the total number of Regulated Projects, instead of the total number of individual treatment systems and HM controls. This lessens the tracking burden for the Permittees and better reflects the way actual inspections are conducted.

This Provision requires each Permittee to inspect all its Regulated Projects at least once every 5 years and inspect an average of 20%, but no less than 15% of the total number of Regulated Projects annually. This requirement serves to prevent failed or improperly maintained pervious pavement systems, stormwater treatment systems, or

HM controls from going undetected until the 5th year. Neither of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor maintained systems, maintenance history, past compliance problems at certain Projects, etc.

Provision C.3.h.ii.(6)(d) This Provision allows Permittees to accept third party inspection reports for vault-based stormwater treatment systems in lieu of conducting Permittee inspections, but only if the third party inspections are conducted at least annually, which is the normal frequency for maintenance of these systems. Each third party inspection must be included in the database or tabular format required in Provision C.3.h.ii.(4) and (5) and clearly identified as a third party inspection, Each third party inspection report must document the third party inspection company, date of inspection, condition of the treatment unit(s) at the time of inspection, maintenance activities performed, and appearance of the inside of the vault units (with photos) before and after maintenance.

Provision C.3.h.ii.(7) As the number of Regulated Projects grows, the Permittees' O&M inspection programs must grow as well. Therefore, this Provision requires each Permittee to develop and implement an Enforcement Response Plan (ERP) for O&M inspections. The ERP serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. This Provision establishes minimum requirements for the ERPs. One of these requirements is that corrective actions must be implemented within 30 days after a problem is identified by an inspector. Thirty days is more than adequate time, considering that many of the problems identified in past O&M inspection reports have been lack of maintenance service or build-up of sediment or debris. The correction of such deficiencies should not take more than 30 days. This Provision also allows for greater than 30 days to complete permanent corrective actions, such as installing additional curb cuts and making grading or vegetation improvements.

Provision C.3.h.iv. This Provision sets the implementation dates for adding pervious pavement to Permittees' O&M programs and complying with the revised minimum inspection frequencies to July 1, 2016, so as to align with the Permittees' fiscal years. This allows time for the Permittees to revise their O&M programs and budget for the revisions. This Provision also specifies a July 1, 2017, due date for implementation of an ERP for the same reasons.

Provision C.3.h.v. As in the Previous Permit, this Provision requires the Permittees to maintain a database or equivalent tabular format with detailed information on each O&M inspection and any necessary enforcement actions against Regulated Projects. To lessen the burden of reporting, this Provision only requires summary data on inspections conducted each fiscal year to be reported in the Annual Report, instead of detailed information on each O&M inspection. However, upon request by the Executive Officer, detailed information from the database or tabular format must be submitted.

Provision C.3.i. (Required Site Design Measures for Small Project and Detached Single-Family Homes Projects) contains requirements on single-family home projects that create and/or replace 2,500 square feet or more of impervious surface and small development projects that create and/or replace > 2,500 ft^2 to <10,000 ft^2 impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development. This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small; however, the cumulative impacts could be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees.

Provision C.3.j. (Green Infrastructure Planning and Implementation) requires Permittees to complete and implement a Green Infrastructure Plan (Plan) for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements.

The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff Total Maximum Daily Load (TMDL) wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is in lieu of expanding the definition of Regulated Projects prescribed in Provision C.3.b.ii. to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. However, subsequent permits may include different impervious surface thresholds or other criteria for Regulated Projects. The Plan also provides a mechanism to establish and implement alternative or in lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.ii.

Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and

evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

The Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash and PCBs, mercury, and other pollutants. Permittees may comply with any requirement of this Provision through a collaborative effort.

Provision C.3.j.i.(1) This Provision requires each Permittee to prepare a framework or workplan that describes specific tasks and timeframes for developing its Green Infrastructure Plan. The framework or workplan is required to be approved by each Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. This approval process provides assurance to the Water Board that Permittees are committed to the development of the Plan and implementation of green infrastructure.

Provision C.3.j.i.(2) This Provision specifies minimum elements that each Green Infrastructure Plan must contain to ensure that each Plan is robust and appropriately identifies the means and methods that each Permittee will employ to implement green infrastructure over time. These minimum elements (discussed below) are not overly prescriptive, so as to allow Permittees flexibility in developing their Plans.

(a) A mechanism to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area specific basis. Implementation of these projects is required to be projected over the same timeframes as specified in Provisions C.11. and C.12. for assessing mercury and PCB load reductions because green infrastructure and projects are an acknowledged means of pollutant load reductions. Each Permittee has flexibility in choosing the mechanism as long as it includes criteria for prioritization and outputs that can be incorporated into its long-term planning and capital improvement processes.

(b) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the same timeframes as specified in Provisions C.11. and C.12. for assessing mercury and PCB load reductions. These self-determined targets represent the green infrastructure work that each Permittee has proactively identified will be completed beyond what would be completed in its community anyway.

(c) A process for tracking and mapping completed projects, public and private, and making the information publicly available. Again, each Permittee has flexibility in what they use to comply with this Provision.

(d) General guidelines and standard specifications for overall streetscape and project design and construction to ensure that projects have a unified, complete design that implements the range of functions associated with the projects. These

guidelines and standard specifications, while crucial to a Green Infrastructure Plan, already exist in many reference documents for green infrastructure design and are readily available.

(e) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. In recognition of space and drainage constraints that may occur for public green infrastructure road projects not subject to Provision C.3.b.ii. (i.e., non-Regulated Projects), this Provision allows Permittees to collectively propose a single approach for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements. The single approach can include different options to address specific issues, constraints, or scenarios.

(f) A summary of the planning documents the Permittee has updated or otherwise modified as well as how the Permittee will ensure that green infrastructure requirements will be included in future plans. The purpose of this element is to show that each Permittee is considering green infrastructure in all aspects of its urban planning.

(g) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation.

(h) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, state, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.

At U.S. EPA's request, Water Board staff has included at the end of this Fact Sheet section an outline of information used in part by MS4 permittees in the Los Angeles area in their preparation of watershed management plans. We recommend that Permittees consider this information as they prepare Green Infrastructure Plans.

Provision C.3.j.i.(5) requires each Permittee to document in its 2017 Annual Report that the framework or workplan for development of its Green Infrastructure Plan was approved by June 30, 2017, as required by Provision C.3.j.i.(1). This Provision also requires each Permittee to submit its Green Infrastructure Plan and documentation of the legal mechanisms to implement the Plan with the 2019 Annual Report. Based on other cities' past experiences in developing Green Infrastructure Plans, Water Board staff believes the deadlines specified provide adequate time for each Permittee to complete the framework or workplan as well as the Green Infrastructure Plan itself. Allowing the entire permit term to complete the Green Infrastructure Plans is too much time and prevents any of the Plans from being used by Board staff to inform the development of the MRP in the next permit term.

Provision C.3.j.ii.(1) requires each Permittee to prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation that have potential for green infrastructure measures.

Provision C.3.j.ii.(2) requires the list to be submitted with each Annual Report along with a summary of planning or implementation status for each public green

infrastructure project and each private green infrastructure project that is not also a Regulated Project under Provision C.3.b.ii. This Provision also requires each Permittee to include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, the Permittee is required to submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

The purpose of Provision C.3.j.ii. is to ensure that each Permittee is proactively developing green infrastructure projects and including green infrastructure elements into already planned infrastructure projects as much as possible, while the Green Infrastructure Plan is being developed.

Provision C.3.j.iii. requires the Permittees, individually or collectively, to track processes, assemble and submit information, and provide information, materials, and presentations as needed to assist relevant regional, state, and federal agencies to plan, design , and fund green infrastructure measures into local infrastructure projects, including transportation projects.

Provision C.3.j.iv. requires the Permittees, individually or collectively, to develop and implement regionally-consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.

Attachment A to U.S. EPA's Comments on the May 11, 2015 Tentative Order Suggested Components of Green Infrastructure Plans

Outlined below are some potential ideas for Green Infrastructure (GI) plans.to be developed by Bay Area permittees during MRP 2.0. Components provided below primarily arise from Los Angeles Regional Water Board guidance for reasonable assurance in watershed management plans as part of MS4 permit. Many components, but perhaps not all, will be applicable to GI plans for Bay Area. EPA encourages the Water Board to consider these ideas, modify as they deem appropriate, and include similar description of GI framework in the MRP 2.0 Fact Sheet. We recognize the continued partnership of MS4 permittees, the Water Board, EPA, and other stakeholders to discuss these ideas prior to inclusion into final GI plans.

A. Identify the water quality priorities with watershed.
   1. Include any applicable required water quality milestones and compliance deadlines
   2. Describe watershed features, waterbodies any other relevant environmental setting information
   3. Outline other municipal specific goals to be addressed; e.g., flood risk, sea level protection, groundwater infiltration.

B. Describe current BMPs and estimate existing pollutant loads
   1. List pollutant sources in watershed
   2. Provide map of major MS4 outfalls
   3. List any current BMPs within watershed (structural and non-structural)
   4. Using existing data (up to 10 yrs), give estimates of pollutant loads from watershed. (could be cone-based if no flow measurements available)
   5. Define on pollutant specific basis
   6. To extent data available and feasible, assess critical condition loads
   7. Describe variability of estimations.

C. Estimate required pollutant load reductions
   1. To extent feasible, provide estimate of pollutant load reductions, if mass-based then calculate difference between current and allowable loads; if concentration- based then define the two values.

D. Identify future control measures/BMPs/strategies to be implemented
   1. Describe drainage areas for implementation
   2. Identify control measures for stormwater and non-stormwater discharges; include number, location(s) and type; i.e., structural or non-structural controls, within new development, retrofit of existing development, stream/habitat restoration projects,
   3. Clarify pollutants to be addressed
   4. Define/map location of each control measure in watershed/jurisdiction
   5. Quantify upstream drainage area captured by each BMP
   6. Clarify if municipal effort only, private efforts or public/private projects
   7. Identify if project is within local jurisdiction or regional and describe cities involved.

E. Provide schedule of implementation
   1. Identify interim milestones and dates for achievement (within this permit cycle)
   2. Identify all future and final dates for achievement

3. Demonstrate that existing and future control measures will yield final pollutant load reductions and/or meet receiving water limits.

F. Provide Pollutant Reduction Plan
   1. Identify compliance points (should be consistent with any existing regulatory compliance locations; e.g., TMDL monitoring sites expected to assess compliance)
   2. Consider assessment locations in association with MS4 outfalls to monitor pollutant load responses due to upstream control measures.
   3. Describe and evaluate selected control measures - appropriate for pollutant and sizing for load capture
   4. Demonstrate selected control measures have reasonable assurance to meet interim/final requirements.
   5. Describe adaptive management process if pollutant milestones are not met and added BMPs are needed
   6. Include timeframe for future re-assessments.

G. If model used, provide description of watershed model
   1. Identify model type; e.g., watershed, receiving water, BMP performance, empirical
   2. Provide (minimum required) model components: input data, parameters, BMP performance parameters, output
   3. Describe model calibration acceptance criteria
   4. Describe efficiency for BMP performance parameters
   5. Demonstrate model outputs for existing pollutant loads will be addressed by combination of control measures/BMPs to achieve final milestones.

H. Describe corresponding water quality monitoring program
   1. Identify parameters of concern, all monitoring sites, sampling frequency (including wet and dry weather events)
   2. Clarify which monitoring sites are MS4 outfalls
   3. Briefly describe analytical methods and QA procedures to support monitoring
   4. Describe any future monitoring locations and anticipated timeframe of data collection
   5. Briefly describe pollutant sources upstream of monitoring sites.

I. Identify post-implementation tracking assessment efforts
   1. Once completed, describe the BMPs implemented, including any modifications from original project design
   2. Describe assessment procedures for evaluating effectiveness of control measure and corresponding pollutant load reductions for each implemented BMP, as necessary
   3. Provide schedule for re-evaluation of BMP load reductions over long term.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires "[a] description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system." Other specific legal authority is cited below.

Specific Provision C.4. Requirements

Provision C.4. has been revised from the Previous Permit so that related topics are grouped together better. A new Provision C.4.d. – Inspections has been created. It essentially consolidates, from the Previous Permit, the inspection requirements in Provision C.4.d. – Inspection Plan and Provision C.4.c. – Enforcement Response Plan.

Provision C.4.a (Legal Authority)

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Provision C.4.b (Inspection Plan)

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit continues to require Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "[p]rovide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

The Permit continues to require Permittees to identify various industrial sites and sources subject to the Industrial General Permit or other individual NPDES permit. U.S. EPA supports the municipalities regulating industrial sites and sources that are already covered by an NPDES permit:

> Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.[23]

And:

> Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, USEPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.[24]

This Permit does not require the Permittees to submit the list of facilities scheduled for inspection each year with annual reports. Instead, Permittees are to add each year's inspection list to the Inspection Plan as part of the annual update to the Inspection Plan. Permittees may choose to keep their annual lists in their databases or in electronic form. The annual lists must be made readily available to Water Board staff or its representatives upon request.

Water Board staff reviewed about 20% of the Permittees' Inspection Plans during the Previous Permit term. A few of those Inspection Plans also provide detailed flow charts or instructions on how to conduct inspections, fill out the inspect forms, execute enforcement actions, conduct follow-up, and fulfill tracking and reporting for the MRP. These comprehensive Inspection Plans help ensure inspection consistency and serve as excellent training documents for new inspection staff.

Provision C.4.c (Enforcement Response Plan) requires the Permittees to implement and update, as needed, their Enforcement Response Plan (ERP) that serves as a reference for inspection staff to take consistent and timely responses to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for

[23] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48056
[24] Ibid

implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP. ERPs are unique to each Permittee. As such, this Permit continues to have broad requirements for the ERP. This allows the individual Permittee maximum flexibility to customize the ERP to fit its legal authority and the way it does business. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Short timeframes for implementing corrective actions encourage businesses to take care of the issues promptly, thus prevent mobilizing potential discharges. Permittees must also require immediate cessation of active non-stormwater discharges, timely implementation of corrective actions to clean up the discharge, and implementation of measures to prevent future active discharges.

This Permit standardizes and clarifies the ERP requirements in provisions C.4., C.5, and C.6. to eliminate any ambiguity in the requirements.

Provision C.4.d (Inspections) takes the inspection requirements from the Previous Permit's Provision C.4.b. Inspection Plan and C.4.c. ERP and consolidates them together into this Provision. Inspection frequencies are determined by each Permittee in its Inspection and Enforcement Response Plans.

U.S. EPA guidance states "management programs should address minimum frequency for routine inspections." The U.S. EPA Fact Sheet—Visual Inspection says "[t]o be effective, inspections must be carried out routinely."[25]

Permittees have asked that this Permit reduce the record keeping and reporting requirements. The specific record keeping requirements are minimal information that needs to be recorded for each inspection and it is essential to document each inspection to develop a history for the facility. Water Board staff evaluations of MS4 programs showed that many Permittees have very comprehensive inspection database records. Annual reports need to provide enough information to show compliance. During the Previous Permit term, annual reports showed few violations for the corresponding number of inspections completed. This did not match with the field inspection experience of Water Board staff. Further investigation showed that some Permittees do not consider potential discharges to be violations.

The Previous Permit exempted verbal warnings from being reported in the annual reports. Water Board staff expected verbal warnings to have very limited use and only given for very minor issues that do not warrant anything in writing. However, from Water Board inspections, and annual report and ERP reviews, we concluded that many Permittees report minimal violations for the number of inspections completed because only observed non-stormwater discharges were considered violations and issued some type of written enforcement action. Potential discharges were all given verbal warnings and it was unclear if these potential discharges were corrected in a timely manner because there was no written documentation on the potential discharges or verbal warnings issued. Examples of potential discharges include housekeeping issues, evidence of actual non-stormwater discharges that are not ongoing during an inspection, lack of BMPs,

[25] U.S. EPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection."

inadequate BMPs, and inappropriate BMPs. Potential discharges need timely corrective actions.

Some Permittees feel that a 10-business day window to implement corrective action is not necessary and even unreasonable during the dry months for potential discharges and especially for minor potential discharges. Permittees have the discretion to add a rationale for allowing a longer time period, especially for corrective actions that require things such as capital improvements, revisions to standard operating procedures, and staff training. However, Water Board staff thinks that prompt implementation of corrective actions for most potential discharges minimizes the risk of potential discharges becoming actual discharges when things are knocked over, when the area is hosed with water, and/or during the next rain event. The Water Board staff has been told by a couple of Permittees that they prefer shorter corrective action timeframes because sites tend to take care of them right away versus forgetting about the corrective actions when given a longer corrective action timeframe. Throughout the Previous Permit term, Water Board staff asked Permittees for a list of minor potential discharges. The only minor issue listed was open dumpster/garbage can lids. Water Board staff concurred that open dumpster/garbage can lids is minor, can be corrected immediately, and would not require any additional follow-up. Water Board industrial and construction inspectors consider open dumpster/garbage can lids and small amounts of trash/debris on the ground to be minor violations that can quickly be corrected, because staff at the industrial or construction sites can immediately cover the dumpsters and pick up and appropriately dispose of the trash. Water Board inspectors note those issues and corrective actions in their inspection reports. This Permit now requires reporting of all potential and actual non-stormwater discharges based on the enforcement levels in each Permittee's ERP, so that Water Board staff can evaluate whether Permittees are conducting appropriate followup.

This Permit becomes effective half way through the 2015-2016 reporting year. The reporting requirements for this Permit are slightly different than the reporting requirements for the Previous Permit. In response to the Permittees commenting on the difficulties of reporting under two different permits, this Permit, C.4.d.iii.(1), continues the reporting requirements from the Previous Permit to the end of the 2015-2016 reporting year. The new reporting requirements, C.4.d.iii.(2), become effective the 2016-2017 reporting year.

Provision C.4.f (Staff Training) section of the Permit requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application "[t]he location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have adequate legal authority to "[p]rohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(F) provides that the Permittee shall have adequate legal authority to "[c]arry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires that the Permittee have a " description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires a "program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires a "description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires a "description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires a "description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires a "description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires a "description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Illicit discharges that are not comprised entirely of stormwater are not authorized to enter the MS4 and are considered to be illicit discharges, unless authorized by a separate NPDES permit, or exempted or conditionally exempted in Provision C.15.

C.5-2 Every Permittee must have the ability to effectively prohibit non-stormwater discharges to the MS4 by actively detecting and eliminating illicit discharges and disposal into its MS4.

C.5-3 Illicit discharges to the storm drain system can be detected in several ways. Permittee staff can detect discharges during their course of other tasks, and business owners and other aware citizens can observe and report suspect discharges. The Permittee must have a direct means for these reports of suspected polluted discharges to the MS4 to be received, responded to in a timely manner, and to receive adequate documentation, tracking, and response through problem resolution.

Removal of Routine Collection System Screening Requirement

The Previous Permit required the Permittees to perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets, and catch basins, to seek and eliminate illicit connections and discharges. The results of the screenings were reported in annual reports. No illicit connections were reported. However, Permittees have found illicit discharges during the screenings and they were cleaned up. It is unclear if personnel conducting the screenings reported these illicit discharges to the illicit discharge staff for investigation and tracking. We have added language to C.5.c. – Spill, Dumping, and Complaint Response Program to ensure that illicit discharges found by municipal staff conducting routine maintenance and inspection activities on the collection system are reported to the illicit discharge staff for investigation and tracking. This is based on the federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3), which requires "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to prohibit illicit discharges to storm sewers as required by federal regulations at 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in a discharge into the MS4 that is not comprised entirely of stormwater. Every Permittee must have the ability to discover, inspect, enforce its ordinance, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (ERP) requires Permittees to implement and update, as needed, their ERP to ensure consistent and timely response to illicit discharges and connections to the MS4. The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) follow-up inspection, (3) referral to another agency, (3) appropriate time periods for implementation of corrective actions, and (4) the roles and responsibilities of staff responsible for implementing the ERP. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Permittees must also require immediate cessation of active discharges, and timely implementation of corrective actions to clean up the discharge and implementation of measures to prevent future active discharges.

Water Board staff reviewed more than half of the Permittees' ERPs during the Previous Permit term. Almost all of those Permittees have one ERP to satisfy the ERP requirements in provisions C.4., C5., and C.6. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in the Previous Permit. Therefore, the ERP requirements in this Permit are standardized in provisions C.4., C5., and C.6.

Provision C.5.c (Spill, Dumping, and Complaint Response Program) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spills, dumping, and complaints reporting. Reports from the public and other Permittee staff are an essential tool in discovering and investigating illicit discharge activities into the MS4. Maintaining contact points will help ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a means to adequately track the suspected polluted discharges from reporting through problem resolution.

Provision C.5.d (Tracking and Case Followup) section of the Permit requires Permittees to track and monitor followup for all incidents and discharges reported to the spills, dumping, and complaint response system that could discharge into the MS4. This requirement is included so Permittees can demonstrate compliance with the ERP requirements in Provision C.5.b and to ensure that illicit discharge reports receive adequate follow up through to resolution.

All municipalities, counties, district, and other public entities that own or operate sanitary sewer systems greater than one mile in length that collect and/or convey untreated or partially treated wastewater to a publicly owned treatment facility in California are

required to report sanitary sewer overflows to the California Integrated Water Quality System Project pursuant to the State Water Board's Order No. 2006-003-DWQ (Statewide General Waste Discharge Requirements for Sanitary Sewer Systems) and Order WQ 2013-0058-EXEC (Adopting Amended Monitoring Requirements for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems order. Sewage discharges that are reported to the California Integrated Water Quality System Project do not need to be tracked and reported in Provision C.5.

Provision C.5.e (Control of Mobile Sources) requires each Permittee to implement a program to reduce the discharge of pollutants from mobile businesses. The purpose of this section is to implement oversight and control of pollutants associated with mobile business sources to the MEP. The Previous Permit required Permittees to develop and implement a program to reduce the discharge of pollutants from mobile businesses. Water Board staff evaluated five Permittees' implementation of Provision C.5., which included Provision C.5.e. – Control of Mobile Sources. Water Board staff evaluated one Permittee in each of the five counties with Permittees covered under the Previous Permit. Three of the Permittees evaluated complied with this Provision. It was evident that they had put in the thought and actions to comply. Two of the Permittees evaluated did not comply with this Provision. They were dependent on the county-wide and/or regional programs to implement this Provision for them. The regional program was supposed to expand the existing regional Surface Cleaner Training and Recognition Program to include two new mobile business categories: automotive washing and carpet cleaning; develop marketing materials, training videos, and self-test applications for those two new mobile business categories; create Spanish tracks of the information for each new business type; and create a web-based application to share information about mobile businesses among the Permittees. At the time of the 2013-2014 Annual Report, none of those regional tasks had been completed. In order to understand what Permittees are doing to control pollutants from mobile sources, this Permit continues the requirements of the Previous Permit and collects data on each Permittee's implementation of the provision.

Provision C.5.f (Municipal Separate Storm Sewer System (MS4) Map) As part of the permit application process, federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[26] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[27] All Permittees have complied with this requirement. This Permit

[26] 40 CFR 124.3 (applicable to state programs, see section 123.25).
[27] 40 CFR 122.26(d)(1)(iv)(E).

continues to require the Permittees to advertise the availability of the maps of their MS4 system and to make available these maps to the public upon request.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires "[a] description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires "[a] description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires "[a] description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires "[a] description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires "[a] description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "[t]he following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: [...] (x) Construction activity including cleaning, grading and excavation activities [...]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed the natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants, such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as stop work orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into the MS4 and then into receiving waters. According to the 2004 National Water Quality Inventory,[28] States and Tribes report that sediment is one of the top 10 causes of impairment of assessed rivers and streams, next to pathogens, habitat alteration, organic enrichment or oxygen depletion, nutrients, metals, etc. Sediment impairs 35,177 river and stream miles (14% of the impaired river and stream miles). Sources of sedimentation include agriculture, urban runoff, construction, and forestry. Sediment runoff rates from construction sites, however, are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[29]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management, and non stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority.

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[28] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[29] U.S. EPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure*. EPA 833-F-00-008. Fact Sheet 2.6.

In its Phase II Compliance Assistance Guidance, U.S. EPA says that "[i]nspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[30] To issue warnings and assess penalties during inspections to achieve timely corrective actions from sites, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to implement and update, as needed, its Enforcement Response Plan (ERP), which serves as a reference for inspection staff to take consistent actions and timely response to achieve effective, timely corrective compliance from all public and private construction site owners/operators.

U.S. EPA supports enforcement of ordinances and permits at construction sites, stating "[e]ffective inspection and enforcement requires [...] penalties to deter infractions and intervention by the municipal authority to correct violations."[31] In addition, U.S. EPA expects permits issued to municipalities to address "weak inspection and enforcement."[32] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program. Prior to the issuance of the Previous Permit, Water Board staff had noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. Therefore, the Previous Permit required Permittees to develop ERPs.

The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP. ERPs are unique to each Permittee. As such, this Permit continues to have broad requirements for the ERP. This allows the individual Permittee maximum flexibility to customize the ERP to fit its legal authority and ordinary business practices. Permittees must require immediate cessation of active non-stormwater discharges, timely implementation of corrective actions to clean up the discharge, and implementation of measures to prevent future active discharges. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Construction sites are required by the statewide NPDES General Permit for Stormwater Discharges Associated with Construction Activities (Construction General Permit) to keep supplies on hand to address BMP issues rapidly. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access an eroded area. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. The Permittees' tracking data needs to provide a rationale for the longer compliance timeframe.

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[30] U.S. EPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, pp.4-31

[31] U.S. EPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.

[32] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p.48058.

Water Board staff reviewed more than half of the Permittees' ERPs during the Previous Permit term. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in the Previous Permit. Therefore, this Permit standardizes and clarifies the ERP requirements in provisions C.4., C.5., and C.6. to eliminate any ambiguity in the requirements.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round seasonally appropriate effective BMPs in the following six categories: (1) erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories are listed in the Construction General Permit. The Water Board decided it was too prescriptive and inappropriate to require a specific set of BMPs that are to be applicable to all sites. Every site is different with regards to terrain, soil type, soil disturbance, and proximity to a waterbody. The Construction General Permit recognizes these different factors and requires site-specific BMPs through the (SWPPP), which addresses the six specified BMP categories. This Permit similarly allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate. This Permit also allows the Permittees and the project proponents the necessary flexibility to make immediate decisions on appropriate, cutting-edge technology to prevent the discharge of construction pollutants into storm drains, waterways, and rights-of-way. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals. Therefore, this Permit is consistent with the Construction General Permit in its requirements for BMPs in the six specified categories.

Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff into the MS4, and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed the natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This can even occur in conjunction with unexpected rain events during the dry season (defined as May 1 through September 30). Although rare, significant rains can occur in the San Francisco Bay Region during the dry season. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the whole year, including during the dry season.

Normally, stormwater restrictions on grading should be implemented during the wet season from October 1 through April 30. Section C.6.c.ii.(1).d of the Permit requires "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent feasible." If grading does occur during the wet season, Permittees shall require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

Slope stabilization is necessary on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. These

requirements are necessary because unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. "Steep slopes are the most highly erodible surface of a construction site, and require special attention."[33] U.S. EPA emphasizes the importance of slope stabilization when it states "slope length and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[34] In lieu of vegetation preservation or replanting, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[35] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, Permittees must ensure that slope stabilization is implemented on sites, as appropriate.

It is also necessary that Permittees ensure that construction sites are revegetated as early as feasible. Implementation of revegetation reduces the threat of polluted stormwater discharges from construction sites. Construction sites should permanently stabilize disturbed soils with vegetation at the conclusion of each phase of construction.[36] A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[37] U.S. EPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[38]

To ensure the MEP standard and water quality standards are met, active treatment systems may be necessary at some construction sites. Requirements for active system requirements are located in the Construction General Permit, Attachment F.

Provision C.6.d. Plan Approval Process. This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures. U.S. EPA states that it is often easier and more effective to incorporate stormwater quality controls during the site plan review process or earlier.[39] In the Phase I stormwater regulations, U.S. EPA states that a primary control technique is good site planning.[40] U.S. EPA goes on to note that the most efficient controls result when a comprehensive stormwater management system is in place.[41] To determine if a construction site is in compliance with construction and grading ordinances and permits, U.S. EPA states that the "MS4 operator should review

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33 Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.
34 U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
35 Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection*. p. 5.
36 Ibid.
37 Ibid. p. 11.
38 U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
39 U.S. EPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 6.3.2.1.
40 *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.
41 Ibid.

the site plans submitted by the construction site operator before ground is broken."[42] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[43]

Provision C.6.e. (Inspections) The Water Board allows flexibility on the legal authority language, ERP, and BMPs required on a site. This section of the Permit pulls together the accountability of the whole Provision through regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the storm drain and waterbodies.

This section clearly identifies the level of effort necessary by Permittees to minimize construction pollutant runoff into storm drains and ultimately, waterbodies, including tracking and reporting sufficient to demonstrate and document Permittee compliance.

This section requires monthly inspections during the wet season of all construction sites disturbing one or more acre of land, all hillside projects, and all high priority sites determined by the Permittee or the Water Board to be significant threats to water quality. Inspections must focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six BMP categories. Each Permittee must implement its ERP and require timely corrections of all actual and potential problems observed. All corrective actions must be implemented before the next rain event, but no longer than 10 business days after the violations are discovered. A longer time period to implement corrective actions is allowed with a reasonable rationale. All inspections must be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format.

The Previous Permit required Permittees to have the legal authority to require effective construction stormwater controls at all construction sites, regardless of the amount of soil disturbed. Water Board staff has observed disturbed construction sites where minimal BMPs were being implemented, and has seen stormwater transport construction site pollutants into the storm drain. For these reasons, ideally, all construction sites with a grading permit from a Permittee should have stormwater inspections during the rainy season to ensure adequate BMPs are implemented and construction pollutants are not entering the storm drain. Construction sites with steeper slopes pose a more-significant threat of discharging construction-related pollutants to the storm drain because they are likely to have higher runoff velocities and because their BMPs must be more robust and more-robustly installed and maintained in order to control pollutants, as compared to less-steep sites. Water Board staff has observed storm water move sediment and other construction-related pollutants into storm drains at sites ranging from those with flat slopes to those with slopes greater than 15%. Because of the relatively greater threat posed by steeper sites, this Permit adds a specific requirement to inspect all hillside projects disturbing greater than or equal to 5,000 square feet of soil. For those Permittees that do not have a hillside development

[42] U.S. EPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 4.6.2.4, pp. 4–30.

[43] Ibid. pp. 4–31.

map or definition, this Permit defines hillside development as development occurring on land with a slope greater than or equal to 15%.

The Previous Permit required Permittees to report the number of violations fully corrected prior to the next event, but no longer than 10 business days after the potential and actual discharges are discovered or otherwise considered corrected in a timely, though longer period. This proved challenging for many Permittees because they track enforcement actions and not discreet violations. While Water Board staff does want to understand how many potential and actual discharges are discovered and resolved in a timely manner, this would require significant changes in databases for some Permittees. The big picture of how many violations or enforcement actions for annual reporting will suffice, as inspection forms are available for more detailed review. Therefore, this Permit allows Permittees to either report by enforcement actions or discreet number of potential and actual discharges.

The Permittees asked that this Permit reduce the reporting since all of the tracking data are available to Water Board staff. This Permit reduces the reporting to what is minimally necessary to provide meaningful data and demonstrate permit compliance.

This Permit becomes effective half way through the 2015-2016 reporting year. The reporting requirements for this Permit are slightly different than the reporting requirements for the Previous Permit. In response to the Permittees commenting on the difficulties of reporting under two different permits, this Permit, Provision C.6.e.iii.(1), continues the reporting requirements from the Previous Permit to the end of the 2015-2016 reporting year. The new reporting requirements, C.6.3.iii.(3), become effective the 2016-2017 reporting year.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct annual staff trainings for municipal staff. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires "[a] description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Finding in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.[44]

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.

[44] U.S. EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[45]

Removal of Media Relations

The Previous Permit had specific requirements for Permittees to participate in or contribute to a media relations campaign. This Permit removes these specific requirements to allow Permittees more flexibility on how to conduct public outreach on different stormwater runoff pollution messages that they feel are most urgent. It is anticipated that Permittees will continue to use public service announcements, social media, and other free media as part of the public outreach required in Provision C.7.b.

Specific Provision C.7 Requirements

Provision C.7.a. Storm Drain Inlet Marking. Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, it is important to set a goal of ensuring that all municipally-maintained inlets are legible labeled with a no dumping message. If storm drain marking can be conducted as a volunteer activity, it has additional public involvement value.

Provision C.7.b. Outreach Campaigns. Permittees have long been implementing outreach campaigns to educate their residents on different stormwater runoff pollution prevention messages. The Permit requires a minimum of one public outreach campaign. It is anticipated that the Bay Area Stormwater Management Agencies Association (BASMAA) will continue implementing the *Our Water, Our World* pesticide use reduction outreach campaign. It is anticipated that individual Permittees, and/or their respective countywide program, and/or BASMAA, will either continue existing public outreach campaigns or start new ones. This Permit removes specificity regarding the expected public outreach campaigns and how they must be conducted. This recognizes that the Permittees have decades of public outreach experience and allows maximum flexibility to best reach their residents regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate the problems caused, and positively influence waste disposal practices and runoff pollution generation by encouraging the implementation of appropriate solutions. Permittees can utilize various electronic and print media, and paid and free media to best reach the different various target audiences. This Permit still requires an effectiveness assessment/evaluation after each outreach campaign. This provides the opportunity for the Permittees to evaluate whether they have best reached residents with the utilized stormwater pollution prevention messages in the outreach campaigns and how to move forward with future outreach campaigns.

Provision C.7.c. Stormwater Pollution Prevention Education. As the public becomes more aware of water quality issues and how certain behaviors negatively impact stormwater runoff, they will need more information on how to minimize stormwater

[45] U.S. EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

pollution. The Previous Permit required Permittees to have and publicize a centralized stormwater point of contact to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives. The Permittees already disseminate numerous brochures, pamphlets, and fact sheets on a number of different stormwater pollution prevention messages which have a stormwater point of contact on them. Some Permittees also have these materials in other languages to reach their populations for whom English is not a first language. Many Permittees have also placed these pollution prevention materials on their websites. Since citizens increasingly use the internet to search for information, this Permit goes further to require all Permittees to place information on watershed characteristics and stormwater pollution prevention materials on their websites.

Provision C.7.d. Public Outreach and Citizen Involvement Events. This Permit combines Public Outreach and Citizen Involvement. Permittees need informed citizens to influence positive stormwater pollution behavior. Therefore, Permittees need to continue communicating with a broach spectrum of citizens with stormwater pollution prevention information through long-established outreach mechanism such as staffing tables or booths at fairs, street fairs, and other community events. Permittees shall continue utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events, such as the Bringing Back the Natives Garden Tour. Combining Citizen Involvement Events with Public Outreach in this Permit does not minimize the importance of Citizen Involvement in events such as creek cleanups and restorations. It is important to provide opportunities for citizens to actively practice being good stewards of our environment. The combined specified numbers of events for Public Outreach and Citizen Involvement in this Permit are, for the most part, slightly less than the combined specified numbers in the Previous Permit. However, many Permittees claimed credit for both public outreach and citizen involvement for a number of events each year. In addition, this Permit has new requirements for each Permittee to have and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website and to advertise this website. It is anticipated that this website will provide the needed stormwater pollution prevention information to citizens more readily.

Provision C.7.e. Watershed Stewardship Collaborative Efforts. Watershed and Creek groups are comprised of active citizens, but they often need support from the local jurisdiction and certainly need to coordinate actions with Permittees such as flood districts and cities.

Provision C.7.f. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision-makers and consumers.

Provision C.7.g. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform Municipal Officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA § 308; Federal NPDES regulations 40 CFR §§122.26(d)(2), 122.41(h), (j)-(l), 122.42(c), 122.44(i), and 122.48.

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program and submit reports as required under Federal NPDES regulations cited above. CWC Section 13383 further authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements.

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of WQBELs that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, U.S. EPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[46]

According to U.S. EPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

- Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;
- Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.[47]

C.8-2 Provision C.8 requires Permittees to conduct water quality monitoring, including ambient monitoring and monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management actions pursuant to this Permit and, accordingly, demonstrate

[46] U.S. EPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf

[47] U.S. EPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

- Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;
- Characterize stormwater discharges;
- Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;
- Assess progress toward reducing receiving water concentrations of impairing pollutants;
- Assess compliance with numeric and narrative water quality objectives and standards;
- Identify sources of pollutants;
- Assess stream channel function and condition, as related to urban stormwater discharges;
- Assess the overall health and evaluate long-term trends in receiving water quality; and
- Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-3 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the Maximum Extent Practicable (MEP) standard where applicable. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1, Water Quality Standards Exceedances, could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs, and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-4 Under the CWA, NPDES permits must contain conditions that require both monitoring and reporting of monitoring results to ensure compliance. (See 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1)-(2).) The regulations provide, in pertinent part:

> *In addition to the conditions established under §122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable.*
>
> > *(i) Monitoring requirements. In addition to § 122.48, the following monitoring requirements:*
> >
> > *(1) To assure compliance with permit limitations, requirements to monitor:*

(i) The mass (or other measurement specified in the permit) for each pollutant limited in the permit;

(ii) The volume of effluent discharged from each outfall;

(iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f); frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.

(iv) According to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR part 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter 1, subchapter N or O. . . .

(2) Except as provided in paragraphs (i)(4) and (i)(5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. . . .

*40 C.F.R. § 122.44(i)(1)-(2). This section allows "for monitoring other than mass or volume, namely some 'other measurement specified in the permit [ ] for each pollutant limited in the permit.'" (NRDC v. U.S.EPA, No. 13-1745, 2015 WL 5780393 at *20 (2nd Cir. Oct. 5, 2015).) The regulations at 40 C.F.R. § 122.48 state that all permits specify the "[r]equired monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring."*

Consistent with the federal regulations, water quality monitoring requirements in Provision C.8 require specific monitoring that will yield data that is both representative of the monitored activity and necessary to assure compliance with the requirements of the Permit, as described below.

C.8 requires monitoring[48]:

(1) At or near outfalls during storm events to obtain flow-weighted concentrations (mass) of pollutants of concern. Flow-weighted monitoring is required to assess progress on attaining TMDLs, including assuring compliance with the required load reductions in the permit (C.8.f. Pollution of Concern Monitoring). This monitoring supports estimates of MS4 pollutant loads to receiving waters and requires data collection to support planning for control actions. The latter includes monitoring effectiveness of control measures and identifying pollutant source areas; and

[48] Provisions C.2-C.4, C.6, C8, C.10, C.13-C.16 contain additional monitoring and reporting requirements to assure compliance with the requirements therein.

(2) In receiving waters during wet and dry weather to assess the physical, chemical and biological impacts of MS4 discharges to urban streams (C.8.d. Creek Status Monitoring).

Creek Status Monitoring requires receiving water monitoring of the types, frequencies and intervals sufficient to yield information on the physical, chemical and biological status of those water bodies. Receiving water monitoring is specified here in lieu of outfall monitoring for the following reasons. First, there are no end-of-pipe limits in the permit to measure. Instead, the permit requires, for example, PCB load reductions; outfall monitoring would not allow the Board to assess whether the PCB limits are met. Second, there are hundreds if not thousands of outfalls in the Permittees' jurisdictions and it is impractical to monitor every single outfall due to both cost and safety concerns. Monitoring a subset of outfalls would provide information about MS4 discharges at those specific locations at only one limited point in time, which leads to the third point that outfall monitoring is time- and spatially limited. In contrast, the required receiving water monitoring integrates the physical, biological and chemical effects to the water body of all MS4 discharges from multiple outfalls over multiple storms (i.e., time and space), yielding more useful data than outfall monitoring to determine compliance with the permit. Receiving water monitoring is done in a probabilistic or rotating basis, depending on the parameter, again yielding more useful data than fixed-location monitoring. Also, both dry weather and storm flows are addressed in receiving water monitoring, whereas outfall monitoring is normally conducted only during storm events. Dry weather discharges can constitute a significant portion of annual pollutant loadings from storm systems in urban areas (NRC 2008).

To provide an example of how receiving water monitoring better captures permit compliance, consider an illicit discharge of chloramine from a swimming pool to an MS4. Both outfall and receiving water monitoring could detect the discharge. However, outfall monitoring would need to be done at the exact location and time of an illicit discharge otherwise it would go undetected, because the discharge would have moved through the outfall and into receiving waters. In contrast, receiving water monitoring could detect chloramine for a longer period of time (depending on pH, organic carbon and temperature) from upstream outfalls to the point where dilution prevents detection. Chloramine can be fairly stable and could be detected in urban waters in summer months, when outfall monitoring is generally not conducted. Receiving water monitoring, which is required in both dry and wet weather, can and has detected chlorine (a break-down product of chloramine), leading to efforts to correct the illicit discharge problem.

Receiving water monitoring as a means to evaluate compliance with permit conditions is supported by the National Research Council (NRC). In *Urban Stormwater Management in the United States*, NRC states that the quality of stormwater from urbanized areas has been well-characterized.[49] Continuing

[49] National Research Council. 2008. Urban Stormwater Management in the United States.

MS4 end-of-pipe monitoring produces data of limited usefulness because of a variety of shortcomings (as detailed in the report). The NRC strongly recommends[50] that MS4 programs modify their evaluation metrics and methods to include biological and physical monitoring and an increased emphasis on watershed scale analyses to ascertain what is actually going on in receiving waters, much like what is required in the permit. Further, NRC finds that biological assessments (as required in the Permit) respond to the range of non-chemical stressors identified as being important in urban waterways including habitat degradation, hydrological alterations, and sediment and siltation impacts, as well as to the influence of nutrients and other chemical stressors where chemical criteria do not exist or where their effects are difficult to measure directly (e.g., episodic stressors).

U.S. EPA Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits notes that:

> ...storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements in water quality.

Section C.8 of this permit satisfies these two objectives by requiring monitoring that will provide Permittees with sufficient data to pinpoint sources of pollutants and assess the effectiveness of efforts to reduce pollutants, both at the source and in receiving waters.

C.8-5 The Water Quality Monitoring Provision is intended to provide answers to fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, management questions that include the following:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

C.8-6 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Water

[50] U.S. EPA has endorsed the NRC's recommendation. (See, e.g., EPA's District of Columbia MS4 Permit No. DC0000221 Fact Sheet, 2011.)

Board staff requested major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program (RMP). The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. Because the RMP monitors waters in each Permittee's jurisdiction and gathers data on the pollutants discussed in this Permit, the Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-7 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Boards, and to coordinate with other monitoring programs. Provision C.8 contains a framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources. In working cooperatively with SWAMP, Permittees can develop a monitoring program that evaluates waters in its jurisdiction and gathers data on each of the pollutants of concern discussed in this Permit.

C.8-8 In 1998, BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[51] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.

In the Previous Permit, Permittees were given the option to implement this same concept by forming a regional monitoring collaborative, which they did. In conducting some of the monitoring required in this Provision, the Regional Monitoring Collaborative (RMC) provides efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level on behalf of

[51] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

all Permittees. Further benefits are expected as more monitoring requirements are fulfilled through the RMC.

C.8-9 This Permit includes monitoring requirements to verify compliance with adopted TMDL WLAs and to provide data needed for TMDL development and/or implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-10 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local water bodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

Provision C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to achieve the following:

- Promote cost savings through economies of scale and eliminate redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality; and
- Simplify reporting.

In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

Provision C.8.b. Monitoring Protocols and Data Quality. Clean Water Act regulations (40 CFR 122.41(j)(1)) require that data submitted pursuant to a NPDES permit meet certain quality standards. To achieve this, and to obtain data of known quality that can be compared to data collected in other California urban creeks, the permit requires monitoring data be collected and analyzed in accordance with the SWAMP Quality Assurance Project Plan and Standard Operating Procedures or U.S. EPA methods. The BASMAA Regional Monitoring Coalition's Creek Status Monitoring Program Quality Assurance Project Plan (January 2014) and Standard Operating Procedures (January 2014) have been deemed to be SWAMP comparable. These two BASMAA documents may be updated to reflect the changing state-of-the-science with Executive Officer's approval.

Provision C.8.c. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.c requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the RMP. Provision C.8.c requires such monitoring to continue.

Provisions C.8.d. Creek Status Monitoring. Based on the stated goals of the CWA, Creek Status Monitoring employs a three-pronged approach to monitoring water quality which includes chemical-specific monitoring, toxicity testing, and bioassessments (U.S. EPA 1991a). Each of the three elements has distinct advantages and all three work together to ensure that the physical, chemical and biological integrity of our waters are protected. Creek Status Monitoring includes probabilistic and targeted sampling of urban creeks and serves as a surrogate to monitoring the discharge from all major outfalls. Sampling the Permittees' numerous outfalls is impractical due to costs and safety factors and the resulting data would not provide commensurately better information. By sampling the sediment, biota and water column in urban creeks, the Permittees can determine where water quality problems are occurring in the creeks, then work to identify which outfalls and land uses are causing or contributing to the problem. In short, Creek Status Monitoring is needed and useful for identifying water quality problems and assessing the health of streams; it is the first step in identifying sources of pollutants and an important component in evaluating the effectiveness of an urban runoff management program. Requirements for number, frequency and general locations of samples are established to sufficiently indicate whether water quality is supportive, or likely to be supportive, of beneficial uses and whether water quality objectives are being met, at a minimum.

Provision C.8.d.i. Biological Assessment including Nutrients and General Water Quality Parameters. Biological Assessment is needed to provide site-specific information about the health and diversity of freshwater benthic communities within a specific reach of a creek, using standard procedures developed and/or used by the SWAMP. It consists of collecting samples of benthic communities and conducting a taxonomic identification to measure community abundance and diversity. Urban creek sampling can be directly compared to a non-urban or reference creek to assess benthic community health. Biological indicators, including the California Stream Condition Index (CSCI), are developed using reference streams, so the calculation of a CSCI score at an urban site already takes comparison to reference conditions into account. This monitoring can also provide information on cumulative pollutant exposure/impacts because pollutant impacts to the benthic community accumulate and occur over time. Nutrient monitoring is necessary because recent monitoring data indicate nutrients, which can increase algal growth and decrease dissolved oxygen concentrations, are present in significant concentrations in Bay Area creeks. The sampling timeframe (generally between April 15 and June 30) is when invertebrates are developed enough to be captured in the sampling equipment but not developed enough to have emerged (flown off), and thus is the timeframe in which necessary information concerning biological integrity can be obtained.

Provision C.8.d.ii. Chlorine monitoring is needed to detect a release of potable water or other chlorinated water sources, which are toxic to aquatic life.

Provision C.8.d.iii. Temperature monitoring is needed to determine if conditions in creeks to which urban runoff is discharged are supportive of cold-water and warm-water beneficial uses, as appropriate.

Provision C.8.d.iv. Continuous monitoring of dissolved oxygen, temperature, and pH is required because these parameters are fundamental to supporting aquatic life beneficial uses and they impact the effect of pollutants in freshwater (e.g., ammonia toxicity is dependent on pH and temperature).

Provision C.8.d.v. Pathogen Indicator monitoring is needed to detect pathogens in waterbodies that could be sources of impairment to recreational uses at or near the sampling location.

Provision C.8.d. (All Parameters) **Monitoring Frequency, Duration, and Location.** Creek Status Monitoring continues to be an annual requirement for the Permittees, except for two much smaller Permittees, Fairfield-Suisun and Vallejo. For each of the Creek Status Monitoring parameters, the number or frequency of samples required is based on the relative population within the countywide stormwater program. Costs are minimized while data necessary for successful stormwater management are obtained. Monitoring durations are based on the amount of data needed to understand the potential effects related to each Creek Status Monitoring parameter. Monitoring frequencies and durations are specified for each parameter.

Creek Status Monitoring locations are to be selected on a probabilistic (random) or targeted basis, depending on the parameter, in similar fashion to SWAMP. If correctly sited, sampling stations are expected to be very useful in answering the monitoring program's management questions and meeting its goals. For this reason, Provision C.8.d. requires sample locations to be based on surrounding land use, likelihood of urban runoff impacts, existing data gaps, and similar considerations. This will help maximize the utility of the sample locations, while also providing the Permittees with adequate flexibility to ultimately choose practical Creek Status Monitoring locations.

Provision C.8.e. Stressor/Source Identification (SSID) Projects are necessary to identify sources of pollutants; identify new or emerging pollutants; and improve stormwater management actions. When Creek Status Monitoring results indicate an exceedance of a water quality objective, a temperature or toxic effect threshold, or other "trigger," these results become candidates for SSID projects. The trigger provides a threshold for considering follow up, and Permittees select which results will be followed up on via a SSID project based on criteria such as magnitude of threshold exceedance; parameter (for a variety of parameters); and likelihood stormwater management action(s) could address the exceedance. A minimum number of SSID Projects is required, rather than a SSID for every monitoring result that exceeds a "trigger" threshold. Every trigger exceedance need not result in a SSID project because (1) triggers are not water quality objectives in most cases and (2) this approach requires investigation of potential water quality issues without duplicating efforts.

Through SSID projects, Permittees must identify the source of the problem and take steps to reduce any pollutants discharged from or through their municipal storm sewer systems. This requirement conforms to the process, outlined in Provision C.1., of complying with the Discharge Prohibition and Receiving Water Limitations. The timeframes for initiating and completing follow-up actions acknowledge the realities of budgeting for these studies, some, but not all of which could require funding above the level available in a given fiscal year. If multiple "triggers" are identified through monitoring, Permittees must focus on the highest priority problems; a cap on the total number of source identification projects conducted within the Permit term is provided to cap Permittees' potential costs.

C.8.f. Pollutants of Concern[52] Monitoring. CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure the effectiveness of the TMDL point and nonpoint source control measures and the progress the water body is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.8.f. Pollutants of Concern (POC) monitoring is intended to assess inputs of Pollutants of Concern to the Bay from local tributaries and urban runoff; provide information to support implementation of TMDLs and other pollutant control strategies; assess progress toward achieving wasteload allocations (WLAs) for TMDLs; and help resolve uncertainties in loading estimates and impairments associated with these pollutants.

In particular, POC monitoring addresses five priority POC management information needs:

1) Source Identification - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

2) Contributions to Bay Impairment - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

3) Management Action Effectiveness - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;

4) Loads and Status - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and

5) Trends - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

The Permit specifies monitoring methods that can be used to address these information needs and which information needs apply to each pollutant of concern. The Permit provides flexibility in the number of samples, or level of effort, but requires minimums to be met annually and over the Permit term. The level of effort (expressed as required number of samples collected and analyzed) is similar to the level of sampling and analysis effort for pollutants of concern monitoring required in the Previous Permit term.

[52] See sections C.9, C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

The approach for POC monitoring does not specify specific monitoring locations or monitoring frequencies at those specific locations. Rather, the Permit requires that monitoring be intelligently and flexibly directed toward answering the management information needs (that apply to a given pollutant), and this flexibility allows the monitoring strategy to be adapted and improved based on information obtained from monitoring conducted early in the permit term. The flexibility also allows the Permittees to continue collecting useful information even during drought years in which conditions limit some types of data collection (e.g., storm even sampling) but not others (e.g., collection of bed sediment). As is true of Creek Status Monitoring, it is impractical to sample all of the urban runoff outfalls in the region, and these outfall data (obtained at great expense) would not provide commensurately better information relative to the management information needs for pollutants of concern. By strategically sampling the sediment and water column in urban creeks and conveyances, the Permittees can better address the five information needs stated above.

To some extent, POC monitoring builds on what we already know about pollutants in creeks (also referred to as tributaries to the Bay) and leads to more effective actions to control those pollutants. For example, we know that pesticide-related toxicity has been widespread and results from approved pesticide uses. POC monitoring for toxicity therefore is tailored to provide information on which pesticides are currently a concern to water quality; a limited number of toxicity samples provides adequate information. Other requirements for number, frequency and general locations of samples are similarly tailored to information needs.

Provisions C.8.g. Pesticides and Toxicity Monitoring. Toxicity testing provides a tool for assessing toxic effects (acute and chronic) of all the chemicals in samples of stormwater, receiving waters or sediments and allows the cumulative effect of the pollutants present in the sample to be evaluated, rather than the toxic responses to individual chemicals. Toxicity in water and on sediment also are monitored in order to determine whether the numeric targets of the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL are being achieved, and to help provide evidence on whether pesticide-related toxicity is decreasing in urban creek waters.

This subprovision combines all the pesticide and toxicity into one place, where previous permits had pesticide and toxicity monitoring in both Creek Status and Pollutants of Concern Monitoring subprovisions. This format is intended to provide for more thoughtful dry weather and wet weather sampling designs that may provide more meaningful data for the region and potentially for statewide studies. Since the Urban Creeks TMDL was adopted by the Water Board in 2005, it has become more apparent that pesticide related toxicity water quality problems are similar in urban waterways across the State. At this time, efforts have begun to develop a statewide coordinated pesticides and pesticide-related toxicity monitoring program. In addition, pesticide-related water quality issues are subject to change as different pesticide products gain market share and increase in urban usage. For these reasons, Permittees may request the Executive Officer modify, reduce or eliminate the requirements of this subprovision during the permit term, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

This Permit describes type, interval and frequency of pesticides and toxicity monitoring sufficient to yield data which are representative of both dry weather and wet weather urban runoff. Required analytes include toxicity and pesticides that are being found at or near concentrations that cause chronic or acute effects to aquatic organisms. Required test methods include the relatively recent Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136) for chronic toxicity. The test species are selected as the most sensitive species to pollutants currently known or suspected to be present in stormwater discharges. All required methods and test species are consistent with those used by SWAMP as well as those required in other California MS4 permits, including the statewide Caltrans permit.

The non-pesticide pollutants arsenic, cadmium, chromium, copper, lead, nickel, and zinc are included in this subprovision in order to facilitate the synoptic collection of these pollutants in sediment with toxicity in sediment during the dry season.

C.8.h. Reporting. CWC section 13383 provides authority for the Water Board to require technical water quality reports. Provision C.8.h. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14 pertain to pollutants of concern, including those for which TMDLs have been adopted.

Legal Authority

The following legal authority applies to provisions C.9 through C.14:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The TMDL-based requirements for pesticides, mercury, PCBs, and bacteria have been imposed in accordance with 40 Code of Federal Regulations section 122.44(d)(1)(vii)(B). Pursuant to 40 Code of Federal Regulations section 122.44(d)(1)(vii)(B), the effluent limitations for NPDES permits must be consistent with the assumptions and requirements of any available Waste Load Allocation (WLA) for the discharge prepared by the state and approved by U.S. EPA, or established by U.S. EPA. In addition, Water Code section 13263, subdivision (a), requires that waste discharge requirements implement any relevant water quality control plans (basin plans), including TMDL requirements that have been incorporated into the basin plans. In addition, under CWA section 402(p)(3)(B)(iii), MS4 discharges "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (33 U.S.C. § 1342(p)(3)(B)(iii).) Under this provision, the Water Board may include requirements for reducing pollutants in stormwater discharges as necessary for compliance with water quality standards. (*See Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166.) This includes requirements to meet TMDLs since TMDL targets are an interpretation of water quality standards.

The Water Board may impose WQBELs effluent limitations that are BMPs or numeric effluent limitations. (33 U.S.C. §1342(p)(3)(B)(iii); 40 C.F.R. §122.44(k)(2)&(3) and § 122.44(d)(1)(vii)(B).) This is consistent with U.S. EPA's November 26, 2014, "Revision to the November 22, 2002, Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs'" (2014 U.S. EPA Memo.) This memorandum, while not binding authority, states "[w]here the TMDL includes WLAs for stormwater sources that provide numeric pollutant loads, the WLA should, where feasible, be translated into effective, measurable WQBELs that will achieve this objective. This could take the form of a numeric limit, or of a measurable, objective BMP-based limit that is projected to achieve the WLA." The 2014 U.S. EPA Memo further acknowledges that the permitting authority should consider the schedules in the TMDL as it decides whether and how to establish enforceable interim requirement and interim dates in the Permit. The interim deadlines in the Provisions are consistent with and in furtherance of the deadlines in the TMDLs.

For trash, the Water Board is authorized to impose effluent limitations under 40 CFR 122.44(d)(1)(i), which requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Trash is being discharged at levels that cause an excursion above the water quality objectives for floating, settleable and suspended materials. For copper, the Permit requires best management practices and copper control measures to prevent urban runoff discharges from causing or contributing to exceedances of copper site-specific water quality objectives for the Bay, consistent with the Basin Plan. Water Code section 13263 requires that waste discharge requirements implement the Basin Plan.

Basin Plan Requirements: Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) states that NPDES stormwater permits issued to municipalities will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. The Water Board has been taking a phased approach of first requiring technically and economically feasible controls to reduce pollutant discharges to the maximum extent practicable. Where this does not result in attainment of water quality objectives, the Basin Plan states the Water Board will require implementation of additional control measures to meet water quality objectives. The Basin Plan also contains urban stormwater TMDL implementation requirements at sections 7.1.1, 7.2.2, 7.7.1, 7.2.3, and 7.4.1 for pesticide-related toxicity, mercury, PCBs, and bacteria. The Basin Plan also requires urban stormwater requirements for copper in section 7.2.1. Finally, the Basin Plan Table 4-1 includes Prohibition 7, which prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas."

General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)

The control measures for mercury are intended to implement the urban runoff requirements stemming from TMDLs for these pollutants. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an implementation of controls to reduce PCBs, and that is the intended approach of the required provisions for all pollutants of concern. Many of the control actions addressing PCBs and mercury will result in reductions of a host of sediment-bound pollutants, including legacy pesticides, PBDEs, and others. The strategy for these pollutants is to use PCBs control to guide decisions concerning where to focus effort, but implementation of the control efforts would take into account the benefits for controlling other pollutants of concern. The POC strategy also includes a phased approach that provides for pilot scale testing (in the 2009 issuance of this permit) and for identifying areas with POC sources. The overall strategy for addressing sediment bound POCs includes the following modes:

1. Pilot-testing in a few specific locations.

2. Focused implementation in areas where benefits are most likely to accrue.
3. Full-scale implementation throughout the region.
4. Other: This may refer to experimental control measures, Research and Development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during a permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. Conversely, the benefits of other control measures may be well known, and these control measures should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering additional information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions.

During the Previous Permit term, a large part of the effort was focused on gathering necessary information about control measure effectiveness. In effect, most of the control measures were implemented at the pilot scale. In this Permit term, the emphasis will shift toward focused and perhaps full-scale implementation of the most effective control measures, and progress will be measured through accounting for specific load reductions. In subsequent permit terms control measures will be implemented on the basis of what we learn in this term, and we will, thus, achieve iterative refinement and improvement through time.

Background on Specific Provisions: Pursuant to CWA§ 402(p)(3)(B)(ii)-(iii) and 40 CFR § 122.44(d)(1)(vii)(B) , Provisions C.9 through C.14 contain technology-based requirements to control pollutants to the MEP, such other provisions the Water Board has determined appropriate for the control of pollutants under CWA, water quality-based requirements consistent with the assumptions and requirements of any WLAs in the applicable TMDLs, and requirements to effectively prohibit non-stormwater discharges into storm sewers. Provision C.9 contains requirements to implement the TMDL for pesticide-related toxicity in urban creeks. Provision C.10 contains requirements to implement narrative water quality objectives related to trash in all receiving water. Provision C.11 contains requirements to implement the San Francisco Bay mercury TMDL WLAs and the TMDL WLAs for mercury in the Guadalupe River Watershed. Provision C.12 contains requirements to implement the San Francisco Bay PCBs TMDL WLAs. Provision C.13 contains requirements to implement the copper site-specific objectives for San Francisco Bay. Provision C.14 contains requirements to implement the TMDL WLAs for San Pedro Creek and Pacifica State Beach Bacteria.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9

C.9-1 This Permit implements the Basin Plan amendments adopted by the Water Board that establish a Water Quality Containment Strategy and TMDL for diazinon and pesticide-related toxicity for Bay Area urban creeks on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Containment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, lead monitoring efforts, and take actions related to pesticide regulatory programs. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff.

C.9-2 The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

C.9-3 This provision is consistent with 2014 U.S. EPA Memo[53] providing guidance on implementing TMDL WLAs in NPDES storm water permits. Specifically, this provision establishes clear actions to achieve pesticide load reductions as well as other requirements (see C.9.f) necessary to achieve receiving water limits. The timeline for achieving the TMDL is not a fixed date for the following reasons. Pesticide-related toxicity continues to occur because state and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. The TMDL implementation plan recognizes that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and state law; and (2) because a realistic date for achieving allocations cannot be discerned given the current pesticide regulatory framework, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline.

Specific Provision C.9 Requirements

C.9 provisions implement the TMDL for Urban Creeks Pesticide Toxicity. All C.9 provisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with the Urban Pesticide Committee and other agencies and organizations. The Urban Pesticides Committee has served as an information clearinghouse and as a forum for coordinating pesticide TMDL implementation. The list of urban-use pesticides of concern to water quality includes

[53] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

pesticides for which local area monitoring data exceed or approach benchmarks and pesticides currently linked to toxicity in surface waters.

Provisions C.9.a through C.9.d are designed to insure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is a pest control strategy that uses an array of complementary methods: natural predators and parasites, pest-resistant varieties, cultural practices, biological controls, various physical techniques, and pesticides as a last resort. If implemented properly, it is an approach that can significantly reduce or eliminate the use of pesticides. The implementation of IPM will be assured through training of municipal employees and contractor requirements.

Provision C.9.e directs the municipalities to conduct outreach to consumers at point of purchase, to residents who contract for pest control, and to pest control professionals. Such targeted outreach is often intended to make the public and pest control professionals aware of the water quality impacts of current-use pesticides that are impacting or have potential to negatively impact urban creeks.

Provision C.9.f requires that municipalities (through cooperation or participation with BASMAA and CASQA_track and participate in pesticide regulatory processes like the U.S. EPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation pesticide evaluation activities. The goal of these efforts is to provide pertinent water quality data and encourage both the state and federal pesticide regulatory agencies to fully evaluate aquatic impacts and to mitigate for impacts to urban water bodies within the pesticide regulation or registration process. Accomplishing this goal would represent the most efficient and effective means to prevent pesticide-related water quality problems in the future.

Provision C.9.g requires Permittees to evaluate the effectiveness of their pesticide source control actions and is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the Permit. The particulars of assessment will depend on the nature of the control measure.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13383, 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), 40 CFR 122.26(d)(2)(iv) , and 40 CFR § 122.44(d)(1)(i).

Specific Legal Authority: Federal NPES regulations 40 CFR 122.26(d)(2)(i) requires "a demonstration that the [Permittee] can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the [Permittee] at a minimum to . . . (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water . . . ."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1) requires "a description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires "a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR § 122.44(d)(1)(i) requires limitations for pollutants which are or may be discharged at a level which has the reasonable potential to cause or contribute to an excursion above any water quality standard, including any narrative criteria for water quality.

San Francisco Bay Basin Plan contains these narrative water quality objectives applicable to trash: floating material (waters shall not contain floating material,

including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses); settleable material (waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses); and suspended material (waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses). Trash is being discharged at levels that have the reasonable potential to cause or contribute to excursions of these narrative water quality objectives. There are currently 26 waterbodies in the Region impaired by trash on the Clean Water Act section 303(d) list and most are receiving waters of discharges from Permittees' municipal storm drain systems. In additional, all Permittees have identified trash hot spots in their receiving water in a July 2010 submittal required by the previous permit. NPDES permitting authorities have discretion to include requirements for reducing pollutants in storm water as necessary for compliance with water quality standards. (*Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166.) U.S. EPA recommends that for MS4 discharges with reasonable potential to cause or contribute to a water quality excursion, a permitting authority exercises its discretion to include clear, specific, and measurable requirements and, where feasible, numeric effluent limitations as necessary to meet water quality standards.[54] The permit contains such requirements to meet water quality standards.

The Basin Plan also contains includes Chapter 4 – Implementation, Table 4-1 Prohibitions, Prohibition 7, which prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. This prohibition was adopted by the Water Board in the 1975 Basin Plan, primarily to protect recreational uses such as boating.

In addition to the foregoing, it should be noted that the State Water Board on April 7, 2015, adopted amendments to the Ocean Plan and the Inland Surface Waters and Inland Bays and Estuaries Plans that establish a narrative water quality objective for trash; establish a prohibition on the discharge of trash; provide implementation requirements for permitted storm water and other dischargers; set a time schedule for compliance, and provide a framework for monitoring and reporting requirements (collectively, Trash Amendments). These Trash Amendments are subject to review by the Office of Administrative Law and U.S. EPA and are not yet effective. Nonetheless, the C.10 requirements of this Permit are consistent with the Trash Amendments.

[54] U.S. EPA, November 26, 2014, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load Waste Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs.'"

Fact Sheet Findings in Support of Provision C.10

C.10-1 Trash is a pervasive problem near and in creeks and in San Francisco Bay. Controlling trash continues to be one of the priorities for this Permit reissuance, not only because of the trash discharge prohibition, but also because trash causes major impacts on our enjoyment of creeks and the Bay. There are also significant impacts on aquatic life and habitat in those waters, and eventually to the global ocean ecosystem, where plastic often floats; persists in the environment for hundreds of years - if not forever; concentrates organic toxins; and is ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared, and can ingest plastic that looks like prey, losing the ability to feed properly.

For the purposes of this provision, trash is defined to consist of litter and particles of litter. Manmade litter is defined in California Government Code section 68055.1 (g): *Litter* means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

C.10-2 Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[55] over the 2003–2005 timeframe,[56] suggested that the approach to managing trash in waterbodies was not reducing the adverse impact on beneficial uses. The levels of trash in the waters of the San Francisco Bay Region were and are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. On the basis of 85 surveys conducted at 26 sites throughout the Bay Area, staff has found an average of 2.93 pieces of trash for every foot of stream. All the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with significantly higher trash in waters relative to other counties—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Results of the trash in waterbodies assessment work by staff show that rather than adjacent neighborhoods polluting the sites at the bottom of the watershed, these areas, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-3 A number of key conclusions can be made on the basis of the trash measurement in streams:

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[55] SWAMP Rapid Trash Assessment Protocol, Version 8

[56] SWAMP S.F. Bay Region Trash Report, January 23, 2007

- Lower watershed sites have higher densities of trash.
- All watersheds studied in the San Francisco Bay Region have high levels of trash.
- There are trash source hotspots (usually associated with parks, schools, or poorly-kept commercial facilities located near creek channels) that appear to contribute a significant portion of the trash deposition at lower watershed sites.
- Homeless encampments and creekside litter from a variety of sources is a significant source of trash directly dumped and placed in the riparian zone where it can be swept into receiving waters by storm flows.
- Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.
- The majority of trash is plastic at lower watershed sites where trash accumulates in the wet season. This suggests that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris. While much of the initial trash deposited and washed into receiving waters is paper, the plastic trash, both floatable and non-floatable is the most persistent trash that survives, significantly impacting the Bay and Ocean.
- Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

C.10-4 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-5 Trash in urban waterways of coastal areas can become marine debris, known to harm fish and wildlife and cause adverse economic impacts.[57] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-6 Trash adversely affects numerous beneficial uses of waters, particularly recreation and aquatic habitat. Not all trash and debris delivered to streams are of equal concern with regards to water quality. Besides the obvious negative aesthetic effects, most of the harm of trash in surface waters is imparted to wildlife in the form of entanglement or ingestion.[58,59] Some elements of trash exhibit significant threats to human health, such as discarded medical waste,

[57] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. *Mar. Poll. Bull.* 40:83-88.

[58] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs.* Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.

[59] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol.* 13(4):925-929.

human or pet waste, and broken glass.[60] Also, some household and industrial wastes can contain toxic batteries, pesticide containers, and fluorescent light bulbs that contain mercury. Large trash items, such as discarded appliances, can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash hotspots where illegal dumping, littering, and/or accumulation of trash occur.

C.10-7 The Water Board, at its February 11, 2009, hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment 10.1 – 303(d) Trash Resolution and Staff Report Feb 2009.

C.10-8 The trash control strategies, monitoring requirements, and mandatory deadlines for trash reductions meet the "Maximum Extent Practicable" (MEP) standard contemplated by the CWA and include such other provisions as the Board determines appropriate for control to ultimately meet the narrative water quality objectives for floating material, settleable material, and suspended material. (CWA §402(p)(3)(B)(iii)) This Permit builds on the data and information collected in the last permit term and increases expectations of Permittees in this Permit. In particular, this Permit requires that the Permittees make significant progress toward having no trash impact on receiving waters by implementing a combination of increased full trash capture, and trash reduction and elimination measures that have similar effect to full trash capture. This is consistent with the statewide amendment to the Ocean Plan and the Inland Surface Waters, Bays and Estuaries Plan relating to trash controls. This Permit includes trash generation source identification and control, visual assessment data collection, and development of receiving water monitoring protocols. These requirements reflect the most current knowledge and data available concerning effectiveness of trash control strategies such as full trash capture, enhanced maintenance methods and current thinking regarding the best methods to assess trash reduction outcomes for the various trash reduction methods.

Specific Provision C.10 Requirements

C.10.a. Trash Reduction Requirements

C.10.a.i. Trash Reduction Schedule – This provision includes compliance deadlines of 70 percent trash load reduction by 2017 and 80 percent trash load reduction by 2019. To provide assurance that Permittees are making timely progress towards meeting the 2017 deadlines, this provision includes a performance guideline of 60 percent trash load reduction by 2016.. This performance guideline is a reporting requirement, but not an enforceable end point. It is a benchmark for assessing progress, and Permittees that do not attain the 60 percent performance guideline are

[60] Sheavly, S.B. 2004. *Marine Debris: an Overview of a Critical Issue for our Oceans*. 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

required to provide documentation in a report to the Water Board that adequate trash management actions to attain the forthcoming 2017 mandatory deadline is underway or scheduled. The compliance deadlines are consistent with the previous permits goals of 70 percent trash load reduction by 2017 and 100 percent trash load reduction (or no adverse trash impact) by 2022.

C.10.a.ii. Trash Generation Area Management – The overarching strategy for reducing trash involves mapping trash generation areas within a Permittee's jurisdiction, then applying effective trash reduction actions to the areas of trash generation and assessing the effectiveness of those actions in delineated trash generation areas, until trash generation is reduced to the no impact level over a Permittee's entire jurisdiction. The Permittees reported these trash generation maps with their Long Term Trash Reduction Plans February, 2014, and these maps provide the 2009 trash generation levels, which were required by the previous permit. Permittees that find inaccuracies in their submitted maps may submit corrected 2009 trash generation maps with their 2016 Annual Reports. Permittees developed their 2009 generation maps by dividing their jurisdiction into Very High, High, Moderate, and Low trash generation areas based on the following ranges of trash generation rates:

Low = less than 5 gal/acre/yr;
Moderate = 5-10 gal/acre/yr;
High = 10-50 gal/acre/yr; and
Very High = greater than 50 gal/acre/yr.

C.10.a.ii.a. Actual trash loading values, particularly in areas of high and very high trash generation areas, may vary significantly, but these delineated ranges provide a frame of reference for tracking and demonstrating trash load reductions and provide relative trash generation weight of these four categories. Permittees likely will need to reduce trash generation to at least Low to attain the ultimate required water quality-based outcome of no trash loads that cause or contribute to adverse trash impacts in receiving waters, i.e., the 2022 goal. Whether attainment of Low trash generation rates are sufficient will be evaluated and considered in the development of requirements in the next permit. Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to a Low trash generation rate during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the 2017 and 2019, 70 and 80 percent trash load reduction requirements, respectively, and consideration of the 2016 performance guideline.

C.10.a.ii.b. Permittees are responsible for trash discharges from their storm drain systems. Permittees have direct control over their properties and right of way, but must also exert control over other lands, such as commercial parking lots, that are plumbed directly into their storm drain system, since trash washed into such conveyance by stormwater will then directly impact receiving waters without encountering trash control actions on public right of way. Permittees may use a variety of means to ensure that either full trash capture devices are installed on such conveyances prior to intersection with the public storm drain system or that other

control actions equivalent to full trash capture are implemented on those private lands and such actions are verified through assessment, similar to the on-land visual assessment. Permittees must report the status of all such lands in parcel sizes over 10,000 ft^2 and place them on their trash generation maps or otherwise record location and status information about them. While Permittees are responsible for all such land in their jurisdictions, the Permit sets a reporting threshold of 10,000 ft^2 with the goal of balancing appropriate oversight over those lands and limiting the total number of specific parcels or area that must be identified and mapped.

C.10.a.iii. Minimum Full Trash Capture - This provision requirement is carried forward from the previous permit. Full trash capture systems provide a direct and effective mean to control trash discharges to and from storm drain systems. Commercial retail/wholesale land use area is a simple surrogate of trash generation area, and the minimum amount of area that was required to be treated with full trash capture systems was considered reasonable and achievable. Most, if not all, Permittees have already met or exceeded the minimum full trash capture requirement. Full trash capture system screening and treatment flow capacity specifications are the same as those specified in the previous permit. They are also the same as the full trash capture specifications in the Trash Amendments adopted by the State Water Board.

C.10.b Demonstration of Trash Reduction Outcomes

C.10.b.i.(a.-c.) Full Trash Capture Systems - Full trash capture systems must be maintained to be effective. If a full trash capture systems enters a rain period with a full trash reservoir, or is clogged with leaves or trash, trash may bypass the device and it will not function as a full trash capture device. Therefore these devices must be frequently inspected and maintained at a sufficient level. These requirements allow for Permittees to conduct inspections and maintenance in a flexible, as-needed, manner. Permittees are required to maintain adequate maintenance records and report any full trash capture devices found to be not adequately maintained or improperly functioning. Permittees are also required to certify annually that all of their full trash capture devices are adequately operated and maintained.

C.10.b.ii. Other Trash Management Actions

C.10.b.ii.a. Implementation Documentation – Documentation of trash management or control actions implemented and areas of implementation is essential to support trash reduction effectiveness and trash condition improvement.

C.10.b.ii.b.((i)-(iv)) Visual Assessment of Outcomes of Other Trash Management Actions – The primary tool currently available for determining trash reduction action success and positive outcomes is visual assessment, with photo documentation of trash generation and conditions in areas that drain to storm drains. Visual assessment involves observing a sufficient portion of each, e.g., sidewalk and curb area, at a frequency that adequately represents the trash management area condition relative to the type(s) of management actions implemented in the area. The frequency of required visual assessments depends on the rate of trash generation, the sources and types of trash, trash management actions deployed, and time of year. During the wet season, October through April, visual assessments in a trash

management area must be conducted at a frequency that determines whether there may be trash discharges to the storm drain system from sources or areas of trash accumulations before a trash management action or combination of actions is implemented or between recurring trash management actions. The degree of trash reduction that a Permittee claims also affects the frequency of visual assessment necessary to make the claim. Higher reduction claims typically require higher frequency of assessments.

During the wet season, for claims that a trash generation area has been reduced to a low trash generation area, this should be at least once per month in what was a very high trash generation area, at least twice per quarter in what was a high trash generation area, and once per quarter in what was a moderate trash generation area. Permittees, with justification, may conduct less frequent visual assessments for claims that a trash generation area has been reduced from what was a very high trash generation area to a high or moderate trash generation area or from what was a high trash generation area to a moderate trash generation area. Frequency of visual assessments during the dry season, May through September, should be at least once per quarter, including, and preferably, within the month (September) before the wet season begins. Higher frequencies of visual assessments than those illustrated above may be required to demonstrate effectiveness of trash control actions and claimed trash reduction. Lower frequencies than those illustrated above may also be acceptable with justification.

At this point in time, due to the lack of a standard method or protocol to effectively measure trash in receiving waters from municipal storm drains, visual assessment is the best type of monitoring to assure compliance with the Permit's requirements to implement trash management actions to reduce trash discharges into municipal storm drains. (See 40 CFR § 122.44(i).) The required amount, type, interval and frequency will yield data that is representative of the monitored activity, as required by 40 CFR § 122.48(b). This graphic demonstrates four trash visual conditions that correspond to the four trash generation categories of Very High (D), High (C), Moderate (B) and Low (A).

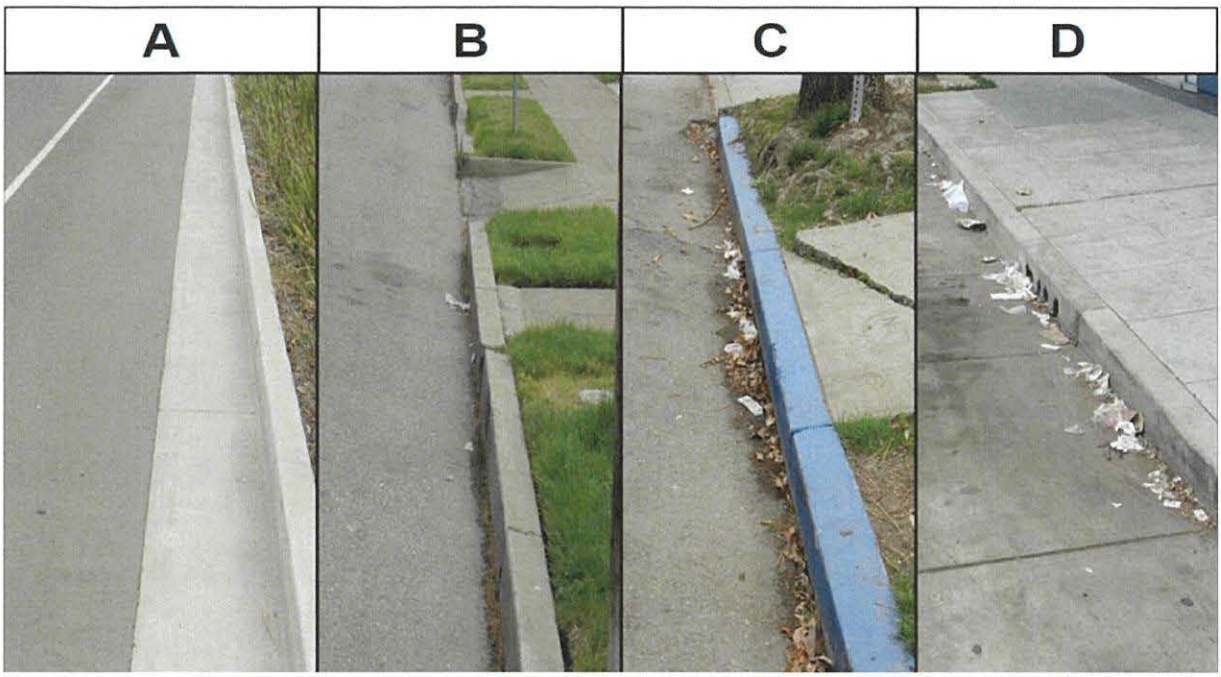

It is also possible to assess trash reduction outcome by documenting and verifying that trash management actions in a trash management area are equivalent to trash management actions implemented in an equivalent trash management area, and the actions in the equivalent trash management area have been assessed to be effective in accordance with a specified performance standard and the assessment results are reproducible. In such cases, it may be possible to extrapolate the performance assessment results to the equivalent trash management area with some verification. If this evidence is proposed by Permittees and accepted by the Executive Officer, Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within similar trash management areas to the same performance standard.

C.10.b.iii. Percentage Discharge Reduction – Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to lower trash generation categories and the Low generation status during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the 70 and 80 percent trash load reduction deadlines and consideration of the 2016 performance guideline (C.10.a.ii.a). However, trash management actions in Very High and High trash generation areas will result in more trash load reduction than actions in Moderate trash generation. Accordingly, a trash reduction demonstration methodology that provides relative benefit weight to actions in Very High and High areas is preferable to one that just considers percentage change in Very High, High, and Moderate trash generation area. The trash generation rates used by Permittees to delineate and map their 2009 trash generation area maps provide a means to provide a relative benefit weight to demonstrated reductions in the areas of Very High and High trash generation, even if they are not reduced all the way to Low generation.

The delineation of trash generation areas were based on ranges of trash generation rates (C.10.a.ii.). Therefore, the ratios of the approximate midpoints of the categorical trash generation ranges provides a means of weighing relative benefit to actions in Very High and High areas compared to actions in Moderate areas. The Moderate range is 5-10 gal/acre/yr, with a midpoint of 7.5 gal/acre/yr. The High range is 10-50 gal/acre/yr with a midpoint of 30 gal/acre/yr. Therefore, the weighed ratio of High to Moderate is 30/7.5 = 4. The Very High range, greater than 50 gal/acre/yr, does not have a specified upper bound that allows calculation of a midpoint. An alternative that provides reasonable weighing of Very High is 90 gal/acre/yr, which is 40 percent higher than the low end of the Very High range. This results in a weighed ratio of Very High to Moderate of 90/7.5 = 12.

The following formula provides a means of demonstrating attainment of the percent trash load reduction deadline and performance guidelines with weighted benefit of Very High and High trash generation area percent reductions relative to Moderate trash generation area percent reductions:

$$\% \text{ Reduction} = 100\,[(12\,A_{VH(2009)} + 4\,A_{H(2009)} + A_{M(2009)}) - (12\,A_{VH} + 4\,A_{H} + A_{M})] \,/\, (12\,A_{VH2009} + 4\,A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$	=	total amount of the 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of the 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of the 2009 moderate trash generation category jurisdictional area
A_{VH}	=	total amount of very high trash generation category jurisdictional area in the reporting year
A_{H}	=	total amount of high trash generation category jurisdictional area in the reporting year
A_{M}	=	total amount of moderate trash generation category jurisdictional area in the reporting year
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
100	=	fraction to percentage conversion factor

C.10.b.iv. Source Control – Jurisdiction-wide source control actions will have trash generation and load reduction benefit beyond what can be accounted for in trash management area specific assessment-based percentage discharge reduction (C.10.b.iii). These include Permittee efforts to adopt and implement source control on certain types of trash, particularly persistent, floating litter and other particularly difficult types of trash that are easily blown by the wind or clog full trash capture devices. This type of trash has been documented to be a significant percentage of the trash collected in full trash capture devices, and Permittees that have implemented such source control have documented significantly less such litter types in their hand collection of trash and litter on land. Permittees will be allowed to claim load reduction compliance value of up to ten percent load reduction total for all such

actions. This would be added to the % Reduction amount calculated by the C.10.b.iii - Percentage Discharge Reduction formula in demonstrating attainment of the percent trash load reduction deadline requirements and performance guideline. To claim a load percentage reduction value, Permittees must provide substantial evidence that these actions reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides evidence that the implementation of source control in its jurisdiction is similarly implemented as the source control assessed in the reference studies. Source control load reduction value(s) will be reviewed during reissuance of the Permit, and value(s) for source control load reductions might not be continued and allowed in the next permit, particularly in areas where the value of source controls will be accounted for in observed reductions in trash in trash generation areas, to avoid double counting. Also, the focus of the next permit will move to attainment of the 2022 goal and consideration of receiving water condition compliance indicators, and source control load reduction values may no longer be relevant.

C.10.b.v. Receiving Water Monitoring – Receiving water monitoring for trash provides additional evidence and can verify that full trash capture systems and other trash management actions are preventing trash from discharging into receiving waters and whether additional actions may be necessary associated with sources within a Permittee's jurisdiction. They can also show whether there are ongoing sources outside of the Permittee's jurisdiction that are causing or contributing to adverse trash impacts in the receiving water(s). There are currently no standard methods and protocols for monitoring trash in receiving waters. However, BASMAA is developing and testing some trash monitoring tools and protocols via a California Proposition 84 grant funded project (Agreement # 12-420-550), *Tracking California's Trash*. During this Permit term, the Permittees will develop and test trash receiving water monitoring tools and protocols designed, to the extent possible, to answer the following questions:

1. Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
2. Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
3. Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
4. Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?

The monitoring tools and protocols may include direct measurements and/or observation of trash in receiving waters. In scenarios where direct measurements or observations are not feasible, surrogates for trash in receiving waters, such as measurement or observation of trash on shorelines or creek banks may provide a practicable means of monitoring trash. This includes consideration and appropriate simplification of the shoreline and creek bank trash assessment method developed by Water Board staff, *Rapid Trash Assessment Method Applied to Waters of the San*

Francisco Bay Region: Trash Measurement in Streams. Surface Water Ambient Monitoring Program. April 2007.

The goal is to establish the least expensive and simplest to use monitoring methods and protocols that are applicable to the various discharge and receiving water scenarios that accounts for the various receiving waters and watershed, community, and drainage characteristics within Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s). These and other factors, such as feasibility, location logistics, types of trash, complexity, and costs, provide a means to focus and limit the number of monitoring tools and protocols, and determine spatial and temporal representativeness of the tools and protocols, representativeness of scenarios that will be tested.

Keys to establishing the least expensive and simplest to use monitoring methods and protocols include: their acceptance and use by interested parties; ensuring their scientific integrity by having them peer reviewed; and a user-friendly system to manage and access monitoring results. To provide a balance between allowing time to develop and test the tools and protocols and allowing enough time to review the proposed monitoring program in advance of reissuance of the Permit, Permittees must submit a preliminary report on the proposed monitoring program by July 1, 2019, a year in advance of the final proposed monitoring program due July 1, 2020, six months before the Permit expires. This should allow for early resolution of some monitoring program issues that are not dependent on completion of tests. Given the interest in receiving water monitoring by multiple parties, Permittees are encouraged to conduct development and testing of the tools and protocols and development of the monitoring program through an independent third party, such as the San Francisco Estuary Institute, that provides for interested party participation and scientific peer review of the work. Permittees will not be required to submit the preliminary monitoring program report if the work is conducted by an independent third party.

C.10.c. Trash Hot Spot Selection and Clean Up

The previous permit included a requirement for Permittees to cleanup a minimum number of Trash Hot Spots in receiving waters or on shorelines or creek banks associated with their jurisdictions. Trash Hot Spot cleanups remove trash discharged from a Permittee's jurisdiction and lessen the adverse impacts from the discharges until they are abated by a Permittee's trash management actions. Trash Hot Spot cleanups have an added benefit in that may also remove discharges of trash from non-storm drain sources, e.g., direct dumping or homeless encampments. They also provide an additional means of assessing the effectiveness or Permittees' trash management actions and identification of the types and sources of trash. The required Trash Hot Spot assessment is based on the SWAMP Rapid Trash Assessment Protocol.

C.10.d. Trash Load Reduction Plans

The previous permit required Permittees to prepare a Plan to achieve the 2017 and 2022 trash reduction deadline requirements. A Trash Load Reduction Plan provides a means for Permittees to determine and account for appropriate trash management actions in their trash management areas and their schedule of implementation, and it provides

documentation of planned actions that can be referenced if annual performance guidelines are not met. It also provides a basis for justifying and accounting for the types and locations of Permittees' assessments of trash management actions, and for optional trash load offset opportunities allowed by C.10e.

C.10.e. Optional Trash Load Reduction Offset Opportunities

C.10.e.i. Additional Creek and Shoreline Cleanup - Some Permittees cleanup more than the minimum required C.10.c Trash Hot Spot cleanups. These additional creek and shoreline cleanups are of value in removing trash from shorelines and creeks or creek banks that are causing or may cause adverse impacts to receiving waters. Permittees conduct some of these additional cleanups with community volunteers, which creates additional public outreach and participation benefits.

The volume of trash removed in these cleanups tends to be high compared to the estimated volume rate loads calculated using the average (nominal midpoint) trash generation rates (C.10.a.ii). This is due in part to Trash Hot Spot locations, which are often downstream of Very High and High trash generation areas with actual generation rates at the upper end of those category ranges. Another reason may be that these cleanups likely remove trash from direct discharges other than from Permittees' storm drain systems. Also, these cleanups sometimes occur just one-time so the volume of trash removed cannot be directly compared with required trash reduction rate volumes.

One way to recognize the value of these additional cleanups and to account for the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume /time) is to use an offset ratio of three to one for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, and ten to one for the 2019 mandatory trash load reduction deadline, when comparing additional cleanup volumes with 2009 trash load estimates based on using average trash generation category values and to cap the offset amount. The following formula generates a Permittee-specific trash volume amount, based on its 2009 categorical trash generation areas and a three to one or ten to one offset ratio, which may be used to offset one percent of a required percent load reduction value:

$$1\% \text{ Reduction Offset (volume)} = (12\ A_{VH(2009)} + 4\ A_{H(2009)} + A_{M(2009)})\ OF$$

where:

$A_{VH(2009)}$	=	total amount of 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of 2009 moderate trash generation category jurisdictional area
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
OF	=	offset factor equal to (7.5 x 0.033) for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.033 is the three to one offset ratio, or (7.5

x 0.1) for the 2019 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

A Permittee can compare trash volumes collected from additional cleanups to this calculated offset volume and apply one percent offset to a C.10.a.i percent load reduction requirement for each collected volume that equals the 1% Reduction Offset (volume). However, the total offset that can be claimed to avoid over-compensation associated with the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume/time) is limited to ten percent. Furthermore, to justify the offset the associated cleanups must occur more than once per year and preferably at a frequency sufficient to demonstrate sustained improvement of a creek or shoreline area. Offset values will be reviewed during reissuance of the permit, and value(s) for cleanups might not be continued and allowed in the next permit, particularly in areas where Permittees have responsibility for discharges of trash to a cleanup area. The focus of the next permit will move to attainment of the 2022 goal and consideration of receiving water condition compliance indicators, and cleanup values may no longer be relevant.

C.10.e.ii. Direct Discharge Controls - Some Permittees are faced with the challenge that large amounts of trash are discharged to receiving waters in their jurisdiction from homeless encampments and direct dumping. These trash discharges are separate from and in addition to discharges from Permittee storm drain systems. Elimination and prevention of adverse water quality impacts due to trash and attainment of water quality standards in receiving waters will require management of these non-storm drain system discharges in addition to control of storm drain system trash discharges by Permittees. Accordingly, some Permittees are taking or are willing to take actions to control these other sources by implementing a comprehensive plan to control all sources of trash discharged to receiving waters in their jurisdiction. Accordingly, Permittees should be allowed to offset some of their percent load reduction requirements if they control these other sources.

Permittees have and likely will continue to demonstrate the benefit of controlling these additional sources by accounting for the volume of trash collected. As with additional creek and shoreline cleanups, the volume of trash removed cannot be compared directly with trash load discharge rate (volume/time).The simplest, and possibly only way to account for these additional control actions, until more rigorous assessment and accountability methods are developed, is to allow a Permittee to offset part of its C.10.a trash load percent reduction requirement using the C.10.e.i formula to determine an offset from additional creek and shoreline cleanup. However, since control of these other sources by Permittees will be through implementation of a comprehensive and sustained program, Permittees that implement a comprehensive plan approved by the Executive Officer merit a higher offset cap than that allowed by C.10.e.i for additional creek and shoreline cleanup. A fifteen percent offset-cap based on the C.10.e.i formula provides a balance between incentive and reward for control of these non-storm drain system sources and the uncertainties associated with the simple formula. It is likely that this offset will be removed from this provision during

the next permit term. This will occur as the 2022 target deadline approaches and the focus turns to determining the condition of the receiving waters to determine compliance.

C.10.f. Reporting

The reporting requirements reflect the minimum amount of information needed to demonstrate compliance with all Provision C.10 requirements.

Costs of Trash Control

With the assistance of a $5 million grant from the American Recovery and Reinvestment Act obtained and distributed by the San Francisco Estuary Partnership, the Permittees cumulatively exceeded the full trash capture permit requirement acreage by over a factor of four. Therefore, it would appear that the following cost estimate produced in 2008 significantly over-estimated the costs of full trash capture installation at the time.

Costs for either enhanced trash management measure implementation or installation and maintenance of trash capture devices are significant, but when spread over several years, and when viewed on a per-capita basis, are reasonable.

Trash is costly to remove from our aquatic resource environments. Staff from the California Coastal Commission report that the Coastal Cleanup Day budget statewide: $200,000-250,000 for Coastal Commission staff, and much more from participating local agencies. The main component of this event is the 18,000 volunteer-hours, which translates to $3,247,200 in labor, and so is equivalent to $3,250,000-3,500,000 per year to clean up 903,566 pounds of trash and recyclables at $3.60 to $3.90 per pound. This is one of the most cost-effective events because of volunteer labor and donations. The County of Los Angeles spends $20 million per year to sweep beaches for trash, according to Coastal Commission staff.

Mr. Morad Sedrak, the TMDL Implementation Program Manager, Bureau of Sanitation, Department of Public Works, City of Los Angeles, reports that the City plans to invest $72 million dollars for storm drain catch basin based capture device installation primarily, for a City of 4 million population, for a per-capita cost of $18 dollars. This effort is occurring over a span of over five years, for an annual per-capita cost of under $4.

Mr. Sedrak reports that O&M costs are not anticipated to increase, as the City of L.A. is already budgeted for 3 catch basin cleanings per year. He also states that catch basin inserts installed inside the catch basin in front of the lateral pipe, which have been certified by the Los Angeles Regional Water Board as total capture trash control devices, cost approximately $800 to $3,000 (including installation) depending on the depth of the catch basin. .

Furthermore, the price for catch basin opening screen covers, which are designed to retain trash at the street level for removal by sweepers, and also to open if there is a potential flooding blockage, ranges roughly from $800 to $4,500, depending on the opening size of the catch basin.

The City of Los Angeles has currently spent 27 million dollars on a retrofit program to install catch basin devices in approximately 30% of its area, with either inserts or screens

or both. Mr. Sedrak states that Los Angeles plans to spend $45 million over the next 3 years to retrofit the remaining catch basins within the City. The total number of catch basins within the City is approximately 52,000.

The following are links to information about the Los Angeles trash control approach:

http://www.lastormwater.org/Siteorg/program/TMDLs/trashtmdl.htm

http://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdf)

http://www.lastorhttp://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdfmwater.org/Siteorg/program/poll_abate/cbscreens.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbinserts.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbscreens.htm

In Oakland, the Lake Merritt Institute is currently budgeted at $160,000 per year, with trash and litter removal from the Lake as a major task. The budget has increased from about $45,000 in 1996 to current levels. In the period of 1996-2005 the Lake Merritt Institute staff, utilizing significant volunteer resources, and accomplishing other education tasks, removed 410,859 pounds of trash from the Lake at cost of $951,725, or $2.30 per pound.

The City of Oakland reports that installation of two vortex and screen separators cost $821,000 for installations and treat tributary catchments of 192 acres before discharge to Lake Merritt (a cost of $4,276 per acre). The following table details these costs and other pertinent information

City of Oakland—CDS Unit Overview 9-07

Existing CDS unit location	Outfall number	Treatment area (acres)	Cost of implementation	Sizing	Maintenance requirements	Comments
Intersection of 27th and Valdez Streets	56*	71	$203,000 to contactor; plus ~$100,000 City costs	73 cfs peak flow; 36" stormdrain; Unit sizing: 18'6'6' box with 10'11"diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Required relocation of electrical conduit. Water main and gas line were also in the way; the box was adjusted to accommodate these conflicts.
Intersection of 22nd and Valley Streets	56*	121	$368,000 to contactor; plus ~$150,000 City costs	115 cfs peak flow; 54" storm drain; Unit sizing: 18'8.5'6' box with 12'diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Installation costs were higher than anticipated. Sewer lines and PGE facilities were exposed that were not known before. Unit had to be modified and poured-in-place.

* The City is treating 192 acres or 72 percent of the 252 acres draining to outfall number 56.

Additional cost information on various trash capture devices is included in the Santa Clara Valley Urban Runoff Pollution Prevention Program BMP Trash Toolbox (July 2007). The Toolbox contains cost information for both trash capture devices and enhanced trash management measure implementation, covers a broad range of options and also discusses operation and maintenance costs. Catch basin screens are included with an earlier estimate by the City of Los Angeles of $44 million over 10 years to install devices in 34,000 inlets.

The City of Oakland provided information on the cost of trash booms. The Damon Slough trash boom or sea curtain cost $36,000 for purchase and installation, including slough side access improvements for maintenance and trash removal. Annual maintenance costs have been $77,000 for weekly maintenance, which includes use of a crane for floating trash removal.

C.11. Mercury Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury wasteload allocations established for the TMDLs.

The C.11 provisions follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)) and accordingly, build on understanding gained from pilot testing many control measures during the Previous Permit term. During this Permit term Permittees are expected to continue to improve the level of certainty concerning control measure benefit and effectiveness by implementing actions in a phased approach, and then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective.

However in contrast to the Previous Permit term, this Permit does not specify control measures to implement to achieve load reductions. Rather, the permit requires development and implementation of a load reduction accounting scheme along with a quantitative demonstration of the load reductions that result from implementation of all relevant control measures. The Permittees may comply with any requirement of this provision through a collaborative effort. Many of the control measures may be chosen primarily for the purpose of achieving PCBs load reductions, but substantial mercury load reductions may result as a tangential benefit and should be accounted for.

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. C.11-3 through C.11-7 are components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 On October 8, 2008, the Water Board adopted a Basin Plan amendment including a TMDL for mercury in the Guadalupe River Watershed (GRW) and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. The GRW mercury TMDL assigns an urban stormwater runoff allocation proportionally equivalent to the mass allocation in the San Francisco Bay mercury TMDL. Accordingly, the GRW urban stormwater runoff mercury allocation is simply the fraction of the Santa Clara Valley Urban Runoff Pollution Prevention Program allocation attributed to the Guadalupe River watershed. The urban stormwater runoff allocation implicitly includes all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public

facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The 2003 load of mercury from urban runoff was estimated to be 160 kg/yr, and the aggregate WLAs for urban runoff is 82 kg/yr and shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and Caltrans. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, *source category*) including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-4 The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

C.11-5 The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff and remain consistent with the section of the Basin Plan chapter titled, *Surface Water Protection and Management—Point Source Control—Stormwater Discharges.*

C.11-6 The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

a. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

b. Continue to develop and implement a mercury source control program;

c. Implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

d. Monitor levels of methylmercury in discharges. This requirement was satisfactorily accomplished during the last permit term and will not be included in the permit during this permit term;

e. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal

areas. This requirement is not necessary at the moment and will not be included in the permit during this permit term;

f. Develop an equitable allocation-sharing scheme in consultation with Caltrans to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board (This was satisfactorily accomplished during the last permit term);

g. Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

h. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Individual WLAs (see Table 4-w of the Basin Plan amendment), by using one of the following methods:

   (1) Quantify the annual average mercury load reduced by implementing

      i. Pollution prevention activities, and
      ii. Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

   (2) Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

   (3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

C.11-7 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

C.11-8 Recent estimates using the latest available data suggest that the urban runoff mercury loading to San Francisco Bay is on the order of 115 kg/yr (McKee and Yee 2015[61]). While this figure is based on environmental data and thus has

[61] McKee, L.J. and Yee, D., 2015. Sources, Pathways and Loadings: Multi-Year Synthesis. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). San Francisco Estuary Institute, Richmond, California.

inherent uncertainty associated with it, it suggests that current mercury loading is approximately equal to the interim TMDL loading milestone (to be reached at the half-way point of TMDL implementation, 2017) of 120 kg/yr. If mercury loads can be reduced by approximately 35 additional kg/yr, urban runoff loading would meet the TMDL wasteload allocation.

C.11-9 Mercury is distributed more uniformly throughout the urban landscape than PCBs. For example, loading from older industrial and other polluted source areas accounts for only 6% of the average annual mercury load, but these areas account for over 50% of the average annual PCBs load (McKee and Yee 2015). The likely stronger role of atmospheric deposition in the case of mercury, which may account for up to 50% of the mercury found in urban runoff, is part of the reason for the more uniform mercury distribution in the landscape (McKee and Yee 2015).

C.11-10 Monitoring data indicate that, while not always the case, watersheds with high PCB~~s~~ concentrations often contain high or moderately high mercury concentrations (McKee and Yee 2015). Therefore, control strategies focused on finding and managing PCBs-contaminated drainages will often yield mercury load reduction benefits as well.

C.11-11 This provision is consistent with a recent U.S. EPA memorandum[62] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear and concrete milestones and deadlines (see C.11.a.iii) for the activities associated with achieving mercury load reductions as well as other requirements (see C.11.b-h.), necessary to achieve receiving water limits of this Permit term relative to the mercury TMDL WLA.

Specific Provision C.11 Requirements

Provision C.11.a. requires Permittees to implement control measures to achieve mercury load reductions. In order to comply with this requirement, Permittees must identify the mercury control measures and the watersheds and management areas in which these measures will be implemented and a time schedule for implementation. Moreover, Permittees must demonstrate quantitatively the load reductions achieved through use of the accounting scheme developed through C.11.b.

This provision is critical to the successful implementation of the urban runoff requirements from the mercury TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds and management areas, 2) a commitment to an implementation schedule, and 3) the quantification of load reductions resulting from control measure implementation. Many or most of the control measures that will generate mercury reduction benefits will be chosen based on the benefit for PCBs load reductions.

[62] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

Available data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances. However, there are conceivable control measures that are unique to mercury, like those addressing collection and recycling of mercury-containing devices, and these are, in fact, required by household hazardous waste and producer responsibility laws.

Recent loading estimates suggest that current mercury loading to the Bay is at or below the interim loading milestone established in the TMDL. Moreover, mercury is more evenly distributed in the landscape than PCBs so there are fewer opportunities to find and address heavily contaminated (with mercury) sites to achieve substantial, short-term load reductions. Instead, much of the additional benefit to reduce mercury urban runoff loads will come from a combination of proper disposal and management of mercury containing products as well as much more extensive treatment elements (e.g., green infrastructure) incorporated into the stormwater infrastructure. For these reasons, short-term load reduction performance criteria are not included in C.11.a (in contrast to C.12.a for PCBs).

Provision C.11.b. requires Permittees to develop and implement an assessment methodology and data collection program to quantify mercury loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required by the provisions of this Permit.

Permittees submitted land-use mass yields of mercury in their 2014Integrated Monitoring Report (IMR) for the Previous Permit. When these yields were multiplied by the total area of various land-use categories, the estimated regionwide (for the entire region that discharges to the Bay) mercury load was lower than the load estimated in the mercury TMDL by approximately a factor of 1.3. Therefore, the land-use yields were multiplied by a factor of 1.3 in order to normalize to the estimated baseline mercury load in the mercury TMDL and to agree with recent load estimates from runoff. The resultant (adjusted) mass yields for three land-use types shown here are based on data Permittees collected during the Previous Permit term and provide a reasonable means of calculating the mercury load reductions for control measures implemented in corresponding areas. Permittees may refine these yields when they submit supporting documentation in their 2016 Annual Report.

- Old Industrial Land Use = 1300 mg mercury/acre/year
- Old Urban Land Use = 215 mg mercury/acre/year
- New Urban areas and Other = 33 mg mercury/acre/year

The land-use yield provides a convenient way to calculate the resulting load reduction of various sorts of control measure strategies. For example, when contaminated areas are **newly or redeveloped**, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). So, the amount of mercury load reduction can be obtained by multiplying the area of new/redevelopment by the difference in yield (either old industrial minus new urban or old urban minus new urban, whichever pre-development land-use is applicable).

The mercury load reductions for **retrofits or other treatment controls** (including green infrastructure) can be calculated by multiplying the area treated by the assumed land-use yield of the treated area multiplied by the efficiency factor of the treatment method (using a default value of 70 percent or an efficiency established through documentation of implemented method and reported in annual reports).

For **contaminated private properties** that are referred to the Water Board or other agencies for subsequent remediation, the estimated load reduction can be derived by assuming that the mercury yield of the source area is reduced over the course of site cleanup from a high yield to the old urban yield (215 mg mercury/acre/year). Source areas identified for the purpose of referral tend to have much higher areal yields, but data are not currently available to provide an interim estimate for the mercury yield of such contaminated sites. Permittees would need to provide this information prior to receiving mercury load reduction credit from referral of private properties for cleanup.

This provision allows the opportunity for Permittees to update their default load reduction accounting factors, as adjusted by the Water Board, and in some cases extending the accounting framework presented in the IMR, justifying assumptions and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected to confirm the load reduction for each type of implemented control measure. Any adjustments to the default accounting framework must be submitted for Executive Officer approval.

Provision C.11.c Available information suggests that mercury is distributed more uniformly throughout the Bay Area landscape than is the case for PCBs. Therefore, a focus on highly contaminated areas (with mercury) may not be enough to achieve the TMDL-required load reductions. A critical part of the strategy to reduce urban runoff mercury loads will be the widespread implementation of green infrastructure control measures to intercept mercury-containing sediment and stormwater before it is discharged to receiving water. Provision C.11.c requires Permittees to implement green infrastructure projects during the term of the permit to achieve mercury load reductions of 48 g/year by June 30, 2020. This green infrastructure load reduction requirement is feasible in that these load reductions are approximately equivalent to the scale of load reduction achieved during the Previous Permit term through green infrastructure and C.3-related treatment controls (Integrated Monitoring Report 2014). It is reasonable to expect that a similar or greater pace of redevelopment plus green infrastructure implementation on public property can be achieved during this Permit term. The green infrastructure load reduction requirement is warranted because it is important to provide a clear performance expectation for Permittees for green infrastructure implementation because widespread and effective green infrastructure implementation will be an important component of achieving the load reductions necessary to achieve the mercury TMDL wasteload allocation.

County-specific load reductions are derived from the allocations and load reductions stated in the mercury TMDL. Namely, the TMDL-required load reduction for a county was divided by the total TMDL-required load reduction for the permit area (the area covered by this Permit) and this fraction was multiplied by 48 g/yr to derive the county-

specific green infrastructure load reduction requirement. While not required in the Permit, it will be essential to develop effective and easy-to-use tracking and visualization tools so Permittees, regulators, and stakeholders can monitor progress of green infrastructure implementation and its water quality impacts.

Because mercury is distributed throughout the urban landscape, extensive implementation of green infrastructure elements is going to be necessary to achieve the load reductions required by the TMDL. However, the planning, financing and implementation of green infrastructure is going to take a long time, perhaps as much as 25 years or more. This also means that the load reduction benefits of such implementation will also be realized over an extended time frame. To ensure that Bay Area municipalities are working effectively and expeditiously in implementing appropriate green infrastructure controls to reduce loads of mercury, PCBs and other pollutants of concern, the Permit requires Permittees to prepare a reasonable assurance analysis to rigorously and quantitatively demonstrate that mercury load reductions of at least 10 kg/yr throughout the permit area will be achieved over the course of the next 25 years (i.e., by 2040) through implementation of green infrastructure throughout the permit area..

Preparing the reasonable assurance analysis will be a step-wise process. Permittees must: establish the relationship between areal extent of green infrastructure implementation and mercury load reductions, estimate the amount and characteristics of land area that will be treated through green infrastructure in future years, and estimate the amount of mercury load reductions that will result from green infrastructure implementation by specific future years. Ultimately, the reasonable assurance analysis will require the use of one or more models. Permittees must therefore ensure that the calculation methods, models, model inputs and modeling assumptions used to make the demonstration have been validated through a peer review process.

Fortunately, the permittees in the Bay Area can take advantage of related (reasonable assurance analysis) efforts already underway in Southern California. The Los Angeles Regional Water Board has produced a useful set of guidelines for conducting a Reasonable Assurance Analysis (RAA) for the watershed management programs that are required through their MS4 permits.[63] These guidelines provide an excellent reference and starting point for the RAA required through C.11/12.c in terms of the mechanics of the analysis, BMP identification, critical condition selection, choice of models, model calibration criteria, modeling inputs, and model outputs. The crucial feature of the Southern California RAAs is that they must demonstrate with sufficient analytical rigor that the suite of foreseeable control measures to reduce loads will result in compliance with final WLAs. The RAA performed for PCBs and mercury for the San Francisco Bay Area will be similar in many respects to the type of analysis described in the Southern California guidance document, but they must also account for the local watershed characteristics as well as what has been learned about the distribution, fate, and transport characteristics of PCBs and mercury.

[63] Los Angeles Regional Water Quality Control Board (LARWQCB) 2015. *Guidelines for Conducting Reasonable Assurance Analysis in a Watershed Management Program, Including an Enhanced Watershed Management Program.*

Provisions C.11.d requires Permittees to prepare a long-term plan and schedule for mercury control measure implementation and corresponding reasonable assurance analysis quantitatively demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations. The type of analysis for this provision shares many features with the one conducted as part of C.11.c.

The mercury TMDL anticipated the challenge of achieving the urban runoff mercury load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that

> *"the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:"*

- *A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;*
- *Documentation has been prepared that demonstrates that all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;*
- *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
- *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.*

Provision C.11.d provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. For example, as explained previously the load reductions for mercury are going to depend heavily on long-term implementation of control strategies (like green infrastructure) that extend beyond the current implementation timeframe of the mercury TMDL. The long-term plan and schedule required as part of this provision will lay the foundation for a formal recognition of an implementation timeframe that is longer than originally conceived in the TMDL.

Provision C.11.e requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in the previous permit term, which funded community based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.12. PCBs Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs wasteload allocations established for the TMDL. In order to make substantial progress, Permittees must implement PCBs control measures strategically during this Permit term. Moreover, aggressive control measure implementation combined with thoughtful planning for the future (see C.12.d) are conditions that must be satisfied before the Water Board can consider an implementation timeframe longer than the 20 years provided in the TMDL.

The C.12 requirements follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)) and accordingly, build on understanding gained during the Previous Permit term. During the Previous Permit, Permittees were required to pilot test a variety of control measures in a limited number of watersheds or portions of a watershed (management area). Building on that knowledge, this provision requires Permittees to implement PCBs control measures (source control, treatment control and/or pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and to report on the loads reduced through implementation of those control measures.

In contrast to the Previous Permit, this Permit does not require implementation of specific control measures. Rather, the Permittees must use their judgment and knowledge of their watersheds to choose the optimum suite of control measures in order to optimize PCBs load reductions. A technically sound load reduction accounting method, based on information gained during the testing phase and based on information reported at the end of the Previous Permit, is provided in this Permit Fact Sheet to provide certainty for Permittees.

As discussed below, based on information gained during control measure pilot testing and reported during the Previous Permit term, load reductions on the order of those required by this Permit are achievable (see Basis for Required PCBs Load Reductions in MRP *2*, February 23, 2015) and necessary in order to make progress toward achieving the regionwide urban runoff wasteload allocation of 2 kg/yr (representing a load reduction from all urban runoff sources of approximately 18 kg/yr compared to loads estimated using data collected in 2003) within the 20-year TMDL timeframe. Further, load reductions resulting from a variety of PCBs control measures may be feasibly calculated in a straightforward manner (see below), and numeric load reduction requirements provide an unambiguous accountability metric against which to evaluate the sufficiency of control measure implementation. In contrast, it is problematic to assess the sufficiency of Permit requirements that merely call for the implementation of BMPs without a specification of the extent or intensity of such BMP implementation. Because specific load reductions are called for by the TMDL, the approach employed in the Permit (specific load reduction requirements) is both more straightforward and appropriate.

The area covered by the Permit (permit area) is smaller than the region that discharges to the Bay. The discharges in the permit area have been allocated 1.6 kg/yr of the total 2 kg/yr wasteload allocation and the total load reductions required from Permittees in the permit area during TMDL implementation is 14.4 kg/yr of the 18 kg/yr regionwide total.

Fact Sheet Findings in Support of Provision C.12

C.12-1 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. U.S. EPA approved the TMDL on March 29, 2010.

C.12-2 The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit:

"The 2003 load of PCBs from urban runoff is 20 kg/yr, and the aggregate WLAs for urban runoff total 2 kg/yr. Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities ... shall reduce PCBs in stormwater runoff to the maximum extent practicable....

In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the

load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section."

C.12-3 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question. If these sources are contributing to urban runoff loads (as opposed to direct Bay discharge), load reductions from these sources will count toward meeting the urban runoff wasteload allocations.

C.12-4 Some PCB congeners have dioxin-like properties. Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

C.12-5 Recent estimates using the latest available data suggest that the urban runoff PCBs loading to San Francisco Bay is on the order of 19 kg/yr (McKee and Yee 2015). While this figure is based on environmental data and thus has inherent uncertainty associated with it, it agrees very well with the regional urban runoff load estimate of 20 kg/yr provided in the TMDL report.

C.12-6 Studies suggest that PCBs load reductions of approximately 6 kg/yr are possible by 2030 through control measures like street sweeping, control of PCBs during building demolition and renovation, drop inlet cleaning, treatment retrofits, redevelopment of contaminated areas, pump station diversion, and street flushing (McKee and Yee 2015). While there are substantial uncertainties associated with these estimates, these results suggest that a substantial portion of the additional load reductions (~ 12 kg/yr) necessary to achieve the PCBs TMDL may need to come from identification and cleanup of PCBs-contaminated properties.

C.12-7 The distribution of PCBs in the urban landscape is much more variable than it is for mercury. For example, data indicate that PCBs-contaminated land uses yield perhaps 800 times more PCBs per unit area compared to the least contaminated land uses. By contrast, there is a 70-fold difference between the highest and lowest yielding land uses for mercury (McKee and Yee 2015). A large proportion (about 53 percent) of annual average urban runoff PCB loading is

likely coming from old industrial or other contaminated areas (McKee and Yee 2015).

C.12-8 A significant recent accomplishment of the Sources, Pathways, and Loadings workgroup of the Regional Monitoring Program has been the development and refinement of a regional watershed spreadsheet model (RWSM). This GIS-based model estimates relative land use and source area yields, and integrates them to provide a transparent, mutually accepted, and peer-reviewed analysis of relative watershed scale yield. Outputs from model runs to date suggest yields for the most polluted watershed in excess of 1000 g/km^2 for PCBs and mercury and a variation between watersheds of ~100,000-fold for PCBs and ~200-fold for mercury. To date, modeling results have a large amount of uncertainty in terms of absolute magnitude, but the results are capturing the patterns of contaminant distribution and transport. The model output is generally consistent with what is known about the distribution of these contaminants in the landscape from stormwater and bedded sediment data. The results are also consistent with what monitoring data tell us about the relative mercury and PCBs loads from land use and source area categories. The predictive power of this modeling tool will be improved as more data are available to characterize PCBs and mercury concentrations in the watersheds and will be useful in predicting regional and sub-regional scale loads of PCBs and other contaminants under a variety of management scenarios (McKee and Yee 2015).

C.12-9 Sufficient information is available to establish default factors for PCBs load reduction credit resulting from foreseeable control measures implemented during this permit term (see information under C.12.b below). For treatment controls, the estimated load reductions can be calculated by multiplying the assumed land-use PCB yearly mass yield by the treated area and by a treatment efficiency factor. The load reduction resulting from cleaning up contaminated properties can be estimated by recognizing that the yield of the contaminated property will be reduced to an assumed background level over the course of site cleanup. The load reduction resulting from controlling PCBs in building materials during demolition can be estimated by estimating the amount of PCBs in the building, the fraction of those PCBs that would enter the storm drain system in the absence of controls, and the efficiency of control measures applied to the demolished building to prevent such PCBs release.

C.12-10 Limited sampling data from Bay Area structures built between 1950 and 1980 suggest that PCB concentrations in caulks here are similar to those in other parts of North America and Europe. Samples collected in about 1350 buildings in Switzerland constructed between 1950 and 1980 found almost half the buildings contained PCBs in caulk, with most samples containing >100 ppm and 20 percent containing 10,000 ppm or more. In Bay Area samples, 40 percentcontained > 50 ppm PCBs and 20% contained > 10,000 ppm PCBs. The study estimates that certain types of Bay Area structures built 1950-1980 contain a mid-range average of 4.7 kg PCBs per building. An estimated 6300 currently standing non-residential buildings in the MRP area were built between

1954 and1974. The mid-range estimate of the total PCB mass in caulk in these buildings is 10,500 kg[64].

C.12-11 Currently there are no protocols for identifying PCBs-containing structures at the time of demolition so that PCBs do not enter municipal storm drains. Some demolition sites, especially high-profile sites such as hospitals, bridges and sports arenas, comply with federal law (Toxic Substances Control Act) and State regulations (California Code of Regulations Title 22) that require a project proponent to determine the presence of PCBs and other hazardous substances and to follow applicable disposal requirements. Soil sampling data from such demolition projects indicate that significant concentrations of PCBs can be present in site soils. Such PCB-laden sediment, particularly at a demolition site without adequate controls, is transported by vehicle tracking, wind erosion or precipitation runoff to the storm drain. PCBs entering the storm drain system during dry weather are non-stormwater discharges that must be effectively prohibited pursuant to CWA § 402(p)(3)(B)(ii). PCBs that are discharged into storm drain systems and waters of the U.S. through stormwater runoff are appropriate for control in order to make progress in achieving the PCBs TMDL wasteload allocations for urban runoff, pursuant to CWA § 402(p)(3)(B)(iii).

C.12-12 U.S. EPA has developed guidelines, available at its "Steps to Safe Renovation and Abatement of Buildings That Have PCB-Containing Caulk" website, for identifying and removing PCBs in building materials that can help in the effort to manage PCBs so that they do not enter municipal storm drains. In addition, during the Previous Permit term, starting in 2009, the Permittees participated in the grant-funded "PCBs in Caulk Project", which addressed potential impacts of PCBs released into stormwater runoff during demolition or remodeling projects in the San Francisco Bay Area. This project fulfilled the permit requirement to investigate the costs, effectiveness, and technical feasibility of PCBs control measures to minimize the release of PCBs in caulks and sealants to stormwater runoff during demolition or remodeling projects. Products developed through this grant-funded project include a fact sheet for developers; a fact sheet on sampling methods; BMPs to control PCBs in caulk at demolition or renovation sites; a Model Implementation Process to incorporate a requirement to use BMPs into the municipal demolition permitting process; a training strategy to train and deploy municipal staff, such as hazardous material or building inspectors, to ensure proper implementation of BMPs; and a technical memorandum on relevant regulations and policies.

C.12-13 This provision is consistent with a recent U.S. EPA memorandum[65] providing guidance on implementing TMDL WLAs in NPDES stormwater permits.

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[64] Klosterhaus S. and McKee L. et al. 2014. *Polychlorinated Biphenyls in the exterior caulk of San Francisco Bay Area buildings, California, USA*. Environment International 66 (2014) 38–43.

[65] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs."

Specifically, this provision establishes clear and concrete milestones and deadlines (see C.12.a.iii) for the achievement of specific PCBs load reductions as well as other requirements (see C.12.b-h.), necessary to achieve receiving water limits of this permit term relative to the PCBs TMDL WLAs.

Specific Provision C.12 Requirements

Provision C.12.a. requires Permittees to implement control measures to achieve specific PCBs load reductions. In order to comply with this requirement, Permittees must identify the PCBs control measures and the watersheds and management areas in which these measures will be implemented and a time schedule for implementation.

In the first year, the Permittees have to identify watersheds and management areas and control measures sufficient to achieve the near term load reduction performance criterion (0.5 kg/yr by June 30, 2018). In subsequent years, the Permittees have to report annually any new watersheds and management areas and control measures necessary to achieve the ultimate PCB load reduction performance criterion (3 kg/yr) by June 30, 2020.

Moreover, Permittees must quantitatively demonstrate the load reductions achieved through use of the load reduction accounting scheme described below and/or further developed through the actions required under C.12.b. This provision element is critical to the successful implementation of the urban runoff requirements of the PCBs TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds, 2) a commitment to an implementation schedule, and 3) the quantification of load reductions resulting from control measure implementation.

This provision requires that Permittees achieve annual PCBs load reductions totaling 0.5 kg/yr by June 30, 2018, and 3.0 kg/yr by June 30, 2020. These load reductions are achievable with the associated deadlines and are based on an assessment of BMPs and control measures controls to reduce PCBs as further described below.

The PCBs load reductions achieved through implementation of Provision C.12.a can be estimated for a unit of activity for a number of anticipated control measures. The effectiveness and benefits of control measures remain uncertain because of limited implementation experience and relatively scarce data on control measure effectiveness for a range of conditions. However, there are sufficient data to develop a starting point for a reasonable system of estimating load reductions as a function of the scale and intensity of control measure implementation.

A simple approach for estimating the load reductions associated with certain control measures involves use of a land-use pollutant yield. A land-use yield is an estimate of the mass of a contaminant contributed by an area of a particular land-use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historical or ongoing use of pollutants in those land uses. PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas where PCBs were never intensively used.

Permittees submitted land-use mass yields of PCBs in their 2014 Integrated Monitoring Report. When these yields were multiplied by the total area of various land-use categories, the estimated region-wide (the entire region that discharges to the Bay) PCBs load was lower than the load estimated in the PCBs TMDL by approximately a factor of 1.73. Therefore, the land-use yields were multiplied by a factor of 1.73 in order to normalize to the estimated baseline PCBs load in the PCBs TMDL and to agree with recent load estimates from runoff. The resultant (adjusted) mass yields for three land-use types shown below are based on data Permittees collected during the Previous Permit term and provide a reasonable means of establishing the PCBs load reductions for control measures implemented in corresponding areas[66]. Permittees may refine these yields when they submit supporting documentation in their 2016 Annual Report.

- Old Industrial Land Use = 86.5 mg PCBs/acre/year
- Old Urban Land Use = 30.3 mg PCBs/acre/year
- New Urban areas and Other = 3.5 mg PCBs/acre/year
- Open Space = 4.3 mg/acre/year

The land-use yield provides a convenient way to estimate the load reduction of various sorts of control measure strategies. For example, when contaminated areas are **newly or redeveloped**, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). So, the amount of PCBs load reduction can be obtained by multiplying the area of new/redevelopment by the difference in yield (either old industrial minus new urban or old urban minus new urban, whichever pre-development land-use is applicable).

The PCBs load reductions for **retrofits or other treatment controls** (including green infrastructure) can be calculated by multiplying the area treated by the assumed land-use yield of the treated area multiplied by the efficiency factor of the treatment method (using a default value of 70 percent or an efficiency established through documentation of implemented method and reported in annual reports).

For **contaminated private properties** that are referred to the Water Board or other agencies for subsequent remediation, the estimated load reduction can be derived by assuming that the PCBs yield of the source area is reduced over the course of site cleanup. Source areas identified for the purpose of referral tend to have much higher areal yields, based on an analysis of the Ettie Street pump station watershed in Oakland. Information adapted from the IMR suggests that 3975 mg PCBs/acre/year is a reasonable interim estimate for the yield of such contaminated sites (Geosyntec 2015). The cleanups will be assumed to take ten years from the date of referral to the Water Board. The assumed result of the cleanup is that the PCBs yield will be reduced over the course of ten years from 3975 mg PCBs/acre/year to the old urban yield of 30.3 mg PCBs/acre/year, or a reduction of 3940 mg PCBs/acre/yr.

Fifty percent of this load reduction will be credited during this Permit term for properties that are referred to the Water Board during the first three years of the Permit term and for which Permittees implement enhanced operation and maintenance measures in the vicinity of the referred property. Often, contaminated properties have a "halo" of

[66] *PCBs Yield Coefficients for MRP 2.0*. Geosyntec Consultants. September 23, 2015.

contamination, and contaminated sediments in this halo can be transported to receiving waters through the stormwater conveyance system. Further, pollutants from the source area may continue to be transported offsite while remediation occurs. Therefore, enhancing operation and maintenance measures in areas immediately adjacent to the source area while the source property is being remediated is a priority to prevent PCBs transport to receiving waters. If enhanced maintenance measures are not implemented in the immediate vicinity of the referred property, the calculated load reduction will be recognized upon completion of the cleanup project.

PCBs load reductions resulting from implementing control measures to prevent discharge to storm drains of **PCBs in building materials during demolition** will be computed as: the mass of PCBs contained in applicable buildings[67] multiplied by the fraction of PCBs entering stormwater conveyances in the absence of controls multiplied by the effectiveness of controls preventing PCBs from entering stormwater conveyances. Each term in this calculation can be represented by a range of values, and information is limited on some of these terms (particularly the fraction of PCBs entering storm drains). However, reasonable values, derived from information available from Klosterhaus (2011) are:

- Mass of PCBs per building = 5 kg
- Number of regulated buildings demolished = 50
- Average fraction of PCBs that enters MS4s during demolition without controls = 1 percent
- Average effectiveness of controls at preventing PCBs from entering storm drains = 80 percent

Multiplying these parameters suggests that about 2 kg/yr of PCBs loads can be reduced by effectively controlling PCBs during demolition. The actual number of demolitions will vary, but 2 kg represents a reasonable estimate and is the basis for establishing the yearly load reduction credit for controlling the release of PCBs to storm drains from such demolitions. If a Permittee implements a control program consistent with these assumptions, a share of the 2 kg/yr credit, pro-rated by population, will be allocated to that Permittee. Permittees may propose an alternative means (other than population-based) of allocating the permit-area-wide load reduction credit associated with implementing C.12.f with the 2019 Annual Report.

Permittees will also likely employ **enhanced operation and maintenance control measures** to reduce loads of mercury and PCBs. These strategies include: street sweeping, drain inlet cleaning, pump station maintenance, PCBs captured by full trash capture devices, etc. It is not possible to state, in advance, specific parameters to allow for load reduction estimates. However, the load reduction calculation is straightforward. The pollutant load reduction (either baseline or enhanced) is the product of the volume of material collected by the control measure multiplied by the percent of the collected material that is sediment multiplied by the density of that sediment multiplied by the concentration of the pollutant in that sediment. The load reduction credit is then simply

[67] Applicable buildings include buildings (excluding single family residential and wood frame buildings) constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm.

the difference between the load reductions achieved with enhanced effort and those achieved with a baseline level of effort (which may be zero if the control measure is new rather than an increased intensity of an existing measure).

PCBs load reduction from other activities can be similarly established and documented through quantification of the amount of material (e.g., sediment or water or other waste) prevented from entering receiving waters multiplied by the concentration of PCBs in that material. The load reduction calculated for all implemented measures shall be summed and compared to the load reduction requirements in Tables 12.1 and 12.2. Permittees can demonstrate compliance with the load reduction requirements by summing the load reduction assigned to each type of activity they undertake. For example, if Permittees meet the Permit requirements for demolitions of regulated buildings (C.12.f) designed to achieve the control effectiveness consistent with the calculation outlined above, then a permit-area-wide load reduction of 2 kg/yr will be applied to the 3 kg/yr by the June 30, 2020, load reduction requirement. Further, Permittees would account for the area treated by green infrastructure, apply the appropriate land use PCB yield, and sum the load reduction over all such treatment installations. Similarly, the calculated load reduction resulting from property referrals and enhanced operation and maintenance can be accounted for using the approach described previously. Summing up all PCBs load reductions from all relevant control measures would constitute the permit-area-wide PCBs load reduction, county-specific, or Permittee-specific PCBs load reduction. Permittees, as a group, are encouraged to implement PCBs controls in the locations with the greatest opportunities for load reduction and be held accountable as a group. However, if the overall load reduction criteria (for all Permittees combined) are not met, the Permit provides an accountability mechanism in the form of load reduction performance criteria for each county in the permit area, calculated according to the proportions used to establish county-specific load allocations in the PCBs TMDL. For example, the load allocation for all Permittees within Alameda County in the PCBs TMDL is 0.5 kg/yr. The estimated baseline load according to the TMDL is 5 kg/yr. This represents achieving a load reduction over 20 years of 4.5 kg/yr (of the 18 kg/yr reduction from urban runoff sources to the Bay overall). However, the Permittees' jurisdictions have an estimated total load reduction responsibility of 14.4 kg/yr, because some of the urban runoff load comes from areas not under the Permittees' jurisdiction. Therefore, the Permittees within Alameda County are responsible for 4.5/14.4 (~ 31.25 %) of the load reductions from the permit area. Applying this same fraction to the required 3,000 g/yr load reduction results in a load reduction for the Alameda County Permittees of 940 g/yr. The load reduction for other counties (e.g., all Contra Costa Permittees combined, all Santa Clara Permittees combined, all San Mateo Permittees combined, and Solano Permittees [Suisun City, Vallejo, Fairfield] combined) can be derived similarly by subtracting the TMDL load allocations from the baseline load estimates and then dividing by 14.4 and then multiplying by either 500 g/yr (for the June 30, 2018, load reductions) or 3,000 g/yr (for the June 30, 2020, load reductions).

Load reduction opportunities almost certainly vary by jurisdiction. Some jurisdictions (e.g., those with a higher proportion of old industrial land use) may have more PCBs-contaminated sites and, hence, greater potential opportunities to implement control measures to reduce loads. Further, the total PCBs load reduction across the entire area

covered under this Permit is relevant to the recovery of San Francisco Bay. Therefore, as long as the total load reductions (500 g/yr by June 30, 2018, and 3 kg/yr by June 30, 2020) are achieved, the load reduction distribution among the counties is much less of a concern.

However, if the permit-areawide total load reduction performance criteria are not achieved, the Permittees in counties meeting the county-level load reduction criteria in the Permit will be deemed in compliance with the performance criteria. If both the permit-area-wide total load reduction criterion and county-specific load reduction criterion are not achieved, those Permittees will be deemed in compliance if they have achieved load reductions consistent with their proportion of the county total established under C.12.b.iii(1). Allocation of the county-wide load reduction responsibility to individual Permittees is based on the fraction of county population in each Permittees' municipality. This is consistent with the assumptions and requirements of the PCBs TMDL in that the permit-area-wide load allocation was distributed to each county based on the proportion of permit-area-wide population contained in each county. Other methods could be used to distribute the county-wide PCBs load reduction performance criteria to individual municipalities (e.g., proportion of county total of certain land-uses associated with PCB presence contained in each municipality). Permittees may propose another alternative as part of reporting on C.12.b.iii(2).

Provision C.12.b. requires Permittees to develop and implement an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required by the provisions of this Permit. The default approach for establishing load reductions for various implementation activities is described above. Early in the Permit term (2016), Permittees will submit documentation supporting this default approach for load reduction accounting along with a description of the data to be collected to establish load reduction value. In particular, C.11/12.b.iii(1) requires Permittees to submit specific details showing how they will perform the calculations to account for mercury and PCBs load reductions from all types of control measures for the reduction of these pollutants. This information includes what data will be used to assign treated areas; how to assign land use to select a yield; and how material will be sampled to determine the contaminant concentration (for control measures requiring such information). Permittees should also identify the types of supporting information that will be submitted so that the calculations can be reproduced. As Permittees gain implementation experience and collect information on this implementation, they may request refinement of the accounting system for use in subsequent Permit terms.

Permittees are encouraged to build on the framework developed in response to a Previous Permit requirement and submitted by Permittees in January 2014 in their Integrated Monitoring Report. This could include updating and in some cases extending the framework presented in that document, justifying assumptions and selected parameters used for each type of control measure, and indicating what information will be collected and submitted to calculate the load reduction for each implemented control measure. The accounting scheme for use in this Permit term and summarized above along with the

refined accounting scheme submitted near the end of the permit term (for use in subsequent Permits) must both be submitted for Executive Officer approval.

Many of the legacy sources of PCBs are found in Bay margins contaminated by historical industrial activity. These legacy sources may be contributing to storm drain runoff conveyances, but Permittees may have jurisdictional challenges in addressing the sources in private property. In addition, Permittees are responsible for contamination in public rights of way. Permittees are expected to make diligent efforts both to address contamination on public property and to refer source properties to the Water Board for possible cleanup and abatement.

Provision C.12.c. requires Permittees to implement green infrastructure projects during the term of the Permit to achieve PCBs load reductions of 120 g/year by June 30, 2020. The county-specific responsibilities for this load reduction are shown in Table 12.2 of the Permit. These county-specific green infrastructure load reduction requirements were derived using the same methodology described above for Provision C.12.a.

Some Bay Area drainages contain notably elevated PCBs concentrations in suspended or bedded sediment (e.g., > 500 ppb in bedded sediment). A recent analysis of soil PCBs and mercury data collected in the Bay Area identifies 15 sites where maximum concentrations exceed 3.8 mg/kg for PCBs and 1.6 mg/kg for total mercury. Areas with moderately high PCBs concentrations (e.g., 100-500 ppb) were found throughout areas where historical industrial activity involved use of PCBs (McKee and Yee 2015). Placing green infrastructure in highly- and moderately-contaminated areas will form an important element in achieving the PCBs TMDL-required load reductions. However, green infrastructure implementation is a long-term proposition and there is value in placing green infrastructure across the broader landscape to intercept PCBs before they are discharged to receiving water.

To ensure that Bay Area municipalities are working effectively and expeditiously in implementing appropriate green infrastructure controls to reduce loads of mercury, PCBs, and other pollutants of concern, the Permit requires Permittees to prepare a reasonable assurance analysis that rigorously and quantitatively demonstrates PCBs load reductions of at least 3 kg/yr throughout the permit area will be achieved by 2040 through implementation of green infrastructure throughout the permit area. The effort to prepare a reasonable assurance analysis is described above under C.11.c.

Provision C.12.d. requires Permittees to prepare a plan and schedule for PCBs control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations. The Permit requires that this plan must: identify all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented; include a schedule according to which these technically and economically feasible control measures will be fully implemented; and provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation:

The PCBs TMDL anticipated the challenge of achieving the urban runoff load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that

> *"... achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:*
>
> - *A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;*
> - *Documentation has been prepared that demonstrates that all technically and economically feasible and cost-effective control measures recognized by the Water Board have been fully implemented, and evaluates and quantifies the PCBs load reduction of such measures;*
> - *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
> - *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate."*

Provision C.12.d provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. The load reductions for PCBs are difficult and time-consuming to achieve because of the distribution of sources in the landscape; challenges associated with finding and reducing these existing sources; and unpredictability related to demolition of PCBs containing structures. Further, some part of the expected PCB load reduction will come from long-term implementation of control strategies (like green infrastructure) that extend beyond the current implementation timeframe of the TMDL. The long-term plan and schedule required by this provision will help lay the foundation for an implementation timeframe that is longer than that stated in the TMDL.

Provision C.12.e. requires that Permittees collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era. The Washington Department of Ecology discovered that PCBs-containing caulk (sealant) was used inside the City of Tacoma's storm drains during a 1970s repair. There is reason to believe that such use was not isolated to this one location. The sampling and analysis required by this Provision C.12 element will count toward partial fulfillment of the monitoring effort aimed at finding PCBs sources (see management information need in C.8.f).

Provision C.12.f. requires Permittees to develop a protocol for controlling PCBs during building demolition so that PCBs are not transmitted to storm drains via vehicle trackout, airborne releases, soil erosion or stormwater runoff during or after demolition. Because this is a new management practice, three years are allotted to working with entities, such as the Bay Air Quality Management District, U.S. EPA, and waste management entities,

to coordinate oversight functions and otherwise develop a coordinated protocol. After the development period, Permittees shall implement the protocol such that PCBs are controlled during the demolition of applicable structures so that they do not enter municipal storm drains. During this Permit term, applicable structures are limited to potential PCB-containing industrial, public, and commercial structures. Single-family residential and wood frame structures are excluded. In future permits, other types of structures and renovations may be included in the protocol.

The Integrated Monitoring Report (IMR)[68] presents estimates of the mass of PCBs per building (constructed or renovated prior to 1979) ranging from 0.6-16 kg and contribution to stormwater ranging from 0.8 to 4000 grams/year. This is one of the largest known sources of PCBs, although it is distributed throughout the region. For a building with 4.7 kg of PCBs and current control measures of medium effectiveness, there may be 280 grams of PCBs released to stormwater during demolition, assuming control measures are only moderately effective. If only control measures of low effectiveness were in place, such a building would release 560 grams PCBs during demolition.

Permittee 2014 Annual Reports, New and Redevelopment Section "Projects Approved" tables (C.3.b.v.(1)) provided a means to gauge the potential number of redevelopment projects involving applicable structures. While these tables are not required to list all the information necessary to determine if applicable structures will be demolished during redevelopment, in some cases enough information is provided. In 6 of the 11 Permittees reviewed, potential PCB-containing structures are planned to be demolished, including one project in which 14 buildings likely built between 1950 and 1980 will be demolished.

Water Board staff also contacted Bay Area waste management entities, such as county recycling and construction debris recovery programs. Brief discussions revealed the following:

- In general, demolition project proponents must submit debris recovery plans to these entities prior to commencing demolition. These plans could be modified to include information on the likelihood and/or actual existence of PCB-containing materials in the structure.
- Waste management entities tend to have technical advisory committees that could advise on appropriate approaches/frameworks for controlling PCBs during demolition so that they do not enter storm drains.
- Applicable structures are a small subset of all demolitions in the Bay Area.
- Some cities use software for recording demolition projects that could be modified by adding a form(s) for applicable structures.
- There are a limited number (approximately 30-40) of construction and debris processing facilities in the Bay Area, and they are listed on county web sites. At least two of these facilities are known PCB-containing sites, although both include metal processing facilities in addition to other debris recycling.
- One waste management entity has produced a video documenting a large-scale demolition project at a former Army Base that had a variety of hazardous

[68] Integrated Monitoring Report Part B: PCB and Mercury Loads Avoided and Reduced via Stormwater (IMR). Prepared by Geosyntec Consultants for the Bay Area Stormwater Management Agencies Association. 2013.

materials to dispose of, including PCBs. Another pointed to You-Tube videos showing how to remove PCB-containing caulk prior to demolition.

These facts (see also C.10, C.11 and C.12 above) indicate that a workable protocol for controlling PCBs during demolition so that they do not enter storm drain systems could be built upon existing demolition requirements and utilize existing information resources.

Some municipalities may have no applicable structures (i.e., the only structures that existed pre-1980 were single-family residential or wood-frame structures). Such Permittees may provide documentation acceptable to the Executive Officer in their 2017 Annual Reports to seek exemption from the requirement to develop a PCBs demolition control program. This allows time for compilation of this documentation, such as historic maps or other historic records, and for determining which Permittees are exempt prior to year the July 1, 2019, requirement to begin implementing the protocols.

Provision C.12.g. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.g requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed. The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

Provision C.12.h. requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes three types of actions for urban runoff management agencies. These actions are implemented through this Permit as provisions to control urban runoff sources of copper.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[69] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the Permit provisions target major sources of copper including architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 SSOs for dissolved copper have been adopted for all segments of San Francisco Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the SSOs.

C.13-5 One of the major sources of copper to urban runoff has been addressed through passage of Senate Bill 346 in 2010, which requires brake pad manufacturers to reduce the use of copper in brake pads sold in California to no more than 5% by weight by 2021, and no more than 0.5% by 2025. The law also provides an objective process to ensure that any new brake materials meet all applicable safety and performance standards. To make sure that new materials will not cause future environmental problems, the law requires brake manufacturers to screen potential alternatives for their impacts on human health and the environment using the Toxic Information Clearinghouse, and to select less hazardous options.

C.13-6 A scientific uncertainty regarding sediment toxicity was identified during the development of SSOs for copper. Bay sediment copper concentrations are somewhat elevated above the natural background (from native soils). Local soils contain 30- 35 ppm (DW, dry weight) based on deep (> 2 meter) sediment core results for SF Bay. The copper ERL (effects range low) is 34 ppm (DW)

[69] TDC (TDC Environmental), 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

and the ERM (effect range median) is 240 ppm (DW). Thus, the natural concentration of local soils is very close to the ERL. There has never been an exceedance of the ERM in the 975 samples collected and analyzed through RMP data. The maximum copper sediment concentration ever recorded in RMP samples (94 ppm DW) is well below the LC50 of the amphipod *Eohaustorius estaurius* (534 ppm) or the amphipod crustacean *Hyalella azteca* (260 ppm). Surface sediment copper concentrations have trended lower over the last 20 years according to monitoring in the Bay. The median surface concentration of copper was 40 ppm (DW) during the period 1993-2004 and dropped to 38 ppm in 2005-2014. This reduced concentration occurred despite significant population increases in the Bay Area and despite the fact that much more sampling effort was conducted in the shallower parts of the Bay (where copper concentrations would be expected to be higher due to human activities and urban sources) during the latter period because of a re-design of RMP sampling strategies. There was some evidence of possible copper-related toxicity in the late 1990s, but there has not been additional evidence of this phenomenon. The possible sediment toxicity occurred in the northern portions of San Francisco Bay (Suisun Bay and San Pablo Bay) where sediment copper concentrations are higher. However, the decrease in median sediment copper concentrations in the northern estuary from the time period 1993-2004 (52 ppm DW) to 2005-2014 (45 ppm DW) has been even more pronounced than the reduction for the Bay as a whole. Because there has not been additional evidence of copper sediment toxicity and copper concentrations in surface sediments appear to be decreasing over time, Permit requirements to further investigate copper sediment toxicity in San Francisco Bay were satisfied by information collected under MRP 1.0 and are no longer needed. If more evidence of such toxicity does appear, this requirement may be re-instated.

C.13-7 A scientific uncertainty regarding the olfactory impairment of salmonids was identified during development of SSOs for copper. Exposure to dissolved copper has been shown to cause olfactory impairment at relatively low concentrations in freshwater fish, resulting in an impaired avoidance response to predators. When the SSOs were established, studies were planned to address whether or not this phenomenon occurred in estuarine water. The studies[70] were supported in part through requirements in the Previous Permit and were conducted by David Baldwin of NOAA's Northwest Fisheries Science Center. Dr. Baldwin measured the firing of neurons in response to exposure to odorant chemicals. The studies indicate that salmon in saline or moderately saline water are much less sensitive than salmon in freshwater, and that the potential effect of copper on salmon olfaction is not a concern in the Bay.

[70] David Baldwin, NOAA Fisheries, Northwest Fisheries Science Center, 2015. *Impact of dissolved copper on the olfactory system of juvenile salmon, Phase II: Effect of estuarine salinity on olfactory toxicity.*

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. Provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. Provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, and auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

C.14. Bacteria Controls

The purpose of this provision is to implement the stormwater runoff and dry weather flow (urban runoff) requirements of the San Pedro Creek and Pacifica State Beach Bacteria TMDL (TMDL) and reduce bacteria loads to make substantial progress toward achieving the urban runoff bacteria wasteload allocations established for the TMDL.

Fact Sheet Findings in Support of Provision C.14

C.14-1 This Permit implements the Basin Plan amendment adopted by the Water Board on November 14, 2012, that establishes a TMDL and an Implementation Plan for bacteria in San Pedro Creek and at Pacifica State Beach. The State Water Board and U.S. EPA have also approved this Basin Plan amendment.

C.14-2 The implementation plan requires the City of Pacifica and San Mateo County (the Pacifica and San Mateo Permittees) to implement bacteria control measures, conduct education and outreach to others, and conduct water quality monitoring efforts. Control measures implemented by the Pacifica and San Mateo Permittees shall reduce bacteria in urban runoff to achieve TMDL wasteload allocations.

C.14-3 The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s and Caltrans facilities. The allocations are expressed in terms of allowable exceedances of single sample bacteria water quality objectives for the water contact recreation beneficial use and shall be achieved by August 2021 for Pacifica State Beach and August 2028 for San Pedro Creek.

C.14-4 The Pacifica and San Mateo Permittees may comply with any requirement of this provision through a collaborative effort.

Specific Provision C.14 Requirements

Provision C.14.a. requires the Pacifica and San Mateo Permittees to implement various control measures and education and outreach activities to achieve bacteria load reductions. In order to comply with this requirement, the Pacifica and San Mateo Permittees must implement measures such as: effectively prohibit potential illicit discharges to the storm drain from the sanitary sewer collection system; address bacteria discharges from existing and future commercial horse facilities; install dog waste-clean-up signs, waste bag dispensers, and trash receptacles at high priority areas; develop and implement a visual inspection and clean-up plan for high dog waste accumulation areas; and develop and implement an enhanced public outreach and education campaign for managing pet waste. This provision also requires the Pacifica and San Mateo Permittees to modify or refocus control measure implementation efforts as appropriate.

This provision is critical to the successful implementation of the urban runoff requirements for the TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds or locations, 2) a commitment to an implementation schedule, and 3) the quantification of the benefit resulting from control measure implementation.

Provision C.14.b. requires the Pacifica and San Mateo Permittees to conduct a water quality monitoring program to assess attainment of wasteload allocations. The monitoring and reporting requirements of Provision C.14 are authorized under Clean Water Act § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h),(j) and (l), 122.42(c), 122.44(i) and 122.48, and Water Code § 13383. In order to comply with this requirement, the Pacifica and San Mateo Permittees are required to monitor bacteria levels in San Pedro Creek and at Pacifica State Beach and analyze, summarize, and report the results of the monitoring to the Water Board. Further, they must provide an annual report of the quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives. This provision is necessary to determine whether or not wasteload allocations are being attained, so additional or enhanced measures are implemented, if necessary.

Provision C.14.c. requires the Pacifica and San Mateo Permittees to conduct a water quality monitoring program to 1) better characterize bacteria sources and 2) evaluate the effectiveness of the bacteria control measures. The results of the monitoring shall be reported to the Water Board on an annual basis. The findings from these assessments will be used throughout this and future Permit terms to revise, refocus, and enhance bacteria control measures to make them as effective and efficient as possible. Future permits will be based on an updated assessment of bacteria sources and control measure effectiveness. This provision is necessary to allow the Pacifica and San Mateo Permittees to identify and implement effective BMPs in an efficient manner.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges. Illicit discharge means "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities" (40 CFR 122.26(b)(2)).

Fact Sheet Findings in Support of Provision C.15.

Prohibition A.1. effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1. if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

Removal of Conditional Exemption for Planned and Unplanned Discharges of the Potable Water System

The Previous Permit-contained requirements for planned and unplanned discharges from the potable water systems owned and/or operated by Permittees who are water purveyors. The discharges were conditionally exempted provided the Permittees complied with the BMP, monitoring, and reporting requirements in the Previous Permit. The requirements were necessary because potable water discharges contain chlorine and chloramines, two very toxic chemicals to aquatic life, and can cause erosion, scouring of stream and creek banks, and sedimentation. The conditional exemption and requirements were included as an interim measure until such time an NPDES permit regulating potable water discharges was adopted. The State Water Board has since adopted the statewide General NPDES Permit for Drinking Water System Discharges to Waters of the United States, Order WQ 2014-0194-DWQ (Potable Water General Permit) on November 18, 2014. Therefore, the conditional exemption and requirements for planned and unplanned discharges from the Permittees' potable water systems is no longer necessary. The Permittees should seek coverage under the Potable Water General Permit for their potable water system discharges. NPDES-permitted discharges, such as those permitted by the Potable Water General Permit, are exempt from Discharge Prohibition A.1.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1. if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1. if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b.'s requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

Provision C.15.b.i.(1). Pumped Groundwater from Non Drinking Water Aquifers. These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Discharges of pumped groundwater from nondrinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit.

Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains. This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

Provision C.15.b.ii. Air Conditioning Condensate. Small air conditioning units are usually operated during the warm weather months. The condensate from these units is uncontaminated and unlikely to reach a storm drain or waters of the State because it tends to be low in volume and tends to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the

condensate tends to be uncontaminated, it picks up contaminates on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

Provision C.15.b.iii. Emergency Discharges of the Potable Water. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two very toxic chemicals to aquatic life. Potable water discharges can cause erosion and scouring of stream and creek banks, and sedimentation can result if effective BMPs are not implemented. This section of the Permit acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs that do not interfere with immediate emergency response operations or impact public health and safety. Reporting requirements for such events shall be determined by Water Board staff on a case-by-case basis.

Provision C.15.b.iv. Individual Residential Car Washing. Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.

Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges. These types of discharges can contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or a waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This provision also requires Permittees to coordinate with local sanitary agencies in these efforts.

Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering. Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the use of fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

C.16. Discharges to Areas of Special Biological Significance

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amendment to the Ocean Plan on October 16, 2012, and the plan was subsequently approved by the State Office of Administrative Law and U.S. EPA. The State Water Board is responsible for reviewing the Ocean Plan water quality standards and for modifying and adopting standards in accordance with CWA section 303(c)(1) and CWC section 13170.2. Pursuant to CWA sections 13263 and 13377, this Permit implements the Ocean Plan. In accordance with the Ocean Plan, the State Water Board granted an exception to the prohibition of stormwater discharges to Areas of Special Biological Significance (ASBSs), as discussed further below.

Fact Sheet Findings in Support of Provision C.16.

The Ocean Plan prohibits the discharge of waste to designated ASBSs. ASBSs are designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. On March 20, 2012, the State Water Board approved Resolution No. 2012-0012, approving a general exception to the Ocean Plan prohibition against discharges to ASBSs for certain nonpoint source discharges and NPDES-permitted municipal storm water discharges (ASBS Exception), as long as those discharges are covered under an appropriate authorization to discharge, such as this Order and comply with the Special Protections contained in Attachment B (Special Protections) to that resolution, among other requirements. The ASBS Exception was subsequently amended by State Water Board Resolution No. 2012-0031, which required pollutant reductions to be achieved within six years, in accordance with ASBS Compliance Plans. This provision applies to discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve ASBS. The provision authorizes the County of San Mateo's stormwater discharge as set forth in the provision and implements the Ocean Plan and the exceptions granted under it by the State Water Board to allow the County of San Mateo to discharge stormwater into the ASBS. The requirements of the Provision are from the ASBS Exception and its Special Protections, which are incorporated into the Order as Attachment E.

Specific Provision C.16.5 Requirements

Provision C.16.5.a. (Green Infrastructure Planning and Implementation), Provision C.16.5.b. (Inspection for Construction Site Control at Hillside Projects), and Provision C.16.5.c. (Trash Load Reductions) extend the deadlines for the specific Permit tasks that do not exist or are on a less aggressive timeline in the East County Permittees' Previous Permit.

Provision C.16.5.d. (Mercury Controls) exempts the East County Permittees from Provision C.11 – Mercury Controls because the East County Permittees are not named as point sources of mercury in the San Francisco Bay Mercury TMDL. Therefore, they do not have San Francisco Bay Mercury TMDL wasteload allocations (WLAs) for mercury (See Provision 16.5.h concerning compliance with the Delta Methylmercury TMDL).

Provision C.16.5.e. (Polychlorinated Biphenyls (PCBs) Controls) exempts the East County Permittees from Provision C.12 – PCBs Controls because the East County Permittees are not named as point sources of PCBs in the San Francisco Bay PCBs TMDL. Therefore, they do not have San Francisco Bay Mercury TMDL WLAs for PCBs.

Provision C.16.5.f. (Diazinon and Chlorpyrifos Controls) implements the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. The Central Valley Regional Water Board adopted a Basin Plan amendment including a TMDL for diazinon and chlorpyrifos in the Sacramento-San Joaquin Delta Waterways (Delta Waterways)[71] on June 23, 2006. The State Water Board and U.S. EPA both approved this Basin Plan Amendment. This TMDL includes waste load allocations (WLAs) for diazinon and chlorpyrifos applicable to the East County Permittees.

This TMDL states that levels of diazinon and chlorpyrifos shall not exceed the sum (S) of one (1) as defined below:

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1.0$$

where:

C_D = diazinon concentration in ug/L of point source discharge
C_C = chlorpyrifos concentration in ug/L of point source discharge
WQO_D = acute or chronic diazinon water quality criterion (0.160 and 0.100 ug/L, respectively)
WQO_C = acute or chronic chlorpyrifos water quality criterion (0.025 and 0.015 ug/L, respectively)

[71] The Delta Waterways include only those reaches that are located within the "Legal" Delta, as defined in Section 12220 of the California Water Code (CWC). The Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin Appendix 42 lists the Delta Waterways to which the site-specific diazinon and chlorpyrifos water quality objectives and implementation and monitoring provisions apply.

For the purpose of calculating the sum (S) above, non-detectable concentrations are considered to be zero.

The East County Permittees' previous Permit included requirements for the Diazinon and Chlorpyrifos TMDL. The Final Compliance Deadline for this TMDL was December 1, 2011.

The East County Permittees submitted a letter dated September 13, 2018, demonstrating their discharge has not exceeded the TMDL WLAs or water quality objective concentrations for diazinon and chlorpyrifos since 2008. The letter summarizes the results of diazinon and chlorpyrifos monitoring from 2012-2014 under Contra Costa Clean Water Program's Pollutants of Concern Load Monitoring at Lower Marsh Creek. This sampling location is directly downstream from one of the largest continuous urbanized areas in East County and samples characterized critical storm runoff events.

In addition, the letter includes diazinon and chlorpyrifos summary monitoring data from other County locations, in areas with both urban and agricultural lands from 2001-2017 by three programs: the State of California's Surface Water Ambient Monitoring Program (SWAMP), the Department of Pesticide Regulation (DPR) Statewide Pesticide Monitoring Program, and the San Francisco Estuary Institute (SFEI) Small Tributaries Loading Strategy. The SWAMP monitoring data includes 16 chlorpyrifos samples with no detections or exceedances, and 16 diazinon samples with 9 detections and 9 exceedances from 2001–2005. The DPR monitoring data includes 13 chlorpyrifos samples with 1 detection and 1 exceedance, and 13 diazinon samples with 1 detection and 1 exceedance from 2008-2009 and 2017. The chlorpyrifos and diazinon exceedances occurred in 2009 and could have been from agricultural sources. The SFEI monitoring data includes 5 chlorpyrifos samples with no detections or exceedances, and 5 diazinon samples with no detections or exceedances from 2013-2014. The monitoring data from SWAMP, DPR, and SFEI show that water quality objectives for diazinon and chlorpyrifos have not been exceeded since 2009, providing additional data to reflect the trend of reduced diazinon and chlorpyrifos concentrations in urban runoff.

The decline in concentrations of diazinon and chlorpyrifos in East County is consistent with observations of declines in urban runoff concentrations in the Central Valley Watershed following cancellation of urban uses of these chemicals. U.S. EPA cancelled the sale of nearly all non-agricultural diazinon and chlorpyrifos products by 2004. However, residents could still be storing diazinon and chlorpyrifos products, and old supplies remain legal to use. Because use of these products is still allowed and out of the direct control of the East County Permittees, there still is potential that such use could make consistent attainment of numeric effluent limits infeasible. The existing monitoring for toxicity and pesticides in Provision C.8. will be sufficient to demonstrate continued compliance with the diazinon and chlorpyrifos TMDL.

Therefore, the East County Permittees are required to implement Provision C.16.5.f. to maintain WLAs for diazinon and chlorpyrifos, and no additional actions are needed for the East County Permittees to comply with this TMDL.

Provision C.16.5.g. (Methylmercury Monitoring) requires methylmercury monitoring to assess compliance with the TMDL and the WLAs. Federal CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure

the effectiveness of the TMDL point and nonpoint source control measures and the progress the waterbody is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.16.5.g. is intended to assess inputs of methylmercury to the Delta from Marsh Creek and urban runoff; provide information to support implementation of pollutant control strategies; and assess progress toward achieving WLAs for the TMDL; and help resolve uncertainties in loading estimates and impairments associated with methylmercury.

In particular, methylmercury monitoring addresses four management questions:

1. Watershed Loads – What is the annual average methylmercury load from the Marsh Creek watershed?
2. Urban Discharge Loads – How much of the Marsh Creek methylmercury load results form discharges from the MS4 system?
3. Management Action Effectiveness – What is the methylmercury load reduction from the MS4 system by implementation of reasonable, foreseeable control measures to the maximum extent practicable?
4. Do eutrophication and low dissolved oxygen increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March through mid-November), and if so:
    - Under what circumstances do those effects reach the Delta?
    - Are there reasonable and foreseeable management actions to ameliorate that condition?

CWA section 402, subdivision (a)(2); 40 CFR sections 122.44, subdivision (i)(1), and 122.48, subdivision (b); and CWC section 13383 provide authority for the Water Board to require monitoring and technical water quality reports. Provision C.16.5.g. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements and (2) provide information useful in evaluating compliance with all Permit requirements.

To inform the permit reissuance, the East County Permittees' Report of Waste Discharge will include the status of their implementation of the Delta Mercury Control Program.

Provision C.16.5.h. (Delta Mercury Control Program) implements the Delta Methylmercury TMDL. On April 22, 2010, the Central Valley Regional Water Board adopted a Basin Plan amendment to the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* for the Control of Methylmercury and Mercury in the Sacramento-San Joaquin Delta Estuary (Resolution No. R5-2010-0043) to address the mercury impairments. The Delta Methylmercury TMDL was approved by the State Water Resources Control Board and the California Office of Administrative Law. Final approval by the U.S. EPA was received on October 20, 2011.

The Delta is impaired because of elevated levels of methylmercury in fish. The Delta is on the CWA 303(d) list for mercury and the State Water Resources Control Board has designated the Delta as a toxic hot spot under the Bay Protection and Toxic Hot Spot Cleanup Program. Mercury problems are evident throughout the Central Valley Watershed. The main concern with

inorganic mercury is that it can develop into methylmercury, a powerful neurotoxin that bioaccumulates in the aquatic food chain to harmful levels. Health advisories have been issued which recommend limiting consumption of fish from the Bay/Delta, tributaries to the Delta, and many lakes and reservoirs in the Central Valley. Concentrations of mercury in fish in other water bodies approach or exceed National Academy of Science (NAS), U.S. EPA, and/or U.S. Food and Drug Administration (FDA) guidelines for wildlife and human protection. Mercury levels also exceed water quality objectives for the Delta and elsewhere. In addition to these concerns, fish-eating birds taken from some bodies of water in the Basins have levels of mercury that can be expected to cause toxic effects. Bird-kills from mercury also have been documented in Lake Berryessa.

Components of the Delta Methylmercury TMDL relevant to implementation through the municipal storm water permits are as follows:

1. The methylmercury waste load allocations for the East County Permittees, by Delta subarea, are:

   Central Delta 0.75 grams/year;

   Marsh Creek 0.30 grams/year; and

   West Delta 3.2 grams/year

   Compliance with the methylmercury waste load allocations shall be met as soon as possible, but no later than 2030, unless the Central Valley Regional Water Board modifies the TMDL implementation schedule and Final Compliance Date.

2. The NPDES Permits for urban runoff management agencies shall require pollution prevention measures and the implementation of BMPs to minimize total mercury discharges. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to human health and wildlife. Requirements in the Permit issued or reissued and applicable for the term of the Permit shall be based on an updated assessment of pollution prevention measures and BMPs to minimize total (inorganic) mercury discharges to the MEP.

3. Annual methylmercury loads in urban runoff in MS4 service area within the Delta and Yolo Bypass may be calculated by the following method or by an alternate method approved the Central Valley Regional Water Board Executive Officer. The annual methylmercury load in urban runoff for a given MS4 service area during a given year may be calculated by the sum of wet weather and dry weather methylmercury loads. To estimate wet weather methylmercury loads discharged by MS4 urban areas, the average of wet weather methylmercury concentrations observed at the MS4's compliance locations may be multiplied by the wet weather runoff volume estimated for all urban areas within the MS4 service area within the Delta and Yolo Bypass. To estimate dry weather methylmercury loads, the average dry weather methylmercury concentrations observed at the MS4's compliance locations may be multiplied by the estimated dry weather urban runoff volume in the MS4 service area within the Delta and Yolo Bypass. This method is consistent with that used to develop load estimates in the Delta Methylmercury TMDL.

4. Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury or methylmercury loads to the Delta or is outside the jurisdiction authority of any agency, the Central Valley Regional Water Board may consider issuing additional allocations and regulatory requirements for the source in question.

In their Previous Permit, the East County Permittees were required to implement Phase 1 of the Delta Methylmercury TMDL. Phase 1 required them to conduct methylmercury control studies to monitor and evaluate the effectiveness of existing BMPs to control methylmercury; and to develop and evaluate additional BMPs effectiveness to control methylmercury. A report documenting the results of their control studies was submitted to the Central Valley Water Board October 2018. This marked the end of Phase 1.

The Central Valley Regional Water Board will use the control studies to conduct a Phase 1 Delta Methylmercury TMDL Review that considers:

- Modification of methylmercury goals, objectives, allocations and/or the Final Compliance Date;
- Implementation of management practices and schedules for methylmercury controls; and
- Adoption of a mercury offset program for dischargers who cannot meet their load and waste load allocations after implementing all reasonable load reduction strategies.

The findings of the control studies and other information will also be used to re-evaluate the fish tissue objectives, the linkage analysis between objectives and sources, and the attainability of the allocations. The linkage analysis, fish tissue objectives, allocations, and time schedules may also be adjusted. In addition, the Central Valley Regional Water Board will use the Phase 1 Control Studies' results and other information to consider amendments to the Delta Methylmercury TMDL during the Phase 1 Delta Methylmercury TMDL Review.

Phase 2 of the Delta Methylmercury TMDL begins after the Phase 1 Delta Methylmercury TMDL Review. If Phase 2 begins during this Permit term, this Permit may be amended to include additional requirements.

Provision C.16.5.h contains minimum BMPs to reduce inorganic mercury loads and make substantial progress toward achieving the urban runoff methylmercury load allocations established for the Delta Methylmercury TMDL. Preventing sediment-bound inorganic mercury from entering wet environments is critical in preventing it from methylating. The BMPs may, or may not, on their own be adequate for achieving compliance with the WLAs. If the East County Permittees are not making progress to achieve the WLAs by the compliance date, they will implement additional BMPs (structural or non-structural).

Mercury Collection and Recycling

Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and this Provision requires continued implementation of collection and

recycling of mercury-containing devices and waste products and alternative procedures to improve proper handling, disposal, and recycling of mercury-containing products.

Enhanced Municipal Management Practices to Reduce Sediment Discharges

Unless appropriate BMPs are implemented, municipal operations and maintenance activities are potential sources of sediment discharges. Sediment accumulated on sidewalks, corporation yards, roads, parking lots, and landscaping, is a major source of point source pollutants found in urban runoff. The enhanced municipal management practices to reduce sediment discharges are intended to minimize total (inorganic) mercury discharges required by the Delta Methylmercury TMDL. Thus, Provision C.16.5.h requires the East County permittees to implement minimum BMPs for municipal facilities and activities as part of their ongoing pollution prevention efforts. Such prevention measures include, but are not limited to, storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning. The work of municipal maintenance personnel is vital to minimize stormwater pollution because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain.

Public Education and Risk Reduction

An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues and its importance and influences positive stormwater pollution prevention behavior.

The East County Permittees have been implementing public outreach campaigns to educate their community on mercury pollution prevention. This Permit requires the East County Permittees to continue implementing a public education, outreach and participation program that is designed to reach residential, commercial, and industrial sources of mercury-containing products or emissions. The East County Permittees can utilize various electronic and print media and paid and free media to best reach the different various target audiences. Additionally, the East County Permittees should continue communicating with a broad spectrum of citizens with stormwater pollution prevention information through long-established outreach mechanisms such as staffing tables or booths at fairs, street fairs, and other community events. An informed community ensures greater compliance with the stormwater program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of local waters.

Methylmercury is a toxicant that is harmful to the brain and nervous system of infants, children, and the developing fetus. Nearly all fish caught in the Delta contain traces of methylmercury, the methylated form of mercury. However, larger fish that have lived longer have the highest levels of methylmercury because they have had more time to accumulate it. These large fish pose the greatest risk to children and pregnant women who eat them regularly. This Provision requires continual actions to manage human health risk due to mercury in Delta fish. This includes efforts to communicate the health risks of eating Delta fish to high risk-communities.

Attachment G: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment G includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with USEPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment G.

Fact Sheet Attachment C10

303(d) Trash Resolution and Staff Report February 2009

Available at
http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0008.pdf

ATTACHMENT B

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/14, Application deemed complete 1/30/15, Project approved 7/16/15	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/15, Application deemed complete 8/2/15, Project approved 12/12/15	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

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Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/16, Application deemed complete 4/10/16; Project approved 6/30/16	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/15, Application deemed complete 10/6/15, Project approved 12/9/15, Construction scheduled to begin 7/10/16	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

S7-1297

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.iv.(2)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.iv.(2)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address** – Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description** – Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed** – State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area** – For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project** – Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date

8. **Source Control Measures** – List all source control measures that have been or will be included in the project.

9. **Site Design Measures** – List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed** – List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism** – List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used** – List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1))** – On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2))** – On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

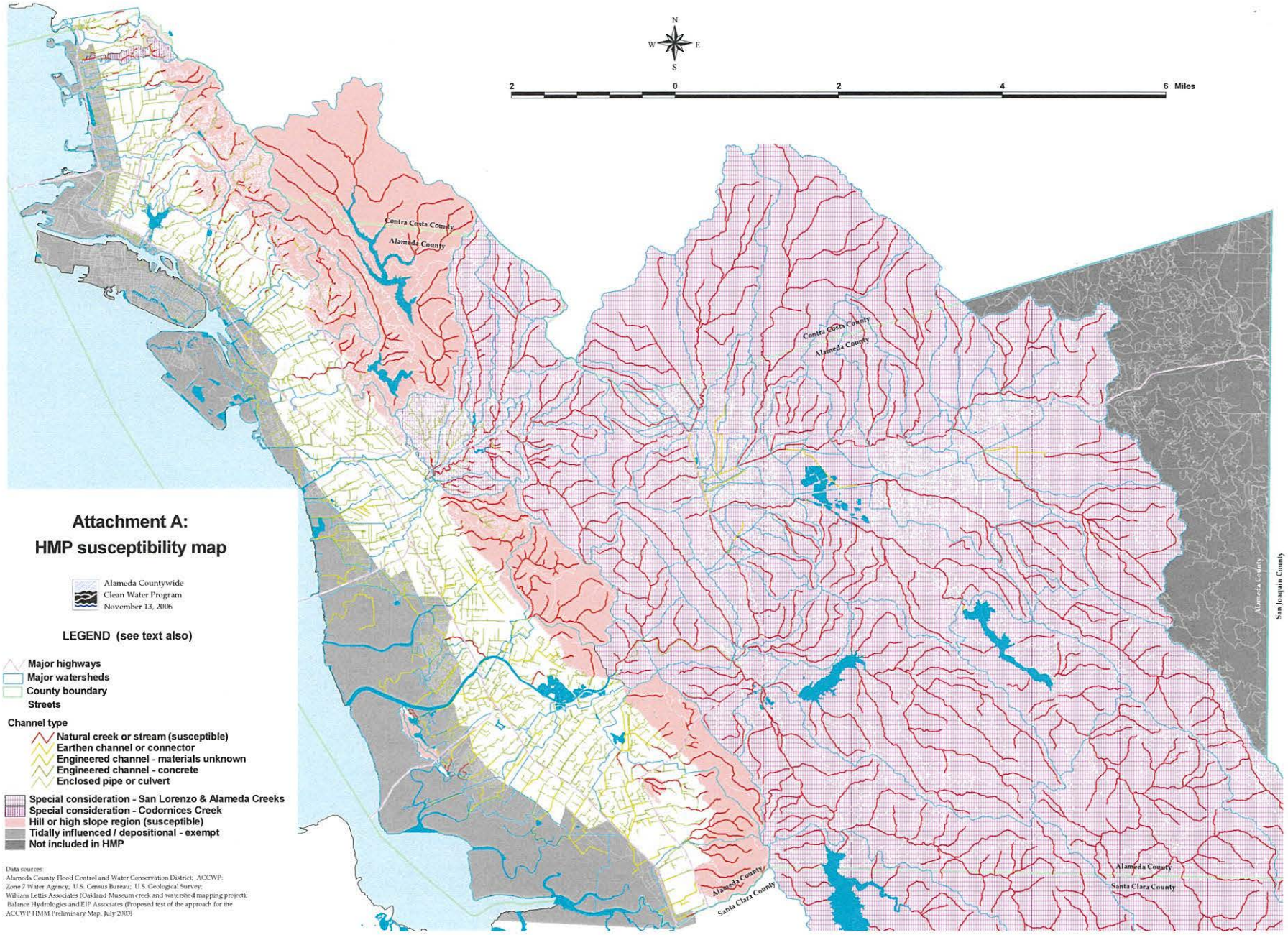
N
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6 Miles
Contra Costa County
Alameda County
Contra Costa County
Alameda County
Alameda County
San Joaquin County
Alameda County
Santa Clara County
Alameda County
Santa Clara County
Attachment A:
HMP susceptibility map
Alameda Countywide
Clean Water Program
November 13, 2006
LEGEND (see text also)
Major highways
Major watersheds
County boundary
Streets
Channel type
Natural creek or stream (susceptible)
Earthen channel or connector
Engineered channel - materials unknown
Engineered channel - concrete
Enclosed pipe or culvert
Special consideration - San Lorenzo & Alameda Creeks
Special consideration - Codornices Creek
Hill or high slope region (susceptible)
Tidally influenced / depositional - exempt
Not included in HMP
Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)

S7-1302

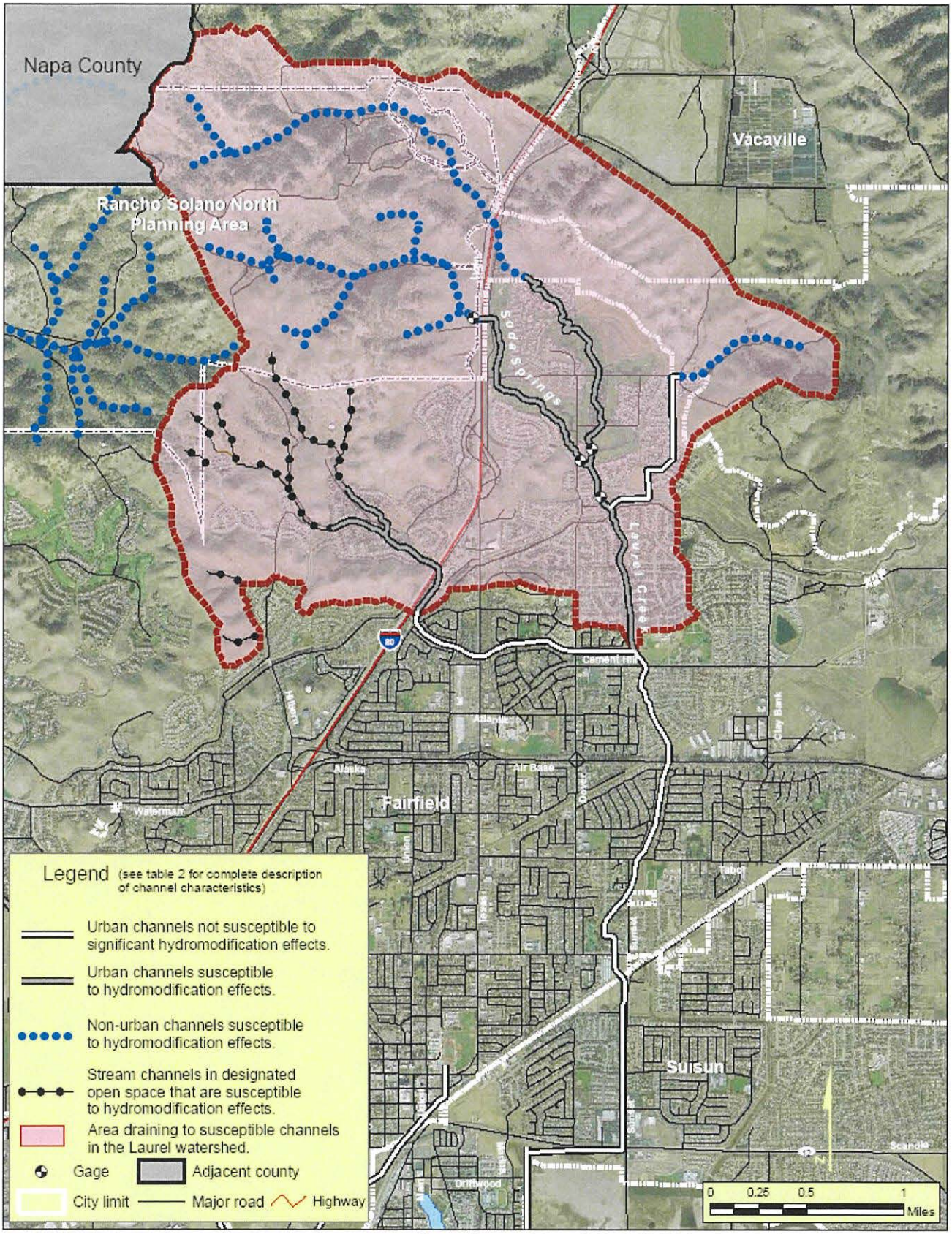

Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

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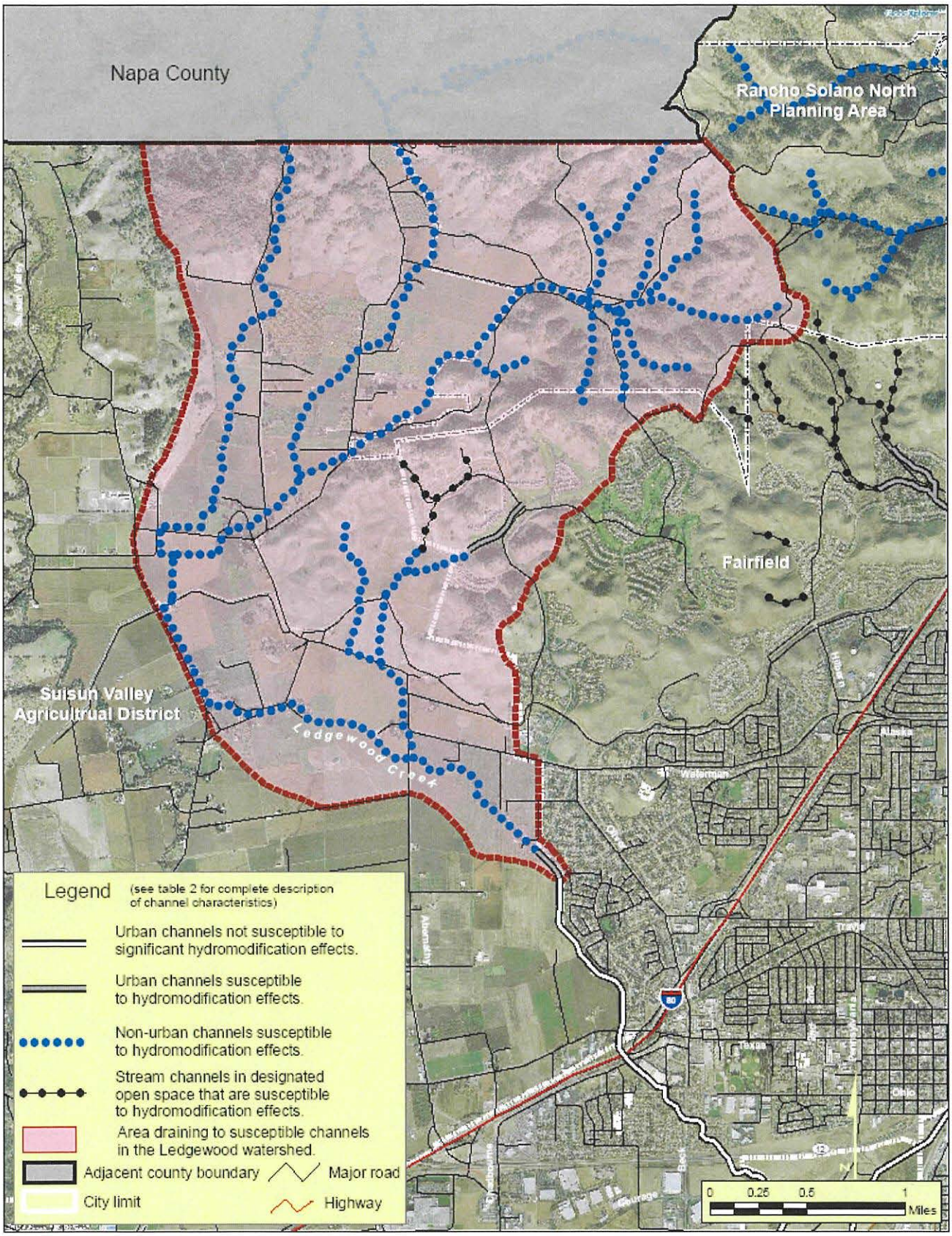

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

S7-1304

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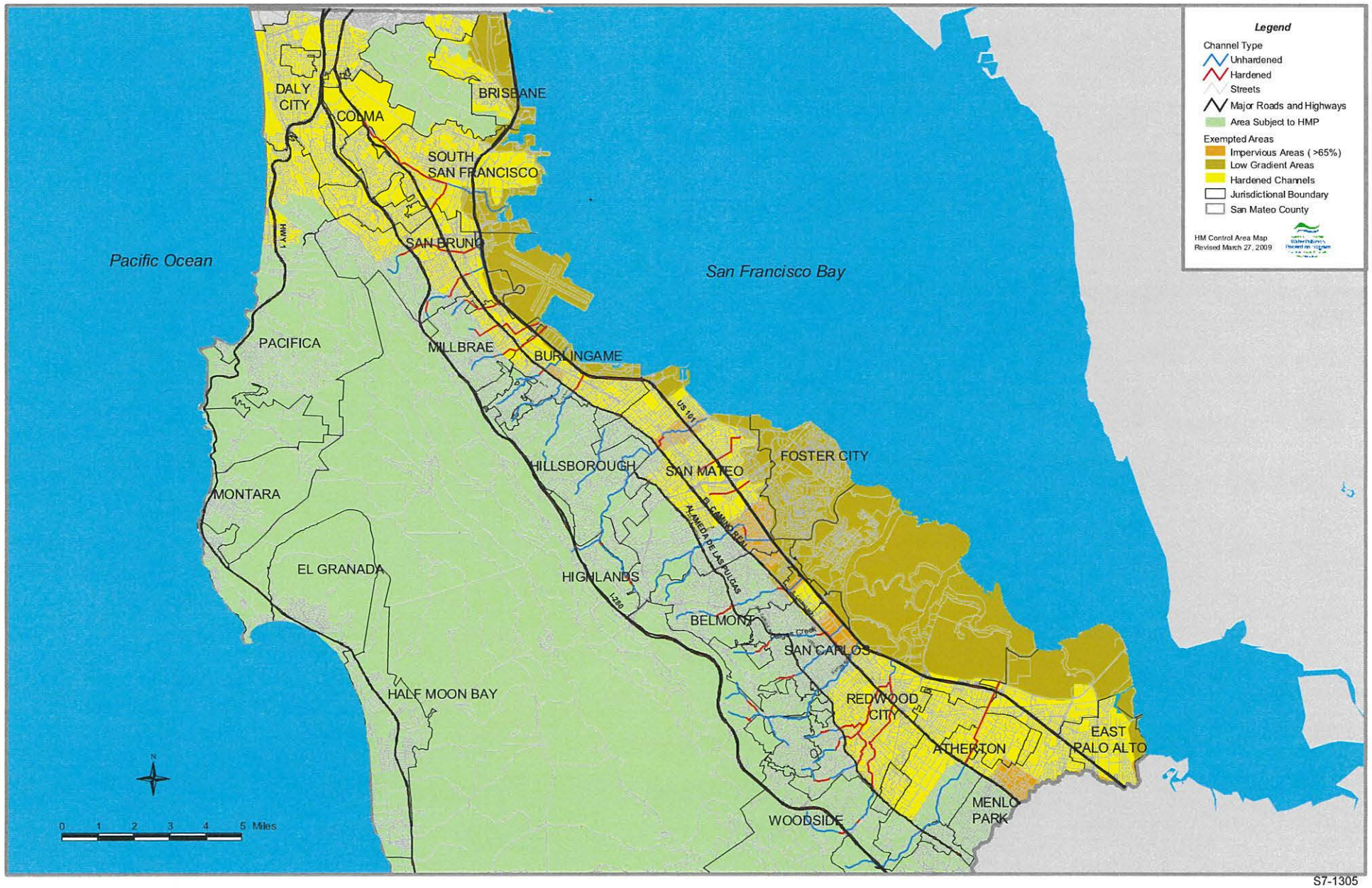
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
HILLSBOROUGH
SAN MATEO
FOSTER CITY
MONTARA
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
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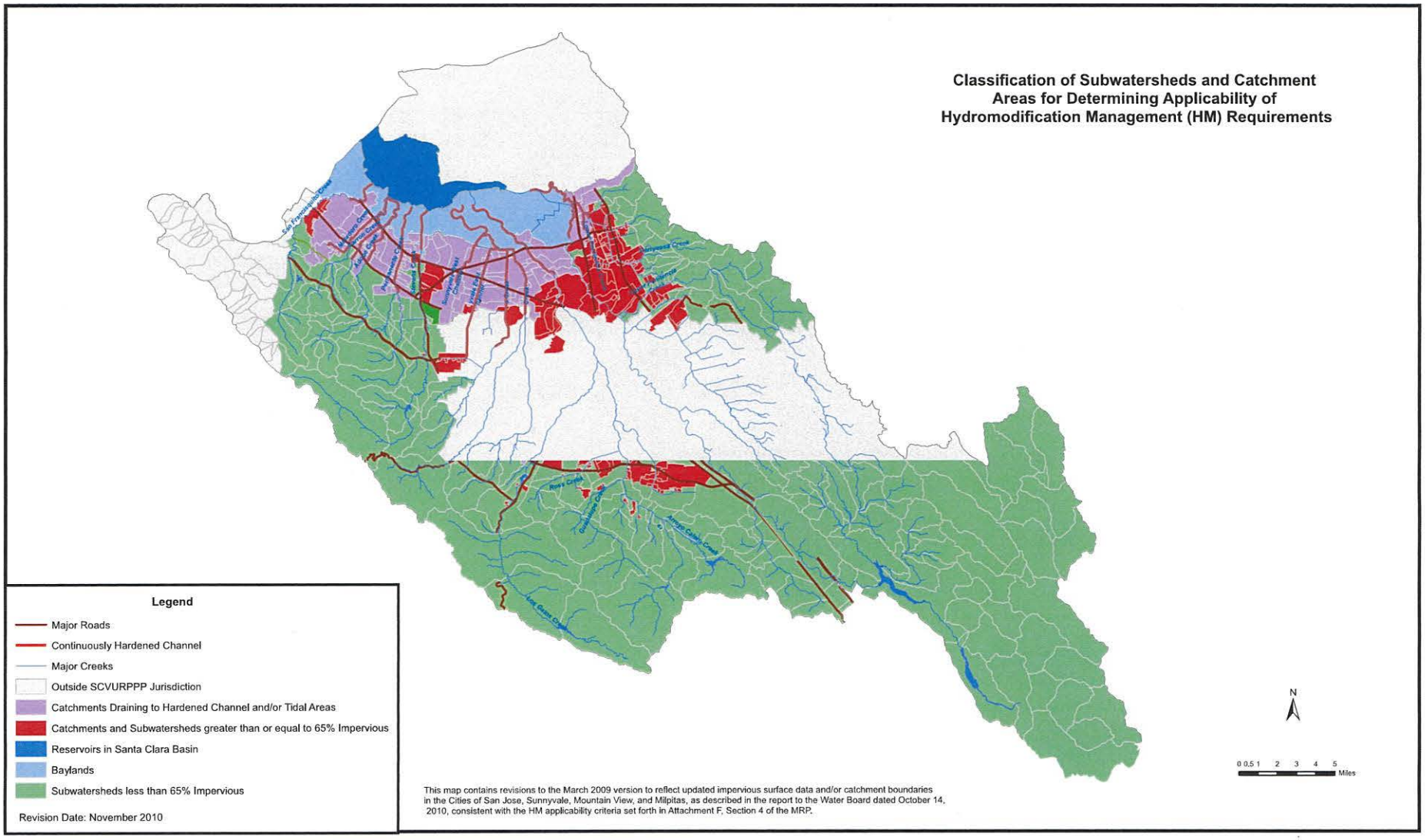
Classification of Subwatersheds and Catchment Areas for Determining Applicability of Hydromodification Management (HM) Requirements
Legend
Major Roads
Continuously Hardened Channel
Major Creeks
Outside SCVURPPP Jurisdiction
Catchments Draining to Hardened Channel and/or Tidal Areas
Catchments and Subwatersheds greater than or equal to 65% Impervious
Reservoirs in Santa Clara Basin
Baylands
Subwatersheds less than 65% Impervious
Revision Date: November 2010
This map contains revisions to the March 2009 version to reflect updated impervious surface data and/or catchment boundaries in the Cities of San Jose, Sunnyvale, Mountain View, and Milpitas, as described in the report to the Water Board dated October 14, 2010, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP.
N
0 0.5 1 2 3 4 5
Miles

S7-1306

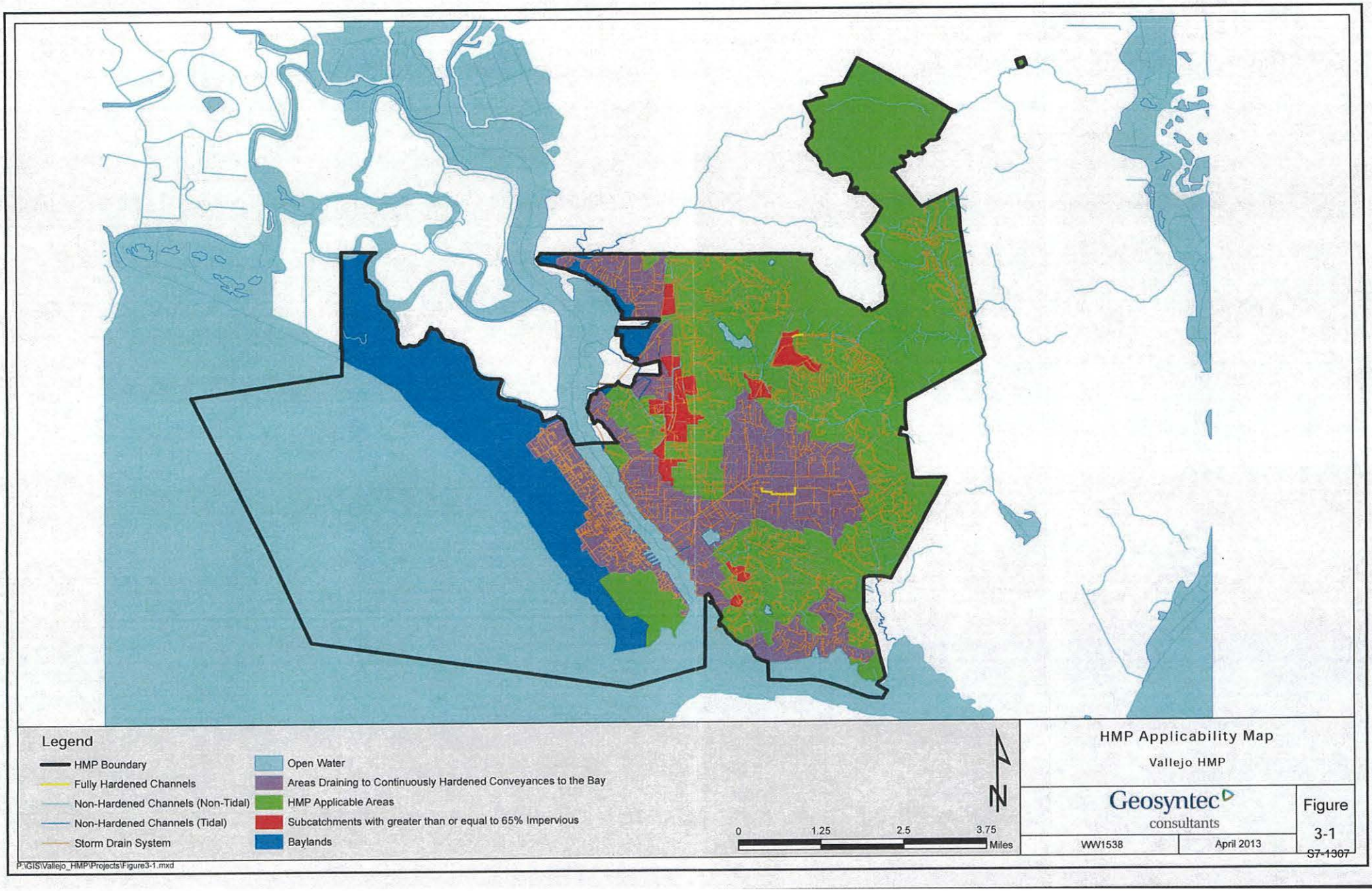
Legend
HMP Boundary
Fully Hardened Channels
Non-Hardened Channels (Non-Tidal)
Non-Hardened Channels (Tidal)
Storm Drain System
Open Water
Areas Draining to Continuously Hardened Conveyances to the Bay
HMP Applicable Areas
Subcatchments with greater than or equal to 65% Impervious
Baylands
N
0
1.25
2.5
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Miles
HMP Applicability Map
Vallejo HMP
Geosyntec consultants
Figure
3-1
WW1538
April 2013
S7-1307
P:\GIS\Vallejo_HMP\Projects\Figure3-1.mxd

ATTACHMENT D

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.

8. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]
9. If a Permittee monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT E

Supporting Information for Provision C.10.

Permittee 2009 Mapped Acreages of Trash Generation Rates

Minimum Full Trash Capture Area

Minimum Trash Hot Spots to be Annually Cleaned

And

Example Trash Generation Rate Map

S7-1311

Table 1. Trash Generation Areas Mapped as of June 2015

County	Permittee	Trash Generation Category (acres) as presented in Long-Term Trash Reduction Plans				
		Low	Moderate	High	Very High	Total
Alameda	Alameda	3,729	1,496	263	10	**5,498**
Alameda	Alameda County	229,012	2,434	347	-	**231,793**
Alameda	Albany	555	305	119	12	**991**
Alameda	Berkeley	2,792	2,317	763	216	**6,088**
Alameda	Dublin	6,498	859	289	-	**7,645**
Alameda	Emeryville	68	351	171	125	**715**
Alameda	Fremont	30,166	6,465	740	-	**37,372**
Alameda	Hayward	10,745	7,008	1,395	165	**19,312**
Alameda	Livermore	11,355	3,325	534	-	**15,214**
Alameda	Newark	2,918	1,816	631	25	**5,391**
Alameda	Oakland	14,432	5,663	4,860	3,465	**28,420**
Alameda	Piedmont	977	109	1	-	**1,086**
Alameda	Pleasanton	13,172	1,416	176	-	**14,765**
Alameda	San Leandro	2,818	4,044	790	77	**7,729**
Alameda	Union City	10,234	1,660	228	-	**12,122**
Contra Costa	Concord	10,832	2,415	678	72	**13,997**
Contra Costa	Contra Costa County	174,854	3,707	1,717	118	**180,396**
Contra Costa	Danville	11,282	106	3	-	**11,391**
Contra Costa	El Cerrito	1,817	311	169	4	**2,301**
Contra Costa	Hercules	3,753	188	12	-	**3,952**
Contra Costa	Lafayette	9,252	245	1	-	**9,498**
Contra Costa	Martinez	5,004	1,777	93	1	**6,875**
Contra Costa	Moraga	5,711	92	125	-	**5,929**
Contra Costa	Orinda	7,764	232	50	-	**8,046**
Contra Costa	Pinole	2,827	136	171	-	**3,134**
Contra Costa	Pittsburg	5,824	2,892	210	132	**9,058**

County	Permittee	Trash Generation Category (acres) as presented in Long-Term Trash Reduction Plans				
		Low	Moderate	High	Very High	Total
Contra Costa	Pleasant Hill	2,873	1,080	371	22	**4,346**
Contra Costa	Richmond	10,704	4,538	1,774	269	**17,285**
Contra Costa	San Pablo	325	682	481	72	**1,560**
Contra Costa	San Ramon	10,536	1,184	-	-	**11,720**
Contra Costa	Walnut Creek	11,329	963	115	-	**12,407**
San Mateo	Atherton	2,984	230	-	-	**3,214**
San Mateo	Belmont	2,517	240	62	-	**2,820**
San Mateo	Brisbane	1,220	473	60	21	**1,775**
San Mateo	Burlingame	1,964	592	99	-	**2,654**
San Mateo	Colma	1,026	122	74	4	**1,225**
San Mateo	Daly City	2,553	1,015	407	-	**3,975**
San Mateo	East Palo Alto	97	879	356	97	**1,428**
San Mateo	Foster City	2,187	109	-	-	**2,296**
San Mateo	Half Moon Bay	3,657	187	51	-	**3,895**
San Mateo	Hillsborough	3,944	7	-	-	**3,950**
San Mateo	Menlo Park	4,811	292	3	-	**5,106**
San Mateo	Millbrae	1,512	369	79	-	**1,959**
San Mateo	Pacifica	7,321	472	104	-	**7,898**
San Mateo	Portola Valley	5,786	5	-	-	**5,790**
San Mateo	Redwood City	7,128	398	1,576	398	**9,502**
San Mateo	San Bruno	2,065	965	57	-	**3,088**
San Mateo	San Carlos	2,584	604	78	-	**3,265**
San Mateo	San Mateo	4,340	2,343	302	-	**6,985**
San Mateo	San Mateo County	172,050	272	362	-	**172,683**
San Mateo	South San Francisco	2,724	2,321	337	-	**5,382**
San Mateo	Woodside	6,989	2	-	-	**6,991**
Santa Clara	Campbell	2,335	1,133	273	-	**3,741**
Santa Clara	Cupertino	5,446	1,161	274	-	**6,881**
Santa Clara	Los Altos	3,966	10	14	-	**3,990**
Santa Clara	Los Altos Hills	5,377	6	-	-	**5,383**
Santa Clara	Los Gatos	6,275	698	-	-	**6,973**
Santa Clara	Milpitas	5,065	3,002	98	2	**8,167**

County	Permittee	Trash Generation Category (acres) as presented in Long-Term Trash Reduction Plans				
		Low	Moderate	High	Very High	Total
Santa Clara	Monte Sereno	1,018	9	-	-	**1,027**
Santa Clara	Mountain View	3,882	2,626	460	-	**6,968**
Santa Clara	Palo Alto	12,592	1,539	53	-	**14,184**
Santa Clara	San Jose	73,366	21,823	5,709	549	**101,447**
Santa Clara	Santa Clara	5,217	4,855	841	12	**10,925**
Santa Clara	Santa Clara County	380,316	678	1,123	-	**382,117**
Santa Clara	Saratoga	7,207	409	-	-	**7,616**
Santa Clara	Sunnyvale	7,082	4,075	907	11	**12,075**
Solano	Fairfield	18,578	240	57	-	**18,875**
Solano	Suisun City	2,043	12	9	-	**2,064**
Solano	Vallejo	10,980	4,314	1,948	476	**17,718**
	Total	**1,404,362**	**118,302**	**33,046**	**6,355**	**1,562,066**

Table 2. Minimum Trash Capture Area and Trash Hot Spots for Population Based Permittees

Data Source: http://quake.abag.ca.gov/mitigation/pickdbh2.html and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)**[1]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[2]
Alameda County						
San Leandro	73,402	721	**216**	2	7	4
Oakland	420,183	759	**228**	14	8	8
Dublin	46,934	377	**113**	1	3	**3**
Emeryville	9,727	69	**21**	1	1	1
Albany	16,877	95	**28**	1	1	1
Berkeley	106,697	183	**55**	3	1	3
Alameda County Unincorporated.	140,825	375	**112**	4	3	4
Alameda	75,823	402	**121**	2	4	**4**
Fremont	213,512	698	**209**	7	6	7
Hayward	149,205	726	**218**	4	7	**7**
Livermore	83,604	423	**127**	2	4	**4**
Newark	43,872	314	**94**	1	3	**3**
Piedmont	11,100	1	**0**	1	1	1
Pleasanton	69,388	366	**110**	2	3	**3**
Union City	73,402	183	**55**	2	1	2

1 30% of Retail / Wholesale Commercial Acres – If population under 12,000 and Retail/Wholesale Commercial < 40 acres, Permittee is exempt from Minimum Full Trash Capture Requirement – C.10.iii.a.

2 If the hot spot # based on % commercial area is more than twice that based on population, the minimum hot spot # is double the population based #.

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)[1]**	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots[2]**
San Mateo County						
San Mateo County Unincorporated.	65,844	71	**21**	2	1	2
Atherton	7,475	0	**0**	1	1	1
Belmont	26,078	58	**17**	1	1	1
Brisbane	3,861	16	**0**	1	1	1
Burlingame	28,867	123	**37**	1	1	1
Colma	1,613	106	**0**	1	1	1
Portola Valley	4,639	9	**0**	1	1	1
Daly City	106,361	242	**73**	3	2	3
East Palo Alto	32,897	59	**18**	1	1	1
Foster City	30,308	67	**20**	1	1	1
Half Moon Bay	13,046	49	**15**	1	1	1
Hillsborough	11,272	0	**0**	1	1	1
Menlo Park	31,490	83	**25**	1	1	1
Millbrae	21,387	68	**20**	1	1	1
Pacifica	39,616	100	**30**	1	1	1
Redwood City	77,269	309	**93**	2	3	**3**
San Bruno	43,444	137	**41**	1	1	1
San Carlos	28,857	129	**39**	1	1	1
San Mateo	95,776	275	**82**	3	2	3
South San Francisco	63,744	195	**58**	2	1	2
Woodside	5,625	9	**0**	1	1	1

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)** [1]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[2]
Contra Costa County						
Contra Costa County Unincorporated.	152,744	524	**157**	5	5	5
Concord	123,776	1016	**305**	4	10	8
Walnut Creek	65,306	329	**99**	2	3	**3**
Clayton	10,784	21	**(0)**	1	1	1
Danville	42,629	134	**40**	1	1	1
El Cerrito	23,320	105	**32**	1	1	1
Hercules	24,324	37	**11**	1	1	1
Lafayette	23,962	68	**20**	1	1	1
Martinez	36,144	142	**43**	1	1	1
Moraga	16,138	108	**32**	1	1	1
Orinda	17,542	24	**7**	1	1	1
Pinole	19,193	140	**42**	1	1	1
Pittsburg	63,652	520	**156**	2	5	4
Pleasant Hill	33,377	219	**66**	1	2	**2**
Richmond	103,577	391	**117**	3	3	3
San Pablo	31,190	131	**39**	1	1	1
San Ramon	59,002	274	**82**	1	2	**2**
Santa Clara County						
Santa Clara County Unincorporated	99,122	270	**47**	3	3	3
Campbell	38,889	137	**41**	1	1	1
Cupertino	55,551	213	**64**	2	2	2
Los Altos	28,291	65	**20**	1	1	1

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)** [1]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[2]
Los Altos Hills	8,837	0	**0**	1	1	1
Los Gatos	30,296	163	**49**	1	1	1
Milpitas	69,419	457	**137**	2	4	**4**
Monte Sereno	3,579	0	**0**	1	1	1
Mountain View	73,932	375	**112**	2	3	**3**
Santa Clara	115,503	560	**168**	3	5	**5**
Saratoga	31,592	41	**12**	1	1	1
San Jose	989,496	2983	**895**	32	29	32
Sunnyvale	137,538	548	**164**	3	5	**5**
Palo Alto	63,367	282	**84**	2	2	2
Solano County						
Vallejo	120,416	559	**168**	4	5	**5**
Fairfield	106,142	486	**146**	3	4	**4**
Suisun	28,031	75	**22**	1	1	1
Totals	4,930,339	19057	**5718**	165	184	349

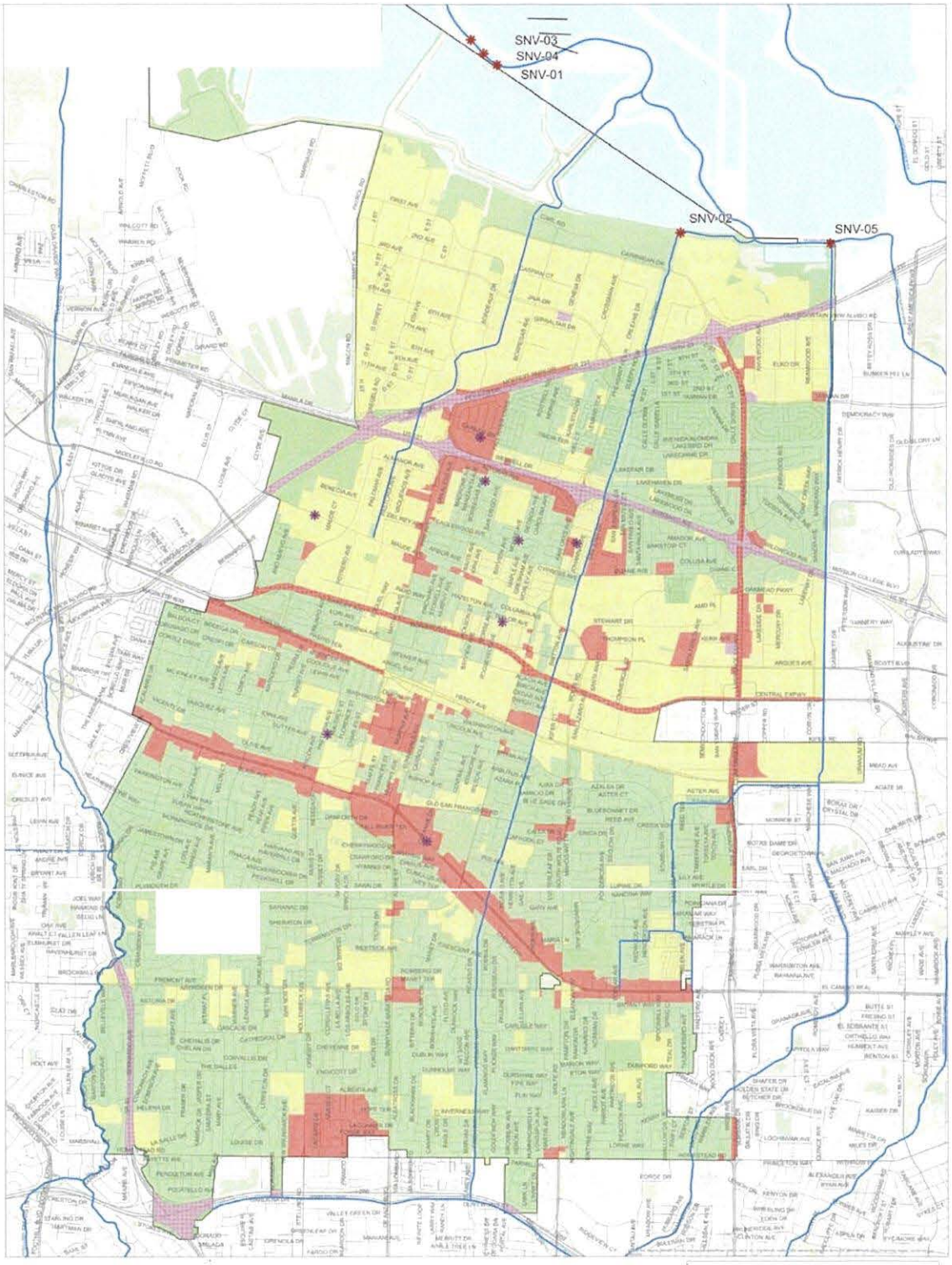

S7-1319

ATTACHMENT F

State Water Resources Control Board
Resolution No. 2012-0031, Attachment B
Special Protections for Areas of Biological Significance

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2012-0031

Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). "Existing storm water outfalls" are those that were constructed or under construction prior to January 1, 2005. "New contribution of waste" is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) (i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.

(b) Foundation and footing drains.

(c) Water from crawl space or basement pumps.

(d) Hillside dewatering.

(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).

The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance

plan for ASBS discharges. The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:

   (1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

   (2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

   (3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and

   (4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

   (1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, Permittees must first consider, and use where feasible, LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site, if LID practices would be the most effective at reducing pollutants from entering the ASBS.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger shall submit a draft written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type. The final ASBS Compliance Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe

the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

B. NONPOINT SOURCE DISCHARGES

1. General Provisions for Nonpoint Sources

   a. Existing nonpoint source waste discharges are allowed into an ASBS only under the following conditions:

      (1) The discharges are authorized under waste discharge requirements, a conditional waiver of waste discharge requirements, or a conditional prohibition issued by the State Water Board or a Regional Water Board.

      (2) The discharges are in compliance with the applicable terms, prohibitions, and special conditions contained in these Special Protections.

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only existing nonpoint source waste discharges are allowed. "Existing nonpoint source waste discharges" are discharges that were ongoing prior to January 1, 2005. "New nonpoint source discharges" are defined as those that commenced on or after January 1, 2005. A change to an existing nonpoint source discharge, in terms of relocation or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges from nonpoint sources (those not subject to an NPDES Permit) are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability, or occur naturally:

(i) Discharges associated with emergency fire fighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

f. At the San Clemente Island ASBS, discharges incidental to military training and research, development, test, and evaluation operations are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed in the two military closure areas in the vicinity of Wilson Cove and Castle Rock. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

g. At the San Nicolas Island and Begg Rock ASBS, discharges incidental to military research, development, testing, and evaluation of, and training with, guided missile and other weapons systems, fleet training exercises, small-scale amphibious warfare training, and special warfare training are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

h. All other nonpoint source discharges not specifically authorized above are prohibited.

2. Planning and Reporting

a. The nonpoint source discharger shall develop an ASBS Pollution Prevention Plan, including an implementation schedule, to address storm water runoff and any other nonpoint source discharges from its facilities. The ASBS Pollution Prevention Plan must be equivalent in contents to an ASBS Compliance Plan as described in I (A)(2) in this document. The ASBS Pollution Prevention Plan is subject to approval by the Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements).

b. The ASBS Pollution Prevention Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff that are necessary to comply with these special conditions, will be achieved through Management Measures and associated Management Practices (Management Measures/Practices). Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director or Regional Water Board Executive Officer that such installation would pose a threat to health or safety. Management Measures to control storm water runoff during a design storm shall achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

c. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff or other nonpoint source pollution is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and the Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents that alter natural water quality and the sources of these constituents.

(2) The report shall describe Management Measures/Practices that are currently being implemented, Management Measures/Practices that are identified in the ASBS Pollution Prevention Plan for future implementation, and any additional Management Measures/Practices that may be added to the Pollution Prevention Plan to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the Management Measures/Practices.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements), the discharger shall revise its ASBS Pollution Prevention Plan to incorporate any new or modified Management Measures/Practices that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised ASBS Pollution Prevention Plan, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the dischargers shall submit a draft written ASBS Pollution Prevention Plan to the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) that describes its strategy to comply with these special conditions, including the requirement to maintain natural ocean water quality in the affected ASBS. The Pollution Prevention Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls to comply with these special conditions for inclusion in the discharger's Pollution Prevention Plan. The final ASBS Pollution Prevention Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these Special Protections shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Pollution Prevention Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with parks and recreation facilities shall comply with the following:

A. The discharger shall include a section in an ASBS Compliance Plan (for NPDES dischargers) or an ASBS Pollution Prevention Plan (for nonpoint source dischargers) to address storm water runoff from parks and recreation facilities.

1. The plan shall identify all pollutant sources, including sediment sources, which may result in waste entering storm water runoff. Pollutant sources include, but are not limited to, roadside rest areas and vistas, picnic areas, campgrounds, trash receptacles, maintenance facilities, park personnel housing, portable toilets, leach fields, fuel tanks, roads, piers, and boat launch facilities.

2. The plan shall describe BMPs or Management Measures/Practices that will be implemented to control soil erosion (both temporary and permanent erosion controls) and reduce or eliminate pollutants in storm water runoff in order to achieve and maintain natural water quality conditions in the affected ASBS. The plan shall include BMPs or

Management Measures/Practices to ensure that trails and culverts are maintained to prevent erosion and minimize waste discharges to ASBS.

3. The plan shall include BMPs or Management Measures/Practices to prevent the discharge of pesticides or other chemicals, including agricultural chemicals, in storm water runoff to the affected ASBS.

4. The plan shall include BMPs or Management Measures/Practices that address public education and outreach. The goal of these BMPs or Management Measures/Practices is to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The BMPs or Management Measures/Practices shall include signage at camping, picnicking, beach and roadside parking areas, and visitor centers, or other appropriate measures, which notify the public of any applicable requirements of these Special Protections and identify the ASBS boundaries.

5. The plan shall include BMPs or Management Measures/Practices that address the prohibition against the discharge of trash to ASBS. The BMPs or Management Measures/Practices shall include measures to ensure that adequate trash receptacles are available for public use at visitor facilities, including parking areas, and that the receptacles are adequately maintained to prevent trash discharges into the ASBS. Appropriate measures include covering trash receptacles to prevent trash from being wind blown and periodically emptying the receptacles to prevent overflows.

6. The plan shall include BMPs or Management Measures/Practices to address runoff from parking areas and other developed features to ensure that the runoff does not alter natural water quality in the affected ASBS. BMPs or Management Measures/Practices shall include measures to reduce pollutant loading in runoff to the ASBS through installation of natural area buffers (LID), treatment, or other appropriate measures.

B. Maintenance and repair of park and recreation facilities must not result in waste discharges to the ASBS. The practice of road oiling must be minimized or eliminated, and must not result in waste discharges to the ASBS.

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with waterfront and marine operations shall comply with the following:

A. For discharges related to waterfront and marine operations, the discharger shall develop a Waterfront and Marine Operations Management Plan (Waterfront Plan). This plan shall contain appropriate Management Measures/Practices to address nonpoint source pollutant discharges to the affected ASBS.

1. The Waterfront Plan shall contain appropriate Management Measures/Practices for any waste discharges associated with the operation and maintenance of vessels, moorings, piers, launch ramps, and cleaning stations in order to ensure that beneficial uses are protected and natural water quality is maintained in the affected ASBS.

2. For discharges from marinas and recreational boating activities, the Waterfront Plan shall include appropriate Management Measures, described in The Plan for California's Nonpoint Source Pollution Control Program, for marinas and recreational boating, or equivalent practices, to ensure that nonpoint source pollutant discharges do not alter natural water quality in the affected ASBS.

3. The Waterfront Plan shall include Management Practices to address public education and outreach to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The management practices shall include appropriate signage, or similar measures, to inform the public of the ASBS restrictions and to identify the ASBS boundaries.

4. The Waterfront Plan shall include Management Practices to address the prohibition against trash discharges to ASBS. The Management Practices shall include the provision of adequate trash receptacles for marine recreation areas, including parking areas, launch ramps, and docks. The plan shall also include appropriate Management Practices to ensure that the receptacles are adequately maintained and secured in order to prevent trash discharges into the ASBS. Appropriate Management Practices include covering the trash receptacles to prevent trash from being windblown, staking or securing the trash receptacles so they don't tip over, and periodically emptying the receptacles to prevent overflow.

5. The discharger shall submit its Waterfront Plan to the by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) within six months of the effective date of these special conditions. The Waterfront Plan is subject to approval by the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The plan must be fully implemented within 18 months of the effective date of the Exception.

B. The discharge of chlorine, soaps, petroleum, other chemical contaminants, trash, fish offal, or human sewage to ASBS is prohibited. Sinks and fish cleaning stations are point source discharges of wastes and are prohibited from discharging into ASBS. Anthropogenic accumulations of discarded fouling organisms on the sea floor must be minimized.

C. Limited-term activities, such as the repair, renovation, or maintenance of waterfront facilities, including, but not limited to, piers, docks, moorings, and breakwaters, are authorized only in accordance with Chapter III.E.2 of the Ocean Plan.

D. If the discharger anticipates that the discharger will fail to fully implement the approved Waterfront Plan within the 18 month deadline, the discharger shall submit a technical report as soon as practicable to the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The technical report shall contain reasons for failing to meet the deadline and propose a revised schedule to fully implement the plan.

E. The State Water Board or the Regional Water Board may, for good cause, authorize additional time to comply with the Waterfront Plan. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in Section III.A.5. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality. The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration of significant hardship by showing that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate.

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected during the same storm and at approximately the same time when post-

storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.

   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

      (3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates); and

      (3) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. Ocean Receiving Water and Reference Area Monitoring Program

In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled prior to (pre-storm) and during (or immediately after) the same storm (post storm). Post storm sampling shall be during the same storm and at approximately the same time as when the runoff is sampled. Reference water quality shall also be sampled three times annually and analyzed for the same constituents pre-storm and post-storm, during the same storm seasons when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,

using the amphipod *Eohaustorius estuarius* must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

   a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)

listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm during the same storm season that receiving water is sampled. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected during the same storm event when storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

Glossary

At the point of discharge(s) – Means in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

Areas of Special Biological Significance (ASBS) – Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of State Water Quality Protection Areas.

Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit.

Development – Relevant to reference monitoring sites, means urban, industrial, agricultural, grazing, mining, and timber harvesting land uses.

Higher threat discharges - Permitted storm drains discharging equal to or greater than 18 inches, industrial storm drains, agricultural runoff discharged through an MS4, discharges associated with waterfront and marina operations (e.g., piers, launch ramps, mooring fields, and associated vessel support activities, except for passive discharges defined below), and direct discharges associated with commercial or industrial activities to ASBS.

Low Impact Development (LID) – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which entails collecting and conveying storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID focuses on using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall.

Marine Operations – Marinas or mooring fields that contain slips or mooring locations for 10 or more vessels.

Management Measure (MM) - Economically achievable measures for the control of the addition of pollutants from various classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. For example, in the "marinas and recreational boating" land-use category specified in the Plan for California's Nonpoint Source Pollution Control Program (NPS Program Plan) (SWRCB, 1999), "boat cleaning and maintenance" is considered a MM or the source of a specific class or type of NPS pollution.

Management Practice (MP) - The practices (e.g., structural, non-structural, operational, or other alternatives) that can be used either individually or in combination to address a specific MM class or classes of NPS pollution. For example, for the "boat cleaning and maintenance" MM, specific MPs can include, but are not limited to, methods for the selection of environmentally sensitive hull paints or methods for cleaning/removal of hull copper anti-fouling paints.

Municipal Separate Storm Sewer System (MS4) – A municipally-owned storm sewer system regulated under the Phase I or Phase II storm water program implemented in compliance with Clean Water Act section 402(p). Note that an MS4 program's boundaries are not necessarily congruent with the permittee's political boundaries.

Natural Ocean Water Quality - The water quality (based on selected physical, chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of: (a) man-made constituents (*e.g.,* DDT); (b) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial), and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question; and (c) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man. Discharges "*shall not alter natural ocean water quality*" as determined by a comparison to the range of constituent concentrations in reference areas agreed upon via the regional monitoring program(s). If monitoring information indicates that *natural ocean water quality* is not maintained, but there is sufficient evidence that a discharge is not contributing to the alteration of natural water quality, then the Regional Water Board may make that determination. In this case, sufficient information must include runoff sample data that has equal or lower concentrations for the range of constituents at the applicable reference area(s).

Nonpoint source – Nonpoint pollution sources generally are sources that do not meet the definition of a point source. Nonpoint source pollution typically results from land runoff, precipitation, atmospheric deposition, agricultural drainage, marine/boating operations or hydrologic modification. Nonpoint sources, for purposes of these Special Protections, include discharges that are not required to be regulated under an NPDES permit.

Non-storm water discharge – Any runoff that is not the result of a precipitation event. This is often referred to as "dry weather flow."

Non-structural control – A Best Management Practice that involves operational, maintenance, regulatory (e.g., ordinances) or educational activities designed to reduce or eliminate pollutants in runoff, and that are not structural controls (i.e. there are no physical structures involved).

Physical impossibility - Means any act of God, war, fire, earthquake, windstorm, flood or natural catastrophe; unexpected and unintended accidents not caused by discharger or its employees' negligence; civil disturbance, vandalism, sabotage or terrorism; restrain by court order or public authority or agency; or action or non-action by, or inability to obtain the necessary authorizations or approvals from any governmental agency other than the permittee.

Representative sites and monitoring procedures – Are to be proposed by the discharger, with appropriate rationale, and subject to approval by Water Board staff.

Sheet-flow – Runoff that flows across land surfaces at a shallow depth relative to the cross-sectional width of the flow. These types of flow may or may not enter a storm drain system before discharge to receiving waters.

Storm Season – Also referred to as rainy season, means the months of the year from the onset of rainfall during autumn until the cessation of rainfall in the spring.

Structural control – A Best Management Practice that involves the installation of engineering solutions to the physical treatment or infiltration of runoff.

Surf Zone - The surf zone is defined as the submerged area between the breaking waves and the shoreline at any one time.

Surface Water Ambient Monitoring Program (SWAMP) comparable – Means that the monitoring program must 1) meet or exceed 2008 SWAMP Quality Assurance Program Management Plan (QAPP) Measurement Quality Objectives, or 2) have a Quality Assurance Project Plan that has been approved by SWAMP; in addition data must be formatted to match the database requirements of the SWAMP Information Management System. Adherence to the measurement quality objectives in the Southern California Bight 2008 ASBS Regional Monitoring Program QAPP and data base management comprises being SWAMP comparable.

Waterfront Operations - Piers, launch ramps, and cleaning stations in the water or on the adjacent shoreline.

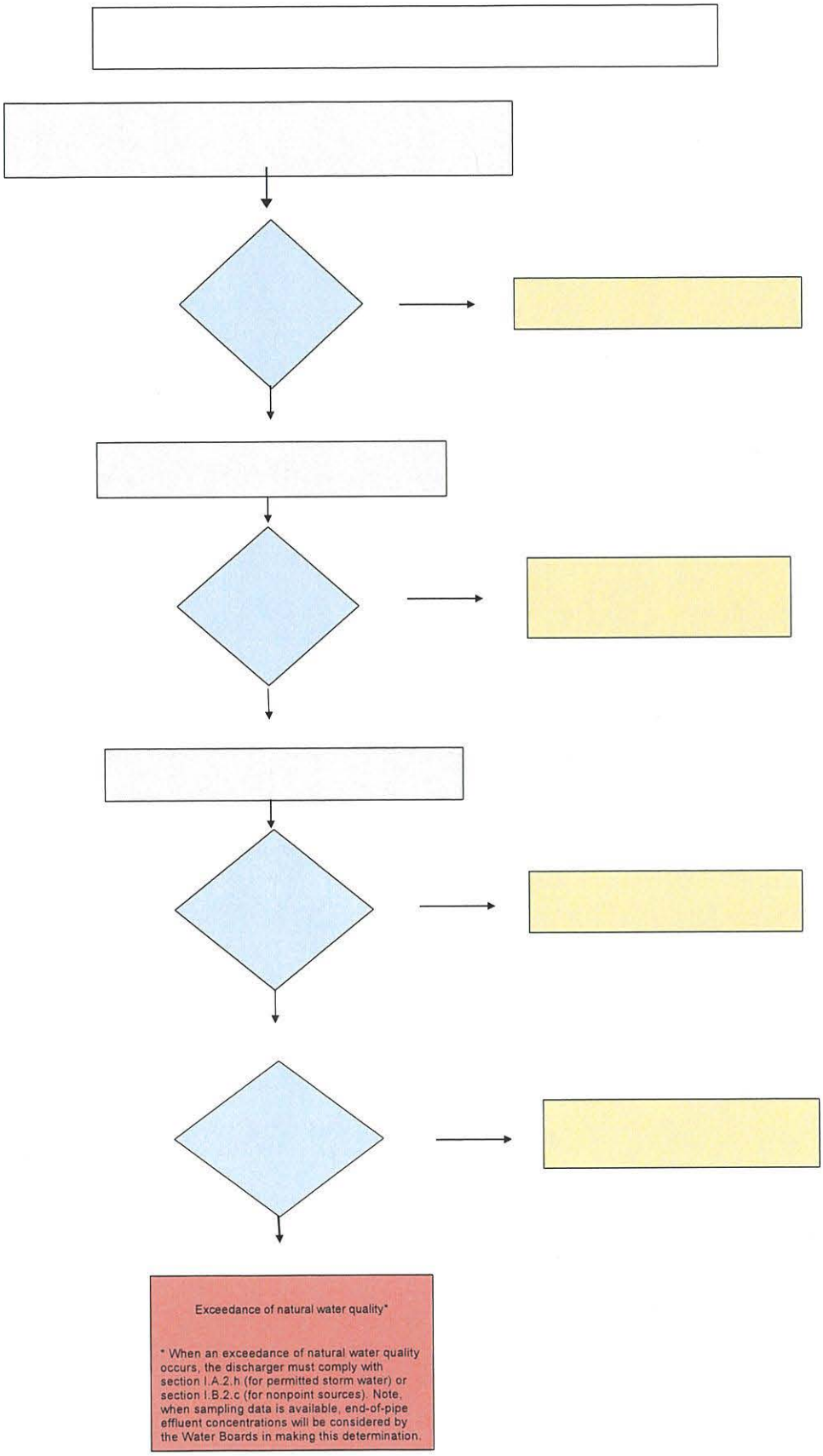
Exceedance of natural water quality*
* When an exceedance of natural water quality occurs, the discharger must comply with section I.A.2.h (for permitted storm water) or section I.B.2.c (for nonpoint sources). Note, when sampling data is available, end-of-pipe effluent concentrations will be considered by the Water Boards in making this determination.

S7-1342

ATTACHMENT G

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements
for
NPDES Stormwater Discharge Permits

November 19, 2015

A. GENERAL PROVISIONS

1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.
2. All discharges authorized by this Order shall be consistent with the terms and conditions of this Order.
3. **Duty to Comply**
   a. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in a Board adopted Order, discharger must comply with the new standard or prohibition. The Board will revise or modify the Order in accordance with such toxic effluent standard or prohibition and so notify the discharger.
   b. If more stringent applicable water quality standards are approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the discharger must comply with the new standard. The Board will revise and modify this Order in accordance with such more stringent standards.
   c. The filing of a request by the discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 122.41(f)]
4. **Duty to Mitigate**

   The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this order and permit which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation. [40 CFR 122.41(d)]
5. Pursuant to U.S. Environmental Protection Agency regulations the discharger must notify the Water Board as soon as it knows or has reason to believe (1) that they have begun or expect to begin, use or manufacture of a pollutant not reported in the permit application,

or (2) a discharge of toxic pollutants not limited by this permit has occurred, or will occur, in concentrations that exceed the limits specified in 40 CFR 122.42(a).

6. The discharge of any radiological, chemical, or biological warfare agent waste is prohibited.

7. All facilities used for transport, treatment, or disposal of wastes shall be adequately protected against overflow or washout as the result of a 100-year frequency flood.

8. Collection, treatment, storage and disposal systems shall be operated in a manner that precludes public contact with wastewater, except where excluding the public is inappropriate, warning signs shall be posted.

9. **Property Rights**

   This Order and Permit does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws, nor create a vested right for the discharge to continue the waste discharge or guarantee the discharger a capacity right in the receiving water. [40 CFR 122.41(g)]

10. **Inspection and Entry**

    The Board or its authorized representatives shall be allowed:

    a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the order and permit;

    b. Access to and copy at, reasonable times, any records that must be kept under the conditions of the order and permit;

    c. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under the order and permit; and

    d. To photograph, sample, and monitor, at reasonable times for the purpose of assuring compliance with the order and permit or as otherwise authorized by the Clean Water Act, any substances or parameters at any locations. [40 CFR 122.41(i)]

11. **Permit Actions**

    This Order and Permit may be modified, revoked and reissued, or terminated in accordance with applicable State and/or Federal regulations. Cause for taking such action includes, but is not limited to any of the following:

    a. Violation of any term or condition contained in the Order and Permit;

    b. Obtaining the Order and Permit by misrepresentation, or by failure to disclose fully all relevant facts;

    c. Endangerment to public health or environment that can only be regulated to acceptable levels by order and permit modification or termination; and

    d. Any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

12. Duty to Provide Information

The discharger shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit. The discharger shall also furnish to the Board, upon request, copies of records required to be kept by its permit. [40 CFR 122.41(h)]

13. Availability

A copy of this permit shall be maintained at the discharge facility and be available at all times to operating personnel.

14. Continuation of Expired Permit

This permit continues in force and effect until a new permit is issued or the Board rescinds the permit. Only those dischargers authorized to discharge under the expiring permit are covered by the continued permit.

B. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

a. All reports required by the order and permit and other information requested by the Board or U.S. EPA Region 9 shall be signed by a principal executive officer or ranking elected official of the discharger, or by a duly authorized representative of that person. [40 CFR 122.22(b)]

b. Certification

All reports signed by a duly authorized representative under Provision E.1.a. shall contain the following certification:
"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

2. Should the discharger discover that it failed to submit any relevant facts or that it submitted incorrect information in any report, it shall promptly submit the missing or correct information. [40 CFR 122.41(l)(8)]

3. False Reporting

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall be subject to enforcement procedures as identified in Section F of these Provisions.

4. **Transfers**

   a. This permit is not transferable to any person except after notice to the Board. The Board may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

   b. Transfer of control or ownership of a waste discharge facility under an National Pollutant Discharge Elimination System permit must be preceded by a notice to the Board at least 30 days in advance of the proposed transfer date. The notice must include a written agreement between the existing discharger and proposed discharger containing specific dates for transfer of responsibility, coverage, and liability between them. Whether an order and permit may be transferred without modification or revocation and reissuance is at the discretion of the Board. If order and permit modification or revocation and reissuance is necessary, transfer may be delayed 180 days after the Board's receipt of a complete application for waste discharge requirements and an NPDES permit.

5. **Compliance Reporting**

   a. Planned Changes

      The discharger shall file with the Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

   b. Compliance Schedules

      Reports of compliance or noncompliance with, or any progress reports on, interim and final compliance dates contained in any compliance schedule shall be submitted within 10 working days following each scheduled date unless otherwise specified within this order and permit. If reporting noncompliance, the report shall include a description of the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance and an estimated date for achieving full compliance. A final report shall be submitted within 10 working days of achieving full compliance, documenting full compliance

   c. Non-compliance Reporting (Twenty-four hour reporting:)

      i. The discharger shall report any noncompliance that may endanger health or the environment. All pertinent information shall be provided orally within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five working days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

C. ENFORCEMENT

1. The provision contained in this enforcement section shall not act as a limitation on the statutory or regulatory authority of the Board.
2. Any violation of the permit constitutes violation of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act, and is the basis for enforcement action, permit termination, permit revocation and reissuance, denial of an application for permit reissuance; or a combination thereof.
3. The Board may impose administrative civil liability, may refer a discharger to the State Attorney General to seek civil monetary penalties, may seek injunctive relief or take other appropriate enforcement action as provided in the California Water Code or federal law for violation of Board orders.
4. It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this order and permit.
5. A discharger seeking to establish the occurrence of any upset (See Definitions, G. 24) has the burden of proof. A discharger who wishes to establish the affirmative defense of any upset in an action brought for noncompliance shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:
   a. an upset occurred and that the Permittee can identify the cause(s) or the upset;
   b. the permitted facility was being properly operated at the time of the upset;
   c. the discharger submitted notice of the upset as required in paragraph E.6.d.; and
   d. the discharger complied with any remedial measures required under A.4.

   No determination made before an action for noncompliance, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.
   In any enforcement proceeding, the discharger seeking to establish the occurrence of any upset has the burden of proof. [40 CFR 122.41(n)]

D. DEFINITIONS

1. Duly authorized representative is one whose:
   a. Authorization is made in writing by a principal executive officer or ranking elected official;
   b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general manager in a partnership, manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
   c. Written authorization is submitted to the U.S. EPA Region 9. If an authorization becomes no longer accurate because a different individual or position has

responsibility for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board and U.S. EPA Region 9 prior to or together with any reports, information, or applications to be signed by an authorized representative.

2. Hazardous substance means any substance designated under 40 CFR 116 pursuant to Section 311 of the Clean Water Act.
3. Priority pollutants are those constituents referred to in 40 CFR S122, Appendix D and listed in the U.S. EPA NPDES Application Form 2C, (dated 6/80) Items V-3 through V-9.
4. Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.
5. Toxic pollutant means any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act or under 40 CFR S401.15.
6. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in this order and permit. The requirements of this order and permit are applicable to the entire volume of water, and the material therein, which is disposed of to surface and ground waters of the State of California.

EXHIBIT 4
to Section 7

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order R2-2009-0074
NPDES Permit No. CAS612008
October 14, 2009

S7-1352

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER R2-2009-0074
NPDES PERMIT NO. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Appendix I) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference.

Existing Permits

2. **Alameda County**—The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 26, 2007, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS0029831 issued by Order No. R2-2003-0021 on February 19, 2003, and amended by Order No. R2-2007-0025 on March 14, 2007, to the Alameda Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

3. **Contra Costa County**—The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated September 30, 2003, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS0029912 issued by Order No. 99-058 on July 21, 1999, amended by Order No. R2-2003-0022 on February 9, 2003, amended by Order Nos. R2-2004-059 and R2-2004-0061 on July 21, 2004, and amended by Order No. R2-2006-0050 on July 12, 2006, to the Contra Costa Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

4. **San Mateo County**—The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District and San Mateo County have joined together to form the San Mateo Countywide Water Pollution Prevention

Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated January 23, 2004, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS0029921 issued by Order No. 99-059 on July 21, 1999, amended by Order No. R2-2003-0023 on February 19, 2003, amended by Order Nos. R2-2004-0060 and R2-2004-0062 on July 21, 2004, and amended by Order R2-2007-0027 on March 14, 2007, to the San Mateo Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County**—The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated February 25, 2005, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS029718 issued by Order No. 01-024 on April 21, 2001, amended by Order No. 01-119 on October 17, 2001, and Order No. R2-2005-0035 on July 20, 2005, to the Santa Clara Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun**—The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated October 17, 2007, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612005 issued by Order No. R2-2003-0034 on April 16, 2003, and amended by Order R2-2007-0026 on March 14, 2007, to the Fairfield-Suisun Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo**—The City of Vallejo and the Vallejo Sanitary District (hereinafter referred to as the Vallejo Permittees) are currently subject to NPDES Permit No. CAS612006 issued by the United States Environmental Protection Agency (USEPA) on April 27, 1999, and that became effective on May 30, 1999, for the discharge of stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions.

8. The Alameda, Contra Costa, San Mateo, Santa Clara, Fairfield-Suisun, and Vallejo Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, USEPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, USEPA published an Interpretive Policy

Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Board), Office of Administrative Law and the USEPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, and selenium in San Francisco Bay segments; pesticide associated toxicity in all urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish TMDLs for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. The San Francisco Estuary Project, established pursuant to CWA Section 320, culminated in June 1993 with completion of its Comprehensive Conservation and Management Plan (CCMP) for the preservation, restoration, and enhancement of the San Francisco Bay-Delta Estuary. The 2007 update of the CCMP includes new and revised actions, while retaining many of the original plan's actions. The CCMP includes recommended actions in the areas of aquatic resources, wildlife, wetlands, water use, pollution prevention and reduction, dredging and waterway modification, land use, public involvement and education, and research and monitoring. Recommended actions which may, in part, be addressed through implementation of this Permit include, but are not limited to, the following:

    (1) ACTION AR-9.1 (New 2007)
    Improve understanding of sources, types, and impacts of marine debris in the Estuary.

    (5) ACTION AR-9.2 (New 2007)
    Expand existing marine debris prevention and cleanup programs and develop new initiatives to reduce discharge of debris to waterways.

    (10) ACTION PO-1.2 (Revised 2007)
    Recommend institutional and financial changes needed to place more focus on pollution prevention.

    (12) ACTION PO-1.6 (Revised 2007)
    Implement a comprehensive strategy to reduce pesticides coming into the Estuary.

    (13) ACTION PO-1.7.1 (New 2007)
    Develop product stewardship program for new commercial products to minimize future pollutant releases.

(14) ACTION PO-1.8 (New 2007)
Develop and implement programs to prevent pollution of the Estuary by other harmful pollutants like trash, bacteria, sediments, and nutrients.

(15) ACTION PO-2.1 (Revised 2007)
Pursue a mass emissions strategy to reduce pollutant discharges into the Estuary from point and nonpoint sources and to address the accumulation of pollutants in estuarine organisms and sediments.

(16) ACTION PO-2.4 (Revised 2007)
Improve the management and control of urban runoff from public and private sources.

(18) ACTION PO-3.3 (New 2007)
Accomplish large-scale improvements to Bay-Delta area infrastructure and implement pollution prevention strategies to prevent pollution threats to public health and wildlife.

(19) ACTION PO-4.1 (New 2007)
Increase regulatory incentives for municipalities, through urban runoff and other programs, to invest in projects that restore or enhance stream and wetland functions.

(20) ACTION LU-1.1 (Revised 2007)
Local land use jurisdiction's General Plans should incorporate watershed protection goals for wetlands and stream environments and to reduce pollutants in runoff.

(21) ACTION LU-1.1.1 (New 2007): Provide assistance to local agencies to ensure that applicable nonpoint source control elements are incorporated into local government and business practices.

(22) ACTION LU-1.5 (LU-3.2 in 1993 CCMP; Revised 2007)
Provide incentives and promote the use of building, planning, and maintenance guidelines for site planning and implementation of best management practices (BMPs) as related to stormwater and encourage local jurisdictions to adopt these guidelines as local ordinances.

(23) ACTION LU-1.6 (New 2007)
Continue and enhance training and certification for planners, public works departments, consultants, and builders on sustainable design and building practices with the goal of preventing or minimizing alteration of watershed functions (e.g., flood water conveyance, groundwater infiltration, stream channel and floodplain maintenance), and preventing construction-related erosion and post-construction pollution.

(24) ACTION LU-2.7 (New 2007)
Adopt and implement policies and plans that protect and restore water quality, flood water storage, and other natural functions of stream and wetland systems.

(25) ACTION LU-3.1 (New 2007)
Promote, encourage, and support collaborative partnerships with broad stakeholder representation, such as watershed councils, in order to develop diverse community-based approaches to long-term stewardship.

(26) ACTION LU-4.1 (Revised 2007)
Educate the public about how human actions impact the Estuary and its watersheds.

(28) ACTION PI-2.5 (Revised 2007)
Assist in the development of long-term educational programs designed to prevent pollution to the Estuary's ecosystem and provide assistance to other programs as needed.

13. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

14. Stormwater runoff is generated from various land uses in all the hydrologic sub basins in the Basin and discharges into watercourses, which in turn flow into Central, Lower and South San Francisco Bay.

15. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not limited to, support for aquatic life; and other pollutants which can cause aquatic toxicity in the receiving waters.

16. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to US EPA Phase II stormwater regulations. Under Phase II, the Water Board can permit these federal, State, and regional entities through use of the Statewide Phase II NPDES General Permit.

17. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

18. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

19. This Order supersedes and rescinds Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, R2-2003-0034, and supersedes NPDES Permit Nos. CAS0029831, CAS0029912, CAS0029921, CAS029718, CAS0612005, and CAS612006.

    This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective December 1, 2009, provided the Regional Administrator, USEPA, Region 9, has no objections.

IT IS HEREBY ORDERED that the Permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act as amended and regulations and guidelines adopted hereunder, shall comply with the following:

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into, storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

- **a.** Floating, suspended, or deposited macroscopic particulate matter, or foam;
- **b.** Bottom deposits or aquatic growths;
- **c.** Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
- **d.** Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- **e.** Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.15.

If exceedance(s) of water quality standards or water quality objectives (collectively, WQSs) persist in receiving waters, the Permittees shall comply with the following procedure:

C.1.a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable WQS, the Permittee(s) shall notify, within no more than 30 days, and thereafter, except for any exceedances of WQSs for pesticides, trash, mercury, polychlorinated biphenols, copper, polybrominated diphenyl ethers, and selenium that are addressed pursuant to Provisions C.8 through C.14 of this Order, submit a report to the Water Board that describes BMPs that are currently being implemented, and the current level of implementation, and additional BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQSs. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

C.1.b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as the Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same WQSs unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure development and implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. **Task Description** – Asphalt/Concrete Removal, Cutting, Installation and Repair - The Permittees shall develop and implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving or repair maintenance activities, such as those described in the California Stormwater Quality Association's Handbook for Municipal Operations.

ii. **Implementation Levels**

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer system is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from such work sites upon completion of work. The Permittees shall require cleanup of all construction remains, spills and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) Blueprint for a Clean Bay.

iii. **Reporting** – The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. **Task Description** – The Permittees shall implement, and require to be implemented, BMPs for pavement washing, mobile cleaning, pressure wash operations in such locations as parking lots and garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning, which prohibit the discharge of polluted wash water and non-stormwater to storm drains. The Permittees shall implement the BMPs included in BASMAA's Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. **Reporting** – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. **Task Description**

(1) The Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. **Implementation Levels**

(1) The Permittees shall prevent all debris, including structural materials and coating debris, such as paint chips, or other debris and pollutants generated in bridge and structure maintenance or graffiti removal from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall determine the proper disposal method for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts about these proper capture and disposal methods for the wastes generated.

iii. **Reporting** – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.d. Stormwater Pump Stations

The objective of this sub-provision is to prevent the discharge of water with low dissolved oxygen (DO) from pump stations, and to explore the use of pump stations for trash capture and removal from waters to protect beneficial uses of receiving waters.

i. **Task Description** – Operation and Maintenance of Stormwater Pump Stations – The Permittees shall develop and implement measures to operate, inspect, and maintain these facilities to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in the stormwater discharges to comply with WQSs.

ii. **Implementation Levels** – The Permittees shall comply with the following implementation measures to reduce polluted water discharges from Permittee-owned or operated pump stations:

(1) Complete an inventory of pump stations within each Permittee's jurisdiction, including locations, and key characteristics[1] by March 1, 2010.

(2) Inspect and collect DO data from all pump stations twice a year during the dry season after July 1, starting in 2010. DO monitoring is exempted where all discharge from a pump station remains in the stormwater collection system or infiltrates into a dry creek immediately downstream.

(3) If DO levels are at or below 3 milligrams per liter (3 mg/L), apply corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 mg/L. Verify corrective actions are effective by increasing DO monitoring interval to weekly until two weekly samples are above 3 mg/L.

(4) Starting in fall 2010, inspect pump stations a minimum of two times during the wet season in the first business day after ¼-inch and larger storm events after a minimum of a two week antecedent period with no precipitation. Post-storm inspections shall collect and report presence and quantity estimates of trash, including presence of odor, color, turbidity, and floating hydrocarbons. Remove debris and trash and replace any oil absorbent booms, as needed.

iii. **Reporting** – The Permittees shall report information resulting from C.2.d.ii.(2)-(4), including DO monitoring data and subsequent corrective actions taken to verify compliance with the 3 mg/L implementation level, in their Annual Report, and maintain records of inspection and maintenance activities and volume or mass of waste materials removed from pump stations.

C.2.e. Rural Public Works Construction and Maintenance

i. **Task Description** – Rural Road and Public Works Construction and Maintenance - For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Game and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

[1] Characteristics include name of pump station, latitude and longitude in WGS 84, number of pumps, drainage area in acres, dominant land use(s), first receiving water body, maximum pumping capacity of station in gallons per minute (gpm), flow measurement capability (Y or N), flow measurement method, average wet season discharge rate in gpm, dry season discharge (Y, N, or unknown), nearest municipal wastewater treatment plant, wet well storage capacity in gallons, trash control (Y or N), trash control measure, and date built or last updated.

ii. Implementation Level

(1) The Permittees shall develop, where they do not already exist, and implement BMPs for erosion and sediment control measures during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities, by April 1, 2010.

(2) The Permittees shall develop and implement appropriate BMPs for the following activities, which minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities:

(a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identification and prioritization of rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Construction of roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Development and implementation of an inspection program to maintain rural roads' structural integrity and prevent impacts on water quality;

(e) Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion;

(f) Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacement of existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall develop or incorporate existing training and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction to avoid water quality impacts.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for the rural public works construction and maintenance activities in their Annual Report, including reporting on increased maintenance in priority areas.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall prepare, implement, and maintain a site specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment and maintenance vehicle parking areas, and material storage facilities to comply with water quality standards. Each SWPPP shall incorporate all applicable BMPs that are described in the California Stormwater Quality Association's Handbook for Municipal Operations and the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003, and its addenda, as appropriate.

(2) The requirements in this provision shall apply only to facilities that are not already covered under the State Board's Industrial Stormwater NPDES General Permit.

(3) The site specific SWPPPs for corporation yards shall be completed by July 1, 2010.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters and street sweeper, vactor, and other related equipment cleaning wash water. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that no non-stormwater discharges are entering the storm drain system and, during storms, pollutant discharges are prevented to the maximum extent practicable. At a minimum, an inspection shall occur before the start of the rainy season.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal

wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing waste pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting – The Permittees shall report on implementation of SWPPPs, the results of inspections, and any follow-up actions in their Annual Report.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. **Task Description** – At a minimum each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain stenciling.

- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:
  - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
  - Dumpster drips from covered trash and food compactor enclosures.
  - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
  - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
  - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the Bay-Friendly Landscape Guidelines).

ii. **Implementation Level** – Most of the elements of this task should already be fully implemented because they are required in the Permittees' existing stormwater permits.

Due Dates for Full Implementation – Immediate for C.3.a.i.(1)-(5), May 1, 2010 for C.3.a.i.(6)-(7), and December 1, 2010 for C.3.a.i.(8). For Vallejo Permittees: December 1, 2010 for C.3.a.i.(1)-(8)

iii. **Reporting** – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1)–(8) in the 2011 Annual Report.

C.3.b. Regulated Projects

i. **Task Description** – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility[2] in accordance with Provisions C.3.c and C.3.d, unless the Provision C.3.e alternate compliance options are evoked. For adjacent Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by

[2] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other,

the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

Regulated Projects, as they are defined in this Provision, do not include detached single-family home projects that are not part of a larger plan of development.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Uncovered parking lots that are stand-alone or part of any other development project. This category includes the top uncovered portion of parking structures unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels;

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement,
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **more than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(e) For any private development project in the categories specified in Provisions C.3.b.ii.(1)(a)(i)-(iv) for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for the 5000 square feet threshold, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the lower 5000 square feet impervious surface threshold specified in Provision C.3.b.ii.(1).

(f) For any private development project in the categories specified in Provisions C.3.b.ii.(1)(a)(i)-(iv) with an application deemed complete after the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011, for the 5000 square feet threshold.

(g) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the lower 5000 square feet of impervious surface threshold (for classification as a Regulated Project) shall not apply.

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

Beginning December 1, 2011, all references to 10,000 square feet in Provision C.3.b.ii.(1) change to 5,000 square feet.

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

- Interior remodels.
- Routine maintenance or repair such as:
  - roof or exterior wall surface replacement, or
  - pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **more than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of **more than 50 percent** of the impervious surface of an existing street or road that was not subject to Provision C.3, **the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design** (i.e.,

stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration **of less than 50 percent** of the impervious surface of an existing street or road that was not subject to Provision C.3, **only the new and/or replaced impervious surface of the project must be included in the treatment system design** (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system must be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) are:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.
- Bicycle lanes that are built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[3]
- Caltrans highway projects and associated facilities.

(e) For any private road or trail project described by Provisions C.3.b.ii.(4)(b) or (c) for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, the requirements of Provisions C.3.b.ii.(4)(b) or (c) to classify the project as a Regulated Project shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for Provisions C.3.b.ii.(4)(b) and (c), the project applicant has not taken

[3] **Permeable surfaces** include pervious concrete, porous asphalt, unit pavers, and granular materials.

any action to obtain the necessary approvals from the Permittee, the project will then be classified as a Regulated Project under Provisions C.3.b.ii.(4)(b) or (c).

(f) For any private road or trail project with an application deemed complete after the Permit effective date, the requirements of Provisions C.3.b.i.(4)(b) or (c) to classify the project as a Regulated Project shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011, for Provisions C.3.b.ii.(4)(b) and (c).

(g) For any public road or trail project for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.b.i.(4)(b) or (c) to classify the project as a Regulated Project shall not apply.

Effective Date – Immediate for C.3.b.ii.(4)(a) and (d)-(g), and December 1, 2011, for C.3.b.ii.(4)(b) and (c). For Vallejo Permittees: Immediate for C.3.b.ii.(4)(d)-(g), and December 1, 2011 for C.3.b.ii.(4)(a)-(c).

iii. Green Street Pilot Projects

The Permittees shall cumulatively complete ten pilot green street projects that incorporate LID techniques for site design and treatment in accordance with Provision C.3.c and that provide stormwater treatment sized in accordance with Provision C.3.d. It is also desirable that they meet or exceed the Bay-Friendly Landscape Scorecard minimum requirements (see www.BayFriendly.org).

(1) Parking lot projects that provide LID treatment in accordance with Provisions C.3.c and Provision C.3.d. for stormwater runoff from the parking lot and street may be considered pilot green street projects.

(2) A Regulated Project (as defined in Provision C.3.b.ii) may not be counted as one of the ten pilot green street projects.

(3) At least two pilot green street projects must be located in each of the following counties: Alameda, Contra Costa, San Mateo, and Santa Clara.

(4) The Permittees shall construct the ten pilot green street projects in such a manner that they, as a whole:

(a) Are representative of the various types of streets: arterial, collector, and local; and

(b) Contain the following key elements:

(i) Stormwater storage for landscaping reuse or stormwater treatment and/or infiltration for groundwater replenishment through the use of natural feature systems;

(ii) Creation of attractive streetscapes that enhance neighborhood livability by enhancing the pedestrian environment and introducing park-like elements into neighborhoods;

(iii) Service as an urban greenway segment that connects neighborhoods, parks, recreation facilities, schools, mainstreets, and wildlife habitats;

(iv) Parking management that includes maximum parking space requirements as opposed to minimum parking space requirements, parking requirement credits for subsidized transit or shuttle service, parking structures, shared parking, car sharing, or on-street diagonal parking;

(v) Meets broader community goals by providing pedestrian and, where appropriate, bicycle access; and

(vi) Located in a Priority Development Area as designated under the Association of Bay Area Government's and Metropolitan Transportation Commission's FOCUS[4] program.

(5) The Permittees shall conduct appropriate monitoring of these projects to document the water quality benefits achieved. Appropriate monitoring may include modeling using the design specifications and specific site conditions.

Due Date – All pilot green street projects shall be completed by December 1, 2014.

iv. Implementation Level – All elements of Provision C.3.b.i.-iii shall be fully implemented by the effective/due dates set forth in their respective sub-provision, and a database or equivalent tabular format shall be developed and maintained that contains all the information listed under Reporting (Provision C.3.b.v.).

Due Dates for Full Implementation – See specific Effective Dates listed under Provisions C.3.b.ii& iii. .The database or equivalent tabular format required by Provision C.3.b.iv shall be developed by December 1, 2010. (For Vallejo Permittees: December 1, 2011)

v. Reporting

(1) **Annual Reporting – C.3.b.ii. Regulated Projects**

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the attached Provision C.3.b. Sample Reporting Table):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multiunit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

[4] FOCUS is a regional incentive-based development and conservation strategy for the Bay Area.

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date);

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project.

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

(i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.v.(a) – (l) for the offsite project; and

(ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.v.(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g.) – If not required, state why not. If required, state control method used.

(2) **Pilot Green Streets Project Reporting - Provision C.3.b.iii.**

(a) On an annual basis, the Permittees shall report on the status of the pilot green street projects.

(b) For each completed project, the Permittees shall report the capital costs, operation and maintenance costs, legal and procedural arrangements in place to address operation and maintenance and its associated costs, and the sustainable landscape measures incorporated in the project including, if relevant, the score from the Bay-Friendly Landscape Scorecard.

(c) The 2013 Annual Report shall contain a summary of all green street projects completed by January 1, 2013. The summary shall include for each completed project the following information:

(i) Location of project

(ii) Size of project, including total impervious surface treated

(iii) Map(s) of project showing areas where stormwater runoff will be treated by LID measures

(iv) Specific type(s) of LID treatment measures included

(v) Total and specific costs of project

(vi) Specific funding sources for project and breakdown of percentage paid by each funding source

(vii) Lessons learned, including recommendations to facilitate funding and building of future projects

(viii) Identification of responsible party and funding source for operation and maintenance.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) **Source Control Requirements**

Require all Regulated Projects to implement source control measures onsite that at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste and compactor enclosures;
- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.[3]

(b) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment.

(ii) A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

(iii) Infeasibility to implement harvesting and re-use, infiltration, or evapotranspiration at a project site may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

(iv) By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report on the criteria and procedures the Permittees shall employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. This report shall, at a minimum, contain the information required in Provision C.3.c.iii.(1).

(v) By December 1, 2013, the Permittees, collaboratively or individually, shall submit a report on their experience with determining infeasibility of harvesting and re-use, infiltration, or evapotranspiration at Regulated Project sites. This report shall, at a minimum, contain the information required in Provision C.3.iii.(2).

(vi) Biotreatment systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate. The planting and soil media for biotreatment systems shall be designed to sustain plant growth and maximize stormwater runoff retention and pollutant removal. By December 1, 2010, the Permittees, working collaboratively or individually, shall submit for Water Board approval, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(3). Once the Water Board approves biotreatment soil media specifications and soil infiltration testing methods, the Permittees shall ensure that biotreatment systems installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications and soil infiltration testing methods.

(vii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. By May 1, 2011, the Permittees shall submit for Water Board approval, proposed minimum specifications for green roofs.

This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(4). Once the Water Board approves green roof minimum specifications, the Permittees shall ensure that green roofs installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications.

(c) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(b) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Implementation Level – All elements of the tasks described in Provision C.3.c.i shall be fully implemented.

Due Date for Full Implementation – December 1, 2011

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provision C.3.c.i shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.c.i.

(2) For any private development project with an application deemed complete after the Permit effective date, the requirements of Provision C.3.c.i shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011.

(3) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provision C.3.c.i shall not apply.

iii. Reporting

(1) Feasibility/Infeasibility Criteria Report - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Literature review and discussion of documented cases/sites, particularly in the Bay Area and California, where infiltration, harvesting and reuse, or evapotranspiration have been demonstrated to be feasible and/or infeasible.
- Discussion of proposed feasibility and infeasibility criteria and procedures the Permittees shall employ to make a determination of when biotreatment will be allowed at a Regulated Project site.

(2) Status Report on Application of Feasibility/Infeasibility Criteria – By December 1, 2013, the Permittees shall submit a report to the Water Board containing the following information:

- Discussion of the most common feasibility and infeasibility criteria employed since implementation of Provision C.3.c requirements, including site-specific examples;
- Discussion of barriers, including institutional and technical site specific constraints, to implementation of harvesting and reuse, infiltration, or evapotranspiration, and proposed strategies for removing these identified barriers;
- If applicable, discussion of proposed changes to feasibility and infeasibility criteria and rationale for the changes; and
- Guidance for the Permittees to make a consistent and appropriate determination of the feasibility of harvesting and reuse, infiltration, or evapotranspiration for each Regulated Project.

(3) Model Biotreatment Soil Media Specifications - By December 1, 2010, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Proposed soil media specifications for biotreatment systems;
- Proposed soil testing methods to verify a long-term infiltration rate of 5-10 inches/hour;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria; and
- Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.

(4) Green Roof Minimum Specifications - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Proposed minimum design specifications for green roofs;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria;
- Discussion of data and lessons learned from already installed green roofs;
- Discussion of barriers, including institutional and technical site specific constraints, to installation of green roofs and proposed strategies for removing these identified barriers; and

- Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.

(5) Report the method(s) of implementation of Provisions C.3.c.i above in the 2012 Annual Report. For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.v, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of the California Stormwater Quality Association's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flowrate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Implementation Level – The Permittees shall immediately require the controls in this task.

Due Date for Full Implementation – Immediate, except December 1, 2010, for Vallejo Permittees.

iii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.v.

iv. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and

underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.c.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.c in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[5] to treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at a Regional Project.[6] The Regional Project must achieve a net environmental benefit.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite projects must be constructed by the end of construction of the Regulated Project. If more time is needed to construct the offsite project, for each additional year, up to three years, after the construction of the Regulated Project, the offsite project must provide an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading. Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of the Regional Project may be

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[5] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

[6] **Regional Project** – A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.

extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

(1) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Special Projects.

(2) By December 1, 2010, the Permittees shall submit a proposal to the Water Board containing the following information:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this Permit for each type of project;
- Identification of institutional barriers and/or technical site-specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite;
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations;
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite;
- Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit; and
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.

iii. Effective Date – December 1, 2011.

iv. Implementation Level

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provisions C.3.e.i-ii shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary

approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.e.i-ii.

(2) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.e.i-ii shall not apply.

(3) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer

(4) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

v. **Reporting** –The Permittees shall submit the ordinance/legal authority and procedural changes made, if any, to implement Provision C.3.e with their 2012 Annual Report. Annual reporting thereafter shall be done in conjunction with reporting requirements under Provision C.3.b.v.

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in the 2012 Annual Report and all subsequent Annual Reports.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. **Task Description** – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third party reviewer must be a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California, or staff of another Permittee subject to the requirements of this Permit.

ii. **Implementation Level** – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, California

Stormwater Quality Association (CASQA), or the equivalent, may be considered qualifying training.

iii. **Reporting** – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. **Hydromodification Management (HM) Projects** are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded within the requirements of Attachments B–F. A project that does not increase impervious surface area over the pre-project condition is not an HM Project. All HM Projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.

ii. **HM Standard**

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 % of the pre-project 2-year peak flow[7] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow. Contra Costa Permittees, when using pre-sized and pre-designed Integrated Management Practices (IMPs) per Attachment C of this Order, are not required to meet the low-flow criterion of 10% of the 2-year peak flow. These IMPs are designed to control 20% of the 2-year peak flow. After the Contra Costa Permittees conduct the required monitoring specified in Attachment C, the design of these IMPs will be reviewed.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent

[7] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

over more than 10 percent of the length of the curve corresponding to the range of flows to control.

(3) **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.

(4) **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

(5) **Existing HM Control Requirements:** The Water Board has adopted HM control requirements for all Permittees (except for the Vallejo Permittees), and these adopted requirements are attached to this Order as listed below. The Permittees shall comply with all requirements in their own Permittee-specific Attachment, unless otherwise specified by this Order. In all cases, the HM Standard shall be achieved.

- Attachment B for Alameda Permittees
- Attachment C for Contra Costa Permittees
- Attachment D for Fairfield-Suisun Permittees
- Attachment E for San Mateo Permittees
- Attachment F for Santa Clara Permittees

iii. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof.

(1) **Onsite HM controls** are flow duration control structures and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[8]

iv. Reporting

For each HM Project approved during the reporting period, the following information shall be reported electronically in tabular form. This information shall be added to the required reporting information specified in Provision C.3.b.v.

(1) Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control;

(2) Method used by the project proponent to design and size the device or method used to meet the HM Standard; and

(3) Other information as required in the Permittee's existing HM requirements, as shown in Attachments B–F.

v. Vallejo Permittees shall complete the following tasks in lieu of complying with Provisions C.3.g.i-iv.

(1) Develop a Hydrograph Modification Management Plan (HMP) for meeting the requirements of Provisions C.3.g.i–iv. The Vallejo Permittees' HMP shall be subject to approval by the Water Board.

(2) Vallejo Permittees shall include the following in their HMP:

(a) A map of the City of Vallejo, delineating areas where the HM Standard applies. The HM Standard shall apply in all areas except where a project:

- discharges stormwater runoff into creeks or storm drains that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete) downstream to their outfall in San Francisco Bay;
- discharges to an underground storm drain discharging to the Bay; or
- is located in a highly developed watershed.[9]

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[8] In-stream control projects require a Stream Alteration Agreement from the California Department of Fish & Game, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

[9] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or subcatchments that are 65% impervious or more.

However, plans to restore a creek reach may reintroduce the applicability of HM controls, and would need to be addressed in the HMP;

(b) A thorough technical description of the methods project proponents may use to meet the HM Standard. Vallejo Permittees shall use the same methodologies, or similar methodologies, to those already in use in the Bay Area to meet the HM Standard. Contra Costa sizing charts may be used on projects up to ten acres after any necessary modifications are made to the sizes to control runoff rates and durations from ten percent of the pre-project 2-year peak flow to the pre-project 10-year peak flow, and adjustments are made for local rainfall and soil types;

(c) A description of any land use planning measures the City of Vallejo will take (e.g., stream buffers and stream restoration activities, including restoration-in-advance of floodplains, revegetation, and use of less-impacting facilities at points of discharge) to allow expected changes in stream channel cross sections, stream vegetation, and discharge rates, velocities, and/or durations without adverse impacts on stream beneficial uses;

(d) A description of how the Vallejo Permittees will incorporate these requirements into their local approval processes, and a schedule for doing so; and

(e) Guidance for City of Vallejo project proponents explaining how to meet the HM Standard.

(3) Vallejo Permittees shall complete the HMP according to the schedule below. All required documents shall be submitted acceptable to the Executive Officer, except the HMP, which shall be submitted to the Water Board for approval. Vallejo Permittees shall report on the status of HMP development and implementation in each Annual Report and shall also provide a summary of projects incorporating measures to address Provision C.3.g and the measures used.

- By April 1, 2011, submit a detailed workplan and schedule for completion of the information required in Provision C.3.g.v.(2).
- By December 1, 2011, submit the map required in Provision C.3.g.v.(2)(a).
- By April 1, 2012, submit a draft HMP.
- By December 1, 2012, provide responses to Water Board comments on the draft HMP so that the final HMP is submitted for Water Board approval by July 1, 2013.
- Upon adoption by the Water Board, implement the HMP, which shall include the requirements of this measure. Before approval of the HMP by the Water Board, Vallejo Permittees shall encourage early implementation of measures likely to be included in the HMP.

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. **Task Description** – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. **Implementation Level** – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the O&M of the installed onsite, joint, and/or offsite stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the O&M of the onsite, joint, and/or offsite installed stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed onsite, joint, and/or offsite stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the O&M responsibility for the installed onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing O&M inspections of the installed stormwater treatment system(s) and HM control(s) (if any).

(4) A written plan and implementation of the plan that describes O&M (including inspection) of all Regional Projects and regional HM controls that are Permittee-owned and/or operated.

(5) A database or equivalent tabular format of all Regulated Projects (public and private) that have installed onsite, joint, and/or offsite stormwater

treatment systems. This database or equivalent tabular format shall include the following information for each Regulated Project:

(a) Name and address of the Regulated Project;

(b) Specific description of the location (or a map showing the location) of the installed stormwater treatment system(s) and HM control(s) (if any);

(c) Date(s) that the treatment system(s) and HM controls (if any) is/are installed;

(d) Description of the type and size of the treatment system(s) and HM control(s) (if any) installed;

(e) Responsible operator(s) of each treatment system and HM control (if any);

(f) Dates and findings of inspections (routine and follow-up) of the treatment system(s) and HM control(s) (if any) by the Permittee; and

(g) Any problems and corrective or enforcement actions taken.

(6) A prioritized plan for inspecting all installed stormwater treatment systems and HM controls. At a minimum, this prioritized plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed stormwater treatment systems and HM controls within 45 days of installation to ensure approved plans have been followed;

(b) Inspection by the Permittee of at least 20 percent of the total number (at the end of the preceding fiscal year) of installed stormwater treatment systems and HM controls;

(c) Inspection by the Permittee of at least 20 percent of the total number (at the end of the preceding fiscal year) of installed vault-based systems; and

(d) Inspection by the Permittee of all installed stormwater treatment systems subject to Provision C.3, at least once every five years.

iii. Maintenance Approvals: The Permittees shall ensure that onsite, joint, and offsite stormwater treatment systems and HM controls installed by Regulated Projects are properly operated and maintained for the life of the projects. In cases where the responsible party for a stormwater treatment system or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment system or HM control, but these approvals are not granted, the Permittees shall be deemed to be in compliance with this Provision. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the O&M requirements contained therein.

Due Date for Full Implementation: Immediate for Provisions C.3.h.i, C.3.h.ii.(1), and C.3.h.iii, and December 1, 2010, for Provisions C.3.h.ii.(2)-(6). For Vallejo Permittees: December 1, 2010, for Provisions C.3.h.i-iii.

iv. Reporting: Beginning with the 2010 Annual Report

(1) For each Regulated Project inspected during the reporting period (fiscal year) the following information shall be reported to the Water Board electronically in tabular form as part of the Annual Report (as set forth in the Provision C.3.h. Sample Reporting Table attached):

- Name of facility/site inspected.
- Location (street address) of facility/site inspected.
- Name of responsible operator for installed stormwater treatment systems and HM controls.
- For each inspection:
  - Date of inspection.
  - Type of inspection (e.g., initial, annual, follow-up, spot).
  - Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well, etc.) and an indication of whether the treatment system is an onsite, joint, or offsite system.
  - Type of HM controls inspected.
  - Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation, maintenance required immediately, etc.).
  - Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, administrative citation, administrative order).

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) A discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(b) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development projects, which create and/or replace ≥ 2500 ft^2 to $< 10{,}000$ ft^2 of impervious surface, and

detached single-family home projects,[10] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[3]

This provision applies to all development projects that require approvals and/or permits issued under the Permittee's' planning, building, or other comparable authority.

ii. **Implementation Level** – All elements of this task shall be fully implemented by December 1, 2012.

iii. **Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

iv. **Task Description** – The Permittees shall develop standard specifications for lot-scale site design and treatment measures (e.g., for roof runoff and paved areas) as a resource for single-family homes and small development projects.

v. **Implementation Level** – This task may be fulfilled by the Permittees cooperating on a countywide or regional basis.

Due Date for Full Implementation – December 1, 2012.

vi. **Reporting** – A report containing the standard specifications for lot-scale treatment BMPs shall be submitted by December 1, 2012.

[10] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites which could reasonably be considered to cause or contribute to pollution of stormwater runoff, with inspections and effective follow-up and enforcement to abate actual or potential pollution sources consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent discharge of pollutants and impacts on beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have sufficient legal enforcement authority to obtain effective stormwater pollutant control on industrial sites. Permittees shall have the ability to inspect and require effective stormwater pollutant control and to escalate progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. Implementation Level

(1) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial to address pollutant sources associated with outdoor process and manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, outdoor drainage from indoor areas, rooftop equipment, and contaminated and erodible surface areas, and other sources determined by the Permittees or Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

(2) Permittees shall notify the discharger of any actual or potential pollutant sources and violations and require problem correction within a reasonably short and expedient time frame commensurate with the threat to water quality. Permittees shall require timely correction of problems involving rapid temporary repair, and may allow longer time periods for implementation of more permanent solutions, if these require significant capital expenditure or construction. Violations shall be corrected prior to the next rain event or within 10 business days after the violations are noted. If more than 10 business days are required for correction, a rationale shall be given in the tabulated sheets.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. Task Description – Permittees shall develop and implement an inspection plan that will serve as a prioritized inspection workplan. This inspection plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

The Inspection Plan shall contain the following information:

(1) Total number and a list of industrial and commercial facilities requiring inspection, within each Permittee's jurisdiction, to be determined on the basis of a prioritization criteria designed to assign a more frequent inspection schedule to the highest priority facilities per Section C.4.b.ii. below.

(2) A description of the process for prioritizing inspections and frequency of inspections. If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan. A mechanism to include newly opened businesses that warrant inspection shall be included.

ii. Implementation Level – Each Permittee shall annually update and maintain a list of industrial and commercial facilities in the Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plans:

(1) Sites that include the following types of functions that may produce pollutants when exposed to stormwater include, but are not limited to:

(a) Outdoor process and manufacturing areas

(b) Outdoor material storage areas

(c) Outdoor waste storage and disposal areas

(d) Outdoor vehicle and equipment storage and maintenance areas

(e) Outdoor wash areas

(f) Outdoor drainage from indoor areas

(g) Rooftop equipment

(h) Other sources determined by the Permittee or Water Board to have a reasonable potential to contribute to pollution of stormwater runoff

(2) The following types of Industrial and Commercial businesses that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges:

(a) Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the State General NPDES Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);

(b) Vehicle Salvage yards;

(c) Metal and other recycled materials collection facilities, waste transfer facilities;

(d) Vehicle mechanical repair, maintenance, fueling, or cleaning;

(e) Building trades central facilities or yards, corporation yards;

(f) Nurseries and greenhouses;

(g) Building material retailers and storage;

(h) Plastic manufacturers; and

(i) Other facilities designated by the Permittee or Water Board to have a reasonable potential to contribute to pollution of stormwater runoff.

(3) **Prioritization of Facilities**

Facilities of the types described in Provision 4.b.ii.(2) above and identified by the Permittees as having the reasonable potential to contribute to pollution of stormwater runoff shall be prioritized on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of concern, proximity to a waterbody, violation history of the facility, and other relevant factors.

(4) **Types/Contents of Inspections**

Each Permittee shall conduct inspections to determine compliance with its ordinances and this Permit. Inspections shall include but not be limited to the following:

(a) Prevention of stormwater runoff pollution or illicit discharge by implementing appropriate BMPs;

(b) Visual observations for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater;

(c) Noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(5) **Inspection Frequency** – Permittees shall establish appropriate inspection frequencies for facilities based on Provision 4.b.ii (3) priority, potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(6) **Record Keeping** – For each facility identified in Provision 4.b.ii, the Permittee shall maintain a database or equivalent of the following information at a minimum:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity including SIC code;

(c) Inspection priority and inspection frequency; and

(d) If coverage under the Industrial General Permit is required.

iii. Reporting – The Permittees shall include the following in the Annual Report:

(1) The list of facilities identified in Provision 4.b.ii in the 2010 Annual Report and revisions or updates in subsequent annual reports; and

(2) The list of facilities scheduled for inspection during the current fiscal year.

C.4.c. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) **Required enforcement actions** – including timeframes for corrections of problems – for various field violation scenarios. The ERP will provide guidance on appropriate use of the various enforcement tools, such as verbal and written notices of violation, citations, cleanup requirements, administrative and criminal penalties.

(2) **Timely Correction of Violations** – All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

A description of the Permittee's procedures for follow-up inspections and enforcement actions or referral to another agency, including appropriate time periods for each level of corrective action.

(3) **Referral and Coordination with Water Board** – Each Permittee shall enforce its stormwater ordinances as necessary to achieve compliance at sites with observed violations. For cases in which Permittee enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney or other relevant agencies for additional enforcement.

(4) **Recordkeeping** – Permittees shall maintain adequate records to demonstrate compliance and appropriate follow-up enforcement responses for facilities inspected.

Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial commercial site inspections:

(a) Name of Facility/Site Inspected

(b) Inspection Date

(c) Industrial General Permit coverage required (Yes or No)

(d) Compliance Status

(e) Type of Enforcement (if applicable)

(f) Type of Activity or Pollutant Source

Examples: Outdoor process/manufacturing areas, Outdoor material storage areas, Outdoor waste storage/disposal areas, outdoor vehicle and equipment storage/maintenance areas, Outdoor parking areas and access roads, Outdoor wash areas, Rooftop equipment, Outdoor drainage from indoor areas

(g) Specific Problems

(h) Problem Resolution

(i) Additional Comments

The electronic database or equivalent tabular system shall be made readily available to the Executive Officer and during inspections and audits by the Water Board staff or its representatives.

(5) The ERP shall be developed and implemented by April 1, 2010.

iii. Reporting – Permittees shall include the following information in each Annual Report:

(1) Number of inspections conducted, Number of violations issued (excluding verbal warnings), Percentage of sites inspected in violation, and number and percent of violations resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner;

(2) Frequency and Types/categories of violations observed, Frequency and type of enforcement conducted;

(3) Summary of types of violations noted by business category; and

(4) Facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

C.4.d. Staff Training

i. Task Description

Permittees shall provide focused training for inspectors annually. Trainings may be Program-wide, Region-wide, or Permittee-specific.

ii. Implementation Level

At a minimum, train inspectors, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Illicit Discharge Detection, Elimination and follow-up; and

(4) Implementation of typical BMPs at Industrial and Commercial Facilities.

Permittees, either countywide or regionally, if they have not already done so, are encouraged to create or adopt guidance for inspectors or reference existing inspector guidance including the California Association of Stormwater Quality Agencies (CASQA) Industrial BMP Handbook.

iii. Reporting

The Permittees shall include the following information in the Annual Report:

(1) Dates of trainings;

(2) Training topics that have been covered; and

(3) Percentage of Permittee inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to ensure illicit discharges are detected and controlled that are not otherwise controlled under provision C4, Industrial and Commercial Site Controls and C6, Construction Site Controls. Permittees shall develop and implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and follow-up component to target illicit discharge and non-stormwater sources. Permittees shall maintain a complaint tracking and follow-up data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. Task Description – Permittees shall have the legal authority to prohibit and control illicit discharges and escalate stricter enforcement to achieve expedient compliance.

ii. Implementation Level

(1) Permittees shall have adequate legal authority to address stormwater and non-stormwater pollution associated with, but not limited to the following:

(a) Sewage;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces and pavement, or the equipment and other facilities of any commercial business, or any other public or private facility;

(c) Discharges of runoff from material storage areas, including containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(f) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to storm drains.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than storm water to storm drains.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as guidance for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges.

ii. Implementation Level – The ERP shall contain the following:

(1) Recommended responses and enforcement actions – including timeframes for corrections of problems – for various types and degree of violations. The ERP shall provide guidelines on when to employ the range of regulatory responses from warnings, citations and cleanup and cost recovery, to administrative or criminal penalties.

(2) Timely Correction of Violations: All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system. Immediate correction can be temporary and short-term if a long-term, permanent correction will involve significant resources and construction time. An example would be replumbing of a wash area to the sanitary sewer, which would involve an immediate short-term, temporary fix followed by permanent replumbing.

(3) If corrective actions are not implemented promptly or if there are repeat violations, Permittees shall escalate responses as needed to achieve compliance, including referral to other agencies were necessary.

(4) The ERP shall be developed and implemented by April 1, 2010.

C.5.c. Spill and Dumping Response, Complaint Response, and Frequency of Inspections

i. Task Description – Permittees shall have a central contact point, including a phone number for complaints and spill reporting, and publicize this number to both internal Permittee staff and the public. If 911 is selected, also maintain and publicize a staffed, non-emergency phone number with voicemail, which is checked during normal business hours.

Permittees shall develop a spill/dumping response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittees immediate capabilities. The list shall be maintained and updated as changes occur.

Permittees shall conduct reactive inspections in response to complaints and follow-up inspections as needed to ensure that corrective measures have been implemented to achieve and maintain compliance.

ii. Implementation Level – Permittees will have the phone number and contact information available and integrated into training and outreach both to Permittee staff and the public by July 1, 2010.

iii. Reporting – Submit the complaint and spill response phone number and spill contact list with the 2010 Annual Report and update annually if changes occur.

C.5.d. Control of Mobile Sources

i. Task Description – The purpose of this section is to establish oversight and control of pollutants associated with mobile business sources.

ii. Implementation Level – Each Permittee shall develop and implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses such as automobile washing, power washing, steam cleaning, and carpet cleaning. This guidance can be developed via county-wide or regional collaboration.

(b) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses.

(c) Outreach to mobile businesses operating within the Permittee's jurisdiction with minimum standards and BMP requirements and local ordinances through an outreach and education strategy.

(d) Inspection of mobile businesses as needed.

(2) Permittees should cooperate regionally in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

iii. Reporting – Permittees shall report on implementation of minimum standards and BMPs for mobile business and their enforcement strategy in each Annual Report.

C.5.e. Collection System Screening - Municipal Separate Storm Sewer System (MS4) Map Availability

i. Task Description – Permittees shall perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for other maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets and catch basins, in coordination with public works/flood control maintenance surveys, video inspections of storm drains, and during other routine Permittee maintenance and inspection activities when Permittee staff are working in or near the MS4 system.

ii. Implementation Level – Permittees shall develop and implement a screening program utilizing the USEPA/Center for Watershed Protection publication, "Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment." Permittees shall implement the screening program by conducting a survey of strategic collection system check points (one screening point per square mile of Permittee urban and suburban jurisdiction area, less open space) including some key major outfalls draining industrial areas as defined in 40 CFR 122.26 (b)(5) once each year in dry weather conditions meaning no significant rainfall within the past 3 weeks. Routine surveys that occur on an ongoing basis during regular conveyance system inspections may be credited toward this requirement. Make maps of the MS4 publicly available, either electronically or in hard copy by July 1, 2010. The public availability shall be through a publicized single point of contact that

is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

iii. Reporting – Permittees shall provide a summary of their collection screening program, a summary of problems found during collection system screening, and any changes to the screening program in each Annual Report.

C.5.f. Tracking and Case Follow-up

i. Task Description – All incidents or discharges reported to the complaint/spill system that might pose a threat to water quality shall be logged to track follow-up and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems, and inter/intra-agency coordination, where appropriate.

ii. Implementation Level – Create and maintain a water quality spill and discharge complaint tracking and follow-up in an electronic database or equivalent tabular system by April 1, 2010.

The spill and discharge complaint tracking system shall contain the following information:

(1) Complaint information:
- (a) Date and time of complaint
- (b) Type of pollutant
- (c) Problem Status (potential or actual discharge.)

(2) Investigation information:
- (a) Date and time started
- (b) Type of pollutant
- (c) Entered storm drain and/or receiving water
- (d) Date abated
- (e) Type of enforcement (if applicable)

(3) Response time (days)
- (a) Call to investigation
- (b) Investigation to abatement
- (c) Call to abatement

The electronic database or equivalent tabular system shall be made available to Water Board staff as needed for review of enforcement response through problem resolution.

iii. Reporting – Permittees shall provide the following information in the Annual Report:

(1) Number of discharges reported;

(2) Number of discharges reaching storm drains and/or receiving waters;

(3) Number and percentage of discharges resolved in a timely manner; and

(4) Summary of major types of discharges and complaints.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers; and reporting shall demonstrate the effectiveness of this inspection and problem solution activity by the Permittees.

C.6.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have the ability to require effective stormwater pollutant controls, and escalate progressively stricter enforcement to achieve expedient compliance and clean up at all public and private construction sites.

ii. Implementation Level

(1) Permittees shall have the legal authority to require at all construction sites year round effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non storm water management through all phases of construction (including but not limited to site grading, building, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and clean up at all construction sites year round.

iii. Reporting – Permittees shall certify adequacy of their respective legal authority in the 2010 Annual Report.

C.6.b. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all public and private construction site owners/operators.

ii. Implementation Level

(1) The ERP shall include required enforcement actions – including timeframes for corrections of problems – for various field violation scenarios. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

(2) If site owners/operators do not implement appropriate corrective actions in a timely manner, or if violations repeat, Permittees shall take progressively stricter responses to achieve compliance. The ERP shall include the structure for progressively stricter responses and various violation scenarios that evoke progressively stricter responses.

(3) The ERP shall be developed and implemented by April 1, 2010.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site specific, and seasonally- and phase-appropriate, effective Best Management Practices (BMPs) in the following six categories:

- Erosion Control
- Run-on and Run-off Control
- Sediment Control
- Active Treatment Systems (as necessary)
- Good Site Management
- Non Stormwater Management.

Theses BMP categories are listed in State General NPDES Permit for Stormwater Discharges Associated with Construction Activities (hereinafter the Construction General Permit).

ii. Implementation Level

The BMPs targeting specific pollutants within the six categories listed in C.6.c.i. shall be site specific. Site specific BMPs targeting specific pollutants from the six categories listed in C.6.c.i. can be a combination of BMPs from:

- California BMP Handbook, Construction, January 2003.
- Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, March 2003, and addenda.
- California Regional Water Quality Control Board, San Francisco Bay Region, Erosion and Sediment Control Field Manual, 2002.
- New BMPs available since the release of these Handbooks.

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements, appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for coverage under the Construction General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in C.6.c.i. are planned;

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction General Permit; and

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in C.6.c.i.; and Permittees shall require timely corrections of all actual and threatened violations of local ordinances observed.

ii. Implementation Level

(1) **Wet Season Notification**

By September 1st of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil to prepare for the upcoming wet season.

(2) **Frequency of Inspections**

Inspections shall be conducted monthly during the wet season[11] at the following sites:

(a) All construction sites disturbing one or more acre of land; and

(b) **High Priority Sites** – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

(iii) Project size and type;

(iv) Sensitivity or receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

[11] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

(3) **Contents of Inspections**

Inspections shall focus on the adequacy and effectiveness of the site specific BMPs implemented for the six categories listed in C.6.c.i. Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site specific BMPs implemented for the six categories listed in C.6.c.i.;

(c) Visual observations for:

- actual discharges of sediment and/or construction related materials into stormdrains and/or waterbodies.
- evidence of sediment and/or construction related materials discharges into stormdrains and/or waterbodies.
- illicit connections.
- potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) **Tracking**

All inspections must be recorded on a written or electronic inspection form. Inspectors shall follow the ERP if a violation is noted and shall require timely corrections of all actual and threatened violations of local ordinances observed. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded on the inspection form.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available to the Executive Officer and during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) Has there been rainfall with runoff since the last inspection?;

(e) Enforcement Response Level (Use ERP);

(f) Problem(s) observed using Illicit Discharge and the six BMP categories listed in C.6.c.i.;

(g) Specific Problem(s) (List the specific problem(s) within the BMP categories);

(h) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(i) Comments, which shall include all Rationales for Longer Compliance Time, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) In each Annual Report, each Permittee shall summarize the following information:

(a) Total number of active sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing 1 acre or more of soil;

(c) Total number of inspections conducted;

(d) Number and percentage[12] of violations in each of the six categories listed in C.6.c.i.;

(e) Number and percentage[13] of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(g) Number of sites with discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(h) Number and percentage[14] of violations fully corrected prior to the next rain event but no longer than 10 business days after the violations are discovered or otherwise considered corrected in a timely, though longer period; and

(i) Number and percentage[15] of violations not fully corrected 30 days after the violations are discovered.

(2) In each Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in C.6.e.ii.(4) above. This evaluation shall include findings on the program's strength, comparison to previous years' results, as well as areas that need

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[12] Percentage shall be calculated as number of violations in each category divided by total number of violations in all six categories.

[13] Percentage shall be calculated as number of each type of enforcement action divided by the total number of enforcement actions.

[14] Percentage shall be calculated as follows: number of violations fully corrected prior to the goal of the next rain event but no later than10 business days after the violations are discovered divided by the total number of violations for the reporting year.

[15] Percentage shall be calculated as follows: number of violations not fully corrected 30 days after the violations are discovered divided by the total number of violations for the reporting year.

more focused education for site owners, operators, and developers the following year.

(3) The Executive Officer may require that the information recorded and tracked by C.6.e.ii.(4) be submitted electronically or in a tabular format. Permittees shall submit the information within 10-working days of the Executive Officer's requirement. Submittal of the information in tabular form for the reporting year is not required in each Annual Report but encouraged.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to municipal staff responsible for conducting construction site stormwater inspections. Training topics will include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information: training topics covered, dates of training, and the percentage of Permittees' inspectors attending each training. If no training in that year, so state.

C.7. Public Information and Outreach

Each Permittee shall increase the knowledge of the target audiences regarding the impacts of stormwater pollution on receiving water and potential solutions to mitigate the problems caused; change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution.

C.7.a. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain at least 80 percent of municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as "No dumping, drains to Bay" or equivalent. At least 80% of municipally-maintained storm drain inlet markings shall be inspected and maintained at least once per 5-year permit term. For newly approved, privately maintained streets, Permittees shall require inlet marking by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain markings of at least 80 percent of municipality maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Verify that newly developed streets are marked prior to acceptance of the project.

iii. Reporting

(1) In the 2013 Annual Report, each Permittee shall report prior years' annual percentages of municipality maintained inlet markings inspected and maintained as legible with a no dumping message or equivalent.

(2) In the 2013 Annual Report, each Permittee shall report prior years' annual number of projects accepted after inlet markings were verified.

C.7.b. Advertising Campaigns

i. Task Description – Permittees shall participate in or contribute to advertising campaigns on trash/litter in waterways and pesticides with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audience.

ii. Implementation Level

(1) Target a broad audience with two separate advertising campaigns, one focused on reducing trash/litter in waterways and one focused on reducing the impact of urban pesticides. The advertising campaigns may be coordinated regionally or county-wide.

(2) Permittees shall conduct a pre-campaign survey and a post-campaign survey to identify and quantify the audiences' knowledge, trends, and

attitudes and/or practices; and to measure the overall population's awareness of the messages and behavior changes achieved by the two advertising campaigns. These surveys may be done regionally or county-wide.

iii. Reporting

(1) In the Annual Report following the pre-campaign survey, each Permittee (or the Countywide Program, if the survey was done county-wide or regionally) shall provide a report of the survey completed, which at a minimum, shall include the following:

- A summary of how the survey was implemented.
- A copy of the survey.
- A copy of the survey results.
- An analysis of the survey results.
- A discussion of the outreach strategies based on the survey results.
- A discussion of the planned or future advertising campaigns to influence awareness and behavior changes regarding trash/litter and pesticides.

(2) In the Annual Report following the post campaign survey, each Permittee (or the Countywide Program, if survey was done county-wide or regionally) shall provide a report of the survey completed, which at minimum shall include the information required in the pre-campaign report (C.7.b.iii.(1)) and the following:

- A discussion of the campaigns.
- A discussion of the measurable changes in awareness and behavior achieved.
- An update of outreach strategies based on the survey results.

C.7.c. Media Relations – Use of Free Media

i. Task Description – Permittees shall participate in or contribute to a media relations campaign. Maximize use of free media/media coverage with the objective of significantly increasing the overall awareness of stormwater pollution prevention messages and associated behavior change in target audiences, and to achieve public goals.

ii. Implementation Level – Conduct a minimum of six pitches (e.g., press releases, public service announcements, and/or other means) per year at the county-wide program, regional, and/or local levels.

iii. Reporting – In each Annual Report, each Permittee (or the Countywide Program, if the media relations campaign was done county-wide or regionally) shall include the details of each media pitch, such as the medium, date, and content of the pitch.

C.7.d. Stormwater Point of Contact

i. Task Description – Permittees shall individually or collectively create and maintain a point of contact, e.g., phone number or website, to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives.

ii. Implementation Level – Maintain and publicize one point of contact for information on stormwater issues. Permittees may combine this function with the complaint/spill contact required in C.5.

iii. Reporting – In the 2010 Annual Report, each Permittee shall discuss how this point of contact is publicized and maintained. If any change occurs in this contact, report in subsequent annual report.

C.7.e. Public Outreach Events

i. Task Description – Participate in and/or host events such as fairs, shows, workshops, (e.g., community events, street fairs, and farmers' markets), to reach a broad spectrum of the community with both general and specific stormwater runoff pollution prevention messages. Pollution prevention messages shall include encouraging residents to (1) wash cars at commercial car washing facilities, (2) use minimal detergent when washing cars, and (3) divert the car washing runoff to landscaped area.

ii. Implementation Level – Each Permittee shall annually participate and/or host the number of events according to its population, as shown in the table below:

Table 7.1 Public Outreach Events[16]

Permittee Population	Number of Outreach Events
< 10,000	2
10,001– 40,000	3
40,001 – 100,000	4
100,001 – 175,000	5
175,001 – 250,000	6
> 250,000	8
Non-population-based Permittees[17]	6

Should a public outreach event contain significant citizen involvement elements, the Permittee may claim credit for both Public Outreach Events (C.7.e.) and Citizen Involvement Events (C.7.g.).

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in and assess the effectiveness

[16] Permittees may claim individual credits for all events in which their Countywide Program or BASMAA participates, supports, and/or hosts, which are publicized to reach the Permittees jurisdiction.

[17] Alameda County Flood Control and Water Conservation District, Contra Costa Flood Control and Water Conservation District, Santa Clara Valley Water District, Vallejo Sanitation and Flood Control District, and Zone 7 of the Alameda County Flood Control and Water Conservation District

of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event survey results, quantity/volume materials cleaned up and comparisons to previous efforts).

C.7.f. Watershed Stewardship Collaborative Efforts

i. Task Description – Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts of community groups such as the Contra Costa Watershed Forum, the Santa Clara Basin Watershed Management Initiative, "friends of creek" groups, and other organizations that benefit the health of the watershed such as the Bay-Friendly Landscaping and Gardening Coalition. If no such organizations exist, encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. Coordinate with existing groups to further stewardship efforts.

ii. Implementation Level – Annually demonstrate effort.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, describe the support given, state what efforts were undertaken and the results of these efforts, and provide an evaluation of the effectiveness of these efforts.

C.7.g. Citizen Involvement Events

i. Task Description – Permittees shall individually or collectively, support citizen involvement events, which provide the opportunity for citizens to directly participate in water quality and aquatic habitat improvement, such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, service learning activities such as storm drain inlet marking, community riparian restoration activities, community grants, other participation and/or host volunteer activities.

ii. Implementation Level – Each Permittee shall annually sponsor and/or host the number of citizen involvement events according to its population, as shown in the table below:

Table 7.2 Community Involvement Events[18]

Permittee Population	Number of Involvement Events
< 10,000	1
10,001 – 40,000	1
40,001 – 100,000	2
100,001 – 175,000	3
175,001 – 250,000	4
> 250,000	5
Non-population-based Permittees	2

[18] Permittees can claim individual credit for all events sponsored or hosted by their Countywide Program or BASMAA, which are publicized to reach the Permittee's jurisdiction.

Should a citizen involvement event contain significant public outreach elements, the Permittee may claim credit for both Citizen Involvement Events (C.7.g.) and Public Outreach Events (C.7.e.).

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in and assess the effectiveness of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event survey results, number of inlets/creeks/shores/parks/and such adopted, quantity/volume materials cleaned up, data trends, and comparisons to previous efforts).

C.7.h. School-Age Children Outreach

i. Task Description – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12).

ii. Implementation Level – Implement annually and demonstrate effectiveness of efforts through assessment.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, spectrum of children reached, and methods used, and provide an evaluation of the effectiveness of these efforts.

C.7.i. Outreach to Municipal Officials

i. Task Description – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. Implementation Level – At least once per permit cycle, or more often.

iii. Reporting – Permittees shall summarize efforts in the 2013 Annual Report.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

i. **Regional Collaboration** – All Permittees shall comply with the monitoring requirements in C.8, however, Permittees may choose to comply with any requirement of this Provision through a collaborative effort to conduct or cause to be conducted the required monitoring in their jurisdictions. Where all or a majority of the Permittees collaborate to conduct water quality monitoring, this shall be considered a regional monitoring collaborative.

Where an existing collaborative body has initiated plans, before the adoption of this Permit, to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request the Executive Officer adjust the due date(s) to synchronize with such efforts.

The types, quantities, and quality of data required within Provision C.8 establish the minimum level-of-effort that a regional monitoring collaborative must achieve. Provided these data types, quantities, and quality are obtained, a regional monitoring collaborative may develop its own sampling design. For Pollutants of Concern and Long-Term monitoring required under C.8.e, an alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described under C.8.e; or an equivalent level of monitoring effort is employed to answer the management information needs stated under C.8.e.

ii. **Implementation Schedule** – Monitoring conducted through a regional monitoring collaborative shall commence data collection by October 2011. All other Permittee monitoring efforts shall commence data collection by October 2010. By July 1, 2010, each Permittee shall provide documentation to the Water Board, such as a written agreement, letter, or similar document that confirms whether the Permittee will conduct monitoring individually or through a regional monitoring collaborative.[19]

iii. **Permittee Responsibilities** – A Permittee may comply with the requirements in Provision C.8 by performing the following:

(1) Contributing to its stormwater countywide program, as determined appropriate by the Permittee members, so that the stormwater countywide Program conducts monitoring on behalf of its members;

(2) Contributing to a regional collaborative effort;

[19] This documentation will allow the Water Board to know when monitoring will commence for each Permittee. Permittees who commit to monitoring individually may join the regional monitoring collaborative at any time. Any Permittee who discontinues monitoring through the regional collaborative must commence complying with all requirements of Provision C.8 immediately.

(3) Fulfilling monitoring requirements within its own jurisdictional boundaries; or

(4) A combination of the previous options, so that all requirements are fulfilled.

iv. **Third-party Monitoring** – Permittees may choose to fulfill requirements of Provision C.8 using data collected by citizen monitors or other third-party organizations, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.h. Where an existing third-party organization has initiated plans to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request that the Executive Officer adjust the due date(s) to synchronize with such efforts.

C.8.b. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[20] such as:

- Are chemical concentrations in the Estuary potentially at levels of concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?
- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP), by contributing their fair-share financially on an annual basis.

C.8.c. Status Monitoring/Rotating Watersheds

i. Status Monitoring is intended to answer these questions: Are water quality objectives, both numeric and narrative, being met in local receiving waters,

[20] These are the management questions approved by the Regional Monitoring Program's Steering Committee on May 9, 2008, and stated at http://www.sfei/rmp/rmp_steering_meetings/rmp_steering_meeting_5_09_08/Item%2010a%20Attachment%201%20%20Draft%20RMP%20Management%20Questions%2005-02-08%20Annotated.pdf. While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

including creeks, rivers and tributaries? Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

ii. **Parameters and Methods** – Permittees shall conduct Status Monitoring using the parameters, methods, occurrences, durations, and minimum number of sampling sites as described in Table 8.1. Spring sampling shall be conducted during the April - June timeframe; dry weather sampling shall be conducted during the July - September timeframe. Minor variations of the parameters and methods may be allowed with Executive Officer concurrence.

iii. **Frequency** – Permittees shall complete the Status Monitoring in Table 8.1 at the following frequencies:

- Alameda Permittees – annually
- Contra Costa Permittees – annually
- Fairfield-Suisun Permittees – twice during the Permit term
- San Mateo Permittees – annually
- Santa Clara Permittees – annually
- Vallejo Permittees – once during the Permit term

Table 8.1 Status Monitoring Elements

Status Monitoring Parameter	Sampling and/or Analytical Method[21]	Minimum Sampling Occurrence[22]	Duration of Sampling	Minimum # Sample Sites to Monitor/Yr[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.
Biological Assessment[24] (Includes Physical Habitat Assessment and General Water Quality Parameters[25]) Nutrients (total phosphorus, dissolved orthophosphate, total nitrogen, nitrate, ammonia, silica, chloride,	SWAMP Std Operating Procedure[26,27,28] for Biological Assessments & PHab; SWAMP	1/yr (Spring Sampling)	Grab sample	Spring 20 / 10 / 4	BMI metrics that indicate substantially degraded community as per Attachment H, Table H-1 For Nutrients: 20% of results in one waterbody exceed one or more water quality standard

21 Refers to field protocol, instrumentation and/or laboratory protocol.

22 Refers to the number of sampling events at a specific site in a given year.

23 The number of sampling sites shown is based on the relative population in each Regional Stormwater Countywide Program and is listed in this order: Santa Clara & Alameda Countywide / Contra Costa & San Mateo Countywide / Vallejo & Fairfield-Suisun Programs.

24 The same general location must be used to collect benthic community, sediment chemistry, and sediment toxicity samples. General Water Quality Parameters need not be collected twice, where it is collected by a multi-parameter probe at a subset of these sample sites (see next row of Table 8.1).

25 Includes dissolved oxygen, temperature, conductivity, and pH.

26 Ode, P.R. 2007. Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised (http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/phab_sopr6.pdf). Permittees may coordinate with Water Board staff to modify their sampling procedures if these referenced procedures change during the Permit term.

27 Biological assessments shall include benthic macroinvertebrates and algae. Bioassessment sampling method shall be multihabitat reach-wide. Macroinvertebrates shall be identified according to the Standard Taxonomic Effort Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists, using the most current SWAMP approved method. Current methods are documented in (1) SWAMP Standard Operating Procedure (SOP) and Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 5-21-07, and (2) Amendment to SWAMP Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 9-17-08. For algae, include mass (ash-free dry weight), chlorophyll a, diatom and soft algae taxonomy, and reachwide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP basic method plus 1) depth and pebble count + CPOM, 2) cobble embeddedness, 3) discharge measurements, and 4) in-stream habitat. Permittees may coordinate with Water Board staff to modify these sampling procedures if SWAMP procedures change during the Permit term.

28 Algae shall be collected in a consistent timeframe as Regional SWAMP. For guidance on algae sampling and evaluation: Fetscher, A. and K. McLaughlin, May 16, 2008. Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP). Technical Report 563 and current SWAMP-approved updates to Standard Operating Procedures therein. Available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf.

Status Monitoring Parameter	Sampling and/or Analytical Method[21]	Minimum Sampling Occurrence[22]	Duration of Sampling	Minimum # Sample Sites to Monitor/Yr[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.
dissolved organic carbon, suspended sediment concentration)	comparable methods for Nutrients				or established threshold
General Water Quality[29]	Multi-Parameter Probe	2/yr (Concurrent with bioassessment & during the Aug. - Sept. timeframe)	15-minute intervals for 1-2 weeks	3 / 2 / 1	20% of results in one waterbody exceed one or more water quality standard or established threshold
Chlorine (Free and Total)	USEPA Std. Method 4500 Cl F[30]	2/yr Spring & Dry Seasons	Grab sample	Spring 20 / 10 / 2 Dry 3 / 2 / 1	After immediate resampling, concentrations remain > 0.08 mg/L
Temperature	Digital Temperature Logger	60-minute intervals	60-minute intervals April through Sept.	8 / 4 / 1	20% of results in one waterbody exceed applicable temperature threshold[31]
Toxicity – Water Column[32]	Applicable SWAMP Comparable Method	2/yr (1/Dry Season & 1 Storm Event)	Grab or composite sample	3 / 2 / 1	If toxicity results < 50% of control results, repeat sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

29 Includes dissolved oxygen, temperature, conductivity, and pH.

30 The method of analysis shall achieve a method detection limit at least as low as that achieved by the Amperometric Titration Method (4500-Cl from *Standard Methods for Examination of Water and Wastewater*, Edition 20).

31 If temperatures exceed applicable threshold (e.g., Maximum Weekly Average Temperature, Sullivan K., Martin, D.J., Cardwell, R.D., Toll, J.E., Duke, S. 2000. *An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria, Sustainable Ecosystem Institute*) or spike with no obvious natural explanation observed.

32 *US EPA three species toxicity tests: Selenastrum* growth and *Ceriodaphnia* and *Pimephales* with lethal and sublethal endpoints. Also H*yalella azteca with lethal endpoint.*

Status Monitoring Parameter	**Sampling and/or Analytical Method**[21]	**Minimum Sampling Occurrence**[22]	**Duration of Sampling**	**Minimum # Sample Sites to Monitor/Yr**[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	**Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.**
Toxicity– Bedded Sediment, Fine-grained[33]	Applicable SWAMP Comparable Method	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pollutants – Bedded Sediment,[34] fine-grained	Applicable SWAMP Comparable Method inc. grain size	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pathogen Indicators[35]	U.S. EPA protocol[36]	1/yr (During Summer)	Follow U.S. EPA protocol	5 / 5 / * *Fairfield-Suisun & Vallejo Permittees: 3 sites twice in permit term	Exceedance of USEPA criteria
Stream Survey (stream walk & mapping)[37]	USA[38] or equivalent	1 waterbody/yr	N/A	9 / 6 / 3 stream miles/year	N/A

[33] Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Coordinate with TMDL Provision requirements as applicable.

[34] Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Analytes shall include all of those reported in MacDonald et al. 2000 (including copper, nickel, mercury, PCBs, DDT, chlordane, dieldrin) as well as pyrethroids (see Table 8.4 for list of pyrethroids). Coordinate with TMDL Provision requirements as applicable. MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

[35] Includes fecal coliform and *E. Coli.*

[36] Rather than collecting samples over five separate days, Permittees may use Example #2, pg. 54, of USEPA's *Implementation Guidance for Ambient Water Quality Criteria for Bacteria*, March 2004 Final.

[37] The Stream Surveys need not be repeated on a watershed if a Stream Survey was completed on that waterbody within the previous five years. The number of stream miles to be surveyed in any given year may be less than that shown in Table 8-1 in order to avoid repeating surveys at areas surveyed during the previous five years.

[38] Center for Watershed Protection, Manual 10: *Unified Stream Assessment: A User's Manual,* February 2005.

iv. **Locations** – For each sampling year (per C.8.c.iii.), Permittees shall select at least one waterbody to sample from the applicable list below. Locations shall be selected so that sampling is sufficient to characterize segments of the waterbody(s). For example, Permittees required to collect a larger number of samples should sample two or more waterbodies, so that each sampling effort represents a reasonable segment length and/or type. Samples shall be collected in reaches that receive urban stormwater discharges, except in possible infrequent instances where non-urban-impacted stream samples are needed for comparison[39]. Waterbody selection shall be based on factors such as watershed area, land use, likelihood of urban runoff impacts, and existing monitoring data.

Table 8.2 Status Monitoring Locations – Waterbodies

SCVURPPP	ACCWP	CCCWP	SMCWPPP	FSUMRP	VALLEJO
Coyote Creek and tributaries	Arroyo Valle (below Livermore or lower)	Kirker Creek	San Pedro Creek and tributaries	Laurel Creek	Chabot Creek
Guadalupe River and tributaries	Arroyo Mocho	Mt. Diablo Creek	Pilarcitos Creek	Ledgewood Creek	Austin Creek & tributaries
San Tomas Creek and tributaries	Tassajara Creek	Walnut Creek and tributaries	Colma Creek		
Calabazas Creek	Alamo Creek	Rodeo Creek	San Bruno Creek and tributaries		
Permanente Creek and tributaries	Arroyo de la Laguna	Pinole Creek	Millbrae Creek and tributaries		
Stevens Creek and tributaries	Alameda Creek (at Fremont or below)	San Pablo Creek	Mills Creek and tributaries		
Matadero Creek and tributaries	San Lorenzo Creek & tribs	Alhambra Creek	Easton Creek and tributaries		
Adobe Creek	San Leandro Creek & tribs	Wildcat Creek	Sanchez Creek and tributaries		
Lower Penitencia Creek and tributaries	Oakland, Berkeley, or Albany Creeks		Burlingame Creek and tributaries		
Barron Creek			San Mateo Creek (below dam only)		
San Francisquito Creek & tributaries			Borel Creek & tributaries		
			Laurel Creek & tribs		
			Belmont Creek & tribs		
			Pulgas Creek & tribs		
			Cordilleras & tributaries		
			Redwood Creek & tribs		
			Atherton Creek & tribs		
			San Francisquito Creek and tributaries		

[39] Sampling efforts shall focus on stream reaches with urban stormwater system discharges. Sampling upstream of urban outfalls is not precluded where needed to meet sampling plan objectives.

v. Status Monitoring Results – When Status Monitoring produces results such as those described in the final column of Table 8.1, Permittees shall conduct Monitoring Project(s) as described in C.8.d.i.

C.8.d. Monitoring Projects – Permittees shall conduct the Monitoring Projects listed below.

i. **Stressor/Source Identification** – When Status results trigger a follow-up action as indicated in Table 8.1, Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, proceed directly to step 2. The first follow-up action shall be initiated as soon as possible, and no later than the second fiscal year after the sampling event that triggered the Monitoring Project.

(1) Conduct a site specific study (or non-site specific if the problem is wide-spread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE)[40] or Toxicity Identification Evaluations (TIE).[41] A TRE, as adapted for urban stormwater data, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE.

(2) Identify and evaluate the effectiveness of options for controlling the cause(s) of the trigger stressor/source.

(3) Implement one or more controls.

(4) Confirm the reduction of the cause(s) of trigger stressor/source.

(5) Stressor/Source Identification Project Cap: Permittees who conduct this monitoring through a regional collaborative shall be required to initiate no more than ten Stressor/Source Identification projects during the Permit term in total, and at least two must be toxicity follow-ups, unless monitoring results do not indicate the presence of toxicity. If conducted through a stormwater countywide program, the Santa Clara and Alameda

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[40] USEPA. August 1999. *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants.* EPA/833B-99/002. Office of Wastewater Management, Washington, D.C.

[41] Select TIE methods from the following references after conferring with SWAMP personnel: For sediment: (1) Ho KT, Burgess R., Mount D, Norberg-King T, Hockett, RS. 2007. *Sediment toxicity identification evaluation: interstitial and whole methods for freshwater and marine sediments.* USEPA, Atlantic Ecology Division/Mid-Continental Ecology Division, Office of Research and Development, Narragansett, RI, or (2) Anderson, BS, Hunt, JW, Phillips, BM, Tjeerdema, RS. 2007. *Navigating the TMDL Process: Sediment Toxicity.* Final Report- 02-WSM-2. Water Environment Research Federation. 181 pp. For water column: (1) USEPA. 1991. *Methods for aquatic toxicity identification evaluations. Phase I Toxicity Characterization Procedures.* EPA 600/6-91/003. Office of Research and Development, Washington, DC., (2) USEPA. 1993. *Methods for aquatic toxicity identification evaluations. Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity.* EPA 600/R-92/080. Office of Research and Development, Washington, DC., or (3) USEPA. 1996. *Marine Toxicity Identification Evaluation (TIE), Phase I Guidance Document.* EPA/600/R-95/054. Office of Research and Development, Washington, DC.

Permittees each shall be required to initiate no more than five (two for toxicity); the Contra Costa and San Mateo Permittees each shall be required to initiate no more than three (one for toxicity); and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate no more than one Stressor/Source Identification project(s) during the Permit term.

(6) As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.

ii. **BMP Effectiveness Investigation** – Investigate the effectiveness of one BMP for stormwater treatment or hydrograph modification control. Permittees who do this project through a regional collaborative are required to initiate no more than one BMP Effectiveness Investigation during the Permit term. If conducted through a stormwater countywide program, the Santa Clara, Alameda, Contra Costa, and San Mateo Permittees shall be required to initiate one BMP Effectiveness Investigation each, and the Fairfield-Suisun and Vallejo Permittees shall be exempt from this requirement. The BMP(s) used to fulfill requirements of C.3.b.iii., C.11.e. and C.12.e. may be used to fulfill this requirement, provided the BMP Effectiveness Investigation includes the range of pollutants generally found in urban runoff. The BMP Effectiveness Investigation will not trigger a Stressor/Source Identification Project. Data from this Monitoring Project need not be SWAMP-comparable.

iii. **Geomorphic Project** – This monitoring is intended to answer the questions: How and where can our creeks be restored or protected to cost-effectively reduce the impacts of pollutants, increased flow rates, and increased flow durations of urban runoff?

Permittees shall select a waterbody/reach, preferably one that contains significant fish and wildlife resources, and conduct one of the following projects within each county, except that only one such project must be completed within the collective Fairfield-Suisun and Vallejo Permittees' jurisdictions:

(1) Gather geomorphic data to support the efforts of a local watershed partnership[42] to improve creek conditions; or

(2) Inventory locations for potential retrofit projects in which decentralized, landscape-based stormwater retention units can be installed; or

(3) Conduct a geomorphic study which will help in development of regional curves which help estimate equilibrium channel conditions for different-sized drainages. Select a waterbody/reach that is not undergoing changing land use. Collect and report the following data:

- Formally surveyed channel dimensions (profile), planform, and cross-sections. Cross-sections shall include the topmost floodplain terrace and

[42] A list of local watershed partnerships may be obtained from Water Board staff.

be marked by a permanent, protruding (not flush with ground) monument.

- Contributing drainage area.
- Best available information on bankfull discharges and width and depth of channel formed by bankfull discharges.
- Best available information on average annual rainfall in the study area.

Permittees shall complete the selected geomorphic project so that project results are reported in the Integrated Monitoring Report (see Provision C.8.g.v).

C.8.e. Pollutants of Concern and Long-Term Trends Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of Pollutants of Concern to the Bay from local tributaries and urban runoff, assess progress toward achieving wasteload allocations (WLAs) for TMDLs and help resolve uncertainties associated with loading estimates for these pollutants. In particular, there are four priority management information needs toward which POC monitoring must be directed: 1) identifying which Bay tributaries (including stormwater conveyances) contribute most to Bay impairment from pollutants of concern; 2) quantifying annual loads or concentrations of pollutants of concern from tributaries to the Bay; 3) quantifying the decadal-scale loading or concentration trends of pollutants of concern from small tributaries to the Bay; and 4) quantifying the projected impacts of management actions (including control measures) on tributaries and identifying where these management actions should be implemented to have the greatest beneficial impact.

Permittees shall implement the following POC monitoring components or pursue an alternative approach that addresses each of the aforementioned management information needs. An alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described; or an equivalent level of monitoring effort is employed to answer the management information needs.

Long-Term monitoring is intended to assess long-term trends in pollutant concentrations and toxicity in receiving waters and sediment, in order to evaluate if stormwater discharges are causing or contributing to toxic impacts on aquatic life. Permittees shall implement the following Long-Term monitoring components or, following approval by the Executive Officer, an equivalent monitoring program.

i. **Pollutants of Concern Loads Monitoring Locations** – Permittees shall conduct Pollutants of Concern monitoring at stations listed below. Permittees may install these stations in two phases providing at least half of the stations are monitored in the water year beginning October 2010, and all the stations are monitored in the water year beginning October 2012. Upon approval by the Executive Officer, Permittees may use alternate POC monitoring locations.

(1) Castro Valley Creek S3 at USGS gauging station in Castro Valley

(2) Guadalupe River

(3) Zone 4 Line A at Chabot Road in Hayward

(4) Rheem Creek at Giant Road in Richmond

(5) Walnut Creek at a downstream location

(6) Calabazas Creek at Lakeside Drive in Sunnyvale, at border with Santa Clara

(7) San Mateo Creek at downstream location

(8) Laurel Creek at Laurie Meadows park, off Casanova Drive in City of San Mateo.

ii. **Long-Term Monitoring Locations** – Permittees shall conduct Long-Term monitoring at stations listed below. After conferring with the Regional SWAMP program, and upon approval by the Executive Officer, Permittees may use alternate Long-Term monitoring locations.

Table 8.3. Long-Term Monitoring Locations

Stormwater Countywide Program	Waterbody	Suggested Location
Alameda Permittees	Alameda Creek OR	East of Alvarado Blvd*
	Lower San Leandro Creek	Empire Road*
Contra Costa Permittees	Kirker Creek OR	Floodway*
	Walnut Creek	Concord Avenue*
Santa Clara Permittees	Guadalupe River OR	USGS Gaging Station 11169025*
	Coyote Creek	Montague*
San Mateo Permittees	San Mateo Creek	Gateway Park*

* SWAMP is scheduled to collect sediment toxicity and sediment chemistry samples annually at these stations during the month of June.

iii. **Parameters and Frequencies** – Permittees shall conduct Pollutants of Concern sampling pursuant to Table 8.4, Categories 1 and 2. In Table 8.4, Category 1 pollutants are those for which the Water Board has active water quality attainment strategies (WQAS), such as TMDL or site-specific objective projects. Category 2 pollutants are those for which WQAS are in development. The lower monitoring frequency for Category 2 pollutants is sufficient to develop preliminary loading estimates for these pollutants.

Permittees shall conduct Long-Term monitoring pursuant to Table 8.4, Category 3. SWAMP has scheduled collection of Category 3 data at the Long-Term monitoring locations stated in C.8.e.ii. As stated in Provision C.8.a.iv., Permittees may use SWAMP data to fulfill Category 3 sampling requirements.

iv. **Protocols** – At a minimum, sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii).

v. **Methods** – Methyl mercury samples shall be grab samples collected during storm events that produce rainfall of at least 0.10 inch, shall be frozen immediately upon collection, and shall be kept frozen during transport to the laboratory. All other Category 1 and 2 samples shall be wet weather flow-weighted composite samples, collected during storm events that produce rainfall of at least 0.10 inch. Sampled storms should be separated by 21 days of dry weather, but, at a minimum, sampled storms must have 72 hours of antecedent dry weather. Samples must include the first rise in the hydrograph. Category 3 monitoring data shall be SWAMP-comparable.

Table 8.4 Pollutants of Concern Loads & Long-Term Monitoring Elements

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Category 1 • Total and Dissolved Copper • Total Mercury[43] • Methyl Mercury • Total PCBs[44] • Suspended Sediments (SSC) • Total Organic Carbon • Toxicity – Water Column • Nitrate as N • Hardness	Annually	Average of 4 wet weather events per year For methyl mercury only: average of 2 wet & 2 dry weather events per year	Flow-weighted composite For methyl mercury only: grab samples collected during the first rise in the hydrograph of a storm event.
Category 2 • Total and Dissolved Selenium • Total PBDEs (Polybrominated Diphenyl Ethers) • Total PAHs (Poly-Aromatic Hydrocarbons) • Chlordane • DDTs (Dichloro-Diphenyl-Trichloroethane) • Dieldrin • Nitrate as N • Pyrethroids - bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin • Carboryl and fipronil • Total and Dissolved Phosphorus	Oct. 2010 - 2011 water year and Oct. 2012 - 2013 water year	2 times per year	Flow-weighted composite
Category 3 Toxicity – Bedded Sediment, fine-grained[45]	Biennially, Coordinate	Once per year, during April-June,	Grab sample

[43] The monitoring type and frequency shown for mercury is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

[44] The monitoring type and frequency shown for PCBs is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Pollutants – Bedded Sediment, fine-grained	with SWAMP	coordinate with SWAMP	

vi. **Sediment Delivery Estimate/Budget** – The objective of this monitoring is to develop a strong estimate of the amount of sediment entering the Bay from local tributaries and urban drainages. By July 1, 2011, Permittees shall develop a design for a robust sediment delivery estimate/sediment budget in local tributaries and urban drainages. Permittees shall implement the study by July 1, 2012.

vii. **Emerging Pollutants** – Permittees shall develop a work plan and schedule for initial loading estimates and source analyses for emerging pollutants: endocrine-disrupting compounds, PFOS/PFAS (Perfluorooctane Sulfonates (PFOS), Perfluoroalkyl sulfonates (PFAS); these perfluorocompounds are related to Teflon products), and NP/NPEs (nonylphenols/nonylphenol esters —estrogen-like compounds). This work plan, which is to be implemented in the next Permit term, shall be submitted with the Integrated Monitoring Report (see Provision C.8.g.).

C.8.f. Citizen Monitoring and Participation

i. Permittees shall encourage Citizen Monitoring.

ii. In developing Monitoring Projects and evaluating Status & Trends data, Permittees shall make reasonable efforts to seek out citizen and stakeholder information and comment regarding waterbody function and quality.

iii. Permittees shall demonstrate annually that they have encouraged citizen and stakeholder observations and reporting of waterbody conditions. Permittees shall report on these outreach efforts in the annual Urban Creeks Monitoring Report.

C.8.g. Reporting

i. **Water Quality Standard Exceedence** – When data collected pursuant to C.8.a.-C.8.f. indicate that stormwater runoff or dry weather discharges are or may be causing or contributing to exceedance(s) of applicable water quality standards, including narrative standards, a discussion of possible pollutant sources shall be included in the Urban Creeks Monitoring Report. When data collected pursuant to C.8.a.-C.8.f. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. The preceding reporting requirements shall not apply to

[45] If Ceriodaphnia, *Hyalella azteca,* or Pimephales survival or Selenastrum growth is < 50% of control results, repeat wet weather sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.8 through C.14 of this Order in accordance with Provision C.1.

ii. **Status Monitoring Electronic Reporting** – Permittees shall submit an Electronic Status Monitoring Data Report no later than January 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Electronic Status Monitoring Data Reports shall be in a format compatible with the SWAMP database.[46] Water Quality Objective exceedances shall be highlighted in the Report.

iii. **Urban Creeks Monitoring Report** – Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period, with the initial report due March 15, 2012, unless the Permittees choose to monitor through a regional collaborative, in which case the due date is March 15, 2013. Each Urban Creeks Monitoring Report shall contain summaries of Status, Long-Term, Monitoring Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:

(1) Maps and descriptions of all monitoring locations;

(2) Data tables and graphical data summaries; Constituents that exceed applicable water quality standards shall be highlighted;

(3) For all data, a statement of the data quality;

(4) An analysis of the data, which shall include the following:

- Calculations of biological metrics and physical habitat endpoints.
- Comparison of biological metrics to:
  - Each other
  - Any applicable, available reference site(s)
  - Any applicable, available index of biotic integrity
  - Physical habitat endpoints.
- Identification and analysis of any long-term trends in stormwater or receiving water quality.

(5) A discussion of the data for each monitoring program component, which shall:

- Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans.

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[46] See http://mpsl.mlml.calstate.edu/swdataformats.htm. Permittees shall maintain an information management system that will support electronic transfer of data to the Regional Data Center of the ***California Environmental Data Exchange Network*** (***CEDEN***), located within the San Francisco Estuary Institute.

- Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness.
- Identify and prioritize water quality problems.
- Identify potential sources of water quality problems.
- Describe follow-up actions.
- Evaluate the effectiveness of existing control measures.
- Identify management actions needed to address water quality problems.

iv. **Monitoring Project Reports** – Permittees shall report on the status of each ongoing Monitoring Project in each annual Urban Creeks Monitoring Report. In addition, Permittees shall submit stand-alone summary reports within six months of completing BMP Effectiveness and Geomorphic Projects; these reports shall include: a description of the project; map(s) of project locations; data tables and summaries; and discussion of results.

v. **Integrated Monitoring Report** – No later than March 15, 2014, Permittees shall prepare and submit an Integrated Monitoring Report through the regional collaborative monitoring effort on behalf of all participating Permittees, or on a countywide basis on behalf of participating Permittees, so that all monitoring conducted during the Permit term is reported.[47] This report shall be in lieu of the Annual Urban Creeks Monitoring Report due on March 15, 2014.

The report shall include, but not be limited to, a comprehensive analysis of all data collected pursuant to Provision C.8., and may include other pertinent studies. For Pollutants of Concern, the report shall include methods, data, calculations, load estimates, and source estimates for each Pollutant of Concern Monitoring parameter. The report shall include a budget summary for each monitoring requirement and recommendations for future monitoring. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit.

vi. **Standard Report Content** –All monitoring reports shall include the following:

- The purpose of the monitoring and briefly describe the study design rationale.
- Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data.
- Brief descriptions of sampling protocols and analytical methods.
- Sample location description, including waterbody name and segment and latitude and longitude coordinates.
- Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue).
- Concentrations detected, measurement units, and detection limits.

[47] Permittees who do not participate in the Regional Monitoring Group or in a stormwater countywide program must submit an individual Integrated Receiving Water Impacts Report.

- Assessment, analysis, and interpretation of the data for each monitoring program component.
- Pollutant load and concentration at each mass emissions station.
- A listing of volunteer and other non-Permittee entities whose data are included in the report.
- Assessment of compliance with applicable water quality standards.
- A signed certification statement.

vii. **Data Accessibility** – Permittees shall make electronic reports available through a regional data center, and optionally through their web sites. Permittees shall notify stakeholders and members of the general public about the availability of electronic and paper monitoring reports through notices distributed through appropriate means, such as an electronic mailing list.

C.8.h. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP)[48] for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent Standard Operating Procedures. A Regional Monitoring Collaborative may adapt the SWAMP QAPP for use in conducting monitoring in the San Francisco Bay Region, and may use such QAPP if acceptable to the Executive Officer.

[48] The current SWAMP QAPP at the time of Permit issuance is dated September 1, 2008, and is available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses their own and others' use of pesticides within their jurisdictions that pose a threat to water quality and that have the potential to enter the municipal conveyance system. This provision implements requirements of the TMDL for Diazinon and Pesticide related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. However, urban runoff management agencies (i.e., the Permittees) are not solely responsible for attaining the allocations because their authority to regulate pesticide use is constrained by federal and State law. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Pesticides of concern include: organophosphorous pesticides (chlorpyrifos, diazinon, and malathion); pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin); carbamates (e.g., carbaryl); and fipronil. The Permittees may coordinate with BASMAA, the Urban Pesticide Pollution Prevention Project, the Urban Pesticide Committee, the Bay-Friendly Landscaping and Gardening Coalition, and other agencies and organizations in carrying out these activities.

C.9.a. Adopt an Integrated Pest Management (IPM) Policy or Ordinance

i. **Task Description** – In their IPM policies or ordinances, the Permittees shall include provisions to minimize reliance on pesticides that threaten water quality and to require the use of IPM in municipal operations and on municipal property.

ii. **Implementation Level** – If not already in place, the Permittees shall adopt IPM policies or ordinances no later than July 1, 2010.

iii. **Reporting** – The Permittees shall submit a copy of their IPM ordinance(s) or policy(s) in their 2010 Annual Report.

C.9.b. Implement IPM Policy or Ordinance

i. **Task Description** – The Permittees shall establish written standard operating procedures for pesticide use that ensure implementation of the IPM policy or ordinance and require municipal employees and contractors to adhere to the IPM standard operating procedures.

ii. **Reporting**

(1) In their Annual Reports, the Permittees shall report on IPM implementation by showing trends in quantities and types of pesticide used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphorous pesticides, pyrethroids, carbaryl, and fipronil.

(2) The Permittees shall maintain pesticide application standard operating procedures and submit them upon request.

C.9.c. Train Municipal Employees

i. **Task Description** – The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides that threaten water quality are trained in IPM practices and the Permittee's IPM policy. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program and EcoWise Certified.

ii. **Reporting**

(1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in IPM policy and IPM standard operating procedures within the last three years.

(2) The Permittees shall submit training materials (e.g., course outline, date, attendees) upon request.

C.9.d. Require Contractors to Implement IPM

i. **Task Description** – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM no later than July 1, 2010.

ii. **Reporting** – In their Annual Reports, the Permittees shall submit documentation to confirm compliance, such as the Permittee's standard contract specification or copy of contractors' certification(s).

C.9.e. Track and Participate in Relevant Regulatory Processes (may be done jointly with other Permittees, such as through CASQA or BASMAA and/or the Urban Pesticide Pollution Prevention Project)

i. **Task Description**

(1) The Permittees shall track USEPA pesticide evaluation and registration activities as they relate to surface water quality, and when necessary, encourage USEPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track California Department of Pesticide Regulation (DPR) pesticide evaluation activities as they relate to surface water quality, and when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and County Agricultural Commissioners in

ensuring that pesticide applications comply with water quality standards; and

(4) As appropriate, the Permittees shall submit comment letters on USEPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting** – In their Annual Reports, the Permittees who participate in a regional effort to comply with C.9.e. may reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected. All other Permittees shall list their specific participation efforts, information submitted, and how regulatory actions were affected.

C.9.f. Interface with County Agricultural Commissioners

i. **Task Description** – The Permittees shall maintain regular communications with county agricultural commissioners (or other appropriate State and/or local agencies) to (1) get input and assistance on urban pest management practices and use of pesticides, (2) inform them of water quality issues related to pesticides, and (3) report violations of pesticide regulations (e.g., illegal handling) associated with stormwater management.

ii. **Reporting** – In their Annual Reports, the Permittees shall summarize improper pesticide usage reported to county agricultural commissioners and report follow-up actions to correct violations.

C.9.g. Evaluate Implementation of Source Control Actions Relating to Pesticides

i. **Task Description** – The Permittees shall evaluate the effectiveness of the control measures implemented, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (Provision C.8.), and identify improvements to existing control measures and/or additional control measures, if needed, to attain targets with an implementation time schedule.

ii. **Reporting** – In their 2013 Annual Reports, the Permittees shall report the evaluation results, and if needed, submit a plan to implement improved and/or new control measures.

C.9.h. Public Outreach (may be done jointly with other Permittees, such as through CASQA or BASMAA and/or the Urban Pesticide Pollution Prevention Project or the Bay-Friendly Landscaping and Gardening Coalition).

i. **Point of Purchase Outreach:** The Permittees shall:

(1) Conduct outreach to consumers at the point of purchase;

(2) Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and

(3) Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.

ii. **Reporting** – In their Annual Reports, the Permittees who participate in a regional effort to comply with C.9.h.i. may reference a report that summarizes these actions. All other Permittees shall summarize activities completed and document any measurable awareness and behavior changes resulting from outreach.

iii. **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural or landscape pest control and shall:

(1) Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control, including IPM;

(2) Incorporate IPM messages into general outreach;

(3) Provide information to residents about "Our Water, Our World" or functionally equivalent program;

(4) Provide information to residents about EcoWise Certified IPM certification in Structural Pest Management, or functionally equivalent certification program; and

(5) Coordinate with household hazardous-waste programs to facilitate appropriate pesticide waste disposal, conduct education and outreach, and promote appropriate disposal.

iv. **Reporting** – In their 2013 Annual Reports, the Permittees who participate in a regional effort to comply with C.9.h.iii. may reference a report that summarizes these actions. All other Permittees shall document the effectiveness of their actions in their 2013 Annual Reports. This documentation may include percentages of residents hiring certified IPM providers and the change in this percentage.

v. **Outreach to Pest Control Operators:** The Permittees shall conduct outreach to pest control operators (PCOs) and landscapers; Permittees are encouraged to work with DPR, county agricultural commissioners, UC-IPM, BASMAA, the Urban Pesticide Committee, the EcoWise Certified Program (or functionally equivalent certification program), the Bio-integral Resource Center and others to promote IPM to PCOs and landscapers.

vi. **Reporting** – In each Annual Report, the Permittees who participate in a regional effort to comply with C.9.h.v. may reference a report that summarizes these actions. All other Permittees shall summarize how they reached PCOs and landscapers and reduced pesticide use.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022 as further specified below.

During this permit term, the Permittees shall develop and implement a Short-Term Trash Load Reduction Plan. This includes implementation of a mandatory minimum level of trash capture; cleanup and abatement progress on a mandatory minimum number of Trash Hot Spots; and implementation of other control measures and best management practices, such as trash reduction ordinances, to prevent or remove trash loads from MS4s to attain a 40% reduction in trash loads by July 1, 2014. The Permittees shall also develop and begin implementation of a Long-Term Trash Load Reduction Plan to attain a 70% reduction in trash loads from their MS4s by 2017 and 100% by 2022. Flood management agencies, which are non-population-based Permittees that do not have jurisdiction over urban watershed land, are not subject to these trash reduction requirements except for minimum full trash capture and Trash Hot Spot requirements, as specified in subsections C.10.a.iii and C.10.b below.

C.10.a. Short-Term Trash Load Reduction

i. **Short-Term Trash Loading Reduction Plan** – Each Permittee shall submit a Short-Term Trash Load Reduction Plan, including an implementation schedule, to the Water Board by February 1, 2012. The Plan shall describe control measures and best management practices, including any trash reduction ordinances, that are currently being implemented and the current level of implementation and additional control measures and best management practices that will be implemented, and/or an increased level of implementation designed to attain a 40% trash load reduction from its MS4 by July 1, 2014.

   The Short-Term Trash Load Reduction Plan shall account for required mandatory minimum Full Trash Capture devices called for in Provision C.10.a.iii and Trash Hot Spot Cleanup called for in Provision C.10.b.

ii. **Baseline Trash Load and Trash Load Reduction Tracking Method** – Each Permittee, working collaboratively or individually, shall determine the baseline trash load from its MS4 to establish the basis for trash load reductions and submit the determined load level to the Water Board by February 1, 2012, along with documentation of methodology used to determine the load level. The submittal shall also include a description of the trash load reduction tracking method that will be used to account for trash load reduction actions and to demonstrate progress and attainment of trash load reduction levels. The submittal shall account for the drainage areas of a Permittee's jurisdiction that are associated with the baseline trash load from its MS4, and the baseline trash load level per unit area by land use type and drainage area characteristics used to derive the total baseline trash load level for each Permittee.

   In the determination of applicable areas that generate trash loads for inclusion in the Baseline Trash Load, the Permittees may propose areas for exclusion, with supporting documentation, which meet Discharge Prohibition A.2 and trash-

related Receiving Water Limitations. Documentation demonstrating no material trash presence or adverse impact may include data from the maintenance of existing trash capture devices, data from trash flux measurements in the MS4 and the water column of streams during wet weather, Trash Hot Spot assessments, and litter audits of street curb and gutter areas in high pedestrian traffic and high commercial activity areas.

If proposed areas for exclusion are commercial, industrial, or high density residential areas, or adjacent to schools or event venues, the Permittee shall collect and submit by February 1, 2013, an additional year of documentation to further support the basis for the exclusion. If the data continue to support the exclusion determination, further trash reduction actions are not required in these areas, unless the Water Board notifies the Permittee otherwise.

Each Permittee shall submit a progress report by February 1, 2011, that indicates whether it is determining its baseline trash load and trash load reduction method individually or collaboratively with other Permittees and a summary of the approach being used. The report shall also include the types and examples of documentation that will be used to propose exclusion areas, and the land use characteristics and estimated area of potentially excluded areas.

iii. **Minimum Full Trash Capture** – Except as excluded below, population-based Permittees shall install and maintain a mandatory minimum number of full trash capture devices by July 1, 2014, to treat runoff from an area equivalent to 30% of Retail/Wholesale Land[49] that drains to MS4s within their jurisdictions (see Table 10.1 in Attachment J). If the sum of the areas that generate trash loads determined pursuant to C.10.a.ii above is a smaller acreage than the required trash capture acreage, a population-based Permittee may reduce its minimum full trash capture requirement to the smaller acreage. A population-based Permittee with a population less than 12,000 and retail/wholesale land less than 40 acres, or a population less than 2000, is exempt from this trash capture requirement. The minimum number of trash capture devices required to be installed and maintained by non-population-based Permittees is included in Attachment J.

All installed devices that meet the following full trash capture definition may be counted toward this requirement regardless of date of installation. A full capture system or device is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour, storm in the sub-drainage area.

C.10.b. Trash Hot Spot Selection and Cleanup

Trash Hot Spots in receiving waters shall be cleaned annually to achieve the multiple benefits of beginning abatement of these impacts as mitigation and to learn more about the sources and patterns of trash loading.

[49] [http://quake.abag.ca.gov/mitigation/pickdbh2.html] and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

i. **Hot Spot Cleanup and Definition** – The Permittees shall cleanup selected Trash Hot Spots to a level of "no visual impact" at least one time per year for the term of the permit. Trash Hot Spots shall be at least 100 yards of creek length or 200 yards of shoreline length.

ii. **Hot Spot Selection** – Population-based Permittees shall identify high trash-impacted locations on State waters totaling at least one Trash Hot Spot per 30,000 population, or one per 100 acres of Retail/Wholesale Commercial Land Area, within their jurisdictions based on Association of Bay Area Governments (ABAG) 2005 data1, whichever is greater. If the hot spot number by one of the two determination methods is more than twice that determined by the other method, double the smaller hot spot number shall be used. Otherwise, the larger hot spot number determined by the two methods shall be the Trash Hot Spot assignment for a population-based Permittee. Each population-based Permittee shall select at least one Trash Hot Spot. The Permittees shall each submit selected Trash Hot Spots to the Water Board by July 1, 2010. The list should include photo documentation (one photo per 50 feet) and initial assessment results for the proposed hot spots. The minimum number of Trash Hot Spots per Permittee is included in Attachment J for population and non-population-based Permittees. The Permittees shall proceed with cleanup of selected Trash Hot Spots unless informed otherwise by the Water Board.

iii. **Hot Spot Assessments** – The Permittees shall quantify the volume of material removed from each Trash Hot Spot cleanup, and identify the dominant types of trash (e.g., glass, plastics, paper) removed and their sources to the extent possible. Documentation shall include the trash condition before and after clean up of the entire hot spot using photo documentation with a minimum of one photo per 50 feet of hot spot length. Trash Hot Spots may also be assessed using either the Rapid Trash Assessment (RTA v.8) or the SCVURPPP Urban RTA variation of that method.

C.10.c. Long-Term Trash Load Reduction

Each Permittee shall submit a Long-Term Trash Load Reduction Plan, including an implementation schedule, to the Water Board by February 1, 2014. The Plan shall describe control measures and best management practices, including any trash reduction ordinances, that are being implemented and the level of implementation and additional control measures and best management practices that will be implemented, and/or an increased level of implementation designed to attain a 70% trash load reduction from its MS4 by July 1, 2017, and 100% by July 1, 2022.

C.10.d. Reporting

i. In each Annual Report, each Permittee shall provide a summary of its trash load reduction actions (control measures and best management practices) including the types of actions and levels of implementation, the total trash loads and dominant types of trash removed by its actions, and the total trash loads and dominant types of trash for each type of action. The latter shall include each Trash Hot Spot selected pursuant to C.10.b. Beginning with the 2012 Annual

Report, each Permittee shall also report its percent annual trash load reduction relative to its Baseline Trash Load.

ii. The Permittees shall retain records for review providing supporting documentation of trash load reduction actions and the volume and dominant type of trash removed from full trash capture devices, from each Trash Hot Spot cleanup, and from additional control measures or best management practices implemented. Data may be combined for specific types of full trash capture devices deployed in the same drainage area. These records shall have the specificity required for the trash load reduction tracking method established pursuant to subsection C.10.a.iii.

C.11. Mercury Controls

The Permittees shall implement the following control programs for mercury. The Permittees shall perform the control measures and provide reporting on those control measures according to the provisions below. The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay mercury TMDL and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury load allocation established for the TMDL. The aggregate, regionwide, urban runoff wasteload load allocation is 82 kg/yr. This allocation should be achieved by February 2028 and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved by February 2018. If the interim loading milestone is not achieved, the Permittees shall demonstrate reasonable and measurable progress toward achieving the milestone. The Permittees may comply with any requirement of this provision through a collaborative effort.

C.11.a. Mercury Collection and Recycling Implemented throughout the Region

i. **Task Description** – The Permittees shall promote, facilitate, and/or participate in collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs).

ii. **Reporting** – The Permittees shall report on these efforts in their Annual Report, including an estimate of the mass of mercury collected.

C.11.b. Monitor Methylmercury

i. **Task Description** – The Permittees shall monitor methymercury in runoff discharges. The objective of the monitoring is to investigate a representative set of drainages and obtain seasonal information and to assess the magnitude and spatial/temporal patterns of methylmercury concentrations.

ii. **Implementation Level** – The Permittees shall analyze aqueous grab samples already being collected for total mercury analysis for methylmercury as specified in Provision C.8.f.

iii. **Reporting** – The Permittees shall report monitoring results annually beginning with their 2010 Annual Report.

C.11.c. Pilot Projects To Investigate and Abate Mercury Sources in Drainages, Including Public Rights-Of-Way, and Stormwater Conveyances with Accumulated Sediment that Contains Elevated Mercury Concentrations.

i. **Task Description** – The Permittees shall investigate and abate mercury sources in or to their storm drain systems in conjunction with the Water Board and other appropriate regulatory agencies with investigation and cleanup authorities. The purpose of this task is to implement and evaluate the benefit of a suite of abatement measures at five pilot project locations. The Permittees shall document the knowledge and experience gained through pilot implementation,

and this documentation will provide a basis for determining the scope of abatement implementation in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads abated resulting from implementation of these measures.

ii. **Implementation Level** – Reducing loads of PCBs is the main pilot location selection factor for this Provision, and reducing loads of mercury is a secondary criterion. Accordingly, for PCB pilot project locations selected as part of Provision C.12.c, the Permittees shall conduct reconnaissance in the pilot project drainage areas. The Permittees shall test sediments in storm drains and conveyances to characterize the extent and magnitude of mercury concentrations. They shall evaluate monitoring data and determine if a mercury sediment abatement program would reduce mercury loading significantly. If so determined, the Permittees shall cause abatement activities to be conducted at those sites under Permittee jurisdiction with identified remedial activities. When contamination is located on private property, a Permittee must either exercise direct authority to require cleanup or notify and request other appropriate authorities to exercise their cleanup authority.

iii. **Reporting** – Report on mercury-related aspects of work and loads abated as part of reporting requirements for Provision C.12.c.

C.11.d. Pilot Projects to Evaluate and Enhance Municipal Sediment Removal and Management Practices

i. **Task Description** – The Permittees shall jointly evaluate ways to enhance mercury load reduction benefits of operation and maintenance actives that remove or manage sediment. The purpose of this task is to implement these management practices at the pilot scale in five drainages during this permit term. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of enhanced sediment removal and management practices in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of enhanced sediment removal management practices in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. **Implementation Level** – In all pilot program drainages selected as part of Provision C.12.c, the Permittees shall jointly evaluate ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits for the control of mercury. This evaluation shall also include consideration of street flushing and capture, collection, or routing to the sanitary sewer (in coordination and consultation with local sanitary sewer agencies) as a potential enhanced management practice in coordination and consultation with local sanitary sewer agencies.

Beginning July 1, 2011, the Permittees shall implement pilot studies for the most potentially effective measures(s) based on the evaluation of Provision C.11.d.ii in all drainages for which PCB pilot projects are being conducted.

iii. Reporting

(1) The Permittees shall present a progress report on the results of the evaluation in their 2010 Annual Report and the final evaluation results in their 2011 Annual Report.

(2) In their March 15, 2014 Integrated Monitoring Report, the Permittees shall report the effectiveness of enhanced practices pilot implementation, report estimates of loads reduced, and present a plan and schedule for possible expanded implementation for subsequent permit terms.

C.11.e. Conduct Pilot Projects to Evaluate On-Site Stormwater Treatment via Retrofit

i. Task Description – The Permittees shall evaluate and quantify the removal of mercury by on-site treatment systems via retrofit of such systems into existing storm drain systems. The purpose of this task is to implement on-site treatment projects at the pilot scale in ten locations during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of on-site treatment retrofits in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. Implementation Level – The Permittees, working collaboratively, shall identify at least ten locations throughout the Permittees' jurisdictions that present opportunities to install and evaluate[50] on-site treatment systems (e.g., detention basins, bioretention units, sand filters, infiltration basins, treatment wetlands) and shall assess best treatment options for those locations. Every county (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano) should have at least one location. This effort shall identify potential locations draining a variety of land uses; evaluate technical feasibility; and discuss economical feasibility. The pilot locations may be the same as those chosen for Provision C.12.e, but consideration should be given to areas of elevated mercury concentrations.

On the basis of the Provision C.11.e.ii report, the Permittees shall select sites to perform pilot studies and shall conduct pilot studies in ten selected locations. Pilot studies shall span treatment types and drainage characteristics.

iii. Reporting –

(1) In their 2011 Annual Report, the Permittees shall report on candidate locations and types of treatment retrofit for each location. The report shall include assessment of at least ten locations.

[50] Permittees may evaluate a maximum of two pre-existing treatment systems of the ten total required systems to be evaluated provided that these existing treatment systems are applicable to the intent of this provision..

(2) In their March 15, 2014 Integrated Monitoring Report, the Permittees shall report status, results, mercury removal effectiveness, and lessons learned from the ten pilot studies and their plan for implementing this type of treatment on an expanded basis throughout their jurisdictions during the next permit term.

C.11.f. Diversion of Dry Weather and First Flush Flows to Publicly Owned Treatment Works (POTWs)

i. **Task Description** – The Permittees shall evaluate the reduced loads of mercury from diversion of dry weather and first flush stormwater flows to sanitary sewers. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. **Implementation Level** – The Permittees shall implement pilot projects to divert dry weather and first flush flows to POTWs to address these flows as a source of PCBs and mercury to receiving waters. The Permittees are strongly encouraged to make use of stormwater pump stations in this effort because pump station characterization work performed pursuant to Provisions C.2 and C.10, addressing dissolved oxygen depletion and trash impacts, may be efficiently leveraged for the initial phase of these diversion pilot projects. The objectives of this Provision are to: implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from each diversion; and gather information to guide the selection of additional diversion projects in future permits. Collectively, the Permittees shall select five stormwater pump stations and five alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with local POTWs on a watershed, county, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select five pump stations and five alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially-dominated catchments where elevated PCB concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at five pilot pump stations. As part of the pilot studies, the Permittees shall monitor, measure, and report mercury load reduction.

iii. Reporting

(1) The Permittees shall summarize the results of the feasibility evaluation in their 2010 Annual Report, including:

- Selection criteria leading to the identification of the five candidate and five alternate pump stations for pilot studies.
- Time schedules for conducting the pilot studies.
- A proposed method for distributing mercury load reductions to participating wastewater and stormwater agencies.

(2) The Permittees shall report annually on the status of the pilot studies in each subsequent Annual Report.

(3) The Permittees shall include in their March 15, 2014 Integrated Monitoring Report:

- Evaluation of pilot program effectiveness.
- Mercury loads reduced.
- Updated feasibility evaluation procedures to guide future diversion project selection.

C.11.g. Monitor Stormwater Mercury Pollutant Loads and Loads Reduced

i. Task Description – The Permittees shall develop and implement a monitoring program to quantify mercury loads and loads reduced through source control, treatment and other management measures as required in Provision C.8.f.

ii. Implementation Level – The Permittees shall demonstrate progress toward (a) the interim loading milestones, or (b) attainment of the program area allocations, by using the following methods:

(1) Quantify through estimates the annual average mercury load reduced by implementing pollution prevention, source control and treatment control efforts required by the provisions of this permit or other relevant efforts; or

(2) Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations; or

(3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the target of 0.2 mg mercury/kg dry weight.

iii. Reporting

(1) The Permittees shall report in their 2010 Annual Report methods used to assess progress toward meeting WLA goals and a full description of the

measurement and estimation methodology and rationale for the approaches.

(2) The Permittees shall report in their March 15, 2014 Integrated Monitoring Report results of chosen monitoring/measurement approach concerning loads assessment and estimation of loads reduced.

C.11.h. Fate and Transport Study of Mercury in Urban Runoff

i. **Task Description** – The Permittees shall conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of mercury discharged in urban runoff to San Francisco Bay and tidal areas.

ii. **Implementation Level** – The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, and the identification of drainages where urban runoff mercury is particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2010 Annual Report a work plan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a schedule. The Permittees shall report on status of these studies in their 2010, 2011, and 2012 Annual Reports. In the March 15, 2014 Integrated Monitoring Report, the Permittees shall report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.11.i. Development of a Risk Reduction Program Implemented Throughout the Region.

i. **Task Description** – The Permittees shall develop and implement or participate in effective programs to reduce mercury-related risks to humans and quantify the resulting risk reductions from these activities.

ii. **Implementation Level** – The risk reduction activities shall include investigating ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Permittees may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning. The risk reduction activities may be performed by a third party if the Permittees wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

iii. **Reporting** – The Permittees shall submit in their 2010 Annual Report the specific manner in which these risk reduction activities will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report on the status of the risk reduction efforts in their 2011 and 2012 Annual Reports. The Permittees shall report the findings and results of the studies completed, planned, or in progress as well as the status of other risk reduction actions in their March 15, 2014 Integrated Monitoring Report.

C.11.j. Develop Allocation Sharing Scheme with Caltrans.

i. **Task Description** – The wasteload allocations for urban stormwater developed through the San Francisco Bay mercury TMDL implicitly include California Department of Transportation (Caltrans) roadway and non-roadway facilities within the geographic boundaries of urban runoff management agencies. Consistent with the TMDL, the Permittees are required to develop an equitable mercury allocation-sharing scheme in consultation with Caltrans to address the Caltrans facilities in the program area, and report the details to the Water Board. Alternatively, Caltrans may choose to implement mercury load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agencies' mercury allocation. In such a case, the Water Board will consider a separate allocation for Caltrans for which it may demonstrate progress toward attaining an allocation or load reduction in the same manner as municipal programs.

ii. **Reporting** – The Permittees shall report on the status of the efforts to develop this allocation sharing scheme in their 2010, 2011, and 2012 Annual Reports. The Permittees shall submit in their March 15, 2014 Integrated Monitoring Report the manner in which the urban runoff mercury TMDL allocation will be shared between the Permittees and Caltrans.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control programs for PCBs. The Permittees shall perform the control measures and provide reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the urban runoff requirements of the PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs load allocation. The Permittees may comply with any requirement of this Provision through a collaborative effort.

C.12.a. Implement Project throughout Region to Incorporate PCBs and PCB-Containing Equipment Identification into Existing Industrial Inspections

i. **Task Description** – The Permittees shall develop training materials and train municipal industrial building inspectors to identify, in the course of their existing inspections, PCBs or PCB-containing equipment. The Permittees shall incorporate such PCB identification into industrial inspection programs.

ii. **Implementation Level** – Where inspectors identify during inspections PCBs or PCB-containing equipment, the Permittees shall document incidents in inspection reports and refer to appropriate regulatory agencies (e.g. county health departments, Department of Toxic Substances Control, California Department of Public Health, and the Water Board) as necessary.

iii. **Reporting** – The Permittees shall report the results of training in their 2010 Annual Report and report on both ongoing training development and inspections for PCB identification in their 2011, and following, Annual Reports.

C.12.b. Conduct Pilot Projects to Evaluate Managing PCB-Containing Materials and Wastes during Building Demolition and Renovation (e.g., Window Replacement) Activities

i. **Task Description** – The Permittees shall evaluate potential presence of PCBs at construction sites, current material handling and disposal regulations/programs (e.g., municipal ordinances, RCRA, TSCA) and current level of implementation.

ii. **Implementation Level** –

(1) The Permittees shall develop a sampling and analysis plan to evaluate PCBs at construction sites that involve demolition activities (including research on when, where, and which materials potentially contained PCBs).

(2) The Permittees shall implement a sampling and analysis plan at a minimum of 10 sites distributed throughout the combined Permittees' jurisdiction areas.

(3) The Permittees shall develop/select BMPs to reduce or prevent discharges of PCBs during demolition/remodeling. The BMPs will focus on methods

to identify, handle, contain, transport and dispose of PCB-containing building materials.

(4) The Permittees shall develop model ordinances or policies, train and deploy inspectors, and pilot test BMPs at 5 sites.

iii. Reporting –

(1) In their 2010 Annual Report, the Permittees shall submit the sampling and analysis plan (of Provision C.12.b.ii.).

(2) In their 2010 Annual Report, the Permittees shall submit a status report on sampling and analysis along with whatever sampling results are available.

(3) In their 2011 Annual Report, the Permittees shall submit the results of the evaluation (Provision C.12.b.i.) of current regulations, level of implementation, and regulatory gaps as well as the final sampling and analysis report, a list of appropriate BMPs, BMP training program, and model ordinances and policies to prevent PCB discharges from building demolition and improvement activities.

(4) In the March 15, 2014 Integrated Monitoring Report, the Permittees shall submit the results of pilot program effectiveness evaluation.

C.12.c. Pilot Projects to Investigate and Abate On-land Locations with Elevated PCB Concentrations, Including Public Rights-of-way, and Stormwater Conveyances with Accumulated Sediments with Elevated PCBs Concentrations.

i. Task Description – The Permittees shall investigate and abate PCBs sources in or to their storm drain systems in conjunction with the Water Board and other appropriate regulatory agencies with investigation and cleanup authorities. The purpose of this task is to implement and evaluate the benefit of a suite of abatement measures at five pilot project locations. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of abatement projects in subsequent permit terms. The Permittees shall also quantify and report the amount of PCBs loads abated resulting from implementation of these measures.

ii. Implementation Level –

(1) The Permittees, working collaboratively, shall identify 5 drainage areas that contain high levels of PCBs and conduct pilot projects to investigate and abate these high PCB concentrations. To accomplish this, the Permittees shall interview municipal staff and review municipal databases, data collected or compiled through grant-funded efforts, other agency files, and other available information to identify potential PCB source areas and areas where PCB-contaminated sediment accumulates, including within stormwater conveyances. The Permittees shall qualitatively rank and map potential PCB source areas within each drainage. Investigation of mercury (Provision C.11.c.) shall be included in these efforts unless not

appropriate. When contamination is located on private property, the Permittees must either exercise direct authority to require cleanup or notify and request other appropriate authorities to exercise their cleanup authority.

(2) The Permittees shall conduct reconnaissance surveys of the identified drainages and gather information concerning past or current use of PCBs to further identify potential source areas and determine whether runoff from such locations is likely to convey soils/sediments with PCBs to municipal stormwater conveyances.

(3) The Permittees shall validate existence of elevated PCB concentrations through surface soil/sediment sampling and analysis where visual inspections and/or other information suggest potential source areas within each drainage.

Where data confirm significantly elevated PCB concentrations in surface soils/sediments within the subject pilot drainage, the Permittees shall provide available information on current site conditions and owner/operators and other potentially responsible parties to Water Board and other appropriate regulatory agencies to facilitate their issuance of orders for further investigation and remediation of subject sites. The Permittees shall assist the Water Board and other appropriate agencies to identify/evaluate funding to perform abatement and/or responsible parties and abatement options.

(4) The Permittees shall identify areas for expedited abatement on the basis of loading potential including factors such as PCB concentration, mass of sediment, and mobilization potential and/or human health protection thresholds, such as California Human Health Screening Levels.

(5) The Permittees shall conduct an abatement program in portions of drainages under their jurisdiction in conjunction with the Water Board and other appropriate agencies.

iii. Reporting

(1) The Permittees shall report on the identified suspect drainage areas [Provision C.12.c.ii (1)] in their 2010 Annual Report and results of the surveys [Provision C.12.c.ii.(2)] in their 2011 Annual Report.

(2) The Permittees shall report sampling and chemical analysis results at pilot locations [Provision C.12.c.ii.(3)] in their 2011 Annual Reports.

(3) The Permittees shall report on proposed abatement opportunities and activities [Provision C.12.c.ii.(4) and (5)], responsible parties, funding, agency oversight, and schedules in their 2012 Annual Report.

(4) The Permittees shall report results of abatement program effectiveness and estimates of loads reduced (see C.11.g) in the March 15, 2014 Integrated Monitoring Report.

C.12.d. Conduct Pilot Projects to Evaluate and Enhance Municipal Sediment Removal and Management Practices

i. **Task Description** – The Permittees shall jointly evaluate ways to enhance PCBs load reduction benefits of operation and maintenance activities that remove or manage sediment. The purpose of this task is to implement these management practices at the pilot scale in five drainages during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of enhanced sediment removal and management practices in subsequent permit terms. The Permittees shall also quantify and report the amount of PCBs loads removed or avoided resulting from implementation of these measures.

ii. **Implementation Level** – In all pilot program drainages selected as part of Provision C.12.c, the Permittees shall jointly evaluate ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. This evaluation shall also include consideration of street flushing and capture, collection, or routing to the sanitary sewer (in coordination and consultation with local sanitary sewer agency) as a potential enhanced management practice. The Permittees shall also jointly evaluate existing information on high-efficiency street sweepers. The goal is to evaluate the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads. The Permittees shall develop recommendations for follow-up studies to be conducted.

iii. **Reporting** – The Permittees shall submit a progress report on the results of these two evaluations in their 2010 Annual Report and the final evaluation results in their 2011 Annual Report.

iv. Beginning July 1, 2011, the Permittees shall implement pilot studies for the most potentially effective measure(s) based on the evaluation of Provision C.12.d. ii. throughout the region.

v. **Reporting** – The Permittees shall report effectiveness of enhanced practices pilot implementation in the March 15, 2014 Integrated Monitoring Report, and their plan for implementing enhanced practices in the next permit term.

C.12.e. Conduct Pilot Projects to Evaluate On-Site Stormwater Treatment via Retrofit

i. **Task Description** – The Permittees shall evaluate and quantify the removal of PCBs by on-site treatment systems via retrofit of such systems into existing storm drain systems. The purpose of this task is to implement on-site treatment projects at the pilot scale in ten locations during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of on-site treatment retrofits in subsequent permit terms.

ii. **Implementation Level** – The Permittees, working collaboratively, shall identify at least 10 locations throughout the Permittees' jurisdictions that present opportunities to install and evaluate[51] on-site treatment systems (e.g., detention basins, bioretention units, sand filters, infiltration basins, treatment wetlands) and shall assess the best treatment options for those locations. Every county (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano) should have at least one location. This assessment shall identify potential locations draining a variety of land uses, discuss technical feasibility, and discuss economical feasibility. The Permittees shall choose pilot study locations primarily on the basis of elevated PCBs concentrations with additional consideration to mercury concentrations.

iii. On the basis of the Provision C.12.e.ii. report, the Permittees shall select sites to perform pilot studies and shall conduct pilot studies in selected locations. Taken as a group, these 10 pilot study locations should span treatment types and drainage characteristics.

iv. **Reporting** –

(1) In their 2011 Annual Report, the Permittees shall report on candidate locations with types of treatment retrofit for each location. The report shall include assessment of at least 10 locations.

(2) In the March 15, 2014 Integrated Monitoring Report, the Permittees shall report status, results, PCBs-removal effectiveness, and lessons learned from the pilot studies and their plan for implementing this type of treatment on an expanded basis throughout the region during the next permit term.

C.12.f. Diversion of Dry Weather and First Flush Flows to POTWs

i. **Task Description** – The Permittees shall evaluate the reduced loads of PCBs from diversion of dry weather and first flush stormwater flows to sanitary sewers. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of urban runoff diversion in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms.

ii. **Implementation Level** – The Permittees shall implement pilot projects to address the role of pump stations as a source of pollutants of concern (primarily PCBs and secondarily mercury). This work is in addition to Provisions C.2 and C.10 that address dissolved oxygen depletion and trash impacts in receiving waters. The objectives of this provision are: to implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from the diversion; and gather

[51] The Permittees may evaluate a maximum of two pre-existing treatment systems of the ten total required systems to be evaluated provided that these existing treatment systems are applicable to the intent of this provision.

information to guide the selection of additional diversion projects required in future permits. Collectively, the Permittees shall select 5 stormwater pump stations and 5 alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with the local POTW on a watershed, program, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select 5 pump stations and 5 alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially dominated catchments where elevated PCB concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at the 5 pilot pump stations. As part of the pilot studies, they shall monitor and measure PCBs load reduction.

iii. Reporting –

(1) The Permittees shall summarize the results of the feasibility evaluation in their 2010 Annual Report, including:

- Selection criteria leading to the identification of the 5 candidate and 5 alternate pump station for pilot studies.
- Time schedules for conducting the pilot studies.
- A proposed method for distributing PCBs load reductions to participating wastewater and stormwater agencies.

(2) The Permittees shall report annually on the status of the pilot studies in each subsequent annual report.

(3) The March 15, 2014 Integrated Monitoring Report shall include:

- Evaluation of pilot program effectiveness.
- PCBs loads reduced.
- Updated feasibility evaluation procedures to guide future diversion project selection.

C.12.g. Monitor Stormwater PCB Pollutant Loads and Loads Reduced

The Permittees shall develop and implement a monitoring program as required in Provision C.8.f to quantify PCBs loads and loads reduced (see C.11.g for details) through the source control, treatment and other management measures implemented as part of the pilot studies of C.12.a through C.12.f.

C.12.h. Fate and Transport Study of PCBs in Urban Runoff

i. **Task Description** – The Permittees shall conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of PCBs discharged in urban runoff.

ii. **Implementation Level** – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2010 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a schedule. The Permittees shall report on status of the studies in their 2011 and 2012 Annual Reports. The Permittees shall report in the March 15, 2014 Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.12.i. Development of a Risk Reduction Program Implemented throughout the Region

i. **Task Description** – The Permittees shall develop and implement or participate in effective programs to reduce PCBs-related risks to humans and quantify the resulting risk reductions from these activities.

ii. **Implementation Level** – The risk reduction activities shall include investigating ways to address public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by PCBs in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Permittees may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning. The risk reduction activities may be performed by a third party if the Permittees wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

iii. **Reporting** – The Permittees shall submit in their 2010 Annual Report the specific manner in which these risk reduction activities will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report on status of the studies in their 2011 and 2012 Annual Reports. The Permittees shall report the findings and results of the studies completed, planned, or in progress as well as the status of other risk reduction actions in the March 15, 2014 Integrated Monitoring Report.

C.13. Copper Controls

The control program for copper is detailed below. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of C.13 Provisions through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. **Task Description** – The Permittees shall ensure that local ordinance authority is established to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of the surface of copper architectural features, including copper roofs to storm drains.

ii. **Implementation Level**

(1) The Permittees shall develop BMPs on how to manage the waste during and post-construction.

(2) The Permittees shall require use of appropriate BMPs when issuing building permits.

(3) The Permittees shall educate installers and operators on appropriate BMPs.

(4) The Permittees shall enforce against noncompliance.

iii. **Reporting**

(1) The Permittees shall certify adequate legal authority in their 2011 Annual Report or otherwise provide justification for schedule not to exceed one year to comply.

(2) The Permittees shall report annually, starting with their 2012 Annual Report, on training, permitting and enforcement activities.

(3) In their 2013 Annual Report, the Permittees shall evaluate the effectiveness of these measures, including BMP implementation and propose any additional measures to address this source.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. **Task Description** – By adopting local ordinances, the Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. **Implementation Level** – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including

connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. **Reporting** – The Permittees shall certify adequate legal authority in their 2011 Annual Report or otherwise provide justification for schedule not to exceed one year to comply.

C.13.c. Vehicle Brake Pads

i. **Task Description** – The Permittees shall engage in efforts to reduce the copper discharged from automobile brake pads to surface waters via urban runoff.

ii. **Implementation Level** – The Permittees shall participate in the Brake Pad Partnership (BPP) process to develop California legislation phasing out copper from certain automobile brake pads sold in California.

iii. **Reporting** – The Permittees shall report on legislation development and implementation status in Annual Reports during the permit term. In their 2013 Annual Report, the Permittees shall assess status of copper water quality issues associated with automobile brake pads and recommend brake pad-related actions for inclusion in subsequent permits if needed.

C.13.d. Industrial Sources

i. **Task Description** – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. **Implementation Level –**

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on-site.

iii. **Reporting**

The Permittees shall highlight copper reduction results in the industrial inspection component in the C.13 portion of each Annual Report beginning September 2010.

C.13.e. Studies to Reduce Copper Pollutant Impact Uncertainties

i. **Task Description** – The Permittees shall conduct or cause to be conducted technical studies to investigate possible copper sediment toxicity and technical studies to investigate sub-lethal effects on salmonids.

ii. **Implementation Level** – Technical uncertainties regarding copper effects in the Bay are described in the Basin Plan's implementation program for copper site-specific objectives. These uncertainties include toxicity to Bay benthic organisms possibly caused by high copper concentrations as well as possible impacts to the olfactory system of salmonids. The Permittees shall ensure that these studies are supported and conducted. Similar requirements are included in NPDES permits for wastewater discharges. The Permittees shall submit in their 2010 Annual Report the specific manner in which these information needs will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report the findings and results of the studies completed, planned, or in progress in their 2012 Annual Report.

C.14. Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium

The control program for PBDEs, legacy pesticides, and selenium is detailed below. The Permittees shall perform the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to gather concentration and loading information on a number of pollutants of concern (e.g., PBDEs, DDT, dieldrin, chlordane, selenium) for which TMDLs are planned or are in the early stages of development. The Permittees may comply with any requirement of C.14 Provisions through a collaborative effort.

C.14.a. Control Program for PBDEs, Legacy Pesticides, and Selenium.

i. **Task Description** – To determine if urban runoff is a conveyance mechanism associated with the possible impairment of San Francisco Bay for PBDEs, legacy pesticides (such as DDT, dieldrin, and chlordane), and selenium, the Permittees shall work with the other municipal stormwater management agencies in the Bay Region to implement a plan (PBDEs/Legacy Pesticides/Selenium Plans) to identify, assess, and manage controllable sources of PBDEs, legacy pesticides, and selenium found in urban runoff, if any. The Water Board recognizes that these three pollutants are distinct in terms of origin and transport, but they have been grouped into a single permit provision because the requirements are identical. The Water Board anticipates that some of the control measures that are developed for PCBs consistent with aforementioned efforts warrant consideration for the control of PBDEs and possibly legacy pesticides.

ii. **Implementation Level** – The PBDEs/Legacy Pesticides/Selenium Plan shall include actions to do the following:

Characterize the representative distribution of PBDEs, legacy pesticides, and selenium in the urban areas of the Bay Region covered by this permit to determine:

(1) If PBDEs, legacy pesticides, and selenium are present in urban runoff;

(2) If PBDEs, legacy pesticides, or selenium are distributed relatively uniformly in urban areas; and

(3) Whether storm drains or other surface drainage pathways are sources of PBDEs, legacy pesticides, or selenium in themselves, or whether there are specific locations within urban watersheds where prior or current uses result in land sources contributing to discharges of PBDEs, legacy pesticides, or selenium to San Francisco Bay via urban runoff conveyance systems.

iii. Report on progress in 2010 and 2011 Annual Reports. Submit in the 2012 Annual Report a report with the results of the characterization of PBDEs, legacy pesticides, and selenium in urban areas throughout the Bay Region.

iv. Provide information to allow calculation of PBDEs, legacy pesticides, and selenium loads to San Francisco Bay from urban runoff conveyance systems.

v. Submit in the 2013 Annual Report a report with the information required to compute such loads to San Francisco Bay of PBDEs, legacy pesticides, and selenium from urban runoff conveyance systems throughout the Bay.

vi. Identify control measures and/or management practices to eliminate or reduce discharges of PBDEs, legacy pesticides, or selenium conveyed by urban runoff conveyance systems.

vii. Submit in the 2013 Annual Report a report identifying such control measures/management practices.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. **Discharge Type** – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers; and

(8) NPDES permitted discharges (individual or general permits).

ii. **Implementation Level** – The non-stormwater discharges listed in Provision C.15.a.i above are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-viii below.

i. **Discharge Type** – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non Drinking Water Aquifers –** Groundwater pumped from monitoring wells, used for groundwater basin management, which are owned and/or operated by the Permittees who pump groundwater as drinking water. These aquifers tend to be shallower, when compared to drinking water aquifers.

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards consistent with the existing effluent limitations in the Water Board's NPDES General Permits, such as NPDES Nos. CAG912002 and CAG912003 for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by fuel and VOCs, respectively, and NPDES No. CAG912004 for discharges of low-level, incidental, and potentially contaminated groundwater.

(ii) The water samples shall be analyzed using approved USEPA Methods (e.g., (a) USEPA Method 160.2 for total suspended solids; (b) USEPA Method 8015 Modified for total petroleum hydrocarbons; (c) USEPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (d) USEPA Method 3005 for metals.

(iii) The water samples shall be analyzed for pH and turbidity.

(iv) If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs** – When uncontaminated (meeting the criteria in C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Discharges shall be properly controlled and maintained to prevent erosion at the discharge point and at a rate that avoids scouring of banks and excess sedimentation in the receiving waterbody.

(ii) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(iii) Turbidity of the discharged groundwater shall be maintained below 50 NTUs for discharges to dry creeks, 110 percent of the

ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(iv) pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5.

(c) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[52] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements.

(b) Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(c) If the discharge options in C.15.b.i.(2)(b) above are not feasible and these discharges must enter a storm drain, sampling shall be done to verify that the discharge is uncontaminated.

(i) The discharge shall meet water quality standards consistent with the existing effluent limitations in the Water Board's NPDES General Permits, such as NPDES Nos. CAG912002 and CAG912003 for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by fuel and VOCs, respectively, and NPDES No. CAG912004 for discharges of low-level, incidental, and potentially contaminated groundwater.

(ii) The Permittees shall require that water samples from these discharge types be analyzed using approved USEPA Methods (e.g., (a) USEPA Method 160.2 for total suspended solids; (b) USEPA Method 8015 Modified for total petroleum hydrocarbons; (c) USEPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (d) USEPA Method 3005 for metals.

(d) **Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in C.15.b.i.(2)(c) above, the Permittees shall require the following during discharge:

(i) Proper control and maintain to prevent erosion at the discharge point and at a rate that avoids scouring of banks and excess sedimentation in the receiving waterbody.

(ii) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include

[52] Pumped groundwater not exempted in C.15.a or conditionally exempted in C.15.b.i.(1).

the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(iii) Testing of water samples for turbidity and pH on the first two consecutive days of dewatering.

(iv) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(v) pH of discharged water shall be maintained within the range of 6.5 to 8.5.

(e) If a Permittee determines that a discharger or a project proponent is unable to comply with the above criteria, the discharger shall be directed to obtain approval or permits directly from the Water Board.

(f) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Types – Planned,[53] Unplanned,[54] and Emergency Discharges of the Potable Water System

(1) **Planned Discharges** – Planned discharges are routine operation and maintenance activities in the potable water distribution system that can be scheduled in advance, such as disinfecting water mains, testing fire hydrants, storage tank maintenance, cleaning and lining pipe sections, routine distribution system flushing, reservoir dewatering, and water main dewatering activities. The following requirements only apply to those Permittees that are water purveyors and pertain to their planned discharges of potable water to their storm drain systems.

(a) **Required BMPs**[55] – The Permittees shall implement appropriate BMPs for dechlorination, and erosion and sediment controls for all planned potable water discharges.

[53] Planned discharges typically result from required routine operation and maintenance activities that can be scheduled in advance. Planned discharges are easier to control than unplanned discharges, and the BMPs are significantly easier to plan and implement.

[54] Unplanned discharges are non-routine, the result of accidents or incidents that cannot be scheduled or planned for in advance.

[55] Reference for BMPs, monitoring methods: *Guidelines for the Development of Your BMP Manual for Drinking Water System Releases.* Developed by the California-Nevada Sections of the American Water Works Association (CA-NV AWWA), Environmental Compliance Committee (ECC) 2005.

(b) **Notification Requirements**

(i) The Permittees shall notify the Water Board staff at least one week in advance for planned discharges with a flow rate of 250,000 gallons per day or more, or a total volume of 500,000 gallons or more. The Permittees shall also notify other interested parties who may be impacted by planned discharges, such as flood control agencies, downstream jurisdictions, and non-governmental organizations such as creek groups, before discharge. The notification shall include the following information, but is not limited to: (1) project name; (2) type of discharges; (3) receiving waterbody(ies); (4) date of discharge; (5) time of discharge (in military time); (6) estimated volume (gallons); and (7) estimated flow rate (gallons per day); and (8) monitoring plan of the discharges and receiving water. If receiving water monitoring is infeasible or is not practicable, justification shall be provided.

(c) **Monitoring and Reporting Requirements**

(i) The Permittees shall monitor planned discharges for pH, chlorine residual, and turbidity.

(ii) The following discharge benchmarks shall be used to evaluate the effectiveness of BMPs for all planned discharges:

- Chlorine residual 0.05 mg/L using the field test (Standard Methods 4500-Cl F and F) or equivalent
- pH ranges between 6.5 and 8.5
- Turbidity of 50 NTU post-BMPs or limit increase in turbidity above background level as follows:

Receiving Water Background	Incremental Increase
Dry Creek	50 NTU
< 50 NTU	5 NTU
50–100 NTU	10 NTU
> 100 NTU	10% of background

(iii) The Permittees shall submit the following information with the Annual Report in tabular form for all planned discharges. Reporting content shall include, but is not limited to the following parameters: (1) project name; (2) type of discharge; (3) receiving waterbody(ies); (4) date of discharge; (5) duration of discharge (in military time); (6) estimated volume (gallons); (7) estimated flow rate (gallons per day); (8) chlorine residual (mg/L); (9) pH; (10) turbidity (NTU) for receiving water where feasible and point of discharge, and (11) description of implemented BMPs or corrective actions.

(2) **Unplanned Discharges** – Unplanned discharges are non-routine activities such as water line breaks, leaks, overflows, fire hydrant shearing, and emergency flushing. The following requirements only apply to those Permittees that are water purveyors and pertain to their unplanned discharges of potable water to their storm drain systems.

(a) **Required BMPs** – The Permittees shall implement appropriate BMPs for dechlorination and erosion and sediment control for all unplanned discharges upon containing the discharge and attaining safety of the discharge site.

(b) **Administrative BMPs** – In some instances, the Permittees shall implement Administrative BMPs, such as source control measures, managerial practices, operations and maintenance procedures, or other measures to reduce or prevent potential pollutants from being discharged during unplanned discharges upon containing the discharge and attaining safety of the discharge site.

(c) **Notification Requirements**

(i) The Permittees shall report to the State Office of Emergency Services as soon as possible, but no later than two hours after becoming aware of (1) any aquatic impacts (e.g., fish kill) as a result of the unplanned discharges, or (2) when the discharge might endanger or compromise public health and safety.

(ii) The Permittees shall report to Water Board staff, by telephone or email as soon as possible, but no later than 24 hours after becoming aware of any unplanned discharges, where the total chlorine residual is greater than 0.05 mg/L and the total volume is approximately 50,000 gallons or more.

- Within five working days after the 24-hour telephone or email report, the Permittees shall submit a report documenting the discharge and corrective actions taken to Water Board staff and other interested parties.

(d) Monitoring and Reporting Requirements

(i) The Permittees shall monitor at least 10% of their unplanned discharges for pH and chlorine residual, and visually assess each discharge for turbidity immediately downstream of implemented BMPs to demonstrate their effectiveness. After the implementation of appropriate BMPs, the discharge pH levels outside the discharge ranges (below 6.5 and above 8.5), chlorine residual above 0.05 mg/l, or moderate and high turbidity shall trigger BMP improvement. If the Permittees monitor more than 10% of the unplanned discharges, all monitoring results shall be included in the Annual Report.

(ii) The Permittees shall submit the following information with the Annual Report in tabular form for all unplanned discharges. The reporting format and content shall be as described in Provision C.15.b.ii.(1)(c)(iii) of the Planned Discharges above. In addition, these reports shall also state the time of discharge discovery, notification time, inspector arrival time, and responding crew arrival time.

(iii) After 18 months of consecutive data gathering, a Permittee may propose, to the Executive Officer, a reduced monitoring plan targeting specific "high-risk" or "environmentally sensitive"

areas (i.e., areas that are prone to erosion and excess sedimentation at high flows, support rare or endangered species, or provide aquatic habitat with proven effective BMPs). Until the Executive Officer approves the reduced monitoring plan, the Permittee shall continue the monitoring plan prescribed in C.15.b.iii.(2)(d)(i).

(3) **Emergency Discharges** – Emergency discharges are the result of firefighting, unauthorized hydrant openings, natural or man-made disasters (e.g., earthquakes, floods, wildfires, accidents, terrorist actions).

Required BMPs

(a) The Permittees shall implement or require fire fighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located.

(b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). The Permittees or fire fighting personnel shall control the pollution threat from their activities to the extent that time and resources allow.

(c) **Reporting Requirements** – Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

Required BMPs

(1) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their MS4s.

(2) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, wash cars at commercial car wash facilities, etc.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) **Required BMPs**

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no

other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[56] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and,

(e) Implementing the Illicit Discharge Enforcement Response Plan from C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their MS4s.

[56] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

(2) **Reporting** – The Permittees shall provide implementation summaries in their Annual Report.

vii. Additional Discharge Types –The Permittees shall identify and describe additional types and categories of discharges not yet listed in Provision C.15.b that they propose to conditionally exempt from Prohibition A.1 in periodic submissions to the Executive Officer. For each such category, the Permittees shall identify and describe, as necessary and appropriate to the category, either documentation that the discharges are not sources of pollutants to receiving waters or circumstances in which they are not found to be sources of pollutants to receiving waters. Otherwise, the Permittees shall describe control measures to eliminate adverse impacts of such sources, procedures and performance standards for their implementation, procedures for notifying the Water Board of these discharges, and procedures for monitoring and record management.

viii. Permit Authorization for Exempted Non-Stormwater Discharges

(1) Discharges of non-stormwater from sources owned or operated by the Permittees are authorized and permitted by this Permit, if they are in accordance with the conditions of this provision.

(2) The Water Board may require dischargers of non-stormwater, other than the Permittees, to apply for and obtain coverage under an NPDES permit and to comply with the control measures pursuant to Provision C.15.b. Non-stormwater discharges that are in compliance with such control measures may be accepted by a Permittee and are not subject to Prohibition A.1.

(3) The Permittees may propose, as part of their annual updates consistent with the requirements of Provision C.15.b of this Permit, additional categories of non-stormwater discharges with BMPs, to be included in the exemption to Prohibition A.1. Such proposals may be subject to approval by the Executive Officer as a minor modification of the Permit.

C.16. Annual Reports

C.16.a. The Permittees shall submit Annual Reports electronically and in paper copy upon request by September 15 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.15. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more that ten business days unless otherwise agreed to by the Executive Officer.

C.16.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2010. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following annual report, to more accurately reflect the reporting requirements of Provisions C.1 – C.15, with the agreement of the Permittees and by the approval of the Executive Officer.

C.16.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit in the Annual Report the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.17. Modifications to this Order

This Order may be modified, or alternatively, revoked or reissued, before the expiration date as follows:

C.17.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.17.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Board or amendments to the Basin Plan approved by the State Board; or

C.17.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order. The Order as modified or reissued under this paragraph shall also contain any other requirements of the CWA then applicable.

C.18. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment K of this Order.

C.19. Expiration Date

This Order expires on November 30, 2014, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.20. Rescission of Old Orders

Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, and R2-2003-0034 are hereby rescinded on the effective date of this Order, which shall be December 1, 2009, provided that the Regional Administrator of USEPA, Region IX, does not object.

C.21. Effective Date

The Effective Date of this Order and Permit shall be December 1, 2009, provided that the Regional Administrator of USEPA, Region IX, does not object.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 14, 2009.

Digitally signed by Bruce Wolfe
Date: 2009.10.15 17:21:01 -07'00'

Bruce H. Wolfe
Executive Officer

Appendix I: Municipal Regional Stormwater Permit Fact Sheet
Attachment A: Provision C.3.b. Sample Reporting Table
Attachment B: Provision C.3.g. Alameda Permittees Hydromodification Requirements
Attachment C: Provision C.3.g. Contra Costa Permittees Hydromodification Requirements
Attachment D: Provision C.3.g. Fairfield-Suisun Permittees Hydromodification Requirements
Attachment E: Provision C.3.g. San Mateo Permittees Hydromodification Requirements
Attachment F: Provision C.3.g. Santa Clara Permittees Hydromodification Requirements
Attachment G: Provision C.3.h. Sample Reporting Table
Attachment H: Provision C.8. Status & Long-Term Monitoring Follow-up Analysis and Actions
Attachment I: Provision C.8. Standard Monitoring Provisions
Attachment J: Provision C.10. Minimum Trash Capture Areas and Minimum Number of Trash Hot Spots
Attachment K: Standard NPDES Stormwater Permit Provisions

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CWA	Federal Clean Water Act
CWC	California Water Code
DCIA	Directly Connected Impervious Area
ERP	Enforcement Response Plan
FR	Federal Register
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable
MRP	Municipal Stormwater Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission

NAFSMA	National Association of Flood & Stormwater Management Agencies
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
O&M	Operation and Maintenance
PBDE	Polybrominated Diphenyl Ether
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RMP	Regional Monitoring Program
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SIC	Standard Industrial Classification
SMWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Toxic Substances Control Act
USEPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations

GLOSSARY

Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the state protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.
Construction Site	Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, paving, disturbances to ground such as stockpiling, and excavation. Construction sites are all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of water quality standards because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.
Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs

	naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Full Trash Capture Device	Full trash capture systems are defined as "any device or series of devices that traps all particles retained by a 5mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area." Trash collection booms and sea curtains do not meet this definition, but are effective for removal of floating trash if properly maintained. Because these devices do not meet the Full Trash Capture Device definition, only ¼ of the catchment area treated by these measures is credited toward meeting the trash management area requirement of C.10.a.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State of California has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.
Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Regional Water Board Executive Officer.
Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under

	Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes French drains).
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other,
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.
Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. Clean Water Act (CWA) 402(p)(3)(B)(iii) requires that municipal stormwater permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Also see State Board Order WQ 2000-11.
Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in

	40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.
Pervious Pavement	Pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste) litter and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and

	highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.
Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).
Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMP	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Standard Industrial Classification (SIC)	A federal system for classifying establishments by the type of activity in which they are engaged using a four-digit code.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet water quality standards even after application of technology-based controls,

	more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.
Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Resources Control Board, U.S. EPA, and the Office of Administrative Law where required. The latest version is effective as of December 22, 2006.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and USEPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the water quality criteria that must be met to protect designated uses. Water quality standards also include the federal and state anti-degradation policy.
Wet Season	October 1 through April 30 of each year

APPENDIX I

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2009-0074

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program

The City of Vallejo and the Vallejo Sanitation and Flood Control District

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I. CONTACT INFORMATION

Water Board Staff Contact: Dale Bowyer, 1515 Clay Street, Suite 1400, Oakland, CA 94612, 510-622-2323, 510-622-2501 (fax), email: dbowyer@waterboards.ca.gov

The Permit and other related documents can be downloaded from the Water Board website at: http://www.waterboards.ca.gov/sanfranciscobay/mrp.htm

Comments can be electronically submitted to mrp@waterboards.ca.gov.

All documents referenced in this Fact Sheet and in the Order are available for public review at the Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 9:00 am to 4:00 pm, Monday through Friday, 12 - 1 pm excluded. Per the Governor's order calling for furloughs, the Water Board office will be closed the first three Fridays of each month through June 2010. To schedule an appointment to inspect public records, contact Melinda Wong at 510-622-2430.

II. PERMIT GOALS AND PUBLIC PROCESS

Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) Development Process include:

1. Consolidate six Phase I municipal stormwater NPDES permits into one consistent permit which is regional in scope.
2. Include more specificity in NPDES permit order language and requirements. Create (A) required stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.
3. Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.
4. Implement and enhance actions to control 303(d) listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.
5. Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d) listed pollutants.

Public Process

Water Board staff conducted a series of stakeholder meetings and workshops with the Permittees and other interested parties to develop this Permit over the past 3 years. These meetings included Water Board staff, representatives of the Permittees, representatives of

environmental groups, homebuilders, private citizens, and other interested parties. The following is a summary of the lengthy stakeholder process.

(2004–2005) Water Board staff and the Bay Area Stormwater Management Agencies Association (BASMAA) agreed to develop a municipal regional stormwater permit. Board staff and BASMAA held monthly meetings to agree on the regional permit approach and developed concepts and ground rules for a Steering Committee. The Steering Committee for the Permit began regular monthly meetings, and there was agreement to form work groups to develop options for permit program components in table format.

(2006) Water Board staff, BASMAA, and nongovernmental groups met and discussed the Performance Standard (i.e., actions, implementation levels, and reporting requirements) tables from six workgroups. In addition to the Steering Committee, Work Group Stakeholder meetings focused on the six program elements to complete the Performance Standard Tables and discuss other issues in preparation for creating the first Draft Permit Provisions. Two large public workshops were held in November with all interested stakeholders to discuss Work Group products.

(2007) The Water Board held a public workshop in March to receive public input. Board staff distributed an Administrative Draft Permit dated May 1, 2007, held multiple meetings and received comment.

(2007- 2008) On December 14, 2007, Board staff distributed the Tentative Order for a 77-day written public comment period ending February 29, 2008. A public hearing for oral testimony was held on March 11, 2008. During the remainder of 2008 there were additional meetings with stakeholders, and Board staff worked on revisions to the Tentative Order and produced responses to both written comments received by February 29, 2008, and oral comments received at the March 11, 2008, hearing. The Revised Tentative Order for the MRP was released on February 11, 2009, and a May 13, 2009, hearing before the Water Board was scheduled. Written comments on the revisions to the Tentative Order were received until April 3, 2009.

(2009) After the May 2009 MRP Public Hearing, Water Board staff held numerous meetings with the Permittees (via the Bay Area Stormwater Management Agencies Association) and other key stakeholders including Save the Bay, NRDC, the Northern California Homebuilders, S.F. BayKeeper and the U.S. EPA. These meetings have been focused on discussion of revisions to the MRP Tentative Order in response to comments received, in an effort to resolve issues primarily related to Provisions C.3 New Development, C.8 Monitoring, C.10 Trash Load Reduction, C.11 Mercury Controls, C.12 PCBs Controls, and C.15 Exempt Non-Stormwater Discharges.

Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is

requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in Provisions C.1 through C.15 of this Permit and section 402(p) of the CWA. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is deemed compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and may reopen this Permit pursuant to Provisions C.1 and C.15 of this Permit to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

Early Permitting Approach

The federal Clean Water Act (CWA) was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the Water Board issued a municipal storm water Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa Counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, to pool resources and expertise, and share information, public outreach and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics which were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the stormwater Plans for implementation details. Often specific aspects of permit and Plan implementation evolved during the five year permit cycle, with relatively significant changes approved at the Water Board staff level without significant public review and comment.

Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

US EPA stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The current and previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the current permits, due to the lack of specific requirements and measurable outcomes of some required actions. Furthermore, federal stormwater regulations require that modifications to stormwater management programs, such as annual revisions to urban runoff management plans, be approved through a public process.

Recent court decisions have reiterated that federal regulations and State law require that the implementation specifics of Municipal Stormwater NPDES permits be adopted after adequate public review and comment, and that no significant change in the permit requirements except minor modifications can occur during the permit term without a similar level of public review and comment.

This Permit introduces a modification to these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the Permit Development Process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the federal Clean Water Act and the State Water Code. An advantage for Permittees and the public of this approach is that the permit requirements are known at the time of permit issuance and not left to be determined later through iterative review and approval of work plans. While it may still be necessary to amend the Permit prior to expiration, any need to this should be minimized.

This Permit does not include approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require significantly increased staff resources. Instead, minimum measures have been established to simplify assessment of compliance and allow the public to more easily assess each Permittee's compliance. Each Permit provision and its reporting requirements are written with this in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites, etc.), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each individual Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to provide the flexibility described above considering the different sizes and resources while ensuring that the Permit is still enforceable. To achieve this, the Permit frequently prescribes minimum measurable

outcomes, while providing Permittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Permit.

Current Permit Approach

In the previous permit issuances, the detailed actions to be implemented by the Permittees were contained in Stormwater Management Plans, which were separate from the NPDES permits, and incorporated by reference. Because those plans were legally an integral part of the permits and were subject to complete public notice, review and comment, this permit reissuance incorporates those plan level details in the permit, thus merging the Permittees' stormwater management plans into the permit in one document. This Permit specifies the actions necessary to reduce the discharge of pollutants in stormwater to the maximum extent practicable, in a manner designed to achieve compliance with water quality standards and objectives, and effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses within the Permittees' jurisdictions. This set of specific actions is equivalent to the requirements that in past permit cycles were included in a separate stormwater management plan for each Permittee or countywide group of Permittees. With this permit reissuance, that level of specific compliance detail is integrated into permit language and is not a separate document.

The Permit includes requirements for the following components:

- Municipal Operations
- New Development and Redevelopment
- Industrial and Commercial Site Controls
- Illicit Discharge and Elimination
- Construction Site Controls
- Public Information and Outreach
- Water Quality Monitoring
- Pesticides Toxicity Controls
- Trash Reduction
- Mercury Controls
- PCBs Controls
- Copper Controls
- Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides, and Selenium
- Exempt and Conditionally Exempt Discharges

IV. ECONOMIC ISSUES

Economic discussions of urban runoff management programs tend to focus on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, when considering the cost of implementing the urban runoff programs, it is also important

to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation.

It is very difficult to ascertain the true cost of implementation of the Permittees' urban runoff management programs because of inconsistencies in reporting by the Permittees. Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin that is not easily explained.[57] Despite these problems, efforts have been made to identify urban runoff management program costs, which can be helpful in understanding the costs of program implementation.

In 1999, United States Environmental Protection Agency (USEPA) reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 per household annually.[58]

A study on program cost was also conducted by the Los Angeles Regional Water Quality Control Board (LARWQCB), where program costs reported in the municipalities' annual reports were assessed. The LARWQCB estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.

The State Water Resources Control Board (State Water Board) also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study is current and includes an assessment of costs incurred by the City of Encinitas in implementing its program. Annual cost per household in the study ranged from $18-46, with the City of Encinitas representing the upper end of the range.[59] The cost of the City of Encinitas' program is understandable, given the City's coastal location, reliance on tourism, and consent decree with environmental groups regarding its program. For these reasons, as well as the general recognition the City of Encinitas receives for implementing a superior program, the City's program cost can be considered as the high end of the spectrum for Permittee urban runoff management program costs.

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38% of program costs are new costs fully attributable to MS4 permits. The remainder of program costs were either pre-existing or resulted from enhancement of pre-exiting programs.[60] The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement its Drainage Area Management Plan, its municipal

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[57] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003.p.2

[58] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.

[59] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii

[60] Ibid. P. 58.

stormwater permit requirements, is less than 20% of the total budget. The remaining 80% is attributable to pre-existing programs.[61]

It is also important to acknowledge that the vast majority of costs that will be incurred as a result of implementing the Order are not new. Urban runoff management programs have been in place in this region for over 15 years. Any increase in cost to the Permittees will be incremental in nature.

Urban runoff management programs cannot be considered in terms of their costs only. The programs must also be viewed in terms of their value to the public. For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[62] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study corroborates USEPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180.[63] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Another important way to consider urban runoff management program costs is to consider the implementation cost in terms of costs incurred by not improving the programs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[64] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8% among bathers at those beaches resulted in about $3 million annually in health-related expenses.[65] Extrapolation of such numbers to the beaches and other water contact recreation in San Francisco Bay and the tributary creeks of the region could result in huge expenses to the public.

Urban runoff and its impact on receiving waters also places a cost on tourism. the California Division of Tourism has estimated that each out-of-state visitor spends $101.00 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999, impacting beach visitation and the local economy.

Finally, it is important to consider the benefits of urban runoff management programs in conjunction with their costs. A recent study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could

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61 County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

62 Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.

63 State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.

64 Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

65 Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.

reach $18 billion.[66] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[67]

V. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R2-2009-0074: CWA, California Water Code (CWC), 40 CFR Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), 40 CFR 131Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R2-2009-0074, and provide the Water Board with ample underlying authority to require each of the directives of Order No. R2-2009-0074.. Legal authority citations are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,D,E, and F) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: [...] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all

[66] LARWQCB, 2004. Alternative Approaches to Stormwater Control.
[67] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. [...] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. [...] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R2-2009-0074 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Francisco Bay Region. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses, as established in the Basin Plan.

State Mandates

This Permit does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Permit implements federally mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-stormwater discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held that these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. USEPA

(9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.) The authority exercised under this Permit is not reserved state authority under the CWA's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements that are not less stringent than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for MS4. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Association of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Likewise, the provisions of this Permit to implement total maximum daily loads (TMDLs) are federal mandates. The CWA requires TMDLs to be developed for waterbodies that do not meet federal water quality standards. (33 U.S.C. § 1313(d).) Once USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable WLA. (40 CFR 122.44(d)(1)(vii)(B).)

Second, the local agencies' (Permittees') obligations under this Permit are similar to, and in many respects less stringent than, the obligations of nongovernmental dischargers who are issued NPDES permits for stormwater discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (Water Code, section 13263), both without regard to the source of the pollutant or waste. As a result, the costs incurred by local agencies to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The CWA and the Porter-Cologne Water Quality Control Act largely regulate stormwater with an even hand, but to the extent that there is any relaxation of this evenhanded regulation, it is in favor of the local agencies. Except for MS4s, the CWA requires point source dischargers, including discharges of stormwater associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial stormwater discharges must strictly comply with water quality standards].) As discussed in prior State Water Board decisions, this Permit does not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) The Permit, therefore, regulates the discharge of waste in municipal stormwater more leniently than the discharge of waste from nongovernmental sources.

Third, the Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Permit. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the MS4. Permittees can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Association of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising

taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. To the extent Permittees have voluntarily availed themselves of the Permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the Permittees have voluntarily sought a program-based municipal stormwater permit in lieu of a numeric limits approach. (See City of Abilene v. USEPA (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The Permittees' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the Permittees' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

This Permit is based on the federal CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Board, the Basin Plan, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion: In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and Regional Water Quality Control Boards (Water Boards) have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Water Boards to set water quality objectives via adoption of Basin Plans that conform to all state policies for water quality control. As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Water Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the Water Board has issued area-wide MS4 NPDES permits. The Permit will re-issue Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, R2-2003-0034 to comply with the CWA and attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by urban runoff. Further discussions of the legal authority associated with the prohibitions and directives of the Permit are provided in section V. of this document.

This Permit supersedes NPDES Permit Nos. CAS029718, CAS029831, CAS029912, CAS029921, CAS612005, and CAS612006.

Basin Plan

The Urban Runoff Management, Comprehensive Control Program section of the Basin Plan requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. A summary of the regulatory provisions is contained in Title 23 of the California Code of Regulations at section 3912. The Basin Plan identifies beneficial uses and establishes water quality objectives for surface waters in the Region, as well as effluent limitations and discharge prohibitions intended to protect those uses. This Permit implements the plans, policies, and provisions of the Water Board's Basin Plan.

Statewide General Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under NPDES permitting pursuant to USEPA Phase II stormwater regulations. Under Phase II, the Water

Board intends to permit these federal, State, and regional entities through use of a Statewide Phase II NPDES General Permit.

Discussion: Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though urban runoff comes from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in States with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, 2006 Revision, Chapter 4 Implementation, Table 4-1, Prohibition 7.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – Receiving Water Limitations are retained from previous Municipal Stormwater Runoff NPDES permits. They reflect applicable water quality standards from the Basin Plan.

Receiving Water Limitation B.2. Legal Authority – Receiving Water Limitations are retained from previous Municipal Stormwater Runoff NPDES permits. They reflect applicable water quality standards from the Basin Plan.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each water board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance [...]."

California Water Code Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

State Water Resources Control Board ("State Water Board") Order WQ 1999-05, is a precedential order requiring that municipal stormwater permits achieve water quality standards and water quality standard based discharge prohibitions through the implementation of control measures, by which Permittees' compliance with the permit can be determined. The State Water Board Order specifically requires that Provision C.1 include language that Permittees shall comply with water quality standards based discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges. State Water Board Order WQ 2001-15 refines Order 1999-05 by requiring an iterative approach to compliance with water quality standards that involves ongoing assessments and revisions.

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), California Water Code (CWC) section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires, "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires, "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires, "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires, "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires, "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Sediment accumulated on paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, is the major source of point source pollutants found in urban runoff. Thus, Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention efforts as set forth in this Permit. Such prevention measures include, but are not limited to, activities as described below. The work of municipal maintenance personnel is vital to minimize stormwater pollution, because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges.

C.2-2 Road construction and other activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, impacting water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b)Identification and prioritization of rural roads maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources; (c) Road and culvert construction designs that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability; (d) Development and implement an inspection program to maintain roads structural integrity and prevent impacts on water quality; (e) Provide adequate maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, re-grade roads to slope outward where consistent with road engineering safety standards, and install water bars; and (f) When replacing existing culverts or redesigning new culverts or bridge crossings use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

Road construction, culvert installation, and other rural maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly

designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other rural public works activities, including those the BMP approach would address, have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways. This Provision would help ensure that these impacts are appropriately controlled.

Specific Provision C.2 Requirements

Provision C.2.a-f. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations) In late 2005, Board staff investigated the occurrence of low salinity and dissolved oxygen conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Game in Alameda County.

In the case of Old Alameda Creek, discharge of black-colored water from the Alvarado pump station to the slough was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L dissolved oxygen water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The dissolved oxygen sag was detected surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Board staff's investigations of these incidents, documented in a memorandum,[68] found that "storm water pump stations, universally operated by automatic float triggers, have been confirmed as the cause in at least one instance, and may represent an overlooked source of controllable pollution to the San Francisco Bay Estuary and its tidal sloughs. . . the discharges of dry weather urban runoff from these pump stations are not being

[68] Internal Water Board Memo dated December 2, 2005: "Dry Weather Urban Weather Urban Runoff Causing or Contributing to Water Quality Violations: Low Dissolved Oxygen (DO) in Old Alameda Creek and Alviso Slough"

managed to protect water quality, and [that] surveillance monitoring has detected measurable negative water quality consequences of this current state of pump station management."

Pump station discharges of dry weather urban runoff can cause violations of water quality objectives. These discharges are controllable point sources of pollution that are virtually unregulated. The Water Board needs a complete inventory of dry weather urban runoff pump stations and to require BMP development and implementation for these discharges now. In the long term, Water Board staff should prioritize the sites from the regional inventory for dry weather diversion to sanitary sewers and encourage engineering feasibility studies to accomplish the diversions in a cost-effective manner. Structural treatment alternatives should be explored for specific pump stations.

To address the short term goals identified in the previous paragraph, Provision C.2.g. requires the Permittees to implement the following measures to reduce pollutant discharges to stormwater runoff from Permittee-owned or operated pump stations:

1. Establish an inventory of pump stations within each Permittee's jurisdiction, including pump station locations and key characteristics, and inspection frequencies.
2. Inspect these pump stations regularly, but at least two times a year, to address water quality problems, including trash control and sediment and debris removal.
3. Inspect trash racks and oil absorbent booms at pump stations in the first business day after ¼-inch within 24 hours and larger storm events. Remove debris in trash racks and replace oil absorbent booms, as needed.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation and most of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the assumption that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions. The goal of Provision C.3. is for Permittees to use their planning authority to include appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques. Neither Provision C.3. nor any of its requirements are intended to restrict or control local land use decision-making authority.

C.3-3 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-4 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to regulation pursuant to Sections 401 or 404 of the federal Clean Water Act. Water Board staff is working with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) to identify how maintenance for stormwater treatment controls required under permits such as this Permit can be appropriately streamlined, given CDFG and USFWS requirements, and particularly those that address special status species. This Permit requires Permittees to ensure that constructed wetlands installed by

Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-5 The Permit requires Permittees to ensure that onsite, joint, and offsite stormwater treatment systems and HM controls installed by Regulated Projects are properly operated and maintained for the life of the projects. In cases where the responsible parties for the treatment systems or HM controls have worked diligently and in good faith with the appropriate state and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment systems or HM controls, but these approvals are not granted, the Permittees shall be considered by the Water Board to be in compliance with Provision C.3.h.iii. of the Permit.

Specific Provision C.3 Requirements

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) sets forth essentially the same legal authority, development review and permitting, environmental review, training, and outreach requirements that are contained in the existing permits. This Provision also requires the Permittees to encourage all projects not regulated by Provision C.3., but that are subject to the Permittees' planning, building, development , or other comparable review, to include adequate source control and site design measures, which include discharge of appropriate wastestreams to the sanitary sewer, subject to the local sanitary agency's authority and standards. Lastly, this Provision requires Permittees to revise, as necessary, their respective General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies. Adequate implementation time has been allocated to Provisions C.3.a.i.(6)-(8), which may be considered new requirements.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

Provision C.3.b.ii.(1) lists Special Land Use Categories that are already regulated under the current stormwater permits. Therefore, extra time is not necessary for the Permittees to comply with this Provision, so the Permit Effective Date is set as the required implementation date. For these categories, the impervious surface threshold (for classification as a Regulated Project subject to Provision C.3.) will be decreased from the current 10,000 ft^2 to 5,000 ft^2 beginning two years from the Permit Effective Date. These special land use categories represent land use types

that may contribute more polluted stormwater runoff. Regulation of these special land use categories at the lower impervious threshold of 5,000 square feet is considered the maximum extent practicable and is consistent with State Board guidance, court decisions, and other Water Boards' requirements. In the precedential decision contained in its WQ Order No. 2000-11, the State Board upheld the SUSMP (Standard Urban Stormwater Mitigation Plan) requirements issued by the Los Angeles Water Board's Executive Officer on March 8, 2000, and found that they constitute MEP for addressing pollutant discharges resulting from Priority Development Projects. The State Board re-affirmed that SUSMP requirements constitute MEP in their Order WQ 2001-15. Provision C.3.b.ii.(1)'s requirement that development projects in the identified Special Land Use Categories adding and/or replacing > 5000 ft^2 of impervious surface shall install hydraulically sized stormwater treatment systems is consistent with the SUSMP provisions upheld by the State Board. Provision C.3.b.ii.(1) is also consistent with Order No. R9-2007-0001 issued by the San Diego Water Board, Order Nos. R4-2009-0057 and R4-2001-182 issued by the Los Angeles Water Board, Order No. 2009-0030 issued by the Santa Ana Water Board, and State Board's Order WQ 2003-0005 issued to Phase II MS4s. Under Order WQ 2003-0005, Phase II MS4s with populations of 50,000 and greater must apply the lower 5000 ft^2 threshold for requiring stormwater treatment systems by April 2008. The MRP allows two years from the MRP effective date for the Permittees to implement the lower 5000 ft^2 threshold for the special land use categories, three and half years later than the Phase II MS4s. However, the additional time is necessary for the Permittees to revise ordinances and permitting procedures and conduct training and outreach.

This Provision contains a "grandfathering" clause, which allows any private development project in a special land use category for which a planning application has been deemed complete by a Permittee on or before the Permit effective date to be exempted from the lower 5,000 square feet impervious surface threshold (for classification as a Regulated Project) as long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for the 5000 square feet threshold, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the lower 5000 square feet impervious surface threshold specified in Provision C.3.b.ii.(1).

For any private development project in a special land use category with an application deemed complete after the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011 for the 5000 square feet threshold.

Previous stormwater permits also used the "application deemed complete" date as the date for determining Provision C.3. applicability, but it was tied to the implementation date for new requirements and not the Permit effective date. The Permit Streamlining Act requires that a public agency must determine whether a permit application is complete within 30 days after receipt; if the public agency does not make this determination, the application is automatically deemed complete after 30 days. Data we have collected from audits and file reviews as well as reported to us by Permittees confirm that in many cases, the development permit applications have indeed not been reviewed for compliance with Provision C.3. requirements and yet have automatically been deemed complete 30 days after the application submittal date. As soon as the Permit is adopted, there is certainty about any new requirements that must be implemented during the Permit term. Therefore, the "application deemed complete" date should only be used to exempt projects that have reached this milestone by the Permit effective date and not years later at a new requirement's implementation date. However, this change requires consideration of those applications that are deemed complete after the Permit effective date. Because there is certainty with regard to new requirements as soon as the Permit becomes effective, we have tied the "final discretionary approval" date to a new requirement's implementation date for determining whether to exempt the projects with applications deemed complete after the Permit effective date. After a project receives "final discretionary approval" it would be too late in the permitting process to implement new requirements, particularly since this type of approval requires actions by city councils or boards of supervisors. Therefore, the "grandfathering" language is a hybrid that makes use of both the "application deemed complete" date and the "final discretionary approval" date, two known and recognized milestones in development planning.

As for private projects, public projects should be far enough along in the design and approval process to warrant being grandfathered and essentially exempted from complying with the lower 5000 ft^2 threshold when it becomes effective. Previous stormwater permits grandfathered projects that only had funds committed by the new threshold's effective date, which was too early because projects can be held for years before design can begin, well after funding commitments have been made. Conversely, application of the grandfathering exemption to projects that have construction scheduled to begin by the threshold effective date (or 2 years after the MRP effective date) may be too late in the permitting process to implement new threshold requirements, particularly since this type of approval requires actions by city councils or boards of supervisors. Therefore, the Permit provides the grandfathering exemption for projects that have construction set to begin within 1 year of the threshold effective date (or 3 years after the MRP effective date).

Provisions C.3.b.ii.(2)-(3) describe land use categories that are already regulated under the current stormwater permits; therefore, extra time is not necessary for the Permittees to comply with these Provisions and the implementation date is the Permit effective date. Because the Vallejo Permittees do not have post-

construction requirements in their current stormwater permit, the Permit allows an extra year for them to comply with these Provisions.

Provision C.3.b.ii.(4) applies to road projects adding and/or replacing 10,000 ft^2 of impervious surface, which include the construction of new roads and sidewalks and bicycle lanes built as part of the new roads; widening of existing roads with additional traffic lanes; and construction of impervious trails that are greater than 10 feet wide or are creekside (within 50 feet of the top of bank). Although widening existing roads with bike lanes and sidewalks increases impervious surface and therefore increases stormwater pollutants because of aerial deposition, they have been excluded from this Provision because we recognize the greater benefit that bike lanes and sidewalks provide by encouraging less use of automobiles. Likewise, this Provision also contains specific exclusions for: sidewalks built as part of a new road and built to direct stormwater runoff to adjacent vegetated areas; bike lanes built as part of a new road but not hydraulically connected to the new road and built to direct stormwater runoff to adjacent vegetated areas; impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees; and sidewalks, bike lanes, or trails constructed with permeable surfaces.

In the case of road widening projects where additional lanes of traffic are added, the 50% rule also applies. That is, the addition of traffic lanes resulting in an alteration of more than 50 percent of the impervious surface of an existing street or road that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system must be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e., the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

Because road widening and trail projects belong to a newly added category of Regulated Projects, adequate implementation time has been included as well as "grandfathering" language. (See discussion under Provision C.3.b.ii.(1).)

Provision C.3.b.iii. requires that the Permittees cumulatively complete 10 pilot "green street" projects within the Permit term. This Provision was originally intended to require stormwater treatment for road rehabilitation projects on

arterial roads that added and/or replaced > 10,000 ft^2 of impervious surface. We acknowledge the logistical difficulties in retrofitting roads with stormwater treatment systems as well as the funding challenges facing municipalities in the Bay Area. However, we are aware that some cities have or will have funding for "green street" retrofit projects that will provide water quality benefits as well as meet broader community goals such as fostering unique and attractive streetscapes that protect and enhance neighborhood livability, serving to enhance pedestrian and bike access, and encouraging the planting of landscapes and vegetation that contribute to reductions in global warming. Therefore, instead of requiring post-construction treatment for all road rehabilitation of arterial streets, this Provision requires the completion of 10 pilot "green street" projects by the Permittees within the Permit term. These projects must incorporate LID techniques for site design and treatment in accordance with Provision C.3.c. and provide stormwater treatment pursuant to Provision C.3.d. and must be representative of the three different types of streets: arterial, collector, and local. To ensure equity and an even distribution of projects, at least two pilot projects must be located in each of the following counties: Alameda, Contra Costa, San Mateo, and Santa Clara. Parking lot projects are acceptable as pilot projects as long as both parking lot and street runoff is addressed. Because these are pilot projects, we have not specified a minimum or maximum size requirement and the details of which cities will have these projects are to be determined by the Permittees.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy[69]. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treat stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, permeable pavement, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(1) lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of

[69] USEPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) http://www.epa.gov/owow/nps/lid/costs07)

businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff. The current stormwater permits also list these methods; however, they are encouraged rather than required. By requiring these source control measures, this Provision sets a consistent, achievable standard for all Regulated Projects and allows the Board to more systematically and fairly measure permit compliance. This Provision retains enough flexibility such that Regulated Projects are not forced to include measures inappropriate, or impracticable, to their projects. This Provision does not preclude Permittees from requiring additional measures that may be applicable and appropriate.

Provision C.3.c.i.(2)(a) lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. On the basis of the Board staff's review of the Permittees' Annual Reports and CWA section 401 certification projects, these measures are already being done at many projects. One design element requires all Regulated Projects to include at least one site design measure from a list of six which includes recycling of roof runoff, directing runoff into vegetated areas, and installation of permeable surfaces instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.

Provision C.3.c.i.(2)(b) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility. LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment. A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site. Infeasibility may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

This Provision recognizes the benefits of harvesting and reuse, infiltration and evapotranspiration and establishes these methods at the top of the LID treatment hierarchy. This Provision also acknowledges the challenges, both institutional and technical, to providing these LID methods at all Regulated Projects. There

are certainly situations where biotreatment is a valid LID treatment measure and this Provision allows Permittees the flexibility to make this determination so that Regulated Projects are not forced to include measures inappropriate or impracticable to the project sites. However, Permittees are required to submit a report within 18 months of the Permit effective date and prior to the required implementation date on the criteria and procedures that Permittees will employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. The Permittees are also required to submit a second report two years after implementing the new LID requirements that documents their experience with determining the feasibility and infeasibility of harvesting and reuse, infiltration, and evapotranspiration at Regulated Project sites. This report shall also discuss barriers, including institutional and technical site specific constraints, to implementation of infiltration, harvesting and reuse, or evapotranspiration and proposed strategies for removing these identified barriers.

This Provision specifies minimum specifications for biotreatment systems to be considered as LID treatment and requires Permittees to develop soil media specifications. Because this Provision recognizes green roofs as biotreatment systems for roof runoff, it also requires Permittees to develop minimum specifications for green roofs.

Provision C.3.c.ii. establishes the implementation date for the new LID requirements of Provision C.3.c.i. to be two years after the Permit effective date. Grandfathering language consistent with Provision C.3.b.ii.(1) has been included in this Provision to exempt private development projects (that are far along in their permitting and approval process) and public projects (that are far along in their funding and design) from the requirements of Provision C.3.c.i.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) lists the hydraulic sizing design criteria that the stormwater treatment systems installed for Regulated Projects must meet. The volume and flow hydraulic design criteria are the same as those required in the current stormwater permits. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects. Provision C.3.d. also adds a new combined flow and volume hydraulic design criteria to accommodate those situations where a combination approach is deemed most efficient.

Provision C.3.d.iv. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites. This Provision requires infiltration devices to be located a minimum of 10 feet

(measured from the base) above the seasonal high groundwater mark and a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials, and other measures to ensure that any potential threat to the beneficial uses of ground water is appropriately evaluated and avoided.

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.c.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

Provision C.3.e.i. In keeping with LID concepts and strategies, we expect new development projects to provide LID treatment onsite and to allocate the appropriate space for these systems because they do not have the site limitations of redevelopment and infill site development in the urban core. However, this Provision does not restrict alternative compliance to redevelopment and infill projects because the Permittees have requested flexibility to make the determination of when alternative compliance is appropriate. Based on the lack of offsite alternative compliance projects installed during the current stormwater permit terms, it seems that having to find offsite projects is already a great disincentive. Therefore, this Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite and Regional Projects are in the same watershed as the Regulated Project.

For the LID Treatment at an Offsite Location alternative compliance option, offsite projects must be constructed by the end of construction of the Regulated Project. We acknowledge that a longer timeframe may be required to complete construction of offsite projects because of administrative, legal, and/or construction delays. Therefore, up to 3 years additional time is allowed for construction of the offsite project; however, to offset the untreated stormwater runoff from the Regulated Project that occurs while construction of the offsite project is taking place, the offsite project must be sized to treat an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading for each year that it is delayed. Permittees have commented that for projects that are delayed, requiring treatment of an additional (10-30)% of stormwater runoff may result in costly re-design of treatment systems. In those cases, payment of in-lieu fees to provide the additional treatment at a Regional Project is a viable alternative.

For the Payment of In-Lieu Fees to a Regional Project alternative compliance option, the Regional Project must be completed within 3 years after the end of construction of the Regulated Project. We acknowledge that a longer timeframe may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended, up to 5 years after the completion of the Regulated

Project, with prior Water Board Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

Provision C.3.e.ii. (Special Projects) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Special Projects.

This Provision requires that by December 1, 2010, Permittees shall submit a proposal to the Water Board containing the following information:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this permit for each type of project..
- Identification of institutional barriers and/or technical site specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite.
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations.
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite.
- Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit.
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.

Provision C.3.f (Alternative Certification of Adherence to Numeric Sizing Criteria for Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed. That is, any consultant, contractor or their employees hired to design and/or construct a stormwater treatment system for a Regulated Project can not also be the certifying third party.

Provision C.3.g. (Hydromodification Management, HM) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Background for Provision C.3.g. Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Within Provision C.3.g, the major common elements of these HM requirements are restated. Attachments B–F contain the HM requirements as adopted by the Water Board, with some changes to correct minor errors and to provide consistency across the Region. Attachment F contains updated HM requirements for the Santa Clara Permittees. Permittees will continue to implement their adopted HM requirements; where Provision C.3.g. contradicts the Attachments, Provision C.3.g. shall be implemented. Additional requirements and/or options contained in the Attachments, above and beyond what is specified in Provision C.3.g., remain unaltered by Provision C.3.g. In all cases, the HM Standard must be achieved.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[70] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[71] All Permittees may use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. Attachment C requires the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices. Following the satisfactory conclusion of this monitoring program, or conclusion of other study(s) that demonstrate devices built according to Attachment C specifications satisfactorily protect streams from excess erosive flows, the Water Board intends to allow the use of the Contra Costa sizing charts, when tailored to local conditions, by other stormwater programs and Permittees. Similarly, any other control strategies or criteria approved by the Board would be made available across the Region. This would be accomplished

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70 http://www.ecy.wa.gov/programs/wq/stormwater/wwhm_training/wwhm/wwhm_v2/instructions_v2.html

71 See www.bayareahydrologymodel.org , Resources.

through Permit amendment or in another appropriate manner following appropriate public notification and process.

The Fairfield-Suisun Permittees have developed design procedures, criteria, and sizing factors for infiltration basins and bioretention units. These procedures, criteria, and sizing factors have been through the public review process already, and are not subject to public review at this time. Water Board staff's technical review found that the procedures, criteria, and sizing factors are acceptable in all ways except one: they are based on an allowable low flow rate that exceeds the criteria established in this Permit. Fairfield-Suisun Permittees may choose to change the design criteria and sizing factors to the allowable criterion of 20 percent of the 2-year peak flow, and seek Executive Officer approval of the modified sizing factors. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data. Following approval by the Executive Officer and notification of the public through such mechanism as an email list-serve, project proponents in the Fairfield-Suisun area may meet the HM Standard by using the Fairfield-Suisun Permittees' design procedures, criteria, and sizing factors for infiltration basins and/or bioretention units.

Attachments B and F allow the Alameda and Santa Clara Permittees to prepare a user guide to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This user guide would reiterate and collate established stream stability assessment methods that have been presented in these Programs' HMPs, which have undergone Water Board staff review and been made available for public review. After the Programs have collated their methods into user guide format, received approval of the user guide from the Executive Officer, and informed the public through such process as an email list-serve, the user guide may be used to guide preparation of technical reports for: implementing the HM standard using in-stream or regional measures; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in this Permit); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp[72] for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow).

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal stormwater Permittees jointly conduct investigations as appropriate. Any future

[72] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

- Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;
- The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;
- The effectiveness of self-retaining areas for management of post-project flows and durations; and/or
- The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

Within Attachments B-F, this Permit allows for alternative HM compliance when on-site and regional HM controls and in-stream measures are not practicable. Alternative HM compliance includes contributing to or providing mitigation at other new or existing development projects that are not otherwise required by this Permit or other regulatory requirements to have HM controls. The Permit provides flexibility in the type, location, and timing of the mitigation measure. The Board recognizes that handling mitigation funds may be difficult for some municipalities because of administrative and legal constraints. The Board intends to allow flexibility for project proponents and/or Permittees to develop new or retrofit stormwater treatment or HM control projects within a broad area and reasonable time frame. Toward the end of the Permit term, the Board will review alternative projects and determine whether the impracticability criteria and options should be broadened or made narrower.

Provision C.3.g.i. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded within Attachments B–F of the Permit. Within these Attachments, the Permittees have identified areas where the potential for single-project and/or cumulative development impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[73]

Provision C.3.g.ii. establishes the standard hydromodification controls must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

[73] Within the context of Provision C.3.g., "highly developed watersheds; refer to catchments or sub-catchments that are 65 percent impervious or more.

Provision C.3.g.iii. identifies and defines three methods of hydromodification management.

Provision C.3.g.iv. sets forth the information on hydromodification management to be submitted in the Permittees' Annual Reports.

Provision C.3.g.v. requires the Vallejo Permittees to develop a Hydromodification Management Plan (HMP), because the Vallejo Permittees have not been required to address HM impacts to date. Vallejo's current permit was issued by USEPA and does not require the Vallejo Permittees' to develop an HMP. The Vallejo Permittees may choose to adopt and implement one or a combination of the approaches in Attachments B–F.

Provision C.3.h (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the project is provided for all onsite, joint, and offsite stormwater treatment systems installed. The Provision requires Permittees to inspect at least 20% of these systems annually, at least 20% of all vault-based systems annually, and every treatment system at least once every 5 years. Requiring inspection of at least 20% of the total number of treatment and HM controls serves to prevent failed or improperly maintained systems from going undetected until the 5th year. We have the additional requirement to inspect at least 20% of all installed vault-based systems because they require more frequent maintenance and problems arise when the appropriate maintenance schedules are not followed. Also, problems with vault systems may not be as readily identified by the projects' regular maintenance crews. Neither of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor maintained systems, maintenance history, etc. This Provision also requires the development of a database or equivalent tabular format to track the operation and maintenance inspections and any necessary enforcement actions against Regulated Projects and submittal of Reporting Table C.3.h., which requires standard information that should be collected on each operation and maintenance inspection. We require this type of information to evaluate a Permittee's inspection and enforcement program and to determine compliance with the Permit. Summary data alone without facility-specific inspection findings does not allow us to determine whether Permittees are doing timely follow-up inspections at problematic facilities and taking appropriate enforcement actions.

Stormwater treatment system maintenance has been identified as a critical aspect of addressing urban runoff from Regulated Projects by many prominent urban runoff authorities, including CASQA, which states that "long-term performance of BMPs [stormwater treatment systems] hinges on ongoing and proper maintenance."[74] USEPA also stresses the importance of BMP [stormwater treatment system] maintenance,

[74] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment, p. 6-1.

stating that "Lack of maintenance often limits the effectiveness of stormwater structure controls such as detention/retention basins and infiltration devices."[75]

Provision C.3.i. (Required Site Design Measures for Small Project and Detached Single-Family Homes Projects) introduces new requirements on single-family home projects that create and/or replace 2500 square feet or more of impervious surface and small development projects that create and/or replace > 2500 ft^2 to <10,000 ft^2 impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small; however, the cumulative impacts could be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees. To assist these small development and single-family home projects, this Provision also requires the Permittees to develop standard specifications for lot-scale site design and treatment measures.

[75] USEPA. 1992. *Guidance Manual for the Preparation of Part II of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems*. EPA 833-B-92-002.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires, "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Specific Provision C.4. Requirements

Provision C.4.a (Legal Authority for Effective Site Management)

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section also describes requirements for effective follow-up and resolution of actual or threatened discharges of either polluted non-stormwater or polluted stormwater runoff from industrial/commercial sites.

Provision C.4.b (Inspection Plan)

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit requires Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Provision C.4.b.ii.(1) (Commercial and Industrial Source Identification)

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

USEPA requires "measures to reduce pollutants in storm water discharges to municipal separate storm sewers from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of

1986 (SARA)."[76] USEPA "also requires the municipal storm sewer Permittees to describe a program to address industrial dischargers that are covered under the municipal storm sewer permit."[77] To more closely follow USEPA's guidance, this Permit also includes operating and closed landfills, and hazardous waste treatment, disposal, storage and recovery facilities.

The Permit requires Permittees to identify various industrial sites and sources subject to the General Industrial Permit or other individual NPDES permit. USEPA supports the municipalities regulating industrial sites and sources that are already covered by an NPDES permit:

> Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.[78]

And:

> Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, USEPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.[79]

Provision C.4.b.ii.(5) (Inspection Frequency)
USEPA guidance[80] says, "management programs should address minimum frequency for routine inspections." The USEPA Fact Sheet—Visual Inspection[81] says, "To be effective, inspections must be carried out routinely."

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[76] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. P. 48056.
[77] Ibid.
[78] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48006.
[79] Ibid. P. 48000
[80] USEPA. 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[81] USEPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

Provision C.4.c (Enforcement Response Plan) requires the Permittees to establish an Enforcement Response Plan (ERP) that ensures timely response to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP also provides for progressive enforcement of violations of ordinances and/or other legal authorities. The ERP will provide guidance on the appropriate use of the various enforcement tools, such as verbal and written notices of violation, when to issue a citations, and require cleanup requirements, cost recovery, and pursue administrative or and criminal penalties. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered.

Provision C.4.d (Staff Training) section of the Permit requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application, "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application, "The location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have, "adequate legal authority to prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall, "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires, "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires, "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires, "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires, "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires, "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Illicit and inadvertent connections to MS4 systems result in the discharge of waste and chemical pollutants to receiving waters. Every Permittee must have the ability to discover, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

C.5-2 Illicit discharges to the storm drain system can be detected in several ways. Permittee staff can detect discharges during their course of other tasks, and business owners and other aware citizens can observe and report suspect discharges. The Permittee must have a direct means for these reports of suspected polluted discharges to receive adequate documentation, tracking, and response through problem resolution.

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to effectuate cessation, abatement, and/or clean up of non-exempt non-stormwater discharges per Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in the discharge of waste and chemical pollutants to receiving waters. Every Permittee must have the ability to discover, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (ERP) requires Permittees to establish an ERP that ensures timely response to illicit discharges and connections to the MS4 and provides progressive enforcement of violations of ordinances and/or other legal authorities. This section also requires Permittees to establish criteria for triggering follow-up investigations. Additional language has been added to this section to clarify the minimum level of effort and time frames for follow-up investigations when violations are discovered. Timely investigation and follow up when action levels are exceeded is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for all violations to be corrected before the next rain event but no longer than 10 business days when there is evidence of illegal non-stormwater discharge, dumping, or illicit connections having reached municipal storm drains is necessary to ensure timely response by Permittees.

Provision C.5.c (Spill and Dumping Response, Complaint Response, and Frequency of Inspections) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spill and complaint reporting. Reports from the public are an essential tool in discovering and investigating illicit discharge activities. Maintaining contact points will help ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a direct means for these reports of suspected polluted discharges to receive adequate documentation, tracking, and response through problem resolution.

Provision C.5.d (Control of Mobile Sources) requires each Permittee to develop and implement a program to reduce the discharge of pollutants from mobile businesses. The purpose of this section is to establish oversight and control of pollutants associated with mobile business sources to the MEP.

Provision C.5.e (Collection System Screening and MS4 Map Availability) Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water." This Provision of the Permit requires the Permittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections. Permittees shall implement a program to actively seek and eliminate illicit connections and discharges during their routine collection system screening and during screening surveys at strategic check points. Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel are used in the program to observe and report these illicit discharges and connections when they are working the system.

This section also requires the Permittees to develop or obtain a map of their entire MS4 system and drainages within their jurisdictions and provide the map to the public for review. As part of the permit application process federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[82] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[83] The requirement in this Provision of the Permit for

[82] 40 CFR 124.3 (applicable to state programs, see section 123.25).
[83] 40 CFR. 122.26(d)(1)(iv)(E).

Permittees to prepare maps of the MS4 system will help ensure that Permittees comply with federal NPDES permit application requirements that are more than 10 years old.

Provision C.5.f (Tracking and Case Follow-up) section of the Permit requires Permittees to track and monitor follow-up for all incidents and discharges reported to the complaint/spill response system that could pose a threat to water quality. This requirement is included so Permittees can demonstrate compliance with the ERP requirements of Section C.5.b and to ensure that illicit discharge reports receive adequate follow up through to resolution.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires, "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires, "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires, "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires, "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires, "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that, "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: [...] (x) Construction activity including cleaning, grading and excavation activities [...]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to, "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute

to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as *stop work* orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into receiving waters. According to the 2004 National Water Quality Inventory[84], States and Tribes report that sediment is one of the top 10 causes of impairment of assessed rivers and streams, next to pathogens, habitat alteration, organic enrichment or oxygen depletion, nutrients, metals, etc.. Sediment impairs 35,177 river and stream miles (14% of the impaired river and stream miles). Sources of sedimentation include agriculture, urban runoff, construction, and forestry. Sediment runoff rates from construction sites, however, are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[85]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the

[84] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[85] USEPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure.* EPA 833-F-00-008. Fact Sheet 2.6.

authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management, and non stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority. Permittees shall certify adequacy of their respective legal authority in the 2010 Annual Report.

Inspectors should have the authority to take immediate enforcement actions when appropriate. Immediate enforcement will get the construction site's owner/operator to quickly implement corrections to violations, thereby minimizing and preventing threats to water quality. When inspectors are unable to take immediate enforcement actions, the threat to water quality continues until an enforcement incentive is issued to correct the violation. In its Phase II Compliance Assistance Guidance, USEPA says that, "Inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[86] To issue warnings and assess penalties during inspections, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to develop and implement an escalating enforcement process that serves as reference for inspection staff to take consistent actions to achieve timely and effective corrective compliance from all public and private construction site owners/operators. Under this section, each Permittee develops its own unique ERP tailored for the specific jurisdiction; but all ERPs must make it a goal to correct all violations before the next rain event but no longer than 10 business days after the violations are discovered. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access the eroded area. The Permittees' tracking data need to provide a rationale for the longer compliance timeframe.

Water Board staff has noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. USEPA supports enforcement of ordinances and permits at construction sites stating, "Effective inspection and enforcement requires [...] penalties to deter infractions and intervention by the municipal authority to correct violations."[87] In addition, USEPA expects permits issued to municipalities to address "weak inspection and enforcement."[88] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round seasonally appropriate effective Best Management Practices (BMPs) in the following six categories: (1)

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[86] USEPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, P.4-31

[87] USEPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.

[88] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48058.

erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories are listed in the State General NPDES Permit for Stormwater Discharges Associated with Construction Activities (General Construction Permit). The Water Board staff decided it was too prescriptive and inappropriate to require a specific set of BMPs that are to be applicable to all sites. Every site is different with regards to terrain, soil type, soil disturbance, and proximity to a waterbody. The General Construction Permit recognizes these different factors and requires site specific BMPs through the Storm Water Pollution Prevention Plan that addresses the six specified BMP categories. This Permit allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate. This Permit also allows the Permittees and the project proponents the necessary flexibility to make immediate decisions on appropriate, cutting-edge technology to prevent the discharge of construction pollutants into stormdrains, waterways, and right-of-ways. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals. Therefore, this Permit is consistent with the General Construction Permit in its requirements for BMPs in the six specified categories.

Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This can even occur in conjunction with unexpected rain events during the so-called *dry-season*. Although rare, significant rains can occur in the San Francisco Bay Region during the dry season. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the dry season.

Normally, stormwater restrictions on grading should be implemented during the wet season from October 1st through April 30th. Section C.6.c.ii.(1).d of the Permit requires, "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent feasible." If grading does occur during the wet season, Permittees shall require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

Slope stabilization is necessary on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. These requirements are needed because unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. "Steep slopes are the most highly erodible surface of a construction site, and require special attention."[89] USEPA emphasizes the importance of slope stabilization when it states, "slope length

[89] Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.

and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[90] In lieu of vegetation preservation or replanting, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[91] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, Permittees must ensure that slope stabilization is implemented on sites, as appropriate.

It is also necessary that Permittees ensure that construction sites are revegetated as early as feasible. Implementation of revegetation reduces the threat of polluted stormwater discharges from construction sites. Construction sites should permanently stabilize disturbed soils with vegetation at the conclusion of each phase of construction.[92] A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[93] USEPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[94]

To ensure the MEP standard and water quality standards are met, advanced treatment systems may be necessary at some construction sites. In requiring the implementation of advanced treatment for sediment at construction sites, Permittees should consider the site's threat to water quality. In evaluating the threat to water quality, the following factors shall be considered: (1) soil erosion potential; (2) the site's slopes; (3) project size and type; (4) sensitivity of receiving waterbodies; (5) proximity to receiving waterbodies; (6) non-stormwater discharges; and (7) any other relevant factors. Advanced treatment is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.[95] Advanced treatment consists of a three part treatment train of coagulation, sedimentation, and polishing filtration. Advanced treatment has been effectively implemented extensively in the other states and in the Central Valley Region of California.[96] In addition, Water Board's inspectors have observed advanced treatment being effectively implemented at both large sites greater than 100 acres, and at small, 5-acre sites. Advanced treatment is often necessary for Permittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards.

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[90] USEPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.

[91] Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection*. p. 5.

[92] Ibid.

[93] Ibid. p. 11.

[94] USEPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.

[95] SWCRB. September 2, 2009. *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities – Order No. 2009-0009-DWQ.*

[96] SWRCB. 2004. Conference on Advanced Treatment at Construction Sites.

Provision C.6.d. Plan Approval Process. This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures. USEPA states that it is often easier and more effective to incorporate stormwater quality controls during the site plan review process or earlier.[97] In the Phase I stormwater regulations, USEPA states that a primary control technique is good site planning.[98] USEPA goes on to say that the most efficient controls result when a comprehensive stormwater management system is in place.[99] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[100] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[101]

Provision C.6.e. (Inspections) The Water Board allows flexibility on the exact legal authority language, ERP, and BMPs required on a site. This section of the Permit pulls together the accountability of the whole Provision through regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the stormdrain and waterbodies.

Currently, Annual Reports show that some Permittees provide no information on its construction inspection and enforcement programs; some Permittees only provide information on pre rainy season inspections; another group of Permittees conduct inspections through December and provide just the date each site was inspected; yet another group of Permittees provides a very brief summary of their respective overall inspection program; and there is a small group of Permittees who report meaningful inspection and enforcement information. Inspections of construction sites by Water Board staff have noted deficiencies in stormwater inspections and enforcement. Therefore, this section clearly identifies the level of effort necessary by all Permittees to minimize construction pollutant runoff into stormdrains and ultimately, waterbodies.

This section requires monthly inspections during the wet season of all construction sites disturbing one or more acre of land and at all high priority sites as determined by the Permittee or the Water Board as significant threats to water quality. Inspections shall focus on the adequacy and effectiveness of the site specific BMPs implemented for the six BMP categories. Permittees shall implement its ERP and require timely corrections of all actual and potential problems observed. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer

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[97] USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide.* EPA 833-R-00-002. Section 6.3.2.1.
[98] *Federal Register.* Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.
[99] Ibid.
[100] USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide.* EPA 833-R-00-002. Section 4.6.2.4, pp. 4–30.
[101] Ibid. pp. 4–31.

than 10 business days after the violations are discovered. All inspections shall be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format. The tracked information provides meaningful data for evaluating compliance. An example tabular format is included as Table 6 – Construction Inspection Data. Submittal of this Table is not required in each Annual Report but encouraged. Each Permittee will need to use the information in the electronic database or tabular format to compile its Annual Reports. The Executive Officer may require that the tracked information be submitted electronically or in a tabular format. When required, Permittees shall submit that data within 10-working days of the requirement. The recommended submittal format is in Table 6 – Construction Inspection Data.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct annual staff trainings for municipal staff. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

Table 6 – Construction Inspection Data

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Run-on and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	9/30/08	Dry	0	Written Notice			x					Driveway not stabilized				
Panoramic Views	10/15/08	Dry	0.5										x			50' of driveway rocked.
Panoramic Views	11/15/08	Rain	3	Stop Work	x		x				x	Uncovered graded lots eroding; Sediment entering a stormdrain that didn't have adequate protection.				
Panoramic Views	11/15/08	Drizzling	0.25										x			Lots blanketed. Storm drains pumped. Street cleaned.
Panoramic Views	12/1/08	Dry	4	Verbal Warning					x			Porta potty next to stormdrain.	x			Porta potty moved away from stormdrain.
Panoramic Views	1/15/08	Rain	3.25	Written Warning	x					x		Fiber rolls need maintenance; Tire wash water flowing into street				
Panoramic Views	1/25/09	Dry	0										x			Fiber rolls replaced.

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Run-on and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	2/28/09	Rain	2.4	Stop Work	x		x				x	Slope erosion control failed. Fiber rolls at the bottom of the hill flattened. Sediment laden discharge skipping protected stormdrains and entering unprotected stormdrains.				
Panoramic Views	2/28/09	Rain	0.1											x		Fiber rolls replaced. Silt fences added. More stormdrains protected. Streets cleaned. Slope too soggy to access.
Panoramic Views	3/15/09	Dry	1	Citation with Fine					x		x	Paint brush washing not designated	x			Street and storm drains cleaned. Slopes blanketed.
Panoramic Views	4/1/09	Dry	0.5	Citation with Fine							x	Concrete washout overflowed; Evidence of illicit discharge				
Panoramic Views	4/15/09	Dry	0										x			Concrete washout replaced; Storm drain and line cleaned.

C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires, "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires , "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires, "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Finding in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.102

[102] USEPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.103

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[104]

Specific Provision C.7 Requirements

Provision C.7.a. Storm Drain Inlet Marking. Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, it is important to set a goal of ensuring that all municipally-maintained inlets are legible labeled with a no dumping message. If storm drain marking can be conducted as a volunteer activity, it has additional public involvement value.

Provision C.7.b. Advertising Campaigns. Use of various electronic and/or print media on trash/litter in waterways and pesticides. Advertising campaigns are long-established outreach management practices. Specifically, the Bay Area Management Agencies Association (BASMAA) already implements an advertising campaign on behalf of the Permittees. While the Permittees have been successful at reaching certain goals for its Public Information/Participation programs, it must continue to increase public awareness of specific stormwater issues. This Permit also requires a pre-campaign survey and a post-campaign survey. These two surveys will help identify and quantify the audiences' knowledge, trends, and attitudes and/or practices; and to measure the overall population awareness of the messages and behavioral changes.

Provision C.7.c. Media Relations. Public service media time is available and allows the Permittees to leverage expensive media purchases to achieve broader outreach goals.

Provision C.7.d. Stormwater Point of Contact. As the public has become more aware, citizens are more frequently calling their local jurisdictions to report spills and other polluting behavior impacting stormwater runoff and causing non-stormwater prohibited discharges. Permittees are required to have a centralized, easily accessible point of contact both for citizen reports and to coordinate reports of problems identified by Permittee staff, permitting follow-up and pollution cleanup or prevention. Often the follow-up, cleanup, and/or prevention provide the opportunity to educate the immediate neighborhood through established public outreach mechanisms such as distributing door hangers in the neighborhood describing the remedy for the problem discovered. Permittees already have existing published stormwater point of contacts.

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103 State Water Board. 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

104 USEPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

Provision C.7.e. Public Outreach Events. Staffing tables or booths at fairs, street fairs or other community events are a long-established outreach mechanism employed by Permittees to reach large numbers of citizens with stormwater pollution prevention information in an efficient and convenient manner. These have been ongoing in the Region for several municipal stormwater permit cycles and are MEP outreach actions. Permittees shall continue with such outreach events utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events such as the Bringing Back the Natives Garden Tour.

Provision C.7.f. Watershed Stewardship Collaborative Efforts. Watershed and Creek groups are comprised of active citizens, but they often need support from the local jurisdiction and certainly need to coordinate actions with Permittees such as flood districts and cities.

Provision C.7.g. Citizen Involvement Events. Citizen involvement and volunteer efforts both accomplish needed creek cleanups and restorations, and serve to raise awareness and provide outreach opportunities. These have been ongoing in the Region for several municipal stormwater permit cycles and are MEP outreach actions.

In previous municipal stormwater permits, Public Information/Participation encompassed both Citizen Involvement Events and Public Outreach Events. Citizen Involvement Events are important because they provide the community opportunities to actively practice being good stewards of our environment. Therefore, this Permit separates out the Public Outreach Events from the Citizen Involvement Events to ensure that citizens in all Bay Area communities are given the opportunity to be involved. In addition, the Permit allows Permittees to claim both Public Outreach and Citizen Involvement credits if the event contains significant elements of both. The combined specified number of events for Public Outreach and Citizen Involvement are very close to current performance standards and/or level of effort for respective Public Information/Participation Programs.

Provision C.7.h. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision makers and consumers.

Provision C.7.i. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform Municipal Officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii); CWC section 13377; Federal
NPDES regulations 40 CFR 122.26(d)(2)(iv)

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.48, 40 CFR 122.44(i), 40 CFR 122.26.(d)(1)(iv)(D), and 40 CFR 122.26(d)(2)(ii)-(iv).

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of water quality-based effluent limitations that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, USEPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[105]

According to USEPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

- Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;
- Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.[106]

C.8-2 Provision C.8 requires Permittees to conduct water quality monitoring, including monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management

[105] USEPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf
[106] USEPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

actions pursuant to this Permit and, accordingly, demonstrate compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

- Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;
- Characterize stormwater discharges;
- Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;
- Assess progress toward reducing receiving water concentrations of impairing pollutants;
- Assess compliance with numeric and narrative water quality objectives and standards;
- Identify sources of pollutants;
- Assess stream channel function and condition, as related to urban stormwater discharges;
- Assess the overall health and evaluate long-term trends in receiving water quality; and
- Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-3 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the MEP standard. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1, Water Quality Standards Exceedances, could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs, and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-4 Water quality monitoring requirements in previous permits were less detailed than the requirements in this Permit. Under previous permits, each program could design its own monitoring program, with few permit guidelines. A decision by the California Superior Court[107] regarding two of the programs' permits stated:

Federal law requires that all NPDES permits specify "[r]equired monitoring including type, intervals, and frequency sufficient to yield

[107] San Francisco Baykeeper vs. Regional Water Quality Control Board, San Francisco Bay Region, Consolidated Case No. 500527, filed Nov. 14, 2003.

data which are representative of the monitored activity." 40 C.F.R. § 122.48(b). Here, there is no monitoring program set forth in the Permit. Instead, an annual Monitoring Program Plan is to be prepared by the dischargers to set forth the monitoring program that will be used to demonstrate the effectiveness of the Stormwater Management Plan. This does not meet the regulatory requirements that a monitoring program be set forth including the types, intervals, and frequencies of the monitoring.

The water quality monitoring requirements in Provision C.8 comply with 40 CFR 122.44(i) and 122.48(b), and the Superior Court decision.

C.8-5 The Water Quality Monitoring Provision is intended to provide answers to five fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, each of the five management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

C.8-6 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Board staff requested major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP). The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. The Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-7 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Quality Control Boards, and to coordinate with other monitoring programs. Provision C.8 contains a

framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources.

C.8-8 In 1998 BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[108] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.
>
> This same concept is found in the optional provision for Permittees to form a regional monitoring collaborative. Such a group is meant to provide efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level. Further benefits are expected from closer cooperation between this group, the Regional Monitoring Program, and SWAMP.

C.8-9 This Permit includes monitoring requirements to verify compliance with adopted TMDL WLAs and to provide data needed for TMDL development and/or implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-10 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local waterbodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

Provision C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to

[108] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

- Promote cost savings through economies of scale and elimination of redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality;
- Simplify reporting; and
- Make data and reports readily publicly available.

In the past, each Stormwater Countywide Program has conducted water quality monitoring on behalf of its member Permittees, and some data were collected by wider collaboratives, such as the Regional Monitoring Program. In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

Provision C.8.b. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.b requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the San Francisco Estuary Regional Monitoring Program for Trace Substances. Provision C.8.b requires such monitoring to continue.

Provisions C.8.c. & C.8.e.ii. Status Monitoring and Long-Term Monitoring. Status Monitoring and Long-Term Monitoring serve as surrogates to monitoring the discharge from all major outfalls, of which the Permittees have many. By sampling the sediment and water column in urban creeks, the Permittees can determine where water quality problems are occurring in the creeks, then work to identify which outfalls and land uses are causing or contributing to the problem. In short, Status and Long-Term Monitoring are needed to identify water quality problems and assess the health of streams; they are the first step in identifying sources of pollutants and an important component in evaluating the effectiveness of an urban runoff management program.

Provisions C.8.c.i. and C.8.e.iii. Parameters and Methods
Status & Long-Term parameters and methods reflect current accepted practices, based on the knowledge and experience of personnel responsible for water quality monitoring, including state and Regional SWAMP managers, Permittee representatives, and citizen monitors. Many Status and Long-Term Monitoring parameters are consistent with parameters the Permittees have been monitoring to date. The following parameters are new for some of the Permittees:

- Biological Assessment—to provide site-specific information about the health and diversity of freshwater benthic communities within a specific reach of a creek, using standard procedures developed and/or used by the State Water

Resources Control Board Surface Water Ambient Monitoring Program.[109] It consists of collecting samples of benthic communities and conducting a taxonomic identification to measure community abundance and diversity, which is then compared to a reference creek to assess benthic community health. This monitoring can also provide information on cumulative pollutant exposure/impacts because pollutant impacts to the benthic community accumulate and occur over time.

- Chlorine—to detect a release of potable water or other chlorinated water sources, which are toxic to aquatic life.
- Nutrients—recent monitoring data indicate nutrients, which can increase algal growth and decrease dissolved oxygen concentrations, are present in significant concentrations in Bay area creeks.
- Toxicity and Pollutants in Bedded Sediment—to determine the presence of, and identify, chemicals and compounds that bind to sediment in a creek bed and are toxic to aquatic life.
- Pathogen Indicators—to detect pathogens in waterbodies that could be sources of impairment to recreational uses at or downstream of the sampling location.
- Stream Survey (stream walk and mapping)—to assess the overall physical health of the stream and to gain information potentially useful in interpreting monitoring results.

In consideration of economic impacts to Permittees, the minimum number of Status & Long-Term samples ("Minimum # Sample Sites" columns in Tables 8.1 and 8.3) reflects the Programs' populations, not waterbody size. Permittees must select exact sample locations that will yield adequate information on the status of their waterbodies; in some cases, additional sampling above the minimum might be necessary.

Provisions C.8.c.ii. and C.8.e.iii. Frequency

Status Monitoring continues to be an annual requirement for the Permittees, except for two much smaller Permittees, Fairfield-Suisun and Vallejo. In considering costs, the frequency of Status Monitoring is established at twice per Permit term for Fairfield-Suisun, and once per Permit term for Vallejo. It is common for Permit terms to be extended through a lengthy Permit reissuance process. Thus, these frequencies are considered the minimum; costs are minimized while data necessary for successful stormwater management are obtained.

Long-Term Monitoring is required every second year (biennially), rather than annually, in order to balance data needs and Permittee costs. To further reduce costs, the Fairfield-Suisun and Vallejo Permittees have no Long-Term Monitoring requirements.

Provisions C.8.c.iii. and C.8.e.ii. Locations

Status Monitoring is to be conducted on a rotating-watershed basis, in similar fashion to the Statewide SWAMP. Provision C.8.c.iii. identifies the major waterbodies, and Permittees are to select which of these waterbodies will be sampled during the Permit

[109] Ode, P.R. 2007. Standard Operating Procedures for Collecting Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised.

term. The exact sample locations within each waterbody are critical in terms of determining the monitoring program's effectiveness. If correctly sited, the stations are expected to be very useful in answering the monitoring program's management questions and meeting its goals. For this reason, Provision C.8.c.iii. requires sample locations to be based on surrounding land use, likelihood of urban runoff impacts, existing data gaps, and similar considerations. This will help maximize the utility of the sample locations, while also providing the Permittees with adequate flexibility to ultimately choose practical Status Monitoring locations.

Long-Term Monitoring is to be conducted at fixed stations, which are intended to be lower reaches of urban creeks. This monitoring is intended to help assess progress toward reducing receiving water concentrations of impairing pollutants, among other purposes. Provision C.8.e.ii. establishes the waterbodies on which to locate fixed stations, and suggests that fixed stations be co-located with SWAMP fixed stations so that Permittees can use SWAMP data to fulfill some of their monitoring requirements. However, Permittees may select alternate locations based on their knowledge of such factors as site access and stream characteristics and provided that similar data types, data quality, and data quantity are collected.

Provision C.8.d. Monitoring Projects. Monitoring Projects are necessary to meet several water quality monitoring objectives under this Permit, including characterize stormwater discharges; identify sources of pollutants; identify new or emerging pollutants; assess stream channel function and condition; and measure and improve the effectiveness of Stormwater Countywide Programs and implemented BMPs. In consideration of economic impacts to Permittees, the number of Monitoring Projects required reflects the Permittees' populations.

Provision C.8.d.i. Stressor/Source Identification
Minimizing sources of pollutants that could impair water quality is a central purpose of urban runoff management programs. Monitoring which enables the Permittees to identify sources of water quality problems aids the Permittees in focusing their management efforts and improving their programs. In turn, the Permittees' programs can abate identified sources, which will improve the quality of urban runoff discharges and receiving waters. This monitoring is needed to address the management question, "What are the sources to urban runoff that contribute to receiving water problems?"

When Status or Long-Term Monitoring results indicate an exceedance of a water quality objective, toxicity threshold, or other "trigger", Permittees must identify the source of the problem and take steps to reduce any pollutants discharged from or through their municipal storm sewer systems. This requirement conforms to the process, outlined in Provision C.1., of complying with the Discharge Prohibition and Receiving Water Limitations. If multiple "triggers" are identified through monitoring, Permittees must focus on the highest priority problems; a cap on the total number of source identification projects conducted within the Permit term is provided to cap Permittees' potential costs.

Provision C.8.d.ii. BMP Effectiveness Investigation
U.S. EPA's stated approach to NPDES stormwater permitting uses BMPs in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.[110] The purpose of this monitoring project is to investigate the effectiveness of one currently in-use BMP to determine how it might be improved. Permittees may choose the particular stormwater treatment or hydromodification control BMP to investigate. As with other monitoring requirements, Permittees may work collaboratively to conduct one investigation on a region-wide basis, or each stormwater countywide program may conduct an investigation.

Provision C.8.d.iii. Geomorphic Project
The physical integrity of a stream's bed, bank and riparian area is integral to the stream's capacity to withstand the impacts of discharged pollutants, including chemical pollutants, sediment, excess discharge volumes, increased discharge velocities, and increased temperatures. At present, various efforts are underway to improve geomorphic conditions in creeks, primarily through local watershed partnerships. In addition, local groups are undertaking *green stormwater projects* with the goal of minimizing the physical and chemical impacts of stormwater runoff on the receiving stream. Such efforts ultimately seek to improve the integrity of the waterbodies that receive urban stormwater runoff.

The purpose of the Geomorphic Project is to contribute to these ongoing efforts in each Stormwater Countywide Program area. Permittees may select the geomorphic project from three categories specified in the Permit.

C.8.e. Pollutants of Concern[111] Monitoring. Federal CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure the effectiveness of the TMDL point and nonpoint source control measures and the progress the waterbody is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.8.e. establishes a monitoring program to measure of the effectiveness of TMDL control measures in progressing toward WLAs. Locations, parameters, methods, protocols, and sampling frequencies for this monitoring are specified. A sediment delivery estimate/budget is also required to improve the Permittees' estimates of their loading estimates. In addition, a workplan is required for estimating loads and analyzing sources of emerging pollutants, which are likely to be present in urban runoff, in the next Permit term.

C.8.f. Citizen Monitoring and Participation. CWA section 101(e) and 40 CFR Part 25 broadly require public participation in all programs established pursuant to the CWA, to foster public awareness of environmental issues and decision-making processes. Provision C.8.f. is intended to do the following:

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[110] USEPA. 1996. *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits*. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf

[111] See section C.9, C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

- Support current and future creek stewardship efforts by providing a framework for citizens and Permittees to share their collective knowledge of creek conditions; and
- Encourage Permittees to use and report data collected by creek groups and other third-parties when the data are of acceptable quality.

C.8.g. Reporting. CWC section 13267 provides authority for the Water Board to require technical water quality reports. Provision C.8.g. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14 pertain to pollutants of concern, including those for which TMDLs are being developed or implemented.

Legal Authority

The following legal authority applies to provisions C.9 through C.14:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal stormwater permits to include any requirements necessary to, "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to, "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Basin Plan Requirements: Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) requires that stormwater permits include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. In the first phase, the Water Board requires implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the MEP. If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions that might require implementation of additional control measures. For example, the control measures required as a result of TMDLs may go beyond the measures required in the first phase of the program.

General Strategy for Sediment-Bound Pollutants (Mercury, PCBs, legacy pesticides, PBDEs)

The control measures for mercury are intended to implement the urban runoff requirements stemming from TMDLs for this pollutant. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan that has been approved by the Water Board and is pending approval by the State Board, the Office of Administrative Law, and U.S. EPA. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an assessment of controls to reduce

PCBs to the MEP, and that is the intended approach of the required provisions for all pollutants of concern. Many of the control actions addressing PCBs and mercury will result in reductions of a host of sediment-bound pollutants, including legacy pesticides, mercury, PBDEs, and PCBs. The strategy for these pollutants is to use PCBs control guide decisions concerning where to focus effort, but implementation of the control efforts would taken into account the benefits for controlling other pollutants of concern. Further, because many of the control strategies addressing these pollutants of concern are relatively untested, the Water Board will implement control measures in the following modes:

1. Full-scale implementation throughout the region.
2. Focused implementation in areas where benefits are most likely to accrue.
3. Pilot-testing in a few specific locations.
4. Other: This may refer to experimental control measures, Research and Development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding level of experience and confidence in the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during this permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. On the other hand there may be some control measures in which there is sufficient confidence, on the basis of prior experience, that the control action should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions that will constitute MEP for the following permit term. In fact, in additional to implementing control measures, gathering the necessary information about control measure effectiveness is a vital part of what needs to be accomplished by Permittees during this permit term. In the next permit term, control measures will be implemented on the basis of what we learn in this term, and we will, thus, achieve iterative refinement and improvement through time.

Background on Specific Provisions: Provisions C.9 through C.14 contain both technology-based requirements to control pollutants to the MEP and water quality based requirements to prevent or reduce discharges of pollutants that may cause or contribute to violations of water quality standards. Provisions C.9 and C.11 of the Permit incorporate requirements for the two TMDLs that have been fully approved and are effective for the Permittees. These TMDLs are for pesticide-related toxicity in urban creeks and mercury in San Francisco Bay. Additionally, Provision C.12 contains measures that address PCBs. The Regional Water Board has adopted a PCB TMDL, but it is still pending approval by State Board, the Office of Administrative Law, and U.S. EPA. This PCBs TMDL includes requirements that would be consistent with this

provision. Finally, Provision C.13 contains measures to implement the copper site-specific objective in San Francisco Bay.

Where a TMDL has been approved, NPDES permits must contain effluent limitations and conditions consistent with the requirements and assumptions in the TMDL.[112] Effluent limitations are generally expressed in numerical form. However, USEPA recommends that for NPDES-regulated municipal and small construction stormwater discharges, effluent limitations should be expressed as BMPs or other similar requirements rather than as numeric effluent limitations.[113] Consistent with USEPA's recommendation, this section implements WQBELs expressed as an iterative BMP approach capable of meeting the WLAs in accordance with the associated compliance schedule. The Permit's WQBELs include the numeric WLA as a performance standard and not as an effluent limitation. The WLA can be used to assess if additional BMPs are needed to achieve the TMDL Numeric Target in the waterbody.

[112] 40 CFR 122.44(d)(1)(vii)(B)
[113] USEPA, 2002. Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs. P. 4.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9.

C.9-1 This Permit fulfills the Basin Plan amendments the Water Board adopted that establish a Water Quality Containment Strategy and TMDL for diazinon and pesticide-related toxicity for Bay Area urban creeks on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Containment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, and lead monitoring efforts. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff to the MEP.

C.9-2 **(Allocations):** The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

Specific Provision C.9 Requirements

C.9 provisions fully implement the TMDL for Urban Creeks Pesticide Toxicity. All C.9 provisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with the Urban Pesticide Pollution Prevention Project, the Urban Pesticide Committee, and other agencies and organizations. The Urban Pesticide Pollution Prevention (UP3) Project has been funded by a grant from the State Water Board and its goal is to prevent water pollution from urban pesticide use. The Urban Pesticides Committee serves as an information clearinghouse and as a forum for coordinating pesticide TMDL implementation.

The UP3 Project provides resources and information on integrated pest management (IPM) and tools to municipalities to support their efforts to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control. In addition, it provides technical assistance to municipalities to encourage the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation to prevent water quality problems from pesticides. It also maintains and manages the Urban Pesticides Committee, a statewide network of agencies, nonprofits, industry, and other stakeholders that are working to solve water quality problems from pesticides.

Specific tools provided by the UP3 Project that relate to permit requirements include:

- Guidance and resources to help agencies create contracts and bid documents for structural pest management services that help them meet their integrated pest management goals
- IPM policies and ordinances
- IPM training workshops and materials

- Outreach program design resources
- Resources for evaluating effectiveness

Provisions C.9.a through C.9.d are designed to insure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is a pest control strategy that uses an array of complementary methods: natural predators and parasites, pest-resistant varieties, cultural practices, biological controls, various physical techniques, and pesticides as a last resort. If implemented properly, it is an approach that can significantly reduce or eliminate the use of pesticides. The implementation of IPM will be assured through training of municipal employees and the requirement that municipalities only hire IPM-certified contractors.

Provision C.9.e requires that municipalities (through cooperation or participation with BASMAA) track and participate in pesticide regulatory processes like the USEPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation (DPR) pesticide evaluation activities. The goal of these efforts is to encourage both the state and federal pesticide regulatory agencies to accommodate water quality concerns within the pesticide regulation or registration process. Through these efforts, it could be possible to prevent pesticide-related water quality problems from happening by affecting which products are brought to market.

Provision C.9.g is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the permit. The particulars of assessment will depend on the nature of the control measure.

Provision C.9.h directs the municipalities to conduct outreach to consumers at point of purchase and provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control. One way in which this can be accomplished is for the Permittees to participate in and provide resources for the "Our Water, Our World" program (www.ourwaterourworld.org) or a functionally equivalent pesticide use reduction outreach program. The "Our Water, Our World" program has developed a Web site with many resources, "to assist consumers in managing home and garden pests in a way that helps protect" the environment.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires, "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires, "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

San Francisco Bay Basin Plan, Chapter 4 – Implementation, Table 4-1 Prohibitions, Prohibition 7, which is consistent with the State Water Board's Enclosed Bays and Estuaries Policy, Resolution 95-84, prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. This prohibition was adopted by the Water Board in the 1975 Basin Plan, primarily to protect recreational uses such as boating.

Fact Sheet Findings in Support of Provision C.10

C.10-1 Trash and litter are a pervasive problem near and in creeks and in San Francisco Bay. Controlling trash is one of the priorities for this Permit reissuance not only because of the trash discharge prohibition, but also because trash and litter cause particularly major impacts on our enjoyment of creeks and the Bay. There are also significant impacts on aquatic life and habitat in those waters and eventually to the global ocean ecosystem, where plastic often floats, persists in the environment for hundreds of years, if not

forever, concentrates organic toxins, and is ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared and can ingest plastic that looks like prey, losing the ability to feed properly.

For the purposes of this provision, trash is defined to consist of litter and particles of litter. Man made litter is defined in California Government Code section 68055.1 (g): *Litter* means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

C.10-2 Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[114] over the 2003–2005 period,[115] suggest that the current approach to managing trash in waterbodies is not reducing the adverse impact on beneficial uses. The levels of trash in the waters of the San Francisco Bay Region are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. On the basis of 85 surveys conducted at 26 sites throughout the Bay Area, staff have found an average of 2.93 pieces of trash for every foot of stream, and all the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with higher trash in waters—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Results of the trash in waterbodies assessment work by staff show that rather than adjacent neighborhoods polluting the sites at the bottom of the watershed, these areas, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-3 A number of key conclusions can be made on the basis of the trash measurement in streams:

- Lower watershed sites have higher densities of trash.
- All watersheds studied in the San Francisco Bay Region have high levels of trash.
- There are trash source hotspots, usually associated with parks, schools, or poorly kept commercial facilities, near creek channels, that appear to contribute a significant portion of the trash deposition at lower watershed sites.

[114] SWAMP Rapid Trash Assessment Protocol, Version 8
[115] SWAMP S.F. Bay Region Trash Report, January 23, 2007

- Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.
- The majority of trash is plastic at lower watershed sites where trash accumulates in the wet season. This suggests that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris.
- Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

C.10-4 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-5 Trash in urban waterways of coastal areas can become *marine debris*, known to harm fish and wildlife and cause adverse economic impacts.[116] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-6 Trash adversely affects numerous beneficial uses of waters, particularly recreation and aquatic habitat. Not all litter and debris delivered to streams are of equal concern with regards to water quality. Besides the obvious negative aesthetic effects, most of the harm of trash in surface waters is imparted to wildlife in the form of entanglement or ingestion.[117,118] Some elements of trash exhibit significant threats to human health, such as discarded medical waste, human or pet waste, and broken glass.[119] Also, some household and industrial wastes can contain toxic batteries, pesticide containers, and fluorescent light bulbs that contain mercury. Large trash items such as discarded appliances can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash *hotspots* where illegal dumping, littering, and/or accumulation of trash occur.

C.10-7 The narrative water quality objectives applicable to trash are Floating Material (Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely

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[116] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. *Mar. Poll. Bull.* 40:83-88.

[117] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs.* Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.

[118] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol.* 13(4):925-929.

[119] Sheavly, S.B. 2004. *Marine Debris: an Overview of a Critical Issue for our Oceans.* 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

affect beneficial uses), Settleable Material (Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses), and Suspended Material (Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses).

C.10-8 The Water Board, at its February 11, 2009 hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment 10.1 – 303(d) Trash Resolution and Staff Report Feb 2009.

Specific Provision C.10 Requirements

Provision C.10. Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022 as further specified below.

C.10.a.i. Short-Term Trash Load Reduction Plan
The Short-Term Trash Load Reduction Plan is intended to describe actions to incrementally reduce trash loads toward the 2014 requirement of a 40% reduction and eventual abatement of trash loads to receiving waters.

C.10.a.ii. Baseline Trash Load and **Trash Load Reduction Tracking Method**
In order to achieve the incremental trash load reductions in an accountable manner, the Permittees will propose Baseline Trash Loads and a Trash Load Reduction Tracking Method. The Tracking will account for additional trash load reducing actions and BMPs the Permittees implement. Permittees are also able to propose, with documentation, areas for exclusion from the Tracking Method accounting, by demonstrating that these areas already meet the Discharge Prohibition A.2 and have no trash loads.

C.10.a.iii. Minimum Full Trash Capture
Installation of full trash capture systems to prevent trash loads through the MS4 is MEP as demonstrated by the significant implementation of these systems occurring in the Los Angeles region. The minimum full trash capture installation requirements in this permit represent a moderate initial step toward employing this tool for trash load reduction.

C.10.b.i, ii. Trash Hot Spot Selection and Clean Up
Trash Hot Spots must be cleaned up as an interim measure until complete abatement of trash loads occurs. Eventually, with adequate source controls and trash loading abatement, trash hot spots will not occur in the receiving waters. In addition, Permittees will be credited for trash volume removed from hot spots in the trash load reduction tracking.

C.10.b.iii. Hot Spot Assessments
Trash Hot Spot assessments have been simplified and streamlined. Rather than counting individual trash items, which can vary in size from small plastic of glass particles to shopping carts, volume of material removed is measured, along with dominant types of trash removed. Photographs are recorded both before and after cleanup, to add to the record and verify cleanup.

C.10.c. Long Term Trash Load Reduction
Each Permittee will submit a Plan to achieve the incremental progress of 70% trash load reduction by 2017 during the following permit term, and the 100% reduction of trash loading by 2022.

C.10.d. Reporting
This sub-provision sets forth the reporting required in this provision, including the specific submittals and reports, and the annual reporting requirements.

Costs of Trash Control

Costs for either enhanced trash management measure implementation or installation and maintenance of trash capture devices are significant, but when spread over several years, and when viewed on a per-capita basis, are reasonable. Also, Trash capture devices have been installed by cities in California and in the Bay Region.

Trash and litter are costly to remove from our aquatic resource environments. Staff from the California Coastal Commission report that the Coastal Cleanup Day budget statewide: $200,000-250,000 for staff Coastal Commission staff, and much more from participating local agencies. The main component of this event is the 18,000 volunteer-hours which translates to $3,247,200 in labor, and so is equivalent to $3,250,000-3,500,000 per year to clean up 903,566 pounds of trash and recyclables at $3.60 to $3.90 per pound. This is one of the most cost-effective events because of volunteer labor and donations. The County of Los Angeles spends $20 million per year to sweep beaches for trash, according to Coastal Commission staff.

In Oakland, the Lake Merritt Institute is currently budgeted at $160,000 per year, with trash and litter removal from the Lake as a major task. The budget has increased from about $45,000 in 1996 to current levels. In the period of 1996-2005 the Lake Merritt Institute staff, utilizing significant volunteer resources, and accomplishing other education tasks, removed 410,859 pounds of trash from the Lake at cost of $951,725 at $2.3 per pound.

The City of Oakland reports that installation of two vortex and screen separators, titled by their brand name of CDS units, which cost, according to the table below, $821,000 for installations that treat tributary catchments of 192 acres before discharge to Lake Merritt at $4,276 per acre.

City of Oakland—CDS Unit Overview 9-07

Existing CDS unit location	Outfall number	Treatment area (acres)	Cost of implementation	Sizing	Maintenance requirements	Comments
Intersection of 27th and Valdez Streets	56*	71	$203,000 to contactor; plus ~$100,000 City costs	73 cfs peak flow; 36" stormdrain; Unit sizing: 18'6'6' box with 10'11"diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Required relocation of electrical conduit. Water main and gas line were also in the way; the box was adjusted to accommodate these conflicts.
Intersection of 22nd and Valley Streets	56*	121	$368,000 to contactor; plus ~$150,000 City costs	115 cfs peak flow; 54" stormdrain; Unit sizing: 18'8.5'6' box with 12'diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Installation costs were higher than anticipated. Sewer lines and PGE facilities were exposed that were not known before. Unit had to be modified and poured-in-place.

* The city is treating 192 acres or 72 percent of the 252 acres draining to outfall 56.

Mr. Morad Sedrak, the TMDL Implementation Program Manager, Bureau of Sanitation, Department of Public Works, City of Los Angeles, reports that the City plans to invest $72 million dollars for storm drain catch basin based capture device installation primarily, for a City of 4 million population, for a per-capita cost of $18 dollars. This effort is occurring over a span of over five years, for an annual per-capita cost of under $4.

Mr. Sedrak reports that O&M costs are not anticipated to increase, as the City of L.A. is already budgeted for 3 catch basin cleanings per year. He also states that catch basin inserts installed inside the catch basin in front of the lateral pipe, which have been certified by the Los Angeles Regional Water Board as total capture trash control devices, cost approximately $800 to $3,000 depending on the depth of the catch basin. The price quoted includes installation and the insert is made of Stainless Steel 316.

Furthermore, the price for catch basin opening screen covers, which are designed to retain trash at the street level for removal by sweepers, and also to open if there is a potential flooding blockage, ranges roughly from $800 to $4,500, depending on the opening size of the catch basin.

The City of Los Angeles has currently spent 27 million dollars on a retrofit program to install catch basin devices in approximately 30% of its area, with either inserts or screens

or both. Mr. Sedrak states that Los Angeles plans to spend $45 million over the next 3 years to retrofit the remaining catch basins within the City. The total number of catch basins within the City is approximately 52,000.

Here are some links to information about the Los Angeles trash control approach:

http://www.lastormwater.org/Siteorg/program/TMDLs/trashtmdl.htm

http://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdf)

http://www.lastorhttp://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdfmwater.org/Siteorg/program/poll_abate/cbscreens.htm)

http://www.lastormwater.org/Siteorg/program/poll_abate/cbinserts.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbscreens.htm

Additional cost information on various trash capture devices are included in the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) BMP Trash Toolbox (July 2007). The Toolbox contains cost information for both trash capture devices and enhanced trash management measure implementation, covers a broad range of options and also discusses operation and maintenance costs. Catch basin screens are included with an earlier estimate by the City of Los Angeles of $44 million over 10 years to install devices in 34,000 inlets.

Litter booms are also discussed with an example from the City of Oakland. The Damon Slough litter boom or sea curtain cost $36,000 for purchase and installation, including slough side access improvements for maintenance and trash removal. Annual maintenance costs have been $77,000 for weekly maintenance, which includes use of a crane for floating trash removal.

The costs of the full trash capture device installation required in the Order is significantly less than the previous tentative orders requirements for trash capture, as set forth in the table below.

Trash Capture Cost Estimates – Final TO versus previous TOs

Trash Capture Device Requirement	Acres of Capture	Cost for Trash Capture Installation	Percent of Retail/Wholesale Commercial (ABAG 2005)	Per capita $, Population = 4,533,634
Final TO: Implemented in Year 4 – 30% of Retail/Wholesale Commercial	5527	**$ 27,635,000**	30%	$6.06
Previous TOs: Implement in Year 4, 5% of Urban/suburban land	0.05 X 529,712 = 26,485 (BASMAA) or ABAG 0.05 X 655,015 = 32,750	$132,425,000 or $163,750,000	5% of Urban/suburban land	$29 or $36

30% X 18,426 acres = 5527 acres X $5000/acre = **$27,635,000** for four counties for installation; maintenance will add an additional cost. The Permittees may work cooperatively to achieve this capture installation requirement, and there is the potential for Regional revenue development. The previous requirement was 5% of (.05 X 655,015) (529,712 by BASMAA's count) acres of urban land (from ABAG 2005 table) = 32,750 acres, ((26,486 according to BASMAA) X $5000 = $132,000,000).

C.11. Mercury Controls

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board has approved this Basin Plan amendment, and USEPA approval is pending. C.11-2 through C.11-6 are components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 The 2003 load of mercury from urban runoff is 160 kg/yr, and the aggregate WLAs for urban runoff is 80 kg/yr and shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and Caltrans. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, *source category*) including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

C.11-4 The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff to the MEP and remain consistent with the section of this chapter titled, *Surface Water Protection and Management—Point Source Control—Stormwater Discharges*.

C.11-5 The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

a. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

b. Develop and implement a mercury source control program;

c. Develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

d. Monitor levels of methylmercury in discharges;

e. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

f. Develop an equitable allocation-sharing scheme in consultation with Caltrans (see below) to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board;

g. Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

h. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Individual WLAs (see Table 4-w of the Basin Plan amendment), by using one of the following methods:

   (1) Quantify the annual average mercury load reduced by implementing

      i. Pollution prevention activities, and
      ii. Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

   (2) Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

   (3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

C.11-6 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Specific Provision C.11 Requirements

The C.11 provisions implement the mercury TMDL and follow the general approach for sediment-bound pollutants discussed above where we seek to build our understanding and level of certainty concerning control actions by implementing actions in a phased approach. We then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective. Accordingly, there are some provisions that will be implemented throughout the Region, some that will be tested on a limited basis first before making the decision to expand region-wide in the next permit term. Some of the measures are companion measures for efforts targeting PCBs.

Provision C.11.a. Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and Provision C.11.a requires promotion, facilitation and/or participation in these region-wide recycling efforts to increase effectiveness and public participation.

Provision C.11.b. The remand resolution of the SF Bay Mercury TMDL made it clear that methyl mercury monitoring must be required of all NPDES Permittees. Methyl mercury is the most toxic form of mercury, and there is very little information, if any, regarding the concentrations of methyl mercury found in urban runoff. The purpose of the monitoring required through this provision is to obtain seasonal information and to assess the magnitude and spatial/temporal patterns of methylmercury concentrations in urban runoff.

Provisions C.11.c through Provision C.11.f relate to identical C.12 Provisions for PCBs. For each of these, sites for pilot studies will primarily be chosen on the basis of the potential for reducing PCB loads, but consideration will be given to mercury removal in the final design and implementation of the studies. For more information, see the fact sheet discussions for
Provisions C.12.c, d, e, and f and Provision C.2.g.

Provision C.11.g implements the TMDL requirement that Permittees measure mercury loads and loads reduced from program activities. There are three options for accomplishing this requirement: quantifying mercury loads reduced through implemented control measures, quantify mercury loading into the Bay from urban runoff, or demonstrating that the concentration of mercury on suspended sediment particles is below the sediment target of 0.2 ppm. It is likely that the first option will be chosen, and this will require development of an accounting system to establish what load reductions result from program activities. This will not be difficult for those measures that involve capture and measurement of mercury-containing sediment, but it will be more challenging for efforts that do not involve direct measurement.

Provision C.11.h is equivalent to Provision C.12.h for PCBs and is motivated by the same remaining technical uncertainties.

Provision C.11.i requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities.

Provision C.11.j requires an allocation sharing scheme to be developed in cooperation with Caltrans. The urban runoff TMDL allocation implicitly includes loads from Caltrans facilities.

C.12. PCBs Controls

The C.12 provisions are consistent with the regulatory approach and implementation plan of the San Francisco Bay PCBs TMDL adopted by the Water Board. They follow the general approach for sediment-bound pollutants discussed above where we seek to build our understanding and level of certainty concerning control actions by implementing actions in a phased approach. We then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective. Accordingly, there are some provisions that will be implemented throughout the region, some that will be tested on a limited basis first before making the decision to expand region-wide in the next permit term.

Fact Sheet Findings in Support of Provision C.12

C.12-2 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. Approval by the State Water Board and USEPA is pending. The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit.

"Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on best available technology economically achievable. All permits shall remain consistent with Section 4.8 - Stormwater Discharges.

In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in

attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Stormwater runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an stormwater runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question."

C.12-3 **Some PCB congeners have dioxin-like properties.** Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

Specific Provision C.12 Requirements

Provision C.12.a. PCBs were used in a variety of electrical devices and equipment, some of which still can be found during industrial inspections. Provision C.12.a requires the stormwater management agencies to ensure that industrial inspectors can identify PCBs or PCB-containing equipment during their inspections and make sure appropriate agencies are notified if they are found. There is enough experience and/or background knowledge about the presence of such PCB-containing equipment that this measure should be implemented region-wide during this permit term.

Provision C.12.b. PCBs are used in a variety of building materials like caulks and adhesives. PCBs contained in such materials can be liberated and transported in runoff during and after demolition and renovation activities. At this point, it is not known how extensive this type of PCB contamination is in the region. Therefore, the expectation for

this permit term is that Permittees conduct pilot studies (Provision C.12.b) that includes evaluation of the presence of PCBs in such materials, sampling and analysis, and BMP development to prevent PCBs in these materials from being released into the environment during demolition and renovation. Conducting these pilot tests and reporting results will help determine if control measures for PCBs from these sources should be implemented in a more widespread fashion in the next permit term.

Provisions C.12.c and C.12.d form the core of PCB-related efforts for this permit term, and these efforts are crucial for the iterative development of effective control measures for PCBs and other sediment-bound pollutants in future permit terms. The overarching purpose of these two provisions is to conduct five comprehensive pilot studies in locations known to contain high levels of PCBs. The pilot studies will involve a combination of efforts including abatement of the on-land PCB contamination (Provision C.12.c) as well as exploration of sediment management practices (C.12.d) that can be implemented by municipalities to control migration of the PCBs away from the source of contamination. We expect that a suite of control measures will be applied in these five pilot regions to determine the optimum suite of measures for controlling PCB contamination and preventing its transport through the storm drain system. The lessons learned through these pilot efforts will inform the direction of future efforts targeting contaminated zones throughout the Region in subsequent permit terms.

Provision C.12.e. One promising management practice for addressing a wide range of sediment-bound contaminants, including PCBs is on-site treatment. Provision C.12.e requires selection of 10 locations for pilot studies spanning treatment types as described in the Provision. This effort can be conducted in conjunction with Provision C.12.d such that on-site treatment efforts conducted as part of C.12.d can be counted toward accomplishing C.12.e requirements.

Provision C.12.f. Another promising management practice is the diversion of certain flows to the sanitary sewers to be treated by the local POTWs. Provision C.12.f requires an evaluation of locations for diversion pilot studies and implementation of pilot studies at five pump stations. This effort can be conducted in conjunction with Provision C.12.d such that POTW diversion efforts conducted as part of C.12.d can be counted toward accomplishing C.12.f requirements. Also see discussion under Provision C.2.g.

Provision C.12.g requires, consistent with the approach taken in the PCBs TMDL, development of a monitoring system to quantify PCBs loads and loads reduced through source control, treatment and other management measures. This monitoring system will be used to determine progress toward meeting TMDL load allocations. This system should establish the baseline loading or loads reduced against which to compare future loading and load reductions.

Provision C.12.h. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.h requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed.

Provision C.12.i. requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes two types of actions for urban runoff management agencies. These actions from the SSO implementation are implemented through this permit as provisions to control urban runoff sources of copper as well as measures to resolve remaining technical uncertainties for copper fate and effects in the Bay.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[120] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the permit provisions target major sources of copper including vehicle brake pads, architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 Site specific water quality objectives for dissolved copper have already been adopted for South San Francisco Bay will soon be adopted for the rest of the Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the site-specific water quality objectives.

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. The provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

[120] TDC (TDC Environmental). 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. The provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Vehicle brake pads are a large source of copper to the urban environment. There are cooperative efforts (e.g., the Brake Pad Partnership) evaluating the potential effects of brake wear debris on water quality. This cooperative effort could result in voluntary actions to reduce the amount of copper in automobile brake pads. However, this voluntary reduction is uncertain, and some aftermarket brake pads are possibly unaffected by the voluntary action. Moreover, the benefits of copper content reduction might be slowly realized because there is a great deal of wear debris already deposited on watersheds, and this wear debris will continue to be deposited as long as copper-containing brake pads are in use. Therefore, there might need to be additional measures addressing copper-containing wear debris on the part of urban stormwater management agencies. Provision C.13.c requires ongoing participation in the cooperative efforts of the Partnership.

Provision C.13.d Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

The most recent Staff Report[121] for the SSOs north of the Dumbarton Bridge also describes several areas of remaining technical uncertainty, and **Provision C.13.e** requires studies to address these uncertainties. Two of these areas are of particular concern, and urban runoff management agencies are required to conduct or cause to be conducted studies to help resolve these two uncertainties.

The first uncertainty concerns copper's tendency, even at low concentrations, to cause a variety of sublethal (not resulting in death, but in impaired function) effects. The studies documenting such effects have, so far, been conducted in the laboratory in experiments modeling freshwater systems, and many of them have not yet been published. A number of uncertainties need to be resolved before interpretation and extension to marine or estuarine systems can be attempted.[122]

The second uncertainty is that surface sediment samples have exhibited toxicity to test organisms at a number of sites throughout the Bay. Research has shown that sediment toxicity to bivalve embryos is caused by "elevated concentrations of divalent cations....with copper as the most probable cause of toxicity." Additional studies are needed to further examine whether water and sediment toxicity tests used in the RMP are accurate predictors of impacts on the Bay's aquatic and benthic communities.

[121] SFBRWQCB (San Francisco Bay Regional Water Quality Control Board). 2007. *Copper Site-Specific Objectives in San Francisco Bay: Proposed Basin Plan Amendment and Draft Staff Report.* June.
[122] Ibid.

C.14. Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium

This section is predicated on the fact that legacy pesticides, PBDEs, and selenium are either known to impair or potentially impair Bay and tributary beneficial uses. Further, urban stormwater is a likely or potential cause or contributor to such impairment. The requirements for this permit term are primarily information gathering consistent with Provision C.1. Namely, this provision requires that Permittees gather information on a number of pollutants of concern (e.g., PBDEs, DDT, dieldrin, chlordane, selenium) for which TMDLs are planned or are in the early stages of development.

The goals of the provisions in this section are the following: One goal is to determine the concentrations and distribution of these pollutants and if urban runoff is a conveyance mechanism associated with their possible impairment of San Francisco Bay.

A second goal is to gather and provide information to allow calculation of PBDEs, legacy pesticides, and selenium loads to San Francisco Bay from urban runoff conveyance systems. A third goal is to identify control measures and/or management practices to eliminate or reduce discharges of PBDEs, legacy pesticides, or selenium conveyed by urban runoff conveyance systems. The Permittees are encouraged to work with the other municipal stormwater management agencies in the Bay Region to implement a plan to identify, assess, and manage controllable sources of these pollutants in urban runoff. The control actions initiated for PCBs will form the core of initial actions targeting sediment bound pollutants like these. It is very likely that some of these PCB control measures (see Provision C.12) warrant consideration for the control of sediment bound pollutants like PBDEs, legacy pesticides, and possibly others as well.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC section 1337, and Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators, "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges.

Fact Sheet Findings in Support of Provision C.15.

Prohibition A.1. effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, we recognize that certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1. if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1. if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1. if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall develop and implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b.'s requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective

pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

Provision C.15.b.i.(1). Pumped Groundwater from Non Drinking Water Aquifers. These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Pumped groundwater from non drinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit.

Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains. This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

Provision C.15.b.ii. Air Conditioning Condensate. Small air conditioning units are usually operated during the warm weather months. The condensate from these units are uncontaminated and unlikely to reach a storm drain or waters of the State because they tend to be low in volume and tend to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the condensate tends to be uncontaminated, it picks up contaminates on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

Provision C.15.b.iii. Planned, Unplanned, and Emergency Discharges of the Potable Water System.. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two very toxic chemicals to aquatic life. Potable water discharges can cause erosion and scouring of stream and creek banks, and sedimentation can result if effective BMPs are not implemented. Therefore, appropriate dechlorination and monitoring of chlorine residual, pH and turbidity, particularly for planned discharges of potable water, are crucial to prevent adverse impacts in the receiving waters.

This section of the Permit requires Permittees to notify Water Board staff at least one week in advance for planned discharges of potable water with a flowrate of 250,000 gpd or more or a total 500,000 gallons or more. These planned discharges must meet specified discharge benchmarks for chlorine residual, pH, and turbidity.

To address unplanned discharges of potable water such as non-routine water line breaks, leaks, overflows, fire hydrant shearing, and emergency flushing, this section of the Permit requires Permittees to implement administrative BMPs such as source control measures, managerial practices, operations and maintenance procedures or other measures to reduce or prevent potential pollutants from being discharged during these events. This Provision also contains specific notification and monitoring requirements to assess immediate and continued impacts to water quality when these events happen.

This section of the Permit acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs that do not interfere with immediate emergency response operations or impact public health and safety. Reporting requirements for such events shall be determined by Water Board staff on a case-by-case basis.

Provision C.15.b.iv. Individual Residential Car Washing. Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.

Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges. These types of discharges can potentially contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This Provision also requires Permittees to coordinate with local sanitary agencies in these efforts.

Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering. Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the use fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

Provision C.15.b.vii. requires Permittees to identify and describe additional types and categories of discharges not listed in Provision C.15.b., that they propose to conditionally exempt from Prohibition A.1., in periodic submittals to the Executive Officer.

Provision C.15.b.viii. establishes a mechanism to authorize under the Permit non-stormwater discharges owned or operated by the Permittees.

Attachment J: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment J includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with USEPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment J.

Fact Sheet Attachment 6.1

Construction Inspection Data

Construction Inspection Data

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Runon and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	9/30/08	Dry	0	Written Notice			x					Driveway not stabilized				
Panoramic Views	10/15/08	Dry	0.5										x			50' of driveway rocked.
Panoramic Views	11/15/08	Rain	3	Stop Work	x		x				x	Uncovered graded lots eroding; Sediment entering a stormdrain that didn't have adequate protection.				
Panoramic Views	11/15/08	Drizzling	0.25										x			Lots blanketed. Storm drains pumped. Street cleaned.
Panoramic Views	12/1/08	Dry	4	Verbal Warning					x			Porta potty next to stormdrain.	x			Porta potty moved away from stormdrain.
Panoramic Views	1/15/08	Rain	3.25	Written Warning	x					x		Fiber rolls need maintenance; Tire wash water flowing into street				
Panoramic Views	1/25/09	Dry	0										x			Fiber rolls replaced.

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Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Runon and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	2/28/09	Rain	2.4	Stop Work	x		x				x	Slope erosion control failed. Fiber rolls at the bottom of the hill flattened. Sediment laden discharge skipping protected stormdrains and entering unprotected stormdrains.				
Panoramic Views	2/28/09	Rain	0.1											x		Fiber rolls replaced. Silt fences added. More stormdrains protected. Streets cleaned. Slope too soggy to access.
Panoramic Views	3/15/09	Dry	1	Citation with Fine					x		x	Paint brush washing not designated	x			Street and storm drains cleaned. Slopes blanketed.
Panoramic Views	4/1/09	Dry	0.5	Citation with Fine							x	Concrete washout overflowed; Evidence of illicit discharge				
Panoramic Views	4/15/09	Dry	0										x			Concrete washout replaced; Storm drain and line cleaned.

Fact Sheet Attachment 10.1

303(d) Trash Resolution and Staff Report February 2009

Available at
http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0008.pdf

ATTACHMENT A

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/08 to 06/09
City of Eden Annual Report FY 2008-09

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/07, Application deemed complete 1/30/08, Project approved 7/16/08	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/08, Application deemed complete 8/2/08, Project approved 12/12/08	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/08 to 06/09
City of Eden Annual Report FY 2008-09

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/09, Application deemed complete 4/10/09; Project approved 6/30/09	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/06, Application deemed complete 10/6/08, Project approved 12/9/08, Construction scheduled to begin 7/10/09	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address** – Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description** – Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed** – State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area** – For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project** – Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date

8. **Source Control Measures** – List all source control measures that have been or will be included in the project.

9. **Site Design Measures** – List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed** – List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism** – List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used** – List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1))** – On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2))** – On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

ATTACHMENT B

Provision C.3.g.
Alameda Permittees
Hydromodification Management Requirements

Alameda Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control*: Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[123] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 6 of this Attachment.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[124]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 6 of this Attachment.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[125]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User's Manual.[126] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with the requirements of this Attachment and Provision C.3.f.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[127] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the

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[123] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[124] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[125] *The Bay Area Hydrology Model – A Tool for Analyzing Hydromodification Effects of Development Projects and Sizing Solutions,* Bicknell, J., D. Beyerlein, and A. Feng, September 26, 2006. Available at http://www.scvurppp-w2k.com/permit_c3_docs/Bicknell-Beyerlein-Feng_CASQA_Paper_9-26-06.pdf

[126] *The Bay Area Hydrology Model – A Tool for Analyzing Hydromodification Effects of Development Projects and Sizing Solutions,* Bicknell, J., D. Beyerlein, and A. Feng, September 26, 2006. Available at http://www.scvurppp-w2k.com/permit_c3_docs/Bicknell-Beyerlein-Feng_CASQA_Paper_9-26-06.pdf

[127] Such models include US EPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Surface Water Management Model (SWMM).

pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a-e above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[128] runoff to the maximum extent practicable. In addition, the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure that is not otherwise required by the Water Board or other regulatory agency. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

[128] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media and include bioretention units, bioswales, basins, planter boxes, tree wells, media filters, and green roofs.

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM Project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are in areas of HM applicability shown in the Alameda Permittees' HM Map.[129] (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

To assist in location and evaluation of project applicability, the Alameda Permittees' HM Map depicts a number of features including the following:

- Hardened channels and culverts at least 24 inches in diameter (green solid or dashed lines);
- Natural channels (red lines);
- Boundaries of major watersheds (light blue lines); and
- Surface streets and highways (gray or black lines).

These data are of varying age, precision and accuracy and are not intended for legal description or engineering design. Watersheds extending beyond the County boundaries are shown for illustration purposes only. Project proponents are responsible for verifying and describing actual conditions of site location and drainage.

5. Alameda Permittees' HM Map is color-coded as follows:

a. **Solid pink areas** – Solid pink designates hilly areas, where high slopes (greater than 25 percent) occur. The HM Standard and all associated requirements apply in areas shown in solid pink on the map. In this area, the HM Standard does *not* apply if a project proponent demonstrates that all project runoff will flow through enclosed storm drains, existing concrete culverts, or fully hardened (with bed and banks continuously concrete-lined) channels to the tidal area shown in light gray.

b. **Purple/red hatched areas** – These are upstream of areas where hydromodification impacts are of concern because of factors such as bank instability, sensitive habitat, or restoration projects. The HM Standard and all associated requirements apply in areas

[129] The watercourses potentially susceptible to hydromodification impacts are identified based on an assessment approach developed by Balance Hydrologics (2003).

shown in purple/red (printer-dependant) hatch marking on the map. Projects in these areas may be subject to additional agency reviews related to hydrologic, habitat or other watershed-specific concerns.

c. **Solid white areas** – Solid white designates the land area between the hills and the tidal zone. This area may be susceptible to hydromodification unless the site is connected to storm drains that discharge to the tidal area. The HM Standard and all associated requirements apply to projects in solid white areas *unless* a project proponent demonstrates that all project runoff will flow through fully hardened channels.[130] Short segments of engineered earthen channels (length less than 10 times the maximum width of trapezoidal cross-section) can be considered resistant to erosion if located downstream of a concrete channel of similar or greater length and comparable cross-sectional dimensions. Plans to restore a hardened channel may affect the HM Standard applicability in this area.

d. **Solid gray areas** – Solid gray designates areas where streams or channels are tidally influenced or primarily depositional near their outfall in San Francisco Bay. The HM Standard does not apply to projects in this area. Plans to restore a hardened channel may affect the HM Standard applicability in this area.

e. **Dark gray, *Eastern County* area** – Dark gray designates the portion of eastern Alameda County that lies outside the discharge area of this NPDES permit. This area is in the Central Valley Regional Water Quality Control Board's jurisdiction.

6. Potential Exceptions to Alameda Permittees' HM Map Designations

The Program may choose to prepare a User Guide[131] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[132] After the Program has collated its methods into a User Guide format, received approval of the User Guide from the Executive Officer,[133] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional HM controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

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[130] In this paragraph, *fully hardened channels* include enclosed storm drains, existing concrete culverts, or channels whose bed and banks are continuously concrete-lined to the tidal area shown in light gray on the map.
[131] The User Guide may be offered under a different title.
[132] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[133] The User Guide shall not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

ATTACHMENT C

Provision C.3.g.
Contra Costa Permittees
Hydromodification Management Requirements

Contra Costa Permittees Hydromodification Management Requirements

1. **Demonstrating Compliance with the Hydromodification Management (HM) Standard**

   Contra Costa Permittees shall ensure that project proponents shall demonstrate compliance with the HM Standard by demonstrating that any one of the following four options is met:

   a. *No increase in impervious area.* The project proponent may compare the project design to the pre-project condition and show that the project will not increase impervious area and also will not facilitate the efficiency of drainage collection and conveyance.

   b. *Implementation of hydrograph modification IMPs.* The project proponent may select and size IMPs to manage hydrograph modification impacts, using the design procedure, criteria, and sizing factors specified in the Contra Costa Clean Water Program's *Stormwater C.3 Guidebook.* The use of flow-through planters shall be limited to upper-story plazas, adjacent to building foundations, on slopes where infiltration could impair geotechnical stability, or in similar situations where geotechnical issues prevent use of IMPs that allow infiltration to native soils. Limited soil infiltration capacity in itself does not make use of other IMPs infeasible.

   c. *Estimated post-project runoff durations and peak flows do not exceed pre-project durations and peak flows.* The project proponent may use a continuous simulation hydrologic computer model such as USEPA's Hydrograph Simulation Program—Fortran (HSPF) to simulate pre-project and post-project runoff, including the effect of proposed IMPs, detention basins, or other stormwater management facilities. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, using limitations and instructions provided in the Program's *Stormwater C.3 Guidebook*, and shall show that the following criteria are met:

   i. For flow rates from 10 percent of the pre-project 2-year runoff event (0.1Q2) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10 percent over more than 10 percent of the length of the flow duration curve.

   ii. For flow rates from 0.5Q2 to Q2, the post-project *peak flows* shall not exceed pre-project peak flows. For flow rates from Q2 to Q10, post-project peak flows may exceed pre-project flows by up to 10 percent for a 1-year frequency interval. For example, post-project flows could exceed pre-project flows by up to 10 percent for the interval from Q9 to Q10 or from Q5.5 to Q6.5, but not from Q8 to Q10.

d. *Projected increases in runoff peaks and durations will not accelerate erosion of receiving stream reaches.* The project proponent may show that, because of the specific characteristics of the stream receiving runoff from the project site, or because of proposed stream restoration projects, or both, there is little likelihood that the cumulative impacts from new development could increase the net rate of stream erosion to the extent that beneficial uses would be significantly impacted. To use this option, the project proponent shall evaluate the receiving stream to determine the relative risk of erosion impacts and take the appropriate actions as described below and in Table A-1. Projects 20 acres or larger in total area shall not use the medium risk methodology in *(d)ii* below.

i. ***Low Risk.*** In a report or letter report, signed by an engineer or qualified environmental professional, the project proponent shall show that all downstream channels between the project site and the Bay/Delta fall into one of the following *low-risk* categories.

(1) Enclosed pipes.

(2) Channels with continuous hardened beds and banks engineered to withstand erosive forces and composed of concrete, engineered riprap, sackcrete, gabions, mats, and such. This category excludes channels where hardened beds and banks are not engineered continuous installations (i.e., have been installed in response to localized bank failure or erosion).

(3) Channels subject to tidal action.

(4) Channels shown to be aggrading (i.e., consistently subject to accumulation of sediments over decades) and to have no indications of erosion on the channel banks.

ii. ***Medium Risk.*** Medium risk channels are those where the boundary shear stress could exceed critical shear stress as a result of hydrograph modification but where either the sensitivity of the boundary shear stress to flow is low (e.g., an oversized channel with high width to depth ratios) or where the resistance of the channel materials is relatively high (e.g., cobble or boulder beds and vegetated banks). In *medium-risk* channels, accelerated erosion due to increased watershed imperviousness is not likely but is possible, and the uncertainties can be more easily and effectively addressed by mitigation than by additional study.

In a preliminary report, the project proponent's engineer or qualified environmental professional shall apply the Program's *Basic Geomorphic Assessment*[134] methods and criteria to show each downstream reach between the project site and the Bay/Delta is either at *low-risk* or *medium-risk* of accelerated erosion due to watershed development. In a following, detailed report, a qualified stream geomorphologist[135] shall use the Program's Basic Geomorphic Assessment methods and criteria, available information, and current field data to evaluate each *medium-risk* reach. For *each medium-risk* reach, the detailed report shall show one of the following:

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[134] Contra Costa Clean Water Program *Hydrograph Modification Management Plan*, May 15, 2005, Attachment 4, pp. 6-13. This method must be made available in the Program's *Stormwater C.3 Guidebook.*

[135] Typically, detailed studies will be conducted by a stream geomorphologist retained by the lead agency (or, on the lead agency's request, another public agency such as the Contra Costa County Flood Control and Water Conservation District) and paid for by the project proponent.

(1) A detailed analysis, using the Program's criteria, showing the particular reach may be reclassified as *low-risk.*

(2) A detailed analysis, using the Program's criteria, confirming the *medium-risk* classification, and:

(a) A preliminary plan for a mitigation project for that reach to stabilize stream beds or banks, improve natural stream functions, and/or improve habitat values, and

(b) A commitment to implement the mitigation project timely in connection with the proposed development project (including milestones, schedule, cost estimates, and funding), and

(c) An opinion and supporting analysis by one or more qualified environmental professionals that the expected environmental benefits of the mitigation project substantially outweigh the potential impacts of an increase in runoff from the development project, and

(d) Communication, in the form of letters or meeting notes, indicating consensus among staff representatives of regulatory agencies having jurisdiction that the mitigation project is feasible and desirable. In the case of the Regional Water Board, this must be a letter, signed by the Executive Officer or designee, specifically referencing this requirement. (This is a preliminary indication of feasibility required as part of the development project's Stormwater Control Plan. All applicable permits must be obtained before the mitigation project can be implemented.)

iii. ***High Risk.*** High-risk channels are those where the sensitivity of boundary shear stress to flow is high (e.g., incised or entrenched channels, channels with low width-to-depth ratios, and narrow channels with levees) or where channel resistance is low (e.g., channels with fine-grained, erodible beds and banks, or with little bed or bank vegetation). In a *high-risk* channel, it is presumed that increases in runoff flows will accelerate bed and bank erosion.

To implement this option (i.e., to allow increased runoff peaks and durations to a high-risk channel), the project proponent must perform a comprehensive analysis to determine the design objectives for channel restoration and must propose a comprehensive program of in-stream measures to improve channel functions while accommodating increased flows. Specific requirements are developed case-by-case in consultation with regulatory agencies having jurisdiction. The analysis will typically involve watershed-scale continuous hydrologic modeling (including calibration with stream gauge data where possible) of pre-project and post-project runoff flows, sediment transport modeling, collection and/or analysis of field data to characterize channel morphology including analysis of bed and bank materials and bank vegetation, selection and design of in-stream structures, and project environmental permitting.

2. IMP Model Calibration and Validation

The Program shall monitor flow from Hydrograph Modification Integrated Management Practices (IMPs) to determine the accuracy of its model inputs and assumptions. Monitoring

shall be conducted with the aim of evaluating flow control effectiveness of the IMPs. The Program shall implement monitoring where feasible at future new development projects to gain insight into actual versus predicted rates and durations of flow from IMP overflows and underdrains.

At a minimum, Permittees shall monitor five locations for a minimum of two rainy seasons. If two rainy seasons are not sufficient to collect enough data to determine the accuracy of model inputs and assumptions, monitoring shall continue until such time as adequate data are collected.

Permittees shall conduct the IMP monitoring as described in the IMP Model Calibration and Validation Plan in Section 5 of this Attachment. Monitoring results shall be submitted to the Executive Officer by June 15 of each year following collection of monitoring data. If the first year's data indicate IMPs are not effectively controlling flows as modeled in the HMP, the Executive Officer may require the Program to make adjustments to the IMP sizing factors or design, or otherwise take appropriate corrective action. The Permittees shall submit an IMP Monitoring Report by August 30 of the second year[136] of monitoring. The IMP Monitoring Report shall contain, at a minimum, all the data, graphic output from model runs, and a listing of all model outputs to be adjusted, with full explanation for each. Board staff will review the IMP Monitoring Report and require the Program to make any appropriate changes to the model within a 3-month time frame.

3. Stormwater C.3 Guidebook and IMP Design Criteria

The Current Contra Costa Clean Water Program C.3 Guidebook, 4th Edition (September 2008) shall be implemented until the expiration of this permit (November 2014). Any significant changes in the designs of the IMPs, their sizing factors or manner of implementation shall be approved by the Water Board.

4. IMP Model Calibration and Validation Plan Objective

Monitoring shall be conducted with the aim of evaluating flow control effectiveness of the IMPs. The IMPs were redesigned in 2008 to meet a low flow criterion of 0.2Q2, not 0.1Q2, which is current HMP standard for Contra Costa County. The Program shall implement monitoring at future new development projects at a minimum of five locations and for a minimum of two rainy seasons to gain insight into actual versus predicted rates and durations of flow from IMP overflows and underdrains. If two rainy seasons are not sufficient to collect enough data to determine the accuracy of model inputs and assumptions, monitoring shall continue until such time as adequate data are collected.

a. **The Dischargers Shall Identify and Establish Monitoring Sites – Program staff** shall work with municipal Co-Permittees to identify potential monitoring sites on development projects that implement IMPs. Proposed sites shall be identified during review of planning and zoning applications so that monitoring stations can be designed and constructed as part of the development project. Monitoring shall begin after the development project is complete and the site is in use.

   Criteria for appropriate sites include, but are not limited to, the following:

[136] If the monitoring extends beyond 2 years, an IMP Monitoring Report shall be submitted by August 30 annually until model calibration and validation is complete.

- To ensure applicability of results, the development project and IMPs should be typical of development sites and types of IMPs foreseen throughout the County. In particular, at least one each of the infiltration planter, flow-through planter, and *dry* swale shall be selected for monitoring.
- The area tributary to the IMP should be clearly defined, should contain and direct runoff at all rainfall intensities to the IMP. Two monitoring locations shall contain tributary areas that are a mix of pervious and impervious areas to test the pervious area simplifying assumptions used in the HMP, Table 14, Attachment 2, page 49. If no such locations are constructed by the monitoring period, modeling of mixed (pervious and impervious) tributary areas can substitute for direct monitoring of this type of location.
- The site shall be easily accessible at all times of day and night to allow inspection and maintenance of measurement equipment.
- Hourly rain gauge data representative of the site's location shall be available.

b. **Documentation of Monitoring Sites** – The Dischargers shall record and report (i.e., document) pertinent information for each monitoring site. Documentation of each monitoring site shall include the following:
   - Amount of tributary area;
   - Condition of roof or paving;
   - Grading and drainage to the IMP, including calculated time of concentration.
   - Locations and elevations of inlets and outlets;
   - As-built measurements of the IMP including depth of soil and gravel layers, height of underdrain pipe above the IMP floor or native soil;
   - Detailed specifications of soil and gravel layers and of filter fabric and other appurtenances; and
   - Condition of IMP surface soils and vegetation.

c. **Design, Construction, and Operation of Monitoring Sites** – The Dischargers shall ensure that IMPs selected for monitoring are equipped with a manhole, vault, or other means to install and access equipment for monitoring flows from IMP overflows and underdrains.

   Development of suitable methods for monitoring the entire range of flows may require experiment. The Program and Water Board are interested in the timing and duration of very low flows from underdrains, as well as higher flows from IMP overflows. The Dischargers shall ensure that equipment is configured to measure the entire range of flows and to avoid potential clogging of orifices used to measure low flows.

   The Dischargers shall ensure that construction of IMPs is inspected carefully to ensure that IMPs are installed as designed and to avoid potential operational problems. For example, gravel used for underdrain layers should be washed free of fines, and filter fabric should be installed without breaks.

The Dischargers shall ensure that, following construction, artificial flows are applied to the IMP to verify the IMP and monitoring equipment are operating correctly and to resolve any operational problems prior to measuring flows from actual rain storms.

The Dischargers shall ensure that monitoring equipment is properly maintained. Maintenance of monitoring equipment will require, initially, inspections during and after storms that produce runoff. The inspection and maintenance schedule may be adjusted as additional experience is gained.

d. **Data to be Obtained** – The Dischargers shall collect the following data for each IMP, during the monitoring period:

- Hourly rainfall and more frequent rainfall data where available;
- Hourly IMP outflow and 15-minute outflow for all time periods in which sub-hourly rainfall data are available;
- Hourly IMP inflow (if possible) and more frequent inflow (if possible) when sub-hourly rainfall data are available; and
- Notes and observations.

e. **Evaluation of Data** – The principal use of the monitoring data shall be a comparison of predicted to actual flows. The Dischargers shall ensure that the HSPF model is set up as it was to prepare the curves in Attachment 2 of the HMP, with appropriate adjustments for the drainage area of the IMP to be monitored and for the actual sizing and configuration of the IMP. Hourly rainfall data from observed storms shall be input to the model, and the resulting hourly predicted output recorded. Where sub-hourly rainfall data are available, the model shall be run with, and output recorded for, 15-minute time steps.

The Dischargers shall compare predicted hourly outflows to the actual hourly outflows. As more data are gathered, the Dischargers may examine aggregated data to characterize deviations from predicted performance at various storm intensities and durations.

Because high-intensity storms are rare, it will take many years to obtain a suitable number of events to evaluate IMP performance under overflow conditions. Underdrain flows will occur more frequently, but possibly only a few times a year, depending on rainfall and IMP characteristics (e.g., extent to which the IMP is oversized, and actual, rather than predicted, permeability of native soils). However, evaluating a range of rainfall events that do *not* produce underflow will help demonstrate the effectiveness of the IMP.

5. **Record Keeping and Reporting**

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A list and thorough technical explanation of any changes in design criteria for HM Controls, including IMPs. Permittees shall submit this list and explanation annually with the Annual Report.

6. The current Contra Costa Clean Water Program C.3 Guidebook, 4th Edition (C.3 Guidebook) (September 2008) design approach and IMPs shall be used to comply with Provision C.3.g flow requirements until this permit expires and is reissued, pending model verification studies as described below. The IMPs shall be an implementation option as the flow control implementation for development projects up to a footprint of 30 acres

By April 1, 2014, the Contra Costa Clean Water Program shall submit a proposal containing one or a combination of the following three options (a.-c.) for implementation after the expiration and reissuance of this permit:

a. Present model verification monitoring results demonstrating that the IMPs are sufficiently overdesigned and perform to meet the 0.1Q2 low flow design criteria; or

b. Present study results of Contra Costa County streams geology and other factors that support the low flow design criteria of 0.2Q2 as the limiting HMP design low flow; or

c. Propose redesigns of the IMPs to meet the low flow design criteria of 0.1Q2 to be implemented during the next permit term.

ATTACHMENT D

Provision C.3.g.
Fairfield-Suisun Permittees
Hydromodification Management Requirements

Fairfield-Suisun Permittees Hydromodification Management Requirements

1. **On-site and Regional Hydromodification Management (HM) Control Design Criteria**
   - **a.** *Range of flows to control*: Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 20 percent of the pre-project 2-year peak flow[137] up to the pre-project 10-year peak flow.
   - **b.** *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.
   - **c.** *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Qcp[138]) shall be no greater than 20 percent of the pre-project 2-year peak flow.
   - **d.** *Standard HM modeling:* On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[139]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual.[140] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this Attachment and Provision C.3.g.

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[137] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[138] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[139] See www.bayareahydrologymodel.org , Resources

[140] *The Bay Area Hydrology Model User Manual*is available at http://www.bayareahydrologymodel.org/downloads.html.

e. *Alternate HM modeling and design:* The project proponent may use a continuous simulation hydrologic computer model[141] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a–c above are met.

f. *Sizing Charts:* The Program developed design procedures, criteria, and sizing factors for infiltration basins and bioretention units, based on a low flow rate that exceeds the allowable low flow rate. After the Program has modified its sizing factors[142] to the allowable criteria, received approval of the modified sizing factors from the Executive Officer,[143] and informed the public through such mechanism as an electronic mailing list, project proponents may meet the HM Standard by using the Program's design procedures, criteria, and sizing factors for infiltration basins and/or bioretention units.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[144] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d. treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls*: A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability*: In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

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[141] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[142] Current sizing factors and design criteria are shown in Appendix D of the FSURMP HMP.

[143] The modified sizing factors will not introduce a new concept but rather make an existing compliance mechanism more stringent; therefore, Executive Officer approval is appropriate.

[144] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, tree wells, media, filters, and green roofs.

d. *Financial contribution to an alternative HM project*: The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects discharge into the upstream reaches of Laurel or Ledgewood Creeks, as delineated in the Fairfield-Suisun Permittees' HM Maps (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf.). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

ATTACHMENT E

Provision C.3.g.
San Mateo Permittees
Hydromodification Management Requirements

San Mateo Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[145] up to the pre-project 10-year peak flow.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Qcp[146]) shall be no greater than 10 percent of the pre-project 2-year peak flow.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[147]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the

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[145] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[146] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[147] See www.bayareahydrologymodel.org , Resources

most current BAHM User Manual.[148] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with the requirements of Provision C.3.g.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[149] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a.–c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[150] runoff to the maximum extent practicable. In addition, , if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project*: The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or

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[148] The Bay Area Hydrology Model User Manualis available at http://www.bayareahydrologymodel.org/downloads.html

[149] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[150] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, tree wells, media filters, and green roofs.

in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality, or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of startup, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are in the HM control areas shown in the San Mateo Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

The HM Standard and all associated requirements apply in areas that are shown in green on the map and noted in the map's key as *areas subject to HMP*. The other areas are exempt from the HM Standard because they drain to hardened channels or low gradient channels (a characteristic applicable to San Mateo County's particular shoreline properties), or are in highly developed areas. Plans to restore a hardened channel may affect areas of applicability.

Areas shown in the San Mateo Permittees' HM Map may be modified as follows:

b. Street Boundary Interpretation – Streets are used to mark the boundary between areas where the HM Standard must be met and exempt areas. Parcels on the boundary street are considered within the area exempted from the hydromodification requirements. Nonetheless, there might be cases where the drainage from a particular parcel(s) on the boundary street drains westward into the hydromodification required area and, as such, any applicable project on such a parcel(s) would be subject to the hydromodification requirements.

c. **Hardened Channel/Drainage to Exempt Area** – If drainage leaving a proposed project subject to the HM Standard is determined to flow only through a hardened channel and/or enclosed pipe along its entire length before directly discharging into a waterway in the exempt area or into tidal waters, the project would be exempted from the HM Standard and its associated requirements. The project proponent must demonstrate, in a statement signed by an engineer or qualified environmental professional, that this condition is met.

d. **Boundary Re-Opener** – If the municipal regional permit or future permit reissuances or amendments modify the types of projects subject to the hydromodification requirements, the appropriate location for an HMP boundary or boundaries will be reevaluated at the same time.

ATTACHMENT F

Provision C.3.g.
Santa Clara Permittees
Hydromodification Management Requirements

Santa Clara Permittees Hydromodification Management Requirements

1. **On-site and Regional Hydromodification Management (HM) Control Design Criteria**

   a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[151] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 5 of this Attachment.

   b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

   c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[152]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 5 of this Attachment.

   d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[153]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the

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[151] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[152] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[153] See www.bayareahydrologymodel.org , Resources.

most current BAHM User Manual.[154] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this attachment and Provision C.3.g.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[155] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a. – c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a Regional HM control[156] within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[157] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project shall contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM control:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative

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[154] *The Bay Area Hydrology Model User Manual* is available at http://www.bayareahydrologymodel.org/downloads.html.

[155] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[156] *Regional HM controls* are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which should incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional control measure discharges.

[157] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, sand filters, and green roofs.

HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are located in areas of HM applicability as described below and shown in the Santa Clara Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).

a. Purple areas: These areas represent catchments that drain to hardened channels that extend continuously to the Bay or to tidally influenced sections of creeks. The HM Standard and associated requirements do not apply to projects in the areas designated in purple on the map.

Plans to restore a creek reach may reintroduce the applicability of HM requirements, unless the creek restoration project is designed to accommodate the potential hydromodification impacts of future development; if this is not the case, in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

b. Red areas: These areas represent catchments and subwatersheds that are greater than or equal to 65% impervious, based on existing imperviousness data sources. The HM Standard and associated requirements do not apply to projects in the areas designated in red on the map.

c. Pink areas: These are areas that are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicate that the actual level of imperviousness of a particular area is greater than or equal

to 65% impervious. Any new data will be submitted to the Water Board in one coordinated submittal within one year of permit adoption.

d. **Green area**: These areas represent catchments and subwatersheds that are less than 65% impervious and are not under review by the Permittees. The HM Standard and associated requirements apply to projects in areas designated as green on the map.

5. Potential Exceptions to Map Designations

The Program may choose to prepare a User Guide[158] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[159] After the Program has collated its methods into User Guide format, received approval of the User Guide from the Executive Officer,[160] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

[158] The User Guide may be offered under a different title.
[159] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[160] The User Guide will not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

ATTACHMENT G

Provision C.3.h.
Sample Reporting Table

Table C.3.h. – Operation and Maintenance of Stormwater Treatment Systems
City of Eden Annual Report FY 2008-09

Facility/Site Inspected and Responsible Party for Maintenance	Date of Inspection	Type of Inspection (annual, follow-up, etc.)	Type of Treatment System or HM Control Inspected	Inspection Findings or Results	Enforcement Action Taken (Warning, NOV, administrative citation, etc.)	Comments
ABC Company 123 Alphabet Road San Jose	12/06/08	annual	offsite bioretention unit	proper operation	none	Unit is operating properly and is well maintained.
DEF site 234 Blossom Drive Santa Clara	12/17/08	annual	onsite media filter	ineffective filter media	verbal warning	Media filter is clogged and needs to be replaced.
	12/19/08	follow-up	onsite media filter	proper operation	none	New media filter in place and unit is operating properly.
	1/19/09	follow-up	onsite media filter	proper operation	none	Unit is operating properly.
GHI Hotel 1001 Grand Blvd 227 Touring Parkway	12/21/08	annual	onsite swales	proper operation	notice of violation	Bioretention unit #2 is badly eroded because of flow channelization. Stormwater is flowing over the eroded areas, bypassing treatment and running off into parking area.
			onsite bioretention unit #1	proper operation		
			onsite bioretention unit #2	eroded areas due to flow channelization		
	12/27/08	follow-up	onsite bioretention unit #2	proper operation	none	Entire bioretention unit #2 has been replanted and re-graded. Raining heavily but no overflow observed.
Rolling Hills Estates Homeowners' Association 543 Rolling Hill Drive Pleasanton	01/17/09	annual	onsite pond	sediment and debris accumulation	notice of violation	Pond needs sediment removal and check dam needs debris removal.
	01/24/09	follow-up	onsite pond	sediment and debris accumulation	administrative citation $1000	Pond still a mess. Administrative citation requires maintenance within a week.
	01/31/09	follow-up	onsite pond	proper maintenance	none	Pond maintenance completed.
	02/18/09	spot inspection	onsite pond	proper operation and maintenance	none	Proper operation and maintenance.

ATTACHMENT H

Provision C.8.
Status and Long-Term Monitoring
Follow-up Analysis and Actions

Status and Long-Term Monitoring Follow-up Analysis and Actions for Biological Assessment, Bedded Sediment Toxicity, and Bedded Sediment Pollutants

When results from Biological Assessment, Bedded Sediment Toxicity, and/or Bedded Sediment Pollutants monitoring indicate impacts at a monitoring location, Permittees shall evaluate the extent and cause(s) of impacts to determine the potential role of urban runoff as indicated in Table H-1.

Table H-1. Sediment Triad Approach to Determining Follow-Up Actions

Chemistry Results[161]	Toxicity Results[162]	Bioassessment Results[163]	Action
No chemicals exceed Threshold Effect Concentrations (TEC), mean Probable Effects Concentrations (PEC) quotient < 0.5 and pyrethroids < 1.0 Toxicity Unit (TU)[164]	No Toxicity	No indications of alterations	No action necessary
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources causing toxicity; initiate no later than the second fiscal year following the sampling event.

[161] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

[162] Toxicity is exhibited when *Hyallela* survival statistically different than and < 20 percent of control.

[163] Alterations are exhibited if metrics indicate substantially degraded community.

[164] Toxicity Units (TU) are calculated as follows: TU = Actual concentration (organic carbon normalized) ÷ Reported *H. azteca* LC_{50} concentration (organic concentration normalized). Weston, D.P., R.W. Holmes, J. You, and M.J. Lydy, 2005. Aquatic Toxicity Due to Residential Use of Pyrethroid Insecticides. *Environ. Science and Technology* 39(24):9778–9784.

Chemistry Results[161]	Toxicity Results[162]	Bioassessment Results[163]	Action
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	No Toxicity	Indications of alterations	Identify the most probable cause(s) of the alterations in biological community. Where impacts are under Permittee's control, take management actions to minimize the impacts causing physical habitat disturbance; initiate no later than the second fiscal year following the sampling event.
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to minimize impacts; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	Indications of alterations	(1) Identify cause of impacts. (2) Where impacts are under Permittee's control, take management actions to minimize the impacts caused by urban runoff; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	No Indications of alterations	If PEC exceedance is Hg or PCBs, address under TMDLs
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to address impacts.

ATTACHMENT I

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.
8. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-

compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

9. If the discharger monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT J

Minimum Trash Capture Area
and
Minimum Number of Trash Hot Spots

Table 10.1 Minimum Trash Capture Area and Trash Hot Spots for Population Based Permittees

Data Source: http://quake.abag.ca.gov/mitigation/pickdbh2.html and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Alameda County						
San Leandro	73,402	721	**216**	2	7	4
Oakland	420,183	759	**228**	14	8	8
Dublin	46,934	377	**113**	1	3	**3**
Emeryville	9,727	69	**21**	1	1	1
Albany	16,877	95	**28**	1	1	1
Berkeley	106,697	183	**55**	3	1	3
Alameda County Unincorporated.	140,825	375	**112**	4	3	4
Alameda	75,823	402	**121**	2	4	**4**
Fremont	213,512	698	**209**	7	6	7
Hayward	149,205	726	**218**	4	7	**7**
Livermore	83,604	423	**127**	2	4	**4**
Newark	43,872	314	**94**	1	3	**3**
Piedmont	11,100	1	**0.3**	1	1	1
Pleasanton	69,388	366	**110**	2	3	**3**
Union City	73,402	183	**55**	2	1	2

[165] 30% of Retail / Wholesale Commercial Acres
[166] If the hot spot # based on % commercial area is more than twice that based on population, the minimum hot spot # is double the population based #.

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
San Mateo County						
San Mateo County Unincorporated.	65,844	71	**21**	2	1	2
Atherton	7,475	0	**0**	1	1	1
Belmont	26,078	58	**17**	1	1	1
Brisbane	3,861	16	**5**	1	1	1
Burlingame	28,867	123	**37**	1	1	1
Colma	1,613	106	**32**	1	1	1
Portola Valley	4,639	9	**3**	1	1	1
Daly City	106,361	242	**73**	3	2	3
East Palo Alto	32,897	59	**18**	1	1	1
Foster City	30,308	67	**20**	1	1	1
Half Moon Bay	13,046	49	**15**	1	1	1
Hillsborough	11,272	0	**0**	1	1	1
Menlo Park	31,490	83	**25**	1	1	1
Millbrae	21,387	68	**20**	1	1	1
Pacifica	39,616	100	**30**	1	1	1
Redwood City	77,269	309	**93**	2	3	**3**
San Bruno	43,444	137	**41**	1	1	1
San Carlos	28,857	129	**39**	1	1	1
San Mateo	95,776	275	**82**	3	2	3
South San Francisco	63,744	195	**58**	2	1	2
Woodside	5,625	9	**3**	1	1	1

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Contra Costa County						
Contra Costa County Unincorporated.	173,573	524	**157**	5	5	5
Concord	123,776	1016	**305**	4	10	8
Walnut Creek	65,306	329	**99**	2	3	**3**
Clayton	10,784	21	**6**	1	1	1
Danville	42,629	134	**40**	1	1	1
El Cerrito	23,320	105	**32**	1	1	1
Hercules	24,324	37	**11**	1	1	1
Lafayette	23,962	68	**20**	1	1	1
Martinez	36,144	142	**43**	1	1	1
Moraga	16,138	108	**32**	1	1	1
Orinda	17,542	24	**7**	1	1	1
Pinole	19,193	140	**42**	1	1	1
Pittsburg	63,652	520	**156**	2	5	4
Pleasant Hill	33,377	219	**66**	1	2	**2**
Richmond	103,577	391	**117**	3	3	3
San Pablo	31,190	131	**39**	1	1	1
San Ramon	59,002	274	**82**	1	2	**2**

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Santa Clara County						
Santa Clara County Unincorporated	99,122	270	**81**	3	3	3
Cupertino	55,551	213	**64**	2	2	2
Los Altos	28,291	65	**20**	1	1	1
Los Altos Hills	8,837	0	**0**	1	1	1
Los Gatos	30,296	163	**49**	1	1	1
Milpitas	69,419	457	**137**	2	4	**4**
Monte Sereno	3,579	0	**0**	1	1	1
Mountain View	73,932	375	**112**	2	3	**3**
Santa Clara	115,503	560	**168**	3	5	**5**
Saratoga	31,592	41	**12**	1	1	1
San Jose	989,496	2983	**895**	32	29	32
Sunnyvale	137,538	548	**164**	3	5	**5**
Palo Alto	63,367	282	**84**	2	2	2
Solano County						
Vallejo	120,416	559	**168**	4	5	**5**
Fairfield	106,142	486	**146**	3	4	**4**
Suisun	28,031	75	**22**	1	1	1
Totals	4,930,339	19057	**5718**	165	184	349

Table 10-2. Non-Population Based Permittee Trash Hot Spot and Trash Capture Assignments

Non population based Permittee	Number of Trash Hot Spots	Trash Capture Requirement
Santa Clara Valley Water District	12	4 trash booms or 8 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda County Flood Control Agency	9	3 trash booms or 6 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda Co. Zone 7 Flood Control Agency	3	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Contra Costa County Flood Control Agency	6	2 trash booms or 4 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
San Mateo County Flood Control District	2	1 trash booms or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Vallejo Sanitation and Flood District	1	1 trash boom or 2 outfall capture devices or equivalent measures (minimum 2 ft. diameter outfall)

ATTACHMENT K

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements
for
NPDES Stormwater Discharge Permits

February 2009

A. GENERAL PROVISIONS

1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.
2. All discharges authorized by this Order shall be consistent with the terms and conditions of this Order.
3. **Duty to Comply**
   a. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in a Board adopted Order, discharger must comply with the new standard or prohibition. The Board will revise or modify the Order in accordance with such toxic effluent standard or prohibition and so notify the discharger.
   b. If more stringent applicable water quality standards are approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the discharger must comply with the new standard. The Board will revise and modify this Order in accordance with such more stringent standards.
   c. The filing of a request by the discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 122.41(f)]
4. **Duty to Mitigate**

   The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this order and permit which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation. [40 CFR 122.41(d)]
5. Pursuant to U.S. Environmental Protection Agency regulations the discharger must notify the Water Board as soon as it knows or has reason to believe (1) that they have begun or expect to begin, use or manufacture of a pollutant not reported in the permit application,

or (2) a discharge of toxic pollutants not limited by this permit has occurred, or will occur, in concentrations that exceed the limits specified in 40 CFR 122.42(a).

6. The discharge of any radiological, chemical, or biological warfare agent waste is prohibited.

7. All facilities used for transport, treatment, or disposal of wastes shall be adequately protected against overflow or washout as the result of a 100-year frequency flood.

8. Collection, treatment, storage and disposal systems shall be operated in a manner that precludes public contact with wastewater, except where excluding the public is inappropriate, warning signs shall be posted.

9. **Property Rights**

   This Order and Permit does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws, nor create a vested right for the discharge to continue the waste discharge or guarantee the discharger a capacity right in the receiving water. [40 CFR 122.41(g)]

10. **Inspection and Entry**

    The Board or its authorized representatives shall be allowed:

    a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the order and permit;

    b. Access to and copy at, reasonable times, any records that must be kept under the conditions of the order and permit;

    c. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under the order and permit; and

    d. To photograph, sample, and monitor, at reasonable times for the purpose of assuring compliance with the order and permit or as otherwise authorized by the Clean Water Act, any substances or parameters at any locations. [40 CFR 122.41(i)]

11. **Permit Actions**

    This Order and Permit may be modified, revoked and reissued, or terminated in accordance with applicable State and/or Federal regulations. Cause for taking such action includes, but is not limited to any of the following:

    a. Violation of any term or condition contained in the Order and Permit;

    b. Obtaining the Order and Permit by misrepresentation, or by failure to disclose fully all relevant facts;

    c. Endangerment to public health or environment that can only be regulated to acceptable levels by order and permit modification or termination; and

    d. Any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

12. Duty to Provide Information

The discharger shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit. The discharger shall also furnish to the Board, upon request, copies of records required to be kept by its permit. [40 CFR 122.41(h)]

13. Availability

A copy of this permit shall be maintained at the discharge facility and be available at all times to operating personnel.

14. Continuation of Expired Permit

This permit continues in force and effect until a new permit is issued or the Board rescinds the permit. Only those dischargers authorized to discharge under the expiring permit are covered by the continued permit.

B. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

a. All reports required by the order and permit and other information requested by the Board or USEPA Region 9 shall be signed by a principal executive officer or ranking elected official of the discharger, or by a duly authorized representative of that person. [40 CFR 122.22(b)]

b. Certification

All reports signed by a duly authorized representative under Provision E.1.a. shall contain the following certification:
"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. [40 CFR 122.22(d)]

2. Should the discharger discover that it failed to submit any relevant facts or that it submitted incorrect information in any report, it shall promptly submit the missing or correct information. [40 CFR 122.41(l)(8)]

3. False Reporting

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall be subject to enforcement procedures as identified in Section F of these Provisions.

4. Transfers

a. This permit is not transferable to any person except after notice to the Board. The Board may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

b. Transfer of control or ownership of a waste discharge facility under an National Pollutant Discharge Elimination System permit must be preceded by a notice to the Board at least 30 days in advance of the proposed transfer date. The notice must include a written agreement between the existing discharger and proposed discharger containing specific dates for transfer of responsibility, coverage, and liability between them. Whether an order and permit may be transferred without modification or revocation and reissuance is at the discretion of the Board. If order and permit modification or revocation and reissuance is necessary, transfer may be delayed 180 days after the Board's receipt of a complete application for waste discharge requirements and an NPDES permit.

5. Compliance Reporting

a. Planned Changes

The discharger shall file with the Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

b. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final compliance dates contained in any compliance schedule shall be submitted within 10 working days following each scheduled date unless otherwise specified within this order and permit. If reporting noncompliance, the report shall include a description of the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance and an estimated date for achieving full compliance. A final report shall be submitted within 10 working days of achieving full compliance, documenting full compliance

c. Non-compliance Reporting (Twenty-four hour reporting:)

i. The discharger shall report any noncompliance that may endanger health or the environment. All pertinent information shall be provided orally within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five working days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

C. ENFORCEMENT

1. The provision contained in this enforcement section shall not act as a limitation on the statutory or regulatory authority of the Board.

2. Any violation of the permit constitutes violation of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act, and is the basis for enforcement action, permit termination, permit revocation and reissuance, denial of an application for permit reissuance; or a combination thereof.

3. The Board may impose administrative civil liability, may refer a discharger to the State Attorney General to seek civil monetary penalties, may seek injunctive relief or take other appropriate enforcement action as provided in the California Water Code or federal law for violation of Board orders.

4. It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this order and permit.

5. A discharger seeking to establish the occurrence of any upset (See Definitions, G. 24) has the burden of proof. A discharger who wishes to establish the affirmative defense of any upset in an action brought for noncompliance shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

   a. an upset occurred and that the Permittee can identify the cause(s) or the upset;

   b. the permitted facility was being properly operated at the time of the upset;

   c. the discharger submitted notice of the upset as required in paragraph E.6.d.; and

   d. the discharger complied with any remedial measures required under A.4.

   No determination made before an action for noncompliance, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.
   In any enforcement proceeding, the discharger seeking to establish the occurrence of any upset has the burden of proof. [40 CFR 122.41(n)]

D. DEFINITIONS

1. DDT and Derivatives shall mean the sum of the p,p' and o,p' isomers of DDT, DDD (TDE), and DDE.

2. Duly authorized representative is one whose:

   a. Authorization is made in writing by a principal executive officer or ranking elected official;

   b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general manager in a partnership, manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

   c. Written authorization is submitted to the USEPA Region 9. If an authorization becomes no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board and USEPA Region 9 prior to

or together with any reports, information, or applications to be signed by an authorized representative.

3. Hazardous substance means any substance designated under 40 CFR 116 pursuant to Section 311 of the Clean Water Act.
4. HCH shall mean the sum of the alpha, beta, gama (Lindane), and delta isomers of hexachlorocyclohexane.
5. Overflow is defined as the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g. through manholes, at pump stations, and at collection points) upstream from the plant headworks or from any treatment plant facilities.
6. Priority pollutants are those constituents referred to in 40 CFR S122, Appendix D and listed in the USEPA NPDES Application Form 2C, (dated 6/80) Items V-3 through V-9.
7. Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.
8. Toxic pollutant means any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act or under 40 CFR S401.15.
9. Total Identifiable Chlorinated hydrocarbons (TICH) shall be measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, PCBs and other identifiable chlorinated hydrocarbons.
10. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in this order and permit. The requirements of this order and permit are applicable to the entire volume of water, and the material therein, which is disposed of to surface and ground waters of the State of California.

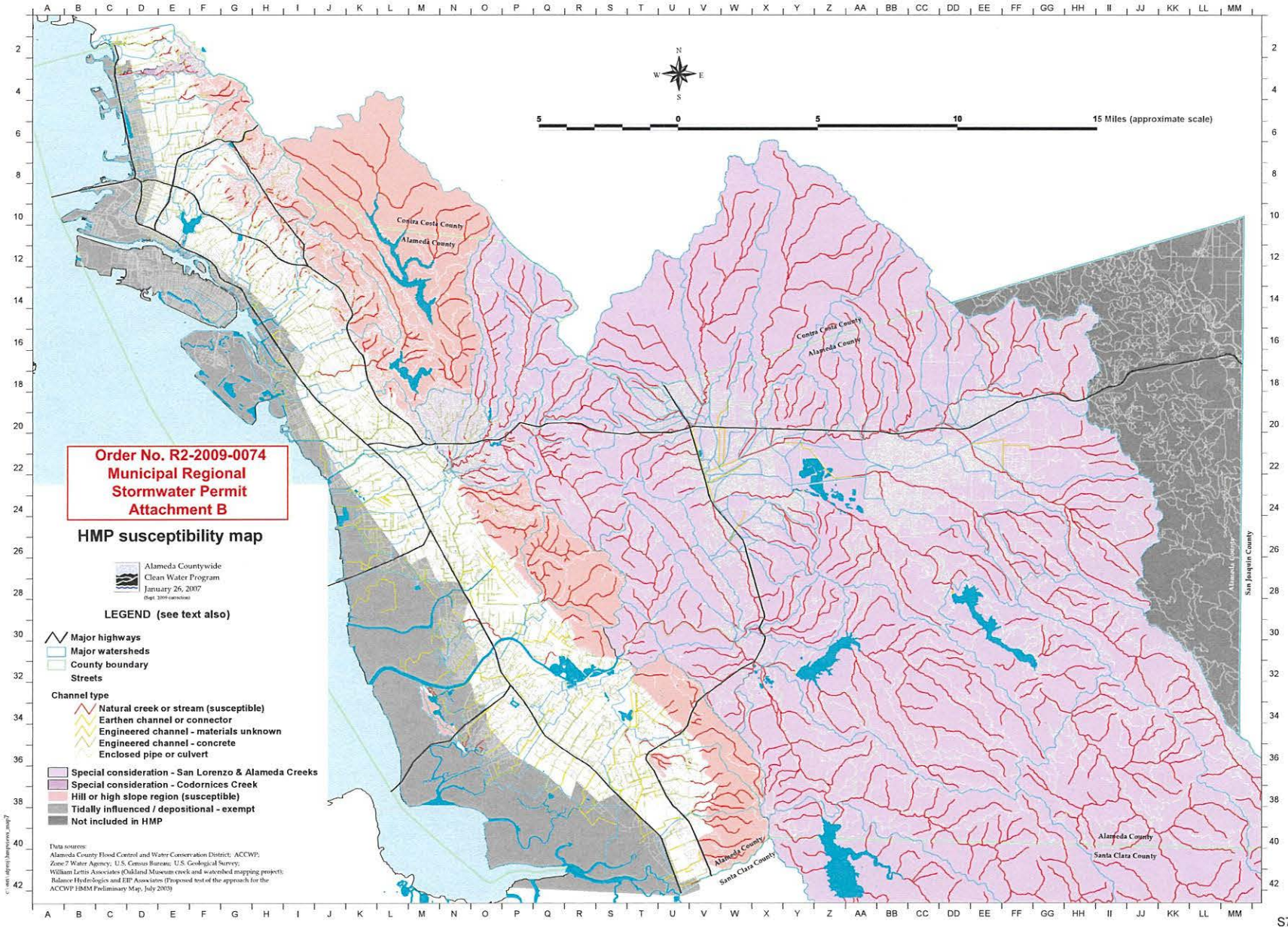
Order No. R2-2009-0074
Municipal Regional
Stormwater Permit
Attachment B
HMP susceptibility map
Alameda Countywide
Clean Water Program
January 26, 2007
LEGEND (see text also)
Major highways
Major watersheds
County boundary
Streets
Channel type
Natural creek or stream (susceptible)
Earthen channel or connector
Engineered channel - materials unknown
Engineered channel - concrete
Enclosed pipe or culvert
Special consideration - San Lorenzo & Alameda Creeks
Special consideration - Codornices Creek
Hill or high slope region (susceptible)
Tidally influenced / depositional - exempt
Not included in HMP
Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)
N
S
E
W
5 0 5 10 15 Miles (approximate scale)
Contra Costa County
Alameda County
Santa Clara County
San Joaquin County

S7-1626

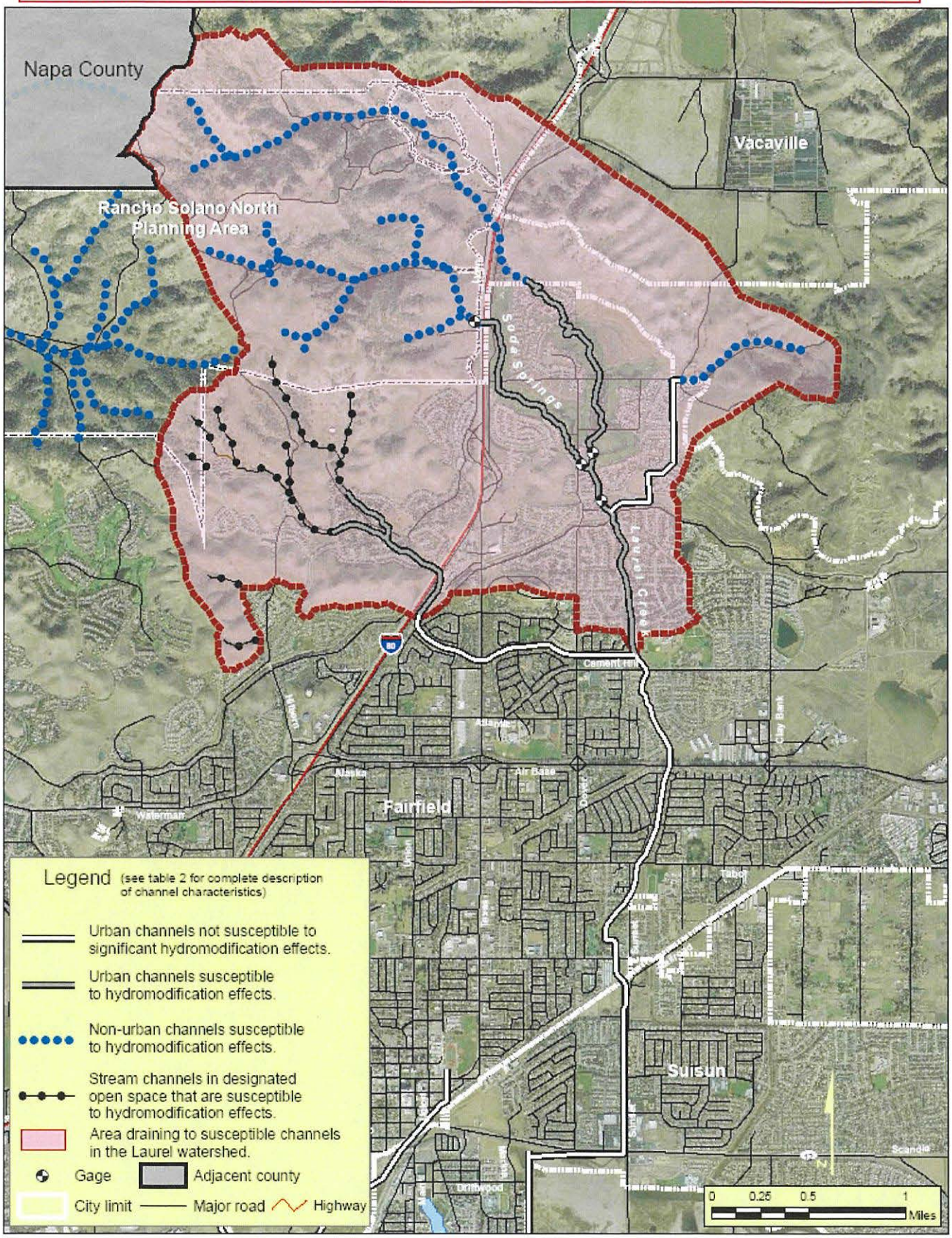

Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure2_edits.mxd

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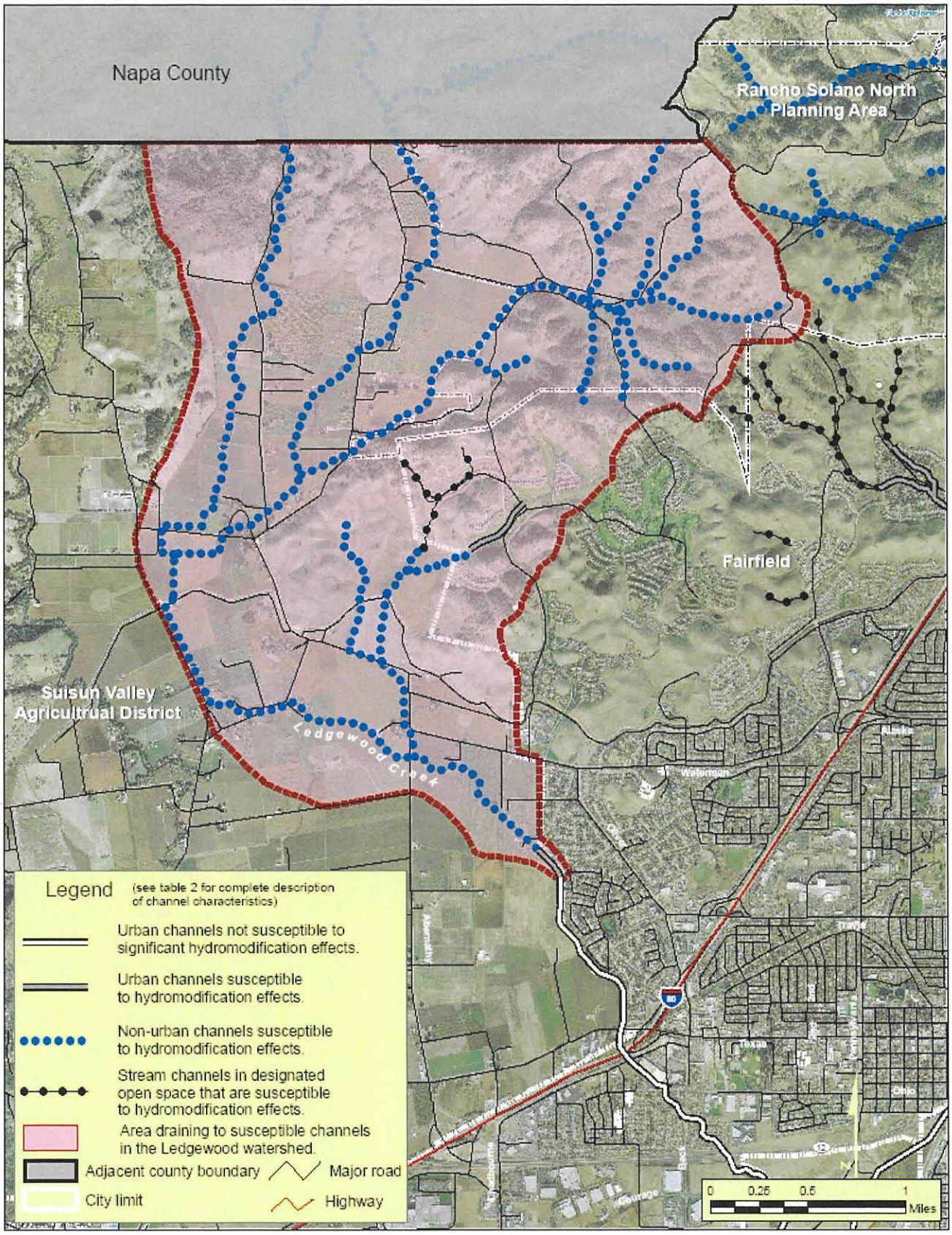

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed.
The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

S7-1628

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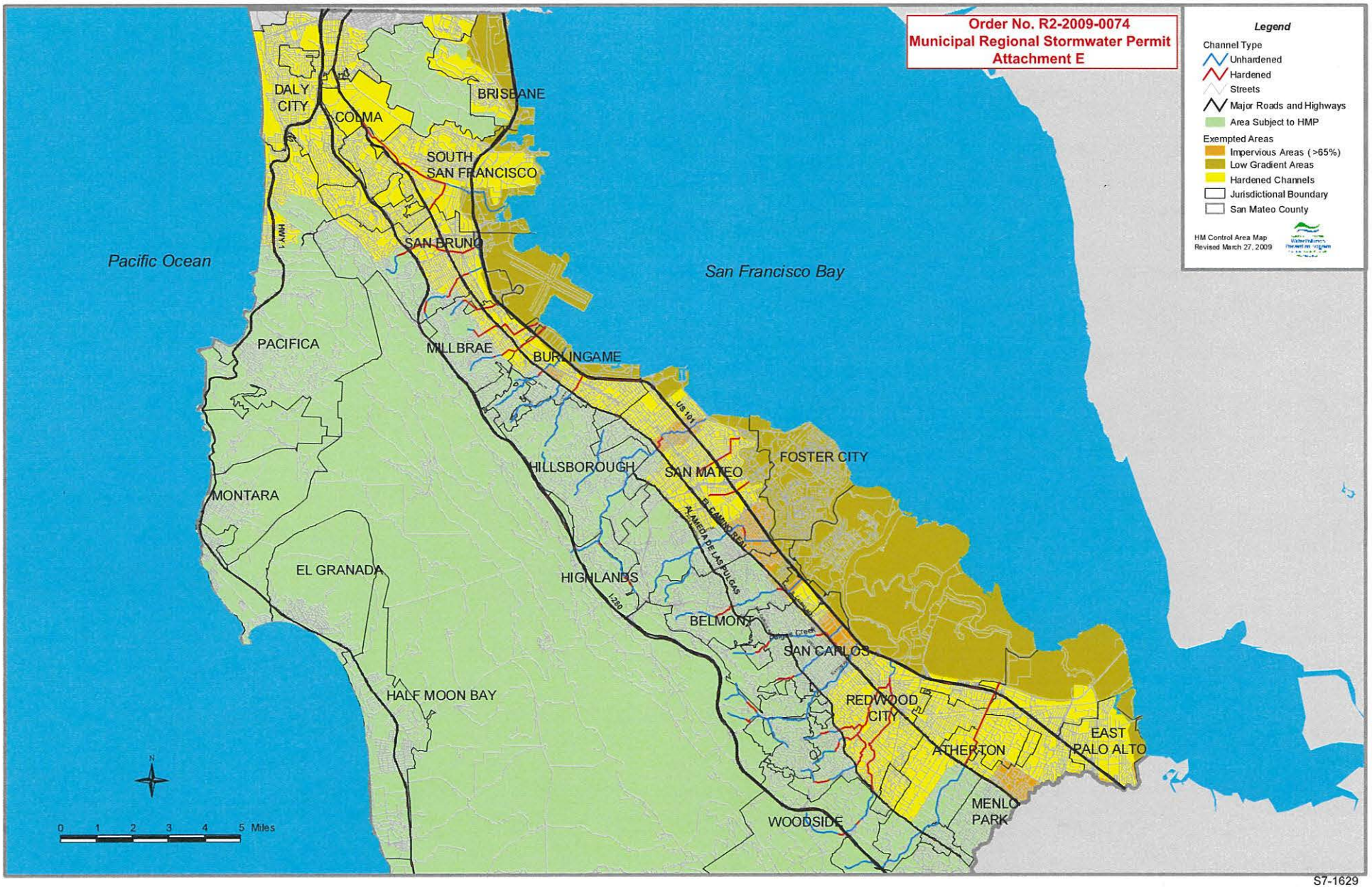
Order No. R2-2009-0074
Municipal Regional Stormwater Permit
Attachment E
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
HILLSBOROUGH
SAN MATEO
FOSTER CITY
MONTARA
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
WOODSIDE
HWY 1
US 101
I 280
EL CAMINO REAL
ALAMEDA DE LAS PULGAS
0 1 2 3 4 5 Miles
N
S7-1629

Classification of Subwatersheds and Catchment Areas for Determining Applicability of HMP Requirements

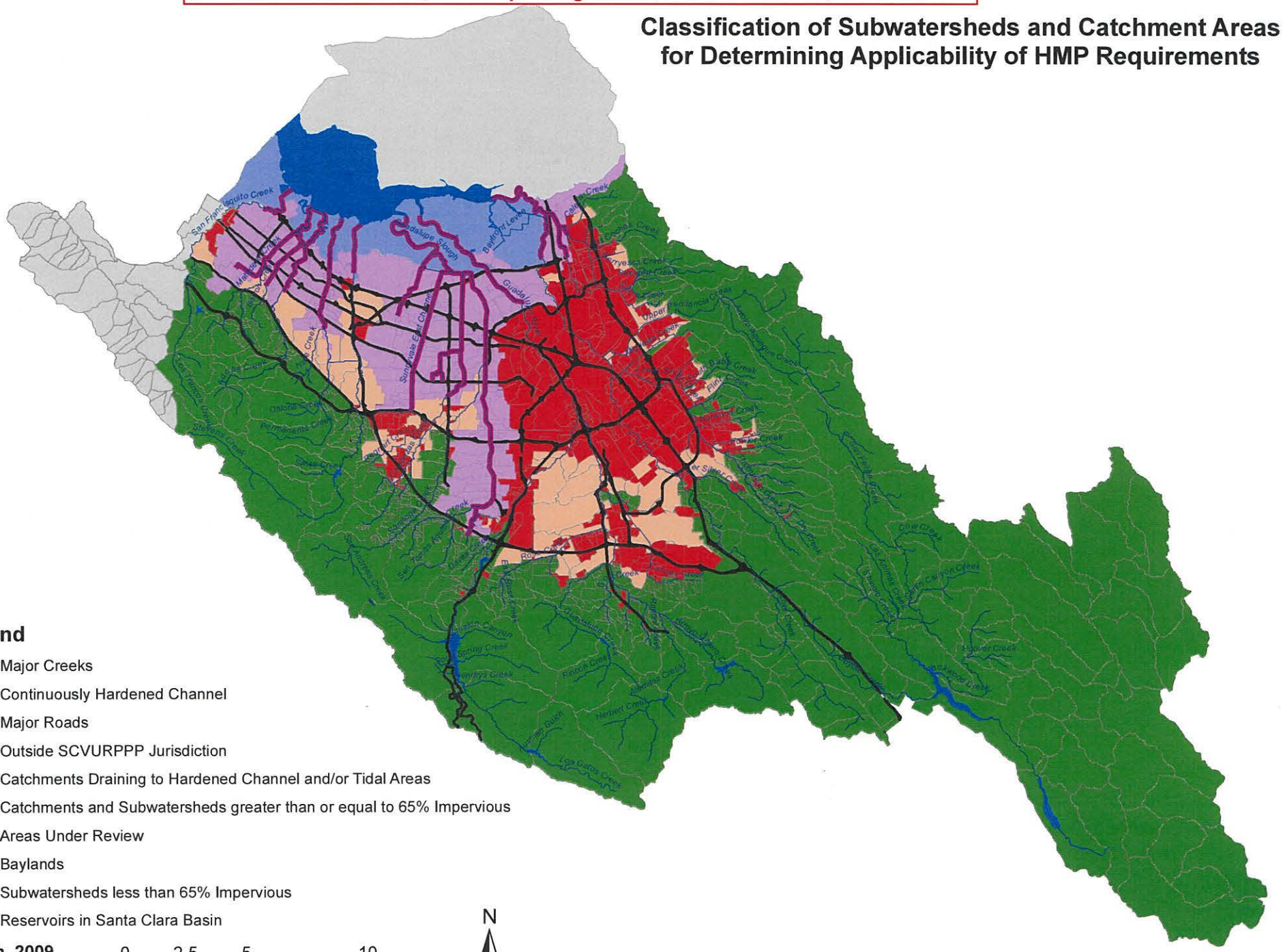

S7-1630

This map contains: 1) a revision to the November 2007 version to correct a mapping error; and 2) two revisions to Areas Under Review in Palo Alto and North Santa Clara County to reflect updated impervious surface data, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP

EXHIBIT 5
to Section 7

KeyCite Yellow Flag - Negative Treatment
Proposed Legislation

United States Code Annotated
Title 33. Navigation and Navigable Waters (Refs & Annos)
Chapter 26. Water Pollution Prevention and Control (Refs & Annos)
Subchapter IV. Permits and Licenses (Refs & Annos)

33 U.S.C.A. § 1342

§ 1342. National pollutant discharge elimination system

Effective: February 7, 2014
Currentness

(a) Permits for discharge of pollutants

(1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311(a) of this title, upon condition that such discharge will meet either (A) all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or (B) prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this chapter.

(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

(4) All permits for discharges into the navigable waters issued pursuant to section 407 of this title shall be deemed to be permits issued under this subchapter, and permits issued under this subchapter shall be deemed to be permits issued under section 407 of this title, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this chapter.

(5) No permit for a discharge into the navigable waters shall be issued under section 407 of this title after October 18, 1972. Each application for a permit under section 407 of this title, pending on October 18, 1972, shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objectives of this chapter to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on October 18, 1972, and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 1314(i)(2) of this title, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend beyond the last day of such period. Each such permit shall

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be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this chapter. No such permit shall issue if the Administrator objects to such issuance.

(b) State permit programs

At any time after the promulgation of the guidelines required by subsection (i)(2) of section 1314 of this title, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each submitted program unless he determines that adequate authority does not exist:

(1) To issue permits which--

(A) apply, and insure compliance with, any applicable requirements of sections 1311, 1312, 1316, 1317, and 1343 of this title;

(B) are for fixed terms not exceeding five years; and

(C) can be terminated or modified for cause including, but not limited to, the following:

(i) violation of any condition of the permit;

(ii) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(D) control the disposal of pollutants into wells;

(2)(A) To issue permits which apply, and insure compliance with, all applicable requirements of section 1318 of this title; or

(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 1318 of this title;

(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

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(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require the identification in terms of character and volume of pollutants of any significant source introducing pollutants subject to pretreatment standards under section 1317(b) of this title into such works and a program to assure compliance with such pretreatment standards by each such source, in addition to adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 1316 of this title if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 1311 of this title if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 1284(b), 1317, and 1318 of this title.

(c) Suspension of Federal program upon submission of State program; withdrawal of approval of State program; return of State program to Administrator

(1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those discharges subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 1314(i)(2) of this title. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

(2) Any State permit program under this section shall at all times be in accordance with this section and guidelines promulgated pursuant to section 1314(i)(2) of this title.

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(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

(4) Limitations on partial permit program returns and withdrawals

A State may return to the Administrator administration, and the Administrator may withdraw under paragraph (3) of this subsection approval, of--

(A) a State partial permit program approved under subsection (n)(3) only if the entire permit program being administered by the State department or agency at the time is returned or withdrawn; and

(B) a State partial permit program approved under subsection (n)(4) only if an entire phased component of the permit program being administered by the State at the time is returned or withdrawn.

(d) Notification of Administrator

(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter. Whenever the Administrator objects to the issuance of a permit under this paragraph such written objection shall contain a statement of the reasons for such objection and the effluent limitations and conditions which such permit would include if it were issued by the Administrator.

(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

(4) In any case where, after December 27, 1977, the Administrator, pursuant to paragraph (2) of this subsection, objects to the issuance of a permit, on request of the State, a public hearing shall be held by the Administrator on such objection. If the State does not resubmit such permit revised to meet such objection within 30 days after completion of the hearing, or, if no hearing is requested within 90 days after the date of such objection, the Administrator may issue the permit pursuant to subsection (a) of this section for such source in accordance with the guidelines and requirements of this chapter.

(e) Waiver of notification requirement

In accordance with guidelines promulgated pursuant to subsection (i)(2) of section 1314 of this title, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to

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subsection (b) of this section for any category (including any class, type, or size within such category) of point sources within the State submitting such program.

(f) Point source categories

The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

(g) Other regulations for safe transportation, handling, carriage, storage, and stowage of pollutants

Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

(h) Violation of permit conditions; restriction or prohibition upon introduction of pollutant by source not previously utilizing treatment works

In the event any condition of a permit for discharges from a treatment works (as defined in section 1292 of this title) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved or where the Administrator determines pursuant to section 1319(a) of this title that a State with an approved program has not commenced appropriate enforcement action with respect to such permit, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

(i) Federal enforcement not limited

Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 1319 of this title.

(j) Public information

A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purpose of reproduction.

(k) Compliance with permits

Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 1311, 1316, or 1342 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application

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has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date which source is not subject to section 407 of this title, the discharge by such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

(l) Limitation on permit requirement

(1) Agricultural return flows

The Administrator shall not require a permit under this section for discharges composed entirely of return flows from irrigated agriculture, nor shall the Administrator directly or indirectly, require any State to require such a permit.

(2) Stormwater runoff from oil, gas, and mining operations

The Administrator shall not require a permit under this section, nor shall the Administrator directly or indirectly require any State to require a permit, for discharges of stormwater runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

(3) Silvicultural activities

(A) NPDES permit requirements for silvicultural activities

The Administrator shall not require a permit under this section nor directly or indirectly require any State to require a permit under this section for a discharge from runoff resulting from the conduct of the following silviculture activities conducted in accordance with standard industry practice: nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance.

(B) Other requirements

Nothing in this paragraph exempts a discharge from silvicultural activity from any permitting requirement under section 1344 of this title, existing permitting requirements under section 1342 of this title, or from any other federal law.

(C) The authorization provided in Section [1] 1365(a) of this title does not apply to any non-permitting program established under 1342(p)(6) [2] of this title for the silviculture activities listed in 1342(l)(3)(A) [3] of this title, or to any other limitations that might be deemed to apply to the silviculture activities listed in 1342(l)(3)(A) [3] of this title.

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(m) Additional pretreatment of conventional pollutants not required

To the extent a treatment works (as defined in section 1292 of this title) which is publicly owned is not meeting the requirements of a permit issued under this section for such treatment works as a result of inadequate design or operation of such treatment works, the Administrator, in issuing a permit under this section, shall not require pretreatment by a person introducing conventional pollutants identified pursuant to section 1314(a)(4) of this title into such treatment works other than pretreatment required to assure compliance with pretreatment standards under subsection (b)(8) of this section and section 1317(b)(1) of this title. Nothing in this subsection shall affect the Administrator's authority under sections 1317 and 1319 of this title, affect State and local authority under sections 1317(b)(4) and 1370 of this title, relieve such treatment works of its obligations to meet requirements established under this chapter, or otherwise preclude such works from pursuing whatever feasible options are available to meet its responsibility to comply with its permit under this section.

(n) Partial permit program

(1) State submission

The Governor of a State may submit under subsection (b) of this section a permit program for a portion of the discharges into the navigable waters in such State.

(2) Minimum coverage

A partial permit program under this subsection shall cover, at a minimum, administration of a major category of the discharges into the navigable waters of the State or a major component of the permit program required by subsection (b).

(3) Approval of major category partial permit programs

The Administrator may approve a partial permit program covering administration of a major category of discharges under this subsection if--

(A) such program represents a complete permit program and covers all of the discharges under the jurisdiction of a department or agency of the State; and

(B) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b).

(4) Approval of major component partial permit programs

The Administrator may approve under this subsection a partial and phased permit program covering administration of a major component (including discharge categories) of a State permit program required by subsection (b) if--

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(A) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b); and

(B) the State submits, and the Administrator approves, a plan for the State to assume administration by phases of the remainder of the State program required by subsection (b) by a specified date not more than 5 years after submission of the partial program under this subsection and agrees to make all reasonable efforts to assume such administration by such date.

(o) Anti-backsliding

(1) General prohibition

In the case of effluent limitations established on the basis of subsection (a)(1)(B) of this section, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 1314(b) of this title subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit. In the case of effluent limitations established on the basis of section 1311(b)(1)(C) or section 1313(d) or (e) of this title, a permit may not be renewed, reissued, or modified to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit except in compliance with section 1313(d)(4) of this title.

(2) Exceptions

A permit with respect to which paragraph (1) applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant if--

(A) material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;

(B)(i) information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or

(ii) the Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under subsection (a)(1)(B);

(C) a less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy;

(D) the permittee has received a permit modification under section 1311(c), 1311(g), 1311(h), 1311(i), 1311(k), 1311(n), or 1326(a) of this title; or

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(E) the permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal, reissuance, or modification).

Subparagraph (B) shall not apply to any revised waste load allocations or any alternative grounds for translating water quality standards into effluent limitations, except where the cumulative effect of such revised allocations results in a decrease in the amount of pollutants discharged into the concerned waters, and such revised allocations are not the result of a discharger eliminating or substantially reducing its discharge of pollutants due to complying with the requirements of this chapter or for reasons otherwise unrelated to water quality.

(3) Limitations

In no event may a permit with respect to which paragraph (1) applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, reissued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 1313 of this title applicable to such waters.

(p) Municipal and industrial stormwater discharges

(1) General rule

Prior to October 1, 1994, the Administrator or the State (in the case of a permit program approved under this section) shall not require a permit under this section for discharges composed entirely of stormwater.

(2) Exceptions

Paragraph (1) shall not apply with respect to the following stormwater discharges:

(A) A discharge with respect to which a permit has been issued under this section before February 4, 1987.

(B) A discharge associated with industrial activity.

(C) A discharge from a municipal separate storm sewer system serving a population of 250,000 or more.

(D) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.

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(E) A discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) Permit requirements

(A) Industrial discharges

Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 1311 of this title.

(B) Municipal discharge

Permits for discharges from municipal storm sewers--

(i) may be issued on a system- or jurisdiction-wide basis;

(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and

(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

(4) Permit application requirements

(A) Industrial and large municipal discharges

Not later than 2 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraphs (2)(B) and (2)(C). Applications for permits for such discharges shall be filed no later than 3 years after February 4, 1987. Not later than 4 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(B) Other municipal discharges

Not later than 4 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraph (2)(D). Applications for permits for such discharges shall be filed no later than 5 years after February 4, 1987. Not later than 6 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

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(5) Studies

The Administrator, in consultation with the States, shall conduct a study for the purposes of--

(A) identifying those stormwater discharges or classes of stormwater discharges for which permits are not required pursuant to paragraphs (1) and (2) of this subsection;

(B) determining, to the maximum extent practicable, the nature and extent of pollutants in such discharges; and

(C) establishing procedures and methods to control stormwater discharges to the extent necessary to mitigate impacts on water quality.

Not later than October 1, 1988, the Administrator shall submit to Congress a report on the results of the study described in subparagraphs (A) and (B). Not later than October 1, 1989, the Administrator shall submit to Congress a report on the results of the study described in subparagraph (C).

(6) Regulations

Not later than October 1, 1993, the Administrator, in consultation with State and local officials, shall issue regulations (based on the results of the studies conducted under paragraph (5)) which designate stormwater discharges, other than those discharges described in paragraph (2), to be regulated to protect water quality and shall establish a comprehensive program to regulate such designated sources. The program shall, at a minimum, (A) establish priorities, (B) establish requirements for State stormwater management programs, and (C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate.

(q) Combined sewer overflows

(1) Requirement for permits, orders, and decrees

Each permit, order, or decree issued pursuant to this chapter after December 21, 2000, for a discharge from a municipal combined storm and sanitary sewer shall conform to the Combined Sewer Overflow Control Policy signed by the Administrator on April 11, 1994 (in this subsection referred to as the "CSO control policy").

(2) Water quality and designated use review guidance

Not later than July 31, 2001, and after providing notice and opportunity for public comment, the Administrator shall issue guidance to facilitate the conduct of water quality and designated use reviews for municipal combined sewer overflow receiving waters.

(3) Report

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Not later than September 1, 2001, the Administrator shall transmit to Congress a report on the progress made by the Environmental Protection Agency, States, and municipalities in implementing and enforcing the CSO control policy.

(r) Discharges incidental to the normal operation of recreational vessels

No permit shall be required under this chapter by the Administrator (or a State, in the case of a permit program approved under subsection (b)) for the discharge of any graywater, bilge water, cooling water, weather deck runoff, oil water separator effluent, or effluent from properly functioning marine engines, or any other discharge that is incidental to the normal operation of a vessel, if the discharge is from a recreational vessel.

CREDIT(S)

(June 30, 1948, c. 758, Title IV, § 402, as added Pub.L. 92-500, § 2, Oct. 18, 1972, 86 Stat. 880; amended Pub.L. 95-217, §§ 33(c), 50, 54(c)(1), 65, 66, Dec. 27, 1977, 91 Stat. 1577, 1588, 1591, 1599, 1600; Pub.L. 100-4, Title IV, §§ 401 to 404(a), (c), formerly (d), 405, Feb. 4, 1987, 101 Stat. 65 to 67, 69; Pub.L. 102-580, Title III, § 364, Oct. 31, 1992, 106 Stat. 4862; Pub.L. 104-66, Title II, § 2021(e)(2), Dec. 21, 1995, 109 Stat. 727; Pub.L. 106-554, § 1(a)(4) [Div. B, Title I, § 112(a)], Dec. 21, 2000, 114 Stat. 2763, 2763A-224; Pub.L. 110-288, § 2, July 29, 2008, 122 Stat. 2650; Pub.L. 113-79, Title XII, § 12313, Feb. 7, 2014, 128 Stat. 992.)

Notes of Decisions (238)

Footnotes

1 So in original. Probably should not be capitalized.

2 So in original. Probably should read “section 1342(p)(6)”.

3 So in original. Probably should read “section 1342(l)(3)(A)”.

33 U.S.C.A. § 1342, 33 USCA § 1342

Current through P.L. 115-40.

End of Document

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33 U.S.C.A. § 1371

§ 1371. Authority under other laws and regulations

Currentness

(a) Impairment of authority or functions of officials and agencies; treaty provisions

This chapter shall not be construed as (1) limiting the authority or functions of any officer or agency of the United States under any other law or regulation not inconsistent with this chapter; (2) affecting or impairing the authority of the Secretary of the Army (A) to maintain navigation or (B) under the Act of March 3, 1899, (30 Stat. 1112); except that any permit issued under section 1344 of this title shall be conclusive as to the effect on water quality of any discharge resulting from any activity subject to section 403 of this title, or (3) affecting or impairing the provisions of any treaty of the United States.

(b) Discharges of pollutants into navigable waters

Discharges of pollutants into the navigable waters subject to the Rivers and Harbors Act of 1910 (36 Stat. 593; 33 U.S.C. 421) and the Supervisory Harbors Act of 1888 (25 Stat. 209; 33 U.S.C. 441-451b) shall be regulated pursuant to this chapter, and not subject to such Act of 1910 and the Act of 1888 except as to effect on navigation and anchorage.

(c) Action of the Administrator deemed major Federal action; construction of the National Environmental Policy Act of 1969

(1) Except for the provision of Federal financial assistance for the purpose of assisting the construction of publicly owned treatment works as authorized by section 1281 of this title, and the issuance of a permit under section 1342 of this title for the discharge of any pollutant by a new source as defined in section 1316 of this title, no action of the Administrator taken pursuant to this chapter shall be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969 (83 Stat. 852) [42 U.S.C.A. § 4321 et seq.]; and

(2) Nothing in the National Environmental Policy Act of 1969 (83 Stat. 852) shall be deemed to--

(A) authorize any Federal agency authorized to license or permit the conduct of any activity which may result in the discharge of a pollutant into the navigable waters to review any effluent limitation or other requirement established pursuant to this chapter or the adequacy of any certification under section 1341 of this title; or

(B) authorize any such agency to impose, as a condition precedent to the issuance of any license or permit, any effluent limitation other than any such limitation established pursuant to this chapter.

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(d) Consideration of international water pollution control agreements

Notwithstanding this chapter or any other provision of law, the Administrator (1) shall not require any State to consider in the development of the ranking in order of priority of needs for the construction of treatment works (as defined in subchapter II of this chapter), any water pollution control agreement which may have been entered into between the United States and any other nation, and (2) shall not consider any such agreement in the approval of any such priority ranking.

CREDIT(S)

(June 30, 1948, c. 758, Title V, § 511, as added Pub.L. 92-500, § 2, Oct. 18, 1972, 86 Stat. 893; amended Pub.L. 93-243, § 3, Jan. 2, 1974, 87 Stat. 1069.)

Notes of Decisions (12)

33 U.S.C.A. § 1371, 33 USCA § 1371
Current through P.L. 115-40.

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KeyCite Yellow Flag - Negative Treatment
Distinguished by Pennsylvania Federation of Sportsmen's Clubs, Inc. v. Hess, 3rd Cir.(Pa.), July 24, 2002

112 S.Ct. 1046
Supreme Court of the United States

ARKANSAS, et al., Petitioners,
v.
OKLAHOMA et al.
ENVIRONMENTAL PROTECTION AGENCY, Petitioner,
v.
OKLAHOMA et al.

Nos. 90–1262, 90–1266.
|
Argued Dec. 11, 1991.
|
Decided Feb. 26, 1992.

Consolidated appeals were taken from the Environmental Protection Agency's (EPA) issuance to Arkansas city of discharge permit pursuant to National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act. The Court of Appeals for the Tenth Circuit, 908 F.2d 595, found that the Clean Water Act did not allow permit to be issued. Certiorari was granted. The Supreme Court, Justice Stevens, held that: (1) the Clean Water Act authorized the EPA's issuance of an NPDES permit to allow an Arkansas sewage treatment plant to discharge effluent into Illinois River which ultimately reached Oklahoma, and (2) EPA's interpretation of Oklahoma's water quality standards was entitled to substantial deference.

Reversed.

Opinion on remand, 962 F.2d 996.

West Headnotes (16)

[1] **Environmental Law**
Concurrent and Conflicting Statutes or Regulations
Environmental Law
Federal preemption
Nuisance
Nature and elements of public nuisance in general
States
Environment;nuclear projects

In cases involving controversies between state which introduces pollutants to waterway and downstream state which objects, federal common law of nuisance and affected state's common law are preempted; only state law applicable to interstate discharge is law of state in which point source is located. Federal Water Pollution Control Act Amendments of 1972, §§ 402(b), 510, as amended, 33 U.S.C.A. §§ 1342(b), 1370.

6 Cases that cite this headnote

[2] **Environmental Law**
Permit and certification proceedings

States which are affected by another state's discharge of effluent into a waterway may not block issuance of discharge permit but must apply to Environmental Protection Agency (EPA) administrator, who has discretion to disapprove permit if he concludes that discharges will have undue impact on interstate waters. Federal Water Pollution Control Act Amendments of 1972, §§ 402(b), 510, as amended, 33 U.S.C.A. §§ 1342(b), 1370.

3 Cases that cite this headnote

[3] **Environmental Law**
Discharge of pollutants

Clean Water Act requires that permits issued by Environmental Protection Agency (EPA) allowing discharge of effluent into interstate waterway comply with requirements for permit issued under approved state plan and with section of Clean Water Act which appears to prohibit issuance of federal permit over objection of affected state unless compliance with affected state's water quality requirements can be insured. Federal Water Pollution Control Act Amendments of 1972,

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§§ 401(a), (a)(2), 402, 402(a), (a)(3), (b), (d)(2), as amended, 33 U.S.C.A. §§ 1341(a), (a)(2), 1342, 1342(a), (a)(3), (b), (d)(2).

20 Cases that cite this headnote

[4] **Environmental Law**
Conditions and limitations

Environmental Protection Agency (EPA) requirement for National Pollution Discharge Elimination System (NPDES) permit that discharge of effluent from Arkansas sewage treatment plant comply with Oklahoma's water quality standards was reasonable exercise of agency's statutory discretion; discharge into Illinois River would travel through Arkansas and over Oklahoma border. Federal Water Pollution Control Act Amendments of 1972, §§ 401(a), 402(a, b), as amended, 33 U.S.C.A. §§ 1341(a), 1342(a, b).

31 Cases that cite this headnote

[5] **Environmental Law**
Interstate pollution

Even if Clean Water Act itself did not require that discharge of effluent from one state comply with water quality standards of another, statute did not limit Environmental Protection Agency's (EPA) authority to mandate that compliance. Federal Water Pollution Control Act Amendments of 1972, §§ 401(a), 402(a, b), as amended, 33 U.S.C.A. §§ 1341(a), 1342(a, b).

20 Cases that cite this headnote

[6] **Environmental Law**
Conditions and limitations

Environmental Protection Agency (EPA) regulations, which provide that National Pollution Discharge Elimination System (NPDES) permit may not be issued if the imposition of conditions would not insure compliance with the applicable water quality requirements of all affected states, were a reasonable exercise of EPA's authority. Federal Water Pollution Control Act Amendments of 1972, §§ 101(a), 301(b)(1)(C), 402(a)(1, 2), (b), (d)(2), as amended, 33 U.S.C.A. §§ 1251(a), 1311(b)(1)(C), 1342(a)(1, 2), (b), (d)(2).

32 Cases that cite this headnote

[7] **Environmental Law**
Interstate pollution

Placing limits on affected state's direct participation in permitting decision concerning the granting of NPDES permit to discharge effluent into interstate waterways did not constrain Environmental Protection Agency's (EPA) authority to require that point source comply with downstream water quality standards. Federal Water Pollution Control Act Amendments of 1972, §§ 101(a), 301(b)(1)(C), 402(a)(1, 2), (b), (d)(2), as amended, 33 U.S.C.A. §§ 1251(a), 1311(b)(1)(C), 1342(a)(1, 2), (b), (d)(2).

28 Cases that cite this headnote

[8] **Environmental Law**
Interstate pollution

Environmental Protection Agency's (EPA) requirement that discharge of effluent from Arkansas sewage treatment plant into Illinois River basin must comply with Oklahoma's water quality standards was reasonable exercise of agency's substantial statutory discretion. Federal Water Pollution Control Act Amendments of 1972, §§ 101(a), 301(b)(1)(C), 402(a)(1, 2), (b), (d)(2), as amended, 33 U.S.C.A. §§ 1251(a), 1311(b)(1)(C), 1342(a)(1, 2), (b), (d)(2).

8 Cases that cite this headnote

[9] **Environmental Law**
Water Quality Standards or Plans

Clean Water Act does not prohibit any discharge of effluent that would reach waters already in violation of existing water quality standards; nothing in Act mandates complete ban, but rather vests in Environmental Protection Agency (EPA) and states broad

authority to develop long-range, area-wide programs to alleviate and eliminate existing pollution. Federal Water Pollution Control Act Amendments of 1972, § 402(h), as amended, 33 U.S.C.A. § 1342(h).

10 Cases that cite this headnote

[10] Environmental Law
Water pollution

Court of Appeals exceeded legitimate scope of judicial review of agency adjudication by finding that Environmental Protection Agency (EPA) had misinterpreted Oklahoma law with regard to discharge of effluent into interstate waterway Court of Appeals substituted its own reading of the law for EPA's and thus failed to give required substantial deference to agency's reasonable interpretation. Federal Water Pollution Control Act Amendments of 1972, §§ 208(b)(2), 301(b)(1)(C), 303(d), 402(h), as amended, 33 U.S.C.A. §§ 1288(b)(2), 1311(b)(1)(C), 1313(d), 1342(h).

37 Cases that cite this headnote

[11] Environmental Law
Power to regulate

States
Environment;nuclear projects

Interstate water pollution is controlled by federal law.

3 Cases that cite this headnote

[12] Environmental Law
Interstate pollution

Evidence supported finding by ALJ that discharge from Fayetteville, Arkansas, sewage treatment plant into interstate Illinois River basin would not violate Oklahoma water quality standards. Federal Water Pollution Control Act Amendments of 1972, §§ 208(b)(2), 301(b)(1)(C), 303(d), 402(h), as amended, 33 U.S.C.A. §§ 1288(b)(2), 1311(b)(1)(C), 1313(d), 1342(h).

58 Cases that cite this headnote

[13] Administrative Law and Procedure
Administrative construction

Environmental Law
Scope of Inquiry on Review of Administrative Decision

Environmental Protection Agency (EPA) is entitled to discretion to interpret its own regulations and those regulations are entitled to appropriate level of deference.

4 Cases that cite this headnote

[14] Administrative Law and Procedure
Substantial evidence

Court reviewing agency's adjudication should accept agency's factual findings if those findings are supported by substantial evidence in the record as a whole; court should not supplant agency's findings merely by identifying alternate findings that could be supported by substantial evidence.

391 Cases that cite this headnote

[15] Administrative Law and Procedure
Arbitrary, unreasonable or capricious action; illegality

Administrative agency ruling is "arbitrary and capricious" if agency has entirely failed to consider important aspect of problem.

23 Cases that cite this headnote

[16] Environmental Law
Water pollution

Court of Appeals made policy choice beyond its authority by ruling that, even if discharge of effluent from Arkansas sewage treatment plant would have no adverse impact on water quality, discharge into Illinois River which would flow through Oklahoma could be prohibited; it was not arbitrary for Environmental Protection Agency (EPA) to conclude, given benefits to river from

increased flow of relatively clean water, and benefits achieved in Arkansas by allowing new plant to operate as designed, that allowing discharge would be wiser.

7 Cases that cite this headnote

****1049** *Syllabus* *

The Clean Water Act provides for two sets of water quality measures: effluent limitations, which are promulgated by the Environmental Protection Agency (EPA or Agency), and water quality standards, which are promulgated by the States. The Act generally prohibits the discharge of effluent into a navigable body of water unless the point source obtains a National Pollution Discharge Elimination System (NPDES) permit from a State with an EPA-approved permit program or from the EPA itself. A Fayetteville, Arkansas, sewage treatment plant received an EPA-issued permit, authorizing it to discharge effluent into a stream that ultimately reaches the Illinois River upstream from the Oklahoma border. Respondents, Oklahoma and other Oklahoma parties, challenged the permit before the EPA, alleging, *inter alia,* that the discharge violated Oklahoma water quality standards, which allow no degradation of water quality in the upper Illinois River. The EPA's Chief Judicial Officer remanded the initial affirmance of the permit by the Administrative Law Judge (ALJ), ruling that the Act requires an NPDES permit to impose any effluent limitations necessary to comply with applicable state water quality standards, and that those standards would be violated only if the record shows by a preponderance of the evidence that the discharge would cause an actual *detectable* violation of Oklahoma's water quality standards. The ALJ then made detailed findings of fact, concluding that Fayetteville had satisfied the Chief Judicial Officer's standard, and the Chief Judicial Officer sustained the permit's issuance. The Court of Appeals reversed, ruling that the Act does not allow a permit to be issued where a proposed source would discharge effluent that would contribute to conditions currently constituting a violation of applicable water quality standards. It concluded that the Illinois River was already degraded, that the Fayetteville effluent would reach the river in Oklahoma, and that the effluent would contribute to the river's deterioration even though it would not detectably affect the river's water quality.

***92** *Held:* The EPA's action was authorized by the Clean Water Act. Pp. 1052–1061.

(a) Where interstate discharge is involved, both federal common law of nuisance, *Milwaukee v. Illinois,* 451 U.S. 304, 101 S.Ct. 1784, 68 L.Ed.2d 114, and an affected State's common law, *International Paper Co. v. Ouellette,* 479 U.S. 481, 493, 107 S.Ct. 805, 812, 93 L.Ed.2d 883, are pre-empted. Affected States may not block a permit, but must apply to the EPA Administrator, who may disapprove a plan if he concludes that the discharge will have an undue impact on interstate waters. *Id.,* at 490–491, 107 S.Ct., at 809. Pp. 1052–1054.

****1050** (b) The EPA has construed the Act as requiring that EPA-issued permits comply with the requirements for a permit issued under an approved state plan and with § 401(a) of the Act, which appears to prohibit the issuance of a federal permit over the objection of an affected State unless compliance with the affected State's water quality requirements can be insured. Pp. 1054–1055.

(c) The EPA's requirement that the Fayetteville discharge comply with Oklahoma's water quality standards is a reasonable exercise of the substantial statutory discretion Congress has vested in the Agency. There is no need to address the question whether the Act requires compliance with affected States' standards, for it clearly does not limit the EPA's authority to mandate such compliance. EPA regulations, which since 1973 have required that an NPDES permit not be issued when compliance with affected States' water quality standards cannot be insured, are a reasonable exercise of the Agency's discretion and are a well-tailored means of reaching the Act's goal of achieving state water quality standards. The EPA's authority is not constrained by the limits in *Ouellette, supra,* concerning an affected State's direct input into the permit process, does not conflict with the Act's legislative history and statutory scheme, and is not incompatible with the balance among competing policies and interests that Congress struck in the Act. Pp. 1056–1057.

(d) Contrary to the Court of Appeals' interpretation, nothing in the Act mandates a complete ban on discharges into a waterway that is in violation of existing water quality standards. Instead, the Act vests in the EPA and the States broad authority to develop long-range,

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area-wide programs to alleviate and eliminate existing pollution. Pp. 1057–1058.

(e) The Court of Appeals exceeded the legitimate scope of judicial review of an agency adjudication when it invalidated the EPA's issuance of the permit on the ground that the Agency misinterpreted Oklahoma's water quality standards. It substituted its own reading of the law for the EPA's. Thus, it failed to give substantial deference to the Agency's reasonable, consistently held interpretation of its own regulations, which incorporate the Oklahoma standards. It also disregarded well-established ***93** standards for reviewing factual findings of agencies by making its own factual findings when the ALJ's findings were supported by substantial evidence. See generally *Universal Camera Corp. v. NLRB,* 340 U.S. 474, 71 S.Ct. 456, 95 L.Ed. 456. As a result, the court's conclusion that the river's degradation was an important and relevant factor which the EPA failed to consider was based on its own erroneous interpretation of the controlling law. Had it been properly respectful of the EPA's permissible reading of the Act—that what matters is not the river's current status, but whether the proposed discharge will have a detectable effect on that status—it would not have adjudged the Agency's decision arbitrary and capricious. Pp. 1058–1061.

908 F.2d 595 (CA10 1990), reversed.

STEVENS, J., delivered the opinion for a unanimous Court.

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Opinion

***94** Justice STEVENS delivered the opinion of the Court.

Pursuant to the Clean Water Act, 86 Stat. 816, as amended, 33 U.S.C. § 1251 *et seq.,* the Environmental Protection Agency (EPA or agency) issued a discharge permit to a new point source in Arkansas, about 39 miles upstream from the Oklahoma state line. The question presented in this litigation is whether the EPA's finding that discharges from the new source would not cause a detectable ****1051** violation of Oklahoma's ***95** water quality standards satisfied the EPA's duty to protect the interests of the downstream State. Disagreeing with the Court of Appeals, we hold that the Agency's action was authorized by the statute.

I

In 1985, the city of Fayetteville, Arkansas, applied to the EPA, seeking a permit for the city's new sewage treatment plant under the National Pollution Discharge Elimination System (NPDES). After the appropriate procedures, the EPA, pursuant to § 402(a)(1) of the Act, 33 U.S.C. § 1342(a)(1), issued a permit authorizing the plant to discharge up to half of its effluent (to a limit of 6.1 million gallons per day) into an unnamed stream in northwestern Arkansas. [1] That flow passes through a series of three creeks for about 17 miles, and then enters the Illinois River at a point 22 miles upstream from the Arkansas–Oklahoma border.

The permit imposed specific limitations on the quantity, content, and character of the discharge and also included a number of special conditions, including a provision that if a study then underway indicated that more stringent limitations were necessary to ensure compliance with Oklahoma's water quality standards, the permit would be modified to incorporate those limits. App. 84.

Respondents challenged this permit before the EPA, alleging, *inter alia,* that the discharge violated the Oklahoma water quality standards. Those standards provide that "no degradation [of water quality] shall be allowed" in the upper Illinois River, including the portion of the river immediately downstream from the state line. [2]

***96** Following a hearing, the Administrative Law Judge (ALJ) concluded that the Oklahoma standards would not be implicated unless the contested discharge had "something more than a mere *de minimis* impact" on the State's waters. He found that the discharge would not have an "undue impact" on Oklahoma's waters and, accordingly, affirmed the issuance of the permit. App. to

Pet. for Cert. in No. 90–1262, pp. 101a–103a (emphasis deleted).

On a petition for review, the EPA's Chief Judicial Officer first ruled that § 301(b)(1)(C) of the Clean Water Act "requires an NPDES permit to impose any effluent limitations necessary to comply with applicable state water quality standards." [3] *Id.,* at 116a–117a. He ****1052** then held that the Act ***97** and EPA regulations offered greater protection for the downstream State than the ALJ's "undue impact" standard suggested. He explained the proper standard as follows:

> "[A] mere theoretical impairment of Oklahoma's water quality standards—*i.e.,* an infinitesimal impairment predicted through modeling but not expected to be actually detectable or measurable—should not by itself block the issuance of the permit. In this case, the permit should be upheld if the record shows by a preponderance of the evidence that the authorized discharges would not cause an actual *detectable* violation of Oklahoma's water quality standards." *Id.,* at 117a (emphasis in original).

On remand, the ALJ made detailed findings of fact and concluded that the city had satisfied the standard set forth by the Chief Judicial Officer. Specifically, the ALJ found that there would be no detectable violation of any of the components of Oklahoma's water quality standards. *Id.,* at 127a–143 a. The Chief Judicial Officer sustained the issuance of the permit. *Id.,* at 145a–153a.

Both the petitioners in No. 90–1262 (collectively Arkansas) and the respondents in this litigation sought judicial review. [4] Arkansas argued that the Clean Water Act did not require an Arkansas point source to comply with Oklahoma's water quality standards. Oklahoma challenged the EPA's determination that the Fayetteville discharge would not produce a detectable violation of the Oklahoma standards.

The Court of Appeals did not accept either of these arguments. The court agreed with the EPA that the statute required compliance with Oklahoma's water quality standards, ***98** see 908 F.2d 595, 602–615 (CA10 1990), and did not disagree with the Agency's determination that the discharges from the Fayetteville plant would not produce a detectable violation of those standards. *Id.,* at 631–633. Nevertheless, relying on a theory that neither party had advanced, the Court of Appeals reversed the Agency's issuance of the Fayetteville permit. The court first ruled that the statute requires that "where a proposed source would discharge effluents that would contribute to conditions currently constituting a violation of applicable water quality standards, such [a] proposed source may not be permitted." *Id.,* at 620. Then the court found that the Illinois River in Oklahoma was "already degraded," that the Fayetteville effluent would reach the Illinois River in Oklahoma, and that that effluent could "be expected to contribute to the ongoing deterioration of the scenic [Illinois R]iver" in Oklahoma even though it would not detectably affect the river's water quality. *Id.,* at 621–629.

The importance and the novelty of the Court of Appeals' decision persuaded us to grant certiorari. 499 U.S. 946, 111 S.Ct. 1412, 113 L.Ed.2d 465 (1991). We now reverse.

II

Interstate waters have been a font of controversy since the founding of the Nation. *E.g., Gibbons v. Ogden,* 9 Wheat. 1, 6 L.Ed. 23 (1824). This Court has frequently resolved disputes between States that are separated by a common river, see, *e.g., Ohio v. Kentucky,* 444 U.S. 335, 100 S.Ct. 588, 62 L.Ed.2d 530 (1980), that border the same body of water, see, *e.g.,* ****1053** *New York v. New Jersey,* 256 U.S. 296, 41 S.Ct. 492, 65 L.Ed. 937 (1921), or that are fed by the same river basin, see, *e.g., New Jersey v. New York,* 283 U.S. 336, 51 S.Ct. 478, 75 L.Ed. 1104 (1931).

[1] Among these cases are controversies between a State that introduces pollutants to a waterway and a downstream State that objects. See, *e.g., Missouri v. Illinois,* 200 U.S. 496, 26 S.Ct. 268, 50 L.Ed. 572 (1906). In such cases, this Court has applied principles of common law tempered by a respect for the sovereignty of the States. Compare *id.,* at 521, 26 S.Ct., at 270, with *Georgia v. Tennessee Copper Co.,* 206 U.S. 230, 237, 27 S.Ct. 618, 619, 51 L.Ed. 1038 (1907). In forging what "may ***99** not improperly be called interstate common law," *Illinois v. Milwaukee,* 406 U.S. 91, 105–106, 92 S.Ct. 1385, 1393–1394, 31 L.Ed.2d 712 (1972) (*Milwaukee I*), however, we remained aware "that new federal laws and new federal regulations may in time pre-empt the field of federal common law of nuisance." *Id.,* at 107, 92 S.Ct. at 1395.

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In *Milwaukee v. Illinois,* 451 U.S. 304, 101 S.Ct. 1784, 68 L.Ed.2d 114 (1981) (*Milwaukee II*), we held that the Federal Water Pollution Control Act Amendments of 1972 did just that. In addressing Illinois' claim that Milwaukee's discharges into Lake Michigan constituted a nuisance, we held that the comprehensive regulatory regime created by the 1972 amendments pre-empted Illinois' federal common law remedy. We observed that Congress had addressed many of the problems we had identified in *Milwaukee I* by providing a downstream State with an opportunity for a hearing before the source State's permitting agency, by requiring the latter to explain its failure to accept any recommendations offered by the downstream State, and by authorizing the EPA, in its discretion, to veto a source State's issuance of any permit if the waters of another State may be affected. *Milwaukee II,* 451 U.S., at 325–326, 101 S.Ct., at 1796–1797.

In *Milwaukee II,* the Court did not address whether the 1972 amendments had supplanted *state* common law remedies as well as the federal common law remedy. See *id.,* at 310, n. 4. On remand, Illinois argued that § 510 of the Clean Water Act, 33 U.S.C. § 1370, expressly preserved the State's right to adopt and enforce rules that are more stringent than federal standards. [5] The Court of Appeals accepted Illinois' reading of § 510, but held that that section did "no more than ***100** to save the right and jurisdiction of a state to regulate activity occurring within the confines of its boundary waters." *Illinois v. Milwaukee,* 731 F.2d 403, 413 (CA7 1984), cert. denied, 469 U.S. 1196, 105 S.Ct. 979, 83 L.Ed.2d 981 (1985).

[2] This Court subsequently endorsed that analysis in *International Paper Co. v. Ouellette,* 479 U.S. 481, 107 S.Ct. 805, 93 L.Ed.2d 883 (1987), in which Vermont property owners claimed that the pollution discharged into Lake Champlain by a paper company located in New York constituted a nuisance under Vermont law. The Court held the Clean Water Act taken "as a whole, its purposes and its history" pre-empted an action based on the law of the affected State and that the only state law applicable to an interstate discharge is "the law of the State in which the point source is located." *Id.,* at 493, 487, 107 S.Ct. at 812, 809. Moreover, in reviewing § 402(b) of the Act, the Court pointed out that when a new permit is being issued by the source State's permit-granting agency, the downstream State

****1054** "does not have the authority to block the issuance of the permit if it is dissatisfied with the proposed standards. An affected State's only recourse is to apply to the EPA Administrator, who then has the discretion to disapprove the permit if he concludes that the discharges will have an undue impact on interstate waters. § 1342(d)(2).... Thus the Act makes it clear that affected States occupy a subordinate position to source States in the federal regulatory program." *Id.,* at 490–491, 107 S.Ct., at 811. [6]

***101** Unlike the foregoing cases, this litigation involves not a state-issued permit, but a federally issued permit. To explain the significance of this distinction, we comment further on the statutory scheme before addressing the specific issues raised by the parties.

III

The Clean Water Act anticipates a partnership between the States and the Federal Government, animated by a shared objective: "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). Toward this end, the Act provides for two sets of water quality measures. "Effluent limitations" are promulgated by the EPA and restrict the quantities, rates, and concentrations of specified substances which are discharged from point sources. See §§ 1311, 1314. "[W]ater quality standards" are, in general, promulgated by the States and establish the desired condition of a waterway. See § 1313. These standards supplement effluent limitations "so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels." *EPA v. California ex rel. State Water Resources Control Bd.,* 426 U.S. 200, 205, n. 12, 96 S.Ct. 2022, 2025, n. 12, 48 L.Ed.2d 578 (1976).

The EPA provides States with substantial guidance in the drafting of water quality standards. See generally 40 CFR pt. 131 (1991) (setting forth model water quality standards). Moreover, § 303 of the Act requires, *inter alia,* that state authorities periodically review water quality standards and secure the EPA's approval of any revisions in the standards. If the EPA recommends changes to the standards and the State fails to comply with that recommendation, the Act authorizes the EPA

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to promulgate water quality standards for the State. 33 U.S.C. § 1313(c).

The primary means for enforcing these limitations and standards is the NPDES, enacted in 1972 as a critical part of Congress' "complete rewriting" of federal water pollution ***102** law. *Milwaukee II,* 451 U.S., at 317, 101 S.Ct., at 1793. Section 301(a) of the Act, 33 U.S.C. § 1311(a), generally prohibits the discharge of any effluent into a navigable body of water unless the point source has obtained an NPDES permit. Section 402 establishes the NPDES permitting regime, and describes two types of permitting systems: state permit programs that must satisfy federal requirements and be approved by the EPA, and a federal program administered by the EPA.

Section 402(b) authorizes each State to establish "its own permit program for discharges into navigable waters within its jurisdiction." 33 U.S.C. § 1342(b). Among the requirements the state program must satisfy ****1055** are the procedural protections for downstream States discussed in *Ouellette* and *Milwaukee II.* See §§ 1342(b)(3), (5). [7] Although these provisions do not authorize the downstream State to veto the issuance of a permit for a new point source in another State, the Administrator retains authority to block the issuance of any state-issued permit that is outside the guidelines and requirements of the Act. § 1342(d)(2). [8]

[3] ***103** In the absence of an approved state program, the EPA may issue an NPDES permit under § 402(a) of the Act. (In these cases, for example, because Arkansas had not been authorized to issue NPDES permits when the Fayetteville plant was completed, the permit was issued by the EPA itself.) The EPA's permit program is subject to the "same terms, conditions, and requirements" as a state permit program. 33 U.S.C. § 1342(a)(3). Notwithstanding this general symmetry, the EPA has construed the Act as requiring that EPA-issued NPDES permits also comply with § 401(a). That section, which predates § 402 and the NPDES, applies to a broad category of federal licenses, and sets forth requirements for "[a]ny applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters." 33 U.S.C. § 1341(a). Section 401(a)(2) appears to prohibit the issuance of any federal license or permit over the objection of an affected State unless compliance with the affected State's water quality requirements can be ensured. [9]

****1056** ***104** IV

[4] The parties have argued three analytically distinct questions concerning the interpretation of the Clean Water Act. First, does the Act require the EPA, in crafting and issuing a permit to a point source in one State, to apply the water quality standards of downstream States? Second, even if the Act does not *require* as much, does the Agency have the statutory authority to mandate such compliance? Third, does the Act provide, as the Court of Appeals held, that once a body of water fails to meet water quality standards no discharge that yields effluent that reach the degraded waters will be permitted?

In these cases, it is neither necessary nor prudent for us to resolve the first of these questions. In issuing the Fayetteville permit, the EPA assumed it was obligated by both the Act and its own regulations to ensure that the Fayetteville discharge would not violate Oklahoma's standards. See App. to Pet. for Cert. in No. 90–1262, pp. 116a–117a, and n. 14. As we discuss below, this assumption was permissible and reasonable and therefore there is no need for us to address whether the Act requires as much. Moreover, much of the analysis and argument in the briefs of the parties relies on statutory provisions that govern not only federal permits issued pursuant to §§ 401(a) and 402(a), but also state permits issued under § 402(b). It seems unwise to evaluate those arguments in a case such as these, which only involve a federal permit.

[5] ***105** Our decision not to determine at this time the scope of the Agency's statutory *obligations* does not affect our resolution of the second question, which concerns the Agency's statutory *authority.* Even if the Clean Water Act itself does not require the Fayetteville discharge to comply with Oklahoma's water quality standards, the statute clearly does not limit the EPA's authority to mandate such compliance.

[6] Since 1973, EPA regulations have provided that an NPDES permit shall not be issued "[w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." [10] 40 CFR § 122.4(d) (1991); see also 38 Fed.Reg. 13533 (1973); 40 CFR § 122.44(d) (1991). Those

regulations—relied upon by the EPA in the issuance of the Fayetteville permit—constitute a reasonable exercise of the Agency's statutory authority.

Congress has vested in the Administrator broad discretion to establish conditions for NPDES permits. Section 402(a)(2) provides that for EPA-issued permits "[t]he Administrator shall prescribe conditions ... to assure compliance with the requirements of [§ 402(a)(1)] and *such other requirements as he deems appropriate.*" 33 U.S.C. § 1342(a)(2) (emphasis added). Similarly, Congress preserved for the Administrator broad authority to oversee state permit programs:

> "No permit shall issue ... if the Administrator ... objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter." § 1342(d)(2).

The regulations relied on by the EPA were a perfectly reasonable exercise of the Agency's statutory discretion. The application of state water quality standards in the interstate context is wholly consistent with the Act's broad purpose "to restore and maintain the chemical, physical, and ***106** biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). Moreover, as noted above, § 301(b)(1)(C) expressly identifies the achievement of state water quality standards as one of the Act's central objectives. The Agency's regulations conditioning NPDES permits are a well-tailored means of achieving this goal.

[7] Notwithstanding this apparent reasonableness, Arkansas argues that our description ****1057** in *Ouellette* of the role of affected States in the permit process and our characterization of the affected States' position as "subordinate," see 479 U.S., at 490–491, 107 S.Ct. at 810–811, indicates that the EPA's application of the Oklahoma standards was error. We disagree. Our statement in *Ouellette* concerned only an affected State's input into the permit process; that input is clearly limited by the plain language of § 402(b). Limits on an affected State's direct participation in permitting decisions, however, do not in any way constrain the *EPA's* authority to require a point source to comply with downstream water quality standards.

Arkansas also argues that regulations requiring compliance with downstream standards are at odds with the legislative history of the Act and with the statutory scheme established by the Act. Although we agree with Arkansas that the Act's legislative history indicates that Congress intended to grant the Administrator discretion in his oversight of the issuance of NPDES permits, [11] we find nothing in that history to indicate that Congress intended to preclude the EPA from establishing a general requirement that such permits be conditioned to ensure compliance with downstream water quality standards.

Similarly, we agree with Arkansas that in the Clean Water Act Congress struck a careful balance among competing policies and interests, but do not find the EPA regulations concerning ***107** the application of downstream water quality standards at all incompatible with that balance. Congress, in crafting the Act, protected certain sovereign interests of the States; for example, § 510 allows States to adopt more demanding pollution-control standards than those established under the Act. Arkansas emphasizes that § 510 preserves such state authority only as it is applied to the waters of the regulating State. Even assuming Arkansas' construction of § 510 is correct, cf. *id.,* at 493, 107 S.Ct., at 812, that section only concerns *state* authority and does not constrain the *EPA's* authority to promulgate reasonable regulations requiring point sources in one State to comply with water quality standards in downstream States.

[8] For these reasons, we find the EPA's requirement that the Fayetteville discharge comply with Oklahoma's water quality standards to be a reasonable exercise of the Agency's substantial statutory discretion. Cf. *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.,* 467 U.S. 837, 842–845, 104 S.Ct. 2778, 2781–2783, 81 L.Ed.2d 694 (1984).

V

[9] The Court of Appeals construed the Clean Water Act to prohibit any discharge of effluent that would reach waters already in violation of existing water quality standards. [12] We find nothing in the Act to support this reading.

****1058** ***108** The interpretation of the statute adopted by the court had not been advanced by any party during the Agency or court proceedings. Moreover, the Court of Appeals candidly acknowledged that its theory "has apparently never before been addressed by a federal court." 908 F.2d, at 620, n. 39. The only statutory

provision the court cited to support its legal analysis was § 402(h), see *id.,* at 633, which merely authorizes the EPA (or a state permit program) to prohibit a publicly owned treatment plant that is violating a condition of its NPDES permit from accepting any additional pollutants for treatment until the ongoing violation has been corrected. See 33 U.S.C. § 1342(h).

Although the Act contains several provisions directing compliance with state water quality standards, see, *e.g.,* § 1311(b)(1)(C), the parties have pointed to nothing that mandates a complete ban on discharges into a waterway that is in violation of those standards. The statute does, however, contain provisions designed to remedy existing water quality violations and to allocate the burden of reducing undesirable discharges between existing sources and new sources. See, *e.g.,* § 1313(d). Thus, rather than establishing the categorical ban announced by the Court of Appeals—which might frustrate the construction of new plants that would improve existing conditions—the Clean Water Act vests in the EPA and the States broad authority to develop long-range, area-wide programs to alleviate and eliminate existing pollution. See, *e.g.,* § 1288(b)(2).

To the extent that the Court of Appeals relied on its interpretation of the Act to reverse the EPA's permitting decision, that reliance was misplaced.

***109** VI

[10] The Court of Appeals also concluded that the EPA's issuance of the Fayetteville permit was arbitrary and capricious because the Agency misinterpreted Oklahoma's water quality standards. The primary difference [13] between the court's and the Agency's interpretation of the standards derives from the court's construction of the Act. Contrary to the EPA's interpretation of the Oklahoma standards, the Court of Appeals read those standards as containing the same categorical ban on new discharges that the court had found in the Clean Water Act itself. Although we do not believe the text of the Oklahoma standards supports the court's reading (indeed, we note that Oklahoma itself had not advanced that interpretation in its briefs in the Court of Appeals), we reject it for a more fundamental reason—namely, that the Court of Appeals exceeded the legitimate scope of judicial review of an agency adjudication. To emphasize the importance of this point, we shall first briefly assess the soundness of the EPA's interpretation and application of the Oklahoma ***110** standards and then comment more specifically on the Court of Appeals' approach.

As discussed above, an EPA regulation requires an NPDES permit to comply "with the applicable water quality requirements of ****1059** all affected States." 40 CFR § 122.4(d) (1991). This regulation effectively incorporates into federal law those state-law standards the Agency reasonably determines to be "applicable." In such a situation, then, state water quality standards—promulgated by the States with substantial guidance from the EPA [14] and approved by the Agency—are part of the federal law of water pollution control.

[11] Two features of the body of law governing water pollution support this conclusion. First, as discussed more thoroughly above, we have long recognized that interstate water pollution is controlled by *federal* law. See *supra,* at 1052–1054. Recognizing that the system of federally approved state standards as applied in the interstate context constitutes federal law is wholly consistent with this principle. Second, treating state standards in interstate controversies as federal law accords with the Act's purpose of authorizing the EPA to create and manage a uniform system of interstate water pollution regulation.

Because we recognize that, at least insofar as they affect the issuance of a permit in another State, the Oklahoma standards have a federal character, the EPA's reasonable, consistently held interpretation of those standards is entitled to substantial deference. Cf. *INS v. National Center for Immigrants' Rights,* 502 U.S. 183, 189–190, 112 S.Ct. 551, 556, 116 L.Ed.2d 546 (1991); *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.,* 467 U.S. 837, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984). In these cases, the Chief Judicial Officer ruled that the Oklahoma standards—which require that there be "no degradation" of the upper Illinois River—would ***111** only be violated if the discharge effected an "actually detectable or measurable" change in water quality. App. to Pet. for Cert. in No. 90–1262, p. 117a.

This interpretation of the Oklahoma standards is certainly reasonable and consistent with the purposes and principles of the Clean Water Act. As the Chief Judicial Officer noted, "unless there is some method for measuring compliance, there is no way to ensure compliance." *Id.,*

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at 118a, n. 16 (internal quotation marks omitted; citation omitted). Moreover, this interpretation of the Oklahoma standards makes eminent sense in the interstate context: If every discharge that had some theoretical impact on a downstream State were interpreted as "degrading" the downstream waters, downstream States might wield an effective veto over upstream discharges.

[12] The EPA's application of those standards in these cases was also sound. On remand, the ALJ scrutinized the record and made explicit factual findings regarding four primary measures of water quality under the Oklahoma standards: eutrophication, [15] esthetics, [16] dissolved oxygen, [17] and ****1060** metals. ***112** [18] In each case, the ALJ found that the Fayetteville discharge would not lead to a detectable change in water quality. He therefore concluded that the Fayetteville discharge would not violate the Oklahoma water quality standards. Because we agree with the Agency's Chief Judicial Officer that these findings are supported by substantial evidence, we conclude that the Court of Appeals should have affirmed both the EPA's construction of the regulations and the issuance of the Fayetteville permit.

In its review of the EPA's interpretation and application of the Oklahoma standards, the Court of Appeals committed three mutually compounding errors.

[13] First, the court failed to give due regard to the EPA's interpretation of its own regulations, as those regulations incorporate the Oklahoma standards. Instead the court voiced its own interpretation of the governing law and concluded that "where a proposed source would discharge effluents that would contribute to conditions currently constituting a violation of applicable water quality standards, such [a] proposed source may not be permitted." 908 F.2d, at 620. As we have already pointed out, that reading of the law is not supported by the statute or by any EPA regulation. The Court of Appeals sat in review of an agency action and should have afforded the EPA's interpretation of the governing law an appropriate level of deference. See generally *Chevron, supra,* 467 U.S., at 842–844, 104 S.Ct., at 2781–2782.

[14] Second, the court disregarded well-established standards for reviewing the factual findings of agencies and instead made its own factual findings. The troubling nature of the court's analysis appears on the face of the opinion itself: At least four times, the court concluded that "there was substantial evidence before the ALJ to support" particular findings which the court thought appropriate, but which were ***113** contrary to those actually made by the ALJ. 908 F.2d, at 620, 625, 627, 629. Although we have long recognized the "substantial evidence" standard in administrative law, the court below turned that analysis on its head. A court reviewing an agency's adjudicative action should accept the *agency's* factual findings if those findings are supported by substantial evidence on the record as a whole. See generally *Universal Camera Corp. v. NLRB,* 340 U.S. 474, 71 S.Ct. 456, 95 L.Ed. 456 (1951). The court should not supplant the agency's findings merely by identifying alternative findings that could be supported by substantial evidence.

Third, the court incorrectly concluded that the EPA's decision was arbitrary and capricious. This error is derivative of the court's first two errors. Having substituted its reading of the governing law for the Agency's, and having made its own factual findings, the Court of Appeals concluded that the EPA erred in not considering an important and relevant fact—namely, that the upper Illinois River was (by the court's assessment) already degraded.

As we have often recognized, an agency ruling is "arbitrary and capricious if the agency has ... entirely failed to consider an important aspect of the problem." *Motor Vehicle Mfrs. Assn. of United States, Inc. v. State Farm Mut. Automobile Ins. Co.,* 463 U.S. 29, 43, 103 S.Ct. 2856, 2867, 77 L.Ed.2d 443 (1983). However, in these cases, the degraded status of the river is only an "important aspect" because of the Court of Appeals' novel and erroneous interpretation of the controlling law. Under the EPA's interpretation of that law, what matters is not the river's current status, but rather whether the proposed discharge will have a "detectable effect" on that status. If the Court of Appeals had been properly respectful of the Agency's permissible reading of the Act and ****1061** the Oklahoma standards, the court would not have adjudged the Agency's decision arbitrary and capricious for this reason.

[15] **[16]** In sum, the Court of Appeals made a policy choice that it was not authorized to make. Arguably, as that court suggested, ***114** it might be wise to prohibit any discharge into the Illinois River, even if that discharge would have no adverse impact on water quality. But

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it was surely not arbitrary for the EPA to conclude—given the benefits to the river from the increased flow of relatively clean water[19] and the benefits achieved in Arkansas by allowing the new plant to operate as designed—that allowing the discharge would be even wiser. It is not our role, or that of the Court of Appeals, to decide which policy choice is the better one, for it is clear that Congress has entrusted such decisions to the Environmental Protection Agency.

Accordingly, the judgment of the Court of Appeals is

Reversed.

All Citations

503 U.S. 91, 112 S.Ct. 1046, 117 L.Ed.2d 239, 34 ERC 1193, 60 USLW 4176, 22 Envtl. L. Rep. 20,552

Footnotes

* The syllabus constitutes no part of the opinion of the Court but has been prepared by the Reporter of Decisions for the convenience of the reader. See *United States v. Detroit Lumber Co.,* 200 U.S. 321, 337, 26 S.Ct. 282, 287, 50 L.Ed. 499.

1 The permit also authorized the plant to discharge the remainder of its effluent into the White River, a river that does not flow into Oklahoma; this aspect of the permit is not at issue in this litigation.

2 Section 5 of the Oklahoma water quality standards provides:

"All streams and bodies of water designated as (a) are protected by prohibition of any new point source discharge of wastes or increased load from an existing point source except under conditions described in Section 3.

"All streams designated by the State as 'scenic river areas,' and such tributaries of those streams as may be appropriate will be so designated. Best management practices for control of nonpoint source discharge should be initiated when feasible." App. 46–47.

Oklahoma has designated the portion of the Illinois River immediately downstream from the state line as a "scenic river." Okla.Stat., Tit. 82, § 1452(b)(1) (Supp.1989); see also App. 54.

Section 3 of the Oklahoma water quality standards provides, in relevant part:

"The intent of the Anti-degradation Policy is to protect all waters of the State from quality degradation. Existing instream water uses shall be maintained and protected. No further water quality degradation which would interfere with or become injurious to existing instream water uses shall be allowed. Oklahoma's waters constitute a valuable State resource and shall be protected, maintained and improved for the benefit of all the citizens.

. . . . .

"No degradation shall be allowed in high quality waters which constitute an outstanding resource or in waters of exceptional recreational or ecological significance. These include water bodies located in national and State parks, Wildlife Refuges, and those designated 'Scenic Rivers' in Appendix A." App. 27–28.

3 Section 301(b)(1)(C) provides, in relevant part, that

"there shall be achieved—

. . . . .

"(C) not later than July 1, 1977, any more stringent limitation, including those necessary to meet *water quality standards ... established pursuant to any State law or regulations* ... or required to implement any applicable water quality standard established pursuant to this chapter." 33 U.S.C. § 1311(b)(1)(C) (emphasis added).

4 The Arkansas petition was filed in the Court of Appeals for the Eighth Circuit and transferred to the Tenth Circuit where it was consolidated with the petition filed by the respondents.

5 Section 510 provides in relevant part:

> "Except as expressly provided in this [Act], nothing in this [Act] shall (1) preclude or deny the right of any State or political subdivision thereof or interstate agency to adopt or enforce (A) any standard or limitation respecting discharges of pollutants, or (B) any requirement respecting control or abatement of pollution [with exceptions]; or (2) be construed as impairing or in any manner affecting any right or jurisdiction of the States *with respect to the waters (including boundary waters) of such States.*" 33 U.S.C. § 1370 (emphasis added).

6 This description of the downstream State's role in the issuance of a new permit by a source State was apparently consistent with the EPA's interpretation of the Act at the time. The Government's *amicus curiae* brief in *Ouellette* stated that "the affected neighboring state [has] only an advisory role in the formulation of applicable effluent standards or

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limitations. The affected state may try to persuade the federal government or the source state to increase effluent requirements, but *ultimately possesses no statutory authority to compel that result, even when its waters are adversely affected by out-of-state pollution.* See 33 U.S.C. § 1341(a)(2), 1342(b)(3) and (5)...." Brief for United States as *Amicus Curiae,* O.T. 1986, No. 85–1233, p. 19 (emphasis added; footnote omitted).

7 Section 402(b) requires state permit programs

"(3) [t]o insure that ... any other State the waters of which may be affected ... receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

. . . . .

"(5) [t]o insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing." 33 U.S.C. § 1342(b).

Although § 402(b) focuses on state-issued permits, § 402(a)(3) requires that, in issuing an NPDES permit, the Administrator follow the same procedures required of state permit programs. See § 1342(a)(3); see also 33 U.S.C. § 1341(a)(2).

8 Section 402(d)(2) provides:

"(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter. Whenever the Administrator objects to the issuance of a permit under this paragraph such written objection shall contain a statement of the reasons for such objection and the effluent limitations and conditions which such permit would include if it were issued by the Administrator." 33 U.S.C. § 1342(d)(2).

9 Section 401(a)(2) provides, in relevant part:

"Whenever such a discharge may affect, as determined by the Administrator, the quality of the waters of any other State, the Administrator ... shall so notify such other State, the licensing or permitting agency, and the applicant. If, within sixty days after receipt of such notification, such other State determines that such discharge will affect the quality of its waters so as to violate any water quality requirements in such State, and within such sixty-day period notifies the Administrator and the licensing or permitting agency in writing of its objection to the issuance of such license or permit and requests a public hearing on such objection, the licensing or permitting agency shall hold such a hearing. The Administrator shall at such hearing submit his evaluation and recommendations with respect to any such objection to the licensing or permitting agency. Such agency, based upon the recommendations of such State, the Administrator, and upon any additional evidence, if any, presented to the agency at the hearing, shall condition such license or permit in such manner as may be necessary to insure compliance with applicable water quality requirements. If the imposition of conditions cannot insure such compliance such agency shall not issue such license or permit." 33 U.S.C. § 1341(a)(2).

10 This restriction applies whether the permit is issued by the EPA or by an approved state program. See 40 CFR § 123.25 (1991).

11 See, *e.g.,* 1 Legislative History of Water Pollution Control Act Amendments of 1972 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93–1, pp. 322, 388–389, 814 (1973); see also 33 U.S.C. § 1342(d)(3).

12 "[W]e hold that the Clean Water Act prohibits granting an NPDES permit under the circumstances of this case (i.e., where applicable water quality standards have already been violated) and reverse EPA's decision to permit Fayetteville to discharge any part of its effluent to the Illinois River Basin." 908 F.2d 595, 616 (CA10 1990).

"Congress cannot reasonably be presumed to have intended to exclude from the CWA's 'all-encompassing program,' 451 U.S., at 318 [101 S.Ct., at 1793] a permitting decision arising in circumstances such as those of this case. It is even more unfathomable that Congress fashioned a '*comprehensive* ... policy for the *elimination* of water pollution,' *id.,* which sanctions continued pollution once minimum water quality standards have been transgressed. More likely, Congress simply never contemplated that EPA or a state would consider it permissible to authorize further pollution under such circumstances. We will not ascribe to the Act either the gaping loophole or the irrational purpose necessary to uphold EPA's action in this case." *Id.,* at 632 (footnotes omitted).

13 The court identified three errors in the EPA's reading of the Oklahoma standards. First, the court correctly observed that the ALJ and the Chief Judicial Officer misinterpreted § 4.10(c) of the standards as governing only the discharge of phosphorus into lakes, rather than the discharge of phosphorus into lakes and into all "perennial and intermittent streams."

Id., at 617 (emphasis omitted). This error was harmless because the ALJ found that the discharge into Lake Francis would comply with § 4.10(c) and it is undisputed that that discharge produced a greater threat to the slow-moving water of the lake than to the rapid flow in the river.

The second flaw identified by the court was the ALJ's mistaken reliance on the 1985, rather than the 1982 version, of the Oklahoma standards. We agree with the Chief Judicial Officer, who also noted this error, that the portions of the two versions relevant to this case "do not differ materially." App. to Pet. for Cert. in No. 90–1262, p. 150a. Therefore, this error was also harmless.

Because these two errors were harmless, we have focused in the text on the major difference between the court's and the EPA's readings of the Oklahoma standards: the "no degradation" provision.

14 See *supra,* at 1054. Oklahoma's water quality standards closely track the EPA's model standards in effect at that time. Compare § 3 of the Oklahoma standards with 40 CFR § 35.1550(e)(1) (1981).

15 Eutrophication is the "normally slow aging process by which a lake evolves into a bog or marsh.... During eutrophication the lake becomes so rich in nutritive compounds (especially nitrogen and phosphorus) that algae and other microscopic plant life become superabundant, thereby 'choking' the lake...." App. 57–58. With regard to eutrophication, the ALJ found that the Fayetteville plant would discharge 30 pounds of phosphorus per day, only about 6 pounds of which would reach the Arkansas/Oklahoma border, and that such a small amount would not result in an increase in eutrophication. App. to Pet. for Cert. in No. 90–1262, p. 129a.

16 With regard to esthetics, the ALJ concluded that the only discharged compound that would affect esthetics was phosphorus and that, again, the amount of that substance crossing the border would not affect the esthetic quality of Oklahoma's waters. *Id.,* at 135a–136a.

17 With regard to dissolved oxygen, the ALJ found that in the 39 miles between discharge and the border the effluent would experience "complete oxygen recovery" and therefore would not affect the dissolved oxygen levels in the river. *Id.,* at 140a.

18 With regard to metals, the ALJ concluded that the concentrations of metals would be so low as not to violate the Oklahoma standards. *Id.,* at 143a.

19 Justice Holmes recognized this potential benefit years ago:

"There is no pretence that there is a nuisance of the simple kind that was known to the older common law. There is nothing which can be detected by the unassisted senses—no visible increase of filth, no new smell. On the contrary, it is proved that the great volume of pure water from Lake Michigan which is mixed with the sewage at the start has improved the Illinois River in these respects to a noticeable extent. Formerly it was sluggish and ill smelling. Now it is a comparatively clear stream to which edible fish have returned. Its water is drunk by the fisherman, it is said, without evil results." *Missouri v. Illinois,* 200 U.S. 496, 522, 26 S.Ct. 268, 270, 50 L.Ed. 572 (1906).

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West's Annotated California Codes
Constitution of the State of California 1879 (Refs & Annos)
Article Xiiib. Government Spending Limitation (Refs & Annos)

West's Ann.Cal.Const. Art. 13B, § 6

§ 6. New programs or services mandated by Legislature or state agencies; subvention; appropriation of funds or suspension of operation

Effective: June 4, 2014
Currentness

SEC. 6. (a) Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the State shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service, except that the Legislature may, but need not, provide a subvention of funds for the following mandates:

(1) Legislative mandates requested by the local agency affected.

(2) Legislation defining a new crime or changing an existing definition of a crime.

(3) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975.

(4) Legislative mandates contained in statutes within the scope of paragraph (7) of subdivision (b) of Section 3 of Article I.

(b)(1) Except as provided in paragraph (2), for the 2005-06 fiscal year and every subsequent fiscal year, for a mandate for which the costs of a local government claimant have been determined in a preceding fiscal year to be payable by the State pursuant to law, the Legislature shall either appropriate, in the annual Budget Act, the full payable amount that has not been previously paid, or suspend the operation of the mandate for the fiscal year for which the annual Budget Act is applicable in a manner prescribed by law.

(2) Payable claims for costs incurred prior to the 2004-05 fiscal year that have not been paid prior to the 2005-06 fiscal year may be paid over a term of years, as prescribed by law.

(3) Ad valorem property tax revenues shall not be used to reimburse a local government for the costs of a new program or higher level of service.

(4) This subdivision applies to a mandate only as it affects a city, county, city and county, or special district.

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(5) This subdivision shall not apply to a requirement to provide or recognize any procedural or substantive protection, right, benefit, or employment status of any local government employee or retiree, or of any local government employee organization, that arises from, affects, or directly relates to future, current, or past local government employment and that constitutes a mandate subject to this section.

(c) A mandated new program or higher level of service includes a transfer by the Legislature from the State to cities, counties, cities and counties, or special districts of complete or partial financial responsibility for a required program for which the State previously had complete or partial financial responsibility.

Credits

(Adopted Nov. 6, 1979. Amended by Stats.2004, Res. c. 133 (S.C.A.4) (Prop.1A, approved Nov. 2, 2004, eff. Nov. 3, 2004); Stats.2013, Res. c. 123 (S.C.A.3), § 2 (Prop. 42, approved June 3, 2014, eff. June 4, 2014).)

Notes of Decisions (202)

West's Ann. Cal. Const. Art. 13B, § 6, CA CONST Art. 13B, § 6
Current with urgency legislation through Ch. 14 of 2017 Reg.Sess

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KeyCite Yellow Flag - Negative Treatment
Distinguished by City of Arcadia v. State Water Resources Control Bd., Cal.App. 4 Dist., December 14, 2010

35 Cal.4th 613
Supreme Court of California

CITY OF BURBANK, Plaintiff and Appellant,
v.
STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Appellants.
City of Los Angeles, Plaintiff and Respondent,
v.
State Water Resources Control Board et al., Defendants and Appellants.

Nos. S119248, B151175, B152562.
|
April 4, 2005.
|
Rehearing Denied June 29, 2005. *

Synopsis
Background: Cities filed petitions for writs of mandate challenging pollutant limitations in wastewater discharge permits issued by regional water quality control boards. The Superior Court, Los Angeles County, Nos. BS060957 and BS060960, Dzintra I. Janavs, J., set aside permits. Regional board and state water resources control board appealed. The Court of Appeal consolidated the cases and reversed. The Supreme Court granted review, superseding the opinion of the Court of Appeal.

Holdings: The Supreme Court, Kennard, J., held that:

[1] regional board may not consider economic factors as justification for imposing pollutant restrictions in wastewater discharge permit which are less stringent than applicable federal standards, and

[2] when imposing more stringent pollutant restrictions that those required by federal law, regional board may take economic factors into account.

Judgment of Court of Appeal affirmed, and matter remanded.

Brown, J., filed concurring opinion.

Opinion, 4 Cal.Rptr.3d 27, superseded.

West Headnotes (5)

[1] **Environmental Law**
Purpose

Clean Water Act is a comprehensive water quality statute designed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Federal Water Pollution Control Act Amendments of 1972, § 101 et seq., as amended, 33 U.S.C.A. § 1251 et seq.

11 Cases that cite this headnote

[2] **Environmental Law**
Conditions and limitations
States
Environment;nuclear projects

Regional water quality control board may not consider economic factors as justification for imposing pollutant restrictions in wastewater discharge permit which are less stringent than applicable federal standards, despite statute directing board to take such factors into consideration, because the federal constitutional supremacy clause requires state law to yield to federal law. U.S.C.A. Const. Art. 6, cl. 2; Federal Water Pollution Control Act Amendments of 1972, §§ 101 et seq., 301(a), (b)(1)(B, C), 402(a)(1, 3), as amended, 33 U.S.C.A. §§ 1251 et seq., 1311(a), (b)(1)(B, C), 1342(a)(1, 3); West's Ann.Cal.Water Code §§ 13000 et seq., 13241(d), 13263, 13377.

See 4 Witkin, Summary of Cal. Law (9th ed. 1987) Real Property, §§ 68, 69; 8 Miller & Starr, Cal. Real Estate (3d ed. 2001) § 23:54; Cal. Jur. 3d, Pollution and Conservation Laws, § 126.

14 Cases that cite this headnote

[3] **Statutes**
Purpose and intent

When construing any statute, the court's task is to determine the Legislature's intent when it enacted the statute so as to adopt the construction that best effectuates the purpose of the law.

13 Cases that cite this headnote

[4] **States**
Conflicting or conforming laws or regulations

Under the federal Constitution's supremacy clause, a state law that conflicts with federal law is without effect. U.S.C.A. Const. Art. 6, cl. 2.

Cases that cite this headnote

[5] **Environmental Law**
Conditions and limitations

When imposing more stringent pollutant restrictions in a wastewater discharge permit than those required by federal law, a regional water quality control board may take into account the economic effects of doing so. Federal Water Pollution Control Act Amendments of 1972, §§ 101 et seq., 101(b), 510, as amended, 33 U.S.C.A. §§ 1251 et seq., 1251(b), 1370; West's Ann.Cal.Water Code §§ 13000 et seq., 13241(d), 13263, 13377.

17 Cases that cite this headnote

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Opinion

KENNARD, J.

***618** ****864** Federal law establishes national water quality standards but allows the states to enforce their own water quality laws so long as they comply with federal standards. Operating within this federal-state framework, California's nine Regional Water Quality Control Boards establish water quality policy. They also issue permits for the discharge of treated wastewater; these permits specify the maximum allowable concentration of chemical pollutants in the discharged wastewater.

The question here is this: When a regional board issues a permit to a wastewater treatment facility, must the board take into account the facility's costs of complying with the board's restrictions on pollutants in the wastewater to be discharged? The trial court ruled that California law required a regional board to weigh the economic burden on the facility against the expected environmental benefits of reducing pollutants in the wastewater discharge. The Court of Appeal disagreed. On petitions by the municipal operators of three wastewater treatment facilities, we granted review.

We reach the following conclusions: Because both California law and federal law require regional boards to comply with federal clean water standards, and because the supremacy clause of the United States Constitution requires state law to yield to federal law, a regional board, when issuing a wastewater discharge permit, may not consider economic factors to justify imposing pollutant restrictions that are *less stringent* than the applicable federal standards require. When, however, a regional board is considering whether to make the pollutant restrictions in a wastewater discharge permit *more stringent* than federal law requires, California law allows the board to take into account economic ****865** factors, including the wastewater discharger's cost of compliance. We remand this case for further proceedings to determine whether the pollutant limitations in the permits challenged here meet or exceed federal standards.

*619 I. STATUTORY BACKGROUND

The quality of our nation's waters is governed by a "complex statutory and regulatory scheme ... that implicates both federal and state administrative responsibilities." (*PUD No. 1 of Jefferson County v. Washington Department of Ecology* (1994) 511 U.S. 700, 704, 114 S.Ct. 1900, 128 L.Ed.2d 716.) We first discuss California law, then federal law.

A. California Law

In California, the controlling law is the Porter–Cologne Water Quality Control Act (Porter–Cologne Act), which was enacted in 1969. (Wat.Code, § 13000 et seq., added by Stats.1969, ch. 482, § 18, p. 1051.)[1] Its goal is "to attain the highest water *****307** quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (§ 13000.) The task of accomplishing this belongs to the State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards; together the State Board and the regional boards comprise "the principal state agencies with primary responsibility for the coordination and control of water quality." (§ 13001.) As relevant here, one of those regional boards oversees the Los Angeles region (the Los Angeles Regional Board).[2]

Whereas the State Board establishes statewide policy for water quality control (§ 13140), the regional boards "formulate and adopt water quality control plans for all areas within [a] region" (§ 13240). The regional boards' water quality plans, called "basin plans," must address the beneficial uses to be protected as well as water quality objectives, and they must establish a program of implementation. (§ 13050, subd. (j).) Basin plans must be consistent with "state policy for water quality control." (§ 13240.)

B. Federal Law

[1] In 1972, Congress enacted amendments (Pub.L. No. 92–500 (Oct. 18, 1972) 86 Stat. 816) to the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), which, as amended in 1977, is commonly known as the Clean ***620** Water Act. The Clean Water Act is a "comprehensive water quality statute designed 'to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' " (*PUD No. 1 of Jefferson County v. Washington Dept. of Ecology, supra,* 511 U.S. at p. 704, 114 S.Ct. 1900, quoting 33 U.S.C. § 1251(a).) The Act's national goal was to eliminate by the year 1985 "the discharge of pollutants into the navigable waters" of the United States. (33 U.S.C. § 1251(a)(1).) To accomplish this goal, the Act established "effluent limitations," which are restrictions on the "quantities, rates, and concentrations of chemical, physical, biological, and other constituents"; these effluent limitations allow the discharge of pollutants only when the water has been satisfactorily treated to conform with federal water quality standards. (33 U.S.C. §§ 1311, 1362(11).)

Under the federal Clean Water Act, each state is free to enforce its own water quality laws so long as its effluent limitations are not "less stringent" than those set out in the Clean Water Act. (33 U.S.C. § 1370.) This led the California Legislature in 1972 to amend the state's Porter–Cologne Act "to ensure consistency with the requirements for state programs implementing the Federal Water Pollution Control Act." (§ 13372.)

****866** Roughly a dozen years ago, the United States Supreme Court, in *Arkansas v. Oklahoma* (1992) 503 U.S. 91, 112 S.Ct. 1046, 117 L.Ed.2d 239, described the distinct roles of the state and federal agencies in enforcing water quality: "The Clean Water Act anticipates a partnership between the States and the Federal Government, animated by a shared objective: 'to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' 33 U.S.C. § 1251(a). Toward *****308** this end, [the Clean Water Act] provides for two sets of water quality measures. 'Effluent limitations' are promulgated by the [Environmental Protection Agency (EPA)] and restrict the quantities, rates, and concentrations of specified substances which are discharged from point sources.[3] See §§ 1311, 1314. '[W]ater quality standards' are, in general, promulgated by the States and establish the desired condition of a waterway. See § 1313. These standards supplement effluent limitations 'so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.' *EPA v. California ex rel. State Water Resources Control Bd.,* 426 U.S. 200, 205, n. 12, 96 S.Ct. 2022, 2025, n. 12, 48 L.Ed.2d 578 (1976).

***621** "The EPA provides States with substantial guidance in the drafting of water quality standards. See generally 40 CFR pt. 131 (1991) (setting forth model water quality standards). Moreover, [the Clean Water Act] requires, *inter alia,* that state authorities periodically review water quality standards and secure the EPA's approval of any revisions in the standards. If the EPA recommends changes to the standards and the State fails to comply with that recommendation, the Act authorizes the EPA to promulgate water quality standards for the State. 33 U.S.C. § 1313(c)." (*Arkansas v. Oklahoma, supra,* 503 U.S. at p. 101, 112 S.Ct. 1046.)

Part of the federal Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), "[t]he primary means" for enforcing effluent limitations and standards under the Clean Water Act. (*Arkansas v. Oklahoma, supra,* 503 U.S. at p. 101, 112 S.Ct. 1046.) The NPDES sets out the conditions under which the federal EPA or a state with an approved water quality control program can issue permits for the discharge of pollutants in wastewater. (33 U.S.C. § 1342(a) & (b).) In California, wastewater discharge requirements established by the regional boards are the equivalent of the NPDES permits required by federal law. (§ 13374.)

With this federal and state statutory framework in mind, we now turn to the facts of this case.

II. FACTUAL BACKGROUND

This case involves three publicly owned treatment plants that discharge wastewater under NPDES permits issued by the Los Angeles Regional Board.

The City of Los Angeles owns and operates the Donald C. Tillman Water Reclamation Plant (Tillman Plant), which serves the San Fernando Valley. The City of Los Angeles also owns and operates the Los Angeles–Glendale Water Reclamation Plant (Los Angeles–Glendale Plant),

which processes wastewater from areas within the City of Los Angeles and the independent cities of Glendale and Burbank. Both the Tillman Plant and the Los Angeles–Glendale Plant discharge wastewater directly into the Los Angeles River, now a concrete-lined flood control channel that runs through the City of Los Angeles, ending at the Pacific Ocean. The State Board and the Los Angeles Regional Board consider the Los Angeles River to be a navigable water of the United States for purposes of the federal Clean Water Act.

The third plant, the Burbank Water Reclamation Plant (Burbank Plant), is owned and operated by the City of Burbank, ***309 serving residents and businesses within that city. The Burbank Plant discharges wastewater into the Burbank Western Wash, which drains into the Los Angeles River.

*622 All three plants, which together process hundreds of millions of gallons of sewage **867 each day, are tertiary treatment facilities; that is, the treated wastewater they release is processed sufficiently to be safe not only for use in watering food crops, parks, and playgrounds, but also for human body contact during recreational water activities such as swimming.

In 1998, the Los Angeles Regional Board issued renewed NPDES permits to the three wastewater treatment facilities under a basin plan it had adopted four years earlier for the Los Angeles River and its estuary. That 1994 basin plan contained general narrative criteria pertaining to the existing and potential future beneficial uses and water quality objectives for the river and estuary.[4] The narrative criteria included municipal and domestic water supply, swimming and other recreational water uses, and fresh water habitat. The plan further provided: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life." The 1998 permits sought to reduce these narrative criteria to specific numeric requirements setting daily maximum limitations for more than 30 pollutants present in the treated wastewater, measured in milligrams or micrograms per liter of effluent.[5]

The Cities of Los Angeles and Burbank (Cities) filed appeals with the State Board, contending that achievement of the numeric requirements would be too costly when considered in light of the potential benefit to water quality, and that the pollutant restrictions in the NPDES permits were unnecessary to meet the narrative criteria described in the basin plan. The State Board summarily denied the Cities' appeals.

Thereafter, the Cities filed petitions for writs of administrative mandate in the superior court. They alleged, among other things, that the Los Angeles Regional Board failed to comply with sections 13241 and 13263, part of California's Porter–Cologne Act, because it did not consider the economic burden on the Cities in having to reduce substantially the pollutant content of their discharged wastewater. They also alleged that compliance with the pollutant restrictions set out in the NPDES permits issued by the regional *623 board would greatly increase their costs of treating the wastewater to be discharged into the Los Angeles River. According to the City of Los Angeles, its compliance costs would exceed $50 million annually, representing more than 40 percent of its entire budget for operating its four wastewater treatment plants and its sewer system; the City of Burbank estimated its added costs at over $9 million annually, a nearly 100 percent increase above its $9.7 million annual budget for wastewater treatment.

***310 The State Board and the Los Angeles Regional Board responded that sections 13241 and 13263 do not require consideration of costs of compliance when a regional board issues a NPDES permit that restricts the pollutant content of discharged wastewater.

The trial court stayed the contested pollutant restrictions for each of the three wastewater treatment plants. It then ruled that sections 13241 and 13263 of California's Porter–Cologne Act required a regional board to consider costs of compliance not only when it adopts a basin or water quality plan but also when, as here, it issues an NPDES permit setting the allowable pollutant content of a treatment plant's discharged wastewater. The court found no evidence that the Los Angeles Regional Board had considered economic factors at either stage. Accordingly, the trial court granted the Cities' petitions for writs of mandate, and it ordered the Los Angeles Regional Board to vacate the contested restrictions on pollutants in the wastewater discharge permits issued to the three municipal plants here and to conduct hearings **868 to consider the Cities' costs of compliance before the board's issuance of new permits. The Los Angeles Regional Board and the

State Board filed appeals in both the Los Angeles and Burbank cases. [6]

The Court of Appeal, after consolidating the cases, reversed the trial court. It concluded that sections 13241 and 13263 require a regional board to take into account "economic considerations" when it adopts water quality standards in a basin plan but not when, as here, the regional board sets specific pollutant restrictions in wastewater discharge permits intended to satisfy those standards. We granted the Cities' petition for review.

*624 III. DISCUSSION

A. Relevant State Statutes

The California statute governing the issuance of *wastewater permits* by a regional board is section 13263, which was enacted in 1969 as part of the Porter–Cologne Act. (See 26 Cal.Rptr.3d pp. 306–307, 108 P.3d p. 865, *ante.*) Section 13263 provides in relevant part: "*The regional board,* after any necessary hearing, *shall prescribe requirements as to the nature of any proposed discharge* [of wastewater]. *The requirements* shall implement any relevant water quality control plans that have been adopted, and *shall take into consideration* the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and *the provisions of Section 13241.*" (§ 13263, subd. (a), italics added.)

Section 13241 states: "Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

***311 "(a) Past, present, and probable future beneficial uses of water.

"(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

"(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

"(d) *Economic considerations.*

"(e) The need for developing housing within the region.

"(f) The need to develop and use recycled water." (Italics added.)

The Cities here argue that section 13263's express reference to section 13241 requires the Los Angeles Regional Board to consider section 13241's listed factors, notably "[e]conomic considerations," before issuing NPDES permits requiring specific pollutant reductions in discharged effluent or treated wastewater.

[2] *625 Thus, at issue is language in section 13263 stating that when a regional board "prescribe[s] requirements as to the nature of any proposed discharge" of treated wastewater it must "take into consideration" certain factors including "the provisions of Section 13241." According to the Cities, this statutory language requires that a regional board make an independent evaluation of the section 13241 factors, including "economic considerations," before restricting the pollutant content in an NPDES permit. This was the view expressed in the trial court's ruling. The Court of Appeal rejected that view. It held that a regional board need consider the section 13241 factors only when it adopts a basin or water quality plan, but not when, as in this case, it issues a wastewater discharge **869 permit that sets specific numeric limitations on the various chemical pollutants in the wastewater to be discharged. As explained below, the Court of Appeal was partly correct.

B. Statutory Construction

[3] When construing any statute, our task is to determine the Legislature's intent when it enacted the statute "so that we may adopt the construction that best effectuates the purpose of the law." (*Hassan v. Mercy American River Hospital* (2003) 31 Cal.4th 709, 715, 3 Cal.Rptr.3d 623, 74 P.3d 726; *Esberg v. Union Oil Co.* (2002) 28 Cal.4th 262, 268, 121 Cal.Rptr.2d 203, 47 P.3d 1069.) In doing this, we look to the statutory language, which ordinarily is "the most reliable indicator of legislative intent." (*Hassan, supra,* at p. 715, 3 Cal.Rptr.3d 623, 74 P.3d 726.)

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As mentioned earlier, our Legislature's 1969 enactment of the Porter–Cologne Act, which sought to ensure the high quality of water in this state, predated the 1972 enactment by Congress of the precursor to the federal Clean Water Act. Included in California's original Porter–Cologne Act were sections 13263 and 13241. Section 13263 directs regional boards, when issuing wastewater discharge permits, to take into account various factors, including those set out in section 13241. Listed among the section 13241 factors is "[e]conomic considerations." (§ 13241, subd. (d).) The plain language of sections 13263 and 13241 indicates the Legislature's intent in 1969, when these statutes were enacted, that a regional board consider the cost of compliance when setting effluent limitations in a wastewater discharge permit.

Our construction of sections 13263 and 13241 does not end with their plain statutory language, however. We must also analyze them in the context of the statutory scheme of which they are a part. ***312 (*State Farm Mutual Automobile Ins. Co. v. Garamendi* (2004) 32 Cal.4th 1029, 1043, 12 Cal.Rptr.3d 343, 88 P.3d 71.) Like sections 13263 and 13241, section 13377 is part of the Porter–Cologne Act. But unlike the former two statutes, section 13377 was *626 not enacted until 1972, shortly after Congress, through adoption of the Federal Water Pollution Control Act Amendments, established a comprehensive water quality policy for the nation.

[4] Section 13377 specifies that wastewater discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act. That act prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the act's clean water standards, regardless of cost (see *id.,* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3)). Because section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a wastewater discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards.[7] Such a construction of section 13263 would not only be inconsistent with federal law, it would also be inconsistent with the Legislature's **870 declaration in section 13377 that all discharged wastewater must satisfy federal standards.[8] This was also the conclusion of the Court of Appeal. Moreover, under the federal Constitution's supremacy clause (art. VI), a state law that conflicts with federal law is " 'without effect.' " (*Cipollone v. Liggett Group, Inc.* (1992) 505 U.S. 504, 516, 112 S.Ct. 2608, 120 L.Ed.2d 407; *Dowhal v. SmithKline Beecham Consumer Healthcare* (2004) 32 Cal.4th 910, 923, 12 Cal.Rptr.3d 262, 88 P.3d 1.) To comport with the principles of federal supremacy, California law cannot authorize this *627 state's regional boards to allow the discharge of pollutants into the navigable waters of the United States in concentrations ***313 that would exceed the mandates of federal law.

Thus, in this case, whether the Los Angeles Regional Board should have complied with sections 13263 and 13241 of California's Porter–Cologne Act by taking into account "economic considerations," such as the costs the permit holder will incur to comply with the numeric pollutant restrictions set out in the permits, depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act. We therefore remand this matter for the trial court to resolve that issue.

C. Other Contentions

The Cities argue that requiring a regional board at the wastewater discharge permit stage to consider the permit holder's cost of complying with the board's restrictions on pollutant content in the water is consistent with federal law. In support, the Cities point to certain provisions of the federal Clean Water Act. They cite section 1251(a)(2) of title 33 United States Code, which sets, as a national goal "*wherever attainable,*" an interim goal for water quality that protects fish and wildlife, and section 1313(c)(2)(A) of the same title, which requires consideration, among other things, of waters' "*use and value* for navigation" when revising or adopting a "water quality standard." (Italics added.) These two federal statutes, however, pertain not to permits for wastewater discharge, at issue here, but to establishing water quality standards, not at issue here. Nothing in the federal Clean Water Act suggests that a state is free to disregard or to weaken the federal requirements for clean water when an NPDES permit holder alleges that compliance with those requirements will be too costly.

[5] At oral argument, counsel for amicus curiae National Resources Defense Council, which argued on behalf of California's State Board and regional water boards, asserted that the federal Clean Water Act incorporates state water policy into federal law, and that therefore a regional board's consideration of economic factors to justify greater pollutant concentration in discharged wastewater would conflict with the federal act even if the specified pollutant restrictions were not less stringent than those required under federal law. We are not persuaded. The federal Clean Water Act reserves to the states significant aspects of water quality policy (33 U.S.C. § 1251(b)), and it specifically grants the states authority to "enforce any effluent limitation" that is not "*less stringent* " than the federal standard (*id.* § 1370, italics added). It does not prescribe or restrict the factors that a state may consider when exercising this reserved authority, and thus it does not prohibit ***628** a state—when imposing effluent limitations that are *more stringent* than required by federal law—from taking into account the economic effects of doing so.

Also at oral argument, counsel for the Cities asserted that if the three municipal wastewater treatment facilities ceased releasing their treated wastewater into the concrete channel that makes up the Los Angeles River, it would (other than during the rainy season) contain no water at all, and thus would not be a "navigable water" of the ****871** United States subject to the Clean Water Act. (See *Solid Waste Agency v. United States Army Corps of Engineers* (2001) 531 U.S. 159, 172, 121 S.Ct. 675, 148 L.Ed.2d 576 ["The term 'navigable' has at least the import of showing us what Congress had in mind as its authority for enacting the CWA: its traditional jurisdiction over waters that were or had been navigable in fact or which could reasonably be so made."].) It is unclear when the Cities first raised this issue. The Court of Appeal did not discuss it in its opinion, and the Cities did not seek rehearing on this ground. (See *****314** Cal. Rules of Court, rule 28(c)(2).) Concluding that the issue is outside our grant of review, we do not address it.

CONCLUSION

Through the federal Clean Water Act, Congress has regulated the release of pollutants into our national waterways. The states are free to manage their own water quality programs so long as they do not compromise the federal clean water standards. When enacted in 1972, the goal of the Federal Water Pollution Control Act Amendments was to *eliminate* by the year 1985 the discharge of pollutants into the nation's navigable waters. In furtherance of that goal, the Los Angeles Regional Board indicated in its 1994 basin plan on water quality the intent, insofar as possible, to remove from the water in the Los Angeles River toxic substances in amounts harmful to humans, plants, and aquatic life. What is not clear from the record before us is whether, in limiting the chemical pollutant content of wastewater to be discharged by the Tillman, Los Angeles–Glendale, and Burbank wastewater treatment facilities, the Los Angeles Regional Board acted only to implement requirements of the federal Clean Water Act or instead imposed pollutant limitations that exceeded the federal requirements. This is an issue of fact to be resolved by the trial court.

DISPOSITION

We affirm the judgment of the Court of Appeal reinstating the wastewater discharge permits to the extent that the specified numeric limitations on chemical pollutants are necessary to satisfy federal Clean Water Act requirements for treated wastewater. The Court of Appeal is directed to remand this ***629** matter to the trial court to decide whether any numeric limitations, as described in the permits, are "more stringent" than required under federal law and thus should have been subject to "economic considerations" by the Los Angeles Regional Board before inclusion in the permits.

WE CONCUR: GEORGE, C.J., BAXTER, WERDEGAR, CHIN, and MORENO, JJ.

Concurring Opinion by BROWN, J.

I write separately to express my frustration with the apparent inability of the government officials involved here to answer a simple question: How do the federal clean water standards (which, as near as I can determine, are the state standards) prevent the state from considering economic factors? The majority concludes that because "the supremacy clause of the United States Constitution requires state law to yield to federal law, a regional board, when issuing a wastewater discharge permit, may not consider economic factors to justify imposing pollutant

restrictions that are *less stringent* than applicable federal standards require." (Maj. opn., *ante,* 26 Cal.Rptr.3d at p. 306, 108 P.3d at p. 864.) That seems a pretty self-evident proposition, but not a useful one. The real question, in my view, is whether the Clean Water Act prevents or prohibits the regional water board from considering economic factors to justify pollutant restrictions that *meet* the clean water standards in more cost-effective and economically efficient ways. I can see no reason why a federal law—which purports to be an example of cooperative federalism—would decree such a result. I do not think the majority's reasoning is at fault here. Rather, the agencies involved seemed to have worked hard to make this simple question impenetrably obscure.

A brief review of the statutory framework at issue is necessary to understand my concerns.

*****315 **872 I. Federal Law**

"In 1972, Congress enacted the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), commonly known as the Clean Water Act (CWA) [Citation.] ... [¶] Generally, the CWA 'prohibits the discharge of any pollutant except in compliance with one of several statutory exceptions. [Citation.]' ... The most important of those exceptions is pollution discharge under a valid NPDES [National Pollution Discharge Elimination System] permit, which can be issued either by the Environmental Protection Agency (EPA), or by an EPA-approved state permit program such as California's. [Citations.] NPDES permits are valid for five years. [Citation.] [¶] Under the CWA's NPDES permit program, the states are required to develop *water quality standards.* [Citations.] A water quality standard 'establish[es] the desired condition of a waterway.' [Citation.] A water quality standard for any ***630** given waterway, or 'water body,' has two components: (1) the designated beneficial uses of the water body and (2) the *water quality criteria* sufficient to protect those uses. [Citations.] [¶] Water quality criteria can be either *narrative* or *numeric.* [Citation.]" (*Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1092–1093, 1 Cal.Rptr.3d 76.)

With respect to satisfying water quality standards, "a polluter must comply with *effluent limitations.* The CWA defines an effluent limitation as 'any restriction established by a State or the [EPA] Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.' [Citation.] 'Effluent limitations are a means of *achieving* water quality standards.' [Citation.] [¶] NPDES permits establish effluent limitations for the polluter. [Citations.] CWA's NPDES permit system provides for a two-step process for the establishing of effluent limitations. First, the polluter must comply with *technology-based effluent limitations,* which are limitations based on the best available or practical technology for the reduction of water pollution. [Citations.] [¶] Second, the polluter must also comply with more stringent *water quality-based effluent limitations* (WQBEL's) where applicable. In the CWA, Congress 'supplemented the "technology-based" effluent limitations with "water quality-based" limitations "so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.' " [Citation.] [¶] The CWA makes WQBEL's applicable to a given polluter whenever WQBEL's are 'necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations....' [Citations.] Generally, NPDES permits must conform to state water quality laws insofar as the state laws impose more stringent pollution controls than the CWA. [Citations.] Simply put, WQBEL's implement water quality standards." (*Communities for a Better Environment v. State Water Resources Control Bd., supra,* 109 Cal.App.4th at pp. 1093–1094, 1 Cal.Rptr.3d 76, fns. omitted.)

This case involves water quality-based effluent limitations. As set forth above, "[u]nder the CWA, states have the primary role in promulgating water quality standards." (*Piney Run Preservation Ass'n v. Commrs. of Carroll Co.* (4th Cir.2001) 268 F.3d 255, 265, fn. 9.) "Under the CWA, the water quality standards referred to in section 301 [see 33 U.S.C. § 1311] are primarily the states' handiwork." *****316** (*American Paper Institute, Inc. v. U.S. Envtl. Protection Agency* (D.C.Cir.1993) 996 F.2d 346, 349 (*American Paper*).) In fact, upon the 1972 passage of the CWA, "[s]tate water quality standards in effect at the time ... were deemed to be the initial water quality benchmarks for CWA purposes.... The states were to revisit and, if ***631** necessary, revise

those initial standards at least once every three years." (*American Paper,* at p. 349.) Therefore, "once a water quality standard has been promulgated, section 301 of the CWA requires all NPDES permits for point sources to incorporate discharge limitations necessary to satisfy that standard." (*American Paper,* at p. 350.) Accordingly, it appears that in most instances, ****873** state water quality standards are identical to the federal requirements for NPDES permits.

II. State Law

In California, pursuant to the Porter–Cologne Water Quality Control Act (Wat.Code, § 13000 et seq.; Stats.1969, ch. 482, § 18, p. 1051; hereafter Porter–Cologne Act), the regional water quality control boards establish water quality standards—and therefore federal requirements for NPDES permits—through the adoption of water quality control plans (basin plans). The basin plans establish water quality objectives using enumerated factors—including economic factors—set forth in Water Code section 13241.

In addition, as one court observed: "The Porter–Cologne Act ... established nine regional boards to prepare water quality plans (known as basin plans) and issue permits governing the discharge of waste. (Wat.Code, §§ 13100, 13140, 13200, 13201, 13240, 13241, 13243.) The Porter–Cologne Act identified these permits as 'waste discharge requirements,' and provided that the waste discharge requirements must mandate compliance with the applicable regional water quality control plan. (Wat.Code, §§ 13263, subd. (a), 13377, 13374.)[¶] Shortly after Congress enacted the Clean Water Act in 1972, the California Legislature added Chapter 5.5 to the Porter–Cologne Act, for the purpose of adopting the necessary federal requirements to ensure it would obtain EPA approval to issue NPDES permits. (Wat.Code, § 13370, subd. (c).) As part of these amendments, the Legislature provided that the state and regional water boards 'shall, as required or authorized by the [Clean Water Act], issue waste discharge requirements ... which apply and ensure compliance with all applicable provisions [of the Clean Water Act], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.' (Wat.Code, § 13377.) Water Code section 13374 provides that '[t]he term "waste discharge requirements" as referred to in this division is the equivalent of the term "permits" as used in the [Clean Water Act].' [¶] California subsequently obtained the required approval to issue NPDES permits. [Citation.] Thus, the waste discharge requirements issued by the regional water boards ordinarily also serve as NPDES permits under federal law. (Wat.Code, § 13374.)" (*Building Industry Assn. of San Diego County v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 875, 22 Cal.Rptr.3d 128.)

***632** Applying this federal-state statutory scheme, it appears that throughout this entire process, the Cities of Burbank and Los Angeles (Cities) were unable to have economic factors considered because the Los Angeles Regional Water Quality Control Board (Board)—the body responsible to enforce the statutory framework—failed to comply with its statutory mandate.

*****317** For example, as the trial court found, the Board did not consider costs of compliance when it initially established its basin plan, and hence the water quality standards. The Board thus failed to abide by the statutory requirement set forth in Water Code section 13241 in establishing its basin plan. Moreover, the Cities claim that the initial narrative standards were so vague as to make a serious economic analysis impracticable. Because the Board does not allow the Cities to raise their economic factors in the permit approval stage, they are effectively precluded from doing so. As a result, the Board appears to be playing a game of "gotcha" by allowing the Cities to raise economic considerations when it is not practical, but precluding them when they have the ability to do so.

Moreover, the Board acknowledges that it has neglected other statutory provisions that might have provided an additional opportunity to air these concerns. As set forth above, pursuant to the CWA, "[t]he states were to revisit and, if necessary, revise those initial standards at least once every three years—a process commonly known as triennial review. [Citation.] Triennial reviews consist of public hearings in which current water quality standards are examined to assure that they 'protect the public health or welfare, enhance the quality of water and serve the purposes' of the Act. [Citation.] Additionally, the CWA ****874** directs states to consider a variety of competing policy concerns during these reviews, including a waterway's 'use and value for public water supplies, propagation of fish and wildlife, recreational purposes,

and agricultural, industrial, and other purposes.' " (*American Paper, supra,* 996 F.2d at p. 349.)

According to the Cities, "[t]he last time that the narrative water quality objective for toxicity contained in the Basin Plan was reviewed and modified was 1994." The Board does not deny this claim. Accordingly, the Board has failed its duty to allow public discussion —including economic considerations—at the required intervals when making its determination of proper water quality standards.

What is unclear is why this process should be viewed as a contest. State and local agencies are presumably on the same side. The costs will be paid by taxpayers and the Board should have as much interest as any other agency in fiscally responsible environmental solutions.

***633** Our decision today arguably allows the Board to continue to shirk its statutory duties. The majority holds that when read together, Water Code sections 13241, 13263, and 13377 do not allow the Board to consider economic factors when issuing NPDES permits to satisfy federal CWA requirements. (Maj. opn., *ante,* 26 Cal.Rptr.3d at pp. 311–312, 108 P.3d at pp. 869–870.) The majority then bifurcates the issue when it orders the Court of Appeal "to remand this matter to the trial court to decide whether any numeric limitations, as described in the permits, are 'more stringent' than required under federal law and thus should have been subject to 'economic considerations' by the Los Angeles Regional Board before inclusion in the permits." (*Id.* at p. 314, 108 P.3d at p. 871.)

The majority overlooks the feedback loop established by the CWA, under which federal standards are linked to state-established water quality standards, including narrative water quality criteria. (See 33 U.S.C. § 1311(b)(1)(C); 40 C.F.R. § 122.44(d)(1) (2004).) Under the CWA, NPDES permit requirements include the state narrative criteria, which are incorporated into the Board's basin plan under the description "no toxins in toxic amounts." As far as I can determine, NPDES permits *****318** designed to achieve this narrative criteria (as well as designated beneficial uses) will usually implement the state's basin plan, while satisfying federal requirements as well.

If federal water quality standards are typically identical to state standards, it will be a rare instance that a state exceeds its own requirements and economic factors are taken into consideration. [1] In light of the Board's initial failure to consider costs of compliance and its repeated failure to conduct required triennial reviews, the result here is an unseemly bureaucratic bait-and-switch that we should not endorse. The likely outcome of the majority's decision is that the Cities will be economically burdened to meet standards imposed on them in a highly questionable manner. [2] In these times of tight fiscal budgets, it is difficult to imagine imposing additional financial burdens on municipalities without at least allowing them to present alternative views.

Based on the facts of this case, our opinion today appears to largely retain the status quo for the Board. If the Board can actually demonstrate that only the precise limitations at issue here, implemented in only one way, will achieve the desired water standards, perhaps its obduracy is justified. That case has yet to be made.

***634** Accordingly, I cannot conclude that the majority's decision is wrong. The analysis ****875** may provide a reasonable accommodation of conflicting provisions. However, since the Board's actions "make me wanna holler and throw up both my hands," [3] I write separately to set forth my concerns and concur in the judgment —*dubitante.* [4]

All Citations

35 Cal.4th 613, 108 P.3d 862, 26 Cal.Rptr.3d 304, 60 ERC 1470, 35 Envtl. L. Rep. 20,071, 05 Cal. Daily Op. Serv. 2861, 2005 Daily Journal D.A.R. 3870

Footnotes

* Brown, J., did not participate therein.

1 Further undesignated statutory references are to the Water Code.

2 The Los Angeles water region "comprises all basins draining into the Pacific Ocean between the southeasterly boundary, located in the westerly part of Ventura County, of the watershed of Rincon Creek and a line which coincides with the

southeasterly boundary of Los Angeles County from the ocean to San Antonio Peak and follows thence the divide between San Gabriel River and Lytle Creek drainages to the divide between Sheep Creek and San Gabriel River drainages." (§ 13200, subd. (d).)

3 A "point source" is "any discernable, confined and discrete conveyance" and includes "any pipe, ditch, channel ... from which pollutants ... may be discharged." (33 U.S.C. § 1362(14).)

4 This opinion uses the terms "narrative criteria" or descriptions, and "numeric criteria" or effluent limitations. Narrative criteria are broad statements of desirable water quality goals in a water quality plan. For example, "no toxic pollutants in toxic amounts" would be a narrative description. This contrasts with numeric criteria, which detail specific pollutant concentrations, such as parts per million of a particular substance.

5 For example, the permits for the Tillman and Los Angeles–Glendale Plants limited the amount of fluoride in the discharged wastewater to 2 milligrams per liter and the amount of mercury to 2.1 micrograms per liter.

6 Unchallenged on appeal and thus not affected by our decision are the trial court's rulings that (1) the Los Angeles Regional Board failed to show how it derived from the narrative criteria in the governing basin plan the specific numeric pollutant limitations included in the permits; (2) the administrative record failed to support the specific effluent limitations; (3) the permits improperly imposed daily maximum limits rather than weekly or monthly averages; and (4) the permits improperly specified the manner of compliance.

7 The concurring opinion misconstrues both state and federal clean water law when it describes the issue here as "whether the Clean Water Act prevents or prohibits the regional water board from considering economic factors to justify pollutant restrictions *that meet the clean water standards in more cost-effective and economically efficient ways.*" (Conc. Opn. of Brown, J., *post,* 26 Cal.Rptr.3d p. 314, 108 P.3d at p. 871, some italics added.) This case has nothing to do with meeting federal standards in more cost effective and economically efficient ways. State law, as we have said, allows a regional board to consider a permit holder's compliance cost to *relax* pollutant concentrations, as measured by numeric standards, for pollutants in a wastewater discharge permit. (§§ 13241 & 13263.) Federal law, by contrast, as stated above in the text, "prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the [federal] act's *clean water standards, regardless of cost* (see *id.,* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3))." (Italics added.)

8 As amended in 1978, section 13377 provides for the issuance of waste discharge permits that comply with federal clean water law "together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." We do not here decide how this provision would affect the cost-consideration requirementsof sections 13241 and 13263 when more stringent effluent standards or limitations in a permit are justified for some reason independent of compliance with federal law.

1 (But see *In the Matter of the Petition of City and County of San Francisco, San Francisco Baykeeper et al.* (Order No. WQ 95–4, Sept. 21, 1995) 1995 WL 576920.)

2 Indeed, given the fact that "water quality standards" in this case are composed of broadly worded components (i.e., a narrative criteria and "designated beneficial uses of the water body"), the Board possessed a high degree of discretion in setting NPDES permit requirements. Based on the Board's past performance, a proper exercise of this discretion is uncertain.

3 Marvin Gaye (1971) "Inner City Blues."

4 I am indebted to Judge Berzon for this useful term. (See *Credit Suisse First Boston Corp. v. Grunwald* (9th Cir.2005) 400 F.3d 1119 (conc. opn. of Berzon, J.).)

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KeyCite Yellow Flag - Negative Treatment
Distinguished by California State Emp. Ass'n v. Trustees of Cal. State Colleges, Cal.App. 1 Dist., October 20, 1965

150 Cal.App.2d 671, 310 P.2d 673

GLENN D. COREY, Appellant,
v.
GOODWIN J. KNIGHT, as Governor, etc., et al., Defendants; CLARKE GRAY, as County Auditor, etc., Respondent.

Civ. No. 22068.
District Court of Appeal, Second District, Division 1, California.
May 6, 1957.

HEADNOTES

(1a, 1b)
Municipal Courts § 7--Judges--Qualifications.
Under Const., art. VI, § 23, declaring that "any elected judge or justice of an existing court who has served in that capacity by election or appointment for five consecutive years immediately preceding the effective date of this amendment shall be eligible to become a judge of a municipal court by which the existing court is superseded upon the establishment of said municipal court," plaintiff was ineligible to become judge of the Municipal Court of the Ventura Judicial District where, if the words "existing court" referred to the Justice Court of Ventura Judicial District, plaintiff was ineligible because he had not served as judge of that court for five consecutive years immediately preceding November 7, 1950, the date of adoption of the constitutional amendment, since such court was not in existence before January 5, 1953, and where, if the words "existing court" referred to the Justice's Court of Ventura Township, plaintiff was ineligible because that court could not be "superseded on the establishment of said municipal court" in 1956, since it was superseded on January 5, 1953, and plaintiff became eligible as judge of the Justice Court under Gov. Code, § 71601, solely because he was "the incumbent of a superseded inferior court."

See **Cal.Jur.2d,** Courts, § 173 et seq.

(2)
Justices of the Peace and Justice Courts § 1--Distinctions.
A justice's court of a township is not the same as a justice court of a judicial district, since the jurisdiction of a justice's court is not exclusive but may be shared with a police court, whereas the jurisdiction of a justice court is exclusive within its territorial area, the territorial area of a township is not necessarily the same as the territorial area of a judicial district, the presiding officer of a justice's court is a justice of the peace whereas the presiding officer of a justice court is a judge, and there are no qualifications for a justice of the peace whereas a judge of a justice court must either be a lawyer or have passed an examination prescribed by the Judicial Council.

(3)
Statutes § 180(2)--Construction--Executive or Departmental Construction.
Where the attorney general has interpreted a law in a written opinion and that position has been adopted by an administrative agency, the administrative interpretation of such law is entitled to respect by the courts and, unless clearly erroneous, is a significant factor to be considered in ascertaining the meaning of such law.

See **Cal.Jur.,** Statutes, § 152.

(4)
Statutes § 152--Construction--Words and Phrases.
A word or clause in a statute is presumed to have the same meaning throughout.

(5)
Statutes § 139--Construction--Exceptions.
Exceptions in a statute are to be narrowly, not broadly, construed.

See **Cal.Jur.,** Statutes, § 119; **Am.Jur.,** Statutes, § 431 et seq.

(6)
Judges § 17.5--Retirement.
Under the County Employees Retirement Law of 1937 (Gov. Code, § 31450 et seq.), a judge of the justice court of a judicial district who was over 70 years of age at the time of his election to such court must be retired "at the end of the first term to which he is elected and which commences on a date following his 70th birthday" (Gov. Code, § 31671), and where his term of office will end by operation of law when a municipal court is established and such

court will come into existence when it is found, pursuant to Gov. Code, § 71043, subd. (c), that there are 40,000 inhabitants of the district, at that moment such judge will be compulsorily retired and entitled to retirement benefits under the County Employees Retirement Law of 1937.

SUMMARY

APPEAL from a judgment of the Superior Court of Ventura County. Charles F. Blackstock, Judge. Affirmed.

Action for declaratory relief. Judgment for defendants affirmed.

COUNSEL
Waite & Drapeau and David R. Drapeau for Appellant.
Charles Kaplan and Arden T. Jensen as Amici Curiae on behalf of Appellant.
Roy A. Gustafson, District Attorney (Ventura), for Respondent.

FOURT, J.

This is an appeal from a judgment in a declaratory relief action wherein it was adjudged "that if plaintiff is Judge of the Justice Court of the Ventura Judicial District at the time when the district is found to have over 40,000 inhabitants, (1) a Municipal Court will thereupon supersede the Justice Court, (2) plaintiff will be ineligible to be Judge of the Municipal Court, (3) a vacancy will exist to be filled by ***673** appointment of the Governor, (4) plaintiff will be compulsorily retired and (5) plaintiff will receive retirement benefits under the County Employees Retirement Law of 1937."

A resume of the facts in the case is as follows: In about 1947, the Legislature requested the Judicial Council to make a survey of all courts in California exercising jurisdiction inferior to the superior court. After an extensive study the Judicial Council, in 1949, recommended to the Legislature a plan for the reorganization of such courts (Twelfth Biennial Report [1948], Judicial Council of California). The Legislature, through committees, conducted public hearings, and as a result thereof some changes and additions were made in the proposed constitutional amendments and the proposed statutes drafted by the council. The interpretation to be given to some of the words added in one of the constitutional amendments which was proposed and adopted (art. VI, § 23) is the only real problem to be determined in this case. The language in question is contained in the "exception" section, generally referred to as the "Grandfather Clause," the pertinent parts of which are as follows:

"No person shall be eligible to the office of a Justice of the Supreme Court, or of a district court of appeal, or of a judge of a superior court, or of a municipal court, unless he shall have been admitted to practice before the Supreme Court of the State for a period of at least five years immediately preceding his election or appointment to such office; provided, however, that any elected judge or justice of an existing court who has served in that capacity by election or appointment for five consecutive years immediately preceding the effective date of this amendment shall be eligible to become the judge of a municipal court by which the existing court is superseded upon the establishment of said municipal court or at the first election of judges thereto and for any consecutive terms thereafter for which he may be re-elected. ..."

The Legislature voted to submit the proposed constitutional amendment to the people at the general election, November 7, 1950. The proposition was Number 3 on the ballot at that time, and was adopted by the people by a large majority. At the same election, section 11 of article VI of the Constitution was amended to provide for only two types of courts inferior to the superior court, namely, justice courts and municipal courts, and further to validate the laws relating to judicial districts enacted in the legislative session of 1949, in anticipation of the adoption of the constitutional amendments. The ***674** amendments provided, among other things, in substance, that each county should be divided into judicial districts and that if the population of any district were over 40,000, the district should have a municipal court, or if under 40,000, a justice court. The Legislature, by section 1 of chapter 1511, Statutes 1949, directed the board of supervisors to district their counties. The new plan was to become effective January 1, 1952, except where two or more incumbent judges would be eligible to be judges of the new court, in which case section 2 of chapter 1510, Statutes 1949, provided that they "shall not automatically succeed to judicial positions in the municipal or justice court, and the existing courts shall continue to function within the district until the first judge or judges of said municipal or justice court shall be elected by the qualified electors of the district at the first general state election held following the expiration of 90 days and qualify."

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Article VI, section 11, as amended in 1950, also contained a provision that "existing courts shall continue to function as presently organized until the first selection and qualification of the judge or judges of the municipal or justice court, at which time, unless otherwise provided by law, pending actions, trials and all pending business of existing courts shall be transferred to and become pending in the municipal or justice court established for the judicial district or city and county in which they are situated, and all records of such superseded courts shall be transferred to, and thereafter be and become records of said municipal or justice court."

On July 6, 1944, Ventura Township was one of nine townships into which Ventura County was divided. The court of Ventura Township was a class B justice court. The justice of the peace who presided over the court died and appellant herein was appointed by the board of supervisors to fill the vacancy.

The city of San Buenaventura (hereinafter referred to as Ventura) is located in the territorial limits of Ventura Township. The charter of Ventura provides for a police court and such court was presided over by Judge B. L. Gregg, a former member of The State Bar. Appellant's original term as justice of the peace expired January 6, 1947. He was elected to that position for the term from January 6, 1947, to January 2, 1951, and was reelected to that position for the term from January 2, 1951, to January 3, 1955. On October 26, 1951, the population of the township having been found to be over 30,000 by the 1950 census, the court became a class A justice court. The boundaries of the Ventura Judicial District were ***675** established as of September 4, 1951, by Ordinance Number 472 of the Board of Supervisors of Ventura County, in conformity with the Statutes of 1949. The area of the district included, but was larger than, Ventura Township. The population of the district was less than 40,000.

On January 1, 1952, there were two judicial officers of courts within the area of Ventura Judicial District, namely, appellant as justice of the peace of Ventura Township, and B. L. Gregg as judge of the police court in the city of Ventura. Both were candidates for the office of judge of the Justice Court of Ventura Judicial District at the election in 1952. Appellant was not and never has been an attorney, and had not passed any examination prescribed by the Judicial Council. Appellant, who was over 70 years of age at the time of the election, was elected and took office as judge of the justice court on January 5, 1953, for the term ending January 5, 1959.

The Justice Court of Ojai Judicial District began functioning in January, 1952, because only one incumbent was eligible to the judgeship. The remaining four districts in Ventura County were inoperative as such, pending the election of judges. Judges were elected in 1952, and the four districts began functioning as such on January 5, 1953, or, in other words, on January 5, 1953, Ventura County had five judicial districts, each with a functioning justice court.

An action was filed in the superior court of Ventura County on July 5, 1956, for the purpose of having it declared that Ventura Judicial District had a population of over 40,000. On September 6, 1956, the trial judge of that court found that there were 40,000 or more persons in the district, and a municipal court is now in existence. Appellant contends that he is eligible to be, and that he is the judge of such municipal court now in existence. Appellant further asserts that he will continue to be a judge of the justice court if found to be ineligible to be the municipal court judge, until a municipal court judge is elected for the term beginning January 5, 1959. Respondent asserts that appellant is ineligible and he cannot pay appellant now that such municipal court is established; that appellant's term is now terminated as of September 6, 1956, the date upon which the municipal court was declared to be in existence, and appellant is compulsorily retired, and that a vacancy existed which was to be filled by appointment by the Governor.

Appellant, in his briefs and in the oral argument, has made ***676** issue of the first contention heretofore mentioned, namely, that he is eligible to become judge of the municipal court of Ventura Judicial District, and no argument or authorities were presented on the other matters, and we therefore assume that the disposition of the first question will dispose of this appeal.

Honorable Charles F. Blackstock, the learned trial judge, prepared findings of fact and conclusions of law and in his conclusions set forth the applicable law. We believe that the commentary of the trial judge concisely and correctly sets forth the law and we adopt his statements in reference thereto, as follows:

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"Both parties concede that if Ventura Judicial District is found to have a population of 40,000 persons and if plaintiff is eligible to be a municipal court judge, the court will begin to function immediately with plaintiff as judge. Government Code, section 71080. Not being an attorney, plaintiff is eligible, if at all, only under this proviso of section 23 of article VI of the Constitution:

" '[A]ny elected judge or justice of an *existing court* who has served in that capacity by election or appointment for five consecutive years immediately preceding the effective date of this amendment shall be eligible to become a judge of a municipal court by which the *existing court* is *superseded* upon the establishment of said municipal court. ...' (Emphasis added.)

([1a]) "The basic question is the meaning of the words 'existing court.' The amendment was adopted November 7, 1950. Do the words refer to a court then existing or to a court existing at the time the amendment is invoked?

"The court over which plaintiff presided on November 7, 1950, was the Justice's Court of Ventura Township. The court over which he now presides is the Justice Court of Ventura Judicial District. If those two courts are the same court (identified by different names), plaintiff is clearly eligible regardless of the time to which the words 'existing court' refer.

([2]) "A Class B Justice's Court had jurisdiction over cases involving claims up to $300. A justice court has jurisdiction of claims up to $500. The jurisdiction of a justice's court was not exclusive and, in fact, was shared in Ventura Township with the police court. The jurisdiction of the justice court is exclusive within its territorial area. The territorial area of a township was not necessarily the same as the territorial area of a judicial district and, in fact, the boundaries of the Ventura Judicial District are larger than the boundaries of ***677** Ventura Township. (There were nine townships in Ventura County, whereas there are only five judicial districts.) The presiding officer of a justice's court was a justice of the peace. The presiding officer of a justice court is a judge. There were no qualifications for a justice of the peace. A judge of a justice court must either be a lawyer or have passed an examination prescribed by the Judicial Council. The term of a justice of the peace was four years. The term of a judge of the justice court is six years. It appears, therefore, that the two courts are different and are not the same.

"This conclusion is fortified by language used in the pertinent laws. Article 6, section 11 of the Constitution refers to the fact that 'existing courts [in a judicial district] shall continue to function' until the new justice court is established at which time all records of such superseded courts shall be transferred to [the] ... justice court.' Government Code, section 71080, provided that where two persons were eligible to be judge of the new justice court (as were Justice of the Peace Glenn Corey and Judge B. L. Gregg in the Ventura Judicial District), 'such incumbents shall not automatically succeed to judicial positions [on January 1, 1952] in the ... justice court, and the existing courts shall continue to function within the district until the first judge ... of such ... justice court [is] elected [for the term beginning January 5, 1953].' Similarly, chapter 14, Statutes of 1952, First Extraordinary Session, referred to the fact that:

" 'Certain Class B justices' courts will *remain in existence* until January 5, 1953, under the inferior court reorganization program, after which time there will be no courts in the State inferior to the superior courts except municipal and justice courts.' (Emphasis added.)

"Thus it is plain that the Justice's Court of Ventura Township is not the same as the Justice Court of Ventura Judicial District.

([1b]) "Which, then, is the 'existing court' referred to in the eligibility clause of the Constitution? If it is the Justice Court of Ventura Judicial District, plaintiff is ineligible because plaintiff has not 'served in that capacity [that is, judge] by election or appointment for five consecutive years immediately preceding [November 7, 1950].' This is so because that court did not exist *before* January 5, 1953. If it is the Justice's Court of Ventura Township, plaintiff is ineligible because that court will not be 'superseded upon the establishment of said municipal court.' This is so because that court ***678** did not exist *after* January 5, 1953 and cannot be superseded in 1956. That court was superseded on January 5, 1953, and plaintiff holds his present position pursuant to section 71601 of the Government Code which made him eligible to be judge of the justice court solely because he was 'the incumbent of a superseded inferior court.' In either event, plaintiff is ineligible. (Had a municipal court been established

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between November 7, 1950 and January 5, 1953, plaintiff would have been eligible to be judge.)

"The conclusion that plaintiff is ineligible has been reached by the attorney general (21 Ops. Cal. Atty. Gen. 152) and by defendant county auditor. ([3]) Where the attorney general has interpreted a law in a written opinion and that position has been adopted by an administrative agency, the 'administrative application of an act is entitled to respect by the courts, and unless clearly erroneous is a significant factor to be considered in ascertaining the meaning of a statute.' *Mudd v. McColgan* (1947), 30 Cal.2d 463 [183 P.2d 10].

"Proposition 19 on the ballot in 1954 was this:

" 'Proposed Amendment to Article VI

" 'Sec. 23. No person shall be eligible to the office of a justice of the Supreme Court, or of a district court of appeal, or of a judge of a superior court, or of a municipal court, unless he shall have been admitted to practice before the Supreme Court of the State for a period of at least five years immediately preceding his election or appointment to such office; provided, however, that any elected judge or justice who has served by election or appointment *as such judge or justice of a court superseded by a justice or municipal court* for five consecutive years immediately preceding *November 7, 1950, and has served continuously as a judge of such superseding court after said date until the establishment of a municipal court,* shall be eligible to become the judge of a municipal court which *supersedes* the court of *which he is judge* upon the establishment of said municipal court or at the first election of judges thereto and for any consecutive terms thereafter for which he may be re- elected. The requirement of consecutive years of judicial service shall be deemed to have been met even though interrupted by service in the armed forces of the United States during the period of war.' ***679**

"In the pamphlet sent to all voters, the following argument was made in favor of the proposition:

" 'The voters of California at the 1950 general election adopted a constitutional amendment providing for the reorganization of the inferior courts of this State and reducing the number of such courts to two classes known as municipal courts and justice courts. The Constitution then required admission to practice law before the Supreme Court for at least five years before a person is eligible to be a municipal court judge. The 1950 amendment made any elective judge or justice of an existing court superseded by a municipal court eligible to become judge if he had served in his present capacity for five consecutive years immediately preceding the effective date of the amendment. It was the intent and spirit of the amendment that experienced incumbent Justices of the Peace would be permitted to continue in office, even though their courts were changed to municipal courts without requiring that they be lawyers.

" 'The Attorney General of California last year gave an opinion that the present Justices who are not attorneys would not be eligible to become the judges of municipal courts when such a court succeeds their justice courts.

" 'Following the opinion of the Attorney General, both houses of the Legislature unanimously voted to submit the present amendment to the Constitution, for the reason that it was the consensus of the Legislature that incumbent Justices who qualify as to consecutive years of service should not be ineligible to continue as municipal court judges because they are not attorneys.

" 'By adopting the present amendment, the people will remove any doubt as to the status of incumbent Justices who are not attorneys and they will be eligible to become municipal judges upon the conversion of their courts if they were eligible to do so in 1950.

" 'There should be nothing in the administration of justice in municipal courts which requires men who have had long experience as judges to be attorneys. The Justices of the Peace have always been close to the people and responsive to their needs in matters over which they have jurisdiction, and it is felt that when a Justice has been in office for many years, he has met with approval at the hands of the people, even though he is not an attorney.

" 'This amendment merits the approval of the people for the reasons herein set forth, in order to protect incumbent ***680** Justices as to their eligibility for office, even though they are not attorneys.

" 'J. B. Cooke,

State Assemblyman, 37th Dist.'

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"Had it been passed, it would have been presumed to have been passed with full knowledge of the attorney general's opinion (*Coca-Cola Co. v. State Board of Equalization* [1945], 25 Cal.2d 918 [156 P.2d 1]) and it would have been presumed to have changed the law, rather than to have 'clarified' it. (*Loew's, Inc. v. Byram* (1938), 11 Cal.2d 746 [82 P.2d 1]. Having failed of passage, there is a presumption that the provision means what the attorney general said it means. The interpretation by the attorney general is the same as this court has reached independently.

"Plaintiff's only possible hope is that the court will, as he urges it to do, 'attach separate meanings to the two uses of the term "existing court. " ' In other words, plaintiff says that 'existing court' means the Justice's Court of Ventura Township in the first part of the sentence and means the Justice Court of Ventura Judicial District in the second part of the sentence. ([4]) This construction is not reasonable because a word or clause in a statute is presumed to have the same meaning throughout. *Pitte v. Shipley* (1873), 46 Cal. 154; *Hoag v. Howard* (1880), 55 Cal. 564. ([5]) Even if reasonable, that construction would be extremely broad and exceptions are to be narrowly, not broadly, construed. *City of National City v. Fritz* (1949), 33 Cal.2d 635 [204 P.2d 7].

([6]) "Plaintiff, as an elective officer, must be retired 'at the end of the first term to which he is elected and which commences on a date following his 70th birthday.' (Gov. Code, § 31671.) His term of office will end, by operation of law, when a Municipal Court is established. 'In each district containing a population of more than 40,000 inhabitants ... there shall be a municipal court.' Constitution, article VI, section 11. 'Whenever a municipal court is established in a district in which a justice court was previously established ..., the justice court shall cease to exist ...' Government Code, section 71084. A 'vacancy in the office of judge of a municipal court shall be filled by appointment by the Governor ...' Government Code, section 71180. (If plaintiff were eligible, he would automatically become judge of the municipal court. If two or more incumbent judges were eligible to one position of judge of the municipal court, the court would not begin to function until January, 1959, following ***681** the election of a judge in 1958. Gov. Code, section 71080, 71081. Neither of these situations exists in this case.) Since the necessary legislation exists for a municipal court in the Ventura Judicial District (Gov. Code, §§ 74880-74887), the court will come into existence when it is found, pursuant to section 71043, subdivision (c), of the Government Code, that there are 40,000 inhabitants of the district. At that moment plaintiff will be compulsorily retired and will be entitled to retirement benefits under the County Employees Retirement Law of 1937."

The judgment is affirmed.

White, P. J., and Doran, J., concurred.
Appellant's petition for a hearing by the Supreme Court was denied July 3, 1957.

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7 Cal.App.5th 628
Court of Appeal,
Third District, California.

DEPARTMENT OF ALCOHOLIC BEVERAGE CONTROL, Petitioner,
v.
ALCOHOLIC BEVERAGE CONTROL APPEALS BOARD, Respondent;
Garfield Beach CVS, LLC et al., Real Parties in Interest.

C078574
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Filed 1/17/2017

Synopsis
Background: Department of Alcoholic Beverage Control appealed decision of the Alcoholic Beverage Control Appeals Board, No. AB9434, which reversed suspension of store's off-sale general license for selling alcohol to a minor decoy.

Holdings: The Court of Appeal, Hoch, J., held that:

[1] Alcoholic Beverage Control rule which required that minor decoys "truthfully answer any questions about his or her age," did not require minor decoy to truthfully respond to clerk's statement, after looking at driver's license, that "I would not have guessed it, you must get asked a lot," as rule only required decoys to answer questions, and

[2] rule did not impose affirmative duty on minor decoy to speak up in order to clarify any mistake regarding age articulated by sales clerk.

Annulled; reinstated and remanded.

West Headnotes (15)

[1] Intoxicating Liquors
Scope and extent of review in general

In the absence of a clear abuse of discretion, the courts will uphold the decision of the Department of Alcoholic Beverage Control to suspend a liquor license for violation of the liquor laws. Cal. Const. art. 20, § 22.

Cases that cite this headnote

[2] Intoxicating Liquors
Direct control by state agencies
Intoxicating Liquors
Administrative officers and proceedings
Intoxicating Liquors
Judicial review and enforcement

The administration of the Alcoholic Beverage Control Act, within the scope of the purposes of that act, is initially vested in the Department of Alcoholic Beverage Control; its decisions, however, are subject to administrative review by the Alcohol Beverage Control Appeals Board, and a final order of the Board is, in turn, subject to judicial review. Cal. Bus. & Prof. Code § 23000 et seq.

Cases that cite this headnote

[3] Intoxicating Liquors
Administrative officers and proceedings
Intoxicating Liquors
Judicial review and enforcement

The scope of review of the decisions of the Department of Alcoholic Beverage Control is the same in the Alcohol Beverage Control Appeals Board and the Court of Appeal. Cal. Bus. & Prof. Code § 23090.2.

Cases that cite this headnote

[4] Intoxicating Liquors
Judicial review and enforcement

Court of Appeal defers to the Department of Alcoholic Beverage Control's interpretation of its own rules, since the agency is likely to be intimately familiar with regulations it authored and sensitive to the practical

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implications of one interpretation over another. Cal. Bus. & Prof. Code § 23090.2.

Cases that cite this headnote

[5] **Intoxicating Liquors**
Judicial review and enforcement

Courts generally will not depart from the Department of Alcoholic Beverage Control's contemporaneous construction of a rule enforced by the Department unless such interpretation is clearly erroneous or unauthorized. Cal. Bus. & Prof. Code § 23090.2.

Cases that cite this headnote

[6] **Intoxicating Liquors**
Judicial review and enforcement

Decisions of the Department of Alcoholic Beverage Control are subject to review only for insufficiency of the evidence, excess of jurisdiction, errors of law, or abuse of discretion. Cal. Bus. & Prof. Code § 23090.2.

Cases that cite this headnote

[7] **Intoxicating Liquors**
To Minors

Alcoholic Beverage Control rule which required that minor decoys "truthfully answer any questions about his or her age," did not require minor decoy to truthfully respond to clerk's statement, after looking at driver's license, that "I would not have guessed it, you must get asked a lot," as rule only required decoys to answer questions. Cal. Bus. & Prof. Code § 25658(a); Cal. Code Regs. tit. 4, § 141(b)(4).

Cases that cite this headnote

[8] **Intoxicating Liquors**
To Minors

Under Department of Alcoholic Beverage Control rule providing that "a decoy shall answer truthfully any questions about his or her age," minor decoys do not need to respond to statements of any kind, nor do they need to respond truthfully to questions other than those concerning their ages. Cal. Bus. & Prof. Code § 25658(a); Cal. Code Regs. tit. 4, § 141(b)(4).

Cases that cite this headnote

[9] **Intoxicating Liquors**
To Minors

Department of Alcoholic Beverage Control rule providing that "a decoy shall answer truthfully any questions about his or her age" does not require minor decoys to correct mistakes articulated by licensed alcohol sellers; instead, the decoys need to respond truthfully only to questions about their ages. Cal. Bus. & Prof. Code § 25658(a); Cal. Code Regs. tit. 4, § 141(b)(4).

Cases that cite this headnote

[10] **Intoxicating Liquors**
To Minors

Alcoholic Beverage Control rule regarding use of minor decoys, which allowed law enforcement to use decoys "in a fashion that promotes fairness," did not impose affirmative duty on minor decoy to speak up in order to clarify any mistake regarding age articulated by sales clerk who stated, after looking at driver's license, that "I would not have guessed it, you must get asked a lot"; rule implement goal of fairness by imposing five specific requirements, minor decoy did not say anything untrue but rather presented accurate information in the form of his driver license, and minor decoy's silence did not involve any attempt to pressure or encourage the sale of an alcoholic beverage to him. Cal. Bus. & Prof. Code § 25658(a); Cal. Code Regs. tit. 4, § 141.

Cases that cite this headnote

[11] **Intoxicating Liquors**
Judicial review and enforcement

Court of Appeal may take judicial notice of decisions of the Alcoholic Beverage Control Appeals Board.

Cases that cite this headnote

[12] Intoxicating Liquors
Judicial review and enforcement

Although not bound by the decisions of the Alcoholic Beverage Control Appeals Board, Court of Appeal would take judicial notice of their decisions and consider their reasoning for persuasive value when determining whether rule regarding use of minor decoys, which required law enforcement to use minor decoys "in a fashion that promotes fairness," was ambiguous. Cal. Code Regs. tit. 4, § 141(a).

Cases that cite this headnote

[13] Statutes
Exceptions, Limitations, and Conditions

An exception to a statute is to be narrowly construed.

Cases that cite this headnote

[14] Statutes
Exceptions, Limitations, and Conditions

When a statute specifies an exception, no others may be added under the guise of judicial construction.

Cases that cite this headnote

[15] Intoxicating Liquors
Evidence

Minor decoy's testimony in proceedings to suspend liquor store's off-sale general license was sufficient to support finding that store clerk's words regarding liquor purchase were a statement, rather than a question about decoy's age to which decoy was required to respond truthfully; decoy's testimony, including that clerk stated "I would not have guessed it, you must get asked a lot," or words to that effect, was clear and credible. Cal. Bus. & Prof. Code § 25658(a); Cal. Code Regs. tit. 4, § 141(b)(4).

Cases that cite this headnote

****132** ORIGINAL PROCEEDING: Petition for writ of review. Petition granted. Alcoholic Beverage Control Appeals Board No. AB9434.

Attorneys and Law Firms

Kamala D. Harris, Attorney General, Alicia M.B. Fowler, Assistant Attorney General, Peter D. Halloran and Lauren Sible, Deputy Attorneys General for Petitioner.

Linda A. Mathes, Sarah M. Smith, John D. Ziegler for Respondent Alcoholic Beverage Control Appeals Board.

Solomon, Saltsman & Jamieson, Stephen Warren Solomon, Ralph Barat Saltsman, Stephen Allen Jamieson, R. Bruce Evans, ****133** Ryan M. Kroll, Jennifer L. Oden, Los Angeles, and Margaret Warner Rose for Real Parties in Interest.

Opinion

HOCH, J.

***630** California Constitution, article XX, section 22, prohibits the sale of alcoholic beverages to persons under 21 years of age. (See also Bus. & Prof. Code, § 25658, subd. (a)), [1] [making it a misdemeanor to sell alcohol to a person under 21 years of age]. Here, the Department of Alcoholic Beverage ***631** Control (Department) issued a 15–day suspension of an off-sale general license held by the Garfield Beach CVS LLC Longs Drug Stores California LLC, doing business as CVS Pharmacy Store 9174 (CVS) after an administrative law judge found the store clerk sold alcohol to a minor decoy. [2] The Alcohol Beverage Control Appeals Board (Appeals Board) reversed the suspension based on California Code of Regulations, title 4, section 141 (Rule 141) that allows a law enforcement agency to use an underage decoy only "in a 'fashion that promotes fairness.' (*Id.*, subd. (a).) In the Appeals Board's view, the suspension was unfair because the minor decoy did not respond about his age when the store clerk looked at his driver license and remarked, "I would never have guessed it, you must get asked a lot." To challenge the reversal

of the license suspension, the Department petitioned for a writ of review in this court. (§ 23090.)

The Department contends it correctly interprets Rule 141 to require minor decoys to answer only questions about their ages. Based on the administrative law judge's finding in this case that the store clerk's remark constituted a statement rather than a question, the Department argues its decision was legally correct and supported by substantial evidence. The Appeals Board counters Rule 141 is ambiguous and results "in confusion and manifest unfairness." And CVS argues the Department's interpretation of Rule 141 unfairly allows decoys to remain silent in the face of mistaken statements about age. According to CVS, affirming the license suspension would allow deceptive and misleading silence in the face of a store clerk's explicit mistake about the minor decoy's age.

We conclude Rule 141 is not ambiguous in requiring minor decoys to answer truthfully only questions about their ages. Because substantial evidence supports the administrative law judge's factual finding the decoy in this case was not questioned about his age, we determine as a matter of law that Rule 141 does not provide CVS with a defense to the accusation it sold an alcoholic beverage to an underage buyer. Accordingly, we annul the Appeals Board's decision.

BACKGROUND

The Department's Imposition of a 15–day License Suspension

In October 2013, the Department accused CVS of selling alcohol to an underage person at its Garfield Beach store. An administrative hearing was ***632** held in February 2014, in which the administrative law judge made the following findings of fact:

CVS has held an off-sale general license to sell alcohol since June 2009, with no prior record of discipline by the Department. On June 3, 2013, Joseph Childers was 18 years old and had the appearance and mannerisms of a person under the age of 21. On that date, Childers accompanied ****134** Department agents and law enforcement officers to conduct an alcoholic beverage decoy operation at the Garfield Beach CVS store. Childers entered the store at 2:30 p.m., went to the beer cooler where he selected a 24–ounce bottle of beer, and took the beer to the checkout line. The CVS store clerk scanned the bottle of beer and asked Childers for identification. Childers handed his California driver license to the clerk. The driver license indicated Childers's date of birth and had a red stripe with white letters that stated, "AGE 21 IN 2015." In addition, the driver license had a blue stripe with white letters that stated, "PROVISIONAL UNTIL AGE 18 IN 2012."

The administrative law judge made the following factual findings: "The clerk looked at Childers's [driver license], tried to scan it, and looked at the [license] again. She then stated, 'I would not have guessed it, you must get asked a lot,' or words to that effect. The clerk's remark was framed as a statement not a question. The decoy did not say anything to the clerk in response to her remark. He thought the clerk's statement was 'casual conversation.' The decoy also testified the statement might or might not have been related to his age. Thus, in his mind it was unclear what the clerk meant by her statement. [¶] The clerk sold Childers the 24-ounce bottle of Corona beer. At no time during the transaction did the clerk ask Childers how old he was or his age. Following the sale of the beer, the decoy exited the premises." The administrative law judge found Childers's testimony at the hearing to be clear, concise, and credible. On this basis, the administrative law judge decided there was cause to suspend CVS's off-sale general license for 15 days.

In April 2014, the Department adopted the administrative law judge's proposed decision as its decision in this case. CVS appealed the decision to the Appeals Board.

The Appeals Board's Reversal of License Suspension

In January 2015, the Appeals Board issued its decision. The Appeals Board's decision relied upon its prior decision to conclude Rule 141 required the decoy to respond to the store clerk's statement upon looking at his driver license. The Appeals Board's decision emphasized the following testimony by the decoy at the administrative hearing:

***633** "[Counsel for CVS]: [A]fter the clerk made that statement to you, what did you take that statement to mean?

"A. [Childers]: Casual conversation.

"Q. And [in] that casual conversation did you see it related in any way to your age?

"A. Yes and no.

"Q. When you say 'Yes and no,' what do you mean?

"A. Yes, that maybe *I looked younger*. No, because she *thought I was older* or thought that I do it a lot, you know."

The Appeals Board reasoned that "[w]hen the decoy believes, as here, that a clerk's remarks are ambiguous as to his or her age, the decoy has an obligation to respond verbally and truthfully. That is the plain meaning of rule 141(a)'s language instructing that minor decoy operations must be conducted in a 'fashion that promotes fairness.' " (Italics omitted.) The Appeals Board further stated that whenever "the decoy him or herself interprets a seller's comments to *in any way* pertain to the decoy's age, the Department should insist that decoy err on the side of responding with clarification." On these grounds, the Appeals Board reversed the Department's decision and rescinded the ****135** suspension of CVS's off-sale general license.

Petition for Writ of Review

In February 2015, the Department filed in this court a petition for writ of review from the decision of the Appeals Board. We issued a writ of review in March 2015. (§ 23090.)

DISCUSSION

I

Standard of Review

[1] **[2]** In addition to prohibiting the sale of alcohol to minors, the California Constitution "vests the Department with broad discretion to revoke or suspend liquor licenses 'for good cause' if continuing the license would be 'contrary to public welfare or morals.' (Cal. Const., art. XX, § 22.) In the ***634** absence of a clear abuse of discretion, the courts will uphold the Department's decision to suspend a license for violation of the liquor laws. (E.g., *Martin v. Alcoholic Bev. etc. Appeals Bd.* (1959) 52 Cal.2d 238, 248–249 [340 P.2d 1].)" (*Provigo Corp. v. Alcoholic Beverage Control Appeals Bd.* (1994) 7 Cal.4th 561, 566, 28 Cal.Rptr.2d 638, 869 P.2d 1163 (*Provigo*).) " 'The administration of the Alcoholic Beverage Control Act, within the scope of the purposes of that act, is initially vested in the department. Its decisions, however, are subject to administrative review by the board and a final order of the board is, in turn, subject to judicial review.' " (*Caressa Camille, Inc. v. Alcoholic Beverage Control Appeals Bd.* (2002) 99 Cal.App.4th 1094, 1099, 121 Cal.Rptr.2d 758, quoting *Walsh v. Kirby* (1974) 13 Cal.3d 95, 102, 118 Cal.Rptr. 1, 529 P.2d 33.)

[3] The scope of review of the Department's decisions is the same in the Appeals Board and this court. (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2002) 100 Cal.App.4th 1066, 1071, 123 Cal.Rptr.2d 278 (*Deleuze*).) Section 23090.2 provides that review "shall not extend further than to determine, based on the whole record of the department as certified by the board, whether: [¶] (a) The department has proceeded without or in excess of its jurisdiction. [¶] (b) The department has proceeded in the manner required by law. [¶] (c) The decision of the department is supported by the findings. [¶] (d) The findings in the department's decision are supported by substantial evidence in the light of the whole record. [¶] (e) There is relevant evidence which, in the exercise of reasonable diligence, could not have been produced or which was improperly excluded at the hearing before the department." Section 23090.2 also excludes the power to make findings of fact from the scope of review. (*Ibid.*)

[4] **[5]** **[6]** In conducting our review, " '[w]e defer to the Department's interpretation of its own rules, since the agency is likely to be intimately familiar with regulations it authored and sensitive to the practical implications of one interpretation over another.' (*Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 12 [78 Cal.Rptr.2d 1, 960 P.2d 1031], (*Yamaha Corp.*).) Courts generally will not depart from the Department's contemporaneous construction of a rule enforced by the Department unless such interpretation is clearly erroneous or unauthorized. (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2003) 109 Cal.App.4th 1687, 1696 [1 Cal.Rptr.3d 339] ....)" (*Department of Alcoholic Beverage Control*

v. Alcoholic Beverage Control Appeals Bd. (2005) 128 Cal.App.4th 1195, 1205, 27 Cal.Rptr.3d 766.) In short, the Department's decisions are ****136** "subject to review only for insufficiency of the evidence, excess of jurisdiction, errors of law, or abuse of discretion." (*Deleuze*, at p. 1072, 123 Cal.Rptr.2d 278.)

***635 II**

Rule 141

The Department contends it correctly rejected CVS's reliance on Rule 141 as providing a defense to its sale of alcohol to the underage decoy in this case. We agree.

A.

The Department's Reliance on Minor Decoys

The Department relies on minor decoy operations as an integral part of its enforcement of the constitutional and statutory prohibitions on sales of alcohol to persons under 21 years of age. (Cal. Const., art. XX, § 22; § 25658, subd. (a).) The California Supreme Court has approved of the practice, noting that "[t]he use of underage decoys to enforce laws against unlawful sales to minors clearly *promotes* rather than hinders" the California constitutional and statutory prohibitions on sales of alcoholic beverages to minors. (*Provigo*, *supra*, 7 Cal.4th at p. 567, 28 Cal.Rptr.2d 638, 869 P.2d 1163.)

The Business and Professions Code provides that "[p]ersons under 21 years of age may be used by peace officers in the enforcement of this section to apprehend licensees, or employees or agents of licensees, or other persons who sell or furnish alcoholic beverages to minors." (§ 25658, subd. (f).) In pertinent part, subdivision (f) of section 25658 further provides: "Guidelines with respect to the use of persons under 21 years of age as decoys shall be adopted and published by the department in accordance with the rulemaking portion of the Administrative Procedure Act ...." To comply with subdivision (f) of section 25658, the Department promulgated Rule 141. (*Acapulco Restaurants, Inc. v. Alcoholic Beverage Control Appeals Bd.* (1998) 67 Cal.App.4th 575, 579, 79 Cal.Rptr.2d 126 (*Acapulco Restaurants*).) In its entirety, Rule 141 states:

"(a) A law enforcement agency may only use a person under the age of 21 years to attempt to purchase alcoholic beverages to apprehend licensees, or employees or agents of licensees who sell alcoholic beverages to minors (persons under the age of 21) and to reduce sales of alcoholic beverages to minors in a fashion that promotes fairness.

"(b) The following minimum standards shall apply to actions filed pursuant to Business and Professions Code Section 25658 in which it is alleged that a minor decoy has purchased an alcoholic beverage: [¶] (1) At the time of the operation, the decoy shall be less than 20 years of age; [¶] (2) The decoy ***636** shall display the appearance which could generally be expected of a person under 21 years of age, under the actual circumstances presented to the seller of alcoholic beverages at the time of the alleged offense; [¶] (3) A decoy shall either carry his or her own identification showing the decoy's correct date of birth or shall carry no identification; a decoy who carries identification shall present it upon request to any seller of alcoholic beverages; [¶] (4) *A decoy shall answer truthfully any questions about his or her age*; [¶] (5) Following any completed sale, but not later than the time a citation, if any, is issued, the peace officer directing the decoy shall make a reasonable attempt to enter the licensed premises and have the minor decoy who purchased alcoholic beverages make a face to face identification of the alleged seller of the alcoholic beverages.

****137** "(c) Failure to comply with this rule shall be a defense to any action brought pursuant to Business and Professions Code Section 25658." (Italics added.)

B.

Availability of the Rule 141 Defense

[7] The Appeals Board contends subdivision (b)(4) of Rule 141 required the minor decoy in this case to truthfully respond to the clerk's statement, "I would not have guessed it, you must get asked a lot." Similarly, CVS argues the minor decoy's lack of response violated Rule 141 and provided a defense to the Department's accusation. The Department counters by noting the

administrative law judge made the factual finding that the CVS clerk's words to the minor decoy constituted a statement rather than a question. On this basis, the Department argues the defense supplied by Rule 141 does not apply here. Resolving these contentions requires us to construe the meaning of Rule 141.

As this court has previously explained, "Generally, the same rules governing the construction and interpretation of statutes apply to the construction and interpretation of administrative regulations. (*In re Richards* (1993) 16 Cal.App.4th 93, 97–98, 19 Cal.Rptr.2d 797.) Accordingly, ' "we begin with the fundamental rule that a court should ascertain the intent of the Legislature so as to effectuate the purpose of the law." ' [Citations.] 'An equally basic rule of statutory construction is, however, that courts are bound to give effect to statutes according to the usual, ordinary import of the language employed in framing them.' [Citations.] Although a court may properly rely on extrinsic aids, it should first turn to the words of the statute to determine the intent of the Legislature. [Citations.] 'If the words of the statute are clear, the court should not add to or alter them to accomplish a ***637** purpose that does not appear on the face of the statute or from its legislative history.' (*California Teachers Assn. v. San Diego Community College Dist*. (1981) 28 Cal.3d 692, 698 [170 Cal.Rptr. 817, 621 P.2d 856].)" (*Schmidt v. Foundation Health* (1995) 35 Cal.App.4th 1702, 1710–1711, 42 Cal.Rptr.2d 172.) " 'The construction of an administrative regulation and its application to a given set of facts are matters of law.' " (*Ibid.*, quoting *Auchmoody v. 911 Emergency Services* (1989) 214 Cal.App.3d 1510, 1517, 263 Cal.Rptr. 278.)

In enacting the Alcoholic Beverage Control Act (Act) (§ 23000 et seq.), the Legislature declared the Act "involves in the highest degree the economic, social, and moral well-being and the safety of the State and of all its people." (§ 23001.) The Act establishes the Department "to provide a governmental organization which will ensure a strict, honest, impartial, and uniform administration and enforcement of the liquor laws throughout the State." (§ 23049.) To that end, section 23001 declares that "[a]ll provisions of this division shall be liberally construed for the accomplishment of these purposes."

[8] **[9]** Rule 141(b)(4) provides that "[a] decoy shall answer truthfully any questions about his or her age." The Rule's guidance is clear and unambiguous. Minor decoys do not need to respond to *statements* of any kind nor do they need to respond truthfully to *questions* other than those concerning their ages. Thus, Rule 141 does not require minor decoys to correct mistakes articulated by licensed alcohol sellers. Instead, the minor decoys need to respond truthfully only to questions about their ages. In short, Rule 141 sets forth clear, unambiguous, and fair guidance for minor decoys to follow during the Department's operations. Consequently, the Department properly construed the ****138** plain language of Rule 141 in determining the minor decoy in this case was not required to respond to the clerk's statement that might have related to the decoy's age.

The Appeals Board disagrees with the Department's plain-meaning interpretation of Rule 141, asserting the Rule is ambiguous and unfair. The Appeals Board argues that "the language of Rule 141[(b)(4)] is ambiguous, and decoys lack the expertise to make a fair decision about whether a clerk's words are a 'question' 'about his or her age.' " The Appeals Board bases its argument on the assertion that "[t]he word 'question' is, especially when uttered vocally as opposed to being written, not free from doubt." In support, the Appeals Board argues the ambiguity of the word "question" is demonstrated by the need for an evidentiary hearing to determine the nature of the store clerk's communication to the minor decoy. We reject the argument.

Courts have long resolved factual issues concerning whether a spoken communication constitutes a question that invited an answer. In ***638** *Rhode Island v. Innis* (1980) 446 U.S. 291, 100 S.Ct. 1682, 64 L.Ed.2d 297, the United States Supreme Court articulated a test for determining when *Miranda* advisements must be given to a suspect that "come[s] into play whenever a person in custody is subjected to either express questioning or its functional equivalent." (*Id.* at pp. 300–301, 100 S.Ct. 1682.) The test under *Rhode Island v. Innis* requires that police officers understand not only whether they are engaging in "express questioning," but also when their words or actions "are reasonably likely to elicit an incriminating response from the suspect." (*Id.* at p. 301, 100 S.Ct. 1682.) The United States Supreme Court's decision establishes the unproblematic nature of distinguishing between oral communications constituting questions (and even their functional equivalents) and statements not reasonably likely to elicit an incriminating

answer. Courts even require law enforcement officers to distinguish between suggestive and nonsuggestive questions. (*People v. Saracoglu* (2007) 152 Cal.App.4th 1584, 1590, 62 Cal.Rptr.3d 418.) Here, the determination required of minor decoys is more clear than the *Rhode Island v. Innis* test or the distinction between suggestive and nonsuggestive questions because subdivision (b)(4) of Rule 141 applies *only* to questions relating to age. "Question" is not an ambiguous term and does not lead to confusion in limiting spoken communications to those involving inquiries that contemplate answers.

[10] We also reject the Appeals Board's contention Rule 141 is ambiguous because "no definition is provided as to what 'fairness' means or how it is to be determined." The lack of a definition of fairness, by itself, does not render Rule 141 ambiguous. (Cf. *Nava v. Mercury Cas. Co.* (2004) 118 Cal.App.4th 803, 805, 13 Cal.Rptr.3d 816 [lack of definition does not render a term ambiguous].) Contrary to the Appeals Board's contention, Rule 141 provides specific guidance regarding how to preserve fairness in minor decoy operations. Subdivision (b) of Rule 141 implements the goal of fairness by imposing five specific requirements for every minor decoy operation. Decoys must be under the age of 20; have the appearance of a person under 21; carry their own actual identification and present that identification upon request; truthfully answer any questions about their ages; and make face-to-face identifications of the persons who sold the alcoholic beverages. (Rule 141(b)(1)-(5).) Fairness under Rule 141 is assured by a set of five expressly defined safeguards, all of which must be fulfilled during a minor decoy operation. ****139** (*Acapulco Restaurants, supra,* 67 Cal.App.4th at p. 580, 79 Cal.Rptr.2d 126.) Consequently, Rule 141's use of the word "fairness" does not render the rule ambiguous or confusing.

[11] **[12]** In support of the Appeals Board's argument Rule 141 is ambiguous regarding what constitutes fairness, it points to its earlier decisions in *7–Eleven, Inc./Johal Stores, Inc.* (2014) AB–9403 (*7–Eleven*), *Equilon Enterprises, LLC* (2002) AB–7845 (*Equilon*), *Lucky Stores, Inc.* (1999) AB–7227 (*Lucky*), *Southland Corp./Dandona* (***639** 1999) AB–7099 (*Southland*), and *Thrifty Payless, Inc.* (1998) AB–7050 (*Thrifty*). We may take judicial notice of decisions of the Appeals Board. (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2005) 128 Cal.App.4th 1195, 1208, fn. 5, 27 Cal.Rptr.3d 766; accord *Reimel v. Alcoholic Beverage Control Appeals Bd.* (1967) 254 Cal.App.2d 340, 62 Cal.Rptr. 54.) Thus, although we are not bound by the Appeals Board's decisions, we take judicial notice of the cited decisions and consider their reasoning for persuasive value.

Regarding agency decisions, the California Supreme Court has noted that "[w]here the meaning and legal effect of a statute is the issue, an agency's interpretation is one among several tools available to the court. Depending on the context, it may be helpful, enlightening, even convincing. It may sometimes be of little worth. [Citation.] Considered alone and apart from the context and circumstances that produce them, agency interpretations are not binding or necessarily even authoritative." (*Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 7–8, 78 Cal.Rptr.2d 1, 960 P.2d 1031.) Based on our review, we conclude the Appeals Board's cited decisions vary in their persuasiveness and fidelity to Rule 141.

In *7–Eleven*, *supra,* AB–9403, the Appeals Board affirmed the suspension of an off-sale license based on sale to a minor decoy after the store clerk looked at the minor decoy's identification and stated, "oh, you are so young." (*7–Eleven*, at pp. 2, 14.) In affirming the suspension, the Appeals Board concluded the minor decoy was not required to respond because the store clerk did not ask a question or indicate a mistake as to the minor decoy's age. The Appeals Board reasoned that "[t]he wor[d] 'young' is a subjective term, and gives no indication that the clerk has made a miscalculation and as a result believes the decoy to be over 21" years of age. (*Id.* at p. 12.) Under the reasoning of *7–Eleven*, the Appeals Board should have affirmed the license suspension in this case as well. Here, the administrative law judge found the store clerk did not ask a question of the minor decoy. And the store clerk did not clearly demonstrate confusion as to the minor's age in the statement, "I would never have guessed it, you must get asked a lot." The minor decoy testified he thought the statement might mean either that "she thought I was older *or thought that I do it a lot* ...." Because the store clerk in this case made a statement akin to that in *7–Eleven*, the reasoning employed in *7–Eleven* should have led the Appeals Board to affirm the Department's decision.

We reject the reasoning contained in the remainder of the Appeals Board's earlier decisions because the reasoning in

each would require minor decoys to speak up to clarify any mistake about their ages even in the absence of a question. (*Equilon,* at p. 2 [concluding Rule 141 "was ***640** violated when the decoy failed to respond to a statement by the clerk which implied that she was 21 years of age or older"], *Lucky*, at p. 4 [same where minor decoy did not respond to mistaken statement, "1978. You are 21"], and *Southland*, at pp. 6, 7 [same where decoy did not respond to statement, "You are 21"]. In each of these decisions, ****140** the Appeals Board relied on the notion of fairness to craft a new requirement for Rule 141, namely the obligation of a minor decoy to respond to any indication of mistake regarding age even in the absence of a question. Rule 141, however, expressly requires minor decoys only to answer questions relating to their ages. (Rule 141(b)(4).) The Appeals Board lacks the power to add a new defense to Rule 141.

The Appeals Board's decision in *Thrifty, supra,* AB–7050 involved a reversal of the Board's decision based on the minor decoy's silent tendering of a driver license rather than answering the clerk's question about her age. (See *Thrifty*, at p. 6 [speculating about the minor decoy's motivation in offering her identification rather than answering about her age].) Unlike this case, *Thrifty* involved an actual question by the clerk about the minor decoy's age and is therefore inapposite in this case where the administrative law judge determined the clerk did not ask any questions. (*Id.* at pp. 5–6.) Consequently, we need not consider whether *Thrifty* was correctly decided in harmony with Rule 141.

Ultimately, we are not persuaded by the Appeals Board's prior decisions that Rule 141 is ambiguous in requiring decoys to answer truthfully only questions relating to their ages.

Next, the Appeals Board argues the principle of fairness upon which Rule 141 is founded imposes an affirmative duty on minor decoys to speak up in order to clarify any mistake regarding age articulated by the vendor. If the Department had wanted to provide license holders with a defense for mistakes about a minor decoy's age or based on a minor decoy's failure to respond to a statement by the clerk, the Department could have done so by including express language to that effect in Rule 141. However, as we explained above, the language of Rule 141 requires minor decoys to respond only to questions about their ages. We reject the Appeals Board's attempt to add a new defense to Rule 141 that is not expressed in the rule. (*Acapulco Restaurants*, *supra*, 67 Cal.App.4th at p. 580, 79 Cal.Rptr.2d 126.)

Acapulco Restaurants involved a minor decoy operation in which the Department did not comply with Rule 141's requirement the minor decoy make a face-to-face identification of the clerk who sold the alcoholic beverage. (67 Cal.App.4th at p. 577, 79 Cal.Rptr.2d 126; see also Rule 141(b)(5).) Despite the failure to follow this express requirement ***641** of Rule 141, the Department imposed and the Appeals Board affirmed a 15–day license suspension on grounds a law enforcement officer witnessed the entire transaction. (*Acapulco Restaurants,* at p. 577, 79 Cal.Rptr.2d 126.) However, the *Acapulco Restaurants* court reversed, explaining, "[t]o ignore a rule and the defense that arises from law enforcement's failure to comply with that rule is not a matter of 'interpretation.' What the Department has done is to unilaterally decide that rule 141[ ](b)(5) applies in some situations but not others, a decision that exceeds the Department's power. By its refusal to apply rule 141[ ](b)(5) when a police officer is present at the time of the sale, the Department has crossed the line separating the interpretation of a word or phrase on one side to the legislation of a different rule on the other, thereby substituting its judgment for that of the rulemaking authority. It might as well have said that rule 141[ ](b)(5) applies on Mondays but not Thursdays." (*Acapulco Restaurants*, *supra*, 67 Cal.App.4th at p. 580, 79 Cal.Rptr.2d 126.)

[13] **[14]** The result in *Acapulco Restaurants* followed the well-established rule that " '[a]n exception to a statute is to be narrowly construed. (Citation.) When a statute specifies an exception, no others ****141** may be added under the guise of judicial construction. (Citations.)' " (*Kirby v. Alcoholic Beverage Control Appeals Bd.* (1968) 267 Cal.App.2d 895, 898, 73 Cal.Rptr. 352, quoting *Lacabanne Properties, Inc. v. Department of Alcoholic Beverage Control* (1968) 261 Cal.App.2d 181, 189, 67 Cal.Rptr. 734.) Fairness does not require the new exception to be judicially grafted into Rule 141 to provide additional defenses that require a minor decoy to speak up in the absence of a question by the store clerk. As the California Supreme Court has noted, "licensees have a ready means of protecting themselves from liability by simply asking any purchasers who could possibly be minors to produce bona fide evidence of their age

and identity." (*Provigo, supra*, 7 Cal.4th at p. 570, 28 Cal.Rptr.2d 638, 869 P.2d 1163.)

Likewise, we reject the argument made by CVS that the minor decoy's silence in response the clerk's statement about his youthful appearance was "deceptive and misleading." As this court has previously noted in a case involving a claim a governmental agency engaged in fraudulent concealment, "Courts uniformly distinguish between the misleading half-truth, or partial disclosure, and the case in which defendant says nothing at all. The general rule is that silence alone is not actionable." (*Wiechmann Engineers v. State of California ex rel. Dept. Pub. Wks.* (1973) 31 Cal.App.3d 741, 751, 107 Cal.Rptr. 529.)

Here, the minor decoy did not say anything untrue. To the contrary, the minor decoy presented accurate information in the form of his driver license. Thus, the minor decoy did not engage in deceptive and misleading communication with the clerk. Notably, the California Supreme Court has rejected a claim the use of a "mature-looking" decoy constitutes an unfair practice by ***642** the Department in a case in which a minor decoy "simply bought beer and wine, *without attempting to pressure or encourage the sales in any way*." (*Provigo, supra*, 7 Cal.4th at p. 569, 28 Cal.Rptr.2d 638, 869 P.2d 1163, italics added.) The same reason applies here. The minor decoy's silence in this case did not involve any attempt to pressure or encourage the sale of an alcoholic beverage to him. The minor decoy's silence did not render the Department's operation unfair.

CVS's argument its clerk was deceived and misled by the minor decoy in this case is based on the same premise as that advanced by the Appeals Board, namely a minor decoy has a duty to speak up in response to a statement indicating a mistaken calculation of age. However, as we have explained, Rule 141 does not supply a defense based on a minor decoy's failure to respond to statements made by the clerk. Consequently, we conclude the Department properly rejected CVS's argument the minor decoy's silence rendered the operation unfair under Rule 141.

C.

Substantial Evidence Supports the Department's Decision

[15] As part of its argument Rule 141 is ambiguous, the Appeals Board asserts the minor decoy's testimony during the hearing was equally uncertain. Specifically, the Appeals Board asserts that "[t]he decoy's testimony is as ambiguous as [Rule 141], and certainly does not support the conclusion, reached by the Department, that the clerk's words were '[i]ndisputably a statement' falling outside the Rule." In light of the administrative law judge's factual finding, we disagree.

Viewed in the light most favorable to the Department's decision, we conclude substantial evidence supports the administrative law judge's decision. As the administrative law judge found, the minor decoy's ****142** testimony was clear and credible. The administrative law judge also expressly found the testimony established the store clerk's communication to the minor decoy was a statement and not a question. Under section 23090.2, the Appeals Board lacks power to disregard the Department's factual findings, which includes findings made by the administrative law judge. (*Hasselbach v. Department of Alcoholic Beverage Control* (1959) 167 Cal.App.2d 662, 667, 334 P.2d 1058 ["The statement made in the opinion of the appeals board was not a finding of fact for that board is without power to make findings of fact"].) Accordingly, we reject the Appeals Board's argument the store clerk's statement might have been a question instead of a statement.

***643** DISPOSITION

The decision of the Alcohol Beverage Control Appeals Board is annulled. The decision of the Department of Alcoholic Beverage Control is reinstated and the case is remanded to the Alcohol Beverage Control Appeals Board for further proceedings consistent with this opinion.

We concur:

BLEASE, Acting P.J.

RENNER, J.

All Citations

7 Cal.App.5th 628, 213 Cal.Rptr.3d 130, 17 Cal. Daily Op. Serv. 384, 2017 Daily Journal D.A.R. 402

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Footnotes

1 Undesignated statutory references are to the Business and Professions Code.

2 The license is held by Garfield Beach CVS LLC Longs Drug Stores California LLC, doing business as CVS Pharmacy Store 9174.

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54 Cal.3d 326, 814 P.2d 1308, 285 Cal.Rptr. 66

FRANCES KINLAW et al., Plaintiffs and Appellants,
v.
THE STATE OF CALIFORNIA et al., Defendants and Respondents.

No. S014349.
Supreme Court of California
Aug 30, 1991.

SUMMARY

Medically indigent adults and taxpayers brought an action pursuant to Code Civ. Proc., § 526a, against the state, alleging that it had violated Cal. Const., art. XIII B, § 6 (reimbursement of local governments for state-mandated new programs), by shifting its financial responsibility for the funding of health care for the poor onto the county without providing the necessary funding, and that as a result the state had evaded its constitutionally mandated spending limits. The trial court granted summary judgment for the State after concluding plaintiffs lacked standing to prosecute the action. (Superior Court of Alameda County, No. 632120-4, Henry Ramsey, Jr., and Demetrios P. Agretelis, Judges.) The Court of Appeal, First Dist., Div. Two, Nos. A041426 and A043500, reversed.

The Supreme Court reversed the judgment of the Court of Appeal, holding the administrative procedures established by the Legislature (Gov. Code, § 17500 et seq.), which are available only to local agencies and school districts directly affected by a state mandate, were the exclusive means by which the state's obligations under Cal. Const., art. XIII B, § 6, were to be determined and enforced. Accordingly, the court held plaintiffs lacked standing to prosecute the action. (Opinion by Baxter, J., with Lucas, C. J., Panelli, Kennard, and Arabian, JJ., concurring. Separate dissenting opinion by Broussard, J., with Mosk, J., concurring.)

HEADNOTES

Classified to California Digest of Official Reports

(1)
State of California § 7--Actions--State-mandated Costs--Reimbursement-- Exclusive Statutory Remedy.
Gov. Code, § 17500 et seq., creates an administrative forum for resolution of state mandate claims arising under Cal. Const., art. XIII B, § 6, and establishes procedures which exist for the express purpose of avoiding multiple proceedings, judicial and administrative, addressing the same claim that a reimbursable state mandate has been created. The statutory scheme also designates the Sacramento County Superior Court as the venue for judicial actions to declare unfunded mandates invalid. It also designates the Sacramento County Superior Court as the venue for judicial actions to declare unfunded mandates invalid (Gov. Code, § 17612). In view of the comprehensive nature of the legislative scheme, and from the expressed intent, the Legislature has created what is clearly intended to be a comprehensive and exclusive procedure by which to implement and enforce Cal. Const., art. XIII B, § 6.

(2)
State of California § 7--Actions--State-mandated Costs--Reimbursement-- Private Action to Enforce--Standing.
In an action by medically indigent adults and taxpayers seeking to enforce Cal. Const., art. XIII B, § 6, for declaratory and injunctive relief requiring the state to reimburse the county for the cost of providing health care services to medically indigent adults who, prior to 1983, had been included in the state Medi-Cal program, the Court of Appeal erred in holding that the existence of an administrative remedy (Gov. Code, § 17500 et seq.) by which affected local agencies could enforce their constitutional right under art. XIII B, § 6 to reimbursement for the cost of state mandates di not bar the action. Because the right involved was given by the Constitution to local agencies and school districts, not individuals either as taxpayers or recipients of government benefits and services, the administrative remedy was adequate fully to implement the constitutional provision. The Legislature has the authority to establish procedures for the implementation of local agency rights under art. XIII B, § 6; unless the exercise of a constitutional right is unduly restricted, a court must limit enforcement to the procedures established by the Legislature. Plaintiffs' interest, although pressing, was indirect and did not differ

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from the interest of the public at large in the financial plight of local government. Relief by way of reinstatement to Medi-Cal pending further action by the state was not a remedy available under the statute, and thus was not one which a court may award.

[See **Cal.Jur.3d,** State of California, § 78; 7 **Witkin,** Summary of Cal. Law (9th ed. 1988) Constitutional Law, § 112.]

COUNSEL

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BAXTER, J.

Plaintiffs, medically indigent adults and taxpayers, seek to enforce section 6 of article XIII B (hereafter, section 6) of the California Constitution through an action for declaratory and injunctive relief. They invoked the jurisdiction of the superior court as taxpayers pursuant to Code of Civil Procedure section 526a and as persons affected by the alleged failure of the state to comply with section 6. The superior court granted summary judgment for defendants State of California and Director of the Department of Health Services, after concluding that plaintiffs lacked standing to prosecute the action. On appeal, the Court of Appeal held that plaintiffs have standing and that the action is not barred by the availability of administrative remedies.

We reverse. The administrative procedures established by the Legislature, which are available only to local agencies and school districts directly affected by a state mandate, are the exclusive means by which the state's obligations under section 6 are to be determined and enforced. Plaintiffs therefore lack standing.

I State Mandates

Section 6, adopted on November 6, 1979, as part of an initiative measure imposing spending limits on state and local government, also imposes on the state an obligation to reimburse local agencies for the cost of most programs and services which they must provide pursuant to a state mandate if the local agencies were not under a preexisting duty to fund the activity. It provides: ***329**

"Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such program or increased level of service, except that the Legislature may, but need not, provide such subvention of funds for the following mandates:

"(a) Legislative mandates requested by the local agency affected;

"(b) Legislation defining a new crime or changing an existing definition of a crime; or

"(c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975."

A complementary provision, section 3 of article XIII B, provides for a shift from the state to the local agency of a portion of the spending or "appropriation" limit of the state when responsibility for funding an activity is shifted to a local agency:

"The appropriations limit for any fiscal year ... shall be adjusted as follows: [¶] (a) In the event that the financial responsibility of providing services is transferred, in whole or in part, ... from one entity of government to another, then for the year in which such transfer becomes effective the appropriations limit of the transferee entity shall be increased by such reasonable amount as the said entities shall mutually agree and the appropriations limit of the transferor entity shall be decreased by the same amount."

II Plaintiffs' Action

The underlying issue in this action is whether the state is obligated to reimburse the County of Alameda, and shift to Alameda County a concomitant portion of the state's spending limit, for the cost of providing health care services to medically indigent adults who prior to 1983 had been included in the state Medi-Cal program. Assembly Bill No. 799 (1981-1982 Reg. Sess.) (AB 799) (Stats. 1982, ch. 328, p. 1568) removed medically indigent adults from Medi-Cal effective January 1, 1983. At the time section 6 was adopted, the state was funding Medi-Cal coverage for these persons without requiring any county financial contribution.

Plaintiffs initiated this action in the Alameda County Superior Court. They sought relief on their own behalf and on behalf of a class of similarly ***330** situated medically indigent adult residents of Alameda County. The only named defendants were the State of California, the Director of the Department of Health Services, and the County of Alameda.

In the complaint for declaratory and injunctive relief, plaintiffs sought an injunction compelling the state to restore Medi-Cal eligibility to medically indigent adults or to reimburse the County of Alameda for the cost of providing health care to those persons. They also prayed for a declaration that the transfer of responsibility from the state-financed Medi- Cal program to the counties without adequate reimbursement violated the California Constitution. [1]

At the time plaintiffs initiated their action neither Alameda County, nor any other county or local agency, had filed a reimbursement claim with the Commission on State Mandates (Commission). [2]

Whether viewed as an action seeking restoration of Medi-Cal benefits, one to compel state reimbursement of county costs, or one for declaratory relief, therefore, the action required a determination that the enactment of AB 799 created a state mandate within the contemplation of section 6. Only upon resolution of that issue favorably to plaintiffs would the state have an obligation to reimburse the county for its increased expense and shift a portion of its appropriation limit, or to reinstate Medi-Cal benefits for plaintiffs and the class they seek to represent.

The gravamen of the action is, therefore, enforcement of section 6. [3] ***331**

III Enforcement of Article XIII B, Section 6

In 1984, almost five years after the adoption of article XIII B, the Legislature enacted comprehensive administrative procedures for resolution of claims arising out of section 6. (§ 17500.) The Legislature did so because the absence of a uniform procedure had resulted in inconsistent rulings on the existence of state mandates, unnecessary litigation, reimbursement delays, and, apparently, resultant uncertainties in accommodating reimbursement requirements in the budgetary process. The necessity for the legislation was explained in section 17500:

"The Legislature finds and declares that the existing system for reimbursing local agencies and school districts for the costs of state- mandated local programs has not provided for the effective determination of the state's responsibilities under Section 6 of Article XIII B of the California Constitution. The Legislature finds and declares that the failure of the existing process to adequately and consistently resolve the complex legal questions involved in the determination of state-mandated costs has led to an increasing reliance by local agencies and school districts on the judiciary and, therefore, in order to relieve unnecessary congestion of the judicial system, *it is necessary to create a mechanism which is capable of rendering sound quasi-judicial decisions and providing an effective means of resolving disputes over the existence of state-mandated local programs.*" (Italics added.)

In part 7 of division 4 of title 2 of the Government Code, "State-Mandated Costs," which commences with section 17500, the Legislature created the Commission (§ 17525), to adjudicate disputes over the existence of a state-mandated program (§§ 17551, 17557) and to adopt procedures for submission and adjudication of reimbursement claims (§ 17553). The five-member Commission includes the Controller, the Treasurer, the Director of Finance, the Director of the Office of Planning and Research, and a public member experienced in public finance. (§ 17525.)

The legislation establishes a test-claim procedure to expeditiously resolve disputes affecting multiple agencies (§ 17554), [4] establishes the method of ***332** payment of

claims (§§ 17558, 17561), and creates reporting procedures which enable the Legislature to budget adequate funds to meet the expense of state mandates (§§ 17562, 17600, 17612, subd. (a).)

Pursuant to procedures which the Commission was authorized to establish (§ 17553), local agencies[5] and school districts[6] are to file claims for reimbursement of state-mandated costs with the Commission (§§ 17551, 17560), and reimbursement is to be provided only through this statutory procedure. (§§ 17550, 17552.)

The first reimbursement claim filed which alleges that a state mandate has been created under a statute or executive order is treated as a "test claim." (§ 17521.) A public hearing must be held promptly on any test claim. At the hearing on a test claim or on any other reimbursement claim, evidence may be presented not only by the claimant, but also by the Department of Finance and any other department or agency potentially affected by the claim. (§ 17553.) Any interested organization or individual may participate in the hearing. (§ 17555.)

A local agency filing a test claim need not first expend sums to comply with the alleged state mandate, but may base its claim on estimated costs. (§ 17555.) The Commission must determine both whether a state mandate exists and, if so, the amount to be reimbursed to local agencies and school districts, adopting "parameters and guidelines" for reimbursement of any claims relating to that statute or executive order. (§ 17557.) Procedures for determining whether local agencies have achieved statutorily authorized cost savings and for offsetting these savings against reimbursements are also provided. (§ 17620 et seq.) Finally, judicial review of the Commission decision is available through petition for writ of mandate filed pursuant to Code of Civil Procedure section 1094.5. (§ 17559.)

The legislative scheme is not limited to establishing the claims procedure, however. It also contemplates reporting to the Legislature and to departments and agencies of the state which have responsibilities related to funding state mandates, budget planning, and payment. The parameters and guidelines adopted by the Commission must be submitted to the Controller, who is to pay subsequent claims arising out of the mandate. (§ 17558.) Executive orders mandating costs are to be accompanied by an appropriations ***333** bill to cover the costs if the costs are not included in the budget bill, and in subsequent years the costs must be included in the budget bill. (§ 17561, subds. (a) & (b).) Regular review of the costs is to be made by the Legislative Analyst, who must report to the Legislature and recommend whether the mandate should be continued. (§ 17562.) The Commission is also required to make semiannual reports to the Legislature of the number of mandates found and the estimated reimbursement cost to the state. (§ 17600.) The Legislature must then adopt a "local government claims bill." If that bill does not include funding for a state mandate, an affected local agency or school district may seek a declaration from the superior court for the County of Sacramento that the mandate is unenforceable, and an injunction against enforcement. (§ 17612.)

Additional procedures, enacted in 1985, create a system of state-mandate apportionments to fund reimbursement. (§ 17615 et seq.)

([1]) It is apparent from the comprehensive nature of this legislative scheme, and from the Legislature's expressed intent, that the exclusive remedy for a claimed violation of section 6 lies in these procedures. The statutes create an administrative forum for resolution of state mandate claims, and establishes procedures which exist for the express purpose of avoiding multiple proceedings, judicial and administrative, addressing the same claim that a reimbursable state mandate has been created. The statutory scheme also designates the Sacramento County Superior Court as the venue for judicial actions to declare unfunded mandates invalid (§ 17612).

The legislative intent is clearly stated in section 17500: "It is the intent of the Legislature in enacting this part to provide for the implementation of Section 6 of Article XIII B of the California Constitution and to consolidate the procedures for reimbursement of statutes specified in the Revenue and Taxation Code with those identified in the Constitution. ..." And section 17550 states: "Reimbursement of local agencies and school districts for costs mandated by the state shall be provided pursuant to this chapter."

Finally, section 17552 provides: "This chapter shall provide *the sole and exclusive procedure* by which a local agency or school district may claim reimbursement for costs mandated by the state as required by Section 6 of

Article XIII B of the California Constitution." (Italics added.)

In short, the Legislature has created what is clearly intended to be a comprehensive and exclusive procedure by which to implement and enforce section 6. ***334**

IV Exclusivity

([2]) Plaintiffs argued, and the Court of Appeal agreed, that the existence of an administrative remedy by which affected local agencies could enforce their right under section 6 to reimbursement for the cost of state mandates did not bar this action because the administrative remedy is available only to local agencies and school districts.

The Court of Appeal recognized that the decision of the County of Alameda, which had not filed a claim for reimbursement at the time the complaint was filed, was a discretionary decision which plaintiffs could not challenge. (*Dunn v. Long Beach L. & W. Co.* (1896) 114 Cal. 605, 609, 610-611 [46 P. 607]; *Silver v. Watson* (1972) 26 Cal.App.3d 905, 909 [103 Cal.Rptr. 576]; *Whitson v. City of Long Beach* (1962) 200 Cal.App.2d 486, 506 [19 Cal.Rptr. 668]; *Elliott v. Superior Court* (1960) 180 Cal.App.2d 894, 897 [5 Cal.Rptr. 116].) The court concluded, however, that public policy and practical necessity required that plaintiffs have a remedy for enforcement of section 6 independent of the statutory procedure.

The right involved, however, is a right given by the Constitution to local agencies, not individuals either as taxpayers or recipients of government benefits and services. Section 6 provides that the "state shall provide a subvention of funds *to reimburse ... local governments* ...." (Italics added.) The administrative remedy created by the Legislature is adequate to fully implement section 6. That Alameda County did not file a reimbursement claim does not establish that the enforcement remedy is inadequate. Any of the 58 counties was free to file a claim, and other counties did so. The test claim is now before the Court of Appeal. The administrative procedure has operated as intended.

The Legislature has the authority to establish procedures for the implementation of local agency rights under section 6. Unless the exercise of a constitutional right is unduly restricted, the court must limit enforcement to the procedures established by the Legislature. (*People v. Western Air Lines, Inc.* (1954) 42 Cal.2d 621, 637 [268 P.2d 723]; *Chesney v. Byram* (1940) 15 Cal.2d 460, 463 [101 P.2d 1106]; *County of Contra Costa v. State of California* (1986) 177 Cal.App.3d 62, 75 [222 Cal.Rptr. 750].)

Plaintiffs' argument that they must be permitted to enforce section 6 as individuals because their right to adequate health care services has been compromised by the failure of the state to reimburse the county for the cost ***335** of services to medically indigent adults is unpersuasive. Plaintiffs' interest, although pressing, is indirect and does not differ from the interest of the public at large in the financial plight of local government. Although the basis for the claim that the state must reimburse the county for its costs of providing the care that was formerly available to plaintiffs under Medi-Cal is that AB 799 created a state mandate, plaintiffs have no right to have any reimbursement expended for health care services of any kind. Nothing in article XIII B or other provision of law controls the county's expenditure of the funds plaintiffs claim must be paid to the county. To the contrary, section 17563 gives the local agency complete discretion in the expenditure of funds received pursuant to section 6, providing: "Any funds received by a local agency or school district pursuant to the provisions of this chapter may be used for any public purpose."

The relief plaintiffs seek in their prayer for state reimbursement of county expenses is, in the end, a reallocation of general revenues between the state and the county. Neither public policy nor practical necessity compels creation of a judicial remedy by which individuals may enforce the right of the county to such revenues. The Legislature has established a procedure by which the county may claim any revenues to which it believes it is entitled under section 6. That test-claim statute expressly provides that not only the claimant, but also "any other interested organization or individual may participate" in the hearing before the Commission (§ 17555) at which the right to reimbursement of the costs of such mandate is to be determined. Procedures for receiving any claims must "provide for presentation of evidence by the claimant, the Department of Finance and any other affected department or agency, *and any other interested person.*" (§ 17553. Italics added.) Neither the county nor an interested individual is without an opportunity to be heard on these questions. These procedures are both adequate and exclusive. [7]

The alternative relief plaintiffs seek-reinstatement to Medi-Cal pending further action by the state-is not a remedy available under the statute, and thus is not one which this court may award. The remedy for the failure to fund a program is a declaration that the mandate is unenforceable. That relief is available only after the Commission has determined that a mandate exists ***336** and the Legislature has failed to include the cost in a local government claims bill, and only on petition by the county. (§ 17612.) [8]

Moreover, the judicial remedy approved by the Court of Appeal permits resolution of the issues raised in a state mandate claim without the participation of those officers and individuals the Legislature deems necessary to a full and fair exposition and resolution of the issues. Neither the Controller nor the Director of Finance was named a defendant in this action. The Treasurer and the Director of the Office of Planning and Research did not participate. All of these officers would have been involved in determining the question as members of the Commission, as would the public member of the Commission. The judicial procedures were not equivalent to the public hearing required on test claims before the Commission by section 17555. Therefore, other affected departments, organizations, and individuals had no opportunity to be heard. [9]

Finally, since a determination that a state mandate has been created in a judicial proceeding rather than one before the Commission does not trigger the procedures for creating parameters and guidelines for payment of claims, or for inclusion of estimated costs in the state budget, there is no source of funds available for compliance with the judicial decision other than the appropriations for the Department of Health Services. Payment from those funds can only be at the expense of another program which the department is obligated to fund. No public policy supports, let alone requires, this result.

The superior court acted properly in dismissing this action.

The judgment of the Court of Appeal is reversed.

Lucas, C. J., Panelli, J., Kennard, J., and Arabian, J., concurred.

BROUSSARD, J.

I dissent. For nine years the Legislature has defied the mandate of article XIII B of the California Constitution (hereafter article XIII B). Having transferred responsibility for the care of medically indigent adults (MIA's) to county governments, the Legislature has failed to provide the counties with sufficient money to meet this responsibility, yet the ***337** Legislature computes its own appropriations limit as if it fully funded the program. The majority, however, declines to remedy this violation because, it says, the persons most directly harmed by the violation-the medically indigent who are denied adequate health care-have no standing to raise the matter. I disagree, and will demonstrate that (1) plaintiffs have standing as citizens to seek a declaratory judgment to determine whether the state is complying with its constitutional duty under article XIII B; (2) the creation of an administrative remedy whereby counties and local districts can enforce article XIII B does not deprive the citizenry of its own independent right to enforce that provision; and (3) even if plaintiffs lacked standing, our recent decision in *Dix v. Superior Court* (1991) 53 Cal.3d 442 [279 Cal.Rptr. 834, 807 P.2d 1063] permits us to reach and resolve any significant issue decided by the Court of Appeal and fully briefed and argued here. I conclude that we should reach the merits of the appeal.

On the merits, I conclude that the state has not complied with its constitutional obligation under article XIII B. To prevent the state from avoiding the spending limits imposed by article XIII B, section 6 of that article prohibits the state from transferring previously state-financed programs to local governments without providing sufficient funds to meet those burdens. In 1982, however, the state excluded the medically indigent from its Medi-Cal program, thus shifting the responsibility for such care to the counties. Subvention funds provided by the state were inadequate to reimburse the counties for this responsibility, and became less adequate every year. At the same time, the state continued to compute its spending limit as if it fully financed the entire program. The result is exactly what article XIII B was intended to prevent: the state enjoys a falsely inflated spending limit; the county is compelled to assume a burden it cannot afford; and the medically indigent receive inadequate health care.

I. Facts and Procedural History

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Plaintiffs-citizens, taxpayers, and persons in need of medical care-allege that the state has shifted its financial responsibility for the funding of health care for MIA's to the counties without providing the necessary funding and without any agreement transferring appropriation limits, and that as a result the state is violating article XIII B. Plaintiffs further allege they and the class they claim to represent cannot, consequently, obtain adequate health care from the County of Alameda, which lacks the state funding to provide it. The county, although nominally a defendant, aligned ***338** itself with plaintiffs. It admits the inadequacy of its program to provide medical care for MIA's but blames the absence of state subvention funds. [1]

At hearings below, plaintiffs presented uncontradicted evidence regarding the enormous impact of these statutory changes upon the finances and population of Alameda County. That county now spends about $40 million annually on health care for MIA's, of which the state reimburses about half. Thus, since article XIII B became effective, Alameda County's obligation for the health care of MIA's has risen from zero to more than $20 million per year. The county has inadequate funds to discharge its new obligation for the health care of MIA's; as a result, according to the Court of Appeal, uncontested evidence from medical experts presented below shows that, "The delivery of health care to the indigent in Alameda County is in a state of shambles; the crisis cannot be overstated ...." "Because of inadequate state funding, some Alameda County residents are dying, and many others are suffering serious diseases and disabilities, because they cannot obtain adequate access to the medical care they need ...." "The system is clogged to the breaking point. ... All community clinics ... are turning away patients." "The funding received by the county from the state for MIAs does not approach the actual cost of providing health care to the MIAs. As a consequence, inadequate resources available to county health services jeopardize the lives and health of thousands of people ...."

The trial court acknowledged that plaintiffs had shown irreparable injury, but denied their request for a preliminary injunction on the ground that they could not prevail in the action. It then granted the state's motion for summary judgment. Plaintiffs appealed from both decisions of the trial court.

The Court of Appeal consolidated the two appeals and reversed the rulings below. It concluded that plaintiffs had standing to bring this action to enforce the constitutional spending limit of article XIII B, and that the action is not barred by the existence of administrative remedies available to counties. It then held that the shift of a portion of the cost of medical indigent care by the state to Alameda County constituted a state-mandated new program under the provisions of article XIII B, which triggered that article's provisions requiring a subvention of funds by the state to reimburse Alameda ***339** County for the costs of such program it was required to assume. The judgments denying a preliminary injunction and granting summary judgment for defendants were reversed. We granted review.

II. Standing

A. *Plaintiffs have standing to bring an action for declaratory relief to determine whether the state is complying with article XIII B.*

Plaintiffs first claim standing as taxpayers under Code of Civil Procedure section 526a, which provides that: "An action to obtain a judgment, restraining and preventing any illegal expenditure of, waste of, or injury to, the estate, funds, or other property of a county ..., may be maintained against any officer thereof, or any agent, or other person, acting in its behalf, either by a citizen resident therein, or by a corporation, who is assessed for and is liable to pay, or, within one year before the commencement of the action, has paid, a tax therein. ..." As in *Common Cause v. Board of Supervisors* (1989) 49 Cal.3d 432, 439 [261 Cal.Rptr. 574, 777 P.2d 610], however, it is "unnecessary to reach the question whether plaintiffs have standing to seek an injunction under Code of Civil Procedure section 526a, because there is an independent basis for permitting them to proceed." Plaintiffs here seek a declaratory judgment that the transfer of responsibility for MIA's from the state to the counties without adequate reimbursement violates article XIII B. A declaratory judgment that the state has breached its duty is essentially equivalent to an action in mandate to compel the state to perform its duty. (See *California Assn. of Psychology Providers v. Rank* (1990) 51 Cal.3d 1, 9 [270 Cal.Rptr. 796, 793 P.2d 2], which said that a declaratory judgment establishing that the state has a duty to act provides relief equivalent to mandamus, and makes issuance of the writ unnecessary.) Plaintiffs further seek a mandatory injunction requiring that the state pay the health costs of MIA's under the Medi-Cal program until the state

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meets its obligations under article XIII B. The majority similarly characterize plaintiffs' action as one comparable to mandamus brought to enforce section 6 of article XIII B.

We should therefore look for guidance to cases that discuss the standing of a party seeking a writ of mandate to compel a public official to perform his or her duty. [2] Such an action may be brought by any person "beneficially interested" in the issuance of the writ. (Code Civ. Proc., § 1086.) In *Carsten* ***340** *v. Psychology Examining Com.* (1980) 27 Cal.3d 793, 796 [166 Cal.Rptr. 844, 614 P.2d 276], we explained that the "requirement that a petitioner be 'beneficially interested' has been generally interpreted to mean that one may obtain the writ only if the person has some special interest to be served or some particular right to be preserved or protected over and above the interest held in common with the public at large." We quoted from Professor Davis, who said, "One who is in fact adversely affected by governmental action should have standing to challenge that action if it is judicially reviewable." (Pp. 796-797, quoting 3 Davis, Administrative Law Treatise (1958) p. 291.) Cases applying this standard include *Stocks v. City of Irvine* (1981) 114 Cal.App.3d 520 [170 Cal.Rptr. 724], which held that low- income residents of Los Angeles had standing to challenge exclusionary zoning laws of suburban communities which prevented the plaintiffs from moving there; *Taschner v. City Council, supra,* 31 Cal.App.3d 48, which held that a property owner has standing to challenge an ordinance which may limit development of the owner's property; and *Felt v. Waughop* (1924) 193 Cal. 498 [225 P. 862], which held that a city voter has standing to compel the city clerk to certify a correct list of candidates for municipal office. Other cases illustrate the limitation on standing: *Carsten v. Psychology Examining Com., supra,* 27 Cal.3d 793, held that a member of the committee who was neither seeking a license nor in danger of losing one had no standing to challenge a change in the method of computing the passing score on the licensing examination; *Parker v. Bowron* (1953) 40 Cal.2d 344 [254 P.2d 6] held that a union official who was neither a city employee nor a city resident had no standing to compel a city to follow a prevailing wage ordinance; and *Dunbar v. Governing Board* (1969) 275 Cal.App.2d 14 [79 Cal.Rptr. 662] held that a member of a student organization had standing to challenge a college district's rule barring a speaker from campus, but persons who merely planned to hear him speak did not.

No one questions that plaintiffs are affected by the lack of funds to provide care for MIA's. Plaintiffs, except for plaintiff Rabinowitz, are not merely citizens and taxpayers; they are medically indigent persons living in Alameda County who have been and will be deprived of proper medical care if funding of MIA programs is inadequate. Like the other plaintiffs here, ***341** plaintiff Kinlaw, a 60-year-old woman with diabetes and hypertension, has no health insurance. Plaintiff Spier has a chronic back condition; inadequate funding has prevented him from obtaining necessary diagnostic procedures and physiotherapy. Plaintiff Tsosie requires medication for allergies and arthritis, and claims that because of inadequate funding she cannot obtain proper treatment. Plaintiff King, an epileptic, says she was unable to obtain medication from county clinics, suffered seizures, and had to go to a hospital. Plaintiff "Doe" asserts that when he tried to obtain treatment for AIDS-related symptoms, he had to wait four to five hours for an appointment and each time was seen by a different doctor. All of these are people personally dependent upon the quality of care of Alameda County's MIA program; most have experienced inadequate care because the program was underfunded, and all can anticipate future deficiencies in care if the state continues its refusal to fund the program fully.

The majority, however, argues that the county has no duty to use additional subvention funds for the care of MIA's because under Government Code section 17563 "[a]ny funds received by a local agency ... pursuant to the provisions of this chapter may be used for any public purpose." Since the county may use the funds for other purposes, it concludes that MIA's have no special interest in the subvention. [3]

This argument would be sound if the county were already meeting its obligations to MIA's under Welfare and Institutions Code section 17000. If that were the case, the county could use the subvention funds as it chose, and plaintiffs would have no more interest in the matter than any other county resident or taxpayer. But such is not the case at bar. Plaintiffs here allege that the county is not complying with its duty, mandated by Welfare and Institutions Code section 17000, to provide health care for the medically indigent; the county admits its failure but pleads lack of funds. Once the county receives adequate funds, it must perform its statutory duty under section 17000 of the Welfare and Institutions Code. If it refused, an action in mandamus would lie to compel performance.

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(See *Mooney v. Pickett* (1971) 4 Cal.3d 669 [94 Cal.Rptr. 279, 483 P.2d 1231].) In fact, the county has made clear throughout this litigation that it would use the subvention funds to provide care for MIA's. The majority's conclusion that plaintiffs lack a special, beneficial interest in the state's compliance with article XIII B ignores the practical realities of health care funding.

Moreover, we have recognized an exception to the rule that a plaintiff must be beneficially interested. "Where the question is one of public right ***342** and the object of the mandamus is to procure the enforcement of a public duty, the relator need not show that he has any legal or special interest in the result, since it is sufficient that he is interested as a citizen in having the laws executed and the duty in question enforced." (*Bd. of Soc. Welfare v. County of L. A.* (1945) 27 Cal.2d 98, 100-101 [162 P.2d 627].) We explained in *Green v. Obledo* (1981) 29 Cal.3d 126, 144 [172 Cal.Rptr. 206, 624 P.2d 256], that this "exception promotes the policy of guaranteeing citizens the opportunity to ensure that no governmental body impairs or defeats the purpose of legislation establishing a public right. ... It has often been invoked by California courts. [Citations.]"

Green v. Obledo presents a close analogy to the present case. Plaintiffs there filed suit to challenge whether a state welfare regulation limiting deductibility of work-related expenses in determining eligibility for aid to families with dependent children (AFDC) assistance complied with federal requirements. Defendants claimed that plaintiffs were personally affected only by a portion of the regulation, and had no standing to challenge the balance of the regulation. We replied that "[t]here can be no question that the proper calculation of AFDC benefits is a matter of public right [citation], and plaintiffs herein are certainly citizens seeking to procure the enforcement of a public duty. [Citation.] It follows that plaintiffs have standing to seek a writ of mandate commanding defendants to cease enforcing [the regulation] in its entirety." (29 Cal.3d at p. 145.)

We again invoked the exception to the requirement for a beneficial interest in *Common Cause v. Board of Supervisors, supra,* 49 Cal.3d 432. Plaintiffs in that case sought to compel the county to deputize employees to register voters. We quoted *Green v. Obledo, supra,* 29 Cal.3d 126, 144, and concluded that "[t]he question in this case involves a public right to voter outreach programs, and plaintiffs have standing as citizens to seek its vindication." (49 Cal.3d at p. 439.) We should reach the same conclusion here.

B. *Government Code sections 17500-17630 do not create an exclusive remedy which bars citizen-plaintiffs from enforcing article XIII B.*

Four years after the enactment of article XIII B, the Legislature enacted Government Code sections 17500 through 17630 to implement article XIII B, section 6. These statutes create a quasi-judicial body called the Commission on State Mandates, consisting of the state Controller, state Treasurer, state Director of Finance, state Director of the Office of Planning and Research, and one public member. The commission has authority to "hear and decide upon [any] claim" by a local government that it "is entitled to be reimbursed by the state" for costs under article XIII B. (Gov. Code, § 17551, ***343** subd. (a).) Its decisions are subject to review by an action for administrative mandamus in the superior court. (See Gov. Code, § 17559.)

The majority maintains that a proceeding before the Commission on State Mandates is the exclusive means for enforcement of article XIII B, and since that remedy is expressly limited to claims by local agencies or school districts (Gov. Code, § 17552), plaintiffs lack standing to enforce the constitutional provision.[4] I disagree, for two reasons.

First, Government Code section 17552 expressly addressed the question of exclusivity of remedy, and provided that "[t]his chapter shall provide the sole and exclusive procedure by which *a local agency or school district* may claim reimbursement for costs mandated by the state as required by Section 6 of Article XIII B of the California Constitution." (Italics added.) The Legislature was aware that local agencies and school districts were not the only parties concerned with state mandates, for in Government Code section 17555 it provided that "any other interested organization or individual may participate" in the commission hearing. Under these circumstances the Legislature's choice of words-"the sole and exclusive procedure by which a local agency or school district may claim reimbursement"-limits the procedural rights of those claimants only, and does not affect rights of other persons. *Expressio unius est exclusio alterius*-"the expression of certain things in a

statute necessarily involves exclusion of other things not expressed." (*Henderson v. Mann Theatres Corp.* (1976) 65 Cal.App.3d 397, 403 [135 Cal.Rptr. 266].)

The case is similar in this respect to *Common Cause v. Board of Supervisors, supra,* 49 Cal.3d 432. Here defendants contend that the counties' right of action under Government Code sections 17551-17552 impliedly excludes ***344** any citizen's remedy; in *Common Cause* defendants claimed the Attorney General's right of action under Elections Code section 304 impliedly excluded any citizen's remedy. We replied that "the plain language of section 304 contains no limitation on the right of private citizens to sue to enforce the section. To infer such a limitation would contradict our long-standing approval of citizen actions to require governmental officials to follow the law, expressed in our expansive interpretation of taxpayer standing [citations], and our recognition of a 'public interest' exception to the requirement that a petitioner for writ of mandate have a personal beneficial interest in the proceedings [citations]." (49 Cal.3d at p. 440, fn. omitted.) Likewise in this case the plain language of Government Code sections 17551-17552 contain no limitation on the right of private citizens, and to infer such a right would contradict our long-standing approval of citizen actions to enforce public duties.

The United States Supreme Court reached a similar conclusion in *Rosado v. Wyman* (1970) 397 U.S. 397 [25 L.Ed.2d 442, 90 S.Ct. 1207]. In that case New York welfare recipients sought a ruling that New York had violated federal law by failing to make cost-of-living adjustments to welfare grants. The state replied that the statute giving the Department of Health, Education and Welfare authority to cut off federal funds to noncomplying states constituted an exclusive remedy. The court rejected the contention, saying that "[w]e are most reluctant to assume Congress has closed the avenue of effective judicial review to those individuals most directly affected by the administration of its program." (P. 420 [25 L.Ed.2d at p. 460].) The principle is clear: the persons actually harmed by illegal state action, not only some administrator who has no personal stake in the matter, should have standing to challenge that action.

Second, article XIII B was enacted to protect taxpayers, not governments. Sections 1 and 2 of article XIII B establish strict limits on state and local expenditures, and require the refund of all taxes collected in excess of those limits. Section 6 of article XIII B prevents the state from evading those limits and burdening county taxpayers by transferring financial responsibility for a program to a county, yet counting the cost of that program toward the limit on state expenditures.

These provisions demonstrate a profound distrust of government and a disdain for excessive government spending. An exclusive remedy under which only governments can enforce article XIII B, and the taxpayer-citizen can appear only if a government has first instituted proceedings, is inconsistent with the ethos that led to article XIII B. The drafters of article XIII B and the voters who enacted it would not accept that the state Legislature-the principal body regulated by the article-could establish a procedure ***345** under which the only way the article can be enforced is for local governmental bodies to initiate proceedings before a commission composed largely of state financial officials.

One obvious reason is that in the never-ending attempts of state and local government to obtain a larger proportionate share of available tax revenues, the state has the power to coerce local governments into foregoing their rights to enforce article XIII B. An example is the Brown-Presley Trial Court Funding Act (Gov. Code, § 77000 et seq.), which provides that the county's acceptance of funds for court financing may, in the discretion of the Governor, be deemed a waiver of the counties' rights to proceed before the commission on all claims for reimbursement for state- mandated local programs which existed and were not filed prior to passage of the trial funding legislation. [5] The ability of state government by financial threat or inducement to persuade counties to waive their right of action before the commission renders the counties' right of action inadequate to protect the public interest in the enforcement of article XIII B.

The facts of the present litigation also demonstrate the inadequacy of the commission remedy. The state began transferring financial responsibility for MIA's to the counties in 1982. Six years later no county had brought a proceeding before the commission. After the present suit was filed, two counties filed claims for 70 percent reimbursement. Now, nine years after the 1982 legislation, the counties' claims are pending before the Court of Appeal. After that court acts, and we decide whether to review its decision, the matter may still have to go back to the commission for hearings to ***346** determine

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the amount of the mandate-which is itself an appealable order. When an issue involves the life and health of thousands, a procedure which permits this kind of delay is not an adequate remedy.

In sum, effective, efficient enforcement of article XIII B requires that standing to enforce that measure be given to those harmed by its violation-in this case, the medically indigent-and not be vested exclusively in local officials who have no personal interest at stake and are subject to financial and political pressure to overlook violations.

C. *Even if plaintiffs lack standing this court should nevertheless address and resolve the merits of the appeal.*

Although ordinarily a court will not decide the merits of a controversy if the plaintiffs lack standing (see *McKinny v. Board of Trustees* (1982) 31 Cal.3d 79, 90 [181 Cal.Rptr. 549, 642 P.2d 460]), we recognized an exception to this rule in our recent decision in *Dix v. Superior Court, supra,* 53 Cal.3d 442 (hereafter *Dix*). In *Dix,* the victim of a crime sought to challenge the trial court's decision to recall a sentence under Penal Code section 1170. We held that only the prosecutor, not the victim of the crime, had standing to raise that issue. We nevertheless went on to consider and decide questions raised by the victim concerning the trial court's authority to recall a sentence under Penal Code section 1170, subdivision (d). We explained that the sentencing issues "are significant. The case is fully briefed and all parties apparently seek a decision on the merits. Under such circumstances, we deem it appropriate to address [the victim's] sentencing arguments for the guidance of the lower courts. Our discretion to do so under analogous circumstances is well settled. [Citing cases explaining when an appellate court can decide an issue despite mootness.]" (53 Cal.3d at p. 454.) In footnote we added that "Under article VI, section 12, subdivision (b) of the California Constitution ..., we have jurisdiction to 'review the *decision of a Court of Appeal* in any cause.' (Italics added.) Here the Court of Appeal's decision addressed two issues-standing and merits. Nothing in article VI, section 12(b) suggests that, having rejected the Court of Appeal's conclusion on the preliminary issue of standing, we are foreclosed from 'review [ing]' the second subject addressed and resolved in its decision." (Pp. 454-455, fn. 8.)

I see no grounds on which to distinguish *Dix.* The present case is also one in which the Court of Appeal decision addressed both standing and merits. It is fully briefed. Plaintiffs and the county seek a decision on the merits. While the state does not seek a decision on the merits in this proceeding, its appeal of the superior court decision in the mandamus proceeding brought by the County of Los Angeles (see maj. opn., *ante,* p. 330, fn. 2) shows that it is not opposed to an appellate decision on the merits. ***347**

The majority, however, notes that various state officials-the Controller, the Director of Finance, the Treasurer, and the Director of the Office of Planning and Research-did not participate in this litigation. Then in a footnote, the majority suggests that this is the reason they do not follow the *Dix* decision. (Maj. opn., *ante,* p. 336, fn. 9.) In my view, this explanation is insufficient. The present action is one for declaratory relief against the state. It is not necessary that plaintiffs also sue particular state officials. (The state has never claimed that such officials were necessary parties.) I do not believe we should refuse to reach the merits of this appeal because of the nonparticipation of persons who, if they sought to participate, would be here merely as amici curiae. [6]

The case before us raises no issues of departmental policy. It presents solely an issue of law which this court is competent to decide on the briefs and arguments presented. That issue is one of great significance, far more significant than any raised in *Dix.* Judges rarely recall sentencing under Penal Code section 1170, subdivision (d); when they do, it generally affects only the individual defendant. In contrast, the legal issue here involves immense sums of money and affect budgetary planning for both the state and counties. State and county governments need to know, as soon as possible, what their rights and obligations are; legislators considering proposals to deal with the current state and county budget crisis need to know how to frame legislation so it does not violate article XIII B. The practical impact of a decision on the people of this state is also of great importance. The failure of the state to provide full subvention funds and the difficulty of the county in filling the gap translate into inadequate staffing and facilities for treatment of thousands of persons. Until the constitutional issues are resolved the legal uncertainties may inhibit both levels of government from taking the steps needed to address this problem. A delay of several years until the Los Angeles case is resolved could result in pain, hardship, or even death for many people. I conclude that, whether or not plaintiffs have standing, this court should address and resolve the merits of the appeal.

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D. *Conclusion as to standing.*

As I have just explained, it is not necessary for plaintiffs to have standing for us to be able to decide the merits of the appeal. Nevertheless, I conclude ***348** that plaintiffs have standing both as persons "beneficially interested" under Code of Civil Procedure section 1086 and under the doctrine of *Green v. Obledo, supra,* 29 Cal.3d 126, to bring an action to determine whether the state has violated its duties under article XIII B. The remedy given local agencies and school districts by Government Code sections 17500- 17630 is, as Government Code section 17552 states, the exclusive remedy by which those bodies can challenge the state's refusal to provide subvention funds, but the statute does not limit the remedies available to individual citizens.

III. Merits of the Appeal

A. *State funding of care for MIA's.*

Welfare and Institutions Code section 17000 requires every county to "relieve and support" all indigent or incapacitated residents, except to the extent that such persons are supported or relieved by other sources.[7] From 1971 until 1982, and thus at the time article XIII B became effective, counties were not required to pay for the provision of health services to MIA's, whose health needs were met through the state-funded Medi-Cal program. Since the medical needs of MIA's were fully met through other sources, the counties had no duty under Welfare and Institutions Code section 17000 to meet those needs. While the counties did make general contributions to the Medi-Cal program (which covered persons other than MIA's) from 1971 until 1978, at the time article XIII B became effective in 1980 the counties were not required to make any financial contributions to Medi-Cal. It is therefore undisputed that the counties were not required to provide financially for the health needs of MIA's when article XIII B became effective. The state funded all such needs of MIA's.

In 1982, the Legislature passed Assembly Bill No. 799 (1981-1982 Reg. Sess.; Stats. 1982, ch. 328, pp. 1568-1609) (hereafter AB No. 799), which removed MIA's from the state-funded Medi-Cal program as of January 1, 1983, and thereby transferred to the counties, through the County Medical Services Plan which AB No. 799 created, the financial responsibility to provide health services to approximately 270,000 MIA's. AB No. 799 required that the counties provide health care for MIA's, yet appropriated only 70 percent of what the state would have spent on MIA's had those persons remained a state responsibility under the Medi-Cal program.

Since 1983, the state has only partially defrayed the costs to the counties of providing health care to MIA's. Such state funding to counties was ***349** initially relatively constant, generally more than $400 million per year. By 1990, however, state funding had decreased to less than $250 million. The state, however, has always included the full amount of its former obligation to provide for MIA's under the Medi-Cal program in the year preceding July 1, 1980, as part of its article XIII B "appropriations limit," i.e., as part of the base amount of appropriations on which subsequent annual adjustments for cost-of-living and population changes would be calculated. About $1 billion has been added to the state's adjusted spending limit for population growth and inflation *solely* because of the state's inclusion of all MIA expenditures in the appropriation limit established for its base year, 1979-1980. The state has not made proportional increases in the sums provided to counties to pay for the MIA services funded by the counties since January 1, 1983.

B. *The function of article XIII B.*

Our recent decision in *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 486-487 [280 Cal.Rptr. 92, 808 P.2d 235] (hereafter *County of Fresno*), explained the function of article XIII B and its relationship to article XIII A, enacted one year earlier:

"At the June 6, 1978, Primary Election, article XIII A was added to the Constitution through the adoption of Proposition 13, an initiative measure aimed at controlling ad valorem property taxes and the imposition of new 'special taxes.' (*Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization* (1978) 22 Cal.3d 208, 231-232 [149 Cal.Rptr. 239, 583 P.2d 1281].) The constitutional provision imposes a limit on the power of state and local governments to adopt and levy taxes. (*City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 59, fn. 1 [266 Cal.Rptr. 139, 785 P.2d 522] (*City of Sacramento*).)

"At the November 6, 1979, Special Statewide Election, article XIII B was added to the Constitution through the adoption of Proposition 4, another initiative measure. That measure places limitations on the ability of both

state and local governments to appropriate funds for expenditures.

" 'Articles XIII A and XIII B work in tandem, together restricting California governments' power both to levy and to spend [taxes] for public purposes.' (*City of Sacramento, supra,* 50 Cal.3d at p. 59, fn. 1.)

"Article XIII B of the Constitution was intended ... to provide 'permanent protection for taxpayers from excessive taxation' and 'a reasonable way to provide discipline in tax spending at state and local levels.' (See *County of Placer v. Corin* (1980) 113 Cal.App.3d 443, 446 [170 Cal.Rptr. 232], quoting and following Ballot Pamp., Proposed Stats. and Amends. to Cal. Const. with arguments to voters, Special Statewide Elec. (Nov. 6, 1979), argument ***350** in favor of Prop. 4, p. 18.) To this end, it establishes an 'appropriations limit' for both state and local governments (Cal. Const., art. XIII B, § 8, subd. (h)) and allows no 'appropriations subject to limitation' in excess thereof (*id.,* § 2).[8] (See *County of Placer v. Corin, supra,* 113 Cal.App.3d at p. 446.) It defines the relevant 'appropriations subject to limitation' as 'any authorization to expend during a fiscal year the proceeds of taxes ....' (Cal. Const., art. XIII B, § 8, subd. (b).)" (*County of Fresno, supra,* 53 Cal.3d at p. 486.)

Under section 3 of article XIII B the state may transfer financial responsibility for a program to a county if the state and county mutually agree that the appropriation limit of the state will be decreased and that of the county increased by the same amount.[9] Absent such an agreement, however, section 6 of article XIII B generally precludes the state from avoiding the spending limits it must observe by shifting to local governments programs and their attendant financial burdens which were a state responsibility prior to the effective date of article XIII B. It does so by requiring that "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the cost of such program or increased level of service ...." [10]

"Section 6 was included in article XIII B in recognition that article XIII A of the Constitution severely restricted the taxing powers of local governments. (See *County of Los Angeles* [v. *State of California* (1987)] 43 Cal.3d 46, 61 [233 Cal.Rptr. 38, 729 P.2d 202].) The provision was intended to preclude the state from shifting financial responsibility for carrying out governmental functions onto local entities that were ill equipped to handle the task. (*Ibid.*; see *Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d 830, 836, fn. 6.) Specifically, it was designed to protect the tax ***351** revenues of local governments from state mandates that would require expenditure of such revenues." (*County of Fresno, supra,* 53 Cal.3d at p. 487.)

C. *Applicability of article XIII B to health care for MIA's.*
The state argues that care of the indigent, including medical care, has long been a county responsibility. It claims that although the state undertook to fund this responsibility from 1979 through 1982, it was merely temporarily (as it turned out) helping the counties meet their responsibilities, and that the subsequent reduction in state funding did not impose any "new program" or "higher level of service" on the counties within the meaning of section 6 of article XIII B. Plaintiffs respond that the critical question is not the traditional roles of the county and state, but who had the fiscal responsibility on November 6, 1979, when article XIII B took effect. The purpose of article XIII B supports the plaintiffs' position.

As we have noted, article XIII A of the Constitution (Proposition 13) and article XIII B are complementary measures. The former radically reduced county revenues, which led the state to assume responsibility for programs previously financed by the counties. Article XIII B, enacted one year later, froze both state and county appropriations at the level of the 1978-1979 budgets-a year when the budgets included state financing for the prior county programs, but not county financing for these programs. Article XIII B further limited the state's authority to transfer obligations to the counties. Reading the two together, it seems clear that article XIII B was intended to limit the power of the Legislature to retransfer to the counties those obligations which the state had assumed in the wake of Proposition 13.

Under article XIII B, both state and county appropriations limits are set on the basis of a calculation that begins with the budgets in effect when article XIII B was enacted. If the state could transfer to the county a program for which the state at that time had full financial responsibility, the county could be forced to assume additional financial obligations without the right to appropriate additional moneys. The state, at the same

time, would get credit toward its appropriations limit for expenditures it did not pay. County taxpayers would be forced to accept new taxes or see the county forced to cut existing programs further; state taxpayers would discover that the state, by counting expenditures it did not pay, had acquired an actual revenue surplus while avoiding its obligation to refund revenues in excess of the appropriations limit. Such consequences are inconsistent with the purpose of article XIII B.

Our decisions interpreting article XIII B demonstrate that the state's subvention requirement under section 6 is not vitiated simply because the ***352** "program" existed before the effective date of article XIII B. The alternate phrase of section 6 of article XIII B, " 'higher level of service[,]' ... must be read in conjunction with the predecessor phrase 'new program' to give it meaning. Thus read, it is apparent that *the subvention requirement for increased or higher level of service is directed to state mandated increases in the services provided by local agencies in existing 'programs.'* " (*County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56 [233 Cal.Rptr. 38, 729 P.2d 202], italics added.)

Lucia Mar Unified School Dist. v. Honig, supra, 44 Cal.3d 830, presents a close analogy to the present case. The state Department of Education operated schools for severely handicapped students, but prior to 1979 *school districts were required by statute to contribute* to education of those students from the district at the state schools. In 1979, in response to the restrictions on school district revenues imposed by Proposition 13, the statutes requiring such district contributions were repealed and the state assumed full responsibility for funding. The state funding responsibility continued until June 28, 1981, when Education Code section 59300 (hereafter section 59300), requiring school districts to share in these costs, became effective.

The plaintiff districts filed a test claim before the commission, contending they were entitled to state reimbursement under section 6 of article XIII B. The commission found the plaintiffs were not entitled to state reimbursement, on the rationale that the increase in costs to the districts compelled by section 59300 imposed no new program or higher level of services. The trial and intermediate appellate courts affirmed on the ground that section 59300 called for only an " 'adjustment of costs' " of educating the severely handicapped, and that "*a shift in the funding of an existing program is not a new program or a higher level of service*" within the meaning of article XIII B. (*Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d at p. 834, italics added.)

We reversed, rejecting the state's theories that the funding shift to the county of the subject program's costs does not constitute a new program. "[There can be no] doubt that although the schools for the handicapped have been operated by the state for many years, the program was new insofar as plaintiffs are concerned, since *at the time section 59300 became effective* they were not required to contribute to the education of students from their districts at such schools. [¶] ... To hold, under the circumstances of this case, that a shift in funding of an existing program from the state to a local entity is not a new program as to the local agency would, we think, violate the intent underlying section 6 of article XIIIB. That article imposed spending limits on state and local governments, and it followed by one year the adoption by initiative of article XIIIA, which severely limited the taxing ***353** power of local governments. ... [¶] The intent of the section would plainly be violated if the state could, while retaining administrative control[11] of programs it has supported with state tax money, simply shift the cost of the programs to local government on the theory that the shift does not violate section 6 of article XIIIB because the programs are not 'new.' Whether the shifting of costs is accomplished by compelling local governments to pay the cost of entirely new programs created by the state, *or by compelling them to accept financial responsibility in whole or in part for a program which was funded entirely by the state before the advent of article XIIIB, the result seems equally violative of the fundamental purpose underlying section 6 of that article.*" (*Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d at pp. 835- 836, fn. omitted, italics added.)

The state seeks to distinguish *Lucia Mar* on the ground that the education of handicapped children in state schools had never been the responsibility of the local school district, but overlooks that the local district had previously been required to contribute to the cost. Indeed the similarities between *Lucia Mar* and the present case are striking. In *Lucia Mar,* prior to 1979 the state and county shared the cost of educating handicapped children in state schools; in the present case from 1971-1979 the state and county shared the cost of caring for MIA's under the Medi-Cal program. In 1979, following enactment of Proposition 13, the state took full responsibility for both

programs. Then in 1981 (for handicapped children) and 1982 (for MIA's), the state sought to shift some of the burden back to the counties. To distinguish these cases on the ground that care for MIA's is a county program but education of handicapped children a state program is to rely on arbitrary labels in place of financial realities.

The state presents a similar argument when it points to the following emphasized language from *Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d 830: "[B]ecause section 59300 shifts partial financial responsibility for the support of students in the state-operated schools from the state to school districts-*an obligation the school districts did not have at the time article XIII B was adopted*-it calls for plaintiffs to support a 'new program' within the meaning of section 6." (P. 836, fn. omitted, italics added.) It urges *Lucia Mar* reached its result *only* because the "program" requiring school district funding in that case *was not required by statute* at the effective date of ***354** article XIII B. The state then argues that the case at bench is distinguishable because it contends Alameda County had a continuing obligation *required by statute* antedating that effective date, which had only been "temporarily" [12] suspended when article XIII B became effective. I fail to see the distinction between a case-*Lucia Mar*-in which no existing statute as of 1979 imposed an obligation on the local government and one-this case-in which the statute existing in 1979 imposed no obligation on local government.

The state's argument misses the salient point. As I have explained, the application of section 6 of article XIII B does not depend upon when the program was created, but upon who had the burden of funding it when article XIII B went into effect. Our conclusion in *Lucia Mar* that the educational program there in issue was a "new" program as to the school districts was not based on the presence or absence of any antecedent statutory obligation therefor. *Lucia Mar* determined that whether the program was new *as to the districts* depended on *when* they were compelled to assume the obligation to partially fund an existing program which they had not funded at the time article XIII B became effective.

The state further relies on two decisions, *Madera Community Hospital v. County of Madera* (1984) 155 Cal.App.3d 136 [201 Cal.Rptr. 768] and *Cooke v. Superior Court* (1989) 213 Cal.App.3d 401 [261 Cal.Rptr. 706], which hold that the county has a statutory obligation to provide medical care for indigents, but that it need not provide precisely the same level of services as the state provided under Medi-Cal. [13] Both are correct, but irrelevant to this case. [14] The county's obligation to MIA's is defined by Welfare and Institutions Code section 17000, not by the former Medi-Cal program. [15] If the ***355** state, in transferring an obligation to the counties, permits them to provide less services than the state provided, the state need only pay for the lower level of services. But it cannot escape its responsibility entirely, leaving the counties with a state-mandated obligation and no money to pay for it.

The state's arguments are also undercut by the fact that it continues to use the approximately $1 billion in spending authority, generated by its previous total funding of the health care program in question, as a portion of its initial *base spending limit* calculated pursuant to sections 1 and 3 of article XIII B. In short, the state may maintain here that care for MIA's is a county obligation, but when it computes its appropriation limit it treats the entire cost of such care as a state program.

IV. Conclusion

This is a time when both state and county governments face great financial difficulties. The counties, however, labor under a disability not imposed on the state, for article XIII A of the Constitution severely restricts their ability to raise additional revenue. It is, therefore, particularly important to enforce the provisions of article XIII B which prevent the state from imposing additional obligations upon the counties without providing the means to comply with these obligations.

The present majority opinion disserves the public interest. It denies standing to enforce article XIII B both to those persons whom it was designed to protect-the citizens and taxpayers-and to those harmed by its violation-the medically indigent adults. And by its reliance on technical grounds to avoid coming to grips with the merits of plaintiffs' appeal, it permits the state to continue to violate article XIII B and postpones the day when the medically indigent will receive adequate health care.

Mosk, J., concurred. ***356**

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Footnotes

1 The complaint also sought a declaration that the county was obliged to provide health care services to indigents that were equivalent to those available to nonindigents. This issue is not before us. The County of Alameda aligned itself with plaintiffs in the superior court and did not oppose plaintiffs' effort to enforce section 6.

2 On November 23, 1987, the County of Los Angeles filed a test claim with the Commission. San Bernardino County joined as a test claimant. The Commission ruled against the counties, concluding that no state mandate had been created. The Los Angeles County Superior Court subsequently granted the counties' petition for writ of mandate (Code Civ. Proc., § 1094.5), reversing the Commission, on April 27, 1989. (No. C-731033.) An appeal from that judgment is presently pending in the Court of Appeal. (*County of Los Angeles v. State of California,* No. B049625.)

3 Plaintiffs argue that they seek only a declaration that AB 799 created a state mandate and an injunction against the shift of costs until the state decides what action to take. This is inconsistent with the prayer of their complaint which sought an injunction requiring defendants to restore Medi-Cal eligibility to all medically indigent adults until the state paid the cost of full health services for them. It is also unavailing.

An injunction against enforcement of a state mandate is available only after the Legislature fails to include funding in a local government claims bill following a determination by the Commission that a state mandate exists. (Gov. Code, § 17612.) Whether plaintiffs seek declaratory relief and/or an injunction, therefore, they are seeking to enforce section 6.

All further statutory references are to the Government Code unless otherwise indicated.

4 The test claim by the County of Los Angeles was filed prior to that proposed by Alameda County. The Alameda County claim was rejected for that reason. (See § 17521.) Los Angeles County permitted San Bernardino County to join in its claim which the Commission accepted as a test claim intended to resolve the issues the majority elects to address instead in this proceeding. Los Angeles County declined a request from Alameda County that it be included in the test claim because the two counties' systems of documentation were so similar that joining Alameda County would not be of any benefit. Alameda County and these plaintiffs were, of course, free to participate in the Commission hearing on the test claim. (§ 17555.)

5 " 'Local agency' means any city, county, special district, authority, or other political subdivision of the state." (§ 17518.)

6 " 'School district' means any school district, community college district, or county superintendant of schools." (§ 17519.)

7 Plaintiffs' argument that the Legislature's failure to make provision for individual enforcement of section 6 before the Commission demonstrates an intent to permit legal actions, is not persuasive. The legislative statement of intent to relegate all mandate disputes to the Commission is clear. A more likely explanation of the failure to provide for test cases to be initiated by individuals lies in recognition that (1) because section 6 creates rights only in governmental entities, individuals lack sufficient beneficial interest in either the receipt or expenditure of reimbursement funds to accord them standing; and (2) the number of local agencies having a direct interest in obtaining reimbursement is large enough to ensure that citizen interests will be adequately represented.

8 Plaintiffs are not without a remedy if the county fails to provide adequate health care, however. They may enforce the obligation imposed on the county by Welfare and Institutions Code sections 17000 and 17001, and by judicial action. (See, e.g., *Mooney v. Pickett* (1971) 4 Cal.3d 669 [94 Cal.Rptr. 279, 483 P.2d 1231].)

9 For this reason, it would be inappropriate to address the merits of plaintiff's claim in this proceeding. (Cf. *Dix v. Superior Court* (1991) 53 Cal.3d 442 [279 Cal.Rptr. 834, 807 P.2d 1063].) Unlike the dissent, we do not assume that in representing the state in this proceeding, the Attorney General necessarily represented the interests and views of these officials.

1 The majority states that "Plaintiffs are not without a remedy if the county fails to provide adequate health care .... They may enforce the obligation imposed on the county by Welfare and Institutions Code sections 17000 and 17001, and by judicial action." (Maj. opn., *ante,* p. 336, fn. 8)

The majority fails to note that plaintiffs have already tried this remedy, and met with the response that, owing to the state's inadequate subvention funds, the county cannot afford to provide adequate health care.

2 It is of no importance that plaintiffs did not request issuance of a writ of mandate. In *Taschner v. City Council* (1973) 31 Cal.App.3d 48, 56 [107 Cal.Rptr. 214] (overruled on other grounds in *Associated Home Builders etc., Inc. v. City of Livermore* (1976) 18 Cal.3d 582, 596 [135 Cal.Rptr. 41, 557 P.2d 473, 92 A.L.R.3d 1038]), the court said that "[a]s against a general demurrer, a complaint for declaratory relief may be treated as a petition for mandate [citations], and where a complaint for declaratory relief alleges facts sufficient to entitle plaintiff to mandate, it is error to sustain a general demurrer without leave to amend."

In the present case, the trial court ruled on a motion for summary judgment, but based that ruling not on the evidentiary record (which supported plaintiffs' showing of irreparable injury) but on the issues as framed by the pleadings. This is

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essentially equivalent to a ruling on demurrer, and a judgment denying standing could not be sustained on the narrow ground that plaintiffs asked for the wrong form of relief without giving them an opportunity to correct the defect. (See *Residents of Beverly Glen, Inc. v. City of Los Angeles* (1973) 34 Cal.App.3d 117, 127-128 [109 Cal.Rptr. 724].)

3 The majority's argument assumes that the state will comply with a judgment for plaintiffs by providing increased subvention funds. If the state were instead to comply by restoring Medi-Cal coverage for MIA's, or some other method of taking responsibility for their health needs, plaintiffs would benefit directly.

4 The majority emphasizes the statement of purpose of Government Code section 17500: "The Legislature finds and declares that the existing system for reimbursing local agencies and school districts for the costs of state-mandated local programs has not provided for the effective determination of the state's responsibilities under section 6 of article XIII B of the California Constitution. The Legislature finds and declares that the failure of the existing process to adequately and consistently resolve the complex legal questions involved in the determination of state-mandated costs has led to an increasing reliance by local agencies and school districts on the judiciary, and, therefore, in order to relieve unnecessary congestion of the judicial system, it is necessary to create a mechanism which is capable of rendering sound quasi-judicial decisions and providing an effective means of resolving disputes over the existence of state-mandated local programs." The "existing system" to which Government Code section 17500 referred was the Property Tax Relief Act of 1972 (Rev. & Tax. Code, §§ 2201-2327), which authorized local agencies and school boards to request reimbursement from the state Controller. Apparently dissatisfied with this remedy, the agencies and boards were bypassing the Controller and bringing actions directly in the courts. (See, e.g., *County of Contra Costa v. State of California* (1986) 177 Cal.App.3d 62 [222 Cal.Rptr. 750].) The legislative declaration refers to this phenomena. It does not discuss suits by individuals.

5 "(a) The initial decision by a county to opt into the system pursuant to Section 77300 *shall constitute a waiver of all claims for reimbursement for state-mandated local programs not theretofore approved by the State Board of Control, the Commission on State Mandates, or the courts to the extent the Governor, in his discretion, determines that waiver to be appropriate*; provided, that a decision by a county to opt into the system pursuant to Section 77300 beginning with the second half of the 1988-89 fiscal year shall not constitute a waiver of a claim for reimbursement based on a statute chaptered on or before the date the act which added this chapter is chaptered, which is filed in acceptable form on or before the date the act which added this chapter is chaptered. A county may petition the Governor to exempt any such claim from this waiver requirement; and the Governor, in his discretion, may grant the exemption in whole or in part. The waiver shall not apply to or otherwise affect any claims accruing after initial notification. Renewal, renegotiation, or subsequent notification to continue in the program shall not constitute a waiver. [¶] (b) The initial decision by a county to opt into the system pursuant to Section 77300 shall constitute a waiver of any claim, cause of action, or action whenever filed, with respect to the Trial Court Funding Act of 1985, Chapter 1607 of the Statutes of 1985, or Chapter 1211 of the Statutes of 1987." (Gov. Code, § 77203.5, italics added.)

"As used in this chapter, 'state-mandated local program' *means any and all reimbursements owed or owing by operation of either Section 6 of Article XIII B of the California Constitution,* or Section 17561 of the Government Code, or both." (Gov. Code, § 77005, italics added.)

6 It is true that these officials would participate in a proceeding before the Commission on State Mandates, but they would do so as members of an administrative tribunal. On appellate review of a commission decision, its members, like the members of the Public Utilities Commission or the Workers' Compensation Appeals Board, are not respondents and do not appear to present their individual views and positions. For example, in *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830 [244 Cal.Rptr. 677, 750 P.2d 318], in which we reviewed a commission ruling relating to subvention payments for education of handicapped children, the named respondents were the state Superintendent of Public Instruction, the Department of Education, and the Commission on State Mandates. The individual members of the commission were not respondents and did not participate.

7 Welfare and Institutions Code section 17000 provides that "[e]very county ... shall relieve and support all incompetent, poor, indigent persons, and those incapacitated by age, disease, or accident, lawfully resident therein, when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions."

8 Article XIII B, section 1 provides: "The total annual appropriations subject to limitation of the state and of each local government shall not exceed the appropriations limit of such entity of government for the prior year adjusted for changes in the cost of living and population except as otherwise provided in this Article."

9 Section 3 of article XIII B reads in relevant part: "The appropriations limit for any fiscal year ... shall be adjusted as follows: "(a) In the event that the financial responsibility of providing services is transferred, in whole or in part ... from one entity of government to another, then for the year in which such transfer becomes effective the appropriation limit of the transferee

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entity shall be increased by such reasonable amount as the said entities shall mutually agree and the appropriations limit of the transferor entity shall be decreased by the same amount. ...”

10 Section 6 of article XIII B further provides that the “Legislature may, but need not, provide such subvention of funds for the following mandates: (a) Legislative mandates requested by the local agency affected; (b) Legislation defining a new crime or changing an existing definition of a crime; or (c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975.” None of these exceptions apply in the present case.

11 The state notes that, in contrast to the program at issue in *Lucia Mar,* it has not retained administrative control over aid to MIA's. But the quoted language from *Lucia Mar,* while appropriate to the facts of that case, was not intended to establish a rule limiting article XIII B, section 6, to instances in which the state retains administrative control over the program that it requires the counties to fund. The constitutional language admits of no such limitation, and its recognition would permit the Legislature to evade the constitutional requirement.

12 The state's repeated emphasis on the “temporary” nature of its funding is a form of post hoc reasoning. At the time article XIII B was enacted, the voters did not know which programs would be temporary and which permanent.

13 It must, however, provide a *comparable* level of services. (See *Board of Supervisors v. Superior Court* (1989) 207 Cal.App.3d 552, 564 [254 Cal.Rptr. 905].)

14 Certain language in *Madera Community Hospital v. County of Madera, supra,* 155 Cal.App.3d 136, however, is questionable. That opinion states that the “Legislature intended that County bear an obligation to its poor and indigent residents, *to be satisfied from county funds,* notwithstanding federal or state programs which exist concurrently with County's obligation and alleviate, to a greater or lesser extent, County's burden.” (P. 151.) Welfare and Institutions Code section 17000 by its terms, however, requires the county to provide support to residents only “when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions.” Consequently, to the extent that the state or federal governments provide care for MIA's, the county's obligation to do so is reduced pro tanto.

15 The county's right to subvention funds under article XIII B arises because its duty to care for MIA's is a state- mandated responsibility; if the county had no duty, it would have no right to funds. No claim is made here that the funding of medical services for the indigent shifted to Alameda County is not a program “ 'mandated' ” by the state; i.e., that Alameda County has any option other than to pay these costs. (*Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d at pp. 836-837.)

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59 Cal.4th 59
Supreme Court of California

LONG BEACH POLICE OFFICERS ASSOCIATION, Plaintiff and Appellant,
v.
CITY OF LONG BEACH et al., Defendants and Appellants;
Los Angeles Times Communications LLC, Real Party in Interest and Respondent.

No. S200872.
|
May 29, 2014.

Synopsis
Background: City police officers association brought action against city, seeking an injunction against disclosure, pursuant to the California Public Records Act (CPRA), of names of officers involved in shooting incidents over a five-year period. Newspaper company intervened and filed opposition, and city filed memorandum aligning itself with association. The Superior Court, Los Angeles County, No. NC055491, Patrick T. Madden, J., denied injunction without prejudice to future requests relating to individual officers. Association and city petitioned for writ of mandate, and the Court of Appeal affirmed. Association and city filed separate petitions for review, and the Supreme Court granted review, superseding the opinion of the Court of Appeal.

[Holding:] The Supreme Court, Kennard, J., held that CPRA did not protect officers' names from disclosure.

Affirmed.

Chin, J., dissented with opinion.

West Headnotes (6)

[1] **Records**
Judicial enforcement in general

Any failure to serve newspaper with police lieutenant's declaration did not adversely affect newspaper in Public Records Act action regarding disclosure of names of officers involved in shootings, as trial court concluded that the facts asserted in the declaration were too general and speculative to support the request for injunctive relief prohibiting disclosure. West's Ann.Cal.Gov.Code § 6250.

2 Cases that cite this headnote

[2] **Records**
Discretion and equitable considerations; balancing interests

Records
Evidence and burden of proof

Public Records Act's "catchall exemption" allowing withholding of records if the public interest served by nondisclosure clearly outweighs the interest served by disclosure contemplates a case-by-case balancing process, with the burden of proof on the proponent of nondisclosure to demonstrate a clear overbalance on the side of confidentiality. West's Ann.Cal.Gov.Code § 6255(a).

4 Cases that cite this headnote

[3] **Records**
Exemptions or prohibitions under other laws

Public Records Act provision which protects records "exempted or prohibited pursuant to federal or state law" incorporates other disclosure prohibitions established by law. West's Ann.Cal.Gov.Code § 6254(k).

3 Cases that cite this headnote

[4] **Records**

Personal privacy considerations in general;personnel matters

California Public Records Act required disclosure of names of city police officers involved in shootings over five-year period; names themselves were not necessarily linked to information in personnel records, as they likely could be found in documents such as initial incident reports and could be provided without revealing any investigatory or disciplinary matter, public's substantial interest in the conduct of the officers involved in the shootings outweighed the officers' personal privacy interests, and there was no evidence of a specific safety concern regarding any particular officer which justified nondisclosure. West's Ann.Cal.Gov.Code §§ 6254(c), 6255; West's Ann.Cal.Penal Code § 832.7(a), 832.8(d).

3 Cases that cite this headnote

[5] Records

Personal privacy considerations in general;personnel matters

When it comes to the Public Records Act disclosure of a peace officer's name, the public's substantial interest in the conduct of its peace officers outweighs, in most cases, the officer's personal privacy interest. West's Ann.Cal.Gov.Code § 6254(c).

3 Cases that cite this headnote

[6] Records

Matters Subject to Disclosure; Exemptions

A mere assertion of possible endangerment does not clearly outweigh the public interest in access to records. West's Ann.Cal.Gov.Code § 6255(a).

See 2 Witkin, Cal. Evidence (5th ed. 2012) Witnesses, § 312 et seq.

1 Cases that cite this headnote

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Opinion

KENNARD, J. *

*64 **461 A newspaper asked a city to release the names of police officers involved in certain **462 shootings while on duty. The police union then sought injunctive relief against the city in superior court, attempting to prevent release of the names. The newspaper intervened (seeking disclosure of the names), and the city then aligned itself with the union (opposing disclosure). The trial court denied the union's request for a permanent injunction; that denial was upheld on appeal. We granted the separate petitions for review filed by the city and the union. We now affirm the judgment of the Court of Appeal.

I

Shortly before 5:00 p.m., on December 12, 2010, two City of Long Beach police officers responded to a resident's telephone call about an intoxicated man brandishing a "six-shooter" on neighboring property. At the sight of the two officers, the man (35–year–old Douglas Zerby) pointed at them an object resembling a gun. The officers immediately fired multiple rounds at Zerby, killing him. It turned out that the object Zerby was holding was a garden hose spray nozzle with a pistol grip.

Three days later, reporter Richard Winton of the Los Angeles Times (the Times), asked the Long Beach City Attorney's Office for "[t]he names of Long Beach police officers involved in the December 12[, 2010,] office[r-]involved shooting in the 5300 block of East Ocean Boulevard" (the Zerby shooting), as well as "[t]he names of Long Beach police officers involved in officer [-]involved shootings from Jan[uary] 1[,] 2005 to Dec[ember] 11, 2010" (the nearly six-year period leading up to the Zerby shooting). The request was made under the California Public Records Act (Gov.Code, § 6250 et seq.).

On December 30, 2010, plaintiff Long Beach Police Officers Association (the Union), the bargaining agent for all Long Beach police officers, sought injunctive relief in the superior court. Named as defendants were the City of Long Beach, the Long Beach Police Department, and its chief of police (collectively, the City). In its complaint, the Union asserted that the City had informed it that, unless prohibited by a court, the City would disclose the information sought by the Times. Accompanying the Union's request for injunctive relief was a declaration by Lieutenant Steve James, the Union's president, expressing concern that release of the officers' names could result *65 in "threats against the well being of officers or their families," as occurred in one recent police shooting case in which release of an officer's name led to "death threats" against ***59 the officer. James also mentioned an anonymous post on an Internet Web site, wishing that the children of an officer involved in a particular police shooting would experience Christmas without their father. James asserted that the Internet offers broad access to personal information, using only a person's name as an Internet search term.

The superior court issued a temporary restraining order prohibiting the City from disclosing to the Times the names of the officers involved in the Zerby shooting. The court then continued the case to a later date to determine whether to issue a preliminary or permanent injunction, and it allowed the Times to intervene in the action.

Defendant City supported plaintiff Union's request for injunctive relief. The City asserted that the names of the two officers involved in the December 2010 fatal shooting of Zerby were exempt from disclosure under the California Public Records Act. With respect to the names of the City's police officers involved in *earlier* shootings, the City asserted that those names, too, were likely subject to the same statutory exemptions but that its practice was to evaluate each disclosure request on a "case-by-case basis."

The City submitted a declaration by Long Beach Police Lieutenant Lloyd Cox, who was in charge of "the criminal and administrative investigations related to all Officer Involved Shootings." The declaration stated that the police department conducts an administrative investigation of every officer-involved shooting, and, if warranted, an internal criminal investigation follows. Documents resulting from these investigations are treated by the police department as personnel records that are statutorily exempt from disclosure. ****463** Cox's declaration also stated that revealing the name of an officer involved in a shooting could expose the officer and the officer's family to harassment, because the officer's home address and other personal information could easily be found using the Internet. The declaration further stated that when, for example, an officer is involved in a shooting of a gang member, it is not uncommon for the gang to retaliate against the officer. Cox mentioned eight "Officer Safety Bulletins ... about potential retaliation/threats against officers," two of which were related to shootings, and he also described graffiti in the City of Long Beach that read "Strike Kill a Cop."

In arguing against disclosure of the names of the officers involved in the Zerby shooting, the Union and the City cited Government Code section 6255, subdivision (a), which authorizes denial of a public records request when "the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record." The Union and the City ***66** argued that the public interest in preventing harassment, threats, or violence against officers and their families outweighed any benefit the public would gain from disclosure.

[1] The Times moved to strike Lieutenant James's declaration (filed by the Union), but the Times did not object to the declaration of Lieutenant Cox (filed by the City).[1] The trial court struck those *****60** portions of the James declaration that mentioned (1) the general safety concerns associated with releasing the names of officers involved in shootings, (2) the death threats made against specific officers involved in past shootings, and (3) the ease with which a name can be used to gather personal information over the Internet. The trial court then denied the Union's request for a preliminary or permanent injunction, and it discharged the temporary restraining order. The court ruled that none of the disclosure exemptions in the California Public Records Act protected the names of officers involved in shootings. With respect to the potential harassment facing those officers and their families, the court considered such harassment to be speculative in the absence of a particularized showing regarding a specific officer. Recognizing that such a showing might be made in the future, the superior court denied injunctive relief "without prejudice" to a renewed request demonstrating that "releasing the names of particular officers will create a likelihood of harm."

The Union and the City appealed, without success. We then granted their petitions for review.[2]

II

A. Statutory Law

The California Legislature in 1968, recognizing that "access to information concerning the conduct of the people's business is a fundamental and ***67** necessary right of every person in this state" (Gov.Code, § 6250), enacted the California Public Records Act, which grants access to public records held by state and local agencies (*id.,* § 6253, subd. (a)). The act broadly defines " '[p]ublic records' " as including "any writing containing information relating to the conduct of the public's business prepared, owned, used, or retained by any state or local agency...." (*Id.,* § 6252, subd. (e).) The act has certain ****464** specific exemptions (*id.,* §§ 6254–6254.30), but a public entity claiming an exemption must show that the

requested information falls within the exemption (*id.,* § 6255, subd. (a)).

[2] Government Code section 6255's subdivision (a) contains a "catchall exemption." (*Michaelis, Montanari & Johnson v. Superior Court* (2006) 38 Cal.4th 1065, 1071, 44 Cal.Rptr.3d 663, 136 P.3d 194.) It allows a public agency to "justify withholding any record by demonstrating that ... on the facts of the particular case the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record." (Gov.Code, § 6255, subd. (a).) As we have said in the past, "this provision contemplates a case-by-case balancing process, with the burden of proof on the proponent of nondisclosure to demonstrate a clear overbalance on the side of confidentiality." (*Michaelis, Montanari & Johnson, supra,* at p. 1071, 44 Cal.Rptr.3d 663, 136 P.3d 194.)

[3] Also relevant here is Government Code section 6254, subdivision (c), which *****61** protects "[p]ersonnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy." But the Union and the City place their greatest reliance on Government Code section 6254, subdivision (k). That provision protects "[r]ecords, the disclosure of which is exempted or prohibited pursuant to federal or state law, including, but not limited to, provisions of the Evidence Code relating to privilege." Succinctly put, subdivision (k) " 'incorporates other [disclosure] prohibitions established by law.' " (*Copley Press, Inc. v. Superior Court* (2006) 39 Cal.4th 1272, 1283, 48 Cal.Rptr.3d 183, 141 P.3d 288 (*Copley*), quoting *CBS, Inc. v. Block* (1986) 42 Cal.3d 646, 656, 230 Cal.Rptr. 362, 725 P.2d 470.) The "prohibitions" pertinent here are those set forth in a set of discovery statutes that the Legislature enacted in 1978 in response to our 1974 decision in *Pitchess v. Superior Court* (1974) 11 Cal.3d 531, 113 Cal.Rptr. 897, 522 P.2d 305 (*Pitchess*).

In *Pitchess,* a defendant charged with battery on four sheriff's deputies (Pen.Code, §§ 242, 243, subd. (b)) claimed he was defending himself against the deputies' use of excessive force. We held that defendants in similar situations had a right, albeit limited, to discover from a peace officer's employer the existence of any previous complaints about the officer's use of excessive force. (*Pitchess, supra,* 11 Cal.3d at pp. 537–538, 113 Cal.Rptr. 897, 522 P.2d 305.) In response to our ***68** decision, the Legislature enacted several statutes, which we hereafter refer to as the "*Pitchess* statutes" and which we summarize below.

Under the *Pitchess* statutes, a public entity that employs peace officers must investigate and retain citizen complaints of any officer misconduct, such as the use of excessive force. (Pen.Code, § 832.5.) Litigants, upon a showing of good cause, are given limited access to records of such complaints and investigations (Evid.Code, §§ 1043, 1045), but such records are otherwise "confidential" and may "not be disclosed" (Pen.Code, §§ 832.7, subd. (a), 832.8, subd. (e)). Also protected as "confidential" are "[p]eace officer ... personnel records" and "information obtained from these records." (*Id.,* § 832.7, subd. (a).) Such "personnel records" include an officer's personal and family information, medical history, election of benefits (*id.,* § 832.8, subds. (a), (b) & (c)), as well as matters related to the officer's "advancement, appraisal, or discipline" (*id.,* subd. (d)). In addition, confidentiality applies to any information that "would constitute an unwarranted invasion of [a peace officer's] personal privacy." (*Id.,* § 832.8, subd. (f).)

One other piece of legislation merits mention here. In 2004, California's voters passed an initiative measure that added to the state Constitution a provision directing the courts to broadly construe statutes that grant public access to government information and to narrowly construe statutes that limit such access. (Cal. Const., art. I, § 3, subd. (b)(2).) That provision, however, does not affect the construction of any statute "to the extent ... it protects [the] right to privacy, including any statutory procedures governing discovery or disclosure of information concerning the official performance or professional qualifications of a peace officer." (****465** Cal. Const., art. I, § 3, subd. (b)(3).) Thus, by its express terms, the constitutional provision excludes from the requirement of narrow construction those statutes that protect the privacy interests of peace officers, including Government Code section 6254's subdivision (c) and the *Pitchess* statutes, both of which are at issue here.

B. Decisional Law

Relevant here are two of this court's recent decisions, which considered the interplay *****62** between the *Pitchess* statutes and requests under the California Public Records Act for disclosure of peace officers' names.

In *Copley, supra,* 39 Cal.4th 1272, 48 Cal.Rptr.3d 183, 141 P.3d 288 (decided in 2006), a newspaper publisher sought access to a civil service commission's records of an administrative appeal brought by a county sheriff's deputy who had been terminated for disciplinary reasons. After the commission denied the request, the publisher unsuccessfully petitioned the superior court for a writ of mandate, seeking to compel disclosure. The publisher then appealed, and the Court of Appeal ***69** directed the civil service commission to give the publisher access to the records, and also to disclose the deputy's name. The Court of Appeal reasoned that because the *Pitchess* statutes define "personnel records" as any file maintained under the officer's name *by the officer's employing agency* (Pen.Code, § 832.8) and because the civil service commission was not the officer's employing agency, the civil service commission's records did not qualify as "personnel records" protected by the *Pitchess* statutes. At the request of two police unions that had intervened in the action, we granted review and, with one justice dissenting, reversed the Court of Appeal.

Copley held that the civil service commission's records of the deputy's appeal were confidential "personnel records" under the *Pitchess* statutes (Pen.Code, §§ 832.7, 832.8) and therefore exempt from disclosure. (*Copley, supra,* 39 Cal.4th at pp. 1286–1296, 48 Cal.Rptr.3d 183, 141 P.3d 288.) *Copley* explained that neither the language nor the legislative history of the *Pitchess* statutes suggested that a peace officer's privacy rights should have less protection simply because the officer's employer uses an outside agency like the civil service commission to conduct its administrative appeals. (*Copley,* at p. 1295, 48 Cal.Rptr.3d 183, 141 P.3d 288.) *Copley* also rejected the Court of Appeal's conclusion that *the name* of the officer who brought the appeal had to be disclosed, noting that the *Pitchess* statutes were "designed to protect, among other things, 'the identity of officers' subject to [citizen] complaints." (*Copley,* at p. 1297, 48 Cal.Rptr.3d 183, 141 P.3d 288, quoting Pen.Code, § 832.7, subd. (a); see *Copley,* at p. 1297, 48 Cal.Rptr.3d 183, 141 P.3d 288, quoting Pen.Code, § 832.7, subd. (c).)

Copley then discussed the Court of Appeal's reliance on an earlier appellate decision, *New York Times Co. v. Superior Court* (1997) 52 Cal.App.4th 97, 60 Cal.Rptr.2d 410 (*New York Times*), which broadly declared that the *Pitchess* statutes do not prevent disclosure of *the names* of peace officers. (*Copley, supra,* 39 Cal.4th at pp. 1297–1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) That categorical statement was made, we said, "[w]ithout any analysis," and was "simply incorrect, at least insofar as it applies to disciplinary matters like the one at issue [in *Copley*]." (*Id.* at p. 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) We disapproved *New York Times* to the extent that decision conflicted with our analysis in *Copley.* (*Copley,* at p. 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.)

In 2007, just one year after *Copley, supra,* 39 Cal.4th 1272, 48 Cal.Rptr.3d 183, 141 P.3d 288, we again addressed the issue of a newspaper's request, made under the California Public Records Act, for disclosure of the names of certain peace officers. In *Commission on Peace Officer Standards and Training v. Superior Court* (2007) 42 Cal.4th 278, 64 Cal.Rptr.3d 661, 165 P.3d 462 (*Commission on Peace Officer Standards*), a newspaper sought certain information about peace officers hired statewide by various California public entities during a specified 10–year period. *****63** The information was contained in a database maintained by a public agency. When the agency denied the newspaper's request, the ***70** newspaper challenged that decision in superior court, which ordered disclosure ****466** of each officer's name, the appointing agency, the date of new appointment, and, if applicable, the date of termination. The Court of Appeal reversed, but a majority of this court disagreed with the Court of Appeal. (*Id.* at p. 303, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

In *Commission on Peace Officer Standards,* the public agency that had compiled the peace officer database did not employ any of the peace officers, and therefore the entries in its database were not "personnel records" under a literal reading of the *Pitchess* statutes (Pen.Code, § 832.8 [limiting personnel records to records held in files maintained by an individual's employer]). Nonetheless, a majority of this court concluded that the information in the database would fall within the protections afforded personnel records if the information was "obtained from" personnel records maintained by the employing agencies of the peace officers in question. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 289, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The majority further concluded, however, "that peace officer personnel records include only the types of information enumerated in [Penal Code] section 832.8" (*id.* at p. 293, 64 Cal.Rptr.3d 661, 165 P.3d 462), and because the specific information the trial court ordered disclosed (the names of the officers,

their employing agencies, and their employment dates) did not fall into any of the enumerated categories, it was not information obtained from protected personnel records (*id.* at pp. 294–299, 64 Cal.Rptr.3d 661, 165 P.3d 462), and therefore it was subject to disclosure.

Commission on Peace Officer Standards next held that Government Code section 6254's subdivision (c), which is part of the California Public Records Act, also did not preclude disclosure of the information covered by the superior court's order. (See *Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 303, 64 Cal.Rptr.3d 661, 165 P.3d 462.) As noted (see 172 Cal.Rptr.3d at p. 60, 325 P.3d at p. 464, *ante*), that statutory provision authorizes denial of a public records request when the information sought consists of "[p]ersonnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy." (Gov.Code, § 6254, subd. (c).) *Commission on Peace Officer Standards* assumed for purposes of its analysis that the records at issue "may be characterized as '[p]ersonnel ... or similar files.' " (*Commission on Peace Officer Standards,* at p. 299, 64 Cal.Rptr.3d 661, 165 P.3d 462.) But it noted that the exemption set forth in section 6254's subdivision (c) requires a balancing of "the privacy interests of peace officers in the information at issue against the public interest in disclosure," and it further noted that the party opposing disclosure "has the burden" of showing that the records at issue fall within the exemption—a showing the agency failed to make in *Commission on Peace Officer Standards.* (*Commission on Peace Officer Standards,* at p. 299, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

Against this background of relevant statutes and court decisions, we now consider the disclosure request of the Times.

***71 III**

[4] The Times, citing the California Public Records Act, seeks disclosure of the names of the two Long Beach police officers involved in the December 12, 2010, fatal shooting of Zerby, as well as the *****64** names of any Long Beach officers involved in shootings occurring between January 1, 2005, and December 11, 2010. The Union and the City oppose disclosure. They rely largely on the confidentiality protections afforded peace officers under the *Pitchess* statutes, focusing in particular on Penal Code section 832.7's subdivision (a) (protecting from disclosure a peace officer's "personnel records") and Penal Code section 832.8's subdivision (d) (defining "personnel records" as including records of employee "appraisal[ ] or discipline").

The Union and the City also attach significance to the italicized language in this quote from *Commission on Peace Officer Standards:* "[T]he legislative concern [in adopting sections 832.7 and 832.8] appears to have been with *linking a named officer to the private or sensitive information listed in section 832.8.* ... It seems unlikely that the Legislature contemplated that the identification of an individual as a peace officer, *unconnected* ****467** *to any of the information it defined as part of a personnel record,* would be rendered confidential by section 832.8." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 295, 64 Cal.Rptr.3d 661, 165 P.3d 462, italics added.) The Union and the City contend that disclosing the names of officers involved in on-duty shootings necessarily *links* the named officers to private or sensitive information in their personnel files, information made confidential under Penal Code section 832.7's subdivision (a). The Union and the City reason that because every on-duty shooting is routinely investigated by the employing agency, the details of every such incident (including the names of the officers involved) are "records relating to" officer "appraisal[ ] or discipline" (Pen.Code, § 832.8, subd. (d)), which, by definition, are confidential "personnel records" (*id.,* § 832.8). We are not persuaded.

Although the *Pitchess* statutes limit public access to personnel records (Pen.Code, § 832.7, subd. (a)), including officer names if they are *linked* to information in personnel records (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 295, 64 Cal.Rptr.3d 661, 165 P.3d 462), many records routinely maintained by law enforcement agencies are not personnel records. For example, the information contained in the initial incident reports of an on-duty shooting are typically not "personnel records" as that term is defined in Penal Code section 832.8. It may be true that such shootings are routinely investigated by the employing agency, resulting eventually in some sort of officer appraisal or discipline. But only the records *generated* in connection with that appraisal or discipline would come within the statutory definition of personnel records (Pen.Code, § 832.8, subd. (d)). We do not read the phrase "records relating to ... [¶] ... ***72** [¶] ... [e]mployee ... appraisal[ ] or discipline" (*ibid.*) so broadly as to include every record that might be *considered* for

purposes of an officer's appraisal or discipline, for such a broad reading of the statute would sweep virtually all law enforcement records into the protected category of "personnel records" (*id.,* § 832.8).

Government Code section 6254's subdivision (f) lends some support to our conclusion. Under that statute, when a shooting by a peace officer occurs during an arrest (Gov.Code, § 6254, subd. (f)(1)) or in the course of responding to a complaint or request for assistance (*id.,* § 6254, subd. (f)(2)), and when the officer's name is recorded as one of the "factual circumstances" of the incident, disclosure of the officer's name is generally required. It thus appears that the Legislature draws a distinction between (1) records of factual information about an incident (which generally must be disclosed) and (2) records generated as part of an internal investigation *****65** of an officer in connection with the incident (which generally are confidential). We therefore agree with this point made in a 2008 opinion by the California Attorney General: "Generally speaking, a response to a request just for the names of officers involved in a particular incident may be provided without revealing any investigatory or disciplinary matter that may have arisen out of the incident. Disclosure would merely communicate a statement of fact that the named officers were involved in the incident. It would not imply any judgment that the actions taken were inappropriate or even suspect." (91 Ops.Cal.Atty.Gen. 11, 16–17 (2008), fn. omitted.) An employing agency is, of course, free to emphasize, when complying with a California Public Records Act request, that its disclosure of the names of officers involved in an incident does not imply any wrongdoing by those officers.

Significantly, the *Pitchess* statutes are silent as to whether the names of officers involved in shootings are protected "personnel records." (Pen.Code, § 832.8.) That silence is important because, as this court observed in *Commission on Peace Officer Standards,* the personnel records exemption is limited to the categories of information that are expressly "enumerated" in Penal Code section 832.8. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 293, 64 Cal.Rptr.3d 661, 165 P.3d 462.) That the Legislature did not intend to protect peace officers' identities can also be inferred from the Legislature's enactment of Penal Code section 830.10, which requires uniformed officers to display their name or identification ****468** number. That statute reflects a legislative policy that, generally, the public has a right to know the identity of an officer involved in an on-duty shooting.

Misplaced is the reliance by the Union and the City on this court's decision in *Copley, supra,* 39 Cal.4th 1272, 48 Cal.Rptr.3d 183, 141 P.3d 288. There, as we noted earlier, a newspaper publisher sought records of an administrative appeal brought by a sheriff's ***73** deputy who had been terminated. This court concluded that the records (including the deputy's name) were confidential personnel records under the *Pitchess* statutes. (*Copley,* at pp. 1297–1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) Later, in *Commission on Peace Officer Standards,* this court emphasized that the records requested in *Copley* would have "linked" the deputy's name to "private or sensitive" personnel matters, thus explaining why the name at issue in *Copley* was protected. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 295, 64 Cal.Rptr.3d 661, 165 P.3d 462; see *id.* at pp. 298–299, 64 Cal.Rptr.3d 661, 165 P.3d 462.) Here, by contrast, disclosing the names of officers involved in various shootings would not imply that those shootings resulted in disciplinary action against the officers, and it would not link those names to any confidential personnel matters or other protected information.

In arguing here against disclosure of the officers' names, the Union and the City note this court's disapproval in *Copley, supra,* 39 Cal.4th at page 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288, of the Court of Appeal's statement in *New York Times, supra,* 52 Cal.App.4th at page 101, 60 Cal.Rptr.2d 410, that " 'an individual's name is not exempt from disclosure' " under the *Pitchess* statutes. But, as we explained in *Commission on Peace Officer Standards, supra,* 42 Cal.4th at page 298, 64 Cal.Rptr.3d 661, 165 P.3d 462, this court disapproved the statement from *New York Times* only " 'insofar as it applie [d] to disciplinary matters like the one at issue' " in *Copley.* (See *Copley,* at p. 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) The records sought in *Copley* linked the officer's name, not just to an on-duty shooting, but to a *****66** confidential disciplinary action involving the officer, and therefore they were exempt from disclosure. (See *Commission on Peace Officer Standards, supra,* 42 Cal.4th at pp. 295, 298–299, 64 Cal.Rptr.3d 661, 165 P.3d 462.) Thus, *Copley*'s disapproval of the statement from *New York Times* did not alter the latter case's core holding, generally permitting disclosure of the names of peace officers involved in on-duty shootings.

(See 91 Ops.Cal.Atty.Gen. 11, 13–15 (2008) [discussing *Copley*'s effect on *New York Times*].)

[5] Nor does Government Code section 6254's subdivision (c), which is part of the California Public Records Act, help the Union and the City in their effort to prevent disclosure of the names of officers involved in shootings. As noted (see 172 Cal.Rptr.3d at p. 60, 325 P.3d at p. 464, *ante*), that provision exempts from disclosure "[p]ersonnel ... or similar files" if disclosure "would constitute an unwarranted invasion of personal privacy." (Gov.Code, § 6254, subd. (c).) A serious question arises as to whether the names of peace officers involved in particular law enforcement incidents can be characterized as "[p]ersonnel ... or similar files" (*ibid.*). Moreover, when it comes to the disclosure of a peace officer's name, the public's substantial interest in the conduct of its peace officers outweighs, in most cases, the officer's personal privacy interest. As we noted in *Commission on Peace Officer Standards:* "Peace officers 'hold one of the most powerful positions in our society; our dependence on them is high and the potential for abuse of power is far from insignificant.' ***74** *City of Hemet v. Superior Court* (1995) 37 Cal.App.4th 1411, 1428 [44 Cal.Rptr.2d 532].) A police officer 'possesses both the authority and the ability to exercise force. Misuse of [this] authority can result in significant deprivation of constitutional rights and personal freedoms, not to mention bodily injury and financial loss.' (*Gray v. Udevitz* (10th Cir.1981) 656 F.2d 588, 591.)" (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at pp. 299–300, 64 Cal.Rptr.3d 661, 165 P.3d 462.) Thus, the public's significant interest in the conduct of its peace officers "diminishes and counterbalances" an officer's privacy interest in keeping his or her name confidential. (*Id.* at p. 299, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

****469** In a case such as this one, which concerns officer-involved shootings, the public's interest in the conduct of its peace officers is particularly great because such shootings often lead to severe injury or death. Here, therefore, in weighing the competing interests, the balance tips strongly in favor of identity disclosure and against the personal privacy interests of the officers involved. Of course, if it is essential to protect an officer's anonymity for safety reasons or for reasons peculiar to the officer's duties —as, for example, in the case of an undercover officer —then the public interest in disclosure of the officer's name may need to give way. (See *International Federation of Professional and Technical Engineers, Local 21, AFL–CIO v. Superior Court* (2007) 42 Cal.4th 319, 337, 64 Cal.Rptr.3d 693, 165 P.3d 488.) That determination, however, would need to be based on a particularized showing, which was not made here.

We next consider the City's assertion that Government Code section 6254's subdivision (f) permits it to withhold the names of officers involved in on-duty shootings. That provision exempts from disclosure "[r]ecords ... of investigations conducted by ... any state or local police agency." (*Ibid.*) The Times here is not seeking the records of any administrative or criminal investigation, so that exemption is inapplicable.

*****67** **[6]** Finally, we consider the catchall exemption in Government Code section 6255's subdivision (a), which allows a public agency to withhold any public record if the agency shows that "on the facts of the particular case the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record." The catchall exemption sets forth a balancing test, and we have already concluded that, generally, the balance of interests favors disclosing the names of peace officers involved in on-duty shootings. (See 172 Cal.Rptr.3d at pp. 65–66, 325 P.3d at pp. 467–468, *ante.*) Vague safety concerns that apply to all officers involved in shootings are insufficient to tip the balance against disclosure of officer names. As we have said in the past, "[a] mere assertion of possible endangerment does not 'clearly outweigh' the public interest in access to ... records." (*CBS, Inc. v. Block, supra,* 42 Cal.3d at p. 652, 230 Cal.Rptr. 362, 725 P.2d 470.)

The Union and the City assert that disclosing the names of peace officers involved in shootings could lead to harassment of those officers and their ***75** families. In rejecting that argument, the trial court found that the Union and the City had offered "no evidence" of a "specific safety concern regarding any particular officer." We agree. The declaration by Long Beach Police Lieutenant Cox (submitted by the City) described the possibility of gang retaliation against officers involved in shooting gang members, but those concerns were general in nature. The December 2010 Zerby shooting did not involve a gang member, and the Union and the City did not identify other shootings that did involve a gang member. The Cox declaration also mentioned two safety bulletins warning of "potential retaliation/threats" against

officers involved in shootings, and it described graffiti that read "Strike Kill a Cop," but those vague concerns do not establish any specific danger to the officers involved in the Zerby shooting or any shooting that occurred in the six years before the Zerby shooting (see the Times's public records request, quoted at 172 Cal.Rptr.3d at p. 58, 325 P.3d at p. 462, *ante*).

We do not hold that the names of officers involved in shootings have to be disclosed in every case, regardless of the circumstances. We merely conclude, as did the trial court and the Court of Appeal, that the particularized showing necessary to outweigh the public's interest in disclosure was not made *here,* where the Union and the City relied on only a few vaguely worded declarations making only general assertions about the risks officers face after a shooting. The public records request by the Times is broadly worded and covers a wide variety of incidents. Thus, the Union and the City sought a blanket rule preventing the disclosure of officer names *every time* an officer is involved in a shooting. Such a rule would even prevent disclosure of the name of an officer who acted in a heroic manner that was unlikely to provoke retaliation of any kind, in which case officer ****470** safety would not be an issue. We reject that blanket rule.

The trial court's denial of injunctive relief was without prejudice to any later evidentiary showing that disclosing a particular officer's name would compromise that officer's safety or the safety of the officer's family. That ruling permits further litigation by the Union, and it reflects the trial court's recognition, which we share, that the public's interest in access to public records is not absolute and must be weighed against the countervailing privacy and safety interests of peace officers. Understandable are the general safety concerns of officers who fear retaliation from angry members of the community *****68** after an officer-involved shooting, especially when the shooting results in the death of an unarmed person. But the Legislature, whose laws we must construe, has not gone so far as to protect the names of all officers involved in such shootings. That the Legislature generally considers it important for the public to know the identities of the officers serving the community is reflected in the statutory provision requiring a uniformed officer to display either a name or an identification number (Pen.Code, § 830.10).

***76 DISPOSITION**

We affirm the judgment of the Court of Appeal, which upheld the trial court's denial of the Union's requested injunctive relief.

WE CONCUR: CANTIL–SAKAUYE, C.J., BAXTER, WERDEGAR, CORRIGAN, LIU, JJ.

Dissenting Opinion by CHIN, J.

I disagree with the majority's conclusion that the City of Long Beach (the City) and the Long Beach Police Officers Association (the Union) have failed to show that the information the Los Angeles Times (the Times) has requested—the names of the officers "involved in" the December 12, 2010, shooting of Douglas Zerby and the names of all police officers "involved in" shootings from January 1, 2005, until December 11, 2010—is exempt from disclosure under the California Public Records Act (CPRA) (Gov.Code, § 6250 et seq.).[1] In my view, the evidence in the record of the safety threat faced by police officers identified as having been involved in a shooting establishes that the requested information is exempt from disclosure under section 6254, subdivision (c), which provides that the CPRA does not require disclosure of "[p]ersonnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy." I therefore dissent.

In relying on this section, the Union acknowledges that the majority in *Commission on Peace Officer Standards and Training v. Superior Court* (2007) 42 Cal.4th 278, 64 Cal.Rptr.3d 661, 165 P.3d 462 (*Commission on Peace Officer Standards*) held that "the privacy and safety interests of peace officers" as a group regarding the mere fact of their employment "do not outweigh the public's interest in the disclosure of [that] information." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 303, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The Union argues, however, that the "heightened safety concerns of officers who have been involved in shootings" warrant striking a different "balance" with regard to this "subgroup." In support of its argument, the Union relies on the declaration of Long Beach Police Lieutenant Lloyd Cox (Cox declaration), which states in relevant part: (1) "A number of officer involved shootings

involve gang members or violent criminals"; (2) "When an officer is involved in a shooting with a gang member, it is not uncommon for the gang to retaliate against law enforcement officers"; (3) "Since late 2007, the Long Beach Police Department has issued eight Officer Safety Bulletins to the department about potential retaliation/threats against officers, two of which were directly related to shootings involving police officers. As recently as January 10, 2011, the department was notified of graffiti at 5100 Appian Way ***77** that was approximately 4 feet high and 6 inches long which read 'Strike Kill a Cop' "; and (4) "Today, in the age of the internet, knowing an individual's name can be the gateway to a world of information. Public documents *****69** are readily ****471** accessible on line and can provide anyone with the home address of an individual, including a police officer. The address of a police officer in the hands of a gang member, violent offender, or angry friend, relative, or associate of a person who was shot by a police officer is of great concern for the personal safety of both the officer and their [*sic*] family. Therefore the Long Beach Police Department insists on protecting the identity of its officers, when those officers are involved in critical incidents, including shootings, in order to ensure their safety and the safety of their families."

I agree with the Union's argument. As I explained in *Commission on Peace Officer Standards,* "in 1990, the Legislature amended subdivision (a) of [Penal Code] section 832.8 by adding [officers'] 'home addresses' to the list of examples of confidential '[p]ersonal data.' (Stats.1990, ch. 264, § 1, p. 1535.) According to the amendment's legislative history, one of the Legislature's purposes in adding 'home addresses' to the list was to protect officers and their families. (Assem. Com. on Public Safety, Analysis of Sen. Bill 1985 (1989–1990 Reg. Sess.) as amended May, 16, 1990, p. 2.) Given that publicly available databases on the Internet make it easy to link a name to an address, the release of an officer's name would not seem to pose much, if any, less of a safety risk than would disclosing an officer's home address. (See *Frank v. City of Akron* (6th Cir.2002) 290 F.3d 813, 819 ['Most individuals' addresses ... are readily available on the Internet'].) ... [I]n light of the accessibility of information through the Internet, it would be entirely 'feasible' for someone hostile toward the police to use the list of names to locate peace officers' addresses in order to 'harass them' or their families. [Citation.] Moreover, in light of the Legislature's acknowledgment of the dangers faced by officers and their families, ... we [cannot] simply dismiss this threat as being 'purely speculative.' (See *King County v. Sheehan* [(2002) 114 Wash.App. 325, 340, 57 P.3d 307] [it is 'naïve ... to believe that police officers who are identified on anti-police web sites ... by name and home address ... could not thereby be placed in danger or subjected to harassment'].)" (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 317, 64 Cal.Rptr.3d 661, 165 P.3d 462 (dis. opn. of Chin, J.).) The evidence in the record here amply supports this analysis.

Nothing in the majority's brief discussion of section 6254, subdivision (c), convinces me otherwise. The majority first asserts that there is a "serious question" as "to whether the names of peace officers involved in particular law enforcement incidents can be characterized as '[p]ersonnel ... or similar files' " within the meaning of section 6254, subdivision (c). (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 467.) However, for reasons I have explained in a previous case, I have no trouble concluding that the names of officers who have been involved in a ***78** shooting constitute "personnel ... or similar files" under section 6254, subdivision (c). (See *International Federation of Professional and Technical Engineers, Local 21, AFL–CIO v. Superior Court* (2007) 42 Cal.4th 319, 350–351, 64 Cal.Rptr.3d 693, 165 P.3d 488 (conc. & dis. opn. of Chin, J.) (*International Federation*).)

The majority then moves on to its primary focus: the public's interest. Relying on *Commission on Peace Officer Standards,* the majority first identifies the public's interest generally in "the conduct of its peace officers"—specifically, the " '[m]isuse' " of their authority—and asserts that, "when it comes to the disclosure of a peace officer's name," this interest "outweighs, in most cases, the officer's personal privacy interest." (Maj. opn., *****70** *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 468.) The majority next asserts that this general public interest "is particularly great" in connection with "officer-involved shootings" because "such shootings often lead to severe injury or death." (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 468.) This heightened public interest, the majority states, "tips" the balance here "strongly in favor of identity disclosure." (*Id.* at p. 66, 325 P.3d at p. 469.)

The majority's discussion is unpersuasive for several reasons. First, the majority fails to explain how disclosing the name of an officer who has in any way been "involved in ****472** officer involved shootings"—which is what the

Times seeks—provides any information about whether the involved officers " ' [m]isuse[d]' " their authority. (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 467.) Thus, merely knowing which officers were "involved in officer involved shootings" does little, if anything, to advance the public's interest in "the conduct of its peace officers." (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 468.)

Second, the majority's assessment of the public's interest is inconsistent with the Legislature's and the voters' view of that interest. Through the *Pitchess* statutes (see maj. opn., *ante,* 172 Cal.Rptr.3d at pp. 60–61, 325 P.3d at pp. 464–465), the Legislature has precluded the general public from obtaining "[p]eace officer ... personnel records" or "information obtained from these records." (Pen.Code, § 832.7, subd. (a).) It has specified that this restriction protects records "relating to" (1) an officer's "advancement, appraisal, or discipline" (*id.,* § 832.8, subd. (d)), and (2) "[c]omplaints, or investigations of complaints, concerning an event or transaction in which [an officer] participated, or which he or she perceived, and pertaining to the manner in which he or she performed his or her duties" (*id.,* § 832.8, subd. (e)). It has authorized law enforcement agencies to "disseminate data regarding the number, type, or disposition of complaints ... made against [their] officers" *only* "if that information is in a form which does not identify the individuals involved." (*Id.,* § 832.7, subd. (c).) These provisions clearly express *the Legislature's* view regarding the public's interest in discovering whether particular officers have misused their power or even have been the subject of complaints about their conduct. ***79** The voters have ratified the Legislature's view by passing a constitutional provision that expressly preserves "statutory procedures governing discovery or disclosure of information concerning the official performance or professional qualifications of a peace officer." (Cal. Const., art. I, § 3, subd. (b)(3).) The majority improperly ignores these expressions of policy by the Legislature and the voters, and improperly substitutes its own view of policy. As a court, we have neither prerogative nor power "to substitute our public policy judgment" for that of the Legislature and the voters. (*Thomas v. City of Richmond* (1995) 9 Cal.4th 1154, 1165, 40 Cal.Rptr.2d 442, 892 P.2d 1185.)

The majority errs in asserting that Penal Code section 830.10 "reflects a legislative policy that, generally, the public has a right to know the identity of an officer involved in an on-duty shooting." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 468.) That section provides: "Any uniformed peace officer shall wear a badge, nameplate, or other device which bears clearly on its face the identification number or name of the officer." (Pen.Code, § 830.10.) On its face, the section applies only to "uniformed" officers. (*Ibid.*) Thus, to the extent it has any relevance to officers who are *not* in uniform, it indicates a legislative intent to protect their identities. Even as to uniformed officers, *****71** it fails to support the majority's broad conclusion that the public, "generally," has a right to know the identity of officers involved in shootings. (Maj. opn., *ante,* at p. 64, 325 P.3d at p. 467.) Under the section, police departments may choose not to require their uniformed officers to display their names, and may instead require them only to display their "identification number[s]." (Pen.Code, § 830.10.) Even were the statute to require officers to display their names, a statute affording the immediate participants in a police encounter access to the officers' names does not reflect a far broader legislative policy that, "generally, the public has a right to know the identity of an officer involved in an on-duty shooting." (Maj. opn., *ante,* at p. 65, 325 P.3d at p. 468.) This conclusion is obvious from the fact that, as noted above, the *Pitchess* statutes allow law enforcement agencies to "disseminate data regarding the number, type, or disposition of complaints ... made against [their] officers" *only* "if that information is in a form which does not identify the individuals involved." (Pen.Code, § 832.7, subd. (c).) In other words, the Legislature has precluded release of identifying information *generally to the public* even though the names of officers against whom complaints have been made are known to those who have filed complaints. As the ****473** majority recognized in *Commission on Peace Officer Standards,* "the mere fact that officers' names" may be displayed on their uniforms does not mean "that the information cannot be considered personal or private. (See *Department of Defense v. FLRA* (1994) 510 U.S. 487, 500, 114 S.Ct. 1006, 127 L.Ed.2d 325 ... ['An individual's [privacy] interest in controlling the dissemination of information regarding personal matters does not dissolve ***80** simply because that information may be available to the public in some form'].)"[2] (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 296, fn. 5, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

Nor do I agree with the majority that, under section 6254, subdivision (f), "when a shooting by a peace

officer occurs during an arrest [citation] or in the course of responding to a complaint or request for assistance [citation], and when the officer's name is recorded as one of the factual circumstances of the incident, disclosure of the officer's name is generally required." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 64, 325 P.3d at p. 467.) Section 6254, subdivision (f), generally exempts from disclosure under the CPRA "[r]ecords of complaints to, or investigations conducted by, ... any state or local police agency." As here relevant, it further provides that, "[n]otwithstanding any other provision of this subdivision," a law enforcement agency "shall" disclose the following: (1) "the factual circumstances surrounding the arrest" of each person the agency arrests (§ 6254, subd. (f)(1)); and (2) the "nature of the response" to all complaints or requests for assistance the agency receives, "including, *****72** to the extent the information regarding crimes alleged or committed or any other incident investigated is recorded, ... the factual circumstances surrounding the crime or incident" (*id.,* subd. (f)(2)). Where one of the specified incidents involves a shooting, it is not at all clear that the "factual circumstances surrounding" the incident (*id.,* subd. (f)(1), (2)) include the names of officers involved in the shooting. The majority cites, and I have found, no case supporting that view. Moreover, the language stating that these disclosure provisions apply "[n]otwithstanding any other provision of *this subdivision* " (*id.,* subd. (f), italics added) indicates that the section's disclosure requirement does not override the confidentiality provisions found in other statutes. Our courts of appeal have so construed the statute. (*County of Los Angeles v. Superior Court* (1993) 18 Cal.App.4th 588, 600, 22 Cal.Rptr.2d 409 ["we cannot construe section 6254, subdivision (f), to require" disclosure of "law enforcement information" the *Pitchess* statutes make confidential].) Finally, the statute itself authorizes nondisclosure "to the extent that disclosure of a particular item of information would endanger the safety of a person involved in an investigation or would endanger the successful completion of the ***81** investigation or a related investigation." (§ 6254, subd. (f).) Because, in my view, this would include the names of officers involved in shootings, I do not agree that, even under the circumstances the majority posits, section 6254, subdivision (f), "generally require[s]" disclosure of the information the Times seeks. [3] (Maj. opn., *ante,* at p. 64, 325 P.3d at p. 466.)

****474** The majority also makes several errors in evaluating the other side of the balance: the interests of the officers in nondisclosure. Although relying principally on a heightened public interest in officer-involved shootings, the majority fails to consider or even acknowledge *the officer's* heightened privacy and safety interests in such cases. In this regard, *Commission on Peace Officer Standards,* on which the majority principally relies (maj. opn., *ante,* 172 Cal.Rptr.3d at pp. 65–66, 325 P.3d at pp. 467–468), actually supports the Union. There, in holding that "the typical peace officer has [no] more than an insubstantial privacy interest in the fact of his or her employment as an officer" (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 300, 64 Cal.Rptr.3d 661, 165 P.3d 462), the majority reasoned that the fact of employment is "innocuous information" (*id.* at p. 302, 64 Cal.Rptr.3d 661, 165 P.3d 462) because "it would not reveal [the *****73** officer's] involvement *in any particular case* " (*id.* at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462, italics added). In this regard, the majority reasoned, disclosure of basic employment information is different from the disclosure sought in *Stone v. F.B.I.* (D.D.C.1990) 727 F.Supp. 662 (*Stone*): the names of FBI agents "who participated in the investigation of the assassination of Robert F. Kennedy." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462.) In *Stone,* " '[w]hat could reasonably be expected to constitute an unwarranted invasion of an agent's privacy is not that he or she is revealed as an FBI agent but that he or she is named as an FBI agent *who participated in the RFK investigation.*' [Citation.]" (*Commission on Peace Officer Standards, supra,* at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The " 'concern is not with the identifying information *per se,* but with the connection between such information and some other detail—a statement, an event, or otherwise—which the individual would not wish to be publicly disclosed.' " (*Ibid.,* quoting *Halloran v. Veterans Admin.* (5th Cir.1989) 874 F.2d 315, 321.) Here, the information the ***82** Times seeks *would* reveal the participation of the named officers in "particular case[s]" and *would* reveal their connection to an event —a shooting—they may " 'not wish to be publicly disclosed.' " (*Commission on Peace Officer Standards, supra,* at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462.) As the majority opinion in *Commission on Peace Officer Standards* establishes, the officers therefore have a heightened privacy interest in nondisclosure. Moreover, the potentially incendiary nature of the information the Times seeks—an officer's involvement in a shooting—further heightens an officer's already elevated privacy

interest in not being linked to "particular case[s]." (*Ibid.*) The majority errs in failing even to acknowledge this heightened interest.

Finally, the majority's conclusion that the Union's claim under section 6254, subdivision (c), fails for lack of a "particularized showing" regarding the need for confidentiality (maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 468) is both erroneous and inconsistent with our prior decisions. The majority acknowledges both the existence and validity of the "safety concerns of officers who fear retaliation from angry members of the community after an officer-involved shooting." (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 469.) It also acknowledges that *the record contains evidence* of " 'potential retaliation/threats' against officers involved in shootings." (Maj. opn., *ante,* at p. 67, 325 P.3d at p. 469.) However, the majority finds this evidence too "vague" and insists that more is required; as to each officer whose name is to be withheld, there must be evidence to "establish" a "specific danger" to the officer or to the members of the officer's family. (Maj. opn., *ante,* at p. 67, 325 P.3d at p. 469.)

****475** The specificity of proof the majority demands is inconsistent with our decision in *Times Mirror Co. v. Superior Court* (1991) 53 Cal.3d 1325, 283 Cal.Rptr. 893, 813 P.2d 240 (*Times Mirror*). There, we held that, because of safety concerns, the Governor of California had properly refused to disclose his daily, weekly, and monthly appointment calendars and schedules. (*Id.* at pp. 1329, 1346–1347, 283 Cal.Rptr. 893, 813 P.2d 240.) The only evidence supporting our conclusion was the declaration of the Governor's security director, which stated in the most general terms that disclosing this information " 'would seriously impair [his] ... ability to assure the Governor's security, and would constitute *a potential threat* to the Governor's safety, because the information ... will enable the *****74** reader to know in advance and with relative precision when and where the Governor may be found, those persons who will be with him, and when he will be alone.' " (*Id.* at p. 1346, 283 Cal.Rptr. 893, 813 P.2d 240, italics added.) Based on this evidence of a " 'potential threat to the Governor's safety' " (*ibid.*), and without requiring evidence of a particular or "specific" threat (maj. opn., *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 468), we concluded that, even as to "outdated calendars and schedules," nondisclosure was justified because "it is plausible to believe that an individual intent on doing harm [to the Governor] could use such information to discern activity patterns of the Governor and identify areas of particular vulnerability." (*Times Mirror, supra,* at p. 1346, 283 Cal.Rptr. 893, 813 P.2d 240.) Here, based on ***83** the Cox declaration, it is plausible to believe there are individuals, intent on doing harm to police officers in retaliation for their involvement in a shooting, who could use the requested information to exact revenge on the officers or members of their families. The "showing" in this case regarding safety concerns is certainly no more "vague," and is at least as, if not more, "particularized" (maj. opn., *ante,* at p. 66, 325 P.3d at p. 469), than the showing we found sufficient in *Times Mirror.* [4]

The majority does not contend otherwise or explain why *Times Mirror* is inapplicable. Instead, in applying a different and far stricter standard, it simply ignores *Times Mirror.* It fails to explain why police officers and their family members are entitled to less protection than the Governor. Surely, their lives are not worth less. Nor is it less "plausible to believe" there are "individual[s] intent on doing harm" to police officers involved in shootings than it is to believe there are "individual[s] intent on doing harm" to the Governor. (*Times Mirror, supra,* 53 Cal.3d at p. 1346, 283 Cal.Rptr. 893, 813 P.2d 240.) On the contrary, as already noted, the majority acknowledges both the existence and validity of the "safety concerns of officers who fear retaliation from angry members of the community after an officer-involved shooting." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 469.)

Contrary to the majority's suggestion (maj. opn., *ante,* 172 Cal.Rptr.3d at pp. 65–66, 325 P.3d at pp. 467–468), *Commission on Peace Officer Standards* and *International Federation* are consistent with, and supportive of, this analysis. In neither case was there any *evidence* submitted regarding the alleged safety concerns, a circumstance the court stressed in refusing to apply a disclosure exemption. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 302, 64 Cal.Rptr.3d 661, 165 P.3d 462; *International Federation, supra,* 42 Cal.4th at pp. 337–338, 64 Cal.Rptr.3d 693, 165 P.3d 488.) Notably, after stating that " '[a] mere assertion of possible endangerment' is insufficient to justify nondisclosure," the majority in *Commission on Peace Officer Standards* cited *Times Mirror* as a case in which *****75** disclosure ****476** *was* justified because *the evidence*—the "declaration of [the] Governor's security director"—"supported [the]

conclusion that release of his schedules would present a potential security threat." (*Commission on Peace Officer Standards, supra,* at p. 302, 64 Cal.Rptr.3d 661, 165 P.3d 462.) As earlier explained, here, even more than in *Times Mirror, evidence* regarding the dangers of disclosure was submitted. Moreover, in *Commission on Peace Officer Standards,* the majority held that, on remand, nondisclosure as to officers in certain "categories" could be justified "because the safety or ***84** efficacy of" officers in those categories "would be jeopardized by disclosure." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 284, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The majority in *Commission on Peace Officer Standards* identified one such category: officers "operating undercover." (*Id.* at p. 301, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The Times's broad request for the names of all officers "involved in" shootings from January 1, 2005, until December 11, 2010, surely includes such officers. Moreover, the evidence in the record here establishes another category of officers whose safety would be jeopardized by disclosure: those who have been involved in a shooting.

Contrary to the majority's suggestion, there is no basis for excluding from this category officers who, in using their weapons, "acted in a heroic manner that was unlikely to provoke retaliation." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 67, 325 P.3d at p. 469.) The majority asserts that safety is not "an issue" for such officers. (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 468.) But the majority fails to explain how to distinguish between heroic acts that are likely to provoke retaliation and those that are not. And it is naïve to believe that the desire for revenge of friends, family members, and gang associates of those shot by police will be reduced, much less eliminated, by the fact that the officers acted heroically. Indeed, the majority's bald assertion will surely come as surprising news to the many officers who, having heroically used their weapons in confronting gang-related crime, face retaliation from other gang members. It simply is not true, as the majority asserts, that officer safety is "not ... an issue" whenever a shooting may be characterized as "heroic" and "unlikely to provoke retaliation." (Maj. opn., *ante,* at p. 67, 325 P.3d at p. 469) Of course, as to individual officers who do not perceive a safety threat to themselves or their families, and who do not oppose public recognition of their heroism, section 6254, subdivision (c), would not prevent disclosure. Releasing an officer's name under those circumstances would not constitute "an unwarranted invasion of personal privacy." (*Ibid.*)

Finally, there are good reasons for not requiring, as to each officer whose name is to be withheld, evidence of an actual and specific threat to the officer or the members of his or her family. Where, as here, the disclosure request covers all officer-involved shootings during a six-year period, requiring such individualized proof will impose an obvious and substantial burden on law enforcement agencies that want to protect their officers.[5] More importantly, *****76** as the Union observes, "killers do not usually announce their intentions in advance." Thus, in most cases, although the threat to officer safety is real, the ***85** kind of evidence the majority demands is not available. Because the lives of our officers and their families are at stake, I would not require a law enforcement agency to wait until there is a specific threat—or worse, an actual attack—before allowing it to withhold information that puts its officers and their families at risk. Absent a showing of some greater public need for the information, we should allow law enforcement agencies to protect the very officers who are out there every day protecting us. They deserve at least that much for their brave service.

I therefore dissent.[6]

All Citations

59 Cal.4th 59, 325 P.3d 460, 172 Cal.Rptr.3d 56, 199 L.R.R.M. (BNA) 3501, 42 Media L. Rep. 2105, 14 Cal. Daily Op. Serv. 5853, 2014 Daily Journal D.A.R. 6795

Footnotes

* Retired Associate Justice of the Supreme Court, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

1 The Times contends that it was not properly served with the Cox declaration. The Times does not, however, assert that it raised that issue in the trial court, and hence the issue appears to have been forfeited. In any case, as discussed below, the trial court concluded that the facts asserted in the Cox declaration were too general and speculative to support the

Union's request for injunctive relief. Therefore, any failure to properly serve the Cox declaration did not adversely affect the Times.

2 Both the trial court and the Court of Appeal rejected the Times's legal issue that Government Code sections 6258 and 6259 set forth the exclusive means for litigating whether requested records must be disclosed and that therefore declaratory relief was inappropriate. (See *Filarsky v. Superior Court* (2002) 28 Cal.4th 419, 121 Cal.Rptr.2d 844, 49 P.3d 194 [holding that a *city* is not entitled to declaratory relief regarding its disclosure obligations under the California Public Records Act, but not deciding whether a *third party*—such as the Union here—is entitled to such relief].) We did not grant review to decide that legal issue, and we express no view on the matter. The issue remains open, and the Times can reassert it in any future proceedings.

1 All further unlabeled statutory references are to the Government Code.

2 The majority cites no legislative history to support its view of the "legislative policy" Penal Code section 830.10 "reflects." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 468.) The statute derives from its substantively identical predecessor, Penal Code former section 830.7, which provided: "Any uniformed peace officer shall wear a badge, nameplate, or other device which bears clearly on its face the identification number or name of such officer." (Stats.1969, ch. 1458, § 1, p. 2978.) In the only illuminating item of legislative history I could find—a letter to the Governor urging him to sign the passed bill containing the statute—the bill's legislative author stated that it would "aid[ ] morale in that it goes far to halt the deindividualization of our law enforcement personnel." (Assemblyman John Miller, letter to Governor Ronald Reagan re Assem. Bill No. 1830 (1969 Reg. Sess.) Aug. 8, 1969, p. 1.) This letter does not support the majority's assertion.

3 The majority asserts that the disclosure exemption of section 6254, subdivision (f), does not apply because the requested information comes from a source other than "the records of any administrative or criminal investigation" of officer-involved shootings (maj. opn., *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 469), perhaps "the initial incident reports" of such shootings (maj. opn., *ante,* at p. 61, 325 P.3d at p. 464). The appellate record offers no basis for the majority's speculation regarding the source of the requested information, as to either the Zerby shooting or any of the other officer-involved shootings that occurred during the six-year period the request identifies. Nor does the majority offer any legal basis for construing the broadly worded phrase "records *relating to* ... [¶] ... [¶] ... [e]mployee ... appraisal[ ] or discipline," which defines one category of confidential personnel records under Penal Code section 832.8, subdivision (d), to apply narrowly "only" to "the records *generated* in connection with" officer appraisal or discipline (maj. opn., *ante,* at pp. 63–64, 325 P.3d at pp. 466–467). Had the Legislature intended to so limit the scope of confidentiality under this section, it easily could have used the majority's far narrower phrase.

4 Moreover, although there is a *greater* showing in this case regarding safety than in *Times Mirror,* the showing needed to justify nondisclosure here arguably *is less than* the showing that was needed in *Times Mirror.* Nondisclosure is proper under section 6254, subdivision (c), upon a showing that disclosure "would constitute an unwarranted invasion of personal privacy." In *Times Mirror,* we held that nondisclosure was proper under section 6255, which requires a showing that "on the facts of the particular case the public interest served by not disclosing the record *clearly outweighs* the public interest served by disclosure of the record." (Italics added; see *Times Mirror, supra,* 53 Cal.3d at pp. 1346–1347, 283 Cal.Rptr. 893, 813 P.2d 240.)

5 For example, according to reported statistics, the Los Angeles Police Department averaged 70 officer-involved shootings per year for the years 2005–2008. (L.A. Police Dept., Use of Force Annual Report, p. 16 < http:// www.lapdonline.org/ assets/pdf/2009YearEndReportFinal.pdf> as of May 29, 2014.) In 42 officer-involved shootings internally reviewed in 2009 for compliance with department policy, "[t]here were 278 substantially involved officers," 85 of whom "discharged their firearms." (*Id.* at p. 19.)

6 Given my conclusion, I do not further address the majority's analysis regarding the applicability of the exemptions set forth in Government Code section 6255 and Penal Code sections 832.7 and 832.8.

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33 Cal.2d 635, 204 P.2d 7

THE CITY OF NATIONAL CITY et al., Petitioners,
v.
GILBERT E. FRITZ, as City Mayor, etc., et al., Respondents.

L. A. No. 20857.
Supreme Court of California
Mar. 22, 1949.

HEADNOTES

(1)
Municipal Corporations § 161--Funds--Capital Outlays.
The term "utilities," as used in the statutory restriction on the use of a municipal fund established for capital outlays (Stats. 1937, p. 1995, Deering's Gen. Laws, Act 8496a) means "public utilities," and does not include sewers; hence such a fund may be used for the construction of sewers.

See 18 **Cal.Jur.** 870, 1076.

SUMMARY

PROCEEDING in mandamus to compel the signing of a contract and the transfer of a fund to meet payments thereunder. Writ granted.

COUNSEL
Burke, Marshall & Burke and Daniel G. Marshall for Petitioners.
Merideth L. Campbell, City Attorney, for Respondents.

CARTER, J.

The controversy in this proceeding involves the interpretation of a statute authorizing the establishment by municipal corporations of capital outlay funds (Stats. 1937, p. 1995, as amended last in 1945; Stats. 1945, p. 1867).

That act provides that the governing body of any city "empowered to levy and collect assessments or taxes may by ordinance provide for the levy and collection of assessments or taxes for the creation and accumulation of a fund for capital outlays." The general limitation on the right to impose taxes applies. "At any time after the creation of such a fund such governing body may transfer to such fund any unincumbered surplus funds remaining on hand in such city, ... at the end of any fiscal year.

"Whenever such fund is created in the manner aforesaid it shall remain inviolate for the making of any capital outlays and no moneys shall be disbursed therefrom excepting for such a purpose; ....

"The term 'capital outlays' shall not be construed to include the construction, acquisition, extensions of, or additions to, ***636** *utilities, other than utilities for the furnishing of water supply."* (Emphasis added.)

In the instant case the city council passed an ordinance purporting to create a capital outlay fund pursuant to the act. There is a dispute in regard to whether the ordinance in fact achieved that end inasmuch as it did not provide for the levy of taxes or assessments for the creation of the fund. It merely created the fund. But in view of the result reached herein, it is not necessary to resolve that question. From the receipts from sale of real property of the city to the United States, $983,800.29 was ordered deposited in the fund by the city council and it is now there and unencumbered. The council has awarded contracts for the construction of sewers in the city in the sum of $675,287.77 but respondent mayor of the city refuses to sign the contracts, and respondent clerk refuses to transfer said sum to the general fund to meet the payments under those contracts, claiming that moneys in the capital outlay fund cannot be used for sewer purposes under the above quoted act for the reason that a sewer is a utility as used in the last sentence dealing with things for which the fund cannot be used. Petitioners, on the other hand, take the position (among others) that a sewer is not a utility as that term is used in the act. With the latter contention we agree for the following reasons.

([1]) The unqualified word "utility" has a broad meaning. It is defined as " quality or state of being useful; usefulness; profitableness to some desired end." (Webster's New Internat. Dict. (2d ed.) p. 2808.) (See also *Interstate National Gas Co. v. Gulley,* 4 F.Supp. 697, 699.) If that definition were applied to the statute in question, there would be practically no activity in which the city could use

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the money from the capital outlay fund because practically all of its property and public services are presumably for useful purposes. Thus the exception in the act (the italicized part thereof) for which funds may not be used would be broader than the main purpose of the act to authorize the creation of, and levy of taxes for, a capital outlay fund. Practically the only use that could be made of the fund would be for a water supply which is an exception carved out of an exception. These factors, coupled with the rule that exceptions in a statute are to be strictly construed (*Hurst v. City & County of San Francisco, ante,* p. 298 [201 P.2d 805]; *McAlpine v. Baumgartner,* 10 Cal.2d 409 [74 P.2d 753]; *Dufton v. Daniels,* 190 Cal. 577 [213 P. 949]; *Forbes v. City of Los* ***637** *Angeles,* 101 Cal.App. 781 [282 P. 528]; Crawford, Statutory Construction, § 299), require that the word "utility" be interpreted to mean a "public utility, " for as will be seen, that term as used here has a more narrow meaning than " utility."

We are convinced that the construction and maintenance of a sewer system is not a "public utility" within the meaning of the act. Generally speaking statutes should be construed in the light of other statutes dealing with the same subject matter. (*In re Phyle,* 30 Cal.2d 838 [186 P.2d 134]; *Stillwell v. State Bar,* 29 Cal.2d 119 [178 P.2d 313].) The term "public utilities," with reference to the power of a municipal corporation to acquire and operate them, customarily embraces an enterprise which was usually engaged in by private corporations or individuals such as supplying water and electricity to the inhabitants. In this state it never has been the custom to have sewers operated privately. There was some doubt whether municipal corporations could acquire and operate such enterprises (public utilities) until the amendment to the Constitution (Cal. Const., art. XI, § 19) in 1911 authorizing such corporations to supply their inhabitants with light, water, power, heat, transportation and means of communications (18 Cal.Jur. 1076), but the power of municipal corporations to construct and maintain sewers has always been broad and unquestioned; the power may be derived from the authority to construct and maintain streets. (See *Harter v. Barkley,* 158 Cal. 742 [112 P. 556]; *Kramer v. Los Angeles,* 147 Cal. 668 [82 P. 334]; *McBean v. City of Fresno,* 112 Cal. 159, 163 [44 P. 358, 53 Am.St.Rep. 191, 31 L.R.A. 794]; *City of Madera v. Black,* 181 Cal. 306, 313 [184 P. 397]). The Public Utilities Act of this state lists many activities as "public utilities " but no mention is made of sewers (Stats. 1915, p. 115, as amended).

For the foregoing reasons it is clear that the term "utilities" as used in the exception in the statute in question does not include sewers. The fund here involved may, therefore, be used for construction of sewers.

Let a peremptory writ of mandate issue as prayed for.

Gibson, C. J., Shenk, J., Traynor, J., Schauer, J., and Spence, J., concurred.

EDMONDS, J.

Again the court has rendered what I consider to be an advisory opinion in a collusive proceeding ***638** brought by a city against two of its officers. The result is a decision which places the stamp of the highest judicial approval upon financial transactions which affect every taxpayer of the city without any truly adversary presentation of the merits of the controversy. Moreover, the construction of the statute authorizing the establishment of a capital outlay fund may now be the unquestioned basis for action by the governing body of other cities. For the reasons I have stated in *City of Whittier v. Dixon,* 24 Cal.2d 664, 668 [151 P.2d 5, 153 A.L.R. 956]; *City and County of San Francisco v. Boyd,* 22 Cal.2d 685, 707 [140 P.2d 666]; *City and County of San Francisco v. Linares,* 16 Cal.2d 441, 448 [106 P.2d 369], I believe that this procedure is contrary to fundamental principles of the administration of justice.

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Declined to Extend by NCDR, L.L.C. v. Mauze & Bagby, P.L.L.C., 5th Cir.(Tex.), March 11, 2014

49 Cal.4th 12
Supreme Court of California

SIMPSON STRONG–TIE COMPANY, INC., Plaintiff and Appellant,
v.
Pierce GORE et al., Defendants and Respondents.

No. S164174.
|
May 17, 2010.

Synopsis
Background: Manufacturer of name-brand galvanized screws brought claims for defamation, trade libel, false advertising, and unfair business practices against attorney, relating to attorney's newspaper advertisement stating that owners of wood decks, built with certain brand-name galvanized screws, "may" have legal rights to compensation or other relief. The Superior Court, Santa Clara County, No. CV057666, John F. Herlihy, J., granted attorney's special motion to strike under the anti-SLAPP (strategic lawsuit against public participation) statute. Manufacturer appealed. The Court of Appeal affirmed. The Supreme Court granted review, superseding the opinion of the Court of Appeal.

Holdings: The Supreme Court, Baxter, J., held that:

[1] plaintiff has burden of establishing the applicability of a statutory exemption from anti-SLAPP statute, disapproving *Brill Media Co., LLC v. TCW Group, Inc.,* 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371, and

[2] "commercial speech" exemption from anti-SLAPP statute was inapplicable.

Affirmed.

Opinion, 76 Cal.Rptr.3d 292, superseded.

West Headnotes (16)

[1] Pleading
Frivolous pleading

For purposes of anti-strategic lawsuit against public participation (SLAPP) statute, a "SLAPP" is a civil lawsuit that is aimed at preventing citizens from exercising their political rights or punishing those who have done so. West's Ann.Cal.C.C.P. § 425.16.

48 Cases that cite this headnote

[2] Pleading
Frivolous pleading

The commercial speech exemption, like the public interest exemption, is a statutory exception to the anti-strategic lawsuit against public participation (SLAPP) statute and should be narrowly construed. West's Ann.Cal.C.C.P. §§ 425.16, 425.17(b, c).

11 Cases that cite this headnote

[3] Pleading
Application and proceedings thereon

The plaintiff has the burden of establishing the applicability of the "commercial speech" statutory exemption from the anti-strategic lawsuit against public participation (SLAPP) statute, in opposing the defendant's anti-SLAPP motion; disapproving *Brill Media Co., LLC v. TCW Group, Inc.,* 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371. West's Ann.Cal.C.C.P. § 425.17(c); West's Ann.Cal.Evid.Code § 500.

63 Cases that cite this headnote

[4] Contracts
Presumptions and burden of proof
Statutes
Burden of proof

It is a legal principle that when a proviso carves an exception out of the body of a

statute or contract those who set up such exception must prove it.

3 Cases that cite this headnote

[5] **Statutes**
Burden of proof

The enactment of the statute providing that except as otherwise provided by law, "a party has the burden of proof as to each fact the existence or nonexistence of which is essential to the claim for relief or defense that he is asserting," did not upset the traditional rule of statutory construction that when a proviso carves an exception out of the body of a statute or contract those who set up such exception must prove it. West's Ann.Cal.Evid.Code § 500.

8 Cases that cite this headnote

[6] **Evidence**
Elements of cause of action or claim
Evidence
Matters of Defense and Rebuttal

The general principle of the statute providing that except as otherwise provided by law, "a party has the burden of proof as to each fact the existence or nonexistence of which is essential to the claim for relief or defense that he is asserting," is that a party who seeks a court's action in his favor bears the burden of persuasion thereon. West's Ann.Cal.Evid.Code § 500.

6 Cases that cite this headnote

[7] **Evidence**
Nature and scope in general

The ordinary rules governing allocation of the burden of proof may be disregarded for policy reasons in exceptional circumstances, yet such exceptions are few, and narrow, and the reasons justifying a shift in the normal allocation of the burden of proof must be compelling.

3 Cases that cite this headnote

[8] **Pleading**
Frivolous pleading

The "commercial speech" exemption from the anti-strategic lawsuit against public participation (SLAPP) statute does not prescribe "content" and "delivery" exemptions with distinctly different elements. West's Ann.Cal.C.C.P. § 425.17(c)(1).

8 Cases that cite this headnote

[9] **Statutes**
Purpose and intent

In any case involving statutory interpretation, the court's fundamental task is to determine the Legislature's intent so as to effectuate the law's purpose.

1 Cases that cite this headnote

[10] **Statutes**
Language and intent, will, purpose, or policy
Statutes
Literal, precise, or strict meaning;letter of the law
Statutes
Unintended or unreasonable results; absurdity
Statutes
Relation to plain, literal, or clear meaning;ambiguity

In construing a statute, courts begin with the text of the statute as the best indicator of legislative intent but courts may reject a literal construction that is contrary to the legislative intent apparent in the statute or that would lead to absurd results.

9 Cases that cite this headnote

[11] **Pleading**
Frivolous pleading

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Statements or conduct made during the delivery of goods or services would qualify as statements or conduct made "in the course of" delivering goods or services, within meaning of the "commercial speech" statutory exemption from the anti-strategic lawsuit against public participation (SLAPP) statute. West's Ann.Cal.C.C.P. § 425.17(c)(1).

35 Cases that cite this headnote

[12] Pleading

Frivolous pleading

The "commercial speech" exemption from the anti-strategic lawsuit against public participation (SLAPP) statute exempts a cause of action arising from commercial speech when (1) the cause of action is against a person primarily engaged in the business of selling or leasing goods or services; (2) the cause of action arises from a statement or conduct by that person consisting of representations of fact about that person's or a business competitor's business operations, goods, or services; (3) the statement or conduct was made either for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services or in the course of delivering the person's goods or services; and (4) the intended audience for the statement or conduct meets the definition set forth in the statute. West's Ann.Cal.C.C.P. § 425.17(c).

45 Cases that cite this headnote

[13] Pleading

Frivolous pleading

Galvanized screw manufacturer's claims against attorney for defamation, trade libel, false advertising, and unfair business practices, relating to attorney's newspaper advertisement stating that owners of wood decks built with the screws "may" have legal rights to compensation or other relief, did not arise from representations of fact about attorney's "business operations, goods, or services," and thus were not within the "commercial speech" exemption from the anti-strategic lawsuit against public participation (SLAPP) statute; even if the advertisement created the inference that attorney had investigated manufacturer, any implication that manufacturer's screws were defective was a representation about manufacturer's products rather than about attorney's business operations. West's Ann.Cal.C.C.P. § 425.17(c)(1).

See Cal. Civil Practice (Thomson Reuters 2010) Civil Rights Litigation, § 14:10; 5 Witkin, Cal. Procedure (5th ed. 2008) Pleading, § 1026; Weil & Brown, Cal. Practice Guide: Civil Procedure Before Trial (The Rutter Group 2009) ¶ 7:555 et seq. (CACIVP Ch. 7(II)-B); Cal. Jur. 3d, Constitutional Law, § 270.

5 Cases that cite this headnote

[14] Pleading

Frivolous pleading

The representation that an attorney would investigate "whether you have a potential claim," in attorney's newspaper advertisement seeking potential plaintiffs for class action against galvanized screw manufacturer, did not constitute a representation of fact about attorney's business operations, goods, or services, and thus was not within the commercial speech exemption to the anti-strategic lawsuit against public participation (SLAPP) law; the statement was not a representation of fact, but an agreement to take certain actions in the future. West's Ann.Cal.C.C.P. § 425.17(c)(1).

3 Cases that cite this headnote

[15] Pleading

Frivolous pleading

Under the "commercial speech" exemption from the anti-strategic lawsuit against public participation (SLAPP) statute the statement or conduct giving rise to the cause of action must consist of factual representations about

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the speaker's or a competitor's goods, services, or business operations; it would not be sufficient for the statement giving rise to the cause of action to appear in the same publication as factual representations about the speaker's or a competitor's business. West's Ann.Cal.C.C.P. § 425.17(c)(1).

24 Cases that cite this headnote

[16] Pleading

Frivolous pleading

A party should not be able to defeat the commercial speech exception to the anti-strategic lawsuit against public participation (SLAPP) statute by parsing a two-sentence advertisement into its component parts; the proper test does not turn on the punctuation used in the advertisement, but on the basis for the cause of action. West's Ann.Cal.C.C.P. § 425.17(c)(1).

1 Cases that cite this headnote

Attorneys and Law Firms

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Arkin & Glovsky, Pasadena, and Sharon Arkin for Consumer Attorneys of California as Amicus Curiae on behalf of Defendants and Respondents.

Levy, Ram & Olson and Karl Olson, San Francisco, for Senator Sheila Kuehl and California First Amendment Coalition as Amici Curiae on behalf of Defendants and Respondents.

Opinion

BAXTER, J.

*16 **1120 In this case we consider the scope of the commercial speech exemption to the anti-SLAPP statute. (See Code Civ. Proc., §§ 425.16, 425.17, subd. (c).) [1]

In February 2006, plaintiff Simpson Strong–Tie Company, Inc. (Simpson) filed this action for defamation and related claims against defendants Pierce Gore and The Gore Law Firm arising from a newspaper advertisement placed by Gore a few weeks earlier. The advertisement, which was directed to owners of wood decks constructed after January 1, 2004, advised readers that "you may have certain legal rights and be entitled to monetary compensation, and repair or replacement of your deck" if the deck was built with galvanized screws manufactured by Simpson or other specified entities, and invited those persons to contact Gore "if you would like an attorney to investigate whether you have a potential claim."

*17 Gore moved successfully in the superior court to have the entire complaint stricken under section 425.16, the anti- ***333 SLAPP statute, and the Court of Appeal affirmed. We granted review to consider the limited issue whether Simpson's complaint was exempt from the anti-SLAPP statute because of section 425.17, subdivision (c) (section 425.17(c)), which excludes causes of action arising from representations of fact about the speaker's or a competitor's "business operations, goods, or services ... made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" or "made in the course of delivering the person's goods or services." Having found that the complaint is not exempt from dismissal under the anti-SLAPP statute, we affirm.

BACKGROUND

Plaintiff Simpson is a California corporation in the business of designing, manufacturing, and marketing building products, including metal connectors and other hardware for use in wood frame construction. According to Simpson, it is well known in the wood frame construction industry that pressure-treated wood, which is commonly used in outdoor decks to protect against termites and fungal decay, can have a corrosive effect on steel products, including galvanized screws. Corrosion potentially shortens the service life of these fasteners and connectors and compromises their ability to support their

recommended loads or endure seismic and environmental stresses.

In early 2004, at the recommendation of the United States Environmental Protection Agency, the construction industry stopped selling lumber treated with chromium copper arsenate, due to health hazards posed by its arsenic content. Alternative lumber products, such as wood treated with alkaline copper quaternary and copper azole, were substituted, but, as Simpson explains, these chemicals are "more corrosive" to galvanized steel products. Simpson states that it communicated this potential problem to the building industry and to the public generally through its Web site, annual catalog, articles in engineering and building magazines, bulletins issued to the building industry, point-of-sale information, and annual report.

Gore, a California attorney, learned from television reports about the potential for corrosion of galvanized deck fasteners and connectors when used on wood pressure treated with alkaline copper quaternary or copper azole, and contacted Ted Todd, a senior inspector with the Contra Costa ***18** County District Attorney's Office who was featured in the television reports. At that time, the district attorney's office was conducting an investigation into the risk posed by galvanized fasteners and connectors when used with these types of pressure-treated wood. The office ultimately issued a "Consumer Alert" warning of the corrosive effect of the ****1121** new pressure-treated wood products "on the metal connector brackets typically used in construction." The alert noted that advisories had been posted in some retail stores about the potential incompatibility of the two products but cautioned that the advisories "tend to be in very small print or somewhat inconspicuously posted."

Gore also visited the company Web site, where Simpson had advised in bold type that "[m]any of the new Pressure Treated Woods use chemicals that are corrosive to steel. By selecting connectors that offer greater corrosion resistance ... you can extend the service life of your connectors. However, corrosion will still occur. You should perform periodic inspection of your connectors and fasteners to insure their strength is not being adversely affected by corrosion. In some cases, it may be necessary to have a local professional perform *****334** the inspections. Because of the many variables involved, Simpson Strong–Tie cannot provide estimates on service life of connectors, anchors or fasteners."

In addition, Gore discovered that a class action complaint had been filed in Massachusetts against one of Simpson's competitors, Phillips Fastener Products, Inc., which sought relief on behalf of consumers allegedly damaged by defective galvanized fasteners and connectors used with pressure-treated lumber, and that Gore's former law firm, Lieff, Cabraser, Heimann & Bernstein, LLP, was investigating claims that some of the newly designed fasteners were failing, in spite of the manufacturers' representations that the "special coatings" were intended to resist corrosion.

Based on this information, Gore arranged for an advertisement to be placed in the San Jose Mercury News in order to locate individuals who had purchased galvanized fasteners and connectors manufactured by Simpson and two other companies, which together were responsible for most of the metal fasteners sold to consumers in California. The advertisement, which commenced Christmas Day 2005 and ran four more times over a 28–day period in the Mercury News and once in the Los Gatos Weekly–Times, read as follows:

***19**

ATTENTION:

WOOD DECK OWNERS

If your deck was built after January 1, 2004 with galvanized screws manufactured by Phillips Fastener Products, Simpson Strong-Tie or Grip-Rite, you may have certain legal rights and be entitled to monetary compensation, and repair or replacement of your deck.

Please call if you would like an attorney to investigate whether you have a potential claim:

Pierce Gore
GORE LAW FIRM
900 East Hamilton Ave.
Suite 100 Campbell, CA 95008
408-879-7444

Gore has asserted that the wording of the advertisement was modeled after notices he or his cocounsel had used in this state and in others during the preceding three years in connection with potential class actions based on consumer fraud or product defects.

****1122** In a letter dated January 9, 2006, counsel for Simpson advised Gore that the advertisement falsely implied that Simpson's galvanized screws fail to meet

appropriate industry standards and that a valid claim may exist against Simpson based upon negligence or product liability. The letter demanded that Gore cease publication of any further defamatory advertisements directed at Simpson and reserved Simpson's right to recover against Gore for any costs *****335** or damages that may have already resulted from this or any similar publication. Gore did not respond to the letter. In a letter dated January 27, 2006, counsel for Simpson declared that Gore's failure to respond "suggests that your claims are without merit, and that your newspaper advertisement is false, misleading, and defames Simpson.... Unless you can present specific evidence to support your charges, Simpson intends to pursue its defamation claim against your firm[ ] and vindicate its rights." Again, Gore did not respond.

Prior to filing this action, Simpson retained an opinion survey firm to confirm that the advertisement had caused injury to Simpson's reputation. The survey firm intercepted 214 randomly selected shoppers at nine different ***20** home improvement stores in January and February 2006 and obtained their responses to a set of questions with and without exposure to the Gore advertisement. The survey revealed that the shoppers, after reading the advertisement, were significantly more likely to believe that Simpson's galvanized screws were defective or of low quality and were significantly less likely to purchase galvanized screws manufactured by Simpson.

Two days after the survey was completed, Simpson filed this action for defamation, trade libel, false advertising, and unfair business practices. The complaint sought compensatory and punitive damages as well as injunctive relief.

When Gore moved to strike the complaint under section 425.16, Simpson invoked the exemption to the anti-SLAPP law for commercial speech under section 425.17(c). The trial court granted the special motion to strike and entered a judgment of dismissal, finding Gore had made a threshold showing that the statements were made in furtherance of his right of petition or free speech on an issue of public interest (§ 425.16, subd. (e)(4)), that Simpson had failed to demonstrate a probability of prevailing on the merits (§ 425.16, subd. (b)(1)), and that the commercial speech exemption did not apply because the advertisement made no statement about a business competitor's products or services.

The Court of Appeal affirmed in a published opinion. The court first considered "who bears the burden of persuasion with respect to the applicability of [the section 425.17(c)] exemption—the party invoking the anti-SLAPP law (i.e., the defendant), or the party invoking the exemption (the plaintiff)?" In assigning the burden to the plaintiff, the Court of Appeal disagreed with *Brill Media Co., LLC v. TCW Group, Inc.* (2005) 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371 (*Brill*), which had assigned the burden to the defendant to establish that the cause of action is *not* exempt. The court next determined that while the advertisement was "made for the purpose of ... promoting ... [Gore's] services" (§ 425.17(c)(1)), Simpson's causes of action did not " 'aris[e] from' " any representation of fact " 'about' Gore's or a competitor's services or business operations."

In construing the exemption in section 425.17(c)(1) for causes of action arising from statements or conduct "made in the course of delivering the person's goods or services," the Court of Appeal once again disagreed with *Brill,* which had found this prong was satisfied where "the statements were made and conduct engaged in as part of....the type of business transaction engaged in by defendants." (*Brill, supra,* 132 Cal.App.4th at p. 341, 33 Cal.Rptr.3d 371.) The Court of Appeal reasoned that the Legislature had enacted instead "a much narrower exemption, predicated by its plain terms on conduct in the course of ***21** *delivering* the *goods or services* the defendant is in the business of *selling or* *****336** *leasing.*" The court then found that the advertisement here "was *seeking business from* prospective clients, not *delivering services to* them." Concluding that the anti-SLAPP statute applied and that Simpson had failed to establish a probability ****1123** of prevailing on any of its claims, the Court of Appeal affirmed the order granting the special motion to strike and the judgment of dismissal.

We granted review to address the conflict in the case law concerning the construction of the commercial speech exemption to the anti-SLAPP statute.

DISCUSSION

[1] A SLAPP is a civil lawsuit that is aimed at preventing citizens from exercising their political rights or punishing those who have done so. " 'While SLAPP suits masquerade as ordinary lawsuits such as defamation

and interference with prospective economic advantage, they are generally meritless suits brought primarily to chill the exercise of free speech or petition rights by the threat of severe economic sanctions against the defendant, and not to vindicate a legally cognizable right.' " (*Castillo v. Pacheco* (2007) 150 Cal.App.4th 242, 249–250, 58 Cal.Rptr.3d 305, quoting Sen. Com. on Judiciary, Analysis of Sen. Bill No. 1296 (1997–1998 Reg. Sess.) as amended May 12, 1997, pp. 1–2.)

In 1992, out of concern over "a disturbing increase" in these types of lawsuits, the Legislature enacted section 425.16, the anti-SLAPP statute. (§ 425.16, subd. (a).) The statute authorized the filing of a special motion to strike to expedite the early dismissal of these unmeritorious claims. (§ 425.16, subds. (b)(1), (f).) To encourage "continued participation in matters of public significance" and to ensure "that this participation should not be chilled through abuse of the judicial process," the Legislature expressly provided that the anti-SLAPP statute "shall be construed broadly." (§ 425.16, subd. (a).)

A special motion to strike involves a two-step process. First, the defendant must make a prima facie showing that the plaintiff's "cause of action ... aris[es] from" an act by the defendant "in furtherance of the [defendant's] right of petition or free speech ... in connection with a public issue." [2] (§ 425.16, subd. (b)(1).) If a defendant meets this threshold showing, the cause of action shall be stricken unless the plaintiff can establish "a probability that the plaintiff will prevail on the claim." (*Ibid.*)

In 2003, concerned about the "disturbing abuse" of the anti-SLAPP statute, the Legislature enacted section 425.17 to exempt certain actions from it. ***22** (§ 425.17, subd. (a).) We recently discussed the exemption for public interest lawsuits in *Club Members for an Honest Election v. Sierra Club* (2008) 45 Cal.4th 309, 86 Cal.Rptr.3d 288, 196 P.3d 1094, where we "narrowly construed" section 425.17, subdivision (b) and held that it applied "only when the entire action is brought in the public interest." (*Club Members for an Honest Election, supra,* 45 Cal.4th at pp. 312, 316, 86 Cal.Rptr.3d 288, 196 P.3d 1094.)

This case involves the scope and operation of the exemption for commercial speech under section 425.17(c), which provides: "Section 425.16 does not apply to any cause of action brought against a person primarily engaged in the business of selling or leasing goods or services, including, but not limited to, insurance, securities, or financial instruments, arising from any statement or conduct by that person if both of the following conditions exist: [¶] *****337** (1) The statement or conduct consists of representations of fact about that person's or a business competitor's business operations, goods, or services, that is made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services, or the statement or conduct was made in the course of delivering the person's goods or services. [¶] (2) The intended audience is an actual or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual or prospective buyer or customer, ..."

[2] The commercial speech exemption, like the public interest exemption, "is a statutory exception to section 425.16" and "should be narrowly construed." (*Club Members for an Honest Election v. Sierra Club, supra,* 45 Cal.4th at p. 316, 86 Cal.Rptr.3d 288, 196 P.3d 1094; see also ****1124** *Major v. Silna* (2005) 134 Cal.App.4th 1485, 1494, 36 Cal.Rptr.3d 875; accord, Sen. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended May 1, 2003, pp. 7–8 ["before us for consideration in [Senate Bill] 515 is a measure that seeks to trim off a few bad branches as argued and identified by the [Consumer Attorneys of California]"].)

A. Which Party Bears the Burden to Establish the Applicability of the "Commercial Speech" Exemption Under Section 425.17(c)?

[3] The Court of Appeal determined that Simpson, as the plaintiff, bore the burden of establishing that Gore's advertisement fell within the commercial speech exemption to the anti-SLAPP law, relying on the general rule that " '[o]ne claiming an exemption from a general statute has the burden of proving that he comes within the exemption.' " Simpson argues that the burden should have been placed on Gore, as the defendant, to establish that the exemption does *not* apply. He relies in particular on our summary in *Equilon Enterprises v. Consumer Cause, Inc.* (2002) 29 Cal.4th 53, 67, 124 Cal.Rptr.2d 507, 52 P.3d 685 (*Equilon*), of the "two-step process" for ***23** analyzing anti-SLAPP motions: "First, the court decides whether the *defendant* has made a threshold showing that the challenged cause of action is one arising from protected activity.... If the court finds such a showing has been made, it then determines whether the *plaintiff*

has demonstrated a probability of prevailing on the claim." (Italics added.) We agree with the Court of Appeal's construction.

[4] It is a "familiar" and "longstanding" legal principle that " '[w]hen a proviso ... carves an exception out of the body of a statute or contract those who set up such exception must prove it.' " (*Meacham v. Knolls Atomic Power Laboratory* (2008) 554 U.S. 84, 128 S.Ct. 2395, 2400, 171 L.Ed.2d 283; see also *Trade Comm'n v. Morton Salt Co.* (1948) 334 U.S. 37, 44–45, 68 S.Ct. 822, 92 L.Ed. 1196 ["the burden of proving justification or exemption under a special exception to the prohibitions of a statute generally rests on one who claims its benefits ..."]; accord, 29 Am.Jur.2d (2008) Evidence § 176, p. 193.) Likewise, in California, "it has been declared that where the statute has exemptions, exceptions or matters which will avoid the statute the burden is on the claimant to show that he falls within that category." (*Colonial Ins. Co. v. Ind. Acc. Com.* (1945) 27 Cal.2d 437, 441, 164 P.2d 490; see also *Briggs v. McCullough* (1869) 36 Cal. 542, 551–552; *In re Lorenzo C.* (1997) 54 Cal.App.4th 1330, 1345, 63 Cal.Rptr.2d 562 ["one who claims an exemption from a general statute has the burden of proving that he or she comes within the exemption"].)

*****338** Simpson does not dispute that section 425.16 sets forth a general statute or that section 425.17 creates specified exemptions to it. Simpson contends, though, that the familiar and long-standing rule of statutory construction governing exemptions to a general statute was abrogated by the enactment in 1965 of Evidence Code section 500, which provides: "Except as otherwise provided by law, a party has the burden of proof as to each fact the existence or nonexistence of which is essential to the claim for relief or defense that he is asserting."

[5] Although it is true that Evidence Code section 500 superseded former section 1981, which had provided that the burden of proof was on the party holding the affirmative of the issue, the change in wording did not upset the traditional rule of statutory construction. As the Law Revision Commission Comments to Evidence Code section 500 explain, the phrase the " 'affirmative of the issue' " in former section 1981 had been criticized "as establishing a meaningless standard," inasmuch as " 'practically any proposition may be stated in either affirmative or negative form.' " (Cal. Law Revision Com. com., reprinted at 29B West's Ann. Evid.Code (1995 ed.) foll. § 500, p. 554.) Evidence Code section 500 was intended to make the allocation of the burden of proof "easier to ascertain" than the "classic formulation," but ***24** not to signal a sea change in the law. (*Conservatorship of Hume* (2006) 140 Cal.App.4th 1385, 1388, fn. 5, 44 Cal.Rptr.3d 906; see also *Los Angeles Unified School Dist. v. Workers' Comp. Appeals Bd.* (1984) 150 Cal.App.3d 823, 829, 198 Cal.Rptr. 116 [citing the two formulations together].) Tellingly, Simpson ****1125** cites nothing to support its novel claim that Evidence Code section 500 abrogated the ordinary rule of statutory construction. (Cf. 31 Cal.Jur.3d (2002) Evidence § 90, p. 151 ["What facts are essential to a particular party's claim for relief or defense is generally a matter to be determined by the substantive law, not the law of evidence; Evid.Code, § 500 does not purport to determine which facts are 'essential' to the plaintiff's claim for relief and which facts are 'essential' to a claimed defense, but rather leaves those substantive determinations to be resolved in light of the particular cause of action or defense at issue," (fns. omitted)].) Indeed, the Law Revision Commission Comments note that Evidence Code section 500 "follows th[e] basic rule"—i.e., " 'that whatever facts a party must affirmatively plead he also has the burden of proving' "—and is even broader, in that it " appl[ies] to issues not necessarily raised in the pleadings." (Cal. Law Revision Com. com., reprinted at 29B West's Ann. Evid.Code, *supra,* foll. § 500, p. 554.) Inasmuch as Simpson concedes that "[t]he initial burden should be on the plaintiff to invoke the exemption in opposition to the anti-SLAPP motion," it follows that the plaintiff also has the burden of proving the applicability of the exemption.

[6] Furthermore, the "general principle" of Evidence Code section 500 is "that a party who seeks a court's action in his favor bears the burden of persuasion thereon." (*Aguilar v. Atlantic Richfield Co.* (2001) 25 Cal.4th 826, 850, 107 Cal.Rptr.2d 841, 24 P.3d 493.) Because establishing the commercial speech exemption is essential to Simpson's defense to the special motion to strike, Evidence Code section 500 places the burden of proof on Simpson. (See generally *City of Lafayette v. East Bay Mun. Utility Dist.* (1993) 16 Cal.App.4th 1005, 1017, 20 Cal.Rptr.2d 658 [" ' "One seeking to be excluded from the sweep of the general statute must establish that the exception applies" ' "].)

Nothing in *Equilon* or its discussion of the "two-step process" alters the analysis. (*Equilon, supra,* 29 Cal.4th

at p. 67, 124 Cal.Rptr.2d 507, 52 P.3d 685.) In *Equilon,* ***339 we explained that the defendant has the burden to show that the cause of action being challenged under the anti-SLAPP statute is one arising from protected activity. (*Equilon, supra,* at p. 67, 124 Cal.Rptr.2d 507, 52 P.3d 685.) In discussing the defendant's burden at the first stage, *Equilon* construed only section 425.16, and did not purport to identify the party with the burden to establish the existence or nonexistence of the public interest exemption in section 425.17, subdivision (b), or the commercial speech exemption in section 425.17(c), inasmuch as *Equilon* predated the enactment of section 425.17. It is worth noting, though, that *25 nothing in *Equilon* purported to abrogate the long-standing rule of construction that the party seeking to benefit from an exception to a general statute bears the burden to establish the exception. [3]

[7] Simpson argues, correctly, that the ordinary rules governing allocation of the burden of proof may be disregarded for policy reasons in exceptional circumstances. (*Adams v. Murakami* (1991) 54 Cal.3d 105, 119–120, 284 Cal.Rptr. 318, 813 P.2d 1348; *Cassady v. Morgan, Lewis & Bockius LLP* (2006) 145 Cal.App.4th 220, 234, 51 Cal.Rptr.3d 527 (*Cassady*).) Yet such exceptions are "few, and narrow" (*Sargent Fletcher, Inc. v. Able Corp.* (2003) 110 Cal.App.4th 1658, 1670, 3 Cal.Rptr.3d 279), and the reasons justifying a shift in the normal allocation of the burden of proof must be "compelling." **1126 (*Aydin Corp. v. First State Ins. Co.* (1998) 18 Cal.4th 1183, 1193, 77 Cal.Rptr.2d 537, 959 P.2d 1213; accord, *Meacham v. Knolls Atomic Power Lab., supra,* 554 U.S. at pp. 90–92, 128 S.Ct. at p. 2400.) Simpson fails to identify any compelling justification.

Simpson does assert that the facts underlying the commercial speech exemption are "peculiarly" within the speaker's knowledge. But Simpson does not explain how a plaintiff would be significantly disadvantaged in demonstrating that the statement or conduct underlying its cause of action "consists of representations of fact about [the defendant]'s or a business competitor's business operations, goods, or services"; that the defendant's statement or conduct was "made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" or "in the course of delivering the persons' goods or services"; or that the "intended audience" was "an actual or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual or potential buyer or customer." (§ 425.17(c)(1), (2); see generally *Schaffer v. Weast* (2005) 546 U.S. 49, 60, 126 S.Ct. 528, 163 L.Ed.2d 387 [" 'Very often one must plead and prove matters as to which his adversary has superior access to the proof' "].) In sum, Simpson does not persuade us that section 425.17(c) presents ***340 one of those " 'rare occasions' " *26 justifying a deviation from the normal allocation of the burden of proof. (*Cassady, supra,* 145 Cal.App.4th at p. 234, 51 Cal.Rptr.3d 527.)

The burden of proof as to the applicability of the commercial speech exemption, therefore, falls on the party seeking the benefit of it—i.e., the plaintiff.

B. Were Simpson's Causes of Action Exempted from the Anti–SLAPP Statute by Section 425.17(c)?

As noted, section 425.17(c) provides, in pertinent part: "Section 425.16 does not apply to any cause of action brought against a person primarily engaged in the business of selling or leasing goods or services ... arising from any statement or conduct by that person if both of the following conditions exist: [¶] (1) The statement or conduct consists of representations of fact about that person's or a business competitor's business operations, goods, or services, that is made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services, or the statement or conduct was made in the course of delivering the person's goods or services. [¶] (2) The intended audience is an actual buyer or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual buyer or customer...."

There are no disputed issues of fact here. We review the applicability of the commercial speech exemption independently. (*Soukup v. Law Offices of Herbert Hafif* (2006) 39 Cal.4th 260, 269, fn. 3, 46 Cal.Rptr.3d 638, 139 P.3d 30.)

[8] The Court of Appeal held, and the parties' initial briefing assumed, that section 425.17(c)(1) prescribes a "content exemption" and a "delivery exemption" and that these exemptions have distinctly different elements. The content exemption shields a cause of action from the anti-SLAPP statute if the cause of action arises from a statement or conduct that "consists of representations of

fact about that person's or a business competitor's business operations, goods, or services, that is made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services." (§ 425.17, subd. (c)(1).) The delivery exemption provides a similar shield for *any* statement or conduct "made in the course of delivering the person's goods or services." (*Ibid.*) In other words, this approach divided the first 47 words of subdivision (c)(1) from the last 17 to create two independent and parallel theories of exemption from the anti-SLAPP law.

Although section 425.17(c)(1) is grammatically susceptible of such a construction, that construction was not necessarily the only plausible one. ***27** Gore had observed, in a footnote in its initial briefing, that the statute might also be read to exempt a cause of action arising from a statement or conduct ****1127** that consists of representations of fact about that person's or a competitor's business operations, goods, or services that was made *either* "for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" *or* "in the course of delivering the person's goods or services." (§ 425.17(c)(1).) We granted the parties the opportunity to file supplemental briefing as to which construction was the correct one and, as will appear, agree with Gore's construction.

[9] **[10]** As in any case involving statutory interpretation, our fundamental task is to determine the Legislature's intent so as to effectuate the law's purpose. *****341** (*People v. Lewis* (2008) 43 Cal.4th 415, 491, 75 Cal.Rptr.3d 588, 181 P.3d 947.) "We begin with the text of the statute as the best indicator of legislative intent" (*Tonya M. v. Superior Court* (2007) 42 Cal.4th 836, 844, 69 Cal.Rptr.3d 96, 172 P.3d 402), but we may reject a literal construction that is contrary to the legislative intent apparent in the statute or that would lead to absurd results. (*Ornelas v. Randolph* (1993) 4 Cal.4th 1095, 1105, 17 Cal.Rptr.2d 594, 847 P.2d 560.)

Simpson's argument, at least at the outset, relies on the plain language of section 425.17(c)(1) and the canon of construction of avoiding surplusage. According to Simpson, section 425.17(c)(1) creates two independent commercial speech exemptions, each introduced by the phrase "the statement or conduct," and to hold otherwise would render the second iteration of "the statement or conduct" in the subdivision redundant. In Simpson's view, therefore, the delivery exemption encompasses a cause of action arising from "*any* statement or conduct made in the course of delivering the person's goods or services." Gore argues that such a construction would contravene the legislative intent and lead to absurd results.

The Legislature's findings supporting the enactment of section 425.17 are set forth in subdivision (a), which states that "there has been a disturbing abuse of Section 425.16, the California Anti–SLAPP Law, which has undermined the exercise of the constitutional rights of freedom of speech and petition for the redress of grievances, contrary to the purpose and intent of Section 425.16. The Legislature finds and declares that it is in the public interest to encourage continued participation in matters of public significance, and that this participation should not be chilled through abuse of the judicial process or Section 425.16."

The construction favored by Simpson does not effectively fulfill the statute's purposes. Under that construction, the Legislature can be seen to have carefully devised specific requirements in order to exempt a cause of ***28** action under the content prong—i.e., the statement or conduct underlying the cause of action must (1) consist of representations of fact (2) about that person's or a business competitor's business operations, goods, or services, and (3) have been made for the purpose of obtaining approval for, promoting, or securing transactions in the person's goods or services. Yet, under Simpson's construction of the delivery prong, the Legislature apparently imposed no particular requirements—i.e., a cause of action arising from *any* statement or conduct on *any* subject for *any* purpose is exempted from the anti-SLAPP statute, as long as it was made in the course of delivering goods or services. Simpson has not offered any rationale for why the stage of the transaction should play such a critical factor in determining whether to exempt a cause of action from the reach of the anti-SLAPP law.

Moreover, under Simpson's approach, a business that was sued because of political or religious statements made by an employee *in the course of delivering* the product or service to a customer would be deprived of the protection of the anti-SLAPP law, but that same business would be able to invoke the anti-SLAPP law if the same statements were made for the purpose of obtaining approval for, promoting, or securing transactions in its

products. Neither the Legislature's findings nor common sense endorses or justifies such a result.

[11] Simpson effectively concedes that such a result would be problematic, but argues that the statements in these hypotheticals "are *not a part of* the delivery of *****342** goods ****1128** or services" and thus fall outside the delivery exemption as Simpson would interpret it. But, as we recently observed, " '[d]uring' means 'at some point in the course of.' " (*People v. Lewis, supra,* 43 Cal.4th at p. 514, 75 Cal.Rptr.3d 588, 181 P.3d 947.) Statements or conduct made *during* the delivery of goods or services thus would qualify as statements or conduct made *in the course of* delivering the goods or services. (Cf. § 425.17(c)(1).)

Simpson attempts to narrow the definition of the delivery exemption by combining language that appears in two different sentences in *Brill, supra,* 132 Cal.App.4th at page 341, 33 Cal.Rptr.3d 371, to argue that the exemption extends only to " 'statements ... made and conduct engaged in *as part of* ... the type of business transaction engaged in by defendants.' " But this formulation does not appear anywhere in the text of section 425.17(c)(1). If, as Simpson effectively concedes, the delivery prong requires an interpretive gloss to avoid absurd results, it seems more consonant with legislative intent to adopt the restriction the Legislature articulated earlier in the sentence setting forth the exemption rather than to rummage about elsewhere for new limitations arising out of whole cloth.

Moreover, Simpson's construction of the delivery prong would render the first part of section 425.17(c)(1)—the so-called "content and purpose" ***29** prong—surplusage. Statements or conduct that are " 'part of ... the type of business transaction engaged in by defendants' " would necessarily encompass "representations of fact about that person's ... business operations, goods, or services, that [are] made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" (§ 425.17(c)(1)) inasmuch as *every* business engages in efforts to obtain approval for, promote, or secure sales or transactions in its goods or services. Indeed, Simpson concedes that "a grocer's advertisement in advance of intended sales" falls within its broad definition of the delivery prong "to the extent the advertising informs the public about the availability of the product for delivery" *or* "to the extent the advertising keeps the product in the public eye and bolsters its prestige." With such a broad definition of the delivery prong, there would be no need for the content and purpose prong.

The legislative history further undermines Simpson's interpretation of the statute. Summaries of the bill prepared for various legislative committees consistently stated that section 425.17(c) would prohibit "the anti-SLAPP motion from being used in specified causes of action against businesses sued for statements or conduct consisting of representations of fact about their goods, services or business operations, or those of a competitor, when *those* statements or conduct were for the purpose of obtaining approval for, promoting, or securing sales or leases of the person's goods or services, *or* in the course of delivering the person's goods or services, if the intended audience is an actual or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual or potential buyer or customer, ..." (Legis. Analyst, 3d reading analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended July 8, 2003, p. 1, italics added; Assem. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended June 27, 2003, p. 2, italics added; Assem. Republican Caucus, analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended June 27, 2003, p. 1, italics added; see also Sen. Sheila Kuehl, letter to Governor Gray Davis, Sept. 3, 2003, p. 2.) In addition, an analysis prepared for the Senate Committee on the Judiciary noted that Senate Bill 515 was *****343** "consistent with the recommendation of the Senate Judiciary Committee analysis last year on [Senate Bill] 1651[,] which urged the sponsors to look at *the content and context* of the statement or conduct when crafting an exemption, rather than enacting a wholesale exclusion of a class of defendants[,] which had been proposed in [Senate Bill] 1651." (Sen. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended May 1, 2003, p. 9, italics added.) Simpson offers no explanation why the Legislature would have been so concerned about the content of the statement or conduct in the first part of section 425.17(c)(1) but would ****1129** have abandoned any such concern in the remainder of the sentence.

[12] ***30** For these reasons, we interpret section 425.17(c) to exempt from the anti-SLAPP law a cause of action arising from commercial speech when (1) the cause of action is against a person primarily engaged in the business of selling or leasing goods or services; (2) the cause of action arises from a statement or conduct by

that person consisting of representations of fact about that person's or a business competitor's business operations, goods, or services; (3) the statement or conduct was made either for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services or in the course of delivering the person's goods or services; and (4) the intended audience for the statement or conduct meets the definition set forth in section 425.17(c)(2).

[13] Gore does not dispute that he is in the business of selling legal services, that Simpson's causes of action arise from Gore's advertisement, that the purpose of the advertisement was to promote Gore's legal services, or that the advertisement was addressed to a qualifying audience under section 425.17, subdivision (c)(2). The point of contention concerns whether the causes of action "aris[e] from ... representations of fact about [Gore's] ... business operations, goods, or services." (§ 425.17(c)(1).) We find that they do not.

Simpson's complaint asserts claims for defamation, trade libel, false advertising, and unfair business practices. The common theme among these causes of action is the allegation that the advertisement "communicates that Simpson's galvanized screws are defective." The complaint alleges in particular that the advertisement "is libelous on its face in that it falsely communicates to the reader that Simpson's products are defective"; that the advertisement "disparaged Simpson's goods in that the Advertisement falsely communicates to the reader that Simpson's galvanized screws are defective"; that these assertions in the advertisement "are false and misleading"; and that using "the false and misleading Advertisement to recruit potential plaintiffs to participate in an unjustified class action lawsuit against Simpson" was an unfair business practice.

We will assume arguendo that the advertisement implies that Simpson's galvanized screws are defective. As the Court of Appeal recognized, however, even an implication that Simpson's screws are defective "is not 'about' Gore's or a competitor's 'business operations, goods, or services....' (§ 425.17(c)(1).) It is, rather, a statement 'about' *Simpson*—or, more precisely, Simpson's products." It therefore falls squarely outside section 425.17(c)' s exemption for commercial speech.

Simpson contends that the advertisement does nonetheless satisfy the commercial speech exemption in that it "expressly states that 'an attorney' will 'investigate whether you have a potential claim" and that it also ***31** supports the inference "that Gore has investigated the named companies and has discovered that they are selling *****344** defective screws." Both of these statements are "about" Gore's business operations, but neither satisfies the elements of the commercial speech exemption to the anti-SLAPP law.

[14] Simpson's causes of action plainly do not "arise from" (§ 425.17(c)) the representation that an attorney will investigate "whether you have a potential claim." Simpson's complaint does not allege that this statement is false or even that it is defamatory. In addition, a promise of what an attorney will do if the reader were to respond to the advertisement "is not a representation of fact, but an agreement to take certain actions in the future." (*Navarro v. IHOP Properties, Inc.* (2005) 134 Cal.App.4th 834, 841, 36 Cal.Rptr.3d 385.) Consequently, it does not constitute "representations of fact about that person's ... business operations, goods, or services." (§ 425.17(c)(1).)

The alleged inference that Gore has investigated Simpson and discovered that the galvanized screws are defective is not obvious from the advertisement itself, which asserts only that users of these fasteners "may" have certain (but unspecified) legal rights and that an attorney would need to "investigate whether you have a potential claim." Even if ****1130** one were to draw this inference, however, it would be no more than an attempt to layer the allegedly defamatory inference itself—i.e., that Simpson's galvanized screws are defective—with an alleged inference that Gore had *discovered* the defect. Simpson cites no authority for expanding the scope of the commercial speech exemption in this manner. (Cf. *Stewart v. Rolling Stone LLC* (2010) 181 Cal.App.4th 664, 676, 105 Cal.Rptr.3d 98 [the commercial speech exemption did not apply to a claim that the defendant magazine wrongfully used plaintiffs' names for a Camel advertisement; "as plaintiffs concede, the goods they sell are copies of Rolling Stone magazine, not Camel cigarettes. More significantly, the statement or conduct at issue here did not consist of 'representations of fact about the business operations, goods, or services' of Rolling Stone or of any of defendants' business competitors. Instead, the representation at the center of this lawsuit is the representation that plaintiffs and their fellow musicians

endorse the sale and use of Camel cigarettes"]; accord, *New.Net v. Lavasoft* (C.D.Cal.2004) 356 F.Supp.2d 1090, 1104 [the commercial speech exemption did not apply because "the purportedly offending statements are not statements made about Defendant's product, but rather statements about Plaintiff and its products" and the two were not competitors]; see also *Troy Group, Inc. v. Tilson* (C.D.Cal.2005) 364 F.Supp.2d 1149, 1151, 1155 [defendant investment adviser's e-mail asking whether plaintiff corporation is one of "the biggest crooks on the planet or what?" is "clearly not about [defendant]'s business, rather it is about [plaintiff], which, as [plaintiffs] admit, is not a business competitor of [defendant]"].) We are reluctant to allow plaintiffs to evade the limitations of the statutory ***32** text by mere wordplay, especially given our obligation to construe the commercial speech exemption narrowly.

Moreover, Simpson has not attempted to recover damages here because of any implied representation that Gore allegedly *discovered* that Simpson's products were defective, but because Gore allegedly *implied* that they were defective. Whether the Simpson products are in fact defective is beyond the scope of this proceeding, but the inference that they are defective is not a representation of fact about *Gore's* business operations, goods, or services. The Court of Appeal stated the issue succinctly: "To the extent that Gore's advertisement 'consists of' representations about his services, Simpson's action does not 'aris[e] *****345** from' it; to the extent that Simpson's action 'aris[es] from' a representation by Gore, the representation was not 'about' Gore's or a competitor's services or business operations." [4]

Simpson argues next that the commercial speech exemption from dismissal under the anti-SLAPP statute should not require that the statement itself giving rise to the cause of action include factual representations about the defendant's or a business competitor's business operations, goods, or services, as long as the statement giving rise to the cause of action is *accompanied* by factual representations about the defendant's or a business competitor's business operations, goods, or services. The statute's plain language, however, is otherwise. The commercial speech exemption applies only to a cause of action "arising from" a statement (or conduct) that "consists of representations of fact about that person's or a business competitor's business operations, goods, or services...." (§ 425.17(c)(1).)

Simpson complains, with rhetorical flourish, that the advertisement "defam[es] Simpson in order to tout Gore and his services.... The tout and the defamation were of an inseparable whole, with the defamation serving as bait for the tout. The Court of Appeal's approach is as if to parse cheese from a mousetrap." But this is merely another way of saying that the speaker made a representation of fact about a *noncompetitor's* goods for the purpose of promoting the speaker's own services. Had the Legislature intended the commercial speech exemption to encompass representations of fact about *any* ****1131** business operations, goods, or services made for the purpose of promoting sales, leases, or transactions in the speaker's own goods or services, then it would not have limited the exemption to statements or conduct consisting of "representations of fact about *that person's or a business competitor's* business operations, goods, or services ...." (§ 425.17(c)(1); see *Mendoza v.* ***33** *ADP Screening and Selection Services, Inc.* (2010) 182 Cal.App.4th 1644, 1652, 107 Cal.Rptr.3d 294 ["the Legislature appears to have enacted section 425.17, subdivision (c), for the purpose of exempting from the reach of the anti-SLAPP statute cases involving comparative advertising by businesses."].)

[15] **[16]** The legislative history accords with the statute's plain language. As stated earlier, committee reports summarized the bill as "[p]rohibit[ing] the anti-SLAPP motion from being used in specified causes of action against businesses sued for statements or conduct *consisting of* representations of fact about their goods, services or business operations, or those of a competitor, *when those statements* ... were for the purpose of obtaining approval for, promoting, or securing sales or leases of the person's goods or services, or in the course of delivering the person's goods or services...." (Assem. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended June 27, 2003, p. 3, italics added.) The plain language and the legislative history each confirm that the statement or conduct giving rise to the cause of action must consist of factual representations about the speaker's (or a competitor's) goods, services, or business operations. Nothing in the plain language or the legislative history suggests it would be enough to protect against dismissal under the anti-SLAPP statute if the factual representations about the speaker's or a competitor's business simply appeared in the *****346** same publication as the statements actually giving rise to the cause of action. [5]

Indeed, Simpson's proposed construction would seriously undermine the anti-SLAPP statute itself. As Gore points out, a press release critical of a political candidate—i.e., core political speech—would lose the protection of the anti-SLAPP statute if the press release *also* mentioned the products sold by the business. We therefore reject Simpson's expansive construction of the commercial speech exemption and conclude, in accordance with the trial court and the Court of Appeal, that Simpson's complaint was not exempted from the anti-SLAPP statute by section 425.17(c)(1).

The trial court went on to consider Gore's special motion to strike the complaint under section 425.16, determined that Simpson had failed to establish a probability of prevailing on the merits, and granted the special motion to strike. The Court of Appeal affirmed. The correctness of those rulings is beyond the scope of our grant of review, which was limited to the ***34** applicability of the commercial speech exemption to the anti-SLAPP statute set forth in section 425.17(c)(1).

DISPOSITION

The judgment of the Court of Appeal is affirmed.

WE CONCUR: GEORGE, C.J., KENNARD, WERDEGAR, CHIN, MORENO, and CORRIGAN, JJ.

All Citations

49 Cal.4th 12, 230 P.3d 1117, 109 Cal.Rptr.3d 329, 38 Media L. Rep. 1737, 10 Cal. Daily Op. Serv. 5946, 2010 Daily Journal D.A.R. 7087

Footnotes

1 SLAPP is an acronym for "strategic lawsuit against public participation." (*Jarrow Formulas, Inc. v. LaMarche* (2003) 31 Cal.4th 728, 732, fn. 1, 3 Cal.Rptr.3d 636, 74 P.3d 737.) All further statutory references are to the Code of Civil Procedure unless otherwise indicated.

2 See *Leoni v. State Bar* (1985) 39 Cal.3d 609, 624, 217 Cal.Rptr. 423, 704 P.2d 183 (lawyer advertising is protected by the First Amendment).

3 As Simpson points out, *Brill* did place the burden on the defendant. But *Brill* analyzed only whether the applicability of the commercial speech exception was part of *Equilon's* first step, where the court decides whether the defendant has made a threshold showing the challenged cause of action arises from protected activity, or part of *Equilon's* second step, where the court determines whether the plaintiff has demonstrated a probability of prevailing on the claim. (*Brill, supra,* 132 Cal.App.4th at pp. 329–331, 33 Cal.Rptr.3d 371.) *Brill's* conclusion that the defendant had the burden of proof to establish the nonapplicability of the commercial speech exception was based solely on its classification of the issue as a first-step determination and did not at all consider section 425.17's status as an exception to section 425.16 or any canons of construction. (*Brill, supra,* at p. 331, 33 Cal.Rptr.3d 371.) *Brill Media Co., LLC v. TCW Group, Inc., supra,* 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371, is therefore disapproved to the extent it is inconsistent with our holding here.

4 One can conceive of a cause of action arising from a representation of fact about the attorney's own services—such as a false claim that the attorney had already recovered a judgment against the manufacturer for the defective product—but the advertisement in this case did not contain such a representation.

5 Simpson complains that a party should not be able to defeat the commercial speech exception to the anti-SLAPP statute by parsing a two-sentence advertisement into its component parts. We agree. The proper test does not turn on the punctuation used in the advertisement, but on the basis for the cause of action. Here, the causes of action all arise from the inference that Simpson's products are defective, an inference that Simpson alleges is implied from the text of the advertisement. This inference, though, contains no representations of fact about *Gore's* business operations, goods, or services.

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34 Cal.App. 660, 168 P. 595

WILLIAM D. STEPHENS, Governor of the State of California, Petitioner,
v.
JOHN S. CHAMBERS, State Controller, Respondent.

Civ. No. 1757.
Court of Appeal, Third District, California.
September 17, 1917.

CONSTITUTIONAL LAW--APPROPRIATION OF PUBLIC MONEY FOR PEACE JUBILEE AT VICKSBURG--VALID LEGISLATIVE ENACTMENT--GIFT PROVISION NOT VIOLATED.
The act of the legislature which became effective July 31, 1917 (Stats. 1917, p. 1608), appropriating the sum of fifteen thousand dollars, to be expended by the Governor, in his discretion, for the purpose of assisting to defray the expenses of a public nature incident to the holding of the national memorial reunion and peace jubilee at Vicksburg, Mississippi, in October, 1917, is a valid enactment, and is not within the inhibition of section 31 of article IV of the Constitution, prohibiting any gift of public money to any individual or corporation, and interdicting the appropriation of public money for the purpose or benefit of any corporation or institution not under the exclusive management and control of the state as a state institution.

ID.--REQUIREMENTS OF BILL APPROPRIATING PUBLIC MONEY--CONSTITUTIONAL PROVISION NOT CONTRAVENED.
The act of the legislature which became effective July 31, 1917, appropriating public money for the purpose of assisting to defray the expenses of a public nature incident to the national memorial and peace jubilee at Vicksburg, Mississippi, in October, 1917, is not inconsistent with section 34 of article IV of the Constitution, declaring that no bill making an appropriation of money, except the general appropriation bill shall contain more than one item of appropriation, and that for a single and certain purpose to be expressed therein, because of the indefiniteness of the language of the act.

ID.--EXPENDITURE OF MONEY--DISCRETION OF GOVERNOR--VALIDITY NOT AFFECTED.
The act of the legislature which went into effect July 31, 1917, appropriating public money for the national peace jubilee celebration at Vicksburg, Mississippi, in October, 1917, is not void because it vests the Governor with discretion in the expenditure of the money appropriated.

APPLICATION for a Writ of Mandamus originally made to the District Court of Appeal for the Third Appellate District.

The facts are stated in the opinion of the court.

***661** L. T. Hatfield, for Petitioner.
U. S. Webb, Attorney-General, and Robert W. Harrison, Deputy Attorney-General, for Respondent.

HART, J.

This is an application for a writ of mandate requiring respondent, as state controller, to draw his warrant in favor of petitioner "for such portion of the sum of fifteen thousand dollars, as petitioner may require."

At the recent session of the legislature there was regularly passed an act entitled "An act to provide for the celebration of the national memorial reunion and peace jubilee at Vicksburg, Mississippi, and making an appropriation therefor," which act was by the Governor approved and took effect July 31, 1917 (Stats. 1917, p. 1608). Section 1 thereof reads, in part, as follows: "There is hereby appropriated … the sum of fifteen thousand dollars, to be expended by the Governor, in his discretion, for the purpose of assisting to defray the expenses of a public nature incident to the holding of the national memorial reunion and peace jubilee to commemorate the victories and virtues leading to the half century of peace and prosperity to the American nation, and further to strengthen the fraternal ties of amity in the United States," said reunion to be held at Vicksburg in October, 1917, on certain named days.

Section 2 provides that the Governor shall "demand from the state controller, and the state controller is hereby authorized and instructed upon such demand, to draw his warrant in favor of the Governor for the sum of fifteen thousand dollars to be expended by him as above provided, and the treasurer is hereby authorized and directed to pay the same."

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By way of answer and return to the petition for a writ of mandate, respondent alleges that said petition "does not state facts sufficient to entitle the petitioner to the relief prayed for," and it is contended that the attempted appropriation of money is contrary to the provisions of section 34, article IV, of the Constitution, which reads: "No bill making an appropriation of money, except the general appropriation bill, shall contain more than one item of appropriation, and that for one single and certain purpose, to be therein expressed."

Thus it will be observed that, so far as the pleadings in this proceeding are concerned, the legality of the statute or appropriation ***662** in question is attacked upon one ground only. Indeed, in his brief, the attorney-general appears to concede that it is within the constitutional competence of the legislature of this state to appropriate money from the funds of the state for the purpose and object for which the appropriation is made by the act under attack here, for he says: "In the determination of the validity of this appropriation, it is not necessary to question the objects and purposes of the reunion to be held at Vicksburg. It may well be admitted that such reunion tends to do all of the things expressed in the act as the reasons for holding such reunion. Nor do we here contend that the holding of such reunion is not a matter of state and national importance and one which it might well be to the state's advantage to encourage, even to the extent of appropriations of money to defray the expenses incident thereto." In thus expressing himself, the attorney-general doubtless took into consideration, as properly he should, the act of the Sixty-fourth Congress of the United States (Session of 1915-16)--Act Cong. Sept. 8, 1916, c. 464, 39 Stat. 812--whereby money was appropriated for defraying the expenses of the "National Memorial Celebration and Peace Jubilee at Vicksburg, in the year 1917, by the survivors of the armies of the Tennessee and of the Mississippi," who participated in the memorable battle of Vicksburg in the month of July, 1863, for the reason that the appropriation involved in the act whose validity is here challenged is in aid of the purposes and objects of said act of the national Congress. With this concession of the attorney-general that there legally reside in the state the power and the right to appropriate a reasonable amount of the public moneys to aid in the achievement of the purposes of the act of Congress referred to, further consideration herein thereof might well be waived or dismissed, but, in view of the strictness with which the Constitution, by certain provisions therein contained, guards the disposal of the public revenues, and of certain cases expounding those provisions, some observations with respect to that proposition need not be deemed out of place herein.

From what has already been said, it is doubtless plain enough that we are in full accord with the concession of the attorney-general that the legislature may, without offending any of the inhibitory mandates of the Constitution with regard to the appropriations of the public moneys, make such ***663** an appropriation as the one whose legality is challenged in this proceeding; and so we express ourselves because of the conviction that, while the legislature will not be permitted to go beyond the bounds expressly established by the people through their Constitution in the matter of the disposal of the revenues raised for the support of the state government. it would be opposed to and, indeed, conceivably in many instances, subversive of the highest ends and the best interests of, a government whose sovereignty and general policies are outlined and controlled by a written constitution, framed in language necessarily general, if it were found requisite, in constitutional construction, to hold that the terms of the organic law should on all occasions be accepted and applied in their literal sense, or that there are not certain matters incidental and necessary to every well-governed state and its subjects as to which the Constitution is silent, in so far as express language is concerned, and as to which legislation looking to the highest welfare of the governed is absolutely necessary. A written constitution, like a statute, cannot so deal with particulars as to meet or provide for every case or contingency which may arise and of which legislative cognizance is allowable if necessary to the complete enjoyment of those privileges, immunities, and rights which are of the essence, and, indeed, the primary and foremost objects of a government in which, like ours, ultimate sovereignty is in the people themselves. By this we do not mean to say that the limitations or barriers contained in the Constitution against the exercise of legislative power may be set aside or disregarded, or that the intent of the organic law, as it is to be gathered from the instrument itself, shall not in all cases prevail. Nor do we intend thus to imply that the courts, in the construction of a written constitution, may be governed by a change in public sentiment as to any subject to which express attention is given and as to which limitations are fixed by the Constitution. But what we do maintain is that, since a written constitution is intended as and is the mere framework according to whose

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general outlines specific legislation must be framed and modeled, and is therefore, as stated and as is essentially true, necessarily couched in general terms or language, it is not to be interpreted according to narrow or super-technical principles, but liberally and on broad general lines, so that it may accomplish in full measure ***664** the objects of its establishment and so carry out the great principles of government.

The Constitution of the United States involves a grant and limitation of powers. The federal government, through its Congress, can exercise or exert no power which is not clearly within the grant of the federal Constitution; and this means that Congress may exercise only the powers expressly conferred upon the federal government and such incidental or auxiliary powers as may be essential to the exercise and execution of the powers expressly granted. There is no provision in the national Constitution expressly authorizing the expenditure of public moneys for the purposes and objects stated in the act of Congress above referred to. Nor is there any single provision of that Constitution within the spirit or reason of which does authority for such an appropriation of the public moneys fall. The same is true as to the several acts of Congress pensioning soldiers who fought to uphold the Union in our domestic Civil War. But the latter acts, as well as the one giving rise to the appropriation herein attacked, have never been challenged upon the ground that they were *ultra vires,* or beyond the authority of Congress to enact. Perhaps, by applying to them the touchstone of strict technical principles of construction, their force as legal enactments might be destroyed. But no such view or method of construction as applied to those acts would by any court be accepted or resorted to. To the contrary, in comparing them with the Constitution, if, indeed, the solution of the question whether they are or are not valid involves a matter of constitutional construction, the courts, if discovering even no indirect or inferential authority for their enactment in the language of that instrument, would nevertheless find ample sanction for them in the general spirit of our national government and in the genius of our political institutions, as outlined and promulgated by the Constitution itself and so sustain them as treating with subjects which clearly fall, not within the letter of the organic law, but within the spirit and reason of those general policies which inhere, and of necessity must inhere, in every government framed and formed upon the lines of enlightened general principles--policies consistent and in harmony with the nature and form of the government as outlined by the primary law of the land and the absence of which would greatly and seriously curtail or ***665** restrict that full enjoyment of the rights of persons and of property which can only come from a government deriving its force from the consent of the governed. It would, indeed, come as a shock if the courts felt compelled to declare and so hold that laws pensioning those who fought to preserve the integrity of the American Union and who, from their accumulated years or disease, are unable to care for themselves, were beyond the power of Congress to enact. Such a judicial fiat would be universally denounced as repugnant to every consideration of governmental duty, obligation, and gratitude. But the motive underlying such legislation is much broader and more far-reaching in its effect upon the government of society than the mere consideration of gratitude. Undeniably, the stability of every civilized government and its political institutions wholly depends upon the patriotism and loyalty thereto of its subjects; hence it is the first duty of every government so to administer its affairs as to inspire in its citizens patriotism and loyalty to the fundamental political principles upon which it is founded, and, to that end, through appropriate policies, teach and exemplify the duty which every citizen owes to his country and its government. Therefore, as stated, legislation which provides for the pensioning of those who have fought the battles of their country for the preservation of its governments and who are in need of assistance involves not only the quality of gratitude, but a just and substantial recognition of services inspired by patriotism, without which battles cannot, as a rule, successfully be fought. If it may be said as to the present crisis with which our country is confronted that patriotism in our citizens has not been aroused, how infinitely worse would the conditions in that regard now be if, in the past, our government had wholly failed in a proper way to recognize and reward, in proper cases, those who had gone to the front and fought our battles in the past?

As we understand the congressional act in aid of the purposes and objects of which the appropriation challenged here was made by our own legislature, the great object and desideratum thereof is to bring about a sentiment of amity between those sections of our country who opposed each other in one of the most bitterly fought domestic wars of which history gives any record; for it is a matter of common historical knowledge that the bitterness of sentiment brought ***666** about between the northern and southern sections by that war existed in

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full vigor down to the opening of hostilities between this country and Spain, which ended with the late Spanish-American war. And there can hardly be any doubt that that same old feeling in some degree still lingers or exists. The governments of the Union and of the states could adopt no more effective policy for reuniting the two sections in one common political sentiment than that which is involved in and represented by the legislation in question. That the inevitable effect of such a gathering, annually held, as seems to be the policy of Congress, so long as there is a considerable number of the survivors of both sides of that war, will be ultimately to destroy every vestige of that old feeling of antagonism in political sentiment (we here use the word "political" in its more comprehensive sense), there cannot be the shadow of a doubt; and that the inevitable consequence of a condition so brought about will be to establish throughout the whole country a deeper, more abiding and a universal love for our common country and its government, is equally plain. Congress could have exercised no power or established no other policy more conducive to the general welfare of our government and the people, for no government can long exist with its people radically divided in sentiment upon the fundamental political doctrines upon which it is founded.

If, then, Congress, circumscribed as it is within the narrow bounds of granted and limited powers, may rightfully, in the absence of express authority therefor, but solely by the exertion of that power which must inhere in every government if the general welfare is on all occasions and in every emergency to be subserved as intended by the very nature and spirit of our form of government, appropriate moneys from the public revenues for the purpose of accomplishing the great ultimate object of the act in question, why may not a state, essentially a constituent part of the Union--which, indeed, goes to the making of the Union--make a like appropriation as in aid of the object thus to be achieved?

While the governments of the Union and the states are independent of each other, operate within distinctly different spheres, and are designed for the accomplishment of different specific objects, yet, upon general political or governmental policies their interests are common, and what in a political sense stands for the general welfare of the Union necessarily ***667** stands for the general welfare of the states. Unquestionably, the states, as separate entities and as component parts of the Union, are each equally with the Union interested in the crystallization and execution of any policy of the federal Union that will tend to perpetuate the permanency of the latter, for largely if not wholly upon the perpetuity of the Union depends the permanency of the states as governmental organizations. It follows, therefore, that the policy of the general government with respect to the subject matter of the act of Congress above mentioned is necessarily the policy of each of the states, and that within the latter, no less than within the federal government, resides the power of effectuating and applying that policy. In other words, the duty, if it be a duty, of contributing to the carrying out or execution of that policy rests no less upon the states than upon the federal government. And the right of the states to do so does not depend upon any authority vested in them by express language in their constitutions, nor is it to be controlled by the restrictions or limitations upon the legislative power contained in those instruments, but, as in the case of the federal government, arises from that inherent, dormant power which may legally be aroused to action, exerted and applied by all democratic governments, controlled by written constitutions, whenever the exigencies of government imperatively require its exertion and exercise--that power which, in a general sense, is analogous to the general war powers of the federal government, under which, as war measures, the latter may, as it is now doing, properly control trade principles and execute an infinite variety of other acts which, under normal conditions, approach if not in truth involve paternalism in government or unwarranted abridgments of individual rights as assured and guaranteed by the Constitution.

Thus, it is clear, the inhibitions of our state Constitution against any gift of public money to any individual, municipal or other corporation (article IV, section 31), and interdicting the appropriation of public money "for the purpose or benefit of any corporation, association, … or other institution not under the exclusive management and control of the state as a state institution" (Const., art. IV, sec. 22) have no application to this case. Indeed, it has been so held in a decision treating a proposition quite analogous in principle to that submitted for solution here. (***668** *Daggett v. Colgan,* 92 Cal. 53, [27 Am. St. Rep. 95, 14 L. R. A. 474, 28 Pac. 51].) That case involves an interesting and instructive discussion of the propositions to which we have hereinabove given considerable attention, and we may, therefore,

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pardonably and with advantage, reproduce herein an extended excerpt from the learned opinion therein. It should first be explained that the legislature of 1891 (Stats. 1891, p. 24) passed an act appropriating a large sum of money to be paid to the California Commission of the World's Fair Columbian Exposition, held in the city of Chicago, and to be used by said commission in the construction of buildings at said fair in which to maintain an exhibit of the industrial products of this state and to defray the expenses arising in connection with such exhibit. The state controller, claiming that the appropriation made by the act was in direct contravention of that part of section 22, article IV, of the Constitution above quoted herein, declined to draw his warrant in favor of said commissioners on the fund so appropriated. After discussing that proposition adversely to the position of the controller, the court, in its opinion, made these significant observations:

"The defendant further contends that the statute is unconstitutional for the reason that the appropriation thereby made is not for a public use, such as the state is authorized to make; that the maintenance of an exhibition of the products of the state in the manner contemplated does not fall within the legitimate authority of the state government.

"In passing upon this proposition, it is necessary to bear in mind that what is for the public good, and what are public purposes, 'are questions which the legislature must decide upon its own judgment, in respect to which it is vested with a large discretion which cannot be controlled by the courts, except, perhaps, where its action is clearly *evasive*…. Where the power which is exercised is legislative in its character, the courts can enforce *only* those limitations which the Constitution imposes; not those implied restrictions which, resting in theory only, the people have been satisfied to leave to the judgment, patriotism, and sense of justice of their representatives.' (Cooley's Constitutional Limitations, 154.)

"It is undoubtedly true that public money can be rightfully expended only for public purposes, but as well said by that eminent jurist, Judge Cooley, in delivering the opinion of the court in ***669** *People v. Salem,* 20 Mich. 452, [4 Am. Rep. 400]: '*Necessity* alone is not the test by which the limits of state authority in this direction are to be defined, but a wise statesmanship must look beyond the expenditures which are absolutely needful to the continued existence of organized government, and embrace others which may tend to make that government *subserve the general well-being of society,* and advance the present and *prospective happiness and prosperity of the people.*'

"In view of these principles of constitutional law, which are so well settled as to be placed beyond discussion or dispute, it is manifest, we think, that the court is not authorized to declare the act under consideration void, upon the theory that the expenditure thereby authorized can in no manner be considered as tending to promote the public welfare, which it is one great object of government to secure. The question whether the public interests of the state would be at all advanced by an exhibition of its products such as is contemplated by the act was an appropriate one for discussion in the halls of the legislature before its enactment, and for the consideration of the Governor before approving it, but it is not one for this court to decide, upon the individual views of its members concerning the wisdom or expediency of such legislation.

"There is no difference, except in degree, between the appropriation contained in this act and those which for years have been made without any question as to their validity, for the support of the state agricultural fair, and the various district agricultural societies throughout the state. The fact that this exhibit of the products of the state is to be made without the limits of the state does not change its essential character, or make it any less an occasion or purpose in which, in an enlarged sense, it may be said that the people of the state have an interest. So, also, it would be hard to distinguish this appropriation in principle from those appropriations which have been made from time to time for the maintenance of horticultural, viticultural, and other similar commissions. None of these, strictly speaking, are required for the proper administration of the government of the state, and possibly, in the opinion of many, call for an unjustifiable and useless expenditure of money. But the power of the legislature to create such commissions has never been doubted.

***670** "We know from the express declaration of the act of Congress authorizing the Columbian Exposition that the purpose of the exposition is to commemorate the four hundredth anniversary of the discovery of America,

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'by an exhibition of the resources of the United States of America, their development, and of the progress of civilization in the New World'; and that such exhibition is to be of a 'national and international character, so that not only the people of the Union and of this continent, but those of all nations, as well, can participate.'

"We have no doubt that it was fairly a matter within the power of the legislature to determine whether, as a matter of public policy and as tending to advance the best interests of its citizens, this state should join with its sister states, and with the government of the United States, in celebrating in the way suggested the historical event referred to.

"It has been held in many cases that a municipal corporation has no authority, under the general powers usually given such corporations, to appropriate money for the celebration of the anniversary of important events in the history of our country, such as the Fourth of July (*Hodges v. Buffalo,* 2 Denio (N. Y.), 110; *Hood v. Lynn,* 1 Allen (Mass.), 103) and the surrender of Cornwallis. (*Tash v. Adams,* 10 Cush. (Mass.) 252. See, also, *The Liberty Bell,* 23 Fed. 844.)

"These decisions, however, all rest upon the principle that municipal corporations have no powers except such as are specifically granted by the act of incorporation, or are necessary for the purpose of carrying into effect the powers expressly granted. *But it has never been doubted that the state could confer upon a city or town the authority to celebrate such important events in the history of the country as appeal to the patriotism or higher sentiments of the people, and to tax their citizens to pay the expense thereof.* Thus it was held that the city of Philadelphia had the power under its charter to provide for the entertainment of distinguished visitors upon the occasion of the celebration of the Centennial Anniversary of American Independence. (*Tatham v. Philadelphia,* 11 Phila. (Pa.) 276.) So, also, in Massachusetts, by general statutes, the power has been conferred upon towns to celebrate the centennial anniversary of their incorporation (*Hill v. East Hampton,* 140 Mass. 381, [4 N. E. 811]), and also to appropriate money for the celebration of holidays, and for ***671** other public purposes. (*Hubbard v. Taunton,* 140 Mass. 467, [5 N. E. 157].)

"These cases are authority for the proposition that the state itself, unless restrained by its Constitution, has the power to make appropriations for such purposes, because unless it possesses the power, it could not confer it upon its municipal corporations. Such expenditures are justified under the general power which the state has to provide for the public welfare--the limits of which are perhaps not capable of exact definition--*and are the same in principle as appropriations made for the building of monuments to commemorate great historical events, or for the erection in public places of the statues of those who by common consent are classed among the patriots or benefactors of the nation.*

"Undoubtedly this power may be the subject of great abuse, but this is no argument against its existence. The only protection against reckless and improvident appropriations for public purposes must be found in the character of those intrusted with the power of legislation, and in the integrity and firmness of the chief executive of the state."

Obviously, there is a distinction between the act questioned in the Daggett case and the act involved in this proceeding with respect to the specific objects of the respective appropriations of the public money. Both, however, aim at the accomplishment of the same general object, viz., the promotion of the general public welfare. For, so far as the promotion of the public welfare is concerned, no distinction in importance or effect between the two acts can logically be pointed out. The exploitation of the industrial resources of a state is surely a matter which directly affects and, where such resources are in magnitude such as to demonstrate the natural material wealth and prosperity of the state, promotes the public welfare. No less may be said of public acts looking to the promotion and fostering in the citizens of a state or nation sentiments of patriotism, which, as we have shown, and as is most obviously true, constitutes the essential mainspring of every stable government. What, indeed, would industrial prosperity count for in a country whose government was without the support of the patriotism and loyalty of its subjects? The past political history of Russia, at this writing in the throes of bitter political disturbances and turbulences, may well stand as an answer to the question.

***672** As stated in the opinion in the Daggett case, *supra,* the question whether the public interests of the state as well as of the nation of which the former is an essential part will be advanced by the meeting in reunion at Vicksburg of the survivors of both sides of the Civil War that fought

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at the battle known in history by the name of that city was an appropriate one for discussion in the halls of the legislature before the appropriation was made by a legislative act, and for the consideration of the executive before approving it. We must assume that the legislature and the Governor had before them facts and data upon which they were enabled to predicate their judgment that the state and the Union would be materially benefited by the reunion and thus the public welfare and general well-being of society subserved. Their conclusion regarding the act cannot, therefore, be impeached by the courts.

There is no language or provision in the statute appropriating the money indicating that any individual will or can, if the appropriation be properly expended, or dispensed according to the face of the act, receive a single cent as a gratuity or by way of assistance, but that the money appropriated shall be expended in such manner as the executive shall determine will the better and the more effectively effectuate the specific objects of the appropriation and the ultimate purpose to be thereby subserved. And herein lies the distinction between the appropriation in question and that considered and properly held invalid by this court in the case of *McClure v. Nye,* 22 Cal. App. 248, [[[133 Pac. 1145]. The act in that case attempted to appropriate the sum of fifteen thousand dollars, out of the state treasury "for the purpose of paying the transportation of certain veterans of the Civil War to Gettysburg, Pennsylvania, on the occasion of the fiftieth anniversary of the battle fought on that battlefield." Obviously, upon the very face of that provision the appropriation amounted to nothing less than a gift of public moneys, and hence flew squarely in the face of the provision of our Constitution against thus disposing of our public revenues. In the present case, as seen, the appropriation is to be used on the occasion of the reunion at Vicksburg for the purpose of effectuating the great, central object of the gathering, as pointed out by the act of Congress and the act here in question, viz., to strengthen the fraternal ties of amity in the United States. ***673** As shown, no express provision is made by the act for the payment of the transportation of veterans or other persons to Vicksburg, though we doubt not that if, in furtherance of the paramount and ultimate object of the reunion, it be necessary to apply some of the money in sending representatives from California to the reunion or convention, such expenditure would come within the legitimate purposes of the appropriation and the right of the state to bear.

We are now brought to the consideration of the principal point upon which the attorney-general relies to impeach the constitutional validity of the appropriation, viz.: That the act making the appropriation is inconsistent with the provisions of section 34 of article IV of the Constitution, which is above reproduced in full herein. The gravamen of the attorney-general's argument in support of this position is that the language of the act is so uncertain and indefinite that it cannot be determined therefrom whether the appropriation thereby provided for is or is not for a public purpose. This argument, no doubt, comes from the language of the act, "for the purpose of assisting to defray the expenses of a *public nature,"* etc. It may be conceded that this language is so general as to be ambiguous as to the specific purpose of the appropriation, and if the act contained no further amplification of the purpose for which the appropriation is designed than may be implied from those words-- that is, that the appropriation was for some unexpressed or undiscovered purpose--it might be necessary to hold that the position of the attorney-general is well taken. But the language referred to is immediately followed by other language which clearly and with certainty expresses the specific purpose of the appropriation--a purpose which the legislature has found refers to the general welfare of the state and, therefore, the expenses necessary for its execution a burden which may properly be borne by the state.

There is no ground to support the argument that the appropriation is not for a "single" purpose within the meaning of that word as it is employed in the section of the Constitution mentioned. The sole and only purpose of the appropriation, as is clearly deducible from the language of the act, is to assist in defraying the expenses of a convention of persons who are so to meet in reunion to effectuate a purpose by the execution of which, according to the tenor of the act here in ***674** question and the act of Congress above referred to, the public welfare of the state will be subserved.

Nor is there any legal reason which will uphold the objection that the act is invalid because it vests in the Governor discretion as to the expenditure of the money appropriated. This provision was doubtless inserted in the act for the purpose of committing to the judgment of the executive the determination of the manner in which the appropriation may be expended to the best and highest interests of the state. If, for illustration, it becomes

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necessary to send representatives from the state to the reunion, it is only proper that the Governor, upon whom the act fixes the responsibility for the expenditure of the money, should be clothed with some discretionary power as to the number of persons so to be sent, and as to the amount of money that should reasonably be expended for defraying the expenses of such representatives to Vicksburg and back and while there during the progress of the convention. This should be true, since the act itself does not undertake to point out specifically how the money shall be used. Of course, the presumption is that the executive will perform his duty under the act faithfully and in furtherance of the objects and purposes intended to be subserved thereby.

Our conclusion is that the appropriation is perfectly valid, and, accordingly, a writ of mandate will issue out of this court commanding and requiring the respondent, state controller, to draw his warrant or warrants on the fund appropriated by the act in favor of the Governor of the state of California, as provided by said act, and, in accordance with the stipulation heretofore filed herein by the attorneys of the respective parties, said writ is ordered to issue forthwith.

Chipman, P. J., and Burnett, J., concurred.

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EXHIBIT 6
to Section 7

22 Cal.3d 208, 583 P.2d 1281, 149 Cal.Rptr. 239
Supreme Court of California

AMADOR VALLEY JOINT UNION HIGH SCHOOL DISTRICT et al., Petitioners,
v.
STATE BOARD OF EQUALIZATION et al., Respondents.
COUNTY OF ALAMEDA et al., Petitioners,
v.
STATE BOARD OF EQUALIZATION et al., Respondents.
CITY AND COUNTY OF SAN FRANCISCO et al., Petitioners,
v.
JOSEPH E. TINNEY, as Tax Assessor, etc., et al., Respondents

S.F. No. 23849., S.F. No. 23850., S.F. No. 23855.
September 22, 1978.

SUMMARY

Various governmental agencies and concerned citizens, invoking the original jurisdiction of the Supreme Court to resolve issues great public importance, challenged, on multiple constitutional grounds, the validity of Cal. Const., art. XIIIA, on its adoption by the electorate in 1978 as an initiative measure. Petitioners contended that the enactment, which changed the previous system of real property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments, constituted a revision of the Constitution and was therefore not adoptable through the initiative process (Cal. Const., art. XVIII). Petitioners also asserted that the single-subject requirement (Cal. Const., art. II, § 8, subd. (d)) and the title and summary-of-purpose requirements (Cal. Const., art. II, § 10; Elec. Code, §§ 3502, 3503, 3531) for initiative measures had been violated, and that the enactment violated the federal equal protection clause, impaired the constitutional right to travel, would inevitably result in impairment of contracts (U.S. Const., art. I, § 10, cl. 1) such as pension and health plan benefits, labor and other municipal contracts, ***209** and redevelopment agency bonds, and was in any event void for vagueness.

The Supreme Court denied the respective petitions, holding that the enactment survived each of the substantial challenges. The enactment, the court held, was a constitutional "amendment," not a "revision," and was therefore adoptable through the initiative process; and because the several elements of the measure were reasonably germane to, and functionally related in furtherance of, the underlying purpose of effective real property tax relief, the measure did not violate the single-subject requirement. The title and summary of purpose of the measure, though imprecise in certain particulars, substantially complied with the law, especially in view of their subsequent correction in all but two counties and in the voters' pamphlet. The federal equal protection clause, the court held, was not violated by the provision requiring property acquired prior to 1975 to be assessed and taxed at its full cash value as shown on the 1975-1976 tax bill, and property acquired thereafter to be assessed and taxed according to its appraised value at the time of acquisition; there was a rational basis for the provision, namely, the theory that the annual taxes that a property owner must pay should bear some rational relationship to the original cost of the property, predicated on the owner's free and voluntary act of purchase, rather than relate to an unforeseen, perhaps unduly inflated, current value. In any event, there is no legal requirement that property of equal current value must be taxed equally. Nor was the federal equal protection clause violated by the provision requiring that any "special taxes" imposed by a city, county, or special district must be approved by a two-thirds vote of its qualified electors; because persons who vote in favor of tax measures may not be deemed to represent a definite, identifiable class, equal protection principles do not forbid "debasing" their vote, or "favoring" the negative votes, by requiring a two-thirds approval of such measures. With respect to the claim of impairment of the constitutional right to travel resulting from the change from the current value system to the acquisition value method, it could equally be argued that under the former system prospective purchasers of real property might well have been deterred from purchasing (thereby impairing their right to travel) by reason of the unpredictable nature of future property tax liability resulting from unlimited inflationary pressures. The challenge based on the impairment of municipal contracts, the court held, was premature, even assuming petitioners, without producing evidence of any present, specific, and substantial impairments affecting them, had the standing to assert the ***210** claim; the enactment on its face neither directly repudiated any express covenant with municipal obligees nor immediately impaired any contract right. Finally, the court held that the enactment was not so vague in its essential terms as to

render it void and inoperable. As with other provisions of the Constitution, it would necessarily require judicial, legislative, and administrative construction, and it was already being implemented by extensive legislation and regulations that, if judicially challenged, could be dealt with on a case-by-case basis. (Opinion by Richardson, J., with Tobriner, Mosk, Clark, Manuel and Newman, JJ., concurring. Separate concurring and dissenting opinion by Bird, C. J.)

HEADNOTES

Classified to California Digest of Official Reports

(1)
Courts § 27--Supreme Court--Original Jurisdiction--Matters of Great Public Importance.
The original jurisdiction of the Supreme Court may properly be invoked where there is a need for prompt judicial resolution concerning matters of great public importance.

(2)
Initiative and Referendum § 6--State Elections--Initiative Measures-- Supreme Court Review.
In exercising its original jurisdiction to adjudicate the constitutionality of an initiative measure, such as one adopted by the voters of the state to limit the assessment and taxing powers of the state and local governments, the Supreme Court will restrict itself to an examination, in the light of established constitutional standards, of the principal, fundamental challenges to the validity of the initiative. The court will not consider or weigh the economic or social wisdom or general propriety of the initiative, and will defer analysis of the problems that may arise respecting the interpretation or application of particular provisions of the enactment for future cases in which those provisions are more directly challenged.

(3)
Initiative and Referendum § 6--State Elections--Initiative Measures-- Liberal Construction.
The power of initiative, reserved to the people under Cal. Const., art. IV, § 1, must be liberally construed to promote the democratic process. ***211**

(4a, 4b, 4c)
Constitutional Law § 3--Adoption and Alteration--Limitations on Taxing Power--Constitutional Amendment Adoptable Through Initiative Process.
Characterization of Cal. Const., art. XIIIA (changing the previous system of real property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments), as a constitutional "revision" could not validly be predicated on the theory that it would result in the loss of home rule or in a change from a "republican" form of government (lawmaking by elected representatives) to a "democratic" governmental plan (lawmaking directly by the people); the enactment would not necessarily result in the delegation, to the Legislature, of the power to make those revenue and budgetary decisions formerly left to local discretion and control, and § 4 of the enactment (requiring that any "special taxes" imposed by a city, county, or special district must be approved by a two-thirds vote of its qualified electors) was nothing novel to the existing governmental framework of California. The enactment, limited in purpose, could fairly be deemed a constitutional "amendment," and thus validly adoptable through the initiative process.

(5)
Constitutional Law § 3--Adoption and Alteration.
Under Cal. Const., art. XVIII, the voters may accomplish a constitutional "amendment" by the initiative process, but a constitutional "revision" may be adopted only after the convening of a constitutional convention and popular ratification or by legislative submission to the people.

(6)
Constitutional Law § 2--Definitions and Distinctions--"Revision"-- "Amendment."
Cal. Const., art. XVIII, contemplates that the principles underlying a constitutional "revision," and the substantial entirety of such a revision, shall be of a permanent and abiding nature similar to that of the Constitution itself. The term "amendment," on the other hand, implies such an additional change within the lines of the original constitutional instrument as will effect an improvement, or better carry out the purpose for which it was framed.

(7)
Constitutional Law § 3--Adoption and Alteration--Revision or Amendment--Quantitative and Qualitative Analysis.
An enactment that is so extensive in its provisions as to change directly the "substantial entirety" of the Constitution by the deletion or alteration ***212** of numerous existing provisions may well constitute a revision thereof. However, even a relatively simple enactment may accomplish such far-

reaching changes in the nature of our basic governmental plan as to amount to a revision also. Thus, a judicial analysis to determine whether a particular constitutional enactment is a revision or an amendment must be both quantitative and qualitative in nature.

(8)
Municipalities § 13--Legislative Control--"Home Rule."
The principle of home rule involves, essentially, the ability of local government (technically, chartered cities, counties, and cities and counties) to control and finance local affairs without undue interference by the Legislature.

(9a, 9b)
Initiative and Referendum § 6--State Elections--Initiative Measures--Single-subject Requirement.
Under Cal. Const., art. II, § 8, subd. (d) (providing that an "initiative measure embracing more than one subject may not be submitted to the electors or have any effect"), an initiative measure will not violate the single-subject requirement if, despite its varied collateral effects, all of its parts are "reasonably germane" to each other.

(10a, 10b, 10c)
Initiative and Referendum § 6--State Elections-- Initiative Measures--Single-subject Requirement--Limitations on Taxing Power.
Cal. Const., art. XIIIA (changing the previous system of real property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments), did not violate the single-subject requirement of Cal. Const., art. II, § 8, subd. (d) (providing that an "initiative measure embracing more than one subject may not be submitted to the electors or have any effect"). The advance publicity and public discussion of the tax-limiting provisions, as an initiative measure, were massive, and the several elements of the enactment were reasonably germane to, and functionally related in furtherance of, a common underlying purpose, namely, effective real property tax relief.

(11)
Initiative and Referendum § 6--State Elections--Initiative Measures-- Single-subject Requirement--Purpose.
Minimization of the risk of voter confusion and deception was one of the purposes of the single-subject requirement of Cal. Const., art. II, § 8, ***213** subd. (d) (providing that an "initiative measure embracing more than one subject may not be submitted to the electors or have any effect").

(12a, 12b, 12c, 12d)
Property Taxes § 7--Constitutional Provisions; Statutes and Ordinances--Equal Protection--Valuation of Property-- Date of Acquisition Versus Current Value.
The provision in Cal. Const., art. XIIIA, § 2 (requiring property acquired prior to 1975 to be assessed and taxed at its full cash value as shown on the 1975-1976 tax bill, and property acquired thereafter to be assessed and taxed according to its appraised value at the time of acquisition), did not constitute an arbitrary discrimination in violation of the equal protection clause of U.S. Const., 14th Amend. There is no legal requirement that property of equal current value must be taxed equally, and the rollback of an assessed value to the 1975-1976 fiscal year was comparable to the use of a "grandfather" clause similar to legislative provisions that are routinely upheld by the courts. The rational basis underlying § 2, satisfying the essential demand of equal protection, includes the theory that the annual taxes that a property owner must pay should bear some rational relationship to the original cost of the property, predicated on the owner's free and voluntary act of purchase, rather than relate to an unforeseen, perhaps unduly inflated, current value.

(13)
Appellate Review § 126--Constitutional Questions.
Generally, courts will not reach constitutional questions unless absolutely necessary to a disposition of the case before them.

(14a, 14b)
Constitutional Law § 82--Equal Protection--Classification--Legislative Power and Discretion--Taxation.
Where taxation is concerned and no specific federal right, apart from equal protection, is imperiled, the states have large leeway in making classifications and drawing lines that in their judgment produce reasonable systems of taxation. The latitude of discretion is notably wide in the classification of property for purposes of taxation and the granting of partial or total exemptions upon grounds of policy.

(15a, 15b)
Constitutional Law § 83--Equal Protection--Classification--Legislative Power and Discretion--Taxation--Judicial Review.

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So long as a system of state taxation is supported by a rational basis, and is not palpably arbitrary, it will be upheld despite ***214** the absence of a precise, scientific uniformity. The fact that a tax law discriminates in favor of a certain class does not make it arbitrary if the discrimination is founded upon a reasonable distinction, or difference in state policy, not in conflict with the federal Constitution.

[See **Cal.Jur.3d,** Constitutional Law, § 178; **Am.Jur.2d,** State and Local Taxation, § 150 et seq.]

(16)
Constitutional Law § 82--Equal Protection--Classification--Legislative Power and Discretion--Taxation.
A state is not limited to ad valorem taxation. It may impose different specific taxes upon different trades and professions and may vary the rate of excise upon various products. In levying such taxes, the state is not required to resort to close distinctions or to maintain a precise, scientific uniformity with reference to composition, use, or value.

(17)
Constitutional Law § 97--Equal Protection--Classification--Bases-- Voting Rights--Limitation on Local Taxing Power--Two-thirds Vote by Electorate.
Cal. Const., art. XIIIA, § 4 (requiring that any "special taxes" imposed by a city, county, or special district must be approved by a two-thirds vote of its qualified electors), did not violate the equal protection clause of U.S. Const., 14th Amend. Because persons who vote in favor of tax measures may not be deemed to represent a definite, identifiable class, equal protection principles do not forbid "debasing" their vote, or "favoring" the negative vote, by requiring a two-thirds approval of such measures.

(18a, 18b)
Constitutional Law § 52--First Amendment and Other Fundamental Rights of Citizens--Scope and Nature--Right to Travel--Property Taxes--Change From Current Value to Acquisition Value.
The right to travel was not unconstitutionally impaired by the provision in Cal. Const., art. XIIIA, changing the assessment and taxation of real property from a current value system to an acquisition value method. Under the former system, prospective purchasers of real property might well have been deterred from purchasing (thereby impairing their right to travel) by reason of the unpredictable nature of future property tax liability resulting from unlimited inflationary pressures.

(19)
Property Taxes § 31--Assessment--Change From Current Value to Acquisition Value--Purpose.
The change from a current value ***215** system to an acquisition value method provided by Cal. Const., art. XIIIA, § 2 (requiring property acquired prior to 1975 to be assessed and taxed at its full cash value as shown on the 1975-1976 tax bill, and property acquired thereafter to be assessed and taxed according to its appraised value at the time of acquisition), was intended to benefit all property owners, past and future, resident and nonresident, by reducing inflationary increases in their assessments, by limiting tax rates, and by permitting the taxpayer to make more careful and accurate predictions of future tax liability.

(20)
Constitutional Law § 72--Contract Rights, Vested Rights, and Retrospective Laws--Right to Contract and Impairment of Contract-- Constitutional Amendment Limiting Taxing Power--Premature Challenge.
A challenge by various governmental agencies and concerned citizens to Cal. Const., art. XIIIA (changing the previous system of real property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments), on the asserted basis that the operation of the enactment would result in the default of certain preexisting contractual obligations (including pension and health plan benefits, labor and other municipal contracts, and redevelopment agency bonds), and would therefore result in an unlawful impairment of contract (U.S. Const., art. I, § 10, cl. 1), was premature, even assuming petitioners had the standing to assert the claim. The enactment, on its face, neither directly repudiated any express covenant with municipal obligees nor immediately impaired any contract right, and petitioners failed to produce evidence of any present, specific, and substantial impairment affecting them or any specified municipal obligees, bondholders, or creditors.

(21a, 21b)
Initiative and Referendum § 6--State Elections--Initiative Measures--Title and Summary of Purpose--Sufficiency--Initiative Measure Limiting Taxing Power.
With respect to the initiative measure adopted by the voters as Cal. Const., art. XIIIA, changing the previous system of real

property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments, both the title "Initiative Constitutional Amendment-Property Tax Limitation" (though imprecise as implying that only property taxes would be affected) and the summary (though imprecise for failing to mention that § 4 of the measure required that any "special taxes" imposed by a city, ***216** county, or special district must be approved by a two-thirds vote of its qualified electors) substantially complied with the law, especially in view of their subsequent correction in all but two counties and in the voters' pamphlet, and in view of the extensive public debates on the measure in all of its several aspects.

(22)
Initiative and Referendum § 6--State Elections--Initiative Measures-- Title and Summary of Purpose--Object.
The requirements that, prior to the circulation of an initiative measure, the Attorney General prepare a title and summary of its chief purposes and points, not exceeding 100 words (Cal. Const., art. II, § 10, subd. (d); Elec. Code, §§ 3502, 3503), and that the statement be true and impartial, and not argumentative or likely to create prejudice for or against the measure (Elec. Code, § 3531), were designed to prevent the public from being misled by inaccurate information.

(23)
Initiative and Referendum § 6--State Elections--Initiative Measures-- Title and Summary of Purpose--Sufficiency.
Generally, the title and summary of an initiative measure, prepared by the Attorney General before its circulation, need not contain a complete catalogue or index of all of the measure's provisions, and are presumed to be accurate. Substantial compliance with the "chief purpose and points" provision (Elec. Code, §§ 3502, 3503) is sufficient, as is the title, if reasonable minds may differ as to its sufficiency.

(24a, 24b, 24c)
Constitutional Law § 10--Construction of Constitutions--Constitutional Amendment Limiting State and Local Taxing Powers--Validity Despite Vague Terms.
Cal. Const., art. XIIIA (changing the previous system of real property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments), though imprecise and ambiguous in a number of particulars, was not so vague and uncertain in its essential terms as to render it void and inoperable. As with other provisions of the Constitution, it would necessarily and over a period of time require judicial, legislative, and administrative construction, and was already being implemented by extensive legislation and regulations that, if judicially challenged, could be dealt with on a case-by-case basis.

(25)
Constitutional Law § 11--Construction of Constitutions--Liberality and Flexibility.
Because a written constitution is intended as, and ***217** is, the mere framework according to whose general outlines specific legislation must be framed and modeled, and is therefore necessarily couched in general terms or language, it is not to be interpreted according to narrow or super-technical principles, but liberally and on broad general lines, so that it may accomplish in full measure the objects of its establishment and so carry out the great principles of government.

(26)
Constitutional Law § 10--Construction of Constitutions--To Uphold Validity.
In the abstract, provisions in a constitution should be interpreted when possible to uphold their validity, and courts should construe them to give specific content to terms that might otherwise be unconstitutionally vague.

(27)
Constitutional Law § 12--Construction of Constitutions--Background, Purpose, and Intent of Enactment.
A constitutional amendment should generally be construed in accordance with the natural and ordinary meaning of its words, but the literal language may be disregarded to avoid absurd results and to fulfill the apparent intent of the framers.

(28)
Constitutional Law § 16--Construction of Constitutions--Contemporaneous and Long-standing Construction-By Legislature and Administration.
Apparent ambiguities in a new enactment may frequently be resolved by the contemporaneous construction of the Legislature or of the administrative agencies charged with implementing it; additionally, when the enactment follows voter approval, the ballot summary and arguments and analysis presented to the electorate may be helpful in determining the probable meaning of uncertain language.

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RICHARDSON, J.

In these consolidated cases, we consider multiple constitutional challenges to an initiative measure which was adopted by the voters of this state at the June 1978 primary election. This measure, designated on the ballot as Proposition 13 and commonly known as the Jarvis-Gann initiative, added article XIII A to the California Constitution. Its provisions are set forth in their entirety in the appendix to this opinion. (See *post*, at p. 257.) As will be seen, the new article changes the previous system of real property taxation and tax procedure by imposing important limitations upon the assessment and taxing powers of state and local governments. ***219**

Petitioners, and the amici supporting them, are various governmental agencies and concerned citizens, each of whom has alleged actual or potential adverse effects resulting from the adoption and ultimate operation of the article. (Hereafter we refer jointly to all petitioners and their amici as petitioners, and refer to all respondents herein and those amici urging the validity of XIII A as respondents.) (1) The issues herein presented are of great public importance and should be resolved promptly. Under well settled principles petitioners, accordingly, have properly invoked the exercise of our original jurisdiction. (See *California Housing Finance Agency v. Elliott* (1976) 17 Cal.3d 575, 580 [131 Cal.Rptr. 361, 551 P.2d 1193]; *County of Sacramento v. Hickman* (1967) 66 Cal.2d 841, 845 [59 Cal.Rptr. 609, 428 P.2d 593].)

(2) We stress initially the limited nature of our inquiry. We do not consider or weigh the economic or social wisdom or general propriety of the initiative. Rather, our sole function is to evaluate article XIII A legally in the light of established constitutional standards. We further emphasize that we examine only those principal, fundamental challenges to the validity of article XIII A as a whole. In doing so we reaffirm and readopt an analytical technique previously used by us in adjudicating attacks upon similar enactments, in which "Analysis of the problems which may arise respecting the interpretation or application of particular provisions of the act should be deferred for future cases in which those provisions are more directly challenged." (*County of Nevada* v. *MacMillen* (1974) 11 Cal.3d 662, 666 [114 Cal.Rptr. 345, 522 P.2d 1345] [declaratory relief action to determine validity of the 1973 conflict of interest law, Gov. Code, § 3600 et seq.].) As will appear, we have concluded that, notwithstanding the existence of some unresolved uncertainties, as to which we reserve judgment, the article nevertheless survives each of the serious and substantial constitutional attacks made by petitioners.

(3) It is a fundamental precept of our law that, although the legislative power under our constitutional framework is firmly vested in the Legislature, "the people reserve to themselves the powers of initiative and referendum." (Cal. Const., art. IV, § 1.) It follows from this that, "'[the] power of initiative must be liberally construed ... to promote the democratic process.'" (*San Diego Bldg. Contractors Assn. v. City Council* (1974) 13 Cal.3d 205, 210, fn. 3 [***220** 118 Cal.Rptr. 146, 529 P.2d 570, 72 A.L.R.3d 973] and cases cited; see *Associated Home Builders etc., Inc. v. City of Livermore* (1976) 18 Cal.3d 582, 591 [135 Cal.Rptr. 41, 557 P.2d 473].) Bearing in mind the foregoing interpretive aid,

we briefly review the basic provisions of article XIII A. We caution that, save only as to the specific constitutional issues resolved, our summary description and interpretation of the article and of the implementing legislation and regulations do not preclude subsequent challenges to the specific meaning or validity of those enactments.

The new article contains four distinct elements. The first imposes a limitation on the *tax rate* applicable to real property: "The maximum amount of any ad valorem tax on real property shall not exceed one percent (1%) of the full cash value of such property ...." (§ 1, subd. (a).) (This limitation is made specifically inapplicable, under subd. (b), to property taxes or special assessments necessary to pay prior indebtedness approved by the voters.) The second is a restriction on the *assessed value* of real property. Section 2, subdivision (a), provides: "The full cash value means the County Assessors valuation of real property as shown on the 1975-76 tax bill under 'full cash value,' or thereafter, the appraised value of real property when purchased, newly constructed, or a change in ownership has occurred after the 1975 assessment ...." Subdivision (b) permits a maximum 2 percent annual increase in "the fair market value base" of real property to reflect the inflationary rate.

The third feature limits the method of changes in *state* taxes: "From and after the effective date of this article, any changes in State taxes enacted for the purpose of increasing revenues collected pursuant thereto whether by increased rates or changes in methods of computation must be imposed by an Act passed by not less than two-thirds of all members ... of the Legislature, except that no new ad valorem taxes on real property, or sales or transaction taxes on the sales of real property may be imposed." (§ 3.) The fourth element is a restriction upon *local* taxes: "Cities, Counties and special districts, by a two-thirds vote of the qualified electors of such district, may impose special taxes on such district, except ad valorem taxes on real property or a transaction tax or sales tax on the sale of real property within such City, County or special district." (§ 4.) (The remaining sections relate to the effective dates (§ 5) and severability (§ 6) of the provisions of the new article.)

We examine petitioners' specific contentions. ***221**

1. *Constitutional Revision or Amendment*

(4a) The petitioners' primary argument is that article XIII A represents such a drastic and far-reaching change in the nature and operation of our governmental structure that it must be considered a "revision" of the state Constitution rather than a mere "amendment" thereof. (5) As will appear, although the voters may accomplish an amendment by the initiative process, a constitutional revision may be adopted only after the convening of a constitutional convention and popular ratification or by legislative submission to the people. Because a revision may not be achieved through the initiative process, petitioners' first contention strikes at the very validity of article XIII A in its inception and in its entirety. Were we to conclude that the Proposition 13 initiative constituted a revision not an amendment, that would end our inquiry; the initiative would be invalid for its failure to meet the constitutional requirements of a revision.

The applicable constitutional provisions are specific. Article XVIII (entitled "Amending and Revising the Constitution") presently provides in full:

"Sec. 1. *The Legislature* by rollcall vote entered in the journal, two-thirds of the membership of each house concurring, *may propose an amendment or revision* of the Constitution and in the same manner may amend or withdraw its proposal. Each amendment shall be so prepared and submitted that it can be voted on separately.

"Sec. 2. *The Legislature* by rollcall vote entered in the journal, two-thirds of the membership of each house concurring, *may submit* at a general election the question whether to call a convention to *revise* the Constitution. If the majority vote yes on that question, within 6 months the Legislature shall provide for the convention. Delegates to a constitutional convention shall be voters elected from districts as nearly equal in population as may be practicable.

"Sec. 3. *The electors may amend* the Constitution *by initiative*.

"Sec. 4. A proposed amendment or revision shall be submitted to the electors and if approved by a majority of votes thereon takes effect the day after the election unless the measure provides otherwise. If provisions of 2 or more measures approved at the same election conflict, those of the ***222** measure receiving the highest affirmative vote shall prevail." (Italics added.)

We think it significant that prior to 1962 a constitutional revision could be accomplished *only* by the elaborate procedure of the convening of, and action by, a constitutional convention (art. XVIII, § 2). This fact suggests that the term "revision" in section XVIII originally was intended to refer to

a substantial alteration of the entire Constitution, rather than to a less extensive change in one or more of its provisions. (6) Many years ago, in *Livermore* v. *Waite* (1894) 102 Cal. 113, 118-119 [36 P. 424], we described the fundamental distinction between revision and amendment as follows: "The very term 'constitution' implies an instrument of a permanent and abiding nature, and the provisions contained therein for its revision indicate the will of the people that the underlying principles upon which it rests, as well as the substantial entirety of the instrument, shall be of a like permanent and abiding nature. On the other hand, the significance of the term 'amendment' implies such an addition or change within the lines of the original instrument as will effect an improvement, or better carry out the purpose for which it was framed."

While the Constitution itself does not specifically distinguish between revision and amendment, we are considerably aided in an evaluation of petitioners' primary argument by our earlier analysis of the issue in *McFadden v. Jordan* (1948) 32 Cal.2d 330 [196 P.2d 787] (cert den., 336 U.S. 918 [93 L.Ed. 1080, 69 S.Ct. 640]). In *McFadden*, we struck down an initiative measure which would have added 21,000 words to our then existing 55,000-word Constitution. We held that the initiative was "revisory rather than amendatory in nature," because of the "far reaching and multifarious substance of the measure ..." (p. 332) which dealt with such varied and diverse subjects as retirement pensions, gambling, taxes, oleomargarine, healing arts, civic centers, senate reapportionment, fish and game, and surface mining. We noted that the proposal would have repealed or substantially altered at least 15 of the 25 articles which then comprised the Constitution. (P. 345.)

We held in *McFadden* that the measure under scrutiny therein was clearly a revision, both because of its varied aspects and because of the "substantial curtail[ment]" of governmental functions which it would cause. (Pp. 345-346.) For example, one provision would have created a state pension commission with comprehensive governmental powers to be exercised by five named commissioners. We concluded that "The ***223** delegation of far reaching and mixed powers to the commission, largely, if not almost entirely in effect, unchecked, places such commission substantially beyond the system of checks and balances which heretofore has characterized our governmental plan." (P. 348.)

In addition, although the subject of taxation was only one of many covered by the *McFadden* initiative, nevertheless we observe that the proposed taxation amendment would have accomplished, *by itself*, a far more substantial change in the state's taxation scheme than that effected by Proposition 13. The far reaching nature of the *McFadden* measure is demonstrated by the fact that it not only would have destroyed the power of cities and counties to tax and regulate their own budgets and expenditures (p. 344), but also the 2 percent gross receipts tax proposed therein was to have been *the only tax* permitted to any agency on real or personal property, or on any business enterprises. (Pp. 336-337.)

Finally, we stressed in *McFadden* that "The proposal is offered as a *single amendment* but it obviously is multifarious. It does not give the people an opportunity to express approval or disapproval severally as to each major change suggested; rather does it, apparently, have the purpose of aggregating for the measure the favorable votes from electors of many suasions who, wanting strongly enough any one or more propositions offered, might grasp at that which they want, tacitly accepting the remainder. Minorities favoring each proposition severally might, thus aggregated, adopt all. Such an appeal might well be proper in voting on a *revised* constitution, proposed under the safeguards provided for such a procedure, but it goes beyond the legitimate scope of a single amendatory article." (P. 346, italics in original.)

(7) Taken together our *Livermore* and *McFadden* decisions mandate that our analysis in determining whether a particular constitutional enactment is a revision or an amendment must be both quantitative and qualitative in nature. For example, an enactment which is so extensive in its provisions as to change directly the "substantial entirety" of the Constitution by the deletion or alteration of numerous existing provisions may well constitute a revision thereof. However, even a relatively simple enactment may accomplish such far reaching changes in the nature of our basic governmental plan as to amount to a revision also. In illustration, the parties herein appear to agree that an enactment which purported to vest all judicial power in the Legislature would amount to a revision without regard either to the length or complexity of the measure or the number of existing articles or sections affected by such change. ***224**

(4b) In both its quantitative and qualitative aspects, however, article XIII A appears demonstrably less sweeping than the initiative measure at issue in *McFadden*. As noted above, the *McFadden* measure consisted of 21,000 words and covered many different subjects, whereas XIII A comprises approximately 400 words and, as we discuss more fully below, is limited to the single subject of taxation (with

particular emphasis upon real property taxation). Although petitioners suggest that 8 articles and 37 sections of the existing Constitution may be affected by the new article, our analysis suggests that the article's quantitative effect is less extensive.

Our review of petitioners' description of numerous asserted changes indicates that the claims may be based upon possible errors in petitioners' interpretation of the new article. For example, they argue that at least three constitutional articles will be modified by the new requirement that the available real property tax revenues be apportioned "to the districts *within* the counties" (§ 1, subd. (a), italics added), thereby excluding those districts which encompass more than a single county. However, implementing legislation has included such multi-county districts within the tax allocation scheme. (See Gov. Code, § 26912, subd. (d).) In addition, petitioners assume that article XIII A will annul or amend the various "home rule" provisions of the state Constitution (art. XI, §§ 3-7), an assumption we discuss and reject below. Finally, we note that the majority of those changes emphasized by petitioners pertain to a single existing constitutional provision, article XIII, which already contains 33 separate sections dealing with the subject of taxation and assessment procedure. Since article XIII doubtless was premised upon the assumption that local taxation would be unrestricted by any tax rate and assessment limitations such as those adopted by XIII A, it is not surprising that many of these sections may be said to be affected by the new taxation scheme. Nevertheless, we decline to hold that article XIII A accomplished a revision of the Constitution by reason of its *quantitative* effect upon the existing provisions of that document.

Petitioners insist, however, that the new article also will have far reaching *qualitative* effects upon our basic governmental plan, in two principal particulars, namely, (1) the loss of "home rule" and (2) the conversion of our governmental framework from "republican" to "democratic" form. A close analysis of XIII A convinces us that its probable effects are not as fundamentally disruptive as petitioners suggest.

a.) *Loss of home rule*. (8) The principle of home rule involves, essentially, the ability of local government (technically, chartered cities, ***225** counties, and cities and counties) to control and finance local affairs without undue interference by the Legislature. (See, e.g., *Weekes v. City of Oakland* (1978) 21 Cal.3d 386, 399-400 [conc. opn.], 422-426 [dis. opn.] [146 Cal.Rptr. 558, 579 P.2d 449], and authorities cited; *Bishop v. City of San Jose* (1969) 1 Cal.3d 56, 61-63 [81 Cal.Rptr. 465, 460 P.2d 137].) (4c) It is undeniably true that a constitutional limitation upon prevailing local taxation rates and assessments will have a potentially limiting effect upon the management and resolution of local affairs. Reduced taxes may be expected to generate reduced revenues, inevitably resulting in a corresponding curtailment of locally financed services and programs. To conclude, however, that the mere imposition of tax limitations, per se, accomplishes a constitutional revision would in effect bar the people from ever achieving *any* local tax relief through the initiative process. Petitioners have cited to us no authorities which support such a broad proposition, and our own research, disclosing only one case, indicates a contrary rule. (See *School Dist. of City of Pontiac v. City of Pontiac* (1933) 262 Mich. 338 [247 N.W. 474, 477] [initiative measure adopting a 1 1/2 percent tax limitation on assessed value, and requiring two-thirds approval of electorate to increase taxes, was a constitutional amendment, not a revision].)

Petitioners insist, however, that article XIII A has an additional effect beyond the mere limitation of tax revenues, namely, the vesting in the Legislature of the power to allocate to local governmental agencies the revenues derived from real property taxation. It is suggested that, by reason of the operation of section 1, subdivision (a), of article XIII A (allocating the revenues from the 1 percent maximum tax "according to law"), the Legislature is thereby empowered, at its whim, and upon whatever conditions it may impose, to pick and choose among the local agencies, rewarding "deserving" agencies with substantial amounts while penalizing others by reduced awards. Certainly nothing on the face of the article, however, abrogates home rule to this extent, or discloses any intent to undermine or subordinate preexisting constitutional provisions on that subject (Cal. Const., art. XI, §§ 3-7). Indeed, present legislative implementation of article XIII A reveals that such a result has not ensued. For several reasons, petitioners' fears in this connection seem illusory and ill-founded.

First, it is clear that even prior to the adoption of article XIII A, the Constitution authorized the Legislature to "provide maximum property tax rates and bonding limits for local government" (art. XIII, § 20), to ***226** provide similar limits for school districts (*id*., § 21), and to grant exemptions from real property taxation in favor of certain specified classes of property (*id*., § 4). Thus, from the standpoint of legislative control, the new article appears potentially no more threatening to home rule than these preexisting constitutional limitations.

Second, wholly unlike the *McFadden* initiative, article XIII A neither destroys nor annuls the taxing power of local agencies. Although revenues derived from real property taxes may well be substantially reduced by reason of the new tax rate and assessment restrictions (§§ 1, 2), local agencies retain full authority to impose "special taxes" (other than certain real property taxes) if approved by a two-thirds vote of the "qualified electors." (§ 4.) Although the interpretation of the foregoing quoted provisions is not presently before us, it seems evident that section 4 assists in preserving home rule principles by leaving to *local* voters the decision whether or not to authorize "special" taxes to support *local* programs.

Third, article XIII A does not by its terms empower the Legislature to direct or control local budgetary decisions or program or service priorities, and we have no reason to assume that the Legislature will attempt to exercise its powers in such a manner as to interfere with local decision-making. Certainly, local agencies retain the same constitutional and statutory authority over municipal affairs which they possessed and exercised prior to the adoption of the new article. The mere fact of reduction in local revenues does not lead us necessarily to the conclusion that local agencies have forfeited control over allocations and disbursements of their remaining funds.

Finally, recent implementing legislation (Stats. 1978, chs. 292, 332) confirms the Legislature's present intention to preserve home rule and local autonomy respecting the allocation and expenditure of real property tax revenues. Although this legislation is, of course, subject to future change and, accordingly, is not conclusive on the point, the present pattern of legislative implementation of article XIII A appears to refute petitioners' premise that the article *necessarily and inevitably* has resulted or will result in the loss of home rule. Among other provisions, the Legislature has enacted Government Code section 26912 which contains the formulae whereby county auditors must allocate to various local agencies and school districts within county boundaries the revenues to be derived from the 1 percent maximum real property tax during the fiscal ***227** year 1978-1979. Although these formulae are somewhat complex, in general they aim at allocating these funds on a *pro rata basis*, without imposing any condition whatever regarding their ultimate use. Each "local agency" (city, county, city and county, and special district) is to receive a proportionate share based upon its average property tax revenues during the previous three fiscal years. (Gov. Code, § 26912, subds. (a), (b)(1).) Similarly, each school district, county superintendent of schools, and community college district, is to receive a proportionate share based upon the entity's average property tax revenues for the 1977-1978 fiscal year. (*Id*., subd. (b)(2).)

The foregoing tax allocation scheme is evidently intended to assure that each local agency and school district will receive approximately the same percentage of the total tax revenues as it had previously received. Thus, contrary to petitioners' fears and assumptions, the adoption of XIII A need not *necessarily* result either in abrogation of home rule in this state or in the delegation to the Legislature of the power to make those revenue and budgetary decisions formerly left to local discretion and control. (Other sections of the new legislation contain formulae for allocating the state's surplus tax funds. These provisions do not relate to the distribution of revenues from real property taxation and, accordingly, they are not relevant to our present discussion, except insofar as the availability of these funds may minimize the impact of the reduction in local tax revenues.)

b.) *Loss of republican form of government*. Continuing their thesis that XIII A is a constitutional revision not an amendment under our *McFadden* holding, petitioners next maintain that the operation of the article, and particularly section 4 thereof, will result in a change from a "republican" form of government (i.e., lawmaking by elected representatives) to a "democratic" governmental plan (i.e., lawmaking directly by the people).

Contrary to petitioners' assertion, however, we are convinced that article XIII A is more modest both in concept and effect and does not change our basic governmental plan. Following the adoption of article XIII A both local and state government will continue to function through the traditional system of elected representation. Other than in the limited area of taxation, the authority of local government to enact appropriate laws and regulations remains wholly unimpaired. The requirement of section 4 that any "special taxes" must be approved by a two-thirds vote of the "qualified electors" restricts but does not abolish the power of local ***228** governments in the raising of revenue. We decline to hold that such a "super-majority" requirement, the two-thirds vote, standing alone and limited to the subject of taxes, constitutes a substantial constitutional revision which cannot be accomplished through an initiative. Similar voting requirements in financial matters have not been uncommon. For example, prior to the adoption of article XIII A, our Constitution required the assent of two-thirds of the qualified

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electors to incur indebtedness exceeding in any year the income and revenue provided for that year. (Art. XVI, § 18.) We have, within another context, previously described other examples of constitutional provisions sanctioning deviations from simple "majority rule." (See *Westbrook v. Mihaly* (1970) 2 Cal.3d 765, 797-798, fn. 64 [87 Cal.Rptr. 839, 471 P.2d 487].)

It should be borne in mind that notwithstanding our continuing representative and republican form of government, the initiative process itself adds an important element of direct, active, democratic contribution by the people. (See *In re Pfahler* (1906) 150 Cal. 71, 77-78 [88 P. 270] [holding that the constitutional guarantee of a republican form of government is inapplicable to the local governmental level].) We thus conclude that section 4 of article XIII A, and its requirement of substantial popular support, beyond that of a bare majority for the approval and adoption of "special" local taxes adds nothing novel to the existing governmental framework of this state.

In summary, we believe that it is apparent that article XIII A will result in various substantial changes in the operation of the former system of taxation. Yet, unlike the alterations effected by the *McFadden* initiative discussed above, the article XIII A changes operate functionally within a relatively narrow range to accomplish a new system of taxation which may provide substantial tax relief for our citizens. We decline to hold that such a limited purpose cannot be achieved directly by the people through the initiative process. As succinctly and graphically expressed a number of years ago in a study of the California procedure, "... the initiative is in essence *a legislative battering ram* which may be used to tear through the exasperating tangle of the traditional legislative procedure and strike directly toward the desired end. Virtually every type of interest-group has on occasion used this instrument. It is deficient as a means of legislation in that it permits very little balancing of interests or compromise, but it was designed primarily for use in situations where the ordinary machinery of legislation had utterly failed in this respect. It has served, with varying degrees of efficacy, as a vehicle for the advocacy of action ***229** ultimately undertaken by the representative body." (Key & Crouch, The Initiative and the Referendum in Cal. (1939) p. 485, italics added.)

The foregoing language, written almost 40 years ago, seems remarkably prophetic given the apparent historic origins of article XIII A. Although we express neither approval nor disapproval of the article from the standpoint of sound fiscal or social policy, we find nothing in the Constitution's revision and amendment provisions (art. XVIII) which would prevent the people of this state from exercising their will in the manner herein accomplished. Indeed, if the foregoing description of the initiative as a "legislative battering ram" is accurate it would seem anomalous to insist, as petitioners in effect do, that the sovereign people cannot themselves act directly to adopt tax relief measures of this kind, but instead must defer to the Legislature, their own representatives. We conclude that article XIII A fairly may be deemed a constitutional amendment, not a revision.

2. *The Single-subject Requirement*

(9a) Our Constitution provides that "An initiative measure embracing more than one subject may not be submitted to the electors or have any effect." (Art. II, § 8, subd. (d).) (10a) Acknowledging that its general reference is to the subject of taxation, petitioners nonetheless argue that article XIII A covers many subjects and, indeed, is so sweeping and extensive in its practical effect and import as to encompass nearly the entirety of "government." In this regard, their argument is somewhat related to their prior contention that article XIII A constitutes a revision of the Constitution, rather than an amendment. Accordingly, many of our previous observations regarding the revision and amendment procedures have application to their one-subject assertions.

The single-subject requirement of article II was adopted in 1948, possibly in response to the many-faceted initiative measure which we invalidated in *McFadden, supra*. Only a year later, in *Perry v. Jordan* (1949) 34 Cal.2d 87 [207 P.2d 47], we had occasion to construe the new constitutional provision. In *Perry*, we adopted and applied the "reasonably germane" test previously developed by earlier decisions construing a similar single-subject restriction applicable to legislation (see Cal. Const., art. IV, § 9). We quoted with approval the following language from an earlier opinion in which we had upheld the legislative adoption of the Probate Code in a single enactment: "... [W]e are of the view that the [single-subject] provision is not to receive a narrow or technical construction ***230** in all cases, but is to be construed liberally to uphold proper legislation, *all parts of which are reasonably germane*. [Citation.] The provision was not enacted to provide means for the overthrow of legitimate legislation. [Citation.] [¶] Numerous provisions, *having one general object*, if fairly indicated in the title, may be united in one act. Provisions governing projects so related and interdependent as to constitute *a single scheme*

may be properly included within a single act. [Citation.] The legislature may insert in a single act all legislation *germane* to the general subject as expressed in its title and within the field of legislation suggested thereby. [Citation.] ... A provision which conduces to the act, or which is auxiliary to and promotive of its main purpose, or has a necessary and natural connection with such purpose is *germane* within the rule ....” (*Evans v. Superior Court* (1932) 215 Cal. 58, 62-63 [8 P.2d 467], italics added.)

In *Perry*, the challenged initiative measure had as its general subject the repeal of constitutional provisions governing aid to the aged and blind. We noted that the repeal measure would have several collateral effects, including (1) vesting the Legislature with power to reduce pension payments, (2) giving the counties the responsibility of administering pension programs, (3) imposing on relatives liability for benefits, and (4) raising the minimum age qualification for benefits. (*Perry v. Jordan, supra*, 34 Cal.2d at pp. 93-94.) Nonetheless, and referring to the foregoing features of the initiative, we unanimously rejected the single-subject challenge, observing that “All those things obviously pertain to any plan—single subject—of aid to the needy aged and blind. They are merely administrative details.” (*Id*., at p. 94.)

(9b) We thus draw from *Perry* its primary lesson that an initiative measure will not violate the single-subject requirement if, despite its varied collateral effects, all of its parts are “reasonably germane” to each other. We note also the existence of a more restrictive test recently proposed in the dissenting opinion of Justice Manuel in *Schmitz v. Younger* (1978) 21 Cal.3d 90, 100 [145 Cal.Rptr. 517, 577 P.2d 652], wherein he suggested that “an initiative's provisions must be functionally related in furtherance of a common underlying purpose.” (10b) Our analysis of article XIII A convinces us that the several elements of that article satisfy either standard in that they are both reasonably germane to, *and* functionally related in furtherance of, a common underlying purpose, namely, effective real property tax relief. ***231**

As previously noted, article XIII A consists of four major elements, a real property *tax rate* limitation (§ 1), a real property *assessment* limitation (§ 2), a restriction on *state* taxes (§ 3), and a restriction on *local* taxes (§ 4). Although petitioners insist that these four features constitute separate *subjects*, we find that each of them is reasonably interrelated and interdependent, forming an interlocking “package” deemed necessary by the initiative's framers to assure effective real property tax relief. Since the total real property tax is a function of both rate and assessment, sections 1 and 2 unite to assure that *both* variables in the property tax equation are subject to control. Moreover, since any tax savings resulting from the operation of sections 1 and 2 could be withdrawn or depleted by additional or increased state or local levies of other than property taxes, sections 3 and 4 combine to place restrictions upon the imposition of such taxes. Although sections 3 and 4 do not pertain solely to the matter of *property* taxation, both sections, in combination with sections 1 and 2, are reasonably germane, and functionally related, to the general subject of property tax relief.

(11) Among other purposes, the single-subject requirement was enacted to minimize the risk of voter confusion and deception. (*Schmitz v. Younger, supra*, 21 Cal.3d 90, 97 [dis. opn.].) (10c) We may take judicial notice of the fact that the advance publicity and public discussion of article XIII A and its predicted effects were massive. (Evid. Code, § 452, subd. (g).) The measure received as much public attention as any other ballot proposition in recent years. These circumstances would seem to dilute the risk of voter confusion or deception by reason of the inclusion of the four principal features of the article in one ballot proposition. Moreover, the official voters pamphlet mailed to all registered voters contained an elaborate and detailed explanation of the various elements of Proposition 13. (See *Morris v. Priest* (1971) 14 Cal.App.3d 621, 625 [92 Cal.Rptr. 476].)

Petitioners contend, however, that adoption of XIII A violated a second important purpose underlying the single-subject requirement, namely, to avoid “exploiting” the initiative process by combining in a single measure several provisions which might not have commanded majority support if considered separately. (See *McFadden v. Jordan, supra*, 32 Cal.2d 330, 346.) Petitioners rely upon cases from several other jurisdictions expressing this principle. For example, in *Kerby v. Luhrs* (1934) 44 Ariz. 208 [36 P.2d 549], the court struck down an initiative measure which would have added to the Arizona Constitution such diverse provisions as (1) a new tax on copper production, (2) a new method of valuing public utility ***232** property, and (3) a new state tax commission. According to the court in *Kerby*, any of these provisions, singly, could have been adopted “without the slightest need of adopting” the others. (P. 554.) Although each provision related to the general subject of “taxation,” the *Kerby* court found no other connection between them, characterizing the measure as “logrolling of the worst type ....” (P. 555.)

Unlike the enactment condemned in *Kerby*, however, the four elements of article XIII A not only pertain to the general subject of taxation, but also are reasonably interdependent and functionally related to each other. More importantly, no apparent "logrolling" is involved in this case. Each of the four basic elements of article XIII A was designed to interlock with the others to assure an effective tax relief program.

Petitioners assert that each of the four separate elements of article XIII A might not have been approved had each element appeared separately on the ballot. They speculate that various classes of voters may have favored some, but not all, of these elements; petitioners would require a showing that *each* of the several provisions of an initiative measure is capable of gaining approval by the electorate, independent of the other provisions. We are unable to accept such a contention, concluding that petitioners' proposed single-subject test is far too strict, and lacks support in the authorities. Aside from the obvious difficulty of ever establishing satisfactorily such "independent voter approval," this standard would defeat many legitimate enactments containing isolated, arguably "unpopular," provisions reasonably deemed necessary to the integrated functioning of the enactment as a whole. We avoid an overly strict judicial application of the single-subject requirement, for to do so could well frustrate legitimate efforts by the people to accomplish integrated reform measures. As we have previously observed, the initiative procedure itself was specifically intended to accomplish such kinds of reforms through its function as a "legislative battering ram." We should dull or blunt its force only for reasons that are constitutionally mandated, and accordingly we conclude that article XIII A does not violate the single-subject requirement of article II.

3. *Equal Protection of the Laws*

Petitioners' equal protection argument against article XIII A is directed at two aspects of the article. They contend that (1) the "rollback" of assessed valuation (§ 2, subd. (a)) assertedly will result in invidious discrimination between owners of similarly situated property, and that (2) ***233** the two-third voting requirement for enacting "special taxes" by local agencies (§ 4) unduly discriminates in favor of those voters casting negative votes. As will appear, we hold that neither contention has merit.

a.) *1975-1976 Assessment Date*. (12a) As we have noted, section 2, subdivision (a), of article XIII A provides that "The full cash value [to which the 1 percent maximum tax applies] means the County Assessors valuation of real property as shown on the 1975-76 tax bill under 'full cash value,' or thereafter, the appraised value of real property when purchased, newly constructed, or a change in ownership has occurred after the 1975 assessment. All real property not already assessed up to the 1975-76 tax levels may be reassessed to reflect that valuation." (§ 2, subd. (b), permits an annual 2 percent maximum increase on the "fair market value base" of property, to reflect the inflationary rate.) Petitioners emphasize that, by reason of the "rollback" of assessed value to the 1975-1976 fiscal year, two substantially identical homes, located "side-by-side" and receiving identical governmental services, could be assessed and taxed at different levels depending upon their date of acquisition. Such a disparity in tax treatment, petitioners claim, constitutes an arbitrary discrimination in violation of the federal equal protection clause (Amend. XIV, § 1).

Preliminarily, we note that petitioners' equal protection challenge, arguably, is premature. (13) As a general rule, courts will not reach constitutional questions "unless absolutely necessary to a disposition" of the case before them (*Bayside Timber Co.* v. *Board of Supervisors* (1971) 20 Cal.App.3d 1, 5-6 [97 Cal.Rptr. 431]), and we could decline to consider the issue in the abstract and instead await its resolution within the framework of an actual controversy wherein the disparity is pivotal.

(12b) Nevertheless, we have elected to treat the equal protection issue as constituting an attack upon the face of the article itself, because the assessors throughout this state must be advised whether to follow the new assessment procedure. As will appear, we will conclude that the essential demands of equal protection are satisfied by a rational basis underlying section 2 of the new article.

(14a) The general principles applicable to the determination of an equal protection challenge to state tax legislation were recently summarized by the United States Supreme Court as follows: "We have long held that '[w]here taxation is concerned and no specific federal right, apart from equal protection, is imperiled, the States have large leeway in ***234** making classifications and drawing lines which in their judgment produce reasonable systems of taxation.' [Citation.] (15a) A state tax law is not arbitrary although it 'discriminate[s] in favor of a certain class ... if the discrimination is founded upon a reasonable distinction, or difference in state policy,' not in conflict with the Federal Constitution. [Citation.] This principle has weathered nearly a century of Supreme Court adjudication ...." (*Kahn v. Shevin*

(1974) 416 U.S. 351, 355-356 [40 L.Ed.2d 189, 193, 94 S.Ct. 1734].)

(14b) Consistent with the foregoing expression of broad liberality, the high court has recognized the wide flexibility permitted states in the enforcement and interpretation of their tax laws, holding that "The latitude of discretion is notably wide in the classification of property for purposes of taxation *and the granting of partial or total exemptions upon grounds of policy*." (*Royster Guano Co.* v. *Virginia* (1920) 253 U.S. 412, 415 [64 L.Ed. 989, 991, 40 S.Ct. 560], italics added; see *Haman* v. *County of Humboldt* (1973) 8 Cal.3d 922, 925-927 [106 Cal.Rptr. 617, 506 P.2d 993].) There exists no "iron rule of equality, prohibiting the flexibility and variety that are appropriate" to schemes of taxation. (*Allied Stores of Ohio v. Bowers* (1959) 358 U.S. 522, 526 [3 L.Ed.2d 480, 484, 79 S.Ct. 437]; see *Tax Commissioners v. Jackson* (1931) 283 U.S. 527, 537 [75 L.Ed. 1248, 1255-1256, 51 S.Ct. 540, 73 A.L.R. 1464]; *Ohio Oil Co. v. Conway* (1930) 281 U.S. 146, 159 [74 L.Ed. 775, 781-782, 50 S.Ct. 310].) (15b) So long as a system of taxation is supported by a rational basis, and is not palpably arbitrary, it will be upheld despite the absence of "'a precise, scientific uniformity"' of taxation. (*Kahn v. Shevin, supra*, 416 U.S. at p. 356, fn. 10 [40 L.Ed.2d at pp. 193-194]; *Allied Stores of Ohio, supra*, at p. 527 [3 L.Ed.2d at p. 485]; *Ohio Oil Co., supra*, at pp. 159-160 [74 L.Ed. at pp. 781-783]; see *Franklin Life Ins. Co. v. State Board of Equalization* (1965) 63 Cal.2d 222, 232-233 [45 Cal.Rptr. 869, 404 P.2d 477].)

(12c) Petitioners, in response, rely upon a line of cases which hold, as a general proposition, that the intentional, systematic *undervaluation* of property similarly situated with other property assessed at its full value constitutes an improper discrimination in violation of equal protection principles. (E.g., *Cumberland Coal Co. v. Board* (1931) 284 U.S. 23, 28 [76 L.Ed. 146, 149-150, 52 S.Ct. 48]; *Sioux City Bridge* v. *Dakota County* (1923) 260 U.S. 441, 445 [67 L.Ed. 340, 342-343, 43 S.Ct. 190, 28 A.L.R. 979]; see *Hillsborough v. Cromwell* (1946) 326 U.S. 620, 623 [90 L.Ed. 358, 363, 66 S.Ct. 445] [equal protection forbids imposing taxes not levied against persons of the same class].) ***235**

The foregoing cases, however, involved constitutional or statutory provisions which *mandated* the taxation of property on a *current value* basis. These cases do not purport to confine the states to a current value system under equal protection principles or to state an exception to the general rule accepted both by the United States Supreme Court and by us, as previously noted, that a tax classification or disparity of tax treatment will be sustained so long as it is founded upon some reasonable distinction or rational basis.

By reason of section 2, subdivision (a), of the article, except for property acquired prior to 1975, henceforth all real property will be assessed and taxed at its value *at date of acquisition* rather than at current value (subject, of course, to the 2 percent maximum annual inflationary increase provided for in subdivision (b)). This "acquisition value" approach to taxation finds reasonable support in a theory that the annual taxes which a property owner must pay should bear some rational relationship to the original cost of the property, rather than relate to an unforeseen, perhaps unduly inflated, current value. Not only does an acquisition value system enable each property owner to estimate with some assurance his future tax liability, but also the system may operate on a fairer basis than a current value approach. For example, a taxpayer who acquired his property for $40,000 in 1975 henceforth will be assessed and taxed on the basis of that cost (assuming it represented the then fair market value). This result is fair and equitable in that his future taxes may be said reasonably to reflect the price he was originally willing and able to pay for his property, rather than an inflated value fixed, after acquisition, in part on the basis of sales to third parties over which sales he can exercise no control. On the other hand, a person who paid $80,000 for similar property in 1977 is henceforth assessed and taxed at a higher level which reflects, again, the price he was willing and able to pay for that property. Seen in this light, and contrary to petitioners' assumption, section 2 does not unduly discriminate against persons who acquired their property after 1975, for those persons are assessed and taxed in precisely the same manner as those who purchased in 1975, namely, on an acquisition value basis predicated on the owner's free and voluntary acts of purchase. This is an arguably reasonable basis for assessment. (We leave open for future resolution questions regarding the proper application of art. XIII A to involuntary changes in ownership or new construction.)

In addition, the fact that two taxpayers may pay different taxes on substantially identical property is not wholly novel to our general taxation ***236** scheme. For example, the computation of a sales tax on two identical items of personalty may vary substantially, depending upon the exact sales price and the availability of a discount. Article XIII A introduces a roughly comparable tax system with respect to real property, whereby the taxes one pays are closely related to the acquisition value of the property.

In converting from a current value method to an acquisition value system, the framers of article XIII A chose not to "roll back" assessments any earlier than the 1975-1976 fiscal year. For assessment purposes, persons who acquired property prior to 1975 are deemed to have purchased it during 1975. These persons, however, cannot complain of any unfair tax treatment in view of the substantial tax advantage they will reap from a return of their assessments from current to 1975-1976 valuation levels. Indeed, the adoption of a uniform acquisition value system without some "cut off" date reasonably might have been considered both administratively unfeasible and incapable of producing adequate tax revenues. The selection of the 1975-1976 fiscal year as a base year, although seemingly arbitrary, may be considered as comparable to utilization of a "grandfather" clause wherein a particular year is chosen as the effective date of new legislation, in order to prevent inequitable results or to promote some other legitimate purpose. (See *Harris v. Alcoholic Bev. etc. Appeals Bd.* (1964) 61 Cal.2d 305, 309-310 [38 Cal.Rptr. 409, 392 P.2d 1].) Similar provisions are routinely upheld by the courts. (See, e.g., *New Orleans v. Dukes* (1976) 427 U.S. 297, 305-306 [49 L.Ed.2d 511, 517-519, 96 S.Ct. 2513]; *In re Norwalk Call* (1964) 62 Cal.2d 185, 188 [41 Cal.Rptr. 666, 397 P.2d 426].)

Petitioners insist, however, that property of equal *current* value must be taxed equally, regardless of its original cost. This proposition is demonstrably without legal merit, for our state Constitution itself expressly contemplates the use of "a value standard other than fair market value ...." (Art. XIII, § 1, subd. (a).) Moreover, the Legislature is empowered to grant total or partial exemptions from property taxation on behalf of various classes (e.g., veterans, blind or disabled persons, religious, hospital or charitable property; see art. XIII, § 4), despite the fact that similarly situated property may be taxed at its full value. In addition, homeowners receive a partial exemption from taxation (art. XIII, § 3, subd. (k)) which is unavailable to other property owners. As noted previously, the state has wide discretion to grant such exemptions. (*Royster Guano Co. v. Virginia, supra*, 253 U.S. 412, 415 [64 L.Ed. 989, 991].) ***237**

Finally, no compelling reason exists for assuming that property lawfully may be taxed only at current values, rather than at some other value, or upon some different basis. (16) As the United States Supreme Court has explained, "The State is not limited to *ad valorem* taxation. It may impose different specific taxes upon different trades and professions and may vary the rate of excise upon various products. In levying such taxes, the State is not required to resort to close distinctions or to maintain a precise, scientific uniformity with reference to composition, use or value." (*Ohio Oil Co. v. Conway, supra*, 281 U.S. 146, 159 [74 L.Ed. 775, 782].) (12d) We cannot say that the acquisition value approach incorporated in article XIII A, by which a property owner's tax liability bears a reasonable relation to his costs of acquisition, is wholly arbitrary or irrational. Accordingly, the measure under scrutiny herein meets the demands of equal protection principles.

b.) *Two-thirds Voting Requirement*. (17) Petitioners have also questioned whether the requirement of a two-thirds vote to approve "special" local taxes (§ 4) denies to voters the equal protection of the laws. We may quickly dispose of the contention. Petitioners rely upon our decision in *Westbrook* v. *Mihaly, supra*, 2 Cal.3d 765, wherein we held that a two-thirds requirement for approval of county general obligation bonds violated federal equal protection principles. However, our *Westbrook* opinion was vacated by the United States Supreme Court (*Mihaly* v. *Westbrook* (1971) 403 U.S. 915 [29 L.Ed.2d 692, 91 S.Ct. 2224]) and the cause was remanded for our reconsideration in the light of *Gordon v. Lance* (1971) 403 U.S. 1 [29 L.Ed.2d 273, 91 S.Ct. 1889], a case which upheld a 60 percent vote requirement primarily because no "discrete and insular minority" was singled out for special treatment by application of the voting requirement. Thus, *Westbrook* no longer represents the controlling law on the subject. (See *Coffineau v. Eu* (1977) 68 Cal.App.3d 138, 143 [137 Cal.Rptr. 90].) Because persons who vote in favor of tax measures may not be deemed to represent a definite, identifiable class, equal protection principles do not forbid "debasing" their vote by requiring a two-thirds approval of such measures.

4. *Right to Travel*

(18a) Petitioners insist that the constitutional right to travel (see *Associated Home Builders etc., Inc. v. City of Livermore, supra*, 18 Cal.3d 582, 602) is impaired by the provisions of article XIII A. They reason that since any "nonresidents or newly arrived residents" will have to pay greater property taxes than "established" residents article XIII A will ***238** deter property owners from moving to another location, thereby inhibiting travel.

As we have explained in discussing petitioners' equal protection challenge, no penalty is imposed on the owner. (19) The change from a current value system to an acquisition value method is intended to benefit *all* property owners, past and future, resident and nonresident, by reducing inflationary increases in assessments, by limiting tax rates, and by

permitting the taxpayer to make more careful and accurate predictions of future tax liability. (18b) Under the former system, it was arguable that prospective purchasers of real property might have been deterred from purchasing (thereby impairing their right to travel) by reason of the unpredictable nature of future property tax liability resulting from unlimited inflationary pressures. Certainly, travel is inhibited to no greater extent by the new system, which establishes a more fixed and stable measure than that imposed by the former system of unconstrained property taxation based on current values. Accordingly, we hold that the right to travel is not unconstitutionally impaired by article XIII A.

5. *Impairment of Contracts*

(20) Petitioners forcefully argue that the operation of article XIII A inevitably will result in the default of various contractual obligations which were incurred by local agencies and districts prior to the enactment of the new article. At the least, petitioners contend, the new restrictions upon the local tax power will "depreciate" the security on which the various obligees have relied for repayment of public obligations held by them. It is claimed, therefore, that article XIII A constitutes an unlawful impairment of contract under the federal Constitution (art. I, § 10, cl. 1).

Petitioners observe that section 1, subdivision (b), of article XIII A, in apparent anticipation of the argument, contains a specific exception in favor of those holding evidence of certain prior indebtedness: "The limitation provided for in subdivision (a) [the 1 percent maximum tax] shall not apply to ad valorem taxes or special assessments to pay the interest and redemption charges *on any indebtedness approved by the voters* prior to the time this section becomes effective." (Italics added.) Petitioners point, however, to certain municipal obligations which were not required to be approved by the voters, including pension and health plan benefits, labor and other municipal contracts, and redevelopment agency bonds. The latter category, particularly, involves a special risk of ***239** impairment, according to petitioners, for redevelopment agencies rely exclusively upon property tax revenues for the retirement of their bonds.

Redevelopment bonds are secured by a pledge of so-called "tax increment" revenues generated by increases in the assessed value of the redeveloped property. (Cal. Const., art. XVI, § 16; Health & Saf. Code, §§ 33670, 33671; see *Redevelopment Agency v. County of San Bernardino* (1978) 21 Cal.3d 255, 257-259 [145 Cal.Rptr. 886, 578 P.2d 133].)

As we explained in *San Bernardino*, "In essence this section [art. XVI, § 16] provides that if, after a redevelopment project has been approved, the assessed valuation of taxable property in the project increases, the taxes levied on such property in the project area are divided between the taxing agency and the redevelopment agency. The taxing agency receives the same amount of money it would have realized under the assessed valuation existing at the time the project was approved, while the additional money resulting from the rise in assessed valuation is placed in a special fund for repayment of indebtedness incurred in financing the project." (*Id*., at p. 259, italics omitted.)

According to petitioners, article XIII A will have a dual adverse effect upon redevelopment agency revenues because both the 1 percent maximum tax and the "rollback" of assessments to a 1975-1976 valuation will combine to reduce substantially tax increment revenues. It is further contended that the problem thereby posed is acute, and the implications widespread. Tax increment bonds are being used to finance 250 redevelopment projects in 121 cities and 3 counties. None of these bonds was specifically approved by the voters, and thus none of them is exempt from the 1 percent maximum tax restriction.

There are two troublesome aspects to petitioners' impairment argument, involving both timing and standing. First, it is readily apparent that petitioners' impairment of contracts argument is prematurely raised. Nothing on the face of article XIII A requires local agencies to default either in meeting their preexisting contracts or in liquidating their outstanding bonds. As we have seen, the ultimate operation of the article may result in a substantial reduction in the amount of available revenues, but as yet no direct impairment of any contract or bond has occurred by virtue thereof. No party to any contract or bondholder has so contended. As we have noted above, courts will avoid reaching constitutional objections when it is not absolutely necessary to the disposition of the ***240** case before them. (*Bayside Timber Co.* v. *Board of Supervisors, supra*, 20 Cal.App.3d 1, 6.)

In the present cases, despite the reduction of revenues from property taxation, doubtless many local public entities will retain sufficient funds to meet preexisting contractual or bonded indebtedness rather than suffer default; allocation of surplus state funds (see Stats. 1978, chs. 292, 332) may assist other entities in these efforts.

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As for redevelopment agencies, and other local agencies and districts relying upon property tax revenue for the retirement of bonds and other prior indebtedness which have not been voter approved, we note that the Legislature has created the Local Agency Indebtedness Fund to promote a public policy of protecting "the credit of the state and local agencies *by assuring that no bond of a local agency goes into default*." (Gov. Code, § 16496, added by Stats. 1978, ch. 292, § 18, italics added.) The new fund is designed to provide loans with a maximum three-year term for the purpose of preventing defaults on bonds during the 1978-1979 fiscal year "while local agencies are reorganizing revenue sources which support payments on such bonds." (*Id*., § 16496.5.) This legislation applies to bonds "which have not been specifically approved and authorized by the voters of the local agency prior to June 6, 1978" (*id*., § 16497, subd. (c)), including redevelopment bonds secured by tax increment revenues (*id*., § 16499, subd. (b), as amended by Stats. 1978, ch. 332, § 22). The legislation thus fills the gap not covered by the constitutional exemption.

Petitioners properly observe that the new legislation does not specify from what sources a state loan to a redevelopment agency might be repaid (as tax increment revenues presumably are reserved to the bondholders). Yet, as we have previously noted, the loans are made to prevent bond defaults while new revenue sources are being explored. We cannot assume on the face of the present record that no new revenue sources will be found or legislatively created. Thus, for all of the foregoing reasons, we are not able to conclude that default of prior contractual obligations is an *inevitable* consequence of article XIII A.

Petitioners extend their impairment argument, however, contending that the new restrictions upon the local taxing power necessarily have resulted in a present "depreciation" of the security relied upon by the various obligees for repayment of their obligations, and that accordingly the impairment issue is ripe for our consideration. According to ***241** petitioners, any substantial restriction placed upon the taxing power of local governments accomplishes an immediate unlawful impairment of preexisting obligations, at least insofar as the discharge of these obligations may depend upon the availability of adequate tax revenues.

The authorities on which petitioners rely for the foregoing proposition are not in point. There is a line of cases holding generally that "a State may not authorize a municipality to borrow money and then restrict its taxing power *so that the debt cannot be repaid*. [Citations.]" (*United States Trust Co. v. New Jersey* (1977) 431 U.S. 1, 24, fn. 22 [52 L.Ed.2d 92, 111, 97 S.Ct. 1505], and cases cited, italics added.) These cases do not suggest, however, that an unlawful impairment occurs immediately upon imposition of the tax restriction, without regard to its ultimate effect upon the repayment of preexisting debts. The *United States Trust Co*. decision, on which petitioners primarily rely, involved a legislative repeal of *an express covenant* which had assured to bondholders that monies pledged as security for repayment would not be used to subsidize rail passenger transportation. The high court explained that "The parties [to a municipal contract] may rely on the continued existence of adequate statutory remedies for enforcing their agreement, *but they are unlikely to expect that state law will remain entirely static*. Thus, a reasonable modification of statutes governing contract remedies is much less likely to upset expectations than a law *adjusting the express terms of an agreement*. In this respect, the repeal of the 1962 covenant is seen as a serious disruption of the bondholders' expectations." (*Id*., at pp. 20-21, fn. 17 [52 L.Ed.2d at p. 108], italics added.)

Nor does the recent case of *Allied Structural Steel Co.* v. *Spannaus* (1978) 438 U.S. 234 [57 L.Ed.2d 727, 98 S.Ct. 2716] assist petitioners, for in that case the challenged statute expressly modified the employees' pension rights which previously had been fixed by contract. In the present case, article XIII A on its face neither directly repudiates any express covenant with municipal obligees nor immediately impairs any contract right. As described by the high court in *Allied*, the federal contract clause (art. I, § 10) applies only to a "substantial impairment of a contractual relationship." (*Id*., at p. 244 [57 L.Ed.2d at p. 736].) In the absence of a factual record disclosing any present, specific and substantial impairment of contract attributable to the adoption of article XIII A, we must reject petitioners' impairment of contract challenge because it is premature. ***242**

A second defect in the impairment argument relates to petitioners' standing to assert the claim. It is noteworthy that, unlike the situation presented in the *United States Trust Co*. and *Allied* cases, none of the petitioners herein are municipal obligees, bondholders or creditors alleging an actual or potential impairment of their rights. In this connection, it is doubtful that petitioners possess the requisite standing to assert the invalidity of article XIII A on impairment of contract grounds. (See, e.g., *Brock v. Superior Court* (1939) 12 Cal.2d 605, 613-614 [86 P.2d 805]; *In re Davis* (1966) 242 Cal.App.2d 645, 666 [51 Cal.Rptr. 702]; 5 Witkin, Summary

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of Cal. Law (8th ed. 1974) Constitutional Law, § 44 et seq.) As expressed in an earlier case, "... no obligation of any contract with the appellant has been impaired, and in the absence of a showing of injury on its part, it may not be heard." (*Irrigation District v. Wutchumna W. Co.* (1931) 111 Cal.App. 688, 696 [296 P. 933].)

We conclude that the challenge to article XIII A based upon the federal contract clause is premature and must await a case in which the contract rights of an obligee have been demonstrably impaired by the operation of the new article.

6. *Initiative Title and Summary*

(21a) According to petitioners, the preelection petitions which were circulated to qualify the initiative measure contained a misleading title and summary. The *title*, "Initiative Constitutional Amendment-Property Tax Limitation," was assertedly defective in its implication that only *property* taxes would be affected by the measure; in fact, other forms of state and local taxes were also involved. (Art. XIII A, §§ 3, 4.) Further, the *summary* of the measure stated in part that it "[a]uthorizes specified local entities to impose special taxes except ... [real property taxes]." In fact, section 4 of the measure *restricts* the imposition of such "special taxes" by imposing a two-thirds vote requirement. It is argued that each of these variances is fatal to the constitutional validity of the article.

Petitioners further observe that the sample ballots distributed in Alameda and San Diego Counties also contained the foregoing "defects." As for other counties, the ballot materials were corrected by court order: The title was changed to "Tax Limitation—Initiative Constitutional Amendment," and the summary was revised to read "[a]uthorizes imposition of special taxes by local government (except on real property) by 2/3 vote of qualified electors." According to respondents, these ***243** corrections were incorporated into the voters pamphlet subsequently mailed to *all* registered voters. Nevertheless, petitioners insist that the petition signers, and certain voters in Alameda and San Diego Counties, may have been misled or confused by the incorrect title and summary.

(22) Prior to the circulation of an initiative measure, the Attorney General is required to prepare a title and summary of its "chief purposes and points"—not exceeding 100 words. (Cal. Const., art. II, § 10, subd. (d); Elec. Code, §§ 3502, 3503.) The Attorney General's statement must be true and impartial, and not argumentative or likely to create prejudice for or against the measure. (Elec. Code, § 3531.) The main purpose of these requirements is to avoid misleading the public with inaccurate information. (See *Clark v. Jordan* (1936) 7 Cal.2d 248, 249-250 [60 P.2d 457, 106 A.L.R. 549]; *Boyd v. Jordan* (1934) 1 Cal.2d 468, 471 [35 P.2d 533].) (23) We have said, however, that the title and summary need not contain a complete catalogue or index of all of the measure's provisions and "if reasonable minds may differ as to the sufficiency of the title, the title should be held sufficient." (*Epperson v. Jordan* (1938) 12 Cal.2d 61, 66 [82 P.2d 445].) As a general rule, the title and summary prepared by the Attorney General are presumed accurate, and substantial compliance with the "chief purpose and points" provision is sufficient. (*Perry v. Jordan, supra*, Cal.2d 87, 94.)

(21b) In the present case, we conclude that the title and summary, though technically imprecise, substantially complied with the law, and we doubt that any significant number of petition signers or voters were misled thereby. We deem that the title, stressing only the property tax aspects of the initiative, was reasonably sufficient in light of the fact that the measure was principally addressed to the subject of real property tax relief. Similarly, the original summary was not so incomplete as to be fatally defective, because it alerted petition signers and voters alike to the fact that the measure contained a provision affecting the imposition of special taxes by local agencies. The summary's omission of any reference to the two-thirds vote requirement was not critical for, as we noted above, the initiative measure was extensively publicized and debated, in all of its several aspects, and a corrected summary was contained in the voters pamphlet which was mailed to all voters. We repeat our observation of some time ago that we ordinarily should assume that the voters who approved a constitutional amendment "... have voted intelligently upon an amendment to their organic law, the whole text of which was supplied each of them prior to the election and which they must be assumed to ***244** have duly considered ...." (*Wright* v. *Jordan* (1923) 192 Cal. 704, 713 [221 P. 915).)

We conclude that the initiative title and summary comply with existing legal requirements.

7. *Vagueness*

(24a) Petitioners have noted the existence of several words and phrases in article XIII A which assertedly are ambiguous or uncertain, suggesting that in its totality the new article is so vague as to be incapable of a rational and uniform interpretation and implementation. For precedential authority

they rely by analogy on cases which have held that a statute must be sufficiently clear so as to provide adequate notice of prohibited conduct. (See, e.g., *People v. Superior Court (Hartway)* (1977) 19 Cal.3d 338, 345-347 [138 Cal.Rptr. 66, 562 P.2d 1315]; *Bowland* v. *Municipal Court* (1976) 18 Cal.3d 479, 491-493 [134 Cal.Rptr. 630, 556 P.2d 1081]; *Morrison v. State Board of Education* (1969) 1 Cal.3d 214, 231 [82 Cal.Rptr. 175, 461 P.2d 375]; see also *Perez* v. *Sharp* (1948) 32 Cal.2d 711, 728 [198 P.2d 17].)

In the present matter, unlike the foregoing cases, no civil or criminal penalties are at issue. Rather, we deal with a constitutional provision of a kind, similar to many others, which necessarily and over a period of time will require judicial, legislative and administrative construction. This is a fairly common procedure. (As an example, we note the broad and uncertain language of the various sections of art. I of the state Constitution, declaring the rights of the people, such as the right to be secure against "unreasonable seizures and searches" (§ 13).)

(25) In evaluating the contention that, in effect, article XIII A is void for vagueness, we are aided by several principles of construction applicable to constitutions generally. As was stated in an early case, "... since a written constitution is intended as and is the mere framework according to whose general outlines specific legislation must be framed and modeled, and is therefore ... necessarily couched in general terms or language, it is not to be interpreted according to narrow or supertechnical principles, but liberally and on broad general lines, so that it may accomplish in full measure the objects of its establishment and so ***245** carry out the great principles of government." (*Stephens v. Chambers* (1917) 34 Cal.App. 660, 663-664 [168 P. 595].)

(26) On the specific issue of vagueness, we have recently expressed the concept that, in the abstract, all "enactments should be interpreted when possible to uphold their validity [citation] and ... courts should construe enactments to give specific content to terms that might otherwise be unconstitutionally vague. [Citations.]" (*Associated Home Builders etc., Inc. v. City of Livermore, supra*, 18 Cal.3d 582, 598.) Significantly, in *Livermore*, the foregoing principles were employed to uphold an ordinance adopted *by initiative*.

(24b) Acknowledging as we must that article XIII A in a number of particulars is imprecise and ambiguous, nonetheless we do not conclude that it is so vague as to be unenforceable. Rather, in the usual manner, the various uncertainties and ambiguities may be clarified or resolved in accordance with several other generally accepted rules of construction used in interpreting similar enactments. Thus, California courts have held that constitutional and other enactments must receive a liberal, practical common-sense construction which will meet changed conditions and the growing needs of the people. (*Los Angeles Met. Transit Authority* v. *Public Util. Com.* (1963) 59 Cal.2d 863, 869 [31 Cal.Rptr. 463, 382 P.2d 583]; see *People* v. *Davis* (1968) 68 Cal.2d 481, 483 [67 Cal.Rptr. 547, 439 P.2d 651]; *Rose v. State of California* (1942) 19 Cal.2d 713, 723 [123 P.2d 505].) (27) A constitutional amendment should be construed in accordance with the natural and ordinary meaning of its words. (*In re Quinn* (1973) 35 Cal.App.3d 473, 482 [110 Cal.Rptr. 881].) The literal language of enactments may be disregarded to avoid absurd results and to fulfill the apparent intent of the framers. (See *Friends of Mammoth* v. *Board of Supervisors* (1972) 8 Cal.3d 247, 259 [104 Cal.Rptr. 761, 502 P.2d 1049]; *In re Kernan* (1966) 242 Cal.App.2d 488, 491 [51 Cal.Rptr. 515].)

(28) Most importantly, apparent ambiguities frequently may be resolved by the contemporaneous construction of the Legislature or of the administrative agencies charged with implementing the new enactment. (See *State of South Dakota v. Brown* (1978) 20 Cal.3d 765, 777 [144 Cal.Rptr. 758, 576 P.2d 473]; *Associated Home Builders etc., Inc. v. City of Livermore, supra*, 18 Cal.3d at p. 598; *Reynolds v. State Board of Equalization* (1946) 29 Cal.2d 137, 140 [173 P.2d 551, 174 P.2d 4].) In addition, when, as here, the enactment follows voter approval, the ballot ***246** summary and arguments and analysis presented to the electorate in connection with a particular measure may be helpful in determining the probable meaning of uncertain language. (See *Carter v. Seaboard Finance Co.* (1949) 33 Cal.2d 564, 580-581 [203 P.2d 758]; *People v. Ottey* (1936) 5 Cal.2d 714, 723 [56 P.2d 193]; *In re Quinn, supra*, 35 Cal.App.3d 473, 483.)

(24c) In the instant matter we have the advantage of both principal interpretive aids, those related to the ballot and the legislative-administrative construction. We focus primarily on the latter. The Legislature has already proceeded to implement article XIII A by enacting extensive legislation. (Stats. 1978, chs. 292, 332.) Administratively, the State Board of Equalization has adopted extensive regulations construing various provisions of the new article. (Cal. Admin. Code, tit. 18, regs. 460-471.) These legislative and administrative implementations are traditionally accorded great weight by

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the courts in construing enactments such as article XIII A. (*State of South Dakota v. Brown, supra*, at p. 777.)

We do not discuss each of article XIII A's numerous uncertainties claimed by petitioners, satisfied that the new legislation and administrative regulations adopted following popular approval of article XIII A disclose that relatively few such uncertainties remain. We do not, of course, thereby suggest that these implementing provisions necessarily constitute, in all instances, correct interpretations of the terms of article XIII A. Nonetheless, these interpretations, a few of which are illustrative, will materially assist both the state and the various local agencies in placing the new taxation scheme into operation in a reasonably workable fashion.

First, and most importantly, the Legislature has read the language of section 1, subdivision (a), ("The one percent (1%) tax to be collected by the counties and apportioned *according to law* to the districts within the counties") as conferring authority to legislate on the subject and to apportion the tax funds to the local agencies and districts. The new legislation sets forth the applicable allocation formulae (Gov. Code, § 26912) and also gives guidance on the following matters, among many, which petitioners had found unclear from the face of article XIII A: (1) The new 1 percent maximum tax is to be levied by the counties on behalf of all local agencies and districts (Rev. & Tax. Code, § 2235); (2) the cities and counties are deemed "districts" under section 1 of the new article and thus share in the tax proceeds (***247** Gov. Code, § 26912; Rev. & Tax. Code, § 2217); (3) the 1 percent tax is a limit on the total, aggregate amount to be levied and apportioned by all local agencies and districts (Rev. & Tax. Code, § 2235, subd. (b)); (4) districts which encompass more than a single county will receive a share of the tax proceeds (Gov. Code, § 26912, subd. (d)), and (5) the exemption for prior, voter-approved indebtedness (art. XIII A, § 1, subd. (b)) includes amounts necessary to meet annual payments on the principal as well as the interest on such indebtedness (Gov. Code, § 26912, subd. (b)(3); Rev. & Tax. Code, § 2235, subd. (a)).

In addition, the new legislation construes or defines several of the undefined terms used in article XIII A, such as "full cash value" and "fair market value" (Rev. & Tax. Code, §§ 110, 110.1) and "change in ownership" (*id*., § 110.6). Further, the State Board of Equalization has adopted regulations covering these and other subjects. (See Cal. Admin. Code, tit. 18, ch. 1, subch. 4, regs. 460 ["full cash value" and "fair market value"], 462 ["change in ownership"], 463 ["newly constructed" property], and 464 [application of homeowners' and veterans' exemptions].)

In short, the foregoing implementing provisions doubtless have not resolved each and every uncertainty described by petitioners. Furthermore, these provisions remain subject to judicial challenge in subsequent cases on the basis that they may incorrectly manifest the intent of article XIII A. Nonetheless, it seems undeniable that good faith efforts have been made, and are presently being made, to carry into practical effect the collective will of a very substantial majority of our citizens, as reflected in the adoption of that article on June 6 of this year. Our analysis convinces us that article XIII A is not so vague and uncertain in its essential terms as to render it void and inoperable.

As noted above, we decline to reach the question whether the various interpretations put forth by the Legislature and State Board of Equalization are correct. In a somewhat similar connection we recently affirmed that "it seems apparent that we cannot, and should not, attempt to pass upon the meaning or validity of each contested provision in every hypothetical context—adjudication of these matters must await an actual controversy, and should proceed on a case-by-case basis as the need arises." (*County of Nevada* v. *McMillen, supra*, 11 Cal.3d 662, 674.) ***248** Many, perhaps most, of the uncertainties carefully noted by petitioners may disappear if a reasonable, common sense approach is used in the interpretation of article XIII A, and if appropriate weight is given to the contemporaneous construction of the legislative and administrative bodies charged with its enforcement in accordance with well established legal precedent.

Conclusion

Petitioners and the amici curiae who support them have mounted substantial and serious legal challenges to the provisions of article XIII A. In doing so they have expressed a commendable and sincere concern that the modifications of the California tax system which are mandated by the new article will impose intolerable financial hardships and administrative burdens in different forms and with varying intensity on public entities, programs, and services throughout California. Yet, as we have recently acknowledged, it is our solemn duty "'to jealously guard'" the initiative power, it being "'one of the most precious rights of our democratic process.'" (*Associated Home Builders etc., Inc. v. City of Livermore, supra*, 18 Cal.3d 582, 591, quoting from earlier cases.) Consistent with our own precedent, in our approach to the constitutional analysis of article XIII A

if doubts reasonably can be resolved in favor of the use of the initiative, we should so resolve them. (*Ibid.*) This we have done.

Having carefully considered them, we have concluded that article XIII A survives each of the substantial challenges raised by petitioners. The orders to show cause previously issued in these cases are discharged, and the respective petitions are denied.

Tobriner, J., Mosk, J., Clark, J., Manuel, J., and Newman, J., concurred.

BIRD, C. J.,

Concurring and Dissenting.

Initiatives by their very nature are direct votes of the people and should be given great deference by our courts. Judges should liberally construe this power so that the will of the people is given full weight and authority. However, if an initiative conflicts with the federal Constitution, judges are duty bound to hold the offending sections unconstitutional.

When these principles are applied to the cases before this court, it is clear that article XIIIA is constitutional in all respects save one. I endorse ***249** the majority opinion's view that there has not been a violation of the one subject rule, an impermissible revision of the Constitution, or a curtailment of the right to travel. Further, it is correct in holding that the question of impairment of contracts is not properly before this court and is not ripe for decision.

One issue remains which troubles me deeply. As judges we must be devoted to the preservation of the great constitutional principles which history has bequeathed to us. In article XIIIA, one of those principles has been violated—the equal protection clause. No one mindful of this nation's colonial history can seriously question the right of the people to act to redress tax grievances. However, our citizens also have a right to be treated equally before the law. The right to equality of taxation is as basic to our democracy as is the right to representation in matters of taxation. Under article XIIIA property taxpayers are not treated equally, and those sections which promote this disparity must fall.

I

Consider these facts. John and Mary Smith live next door to Tom and Sue Jones. Their houses and lots are identical with current market values of $80,000. The Smiths bought their home in January of 1975 when the market value was $40,000. The Joneses bought their home in 1977 when the market value was $60.000. In 1977, both homes were assessed at $60,000, and both couples paid the same amount of property tax. However, under article XIIIA in 1978, the Joneses will pay 150 percent of the taxes that the Smiths will pay. Should a third couple buy the Smiths' home in 1978, that couple would pay twice the taxes that the Smiths would have paid for the *same* home had they not sold it. Today, this court holds that such disparity is not only equitable, but that it does not violate the equal protection clause of the Constitution.

The basic problem with this position is that it upholds the adoption of an assessment scheme that systematically assigns different values to property of equal worth. By pegging some assessments to the value of property at its date of purchase and other assessments to the value of property as of March 1, 1975, article XIIIA creates an irrational tax world where people living in homes of identical value pay different property taxes. Thus, instead of establishing an assessment scheme with one basis by which all property owners are taxed, article XIIIA utilizes two bases, ***250** acquisition date and 1975 market value, to impose artificial distinctions upon equally situated property owners.

Article XIIIA divides the property tax-paying public into two classes, pre-and post-1975 purchasers. Section 2(a) rewards those owners who purchased their property before March 1, 1975, by constitutionally fixing their tax assessments at lower figures than those who buy property of similar or identical value at a later date. This "roll back" provision confers substantial benefits upon one group of property owners not shared by other similarly situated owners. This provision raises the ugly specter of a race for tax savings in which the players start at different points, weighed down by different "handicaps."

Inequalities in state taxation have been held to be constitutional so long as they "rest upon some ground of difference having a fair and substantial relation to the object of legislation ...." (*Royster Guano Co. v. Virginia* (1920) 253 U.S. 412, 415 [64 L.Ed. 989, 990, 40 S.Ct. 560]; see also *Kahn v. Shevin* (1974) 416 U.S. 351, 355-356 [40 L.Ed.2d 189, 193, 94 S.Ct. 1734]; *Allied Stores of Ohio v. Bowers* (1959) 358 U.S. 522, 526-527 [3 L.Ed.2d 480, 484, 79 S.Ct. 437]; *Ohio*

Oil Co. v. *Conway* (1930) 281 U.S. 146, 159-160 [74 L.Ed. 775, 781-782, 50 S.Ct. 310].)

However, even minimal scrutiny requires that the statutes of the Legislature and the initiatives of the people be defensible in terms of a shared public good, not merely in terms of the purposes of a special group or class of persons. (See Tribe, American Constitutional Law (1978) p. 995.) The law should be something more than just the handmaiden of a special class; it must ultimately be the servant of justice.

Respondents fail to establish the general public benefit to be found in giving some, but not all, individuals a "roll back" to 1975 assessments. To be eligible for the full "roll back," article XIIIA requires that an individual have owned continuously his or her property since a date prior to March of 1975. This requirement makes it literally impossible for persons purchasing property in 1978 or thereafter to qualify for benefits granted fully to pre-1975 owners (and less fully to 1975-1978 owners). In so doing, article XIIIA transgresses the constitutional guarantee of equal protection under the law.

Respondents defend the rationality of the 1975 date by characterizing it as a cut-off date or "grandfather" clause. Although its arbitrariness is ***251** conceded, they argue that it is defensible as a matter of administrative convenience. This contention lacks merit. It merely acknowledges that "it is difficult to be just, and easy to be arbitrary." (*Stewart Dry Goods Co. v. Lewis* (1935) 294 U.S. 550, 560 [79 L.Ed. 1054, 1059, 55 S.Ct. 525].) Administrative convenience is wholly inadequate to warrant preferred treatment of a closed class of property owners. This court has previously refused to accept administrative convenience as a sufficient explanation of "great" differences in tax rates among similarly situated individuals. (*Haman v. County of Humboldt* (1973) 8 Cal.3d 922, 927-928 [106 Cal.Rptr. 617, 506 P.2d 993]; cf. *Toomer v. Witsell* (1948) 334 U.S. 385, 398-399 [92 L.Ed. 1460, 1472-1473, 68 S.Ct. 1157].) In *Haman*, this court rejected the contention that administrative convenience justified a 23 percent spread in the rate at which California-registered and out-of-state registered fishing vessels were taxed. Article XIIIA may in individual cases cause a disparity in taxes which is much greater than 23 percent. This is especially true in those cases where the effect of inflation and appreciation on real property values has been acute.

The fact that the former property tax system allowed inequalities through exemptions for charitable, religious, nonprofit and educational institutions is no answer to the questions raised by article XIIIA. Those exemptions benefitted the general public since the public received specific benefits from the exempted organizations. No one has yet established what benefits the general public derives from the systematic undervaluation of the property of pre-1975 purchasers, and this court should decline to hypothesize rationales. (See Gunther, *The Supreme Court, 1971 Term —Forward: In Search of Evolving Doctrine on a Changing Court: A Model for a Newer Equal Protection* (1972) 86 Harv.L.Rev. 1, 33, 44-46, 47.)

II

The adoption of the acquisition date of property as the standard for valuation raises novel constitutional questions never decided by the Supreme Court. In analyzing section 2(a), this court must decide whether it is constitutionally permissible for a state to systematically assign unequal assessment to properties of concededly equal market value.

The practical effect of section 2(a) is to undervalue property purchased at an earlier date in comparison to the assessments assigned to subsequently purchased property. The extent of undervaluation will fluctuate ***252** with the degree of property value appreciation in a particular locality. Given the "roll back" feature, the process inevitably starts by substantially undervaluing prior purchased property.

Once it is understood that article XIIIA systematically imposes different assessments on property of similar worth, a long line of Supreme Court cases becomes relevant. Those cases support the proposition that a person is denied equal protection of the law when his property is assessed at a higher value than property of equal worth in the same locale. "The purpose of the equal protection clause of the Fourteenth Amendment is to secure every person within the State's jurisdiction against intentional and arbitrary discrimination, whether occasioned by express terms of a statute or by its improper execution .... And it must be regarded as settled that intentional systematic undervaluation by state officials of other taxable property in the same class contravenes the constitutional right of one taxed upon the full value of his property." (*Sunday Lake Iron Co.* v. *Wakefield* (1918) 247 U.S. 350, 352-353 [62 L.Ed. 1154, 1155-1156, 38 S.Ct. 495]; see also *Raymond* v. *Chicago Traction Co.* (1907) 207 U.S. 20, 36-37 [52 L.Ed. 78, 87-88, 28 S.Ct. 7]; *Sioux City Bridge* v. *Dakota County* (1923) 260 U.S. 441, 445 [67 L.Ed. 340, 342-343, 43 S.Ct. 190, 28 A.L.R. 979]; *Cumberland Coal Co. v. Board* (1931) 284 U.S. 23, 28-29 [76 L.Ed. 146, 149-150, 52 S.Ct. 48].)

In *Sioux City Bridge, supra*, the Supreme Court held it to be a violation of the equal protection clause to assess one company's property at 100 percent of its market value while other real estate in the same district was generally assessed at only 55 percent of the market value. Section 2(a) of article XIIIA authorizes the same kind of discrimination as that condemned in *Sioux City Bridge*. Initially, properties purchased in earlier years will be undervalued in comparison with other properties (though they may be identical in current fair market value) purchased, constructed, or transferred in later years. Then, as the years go by, the skewed nature of the tax world created by article XIIIA will become even more pronounced as each successive generation of purchasers will have their property overvalued in comparison to their neighbors or predecessor owners. For example, consider the condominium complex where each unit, though of identical fair market value, receives a different tax assessment simply because purchased in a different year. Consider the plight of the military family required by circumstances to change residence periodically. In 1979, that family may sell a house purchased in 1975, and buy a new house of identical current cash value. However, their ***253** tax bill will take a quantum leap upward, as their assessment jumps from 1975 to 1979 levels. Conversely, the family allowed by circumstances to remain in one house for long periods of time will reap substantial tax benefits simply because of the length of their residency.

Consider further the plight of the family which "newly constructs" their house after a natural disaster such as fire or flood. Article XIIIA, section 2(a) penalizes them by reassessing the value of their house to market value at the time of the new construction. What is the possible rationale for allowing natural disasters to trigger an increase in property tax obligations? Surely a truly rational tax world would consider such families for tax relief.[1] Finally, consider the reassessment to current market value mandated by section 2, subdivision (a) for "changes in ownership" brought about by divorce or death. Did those who voted so overwhelmingly for article XIIIA's general tax relief also intend to penalize those families who experience such family crises?

In *Cumberland Coal Co.* v. *Board, supra*, 284 U.S. 23, the Supreme Court invalidated a taxing measure that ignored differences in current market value. In that case, the local assessors chose to assign the same dollar value per ton to all unmined coal in the county. However, it was undisputed that there existed substantial differences in value between given tons of coal, depending on the mining and transportation costs. The court saw clearly the gross inequalities that resulted, *even though the same percentage tax was levied on all*: "... the fact that a uniform percentage of assigned values is used, cannot be regarded as important if, in assigning the values to which the percentage is applied, a system is deliberately adopted which ignores differences in actual values so that property in the same class as that of the complaining taxpayer is valued at the same figure (according to the unit of valuation, as, for example, an acre) as the property of other owners which has an actual value admittedly higher. Applying the same ratio to the same assigned values, when the actual values differ, creates the same disparity in effect as applying a different ratio to actual values when the latter are the same." (*Id.*, at p. 29 [76 L.Ed. at p. 150].)

Article XIIIA adopts an assessment scheme similar in effect to that condemned in *Cumberland Coal*. The same percentage (one percent) is ***254** applied to all assessed values; but the assessed values themselves do not accurately reflect the respective market values of property. This has the effect, as the court noted in *Cumberland Coal, supra*, 284 U.S. at page 29 [76 L.Ed. at p. 150], of taxing identically situated property owners at different percentages of the true value of their property. If article XIIIA had been drafted to say, "Some persons will pay a property tax of one percent of the true value of their property; others will pay only a one-half of one percent tax," the violation of the equal protection clause would have been obvious. Yet, the result article XIIIA is the same. Assume, for instance, that the market value of a home increases from $50,000 in 1975 to $100,000 some time in the future. A one percent tax on the 1975 is equivalent to a one-half of one percent tax on the new value.

Decisions in this jurisdiction have reiterated the principle that the equal protection clause is violated when one person's property is assessed at a higher level than another person's property which is of identical value. For example, in *Birch v. County of Orange* (1921) 186 Cal. 736, 741 [200 P. 647], this court held that a taxpayer is entitled to "the exercise of good faith and fair consideration on the part of the taxing power in assessing his property, at the same rate and on the same basis of valuation as that applied to other property of like character and similarly situated."

The Court of Appeal recently restated this principle: "The value of property for assessment purposes is to be determined ... on such basis as is used in regard to other property so as to make all assessments as equal and fair as

is practicable. [Citations.] In order to carry out this principle, the assessor and the county board of equalization must apply the same ratio to market value uniformly within the county." (*Glidden Company v. County of Alameda* (1970) 5 Cal.App.3d 371, 378 [85 Cal.Rptr. 88, 86 Cal.Rptr. 464]; see also *Simms* v. *County of Los Angeles* (1950) 35 Cal.2d 303, 315 [217 P.2d 936]; *Mahoney v. City of San Diego* (1926) 198 Cal. 388, 397, 404 [245 P. 189]; *Metropolitan Stevedore Co.* v. *County of Los Angeles* (1972) 29 Cal.App.3d 565, 572 [105 Cal.Rptr. 595]; *City of Los Angeles v. County of Inyo* (1959) 167 Cal.App.2d 736, 740 [335 P.2d 166]; *Rancho Santa Margarita* v. *San Diego Co.* (1932) 126 Cal.App. 186, 197 [14 P.2d 588]; *Birch* v. *County of Orange* (1927) 88 Cal.App. 82, 85 [262 P. 788].) Thus, strong authority exists for the conclusion that the attempt of article XIIIA to assign different assessments to properties of equal market value violates the equal protection clause. ***255**

Respondents would seek to deny that those who pay more for property are in reality "similarly situated" with those who paid less for property of the same value in earlier years. The premise of this argument is that the later purchaser is better able to afford a high tax since (1) he paid more for his property to begin with and (2) he knew from the beginning he was buying a highly assessed piece of property.

The fact that a purchaser presently pays $80,000 for a home which someone else bought for $40,000 in 1975 may tell us nothing more than that inflation has been rampant and property values on the rise. In fact, the higher mortgage payments that new homeowners pay as compared to earlier purchasers forewarns us against any cavalier assumption that later purchasers are able to bear heavier taxes.

Section 2(a) mandates reassessment to current market value not only for voluntary purchasers but any time there is a "change in ownership." Thus, as previously noted, the person who inherits the family home or the spouse who gains title to property after a divorce may find that the assessment on the property suddenly skyrockets for property tax purposes. There is no rationality to the jump in valuation that accompanies these occurrences. Similarly, those persons who must move often because of the nature of their employment (for example, military families) will find that section 2(a)'s mandated reassessments bear little relation to their financial situation. Even more perplexing is the situation of persons who find that new construction must be done to their property after a natural disaster. Section 2(a) once more requires reassessment to "full cash value." The arbitrariness of article XIIIA's assessment scheme could not be more apparent.

Finally, the arbitrariness of the acquisition date valuation as a tax standard can be demonstrated by considering the plight of the taxpayer whose property has actually *decreased* in value since 1975. Under the previous tax system, such a person's property tax assessment would eventually reflect the decline in market value. However, under article XIIIA the assessment remains fixed at the acquisition date value since section 2(b) allows for a reduction in assessment only on the basis of a downward turn in the consumer price index.

I am aware that during the past 40 years, since the end of the *Lochner* era (see *Lochner v. New York* (1095) 198 U.S. 45 [49 L.Ed. 937, 25 S.Ct. 539]), courts have not used the Fourteenth Amendment "to strike down ***256** state laws ... because they may be unwise, improvident, or out of harmony with a particular school of thought." (*Williamson v. Lee Optical Co.* (1955) 348 U.S. 483, 488 [99 L.Ed. 563, 572, 75 S.Ct. 461].) I fully agree that in regard to matters of economics and tax policy, courts must defer to the will of the people unless the challenged enactment lacks a rational basis. However, the rational basis test was never meant to authorize judicial tolerance of unconstitutional classifications.

Earlier this year, this court reiterated that minimal scrutiny "'require[s] the court to conduct "*a serious and genuine judicial inquiry* into the correspondence between the classification and the legislative goals."'" (*Cooper v. Bray* (1978) 21 Cal.3d 841, 848 [148 Cal.Rptr. 148, 582 P.2d 604], quoting *Newland v. Board of Governors* (1977) 19 Cal.3d 705, 711 [139 Cal.Rptr. 620, 566 P.2d 254], italics original in *Cooper v. Bray, supra*.) After conducting such a "serious and genuine judicial inquiry," many courts have found that various classifications could not survive even minimal scrutiny under the equal protection clause. (E.g., *U.S. Dept. of Agriculture* v. *Moreno* (1973) 413 U.S. 528, 538 [37 L.Ed.2d 782, 790, 93 S.Ct.2821]; *Rinaldi v. Yeager* (1966) 384 U.S. 305, 309-310 [16 L.Ed.2d 577, 580-581, 86 S.Ct. 1497]; *D'Amico* v. *Board of Medical Examiners* (1974) 11 Cal.3d 1, 22-23 [112 Cal.Rptr. 786, 520 P.2d 10]; *Blumenthal v. Board of Medical Examiners* (1962) 57 Cal.2d 228, 234-235 [18 Cal.Rptr. 501, 368 P.2d 101]; *Miller v. Union Bank & Trust Co.* (1936) 7 Cal.2d 31, 34-36 [59 P.2d 1024].) Some of the classifications which were invalidated related to matters of taxation. (E.g., *WHYY v. Glassboro* (1968) 393 U.S. 117, 120 [21 L.Ed.2d 242, 245, 89 S.Ct. 286]; *City of Los Angeles* v. *Shell Oil Co.* (1971) 4 Cal.3d 108, 125-126 [93 Cal.Rptr.

1, 480 P.2d 953]; *County of Alameda* v. *City and County of San Francisco* (1971) 19 Cal.App.3d 750, 756-757 [97 Cal.Rptr. 175, 48 A.L.R.3d 332].) The lines drawn by section 2(a) of article XIIIA are similar in effect to the discriminatory categories struck down in those cases. If a serious and genuine judicial inquiry is made of the classifications under section 2(a), it is clear that they violate the equal protection clause of the Constitution by treating identical or similarly situated property taxpayers in an unfair and unequal way.

III

This decision has not been an easy one. The issues are close and reasonable people may differ. Emotions run high on this question, but as judges we must follow the law and do what it requires. As Justice Story ***257** wrote in *Trustees of Dartmouth College* v. *Woodward* (1819) 17 U.S. (4 Wheat.) 250, 338 [4 L.Ed. 629, 713], "It is not for judges to listen to the voice of persuasive eloquence, or popular appeal. We have nothing to do, but to pronounce the law as we find it; and having done this, our justifications must be left to the impartial judgment of our country."

Article XIII A

"Section 1. (a) The maximum amount of any ad valorem tax on real property shall not exceed one percent (1%) of the full cash value of such property. The one percent (1%) tax to be collected by the counties and apportioned according to law to the districts within the counties.

"(b) The limitation provided for in subdivision (a) shall not apply to ad valorem taxes or special assessments to pay the interest and redemption charges on any indebtedness approved by the voters prior to the time this section becomes effective.

"Section 2. (a) The full cash value means the County Assessors valuation of real property as shown on the 1975-76 tax bill under 'full cash value,' or thereafter, the appraised value of real property when purchased, newly constructed, or a change in ownership has occurred after the 1975 assessment. All real property not already assessed up to the 1975-76 tax levels may be reassessed to reflect that valuation.

"(b) The fair market value base may reflect from year to year the inflationary rate not to exceed two percent (2%) for any given year or reduction as shown in the consumer price index or comparable data for the area under taxing jurisdiction.

"Section 3. From and after the effective date of this article, any changes in State taxes enacted for the purpose of increasing revenues collected pursuant thereto whether by increased rates or changes in methods of computation must be imposed by an Act passed by not less than two-thirds of all members elected to each of the two houses of the Legislature, except that no new ad valorem taxes on real property, or sales or transaction taxes on the sales of real property may be imposed.

"Section 4. Cities. Counties and special districts, by a two-thirds vote of the qualified electors of such district, may impose special taxes on such district, except ad valorem taxes on real property or a transaction tax or sales tax on the sale of real property within such City, County or special district.

"Section 5. This article shall take effect for the tax year beginning on July 1 following the passage of this Amendment, except Section 3 which shall become effective upon the passage of this article.

"Section 6. If any section, part, clause, or phrase hereof is for any reason held to be invalid or unconstitutional, the remaining sections shall not be affected but will remain in full force and effect." ***258**

Footnotes

1 It is noteworthy that a proposed constitutional amendment to remedy this anomalous situation has been adopted by the Legislature and awaits a vote of the people. (Sen. Const. Amend. No. 67, Stats. 1978 (1977-1978 Reg. Sess.) res. ch. 76, pp. _____.)

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35 Cal.4th 613
Supreme Court of California

CITY OF BURBANK, Plaintiff and Appellant,
v.
STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Appellants.
City of Los Angeles, Plaintiff and Respondent,
v.
State Water Resources Control Board et al., Defendants and Appellants.

Nos. S119248, B151175, B152562.
|
April 4, 2005.
|
Rehearing Denied June 29, 2005. *

Synopsis
Background: Cities filed petitions for writs of mandate challenging pollutant limitations in wastewater discharge permits issued by regional water quality control boards. The Superior Court, Los Angeles County, Nos. BS060957 and BS060960, Dzintra I. Janavs, J., set aside permits. Regional board and state water resources control board appealed. The Court of Appeal consolidated the cases and reversed. The Supreme Court granted review, superseding the opinion of the Court of Appeal.

Holdings: The Supreme Court, Kennard, J., held that:

regional board may not consider economic factors as justification for imposing pollutant restrictions in wastewater discharge permit which are less stringent than applicable federal standards, and

when imposing more stringent pollutant restrictions that those required by federal law, regional board may take economic factors into account.

Judgment of Court of Appeal affirmed, and matter remanded.

Brown, J., filed concurring opinion.

Opinion, 4 Cal.Rptr.3d 27, superseded.

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Opinion

KENNARD, J.

*618 **864 Federal law establishes national water quality standards but allows the states to enforce their own water quality laws so long as they comply with federal standards. Operating within this federal-state framework, California's nine Regional Water Quality Control Boards establish water quality policy. They also issue permits for the discharge of treated wastewater; these permits specify the maximum allowable concentration of chemical pollutants in the discharged wastewater.

The question here is this: When a regional board issues a permit to a wastewater treatment facility, must the board take into account the facility's costs of complying with the board's restrictions on pollutants in the wastewater to be discharged? The trial court ruled that California law required a regional board to weigh the economic burden on the facility against the expected environmental benefits of reducing pollutants in the wastewater discharge. The Court of Appeal disagreed. On petitions by the municipal operators of three wastewater treatment facilities, we granted review.

We reach the following conclusions: Because both California law and federal law require regional boards to comply with federal clean water standards, and because the supremacy clause of the United States Constitution requires state law to yield to federal law, a regional board, when issuing a wastewater discharge permit, may not consider economic factors to justify imposing pollutant restrictions that are *less stringent* than the applicable federal standards require. When, however, a regional board is considering whether to make the pollutant restrictions in a wastewater discharge permit *more stringent* than federal law requires, California law allows the board to take into account economic **865 factors, including the wastewater discharger's cost of compliance. We remand this case for further proceedings to determine whether the pollutant limitations in the permits challenged here meet or exceed federal standards.

*619 I. STATUTORY BACKGROUND

The quality of our nation's waters is governed by a "complex statutory and regulatory scheme ... that implicates both federal and state administrative responsibilities." (*PUD No. 1 of Jefferson County v. Washington Department of Ecology* (1994) 511 U.S. 700, 704, 114 S.Ct. 1900, 128 L.Ed.2d 716.) We first discuss California law, then federal law.

A. California Law

In California, the controlling law is the Porter–Cologne Water Quality Control Act (Porter–Cologne Act), which was enacted in 1969. (Wat.Code, § 13000 et seq., added by Stats.1969, ch. 482, § 18, p. 1051.)[1] Its goal is "to attain the highest water ***307 quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (§ 13000.) The task of accomplishing this belongs to the State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards; together the State Board and the regional boards comprise "the principal state agencies with primary responsibility for the coordination and control of water quality." (§ 13001.) As relevant here, one of those regional boards oversees the Los Angeles region (the Los Angeles Regional Board).[2]

Whereas the State Board establishes statewide policy for water quality control (§ 13140), the regional boards "formulate and adopt water quality control plans for all areas within [a] region" (§ 13240). The regional boards' water quality plans, called "basin plans," must address the beneficial uses to be protected as well as water quality objectives, and they must establish a program of implementation. (§ 13050, subd. (j).) Basin plans must be consistent with "state policy for water quality control." (§ 13240.)

B. Federal Law

In 1972, Congress enacted amendments (Pub.L. No. 92–500 (Oct. 18, 1972) 86 Stat. 816) to the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), which, as amended in 1977, is commonly known as the Clean ***620** Water Act. The Clean Water Act is a "comprehensive water quality statute designed 'to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' " (*PUD No. 1 of Jefferson County v. Washington Dept. of Ecology, supra,* 511 U.S. at p. 704, 114 S.Ct. 1900, quoting 33 U.S.C. § 1251(a).) The Act's national goal was to eliminate by the year 1985 "the discharge of pollutants into the navigable waters" of the United States. (33 U.S.C. § 1251(a)(1).) To accomplish this goal, the Act established "effluent limitations," which are restrictions on the "quantities, rates, and concentrations of chemical, physical, biological, and other constituents"; these effluent limitations allow the discharge of pollutants only when the water has been satisfactorily treated to conform with federal water quality standards. (33 U.S.C. §§ 1311, 1362(11).)

Under the federal Clean Water Act, each state is free to enforce its own water quality laws so long as its effluent limitations are not "less stringent" than those set out in the Clean Water Act. (33 U.S.C. § 1370.) This led the California Legislature in 1972 to amend the state's Porter–Cologne Act "to ensure consistency with the requirements for state programs implementing the Federal Water Pollution Control Act." (§ 13372.)

****866** Roughly a dozen years ago, the United States Supreme Court, in *Arkansas v. Oklahoma* (1992) 503 U.S. 91, 112 S.Ct. 1046, 117 L.Ed.2d 239, described the distinct roles of the state and federal agencies in enforcing water quality: "The Clean Water Act anticipates a partnership between the States and the Federal Government, animated by a shared objective: 'to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' 33 U.S.C. § 1251(a). Toward *****308** this end, [the Clean Water Act] provides for two sets of water quality measures. 'Effluent limitations' are promulgated by the [Environmental Protection Agency (EPA)] and restrict the quantities, rates, and concentrations of specified substances which are discharged from point sources.[3] See §§ 1311, 1314. '[W]ater quality standards' are, in general, promulgated by the States and establish the desired condition of a waterway. See § 1313. These standards supplement effluent limitations 'so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.' *EPA v. California ex rel. State Water Resources Control Bd.,* 426 U.S. 200, 205, n. 12, 96 S.Ct. 2022, 2025, n. 12, 48 L.Ed.2d 578 (1976).

***621** "The EPA provides States with substantial guidance in the drafting of water quality standards. See generally 40 CFR pt. 131 (1991) (setting forth model water quality standards). Moreover, [the Clean Water Act] requires, *inter alia,* that state authorities periodically review water quality standards and secure the EPA's approval of any revisions in the standards. If the EPA recommends changes to the standards and the State fails to comply with that recommendation, the Act authorizes the EPA to promulgate water quality standards for the State. 33 U.S.C. § 1313(c)." (*Arkansas v. Oklahoma, supra,* 503 U.S. at p. 101, 112 S.Ct. 1046.)

Part of the federal Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), "[t]he primary means" for enforcing effluent limitations and standards under the Clean Water Act. (*Arkansas v. Oklahoma, supra,* 503 U.S. at p. 101, 112 S.Ct. 1046.) The NPDES sets out the conditions under which the federal EPA or a state with an approved water quality control program can issue permits for the discharge of pollutants in wastewater. (33 U.S.C. § 1342(a) & (b).) In California, wastewater discharge requirements established by the regional boards are the equivalent of the NPDES permits required by federal law. (§ 13374.)

With this federal and state statutory framework in mind, we now turn to the facts of this case.

II. FACTUAL BACKGROUND

This case involves three publicly owned treatment plants that discharge wastewater under NPDES permits issued by the Los Angeles Regional Board.

The City of Los Angeles owns and operates the Donald C. Tillman Water Reclamation Plant (Tillman Plant), which serves the San Fernando Valley. The City of Los Angeles also owns and operates the Los Angeles–Glendale Water Reclamation Plant (Los Angeles–Glendale Plant), which processes wastewater from areas within the City of Los Angeles and the independent cities of Glendale and Burbank. Both the Tillman Plant and the Los Angeles–Glendale Plant

discharge wastewater directly into the Los Angeles River, now a concrete-lined flood control channel that runs through the City of Los Angeles, ending at the Pacific Ocean. The State Board and the Los Angeles Regional Board consider the Los Angeles River to be a navigable water of the United States for purposes of the federal Clean Water Act.

The third plant, the Burbank Water Reclamation Plant (Burbank Plant), is owned and operated by the City of Burbank, *****309** serving residents and businesses within that city. The Burbank Plant discharges wastewater into the Burbank Western Wash, which drains into the Los Angeles River.

***622** All three plants, which together process hundreds of millions of gallons of sewage ****867** each day, are tertiary treatment facilities; that is, the treated wastewater they release is processed sufficiently to be safe not only for use in watering food crops, parks, and playgrounds, but also for human body contact during recreational water activities such as swimming.

In 1998, the Los Angeles Regional Board issued renewed NPDES permits to the three wastewater treatment facilities under a basin plan it had adopted four years earlier for the Los Angeles River and its estuary. That 1994 basin plan contained general narrative criteria pertaining to the existing and potential future beneficial uses and water quality objectives for the river and estuary.[4] The narrative criteria included municipal and domestic water supply, swimming and other recreational water uses, and fresh water habitat. The plan further provided: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life." The 1998 permits sought to reduce these narrative criteria to specific numeric requirements setting daily maximum limitations for more than 30 pollutants present in the treated wastewater, measured in milligrams or micrograms per liter of effluent.[5]

The Cities of Los Angeles and Burbank (Cities) filed appeals with the State Board, contending that achievement of the numeric requirements would be too costly when considered in light of the potential benefit to water quality, and that the pollutant restrictions in the NPDES permits were unnecessary to meet the narrative criteria described in the basin plan. The State Board summarily denied the Cities' appeals.

Thereafter, the Cities filed petitions for writs of administrative mandate in the superior court. They alleged, among other things, that the Los Angeles Regional Board failed to comply with sections 13241 and 13263, part of California's Porter–Cologne Act, because it did not consider the economic burden on the Cities in having to reduce substantially the pollutant content of their discharged wastewater. They also alleged that compliance with the pollutant restrictions set out in the NPDES permits issued by the regional ***623** board would greatly increase their costs of treating the wastewater to be discharged into the Los Angeles River. According to the City of Los Angeles, its compliance costs would exceed $50 million annually, representing more than 40 percent of its entire budget for operating its four wastewater treatment plants and its sewer system; the City of Burbank estimated its added costs at over $9 million annually, a nearly 100 percent increase above its $9.7 million annual budget for wastewater treatment.

*****310** The State Board and the Los Angeles Regional Board responded that sections 13241 and 13263 do not require consideration of costs of compliance when a regional board issues a NPDES permit that restricts the pollutant content of discharged wastewater.

The trial court stayed the contested pollutant restrictions for each of the three wastewater treatment plants. It then ruled that sections 13241 and 13263 of California's Porter–Cologne Act required a regional board to consider costs of compliance not only when it adopts a basin or water quality plan but also when, as here, it issues an NPDES permit setting the allowable pollutant content of a treatment plant's discharged wastewater. The court found no evidence that the Los Angeles Regional Board had considered economic factors at either stage. Accordingly, the trial court granted the Cities' petitions for writs of mandate, and it ordered the Los Angeles Regional Board to vacate the contested restrictions on pollutants in the wastewater discharge permits issued to the three municipal plants here and to conduct hearings ****868** to consider the Cities' costs of compliance before the board's issuance of new permits. The Los Angeles Regional Board and the State Board filed appeals in both the Los Angeles and Burbank cases.[6]

The Court of Appeal, after consolidating the cases, reversed the trial court. It concluded that sections 13241 and 13263 require a regional board to take into account "economic considerations" when it adopts water quality standards in a basin plan but not when, as here, the regional board sets specific pollutant restrictions in wastewater discharge permits

intended to satisfy those standards. We granted the Cities' petition for review.

*624 III. DISCUSSION

A. Relevant State Statutes

The California statute governing the issuance of *wastewater permits* by a regional board is section 13263, which was enacted in 1969 as part of the Porter–Cologne Act. (See 26 Cal.Rptr.3d pp. 306–307, 108 P.3d p. 865, *ante.*) Section 13263 provides in relevant part: "*The regional board,* after any necessary hearing, *shall prescribe requirements as to the nature of any proposed discharge* [of wastewater]. *The requirements* shall implement any relevant water quality control plans that have been adopted, and *shall take into consideration* the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and *the provisions of Section 13241*." (§ 13263, subd. (a), italics added.)

Section 13241 states: "Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

***311 "(a) Past, present, and probable future beneficial uses of water.

"(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

"(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

"(d) *Economic considerations.*

"(e) The need for developing housing within the region.

"(f) The need to develop and use recycled water." (Italics added.)

The Cities here argue that section 13263's express reference to section 13241 requires the Los Angeles Regional Board to consider section 13241's listed factors, notably "[e]conomic considerations," before issuing NPDES permits requiring specific pollutant reductions in discharged effluent or treated wastewater.

*625 Thus, at issue is language in section 13263 stating that when a regional board "prescribe[s] requirements as to the nature of any proposed discharge" of treated wastewater it must "take into consideration" certain factors including "the provisions of Section 13241." According to the Cities, this statutory language requires that a regional board make an independent evaluation of the section 13241 factors, including "economic considerations," before restricting the pollutant content in an NPDES permit. This was the view expressed in the trial court's ruling. The Court of Appeal rejected that view. It held that a regional board need consider the section 13241 factors only when it adopts a basin or water quality plan, but not when, as in this case, it issues a wastewater discharge **869 permit that sets specific numeric limitations on the various chemical pollutants in the wastewater to be discharged. As explained below, the Court of Appeal was partly correct.

B. Statutory Construction

When construing any statute, our task is to determine the Legislature's intent when it enacted the statute "so that we may adopt the construction that best effectuates the purpose of the law." (*Hassan v. Mercy American River Hospital* (2003) 31 Cal.4th 709, 715, 3 Cal.Rptr.3d 623, 74 P.3d 726; *Esberg v. Union Oil Co.* (2002) 28 Cal.4th 262, 268, 121 Cal.Rptr.2d 203, 47 P.3d 1069.) In doing this, we look to the statutory language, which ordinarily is "the most reliable indicator of legislative intent." (*Hassan, supra,* at p. 715, 3 Cal.Rptr.3d 623, 74 P.3d 726.)

As mentioned earlier, our Legislature's 1969 enactment of the Porter–Cologne Act, which sought to ensure the high quality of water in this state, predated the 1972 enactment by Congress of the precursor to the federal Clean Water Act. Included in California's original Porter–Cologne Act were sections 13263 and 13241. Section 13263 directs regional boards, when issuing wastewater discharge permits, to take into account various factors, including those set out in section 13241. Listed among the section 13241 factors is "[e]conomic considerations." (§ 13241, subd. (d).) The plain language of sections 13263 and 13241 indicates the Legislature's intent

in 1969, when these statutes were enacted, that a regional board consider the cost of compliance when setting effluent limitations in a wastewater discharge permit.

Our construction of sections 13263 and 13241 does not end with their plain statutory language, however. We must also analyze them in the context of the statutory scheme of which they are a part. (***312 *State Farm Mutual Automobile Ins. Co. v. Garamendi* (2004) 32 Cal.4th 1029, 1043, 12 Cal.Rptr.3d 343, 88 P.3d 71.) Like sections 13263 and 13241, section 13377 is part of the Porter–Cologne Act. But unlike the former two statutes, section 13377 was *626 not enacted until 1972, shortly after Congress, through adoption of the Federal Water Pollution Control Act Amendments, established a comprehensive water quality policy for the nation.

Section 13377 specifies that wastewater discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act. That act prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the act's clean water standards, regardless of cost (see *id.,* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3)). Because section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a wastewater discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards.[7] Such a construction of section 13263 would not only be inconsistent with federal law, it would also be inconsistent with the Legislature's **870 declaration in section 13377 that all discharged wastewater must satisfy federal standards.[8] This was also the conclusion of the Court of Appeal. Moreover, under the federal Constitution's supremacy clause (art. VI), a state law that conflicts with federal law is " 'without effect.' " (*Cipollone v. Liggett Group, Inc.* (1992) 505 U.S. 504, 516, 112 S.Ct. 2608, 120 L.Ed.2d 407; *Dowhal v. SmithKline Beecham Consumer Healthcare* (2004) 32 Cal.4th 910, 923, 12 Cal.Rptr.3d 262, 88 P.3d 1.) To comport with the principles of federal supremacy, California law cannot authorize this *627 state's regional boards to allow the discharge of pollutants into the navigable waters of the United States in concentrations ***313 that would exceed the mandates of federal law.

Thus, in this case, whether the Los Angeles Regional Board should have complied with sections 13263 and 13241 of California's Porter–Cologne Act by taking into account "economic considerations," such as the costs the permit holder will incur to comply with the numeric pollutant restrictions set out in the permits, depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act. We therefore remand this matter for the trial court to resolve that issue.

C. Other Contentions

The Cities argue that requiring a regional board at the wastewater discharge permit stage to consider the permit holder's cost of complying with the board's restrictions on pollutant content in the water is consistent with federal law. In support, the Cities point to certain provisions of the federal Clean Water Act. They cite section 1251(a)(2) of title 33 United States Code, which sets, as a national goal "*wherever attainable,*" an interim goal for water quality that protects fish and wildlife, and section 1313(c)(2)(A) of the same title, which requires consideration, among other things, of waters' "*use and value* for navigation" when revising or adopting a "water quality standard." (Italics added.) These two federal statutes, however, pertain not to permits for wastewater discharge, at issue here, but to establishing water quality standards, not at issue here. Nothing in the federal Clean Water Act suggests that a state is free to disregard or to weaken the federal requirements for clean water when an NPDES permit holder alleges that compliance with those requirements will be too costly.

At oral argument, counsel for amicus curiae National Resources Defense Council, which argued on behalf of California's State Board and regional water boards, asserted that the federal Clean Water Act incorporates state water policy into federal law, and that therefore a regional board's consideration of economic factors to justify greater pollutant concentration in discharged wastewater would conflict with the federal act even if the specified pollutant restrictions were not less stringent than those required under federal law. We are not persuaded. The federal Clean Water Act reserves to the states significant aspects of water quality policy (33 U.S.C. § 1251(b)), and it specifically grants the states authority to "enforce any effluent limitation" that is not "*less stringent* " than the federal standard (*id.* § 1370, italics added). It does not prescribe or restrict the factors that a state may consider

when exercising this reserved authority, and thus it does not prohibit ***628** a state—when imposing effluent limitations that are *more stringent* than required by federal law—from taking into account the economic effects of doing so.

Also at oral argument, counsel for the Cities asserted that if the three municipal wastewater treatment facilities ceased releasing their treated wastewater into the concrete channel that makes up the Los Angeles River, it would (other than during the rainy season) contain no water at all, and thus would not be a "navigable water" of the ****871** United States subject to the Clean Water Act. (See *Solid Waste Agency v. United States Army Corps of Engineers* (2001) 531 U.S. 159, 172, 121 S.Ct. 675, 148 L.Ed.2d 576 ["The term 'navigable' has at least the import of showing us what Congress had in mind as its authority for enacting the CWA: its traditional jurisdiction over waters that were or had been navigable in fact or which could reasonably be so made."].) It is unclear when the Cities first raised this issue. The Court of Appeal did not discuss it in its opinion, and the Cities did not seek rehearing on this ground. (See *****314** Cal. Rules of Court, rule 28(c)(2).) Concluding that the issue is outside our grant of review, we do not address it.

CONCLUSION

Through the federal Clean Water Act, Congress has regulated the release of pollutants into our national waterways. The states are free to manage their own water quality programs so long as they do not compromise the federal clean water standards. When enacted in 1972, the goal of the Federal Water Pollution Control Act Amendments was to *eliminate* by the year 1985 the discharge of pollutants into the nation's navigable waters. In furtherance of that goal, the Los Angeles Regional Board indicated in its 1994 basin plan on water quality the intent, insofar as possible, to remove from the water in the Los Angeles River toxic substances in amounts harmful to humans, plants, and aquatic life. What is not clear from the record before us is whether, in limiting the chemical pollutant content of wastewater to be discharged by the Tillman, Los Angeles–Glendale, and Burbank wastewater treatment facilities, the Los Angeles Regional Board acted only to implement requirements of the federal Clean Water Act or instead imposed pollutant limitations that exceeded the federal requirements. This is an issue of fact to be resolved by the trial court.

DISPOSITION

We affirm the judgment of the Court of Appeal reinstating the wastewater discharge permits to the extent that the specified numeric limitations on chemical pollutants are necessary to satisfy federal Clean Water Act requirements for treated wastewater. The Court of Appeal is directed to remand this ***629** matter to the trial court to decide whether any numeric limitations, as described in the permits, are "more stringent" than required under federal law and thus should have been subject to "economic considerations" by the Los Angeles Regional Board before inclusion in the permits.

WE CONCUR: GEORGE, C.J., BAXTER, WERDEGAR, CHIN, and MORENO, JJ.

Concurring Opinion by BROWN, J.

I write separately to express my frustration with the apparent inability of the government officials involved here to answer a simple question: How do the federal clean water standards (which, as near as I can determine, are the state standards) prevent the state from considering economic factors? The majority concludes that because "the supremacy clause of the United States Constitution requires state law to yield to federal law, a regional board, when issuing a wastewater discharge permit, may not consider economic factors to justify imposing pollutant restrictions that are *less stringent* than applicable federal standards require." (Maj. opn., *ante,* 26 Cal.Rptr.3d at p. 306, 108 P.3d at p. 864.) That seems a pretty self-evident proposition, but not a useful one. The real question, in my view, is whether the Clean Water Act prevents or prohibits the regional water board from considering economic factors to justify pollutant restrictions that *meet* the clean water standards in more cost-effective and economically efficient ways. I can see no reason why a federal law—which purports to be an example of cooperative federalism—would decree such a result. I do not think the majority's reasoning is at fault here. Rather, the agencies involved seemed to have worked hard to make this simple question impenetrably obscure.

A brief review of the statutory framework at issue is necessary to understand my concerns.

*****315 **872 I. Federal Law**

"In 1972, Congress enacted the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), commonly known as the Clean Water Act (CWA) [Citation.] ... [¶] Generally, the CWA 'prohibits the discharge of any pollutant except in compliance with one of several statutory exceptions. [Citation.]' ... The most important of those exceptions is pollution discharge under a valid NPDES [National Pollution Discharge Elimination System] permit, which can be issued either by the Environmental Protection Agency (EPA), or by an EPA-approved state permit program such as California's. [Citations.] NPDES permits are valid for five years. [Citation.] [¶] Under the CWA's NPDES permit program, the states are required to develop *water quality standards.* [Citations.] A water quality standard 'establish[es] the desired condition of a waterway.' [Citation.] A water quality standard for any ***630** given waterway, or 'water body,' has two components: (1) the designated beneficial uses of the water body and (2) the *water quality criteria* sufficient to protect those uses. [Citations.] [¶] Water quality criteria can be either *narrative* or *numeric.* [Citation.]" (*Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1092–1093, 1 Cal.Rptr.3d 76.)

With respect to satisfying water quality standards, "a polluter must comply with *effluent limitations.* The CWA defines an effluent limitation as 'any restriction established by a State or the [EPA] Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.' [Citation.] 'Effluent limitations are a means of *achieving* water quality standards.' [Citation.] [¶] NPDES permits establish effluent limitations for the polluter. [Citations.] CWA's NPDES permit system provides for a two-step process for the establishing of effluent limitations. First, the polluter must comply with *technology-based effluent limitations,* which are limitations based on the best available or practical technology for the reduction of water pollution. [Citations.] [¶] Second, the polluter must also comply with more stringent *water quality-based effluent limitations* (WQBEL's) where applicable. In the CWA, Congress 'supplemented the "technology-based" effluent limitations with "water quality-based" limitations "so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.' " [Citation.] [¶] The CWA makes WQBEL's applicable to a given polluter whenever WQBEL's are 'necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations....' [Citations.] Generally, NPDES permits must conform to state water quality laws insofar as the state laws impose more stringent pollution controls than the CWA. [Citations.] Simply put, WQBEL's implement water quality standards." (*Communities for a Better Environment v. State Water Resources Control Bd., supra,* 109 Cal.App.4th at pp. 1093–1094, 1 Cal.Rptr.3d 76, fns. omitted.)

This case involves water quality-based effluent limitations. As set forth above, "[u]nder the CWA, states have the primary role in promulgating water quality standards." (*Piney Run Preservation Ass'n v. Commrs. of Carroll Co.* (4th Cir.2001) 268 F.3d 255, 265, fn. 9.) "Under the CWA, the water quality standards referred to in section 301 [see 33 U.S.C. § 1311] are primarily the states' handiwork." *****316** (*American Paper Institute, Inc. v. U.S. Envtl. Protection Agency* (D.C.Cir.1993) 996 F.2d 346, 349 (*American Paper*).) In fact, upon the 1972 passage of the CWA, "[s]tate water quality standards in effect at the time ... were deemed to be the initial water quality benchmarks for CWA purposes.... The states were to revisit and, if ***631** necessary, revise those initial standards at least once every three years." (*American Paper,* at p. 349.) Therefore, "once a water quality standard has been promulgated, section 301 of the CWA requires all NPDES permits for point sources to incorporate discharge limitations necessary to satisfy that standard." (*American Paper,* at p. 350.) Accordingly, it appears that in most instances, ****873** state water quality standards are identical to the federal requirements for NPDES permits.

II. State Law

In California, pursuant to the Porter–Cologne Water Quality Control Act (Wat.Code, § 13000 et seq.; Stats.1969, ch. 482, § 18, p. 1051; hereafter Porter–Cologne Act), the regional water quality control boards establish water quality standards —and therefore federal requirements for NPDES permits— through the adoption of water quality control plans (basin plans). The basin plans establish water quality objectives using enumerated factors—including economic factors—set forth in Water Code section 13241.

In addition, as one court observed: "The Porter–Cologne Act ... established nine regional boards to prepare water quality plans (known as basin plans) and issue permits governing the discharge of waste. (Wat.Code, §§ 13100, 13140, 13200, 13201, 13240, 13241, 13243.) The Porter–

Cologne Act identified these permits as 'waste discharge requirements,' and provided that the waste discharge requirements must mandate compliance with the applicable regional water quality control plan. (Wat.Code, §§ 13263, subd. (a), 13377, 13374.)[¶] Shortly after Congress enacted the Clean Water Act in 1972, the California Legislature added Chapter 5.5 to the Porter–Cologne Act, for the purpose of adopting the necessary federal requirements to ensure it would obtain EPA approval to issue NPDES permits. (Wat.Code, § 13370, subd. (c).) As part of these amendments, the Legislature provided that the state and regional water boards 'shall, as required or authorized by the [Clean Water Act], issue waste discharge requirements ... which apply and ensure compliance with all applicable provisions [of the Clean Water Act], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.' (Wat.Code, § 13377.) Water Code section 13374 provides that '[t]he term "waste discharge requirements" as referred to in this division is the equivalent of the term "permits" as used in the [Clean Water Act].' [¶] California subsequently obtained the required approval to issue NPDES permits. [Citation.] Thus, the waste discharge requirements issued by the regional water boards ordinarily also serve as NPDES permits under federal law. (Wat.Code, § 13374.)" (*Building Industry Assn. of San Diego County v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 875, 22 Cal.Rptr.3d 128.)

***632** Applying this federal-state statutory scheme, it appears that throughout this entire process, the Cities of Burbank and Los Angeles (Cities) were unable to have economic factors considered because the Los Angeles Regional Water Quality Control Board (Board)—the body responsible to enforce the statutory framework—failed to comply with its statutory mandate.

*****317** For example, as the trial court found, the Board did not consider costs of compliance when it initially established its basin plan, and hence the water quality standards. The Board thus failed to abide by the statutory requirement set forth in Water Code section 13241 in establishing its basin plan. Moreover, the Cities claim that the initial narrative standards were so vague as to make a serious economic analysis impracticable. Because the Board does not allow the Cities to raise their economic factors in the permit approval stage, they are effectively precluded from doing so. As a result, the Board appears to be playing a game of "gotcha" by allowing the Cities to raise economic considerations when it is not practical, but precluding them when they have the ability to do so.

Moreover, the Board acknowledges that it has neglected other statutory provisions that might have provided an additional opportunity to air these concerns. As set forth above, pursuant to the CWA, "[t]he states were to revisit and, if necessary, revise those initial standards at least once every three years—a process commonly known as triennial review. [Citation.] Triennial reviews consist of public hearings in which current water quality standards are examined to assure that they 'protect the public health or welfare, enhance the quality of water and serve the purposes' of the Act. [Citation.] Additionally, the CWA ****874** directs states to consider a variety of competing policy concerns during these reviews, including a waterway's 'use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes.' " (*American Paper, supra,* 996 F.2d at p. 349.)

According to the Cities, "[t]he last time that the narrative water quality objective for toxicity contained in the Basin Plan was reviewed and modified was 1994." The Board does not deny this claim. Accordingly, the Board has failed its duty to allow public discussion—including economic considerations—at the required intervals when making its determination of proper water quality standards.

What is unclear is why this process should be viewed as a contest. State and local agencies are presumably on the same side. The costs will be paid by taxpayers and the Board should have as much interest as any other agency in fiscally responsible environmental solutions.

***633** Our decision today arguably allows the Board to continue to shirk its statutory duties. The majority holds that when read together, Water Code sections 13241, 13263, and 13377 do not allow the Board to consider economic factors when issuing NPDES permits to satisfy federal CWA requirements. (Maj. opn., *ante,* 26 Cal.Rptr.3d at pp. 311–312, 108 P.3d at pp. 869–870.) The majority then bifurcates the issue when it orders the Court of Appeal "to remand this matter to the trial court to decide whether any numeric limitations, as described in the permits, are 'more stringent' than required under federal law and thus should have been subject to 'economic considerations' by the Los Angeles Regional Board before inclusion in the permits." (*Id.* at p. 314, 108 P.3d at p. 871.)

The majority overlooks the feedback loop established by the CWA, under which federal standards are linked to state-established water quality standards, including narrative water quality criteria. (See 33 U.S.C. § 1311(b)(1)(C); 40 C.F.R. § 122.44(d)(1) (2004).) Under the CWA, NPDES permit requirements include the state narrative criteria, which are incorporated into the Board's basin plan under the description "no toxins in toxic amounts." As far as I can determine, NPDES permits *****318** designed to achieve this narrative criteria (as well as designated beneficial uses) will usually implement the state's basin plan, while satisfying federal requirements as well.

If federal water quality standards are typically identical to state standards, it will be a rare instance that a state exceeds its own requirements and economic factors are taken into consideration.[1] In light of the Board's initial failure to consider costs of compliance and its repeated failure to conduct required triennial reviews, the result here is an unseemly bureaucratic bait-and-switch that we should not endorse. The likely outcome of the majority's decision is that the Cities will be economically burdened to meet standards imposed on them in a highly questionable manner.[2] In these times of tight fiscal budgets, it is difficult to imagine imposing additional financial burdens on municipalities without at least allowing them to present alternative views.

Based on the facts of this case, our opinion today appears to largely retain the status quo for the Board. If the Board can actually demonstrate that only the precise limitations at issue here, implemented in only one way, will achieve the desired water standards, perhaps its obduracy is justified. That case has yet to be made.

***634** Accordingly, I cannot conclude that the majority's decision is wrong. The analysis ****875** may provide a reasonable accommodation of conflicting provisions. However, since the Board's actions "make me wanna holler and throw up both my hands,"[3] I write separately to set forth my concerns and concur in the judgment—*dubitante.*[4]

All Citations

35 Cal.4th 613, 108 P.3d 862, 26 Cal.Rptr.3d 304, 60 ERC 1470, 35 Envtl. L. Rep. 20,071, 05 Cal. Daily Op. Serv. 2861, 2005 Daily Journal D.A.R. 3870

Footnotes

* Brown, J., did not participate therein.

1 Further undesignated statutory references are to the Water Code.

2 The Los Angeles water region "comprises all basins draining into the Pacific Ocean between the southeasterly boundary, located in the westerly part of Ventura County, of the watershed of Rincon Creek and a line which coincides with the southeasterly boundary of Los Angeles County from the ocean to San Antonio Peak and follows thence the divide between San Gabriel River and Lytle Creek drainages to the divide between Sheep Creek and San Gabriel River drainages." (§ 13200, subd. (d).)

3 A "point source" is "any discernable, confined and discrete conveyance" and includes "any pipe, ditch, channel ... from which pollutants ... may be discharged." (33 U.S.C. § 1362(14).)

4 This opinion uses the terms "narrative criteria" or descriptions, and "numeric criteria" or effluent limitations. Narrative criteria are broad statements of desirable water quality goals in a water quality plan. For example, "no toxic pollutants in toxic amounts" would be a narrative description. This contrasts with numeric criteria, which detail specific pollutant concentrations, such as parts per million of a particular substance.

5 For example, the permits for the Tillman and Los Angeles–Glendale Plants limited the amount of fluoride in the discharged wastewater to 2 milligrams per liter and the amount of mercury to 2.1 micrograms per liter.

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6 Unchallenged on appeal and thus not affected by our decision are the trial court's rulings that (1) the Los Angeles Regional Board failed to show how it derived from the narrative criteria in the governing basin plan the specific numeric pollutant limitations included in the permits; (2) the administrative record failed to support the specific effluent limitations; (3) the permits improperly imposed daily maximum limits rather than weekly or monthly averages; and (4) the permits improperly specified the manner of compliance.

7 The concurring opinion misconstrues both state and federal clean water law when it describes the issue here as "whether the Clean Water Act prevents or prohibits the regional water board from considering economic factors to justify pollutant restrictions *that meet the clean water standards in more cost-effective and economically efficient ways.*" (Conc. Opn. of Brown, J., *post,* 26 Cal.Rptr.3d p. 314, 108 P.3d at p. 871, some italics added.) This case has nothing to do with meeting federal standards in more cost effective and economically efficient ways. State law, as we have said, allows a regional board to consider a permit holder's compliance cost to *relax* pollutant concentrations, as measured by numeric standards, for pollutants in a wastewater discharge permit. (§§ 13241 & 13263.) Federal law, by contrast, as stated above in the text, "prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the [federal] act's *clean water standards, regardless of cost* (see *id.,* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3))." (Italics added.)

8 As amended in 1978, section 13377 provides for the issuance of waste discharge permits that comply with federal clean water law "together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." We do not here decide how this provision would affect the cost-consideration requirementsof sections 13241 and 13263 when more stringent effluent standards or limitations in a permit are justified for some reason independent of compliance with federal law.

1 (But see *In the Matter of the Petition of City and County of San Francisco, San Francisco Baykeeper et al.* (Order No. WQ 95–4, Sept. 21, 1995) 1995 WL 576920.)

2 Indeed, given the fact that "water quality standards" in this case are composed of broadly worded components (i.e., a narrative criteria and "designated beneficial uses of the water body"), the Board possessed a high degree of discretion in setting NPDES permit requirements. Based on the Board's past performance, a proper exercise of this discretion is uncertain.

3 Marvin Gaye (1971) "Inner City Blues."

4 I am indebted to Judge Berzon for this useful term. (See *Credit Suisse First Boston Corp. v. Grunwald* (9th Cir.2005) 400 F.3d 1119 (conc. opn. of Berzon, J.).)

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150 Cal.App.2d 671
District Court of Appeal, Second District, Division 1, California.

Glenn D. COREY, Plaintiff and Appellant,
v.
Goodwin J. KNIGHT, Governor of the State of California, et al., Defendants,
Clarke Gray, Respondent.

Civ. No. 22068.
|
May 6, 1957.
|
Hearing Denied July 3, 1957.

Synopsis

Declaratory judgment action to determine eligibility of judge of the justice court to position of judge of municipal court and to determine judge's retirement rights. The Superior Court, Ventura County, Charles F. Blackstock, J., entered judgment adverse to judge of the justice court, and he appealed. The District Court of Appeal, Fourt, J., held that judge would be ineligible to be municipal court judge, and that, in event that municipal court were to come into existence, judge, who was over 70, would be compulsorily retired and be entitled to retirement benefits under the County Employees Retirement Law of 1937 when the municipal court came into existence.

Judgment affirmed.

Attorneys and Law Firms

****674** ***672** Waite & Drapeau, by David R. Drapeau, Ventura, for appellant.

Charles Kaplan, Beverly Hills, Arden T. Jensen, Solvang, amici curiae.

Roy A. Gustafson, Dist. Atty., Ventura County, Ventura, for respondent.

Opinion

FOURT, Justice.

This is an appeal from a judgment in a declaratory relief action wherein it was adjudged 'that if plaintiff is Judge of the Justice Court of the Ventura Judicial District at the time when the district is found to have over 40,000 inhabitants, (1) a Municipal Court will thereupon supersede the Justice Court, (2) plaintiff will be ineligible to be Judge of the Municipal Court, (3) a vacancy will exist to be filled by ***673** appointment of the Governor, (4) plaintiff will be compulsorily retired and (5) plaintiff will receive retirement benefits under the County Employees Retirement Law of 1937 [Gov.Code, § 31450 et seq.].'

A resume of the facts in the case is as follows: In about 1947, the legislature requested the Judicial Council to make a survey of all courts in California exercising jurisdiction inferior to the superior court. After an extensive study the Judicial Council, in 1949, recommemded to the legislature a plan for the reorganization of such courts (Twelfth Binnial Report [1948], Judicial Council of California). The legislature, through committees, conducted public hearings, and as a result thereof some changes and additions were made in the proposed constitutional amendments and the proposed statutes drafted by the Council. The interpretation to be given to some of the words added in one of the constitutional amendments which was proposed and adopted (Article VI, section 23) is the only ****675** real problem to be determined in this case. The language in question is contained in the 'exception' section, generally referred to as the 'Grandfather Clause', the pertinent parts of which are as follows:

'No person shall be eligible to the office of a Justice of the Supreme Court, or of a district court of appeal, or of a judge of a superior court, or of a municipal court, unless he shall have been admitted to practice before the Supreme Court of the State for a period of at least five years immediately preceding his election or appointment to such office; provided, however, that any elected judge or justice of an existing court who has served in that capacity by election or appointment for five consecutive years immediately preceding the effective date of this amendment shall be eligible to become the judge of a municipal court by which the existing court is superseded upon the establishment of said municipal court or at the first election of judges thereto and for any consecutive terms thereafter for which he may be reelected * * *.'

The legislature voted to submit the proposed constitutional amendment to the People at the General Election, November 7, 1950. The proposition was Number 3 on the ballot at that time, and was adopted by the People by a large majority. At the same election, section 11 of Article VI of the Constitution was amended to provide for only two types of courts inferior to the superior court, namely, justice courts and municipal courts, and further to validate the laws relating to

judicial districts enacted in the legislative session of 1949, in anticipation of the adoption of the constitutional amendments. The ***674** amendments provided, among other things, in substance, that each county should be divided into judicial districts and that if the population of any district were over 40,000, the district should have a municipal court, or if under 40,000, a justice court. The legislature, by section 1 of Chapter 1511, Statutes 1949, Government Code, § 71040, directed the Board of Supervisors to district their counties. The new plan was to become effective January 1, 1952, except where two or more incumbent judges would be eligible to be judges of the new court, in which case section 2 of Chapter 1510, Statutes 1949, Government Code, §§ 71080, 71081, provided that they 'shall not automatically succeed to judicial positions in the municipal or justice court, and the existing courts shall continue to function within the district until the first judge or judges of said municipal or justice court shall be elected by the qualified electors of the district at the first general state election held following the expiration of 90 days and qualify.'

Article VI, section 11, as amended in 1950, also contained a provision that 'existing courts shall continue to function as presently organized until the first selection and qualification of the judge or judges of the municipal or justice court, at which time, unless otherwise provided by law, pending actions, trials and all pending business of existing courts shall be transferred to and become pending in the municipal or justice court established for the judicial district or city and county in which they are situated, and all records of such superseded courts shall be transferred to, and thereafter be and become records of said municipal or justice court.'

On July 6, 1944, Ventura township was one of nine townships into which Ventura county was divided. The court of Ventura township was a class B justice court. The justice of the peace who presided over the court died and appellant herein was appointed by the Board of Supervisors to fill the vacancy.

The City of San Buenaventura (hereinafter referred to as Ventura) is located in the territorial limits of Ventura township. The charter of Ventura provides for a police court and such court was presided over by Judge B. L. Gregg, a former member of the State Bar. Appellant's original term as justice of the peace expired January 6, 1947. He was elected to that position for the term from January 6, 1947, to January 2, 1951, and was re-elected to that position for the term from January 2, 1951, to January 3, 1955. On October 26, 1951, the ****676** population of the township having been found to be over 30,000 by the 1950 census, the court became a class A justice court. The boundaries of the Ventura judicial district were ***675** established as of September 4, 1951, by Ordinance No. 472 of the board of supervisors of Ventura county, in conformity with the Statutes of 1949. The area of the district included, but was larger than, Ventura township. The population of the district was less than 40,000.

On January 1, 1952, there were two judicial officers of courts within the area of Ventura judicial district, namely, appellant as justice of the peace of Ventura township, and B. L. Gregg as judge of the police court in the city of Ventura. Both were candidates for the office of judge of the justice court of Ventura judicial district at the election in 1952. Appellant was not and never has been an attorney, and had not passed any examination prescribed by the judicial council. Appellant, who was over 70 years of age at the time of the election, was elected and took office as judge of the justice court on January 5, 1953, for the term ending January 5, 1959.

The justice court of Ojai judicial district began functioning in January, 1952, because only one incumbent was eligible to the judgeship. The remaining four districts in Ventura county were inoperative as such, pending the election of judges. Judges were elected in 1952, and the four districts began functioning as such on January 5, 1953, or, in other words, on January 5, 1953, Ventura county have five judicial districts, each with a functioning justice court.

An action was filed in the superior court of Ventura county on July 5, 1956, for the purpose of having it declared that Ventura judicial district had a population of over forty thousand. On September 6, 1956, the trial judge of that court found that there were forty thousand or more persons in the district, and a municipal court is now in existence. Appellant contends that he is eligible to be, and that he is the judge of such municipal court now in existence. Appellant further asserts that he will continue to be a judge of the justice court if found to be ineligible to be the municipal court judge, until a municipal court judge is elected for the term beginning January 5, 1959. Respondent asserts that appellant is ineligible and he cannot pay appellant now that such municipal court is established; that appellant's term is now terminated as of September 6, 1956, the date upon which the municipal court was declared to be in existence, and appellant is compulsorily retired, and that a vancency existed which was to be filled by appointment by the Governor.

Appellant, in his briefs and in the oral argument, has made ***676** issue of the first contention heretofore mentioned, namely, that he is eligible to become judge of the municipal

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court of Ventura judicial district, and no argument or authorities were presented on the other matters, and we therefore assume that the disposition of the first question will dispose of this appeal.

Honorable Charles F. Blackstock, the learned trial judge, prepared findings of fact and conclusions of law and in his conclusions set forth the applicable law. We believe that the commentary of the trial judge concisely and correctly sets forth the law and we adopt his statements in reference thereto, as follows:

'Both parties concede that if Ventura Judicial District is found to have a population of 40,000 persons and if plaintiff is eligible to be a Municipal Court judge, the court will begin to function immediately with plaintiff as judge. Government Code, Section 71080. Not being an attorney, plaintiff is eligible, if at all, only under this proviso of Section 23 of Article VI of the Constitution:

"[A]ny elected judge or justice of an *existing court* who has served in that capacity by election or appointment for five consecutive years immediately preceding the effective date of this amendment shall be eligible to become a judge of a municipal court by which the *existing court* is *superseded* upon the establishment of said municipal court. * * *' (Emphasis added.)

****677** 'The basic question is the meaning of the words 'existing court'. The amendment was adopted November 7, 1950. Do the words refer to a court then existing or to a court existing at the time the amendment is invoked?

'The court over which plaintiff presided on November 7, 1950 was the Justice's Court of Ventura Township. The court over which he now presides is the Justice Court of Ventura Judicial District. If those two courts are the same court (identified by different names), plaintiff is clearly eligible regardless of the time to which the words 'existing court' refer.

'A Class B Justice's Court had jurisdiction over cases involving claims up to $300. A Justice Court has jurisdiction of Claims up to $500. The jurisdiction of a Justice's Court was not exclusive and, in fact, was shared in Ventura Township with the Police Court. The jurisdiction of the Justice Court is exclusive within its territorial area. The territorial area of a township was not necessarily the same as the territorial area of a judicial district and, in fact, the boundaries of the Ventura Judicial District are larger than the boundaries of ***677** Ventura Township. (There were nine townships in Ventura County, whereas there are only five judicial districts.) The presiding officer of a Justice's Court was a Justice of the Peace. The presiding officer of a Justice Court is a Judge. There were no qualifications for a Justice of the Peace. A Judge of a Justice Court must either be a lawyer or have passed an examination prescribed by the Judicial Council. The term of a Justice of the Peace was four years. The term of a Judge of the Justice Court is six years. It appears, therefore, that the two courts are different and are not the same.

'This conclusion is fortified by language used in the pertinent laws. Article 6, Section 11 of the Constitution refers to the fact that 'existing courts [in a judicial district] shall continue to function' until the new justice court is established at which time all records of such superseded courts shall be transferred to [the] * * * justice court.' Government Code, Section 71080 provided that where two persons were eligible to be judge of the new justice court (as were Justice of the Peace Glenn Corey and Judge B. L. Gregg in the Ventura Judicial District), 'such incumbents shall not automatically succeed to judicial positions [on January 1, 1952] in the * * * justice court, and the existing courts shall continue to function within the district until the first judge * * * of such * * * justice court [is] elected [for the term beginning January 5, 1953].' Similarly, Chapter 14, Statutes of 1952, First Extraorinary Session, referred to the fact that:

"Certain Class B justices' courts will *remain in existence* until January 5, 1953, under the inferior court reorganization program, after which time there will be no courts in the State inferior to the superior courts except municipal and justice courts.' (Emphasis added.)

'Thus it is plain that the Justice's Court of Ventura Township is not the same as the Justice Court of Ventura Judicial District.

'Which, then, is the 'existing court' referred to in the eligibility clause of the Constitution? If it is the Justice Court of Ventura Judicial District, plaintiff is ineligible because plaintiff has not 'served in that capacity [that is, judge] by election or appointment for five consecutive years immediately preceding [November 7, 1950].' This is so because that court did not exist *before* January 5, 1953. If it is the Justice's Court of Ventura Township, plaintiff is ineligible because that court will not be 'superseded upon the establishment of said municipal court.' This is so because that court ***678** did not exist *after* January 5, 1953 and cannot be superseded in 1956. That court was superseded on January 5, 1953 and plaintiff holds his present position pursuant to Section 71601 of the Government Code which made him eligible to be Judge of the Justice Court solely because he

was 'the incumbent of a superseded inferior court.' In either event, plaintiff is ineligible. (Had a Municipal Court been established **678 between November 7, 1950 and January 5, 1953, plaintiff would have been eligible to be judge.)

'The conclusion that plaintiff is ineligible has been reached by the Attorney General (21 Ops.Cal.Atty.Gen. 152) and by defendant county auditor. Where the Attorney General has interpreted a law in a written opinion and that position has been adopted by an administrative agency, the 'administrative application of an act is entitled to respect by the courts, and unless clearly erroneous is a significant factor to be considered in ascertaining the meaning of a statute.' Mudd v. McColgan (1947), 30 Cal.2d 463 [183 P.2d 10].

'Proposition 19 on the ballot in 1954 was this:

"Proposed Amendment to Article VI

"Sec. 23. No person shall be eligible to the office of a justice of the Supreme Court, or of a district court of appeal, or of a judge of a superior court, or of a municipal court, unless he shall have been admitted to practice before the Supreme Court of the State for a period of at least five years immediately preceding his election or appointment to such office; provided, however, that any elected judge or justice who has served by election or appointment *as such judge or justice of a court superseded by a justice or municipal court* for five consecutive years immediately preceding *November 7, 1950, and has served continuously as a judge of such superseding court after said date until the establishment of a municipal court*, shall be eligible to become the judge of a municipal court which *supersedes* the court *of which he is judge* upon the establishment of said municipal court or at the first election of judge thereto and for any consecutive terms thereafter for which he may be reelected. The requirement of consecutive years of judicial service shall be deemed to have been met even though interrupted by service in the armed forces of the United States during the period of war.'

*679 'In the pamphlet sent to all voters, the following argument was made in favor of the proposition:

"The voters of California at the 1950 general election adopted a constitutional amendment providing for the reorganization of the inferior courts of this State and reducing the number of such courts to two classes known as municipal courts and justice courts. The Constitution then required admission to practice law before the Supreme Court for at least five years before a person is eligible to be a municipal court judge. The 1950 amendment made any elective judge or justice of an existing court superseded by a municipal court eligible to become judge if he had served in his present capacity for five consecutive years immediately preceding the effective date of the amendment. It was the intent and spirit of the amendment that experienced incumbent Justices of the Peace would be permitted to continue in office, even though their courts were changed to municipal courts without requiring that they be lawyers.

"The Attorney General of California last year gave an opinion that the present Justices who are not attorneys would not be eligible to become the judges of municipal courts when such a court succeeds their justice courts.

"Following the opinion of the Attorney General, both houses of the Legislature unanimously voted to submit the present amendment to the Constitution, for the reason that it was the concensus of the Legislature that incumbent Justices who qualify as to consecutive years of service should not be ineligible to continue as municipal court judges because they are not attorneys.

"By adopting the present amendment the people will remove any doubt as to the status of incumbent Justices who are not attorneys and they will be eligible to become municipal judges upon the conversion of their courts if they were eligible to do so in 1950.

**679 "There should be nothing in the administration of justice in municipal courts which requires men who have had long experience as judges to be attorneys. The Justices of the Peace have always been close to the people and responsive to their needs in matter over which they have jurisdiction, and it is felt that when a Justice has been in office for many years, he has met with approval at the hands of the people, even though he is not an attorney.

"This amendment merits the approval of the people for the reasons herein set forth, in order to protect incumbent *680 Justices as to their eligibility for office, even though they are not attorneys.

"J. B. Cooke

"State Assemblyman 37th Dist.'

Had it been passed, it would have been presumed to have been passed with full knowledge of the Attorney General's opinion (Coca-Cola Co. v. State Board of Equalization [1945], 25 Cal.2d 918 [156 P.2d 1]) and it would have been presumed to have changed the law, rather than to have 'clarified' it.

Loew's, Inc., v. Byram (1938), 11 Cal.2d 746 [82 P.2d 1]. Having failed of passage, there is a presumption that the provision means what the Attorney General said it means. The interpretation by the Attorney General is the same as this Court has reached independently.

'Plaintiff's only possible hope is that the Court will, as he urges it to do, 'attach separate meanings to the two uses of the term 'existing.'' In other words, plaintiff says that 'existing court' means the Justice's Court of Ventura Township in the first part of the sentence and means the Justice Court of Ventura Judicial District in the second part of the sentence. This construction is not reasonable because a word or clause in a statute is presumed to have the same meaning throughout. Pitte v. Shipley (1873), 46 Cal. 154; Hoag v. Howard (1880), 55 Cal. 564. Even if reasonable, that construction would be extremely broad and exceptions are to be narrowly, not broadly, construed. City of National City v. Fritz (1949), 33 Cal.2d 635 [204 P.2d 7].

'Plaintiff, as an elective officer, must be retired 'at the end of the first term to which he is elected and which commences on a date following his seventieth birthday.' Gov. Code, Sec. 31671. His term of office will end, by operation of law, when a Municipal Court is established. 'In each district containing a population of more than 40,000 inhabitants * * * there shall be a municipal court.' Constitution, Article VI, Section 11. 'Whenever a municipal court is established in a district in which a justice court was previously established * * *, the justice court shall cease to exist. * * *' Government Code, Section 71084. A 'vacancy in the office of judge of a municipal court shall be filled by appointment by the Governor. * * *' Government Code, Section 71180. (If plaintiff were eligible, he would automatically become Judge of the Municipal Court. If two or more incumbent judges were eligible to one position of Judge of the Municipal Court, the court would not begin to function until January, 1959 following ***681** the election of a judge in 1958. Gov. Code, Secs. 71080, 71081. Neither of these situations exists in this case.) Since the necessary legislation exists for a Municipal Court in the Ventura Judicial District (Gov. Code, Secs. 74880–74887), the court will come into existence when it is found, pursuant to Section 71043(c) of the Government Code, that there are 40,000 inhabitants of the district. At that moment plaintiff will be compulsorily retired and will be entitled to retirement benefits under the County Employees Retirement Law of 1937.'

The judgment is affirmed.

WHITE, P. J., and DORAN, J., concur.

All Citations

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7 Cal.App.5th 628
Court of Appeal, Third District, California.

DEPARTMENT OF ALCOHOLIC BEVERAGE CONTROL, Petitioner,
v.
ALCOHOLIC BEVERAGE CONTROL APPEALS BOARD, Respondent;
Garfield Beach CVS, LLC et al., Real Parties in Interest.

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Filed 1/17/2017

Synopsis

Background: Department of Alcoholic Beverage Control appealed decision of the Alcoholic Beverage Control Appeals Board, No. AB9434, which reversed suspension of store's off-sale general license for selling alcohol to a minor decoy.

Holdings: The Court of Appeal, Hoch, J., held that:

Alcoholic Beverage Control rule which required that minor decoys "truthfully answer any questions about his or her age," did not require minor decoy to truthfully respond to clerk's statement, after looking at driver's license, that "I would not have guessed it, you must get asked a lot," as rule only required decoys to answer questions, and

rule did not impose affirmative duty on minor decoy to speak up in order to clarify any mistake regarding age articulated by sales clerk.

Annulled; reinstated and remanded.

****132** ORIGINAL PROCEEDING: Petition for writ of review. Petition granted. Alcoholic Beverage Control Appeals Board No. AB9434.

Attorneys and Law Firms

Kamala D. Harris, Attorney General, Alicia M.B. Fowler, Assistant Attorney General, Peter D. Halloran and Lauren Sible, Deputy Attorneys General for Petitioner.

Linda A. Mathes, Sarah M. Smith, John D. Ziegler for Respondent Alcoholic Beverage Control Appeals Board.

****133** Solomon, Saltsman & Jamieson, Stephen Warren Solomon, Ralph Barat Saltsman, Stephen Allen Jamieson, R. Bruce Evans, Ryan M. Kroll, Jennifer L. Oden, Los Angeles, and Margaret Warner Rose for Real Parties in Interest.

Opinion

HOCH, J.

***630** California Constitution, article XX, section 22, prohibits the sale of alcoholic beverages to persons under 21 years of age. (See also Bus. & Prof. Code, § 25658, subd. (a)),[1] [making it a misdemeanor to sell alcohol to a person under 21 years of age]. Here, the Department of Alcoholic Beverage ***631** Control (Department) issued a 15–day suspension of an off-sale general license held by the Garfield Beach CVS LLC Longs Drug Stores California LLC, doing business as CVS Pharmacy Store 9174 (CVS) after an administrative law judge found the store clerk sold alcohol to a minor decoy.[2] The Alcoholic Beverage Control Appeals Board (Appeals Board) reversed the suspension based on California Code of Regulations, title 4, section 141 (Rule 141), which allows a law enforcement agency to use an underage decoy only "in a 'fashion that promotes fairness.' (*Id.*, subd. (a).) In the Appeals Board's view, the suspension was unfair because the minor decoy did not respond about his age when the store clerk looked at his driver license and remarked, "I would never have guessed it, you must get asked a lot." To challenge the reversal of the license suspension, the Department petitioned for a writ of review in this court. (§ 23090.)

The Department contends it correctly interprets Rule 141 to require minor decoys to answer only questions about their ages. Based on the administrative law judge's finding in this case that the store clerk's remark constituted a statement rather than a question, the Department argues its decision was legally correct and supported by substantial evidence. The Appeals Board counters Rule 141 is ambiguous and results "in confusion and manifest unfairness." CVS argues the Department's interpretation of Rule 141 unfairly allows decoys to remain silent in the face of mistaken statements about age. According to CVS, affirming the license suspension would allow deceptive and misleading silence in the face of a store clerk's explicit mistake about the minor decoy's age.

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We conclude Rule 141 is not ambiguous in requiring minor decoys to answer truthfully only questions about their ages. Because substantial evidence supports the administrative law judge's factual finding the decoy in this case was not questioned about his age, we determine as a matter of law that Rule 141 does not provide CVS with a defense to the accusation it sold an alcoholic beverage to an underage buyer. Accordingly, we annul the Appeals Board's decision.

BACKGROUND

The Department's Imposition of a 15–day License Suspension

In October 2013, the Department accused CVS of selling alcohol to an underage person at its Garfield Beach store. An administrative hearing was ***632** held in February 2014, in which the administrative law judge made the following findings of fact:

CVS has held an off-sale general license to sell alcohol since June 2009, with no prior record of discipline by the Department. On June 3, 2013, Joseph Childers was 18 years old and had the appearance and mannerisms of a person under the age of 21. On that date, Childers accompanied ****134** Department agents and law enforcement officers to conduct an alcoholic beverage decoy operation at the Garfield Beach CVS store. Childers entered the store at 2:30 p.m., went to the beer cooler where he selected a 24–ounce bottle of beer, and took the beer to the checkout line. The CVS store clerk scanned the bottle of beer and asked Childers for identification. Childers handed his California driver license to the clerk. The driver license indicated Childers's date of birth and had a red stripe with white letters that stated, "AGE 21 IN 2015." In addition, the driver license had a blue stripe with white letters that stated, "PROVISIONAL UNTIL AGE 18 IN 2012."

The administrative law judge made the following factual findings: "The clerk looked at Childers's [driver license], tried to scan it, and looked at the [license] again. She then stated, 'I would never have guessed it, you must get asked a lot,' or words to that effect. The clerk's remark was framed as a statement not a question. The decoy did not say anything to the clerk in response to her remark. He thought the clerk's statement was 'casual conversation.' The decoy also testified the statement might or might not have been related to his age. Thus, in his mind it was unclear what the clerk meant by her statement. [¶] The clerk sold Childers the 24-ounce bottle of Corona beer. At no time during the transaction did the clerk ask Childers how old he was or his age. Following the sale of the beer, the decoy exited the premises." The administrative law judge found Childers's testimony at the hearing to be clear, concise, and credible. On this basis, the administrative law judge decided there was cause to suspend CVS's off-sale general license for 15 days.

In April 2014, the Department adopted the administrative law judge's proposed decision as its decision in this case. CVS appealed the decision to the Appeals Board.

The Appeals Board's Reversal of License Suspension

In January 2015, the Appeals Board issued its decision. The Appeals Board's decision relied upon its prior decision to conclude Rule 141 required the decoy to respond to the store clerk's statement upon looking at his driver license. The Appeals Board's decision emphasized the following testimony by the decoy at the administrative hearing:

***633** "[Counsel for CVS]: [A]fter the clerk made that statement to you, what did you take that statement to mean?

"A. [Childers]: Casual conversation.

"Q. And [in] that casual conversation did you see it related in any way to your age?

"A. Yes and no.

"Q. When you say 'Yes and no,' what do you mean?

"A. Yes, that maybe *I looked younger*. No, because she *thought I was older* or thought that I do it a lot, you know."

The Appeals Board reasoned that "[w]hen the decoy believes, as here, that a clerk's remarks are ambiguous as to his or her age, the decoy has an obligation to respond verbally and truthfully. That is the plain meaning of rule 141(a)'s language instructing that minor decoy operations must be conducted in a 'fashion that promotes fairness.' " (Italics omitted.) The Appeals Board further stated that whenever "the decoy him or herself interprets a seller's comments to *in any way* pertain to the decoy's age, the Department should insist that decoy err on the side of responding with clarification." On these grounds,

the Appeals Board reversed the Department's decision and rescinded the ****135** suspension of CVS's off-sale general license.

Petition for Writ of Review

In February 2015, the Department filed in this court a petition for writ of review from the decision of the Appeals Board. We issued a writ of review in March 2015. (§ 23090.)

DISCUSSION

I

Standard of Review

In addition to prohibiting the sale of alcohol to minors, the California Constitution "vests the Department with broad discretion to revoke or suspend liquor licenses 'for good cause' if continuing the license would be 'contrary to public welfare or morals.' (Cal. Const., art. XX, § 22.) In the ***634** absence of a clear abuse of discretion, the courts will uphold the Department's decision to suspend a license for violation of the liquor laws. (E.g., *Martin v. Alcoholic Bev. etc. Appeals Bd.* (1959) 52 Cal.2d 238, 248–249 [340 P.2d 1].)" (*Provigo Corp. v. Alcoholic Beverage Control Appeals Bd.* (1994) 7 Cal.4th 561, 566, 28 Cal.Rptr.2d 638, 869 P.2d 1163 (*Provigo*).) " 'The administration of the Alcoholic Beverage Control Act, within the scope of the purposes of that act, is initially vested in the department. Its decisions, however, are subject to administrative review by the board and a final order of the board is, in turn, subject to judicial review.' " (*Caressa Camille, Inc. v. Alcoholic Beverage Control Appeals Bd.* (2002) 99 Cal.App.4th 1094, 1099, 121 Cal.Rptr.2d 758, quoting *Walsh v. Kirby* (1974) 13 Cal.3d 95, 102, 118 Cal.Rptr. 1, 529 P.2d 33.)

The scope of review of the Department's decisions is the same in the Appeals Board and this court. (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2002) 100 Cal.App.4th 1066, 1071, 123 Cal.Rptr.2d 278 (*Deleuze*).) Section 23090.2 provides that review "shall not extend further than to determine, based on the whole record of the department as certified by the board, whether: [¶] (a) The department has proceeded without or in excess of its jurisdiction. [¶] (b) The department has proceeded in the manner required by law. [¶] (c) The decision of the department is supported by the findings. [¶] (d) The findings in the department's decision are supported by substantial evidence in the light of the whole record. [¶] (e) There is relevant evidence which, in the exercise of reasonable diligence, could not have been produced or which was improperly excluded at the hearing before the department." Section 23090.2 also excludes the power to make findings of fact from the scope of review. (*Ibid.*)

In conducting our review, " '[w]e defer to the Department's interpretation of its own rules, since the agency is likely to be intimately familiar with regulations it authored and sensitive to the practical implications of one interpretation over another.' (*Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 12 [78 Cal.Rptr.2d 1, 960 P.2d 1031], (*Yamaha Corp.*).) Courts generally will not depart from the Department's contemporaneous construction of a rule enforced by the Department unless such interpretation is clearly erroneous or unauthorized. (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2003) 109 Cal.App.4th 1687, 1696 [1 Cal.Rptr.3d 339] ....)" (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2005) 128 Cal.App.4th 1195, 1205, 27 Cal.Rptr.3d 766.) In short, the Department's decisions are ****136** "subject to review only for insufficiency of the evidence, excess of jurisdiction, errors of law, or abuse of discretion." (*Deleuze*, at p. 1072, 123 Cal.Rptr.2d 278.)

***635 II**

Rule 141

The Department contends it correctly rejected CVS's reliance on Rule 141 as providing a defense to its sale of alcohol to the underage decoy in this case. We agree.

A.

The Department's Reliance on Minor Decoys

The Department relies on minor decoy operations as an integral part of its enforcement of the constitutional and statutory prohibitions on sales of alcohol to persons under 21 years of age. (Cal. Const., art. XX, § 22; § 25658, subd. (a).) The California Supreme Court has approved

of the practice, noting that "[t]he use of underage decoys to enforce laws against unlawful sales to minors clearly *promotes* rather than hinders" the California constitutional and statutory prohibitions on sales of alcoholic beverages to minors. (*Provigo, supra*, 7 Cal.4th at p. 567, 28 Cal.Rptr.2d 638, 869 P.2d 1163.)

The Business and Professions Code provides that "[p]ersons under 21 years of age may be used by peace officers in the enforcement of this section to apprehend licensees, or employees or agents of licensees, or other persons who sell or furnish alcoholic beverages to minors." (§ 25658, subd. (f).) In pertinent part, subdivision (f) of section 25658 further provides: "Guidelines with respect to the use of persons under 21 years of age as decoys shall be adopted and published by the department in accordance with the rulemaking portion of the Administrative Procedure Act ...." To comply with subdivision (f) of section 25658, the Department promulgated Rule 141. (*Acapulco Restaurants, Inc. v. Alcoholic Beverage Control Appeals Bd.* (1998) 67 Cal.App.4th 575, 579, 79 Cal.Rptr.2d 126 (*Acapulco Restaurants*).) In its entirety, Rule 141 states:

"(a) A law enforcement agency may only use a person under the age of 21 years to attempt to purchase alcoholic beverages to apprehend licensees, or employees or agents of licensees who sell alcoholic beverages to minors (persons under the age of 21) and to reduce sales of alcoholic beverages to minors in a fashion that promotes fairness.

"(b) The following minimum standards shall apply to actions filed pursuant to Business and Professions Code Section 25658 in which it is alleged that a minor decoy has purchased an alcoholic beverage: [¶] (1) At the time of the operation, the decoy shall be less than 20 years of age; [¶] (2) The decoy ***636** shall display the appearance which could generally be expected of a person under 21 years of age, under the actual circumstances presented to the seller of alcoholic beverages at the time of the alleged offense; [¶] (3) A decoy shall either carry his or her own identification showing the decoy's correct date of birth or shall carry no identification; a decoy who carries identification shall present it upon request to any seller of alcoholic beverages; [¶] (4) *A decoy shall answer truthfully any questions about his or her age*; [¶] (5) Following any completed sale, but not later than the time a citation, if any, is issued, the peace officer directing the decoy shall make a reasonable attempt to enter the licensed premises and have the minor decoy who purchased alcoholic beverages make a face to face identification of the alleged seller of the alcoholic beverages.

****137** "(c) Failure to comply with this rule shall be a defense to any action brought pursuant to Business and Professions Code Section 25658." (Italics added.)

B.

Availability of the Rule 141 Defense

The Appeals Board contends subdivision (b)(4) of Rule 141 required the minor decoy in this case to truthfully respond to the clerk's statement, "I would never have guessed it, you must get asked a lot." Similarly, CVS argues the minor decoy's lack of response violated Rule 141 and provided a defense to the Department's accusation. The Department counters by noting the administrative law judge made the factual finding that the CVS clerk's words to the minor decoy constituted a statement rather than a question. On this basis, the Department argues the defense supplied by Rule 141 does not apply here. Resolving these contentions requires us to construe the meaning of Rule 141.

As this court has previously explained, "Generally, the same rules governing the construction and interpretation of statutes apply to the construction and interpretation of administrative regulations. (*In re Richards* (1993) 16 Cal.App.4th 93, 97–98, 19 Cal.Rptr.2d 797.) Accordingly, ' "we begin with the fundamental rule that a court should ascertain the intent of the Legislature so as to effectuate the purpose of the law." ' [Citations.] 'An equally basic rule of statutory construction is, however, that courts are bound to give effect to statutes according to the usual, ordinary import of the language employed in framing them.' [Citations.] Although a court may properly rely on extrinsic aids, it should first turn to the words of the statute to determine the intent of the Legislature. [Citations.] 'If the words of the statute are clear, the court should not add to or alter them to accomplish a ***637** purpose that does not appear on the face of the statute or from its legislative history.' (*California Teachers Assn. v. San Diego Community College Dist.* (1981) 28 Cal.3d 692, 698 [170 Cal.Rptr. 817, 621 P.2d 856].)" (*Schmidt v. Foundation Health* (1995) 35 Cal.App.4th 1702, 1710–1711, 42 Cal.Rptr.2d 172.) " 'The construction of an administrative regulation and its application to a given set of facts are matters of law.' " (*Ibid.*, quoting *Auchmoody v. 911 Emergency Services* (1989) 214 Cal.App.3d 1510, 1517, 263 Cal.Rptr. 278.)

In enacting the Alcoholic Beverage Control Act (Act) (§ 23000 et seq.), the Legislature declared the Act "involves in the highest degree the economic, social, and moral well-being and the safety of the State and of all its people." (§ 23001.) The Act establishes the Department "to provide a governmental organization which will ensure a strict, honest, impartial, and uniform administration and enforcement of the liquor laws throughout the State." (§ 23049.) To that end, section 23001 declares that "[a]ll provisions of this division shall be liberally construed for the accomplishment of these purposes."

Rule 141, subdivision (b)(4) provides that "[a] decoy shall answer truthfully any questions about his or her age." The Rule's guidance is clear and unambiguous. Minor decoys do not need to respond to *statements* of any kind nor do they need to respond truthfully to *questions* other than those concerning their ages. Thus, Rule 141 does not require minor decoys to correct mistakes articulated by licensed alcohol sellers. Instead, the minor decoys need to respond truthfully only to questions about their ages. In short, Rule 141 sets forth clear, unambiguous, and fair guidance for minor decoys to follow during the Department's operations. Consequently, the Department properly construed the ****138** plain language of Rule 141 in determining the minor decoy in this case was not required to respond to the clerk's statement that might have related to the decoy's age.

The Appeals Board disagrees with the Department's plain-meaning interpretation of Rule 141, asserting the Rule is ambiguous and unfair. The Appeals Board argues that "the language of Rule 141[(b)(4)] is ambiguous, and decoys lack the expertise to make a fair decision about whether a clerk's words are a 'question' 'about his or her age.' " The Appeals Board bases its argument on the assertion that "[t]he word 'question' is, especially when uttered vocally as opposed to being written, not free from doubt." In support, the Appeals Board argues the ambiguity of the word "question" is demonstrated by the need for an evidentiary hearing to determine the nature of the store clerk's communication to the minor decoy. We reject the argument.

Courts have long resolved factual issues concerning whether a spoken communication constitutes a question that invited an answer. In ***638** *Rhode Island v. Innis* (1980) 446 U.S. 291, 100 S.Ct. 1682, 64 L.Ed.2d 297, the United States Supreme Court articulated a test for determining when *Miranda* advisements must be given to a suspect that "come[s] into play whenever a person in custody is subjected to either express questioning or its functional equivalent." (*Id.* at pp. 300–301, 100 S.Ct. 1682.) The test under *Rhode Island v. Innis* requires that police officers understand not only whether they are engaging in "express questioning," but also when their words or actions "are reasonably likely to elicit an incriminating response from the suspect." (*Id.* at p. 301, 100 S.Ct. 1682. fn. omitted.) The United States Supreme Court's decision establishes the unproblematic nature of distinguishing between oral communications constituting questions (and even their functional equivalents) and statements not reasonably likely to elicit an incriminating answer. Courts even require law enforcement officers to distinguish between suggestive and nonsuggestive questions. (*People v. Saracoglu* (2007) 152 Cal.App.4th 1584, 1590, 62 Cal.Rptr.3d 418.) Here, the determination required of minor decoys is more clear than the *Rhode Island v. Innis* test or the distinction between suggestive and nonsuggestive questions because subdivision (b)(4) of Rule 141 applies *only* to questions relating to age. "Question" is not an ambiguous term and does not lead to confusion in limiting spoken communications to those involving inquiries that contemplate answers.

We also reject the Appeals Board's contention Rule 141 is ambiguous because "no definition is provided as to what 'fairness' means or how it is to be determined." The lack of a definition of fairness, by itself, does not render Rule 141 ambiguous. (Cf. *Nava v. Mercury Cas. Co.* (2004) 118 Cal.App.4th 803, 805, 13 Cal.Rptr.3d 816 [lack of definition does not render a term ambiguous].) Contrary to the Appeals Board's contention, Rule 141 provides specific guidance regarding how to preserve fairness in minor decoy operations. Subdivision (b) of Rule 141 implements the goal of fairness by imposing five specific requirements for every minor decoy operation. Decoys must be under the age of 20; have the appearance of a person under 21; carry their own actual identification and present that identification upon request; truthfully answer any questions about their ages; and make face-to-face identifications of the persons who sold the alcoholic beverages. (Rule 141, subd. (b)(1)-(5).) Fairness under Rule 141 is assured by a set of five expressly defined safeguards, all of which must be fulfilled during a minor decoy operation. ****139** (*Acapulco Restaurants, supra,* 67 Cal.App.4th at p. 580, 79 Cal.Rptr.2d 126.) Consequently, Rule 141's use of the word "fairness" does not render the rule ambiguous or confusing.

In support of the Appeals Board's argument Rule 141 is ambiguous regarding what constitutes fairness, it points to its earlier decisions in *7–Eleven, Inc. & Johal Stores, Inc.* (Oct. 1, 2014) AB–9403 (*7–Eleven*), *Equilon Enterprises, LLC* (July 26, 2002) AB–7845 (*Equilon*), *Lucky Stores, Inc*. (Oct. 13, 1999) AB–7227 (*Lucky*), *Southland Corp. & Dandona* (Apr. ***639** 16, 1999) AB–7099 (*Southland*), and *Thrifty Payless, Inc*. (Dec. 30, 1998) AB–7050 (*Thrifty*). We may take judicial notice of decisions of the Appeals Board. (*Department of Alcoholic Beverage Control v. Alcoholic Beverage Control Appeals Bd.* (2005) 128 Cal.App.4th 1195, 1208, fn. 5, 27 Cal.Rptr.3d 766; accord *Reimel v. Alcoholic Beverage Control Appeals Bd.* (1967) 254 Cal.App.2d 340, 62 Cal.Rptr. 54.) Thus, although we are not bound by the Appeals Board's decisions, we take judicial notice of the cited decisions and consider their reasoning for persuasive value.

Regarding agency decisions, the California Supreme Court has noted that "[w]here the meaning and legal effect of a statute is the issue, an agency's interpretation is one among several tools available to the court. Depending on the context, it may be helpful, enlightening, even convincing. It may sometimes be of little worth. [Citation.] Considered alone and apart from the context and circumstances that produce them, agency interpretations are not binding or necessarily even authoritative." (*Yamaha Corp. of America v. State Bd. of Equalization* (1998) 19 Cal.4th 1, 7–8, 78 Cal.Rptr.2d 1, 960 P.2d 1031.) Based on our review, we conclude the Appeals Board's cited decisions vary in their persuasiveness and fidelity to Rule 141.

In *7–Eleven*, *supra,* AB–9403, the Appeals Board affirmed the suspension of an off-sale license based on sale to a minor decoy after the store clerk looked at the minor decoy's identification and stated, "oh, you are so young." (*7–Eleven*, at pp. 2, 14.) In affirming the suspension, the Appeals Board concluded the minor decoy was not required to respond because the store clerk did not ask a question or indicate a mistake as to the minor decoy's age. The Appeals Board reasoned that "[t]he wor[d] 'young' is a subjective term, and gives no indication that the clerk has made a miscalculation and as a result believes the decoy to be over 21" years of age. (*Id.* at p. 12.) Under the reasoning of *7–Eleven*, the Appeals Board should have affirmed the license suspension in this case as well. Here, the administrative law judge found the store clerk did not ask a question of the minor decoy. And the store clerk did not clearly demonstrate confusion as to the minor's age in the statement, "I would never have guessed it, you must get asked a lot." The minor decoy testified he thought the statement might mean either that "she thought I was older *or thought that I do it a lot* ...." (Italics added.) Because the store clerk in this case made a statement akin to that in *7–Eleven*, the reasoning employed in *7–Eleven* should have led the Appeals Board to affirm the Department's decision.

We reject the reasoning contained in the remainder of the Appeals Board's earlier decisions because the reasoning in each would require minor decoys to speak up to clarify any mistake about their ages even in the absence of a question. (*Equilon,* supra, AB-7845, at p. 2 [concluding Rule 141 "was ***640** violated when the decoy failed to respond to a statement by the clerk which implied that she was 21 years of age or older"], *Lucky*, supra, AB-7227, at p. 4 [same where minor decoy did not respond to mistaken statement, "1978. You are 21"], and *Southland*, supra, AB-7099, at pp. 6, 7 [same where decoy did not respond to statement, "You are 21"]. In each of these decisions, ****140** the Appeals Board relied on the notion of fairness to craft a new requirement for Rule 141, namely the obligation of a minor decoy to respond to any indication of mistake regarding age even in the absence of a question. Rule 141, however, expressly requires minor decoys only to answer questions relating to their ages. (Rule 141, subd. (b)(4).) The Appeals Board lacks the power to add a new defense to Rule 141.

The Appeals Board's decision in *Thrifty, supra,* AB–7050 involved a reversal of the Board's decision based on the minor decoy's silent tendering of a driver license rather than answering the clerk's question about her age. (See *Thrifty*, at p. 6 [speculating about the minor decoy's motivation in offering her identification rather than answering about her age].) Unlike this case, *Thrifty* involved an actual question by the clerk about the minor decoy's age and is therefore inapposite in this case where the administrative law judge determined the clerk did not ask any questions. (*Id.* at pp. 5–6.) Consequently, we need not consider whether *Thrifty* was correctly decided in harmony with Rule 141.

Ultimately, we are not persuaded by the Appeals Board's prior decisions that Rule 141 is ambiguous in requiring decoys to answer truthfully only questions relating to their ages.

Next, the Appeals Board argues the principle of fairness upon which Rule 141 is founded imposes an affirmative duty on minor decoys to speak up in order to clarify any mistake regarding age articulated by the vendor. If the Department had wanted to provide license holders with a defense for mistakes about a minor decoy's age or based on a minor decoy's failure

to respond to a statement by the clerk, the Department could have done so by including express language to that effect in Rule 141. However, as we explained above, the language of Rule 141 requires minor decoys to respond only to questions about their ages. We reject the Appeals Board's attempt to add a new defense to Rule 141 that is not expressed in the rule. (*Acapulco Restaurants, supra*, 67 Cal.App.4th at p. 580, 79 Cal.Rptr.2d 126.)

Acapulco Restaurants involved a minor decoy operation in which the Department did not comply with Rule 141's requirement the minor decoy make a face-to-face identification of the clerk who sold the alcoholic beverage. (Acapulco Restaurants, supra, 67 Cal.App.4th at p. 577, 79 Cal.Rptr.2d 126; see also Rule 141, subd. (b)(5).) Despite the failure to follow this express requirement ***641** of Rule 141, the Department imposed and the Appeals Board affirmed a 15–day license suspension on grounds a law enforcement officer witnessed the entire transaction. (*Acapulco Restaurants,* at p. 577, 79 Cal.Rptr.2d 126.) However, the *Acapulco Restaurants* court reversed, explaining, "[t]o ignore a rule and the defense that arises from law enforcement's failure to comply with that rule is not a matter of 'interpretation.' What the Department has done is to unilaterally decide that rule 141[ ](b)(5) applies in some situations but not others, a decision that exceeds the Department's power. By its refusal to apply rule 141[ ](b)(5) when a police officer is present at the time of the sale, the Department has crossed the line separating the interpretation of a word or phrase on one side to the legislation of a different rule on the other, thereby substituting its judgment for that of the rulemaking authority. It might as well have said that rule 141[ ](b)(5) applies on Mondays but not Thursdays." (*Acapulco Restaurants, supra*, 67 Cal.App.4th at p. 580, 79 Cal.Rptr.2d 126.)

The result in *Acapulco Restaurants* followed the well-established rule that " '[a]n exception to a statute is to be narrowly construed. (Citation.) When a statute specifies an exception, no others ****141** may be added under the guise of judicial construction. (Citations.)' " (*Kirby v. Alcoholic Beverage Control Appeals Bd.* (1968) 267 Cal.App.2d 895, 898, 73 Cal.Rptr. 352, quoting *Lacabanne Properties, Inc. v. Department of Alcoholic Beverage Control* (1968) 261 Cal.App.2d 181, 189, 67 Cal.Rptr. 734.) Fairness does not require the new exception to be judicially grafted into Rule 141 to provide additional defenses that require a minor decoy to speak up in the absence of a question by the store clerk. As the California Supreme Court has noted, "licensees have a ready means of protecting themselves from liability by simply asking any purchasers who could possibly be minors to produce bona fide evidence of their age and identity." (*Provigo, supra*, 7 Cal.4th at p. 570, 28 Cal.Rptr.2d 638, 869 P.2d 1163.)

Likewise, we reject the argument made by CVS that the minor decoy's silence in response the clerk's statement about his youthful appearance was "deceptive and misleading." As this court has previously noted in a case involving a claim a governmental agency engaged in fraudulent concealment, "Courts uniformly distinguish between the misleading half-truth, or partial disclosure, and the case in which defendant says nothing at all. The general rule is that silence alone is not actionable." (*Wiechmann Engineers v. State of California ex rel. Dept. Pub. Wks.* (1973) 31 Cal.App.3d 741, 751, 107 Cal.Rptr. 529.)

Here, the minor decoy did not say anything untrue. To the contrary, the minor decoy presented accurate information in the form of his driver license. Thus, the minor decoy did not engage in deceptive and misleading communication with the clerk. Notably, the California Supreme Court has rejected a claim the use of a "mature-looking" decoy constitutes an unfair practice by ***642** the Department in a case in which a minor decoy "simply bought beer and wine, *without attempting to pressure or encourage the sales in any way*." (*Provigo, supra*, 7 Cal.4th at p. 569, 28 Cal.Rptr.2d 638, 869 P.2d 1163, italics added.) The same reason applies here. The minor decoy's silence in this case did not involve any attempt to pressure or encourage the sale of an alcoholic beverage to him. The minor decoy's silence did not render the Department's operation unfair.

CVS's argument its clerk was deceived and misled by the minor decoy in this case is based on the same premise as that advanced by the Appeals Board, namely a minor decoy has a duty to speak up in response to a statement indicating a mistaken calculation of age. However, as we have explained, Rule 141 does not supply a defense based on a minor decoy's failure to respond to statements made by the clerk. Consequently, we conclude the Department properly rejected CVS's argument the minor decoy's silence rendered the operation unfair under Rule 141.

C.

Substantial Evidence Supports the Department's Decision

As part of its argument Rule 141 is ambiguous, the Appeals Board asserts the minor decoy's testimony during the hearing was equally uncertain. Specifically, the Appeals Board asserts that "[t]he decoy's testimony is as ambiguous as [Rule 141], and certainly does not support the conclusion, reached by the Department, that the clerk's words were '[i]ndisputably a statement' falling outside the Rule." In light of the administrative law judge's factual finding, we disagree.

Viewed in the light most favorable to the Department's decision, we conclude substantial evidence supports the administrative law judge's decision. As the administrative law judge found, the minor decoy's ****142** testimony was clear and credible. The administrative law judge also expressly found the testimony established the store clerk's communication to the minor decoy was a statement and not a question. Under section 23090.2, the Appeals Board lacks power to disregard the Department's factual findings, which includes findings made by the administrative law judge. (*Hasselbach v. Department of Alcoholic Beverage Control* (1959) 167 Cal.App.2d 662, 667, 334 P.2d 1058 ["The statement made in the opinion of the appeals board was not a finding of fact for that board is without power to make findings of fact"].) Accordingly, we reject the Appeals Board's argument the store clerk's statement might have been a question instead of a statement.

***643** DISPOSITION

The decision of the Alcohol Beverage Control Appeals Board is annulled. The decision of the Department of Alcoholic Beverage Control is reinstated and the case is remanded to the Alcohol Beverage Control Appeals Board for further proceedings consistent with this opinion.

We concur:

BLEASE, Acting P.J.

RENNER, J.

All Citations

7 Cal.App.5th 628, 213 Cal.Rptr.3d 130, 17 Cal. Daily Op. Serv. 384, 2017 Daily Journal D.A.R. 402

Footnotes

1 Undesignated statutory references are to the Business and Professions Code.

2 The license is held by Garfield Beach CVS LLC Longs Drug Stores California LLC, doing business as CVS Pharmacy Store 9174.

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98 Cal.App.4th 1351
Court of Appeal, Sixth District, California.

HOWARD JARVIS TAXPAYERS ASSOCIATION et al., Plaintiffs and Appellants,
v.
CITY OF **SALINAS** et al., Defendants and Respondents.

No. H022665.
|
June 3, 2002.
|
Rehearing Denied July 2, 2002.
|
Review Denied Aug. 28, 2002.

Synopsis

Taxpayers challenged a storm drainage fee imposed by the **city**. The Superior Court, Monterey County, No. M45873, Richard M. Silver, J., entered judgment in favor of **city**. **Taxpayers** appealed. The Court of Appeal, Elia, J., held that: (1) fee was a property-related fee requiring voter approval, and (2) fee was not a "fee related to sewer and water services," and thus did not fall into the exception to the voter-approval requirements for new taxes.

Reversed.

Procedural Posture(s): On Appeal.

Attorneys and Law Firms

****229 *1352** Timothy J. Morgan, Santa Cruz, and Jonathan M. Coupal, Sacramento, and Timothy A. Bittle, Attorneys for Appellants.

James C. Sanchez, **City** Attorney of **Salinas**, and Richards, Watson & Gershon, Mitchell E. Abbott, Los Angeles, and Patrick K. Bobko, Attorneys for Respondents.

Opinion

ELIA, J.

In this "reverse validation" action, plaintiff **taxpayers** challenged a storm drainage fee imposed by the **City** of **Salinas**. Plaintiffs contended that the fee was a "property-related" fee requiring voter approval, pursuant to **California** Constitution, article XIII D, section 6(c), which was added by the passage of Proposition 218. The trial court ruled that the fee did not violate this provision because (1) it was not a property-related fee ***1353** and (2) it met the exemption for fees for sewer and water services. We disagree with the trial court's conclusion and therefore reverse the order.

Background

In an effort to comply with the 1987 amendments to the federal Clean Water Act (33 U.S.C. § 1251, et seq., 40 C.F.R. § 122.26(a) et seq.), the **Salinas City** Council took measures to reduce or eliminate pollutants contained in storm water, which was channeled in a drainage system separate from the sanitary and industrial waste systems. On June 1, 1999, the **City** Council enacted two ordinances to fund and maintain the compliance program. These measures, ordinance Nos. 2350 and 2351, added former Chapters 29 and 29A, respectively, to the **Salinas City** Code. Former section 29A–3 allowed the **City** Council to adopt a resolution imposing a "Storm Water Management Utility fee" to finance the improvement of storm and surface water management facilities. The fee would be imposed on "users of the storm water drainage system."

On July 20, 1999, the **City** Council adopted resolution No. 17019, which established rates for the storm and surface water management system. The resolution specifically states: "There is hereby imposed on each and every developed parcel of land within the **City**, and the owners and occupiers thereof, jointly and severally, a storm drainage fee." The fee was to be paid annually to the **City** "by the owner or occupier of each and every developed parcel in the **City** who shall be presumed to be the primary utility rate payer ...." The amount of the fee was to be calculated according to the degree to which the property contributed runoff to the **City's** drainage facilities. That contribution, in turn, would be measured by the amount of "impervious area"[1] on that parcel.

****230** Undeveloped parcels—those that had not been altered from their natural state—were not subject to the storm drainage fee. In addition, developed parcels that maintained their own storm water management facilities or only partially contributed storm or surface water to the **City's** storm drainage facilities were required to pay in proportion to the amount they did contribute runoff or used the **City's** treatment services.

***1354** On September 15, 1999, plaintiffs filed a complaint under Code of Civil Procedure section 863 to determine the validity of the fee.[2] Plaintiffs alleged that this was a property-

related fee that violated article XIII D, section 6, subdivision (c), of the **California** Constitution because it had not been approved by a majority vote of the affected property owners or a two-thirds vote of the residents in the affected area. The trial court, however, found this provision to be inapplicable on two grounds: (1) the fee was not "property related" and (2) it was exempt from the voter-approval requirement because it was "related to" sewer and water services.

Discussion

Article XIII D was added to the **California** Constitution in the November 1996 election with the passage of Proposition 218, the "Right to Vote On Taxes Act." Section 6 of article XIII D[3] requires notice of a proposed property-related fee or charge and a public hearing. If a majority of the affected owners submit written protests, the fee may not be imposed. (§ 6, subd. (a)(2).) The provision at issue is section 6, subdivision (c) (hereafter "section 6(c)"), which states, in relevant part: "Except for fees or charges for sewer, water, and refuse collection services, no property related fee or charge shall be imposed or increased unless and until that fee or charge is submitted and approved by a majority vote of the property owners of the property subject to the fee or charge or, at the option of the agency, by a two-thirds vote of the electorate residing in the affected area."

Section 2 defines a "fee" under this article as a levy imposed "upon a parcel or upon a person as an incident of property ownership, including a user fee or charge for a property related service." (§ 2, subd. (e).) A "property-related service" is "a public service having a direct relationship to property ownership." (§ 2, subd. (h).) The **City** maintains that the storm drainage fee is not a property-related fee, but a "user fee" which the property owner can avoid simply by maintaining a storm water management facility on the property. Because it is possible to own property without being subject to the fee, the **City** argues this is not a fee imposed "as an incident of property ownership" or "for a property related service" within the meaning of section 2.

We cannot agree with the **City's** position. Resolution No. 17019 plainly established a property-related fee for a property-related service, the management of storm water runoff from the "impervious" areas of each parcel in the ***1355** **City**. The ****231** resolution expressly stated that "each owner and occupier of a developed lot or parcel of real property within the **City**, is served by the **City's** storm drainage facilities" and burdens the system to a greater extent than if the property were undeveloped. Those owners and occupiers of developed property "should therefore pay for the improvement, operation and maintenance of such facilities." Accordingly, the resolution makes the fee applicable to "*each and every developed parcel* of land within the **City**." (Italics added.) This is not a charge directly based on or measured by use, comparable to the metered use of water or the operation of a business, as the **City** suggests. (See *Apartment Assn. of Los Angeles County, Inc. v. **City** of Los Angeles* (2001) 24 **Cal**.4th 830, 838, 102 Cal.Rptr.2d 719, 14 P.3d 930 [article XIII D inapplicable to inspection fee imposed on private landlords]; ***Howard Jarvis Taxpayers** Assn. v. **City** of Los Angeles* (2000) 85 Cal.App.4th 79, 101 Cal.Rptr.2d 905, [water usage rates are not within the scope of article XIII D].)

The "Proportional Reduction" clause on which the **City** relies does not alter the nature of the fee as property related.[4] A property owner's operation of a private storm drain system reduces the amount owed to the **City** to the extent that runoff into the **City's** system is reduced. The fee nonetheless is a fee for a public service having a direct relationship to the ownership of developed property. The **City's** characterization of the proportional reduction as a simple "opt-out" arrangement is misleading, as it suggests the property owner can avoid the fee altogether by declining the service. Furthermore, the reduction is not proportional to the amount of services requested or used by the occupant, but on the physical properties of the parcel. Thus, a parcel with a large "impervious area" (driveway, patio, roof) would be charged more than one consisting of mostly rain-absorbing soil. Single-family residences are assumed to contain, on average, a certain amount of impervious area and are charged $18.66 based on that assumption.

Proposition 218 specifically stated that "[t]he provisions of this act shall be liberally construed to effectuate its purposes of limiting local government revenue and enhancing **taxpayer** consent." (Proposition 218, § 5; reprinted at Historical Notes, 2A West's Ann.Cal.Const. (2002 supp.) foll. art. XIII C, p. 38 [hereafter Historical Notes].) We are obligated to construe constitutional amendments in accordance with the natural and ordinary meaning of the language used by the framers—in this case, the voters of **California**—in a manner that effectuates their purpose in adopting the law. (*Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization* (1978) 22 **Cal**.3d 208, 244–245, 149 Cal.Rptr. 239, 583 P.2d 1281; *Arden Carmichael, Inc. v. County of Sacramento* (2001) 93 Cal.App.4th 507, 514–515,

113 Cal.Rptr.2d 248; *Board of Supervisors v. Lonergan* (1980) 27 Cal.3d 855, 863, 167 Cal.Rptr. 820, 616 P.2d ***1356** 802.) To interpret the storm drainage fee as a use-based charge would contravene one of the stated objectives of Proposition 218 by "frustrat[ing] the purposes of voter approval for tax increases." (Proposition 218, § 2.) We must conclude, therefore, that the storm drainage fee "burden[s] landowners *as landowners,*" and is therefore subject to the voter-approval requirements of article XIII D unless an exception applies. (****232** *Apartment Assn. of Los Angeles County, Inc. v. City of Los Angeles, supra,* 24 Cal.4th at p. 842, 102 Cal.Rptr.2d 719, 14 P.3d 930.)

Exception for "Sewer" or "Water" Service

As an alternative ground for its decision, the trial court found that the storm drainage fee was "clearly a fee related to 'sewer' and 'water' services." The exception in section 6(c) applies to fees "for sewer, water, and refuse collection services." Thus, the question we must next address is whether the storm drainage fee was a charge *for* sewer service or water service.

The parties diverge in their views as to whether the reach of California Constitution, article XIII D, section 6(c) extends to a storm drainage system as well as a sanitary or industrial waste sewer system. The City urges that we rely on the "commonly accepted" meaning of "sewer," noting the broad dictionary definition of this word.[5] The City also points to Public Utilities Code section 230.5 and the Salinas City Code, which describe storm drains as a type of sewer.[6]

Plaintiffs "do not disagree that storm water is carried off in storm sewers," but they argue that we must look beyond mere definitions of "sewer" to examine the legal meaning in context. Plaintiffs note that the storm water management system here is distinct from the sanitary sewer system and the industrial waste management system. Plaintiffs' position echoes that of the ***1357** Attorney General, who observed that several California statutes differentiate between management of storm drainage and sewerage systems.[7] (81 Ops.Cal.Atty. Gen. 104, 106 (1998).) Relying extensively on the Attorney General's opinion, plaintiffs urge application of a different rule of construction than the plain-meaning rule; they invoke the maxim that "if a statute on a particular subject omits a particular provision, inclusion of that provision in another related statute indicates an intent [that] the provision is not applicable to the statute from which it was omitted." (*In re Marquis D.* (1995) 38 Cal.App.4th 1813, 1827, 46 Cal.Rptr.2d 198.) Thus, while section 5, which addresses assessment procedures, refers to exceptions specifically ****233** for "*sewers,* water, flood control, [and] *drainage systems*" (italics added), the exceptions listed in section 6(c) pertain only to "sewer, water, and refuse collection services." Consequently, in plaintiffs' view, the voters must have intended to exclude drainage systems from the list of exceptions to the voter-approval requirement.

The statutory construction principles invoked by both parties do not assist us. The maxim proffered by plaintiffs, "although useful at times, is no more than a rule of reasonable inference" and cannot control over the lawmakers' intent. (*California Fed. Savings & Loan Assn. v. City of Los Angeles* (1995) 11 Cal.4th 342, 350, 45 Cal.Rptr.2d 279, 902 P.2d 297; *Murillo v. Fleetwood Enterprises, Inc.* (1998) 17 Cal.4th 985, 991, 73 Cal.Rptr.2d 682, 953 P.2d 858.) On the other hand, invoking the plain-meaning rule only begs the question of whether the term "sewer services" was intended to encompass the more specific sewerage with which most voters would be expected to be familiar, or all types of systems that use sewers, including storm drainage and industrial waste. The popular, nontechnical sense of sewer service, particularly when placed next to "water" and "refuse collection" services, suggests the service familiar to most households and businesses, the sanitary sewerage system.

We conclude that the term "sewer services" is ambiguous in the context of both section 6(c) and Proposition 218 as a whole. We must keep in mind, however, the voters' intent that the constitutional provision be construed liberally to curb the rise in "excessive" taxes, assessments, and fees exacted ***1358** by local governments without taxpayer consent. (Proposition 218, §§ 2, 5; reprinted at Historical Notes, *supra,* p. 38.) Accordingly, we are compelled to resort to the principle that exceptions to a general rule of an enactment must be strictly construed, thereby giving "sewer services" its narrower, more common meaning applicable to sanitary sewerage.[8] (Cf. *Estate of Banerjee* (1978) 21 Cal.3d 527, 540, 147 Cal.Rptr. 157, 580 P.2d 657; *City of Lafayette v. East Bay Mun. Utility Dist.* (1993) 16 Cal.App.4th 1005, 20 Cal.Rptr.2d 658.)

The City itself treats storm drainage differently from its other sewer systems. The stated purpose of Ordinance No. 2350 was to comply with federal law by reducing the amount of pollutants discharged into the storm water, and by preventing the discharge of "non-storm water" into the storm drainage

system, which channels storm water into state waterways. According to John Fair, the Public Works Director, the **City's** storm drainage fee was to be used not just to provide drainage service to property owners, but to monitor and control pollutants that might enter the storm water before it is discharged into natural bodies of water. [9] The **Salinas City** Code contains requirements ****234** addressed specifically to the management of storm water runoff. [10] (See, e.g., **Salinas City** Code, §§ 31–802.2, 29–15.)

For similar reasons we cannot subscribe to the **City's** suggestion that the storm drainage fee is "for ... water services." Government Code section 53750, enacted to explain some of the terms used in articles XIII C and XIII D, defines " '[w]ater' " as "any system of public improvements intended to provide for the production, storage, supply, treatment, or distribution of water." (Gov.Code, § 5370, subd. (m).) The average voter would envision "water service" as the supply of water for personal, household, and commercial use, not a system or program that monitors storm water for pollutants, carries it away, and discharges it into the nearby creeks, river, and ocean.

We conclude that article XIII D required the **City** to subject the proposed storm drainage fee to a vote by the property owners or the voting residents of ***1359** the affected area. The trial court therefore erred in ruling that Ordinance Nos. 2350 and 2351 and Resolution No. 17019 were valid exercises of authority by the **City** Council.

Disposition

The judgment is reversed. Costs on appeal are awarded to plaintiffs.

WE CONCUR: PREMO, Acting P.J., and MIHARA, J.

All Citations

98 Cal.App.4th 1351, 121 Cal.Rptr.2d 228, 02 Cal. Daily Op. Serv. 4853, 2002 Daily Journal D.A.R. 6161

Footnotes

1 "Impervious Area," according to resolution No. 17019, is "any part of any developed parcel of land that has been modified by the action of persons to reduce the land's natural ability to absorb and hold rainfall. This includes any hard surface area which either prevents or retards the entry of water into the soil mantle as it entered under natural conditions pre-existent to development, and/or a hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions pre-existent to development."

2 Plaintiffs are the **Howard Jarvis Taxpayers Association**, the Monterey Peninsula **Taxpayers Association**, and two resident property owners.

3 All further unspecified section references are to article XIII D of the **California** Constitution.

4 According to the Public Works Director, proportional reductions were not anticipated to apply to a large number of people.

5 Webster's Third New International Dictionary, for example, defines "sewer" as "1: a ditch or surface drain; 2: an artificial usu. subterranean conduit to carry off water and waste matter (as surface water from rainfall, household waste from sinks or baths, or waste water from industrial works)." (Webster's 3d New Internat. Dict. (1993) p.2081.) The American Heritage Dictionary also denotes the function of "carrying off sewage or rainwater." (American Heritage College Dict. (3d ed.1997) p. 1248.) On the other hand, the Random House Dictionary of the English Language (2d ed.1987) page 1754, does not mention storm or rain water in defining

"sewer" as "an artificial conduit, usually underground, for carrying off waste water and refuse, as in a town or **city**."

6 Public Utilities Code section 230.5 defines "Sewer system" to encompass all property connected with "sewage collection, treatment, or disposition for sanitary or drainage purposes, including ... all drains, conduits, and outlets for surface or storm waters, and any and all other works, property or structures necessary or convenient for the collection or disposal of sewage, industrial waste, or surface or storm waters." **Salinas City** Code section 36–2(31) defines "storm drain" as "a sewer which carries storm and surface waters and drainage, but which excludes sewage and industrial wastes other than runoff water."

7 For example, Government Code section 63010 specifies "storm sewers" in delimiting the scope of " '[d]rainage,' " while separately identifying the facilities and equipment used for " '[s]ewage collection and treatment.' " (Gov.Code, § 63010, subds.(q)(3), (q)(10).) Government Code section 53750, part of the Proposition 218 Omnibus Implementation Act, explains that for purposes of articles XIII C and article XIII D " '[d]rainage system' " means "any system of public improvements that is intended to provide for erosion control, landslide abatement, or for other types of water drainage." Health and Safety Code section 5471 sets forth government power to collect fees for "services and facilities ... in connection with its water, sanitation, storm drainage, or sewerage system."

8 Sanitary sewerage carries "putrescible waste" from residences and businesses and discharges it into the sanitary sewer line for treatment by the Monterey Regional Water Pollution Control Agency. (**Salinas City** Code, § 36–2, subd. (26).)

9 Resolution No. 17019 defined "Storm Drainage Facilities" as "the storm and surface water sewer drainage systems comprised [*sic*] of storm water control facilities and any other natural features [that] store, control, treat and/or convey surface and storm water. The Storm Drainage Facilities shall include all natural and man-made elements used to convey storm water from the first point of impact with the surface of the earth to a suitable receiving body of water or location internal or external to the boundaries of the **City**...." The "storm drainage system" was defined to include pipes, culverts, streets and gutters, "storm water sewers," ditches, streams, and ponds. (See also **Salinas City** Code, former § 29–3, subd. (*l*) [defining "storm drainage system"].)

10 Storm water under ordinance No. 2350 includes "storm water runoff, snowmelt runoff, and surface runoff and drainage." (**Salinas City** Code, former § 29–3, subd. (dd).)

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54 Cal.3d 326, 814 P.2d 1308, 285 Cal.Rptr. 66
Supreme Court of California

FRANCES KINLAW et al., Plaintiffs and Appellants,
v.
THE STATE OF CALIFORNIA et al., Defendants and Respondents.

No. S014349.
Aug 30, 1991.

SUMMARY

Medically indigent adults and taxpayers brought an action pursuant to Code Civ. Proc., § 526a, against the state, alleging that it had violated Cal. Const., art. XIII B, § 6 (reimbursement of local governments for state-mandated new programs), by shifting its financial responsibility for the funding of health care for the poor onto the county without providing the necessary funding, and that as a result the state had evaded its constitutionally mandated spending limits. The trial court granted summary judgment for the State after concluding plaintiffs lacked standing to prosecute the action. (Superior Court of Alameda County, No. 632120-4, Henry Ramsey, Jr., and Demetrios P. Agretelis, Judges.) The Court of Appeal, First Dist., Div. Two, Nos. A041426 and A043500, reversed.

The Supreme Court reversed the judgment of the Court of Appeal, holding the administrative procedures established by the Legislature (Gov. Code, § 17500 et seq.), which are available only to local agencies and school districts directly affected by a state mandate, were the exclusive means by which the state's obligations under Cal. Const., art. XIII B, § 6, were to be determined and enforced. Accordingly, the court held plaintiffs lacked standing to prosecute the action. (Opinion by Baxter, J., with Lucas, C. J., Panelli, Kennard, and Arabian, JJ., concurring. Separate dissenting opinion by Broussard, J., with Mosk, J., concurring.)

HEADNOTES

Classified to California Digest of Official Reports

(1)
State of California § 7--Actions--State-mandated Costs--Reimbursement-- Exclusive Statutory Remedy.
Gov. Code, § 17500 et seq., creates an administrative forum for resolution of state mandate claims arising under Cal. Const., art. XIII B, § 6, and establishes ***327** procedures which exist for the express purpose of avoiding multiple proceedings, judicial and administrative, addressing the same claim that a reimbursable state mandate has been created. The statutory scheme also designates the Sacramento County Superior Court as the venue for judicial actions to declare unfunded mandates invalid. It also designates the Sacramento County Superior Court as the venue for judicial actions to declare unfunded mandates invalid (Gov. Code, § 17612). In view of the comprehensive nature of the legislative scheme, and from the expressed intent, the Legislature has created what is clearly intended to be a comprehensive and exclusive procedure by which to implement and enforce Cal. Const., art. XIII B, § 6.

(2)
State of California § 7--Actions--State-mandated Costs--Reimbursement-- Private Action to Enforce--Standing.
In an action by medically indigent adults and taxpayers seeking to enforce Cal. Const., art. XIII B, § 6, for declaratory and injunctive relief requiring the state to reimburse the county for the cost of providing health care services to medically indigent adults who, prior to 1983, had been included in the state Medi-Cal program, the Court of Appeal erred in holding that the existence of an administrative remedy (Gov. Code, § 17500 et seq.) by which affected local agencies could enforce their constitutional right under art. XIII B, § 6 to reimbursement for the cost of state mandates di not bar the action. Because the right involved was given by the Constitution to local agencies and school districts, not individuals either as taxpayers or recipients of government benefits and services, the administrative remedy was adequate fully to implement the constitutional provision. The Legislature has the authority to establish procedures for the implementation of local agency rights under art. XIII B, § 6; unless the exercise of a constitutional right is unduly restricted, a court must limit enforcement to the procedures established by the Legislature. Plaintiffs' interest, although pressing, was indirect and did not differ from the interest of the public at large in the financial plight of local government. Relief by way of reinstatement to Medi-Cal pending further action by the state was not a remedy available under the statute, and thus was not one which a court may award.

[See **Cal.Jur.3d,** State of California, § 78; 7 **Witkin,** Summary of Cal. Law (9th ed. 1988) Constitutional Law, § 112.]

COUNSEL

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Catherine I. Hanson, Astrid G. Meghrigian, Alice P. Mead, Alan K. Marks, County Counsel (San Bernardino), Paul F. Mordy, Deputy County Counsel, De Witt W. Clinton, County Counsel (Los Angeles), Robert M. Fesler, Assistant County Counsel, Frank J. DaVanzo, Deputy County Counsel, Weissburg & Aronson, Mark S. Windisch, Carl Weissburg and Howard W. Cohen as Amici Curiae on behalf of Plaintiffs and Appellants.
John K. Van de Kamp and Daniel E. Lungren, Attorneys General, N. Eugene Hill, Assistant Attorney General, Richard M. Frank, Asher Rubin and Carol Hunter, Deputy Attorneys General, for Defendants and Respondents.

BAXTER, J.

Plaintiffs, medically indigent adults and taxpayers, seek to enforce section 6 of article XIII B (hereafter, section 6) of the California Constitution through an action for declaratory and injunctive relief. They invoked the jurisdiction of the superior court as taxpayers pursuant to Code of Civil Procedure section 526a and as persons affected by the alleged failure of the state to comply with section 6. The superior court granted summary judgment for defendants State of California and Director of the Department of Health Services, after concluding that plaintiffs lacked standing to prosecute the action. On appeal, the Court of Appeal held that plaintiffs have standing and that the action is not barred by the availability of administrative remedies.

We reverse. The administrative procedures established by the Legislature, which are available only to local agencies and school districts directly affected by a state mandate, are the exclusive means by which the state's obligations under section 6 are to be determined and enforced. Plaintiffs therefore lack standing.

I State Mandates

Section 6, adopted on November 6, 1979, as part of an initiative measure imposing spending limits on state and local government, also imposes on the state an obligation to reimburse local agencies for the cost of most programs and services which they must provide pursuant to a state mandate if the local agencies were not under a preexisting duty to fund the activity. It provides: ***329**

"Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such program or increased level of service, except that the Legislature may, but need not, provide such subvention of funds for the following mandates:

"(a) Legislative mandates requested by the local agency affected;

"(b) Legislation defining a new crime or changing an existing definition of a crime; or

"(c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975."

A complementary provision, section 3 of article XIII B, provides for a shift from the state to the local agency of a portion of the spending or "appropriation" limit of the state when responsibility for funding an activity is shifted to a local agency:

"The appropriations limit for any fiscal year ... shall be adjusted as follows: [¶] (a) In the event that the financial responsibility of providing services is transferred, in whole or in part, ... from one entity of government to another, then for the year in which such transfer becomes effective the appropriations limit of the transferee entity shall be increased by such reasonable amount as the said entities shall mutually agree and the appropriations limit of the transferor entity shall be decreased by the same amount."

II Plaintiffs' Action

The underlying issue in this action is whether the state is obligated to reimburse the County of Alameda, and shift to Alameda County a concomitant portion of the state's spending limit, for the cost of providing health care services to medically indigent adults who prior to 1983 had been included in the state Medi-Cal program. Assembly Bill No. 799 (1981-1982 Reg. Sess.) (AB 799) (Stats. 1982, ch. 328, p. 1568) removed medically indigent adults from Medi-Cal effective January 1, 1983. At the time section 6 was adopted, the state was funding Medi-Cal coverage for these persons without requiring any county financial contribution.

Plaintiffs initiated this action in the Alameda County Superior Court. They sought relief on their own behalf and on behalf

of a class of similarly ***330** situated medically indigent adult residents of Alameda County. The only named defendants were the State of California, the Director of the Department of Health Services, and the County of Alameda.

In the complaint for declaratory and injunctive relief, plaintiffs sought an injunction compelling the state to restore Medi-Cal eligibility to medically indigent adults or to reimburse the County of Alameda for the cost of providing health care to those persons. They also prayed for a declaration that the transfer of responsibility from the state-financed Medi- Cal program to the counties without adequate reimbursement violated the California Constitution. [1]

At the time plaintiffs initiated their action neither Alameda County, nor any other county or local agency, had filed a reimbursement claim with the Commission on State Mandates (Commission). [2]

Whether viewed as an action seeking restoration of Medi-Cal benefits, one to compel state reimbursement of county costs, or one for declaratory relief, therefore, the action required a determination that the enactment of AB 799 created a state mandate within the contemplation of section 6. Only upon resolution of that issue favorably to plaintiffs would the state have an obligation to reimburse the county for its increased expense and shift a portion of its appropriation limit, or to reinstate Medi-Cal benefits for plaintiffs and the class they seek to represent.

The gravamen of the action is, therefore, enforcement of section 6. [3] ***331**

III Enforcement of Article XIII B, Section 6

In 1984, almost five years after the adoption of article XIII B, the Legislature enacted comprehensive administrative procedures for resolution of claims arising out of section 6. (§ 17500.) The Legislature did so because the absence of a uniform procedure had resulted in inconsistent rulings on the existence of state mandates, unnecessary litigation, reimbursement delays, and, apparently, resultant uncertainties in accommodating reimbursement requirements in the budgetary process. The necessity for the legislation was explained in section 17500:

"The Legislature finds and declares that the existing system for reimbursing local agencies and school districts for the costs of state- mandated local programs has not provided for the effective determination of the state's responsibilities under Section 6 of Article XIII B of the California Constitution. The Legislature finds and declares that the failure of the existing process to adequately and consistently resolve the complex legal questions involved in the determination of state-mandated costs has led to an increasing reliance by local agencies and school districts on the judiciary and, therefore, in order to relieve unnecessary congestion of the judicial system, *it is necessary to create a mechanism which is capable of rendering sound quasi-judicial decisions and providing an effective means of resolving disputes over the existence of state-mandated local programs.*" (Italics added.)

In part 7 of division 4 of title 2 of the Government Code, "State-Mandated Costs," which commences with section 17500, the Legislature created the Commission (§ 17525), to adjudicate disputes over the existence of a state-mandated program (§§ 17551, 17557) and to adopt procedures for submission and adjudication of reimbursement claims (§ 17553). The five-member Commission includes the Controller, the Treasurer, the Director of Finance, the Director of the Office of Planning and Research, and a public member experienced in public finance. (§ 17525.)

The legislation establishes a test-claim procedure to expeditiously resolve disputes affecting multiple agencies (§ 17554), [4] establishes the method of ***332** payment of claims (§§ 17558, 17561), and creates reporting procedures which enable the Legislature to budget adequate funds to meet the expense of state mandates (§§ 17562, 17600, 17612, subd. (a).)

Pursuant to procedures which the Commission was authorized to establish (§ 17553), local agencies [5] and school districts [6] are to file claims for reimbursement of state-mandated costs with the Commission (§§ 17551, 17560), and reimbursement is to be provided only through this statutory procedure. (§§ 17550, 17552.)

The first reimbursement claim filed which alleges that a state mandate has been created under a statute or executive order is treated as a "test claim." (§ 17521.) A public hearing must be held promptly on any test claim. At the hearing on a test claim or on any other reimbursement claim, evidence may be presented not only by the claimant, but also by the Department of Finance and any other department or agency potentially affected by the claim. (§ 17553.) Any interested organization or individual may participate in the hearing. (§ 17555.)

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A local agency filing a test claim need not first expend sums to comply with the alleged state mandate, but may base its claim on estimated costs. (§ 17555.) The Commission must determine both whether a state mandate exists and, if so, the amount to be reimbursed to local agencies and school districts, adopting "parameters and guidelines" for reimbursement of any claims relating to that statute or executive order. (§ 17557.) Procedures for determining whether local agencies have achieved statutorily authorized cost savings and for offsetting these savings against reimbursements are also provided. (§ 17620 et seq.) Finally, judicial review of the Commission decision is available through petition for writ of mandate filed pursuant to Code of Civil Procedure section 1094.5. (§ 17559.)

The legislative scheme is not limited to establishing the claims procedure, however. It also contemplates reporting to the Legislature and to departments and agencies of the state which have responsibilities related to funding state mandates, budget planning, and payment. The parameters and guidelines adopted by the Commission must be submitted to the Controller, who is to pay subsequent claims arising out of the mandate. (§ 17558.) Executive orders mandating costs are to be accompanied by an appropriations ***333** bill to cover the costs if the costs are not included in the budget bill, and in subsequent years the costs must be included in the budget bill. (§ 17561, subds. (a) & (b).) Regular review of the costs is to be made by the Legislative Analyst, who must report to the Legislature and recommend whether the mandate should be continued. (§ 17562.) The Commission is also required to make semiannual reports to the Legislature of the number of mandates found and the estimated reimbursement cost to the state. (§ 17600.) The Legislature must then adopt a "local government claims bill." If that bill does not include funding for a state mandate, an affected local agency or school district may seek a declaration from the superior court for the County of Sacramento that the mandate is unenforceable, and an injunction against enforcement. (§ 17612.)

Additional procedures, enacted in 1985, create a system of state-mandate apportionments to fund reimbursement. (§ 17615 et seq.)

(1) It is apparent from the comprehensive nature of this legislative scheme, and from the Legislature's expressed intent, that the exclusive remedy for a claimed violation of section 6 lies in these procedures. The statutes create an administrative forum for resolution of state mandate claims, and establishes procedures which exist for the express purpose of avoiding multiple proceedings, judicial and administrative, addressing the same claim that a reimbursable state mandate has been created. The statutory scheme also designates the Sacramento County Superior Court as the venue for judicial actions to declare unfunded mandates invalid (§ 17612).

The legislative intent is clearly stated in section 17500: "It is the intent of the Legislature in enacting this part to provide for the implementation of Section 6 of Article XIII B of the California Constitution and to consolidate the procedures for reimbursement of statutes specified in the Revenue and Taxation Code with those identified in the Constitution. ..." And section 17550 states: "Reimbursement of local agencies and school districts for costs mandated by the state shall be provided pursuant to this chapter."

Finally, section 17552 provides: "This chapter shall provide *the sole and exclusive procedure* by which a local agency or school district may claim reimbursement for costs mandated by the state as required by Section 6 of Article XIII B of the California Constitution." (Italics added.)

In short, the Legislature has created what is clearly intended to be a comprehensive and exclusive procedure by which to implement and enforce section 6. ***334**

IV Exclusivity

(2) Plaintiffs argued, and the Court of Appeal agreed, that the existence of an administrative remedy by which affected local agencies could enforce their right under section 6 to reimbursement for the cost of state mandates did not bar this action because the administrative remedy is available only to local agencies and school districts.

The Court of Appeal recognized that the decision of the County of Alameda, which had not filed a claim for reimbursement at the time the complaint was filed, was a discretionary decision which plaintiffs could not challenge. (*Dunn v. Long Beach L. & W. Co.* (1896) 114 Cal. 605, 609, 610-611 [46 P. 607]; *Silver v. Watson* (1972) 26 Cal.App.3d 905, 909 [103 Cal.Rptr. 576]; *Whitson v. City of Long Beach* (1962) 200 Cal.App.2d 486, 506 [19 Cal.Rptr. 668]; *Elliott v. Superior Court* (1960) 180 Cal.App.2d 894, 897 [5 Cal.Rptr. 116].) The court concluded, however, that public policy and practical necessity required that plaintiffs have a remedy for enforcement of section 6 independent of the statutory procedure.

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The right involved, however, is a right given by the Constitution to local agencies, not individuals either as taxpayers or recipients of government benefits and services. Section 6 provides that the "state shall provide a subvention of funds *to reimburse ... local governments ....*" (Italics added.) The administrative remedy created by the Legislature is adequate to fully implement section 6. That Alameda County did not file a reimbursement claim does not establish that the enforcement remedy is inadequate. Any of the 58 counties was free to file a claim, and other counties did so. The test claim is now before the Court of Appeal. The administrative procedure has operated as intended.

The Legislature has the authority to establish procedures for the implementation of local agency rights under section 6. Unless the exercise of a constitutional right is unduly restricted, the court must limit enforcement to the procedures established by the Legislature. (*People v. Western Air Lines, Inc.* (1954) 42 Cal.2d 621, 637 [268 P.2d 723]; *Chesney v. Byram* (1940) 15 Cal.2d 460, 463 [101 P.2d 1106]; *County of Contra Costa v. State of California* (1986) 177 Cal.App.3d 62, 75 [222 Cal.Rptr. 750].)

Plaintiffs' argument that they must be permitted to enforce section 6 as individuals because their right to adequate health care services has been compromised by the failure of the state to reimburse the county for the cost ***335** of services to medically indigent adults is unpersuasive. Plaintiffs' interest, although pressing, is indirect and does not differ from the interest of the public at large in the financial plight of local government. Although the basis for the claim that the state must reimburse the county for its costs of providing the care that was formerly available to plaintiffs under Medi-Cal is that AB 799 created a state mandate, plaintiffs have no right to have any reimbursement expended for health care services of any kind. Nothing in article XIII B or other provision of law controls the county's expenditure of the funds plaintiffs claim must be paid to the county. To the contrary, section 17563 gives the local agency complete discretion in the expenditure of funds received pursuant to section 6, providing: "Any funds received by a local agency or school district pursuant to the provisions of this chapter may be used for any public purpose."

The relief plaintiffs seek in their prayer for state reimbursement of county expenses is, in the end, a reallocation of general revenues between the state and the county. Neither public policy nor practical necessity compels creation of a judicial remedy by which individuals may enforce the right of the county to such revenues. The Legislature has established a procedure by which the county may claim any revenues to which it believes it is entitled under section 6. That test-claim statute expressly provides that not only the claimant, but also "any other interested organization or individual may participate" in the hearing before the Commission (§ 17555) at which the right to reimbursement of the costs of such mandate is to be determined. Procedures for receiving any claims must "provide for presentation of evidence by the claimant, the Department of Finance and any other affected department or agency, *and any other interested person.*" (§ 17553. Italics added.) Neither the county nor an interested individual is without an opportunity to be heard on these questions. These procedures are both adequate and exclusive. [7]

The alternative relief plaintiffs seek—reinstatement to Medi-Cal pending further action by the state—is not a remedy available under the statute, and thus is not one which this court may award. The remedy for the failure to fund a program is a declaration that the mandate is unenforceable. That relief is available only after the Commission has determined that a mandate exists ***336** and the Legislature has failed to include the cost in a local government claims bill, and only on petition by the county. (§ 17612.) [8]

Moreover, the judicial remedy approved by the Court of Appeal permits resolution of the issues raised in a state mandate claim without the participation of those officers and individuals the Legislature deems necessary to a full and fair exposition and resolution of the issues. Neither the Controller nor the Director of Finance was named a defendant in this action. The Treasurer and the Director of the Office of Planning and Research did not participate. All of these officers would have been involved in determining the question as members of the Commission, as would the public member of the Commission. The judicial procedures were not equivalent to the public hearing required on test claims before the Commission by section 17555. Therefore, other affected departments, organizations, and individuals had no opportunity to be heard. [9]

Finally, since a determination that a state mandate has been created in a judicial proceeding rather than one before the Commission does not trigger the procedures for creating parameters and guidelines for payment of claims, or for inclusion of estimated costs in the state budget, there is no source of funds available for compliance with the judicial decision other than the appropriations for the Department

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of Health Services. Payment from those funds can only be at the expense of another program which the department is obligated to fund. No public policy supports, let alone requires, this result.

The superior court acted properly in dismissing this action.

The judgment of the Court of Appeal is reversed.

Lucas, C. J., Panelli, J., Kennard, J., and Arabian, J., concurred.

BROUSSARD, J.

I dissent. For nine years the Legislature has defied the mandate of article XIII B of the California Constitution (hereafter article XIII B). Having transferred responsibility for the care of medically indigent adults (MIA's) to county governments, the Legislature has failed to provide the counties with sufficient money to meet this responsibility, yet the ***337** Legislature computes its own appropriations limit as if it fully funded the program. The majority, however, declines to remedy this violation because, it says, the persons most directly harmed by the violation—the medically indigent who are denied adequate health care—have no standing to raise the matter. I disagree, and will demonstrate that (1) plaintiffs have standing as citizens to seek a declaratory judgment to determine whether the state is complying with its constitutional duty under article XIII B; (2) the creation of an administrative remedy whereby counties and local districts can enforce article XIII B does not deprive the citizenry of its own independent right to enforce that provision; and (3) even if plaintiffs lacked standing, our recent decision in *Dix v. Superior Court* (1991) 53 Cal.3d 442 [279 Cal.Rptr. 834, 807 P.2d 1063] permits us to reach and resolve any significant issue decided by the Court of Appeal and fully briefed and argued here. I conclude that we should reach the merits of the appeal.

On the merits, I conclude that the state has not complied with its constitutional obligation under article XIII B. To prevent the state from avoiding the spending limits imposed by article XIII B, section 6 of that article prohibits the state from transferring previously state-financed programs to local governments without providing sufficient funds to meet those burdens. In 1982, however, the state excluded the medically indigent from its Medi-Cal program, thus shifting the responsibility for such care to the counties. Subvention funds provided by the state were inadequate to reimburse the counties for this responsibility, and became less adequate every year. At the same time, the state continued to compute its spending limit as if it fully financed the entire program. The result is exactly what article XIII B was intended to prevent: the state enjoys a falsely inflated spending limit; the county is compelled to assume a burden it cannot afford; and the medically indigent receive inadequate health care.

I. Facts and Procedural History

Plaintiffs—citizens, taxpayers, and persons in need of medical care—allege that the state has shifted its financial responsibility for the funding of health care for MIA's to the counties without providing the necessary funding and without any agreement transferring appropriation limits, and that as a result the state is violating article XIII B. Plaintiffs further allege they and the class they claim to represent cannot, consequently, obtain adequate health care from the County of Alameda, which lacks the state funding to provide it. The county, although nominally a defendant, aligned ***338** itself with plaintiffs. It admits the inadequacy of its program to provide medical care for MIA's but blames the absence of state subvention funds. [1]

At hearings below, plaintiffs presented uncontradicted evidence regarding the enormous impact of these statutory changes upon the finances and population of Alameda County. That county now spends about $40 million annually on health care for MIA's, of which the state reimburses about half. Thus, since article XIII B became effective, Alameda County's obligation for the health care of MIA's has risen from zero to more than $20 million per year. The county has inadequate funds to discharge its new obligation for the health care of MIA's; as a result, according to the Court of Appeal, uncontested evidence from medical experts presented below shows that, "The delivery of health care to the indigent in Alameda County is in a state of shambles; the crisis cannot be overstated ...." "Because of inadequate state funding, some Alameda County residents are dying, and many others are suffering serious diseases and disabilities, because they cannot obtain adequate access to the medical care they need ...." "The system is clogged to the breaking point. ... All community clinics ... are turning away patients." "The funding received by the county from the state for MIAs does not approach the actual cost of providing health care to the MIAs. As a consequence, inadequate resources available to county health services jeopardize the lives and health of thousands of people ...."

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The trial court acknowledged that plaintiffs had shown irreparable injury, but denied their request for a preliminary injunction on the ground that they could not prevail in the action. It then granted the state's motion for summary judgment. Plaintiffs appealed from both decisions of the trial court.

The Court of Appeal consolidated the two appeals and reversed the rulings below. It concluded that plaintiffs had standing to bring this action to enforce the constitutional spending limit of article XIII B, and that the action is not barred by the existence of administrative remedies available to counties. It then held that the shift of a portion of the cost of medical indigent care by the state to Alameda County constituted a state-mandated new program under the provisions of article XIII B, which triggered that article's provisions requiring a subvention of funds by the state to reimburse Alameda ***339** County for the costs of such program it was required to assume. The judgments denying a preliminary injunction and granting summary judgment for defendants were reversed. We granted review.

II. Standing

A. *Plaintiffs have standing to bring an action for declaratory relief to determine whether the state is complying with article XIII B.*

Plaintiffs first claim standing as taxpayers under Code of Civil Procedure section 526a, which provides that: "An action to obtain a judgment, restraining and preventing any illegal expenditure of, waste of, or injury to, the estate, funds, or other property of a county ..., may be maintained against any officer thereof, or any agent, or other person, acting in its behalf, either by a citizen resident therein, or by a corporation, who is assessed for and is liable to pay, or, within one year before the commencement of the action, has paid, a tax therein. ..." As in *Common Cause v. Board of Supervisors* (1989) 49 Cal.3d 432, 439 [261 Cal.Rptr. 574, 777 P.2d 610], however, it is "unnecessary to reach the question whether plaintiffs have standing to seek an injunction under Code of Civil Procedure section 526a, because there is an independent basis for permitting them to proceed." Plaintiffs here seek a declaratory judgment that the transfer of responsibility for MIA's from the state to the counties without adequate reimbursement violates article XIII B. A declaratory judgment that the state has breached its duty is essentially equivalent to an action in mandate to compel the state to perform its duty. (See *California Assn. of Psychology Providers v. Rank* (1990) 51 Cal.3d 1, 9 [270 Cal.Rptr. 796, 793 P.2d 2], which said that a declaratory judgment establishing that the state has a duty to act provides relief equivalent to mandamus, and makes issuance of the writ unnecessary.) Plaintiffs further seek a mandatory injunction requiring that the state pay the health costs of MIA's under the Medi-Cal program until the state meets its obligations under article XIII B. The majority similarly characterize plaintiffs' action as one comparable to mandamus brought to enforce section 6 of article XIII B.

We should therefore look for guidance to cases that discuss the standing of a party seeking a writ of mandate to compel a public official to perform his or her duty.[2] Such an action may be brought by any person "beneficially interested" in the issuance of the writ. (Code Civ. Proc., § 1086.) In *Carsten* ***340** *v. Psychology Examining Com.* (1980) 27 Cal.3d 793, 796 [166 Cal.Rptr. 844, 614 P.2d 276], we explained that the "requirement that a petitioner be 'beneficially interested' has been generally interpreted to mean that one may obtain the writ only if the person has some special interest to be served or some particular right to be preserved or protected over and above the interest held in common with the public at large." We quoted from Professor Davis, who said, "One who is in fact adversely affected by governmental action should have standing to challenge that action if it is judicially reviewable." (Pp. 796-797, quoting 3 Davis, Administrative Law Treatise (1958) p. 291.) Cases applying this standard include *Stocks v. City of Irvine* (1981) 114 Cal.App.3d 520 [170 Cal.Rptr. 724], which held that low- income residents of Los Angeles had standing to challenge exclusionary zoning laws of suburban communities which prevented the plaintiffs from moving there; *Taschner v. City Council, supra,* 31 Cal.App.3d 48, which held that a property owner has standing to challenge an ordinance which may limit development of the owner's property; and *Felt v. Waughop* (1924) 193 Cal. 498 [225 P. 862], which held that a city voter has standing to compel the city clerk to certify a correct list of candidates for municipal office. Other cases illustrate the limitation on standing: *Carsten v. Psychology Examining Com., supra,* 27 Cal.3d 793, held that a member of the committee who was neither seeking a license nor in danger of losing one had no standing to challenge a change in the method of computing the passing score on the licensing examination; *Parker v. Bowron* (1953) 40 Cal.2d 344 [254 P.2d 6] held that a union official who was neither a city employee nor a city resident had no standing to compel a city to follow a prevailing wage ordinance; and *Dunbar v. Governing Board* (1969) 275 Cal.App.2d 14 [79 Cal.Rptr. 662] held that a member of

a student organization had standing to challenge a college district's rule barring a speaker from campus, but persons who merely planned to hear him speak did not.

No one questions that plaintiffs are affected by the lack of funds to provide care for MIA's. Plaintiffs, except for plaintiff Rabinowitz, are not merely citizens and taxpayers; they are medically indigent persons living in Alameda County who have been and will be deprived of proper medical care if funding of MIA programs is inadequate. Like the other plaintiffs here, ***341** plaintiff Kinlaw, a 60-year-old woman with diabetes and hypertension, has no health insurance. Plaintiff Spier has a chronic back condition; inadequate funding has prevented him from obtaining necessary diagnostic procedures and physiotherapy. Plaintiff Tsosie requires medication for allergies and arthritis, and claims that because of inadequate funding she cannot obtain proper treatment. Plaintiff King, an epileptic, says she was unable to obtain medication from county clinics, suffered seizures, and had to go to a hospital. Plaintiff "Doe" asserts that when he tried to obtain treatment for AIDS-related symptoms, he had to wait four to five hours for an appointment and each time was seen by a different doctor. All of these are people personally dependent upon the quality of care of Alameda County's MIA program; most have experienced inadequate care because the program was underfunded, and all can anticipate future deficiencies in care if the state continues its refusal to fund the program fully.

The majority, however, argues that the county has no duty to use additional subvention funds for the care of MIA's because under Government Code section 17563 "[a]ny funds received by a local agency ... pursuant to the provisions of this chapter may be used for any public purpose." Since the county may use the funds for other purposes, it concludes that MIA's have no special interest in the subvention. [3]

This argument would be sound if the county were already meeting its obligations to MIA's under Welfare and Institutions Code section 17000. If that were the case, the county could use the subvention funds as it chose, and plaintiffs would have no more interest in the matter than any other county resident or taxpayer. But such is not the case at bar. Plaintiffs here allege that the county is not complying with its duty, mandated by Welfare and Institutions Code section 17000, to provide health care for the medically indigent; the county admits its failure but pleads lack of funds. Once the county receives adequate funds, it must perform its statutory duty under section 17000 of the Welfare and Institutions Code. If it refused, an action in mandamus would lie to compel performance. (See *Mooney v. Pickett* (1971) 4 Cal.3d 669 [94 Cal.Rptr. 279, 483 P.2d 1231].) In fact, the county has made clear throughout this litigation that it would use the subvention funds to provide care for MIA's. The majority's conclusion that plaintiffs lack a special, beneficial interest in the state's compliance with article XIII B ignores the practical realities of health care funding.

Moreover, we have recognized an exception to the rule that a plaintiff must be beneficially interested. "Where the question is one of public right ***342** and the object of the mandamus is to procure the enforcement of a public duty, the relator need not show that he has any legal or special interest in the result, since it is sufficient that he is interested as a citizen in having the laws executed and the duty in question enforced." (*Bd. of Soc. Welfare v. County of L. A.* (1945) 27 Cal.2d 98, 100-101 [162 P.2d 627].) We explained in *Green v. Obledo* (1981) 29 Cal.3d 126, 144 [172 Cal.Rptr. 206, 624 P.2d 256], that this "exception promotes the policy of guaranteeing citizens the opportunity to ensure that no governmental body impairs or defeats the purpose of legislation establishing a public right. ... It has often been invoked by California courts. [Citations.]"

Green v. Obledo presents a close analogy to the present case. Plaintiffs there filed suit to challenge whether a state welfare regulation limiting deductibility of work-related expenses in determining eligibility for aid to families with dependent children (AFDC) assistance complied with federal requirements. Defendants claimed that plaintiffs were personally affected only by a portion of the regulation, and had no standing to challenge the balance of the regulation. We replied that "[t]here can be no question that the proper calculation of AFDC benefits is a matter of public right [citation], and plaintiffs herein are certainly citizens seeking to procure the enforcement of a public duty. [Citation.] It follows that plaintiffs have standing to seek a writ of mandate commanding defendants to cease enforcing [the regulation] in its entirety." (29 Cal.3d at p. 145.)

We again invoked the exception to the requirement for a beneficial interest in *Common Cause v. Board of Supervisors, supra,* 49 Cal.3d 432. Plaintiffs in that case sought to compel the county to deputize employees to register voters. We quoted *Green v. Obledo, supra,* 29 Cal.3d 126, 144, and concluded that "[t]he question in this case involves a public right to voter outreach programs, and plaintiffs have standing

as citizens to seek its vindication." (49 Cal.3d at p. 439.) We should reach the same conclusion here.

B. *Government Code sections 17500-17630 do not create an exclusive remedy which bars citizen-plaintiffs from enforcing article XIII B.*

Four years after the enactment of article XIII B, the Legislature enacted Government Code sections 17500 through 17630 to implement article XIII B, section 6. These statutes create a quasi-judicial body called the Commission on State Mandates, consisting of the state Controller, state Treasurer, state Director of Finance, state Director of the Office of Planning and Research, and one public member. The commission has authority to "hear and decide upon [any] claim" by a local government that it "is entitled to be reimbursed by the state" for costs under article XIII B. (***343** Gov. Code, § 17551, subd. (a).) Its decisions are subject to review by an action for administrative mandamus in the superior court. (See Gov. Code, § 17559.)

The majority maintains that a proceeding before the Commission on State Mandates is the exclusive means for enforcement of article XIII B, and since that remedy is expressly limited to claims by local agencies or school districts (Gov. Code, § 17552), plaintiffs lack standing to enforce the constitutional provision.[4] I disagree, for two reasons.

First, Government Code section 17552 expressly addressed the question of exclusivity of remedy, and provided that "[t]his chapter shall provide the sole and exclusive procedure by which *a local agency or school district* may claim reimbursement for costs mandated by the state as required by Section 6 of Article XIII B of the California Constitution." (Italics added.) The Legislature was aware that local agencies and school districts were not the only parties concerned with state mandates, for in Government Code section 17555 it provided that "any other interested organization or individual may participate" in the commission hearing. Under these circumstances the Legislature's choice of words—"the sole and exclusive procedure by which a local agency or school district may claim reimbursement"—limits the procedural rights of those claimants only, and does not affect rights of other persons. *Expressio unius est exclusio alterius*—"the expression of certain things in a statute necessarily involves exclusion of other things not expressed." (*Henderson v. Mann Theatres Corp.* (1976) 65 Cal.App.3d 397, 403 [135 Cal.Rptr. 266].)

The case is similar in this respect to *Common Cause v. Board of Supervisors, supra,* 49 Cal.3d 432. Here defendants contend that the counties' right of action under Government Code sections 17551-17552 impliedly excludes ***344** any citizen's remedy; in *Common Cause* defendants claimed the Attorney General's right of action under Elections Code section 304 impliedly excluded any citizen's remedy. We replied that "the plain language of section 304 contains no limitation on the right of private citizens to sue to enforce the section. To infer such a limitation would contradict our long-standing approval of citizen actions to require governmental officials to follow the law, expressed in our expansive interpretation of taxpayer standing [citations], and our recognition of a 'public interest' exception to the requirement that a petitioner for writ of mandate have a personal beneficial interest in the proceedings [citations]." (49 Cal.3d at p. 440, fn. omitted.) Likewise in this case the plain language of Government Code sections 17551-17552 contain no limitation on the right of private citizens, and to infer such a right would contradict our long-standing approval of citizen actions to enforce public duties.

The United States Supreme Court reached a similar conclusion in *Rosado v. Wyman* (1970) 397 U.S. 397 [25 L.Ed.2d 442, 90 S.Ct. 1207]. In that case New York welfare recipients sought a ruling that New York had violated federal law by failing to make cost-of-living adjustments to welfare grants. The state replied that the statute giving the Department of Health, Education and Welfare authority to cut off federal funds to noncomplying states constituted an exclusive remedy. The court rejected the contention, saying that "[w]e are most reluctant to assume Congress has closed the avenue of effective judicial review to those individuals most directly affected by the administration of its program." (P. 420 [25 L.Ed.2d at p. 460].) The principle is clear: the persons actually harmed by illegal state action, not only some administrator who has no personal stake in the matter, should have standing to challenge that action.

Second, article XIII B was enacted to protect taxpayers, not governments. Sections 1 and 2 of article XIII B establish strict limits on state and local expenditures, and require the refund of all taxes collected in excess of those limits. Section 6 of article XIII B prevents the state from evading those limits and burdening county taxpayers by transferring financial responsibility for a program to a county, yet counting the cost of that program toward the limit on state expenditures.

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These provisions demonstrate a profound distrust of government and a disdain for excessive government spending. An exclusive remedy under which only governments can enforce article XIII B, and the taxpayer-citizen can appear only if a government has first instituted proceedings, is inconsistent with the ethos that led to article XIII B. The drafters of article XIII B and the voters who enacted it would not accept that the state Legislature—the principal body regulated by the article—could establish a procedure ***345** under which the only way the article can be enforced is for local governmental bodies to initiate proceedings before a commission composed largely of state financial officials.

One obvious reason is that in the never-ending attempts of state and local government to obtain a larger proportionate share of available tax revenues, the state has the power to coerce local governments into foregoing their rights to enforce article XIII B. An example is the Brown-Presley Trial Court Funding Act (Gov. Code, § 77000 et seq.), which provides that the county's acceptance of funds for court financing may, in the discretion of the Governor, be deemed a waiver of the counties' rights to proceed before the commission on all claims for reimbursement for state-mandated local programs which existed and were not filed prior to passage of the trial funding legislation.[5] The ability of state government by financial threat or inducement to persuade counties to waive their right of action before the commission renders the counties' right of action inadequate to protect the public interest in the enforcement of article XIII B.

The facts of the present litigation also demonstrate the inadequacy of the commission remedy. The state began transferring financial responsibility for MIA's to the counties in 1982. Six years later no county had brought a proceeding before the commission. After the present suit was filed, two counties filed claims for 70 percent reimbursement. Now, nine years after the 1982 legislation, the counties' claims are pending before the Court of Appeal. After that court acts, and we decide whether to review its decision, the matter may still have to go back to the commission for hearings to ***346** determine the amount of the mandate—which is itself an appealable order. When an issue involves the life and health of thousands, a procedure which permits this kind of delay is not an adequate remedy.

In sum, effective, efficient enforcement of article XIII B requires that standing to enforce that measure be given to those harmed by its violation—in this case, the medically indigent—and not be vested exclusively in local officials who have no personal interest at stake and are subject to financial and political pressure to overlook violations.

C. *Even if plaintiffs lack standing this court should nevertheless address and resolve the merits of the appeal.*

Although ordinarily a court will not decide the merits of a controversy if the plaintiffs lack standing (see *McKinny v. Board of Trustees* (1982) 31 Cal.3d 79, 90 [181 Cal.Rptr. 549, 642 P.2d 460]), we recognized an exception to this rule in our recent decision in *Dix v. Superior Court, supra,* 53 Cal.3d 442 (hereafter *Dix*). In *Dix,* the victim of a crime sought to challenge the trial court's decision to recall a sentence under Penal Code section 1170. We held that only the prosecutor, not the victim of the crime, had standing to raise that issue. We nevertheless went on to consider and decide questions raised by the victim concerning the trial court's authority to recall a sentence under Penal Code section 1170, subdivision (d). We explained that the sentencing issues "are significant. The case is fully briefed and all parties apparently seek a decision on the merits. Under such circumstances, we deem it appropriate to address [the victim's] sentencing arguments for the guidance of the lower courts. Our discretion to do so under analogous circumstances is well settled. [Citing cases explaining when an appellate court can decide an issue despite mootness.]" (53 Cal.3d at p. 454.) In footnote we added that "Under article VI, section 12, subdivision (b) of the California Constitution ..., we have jurisdiction to 'review the *decision of a Court of Appeal* in any cause.' (Italics added.) Here the Court of Appeal's decision addressed two issues—standing and merits. Nothing in article VI, section 12(b) suggests that, having rejected the Court of Appeal's conclusion on the preliminary issue of standing, we are foreclosed from 'review [ing]' the second subject addressed and resolved in its decision." (Pp. 454-455, fn. 8.)

I see no grounds on which to distinguish *Dix.* The present case is also one in which the Court of Appeal decision addressed both standing and merits. It is fully briefed. Plaintiffs and the county seek a decision on the merits. While the state does not seek a decision on the merits in this proceeding, its appeal of the superior court decision in the mandamus proceeding brought by the County of Los Angeles (see maj. opn., *ante,* p. 330, fn. 2) shows that it is not opposed to an appellate decision on the merits. ***347**

The majority, however, notes that various state officials—the Controller, the Director of Finance, the Treasurer, and the Director of the Office of Planning and Research—did not

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participate in this litigation. Then in a footnote, the majority suggests that this is the reason they do not follow the *Dix* decision. (Maj. opn., *ante,* p. 336, fn. 9.) In my view, this explanation is insufficient. The present action is one for declaratory relief against the state. It is not necessary that plaintiffs also sue particular state officials. (The state has never claimed that such officials were necessary parties.) I do not believe we should refuse to reach the merits of this appeal because of the nonparticipation of persons who, if they sought to participate, would be here merely as amici curiae. [6]

The case before us raises no issues of departmental policy. It presents solely an issue of law which this court is competent to decide on the briefs and arguments presented. That issue is one of great significance, far more significant than any raised in *Dix*. Judges rarely recall sentencing under Penal Code section 1170, subdivision (d); when they do, it generally affects only the individual defendant. In contrast, the legal issue here involves immense sums of money and affect budgetary planning for both the state and counties. State and county governments need to know, as soon as possible, what their rights and obligations are; legislators considering proposals to deal with the current state and county budget crisis need to know how to frame legislation so it does not violate article XIII B. The practical impact of a decision on the people of this state is also of great importance. The failure of the state to provide full subvention funds and the difficulty of the county in filling the gap translate into inadequate staffing and facilities for treatment of thousands of persons. Until the constitutional issues are resolved the legal uncertainties may inhibit both levels of government from taking the steps needed to address this problem. A delay of several years until the Los Angeles case is resolved could result in pain, hardship, or even death for many people. I conclude that, whether or not plaintiffs have standing, this court should address and resolve the merits of the appeal.

D. *Conclusion as to standing.*

As I have just explained, it is not necessary for plaintiffs to have standing for us to be able to decide the merits of the appeal. Nevertheless, I conclude ***348** that plaintiffs have standing both as persons "beneficially interested" under Code of Civil Procedure section 1086 and under the doctrine of *Green v. Obledo, supra,* 29 Cal.3d 126, to bring an action to determine whether the state has violated its duties under article XIII B. The remedy given local agencies and school districts by Government Code sections 17500- 17630 is, as Government Code section 17552 states, the exclusive remedy by which those bodies can challenge the state's refusal to provide subvention funds, but the statute does not limit the remedies available to individual citizens.

III. Merits of the Appeal

A. *State funding of care for MIA's.*

Welfare and Institutions Code section 17000 requires every county to "relieve and support" all indigent or incapacitated residents, except to the extent that such persons are supported or relieved by other sources. [7] From 1971 until 1982, and thus at the time article XIII B became effective, counties were not required to pay for the provision of health services to MIA's, whose health needs were met through the state-funded Medi-Cal program. Since the medical needs of MIA's were fully met through other sources, the counties had no duty under Welfare and Institutions Code section 17000 to meet those needs. While the counties did make general contributions to the Medi-Cal program (which covered persons other than MIA's) from 1971 until 1978, at the time article XIII B became effective in 1980 the counties were not required to make any financial contributions to Medi-Cal. It is therefore undisputed that the counties were not required to provide financially for the health needs of MIA's when article XIII B became effective. The state funded all such needs of MIA's.

In 1982, the Legislature passed Assembly Bill No. 799 (1981-1982 Reg. Sess.; Stats. 1982, ch. 328, pp. 1568-1609) (hereafter AB No. 799), which removed MIA's from the state-funded Medi-Cal program as of January 1, 1983, and thereby transferred to the counties, through the County Medical Services Plan which AB No. 799 created, the financial responsibility to provide health services to approximately 270,000 MIA's. AB No. 799 required that the counties provide health care for MIA's, yet appropriated only 70 percent of what the state would have spent on MIA's had those persons remained a state responsibility under the Medi-Cal program.

Since 1983, the state has only partially defrayed the costs to the counties of providing health care to MIA's. Such state funding to counties was ***349** initially relatively constant, generally more than $400 million per year. By 1990, however, state funding had decreased to less than $250 million. The state, however, has always included the full amount of its former obligation to provide for MIA's under the Medi-Cal program in the year preceding July 1, 1980, as part of its article XIII B "appropriations limit," i.e., as part of the base amount of appropriations on which subsequent

annual adjustments for cost-of-living and population changes would be calculated. About $1 billion has been added to the state's adjusted spending limit for population growth and inflation *solely* because of the state's inclusion of all MIA expenditures in the appropriation limit established for its base year, 1979-1980. The state has not made proportional increases in the sums provided to counties to pay for the MIA services funded by the counties since January 1, 1983.

B. *The function of article XIII B.*

Our recent decision in *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 486-487 [280 Cal.Rptr. 92, 808 P.2d 235] (hereafter *County of Fresno*), explained the function of article XIII B and its relationship to article XIII A, enacted one year earlier:

"At the June 6, 1978, Primary Election, article XIII A was added to the Constitution through the adoption of Proposition 13, an initiative measure aimed at controlling ad valorem property taxes and the imposition of new 'special taxes.' (*Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization* (1978) 22 Cal.3d 208, 231-232 [149 Cal.Rptr. 239, 583 P.2d 1281].) The constitutional provision imposes a limit on the power of state and local governments to adopt and levy taxes. (*City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 59, fn. 1 [266 Cal.Rptr. 139, 785 P.2d 522] (*City of Sacramento*).)

"At the November 6, 1979, Special Statewide Election, article XIII B was added to the Constitution through the adoption of Proposition 4, another initiative measure. That measure places limitations on the ability of both state and local governments to appropriate funds for expenditures.

" 'Articles XIII A and XIII B work in tandem, together restricting California governments' power both to levy and to spend [taxes] for public purposes.' (*City of Sacramento, supra,* 50 Cal.3d at p. 59, fn. 1.)

"Article XIII B of the Constitution was intended ... to provide 'permanent protection for taxpayers from excessive taxation' and 'a reasonable way to provide discipline in tax spending at state and local levels.' (See *County of Placer v. Corin* (1980) 113 Cal.App.3d 443, 446 [170 Cal.Rptr. 232], quoting and following Ballot Pamp., Proposed Stats. and Amends. to Cal. Const. with arguments to voters, Special Statewide Elec. (Nov. 6, 1979), argument ***350** in favor of Prop. 4, p. 18.) To this end, it establishes an 'appropriations limit' for both state and local governments (Cal. Const., art. XIII B, § 8, subd. (h)) and allows no 'appropriations subject to limitation' in excess thereof (*id.,* § 2). [8] (See *County of Placer v. Corin, supra,* 113 Cal.App.3d at p. 446.) It defines the relevant 'appropriations subject to limitation' as 'any authorization to expend during a fiscal year the proceeds of taxes ....' (Cal. Const., art. XIII B, § 8, subd. (b).)" (*County of Fresno, supra,* 53 Cal.3d at p. 486.)

Under section 3 of article XIII B the state may transfer financial responsibility for a program to a county if the state and county mutually agree that the appropriation limit of the state will be decreased and that of the county increased by the same amount. [9] Absent such an agreement, however, section 6 of article XIII B generally precludes the state from avoiding the spending limits it must observe by shifting to local governments programs and their attendant financial burdens which were a state responsibility prior to the effective date of article XIII B. It does so by requiring that "Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the cost of such program or increased level of service ...." [10]

"Section 6 was included in article XIII B in recognition that article XIII A of the Constitution severely restricted the taxing powers of local governments. (See *County of Los Angeles* [v. *State of California* (1987)] 43 Cal.3d 46, 61 [233 Cal.Rptr. 38, 729 P.2d 202].) The provision was intended to preclude the state from shifting financial responsibility for carrying out governmental functions onto local entities that were ill equipped to handle the task. (*Ibid.*; see *Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d 830, 836, fn. 6.) Specifically, it was designed to protect the tax ***351** revenues of local governments from state mandates that would require expenditure of such revenues." (*County of Fresno, supra,* 53 Cal.3d at p. 487.)

C. *Applicability of article XIII B to health care for MIA's.*

The state argues that care of the indigent, including medical care, has long been a county responsibility. It claims that although the state undertook to fund this responsibility from 1979 through 1982, it was merely temporarily (as it turned out) helping the counties meet their responsibilities, and that the subsequent reduction in state funding did not impose any "new program" or "higher level of service" on the counties within the meaning of section 6 of article XIII B. Plaintiffs respond that the critical question is not the traditional roles of the county and state, but who had the fiscal responsibility

on November 6, 1979, when article XIII B took effect. The purpose of article XIII B supports the plaintiffs' position.

As we have noted, article XIII A of the Constitution (Proposition 13) and article XIII B are complementary measures. The former radically reduced county revenues, which led the state to assume responsibility for programs previously financed by the counties. Article XIII B, enacted one year later, froze both state and county appropriations at the level of the 1978-1979 budgets—a year when the budgets included state financing for the prior county programs, but not county financing for these programs. Article XIII B further limited the state's authority to transfer obligations to the counties. Reading the two together, it seems clear that article XIII B was intended to limit the power of the Legislature to retransfer to the counties those obligations which the state had assumed in the wake of Proposition 13.

Under article XIII B, both state and county appropriations limits are set on the basis of a calculation that begins with the budgets in effect when article XIII B was enacted. If the state could transfer to the county a program for which the state at that time had full financial responsibility, the county could be forced to assume additional financial obligations without the right to appropriate additional moneys. The state, at the same time, would get credit toward its appropriations limit for expenditures it did not pay. County taxpayers would be forced to accept new taxes or see the county forced to cut existing programs further; state taxpayers would discover that the state, by counting expenditures it did not pay, had acquired an actual revenue surplus while avoiding its obligation to refund revenues in excess of the appropriations limit. Such consequences are inconsistent with the purpose of article XIII B.

Our decisions interpreting article XIII B demonstrate that the state's subvention requirement under section 6 is not vitiated simply because the ***352** "program" existed before the effective date of article XIII B. The alternate phrase of section 6 of article XIII B, " 'higher level of service[,]' ... must be read in conjunction with the predecessor phrase 'new program' to give it meaning. Thus read, it is apparent that *the subvention requirement for increased or higher level of service is directed to state mandated increases in the services provided by local agencies in existing 'programs.'* " (*County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56 [233 Cal.Rptr. 38, 729 P.2d 202], italics added.)

Lucia Mar Unified School Dist. v. Honig, supra, 44 Cal.3d 830, presents a close analogy to the present case. The state Department of Education operated schools for severely handicapped students, but prior to 1979 *school districts were required by statute to contribute* to education of those students from the district at the state schools. In 1979, in response to the restrictions on school district revenues imposed by Proposition 13, the statutes requiring such district contributions were repealed and the state assumed full responsibility for funding. The state funding responsibility continued until June 28, 1981, when Education Code section 59300 (hereafter section 59300), requiring school districts to share in these costs, became effective.

The plaintiff districts filed a test claim before the commission, contending they were entitled to state reimbursement under section 6 of article XIII B. The commission found the plaintiffs were not entitled to state reimbursement, on the rationale that the increase in costs to the districts compelled by section 59300 imposed no new program or higher level of services. The trial and intermediate appellate courts affirmed on the ground that section 59300 called for only an " 'adjustment of costs' " of educating the severely handicapped, and that "*a shift in the funding of an existing program is not a new program or a higher level of service*" within the meaning of article XIII B. (*Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d at p. 834, italics added.)

We reversed, rejecting the state's theories that the funding shift to the county of the subject program's costs does not constitute a new program. "[There can be no] doubt that although the schools for the handicapped have been operated by the state for many years, the program was new insofar as plaintiffs are concerned, since *at the time section 59300 became effective* they were not required to contribute to the education of students from their districts at such schools. [¶] ... To hold, under the circumstances of this case, that a shift in funding of an existing program from the state to a local entity is not a new program as to the local agency would, we think, violate the intent underlying section 6 of article XIIIB. That article imposed spending limits on state and local governments, and it followed by one year the adoption by initiative of article XIIIA, which severely limited the taxing ***353** power of local governments. ... [¶] The intent of the section would plainly be violated if the state could, while retaining administrative control [11] of programs it has supported with state tax money, simply shift the cost of the programs to local government on the theory that the shift does not violate section 6 of article XIIIB because the programs

are not 'new.' Whether the shifting of costs is accomplished by compelling local governments to pay the cost of entirely new programs created by the state, *or by compelling them to accept financial responsibility in whole or in part for a program which was funded entirely by the state before the advent of article XIIIB, the result seems equally violative of the fundamental purpose underlying section 6 of that article.*" (*Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d at pp. 835- 836, fn. omitted, italics added.)

The state seeks to distinguish *Lucia Mar* on the ground that the education of handicapped children in state schools had never been the responsibility of the local school district, but overlooks that the local district had previously been required to contribute to the cost. Indeed the similarities between *Lucia Mar* and the present case are striking. In *Lucia Mar,* prior to 1979 the state and county shared the cost of educating handicapped children in state schools; in the present case from 1971-1979 the state and county shared the cost of caring for MIA's under the Medi-Cal program. In 1979, following enactment of Proposition 13, the state took full responsibility for both programs. Then in 1981 (for handicapped children) and 1982 (for MIA's), the state sought to shift some of the burden back to the counties. To distinguish these cases on the ground that care for MIA's is a county program but education of handicapped children a state program is to rely on arbitrary labels in place of financial realities.

The state presents a similar argument when it points to the following emphasized language from *Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d 830: "[B]ecause section 59300 shifts partial financial responsibility for the support of students in the state-operated schools from the state to school districts—*an obligation the school districts did not have at the time article XIII B was adopted*—it calls for plaintiffs to support a 'new program' within the meaning of section 6." (P. 836, fn. omitted, italics added.) It urges *Lucia Mar* reached its result *only* because the "program" requiring school district funding in that case *was not required by statute* at the effective date of ***354** article XIII B. The state then argues that the case at bench is distinguishable because it contends Alameda County had a continuing obligation *required by statute* antedating that effective date, which had only been "temporarily" [12] suspended when article XIII B became effective. I fail to see the distinction between a case—*Lucia Mar*—in which no existing statute as of 1979 imposed an obligation on the local government and one—this case—in which the statute existing in 1979 imposed no obligation on local government.

The state's argument misses the salient point. As I have explained, the application of section 6 of article XIII B does not depend upon when the program was created, but upon who had the burden of funding it when article XIII B went into effect. Our conclusion in *Lucia Mar* that the educational program there in issue was a "new" program as to the school districts was not based on the presence or absence of any antecedent statutory obligation therefor. *Lucia Mar* determined that whether the program was new *as to the districts* depended on *when* they were compelled to assume the obligation to partially fund an existing program which they had not funded at the time article XIII B became effective.

The state further relies on two decisions, *Madera Community Hospital v. County of Madera* (1984) 155 Cal.App.3d 136 [201 Cal.Rptr. 768] and *Cooke v. Superior Court* (1989) 213 Cal.App.3d 401 [261 Cal.Rptr. 706], which hold that the county has a statutory obligation to provide medical care for indigents, but that it need not provide precisely the same level of services as the state provided under Medi-Cal. [13] Both are correct, but irrelevant to this case. [14] The county's obligation to MIA's is defined by Welfare and Institutions Code section 17000, not by the former Medi-Cal program. [15] If the ***355** state, in transferring an obligation to the counties, permits them to provide less services than the state provided, the state need only pay for the lower level of services. But it cannot escape its responsibility entirely, leaving the counties with a state-mandated obligation and no money to pay for it.

The state's arguments are also undercut by the fact that it continues to use the approximately $1 billion in spending authority, generated by its previous total funding of the health care program in question, as a portion of its initial *base spending limit* calculated pursuant to sections 1 and 3 of article XIII B. In short, the state may maintain here that care for MIA's is a county obligation, but when it computes its appropriation limit it treats the entire cost of such care as a state program.

IV. Conclusion

This is a time when both state and county governments face great financial difficulties. The counties, however, labor under a disability not imposed on the state, for article XIII A of the Constitution severely restricts their ability to raise additional revenue. It is, therefore, particularly important to enforce the provisions of article XIII B which prevent

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the state from imposing additional obligations upon the counties without providing the means to comply with these obligations.

The present majority opinion disserves the public interest. It denies standing to enforce article XIII B both to those persons whom it was designed to protect—the citizens and taxpayers—and to those harmed by its violation—the medically indigent adults. And by its reliance on technical grounds to avoid coming to grips with the merits of plaintiffs' appeal, it permits the state to continue to violate article XIII B and postpones the day when the medically indigent will receive adequate health care.

Mosk, J., concurred. ***356**

Footnotes

1 The complaint also sought a declaration that the county was obliged to provide health care services to indigents that were equivalent to those available to nonindigents. This issue is not before us. The County of Alameda aligned itself with plaintiffs in the superior court and did not oppose plaintiffs' effort to enforce section 6.

2 On November 23, 1987, the County of Los Angeles filed a test claim with the Commission. San Bernardino County joined as a test claimant. The Commission ruled against the counties, concluding that no state mandate had been created. The Los Angeles County Superior Court subsequently granted the counties' petition for writ of mandate (Code Civ. Proc., § 1094.5), reversing the Commission, on April 27, 1989. (No. C-731033.) An appeal from that judgment is presently pending in the Court of Appeal. (*County of Los Angeles v. State of California,* No. B049625.)

3 Plaintiffs argue that they seek only a declaration that AB 799 created a state mandate and an injunction against the shift of costs until the state decides what action to take. This is inconsistent with the prayer of their complaint which sought an injunction requiring defendants to restore Medi-Cal eligibility to all medically indigent adults until the state paid the cost of full health services for them. It is also unavailing.

An injunction against enforcement of a state mandate is available only after the Legislature fails to include funding in a local government claims bill following a determination by the Commission that a state mandate exists. (Gov. Code, § 17612.) Whether plaintiffs seek declaratory relief and/or an injunction, therefore, they are seeking to enforce section 6.

All further statutory references are to the Government Code unless otherwise indicated.

4 The test claim by the County of Los Angeles was filed prior to that proposed by Alameda County. The Alameda County claim was rejected for that reason. (See § 17521.) Los Angeles County permitted San Bernardino County to join in its claim which the Commission accepted as a test claim intended to resolve the issues the majority elects to address instead in this proceeding. Los Angeles County declined a request from Alameda County that it be included in the test claim because the two counties' systems of documentation were so similar that joining Alameda County would not be of any benefit. Alameda County and these plaintiffs were, of course, free to participate in the Commission hearing on the test claim. (§ 17555.)

5 " 'Local agency' means any city, county, special district, authority, or other political subdivision of the state." (§ 17518.)

6 " 'School district' means any school district, community college district, or county superintendant of schools." (§ 17519.)

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7 Plaintiffs' argument that the Legislature's failure to make provision for individual enforcement of section 6 before the Commission demonstrates an intent to permit legal actions, is not persuasive. The legislative statement of intent to relegate all mandate disputes to the Commission is clear. A more likely explanation of the failure to provide for test cases to be initiated by individuals lies in recognition that (1) because section 6 creates rights only in governmental entities, individuals lack sufficient beneficial interest in either the receipt or expenditure of reimbursement funds to accord them standing; and (2) the number of local agencies having a direct interest in obtaining reimbursement is large enough to ensure that citizen interests will be adequately represented.

8 Plaintiffs are not without a remedy if the county fails to provide adequate health care, however. They may enforce the obligation imposed on the county by Welfare and Institutions Code sections 17000 and 17001, and by judicial action. (See, e.g., *Mooney v. Pickett* (1971) 4 Cal.3d 669 [94 Cal.Rptr. 279, 483 P.2d 1231].)

9 For this reason, it would be inappropriate to address the merits of plaintiff's claim in this proceeding. (Cf. *Dix v. Superior Court* (1991) 53 Cal.3d 442 [279 Cal.Rptr. 834, 807 P.2d 1063].) Unlike the dissent, we do not assume that in representing the state in this proceeding, the Attorney General necessarily represented the interests and views of these officials.

1 The majority states that “Plaintiffs are not without a remedy if the county fails to provide adequate health care .... They may enforce the obligation imposed on the county by Welfare and Institutions Code sections 17000 and 17001, and by judicial action.” (Maj. opn., *ante,* p. 336, fn. 8)

The majority fails to note that plaintiffs have already tried this remedy, and met with the response that, owing to the state's inadequate subvention funds, the county cannot afford to provide adequate health care.

2 It is of no importance that plaintiffs did not request issuance of a writ of mandate. In *Taschner v. City Council* (1973) 31 Cal.App.3d 48, 56 [107 Cal.Rptr. 214] (overruled on other grounds in *Associated Home Builders etc., Inc. v. City of Livermore* (1976) 18 Cal.3d 582, 596 [135 Cal.Rptr. 41, 557 P.2d 473, 92 A.L.R.3d 1038]), the court said that “[a]s against a general demurrer, a complaint for declaratory relief may be treated as a petition for mandate [citations], and where a complaint for declaratory relief alleges facts sufficient to entitle plaintiff to mandate, it is error to sustain a general demurrer without leave to amend.”

In the present case, the trial court ruled on a motion for summary judgment, but based that ruling not on the evidentiary record (which supported plaintiffs' showing of irreparable injury) but on the issues as framed by the pleadings. This is essentially equivalent to a ruling on demurrer, and a judgment denying standing could not be sustained on the narrow ground that plaintiffs asked for the wrong form of relief without giving them an opportunity to correct the defect. (See *Residents of Beverly Glen, Inc. v. City of Los Angeles* (1973) 34 Cal.App.3d 117, 127-128 [109 Cal.Rptr. 724].)

3 The majority's argument assumes that the state will comply with a judgment for plaintiffs by providing increased subvention funds. If the state were instead to comply by restoring Medi-Cal coverage for MIA's, or some other method of taking responsibility for their health needs, plaintiffs would benefit directly.

4 The majority emphasizes the statement of purpose of Government Code section 17500: “The Legislature finds and declares that the existing system for reimbursing local agencies and school districts for the costs of state-mandated local programs has not provided for the effective determination of the state's responsibilities under section 6 of article XIII B of the California Constitution. The Legislature finds and declares that the failure of the existing process to adequately and consistently resolve the complex legal questions involved in the determination of state-mandated costs has led to an increasing reliance by local agencies and school districts on the judiciary, and, therefore, in order to relieve unnecessary congestion of the judicial system, it is

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necessary to create a mechanism which is capable of rendering sound quasi-judicial decisions and providing an effective means of resolving disputes over the existence of state-mandated local programs."

The "existing system" to which Government Code section 17500 referred was the Property Tax Relief Act of 1972 (Rev. & Tax. Code, §§ 2201-2327), which authorized local agencies and school boards to request reimbursement from the state Controller. Apparently dissatisfied with this remedy, the agencies and boards were bypassing the Controller and bringing actions directly in the courts. (See, e.g., *County of Contra Costa v. State of California* (1986) 177 Cal.App.3d 62 [222 Cal.Rptr. 750].) The legislative declaration refers to this phenomena. It does not discuss suits by individuals.

5 "(a) The initial decision by a county to opt into the system pursuant to Section 77300 *shall constitute a waiver of all claims for reimbursement for state-mandated local programs not theretofore approved by the State Board of Control, the Commission on State Mandates, or the courts to the extent the Governor, in his discretion, determines that waiver to be appropriate*; provided, that a decision by a county to opt into the system pursuant to Section 77300 beginning with the second half of the 1988-89 fiscal year shall not constitute a waiver of a claim for reimbursement based on a statute chaptered on or before the date the act which added this chapter is chaptered, which is filed in acceptable form on or before the date the act which added this chapter is chaptered. A county may petition the Governor to exempt any such claim from this waiver requirement; and the Governor, in his discretion, may grant the exemption in whole or in part. The waiver shall not apply to or otherwise affect any claims accruing after initial notification. Renewal, renegotiation, or subsequent notification to continue in the program shall not constitute a waiver. [¶] (b) The initial decision by a county to opt into the system pursuant to Section 77300 shall constitute a waiver of any claim, cause of action, or action whenever filed, with respect to the Trial Court Funding Act of 1985, Chapter 1607 of the Statutes of 1985, or Chapter 1211 of the Statutes of 1987." (Gov. Code, § 77203.5, italics added.)

"As used in this chapter, 'state-mandated local program' *means any and all reimbursements owed or owing by operation of either Section 6 of Article XIII B of the California Constitution,* or Section 17561 of the Government Code, or both." (Gov. Code, § 77005, italics added.)

6 It is true that these officials would participate in a proceeding before the Commission on State Mandates, but they would do so as members of an administrative tribunal. On appellate review of a commission decision, its members, like the members of the Public Utilities Commission or the Workers' Compensation Appeals Board, are not respondents and do not appear to present their individual views and positions. For example, in *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830 [244 Cal.Rptr. 677, 750 P.2d 318], in which we reviewed a commission ruling relating to subvention payments for education of handicapped children, the named respondents were the state Superintendent of Public Instruction, the Department of Education, and the Commission on State Mandates. The individual members of the commission were not respondents and did not participate.

7 Welfare and Institutions Code section 17000 provides that "[e]very county ... shall relieve and support all incompetent, poor, indigent persons, and those incapacitated by age, disease, or accident, lawfully resident therein, when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions."

8 Article XIII B, section 1 provides: "The total annual appropriations subject to limitation of the state and of each local government shall not exceed the appropriations limit of such entity of government for the prior year adjusted for changes in the cost of living and population except as otherwise provided in this Article."

9 Section 3 of article XIII B reads in relevant part: "The appropriations limit for any fiscal year ... shall be adjusted as follows:

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"(a) In the event that the financial responsibility of providing services is transferred, in whole or in part ... from one entity of government to another, then for the year in which such transfer becomes effective the appropriation limit of the transferee entity shall be increased by such reasonable amount as the said entities shall mutually agree and the appropriations limit of the transferor entity shall be decreased by the same amount. ..."

10 Section 6 of article XIII B further provides that the "Legislature may, but need not, provide such subvention of funds for the following mandates: (a) Legislative mandates requested by the local agency affected; (b) Legislation defining a new crime or changing an existing definition of a crime; or (c) Legislative mandates enacted prior to January 1, 1975, or executive orders or regulations initially implementing legislation enacted prior to January 1, 1975." None of these exceptions apply in the present case.

11 The state notes that, in contrast to the program at issue in *Lucia Mar,* it has not retained administrative control over aid to MIA's. But the quoted language from *Lucia Mar,* while appropriate to the facts of that case, was not intended to establish a rule limiting article XIII B, section 6, to instances in which the state retains administrative control over the program that it requires the counties to fund. The constitutional language admits of no such limitation, and its recognition would permit the Legislature to evade the constitutional requirement.

12 The state's repeated emphasis on the "temporary" nature of its funding is a form of post hoc reasoning. At the time article XIII B was enacted, the voters did not know which programs would be temporary and which permanent.

13 It must, however, provide a *comparable* level of services. (See *Board of Supervisors v. Superior Court* (1989) 207 Cal.App.3d 552, 564 [254 Cal.Rptr. 905].)

14 Certain language in *Madera Community Hospital v. County of Madera, supra,* 155 Cal.App.3d 136, however, is questionable. That opinion states that the "Legislature intended that County bear an obligation to its poor and indigent residents, *to be satisfied from county funds,* notwithstanding federal or state programs which exist concurrently with County's obligation and alleviate, to a greater or lesser extent, County's burden." (P. 151.) Welfare and Institutions Code section 17000 by its terms, however, requires the county to provide support to residents only "when such persons are not supported and relieved by their relatives or friends, by their own means, or by state hospitals or other state or private institutions." Consequently, to the extent that the state or federal governments provide care for MIA's, the county's obligation to do so is reduced pro tanto.

15 The county's right to subvention funds under article XIII B arises because its duty to care for MIA's is a state-mandated responsibility; if the county had no duty, it would have no right to funds. No claim is made here that the funding of medical services for the indigent shifted to Alameda County is not a program " 'mandated' " by the state; i.e., that Alameda County has any option other than to pay these costs. (*Lucia Mar Unified School Dist. v. Honig, supra,* 44 Cal.3d at pp. 836-837.)

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59 Cal.4th 59
Supreme Court of California

LONG BEACH POLICE OFFICERS ASSOCIATION, Plaintiff and Appellant,
v.
CITY OF LONG BEACH et al., Defendants and Appellants;
Los Angeles Times Communications LLC, Real Party in Interest and Respondent.

No. S200872.
|
May 29, 2014.

Synopsis
Background: City police officers association brought action against city, seeking an injunction against disclosure, pursuant to the California Public Records Act (CPRA), of names of officers involved in shooting incidents over a five-year period. Newspaper company intervened and filed opposition, and city filed memorandum aligning itself with association. The Superior Court, Los Angeles County, No. NC055491, Patrick T. Madden, J., denied injunction without prejudice to future requests relating to individual officers. Association and city petitioned for writ of mandate, and the Court of Appeal affirmed. Association and city filed separate petitions for review, and the Supreme Court granted review, superseding the opinion of the Court of Appeal.

The Supreme Court, Kennard, J., held that CPRA did not protect officers' names from disclosure.

Affirmed.

Chin, J., dissented with opinion.

Procedural Posture(s): Petition for Discretionary Review; On Appeal; Motion for Permanent Injunction.

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Opinion

KENNARD, J. *

*64 **461 A newspaper asked a city to release the names of police officers involved in certain **462 shootings while on duty. The police union then sought injunctive relief against the city in superior court, attempting to prevent release of the names. The newspaper intervened (seeking disclosure of the names), and the city then aligned itself with the union (opposing disclosure). The trial court denied the union's request for a permanent injunction; that denial was upheld on appeal. We granted the separate petitions for review filed by the city and the union. We now affirm the judgment of the Court of Appeal.

I

Shortly before 5:00 p.m., on December 12, 2010, two City of Long Beach police officers responded to a resident's telephone call about an intoxicated man brandishing a "six-shooter" on neighboring property. At the sight of the two officers, the man (35–year–old Douglas Zerby) pointed at them an object resembling a gun. The officers immediately fired multiple rounds at Zerby, killing him. It turned out that the object Zerby was holding was a garden hose spray nozzle with a pistol grip.

Three days later, reporter Richard Winton of the Los Angeles Times (the Times), asked the Long Beach City Attorney's Office for "[t]he names of Long Beach police officers involved in the December 12[, 2010,] office[r-]involved shooting in the 5300 block of East Ocean Boulevard" (the Zerby shooting), as well as "[t]he names of Long Beach police officers involved in officer [-]involved shootings from Jan[uary] 1[,] 2005 to Dec[ember] 11, 2010" (the nearly six-year period leading up to the Zerby shooting). The request was made under the California Public Records Act (Gov.Code, § 6250 et seq.).

On December 30, 2010, plaintiff Long Beach Police Officers Association (the Union), the bargaining agent for all Long Beach police officers, sought injunctive relief in the superior court. Named as defendants were the City of Long Beach, the Long Beach Police Department, and its chief of police (collectively, the City). In its complaint, the Union asserted that the City had informed it that, unless prohibited by a court, the City would disclose the information sought by the Times. Accompanying the Union's request for injunctive relief was a declaration by Lieutenant Steve James, the Union's president, expressing concern that release of the officers' names could result *65 in "threats against the well being of officers or their families," as occurred in one recent police shooting case in which release of an officer's name led to "death threats" against ***59 the officer. James also mentioned an anonymous post on an Internet Web site, wishing that the children of an officer involved in a particular police shooting would experience Christmas without their father. James asserted that the Internet offers broad access to personal information, using only a person's name as an Internet search term.

The superior court issued a temporary restraining order prohibiting the City from disclosing to the Times the names of the officers involved in the Zerby shooting. The court then continued the case to a later date to determine whether to issue a preliminary or permanent injunction, and it allowed the Times to intervene in the action.

Defendant City supported plaintiff Union's request for injunctive relief. The City asserted that the names of the two officers involved in the December 2010 fatal shooting of Zerby were exempt from disclosure under the California Public Records Act. With respect to the names of the City's

police officers involved in *earlier* shootings, the City asserted that those names, too, were likely subject to the same statutory exemptions but that its practice was to evaluate each disclosure request on a "case-by-case basis."

The City submitted a declaration by Long Beach Police Lieutenant Lloyd Cox, who was in charge of "the criminal and administrative investigations related to all Officer Involved Shootings." The declaration stated that the police department conducts an administrative investigation of every officer-involved shooting, and, if warranted, an internal criminal investigation follows. Documents resulting from these investigations are treated by the police department as personnel records that are statutorily exempt from disclosure. ****463** Cox's declaration also stated that revealing the name of an officer involved in a shooting could expose the officer and the officer's family to harassment, because the officer's home address and other personal information could easily be found using the Internet. The declaration further stated that when, for example, an officer is involved in a shooting of a gang member, it is not uncommon for the gang to retaliate against the officer. Cox mentioned eight "Officer Safety Bulletins ... about potential retaliation/threats against officers," two of which were related to shootings, and he also described graffiti in the City of Long Beach that read "Strike Kill a Cop."

In arguing against disclosure of the names of the officers involved in the Zerby shooting, the Union and the City cited Government Code section 6255, subdivision (a), which authorizes denial of a public records request when "the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record." The Union and the City ***66** argued that the public interest in preventing harassment, threats, or violence against officers and their families outweighed any benefit the public would gain from disclosure.

The Times moved to strike Lieutenant James's declaration (filed by the Union), but the Times did not object to the declaration of Lieutenant Cox (filed by the City).[1] The trial court struck those *****60** portions of the James declaration that mentioned (1) the general safety concerns associated with releasing the names of officers involved in shootings, (2) the death threats made against specific officers involved in past shootings, and (3) the ease with which a name can be used to gather personal information over the Internet. The trial court then denied the Union's request for a preliminary or permanent injunction, and it discharged the temporary restraining order. The court ruled that none of the disclosure exemptions in the California Public Records Act protected the names of officers involved in shootings. With respect to the potential harassment facing those officers and their families, the court considered such harassment to be speculative in the absence of a particularized showing regarding a specific officer. Recognizing that such a showing might be made in the future, the superior court denied injunctive relief "without prejudice" to a renewed request demonstrating that "releasing the names of particular officers will create a likelihood of harm."

The Union and the City appealed, without success. We then granted their petitions for review.[2]

II

A. Statutory Law

The California Legislature in 1968, recognizing that "access to information concerning the conduct of the people's business is a fundamental and ***67** necessary right of every person in this state" (Gov.Code, § 6250), enacted the California Public Records Act, which grants access to public records held by state and local agencies (*id.,* § 6253, subd. (a)). The act broadly defines " '[p]ublic records' " as including "any writing containing information relating to the conduct of the public's business prepared, owned, used, or retained by any state or local agency...." (*Id.,* § 6252, subd. (e).) The act has certain ****464** specific exemptions (*id.,* §§ 6254–6254.30), but a public entity claiming an exemption must show that the requested information falls within the exemption (*id.,* § 6255, subd. (a)).

Government Code section 6255's subdivision (a) contains a "catchall exemption." (*Michaelis, Montanari & Johnson v. Superior Court* (2006) 38 Cal.4th 1065, 1071, 44 Cal.Rptr.3d 663, 136 P.3d 194.) It allows a public agency to "justify withholding any record by demonstrating that ... on the facts of the particular case the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record." (Gov.Code, § 6255, subd. (a).) As we have said in the past, "this provision contemplates a case-by-case balancing process, with the burden of proof on the proponent of nondisclosure to demonstrate a clear overbalance on the side of confidentiality." (*Michaelis, Montanari & Johnson, supra,* at p. 1071, 44 Cal.Rptr.3d 663, 136 P.3d 194.)

Also relevant here is Government Code section 6254, subdivision (c), which ***61 protects "[p]ersonnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy." But the Union and the City place their greatest reliance on Government Code section 6254, subdivision (k). That provision protects "[r]ecords, the disclosure of which is exempted or prohibited pursuant to federal or state law, including, but not limited to, provisions of the Evidence Code relating to privilege." Succinctly put, subdivision (k) " 'incorporates other [disclosure] prohibitions established by law.' " (*Copley Press, Inc. v. Superior Court* (2006) 39 Cal.4th 1272, 1283, 48 Cal.Rptr.3d 183, 141 P.3d 288 (*Copley*), quoting *CBS, Inc. v. Block* (1986) 42 Cal.3d 646, 656, 230 Cal.Rptr. 362, 725 P.2d 470.) The "prohibitions" pertinent here are those set forth in a set of discovery statutes that the Legislature enacted in 1978 in response to our 1974 decision in *Pitchess v. Superior Court* (1974) 11 Cal.3d 531, 113 Cal.Rptr. 897, 522 P.2d 305 (*Pitchess*).

In *Pitchess,* a defendant charged with battery on four sheriff's deputies (Pen.Code, §§ 242, 243, subd. (b)) claimed he was defending himself against the deputies' use of excessive force. We held that defendants in similar situations had a right, albeit limited, to discover from a peace officer's employer the existence of any previous complaints about the officer's use of excessive force. (*Pitchess, supra,* 11 Cal.3d at pp. 537–538, 113 Cal.Rptr. 897, 522 P.2d 305.) In response to our *68 decision, the Legislature enacted several statutes, which we hereafter refer to as the "*Pitchess* statutes" and which we summarize below.

Under the *Pitchess* statutes, a public entity that employs peace officers must investigate and retain citizen complaints of any officer misconduct, such as the use of excessive force. (Pen.Code, § 832.5.) Litigants, upon a showing of good cause, are given limited access to records of such complaints and investigations (Evid.Code, §§ 1043, 1045), but such records are otherwise "confidential" and may "not be disclosed" (Pen.Code, §§ 832.7, subd. (a), 832.8, subd. (e)). Also protected as "confidential" are "[p]eace officer ... personnel records" and "information obtained from these records." (*Id.,* § 832.7, subd. (a).) Such "personnel records" include an officer's personal and family information, medical history, election of benefits (*id.,* § 832.8, subds. (a), (b) & (c)), as well as matters related to the officer's "advancement, appraisal, or discipline" (*id.,* subd. (d)). In addition, confidentiality applies to any information that "would constitute an unwarranted invasion of [a peace officer's] personal privacy." (*Id.,* § 832.8, subd. (f).)

One other piece of legislation merits mention here. In 2004, California's voters passed an initiative measure that added to the state Constitution a provision directing the courts to broadly construe statutes that grant public access to government information and to narrowly construe statutes that limit such access. (Cal. Const., art. I, § 3, subd. (b)(2).) That provision, however, does not affect the construction of any statute "to the extent ... it protects [the] right to privacy, including any statutory procedures governing discovery or disclosure of information concerning the official performance or professional qualifications of a peace officer." (**465 Cal. Const., art. I, § 3, subd. (b)(3).) Thus, by its express terms, the constitutional provision excludes from the requirement of narrow construction those statutes that protect the privacy interests of peace officers, including Government Code section 6254's subdivision (c) and the *Pitchess* statutes, both of which are at issue here.

B. Decisional Law

Relevant here are two of this court's recent decisions, which considered the interplay ***62 between the *Pitchess* statutes and requests under the California Public Records Act for disclosure of peace officers' names.

In *Copley, supra,* 39 Cal.4th 1272, 48 Cal.Rptr.3d 183, 141 P.3d 288 (decided in 2006), a newspaper publisher sought access to a civil service commission's records of an administrative appeal brought by a county sheriff's deputy who had been terminated for disciplinary reasons. After the commission denied the request, the publisher unsuccessfully petitioned the superior court for a writ of mandate, seeking to compel disclosure. The publisher then appealed, and the Court of Appeal *69 directed the civil service commission to give the publisher access to the records, and also to disclose the deputy's name. The Court of Appeal reasoned that because the *Pitchess* statutes define "personnel records" as any file maintained under the officer's name *by the officer's employing agency* (Pen.Code, § 832.8) and because the civil service commission was not the officer's employing agency, the civil service commission's records did not qualify as "personnel records" protected by the *Pitchess* statutes. At the request of two police unions that had intervened in the action, we granted review and, with one justice dissenting, reversed the Court of Appeal.

Copley held that the civil service commission's records of the deputy's appeal were confidential "personnel records" under the *Pitchess* statutes (Pen.Code, §§ 832.7, 832.8) and therefore exempt from disclosure. (*Copley, supra,* 39 Cal.4th at pp. 1286–1296, 48 Cal.Rptr.3d 183, 141 P.3d 288.) *Copley* explained that neither the language nor the legislative history of the *Pitchess* statutes suggested that a peace officer's privacy rights should have less protection simply because the officer's employer uses an outside agency like the civil service commission to conduct its administrative appeals. (*Copley,* at p. 1295, 48 Cal.Rptr.3d 183, 141 P.3d 288.) *Copley* also rejected the Court of Appeal's conclusion that *the name* of the officer who brought the appeal had to be disclosed, noting that the *Pitchess* statutes were "designed to protect, among other things, 'the identity of officers' subject to [citizen] complaints." (*Copley,* at p. 1297, 48 Cal.Rptr.3d 183, 141 P.3d 288, quoting Pen.Code, § 832.7, subd. (a); see *Copley,* at p. 1297, 48 Cal.Rptr.3d 183, 141 P.3d 288, quoting Pen.Code, § 832.7, subd. (c).)

Copley then discussed the Court of Appeal's reliance on an earlier appellate decision, *New York Times Co. v. Superior Court* (1997) 52 Cal.App.4th 97, 60 Cal.Rptr.2d 410 (*New York Times*), which broadly declared that the *Pitchess* statutes do not prevent disclosure of *the names* of peace officers. (*Copley, supra,* 39 Cal.4th at pp. 1297–1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) That categorical statement was made, we said, "[w]ithout any analysis," and was "simply incorrect, at least insofar as it applies to disciplinary matters like the one at issue [in *Copley*]." (*Id.* at p. 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) We disapproved *New York Times* to the extent that decision conflicted with our analysis in *Copley.* (*Copley,* at p. 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.)

In 2007, just one year after *Copley, supra,* 39 Cal.4th 1272, 48 Cal.Rptr.3d 183, 141 P.3d 288, we again addressed the issue of a newspaper's request, made under the California Public Records Act, for disclosure of the names of certain peace officers. In *Commission on Peace Officer Standards and Training v. Superior Court* (2007) 42 Cal.4th 278, 64 Cal.Rptr.3d 661, 165 P.3d 462 (*Commission on Peace Officer Standards*), a newspaper sought certain information about peace officers hired statewide by various California public entities during a specified 10–year period. *****63** The information was contained in a database maintained by a public agency. When the agency denied the newspaper's request, the ***70** newspaper challenged that decision in superior court, which ordered disclosure ****466** of each officer's name, the appointing agency, the date of new appointment, and, if applicable, the date of termination. The Court of Appeal reversed, but a majority of this court disagreed with the Court of Appeal. (*Id.* at p. 303, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

In *Commission on Peace Officer Standards,* the public agency that had compiled the peace officer database did not employ any of the peace officers, and therefore the entries in its database were not "personnel records" under a literal reading of the *Pitchess* statutes (Pen.Code, § 832.8 [limiting personnel records to records held in files maintained by an individual's employer]). Nonetheless, a majority of this court concluded that the information in the database would fall within the protections afforded personnel records if the information was "obtained from" personnel records maintained by the employing agencies of the peace officers in question. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 289, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The majority further concluded, however, "that peace officer personnel records include only the types of information enumerated in [Penal Code] section 832.8" (*id.* at p. 293, 64 Cal.Rptr.3d 661, 165 P.3d 462), and because the specific information the trial court ordered disclosed (the names of the officers, their employing agencies, and their employment dates) did not fall into any of the enumerated categories, it was not information obtained from protected personnel records (*id.* at pp. 294–299, 64 Cal.Rptr.3d 661, 165 P.3d 462), and therefore it was subject to disclosure.

Commission on Peace Officer Standards next held that Government Code section 6254's subdivision (c), which is part of the California Public Records Act, also did not preclude disclosure of the information covered by the superior court's order. (See *Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 303, 64 Cal.Rptr.3d 661, 165 P.3d 462.) As noted (see 172 Cal.Rptr.3d at p. 60, 325 P.3d at p. 464, *ante*), that statutory provision authorizes denial of a public records request when the information sought consists of "[p]ersonnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy." (Gov.Code, § 6254, subd. (c).) *Commission on Peace Officer Standards* assumed for purposes of its analysis that the records at issue "may be characterized as '[p]ersonnel ... or similar files.' " (*Commission on Peace Officer Standards,* at p. 299, 64 Cal.Rptr.3d 661, 165 P.3d 462.) But it noted that the exemption set forth in section 6254's subdivision (c) requires a balancing of "the privacy interests of peace officers in the information at issue against the public interest in disclosure," and it further noted that the

party opposing disclosure "has the burden" of showing that the records at issue fall within the exemption—a showing the agency failed to make in *Commission on Peace Officer Standards.* (*Commission on Peace Officer Standards,* at p. 299, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

Against this background of relevant statutes and court decisions, we now consider the disclosure request of the Times.

***71 III**

The Times, citing the California Public Records Act, seeks disclosure of the names of the two Long Beach police officers involved in the December 12, 2010, fatal shooting of Zerby, as well as the *****64** names of any Long Beach officers involved in shootings occurring between January 1, 2005, and December 11, 2010. The Union and the City oppose disclosure. They rely largely on the confidentiality protections afforded peace officers under the *Pitchess* statutes, focusing in particular on Penal Code section 832.7's subdivision (a) (protecting from disclosure a peace officer's "personnel records") and Penal Code section 832.8's subdivision (d) (defining "personnel records" as including records of employee "appraisal[ ] or discipline").

The Union and the City also attach significance to the italicized language in this quote from *Commission on Peace Officer Standards:* "[T]he legislative concern [in adopting sections 832.7 and 832.8] appears to have been with *linking a named officer to the private or sensitive information listed in section 832.8.* ... It seems unlikely that the Legislature contemplated that the identification of an individual as a peace officer, *unconnected* ****467** *to any of the information it defined as part of a personnel record,* would be rendered confidential by section 832.8." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 295, 64 Cal.Rptr.3d 661, 165 P.3d 462, italics added.) The Union and the City contend that disclosing the names of officers involved in on-duty shootings necessarily *links* the named officers to private or sensitive information in their personnel files, information made confidential under Penal Code section 832.7's subdivision (a). The Union and the City reason that because every on-duty shooting is routinely investigated by the employing agency, the details of every such incident (including the names of the officers involved) are "records relating to" officer "appraisal[ ] or discipline" (Pen.Code, § 832.8, subd. (d)), which, by definition, are confidential "personnel records" (*id.,* § 832.8). We are not persuaded.

Although the *Pitchess* statutes limit public access to personnel records (Pen.Code, § 832.7, subd. (a)), including officer names if they are *linked* to information in personnel records (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 295, 64 Cal.Rptr.3d 661, 165 P.3d 462), many records routinely maintained by law enforcement agencies are not personnel records. For example, the information contained in the initial incident reports of an on-duty shooting are typically not "personnel records" as that term is defined in Penal Code section 832.8. It may be true that such shootings are routinely investigated by the employing agency, resulting eventually in some sort of officer appraisal or discipline. But only the records *generated* in connection with that appraisal or discipline would come within the statutory definition of personnel records (Pen.Code, § 832.8, subd. (d)). We do not read the phrase "records relating to ... [¶] ... ***72** [¶] ... [e]mployee ... appraisal[ ] or discipline" (*ibid.*) so broadly as to include every record that might be *considered* for purposes of an officer's appraisal or discipline, for such a broad reading of the statute would sweep virtually all law enforcement records into the protected category of "personnel records" (*id.,* § 832.8).

Government Code section 6254's subdivision (f) lends some support to our conclusion. Under that statute, when a shooting by a peace officer occurs during an arrest (Gov.Code, § 6254, subd. (f)(1)) or in the course of responding to a complaint or request for assistance (*id.,* § 6254, subd. (f)(2)), and when the officer's name is recorded as one of the "factual circumstances" of the incident, disclosure of the officer's name is generally required. It thus appears that the Legislature draws a distinction between (1) records of factual information about an incident (which generally must be disclosed) and (2) records generated as part of an internal investigation *****65** of an officer in connection with the incident (which generally are confidential). We therefore agree with this point made in a 2008 opinion by the California Attorney General: "Generally speaking, a response to a request just for the names of officers involved in a particular incident may be provided without revealing any investigatory or disciplinary matter that may have arisen out of the incident. Disclosure would merely communicate a statement of fact that the named officers were involved in the incident. It would not imply any judgment that the actions taken were inappropriate or even suspect." (91 Ops.Cal.Atty.Gen. 11, 16–17 (2008), fn. omitted.) An employing agency is, of course, free to

emphasize, when complying with a California Public Records Act request, that its disclosure of the names of officers involved in an incident does not imply any wrongdoing by those officers.

Significantly, the *Pitchess* statutes are silent as to whether the names of officers involved in shootings are protected "personnel records." (Pen.Code, § 832.8.) That silence is important because, as this court observed in *Commission on Peace Officer Standards,* the personnel records exemption is limited to the categories of information that are expressly "enumerated" in Penal Code section 832.8. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 293, 64 Cal.Rptr.3d 661, 165 P.3d 462.) That the Legislature did not intend to protect peace officers' identities can also be inferred from the Legislature's enactment of Penal Code section 830.10, which requires uniformed officers to display their name or identification ****468** number. That statute reflects a legislative policy that, generally, the public has a right to know the identity of an officer involved in an on-duty shooting.

Misplaced is the reliance by the Union and the City on this court's decision in *Copley, supra,* 39 Cal.4th 1272, 48 Cal.Rptr.3d 183, 141 P.3d 288. There, as we noted earlier, a newspaper publisher sought records of an administrative appeal brought by a sheriff's ***73** deputy who had been terminated. This court concluded that the records (including the deputy's name) were confidential personnel records under the *Pitchess* statutes. (*Copley,* at pp. 1297–1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) Later, in *Commission on Peace Officer Standards,* this court emphasized that the records requested in *Copley* would have "linked" the deputy's name to "private or sensitive" personnel matters, thus explaining why the name at issue in *Copley* was protected. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 295, 64 Cal.Rptr.3d 661, 165 P.3d 462; see *id.* at pp. 298–299, 64 Cal.Rptr.3d 661, 165 P.3d 462.) Here, by contrast, disclosing the names of officers involved in various shootings would not imply that those shootings resulted in disciplinary action against the officers, and it would not link those names to any confidential personnel matters or other protected information.

In arguing here against disclosure of the officers' names, the Union and the City note this court's disapproval in *Copley, supra,* 39 Cal.4th at page 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288, of the Court of Appeal's statement in *New York Times, supra,* 52 Cal.App.4th at page 101, 60 Cal.Rptr.2d 410, that " 'an individual's name is not exempt from disclosure' " under the *Pitchess* statutes. But, as we explained in *Commission on Peace Officer Standards, supra,* 42 Cal.4th at page 298, 64 Cal.Rptr.3d 661, 165 P.3d 462, this court disapproved the statement from *New York Times* only " 'insofar as it applie [d] to disciplinary matters like the one at issue' " in *Copley.* (See *Copley,* at p. 1298, 48 Cal.Rptr.3d 183, 141 P.3d 288.) The records sought in *Copley* linked the officer's name, not just to an on-duty shooting, but to a *****66** confidential disciplinary action involving the officer, and therefore they were exempt from disclosure. (See *Commission on Peace Officer Standards, supra,* 42 Cal.4th at pp. 295, 298–299, 64 Cal.Rptr.3d 661, 165 P.3d 462.) Thus, *Copley*'s disapproval of the statement from *New York Times* did not alter the latter case's core holding, generally permitting disclosure of the names of peace officers involved in on-duty shootings. (See 91 Ops.Cal.Atty.Gen. 11, 13–15 (2008) [discussing *Copley*'s effect on *New York Times*].)

Nor does Government Code section 6254's subdivision (c), which is part of the California Public Records Act, help the Union and the City in their effort to prevent disclosure of the names of officers involved in shootings. As noted (see 172 Cal.Rptr.3d at p. 60, 325 P.3d at p. 464, *ante*), that provision exempts from disclosure "[p]ersonnel ... or similar files" if disclosure "would constitute an unwarranted invasion of personal privacy." (Gov.Code, § 6254, subd. (c).) A serious question arises as to whether the names of peace officers involved in particular law enforcement incidents can be characterized as "[p]ersonnel ... or similar files" (*ibid.*). Moreover, when it comes to the disclosure of a peace officer's name, the public's substantial interest in the conduct of its peace officers outweighs, in most cases, the officer's personal privacy interest. As we noted in *Commission on Peace Officer Standards:* "Peace officers 'hold one of the most powerful positions in our society; our dependence on them is high and the potential for abuse of power is far from insignificant.' ***74** *City of Hemet v. Superior Court* (1995) 37 Cal.App.4th 1411, 1428 [44 Cal.Rptr.2d 532].) A police officer 'possesses both the authority and the ability to exercise force. Misuse of [this] authority can result in significant deprivation of constitutional rights and personal freedoms, not to mention bodily injury and financial loss.' (*Gray v. Udevitz* (10th Cir.1981) 656 F.2d 588, 591.)" (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at pp. 299–300, 64 Cal.Rptr.3d 661, 165 P.3d 462.) Thus, the public's significant interest in the conduct of its peace officers "diminishes and counterbalances" an officer's privacy interest in keeping his

or her name confidential. (*Id.* at p. 299, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

****469** In a case such as this one, which concerns officer-involved shootings, the public's interest in the conduct of its peace officers is particularly great because such shootings often lead to severe injury or death. Here, therefore, in weighing the competing interests, the balance tips strongly in favor of identity disclosure and against the personal privacy interests of the officers involved. Of course, if it is essential to protect an officer's anonymity for safety reasons or for reasons peculiar to the officer's duties—as, for example, in the case of an undercover officer—then the public interest in disclosure of the officer's name may need to give way. (See *International Federation of Professional and Technical Engineers, Local 21, AFL–CIO v. Superior Court* (2007) 42 Cal.4th 319, 337, 64 Cal.Rptr.3d 693, 165 P.3d 488.) That determination, however, would need to be based on a particularized showing, which was not made here.

We next consider the City's assertion that Government Code section 6254's subdivision (f) permits it to withhold the names of officers involved in on-duty shootings. That provision exempts from disclosure "[r]ecords ... of investigations conducted by ... any state or local police agency." (*Ibid.*) The Times here is not seeking the records of any administrative or criminal investigation, so that exemption is inapplicable.

*****67** Finally, we consider the catchall exemption in Government Code section 6255's subdivision (a), which allows a public agency to withhold any public record if the agency shows that "on the facts of the particular case the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record." The catchall exemption sets forth a balancing test, and we have already concluded that, generally, the balance of interests favors disclosing the names of peace officers involved in on-duty shootings. (See 172 Cal.Rptr.3d at pp. 65–66, 325 P.3d at pp. 467–468, *ante.*) Vague safety concerns that apply to all officers involved in shootings are insufficient to tip the balance against disclosure of officer names. As we have said in the past, "[a] mere assertion of possible endangerment does not 'clearly outweigh' the public interest in access to ... records." (*CBS, Inc. v. Block, supra,* 42 Cal.3d at p. 652, 230 Cal.Rptr. 362, 725 P.2d 470.)

The Union and the City assert that disclosing the names of peace officers involved in shootings could lead to harassment of those officers and their ***75** families. In rejecting that argument, the trial court found that the Union and the City had offered "no evidence" of a "specific safety concern regarding any particular officer." We agree. The declaration by Long Beach Police Lieutenant Cox (submitted by the City) described the possibility of gang retaliation against officers involved in shooting gang members, but those concerns were general in nature. The December 2010 Zerby shooting did not involve a gang member, and the Union and the City did not identify other shootings that did involve a gang member. The Cox declaration also mentioned two safety bulletins warning of "potential retaliation/threats" against officers involved in shootings, and it described graffiti that read "Strike Kill a Cop," but those vague concerns do not establish any specific danger to the officers involved in the Zerby shooting or any shooting that occurred in the six years before the Zerby shooting (see the Times's public records request, quoted at 172 Cal.Rptr.3d at p. 58, 325 P.3d at p. 462, *ante*).

We do not hold that the names of officers involved in shootings have to be disclosed in every case, regardless of the circumstances. We merely conclude, as did the trial court and the Court of Appeal, that the particularized showing necessary to outweigh the public's interest in disclosure was not made *here,* where the Union and the City relied on only a few vaguely worded declarations making only general assertions about the risks officers face after a shooting. The public records request by the Times is broadly worded and covers a wide variety of incidents. Thus, the Union and the City sought a blanket rule preventing the disclosure of officer names *every time* an officer is involved in a shooting. Such a rule would even prevent disclosure of the name of an officer who acted in a heroic manner that was unlikely to provoke retaliation of any kind, in which case officer ****470** safety would not be an issue. We reject that blanket rule.

The trial court's denial of injunctive relief was without prejudice to any later evidentiary showing that disclosing a particular officer's name would compromise that officer's safety or the safety of the officer's family. That ruling permits further litigation by the Union, and it reflects the trial court's recognition, which we share, that the public's interest in access to public records is not absolute and must be weighed against the countervailing privacy and safety interests of peace officers. Understandable are the general safety concerns of officers who fear retaliation from angry members of the community *****68** after an officer-involved shooting, especially when the shooting results in the death of an unarmed person. But the Legislature, whose laws we must construe, has not gone so far as to protect the names of

all officers involved in such shootings. That the Legislature generally considers it important for the public to know the identities of the officers serving the community is reflected in the statutory provision requiring a uniformed officer to display either a name or an identification number (Pen.Code, § 830.10).

***76 DISPOSITION**

We affirm the judgment of the Court of Appeal, which upheld the trial court's denial of the Union's requested injunctive relief.

WE CONCUR: CANTIL–SAKAUYE, C.J., BAXTER, WERDEGAR, CORRIGAN, LIU, JJ.

Dissenting Opinion by CHIN, J.

I disagree with the majority's conclusion that the City of Long Beach (the City) and the Long Beach Police Officers Association (the Union) have failed to show that the information the Los Angeles Times (the Times) has requested —the names of the officers "involved in" the December 12, 2010, shooting of Douglas Zerby and the names of all police officers "involved in" shootings from January 1, 2005, until December 11, 2010—is exempt from disclosure under the California Public Records Act (CPRA) (Gov.Code, § 6250 et seq.).[1] In my view, the evidence in the record of the safety threat faced by police officers identified as having been involved in a shooting establishes that the requested information is exempt from disclosure under section 6254, subdivision (c), which provides that the CPRA does not require disclosure of "[p]ersonnel, medical, or similar files, the disclosure of which would constitute an unwarranted invasion of personal privacy." I therefore dissent.

In relying on this section, the Union acknowledges that the majority in *Commission on Peace Officer Standards and Training v. Superior Court* (2007) 42 Cal.4th 278, 64 Cal.Rptr.3d 661, 165 P.3d 462 (*Commission on Peace Officer Standards*) held that "the privacy and safety interests of peace officers" as a group regarding the mere fact of their employment "do not outweigh the public's interest in the disclosure of [that] information." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 303, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The Union argues, however, that the "heightened safety concerns of officers who have been involved in shootings" warrant striking a different "balance" with regard to this "subgroup." In support of its argument, the Union relies on the declaration of Long Beach Police Lieutenant Lloyd Cox (Cox declaration), which states in relevant part: (1) "A number of officer involved shootings involve gang members or violent criminals"; (2) "When an officer is involved in a shooting with a gang member, it is not uncommon for the gang to retaliate against law enforcement officers"; (3) "Since late 2007, the Long Beach Police Department has issued eight Officer Safety Bulletins to the department about potential retaliation/threats against officers, two of which were directly related to shootings involving police officers. As recently as January 10, 2011, the department was notified of graffiti at 5100 Appian Way ***77** that was approximately 4 feet high and 6 inches long which read 'Strike Kill a Cop' "; and (4) "Today, in the age of the internet, knowing an individual's name can be the gateway to a world of information. Public documents *****69** are readily ****471** accessible on line and can provide anyone with the home address of an individual, including a police officer. The address of a police officer in the hands of a gang member, violent offender, or angry friend, relative, or associate of a person who was shot by a police officer is of great concern for the personal safety of both the officer and their [*sic*] family. Therefore the Long Beach Police Department insists on protecting the identity of its officers, when those officers are involved in critical incidents, including shootings, in order to ensure their safety and the safety of their families."

I agree with the Union's argument. As I explained in *Commission on Peace Officer Standards,* "in 1990, the Legislature amended subdivision (a) of [Penal Code] section 832.8 by adding [officers'] 'home addresses' to the list of examples of confidential '[p]ersonal data.' (Stats.1990, ch. 264, § 1, p. 1535.) According to the amendment's legislative history, one of the Legislature's purposes in adding 'home addresses' to the list was to protect officers and their families. (Assem. Com. on Public Safety, Analysis of Sen. Bill 1985 (1989–1990 Reg. Sess.) as amended May, 16, 1990, p. 2.) Given that publicly available databases on the Internet make it easy to link a name to an address, the release of an officer's name would not seem to pose much, if any, less of a safety risk than would disclosing an officer's home address. (See *Frank v. City of Akron* (6th Cir.2002) 290 F.3d 813, 819 ['Most individuals' addresses ... are readily available on the Internet'].) ... [I]n light of the accessibility of information through the Internet, it would be entirely 'feasible' for someone hostile toward the police to use the list of names to locate peace officers' addresses in order

to 'harass them' or their families. [Citation.] Moreover, in light of the Legislature's acknowledgment of the dangers faced by officers and their families, ... we [cannot] simply dismiss this threat as being 'purely speculative.' (See *King County v. Sheehan* [(2002) 114 Wash.App. 325, 340, 57 P.3d 307] [it is 'naïve ... to believe that police officers who are identified on anti-police web sites ... by name and home address ... could not thereby be placed in danger or subjected to harassment'].)" (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 317, 64 Cal.Rptr.3d 661, 165 P.3d 462 (dis. opn. of Chin, J.).) The evidence in the record here amply supports this analysis.

Nothing in the majority's brief discussion of section 6254, subdivision (c), convinces me otherwise. The majority first asserts that there is a "serious question" as "to whether the names of peace officers involved in particular law enforcement incidents can be characterized as '[p]ersonnel ... or similar files' " within the meaning of section 6254, subdivision (c). (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 467.) However, for reasons I have explained in a previous case, I have no trouble concluding that the names of officers who have been involved in a ***78** shooting constitute "personnel ... or similar files" under section 6254, subdivision (c). (See *International Federation of Professional and Technical Engineers, Local 21, AFL–CIO v. Superior Court* (2007) 42 Cal.4th 319, 350–351, 64 Cal.Rptr.3d 693, 165 P.3d 488 (conc. & dis. opn. of Chin, J.) (*International Federation*).)

The majority then moves on to its primary focus: the public's interest. Relying on *Commission on Peace Officer Standards,* the majority first identifies the public's interest generally in "the conduct of its peace officers"—specifically, the " '[m]isuse' " of their authority—and asserts that, "when it comes to the disclosure of a peace officer's name," this interest "outweighs, in most cases, the officer's personal privacy interest." (Maj. opn., *****70** *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 468.) The majority next asserts that this general public interest "is particularly great" in connection with "officer-involved shootings" because "such shootings often lead to severe injury or death." (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 468.) This heightened public interest, the majority states, "tips" the balance here "strongly in favor of identity disclosure." (*Id.* at p. 66, 325 P.3d at p. 469.)

The majority's discussion is unpersuasive for several reasons. First, the majority fails to explain how disclosing the name of an officer who has in any way been "involved in ****472** officer involved shootings"—which is what the Times seeks —provides any information about whether the involved officers " ' [m]isuse[d]' " their authority. (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 467.) Thus, merely knowing which officers were "involved in officer involved shootings" does little, if anything, to advance the public's interest in "the conduct of its peace officers." (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 468.)

Second, the majority's assessment of the public's interest is inconsistent with the Legislature's and the voters' view of that interest. Through the *Pitchess* statutes (see maj. opn., *ante,* 172 Cal.Rptr.3d at pp. 60–61, 325 P.3d at pp. 464–465), the Legislature has precluded the general public from obtaining "[p]eace officer ... personnel records" or "information obtained from these records." (Pen.Code, § 832.7, subd. (a).) It has specified that this restriction protects records "relating to" (1) an officer's "advancement, appraisal, or discipline" (*id.,* § 832.8, subd. (d)), and (2) "[c]omplaints, or investigations of complaints, concerning an event or transaction in which [an officer] participated, or which he or she perceived, and pertaining to the manner in which he or she performed his or her duties" (*id.,* § 832.8, subd. (e)). It has authorized law enforcement agencies to "disseminate data regarding the number, type, or disposition of complaints ... made against [their] officers" *only* "if that information is in a form which does not identify the individuals involved." (*Id.,* § 832.7, subd. (c).) These provisions clearly express *the Legislature's* view regarding the public's interest in discovering whether particular officers have misused their power or even have been the subject of complaints about their conduct. ***79** The voters have ratified the Legislature's view by passing a constitutional provision that expressly preserves "statutory procedures governing discovery or disclosure of information concerning the official performance or professional qualifications of a peace officer." (Cal. Const., art. I, § 3, subd. (b)(3).) The majority improperly ignores these expressions of policy by the Legislature and the voters, and improperly substitutes its own view of policy. As a court, we have neither prerogative nor power "to substitute our public policy judgment" for that of the Legislature and the voters. (*Thomas v. City of Richmond* (1995) 9 Cal.4th 1154, 1165, 40 Cal.Rptr.2d 442, 892 P.2d 1185.)

The majority errs in asserting that Penal Code section 830.10 "reflects a legislative policy that, generally, the public has a right to know the identity of an officer involved in an on-duty shooting." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65,

325 P.3d at p. 468.) That section provides: "Any uniformed peace officer shall wear a badge, nameplate, or other device which bears clearly on its face the identification number or name of the officer." (Pen.Code, § 830.10.) On its face, the section applies only to "uniformed" officers. (*Ibid.*) Thus, to the extent it has any relevance to officers who are *not* in uniform, it indicates a legislative intent to protect their identities. Even as to uniformed officers, *****71** it fails to support the majority's broad conclusion that the public, "generally," has a right to know the identity of officers involved in shootings. (Maj. opn., *ante,* at p. 64, 325 P.3d at p. 467.) Under the section, police departments may choose not to require their uniformed officers to display their names, and may instead require them only to display their "identification number[s]." (Pen.Code, § 830.10.) Even were the statute to require officers to display their names, a statute affording the immediate participants in a police encounter access to the officers' names does not reflect a far broader legislative policy that, "generally, the public has a right to know the identity of an officer involved in an on-duty shooting." (Maj. opn., *ante,* at p. 65, 325 P.3d at p. 468.) This conclusion is obvious from the fact that, as noted above, the *Pitchess* statutes allow law enforcement agencies to "disseminate data regarding the number, type, or disposition of complaints ... made against [their] officers" *only* "if that information is in a form which does not identify the individuals involved." (Pen.Code, § 832.7, subd. (c).) In other words, the Legislature has precluded release of identifying information *generally to the public* even though the names of officers against whom complaints have been made are known to those who have filed complaints. As the ****473** majority recognized in *Commission on Peace Officer Standards,* "the mere fact that officers' names" may be displayed on their uniforms does not mean "that the information cannot be considered personal or private. (See *Department of Defense v. FLRA* (1994) 510 U.S. 487, 500, 114 S.Ct. 1006, 127 L.Ed.2d 325 ... ['An individual's [privacy] interest in controlling the dissemination of information regarding personal matters does not dissolve ***80** simply because that information may be available to the public in some form'].)"[2] (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 296, fn. 5, 64 Cal.Rptr.3d 661, 165 P.3d 462.)

Nor do I agree with the majority that, under section 6254, subdivision (f), "when a shooting by a peace officer occurs during an arrest [citation] or in the course of responding to a complaint or request for assistance [citation], and when the officer's name is recorded as one of the factual circumstances of the incident, disclosure of the officer's name is generally required." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 64, 325 P.3d at p. 467.) Section 6254, subdivision (f), generally exempts from disclosure under the CPRA "[r]ecords of complaints to, or investigations conducted by, ... any state or local police agency." As here relevant, it further provides that, "[n]otwithstanding any other provision of this subdivision," a law enforcement agency "shall" disclose the following: (1) "the factual circumstances surrounding the arrest" of each person the agency arrests (§ 6254, subd. (f)(1)); and (2) the "nature of the response" to all complaints or requests for assistance the agency receives, "including, *****72** to the extent the information regarding crimes alleged or committed or any other incident investigated is recorded, ... the factual circumstances surrounding the crime or incident" (*id.,* subd. (f)(2)). Where one of the specified incidents involves a shooting, it is not at all clear that the "factual circumstances surrounding" the incident (*id.,* subd. (f)(1), (2)) include the names of officers involved in the shooting. The majority cites, and I have found, no case supporting that view. Moreover, the language stating that these disclosure provisions apply "[n]otwithstanding any other provision of *this subdivision* " (*id.,* subd. (f), italics added) indicates that the section's disclosure requirement does not override the confidentiality provisions found in other statutes. Our courts of appeal have so construed the statute. (*County of Los Angeles v. Superior Court* (1993) 18 Cal.App.4th 588, 600, 22 Cal.Rptr.2d 409 ["we cannot construe section 6254, subdivision (f), to require" disclosure of "law enforcement information" the *Pitchess* statutes make confidential].) Finally, the statute itself authorizes nondisclosure "to the extent that disclosure of a particular item of information would endanger the safety of a person involved in an investigation or would endanger the successful completion of the ***81** investigation or a related investigation." (§ 6254, subd. (f).) Because, in my view, this would include the names of officers involved in shootings, I do not agree that, even under the circumstances the majority posits, section 6254, subdivision (f), "generally require[s]" disclosure of the information the Times seeks.[3] (Maj. opn., *ante,* at p. 64, 325 P.3d at p. 466.)

****474** The majority also makes several errors in evaluating the other side of the balance: the interests of the officers in nondisclosure. Although relying principally on a heightened public interest in officer-involved shootings, the majority fails to consider or even acknowledge *the officer's* heightened privacy and safety interests in such cases. In this regard, *Commission on Peace Officer Standards,* on which the majority principally relies (maj. opn., *ante,* 172 Cal.Rptr.3d at pp. 65–66, 325 P.3d at pp. 467–468), actually supports

the Union. There, in holding that "the typical peace officer has [no] more than an insubstantial privacy interest in the fact of his or her employment as an officer" (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 300, 64 Cal.Rptr.3d 661, 165 P.3d 462), the majority reasoned that the fact of employment is "innocuous information" (*id.* at p. 302, 64 Cal.Rptr.3d 661, 165 P.3d 462) because "it would not reveal [the *****73** officer's] involvement *in any particular case* " (*id.* at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462, italics added). In this regard, the majority reasoned, disclosure of basic employment information is different from the disclosure sought in *Stone v. F.B.I.* (D.D.C.1990) 727 F.Supp. 662 (*Stone*): the names of FBI agents "who participated in the investigation of the assassination of Robert F. Kennedy." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462.) In *Stone,* " '[w]hat could reasonably be expected to constitute an unwarranted invasion of an agent's privacy is not that he or she is revealed as an FBI agent but that he or she is named as an FBI agent *who participated in the RFK investigation.*' [Citation.]" (*Commission on Peace Officer Standards, supra,* at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The " 'concern is not with the identifying information *per se,* but with the connection between such information and some other detail —a statement, an event, or otherwise—which the individual would not wish to be publicly disclosed.' " (*Ibid.,* quoting *Halloran v. Veterans Admin.* (5th Cir.1989) 874 F.2d 315, 321.) Here, the information the ***82** Times seeks *would* reveal the participation of the named officers in "particular case[s]" and *would* reveal their connection to an event—a shooting—they may " 'not wish to be publicly disclosed.' " (*Commission on Peace Officer Standards, supra,* at p. 302, fn. 12, 64 Cal.Rptr.3d 661, 165 P.3d 462.) As the majority opinion in *Commission on Peace Officer Standards* establishes, the officers therefore have a heightened privacy interest in nondisclosure. Moreover, the potentially incendiary nature of the information the Times seeks—an officer's involvement in a shooting—further heightens an officer's already elevated privacy interest in not being linked to "particular case[s]." (*Ibid.*) The majority errs in failing even to acknowledge this heightened interest.

Finally, the majority's conclusion that the Union's claim under section 6254, subdivision (c), fails for lack of a "particularized showing" regarding the need for confidentiality (maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 468) is both erroneous and inconsistent with our prior decisions. The majority acknowledges both the existence and validity of the "safety concerns of officers who fear retaliation from angry members of the community after an officer-involved shooting." (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 469.) It also acknowledges that *the record contains evidence* of " 'potential retaliation/threats' against officers involved in shootings." (Maj. opn., *ante,* at p. 67, 325 P.3d at p. 469.) However, the majority finds this evidence too "vague" and insists that more is required; as to each officer whose name is to be withheld, there must be evidence to "establish" a "specific danger" to the officer or to the members of the officer's family. (Maj. opn., *ante,* at p. 67, 325 P.3d at p. 469.)

****475** The specificity of proof the majority demands is inconsistent with our decision in *Times Mirror Co. v. Superior Court* (1991) 53 Cal.3d 1325, 283 Cal.Rptr. 893, 813 P.2d 240 (*Times Mirror*). There, we held that, because of safety concerns, the Governor of California had properly refused to disclose his daily, weekly, and monthly appointment calendars and schedules. (*Id.* at pp. 1329, 1346–1347, 283 Cal.Rptr. 893, 813 P.2d 240.) The only evidence supporting our conclusion was the declaration of the Governor's security director, which stated in the most general terms that disclosing this information " 'would seriously impair [his] ... ability to assure the Governor's security, and would constitute *a potential threat* to the Governor's safety, because the information ... will enable the *****74** reader to know in advance and with relative precision when and where the Governor may be found, those persons who will be with him, and when he will be alone.' " (*Id.* at p. 1346, 283 Cal.Rptr. 893, 813 P.2d 240, italics added.) Based on this evidence of a " 'potential threat to the Governor's safety' " (*ibid.*), and without requiring evidence of a particular or "specific" threat (maj. opn., *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 468), we concluded that, even as to "outdated calendars and schedules," nondisclosure was justified because "it is plausible to believe that an individual intent on doing harm [to the Governor] could use such information to discern activity patterns of the Governor and identify areas of particular vulnerability." (*Times Mirror, supra,* at p. 1346, 283 Cal.Rptr. 893, 813 P.2d 240.) Here, based on ***83** the Cox declaration, it is plausible to believe there are individuals, intent on doing harm to police officers in retaliation for their involvement in a shooting, who could use the requested information to exact revenge on the officers or members of their families. The "showing" in this case regarding safety concerns is certainly no more "vague," and is at least as, if not more, "particularized" (maj. opn., *ante,* at p. 66, 325 P.3d at p. 469), than the showing we found sufficient in *Times Mirror.* [4]

The majority does not contend otherwise or explain why *Times Mirror* is inapplicable. Instead, in applying a different and far stricter standard, it simply ignores *Times Mirror.* It fails to explain why police officers and their family members are entitled to less protection than the Governor. Surely, their lives are not worth less. Nor is it less "plausible to believe" there are "individual[s] intent on doing harm" to police officers involved in shootings than it is to believe there are "individual[s] intent on doing harm" to the Governor. (*Times Mirror, supra,* 53 Cal.3d at p. 1346, 283 Cal.Rptr. 893, 813 P.2d 240.) On the contrary, as already noted, the majority acknowledges both the existence and validity of the "safety concerns of officers who fear retaliation from angry members of the community after an officer-involved shooting." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 469.)

Contrary to the majority's suggestion (maj. opn., *ante,* 172 Cal.Rptr.3d at pp. 65–66, 325 P.3d at pp. 467–468), *Commission on Peace Officer Standards* and *International Federation* are consistent with, and supportive of, this analysis. In neither case was there any *evidence* submitted regarding the alleged safety concerns, a circumstance the court stressed in refusing to apply a disclosure exemption. (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 302, 64 Cal.Rptr.3d 661, 165 P.3d 462; *International Federation, supra,* 42 Cal.4th at pp. 337–338, 64 Cal.Rptr.3d 693, 165 P.3d 488.) Notably, after stating that " '[a] mere assertion of possible endangerment' is insufficient to justify nondisclosure," the majority in *Commission on Peace Officer Standards* cited *Times Mirror* as a case in which *****75** disclosure ****476** *was* justified because *the evidence*—the "declaration of [the] Governor's security director"—"supported [the] conclusion that release of his schedules would present a potential security threat." (*Commission on Peace Officer Standards, supra,* at p. 302, 64 Cal.Rptr.3d 661, 165 P.3d 462.) As earlier explained, here, even more than in *Times Mirror, evidence* regarding the dangers of disclosure was submitted. Moreover, in *Commission on Peace Officer Standards,* the majority held that, on remand, nondisclosure as to officers in certain "categories" could be justified "because the safety or ***84** efficacy of" officers in those categories "would be jeopardized by disclosure." (*Commission on Peace Officer Standards, supra,* 42 Cal.4th at p. 284, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The majority in *Commission on Peace Officer Standards* identified one such category: officers "operating undercover." (*Id.* at p. 301, 64 Cal.Rptr.3d 661, 165 P.3d 462.) The Times's broad request for the names of all officers "involved in" shootings from January 1, 2005, until December 11, 2010, surely includes such officers. Moreover, the evidence in the record here establishes another category of officers whose safety would be jeopardized by disclosure: those who have been involved in a shooting.

Contrary to the majority's suggestion, there is no basis for excluding from this category officers who, in using their weapons, "acted in a heroic manner that was unlikely to provoke retaliation." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 67, 325 P.3d at p. 469.) The majority asserts that safety is not "an issue" for such officers. (Maj. opn., *ante,* at p. 66, 325 P.3d at p. 468.) But the majority fails to explain how to distinguish between heroic acts that are likely to provoke retaliation and those that are not. And it is naïve to believe that the desire for revenge of friends, family members, and gang associates of those shot by police will be reduced, much less eliminated, by the fact that the officers acted heroically. Indeed, the majority's bald assertion will surely come as surprising news to the many officers who, having heroically used their weapons in confronting gang-related crime, face retaliation from other gang members. It simply is not true, as the majority asserts, that officer safety is "not ... an issue" whenever a shooting may be characterized as "heroic" and "unlikely to provoke retaliation." (Maj. opn., *ante,* at p. 67, 325 P.3d at p. 469) Of course, as to individual officers who do not perceive a safety threat to themselves or their families, and who do not oppose public recognition of their heroism, section 6254, subdivision (c), would not prevent disclosure. Releasing an officer's name under those circumstances would not constitute "an unwarranted invasion of personal privacy." (*Ibid.*)

Finally, there are good reasons for not requiring, as to each officer whose name is to be withheld, evidence of an actual and specific threat to the officer or the members of his or her family. Where, as here, the disclosure request covers all officer-involved shootings during a six-year period, requiring such individualized proof will impose an obvious and substantial burden on law enforcement agencies that want to protect their officers.[5] More importantly, *****76** as the Union observes, "killers do not usually announce their intentions in advance." Thus, in most cases, although the threat to officer safety is real, the ***85** kind of evidence the majority demands is not available. Because the lives of our officers and their families are at stake, I would not require a law enforcement agency to wait until there is a specific threat—or worse, an actual attack—before allowing it to withhold information that puts its officers and their families

at risk. Absent a showing of some greater public need for the information, we should allow law enforcement agencies to protect the very officers who are out there every day protecting us. They deserve at least that much for their brave service.

I therefore dissent. [6]

All Citations

59 Cal.4th 59, 325 P.3d 460, 172 Cal.Rptr.3d 56, 199 L.R.R.M. (BNA) 3501, 42 Media L. Rep. 2105, 14 Cal. Daily Op. Serv. 5853, 2014 Daily Journal D.A.R. 6795

Footnotes

* Retired Associate Justice of the Supreme Court, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

1 The Times contends that it was not properly served with the Cox declaration. The Times does not, however, assert that it raised that issue in the trial court, and hence the issue appears to have been forfeited. In any case, as discussed below, the trial court concluded that the facts asserted in the Cox declaration were too general and speculative to support the Union's request for injunctive relief. Therefore, any failure to properly serve the Cox declaration did not adversely affect the Times.

2 Both the trial court and the Court of Appeal rejected the Times's legal issue that Government Code sections 6258 and 6259 set forth the exclusive means for litigating whether requested records must be disclosed and that therefore declaratory relief was inappropriate. (See *Filarsky v. Superior Court* (2002) 28 Cal.4th 419, 121 Cal.Rptr.2d 844, 49 P.3d 194 [holding that a *city* is not entitled to declaratory relief regarding its disclosure obligations under the California Public Records Act, but not deciding whether a *third party*—such as the Union here—is entitled to such relief].) We did not grant review to decide that legal issue, and we express no view on the matter. The issue remains open, and the Times can reassert it in any future proceedings.

1 All further unlabeled statutory references are to the Government Code.

2 The majority cites no legislative history to support its view of the "legislative policy" Penal Code section 830.10 "reflects." (Maj. opn., *ante,* 172 Cal.Rptr.3d at p. 65, 325 P.3d at p. 468.) The statute derives from its substantively identical predecessor, Penal Code former section 830.7, which provided: "Any uniformed peace officer shall wear a badge, nameplate, or other device which bears clearly on its face the identification number or name of such officer." (Stats.1969, ch. 1458, § 1, p. 2978.) In the only illuminating item of legislative history I could find—a letter to the Governor urging him to sign the passed bill containing the statute—the bill's legislative author stated that it would "aid[ ] morale in that it goes far to halt the deindividualization of our law enforcement personnel." (Assemblyman John Miller, letter to Governor Ronald Reagan re Assem. Bill No. 1830 (1969 Reg. Sess.) Aug. 8, 1969, p. 1.) This letter does not support the majority's assertion.

3 The majority asserts that the disclosure exemption of section 6254, subdivision (f), does not apply because the requested information comes from a source other than "the records of any administrative or criminal investigation" of officer-involved shootings (maj. opn., *ante,* 172 Cal.Rptr.3d at p. 66, 325 P.3d at p. 469), perhaps "the initial incident reports" of such shootings (maj. opn., *ante,* at p. 61, 325 P.3d at p. 464). The appellate record offers no basis for the majority's speculation regarding the source of the requested information, as to either the Zerby shooting or any of the other officer-involved shootings that occurred during the six-year period the request identifies. Nor does the majority offer any legal basis for construing the broadly worded phrase "records *relating to* ... [¶] ... [¶] ... [e]mployee ... appraisal[ ] or discipline," which defines one category of confidential personnel records under Penal Code section 832.8, subdivision (d), to apply narrowly

"only" to "the records *generated* in connection with" officer appraisal or discipline (maj. opn., *ante,* at pp. 63–64, 325 P.3d at pp. 466–467). Had the Legislature intended to so limit the scope of confidentiality under this section, it easily could have used the majority's far narrower phrase.

4 Moreover, although there is a *greater* showing in this case regarding safety than in *Times Mirror,* the showing needed to justify nondisclosure here arguably *is less than* the showing that was needed in *Times Mirror.* Nondisclosure is proper under section 6254, subdivision (c), upon a showing that disclosure "would constitute an unwarranted invasion of personal privacy." In *Times Mirror,* we held that nondisclosure was proper under section 6255, which requires a showing that "on the facts of the particular case the public interest served by not disclosing the record *clearly outweighs* the public interest served by disclosure of the record." (Italics added; see *Times Mirror, supra,* 53 Cal.3d at pp. 1346–1347, 283 Cal.Rptr. 893, 813 P.2d 240.)

5 For example, according to reported statistics, the Los Angeles Police Department averaged 70 officer-involved shootings per year for the years 2005–2008. (L.A. Police Dept., Use of Force Annual Report, p. 16 < http:// www.lapdonline.org/assets/pdf/2009YearEndReportFinal.pdf> as of May 29, 2014.) In 42 officer-involved shootings internally reviewed in 2009 for compliance with department policy, "[t]here were 278 substantially involved officers," 85 of whom "discharged their firearms." (*Id.* at p. 19.)

6 Given my conclusion, I do not further address the majority's analysis regarding the applicability of the exemptions set forth in Government Code section 6255 and Penal Code sections 832.7 and 832.8.

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33 Cal.2d 635, 204 P.2d 7
Supreme Court of California

THE CITY OF NATIONAL CITY et al., Petitioners,
v.
GILBERT E. FRITZ, as City
Mayor, etc., et al., Respondents.

L. A. No. 20857.
Mar. 22, 1949.

HEADNOTES

(1)
Municipal Corporations § 161--Funds--Capital Outlays.
The term "utilities," as used in the statutory restriction on the use of a municipal fund established for capital outlays (Stats. 1937, p. 1995, Deering's Gen. Laws, Act 8496a) means "public utilities," and does not include sewers; hence such a fund may be used for the construction of sewers.

See 18 **Cal.Jur.** 870, 1076.

SUMMARY

PROCEEDING in mandamus to compel the signing of a contract and the transfer of a fund to meet payments thereunder. Writ granted.

COUNSEL
Burke, Marshall & Burke and Daniel G. Marshall for Petitioners.
Merideth L. Campbell, City Attorney, for Respondents.

CARTER, J.

The controversy in this proceeding involves the interpretation of a statute authorizing the establishment by municipal corporations of capital outlay funds (Stats. 1937, p. 1995, as amended last in 1945; Stats. 1945, p. 1867).

That act provides that the governing body of any city "empowered to levy and collect assessments or taxes may by ordinance provide for the levy and collection of assessments or taxes for the creation and accumulation of a fund for capital outlays." The general limitation on the right to impose taxes applies. "At any time after the creation of such a fund such governing body may transfer to such fund any unincumbered surplus funds remaining on hand in such city, ... at the end of any fiscal year.

"Whenever such fund is created in the manner aforesaid it shall remain inviolate for the making of any capital outlays and no moneys shall be disbursed therefrom excepting for such a purpose; ....

"The term 'capital outlays' shall not be construed to include the construction, acquisition, extensions of, or additions to, ***636** *utilities, other than utilities for the furnishing of water supply."* (Emphasis added.)

In the instant case the city council passed an ordinance purporting to create a capital outlay fund pursuant to the act. There is a dispute in regard to whether the ordinance in fact achieved that end inasmuch as it did not provide for the levy of taxes or assessments for the creation of the fund. It merely created the fund. But in view of the result reached herein, it is not necessary to resolve that question. From the receipts from sale of real property of the city to the United States, $983,800.29 was ordered deposited in the fund by the city council and it is now there and unencumbered. The council has awarded contracts for the construction of sewers in the city in the sum of $675,287.77 but respondent mayor of the city refuses to sign the contracts, and respondent clerk refuses to transfer said sum to the general fund to meet the payments under those contracts, claiming that moneys in the capital outlay fund cannot be used for sewer purposes under the above quoted act for the reason that a sewer is a utility as used in the last sentence dealing with things for which the fund cannot be used. Petitioners, on the other hand, take the position (among others) that a sewer is not a utility as that term is used in the act. With the latter contention we agree for the following reasons.

(1) The unqualified word "utility" has a broad meaning. It is defined as "quality or state of being useful; usefulness; profitableness to some desired end." (Webster's New Internat. Dict. (2d ed.) p. 2808.) (See also *Interstate National Gas Co. v. Gulley,* 4 F.Supp. 697, 699.) If that definition were applied to the statute in question, there would be practically no activity in which the city could use the money from the capital outlay fund because practically all of its property and public services are presumably for useful purposes. Thus the exception in the act (the italicized part thereof) for which funds may not be used would be broader than the main purpose of the act to authorize the creation of, and levy of taxes for, a capital outlay fund. Practically the only use that

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could be made of the fund would be for a water supply which is an exception carved out of an exception. These factors, coupled with the rule that exceptions in a statute are to be strictly construed (*Hurst v. City & County of San Francisco, ante,* p. 298 [201 P.2d 805]; *McAlpine v. Baumgartner,* 10 Cal.2d 409 [74 P.2d 753]; *Dufton v. Daniels,* 190 Cal. 577 [213 P. 949]; *Forbes v. City of Los* ***637** *Angeles,* 101 Cal.App. 781 [282 P. 528]; Crawford, Statutory Construction, § 299), require that the word "utility" be interpreted to mean a "public utility," for as will be seen, that term as used here has a more narrow meaning than "utility."

We are convinced that the construction and maintenance of a sewer system is not a "public utility" within the meaning of the act. Generally speaking statutes should be construed in the light of other statutes dealing with the same subject matter. (*In re Phyle,* 30 Cal.2d 838 [186 P.2d 134]; *Stillwell v. State Bar,* 29 Cal.2d 119 [178 P.2d 313].) The term "public utilities," with reference to the power of a municipal corporation to acquire and operate them, customarily embraces an enterprise which was usually engaged in by private corporations or individuals such as supplying water and electricity to the inhabitants. In this state it never has been the custom to have sewers operated privately. There was some doubt whether municipal corporations could acquire and operate such enterprises (public utilities) until the amendment to the Constitution (Cal. Const., art. XI, § 19) in 1911 authorizing such corporations to supply their inhabitants with light, water, power, heat, transportation and means of communications (18 Cal.Jur. 1076), but the power of municipal corporations to construct and maintain sewers has always been broad and unquestioned; the power may be derived from the authority to construct and maintain streets. (See *Harter v. Barkley,* 158 Cal. 742 [112 P. 556]; *Kramer v. Los Angeles,* 147 Cal. 668 [82 P. 334]; *McBean v. City of Fresno,* 112 Cal. 159, 163 [44 P. 358, 53 Am.St.Rep. 191, 31 L.R.A. 794]; *City of Madera v. Black,* 181 Cal. 306, 313 [184 P. 397]). The Public Utilities Act of this state lists many activities as "public utilities" but no mention is made of sewers (Stats. 1915, p. 115, as amended).

For the foregoing reasons it is clear that the term "utilities" as used in the exception in the statute in question does not include sewers. The fund here involved may, therefore, be used for construction of sewers.

Let a peremptory writ of mandate issue as prayed for.

Gibson, C. J., Shenk, J., Traynor, J., Schauer, J., and Spence, J., concurred.

EDMONDS, J.

Again the court has rendered what I consider to be an advisory opinion in a collusive proceeding ***638** brought by a city against two of its officers. The result is a decision which places the stamp of the highest judicial approval upon financial transactions which affect every taxpayer of the city without any truly adversary presentation of the merits of the controversy. Moreover, the construction of the statute authorizing the establishment of a capital outlay fund may now be the unquestioned basis for action by the governing body of other cities. For the reasons I have stated in *City of Whittier v. Dixon,* 24 Cal.2d 664, 668 [151 P.2d 5, 153 A.L.R. 956]; *City and County of San Francisco v. Boyd,* 22 Cal.2d 685, 707 [140 P.2d 666]; *City and County of San Francisco v. Linares,* 16 Cal.2d 441, 448 [106 P.2d 369], I believe that this procedure is contrary to fundamental principles of the administration of justice.

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49 Cal.4th 12
Supreme Court of California

SIMPSON STRONG–TIE COMPANY, INC., Plaintiff and Appellant,
v.
Pierce GORE et al., Defendants and Respondents.

No. S164174
|
May 17, 2010.

Synopsis

Background: Manufacturer of name-brand galvanized screws brought claims for defamation, trade libel, false advertising, and unfair business practices against attorney, relating to attorney's newspaper advertisement stating that owners of wood decks, built with certain brand-name galvanized screws, "may" have legal rights to compensation or other relief. The Superior Court, Santa Clara County, No. CV057666, John F. Herlihy, J., granted attorney's special motion to strike under the anti-SLAPP (strategic lawsuit against public participation) statute. Manufacturer appealed. The Court of Appeal affirmed. The Supreme Court granted review, superseding the opinion of the Court of Appeal.

Holdings: The Supreme Court, Baxter, J., held that:

plaintiff has burden of establishing the applicability of a statutory exemption from anti-SLAPP statute, disapproving *Brill Media Co., LLC v. TCW Group, Inc.,* 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371, and

"commercial speech" exemption from anti-SLAPP statute was inapplicable.

Affirmed.

Opinion, 76 Cal.Rptr.3d 292, superseded.

Attorneys and Law Firms

*****332** Shartsis Friese, Arthur J. Shartsis, Erick C. Howard, San Francisco; Eisenberg and Hancock, Jon B. Eisenberg and William N. Hancock, San Francisco, for Plaintiff and Appellant.

Davis Wright Tremaine, Thomas R. Burke, San Francisco, and Rochelle L. Wilcox, Los Angeles, for Defendants and Respondents.

Arkin & Glovsky, Pasadena, and Sharon Arkin for Consumer Attorneys of California as Amicus Curiae on behalf of Defendants and Respondents.

Levy, Ram & Olson and Karl Olson, San Francisco, for Senator Sheila Kuehl and California First Amendment Coalition as Amici Curiae on behalf of Defendants and Respondents.

Opinion

BAXTER, J.

***16** ****1120** In this case we consider the scope of the commercial speech exemption to the anti-SLAPP statute. (See Code Civ. Proc., §§ 425.16, 425.17, subd. (c).)[1]

In February 2006, plaintiff Simpson Strong–Tie Company, Inc. (Simpson) filed this action for defamation and related claims against defendants Pierce Gore and The Gore Law Firm arising from a newspaper advertisement placed by Gore a few weeks earlier. The advertisement, which was directed to owners of wood decks constructed after January 1, 2004, advised readers that "you may have certain legal rights and be entitled to monetary compensation, and repair or replacement of your deck" if the deck was built with galvanized screws manufactured by Simpson or other specified entities, and invited those persons to contact Gore "if you would like an attorney to investigate whether you have a potential claim."

***17** Gore moved successfully in the superior court to have the entire complaint stricken under section 425.16, the anti-SLAPP *****333** statute, and the Court of Appeal affirmed. We granted review to consider the limited issue whether Simpson's complaint was exempt from the anti-SLAPP statute because of section 425.17, subdivision (c) (section 425.17(c)), which excludes causes of action arising from representations of fact about the speaker's or a competitor's "business operations, goods, or services ... made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" or "made in the course of delivering the person's goods or services." Having found that the complaint is not exempt from dismissal under the anti-SLAPP statute, we affirm.

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BACKGROUND

Plaintiff Simpson is a California corporation in the business of designing, manufacturing, and marketing building products, including metal connectors and other hardware for use in wood frame construction. According to Simpson, it is well known in the wood frame construction industry that pressure-treated wood, which is commonly used in outdoor decks to protect against termites and fungal decay, can have a corrosive effect on steel products, including galvanized screws. Corrosion potentially shortens the service life of these fasteners and connectors and compromises their ability to support their recommended loads or endure seismic and environmental stresses.

In early 2004, at the recommendation of the United States Environmental Protection Agency, the construction industry stopped selling lumber treated with chromium copper arsenate, due to health hazards posed by its arsenic content. Alternative lumber products, such as wood treated with alkaline copper quaternary and copper azole, were substituted, but, as Simpson explains, these chemicals are "more corrosive" to galvanized steel products. Simpson states that it communicated this potential problem to the building industry and to the public generally through its Web site, annual catalog, articles in engineering and building magazines, bulletins issued to the building industry, point-of-sale information, and annual report.

Gore, a California attorney, learned from television reports about the potential for corrosion of galvanized deck fasteners and connectors when used on wood pressure treated with alkaline copper quaternary or copper azole, and contacted Ted Todd, a senior inspector with the Contra Costa ***18** County District Attorney's Office who was featured in the television reports. At that time, the district attorney's office was conducting an investigation into the risk posed by galvanized fasteners and connectors when used with these types of pressure-treated wood. The office ultimately issued a "Consumer Alert" warning of the corrosive effect of the ****1121** new pressure-treated wood products "on the metal connector brackets typically used in construction." The alert noted that advisories had been posted in some retail stores about the potential incompatibility of the two products but cautioned that the advisories "tend to be in very small print or somewhat inconspicuously posted."

Gore also visited the company Web site, where Simpson had advised in bold type that "[m]any of the new Pressure Treated Woods use chemicals that are corrosive to steel. By selecting connectors that offer greater corrosion resistance ... you can extend the service life of your connectors. However, corrosion will still occur. You should perform periodic inspection of your connectors and fasteners to insure their strength is not being adversely affected by corrosion. In some cases, it may be necessary to have a local professional perform *****334** the inspections. Because of the many variables involved, Simpson Strong–Tie cannot provide estimates on service life of connectors, anchors or fasteners."

In addition, Gore discovered that a class action complaint had been filed in Massachusetts against one of Simpson's competitors, Phillips Fastener Products, Inc., which sought relief on behalf of consumers allegedly damaged by defective galvanized fasteners and connectors used with pressure-treated lumber, and that Gore's former law firm, Lieff, Cabraser, Heimann & Bernstein, LLP, was investigating claims that some of the newly designed fasteners were failing, in spite of the manufacturers' representations that the "special coatings" were intended to resist corrosion.

Based on this information, Gore arranged for an advertisement to be placed in the San Jose Mercury News in order to locate individuals who had purchased galvanized fasteners and connectors manufactured by Simpson and two other companies, which together were responsible for most of the metal fasteners sold to consumers in California. The advertisement, which commenced Christmas Day 2005 and ran four more times over a 28–day period in the Mercury News and once in the Los Gatos Weekly–Times, read as follows:

***19**

ATTENTION:

WOOD DECK OWNERS

If your deck was built after January 1, 2004 with galvanized screws manufactured by Phillips Fastener Products, Simpson Strong-Tie or Grip-Rite, you may have certain legal rights and be entitled to monetary compensation, and repair or replacement of your deck.

Please call if you would like an attorney to investigate whether you have a potential claim:

Pierce Gore
GORE LAW FIRM
900 East Hamilton Ave.
Suite 100 Campbell, CA 95008
408-879-7444

Gore has asserted that the wording of the advertisement was modeled after notices he or his cocounsel had used in this state and in others during the preceding three years in connection with potential class actions based on consumer fraud or product defects.

****1122** In a letter dated January 9, 2006, counsel for Simpson advised Gore that the advertisement falsely implied that Simpson's galvanized screws fail to meet appropriate industry standards and that a valid claim may exist against Simpson based upon negligence or product liability. The letter demanded that Gore cease publication of any further defamatory advertisements directed at Simpson and reserved Simpson's right to recover against Gore for any costs *****335** or damages that may have already resulted from this or any similar publication. Gore did not respond to the letter. In a letter dated January 27, 2006, counsel for Simpson declared that Gore's failure to respond "suggests that your claims are without merit, and that your newspaper advertisement is false, misleading, and defames Simpson.... Unless you can present specific evidence to support your charges, Simpson intends to pursue its defamation claim against your firm[ ] and vindicate its rights." Again, Gore did not respond.

Prior to filing this action, Simpson retained an opinion survey firm to confirm that the advertisement had caused injury to Simpson's reputation. The survey firm intercepted 214 randomly selected shoppers at nine different ***20** home improvement stores in January and February 2006 and obtained their responses to a set of questions with and without exposure to the Gore advertisement. The survey revealed that the shoppers, after reading the advertisement, were significantly more likely to believe that Simpson's galvanized screws were defective or of low quality and were significantly less likely to purchase galvanized screws manufactured by Simpson.

Two days after the survey was completed, Simpson filed this action for defamation, trade libel, false advertising, and unfair business practices. The complaint sought compensatory and punitive damages as well as injunctive relief.

When Gore moved to strike the complaint under section 425.16, Simpson invoked the exemption to the anti-SLAPP law for commercial speech under section 425.17(c). The trial court granted the special motion to strike and entered a judgment of dismissal, finding Gore had made a threshold showing that the statements were made in furtherance of his right of petition or free speech on an issue of public interest (§ 425.16, subd. (e)(4)), that Simpson had failed to demonstrate a probability of prevailing on the merits (§ 425.16, subd. (b)(1)), and that the commercial speech exemption did not apply because the advertisement made no statement about a business competitor's products or services.

The Court of Appeal affirmed in a published opinion. The court first considered "who bears the burden of persuasion with respect to the applicability of [the section 425.17(c)] exemption—the party invoking the anti-SLAPP law (i.e., the defendant), or the party invoking the exemption (the plaintiff)?" In assigning the burden to the plaintiff, the Court of Appeal disagreed with *Brill Media Co., LLC v. TCW Group, Inc.* (2005) 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371 (*Brill*), which had assigned the burden to the defendant to establish that the cause of action is *not* exempt. The court next determined that while the advertisement was "made for the purpose of ... promoting ... [Gore's] services" (§ 425.17(c)(1)), Simpson's causes of action did not " 'aris[e] from' " any representation of fact " 'about' Gore's or a competitor's services or business operations."

In construing the exemption in section 425.17(c)(1) for causes of action arising from statements or conduct "made in the course of delivering the person's goods or services," the Court of Appeal once again disagreed with *Brill,* which had found this prong was satisfied where "the statements were made and conduct engaged in as part of....the type of business transaction engaged in by defendants." (*Brill, supra,* 132 Cal.App.4th at p. 341, 33 Cal.Rptr.3d 371.) The Court of Appeal reasoned that the Legislature had enacted instead "a much narrower exemption, predicated by its plain terms on conduct in the course of ***21** *delivering* the *goods or services* the defendant is in the business of *selling or* *****336** *leasing.*" The court then found that the advertisement here "was *seeking business from* prospective clients, not *delivering services to* them." Concluding that the anti-SLAPP statute applied and that Simpson had failed to establish a probability ****1123** of prevailing on any of its claims, the Court of Appeal affirmed the order granting the special motion to strike and the judgment of dismissal.

We granted review to address the conflict in the case law concerning the construction of the commercial speech exemption to the anti-SLAPP statute.

DISCUSSION

A SLAPP is a civil lawsuit that is aimed at preventing citizens from exercising their political rights or punishing those who have done so. " 'While SLAPP suits masquerade as ordinary lawsuits such as defamation and interference with prospective economic advantage, they are generally meritless suits brought primarily to chill the exercise of free speech or petition rights by the threat of severe economic sanctions against the defendant, and not to vindicate a legally cognizable right.' " (*Castillo v. Pacheco* (2007) 150 Cal.App.4th 242, 249–250, 58 Cal.Rptr.3d 305, quoting Sen. Com. on Judiciary, Analysis of Sen. Bill No. 1296 (1997–1998 Reg. Sess.) as amended May 12, 1997, pp. 1–2.)

In 1992, out of concern over "a disturbing increase" in these types of lawsuits, the Legislature enacted section 425.16, the anti-SLAPP statute. (§ 425.16, subd. (a).) The statute authorized the filing of a special motion to strike to expedite the early dismissal of these unmeritorious claims. (§ 425.16, subds. (b)(1), (f).) To encourage "continued participation in matters of public significance" and to ensure "that this participation should not be chilled through abuse of the judicial process," the Legislature expressly provided that the anti-SLAPP statute "shall be construed broadly." (§ 425.16, subd. (a).)

A special motion to strike involves a two-step process. First, the defendant must make a prima facie showing that the plaintiff's "cause of action ... aris[es] from" an act by the defendant "in furtherance of the [defendant's] right of petition or free speech ... in connection with a public issue."[2] (§ 425.16, subd. (b)(1).) If a defendant meets this threshold showing, the cause of action shall be stricken unless the plaintiff can establish "a probability that the plaintiff will prevail on the claim." (*Ibid.*)

In 2003, concerned about the "disturbing abuse" of the anti-SLAPP statute, the Legislature enacted section 425.17 to exempt certain actions from it. ***22** (§ 425.17, subd. (a).) We recently discussed the exemption for public interest lawsuits in *Club Members for an Honest Election v. Sierra Club* (2008) 45 Cal.4th 309, 86 Cal.Rptr.3d 288, 196 P.3d 1094, where we "narrowly construed" section 425.17, subdivision (b) and held that it applied "only when the entire action is brought in the public interest." (*Club Members for an Honest Election, supra,* 45 Cal.4th at pp. 312, 316, 86 Cal.Rptr.3d 288, 196 P.3d 1094.)

This case involves the scope and operation of the exemption for commercial speech under section 425.17(c), which provides: "Section 425.16 does not apply to any cause of action brought against a person primarily engaged in the business of selling or leasing goods or services, including, but not limited to, insurance, securities, or financial instruments, arising from any statement or conduct by that person if both of the following conditions exist: [¶] *****337** (1) The statement or conduct consists of representations of fact about that person's or a business competitor's business operations, goods, or services, that is made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services, or the statement or conduct was made in the course of delivering the person's goods or services. [¶] (2) The intended audience is an actual or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual or prospective buyer or customer, ..."

The commercial speech exemption, like the public interest exemption, "is a statutory exception to section 425.16" and "should be narrowly construed." (*Club Members for an Honest Election v. Sierra Club, supra,* 45 Cal.4th at p. 316, 86 Cal.Rptr.3d 288, 196 P.3d 1094; see also ****1124** *Major v. Silna* (2005) 134 Cal.App.4th 1485, 1494, 36 Cal.Rptr.3d 875; accord, Sen. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended May 1, 2003, pp. 7–8 ["before us for consideration in [Senate Bill] 515 is a measure that seeks to trim off a few bad branches as argued and identified by the [Consumer Attorneys of California]"].)

A. Which Party Bears the Burden to Establish the Applicability of the "Commercial Speech" Exemption Under Section 425.17(c)?

The Court of Appeal determined that Simpson, as the plaintiff, bore the burden of establishing that Gore's advertisement fell within the commercial speech exemption to the anti-SLAPP law, relying on the general rule that " '[o]ne claiming an exemption from a general statute has the burden of proving that he comes within the exemption.' " Simpson argues that the burden should have been placed on Gore, as the defendant, to establish that the exemption does *not* apply. He relies in particular on our summary in *Equilon Enterprises v. Consumer Cause, Inc.* (2002) 29 Cal.4th 53, 67, 124 Cal.Rptr.2d 507, 52 P.3d 685 (*Equilon*), of the "two-step process" for ***23** analyzing anti-SLAPP motions: "First, the court decides whether the *defendant* has made a threshold showing that the challenged cause of action is one arising from protected activity.... If the court finds such a showing has been made, it then determines whether the *plaintiff* has demonstrated a probability of prevailing on the

claim." (Italics added.) We agree with the Court of Appeal's construction.

It is a "familiar" and "longstanding" legal principle that " '[w]hen a proviso ... carves an exception out of the body of a statute or contract those who set up such exception must prove it.' " (*Meacham v. Knolls Atomic Power Laboratory* (2008) 554 U.S. 84, 128 S.Ct. 2395, 2400, 171 L.Ed.2d 283; see also *Trade Comm'n v. Morton Salt Co.* (1948) 334 U.S. 37, 44–45, 68 S.Ct. 822, 92 L.Ed. 1196 ["the burden of proving justification or exemption under a special exception to the prohibitions of a statute generally rests on one who claims its benefits ..."]; accord, 29 Am.Jur.2d (2008) Evidence § 176, p. 193.) Likewise, in California, "it has been declared that where the statute has exemptions, exceptions or matters which will avoid the statute the burden is on the claimant to show that he falls within that category." (*Colonial Ins. Co. v. Ind. Acc. Com.* (1945) 27 Cal.2d 437, 441, 164 P.2d 490; see also *Briggs v. McCullough* (1869) 36 Cal. 542, 551–552; *In re Lorenzo C.* (1997) 54 Cal.App.4th 1330, 1345, 63 Cal.Rptr.2d 562 ["one who claims an exemption from a general statute has the burden of proving that he or she comes within the exemption"].)

*****338** Simpson does not dispute that section 425.16 sets forth a general statute or that section 425.17 creates specified exemptions to it. Simpson contends, though, that the familiar and long-standing rule of statutory construction governing exemptions to a general statute was abrogated by the enactment in 1965 of Evidence Code section 500, which provides: "Except as otherwise provided by law, a party has the burden of proof as to each fact the existence or nonexistence of which is essential to the claim for relief or defense that he is asserting."

Although it is true that Evidence Code section 500 superseded former section 1981, which had provided that the burden of proof was on the party holding the affirmative of the issue, the change in wording did not upset the traditional rule of statutory construction. As the Law Revision Commission Comments to Evidence Code section 500 explain, the phrase the " 'affirmative of the issue' " in former section 1981 had been criticized "as establishing a meaningless standard," inasmuch as " 'practically any proposition may be stated in either affirmative or negative form.' " (Cal. Law Revision Com. com., reprinted at 29B West's Ann. Evid.Code (1995 ed.) foll. § 500, p. 554.) Evidence Code section 500 was intended to make the allocation of the burden of proof "easier to ascertain" than the "classic formulation," but ***24** not to signal a sea change in the law. (*Conservatorship of Hume* (2006) 140 Cal.App.4th 1385, 1388, fn. 5, 44 Cal.Rptr.3d 906; see also *Los Angeles Unified School Dist. v. Workers' Comp. Appeals Bd.* (1984) 150 Cal.App.3d 823, 829, 198 Cal.Rptr. 116 [citing the two formulations together].) Tellingly, Simpson ****1125** cites nothing to support its novel claim that Evidence Code section 500 abrogated the ordinary rule of statutory construction. (Cf. 31 Cal.Jur.3d (2002) Evidence § 90, p. 151 ["What facts are essential to a particular party's claim for relief or defense is generally a matter to be determined by the substantive law, not the law of evidence; Evid.Code, § 500 does not purport to determine which facts are 'essential' to the plaintiff's claim for relief and which facts are 'essential' to a claimed defense, but rather leaves those substantive determinations to be resolved in light of the particular cause of action or defense at issue," (fns. omitted)].) Indeed, the Law Revision Commission Comments note that Evidence Code section 500 "follows th[e] basic rule"—i.e., " 'that whatever facts a party must affirmatively plead he also has the burden of proving' "—and is even broader, in that it " appl[ies] to issues not necessarily raised in the pleadings." (Cal. Law Revision Com. com., reprinted at 29B West's Ann. Evid.Code, *supra,* foll. § 500, p. 554.) Inasmuch as Simpson concedes that "[t]he initial burden should be on the plaintiff to invoke the exemption in opposition to the anti-SLAPP motion," it follows that the plaintiff also has the burden of proving the applicability of the exemption.

Furthermore, the "general principle" of Evidence Code section 500 is "that a party who seeks a court's action in his favor bears the burden of persuasion thereon." (*Aguilar v. Atlantic Richfield Co.* (2001) 25 Cal.4th 826, 850, 107 Cal.Rptr.2d 841, 24 P.3d 493.) Because establishing the commercial speech exemption is essential to Simpson's defense to the special motion to strike, Evidence Code section 500 places the burden of proof on Simpson. (See generally *City of Lafayette v. East Bay Mun. Utility Dist.* (1993) 16 Cal.App.4th 1005, 1017, 20 Cal.Rptr.2d 658 [" ' "One seeking to be excluded from the sweep of the general statute must establish that the exception applies" ' "].)

Nothing in *Equilon* or its discussion of the "two-step process" alters the analysis. (*Equilon, supra,* 29 Cal.4th at p. 67, 124 Cal.Rptr.2d 507, 52 P.3d 685.) In *Equilon,* *****339** we explained that the defendant has the burden to show that the cause of action being challenged under the anti-SLAPP statute is one arising from protected activity. (*Equilon, supra,* at p. 67, 124 Cal.Rptr.2d 507, 52 P.3d 685.) In discussing

the defendant's burden at the first stage, *Equilon* construed only section 425.16, and did not purport to identify the party with the burden to establish the existence or nonexistence of the public interest exemption in section 425.17, subdivision (b), or the commercial speech exemption in section 425.17(c), inasmuch as *Equilon* predated the enactment of section 425.17. It is worth noting, though, that ***25** nothing in *Equilon* purported to abrogate the long-standing rule of construction that the party seeking to benefit from an exception to a general statute bears the burden to establish the exception. [3]

Simpson argues, correctly, that the ordinary rules governing allocation of the burden of proof may be disregarded for policy reasons in exceptional circumstances. (*Adams v. Murakami* (1991) 54 Cal.3d 105, 119–120, 284 Cal.Rptr. 318, 813 P.2d 1348; *Cassady v. Morgan, Lewis & Bockius LLP* (2006) 145 Cal.App.4th 220, 234, 51 Cal.Rptr.3d 527 (*Cassady*).) Yet such exceptions are "few, and narrow" (*Sargent Fletcher, Inc. v. Able Corp.* (2003) 110 Cal.App.4th 1658, 1670, 3 Cal.Rptr.3d 279), and the reasons justifying a shift in the normal allocation of the burden of proof must be "compelling." ****1126** (*Aydin Corp. v. First State Ins. Co.* (1998) 18 Cal.4th 1183, 1193, 77 Cal.Rptr.2d 537, 959 P.2d 1213; accord, *Meacham v. Knolls Atomic Power Lab., supra,* 554 U.S. at pp. 90–92, 128 S.Ct. at p. 2400.) Simpson fails to identify any compelling justification.

Simpson does assert that the facts underlying the commercial speech exemption are "peculiarly" within the speaker's knowledge. But Simpson does not explain how a plaintiff would be significantly disadvantaged in demonstrating that the statement or conduct underlying its cause of action "consists of representations of fact about [the defendant]'s or a business competitor's business operations, goods, or services"; that the defendant's statement or conduct was "made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" or "in the course of delivering the persons' goods or services"; or that the "intended audience" was "an actual or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual or potential buyer or customer." (§ 425.17(c)(1), (2); see generally *Schaffer v. Weast* (2005) 546 U.S. 49, 60, 126 S.Ct. 528, 163 L.Ed.2d 387 [" 'Very often one must plead and prove matters as to which his adversary has superior access to the proof' "].) In sum, Simpson does not persuade us that section 425.17(c) presents *****340** one of those " 'rare occasions' " ***26** justifying a deviation from the normal allocation of the burden of proof. (*Cassady, supra,* 145 Cal.App.4th at p. 234, 51 Cal.Rptr.3d 527.)

The burden of proof as to the applicability of the commercial speech exemption, therefore, falls on the party seeking the benefit of it—i.e., the plaintiff.

B. Were Simpson's Causes of Action Exempted from the Anti–SLAPP Statute by Section 425.17(c)?

As noted, section 425.17(c) provides, in pertinent part: "Section 425.16 does not apply to any cause of action brought against a person primarily engaged in the business of selling or leasing goods or services ... arising from any statement or conduct by that person if both of the following conditions exist: [¶] (1) The statement or conduct consists of representations of fact about that person's or a business competitor's business operations, goods, or services, that is made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services, or the statement or conduct was made in the course of delivering the person's goods or services. [¶] (2) The intended audience is an actual buyer or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual buyer or customer...."

There are no disputed issues of fact here. We review the applicability of the commercial speech exemption independently. (*Soukup v. Law Offices of Herbert Hafif* (2006) 39 Cal.4th 260, 269, fn. 3, 46 Cal.Rptr.3d 638, 139 P.3d 30.)

The Court of Appeal held, and the parties' initial briefing assumed, that section 425.17(c)(1) prescribes a "content exemption" and a "delivery exemption" and that these exemptions have distinctly different elements. The content exemption shields a cause of action from the anti-SLAPP statute if the cause of action arises from a statement or conduct that "consists of representations of fact about that person's or a business competitor's business operations, goods, or services, that is made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services." (§ 425.17, subd. (c)(1).) The delivery exemption provides a similar shield for *any* statement or conduct "made in the course of delivering the person's goods or services." (*Ibid.*) In other words, this approach divided the first 47 words of subdivision (c)(1) from the last 17 to create two independent and parallel theories of exemption from the anti-SLAPP law.

Although section 425.17(c)(1) is grammatically susceptible of such a construction, that construction was not necessarily the only plausible one. ***27** Gore had observed, in a footnote in its initial briefing, that the statute might also be read to exempt a cause of action arising from a statement or conduct ****1127** that consists of representations of fact about that person's or a competitor's business operations, goods, or services that was made *either* "for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" *or* "in the course of delivering the person's goods or services." (§ 425.17(c)(1).) We granted the parties the opportunity to file supplemental briefing as to which construction was the correct one and, as will appear, agree with Gore's construction.

As in any case involving statutory interpretation, our fundamental task is to determine the Legislature's intent so as to effectuate the law's purpose. (*****341** *People v. Lewis* (2008) 43 Cal.4th 415, 491, 75 Cal.Rptr.3d 588, 181 P.3d 947.) "We begin with the text of the statute as the best indicator of legislative intent" (*Tonya M. v. Superior Court* (2007) 42 Cal.4th 836, 844, 69 Cal.Rptr.3d 96, 172 P.3d 402), but we may reject a literal construction that is contrary to the legislative intent apparent in the statute or that would lead to absurd results. (*Ornelas v. Randolph* (1993) 4 Cal.4th 1095, 1105, 17 Cal.Rptr.2d 594, 847 P.2d 560.)

Simpson's argument, at least at the outset, relies on the plain language of section 425.17(c)(1) and the canon of construction of avoiding surplusage. According to Simpson, section 425.17(c)(1) creates two independent commercial speech exemptions, each introduced by the phrase "the statement or conduct," and to hold otherwise would render the second iteration of "the statement or conduct" in the subdivision redundant. In Simpson's view, therefore, the delivery exemption encompasses a cause of action arising from "*any* statement or conduct made in the course of delivering the person's goods or services." Gore argues that such a construction would contravene the legislative intent and lead to absurd results.

The Legislature's findings supporting the enactment of section 425.17 are set forth in subdivision (a), which states that "there has been a disturbing abuse of Section 425.16, the California Anti–SLAPP Law, which has undermined the exercise of the constitutional rights of freedom of speech and petition for the redress of grievances, contrary to the purpose and intent of Section 425.16. The Legislature finds and declares that it is in the public interest to encourage continued participation in matters of public significance, and that this participation should not be chilled through abuse of the judicial process or Section 425.16."

The construction favored by Simpson does not effectively fulfill the statute's purposes. Under that construction, the Legislature can be seen to have carefully devised specific requirements in order to exempt a cause of ***28** action under the content prong—i.e., the statement or conduct underlying the cause of action must (1) consist of representations of fact (2) about that person's or a business competitor's business operations, goods, or services, and (3) have been made for the purpose of obtaining approval for, promoting, or securing transactions in the person's goods or services. Yet, under Simpson's construction of the delivery prong, the Legislature apparently imposed no particular requirements—i.e., a cause of action arising from *any* statement or conduct on *any* subject for *any* purpose is exempted from the anti-SLAPP statute, as long as it was made in the course of delivering goods or services. Simpson has not offered any rationale for why the stage of the transaction should play such a critical factor in determining whether to exempt a cause of action from the reach of the anti-SLAPP law.

Moreover, under Simpson's approach, a business that was sued because of political or religious statements made by an employee *in the course of delivering* the product or service to a customer would be deprived of the protection of the anti-SLAPP law, but that same business would be able to invoke the anti-SLAPP law if the same statements were made for the purpose of obtaining approval for, promoting, or securing transactions in its products. Neither the Legislature's findings nor common sense endorses or justifies such a result.

Simpson effectively concedes that such a result would be problematic, but argues that the statements in these hypotheticals "are *not a part of* the delivery of *****342** goods ****1128** or services" and thus fall outside the delivery exemption as Simpson would interpret it. But, as we recently observed, " '[d]uring' means 'at some point in the course of.' " (*People v. Lewis, supra,* 43 Cal.4th at p. 514, 75 Cal.Rptr.3d 588, 181 P.3d 947.) Statements or conduct made *during* the delivery of goods or services thus would qualify as statements or conduct made *in the course of* delivering the goods or services. (Cf. § 425.17(c)(1).)

Simpson attempts to narrow the definition of the delivery exemption by combining language that appears in two

different sentences in *Brill, supra,* 132 Cal.App.4th at page 341, 33 Cal.Rptr.3d 371, to argue that the exemption extends only to " 'statements ... made and conduct engaged in *as part of* ... the type of business transaction engaged in by defendants.' " But this formulation does not appear anywhere in the text of section 425.17(c)(1). If, as Simpson effectively concedes, the delivery prong requires an interpretive gloss to avoid absurd results, it seems more consonant with legislative intent to adopt the restriction the Legislature articulated earlier in the sentence setting forth the exemption rather than to rummage about elsewhere for new limitations arising out of whole cloth.

Moreover, Simpson's construction of the delivery prong would render the first part of section 425.17(c)(1)—the so-called "content and purpose" ***29** prong—surplusage. Statements or conduct that are " 'part of ... the type of business transaction engaged in by defendants' " would necessarily encompass "representations of fact about that person's ... business operations, goods, or services, that [are] made for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services" (§ 425.17(c)(1)) inasmuch as *every* business engages in efforts to obtain approval for, promote, or secure sales or transactions in its goods or services. Indeed, Simpson concedes that "a grocer's advertisement in advance of intended sales" falls within its broad definition of the delivery prong "to the extent the advertising informs the public about the availability of the product for delivery" *or* "to the extent the advertising keeps the product in the public eye and bolsters its prestige." With such a broad definition of the delivery prong, there would be no need for the content and purpose prong.

The legislative history further undermines Simpson's interpretation of the statute. Summaries of the bill prepared for various legislative committees consistently stated that section 425.17(c) would prohibit "the anti-SLAPP motion from being used in specified causes of action against businesses sued for statements or conduct consisting of representations of fact about their goods, services or business operations, or those of a competitor, when *those* statements or conduct were for the purpose of obtaining approval for, promoting, or securing sales or leases of the person's goods or services, *or* in the course of delivering the person's goods or services, if the intended audience is an actual or potential buyer or customer, or a person likely to repeat the statement to, or otherwise influence, an actual or potential buyer or customer, ..." (Legis. Analyst, 3d reading analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended July 8, 2003, p. 1, italics added; Assem. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended June 27, 2003, p. 2, italics added; Assem. Republican Caucus, analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended June 27, 2003, p. 1, italics added; see also Sen. Sheila Kuehl, letter to Governor Gray Davis, Sept. 3, 2003, p. 2.) In addition, an analysis prepared for the Senate Committee on the Judiciary noted that Senate Bill 515 was *****343** "consistent with the recommendation of the Senate Judiciary Committee analysis last year on [Senate Bill] 1651[,] which urged the sponsors to look at *the content and context* of the statement or conduct when crafting an exemption, rather than enacting a wholesale exclusion of a class of defendants[,] which had been proposed in [Senate Bill] 1651." (Sen. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended May 1, 2003, p. 9, italics added.) Simpson offers no explanation why the Legislature would have been so concerned about the content of the statement or conduct in the first part of section 425.17(c)(1) but would ****1129** have abandoned any such concern in the remainder of the sentence.

***30** For these reasons, we interpret section 425.17(c) to exempt from the anti-SLAPP law a cause of action arising from commercial speech when (1) the cause of action is against a person primarily engaged in the business of selling or leasing goods or services; (2) the cause of action arises from a statement or conduct by that person consisting of representations of fact about that person's or a business competitor's business operations, goods, or services; (3) the statement or conduct was made either for the purpose of obtaining approval for, promoting, or securing sales or leases of, or commercial transactions in, the person's goods or services or in the course of delivering the person's goods or services; and (4) the intended audience for the statement or conduct meets the definition set forth in section 425.17(c)(2).

Gore does not dispute that he is in the business of selling legal services, that Simpson's causes of action arise from Gore's advertisement, that the purpose of the advertisement was to promote Gore's legal services, or that the advertisement was addressed to a qualifying audience under section 425.17, subdivision (c)(2). The point of contention concerns whether the causes of action "aris[e] from ... representations of fact about [Gore's] ... business operations, goods, or services." (§ 425.17(c)(1).) We find that they do not.

Simpson's complaint asserts claims for defamation, trade libel, false advertising, and unfair business practices. The

common theme among these causes of action is the allegation that the advertisement "communicates that Simpson's galvanized screws are defective." The complaint alleges in particular that the advertisement "is libelous on its face in that it falsely communicates to the reader that Simpson's products are defective"; that the advertisement "disparaged Simpson's goods in that the Advertisement falsely communicates to the reader that Simpson's galvanized screws are defective"; that these assertions in the advertisement "are false and misleading"; and that using "the false and misleading Advertisement to recruit potential plaintiffs to participate in an unjustified class action lawsuit against Simpson" was an unfair business practice.

We will assume arguendo that the advertisement implies that Simpson's galvanized screws are defective. As the Court of Appeal recognized, however, even an implication that Simpson's screws are defective "is not 'about' Gore's or a competitor's 'business operations, goods, or services....' (§ 425.17(c)(1).) It is, rather, a statement 'about' *Simpson*—or, more precisely, Simpson's products." It therefore falls squarely outside section 425.17(c)' s exemption for commercial speech.

Simpson contends that the advertisement does nonetheless satisfy the commercial speech exemption in that it "expressly states that 'an attorney' will 'investigate whether you have a potential claim" and that it also ***31** supports the inference "that Gore has investigated the named companies and has discovered that they are selling *****344** defective screws." Both of these statements are "about" Gore's business operations, but neither satisfies the elements of the commercial speech exemption to the anti-SLAPP law.

Simpson's causes of action plainly do not "arise from" (§ 425.17(c)) the representation that an attorney will investigate "whether you have a potential claim." Simpson's complaint does not allege that this statement is false or even that it is defamatory. In addition, a promise of what an attorney will do if the reader were to respond to the advertisement "is not a representation of fact, but an agreement to take certain actions in the future." (*Navarro v. IHOP Properties, Inc.* (2005) 134 Cal.App.4th 834, 841, 36 Cal.Rptr.3d 385.) Consequently, it does not constitute "representations of fact about that person's ... business operations, goods, or services." (§ 425.17(c)(1).)

The alleged inference that Gore has investigated Simpson and discovered that the galvanized screws are defective is not obvious from the advertisement itself, which asserts only that users of these fasteners "may" have certain (but unspecified) legal rights and that an attorney would need to "investigate whether you have a potential claim." Even if ****1130** one were to draw this inference, however, it would be no more than an attempt to layer the allegedly defamatory inference itself—i.e., that Simpson's galvanized screws are defective—with an alleged inference that Gore had *discovered* the defect. Simpson cites no authority for expanding the scope of the commercial speech exemption in this manner. (Cf. *Stewart v. Rolling Stone LLC* (2010) 181 Cal.App.4th 664, 676, 105 Cal.Rptr.3d 98 [the commercial speech exemption did not apply to a claim that the defendant magazine wrongfully used plaintiffs' names for a Camel advertisement; "as plaintiffs concede, the goods they sell are copies of Rolling Stone magazine, not Camel cigarettes. More significantly, the statement or conduct at issue here did not consist of 'representations of fact about the business operations, goods, or services' of Rolling Stone or of any of defendants' business competitors. Instead, the representation at the center of this lawsuit is the representation that plaintiffs and their fellow musicians endorse the sale and use of Camel cigarettes"]; accord, *New.Net v. Lavasoft* (C.D.Cal.2004) 356 F.Supp.2d 1090, 1104 [the commercial speech exemption did not apply because "the purportedly offending statements are not statements made about Defendant's product, but rather statements about Plaintiff and its products" and the two were not competitors]; see also *Troy Group, Inc. v. Tilson* (C.D.Cal.2005) 364 F.Supp.2d 1149, 1151, 1155 [defendant investment adviser's e-mail asking whether plaintiff corporation is one of "the biggest crooks on the planet or what?" is "clearly not about [defendant]'s business, rather it is about [plaintiff], which, as [plaintiffs] admit, is not a business competitor of [defendant]"].) We are reluctant to allow plaintiffs to evade the limitations of the statutory ***32** text by mere wordplay, especially given our obligation to construe the commercial speech exemption narrowly.

Moreover, Simpson has not attempted to recover damages here because of any implied representation that Gore allegedly *discovered* that Simpson's products were defective, but because Gore allegedly *implied* that they were defective. Whether the Simpson products are in fact defective is beyond the scope of this proceeding, but the inference that they are defective is not a representation of fact about *Gore's* business operations, goods, or services. The Court of Appeal stated the issue succinctly: "To the extent that Gore's advertisement 'consists of' representations about his services, Simpson's action does not 'aris[e] *****345** from' it; to the extent that

Simpson's action 'aris[es] from' a representation by Gore, the representation was not 'about' Gore's or a competitor's services or business operations."[4]

Simpson argues next that the commercial speech exemption from dismissal under the anti-SLAPP statute should not require that the statement itself giving rise to the cause of action include factual representations about the defendant's or a business competitor's business operations, goods, or services, as long as the statement giving rise to the cause of action is *accompanied* by factual representations about the defendant's or a business competitor's business operations, goods, or services. The statute's plain language, however, is otherwise. The commercial speech exemption applies only to a cause of action "arising from" a statement (or conduct) that "consists of representations of fact about that person's or a business competitor's business operations, goods, or services...." (§ 425.17(c)(1).)

Simpson complains, with rhetorical flourish, that the advertisement "defam[es] Simpson in order to tout Gore and his services.... The tout and the defamation were of an inseparable whole, with the defamation serving as bait for the tout. The Court of Appeal's approach is as if to parse cheese from a mousetrap." But this is merely another way of saying that the speaker made a representation of fact about a *noncompetitor's* goods for the purpose of promoting the speaker's own services. Had the Legislature intended the commercial speech exemption to encompass representations of fact about *any* ****1131** business operations, goods, or services made for the purpose of promoting sales, leases, or transactions in the speaker's own goods or services, then it would not have limited the exemption to statements or conduct consisting of "representations of fact about *that person's or a business competitor's* business operations, goods, or services ...." (§ 425.17(c)(1); see ***33** *Mendoza v. ADP Screening and Selection Services, Inc.* (2010) 182 Cal.App.4th 1644, 1652, 107 Cal.Rptr.3d 294 ["the Legislature appears to have enacted section 425.17, subdivision (c), for the purpose of exempting from the reach of the anti-SLAPP statute cases involving comparative advertising by businesses."].)

The legislative history accords with the statute's plain language. As stated earlier, committee reports summarized the bill as "[p]rohibit[ing] the anti-SLAPP motion from being used in specified causes of action against businesses sued for statements or conduct *consisting of* representations of fact about their goods, services or business operations, or those of a competitor, *when those statements* ... were for the purpose of obtaining approval for, promoting, or securing sales or leases of the person's goods or services, or in the course of delivering the person's goods or services...." (Assem. Com. on Judiciary, Analysis of Sen. Bill No. 515 (2003–2004 Reg. Sess.) as amended June 27, 2003, p. 3, italics added.) The plain language and the legislative history each confirm that the statement or conduct giving rise to the cause of action must consist of factual representations about the speaker's (or a competitor's) goods, services, or business operations. Nothing in the plain language or the legislative history suggests it would be enough to protect against dismissal under the anti-SLAPP statute if the factual representations about the speaker's or a competitor's business simply appeared in the *****346** same publication as the statements actually giving rise to the cause of action.[5]

Indeed, Simpson's proposed construction would seriously undermine the anti-SLAPP statute itself. As Gore points out, a press release critical of a political candidate—i.e., core political speech—would lose the protection of the anti-SLAPP statute if the press release *also* mentioned the products sold by the business. We therefore reject Simpson's expansive construction of the commercial speech exemption and conclude, in accordance with the trial court and the Court of Appeal, that Simpson's complaint was not exempted from the anti-SLAPP statute by section 425.17(c)(1).

The trial court went on to consider Gore's special motion to strike the complaint under section 425.16, determined that Simpson had failed to establish a probability of prevailing on the merits, and granted the special motion to strike. The Court of Appeal affirmed. The correctness of those rulings is beyond the scope of our grant of review, which was limited to the ***34** applicability of the commercial speech exemption to the anti-SLAPP statute set forth in section 425.17(c)(1).

DISPOSITION

The judgment of the Court of Appeal is affirmed.

WE CONCUR: GEORGE, C.J., KENNARD, WERDEGAR, CHIN, MORENO, and CORRIGAN, JJ.

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Footnotes

1 SLAPP is an acronym for "strategic lawsuit against public participation." (*Jarrow Formulas, Inc. v. LaMarche* (2003) 31 Cal.4th 728, 732, fn. 1, 3 Cal.Rptr.3d 636, 74 P.3d 737.) All further statutory references are to the Code of Civil Procedure unless otherwise indicated.

2 See *Leoni v. State Bar* (1985) 39 Cal.3d 609, 624, 217 Cal.Rptr. 423, 704 P.2d 183 (lawyer advertising is protected by the First Amendment).

3 As Simpson points out, *Brill* did place the burden on the defendant. But *Brill* analyzed only whether the applicability of the commercial speech exception was part of *Equilon's* first step, where the court decides whether the defendant has made a threshold showing the challenged cause of action arises from protected activity, or part of *Equilon's* second step, where the court determines whether the plaintiff has demonstrated a probability of prevailing on the claim. (*Brill, supra,* 132 Cal.App.4th at pp. 329–331, 33 Cal.Rptr.3d 371.) *Brill's* conclusion that the defendant had the burden of proof to establish the nonapplicability of the commercial speech exception was based solely on its classification of the issue as a first-step determination and did not at all consider section 425.17's status as an exception to section 425.16 or any canons of construction. (*Brill, supra,* at p. 331, 33 Cal.Rptr.3d 371.) *Brill Media Co., LLC v. TCW Group, Inc., supra,* 132 Cal.App.4th 324, 33 Cal.Rptr.3d 371, is therefore disapproved to the extent it is inconsistent with our holding here.

4 One can conceive of a cause of action arising from a representation of fact about the attorney's own services —such as a false claim that the attorney had already recovered a judgment against the manufacturer for the defective product—but the advertisement in this case did not contain such a representation.

5 Simpson complains that a party should not be able to defeat the commercial speech exception to the anti-SLAPP statute by parsing a two-sentence advertisement into its component parts. We agree. The proper test does not turn on the punctuation used in the advertisement, but on the basis for the cause of action. Here, the causes of action all arise from the inference that Simpson's products are defective, an inference that Simpson alleges is implied from the text of the advertisement. This inference, though, contains no representations of fact about *Gore's* business operations, goods, or services.

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DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On June 18, 2024, I served the:

- **Current Mailing List dated June 17, 2024**
- **Notice of Complete Test Claim, Schedule for Comments, and Notice of Tentative Hearing Date issued June 18, 2024**
- **Test Claim filed by Union City on June 30, 2023**

  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07
  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-018, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.ii(4), C.3.b.ii(5), C.3.j.ii(1)(a)-(g), C.3.j.ii(4), C.3.j.ii(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b, C.21.b, issued May 11, 2022, effective July 1, 2022
  Union City, Claimant

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on June 18, 2024 at Sacramento, California.

Jill Magee

Jill Magee
Commission on State Mandates
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COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 6/17/24

Claim Number: 22-TC-07

Matter: California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018

Claimant: Union City

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

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Exhibit B

Commission on State Mandates
Filed Date
07/15/25

July 15, 2025

VIA DROP BOX
Juliana Gmur
Executive Director
Commission on State Mandates
980 Ninth Street, Suite 300
Sacramento, CA 95814

California Regional Water Quality Control Board, San Francisco Bay Region, 22-TC-07
Order No. R2-2022-0018, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.ii(4), C.3.b.ii(5), C.3.j.ii(1)(a)- (g), C.3.j.ii(4), C.3.j.ii(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b, C.21.b, issued May 11, 2022, effective July 1, 2022, Union City, Claimant

San Francisco Bay Regional Water Quality Control Board and State Water Resources Control Board Comments on Test Claim

Dear Ms. Gmur:

The San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) and the State Water Resources Control Board (State Water Board) (together, Water Boards) submit these comments on Test Claim 22-TC-07.

The permit at issue in this Test Claim is the San Francisco Bay Water Board Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order No. R2-2022-0018, as modified by Order No. R2-2023-0019, NPDES Permit No. CAS612008) that covers stormwater discharges from municipalities and local agencies (Permittees) in the San Francisco Bay region.[1] Union City contends it is

[1]Specifically, the cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean

entitled to subvention under Article XIII B, section 6(a) of the California Constitution for Provisions C.3.b.ii(4), C.3.b.ii(5), C.3.j.ii(1)(a)- (g), C.3.j.ii(4), C.3.j.ii(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b, and C.21.b in MRP 3. The Water Boards do not agree. The challenged provisions are not subject to subvention under Article XIII B, section (6)(a) of the California Constitution. None of the provisions are a new program or higher level of service. Union City also has fee authority to cover the costs of the challenged provisions. Additionally, some of the provisions are subject to the subvention exceptions for offsetting savings and federal mandates. The Commission should deny the Test Claim in its entirety.

I. Background

A. Federal and State Water Quality Law

1. Water Quality Standards

The Federal Water Pollution Control Act, commonly known as the Clean Water Act (33 U.S.C. § 1251 et seq.), has the stated objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[2] Among other things, the act requires states to establish water quality standards for each waterbody in their jurisdiction.[3] Water quality standards identify designated uses of the waterbody—such as agriculture, recreation, and navigation—and in turn specify water quality criteria and an antidegradation policy to protect those uses.[4] Water quality criteria may be expressed in numeric form, by limiting the amount of a specific pollutant, or in narrative form, by describing actions or conduct designed to decrease the amount of a pollutant.[5]

Water Program (Alameda Permittees); the cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees); the cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees); the cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees); and the cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance (Solano Permittees).

[2] 33 U.S.C. § 1251(a).

[3] 33 U.S.C. § 1313(a), (c)(1).

[4] 33 U.S.C. § 1313(c)(2)(A); 40 C.F.R. §§ 131.6, 131.10, 131.11, 131.12.

[5] See 40 C.F.R. § 131.11(b).

California's Porter-Cologne Water Quality Control Act was enacted to promote conservation, to attain the highest water quality reasonable, and to protect the public health, safety, and welfare.[6] The Porter-Cologne Act created the State Water Board and nine regional water quality control boards to implement water quality control law and policy.[7] Each regional water quality control board must adopt water quality control plans, referred to as "basin plans," for waterbodies in their respective region.[8] Basin plans must designate the beneficial uses (or "designated uses" under the Clean Water Act) for each waterbody, establish water quality objectives (or "water quality criteria" under the Clean Water Act) that protect and promote those beneficial uses, and set forth a program of implementation for achieving water quality objectives.[9] For waterbodies subject to the Clean Water Act, the basin plan sets forth the federally required water quality standards, and regional water quality control boards have no discretion to set standards less stringent than those required by federal law.[10] The State Water Board may also adopt water quality control plans for waters that require water quality standards under the Clean Water Act, and such plans supersede standards in basin plans where there is a conflict.[11]

The San Francisco Bay Water Board adopted a Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) in 1975, with the most recent major revision occurring in 1995. Since 1975, the Basin Plan has prohibited the discharge of "[r]ubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas."[12]

The State Water Board adopted a Water Quality Control Plan for the Ocean Waters of California (Ocean Plan) in 1972 (revised in 2019) and a Water Quality Control Plan for Enclosed Bays and Estuaries of California in 2008 (revised 2018) (which the State Water Board intends to amend and turn into the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE)). To control and reduce the amount of trash entering surface waters across the state, the State Water Board adopted an amendment to the Ocean Plan and adopted Part 1 Trash Provisions of the ISWEBE (Trash Provisions) on April 7, 2015.[13] The U.S. Environmental Protection Agency approved the water quality standards (the narrative water quality objective and

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[6] Wat. Code, § 13000.
[7] Wat. Code, §§ 13100,13140, 13200, 13201, 13241, 13243.
[8] See Wat. Code, § 13240.
[9] Wat. Code, § 13050, subd. (j).
[10] See *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 620 (citing 33 U.S.C. § 1370).
[11] Wat. Code, § 13170.
[12] Basin Plan, ch. 4.2, Table 4-1, see also MRP 2, S.F. Bay Water Board Order R2-2015-0049, Fact Sheet, p. A-87.
[13] Ocean Plan, chs. II.C.5, III.I.6, III.L; ISWEBE, pt. 1.

the discharge prohibition) in the Trash Provisions, making the standards effective for implementation through NPDES permits on January 12, 2016.[14] The Trash Provisions apply to the state's ocean waters and all surface waters of the state, except those waters within the jurisdiction of the Los Angeles Regional Water Quality Control Board (LA Water Board) where trash total maximum daily loads were in effect prior to the effective date of the Trash Provisions.[15]

2. Total Maximum Daily Loads

Clean Water Act Section 303(d) requires states to determine which waterbodies are not meeting applicable water quality standards and submit the list of waterbodies (often referred to as the "303(d) list") to U.S. EPA. A waterbody that does not meet water quality standards for a particular pollutant is "impaired" for that pollutant. States must develop a total maximum daily load (TMDL) for a pollutant identified as the cause of impairment on the 303(d) list.[16] Fundamentally, the purpose of a TMDL is to determine how much of a specific pollutant a waterbody can tolerate and still meet water quality standards and protect beneficial uses, and then to allocate that pollutant load by establishing wasteload allocations for point sources and load allocations for nonpoint sources.[17] TMDLs adopted by a regional water quality control board must be approved by U.S. EPA before they become effective.[18] Once U.S. EPA approves a TMDL for a waterbody, NPDES permits must include effluent limits "consistent with the assumptions and requirements of any available wasteload allocations."[19]

TMDLs and their implementation plans are included in basin plans. The San Francisco Bay Water Board adopted, and U.S. EPA approved, TMDLs for mercury to address

[14] U.S. EPA, Clean Water Act Approval Action on State Trash Water Quality Standards (Jan. 12, 2016).
[15] Ocean Plan, ch. III.L.1.b; ISWEBE, pt. 1, ch. IV.A.1.b.
[16] See 33 U.S.C. 1313(d)(1)(C).
[17] See 40 C.F.R. § 130.2(i) (defining TMDL as "[t]he sum of the individual [wasteload allocations] for point sources and [load allocations] for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.").
[18] See 33 U.S.C. § 1313(d)(2).
[19] 40 C.F.R. § 122.44(d)(1)(vii)(B)

impairments of San Francisco Bay and the Guadalupe River Watershed,[20] and a TMDL for PCBs to address impairment of San Francisco Bay.[21]

3. National Pollutant Discharge Elimination System Municipal Stormwater Permits

The Clean Water Act prohibits the discharge of pollutants from point sources to waters of the United States, except in compliance with an NPDES permit.[22] U.S. EPA has authorized California—through the State Water Board and the nine regional water quality control boards—to administer the NPDES permitting program.[23] When issuing NPDES permits, the Water Boards must implement the Clean Water Act and federal regulatory requirements U.S. EPA established for state permitting agencies.[24]

The Clean Water Act has specific requirements for NPDES permits issued for stormwater discharged from a municipal separate storm sewer system (MS4). MS4 permits "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers," and "shall require controls to reduce the discharge of pollutants to the maximum extent practicable [(MEP)], including management practices, control techniques and system design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."[25] The MEP standard is an evolving standard that is refined through an iterative process as knowledge and technology advance.[26]

In addition to the statutory requirements, 40 C.F.R. section 122.26(d) requires MS4 Permittees to submit an application that includes information specified therein. Among other items, the application must include a proposed management program covering the duration of the permit that includes a comprehensive planning process to reduce the discharge of pollutants to the MEP.[27] The management program must be based on a

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[20] The concentration-based wasteload allocation for urban stormwater runoff in the Guadalupe River Watershed Mercury TMDL is implemented through the implementation of the San Francisco Bay Mercury TMDL and the regional MS4 permit. (See Basin Plan, ch. 7.7.1.6, subheading titled "Implementation Actions for Urban Stormwater Runoff"; see also table 7.7.1-2 [showing the concentration-based allocations for pollutant sources].) Thus, discussions regarding requirements for the mercury TMDLs will focus on the San Francisco Bay Mercury TMDL.
[21] See Basin Plan, chs. 7.2.2, 7.2.3, and 7.7.1.
[22] 33 U.S.C. § 1311(a).
[23] 33 U.S.C. § 1342(b); Wat. Code, § 13370.
[24] 40 C.F.R. § 123.25.
[25] 33 U.S.C. § 1342(p)(3)(8)(ii) and (iii).
[26] See 55 Fed. Reg. 47990, 48052 (Nov. 16, 1990) ("EPA anticipates that storm water management programs will evolve and mature over time."); 64 Fed. Reg. 68722, 68754 (Dec. 8, 1999) ("EPA envisions application of the MEP standard as an iterative process."); and U.S. EPA, Office of Water, Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits, EPA 833-D-96-001 (Sept. 1996) ("The interim permitting approach uses BMPs in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.")
[27] 40 C.F.R. § 122.26(d)(2)(iv).

description of "structural and source control measures to reduce runoff from commercial and residential areas that are discharged from the [MS4] . . . accompanied with an estimate of the expected reduction of pollutant loads and proposed schedule for implementing such controls"; "a program, including a schedule, to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer"; "a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system"; "program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."[28] The application must also include characterization data for the quantity and quality of the stormwater discharge, requiring the applicant to collect and analyze representative samples.[29] As part of the characterization data, the applicant must include a "proposed monitoring program for representative data collection for the term of the permit that describes the location of outfalls or field screening points to be sampled (or the location of instream stations), why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment."[30] Finally, the application must include an assessment of the controls that estimates reductions in pollutant loadings as a result of the management program and a fiscal analysis that identifies the expenditures necessary to accomplish activities for the characterization data and the proposed management program.[31]

Federal regulations also specify conditions that must be included in NPDES permits that require: monitoring to assure compliance with permit limitations;[32] monitoring reports at the frequency required under the permit (and no less than annually);[33] reports of non-compliance, including 24-hour reporting of any non-compliance which may endanger health or the environment that includes a description of non-compliance and its cause, period of non-compliance and the anticipated time it is expected to continue;[34] and, specific to MS4 permits, annual reports that include the status of implementing

[28] 40 C.F.R. § 122.26(d)(2)(iv).
[29] 40 C.F.R. § 122.26(d)(1)(iv)(B), (E); 40 C.F.R. § 122.26(d)(2)(iii).
[30] 40 C.F.R. § 122.26(d)(2)(iii)(D).
[31] 40 C.F.R. § 122.26(d)(2)(v), (vi).
[32] 40 C.F.R. § 122.44(i)(1); see also 40 C.F.R. § 122.48(b) ("All permits shall specify: . . . Required monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring").
[33] 40 C.F.R. §§ 122.41(l)(4); 122.44(i)(2).
[34] 40 C.F.R. § 122.41(l)(6), (7).

components of the stormwater management program that are established as permit conditions, proposed changes to the stormwater management program, revisions, if necessary, to the assessment of controls and the fiscal analysis included in the permit application, a summary of data, including monitoring data for the reporting year, annual expenditures and budget for the following year, a summary of enforcement actions, inspections and public education programs, and identification of water quality improvements or degradation.[35]

4. San Francisco Bay Water Board Municipal Regional Stormwater NPDES Permits

In 2009, the San Francisco Bay Water Board adopted a Municipal Regional Stormwater NPDES Permit (MRP 1) that applied region wide and replaced county-wide and municipality-specific MS4 permits.[36] The Board reissued the MRP in 2015 (MRP 2)[37] and again in 2022 (MRP 3).[38] The Board amended MRP 3 in October 2023.[39] MRP 3, as amended, is the subject of this Test Claim filed by Union City.

II. Comments

A. None of the challenged provisions are a new program or higher level of service

The provisions challenged in the Test Claim are not new programs or higher levels of service that require subvention. Article XIII B, section 6, subdivision (a) of the California Constitution provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service."[40] The California Supreme Court has defined "program" as "(1) programs that carry out the governmental function of providing services to the public, or (2) laws which, to implement a state policy, impose unique requirements on local governments and do not apply generally to all residents and entities in the state."[41] Although a requirement can be a program if it meets either prong,[42] the two prongs are interrelated. Reimbursement to local agencies is required only for the costs involved in carrying out functions peculiar to government, not for expenses incurred by local agencies as an incidental impact of laws that apply generally to all state residents and entities. Laws of

[35] 40 C.F.R. § 122.42((c).
[36] San Francisco Bay Water Board Order R2-2009-0074.
[37] San Francisco Bay Water Board Order R2-2015-0049.
[38] San Francisco Bay Water Board Order R2-2022-0018.
[39] San Francisco Bay Water Board Order R2-2023-0019.
[40] Cal Const., art. XIII B, § 6, subd. (a)
[41] *San Diego Unified School Dist. v. Com. on State Mandates* (2004) 33 Cal.4th 859, 874 (brackets omitted) (quoting *County of L.A. v. State of California* (1987) 43 Cal.3d 46, 56).
[42] See *Dept. of Finance v. Com. on State Mandates* (2021) 59 Cal.App.5th 546, 557; *County of L.A. v. Dept. of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1545.

general application are not entitled to subvention.[43] The fact that a requirement may single out local governments is not dispositive; where local agencies are required to perform the same functions as private industry, no subvention is required.[44] Thus, the applicability of a requirement to entities other than local governments can indicate that the requirement does not carry out a governmental function that provides services to the public.[45]

1. The challenged provisions are not programs—they do not provide services to the public and they are not unique to local government

The challenged provisions do not carry out the governmental function of providing services to the public. Nor are they unique to local government. The fact that the public may ultimately benefit from improved water quality does not mean that the challenged provisions discharge a governmental function of providing services to the public. Permittees are subject to the challenged provisions not as a provider of services to the public but as dischargers of pollutants. The challenged provisions in MRP 3 regulate the discharge of pollutants from the Permittees' MS4 systems just as requirements in other permits regulate the discharge of pollutants from non-municipal systems. And while the MRP 3 provisions apply only to the municipalities and counties named in the permit, that does not mean the requirements are unique to local government when private entities are subject to similar requirements.[46]

The challenged LID requirements do not provide a service to the public. LID requirements contribute in a general way to the overall reduction of pollution in stormwater, but the primary benefits will be localized, in many cases benefiting private property owners and not the public more broadly.[47] LID provisions do not impose unique requirements on local governments either. Other permits impose similar size thresholds on both public and private permittees as a way of reducing runoff or generating other water quality benefits.[48] Similarly, the green infrastructure requirements are not unique

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[43] *County of L.A. v. State of California,* 43 Cal.3d 46, 57–58.
[44] *See City of Richmond v. Com. on State Mandates* (1998) 64 Cal.App.4th 1190, 1197.
[45] See *County of L.A. v. Dept. of Industrial Relations*, *supra*, 214 Cal.App.3d at 1546 ("the critical question is whether the *mandated program* carries out the governmental function of providing services to the public, not whether the elevators can be used to obtain these services. Providing elevators equipped with fire and earthquake safety features simply is not "a governmental function of providing services to the public."); see also *San Diego Unified School Dist. v. Com. on State Mandates*, *supra*, 33 Cal.4th at 876 (noting that state-mandated requirements applicable to both private and public-sector employers to provide employee benefits did not increase or enhance government services, even if such requirements could indirectly improve the public employee applicant pool).
[46] *See City of Richmond v. Com. on State Mandates, supra*, 64 Cal.App.4th at p. 1197 (finding that a law that applied only to local governments was not unique to local governments where the function of the law was to extend obligations that already applied to private entities).
[47] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, p. 82.
[48] See, e.g., NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, State Water Board Order WQ 2022-0057-DWQ (imposing BMP requirements for construction activities that disturb more than one acre of land); General Waste Discharge Requirements

to local agencies. The San Francisco Bay Water Board imposes stormwater treatment requirements on independently permitted development projects[49] and requires stormwater control measures to be installed on roads maintained by private parties in multiple permits.[50]

The challenged trash provisions do not discharge a governmental function that provides services to the public and are not unique to local government. As demonstrated by the statewide applicability of the Trash Amendments and the regionwide applicability of the San Francisco Bay Water Board's prohibition on the discharge of trash, the elimination of trash discharges is not a uniquely governmental function. The provisions are of general applicability. All dischargers, whether public or private, are prohibited from discharging trash where it may be discharged to surface waters of the state.[51] The Trash Provisions require Caltrans, a state agency; private industrial dischargers; private or public operators of recreational facilities; and municipalities alike to comply with the prohibitions.[52] Strict compliance with the trash prohibitions is generally required outside of the municipal stormwater context, and non-municipal dischargers are not subject to time schedules that allow for compliance over time like municipalities.[53]

With respect to the monitoring requirements in Provision C.8, federal law requires all NPDES permits to include monitoring "sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring."[54] In keeping with this requirement, the monitoring obligations in Provision C.8 are comparable to those for non-municipal NPDES permittees in the Bay Area and the

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(WDRs) and Water Quality Certification for Construction and Maintenance of Overwater Structures, S.F. Bay Water Board Order R2-2018-0009 (requiring BMPs small overwater structure construction projects based on size).

[49] See, e.g., WDRs for Eden Shores Residential 2 Project, S.F. Bay Water Board Order R2-2018-0019, pp. 7–8 (requiring stormwater treatment proportionate to amount of impervious surface constructed for private residential construction project); General WDRs for Projects Under the Voluntary Habitat Restoration Program, S.F. Bay Water Board Order R2-2015-0020, pp. 9, 19 (requiring implementation of BMPs to minimize off-site stormwater runoff).

[50] See, e.g., General WDRs for Vineyard Properties in the Napa River and Sonoma Creek Watersheds, S.F. Bay Water Board Order R2-2017-0033, pp. 11–12 (requiring erosion-control measures for roads on vineyards); General WDRs for Confined Animal Facilities, S.F. Bay Water Board Order R2-2016-0031, Attachment B, p. 6, Attachment E, p. 2 (requiring erosion-control measures for roads at confined animal facilities).

[51] See Ocean Plan, ch. III.I.6; ISWEBE, pt. 1, ch. IV.A.2; Basin Plan, ch. Table 4-1, Prohibitions 7 & 8.

[52] Ocean Plan, ch. III.I.6; ISWEBE, pt. 1, ch. IV.A.2.

[53] See Ocean Plan, ch. III.L.2.c; ISWEBE, pt. 1, ch. IV.A.3.c (requiring industrial stormwater dischargers to comply with the outright prohibition on the discharge of trash but allowing an industrial discharger to install full capture systems or their equivalent upon a demonstration of the discharger's inability to comply with the outright prohibition); Ocean Plan ch.III.L.4, ISWEBE, pt. 1, ch. IV.A.5 (allowing municipalities and Caltrans up to 15 years from the effective date of the Trash Provisions to come into compliance with the prohibition, while requiring industrial dischargers to come into compliance with the prohibition by the end of the first permit term).

[54] 40 C.F.R. § 122.48(b).

state. Monitoring pollutants of concern to assess compliance with receiving water limitations under Provision C.8.e is not unique to municipalities; private entities are also required to monitor pollutants to assess compliance with permit requirements and to ensure water quality standards are met.[55] Trash monitoring and monitoring for BMP effectiveness are also requirements in non-municipal NPDES permits.[56]

The mercury requirements and PCBs requirements in Provisions C.11.c and C.12.c, respectively, are generally applicable and do not discharge a governmental function of providing services to the public. Provisions C.11.c and C.12.c implement the San Francisco Bay and Guadalupe River Watershed[57] Mercury TMDLs and the San Francisco Bay PCBs TMDL. Under the TMDLs, local, state, and private entities alike have wasteload allocations and are required to reduce their discharges of PCBs and mercury. The San Francisco Bay Mercury TMDL has wasteload allocations for stormwater runoff, wastewater from refineries and other industrial dischargers, and publicly-owned treatment works,[58] and the PCBs TMDL has wasteload allocations for industrial wastewater discharges, municipal discharges, stormwater, and the Central

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[55] NPDES permits for wastewater discharges generally require permittees to monitor specific parameters at designated locations to demonstrate compliance with effluent limitations, discharge specifications, and other permit requirements. (See, e.g., NPDES Permit for Martinez Refining Company, S.F. Bay Water Board Order R2-2022-0034, Attachment E, pp. E-2, E-7 to E-8 [requiring monitoring of pollutants in stormwater], NPDES Permit for Chevron Products Co. Richmond Refinery, S.F. Bay Water Board Order R2-2023-0025, Attachment E, pp. E-2, E-7 to E-9 [requiring monitoring of pollutants in stormwater discharges]). Such other requirements included receiving water limitations that prohibit the discharge from causing a violation of water quality standards adopted by the S.F. Bay Water Board or the State Water Board. (See, e.g., NPDES Permit for Martinez Refining Co., *supra*, R2-2022-0034, p. 11, NPDES Permit for Chevron Products Co., *supra*, R2-2023-0025, p. 11.) For the Commission's awareness, the Water Boards note the U.S. Supreme Court recently held that Clean Water Act section 301(b)(1)(C) did not authorize U.S. EPA to include "end-result requirements" in an individual wastewater NPDES permit issued to the City and County of San Francisco. (*City and County of S.F. v. U.S. EPA* (2025) 145 S.Ct. 704.) The decision does not affect the validity of receiving water limitations in MRP 3 (or MRP 2), and accordingly, the decision does not have an impact on any issue that is before the Commission.

[56] See, e.g., NPDES General Permit for Discharge of Residual Fireworks Pollutants from Public Fireworks Displays (S.F. Bay Fireworks Permit), S.F. Bay Water Board Order R2-2020-0021, pp. 7–8 (requiring BMPs to collect, control, and remove fireworks debris and requiring visual monitoring to assess BMP performance); NPDES General Permit for Fireworks (L.A. Fireworks Permit), L.A. Water Board Order R4-2023-0180, Attachment E, pp. E-1 to E-2 (requiring visual monitoring for debris from fireworks); NPDES General Permit for Storm Water Discharges Associated with Industrial Activities (IGP), State Water Board Order WQ 2014-0057-DWQ, as amended by Order WQ 2015-0122-DWQ and 2018-0028-DWQ, p. 43 (requiring visual monitoring for trash/debris); General WDRs for Vineyard Properties, *supra*, Order R2-2017-0033, pp. 13, E-2 (requiring monitoring for BMP effectiveness) NPDES Permit for Martinez Refining Co., *supra*, Order R2-2022-0034, pp. 16 (requiring evaluation of effectiveness of control actions for copper and cyanide), S-5 (requiring assessment of effectiveness of BMPs to reduce or prevent pollutants in industrial stormwater discharges).

[57] The concentration-based wasteload allocation for urban stormwater runoff in the Guadalupe River Watershed Mercury TMDL is implemented through the implementation of the San Francisco Bay Mercury TMDL and the regional MS4 permit. (*Supra*, fn. 20.)

[58] See Basin Plan, ch. 7.2.2.4, tables 7.2.2-1 through 7.2.2-5.

Valley watershed.[59] Highlighting the general applicability of the TMDL requirements, both industrial and municipal discharges of wastewater are subject to a region-wide permit that implements the wasteload allocations for wastewater in the respective TMDLs.[60] Under the region-wide permit, wastewater dischargers are required to achieve load reductions by complying with effluent limitations and implementing source control programs to reduce the PCBs and mercury loads entering their treatment systems.[61]

Requirements to prepare BMP reports,[62] maps,[63] and climate adaptation plans[64] are also imposed on private entities and do not provide a service to the public.

2. The challenged provisions are not new programs or higher levels of service

To the extent the Commission determines that the challenged provisions are programs, the provisions are not new or a higher level of service. "A program is 'new' if the local government entity had not previously been required to institute it."[65] A "higher level of service" means "state mandated increases in the services provided by local agencies in existing 'programs.'"[66] A higher level of service is not simply any increase in costs: "If the Legislature had intended to continue to equate 'increased level of service' with 'additional costs,' then the provision would be circular: 'costs mandated by the state' are defined as 'increased costs' due to an increased level of service, which, in turn would be

[59] See Basin Plan, ch. 7.2.3.5, tables 7.2.3-3 through 7.2.3-5
[60] NPDES Permit and Waste Discharge Requirements for Mercury and PCBs from Municipal and Industrial Wastewater Discharges to San Francisco Bay (Mercury and PCBs Watershed Permit), S.F. Bay Water Board Order R2-2022-0038.
[61] Mercury and PCBs Watershed Permit, *supra*, pp. 11–17, 20, F-33.
[62] See, e.g., S.F. Bay Fireworks Permit, *supra*, Order R2-2020-0021, pp. 6–8 (requiring dischargers to prepare and implement a BMP Plan); L.A. Fireworks Permit, *supra*, Order R4-2023-0180, pp. 8–10 (same); NPDES General Permit for Discharges from Dry Dock Operations, S.F. Bay Water Board Order R2-2023-0007, pp. 10–11 (same).
[63] See, e.g., NPDES Permit for Martinez Refining Co., *supra*, Order R2-2022-0034, Attachment S, p. S-3 (requiring discharger to prepare a site map); General WDRs for Vineyard Properties, *supra*, Order R2-2017-0033, Attachment A, p. A-2 (requiring dischargers to prepare a vineyard base map); IGP, *supra*, Order WQ 2014-0057-DWQ, as amended by Order WQ 2015-0122-DWQ and 2018-0028-DWQ, pp. 30–31 (requiring dischargers to prepare a site map).
[64] See, e.g., Amendment of WDRs for Oceanfront and Bayfront Landfills and Industrial Facilities for Long-Term Flood Protection Requirements, S.F. Bay Water Board Order R2-2024-0002, pp. 7–8 (requiring dischargers to submit a plan that identifies strategies for long-term protection of the site from inundation due to sea-level rise, groundwater rise, and extreme climate events); NPDES Permit for Southern California Edison Decommissioning of San Onofre Nuclear Generating Station, San Diego Regional Water Quality Control Board Order R9-2023-0011, as amended by Order R9-2025-0002, Attachment E, p. E-33 (requiring submittal of a Climate Change Action Plan); Water Code Section 13383 Order Requiring Submittal of Information on Climate Change Adaptation for Refineries (Jan. 8, 2021) (requiring refineries to submit reports evaluating risks to facilities due to climate change and proposed plan to mitigate or avoid the risks).
[65] *County of L.A. v. Com. on State Mandates* (2003) 110 Cal. App.4th 1176, 1189.
[66] *Dept. of Finance v. Com. on State Mandates* (2021) 59 Cal.App.5th 546, 556 (quoting *County of L.A. v. State of California* (1987) 43 Cal.3d 46, 56).

defined as 'additional costs.'"[67] A higher level of service does not equal "every increase in a locality's budget resulting from compliance with a new state directive."[68] Nor does every increase in specificity about where to direct costs amount to a higher level of service.[69] To determine whether a challenged provision is new or a higher level of service, the requirement is compared to the legal requirements in effect before the new permit went into effect, including MRP 2.[70] The challenged provisions continue the stormwater controls in the previous permit to reduce pollutants to the MEP, to prohibit non-stormwater discharges, and to require monitoring to ensure compliance with the MRP 3 requirements. These provisions are not new to MRP 3. Some of the provisions refine existing requirements and result in additional costs, but they are not a higher level of service either. Specific arguments as to why the challenged provisions are not a new program or higher level of service follow.

a) Provisions C.3.b.ii.(4) (road projects that create 5,000 square feet or more of contiguous impervious surface), C.3.b.ii.(5) (road reconstruction projects), and C.3.j.ii.(2)(a)–(j) (numeric retrofit requirements for green infrastructure projects)

As Union City acknowledges, Permittees were previously required to implement low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for "regulated projects."[71] Under MRP 2, "regulated projects" included enumerated "road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface that fall under the building and planning authority of a Permittee."[72] MRP 3 continues to require Permittees to implement LID requirements for the same enumerated road projects, except that it applies to road projects that create 5,000 square feet or more of newly constructed continuous impervious surface.[73] The change in square footage will increase the number of road projects that are subject to the LID requirements and will increase costs. However, an increase in costs alone is not sufficient to establish a new program or higher level of service. The change does not require Permittees to do anything new or to provide a higher level of service compared to the actions required under MRP 2.

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[67] *County of L.A. v. Com. on State Mandates*, *supra*, 110 Cal.App.4th at 1191. See also Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, p. 211.
[68] *County of L.A. v. Com. on State Mandates*, *supra*, 110 Cal.App.4th at p. 1194; accord *San Diego Unified School Dist. v. Com. on State Mandates* (2004) 94 Cal.4th 859, 876–77.
[69] *County of L.A. v. Com. on State* Mandates, *supra*, 110 Cal.App.4th at p. 1194 (requiring that local law enforcement agencies devote some of their training budgets to domestic violence training was not higher level of service),
[70] *Dept. of Finance v. Com. on State Mandates* (2022) 85 Cal.App.5th 535, 559.
[71] Test Claim 22-TC-07, p. 5.14.
[72] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.3.b.ii(4).
[73] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.3.b.ii(4).

In its decision on MRP 1, the Commission found that the requirement to select and clean hot spots was not a new requirement or higher level of service—

> [A]ll Permittees were required to clean trash hotspots under prior law and this requirement is not new. Although they may be required to select and clean additional high trash hotpots and incur increased costs to meet the "one trash hot spot per 30,000 population" requirement and to reduce trash loads as required by the permit, increased costs alone are not determinative of whether Sections C.10.b.i. and C.10.b.ii. impose a reimbursable state-mandated program under article XII B, section 6.1 The requirement to clean selected trash hotspots is not new. Moreover, under the Permittees' prior permits, if trash problems persisted and exceeded the water quality standards in the Basin Plan and the discharge prohibitions and receiving water limitations of their prior permits, which they did, then the Permittees were required by prior law to perform *additional* BMPs and monitoring to prevent or reduce the pollutants causing or contributing to the exceedance in water quality standards.[74]

Like the trash hot spots, the reduction from 10,000 square feet to 5,000 square feet may result in additional projects subject to the LID requirements and additional costs, but the required actions are not new. The same reasoning applies to road reconstruction projects under Provision C.3.b.ii(5). Although this is a new type of "regulated project" that expands the range of projects subject to the LID requirements, it does not impose a new program or higher level of service on the Permittees.

Likewise, the requirement to implement green infrastructure projects for projects that are not "Regulated Projects" to meet the numeric targets under Provision C.3.j.ii(2)(a) is not new or a higher level of service. Permittees were required to implement green infrastructure projects under MRP 2,[75] and they were required to establish retrofit

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[74] Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, p. 292 (italics in original).

[75] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.3.c ("LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes."), C.3.j (requiring Permittees to develop and implement a Green Infrastructure Plan for the inclusion of LID drainage design into storm drain infrastructure), C.11.c (requiring Permittees to implement green infrastructure projects to achieve mercury load reductions), C.12.c (requiring the same for PCBs). See also MRP 2, *supra*, Glossary (defining "Green Infrastructure" as "Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At

targets in their Green Infrastructure Plans.[76] While Provision C.3.j.ii(2)(a) may increase the number of green infrastructure projects required, the underlying requirements are the same.

b) Provision C.3.j.ii.(1)(a)–(g) (continued implementation of Green Infrastructure Plan and any necessary updates to the plan)

MRP 2 required Permittees to "complete and implement a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands" and specified what the Permittees were required to include in the plan.[77] Union City submitted their Green Infrastructure Plan as required.[78] Provision C.3.j.ii(1)(a)–(g) requires Permittees to continue to implement their Green Infrastructure Plans and to update or supplement their plans "as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned" based on enumerated tasks.[79] The Permittees are required to include any necessary plan updates as part of their annual report.[80] Under 40 C.F.R. section 122.42(c), Permittees are required submit an annual report that includes the status of implementing components of their stormwater management program that are established as permit conditions and any proposed changes to those controls. Additionally, as part of their permit application, Permittees are required to describe their existing legal authority to control discharges to the MS4 and to demonstrate that they have the legal authority to require compliance with conditions in ordinances, permits, contracts, or orders.[81] The challenged provision falls within the scope of what was already required under MRP 2 and existing law—it is not new or a higher level of service.

Union City specifically claims that it incurred expenses because Alameda Countywide Clean Water Program "updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with [Provision C.3.j.ii.(1)(a)–(g)]."[82] Provision C.3.j.ii.(1)(a)–(g) does not require Permittees to update their tracking system. Moreover, it is not a new program or higher level of service. MRP 2 required Permittees to "develop and implement regionally-consistent methods to track and report

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the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water."

[76] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.3.j.ii(2)(c). See also City of Union City Final Green Infrastructure Plan (Sept. 2019), pp. 6–7.

[77] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.3.j.i, C.3.j.ii(2).

[78] City of Union City Final Green Infrastructure Plan (Sept. 2019).

[79] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provisions C.3.j.i and C.3.j.ii(1).

[80] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.3.j.v(2), (4).

[81] 40 C.F.R. § 122.26(d)(1)(ii), (d)(2)(i)(E).

[82] Test Claim No. 22-TC-07, p. 5.15.

implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions."[83] Provision C.3.j.v(1) in MRP 3—a provision not challenged by Union City—requires Permittees to "*continue to implement* the *existing* regionally-consistent tracking and mapping tools *developed pursuant to Provision C.3.j.i.(2).(d) of the Previous Permit* to track and report implementation of green infrastructure measures."[84]

c) Provision C.3.j.ii.(4) (optional Technical Working Group to develop long-term GSI goals and recommend long-term reductions)

Provision C.3.j.ii.(4) is not a mandate, state or otherwise. The provision provides that "[t]he Permittees and their representatives *may*, together with Water Board staff and impartial science experts . . ., collectively form a Technical Working Group (TWG) to discuss long-term green infrastructure goals and recommend long-term percentage reduction in Permittees' impervious surfaces, at individual, countywide, and regional scales."[85] The key word here is "may." May is not mandatory; it is permissive.[86] The Permit does not require Permittees to form a Technical Working Group—the Permittees may choose to do so, but the Permit does not mandate it.

d) Provision C.5.f (identify information missing from MS4 maps and update maps)

Union City challenges the portion of Provision C.5.f that requires Permittees to "identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition." The provision does not require Permittees to collect new information on each characteristic and condition of their storm sewer system listed in Provision C.5.f; rather, it requires Permittees to consider potential opportunities to identify those characteristics when developing their plan to update MS4 maps.[87] This requirement is not a new program or higher level of service.

As required by 40 C.F.R. section 122.26(d)(1)(iii), the Permittees must include a topographic map in their application identifying the location of known MS4 outfalls that discharge to waters of the U.S., a description of land use activities and population

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[83] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.3.j.v(1).
[84] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.3.j.v(1) (italics added).
[85] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.3.j.ii.(4) (italics added).
[86] Black's Law Dict. (12th ed. 2024) (defining "may" as "To be permitted to"); see also Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, p. 294, n. 1226, citing Water Code, § 15 ("'Shall' is mandatory and 'may' is permissive.").
[87] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Response to Comments on Tentative Order, p. 375.

densities within the drainage area, the location of municipal landfills, the location of discharges to the MS4 authorized by an NPDES permit, location of major structural controls for stormwater discharge, and identification of public parks and other open spaces.[88] The Permittees must also identify the location of any major outfall[89] that is not identified in the required map.[90] Requiring Permittees to update maps to include information that is missing is not a new program or higher level of service—it is a requirement to do what is already required by existing law.

e) *Provisions C.8.d (LID Monitoring Plans), C.8.e.ii.(1), (2) (trash monitoring), and C.8.f (pollutant of concern monitoring for compliance with receiving water limitations)*

The challenged monitoring provisions are not new programs or higher levels of service. Under the Clean Water Act, the Water Boards must include conditions in NPDES permits to assure compliance with permit limitations, including conditions on data and information collection (i.e., monitoring) and reporting.[91] Additionally, under the Clean Water Act implementing regulations, a stormwater permit must establish the "type, intervals, and frequency [of monitoring] sufficient to yield data which are representative of the monitored activity."[92] An NPDES permit is unlawful if a permittee is not required to monitor its discharges in a manner sufficient to comply with the permit.[93]

In its rejection of challenges to monitoring requirements in MRP 1, the Commission recognized that "[f]ederal law has long required NPDES permits include conditions to achieve water quality standards and objectives, including monitoring requirements sufficient to ensure water quality standards are met."[94] As in MRP 2 and previous permits, MRP 3 includes monitoring requirements that continue to establish the type, interval, and frequency of monitoring to yield data that are representative of the monitored activity and are necessary to assure compliance with permit limitations and

[88] 40 C.F.R. § 122.26(d)(1)(iii)(B).
[89] A "major outfall" is "a municipal separate sewer outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive storm water from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more)." (40 C.F.R. § 122.26(b)(5), (6).)
[90] 40 C.F.R. § 122.26(d)(2)(ii).
[91] 33 U.S.C. § 1342(a)(1); see also 40 C.F.R. § 122.44(i)(1).
[92] 40 C.F.R. § 122.48(b).
[93] *Natural Resources Defense Council, Inc. v. County of L.A.* (2013) 725 F.3d 1194, 1207.
[94] Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, p. 179.

water quality standards.[95] MRP 2 also required monitoring to assess the effectiveness of control measures,[96] which MRP 3 continues to require.

(1) LID and trash monitoring requirements are not new programs or higher levels of service

MRP 2 included monitoring and reporting requirements for LID and trash. Under MRP 2, Permittees were required to submit various LID reports[97] and to implement an Operation and Maintenance Verification Program that included Permittee inspections of installed LID stormwater treatment systems and reporting on results of inspections, including findings of whether the system was operating properly and whether enforcement action was taken.[98] Under MRP 2, Permittees were also required to demonstrate trash reduction outcomes.[99] As part of that requirement, Permittees were required to perform visual monitoring on land to assess the effectives of trash control actions.[100] Permittees were also required to conduct receiving water monitoring and develop a monitoring program to answer the following questions:

- Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
- Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
- Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
- Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?[101]

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[95] See MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, p. 185 ("Consistent with the federal regulations, water quality monitoring requirements in Provision C.8 require specific monitoring that will yield data that is both representative of the monitored activity and necessary to assure compliance with the requirements of the Permit, . . .").

[96] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.8.h.iii.(4)(b) (requiring evaluation of effectiveness of existing control measures in Urban Creeks Monitoring Report), C.9.g.i (requiring evaluation of effectiveness of pesticide control measures), C.10.b.ii.b (requiring visual monitoring to determine or verify the effectiveness of trash management actions); C.14.c (requiring the City of Pacifica and San Mateo County to evaluate effectiveness of BMPs implemented to control bacteria).

[97] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.3.b.iv, C.3.c.ii, C.3.h.v, and C.3.j.v.

[98] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.3.h.i, ii, iv.

[99] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.b

[100] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.b.ii.b.

[101] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.b.v. See also MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, p. 25 ("trash monitoring requirements have been moved to Provision C.8 from Provision C.10. While they have been updated to reflect next steps based on work the Permittees completed during MRP 2, they are expected to involve a similar level of effort and cost.")

The management and monitoring questions for trash monitoring under MRP 3 track and refine those in MRP 2:

- Have Permittees' trash control actions effectively prevented trash within Permittees' jurisdiction from discharging into receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?
- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?[102]

MRP 3 continues to require Permittees to monitor the effectiveness of LID and trash control measures. The LID and trash monitoring requirements are not new and do not require a higher level of service.

Furthermore, the San Francisco Bay Water Board eliminated monitoring requirements from MRP 2 that required Permittees to conduct creek status monitoring[103] and stressor/source identification projects[104] to allow Permittees to redirect resources to LID and trash monitoring.[105] With the removal of the other monitoring requirements, total monitoring costs under MRP 3 are expected to be consistent with MRP 2 costs.[106] Under Government Code section 17556, subdivision (e), there are no costs mandated by the state if—as is the case here—the executive order provides for offsetting savings to the local agencies that result in no net costs to the local agencies.[107]

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[102] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, p. 205.
[103] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.d.
[104] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.e.
[105] See MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, p.183; see also *id.*, p. 24 ("while Provision C.8, Monitoring, incorporates certain revised monitoring expectations, they are expected to result in costs similar to those incurred by the Permittees during MRP 2, including for monitoring conducted pursuant to Provision C.10, which has been moved into Provision C.8. That is because while some monitoring has been maintained (e.g., pesticides and pollutants of concern monitoring) or added (e.g., green stormwater infrastructure monitoring), other monitoring expectations were removed (e.g., creek status monitoring) and replaced with monitoring that is expected, overall, to have similar total costs.").
[106] *Ibid.*
[107] Gov. Code, § 17556, subd (e).

(2) Monitoring for compliance with receiving water limitations is not a new program or higher level of service

In addition to the trash and LID monitoring, Union City claims that pollutants of concern (POC) monitoring to address compliance with receiving water limitations is new—it is not. In its decision on MRP 1, the Commission explained that Permittees were required to monitor for compliance with receiving water limitations even before MRP 1:

> All prior permits required compliance with water quality standards and objectives and imposed monitoring requirements to ensure water quality standards were met as required by federal law. Specifically, like the test claim permit, the prior permits contain discharge prohibitions and receiving water limitations that required the permittees to effectively prohibit the discharge of non-stormwater into the storm drain systems and required discharges shall not cause or contribute to a violation of any applicable water quality standard or objective for the receiving waters that were contained in the Regional Board's Basin Plan. * * *
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> To ensure compliance with these water quality objectives, all prior permits had monitoring requirements to 1) assess the existing or potential adverse impacts on beneficial uses caused by pollutants of concern in stormwater discharges, including an evaluation of representative receiving waters; 2) identify potential sources of pollutants in stormwater discharge; and 3) evaluate the effectiveness of representative stormwater pollution prevention or control measures. And all permittees were required to conduct monitoring activities using physical, chemical, and biological parameters and indicators. * * *
>
> In addition, as indicated above, all prior permits required that a discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters contained in the Regional Board Basin Plan. Section C.1. of the prior permits further required that upon determination by either the discharger or the Regional Board that discharges are causing or contributing to an exceedance of an applicable water quality standard, the discharger was required to promptly notify and thereafter submit a report to the Regional Board describing the BMPs currently implemented and additional BMPs that will be implemented to prevent or reduce any pollutants that are causing or contributing to the exceedance of water quality standards. Following approval of the report, the permittees had to revise their management plan and monitoring program to incorporate the approved modified control measures and "any additional monitoring required" and implement those plans and programs. These procedures

> had to be repeated if exceedances continued and the Regional Board or EPA required additional control measures and BMPs.
>
> Although the prior permits did not explicitly identify the procedures for determining the source of the pollutant that may be causing or contributing to an exceedance, the prior permits expressly required the permittees "to identify potential sources of pollutants in stormwater discharges" and to assess the existing or potential adverse impacts on beneficial uses caused by pollutants of concern. Identifying the pollutant and the source of the pollutant is required in order to comply with the receiving water limitations "to prevent or reduce any pollutants that are causing or contributing to an exceedance of water quality standards."[108]

The Commission's reasoning extends here. Permittees were required to conduct POC monitoring under MRP 2.[109] Although MRP 2 did not specifically identify "Compliance with Receiving Water Limitations" as a priority POC management information need, Permittees were required to use POC monitoring data to assess compliance with receiving water limitations. Provision C.8.h in MRP 2 required Permittees to notify the San Francisco Bay Water Board if "data collected pursuant to C.8.a.-C.8.g. indicate[d] that discharges [were] causing or contributing to an exceedance of an applicable water quality standard."[110] Additionally, Permittees were required to include an assessment of compliance with applicable water quality standards in all monitoring reports under Provision C.8.[111] Under MRP 2, Permittees were required to submit reports on water quality monitoring activities to "provide information useful in evaluating compliance with all Permit requirements,"[112] including receiving water limitations that prohibited the discharge from causing or contributing to applicable water quality standards for receiving waters.[113] Finally, MRP 2 also required Permittees to conduct creek status

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[108] Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, pp. 179–182, 186–187 (fns. omitted) (original italics).

[109] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.f. POC monitoring was also required under MRP 1. (See MRP 1, S.F. Bay Water Board Order R2-2009-0074, Provision C.8.e.)

[110] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.h.i. Although the provision in MRP 2 does not specifically refer to the receiving water limitations, the use of "water quality standards" necessarily turns on the state of the receiving waters. "***Water quality standards*** are provisions of State or Federal law which consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act." (40 C.F.R. § 131.3(i).) Furthermore, Provision C.8.h.i in MRP 2 requires Permittees to submit a follow-up report in accordance with Provision C.1 requirements, which addressed compliance with discharge prohibitions and receiving water limitations. (MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.h.i; see also MRP 2, Provision C.1.) MRP 1 also included the same requirement. (See MRP 1, S.F. Bay Water Board Order R2-2009-0074, Provision C.8.g.i.)

[111] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.h.vi.

[112] MRP 2, Bay Water Board Order R2-2015-0049, Fact Sheet, p. A-80.

[113] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision B.2.

monitoring to "assess the chemical, physical, and biological impacts of urban runoff on receiving waters" to determine whether water quality objectives were being met in receiving waters and whether receiving waters were supportive of beneficial uses.[114] As part of the creek status monitoring, Permittees were required to collect samples from receiving waters at a specified frequency and analyze the samples (including fecal bacteria indicator) using a specified method.[115]

Like the previous permits, MRP 3 includes receiving water limitations that prohibit the discharge from causing or contributing to a violation of any applicable water quality standard or objective for the receiving waters.[116] And MRP 3 continues to require Permittees to monitor to assess compliance with the receiving water limitations. Even if the frequency and analytes may vary, the actions are not new—Permittees were required to monitor for compliance with receiving water limitations under previous permits and existing federal law. POC monitoring for compliance with receiving water limitations is not a new program or a higher level of service.

None of the challenged monitoring requirements are a new program or higher level of service.

f) Provisions C.10.a.i (extension of 100% trash load reduction deadline with an accompanying 90% load reduction deadline), C.10.a.ii (trash capture for private lands draining to the system; trash generation map); C.10.d, C.10.e (optional Trash Impracticability Report and requirements if Permittees elect to prepare a report)

The challenged trash requirements are not new. The Clean Water Act requires MS4 permits to include a requirement to effectively prohibit non-stormwater discharges—including trash—to storm sewers.[117] The Basin Plan includes a prohibition on the discharge of rubbish, refuse, and other solid wastes to surface waters or any place where they could be transported to surface waters that has been in effect since 1975.[118] The State Water Board's Trash Provisions prohibits the discharge of trash statewide, and provides implementation requirements and a time schedule for MS4s to come into compliance with the discharge prohibition.[119] Like the previous permit, MRP 3 continues to implement the non-stormwater prohibition, the Basin Plan prohibition, and the Trash

[114] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.d.
[115] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.8.d.i to v.
[116] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision B.2.
[117] 33 U.S.C. § 1342(p)(3)(B)(ii).
[118] Basin Plan, ch. 4.2, table 4-1, Prohibition 7.
[119] State Water Board, Final Staff Report for Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Apr. 7, 2015), p. 10.

Provisions[120] by providing Permittees with a reasonable timeline to cease their discharge of trash.

(1) Extension of existing trash load reduction deadline is not a new program or higher level of service

MRP 2 required Permittees to implement control measures to reduce trash discharges from 2009 levels by 70% by July 1, 2017, and by 80% by July 1, 2019, to reach 100% trash load reduction by July 1, 2022.[121] MRP 3 relaxes the MRP 2 requirements by providing a three-year extension of the deadline for 100% trash load reduction. The Permittees—including the Alameda Countywide Clean Water Program (Alameda Program), in which Union City is a member agency—asked for an extension of the 100% reduction deadline for various reasons, including delays due to the COVID-19 pandemic.[122] So, instead of requiring 100% reduction by July 1, 2022, MRP 3 provides Permittees until July 30, 2025, to meet the 100% reduction requirement established under MRP 2 and MRP 1. MRP 3 includes a 90% reduction deadline of June 30, 2025, a date that extends beyond the original 100% reduction deadline of July 1, 2022, and would not have been needed but for the extension. The load reduction deadlines are not a new requirement or a higher level of service. MRP 3 delays an existing requirement and provides the same level of service of ultimately reaching 100% trash load reduction.

(2) Requirement for a plan of additional trash controls that is triggered by failure to meet the 90% reduction deadline is not a new program or higher level of service

Under MRP 2, Permittees that did not achieve a 60 percent reduction by July 1, 2016, were required to submit a plan and schedule of implementation for additional trash control actions that would attain the 70% load reduction by the July 1, 2017, deadline.[123] Provision C.10.a.i in MRP 3 continues this requirement by requiring a plan and schedule of implementation for additional trash control actions if Permittees do not meet the 90% compliance deadline. Moreover, like the 90% load reduction deadline, this requirement would not have been necessary but for the Permittees' request for an extension of the 100% load reduction deadline. This is not a new program or higher level of service.

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[120] The Trash Provisions were not in effect when the San Francisco Bay Water Board adopted MRP 2, but the Board acknowledged that the trash requirements in the permit were consistent with the pending provisions. See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Fact Sheet, p. A-87.

[121] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.10.a, C.10.a.i. See also MRP 1, S.F. Bay Water Board Order R2-2009-0074, Provision C.10 (establishing requirement to reduce trash loads by 70% by 2017 and by 100% by 2022).

[122] See, e.g., Alameda Countywide Clean Water Program NPDES Permit Application and Report of Waste Discharge (ROWD), Attachment B, p. 2; Santa Clara Valley Urban Runoff Pollution Prevention Program NPDES Permit Application and ROWD, Attachment 5, p. 21; San Mateo Countywide Water Pollution Prevention Program, NPDES Permit Application and ROWD, p. 98; see also MRP 3, S.F. Bay Water Board Order R2-2022-0018, Response to Comments on Tentative Order, p. 68.

[123] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.a.i.

(3) Continuing requirement to equip private drainage areas with full trash capture systems or equivalent control actions is not a new program or higher level of service

The trash control requirements in C.10.a.ii.b for private land drainage areas are not a new program or higher level of service. MRP 2 required Permittees to "ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems."[124] MRP 3 continues this requirement in Provision C.10.a.ii.b, using the term "private lands" and adding a deadline of July 1, 2025. The change in terminology and the addition of a deadline does not change the underlying actions that were required under MRP 2. This is not a new program or a higher level of service.

(4) Requirement to update Trash Generation Maps is not a new program or higher level of service

The mapping requirements in C.10.a.ii are not a new program or a higher level of service. In 2014, Permittees submitted Trash Generation Area Maps that mapped trash management areas within their jurisdiction based on the 2009 trash levels.[125] The 2014 maps delineated trash generation areas in the Permittees' jurisdictions into the categories of Low, Moderate, High, and Very High, and showed trash management areas where full trash capture devices, or other controls, would be implemented.[126] MRP 2 provided Permittees with an opportunity to submit corrections or revisions to the 2014 maps with their 2016 annual report.[127] MRP 2 also required Permittees to submit a map (or otherwise record the location) by July 1, 2018, of all private land areas greater than 10,000 ft^2 within very high, high, and moderate trash generation areas that are plumbed directly into the Permittees' storm drain systems and include the status of trash control in those areas.[128] MRP 3 requires Permittees to update their Trash Generation Area Map to include trash management areas and private land drainage areas that will be retrofitted with full trash capture systems or the equivalent. This requirement is a continuation of actions required under MRP 2; it is not a new program or a higher level of service.

[124] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.a.ii.b.
[125] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.a.ii; MRP 2, Fact Sheet, p. A-91.
[126] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.a.ii.
[127] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.a.ii.
[128] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.10.a.ii.b.

(5) The option to submit a Trash Impracticability Report is not a mandate

The trash impracticability report under Provision C.10.e is optional: "Permittees *may* collectively submit a programmatic report by March 31, 2023, for the approval of the Executive Officer, that describes conditions under which it is impracticable to control trash via full trash capture devices."[129] It is not a mandate.[130] If a Permittee chooses to submit a trash impracticality report, that triggers the requirement under Provision C.10.e.iv to use the report to update the Trash Load Reduction Workplans. The requirements that apply if the Permittees choose to prepare a trash impracticability report are not mandates.[131]

g) *Provisions C.11.c and C.12.c (implement control measures to treat old industrial land at 70% efficiency or equivalent for mercury and PCBs)*

NPDES permits must include water quality-based effluent limitations in NPDES permits that are "consistent with the assumptions and requirements of any available wasteload allocations."[132] Water quality-based effluent limitations for MS4 permits may be expressed as BMPs or similar requirements that are consistent with the TMDL, rather than as numeric effluent limitations.[133] Consistent with the federal requirement, MRP 2 included provisions to make progress toward achieving the wasteload allocations in the San Francisco Bay and Guadalupe River Watershed Mercury TMDLs and the San Francisco Bay PCBs TMDL.[134] Among those provisions, MRP 2 required Permittees to implement mercury and PCBs control measures in areas where benefits were most likely to accrue and to report in their annual reports the control measures being implemented and that would be implemented.[135] As part of their source control measures for mercury and PCBs under MRP 2, the Alameda Program implemented a source area and abatement program under which they addressed PCBs in old industrial land use areas:

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[129] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.10.e.
[130] See *supra* p. 15, fn. 86.
[131] See *Dept. of Finance v. Com. on State Mandates* (2003) 30 Cal.4th 727, 745 (finding that requirements for an education program were not a state mandate if a school district elected to participate in the voluntary program underlying the requirements); see also Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, pp. 75–80.
[132] 40 C.F.R. § 122.44(d)(1)(vii)(B).
[133] U.S. EPA, Revisions to the November 22, 2002, Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" (Nov. 26, 2014) p. 4.
[134] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.11 and C.12.
[135] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.11 and C.11.a.iii.

> Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels and are being transported to the MS4. . . .
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> Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the Regional Water Board for investigation and abatement.[136]

MRP 3 continues the MRP 2 requirement by requiring Permittees to implement control measures in areas where benefits are most likely to accrue (i.e., old industrial areas) to make progress toward achieving the wasteload allocations in the respective TMDLs and report on the control measures in their annual reports. Based on monitoring data, the San Francisco Bay Water Board identified old industrial areas as high PCBs-yielding watersheds and thus areas where load reduction benefits are most likely to accrue.[137] The requirement to implement control measures to meet wasteload allocations in the TMDLs is not new and does not provide a higher level of service. The wasteload allocations are the level of service that will be provided by the control measures, and those allocations were established in the TMDLs and included in MRP 2.

h) *Provision C.12.a (continue to quantify and report PCB load reductions, and refine assessment framework as necessary)*

Under MRP 2, Permittees were required to develop, document, and implement an assessment methodology and data collection program to quantify PCB loads reduction to demonstrate progress toward achieving load reductions to meet TMDL wasteload allocations.[138] Permittees were required to report on their progress in their annual

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[136] Alameda Countywide Clean Water Program, Report of Waste Discharge, Supplemental Information to Form 200 of the Report of Waste Discharge, pp. 16–17; Alameda Countywide Clean Water Program, FY 2019–20 Annual Report, Appendix O (Alameda County PCBs and Mercury Control Measure Plan and Reasonable Assurance Analysis Report), pp. 9–12. See also Contra Costa Clean Water Program, Annual Report, FY 2019–2020, Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis, Attachment 12.1, p. xi ("Enhanced O&M generally means increasing the frequency that sediment is removed from storm drain catch basin inserts, or increasing street sweeping frequencies. Permittees began enhanced O&M measures in 2017-18, resulting in the 0.004 g / year pf PCBs reduced shown in Table ES-1. Permittees will continue to perform enhanced O&M at current levels and will consider expanding enhanced O&M in Old Industrial areas and / or near source property areas.")

[137] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, pp. 223–24, 279–80. See also, e.g., Alameda Countywide Clean Water Program, Annual Report, FY 2019–2020, Source Control Load Reduction Accounting, Appendix N, p 3 ("PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas."); Contra Costa Clean Water Program, Annual Report, FY 2019–2020, p. 12-1 ("Previous studies indicate that old industrial areas are the most likely land use type to contain high PCBs concentrations.")

[138] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.12.b.i.

reports, including the submittal of supporting data to substantiate load reduction estimates and any necessary refinements in the assessment methodology to assess load reductions in the subsequent permit (i.e., MRP 3).[139] Provision C.12.a in MRP 3 continues to require Permittees to implement the assessment and data collection program, to report PCB load reductions in their annual reports, and to submit any necessary refinements to the assessment framework. This requirement is not new and does not provide a higher level of service.

i) *Provision C.15.b.iii (Firefighting Discharges Working Group and Firefighting Discharges Report)*

Provision C.15.b.iii is not a new program or a higher level of service. In accordance with the Clean Water Act, MRP 2 required Permittees to effectively prohibit the discharge of non-stormwater (i.e., materials other than stormwater) into the MS4s and watercourses.[140] MRP 2 conditionally exempted non-stormwater discharges of potable water from emergency firefighting activities on the condition that Permittees implement (or require firefighting personnel to implement) BMPs for emergency discharges.[141] MRP 3 continues the conditional exemption and includes discharges of foam in the conditional exemption.[142] Provision C.15.b.iii(2) requires the Permittees to convene a regionwide Firefighting Discharges Working Group to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activities. The provision also requires Permittees to collectively submit a Firefighting Discharges Report by September 30, 2025, containing recommendations regarding the implementation of BMPs, standard operating procedures, and resources used for the containment and cleanup of firefighting water and foam discharged during firefighting emergencies.[143] The Firefighting Discharges Working Group and Firefighting Discharges Report will help create administrative efficiencies and reduce costs by allowing Permittees to pool resources and avoid the duplication of work that might occur if Permittees studied these issues individually,[144] and are necessary to carry out the continuing requirement to implement BMPs for discharges associated with emergency firefighting activities.

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[139] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.12.b.iii.
[140] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision A.1.
[141] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.15.b.iii.
[142] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.15.b.iii.
[143] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.15.b.iii(2)(b).
[144] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, p. 320.

j) *Provision C.17.a (BMP report for non-stormwater discharges associated with homelessness to address water quality impacts)*

The BMP report required under Provision C.17.a is not a new program or a higher level of service. Consistent with the Clean Water Act, MRP 2 and previous iterations of the permit required Permittees to effectively prohibit the discharge of non-stormwater to the MS4s.[145] Under MRP 2, if the Permittees or the San Francisco Bay Water Board determined that discharges were causing or contributing to an exceedance of an applicable water quality standard, Permittees were required to submit a report describing controls or BMPs that were being implemented, the level of implementation, and additional controls or BMPs that would be implemented to prevent or reduce the discharge of pollutants that was causing or contributing to the exceedance.[146] MRP 3 continues to require Permittees to effectively prohibit the discharge of non-stormwater to the MS4s.[147] Provision C.17.a more specifically addresses non-stormwater discharges into MS4s associated with unsheltered homeless populations.[148] The unauthorized discharges associated with homelessness impact water quality and public health leading to the need for the BMP report required under Provision C.17.a.[149] BMP reports are not a new program or a higher level of service. Permittees were already required to effectively prohibit non-stormwater discharges and to prepare BMP reports when their BMPs were not effectively controlling the discharge of pollutants and thus impacting water quality.

The requirement to submit a map of the locations of unsheltered homeless populations is not a new program or higher level of service either. Permittees were required to submit maps under MRP 2 and existing federal law.[150]

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[145] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision A.1; see also Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, p. 269 ("like the test claim permit, the prior permits contain discharge prohibitions . . . that required the permittees to effectively prohibit the discharge of non-stormwater into the storm drain systems").

[146] MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.1; see also Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, pp. 186–187 (explaining the process under Provision C.1 in MRP 1).

[147] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision A.1.

[148] MRP 3, S.F. Bay Water Board Order R2-2022-0018, as amended by Order R2-2023-0019, Provision C.17.

[149] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Fact Sheet, pp. 326–328.

[150] See MRP 2, S.F. Bay Water Board Order R2-2015-0049, C.3.g.i, vi (requiring updated hydromodification maps), C.10.a.ii (providing opportunity to update trash maps); C.10.ii.b (requiring map or other recordation of location of private lands plumbed to MS4)]; 40 C.F.R. § 122.26(d)(1)(iii)(B). See also 40 C.F.R. § 122.26(d)(1)(iv)(D).

k) Provision C.20.b (cost-reporting framework and methodology for annual fiscal analysis)

The costs associated with cost-reporting framework and methodology are de minimis and not subject to subvention. In *San Diego Unified School District v. Commission on State Mandates*, the school district challenged two statutes: Education Code sections 48918 and 48915.[151] Section 48918 declared the right of a student to an expulsion hearing and set forth procedures for the hearing.[152] The parties agreed that the statute implemented federal due process law, but the district argued that the statute's requirements for notice, right of inspection, and recording requirements exceeded federal due process requirements.[153] The Supreme Court found that the requirements that exceeded federal law were "designed to make the federal law enforceable and to set forth procedural details that were not expressly articulated in the case law establishing the respective rights" and did not significantly increase the cost of compliance.[154] The court ultimately held that "challenged state rules or procedures that are intended to implement an applicable federal law—and whose costs are, in context, de minimis—should be treated as part and parcel of the underlying federal mandate."[155]

Here, under existing federal law Permittees are required to report on costs in their permit applications: 40 C.F.R. section 122.26(d)(1)(vi) requires "[for] each fiscal year to be covered by the permit, a description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs"; and 40 C.F.R. section 122.26(d)(2)(vi) requires "[for] each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) [characterization data] and (iv) [stormwater management program] of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds." The cost reporting framework and methodology required under Provision C.20.b provides the procedure for reporting costs for the federal requirements and does not significantly increase the cost of compliance. The requirement is intended to implement the federal cost-reporting requirements and part and parcel of them. Thus, any costs associated with Provision C.20.b are de minimis and not subject to subvention.

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[151] *San Diego Unified School Dist. v. Com. on State Mandates* (2004) 33 Cal.4th 859, 868.
[152] *Ibid.*
[153] *Id.* at p. 885.
[154] *Id.* at p. 889.
[155] *Id.* at p. 890.

l) Provision C.21.b (develop and implement an Asset Management Plan and Climate Change Adaptation Report;)

The asset management requirements are not a new program or a higher level of service. Under 40 C.F.R. section 122.41(e), NPDES permittees are required to properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with its permit. The Asset Management Plan and the Climate Change Adaptation Report implement the existing federal requirement to ensure Permittees properly operate and maintain their systems of treatment and control. Without proper planning, assets cannot be properly maintained. The San Francisco Bay Water Board expects Permittees to use the information and data they already have about their own maintenance needs and the condition of their hard stormwater assets to prioritize maintenance and repairs.[156] The intent of this requirement is to ensure that Permittees use their limited resources as efficiently as possible and that improvements or repairs are planned in areas where they are needed most to maintain their treatment and control systems.[157]

B. Government Code section 17556 exceptions apply to require a finding that there a no costs mandated by the state

Even if the Commission determines any of the challenged provisions is a new program or higher level of service, reimbursement is not warranted. Government Code section 17556 sets forth circumstances under which the Commission shall not find costs mandated by the state. Three of the statute's exceptions apply here such that the Commission should find there are no costs mandated by the state: Union City (and the other Permittees) have the authority to levy service charges, fees, or assessments to pay for the challenged provisions; the challenged monitoring and TMDL provisions are mandated by federal law; and MRP 3 provides offsetting savings for the challenged monitoring requirements. The analysis that follows discusses the first two exceptions; the last one is discussed above.[158]

1. There are no costs mandated by the state because Union City has fee authority sufficient to pay for the challenged permit provisions

Article XIII B of the Constitution was not intended to reach beyond taxation and "requires subvention only when the costs in question can be recovered solely from tax revenues."[159] Costs are not mandated by the state when the local agency has "authority to levy service charges, fees, or assessments sufficient to pay for the mandated

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[156] MRP 3, S.F. Bay Water Board Order R2-2022-0018, Response to Comments on Tentative Order, p. 148.
[157] *Ibid.*
[158] The applicability of the third exception (offsetting savings under section 17556, subdivision (e)) is discussed *supra* at pages 18–19.
[159] *County of Fresno v. State of California* (1987) 53 Cal.3d 482, 487.

program or increased level of service."[160] Union City and the other Permittees have the authority to impose charges, fees, or assessments to implement the challenged permit requirements. As such, Government Code section 17556, subdivision (d), precludes reimbursement.

Permittees have authority to levy fees under their general police powers.[161] In addition, Health and Safety Code section 5471, subdivision (a), gives Permittees fee authority for "services and facilities furnished…in connection with [their] water, sanitation, storm drainage, or sewerage system[s]."[162] Similarly, Public Resources Code section 40059, subdivision (a)(1), also confers fee authority on counties, cities, districts, or other local governmental agencies for "[a]spects of solid waste handling which are of local concern, including, but not limited to, frequency of collection, means of collection and transportation, level of services, charges and fees, and nature, location, and extent of providing solid waste handling services."[163]

Local governments may impose regulatory fees provided they do not exceed the reasonable cost of providing the service or benefit for which the fee is charged.[164] It is reasonable for Permittees to collect fees from developers for the costs associated with implementing the mercury, PCBs, LID, and green infrastructure provisions. Indeed, the Town of Moraga imposes a Storm Drainage Fee on new development as "a fair and equitable method of securing some of the revenues necessary to fund the construction and implementation of improvements to the town's storm drainage system sufficient to accommodate storm drainage generated by new development."[165] Similarly, the costs of full trash capture can be allocated to businesses responsible for generating trash. Asking these entities to bear the costs directly related to their activities "is comparable in

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[160] Gov. Code, § 17556, subd. (d).

[161] See Cal. Const., art. XI, § 7; *Freeman v. Contra Costa County Water Dist.* (1971) 18 Cal.App.3d 404, 408 ("It cannot be denied that prevention of water pollution is a legitimate governmental objective, in furtherance of which the police power may be exercised."); *Dept. of Finance v. Com. on State Mandates* (2021) 59 Cal.App.5th 546, 561–562 (holding in part that local governments have the authority sufficient to pay for inspection requirements for commercial and industrial facilities and construction sites to ensure compliance with various environmental regulations in an MS4 permit under their police powers for the prevention of water pollution).

[162] Health & Safety Code, § 5471, subd. (a).

[163] Pub. Resources Code, § 40059, subd. (a)(1)

[164] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1210 (citing *Sinclair Paint Co. v. State Bd. of Equalization* (1997) 15 Cal.4th 866, 876). See also Cal. Const., § XIII C, § 1, subd. (e) (defining "tax" as "any levy, charge, or exaction of any kind imposed by a local government" and providing exceptions to that definition, including charges imposed for governmental services or benefits, charges for regulatory costs of issuing permits and performing inspections, charges imposed as a condition of property development, and property-related fees and assessments under Article XIII D); *Schmeer v. County of L.A.* (2013) 213 Cal. App. 4th 1310, 1326 (finding plastic bag charge retained by businesses not to be a tax).

[165] Moraga Municipal Code, tit. 17, § 17.16.010. See also Moraga Municipal Code, tit. 17 §§ 17.04.020–17.04.050; see also Town of Moraga, Development Impact Fees AB 1600 Annual Report, FY 2023–2024, p. 3, https://www.moraga.ca.us/ArchiveCenter/ViewFile/Item/280, (as of July 14, 2025).

character to similar police power measures imposing fees to defray the actual or anticipated adverse effects of various business operations."[166] Permittees' police powers are "broad enough to include mandatory remedial measures to mitigate the *past, present or future* adverse impact of the fee payer's operations" in situations, like those present here, where there is a causal connection or nexus between the adverse effects and the fee payer's activities.[167]

Union City and the other Permittees may also impose property-related fees for stormwater sewer services.[168] When imposing a property-related fee, California Constitution, article XIII D, section 6(a), requires a local agency to identify parcels subject to a new fee, calculate the fee amount, and provide notice to affected property owners.[169] If a majority of the property owners submit written protests against a stormwater sewer fee, the fee may not be imposed.[170] In *Paradise Irrigation v. Commission on State Mandates*, the court of appeal considered whether this majority protest procedure deprived local agencies of authority to impose fees and ultimately held that it did not.[171] Thus, Union City and the other Permittees have fee authority for the challenged provisions even though a fee is subject to the majority protest procedure.

A property-related fee imposed by a local agency must meet the following requirements:

> (1) Revenues derived from the fee or charge shall not exceed the funds required to provide the property related service.
>
> (2) Revenues derived from the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.
>
> (3) The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.
>
> (4) No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees or charges based on potential or future use of a service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with Section 4.

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[166] *Sinclair Paint Co. v. State Bd. of Equalization, supra,* 15 Cal.4th at 877.
[167] *Id.* at pp. 877–878.
[168] See Cal. Const., art. XIII C, § 1, subd. (e)(7); art. XIII D, § 6.
[169] Cal. Const., art. XIII D, § 6, subd. (a)(1).
[170] Cal. Const., art. XIII D, § 6, subd. (a)(2).
[171] 33 Cal.App.5th 174, 182, 194–195.

> (5) No fee or charge may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services, where the service is available to the public at large in substantially the same manner as it is to property owners. Reliance by an agency on any parcel map, including, but not limited to, an assessor's parcel map, may be considered a significant factor in determining whether a fee or charge is imposed as an incident of property ownership for purposes of this article. In any legal action contesting the validity of a fee or charge, the burden shall be on the agency to demonstrate compliance with this article.[172]

The Third District Court of Appeal held that the state does not have the burden of demonstrating that local agency can satisfy each of these criteria: "the State has the burden of establishing that permittees have fee authority, but that burden does not require the State also to prove permittees as a matter of law and fact are able to promulgate a fee that satisfies article XIII D's substantive requirements."[173] In so holding, the Third District Court of Appeal recognized that it was potentially in conflict with a Second District Court of Appeal opinion[174] and attempted to reconcile the decisions: "Although the Court of Appeal in *Los Angeles Mandates II* stated the state bore the burden to show that a fee for public trash receptacles could satisfy the substantive requirements, and that the state did not satisfy its burden, the court actually ruled that the local governments could not establish a fee that could meet the substantive requirements as a matter of law or undisputed fact."[175]

In its decision on MRP 1, the Commission applied the Third District's reconciling rationale and found that the MRP 1 Permittees had fee authority for the provisions at issue there:

> Similarly, here, there is no showing as a matter of law or fact that a fee cannot meet the substantive requirements of article XIII D, section 6(b). The new state-mandated requirements in this case are *not* like the requirement to place trash receptacles on transit property owned by other entities and not within the regulatory control of the permittees. The new mandated requirements at issue here (monitoring, trash, and mercury and

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[172] Cal. Const., art. XIII D, § 6, subd. (b).
[173] *Dept. of Finance v. Com. on State Mandates* (2022) 85 Cal.App.5th 535, 584–585. See also *id.* at 583–586.
[174] *Dept. of Finance v. Com. on State Mandates* (2021) 59 Cal.App.5th 546.
[175] *Dept. of Finance v. Com. on State Mandates, supra,* 85 Cal.App.5th 535, 584–585. See also Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, pp. 355–358 (discussing the two appellate cases at length and finding that MRP 1 Permittees had fee authority for the challenged provisions).

> PCB diversion studies) address waters and areas within the regulatory control of the permittees. Like street sweeping in the 2022 *Department of Finance* case, all of the new requirements implement the receiving water limitations and discharge prohibitions required by the permit to protect the beneficial uses of the local waters enjoyed by property owners in the San Francisco region and to prevent pollutants from causing or contributing to a violation of water quality standards.[176]

Like the provisions challenged in MRP 1, the provisions challenged in this Test Claim (LID and green infrastructure, illicit discharges, monitoring, pollutant control measures, prohibition of non-stormwater discharges, cost-reporting, and asset management) address waters and areas within the regulatory control of the Permittees. Union City and the other Permittees have fee authority for the challenged provisions, and there are no costs mandated by the state.

Moreover, Union City could adopt a property-related fee that meets the article XIII D substantive criteria to fund the provisions challenged in this Test Claim. The challenged requirements provide stormwater sewer services that are used by and immediately benefit property owners, and Union City could develop a fee that does not exceed the proportional cost of the stormwater sewer services. The fact that several other Permittees have adopted property-related stormwater management fees that meet the constitutional criteria supports this conclusion:

- The City of Palo Alto adopted a Stormwater Management Fee in 2016 that was approved by voters in 2017. The fee includes two components: the Base Component that funds ongoing stormwater management and maintenance, including litter and water pollution prevention programs and regulatory compliance; and the Projects and Infrastructure Component that funds new stormwater system capacity improvements, upgrades, and green stormwater infrastructure projects.[177]

- The City of Berkeley has a Clean Stormwater Fee that is imposed on property owners to fund “clean stormwater activities” defined as “programs required under the Alameda County Urban Runoff Clean Water Program and the NPDES Permit; operation and maintenance of the City’s stormwater drainage system; capital improvements to repair, rehabilitate, or replace components of the stormwater

[176] Com. on State Mandates, Decision on California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R9-2009-0074, Case Nos. 10-TC-02, 10-TC-03, and 10-TC-05, p. 358 (italics in original).
[177] City of Palo Alto Website, Stormwater Management Fee Webpage, https://www.paloalto.gov/Departments/Public-Works/Engineering-Services/Stormwater-Management-Fee (as of July 14, 2025)

drainage system; any other activities related to the foregoing; and the administration of this ordinance."[178]

- The City of Alameda has a Water Quality and Flood Protection Fee to raise revenue for "the acquisition, construction, reconstruction, maintenance, and operation of the storm drainage and flood control system of the City or related green infrastructure or other activities required by the City's NPDES permits, to repay principal and interest on any bonds which may hereafter be issued for said purposes, to repay loans or advances which may hereafter be made for said purposes."[179]

- The City of Vallejo collects a storm drainage service charge to "raise revenue for the cost of maintenance, operation and replacement, and capital requirements of the Vallejo Flood and Wastewater District facilities used for collection, transport, quality control, and discharge of stormwater flows."[180] The service charge is based on the proportional cost of the service attributable to the property.[181]

Furthermore, the California Stormwater Quality Association provides guidance to assist its member agencies and other municipalities in developing stormwater fees to fund MS4 permit compliance that meet the requirements of article XIII D.[182] Union City and the other Permittees could meet the substantive requirements of the Constitution to impose a property-related fee to fund the challenged provisions.

Union City and the other Permittees have fee authority to cover the costs of the challenged provisions—there are no costs mandated by the state.

2. The challenged monitoring and TMDL provisions are mandated by the federal Clean Water Act and its implementing regulations

In addition to fee authority, subvention is not warranted for the challenged monitoring and TMDL provisions because they are compelled by federal law. As provided in Government Code section 17556, subdivision (c), costs are not mandated by the state if the "executive order imposes a requirement that is mandated by a federal law or regulation and results in costs mandated by the federal government, unless the statute

[178] Berkeley Municipal Code, §§ 7.76.050, 7.76.020.
[179] Alameda Municipal Code, § 18-31.1, subd. b.
[180] Vallejo Flood and Wastewater District Code, § 6.08.010. See also Vallejo Flood and Wastewater District, Residential Rates Webpage, https://www.vallejowastewater.org/257/Residential-Rates (as of July 14, 2025).
[181] Vallejo Flood and Wastewater District Code, § 6.08.030.
[182] See California Stormwater Quality Association, Stormwater Funding Webpage, https://www.casqa.org/resources/stormwater-funding and Fee Study and Ordinance Webpage, https://www.casqa.org/resources/stormwater-funding/creating-a-stormwater-utility/fee-study-and-ordinance (as of July 14, 2025).

or executive order mandates costs that exceed the mandate in that federal law or regulation."[183]

In *Department of Finance v. Commission on State Mandates*, the state Supreme Court analyzed the application of the federal mandate exception to trash receptable and inspection requirements in an MS4 NPDES permit issued by the Los Angeles Water Board.[184] The court looked at whether the three conditions were mandated by the MEP standard and specific implementing regulations.[185] In its analysis, the court reviewed several cases to distill the principle that "if federal law gives the state discretion whether to impose a particular implementing requirement, and the state exercises its discretion to impose the requirement by virtue of a "true choice," the requirement is not federally mandated."[186] Applying that principle, the court concluded that the Los Angeles Water Board had discretion to include permit requirements that would meet the MEP standard and thus the federal MEP standard did not compel the Board to include the challenged permit requirements.[187] The court also noted that if the Los Angeles Water Board had found, when imposing the requirements, that the conditions were the "only means" by which the MEP standard could be met, then deference to the Board's conclusion that the requirements were federally mandated would be appropriate.[188] The Supreme Court's decision largely focused on the MEP standard and touched on several other federal provisions cited by the LA Water Board.[189] The Supreme Court's decision did not analyze federal monitoring requirements or TMDL requirements. The challenged monitoring and TMDL provisions in MRP 3 are compelled by these federal requirements and thus not subject to subvention.

a) Monitoring and reporting requirements are mandated by federal law

The challenged monitoring and reporting requirements in Provisions C.8.d, C.8.e, and C.8.f are compelled by federal law and regulation. The Clean Water Act and its implementing regulations require the permitting authority to include monitoring requirements in NPDES permits that assure compliance with permit requirements.[190] Indeed, an NPDES permit is unlawful if a permittee is not required to monitor its

[183] Gov. Code, § 17556, subd. (c).
[184] See 1 Cal.5th 749, 770–772.
[185] *Id.* at 757.
[186] *Id.* at 765.
[187] *Id.* at 767–768.
[188] *Id.* at 768.
[189] *Id*. at p. 767 ("The federal CWA broadly directed the board to issue permits...designed to reduce the pollutant discharges to the maximum extent practicable").
[190] See 40 C.F.R. § 122.44(i)(1); see also 40 C.F.R. § 122.48(b) ("All permits shall specify: . . . Required monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring").

discharges in a manner sufficient to comply with the permit.[191] Federal regulations also require MS4 permittees to submit annual reports that include the status of implementing components of the stormwater management program that are established as permit conditions; proposed changes to the stormwater management program; revisions, if necessary, to the assessment of controls and the fiscal analysis included in the permit application; a summary of data, including monitoring data for the reporting year; annual expenditures and budget for the following year; a summary of enforcement actions, inspections and public education programs; and identification of water quality improvements or degradation.[192] The San Francisco Bay Water Board was compelled by these federal mandates to include the challenged monitoring requirements. The monitoring and reporting provisions are necessary to assure compliance with permit requirements and without them MRP 3 would be unlawful.

b) TMDL requirements are mandated by federal law

The requirements implementing the mercury TMDLs and the PCBs TMDL in Provisions C.11.c and C.12.c are also required by federal law and regulation. After U.S. EPA approves a TMDL, the Water Boards must include water quality-based effluent limitations in NPDES permits that are "consistent with the assumptions and requirements of any available wasteload allocations."[193] This federal requirement in 40 C.F.R. section 122.44(d)(1)(vii)(B) is independent from and more restrictive than the MEP standard. Section 122.44(d)(1)(vii)(B) compels permitting authorities to include water quality-based effluent limitations, and these limits must be consistent with the assumptions and requirements of applicable wasteload allocations. Water quality-based effluent limitations for MS4 permits may be expressed as BMPs or similar requirements that are consistent with the TMDL, but the requirements should be "clear, specific, and measurable."[194]

The assumptions and requirements of the applicable wasteload allocations are described in the TMDLs, which include comprehensive implementation plans that provide the procedural framework to achieve wasteload allocations. The implementation plans for the PCB and Mercury TMDLs provide that wasteload allocations for municipal stormwater discharges will be achieved within 20 years through the implementation of BMPs and control measures required in NPDES permits.

The implementation plan for urban stormwater runoff in the San Francisco Bay Mercury TMDL states—

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[191] *Natural Resources Defense Council, Inc. v. County of L.A.* (2013) 725 F.3d 1194, 1207.
[192] 40 C.F.R. § 122.42(c).
[193] 40 C.F.R. § 122.44(d)(1)(vii)(B).
[194] U.S. EPA, Revisions to the November 22, 2002, Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" (Nov. 26, 2014) p. 5.

> The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and control measures designed to achieve the [wasteload] allocations or accomplish the load reductions derived from the allocations. . . . Requirements in each permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff to the maximum extent practicable and remain consistent with the section of this chapter titled "Surface Water Protection and Management—Point Source Control—Stormwater Discharges."[195]

Similarly, the implementation plan for stormwater runoff in the PCBs TMDL also focuses on control measures:

> Requirements in each NPDES permit issued or reissued, shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater runoff to the maximum extent practicable. . . .
>
> In the first five-year permit term, stormwater permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations.[196]

The implementation of BMPs to reduce pollutant loads in old industrial areas required under Provisions C.11.c and C.12. is consistent with the implementation plans for the respective TMDLs. The requirements in the challenged provisions are water quality-based effluent limitations that are consistent with the wasteload allocations in the

[195] San Francisco Bay Mercury TMDL, Basin Plan, ch. 7.2.2.6.
[196] San Francisco Bay PCBs TMDL, Basin Plan, ch. 7.2.3.6.

respective TMDLs that the San Francisco Bay Water Board was compelled to include under 40 C.F.R. section 122.44(d)(1)(vii)(B).

III. Conclusion

Based on the foregoing, the Water Boards ask the Commission to deny Union City's test claim in its entirety.

I declare under penalty of perjury that this filing is true and correct to the best of my personal knowledge, information, or belief.

Sincerely,

Teresita J. Sablan
Attorney IV

cc: Service List [via Commission Drop Box]

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[1] Appendices to the Staff Report available at https://www.waterboards.ca.gov/water_issues/programs/trash_control/documentation.html.

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[2] The member agencies of the programs also submitted individual annual reports, which are not included here except for Union City's report.

[3] Attachments to the applications are not included and not cited in the comments.

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33 U.S.C.A. § 1251

§ 1251. Congressional declaration of goals and policy

Currentness

(a) Restoration and maintenance of chemical, physical and biological integrity of Nation's waters; national goals for achievement of objective

The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this chapter--

(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;

(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;

(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;

(4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;

(5) it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State;

(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans; and

(7) it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this chapter to be met through the control of both point and nonpoint sources of pollution.

(b) Congressional recognition, preservation, and protection of primary responsibilities and rights of States

It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this chapter. It is the policy of

Congress that the States manage the construction grant program under this chapter and implement the permit programs under sections 1342 and 1344 of this title. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection with the prevention, reduction, and elimination of pollution.

(c) Congressional policy toward Presidential activities with foreign countries

It is further the policy of Congress that the President, acting through the Secretary of State and such national and international organizations as he determines appropriate, shall take such action as may be necessary to insure that to the fullest extent possible all foreign countries shall take meaningful action for the prevention, reduction, and elimination of pollution in their waters and in international waters and for the achievement of goals regarding the elimination of discharge of pollutants and the improvement of water quality to at least the same extent as the United States does under its laws.

(d) Administrator of Environmental Protection Agency to administer chapter

Except as otherwise expressly provided in this chapter, the Administrator of the Environmental Protection Agency (hereinafter in this chapter called "Administrator") shall administer this chapter.

(e) Public participation in development, revision, and enforcement of any regulation, etc.

Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this chapter shall be provided for, encouraged, and assisted by the Administrator and the States. The Administrator, in cooperation with the States, shall develop and publish regulations specifying minimum guidelines for public participation in such processes.

(f) Procedures utilized for implementing chapter

It is the national policy that to the maximum extent possible the procedures utilized for implementing this chapter shall encourage the drastic minimization of paperwork and interagency decision procedures, and the best use of available manpower and funds, so as to prevent needless duplication and unnecessary delays at all levels of government.

(g) Authority of States over water

It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter. It is the further policy of Congress that nothing in this chapter shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.

CREDIT(S)

(June 30, 1948, c. 758, Title I, § 101, as added Pub.L. 92-500, § 2, Oct. 18, 1972, 86 Stat. 816; amended Pub.L. 95-217, §§ 5(a), 26(b), Dec. 27, 1977, 91 Stat. 1567, 1575; Pub.L. 100-4, Title III, § 316(b), Feb. 4, 1987, 101 Stat. 60.)

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EXECUTIVE ORDERS

EXECUTIVE ORDER NO. 11548

Ex. Ord. No. 11548, July 20, 1970, 35 F.R. 11677, which related to the delegation of Presidential functions, was superseded by Ex. Ord. No. 11735, Aug. 3, 1973, 38 F.R. 21243, set out as a note under section 1321 of this title.

EXECUTIVE ORDER NO. 11742

<Oct. 23, 1973, 38 F.R. 29457>

Delegation of Functions to Secretary of State Respecting Negotiation of International Agreements Relating to Enhancement of Environment

Under and by virtue of the authority vested in me by section 301 of title 3 of the United States Code and as President of the United States, I hereby authorize and empower the Secretary of State, in coordination with the Council on Environmental Quality, the Environmental Protection Agency, and other appropriate Federal agencies, to perform, without the approval, ratification, or other action of the President, the functions vested in the President by Section 7 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500; 86 Stat. 898) with respect to international agreements relating to the enhancement of the environment.

RICHARD NIXON.

Notes of Decisions (160)

33 U.S.C.A. § 1251, 33 USCA § 1251
Current through P.L. 119-18. Some statute sections may be more current, see credits for details.

End of Document

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33 U.S.C.A. § 1311

§ 1311. Effluent limitations

Currentness

(a) Illegality of pollutant discharges except in compliance with law

Except as in compliance with this section and sections 1312, 1316, 1317, 1328, 1342, and 1344 of this title, the discharge of any pollutant by any person shall be unlawful.

(b) Timetable for achievement of objectives

In order to carry out the objective of this chapter there shall be achieved--

(1)(A) not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 1314(b) of this title, or (ii) in the case of a discharge into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, which shall require compliance with any applicable pretreatment requirements and any requirements under section 1317 of this title; and

(B) for publicly owned treatment works in existence on July 1, 1977, or approved pursuant to section 1283 of this title prior to June 30, 1974 (for which construction must be completed within four years of approval), effluent limitations based upon secondary treatment as defined by the Administrator pursuant to section 1314(d)(1) of this title; or,

(C) not later than July 1, 1977, any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section 1370 of this title) or any other Federal law or regulation, or required to implement any applicable water quality standard established pursuant to this chapter.

(2)(A) for pollutants identified in subparagraphs (C), (D), and (F) of this paragraph, effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b)(2) of this title, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 1325 of this title), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b)(2) of this title, or (ii) in the case of the introduction of a pollutant into a publicly owned treatment works which

meets the requirements of subparagraph (B) of this paragraph, shall require compliance with any applicable pretreatment requirements and any other requirement under section 1317 of this title;

(B) Repealed. Pub.L. 97-117, § 21(b), Dec. 29, 1981, 95 Stat. 1632.

(C) with respect to all toxic pollutants referred to in table 1 of Committee Print Numbered 95-30 of the Committee on Public Works and Transportation of the House of Representatives compliance with effluent limitations in accordance with subparagraph (A) of this paragraph as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314(b) of this title, and in no case later than March 31, 1989;

(D) for all toxic pollutants listed under paragraph (1) of subsection (a) of section 1317 of this title which are not referred to in subparagraph (C) of this paragraph compliance with effluent limitations in accordance with subparagraph (A) of this paragraph as expeditiously as practicable, but in no case later than three years after the date such limitations are promulgated under section 1314(b) of this title, and in no case later than March 31, 1989;

(E) as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314(b) of this title, and in no case later than March 31, 1989, compliance with effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which in the case of pollutants identified pursuant to section 1314(a)(4) of this title shall require application of the best conventional pollutant control technology as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b)(4) of this title; and

(F) for all pollutants (other than those subject to subparagraphs (C), (D), or (E) of this paragraph) compliance with effluent limitations in accordance with subparagraph (A) of this paragraph as expeditiously as practicable but in no case later than 3 years after the date such limitations are established, and in no case later than March 31, 1989.

(3)(A) for effluent limitations under paragraph (1)(A)(i) of this subsection promulgated after January 1, 1982, and requiring a level of control substantially greater or based on fundamentally different control technology than under permits for an industrial category issued before such date, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are promulgated under section 1314(b) of this title, and in no case later than March 31, 1989; and

(B) for any effluent limitation in accordance with paragraph (1)(A)(i), (2)(A)(i), or (2)(E) of this subsection established only on the basis of section 1342(a)(1) of this title in a permit issued after February 4, 1987, compliance as expeditiously as practicable but in no case later than three years after the date such limitations are established, and in no case later than March 31, 1989.

(c) Modification of timetable

The Administrator may modify the requirements of subsection (b)(2)(A) of this section with respect to any point source for which a permit application is filed after July 1, 1977, upon a showing by the owner or operator of such point source satisfactory to the Administrator that such modified requirements (1) will represent the maximum use of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants.

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(d) Review and revision of effluent limitations

Any effluent limitation required by paragraph (2) of subsection (b) of this section shall be reviewed at least every five years and, if appropriate, revised pursuant to the procedure established under such paragraph.

(e) All point discharge source application of effluent limitations

Effluent limitations established pursuant to this section or section 1312 of this title shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this chapter.

(f) Illegality of discharge of radiological, chemical, or biological warfare agents, high-level radioactive waste, or medical waste

Notwithstanding any other provisions of this chapter it shall be unlawful to discharge any radiological, chemical, or biological warfare agent, any high-level radioactive waste, or any medical waste, into the navigable waters.

(g) Modifications for certain nonconventional pollutants

(1) General authority

The Administrator, with the concurrence of the State, may modify the requirements of subsection (b)(2)(A) of this section with respect to the discharge from any point source of ammonia, chlorine, color, iron, and total phenols (4AAP) (when determined by the Administrator to be a pollutant covered by subsection (b)(2)(F)) and any other pollutant which the Administrator lists under paragraph (4) of this subsection.

(2) Requirements for granting modifications

A modification under this subsection shall be granted only upon a showing by the owner or operator of a point source satisfactory to the Administrator that--

(A) such modified requirements will result at a minimum in compliance with the requirements of subsection (b)(1)(A) or (C) of this section, whichever is applicable;

(B) such modified requirements will not result in any additional requirements on any other point or nonpoint source; and

(C) such modification will not interfere with the attainment or maintenance of that water quality which shall assure protection of public water supplies, and the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities, in and on the water and such modification will not result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity or teratogenicity), or synergistic propensities.

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(3) Limitation on authority to apply for subsection (c) modification

If an owner or operator of a point source applies for a modification under this subsection with respect to the discharge of any pollutant, such owner or operator shall be eligible to apply for modification under subsection (c) of this section with respect to such pollutant only during the same time period as he is eligible to apply for a modification under this subsection.

(4) Procedures for listing additional pollutants

(A) General authority

Upon petition of any person, the Administrator may add any pollutant to the list of pollutants for which modification under this section is authorized (except for pollutants identified pursuant to section 1314(a)(4) of this title, toxic pollutants subject to section 1317(a) of this title, and the thermal component of discharges) in accordance with the provisions of this paragraph.

(B) Requirements for listing

(i) Sufficient information

The person petitioning for listing of an additional pollutant under this subsection shall submit to the Administrator sufficient information to make the determinations required by this subparagraph.

(ii) Toxic criteria determination

The Administrator shall determine whether or not the pollutant meets the criteria for listing as a toxic pollutant under section 1317(a) of this title.

(iii) Listing as toxic pollutant

If the Administrator determines that the pollutant meets the criteria for listing as a toxic pollutant under section 1317(a) of this title, the Administrator shall list the pollutant as a toxic pollutant under section 1317(a) of this title.

(iv) Nonconventional criteria determination

If the Administrator determines that the pollutant does not meet the criteria for listing as a toxic pollutant under such section and determines that adequate test methods and sufficient data are available to make the determinations required by paragraph (2) of this subsection with respect to the pollutant, the Administrator shall add the pollutant to the list of pollutants specified in paragraph (1) of this subsection for which modifications are authorized under this subsection.

(C) Requirements for filing of petitions

A petition for listing of a pollutant under this paragraph--

(i) must be filed not later than 270 days after the date of promulgation of an applicable effluent guideline under section 1314 of this title;

(ii) may be filed before promulgation of such guideline; and

(iii) may be filed with an application for a modification under paragraph (1) with respect to the discharge of such pollutant.

(D) Deadline for approval of petition

A decision to add a pollutant to the list of pollutants for which modifications under this subsection are authorized must be made within 270 days after the date of promulgation of an applicable effluent guideline under section 1314 of this title.

(E) Burden of proof

The burden of proof for making the determinations under subparagraph (B) shall be on the petitioner.

(5) Removal of pollutants

The Administrator may remove any pollutant from the list of pollutants for which modifications are authorized under this subsection if the Administrator determines that adequate test methods and sufficient data are no longer available for determining whether or not modifications may be granted with respect to such pollutant under paragraph (2) of this subsection.

(h) Modification of secondary treatment requirements

The Administrator, with the concurrence of the State, may issue a permit under section 1342 of this title which modifies the requirements of subsection (b)(1)(B) of this section with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters, if the applicant demonstrates to the satisfaction of the Administrator that--

(1) there is an applicable water quality standard specific to the pollutant for which the modification is requested, which has been identified under section 1314(a)(6) of this title;

(2) the discharge of pollutants in accordance with such modified requirements will not interfere, alone or in combination with pollutants from other sources, with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on the water;

(3) the applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable, and the scope of such monitoring is limited to include only those scientific investigations which are necessary to study the effects of the proposed discharge;

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(4) such modified requirements will not result in any additional requirements on any other point or nonpoint source;

(5) all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;

(6) in the case of any treatment works serving a population of 50,000 or more, with respect to any toxic pollutant introduced into such works by an industrial discharger for which pollutant there is no applicable pretreatment requirement in effect, sources introducing waste into such works are in compliance with all applicable pretreatment requirements, the applicant will enforce such requirements, and the applicant has in effect a pretreatment program which, in combination with the treatment of discharges from such works, removes the same amount of such pollutant as would be removed if such works were to apply secondary treatment to discharges and if such works had no pretreatment program with respect to such pollutant;

(7) to the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from nonindustrial sources into such treatment works;

(8) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit;

(9) the applicant at the time such modification becomes effective will be discharging effluent which has received at least primary or equivalent treatment and which meets the criteria established under section 1314(a)(1) of this title after initial mixing in the waters surrounding or adjacent to the point at which such effluent is discharged.

For the purposes of this subsection the phrase "the discharge of any pollutant into marine waters" refers to a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to allow compliance with paragraph (2) of this subsection, and section 1251(a)(2) of this title. For the purposes of paragraph (9), "primary or equivalent treatment" means treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of the biological oxygen demanding material and of the suspended solids in the treatment works influent, and disinfection, where appropriate. A municipality which applies secondary treatment shall be eligible to receive a permit pursuant to this subsection which modifies the requirements of subsection (b)(1)(B) of this section with respect to the discharge of any pollutant from any treatment works owned by such municipality into marine waters. No permit issued under this subsection shall authorize the discharge of sewage sludge into marine waters. In order for a permit to be issued under this subsection for the discharge of a pollutant into marine waters, such marine waters must exhibit characteristics assuring that water providing dilution does not contain significant amounts of previously discharged effluent from such treatment works. No permit issued under this subsection shall authorize the discharge of any pollutant into saline estuarine waters which at the time of application do not support a balanced indigenous population of shellfish, fish and wildlife, or allow recreation in and on the waters or which exhibit ambient water quality below applicable water quality standards adopted for the protection of public water supplies, shellfish, fish and wildlife or recreational activities or such other standards necessary to assure support and protection of such uses. The prohibition contained in the preceding sentence shall apply without regard to the presence or absence of a causal relationship between such characteristics and the applicant's current or proposed discharge. Notwithstanding any other provisions of this subsection, no permit may be issued under this subsection for discharge of a pollutant into the New York Bight Apex consisting of the ocean waters of the Atlantic Ocean westward of 73 degrees 30 minutes west longitude and northward of 40 degrees 10 minutes north latitude.

(i) Municipal time extensions

(1) Where construction is required in order for a planned or existing publicly owned treatment works to achieve limitations under subsection (b)(1)(B) or (b)(1)(C) of this section, but (A) construction cannot be completed within the time required in such subsection, or (B) the United States has failed to make financial assistance under this chapter available in time to achieve such limitations by the time specified in such subsection, the owner or operator of such treatment works may request the Administrator (or if appropriate the State) to issue a permit pursuant to section 1342 of this title or to modify a permit issued pursuant to that section to extend such time for compliance. Any such request shall be filed with the Administrator (or if appropriate the State) within 180 days after February 4, 1987. The Administrator (or if appropriate the State) may grant such request and issue or modify such a permit, which shall contain a schedule of compliance for the publicly owned treatment works based on the earliest date by which such financial assistance will be available from the United States and construction can be completed, but in no event later than July 1, 1988, and shall contain such other terms and conditions, including those necessary to carry out subsections (b) through (g) of section 1281 of this title, section 1317 of this title, and such interim effluent limitations applicable to that treatment works as the Administrator determines are necessary to carry out the provisions of this chapter.

(2)(A) Where a point source (other than a publicly owned treatment works) will not achieve the requirements of subsections (b)(1)(A) and (b)(1)(C) of this section and--

(i) if a permit issued prior to July 1, 1977, to such point source is based upon a discharge into a publicly owned treatment works; or

(ii) if such point source (other than a publicly owned treatment works) had before July 1, 1977, a contract (enforceable against such point source) to discharge into a publicly owned treatment works; or

(iii) if either an application made before July 1, 1977, for a construction grant under this chapter for a publicly owned treatment works, or engineering or architectural plans or working drawings made before July 1, 1977, for a publicly owned treatment works, show that such point source was to discharge into such publicly owned treatment works,

and such publicly owned treatment works is presently unable to accept such discharge without construction, and in the case of a discharge to an existing publicly owned treatment works, such treatment works has an extension pursuant to paragraph (1) of this subsection, the owner or operator of such point source may request the Administrator (or if appropriate the State) to issue or modify such a permit pursuant to such section 1342 of this title to extend such time for compliance. Any such request shall be filed with the Administrator (or if appropriate the State) within 180 days after December 27, 1977, or the filing of a request by the appropriate publicly owned treatment works under paragraph (1) of this subsection, whichever is later. If the Administrator (or if appropriate the State) finds that the owner or operator of such point source has acted in good faith, he may grant such request and issue or modify such a permit, which shall contain a schedule of compliance for the point source to achieve the requirements of subsections (b)(1)(A) and (C) of this section and shall contain such other terms and conditions, including pretreatment and interim effluent limitations and water conservation requirements applicable to that point source, as the Administrator determines are necessary to carry out the provisions of this chapter.

(B) No time modification granted by the Administrator (or if appropriate the State) pursuant to paragraph (2)(A) of this subsection shall extend beyond the earliest date practicable for compliance or beyond the date of any extension granted to the appropriate publicly owned treatment works pursuant to paragraph (1) of this subsection, but in no event shall it extend beyond July 1, 1988; and no such time modification shall be granted unless (i) the publicly owned treatment works will be in operation and available to the point source before July 1, 1988, and will meet the requirements of subsections (b)(1)(B) and (C) of this section after receiving the discharge from that point source; and (ii) the point source and the publicly owned treatment works

have entered into an enforceable contract requiring the point source to discharge into the publicly owned treatment works, the owner or operator of such point source to pay the costs required under section 1284 of this title, and the publicly owned treatment works to accept the discharge from the point source; and (iii) the permit for such point source requires that point source to meet all requirements under section 1317(a) and (b) of this title during the period of such time modification.

(j) Modification procedures

(1) Any application filed under this section for a modification of the provisions of--

(A) subsection (b)(1)(B) under subsection (h) of this section shall be filed not later that [1] the 365th day which begins after December 29, 1981, except that a publicly owned treatment works which prior to December 31, 1982, had a contractual arrangement to use a portion of the capacity of an ocean outfall operated by another publicly owned treatment works which has applied for or received modification under subsection (h), may apply for a modification of subsection (h) in its own right not later than 30 days after February 4, 1987, and except as provided in paragraph (5);

(B) subsection (b)(2)(A) as it applies to pollutants identified in subsection (b)(2)(F) shall be filed not later than 270 days after the date of promulgation of an applicable effluent guideline under section 1314 of this title or not later than 270 days after December 27, 1977, whichever is later.

(2) Subject to paragraph (3) of this section, any application for a modification filed under subsection (g) of this section shall not operate to stay any requirement under this chapter, unless in the judgment of the Administrator such a stay or the modification sought will not result in the discharge of pollutants in quantities which may reasonably be anticipated to pose an unacceptable risk to human health or the environment because of bioaccumulation, persistency in the environment, acute toxicity, chronic toxicity (including carcinogenicity, mutagenicity, or teratogenicity), or synergistic propensities, and that there is a substantial likelihood that the applicant will succeed on the merits of such application. In the case of an application filed under subsection (g) of this section, the Administrator may condition any stay granted under this paragraph on requiring the filing of a bond or other appropriate security to assure timely compliance with the requirements from which a modification is sought.

(3) Compliance requirements under subsection (g)

(A) Effect of filing

An application for a modification under subsection (g) and a petition for listing of a pollutant as a pollutant for which modifications are authorized under such subsection shall not stay the requirement that the person seeking such modification or listing comply with effluent limitations under this chapter for all pollutants not the subject of such application or petition.

(B) Effect of disapproval

Disapproval of an application for a modification under subsection (g) shall not stay the requirement that the person seeking such modification comply with all applicable effluent limitations under this chapter.

(4) Deadline for subsection (g) decision

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An application for a modification with respect to a pollutant filed under subsection (g) must be approved or disapproved not later than 365 days after the date of such filing; except that in any case in which a petition for listing such pollutant as a pollutant for which modifications are authorized under such subsection is approved, such application must be approved or disapproved not later than 365 days after the date of approval of such petition.

(5) Extension of application deadline

(A) In general

In the 180-day period beginning on October 31, 1994, the city of San Diego, California, may apply for a modification pursuant to subsection (h) of the requirements of subsection (b)(1)(B) with respect to biological oxygen demand and total suspended solids in the effluent discharged into marine waters.

(B) Application

An application under this paragraph shall include a commitment by the applicant to implement a waste water reclamation program that, at a minimum, will--

(i) achieve a system capacity of 45,000,000 gallons of reclaimed waste water per day by January 1, 2010; and

(ii) result in a reduction in the quantity of suspended solids discharged by the applicant into the marine environment during the period of the modification.

(C) Additional conditions

The Administrator may not grant a modification pursuant to an application submitted under this paragraph unless the Administrator determines that such modification will result in removal of not less than 58 percent of the biological oxygen demand (on an annual average) and not less than 80 percent of total suspended solids (on a monthly average) in the discharge to which the application applies.

(D) Preliminary decision deadline

The Administrator shall announce a preliminary decision on an application submitted under this paragraph not later than 1 year after the date the application is submitted.

(k) Innovative technology

In the case of any facility subject to a permit under section 1342 of this title which proposes to comply with the requirements of subsection (b)(2)(A) or (b)(2)(E) of this section by replacing existing production capacity with an innovative production process which will result in an effluent reduction significantly greater than that required by the limitation otherwise applicable to such facility and moves toward the national goal of eliminating the discharge of all pollutants, or with the installation of an innovative control technique that has a substantial likelihood for enabling the facility to comply with the applicable effluent

limitation by achieving a significantly greater effluent reduction than that required by the applicable effluent limitation and moves toward the national goal of eliminating the discharge of all pollutants, or by achieving the required reduction with an innovative system that has the potential for significantly lower costs than the systems which have been determined by the Administrator to be economically achievable, the Administrator (or the State with an approved program under section 1342 of this title, in consultation with the Administrator) may establish a date for compliance under subsection (b)(2)(A) or (b)(2)(E) of this section no later than two years after the date for compliance with such effluent limitation which would otherwise be applicable under such subsection, if it is also determined that such innovative system has the potential for industrywide application.

(l) Toxic pollutants

Other than as provided in subsection (n) of this section, the Administrator may not modify any requirement of this section as it applies to any specific pollutant which is on the toxic pollutant list under section 1317(a)(1) of this title.

(m) Modification of effluent limitation requirements for point sources

(1) The Administrator, with the concurrence of the State, may issue a permit under section 1342 of this title which modifies the requirements of subsections (b)(1)(A) and (b)(2)(E) of this section, and of section 1343 of this title, with respect to effluent limitations to the extent such limitations relate to biochemical oxygen demand and pH from discharges by an industrial discharger in such State into deep waters of the territorial seas, if the applicant demonstrates and the Administrator finds that--

(A) the facility for which modification is sought is covered at the time of the enactment of this subsection by National Pollutant Discharge Elimination System permit number CA0005894 or CA0005282;

(B) the energy and environmental costs of meeting such requirements of subsections (b)(1)(A) and (b)(2)(E) and section 1343 of this title exceed by an unreasonable amount the benefits to be obtained, including the objectives of this chapter;

(C) the applicant has established a system for monitoring the impact of such discharges on a representative sample of aquatic biota;

(D) such modified requirements will not result in any additional requirements on any other point or nonpoint source;

(E) there will be no new or substantially increased discharges from the point source of the pollutant to which the modification applies above that volume of discharge specified in the permit;

(F) the discharge is into waters where there is strong tidal movement and other hydrological and geological characteristics which are necessary to allow compliance with this subsection and section 1251(a)(2) of this title;

(G) the applicant accepts as a condition to the permit a contractural[2] obligation to use funds in the amount required (but not less than $250,000 per year for ten years) for research and development of water pollution control technology, including but not limited to closed cycle technology;

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(H) the facts and circumstances present a unique situation which, if relief is granted, will not establish a precedent or the relaxation of the requirements of this chapter applicable to similarly situated discharges; and

(I) no owner or operator of a facility comparable to that of the applicant situated in the United States has demonstrated that it would be put at a competitive disadvantage to the applicant (or the parent company or any subsidiary thereof) as a result of the issuance of a permit under this subsection.

(2) The effluent limitations established under a permit issued under paragraph (1) shall be sufficient to implement the applicable State water quality standards, to assure the protection of public water supplies and protection and propagation of a balanced, indigenous population of shellfish, fish, fauna, wildlife, and other aquatic organisms, and to allow recreational activities in and on the water. In setting such limitations, the Administrator shall take into account any seasonal variations and the need for an adequate margin of safety, considering the lack of essential knowledge concerning the relationship between effluent limitations and water quality and the lack of essential knowledge of the effects of discharges on beneficial uses of the receiving waters.

(3) A permit under this subsection may be issued for a period not to exceed five years, and such a permit may be renewed for one additional period not to exceed five years upon a demonstration by the applicant and a finding by the Administrator at the time of application for any such renewal that the provisions of this subsection are met.

(4) The Administrator may terminate a permit issued under this subsection if the Administrator determines that there has been a decline in ambient water quality of the receiving waters during the period of the permit even if a direct cause and effect relationship cannot be shown: *Provided*, That if the effluent from a source with a permit issued under this subsection is contributing to a decline in ambient water quality of the receiving waters, the Administrator shall terminate such permit.

(n) Fundamentally different factors

(1) General rule

The Administrator, with the concurrence of the State, may establish an alternative requirement under subsection (b)(2) or section 1317(b) of this title for a facility that modifies the requirements of national effluent limitation guidelines or categorical pretreatment standards that would otherwise be applicable to such facility, if the owner or operator of such facility demonstrates to the satisfaction of the Administrator that--

(A) the facility is fundamentally different with respect to the factors (other than cost) specified in section 1314(b) or 1314(g) of this title and considered by the Administrator in establishing such national effluent limitation guidelines or categorical pretreatment standards;

(B) the application--

(i) is based solely on information and supporting data submitted to the Administrator during the rulemaking for establishment of the applicable national effluent limitation guidelines or categorical pretreatment standard specifically raising the factors that are fundamentally different for such facility; or

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(ii) is based on information and supporting data referred to in clause (i) and information and supporting data the applicant did not have a reasonable opportunity to submit during such rulemaking;

(C) the alternative requirement is no less stringent than justified by the fundamental difference; and

(D) the alternative requirement will not result in a non-water quality environmental impact which is markedly more adverse than the impact considered by the Administrator in establishing such national effluent limitation guideline or categorical pretreatment standard.

(2) Time limit for applications

An application for an alternative requirement which modifies the requirements of an effluent limitation or pretreatment standard under this subsection must be submitted to the Administrator within 180 days after the date on which such limitation or standard is established or revised, as the case may be.

(3) Time limit for decision

The Administrator shall approve or deny by final agency action an application submitted under this subsection within 180 days after the date such application is filed with the Administrator.

(4) Submission of information

The Administrator may allow an applicant under this subsection to submit information and supporting data until the earlier of the date the application is approved or denied or the last day that the Administrator has to approve or deny such application.

(5) Treatment of pending applications

For the purposes of this subsection, an application for an alternative requirement based on fundamentally different factors which is pending on February 4, 1987, shall be treated as having been submitted to the Administrator on the 180th day following February 4, 1987. The applicant may amend the application to take into account the provisions of this subsection.

(6) Effect of submission of application

An application for an alternative requirement under this subsection shall not stay the applicant's obligation to comply with the effluent limitation guideline or categorical pretreatment standard which is the subject of the application.

(7) Effect of denial

If an application for an alternative requirement which modifies the requirements of an effluent limitation or pretreatment standard under this subsection is denied by the Administrator, the applicant must comply with such limitation or standard as established or revised, as the case may be.

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(8) Reports

By January 1, 1997, and January 1 of every odd-numbered year thereafter, the Administrator shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report on the status of applications for alternative requirements which modify the requirements of effluent limitations under section 1311 or 1314 of this title or any national categorical pretreatment standard under section 1317(b) of this title filed before, on, or after February 4, 1987.

(o) Application fees

The Administrator shall prescribe and collect from each applicant fees reflecting the reasonable administrative costs incurred in reviewing and processing applications for modifications submitted to the Administrator pursuant to subsections (c), (g), (i), (k), (m), and (n) of this section, section 1314(d)(4) of this title, and section 1326(a) of this title. All amounts collected by the Administrator under this subsection shall be deposited into a special fund of the Treasury entitled "Water Permits and Related Services" which shall thereafter be available for appropriation to carry out activities of the Environmental Protection Agency for which such fees were collected.

(p) Modified permit for coal remining operations

(1) In general

Subject to paragraphs (2) through (4) of this subsection, the Administrator, or the State in any case which the State has an approved permit program under section 1342(b) of this title, may issue a permit under section 1342 of this title which modifies the requirements of subsection (b)(2)(A) of this section with respect to the pH level of any pre-existing discharge, and with respect to pre-existing discharges of iron and manganese from the remined area of any coal remining operation or with respect to the pH level or level of iron or manganese in any pre-existing discharge affected by the remining operation. Such modified requirements shall apply the best available technology economically achievable on a case-by-case basis, using best professional judgment, to set specific numerical effluent limitations in each permit.

(2) Limitations

The Administrator or the State may only issue a permit pursuant to paragraph (1) if the applicant demonstrates to the satisfaction of the Administrator or the State, as the case may be, that the coal remining operation will result in the potential for improved water quality from the remining operation but in no event shall such a permit allow the pH level of any discharge, and in no event shall such a permit allow the discharges of iron and manganese, to exceed the levels being discharged from the remined area before the coal remining operation begins. No discharge from, or affected by, the remining operation shall exceed State water quality standards established under section 1313 of this title.

(3) Definitions

For purposes of this subsection--

(A) Coal remining operation

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The term "coal remining operation" means a coal mining operation which begins after February 4, 1987 at a site on which coal mining was conducted before August 3, 1977.

(B) Remined area

The term "remined area" means only that area of any coal remining operation on which coal mining was conducted before August 3, 1977.

(C) Pre-existing discharge

The term "pre-existing discharge" means any discharge at the time of permit application under this subsection.

(4) Applicability of strip mining laws

Nothing in this subsection shall affect the application of the Surface Mining Control and Reclamation Act of 1977 to any coal remining operation, including the application of such Act to suspended solids.

CREDIT(S)

(June 30, 1948, c. 758, Title III, § 301, as added Pub.L. 92-500, § 2, Oct. 18, 1972, 86 Stat. 844; amended Pub.L. 95-217, §§ 42-47, 53(c), Dec. 27, 1977, 91 Stat. 1582-1586, 1590; Pub.L. 97-117, §§ 21, 22(a)-(d), Dec. 29, 1981, 95 Stat. 1631, 1632; Pub.L. 97-440, Jan. 8, 1983, 96 Stat. 2289; Pub.L. 100-4, Title III, §§ 301(a) to (e), 302(a) to (d), 303(a), (b)(1), (c) to (f), 304(a), 305, 306(a), (b), 307, Feb. 4, 1987, 101 Stat. 29-37; Pub.L. 100-688, Title III, § 3202(b), Nov. 18, 1988, 102 Stat. 4154; Pub.L. 103-431, § 2, Oct. 31, 1994, 108 Stat. 4396; Pub.L. 104-66, Title II, § 2021(b), Dec. 21, 1995, 109 Stat. 727.)

U.S. SUPREME COURT OCTOBER TERM 2024

<U.S. Supreme Court, Oct. Term 2024, Oral Argument - Question Presented: >

<Whether the Clean Water Act allows EPA (or an authorized state) to impose generic prohibitions in NPDES permits that subject permitholders to enforcement for exceedances of water quality standards without identifying specific limits to which their discharges must conform. City and Cnty. of San Francisco v. U.S. Environmental Protection Agency, 75 F.4th 1074 (C.A.9, 2023), cert. granted, 2024 WL 2709345 (U.S., 2024); CITY AND COUNTY OF SAN FRANCISCO, California, Petitioner, v. ENVIRONMENTAL PROTECTION AGENCY, Respondent., 2024 WL 4519618 (U.S.) (U.S.Oral.Arg.,2024).>

Notes of Decisions (449)

Footnotes

1 So in original. Probably should be "than".

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2 So in original. Probably should be “contractual”.

33 U.S.C.A. § 1311, 33 USCA § 1311
Current through P.L. 119-18. Some statute sections may be more current, see credits for details.

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Proposed Legislation

United States Code Annotated
Title 33. Navigation and Navigable Waters (Refs & Annos)
Chapter 26. Water Pollution Prevention and Control (Refs & Annos)
Subchapter III. Standards and Enforcement (Refs & Annos)

33 U.S.C.A. § 1313

§ 1313. Water quality standards and implementation plans

Currentness

(a) Existing water quality standards

(1) In order to carry out the purpose of this chapter, any water quality standard applicable to interstate waters which was adopted by any State and submitted to, and approved by, or is awaiting approval by, the Administrator pursuant to this Act as in effect immediately prior to October 18, 1972, shall remain in effect unless the Administrator determined that such standard is not consistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972. If the Administrator makes such a determination he shall, within three months after October 18, 1972, notify the State and specify the changes needed to meet such requirements. If such changes are not adopted by the State within ninety days after the date of such notification, the Administrator shall promulgate such changes in accordance with subsection (b) of this section.

(2) Any State which, before October 18, 1972, has adopted, pursuant to its own law, water quality standards applicable to intrastate waters shall submit such standards to the Administrator within thirty days after October 18, 1972. Each such standard shall remain in effect, in the same manner and to the same extent as any other water quality standard established under this chapter unless the Administrator determines that such standard is inconsistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972. If the Administrator makes such a determination he shall not later than the one hundred and twentieth day after the date of submission of such standards, notify the State and specify the changes needed to meet such requirements. If such changes are not adopted by the State within ninety days after such notification, the Administrator shall promulgate such changes in accordance with subsection (b) of this section.

(3)(A) Any State which prior to October 18, 1972, has not adopted pursuant to its own laws water quality standards applicable to intrastate waters shall, not later than one hundred and eighty days after October 18, 1972, adopt and submit such standards to the Administrator.

(B) If the Administrator determines that any such standards are consistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972, he shall approve such standards.

(C) If the Administrator determines that any such standards are not consistent with the applicable requirements of this Act as in effect immediately prior to October 18, 1972, he shall, not later than the ninetieth day after the date of submission of such standards, notify the State and specify the changes to meet such requirements. If such changes are not adopted by the State

within ninety days after the date of notification, the Administrator shall promulgate such standards pursuant to subsection (b) of this section.

(b) Proposed regulations

(1) The Administrator shall promptly prepare and publish proposed regulations setting forth water quality standards for a State in accordance with the applicable requirements of this Act as in effect immediately prior to October 18, 1972, if--

(A) the State fails to submit water quality standards within the times prescribed in subsection (a) of this section.

(B) a water quality standard submitted by such State under subsection (a) of this section is determined by the Administrator not to be consistent with the applicable requirements of subsection (a) of this section.

(2) The Administrator shall promulgate any water quality standard published in a proposed regulation not later than one hundred and ninety days after the date he publishes any such proposed standard, unless prior to such promulgation, such State has adopted a water quality standard which the Administrator determines to be in accordance with subsection (a) of this section.

(c) Review; revised standards; publication

(1) The Governor of a State or the State water pollution control agency of such State shall from time to time (but at least once each three year period beginning with October 18, 1972) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards. Results of such review shall be made available to the Administrator.

(2)(A) Whenever the State revises or adopts a new standard, such revised or new standard shall be submitted to the Administrator. Such revised or new water quality standard shall consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses. Such standards shall be such as to protect the public health or welfare, enhance the quality of water and serve the purposes of this chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value for navigation.

(B) Whenever a State reviews water quality standards pursuant to paragraph (1) of this subsection, or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria for all toxic pollutants listed pursuant to section 1317(a)(1) of this title for which criteria have been published under section 1314(a) of this title, the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the State, as necessary to support such designated uses. Such criteria shall be specific numerical criteria for such toxic pollutants. Where such numerical criteria are not available, whenever a State reviews water quality standards pursuant to paragraph (1), or revises or adopts new standards pursuant to this paragraph, such State shall adopt criteria based on biological monitoring or assessment methods consistent with information published pursuant to section 1314(a)(8) of this title. Nothing in this section shall be construed to limit or delay the use of effluent limitations or other permit conditions based on or involving biological monitoring or assessment methods or previously adopted numerical criteria.

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(3) If the Administrator, within sixty days after the date of submission of the revised or new standard, determines that such standard meets the requirements of this chapter, such standard shall thereafter be the water quality standard for the applicable waters of that State. If the Administrator determines that any such revised or new standard is not consistent with the applicable requirements of this chapter, he shall not later than the ninetieth day after the date of submission of such standard notify the State and specify the changes to meet such requirements. If such changes are not adopted by the State within ninety days after the date of notification, the Administrator shall promulgate such standard pursuant to paragraph (4) of this subsection.

(4) The Administrator shall promptly prepare and publish proposed regulations setting forth a revised or new water quality standard for the navigable waters involved--

(A) if a revised or new water quality standard submitted by such State under paragraph (3) of this subsection for such waters is determined by the Administrator not to be consistent with the applicable requirements of this chapter, or

(B) in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of this chapter.

The Administrator shall promulgate any revised or new standard under this paragraph not later than ninety days after he publishes such proposed standards, unless prior to such promulgation, such State has adopted a revised or new water quality standard which the Administrator determines to be in accordance with this chapter.

(d) Identification of areas with insufficient controls; maximum daily load; certain effluent limitations revision

(1)(A) Each State shall identify those waters within its boundaries for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.

(B) Each State shall identify those waters or parts thereof within its boundaries for which controls on thermal discharges under section 1311 of this title are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife.

(C) Each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation. Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

(D) Each State shall estimate for the waters identified in paragraph (1)(B) of this subsection the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the dissipative capacity of the identified waters or parts thereof. Such estimates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of

knowledge concerning the development of thermal water quality criteria for such protection and propagation in the identified waters or parts thereof.

(2) Each State shall submit to the Administrator from time to time, with the first such submission not later than one hundred and eighty days after the date of publication of the first identification of pollutants under section 1314(a)(2)(D) of this title, for his approval the waters identified and the loads established under paragraphs (1)(A), (1)(B), (1)(C), and (1)(D) of this subsection. The Administrator shall either approve or disapprove such identification and load not later than thirty days after the date of submission. If the Administrator approves such identification and load, such State shall incorporate them into its current plan under subsection (e) of this section. If the Administrator disapproves such identification and load, he shall not later than thirty days after the date of such disapproval identify such waters in such State and establish such loads for such waters as he determines necessary to implement the water quality standards applicable to such waters and upon such identification and establishment the State shall incorporate them into its current plan under subsection (e) of this section.

(3) For the specific purpose of developing information, each State shall identify all waters within its boundaries which it has not identified under paragraph (1)(A) and (1)(B) of this subsection and estimate for such waters the total maximum daily load with seasonal variations and margins of safety, for those pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation and for thermal discharges, at a level that would assure protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife.

(4) Limitations on revision of certain effluent limitations

(A) Standard not attained

For waters identified under paragraph (1)(A) where the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if (i) the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section.

(B) Standard attained

For waters identified under paragraph (1)(A) where the quality of such waters equals or exceeds levels necessary to protect the designated use for such waters or otherwise required by applicable water quality standards, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section, or any water quality standard established under this section, or any other permitting standard may be revised only if such revision is subject to and consistent with the antidegradation policy established under this section.

(e) Continuing planning process

(1) Each State shall have a continuing planning process approved under paragraph (2) of this subsection which is consistent with this chapter.

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(2) Each State shall submit not later than 120 days after October 18, 1972, to the Administrator for his approval a proposed continuing planning process which is consistent with this chapter. Not later than thirty days after the date of submission of such a process the Administrator shall either approve or disapprove such process. The Administrator shall from time to time review each State's approved planning process for the purpose of insuring that such planning process is at all times consistent with this chapter. The Administrator shall not approve any State permit program under subchapter IV of this chapter for any State which does not have an approved continuing planning process under this section.

(3) The Administrator shall approve any continuing planning process submitted to him under this section which will result in plans for all navigable waters within such State, which include, but are not limited to, the following:

(A) effluent limitations and schedules of compliance at least as stringent as those required by section 1311(b)(1), section 1311(b)(2), section 1316, and section 1317 of this title, and at least as stringent as any requirements contained in any applicable water quality standard in effect under authority of this section;

(B) the incorporation of all elements of any applicable area-wide waste management plans under section 1288 of this title, and applicable basin plans under section 1289 of this title;

(C) total maximum daily load for pollutants in accordance with subsection (d) of this section;

(D) procedures for revision;

(E) adequate authority for intergovernmental cooperation;

(F) adequate implementation, including schedules of compliance, for revised or new water quality standards, under subsection (c) of this section;

(G) controls over the disposition of all residual waste from any water treatment processing;

(H) an inventory and ranking, in order of priority, of needs for construction of waste treatment works required to meet the applicable requirements of sections 1311 and 1312 of this title.

(f) Earlier compliance

Nothing in this section shall be construed to affect any effluent limitation, or schedule of compliance required by any State to be implemented prior to the dates set forth in sections 1311(b)(1) and 1311(b)(2) of this title nor to preclude any State from requiring compliance with any effluent limitation or schedule of compliance at dates earlier than such dates.

(g) Heat standards

Water quality standards relating to heat shall be consistent with the requirements of section 1326 of this title.

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(h) Thermal water quality standards

For the purposes of this chapter the term "water quality standards" includes thermal water quality standards.

(i) Coastal recreation water quality criteria

(1) Adoption by States

(A) Initial criteria and standards

Not later than 42 months after October 10, 2000, each State having coastal recreation waters shall adopt and submit to the Administrator water quality criteria and standards for the coastal recreation waters of the State for those pathogens and pathogen indicators for which the Administrator has published criteria under section 1314(a) of this title.

(B) New or revised criteria and standards

Not later than 36 months after the date of publication by the Administrator of new or revised water quality criteria under section 1314(a)(9) of this title, each State having coastal recreation waters shall adopt and submit to the Administrator new or revised water quality standards for the coastal recreation waters of the State for all pathogens and pathogen indicators to which the new or revised water quality criteria are applicable.

(2) Failure of States to adopt

(A) In general

If a State fails to adopt water quality criteria and standards in accordance with paragraph (1)(A) that are as protective of human health as the criteria for pathogens and pathogen indicators for coastal recreation waters published by the Administrator, the Administrator shall promptly propose regulations for the State setting forth revised or new water quality standards for pathogens and pathogen indicators described in paragraph (1)(A) for coastal recreation waters of the State.

(B) Exception

If the Administrator proposes regulations for a State described in subparagraph (A) under subsection (c)(4)(B), the Administrator shall publish any revised or new standard under this subsection not later than 42 months after October 10, 2000.

(3) Applicability

Except as expressly provided by this subsection, the requirements and procedures of subsection (c) apply to this subsection, including the requirement in subsection (c)(2)(A) that the criteria protect public health and welfare.

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CREDIT(S)

(June 30, 1948, c. 758, Title III, § 303, as added Pub.L. 92-500, § 2, Oct. 18, 1972, 86 Stat. 846; amended Pub.L. 100-4, Title III, § 308(d), Title IV, § 404(b), Feb. 4, 1987, 101 Stat. 39, 68; Pub.L. 106-284, § 2, Oct. 10, 2000, 114 Stat. 870.)

Notes of Decisions (181)

33 U.S.C.A. § 1313, 33 USCA § 1313
Current through P.L. 119-18. Some statute sections may be more current, see credits for details.

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Proposed Legislation

United States Code Annotated
Title 33. Navigation and Navigable Waters (Refs & Annos)
Chapter 26. Water Pollution Prevention and Control (Refs & Annos)
Subchapter IV. Permits and Licenses (Refs & Annos)

33 U.S.C.A. § 1342

§ 1342. National pollutant discharge elimination system

Currentness

(a) Permits for discharge of pollutants

(1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311(a) of this title, upon condition that such discharge will meet either (A) all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or (B) prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this chapter.

(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

(4) All permits for discharges into the navigable waters issued pursuant to section 407 of this title shall be deemed to be permits issued under this subchapter, and permits issued under this subchapter shall be deemed to be permits issued under section 407 of this title, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this chapter.

(5) No permit for a discharge into the navigable waters shall be issued under section 407 of this title after October 18, 1972. Each application for a permit under section 407 of this title, pending on October 18, 1972, shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objectives of this chapter to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on October 18, 1972, and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 1314(i)(2) of this title, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend

beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this chapter. No such permit shall issue if the Administrator objects to such issuance.

(b) State permit programs

At any time after the promulgation of the guidelines required by subsection (i)(2) of section 1314 of this title, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each submitted program unless he determines that adequate authority does not exist:

(1) To issue permits which--

(A) apply, and insure compliance with, any applicable requirements of sections 1311, 1312, 1316, 1317, and 1343 of this title;

(B) are for fixed terms not exceeding five years; and

(C) can be terminated or modified for cause including, but not limited to, the following:

(i) violation of any condition of the permit;

(ii) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(D) control the disposal of pollutants into wells;

(2)(A) To issue permits which apply, and insure compliance with, all applicable requirements of section 1318 of this title; or

(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 1318 of this title;

(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

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(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require the identification in terms of character and volume of pollutants of any significant source introducing pollutants subject to pretreatment standards under section 1317(b) of this title into such works and a program to assure compliance with such pretreatment standards by each such source, in addition to adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 1316 of this title if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 1311 of this title if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 1284(b), 1317, and 1318 of this title.

(c) Suspension of Federal program upon submission of State program; withdrawal of approval of State program; return of State program to Administrator

(1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those discharges subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 1314(i)(2) of this title. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

(2) Any State permit program under this section shall at all times be in accordance with this section and guidelines promulgated pursuant to section 1314(i)(2) of this title.

(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The

Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

(4) Limitations on partial permit program returns and withdrawals

A State may return to the Administrator administration, and the Administrator may withdraw under paragraph (3) of this subsection approval, of--

(A) a State partial permit program approved under subsection (n)(3) only if the entire permit program being administered by the State department or agency at the time is returned or withdrawn; and

(B) a State partial permit program approved under subsection (n)(4) only if an entire phased component of the permit program being administered by the State at the time is returned or withdrawn.

(d) Notification of Administrator

(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter. Whenever the Administrator objects to the issuance of a permit under this paragraph such written objection shall contain a statement of the reasons for such objection and the effluent limitations and conditions which such permit would include if it were issued by the Administrator.

(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

(4) In any case where, after December 27, 1977, the Administrator, pursuant to paragraph (2) of this subsection, objects to the issuance of a permit, on request of the State, a public hearing shall be held by the Administrator on such objection. If the State does not resubmit such permit revised to meet such objection within 30 days after completion of the hearing, or, if no hearing is requested within 90 days after the date of such objection, the Administrator may issue the permit pursuant to subsection (a) of this section for such source in accordance with the guidelines and requirements of this chapter.

(e) Waiver of notification requirement

In accordance with guidelines promulgated pursuant to subsection (i)(2) of section 1314 of this title, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any category (including any class, type, or size within such category) of point sources within the State submitting such program.

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(f) Point source categories

The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

(g) Other regulations for safe transportation, handling, carriage, storage, and stowage of pollutants

Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

(h) Violation of permit conditions; restriction or prohibition upon introduction of pollutant by source not previously utilizing treatment works

In the event any condition of a permit for discharges from a treatment works (as defined in section 1292 of this title) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved or where the Administrator determines pursuant to section 1319(a) of this title that a State with an approved program has not commenced appropriate enforcement action with respect to such permit, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

(i) Federal enforcement not limited

Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 1319 of this title.

(j) Public information

A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purpose of reproduction.

(k) Compliance with permits

Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 1311, 1316, or 1342 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date which source is not subject to section 407 of this title, the discharge by such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

(l) Limitation on permit requirement

(1) Agricultural return flows

The Administrator shall not require a permit under this section for discharges composed entirely of return flows from irrigated agriculture, nor shall the Administrator directly or indirectly, require any State to require such a permit.

(2) Stormwater runoff from oil, gas, and mining operations

The Administrator shall not require a permit under this section, nor shall the Administrator directly or indirectly require any State to require a permit, for discharges of stormwater runoff from mining operations or oil and gas exploration, production, processing, or treatment operations or transmission facilities, composed entirely of flows which are from conveyances or systems of conveyances (including but not limited to pipes, conduits, ditches, and channels) used for collecting and conveying precipitation runoff and which are not contaminated by contact with, or do not come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

(3) Silvicultural activities

(A) NPDES permit requirements for silvicultural activities

The Administrator shall not require a permit under this section nor directly or indirectly require any State to require a permit under this section for a discharge from runoff resulting from the conduct of the following silviculture activities conducted in accordance with standard industry practice: nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance.

(B) Other requirements

Nothing in this paragraph exempts a discharge from silvicultural activity from any permitting requirement under section 1344 of this title, existing permitting requirements under section 1342 of this title, or from any other federal law.

(C) The authorization provided in Section [1] 1365(a) of this title does not apply to any non-permitting program established under 1342(p)(6) [2] of this title for the silviculture activities listed in 1342(l)(3)(A) [2] of this title, or to any other limitations that might be deemed to apply to the silviculture activities listed in 1342(l)(3)(A) [2] of this title.

(m) Additional pretreatment of conventional pollutants not required

To the extent a treatment works (as defined in section 1292 of this title) which is publicly owned is not meeting the requirements of a permit issued under this section for such treatment works as a result of inadequate design or operation of such treatment works, the Administrator, in issuing a permit under this section, shall not require pretreatment by a person introducing conventional pollutants identified pursuant to section 1314(a)(4) of this title into such treatment works other than pretreatment required to assure compliance with pretreatment standards under subsection (b)(8) of this section and section 1317(b)(1) of this title. Nothing in this subsection shall affect the Administrator's authority under sections 1317 and 1319 of this title, affect

State and local authority under sections 1317(b)(4) and 1370 of this title, relieve such treatment works of its obligations to meet requirements established under this chapter, or otherwise preclude such works from pursuing whatever feasible options are available to meet its responsibility to comply with its permit under this section.

(n) Partial permit program

(1) State submission

The Governor of a State may submit under subsection (b) of this section a permit program for a portion of the discharges into the navigable waters in such State.

(2) Minimum coverage

A partial permit program under this subsection shall cover, at a minimum, administration of a major category of the discharges into the navigable waters of the State or a major component of the permit program required by subsection (b).

(3) Approval of major category partial permit programs

The Administrator may approve a partial permit program covering administration of a major category of discharges under this subsection if--

(A) such program represents a complete permit program and covers all of the discharges under the jurisdiction of a department or agency of the State; and

(B) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b).

(4) Approval of major component partial permit programs

The Administrator may approve under this subsection a partial and phased permit program covering administration of a major component (including discharge categories) of a State permit program required by subsection (b) if--

(A) the Administrator determines that the partial program represents a significant and identifiable part of the State program required by subsection (b); and

(B) the State submits, and the Administrator approves, a plan for the State to assume administration by phases of the remainder of the State program required by subsection (b) by a specified date not more than 5 years after submission of the partial program under this subsection and agrees to make all reasonable efforts to assume such administration by such date.

(o) Anti-backsliding

(1) General prohibition

In the case of effluent limitations established on the basis of subsection (a)(1)(B) of this section, a permit may not be renewed, reissued, or modified on the basis of effluent guidelines promulgated under section 1314(b) of this title subsequent to the original issuance of such permit, to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit. In the case of effluent limitations established on the basis of section 1311(b)(1)(C) or section 1313(d) or (e) of this title, a permit may not be renewed, reissued, or modified to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit except in compliance with section 1313(d)(4) of this title.

(2) Exceptions

A permit with respect to which paragraph (1) applies may be renewed, reissued, or modified to contain a less stringent effluent limitation applicable to a pollutant if--

(A) material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation;

(B)(i) information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of a less stringent effluent limitation at the time of permit issuance; or

(ii) the Administrator determines that technical mistakes or mistaken interpretations of law were made in issuing the permit under subsection (a)(1)(B);

(C) a less stringent effluent limitation is necessary because of events over which the permittee has no control and for which there is no reasonably available remedy;

(D) the permittee has received a permit modification under section 1311(c), 1311(g), 1311(h), 1311(i), 1311(k), 1311(n), or 1326(a) of this title; or

(E) the permittee has installed the treatment facilities required to meet the effluent limitations in the previous permit and has properly operated and maintained the facilities but has nevertheless been unable to achieve the previous effluent limitations, in which case the limitations in the reviewed, reissued, or modified permit may reflect the level of pollutant control actually achieved (but shall not be less stringent than required by effluent guidelines in effect at the time of permit renewal, reissuance, or modification).

Subparagraph (B) shall not apply to any revised waste load allocations or any alternative grounds for translating water quality standards into effluent limitations, except where the cumulative effect of such revised allocations results in a decrease in the amount of pollutants discharged into the concerned waters, and such revised allocations are not the result of a discharger eliminating or substantially reducing its discharge of pollutants due to complying with the requirements of this chapter or for reasons otherwise unrelated to water quality.

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(3) Limitations

In no event may a permit with respect to which paragraph (1) applies be renewed, reissued, or modified to contain an effluent limitation which is less stringent than required by effluent guidelines in effect at the time the permit is renewed, reissued, or modified. In no event may such a permit to discharge into waters be renewed, reissued, or modified to contain a less stringent effluent limitation if the implementation of such limitation would result in a violation of a water quality standard under section 1313 of this title applicable to such waters.

(p) Municipal and industrial stormwater discharges

(1) General rule

Prior to October 1, 1994, the Administrator or the State (in the case of a permit program approved under this section) shall not require a permit under this section for discharges composed entirely of stormwater.

(2) Exceptions

Paragraph (1) shall not apply with respect to the following stormwater discharges:

(A) A discharge with respect to which a permit has been issued under this section before February 4, 1987.

(B) A discharge associated with industrial activity.

(C) A discharge from a municipal separate storm sewer system serving a population of 250,000 or more.

(D) A discharge from a municipal separate storm sewer system serving a population of 100,000 or more but less than 250,000.

(E) A discharge for which the Administrator or the State, as the case may be, determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.

(3) Permit requirements

(A) Industrial discharges

Permits for discharges associated with industrial activity shall meet all applicable provisions of this section and section 1311 of this title.

(B) Municipal discharge

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Permits for discharges from municipal storm sewers--

(i) may be issued on a system- or jurisdiction-wide basis;

(ii) shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and

(iii) shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.

(4) Permit application requirements

(A) Industrial and large municipal discharges

Not later than 2 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraphs (2)(B) and (2)(C). Applications for permits for such discharges shall be filed no later than 3 years after February 4, 1987. Not later than 4 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(B) Other municipal discharges

Not later than 4 years after February 4, 1987, the Administrator shall establish regulations setting forth the permit application requirements for stormwater discharges described in paragraph (2)(D). Applications for permits for such discharges shall be filed no later than 5 years after February 4, 1987. Not later than 6 years after February 4, 1987, the Administrator or the State, as the case may be, shall issue or deny each such permit. Any such permit shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the date of issuance of such permit.

(5) Studies

The Administrator, in consultation with the States, shall conduct a study for the purposes of--

(A) identifying those stormwater discharges or classes of stormwater discharges for which permits are not required pursuant to paragraphs (1) and (2) of this subsection;

(B) determining, to the maximum extent practicable, the nature and extent of pollutants in such discharges; and

(C) establishing procedures and methods to control stormwater discharges to the extent necessary to mitigate impacts on water quality.

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Not later than October 1, 1988, the Administrator shall submit to Congress a report on the results of the study described in subparagraphs (A) and (B). Not later than October 1, 1989, the Administrator shall submit to Congress a report on the results of the study described in subparagraph (C).

(6) Regulations

Not later than October 1, 1993, the Administrator, in consultation with State and local officials, shall issue regulations (based on the results of the studies conducted under paragraph (5)) which designate stormwater discharges, other than those discharges described in paragraph (2), to be regulated to protect water quality and shall establish a comprehensive program to regulate such designated sources. The program shall, at a minimum, (A) establish priorities, (B) establish requirements for State stormwater management programs, and (C) establish expeditious deadlines. The program may include performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate.

(q) Combined sewer overflows

(1) Requirement for permits, orders, and decrees

Each permit, order, or decree issued pursuant to this chapter after December 21, 2000, for a discharge from a municipal combined storm and sanitary sewer shall conform to the Combined Sewer Overflow Control Policy signed by the Administrator on April 11, 1994 (in this subsection referred to as the "CSO control policy").

(2) Water quality and designated use review guidance

Not later than July 31, 2001, and after providing notice and opportunity for public comment, the Administrator shall issue guidance to facilitate the conduct of water quality and designated use reviews for municipal combined sewer overflow receiving waters.

(3) Report

Not later than September 1, 2001, the Administrator shall transmit to Congress a report on the progress made by the Environmental Protection Agency, States, and municipalities in implementing and enforcing the CSO control policy.

(r) Discharges incidental to the normal operation of recreational vessels

No permit shall be required under this chapter by the Administrator (or a State, in the case of a permit program approved under subsection (b)) for the discharge of any graywater, bilge water, cooling water, weather deck runoff, oil water separator effluent, or effluent from properly functioning marine engines, or any other discharge that is incidental to the normal operation of a vessel, if the discharge is from a recreational vessel.

(s) Integrated plans

(1) Definition of integrated plan

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In this subsection, the term "integrated plan" means a plan developed in accordance with the Integrated Municipal Stormwater and Wastewater Planning Approach Framework, issued by the Environmental Protection Agency and dated June 5, 2012.

(2) In general

The Administrator (or a State, in the case of a permit program approved by the Administrator) shall inform municipalities of the opportunity to develop an integrated plan that may be incorporated into a permit under this section.

(3) Scope

(A) Scope of permit incorporating integrated plan

A permit issued under this section that incorporates an integrated plan may integrate all requirements under this chapter addressed in the integrated plan, including requirements relating to--

(i) a combined sewer overflow;

(ii) a capacity, management, operation, and maintenance program for sanitary sewer collection systems;

(iii) a municipal stormwater discharge;

(iv) a municipal wastewater discharge; and

(v) a water quality-based effluent limitation to implement an applicable wasteload allocation in a total maximum daily load.

(B) Inclusions in integrated plan

An integrated plan incorporated into a permit issued under this section may include the implementation of--

(i) projects, including innovative projects, to reclaim, recycle, or reuse water; and

(ii) green infrastructure.

(4) Compliance schedules

(A) In general

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A permit issued under this section that incorporates an integrated plan may include a schedule of compliance, under which actions taken to meet any applicable water quality-based effluent limitation may be implemented over more than 1 permit term if the schedule of compliance--

(i) is authorized by State water quality standards; and

(ii) meets the requirements of section 122.47 of title 40, Code of Federal Regulations (as in effect on January 14, 2019).

(B) Time for compliance

For purposes of subparagraph (A)(ii), the requirement of section 122.47 of title 40, Code of Federal Regulations, for compliance by an applicable statutory deadline under this chapter does not prohibit implementation of an applicable water quality-based effluent limitation over more than 1 permit term.

(C) Review

A schedule of compliance incorporated into a permit issued under this section may be reviewed at the time the permit is renewed to determine whether the schedule should be modified.

(5) Existing authorities retained

(A) Applicable standards

Nothing in this subsection modifies any obligation to comply with applicable technology and water quality-based effluent limitations under this chapter.

(B) Flexibility

Nothing in this subsection reduces or eliminates any flexibility available under this chapter, including the authority of a State to revise a water quality standard after a use attainability analysis under section 131.10(g) of title 40, Code of Federal Regulations (or a successor regulation), subject to the approval of the Administrator under section 1313(c) of this title.

(6) Clarification of State authority

(A) In general

Nothing in section 1311(b)(1)(C) of this title precludes a State from authorizing in the water quality standards of the State the issuance of a schedule of compliance to meet water quality-based effluent limitations in permits that incorporate provisions of an integrated plan.

(B) Transition rule

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In any case in which a discharge is subject to a judicial order or consent decree, as of January 14, 2019, resolving an enforcement action under this chapter, any schedule of compliance issued pursuant to an authorization in a State water quality standard may not revise a schedule of compliance in that order or decree to be less stringent, unless the order or decree is modified by agreement of the parties and the court.

CREDIT(S)

(June 30, 1948, c. 758, Title IV, § 402, as added Pub.L. 92-500, § 2, Oct. 18, 1972, 86 Stat. 880; amended Pub.L. 95-217, §§ 33(c), 50, 54(c)(1), 65, 66, Dec. 27, 1977, 91 Stat. 1577, 1588, 1591, 1599, 1600; Pub.L. 100-4, Title IV, §§ 401 to 404(a), (c), formerly (d), 405, Feb. 4, 1987, 101 Stat. 65 to 67, 69; Pub.L. 102-580, Title III, § 364, Oct. 31, 1992, 106 Stat. 4862; Pub.L. 104-66, Title II, § 2021(e)(2), Dec. 21, 1995, 109 Stat. 727; Pub.L. 106-554, § 1(a)(4) [Div. B, Title I, § 112(a)], Dec. 21, 2000, 114 Stat. 2763, 2763A-224; Pub.L. 110-288, § 2, July 29, 2008, 122 Stat. 2650; Pub.L. 113-79, Title XII, § 12313, Feb. 7, 2014, 128 Stat. 992; Pub.L. 115-436, § 3(a), Jan. 14, 2019, 132 Stat. 5558.)

U.S. SUPREME COURT OCTOBER TERM 2024

<U.S. Supreme Court, Oct. Term 2024, Oral Argument - Question Presented: >

<Whether the Clean Water Act allows EPA (or an authorized state) to impose generic prohibitions in NPDES permits that subject permitholders to enforcement for exceedances of water quality standards without identifying specific limits to which their discharges must conform. City and Cnty. of San Francisco v. U.S. Environmental Protection Agency, 75 F.4th 1074 (C.A.9, 2023), cert. granted, 2024 WL 2709345 (U.S., 2024); CITY AND COUNTY OF SAN FRANCISCO, California, Petitioner, v. ENVIRONMENTAL PROTECTION AGENCY, Respondent., 2024 WL 4519618 (U.S.) (U.S.Oral.Arg.,2024). >

Notes of Decisions (322)

Footnotes

1 So in original. Probably should not be capitalized.

2 So in original. Probably should be preceded by “section”.

33 U.S.C.A. § 1342, 33 USCA § 1342
Current through P.L. 119-18. Some statute sections may be more current, see credits for details.

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West's Annotated California Codes
Constitution of the State of California 1879 (Refs & Annos)
Article XI. Local Government (Refs & Annos)

West's Ann.Cal.Const. Art. 11, § 7

§ 7. Counties and cities; ordinances and regulations; authority

Currentness

Sec. 7. A county or city may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws.

Credits
(Adopted June 2, 1970.)

Notes of Decisions (1698)

West's Ann. Cal. Const. Art. 11, § 7, CA CONST Art. 11, § 7
Current with urgency legislation through Ch. 7 of 2025 Reg.Sess. Some statute sections may be more current, see credits for details.

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Proposed Legislation

West's Annotated California Codes
Constitution of the State of California 1879 (Refs & Annos)
Article XIIIC. [Voter Approval for Local Tax Levies] (Refs & Annos)

West's Ann.Cal.Const. Art. 13C, § 1

§ 1. Definitions

Currentness

SECTION 1. Definitions. As used in this article:

(a) "General tax" means any tax imposed for general governmental purposes.

(b) "Local government" means any county, city, city and county, including a charter city or county, any special district, or any other local or regional governmental entity.

(c) "Special district" means an agency of the State, formed pursuant to general law or a special act, for the local performance of governmental or proprietary functions with limited geographic boundaries including, but not limited to, school districts and redevelopment agencies.

(d) "Special tax" means any tax imposed for specific purposes, including a tax imposed for specific purposes, which is placed into a general fund.

(e) As used in this article, "tax" means any levy, charge, or exaction of any kind imposed by a local government, except the following:

(1) A charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege.

(2) A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product.

(3) A charge imposed for the reasonable regulatory costs to a local government for issuing licenses and permits, performing investigations, inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof.

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(4) A charge imposed for entrance to or use of local government property, or the purchase, rental, or lease of local government property.

(5) A fine, penalty, or other monetary charge imposed by the judicial branch of government or a local government, as a result of a violation of law.

(6) A charge imposed as a condition of property development.

(7) Assessments and property-related fees imposed in accordance with the provisions of Article XIII D.

The local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity.

Credits
(Added by Initiative Measure (Prop. 218, § 3, approved Nov. 5, 1996). Amended by Initiative Measure (Prop. 26, § 3, approved Nov. 2, 2010, eff. Nov. 3, 2010).)

Notes of Decisions (134)

West's Ann. Cal. Const. Art. 13C, § 1, CA CONST Art. 13C, § 1
Current with urgency legislation through Ch. 7 of 2025 Reg.Sess. Some statute sections may be more current, see credits for details.

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West's Annotated California Codes
Constitution of the State of California 1879 (Refs & Annos)
Article XIIID. [Assessment and Property Related Fee Reform] (Refs & Annos)

West's Ann.Cal.Const. Art. 13D, § 6

§ 6. New or existing increased fees and charges; procedures and requirements; voter approval

Currentness

Sec. 6. Property Related Fees and Charges. (a) Procedures for New or Increased Fees and Charges. An agency shall follow the procedures pursuant to this section in imposing or increasing any fee or charge as defined pursuant to this article, including, but not limited to, the following:

(1) The parcels upon which a fee or charge is proposed for imposition shall be identified. The amount of the fee or charge proposed to be imposed upon each parcel shall be calculated. The agency shall provide written notice by mail of the proposed fee or charge to the record owner of each identified parcel upon which the fee or charge is proposed for imposition, the amount of the fee or charge proposed to be imposed upon each, the basis upon which the amount of the proposed fee or charge was calculated, the reason for the fee or charge, together with the date, time, and location of a public hearing on the proposed fee or charge.

(2) The agency shall conduct a public hearing upon the proposed fee or charge not less than 45 days after mailing the notice of the proposed fee or charge to the record owners of each identified parcel upon which the fee or charge is proposed for imposition. At the public hearing, the agency shall consider all protests against the proposed fee or charge. If written protests against the proposed fee or charge are presented by a majority of owners of the identified parcels, the agency shall not impose the fee or charge.

(b) Requirements for Existing, New or Increased Fees and Charges. A fee or charge shall not be extended, imposed, or increased by any agency unless it meets all of the following requirements:

(1) Revenues derived from the fee or charge shall not exceed the funds required to provide the property related service.

(2) Revenues derived from the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.

(3) The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.

(4) No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees or charges based on potential or future use of a service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with Section 4.

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(5) No fee or charge may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services, where the service is available to the public at large in substantially the same manner as it is to property owners. Reliance by an agency on any parcel map, including, but not limited to, an assessor's parcel map, may be considered a significant factor in determining whether a fee or charge is imposed as an incident of property ownership for purposes of this article. In any legal action contesting the validity of a fee or charge, the burden shall be on the agency to demonstrate compliance with this article.

(c) Voter Approval for New or Increased Fees and Charges. Except for fees or charges for sewer, water, and refuse collection services, no property related fee or charge shall be imposed or increased unless and until that fee or charge is submitted and approved by a majority vote of the property owners of the property subject to the fee or charge or, at the option of the agency, by a two-thirds vote of the electorate residing in the affected area. The election shall be conducted not less than 45 days after the public hearing. An agency may adopt procedures similar to those for increases in assessments in the conduct of elections under this subdivision.

(d) Beginning July 1, 1997, all fees or charges shall comply with this section.

Credits
(Added by Initiative Measure (Prop. 218, § 4, approved Nov. 5, 1996).)

Notes of Decisions (168)

West's Ann. Cal. Const. Art. 13D, § 6, CA CONST Art. 13D, § 6
Current with urgency legislation through Ch. 7 of 2025 Reg.Sess. Some statute sections may be more current, see credits for details.

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725 F.3d 1194
United States Court of Appeals, Ninth Circuit.

NATURAL RESOURCES DEFENSE COUNCIL, INC.; Santa Monica Baykeeper, Plaintiffs–Appellants,
v.
COUNTY OF LOS ANGELES; Los Angeles County Flood Control District; Michael Antonovich, in his official capacity as Supervisor; Yvonne Burke, in her official capacity as Supervisor; Gloria Molina, in her official capacity as Supervisor; Zev Yaroslavsky, in his official capacity as Supervisor; Dean D. Efstathiou, in his official capacity as Acting Director of Los Angeles County Department of Public Works; Don Knabe, in his official capacity as Supervisor, Defendants–Appellees.

No. 10–56017
|
Aug. 8, 2013.

Synopsis

Background: Environmental organizations brought action against California municipal entities, alleging that they were discharging urban stormwater runoff into navigable waters in violation of the Clean Water Act (CWA). The United States District Court for the Central District of California, A. Howard Matz, J., entered a partial final judgment in favor of defendants, and plaintiffs appealed. On denial of rehearing en banc, the Court of Appeals, 673 F.3d 880, affirmed in part, reversed in part, and remanded. Certiorari was granted. —— U.S. ——, 133 S.Ct. 710, 184 L.Ed.2d 547, reversed and remanded.

[Holding:] On remand, the Court of Appeals, Milan D. Smith, Jr., held that pollution exceedances detected at monitoring stations of County of Los Angeles and Los Angeles County Flood Control District were sufficient to establish County defendants' liability as matter of law for violations of terms of their National Pollutant Discharge Elimination System (NPDES) permit.

Reversed and remanded.

Procedural Posture(s): On Appeal.

West Headnotes (9)

[1] **Environmental Law** Discharge of pollutants

In nearly all cases, a National Pollutant Discharge Elimination System (NPDES) permit is required before anyone may lawfully discharge a pollutant from a point source into the navigable waters of the United States. Clean Water Act, §§ 301(a), 402, 33 U.S.C.A. §§ 1311(a), 1342.

25 Cases that cite this headnote

[2] **Environmental Law** Reporting, notice, and monitoring requirements

Pollution exceedances detected at monitoring stations of County of Los Angeles and Los Angeles County Flood Control District were sufficient to establish County defendants' liability as matter of law for violations of terms of their National Pollutant Discharge Elimination System (NPDES) permit issued pursuant to Clean Water Act, since data collected at monitoring stations was intended to determine whether permittees were in compliance with permit, and extrinsic considerations, including Clean Water Act's monitoring requirements, also supported that conclusion; limiting permittee's responsibility to "discharge[s] for which it is the operator" applied to appropriate remedy for permit violations, not to liability for those violations. Clean Water Act, § 402(a)(2), (k), 33 U.S.C.A. § 1342(a)(2), (k); 40 C.F.R. §§ 122.26(d)(2)(i)(F), 122.41(a), 122.44(i)(1); Restatement (Second) of Contracts § 203(a).

14 Cases that cite this headnote

[3] **Federal Courts** Mandate

No opinion of the circuit becomes final until the mandate issues. F.R.A.P.Rule 41(c), 28 U.S.C.A.

11 Cases that cite this headnote
More cases on this issue

[4] **Federal Courts** Law of the case in general

Federal Courts Mandate

Earlier judgment by Court of Appeal was not final, and it could not be considered the law of the case, since mandate in case had not issued.

6 Cases that cite this headnote
More cases on this issue

[5] **Environmental Law** Violations and liability in general

A permittee violates the CWA when it discharges pollutants in excess of the levels specified in the permit, or where the permittee otherwise violates the permit's terms. Clean Water Act, § 402(k), 33 U.S.C.A. § 1342(k); 40 C.F.R. § 122.41(a).

22 Cases that cite this headnote

[6] **Environmental Law** Discharge of pollutants

If the language of a National Pollutant Discharge Elimination System (NPDES) permit, considered in light of the structure of the permit as a whole, is plain and capable of legal construction, the language alone must determine the permit's meaning; however, if the permit's language is ambiguous, a court may turn to extrinsic evidence to interpret its terms. Clean Water Act, § 402(k), 33 U.S.C.A. § 1342(k); 40 C.F.R. § 122.41(a).

36 Cases that cite this headnote

[7] **Environmental Law** Discharge of pollutants

A court must give effect to every word or term in a National Pollutant Discharge Elimination System (NPDES) permit and reject none as meaningless or surplusage; therefore, a court must interpret the permit in a manner that gives full meaning and effect to all of the permit's provisions and avoid a construction of the permit that focuses only on a few isolated provisions. Clean Water Act, § 402(k), 33 U.S.C.A. § 1342(k); 40 C.F.R. § 122.41(a); Restatement (Second) of Contracts § 203(a).

12 Cases that cite this headnote

[8] **Environmental Law** Discharge of pollutants

One of a court's obligations in interpreting an National Pollutant Discharge Elimination System (NPDES) permit is to determine the intent of the permitting authority; thus, a court gives significant weight to any extrinsic evidence that evinces the permitting authority's interpretation of the relevant permit. Clean Water Act, § 402(a)(2), (k), 33 U.S.C.A. § 1342(a)(2), (k); 40 C.F.R. §§ 122.26(d)(2)(i)(F), 122.41(a), 122.44(i)(1).

13 Cases that cite this headnote

[9] **Environmental Law** Discharge of pollutants

A court does not defer to the interpretation of CWA National Pollutant Discharge Elimination System (NPDES) permit by a regional board. Clean Water Act, § 402, 33 U.S.C.A. § 1342.

26 Cases that cite this headnote

Attorneys and Law Firms

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Andrea Sheridan Ordin, Judith A. Fries, Laurie Dods, Los Angeles County Department of County Counsel, Howard Gest and David W. Burhenn, Burhenn & Gest LLP, Los Angeles, CA, for Defendants–Appellees.

On Remand from the United States Supreme Court. D.C. No. 2:08–cv–01467–AHM–PLA.

Before: HARRY PREGERSON and MILAN D. SMITH, JR., Circuit Judges, and H. RUSSEL HOLLAND, Senior District Judge.*

* The Honorable H. Russel Holland, Senior District Judge for the U.S. District Court for the District of Alaska, sitting by designation.

OPINION

M. SMITH, Circuit Judge:

Plaintiffs–Appellants Natural Resources Defense Council and Santa Monica Baykeeper (collectively, the Plaintiffs) filed suit against the County of Los Angeles and the Los Angeles County Flood Control District (collectively, the County Defendants) alleging that the County Defendants are discharging polluted stormwater in violation of the terms of their National Pollutant Discharge Elimination System (NPDES) permit, issued pursuant to the Federal Water Pollution Control Act (the Clean Water Act, Act, or CWA), 86 Stat. 816, codified as amended at 33 U.S.C. §§ 1251, *et seq.* The district court granted the County Defendants' motion for summary judgment, reasoning that Plaintiffs failed to prove that any *individual* defendant had discharged pollutants in violation of the Clean Water Act, where Plaintiffs' only evidence of violations was monitoring data taken downstream of the County Defendants' (and others') discharge points, as opposed to data sampled at the relevant discharge points themselves. On appeal, we affirmed the district court's judgment in part and reversed in part. *Natural Res. Def. Council, Inc. v. Cnty. of L.A.,* 673 F.3d 880 (9th Cir.2011). On January 8, 2013, the Supreme Court reversed our judgment and remanded this case to us for further proceedings. *L.A. Cnty. Flood Control Dist. v. Natural Res. Def. Council, Inc.,* —— U.S. ——, 133 S.Ct. 710, 184 L.Ed.2d 547 (2013). On February 19, 2013, we ordered the parties to file supplemental briefs addressing the implications of the Supreme Court's ruling. Having considered the Supreme Court's ruling, the responses of the parties in their supplemental briefs, and other matters noted ***1197** herein, we now conclude that the pollution exceedances detected at the County Defendants' monitoring stations are sufficient to establish the County Defendants' liability for NPDES permit violations as a matter of law. Accordingly, we once again reverse the district court's grant of summary judgment in favor of the County Defendants, and remand to the district court for a determination of the appropriate remedy for the County Defendants' violations.

FACTUAL BACKGROUND

I. Stormwater Runoff in Los Angeles County

Stormwater runoff is surface water generated by precipitation events, such as rainstorms, which flows over streets, parking lots, commercial sites, and other developed parcels of land. When stormwater courses over urban environs, it frequently becomes polluted with contaminants, such as "suspended metals, sediments, algae-promoting nutrients (nitrogen and phosphorus), floatable trash, used motor oil, raw sewage, [and] pesticides[.]"[1] *Envtl. Def. Ctr., Inc. v. EPA,* 344 F.3d 832, 840 (9th Cir.2003). This polluted stormwater often makes its way into storm drains and sewers, which "generally channel collected runoff into federally protected water bodies," *id.,* such as rivers and oceans. Consequently, stormwater runoff has been recognized as "one of the most significant sources of water pollution in the nation, at times comparable to, if not greater than, contamination from industrial and sewage sources." *Id.* (citation omitted).

1 Whereas natural, vegetated soil can absorb rainwater and capture pollutants, paved surfaces and developed land can do neither. Paved facilities with particularly high volumes of motor vehicle traffic—such as parking lots, retail gasoline outlets, and fast food restaurants—are typically responsible for producing higher concentrations of pollutants in storm water runoff.

Los Angeles County (the County) is home to more than 10 million people and covers a sprawling amalgam of populous incorporated cities and significant swaths of unincorporated land. The Los Angeles County Flood Control District (the District) is a public entity governed by the Los Angeles County Board of Supervisors and the Los Angeles County Department of Public Works. The District comprises 84 cities and some unincorporated areas of the County. The County and the District are separate legal entities.

Each city in the District operates a municipal separate storm sewer system (ms4)[2] that is composed of gutters, catch basins, storm drains, and pipes that collect and convey stormwater. The County also operates its own ms4 that primarily collects and conveys stormwater runoff in the unincorporated areas of the County. Each of these ms4s connects to the District's substantially larger ms4, an extensive flood-control and storm-sewer infrastructure ***1198** consisting of approximately 500 miles of open

channels and 2,800 miles of storm drains. Because a comprehensive map of the County Defendants' storm sewer system does not exist, no one knows the exact size of the LA MS4[3] or the locations of all of its storm drain connections and outfalls.[4] But while the number and location of storm drains and outfalls are too numerous to catalog, it is undisputed that the LA MS4 collects and channels stormwater runoff from across the County. It is similarly undisputed that untreated stormwater is discharged from LA MS4 outfalls into various watercourses, including the Los Angeles and San Gabriel Rivers.[5] These rivers, in turn, drain into several coastal waters, including, among others, the Santa Monica Bay and the Pacific Ocean.

2 Federal Regulations define an ms4 as:

> a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):
> (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body ... having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity ...;
> (ii) Designed or used for collecting or conveying storm water;
> (iii) Which is not a combined sewer; and
> (iv) Which is not part of a Publicly Owned Treatment Works....

40 C.F.R. § 122.26(b)(8). Unlike a sanitary sewer system, which transports municipal sewage for treatment at a wastewater facility, or a combined sewer system, which transports sewage and stormwater for treatment, an ms4 conveys only untreated stormwater. *See* 40 C.F.R. § 122.26(a)(7), (b)(8).

3 Throughout this Opinion, reference is made to both "ms4" and the "LA MS4." The former is a generic reference to an individual municipal separate storm sewer system without regard to its particular location, while the latter specifically refers to the entire flood control and stormsewer infrastructure described *supra* that exists in Los Angeles County, and which is made up of the various interconnected ms4s that are controlled by the County, the District, and the incorporated cities within the District.

4 An "outfall" is defined as a "point source ... at the point where a municipal separate storm sewer discharges to waters of the United States...." 40 C.F.R. § 122.26(b)(9). It is estimated that the LA MS4 contains tens of thousands of outfalls where stormwater runoff is discharged into federally protected water bodies.

5 Plaintiffs originally complained about the County Defendants' discharges into four water bodies: the Los Angeles River, the San Gabriel River, the Santa Clara River, and Malibu Creek. *See Natural Res. Def. Council,* 673 F.3d at 883. On remand to this court, however, Plaintiffs only seek review of the district court's summary judgment ruling regarding the County Defendants' discharges into the Los Angeles and San Gabriel Rivers.

II. The County Defendants' NPDES Permit

[1] Section 301(a) of the CWA prohibits the "discharge of any pollutant" from any "point source" into "navigable waters" unless the discharge complies with certain other sections of the CWA.[6] *See* 33 U.S.C. § 1311(a). One of those sections is section 402, which provides for the issuance of NPDES permits. 33 U.S.C. § 1342. In nearly all cases, an NPDES permit is required before anyone may lawfully discharge a pollutant from a point source into the navigable waters of the United States. *See Arkansas v. Oklahoma,* 503 U.S. 91, 101–02, 112 S.Ct. 1046, 117 L.Ed.2d 239 (1992); *Environmental Law Handbook* 323 (Thomas F.P. Sullivan ed., 21st ed.2011).

6 A point source is defined as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." 33 U.S.C. § 1362(14). Throughout this litigation, there has been confusion regarding whether the LA MS4 is a "point source" under the CWA. *See Natural Res. Def. Council,* 673 F.3d at 898 (accepting Plaintiffs' argument that "[u]nder the Clean Water Act, the [LA] MS4 is a 'Point Source.' "). The LA MS4 is *not* a single point

source. Rather, the LA MS4 is a collection of point sources, including outfalls, that discharge into the navigable waters of the United States.

Congress has empowered the EPA Administrator to delegate NPDES permitting authority to state agencies. 33 U.S.C. § 1342(b). Pursuant to this authority, the EPA has authorized the State of California to develop water quality standards and issue NPDES permits. Pursuant to the Porter–Cologne Water Quality Control Act, California state law designates the State Water Resources Control Board and ***1199** nine regional boards as the principal state agencies charged with enforcing federal and state water pollution laws and issuing NPDES permits. *See* Cal. Water Code §§ 13000 *et seq.* The entity responsible for issuing permits in the Los Angeles area is the California State Water Resources Control Board for the Los Angeles Region (the Regional Board).

On June 18, 1990, the Regional Board first issued an NPDES permit (the Permit) regulating stormwater discharges by the County, the District, and the 84 incorporated municipalities in the District (collectively, the Permittees). The Permit has subsequently been renewed or amended several times, and the version of the Permit at issue in this litigation came into force on December 13, 2001.[7] The Permit covers all relevant discharges that occur "within the boundaries of the Permittee municipalities ... over which [the municipalities have] regulatory jurisdiction as well as unincorporated areas in Los Angeles County within the jurisdiction of the Regional Board."

7 On November 8, 2012, the Regional Board issued a new NPDES permit to the County Defendants and various other permittees.

The Permit runs to 99 pages and contains a myriad of rules, regulations, and conditions regarding the Permittees' operation of the LA MS4. However, only two sets of the Permit's provisions are particularly relevant to this appeal; those contained in Part 2, titled "Receiving Water Limitations," and those contained in the section titled "Monitoring and Reporting Program."

Part 2 places limits on the type and amount of pollutants the Permittees may lawfully discharge from the LA MS4. Specifically, Part 2 prohibits "discharges from the [LA] MS4 that cause or contribute to the violation of the Water Quality Standards or water quality objectives."[8] The Permit defines "Water Quality Standards and Water Quality Objectives" as "water quality criteria contained in the Basin Plan, the California Ocean Plan, the National Toxics Rule, the California Toxics Rule, and other state or federal approved surface water quality plans."[9] Succinctly put, the Permit incorporates the pollution standards promulgated in other agency documents such as the Basin Plan, and prohibits stormwater discharges that "cause or contribute to the violation" of those incorporated standards. The Permit further provides that the Permittees "shall comply" with the LA MS4 discharge prohibitions outlined in Part 2 "through timely implementation of control measures and other actions to reduce pollutants in the[ir LA MS4] discharges...."

8 Part 2 also mandates that "[d]ischarges from the [LA] MS4 of storm water, or non-storm water, for which a Permittee is responsible for [sic], shall not cause or contribute to a condition of nuisance."

9 Under California law, regional boards are required to formulate water quality plans, called "basin plans," which designate the beneficial uses of protected water bodies within the boards' jurisdiction, establish water quality objectives for those water bodies, and establish a program for implementing the basin plan. *See City of Burbank v. State Water Res. Control Bd.,* 35 Cal.4th 613, 26 Cal.Rptr.3d 304, 108 P.3d 862, 865 (2005) (citing Cal. Water Code § 13050(j)).

The Monitoring and Reporting Program complements Part 2. Under that program, the Permittees are required to monitor the impacts of their LA MS4 discharges on water quality and to publish the results of all pollution monitoring at least annually. The primary objectives of the monitoring program include "assessing compliance" with the Permit, "measuring and improving the effectiveness" of the Los Angeles Countywide Stormwater Quality Management Program (SQMP),[10] and assessing ***1200** the environmental impact of urban runoff on the receiving waters in the County.

10 The Permit defines the SQMP as "the Los Angeles Countywide Stormwater Quality Management Program, which includes descriptions of programs, collectively developed by the Permittees in accordance with the provisions of the NPDES permit, to comply with applicable federal and state law...."

One of the principal ways the Permittees are required to monitor their LA MS4 discharges is through mass-emissions monitoring. Mass-emissions monitoring measures

all constituents present in water, and the readings give a cumulative picture of the pollutant load in a waterbody. The Permit requires the District, as Principal Permittee, to conduct mass-emissions monitoring at seven enumerated monitoring stations located throughout the County. The District is also responsible for analyzing the resulting data and submitting a comprehensive report of its findings. [11] According to the Permit, the purpose of mass-emissions monitoring is to: (1) estimate the mass emissions from the LA MS4; (2) assess trends in the mass emissions over time; and (3) determine if the LA MS4 is contributing to exceedances of Water Quality Standards by comparing the monitoring results to the applicable pollution standards promulgated in the Basin Plan and similar documents.

11 The District publishes these "Stormwater Monitoring Reports" on the internet at: http://ladpw.org/wmd/NPDES/report_directory.cfm. (last accessed August 1, 2013).

The Permittees sited a mass-emissions monitoring station in both the Los Angeles and San Gabriel Rivers (collectively, the Monitoring Stations). The Los Angeles River monitoring station is located in a channelized portion of the Los Angeles River that runs through the City of Long Beach. [12] The San Gabriel River monitoring station is located in a channelized portion of the San Gabriel River that runs through the City of Pico Rivera. The Monitoring Stations are located downstream of numerous LA MS4 outfalls controlled by the County Defendants and various other non-party Permittees.

12 In a declaration submitted to the district court, the County Defendants described both Monitoring Stations as being located "in a portion of the District's flood control channel." *See also* "Section Two: Site Descriptions," Los Angeles Cnty. Dept. of Pub. Works, *available at* http://dpw.lacounty.gov/wmd/npdes/9899_report/SiteDesc.pdf (last accessed August 1, 2013). Thus, it appears that the pertinent river segments are part of *both* the LA MS4 itself *and* "the waters of the United States" that the CWA protects. But regardless of whether the mass-emissions monitoring stations are *also* part of the LA MS4, there is no dispute that the mass-emissions monitoring stations are located *within* the Los Angeles and San Gabriel Rivers, downstream of a significant number of the County Defendants' LA MS4 outfalls. We misconstrued some of the data before us when we previously held otherwise. *See Natural Res. Def. Council,* 673 F.3d at 899 ("As a matter of law and fact, the [LA] MS4 is distinct from the two navigable rivers; the [LA] MS4 is an intra-state man-made construction—not a naturally occurring Watershed River"); *see also* 53 Fed.Reg. 49,416, 49,453 (Dec. 7, 1988) (EPA observes that "[i]n many situations, waters of the United States that receive discharges from municipal storm sewers can be mistakenly considered to be part of the storm sewer system.").

Between 2002 and 2008, when this case was filed, the District published annual monitoring reports that contain the data that the District collected at the Monitoring Stations. According to those reports, the Monitoring Stations identified 140 separate exceedances of the Permit's water quality standards, including excessive levels of aluminum, copper, cyanide, zinc, and fecal coliform bacteria in both the Los Angeles and San Gabriel Rivers. The County Defendants do not dispute the accuracy of the monitoring data.

PROCEDURAL BACKGROUND

Using the monitoring data self-reported by the District, Plaintiffs cataloged the ***1201** water quality exceedances measured in various receiving waters in the County. Beginning on May 31, 2007, Plaintiffs sent a series of notice letters to the County Defendants informing them that Plaintiffs believed that they were violating the terms of the Permit. [13] Specifically, Plaintiffs contended that the water quality exceedances documented in the District's monitoring reports demonstrated liability under the CWA. Dissatisfied with the County Defendants' response to these letters, Plaintiffs brought this citizen-enforcement action on March 3, 2008. After the district court dismissed certain elements of the Plaintiffs' initial complaint because notice of the Permit violations was defective, Plaintiffs sent the County Defendants an adequate notice letter on July 3, 2008.

13 The CWA requires plaintiffs to provide 60 days notice to an alleged violator, the State in which the violation is alleged to be occurring, and the EPA, before filing suit. 33 U.S.C. § 1365(b)(1)(A).

Plaintiffs filed their First Amended Complaint on September 18, 2008. In the complaint, Plaintiffs asserted six causes of action under the CWA. Four of the Plaintiffs' claims, which the district court designated the "Watershed Claims,"

were initially before us on appeal. The first three Watershed Claims allege that, beginning in 2002 or 2003, the County Defendants caused or contributed to exceedances of water quality standards in the Santa Clara River (Claim 1), the Los Angeles River (Claim 2), and the San Gabriel River (Claim 3), in violation of 33 U.S.C. §§ 1311(a), 1342(p). The fourth Watershed Claim alleges that, beginning in 2002, County Defendants caused or contributed to exceedances of the water quality standards and violated the total maximum daily load limits in Malibu Creek. All of the Watershed Claims rest on the same premise: (1) the Permit incorporates water-quality limits for each receiving water body; (2) mass-emissions monitoring stations have recorded pollutant loads in the receiving water bodies that exceed those permitted under the relevant standards; (3) an exceedance constitutes non-compliance with the Permit and, thereby, the Clean Water Act; and (4) County Defendants, as holders of the Permit and joint operators of the LA MS4, are liable for these exceedances under the Act.

Early in the litigation, the district court bifurcated liability and remedy, and all proceedings related to remedy were stayed until liability was determined. On March 2, 2010, the district court denied all parties' cross-motions for summary judgment with regard to liability. *NRDC v. Cnty. of L.A.,* No. CV 08–1467–AHM, 2010 WL 761287 (C.D.Cal. Mar. 2, 2010), *amended on other grounds,* 2011 WL 666875 (C.D.Cal. Jan. 27, 2011). Although the district court accepted Plaintiffs' arguments that the Permit "clearly prohibits 'discharges from the [LA] MS4 that cause or contribute to the violation of Water Quality Standards or water quality objectives,' " 2010 WL 761287, at *6, and that mass-monitoring stations "are the proper monitoring locations to determine if the [LA] MS4 is contributing to exceedances" of the Water Quality Standards or water quality objectives, *id.,* the district court held that Plaintiffs were improperly attempting to use the District's self-reported monitoring data to establish liability without presenting evidence that any individual defendant was discharging pollutants that "cause[d] or contribute[d] to the violation" of the water quality standards. *Id.* The district court observed that although "the District is responsible for the pollutants in the [LA] MS4" at the time they pass the Monitoring Stations, "that does not necessarily determine the question of whether the water passing by these points is a ***1202** 'discharge' within the meaning of the Permit and the Clean Water Act." *Id.* at *7. Unable to determine whether any of the County Defendants' upstream LA MS4 outflows were contributing polluted stormwater to navigable waters, the district court stated that "Plaintiffs would need to present some evidence (monitoring data or an admission) that some amount of a standards-exceeding pollutant is being discharged through at least one District outlet." *Id.* at *8.

Following supplemental briefing, the district court again determined that "Plaintiffs failed to present evidence that the standards-exceeding pollutants passed through the Defendants' [LA] MS4 *outflows* at or near the time the exceedances were observed. Nor did Plaintiffs provide any evidence that the mass emissions stations themselves are located at or near a Defendant's outflow." The district court thus entered summary judgment for the County Defendants on the Watershed Claims.

On June 9, 2010, the district court entered a partial final judgment on the Watershed Claims under Fed.R.Civ.P. 54(b). The court reasoned that an interlocutory appeal was appropriate because the Watershed Claims are "factually and legally severable" from the Plaintiffs' other claims and "[t]he parties and the Court would benefit from appellate resolution of the central legal question underlying the watershed claims: what level of proof is necessary to establish defendants' liability." The Plaintiffs timely appealed.

On appeal, the Plaintiffs pressed the same legal argument they advanced in the district court: that the data published in the County Defendants' annual monitoring reports—data which shows undisputed pollution exceedances at the mass-emissions monitoring stations—conclusively establishes the County Defendants' liability for Permit violations as a matter of law. Like the district court, we rejected this contention and held that the Plaintiffs must submit at least some additional proof of the County Defendants' *individual* contributions to the measured Permit violations. *See Natural Res. Def. Council,* 673 F.3d at 898 (noting that "the Clean Water Act does not prohibit 'undisputed' exceedances; it prohibits 'discharges' that are *not* in compliance with the Act.... While it may be undisputed that exceedances have been detected, responsibility for those exceedances requires proof that some entity discharged a pollutant.").

Nonetheless, we held the District liable for CWA violations in the Los Angeles and San Gabriel Rivers because we concluded that the mass-emissions monitoring stations for each river are "located in a section of the [LA] MS4 owned and operated by the District" and that "when pollutants were detected, they had not yet exited the point source into navigable waters." *Id.* at 899. We further clarified that "[t]he [relevant] discharge from a point source occurred when the

still-polluted stormwater flowed out of the concrete channels where the Monitoring Stations are located, through an outfall, and into the navigable waterways. We agree with Plaintiffs that the precise location of each outfall is ultimately irrelevant because there is no dispute that [the LA] MS4 eventually adds stormwater to the Los Angeles and San Gabriel Rivers downstream from the Monitoring Stations." *Id.* at 900.

On October 11, 2011, the District filed a petition for writ of certiorari, 2011 WL 4874090, which was granted in part on June 25, 2012. *L.A. Cnty. Flood Control Dist. v. Natural Res. Def. Council, Inc.,* —— U.S. ——, 133 S.Ct. 23, 183 L.Ed.2d 673 (2012). The Supreme Court granted review in order to answer a single question: "Under the CWA, does a discharge of pollutants occur when polluted water ***1203** flows from one portion of a river that is navigable water of the United States, through a concrete channel or other engineered improvement in the river, and then into a lower portion of the same river?" *L.A. Cnty. Flood Control Dist.,* 133 S.Ct. at 712–13 (internal quotation marks omitted). The Court answered in the negative, and re-affirmed its holding in *S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians,* 541 U.S. 95, 124 S.Ct. 1537, 158 L.Ed.2d 264 (2004), that "pumping polluted water from one part of a water body into another part of the same body is not a discharge of pollutants under the CWA." *L.A. Cnty. Flood Control Dist.,* 133 S.Ct. at 711. The Court did not address any other basis for the District's potential liability for Permit violations and instead reversed our prior judgment and remanded this case to us for additional proceedings. *Id.* at 713–14.

JURISDICTION AND STANDARD OF REVIEW

We have jurisdiction under 28 U.S.C. § 1291. We review the district court's grant of summary judgment de novo. *Assoc. to Protect Hammersley, Eld, & Totten Inlets v. Taylor Res., Inc.,* 299 F.3d 1007, 1009 (9th Cir.2002).

DISCUSSION

I.

[2] Plaintiffs return from the Supreme Court with the same argument they have consistently advanced throughout this litigation—that the County Defendants' monitoring data establishes their liability for Permit violations as a matter of law. We previously rejected this argument, *see Natural Res. Def. Council,* 673 F.3d at 898, and the Supreme Court explicitly declined to address it. [14]

14 *See L.A. Cnty. Flood Control Dist.,* 133 S.Ct. at 713–14 ("Under the permit's terms, the NRDC and Baykeeper maintain, the exceedances detected at instream monitoring stations are by themselves sufficient to establish the District's liability under the CWA for its upstream discharges. This argument failed below. It is not embraced within, or even touched by, the narrow question on which we granted certiorari. We therefore do not address, and indicate no opinion on, the issue NRDC and Baykeeper seek to substitute for the question we took up for review.").

On remand, the County Defendants argue that we may not reconsider our earlier decision because it has become "final," and because "reconsideration of Appellants' monitoring argument would fly in the face of the finality given to decisions of this Court after denial of rehearing or expiration of the time in which to seek such further review." Alternatively, the County Defendants argue that our earlier disposition should be left undisturbed because it has become the law of the case. The County Defendants are mistaken on both counts.

[3] **[4]** "No opinion of this circuit becomes final until the mandate issues[.]" *Carver v. Lehman,* 558 F.3d 869, 878 (9th Cir.2009); *see also* Fed R.App. P. 41(c), 1998 Adv. Comm. Note ("A court of appeals' judgment or order is not final until issuance of the mandate[.]"). Thus, we have explained that a "court of appeals may modify or revoke its judgment at any time prior to issuance of the mandate, sua sponte or by motion of the parties." *United States v. Foumai,* 910 F.2d 617, 620 (9th Cir.1990). The mandate in this case has not issued. Consequently, our earlier judgment is not final. *Carver,* 558 F.3d at 878. Nor can it be considered the law of the case. *See id.* at 878 n. 16 ("[U]ntil the mandate issues, an opinion is not fixed as settled Ninth Circuit law, and reliance on the opinion is a gamble." (citation omitted)); *see also* ***1204** *Key Enters. of Del., Inc. v. Venice Hosp.,* 9 F.3d 893, 898 (11th Cir.1993) ("[B]ecause the panel's mandate had not issued, the panel's decision was never the 'law of the case.' "). Put simply, we are free to reconsider the merits of Plaintiffs' argument, and we now do so.

II.

[5] Where a permittee discharges pollutants in compliance with the terms of its NPDES permit, the permit acts to "shield" the permittee from liability under the CWA. 33 U.S.C. § 1342(k). The permit shield is a major benefit to a permittee because it protects the permittee from any obligation to meet more stringent limitations promulgated by the EPA unless and until the permit expires. *See Piney Run Pres. Ass'n v. Cnty. Comm'rs of Carroll Cnty.,* 268 F.3d 255, 266–69 (4th Cir.2001); *see also The Clean Water Act Handbook* 67 (Mark A. Ryan ed., 3rd ed.2011). Of course, with every benefit comes a cost: a permittee violates the CWA when it discharges pollutants in excess of the levels specified in the permit, or where the permittee otherwise violates the permit's terms. *See Russian River Watershed Prot. Comm. v. City of Santa Rosa,* 142 F.3d 1136, 1138 (9th Cir.1998); *see also* 40 C.F.R. § 122.41(a) ("Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for [an] enforcement action"); *Nw. Envtl. Advocates v. City of Portland,* 56 F.3d 979, 986 (9th Cir.1995) (noting that "[t]he plain language of [the CWA citizen suit provision] authorizes citizens to enforce *all* permit conditions"); *Environmental Law Handbook* 327 ("The primary purpose of NPDES permits is to establish enforceable effluent limitations.").

Plaintiffs allege that the County Defendants are violating the terms of the Permit by discharging pollutants into the Los Angeles and San Gabriel Rivers in excess of the permitted levels. County Defendants do not dispute that they are discharging pollutants from the LA MS4 into these rivers. Nor can the County Defendants dispute that their own monitoring reports demonstrate that pollution levels recorded at the Monitoring Stations are in excess of those allowed under the Permit. Rather, the County Defendants focus on their perception of the evidentiary burden Plaintiffs must satisfy in order to hold any individual defendant liable for these pollution exceedances. Plaintiffs contend that they may rely exclusively on the District's monitoring reports to establish liability. County Defendants, however, argue that they cannot be held liable for Permit violations based solely on the data published in the District's monitoring reports because: (1) the mass-emissions monitoring required under the Permit was "neither designed nor intended" to measure the compliance of any Permittee; and (2) the monitoring data cannot parse out precisely *whose* discharge(s) contributed to any given exceedance because the Monitoring Stations sample pollution levels downstream from a legion of discharge points (*e.g.,* LA MS4 outfalls) controlled by various Permittees and other non-party entities, as opposed to at the discharge points themselves.

[6] To resolve the parties' contentions, we must interpret the language of the Permit. Although the NPDES permitting scheme can be complex, a court's task in interpreting and enforcing an NPDES permit is not—NPDES permits are treated like any other contract. *See Nw. Envtl. Advocates,* 56 F.3d at 982 ("We review the district court's interpretation of the 1984 permit as we would the interpretation of a contract or other legal document."). [15] If the language of the permit, considered in light of the structure of the permit as a ***1205** whole, "is plain and capable of legal construction, the language alone must determine the permit's meaning." *Piney Run Pres. Ass'n,* 268 F.3d at 270 (citation omitted). If, however, the permit's language is ambiguous, we may turn to extrinsic evidence to interpret its terms. *Id.* Our sole task at this point of the case is to determine what Plaintiffs are required to show in order to establish *liability* under the terms of *this particular* NPDES permit. [16]

15 *See also Piney Run Pres. Ass'n.,* 268 F.3d at 269–70; *Am. Canoe Ass'n., Inc. v. D.C. Water & Sewer Auth.,* 306 F.Supp.2d 30, 42 (D.D.C.2004).

16 The question before us is not whether the Clean Water Act mandates any particular result. An NPDES permitting authority has wide discretion concerning the terms of a permit. It could, for example, lawfully write an ms4 permit that provides that all permittees will share liability in some ratio for any measured exceedance of applicable pollutant limits. Or, as a further example, a permitting authority could lawfully write a permit providing that only the co-permittee(s) whose specific discharges are connected to a particular pollutant exceedance may be held liable for the permit violation. *See* 33 U.S.C. § 1342(a)(2) ("The Administrator shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of [33 U.S.C. § 1342(a)(1)], including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.").

A. The Plain Language of the Permit

"[NPDES permit] terms are to be given their ordinary meaning, and when the terms of a [permit] are clear, the

intent of the parties must be ascertained from the [permit] itself." *Klamath Water Users Protective Ass'n. v. Patterson,* 204 F.3d 1206, 1210 (9th Cir.1999). Plaintiffs argue that the text of the County Defendants' Permit is clear, and provides that the District's mass-emissions monitoring data will be used to assess the County Defendants' compliance with the Permit, and particularly Part 2, which prohibits "discharges from the [LA] MS4 that cause or contribute to the violation of Water Quality Standards or water quality objectives." The County Defendants dispute this notion, and first claim that the District's mass-emissions monitoring is intended to serve only a hortatory purpose. As County Defendants state, "the mass emission monitoring program ... neither measures nor was designed to measure any individual permittee's compliance with the Permit." This argument is clearly belied by the text of the Permit and is rejected.

The Permit establishes a "Monitoring and Reporting Program" with the stated objectives of *both* characterizing stormwater discharges *and* assessing compliance with water-quality standards. The Permit language could not be more explicit in this regard, stating that "[a]ssessing compliance with this [Permit]" is one of the "primary objectives of the Monitoring Program." "The fact that the parties dispute a [permit's] meaning does not establish that the [permit] is ambiguous; it is only ambiguous if reasonable people could find its terms susceptible to more than one interpretation." *Klamath Water Users Protective Ass'n,* 204 F.3d at 1210. No reasonable person could find even the slightest ambiguity in the phrase "[t]he primary objectives of the Monitoring Program include, but are not limited to: Assessing compliance with this [Permit]." Consequently, we decline to embrace the County Defendants' initial argument that "the mass-emission monitoring stations, as a matter of fact, do not assess the compliance of any permittee with the Permit...."

County Defendants' alternative argument, while more facially appealing, fares no better. Specifically, the County Defendants point to certain Permit language they claim shows that the Regional Board did not intend for the mass–emissions monitoring data to be used to establish liability for Permit violations. For instance, ***1206** the County Defendants note that the Permit provides that "[e]ach permittee is responsible only for a discharge for which it is the operator." County Defendants also cite language in Part 2 that reads: "Discharges from the [LA] MS4 of storm water, or non-storm water, *for which a Permittee is responsible* for [sic], shall not cause or contribute to a condition of nuisance." The County Defendants read this language as precluding a finding of liability against them—or any other Permittee—without independent monitoring data establishing that discharges from a particular entity's ms4 outfalls exceeded standards.

[7] "[A] court must give effect to every word or term" in an NPDES permit "and reject none as meaningless or surplusage...." *In re Crystal Props., Ltd., L.P.,* 268 F.3d 743, 748 (9th Cir.2001) (quotations omitted); *see also* Restatement (Second) of Contracts § 203(a) (1981) ("[A]n interpretation which gives a reasonable, lawful, and effective meaning to all the terms is preferred to an interpretation which leaves a part unreasonable, unlawful, or of no effect."). "Therefore, we must interpret the [Permit] in a manner that gives full meaning and effect to all of the [Permit's] provisions and avoid a construction of the [Permit] that focuses only on" a few isolated provisions. *In re Crystal Props.,* 268 F.3d at 748.

The County Defendants' interpretation of the Permit ultimately must be rejected because it would create an unreasonable result. Reading the clause that "[e]ach permittee is responsible only for a discharge for which it is the operator" to preclude use of the mass-emission monitoring data to "assess [ ] compliance with this [Permit]" would render the monitoring provisions of the Permit largely meaningless. Under the County Defendants' reading of the Permit, individual Permittees could discharge an unlimited amount of pollutants from the LA MS4 but never be held liable for those discharges based on the results of the mass-emissions monitoring, even though that monitoring is explicitly intended to assess whether Permittees are in compliance with Part 2's discharge limitations. We are unwilling to accept such a strained interpretation. *See Mastrobuono v. Shearson Lehman Hutton, Inc.,* 514 U.S. 52, 63, 115 S.Ct. 1212, 131 L.Ed.2d 76 (1995) (holding that courts should be guided by the "cardinal principle of contract construction: that a document should be read to give effect to all of its provisions and to render them consistent with each other"). A better reading of the Permit's putatively conflicting provisions, therefore, is the one proposed by Plaintiffs. Limiting a Permittee's responsibility to "discharge[s] for which it is the operator" applies to the appropriate *remedy* for Permit violations, not to *liability* for those violations. Indeed, Plaintiffs' reading is consistent with the remedial scheme of the Permit itself. If the LA MS4 is found to be contributing to water quality violations, each Permittee must take appropriate remedial measures with respect to its *own* discharges. [17] Thus, a finding of *liability* against the County Defendants would not, as defendants argue, hold any County

Defendant responsible for discharges for which they are not "the operator."

17 The relevant Permit provision states: "Each Permittee is required to comply with the requirements of this Order applicable to discharges within its boundaries ... and not for the implementation of the provisions applicable to the Principal Permittee or other Permittees."

In sum, and contrary to the County Defendants' contentions, the language of the Permit is clear—the data collected at the Monitoring Stations is intended to determine whether the Permittees are in compliance with the Permit. If the District's ***1207** monitoring data shows that the level of pollutants in federally protected water bodies exceeds those allowed under the Permit, then, as a matter of permit construction, the monitoring data conclusively demonstrate that the County Defendants are not "in compliance" with the Permit conditions. Thus, the County Defendants are liable for Permit violations.

B. Extrinsic Considerations

Although we believe the plain language of the Permit clearly contemplates that the County Defendants' monitoring data will be used to assess Permit compliance (*i.e.,* establish liability for CWA violations), we note that numerous extrinsic considerations also undercut the County Defendants' position.

First and foremost, the Clean Water Act *requires* every NPDES permittee to monitor its discharges into the navigable waters of the United States in a manner sufficient to determine whether it is in compliance with the relevant NPDES permit. 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1) ("[E]ach NPDES permit shall include conditions meeting the following ... monitoring requirements ... to assure compliance with permit limitations."). That is, an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance. *See* 40 C.F.R. § 122.26(d)(2)(i)(F) ("Permit applications for discharges from large and medium municipal storm sewers ... shall include ... monitoring procedures necessary to determine compliance and noncompliance with permit conditions...."). As previously noted, the County Defendants contend that the mass–emissions monitoring program "neither measures nor was designed to measure any individual permittee's compliance with the Permit." But if the County Defendants are correct, the Permit would be unlawful under the CWA. We must interpret the provisions of the Permit like any other contract and reject an interpretation that would render the Permit unenforceable. *See Walsh v. Schlecht,* 429 U.S. 401, 408, 97 S.Ct. 679, 50 L.Ed.2d 641 (1977) (noting that "contracts should not be interpreted to render them illegal and unenforceable where the wording lends itself to a logically acceptable construction that renders them legal and enforceable"); *see also Nw. Envtl. Advocates,* 56 F.3d at 984; Restatement (Second) of Contracts § 203.

[8] Second, the County Defendants' position has been explicitly rejected by the Regional Board, the entity that issued the Permit. This is important because one of our obligations in interpreting an NPDES permit is "to determine the intent of the permitting authority...." *Piney Run Pres. Ass'n,* 268 F.3d at 270. Thus, we give significant weight to any extrinsic evidence that evinces the permitting authority's interpretation of the relevant permit. *See Nw. Envtl. Advocates,* 56 F.3d at 985 (relying on "significant evidence from [the state permitting agency], the permit author," to determine the proper scope of an NPDES permit).

Here, the record contains an amicus brief filed by the Regional Board in a lawsuit nearly identical to this one. 18 In that suit, these same Plaintiffs sued the City of Malibu, one of the County Defendants' co-permittees, for violating the NPDES Permit at issue in this case. In its brief, the Regional Board stated its position that:

18 *Santa Monica Baykeeper, et al. v. City of Malibu,* No. CV–08–01465 (AHM) (C.D.Cal. Mar. 3, 2008).

> The Permit recognizes that the inter-connected nature of the system means that it may be difficult to determine exactly where [pollutants] originated ***1208** within the [LA] MS4. This does not mean, however, that the Permit assumes only one permittee may be responsible. Instead, it recognizes that in such an integrated storm sewer system, one or more Permittees may have caused or contributed to violations.... Having constructed a joint sewer system that, by design, co-mingles the [Permittees'] discharges, they cannot

> avoid enforcement because one cannot determine the original source of pollutants in the waste stream.

[9] The Regional Board also noted that "the monitoring program that the permittees requested (and were granted) does not readily generate the permittee-by-permittee outfall data that the [County Defendants] would require as a precondition to enforcement." As a result, the Regional Board disagreed with any construction of the Permit that would require individualized proof of a Permittees' discharges in order to establish liability. Simply put, the Regional Board indicated that it "does not agree" that the "burden [of proving Permit violations] rests upon the enforcing entity." Although we do not defer to the Regional Board's interpretation of the Permit, *see Orthopaedic Hosp. v. Belshe,* 103 F.3d 1491, 1495 (9th Cir.1997), its rejection of the County Defendants' position is clearly instructive.

Finally, the County Defendants' arguments run counter to the purposes of the CWA, and ignore the inherent complexity of ensuring an ms4's compliance with an NPDES permit that covers thousands of different point sources and outfalls. As we have previously recognized, "[t]he NPDES program fundamentally relies on self-monitoring." *Sierra Club v. Union Oil Co. of Cal.,* 813 F.2d 1480, 1491 (9th Cir.1987), *vacated and remanded on other grounds,* 485 U.S. 931, 108 S.Ct. 1102, 99 L.Ed.2d 264 (1988), *and reinstated and amended by* 853 F.2d 667 (9th Cir.1988). Congress' purpose in adopting this self-monitoring mechanism was to promote straightforward enforcement of the Act. *See id.* at 1492 (noting that Congress wished to "avoid the necessity of lengthy fact finding, investigations, and negotiations at the time of enforcement. Enforcement of violations of requirements under this Act should be based on relatively narrow fact situations requiring a minimum of discretionary decision making or delay") (quoting S.Rep. No. 92–414, 92nd Cong., 1st Sess. 64, *reprinted in* 1972 U.S.Code Cong. & Ad. News 3668, 3730). [19] Or, as one treatise writer has described enforcement of the Act:

> The CWA is viewed by many as the easiest of the federal environmental statutes to enforce. This is because persons regulated under the act normally must report their own compliance and noncompliance to the regulating agency. For example, holders of NPDES permits must file periodic discharge monitoring reports (or DMRs), which must contain the results of all monitoring of discharges, and must indicate where those discharges exceed permit limitations.... Thus, enforcement actions may be brought based on little, if anything, more than the DMRs and other reports submitted by the permittee itself.

Environmental Law Handbook at 357–58.

Admittedly, regulating pollution from ms4s is substantially more complicated than regulating pollution from a few defined point sources. Like the LA MS4 at issue here, municipal separate storm sewer systems often cover many square miles and comprise numerous, geographically ***1209** scattered, and sometimes uncharted sources of pollution, including streets, catch basins, gutters, man-made channels, and storm drains. Faced with the difficult task of regulating millions of storm-sewer point sources, Congress amended the CWA in 1987 to grant the EPA the express authority to create a separate permitting program for ms4s. 33 U.S.C. § 1342(p)(2), (3). In enacting these amendments, Congress recognized that for large urban areas like Los Angeles, ms4 permitting cannot be accomplished on a source-by-source basis. The amendments therefore give the EPA, or a state like California to which the EPA has delegated permitting authority, broad discretion to issue permits "on a system-wide or jurisdiction-wide basis," 40 C.F.R. § 122.26(a)(1)(v), rather than requiring cities and counties to obtain separate permits for millions of individual stormwater discharge points. This increased flexibility is crucial in easing the burden of issuing stormwater permits for both permitting authorities and permittees. [20]

19 *See also* 44 Fed.Reg. 32,854, 32,863 (June 7, 1979) ("Congress intended that prosecution for permit violations be swift and simple.").

20 *See* 55 Fed.Reg. 47,990, 48,046 (Nov. 16, 1990) (noting that issuing individual permits to cover all ms4 discharges to the waters of the United States is "unmanageable"); *id.* at 48,049–48,050 ("Given the complex, variable nature of storm

water discharges from municipal systems, EPA favors a permit scheme where the ... [p]ermit writers have the necessary flexibility to develop monitoring requirements that more accurately reflect the true nature of highly variable and complex discharges.”).

But while otherwise more flexible than the traditional NPDES permitting system, nothing in the ms4 permitting scheme relieves permittees of the obligation to monitor their compliance with their NPDES permit in some fashion. *See* 33 U.S.C. § 1342(a)(2) (“The Administrator shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of [the permit], including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.”); 40 C.F.R. § 122.44(i)(1) (establishing that every permit “shall include” monitoring “[t]o assure compliance with the permit limitations”). Rather, EPA regulations make clear that while ms4 NPDES permits need not require monitoring of each stormwater source at the precise point of discharge, they may instead establish a monitoring scheme “sufficient to yield data which are *representative of the monitored activity....*” 40 C.F.R. § 122.48(b) (emphasis added). In fact, EPA regulations require permittees, like the County Defendants here, to propose a “monitoring program for *representative data collection* for the term of the permit that describes the location of outfalls or field screening points to be sampled (*or the location of instream stations*)” and explain “why the [chosen] location is *representative*....” 40 C.F.R. § 122.26(d)(2)(iii)(D) (emphases added). Here, the County Defendants did just that. County Defendants themselves chose the locations of the Monitoring Stations, locations that are downstream from a significant number of their outfalls.[21] And, as required by law, the County Defendants chose locations that they certified were necessarily “representative” of the monitored activity (*i.e.,* the Permittees' discharges of stormwater runoff into the navigable waters of the United States).[22] Now, however, County Defendants claim ***1210** that their compliance with the Permit cannot be measured using the results of the representative monitoring they themselves agreed to, that the Regional Board approved, and that the Permit itself contemplates is to be used to assess compliance with its terms. We take this opportunity to reevaluate and reject County Defendants' arguments.

21 “Q: Does the County's ms4 outlet to any tributaries of the Los Angeles River? A: Yes. Q: Does it outlet to tributaries of the Los Angeles River upstream of the mass emissions station? A: Yes.... Q: Does [the County's ms4] outlet to the San Gabriel River upstream of the mass emissions station? A: Yes.” Pestrella Dep. 697:7–698:6, June 2, 2009.

22 “Q: Who selected the location of those stations, do you know? A: The County selected those locations for a particular purpose. And the purpose was [to be] far enough away from tidal influence *so that you would be characterizing the stormwater runoff as opposed to ocean waters.* Q: And the locations were then approved by Regional Board staff; is that correct? A: Correct.” Wamikannu Dep. 130:13–130:19, July 1, 2009 (emphasis added).

CONCLUSION

Because the results of County Defendants' pollution monitoring conclusively demonstrate that pollution levels in the Los Angeles and San Gabriel Rivers are in excess of those allowed under the Permit, the County Defendants are *liable* for Permit violations as a matter of law. This case is remanded to the district court for further proceedings consistent with this opinion, including a determination of the appropriate *remedy* for the County Defendants' violations.

REVERSED and REMANDED.

*1211 APPENDICES

Appendix A

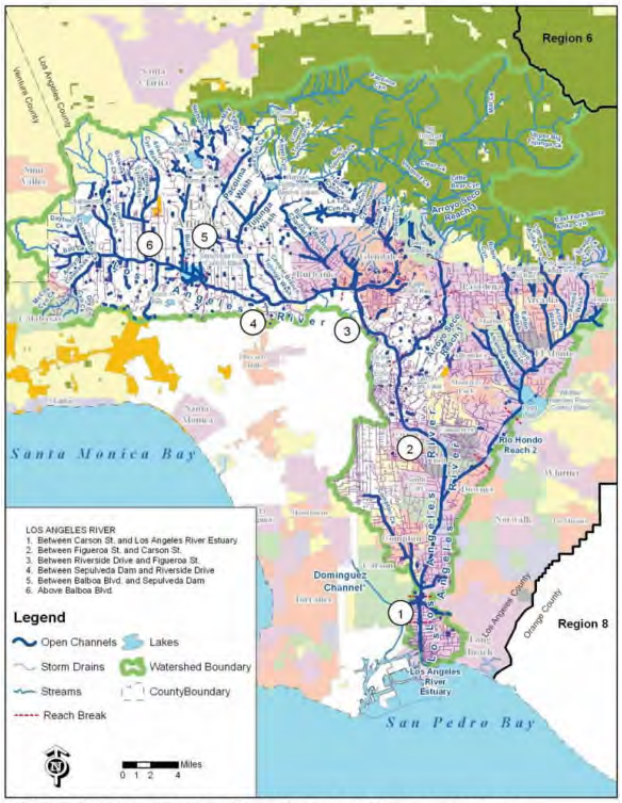

Figure C-4: Los Angeles River Watershed Management Area Flow Schematic.

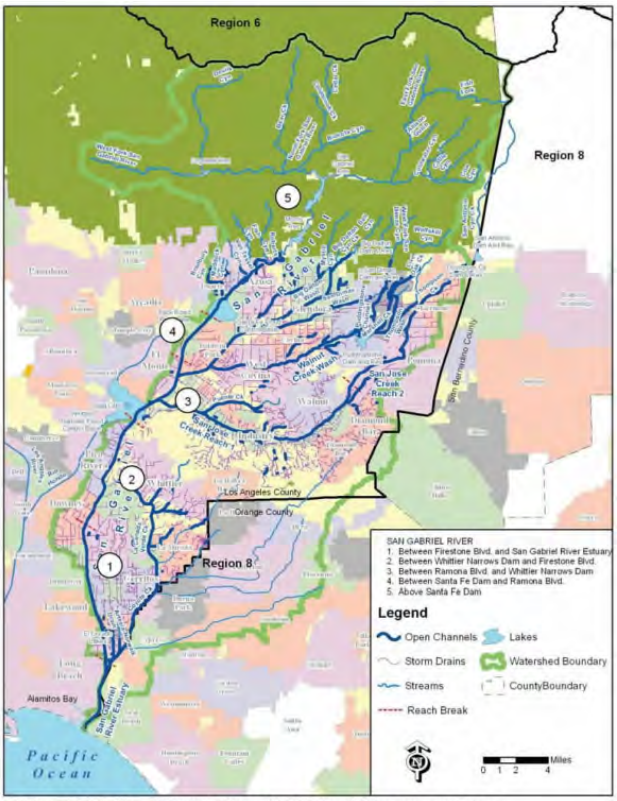

Figure C-5: San Gabriel River Watershed Management Area Flow Schematic.

Appendix B

All Citations

725 F.3d 1194, 13 Cal. Daily Op. Serv. 8623, 2013 Daily Journal D.A.R. 10,619

End of Document

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KeyCite Yellow Flag
Distinguished by City of Arcadia v. State Water Resources Control Bd., Cal.App. 4 Dist., December 14, 2010

35 Cal.4th 613
Supreme Court of California

CITY OF BURBANK, Plaintiff and Appellant,
v.
STATE WATER RESOURCES CONTROL BOARD et al., Defendants and Appellants.
City of Los Angeles, Plaintiff and Respondent,
v.
State Water Resources Control Board et al., Defendants and Appellants.

Nos. S119248, B151175, B152562
|
April 4, 2005.
|
Rehearing Denied June 29, 2005. *

* Brown, J., did not participate therein.

Synopsis
Background: Cities filed petitions for writs of mandate challenging pollutant limitations in wastewater discharge permits issued by regional water quality control boards. The Superior Court, Los Angeles County, Nos. BS060957 and BS060960, Dzintra I. Janavs, J., set aside permits. Regional board and state water resources control board appealed. The Court of Appeal consolidated the cases and reversed. The Supreme Court granted review, superseding the opinion of the Court of Appeal.

Holdings: The Supreme Court, Kennard, J., held that:

[1] regional board may not consider economic factors as justification for imposing pollutant restrictions in wastewater discharge permit which are less stringent than applicable federal standards, and

[2] when imposing more stringent pollutant restrictions that those required by federal law, regional board may take economic factors into account.

Judgment of Court of Appeal affirmed, and matter remanded.

Brown, J., filed concurring opinion.

Opinion, 4 Cal.Rptr.3d 27, superseded.

West Headnotes (5)

[1] **Environmental Law** Purpose

Clean Water Act is a comprehensive water quality statute designed to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Federal Water Pollution Control Act Amendments of 1972, § 101 et seq., as amended, 33 U.S.C.A. § 1251 et seq.

22 Cases that cite this headnote

[2] **Environmental Law** Conditions and limitations

Federal Preemption Environmental law

Regional water quality control board may not consider economic factors as justification for imposing pollutant restrictions in wastewater discharge permit which are less stringent than applicable federal standards, despite statute directing board to take such factors into consideration, because the federal constitutional supremacy clause requires state law to yield to federal law. U.S.C.A. Const. Art. 6, cl. 2; Federal Water Pollution Control Act Amendments of 1972, §§ 101 et seq., 301(a), (b)(1)(B, C), 402(a)(1, 3), as amended, 33 U.S.C.A. §§ 1251 et seq., 1311(a), (b)(1)(B, C), 1342(a)(1, 3); West's Ann.Cal.Water Code §§ 13000 et seq., 13241(d), 13263, 13377.

25 Cases that cite this headnote

[3] **Statutes** Purpose and intent

When construing any statute, the court's task is to determine the Legislature's intent when it enacted the statute so as to adopt the construction that best effectuates the purpose of the law.

14 Cases that cite this headnote

[4] **Federal Preemption** Conflicting or Conforming Laws or Regulations; Conflict Preemption

Under the federal Constitution's supremacy clause, a state law that conflicts with federal law is without effect. U.S.C.A. Const. Art. 6, cl. 2.

[5] **Environmental Law** Conditions and limitations

When imposing more stringent pollutant restrictions in a wastewater discharge permit than those required by federal law, a regional water quality control board may take into account the economic effects of doing so. Federal Water Pollution Control Act Amendments of 1972, §§ 101 et seq., 101(b), 510, as amended, 33 U.S.C.A. §§ 1251 et seq., 1251(b), 1370; West's Ann.Cal.Water Code §§ 13000 et seq., 13241(d), 13263, 13377.

28 Cases that cite this headnote

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Opinion

KENNARD, J.

***618 **864** Federal law establishes national water quality standards but allows the states to enforce their own water quality laws so long as they comply with federal standards. Operating within this federal-state framework, California's nine Regional Water Quality Control Boards establish water quality policy. They also issue permits for the discharge of treated wastewater; these permits specify the maximum allowable concentration of chemical pollutants in the discharged wastewater.

The question here is this: When a regional board issues a permit to a wastewater treatment facility, must the board take into account the facility's costs of complying with the board's restrictions on pollutants in the wastewater to be discharged? The trial court ruled that California law required a regional board to weigh the economic burden on the facility against the expected environmental benefits of reducing pollutants in the wastewater discharge. The Court of Appeal disagreed. On petitions by the municipal operators of three wastewater treatment facilities, we granted review.

We reach the following conclusions: Because both California law and federal law require regional boards to comply with federal clean water standards, and because the supremacy clause of the United States Constitution requires state law to yield to federal law, a regional board, when issuing a wastewater discharge permit, may not consider economic factors to justify imposing pollutant restrictions that are *less stringent* than the applicable federal standards require. When, however, a regional board is considering whether to make the pollutant restrictions in a wastewater discharge permit *more stringent* than federal law requires, California law allows the board to take into account economic ****865** factors, including the wastewater discharger's cost of compliance. We remand this case for further proceedings to determine whether the pollutant limitations in the permits challenged here meet or exceed federal standards.

*619 I. STATUTORY BACKGROUND

The quality of our nation's waters is governed by a "complex statutory and regulatory scheme ... that implicates both federal and state administrative responsibilities." (*PUD No. 1 of Jefferson County v. Washington Department of Ecology* (1994) 511 U.S. 700, 704, 114 S.Ct. 1900, 128 L.Ed.2d 716.) We first discuss California law, then federal law.

A. California Law

In California, the controlling law is the Porter–Cologne Water Quality Control Act (Porter–Cologne Act), which was enacted in 1969. (Wat.Code, § 13000 et seq., added by Stats.1969, ch. 482, § 18, p. 1051.)[1] Its goal is "to attain the highest water *****307** quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (§ 13000.) The task of accomplishing this belongs to the State Water Resources Control Board (State Board) and the nine Regional Water Quality Control Boards; together the State Board and the regional boards comprise "the principal state agencies with primary responsibility for the coordination and control of water quality." (§ 13001.) As relevant here, one of those regional boards oversees the Los Angeles region (the Los Angeles Regional Board).[2]

1 Further undesignated statutory references are to the Water Code.

2 The Los Angeles water region "comprises all basins draining into the Pacific Ocean between the southeasterly boundary, located in the westerly part of Ventura County, of the watershed of Rincon Creek and a line which coincides with the southeasterly boundary of Los Angeles County from the ocean to San Antonio Peak and follows thence the divide between San Gabriel River and Lytle Creek drainages to the divide between Sheep Creek and San Gabriel River drainages." (§ 13200, subd. (d).)

Whereas the State Board establishes statewide policy for water quality control (§ 13140), the regional boards "formulate and adopt water quality control plans for all areas within [a] region" (§ 13240). The regional boards' water quality plans, called "basin plans," must address the beneficial uses to be protected as well as water quality objectives, and they must establish a program of implementation. (§ 13050, subd. (j).) Basin plans must be consistent with "state policy for water quality control." (§ 13240.)

B. Federal Law

[1] In 1972, Congress enacted amendments (Pub.L. No. 92–500 (Oct. 18, 1972) 86 Stat. 816) to the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), which, as amended in 1977, is commonly known as the Clean

***620** Water Act. The Clean Water Act is a "comprehensive water quality statute designed 'to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' " (*PUD No. 1 of Jefferson County v. Washington Dept. of Ecology, supra,* 511 U.S. at p. 704, 114 S.Ct. 1900, quoting 33 U.S.C. § 1251(a).) The Act's national goal was to eliminate by the year 1985 "the discharge of pollutants into the navigable waters" of the United States. (33 U.S.C. § 1251(a)(1).) To accomplish this goal, the Act established "effluent limitations," which are restrictions on the "quantities, rates, and concentrations of chemical, physical, biological, and other constituents"; these effluent limitations allow the discharge of pollutants only when the water has been satisfactorily treated to conform with federal water quality standards. (33 U.S.C. §§ 1311, 1362(11).)

Under the federal Clean Water Act, each state is free to enforce its own water quality laws so long as its effluent limitations are not "less stringent" than those set out in the Clean Water Act. (33 U.S.C. § 1370.) This led the California Legislature in 1972 to amend the state's Porter–Cologne Act "to ensure consistency with the requirements for state programs implementing the Federal Water Pollution Control Act." (§ 13372.)

****866** Roughly a dozen years ago, the United States Supreme Court, in *Arkansas v. Oklahoma* (1992) 503 U.S. 91, 112 S.Ct. 1046, 117 L.Ed.2d 239, described the distinct roles of the state and federal agencies in enforcing water quality: "The Clean Water Act anticipates a partnership between the States and the Federal Government, animated by a shared objective: 'to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' 33 U.S.C. § 1251(a). Toward *****308** this end, [the Clean Water Act] provides for two sets of water quality measures. 'Effluent limitations' are promulgated by the [Environmental Protection Agency (EPA)] and restrict the quantities, rates, and concentrations of specified substances which are discharged from point sources.[3] See §§ 1311, 1314. '[W]ater quality standards' are, in general, promulgated by the States and establish the desired condition of a waterway. See § 1313. These standards supplement effluent limitations 'so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.' *EPA v. California ex rel. State Water Resources Control Bd.,* 426 U.S. 200, 205, n. 12, 96 S.Ct. 2022, 2025, n. 12, 48 L.Ed.2d 578 (1976).

3 A "point source" is "any discernable, confined and discrete conveyance" and includes "any pipe, ditch, channel ... from which pollutants ... may be discharged." (33 U.S.C. § 1362(14).)

***621** "The EPA provides States with substantial guidance in the drafting of water quality standards. See generally 40 CFR pt. 131 (1991) (setting forth model water quality standards). Moreover, [the Clean Water Act] requires, *inter alia,* that state authorities periodically review water quality standards and secure the EPA's approval of any revisions in the standards. If the EPA recommends changes to the standards and the State fails to comply with that recommendation, the Act authorizes the EPA to promulgate water quality standards for the State. 33 U.S.C. § 1313(c)." (*Arkansas v. Oklahoma, supra,* 503 U.S. at p. 101, 112 S.Ct. 1046.)

Part of the federal Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), "[t]he primary means" for enforcing effluent limitations and standards under the Clean Water Act. (*Arkansas v. Oklahoma, supra,* 503 U.S. at p. 101, 112 S.Ct. 1046.) The NPDES sets out the conditions under which the federal EPA or a state with an approved water quality control program can issue permits for the discharge of pollutants in wastewater. (33 U.S.C. § 1342(a) & (b).) In California, wastewater discharge requirements established by the regional boards are the equivalent of the NPDES permits required by federal law. (§ 13374.)

With this federal and state statutory framework in mind, we now turn to the facts of this case.

II. FACTUAL BACKGROUND

This case involves three publicly owned treatment plants that discharge wastewater under NPDES permits issued by the Los Angeles Regional Board.

The City of Los Angeles owns and operates the Donald C. Tillman Water Reclamation Plant (Tillman Plant), which serves the San Fernando Valley. The City of Los Angeles also owns and operates the Los Angeles–Glendale Water Reclamation Plant (Los Angeles–Glendale Plant), which processes wastewater from areas within the City of Los Angeles and the independent cities of Glendale and Burbank. Both the Tillman Plant and the Los Angeles–Glendale Plant discharge wastewater directly into the Los Angeles River, now a concrete-lined flood control channel that runs through

the City of Los Angeles, ending at the Pacific Ocean. The State Board and the Los Angeles Regional Board consider the Los Angeles River to be a navigable water of the United States for purposes of the federal Clean Water Act.

The third plant, the Burbank Water Reclamation Plant (Burbank Plant), is owned and operated by the City of Burbank, *****309** serving residents and businesses within that city. The Burbank Plant discharges wastewater into the Burbank Western Wash, which drains into the Los Angeles River.

***622** All three plants, which together process hundreds of millions of gallons of sewage ****867** each day, are tertiary treatment facilities; that is, the treated wastewater they release is processed sufficiently to be safe not only for use in watering food crops, parks, and playgrounds, but also for human body contact during recreational water activities such as swimming.

In 1998, the Los Angeles Regional Board issued renewed NPDES permits to the three wastewater treatment facilities under a basin plan it had adopted four years earlier for the Los Angeles River and its estuary. That 1994 basin plan contained general narrative criteria pertaining to the existing and potential future beneficial uses and water quality objectives for the river and estuary. [4] The narrative criteria included municipal and domestic water supply, swimming and other recreational water uses, and fresh water habitat. The plan further provided: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life." The 1998 permits sought to reduce these narrative criteria to specific numeric requirements setting daily maximum limitations for more than 30 pollutants present in the treated wastewater, measured in milligrams or micrograms per liter of effluent. [5]

4 This opinion uses the terms "narrative criteria" or descriptions, and "numeric criteria" or effluent limitations. Narrative criteria are broad statements of desirable water quality goals in a water quality plan. For example, "no toxic pollutants in toxic amounts" would be a narrative description. This contrasts with numeric criteria, which detail specific pollutant concentrations, such as parts per million of a particular substance.

5 For example, the permits for the Tillman and Los Angeles–Glendale Plants limited the amount of fluoride in the discharged wastewater to 2 milligrams per liter and the amount of mercury to 2.1 micrograms per liter.

The Cities of Los Angeles and Burbank (Cities) filed appeals with the State Board, contending that achievement of the numeric requirements would be too costly when considered in light of the potential benefit to water quality, and that the pollutant restrictions in the NPDES permits were unnecessary to meet the narrative criteria described in the basin plan. The State Board summarily denied the Cities' appeals.

Thereafter, the Cities filed petitions for writs of administrative mandate in the superior court. They alleged, among other things, that the Los Angeles Regional Board failed to comply with sections 13241 and 13263, part of California's Porter–Cologne Act, because it did not consider the economic burden on the Cities in having to reduce substantially the pollutant content of their discharged wastewater. They also alleged that compliance with the pollutant restrictions set out in the NPDES permits issued by the regional ***623** board would greatly increase their costs of treating the wastewater to be discharged into the Los Angeles River. According to the City of Los Angeles, its compliance costs would exceed $50 million annually, representing more than 40 percent of its entire budget for operating its four wastewater treatment plants and its sewer system; the City of Burbank estimated its added costs at over $9 million annually, a nearly 100 percent increase above its $9.7 million annual budget for wastewater treatment.

*****310** The State Board and the Los Angeles Regional Board responded that sections 13241 and 13263 do not require consideration of costs of compliance when a regional board issues a NPDES permit that restricts the pollutant content of discharged wastewater.

The trial court stayed the contested pollutant restrictions for each of the three wastewater treatment plants. It then ruled that sections 13241 and 13263 of California's Porter–Cologne Act required a regional board to consider costs of compliance not only when it adopts a basin or water quality plan but also when, as here, it issues an NPDES permit setting the allowable pollutant content of a treatment plant's discharged wastewater. The court found no evidence that the Los Angeles Regional Board had considered economic factors at either stage. Accordingly, the trial court granted the Cities' petitions for writs of mandate, and it ordered the Los Angeles Regional

Board to vacate the contested restrictions on pollutants in the wastewater discharge permits issued to the three municipal plants here and to conduct hearings **868 to consider the Cities' costs of compliance before the board's issuance of new permits. The Los Angeles Regional Board and the State Board filed appeals in both the Los Angeles and Burbank cases. [6]

6 Unchallenged on appeal and thus not affected by our decision are the trial court's rulings that (1) the Los Angeles Regional Board failed to show how it derived from the narrative criteria in the governing basin plan the specific numeric pollutant limitations included in the permits; (2) the administrative record failed to support the specific effluent limitations; (3) the permits improperly imposed daily maximum limits rather than weekly or monthly averages; and (4) the permits improperly specified the manner of compliance.

The Court of Appeal, after consolidating the cases, reversed the trial court. It concluded that sections 13241 and 13263 require a regional board to take into account "economic considerations" when it adopts water quality standards in a basin plan but not when, as here, the regional board sets specific pollutant restrictions in wastewater discharge permits intended to satisfy those standards. We granted the Cities' petition for review.

*624 III. DISCUSSION

A. Relevant State Statutes

The California statute governing the issuance of *wastewater permits* by a regional board is section 13263, which was enacted in 1969 as part of the Porter–Cologne Act. (See 26 Cal.Rptr.3d pp. 306–307, 108 P.3d p. 865, *ante.*) Section 13263 provides in relevant part: "*The regional board,* after any necessary hearing, *shall prescribe requirements as to the nature of any proposed discharge* [of wastewater]. *The requirements* shall implement any relevant water quality control plans that have been adopted, and *shall take into consideration* the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and *the provisions of Section 13241*." (§ 13263, subd. (a), italics added.)

Section 13241 states: "Each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors to be considered by a regional board in establishing water quality objectives shall include, but not necessarily be limited to, all of the following:

***311 "(a) Past, present, and probable future beneficial uses of water.

"(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

"(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

"(d) *Economic considerations.*

"(e) The need for developing housing within the region.

"(f) The need to develop and use recycled water." (Italics added.)

The Cities here argue that section 13263's express reference to section 13241 requires the Los Angeles Regional Board to consider section 13241's listed factors, notably "[e]conomic considerations," before issuing NPDES permits requiring specific pollutant reductions in discharged effluent or treated wastewater.

[2] *625 Thus, at issue is language in section 13263 stating that when a regional board "prescribe[s] requirements as to the nature of any proposed discharge" of treated wastewater it must "take into consideration" certain factors including "the provisions of Section 13241." According to the Cities, this statutory language requires that a regional board make an independent evaluation of the section 13241 factors, including "economic considerations," before restricting the pollutant content in an NPDES permit. This was the view expressed in the trial court's ruling. The Court of Appeal rejected that view. It held that a regional board need consider the section 13241 factors only when it adopts a basin or water quality plan, but not when, as in this case, it issues a wastewater discharge **869 permit that sets specific

numeric limitations on the various chemical pollutants in the wastewater to be discharged. As explained below, the Court of Appeal was partly correct.

B. Statutory Construction

[3] When construing any statute, our task is to determine the Legislature's intent when it enacted the statute "so that we may adopt the construction that best effectuates the purpose of the law." (*Hassan v. Mercy American River Hospital* (2003) 31 Cal.4th 709, 715, 3 Cal.Rptr.3d 623, 74 P.3d 726; *Esberg v. Union Oil Co.* (2002) 28 Cal.4th 262, 268, 121 Cal.Rptr.2d 203, 47 P.3d 1069.) In doing this, we look to the statutory language, which ordinarily is "the most reliable indicator of legislative intent." (*Hassan, supra,* at p. 715, 3 Cal.Rptr.3d 623, 74 P.3d 726.)

As mentioned earlier, our Legislature's 1969 enactment of the Porter–Cologne Act, which sought to ensure the high quality of water in this state, predated the 1972 enactment by Congress of the precursor to the federal Clean Water Act. Included in California's original Porter–Cologne Act were sections 13263 and 13241. Section 13263 directs regional boards, when issuing wastewater discharge permits, to take into account various factors, including those set out in section 13241. Listed among the section 13241 factors is "[e]conomic considerations." (§ 13241, subd. (d).) The plain language of sections 13263 and 13241 indicates the Legislature's intent in 1969, when these statutes were enacted, that a regional board consider the cost of compliance when setting effluent limitations in a wastewater discharge permit.

Our construction of sections 13263 and 13241 does not end with their plain statutory language, however. We must also analyze them in the context of the statutory scheme of which they are a part. (***312 *State Farm Mutual Automobile Ins. Co. v. Garamendi* (2004) 32 Cal.4th 1029, 1043, 12 Cal.Rptr.3d 343, 88 P.3d 71.) Like sections 13263 and 13241, section 13377 is part of the Porter–Cologne Act. But unlike the former two statutes, section 13377 was *626 not enacted until 1972, shortly after Congress, through adoption of the Federal Water Pollution Control Act Amendments, established a comprehensive water quality policy for the nation.

[4] Section 13377 specifies that wastewater discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act. That act prohibits the discharge of pollutants into the navigable waters of the United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the act's clean water standards, regardless of cost (see *id.,* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3)). Because section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a wastewater discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards. [7] Such a construction of section 13263 would not only be inconsistent with federal law, it would also be inconsistent with the Legislature's **870 declaration in section 13377 that all discharged wastewater must satisfy federal standards. [8] This was also the conclusion of the Court of Appeal. Moreover, under the federal Constitution's supremacy clause (art. VI), a state law that conflicts with federal law is " 'without effect.' " (*Cipollone v. Liggett Group, Inc.* (1992) 505 U.S. 504, 516, 112 S.Ct. 2608, 120 L.Ed.2d 407; *Dowhal v. SmithKline Beecham Consumer Healthcare* (2004) 32 Cal.4th 910, 923, 12 Cal.Rptr.3d 262, 88 P.3d 1.) To comport with the principles of federal supremacy, California law cannot authorize this *627 state's regional boards to allow the discharge of pollutants into the navigable waters of the United States in concentrations ***313 that would exceed the mandates of federal law.

7 The concurring opinion misconstrues both state and federal clean water law when it describes the issue here as "whether the Clean Water Act prevents or prohibits the regional water board from considering economic factors to justify pollutant restrictions *that meet the clean water standards in more cost-effective and economically efficient ways.*" (Conc. Opn. of Brown, J., *post,* 26 Cal.Rptr.3d p. 314, 108 P.3d at p. 871, some italics added.) This case has nothing to do with meeting federal standards in more cost effective and economically efficient ways. State law, as we have said, allows a regional board to consider a permit holder's compliance cost to *relax* pollutant concentrations, as measured by numeric standards, for pollutants in a wastewater discharge permit. (§§ 13241 & 13263.) Federal law, by contrast, as stated above in the text, "prohibits the discharge of pollutants into the navigable waters of the

United States unless there is compliance with federal law (33 U.S.C. § 1311(a)), and publicly operated wastewater treatment plants such as those before us here must comply with the [federal] act's *clean water standards, regardless of cost* (see *id.,* §§ 1311(a), (b)(1)(B) & (C), 1342(a)(1) & (3))." (Italics added.)

8 As amended in 1978, section 13377 provides for the issuance of waste discharge permits that comply with federal clean water law "together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." We do not here decide how this provision would affect the cost-consideration requirementsof sections 13241 and 13263 when more stringent effluent standards or limitations in a permit are justified for some reason independent of compliance with federal law.

Thus, in this case, whether the Los Angeles Regional Board should have complied with sections 13263 and 13241 of California's Porter–Cologne Act by taking into account "economic considerations," such as the costs the permit holder will incur to comply with the numeric pollutant restrictions set out in the permits, depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act. We therefore remand this matter for the trial court to resolve that issue.

C. Other Contentions

The Cities argue that requiring a regional board at the wastewater discharge permit stage to consider the permit holder's cost of complying with the board's restrictions on pollutant content in the water is consistent with federal law. In support, the Cities point to certain provisions of the federal Clean Water Act. They cite section 1251(a)(2) of title 33 United States Code, which sets, as a national goal "*wherever attainable,*" an interim goal for water quality that protects fish and wildlife, and section 1313(c)(2)(A) of the same title, which requires consideration, among other things, of waters' "*use and value* for navigation" when revising or adopting a "water quality standard." (Italics added.) These two federal statutes, however, pertain not to permits for wastewater discharge, at issue here, but to establishing water quality standards, not at issue here. Nothing in the federal Clean Water Act suggests that a state is free to disregard or to weaken the federal requirements for clean water when an NPDES permit holder alleges that compliance with those requirements will be too costly.

[5] At oral argument, counsel for amicus curiae National Resources Defense Council, which argued on behalf of California's State Board and regional water boards, asserted that the federal Clean Water Act incorporates state water policy into federal law, and that therefore a regional board's consideration of economic factors to justify greater pollutant concentration in discharged wastewater would conflict with the federal act even if the specified pollutant restrictions were not less stringent than those required under federal law. We are not persuaded. The federal Clean Water Act reserves to the states significant aspects of water quality policy (33 U.S.C. § 1251(b)), and it specifically grants the states authority to "enforce any effluent limitation" that is not "*less stringent* " than the federal standard (*id.* § 1370, italics added). It does not prescribe or restrict the factors that a state may consider when exercising this reserved authority, and thus it does not prohibit ***628** a state—when imposing effluent limitations that are *more stringent* than required by federal law—from taking into account the economic effects of doing so.

Also at oral argument, counsel for the Cities asserted that if the three municipal wastewater treatment facilities ceased releasing their treated wastewater into the concrete channel that makes up the Los Angeles River, it would (other than during the rainy season) contain no water at all, and thus would not be a "navigable water" of the ****871** United States subject to the Clean Water Act. (See *Solid Waste Agency v. United States Army Corps of Engineers* (2001) 531 U.S. 159, 172, 121 S.Ct. 675, 148 L.Ed.2d 576 ["The term 'navigable' has at least the import of showing us what Congress had in mind as its authority for enacting the CWA: its traditional jurisdiction over waters that were or had been navigable in fact or which could reasonably be so made."].) It is unclear when the Cities first raised this issue. The Court of Appeal did not discuss it in its opinion, and the Cities did not seek rehearing on this ground. (See *****314** Cal. Rules of Court, rule 28(c)(2).) Concluding that the issue is outside our grant of review, we do not address it.

CONCLUSION

Through the federal Clean Water Act, Congress has regulated the release of pollutants into our national waterways. The states are free to manage their own water quality programs so long as they do not compromise the federal clean water

standards. When enacted in 1972, the goal of the Federal Water Pollution Control Act Amendments was to *eliminate* by the year 1985 the discharge of pollutants into the nation's navigable waters. In furtherance of that goal, the Los Angeles Regional Board indicated in its 1994 basin plan on water quality the intent, insofar as possible, to remove from the water in the Los Angeles River toxic substances in amounts harmful to humans, plants, and aquatic life. What is not clear from the record before us is whether, in limiting the chemical pollutant content of wastewater to be discharged by the Tillman, Los Angeles–Glendale, and Burbank wastewater treatment facilities, the Los Angeles Regional Board acted only to implement requirements of the federal Clean Water Act or instead imposed pollutant limitations that exceeded the federal requirements. This is an issue of fact to be resolved by the trial court.

DISPOSITION

We affirm the judgment of the Court of Appeal reinstating the wastewater discharge permits to the extent that the specified numeric limitations on chemical pollutants are necessary to satisfy federal Clean Water Act requirements for treated wastewater. The Court of Appeal is directed to remand this ***629** matter to the trial court to decide whether any numeric limitations, as described in the permits, are "more stringent" than required under federal law and thus should have been subject to "economic considerations" by the Los Angeles Regional Board before inclusion in the permits.

WE CONCUR: GEORGE, C.J., BAXTER, WERDEGAR, CHIN, and MORENO, JJ.

Concurring Opinion by BROWN, J.

I write separately to express my frustration with the apparent inability of the government officials involved here to answer a simple question: How do the federal clean water standards (which, as near as I can determine, are the state standards) prevent the state from considering economic factors? The majority concludes that because "the supremacy clause of the United States Constitution requires state law to yield to federal law, a regional board, when issuing a wastewater discharge permit, may not consider economic factors to justify imposing pollutant restrictions that are *less stringent* than applicable federal standards require." (Maj. opn., *ante,* 26 Cal.Rptr.3d at p. 306, 108 P.3d at p. 864.) That seems a pretty self-evident proposition, but not a useful one. The real question, in my view, is whether the Clean Water Act prevents or prohibits the regional water board from considering economic factors to justify pollutant restrictions that *meet* the clean water standards in more cost-effective and economically efficient ways. I can see no reason why a federal law—which purports to be an example of cooperative federalism—would decree such a result. I do not think the majority's reasoning is at fault here. Rather, the agencies involved seemed to have worked hard to make this simple question impenetrably obscure.

A brief review of the statutory framework at issue is necessary to understand my concerns.

*****315 **872 I. Federal Law**

"In 1972, Congress enacted the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), commonly known as the Clean Water Act (CWA) [Citation.] ... [¶] Generally, the CWA 'prohibits the discharge of any pollutant except in compliance with one of several statutory exceptions. [Citation.]' ... The most important of those exceptions is pollution discharge under a valid NPDES [National Pollution Discharge Elimination System] permit, which can be issued either by the Environmental Protection Agency (EPA), or by an EPA-approved state permit program such as California's. [Citations.] NPDES permits are valid for five years. [Citation.] [¶] Under the CWA's NPDES permit program, the states are required to develop *water quality standards.* [Citations.] A water quality standard 'establish[es] the desired condition of a waterway.' [Citation.] A water quality standard for any ***630** given waterway, or 'water body,' has two components: (1) the designated beneficial uses of the water body and (2) the *water quality criteria* sufficient to protect those uses. [Citations.] [¶] Water quality criteria can be either *narrative* or *numeric.* [Citation.]" (*Communities for a Better Environment v. State Water Resources Control Bd.* (2003) 109 Cal.App.4th 1089, 1092–1093, 1 Cal.Rptr.3d 76.)

With respect to satisfying water quality standards, "a polluter must comply with *effluent limitations.* The CWA defines an effluent limitation as 'any restriction established by a State or the [EPA] Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.' [Citation.] 'Effluent limitations are a means of *achieving* water quality

standards.' [Citation.] [¶] NPDES permits establish effluent limitations for the polluter. [Citations.] CWA's NPDES permit system provides for a two-step process for the establishing of effluent limitations. First, the polluter must comply with *technology-based effluent limitations,* which are limitations based on the best available or practical technology for the reduction of water pollution. [Citations.] [¶] Second, the polluter must also comply with more stringent *water quality-based effluent limitations* (WQBEL's) where applicable. In the CWA, Congress 'supplemented the "technology-based" effluent limitations with "water quality-based" limitations "so that numerous point sources, despite individual compliance with effluent limitations, may be further regulated to prevent water quality from falling below acceptable levels.' " [Citation.] [¶] The CWA makes WQBEL's applicable to a given polluter whenever WQBEL's are 'necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations....' [Citations.] Generally, NPDES permits must conform to state water quality laws insofar as the state laws impose more stringent pollution controls than the CWA. [Citations.] Simply put, WQBEL's implement water quality standards." (*Communities for a Better Environment v. State Water Resources Control Bd., supra,* 109 Cal.App.4th at pp. 1093–1094, 1 Cal.Rptr.3d 76, fns. omitted.)

This case involves water quality-based effluent limitations. As set forth above, "[u]nder the CWA, states have the primary role in promulgating water quality standards." (*Piney Run Preservation Ass'n v. Commrs. of Carroll Co.* (4th Cir.2001) 268 F.3d 255, 265, fn. 9.) "Under the CWA, the water quality standards referred to in section 301 [see 33 U.S.C. § 1311] are primarily the states' handiwork." *****316** (*American Paper Institute, Inc. v. U.S. Envtl. Protection Agency* (D.C.Cir.1993) 996 F.2d 346, 349 (*American Paper*).) In fact, upon the 1972 passage of the CWA, "[s]tate water quality standards in effect at the time ... were deemed to be the initial water quality benchmarks for CWA purposes.... The states were to revisit and, if ***631** necessary, revise those initial standards at least once every three years." (*American Paper,* at p. 349.) Therefore, "once a water quality standard has been promulgated, section 301 of the CWA requires all NPDES permits for point sources to incorporate discharge limitations necessary to satisfy that standard." (*American Paper,* at p. 350.) Accordingly, it appears that in most instances, ****873** state water quality standards are identical to the federal requirements for NPDES permits.

II. State Law

In California, pursuant to the Porter–Cologne Water Quality Control Act (Wat.Code, § 13000 et seq.; Stats.1969, ch. 482, § 18, p. 1051; hereafter Porter–Cologne Act), the regional water quality control boards establish water quality standards —and therefore federal requirements for NPDES permits— through the adoption of water quality control plans (basin plans). The basin plans establish water quality objectives using enumerated factors—including economic factors—set forth in Water Code section 13241.

In addition, as one court observed: "The Porter–Cologne Act ... established nine regional boards to prepare water quality plans (known as basin plans) and issue permits governing the discharge of waste. (Wat.Code, §§ 13100, 13140, 13200, 13201, 13240, 13241, 13243.) The Porter–Cologne Act identified these permits as 'waste discharge requirements,' and provided that the waste discharge requirements must mandate compliance with the applicable regional water quality control plan. (Wat.Code, §§ 13263, subd. (a), 13377, 13374.)[¶] Shortly after Congress enacted the Clean Water Act in 1972, the California Legislature added Chapter 5.5 to the Porter–Cologne Act, for the purpose of adopting the necessary federal requirements to ensure it would obtain EPA approval to issue NPDES permits. (Wat.Code, § 13370, subd. (c).) As part of these amendments, the Legislature provided that the state and regional water boards 'shall, as required or authorized by the [Clean Water Act], issue waste discharge requirements ... which apply and ensure compliance with all applicable provisions [of the Clean Water Act], together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance.' (Wat.Code, § 13377.) Water Code section 13374 provides that '[t]he term "waste discharge requirements" as referred to in this division is the equivalent of the term "permits" as used in the [Clean Water Act].' [¶] California subsequently obtained the required approval to issue NPDES permits. [Citation.] Thus, the waste discharge requirements issued by the regional water boards ordinarily also serve as NPDES permits under federal law. (Wat.Code, § 13374.)" (*Building Industry Assn. of San Diego County v. State Water Resources Control Bd.* (2004) 124 Cal.App.4th 866, 875, 22 Cal.Rptr.3d 128.)

***632** Applying this federal-state statutory scheme, it appears that throughout this entire process, the Cities of Burbank and

Los Angeles (Cities) were unable to have economic factors considered because the Los Angeles Regional Water Quality Control Board (Board)—the body responsible to enforce the statutory framework—failed to comply with its statutory mandate.

*****317** For example, as the trial court found, the Board did not consider costs of compliance when it initially established its basin plan, and hence the water quality standards. The Board thus failed to abide by the statutory requirement set forth in Water Code section 13241 in establishing its basin plan. Moreover, the Cities claim that the initial narrative standards were so vague as to make a serious economic analysis impracticable. Because the Board does not allow the Cities to raise their economic factors in the permit approval stage, they are effectively precluded from doing so. As a result, the Board appears to be playing a game of "gotcha" by allowing the Cities to raise economic considerations when it is not practical, but precluding them when they have the ability to do so.

Moreover, the Board acknowledges that it has neglected other statutory provisions that might have provided an additional opportunity to air these concerns. As set forth above, pursuant to the CWA, "[t]he states were to revisit and, if necessary, revise those initial standards at least once every three years—a process commonly known as triennial review. [Citation.] Triennial reviews consist of public hearings in which current water quality standards are examined to assure that they 'protect the public health or welfare, enhance the quality of water and serve the purposes' of the Act. [Citation.] Additionally, the CWA ****874** directs states to consider a variety of competing policy concerns during these reviews, including a waterway's 'use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes.' " (*American Paper, supra,* 996 F.2d at p. 349.)

According to the Cities, "[t]he last time that the narrative water quality objective for toxicity contained in the Basin Plan was reviewed and modified was 1994." The Board does not deny this claim. Accordingly, the Board has failed its duty to allow public discussion—including economic considerations—at the required intervals when making its determination of proper water quality standards.

What is unclear is why this process should be viewed as a contest. State and local agencies are presumably on the same side. The costs will be paid by taxpayers and the Board should have as much interest as any other agency in fiscally responsible environmental solutions.

***633** Our decision today arguably allows the Board to continue to shirk its statutory duties. The majority holds that when read together, Water Code sections 13241, 13263, and 13377 do not allow the Board to consider economic factors when issuing NPDES permits to satisfy federal CWA requirements. (Maj. opn., *ante,* 26 Cal.Rptr.3d at pp. 311–312, 108 P.3d at pp. 869–870.) The majority then bifurcates the issue when it orders the Court of Appeal "to remand this matter to the trial court to decide whether any numeric limitations, as described in the permits, are 'more stringent' than required under federal law and thus should have been subject to 'economic considerations' by the Los Angeles Regional Board before inclusion in the permits." (*Id.* at p. 314, 108 P.3d at p. 871.)

The majority overlooks the feedback loop established by the CWA, under which federal standards are linked to state-established water quality standards, including narrative water quality criteria. (See 33 U.S.C. § 1311(b)(1)(C); 40 C.F.R. § 122.44(d)(1) (2004).) Under the CWA, NPDES permit requirements include the state narrative criteria, which are incorporated into the Board's basin plan under the description "no toxins in toxic amounts." As far as I can determine, NPDES permits *****318** designed to achieve this narrative criteria (as well as designated beneficial uses) will usually implement the state's basin plan, while satisfying federal requirements as well.

If federal water quality standards are typically identical to state standards, it will be a rare instance that a state exceeds its own requirements and economic factors are taken into consideration. [1] In light of the Board's initial failure to consider costs of compliance and its repeated failure to conduct required triennial reviews, the result here is an unseemly bureaucratic bait-and-switch that we should not endorse. The likely outcome of the majority's decision is that the Cities will be economically burdened to meet standards imposed on them in a highly questionable manner. [2] In these times of tight fiscal budgets, it is difficult to imagine imposing additional financial burdens on municipalities without at least allowing them to present alternative views.

1 (But see *In the Matter of the Petition of City and County of San Francisco, San Francisco*

Baykeeper et al. (Order No. WQ 95–4, Sept. 21, 1995) 1995 WL 576920.)

2 Indeed, given the fact that "water quality standards" in this case are composed of broadly worded components (i.e., a narrative criteria and "designated beneficial uses of the water body"), the Board possessed a high degree of discretion in setting NPDES permit requirements. Based on the Board's past performance, a proper exercise of this discretion is uncertain.

Based on the facts of this case, our opinion today appears to largely retain the status quo for the Board. If the Board can actually demonstrate that only the precise limitations at issue here, implemented in only one way, will achieve the desired water standards, perhaps its obduracy is justified. That case has yet to be made.

***634** Accordingly, I cannot conclude that the majority's decision is wrong. The analysis ****875** may provide a reasonable accommodation of conflicting provisions. However, since the Board's actions "make me wanna holler and throw up both my hands,"[3] I write separately to set forth my concerns and concur in the judgment—*dubitante.*[4]

3 Marvin Gaye (1971) "Inner City Blues."

4 I am indebted to Judge Berzon for this useful term. (See *Credit Suisse First Boston Corp. v. Grunwald* (9th Cir.2005) 400 F.3d 1119 (conc. opn. of Berzon, J.).)

All Citations

35 Cal.4th 613, 108 P.3d 862, 26 Cal.Rptr.3d 304, 60 ERC 1470, 35 Envtl. L. Rep. 20,071, 05 Cal. Daily Op. Serv. 2861, 2005 Daily Journal D.A.R. 3870

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KeyCite Yellow Flag
Distinguished by Great Oaks Water Co. v. Santa Clara Valley Water Dist., Cal.App. 6 Dist., February 28, 2025

3 Cal.5th 1191
Supreme Court of California.

CITY OF SAN BUENAVENTURA,
Plaintiff, Cross-defendant and Appellant,
v.
UNITED WATER CONSERVATION DISTRICT et al., Defendants, Cross-complainants and Appellants.

S226036
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Filed 12/4/2017
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As Modified on Denial of Rehearing 2/21/2018

Synopsis
Background: City filed separate petitions for writ of mandate and writ of administrative mandate and claims for reverse validation and declaratory relief against water conservation district that managed county groundwater resources challenging constitutionality of district's groundwater charges to city and other well operators for certain water years, which were consolidated. District filed cross-complaint, seeking declaratory relief upholding its groundwater charge. The Superior Court, Santa Barbara County, Nos. VENCI 00401714, VENCI 1414739, entered a declaratory judgment and issued the writs of mandate, ordering district to refund charges to city for certain water years. District appealed and city cross-appealed. The Supreme Court granted review, superseding the opinion of the Court of Appeal.

Holdings: The Supreme Court, Kruger, J., held that:

[1] groundwater charge did not constitute "charge for a property related service," within meaning of constitutional provision restricting amount of such charge to proportional cost of service attributable to parcel on which it was imposed, disapproving *Pajaro Valley Water Management Agency v. Amrhein*, 59 Cal.Rptr.3d 484, and *Griffith v. Pajaro Valley Water Management Agency*, 163 Cal.Rptr.3d 243, and

[2] Court of Appeal was required to consider whether charge bore reasonable relationship to benefits of district's conservation activities, as required for charge to qualify as nontax fee that did not require voter approval.

Affirmed in part, reversed in part, and remanded with instructions.

Liu, J., filed concurring opinion.

Opinion, 185 Cal.Rptr.3d 207, superseded.

Procedural Posture(s): On Appeal; Petition for Writ of Mandamus; Complaint for Declaratory Relief.

West Headnotes (8)

[1] **Water Law** Types of Charges and Fees

Water conservation district's groundwater charge to city and other well operators for conservation and management services did not constitute "charge for a property related service," within meaning of constitutional provision restricting amount of such charge to proportional cost of service attributable to parcel on which it was imposed; district conserved groundwater in underground basins that did not correspond with parcel boundaries, basins were managed by district for benefit of public, not merely for benefit of well operators, and groups were not same, as some well operators extracted water for their own use, while others, such as city, extracted water for sale and distribution elsewhere; disapproving *Pajaro Valley Water Management Agency v. Amrhein*, 59 Cal.Rptr.3d 484, and *Griffith v. Pajaro Valley Water Management Agency*, 163 Cal.Rptr.3d 243. Cal. Const. art. XIII D, §§ 2, 6(b); Cal. Water Code §§ 75521, 75522.

4 Cases that cite this headnote

[2] **Municipal, County, and Local Government** Power and Duty to Tax or Raise Revenue

Taxation Nature of property tax

Constitutional provision governing assessment and property-related fee reform allows only four types of local property taxes: (1) an ad valorem

property tax; (2) a special tax; (3) an assessment; and (4) a fee or charge, and places certain restrictions on each kind of exaction. Cal. Const. art. XIII D.

15 Cases that cite this headnote

[3] **Municipal, County, and Local Government** Benefit to property in general

Whether an exaction is a property-related charge for purposes of the constitutional provision governing assessment and property-related fee reform, which provides that the amount of such charge may not exceed the proportional cost of the service attributable to the parcel, is a question of law for the appellate courts to decide on independent review of the facts. Cal. Const. art. XIII D, § 6(b)(1, 2, 3).

6 Cases that cite this headnote

[4] **Municipal, County, and Local Government** Constitutional Requirements and Restrictions

Supreme Court construes the constitutional provision governing assessment and property-related fee reform liberally to effectuate its purposes of limiting local government revenue and enhancing taxpayer consent. Cal. Const. art. XIII D.

3 Cases that cite this headnote

[5] **Municipal, County, and Local Government** Benefit to property in general

A fee is charged for a property-related service, and is thus subject to the requirements of the constitutional provision governing assessment and property-related fee reform, which requires that the amount of such charge may not exceed the proportional cost of the service attributable to the parcel, if it is imposed on a property owner, in his or her capacity as a property owner, to pay for the costs of providing a service to a parcel of property. Cal. Const. art. XIII D, §§ 2(e), 6(b).

10 Cases that cite this headnote

[6] **Constitutional Law** Construction of statutes in general

Whatever the Legislature's intent in enacting a statute may have been, the ultimate constitutional interpretation must rest with the judiciary.

2 Cases that cite this headnote

[7] **Water Law** Necessity of voter approval

Court of Appeal was required to consider whether record demonstrated that water conservation district's groundwater charge to city and other well operators for conservation and management services, which was imposed without voter approval, bore reasonable relationship to burdens on or benefits of district's conservation activities, as required for charge to qualify as non-tax fee that did not require voter approval under constitutional provision governing voter approval of tax levies, in city's action against district challenging constitutionality of charge, especially in light of statute requiring that charges for pumping groundwater for nonagricultural uses generally must be at least three times the charges for pumping water for agricultural uses. Cal. Const. art. XIII C, §§ 1(e)(1), 1(e)(2); Cal. Water Code § 75594.

6 Cases that cite this headnote

[8] **Municipal, County, and Local Government** Benefit to property in general

To qualify as a nontax "fee" that does not require voter approval under the constitutional provision governing voter approval of tax levies, a charge must satisfy both the requirement that it be fixed in an amount that is no more than necessary to cover the reasonable costs of the governmental activity, and the requirement that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity. Cal. Const. art. XIII C, § 1(e).

See 9 Witkin, Summary of Cal. Law (11th ed. 2017) Taxation, § 147 et seq.

10 Cases that cite this headnote

****734** *****52** Ct.App. 2/6 B251810, Santa Barbara County, Super. Ct. Nos. VENCI 00401714, VENCI 1414739

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Opinion

Kruger, J.

***1197** The California Constitution, as amended by a series of voter initiatives, places limitations on the authority of state and local governments to collect revenue through taxes, fees, charges, and other types of levies. (Cal. Const., arts. XIII A, XIII C, XIII D.) This case concerns the application of these constitutional limitations to a particular *****54** kind of local government charge: a statutorily authorized "ground water charge" imposed on well operators by a local water conservation district to fund conservation activities such as replenishing groundwater stores and preventing degradation of the water supply. (See Wat. Code, § 75522.) By statute, charges for pumping groundwater for nonagricultural uses

generally must be at least three times the charges for pumping water for agricultural uses. (*Id.*, § 75594.)

The City of San Buenaventura (more commonly known as the City of Ventura) (City), which pumps large quantities of groundwater for delivery to residential customers, contends that the groundwater pumping charges it pays to its local water conservation district, United Water Conservation District (District), are disproportionate to the benefits it receives from the District's conservation activities. It also contends that it pays a disproportionate share of the costs of those activities by virtue of the three-to-one ratio in Water Code section 75594. The City argues that the charges therefore violate article XIII D of the California Constitution (added by Prop. 218, as approved by voters, Gen. Elec. (Nov. 5, 1996)), which provides that a charge imposed "as an incident of property ownership," including a "charge for a property related service," may not "exceed the proportional cost" of the service that is "attributable to the parcel" on which the charge is imposed. (Cal. Const., art. XIII D, §§ 2, subd. (e), 6, subd. (b)(3).) In the alternative, the City argues that the charges violate article XIII C of the California Constitution (as amended by Prop. 26, as approved by voters, Gen. Elec. (Nov. 2, 2010)), which provides that local government charges are taxes that generally must be approved by voters, but exempts from this category those charges that are limited to the reasonable costs of providing a ****736** special benefit or service and that bear a "fair or reasonable" relationship to the benefit to the payor of, or the payor's burden on, the government activity (Cal. Const., art. XIII C, § 1, subd. (e)(1) & (2)). The City argues that the groundwater pumping charges do not satisfy the criteria for exempt charges, and therefore should be considered unapproved taxes imposed in violation of the Constitution.

***1198** The Court of Appeal rejected both arguments. We conclude, as did the Court of Appeal, that article XIII C, as amended by Proposition 26, rather than article XIII D, supplies the proper framework for evaluating the constitutionality of the groundwater pumping charges at issue in this case. But because the Court of Appeal did not address the City's argument that the charges do not bear a fair or reasonable relationship to the payor's burdens on or benefits from the District's conservation activities, as article XIII C requires, we affirm in part, reverse in part, and remand for consideration of that question.

I.

A.

The District is a water conservation district formed under the Water Conservation District Law of 1931 (Wat. Code, § 74000 et seq.), to " 'manage, protect, conserve and enhance the water resources of the Santa Clara River, its tributaries and associated aquifers, in the most cost effective and environmentally balanced manner.' " The District's territory, which covers approximately 214,000 acres in central Ventura County, encompasses all or part of eight groundwater basins. [1]

[1] A groundwater basin is "[a]n alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom." (Dept. of Water Resources, California's Groundwater, Bulletin 118 (2003) p. 216.) An aquifer is "[a] body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs." (Id. at p. 214.)

*****55** Like many groundwater basins throughout California, basins in the District's territory have suffered from what is known as "overdraft"—meaning that more water is being taken out than is replaced by natural processes, including rainfall and river and streamflow. Overdraft can result in saltwater intrusion into the fresh groundwater supply and can reduce the basin's capacity for groundwater storage. (See Wat. Code, § 75505.) To counteract overdraft and its effects, the District artificially "recharges," or replenishes, the groundwater supply by diverting water from other sources and spreading it over the ground covering certain basins within district boundaries. To reduce the demand for groundwater extraction, the District also provides pipeline deliveries of water derived from other sources.

The Water Code authorizes water conservation districts to finance their activities by imposing a "ground water charge[ ]" on "the production of ground water from all water-producing facilities" within the district (or within ***1199** certain zones in the district). (Wat. Code, § 75522.) [2] Under the code, a district may establish different zones for rate-setting purposes. (*Id.*, § 75591.) Within each zone, the

district must charge a uniform rate for all water pumped for agricultural use, and a uniform rate for all water pumped for nonagricultural use. (*Id.*, §§ 75591, 75593.) Subject to an exception not relevant here (*id.*, § 75595), the rate for nonagricultural use must be between three and five times the rate for agricultural use. (*Id.*, § 75594.) Consistent with these provisions, the District imposes a volume-based charge on groundwater pumping within its territory. As required by section 75594 of the Water Code, the District's rates for pumping for nonagricultural use are three times those for pumping for agricultural use.

2 For the purposes of the statute, " 'groundwater' means all water beneath the earth's surface," with certain exceptions not applicable here, as well as "water produced from artesian wells." (Wat. Code, § 75502.5.)

B.

Under the California Constitution, as amended by a series of voter initiatives, local government taxes, fees, charges, and other exactions are subject to several requirements and restrictions. The first of these initiatives, Proposition 13, added article XIII A to the Constitution. Passed in 1978, the purpose of ****737** the initiative "was to assure effective real property tax relief by means of an 'interlocking "package" ' consisting of a real property tax rate limitation (art. XIII A, § 1), a real property assessment limitation (art. XIII A, § 2), a restriction on state taxes (art. XIII A, § 3), and a restriction on local taxes (art. XIII A, § 4)." (*Sinclair Paint Co. v. State Bd. of Equalization* (1997) 15 Cal.4th 866, 872, 64 Cal.Rptr.2d 447, 937 P.2d 1350 (*Sinclair Paint*).) The " 'principal provisions' " of the initiative " 'limited ad valorem property taxes to 1 percent of a property's assessed valuation and limited increases in the assessed valuation to 2 percent per year unless and until the property changed hands. (Cal. Const., art. XIII A, §§ 1, 2.)' " (*Apartment Assn. of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 836, 102 Cal.Rptr.2d 719, 14 P.3d 930 (*Apartment Association*), quoting *Howard Jarvis Taxpayers Assn. v. City of Riverside* (1999) 73 Cal.App.4th 679, 681, 86 Cal.Rptr.2d 592 (*Howard Jarvis*).) " 'To prevent local *****56** governments from subverting its limitations, Proposition 13 also prohibited counties, cities, and special districts from enacting any special tax without a two-thirds vote of the electorate. [Citations.]' " (*Apartment Association*, at p. 836, 102 Cal.Rptr.2d 719, 14 P.3d 930; see Cal. Const., art. XIII A, § 4.)

Courts uniformly held, however, that article XIII A did not restrict local governments' ability to impose "legitimate special assessments"—that is, charges levied on owners of real property directly benefited by a local improvement to defray its costs. (***1200** *Knox v. City of Orland* (1992) 4 Cal.4th 132, 141, 14 Cal.Rptr.2d 159, 841 P.2d 144.) In part to close this perceived loophole, voters in 1996 passed Proposition 218, which, among other things, " 'buttresse[d] Proposition 13's limitations on ad valorem property taxes and special taxes by placing analogous restrictions on assessments, fees, and charges.' " (*Apartment Association*, *supra*, 24 Cal.4th at p. 837, 102 Cal.Rptr.2d 719, 14 P.3d 930, quoting *Howard Jarvis*, *supra*, 73 Cal.App.4th at p. 682, 86 Cal.Rptr.2d 592.) Article XIII D, added by Proposition 218, imposes certain substantive and procedural restrictions on taxes, assessments, fees, and charges "assessed by any agency upon any parcel of property or upon any person as an incident of property ownership." (Cal. Const., art. XIII D, § 3, subd. (a).) Among other things, article XIII D instructs that the amount of a "fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel." (*Id.*, § 6, subd. (b)(3).)

Proposition 218 also added article XIII C, which restricts the authority of local governments to impose taxes by, among other things, requiring voter approval of all taxes imposed by local governments. [3] In 2010, voters passed Proposition 26, which further expanded the reach of article XIII C's voter approval requirement by broadening the definition of " 'tax' " to include "any levy, charge, or exaction of any kind imposed by a local government." (Cal. Const., art. XIII C, § 1, subd. (e).) The definition contains numerous exceptions for certain types of exactions, including for "property-related fees imposed in accordance with the provisions of Article XIII D" (*id.*, § 1, subd. (e)(7)), as well as for charges for "a specific benefit conferred or privilege granted," or "a specific government service or product" that is provided, "directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government" (*id.*, § 1, subd. (e)(1) & (2)). To fall within one of these exemptions, the amount of the charge may be "no more than necessary to cover the reasonable costs of the governmental activity," and "the manner in which those costs are allocated to a payor" must "bear a fair or reasonable

relationship to the payor's burdens on, or benefits received from, the governmental activity." (*Id.*, § 1, subd. (e).)

3 Article XIII C provides that all taxes imposed by local governments are either general taxes or special taxes (art. XIII C, § 2, subd. (a)), and requires all general taxes to be approved by a majority vote (art. XIII C, § 2, subd. (b)) and all special taxes to be approved by a two-thirds vote (art. XIII C, § 2, subd. (d)).

****738 C.**

This case arises from a long-running controversy between the City and the District about the District's groundwater *****57** pumping charges. In the 1980s, the ***1201** District planned a major improvement project to divert water from the Santa Clara River for recharge purposes. The District proposed to finance the diversion project by imposing new pumping charges on users within a newly established rate zone comprising areas that would benefit from the project. The City protested, arguing that the proposed zone included a basin on which City wells operated that would not benefit from the project, and filed several lawsuits challenging the District's proposal. In 1987, the parties entered a settlement agreement in which the District agreed to create a second zone for project-related charges in which the rate for nonagricultural use would be set at one-third of the previously announced rate for the first zone—that is, a rate equal to the rate imposed on agricultural users within the first zone. When the settlement agreement expired at the end of 2011, the District eliminated the special zone, resulting in substantially higher pumping rates for groundwater extractors in the affected territory, including the City. After providing notice and inviting comment, the District also increased the general rate for groundwater pumping throughout the district.

The City again filed suit to challenge the pumping charges, contending that the charges violate either article XIII D or, in the alternative, article XIII C of the California Constitution. In support of its contention, the City alleged that it pays more than its fair share of the costs of the District's conservation efforts, both relative to agricultural users by virtue of the three-to-one ratio required under section 75594 of the Water Code, and relative to other users in the district that pump from basins that receive greater benefit from the District's recharge efforts. The City petitioned the court for a writ of mandate under Code of Civil Procedure section 1085 and for a writ of administrative mandate under Code of Civil Procedure section 1094.5, and sought declaratory relief as well as a determination of invalidity under Code of Civil Procedure section 860 et seq. (commonly known as a reverse validation action (*McLeod v. Vista Unified School Dist.* (2008) 158 Cal.App.4th 1156, 1165–1166, 71 Cal.Rptr.3d 109)). The City challenged the 2011–2012 rates and the 2012–2013 rates in separate actions, which were consolidated in the trial court.

The trial court ruled in the City's favor. Relying on *Pajaro Valley Water Management Agency v. Amrhein* (2007) 150 Cal.App.4th 1364, 59 Cal.Rptr.3d 484 (*Amrhein*), the trial court concluded that the pumping charges are "imposed on persons as an incident of property ownership" and thus subject to the requirements and restrictions of article XIII D. The trial court concluded, however, that the District's general practice of charging a uniform fee across an area comported with article XIII D's requirement that a property-related fee or charge "not exceed the proportional cost of the service attributable to the parcel" (Cal. Const., art. XIII D, § 6, subd. (b)(3)) because it would be infeasible for the District to attribute the costs of its conservation activities on a parcel-by-parcel basis, and because ***1202** the charges in the aggregate did not exceed the reasonable costs of the District's conservation activities. But the trial court concluded that the three-to-one ratio mandated by Water Code section 75594 did violate article XIII D's proportionality requirement because the District failed to demonstrate that "the costs relating to agricultural water as compared with non-agricultural water support [the] differential." The trial court entered a declaratory judgment and issued the writs of mandate, ordering the District to refund the City $548,296.22 for charges for the 2011–2012 water year and $794,815.57 for the 2012–2013 water year, plus interest. *****58** These represent the amounts the City paid in excess of the District's average costs for all types of water usage.

The Court of Appeal reversed. It held that the pumping charges are not property-related charges or fees within the meaning of article XIII D. The court distinguished *Amrhein*, on which the trial court had relied, as involving "a unique set of facts" not present here. But the court went on to conclude that regardless of the factual setting, "a pump fee is better characterized as a charge on the ****739** activity of pumping than a charge imposed by reason of property ownership." (Citing *Orange County Water Dist. v. Farnsworth* (1956) 138 Cal.App.2d 518, 292 P.2d 927.) Moreover, the Court of Appeal held that even if the charges were "property-related charges" for purposes of article XIII

D, they would not violate article XIII D's requirement that the fee "not exceed the proportional cost of the service attributable to the parcel" by virtue of the three-to-one ratio in Water Code section 75594. (Cal. Const., art. XIII D, § 6, subd. (b)(3).) The court reasoned: "Section 75594 does not discriminate between persons or parcels. It discriminates between types of use. [Citation.] If the City chooses to use its groundwater for agricultural purposes, it too can benefit from the lower rates."

The Court of Appeal further held that the pumping charges are not taxes subject to the requirements of article XIII C. The court concluded that the charges fall within the exception for payor-specific benefits and privileges. The court reasoned that the operative question, for purposes of this exception, is whether the charges in the aggregate exceed the District's costs of providing groundwater management services. The court held that this question was effectively answered by the trial court's finding that the pumping charges in the aggregate do not exceed the District's reasonable costs.

II.

[1] We begin by considering the City's argument that the District's groundwater pumping charges violate article XIII D, added by Proposition 218. The threshold question for our determination is whether the pumping charges are "imposed ... upon a parcel or upon a person as an incident of property ***1203** ownership" within the meaning of article XIII D. (Cal. Const., art. XIII D, § 2, subd. (e).) We conclude that they are not, and that they therefore fall outside the reach of article XIII D.

A.

[2] Article XIII D was passed as part of Proposition 218, an initiative designed to buttress Proposition 13's limitation on property taxes. (*Apartment Association*, *supra*, 24 Cal.4th at p. 837, 102 Cal.Rptr.2d 719, 14 P.3d 930.) To that end, article XIII D " 'allows only four types of local property taxes: (1) an ad valorem property tax; (2) a special tax; (3) an assessment; and (4) a fee or charge,' " and places certain restrictions on each kind of exaction. (*Apartment Association*, at p. 837, 102 Cal.Rptr.2d 719, 14 P.3d 930, quoting *Howard Jarvis*, *supra*, 73 Cal.App.4th 679, 682, 86 Cal.Rptr.2d 592.) The provisions governing fees and charges command that no fee or charge "shall be assessed ... upon any parcel of property or upon any person as an incident of property ownership" except "[f]ees or charges for property related services" that satisfy the requirements of article XIII D. (Cal. Const., art. XIII D, § 3, subd. (a)(4).) Article XIII D defines " '[f]ee' or 'charge' " to mean "any levy other than an ad valorem tax, a special tax, or an assessment, imposed by an agency upon a parcel or upon a person as an incident of property ownership, *****59** including a user fee or charge for a property related service." (*Id.*, § 2, subd. (e).)[4] A " '[p]roperty-related service,' " in turn, is defined as a "public service having a direct relationship to property ownership." (*Id.*, § 2, subd. (h).)

4 Because article XIII D includes a single definition for a " 'fee' or 'charge,' " we use those terms interchangeably here. (Cal. Const., art. XIII D, § 2, subd. (e); see *Bighorn*–Desert View Water Agency v. Verjil (2006) 39 Cal.4th 205, 214, fn. 4, 46 Cal.Rptr.3d 73, 138 P.3d 220.)

A "[p]roperty [r]elated" fee or charge within the meaning of these provisions is subject to several procedural requirements. (Cal. Const., art. XIII D, § 6.) Among other things, an agency that proposes to impose such a fee or charge must notify "the record owner of each identified parcel upon which the fee or charge is proposed for imposition" and conduct a public hearing on the proposal. (*Id.*, § 6, subd. (a)(1); *id.*, § 6, subd. (a)(2).) "If written protests against the proposed fee or charge are presented by a majority of owners of the identified parcels, the agency shall not impose the fee or charge." (*Id.*, § 6, subd. (a)(2).) "Except for fees or charges for sewer, water, and refuse collection services, no property related fee or charge" may be "imposed or increased" unless it is "approved by a majority vote of the property owners of the property subject to the fee or charge or, ****740** at the option of the agency, by a two-thirds vote of the electorate residing in the affected area." (*Id.*, § 6, subd. (c).)

***1204** A covered fee or charge is also subject to a series of substantive limitations. The revenues derived from the fee or charge may not exceed the funds required to provide the property-related service, nor may they be used for any purpose other than that for which the fee or charge was imposed. (Cal. Const., art. XIII D, § 6, subd. (b)(1) & (2).) And in a provision central to the City's challenge in this case, article XIII D provides that the amount of the charge may not "exceed the proportional cost of the service attributable to the parcel." (*Id.*, § 6, subd. (b)(3).)

[3] **[4]** Whether an exaction is a property-related charge for purposes of article XIII D "is a question of law for the appellate courts to decide on independent review of the facts." (*Sinclair Paint*, *supra*, 15 Cal.4th at p. 874, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) We construe the provisions of article XIII D liberally, " 'to effectuate its purposes of limiting local government revenue and enhancing taxpayer consent.' " (*Silicon Valley Taxpayers' Assn., Inc. v. Santa Clara County Open Space Authority* (2008) 44 Cal.4th 431, 448, 79 Cal.Rptr.3d 312, 187 P.3d 37.) The relevant government agency—here, the District—bears the burden of demonstrating compliance. (Cal. Const., art. XIII D, § 6, subd. (b)(5).)

B.

In considering whether the District's groundwater pumping charges are property-related fees and charges for purposes of article XIII D, we do not write on a clean slate. We previously addressed the meaning of article XIII D's definition of property-related fees and charges in a trio of cases beginning with *Apartment Association*, *supra*, 24 Cal.4th 830, 102 Cal.Rptr.2d 719, 14 P.3d 930. In that case, we considered whether an apartment inspection fee imposed on landlords of private apartment buildings was a fee imposed "upon a parcel or upon a person as an incident of property ownership" (art. XIII D, § 2, subd. (e)) and thus subject to the requirements of article XIII D. We concluded that it was not. Article XIII D's *****60** repeated references to fees and charges imposed " 'as an incident of property ownership,' " we explained, "mean[ ] that a levy may not be imposed on a property owner as such—i.e., in its capacity as property owner—unless it meets constitutional prerequisites. In this case, however, the fee is imposed on landlords not in their capacity as landowners, but in their capacity as business owners. The exaction at issue here is more in the nature of a fee for a business license than a charge against property. It is imposed only on those landowners who choose to engage in the residential rental business, and only while they are operating the business." (*Apartment Association*, *supra*, 24 Cal.4th at pp. 839–840, 102 Cal.Rptr.2d 719, 14 P.3d 930.)

In the next case in the series, *Richmond v. Shasta Community Services Dist.* (2004) 32 Cal.4th 409, 9 Cal.Rptr.3d 121, 83 P.3d 518 (*Richmond*), we considered whether a fee for making a new connection to a water system was ***1205** "imposed 'as an incident of property ownership' " within the meaning of article XIII D. (*Id.* at p. 426, 9 Cal.Rptr.3d 121, 83 P.3d 518.) We again concluded that the fee was not "property-related" for constitutional purposes. We explained that, much as in *Apartment Association*, the fee in question was "not imposed simply by virtue of property ownership, but instead ... as an incident of the voluntary act of the property owner in applying for a service connection." (*Richmond*, at p. 426, 9 Cal.Rptr.3d 121, 83 P.3d 518.)

In so concluding, we also rejected the challengers' argument that the fee must be "property related" because "user fee[s] or charge[s] for a property related service" are included in article XIII D's definition of property-related fees, and supplying water is a "property related service." (Cal. Const., art. XIII D, § 2, subd. (e).) We agreed with challengers, as an initial matter, that "supplying water is a 'property-related service' within the meaning of article XIII D's definition of a fee or charge." (*Richmond*, *supra*, 32 Cal.4th at p. 426, 9 Cal.Rptr.3d 121, 83 P.3d 518.) That view, we noted, finds support in ballot materials for Proposition 218, in which the Legislative Analyst opined that " '[f]ees for water, sewer, and refuse collection service probably meet the measure's definition ****741** of property-related fee.' " (*Ibid.*) And the Legislative Analyst's view, in turn, finds support in surrounding provisions of article XIII D, which expressly exempt certain types of utility charges from some or all of its requirements: section 3, subdivision (b) exempts fees for electrical or gas service from the scope of "charges imposed 'as an incident of property ownership,' " while section 6, subdivision (c) exempts fees for sewer, water, and refuse collection services from article XIII D's voter approval requirements. (*Richmond*, at p. 427, 9 Cal.Rptr.3d 121, 83 P.3d 518, citing Cal. Const., art. XIII D, §§ 3, subd. (b), 6, subd. (c).)

But we explained in *Richmond* that even though "supplying water" is a property-related service, not "*all* water service charges are necessarily subject to the restrictions that article XIII D imposes on fees and charges.... [A] water service fee is a fee or charge ... if, but only if, it is imposed 'upon a person as an incident of property ownership.' (Art. XIII D, § 2, subd. (e).) A fee for ongoing water service through an existing connection is imposed 'as an incident of property ownership' because it requires nothing other than normal ownership and use of property. But a fee for making a new connection to the system is not imposed 'as an incident of property ownership' because it results from the owner's voluntary decision to apply for the connection." (*****61** *Richmond*, *supra*, 32 Cal.4th at p. 427, 9 Cal.Rptr.3d 121, 83 P.3d 518.) That conclusion, we noted, is reinforced by practical considerations: Because

a local government agency cannot identify in advance which property owners will seek new connections to the water system, it has no practical means of complying with article XIII D's requirement that the agency "identify the parcels on which the assessment will be imposed and provide an opportunity for a majority protest ...." (*Richmond*, at p. 419, 9 Cal.Rptr.3d 121, 83 P.3d 518; see *id.* at pp. 427–428, 9 Cal.Rptr.3d 121, 83 P.3d 518.)

***1206** Finally, in *Bighorn–Desert View Water Agency v. Verjil*, *supra*, 39 Cal.4th 205, 46 Cal.Rptr.3d 73, 138 P.3d 220 (*Bighorn*), we considered whether a charge for ongoing water delivery services is a "fee or charge" for purposes of article XIII C, which provides that "the initiative power shall not be prohibited or otherwise limited in matters of reducing or repealing any local tax, assessment, fee or charge" (art. XIII C, § 3), but contains no definition of "fee" or "charge." We held that it is. Reasoning that the category of "fees or charges" subject to article XIII C must include, at a minimum, any fee or charge subject to article XIII D, we reaffirmed what we had said, albeit in dicta, in *Richmond*: A charge for ongoing water delivery is a " 'fee' " or " 'charge' " within the meaning of article XIII D. (*Bighorn*, *supra*, 39 Cal.4th at pp. 215–216, 46 Cal.Rptr.3d 73, 138 P.3d 220, citing *Richmond*, *supra*, 32 Cal.4th at pp. 426–427, 9 Cal.Rptr.3d 121, 83 P.3d 518.) This is so, we concluded, even if the total amount of the bill is usage-based, and thus depends on the customer's "voluntary decisions ... as to how much water to use": "[O]nce a property owner or resident has paid the connection charges and has become a customer of a public water agency, all charges for water delivery incurred thereafter are charges for a property-related service, whether the charge is calculated on the basis of consumption or is imposed as a fixed monthly fee." (*Id.* at pp. 216–217, 46 Cal.Rptr.3d 73, 138 P.3d 220, fn.omitted.)

C.

Following this trio of decisions, the Courts of Appeal have drawn different conclusions about how to evaluate the constitutionality of groundwater pumping charges under article XIII D. In *Amrhein*, *supra*, 150 Cal.App.4th 1364, 59 Cal.Rptr.3d 484, the Court of Appeal considered whether a groundwater pumping charge imposed by a local water management agency qualified as a property-related charge subject to article XIII D. On initial hearing, the Court of Appeal, relying primarily on *Richmond* and *Apartment Association*, concluded that the pumping charge was not incidental to property ownership, for three reasons: "(1) it was incurred only through voluntary action, i.e., the pumping of groundwater ...; (2) it would never be possible for the [a]gency to comply with Article XIII D's requirement that it calculate in advance the amount to be charged on a given well; and (3) the charge burdens those on whom it is imposed not as landowners but as water extractors." (*Amrhein*, *supra*, 150 Cal.App.4th at pp. 1385–1386, 59 Cal.Rptr.3d 484, fn. omitted.) After *Bighorn* was decided, however, ****742** the *Amrhein* court granted rehearing and reversed course, concluding that its earlier view was irreconcilable with *Bighorn*'s holding that usage-based water delivery fees are imposed as an incident of property ownership. The court reasoned that the pumping charges at issue were comparable to usage-based water delivery fees, in that both charges are levied based on a property owner's voluntary decision to consume water. (*Id.* at pp. 1388–1389, 59 Cal.Rptr.3d 484.) And because an "overlying owner possesses 'special rights' to the reasonable use of *****62** groundwater under his land," the court explained, a ***1207** charge on groundwater pumping "is at least as closely connected to the ownership of property as is a charge on delivered water." (*Id.* at pp. 1391–1392, 59 Cal.Rptr.3d 484.)

The *Amrhein* court allowed that, under *Apartment Association*, it might be argued that a "fee falls outside Article XIII D to the extent it is charged for consumption of a public service for purposes or in quantities exceeding what is required for basic (i.e., residential) use of the property." (*Amrhein*, *supra*, 150 Cal.App.4th at p. 1389, 59 Cal.Rptr.3d 484.) But the court emphasized that "a large majority" of water extractors in the jurisdiction were using the water for "residential or domestic," rather than business, purposes. (*Amrhein*, at p. 1390, 59 Cal.Rptr.3d 484; see also *id.* at p. 1397, 59 Cal.Rptr.3d 484 (conc. opn. of Bamattre–Manoukian, J.) [emphasizing record evidence showing "that the vast majority of property owners in the Pajaro Valley obtained their water from wells, and that alternative sources were not practically feasible"].) [5]

5 The court in *Amrhein* cautioned that it was not deciding whether a groundwater pumping charge "is necessarily subject to all of the restrictions imposed by Article XIII D on charges incidental to property ownership" since there was "no occasion to determine whether this or a similar charge may fall within any of the express exemptions or partial exemptions set forth in that measure." (*Amrhein, supra*, 150 Cal.App.4th at p. 1393, fn. 21, 59 Cal.Rptr.3d 484.) The Court of Appeal answered

this question in the follow-on case of *Griffith v. Pajaro Valley Water Management Agency* (2013) 220 Cal.App.4th 586, 595–596, 163 Cal.Rptr.3d 243 (*Griffith*). In *Griffith*, the court held that the water management agency's groundwater pumping charge fell within the provision exempting "fees or charges for sewer, water, and refuse collection services" from article XIII D's voter approval requirements. (Cal. Const., art. XIII D, § 6, subd. (c).) The *Griffith* court explained this conclusion flowed from *Amrhein's* holding that a groundwater pumping charge "does not differ materially 'from a charge on delivered water.' " (*Griffith, supra*, at p. 595, 163 Cal.Rptr.3d 243, quoting *Amrhein, supra,* 150 Cal.App.4th at pp. 1388–1389, 59 Cal.Rptr.3d 484.)

The Court of Appeal in this case, by contrast, concluded that the pumping fee does not qualify as a property-related charge subject to article XIII D. The court distinguished *Amrhein* on the ground that the record in this case contains no comparable indication that the majority of property owners in the District's territory obtain water by pumping it from wells. But the court concluded that a pumping fee is in any event "better characterized as a charge on the activity of pumping than a charge imposed by reason of property ownership." This is true, the court concluded, "even with respect to the individual household that elects to pump water for its own consumption."

[5] We conclude that the Court of Appeal in this case has the better of the argument. The critical question is whether the groundwater charge—a charge for the District's conservation and management services—qualifies as a "charge for a property related service." (Cal. Const., art. XIII D, § 2, subd. (e).) The text of article XIII D provides important indications about what sort of service-related charges the voters had in mind. Article XIII D, section 6 tells us, for example, that revenues derived from the fee may not ***1208** "exceed the funds required to provide the property related service" (subd. (b)(1)); that the amount imposed on any parcel may not "exceed the proportional cost of the service attributable to the parcel" (subd. (b)(3)); and that property owners may not be charged for "potential or future use of a service" (subd. (b)(4)) or for "general governmental services" (subd. (b)(5)). The lesson *****63** that emerges from the text and cases is this: A fee is charged for a "property-related service," and is thus subject to article XIII D, if it is imposed on a property owner, in his or her capacity as a property owner, to pay for the costs of providing a service to a parcel of property.

Measured by that yardstick, the groundwater pumping charge at issue here falls ****743** short. To be sure, the charge is used for the conservation and management of groundwater, and water is, as we said in *Bighorn*, "indispensable to most uses of real property." (*Bighorn*, *supra*, 39 Cal.4th at p. 214, 46 Cal.Rptr.3d 73, 138 P.3d 220.) But not all fees associated with obtaining water are property-related fees within the meaning of article XIII D; otherwise, *Richmond*, which concerned fees for making connections necessary for obtaining water delivery, would have been decided differently. And while *Bighorn* holds that fees for supplying water through an established connection are property-related service fees, charges for the service the District provides—that is, the conservation of limited groundwater stores, and remediation of the adverse effects of groundwater extraction—are not property-related in the same way: The District does not "deliver" water "via groundwater" to any particular parcel or set of parcels, as the City would characterize it. The District instead conserves and replenishes groundwater that flows through an interconnected series of underground basins, none of which corresponds with parcel boundaries. These basins are managed by the District for the benefit of the public that relies on groundwater supplies, not merely for the benefit of the owners of land on which wells are located. (See Wat. Code, §§ 75521, 75522.) And as this case demonstrates, these two groups are not one and the same; while some well operators extract water for use on their own property, others, such as the City, extract water for sale and distribution elsewhere. (Cf. *City of Barstow* (2000) 23 Cal.4th 1224, 1240–1241, 99 Cal.Rptr.2d 294, 5 P.3d 853 [contrasting overlying with appropriative water rights].)

All this means that the District's services, by their nature, are not directed at any particular parcel or set of parcels in the same manner as, for example, water delivery or refuse collection services. (*Richmond*, *supra*, 32 Cal.4th at p. 426, 9 Cal.Rptr.3d 121, 83 P.3d 518, citing Ballot Pamp., Gen. Elec. (Nov. 5, 1996) analysis of Prop. 218 by Legis. Analyst, p. 73.) Put differently, when the District fulfills its statutory functions, it is not providing a service to the City in its capacity as the owner of the lands on which its wells are located, but in the City's capacity as an extractor of groundwater from stores that are managed for the benefit of the public.

***1209** **[6]** We see no indication that the voters who approved Proposition 218—thereby, among other things, giving property owners the right to block property-related

fees and charges by majority protest (Cal. Const., art. XIII D, § 6, subd. (a)(2))—had this sort of charge in mind. We therefore conclude that the groundwater charge authorized by Water Code section 75522 is not a charge for a "property-related service" that falls within the scope of Proposition 218. [6]

6 The City contends that the Legislature implicitly concluded otherwise when it enacted the Sustainable Groundwater Management Act of 2014 (Wat. Code, § 10720 et seq.) (SGMA), which was enacted before the Court of Appeal issued its decision in this case. In SGMA, the Legislature provided that certain newly created "groundwater sustainability agencies" may impose groundwater pumping charges to fund the costs of groundwater management, but subject to the requirements of article XIII D, section 6, subdivisions (a) and (b). (Wat. Code, § 10730.2, subds. (a) & (c).) Omitted from these requirements is article XIII D, section 6, subdivision (c), which generally forbids agencies from imposing new or increased fees unless they first gain the approval of a majority of property owners or two-thirds of the electorate residing in the affected area. It is unclear that by enacting Water Code section 10730.2, subdivision (c) the Legislature intended to express any judgment on the interpretive question before us, as opposed to, for example, signaling its agreement with a post-*Amrhein* appellate ruling that groundwater charges are exempt from article XIII D's voter approval requirement as charges for "water service[s]." (*Griffith, supra*, 220 Cal.App.4th at p. 596, 163 Cal.Rptr.3d 243.) In any event, whatever the Legislature's intent may have been, "the ultimate constitutional interpretation must rest, of course, with the judiciary." (*Pacific Legal Foundation v. Brown* (1981) 29 Cal.3d 168, 180, 172 Cal.Rptr. 487, 624 P.2d 1215.) The Legislature is, of course, free to impose additional requirements by statute.

Furthermore, although we disagree with the trial court that the fee at issue here is a property-related fee within the meaning of article XIII D, and therefore conclude that the fee is not subject to that provision's proportionality requirement, we express no opinion about the trial court's determination that the District's practice of charging a uniform fee across an area because of the infeasibility of allocating costs on a parcel-by-parcel basis complies with that requirement. (See ante, 226 Cal.Rptr.3d at pp. 56–58, 406 P.3d at pp. 738.)

We disapprove *Pajaro Valley Water Management Agency v. Amrhein* (2007) 150 Cal.App.4th 1364, 59 Cal.Rptr.3d 484, and *Griffith v. Pajaro Valley Water Management Agency* (2013) 220 Cal.App.4th 586, 163 Cal.Rptr.3d 243, insofar as they are inconsistent with this opinion.

*****64 **744 III.**

[7] We next turn to the City's argument that the District's groundwater pumping charges violate article XIII C, as amended by Proposition 26. As noted, Proposition 26 expanded the definition of "taxes" requiring voter approval to include a "levy, charge or exaction of any kind," but exempted certain categories of exactions from its reach, including certain charges imposed for specific government benefits, privileges, services, or products provided directly to the payor. (Cal. Const., art. XIII C, § 1, subd. (e)(1) & (2).) "The local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated ***1210** to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." (*Id.*, § 1, subd. (e).)

As both parties acknowledge, the language of Proposition 26 is drawn in large part from pre-Proposition 26 case law distinguishing between taxes subject to the requirements of article XIII A, on the one hand, and regulatory and other fees, on the other. (See *Jacks v. City of Santa Barbara* (2017) 3 Cal.5th 248, 262, 219 Cal.Rptr.3d 859, 397 P.3d 210 (*Jacks*).) We described this distinction in *Sinclair Paint, supra*, 15 Cal.4th 866, 64 Cal.Rptr.2d 447, 937 P.2d 1350 which concerned the proper categorization of fees imposed on manufacturers of lead-containing products (and others) to raise revenue for a statewide lead poisoning evaluation, screening, and followup program. We explained that, "[i]n general, taxes are imposed for revenue purposes, rather than in return for a specific benefit conferred or privilege granted." (*Sinclair Paint*, at p. 874, 64 Cal.Rptr.2d 447, 937 P.2d 1350; see Cal. Const., art. XIII C, § 1, subd. (e)(1).) Accordingly, we concluded, a fee does not become a tax subject to article XIII A unless it " ' "exceed[s] the reasonable

cost of providing services ... for which the fee is charged." ' " (*Sinclair Paint*, at p. 876, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) We *****65** further explained that " 'the basis for determining the manner in which the costs are apportioned' " should demonstrate that " 'charges allocated to a payor bear a fair or reasonable relationship to the payor's burdens on or benefits from the regulatory activity.' " (*Id.* at p. 878, 64 Cal.Rptr.2d 447, 937 P.2d 1350, quoting *San Diego Gas & Electric Co. v. San Diego County Air Pollution Control Dist.* (1988) 203 Cal.App.3d 1132, 1146, 250 Cal.Rptr. 420 (*SDG&E*).) Proposition 26 codified both requirements. (See Cal. Const., art. XIII C, § 1, subd. (e) [to prove fee is not a tax, "local government bears the burden of proving ... that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits *****66** received from, the governmental activity," and "that the amount is no more than necessary to cover the reasonable costs of the governmental activity"].) [7]

[7] As we recognized in *Jacks*, *supra*, 3 Cal.5th at page 262 and footnote 5, 219 Cal.Rptr.3d 859, 397 P.3d 210, although Proposition 26 codifies *Sinclair Paint* in significant part, Proposition 26 describes categories of charges imposed for reasonable regulatory costs in a manner that "does not mirror our discussion of such costs in *Sinclair Paint* [citation]." (See Cal. Const., art. XIII C, § 1, subd. (e)(3) [exempting from the definition of tax "[a] charge imposed for the reasonable regulatory costs to a local government for issuing licenses and permits, performing investigations, inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof"].) Here, as in *Jacks*, we have no occasion to address the extent of the difference.

Both the trial court and the Court of Appeal concluded that the groundwater pumping charge was exempt from article XIII C's definition of "tax," but for different reasons. The trial court held that the charge falls within the exception for "[a]ssessments and property-related fees imposed in accordance with the provisions of Article XIII D." (Cal. Const., art. XIII C, § 1, subd. (e)(7).) The Court of Appeal concluded that the charge instead falls into ***1211** the exception for "[a] charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege." ****745** (*Id.*, § 1, subd. (e)(1).) The court reasoned that the charge is imposed on well operators for the privilege of extracting water from underground reserves, akin to a charge for entrance to a state or local park for purposes of conserving the resource, and that each well operator receives a benefit from the District's conservation activities.

The City does not dispute that the pumping charge is imposed for a government "privilege" or "benefit," or, alternatively, for a "government service or product" (which is subject to the same set of requirements as a fee for a government "privilege" or "benefit" under article XIII C, § 1, subd. (e)(1)) (Id., subd. (e)(2)). But the City contends that the pumping charge cannot satisfy the remaining requirements for an exempt charge because the City does not benefit from the District's activities to the same extent as other pumpers, and because Water Code section 75594's three-to-one ratio requires the City and other nonagricultural users to shoulder a disproportionate share of the fiscal burden of supporting the District's activities. The City argues that the charges therefore violate both the requirement that the amount of a nontax charge be "no more than necessary to cover the reasonable costs of the governmental activity," and the requirement that "the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." (Cal. Const., art. XIII C, § 1, subd. (e).)

Although the Court of Appeal declared both requirements satisfied, its analysis addressed only the first. The Court of Appeal mentioned the "fair or reasonable relationship" requirement only in passing, noting that, "by imposing fees based upon the volume of water extracted, the District largely *does* charge individual pumpers in proportion to the benefit they receive from the District's conservation activities." But, the court concluded, "[t]hat is more than is required." What article XIII C does require, the court reasoned, is simply that the District's pumping charges, in the aggregate, do not exceed the reasonable cost of regulating the District's groundwater supply. In support of this conclusion, the Court of Appeal cited our decision in *California Farm Bureau Federation v. State Water Resources Control Bd.* (2011) 51 Cal.4th 421, 438, 121 Cal.Rptr.3d 37, 247 P.3d 112 (*Farm Bureau*), in which we said that for purposes of the *Sinclair Paint* analysis, "[a] regulatory fee does not become a tax simply because the fee may be disproportionate to the service rendered to individual payors. [Citation.] The question of proportionality is not measured on an individual basis. Rather, it is measured collectively, considering all rate

payors." *Farm Bureau* went on to say that, under ***1212** this standard, "permissible fees must be related to the overall cost of the governmental regulation. They need not be finely calibrated to the precise benefit each individual fee payor might derive. What a fee cannot do is exceed the reasonable cost of regulation with the generated surplus used for general revenue collection." (*Ibid.*) [8] So too here, the Court of Appeal held, "[t]he District need only ensure that its charges in the aggregate do not exceed its regulatory costs."

8 Although Proposition 26 had been passed by the time we issued our decision in *Farm Bureau*, we had no occasion to address it. (See *Farm Bureau*, *supra*, 51 Cal.4th at p. 428, fn. 2, 121 Cal.Rptr.3d 37, 247 P.3d 112.)

The City does not challenge the Court of Appeal's reliance on *Farm Bureau* in conducting the "reasonable cost" inquiry under article XIII C. It contends, however, that the court's aggregate cost analysis does not answer the separate question whether "the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." (Cal. Const., art. XIII C, § 1, subd. (e).) We agree.

Sinclair Paint, from which the relevant article XIII C requirements are derived, made clear that the aggregate cost inquiry and the allocation inquiry are two separate steps in the analysis. (*****67** *Sinclair Paint*, *supra*, 15 Cal.4th at p. 878, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* adopted this analytical framework from the Court of Appeal's opinion in *SDG&E*, *supra*, 203 Cal.App.3d 1132, 250 Cal.Rptr. 420 which concerned permitting fees assessed under legislation that authorized "local air pollution control districts ****746** to apportion the costs of their permit programs among all monitored polluters according to a formula based on the amount of emissions they discharged." (*Sinclair Paint*, *supra*, 15 Cal.4th at p. 878, 64 Cal.Rptr.2d 447, 937 P.2d 1350, citing *SDG&E*, *supra*, 203 Cal.App.3d at p. 1135, 250 Cal.Rptr. 420.) The Court of Appeal in that case had concluded the fees were not special taxes for purposes of article XIII A, *both* because "the amount of the regulatory fees was limited to the reasonable costs of each district's program," *and* because "the allocation of costs based on emissions 'fairly relates to the permit holder's burden on the district's programs.' " (*Sinclair Paint*, at p. 878, 64 Cal.Rptr.2d 447, 937 P.2d 1350, quoting *SDG&E*, *supra*, 203 Cal.App.3d at p. 1146, 250 Cal.Rptr. 420.) Applying the same framework in *Sinclair Paint*, we explained that Sinclair, a manufacturer challenging the fees at issue in the case, would have the opportunity to "prove at trial that the amount of fees assessed and paid exceeded the reasonable cost of providing the protective services for which the fees were charged, or that the fees were levied for unrelated revenue purposes. [Citation.] *Additionally*, Sinclair will have the opportunity to try to show that no clear nexus exists between its products and childhood lead poisoning, or that the amount of the fees bore no reasonable ***1213** relationship to the social or economic 'burdens' its operations generated. [Citations.]" (*Sinclair Paint*, at p. 881, 64 Cal.Rptr.2d 447, 937 P.2d 1350, italics added; see also *id.* at p. 876, 64 Cal.Rptr.2d 447, 937 P.2d 1350.)

Our decision in *Farm Bureau*, on which the Court of Appeal in this case relied, did not alter this framework. (*Farm Bureau*, *supra*, 51 Cal.4th at pp. 436–437, 441, 121 Cal.Rptr.3d 37, 247 P.3d 112.) In *Farm Bureau*, we considered and rejected a facial challenge to a statutory user fee on certain water rights holders for purposes of supporting the State Water Resources Control Board's Division of Water Rights Division. We explained that the statutory scheme did not authorize fees for general revenue purposes, but for purposes of funding activities performed by the Water Rights Division. (*Id.* at pp. 439–440, 121 Cal.Rptr.3d 37, 247 P.3d 112.) It was in the course of this discussion that we observed that "[t]he question of proportionality is not measured on an individual basis," but is instead "measured collectively." (*Id.* at p. 438, 121 Cal.Rptr.3d 37, 247 P.3d 112.) In a separate section of the opinion, we addressed the plaintiffs' argument that the statute was unconstitutional as applied because the fee schedule established by regulation meant that, as a practical matter, 40 percent of water rights holders would be responsible for funding 100 percent of governmental activities that benefit all water rights holders and the general public. The plaintiffs argued that, for this reason, the fees were "disproportionate to the benefit derived by the fee payors or the burden they place on the regulatory system." (*Id.* at p. 440, 121 Cal.Rptr.3d 37, 247 P.3d 112.) We remanded for further consideration of that question, instructing the trial court on remand to "determine whether the statutory scheme and its implementing regulations provide a fair, reasonable, and substantially proportionate assessment of all costs related to the regulation of affected payors." (*Id.* at p. 442, 121 Cal.Rptr.3d 37, 247 P.3d 112.) This is, in essence, the same question that the Court of Appeal in this case missed.

To be sure, pre-Proposition 26 case law made clear that, "[i]n pursuing a constitutionally and statutorily mandated

conservation program, cost allocations for services provided are to be judged by a standard of reasonableness with some flexibility permitted to account for system-wide complexity." (*Brydon v. East Bay Mun. Utility Dist.* (1994) 24 Cal.App.4th 178, 193, 29 Cal.Rptr.2d 128.) Article XIII A, the cases held, "does not apply to every regulatory fee simply because, as applied to one or another of the payor class, the fee is disproportionate to the service rendered." (*Id.* at p. 194, 29 Cal.Rptr.2d 128.) Courts thus held that an agency could, for example, charge a flat filing fee to defray the costs of agency environmental review, even though review of some documents undoubtedly required a greater expenditure of agency resources than others. (*****68** *California Assn. of Prof. Scientists v. Department of Fish & Game* (2000) 79 Cal.App.4th 935, 953, 94 Cal.Rptr.2d 535.) But the case law did not suggest that the constitutionality of a fee for a government service, for example, depended solely on whether the fees collected, in the ****747** aggregate, exceeded the aggregate amount necessary to provide the service to ***1214** affected payors. (See *id.* at p. 950, 94 Cal.Rptr.2d 535 [distinguishing regulatory fees from "other types of user fees" that are "easily correlated to a specific, ascertainable cost"].) Nor did the cases suggest that the constitutional framework was otherwise indifferent to allegations that a government agency lacked any reasonable basis for charging a higher fee to some payors than others. (See *id.* at p. 955, 94 Cal.Rptr.2d 535 [upholding higher fees for filing certain environmental review documents as having "sufficient reasonable basis"].)

[8] In any event, regardless of the backdrop against which Proposition 26 was passed, it is clear from the text itself that voters intended to adopt two separate requirements: To qualify as a nontax "fee" under article XIII C, as amended, a charge must satisfy *both* the requirement that it be fixed in an amount that is "no more than necessary to cover the reasonable costs of the governmental activity," *and* the requirement that "the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." (Cal. Const., art. XIII C, § 1, subd. (e).) We must presume the Legislature intended each requirement to have independent effect. (*Dix v. Superior Court* (1991) 53 Cal.3d 442, 459, 279 Cal.Rptr. 834, 807 P.2d 1063.)

As noted, the Court of Appeal did mention the reasonable-relationship requirement, if only to observe that the District's volume-based charges mean that the District "largely *does* charge individual pumpers in proportion to the benefit they receive from the District's conservation activities." But this observation misses the entire basis of the City's argument: namely, that the City does not receive the same benefit from the District's conservation activities as other pumpers, and that it is required to bear a disproportionate share of the fiscal burden by virtue of Water Code section 75594's three-to-one ratio. We thus remand the case to the Court of Appeal with instructions to consider whether the record sufficiently establishes that the District's rates for the 2011–2012 and the 2012–2013 water years bore a reasonable relationship to the burdens on or the benefits of its conservation activities, as article XIII C requires. In making this determination, the Court of Appeal may consider whether the parties should be afforded the opportunity to supplement the administrative record with evidence bearing on this question. [9]

9 The question whether the District's rates for the 2011–2012 and the 2012–2013 water years be justified under article XIII C is a separate question from whether the three-to-one ratio in Water Code section 75594 is facially unconstitutional under article XIII C, as the City contends. Because the specific question before us concerns the justification for the challenged rates that were imposed without voter approval, we do not reach the latter issue; the parties and interested amici are free to argue the point on remand.

***1215 IV.**

The judgment of the Court of Appeal is affirmed in part and reversed in part, and the case remanded for further proceedings consistent with this opinion.

Cantil–Sakauye, C. J.

Chin, J.

Corrigan, J.

*****69** Cuéllar, J.

Irion, J. [*], concurred.

* Associate Justice of the Court of Appeal, Fourth Appellate District, Division One, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

Liu, J.

I join today's opinion. But I would provide an explicit answer to a question addressed only implicitly by the court. One of the issues on which we granted review was whether Water Code section 75594's requirement for at least a three-to-one ratio of fees on nonagricultural use of groundwater to such fees on agricultural use survives the adoption of articles XIII C and XIII D. The answer, which is apparent from today's opinion, is that the requirement does not survive. There may be ****748** circumstances in which the three-to-one ratio is justified, but the justification will not have anything to do with Water Code section 75594. Instead, the justification will be that the fees imposed on ratepayers bear "a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." (Cal. Const., art. XIII C, § 1, subd. (e); maj. opn., *ante*, 226 Cal.Rptr.3d at p.68, 406 P.3d at p. 747.)

The petition of appellant City of San Buenaventura for a rehearing was denied February 21, 2018, and the opinion was modified to read as printed above.

All Citations

3 Cal.5th 1191, 406 P.3d 733, 226 Cal.Rptr.3d 51, 17 Cal. Daily Op. Serv. 11,444, 2017 Daily Journal D.A.R. 11,454

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18 Cal.App.3d 404, 95 Cal.Rptr. 852

DOUGLAS H. FREEMAN et al., Plaintiffs and Appellants,
v.
CONTRA COSTA COUNTY WATER DISTRICT, Defendant and Respondent

Civ. No. 28717.
Court of Appeal, First District, Division 4, California.
June 24, 1971.

SUMMARY

Homeowners with wells on their property challenged the validity of a regulation of their county water district requiring that unless they installed on their water meter boxes, at their own expense ($35, plus 25 cents per month maintenance) a double check valve assembly to prevent water from their auxiliary supply from backing up into, and contaminating, the public water system, their public water service would be terminated. Judgment was entered for the district. (Superior Court of Contra Costa County, No. 113193, S. C. Masterson, Judge.)

The Court of Appeal affirmed. Pointing out that the prevention of water pollution is a proper exercise of the police power to which the eminent domain guaranty of compensation is inapplicable, the court held that the district regulation was justified by the potential hazard of cross- connections, accidental or otherwise, between the homeowners' well systems and the public water supply, and that there was no necessity to wait until contamination had actually occurred. Furthermore, the regulation was statutorily authorized and was not void for vagueness. Other contentions by plaintiffs were held to be without merit. (Opinion by Christian, J., with Devine, P.J., and Rattigan, J., concurring.)

HEADNOTES

Classified to California Digest of Official Reports

(1a, 1b)
Constitutional Law § 97--Police Power--Right to Damages.
The constitutional guaranty of just compensation that attaches to an exercise of the power of eminent domain does not extend to the state's exercise of its police power, and injury resulting from a proper exercise ***405** of the police power is *damnum absque injuria*. Thus, the eminent domain guaranty was inapplicable to the requirement by a water district that homeowners with wells on their property should install at their own expense, if they chose to make use of the public water supply, a $35 double check valve assembly on their public water meter box to prevent auxiliary water from backing up into, and contaminating, the public system, and it was immaterial that the general public, and not the homeowners, would receive the benefit of the protective device.

[See **Cal.Jur.2d, Rev.,** Eminent Domain, § 3; **Am.Jur.2d,** Constitutional Law, §§ 264, 301.]

(2)
Constitutional Law § 107--Police Power--Legislative Discretion and Court Review.
A governmental regulation will be upheld as a valid exercise of the police power if it is reasonably necessary to protect the order, safety, health, morals, and general welfare of society.

(3)
Administrative Law § 144--Judicial Review and Control--Burden of Proof.
A governmental regulation is presumed to be valid; therefore, one who challenges its validity has the burden of proving unreasonableness.

(4)
Waters § 278--Interference of Third Parties--Pollution--Police Power.
Prevention of water pollution is a legitimate governmental objective in furtherance of which the police power may be exercised.

(5)
Waters § 285(1)--Pollution--Remedies:Constitutional Law § 104--Police Power--Preventing Contamination to Water Supply.
The state need not wait until the public safety has actually suffered injury, and may take reasonable steps to protect a public water supply from potential cross-connections that may create a substantial hazard of contamination. Thus, in the case of homeowners with wells on their property, the potential hazard from cross-connections, accidental or otherwise, between their well-water and their public water supply justified the water district's requirement that the

homeowners install, at their own expense, a device on their water meter box to eliminate the hazard, despite their claims that no such cross-connections presently existed.

(6)
Waters § 483--Districts--Validity of Acts--Anti-contamination Regulation.
A regulation requiring that a protective device be installed on any premises receiving water from the public water system and ***406** containing an auxiliary water supply regardless of whether the auxiliary water supply were connected to the public water system was not unconstitutionally vague as leaving the determination of what constitutes an "auxiliary water supply" to the water district's unfettered discretion, where a state regulation defined "auxiliary water supply" as "any water supply on or available to the premises other than the public water supply."

(7)
Waters § 483--Districts--Validity of Acts--Anti-contamination Regulation.
The requirement by a water district that homeowners with wells on their property should install, at their own expense, a protective device on their public water meter box to prevent auxiliary water from backing up into, and contaminating, the public water supply, was statutorily authorized, not only under Wat. Code, § 31024, authorizing a water district to establish regulations for the distribution and use of water, but also under a combination of Wat. Code, § 30060, providing that County Water District Law does not modify any other law relating to water, and Health & Saf. Code, §§ 203, 208, authorizing regulations that included the requirement that the responsibility for installing the protective device be placed on the water user.

(8)
Administrative Law § 43--Validity of Administrative Action:Waters § 480--Districts--Due Process.
Due process does not require that new notice and hearing be given in each individual case before an agency can enforce a valid statute or regulation. Thus, homeowners with wells on their property were not required to be given notice and a hearing before their water district could demand either that their water service be discontinued or that they install, at their own expense, a device on their water meter boxes to prevent water from their well systems from backing up into, and contaminating, the public water supply, where, in making the demand, the district was merely enforcing a lawful state regulation.

COUNSEL
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Bold & Polisner and Jeffrey D. Polisner for Defendant and Respondent.
Evelle J. Younger, Attorney General, Sanford N. Gruskin, Assistant Attorney General, Roderick Walston and Charlton G. Holland, Deputy Attorneys General, as Amici Curiae on behalf of Defendant and Respondent. ***407**

CHRISTIAN, J.

Appellants are the owners of residences in the City of Concord served by the water system of respondent Contra Costa County Water District. Each of the appellants maintains on his property a well from which water is drawn for such purposes as gardening and car-washing. Although appellants had not connected their well water systems to the pipes of the district's public system, the district threatens to terminate service until the affected householders agree to have installed, at their own expense, a "double check valve assembly," designed to prevent water from the auxiliary supply from "backing up" into and contaminating the public water supply. Appellants sought from the court protection against the district's threat; judgment was for the district, and the present appeal followed. We affirm the judgment.

The record shows without contradiction that contamination of a water system can occur if there is a physical connection between the public system and auxiliary water supply, such as where the two systems are connected by pipes, or where the auxiliary water is "impounded" (e.g., in a swimming pool or fish pond) and an ordinary garden hose from the public water supply is allowed to lie in water from the auxiliary system. In the latter situation a temporary loss of pressure can result in contaminated water being drawn into the public system.

Protection against this risk can be provided by installing in the consumer's water meter box a device which prevents a backward flow of water. The directors of respondent district have established an installation charge of $35, and a $.25 per month maintenance charge, for such devices, based on the cost thereof to the district. Appellants receive no special benefit from the device other than that which they receive as members of the general public.

It will be useful to outline the statutory framework under which respondent is requiring the installation of the back

flow prevention device. Health and Safety Code section 203 provides that the State Department of Public Health "shall examine and may prevent the pollution of sources of public domestic water ... supply." The department may "adopt and enforce rules and regulations" for this purpose. (Health & Saf. Code, § 208.) Pursuant to these statutes, the department adopted administrative regulations designed to prevent contamination or pollution of any public water supply as a result of "actual *or* potential cross-connections" with auxiliary water supplies. (Cal.Admin.Code, tit. 17, § 7583, italics added.) An auxiliary water supply is defined as "any water supply on or available to the premises other than the public water supply." (***408** Cal.Admin.Code, tit. 17, § 7590.) A protective device is required to be installed on any premises receiving water from the public water system and containing an auxiliary water supply, regardless of whether the auxiliary water supply is connected to the public water system. (Cal.Admin.Code, tit. 17, § 7603.) The regulations specify various types of protective devices, depending on the "degree of hazard" involved; where the auxiliary and public water supplies are not connected, the protective device required is a "double check valve assembly," which is what respondent desires appellants to install. (Cal.Admin.Code, tit. 17, § 7604, subd. 1.) Responsibility for installing the protective device is placed on the water user. (Cal.Admin.Code, tit. 17, § 7603.) Pursuant to the foregoing state regulations, respondent adopted its own regulations providing for discontinuance of water service to any consumer who failed to install the required device.

(1a) Appellants contend that the requirement that they install a protective device constitutes a taking of property which must be compensated. They argue that they have the right to take water from their wells and that respondent's demand infringes on their right to use their property as they wish. This contention confuses an exercise of the police power with an exercise of the power of eminent domain; "the constitutional guarantee of just compensation attached to an exercise of the power of eminent domain does not extend to the state's exercise of its police power, and damage resulting from a proper exercise of the police power is simply *damnum absque injuria*" (*Lees v. Bay Area Air, etc. Control Dist.* (1965) 238 Cal.App.2d 850, 856 [48 Cal.Rptr. 295]; see also *Goldblatt* v. *Town of Hempstead* (1962) 369 U.S. 590, 593 [8 L.Ed.2d 130, 133, 82 S.Ct. 987]; *Beverly Oil Co.* v. *City of Los Angeles* (1953) 40 Cal.2d 552, 557 [254 P.2d 865]). (2) A governmental regulation will be upheld as a valid exercise of the police power if it is reasonably necessary to "protect the order, safety, health, morals and general welfare of society." (*Lees v. Bay Area Air, etc. Control Dist., supra*, at p. 857, citing *In re Rameriz* (1924) 193 Cal. 633, 649, 650 [226 P. 914, 34 A.L.R. 51].) (3) A regulation is presumed to be valid; therefore, appellants have the burden of proving unreasonableness. (*Goldblatt v. Town of Hempstead, supra*, at p. 596 [8 L.Ed.2d at p. 135].) (4) It cannot be denied that prevention of water pollution is a legitimate governmental objective, in furtherance of which the police power may be exercised. (5) Appellants argue, however, that it is unreasonable to require them to install a protective device when their water well is not connected to the domestic water supply. Therefore, it is argued, there is no possibility of contamination and the danger that respondent seeks to protect is "imagined and speculative." But the state need not wait until the public safety has actually suffered injury; it may take reasonable steps to protect a public water supply from potential cross-connections ***409** that may create a substantial hazard of contamination. Otherwise respondent, or the Department of Public Health, would have the burdensome job of continuous inspection of all premises which possessed auxiliary water supplies to insure that no cross-connections had been made, accidently or otherwise. It is not unreasonable or oppressive to require appellants to install a $35 device to protect against a potential danger of water contamination.

(1b) Appellants also argue that it is unreasonable to require them to pay for the cost of installation and maintenance as their property receives no special benefit from the prevention device. It is argued that, since the device is for the benefit of the public, the public should pay for it. A similar contention was made in *Atchison, Topeka & S. F. R. Co. v. Public Util. Com.* (1953) 346 U.S. 346 [98 L.Ed. 51, 74 S.Ct. 92]. In that case the California Public Utilities Commission had ordered improvement of railroad underpasses to promote public safety and had assessed half the cost of the improvements to the railroads. The railroads argued that, since they would receive little or no benefit from the construction, the allocation of costs constituted a taking of their property without due process of law. In rejecting this contention, the United States Supreme Court stated, "The railroad tracks are in the streets not as a matter of right but by permission from the State or its subdivisions. The presence of these tracks in the streets creates the burden of constructing grade separations in the interest of public safety and convenience. Having brought about the problem, the railroads are in no position to complain because their share in the cost of alleviating it is not based solely on the special benefits accruing to them from the improvements." (346 U.S. at p. 353 [98 L.Ed. at p. 60].)

Similarly appellants, by maintaining water wells on their premises, have created the potential hazard which requires special measures of protection; they have no reasonable grounds for complaint at being required to pay the cost of such protection. Appellants are not being forced to subscribe to respondent's water service; they have the option of relying solely on their water well for their water needs. While they are entitled to use both the public water supply and their own water well, they have no right to do so in a manner which may endanger the public water supply.

(6) Appellants next contend that the term "auxiliary water supply" used in the regulation is unconstitutionally vague, as it leaves the determination of what constitutes an auxiliary water supply to respondent's unfettered discretion. Title 17, section 7590, of the California Administrative Code defines "auxiliary water supply" as "any water supply on or available to the premises other than the public water supply." This definition is not so vague and ambiguous as to be unenforceable. ***410**

(7) Appellants argue that the district is without statutory authority to charge them for installation and maintenance of the protective device, as the County Water District Law (Wat. Code, § 30000 et seq.) provides the sole means by which respondent may finance public improvements. Respondent has not attempted to raise funds for installation of protective devices by any of the methods specified in the County Water District Act. (See Wat. Code, §§ 31501, 31502, 31503.) But section 31024 authorizes a water district to "establish rules and regulations for the sale, distribution, and use of water ..." The protective device is not a public improvement but a condition for appellants' use of the public water supply, a condition which respondent is authorized to impose under section 31024. Moreover, Water Code section 30060 provides that the County Water District Law shall not "be so construed as repealing or in anywise modifying any other law relating to water or the supply of water ...." The Department of Public Health regulations, authorized under Health and Safety Code sections 203 and 208, require that responsibility for installing the protective device be placed on the water user. Therefore the statutes do authorize respondent to require appellants to pay for the cost of installing and inspecting the protective device.

(8) Appellants contend that due process entitled them to notice and a hearing before respondent could demand that they either install the device or have their water service discontinued. But respondent was merely enforcing a lawful state regulation in making the demand. State law requires that before the regulations could be adopted there must be notice and a hearing at which any interested person could appear to oppose the proposed regulations. (Gov. Code, § 11420 et seq.) There is no requirement that a new notice and hearing be given in each individual case before an agency can enforce a valid statute or regulation.

The judgment is affirmed.

Devine, P. J., and Rattigan, J., concurred. ***411**

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Distinguished by Howard Jarvis Taxpayers Assn. v. Bay Area Toll Authority, Cal.App. 1 Dist., June 29, 2020

213 Cal.App.4th 1310
Court of Appeal, Second District, Division 3, California.

Lee SCHMEER et al., Plaintiffs and Appellants,
v.
COUNTY OF LOS ANGELES et al., Defendants and Respondents.

B240592
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Filed February 21, 2013
|
As Modified March 11, 2013
|
Review Denied May 15, 2013 *

* Kennard and Corrigan, JJ., are of the opinion the petition should be granted.

Synopsis
Background: Petitioners filed combined petition for writ of mandate and complaint challenging county ordinance prohibiting retail stores from providing plastic carryout bags and requiring stores to charge customers 10 cents for each paper carryout bag provided. The Superior Court, Los Angeles County, No. BC470705, James C. Chalfant, J., denied relief, and petitioners appealed.

[Holding:] The Court of Appeal, Croskey, Acting P.J. held that paper bag carryout charge was not a "tax" which required voter approval.

Affirmed.

Procedural Posture(s): On Appeal; Judgment; Petition for Writ of Mandate.

West Headnotes (10)

[1] **Constitutional Law** Amendments in general

The court construes provisions added to the state Constitution by a voter initiative by applying the same principles governing the construction of a statute.

[2] **Constitutional Law** Intent in general

When construing provisions added to the state Constitution by a voter initiative, the court's task is to ascertain the intent of the electorate so as to effectuate the purpose of the law.

1 Case that cites this headnote

[3] **Constitutional Law** Intent in general

When construing provisions added to the state Constitution by a voter initiative, the court first examines the language of the initiative, as the best indicator of the voters' intent.

6 Cases that cite this headnote

[4] **Constitutional Law** Plain, ordinary, or common meaning

When construing provisions added to the state Constitution by a voter initiative, the court gives the words of the initiative their ordinary and usual meaning and construes them in the context of the entire scheme of law of which the initiative is a part, so that the whole may be harmonized and given effect.

1 Case that cites this headnote

[5] **Constitutional Law** Existence of ambiguity

Constitutional Law Extrinsic aids to construction in general

If the language of a provisions added to the state Constitution by a voter initiative is unambiguous and a literal construction would not result in

absurd consequences, the court presumes that the voters intended the meaning on the face of the initiative and the plain meaning governs; if the language is ambiguous, the court may consider the analyses and arguments contained in the official ballot pamphlet as extrinsic evidence of the voters' intent and understanding of the initiative.

7 Cases that cite this headnote

[6] **Appeal and Error** Statutory or legislative law

The construction of statute or an initiative, including the resolution of any ambiguity, is a question of law reviewed de novo.

5 Cases that cite this headnote

[7] **Taxation** Distinguishing "tax" and "license" or "fee"

Charge of $0.10 imposed by county ordinance on retail establishments for each carryout paper bag provided was not a "tax" within meaning of state constitution provision prohibiting any new general or special tax imposed by local government without prior approval by the voters; charge was not remitted to the county, but rather was payable to and retained by the retail store providing the bag, and the store was required to use the funds for specified purposes. Cal. Const. art. 13 C, § 1.

11 Cases that cite this headnote

[8] **Taxation** Nature of taxes

The term "tax" in ordinary usage refers to a compulsory payment made to the government or remitted to the government.

4 Cases that cite this headnote

[9] **Taxation** Nature of taxes

Taxes ordinarily are imposed to raise revenue for the government, although taxes may be imposed for nonrevenue purposes as well.

8 Cases that cite this headnote

[10] **Municipal, County, and Local Government** Submission to popular vote

Language "any levy, charge, or exaction of any kind imposed by a local government" in state constitution provision defining a "tax," for purposes of prohibition against new taxes without prior voter approval, is limited to charges payable to, or for the benefit of, a local government. Cal. Const. art. 13 C, § 1.

See 9 Witkin, Summary of Cal. Law (10th ed. 2005) Taxation, § 136.

18 Cases that cite this headnote

****353** APPEAL from a judgment of the Superior Court of Los Angeles County,James C. Chalfant, Judge. Affirmed. (Los Angeles County Super. Ct. No. BC470705)

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Opinion

CROSKEY, Acting P.J.

***1313** A Los Angeles County ordinance prohibits retail stores from providing plastic carryout bags and requires stores to charge customers 10 cents for each paper carryout bag provided. Lee Schmeer and others (Petitioners) filed a combined petition for writ of mandate and complaint challenging the ordinance. Petitioners contend the ordinance violates article XIII C of the California Constitution, as amended by Proposition 26, because the 10–cent charge is a tax and was not approved by county voters. We conclude that the paper carryout bag charge is not a tax for purposes of article XIII C because the charge is payable to and retained by ***1314** the retail store and is not remitted to the county. We therefore will affirm the judgment in favor of the county and other respondents.

FACTUAL AND PROCEDURAL BACKGROUND

1. *Factual Background*

The Los Angeles County Board of Supervisors enacted ordinance No. 2010–0059 on November 23, 2010. The ordinance prohibits retail stores within unincorporated areas of Los Angeles County from providing plastic carryout bags to customers. The ordinance states that retail stores may provide, for the purpose of carrying goods away from the store, only recyclable paper carryout bags or reusable carryout bags meeting certain requirements (including plastic bags satisfying those requirements). The ordinance also states that retail stores must provide reusable bags to customers, either for sale or free of charge, and encourages retail stores to educate their employees to promote reusable bags and post signs encouraging customers to use reusable bags.

The ordinance further states that retail stores must charge the customer 10 cents for each recyclable paper carryout bag provided and must indicate on the receipt the number of recyclable paper carryout bags provided and the total amount charged for the bags. It states that customers participating in the California Supplemental Food Program for Women, Infants, and Children (Health & Saf.Code, § 123275) or the Supplemental Food Program (Welf. & Inst.Code, § 15500 et seq.) are exempt from the charge and must be provided free of charge either reusable bags or recyclable paper carryout bags. The ordinance states that the money received for recyclable paper bags must be retained by the store and used only for (1) the costs of compliance with the ordinance; ****355** (2) the actual costs of providing recyclable paper bags; or (3) the costs of educational materials or other costs of promoting the use of reusable bags, if any.

The ordinance includes a severability provision stating: "If any section, subsection, sentence, clause, or phrase of this ordinance is for any reason held to be invalid by a decision of any court of competent jurisdiction, that decision will not affect the validity of the remaining portions of the ordinance. The Board of Supervisors hereby declares that it would have passed this ordinance and each and every section, subsection, sentence, clause, or phrase not declared invalid or unconstitutional without regard to whether any portion of this ordinance would be subsequently declared invalid."

The ordinance became effective on July 1, 2011. The ordinance was not submitted to the county electorate for its approval.

***1315** 2. *Trial Court Proceedings*

Lee Schmeer, Salim Bana, Jeff Wheeler, Chris Wheeler and Hilex Poly Co. LLC (Hilex) filed a combined petition for writ of mandate and complaint in October 2011 against the County of Los Angeles and three county officials. Petitioners allege that the individual petitioners are California taxpayers who have been required to pay the paper carryout bag charge and that Hilex is a manufacturer of plastic bags prohibited by the ordinance.

Petitioners allege that the paper carryout bag charge required under the ordinance is a "tax" as defined in article XIII C of the California Constitution, as amended by Proposition 26. They allege that the charge was imposed by the county in violation of section 2 of article XIII C, which prohibits any new general or special tax imposed by local government without prior approval by the voters. Petitioners allege counts for (1) a writ of mandate to prevent the county from implementing and enforcing the ordinance and (2) a judicial declaration that the paper carryout bag charge violates article XIII C.

The trial court conducted a hearing on the merits of the petition for writ of mandate in March 2012. The court adopted its written tentative decision denying the petition as its final ruling. The court concluded that the paper carryout bag charge is not a general or special tax because the money is retained by the retail stores and is not remitted to the county. The court also concluded that even if the charge fell within the general

definition of a tax under Proposition 26, the charge would satisfy an exception to that definition for "[a] charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege" (Cal. Const., art. XIII C, § 1(e)(1)). The court stated that the county, through retail stores, conferred the benefit of a paper carryout bag only on customers paying the charge, satisfying the first prong of the exception. The court stated that Petitioners waived the argument that the charge did not satisfy the second prong of the exception by failing to assert that argument in their opening brief on the petition. The court stated further that, in any event, substantial evidence shows that the money received by the stores for recyclable paper bags will be used for the purposes required under the ordinance. The court therefore concluded that Petitioners were not entitled to a writ of mandate.

Petitioners' counsel acknowledged that the trial court's ruling on the petition for writ of mandate effectively adjudicated the count for declaratory relief as well. The court entered a judgment in April 2012 denying Petitioners any relief on their ****356** combined petition for writ of mandate and complaint. Petitioners timely appealed the judgment.

**1316 CONTENTIONS*

Petitioners contend (1) the paper carryout bag charge is a special tax imposed by the county without the voters' prior approval and therefore violates article XIII C of the California Constitution; (2) the charge does not satisfy the exception for a charge imposed for a specific benefit conferred or privilege granted, or any other exception under article XIII C; and (3) the challenged provisions of the ordinance are not severable, so the entire ordinance must be invalidated, including the ban on single–use plastic bags.

DISCUSSION

1. *Standard of Review*

The trial court's ruling turned on its construction of article XIII C of the California Constitution, as amended by Proposition 26, and its determination that the amount charged did not exceed the reasonable costs. We review the ruling de novo to the extent that the court decided questions of law concerning the construction of constitutional provisions and not turning on any disputed facts. (*Professional Engineers in California Government v. Kempton* (2007) 40 Cal.4th 1016, 1032, 56 Cal.Rptr.3d 814, 155 P.3d 226 (*Professional Engineers*).) We review the court's factual findings under the substantial evidence standard. (*Ibid.*)

2. *Construction of a Voter Initiative*

[1] **[2]** **[3]** **[4]** We construe provisions added to the state Constitution by a voter initiative by applying the same principles governing the construction of a statute. (*Professional Engineers, supra,* 40 Cal.4th at p. 1037, 56 Cal.Rptr.3d 814, 155 P.3d 226.) Our task is to ascertain the intent of the electorate so as to effectuate the purpose of the law. (*Robert L. v. Superior Court* (2003) 30 Cal.4th 894, 901, 135 Cal.Rptr.2d 30, 69 P.3d 951.) We first examine the language of the initiative as the best indicator of the voters' intent. (*Kwikset Corp. v. Superior Court* (2011) 51 Cal.4th 310, 321, 120 Cal.Rptr.3d 741, 246 P.3d 877.) We give the words of the initiative their ordinary and usual meaning and construe them in the context of the entire scheme of law of which the initiative is a part, so that the whole may be harmonized and given effect. (*Professional Engineers, supra,* at p. 1037, 56 Cal.Rptr.3d 814, 155 P.3d 226; *State Farm Mutual Automobile Ins. Co. v. Garamendi* (2004) 32 Cal.4th 1029, 1043, 12 Cal.Rptr.3d 343, 88 P.3d 71.)

[5] If the language is unambiguous and a literal construction would not result in absurd consequences, we presume that the voters intended the meaning on the face of the initiative and the plain meaning governs. (*Professional Engineers, supra,* 40 Cal.4th at p. 1037, 56 Cal.Rptr.3d 814, 155 P.3d 226; ***1317** *Coalition of Concerned Communities, Inc. v. City of Los Angeles* (2004) 34 Cal.4th 733, 737, 21 Cal.Rptr.3d 676, 101 P.3d 563.) If the language is ambiguous, we may consider the analyses and arguments contained in the official ballot pamphlet as extrinsic evidence of the voters' intent and understanding of the initiative. (*Professional Engineers, supra,* at p. 1037, 56 Cal.Rptr.3d 814, 155 P.3d 226.)

[6] The construction of statute or an initiative, including the resolution of any ambiguity, is a question of law that we review de novo. (*Bruns v. E–Commerce Exchange, Inc.* (2011) 51 Cal.4th 717, 724, 122 Cal.Rptr.3d 331, 248 P.3d 1185.)

3. *Historical Foundations of Proposition 26*

a. *Proposition 13*

California voters adopted Proposition 13 in June 1978, adding ****357** article XIII A to the California Constitution. Proposition 13 "impos[ed] important limitations upon the assessment and taxing powers of state and local governments." (*Amador Valley Joint Union High Sch. Dist. v. State Bd. of Equalization* (1978) 22 Cal.3d 208, 218, 149 Cal.Rptr. 239, 583 P.2d 1281 (*Amador Valley*).) Proposition 13 generally (1) limited the rate of any ad valorem tax on real property to 1 percent; (2) limited increases in the assessed value of real property to 2 percent annually absent a change in ownership; (3) required that " 'any changes in State taxes enacted for the purpose of increasing revenues collected pursuant thereto whether by increased rates or changes in methods of computation' " must be approved by two-thirds of the Legislature; and (4) required that special taxes imposed by cities, counties and special districts must be approved by a two-thirds vote of the electors. (*Amador Valley, supra,* at p. 220, 149 Cal.Rptr. 239, 583 P.2d 1281, quoting former art. XIII A, § 3 as added by Prop. 13.)

The California Supreme Court in *Amador Valley, supra,* 22 Cal.3d at page 231, 149 Cal.Rptr. 239, 583 P.2d 1281 , stated that the various elements of Proposition 13 formed "an interlocking 'package' " with the purpose of providing effective real property tax relief. *Amador Valley* rejected several constitutional challenges to the initiative. Local governments, however, soon found ways to generate additional revenue without a two-thirds vote of the electors despite Proposition 13. Some of those efforts were approved by the courts.

The California Supreme Court in *Los Angeles County Transportation Com. v. Richmond* (1982) 31 Cal.3d 197, 208, 182 Cal.Rptr. 324, 643 P.2d 941 (*Richmond*), held that a sales tax imposed by the Los Angeles County Transportation Commission and approved by a majority, but less than two-thirds, of county voters was validly adopted. The state Legislature, before the ***1318** passage of Proposition 13, had authorized the local commission to adopt a sales tax to fund public transit projects. Writing for a plurality of three justices, Justice Mosk stated that the term "special districts" in section 4 of article XIII A of the California Constitution was ambiguous. (*Richmond, supra,* at p. 201, 182 Cal.Rptr. 324, 643 P.2d 941 (plur. opn. of Mosk, J.).) Justice Mosk stated that the requirement of a two-thirds vote imposed by the state's voters on local voters was "fundamentally undemocratic" and that the language of section 4 therefore must be strictly construed in favor of allowing local voters to approve special taxes by a majority vote rather than a two-thirds vote. (*Richmond, supra,* at p. 205, 182 Cal.Rptr. 324, 643 P.2d 941 (plur. opn. of Mosk, J.).) Noting that section 4 expressly prohibited cities, counties and special districts from imposing ad valorem taxes on real property or transaction or sales taxes on the sale of real property even with a two-thirds vote, and citing language in the ballot pamphlet, the plurality held that "special districts" under section 4 must be limited to special districts authorized to levy taxes on real property. (*Richmond, supra,* at p. 205, 182 Cal.Rptr. 324, 643 P.2d 941 (plur. opn. of Mosk, J.).) Two justices concurred in the judgment and also concluded that the term "special districts" was limited to special districts authorized to levy taxes on real property. (*Richmond, supra,* at p. 209, 182 Cal.Rptr. 324, 643 P.2d 941 (conc. opn. of Kaus, J.).)

Justice Richardson stated in a dissent that the sales tax imposed by the local commission served as a convenient substitute for an increase in real property taxes. (*Richmond, supra,* 31 Cal.3d at pp. 212–213, 182 Cal.Rptr. 324, 643 P.2d 941 (dis. opn. of Richardson, J.).) The dissent stated that under the holding by the majority, the creation of districts without real property ****358** taxing authority provided a means by which local government could readily avoid the restrictions of Proposition 13. (*Id.* at p. 213, 182 Cal.Rptr. 324, 643 P.2d 941.) The dissent concluded that just as the county would be prohibited from imposing the new tax without a two-thirds vote of its voters, the local commission as the county's surrogate should be prohibited from imposing the new tax without the required voter approval. (*Id.* at p. 215, 182 Cal.Rptr. 324, 643 P.2d 941.)

City and County of San Francisco v. Farrell (1982) 32 Cal.3d 47, 184 Cal.Rptr. 713, 648 P.2d 935 held that a payroll and gross receipts tax imposed on businesses operating within the City and County of San Francisco, but not approved by a two-thirds vote of the voters, was valid. *Farrell* concluded that the requirement in section 4 of article XIII A of the California Constitution that "special taxes" imposed by cities, counties and special districts must be approved by a two-thirds vote of the electors applied only to taxes levied for a specific purpose and did not apply to taxes paid into the general fund to be used for general governmental purposes. (*Farrell, supra,* at p. 57, 184 Cal.Rptr. 713, 648 P.2d 935.)

Rider v. County of San Diego (1991) 1 Cal.4th 1, 2 Cal.Rptr.2d 490, 820 P.2d 1000 found invalid a sales tax imposed

by the County of San Diego ***1319** for the purpose of financing the construction and operation of criminal detention and courthouse facilities. The tax was enacted without the approval of two-thirds of the voters.[1] Distinguishing *Richmond, supra,* 31 Cal.3d 197, 182 Cal.Rptr. 324, 643 P.2d 941, the *Rider* court held that a local agency that the trial court found was created solely for the purpose of circumventing Proposition 13's two-thirds voter approval requirement was a "special district" (Cal. Const., art. XIII A, § 4) despite its lack of authority to levy taxes on real property. (*Rider, supra,* at pp. 8, 10, 2 Cal.Rptr.2d 490, 820 P.2d 1000.) *Rider* stated, "To hold otherwise clearly would create a wide loophole in Proposition 13 as feared by the dissent in *Richmond*." (*Id.* at p. 10, 2 Cal.Rptr.2d 490, 820 P.2d 1000.) *Rider* noted a proliferation of governmental entities lacking the power to levy real property taxes raising revenues through sales taxes without the approval of two-thirds of the voters following *Richmond, supra,* 31 Cal.3d 197, 182 Cal.Rptr. 324, 643 P.2d 941. (*Rider, supra,* at p. 10, 2 Cal.Rptr.2d 490, 820 P.2d 1000.) *Rider* stated that the framers of Proposition 13 and the voters who adopted it could not have "intended to adopt a definition [of 'special districts'] that could so readily permit circumvention of section 4." (*Rider, supra,* at p. 11, 2 Cal.Rptr.2d 490, 820 P.2d 1000.) *Rider* held that the term "special district" includes "any local taxing agency created to raise funds for city or county purposes to replace revenues lost by reason of the restrictions of Proposition 13." (*Ibid.*)

1 The tax was approved by 50.8%, a bare majority of the county voters. (*Rider, supra,* 1 Cal.4th at p. 6, 2 Cal.Rptr.2d 490, 820 P.2d 1000.)

Knox v. City of Orland (1992) 4 Cal.4th 132, 14 Cal.Rptr.2d 159, 841 P.2d 144 held that a charge levied against real property in the City of Orland for the maintenance of public parks was a "special assessment," and was not a "special tax" within the meaning of section 4 of article XIII A of the California Constitution. *Knox* stated that a special assessment is a charge levied against real property within a particular district for the purpose of conferring a special benefit on the assessed properties beyond any benefit received by the general public. (*Knox, supra,* at pp. 141–142, 14 Cal.Rptr.2d 159, 841 P.2d 144.) A "special tax," in contrast, is imposed to provide ****359** benefits to the general public. (*Id.* at pp. 142–143, 14 Cal.Rptr.2d 159, 841 P.2d 144.) *Knox* concluded that the park maintenance charge was a special assessment and therefore was not subject to the two-thirds voter approval requirement. (*Id.* at pp. 140–141, 145, 14 Cal.Rptr.2d 159, 841 P.2d 144.)

b. *Proposition 218*

California voters adopted Proposition 218 in November 1992, adding articles XIII C and XIII D to the California Constitution. Proposition 218 imposed additional voting approval requirements on the imposition of taxes by a local government. Proposition 218 also added to Proposition 13's limitations on ad valorem property taxes and special taxes similar limitations on assessments, fees, and charges relating to real property. (***1320** *Apartment Assn. of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 837, 102 Cal.Rptr.2d 719, 14 P.3d 930 (*Apartment Assn.*).) The initiative measure's findings and declaration of purpose stated:

"The people of the State of California hereby find and declare that Proposition 13 was intended to provide effective tax relief and to require voter approval of tax increases. However, local governments have subjected taxpayers to excessive tax, assessment, fee and charge increases that not only frustrate the purposes of voter approval for tax increases, but also threaten the economic security of all Californians and the California economy itself. This measure protects taxpayers by limiting the methods by which local governments exact revenue from taxpayers without their consent." (Ballot Pamp., Gen. Elec. (Nov. 5, 1996) text of Prop. 218, § 2, p. 108, reprinted in Historical Notes, 2A West's Ann. Cal. Const. (2013 supp.) foll. art. XIII C, § 1, p. 171.)

Section 2, subdivision (a) of article XIII C of the California Constitution, added by Proposition 218, states: "All taxes imposed by any local government shall be deemed to be either general taxes or special taxes. Special purpose districts or agencies, including school districts, shall have no power to levy general taxes." Section 1 of article XIII C defines "[g]eneral tax" as "any tax imposed for general governmental purposes" and defines "[s]pecial tax" as "any tax imposed for specific purposes, including a tax imposed for specific purposes, which is placed into a general fund." (*Id.,* subds.(a), (d).) Proposition 218 required that all general taxes imposed by a local government must be approved by a majority vote of the electorate and all special taxes imposed by a local government must be approved by a two-thirds vote of the electorate.[2] (Cal. Const., art. XIII C, § 2, subds. (b), (d).) Proposition 218, however, did not define the term "tax."

2 Article XIII C, section 2, subdivision (b) states, in relevant part, "No local government may impose, extend, or increase any general tax unless and until that tax is submitted to the electorate and approved by a majority vote." Subdivision (d) states, in relevant part, "No local government may impose, extend, or increase any special tax unless and until that tax is submitted to the electorate and approved by a two-thirds vote."

Section 3, subdivision (a) of article XIII D of the California Constitution, added by Proposition 218, states that the only "taxes, assessments, fees, or charges" that a local government may impose "as an incident of property ownership" are ad valorem property taxes, special taxes approved by two-thirds of the voters, "[a]ssessments as provided by this article," and "[f]ees or charges for property related services as provided by this article." Proposition 218 restricted local government's ability to impose real property assessments by (1) tightening the definition of "special benefit" ****360** and "proportionality" (Cal. Const., art. XIII D, §§ 2, subd. (i), 4, subd. (a)); (2) establishing strict procedural requirements for the imposition of an assessment (*id.,* § 4, subds.(b)-(e)); and (3) shifting to the public agency the burden of demonstrating the legality of an assessment (*id.,* § 4, subd. (f)). (***1321** *Silicon Valley Taxpayers' Assn., Inc. v. Santa Clara County Open Space Authority* (2008) 44 Cal.4th 431, 443–444, 79 Cal.Rptr.3d 312, 187 P.3d 37.) Proposition 218 also established procedural requirements for the imposition of new or increased fees and charges relating to real property and requirements for existing fees and charges. (Cal. Const., art. XIII D, § 6.)

Apartment Assn., supra, 24 Cal.4th at page 838, 102 Cal.Rptr.2d 719, 14 P.3d 930, held that article XIII D of the California Constitution restricted only fees imposed on real property owners in their capacity as owners and therefore did not apply to an inspection fee imposed by the City of Los Angeles on property owners in their capacity as landlords.

c. *Sinclair Paint Co. v. State Board of Equalization*

In *Sinclair Paint Co. v. State Board of Equalization* (1997) 15 Cal.4th 866, 64 Cal.Rptr.2d 447, 937 P.2d 1350, the California Supreme Court decided the question whether fees imposed by the Legislature on manufacturers and others contributing to environmental lead contamination were "taxes enacted for the purpose of increasing revenues" under former section 3 of article XIII A of the California Constitution, and therefore subject to the requirement of a two-thirds vote of the Legislature. (*Sinclair Paint, supra,* at p. 873, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* construed the language " 'taxes enacted for the purpose of increasing revenues' " in former section 3 of article XIII A, which had not been construed in any California appellate opinion, by reference to prior opinions construing the term "special taxes" in section 4 of article XIII A. (*Sinclair Paint, supra,* at pp. 873–881, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* stated:

"The cases recognize that 'tax' has no fixed meaning, and that the distinction between taxes and fees is frequently 'blurred,' taking on different meanings in different contexts. [Citations.] In general, taxes are imposed for revenue purposes, rather than in return for a specific benefit conferred or privilege granted. [Citations.]....

"The 'special tax' cases have involved three general categories of fees or assessments: (1) special assessments, based on the value of benefits conferred on property; (2) development fees, exacted in return for permits or other government privileges; and (3) regulatory fees, imposed under the police power." (*Sinclair Paint,supra,* 15 Cal.4th at p. 874, 64 Cal.Rptr.2d 447, 937 P.2d 1350.)

Sinclair Paint stated that the courts had held that special assessments and development fees satisfying certain requirements were not "special taxes" under article XIII A, section 4. (*Sinclair Paint,supra,* 15 Cal.4th at pp. 874–875, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* stated that regulatory fees that do not exceed the reasonable cost of providing the services for which the ***1322** fees are charged and are not levied for any unrelated revenue purposes also are not "special taxes" subject to the two-thirds voting requirement of section 4. (*Sinclair Paint, supra,* at p. 876, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* rejected the holding by the Court of Appeal in that case that the fees were not regulatory in nature because the legislation imposing the fees imposed no other conditions ****361** on persons subject to the fees. Instead, *Sinclair Paint* concluded that the fees were regulatory because the legislation "requires manufacturers and other persons whose products have exposed children to lead contamination to bear a fair share of the cost of mitigating the adverse health effects their products created in the community." (*Id.* at p. 877, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* stated that such " 'mitigating effects' fees" were just as regulatory in nature as fees imposed on polluters or producers

of contaminating products for the initial permit or licensing programs, and that such fees in substantial amounts also regulate future conduct by deterring the conduct subject to the fee and by encouraging research and development of alternative products. (*Ibid.*)

Sinclair Paint rejected the argument that the state had no authority to impose the fees, stating that the case law "clearly indicates that the police power is broad enough to include mandatory remedial measures to mitigate the *past, present, or future* adverse impact of the fee payer's operations, at least where, as here, the measure requires a casual connection or nexus between the product and its adverse effects. [Citations.]" (*Sinclair Paint,supra,* 15 Cal.4th at pp. 877–878, 64 Cal.Rptr.2d 447, 937 P.2d 1350.) *Sinclair Paint* stated that if the primary purpose of a fee is to regulate rather than to raise revenue, the fee is not a tax. (*Id.* at p. 880, 64 Cal.Rptr.2d 447, 937 P.2d 1350.)

4. *Proposition 26*

California voters approved Proposition 26 on November 2, 2010. Proposition 26 expanded the definition of taxes so as to include fees and charges, with specified exceptions; required a two-thirds vote of the Legislature to approve laws increasing taxes on any taxpayers; and shifted to the state or local government the burden of demonstrating that any charge, levy or assessment is not a tax. Proposition 26 amended section 3 of article XIII A and section 1 of article XIII C of the California Constitution. The initiative was an effort to close perceived loopholes in Propositions 13 and 218 and was largely a response to *Sinclair Paint, supra,* 15 Cal.4th 866, 64 Cal.Rptr.2d 447, 937 P.2d 1350. Proposition 26's findings and declaration of purpose stated:

"The people of the State of California find and declare that:

"(a) Since the people overwhelmingly approved Proposition 13 in 1978, the Constitution of the State of California has required that increases in state taxes be adopted by not less than two-thirds of the members elected to each house of the Legislature.

***1323** "(b) Since the enactment of Proposition 218 in 1996, the Constitution of the State of California has required that increases in local taxes be approved by the voters.

"(c) Despite these limitations, California taxes have continued to escalate. Rates for state personal income taxes, state and local sales and use taxes, and a myriad of state and local business taxes are at all–time highs. Californians are taxed at one of the highest levels of any state in the nation.

"(d) Recently, the Legislature added another $12 billion in new taxes to be paid by drivers, shoppers, and anyone who earns an income.

"(e) This escalation in taxation does not account for the recent phenomenon whereby the Legislature and local governments have disguised new taxes as 'fees' in order to extract even more revenue from California taxpayers without having to abide by these constitutional voting requirements. Fees couched as 'regulatory' but which ****362** exceed the reasonable costs of actual regulation or are simply imposed to raise revenue for a new program and are not part of any licensing or permitting program are actually taxes and should be subject to the limitations applicable to the imposition of taxes.

"(f) In order to ensure the effectiveness of these constitutional limitations, this measure also defines a 'tax' for state and local purposes so that neither the Legislature nor local governments can circumvent these restrictions on increasing taxes by simply defining new or expanded taxes as 'fees.' " (Ballot Pamp., Gen. Elec. (Nov. 2, 2010) text of Prop. 26, § 1, p. 114, reprinted in Historical Notes, 2A West's Ann. Cal. Const. (2013 supp.) foll. art. XIII C, § 3, pp. 141–142.)

****363** Proposition 26 amended section 3 of article XIII A of the California Constitution to read:

"(a) Any change in state statute which results in any taxpayer paying a higher tax must be imposed by an act passed by not less than two-thirds of all members elected to each of the two houses of the Legislature, except that no new ad valorem taxes on real property, or sales or transaction taxes on the sales of real property may be imposed.

"(b) As used in this section, 'tax' means any levy, charge, or exaction of any kind imposed by the State, except the following:

"(1) A charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does ***1324** not exceed the reasonable costs to the State of conferring the benefit or granting the privilege to the payor.

"(2) A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the State of providing the service or product to the payor.

"(3) A charge imposed for the reasonable regulatory costs to the State incident to issuing licenses and permits, performing investigations, inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof.

"(4) A charge imposed for entrance to or use of state property, or the purchase, rental, or lease of state property, except charges governed by Section 15 of Article XI.

"(5) A fine, penalty, or other monetary charge imposed by the judicial branch of government or the State, as a result of a violation of law.

"(c) Any tax adopted after January 1, 2010, but prior to the effective date of this act, that was not adopted in compliance with the requirements of this section is void 12 months after the effective date of this act unless the tax is reenacted by the Legislature and signed into law by the Governor in compliance with the requirements of this section.

"(d) The State bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." [3]

3 Section 3 of article XIII A stated, in its entirety, before the enactment of Proposition 26: "From and after the effective date of this article, any changes in State taxes enacted for the purpose of increasing revenues collected pursuant thereto whether by increased rates or changes in methods of computation must be imposed by an Act passed by not less than two-thirds of all members elected to each of the two houses of the Legislature, except that no new ad valorem taxes on real property, or sales or transaction taxes on the sales of real property may be imposed." Proposition 26 amended the first sentence of section 3, designated the first paragraph as subdivision (a), and added subdivisions (b), (c) and (d).

Proposition 26 amended section 1 of article XIII C of the California Constitution to read:

***1325** "(a) 'General tax' means any tax imposed for general governmental purposes.

"(b) 'Local government' means any county, city, city and county, including a charter city or county, any special district, or any other local or regional governmental entity.

"(c) 'Special district' means an agency of the state, formed pursuant to general law or a special act, for the local performance of governmental or proprietary functions with limited geographic boundaries including, but not limited to, school districts and redevelopment agencies.

"(d) 'Special tax' means any tax imposed for specific purposes, including a tax imposed for specific purposes, which is placed into a general fund.

"(e) As used in this article, 'tax' means any levy, charge, or exaction of any kind imposed by a local government, except the following:

"(1) A charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege.

"(2) A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product.

"(3) A charge imposed for the reasonable regulatory costs to a local government for issuing licenses and permits, performing investigations, inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof.

"(4) A charge imposed for entrance to or use of local government property, or the purchase, rental, or lease of local government property.

"(5) A fine, penalty, or other monetary charge imposed by the judicial branch of government or a local government, as a result of a violation of law.

"(6) A charge imposed as a condition of property development.

"(7) Assessments and property-related fees imposed in accordance with the provisions of Article XIII D.

***1326** "The local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity." [4]

4 Proposition 26 added subdivision (e) of article XIII C, section 1 and left subdivisions (a) through (d) of section 1 unchanged.

Proposition 26, in an effort to curb the perceived problem of a proliferation of regulatory fees imposed by the state without a two-thirds vote of the Legislature or imposed ****364** by local governments without the voters' approval, defined a "tax" to include "any levy, charge, or exaction of any kind imposed by" the state or a local government, with specified exceptions. The question here is whether the paper carryout bag charge constitutes a tax and therefore is subject to one of the two voter approval requirements (Cal. Const., art. XIII C, § 2, subds. (b), (d)).

5. *The Paper Carryout Bag Charge Is Not a Tax*

[7] The county contends the paper carryout bag charge is not a tax because it is payable to and retained by the retail store and is not remitted to the county. We agree.

[8] **[9]** The term "tax" in ordinary usage refers to a compulsory payment made to the government or remitted to the government. Taxes ordinarily are imposed to raise revenue for the government (*California Farm Bureau Federation v. State Water Resources Control Bd.* (2011) 51 Cal.4th 421, 437, 121 Cal.Rptr.3d 37, 247 P.3d 112 (*California Farm*) ["Ordinarily taxes are imposed for revenue purposes and not 'in return for a specific benefit conferred or privilege granted' "]; *Sinclair Paint, supra,* 15 Cal.4th at p. 874, 64 Cal.Rptr.2d 447, 937 P.2d 1350 ["In general, taxes are imposed for revenue purposes, rather than in return for a specific benefit conferred or privilege granted"]; *Morning Star Co. v. Board of Equalization* (2011) 201 Cal.App.4th 737, 750, 135 Cal.Rptr.3d 457), although taxes may be imposed for nonrevenue purposes as well (see *Washington v. Confederated Tribes of Colville Indian Reservation* (1980) 447 U.S. 134, 158, 100 S.Ct. 2069, 65 L.Ed.2d 10 ["taxes can be used for distributive or regulatory purposes, as well as for raising revenue"]).

The definition of a "tax" in California Constitution, article XIII C, section 1, subdivision (e) does not explicitly state that the levy, charge or exaction must be payable to a local government, but does state that it must be "imposed by a local government." In light of the ordinary meaning of a "tax" as a ***1327** compulsory payment made to the government or remitted to the government, we conclude that subdivision (e) is ambiguous as to whether a levy, charge or exaction must be payable to a local government in order to constitute a tax. Our consideration of other language added to article XIII C by Proposition 26 helps to resolve this ambiguity.

Subdivision (e) of article XIII C, section 1 lists seven exceptions to the rule that " 'tax' means any levy, charge, or exaction of any kind imposed by a local government" (*ibid.*). The exceptions (quoted *ante*) all relate to charges ordinarily payable to the government, including charges imposed in connection with governmental activities or use of government property, fines imposed by the government for a violation of law, development fees and real property assessments. (*Ibid.*)

The first three exceptions, in particular, state that a charge imposed by a local government is not a tax if the charge does not exceed "the reasonable costs to the local government" of conferring a specific benefit or privilege directly to the payor or providing a specific service or product directly to the payor, and also except from the definition of a tax a charge "for the reasonable regulatory costs to a local government for issuing licenses and permits" and related activities. (Cal. Const., art. XIII C, § 1, subd. (e), items (1), (2) & (3).) These exceptions, generally speaking, except from the definition of a "tax" charges not exceeding the reasonable costs to the local government of providing specific benefits or regulatory services. These exceptions do not contemplate the situation where a charge is paid to an entity or ****365** person other than a local government or where such an entity or person incurs reasonable costs. In our view, this suggests an understanding that the language "any levy, charge, or exaction of any kind imposed by a local government" in the first paragraph of

article XIII C, section 1, subdivision (e) is limited to charges payable to a local government. This is consistent with the ordinary meaning of the term "tax."[5]

5 None of the seven exceptions expressly refers to the reasonable costs to a nongovernmental entity or person or to activities undertaken by or payments typically made to a nongovernmental entity or person. Consideration of the final paragraph of article XIII C, section 1, subdivision (e) supports the view that the exceptions all refer to activities directly undertaken by the local government. The final paragraph states, "The local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of *the governmental activity,* and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, *the governmental activity*." (Italics added.) Use of the term "the governmental activity" as a shorthand reference for the activities described in the exceptions suggests that the exceptions all refer to activities undertaken directly by the local government.

No reason appears on the face of Proposition 26, or from our consideration of the ballot pamphlet and the historical foundations of the initiative, ***1328** to conclude that the voters approving the initiative intended the definition of a "tax" to include both charges payable to a local government and charges payable to a nongovernmental entity or person, while limiting the "reasonable costs" exceptions to charges payable to a local government. In other words, there is no reason to believe that the voters approving Proposition 26 intended to except from the definition of a "tax" and, consequently, from the voter approval requirements, charges payable to a local government not exceeding the reasonable costs of providing specific benefits or regulatory activities, but intended the same charges if made payable to another person or entity in an amount not exceeding the reasonable costs to be considered taxes subject to the voter approval requirements.

The analysis and arguments for and against the initiative in the official ballot pamphlet discussed the impact of the initiative on the ability of local government to raise revenues. The analysis by the Legislative Analyst stated, "Generally, the types of fees and charges that would become taxes under the measure are ones that government imposes to address health, environmental, or other societal or economic concerns." A chart listed several examples of regulatory fees that could be considered taxes under the measure, stating as to each one that the state or local government "uses the funds" for specified purposes, necessarily implying that the fees were payable to the government. There was no discussion in the ballot pamphlet of any charges or fees payable to a nongovernmental entity or person and nothing to suggest to the voters that Proposition 26 would have any impact on such charges or fees.[6]

6 Another part of the Legislative Analyst's analysis provided other examples of regulatory fees, including "fees on the purchase of beverage containers to support recycling programs." The California Beverage Container Recycling and Litter Reduction Law (Pub. Resources Code, § 14500 et seq.) requires a payment by the distributor to the Department of Resources Recycling and Recovery for each beverage container sold or transferred to a retailer. (*Id.,* § 14574.) The burden of the distributor's payment is passed on to the consumer through a fee charged by the retailer. The payments are deposited into a fund in the state treasury and used for the administration of the recycling program. (*Id.,* §§ 14574, 14580, subd. (a).) Here, in contrast, the paper carryout bag charge is retained by the retailer, and no payment is made into any government fund. Contrary to Petitioners' argument, the charge here is not akin to a beverage container fee, and the reference in the ballot materials to beverage container fees did not suggest to the voters that a charge such as the paper carryout bag charge would be considered a tax.

****366** **[10]** Accordingly, we conclude that the language "any levy, charge, or exaction of any kind imposed by a local government" in the first paragraph of ***1329** article XIII C, section 1, subdivision (e) is limited to charges payable to, or for the benefit of, a local government.[7]

7 A charge payable to a third party creditor to extinguish a debt owed by a local government, for example, would effectively be equivalent to a payment made to the local government.

Petitioners note that Proposition 26 deleted the language "any change in state taxes enacted for the purpose of increasing revenues collected pursuant thereto" in article XIII A, section 3 of the California Constitution and replaced it with "[a]ny change in state statute which results in any taxpayer paying a higher tax." Petitioners argue that this amendment indicates an intent to eliminate the prior requirement that a charge must produce revenue for the government to be considered a tax. We disagree. This amendment was to the provision requiring approval by two-thirds of the Legislature for any increase in state taxes. The provisions requiring voter approval for increases in local taxes (Cal. Const., art. XIII A, § 4, art. XIII C, § 2), in contrast, never included the language "for the purpose of increasing revenues" or any similar limiting language. The purpose of this amendment to article XIII A, section 3 was to end the Legislature's practice of approving by a simple majority vote so-called "revenue-neutral" laws that increased taxes for some taxpayers but decreased taxes for others. The Legislative Analyst's analysis in the official ballot pamphlet stated:

"*Current Requirement.* The State Constitution currently specifies that laws enacted 'for the purpose of increasing revenues' must be approved by two-thirds of each house of the Legislature. Under current practice, a law that increases the amount of taxes charged to some taxpayers but offers an equal (or larger) reduction in taxes for other taxpayers has been viewed as not increasing revenues. As such, it can be approved by a majority vote of the Legislature.

"*New Approval Requirement.* The measure specifies that state laws that result in *any* taxpayer paying a higher tax must be approved by two-thirds of each house of the Legislature." (Boldface omitted.)

Accordingly, we conclude that the amendment to article XIII A, section 3 does not support Petitioners' position. The paper carryout bag charge is payable to and retained by the retail store providing the bag, which is required to use the funds for specified purposes. The charge is not remitted to the county. Because the charge is not remitted to the county and raises no revenue for the county, we conclude that the charge is not a "tax" for purposes of article XIII C of the California Constitution. The voter approval requirements of article XIII C, section 2 ***1330** therefore are inapplicable. In light of our conclusion, we need not decide whether, if the charge were otherwise considered a tax, any of the specified exceptions would apply.

DISPOSITION

The judgment is affirmed. Respondents are entitled to recover their costs on appeal.

****367** WE CONCUR:

KITCHING, J.

ALDRICH, J.

All Citations

213 Cal.App.4th 1310, 153 Cal.Rptr.3d 352, 13 Cal. Daily Op. Serv. 2037, 2013 Daily Journal D.A.R. 2393

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Superseded by Constitutional Amendment as Stated in Zolly v. City of Oakland, Cal., August 11, 2022

15 Cal.4th 866, 937 P.2d 1350, 64 Cal.Rptr.2d 447, 97 Cal. Daily Op. Serv. 5059, 97 Daily Journal D.A.R. 8242
Supreme Court of California

SINCLAIR PAINT COMPANY,
Plaintiff and Respondent,
v.
STATE BOARD OF EQUALIZATION, Defendant and Appellant; DEPARTMENT OF HEALTH SERVICES et al., Interveners and Appellants.

No. S054115.
June 26, 1997.

SUMMARY

The trial court granted a paint company summary judgment in the company's action against the Board of Equalization for a refund of fees paid pursuant to an assessment under the Childhood Lead Poisoning Prevention Act of 1991 (Health & Saf. Code, § 105275 et seq.). The trial court found that the fees were taxes, and thus they were invalid since the Legislature passed the act by a simple majority, rather than by the two-thirds majority required by Cal. Const., art. XIII A, § 3 (Prop. 13). (Superior Court of Sacramento County, No. CV541310, Joe S. Gray, Judge.) The Court of Appeal, Third Dist., No. C021559, affirmed.

The Supreme Court reversed the judgment of the Court of Appeal. The court held that the Court of Appeal erred in ruling that "fees" assessed on manufacturers or other persons contributing to environmental lead contamination, pursuant to the Childhood Lead Poisoning Prevention Act of 1991, were in legal effect "taxes" required to be enacted by a two-thirds vote of the Legislature under Prop. 13. Rather, the fees imposed were bona fide regulatory fees. The act requires manufacturers and other persons whose products have exposed children to lead contamination to bear a fair share of the cost of mitigating the adverse health effects their products created in the community. The shifting of costs of providing evaluation, screening, and medically necessary follow-up services for potential child victims of lead poisoning from the public to those persons deemed responsible for that poisoning is a reasonable police power decision. The fact that the fees were charged after, rather than before, the product's adverse effects were realized was immaterial to the question whether the measure imposed valid regulatory fees rather than taxes. Also, if regulation is the primary purpose of a fee, the mere fact that revenue is also obtained does not make the imposition a tax. (Opinion ***867** by Chin, J., with George, C. J., Mosk, Kennard, Baxter, Werdegar, JJ., and Armstrong, J.,* concurring.)

* Associate Justice of the Court of Appeal, Second District, Division Five, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

HEADNOTES

Classified to California Digest of Official Reports

(1)
Property Taxes § 7.2--Constitutional Provisions--Proposition 13.
The purpose of Prop. 13 was to assure effective real property tax relief by means of an interlocking package consisting of a real property tax rate limitation (Cal. Const., art. XIII A, § 1), a real property assessment limitation (Cal. Const., art. XIII A, § 2), a restriction on state taxes (Cal. Const., art. XIII A, § 3), and a restriction on local taxes (Cal. Const., art. XIII A, § 4). Since any tax savings resulting from the operation of Cal. Const., art. XIII A, §§ 1 and 2, could be withdrawn or depleted by additional or increased state or local levies of other than property taxes, Cal. Const., art. XIII A, §§ 3 and 4, combine to place restrictions upon the imposition of such taxes.

(2a, 2b, 2c)
Taxation § 2--Validity of Taxation Legislation--Proposition 13--Fees Assessed Under Childhood Lead Poisoning Prevention Act-- Applicability of Supermajority Requirement:Property Taxes § 7.8--Proposition 13.
The Court of Appeal erred in ruling that "fees" assessed on manufacturers or other persons contributing to environmental lead contamination, pursuant to the Childhood Lead Poisoning Prevention Act of 1991 (Health & Saf. Code, § 105275 et seq.), which the Legislature had enacted by a simple majority, were in legal effect "taxes" required to be enacted by a two-thirds vote of the Legislature under Prop. 13 (Cal. Const., art. XIII A, § 3). Rather, the fees imposed were bona fide regulatory fees. The act requires manufacturers and other persons whose products have exposed children

to lead contamination to bear a fair share of the cost of mitigating the adverse health effects their products created in the community. The shifting of costs of providing evaluation, screening, and medically necessary follow-up services for potential child victims of lead poisoning from the public to those persons deemed responsible for that poisoning is a reasonable police power decision. The fact that the fees were charged after, rather than before, the product's adverse effects were realized was immaterial to the question whether the measure imposed valid regulatory fees rather than taxes. Also, if regulation is ***868** the primary purpose of a fee, the mere fact that revenue is also obtained does not make the imposition a tax.

[See 8 Witkin, Summary of Cal. Law (9th ed. 1988) Constitutional Law, § 784.]

(3)
Property Taxes § 7.6--Constitutional Provisions--Proposition 13-- Assessments as Fees or Taxes:Taxation § 3--Construction.
In determining under Prop. 13 (Cal. Const., art. XIII A, § 3), whether impositions are "taxes" or "fees" is a question of law for the appellate courts to decide on independent review of the facts. The term "tax" has no fixed meaning, and the distinction between taxes and fees is frequently blurred, taking on different meanings in different contexts. In general, taxes are imposed for revenue purposes, rather than in return for a specific benefit conferred or privilege granted. Most taxes are compulsory rather than imposed in response to a voluntary decision to develop or to seek other government benefits or privileges. But compulsory fees may be deemed legitimate fees rather than taxes.

(4a, 4b)
Property Taxes § 7.8--Constitutional Provisions--Proposition 13--Special Taxes:Taxation § 3--Construction.
There are three general categories of fees or assessments involved in disputes concerning whether they are in legal effect "special taxes" required to be enacted by a two-thirds vote of the Legislature under Prop. 13 (Cal. Const., art. XIII A, §§ 3 and 4). They are (1) special assessments, based on the value of benefits conferred on property, (2) development fees, exacted in return for permits or other government privileges, and (3) regulatory fees, imposed under the police power. Special assessments on property or similar business charges, in amounts reasonably reflecting the value of the benefits conferred by improvements, are not "special taxes." Similarly, development fees exacted in return for building permits or other governmental privileges are not special taxes if the amount of the fees bears a reasonable relation to the development's probable costs to the community and benefits to the developer. Also, fees charged in connection with regulatory activities which fees do not exceed the reasonable cost of providing services necessary to the activity for which the fee is charged and which are not levied for unrelated revenue purposes, are not special taxes.

(5)
Property Taxes § 7.8--Constitutional Provisions--Proposition 13-- Assessments as Regulatory Fee:Taxation § 3--Construction.
In order to show that an imposition is a regulatory fee and not a special tax under Prop. 13 (Cal. Const., art. XIII A, § 3), the government should prove (1) the estimated costs of the service or regulatory ***869** activity, and (2) the basis for determining the manner in which the costs are apportioned, so that charges allocated to a payor bear a fair or reasonable relationship to the payor's burdens on or benefits from the regulatory activity.

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CHIN, J.

In 1991, by simple majority vote, the Legislature enacted the Childhood Lead Poisoning Prevention Act of 1991 (the Act) (Stats. 1991, ch. 799, § 3, amended Stats. 1995, ch. 415, § 5; see ***870** Health & Saf. Code, § 105275 et seq.).[1] The Act provided evaluation, screening, and medically necessary follow-up services for children who were deemed potential victims of lead poisoning. The Act's program was entirely supported by "fees" assessed on manufacturers or other persons contributing to environmental lead contamination. (See §§ 105305, 105310.) The question arises whether these fees were in legal effect "taxes" required to be enacted by a two-thirds vote of the Legislature. (See Cal. Const., art. XIII A, § 3.)

1 All further statutory references are to the Health and Safety Code unless otherwise noted.

Contrary to the trial court and Court of Appeal, we conclude that the Act imposed bona fide regulatory fees, not taxes, because the Legislature imposed the fees to mitigate the actual or anticipated adverse effects of the fee payers' operations, and under the Act the amount of the fees must bear a reasonable relationship to those adverse effects. Accordingly, the trial court erred in granting summary judgment to award plaintiff Sinclair Paint Company (Sinclair) a refund of the fees it paid under the Act.

We take the following statement of uncontradicted facts largely from the Court of Appeal opinion in this case. Sinclair paid $97,825.26 in fees for 1991. After the Board of Equalization (the Board) denied Sinclair's administrative claim for refund, Sinclair filed a complaint for refund, alleging the fees assessed under section 105310 were "actually taxes imposed by the California [L]egislature in violation of Proposition 13, Article XIIIA, Section 3 of the California Constitution." The court granted the request of the Department of Health Services (the Department) for leave to intervene. It also granted a similar request to intervene by Ray Cochenour and Cardaryl Commodore, representatives of a class of children suffering from lead poisoning, and People United for a Better Oakland, an unincorporated association whose members include the Act's intended beneficiaries (collectively Cochenour).

Sinclair moved for summary judgment, claiming the Act was invalid on its face because it was not passed by the requisite two-thirds majority vote of the Legislature. The court agreed the Act imposed an unconstitutional tax and granted Sinclair's motion.

The Board, the Department, and Cochenour appealed, contending the Act involves a regulatory fee, not a tax. Appellants also argued the court erred in granting Sinclair summary judgment without compelling it to produce discovery and improperly relied on legislative history in determining the Act's constitutionality. The Court of Appeal affirmed the judgment, concluding that the Act was unconstitutional on its face and rejecting appellants' other claims. We reverse the Court of Appeal's judgment. ***871**

Discussion

I. *The Childhood Lead Poisoning Prevention Act of 1991*

When the Legislature enacted the Act in 1991, it explained the Act's background and purpose in findings that described the numerous health hazards children face when exposed to lead toxicity and declared four state "goals," namely, (1) evaluating, screening, and providing case management for children at risk of lead poisoning, (2) identifying sources of lead contamination responsible for this poisoning, (3) identifying and utilizing programs providing adequate case management for children found to have lead poisoning, and (4) providing education on lead-poisoning detection and case management to state health care providers. (Stats. 1991, ch. 799, § 1.)

The Act directs the Department to adopt regulations establishing a standard of care for evaluation, screening (i.e., measuring lead concentration in blood), and medically necessary follow-up services for children determined to be at risk of lead poisoning. (§ 105285; see § 105280, subd. (e).) If a child is identified as being at risk of lead poisoning, the Department must ensure "appropriate case management," i.e., "health care referrals, environmental assessments, and educational activities" needed to reduce the child's exposure to lead and its consequences. (§§ 105280, subd. (a), 105290.) Additionally, the Act requires the Department to collect data and report on the effectiveness of case management efforts. (§ 105295.)

The Department has "broad regulatory authority to fully implement and effectuate the purposes" of the Act. (§ 105300.) This authority "include[s], but is not limited

to," the development of protocols for screening and for appropriate case management; the designation of laboratories qualified to analyze blood specimens for lead concentrations, and the monitoring of those laboratories for accuracy; the development of reporting procedures by laboratories; reimbursement for state-sponsored services related to screening and case management; establishment of lower lead concentrations in whole blood than those specified by the United States Centers for Disease Control for lead poisoning; notification to parents or guardians of the results of blood-lead testing and environmental assessment; and establishment of a periodicity schedule for evaluating childhood lead poisoning. (§ 105300.)

The Act states that its program of evaluation, screening, and follow-up is supported *entirely* by fees collected under the Act: "Notwithstanding the scope of activity mandated by this chapter, in no event shall this chapter be interpreted to require services necessitating expenditures in any fiscal year in excess of the fees, and earnings therefrom, collected pursuant to Section ***872** 105310. This chapter shall be implemented only to the extent fee revenues pursuant to Section 105310 are available for expenditure for purposes of this chapter." (§ 105305.)

Section 105310 imposes the fees at issue here. In pertinent part, that section imposes fees on manufacturers and other persons formerly and/or presently engaged in the stream of commerce of lead or products containing lead, or who are otherwise responsible for identifiable sources of lead, which have significantly contributed and/or currently contribute to environmental lead contamination. (§ 105310, subd. (a).) The Department must determine fees based on the manufacturer's or other person's past and present responsibility for environmental lead contamination, or its "market share" responsibility for this contamination. (§ 105310, subd. (b).)

Those persons able to show that their industry did not contribute to environmental lead contamination, or that their lead-containing product does not and did not "result in quantifiably persistent environmental lead contamination," are exempt from paying the fees. (§ 105310, subd. (d).)

The Legislature has authorized the Department to adopt regulations establishing the specific fees to be assessed the parties identified in section 105310, subdivision (a). (§ 105310, subd. (b).) The formula for calculating fees attributable to leaded architectural coatings, including ordinary house paint, is set forth in California Code of Regulations, title 17, section 33020.

II. *Proposition 13*

(1) In June 1978, California voters added article XIII A, commonly known as the Jarvis-Gann Property Tax Initiative or Proposition 13 (article XIII A), to the state Constitution. The initiative's purpose was to assure effective real property tax relief by means of an "interlocking 'package' " consisting of a real property tax rate limitation (art. XIII A, § 1), a real property assessment limitation (art. XIII A, § 2), a restriction on state taxes (art. XIII A, § 3), and a restriction on local taxes (art. XIII A, § 4). (*Amador Valley Joint Union High Sch. Dist.* v. *State Bd. of Equalization* (1978) 22 Cal.3d 208, 231 [149 Cal.Rptr. 239, 583 P.2d 1281] (*Amador Valley*); see also *County of Los Angeles* v. *Sasaki* (1994) 23 Cal.App.4th 1442, 1451 [29 Cal.Rptr.2d 103].)

Section 3 of article XIII A restricts the enactment of changes in state taxes, as follows: "From and after the effective date of this article, any changes in State taxes enacted for the purpose of increasing revenues collected pursuant thereto whether by increased rates or changes in methods ***873** of computation must be imposed by an Act passed by not less than two-thirds of all members ... of the Legislature, except that no new ad valorem taxes on real property, or sales or transaction taxes on the sales of real property may be imposed."

Section 4 of article XIII A imposes similar restrictions on local entities: "Cities, Counties and special districts, by a two-thirds vote of the qualified electors of such district, may impose *special taxes* on such district, except ad valorem taxes on real property or a transaction tax or sales tax on the sale of real property within such City, County or special district." (Italics added.)

As we explained in *Amador Valley*, "... since any tax savings resulting from the operation of sections 1 and 2 [of article XIII A] could be withdrawn or depleted by additional or increased state or local levies of other than property taxes, sections 3 and 4 combine to place restrictions upon the imposition of such taxes." (*Amador Valley*, *supra*, 22 Cal.3d at p. 231.)

III. *Taxes or Fees?*

(2a) Are the "fees" section 105310 imposes in legal effect "taxes enacted for the purpose of increasing revenues" under article XIII A, section 3, and therefore subject to a two-thirds majority vote? Although we have found no cases

that interpret the language of section 3, several California appellate decisions have considered whether various fees are really "special taxes" under article XIII A, section 4. (See also *City and County of San Francisco v. Farrell* (1982) 32 Cal.3d 47, 57 [184 Cal.Rptr. 713, 648 P.2d 935] ["special taxes" are taxes levied for a specific purpose rather than for general governmental purposes]; Gov. Code, § 50076 [excluding from the term "special tax" in article XIII A, section 4, "any fee which does not exceed the reasonable cost of providing the service or regulatory activity for which the fee is charged and which is not levied for general revenue purposes"].) Because of the close, "interlocking" relationship between the various sections of article XIII A (see *Amador Valley*, *supra*, 22 Cal.3d at p. 231), we believe these "special tax" cases may be helpful, though not conclusive, in deciding the case before us. The reasons why particular fees are, or are not, "special taxes" under article XIII A, section 4, may apply equally to section 3 cases. [2]

2 We are not here concerned with issues arising under constitutional amendments effected by a recent initiative measure (Proposition 218) adopted at the November 5, 1996, General Election. That measure contains new restrictions on local agencies' power to impose fees and assessments.

We first consider certain general guidelines used in determining whether "taxes" are involved in particular situations. (3) The cases agree that ***874** whether impositions are "taxes" or "fees" is a question of law for the appellate courts to decide on independent review of the facts. (*Bixel Associates v. City of Los Angeles* (1989) 216 Cal.App.3d 1208, 1216 [265 Cal.Rptr. 347]; *California Bldg. Industry Assn. v. Governing Bd.* (1988) 206 Cal.App.3d 212, 234 [253 Cal.Rptr. 497]; *Russ Bldg. Partnership v. City and County of San Francisco* (1987) 199 Cal.App.3d 1496, 1504 [246 Cal.Rptr. 21].)

The cases recognize that "tax" has no fixed meaning, and that the distinction between taxes and fees is frequently "blurred," taking on different meanings in different contexts. (*Russ Bldg. Partnership v. City and County of San Francisco*, *supra*, 199 Cal.App.3d at p. 1504; *Terminal Plaza Corp. v. City and County of San Francisco* (1986) 177 Cal.App.3d 892, 905 [223 Cal.Rptr. 379]; *Mills v. County of Trinity* (1980) 108 Cal.App.3d 656, 660 [166 Cal.Rptr. 674]; *County of Fresno* v. *Malmstrom* (1979) 94 Cal.App.3d 974, 983-984 [156 Cal.Rptr. 777].) In general, taxes are imposed for revenue purposes, rather than in return for a specific benefit conferred or privilege granted. (*Shapell Industries, Inc. v. Governing Board* (1991) 1 Cal.App.4th 218, 240 [1 Cal.Rptr.2d 818]; *County of Fresno* v. *Malmstrom*, *supra*, 94 Cal.App.3d at p. 983 ["Taxes are raised for the general revenue of the governmental entity to pay for a variety of public services."].) Most taxes are compulsory rather than imposed in response to a voluntary decision to develop or to seek other government benefits or privileges. (*Shapell Industries, Inc. v. Governing Board*, *supra*, 1 Cal.App.4th at p. 240; *Russ Bldg. Partnership v. City and County of San Francisco*, *supra*, 199 Cal.App.3d at pp. 1505-1506; see *Terminal Plaza Corp. v. City and County of San Francisco*, *supra*, 177 Cal.App.3d at p. 907.) But compulsory fees may be deemed legitimate fees rather than taxes. (See *Kern County Farm Bureau v. County of Kern* (1993) 19 Cal.App.4th 1416, 1424 [23 Cal.Rptr.2d 910].)

(4a) The "special tax" cases have involved three general categories of fees or assessments: (1) special assessments, based on the value of benefits conferred on property; (2) development fees, exacted in return for permits or other government privileges; and (3) regulatory fees, imposed under the police power. Although these three categories may overlap in a particular case, we consider them separately.

The cases uniformly hold that *special assessments* on property or similar business charges, in amounts reasonably reflecting the value of the benefits conferred by improvements, are not "special taxes" under article XIII A, section 4. (*Evans v. City of San Jose* (1992) 3 Cal.App.4th 728, 735-739 [4 Cal.Rptr.2d 601] [assessments on businesses for downtown promotion]; ***875** *J. W. Jones Companies v. City of San Diego* (1984) 157 Cal.App.3d 745, 750-758 [203 Cal.Rptr. 580] [facilities benefit assessments]; *City Council v. South* (1983) 146 Cal.App.3d 320, 332 [194 Cal.Rptr. 110] [special assessments on real property]; *County of Fresno v. Malmstrom*, *supra*, 94 Cal.App.3d at pp. 984-985 [special assessments for construction of streets].)

Similarly, *development fees* exacted in return for building permits or other governmental privileges are not special taxes if the amount of the fees bears a reasonable relation to the development's probable costs to the community and benefits to the developer. (*Shapell Industries, Inc. v. Governing Board*, *supra*, 1 Cal.App.4th at p. 240 [school facilities fees]; *Bixel Associates v. City of Los Angeles*, *supra*, 216 Cal.App.3d at pp. 1211, 1218-1219 [fire hydrant fees]; *California Bldg. Industry Assn. v. Governing Bd.*, *supra*, 206 Cal.App.3d at pp. 235-237 [school facilities development fees]; *Russ Bldg. Partnership v. City and County of San Francisco*, *supra*, 199

Cal.App.3d at pp. 1504-1506 [transit impact fees]; *Beaumont Investors v. Beaumont-Cherry Valley Water Dist.* (1985) 165 Cal.App.3d 227, 235-238 [211 Cal.Rptr. 567] [new facilities water hookup fees]; *Trent Meredith, Inc.* v. *City of Oxnard* (1981) 114 Cal.App.3d 317, 325-328 [170 Cal.Rptr. 685] [fees as precondition for building permits]; *Mills v. County of Trinity*, *supra*, 108 Cal.App.3d at pp. 661-663 [fees for processing subdivision, zoning, and land use applications]; see *Ehrlich v. City of Culver City* (1996) 12 Cal.4th 854, 898 [50 Cal.Rptr.2d 242, 911 P.2d 429] (conc. opn. of Mosk, J.).)

According to Sinclair, because the present fees have been imposed solely to defray the cost of the state's program of evaluation, screening, and follow-up services for children determined to be at risk for lead poisoning, they are not analogous to either special assessments or development fees, for they neither reimburse the state for special benefits conferred on manufacturers of lead-based products nor compensate the state for governmental privileges granted to those manufacturers. As the Court of Appeal observed, the fees challenged here "do not constitute payment for a government benefit or service. The program described in the Act bears no resemblance to regulatory schemes involving special assessments, developer fees, or efforts to recoup the cost of processing land use applications where the benefit analysis is typically applied. [Citations.] The face of the Act makes clear the funds collected pursuant to section 105310 are used to benefit children exposed to lead, not Sinclair or other manufacturers in the stream of commerce for products containing lead."

(2b) Appellants argue, however, that the challenged fees fall squarely within a third recognized category not dependent on government-conferred benefits or privileges, namely, *regulatory fees* imposed under the police power, rather than the taxing power. We agree. ***876**

(4b) We have acknowledged that the term "special taxes" in article XIII A, section 4, " 'does not embrace fees charged in connection with regulatory activities which fees do not exceed the reasonable cost of providing services necessary to the activity for which the fee is charged and which are not levied for unrelated revenue purposes.' [Citations.]" (*Pennell v. City of San Jose* (1986) 42 Cal.3d 365, 375 [228 Cal.Rptr. 726, 721 P.2d 1111] (*Pennell*), affd. on other grounds *sub nom. Pennell v. San Jose* (1988) 485 U.S. 1 [108 S.Ct. 849, 99 L.Ed.2d 1], quoting from *Mills v. County of Trinity*, *supra*, 108 Cal.App.3d at pp. 659-660; see *City of Oakland v. Superior Court* (1996) 45 Cal.App.4th 740, 760-762 [53 Cal.Rptr.2d 120] [upholding regulatory fees charged to alcoholic beverage sale licensees to support pilot project to address public nuisances associated with those sales]; *Kern County Farm Bureau v. County of Kern*, *supra*, 19 Cal.App.4th at pp. 1422-1425 [upholding landfill assessment based on land use to reduce illegal waste disposal]; *City of Dublin v. County of Alameda* (1993) 14 Cal.App.4th 264, 280-285 [17 Cal.Rptr.2d 845] [upholding waste disposal surcharge imposed on waste haulers]; *Evans v. City of San Jose*, *supra*, 3 Cal.App.4th at p. 737; *San Diego Gas & Electric Co.* v. *San Diego County Air Pollution Control Dist.* (1988) 203 Cal.App.3d 1132, 1145-1149 [250 Cal.Rptr. 420] (*SDG&E*) [upholding emissions-based formula for recovering direct and indirect costs of pollution emission permit programs]; *United Business Com.* v . *City of San Diego* (1979) 91 Cal.App.3d 156, 166-168 [154 Cal.Rptr. 263] (*United Business*) [upholding fees for inspecting and inventorying on-premises advertising signs].)

Pennell upheld rental unit fees that a city imposed under its rent control ordinance to assure it recovered the actual costs of providing and administering a rental dispute hearing process. (*Pennell*, *supra*, 42 Cal.3d at p. 375.) We explained in *Pennell* that regulatory fees in amounts necessary to carry out the regulation's purpose are valid despite the absence of any perceived "benefit" accruing to the fee payers. (*Id.* at p. 375, fn. 11; see also *SDG&E*, *supra*, 203 Cal.App.3d at p. 1146, fn. 18; *Mills* v. *County of Trinity*, *supra*, 108 Cal.App.3d at p. 661.)

We observe that Sinclair, in moving for summary judgment, did not contend that the fees exceed in amount the reasonable cost of providing the protective services for which the fees are charged, or that the fees were levied for any *unrelated* revenue purposes. (See *Pennell*, *supra*, 42 Cal.3d at p. 375.) Moreover, Sinclair has not yet sought to establish that the amount of the fees bears no reasonable relationship to the social or economic "burdens" that Sinclair's operations generated. (See *SDG&E*, *supra*, 203 Cal.App.3d at p. 1146; see also § 105310, subds. (b), (d); *Sea & Sage Audubon Society, Inc.* v. *Planning Com.* (1983) 34 Cal.3d 412, 421 [***877** 194 Cal.Rptr. 357, 668 P.2d 664] [persons challenging fees have burden of establishing invalidity].) Sinclair does contend, however, that the Act is not *regulatory* in nature, being primarily aimed at producing revenue.

According to Sinclair, the challenged fees were in effect "taxes" because the compulsory revenue measure that imposed them was not part of a *regulatory* effort. The Court

of Appeal agreed, relying on prior cases indicating that where payments are exacted solely for *revenue* purposes and give the right to carry on the business with no further conditions, they are taxes. (E.g., *United Business*, *supra*, 91 Cal.App.3d at p. 165.) The Court of Appeal held that "Placing the factors distinguishing taxes and fees along a continuum, we conclude the monies paid by Sinclair pursuant to the Act are more like taxes than fees. [¶] *There is nothing on the face of the Act to show the fees collected are used to regulate Sinclair.* Apart from mere calculation of the payment, the Department's regulatory authority involves implementation of the program to evaluate, screen, and provide followup services to children at risk for lead poisoning. The Act does not require Sinclair to comply with any other conditions; it merely requires Sinclair to pay what the Department determines to be its share of the program cost."

Contrary to the Court of Appeal, we believe that section 105310 imposes bona fide regulatory fees. It requires manufacturers and other persons whose products have exposed children to lead contamination to bear a fair share of the cost of mitigating the adverse health effects their products created in the community. Viewed as a "mitigating effects" measure, it is comparable in character to similar police power measures imposing fees to defray the actual or anticipated adverse effects of various business operations.

From the viewpoint of general police power authority, we see no reason why statutes or ordinances calling on polluters or producers of contaminating products to help in mitigation or cleanup efforts should be deemed less "regulatory" in nature than the initial permit or licensing programs that allowed them to operate. Moreover, imposition of "mitigating effects" fees in a substantial amount (Sinclair allegedly paid $97,825.26 in 1991) also "regulates" future conduct by deterring further manufacture, distribution, or sale of dangerous products, and by stimulating research and development efforts to produce safer or alternative products. (Cf. *SDG&E*, *supra*, 203 Cal.App.3d at p. 1147, fn. 20 [emissions-based fees provide incentive to use nonpollutant fuels].)

Sinclair disputes the state's authority to impose industry-wide "remediation fees" to compensate for the adverse societal effects generated by an industry's products. To the contrary, the case law previously cited or discussed clearly indicates that the police power is broad enough to include ***878** mandatory remedial measures to mitigate the *past, present, or future* adverse impact of the fee payer's operations, at least where, as here, the measure requires a causal connection or nexus between the product and its adverse effects. (See *City of Oakland v. Superior Court*, *supra*, 45 Cal.App.4th at pp. 760-762; *Kern County Farm Bureau v. County of Kern*, *supra*, 19 Cal.App.4th at pp. 1422-1425; *City of Dublin v. County of Alameda*, *supra*, 14 Cal.App.4th at pp. 284-285; *SDG&E*, *supra*, 203 Cal.App.3d at pp. 1146-1149; *United Business*, *supra*, 91 Cal.App.3d at p. 168; *Russ Bldg. Partnership v. City and County of San Francisco*, *supra*, 199 Cal.App.3d at pp. 1504-1506 [fees to pay for increased transit costs]; *J. W. Jones Companies v. City of San Diego*, *supra*, 157 Cal.App.3d at pp. 755, 758 [fees to defray costs of additional public facilities]; *Trent Meredith, Inc.* v. *City of Oxnard*, *supra*, 114 Cal.App.3d at p. 325 [fees to reduce growth impact of new subdivision]; see also *Western Indemnity Co. v. Pillsbury* (1915) 170 Cal. 686, 694 [151 P. 398] [police power authorizes legislation necessary or proper for protection of legitimate public interest]; *County of Plumas* v . *Wheeler* (1906) 149 Cal. 758, 761-764 [87 P. 909] [broad legislative discretion to regulate business, including license fees or charges]; 8 Witkin, Summary of Cal. Law (9th ed. 1988) Constitutional Law, § 784, p. 311 ["police power is simply the power of sovereignty or power to govern—the inherent reserved power of the state to subject individual rights to reasonable regulation for the general welfare"]; see generally, 6A McQuillan, The Law of Municipal Corporations (3d rev. ed. 1997) Municipal Police Power and Ordinances, § 24.01 et seq., p. 7 et seq.)

SDG&E involved regulatory fees comparable in some respects to the fees challenged here. (*SDG&E*, *supra*, 203 Cal.App.3d 1132.) There, 1982 legislation (see § 42311) empowered local air pollution control districts to apportion the costs of their permit programs among all monitored polluters according to a formula based on the amount of emissions they discharged. (See *SDG&E*, *supra*, 203 Cal.App.3d at p. 1135.) (5) The *SDG&E* court observed that "to show a fee is a regulatory fee and not a special tax, the government should prove (1) the estimated costs of the service or regulatory activity, and (2) the basis for determining the manner in which the costs are apportioned, so that charges allocated to a payor bear a fair or reasonable relationship to the payor's burdens on or benefits from the regulatory activity." (*Id.* at p. 1146, fn. omitted; see *Beaumont Investors v. Beaumont-Cherry Valley Water Dist.*, *supra*, 165 Cal.App.3d at pp. 234-235.)

In *SDG&E,* the amount of the regulatory fees was limited to the reasonable costs of each district's program, and the allocation of costs based on emissions "fairly relates to the

permit holder's burden on the district's programs." (*SDG&E*, *supra*, 203 Cal.App.3d at p. 1146.) Accordingly, the ***879** court concluded that the fees were not "special taxes" under article XIII A, section 4. (*SDG&E*, *supra*, 203 Cal.App.3d at p. 1148.)

As the court observed in *SDG&E*, "Proposition 13's goal of providing effective property tax relief is not subverted by the increase in fees or the emissions-based apportionment formula. A reasonable way to achieve Proposition 13's goal of tax relief is to shift the costs of controlling stationary sources of pollution from the tax-paying public to the pollution-causing industries themselves ...." (*SDG&E*, *supra*, 203 Cal.App.3d at p. 1148.) (2c) In our view, the shifting of costs of providing evaluation, screening, and medically necessary follow-up services for potential child victims of lead poisoning from the public to those persons deemed responsible for that poisoning is likewise a reasonable police power decision. (See also *Mills* v. *County of Trinity*, *supra*, 108 Cal.App.3d at p. 663; *County of Fresno v. Malmstrom*, *supra*, 94 Cal.App.3d at p. 985 [special assessments have no impact on government spending].)

The fact that the challenged fees were charged after, rather than before, the product's adverse effects were realized is immaterial to the question whether the measure imposes valid regulatory fees rather than taxes. *City of Oakland v. Superior Court* seems close on point. There, the court upheld city fees imposed on retailers of alcoholic beverages to defray the cost of providing and administering hearings into nuisance problems associated with the prior sale of those beverages. The court first observed that "If a business imposes an unusual burden on city services, a municipality may properly impose fees pursuant to its police powers" to assure that the persons responsible "pay their fair share of the cost of government." (*City of Oakland v. Superior Court*, *supra*, 45 Cal.App.4th at p. 761.) The court concluded that "The ordinance's primary purpose is regulatory—to create an environment in which nuisance and criminal activities associated with alcoholic beverage retail establishments may be reduced or eliminated. Thus, the fee imposed ... is not a tax imposed to pay general revenue to the local governmental entity, but is a regulatory fee intended to defray the cost of providing and administering the hearing process set out in the ordinance. [Citation.]" (*Id.* at p. 762.)

The court in *United Business* applied the "regulation/revenue" distinction to conclude that sign inventory fees adopted to recover the city's cost of inventorying signs and bringing them into conformance with law were regulatory fees, not revenue-raising taxes. The court observed that, under the police power, municipalities may impose fees for the purpose of legitimate regulation, and not mere revenue-raising, if the fees do not exceed the reasonably necessary expense of the regulatory effort. (***880** *United Business*, *supra*, 91 Cal.App.3d at p. 165, and authorities cited.) Quoting with approval from an earlier decision, the court noted that, if revenue is the primary purpose, and regulation is merely incidental, the imposition is a tax, but if regulation is the primary purpose, the mere fact that revenue is also obtained does not make the imposition a tax. (*Ibid.*) Moreover, according to *United Business,* if a fee is exacted for revenue purposes, and its payment gives the right to carry on business without any further conditions, it is a tax. (*Ibid.*; see also *City of Oakland v. Superior Court*, *supra*, 45 Cal.App.4th at p. 761; *County of Plumas* v. *Wheeler*, *supra*, 149 Cal. at p. 763 [fee in amount greater than reasonably needed to regulate business "cannot stand as an exercise of the police power"]; *Mills* v. *County of Trinity*, *supra*, 108 Cal.App.3d at pp. 659-660; *City & County of San Francisco v. Boss* (1948) 83 Cal.App.2d 445, 450-451 [189 P.2d 32].)

The Court of Appeal, citing *United Business,* stressed that the challenged fees were exacted solely for revenue purposes, and their payment gave Sinclair and others the right to carry on the business without any further conditions. We see two flaws in that analysis. First, *all* regulatory fees are necessarily aimed at raising "revenue" to defray the cost of the regulatory program in question, but that fact does not automatically render those fees "taxes." As stated in *United Business,* if regulation is the primary purpose of the fee measure, the mere fact that the measure also generates revenue does not make the imposition a tax. (*United Business*, *supra*, 91 Cal.App.3d at p. 165; see also *Mills* v. *County of Trinity*, *supra*, 108 Cal.App.3d at p. 660 [rejecting broad definition of "tax" as including all fees and charges that exact money for public purposes].)

Second, we find inconclusive the fact that the Act permits Sinclair and other producers to carry on their operations without any further conditions *specified in the Act itself*. As we have indicated, fees can "regulate" business entities without directly licensing them by mitigating their operations' adverse effects. Moreover, as appellants observe, the Act is part of a broader regulatory scheme by which, under various state and federal statutes, the state regulates Sinclair and other manufacturers in the stream of commerce for products containing lead. That being so, Sinclair's payment of the

challenged fees did not confer the right to carry on business without any further conditions or regulation.

The Court of Appeal rejected appellants' argument invoking other state and federal regulations: "First, there is nothing on the face of the Act or the accompanying statement of legislative purpose which links the Act's programs for children at risk for lead poisoning with the cited state or federal statutes regulating lead. Second, none of the fees collected pursuant to ***881** section 105310 are used to fund those regulatory efforts." However, it is undisputed that Sinclair and other manufacturers of lead-based products remain subject to government regulation, that payment of the challenged fees therefore does not entitle those manufacturers to operate free of regulation, and that the state must use the funds it collects under section 105310 *exclusively* for mitigating the adverse effects of lead poisoning of children, and not for general revenue purposes. (§ 105310, subd. (f).)

Under existing case law, we can reasonably characterize the challenged fees as *regulatory fees* rather than as taxes. Accordingly, we conclude the trial court erred in granting Sinclair summary judgment on the constitutional issues. Of course, Sinclair should be permitted to attempt to prove at trial that the amount of fees assessed and paid exceeded the reasonable cost of providing the protective services for which the fees were charged, or that the fees were levied for unrelated revenue purposes. (See *Pennell*, *supra*, 42 Cal.3d at p. 375.) Additionally, Sinclair will have the opportunity to try to show that no clear nexus exists between its products and childhood lead poisoning, or that the amount of the fees bore no reasonable relationship to the social or economic "burdens" its operations generated. (*SDG&E*, *supra*, 203 Cal.App.3d. at p. 1146; see also § 105310, subds. (b), (d).)

Disposition

The judgment of the Court of Appeal, affirming the trial court's grant of summary judgment in Sinclair's favor, is reversed.

George, C. J., Mosk, J., Kennard, J., Baxter, J., Werdegar, J., and Armstrong, J.,* concurred.

* Associate Justice of the Court of Appeal, Second District, Division Five, assigned by the Chief Justice pursuant to article VI, section 6 of the California Constitution.

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SAN FRANCISCO BAY BASIN (REGION 2)
WATER QUALITY CONTROL PLAN
(BASIN PLAN)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

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Incorporating all amendments approved by the Office of Administrative Law as of July 22 2024.

CHAPTER 1: INTRODUCTION

1.1 THE SAN FRANCISCO BAY REGION

The San Francisco Bay Region (Region) is 4,603 square miles, roughly the size of the State of Connecticut, and characterized by its dominant feature, 1,100 square miles of the 1,600 square mile San Francisco Bay Estuary (Estuary), the largest estuary on the west coast of the United States, where fresh waters from California's Central Valley mix with the saline waters of the Pacific Ocean. The Region also includes coastal portions of Marin and San Mateo counties, from Tomales Bay in the north to Pescadero and Butano Creeks in the south.

The Estuary conveys the waters of the Sacramento and San Joaquin rivers into the Pacific Ocean. Located on the central coast of California (Figure 1-1), the Bay system functions as the only drainage outlet for waters of the Central Valley. It also marks natural topographic separation between the northern and southern coastal mountain ranges. The Region's waterways, wetlands, and bays form the centerpiece of the United States' fourth-largest metropolitan region, including all or major portions of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

Because of its highly dynamic and complex environmental conditions, the Bay system supports an extraordinarily diverse and productive ecosystem. Within each section of the Bay lie deepwater areas that are adjacent to large expanses of very shallow water. Salinity levels range from hypersaline to fresh water, and water temperature varies throughout the Bay system. These factors greatly increase the number of species that can live in the Estuary and enhance its biological stability.

The Bay system's deepwater channels, tidelands, marshlands, freshwater streams, and rivers provide a wide variety of habitats that have become increasingly vital to the survival of several plant and animal species as other estuaries are reduced in size or lost to development. These areas sustain rich communities of crabs, clams, fish, birds, and other aquatic life and serve both as important wintering sites for migrating waterfowl and as spawning areas for anadromous fish.

1.2 THE BAY SYSTEM'S SURFACE WATER & GROUNDWATER

The Sacramento and San Joaquin rivers, which enter the Bay system through the Delta at the eastern end of Suisun Bay, contribute almost all the freshwater inflow to the Bay. Many small rivers and streams also convey fresh water to the Bay system. The rate and timing of these freshwater flows are among the most important factors influencing physical, chemical, and biological conditions in the Estuary. Much of the freshwater inflow, however, is trapped upstream by the dams, canals, and reservoirs of California's water diversion projects, which provide vital water to industries, farms, homes, and businesses throughout the state. This freshwater diversion has sparked statewide controversy over possible adverse effects on the Estuary's water quality, fisheries, and ecosystem.

Flows in the Region are highly seasonal, with more than 90 percent of the annual runoff occurring during the winter rainy season between October and April. Many streams go dry during the middle or late summer. For example, the Napa River, which is least affected by upstream regulation, clearly shows the seasonal nature of runoff. Only 4-1/2 percent of this river's average annual runoff occurs during the summer months.

Groundwater is an important component of the hydrologic system in the Region. Groundwater provides excellent natural storage, distribution, and treatment systems. Groundwater also supplies

high quality water for drinking, irrigation, and industrial processing and service. As an important source of freshwater replenishment, groundwater may also discharge to surface streams, wetlands, and San Francisco Bay.

A variety of historical and ongoing industrial, urban, and agricultural activities and their associated discharges degrade groundwater quality, including industrial and agricultural chemical spills, underground and above-ground tank and sump leaks, landfill leachate, septic tank failures, and chemical seepage via shallow drainage wells and abandoned wells. In addition, saltwater intrusion directly attributed to over- pumping has degraded the purity of some groundwater aquifers.

These adverse impacts on groundwater quality often have long-term effects that are costly to remediate. Consequently, as additional discharges are identified, source removal, pollution containment, and cleanup must be undertaken as quickly as possible. Activities that may potentially pollute groundwater must be managed to ensure that groundwater quality is protected.

1.3 PROTECTING SAN FRANCISCO BAY: THE WATER BOARD

Because of its unique characteristics, the San Francisco Bay estuarine system merits special protection. The adverse effects of waste discharges must be controlled. Extensive upstream water diversions must be limited, and their effects mitigated. To address these and other water issues, the California Legislature established the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards (Regional Water Boards) in 1949. Operating under the provisions of the California Water Code (Water Code), their unique relationship couples state-level coordination and regional familiarity with local needs and conditions. Their joint actions constitute a comprehensive program for managing water quality in California, as well as for effective state administration of federal water pollution control laws.

The State Water Board administers water rights, water pollution control, and water quality functions for the state as part of the California Environmental Protection Agency (Cal/EPA). It provides policy guidance and budgetary authority to the Regional Water Boards, which conduct planning, permitting, and enforcement activities. The State Water Board shares authority for implementation of the federal Clean Water Act and the state Porter-Cologne Act with the Regional Water Boards.

The San Francisco Bay Regional Water Quality Control Board (Water Board) regulates surface water and groundwater quality in the Region. The area under the Water Board's jurisdiction comprises all of the San Francisco Bay segments extending to the mouth of the Sacramento-San Joaquin Delta (Winter Island near Pittsburg).

California's governor appoints the nine-member Water Board, whose members serve for four-year terms. Water Board members must reside or maintain a place of business within the Region and must be associated with or have special knowledge of specific activities related to water quality control. Members of the Water Board serve without pay and conduct their business at regular meetings and frequent public hearings where public participation is encouraged.

The Water Board's overall mission is to protect surface waters and groundwater in the Region. The Water Board carries out its mission by:

- Addressing Region-wide water quality concerns through the creation and triennial update of a Water Quality Control Plan (Basin Plan);
- Preparing new or revised policies addressing Region-wide water quality concerns;

- Adopting, monitoring compliance with, and enforcing waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permits;
- Providing recommendations to the State Water Board on financial assistance programs, proposals for water diversion, budget development, and other statewide programs and policies;
- Coordinating with other public agencies that are concerned with water quality control; and
- Informing and involving the public on water quality issues.

1.4 WATER QUALITY CONTROL PLAN

By law, the Water Board is required to develop, adopt (after public hearing), and implement a Basin Plan for the Region. The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the Region. The plan must include:

- A statement of beneficial water uses that the Water Board will protect;
- The water quality objectives needed to protect the designated beneficial water uses; and
- The strategies and time schedules for achieving the water quality objectives.

The Water Board first adopted a plan for waters inland from the Golden Gate in 1968. After several revisions, the first comprehensive Basin Plan for the Region was adopted by the Water Board and approved by the State Water Board in April 1975. Subsequently, major revisions were adopted in 1982, 1986, 1992, 1995, 2002, and 2004. Each proposed amendment to the Basin Plan is subject to an extensive public review process. The Water Board must then adopt the amendment, which is then subject to approval by the State Water Board. In most cases, the Office of Administrative Law and the U.S. Environmental Protection Agency (U.S. EPA) must approve the amendment as well.

The basin planning process drives the Water Board's effort to manage water quality. The Basin Plan provides a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses in a manner that will result in maximum benefit to the people of California. The Basin Plan fulfills the following needs:

- The U.S. EPA requires such a plan in order to allocate federal grants to cities and districts for construction of wastewater treatment facilities.
- The Basin Plan provides a basis for establishing priorities as to how both state and federal grants are disbursed for constructing and upgrading wastewater treatment facilities.
- The Basin Plan fulfills the requirements of the Porter-Cologne Act that call for water quality control plans in California.
- The Basin Plan, by defining the resources, services, and qualities of aquatic ecosystems to be maintained, provides a basis for the Water Board to establish or revise waste discharge requirements and for the State Water Board to establish or revise water rights permits.
- The Basin Plan establishes conditions (discharge prohibitions) that must be met at all times.
- The Basin Plan establishes or indicates water quality standards applicable to waters of the Region, as required by the federal Clean Water Act.

- The Basin Plan establishes water quality attainment strategies, including total maximum daily loads (TMDLs) required by the Clean Water Act, for pollutants and water bodies where water quality standards are not currently met.

The intent of this comprehensive planning effort is to provide positive and firm direction for future water quality control. However, adequate provision must be made for changing conditions and technology. The Water Board will review the Basin Plan at least once every three years. Unlike traditional plans, which often become obsolete within a few years after their preparation, the Basin Plan is updated as deemed necessary to maintain pace with technological, hydrological, political, and physical changes in the Region.

This Basin Plan contains water quality regulations adopted by the Water Board, and approved by the State Water Board, the Office of Administrative Law, and U.S. EPA. It also contains statewide regulations adopted by the State Water Board and other state agencies that refer to activities regulated by the Water Board. For the most recent list of statewide regulations applicable in the Region, please refer to the State Water Board's "Compendium of Current, Statewide Applicable Water Quality Regulations." Federal laws and regulations also specify water quality standards and are available at U.S. EPA's website.

1.5 WATERSHED MANAGEMENT PLANNING

In 1995, the Water Board initiated a watershed management approach to regulating water quality, expanding its primary focus from point sources of pollution to include more diffuse sources such as urban and agricultural runoff. A five-year statewide Strategic Plan was completed in 2001 and guides the water resource protection efforts by the State and Regional Water Boards. A key component of the Strategic Plan is the Watershed Management Initiative (WMI).

A watershed is the area of land drained by a stream or river system. It is where water precipitates and collects, extending from ridges down to the topographic low points where the water drains into a river, bay, ocean, or other water body. A watershed includes surface water bodies (e.g., streams, rivers, lakes, reservoirs, wetlands, and estuaries), groundwater (e.g., aquifers and groundwater basins) and the surrounding landscape. Watershed management is a strategy for protecting water quality in all water bodies by looking at all components that make up a watershed area, including the natural environment, water supply, land uses and their effects on drainage, wastewater collection and discharges, and the ways humans interact with the water bodies.

In the Water Board's watershed management approach to water quality protection, water resource problems are identified and prioritized primarily on the basis of water quality within individual watersheds (i.e., the geographic drainage areas and groundwater basins used for management purposes). Unique solutions are developed for each watershed that consider all local conditions and pollution sources and rely on the input and involvement of local stakeholders. Major features of a watershed management approach are: targeting priority problems based on water quality information and monitoring, promoting stakeholder involvement in prioritization and management decisions, developing integrated solutions that make use of the expertise and authority of multiple agencies and organizations, and measuring success through monitoring and other collected data. The approach culminates in the creation and implementation of "watershed action plans."

The water quality of many water bodies continues to be degraded from pollutants discharged from diffuse sources, referred to as nonpoint sources, and from the cumulative impacts of multiple point sources such as drainage from urban areas, known as urban runoff. This degradation persists despite successful pollutant reduction efforts in the regulation of municipal and industrial

wastewater point source discharges through the NPDES program. Watershed management represents a shift from the approach that focuses on regulation of point sources to a more regional approach that acknowledges environmental impacts from all activities, and prioritizes regulation of these activities with input from local stakeholders.

Watersheds transcend political, social, and economic boundaries. It is important to engage all affected stakeholders in designing and implementing goals for the watershed to protect water quality. Groups formed to create watershed action plans may include representatives from all levels of government, public interest groups, industry, academic institutions, private landowners, concerned citizens and others. Tasks in a watershed action plan could include a wide range of actions, such as improving coordination between regulatory and permitting agencies, increasing citizen participation in watershed planning activities, improving public education on water quality and protection issues, and enforcing current regulations on a more consistent and prioritized basis.

1.6 THE SAN FRANCISCO ESTUARY PROJECT

The Water Board has been an active participant in the San Francisco Estuary Project (Estuary Project), a cooperative program aimed at promoting effective, environmentally sound management of the San Francisco Bay Estuary while protecting and restoring its natural resources. In 1993, the Estuary Project reached its goal of developing a Comprehensive Conservation and Management Plan (CCMP). The CCMP addresses five critical concerns identified by the Estuary Project's broad-based advisory committees: decline of biological resources; increased pollutants; freshwater diversion and altered flow regime; dredging and waterway modification; and intensified land use.

Implementation of the CCMP's over 140 recommended actions has been ongoing since the early 1990s. The Water Board serves as lead state agency, undertaking responsibility for ensuring that CCMP actions are carried out. The Estuary Project's Public Involvement and Education Program, which seeks to inform and involve the public in Estuary issues, is currently housed at the Water Board office.

FIGURES

Figure 1-1: San Francisco Bay Basin

CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The Water Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of waters of the State presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain these goals.

Beneficial use designations for any given water body do not rule out the possibility that other beneficial uses exist or have the potential to exist. Existing beneficial uses that have not been formally designated in this Basin Plan are protected whether or not they are identified. While the tables in this Chapter list a large, representative portion of the water bodies in our region, it is not practical to list each and every water body.

2.1 DEFINITION OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation)

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Water Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The California Ocean Plan prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance of natural water

quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code.

2.1.3 COLD FRESHWATER HABITAT (COLD)

Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold freshwater habitats generally support trout and may support anadromous salmon and steelhead fisheries as well. Cold water habitats are commonly well-oxygenated. Life within these waters is relatively intolerant to environmental stresses. Often, soft waters feed cold water habitats. These waters render fish more susceptible to toxic metals, such as copper, because of their lower buffering capacity.

2.1.4 COMMERCIAL AND SPORT FISHING (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

To maintain fishing, the aquatic life habitats where fish reproduce and seek their food must be protected. Habitat protection is under descriptions of other beneficial uses.

2.1.5 ESTUARINE HABITAT (EST)

Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.

Estuarine habitat provides an essential and unique habitat that serves to acclimate anadromous fishes (e.g., salmon, striped bass) migrating into fresh or marine water conditions. The protection of estuarine habitat is contingent upon (1) the maintenance of adequate Delta outflow to provide mixing and salinity control; and (2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities). Estuarine habitat is generally associated with moderate seasonal fluctuations in dissolved oxygen, pH, and temperature and with a wide range in turbidity.

2.1.6 FRESHWATER REPLENISHMENT (FRESH)

Uses of water for natural or artificial maintenance of surface water quantity or quality.

Fresh water inputs are important for maintaining salinity balance, flow, and/or water quantity for such surface water bodies as marshes, wetlands, and lakes.

2.1.7 GROUNDWATER RECHARGE (GWR)

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect

quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher water quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

The water quality provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. Natural tidal movement in estuaries and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug

one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Navigation is a designated use where water is used for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PROC)

Uses of water for industrial activities that depend primarily on water quality.

Water quality requirements differ widely for the many industrial processes in use today. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.

Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

Public access to drinking water reservoirs is limited or prohibited by reservoir owner/operators for purposes of protecting drinking water quality and public health. In some cases, access to reservoir tributaries is also prohibited. For these water bodies, REC-1 is designated as E*, for the purpose of protecting water quality. No right to public access is intended by this designation.

2.1.16 NONCONTACT WATER RECREATION (REC2)

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of

considerable concern in shellfish regulation. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well-oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

2.1.19 WARM FRESHWATER HABITAT (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other fish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of nonfish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, and sedimentation, as well as by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 EXISTING AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), commercial and sport fishing (COMM), freshwater replenishment (FRSH), industrial process supply (PROC), groundwater recharge (GWR), preservation of rare and endangered species (RARE), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN).

The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to COMM, RARE, REC1, REC2, WILD, MIGR, and SPWN.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); industrial service supply (IND); navigation (NAV); marine habitat (MAR); shellfish harvesting (SHELL); commercial and sport fishing (COMM); wildlife habitat (WILD), fish migration (MIGR), fish spawning (SPWN), and preservation of rare and endangered species (RARE). In addition, the California coastline within the Region is endowed with exceptional scenic beauty.

The beneficial uses of any specifically identified water body generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the Water Board's judgment regarding water quality control measures necessary to protect beneficial uses will be applied.

Beneficial uses of streams that have intermittent flows, as is typical of many streams in the region, must be protected throughout the year and are designated as "existing."

Beneficial uses of each significant water body have been identified and are organized according to the seven major Hydrologic Planning Areas within the Region (Figure 2-2). The maps locating each water body (Figures 2-3 through 2-9b) were produced using a geographical information system (GIS) at the Water Board. The maps use the hydrologic basin information compiled by the California Interagency Watershed map, with supplemental information from the Oakland Museum of California Creek and Watershed Map series, the Contra Costa County Watershed Atlas, and the San Francisco Estuary Institute EcoAtlas. More detailed representations of each location can be created using this GIS version.

Table 2-1 contains the beneficial uses for many surface water bodies in the Region, organized geographically by the Region's seven Hydrologic Planning Areas. Within each Hydrologic Planning Area, water bodies are listed geographically, with tributaries indented below their receiving water body. In cases where a water body shares the same name with another water body (e.g., Redwood Creek), the location of the water body (county and/or other identifier) is given in

parentheses. An alternative name for a water body, where known, is also shown in parentheses. In Table 2-1, beneficial uses are indicated as follows:

E – indicates the beneficial use exists in the water body.

E* – indicates public access to the water body is limited or prohibited for purposes of protecting drinking water quality and public health. REC-1 is designated as E* for the purpose of protecting water quality. No right to public access is intended by this designation.

P – indicates the water body could potentially support the beneficial use.

2.2.2 GROUNDWATER

Groundwater is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where groundwater occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers.

Water-bearing geologic units occur within groundwater basins in the Region that do not meet the definition of an aquifer. For instance, there are shallow, low permeability zones throughout the Region that have extremely low water yields. Groundwater may also occur outside of currently identified basins. Therefore, for basin planning purposes, the term “groundwater” includes all subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified groundwater basins.

The California Department of Water Resources (DWR) evaluated the characteristics of groundwater basins in the Region and throughout the state and summarized the results in California’s Groundwater, Bulletin 118 (2003). Of special importance to the Region are the 28 groundwater basins and seven sub-basins classified by DWR that produce, or potentially could produce, significant amounts of groundwater (Figures 2-10 and 2-10A-D). The Water Board maintains a GIS for all water bodies in the Region and has the capacity to present information on each basin at a much higher level of resolution than is depicted in Figures 2-10A-D.

Existing and potential beneficial uses applicable to groundwater in the Region include municipal and domestic water supply (MUN), industrial service supply (IND), industrial process supply (PROC), agricultural water supply (AGR), groundwater recharge (GWR), and freshwater replenishment to surface waters (FRSH). Table 2-2 lists the 28 identified groundwater basins and seven sub-basins located in the Region and their existing and potential beneficial uses.

Unless otherwise designated by the Water Board, all groundwater is considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making any exceptions, the Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63 and Water Board Resolution No. 89-39, “Sources of Drinking Water,” where:

- The total dissolved solids exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, µS/cm, electrical conductivity), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either

Best Management Practices (BMPs) or best economically achievable treatment practices; or

- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or
- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3.

2.2.3 WETLANDS

Federal administrative law (e.g., 40 CFR Part 122.2, revised December 22, 1993) defines wetlands as waters of the United States. National waters include waters of the State of California, defined by the Porter-Cologne Act as "any water, surface or underground, including saline waters, within the boundaries of the State" (California Water Code §13050[e]). Wetland water quality control is therefore clearly within the jurisdiction of the State Water Board and Regional Water Boards.

Wetlands are further defined in 40 CFR 122.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The Water Board recognizes that wetlands frequently include areas commonly referred to as saltwater marshes, freshwater marshes, open or closed brackish water marshes, mudflats, sandflats, unvegetated seasonally ponded areas, vegetated shallows, sloughs, wet meadows, playa lakes, natural ponds, vernal pools, diked baylands, seasonal wetlands, floodplains, and riparian woodlands.

Mudflats make up one of the largest and most important habitat types in the Estuary. Snails, clams, worms, and other animals convert the rich organic matter in the mud bottom to food for fish, crabs, and birds.

Mudflats generally support a variety of edible shellfish, and many species of fish rely heavily on the mudflats during at least a part of their life cycle. Additionally, San Francisco Bay mudflats are one of the most important habitats on the coast of California for millions of migrating shorebirds.

Another important characteristic of the Estuary is the fresh, brackish, and salt water marshes around the Bay's margins. These highly complex communities are recognized as vital components of the Bay system's ecology. Most marshes around the Bay have been destroyed through filling and development. The protection, preservation, and restoration of the remaining marsh communities are essential for maintaining the ecological integrity of the Estuary.

Identifying wetlands may be complicated by such factors as the seasonality of rainfall in the Region. Therefore, in identifying wetlands considered waters of the United States, the Water Board will consider such indicators as hydrology, hydrophytic plants, and/or hydric soils for the purpose of mapping and inventorying wetlands. The Water Board will, in general, rely on the federal manual for wetland delineation in the Region when issuing Clean Water Act Section 401 water quality certifications (U.S. Army Corps of Engineers (Corps) Wetlands Delineation Manual, 1987). In the rare cases where the U.S. EPA and Corps guidelines disagree on the boundaries for federal

jurisdictional wetlands, the Water Board will rely on the wetlands delineation made by the U.S. EPA or the California Department of Fish and Game (CDFG). For the purpose of mapping and inventorying wetlands, the Water Board will rely on the protocols and naming conventions of the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS).

Many individual wetlands provide multiple benefits depending on the wetland type and location. There are many potential beneficial uses of wetlands, including Wildlife Habitat (WILD); Preservation of Rare and Endangered Species (RARE); Shellfish Harvesting (SHELL); Water Contact Recreation (REC1); Noncontact Water Recreation (REC2); Commercial, and Sport Fishing (COMM); Marine Habitat (MAR); Fish Migration (MIGR); Fish Spawning (SPAWN); and Estuarine Habitat (EST). Some of these general beneficial uses can be further described in terms of their component wetland function. For example, many wetlands that provide groundwater recharge (GWR) also provide flood control, pollution control, erosion control, and stream baseflow.

Table 2-3 shows how beneficial uses are associated with different wetland types. Table 2-4 lists and specifies beneficial uses for 34 significant wetland areas within the Region; generalized locations of these wetlands are shown in Figure 2-11. It should be noted that most of the wetlands listed in Table 2-4 are saltwater marshes, and that the list is not comprehensive.

The Water Board has participated in completing the Baylands Ecosystem Habitat Goals Report (1999) and the Baylands Ecosystem Species and Community Profiles (2000), which were written by scientists and managers in the Region in order to recommend sound wetland restoration strategies. Other efforts around the Bay to locate wetland sites include San Francisco Estuary Institute's (SFEI) EcoAtlas Baylands Maps (Baylands Maps) and Bay Area Wetlands Project Tracker (Wetlands Tracker), and the Wetland Tracker managed by the San Francisco Bay Joint Venture. Because of the large number of small and non-contiguous wetlands, it is not practical to delineate and specify beneficial uses of every wetland area. Therefore, beneficial uses may be determined site specifically, as needed. Chapter 4 of this Plan contains additional information on the process used to determine beneficial uses for specific wetland sites.

FIGURES

Figure 2-1: Areas of Special Biological Significance

Figure 2-2: Hydrologic Planning Areas

Legend for Figures 2-3 through 2-9b

Figures 2-3 through 2-3b: Marin Coastal Basin

Figures 2-4 through 2-4b: San Mateo Coastal Basin

Figure 2-5: Central Basin

Figures 2-6 through 2-6b: South Bay Basin

Figures 2-7 through 2-7b: Santa Clara Basin

Figures 2-8 through 2-8b: San Pablo Basin

Figures 2-9 through 2-9b: Suisun Basin

Figure 2-10: Significant Groundwater Basins

Figure 2-10A: Groundwater Basins: Marin / Sonoma / Napa

Figure 2-10B: Groundwater Basins: Napa / Solano

Figure 2-10C: Groundwater Basins: San Francisco

Figure 2-10D: Groundwater Basins: East and South Bay

Figure 2-11: General Locations of Wetland Areas

TABLES

Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

Table 2-2: Existing and Potential Beneficial Uses of Groundwater in Identified Basins

Table 2-3: Examples of Existing and Potential Beneficial Uses of Selected Wetlands

Table 2-4: Beneficial Uses of Wetland Areas

CHAPTER 3: WATER QUALITY OBJECTIVES

The overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. California's regulatory framework uses water quality objectives both to define appropriate levels of environmental quality and to control activities that can adversely affect aquatic systems.

3.1 WATER QUALITY OBJECTIVES

There are two types of objectives: narrative and numerical. Narrative objectives present general descriptions of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives.

Historically, numerical objectives were developed primarily to limit the adverse effect of pollutants in the water column. Two decades of regulatory experience and extensive research in environmental science have demonstrated that beneficial uses are not fully protected unless pollutant levels in all parts of the aquatic system are also monitored and controlled. The Regional Board is actively working towards an integrated set of objectives, including numerical sediment objectives, that will ensure the protection of all current and potential beneficial uses.

Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself, and the toxicity of the water to aquatic organisms. These objectives are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses (as described in Chapter 2).

The technical bases of the region's water quality objectives include extensive biological, chemical, and physical partitioning information reported in the scientific literature, national water quality criteria, studies conducted by other agencies, and information gained from local environmental and discharge monitoring (as described in Chapter 6). The Regional Board recognizes that limited information exists in some cases, making it difficult to establish definitive numerical objectives, but the Regional Board believes its conservative approach to setting objectives has been proper. In addition to the technical review, the overall feasibility of reaching objectives in terms of technological, institutional, economic, and administrative factors is considered at many different stages of objective derivation and implementation of the water quality control plan.

Together, the narrative and numerical objectives define the level of water quality that shall be maintained within the region. In instances where water quality is better than that prescribed by the objectives, the state Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy With Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation. The state's Antidegradation Policy is consistent with the federal Antidegradation Policy, as interpreted by the State Water Resources Control Board in State Board Order No. 86-17.

When uncontrollable water quality factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, the Regional Board will conduct a case-by-case analysis of the benefits and costs of preventing further degradation. In cases where this analysis indicates that beneficial uses will be adversely impacted by allowing further

degradation, then the Regional Board will not allow controllable water quality factors to cause any further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.

The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. The same objectives cannot be applied at or immediately adjacent to submerged effluent discharge structures. Zones of initial dilution within which higher concentrations can be tolerated will be allowed for such discharges.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from submerged outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

Compliance with water quality objectives may be prohibitively expensive or technically impossible in some cases. The Regional Board will consider modification of specific water quality objectives as long as the discharger can demonstrate that the alternate objective will protect existing beneficial uses, is scientifically defensible, and is consistent with the state Antidegradation Policy. This exception clause properly indicates that the Regional Board will conservatively compare benefits and costs in these cases because of the difficulty in quantifying beneficial uses.

These water quality objectives are considered necessary to protect the present and potential beneficial uses described in Chapter 2 of this Plan and to protect existing high quality waters of the state. These objectives will be achieved primarily through establishing and enforcing waste discharge requirements and by implementing this water quality control plan.

3.2 OBJECTIVES FOR OCEAN WATERS

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revision to them will apply to ocean waters. These plans describe objectives and effluent limitations for ocean waters.

3.3 OBJECTIVES FOR SURFACE WATERS

The following objectives apply to all surface waters within the region, except the Pacific Ocean.

3.3.1 BACTERIA

Table 3-1 provides the bacterial water quality objectives for marine and freshwaters in the region and identifies the sources of those objectives.

3.3.3.1 Implementation Provisions for Water Contact Recreation Bacteria Objectives

Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL. In the context of a TMDL, the Water Board may implement the objectives in fresh and marine waters by using a “reference system and antidegradation approach” as discussed below. Implementation of water quality objectives for bacteria using a “reference system and antidegradation approach” requires control of bacteria from all anthropogenic sources so that bacteriological water quality is consistent with that of a reference system. A reference system is defined as an area (e.g., a subwatershed or catchment) and associated monitoring point(s) that is minimally impacted by human activities that potentially affect bacteria densities in the reference receiving water body.

This approach recognizes that there are natural sources of bacteria (defined as non-anthropogenic sources) that may cause or contribute to exceedances of the objectives for indicator bacteria. It also avoids requiring treatment or diversion of water bodies or treatment of natural sources of bacteria from undeveloped areas. Such requirements, if imposed by the Water Board, could adversely affect valuable aquatic life and wildlife beneficial uses supported by water bodies in the region.

Under the reference system approach, a certain frequency of exceedance of bacteria water quality objectives shall be permitted. The permitted number of exceedances shall be based on the observed exceedance frequency in a selected reference system(s) or the targeted water body, whichever is less. The “reference system and antidegradation approach” ensures that bacteriological water quality is at least as good as that of a reference system and that no degradation of existing bacteriological water quality is permitted where existing bacteriological water quality is better than that of the selected reference system(s).

3.3.2 BIOACCUMULATION

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

3.3.3 BIOSTIMULATORY SUBSTANCES

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

3.3.4 COLOR

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

3.3.5 DISSOLVED OXYGEN

For all tidal waters, the following objectives shall apply:

In the Bay:

Downstream of Carquinez Bridge	5.0 mg/L minimum
Upstream of Carquinez Bridge	7.0 mg/L minimum

For nontidal waters, the following objectives shall apply:

Waters designated as:

Cold water habitat	7.0 mg/L minimum
Warm water habitat	5.0 mg/L minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation.

Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/L and 7 mg/ are frequently used as objectives to protect fish life, higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

For Suisun Marsh, the following objectives shall apply:

DO Objectives	DO Concentrations	Applicability
Acute objective	3.8 mg/L minimum (daily average)	Year-round in all sloughs and channels
Chronic objectives	5.0 mg/L minimum (30-day running average)	Year-round in all sloughs and channels
	6.4 mg/L minimum (30-day running average)	January 1 through April 30 in Montezuma, Nurse, and Denverton sloughs only

3.3.6 FLOATING MATERIAL

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.7 OIL AND GREASE

Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

3.3.8 POPULATION AND COMMUNITY ECOLOGY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.9 pH

The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

3.3.10 RADIOACTIVITY

Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations (CCR), which is incorporated by reference into this Plan. This incorporation is prospective, including future changes to the incorporated provisions as the changes take effect (see Table 3-5).

3.3.11 SALINITY

Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

3.3.12 SEDIMENT

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.

3.3.13 SETTLEABLE MATERIAL

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

3.3.14 SUSPENDED MATERIAL

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.15 SULFIDE

All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment.

Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.

3.3.16 TASTES AND ODORS

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

3.3.17 TEMPERATURE

Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan.

In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
- The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature

3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.

Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.19 TURBIDITY

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

3.3.20 UN-IONIZED AMMONIA

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits (in mg/L as N):

Annual Median	0.025
Maximum, Central Bay (as depicted in Figure 2-5) and upstream	0.16
Maximum, Lower Bay (as depicted in Figures 2-6 and 2-7):	0.4

The intent of this objective is to protect against the chronic toxic effects of ammonia in the receiving waters. An ammonia objective is needed for the following reasons:

- Ammonia (specifically un-ionized ammonia) is a demonstrated toxicant. Ammonia is generally accepted as one of the principle toxicants in municipal waste discharges. Some industries also discharge significant quantities of ammonia.
- Exceptions to the effluent toxicity limitations in Chapter 4 of the Plan allow for the discharge of ammonia in toxic amounts. In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly. However, this does not occur in all cases, the South Bay being a notable example. The ammonia limit is recommended in order to preclude any build up of ammonia in the receiving water.
- A more stringent maximum objective is desirable for the northern reach of the Bay for the protection of the migratory corridor running through Central Bay, San Pablo Bay, and upstream reaches.

3.3.21 OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants for surface waters are given in Tables 3-3, 3-3A, 3-3B, 3-3C, 3-4 and 3-4A.

The Water Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Water Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. The objectives in Tables 3-3 and 3-4 apply throughout the region except as otherwise indicated in the tables or when site-specific objectives for the pollutant parameter have been adopted. Site-

specific objectives have been adopted for copper in segments of San Francisco Bay (see Figure 7.2-1-01), for nickel in South San Francisco Bay (Table 3-3A), and for cyanide in all San Francisco Bay segments (Table 3-3C). Objectives for mercury that apply to San Francisco Bay are listed in Table 3-3B. Objectives for mercury that apply to Walker Creek, Soulajule Reservoir, and their tributaries, and to waters of the Guadalupe River watershed are listed in Table 3-4A.

South San Francisco Bay south of the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Water Board. Controlling urban and upland runoff sources is critical to the success of maintaining water quality in this portion of the Bay. Site-specific water quality objectives have been adopted for dissolved copper and nickel in this Bay segment. Site-specific objectives may be appropriate for other pollutants of concern, but this determination will be made on a case-by-case basis, and after it has been demonstrated that all other reasonable treatment, source control and pollution prevention measures have been exhausted. The Water Board will determine whether revised water quality objectives and/or effluent limitations are appropriate based on sound technical information and scientific studies, stakeholder input, and the need for flexibility to address priority problems in the watershed.

3.3.22 CONSTITUENTS OF CONCERN FOR MUNICIPAL AND AGRICULTURAL WATER SUPPLIES

At a minimum, surface waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Table 64431-A (Inorganic Chemicals) of Section 64431, and Table 64433.2-A (Fluoride) of Section 64433.2, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (SMCLs-Consumer Acceptance Limits) and 64449-B (SMCLs-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Table 3-5 contains water quality objectives for municipal supply, including the MCLs contained in various sections of Title 22 as of the adoption of this plan.

At a minimum, surface waters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

3.3.23 OBJECTIVES FOR GROUNDWATER

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Water Board will establish basin- and/or site-specific numerical groundwater objectives as necessary. For example, the Water Board has groundwater basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table 3-7.

The maintenance of existing high quality of groundwater (i.e., "background") is the primary groundwater objective.

In addition, at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater. Under existing law, the Water Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste

discharges that affect groundwater that is in continuity with surface water cannot cause violations of any applicable surface water standards.

3.3.24 BACTERIA

In groundwater with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL) (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

3.3.25 ORGANIC AND INORGANIC CHEMICAL CONSTITUENTS

All groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., U.S. Environmental Protection Agency (U.S. EPA), the State Water Board, California Department of Health Services (DHS), U.S. Food and Drug Administration, National Academy of Sciences, California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA), U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control (DTSC), and other appropriate organizations.)

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) of Section 64431, Table 64433.2-A (Fluoride) of Section 64433.2, and Table 64444-A (Organic Chemicals) of Section 64444. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

Groundwater with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. In determining compliance with this objective, the Water Board will consider as evidence relevant and scientifically valid water quality goals from sources such as the Food and Agricultural Organizations of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria," as well as other relevant and scientifically valid evidence. At a minimum, groundwater designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

Groundwater with a beneficial use of freshwater replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Groundwater with a beneficial use of industrial service supply or industrial process supply shall not contain pollutant levels that impair current or potential industrial uses.

3.3.26 RADIOACTIVITY

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 4 (Radioactivity) of Section 64443 of Title 22, which is incorporated by reference into this plan. This incorporation-

by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.3.27 TASTE AND ODOR

Groundwater designated for use as domestic or municipal supply (MUN) shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, groundwater designated for use as domestic or municipal supply shall not contain concentrations in excess of the SMCLs specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.4 OBJECTIVES FOR THE DELTA

The objectives contained in the State Water Board's 1995 "Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary" and any revisions thereto shall apply to the waters of the Sacramento-San Joaquin Delta and adjacent waters as specified in that plan.

3.5 OBJECTIVES FOR ALAMEDA CREEK WATERSHED

The water quality objectives contained in Table 3-7 apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

Wastewater discharges that cause the surface water limits in Table 3-7 to be exceeded may be allowed if they are part of an overall wastewater resource operational program developed by those agencies affected and approved by the Water Board.

TABLES

Table 3-1: Water Quality Objectives for Bacteria

Table 3-3: Marine Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-3A: Water Quality Objectives for Copper and Nickel in San Francisco Bay Segments

Table 3-3B: Marine Water Quality Objectives for Mercury in San Francisco Bay

Table 3-3C: Marine Water Quality Objectives for Cyanide in San Francisco Bay

Table 3-4: Freshwater Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-4A: Freshwater Water Quality Objectives for Mercury in Walker Creek, Soulajule Reservoir, and All Tributary Waters

Table 3-5: Water Quality Objectives for Municipal Supply

Table 3-6: Water Quality Objectives for Agricultural Supply

Table 3-7: Water Quality Objectives for the Alameda Creek Watershed above Niles

CHAPTER 4: IMPLEMENTATION PLANS

INTRODUCTION

The San Francisco Bay Regional Water Quality Control Board (Water Board)'s overall mission is to protect the beneficial uses supported by the quality of the San Francisco Bay Region (Region)'s surface water and groundwater. Together, the beneficial uses described in detail in Chapter 2 define the resources, services, and qualities of aquatic ecosystems that are the ultimate goals of protecting and achieving water quality. The objectives presented in Chapter 3 present a framework for determining whether water quality is indeed supporting these beneficial uses. This chapter describes in detail the Water Board's regulatory programs and specific plans of action for meeting water quality objectives and protecting beneficial uses.

The descriptions of specific actions to be taken by local public entities and industries to comply with the policies and objectives of this Water Quality Control Plan (Basin Plan) are intended for the guidance of local officials. The Water Board will consider any proposed alternative actions that are consistent with and achieve the policies and objectives of the Basin Plan.

This chapter describes the watershed management conceptual framework for water quality control in the Region and presents each of the individual regulatory programs that form part of this comprehensive approach. These programs are organized into general categories, including surface water protection and management, groundwater protection and management, wetland protection and management, and emerging program areas. Taken together, these programs constitute an integrated, comprehensive water quality control program that is protective, efficient, and flexible.

4.1 THE WATERSHED MANAGEMENT APPROACH

In 1995, the Water Board initiated a watershed management approach to regulating water quality, expanding its primary focus from point sources of pollution to include more diffuse sources such as urban and agricultural runoff. A five-year statewide Strategic Plan guides the water resource protection efforts of the State and Regional Water Boards. A key component of the Strategic Plan is the Watershed Management Initiative (WMI), which promotes a watershed management approach for water quality protection as discussed in Chapter 1.

The WMI is designed to integrate various surface water and groundwater regulatory programs while promoting cooperative, collaborative efforts within a watershed that are designed to improve water quality and protect the beneficial uses of the watershed's water bodies. The WMI is also designed to focus limited funding and resources on the highest priority water quality issues identified by the Water Board in consultation with local stakeholders. The Water Board's strategy for the WMI is contained in the report titled, "San Francisco Bay Regional Water Quality Control Board Watershed Management Initiative, Integrated Plan Chapter." This report is a regularly updated planning tool for identifying priorities to be funded by existing resources, as well as priority tasks that are currently not funded. For each update, activities are planned over the next one to two years, and in some cases, over the next five years. The report also contains descriptions of regional and watershed strategies, discusses how the Water Board is structured to implement the WMI, and how the Water Board is implementing a priority-setting process. The WMI builds upon the progress made to date by the Water Board's efforts, combined with local watershed efforts led by other entities, and it also identifies tasks to be accomplished to fully implement the WMI. Examples of local implementation of the WMI are included in Section 4.1.3 Watershed Management in Countywide Programs and Individual Watersheds.

To implement the WMI in the Region, there are three levels of watershed management: 1) region-wide, 2) countywide, and 3) in sub-watersheds. This watershed management process is flexible and recognizes the existing institutional structures that can implement watershed management to protect water quality.

Some water quality issues are managed at the region-wide level. For example, the Water Board's water quality control program focuses in part on managing the influx of toxic pollutants to the Estuary's aquatic system, described in Section 4.1.2 Toxic Pollutant Management in the San Francisco Estuary System. The goal of this program element is to limit the total amount of pollutants in the entire system to ensure protection of beneficial uses. In cases where evidence suggests beneficial uses are not protected due to specific pollutants in the system, the program described in Section 4.1.1 Water Quality Attainment Strategies, Including Total Maximum Daily Loads is initiated.

Other water quality issues are managed at the countywide level. The Region includes portions of nine counties, which all include shoreline on the Bay, permitted discharges to the Bay, and watershed drainage to the Bay. These institutions are therefore well suited to organize and/or participate in a watershed management approach at the countywide level, forming stakeholder groups that include municipalities, other organizations, and members of the public. Examples are discussed in Section 4.1.3 Watershed Management in Countywide Programs and Individual Watersheds. For example, several urban runoff management programs are organized at this countywide level.

Sub-watershed level watershed management occurs within the county-wide framework, as a result of priority setting that is strongly influenced by local input.

4.1.1 Water Quality Attainment Strategies, Including Total Maximum Daily Loads

The Water Board intends to establish Water Quality Attainment Strategies (WQAS) including Total Maximum Daily Loads (TMDLs) where necessary and appropriate to ensure attainment and maintenance of water quality standards. WQAS and TMDLs for the Region are described in Chapter 7. Section 303(d) of the federal Clean Water Act requires states to identify water bodies that are not attaining water quality standards, and to establish TMDLs for pollutants causing the impairment (non-attainment of water quality standards) of listed water bodies. As such, TMDLs are the pollutant load levels necessary to attain the applicable water quality standards. A complete TMDL refers to the process and elements associated with establishing a TMDL that include, but are not limited to, problem statement, numeric target(s), source analysis, linkage analysis, wasteload and load allocations, implementation plan, and monitoring plan.

WQAS are development and implementation actions associated with implementing (attaining) water quality standards. Complete TMDLs are WQAS, but WQAS are not limited to 303(d)-list pollutants. For example, they may be developed for pollutants for which threat of impairment provides cause for pollution prevention actions and related activities. WQAS may contain, but not necessarily include, all or some of the complete TMDL elements.

The Water Board will establish WQAS including TMDLs at the level (the Estuary, smaller segments within the Estuary, or individual watersheds) deemed most appropriate in terms of effectiveness and efficiency relative to the applicable water quality standard, types and locations of pollutant sources, and type and scale of implementation actions.

4.1.2 Toxic Pollutant Management in the Estuary

The Water Board's water quality programs began decades ago with a focus on controlling the discharge of point sources of pollution such as municipal sewage and industrial wastewater. Since then, highly effective waste treatment systems have been built, essentially eliminating what had been major water quality problems associated with high nutrient and organic loading. In addition, the overall influx of toxic pollutants from point sources has significantly declined as a result of these efforts. Still, certain toxic pollutants remain a great concern.

The focus of efforts to attain water quality goals has expanded accordingly. Further reductions in point source pollutant loadings are being attained through complex, innovative programs often involving numerous public agencies and private organizations. Loading from diffuse sources, such as urban and agricultural runoff, had until recently, continued largely unchecked. These sources are now generally considered to be the largest source of pollutants to aquatic systems. Water Board programs aim to reduce this diffuse pollutant loading.

4.1.2.1 Numeric Water Quality Objectives: Wasteload Allocations

The numerical objectives presented in Chapter 3 define maximum levels of individual pollutants allowed in the waters of the region. These objectives are based on extensive technical information that relates concentrations of pollutants in water to adverse effects on beneficial uses.

Assuring that pollutant concentrations throughout the whole Estuary system will meet objectives for each pollutant requires (a) information on the fate, transport, and distribution of that pollutant and (b) quantification of loading from all sources, including riverine inputs, urban and agricultural runoff, and point source discharges. When this information is available, the total amount of each pollutant that can enter the system without exceeding water quality objectives can be calculated. The maximum pollutant load can then be allocated among all sources, a process known as wasteload allocation. By considering pollutant influx from all sources, wasteload allocation supports the identification and implementation of the most effective and economically efficient means of achieving water quality objectives in the larger Estuary system.

There are three limitations to this approach. First, there are many pollutants of local concern for which objectives have not been developed and adopted. The objectives for specific toxic pollutants contained in Chapter 3 are reasonable for the purposes of interim regulation because they provide a minimum level of protection in the Estuary; however, additional objectives are necessary to fully implement the wasteload allocation approach. The Water Board will establish water quality objectives for selected pollutants as the necessary technical information becomes available and a framework for assessing economic factors is developed.

Second, the wasteload allocation approach only considers the impact of individual pollutants. Aquatic systems in the region contain mixtures of pollutants in a complex and variable water matrix. Implementation of the toxicity objective described in the following section addresses this issue.

Finally, substances that accumulate in sediment or organisms pose a more complicated problem for water quality control. The additional considerations necessary for these pollutants are described below.

4.1.2.2 Toxic Pollutant Accumulation: Mass-Based Strategies

Wasteload allocations based on the achievement of numeric water quality objectives will provide appropriate protection of beneficial uses for many toxic pollutants. For some pollutants, however, concentrations in water are not good indicators of their impairment of beneficial uses. Instead, wasteload allocations for such compounds are developed based on mass rather than concentration, and tissue and sediment concentrations. Typically, mass-based allocations require more extensive technical information on the fate and transport of pollutants in the system than those based on water alone.

The Water Board implements the narrative objectives regarding sediment accumulation and bioaccumulation in several ways. These are discussed in greater detail later in this chapter. In general, pollutants are identified and monitored in both discharges and the aquatic system. At a minimum, limits placed on point and nonpoint discharges take pollutant accumulation into consideration. Ultimately, the goal is to develop system-wide, mass-based wasteload allocations for appropriate substances.

4.1.2.3 Scientific Research: Ongoing Refinement of Programs

The quantity of pollutants in the Estuary system is the result of many complex and interacting factors beyond the total amount discharged day-to-day. Levels of pollutants in water, sediments, and aquatic organisms are regularly assessed through the Regional Monitoring Program and other surveillance described in Chapter 6.

In addition, implementation of this Water Quality Control Plan involves research and investigation on processes controlling the fate, transport, and distribution of pollutants. In the past, the Water Board has supported research on Delta outflow and associated flushing, sediment movement, chemical transformations within the aquatic system, and biological effects associated with existing and projected pollutant levels.

Information resulting from ongoing scientific research and regular monitoring within the Estuary is continuously incorporated into each of the programs described in detail later in this chapter. In addition, the Water Board typically requires technical investigations in situations where water quality problems have been identified but not enough information is available to craft appropriate courses of action. As a result, programs are constantly evolving as better scientific information becomes available.

4.1.2.4 Riverine Flows, System Flushing, and Pollutant Loading

4.1.2.4.1 Delta Outflow

In addition to pollution control measures, achieving water quality objectives and protecting the beneficial uses of the San Francisco Bay Estuary system (particularly fish migration and estuarine habitat) are depends on freshwater outflow from the Delta. Adequate freshwater inflow to the Bay system is necessary to control salinity, to provide mixing (particularly in the entrapment zone), to maintain proper temperature, and to flush out residual pollutants that cannot be eliminated by treatment or nonpoint source management. Except for local drainage and wastewater discharges, Delta outflow provides virtually all the freshwater inflow to San Francisco Bay. However, the availability of adequate Delta outflow to meet these needs is very uncertain because of the existing and potential upstream diversions of water and fluctuations in rainfall.

The State Board first addressed the issue of the Bay's inflow needs in the Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh and in the Water Rights Decision

1485, issued in August 1978. In these documents, the State Board established maximum salinity standards (but no corresponding flow standards for the Delta) and required the two major water diverters to conduct research and determine:

- Outflow needs in San Francisco Bay, including the ecological benefits of unregulated outflows and salinity gradients established by them; and
- The need for winter flows for long-term protection of striped bass and other aquatic organisms in the Delta.

In 1993, estuarine scientists and managers associated with the San Francisco Estuary Project recommended development of salinity standards for different parts of the year to be used in conjunction with flow standards. Specifically, they indicate that average upstream positions of the near-bottom 2 0/00 isohaline would be an appropriate index for salinity standards.

Technical evidence developed during the Estuary Project process and the State Board Bay/Delta hearings will be used to help formulate future amendments to the Basin Plan.

4.1.2.4.2 San Luis Drain

The San Luis Drain is a proposed method of funneling agricultural runoff from the San Joaquin Valley into the Delta.

Agricultural irrigation in the San Joaquin Valley leads to high salinity concentrations in the soil, which may be harmful to crops. To alleviate this condition, tile drains have been and are being installed to carry the saline water away from the fields. However, there have been adverse environmental effects associated with this wastewater.

In 1982, the U.S. Fish and Wildlife Service discovered selenium concentrations in fish from the San Luis Drain and Kesterson Reservoir to be as much as 100 times higher than background. It also found high mortalities and deformities among newborn coots, grebes, stilts, and ducks.

There was early concern about the potential for impacts on beneficial uses in the Estuary if the Drain were completed and discharged into the Delta. In response, the Water Board prohibited the proposed discharge in 1964, unless compelling evidence that the proposed discharge would not harm beneficial uses was submitted by proponents. In 1981, the Water Board requested that the State Board take the lead role in developing, revising, renewing, and enforcing waste discharge requirements for the Drain.

Unfortunately, the problem of agricultural drainage still exists. The San Joaquin Valley Drainage Program, another state and federal interagency program, has begun to investigate further the problems associated with the drainage of agricultural lands and to develop solutions.

4.1.3 Watershed Management: Countywide Programs and Individual Watersheds

Protection of beneficial uses associated with the Estuary also depends upon achieving water quality goals within each of the watersheds draining to the Bay. Successful wasteload allocations depend upon limiting pollutant influx from nonpoint as well as point sources. In turn, nonpoint source control is dependent on a wide range of factors, including physical factors such as the geology and hydrological characteristics of an area; existing natural resources such as vegetation along streambanks; and a wide range of human activities.

Watershed management planning in each countywide program or individual watershed involves a series of steps. First, a detailed assessment of current conditions, including identification of existing or potential problems, is conducted. Next, the process attempts to bring together all affected stakeholders and interested parties to determine how they would manage their watershed. Finally, specific actions are taken during implementation of the countywide or local watershed action plan.

The Water Board firmly believes that watershed planning and protection efforts will not be effective unless solutions are defined and implemented at the local level. The following sections present four examples of local watershed management planning activities supported by the Water Board.

4.1.3.1 The Napa River Watershed

The Water Board has initiated county-level watershed management planning efforts. The first began in the Napa River Watershed where depressed oxygen levels, high coliform levels, and sedimentation due to erosion were recurring problems in segments of the Napa River.

The Water Board initiated the planning process by preparing a complete resource evaluation in cooperation with a wide range of local public and private entities. This evaluation encompassed traditional evaluations of natural resources and also included descriptions of existing management and regulatory frameworks, funding, and tax incentive programs to support the local planning process.

The Water Board is supporting local agency staff, public officials, agricultural landowners, urban residents of Napa County, and the Napa Resource Conservation District in their efforts to define watershed management goals and specific actions that will eventually allow those goals to be met. In 1999, the Water Board issued waste discharge requirements (WDRs) for the Napa River Flood Control Project, which has set a national standard for innovative, community-based planning to ensure a "Living River" corridor along the Napa River that protects water quality, successfully integrating flood control, water quality, and habitat protection requirements.

4.1.3.2 The Santa Clara Basin Watershed Management Initiative

In 1996, the Water Board and the U.S. EPA initiated a broad stakeholder effort to encourage local stewardship in the Santa Clara basin as part of the statewide WMI. The Santa Clara basin is defined as the San Francisco Bay south of the Dumbarton Bridge and the watersheds draining to that segment of the Bay. The Santa Clara Basin Watershed Management Initiative is a broad-based stakeholder group of 32 signatories from local, state and federal public agencies, business and trade associations, and civic and environmental groups and programs. The declared purpose of this WMI is "to develop and implement a comprehensive watershed management program - one that recognizes that healthy watersheds mean addressing water quality problems and quality of life issues for the people, animals and plants that live in the watershed." This WMI first established a mission statement, goals, planning objectives for development of a watershed action plan, implementation objectives, and a framework for conducting a watershed assessment. The most outstanding successes of this WMI have been in sustaining organizational continuity, providing a forum for stakeholder input on regulatory actions, and producing a variety of outreach materials for the general public to assist in natural resource protection. This WMI has continued to develop its foundation by producing watershed assessments (2002), and a watershed action plan (2003), and by further developing its priorities for implementation to protect and improve water quality (2005).

4.1.3.3 The Tomales Bay Watershed

The Tomales Bay watershed in western Marin County is one of the major estuaries on the west coast of the United States. It has a diverse ecosystem and several notable tributaries, including Lagunitas Creek, which has one of the few remaining viable coho salmon runs in central California. In December 1999, the local citizens and state, federal, and local agencies formed the Tomales Bay Watershed Council. The Council produced a Stewardship Plan for the Tomales Bay watershed to ensure that water quality in Tomales Bay and its tributary streams is sufficient to support natural resources and beneficial uses. The plan also includes recommendations to restore and protect the integrity of natural habitats and native plant communities, which contribute to improved water quality. The Water Board has actively participated on the Council, working with the other agencies and interested parties to coordinate monitoring and recommend funding for grant projects for a variety of pollution prevention and restoration projects within the watershed.

4.1.3.4 The Contra Costa Watershed Forum

The Contra Costa Watershed Forum (CCWF) was established as a result of a countywide Creek and Watershed Symposium in 1999. The CCWF is an open committee of approximately 50 organizations, including federal, state, and local agencies; local governments; a professional watershed research organization; local non-profit environmental and education organizations; community volunteer groups; and private citizens. The CCWF staff are from the Contra Costa County Community Development Department. This diverse group of stakeholders is united by their concern for the watersheds of Contra Costa County. Through the coordinated activities of the CCWF, local creek and watershed groups have been sustained, and the CCWF has received grant funding for creek surveys and mapping, biological water quality (benthic macroinvertebrate) monitoring, and production of the Watershed Atlas. The Watershed Atlas compiles information on geography, hydrology, demographics, impervious surface, drainage patterns and much other information pertinent to water quality protection and evaluation, including activities of local watershed groups and restoration projects. The Water Board supports the CCWF by attendance at meetings, management of grant-funded projects, and work with CCWF staff on setting watershed priorities. These efforts are leading to water quality improvements as the citizens of Contra Costa County become more directly involved in assessing, monitoring, restoring, and protecting their watersheds.

4.2 DISCHARGE PROHIBITIONS APPLICABLE THROUGHOUT THE REGION

To protect water quality of all aquatic systems throughout the region, the discharge prohibitions listed in Table 4-1 apply. The Water Board will not allow exceptions to these prohibitions, except where noted below.

Exceptions to Prohibitions 1, 2, and 3 will be considered where:

- An inordinate burden would be placed on the discharger relative to beneficial uses protected and an equivalent level of environmental protection can be achieved by alternate means, such as an alternative discharge site, a higher level of treatment, and/or improved treatment reliability; or
- A discharge is approved as part of a reclamation project; or
- It can be demonstrated that net environmental benefits will be derived as a result of the discharge; or
- A discharge is approved as part of a groundwater clean-up project, and in accordance with Resolution No. 88-160 "Regional Board Position on the Disposal of Extracted Groundwater

from Groundwater Clean-up Projects," and it has been demonstrated that neither reclamation nor discharge to a POTW is technically and economically feasible, and the discharger has provided certification of the adequacy and reliability of treatment facilities and a plan that describes procedures for proper operation and maintenance of all treatment facilities. (The Water Board recognizes the resource value of extracted and treated groundwater and urges its utilization for the highest beneficial use for which applicable water quality standards can be achieved.)

In reviewing requests for exceptions, the Water Board will consider the reliability of the discharger's system in preventing inadequately treated wastewater from being discharged to the receiving water and the environmental consequences of such discharges.

Prohibitions 1 through 5 refer to particular characteristics of concern to beneficial uses. The Water Board may consider an exception to 4 provided that any proposed reclamation project demonstrates that beneficial uses will be protected. This broad language has been and will be interpreted by the Water Board on a case-by-case basis. It should be noted that the Water Board will consider all discharges of treated sewage and other discharges where the treatment process is subject to upset to contain particular characteristics of concern unless the discharger can demonstrate that the discharge of inadequately treated waste will be reliably prevented.

4.2.1 Summary

The detailed program descriptions presented in the remainder of this chapter are focused on protecting water quality in systems ranging from small creeks to the larger Estuary.

The section on point source control focuses primarily on protecting beneficial uses in each segment of the Estuary, as well as the whole system. The section on nonpoint source control focuses primarily on individual watersheds, but also on the contributions of runoff to the larger Bay system. The section on groundwater protection and management centers on groundwater basins within each watershed. The section on emerging program areas describes resources and issues that have increasingly become the focus of Water Board activity. Often, these areas require integrated and innovative approaches that are substantially different than those that exist in established programs.

4.3 POINT SOURCE CONTROL

Surface waters in the region consist of inland surface water (freshwater lakes, rivers, and streams), estuaries, enclosed bays, and ocean waters. Historical and ongoing wasteloads contributed to the surface water bodies in the region come from upstream discharges carried into the region via Delta outflow, direct input in the forms of point and nonpoint sources, and indirect input via groundwater seepage.

A point source usually refers to waste emanating from a single, identifiable location, while a nonpoint source usually refers to waste emanating from diffuse locations. While legally considered point sources, stormwater sewer systems are discussed under the nonpoint source control because waste entering the systems is generated from diffuse sources. This section describes control measures for point source discharges. The Water Board may control either type of discharge, but approaches may differ.

Wasteloads from point sources are those that are generally associated with pollutant discharges from an identifiable location to a specific receiving water body. Major types of point sources include:

- Treated municipal sewage discharged from Publicly Owned Treatment Works (POTWs), which often consist of a combination of domestic, industrial, and commercial waste streams;
- Treated industrial wastewater resulting from industrial operations, processing, cleaning, and cooling;
- Treated groundwater from clean-up of groundwater pollution sites; and,
- Other miscellaneous types of discharges, including certain non-point sources with a physically identifiable point of discharge.

4.4 WASTE DISCHARGE PERMITTING PROGRAM

Point source discharges to surface waters are generally controlled through waste discharge requirements issued under the federal National Pollutant Discharge Elimination System (NPDES) permits. Although the NPDES program was established by the federal Clean Water Act, the permits are prepared and enforced by the Water Boards per California's delegated authority for the act.

Issued in five-year terms, an NPDES permit usually contains components such as discharge prohibitions, effluent limitations, and necessary specifications and provisions to ensure proper treatment, storage, and disposal of the waste. The permit often contains a monitoring program that establishes monitoring stations at effluent outfall and receiving waters.

Under the state's Porter-Cologne Water Quality Control Act, any person discharging or proposing to discharge waste within the region (except discharges into a community sewer system) that could affect the quality of the waters of the state is required to file a Report Of Waste Discharge (ROWD). The Water Board reviews the nature of the proposed discharge and adopts Waste Discharge Requirements (WDRs) to protect the beneficial uses of waters of the state. Waste discharge requirements could be adopted for an individual discharge, or a specific type of discharges in the form of a general permit. The Water Board may waive the requirements for filing a ROWD or issuing WDRs for a specific discharge where such a waiver is not against the public interest. NPDES requirements may not be waived.

Acceptable control measures for point source discharges must ensure compliance with NPDES permit conditions, including the discharge prohibitions (Table 4-1) and the effluent limitations provided on the following pages. In addition, control measures must satisfy water quality objectives set forth in the Basin Plan unless the Water Board judges that related economic, environmental, or social considerations merit a modification after a public hearing process has been conducted. Control measures employed must be sufficiently flexible to accommodate future changes in technology, population growth, land development, and legal requirements.

4.5 EFFLUENT LIMITATIONS

4.5.1 Technology- and Water Quality-based Limitations

The federal Clean Water Act (CWA) requires that NPDES permits include technology-based and, where appropriate, water quality-based effluent limitations. Technology-based effluent limitations are promulgated performance standards based on secondary treatment or best practicable control technology. When technology-based limitations fail to attain or maintain acceptable water quality (as measured by water quality objectives) or comply with water quality control plans, additional or more stringent effluent limitations will be required in order to attain water quality objectives. The more stringent limitations are known as water quality-based limits.

Water quality-based effluent limitations will consist of narrative requirements and, where appropriate, numerical limits for the protection of the most sensitive beneficial uses of the receiving water. Establishing numeric limits takes into account the appropriate water quality objectives, background concentrations in the receiving water, and allowable dilution credit.

In many cases, numerical water quality objectives are not available for various types of beneficial uses or for various constituents of concern. In these cases, best professional judgment will be used in deriving numerical effluent limitations that will ensure attainment and maintenance of narrative water quality objectives.

4.5.2 Site-specific Objectives

In some cases, the Water Board may elect to develop and adopt site-specific water quality objectives. These objectives will reflect site-specific conditions and comply with the Antidegradation Policy. This situation may arise when:

- It is determined that promulgated water quality standards or objectives are not protective of beneficial uses; or
- Site-specific conditions warrant less stringent effluent limits than those based on promulgated water quality standards or objectives, without compromising the beneficial uses of the receiving water.

In the above cases, the Water Board may consider developing and adopting site-specific water quality objectives for the constituent(s) of concern. These site-specific objectives will be developed to provide the same level of environmental protection as intended by national criteria, but will more accurately reflect local conditions. Such objectives are subject to approval by the State Water Board, Office of Administrative Law, and U.S. EPA.

There may be cases where the promulgated water quality standard or adopted objectives are practically not attainable in the receiving water due to existing high concentrations. In such circumstances, discharges shall not cause impairment of beneficial uses.

Site-specific objectives have been adopted by the Water Board for copper in San Francisco Bay and for nickel in South San Francisco Bay (Table 3-3A) and for cyanide in San Francisco Bay (Table 3-3C).

4.5.3 Best Professional Judgment

In developing and setting water quality-based effluent limitations for toxic pollutants, best professional judgment will involve consideration of many factors. Factors that may be considered include:

- Applicable and relevant federal laws, regulation, and guidance (specifically 40 CFR 122 and 131;, promulgated National Toxics Rules, U.S. EPA Water Quality Criteria; and technical guidance on water-quality based toxics control);
- State laws, regulations, policies, guidance, and Water Quality Control Plans;
- This Regional Water Quality Control Plan;
- Achievability by available technology or control strategies;
- Effectiveness of pollution prevention and source control measures; and

- Economic and social costs and benefits.

While the conditions surrounding a waste discharge may vary from case to case, all attempts will be made to ensure consistency among permits when exercising best professional judgment.

The effluent limitations described below have been established to help achieve the water quality objectives identified in Chapter 3.

Numerical effluent limitations identified in this section may not contain a complete list of pollutants that have a reasonable potential to cause an adverse impact on water quality. Inclusion of such pollutants of concern into the NPDES permit will be evaluated on a case-by-case basis.

The Water Board will consider establishing more stringent limitations as necessary to meet water quality objectives and protect beneficial uses in particularly sensitive areas. Similarly, the Water Board will consider establishing less stringent limitations, consistent with state and federal laws, for any discharge where it can be conclusively demonstrated through a comprehensive program approved by the Water Board that such limitations will not result in unacceptable adverse impacts on the beneficial uses of the receiving water. Such a comprehensive program must evaluate the impact of other, nearby discharges as well as the discharge itself.

The numerical limits identified in this section have been and will be applied on a gross rather than a net basis except for certain industrial waste discharges, which will be evaluated on a case-by-case basis.

4.5.4 Discharges to Ocean Waters

Within the context of this Basin Plan, ocean waters of the region are all territorial marine waters of the state west of the coastline, except enclosed bays.

All discharges to ocean waters must comply with the applicable quality requirements for waste discharges specified in the State Water Board's Ocean Plan and Thermal Plan.

4.5.5 Discharges to Inland Surface Waters, Enclosed Bays, and Estuaries

Within the context of this plan, enclosed bays are the indentations along the coast that enclose an area of marine water (such as Tomales Bay and Drake's Estero) including San Francisco Bay; estuaries extend from a bay to points upstream where there is no significant mixing or fresh water or sea water (this includes significant portions of the main San Francisco Bay and the portions of streams draining to the Bay where salt and freshwater mix); and inland surface waters are all other waterbodies within the region (freshwater rivers, streams, lakes, and reservoirs). As described in Chapter 3, effluent limits for discharge into any surface water body within the region is based on salinity. These are defined in the State Enclosed Bays and Estuaries Policy, 1974.

4.5.5.1 Limitations For Conventional Pollutants

Table 4-2 contains effluent limitations for discharges to inland surface waters and enclosed bays and estuaries within the region.

Table 4-2A contains effluent limitations for bacteriological indicator organisms. All NPDES permits for discharges that contain sanitary waste shall include the applicable effluent limitations from Table 4-2A, except for discharges into Hayward Marsh, for which REC-1 is not a designated beneficial use. The water quality-based effluent limitations in Table 4-2A may be adjusted to

account for dilution in a manner consistent with procedures in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

4.5.5.2 Limitations for Selected Toxic Pollutants

Water quality-based effluent limitations for shallow water and deepwater dischargers shall be calculated according to the methodology in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bay, and Estuaries of California (SIP), and any amendments thereto.

The Water Board may adopt additional numerical standards for conservative constituents documented in discharges and/or documented to be of concern in receiving waters.

4.5.5.3 Whole Effluent Toxicity Limits and Control Program

The narrative water quality objective for toxicity (see Chapter 3) protects beneficial uses against mixtures of pollutants typically found in aquatic systems. This approach is used because numerical objectives for individual pollutants do not take mixtures into account and because numerical objectives exist for only a small fraction of potential pollutants of concern.

Effluent limits for acute toxicity are described below and were derived through the Effluent Toxicity Characterization Program (ETCP). A detailed description of the ETCP is presented later in this section. These limits define in specific terms how the Water Board assesses whether waters are "maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms" (the narrative objective in Chapter 3) and maintains waters free of "toxic substances in toxic amounts" (Clean Water Act).

4.5.5.3.1 Acute Toxicity

The acute toxicity effluent limitation states that the survival of organisms in effluent shall be a median value of not less than 90 percent survival, and a 90 percentile value of not less than 70 percent survival using tests as specified in Table 4-3 and Table 4-4.

Compliance with the acute toxicity limitation is evaluated by measuring survival of test fishes exposed to effluent for 96 hours. Each fish species represents a single sample. Dischargers are required to conduct flow-through effluent toxicity tests, except for those that discharge intermittently and discharge less than 1.0 million gallons per day (average dry weather flow). Such small, intermittent dischargers are required to perform static renewal bioassays.

All dischargers perform toxicity tests using fish species, according to protocols approved by the U.S. EPA or State Board or published by the American Society for Testing and Materials (ASTM) or American Public Health Association. Two fish species shall be tested concurrently. These shall be the most sensitive two species determined from concurrent screening(s) of three species: three-spine stickleback, rainbow trout, and fathead minnow. Tests completed within ten days of the initial test are considered concurrent. This three-species-screening requirement can be met using either flow-through or static renewal bioassays.

The Water Board may consider allowing compliance monitoring with only one (the most sensitive, if known) fish species, if the following condition is met: The discharger can document that the acute toxicity limitation, specified above, has not been exceeded during the previous three years, or that acute toxicity has been observed in only one of two fish species.

The Water Board may modify the flow-through bioassay requirements and the specific test species requirements on a case-by-case basis for discharges of once-through cooling water or excessively saline wastes, which make the implementation of these test requirements impractical. Such changes are not intended as a reduction in the acute toxicity limitation, but rather to account for the technical difficulties of performing the tests.

In addition, for deep water discharges subject to marine effluent limitations, dischargers are not to be considered out of compliance with the acute toxicity effluent limitation under the following circumstances: the discharger documents that the only cause of acute toxicity is ammonia which rapidly decays in the receiving water, and demonstrates that ammonia in the discharge does not impact water quality or beneficial uses.

4.5.5.3.2 Chronic Toxicity

Chronic toxicity effluent limits are derived for individual dischargers based upon Best Professional Judgment. Some of the factors that may be considered in the development of these limits include: allowing credit for dilution comparable to those allowed for numeric chemical-specific objectives, effluent variability, and intent to protect against consistent chronic toxicity and severe episodic toxic events.

Chronic toxicity limitations are contained in the permits of all dischargers that have completed or are currently participating in the Effluent Toxicity Characterization Program (ETCP). This includes all municipal facilities with pre-treatment programs, all major industrial facilities, and selected treated groundwater dischargers.

Monitoring requirements for chronic toxicity, such as test species, effluent sampling procedures, dilution series, monitoring frequency, dilution waters and reference toxicant testing requirements, are specified in NPDES permits on a case-by-case basis. Monitoring requirements will be based on Effluent Toxicity Characterization Program data. Test species and protocols will be selected from those listed in Table 4-5.

Dischargers with chronic toxicity limits in their permits monitoring quarterly or less frequently are required to accelerate the frequency to monthly (or as otherwise specified by the Executive Officer) when conditions such as those listed in Table 4-5 occur.

4.5.5.3.3 Toxicity Identification/Reduction Evaluation (TIE/TRE)

Permits shall require that if consistent toxicity is exhibited, then a chronic toxicity identification evaluation (TIE) and toxicity reduction evaluation (TRE) shall be conducted. Specific language in permits requires the development of workplans for implementing TIEs. TIEs will be initiated within 30 days of detection of persistent toxicity. The purpose of a TIE is to identify the chemical or combination of chemicals causing the observed toxicity. Every reasonable effort using currently available TIE methodologies shall be employed by the discharger. The Water Board recognizes that identification of causes of chronic toxicity may not be successful in all cases.

The purposes of a TRE are to identify the source(s) of the toxic constituents and evaluate alternative strategies for reducing or eliminating their discharge. The TRE shall include all reasonable steps to reduce toxicity to the required level. In addition, the Water Board will review chronic toxicity test results to assess acute toxicity and consider the need for an acute TIE.

Following completion of the TRE, if consistent toxicity is still exhibited in a discharge, then the discharger shall pursue all feasible waste minimization measures at a level that is acceptable to

the Water Board. The discharger must document that the acceptable level of participation is maintained by submitting reports on a specified schedule to the Water Board.

A Toxicity Reduction Evaluation may again be required in situations where chronic toxicity still exists and new techniques for identifying and reducing toxicity become available. Alternatively, the cause of effluent toxicity may change, so that existing techniques will enable identification and reduction of toxicity.

Consideration of any enforcement action by the Water Board for violation of the effluent limitation will be based in part on the discharger's actions in identifying and reducing sources of persistent toxicity.

4.5.5.3.4 Effluent Toxicity Characterization Program

The Effluent Toxicity Characterization Program was initiated in 1986 with the goal of developing and implementing toxicity limits for each discharger based on actual characteristics of both receiving waters and waste streams. The Water Board initiated the program as a means of implementing the narrative objective prohibiting toxic effects in receiving water.

The first two phases of the program focused on developing methods for monitoring effluent toxicity (known as effluent characterization) and deriving the appropriate series of tests to ensure that each effluent and its immediate receiving waters are not toxic to aquatic organisms.

Information from these phases is used to determine whether the narrative objectives are being met in each segment of the Bay and will support the development of site-specific water quality objectives and wasteload allocations.

As the program progresses, the Water Board may: (a) Modify existing effluent limits; (b) Specify different test organisms and methods for determining compliance with toxicity effluent limits; and/or (3) Require a toxicity reduction evaluation (TRE) to determine the cost-effectiveness of controlling toxicity or reducing concentrations of specific pollutants.

This program is being implemented within the existing framework of the NPDES permitting program for municipal and industrial facilities.

The purposes of effluent characterization are to:

- Define effluent variability so that the most appropriate compliance monitoring program can be put in place for each discharge and so that adequate information can be developed to determine if treatment processes or source control modifications are necessary to comply with effluent limits;
- Define the sensitivity of different test species to different effluents so that appropriate acute toxicity effluent limits can be defined and to identify the most sensitive of a group of test organisms used for compliance monitoring; and
- Define the chronic toxicity of the effluent to different test species such that the most sensitive organism of a standard set can be defined and either used for compliance monitoring or used for development of application factors to be applied to the acute toxicity effluent limit.

Two rounds of effluent characterization have been completed by dischargers selected on the basis of the nature, volume, and location of discharge. The first round started characterization in 1988;

the second round in 1991. The Water Board adopted guidance documents for each round of characterization, with modifications made to the second round from knowledge gained during the first. Status reports were issued in July 1989, March 1990, and July 1991. A summary report is scheduled upon completion of the second round in 1995. The need for a third round of characterization will be evaluated at that time.

Thus far, no one test species has consistently been the most sensitive to all discharges. This strongly supports the current approach of requiring screening using several test species. Also, acute toxicity has been observed at several sites using the expanded range of test species.

Although these sites can meet existing limits with test species currently used to determine compliance (fathead minnow, trout, and stickleback), they cannot meet the limits based on more sensitive species now available.

Detailed technical guidelines for conducting toxicity tests and analyzing resulting data were compiled in “Modified Guidelines: Effluent Toxicity Characterization Program,” San Francisco Bay Regional Water Quality Control Board, 1991, Resolution No. 91-083, after experience gained during the first round. This document is incorporated by reference into this plan.

4.6 CALCULATION OF WATER QUALITY-BASED EFFLUENT LIMITATIONS

4.6.1 Dilution Ratios

The allocation of dilution ratio depends on whether a discharge is classified as a deep water or a shallow water discharge. In order to be classified as a deep water discharge, waste must be discharged through an outfall with a diffuser and must receive a minimum initial dilution of 10:1, with generally much greater dilution. All other dischargers are classified as shallow water discharges.

4.6.1.1 Deep Water Discharges

While it is recognized that the actual initial dilution of many deep water discharges is greater than ten, the Water Board has taken a conservative approach to calculating effluent limitations for the following reasons. First, there is concern over the effects of the cumulative mass loadings of toxic pollutants from the numerous discharges into San Francisco Bay. Limiting the allocation of dilution credits is one means of limiting mass loadings. Second, recent Water Board studies have detected toxicity in ambient waters throughout the Bay system based on laboratory toxicity tests. This calls for a cautious approach in allowing the discharge of toxic substances. Third, studies indicate that bioaccumulation of pollutants in San Francisco Bay biota is of concern to wildlife and human health. Fourth, it is difficult to either measure or predict actual dilution in the San Francisco Bay estuarine environment. In the Estuary, the direction of waste transport varies over the course of the tidal cycle, so it is difficult to determine the fraction of new water versus recirculated water mixing with the discharge. U.S. EPA has developed several models of initial dilution for discharge plumes, but none take into account transport due to tidal currents.

The Water Board will consider inclusion of an effluent limitation greater than that calculated from water quality objectives when the increase in concentration is caused by implementation of significant water reclamation or water reuse programs at the facility; the increase in the effluent limitation does not result in an increase in the mass loading; and water quality objectives will not be exceeded outside the zone of initial dilution.

4.6.1.2 Shallow Water Discharges

Shallow water dischargers are subject to a discharge prohibition (Table 4-1, No. 1), which is intended to protect beneficial uses in areas that receive very limited, if any, dilution. When an exception to the prohibition is granted, it is generally not appropriate to allocate dilution credits for purposes of calculating effluent limitations, because these shallow aquatic environments are often biologically sensitive or critical habitats.

However, dilution credit may be granted on a discharger-by-discharger and pollutant-by-pollutant basis. Dilution credits for priority pollutants shall be based on provisions of the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bay, and Estuaries of California (SIP)." Dilution credits for non-priority pollutants may be based on the SIP or other applicable policies, regulations, or guidance. In making this determination, the Water Board will grant dilution credit on a pollutant-by-pollutant basis if the discharger demonstrates that an aggressive pretreatment and source control program is in place, including the following:

- Completion of a source identification study;
- Development and implementation of a source reduction plan; and
- Commitment of resources to fully implement the source control and reduction plan.

Any dilution credit granted must be consistent with the antibacksliding policy and may be granted only after very rigorous scrutiny of source control efforts and receiving water data. When dilution is granted, permits shall include provisions requiring continuing efforts at source control, targeting the substances to which the exceptions apply.

For certain low volume, short duration, or one-time discharges, the requirements of pretreatment and source control programs may not be practical. The Water Board may choose to waive such requirements for pollutants in low volume discharges determined to have no significant adverse impact on water quality.

In addition, the Water Board will consider the discharger's demonstration of compliance with water quality objectives, in accordance with the SIP. This demonstration shall address the following issues:

a) A demonstration that the proposed effluent limitation will result in compliance with water quality objectives, including the narrative chronic toxicity objective, in the receiving water. Water quality objectives used in this demonstration are to be based on ambient salinity and hardness (for fresh waters) at the time of sampling. In addition, demonstration of compliance is to be based on the averaging period associated with each objective. Compliance with both acute and chronic chemical-specific water quality objectives shall be demonstrated. If freshwater objectives apply in the receiving waters (i.e., salinity is less than 5 parts per thousand), compliance with saltwater objectives shall also be demonstrated at the nearest point in the receiving waters where salinity reaches 5 parts per thousand. Such a demonstration shall be based on ambient monitoring at a frequency equal to that typically required for effluent monitoring for a period of time defined in the study plan;

b) An evaluation of worst-case conditions (in terms of tidal cycle, currents, or instream flows, as appropriate) through monitoring and/or modeling to demonstrate that water quality objectives will continue to be met, taking into account the averaging period associated with each objective; and

c) An evaluation of the effects of mass loading resulting from allowing higher concentrations of pollutants in the discharge, in particular, the potential for accumulation of pollutants in aquatic life or sediments to levels that would impair aquatic life or threaten human health. This evaluation may include sampling of sediment and biota in the vicinity of the discharge to determine the accumulation of pollutants resulting from the current levels of discharge.

A study plan for conducting this work must be submitted to the Water Board for approval by the Executive Officer. Results of the study or studies addressing these three points shall be submitted to the Water Board. Effluent limitations based on either concentration or mass loading shall be developed for consideration by the Water Board based on study results and any other available information. The goal in setting effluent limitations shall be to ensure that water quality objectives are met in the receiving water and that mass loadings are limited to a level that provides protection of beneficial uses. In no case shall effluent limitations impair the basis upon which exception to the prohibition against discharge to shallow water was granted. Continued ambient monitoring shall also be required to ensure that water quality objectives are met.

4.6.2 Fresh Water vs. Marine Water

Due to the unique estuarine environment that exists in the region, the salinity characteristics (i.e., freshwater vs. marine water) of the receiving water shall be considered in establishing water quality objectives. Freshwater effluent limitations shall apply to discharges to waters both outside the zone of tidal influence and with salinities equal to or less than 1 part per thousand at least 95 percent of the time in a normal water year. Marine effluent limitations shall apply to discharges to waters with salinities equal to or greater than 10 parts per thousand at least 95 percent of the time, except for discharges to the Pacific Ocean, which are covered by the California Ocean Plan. For discharges to waters with salinities in between these two categories, defined as estuarine, effluent limitations shall be the lower of the marine or freshwater effluent limitation, based on ambient hardness, for each substance. The use of alternative marine or freshwater criteria may be approved if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life; or conversely, the biology of the water body is dominated by marine aquatic life.

4.6.3 Background Concentrations

When dilution credit is granted, the background concentration of the substance is taken into account in calculating effluent limitations so that the dilution provided by mixing with receiving waters is not overestimated. Ambient background concentration means the concentration of a substance, in the vicinity of a discharge, which is not influenced by the discharge. For the San Francisco Estuary, it is difficult to identify a location that is not influenced by a discharge. Furthermore, background concentrations should vary within the Estuary due to changing geochemistry of the waters as they travel downstream. However, in order to simplify the calculation of effluent limitations, it is desirable to use one background concentration throughout the region.

The determination of ambient background concentration, for purposes of establishing NPDES effluent limitations for toxic pollutants, will be done in accordance with the provisions of the SIP, and amendments thereto.

4.7 IMPLEMENTATION OF EFFLUENT LIMITATIONS

In incorporating and implementing effluent limitations in NPDES permits, the following general guidance shall apply:

4.7.1 Performance-based Limits

Where water quality objectives in the receiving water are being met, and an existing effluent limitation for a substance in a discharge is significantly lower than appropriate water quality-based limits, performance-based effluent limitations for that substance may be specified or the effluent limit revised. Any changes are subject to compliance with the state Antidegradation Policy. The performance-based effluent limitation may be either concentration- or mass-based, as appropriate.

4.7.2 Site-specific Objective Incorporation

Once the Water Board has adopted a site-specific objective for any substance, effluent limitations shall be calculated from that objective in accordance with the methodology in the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" (SIP).

Site-specific objectives have been adopted by the Water Board for copper in San Francisco Bay and for nickel in South San Francisco Bay (Table 3-3A) and for cyanide in San Francisco Bay (Table 3-3C).

4.7.2.1 Copper and Nickel in South San Francisco Bay

As part of the implementation plan for copper and nickel site-specific objectives, the municipal wastewater dischargers in South San Francisco Bay shall have effluent limits for copper and nickel, derived from the site-specific objectives in Table 3-3A using SIP methodology. The Water Quality Attainment Strategy for copper and nickel in South San Francisco Bay that implements these site-specific objectives is included in Chapter 7.

4.7.2.2 Cyanide

Cyanide is present in low levels in all municipal wastewater effluents and most industrial wastewater effluents. Disinfection processes contribute to in-plant formation of cyanide. Therefore, cyanide in the effluent from municipal treatment plants is a combination of cyanide in the influent and cyanide produced during disinfection. Cyanide concentration spikes in the effluent, although rare, are generally caused by accidental high concentration discharges in the collection system.

As part of the implementation plan for marine site-specific objectives for cyanide, all municipal wastewater dischargers that discharge to any segment of San Francisco Bay including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay shall have effluent limits for cyanide derived from the marine site-specific objectives in Table 3-3C, using the methodology in the SIP. Specifically, under Step 7 of the SIP methodology, effluent limits are necessary considering the nature of cyanide, its use in the disinfection process, and to promote achievement and ensure maintenance of the marine cyanide site-specific objectives.

Industrial wastewater dischargers to San Francisco Bay shall have effluent limits for cyanide derived from the marine site-specific objectives in Table 3-3C, using the methodology in the SIP. However, effluent limits shall not be required, under Step 7 of the SIP alone, where the industrial discharger demonstrates one of the following:

- Cyanide is not detected in its effluent, using a method with a detection limit of 1.0 µg/L
- It does not disinfect any portion of its effluent
- It otherwise demonstrates that cyanide is not used in its industrial process

Effluent limits for shallow water dischargers that have been granted an exception to Basin Plan Prohibition 1 shall be based on the dilution credits set forth in Table 4-6. Alternatively, effluent limits for these shallow water dischargers may be based on updated dilution credits derived in accordance with the SIP requirements to account for water conservation or water recycling projects. Setting forth dilution credits in Table 4-6 does not authorize discharges into shallow waters. Each discharger must continue to satisfy all requirements for an exception to Basin Plan Prohibition 1.

Where cyanide effluent limits are included in an NPDES permit, the discharger shall be required to implement a monitoring and surveillance program. This program shall include influent and effluent monitoring and ambient monitoring in San Francisco Bay. Each discharger shall review sources of cyanide to its influent at least once every five years. Where potential cyanide contributors exist within a discharger's service area, the discharger shall implement a local program to prevent illicit discharges to the sewer system which, at a minimum, shall include inspecting potential contributor sites, developing and distributing educational materials and preparing emergency monitoring and response plans to be implemented if a significant cyanide discharge occurs. Additionally, if ambient monitoring shows cyanide concentrations of 1.0 µg/L or higher, the discharger shall undertake actions to determine and abate identified sources of cyanide in San Francisco Bay.

4.7.3 Averaging Periods

For some substances there may be more than one effluent limitation with different averaging periods (e.g., daily average and 30-day average). In both cases, the effluent limitations shall apply to the mean concentration of all samples analyzed during the averaging period. If only one sample is taken during the averaging period, the effluent limitation applies to the concentration of that sample.

4.7.4 Method Detection Limits, Practical Quantitation Levels, and Limits of Quantification

Method Detection Limits (MDLs) are defined in Title 40, Code of Federal Regulations, Part 136, Appendix B (revised June 30, 1986).

Practical Quantitation Level (PQL) is the lowest concentration of a substance within plus or minus 20 percent of the true concentration by 75 percent of the analytical laboratories testing in a performance evaluation study. If performance data are not available, the PQL is the MDL x 5 for carcinogens and the MDL x 10 for noncarcinogens.

Limits of Quantification are ten standard deviations greater than the average measured blank values used in developing the MDL.

These terms and concepts are useful when pollutant concentrations in waters are relatively low. However, these will be taken into account in determining compliance with, rather than in the calculation of, effluent limitations.

4.7.5 Selection of Parameters

Effluent limits are not necessary for substances that do not pose any risk to beneficial uses or are shown not to be present in discharge. However, a discharger must demonstrate to the satisfaction of the Water Board that particular substances do not cause, or have the reasonable potential to cause or contribute to an excursion above numerical and narrative objectives. Dischargers must also demonstrate that pollutants of concern are (a) not in the waste stream, and (b) no change has occurred that may cause release of pollutants. This certification shall be supported, at a minimum,

by monitoring results for such pollutants and process and treatment descriptions that demonstrate these substances are not expected to be present in the waste stream. At a minimum, this monitoring and certification is required prior to issuance and reissuance of WDRs.

The Water Board may choose to not require periodic monitoring and certification for pollutants in low volume discharges determined to have no significant adverse impact on water quality.

4.7.6 Compliance Schedules

As new objectives or standards are adopted, permits will be revised accordingly. Revised permits will distinguish between effluent limitations that are met by current performance, and effluent limitations not currently attained. Immediate compliance will be required for effluent limitations that are met by current performance.

The Water Board may consider dischargers' proposals for longer compliance schedules for newly adopted objectives or standards as NPDES permit conditions for particular substances, where revised effluent limitations are not currently being met and where justified. The primary goal in setting compliance schedules is to promote the completion of source control and waste minimization measures, including water reclamation.

Justification for compliance schedules will include, at a minimum, all of the following:

a) Submission of results of a diligent effort to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream;
b) Documentation of source control efforts currently underway or completed, including compliance with the Pollution Prevention program described in the Basin Plan;
c) A proposed schedule for additional source control measures or waste treatment; and
d) A demonstration that the proposed schedule is as short as possible.

Implementation of source control measures to reduce pollutant loadings to the maximum extent practicable shall be completed as soon as possible, but in no event later than four years after new objectives or standards take effect. Implementation of any additional measures that may be required to comply with effluent limitations shall be completed as soon as possible, but in no event later than ten years after new objectives or standards take effect. The issuance of the permit containing a compliance schedule should not result in a violation of any applicable requirement of the federal Clean Water Act or the California Water Code, including any applicable Clean Water Act statutory deadlines.

4.8 STORMWATER DISCHARGES

As discussed in a later section titled "Urban Runoff Management," the Water Board has initiated a program that regulates certain municipal, industrial, and construction stormwater discharges through NPDES permits. Since both the sources of pollutants in stormwater discharges and the points of discharge are diffuse, and the methods of reducing pollutants in stormwater discharges are in the development stage, water quality-based numerical effluent limitations are not feasible at this time. Instead, stormwater permits will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. Compliance with these requirements is expected to be achieved through implementation of control measures or best management practices identified in dischargers' stormwater management plans or stormwater pollution prevention plans. Instead, stormwater permits will include requirements to prevent or

reduce discharges of pollutants that cause or contribute to violations of water quality objectives for receiving waters. Compliance with these requirements is expected to be achieved through implementation of control measures or best management practices identified in dischargers' stormwater management plans or stormwater pollution prevention plans.

The Water Board is taking a phased approach towards attainment of water quality objectives in waters that receive stormwater discharges from urban areas and certain industrial and construction activities. The Water Board will first require entities subject to NPDES permits for stormwater discharges to complete implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the maximum extent practicable. For industrial facilities, such control measures include those representing the best available technology that is economically achievable.

NPDES permits for stormwater discharges will require completion of technically and economically feasible control measures as soon as possible. Specific schedules for implementing control measures may, at the discretion of the Water Board, be included in permits (to the extent that such schedules are authorized by state or federal laws) either by reference to a stormwater management plan or by permit conditions. In no event will these schedules extend beyond the term of the permit.

If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions which may require implementation of additional control measures. In such circumstances, the Water Board may consider dischargers' proposed schedules for identification and implementation of additional control measures designed to attain water quality objectives. Such schedules shall be as short as practicable and will only be considered for inclusion in permits when a discharger has demonstrated the following:

a) A diligent effort to quantify pollutant levels and the sources of the pollutant in stormwater discharges; and

b) Documentation of completion of implementation of all technically and economically reasonable control measures.

4.9 WET WEATHER OVERFLOWS

During periods of heavy rainfall, large pulses of water enter sewerage systems. When these pulses exceed the collection, treatment, or disposal capacity of a sewerage system, overflows occur. This is especially problematic for sewer systems that combine both sanitary sewage and stormwater (Combined Sewer Systems or CSS), such as the City and County of San Francisco's system (discussed under the municipal discharger section). All other municipalities in the region operate two distinct sewer systems. Wet weather is also problematic for separate systems because more water infiltrates the pipes leading to treatment plants. This problem is commonly referred to as inflow/infiltration (I/I). In either case, pulses of water during wet weather may cause untreated or partially treated wastewater to be discharged directly to surface water bodies.

Wet weather overflows of wastewater affect three types of beneficial uses: water contact recreation, non-contact water recreation, and shellfish harvesting. The water quality characteristics that can adversely affect these beneficial uses are pathogens, oxygen-demanding pollutants, suspended and settleable solids, nutrients, toxics, and floatable matter.

4.9.1 Federal Combined Sewer Overflow Control Policy

On April 11, 1994, the U.S. EPA adopted the Combined Sewer Overflow (CSO) Control Policy (50 FR 18688). This policy establishes a consistent national approach for controlling wet weather discharges from CSS to the nation's water. The policy requires implementation of nine minimum controls that serve as minimum technology-based requirements pursuant to the Clean Water Act. The policy also requires implementation of a long-term control plan that serves as the water quality-based requirements of the Clean Water Act. The long-term control plan must consider the permittee's financial capability and provide for the attainment of water quality standards.

The Water Board applies the policy to the City and County of San Francisco's CSS. San Francisco substantially constructed wet weather control facilities prior to adoption of the CSO Control Policy. Accordingly, since construction was completed in 1997, the Water Board has issued permits to the City and County of San Francisco that require compliance with the provisions of the CSO Control Policy that apply to CSO controls: maintenance of the wet weather facilities to ensure continued maximization of storage and treatment; continued implementation of the nine minimum controls, which constitute the technology-based requirements of the CSO Control Policy; post-construction monitoring to confirm the system's performance; and re-evaluation of the feasibility of reducing or eliminating discharges to sensitive areas.

4.9.2 Surface Impoundment Overflow Protection

In providing protection of waste management units against wet weather overflows, Chapter 15 requires that surface impoundments must have sufficient freeboard to accommodate seasonal precipitation and precipitation conditions specified for each class of waste management unit. Those specified precipitation conditions are probable maximum precipitation for Class I units; and the 1000-year, 24-hour precipitation for Class II units.

To guarantee the protection of water quality, the Water Board will interpret seasonal precipitation to be the 100-year return period wet season for Class I units and the 10-year return period wet season for Class II units. The sources to be used for determining the applicable precipitation for a given return period and location are California Department of Water Resources Bulletin No. 195 (or any update by the Department), local water agency publications, or other sources approved by the Executive Officer.

4.10 DISCHARGE OF TREATED GROUNDWATER

Cleanup of groundwater pollution sites often includes groundwater extraction, and thus creates the need for proper disposal of treated groundwater. The majority of the groundwater pollution cases in the Region involve surface spills, pipeline breaks, or leakages from tanks, vaults, sumps, surface impoundments, or landfills. Toxic pollutants commonly found in groundwater range from solvents (including volatile organic compounds [VOCs] and semi-volatile organic compounds [SVOCs]), petroleum hydrocarbons, heavy metals, or a combination of these pollutants. In many cases, the treated groundwater is discharged to surface waters via storm drains. These direct discharges would normally require an exception to the prohibitions against discharge into shallow or non-tidal waters.

To address this issue, the Water Board adopted Resolution No. 88-160 (see Chapter 5, Plans and Policies). The Resolution urges dischargers of groundwater extracted from cleanup projects to recycle (reclaim) their effluent. When recycling is not technically and/or economically feasible, discharges must be piped to a publicly-owned treatment works (POTW). Furthermore, as required in State Water Board Resolution 89-21 (see Chapter 5, Plans and Policies), the Water Board

recognizes the resource value of the extracted and treated groundwater and urges its utilization for the highest beneficial use for which applicable water quality standards can be achieved.

The Water Board will consider granting an exception to the discharge prohibitions only if (a) it has been demonstrated that neither recycling nor discharge to a POTW is technically or economically feasible, and (b) beneficial uses of the receiving water are not adversely affected. Such an exception is based on the Water Board's recognition that discharges allowed under the exception are an integral part of a program to cleanup polluted groundwater and thereby produce an environmental benefit.

Dischargers shall demonstrate that their groundwater extraction and treatment systems and associated operation, maintenance, and monitoring plans constitute acceptable programs for minimizing the discharge of toxic substances and for complying with effluent limitations deemed necessary for protection of the beneficial uses of receiving waters.

Applications for National Pollutant Discharge Elimination System (NPDES) permits to discharge treated groundwater directly to surface waters will be evaluated on a case-by-case basis. In some cases, the applicant may qualify for the requirements of a general NPDES permit for discharge of treated groundwater. The Water Board has adopted general NPDES permits for the following two types of groundwater cleanup projects:

a) Groundwater polluted by fuel leaks and other related wastes at service stations and similar sites (NPDES General Waste Discharge Requirements for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Fuel Leaks and Other Related Wastes at Service Stations and Similar Sites, NPDES No. CAG912002); and

b) Groundwater polluted by VOCs (NPDES General Waste Discharge Requirements for Discharge and Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds, NPDES No. CAG912003.

These general permits are intended to streamline a common regulatory process and are not available for groundwater discharges with constituents other than fuels and VOCs. The Water Board may renew, revise, or rescind the permits if deemed appropriate. The general permits specify effluent limitations for discharges to surface water bodies, establish self-monitoring requirements, and identify trigger levels for non-routine constituents that are used to determine if additional effluent sampling and treatability studies are needed. Updates to these two general permits are considered every five years.

4.11 MUNICIPAL FACILITIES (POTWs)

Table 4-8 is a list of municipal wastewater treatment facilities (excluding wet weather facilities) within the Region that discharge directly into surface waters. Figure 4-1 shows where these facilities are located in the region. Under normal operational conditions, these POTWs provide a minimum of secondary treatment. In addition, with more than thirty percent of the total flow receives advanced treatment.

Brief discussions of the issues specific to the City and County of San Francisco, South Bay dischargers, the Fairfield-Suisun Sewer District, the Livermore-Amador Valley, and the East Bay Municipal Utilities District are presented below.

4.11.1 City and County of San Francisco

The City and County of San Francisco owns and operates the only combined sewer system in the San Francisco Bay Region. In San Francisco's combined sewer system domestic sewage, industrial wastewater, and stormwater runoff are collected in the same pipes and treated at one of two all-weather secondary treatment plants—the Southeast Water Pollution Control Plant and the Oceanside Water Pollution Control Plant—or at the North Point Wet Weather Facility. The system was designed and constructed with several features intended to minimize combined sewer overflows. First, the system has a peak wet weather treatment capacity significantly in excess of dry weather flows. Second, the system design includes more than 200 million gallons of wet weather storage in large transport/storage (T/S) structures that surround San Francisco. These T/S structures hold back the wet weather flows generated by most storms until they can be routed to the treatment plants. During large storms, wet weather flows consisting mostly of stormwater are discharged through one of thirty-six permitted combined sewer discharge (CSD) outfalls. The T/S structures also include baffles and weirs to hold back solids and floating debris prior to discharge through a CSD outfall.

San Francisco was one of the first municipalities in the nation to complete construction of comprehensive combined sewer overflow controls. This construction program began in 1974 with the publication of the Master Plan Environmental Impact Statement and Report, jointly issued by San Francisco and the U.S. EPA, which described an integrated wastewater control system designed to provide control and treatment for both dry weather sewage and wet weather storm flows, and to achieve long-term average CSD frequencies mandated by the Water Board to protect beneficial uses. The program was fully implemented in 1997 at a cost of approximately $2 billion.

4.11.2 South Bay Municipal Dischargers (San José/Santa Clara, Palo Alto, and Sunnyvale)

The South Bay municipal dischargers consist of three sewage treatment facilities: the San Jose/Santa Clara Water Pollution Control Plant (WPCP), the Palo Alto Regional Water Quality Control Plant, and the Sunnyvale WPCP. These three plants serve all of the urban communities of Santa Clara County located in the Region. The South Bay municipal dischargers, as shown in Figure 4-1, presently discharge effluent receiving tertiary treatment (secondary plus nitrification, filtration, and disinfection) to shallow sloughs contiguous with the Bay, south of the Dumbarton Bridge.

The existing discharge locations for the Lower South SF Bay municipal wastewater dischargers are contrary to Basin Plan policy concerning discharge prohibitions (listed in Table 4-1). Exceptions to the first three of these prohibitions are discussed in Section 4.2 Discharge Prohibitions Applicable Throughout the Region.

State Water Board Order WQ 90-5 (1990) found that a net environmental benefit exception to these prohibitions could not be made for the three South Bay municipal discharges. However, the Order found that a finding of equivalent protection can be made if water quality based concentration limits for metals and revised mass loading limits for metals are placed in the dischargers' NPDES permits, if Sunnyvale and San Jose/Santa Clara continue avian botulism control programs, and if San Jose/Santa Clara implements mitigation for loss and degradation of endangered species habitat. Order WQ 90-5 also included provisions that would prevent increases in flows that would adversely impact endangered species habitats. In subsequent NPDES permit reissuances and Water Board resolutions from 1993 through 2003, the South Bay municipal dischargers met the three conditions required to support a finding of equivalent protection. The

three conditions for granting the discharge prohibition must be confirmed at each NPDES permit reissuance.

4.11.3 Fairfield-Suisun Sewer District (FSSD)

The FSSD's tertiary wastewater treatment plant has a dry weather treatment capacity of 17.5 million gallons per day (mgd), a wet weather capacity of 40 mgd, and 45 million gallons of off-line storage capacity. The District is currently treating 13 mgd (1993 dry weather data) from a service population of about 111,000. In order to comply with the Water Board's prohibition against dry weather discharges to the Suisun Marsh, FSSD operates a reclamation project in cooperation with the Solano Irrigation District. However, due to various contractual, legal and economic constraints, only about 40 percent of the treatment plant's annual effluent flow is reclaimed for agricultural irrigation. The remainder is discharged to Boynton Slough in Suisun Marsh.

The Water Board required FSSD to conduct an investigation to evaluate the discharge's impact on water quality conditions and beneficial uses of the receiving waters. This investigation was completed in 1987 and found that the discharge has some measurable local effects on water quality in Boynton Slough, but that beneficial uses are not impaired by the discharge. The study concluded that, overall and on a year-round basis, the discharge affords a net environmental benefit to Boynton Slough and the Suisun Marsh.

Given the findings of this study, the plant's high degree of operational redundancy and emergency storage capacity, and continued efforts by FSSD to maximize the use of reclaimed water, the Water Board has granted FSSD an exception to the Basin Plan prohibition. The Water Board allows, through the NPDES permit issued to FSSD, that portion of FSSD's tertiary effluent which cannot be reclaimed to be discharged to Boynton Slough on a year-round basis.

4.11.4 Livermore-Amador Valley

The primary Water Board concern in the Livermore-Amador Valley (Valley) is the increase in salt loading that has occurred in the Valley's main groundwater basin. It is projected that with natural saline sources and historical basin management practices, and with minimal water recycling, there will be a net salt loading increase from an average of 4,000 tons per year to 6,000 tons per year, resulting in a 10 milligram per liter (mg/L) per year increase in total dissolved solids (TDS) in groundwater. As a result, it has become increasingly important to develop and implement an integrated water/wastewater resource operational plan to protect the water quality and beneficial uses of the groundwater basin.

To achieve this goal, the Water Board supports local water management efforts to concurrently improve the salt balance in the main basin, to increase the local water supply, and to reduce the need for wastewater export through recycled water irrigation and groundwater recharge and other basin management practices.

4.11.4.1 Salt Management in the Livermore-Amador Valley

The Livermore-Amador Valley groundwater basin is located in the middle of the Livermore-Amador Valley in eastern Alameda County and is primarily a closed groundwater basin within the Alameda Creek Watershed with multiple groundwater sub-basins of variable water quality. The Main Basin (that portion underlying the Cities of Livermore and Pleasanton) has the highest water quality, supplies most of the municipal wells in the area, and is used to store and distribute high quality imported water.

Alameda Creek and its tributaries recharge the Valley's groundwater basin and serve as channels to convey water released from the South Bay Aqueduct (SBA) to the main basin and the Niles Cone groundwater basin for artificial recharge. During dry weather, creek flow consists primarily of SBA release water.

The Alameda County Flood Control and Water Conservation District, locally known as the Zone 7 Water Agency (Zone 7), is the potable water wholesaler for most of the Valley and operates facilities to import and treat surface water from the State Water Project, groundwater wells, and distribution pipelines. Zone 7 serves as the overall water quality management planning agency for the Livermore-Amador watershed and is responsible for managing the Valley's surface water and groundwater resources for the Valley's drinking water supply.

Dublin-San Ramon Services District (DSRSD) distributes potable water and treats wastewater in the western portion of the Valley, including parts of Contra Costa County. The City of Livermore distributes potable water to about one-fourth of Livermore and treats wastewater from the city and the adjacent national laboratories, Lawrence Livermore and Sandia National Laboratories.

The City of Livermore and DSRSD are member agencies of the Livermore-Amador Valley Water Management Agency (LAVWMA). Since 1980, wastewater has been exported from the Valley via LAVWMA-operated facilities that connect to the East Bay Dischargers Authority's (EBDA) interceptor in San Leandro. These waters are ultimately discharged through the EBDA outfall into south San Francisco Bay west of the Oakland Airport.

The current surface water quality objectives for the Alameda Creek Watershed above Niles (Table 3-7) were adopted in 1975. They were based on historic SBA water quality primarily to prevent degradation by wastewater discharges of imported SBA water being conveyed and used for groundwater recharge during dry weather periods. Wastewater discharges were terminated in 1980.

4.11.4.2 Water Recycling and Valley Water/Wastewater Management

The water and wastewater agencies of the Valley have studied water recycling as an alternative to import of new water supplies and export of wastewater since the early 1970 (see Section 4.16 Water Recycling).

Zone 7, DSRSD and the City of Livermore's interests in water recycling have increased over the years due to droughts, continuing scarcity of new water supplies, institutional barriers to increasing wastewater export capacity from the Valley, and increasing public acceptance of water recycling throughout California. Technological advances and reduced costs of demineralization also now make groundwater recharge with demineralized recycled water a technically viable tool to help manage salt concentrations in the Valley.

Valley-wide water recycling is consistent with the Water Board's policy on recycled water, which states in part that disposal of wastewater to inland, estuarine, or coastal waters is not considered a permanent wastewater disposal solution where the potential exists for conservation and water recycling (see Section 4.16 Water Recycling). As directed by California Water Code Sections 13511 and 13512, the Water Board strongly supports the use of recycled water to supplement existing surface water and groundwater supplies and will work with agencies to facilitate development of water recycling facilities.

The Valley water and wastewater agencies jointly sponsored the "Livermore-Amador Valley Water Recycling Study" (May 1992) that includes a comprehensive investigation of water recycling

options. The study documented the Valley's hydrogeology. It also identified and analyzed potential projects throughout the Valley, including irrigation with non-demineralized effluent, groundwater recharge with demineralized effluent, and export of brine. The report included a discussion of how water recycling could be implemented in conformance with Water Board requirements and Zone 7 policies and still manage salt loading on a Valley-wide scale.

The report also detailed a strategy for developing a water recycling program incrementally, beginning with small demonstration projects to gain experience and public acceptance and building up to large-scale projects that could contribute substantially to water supply and wastewater disposal needs in future years.

The 1992 study documented that between 19,000 and 38,000 acre-feet per year of recycled water could be beneficially reused within the Valley via irrigation and groundwater recharge. Well-established technologies and procedures exist for accomplishing such uses and could be in full compliance with Water Board requirements and the Department of Health Services' (DHS) Title 22 CCR requirements. The long-operating Orange County Water District Water Factory 21 project has served as a model for many recycled water groundwater recharge facilities.

4.11.4.3 Valley-wide Salt Management Plan

As recommended in the 1992 study, the agencies jointly applied for a Master Water Reuse Permit (Master Permit) to cover proposed water recycling activities throughout the Valley. The Water Board issued the Master Permit in 1993 (Order No. 93-159). The permit specifies the various technical reports that were required to be submitted for review and approval by the Executive Officer before projects could commence operation. In this manner, the Master Permit fully addresses the regulatory requirements that projects must comply with, while facilitating the approval process.

The permit allows small-scale irrigation projects to be developed by the cooperating agencies. Before large-scale recycling projects could be approved, a long-range Valley-wide Salt Management Plan (SMP) was required to be developed and implemented. The Master Permit required further characterization of basin hydrogeology, refinement of salt balance calculations, selection of TDS policy targets and examination of alternative ways to offset natural and recycled sources of salt loadings. The SMP would need to address the water quality objectives for the Alameda Creek Watershed, which state that wastewater disposal/reuse projects be part of an "overall water-wastewater resource operational program developed by the agencies affected and approved by the Water Board."

Zone 7, in partnership with a technical advisory group composed of local water retailers and a Zone 7 citizens committee, prepared the SMP as required by the Master Permit. The development of the SMP occurred through a lengthy public process (1994 to 1999) and resulted in Water Board approval in 2004. Over the years, the scope of the SMP broadened beyond that outlined in the Master Permit to one more resembling a comprehensive watershed and water resources management plan.

The purpose of the SMP is to identify and document the long-term strategy for managing salt and mineral water quality in the Valley's groundwater basin. The primary strategy is to increase conjunctive use combined with groundwater demineralization in the western portion of the service area to fully offset current and future sources of salt loading to the Valley's Main Basin. This strategy was designed to also maintain and improve delivered water quality and to facilitate increased use of recycled water using Zone 7 facilities to offset the associated increase in salt

loading. Other strategies were identified and may be implemented through Zone 7's monthly Water Operations Plans using an adaptive management process.

4.11.4.4 General Water Reuse Permit

The City of Livermore and DSRSD were approved for the General Water Reuse Requirements for Municipal Wastewater and Water Agencies, (General Water Reuse Permit, see Section 4.16 Water Recycling), to administer their current and future recycled water projects involving landscape and/or agricultural irrigation recycling water projects. The General Water Reuse Permit, which delegates the administration of domestic wastewater reuse to water recycling agencies and water agencies, replaces the Master Permit for surface irrigation projects. The General Water Reuse Permit issued to the City of Livermore and DSRSD incorporates the requirements of the approved SMP. The Master Permit will remain on record, and, if needed, will be revised to address any future groundwater recharge projects that may be planned by the two agencies.

Groundwater recharge or conveyance via ephemeral streams is an essential component of the proposed Valley-wide, year-round water recycling and groundwater quality management program. However, projects subject to NPDES requirements are not authorized under the Master Permit. The Master Permit identifies the technical reports necessary to support a future NPDES permit application. The Water Board will consider issuing a separate NPDES permit to the permittees following receipt of a complete NPDES application.

4.11.4.5 Water Board Support for Water Quality Management Strategies Protecting the Livermore-Amador Valley Groundwater Basins

The Water Board supports the concept that water recycling is an essential component for planning the Valley's future water supply. Water recycling is particularly important in areas like this, that are dependent on imported water.

As demonstrated by its 2004 approval, the Water Board supports the Salt Management Plan developed by the cooperating agencies in the Valley to facilitate increased use of recycled water to offset salt loading.

The Water Board supports the export of concentrate from the demineralization of groundwater via the LAVWMA and EBDA pipelines when implemented as part of the Salt Management Plan and is protective of beneficial uses of the San Francisco Bay.

The Water Board supports the concept of transport and groundwater recharge through the Valley's ephemeral streams. Recharge of the groundwater basin may be accomplished with imported water, as is done now, or combined with high-quality recycled water under a future groundwater-recharge NPDES permit or WDRs. The year-round, dependable recycled water resource may also be appropriate for streamflow augmentation to enhance beneficial uses of the Valley's ephemeral streams.

4.11.5 East Bay Municipal Utility District (EBMUD) and Local Agencies

The sewer systems of the seven local agencies in the East Bay communities (Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont, and Stege Sanitary District) have had a serious problem with infiltration/inflow (I/I) during the wet weather season. During major storms, the community's sewers receive up to 20 times more flow than in dry weather. As a result, the communities' sewers overflowed to streets, local watercourses, and the Bay, creating a risk to public health and impairing water. The seven local agencies discharging sanitary sewage deliver sewage to

EBMUD's facilities, and thus, EBMUD's interceptors and treatment facilities also subject to overflows during storm events.

The Water Board approved a regional approach -- a combination of community collection system improvements and EBMUD capacity improvements - for correcting wet weather overflows. Following the Basin Plan, EBMUD and the agencies established the following priorities to correct this problem:

- Substantially reduce or eliminate community sewer overflows with high public health risks;
- Substantially reduce or eliminate other community sewer overflows; and
- Eliminate or mitigate interceptor overflows.

In 1985, the East Bay communities completed a multi-year infiltration/inflow (I/I) study, which proposed a $300 million (1985 dollars) comprehensive sewer rehabilitation and relief line program known as the East Bay Infiltration/Inflow Correction Program (ICP), it required 20 years to implement. In a 1986 enforcement order, the Water Board accepted the proposed approach and directed the ICP Program to focus on high public health problems.

In 1986, all agencies submitted Compliance Plans in response to the cease-and-desist orders issued by the Water Board. These plans set forth the design and implementation requirements of each agency's I/I Correction Program.

EBMUD's and the collection system agencies' programs are designed to handle wastewater and I/I flows for up to a 5-year wet weather event. For rainfall events that have a return frequency greater than 5 years, overflows from the sanitary collection and treatment systems may occur. This approach is consistent with the Basin Plan wet weather overflow requirements (Maintenance Level C) adopted for the I/I Correction and the Wet Weather Facilities Program.

The communities have made good progress implementing their ICP eliminating about 60 percent of the high public public health risk overflows. They have also gained a better understanding of how to implement their ICP. This experience has revealed that some of the original planning assumptions underestimated sewer rehabilitation and replacement costs. As a result, the communities revised their programs and the Cities of Alameda, Albany, Berkeley, Oakland, and Piedmont requested extensions to their compliance schedules by 5 to 10 years. In 1993, the Water Board amended its enforcement order giving extensions to some communities' compliance schedules. The amended enforcement order also contains revised compliance reporting requirements.

As part of the regional approach, EBMUD's contribution is a $145 million (1985 dollars) Wet Weather Program, designed to increase treatment capacity to match the communities' flows. The Wet Weather Program includes an expansion of the main wastewater treatment plant, new storage basins, four new remote wet weather treatment plants, new and ungraded pumping stations, and 7.5 miles of new interceptors. This program will increase EBMUD's peak transport and treatment capacity, without which community sewers would continue to overflow. It will also provide treatment for wet weather discharges and meet or exceed Basin Plan requirements.

As of 1995, EBMUD has completed the expansion of the main wastewater treatment plant, all interceptor improvements, construction of the main plant storage basin, and construction of the two principal wet weather treatment facilities (Oakport and Point Isabel). The work remaining includes

two pump station improvements, a storage basin, and two wet weather treatment plants. The Wet Weather Program is scheduled for completion in 1998.

4.12 INDUSTRIAL FACILITIES

This section discusses industrial waste discharges to surface waters under the NPDES program. Other industrial waste disposal practices are discussed in a later section entitled "Hazardous and Nonhazardous Waste Disposal" under Groundwater Protection and Management.

The Water Board has permitted over 320 industrial discharges in the region. They can be separated into two general types: process-related wastewaters and groundwater from cleanup activities. There are about 50 discharges of process wastewater; of these, 15 are classified as major discharges and the rest are mostly small discharges of non-contact cooling water and/or runoff. About 270 of the 320 discharges consist solely of treated groundwater from remediation activities at solvent and/or fuel contamination sites. These are minor in flow relative to the major discharges, and are discussed in more detail in an earlier section entitled "Discharge of Treated Groundwater." Additionally, there are over 1,500 industrial facilities discharging only stormwater runoff. The regulation of these discharges is discussed in a later section entitled: "Urban Runoff Management."

The 15 major discharges are the most significant individual sources of pollutant loadings from industrial discharges. They are identified and described in Table 4-9, and their locations are shown in Figure 4-2. These industries have all installed treatment facilities that can be considered to provide "best available treatment economically achievable" (BAT), and are in compliance with available BAT standards promulgated by the U.S. EPA for each industrial classification.

The Water Board's goal for regulation of industrial discharges is to continue to move beyond treatment technology-based standards to water quality-based standards. With this shift, the industries are challenged to improve existing or develop new treatment and control technologies to achieve higher levels of protection of receiving waters' beneficial uses.

The effect of the Water Board's regulation has been to drastically reduce the pollutant loadings from industrial sources. But with the focus shifting to water quality-based standards, concerns still do exist in certain areas. For example, a major concern is discharge of selenium from oil refineries. Water quality data from the Regional Monitoring Program and other studies will be necessary to identify areas of most concern and help target future pollutant reduction efforts.

4.13 PRETREATMENT AND POLLUTION PREVENTION

The Waste Discharge Permitting Program described in Section 4.12 Industrial Facilities focuses on limiting pollutant discharge to the Bay from industrial and municipal treatment systems. In most situations, however, the overall effectiveness of treatment depends on the type and amount of pollutants that enter these POTWs or industrial treatment system. Some pollutants may cause upset to or interference with the operation of the treatment plant, sludge contamination, or harm to treatment plant workers and the public if discharged into sewer systems. In general, it is often more economical to reduce overall pollutant loading into treatment systems than to install complex and expensive technology at the plant. Both pretreatment and pollution prevention programs are key components of pollutant source control.

The goal of the pretreatment program is to protect treatment plants, worker health and safety, and the environment from the impact of discharges of certain toxic wastes (e.g., explosive and corrosive materials) into collection systems.

The pollution prevention program expands beyond the pretreatment program to include industrial, commercial, and residential sources. The goals of pollution prevention are to:

- Reduce or eliminate the discharge of all pollutants that have been found to impact or threaten beneficial uses;
- Focus on pollutant source reduction "upstream" of treatment plants, with an emphasis on material recycling, efficient use of chemicals, waste reduction, material and/or product substitution, and process modification; and
- Support reduction of pollutant discharges into collection systems through water conservation, recycling, and reuse.

The combined efforts of the pretreatment and pollution prevention programs have influenced thousands of facilities in the Region to significantly reduce the amount of pollutants discharged to the Bay. Between 1986 and 1999, the loading of heavy metals discharged from 27 POTWs with pretreatment programs, were reduced by 59 percent, even though the total volume discharged from these 27 POTWs increased slightly over this period.

4.13.1 California's Pretreatment Program

Each POTW regulates the types of waste discharged into collection systems leading to its treatment plant. The U.S. EPA, for certain types of waste and industrial categories, sets general standards for discharge to POTWs. Each POTW receiving a large amount of industrial waste and/or with a design flow greater than 5 million gallons per day (MGD) is required to develop and implement a pretreatment program, including enforce its own local discharge limits. The goal is to both protect treatment plants and ensure that the POTW is in compliance with its own discharge permit.

The Water Board oversees the implementation of the California pretreatment program under the California Water Code and federal Clean Water Act, although U.S. EPA retains its oversight role and is still actively involved in inspections and enforcement activities. POTW pretreatment programs must include components as specified in federal regulations and program descriptions incorporated into the NPDES permit for each POTW.

Specific monitoring and reporting requirements for the 27 POTWs in the Region with approved pretreatment programs are contained in the NPDES Permits for the POTWs. Major budgeted program tasks for the Water Board's oversight activities include pretreatment compliance inspections and audits; annual and semiannual report reviews; program modifications, particularly local limits revisions; and enforcement activities.

4.13.2 Pollution Prevention

The Water Board supports reducing toxic discharges through pollution prevention and expansion of the pretreatment program. This general approach to minimizing waste discharge is a necessary element in the implementation of the State Water Board's Mass Emission Strategy and will become increasingly important as alternative uses of wastewater are developed.

The Water Board's pollution prevention program is a two-tiered program that consists of a general and a targeted program. The first tier is a general program, requiring dischargers to focus on long-term pollution prevention and overall reduction of toxics entering collection systems. The general program is structured to allow dischargers to develop and direct pollution prevention efforts in its

own service area. It also allows dischargers to reduce toxic pollutant loading to their plants and remain in compliance with their discharge permit.

The second tier is a targeted program aimed to ameliorate existing water quality problems. The goal of targeted programs is to reduce the total amount of a specific pollutant (or pollutants) discharged to specific water bodies. Targeted programs are required when numeric or narrative water quality objectives are exceeded and beneficial uses are impaired or threatened.

Both the general and targeted pollution prevention programs will take multimedia concerns into account by coordinating with other relevant regulatory programs related to air and land disposal (e.g., sludge or biosolids).

All POTWs with an approved pretreatment program and all major industrial dischargers are required to develop and implement a general pollution prevention program within their jurisdiction. Dischargers are required to develop and implement a targeted program under the circumstances described in Section 4.13.2.4 Targeted Pollution Prevention for POTWs.

Presently, dischargers with required pollution prevention programs submit mid-year progress reports and/or a comprehensive annual report, which discusses progress and accomplishments along with program changes, and future program goals, developments and effectiveness measures. With forthcoming data needs for watershed permits, reporting formats will be standardized to improve comparability between programs.

4.13.2.1 General Pollution Prevention Priorities

The following are the Water Board's priorities for the pollution prevention program in the coming years:

- Encourage continued region-wide leadership across all pollution prevention programs through cross-program and cross media coordination, watershed based problem solving, and adaptability to new concerns through collaboration and partnerships.
- Develop strategies to measure effectiveness of pollution prevention efforts over the long and short term.
- Recognize and promote excellence through pollution prevention awards to programs that demonstrate resourcefulness, effectiveness, innovation, wide outreach (business, residential, and educational), and that take action to promote region-wide solutions.

4.13.2.2 Pollution Prevention Program History

In 1988, the Water Board began requiring "source control" programs from the three South Bay POTWs. In 1992, the Water Board required the remaining POTWs with pretreatment programs to develop and implement Waste Minimization Programs. Specifically, this included targeted programs for POTWs to reduce pollutants that exceeded water quality criteria, general programs for the remaining POTWs, and waste minimization audits for select industrial facilities discharging directly to surface waters. In 1993, the "Waste Minimization Program" was changed to "Pollution Prevention Program."

The Water Board formed the Bay Area Pollution Prevention Group (BAPPG) in 1990 and continues to support its significant successes in reducing pollution through product and chemical bans, targeted initiatives to reduce heavy metals, and regional technology transfer, outreach, and resource sharing.

In 2000, the state legislature enacted Water Code Section 13263.3 on pollution prevention programs. Also in 2000, the Policy for Implementation of Toxic Standards from Inland Surface Waters, Enclosed Bays and Estuaries of California (State Implementation Plan, or SIP) became effective, which addresses pollutant minimization programs.

In 2003, the Water Board adopted Resolution No. R2-2003-0096 promoting collaboration between the Bay Area Clean Water Agencies (BACWA) and the Water Board. It established 11 guiding principles for developing tools and guidance for POTW pollution prevention programs to balance program flexibility and program effectiveness. The products developed from this effort include a guidance document for pollution prevention program managers seeking to improve outreach and effectiveness of their programs, "Pollution Prevention Guidance and Tools for POTWs" (April 2005).

4.13.2.3 General Pollution Prevention Programs for POTWs

The general program is designed to allow individual POTWs to develop and direct long-term pollution prevention efforts according to local needs and is more flexible than targeted programs. General programs should contain the following elements:

- Pretreatment program review and enhancement should include a general review of opportunities for incorporating waste reduction goals into inspections, enforcement, and permitting (such as increased inspection, improved process flow measurements, etc.) In addition, previously unregulated types of industrial and commercial facilities that discharge pollutants of concern to the POTW should be identified. Each general program should include provisions for two additional categories of discharge that are not covered under the federal regulations (such as waste oil disposal, household products, car and truck washing operations, medical and dental facilities, etc.).
- Prioritize the need for and conduct audits of industrial users. The criteria for prioritization should include discharge of pollutants of concern, volume of flow, industrial user compliance, and opportunities for waste reduction.
- Periodic analysis of the waste discharge to determine which pollutants are currently problems and/or which pollutants may pose problems in the future.
- Identify sources of all pollutants of concern.
- Identify and implement tasks to reduce the sources of pollutants of concern.
- Design and conduct public education programs aimed at changing public behavior through educating the public about a pollutant, its sources, its impact to beneficial uses, how it is released into the environment, and where appropriate, options for safer product use, substitution, and product disposal (e.g., household hazardous waste management). Such efforts include advertising outreach and household hazardous waste programs. Current regional successes include product bans and advertising campaigns in English, Spanish, and Chinese. Successful outreach results in changing behaviors that lead to changes in purchasing behavior, or the way a toxic product is used, recycled, or disposed.
- Coordination with other programs involving recycling, reuse, and source reduction of toxic chemicals. This includes programs involving other media, such as air, hazardous waste, and land disposal. This might include developing programs for joint inspections and sharing in enforcement activities.
- An effectiveness monitoring program specifically designed to measure the success or effectiveness of specific pollution prevention activities, as well as overall successes

achieved in reducing toxic loads to the receiving watershed where possible, as well as to air, or land via sludge disposal. Such evaluations of program effectiveness are conducted on a regular basis.

4.13.2.4 Targeted Pollution Prevention Programs for POTWs

The purpose of targeted pollution prevention programs is to reduce the total amount of specific toxic pollutants being discharged to POTWs. Targeted programs are more intensive versions of the general programs and are focused only on one or a select number of pollutants.

Specifically, targeted programs are required for POTWs when any of the following conditions exist:

a) When numeric or narrative water quality objectives are exceeded and beneficial uses are impaired or threatened;

b) Are required as part of a TMDL or site-specific objective (SSO) implementation plan;

c) Are required under the SIP when there are effluent limit compliance problems; or

d) As authorized under the Water Code Section 13263.3.

The Water Board may, at its discretion, require dischargers to implement pollution prevention plans consistent with Water Code Section 13263.3 and the SIP.

In those areas of a watershed or the Estuary identified as exceeding water quality objectives or having impaired beneficial uses, dischargers that are significant contributors to the water quality problem will be identified and will be required to participate in a targeted waste minimization (pollution prevention) program. In addition to general program elements, a targeted pollution prevention program involves quantifying the sources to the POTW of the targeted pollutants in question. It may also be necessary to conduct further monitoring of the targeted pollutants in the receiving water, sediment, and biota by identified dischargers to POTW systems and/or POTWs at and near their discharge locations in order to more precisely determine associated effects.

A targeted program must also initiate reductions in pollutant loading through a control strategy designed to achieve the goal of maintaining concentrations of reportable priority pollutants in the effluent at or below the effluent limit, focusing on the most effective and economic control measures first. These reductions may be achievable through focused public outreach, implementation of Best Management Practices (BMPs), technical information transfer regarding effective management techniques, or installation of appropriate technologies.

The targeted program shall include all elements of the general program, expanding where appropriate to maximize the reduction of the targeted pollutants.

Targeted programs may also require other options such as performance-based effluent concentration limits and mass limitations for the pollutants of concern, in order to attain water quality objectives in the receiving water body.

4.13.2.5 Direct Industrial Discharger Pollution Prevention Program

Industrial entities discharging directly to receiving waters instead of public sewer systems are also subject to similar pollution prevention requirements. Overall source reduction and recycling of hazardous wastes, including audits, planning, and reporting to the Department of Toxic Substance Control (DTSC) is required under the Hazardous Waste Source Reduction and Management Review Act of 1989 (Title 22, CCR, Ch 31). Rather than require separate pollution prevention

programs, major dischargers were asked to submit copies of the required pollution prevention reports (those sections specifically addressing liquid waste and reduction of pollutants discharged to water) to the Water Board. These dischargers submitted initial plans for pollution prevention, including detailed descriptions of tasks and schedules, in 1992.

In the event that existing pollution prevention reports do not adequately address reduction of toxic pollutants in effluent, the Water Board will require additional information.

In cases where water quality problems exist or where beneficial uses are impaired or threatened by direct industrial dischargers, focused pollution prevention programs similar to POTW targeted programs will also be required. In cases where Water Board staff determines that independent audits, as opposed to audits conducted by the involved companies, the issue will be brought before the Water Board. The effort should result in the reduction or elimination of specific pollutants of concern.

4.14 URBAN RUNOFF MANAGEMENT

During periods of rain, water flushes sediment and pollutants from urbanized parts of the Estuary (Figure 4-3) into storm drain systems. These drains discharge directly to surface waters within the region, except in San Francisco where stormwater is mixed with sewage and directed to the treatment plant.

Urban runoff contributes significant quantities of total suspended solids, heavy metals, petroleum hydrocarbons, and other pollutants to the waters of the region. The impacts of pollutants in urban runoff on aquatic systems are many and varied. For example, small soil particles washed into streams can smother spawning grounds and marsh habitat. Lead and petroleum hydrocarbons washed off from roadways and parking lots may cause toxic responses in aquatic life and exemplify another kind of threat. The US EPA found levels of cadmium, copper, lead, and zinc in urban runoff exceeded freshwater acute aquatic life criteria in 9 to 50 percent of samples taken across the country. The chronic criteria for these metals, beryllium, cyanide, mercury, and silver were exceeded in at least 10 percent of the samples. In the San Francisco Bay Region, the Association of Bay Area Governments (ABAG) has found consistently high levels of hydrocarbons in urban runoff.

The Water Board's urban runoff management program focuses on reducing pollutant transport through stormwater drain systems into surface waters. In general, measures that will effectively limit storm drain pollutant discharge will also limit direct runoff of pollutants into creeks, streams, and lakes.

The program is structured around the municipalities and local agencies responsible for maintaining storm drain systems, and three classes of activities that are responsible for significant amounts of pollutant influx to those public storm drain systems: highways under the jurisdiction of the California Department of Transportation (Caltrans), industrial activities, and construction on areas larger than 5 acres.

Within each of these program areas, the Water Board's urban runoff management approach emphasizes general, long-term planning to avoid any increases in pollutant loading, and more structured, intensive approaches when existing water quality problems require immediate action.

A large part of the Water Board's work in managing urban runoff involves supporting local planning and investigation. The program includes:

- Organizing local ad hoc task forces within each hydrologic sub-region (see maps in Chapter 2) to facilitate investigations and design of appropriate control strategies. These task forces include representatives from local government, point source dischargers, local industries, the Water Board, and U.S. EPA.
- Developing cooperative investigation and control strategies utilizing the expertise and resources of point source dischargers in each of the receiving water segments.
- Supporting research by the San Francisco Estuary Institute, ABAG, U.S. EPA, and others entities to better define the impacts of urban runoff discharges.
- Participating on the State Water Board Stormwater Quality Task Force and the development and implementation of a statewide urban stormwater best management practices manual.
- Working with other agencies such as the Bay Area Air Quality Management District and the Metropolitan Transportation Commission to ensure that transportation related strategies and plans will reduce the impact on receiving waters from transportation system runoff discharges.

4.14.1 Management of Pollutant Discharge from Storm Drains

The Water Board's strategy for managing pollutants and sediment in urban runoff entering and being discharged public storm drain systems is two-tiered. All cities and counties are encouraged to develop and implement voluntary programs aimed at pollution prevention throughout the region (Baseline Control Program). Selected cites and counties, by virtue of the amount of pollutants being discharged from their storm drain system, impact of those discharges on receiving waters, or population, are required to develop pollution prevention programs and take steps to reduce runoff into drain systems (Comprehensive Control Program).

The first major step in addressing pollutant loading to public storm drains was to compile basic information on existing systems. A Board survey of local agencies owning or responsible for storm drain systems and flood control agencies had limited and often dated information on the storm drain systems that they own or manage. In addition, flow and water quality data for storm drain system discharge were virtually nonexistent. The survey also found that current management of storm drain systems is primarily focused on flood control, with storm drainage inlets, lines, and catch basins scheduled for cleaning annually or on an as-needed basis for flood prevention purposes.

4.14.1.1 Baseline Control Program

All local agencies, including special districts, in the cities and counties in the region (see Table 4-10) that own or have maintenance responsibility for storm drain systems should develop and implement a baseline control program.

The goal of the baseline control programs is to prevent any increase in pollutants entering these systems. To a large extent, this goal can be achieved by including consideration of pollutant runoff into storm drain systems in the course of local planning efforts and encouraging "good practice" techniques.

Components of baseline control programs should include: review and update of operation and maintenance programs for storm drain systems; development and adoption of ordinances or other planning procedures (such as CEQA review) to avoid and control pollutant and sediment loading to runoff as part of the normal design and construction of new and significant redevelopment (both

during construction and after construction is completed); and education measures to inform the public, commercial entities, and industries on the proper use and disposal of materials and waste and correct practices of urban runoff control. Baseline control programs should also include surveillance, monitoring, and enforcement activities to ensure and document implementation.

Similarly, flood control agencies should consider the impact of their projects on receiving waters. Flood management projects, facilities, or operations should be designed, operated, and maintained to reduce the amount of pollutants in stormwater discharges as well as achieving flood control objectives.

The Water Board will support and encourage the development and implementation of baseline control programs in cooperation with cities and counties. Board staff may provide technical guidance and support, facilitate ad-hoc working groups including people with expertise and experience in POTW pollution prevention programs and local hazardous waste management, and participate in development of model ordinances.

The programs should be coordinated with POTW and industrial pollution prevention programs and local hazardous materials management programs.

In addition, the Water Board will focus its surveillance, monitoring, and enforcement activities on and review Environmental Impact Reports on new development and significant redevelopment and focus its surveillance, monitoring, and enforcement activities to support implementation of effective baseline control programs. The effectiveness of a municipality's baseline control program will also be considered when issuing NPDES permits for construction activities pursuant to the Water Board's Construction Activity Control Program.

The Water Board requires the local agencies, special districts, and municipalities listed in Table 4-10 to submit annual reports (pursuant to Section 13225(c) of the California Water Code) describing their baseline control programs. These reports are due on September 1 of each year and should describe:

- Operation and maintenance activities associated with the storm drain system;
- Master planning procedures and documentation of activities associated with control;
- A list of all new development and significant redevelopment projects with documentation that urban runoff control measures have been required and are being implemented;
- Documentation of educational measures;
- Documentation of surveillance, monitoring, and enforcement activities; and
- A qualitative evaluation of program effectiveness, including, but not limited to, program accomplishments, funds expended, staff hours utilized, an overall evaluation, and plans for the upcoming year.

To the extent that voluntary implementation of baseline control programs is not realized, the Water Board will act, where necessary, to require individual local agencies to investigate specific runoff discharges, quantify pollutant loads, and identify and implement control strategies for pollutant runoff into storm drains. Where necessary, require individual local agencies to file a Report of Waste Discharge or NPDES permit application for the implementation of baseline control programs.

Cities and counties should review and revise their planning procedures and develop or revise comprehensive master plans to assure that increases in pollutant loading associated with newly developed and significantly redeveloped areas are, to the maximum extent practicable, limited. Areas that are in the process of development, or redevelopment offer the greatest potential for utilizing the full range of structural and non-structural control measures to limit increases in pollutant loads. Comprehensive planning must be used to incorporate these measures in the process of developing. Cities and counties should fully utilize their authority under CEQA to assure implementation of control measures at all proposed development and significant redevelopment projects.

4.14.1.2 Comprehensive Control Program

The goal of the Water Board's comprehensive control program is to remediate existing water quality problems and prevent new problems associated with urban runoff. To achieve this, the program focuses on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Water Board's comprehensive program is designed to be consistent with federal regulations (40 CFR 122-124) and is implemented by issuing NPDES permits to owners and operators of large storm drain systems and systems discharging significant amounts of pollutants. The conditions of each NPDES stormwater permit require that entities responsible for the systems develop and implement comprehensive control programs.

The regulations authorize the issuance of system-wide or jurisdiction-wide permits and they effectively prohibit non-stormwater discharges to storm drains. They also require listed municipalities to implement control measures to reduce pollutants in urban stormwater runoff discharges to the maximum extent practicable. The Water Board will, where necessary, require stormwater discharge permits for discharges not cited in the regulations which are a significant contributor of pollutants to waters of the region.

The comprehensive urban runoff control program includes all elements of the baseline control program designed to prevent increases in pollutant loading. To reduce current pollutant loading to the maximum extent practicable, the program also includes:

- Characterization of urban runoff discharges to the extent necessary to support program development;
- Elimination of illicit connections and illegal dumping into storm drains;
- Development and implementation of measures to reduce pollutant runoff associated with the application of pesticides, herbicides, and fertilizer;
- Development and implementation of measures to operate and maintain public highways in a manner that reduces pollutants in runoff; and
- Effective pollution reduction measures may include educational activities such as painting signs on storm drain inlets and regulation of activities such as application of pesticides in public right-of-ways.

Each NPDES stormwater permit issued by the Water Board will require an annual report evaluating the effectiveness of its comprehensive urban runoff control program. At a minimum, quantitative monitoring, a detailed accounting of program accomplishments (including funds expended and staff hours utilized), an overall evaluation of the program, and plans and schedules for the upcoming year shall be used to assess effectiveness.

The Water Board's urban runoff control program is still relatively new. Table 4-10 lists the entities in each area that have implemented comprehensive control programs. In addition, there is a need to develop and implement similar programs in the urban and rapidly developing areas of Solano County and the cities of San Rafael, Novato, Petaluma, Napa, and Benicia, and the Ports of Oakland, Richmond, and San Francisco. Urban runoff discharges from these areas are considered significant sources of pollutants to waters of the region and may be causing or threatening to cause violation of water quality objectives. The Water Board intends to consider similar action for these at a later time. The City and County of San Francisco is not permitted under the storm water program because it has a combined (sanitary and storm) sewer system operating in accordance with existing NPDES permits.

The Water Board will conduct surveillance activities and provide overall direction to verify and oversee implementation of urban runoff control programs. Technical guidance for prevention activities, the identification, assignment, and implementation of control measures, and monitoring will be developed.

4.14.2 Highway Runoff Control Program

An essential component of reducing pollutant loading to storm drain systems involves managing runoff from public roads. While many roads fall under the jurisdiction of entities responsible for storm drain systems, public highways are controlled by the California Department of Transportation (Caltrans). In order to ensure that all public highways are maintained to reduce pollutant runoff, the Water Board issued a stormwater NPDES permit to Caltrans in August, 1994. The permit requires implementation of a highway Stormwater Management Plan which addresses the design, construction, and maintenance of highway facilities relative to reducing pollutant runoff discharges to the maximum extent practicable.

The highway runoff management plan shall include litter control, management of pesticide/herbicide use, reducing direct discharges, reducing runoff velocity, grassed channels, curb elimination, catch basin maintenance, appropriate street cleaning, establishing and maintaining vegetation, infiltration practices, and detention/retention practices. In addition, the plan must include monitoring the effectiveness of control measures, runoff water quality, and pollutant loads. When possible, Caltrans is expected to coordinate with existing agencies and programs related to the reduction of pollutants in highway runoff.

4.14.3 Industrial Activity Control Program

Industrial stormwater sources are subject to best available technology (BAT) economically-based standards. Federal regulations require stormwater permits for any site where industrial activity takes place (or has in the past), and materials are exposed to stormwater. The definitions of industrial activities subject to these permits (provisions of Title 40 Code of Federal Regulation, Part 122.26, revised December 18, 1992) are incorporated by reference into this plan. This incorporation by reference is prospective including future changes as they take effect. The Water Board will require an NPDES permit for the discharge of stormwater from all industrial facilities where such activities occur. These permits apply to the discharge from any system used to collect and convey stormwater at industrial sites. These sites include, but are not limited to, industrial plant yards, access roads and rail lines, material and refuse handling areas, storage areas (including tank farms) and areas where significant amounts of materials remain from past activity. Permits are issued both to privately and publicly (federal, state, and municipal) owned facilities.

The Water Board's permitting strategy for industrial facilities is based on a four-tier set of priorities for issuing permits. At a minimum, all permits will require compliance with all local agency

requirements. General permits for industrial facilities will not be less stringent than individual permits.

4.14.3.1 Tier I: General Permitting

The majority of stormwater discharges associated with industrial activity in the region will be covered under a general permit issued by the State Water Board in November 1991.

4.14.3.2 Tier II: Specific Watershed Permitting

In some watersheds, water quality has been impacted by stormwater discharges from facilities associated with industrial activity. Facilities within these watersheds will be targeted for individual stormwater permits or regulation under watershed-specific general permits. The Water Board issued a general permit for industrial activity in the portion of Santa Clara County that drains to South San Francisco Bay to support the county's comprehensive control program and will consider a similar general permit for Alameda County at a later time.

4.14.3.3 Tier III: Industry-specific Permitting

Specific industrial categories will be targeted for individual or industry-specific general permits. For example, the Water Board issued a general permit for storm water discharges from boatyards in August 1992. The use of general permits is intended to alleviate the administrative burden of issuing storm water permit for individual industrial facilities. In some cases, such as large U.S. Department of Defense facilities, individual sites or classes of sites may be significant sources of pollutants, and individual permit(s) specific to these classes of sites are warranted.

The Water Board considers stormwater discharges from automotive operations, including gas stations, auto repair shops, auto body shops, dealerships, and mobile fleet-washing businesses to be significant sources of pollutants to waters in the region. Local agencies implementing comprehensive control programs are addressing these discharges through ordinances as part of their comprehensive control programs. The effectiveness of local measures will be assessed before the Water Board considers permitting these under a separate industrial permit.

4.14.3.4 Tier IV: Facility-specific Permitting

A variety of factors will be used to target specific facilities for individual permits, such as amount and characteristics of runoff, size of facility, and contribution to existing water quality problems. Permitted individual facilities will be required to identify "hot areas" where runoff may contact pollutants; activities that may release pollutants to runoff; segregate stormwater discharges from the "hot areas;" and identify and implement control measures for "hot areas.” In addition, permittees will be required to eliminate all non-stormwater discharges to storm drain systems unless authorized by an NPDES permit or determined not to be a source of pollutants requiring an NPDES permit.

4.14.4 Construction Activity Control Program

The Water Board will require an NPDES permit for the discharge of stormwater from construction activities involving disturbance of five acres or greater total land area or are part of a larger common plan of development that disturbs greater than five acres of total land area. The majority of construction activity discharges in the region will be permitted under a general permit issued by the State Water Board in 1992. Permit conditions address pollutant and waste discharges occurring during construction activities and the discharge of pollutants in runoff after construction is completed. Permit conditions are consistent with the Water Board's erosion and sediment control

policy (Resolution No. 80-5) and consistent with local agency ordinance and regulatory programs. The intent of the permit is not to supersede local programs, but rather to complement local requirements. This will require local agencies to effectively address construction activities through their early planning, CEQA processes, and implementation of development control measures as part of their baseline or comprehensive control programs.

4.15 AGRICULTURAL WASTEWATER MANAGEMENT

Agricultural wastewaters and the effect of agricultural operations must be considered in terms of land use practices and controls developed in the agricultural element of land use plans. The activities of primary importance to water quality in this basin are animal confinement and irrigation practices. Agricultural pesticide use and limits on fertilizer application are not specifically considered because of the limited applicability in this region.

4.15.1 Animal Confinement Operations

Animal confinement operations such as kennels, horse stables, poultry ranches, and dairies, raise or shelter animals in high densities. Wastes from such facilities can contain significant amounts of pathogens, oxygen-depleting organic matter, nitrogen compounds, and other suspended and dissolved solids. In addition, erosion is also a common problem associated with these facilities. Runoff of storm or wash water can carry waste and sediment and degrade receiving surface waters. Groundwaters can also be degraded when water containing these wastes percolates into aquifers. The risk of water quality degradation increases during the rainy season when animal waste containment and treatment ponds are often overloaded.

Minimum design and management standards for the protection of water quality from confined animal operations are promulgated in Title 23, California Code of Regulations, Chapter 15, Article 6. These regulations prohibit the discharge of facility wash water, animal wastes, and stormwater runoff from animal confinement areas into waters of the state. They also specify minimum design and waste management standards including:

- Collection of all wastewaters;
- Retention of water within manured areas during a 25-year, 24 hour storm;
- Use of paving or impermeable soils in manure storage areas; and
- Application of manures and wastewaters on land at reasonable rates.

The Water Board has the authority to enforce these regulations through Waste Discharge Requirements.

Facilities such as the dairies located in Marin and Sonoma counties and horse boarding stables are typical of animal confinement operations within the region.

4.15.1.1 Dairy Waste Management

Much of the land within the Tomales Bay, Petaluma River, Napa, and Sonoma Valley watersheds is used for agricultural purposes. Within these watersheds, a significant number of livestock are housed and grazed.

Animal waste can cause water quality problems through runoff into surface and groundwaters of the state. Stockpiled manure, washwater, and stormwater runoff from corrals, pens, and other animal confinement areas are potential sources of water pollution due to their high bacteria levels

(the coliform group used as indicators), ammonia, nitrate and suspended solids. Detergents, disinfectants, and other biocides commonly used may also contribute to the toxicity of animal wastes. These constituents can be extremely deleterious to fish and other forms of aquatic life. High bacterial levels have had an adverse impact on shellfish resources in the region (i.e., commercial shellfish harvesting in Tomales Bay).

Problems facing the dairy industry include manure containment during the rainy season, appropriate manure dispersal on pasture land, and implementation of range management practices aimed at water quality protection. The availability of ample farm and pastureland is therefore extremely important in managing animal waste.

Since the 1970s, the cooperative relationship between the Water Board and the dairy industry has been an important aspect of dairy waste control. That relationship has been instrumental in the construction of dairy waste handling, treatment, and disposal facilities in the late 1970s. However, proper waste control management is just as important as the physical facility. Management techniques include routing wash water and drainage to impervious holding and storage areas, constructing manure storage areas controlling both subsurface infiltration and runoff, stormwater overflow protection for retention basins, and applying manures and wastewater on land at reasonable rates for maximum plant uptake of nitrogen.

Poor practices that have led to water quality problems in the past include: inadequate maintenance and operation of facilities; overloading treatment and storage facilities; increase of herd size without commensurate additions to waste handling facilities; poor range management practices; and simple neglect of seasonal waste management responsibilities.

4.15.1.2 Dairy Waste Regulation

Both the regulation and the support services for the dairy industry involve several federal, state, and local agencies. Each has its particular role and mission, but all share the goal of protecting the beneficial uses of state waters while assisting dairies in complying with regulations while conducting their day-to-day business. The following agencies play a direct role in dairy waste management and regulation:

Regulatory

- California Regional Water Quality Control Board
- California Department of Fish and Game

Support Services

- Agricultural Stabilization and Conservation Services
- U.S. Department of Agriculture — Soil Conservation Service
- University of California Cooperative Extension Farm Advisor
- County Farm Bureaus
- Resource Conservation Districts

To address dairy waste management concerns, dairy operators in Marin and Sonoma Counties have formed a Dairy Waste Committee. The Dairy Waste Committee supports dairy operators in their efforts to solve waste control problems and locate technical and financial assistance. The

Committee serves as a vehicle through which the Water Boards and California Department of Fish and Game can disseminate information on water quality regulations and requirements. This committee does and will continue to play an important role in any successful waste control program.

Additionally, the Southern Sonoma and Marin County Resource Conservation Districts (RCDs) have a cooperative, voluntary program in which a farmer agrees to use the land within its capabilities, develop a conservation plan, and apply conservation practices to meet objectives and technical standards of the RCDs. In turn, the RCD agrees to furnish the farmer with information and technical assistance in order to carry out the conservation plan.

4.15.1.3 Water Board Program

4.15.1.3.1 Permitting/Waiver of Permits

Generally, discharges are subject to Waste Discharge Requirements (WDRs) issued by the Water Board. However, the Water Board may waive WDRs where such a waiver is not against the public interest and still assures the protection of beneficial uses of state waters. For the present, the Water Board has been waiving WDRs for dairies where proper waste control facilities are in place and management practices are in conformance with the California Code of Regulations - Title 23, Article 3, Chapter 15 (Discharge of Waste to Land).

4.15.1.3.2 Continuing Waste Control Planning

In 1990, the State Water Board established a Dairy Waste Task Force to look at the dairy industry statewide and develop standards for dairy regulation. The main emphasis has been on developing better communication and guidance materials for the industry; developing a dairy survey form to help the Water Boards determine if a dairy qualifies for a waiver from WDRs; determining the number and location of dairies; develop more uniform WDRs; and preparing an outreach program aimed at the dairy industry, local government, and the public.

The Water Board directs the Executive Officer to continue the following staff activities:

- Work with the dairy industry through the local dairy waste committees, County Farm Bureaus, RCDs, and other local/state agencies in obtaining cooperative correction of dairy waste problems.
- Recommend adoption of WDRs in those cases where water quality objectives for waters within an agricultural watershed are consistently exceeded, or where corrective action is unsuccessful in eliminating either the short- or long-term water quality problems or threats. The Water Board may choose to take enforcement action through the issuance of a Clean-up and Abatement Order or assess monetary penalties in those cases where dairy practices have resulted in or threaten to cause a condition of pollution or nuisance in surface waters through the issuance of Administrative Civil Liability or referral to the California Attorney General's Office.
- Monitor the compliance of dairy waste management programs with regional goals and implement the recommendations of the State Dairy Waste Task Force.

4.15.2 Irrigation Operations

An increase in the concentration of soluble salts contained in percolating irrigation water is an unavoidable result of consumptive use of water. Salt management within soils and groundwater is considered separate from water management, but is closely related to drainage control and

wastewater operations. For irrigated agriculture to continue in the future, acceptable levels of salts in soils and groundwaters must be controlled.

Maintenance of a favorable salt balance, that being a reasonable balance between the import and export of salts from individual basins, must be considered to control increases in mineral content. This is especially applicable for the Livermore and Santa Clara Valley groundwater basins.

The ultimate consequences of regulatory action for irrigation operations must be carefully assessed. The "no-degradation" concept in connection with salt levels is not appropriate in all circumstances.

A concept of minimal degradation might be considered in some areas. It would need to be coupled with management of the surface and underground water supplies in order to assure acceptable degradation effects. If minimal degradation is considered, it can be offset by either recharge and replenishment of groundwater basins with higher quality water that will furnish dilution to the added salts, or by drainage of degraded waters at a sufficient rate to maintain low salts and salts leaving the basin. To aid recharge and dilution operations, additional winter runoff can be stored in surface reservoirs for subsequent use with either surface stream or groundwater basin quantity/quality management.

4.16 WATER RECYCLING

Per Water Code Section 13050, recycled water means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource. To date in this Region, disposal of most municipal and industrial wastewater has primarily involved discharges into the Region's watersheds and the Estuary. With growing awareness of the impacts of toxic discharges, drought, future urbanization, and growth on the local aquatic habitat, there is an increasing need to look for other sources of water. Increasingly, conservation and water recycling (formerly referred to as reclamation) will be needed to deal with these long-term water issues. The Water Board recognizes that people of the Region are interested in developing the capacity to conserve and recycle water to supplement existing water supplies, meet future water requirements, and restore the Region's watersheds and Estuary. Disposal of wastewater to inland, estuarine or coastal waters is not considered a permanent solution where the potential exists for conservation, water recycling, and reuse.

The Constitution of California, Article X, declares that, "...because of the conditions prevailing in the state, the general welfare requires that the water resources of the state be put to beneficial use to the fullest extent to which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare." In other words, when suitable recycled water is available, it should be used to supplement existing water supplies used for agricultural, industrial, municipal, and environmental purposes.

The Water Board also recognizes and supports the concept that water reuse is an essential component for planning future water supply, especially in areas dependent on imported water. This includes projects that use recycled water to increase the local water supply, to improve the salt balance in the groundwater basin, or to reduce the need for wastewater export through recycled water irrigation and groundwater recharge with imported water or with high-quality recycled water. The year-round, dependable recycled water resource may also be appropriate for stream flow augmentation to enhance beneficial uses of streams.

State Water Board Resolution 77-1, adopted in 1977, requires the State and Regional Water Boards to encourage water recycling projects for beneficial use using wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds. The resolution also specifies using recycled water to replace or supplement the use of fresh water or better quality water, and to preserve, restore, or enhance in-stream beneficial uses, including fish, wildlife, recreation and aesthetics associated with any surface water or wetlands.

4.16.1 Water Recycling and Reuse Program

Before a wastewater producer can obtain an increase in connections and discharge flows under the Water Board's NPDES program, it must demonstrate that a maximum effort has been made to develop and implement a credible and effective water recycling program. This program must be integrated with a source control program (Pretreatment and Pollution Prevention Program (Section 4.13 Pretreatment and Pollution Prevention) and a water conservation program.

All water recycling projects involve three components: 1) treatment of wastewater to produce water of quality suitable for the intended reuse; 2) distribution, which may also include storage, to convey the treated water to the place(s) of use; and 3) the end use, reuse. The most common types of reuse involve discharges to land for irrigation of landscape plants or crops, but reuse may also include non-discharge uses such as for cooling water or toilet flushing. Each of these components is subject to various design and operational requirements specified in the Water Recycling Criteria (WRC) codified at Title 22, CCR, Division 4, Chapter 3, which were extensively revised and updated by Department of Health Services (DHS) from 1993 to 2001.

The Water Board in conjunction with DHS implements the WRC. DHS and the State Water Board have entered into a Memorandum of Agreement (MOA) on Use of Reclaimed Water. The intent of the MOA is to insure that there is coordination among DHS, the State Water Board and the Regional Water Boards to implement the recycled water program.

The Water Board is the permitting agency for water recycling projects through issuance of water recycling requirements, also called Water Reuse Requirements (WRRs). The WRRs require a discharger proposing a new water-recycling project to prepare an engineering report describing the project, for review and approval by DHS. The Water Board may then prescribe WRRs for the project based on recommendations from DHS. WRRs include relevant specifications from the WRC and other applicable requirements based on Water Board plans and policies, such as effluent limits and operation, and monitoring and reporting requirements. WRRs may be issued for discrete single-facility reuse projects or for large-scale projects such as municipality-based reuse programs involving multiple types and places of reuse.

In 1996, in order to facilitate water recycling and reuse in the Region, the Water Board adopted the General Water Reuse Requirements for Municipal Wastewater and Water Agencies, Water Board Order No. 96-011 (General Water Reuse Permit). This permit is applicable to producers, distributors, and users of non-potable recycled municipal wastewater throughout the Region. The intent of the General Water Reuse Permit is to streamline the permitting process and delegate, to the fullest extent possible, the responsibility of administrating water reuse programs to local agencies. Regulation under the General Water Reuse Permit requires submittal of a Notice of Intent (NOI) to the Water Board and written authorization from the Water Board’s Executive Officer.

Under the General Water Reuse Permit, water recycling and reuse have expanded rapidly throughout the Region. It is estimated that twenty wastewater or water distribution agencies in the Region will be operating under the General Water Reuse Permit by 2007.

In 2001, the State Legislature established the California Recycled Water Task Force (Task Force). The mission of the Task Force was to evaluate the current framework of state and local rules, regulations, ordinances, and permits to identify opportunities for and obstacles to the safe use of recycled water in California. The Task Force consisted of representatives from federal, state, and local agencies, private entities, environmental organizations, universities, and public-interest groups. The Task Force identified and adopted recommendations to address obstacles, impediments, and opportunities for California to increase its recycled water usage as described in the report “Water Recycling 2030, Recommendations of California’s Recycled Water Task Force."

4.16.2 Interagency Water Recycling Program and Coordination

Implementation of water recycling projects requires the involvement, approval, and support of a number of agencies, including state and local health departments, the Water Board, local POTWs and water districts, and land use planning agencies. Interagency coordination must be a priority of all parties involved in water recycling. Failure to coordinate activities can result in the inability to carry out water recycling projects in a timely, consistent, and cost-effective manner. The Water Board seeks cooperation and participation of professionals from the water recycling industry and the water, health, and regulatory agencies to assure the development of criteria that are both attainable and appropriate. To facilitate inter-/intra-regional recycling projects, interagency coordination is necessary when the wastewater agency produces recycled water outside of an interested water purveyor's service area. Effective communication and cooperation between agencies regarding distribution and service is vital and should begin early in the planning process. This will assure the water purveyor that there will be no duplication of service, enable interagency agreement on project development and implementation, and help avoid any unnecessary delays that could jeopardize a project.

Several regional water-recycling programs have been initiated in the Region to facilitate water reuse in contiguous areas. This has heralded a new way to implement water-recycling projects by focusing agencies toward regional collaboration, irrespective of jurisdictional boundaries. This has the effect of integrating water and wastewater planning to concurrently solve water supply and wastewater discharge problems, and will lead to more efficient water recycling projects by taking advantage of economics of scale. One such program is the South Bay Recycling Program in Santa Clara County. In addition, the North Bay Watershed Association was created, “to help regulated local and regional public agencies work cooperatively on water resource issues that impact areas beyond traditional boundaries in order to promote stewardship of the North Bay Watershed (Marin, Sonoma and Napa Counties).” The coordination and integration of water reuse activities in the North Bay is an important component of the Association’s functions.

4.17 MUNICIPAL WASTEWATER SLUDGE MANAGEMENT

One particular type of solid waste is wastewater sludge, a by-product of wastewater treatment. Raw sludge usually contains 93 to 99.5 percent water, with the balance being solids that were present in the wastewater and that were added to or cultured by wastewater treatment processes. Most POTWs treat the sludge prior to ultimate use or disposal. Normally this treatment consists of dewatering and/or digestion. In some cases, such as at the Palo Alto treatment plant, the sludge is incinerated.

Treated and untreated sludges often contain high concentrations of toxic metals and often contain significant amounts of toxic organic pollutants and pathogens. The storage and disposal of municipal sludges on land can result in degradation of ground and surface water if not properly performed. Therefore, sludge handling and disposal must be regulated.

On February 19, 1993, the U.S. EPA promulgated national standards regulating the use or disposal of non-hazardous sewage sludge (40 CFR Part 503, et. seq.). Part 503 regulations primarily affect sewage sludge (also known as "biosolids") use and disposal by incineration, surface disposal, and land application (including distribution and marketing). Part 503 regulations also establish pollutant limits, operational and maintenance practices, monitoring frequency, recordkeeping, and reporting requirements. The federal definition of sewage sludge includes domestic septage (from septic tanks, cesspool, portable toilet, etc.). Disposal in a municipal solid waste landfill (MSWLF) is not considered surface disposal. Thus, the MSWLF is not regulated by the national sewage sludge program.

The State of California has neither requested nor been granted the delegation of the federal sewage sludge management program at this time. Therefore, U.S. EPA will be responsible for implementation and enforcement of the national rule. Under the rule, facilities that must apply for a permit include the generators, treaters and disposers of sewage sludge. Nevertheless, 40 CFR Part 503 has, for the most part, been written to be self-implementing. This means that anyone who uses or disposes of sewage sludge regulated by 40 CFR Part 503 must comply with all the provisions of the rule, whether or not a permit has been issued.

State regulations of the handling and disposal of sludge are contained in Chapter 15 and DTSC standards for hazardous waste management. Prior to promulgation of the national rule, sewage sludge facilities were regulated by the Water Board through the issuance of site-specific waste discharge requirements. The Water Board may continue to regulate certain sewage sludge facilities when believed to be necessary for the protection of water quality.

4.18 ON-SITE WASTEWATER TREATMENT AND DISPERSAL SYSTEMS

As the population of the Region increases, demand for new development increases. In many cases, new development is within areas served by municipal sewer systems. However, development is also occurring in outlying areas not served by existing sewerage agencies. In those instances, new discrete sewerage systems are being proposed. These are primarily onsite wastewater treatment and dispersal systems (onsite systems or septic systems) serving individual homes, but include community systems serving multiple residences. Today there are more than 110,000 onsite systems throughout the Region, and approximately 1,000 new systems are approved each year.

In response to these development pressures, the Water Board adopted a Policy on Discrete Sewerage Facilities in 1978 (Board Resolution No. 78-14). The Policy set forth guiding regulatory principles and the actions that the Water Board would take with respect to proposals for individual or community sewerage systems serving new development. The 1978 Policy was rescinded in 2014 when the State Water Board's statewide Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy) was incorporated by reference into the Basin Plan (section 4.18.2) but relevant guiding principles and requirements from the 1978 Policy have been retained in section 4.18.1 to complement the OWTS Policy.

4.18.1 Policy on Discrete Sewerage Facilities

The Water Board will apply the following guiding principles to all wastewater discharges from discrete sewerage systems:

- The system must be designed and constructed so as to be capable of preventing pollution or contamination of the waters of the state or creating nuisance;

- The system must be operated, maintained, and monitored so as to continually prevent pollution or contamination of the waters of the state and the creation of a nuisance.

The Water Board requires an assessment of the cumulative impact of discharges from individual wastewater treatment and disposal systems on water quality and public health where the density of systems or geologic conditions are such that adverse impacts may occur. This assessment shall be included in the application submitted to local agencies for systems covered by the OWTS Policy conditional waiver or, if not covered by the conditional waiver, in the Report of Waste Discharge submitted to the Water Board.

The Water Board also requires that a public entity must assume legal authority and responsibility for the planning, design, financing, construction, operation, and maintenance of any new community wastewater treatment and dispersal system. Community systems are defined as collection sewers plus treatment facilities serving multiple discharges under separate ownership, such as small, pre-engineered and prefabricated packaged wastewater treatment plants or common septic tanks plus dispersal facilities. The responsible public entity must prepare acceptable operation, maintenance, revenue, and contingency plans for the wastewater treatment and dispersal facility. These plans shall be included in the application submitted to local agencies for systems covered by the OWTS Policy conditional waiver or, if not covered by the conditional waiver, in the Report of Waste Discharge submitted to the Water Board. In the absence of acceptable plans, the discharge will be prohibited.

4.18.2 Onsite Wastewater System Requirements

The Water Board prohibits the discharge of wastes which threaten to cause water pollution, water quality degradation, or the creation of health hazards or nuisance condition. Requirements for siting, design, operation, maintenance, and management of onsite wastewater treatment systems are specified in the State Water Board's OWTS Policy. The OWTS Policy, including future revisions, is incorporated into this Basin Plan and shall be implemented according to the policy's provisions.

The OWTS Policy sets forth a tiered implementation program with requirements based upon levels (tiers) of potential threat to water quality. The OWTS Policy applies to: individual treatment and dispersal systems; community collection, treatment, and dispersal systems; and alternative collection, treatment, and dispersal systems that use subsurface dispersal. The OWTS Policy only applies to such systems with a projected flow of 10,000 gallons per day or less of domestic wastewater and, in some cases, high strength wastewater (not exceeding 900 mg/L BOD) from commercial food service buildings equipped with a properly sized and functioning oil/grease interceptor.

The OWTS Policy includes a conditional waiver of waste discharge requirements for onsite systems that are in conformance with the policy. Onsite wastewater treatment systems that do not meet the applicability criteria of the OWTS Policy or whose wastewater does not meet the quantity and quality specifications of the policy cannot receive coverage under the conditional waiver so these systems will be regulated by the Water Board through other regulatory means.

4.18.3 Graywater Systems

Graywater systems are a type of onsite systems that are used to manage only isolated domestic wastewaters that have not come in contact with toilet wastes. In 2009, the California Building Standards Commission approved revised California Graywater Standards (Graywater Standards). These standards developed by the California Department of Housing and Community

Development, are codified at Title 24, CCR, Part 5, Chapter 16, and apply to all graywater systems statewide.

Pursuant to Health and Safety Code section 17922.12, “graywater” means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. “Graywater” includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.

The Graywater Standards specify the means by which graywater may be collected, filtered, and used either in irrigation systems or, if treated, certain indoor uses. The standards apply to both residential and commercial buildings. The Graywater Standards promote water conservation by facilitating re-use of laundry, shower, lavatory and similar sources of discharge for irrigation and/or indoor use. These revised standards allow certain types of systems to be installed without a building permit.

Cities and counties have authority to develop policies and procedures for the implementation of graywater programs. In developing these, consultation with the Water Board and local water districts can ensure that potential impacts on local water quality are taken into consideration.

4.19 EROSION AND SEDIMENT CONTROL

Current estimates of annual sediment inflow to San Francisco Bay are 5.9 million cubic yards with 3.9 million cubic yards contributed through the Delta and 2.0 million cubic yards from Bay Area tributary streams. By the year 2000, ABAG has estimated that approximately 322,500 acres of land area will be converted to urban use. This is a 73 percent increase above the 1975 urbanized land area. This increase in urbanized land use can be expected to be the future source of much of the sediment that will reach the rivers, streams and channels and ultimately the Bay system each year.

Soil erosion and related water quality impacts may result from a wide variety of causes including construction, hillside cultivation, non-maintained roads, timber harvesting, improper hiking/ biking trail use, and off-road vehicles.

Natural erosion processes are accelerated when existing protective cover is removed before, during, and following construction and agricultural activities. Studies relate that erosion on land where construction activities are taking place is about 10 times greater than on land in cultivated row crops, 200 times greater than on pasture land, and 2,000 time greater than on timber land that has not been logged.

The exposure of the soil mantle to falling rain, overland and channelized flow, and the impact of equipment moving over the site results in the increased movement and loss of soil.

Damage from erosion and sedimentation can be categorized in the following ways:

- Damage to construction sites;
- Damage to stream channels;
- Damage to water quality/beneficial uses;
- Damage to public and private property; and

- Damage to agricultural lands.

In most cases, the adverse results of human activities can be reduced and in some instances eliminated through the use of both structural and non-structural measures of various types that are properly employed at the appropriate time. The high cost of lost resources, resource replenishment and after-the-fact repair and maintenance make both pre-project erosion control planning and preventive maintenance necessary. The goals of and the program for erosion and sediment control are summarized below.

Goal

The goal of the Water Board's Erosion and Sediment Control Program is to reduce and prevent accelerated (human-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired, or threatened with impairment, by sediment.

This goal is to be attained through implementation of proper soil management practices. Voluntary implementation is encouraged, but enforcement authority will be exercised where beneficial uses of water are clearly threatened by poor soil management practices.

Program

In May of 1980, the Water Board adopted two separate items to alert local governments to the Water Board's concern on erosion control problems related to construction activities. The first item was a statement of intent (Resolution No. 80-5) regarding erosion control which stated that the Water Board:

- Recognizes that water quality problems are associated with construction related activities;
- Recognizes ABAG's progress in developing erosion and sediment control regulatory programs and assistance to local governments to implement these programs;
- Recognizes local governments power to adopt and implement these programs;
- Intends to strengthen its position with regard to regulation of sediment and erosion control problems especially with regard to construction activities; and
- Intends to take appropriate enforcement action pursuant to the California Water Code in cases where land development or other construction activity causes or threatens to cause adverse water quality impacts associated with erosion problems and intends to consider, during enforcement actions, whether local government negligently contributed to the problem due to failure to adopt and/or effectively enforce erosion control programs.

The second item was a memorandum of understanding negotiated with the Council of Bay Area Resource Conservation Districts that is intended to provide the following:

- Assessment, control and monitoring of potential and existing soil erosion related water quality problems;
- Improvement of coordination between the Resource Conservation Districts and the Water Board; and
- Monitoring of local government progress on the adoption and implementation of erosion and sediment control ordinances.

The Water Board has recognized and encouraged the efforts that ABAG has made since mid-1980 in working with local Bay Area governments to improve their ordinance and regulatory programs on erosion and sediment control. ABAG's 1995 Manual of Standards for Erosion and Sediment Control Measures, which provides specific guidance to local governments, is an important tool for improving erosion and sediment control.

The Water Board intends to follow the guidelines listed below in regulating erosion and sedimentation for the protection of beneficial uses of water.

- Local units of government with land use planning authority should have the lead role in controlling land use activities that cause erosion and may, as necessary, impose further conditions, restrictions, or limitations on waste disposal or other activities that might degrade the quality of waters of the state.
- Best Management Practices (BMPs) should be implemented to reduce erosion and sedimentation and minimize adverse effects on water quality. A BMP is a practice or combination of practices determined to be the most effective and practicable means to prevent or reduce erosion and sediment related water quality degradation. Examples of control measures are contained in the Manual of Standards for Erosion and Sediment Control Measures. Further technical guidance can be obtained from the Resource Conservation Districts.
- Local governments should develop an effective erosion and sediment control ordinance and regulatory program. An effective ordinance and regulatory program must:
    - Be at least comparable to the model ordinances in ABAG's Manual of Standards for Erosion and Sediment Control Measures;
    - State that water quality protection is an explicit goal of the ordinance;
    - Require preparation of erosion and sediment control plans consistent with the Manual of Standards with specific attention to both off-site and on-site impacts;
    - Provide for installation of approved control measures no later than October 15 of each year; and
    - Have provisions for site inspections with follow up at appropriate times, posting of financial assurances for implementation of control measures, and an enforcement program to assure compliance with the ordinance.
- All persons proposing alterations to land (over five acres) are required to file a Report of Waste Discharge and/or and Erosion Control Plan with the Water Board. A statewide general NPDES permit aimed at minimizing erosion from the proposed activities has been issued.
- In addition, the Water Board may find that any water quality problems caused by erosion and sedimentation for such a project were due to the negligent lack of an adequate erosion control ordinance and enforcement program by the local permitting agency. Such a finding of negligence could subject a permitting agency to liability for indemnification to a developer if civil monetary remedies are recovered by the state.
- The Water Board may take enforcement action pursuant to the California Water Code to require the responsible persons (including local permitting agencies) to clean up and abate water quality problems caused by erosion and sedimentation in the event that the local permitting agency fails to take the necessary corrective action.

4.20 DREDGING AND DISPOSAL OF DREDGED SEDIMENT

4.20.1 Background

Dredging and dredged sediment disposal in the San Francisco Bay Area is an ongoing activity because of continual shoaling which impedes navigation and other water dependent activities. Large volumes of sediment are transported in the waters of the Sacramento and San Joaquin Rivers which drain the Central Valley. The average annual sediment load to the San Francisco Bay system from these two rivers is estimated to be eight million cubic yards. Of this amount, some four million cubic yards is transported out of the Bay through the Golden Gate. The remaining four million cubic yards is circulated and/or deposited in the Bay. In addition, some two and one-half million cubic yards are deposited into the Bay from local watersheds. The largest volume of sediment that affects the Bay is the approximately 100 million cubic yards that are re-suspended in the water column by the actions of tide, wind and currents.

Dredging is generally necessary to maintain the beneficial use of navigation. The trend towards increasingly larger vessels also necessitates increased channel depths in the shipping channels.

Disposal of the majority of dredged material from San Francisco Bay has historically been at designated disposal sites in San Francisco Bay. This practice dates back to at least the beginning of the 20th century. Currently there are three such multi-user disposal sites designated by the U.S. Army Corps of Engineers (USACE, or Corps): the Alcatraz (SF-11), San Pablo Bay (SF-10), and Carquinez (SF-9) Disposal Sites. A fourth site (Suisun Bay, SF-16) is maintained for Corps use exclusively for material from dredging of the Suisun Bay and New York Slough federal channels.

Annual maintenance dredging of shipping channels, harbors, and marinas in the San Francisco Bay results in disposal of between two and eight million cubic yards of dredged material at in-bay disposal sites. All designated aquatic dredged material disposal sites are operated as “dispersive” sites, that is, material disposed at the sites is intended to disperse and be carried by currents out to sea. Additionally, one of the management practices is to only allow material to be disposed of at disposal sites downstream of the dredging sites, with the objective of moving sediments away from dredging sites and out of the Bay. While the overall hydrodynamics of the Bay are not completely understood it is clear that the fate of material placed at in-bay disposal sites is dependent upon material type, disposal volume, and disposal frequency.

Since 1994, when the U.S. EPA designated the Deep Ocean Disposal Site approximately 50 miles offshore of San Francisco, approximately 6 million cubic yards of dredged material have been disposed of there.

Dredged material has also been used as fill for wetland restoration projects, for levee maintenance, and as daily cover for landfills. Volumes for these, and other beneficial reuse projects, have totaled approximately 2 million cubic yards over the past 9 years.

4.20.2 Regulatory Framework

The Corps of Engineers issues federal permits for dredging projects pursuant to Section 404 of the Clean Water Act. The U. S. EPA provides oversight of the Corps’ regulatory program.

As a part of the Section 404 permitting process, the dredging permit applicant must seek water quality certification from the State of California, in accordance with Section 401 of the Clean Water Act. The Water Board reviews the proposed project, then may grant or deny certification. Additionally, the Water Board may choose to act under the authority of the state Porter Cologne

Water Quality Control Act, by issuing waste discharge requirements for the project in conjunction with the water quality certification.

Water quality certifications and waste discharge requirements often contain conditions to protect water resources that the permittee must meet during the term of the permit.

The San Francisco Bay Conservation and Development Commission (BCDC) also regulates dredging and disposal under the provisions of the McAteer-Petris Act.

Projects involving the use of sovereign lands of the state may be subject to the lease or permitting requirements of the State Lands Commission.

4.20.3 Long-term Management Strategy

In the early 1980s, the problems associated with heavy reliance on in-Bay disposal sites became apparent, including navigational problems associated with the "mound" of dredged material at the Alcatraz disposal site, as well as potential environmental problems associated with disposal and dredging activities in general. These conditions led to the creation of the Long Term management Strategy for the Placement of Dredged Material in the San Francisco Bay Region (LTMS).

The LTMS program began in 1990, when the Water Board joined with USACE, U. S. EPA, BCDC, the State Board, and representatives from the dredging and environmental communities to ensure adequate dredged material disposal and reuse capacity and protection of aquatic resources over a 50-year planning period. The adopted goals for the program (Table 4-11) reflect this purpose. The primary focus of the LTMS is on the various dredged material disposal options and their related impacts. The LTMS was also initiated to maximize beneficial reuse of dredged material, improve coordination of the agencies governing these activities, and ensure a more predictable regulatory framework.

The LTMS examined several possible long-term dredged material management strategies. The LTMS Policy Environmental Impact Statement/Programmatic Environmental Impact Report (LTMS EIS/EIR) selected as the preferred alternative a reduction in the reliance on in-Bay disposal. The ultimate goal of this alternative is a "low" volume of disposal at in-Bay sites (20% of historical average dredging volumes), and an increased reliance on ocean disposal and beneficial reuse of dredged material (with the remaining material split evenly between these two options). The LTMS EIS/EIR was certified by the USACE and U.S. EPA in July 1999 and by the State Board in November 1999, thus beginning the implementation of the preferred alternative.

During the preparation of the LTMS EIS/EIR, the LTMS agencies consulted with the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the California Department of Fish and Game (CDFG) regarding potential impacts of dredging and dredged material disposal to sensitive biological resources. These resource agencies, in conjunction with the LTMS agencies, developed a list of restrictions for such projects to protect critical habitat for special status and important commercial and recreational species.

The LTMS EIS/EIR identified the overall future disposal management strategy (i.e. reduced in-Bay disposal volumes at the designated dispersive sites). The LTMS Management Plan contains specific guidance that will be used to implement the preferred alternative by each of the LTMS agencies. The Management Plan will be reviewed and updated every three years to reflect changing statutory, regulatory, technical, or environmental conditions. The Basin Plan dredging policies will be updated, as necessary, in conjunction with Management Plan updates.

4.20.4 Environmental Impacts of Dredging and Disposal in the Aquatic Environment

Most dredging and dredge material disposal operations cause localized and ephemeral impacts with related biological consequences (Table 4-12). In the 1980s it was determined that the Alcatraz disposal site was accumulating significant amounts of material, causing the depth of the site to decrease from the original 110 feet to 30 feet. The mounding at the disposal site ultimately became a threat to navigation. The Corps eventually dredged the Alcatraz site to increase the depth, redistributing the material within the disposal area several times between 1984 and 1986.

In September of 1988, Water Board staff circulated and presented an issue paper entitled "A Review of Issues and Policies Related to Dredge Spoil Disposal in San Francisco Bay." The issue paper discussed the major environmental concerns posed by dredged sediment disposal in San Francisco Bay, namely: (1) mounding at the Alcatraz disposal site which posed a navigational hazard and has the potential to alter circulation patterns in the Bay; (2) the disposal of increasingly large amounts of material has the potential to alter benthic and shoreline habitats and to increase water column turbidity; and (3) the resuspension of dredged sediments may increase contaminant bioavailability. The issue paper presented a range of alternative strategies for the Water Board to consider. Public and agency testimony was received by the Water Board during hearings on September 15, 1988 and October 19, 1988. Agencies testifying included the Corps, U.S. EPA, and California Department of Fish and Game (CDFG). In the issue paper, Water Board staff recommended that the Water Board consider adopting quantity and quality limits for the disposal of dredged sediment at unconfined aquatic disposal sites within San Francisco Bay.

Additionally, the Water Board and the Corps took steps to prevent further "mounding" at the region's single largest disposal site, the Alcatraz site. In 1989, the Water Board adopted volume targets which served to prevent over-filling of the region's three aquatic disposal sites. BCDC also revised its policies to restrict in-bay disposal. These volumes were reduced further for the Alcatraz disposal site (SF-11) in 1993 when the USACE issued Public Notice 93-3.

4.20.5 Wetland Restoration Using Dredged Material

While the Water Board remains concerned about the impacts of both polluted and clean sediments on the San Francisco Estuary, much of the sediment disposed of in the Region is not polluted and could be used in beneficial ways (termed "reuse"). One of these uses involves the restoration of tidal marshes in areas which were once part of the Bay. These areas, known as diked historic baylands, were once open to the tides and were thriving salt marsh and mudflat ecosystems (further discussion under "Wetlands Protection and Management" section). Decades of land "reclamation," first initiated in the 1800s resulted in diked agricultural lands, the land surface of which has subsided for a variety of reasons.

In order to foster growth of marsh vegetation, and proper slough channel formation, the new marsh must be built near mean high tide. In many cases it will be beneficial to place a layer of sediment across the site so as to raise the elevation of the land surface to a point near the mean tide line. LTMS studies have examined the environmental, engineering and economic considerations that are involved in restoring certain sites. The studies commissioned by LTMS have shown that, given current laws and policies, placement of dredged sediment at wetland restoration projects may cost more than traditional in-Bay disposal, but less than ocean disposal.

4.20.6 Delta Island Levee Repair and Maintenance

Winter Island, located in the western Delta, near Pittsburg, is operated as a duck club by the local Reclamation District. In 1998, the Reclamation District, in need of material to repair levees, partnered with the Corps of Engineers, and accepted over 200,000 cubic yards of sandy dredged material from the Corps' dredging of the federal Suisun Bay Channel. In 1999, an additional 225,000 cubic yards from the Suisun Bay Channel project was placed on the site, along with approximately 30,000 cubic yards of finer-grained material from the Port of San Francisco. The Reclamation District estimates that they will have a long-term need for fine-grained dredged material, of about 100,000 cubic yards per year.

Other Delta islands are also in need of material for levee repair. For example, the Corps is currently exploring the possibility of taking material from the Suisun Bay Channel to Sherman Island. Cooperation with the Department of Water Resources, the Central Valley Regional Water Quality Control Board, and the CalFed program may provide additional opportunities for reuse of dredge material in the future.

4.20.7 Water Board Policies on Dredging and Dredge Sediment Disposal

The overall policy for dredging and disposal of dredged sediment includes a reduction of in-bay disposal volumes and an increased emphasis on beneficial reuse of dredged material. The most likely beneficial reuse of dredged material is wetland restoration projects or for levee maintenance and repair. Additional capacity for dredged material is available at the deep ocean disposal site designated by U.S. EPA in 1994. The goal of the policies below is to reduce in-bay disposal volumes to approximately 20% of recent historical dredging volumes, to about 1 million cubic yards per year.

Dredging and dredged material disposal should be conducted in an environmentally and economically sound manner. Dredgers should reduce disposal in the Bay over time to achieve the LTMS goal of one million cubic yards, or less, per year. The LTMS agencies will implement a system of disposal allocations for the designated disposal sites to individual dredgers to achieve the LTMS goal only if voluntary efforts are not effective in reaching this goal.

4.20.7.1 Need for Regional and Local Monitoring

The Regional Monitoring Program (RMP) provides information on the regional-scale effects of contaminants in the Bay. The Water Board is evaluating whether additional, more localized monitoring to isolate the effects of the disposal of dredged material in the Bay is needed. In the interim, existing sediment evaluation procedures (See Policy 4.20.7.5, below) and monitoring and management efforts at the in-Bay disposal sites are protective of the beneficial uses of the Bay.

4.20.7.2 Material Disposal Restriction

Materials disposed of at approved aquatic dredged material disposal sites shall be restricted to dredged sediment. Disposal of rock, timber, general refuse and other materials shall be prohibited. Additional specific requirements regarding material type and dredging and disposal mechanisms may be implemented as required, based on ongoing site monitoring and adaptive management.

4.20.7.3 Volume Targets

4.20.7.3.1 Individual Disposal Sites

Volume targets for each disposal site were developed based on understandings of sediment dynamics and historical information regarding disposal volumes (Table 4-14).

In addition, the Water Board establishes a volume target of 0.2 million cubic yards per year for the Suisun Bay Channel disposal site and restricts its use to Corps maintenance dredging. The San Francisco Bar site is used for disposal of material from the bar channel. The use of the San Francisco Bar disposal site is regulated under the Marine Protection, Research, and Sanctuaries Act (MPRSA).

4.20.7.3.2 Overall In-bay Disposal

Although the overall in-Bay disposal goal is one million cubic yards per year, the LTMS recognized that the inherent variability in dredging operations and needs and other factors may impact dredgers' ability to achieve this goal. The LTMS therefore established a slightly higher long-term in-Bay disposal volume target of 1.25 million cubic yards per year. Total in-Bay disposal volumes should decrease according to the schedule identified in Table 4-15, until the long-term LTMS target of 1.25 million cubic yards per year is attained.

In addition to the total volume specified in Table 4-15:

a) Material from small dredging projects (see below) will, in general, be exempt from restrictions on in-Bay disposal if it is demonstrated through an alternatives analysis that there are no practical alternatives to in-Bay disposal, and

b) A contingency volume of 250,000 cubic yards per year will be established for "emergencies"[1] or for years when sedimentation or other factors result in unanticipated material volumes.

4.20.7.4 Volume Target Implementation

4.20.7.4.1 Individual Disposal Sites

The Water Board will consider denial of water quality certification for:

a) Any project proposing to place material at a disposal site for which the annual or monthly volume target, as defined in Table 4-14, has been exceeded; and

b) Any project that does not provide an adequate alternatives analysis showing that there are no practicable alternatives to in-Bay disposal.

Small project proponents may apply for an exemption to monthly or annual volume targets. A small project is defined as a facility or project whose design depth does not exceed 12 feet Mean Lower Low Water (MLLW) with an annual average disposal volume of less than 50,000 cubic yards. The project proponent must demonstrate that:

a) The additional burden of using an alternative to in-Bay disposal placed upon the applicant would be inordinate relative to the beneficial uses protected; and

[1] A dredging emergency is a situation that poses an immediate danger to life, health, property, or essential public service and that demands action by the Board more quickly than the Board's normal permit procedures would allow.

b) The alternatives analysis indicates that there are no practical alternatives to in-Bay disposal.

4.20.7.4.2 Overall In-bay Disposal

A voluntary program will be instituted to attain the overall in-Bay disposal targets adopted by the LTMS EIS/EIR with the majority of maintenance material from Corps of Engineers projects being used in wetland restoration projects or taken to the ocean disposal site. As part of the voluntary program, other dredgers will make efforts to use alternatives to in-Bay disposal.

Progress towards the goal will be evaluated both on an annual basis and every three years, based on the three-year average volume of in-Bay disposal. Should this voluntary program fail to provide progress toward the goal in the reviews outlined above, a mandatory allocation program will be considered. The institution of the mandatory allocation process will occur as outlined below and the determination to rescind mandatory allocation, if imposed, will be a symmetric process.

The Water Board will consider the imposition of mandatory allocation in a Water Board hearing. In making its decision regarding disposal allocations, the Water Board will confer with the LTMS agencies and consider the factors affecting the need for allocations in light of progress towards the long-term goal adopted by the LTMS EIS/EIR, including (1) the status of alternatives to in-Bay disposal and cooperative efforts to implement them, (2) exigencies that hamper the use of alternative sites, and (3) other relevant factors. If the Water Board votes to impose mandatory allocations, the mandatory allocation program will be regulated through the issuance of general Waste Discharge Requirements for small- and medium-category dredging projects and through separate Waste Discharge Requirements for all USACE dredging projects. If in place, rescission of the mandatory allocation program would be considered if the three-year average disposal volume was lower than the target volumes as identified in Table 4-15, unless, after review by the Water Board in a public hearing, the Water Board votes to not rescind mandatory allocations. Both the institution and rescission of the mandatory allocation program would be discretionary actions of the Water Board, and thus subject to review pursuant to CEQA under the Water Board's functionally-equivalent process.

4.20.7.5 Use of Testing Guidelines

In February of 1998, the Corps and U.S. EPA published Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual, Inland Testing Manual (ITM). The ITM has been adopted by the LTMS agencies as the framework for the evaluation of the suitability of dredged material for in-Bay disposal. It provides comprehensive guidance to dredging permit applicants on sampling and testing of sediment proposed for disposal in waters of the United States, pursuant to Section 404 of the Clean Water Act. Disposal at the in-Bay disposal sites is subject to this guidance. The ITM outlines a tiered approach to sediment testing, similar to the existing Ocean Disposal Testing Manual, or "Green Book," the federal guidance document for testing for ocean disposal (pursuant to MPRSA). The Water Board's Executive Officer will require evaluation of sediments proposed for in-Bay disposal according to the ITM, before issuing authorizations for such disposal.

The ITM was intended to only address testing of material for aquatic disposal and does not provide a protocol for upland disposal. Water Board staff have developed a document, "Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines," to assist project planners with developing testing procedures for beneficial reuse projects, including wetland restoration, levee maintenance, and construction fill. The document also provides general sediment screening guidelines for these uses. However, disposal of dredged material for beneficial reuse will be

subject to site-specific testing requirements and material suitability criteria that will be defined in Water Board Orders.

The Water Board is working in cooperation with other LTMS agencies to develop a regional implementation manual which will detail testing requirements for all three disposal environments.

The Executive Officer, following consultation with other agencies, will periodically review and update all testing procedures. The Executive Officer may require additional data collection beyond the tiered-testing procedures on a case-by-case basis.

4.20.7.6 Environmental Windows

The Water Board will restrict dredging or dredge disposal activities during certain periods ("windows") in order to protect the beneficial uses of San Francisco Bay. These beneficial uses include water contact recreation; ocean, commercial, and sport fishing; marine habitat; fish migration; fish spawning; shellfish harvesting; and estuarine habitat.

These restrictions may include, but are not limited to those specified by USFWS and NMFS in their review of the LTMS programmatic EIS/EIR pursuant to Section 7 of the Endangered Species Act, and will incorporate any requirements from project specific consultations.

4.20.7.7 Impacts at Dredge Site

The Water Board may require additional documentation and inspections during dredging activities in order to ensure that dredgers minimize impacts at the dredging location. Water Quality Certifications or waste discharge requirements may contain additional conditions to address barge overflow and other impacts at the dredging site. Permit conditions may include:

a) Special reporting procedures for the hydraulic pumping of dredged material into transport scows prior to disposal (marina slip applications);

b) Evidence of compliance with the conditions described in 4.20.7.6, above;

c) Time limit on the overflow from hopper-type hydraulic dredges in order to obtain an economical load; or

d) Precautions to minimize overflow and spillage from the dredging vessel when in-route to the authorized disposal site. (Appreciable loss during transit shall be considered unauthorized disposal, or "short dumping" and such occurrences are subject to enforcement by the Water Board or other applicable state or federal agencies.)

4.20.7.8 Policy on Land and Ocean Disposal

The Water Board shall continue to encourage land and ocean disposal alternatives whenever practical. Water Board staff have determined that there should be a high priority placed on disposing of dredged sandy material upland. At a minimum, incentives should be developed to limit disposal of any such material with a market value to upland uses. Staff may condition certifications so as to encourage upland reuse of high value sediments. Staff will also continue to work with staff from the Central Valley Regional Water Quality Control Board to provide appropriate options for material use in levee maintenance in the delta or for use on delta islands, as appropriate.

4.20.7.9 Policy on Dredged Material Disposal Permit Coordination

The Water Board will implement these measures through its issuance of Waste Discharge Requirements, Water Quality Certification under Section 401 of the Clean Water Act or other orders. In addition, the Water Board may require pre- and post-dredge surveys to determine disposal volumes and compliance with permit conditions. In order to better manage data and reduce paper files, Water Board staff may request, but not require, that applicants submit testing and other project data in a specific electronic format.

Water Board staff have been participating in a coordinated permitting process, the Dredged Material Management Office (DMMO), since 1995. The DMMO consists of staff representatives of the Water Board, BCDC, U. S. EPA, USACE, and the California State Lands Commission, with active participation by the California Department of Fish and Game and the National Marine Fisheries Service as commenting resource agencies. The DMMO meets regularly to review permit applications and sediment testing plans and results and to make recommendations on proposed dredging projects. While each agency retains its separate authority the agency representatives strive to provide clear and coordinated guidance to applicants and to reach consensus-based recommendations.

4.21 MINES AND MINERAL PRODUCERS

The Water Board oversees water quality problems associated with over 150 inactive and active mining and mineral producers in the Region, as described below.

4.21.1 Inactive Sites

Over 50 abandoned or inactive mines have been identified within the Region (Table 4-16 and Figure 4-5). The mineral resources extracted include mercury, magnesite, megnesium salts, manganese, pyrite, coal, copper, silver, and gold. A large percentage of the mining activities took place from 1890-1930, although some areas were mined as recently as 1971. The size of these mines varies from relatively small surface mines of less than half an acre to the world's second largest mercury mine, the New Almaden District, located in Santa Clara County.

Water quality problems associated with mining activities can be divided into three categories:

- Erosion and sediment discharges from surface mines and ore tailings piles;
- Acid or otherwise toxic aqueous discharge from underground mines, ore tailings, slag, or other mining processes; and
- Atmospheric deposition, such as releases from stacks carried downwind from mine sites.
- Problems of erosion and sediment discharged from mined areas may be intensified due to the fact that sediment from ore-rich areas typically contain high concentrations of metals. Biological processes which take place in lake and stream bottom sediments may allow for these pollutants to be released in a form that more readily bioaccumulates in the food chain.

Water quality and aquatic toxicity monitoring data suggests that the beneficial uses of a number of water supply reservoirs, creeks, and streams in the Region have been impacted as a result of past mining activities. Threatened beneficial uses of lakes, streams, bays and marshes due to mining activities so far identified in the Region include: fish migration, fish spawning, shellfish harvesting, wildlife habitat, preservation of rare and endangered species, cold and warm freshwater habitat, and water contact recreation. In response to these findings, the Water Board conducted surveys to

locate abandoned and operating mines in the Region. The results of the surveys are compiled in the 1998 report titled, "San Francisco Bay Regional Water Quality Control Board Mines Report."

In many cases, the adverse results of previous surface mining activities can be reduced, and in some cases eliminated, through appropriate erosion and sediment control practices. The U.S. Natural Resource Conservation Service (NRCS, formerly Soil Conservation Service) has developed a Resource Management System for Surface Mined Areas. This management system references practices and treatment alternatives needed to address the following:

- Erosion control practices that route surface water run-off at non-erosive velocities and reduce soil movement by wind or water to within acceptable limits;
- Maintenance of adequate water quality and quantity for planned uses and to meet federal, state, and local requirements;
- Pollution control to meet federal, state, and local regulations; and
- A system of planned access and/or conveyance that is within local regulations and meets the needs for the intended use.

In 1980, a memorandum of understanding (MOU) was negotiated with the Council of Bay Area Resource Conservation Districts in order to provide for assessment and monitoring of potential and existing soil erosion-related water quality problems, and identification of control measures. It was agreed that local units of government should have the lead role in controlling land use activities that cause erosion. Controls measures include the implementation of BMPs. The Resource Management System for Surface Mined Areas developed by NRCS specifically references BMPs determined to be the most effective and practicable means of preventing or reducing erosion and sediment-related water quality degradation resulting from surface mining activities.

4.21.2 Active Sites

There are approximately 100 active quarries and mineral producers within the Region. The primary commodities produced include clay, salt, sand and gravel, shale, and crushed stone. Water quality problems associated with active mineral production generally consist of erosion and sediment discharge into nearby surface water bodies and wildlife habitat destruction.

Mining activities are in part regulated under the Surface Mining and Reclamation Act of 1975. This Act requires all mine operators to submit a reclamation plan to the California Geological Survey (formerly California Department of Conservation, Division of Mines and Geology) and the recognized lead local agency for the area in which the mining is taking place. Recognized lead local agencies for the Region include county planning and public works departments. Additionally, some local planning departments regulate mining activities through the issuance of conditional land use permits. The goal of each reclamation plan is to assure that mined lands are reclaimed to a usable condition that is readily adaptable for alternate land uses and creates no danger to public health and safety. The current permitting process places very little emphasis on the need to protect beneficial uses of surface and groundwater.

Under Title 23, CCR, Chapter 15, Article 7, the Water Board has the authority to regulate mining activities that result in a waste discharge to land through the use of WDRs. Additionally, the federal NPDES stormwater regulations (40 CFR Parts 122, 123, and 124) require active and inactive mining operations to obtain NPDES permit coverage for the discharge of stormwater polluted by contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products.

4.21.3 Mining Program Goal

The Water Board's goal for its mining program is to restore and protect beneficial uses of receiving waters now impaired, or threatened with impairment, resulting from past or present mining activities. This goal will be attained by the coordinated effort of the Water Board, NRCS, the Council of Bay Area Resource Conservation Districts, the California Geological Survey, and lead local government agencies through the implementation of a mineral production and mining management program.

4.21.4 Mining Program Description

The Water Board intends to continue to work closely with Resource Conservation Districts and NRCS to identify all existing and abandoned mines and mineral production sites in the Region. Responsible parties will be identified. If needed, potential funding alternatives for cleanup activities will also be identified. Sites will be prioritized based on existing and potential impacts to water quality and size.

The Water Board will require an NPDES permit for the discharge of polluted stormwater from active and inactive mining operations, as defined in NPDES stormwater regulations. The Water Board will consider issuing individual permits or a general permit for such discharges, or will otherwise allow coverage under the State Water Board general permit for stormwater discharges associated with industrial activity as described in Section 4.14 Urban Runoff Management, Industrial Activity Control Program. Requirements of the notice of intent to be covered under the general permit(s) and the schedule for submittal will be established in the permit(s).

The responsible party or operator of each site discharging, or potentially discharging waste to land shall be required to submit a Report of Waste Discharge to the Water Board. Submittal of a Report of Discharge will be requested by the Water Board pursuant to the Water Code Section 13267. Requests will be made on a site-by-site basis and based on priority. A Report of Waste Discharge shall consist of a "Site Closure Plan" and an "Operation and Management Plan" for active sites, as described below:

- Each plan shall be designed to ensure short- and long-term protection of beneficial uses of receiving waters.
- The "Closure Plan" shall address site restoration and long-term maintenance and monitoring, which may include a financial guarantee to ensure that adequate funds are available for proper site closure.
- The "Operation and Management Plan" shall address stormwater runoff and erosion control measures and practices.
- Each plan will be evaluated in regard to potential impacts to beneficial uses of receiving waters. WDRs will be issued or conditionally waived at the discretion of the Water Board based on the threat to water quality and the effectiveness of identified and implemented control measures and the effectiveness of local agency oversight.

4.22 VESSEL WASTES

The discharge of wastes from pleasure, commercial, and military vessels has been a water quality concern of the Water Board since 1968 when Resolution No. 665 was adopted, which suggested that the federal government regulate waste discharges from vessels. In 1970 the Water Board adopted Resolutions 70-1 and 70-65 on vessel wastes. The first urged BCDC to condition marina permits for new or expanded marinas to include pumpout facilities, dockside sewers, and restroom

facilities. Resolution 70-65 recommended that vessel wastes be controlled in such a manner through legislative action.

In 1982, the Water Board conducted a study that found high levels of coliform in the vicinity of several marinas in Marin County's Richardson Bay. Subsequently, the Water Board adopted a prohibition against discharge of any kind into Richardson Bay. A regional agency was formed to implement and enforce this prohibition.

There is an ongoing effort to construct, renovate, and improve pumpout facilities at marinas and ports around the region. The goal of these efforts is to increase the accessibility of these facilities to boaters and reduce pollution from vessel wastes.

4.23 WETLAND PROTECTION AND MANAGEMENT

Wetlands and related habitats comprise some of the Region's most valuable natural resources. Wetlands provide critical habitats for hundreds of species of fish, birds, and other wildlife; offer open space; and provide many recreational opportunities. Wetlands also serve to enhance water quality, through such natural functions as flood control and erosion control, stream bank stabilization, and filtration and purification of surface water.

The Water Board will refer to the following for guidance when permitting or otherwise acting on wetland issues:

- Governor's Executive Order W-59-93 (signed August 23, 1993; also known as the California Wetlands Conservation Policy, or the "No Net Loss" policy);
- Senate Concurrent Resolution No. 28; and
- Water Code Section 13142.5 (applies to coastal marine wetlands).

The goals of the California Wetlands Conservation Policy include ensuring "no overall net loss," achieve a "long-term net gain in the quantity, quality, and permanence of wetlands acreage and values ...", and reducing "procedural complexity in the administration of state and federal wetlands conservation programs."

Senate Concurrent Resolution No. 28 states, "It is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for the benefit of the people of the state."

Water Code Section 13142.5 states, "Highest priority shall be given to improving or eliminating discharges that adversely affect ... wetlands, estuaries, and other biologically sensitive sites."

The Water Board may also refer to the Estuary Project's Comprehensive Conservation and Management Plan (2007) for recommendations on how to effectively participate in a Region-wide, multiple-agency wetlands management program.

4.23.1 Baylands Ecosystem Habitat Goals

Consistent with the California Wetlands Conservation Policy, the Water Board participated in the preparation of two planning documents for wetland restoration around the Estuary: Baylands Ecosystem Habitat Goals (1999) and Baylands Ecosystem Species and Community Profiles (2000), together known as the Habitat Goals reports. The Habitat Goals reports provide a starting point for coordinating and integrating wetland planning and regulatory activities around the Estuary.

The Habitat Goals reports identify and specify the beneficial uses and/or functions of existing wetlands and suggest wetland habitat goals for the baylands,defined in the Habitat Goals reports as shallow water habitats around the San Francisco Bay between maximum and minimum elevations of the tides. The baylands ecosystem includes the baylands, adjacent habitats, and their associated plants and animals. The boundaries of the ecosystem vary with the bayward and landward movements of fish and wildlife that depend upon the baylands for survival. The Habitat Goals reports were the non-regulatory component of a conceptual regional wetlands management plan from the mid-1990's.

4.23.2 Determination of Applicable Beneficial Uses for Wetlands

Beneficial uses of water are defined in Chapter 2 Beneficial Uses and are applicable throughout the Region. Chapter 2 also identifies and specifies the beneficial uses of 34 significant marshes within the Region (Table 2-3). Chapter 2 indicates that the listing is not comprehensive and that beneficial uses may be determined site-specifically. In making those site-specific determinations, the Water Board will consider the Habitat Goals reports, which provide a technical assessment of wetlands in the Region and their existing and potential beneficial uses. In addition to the wetland areas identified in Chapter 2, the Habitat Goals reports identified additional wetlands in the Region as having important habitat functions. Because of the large number of small and non-contiguous wetlands within the Region, it is not practical to specify beneficial uses for every wetland area. Therefore, beneficial uses will frequently be specified as needed for a particular site. This section provides guidance on how beneficial uses will be determined for wetlands within the Region.

Information contained in the Habitat Goals reports, the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS), and in the scientific literature regarding the location and areal extent of different wetland types will be used as initial references for any necessary beneficial use designation. The NWI is the updated version of the USFWS's Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et al. 1979), which is incorporated by reference into this plan, and was previously used by the Water Board to identify specific wetland systems and their locations. The updated NWI or other appropriate methods will continue to be used to locate and identify wetlands in the Region. A matrix of the potential beneficial uses that may be supported by each USFWS wetland system type is presented in Table 2-4.

It should be noted that, while the Habitat Goals reports and USFWS's NWI wetlands classification system are useful tools for helping to establish beneficial uses for a wetland site, it is not suggested that these tools be used to formally delineate wetlands.

4.23.3 Hydrology

Hydrology is a major factor affecting the beneficial uses of wetlands. To protect the beneficial uses and water quality of wetlands from impacts due to hydrologic modifications, the Water Board will carefully review proposed water diversions and transfers (including groundwater pumping proposals) and require or recommend control measures and/or mitigation as necessary and applicable.

4.23.4 Wetland Fill

The beneficial uses of wetlands are frequently affected by diking and filling. Pursuant to Section 404 of the Clean Water Act, discharge of fill material to waters of the United States must be performed in conformance with a permit obtained from the U.S. Army Corps of Engineers (Corps) prior to commencement of the fill activity. Under Section 401 of the Clean Water Act, the state must

certify that any permit issued by the Corps pursuant to Section 404 will comply with water quality standards established by the state (e.g., Basin Plans or statewide plans), or can deny such certification, with or without prejudice. In California, the State and Regional Water Boards are charged with implementing Section 401. California's Section 401 regulations are at Title 23, CCR, Division 3, Chap 28, Sections 3830-3869. Pursuant to these regulations, the Water Board and/or the Water Board's Executive Officer have the authority to issue or deny Section 401 water quality certification. The certification may be issued with or without conditions to protect water quality.

The Water Board has independent authority under the Water Code to regulate discharges of waste to wetlands (waters of the state) that would adversely affect the beneficial uses of those wetlands through waste discharge requirements or other orders. The Water Board may choose to exercise its independent authority under the Water Code in situations where there is a conflict between the state and the Corps, such as over a jurisdictional determination or in instances where the Corps may not have jurisdiction. In situations where there is a conflict between the state and the Corps, such as over a jurisdictional determination or in instances where the Corps may not have jurisdiction, the Water Board may choose to exercise its independent authority under the Water Code.

The regulation of "isolated" waters determined not to be waters of the U.S. is one such instance where the Corps does not have jurisdiction. The U. S. Supreme Court, in its 2001 decision in Solid Waste Agency of Northern Cook County v. U. S. Army Corps of Engineers (the "SWANCC decision") determined that certain isolated, non-navigable waters are not waters of the U.S., but are the province of the states to regulate. The Water Code provides the State and Regional Water Boards clear authority to regulate such isolated, non-navigable waters of the state, including wetlands. To address the impacts of the SWANCC decision on the waters of the state, the State Water Board issued Order No. 2004-0004-DWQ in 2004, General WDRs for dredged or fill discharges to waters deemed by the Corps to be outside of federal jurisdiction. It is the intent of these General WDRs to regulate a subset of the discharges that have been determined not to fall within federal jurisdiction, particularly those projects involving impacts to small acreage or linear feet and those involving a small volume of dredged material.

Order No. 2004-004-DWQ does not address all instances where the Water Board may need to exercise its independent authority under the Water Code. In such instances, dischargers and/or affected parties will be notified with 60 days of the Water Board's determination and be required to file a report of waste discharge.

For proposed fill activities deemed to require mitigation, the Water Board will require the applicant to locate the mitigation project within the same section of the Region, wherever feasible. The Water Board will evaluate both the project and the proposed mitigation together to ensure that there will be no net loss of wetland acreage and no net loss of wetland functions. The Water Board may consider such sources as the Habitat Goals reports, the Estuary Project's Comprehensive Conservation and Management Plan, or other approved watershed management plans when determining appropriate "out-of-kind" mitigation.

The Water Board uses the U.S. EPA's Section 404(b)(1), "Guidelines for Specification of Disposal Sites for Dredge or Fill Material," dated December 24, 1980, which is incorporated by reference into this plan, in determining the circumstances under which wetlands filling may be permitted.

In general, it is preferable to avoid wetland disturbance. When this is not possible, disturbance should be minimized. Mitigation for lost wetland acreage and functions through restoration or creation should only be considered after disturbance has been minimized.

Complete mitigation projects should be assessed using established wetland compliance and ecological assessment methods, such as the Wetland Ecological Assessment (WEA) and the California Rapid Assessment Method (CRAM).

4.24 OIL SPILLS

Oil spills can cause severe and extensive damage to the environment. Fortunately, the petroleum industry has been improving its safety record in oil transfer operations - the step in petroleum handling where spills are most likely to occur. The volume of oil spilled during transfer operations has decreased since 1975.

This improvement is due to:

- U.S. Coast Guard regulations for oil transfer operations;
- State Lands Commission guidelines for petroleum facility operations manuals;
- High clean-up costs and public concern associated with oil spills; and
- Water Board, California Department of Fish and Game, and U.S. Coast Guard enforcement actions against parties responsible for spills.

The Water Board considered adopting a policy requiring specific improvements in oil transfer operations, but due to the industry's improved performance, the Water Board is holding the adoption of such a policy in abeyance while continuing to monitor the industry's performance. The Water Board recognizes that additional regulation is unnecessary if the petroleum industry maintains its improved record.

4.25 GROUNDWATER PROTECTION AND MANAGEMENT

Per State Water Board Resolution No. 88-63, almost all the Region's groundwater is considered to be an existing or a potential source of drinking water. With limited resources, the Water Board must concentrate its groundwater protection and management efforts on the most important groundwater basins. DWR has identified 28 individual groundwater basins and seven sub-basins in the Region that serve, or could serve, as sources of high quality drinking water.

Increased demands on these groundwater resources have become evident in the rapidly developing Region. Years of drought and decades of discoveries of groundwater pollution have resulted in impacts or impairment to portions of these basins. Some municipal, domestic, industrial, and agricultural supply wells have been taken out of service due to the presence of pollution. Some of the basins have also been affected by over-pumping, resulting in land subsidence and saltwater intrusion.

Such pressures on groundwater resources require that comprehensive environmental planning and management practices be developed and implemented for each individual basin by all concerned and affected parties. The Water Board will foster this concept with the following groundwater protection and management goals for the Region.

- Identify and update beneficial uses and water quality objectives for each groundwater basin.

  Water quality objectives must maintain the existing high quality of groundwater, protect its beneficial uses, and protect human health and the environment. The Water Board's

program to identify and update objectives is described in Section 4.25.1 Application of Water Quality Objectives.

- Regulate activities that impact or have the potential to impact the beneficial uses of groundwater of the Region.

  Federal, state, and local groundwater protection and remediation programs that will result in the overall maintenance or improvement of groundwater quality must be implemented Region-wide in a consistent manner. When a potential threat or problem is discovered, containment and clean-up efforts must be undertaken as quickly as possible to limit groundwater pollution. Where activities that could affect the beneficial uses of groundwater are not regulated by other federal, state, or local programs, the Water Board will consider regulation depending upon the threat to beneficial uses and availability of Water Board resources. The overall requirements for site cleanup and closure, setting cleanup levels, and future groundwater management strategies are described in Section 4.25.2 Requirements for Site Investigation, Cleanup and Site Closure. The Water Board's programs for cleanup of polluted sites are described in Section 4.25.3 Regulation of Potential Pollution Sources.

- Prevent future impacts to the groundwater resource through local and regional planning, management, education, and monitoring.

  Groundwater is an integral component of a watershed's hydrologic system. A comprehensive watershed management approach is necessary to protect groundwater resources. The Water Board's program for broadening its information base on groundwater resources and individual protection needs of basins is described in Section 4.25.4 Groundwater Protection Programs. Groundwater monitoring efforts by state and local agencies are described in Chapter 6 Surveillance and Monitoring.

  Local water, fire, planning and health departments are actively involved with their own groundwater protection programs. These programs include: salt water intrusion and land subsidence control, wellhead protection, groundwater recharge area preservation, hazardous material storage and management ordinances, Local Oversight Programs and non-Local Oversight Programs for cleanup of leaking underground fuel tanks, potential conduit well destruction, and well permitting and inspection. For some agencies, maintaining funding for protection programs is an ongoing challenge. Through numerous regional projects, the Water Board is evaluating the groundwater protection needs in specific basins, and thus will provide additional support for local agency efforts.

4.25.1 Application of Water Quality Objectives

Water quality objectives apply to all groundwater, rather than at a wellhead or at a point of consumption. The maintenance of the existing high quality of groundwater (i.e., "background") is the primary objective, which defines the lowest concentration limit that the Water Board requires for groundwater protection. The Water Board also has narrative and numeric water quality objectives for bacteria, chemical constituents, radioactivity, and taste and odor (see Chapter 3). These objectives define the upper concentration limit that the Water Board considers protective of beneficial uses. The lower and upper concentration limits define the range that the Water Board considers for clean-up levels of polluted groundwater. Establishment of cleanup levels is discussed in Section 4.25.2 Requirements for Site Investigation, Cleanup and Site Closure.

Numerical limits that implement all applicable water quality objectives include Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs), and are only

acceptable as the upper end of a concentration range to protect the beneficial uses of municipal and domestic drinking water sources.

Ideally, the Water Board would establish numerical groundwater objectives for all constituents. However, the Water Board is limited in its ability and resources to independently establish numerical objectives for groundwater. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., State Water Board, U.S. EPA, DHS, Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA), Cal/EPA's Department of Toxic Substances Control (DTSC), etc.) to provide the numerical criteria for Water Board consideration as groundwater objectives.

The Central Valley Water Board summarized water quality standards and criteria from a variety of sources in "A Compilation of Water Quality Goals". This report contains an extensive compendium of numerical water quality limits from the literature for over 800 chemical constituents and water quality parameters.

In practice, the Water Board uses water quality objectives for groundwater somewhat differently from those for surface water. For groundwater, the Water Board's emphasis is the regulation of sites where water quality objectives are not being met, clean-up is required and/or under way, and no further waste discharges will be allowed in the future. In contrast, surface water discharges regulated by the Water Board are usually for ongoing discharges regulated to meet water quality objectives in receiving waters.

In a typical situation, the Water Board must identify and establish site- and basin-specific groundwater beneficial uses and standards for the cleanup of groundwater polluted by numerous and extensive spills and leaks of toxic chemicals (e.g., organic solvents, fuels, metals, etc.).

Very few waste discharges to land are allowed by the Water Board and those that are permitted (e.g., landfills, industrial waste disposal, above-ground soil treatment, etc.) are closely regulated under the requirements of existing laws and regulations in order to maintain and protect groundwater quality objectives. An additional category of discharges to land is the numerous individual domestic waste disposal systems (e.g., onsite dispersal systems) that are permitted and regulated by the counties. The Water Board waives regulation based upon the fact that the counties' regulation of the systems complies with applicable Water Board requirements.

Groundwater objectives for individual basins may be developed in the future. As the Water Board completes projects that provide more detailed delineation of beneficial uses within basins, revised objectives may be developed for portions of groundwater basins that have unique protection needs. Examples of Water Board projects completed in the Region are described in "Section 4.25.5 Groundwater Protection Studies."

4.25.2 Requirements for Site Investigation, Cleanup, and Site Closure

This section describes the regulatory requirements and their applications for investigation, cleanup, and closure at sites impacted by soil and groundwater pollution.

4.25.2.1 State Water Board Policies for Groundwater Cleanup

Antidegradation Policy

The "Statement of Policy with Respect to Maintaining High Quality of Waters in California," known as the Antidegradation Policy (State Water Board Resolution No. 68-16), requires the continued maintenance of existing high quality waters. It provides conditions under which a change in water quality is allowable. A change must:

- Be consistent with maximum benefit to the people of the state;
- Not unreasonably affect present and anticipated beneficial uses of water; and
- Not result in water quality less than that prescribed in water quality control plans or policies.

However, in cases where unauthorized releases have polluted groundwater, restoring groundwater quality to background concentrations is often technically impractical. In those situations, groundwater should be restored to attain applicable beneficial uses.

Sources of Drinking Water Policy

This policy, adopted by the State Water Board in 1988 (Resolution No. 88-63), established state policy that all surface and ground water in the state are considered suitable, or potentially suitable, for municipal or domestic supply (MUN) and should be designated for this use, with certain exceptions. The exceptions for groundwater are:

- The groundwater's TDS exceeds 3,000 mg/L (5,000 microSiemens per centimeter (µS/cm), electrical conductivity), and it is not reasonably expected by the Water Boards to supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use through implementation of BMPs or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or
- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR), Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3.

Policies and Procedures for Investigation and Cleanup and Abatement of Discharges

State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation, Cleanup and Abatement of Discharges Under Water Code Section 13304" contains the policies and procedures that all Water Boards shall follow to oversee and regulate investigations and cleanup and abatement activities resulting from all types of discharge or threat of discharge subject to Water Code Section 13304. Therefore, the five program areas described below follow the same policies and procedures outlined in Resolution No. 92-49 for determining:

- When an investigation is required;
- The scope of phased investigations necessary to define the nature and extent of contamination or pollution;

- Cost-effective procedures to detect, cleanup or abate contamination; and
- Reasonable schedules for investigation, cleanup, abatement, or any other remedial action at a site.

State Water Board Resolution No. 92-49 requires that the Water Board ensure that the discharger is aware of and considers minimum cleanup and abatement methods. The minimum methods that the discharger should be aware of and consider, to the extent that they may be applicable to the discharge or threat thereof, are:

- Source removal and/or isolation;
- In-place treatment of soil or water, including bioremediation, aeration, and fixation;
- Excavation or extraction of soil, water, or gas for on-site or off-site treatment techniques including bioremediation; thermal destruction; aeration; sorption; precipitation, flocculation and sedimentation; filtration; fixation; and evaporation; and,
- Excavation or extraction of soil, water, or gas for appropriate recycling, reuse, or disposal.

State Water Board Resolution No. 92-49 was amended in 1996 with Resolution No. 96-79, Containment Zone Policy. Per the revised resolution, it is not the intent of the State Water Board or the Regional Water Boards to allow dischargers, whose actions have caused, permitted, or threaten to cause or permit conditions of pollution, to avoid responsibilities for cleanup. However, in some cases, attainment of applicable water quality objectives for groundwater cannot reasonably be achieved. In these cases, the State Water Board determines that establishment of a containment zone is appropriate and consistent with the maximum benefit to the people of the state if applicable requirements contained in the policy are satisfied.

State Water Board Decisions

In addition to State Water Board policies that specify requirements for investigation and cleanup of groundwater, State Water Board precedential orders on petitions provide guidance and direction to the nine Regional Water Boards with respect to cleanup orders. State Water Board decisions affecting site cleanup fall into three general categories: naming responsible parties, setting cleanup standards, and closing low-risk cases.

4.25.2.2 Elements of Groundwater Cleanup and Site Closure

State Water Board Resolution No. 92-49 outlines the five basic elements of a site investigation. Any or all elements of an investigation may proceed concurrently, rather than sequentially, in order to expedite cleanup and abatement of a discharge, provided that the overall cleanup goals and abatement are not compromised. State Water Board Resolution No. 92-49 investigation components are as follows:

- Preliminary site assessment to confirm the discharge and the identity of the dischargers; to identify affected or threatened waters of the state and their beneficial uses; and to develop preliminary information on the nature and vertical and horizontal extent, of the discharge;
- Soil and water investigation to determine the source, nature, and extent of the discharge with sufficient detail to provide the basis for decisions regarding subsequent clean-up and abatement actions, if any are determined by the Regional Water Board to be necessary;
- Proposal and selection of clean-up action to evaluate feasible and effective cleanup and abatement actions and to develop preferred clean-up and abatement alternatives;

- Implementation of clean-up and abatement action to implement the selected alternative and to monitor in order to verify progress; and
- Monitoring to confirm short- and long-term effectiveness of cleanup and abatement.

The following additional requirements for site cleanup and closure may also apply, as described below.

- "Cleanup Complete" Determinations – The Water Board provides no further action (NFA) confirmations and no-further-active-cleanup confirmations to responsible parties when no further active cleanup is needed. For petroleum-impacted sites, the Water Board provides a case closure letter as part of the case closure summary report.
- Public Participation – The Water Board will provide opportunities for public participation in the oversight process so that the public is informed and has the opportunity to comment. The level of effort is tailored to site-specific conditions, depending on site complexity and public interest. The level of public participation effort at a particular site is based on the potential threat to human health, water quality, and the environment; the degree of public concern or interest in site cleanup; and any environmental justice factors associated with the site.
- Electronic Data Reporting – The State Water Board maintains a web-based geographic information system (GIS) program that provides the public and regulators with online access to environmental data. The State Water Board adopted regulations that require electronic submittal of information for groundwater cleanup programs (Title 23, CCR, Division 3, Chapter 30). For several years, parties responsible for cleanup of leaking underground fuel tanks (LUFT) have been required to submit groundwater analytical data, the surveyed locations of monitoring wells, and certain other data to the State Water Board database over the Internet. As of 2005, all groundwater cleanup programs are required to submit these items as well as a portable data format (PDF) copy of reports.
- Compliance Monitoring – Monitoring reports are required periodically that describe the status of the cleanup activities and monitoring results. The Water Board will conduct site inspections to ensure the responsible party is complying with Water Board enforcement directives.
- Deed Restriction - A deed restriction (land use covenant) may be required to facilitate the remediation of past environmental contamination and to protect human health and the environment by reducing the risk of exposure to residual hazardous materials. Water Code Section 13307.1 requires that deed restrictions be mandated for sites that are not cleaned up to "unrestricted use", and that the restrictions be recorded and run with the land to prohibit sensitive uses such as homes, schools, or day care facilities. Underground storage tank (UST) sites are exempted from this requirement because of the sheer numbers and the small size of most of these sites. Site conditions are tracked in the statewide database developed by the State Water Board (Section 4.25.2.2 Electronic Data Reporting).
- Liability Relief Tools – Several tools are available to municipalities, landowners, developers and responsible parties for seeking relief from contamination liability. The Polanco Act, California Land Environmental Restoration and Reuse Act, and California Land Reuse and Revitalization Act provide liability relief and help redevelopment agencies, cities and counties to guide and pursue redevelopment of Brownfield sites (Section 4.25.3.1.3 Brownfields).

4.25.2.3 Setting Cleanup Levels

The Water Board approves soil and groundwater clean-up levels for polluted sites. Per State Board Resolution No. 92-49, the basis for Water Board decisions regarding investigation, and cleanup and abatement includes: (1) site-specific characteristics; (2) applicable state and federal statutes and regulations; (3) applicable water quality control plans adopted by the State and Regional Water Boards, including beneficial uses, water quality objectives, and implementation plans; (4) State and Regional Water Board policies, including State Water Board Resolutions No. 68-16 (Antidegradation Policy) and No. 88-63 (Sources of Drinking Water Policy); and (5) relevant standards, criteria, and advisories adopted by other state and federal agencies.

State Water Board Resolution No. 92-49 directs the Regional Water Boards to ensure that dischargers are required to cleanup and abate the effect of discharges. This cleanup and abatement shall be done in a manner that promotes attainment of either background water quality, or the best water quality that is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved: beneficial and detrimental, economic and social, tangible and intangible. Any alternative cleanup levels less stringent than background shall:

- Be consistent with maximum benefit to the people of the state;
- Not unreasonably affect present and anticipated beneficial uses of such water; and
- Not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.

Groundwater Cleanup Levels

The overall clean-up level established for a waterbody is based upon the most sensitive beneficial use identified. In all cases, the Water Board first considers high quality or naturally occurring "background" concentration objectives as the clean-up levels for polluted groundwater and the factors listed above under "Setting Cleanup Levels." For groundwaters with a beneficial use of municipal and domestic supply, cleanup levels are set no higher than:

- MCLs or adopted SMCLs, whichever is more restrictive, or
- A more stringent level (i.e., below MCLs) based upon a site-specific risk assessment. Clean-up levels must be set to maintain the excess upperbound lifetime cancer risk to an individual of less than 1 in 10,000 (10-4) or a cumulative toxicological effect as measured by the Hazard Index of less than one. For all sites performing risk assessments, an alternative with an excess cancer risk of 1 in 1,000,000 (10-6) or less must also be considered.

The Water Board determines excess cancer risks and the Hazard Index following the procedures described in the U.S. EPA's Risk Assessment Guidance for Superfund, Volume I, Parts A dated August 1989, B dated December 1991, and C dated December 1991, which are incorporated by reference into this plan. The Water Board may modify the U.S. EPA's approach based on OEHHA's guidelines or more current site- or pollutant-specific information.

Groundwater clean-up levels are approved on a case-by-case basis by the Water Board. The Executive Officer or a local agency may approve clean-up levels as appropriately established by the Water Board. Proposed final clean-up levels are based on a discharger-developed feasibility study of clean-up alternatives that compares effectiveness, cost, time to achieve clean-up

standards, and a risk assessment to determine impacts on beneficial uses, human health, and the environment. Clean-up levels must also take into account the mobility, toxicity, and volume of pollutants. Feasibility studies of cleanup alternatives may include the guidance provided by Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300); Section 25356.1(c) of the California Health and Safety Code; CERCLA; the State Water Board's Resolutions Nos. 68-16 and 92-49; and the Water Board Resolution No. 88-160.

Soil Cleanup Levels

Soil pollution can present a health risk and a threat to water quality. The Water Board sets soil clean-up levels for the unsaturated zone based on these threats. Guidance from the U.S. EPA, DTSC, and OEHHA are considered when determining cleanup levels. Cleanup levels must be protective of human health for existing and likely future land use based on properly adopted land use designations in general plans, zoning, and other mechanisms. In addition, if it is unreasonable to cleanup soils to background concentration levels, the Water Board may:

- Allow residual pollutants to remain in soil at concentrations such that:
    - Any residual mobile constituents generated would not cause groundwater to exceed applicable groundwater quality objectives, and
    - Health risks from surface or subsurface exposure are within acceptable guidelines.
- Require follow-up groundwater monitoring to verify that groundwater is not polluted by chemicals remaining in the soil. Follow-up groundwater monitoring may not be required where residual soil pollutants are not expected to impact groundwater.
- Require measures to ensure that soils with residual pollutants are covered and managed to minimize pollution of surface waters and/or exposure to the public.
- Implement applicable provisions of CCR Title 27 where significant amounts of wastes remain on-site. This may include, but is not limited to, subsurface barriers, pollutant immobilization, toxicity reduction, and financial assurances.

In order for a discharger to make site-specific recommendations for soil clean-up levels above background, the fate and transport of leachate can be modeled by the discharger using site-specific factors and appropriate models. Assumptions for minimal leachate dilution, as proposed by the discharger, may be considered by the Water Board if deemed reasonable.

4.25.3 Program Areas

Sites with identified pollution problems are managed through five program areas: (1) Spills, Leaks, Investigations, and Cleanups (SLIC) Program; (2) UST Program; (3) Landfill Program, (4) Department of Defense/Department of Energy (DoD/DoE) Program and (5) Above-ground Petroleum Storage Tank Program. Requirements for site investigation and remediation of groundwater under these programs are described in Section 4.25.2 Requirements for Site Investigation, Cleanup, and Site Closure.

4.25.3.1 Spills, Leaks, Investigation, and Cleanup Program (SLIC)

The SLIC program focuses on unauthorized releases of pollutants to soil, surface water, and groundwater. Sites that are managed within the SLIC program include sites with pollution from recent or historical surface spills, subsurface releases (e.g., pipelines, sumps, etc.), and all other unauthorized discharges that pollute or threaten to pollute surface or groundwater. The SLIC program also includes groundwater cleanup at Brownfields, refineries, and other large industrial facilities. There is some overlap with the UST program as many SLIC cases also have leaking underground tanks.

The Water Board identified many historical releases in the 1980s. New releases are identified through discharger reports, complaints to the Water Board, the Water Board's own surveillance, “due diligence” reports for proposed property transfer or redevelopment, and local agency reports.

There are variety of different pollutants at SLIC sites, including chlorinated solvents, fuels and non-chlorinated solvents, SVOCs, inorganic constituents and metals, polychlorinated biphenols (PCBs), and pesticides. Persistent and mobile constituents, such as chlorinated solvents, tend to cause more serious pollution problems, while immobile constituents, such as metals, and biodegradable constituents, such as fuels, tend to be less serious. Two other factors can increase case complexity: multiple dischargers on a site (such as a current owner, past owner, and past operator) and commingled groundwater plumes, where contaminants from two or more source sites have merged. In both cases, dischargers may argue against being named in cleanup orders or may demand that other parties be named as well.

The Water Code provides authority for the Water Board to require investigation and cleanup of sites with unauthorized pollutant releases. Water Code Section 13267 allows the Water Board to require technical reports from suspected dischargers. Water Code Section 13304 authorizes the Water Board to issue “cleanup and abatement” orders requiring a discharger to cleanup and abate waste, “where the discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.” The Water Board coined the term “site cleanup requirements” (SCRs) to describe Water Code Section 13304 orders where soil or groundwater cleanup would take many years to complete and the dischargers are cooperating.

The Water Board also complies with any requirements in the state Health and Safety Code and the federal Superfund law for authority at federal Superfund sites where the Water Board is the lead agency.

SLIC Cost Recovery Program

Water Code Section 13304 authorizes the Regional Water Boards to recover costs for oversight of site cleanup at sites where a discharge of waste has occurred and that discharge creates, or threatens to create, a condition of pollution or nuisance. The Water Board was instrumental in establishing the State Water Board’s SLIC cost recovery program. Cost recovery was initially established in the early 1990s with the agreement of Bay Area petroleum refineries to reimburse the state for oversight of groundwater and soil remediation. Shortly thereafter the State Water Board organized a pilot program to expand the cost recovery program to other SLIC sites. During this period the legislature amended this section of the Water Code to strengthen the ability of the Regional Water Boards to recover staff oversight costs.

In 1993, the State Water Board established a unified SLIC cost recovery program. Program funding came initially from the General Fund but later switched to the State Water Board’s Cleanup

and Abatement Account (revolving fund mechanism). The net cost of this program to the state is a small fraction of this amount because dischargers repay almost all of the staff oversight costs.

In general, SLIC sites should be enrolled in the SLIC cost recovery program because there is very limited program funding for oversight of non-cost recovery sites. Exceptions include de minimus sites (e.g., sites where oversight can be completed with minimal staff effort), and under special circumstances (e.g., sites with significant potential threat to human health or water quality where there are limited funds available for remedial action).

Federal Sites

Superfund Sites – The federal Superfund program was created in 1980 when Congress enacted CERCLA, known as Superfund. CERCLA was amended in 1986 with the Superfund Amendments and Reauthorization Act (SARA). The Water Board is the lead regulatory oversight agency for 16 federal Superfund sites in the South Bay. The Superfund program was designed to address the most seriously contaminated hazardous waste sites in the country. The Water Board previously had a U.S. EPA grant to oversee the 16 federal Superfund sites. Currently the sites are all enrolled in the Water Board's cost recovery program and are managed similar to SLIC cases while still ensuring that U.S. EPA's requirements, as defined in the National Contingency Plan, are met. The Water Board has adopted final SCRs for all 16 sites, and all 16 sites have implemented long-term remediation projects.

RCRA Sites – Six sites originally proposed as federal Superfund sites were subsequently dropped because cleanup could be required under Resource Conservation and Recovery Act (RCRA). As with the Superfund sites, the Water Board has adopted final SCRs for all sites in compliance with RCRA requirements, and all six sites have implemented long-term remediation projects. There are also about 20 RCRA “analogous” sites. These are sites where Water Board oversight has included extra steps to assure that oversight is analogous to the state and federal RCRA requirements. The Water Board has adopted SCRs for all “analogous” sites, and most have implemented long-term remediation.

Brownfields

The Water Board is one of several agencies with a role in the Brownfield cleanup and redevelopment process. Brownfields are properties that are contaminated, or thought to be contaminated, and are underutilized due to perceived remediation costs and liability concerns. The Water Board directly oversees investigation and cleanup at Brownfield sites. Other stakeholders in the process include: local redevelopment agencies (who designate redevelopment areas and often acquire and assist in redevelop of Brownfield sites), local governments (who must approve redevelopment proposals), developers and non-profits (who make redevelopment proposals), lenders, and community members.

BROWNFIELD REGULATIONS

There are several key federal and state environmental laws that have fostered Brownfield development, as described below.

Federal Legislation

The Small Business Liability Relief and Brownfields Revitalization Act (Brownfield Law) signed into law in 2002 contains three subtitles dealing with funding and liability for assessing and cleaning up contaminated properties. Subtitle A codified and expanded U.S. EPA’s current Brownfield program by authorizing funding for assessment and cleanup of Brownfield sites. Subtitle B exempted

contiguous property owners and prospective purchasers from Superfund liability, and clarified the extent of appropriate environmental inquiry for innocent landowners. “Innocent landowners” are those who hold property with contamination on it, but did not contribute to the pollution. Subtitle C authorized funding for State response programs and limited U.S. EPA’s Superfund enforcement authority at sites cleaned up under a State response program.

This law is important because it provides liability relief for innocent landowners and purchasers as long as they meet certain requirements. Many redevelopment deals have stalled previously because there was no clear-cut mechanism for providing liability relief to innocent purchasers who were willing to perform the cleanup, but unwilling to take on the long-term liability associated with the site.

State Legislation

The Polanco Redevelopment Act of 1990 (Polanco) outlines the processes for redevelopment agencies to follow when cleaning up a hazardous substance release in a redevelopment project area. It also provides immunity from liability for redevelopment agencies and subsequent property purchasers for sites cleaned up under a plan approved by the Water Board (or DTSC). The Polanco process has become a widely used tool by redevelopment agencies to guide and pursue redevelopment of Brownfields. Redevelopment agencies requesting approval of their cleanup plans under the provisions of Polanco are required to reimburse oversight costs to the agencies.

The California Land Environmental Restoration and Reuse Act of 2001 was enacted to enable cities and counties to direct or conduct investigation and remediation at Brownfield sites that are outside of redevelopment areas to help return Brownfields to productive uses. It requires Cal/EPA to provide a variety of data related to Brownfield cleanups, and to develop a set of screening values for hazardous substances commonly found at Brownfield sites. A centerpiece of the legislation was its requirement that Cal/EPA develop statewide screening levels, based on environmental screening levels developed at this Water Board (Section 4.25.2.3 Setting Cleanup Levels).

The California Land Reuse and Revitalization Act of 2004 (CLRRA) is intended to bring California into conformity with the federal statutes concerning liability relief for innocent landowners, perspective (bona fide) purchasers, and contiguous property owners in urban areas. It allows for risk-based cleanups at Brownfield sites. Participants who seek immunity must enter into an agreement with the agency that includes the preparation and implementation of a site assessment plan, and if necessary, a response plan. A certificate of completion is issued upon determining that all response actions have been completed in accordance with the agency approval process.

BROWNFIELD GRANTS AND LIABILITY RELIEF TOOLS

Brownfield Grants

The U.S. EPA provides two types of Brownfield grants to states for the purpose of promoting Brownfield redevelopment, and to local agencies and non-profits to jump-start specific Brownfield redevelopment projects. The Water Board has worked closely with several cities in the Region to encourage Brownfield site cleanup and redevelopment, including writing letters of support for project-specific U.S. EPA grants. Between 1996 and 2005, U.S. EPA has awarded Brownfield grants totaling $9 million within the Region. The City of Oakland alone has received over $2 million in grants. Other recipient jurisdictions include: Emeryville, East Palo Alto, Richmond, San Francisco, Livermore, Alameda County, Contra Costa County, San Pablo, Petaluma, San Jose, and Union City.

Cal/EPA's Brownfield Initiative

In 2004, Cal/EPA announced a Brownfield initiative aimed at improving the way Cal/EPA agencies coordinate their regulatory activities at Brownfield sites. The initiative includes an ambitious implementation plan to:

- Foster partnerships with Brownfield stakeholders;
- Develop an inventory of Brownfield sites in California;
- Provide liability relief to Brownfield owners and buyers; and
- Pursue necessary funding and resources for Brownfield cleanup.

The initiative also directed the State Water Board, Regional Water Boards, and DTSC to complete a MOA. The MOA was signed in 2005 and contains the following elements:

- Limit oversight to a single lead agency at any given site;
- Establish procedures for identifying the appropriate lead agency;
- Establish a uniform site assessment procedure to be used by both agencies;
- Require that cleanups address the issues and concerns of both agencies;
- Allow the lead agency to gain the advice and expertise of the other agency as appropriate;
- Ensure ample opportunities for public input and involvement;
- Establish target timeframes for completing investigation and cleanup; and
- Establish regular coordinating meetings.

California State Liability Relief Tools

Several tools are available to municipalities, landowners, developers and responsible parties for seeking relief from contamination liability. Polanco, the California Land Environmental Restoration and Reuse Act, and CLLRA provide liability relief and help redevelopment agencies, cities and counties to guide and pursue redevelopment of Brownfields. Prospective purchaser agreements (PPA) are agreements to protect purchasers from being named as a discharger for pre-existing pollution. The buyer must provide something in return, such as an agreement to provide reasonable access for site cleanup and monitoring.

The Water Board may issue "comfort letters" to buyers of polluted property or owners of off-site properties affected by migrating groundwater pollution to mollify buyers or lenders about the potential liability they face. Letters to offsite owners typically promise not to enforce against them as long as they provide reasonable access. Letters to onsite buyers typically promise not to enforce against them as long as they provide reasonable access and the current responsible parties continue to perform necessary cleanup work.

4.25.3.2 Underground Storage Tank Program

An underground storage tank (UST) is defined by law as "any one or combination of tanks, including pipes connected thereto, that is used for the storage of hazardous substances and that is substantially or totally beneath the surface of the ground" (certain exceptions apply). The purpose of the UST Program is to protect public health and safety and the environment from releases of petroleum and other hazardous substances from tanks. State regulations regarding underground

tank construction, monitoring, repair, closure, release reporting, and corrective action are contained within CCR Title 23, Chapter 16.

Implementation of the UST Program is unique, as the Health and Safety Code Division 20, Chapters 6.7 and 6.75, gives local agencies the authority to oversee investigation and cleanup of UST leak sites. The Corrective Action regulations (CCR, Title 23, Chapter 16, Article 11) use the term "regulatory agency" in recognition of the fact that local agencies have the option to oversee site investigation and cleanup, in addition to their statutory mandate to oversee leak reporting and tank closure.

Some local agencies also provide oversight for underground fuel storage tank cases under a Local Oversight Program (LOP) contract with the State Water Board. Most oversight charges are billed to responsible parties. Some LOPs, known as Local Implementing Agencies (LIAs), have independent authority under UST laws to require investigations and cleanup. The Water Board still retains its Water Code authority to approve case closure. However, the Water Board has authorized a few local agencies to close fuel leak cases where groundwater has not been polluted, and future groundwater impacts are not expected.

Additionally, a few other local agencies have funded their own (non-LOP) oversight programs and have developed guidance documents based upon State and Regional Water Board guidance. In many areas throughout the Region the local agency has opted not to assume the lead position for fuel leak cases. Consequently, the Water Board is the lead agency for fuel leak sites in those areas.

Case Determination

Certified Unified Permitting Agencies (CUPAs) permit and regulate UST operations including leak prevention and inspections. When a release occurs, the Water Board is generally notified of the release via a copy of an Unauthorized Release Form (URF). This form is tailored so as its notification hierarchy complies with Proposition 65 notification requirements.

If the release is fuel based, and the CUPA happens to also be an LOP agency or an agency that has an agreement with the Water Board for fuel UST cleanup oversight, it will oversee cleanup operations from that point. All of this Region's LOP agencies are part of a CUPA. The same holds true in the case of our LIA agencies, with the exception of the Alameda County Water District (ACWD).

If the release is solvent based, the Water Board will provide oversight for cleanup. Exceptions may be found for those situations for which DTSC is the lead agency because the tank is on a site that is under DTSC lead, such as the solvent UST being located within a RCRA site, or by mutual agency agreement.

Water Board Lead UST Sites

The Water Board oversees cases for all of Contra Costa County, Marin County, and various cases within the LOP and LIA jurisdictions.

The Water Board having the lead in UST cases is the result of one or more of the following: 1) solvents or solvents commingled with fuels are the pollutant of concern; 2) the petroleum discharge is from something other than a UST under the Local Oversight Program or not necessarily under UST regulation such as sumps, spills, or agricultural tanks; 3) complex technical or policy issues; 4) conflict of interest issues in which the local agency is the responsible party, there is

inappropriate political pressure on the case, or for which the agency requests Water Board lead; 5) cases given to the Water Board as part of the Site Designation Process (AB 2061); 6) the local agency is unable, unwilling, and/or unavailable to provide proper oversight; 7) part of the site is within a larger facility currently under Water Board oversight; and 8) historical precedent.

Local Oversight Program (LOP) Agencies

Although the LOP agency contracts with the State Water Board, the Water Board provides technical guidance and enforcement support as needed. Upon determination by the LOP agency that a case is ready for closure, the LOP agency submits a closure package to Water Board for review. If the Water Board concurs or fails to act within 30 days, the closure is deemed approved and the LOP agency issues the closure letter.

The following agencies are LOPs in the Region, as of 2005:

- Alameda County Health Care Services, Department of Environmental Health
- Napa County Department of Environmental Management
- San Francisco Department of Public Health, Bureau of Environmental Health Management
- San Mateo County Department of Health Services, Office of Environmental Health
- Santa Clara County Department of Environmental Health
- Solano County Department of Environmental Management
- Sonoma County Department of Health Services, Environmental Health Division

Local Implementing Agencies (LIAs)

The Water Board provides technical and enforcement assistance to the LIAs, as necessary. However, these agencies essentially perform the same technical oversight duties (report requests, report review, etc.) that the Water Board would be expected to perform when overseeing case cleanups.

As part of this Region's case closure protocol with the LIA agencies, the Water Board reviews the LIA's case closure recommendation and case closure summary package (although in some cases the Water Board may prepare the summary package for the agency). If the Water Board concurs with the agency's recommendation, the Water Board issues the closure letter.

The following agencies are LIAs in the Region, as of 2005:

- Alameda County Water District
- City of Berkeley Toxics Management Program
- City of Hayward Fire Department
- City of San Leandro

UST Program Background

In 1995, the State Water Board commissioned the Lawrence Livermore National Laboratory (LLNL) and the University of California to conduct a review of the regulatory framework and cleanup process applied to LUFTs. The study titled, "Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks (LUFTs)" concluded that fuel hydrocarbons have

limited impact on human health, the environment, or California's groundwater resources, and recommended applying a modified ASTM risk-based corrective action (RBCA) process for closing leaking UST sites (ASTM E1739-95, 2002). A risk-based approach to leaking UST cleanups has been widely applied following this recommendation.

In the mid 1990's, methyl tert-butyl ether (MtBE) was recognized as a major threat to groundwater resources. MtBE had been added to gasoline sold in California since 1979 until January 1, 2004, first as an octane booster, and later as an oxygenate comprising up to 11 percent by volume. MtBE prioritization guidelines were developed based on a risk-based approach, and the expedited site assessment has been used to cleanup high threat MtBE sites (Expedited Site Assessment Tools for UST Sites (EPA 510-B-97-001, 1997)).

In 1998, the State Water Board commissioned LLNL to study the impacts of MtBE on groundwater in California. LLNL concluded that MtBE is a frequent and widespread contaminant in shallow groundwater throughout California and that MtBE plumes are more mobile than benzene, toluene, ethylbenzene, and xylenes (BTEX) plumes (An Evaluation of MTBE Impacts to California Groundwater Resources, 1998). Guidelines were developed by the State Water Board for investigation and cleanup of MtBE and other ether-based oxygenates (Guidelines for Investigation and Cleanup of MtBE and Other Ether-Based Oxygenates, 2001).

Since 1998 several studies have been conducted that evaluated the occurrence of MtBE releases at UST sites. These studies indicated that effectiveness of the existing UST leak detection systems has been limited, and that MtBE has impacted the majority of the UST sites (Report on MtBE Monitoring at Operating UST Facilities in Santa Clara County, 2004).

UST Cleanup Fund

Federal and state laws require every owner and operator of a petroleum UST to maintain financial responsibility to pay for any damages arising from their tank operations. The Barry Keene Underground Storage Tank Cleanup Fund Act of 1989 (Cleanup Fund) was created by the California Legislature, and is administered by the State Water Board, to provide a means for petroleum UST owners and operators to meet the federal and state requirements. The Cleanup Fund also assists a large number of small businesses and individuals by providing reimbursement for unexpected and catastrophic expenses associated with the cleanup of leaking petroleum USTs.

If a leak occurs, responsible parties or their representative must notify the appropriate Water Board or county agency and submit an unauthorized release form (URF). The Cleanup Fund can only reimburse costs after the site investigation and cleanup of the tank release has been reported to the Water Board or county regulatory agency.

4.25.3.3 Landfill Program

Discharges of solid, semisolid, and liquid wastes to landfills, waste piles, surface impoundments, and land treatment facilities can create sources of pollution affecting the quality of waters of the state. Low-concentration liquid waste discharges can be assimilated by receiving waters, if the concentration of pollutants in the waste is regulated (i.e., treated wastewater from municipal or industrial facilities). Conversely, discharges of wastes to waste management units require long-term containment or active treatment in order to prevent waste or waste constituents from migrating to and impairing the beneficial uses of waters of the state. Pollutants from such discharges may continue to affect water quality long after the discharger has stopped discharging new wastes at a site, either because of undetermined releases from the site or because pollutants from the site have accumulated in underlying soils and are migrating to groundwater.

Landfills for disposal of municipal or industrial solid waste (solid waste disposal sites) are the major categories of waste management units located in the Region. The Water Board issues WDRs to ensure that these discharges are properly contained to protect the Region's water resources from degradation and to ensure that the dischargers undertake effective monitoring to verify continued compliance with requirements.

These discharges, and the waste management units at which the wastes are discharged, are subject to concurrent regulation by other state and local agencies responsible for land-use planning, solid waste management, and hazardous waste management. Local enforcement agencies (LEAs) implement the state's solid waste management laws and local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. DTSC issues permits for all hazardous waste. The State Water Board, Regional Water Boards, the CIWMB, and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

Oversight costs for sites in the landfill program at the Water Board and CIWMB are primarily funded through waste discharge permit fees and landfill waste tipping fees.

The Water Board regulates landfills receiving municipal solid wastes (MSW) and facilities receiving classified, nonhazardous, and industrial wastes of various types. Figure 4-6 shows the active and inactive municipal solid waste landfill sites within the Region as of 2005. The Water Board regulates these sites closely, but the required monitoring has revealed water quality problems at some sites that the respective owners or operators are addressing through appropriate remedial measures. As a result of federal laws in the area of hazardous waste regulation, more effort is being devoted to regulation of the onsite treatment, storage, and disposal of hazardous waste.

Waste Regulations

In 1997, the State revised and strengthened the laws and regulations governing the discharges of both hazardous and nonhazardous solid waste. The primary purpose of the regulations is to: 1) assure the protection of human health and the environment, 2) ensure waste is properly contained or cleaned-up as appropriate, and 3) protect surface water and groundwater from the discharge of waste to land. The primary regulation used by the Water Board in regulating nonhazardous waste treatment, storage, and disposal is the combined State Water Board and CIWMB regulations contained in CCR Title 27, Division 2 of the Solid Waste Regulations, formerly CCR Title 23, Division 3, Chapter 15. Title 27 includes very specific siting, construction, monitoring, and closure requirements for all existing and new nonhazardous waste treatment, storage, and disposal facilities. Title 27 also contains a provision requiring operators to provide assurances of financial responsibility for: landfill closure activities; post closure monitoring and maintenance; and corrective action for landfill releases. Title 27 establishes detailed technical criteria for establishing water quality protection standards, monitoring programs, and corrective action programs for releases from waste management units.

Title 27 defines three types of nonhazardous waste: 1) designated wastes; 2) nonhazardous solid waste; and 3) inert waste, as described below.

Unlike other waste classifications, designated waste is defined in Water Code Section 13173 (and in Title 27) as follows:

"Designated waste," means either of the following:

- Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code.
- Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

Title 27 Section 20220 defines nonhazardous solid waste as waste normally associated with domestic, agricultural, and commercial activities. In addition to the regulations under Title 27, landfills that receive nonhazardous solid waste are subject to the State Water Board's special regulations for municipal solid waste landfills (State Water Board Resolution No. 93-62), which adapt federal municipal solid waste landfill standards to the state's landfill regulation scheme.

Title 27 Section 20230 defines inert waste as that subset of nonhazardous solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste. The Water Board regulates inert waste landfills outside of its Title 27 authority and only to the extent necessary to protect water quality from siltation and other indirect effects.

The Water Board regulates discharges of designated waste and nonhazardous solid waste pursuant to the regulations in Title 27; regulates discharges of municipal solid waste pursuant to both the Title 27 regulations and State Water Board Resolution No. 93-62; and regulates discharges of inert wastes only as necessary to protect water quality (e.g., to prevent sediment discharges to surface waters or to assure that such relatively unregulated units receive only inert waste).

Hazardous waste is defined by DTSC in CCR Title 22, Division 4.5, Chapter 11. Disposal of hazardous waste and hazardous waste sites located in the Region are regulated by DTSC.

The Water Board has been regulating nonhazardous solid waste facilities since the mid-1970's, and in some instances since to the early 1950's. Many of the small, older facilities have closed, and waste is now being disposed of at large regional nonhazardous solid waste facilities. The Water Board reviews and revises WDRs at active nonhazardous waste sites, and at closed sites, and assures consistency with the current regulations. These actions include defining the levels of designated wastes (see below), requiring the discharger to establish and operate groundwater monitoring systems capable of identifying whether water quality objectives are being violated, establishing corrective evaluation monitoring (investigation) and corrective action programs where standards are violated, and reviewing and overseeing the development and implementation of facility closure plans. Active landfills are also subject to construction and industrial stormwater NPDES permit requirements (Section 4.14 Urban Runoff Management).

To implement Title 27 at nonhazardous solid waste facilities, the Water Board must define designated wastes. Many wastes which are not hazardous still contain constituents of water quality concern that could become soluble in a nonhazardous solid waste facility and produce leachates and gases that could pose a threat to beneficial uses of state waters. Furthermore, a waste (e.g., salty solids) that might be a designated waste at a landfill that overlies potable water would not be a designated waste at one that overlies groundwater with non-potable water at comparable concentrations (i.e., salty solids are not a threat to salty groundwater).

The criteria for determining if a nonhazardous waste is a designated waste are based on water quality objectives in the vicinity of the site, the containment features of the solid waste facility, and the solubility/mobility of the waste constituents. Therefore, all owners and operators of active nonhazardous municipal solid waste facilities in the Region who wish to receive wastes other than municipal solid waste or inert wastes must propose waste constituent concentration criteria above which wastes will be considered designated waste and therefore, not suitable for disposal at their site. In determining whether a nonhazardous waste is designated waste, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other sources, such as the Central Valley Water Board's report, "Designated Level Methodology for Waste Classification and Cleanup Level Determination," or an equivalent methodology acceptable to the Executive Officer.

Resource Conservation and Recovery Act (RCRA)

The state implements federally authorized regulations that are equivalent to those promulgated by the U.S. EPA under Subtitle C of RCRA—Hazardous Waste Regulations for Treatment, Storage, and Disposal. In 1992, U.S. EPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in CCR Title 23, Chapter 15. Chapter 15 monitoring requirements were amended in 1997 to be equivalent to RCRA requirements in regard to the discharge of hazardous waste to land.

The U.S. EPA promulgated federal regulations, as required by Subtitle D of the federal RCRA statute, applicable to municipal solid waste landfills (40 CFR 257 and 258). These regulations are self-implementing. The CIWMB and the State Water Board are jointly responsible for implementing the state program, which the U.S. EPA has approved as being equivalent. The Regional Water Boards implement the water quality aspects of the state program. The LEAs and the CIWMB implement the public health and safety aspects of the state program.

Toxic Pits Cleanup Act

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system or be dried out by July 1, 1988, and subsequently closed. In 1985, there were 26 sites in the Region with ponds subject to TPCA. As of 2005, one site is permitted to operate its ponds under TPCA's exemption requirement but is not accepting waste and is seeking closure. The remaining 25 sites have been closed.

Bayfront Landfill Expansions into Wetlands

A significant issue that the Water Board has addressed is the expansion of existing Bayfront landfills into wetland areas. The Water Board, in a few cases, allowed modest expansions (and undesirable loss of wetlands) to allow local governments time to develop other disposal options. However, these expansions were only approved because there was a demonstrated immediate public need. One expansion permit was appealed to the State Water Board, which clearly indicated that the Water Board should disapprove future such expansions into wetlands, and that local governments must complete the necessary planning to avoid this problem. Given the State Water Board’s position and the wetland provisions contained elsewhere in this Basin Plan, the Water Board will not approve further expansions of Bayfront landfills into wetlands.

4.25.3.4 Department of Defense and Department of Energy Program

The goal of the DoD/DoE program is the investigation and cleanup of pollution at federal military sites. DoD sites include active and inactive military bases and formerly utilized defense (FUDs)

sites. DoE sites include active federal energy agency sites. DoD and DoE sites in the Region as of 2005 are shown on Figure 4-7. An adjunct to cleanup, particularly with respect to DoD sites, is the return of these sites to productive, civilian use.

Investigation and cleanup at these sites follows the CERCLA process. For DoD sites, the DoD has elected to follow the CERCLA process even if the sites are not listed as “Superfund” sites. This process follows a rigorous sequence of document preparation and agency approvals including completion of the formal Preliminary Assessment, Site Investigation, Remedial Investigation, and Feasibility Study, all leading to a Record of Decision (ROD) on an acceptable Remedial Action Plan (RAP).

Groundwater cleanup must also adhere to the requirements of the Basin Plan and existing state law (the Water Code), relevant regulations (e.g., Title 27; Title 23, Chapter 16, etc.), and policies set forth by State Water Board Resolution Nos. 68-16, 88-63, and 92-49.

Under the Base Realignment and Closure Act of 1990 (amended 2005), the DoD has been conducting environmental investigation and cleanup at each of these sites with oversight from the Water Board and other agencies. There is considerable state and federal interest in moving these latter types of DoD sites into economically productive uses, in part to offset the negative economic impact of base closures on the local community or to invigorate the often depressed economies of local communities located near these sites. Progress has been slow in many cases due to competition for limited DoD cleanup funds, the complexities of the sites themselves, and uncertainty about the planned reuse. Cities have recently been pursuing “early transfers” that allow them to receive the military property prior to completion of cleanup. Local governments have contracted with developers and environmental firms to perform an integrated cleanup and redevelopment.

Closed military bases that are transferred to a local entity before the cleanup is complete may be subject to a land use covenant (LUC) issued by the Water Board to ensure the site cleanup is completed. The Water Board may issue SCRs per Water Code Section 13304 to allow investigation and cleanup after the military property is transferred. For additional regulatory tools, see Section 4.25.2 Requirements for Site Investigation, Cleanup, and Site Closure.

For the DoE program, all of the sites currently within the Region are active and are not expected to fall within public hands for the foreseeable future. Cleanup is ongoing at these sites. Contamination generally consists of discharges of solvents, petroleum hydrocarbons, PCBs, and/or metals to both soil and groundwater. In some cases, radionuclides have also been released. DoE has regulatory authority over radionuclide discharges, although the Water Board provides input into the investigation and cleanup activities related to them.

Federal funding for both the DoD and DoE programs covers all costs associated with Water Board and State Water Board staff oversight. The state signed a Cooperative Agreement with the Department of Defense (Defense-State Memorandum of Agreement, DSMOA)). In the Cooperative Agreement, DTSC acts as the state’s agent. Both the State Water Board and the Regional Water Boards coordinate with DTSC to allocate agency responsibility and funding and establish procedures under which site investigation and cleanup will proceed, decisions will be made, and disputes will be resolved. For the DoE program, a grant has been established which describes and funds Water Board oversight at DoE sites.

4.25.3.5 Aboveground Petroleum Storage Act

The state's Aboveground Petroleum Storage Act was enacted in 1989 and amended in 1991. The Act became effective on January 1, 1990.

The purpose of this Act is to protect the public and the environment from the serious threat of spillage of millions of gallons of petroleum-derived chemicals stored in thousands of aboveground storage tanks. The Act requires that the Water Board inspect aboveground petroleum storage tanks used for crude oil and its fractions for their compliance with the federally required Spill Prevention, Control, and Countermeasure Plan (SPCCP). In the event that a release occurs that threatens surface or groundwater, the Act allows the state to recover reasonable costs incurred in the oversight and regulation of the cleanup. The Water Board oversees sites where releases from aboveground storage tanks have impacted groundwater under the SLIC cost recovery program.

4.25.4 Groundwater Protection Studies

The intimate ties among the land, surface water, groundwater, the Estuary, and human activity must be acknowledged in order to promote wise, balanced, and sustainable use of water resources. In this regard, the Water Board will encourage planning and management by supplying tools and information that will provide an integrated environmental management approach to problem solving. It also must be recognized that groundwater quality and quantity are inextricably linked. Because an informed and involved citizenry is crucial to realizing groundwater protection, policies and plans should encourage and promote research, education, and public involvement as an integral part of any protection program.

4.25.4.1 Groundwater Protection and Beneficial Use Studies

Water Board staff, with contributions from local agencies, evaluated existing groundwater protection programs and beneficial uses of groundwater in the Napa River Watershed (1996), San Francisco and Northern San Mateo Counties (1996), East Bay Plain, Alameda and Contra Costa Counties (1999), and South San Francisco Bay Basin, Alameda, San Mateo, and Santa Clara Counties (2003). Extensive research was conducted and numerous references were compiled to prepare these groundwater studies. In general, each study included the following goals:

- Describe the hydrogeology and groundwater use for the groundwater basins;
- Identify major threats to groundwater and groundwater protection programs;
- Identify locations where groundwater is vulnerable to contamination;
- Identify locations where groundwater monitoring is needed;
- Use GIS to compile complex data sets to use as a decision-making tool for groundwater protection;
- Refine beneficial use designations for some groundwater basins;
- Identify inactive well locations;
- Describe groundwater extraction for municipal, agricultural, and industrial water supply;
- Summarize statewide initiatives for groundwater protection and data sharing; and
- Evaluate special problem areas that are typically not addressed by groundwater protection programs.

The results of these groundwater protection studies identified several key groundwater protection issues that are summarized in Section 4.26 Emerging Program Areas. The reports are available at the Water Board website.

4.25.4.2 State Water Board Groundwater Protection Planning Contract

At the Water Board's request, the State Water Board funded a contract with the University of California at Berkeley to develop a regional groundwater protection plan. The project focused on several significant groundwater basins: Santa Clara Valley, Niles Cone, Livermore Valley, San Mateo Plain, and Half Moon Bay Terrace (Table 2-2). The vulnerability to pollution of each of the basins was determined using the U.S. EPA's DRASTIC Index Method (U.S. EPA Project No. 600/2-87-035, April 1987) on a GIS. The project was completed in 1994 by the Center for Environmental Design Research, University of California at Berkeley.

4.25.4.3 Integrated Environmental Management Project

In 1987, the U.S. EPA completed the Integrated Environmental Management Plan (IEMP). This innovative study conducted in Santa Clara County sought to improve public health and environmental protection by integrating approaches for hazardous material management for land, air, and water. The IEMP's Drinking Water Subcommittee developed recommendations to address the question “How clean is clean?” The committee wrote,"...because contamination and clean-up impacts vary significantly in different sites and different hydrogeologic zones, the Water Board should continue to develop and standardize a process for clean-up decision making, rather than establish across-the-board clean-up levels." The recommendations from this study were applied to developing site-specific cleanup levels.

4.25.4.4 Groundwater Resource Study

A basin-wide approach for implementing and prioritizing groundwater cleanup was recommended in a series of reports titled "San Francisco Bay Region Groundwater Resource Study" (1987). The reports were a cooperative effort by the Water Board and the University of California at Berkeley, School of Public Health, and Department of Landscape Architecture. The ten volume series covered eight high priority groundwater basins: Niles Cone, Livermore and Sunol Valley, Ygnacio/Pittsburg/Clayton/San Ramon Basins, Suisun/Fairfield Basin, Napa Valley, Sonoma Valley, and San Mateo Basin. The Water Board used the results of this study to prioritize its workload in addressing polluted sites.

4.25.4.5 Shallow Drainage Wells

The California Water Code, Section 13710, defines the term "well" or "water well" to mean any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. The definition does not include (a) oil, gas, and geothermal wells, or (b) construction dewatering wells and hillside stabilization dewatering wells. Therefore, all shallow drainage wells (also known as dry wells, infiltration basins, and shallow injection wells) used for the purpose of disposing of stormwater or surface runoff are covered under this definition. The purpose of this Basin Plan section is to clarify the Water Board's position in regard to the construction, usage, and regulatory permitting aspects of shallow drainage wells.

In 1951, the Water Board adopted Resolution No. 81, "Statement of Policy on Sewer and Drainage Wells", which is incorporated by reference into this plan. This resolution states that the Water Board disapproves of the construction and use of wells for disposal of effluent from septic tanks and surface runoff from streets and highways except where such wells discharge into a formation that at no time will contain groundwater fit for domestic, agricultural, or industrial use. At the same

time, the Water Board recognized that these wells already existed in the Region and that immediate abandonment may be impractical. Therefore no new installations were to be permitted, more satisfactory drainage methods were to be substituted for existing installations at the earliest practicable date, and the Water Board was to consider the matter of prescribing requirements for the discharge in granting any exceptions to the prohibition. After review of Water Board files, it does not appear as if any exceptions to the resolution were officially granted.

The Federal Underground Injection Control Program was established in 1984 with the adoption of the Safe Drinking Water Act. In California, the U. S. EPA is the lead agency in charge of administering the program. Under this program, wells used to dispose of surface water runoff are classified as Class V injection wells. The owner or operator of any existing Class V well is required to submit information on each well, including the nature and type of discharge and operating status. U.S. EPA is conducting a well inventory statewide to identify Class V wells.

There are a number of applicable state regulations pertaining to the construction and use of shallow drainage wells. AB2182 (Chapter 1131, Section 4458) of the California Health and Safety Code, passed in 1961, prohibits the use of drainage wells for the disposal of sewer water unless authorized by the Water Board. The Water Code (Chapter 10, Sections 13700 – 13806) defines the terms "well" and "water well" and states that any person who intends to dig, bore, or drill such a well must file a notice of intent with DWR or the designated local enforcement agency. A detailed report of completion must then be filed after construction. If the Water Board finds that standards of water well construction, maintenance, abandonment, and destruction are needed in any area to protect beneficial uses of groundwater, it shall determine the area to be involved and so report to each affected county and city in the area. Each such affected county shall, within 120 days of receipt of the report, adopt an ordinance establishing standards of water well construction, maintenance, abandonment, and destruction for the designated area. To date, standards and siting criteria for shallow drainage wells are non-existent in the Region and subsequently not included in the well-permitting process.

The Water Board issues NPDES permits for stormwater discharges to surface water for certain industrial and construction activities and to the larger municipalities in the Region (Section 4.14 Urban Runoff Management). The permits require the implementation of control measures to reduce pollutant loading, along with water quality monitoring to assure that the waters being discharged will not impact the beneficial uses of receiving waters. The discharge of industrial waste into the sanitary sewer system is now closely regulated under a pretreatment program. Likewise, the discharge of stormwater to the subsurface must also be regulated to assure the protection of groundwater supplies. Standards for shallow drainage well construction, maintenance, abandonment, destruction and siting criteria are needed throughout the Region. Land-use decisions, such as stormwater structural controls and well construction permitting, are most often made by local government agencies, including water districts, planning, and building departments. Many of these agencies are not aware of the Water Board's Resolution No. 81, or the rationale behind it.

Goal

The goal of the Shallow Drainage Program is to eliminate the unregulated construction and use of shallow drainage wells in areas where municipal, domestic, agricultural, and industrial groundwater supplies are threatened.

This goal is to be attained by a coordinated effort on the part of U.S. EPA, the Water Board, DWR, and local government agencies to implement a shallow drainage well control program.

Shallow Drainage Program

The Water Board prohibits the unauthorized construction and use of shallow drainage wells. The shallow drainage well control program shall consist of two main elements: 1) locating existing wells; and 2) regulating the construction and use of existing and new wells.

1. Locating existing wells

U.S. EPA, the Water Board, and local government agencies will need to work together to identify all existing shallow drainage wells.

2. Regulating existing wells and new wells

Continued use of existing wells or construction of new wells may be authorized by a local enforcing agency through its well-permitting process. The Water Board will work with DWR and each city, county, and local water supply and flood control agency on developing standards for adoption by ordinance for the construction, maintenance, abandonment, and destruction of shallow drainage wells. Additionally, it must be demonstrated that the use of the well will not result in a discharge that may pose a threat to municipal, domestic, agricultural, and industrial groundwater supplies. If this cannot be adequately demonstrated, the well must be permanently closed. Closure of each well must be done in compliance with U.S. EPA Class V injection well closure guidelines and applicable local agency guidelines or regulations.

4.26 EMERGING PROGRAM AREAS

There are several aspects of protecting beneficial uses associated with aquatic systems and groundwater protection that have emerged as critical issues in recent years. This section presents a prospective view of emerging program areas that have increasingly become the focus of Water Board activity. Each involves both an integration of approaches used in current Water Board programs as well as innovative solutions.

4.26.1 Wetland Restoration

As documented in the Habitat Goals reports, a large percentage of historic tidal marsh and mudflats around the Estuary have been diked, drained, and/or filled to serve various human purposes. Current planning efforts by multiple agencies recognize the importance of restoring wetland functions to the Estuary to protect and enhance beneficial uses. The Estuary Project's Comprehensive Conservation and Management Plan (June 1994) proposes several goals for wetland management in the Estuary, and recommends large-scale restoration of salt ponds and other former wetlands in order to support sustainable populations of fish and wildlife as well as other benefits associated with wetlands. The Habitat Goals reports provide guidance to the Water Board and indicates where wetland restoration potential exists around the Estuary.

The Water Board participates in a number of wetland restoration projects in the Region, both in a regulatory role regarding proposed wetland fill and/or discharges, and in the role of an interested party or stakeholder, recognizing the multiple benefits of wetland restoration for water quality and beneficial uses. Major restoration projects underway include former salt ponds adjacent to South San Francisco Bay and San Pablo Bay, former DoD sites such as Hamilton Field in Marin County, and the Bair Island Ecological Reserve in South San Francisco Bay. While these projects are expected to have a positive impact on water quality and beneficial uses, certain challenges must be addressed, such as minimizing uptake of mercury into the food web, meeting water quality objectives for salinity and dissolved oxygen in discharges from ponds (impounded bay waters),

protecting existing tidal mudflats, and controlling harmful invasive species such as Spartina alterniflora cordgrass and its hybrids.

4.26.2 Desalination

San Francisco Bay has only recently been identified as a potential drinking water source, and this has become an emerging program area for the Water Board. Producing drinking water from saltwater results in a concentrated brine stream that must be managed to protect water quality. In the late 1990s, some water supply agencies in the Region began investigating the feasibility of producing drinking water from the Estuary using desalination technology. As of 2005, several sites are being screened for potential desalination facilities by various agencies, and in 2005 the Water Board issued an NPDES permit to one pilot plant for the Marin Municipal Water District in the City of San Rafael.

Desalination plants are in operation throughout the world, with facilities most common in the Middle East, the Caribbean and Florida. To date, only a limited number of desalination plants have been built along the California coast, primarily because the cost of desalination is generally higher than the costs of other water supply alternatives available in California (e.g., water transfers and groundwater pumping). However, as drought conditions occur and concern over water availability increases, desalination projects are being proposed at numerous locations in the state.

Desalination plants produce liquid wastes that may contain all or some of the following constituents: high salt concentrations, chemicals used to clean plant equipment and used during pretreatment, and toxic metals (which are most likely to be present if the discharge water was in contact with metallic materials used in construction of the plant facilities). Potential alternatives for disposal of liquid waste include discharge into waters of the state, combination with other discharges (e.g., power plant cooling water or sewage treatment plant effluent) before discharge, discharge into a sewer for treatment in a sewage treatment plant, or drying and disposal in a landfill. Desalination plants also produce a small amount of solid waste (e.g., spent pretreatment filters and solid particles that are filtered out in the pretreatment process).

If water supply agencies implement desalination to augment supplies along with waste management practices that protect beneficial uses, the Water Board will consider amending the Basin Plan to designate the municipal and domestic supply (MUN) beneficial use for applicable marine or estuarine areas of the Region.

4.26.3 Emerging Toxic Pollutants of Concern

As noted in Section 4.1.2.1 Numeric Water Quality Objectives, Wasteload Allocations, there are pollutants of local concern for which water quality objectives have not been developed and adopted. Both regulatory and research surveillance programs periodically detect pollutants that are persisting in the aquatic environment, which may or may not have published guidelines for protecting beneficial uses. Such pollutants may be inducing toxicity or exhibiting bioaccumulation in the food web. The Regional Monitoring Program for the San Francisco Bay, described in Section 6.1 Regional Monitoring Program, includes studies to anticipate potential water quality problems by identifying previously unmonitored and/or unknown pollutants. It is through such efforts that the potential pollutant problems of the future can be identified and addressed before they become environmentally and economically costly “legacy” pollutants, such as mercury, PCBs, and chlorinated pesticides such as dichloro-diphenyl-trichloroethane (DDT). Absent regulatory objectives or published guidelines, the Water Board will encourage source identification and control of pollutants found in the Region’s waters that exhibit characteristics of concern, such as detectable and/or increasing levels in tissues of the Estuary’s organisms, as in the case of

polybrominated diphenyl ethers (PBDEs). The Water Board will establish water quality objectives for selected pollutants as the necessary technical information becomes available.

Groundwater quality has been impacted by several emerging contaminants and by previously known contaminants that have undergone increased regulatory concern. Emerging contaminants, including N-nitrosodimethylamine (NDMA), disinfection byproducts such as trihalomethanes, haloacetic acids, bromate, and chlorite, endocrine disruptors, and pharmaceutically active compounds, may be present in sanitary wastewater, recycled water, imported water, and any other water source that receives sanitary wastewater. Emerging contaminants may pose a threat to groundwater quality when such waters are used for artificial recharge or are otherwise intentionally infiltrated. Other contaminants of concern affecting groundwater quality that are of concern include nitrate, total dissolved solids, perchlorate, solvent stabilizers (such as 1,4-dioxane), arsenic, and hexavalent chromium.

4.26.4 Groundwater Protection Issues

Groundwater protection studies conducted by Water Board staff identified several key groundwater protection issues and are summarized below.

4.26.4.1 Vertical Conduits

Vertical conduits can provide pathways for the migration of surface pollution or shallow groundwater pollution into deeper water bearing zones. Pollutants that enter groundwater through vertical conduits circumvent the natural migration process, which protects groundwater by filtering and other natural attenuation processes. Numerous agricultural and domestic wells installed in the Region have been abandoned or covered by subsequent development. Identification and proper destruction of these potential conduits is critical to include in any groundwater protection program.

4.26.4.2 Horizontal Conduits/Sanitary Sewer Leaks to Groundwater

Horizontal conduits also serve to spread contamination by providing preferential pathways for migration of contaminants and contaminated groundwater. Storm drain systems and their construction backfill can be significant pathways for migration of contaminated shallow groundwater to water bodies where the storm drains discharge. Similar protocols should be followed for investigating horizontal conduits as for vertical conduits. A horizontal conduit study should be conducted at all sites where releases of toxic or hazardous materials are documented and before development or new construction begins at sites where toxic or hazardous materials have been used or stored. This is particularly important at or near dry cleaners or other operations where chlorinated solvents have been used.

Sanitary sewer lines may also allow pollutants to migrate to groundwater. Exfiltration is leakage from sanitary sewer lines into the subsurface and, in most cases, into surrounding groundwater. This phenomenon usually occurs in areas where the water table is below the sewer line. Leaking sewer lines can introduce pathogens into surrounding groundwater. Of more significance are chemicals transported in sewer lines that are released and migrate to and affect both shallow and deeper aquifers. The most significant historical impacts of leaking sewer lines are often associated with dry cleaning operations and the use of chlorinated solvents in electronics industries, such as wafer fabricators, plating shops, and printed circuit board shops.

4.26.4.3 Groundwater-Surface Water Interactions

Nearly all surface water features (streams, lakes, reservoirs, wetlands, and estuaries) interact with groundwater. Several issues have been identified that simultaneously affect the quality and

quantity of surface water and groundwater due to the dynamic relationship between the two. The effects of these issues on water quality and quantity must be understood in order to develop effective water resource management strategies. These issues include the effect of surface water diversion and groundwater withdrawal on creek and riparian habitat, water quality, surface water infiltration to groundwater (e.g., recharge and stormwater infiltration), groundwater discharge to surface water (e.g., plume discharges), and changing land use (as it affects runoff and recharge).

4.26.4.4 Saltwater Intrusion

Saltwater from San Francisco Bay and adjacent salt ponds has intruded freshwater-bearing aquifers in the Niles Cone, Santa Clara Valley, and San Mateo Plain basins. In both the Niles Cone and Santa Clara Valley basins, local agencies have implemented measures to prevent saltwater intrusion. The threat of saltwater intrusion in the Niles Cone is primarily due to the basin's proximity to San Francisco Bay and the large system of salt ponds that operate along the Bay's margin. In Santa Clara County, land subsidence, resulting from historical pumping that lowered the water table, has caused the lower reaches of streams and rivers to be invaded by saline tidal waters, increasing salinity in shallow groundwater. Land subsidence is no long occurring in Santa Clara Valley.

4.26.4.5 Tracking Institutional Controls

Due to the difficulty of accomplishing rapid cleanup at most sites, it is usually necessary to manage site contamination to avoid or minimize exposure pending attainment of cleanup standards. Risk management measures include engineering controls (such as slurry walls or engineered caps) and institutional controls (such as notifications to site occupants or deed restrictions prohibiting sensitive land uses). Because risk management measures usually need to remain effective for many years, their effective implementation needs to be tracked and enforced. At issue is how best to do this. The solution will involve some combination of oversight by the Water Board or other cleanup oversight agency, the local permitting agency, and the discharger.

4.26.5 Sediment

Sediments in the larger Estuary are both sources and sinks of pollutants. Under the Bay Protection and Toxic Cleanup Program in 1999, The Water Board completed a detailed assessment of (a) the levels of pollutants in sediment throughout the Bay, and (b) the risks and benefits of cleaning or otherwise managing existing hot spots.

Pollutant transport associated with sediments is also the subject of numerous studies, many of which are supported by the Water Board. The dynamics of sediment movement, uptake of pollutants through the benthic food web, measurement of pollutant levels on suspended material, and food web models associated with TMDL projects are examples of such studies.

Finally, the environmental effects associated with the disposal or reuse of Estuary sediments have been extensively investigated within the context of the Water Board's dredging management program. As part of this effort, the Water Board has supported detailed research on developing sediment toxicity tests and sediment quality objectives.

4.26.6 National "Portfields" Initiative

The U.S. EPA, National Oceanic and Atmospheric Administration (NOAA), and a number of other federal agencies announced the "Portfields" initiative in 2003. This effort is a renewed focus on revitalizing the nation's port communities to protect the coastal environment and restore or maintain economic vitality. Many waterfront areas have suffered as waterfront-manufacturing

industries changed their interests or went abroad. Abandoned properties with perceived contamination can prevent redevelopment, and local communities lose jobs and other economic benefit. Businesses that are today seeking viable waterfront lands for manufacturing, shipping, and tourism can benefit from Portfields revitalization projects. There are significant waterfront industrial areas in the Region that have undergone redevelopment, such as the Port of Oakland and Mission Bay, and more are expected as federal agencies direct funding to Brownfield project proponents in port areas.

4.26.7 Hydromodification

Hydromodification is a general term that encompasses effects of projects on the natural hydrologic, geochemical and physical functions of streams and wetlands that maintain or enhance water quality. Regional Water Boards use this term to describe an alteration away from a natural state of stream flows or the beds or banks of rivers, streams, or creeks, including ephemeral streams, which results in hydrogeomorphic changes. Protecting beneficial uses within the Region consistent with the federal Clean Water Act and the Porter-Cologne Act requires careful consideration of projects that result in hydrogeomorphic changes and related adverse impacts to the water quality and beneficial uses of waters of the State.

An increasing number of Water Board regulatory actions pertain to the proposed hydromodification of stream and river systems in the Region. These actions include water quality certifications or waste discharge requirements for projects that apply for Clean Water Act Section 401 Certification, total maximum daily loads (TMDLs) for sediments and nutrients in some of the Region's streams, and requirements for municipal stormwater management programs to develop Hydromodification Management Plans. Additionally, many of the grants for clean water awarded under voter-approved bond measures and managed by Water Board staff involve restoration proposals on various components of stream systems. To ensure protection of streams through its regulatory and grant programs, and increase efficiency of the application process, Water Board staff developed a technical reference circular (Circular) in 2003, entitled, "A Primer on Stream and River Protection for the Regulator and Program Manager." The purpose of the Circular is to help various agency staff and permit applicants recognize the linkages between water quality and the good physical conditions of stream channels. The Water Board will consider amending the water quality standards and implementation program to clarify the dependence of water quality and beneficial uses on the functions and physical characteristics of water bodies.

FIGURES

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CHAPTER 5: PLANS AND POLICIES

In addition to the Water Quality Control Plan (Basin Plan), many other plans and policies direct San Francisco Bay Regional Water Quality Control Board (Water Board) actions or clarify the Water Board's intent. The following pages describe numerous State Water Resources Control Board (State Water Board) plans and policies and Water Board policies.

All of these policies may be revised periodically. Contact the State Water Board and the Water Board for further information.

5.1 STATE WATER BOARD PLANS AND POLICIES

STATE AND REGIONAL WATER BOARDS WATER QUALITY COORDINATING COMMITTEE — RESOLUTION NO. 68-1

By adopting the Resolution, the Water Board approved a State and Regional Water Boards Coordinating Committee for the purpose of (1) coordinating and exchanging technical and administrative information; (2) augmenting staff support to the Water Quality Advisory Committee of the State Water Board; and (3) recommending action to be taken on water quality programs.

ANTIDEGRADATION POLICY — RESOLUTION NO. 68-16

The "Statement of Policy with Respect to Maintaining High Quality of Waters in California," known as the Antidegradation Policy, adopted in 1968, requires the continued maintenance of existing high quality waters. It provides conditions under which a change in water quality is allowable. A change must:

- Be consistent with maximum benefit to the people of the State,
- Not unreasonably affect present and anticipated potential beneficial uses of water, and
- Not result in water quality less than that prescribed in water quality control plans or policies.

STATE POLICY FOR WATER QUALITY CONTROL

The "State Policy for Water Quality Control", adopted in 1972, declares the State Water Board's intent to protect water quality through the implementation of water resources management programs. It serves as the general basis for subsequent water quality control policies.

POLICY REGARDING WATER RECLAMATION — RESOLUTION NO. 77-1

This resolution adopted in 1977 requires the State and Regional Water Boards to encourage water recycling projects for beneficial use using wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds. The resolution also specifies using recycled water to replace or supplement the use of fresh water or better water quality water, and to preserve, restore, or enhance in-stream beneficial uses, including fish, wildlife, recreation and esthetics associated with any surface water or wetlands.

BAYS AND ESTUARIES POLICY — RESOLUTION NOS. 74-43 AND 95-84

The "Water Quality Control Policy for the Enclosed Bays and Estuaries of California" (Bays and Estuaries Policy), adopted in 1974 and amended in 1995, provides water quality principles and guidelines for the prevention of water quality degradation and the protection of beneficial uses of waters.

THERMAL PLAN (1975)

The “Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California” (known as the Thermal Plan), adopted in 1972 and amended in 1975, specifies water quality objectives, effluent quality limits, and discharge prohibitions related to elevated temperature waste discharges to interstate waters, enclosed bays, and estuaries.

POWERPLANT COOLING POLICY — RESOLUTION NO. 75-58

The “Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling” (Powerplant Cooling Policy), adopted in 1975, specifies the State Water Board’s position on powerplant cooling, specifying that fresh inland waters should be used for cooling only when other alternatives are environmentally undesirable or economically unsound.

POLICY ON DISPOSAL OF SHREDDER WASTE — RESOLUTION NO. 87-22

In 1987, the State Water Board adopted this policy that describes specific conditions to be enforced by the Regional Water Boards with regards to disposal of mechanically destructed car bodies, old appliances, or other similar castoffs at landfills.

POLICY REGARDING THE UNDERGROUND STORAGE TANK PILOT PROGRAM — RESOLUTION NO. 88-23

This policy adopted in 1988 implements a pilot program to fund oversight of remedial actions at leaking underground storage tank sites, in cooperation with the Department of Health Services.

SOURCES OF DRINKING WATER POLICY — RESOLUTION NO. 88-63

This policy, adopted by the State Water Board in 1988 and incorporated into the Basin Plan in 1989 (Water Board Order No. 89-039), established state policy that all surface and groundwater in the state are considered suitable, or potentially suitable, for municipal or domestic supply (MUN) and should be designated for this use, with certain exceptions.

NONPOINT SOURCE MANAGEMENT PLAN — RESOLUTION NO. 88-123

The “Nonpoint Source Management Plan” adopted in 1988 outlines the objectives and framework for implementing source control programs, with an emphasis on voluntary Best Management Practices and cooperation with local governments and other agencies.

RESOURCE VALUE OF TREATED GROUNDWATER — RESOLUTION NO. 89-21

The State Water Board, in approving the Water Board’s guidelines for the disposal of extracted groundwater from groundwater clean-up projects, urges the Water Board to recognize the resource value of treated groundwater and to maximize its utilization for the highest beneficial uses for which applicable water quality standards can be achieved.

OCEAN PLAN — RESOLUTION NO. 90-27

The “Water Quality Control Plan for Ocean Waters of California” (Ocean Plan) adopted in 1990 establishes beneficial uses and water quality objectives for waters of the Pacific Ocean adjacent to the California coast outside of enclosed bays, estuaries, and coastal lagoons. The Ocean Plan prescribes effluent quality requirements and management principles for waste discharge and specifies certain waste discharge prohibitions.

POLLUTANT POLICY FOR SAN FRANCISCO BAY AND THE DELTA — RESOLUTION NO. 90-67

In 1990, the State Water Board adopted the “Pollutant Policy Document,” which identifies and characterizes the pollutants of greatest concern in the Bay-Delta Estuary. This policy requires implementation of a mass emission strategy; a monitoring and assessment program; and strategies for discharges from boat yards, drydock facilities, and dredge disposal practices. In 1990, the Water Board passed a resolution directing implementation of the Pollutant Policy.

POLICIES AND PROCEDURES FOR INVESTIGATION AND CLEANUP AND ABATEMENT OF DISCHARGES — RESOLUTION NOS. 92-49 AND 96-79

This policy defines the goal of pollution cleanup and abatement as achieving the best quality of water that is reasonable. In certain cases where it is not reasonable to restore water quality to background levels, case-by-case clean-up levels may be specified, subject to the water quality provisions of the Basin Plan, beneficial uses of the waters, and maximum benefit to the people of the state. The State Water Board may determine that establishment of a containment zone is appropriate and consistent with the maximum benefit to the people of the State if applicable requirements contained in the Policy are satisfied.

DEPARTMENT OF DEFENSE AND STATE MEMORANDUM OF AGREEMENT 1992

In 1992, the State signed a cooperative agreement with the Department of Defense, Defense-State Memorandum of Agreement (DSMOA). The Deparment of Toxic Substances Control (DTSC) acts as the State's agent. Both the State and Regional Water Boards coordinate with DTSC to allocate agency responsibility and funding and establish procedures under which site investigation and cleanup will proceed, decisions will be made, and disputes will be resolved.

CALIFORNIA WETLANDS CONSERVATION POLICY (EXECUTIVE ORDER W-59-93)

This policy, adopted in 1993, established state guidelines for wetlands conservation. The primary goal is to ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage in California.

POLICY FOR REGULATION OF DISCHARGES OF MUNICIPAL SOLID WASTE — RESOLUTION NO. 93-62

Adopted in 1993, this policy directs the Regional Water Boards to amend waste discharge requirements for municipal solid waste landfills to incorporate pertinent provisions of the federal "Subtitle D" regulations under the Resource Conservation and Recovery Act (RCRA).

DELTA PLAN — RESOLUTION NO. 95-24

The “Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh” (Delta Plan), adopted in 1978, and Water Rights Decision No. 1485 designate beneficial uses and establish water quality (salinity) and flow standards to protect the beneficial uses in State waters from the large scale water operations under the State Water Project and Central Valley Project. In 1991, the State Water Board adopted the Water Quality Control Plan for Salinity, which supersedes the 1978 Delta Plan. The 1991 Plan does not establish Delta outflow standards.

In 1995, the State Water Board adopted Resolution No. 95-24 updating the 1991 Delta Plan. The Bay-Delta Plan protects the same beneficial uses that were protected by the 1991 Plan. The definitions of the beneficial uses, however, were changed non-substantively to ensure consistency with the State Water Board's policy.

MEMORANDUM OF AGREEMENT (MOA) BETWEEN THE DEPARTMENT OF HEALTH SERVICES AND THE STATE WATER BOARD ON USE OF RECLAIMED WATER (1996)

This MOA is intended to assure that the respective authority of DHS, the State Water Board, and the Regional Water Boards relative to use of recycled water will be exercised in a coordinated and cohesive manner to eliminate overlap of activities, duplication of effort, gaps in regulation, and inconsistency of action. It provides an important coordination role in the Water Board's recycled water regulation and resulted in the Water Board developing its General Water Reuse Permit (Order 96-011) and recycled water program.

POLICY FOR THE IMPLEMENTATION OF TOXICS STANDARDS FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF CALIFORNIA (SIP) — RESOLUTION NOS. 2000-0015 AND 2000-0030

The State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan, or SIP) in 2000. U.S. EPA subsequently approved all aspects of the SIP, except the TMDL Compliance Schedule provision. The SIP contains implementation provisions for 126 priority toxic pollutant criteria found within the National Toxics Rule, the California Toxics Rule and for priority pollutant objectives found in Basin Plans. The SIP applies to discharges of toxic pollutants and allows for a standardized approach for permitting, maintaining statewide consistency.

THE WATER QUALITY ENFORCEMENT POLICY — RESOLUTION NO. 2017-0020

The primary goal of the Enforcement Policy is to create a framework for identifying and investigating instances of noncompliance, for taking enforcement actions that are appropriate in relation to the nature and severity of the violation, and for prioritizing enforcement resources to achieve maximum environmental benefits.

COOPERATIVE AGREEMENT WITH DEPARTMENT OF NAVY FOR REGULATORY OVERSIGHT AT NAVAL FACILITIES — RESOLUTION NO. 2003-0043

The Department of Navy and the State Water Board agreed to remove the remaining Navy facilities from the DSMOA and place those facilities into the Navy Cost Recovery program.

POLICY FOR IMPLEMENTATION AND ENFORCEMENT OF THE NONPOINT SOURCE POLLUTION CONTROL PROGRAM (2004)

This policy adopted in 2004 is designed to assist all responsible and/or interested parties in understanding how the State's nonpoint source pollution (NPS) water quality requirements will be implemented and enforced.

WATER QUALITY CONTROL POLICY FOR DEVELOPING CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST — RESOLUTION NO. 2004-0063

This policy adopted in 2004 describes the process by which the State and Regional Water Boards will comply with the listing requirements of Section 303(d) of the federal Clean Water Act. The objective of the policy is to establish a standardized approach for developing California's Section 303(d) water body list in order to achieve water quality standards and maintain beneficial uses in California's surface waters.

MEMORANDUM OF AGREEMENT BETWEEN DTSC, STATE WATER BOARD, WATER BOARDS, AND CAL/EPA FOR THE OVERSIGHT OF INVESTIGATION AND CLEANUP ACTIVITIES AT BROWNFIELD SITES (2005)

The purpose of the Brownfield Memorandum of Agreement (MOA) is to improve coordination between the Department of Toxic Substances Control (DTSC), the State Water Board and the Regional Water Boards regarding the oversight of cleanup activities at Brownfield sites. The MOA was developed in 2005 to ensure effective and expeditious cleanup of Brownfield sites in a manner that is protective of both public health and safety and the environment.

WATER QUALITY CONTROL POLICY FOR SITING, DESIGN, OPERATION, AND MAINTENANCE OF ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS POLICY)

The Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy), Resolution No. 2012-0032, was adopted by the State Water Resources Control Board on June 19, 2012. This Policy implements California Water Code, Chapter 4.5, Division 7, sections 13290-13291.7, and establishes statewide regulations and standards for permitting and operation of onsite wastewater systems. The OWTS Policy specifies criteria for existing and new onsite systems and establishes a conditional waiver of waste discharge requirements for onsite systems that comply with the policy.

5.2 WATER BOARD PLANS AND POLICIES

Plans and policies adopted by the Water Board are classified under the following headings for easy reference.

Resolutions adopted prior to the revision date of the 1995 Basin Plan are superceded unless specifically incorporated by reference into the plan. A discussion of each of the current Water Board Policies is under the appropriate heading.

- Cooperative Agreements
- Regional Monitoring, Data Use, and the Aquatic Habitat Program
- Discharger Reporting and Responsibilities
- Delta Planning
- Dredging
- Nonpoint source pollution
- Onsite Waste Dispersal and Waste Discharge
- Shellfish
- Vessel Wastes
- Water Recycling
- Wetlands
- Groundwater

5.2.1 COOPERATIVE AGREEMENTS

Many different local, state, and federal agencies oversee activities that affect the beneficial uses of the Region. To ensure that these activities are coordinated to the greatest possible degree, the Water Board enters into formal cooperative agreements. These agreements indicate the specific issue area of concern to both agencies and may also describe processes by which coordination will take place. Agreements regarding general coordination are listed below. Others are listed under specific issue areas.

MEMORANDUM OF UNDERSTANDING WITH THE DEPARTMENT OF FISH AND GAME — 1966

The Water Board has no means to conduct surveillance of ocean waters within its jurisdiction. Under the terms of this MOU, the Department of Fish and Game (DFG) agrees to notify the Water Board of any suspected violations of the Water Board's requirements for ocean disposal.

COORDINATION WITH THE SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION (BCDC)

In 1966, the Water Board stated its intent to cooperate with the San Francisco Bay Conservation and Development Commission (BCDC) to the fullest extent necessary to ensure the protection of the San Francisco Bay shoreline and water quality (Resolution No. 737). In 1970, the Water Board urged BCDC to (1) require wastes resulting from projects permitted by BCDC to be connected to existing sewer lines; and (2) disapprove or temporarily withhold approval of any project that would cause added waste loading on a community sewerage system that is not meeting Board waste discharge requirements (Resolution No. 70-19).

LOCAL AGENCY FORMATION COMMISSIONS — RESOLUTION NO. 73-17

This Resolution describes actions that the Water Board and these commissions could take that would result in a coordinated effort to prevent and abate pollution.

MEMORANDUM OF UNDERSTANDING BETWEEN THE DEPARTMENT OF FISH AND GAME, STATE ATTORNEY GENERAL'S OFFICE, AND THE WATER BOARD ON NEGOTIATED SETTLEMENTS OF OIL SPILLS TO SAN FRANCISCO BAY FROM VESSELS TO SHORE FACILITIES DURING TRANSFER OPERATIONS

Due to the high frequency of oil spill events during the late 1970s, a MOU was developed between the Department of Fish and Game, the State Attorney General's Office and the Water Board to expedite enforcement of such spills. The MOU outlined a negotiated settlement process that emphasized industry preventative measures, a cleanup plan, and operational changes. In 1980 the Water Board contracted for a study and report to recommend technically feasible operational standards at marine transfer facilities in San Francisco Bay. The resulting 1980 report titled "Oil Pollution Prevention and Control in the San Francisco Bay Area" was instrumental in changing the oil industry's operational procedures and a 90% reduction in oil transfer incidents over a two-year period.

MEMORANDUM OF UNDERSTANDING WITH THE COUNCIL OF BAY AREA RESOURCE CONSERVATION DISTRICTS (RCDS) — 1980

The purpose of this MOU is to combine the erosion control expertise of the Resource Conservation Districts (RCDs) with the regulatory authority of the Water Board to enforce erosion control measures. This action will increase the Water Board's ability to identify and correct erosion control problems associated with construction or agricultural activities.

WATER QUALITY MANAGEMENT: MOU WITH BCDC, STATE BOARD, AND THE WATER BOARD — NO. 87-154

This MOU specifies a coordination process for the three agencies to implement water quality goals mandated by State and federal legislation and states the Water Board's support in concept for legislation that would require a project applicant to obtain all discretionary approvals from the Water Board before filing its BCDC permit application.

POLICY TO PROMOTE COLLABORATION BETWEEN BAY AREA CLEAN WATER AGENCIES AND THE WATER BOARD ON POLLUTION PREVENTION — RESOLUTION NO. 2003-096

The Water Board and the Bay Area Clean Water Agencies (BACWA) agreed to pollution prevention guidelines and guiding principals in order to implement the requirements of Water Code Section 13263.3 and the Policy for Implementation of Toxic Substances for Inland Surface Waters, Enclosed Bays, and Estuaries (State Implementation Plan).

5.2.2 REGIONAL MONITORING, DATA USE, AND THE AQUATIC HABITAT PROGRAM

USE OF DATA COLLECTED BY THE AQUATIC HABITAT PROGRAM—RESOLUTION NO. 82-1

This resolution states how data collected by the Aquatic Habitat Program will be used and describes the Water Board's intent to seek the assistance of the University of California in data quality control and interpretation. Possible uses of data include: (a) revising water quality objectives; (b) relaxing or tightening effluent requirements; (c) enforcement action; (d) dissemination of information to the public; (e) determining sources of pollution; and (f) determining assimilative capacities of receiving waters.

MODIFIED GUIDELINES FOR THE EFFLUENT TOXICITY CHARACTERIZATION PROGRAM—RESOLUTION NO. 91-083

This resolution modifies the requirements of the Effluent Toxicity Characterization Program (adopted as a Basin Plan amendment in 1986) to make them more cost effective and responsive to the region's biomonitoring needs after several years' experience with the program.

REGIONAL MONITORING PROGRAM—RESOLUTION 92-043

In this resolution, the Water Board endorses the development and implementation of a comprehensive, Estuarywide monitoring program that will regularly collect information on concentrations of pollutants in water, sediment, and biota.

5.2.3 DISCHARGER REPORTING AND RESPONSIBILITIES

RESPONSIBILITY OF DISCHARGERS FILING TECHNICAL REPORTS—RESOLUTION NO. 67-3

This resolution requires those dischargers filing technical reports to submit a letter of transmittal signed by the discharger's senior administrative officer with reports involving formal time schedules and cease-and-desist orders.

SELF-MONITORING REPORTS—RESOLUTION NO. 73-16

With this resolution, the Water Board specified the format and requirements for filing self-monitoring reports.

CONTINGENCY PLANS—RESOLUTION 74-10

By adopting this resolution, the Water Board required dischargers to develop and implement contingency plans to assure continuous operation of facilities for the collection, treatment, and disposal of wastes.

WAIVING WASTE DISCHARGE REQUIREMENTS FOR SPECIFIC TYPES OF DISCHARGE—RESOLUTION NO. 83-3

The Water Board waived the requirement of filing report of waste discharge for specific types of waste discharge that have a relatively insignificant adverse effect on water quality.

CATEGORICAL EXEMPTION TO THE POLICY FOR IMPLEMENTATION OF TOXICS STANDARDS FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF CALIFORNIA FOR DISCHARGES FROM DRINKING WATER SYSTEMS IN THE SAN FRANCISCO BAY REGION - RESOLUTION R2-2008-0101

The Water Board will grant exceptions to discharges from drinking water systems from meeting the priority pollutant objectives for copper and trihalomethanes when necessary to implement control measures conducted to fulfill statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code.

5.2.4 DELTA PLANNING

SAN LUIS DRAIN—RESOLUTION NOS. 535 (1964) AND 81-1

The Water Board prohibits discharge by the proposed drain until evidence that the discharge would not threaten beneficial uses is submitted by the dischargers. The resolution (No. 535) also directs the staff to determine the beneficial uses of the proposed receiving waters and the conditions necessary for their protection. In 1981 (No. 81-1), the Board requested that the State Water Board, in close coordination with the Water Board, assume the lead role in the development, revision, renewal, and enforcement of waste discharge requirements for the proposed San Luis Drain.

PERIPHERAL CANAL—RESOLUTION NO. 80-6

In 1980, the Board expressed its concern regarding the adverse impacts on water quality of certain projects authorized by Senate Bill 200 and endorsed protective measures for the Delta, Suisun Bay, and San Francisco Bay.

5.2.5 DREDGING

SCREENING CRITERIA AND TESTING REQUIREMENTS FOR USE OF SEDIMENT FOR WETLAND CREATION AND OTHER UPLAND USES—RESOLUTION NO. 92-145

In this resolution, the Water Board established screening criteria to be used to evaluate the appropriateness of using dredged material for beneficial purposes.

EVALUATION FRAMEWORK FOR DREDGED MATERIAL PROPOSED FOR IN-BAY DISPOSAL AND DREDGED MATERIAL MANAGEMENT OFFICE – RESOLUTION NO. 01-065

This resolution, (1) adopted the federal guidance issued by the USACE and the U. S. EPA in 1998 for evaluating the suitability of dredged material for disposal at aquatic disposal sites like the in-Bay disposal sites: *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual, Inland Testing Manual* (ITM), as well as the guidance for implementing the ITM locally, which was developed jointly by Water Board staff, USACE San Francisco District, U. S. EPA Region IX, San Francisco Bay Conservation and Development Commission, and State Lands Commission through the multi-agency Dredged Material Management Office (DMMO); and (2) recognized the success of the DMMO in providing a coordinated permitting process for dredging and disposal projects in the Bay area and as an important component in implementing the Long Term Management Strategy for Disposal of Dredged Material in the San Francisco Bay Region (LTMS), and directed staff to continue to participate in the DMMO.

5.2.6 NONPOINT SOURCE POLLUTION

CONTROL OF WATER POLLUTION FROM CONSTRUCTION OF DAMS—1953

The Water Board adopted this motion to reduce the possibility of erosion during the construction of dams. For small projects not likely to cause erosion problems, the motion recommends that the

Executive Officer send a letter to the responsible person advising him or her to take appropriate precautionary actions. For larger projects, the responsible person is required to submit a report of waste discharge.

SURFACE RUNOFF—RESOLUTION NO. 78-5

In this resolution, the Water Board acknowledges surface runoff as a significant source of pollution in the San Francisco Bay Basin and resolves to take appropriate actions (e.g., best management practices) to reduce pollution loads from surface water runoff.

EROSION CONTROL FROM CONSTRUCTION ACTIVITIES—RESOLUTION NO. 80-5

The Water Board, in this resolution, recognizes the seriousness of impacts on beneficial uses related to construction activities. The Water Board identifies local governments as having the responsibility for controlling erosion from development activities and for adopting and administering erosion control ordinances. The Water Board also stated its intent to monitor the progress of local governments in their adoption and implementation of effective erosion control programs.

DAIRY WASTES—RESOLUTION NOS. 74-11 AND 77-5

In 1974, the Water Board passed Resolution No. 74-11, which prohibits the discharge of manure into a watercourse subject to flooding. This requirement augmented the State Water Board's "Minimum Guidelines for Animal Waste Management." Full compliance was initially scheduled to occur by September 1977, but was extended to 1978 for dairies outside the Tomales Bay and Walker Creek watersheds because of a severe drought (77-5).

INDUSTRIAL STORM WATER DISCHARGES—RESOLUTION NO. 92-118

In this resolution, the Water Board authorized additional monitoring and reporting requirements for dischargers holding industrial stormwater NPDES permits in cases where the watershed is known to be adversely impacted by storm water discharges, the pollution potential of the discharge cannot be assessed with the minimum information, or more information will lead to more effective control mechanisms.

LIABILITY FOR PARTIES ENGAGED IN ABANDONED MINE REMEDIATION—RESOLUTION NO. 93-078

In 1993, the Water Board expressed concern regarding the incentives for cleaning up mines thought to be responsible for roughly 60% of copper loading to the Delta.

5.2.7 ONSITE WASTE DISPERSAL AND WASTE DISCHARGE

The Water Board's policy on small waste discharge systems has evolved considerably as the Bay Area has become more developed. The following section summarizes a series of resolutions regarding conditions under which the Water Board would either object to or prohibit specific activities involving small waste discharge systems.

SEPTIC, LEACHING, AND SMALL COMMUNITY SYSTEMS—RESOLUTION NO. 81 (1951)

This resolution stated the Water Board's objection to the construction and use of wells for septic effluent disposal or street runoff, except when such wells discharge into geologic formations that at no time contained water suitable for domestic, agricultural, or industrial use.

SEWER AND ONSITE SEWER DISPOSAL IN BOLINAS — RESOLUTION NOS. 85-007 AND 87-091

The Water Board indicated its support of a moratorium on new sewer connections and new onsite sewage disposal systems adopted by Marin County Board of Supervisors.

SPECIFIC PROHIBITIONS OF ONSITE DISPOSAL SYSTEMS FOR STINSON BEACH AND GLEN ELLEN (RESOLUTION NOS. 73-13 AND 73-14) AND EMERALD LAKE HILLS (RESOLUTION NO. 76-7)

These resolutions prohibited waste discharges to onsite disposal systems in the Stinson Beach (Marin County), Glen Ellen (Sonoma County), and Emerald Lake Hills and Oak Knoll Manor (San Mateo County) areas, with some exceptions to the prohibition. Resolution No. 73-13 has since been amended or clarified in Resolution Nos. 73-18, 74-5, 74-6, 77-2, 78-1, and 81-5. Resolution No. 78-1 conditionally amended the prohibition of discharge outlined in 73-13 by allowing the discharge of waste to individual leaching or percolation systems where such discharges are regulated by the Stinson Beach County Water District.

MEMORANDUM OF UNDERSTANDING WITH NAPA COUNTY REGARDING WINERY PROCESS TREATMENT AND DISPOSAL — 1982 (UPDATED IN 1992)

Under this agreement, the Water Board approved Napa County's program for monitoring winery onsite disposal.

5.2.8 SHELLFISH

POLICY STATEMENT WITH RESPECT TO THE IMPLEMENTATION OF TIME SCHEDULES FOR FACILITIES TO PROTECT SHELLFISH — RESOLUTION NO. 74-14

In this resolution the Water Board directed the Executive Officer to determine whether or not dischargers were providing or would be providing adequate protection to allow for sport harvesting of shellfish. The Water Board also stated its intent to adopt a time schedule for protection (in conformance with staff guidelines).

SHELLFISH PROGRAM — RESOLUTION NOS. 78-8 AND 83-10

The first resolution directs the Executive Officer to develop and implement a program to determine the feasibility of opening shellfish beds for recreational use. The second resolution describes a phased shellfish protection program in which discharge limits for dry-season runoff to Anza Lagoon and other South Bay sites would be considered. In addition, the Water Board urged BCDC to consider ways to eliminate or minimize potential dry season runoff from planned projects and directed review of discharger self-monitoring studies to determine when additional data are necessary to avoid effects on shellfish beds.

DESIGNATION OF TOMALES BAY UNDER THE 1993 SHELLFISH PROTECTION ACT — RESOLUTION NO. 94-018

In this resolution, the Water Board identified Tomales Bay as an area where commercial shellfishery is threatened and authorized the formation of a technical advisory committee to investigate and develop a remediation strategy.

5.2.9 VESSEL WASTES

VESSEL SEWAGE DISCHARGE POLICY — RESOLUTION NO. 665 (1965)

The Water Board, in this resolution, expressed concern over the discharge of untreated sewage from certain vessels over which it does not have jurisdiction. The Board suggested that the discharge of vessel wastes be regulated by the federal government.

URGING BCDC TO REQUIRE SHORESIDE VESSEL WASTE FACILITIES — RESOLUTION NO. 70-1 (1970)

This resolution urged BCDC to require applicants for new or expanded marinas or port facilities to provide the following as permit conditions: (I) dockside sewers; (2) pump_out facilities at marinas with disposal to shoreside sewage facilities; and (3) adequate restroom facilities.

VESSEL WASTE DISCHARGES TO SAN FRANCISCO BAY — RESOLUTION NO. 70-65

Three recommendations were made in this resolution: (1) that owners of marinas provide dockside sewerage facilities and that owners of vessels with sanitary facilities install holding tanks; (2) that the State Water Board request the federal government to prohibit discharges of vessel wastes; and (3) that the legislature adopt legislation that would require waste holding tanks on vessels with sanitary facilities to transport the wastes to treatment plants.

VESSEL WASTE DISCHARGE INTO RICHARDSON BAY — RESOLUTION NO. 91-118

In this resolution, the Water Board found that the Richardson Bay Regional Agency's Implementation Plan and associated local ordinances will provide a mechanism for enforcing the prohibition against vessel waste discharge in the area.

5.2.10 WATER RECYCLING

WATER REUSE STUDY — RESOLUTION NO. 79-2

In this resolution, the Water Board stated its position regarding Phase II of the San Francisco Bay Area Water Reuse Study. The Water Board acknowledged the importance of using recycled water to meet California's future water supply needs and commented on the economics of the delivery of recycled water to users.

5.2.11 WETLANDS

USE OF WASTEWATER TO CREATE, RESTORE, AND ENHANCE MARSHLANDS — RESOLUTION NO. 94-086

These resolutions describe the Water Board's policy regarding the use of wastewater to create, restore, maintain, and enhance marshlands. In general, the policy supports the use of wastewater to support new wetland habitat, under the condition that beneficial uses established are fully protected.

USE OF CONSTRUCTED WETLANDS FOR URBAN RUNOFF POLLUTION CONTROL — RESOLUTION NO. 94-102

In this resolution, the Water Board expressed support for the construction of new wetland areas for the purpose of reducing pollutant loading from urban runoff, under certain conditions.

5.2.12 GROUNDWATER

DISPOSAL OF EXTRACTED GROUNDWATER FROM CLEAN-UP PROJECTS — RESOLUTION NO. 88-160

In this resolution, the Water Board established priorities for the disposal of water extracted from groundwater cleanup sites. The first priority is to reclaim effluents to the extent reclamation is technically and economically feasible. If this is not possible, then discharge to a municipal treatment plant was determined to be in the public interest. If neither reclamation nor discharge to a municipal plant is feasible, the Board will issue NPDES permits authorizing discharge from these sites.

CHAPTER 6: SURVEILLANCE AND MONITORING

6.1 REGIONAL MONITORING PROGRAM

The effectiveness of a water quality control program requires information supplied by comprehensive surveillance and monitoring of water, sediment, aquatic resources, and the human activities that have the potential to impact beneficial uses. The following section describes the monitoring programs that together provide high quality, comprehensive scientific information on water quality in the Region. The Water Board uses information produced by the programs described below to satisfy the requirements of Sections 104, 106, 208, 301, 303, 304, 307, 308, 314, and 402 of the federal Clean Water Act and applicable portions of the state's Porter-Cologne Water Quality Control Act.

The Regional Monitoring Program forms the core of water quality, sediment quality, and tissue (including bivalves and fish) monitoring in the Estuary. Historically, water quality in the Region was tracked by Water Board and State Water Board research and monitoring programs and numerous studies carried out by other interested state, federal, and local agencies.

From 1989 to 1992, the Water Board developed and implemented pilot programs for the San Francisco Estuary Regional Monitoring Program (RMP), through the Bay Protection and Toxic Cleanup Program (BPTCP) and U.S. EPA grants. In 1993, the RMP was formally established to provide integrated, comprehensive, and systematic information on water quality in the Region. Its goal is to evaluate the effectiveness of the Water Board's water quality program in meeting Basin Plan objectives, including protection of beneficial uses in the Estuary.

The Regional Monitoring Program's specific objectives are to:

1. Describe the distribution and trends of pollutant concentrations in the Estuary;
2. Project future contaminant status and trends using best understanding of ecosystem processes and human activities;
3. Describe sources, pathways, and loading of pollutants entering the Estuary;
4. Measure pollution exposure and effects on selected parts of the Estuary ecosystem (including humans);
5. Compare monitoring information to relevant benchmarks, such as total maximum daily load (TMDL) targets, tissue screening levels, water quality objectives, and sediment quality objectives; and
6. Effectively communicate information from a range of sources to present a more complete picture of the sources, distribution, fate, and effects of pollutants and beneficial use attainment or impairment in the Estuary ecosystem.

Every five years, an outside group of scientific experts reviews the RMP to assure it is fulfilling its objectives and providing useful and timely information regarding the Estuary. In 2002, the RMP status and trends component was revised to incorporate probabilistic monitoring. The 2002-2004 sample locations shown in Figure 6-1 were selected according to a probabilistic design. Each year sites are randomly selected and will be in different locations than shown in Figure 6-1. The list of parameters is presented in Table 6-1.

The RMP participants, including dredgers, stormwater agencies, and municipal and industrial dischargers that hold Water Board permits for waste discharge into the Estuary, fund the RMP as a

requirement of their permits. The San Francisco Estuary Institute (SFEI), an independent nonprofit organization, administers and manages the program under a Memorandum of Understanding with the Water Board.

The RMP, through SFEI, produces an Annual Monitoring Report that summarizes the current state of the Estuary with regard to pollution, a summary report (Pulse of the Estuary), a quarterly newsletter, technical reports that document specific studies and synthesize information from diverse sources, and journal publications that disseminate RMP results to the world's scientific community.

6.2 SURFACE WATER AMBIENT MONITORING PROGRAM

In January 2000, the Surface Water Ambient Monitoring Program (SWAMP) was proposed in a Report to the Legislature to integrate existing water quality monitoring activities of the State and Regional Water Boards, and to coordinate with other monitoring programs. Water Code Section 13192 required the State Water Board to assess and report on the state monitoring programs and prepare a proposal for a comprehensive monitoring program. Water Code Section 13191 requires the State Water Board to convene an Advisory Group to assist in the evaluation of program structure and effectiveness, as it relates to the implementation of the requirements of Clean Water Act Section 303 (d), applicable federal regulation, and monitoring and assessment programs.

Ambient monitoring refers to any activity in which information about the status of the physical, chemical and biological characteristics of the environment is collected to answer specific questions about the status and trends in those characteristics. For the purposes of SWAMP, ambient monitoring refers to these activities as they relate to the characteristics of water quality.

SWAMP is a statewide monitoring effort designed to assess the conditions of surface waters throughout the state of California. The State Water Board administers the program. Responsibility for implementation of monitoring activities resides with the nine Regional Water Boards that have jurisdiction over their specific geographical areas of the state.

In the Region, SWAMP is targeted to water bodies not monitored by the RMP. The numerous water bodies of the Region are listed in Table 2-1. SWAMP includes physical, chemical, and biological monitoring. SWAMP's focus is on water quality assessment in watersheds. SWAMP is intended to fulfill water quality assessment reporting requirements under Clean Water Act Section 305(b), and to support Clean Water Act Section 303(d) impairment decisions in cases where there is adequate information available to meet data requirements in the State Water Board's 303(d) Listing Policy, established in September 2004. The 305b and 303d requirements for the Estuary are met through the RMP, described in Section 6.1 Regional Monitoring Program.

In 1976, the state initiated the State Mussel Watch and State Toxic Substances Monitoring Programs to regularly monitor the concentration of pollutants in the tissue of aquatic organisms. Tissue levels reflect exposure over much longer periods of time than instantaneous water column samples and provide a field-based estimate for exposure of people, fish, and wildlife to pollutants in the food chain.

The Mussel Watch Program uses resident and transplanted bivalves to monitor pollutant levels at coastal reference stations and selected sites in bays and estuaries to confirm potential toxic substance pollution. The location of bivalve sampling stations in the Region are summarized in Figure 6-2 and Table 6-2. Periodic monitoring of bivalve tissue conducted by the National Mussel Watch administered by the National Oceanic and Atmospheric Association (NOAA) and international surveys complements information from the State Mussel Watch Program.

The Toxic Substances Monitoring Program used resident fish and other aquatic organisms to monitor pollutant levels in freshwater systems throughout the state. The location and sampling history of Toxic Substances Monitoring stations in the region are summarized in Figure 6-3 and Table 6-3.

The State Mussel Watch and State Substances Monitoring Programs have been incorporated into SWAMP. The Toxicity Testing Program and Coast Fish Contamination Program have also been incorporated into SWAMP.

6.3 SACRAMENTO-SAN JOAQUIN RIVERS AND NORTHERN SAN FRANCISCO BAY ESTUARY WATER QUALITY SURVEILLANCE

Water flowing into the San Francisco Estuary from the Sacramento and San Joaquin rivers is regularly monitored by numerous agencies and programs, including the Sacramento Coordinated Water Quality Monitoring Program (in the Sacramento metropolitan area), the Department of Water Resources, the Central Valley Regional Water Quality Control Board, and the Interagency Ecological Studies Program. Conventional water quality parameters, water and suspended material chemistry, and toxicity are sampled at a network of stations located throughout the Delta and into San Pablo Bay. In addition, phytoplankton, benthic community, and beneficial use surveys are regularly conducted in this area.

The primary goals of these efforts are to: (a) assure riverine water quality meets applicable standards; (b) identify changes in water quality potentially related to the operation of the State Water Project; and (c) develop technical information that can be used to estimate mass loading of pollutants to the Estuary from riverine sources.

6.4 GROUNDWATER MONITORING NETWORKS

Groundwater monitoring networks are established in several basins in the Region. At present, there are monitoring networks in the Livermore-Amador Valley by Zone 7, Niles Cone by the Alameda County Water District (ACWD), Santa Clara Valley by the Santa Clara Valley Water District (SCVWD), Half Moon Bay Terrace by the Coastside County Water District and the Montara Water and Sanitation District), San Francisco's Westside Basin by the San Francisco Public Utilities District (SFPUC), and Napa Valley by the Napa Valley Flood Control and Water Conservation District. In order to find out the most current status of these networks, local water management agencies should be contacted directly.

In addition, the U.S. Geological Survey (USGS) and the Department of Water Resources (DWR) maintain regional monitoring networks. Typically, monitoring is conducted at least annually for general mineral quality and water levels. This well data may be of use to determine the general potability of groundwater and the status of sea water intrusion control.

The Water Board is integrating the locations of monitoring well networks into its groundwater geographic information system. The water quality data generated from the networks will assist Water Board staff in the refinement of beneficial use designations for groundwater basins.

The State Water Board has contracted the USGS and Lawrence Livermore National Laboratory (LLNL) to implement the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The primary objective of the GAMA Program is to comprehensively assess statewide groundwater quality and gain an understanding about contamination risk to specific groundwater resources. The Groundwater Quality Monitoring Act of 2001 (Sections 10780-10782.3 of the Water Code) resulted in a publicly accepted plan to monitor and assess the quality of all priority groundwater basins that

account for over 90 percent of all groundwater used in the state. The plan prioritizes groundwater basins assessment based on groundwater use.

The GAMA Program monitors groundwater from public supply wells for a broad suite of chemicals at very low detection limits, including exotic chemicals such as wastewater chemicals and pharmaceuticals. Monitoring and assessments for priority groundwater basins will be completed every ten years, with trend monitoring every three years. Monitoring reports for data collected in the Region are available at the State Water Board website.

6.5 COMPLIANCE MONITORING

A second component of the state's water quality surveillance and monitoring program relates specifically to discharges of pollutants at individual point and nonpoint sources. All entities holding Water Board discharge permits must conduct regular sampling and analysis of waste released to surface and groundwaters. They must also analyze material to be dredged. The specific chemical and physical parameters, types (i.e., toxicity tests, bioaccumulation studies, waste stream sampling, etc.), frequency, and other information requirements are determined on a case-by-case basis according to the nature of the discharge and potential environmental effects. Each permit issued by the Water Board describes the specific compliance monitoring requirements for that permit holder. Monitoring data collected by point source dischargers and nonpoint pollution control programs are used to:

- Determine compliance with and provide documentation to support enforcement of permit conditions;
- Support derivation of effluent limitations and wasteload allocations; and
- Provide information needed to relate receiving water quality to mass emissions of pollutants by dischargers.

Self-monitoring data are often supplemented by information obtained by Water Board staff during site inspections (including waste analyses) and through special studies, such as those characterizing the variability of the discharge, pollutant levels in nearby receiving water and biota, and characterization of pollutant loads attributable to urban runoff.

6.5.1 Compliance Monitoring – San Francisco Bay Mercury Human Health Objective

Compliance with the human health marine water quality objective for mercury in San Francisco Bay (Table 3-3B) will be evaluated in fish at the lengths shown below (Table 6-4). The mercury concentration in the edible portion of these five species will be averaged and compared to the human health water quality objective.

6.6 COMPLAINT INVESTIGATION

The Water Board encourages members of the public to alert it to pollutant discharge or nuisances that may impact water quality. Staff respond to each complaint, document the observed conditions, and take any necessary follow-up actions to institute appropriate corrective measures.

6.7 BIENNIAL WATER QUALITY INVENTORY

The Water Board prepares a biennial report on water quality (as required under Section 305(b) of the Clean Water Act, PL 92-500). This report includes (a) a description of the water quality of major navigable waters in the state during the preceding years; (b) an analysis of the extent to which significant navigable waters provide for the protection and propagation of a balanced population of

shellfish, fish, and wildlife and allow recreational activities in and on the water; (c) an analysis of the extent to which elimination of the discharge of pollutants is being employed or will be needed; and (d) an estimate of the environmental impact and the economic and social costs necessary to achieve the “no discharge” objective of PL 92-500, the economic and social benefits of such achievement, and an estimate of the date of such achievement. Recommendations as to the programs that must be undertaken are provided, along with estimates of the cost.

6.8 OTHER MONITORING PROGRAMS

In addition to the state’s surveillance and monitoring program, several other agencies in the Bay Area monitor water quality, including local city and county offices, federal agencies, and water supply districts. Local universities also conduct research and monitoring activities. All of these programs provide additional information and data that enhance the state’s efforts.

FIGURES

Figure 6-1: Regional Monitoring Program Sampling Stations

Figure 6-2: State Mussel Watch Program Monitoring Network

Figure 6-3: Toxic Substances Monitoring Network

TABLES

Table 6-1: Parameters Analyzed for in the Regional Monitoring Program

Table 6-2: Key to Figure 6-2: State Monitoring Network

Table 6-3: Key to Figure 6-3: State Monitoring Network

Table 6-4: Five Most Commonly Consumed Bay Fish

CHAPTER 7: WATER QUALITY ATTAINMENT STRATEGIES INCLUDING TOTAL MAXIMUM DAILY LOADS

Water Quality Attainment Strategies (WQAS) including Total Maximum Daily Loads (TMDLs) deemed necessary and appropriate to ensure attainment and maintenance of water quality standards in the Region are presented in this chapter.

7.1 REGION-WIDE WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS

7.1.1 Water Quality Attainment Strategy and TMDL for Diazinon and Pesticide-related Toxicity in Urban Creeks

The following sections establish a water quality attainment strategy and TMDL for diazinon and pesticide-related toxicity in the Region's urban creeks, including actions and monitoring necessary to implement the strategy. The term "pesticides," as used here, refers to substances (or mixtures of substances) intended for defoliating plants, regulating plant growth, or preventing, destroying, repelling, or mitigating pests that may infest or be detrimental to vegetation, humans, animals, or households, or be present in any agricultural or nonagricultural environment. The term "urban creeks," as used here, refers to freshwater streams that flow through urban areas, including incorporated cities and towns and unincorporated areas with similar land use intensities. This strategy applies to all San Francisco Bay Region urban creeks.

The numeric targets, allocations, and implementation plan described below are intended to ensure that urban creeks meet applicable water quality standards established to protect and support beneficial uses. This strategy will also reduce pesticide concentrations in the Bay resulting from urban creek flows. The effectiveness of the implementation actions, the monitoring undertaken to track progress toward meeting the targets, and the most current scientific understanding pertaining to pesticide-related toxicity will be periodically reviewed, and the strategy will be adapted as necessary to reflect changing conditions and information.

7.1.1.1 Problem Statement

In 1998, a number of the Region's urban creeks were placed on the 303(d) list of impaired waters due to toxicity attributed to diazinon. In the early 1990s, many urban creek water samples collected from selected creeks throughout the Region were toxic to aquatic organisms. Studies found that pesticides, particularly diazinon, caused the toxicity. The 303(d) listings were based on observed toxicity, diazinon detections, and similarities among the Region's urban pesticide use profiles.

When pesticide-related toxicity occurs in urban creek water, creeks do not meet the narrative toxicity objective. When pesticide-related toxicity occurs in sediment, the creeks also do not meet the narrative sediment objective. Likewise, when creek water or sediment is toxic, creeks do not meet the narrative population and community ecology objective. Urban creek waters that fail to meet these objectives are not protective of cold and warm freshwater habitats.

Although U.S. EPA phased out urban diazinon applications at the end of 2004, other pesticides may now pose potential water quality and sediment quality concerns because they are used as diazinon replacements and because pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that threaten water quality.

7.1.1.2 Numeric Targets

The numeric targets below interpret the applicable narrative objectives in terms of quantitatively measurable water quality parameters. Meeting these pesticide-related toxicity and diazinon concentration targets will protect cold and warm freshwater habitats. These targets shall be met at all urban creek locations, including those near storm drain outfalls where urban runoff enters receiving waters.

Pesticide-Related Toxicity

The toxicity targets are expressed in terms of acute toxic units (TU_a) and chronic toxic units (TU_c). The targets are as follows: pesticide-related acute and chronic toxicity in urban creek water and sediment, as determined through standard toxicity tests, shall not exceed 1.0 TU_a or 1.0 TU_c, where $TU_a = 100/NOAEC$ and $TU_c = 100/NOEC$. "NOAEC" refers to the "no observed adverse effect concentration," which is the highest tested concentration of a sample that causes no observable adverse effect (i.e., mortality) to exposed organisms during an acute toxicity test. For purposes of this strategy, "NOEC" refers to the "no observable effect concentration," which is the highest tested concentration of a sample that causes no observable effect to exposed organisms during a chronic toxicity test. NOAEC and NOEC are both expressed as the percentage of a sample in a test container (e.g., an undiluted sample has a concentration of 100%). In both cases, an observable effect must be statistically significant. For purposes of this strategy, an undiluted ambient water or sediment sample that does not exhibit an acute or chronic toxic effect that is significantly different from control samples on a statistical basis shall be assumed to meet the relevant target.

The above definitions of TU_a and TU_c apply only to ambient conditions in the context of this diazinon and pesticide-related toxicity strategy. If toxicity exists in urban creeks but pesticides do not cause or contribute to the toxicity, these targets do not apply. Moreover, the numeric toxicity targets do not limit the Water Board's authority to evaluate attainment of the narrative objectives through other appropriate means.

Diazinon

The diazinon concentration target is as follows: diazinon concentrations in urban creeks shall not exceed 100 ng/L as a one-hour average. The target addresses both acute and chronic diazinon-related toxicity.

7.1.1.3 Sources

Pesticides, including diazinon, enter urban creeks through urban runoff. Most urban runoff flows through storm drains owned and operated by the Region's municipalities, industrial dischargers, large institutions (e.g., campuses), construction dischargers, and the California Department of Transportation (Caltrans). Urban runoff contains pesticides as a result of pesticides being manufactured, formulated into products, and sold through distributors and retailers to businesses and individuals who apply them for structural pest control, landscape maintenance, agricultural, and other pest management purposes. Factors that affect pesticide concentrations in urban creeks include the amount used, the chemical and physical properties of the pesticide and its product formulation, the sites of use (e.g., landscaping, turf, or paved surfaces), and irrigation practices and precipitation. In the San Francisco Bay Region, ants are the most common pest problem for which pesticides are used. Argentine ants are an introduced species. Pesticide use by structural pest control professionals and use of products sold over-the-counter can be among the greatest contributors of pesticides in urban runoff.

7.1.1.4 Total Maximum Daily Load

The assimilative capacity of the Region's urban creeks for diazinon and pesticide-related toxicity is the amount of diazinon and pesticide-related toxicity they can receive without exceeding water quality standards. For urban creeks to assimilate diazinon and other pesticide discharges and meet water quality standards, the targets must be met. Rather than establishing a mass-based TMDL to attain the targets, this TMDL is expressed in concentration units. The TMDL is equal to the targets.

The targets rely on a conservative approach that provides an implicit margin of safety to account for any lack of knowledge concerning the relationship between the allocations and water quality. Weather and seasons affect creek flows and pesticide loads, concentrations, and toxicity. By expressing the targets in terms of toxicity and diazinon concentrations, the inherent pesticide mass loads automatically reflect seasonal and other critical conditions as creek conditions change.

7.1.1.5 Allocations

The TMDL is allocated to all urban runoff, including urban runoff associated with municipal separate storm sewer systems, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations, and are the same as the numeric targets and the TMDL.

7.1.1.6 Implementation

The cornerstone of this strategy is pollution prevention. Pesticide-related toxicity in the Region's urban creeks is to be eliminated and prevented by using pest management alternatives that protect water quality and by not using pesticides that threaten water quality. This can best be accomplished through the rigorous application of integrated pest management techniques and the use of less toxic pest control methods. The term "integrated pest management," as used here, refers to a process that includes setting action thresholds, monitoring and identifying pests, preventing pests, and controlling pests when necessary. Integrated pest management meets the following conditions:

- Pest control practices focus on long-term pest prevention through a combination of techniques, such as biological control, habitat manipulation, and modification of cultural practices;
- Pesticides are used only after monitoring indicates that they are needed;
- Treatments are made with the goal of removing only the target pest; and
- Pesticides are selected to minimize risks to human health, beneficial and non-target organisms, and the environment, including risks to aquatic habitats.

The term "less toxic pest control," as used here, refers to the use of pest control strategies selected to minimize the potential for pesticide-related toxicity in water and sediment.

Strategy implementation will focus on three areas: (1) regulatory programs, (2) education and outreach, and (3) research and monitoring. Regulatory programs will prevent pollution by using existing regulatory tools to ensure that pesticides are not applied in a manner that results in discharges that threaten urban creek uses. Education and outreach programs will focus on decreasing demand for pesticides that threaten water quality, while increasing awareness of alternatives that pose less risk to water quality. Research will fill existing information gaps, and monitoring will be used to measure implementation progress and success. The actions described below are intended to address these strategic goals.

When pesticide-related toxicity occurs in urban creeks, many entities share responsibility for the discharge, and therefore many entities share responsibility for implementing actions to ensure that pesticide-related toxicity does not threaten water quality. Although the allocations apply to all urban runoff, responsibility for attaining the allocations is not the sole responsibility of urban runoff management agencies, whose authority to regulate pesticide use is constrained. Actions to be implemented by regulatory agencies, urban runoff management agencies, and other entities are listed below. The agencies with the broadest authorities to oversee pesticide use and pesticide discharges include U.S. EPA, the California Department of Pesticide Regulation, and the Water Board. Regulatory and non-regulatory actions are needed to ensure that pesticide use does not result in discharges that cause or contribute to toxicity in urban creeks. Implementing these actions is expected to ensure attainment of the allocations. Many entities are already implementing these actions. Actions that can be required through NPDES permits are already in some permits and shall be incorporated into all applicable NPDES permits when the permits are reissued or by other regulatory actions if appropriate. Voluntary actions should commence immediately, and inter-agency coordination is already underway.

Water Board Actions

The role of the Water Board is to encourage, monitor, and enforce implementation actions, and to lead by example. The Water Board will implement the following actions related to regulatory programs:

- Track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and share monitoring and research data with U.S. EPA;
- When necessary, request that U.S. EPA coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act;
- Encourage U.S. EPA to fully address urban water quality concerns within its pesticide registration process;
- Work with the California Department of Pesticide Regulation, County Agricultural Commissioners, and the Structural Pest Control Board to ensure that pesticide applications result in discharges that comply with water quality standards;
- Interpret water quality standards for the California Department of Pesticide Regulation and County Agricultural Commissioners, and assemble available information (such as monitoring data) to assist the California Department of Pesticide Regulation and County Agricultural Commissioners in taking actions necessary to protect water quality; and
- Use authorities (e.g., through permits or waste discharge requirements) to require implementation of best management practices and control measures to minimize pesticide discharges to urban creeks.

The Water Board will implement the following actions related to outreach and education:

- Encourage integrated pest management and less toxic pest management practices;
- Encourage grant funding for activities likely to reduce pesticide discharges, promote less toxic pest management practices, or otherwise further the goals of this implementation plan; and
- Encourage pilot demonstration projects that show promise for reducing pesticide discharges throughout the Region.

The Water Board will implement the following actions related to research, monitoring, and overall program coordination:

- Promote and support studies to address critical data needs (see Adaptive Implementation, below); and
- Assist municipalities and others implementing this strategy by convening stakeholder forums to coordinate implementation.

U.S. Environmental Protection Agency Actions

U.S. EPA is responsible for implementing the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act. U.S. EPA is therefore responsible for ensuring that both federal pesticide laws and water quality laws are implemented. U.S. EPA should exercise its authorities to ensure that foreseeable pesticide applications do not cause or contribute to water column or sediment toxicity in the Region's waters. Because some pesticides pose water quality risks, U.S. EPA should implement the following actions:

- Continue internal coordination efforts to ensure that pesticide applications and resulting discharges comply with water quality standards and avoid water quality impairment (i.e., restrict uses or application practices to manage risks);
- Continue and enhance education and outreach programs to encourage integrated pest management and less toxic pest control; and
- Complete studies to address critical data needs (see Adaptive Implementation, below).

California Department of Pesticide Regulation Actions

Like the Water Board, the California Department of Pesticide Regulation is part of the California Environmental Protection Agency. It regulates pesticide product sales and use within California pursuant to the California Food and Agricultural Code. When the California Department of Pesticide Regulation evaluates whether to register a pesticide product, it must give special attention to the potential for environmental damage, including interference with attainment of water quality standards. The California Department of Pesticide Regulation is mandated to protect water quality from environmentally harmful pesticide materials, which should include pesticides used such that their runoff violates water quality standards. The California Department of Pesticide Regulation should also recognize pesticides used such that their runoff poses a reasonable potential to violate water quality standards to be potentially harmful and take preventive action to address foreseeable risks. The Water Board will assist the California Department of Pesticide Regulation in identifying pesticides that could harm water quality.

The California Department of Pesticide Regulation must endeavor to mitigate adverse effects of pesticides that endanger the environment, such as existing or reasonably foreseeable pesticiderelated violations of water quality standards. If a pesticide product has a demonstrated serious uncontrollable adverse effect, mitigation may include canceling its registration. Mitigation is also warranted to avoid existing and reasonably foreseeable serious uncontrolled adverse effects. The Water Board will notify the California Department of Pesticide Regulation whenever it obtains information concerning actual or potential water quality standard violations so the California Department of Pesticide Regulation can implement appropriate protective actions.

To be effective, this strategy relies on the California Department of Pesticide Regulation to use its authorities in concert with the Water Board. Consistent with its authorities, the California Department of Pesticide Regulation should implement the following actions:

- Work with the Water Board to identify pesticides applied in urban areas in such a manner that runoff does or could cause or contribute to water quality standard violations;
- Condition registrations, as appropriate, to require registrants to provide information necessary to determine the potential for their products to cause or contribute to water quality standard violations and to implement actions necessary to prevent violations;
- Continue and enhance efforts to evaluate the potential for registered pesticide products to cause or contribute to water quality standard violations (the California Department of Pesticide Regulation need not wait for the Water Board to evaluate potential water quality effects);
- Implement actions to eliminate pesticide-related water quality standard violations caused by registered pesticides;
- Implement actions to prevent potential pesticide-related water quality standard violations before they occur;
- Notify U.S. EPA of potential deficiencies in product labels for products that threaten water quality;
- Continue and enhance education and outreach programs to encourage integrated pest management and less toxic pest control (work with County Agricultural Commissioners, urban runoff management agencies, and the University of California Statewide Integrated Pest Management Program to coordinate activities);
- Continue and enhance efforts to prevent the introduction of new exotic pests to the Region; and
- Complete studies to address critical data needs (see Adaptive Implementation, below).

Collaboration within the California Environmental Protection Agency

As sister agencies within the California Environmental Protection Agency, the Water Board and the California Department of Pesticide Regulation should coordinate pesticide and water quality regulation in the Region. In 1997, the California Department of Pesticide Regulation and the State Water Resources Control Board entered into a management agency agreement. The California Department of Pesticide Regulation agreed to ensure that compliance with numeric and narrative water quality objectives is achieved. The State and Regional Water Boards retained responsibility for interpreting compliance with narrative water quality objectives. In light of the agreement, the Water Board and the California Department of Pesticide Regulation should work together to eliminate recurrences of water quality standard violations and prevent potential future violations. In consultation with the California Department of Pesticide Regulation, the Water Board will implement the following actions:

- Gather and review available information to identify pesticides most likely to run off into urban creeks and cause or contribute to water quality standard violations;
- Identify evaluation criteria that can be used to discern whether water quality standards are met (e.g., water quality objectives, targets, monitoring benchmarks, or other criteria);

- Evaluate available information to determine whether water quality standards are met and, if so, whether circumstances suggest that future violations are likely; and
- Notify the California Department of Pesticide Regulation and County Agricultural Commissioners if water quality standard violations exist or are likely to exist in the future due to pesticide discharges, thereby enabling these agencies to implement appropriate actions and assisting them in ensuring that their regulatory programs adequately protect water quality.

In consultation with the Water Board, the California Department of Pesticide Regulation should implement the following actions:

- When available information is insufficient to conclude whether water quality standards are met, work with the Water Board to identify information needed to evaluate the potential for pesticide discharges to cause or contribute to water quality standard violations;
- Obtain information necessary to determine whether water quality standards are or are likely to be met from pesticide product registrants, U.S. EPA, and other sources (conservative [i.e., protective] assumptions may be used to fill information gaps);
- Evaluate whether water quality standards are likely to be met (e.g., consider pesticide use, toxicity, application sites and techniques, runoff potential, and environmental persistence; estimate foreseeable water and sediment pesticide concentrations; and consider Water Board evaluation criteria);
- When pesticide discharges are or are likely to cause or contribute to water quality standard violations, identify and evaluate possible corrective actions (using the Water Board's evaluation criteria) and implement those needed to ensure that water quality standards will be met; and
- When available information suggests that pesticide discharges appear likely to cause or contribute to water quality standard violations in the future (assuming standards are currently met), identify and evaluate possible preventive actions and, commensurate with the weight of the evidence, implement those actions needed to ensure that water quality standards will be met.

Sometimes, a pesticide-by-pesticide approach may be counterproductive, particularly if existing pesticide problems are likely to be replaced by new pesticide problems. As appropriate, the California Department of Pesticide Regulation may evaluate several pesticides at once if related to a specific application method, application site of concern, or other shared factor.

During adaptive implementation reviews (see "Adaptive Implementation," below), the Water Board will consider the extent to which inter-agency collaboration is sufficient to address water quality concerns. If necessary, the Water Board will notify the California Department of Pesticide Regulation of deficiencies and could consider the need to use its own regulatory authorities to control pesticide discharges.

County Agricultural Commissioners' Actions

County Agricultural Commissioners are the local enforcement agents for the California Department of Pesticide Regulation. They provide local enforcement of applicable pesticide laws and, when necessary to address local circumstances (e.g., localized toxicity in an urban creek), can adopt local regulations (subject to California Department of Pesticide Regulation approval) that govern

the conduct of pest control operations and the records and reports of those operations. County Agricultural Commissioners should implement the following actions:

- Continue and enhance enforcement related to illegal sale or use of pesticides, including pesticides sold over-the-counter;
- Continue to enforce the phase out of diazinon products and any new regulations affecting pesticide applications and their water quality risks;
- Continue and enhance efforts to prevent the introduction of new exotic pests to the Region;
- Provide outreach and training to pest control licensees regarding water quality issues as part of pest control business license registration and inspection programs; and
- Work with the California Department of Pesticide Regulation, urban runoff management agencies, and the University of California Statewide Integrated Pest Management Program to coordinate education and outreach programs to minimize pesticide discharges.

Structural Pest Control Board Actions

The Structural Pest Control Board is responsible for licensing structural pest control professionals. The Structural Pest Control Board requires training and examinations to maintain a license to practice structural pest control, and regulates the advertising practices of structural pest control businesses. The Structural Pest Control Board should implement the following actions:

- Through licensing and other authorities, work to ensure that structural pest control practices result in discharges that comply with water quality standards;
- Work to develop a mechanism through which consumers can determine which structural pest control providers offer services most likely to protect water quality; and
- Work to enhance initial and continuing integrated pest management training for structural pest control licensees.

University of California Actions

The University of California Statewide Integrated Pest Management Program promotes pest management education and outreach throughout California. The University of California should implement the following actions:

- Continue and enhance educational efforts targeting urban pesticide users to promote integrated pest management and less toxic pest management practices;
- Continue to encourage and support efforts to identify and improve new less toxic pest management strategies for the urban environment;
- Continue to serve as a resource for information on alternative pest management practices that protect water quality and develop publications others can use to support outreach activities;
- Continue to train University of California Master Gardeners to help disseminate information about integrated pest management and pest management alternatives that protect water quality; and
- Work with the California Department of Pesticide Regulation, County Agricultural Commissioners, and urban runoff management agencies to coordinate education and outreach programs to minimize pesticide discharges.

Urban Runoff Management Agencies and Similar Entities Actions

NPDES permits for urban runoff management agencies and similar entities responsible for controlling urban runoff (e.g., industrial facilities, construction sites, California Department of Transportation facilities, universities, and military installations) shall require implementation of best management practices and control measures. Urban runoff management agencies' and similar entities' respective responsibilities for addressing these allocations and targets will be satisfied by complying with the requirements set forth below and permit-related requirements based on them.

Requirements in each NPDES permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pesticides in urban runoff. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on Best Available Technology Economically Achievable. All permits shall remain consistent with the section of this chapter titled "Surface Water Protection and Management—Point Source Control—Stormwater Discharges." These requirements shall be included in permits no later than five years after the effective date of this strategy. If these requirements prove inadequate to meet the targets and allocations, the Water Board will require additional control measures or call for additional actions by others until the targets and allocations are attained.

The following general requirements shall be implemented through NPDES permits issued or reissued for urban runoff discharges:

- Reduce reliance on pesticides that threaten water quality by adopting and implementing policies, procedures, or ordinances that minimize the use of pesticides that threaten water quality in the discharger's operations and on the discharger's property;
- Track progress by periodically reviewing the discharger's pesticide use and pesticide use by its hired contractors;
- Train the discharger's employees to use integrated pest management techniques and require that they rigorously adhere to integrated pest management practices;
- Require the discharger's contractors to practice integrated pest management; and
- Study the effectiveness of the control measures implemented, evaluate attainment of the targets, identify effective actions to be taken in the future, and report conclusions to the Water Board.

The following education and outreach requirements shall also be implemented through NPDES permits issued or reissued for urban runoff discharges:

- Undertake targeted outreach programs to encourage communities within a discharger's jurisdiction to reduce their reliance on pesticides that threaten water quality, focusing efforts on those most likely to use pesticides that threaten water quality;
- Work with the California Department of Pesticide Regulation, County Agricultural Commissioners, and the University of California Statewide Integrated Pest Management Program to coordinate education and outreach programs to minimize pesticide discharges.
- Encourage public and private landscape irrigation management that minimizes pesticide runoff; and

- Facilitate appropriate pesticide waste disposal, and conduct education and outreach to promote appropriate disposal.

The following monitoring and reporting requirements shall also be implemented through NPDES permits issued or reissued for urban runoff discharges:

- Monitor diazinon and other pesticides discharged in urban runoff that pose potential water quality threats to urban creeks; monitor toxicity in both water and sediment; and implement alternative monitoring mechanisms, if appropriate, to indirectly evaluate water quality as described below (see Monitoring, below);
- Disseminate monitoring data to appropriate regulatory agencies; and
- Contribute to studies to address critical data needs (see Adaptive Implementation, below).

The following requirements related to regulatory programs shall also be implemented through NPDES permits issued or reissued for urban runoff discharges:

- Track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the Federal Clean Water Act and to accommodate water quality concerns within its pesticide registration process;
- Assemble and submit information (such as monitoring data) as needed to assist the California Department of Pesticide Regulation and County Agricultural Commissioners in ensuring that pesticide applications within the Region comply with water quality standards; and
- Report violations of pesticide regulations (e.g., illegal handing) to County Agricultural Commissioners.

The actions above may be implemented by individual urban runoff management entities, jointly by two or more entities acting in concert, or cooperatively through a regional approach, as appropriate.

NPDES permits issued or reissued for industrial, construction, and California Department of Transportation facilities shall implement the general requirements and education and outreach requirements listed above and monitoring requirements as appropriate.

Private Entities Actions

Most pesticides do not occur naturally in the environment; they are manufactured. Pesticide manufacturers and formulators sell products to distributors and retailers, who sell them to the pesticide users who apply them. These private entities should implement the following actions to prevent pesticide-related toxicity in urban creeks:

- Pesticide manufacturers and formulators should minimize potential pesticide discharges by developing and marketing products designed to avoid discharges that exceed water quality standards. (Many manufacturers successfully market such products.) They should also undertake studies to address critical data needs (see Adaptive Implementation, below);
- Distributors and retailers should offer point-of-sale information on less toxic alternatives. They should also offer and promote less toxic alternatives to customers;

- Pest control advisors should recommend integrated pest management strategies so pesticides that could threaten water quality are used only as a last resort; and
- Pesticide users (e.g., private citizens, professional pesticide applicators, school districts, transit districts, and mosquito abatement and vector control districts) should adopt integrated pest management and less toxic pest control techniques so pesticide applications do not contribute to pesticide runoff and toxicity in urban creeks.

7.1.1.7 Monitoring

Monitoring is needed to demonstrate target attainment and to track and evaluate the effectiveness of strategy implementation. Diazinon monitoring needs to demonstrate that diazinon concentrations meet the target. When the concentrations consistently drop below the target, such monitoring may no longer be needed. However, because other pesticides will continue to be applied in urban areas, the need to monitor for water and sediment toxicity—and sometimes specific pesticides—will likely remain well after achieving the diazinon concentration target.

A number of programs monitor pesticide concentrations and toxicity in the Region's waters, including the Water Board's Surface Water Ambient Monitoring Program, the California Department of Pesticide Regulation's Surface Water Protection Program, and the Regional Monitoring Program for Trace Substances. Municipal storm water NPDES permits may also require dischargers to characterize their discharges and receiving waters. This can involve monitoring toxicity and specific pollutants, like diazinon, in storm drain systems and urban creeks.

Monitoring Requirements

Monitoring requirements shall be implemented through NPDES permits issued or reissued for urban runoff discharges. Urban runoff management agencies shall undertake monitoring efforts related to pesticides and toxicity. They shall design and implement a monitoring program to answer the following questions:

- Is the diazinon concentration target being met?
- Are the toxicity targets being met?
- Is toxicity observed in urban creeks caused by a pesticide?
- Is urban runoff the source of any observed toxicity in urban creeks?
- How does observed pesticide-related toxicity in urban creeks (or pesticide concentrations contributing to such toxicity) vary in time and magnitude across urban creek watersheds, and what types of pest control practices contribute to such toxicity?
- Are actions already being taken to reduce pesticide discharges sufficient to meet the targets, and if not, what should be done differently?

The monitoring program may be developed by individual urban runoff management agencies, jointly by two or more agencies acting in concert, or cooperatively through a regional approach. Designing the program shall involve characterizing watersheds, selecting representative creeks, identifying sample locations, developing sampling plans, and selecting appropriate analytical tests of water and sediment. Chemical and toxicity tests shall be conducted on urban creek water and sediment. At a minimum, tests shall be used to measure the following:

- Water column toxicity;

- Sediment toxicity;
- Diazinon concentrations in water (until the diazinon concentration target is met consistently); and
- Concentrations of other pesticides that pose potential water quality and sediment quality threats, as feasible.

Sampling frequency, timing, and number of samples shall be adequate to answer the monitoring questions above and any others set forth for the monitoring program.

Additional types of monitoring tools may be used to support and optimize conventional water and sediment monitoring. For example, monitoring in storm drain systems or near application sites may be useful in selecting creek sampling strategies because pesticide concentrations are easier to detect nearer to the pesticide application site. Efforts to monitor parameters that can serve as surrogates or indicators of pesticide-related water quality conditions may moderate the need for more comprehensive water quality monitoring. While some toxicity and pollutant monitoring will always be necessary, extensive monitoring will be less important if other information is collected that can be used to evaluate the potential for toxicity or specific pollutants to occur in water. Alternative monitoring information can also help focus water quality monitoring efforts and mitigation actions. Such monitoring could include reviewing pesticide sales and use data for the Region, pesticide fate and transport data, and public attitudes regarding pesticides and water quality. If undertaken, such monitoring may seek to answer the following questions:

- What pesticides pose the greatest water quality risks?
- How is the use of such pesticides changing?
- Are existing actions effective in reducing pesticide discharges that threaten water quality?
- What approach is best for monitoring toxicity and pesticides in urban creek water and sediment?

Monitoring Benchmarks

To determine whether measured or predicted pesticide concentrations in water are cause for concern, monitoring benchmarks are needed. Ideally, water quality criteria would be used; however, water quality criteria do not exist for most pesticides. In the absence of water quality criteria, a monitoring benchmark may be calculated as follows. Such a monitoring benchmark is not a water quality objective unless adopted as such by the Water Board. Where valid tests have determined four-day LC_{50} values for aquatic organisms (the concentration that kills one half of the test organisms), a monitoring benchmark may be calculated by dividing the lowest LC_{50} value measured by the appropriate benchmark factor from Table 7.1.1-1 (typically 14 or less for a registered pesticide).

Monitoring Benchmark = Lowest LC_{50} ÷ Benchmark Factor

Where multiple LC_{50} measurements are available, the lowest “genus mean acute value” may be used in place of the lowest LC_{50}. The term “genus mean acute value,” as used here, refers to the geometric mean of the available “species mean acute values” within a genus. The term “species mean acute value,” as used here, refers to the geometric mean of available four-day LC_{50} values for each species. Other available information regarding the pesticide (such as its potential for sub-lethal effects) may also be considered to determine if lower monitoring benchmarks are appropriate

to reflect attainment of the narrative objectives. Table 7.1.1-1 is not intended for deriving monitoring benchmarks for sediment tests.

Table 7.1.1-1 Benchmark Factors

Number of Data Requirements Satisfied[a]	Benchmark Factor[b]
2	16
3	14
4	14
5	12
6	10
7	8

Notes:

[a] U.S. EPA water quality criteria guidelines require data for at least eight taxonomic families to derive water quality criteria.

[b] These values apply only when both daphnid and salmonid toxicity data are available. U.S. EPA typically requires such data to register a pesticide.

When monitoring data demonstrate that pesticide concentrations exceed monitoring benchmarks, the information will be considered during periodic reviews undertaken as part of adaptive implementation (see below). When pesticide concentrations exceed monitoring benchmarks, the Water Board may consider such information in determining compliance with the narrative toxicity, sediment, and population and community ecology objectives. The Water Board may also seek additional toxicity data to derive water quality criteria. The Water Board may inform other regulatory agencies (e.g., the California Department of Pesticide Regulation) about the potential threat to water quality and seek action to prevent water quality impairment.

7.1.1.8 Adaptive Implementation

Adaptive implementation entails taking immediate actions commensurate with available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking immediate action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Table 7.1.1-2 lists specific actions the Water Board will use to track its progress and an implementation timeframe.

Table 7.1.1-2 Water Board Implementation Measure Tracking

Action	Schedule
Summarize pesticide regulatory activities as they relate to water quality, and identify opportunities to advise pesticide regulatory oversight agencies regarding future actions	Annually
Summarize research and monitoring data for pesticide regulatory oversight agencies and others, and determine where to focus future monitoring efforts based on critical data needs	Annually
Describe urban pesticide use trends and identify pesticides likely to affect water quality	Annually
Notify pesticide regulatory oversight agencies if water quality standard violations exist or are likely to exist in the future due to pesticide discharges	At least annually
Identify waters impaired by pesticide-related toxicity and waters where there is a potential for impairment	Biennially
Meet or correspond with pesticide regulatory oversight agencies regarding their roles in protecting water quality	At least annually
Place required actions in NPDES stormwater permits	No later than five years from effective date of strategy
Report implementation status to Water Board	Annually

Periodic Review

The Water Board will review this strategy approximately every five years. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. If any modifications are needed, they will be incorporated into the Basin Plan. At a minimum, the following focusing questions will be used to conduct the reviews. Additional focusing questions will be developed in collaboration with stakeholders during each review.

- Are changes in urban creek conditions moving toward improvements in water quality (e.g., toward target attainment)?
- If it is unclear whether there is progress, how should monitoring efforts be modified to measure trends?
- If there has not been adequate progress, how might the implementation actions or allocations be modified to improve progress?
- Is there new information that suggests the need to modify the targets, allocations, or implementation actions?
- If so, how should the strategy be modified?

During the periodic reviews, the Water Board will consider newly available information regarding such topics as market trends, monitoring results, tools for risk evaluation, outreach effectiveness, and regulatory actions.

Additional Sources

As the strategy is implemented, additional sources of pesticide-related toxicity may emerge, either as the result of a new discharge or a new pesticide being applied. In such situations, the allocations for additional sources shall be the same as those for the existing sources unless the Water Board finds these allocations to be inappropriate or chooses to refine the strategy in some other manner.

Critical Data Needs

Various types of information and tools are needed to adequately evaluate the risks associated with pesticide runoff. To the extent possible, the pesticide industry should shoulder the burden of collecting this information and developing appropriate tools. At times, however, the citizens of the Region (as represented by the Water Boards, the urban runoff management agencies, and others) should lead by example. Therefore, the pesticide industry should undertake and others should support and promote the following actions:

- Conduct surveillance monitoring of surface waters and sediment and publicly report the results;
- Develop publicly available and commercially viable analytical methods to detect ecologically relevant concentrations of pesticides that pose water quality risks;
- Develop procedures that can be used to identify potential causes of toxicity in water and sediment (e.g., Toxicity Identification Evaluation procedures);
- Complete publicly available studies that characterize the fate and transport of pesticides applied in urban areas;
- Develop and adopt evaluation methods (e.g., quantitative fate and transport models) for urban pesticide applications, including applications to impervious surfaces; and
- Complete publicly available studies to support the development of water quality criteria for pesticides in water and sediment.

7.2 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR SAN FRANCISCO BAY AND BAY SEGMENTS

7.2.1 Water Quality Attainment Strategy to Support Copper Site-specific Objectives for San Francisco Bay, and Nickel Site-specific Objectives for South San Francisco Bay

The Water Quality Attainment Strategy (WQAS) for copper in all San Francisco Bay segments (see Figure 7.2.1-1) and nickel in South San Francisco Bay is designed to prevent water quality degradation and ensure attainment of the copper and nickel site-specific objectives (SSOs). This section describes the details of the WQAS and how the Water Board will use its regulatory authority to implement this strategy.

The four elements of the WQAS are:

- Control measures/actions to minimize the discharge of copper (from wastewater treatment plants, urban runoff, anti-fouling boat paints, and lagoons to ensure that significant copper sources are properly managed)
- Statistically-based water quality "triggers" and a receiving water monitoring program that would initiate additional control measures/actions if the "triggers" are exceeded
- Metal translators that will be used to compute copper and nickel effluent limits for the municipal wastewater treatment plants discharging to South San Francisco Bay
- Metal translators that will be used to compute copper effluent limits for municipal and industrial wastewater treatment plants that discharge to deep water (see Section 4.6.1 for definition) north of the Dumbarton Bridge

7.2.1.1 Background

All San Francisco Bay segments (see Figure 7.2.1-1) meet water quality objectives for copper and nickel. Since the mid-1980s, because of effective treatment and successful pollution prevention and source control efforts, substantial reductions in metal loading to San Francisco Bay segments have been achieved. Other sources that are difficult to manage such as urban runoff (which includes copper from automobile brake pads), historical deposits of copper in the Bay sediments, and natural sources of copper are among the dominant contributions to current ambient water concentrations. SSOs (see Chapter 3) for dissolved copper in all Bay segments (and nickel in South San Francisco Bay) have been derived using toxicity data representing site-specific conditions in all San Francisco Bay segments, and these SSOs fully protect San Francisco Bay beneficial uses.

Figure 7.2.1-1 Segments of San Francisco Bay showing location of Hayward Shoals as a line connecting Little Coyote Point and the Oakland Airport.

7.2.1.2 Implementation Plan and Monitoring Program

This section discusses the actions and ambient monitoring program needed to ensure continued attainment of the copper site-specific objectives throughout San Francisco Bay and ensure that copper sources are properly managed so ambient copper levels do not increase due to potential increases in loading of copper to San Francisco Bay. The implementation plan also calls for requirements in NPDES permits to support investigations to resolve three key areas of remaining technical uncertainty regarding copper: urban tributary loads and trends; toxicity to benthic organisms; and possible effects on the olfactory system of salmonids.

Control Measures for Urban Runoff Management Agencies

The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and copper control measures designed to prevent urban runoff discharges from causing or contributing to exceedances of copper water quality objectives. Requirements in each permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce copper in stormwater runoff to the maximum extent practicable. Urban runoff management agencies must implement control measures targeting: vehicle brake pads, architectural copper, copper pesticides, and industrial copper use. Additionally, these permits shall contain requirements to conduct or cause to be conducted: monitoring of copper loading to the Bay at locations and frequency sufficient to track loading trends; and technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.

If an ambient trigger concentration in any San Francisco Bay segment (see Ambient Monitoring Program, below) is exceeded, all urban runoff management agencies discharging to that segment shall submit a report to the Water Board that describes best management practices that are currently being implemented and additional measures, with a schedule, that will be implemented to prevent their copper discharges from causing or contributing to the exceedance.

Control Measures for Wastewater Treatment Facilities

The management measures for municipal and industrial wastewater treatment facilities will be implemented through their individual NPDES permits, which shall include the following elements:

- Water quality-based effluent limits (WQBELs) computed from the SSOs.
- Baseline Program of pollution prevention measures.
- Requirement to conduct or cause to be conducted technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.
- Effluent Monitoring and Reporting.

The baseline pollution prevention measures for wastewater facilities include:

- Evaluate copper sources (all municipal and industrial facilities)
- Confirm industrial facility compliance with local pre-treatment copper limits (municipal facilities only)
- Control municipal water supply pipeline corrosion from commercial and residential sources (municipal facilities only)

More advanced, facility-specific pollution prevention measures shall be implemented by facilities that exceed a copper effluent limit due to increased copper influent loading compared to the previous year's performance. Additionally, if an ambient trigger concentration (see Ambient Monitoring Program, below) is exceeded, each municipal and industrial wastewater facility discharging to that segment of the Bay shall evaluate the history of its facility's effluent copper concentrations. Those facilities with increasing copper effluent trends shall develop and implement plans to control these increasing levels.

Metal Translators

An important regulatory element of the WQAS is the specification of metal translators. Water quality objectives for copper and nickel are expressed as dissolved metal concentrations. Effluent limits for the wastewater dischargers' treatment facilities are expressed as total metal concentrations and must be calculated according to the procedure outlined in the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California." Therefore, for metals like copper and nickel, the calculation of an effluent limit requires the use of a ratio of total to dissolved metals called the metal translator.

South San Francisco Bay copper and nickel translators were developed using a regression relationship between the translators and total suspended solids (TSS). The translators were computed by evaluating the upper 95 percent confidence interval regression relationship at the median TSS value for South San Francisco Bay. For this reason, there is a single translator value for each metal (Table 7.2.1-1). The higher translators that result from using the upper confidence level regression result in lower numeric effluent limits and provide an additional measure of protection of beneficial uses.

There is not a strong relationship between TSS and translators for the segments of the Bay north of the Dumbarton Bridge. There are geographic differences in computed translators between the northernmost segments and those in the southern segments the Bay. In such cases, median and 90th percentile translators can be computed from available data for use in computing average monthly and maximum daily effluent limits, respectively. The translators in Table 7.2.1-2 apply only to deepwater wastewater discharges to San Francisco Bay because the available translator data are not representative of shallow water discharge (defined as those wastewater discharges that have been granted an exception to the prohibition against wastewater discharges into non-tidal water, dead-end sloughs or at any point that wastewater does not receive dilution of at least 10:1) locations. Shallow water wastewater dischargers must develop translators applicable to the discharge location at the time of permit reissuance.

Table 7.2.1-1 Translators Applicable to South San Francisco Bay Municipal Wastewater Discharges for Copper and Nickel

Bay Segments	Copper Translator for Effluent Limit Calculation	Nickel Translator for Effluent Limit Calculation
South San Francisco Bay	0.53	0.44

Table 7.2.1-2 Translators Applicable to Other San Francisco Bay Municipal and Industrial Wastewater Deep Water Discharges for Copper

Bay Segments	Copper Translator For Average Monthly Effluent Limit Calculation	Copper Translator For Maximum Daily Effluent Limit Calculation
Suisun Bay San Pablo Bay	0.38	0.66
Central San Francisco Bay Lower San Francisco Bay	0.73	0.87

Copper From Anti-Fouling Boat Paint

Paints applied to boats and ships to control unwanted “fouling” growth on their hulls often contain copper-based biocides. In San Francisco Bay, there are major ports, industrial piers, and dozens of marinas. Boats and ships coated with copper-containing biocides may release copper directly into the Bay during storage, operation, and in-water maintenance.

The Water Board is relying on the authority of the California Department of Pesticide Regulation (DPR) to regulate the pesticidal use of copper in antifouling paints such that water quality objectives will be attained. The Water Board will work with DPR as it executes its regulatory strategy for biocides in marine antifouling coatings, which includes monitoring to evaluate water quality impacts and review of registration status.

Control Measures for Lagoons

There are many managed lagoons that are hydraulically connected to the Bay. Because of nutrient loading and stagnant conditions, excessive growth of aquatic plants and algae can cause nuisance conditions. In addition to mechanical harvesting, copper-based algaecides are used to control nuisance plant and algae growth. The application of these algaecides is permitted under the State Water Board’s Statewide General NPDES Permit (Order No. 2004-0009-DWQ) for discharges of aquatic pesticides to surface waters. The Water Board recognizes coverage under the general permit as being sufficient to ensure that application of copper pesticides to lagoons shall not cause or contribute to violations of the water quality objectives.

Ambient Monitoring Program

The implementation plan establishes copper control measures in order to prevent increases in ambient dissolved copper concentrations. Ambient concentrations of copper in the Bay have remained essentially unchanged from 1993 through 2006 and are not expected to increase in the future. In order to determine systematically if ambient concentrations have increased, specific copper concentration triggers are compared to data collected through the Regional Monitoring Program for Trace Substances (RMP). This is accomplished by calculating every year the three-year rolling mean of RMP copper concentrations in segments of the Bay. These rolling mean concentrations will be compared to trigger concentration values for each segment. The trigger concentrations (shown in Table 7.2.1-3) were calculated in order to detect a change (from 2003 concentrations) in dissolved copper concentration of about 1 µg/L with a statistical power of 99%. If the trigger concentration is exceeded in any Bay segment, the Water Board will investigate causes of the exceedance and potential control options and require wastewater and urban runoff dischargers to that segment to investigate whether they have caused or contributed to the

exceedance and, if so, to identify and submit a plan and schedule to implement controls to resolve their contribution to the exceedance.

The Water Board will assess the continued appropriateness of the SSOs for San Francisco Bay should conditions change in Bay water quality. Dissolved organic carbon (DOC) will be used as a surrogate measure of the protective effect of Bay water against copper water column toxicity. An analysis and evaluation of trends in DOC data collected through the RMP will determine whether or not additional water column toxicity tests are needed to confirm that the SSOs are protective. In addition, the Water Board will evaluate sediment copper concentration and sediment toxicity data collected through the RMP to assess possible effects related to copper accumulation in Bay sediments. The need for a reevaluation of the SSOs or other regulatory actions will be established through the triennial review of the Basin Plan.

Table 7.2.1-3 Dissolved Copper (µg/L) Trigger Concentrations at 99% Statistical Power

Bay Segment (or portion thereof)	Trigger Level (µg/L)
Suisun Bay	2.8
San Pablo Bay	3.0
Central San Francisco Bay Lower San Francisco Bay (north Hayward Shoals)	2.2
Lower San Francisco Bay (south of Hayward Shoals)	3.6
South San Francisco Bay	4.2

7.2.2 San Francisco Bay Mercury TMDL

The following sections establish the allowable annual mercury load (Total Maximum Daily Load [TMDL]) to San Francisco Bay, and actions and monitoring necessary to implement the TMDL. The numeric targets, allocations, and associated implementation plan will ensure that all San Francisco Bay segments and Suisun Marsh attain applicable water quality standards, including the mercury water quality objectives set forth in Table 3-3B, established to protect and support beneficial uses.

The TMDL allocations and implementation plan focus on controlling the amount of mercury that reaches the Bay and identifying and implementing actions to minimize mercury bioavailability. The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited. However, this is an area of active research and strategies for controlling this process are forthcoming. The effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed and the TMDL may be adapted as warranted.

7.2.2.1 Problem Statement

San Francisco Bay and Suisun Marsh are impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. Mercury concentrations in San Francisco Bay fish are high enough to threaten the health of humans who consume them. In addition, mercury concentrations in some bird eggs harvested from the shores of San Francisco Bay are high enough to account for abnormally high rates of eggs failing to hatch.

In the context of this TMDL, “San Francisco Bay” refers to the following water bodies:

- Sacramento/San Joaquin River Delta (within San Francisco Bay region)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- Central San Francisco Bay
- Lower San Francisco Bay
- South San Francisco Bay (including the Lower South Bay)

This TMDL also addresses the following mercury-impaired water bodies that exist within the water bodies listed above:

- Castro Cove (part of San Pablo Bay)
- Oakland Inner Harbor (part of Central San Francisco Bay)
- San Leandro Bay (part of Central San Francisco Bay)

7.2.2.2 Numeric Targets

TMDL numeric targets interpret narrative and/or numeric water quality standards, including beneficial uses and water quality objectives. To protect humans who consume Bay fish, the average fish tissue mercury concentration for a commonly consumed fish species is specified below as a human health target. To protect wildlife and rare and endangered species, the average fish tissue mercury concentration in fish consumed by piscivorous birds is specified below as a wildlife target. The goal of this target is that controllable water quality factors not cause detrimental mercury concentrations in San Francisco Bay wildlife, which is consistent with the bioaccumulation objective in Chapter 3. To achieve the human health and wildlife targets and to attain water quality standards, the Baywide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.

The Regional Monitoring Program (RMP) conducts monitoring relevant to evaluating progress toward meeting the sediment and human health and wildlife targets. The following passages describe acceptable approaches to evaluate progress toward meeting the targets. Other approaches can be considered during adaptive implementation reviews.

Suspended Sediment Target

The suspended sediment target (0.2 mg mercury per kg dry sediment) shall be compared to the annual median Bay suspended sediment mercury concentration found through RMP monitoring. The suspended sediment mercury concentration shall be computed as the difference between total and dissolved mercury concentration in a water sample (at each location) divided by the suspended sediment concentration for that same sample.

Human Health Target

The human health target is a fish tissue mercury concentration (0.2 mg mercury per kg fish tissue). This target applies to average wet weight fish tissue muscle concentrations in 60 cm long striped bass. The RMP conducts fish tissue sampling and analysis in San Francisco Bay every three years. Progress toward attainment of the human health target shall be evaluated by tracking

mercury concentrations in striped bass, a commonly consumed sport fish with relatively high mercury concentrations. Striped bass are routinely caught in three size ranges: 45–59 cm (small), 60–82 cm (medium), and larger than 82 cm (large). To provide sufficient data to evaluate the target, striped bass in the small and medium size ranges should be caught and analyzed. The best functional relationship between mercury concentration and length shall be established for the fish caught, and the resulting equation of fit shall be evaluated at 60 cm to compute the mercury concentration to compare to the human health target. The RMP tracks mercury concentrations in other San Francisco Bay sportfish, such as halibut and jack-smelt. This information will be used to assess overall trends and human health risks.

Wildlife Target

The wildlife target is a fish tissue mercury concentration (0.03 mg mercury per kg fish). This target applies to average wet weight whole fish concentrations in 3–5 cm length fish.

The RMP is developing a long term monitoring program to evaluate mercury concentrations in small fish typically consumed by birds, including by the California least tern. Progress toward attainment of the wildlife target will be evaluated by tracking mercury concentrations in 3–5 cm long Bay fish. The RMP is also collaborating with the U.S. Fish and Wildlife Service on long-term monitoring and analysis of bird egg mercury concentrations.

7.2.2.3 Sources and Losses

During the California Gold Rush, cinnabar mines in the Central Coast Ranges produced the mercury used to extract gold from the Sierra Nevada foothills. Mercury was later mined and used to produce munitions, electronics, and health care and commercial products.

The year 2003 estimate of total mercury inputs to the San Francisco Bay is about 1220 kg/yr. The sources of mercury in San Francisco Bay include bed erosion (about 460 kg/yr), the Central Valley watershed (about 440 kg/yr), urban stormwater runoff (about 160 kg/yr), the Guadalupe River watershed (about 92 kg/yr), direct atmospheric deposition (about 27 kg/yr), non-urban stormwater runoff (about 25 kg/yr), and wastewater discharges (about 18 kg/yr). There is a potential that mercury may enter the Bay from Bay margin contaminated sites and abandoned mercury mines outside the Guadalupe watershed. An evaluation of these potential sources is addressed below under Mercury TMDL Implementation.

Using box models for sediment and mercury inputs and outputs to and from San Francisco Bay, the 2003 estimate for San Francisco Bay mercury losses is approximately 1700 kg/yr. Mercury leaves the Bay by transport to the Pacific Ocean via the Golden Gate, the net result of dredging and disposal (in-Bay and upland), and other losses.

7.2.2.4 Allocations

Tables 7.2.2-1 through 7.2.2-5 present load and wasteload allocations for San Francisco Bay mercury sources. Table 7.2.2-1 presents load and wasteload allocations by source category and the 2003 estimated annual loads. Tables 7.2.2-2 through 7.2.2-5 contain wasteload allocations for individual wastewater and urban stormwater discharges to San Francisco Bay. When summed, the individual allocations equal the category totals for urban stormwater and wastewater shown in Table 7.2.2-1.

Table 7.2.2-1 Mercury Load and Wasteload Allocations by Source Category

Source	2003 Mercury Load (kg/yr)	Allocation (kg/yr)
Bed erosion[a]	460	220
Central Valley Watershed	440	330
Urban Stormwater Runoff	160	82
Guadalupe River Watershed (mining legacy)	92[b]	2
Atmospheric deposition	27	27
Non-urban stormwater runoff	25	25
Wastewater (municipal and industrial)	18	12
Sediment dredging and disposal[c]	net loss	0 ≤ ambient concentration

Notes:

[a] Bed erosion occurs as mercury buried in Bay sediment becomes available for biological uptake when overlying sediment erodes.

[b] This load does not account for mercury captured in ongoing sediment removal programs conducted in the watershed.

[c] Sediment dredging and disposal often moves mercury-containing sediment from one part of the Bay to another. The dredged sediment mercury concentration generally reflects ambient conditions in San Francisco Bay sediment. This allocation is both mass-based and concentration-based. The allocation will be implemented by confirming both that the combined effect of dredging and disposal continues to be a net loss and that the mercury concentration of dredged material disposed in the Bay must be at or below the Baywide ambient mercury concentration. This allocation ensures that this source category continues to represent a net loss of mercury.

Table 7.2.2-2 Individual Wasteload Allocations for Mercury in Urban Stormwater Discharges

Entity	NPDES Permit	Allocation (kg/yr)[a]	Load Reduction (kg/yr)[b]
Santa Clara Valley Urban Runoff Pollution Prevention Program	CAS029718	23	21
Alameda Countywide Clean Water Program	CAS029831	20	19
Contra Costa Clean Water Program	CAS029912	11	11
San Mateo County Stormwater Pollution Prevention Program	CAS029921	8.4	8.0
Vallejo Sanitation and Flood Control District	CAS612006	1.6	1.6
Fairfield-Suisun Urban Runoff Management Program	CAS612005	1.6	1.5
American Canyon	CAS612007	0.14	0.13
Sonoma County area[c]	CAS000004	1.6	1.5
Napa County area[c]	CAS000004	1.6	1.5
Marin County area[c]	CAS000004	3.3	3.2
Solano County area[c]	CAS000004	0.81	0.77
San Francisco County area[c,d]	CAS000004	8.8	8.4
Total		**82[e]**	**78[e]**

Notes:

[a] Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

[b] This column contains calculated load reductions relative to the estimated 2003 urban stormwater runoff annual load that are consistent with attaining the wasteload allocation. Demonstration of such load reductions is an alternative manner of showing compliance with the allocations.

[c] Includes unincorporated areas and all municipalities in the county that are in the Region and drain to the Bay. The statewide municipal stormwater general permit issued by the State Water Resources Control Board covers these municipalities.

[d] This urban stormwater runoff load estimate does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the Bayside facilities (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

[e] These totals differ slightly from the column sum due to rounding.

Table 7.2.2-3 Individual Wasteload Allocations for Mercury in Municipal Wastewater Discharges

Permitted Entity (Bold type indicates advanced treatment)	NPDES Permit	2000–2003 Load (kg/yr)	Interim Allocation (kg/yr)	Final Allocation (kg/yr)
American Canyon, City of	**CA0038768**	**0.12**	**0.095**	**0.095**
California Department of Parks and Recreation, Angel Island State Park	CA0037401	0.013	0.013	0.013
Benicia, City of	CA0038091	0.088	0.088	0.088
Burlingame, City of	CA0037788	0.089	0.089	0.089
Calistoga, City of	CA0037966	0.016	0.016	0.016
Central Contra Costa Sanitary District	CA0037648	2.23	1.8	1.3
Central Marin Sanitation Agency	CA0038628	0.18	0.15	0.11
Delta Diablo Sanitation District	CA0038547	0.31	0.25	0.19
East Bay Dischargers Authority	CA0037869	3.6	2.9	2.2
Dublin-San Ramon Services District (CA0037613) Hayward Shoreline Marsh (CA0038636) Livermore, City of (CA0038008) Union Sanitary District, wet weather (CA0038733)				
East Bay Municipal Utilities District	CA0037702	2.6[a]	2.1	1.5
East Brother Light Station	CA0038806	0.00001	0.000012	0.000012
Fairfield-Suisun Sewer District	**CA0038024**	**0.22**	**0.17**	**0.17**
Las Gallinas Valley Sanitary District	CA0037851	0.17	0.13	0.10
Marin County Sanitary District, Paradise Cove	CA0037427	0.00055	0.00055	0.00055
Marin County Sanitary District, Tiburon	CA0037753	0.0099	0.0099	0.0099
Millbrae, City of	CA0037532	0.052	0.052	0.052
Mountain View Sanitary District	**CA0037770**	**0.034**	**0.034**	**0.034**
Napa Sanitation District	CA0037575	0.28	0.23	0.17
Novato Sanitary District	CA0037958	0.079	0.079	0.079
Palo Alto, City of	**CA0037834**	**0.38**	**0.31**	**0.31**
Petaluma, City of	CA0037810	0.063	0.063	0.063
Pinole, City of	CA0037796	0.055	0.055	0.055
Contra Costa County, Port Costa Wastewater Treatment Plant	CA0037885	0.00072	0.00072	0.00072

Permitted Entity (Bold type indicates advanced treatment)	NPDES Permit	2000–2003 Load (kg/yr)	Interim Allocation (kg/yr)	Final Allocation (kg/yr)
Rodeo Sanitary District	CA0037826	0.060	0.060	0.060
Saint Helena, City of	CA0038016	0.047	0.047	0.047
San Francisco, City and County of, San Francisco International Airport WQCP	CA0038318	0.032	0.032	0.032
San Francisco, City and County of, Southeast Plant	CA0037664	2.7	2.1	1.6
San Jose/Santa Clara WPCP	**CA0037842**	**1.0**	**0.80**	**0.80**
San Mateo, City of	CA0037541	0.32	0.26	0.19
Sausalito-Marin City Sanitary District	CA0038067	0.078	0.078	0.078
Seafirth Estates	CA0038893	0.00036	0.00036	0.00036
Sewerage Agency of Southern Marin	CA0037711	0.13	0.10	0.076
Sonoma Valley County Sanitary District	CA0037800	0.041	0.041	0.041
South Bayside System Authority	CA0038369	0.53	0.42	0.32
South San Francisco/San Bruno WQCP	CA0038130	0.29	0.24	0.18
Sunnyvale, City of	**CA0037621**	**0.15**	**0.12**	**0.12**
US Naval Support Activity, Treasure Island WWTP	CA0110116	0.026	0.026	0.026
Vallejo Sanitation & Flood Control District	CA0037699	0.57	0.46	0.34
West County Agency, Combined Outfall	CA0038539	0.38[c]	0.30	0.23
Yountville, Town of	CA0038121	0.040	0.040	0.04
Total		**17[b]**	**14[b]**	**11[b]**

Notes:

[a] This allocation includes wastewater treatment and all wet weather facilities.

[b] Total differs slightly from the column sum due to rounding.

[c] Mercury monitoring data quality concerns pertaining to this discharger will need to be addressed during the next review.

Table 7.2.2-4 Individual Wasteload Allocations for Mercury in Petroleum Refinery Wastewater Discharges

Permitted Entity	NPDES Permit	Allocation (kg/yr)
Chevron Products Company	CA0005134	0.34
ConocoPhillips	CA0005053	0.13
Martinez Refining Co. (formerly Shell)	CA0005789	0.22
Ultramar, Golden Eagle	CA0004961	0.11
Valero Refining Company	CA0005550	0.08
Total		**0.9**

Table 7.2.2-5 Individual Wasteload Allocations for Mercury in Industrial (Non-Petroleum Refinery) Wastewater Discharges[c]

Permitted Entity	NPDES Permit	Allocation (kg/yr)
C&H Sugar Co.	CA0005240	0.0013
Crockett Cogeneration	CA0029904	0.0047
The Dow Chemical Company	CA0004910	0.041
General Chemical[a]	CA0004979	0.21
GWF Power Systems, Site I	CA0029106	0.0016
GWF Power Systems, Site V	CA0029122	0.0025
Hanson Aggregates, Amador Street	CA0030139	0.000005
Hanson Aggregates, Olin Jones Dredge Spoils Disposal	CA0028321	0.000005
Hanson Aggregates, Tidewater Ave. Oakland	CAA030147	0.000005
Pacific Gas and Electric, East Shell Pond	CA0030082	0.00063
Pacific Gas and Electric, Hunters Point Power Plant	CA0005649	0.020
Rhodia, Inc.	CA0006165	0.011
San Francisco, City and Co., SF International Airport Industrial WTP	CA0028070	0.051
Southern Energy California, Pittsburg Power Plant	CA0004880	0.0078
Southern Energy Delta LLC, Potrero Power Plant	CA0005657	0.0031
United States Navy, Point Molate	CA0030074	0.013
USS-Posco	CA0005002	0.045
Total		**0.4[b]**

Notes:

[a] Data quality concerns pertaining to this discharger will need to be addressed during the next review.

[b] Total differs slightly from the column sum due to rounding.

[c] Wasteload allocations for industrial wastewater discharges do not include mass from once-through cooling water. The Water Board will apply intake credits to once-through cooling water as allowed by law.

7.2.2.5 Total Maximum Daily Load

The mercury TMDL for San Francisco Bay is the sum of the load and wasteload allocations, 700 kg/yr. The Bay will attain applicable water quality standards for mercury when the overall mercury load is reduced to the TMDL and mercury methylation control measures are implemented.

A TMDL must include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality. This TMDL's targets and allocations rely on conservative assumptions, which thereby provide an implicit margin of safety. The adaptive approach to implementation provides an additional margin of safety.

There is no evidence that mercury contamination in San Francisco Bay is worse at any particular time of year. Therefore, the TMDL and allocation scheme do not have a seasonal component.

7.2.2.6 Mercury TMDL Implementation

The San Francisco Bay mercury TMDL implementation plan has four objectives: (1) reduce mercury loads to achieve load and wasteload allocations, (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury, (3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system, and (4) encourage actions that address multiple pollutants. The plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. The adaptive implementation section describes the method and schedule for evaluating and adapting the TMDL and implementation plan as needed to assure water quality standards are attained.

Mercury Source Control Actions

This section, organized by mercury source categories, specifies actions required to achieve allocations and implement the TMDL.

Central Valley Watershed

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is developing mercury TMDLs for several mercury-impaired water bodies in its region that drain to San Francisco Bay. The Central Valley Water Board staff is currently developing a mercury TMDL for portions of the Delta within the Central Valley region designed to meet the Central Valley watershed's load allocation. This Delta mercury TMDL is scheduled for consideration as a Basin Plan Amendment by the Central Valley Water Board by December 2006.

Attainment of the load allocation shall be assessed as a five-year average annual mercury load by one of two methods. First, attainment may be demonstrated by documentation provided by the Central Valley Water Board that shows a net 110 kg/yr decrease in total mercury entering the Delta from within the Central Valley region. Alternatively, attainment of the load allocation may be demonstrated by multiplying the flow-weighted suspended sediment mercury concentration by the sediment load measured at the RMP Mallard Island monitoring station. If sediment load estimates are unavailable, the load shall be assumed to be 1,600 million kg of sediment per year. The mercury load fluxing past Mallard Island will be less than or equal to 330 kg/yr after attainment of the allocation.

The allocation for the Central Valley watershed should be achieved within 20 years after the Central Valley Water Board begins implementing its TMDL load reduction program. Studies need

to be conducted to evaluate the time lag between the remediation of mercury sources and resulting load reductions from the Delta. An interim loading milestone of 385 kg/yr of mercury, halfway between the current load and the allocation, should be attained ten years after implementation of the Central Valley Delta TMDL begins. This schedule will be reevaluated as the load reduction plans are implemented.

Urban Stormwater Runoff

The wasteload allocations shown in Table 7.2.2-2 shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, “source category”) including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

The allocations for this source category should be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within ten years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, best management practices or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in each permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff to the maximum extent practicable and remain consistent with the section of this chapter titled “Surface Water Protection and Management—Point Source Control—Stormwater Discharges.” The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

1. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;
2. Develop and implement a mercury source control program;
3. Develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;
4. Monitor levels of methylmercury in discharges;
5. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;
6. Develop an equitable allocation-sharing scheme in consultation with Caltrans (see below) to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board;
7. Prepare an annual report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

8. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Table 7.2.2-2, by using one of the following methods:
    - Quantify the annual average mercury load reduced by implementing (a) pollution prevention activities, and (b) source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.
    - Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
    - Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

Once the Water Board accepts that a requirement has been completed by an urban runoff management agency, it need not be included in subsequent permits for that agency. These requirements apply to municipalities covered by the statewide municipal stormwater general permit (issued by the State Water Resources Control Board) five years after the effective date of the San Francisco Bay mercury TMDL.

Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an urban runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Within the jurisdiction of each urban runoff management agency, Caltrans is responsible for discharges associated with roadways and non-roadway facilities. Consequently, Caltrans shall be required to implement the following actions:

1. Develop and implement a system to quantify mercury loads or loads reduced through control actions;
2. Prepare an annual report that documents mercury loads or loads reduced through control actions; and
3. Develop an equitable allocation-sharing scheme that reflects Caltrans load reduction responsibility in consultation with the urban runoff management agencies, and report the details to the Water Board. Alternatively, Caltrans may choose to implement load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agency's allocation. In such a case, the Water Board will consider a separate allocation for Caltrans for which they may demonstrate progress toward attaining an allocation or load reduction in the same manner mentioned previously for municipal programs.

Guadalupe River Watershed (Mining Legacy)

In the near term, the effort underway to develop the Guadalupe River Watershed Mercury TMDL will be the mechanism used to implement and track progress toward achieving the load allocation.

Ultimately, the Water Board expects the implementation plan for the Guadalupe River Watershed Mercury TMDL to integrate implementation efforts relative to that TMDL with those implementation efforts for the San Francisco Bay mercury TMDL.

The Guadalupe River Watershed Mercury TMDL will provide a watershed-wide mercury management strategy. Efforts are already underway in the watershed to take early actions to reduce mercury loads, and more are planned. A high priority for the watershed-based strategy is to control upper watershed sources associated with the mining legacy to avoid compromising actions taken in the lower watershed. The strategy will include measures that prevent mercury-laden sediment from reaching the Bay, either by removal or by preventing their transport to the Bay. The strategy will also feature measures intended to reduce methylmercury production and risks to human health and wildlife. An essential component of the strategy will also involve testing and evaluation of new techniques and control measures, the benefits of that may apply throughout the Bay. As the mercury load, methylation, and reductions resulting from these efforts are quantified by the dischargers identified through the Guadalupe River Watershed Mercury TMDL process, the Water Board will consider how the reductions achieved will be counted toward fulfillment of the load reductions required to meet the Guadalupe River watershed load allocation.

The Guadalupe River watershed mining legacy mercury load allocation is expected to be attained within 20 years after the Water Board begins implementing the Guadalupe River Watershed Mercury TMDL. As a way to measure progress, an interim-loading milestone of 47 kg/yr of mercury, halfway between the current load and the allocation, should be achieved within ten years. If the interim loading milestone is not achieved, dischargers shall make reasonable and measurable progress toward achieving the ten-year load reduction through implementation of the watershed-wide strategy.

Progress toward (a) the interim loading milestone, or (b) attainment of the allocation, shall be demonstrated by the dischargers identified through the Guadalupe River Watershed TMDL using one of the methods listed below:

- Quantify the annual average mercury load reduced by implementing (a) pollution prevention activities, (b) source and treatment controls, and (c) if applicable, other efforts to reduce methylation or mercury-related risks to humans and wildlife consistent with the watershed-based strategy. The Water Board will recognize loads reduced resulting from activities implemented after 1996 (or earlier if actions taken are not reflected in the 2001 load estimate) to estimate load reductions.
- Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
- Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged from the watershed to San Francisco Bay is below the suspended sediment target.

Municipal Wastewater

The individual municipal wastewater wasteload allocations shown in Table 7.2.2-3 shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual allocations, 11 kg/yr. The Water Board will issue a San Francisco Bay watershed mercury NPDES permit to all dischargers listed in Table 7.2.2-3 to implement the individual and aggregate mass limits.

The wasteload allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, interim individual allocations equal to a 20 percent reduction from 2000–2003 annual mass discharge levels shall be achieved within 10 years. These interim allocations, shown in Table 7.2.2-3, shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual interim allocations, 14 kg/yr. During the initial ten years, individual mass limits shall be the 2000–2003 annual mass discharge levels shown in Table 7.2.2-3, and the aggregate mass limit is the sum of these individual mass discharge levels.

If any aggregate mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass discharges exceed their individual mass limits.

The mass limits and the following requirements shall be incorporated into the watershed NPDES permit for municipal wastewater dischargers:

- Develop and implement effective programs that include but are not limited to pollution prevention to control mercury sources and loading, a plan and schedule of actions and effectiveness measures applicable for the term of the permit, based on identification of the largest and most controllable sources and an updated assessment of source control measures and wastewater treatment technologies (the level of effort shall be commensurate with the mercury load and performance of the facility) and quantify the mercury load avoided or reduced;
- Develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify risk reductions resulting from these activities;
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Track individual facility and aggregate wastewater loads and the status of source control and pollution prevention activities;
- Monitor levels of methylmercury in discharges;
- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, the conditions under which mercury methylation occurs, and biological uptake in San Francisco Bay and tidal areas;
- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions.

The watershed NPDES permit shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that municipal wastewater facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation as a 12-month rolling average or an effluent mercury trigger concentration, it shall be required to report the exceedance in its individual Self-Monitoring Report, implement a corrective action plan, and to submit a report within 60 days that:

- Evaluates the cause of the trigger or mass exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance;
- Evaluates other measures for preventing future exceedances, depending on the cause of an exceedance; and
- Includes an action plan and time schedule to correct and prevent trigger exceedances.

Effluent mercury trigger concentrations for secondary treatment facilities are a daily maximum of 0.065 µg/L total mercury and monthly average of 0.041 µg/L total mercury. For advanced treatment facilities, effluent mercury trigger concentrations are a daily maximum of 0.021 µg/L total mercury and a monthly average of 0.011 µg/L total mercury. The Water Board may develop and implement alternative performance-based triggers on a discharger-by-discharger basis to account for water conservation or water recycling projects.

The Water Board will pursue enforcement action against dischargers that do not respond to exceedances of triggers or do not implement reasonable actions to correct and prevent trigger exceedances. Determination of reasonable actions will be based on an updated assessment of source control measures and wastewater treatment technologies applicable for the term of each issued or reissued permit.

Industrial Wastewater

The individual wasteload allocations for the industrial wastewater discharges from the five Bay Area petroleum refineries (Chevron, ConocoPhillips, Martinez Refining Co., Ultramar Golden Eagle, and Valero) listed in Table 7.2.2-4, and the individual wasteload allocations for all other industrial wastewater facilities listed in Table 7.2.2-5 shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual allocations, 1.3 kg/yr. If the aggregate mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass discharges exceed their individual mass limits.

The mass limits and the following requirements shall be incorporated into NPDES permits for all industrial wastewater dischargers:

- Develop and implement effective programs to control mercury sources and loading including demonstration that discharge levels represent good performance based on an updated assessment of source control measures and wastewater treatment technologies (the level of effort will be commensurate with the mercury load and performance of the facility) and quantify the mercury load avoided or reduced;
- Develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify the risk reductions resulting from these activities;
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Monitor levels of methylmercury in discharges;
- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, the conditions under which mercury methylation occurs, and biological uptake in San Francisco Bay and tidal areas;

- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions.

The NPDES permits for industrial facilities shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that industrial wastewater facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation as a 12-month rolling average or an effluent mercury trigger concentration, it shall be required to report the exceedance in its individual Self-Monitoring Report, implement a corrective action plan, and submit a report within 60 days that:

- Evaluates the cause of the trigger or mass exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance;
- Evaluates other measures for preventing future exceedances, depending on the cause of an exceedance; and
- Includes an action plan and time schedule to correct and prevent trigger exceedances.

Effluent mercury trigger concentrations are a daily maximum of 0.062 µg/L total mercury and monthly average of 0.037 µg/L total mercury. The Water Board may develop and implement alternative performance-based triggers on a discharger-by-discharger basis to account for water recycling projects or when there is material and substantial alteration or addition to the permitted facility.

The Water Board will pursue enforcement action against dischargers that do not respond to exceedances of triggers or do not implement reasonable actions to correct and prevent trigger exceedances. Determination of reasonable actions will be based on an updated assessment of source control measures and wastewater treatment technologies applicable for the term of each issued or reissued permit.

Bay Area petroleum refineries shall be required to work collaboratively with the Water Board to investigate the environmental fate of mercury in crude oil and report findings to the Water Board within five years of the effective date of the San Francisco Bay mercury TMDL implementation plan. These requirements may be implemented via the Water Board's authority under Section 13267 of the California Water Code or petroleum refinery wastewater NPDES permits. The report shall address two key questions:

1. What are the potential pathways by which crude oil mercury could be discharged to the Bay from Bay Area petroleum refining facilities?
2. What are the annual mercury loads associated with these discharge pathways?

Sediment Dredging and Disposal

The allocation for sediment dredging and disposal is both mass-based and concentration-based. The mercury concentration in dredged material disposed of in the Bay shall not exceed the 99th

percentile mercury concentration of the previous 10 years of Bay sediment samples collected through the Regional Monitoring Program (excluding stations outside the Bay like the Sacramento River, San Joaquin River, Guadalupe River and Standish Dam stations). Prior to disposal, the material shall be sampled and analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region." All in-Bay disposal of dredged material shall comply with the Dredging and Disposal of Dredged Sediment program described in Chapter 4 and the Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region.

The process of dredging and disposing of dredged material in the Bay may enhance biological uptake and methylmercury exposure. To address this concern, permitted dredging and disposal operations shall demonstrate that their activities are accomplished in a manner that does not increase bioavailability of mercury. As part of this demonstration, the Waste Discharge Requirements for such operations shall include requirements to conduct or cause to be conducted studies to better understand how their operations affect mercury fate, transport, and biological uptake.

Atmospheric Deposition

Mercury that deposits directly on the Bay surface and the surrounding watershed is attributed to both remote and local sources. The extent to which these sources can be controlled is unknown and the Water Board's authority to control such sources is limited. The load allocation does not allow an increase of current loads, and does not require a reduction from this source category at this time. Recent scientific studies suggest that mercury newly deposited from the atmosphere may be more available for biological uptake than mercury already present in an aquatic system. As such, the following implementation efforts need to be undertaken to evaluate the significance of atmospheric deposition and the feasibility of load reductions:

- The U.S. Environmental Protection Agency should investigate the significance of atmospheric deposition and actively pursue national and international efforts to reduce the amount of mercury released through combustion of fossil fuels; and
- The Bay Area Air Quality Management District should conduct a local mercury emissions inventory, investigate the significance of local mercury air emissions, evaluate the effectiveness of existing control measures and the feasibility of additional controls.

If local air sources are found to contribute substantially to atmospheric deposition loading to the Bay and its surrounding watershed, the Water Board will consider assigning allocations and load reductions to individual air sources and work with the Bay Area Air Quality Management District to ensure allocations are achieved.

New Mercury Sources

As the TMDL is implemented, new sources of mercury may emerge either as the result of a new facility applying for a discharge permit or as a result of a new source being discovered. The Water Board will consider establishing a load or wasteload allocation for a new mercury source under any of the following circumstances:

- The allocation from one or more existing sources of the same category (e.g., municipal wastewater) will be reduced by an amount equal to the new allocation; or

- The Water Board finds that the magnitude of the new allocation is negligible compared to load reductions from all sources that will have been realized prior to establishing the new allocation; or
- The allocation is for a previously unquantified discharge of mercury from a source category that does not already have an allocation.

This section specifies actions required for sources that are potentially either discharging mercury or enhancing methylmercury production in the Bay.

Mercury Mines

Local inactive mercury mines shall be addressed through continued implementation of the Mines and Mineral Producers Discharge Control Program (Mines Program) described in Chapter 4. The key regulatory component of this established program is that property owners of inactive and active mine sites that discharge stormwater contaminated by contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products are required to comply with NPDES industrial stormwater regulations. Under the Mines Program, the Water Board has the authority to issue individual industrial permits or allow the discharger to obtain coverage under the industrial stormwater general permit issued by the State Water Resources Control Board. For those mines that are not currently meeting the conditions set forth in the Mines Program, responsible parties shall attain compliance within five years of the effective date of the San Francisco Bay mercury TMDL implementation plan.

Bay Margin Contaminated Sites

A number of former industrial and military sites that contain mercury-enriched sediment surround the Bay. Available data are insufficient at this time to determine whether these sites may be discharging to the Bay. While the load these sites contribute to the Bay may be small relative to known sources, these sites may pose local threats. As such, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will require parties responsible for Bay margin contaminated sites to:

1. Quantify mercury mass on site such that the upper 95% confidence limit of the mean value is no more than 20% higher than the estimated mean;
2. Determine seasonal and spatial patterns of total mercury and methylmercury in sediments on site;
3. Estimate future mercury mass on site and patterns of contamination after planned remediation efforts are complete;
4. Determine seasonal patterns of total mercury and methylmercury in the water column at the site;
5. Collect prey items for local fish and birds and assess mercury concentrations; and
6. Quantify rate of sediment accretion or erosion at the site.

These requirements shall be incorporated into relevant site cleanup plans within five years of the effective date of the San Francisco Bay mercury TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL.

Wetlands

Wetlands may contribute substantially to methylmercury production and biological exposure to mercury within the Bay. Plans for extensive wetland restoration in the San Francisco Bay region raise the concern that mercury methylation may increase, thereby increasing the amount of mercury entering the food web. Implementation tasks related to wetlands focus on managing existing wetlands and ensuring that new constructed wetlands are designed to minimize methylmercury production and subsequent transfer to the food web. Implementation actions identified in the Suisun Marsh TMDL for dissolved oxygen (Section 7.9.1) are expected to reduce methylmercury production and the overall load of mercury into the Bay.

The Water Board issues Waste Discharge Requirements and Clean Water Act Section 401 certifications that set forth conditions related to Bay filling and the construction and management of wetlands. To implement the San Francisco Bay mercury TMDL, the Waste Discharge Requirements and Section 401 certifications for wetland projects shall include provisions that the restored wetland region be designed and operated to minimize methylmercury production and biological uptake, and result in no net increase in mercury or methylmercury loads to the Bay. Additionally, to demonstrate compliance with the provisions, projects must conduct mercury monitoring or cause such monitoring to be conducted, to determine how tidal wetlands and wetlands restoration impact net methylmercury production and/or bioaccumulation into the food web. Monitoring may be conducted on a project or regional basis. A regional approach to measuring and understanding patterns of mercury in biosentinel species (e.g., fish) conducted by a discharger-funded regional monitoring program is desirable and should be coordinated across individual restoration projects.

There is much active research on mercury cycling in wetlands. Information about how to manage wetlands to suppress or minimize mercury methylation will be adaptively incorporated into this implementation plan as it becomes available.

Risk Management

The mercury problem in San Francisco Bay may take decades to solve. However, there are activities that should be undertaken immediately to help manage the risk to consumers of mercury-contaminated fish. In this effort, the Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Health Services, and dischargers that pursue risk management as part of their mercury-related programs. The risk management activities will include the following:

- Providing multilingual fish-consumption advice to the public to help reduce methylmercury exposure through community outreach, broadcast and print media, and signs posted at popular fishing locations;
- Regularly informing the public about monitoring data and findings regarding hazards of eating mercury-contaminated fish; and
- Performing special studies needed to support health risk assessment and risk communication.
- Investigate ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of and mitigate health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay caught fish, such as subsistence fishers and their families.

Adaptive Implementation

The Water Board will adapt the TMDL to incorporate new and relevant scientific information such that effective and efficient actions can be taken to achieve TMDL goals. Approximately every five years, the Water Board will review the San Francisco Bay mercury TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan. At a minimum, the following focusing questions will be used to conduct the reviews. Additional focusing questions will be developed in collaboration with stakeholders during each review.

1. Is the Bay progressing toward TMDL targets as expected? If it is unclear whether there is progress, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
2. What are the loads for the various source categories, how have these loads changed over time, and how might source control measures be modified to improve load reduction?
3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? In particular, is there new evidence regarding methylmercury that might justify a methylmercury TMDL or allocation, either in addition to or instead of the total mercury TMDL and allocations? If so, how should the TMDL be modified?
4. Are effective risk management activities in place to reduce human and wildlife exposure to methylmercury? If not, how should these activities be modified or enhanced?
5. Do prey fish monitoring data confirm that TMDL load allocations are adequate to attain the wildlife target?
6. Are mercury mine and Bay margin contaminated site cleanups proceeding as expected? Are any additional actions needed to protect water quality?

Using available data, the load and wasteload allocations were determined on the basis of their sufficiency to achieve water quality standards. As part of the adaptive implementation process, the Water Board will review the TMDL as a whole and determine whether new evidence suggests revisions of specific load and wasteload allocations that will result in more strategic, efficient, and cost effective achievement of water quality standards. For example, as reliable information becomes available regarding methylation control or the relative bioavailability of sources, the Water Board will consider adjusting allocations to implement the TMDL more effectively. The Water Board may also consider revising implementation requirements and/or resulting permit requirements if such changes are consistent with the assumptions and requirements of the allocations and the cumulative effect of such changes will ensure attainment of water quality standards.

Achievement of the allocations for three of the largest source categories (Central Valley Watershed, Urban Stormwater Runoff, Guadalupe River Watershed) is projected to take 20 years, with an interim 10-year milestone of fifty percent achievement. Approximately 10 years after the effective date of the TMDL or any time thereafter, the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:

- A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;
- Documentation has been prepared that demonstrates that all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;
- A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and
- A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.

Achievement of the wasteload allocations for municipal wastewater dischargers is required within 20 years, and interim allocations within 10 years. The interim allocations are expected to be attained though aggressive pollution prevention and other cost-effective mercury reduction methods. The final wasteload allocations are expected to be attained through wastewater treatment system improvements and/or implementation of a pollutant offset program. Approximately 10 years after the effective date of the TMDL or any time thereafter, the Water Board will consider modifying the schedule for achievement of the wasteload allocations or revisions to wasteload allocations if:

- The State Board has not established a pollutant offset program that can be implemented within the 20 years required to achieve final wasteload allocations;.
- It can be demonstrated that all reasonable and feasible efforts have been taken to reduce mercury loads; and
- It can be demonstrated that no adverse local effects will result.

At approximately 20 years after the start of implementation and after taking the steps regarding schedule modification listed above, if a source category or individual discharger cannot demonstrate achievement of its allocation, despite implementation of all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger, the Water Board will consider revising the allocation scheme provided that any resulting revisions ensure water quality standards are attained.

Load and wasteload allocations have been assigned to individual entities. However, assigning loads by watersheds could be a useful approach for managing pollutant loads, particularly if net environmental benefits can be realized. A watershed-based allocation program would only involve watersheds in the San Francisco Bay region that drain to the Bay. Such an approach could involve urban runoff management programs, wastewater facilities, and other dischargers in a watershed accepting joint responsibility for load reductions. An acceptable watershed allocation program may include incentives for agencies to implement load reduction activities and account for avoided mercury loads as well as incentives for strategic removal or sequestration of mercury already in the system. Credits could be used to offset annual loads and attain allocations for multiple sources. In addition, the Water Board will encourage and consider a pilot mercury mass offset program if it is demonstrated that such a program is a more cost effective and efficient means of achieving water quality standards, and the relative potential for mercury from different sources to enter the food web and the potential for adverse local impacts have been evaluated. These programs should

recognize and reward ongoing efforts that are above and beyond those required by this TMDL. Until such programs are established, the Water Board will consider mercury source control and risk reduction activities on a case-by-case basis to determine how they contribute toward achievement of TMDL goals. The Water Board will also include in any new or modified NPDES permit a reopener to implement a pollutant offset program when it is established.

7.2.3 San Francisco Bay Polychlorinated Biphenyls TMDL

The following sections establish the TMDL for total polychlorinated biphenyls including dioxin-like PCBs congeners (hereinafter referred to as PCBs) for the San Francisco Bay. The associated numeric target, allocations, and implementation plan are designed to ensure attainment of beneficial uses and water quality objectives for the San Francisco Bay.

7.2.3.1 Problem Statement

All segments of the San Francisco Bay have been identified as impaired due to elevated levels of PCBs in sport fish. Neither the narrative water quality objective, which states that controllable water quality factors shall not cause a detrimental increase in toxic substances found in bottom sediments or aquatic life, nor the numeric water quality objective of 0.00017 µg/L total PCBs in water is attained in the San Francisco Bay. The existing beneficial use for commercial and sport fishing is not fully supported.

This TMDL addresses impairment of San Francisco Bay segments by PCBs. In the context of this TMDL, “San Francisco Bay” refers to all of the following water bodies:

- Sacramento/San Joaquin Delta (within Region 2)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- San Francisco Bay, Central
- San Francisco Bay, Lower (including)
    - Central Basin, San Francisco
    - Mission Creek
    - Oakland Inner Harbor (Fruitvale site)
    - Oakland Inner Harbor (Pacific Dry-Dock Yard 1 site) San Francisco Bay, South

This TMDL is intended to achieve protection of the commercial and sport fishing beneficial use and to the extent that other beneficial uses are affected by PCBs, the TMDL will also ensure protection of other beneficial uses, specifically, preservation of rare and endangered species, estuarine habitat and wildlife habitat.

7.2.3.2 Numeric Target

The numeric target (also referred to as the TMDL target) to protect both human health and wildlife is an average fish tissue concentration of 10 micrograms total PCBs per kilogram of typically

consumed fish, on a wet weight basis (10 µg/kg wet weight). Attainment of the total PCBs fish tissue numeric target will also protect human health and wildlife for dioxin-like PCBs.

Attainment of the fish tissue target for PCBs in San Francisco Bay will be initially evaluated by comparing the average total PCBs concentrations in the edible portion of two fish species, white croaker (size class, 20 to 30 centimeters in length) and shiner surfperch (size class, 10 to 15 centimeters in length) to the target. Comparison of the fish target against these two species of fish is considered to be protective and provides a margin of safety for the TMDL, because PCBs concentrations in these species are the highest of the fish species measured and sport recreational fishers likely consume a variety of fish species, including those species with lower PCBs concentrations. As part of the adaptive implementation of this TMDL, the Water Board will require the collection of additional information regarding recreational and subsistence fishers' patterns of consumption and evaluate if fish species other than white croaker and shiner surfperch should be considered to evaluate attainment of the target.

The number of fish samples collected to determine compliance with the target will be based on guidance described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (EPA 823-B-00-007) and on the statistical power needed to demonstrate trends in total PCBs concentration over time.

7.2.3.3 Sources

Sources of PCBs to fish and the water column of San Francisco Bay fall into two categories: (1) external sources including atmospheric deposition, Central Valley inflow, municipal and industrial wastewater discharges, and urban and non-urban stormwater runoff; and (2) internal sources, including movement or release of PCBs already in San Francisco Bay sediments, specifically, dredging and in-Bay disposal of dredged sediment, erosion of bay bottom sediment containing PCBs (bed erosion), and in-Bay contaminated sediment sites. These sources and estimates of associated loads are shown in Table 7.2.3-1. Decreases of PCBs in San Francisco Bay occur via out-of-Bay dredge material disposal, natural attenuation, and outflow through the Golden Gate.

Table 7.2.3-1 PCBs Sources and Current Loads to San Francisco Bay

Source Category	PCBs Loads kilograms per year
External	
Direct Atmospheric Deposition	Net loss
Central Valley Watershed	11
Municipal Wastewater Dischargers	2.3
Industrial Wastewater Dischargers	0.035
Urban and Non-Urban Stormwater Runoff	20
Total	**33[a]**
Internal	
Sediment Dredging and Disposal	Net Loss
Bed Erosion	Not Quantified
In-Bay Contaminated Sediment	Not Quantified

a. Total differs from column sum due to rounding

7.2.3.4 Total Maximum Daily Load

The TMDL for PCBs in San Francisco Bay is 10 kg/year. Calculation of the TMDL is based on two models: a food-web PCBs bioaccumulation model and a long-term fate mass balance model. The model results predict that attainment of the numeric target will occur when the total PCBs concentration in surface sediments in the Bay declines to one µg/kg, which will be achieved when loads from external sources are reduced to 10 kg/year.

7.2.3.5 Load and Wasteload Allocations

Load allocations are presented in Table 7.2.3-2 for source categories. Individual wasteload allocations for municipal wastewater dischargers and industrial wastewater dischargers are presented in Table 7.2.3-3 and Table 7.2.3-4. Individual wasteload allocations for stormwater runoff to county-based watersheds are presented in Table 7.2.3-5.

Table 7.2.3-2 Load and Wasteload Allocations

Source Category	Allocations kilograms per year
External	
Direct Atmospheric Deposition	0[a]
Central Valley Watershed	5
Municipal Wastewater Dischargers	2
Industrial Wastewater Dischargers	0.035
Stormwater Runoff	2
Stormwater Runoff Treatment by Municipal Wastewater Dischargers	1
Total	**10[b]**

a. Zero allocation reflects overall net loss to the atmosphere

b. Total differs from column sum due to rounding

Table 7.2.3-3 Individual Wasteload Allocations for Municipal Wastewater Dischargers

Permitted Entity	NPDES Permit	Allocations kilograms per year
American Canyon, City of	CA0038768	0.002
Benicia, City of	CA0038091	0.009
Burlingame, City of	CA0037788	0.01
Calistoga, City of	CA0037966	0.002
Central Contra Costa Sanitary District	CA0037648	0.1
Central Marin Sanitation Agency	CA0038628	0.04
Delta Diablo Sanitation District	CA0038547	0.04
East Bay Dischargers Authority Dublin-San Ramon Services District (CA0037613) Hayward Shoreline Marsh (CA0037702) Livermore, City of (CA0038008) Union Sanitary District, Wet Weather (CA0038733)	CA0037869	0.3
East Bay Municipal Utilities District	CA0037702	0.3
East Brother Light Station	CA0038806	0.00030
Fairfield-Suisun Sewer District	CA0038024	0.05
Las Gallinas Valley Sanitary District	CA0037851	0.01
Marin County Sanitary District, Paradise Cove	CA0037427	0.00003
Marin County Sanitary District, Tiburon	CA0037753	0.002
Millbrae, City of	CA0037532	0.007
Mt. View Sanitary District	CA0037770	0.007
Napa Sanitation District	CA0037575	0.04
Novato Sanitary District	CA0037958	0.02
Palo Alto, City of	CA0037834	0.09
Petaluma, City of	CA0037810	0.02
Pinole, City of	CA0037796	0.009
Contra Costa County, Port Costa Wastewater Treatment Plant	CA0037885	0.0001
Rodeo Sanitary District	CA0037826	0.002
Saint Helena, City of	CA0038016	0.001
San Francisco, City and County of, San Francisco International Airport WQCP	CA0038318	0.002
San Francisco, City and County of, Southeast Plant	CA0037664	0.3
San Jose/Santa Clara WPCP	CA0037842	0.4

Permitted Entity	NPDES Permit	Allocations kilograms per year
San Mateo, City of	CA0037541	0.04
Sausalito-Marin City Sanitary District	CA0038067	0.005
Seafirth Estates	CA0038893	0.00001
Sewerage Agency of Southern Marin	CA0037711	0.01
Sonoma Valley County Sanitary District	CA0037800	0.01
South Bayside System Authority	CA0038369	0.06
South San Francisco/San Bruno WQCP	CA0038130	0.03
Sunnyvale, City of	CA0037621	0.05
US Naval Support Activity, Treasure Island WWTP	CA0110116	0.002
Vallejo Sanitation & Flood Control District	CA0037699	0.05
West County Agency, Combined Outfall	CA0038539	0.05
Yountville, Town of	CA0038121	0.001
Total		**2**[a]

a. Total differs from column sum due to rounding

Table 7.2.3-4 Individual Wasteload Allocations for Industrial Wastewater Dischargers

Permitted Entity	NPDES Permit	Allocations[a] kilograms per year
C&H Sugar and Crockett Community Services District.	CA0005240	0.00006
Chevron Products Company	CA0005134	0.003
ConocoPhillips	CA0005053	0.0006
Crockett Cogeneration LP, and Pacific Crockett Energy, Inc.	CA0029904	0.0006
General Chemical	CA0004979	0.0009
GWF Power Systems, Site I	CA0029106	0.0001
GWF Power Systems, Site V	CA0029122	0.0001
Hanson Aggregates, Amador Street	CA0030139	0.00003
Hanson Aggregates, Olin Jones Dredge Spoils Disposal	CA0028321	0.00003
Hanson Aggregates, Tidewater Ave., Oakland	CA0030147	0.00003
Morton Salt	CA0005185	0.00008
Pacific Gas and Electric, East Shell Pond	CA0030082	0.00003
Rhodia, Inc.	CA0006165	0.0003
San Francisco, City and Co., SF International Airport Industrial WTP	CA0028070	0.002
Shell Oil Products US and Equilon Enterprises LLC	CA0005789	0.002
Mirant Delta LLC, Pittsburg Power Plant	CA0004880	0.0008
Mirant Potrero LLC, Potrero Power Plant	CA0005657	0.0003
Tesoro Refining and Marketing Company	CA0004961	0.002
The Dow Chemical Company	CA0004910	0.0006
USS-Posco	CA0005002	0.02
Valero Refining Company	CA0005550	0.0007
Total		**0.035[b]**

a. Wasteload allocations for industrial wastewater dischargers do not include mass from once-through cooling water. The Water Board will apply intake credits to once-through cooling water as allowed by law.

b. Total differs from column sum due to rounding

Table 7.2.3-5 County-Based Watershed Wasteload Allocations for Stormwater Runoff

County[b]	Allocations[a] kilograms per year
Alameda	0.5
Contra Costa	0.3
Marin	0.1
Napa	0.05
San Francisco[c]	0.2
San Mateo	0.2
Santa Clara	0.5
Solano	0.1
Sonoma	0.05
Total:	**2**

a. Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas within the County. Examples of discharges include but are not limited to California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

b. Includes unincorporated areas and all municipalities in the county that drain to the Bay and are part of the San Francisco Bay Region.

c. Does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the City and County of San Francisco's Southeast Plant and Northpoint Wet Weather Facility (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

7.2.3.6 Implementation Plan

The implementation plan includes three general implementation categories: control of external loadings of PCBs to the Bay, control of internal sources of PCBs within the Bay, and actions to manage risks to Bay fish consumers. In addition, the plan includes monitoring to measure attainment of the numeric target and load allocations, and measuring implementation progress. The plan will be implemented in phases via an adaptive implementation strategy founded on requiring actions in each category based on the current state of knowledge of PCBs sources and control measures, while also conducting studies to improve our understanding of PCBs sources, control options, and fate in the environment.

External Sources

This section, organized by source categories, specifies actions required to achieve allocations and implement the TMDL.

Central Valley Watershed

Sediments entering the Bay from the Central Valley have lower concentrations of PCBs than in-Bay sediment. Major mass loading events that occur during episodic high flow conditions generally flow directly out of the Bay through the Golden Gate. It is anticipated that the Central Valley allocation will be attained through natural attenuation.

Municipal and Industrial Wastewater Dischargers

Wasteload allocations shall be implemented through NPDES permits that require implementation of best management practices to maintain optimum treatment performance for solids removal and the identification and management of controllable sources. NPDES permits shall include effluent limits based on current performance and a requirement for quantification of PCBs loads to the Bay in order to determine attainment of the wasteload allocations. Compliance with effluent limits shall be determined using a Title 40, Code of Federal Regulations, Part 136 analytical method (effective as of April 25, 2007). In addition, municipal and industrial wastewater dischargers will be required to support actions to reduce the health risks of people who eat PCBs-contaminated, San Francisco Bay fish and to conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

It is the Water Board's intent to implement individual wasteload allocations via numeric water quality-based effluent limitations for PCBs in NPDES permits. These limits shall represent individual dischargers' PCBs loads, consistent with the underlying assumptions and requirements of the wasteload allocations. In the absence of actual discharge performance data sufficient to calculate such limits, the Water Board will apply appropriate uncertainty factors to the individual wasteload allocations.

Dischargers shall also be required to conduct sufficient monitoring of their effluent, which accounts for discharge variability and blended effluent, to enable calculation of current PCBs loading. These requirements will be implemented via NPDES permits or the Water Board's authority under Section 13267 of the California Water Code, such that monitoring begins no later than January 2009 and is completed in a timely manner.

Stormwater Runoff

Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued, shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on best available technology economically achievable. All permits shall remain consistent with Section 4.8 - Stormwater Discharges.

In the first five-year permit term, stormwater permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement

technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Stormwater runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an stormwater runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Urban Stormwater Runoff Treatment by Municipal Wastewater Dischargers

Routing of urban stormwater runoff through municipal wastewater treatment facilities may be an efficient means of reducing PCBs, and other particle-associated contaminant loads to the Bay. This load allocation shall be implemented through a permit. Within five years of adoption of this TMDL, the Water Board will consider issuance of a permit under which municipal wastewater dischargers can apply for a portion of this reserved allocation.

Internal Sources

In-Bay PCB-Contaminated Sites

A number of former industrial and military sites adjacent to PCBs-enriched sediment are found throughout the Bay. This TMDL does not require any specific party to implement new actions for in-Bay PCB-contaminated sites. However, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will maintain an inventory of contaminated sites and continue to set priorities for investigating and remediating the sites. The existing list of in-Bay PCB-contaminated sites referred to in this TMDL is based on data collected under the Bay Protection Toxic Cleanup Program, which identified sites with total PCBs in sediment that exceed 180 µg/kg. This TMDL does not set a cleanup level for total PCBs in sediment. The fish tissue target of 10 µg/kg and the sediment goal of one ug/kg are not cleanup standards, nor should they be considered appropriate, or relevant, and applicable requirements (ARARs) or a "to-be-considered" ARAR under the National Contingency Plan, 40 CFR Part 300 et. Seq. or the 1986 Superfund Amendments and Reauthorization Act. An analysis of the feasibility, technical practicability, and potential environmental impacts of individual clean-up actions is currently required prior to conducting cleanup of contaminated in-Bay sediment overseen by the Water Board and the Department of Toxic Substances Control and will continue to be required, not withstanding this TMDL. The Water Board has the authority to approve, disapprove or condition these projects to minimize adverse environmental impacts while achieving the goals of environmental cleanup.

The Water Board will coordinate cleanup actions with the U.S. EPA and the Department of Toxic Substances Control, and advise them that the fish tissue target and sediment goal do not constitute cleanup standards for ARARs. The Water Board will issue cleanup orders as necessary. The Water Board will require responsible parties for each specific Bay margin contaminated site to:

1. Estimate the pre-cleanup and post-cleanup vertical and lateral extent of PCBs in Bay sediments;
2. Estimate the pre-cleanup and post-cleanup mass of PCBs in Bay sediments;
3. Quantify rate(s) of sediment accretion, erosion or natural attenuation;
4. Implement on-land source control measures, if necessary, to ensure that on-land sources of PCBs do not further contaminate in-Bay sediments;
5. Evaluate post-cleanup, the residual risks to humans and wildlife;
6. Support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish;
7. Conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

These requirements shall be incorporated into relevant site investigation plans within five years of the effective date of this TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL or as agreed to in the individual site investigation plan.

Navigational Dredging

The PCBs concentration in dredged material disposed of in the Bay shall not exceed the 99th percentile PCBs concentration of the previous 10 years of Bay sediment samples collected through the RMP (excluding stations outside the Bay like the Sacramento River, San Joaquin River, Guadalupe River and Standish Dam stations). Prior to disposal, the material shall be sampled and analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region." All in-Bay disposal of dredged material shall comply with Section 4.20, entitled Dredging and Disposal of Dredged Sediment, including the Long Term Management Strategy. Additionally, dredged material dischargers will be required to conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

Risk Management

Load reductions and attainment of the numeric target to support fishing in the Bay as a beneficial use will take time to achieve. However, there are actions that should be undertaken prior to achievement of the numeric fish tissue target to help manage the risk to consumers of PCBs-contaminated fish. The Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Toxic Substances Control, the California Department of Public Health, dischargers, and interested parties to pursue risk management strategies. The risk management activities will include the following:

- Investigating and implementing actions to address the public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce the actual and potential exposure of, and mitigate health impacts to, people and communities most likely to be consuming PCB-contaminated fish from San Francisco Bay, such as recreational and subsistence fishers and their families;
- Providing multilingual fish-consumption advice to the public to help reduce PCBs exposure through community outreach, broadcast and print media, and signs posted at popular fishing locations;

- Regularly informing the public about monitoring data and findings regarding hazards of eating PCB-contaminated fish; and
- Conducting special studies needed to support health risk assessment and risk communication, including the collection of additional information regarding recreational and subsistence fishers' patterns of consumption.

7.2.3.7 Critical Data Needs

Additional data and other information will be needed to assess both the progress toward attainment of the fish tissue target and to evaluate the need for modifications to the implementation plan, TMDL, and/or allocations. Dischargers will be required to conduct or cause to be conducted the following studies to fill critical data needs.

- PCBs mass budget modeling and food web model improvements – Model refinements to improve our ability to predict recovery rates of the Bay from impairment by PCBs, to help strategically focus implementation actions on those actions with the most potential for success, and to help better our understanding of the role in-Bay PCBs-contaminated sites play in the Bay's recovery.
- Rate of natural attenuation of PCBs in the Bay environments –A better understanding of local rates of natural attenuation in order to predict with more certainty the recovery time of the Bay.

Monitoring

Monitoring to demonstrate progress toward attainment of the TMDL target shall be conducted by maintaining discharger-funded RMP monitoring of PCBs in San Francisco Bay fish, sediments, and water at a spatial scale and frequency to track trends in the decline of PCBs in the Bay. Monitoring of load allocations to demonstrate progress towards attainment shall be conducted by municipal and industrial wastewater dischargers and stormwater permittees as discussed in external sources above.

Continued regular monitoring of PCB loads from the Central Valley and other tributaries to the Bay shall be conducted by maintaining discharger-funded RMP monitoring in order to provide information on the long term decline of PCBs to the Bay and to confirm the assumption that Central Valley loads are being reduced due to natural attenuation. Monitoring of loads allocated to other sources will be considered as part of the RMP special studies.

Adaptive Implementation

Adaptive implementation entails taking actions commensurate with the existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Accordingly, this TMDL will be implemented in phases starting with actions described in each source category, risk management, monitoring, and critical data needs section above with subsequent modifications and phases based on improved knowledge of PCBs sources, control measures, and fate in the environment.

The Water Board will adapt the TMDL and implementation plan to incorporate new and relevant scientific information such that effective and efficient measures can be taken to achieve the allocations and numeric fish tissue target. The Water Board staff will present an annual progress

report to the Water Board on implementation of the TMDL that includes evaluation of new and relevant information that becomes available through implementation actions, monitoring, special studies, and the scientific literature. Within ten years of the effective date of the TMDL, Water Board will consider a Basin Plan amendment that will reflect and incorporate the data and information that is generated in the intervening years. The Water Board will consider amending the PCBs TMDL and implementation plan as necessary to ensure attainment of water quality standards in a timely manner while considering the financial and environmental consequences of new control measures.

In particular, achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:

- A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;
- Documentation has been prepared that demonstrates that all technically and economically feasible and cost-effective control measures recognized by the Water Board have been fully implemented, and evaluates and quantifies the PCBs load reduction of such measures;
- A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and
- A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.

7.2.4 North San Francisco Bay Selenium Total Maximum Daily Load (TMDL)

The following sections establish the TMDL for selenium in North San Francisco Bay segments (North Bay) including the portion of the Sacramento/San Joaquin Delta (within the San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, and Central Bay. The associated numeric targets, allocations, and implementation plan are designed to ensure attainment of selenium water quality standards, including beneficial uses in the North Bay.

7.2.4.1 Problem Statement

This TMDL addresses selenium impairment in North San Francisco Bay segments. Selenium is an essential and naturally-occurring micronutrient but in high quantities can cause reproductive impairment. Dietary uptake of particulate selenium is the most important exposure pathway for aquatic organisms, especially predators, and some types of food webs bioaccumulate selenium more efficiently than others. In the North Bay, selenium bioaccumulation at levels of concern has been detected only in clam–eating bottom feeders, such as white sturgeon and Sacramento splittail. Sturgeon feed predominantly on benthic organisms, including invasive, non-native clams (i.e., *Potamocorbula amurensis*) that are very efficient selenium bioaccumulators, which makes sturgeon susceptible to bioaccumulation of selenium to toxic levels. This TMDL is intended to ensure protection of the estuarine habitat beneficial uses, and to the extent that other beneficial uses are affected by selenium, the TMDL will also ensure protection of other beneficial uses, specifically, preservation of rare and endangered species, wildlife, and commercial and sport fishing beneficial uses.

7.2.4.2 Numeric Targets

The numeric targets for the North Bay are listed in Table 7.2.4-1.

Table 7.2.4-1 Numeric Targets for Selenium

Fish Tissue Targets	Water Column Target
8.0 µg/g whole-body dry weight **11.3** µg/g muscle tissue dry weight	**0.5** µg/L (dissolved total Se)

The whole-body fish tissue target protects against long-term chronic effects of selenium in fish and forms the basis for the water column target. Both the fish tissue and the water column targets will be evaluated to assess protection of beneficial uses. Attainment of the fish tissue targets will be assessed by comparing measured selenium concentrations in fish to the appropriate tissue. Concentrations in sturgeon will be compared to the muscle tissue target, because sturgeon are too large a fish to be analyzed whole and, therefore, comparison to the whole-body numeric target is not feasible. Use of nonlethal sampling methods, i.e., sampling of tissue plugs, in lieu of muscle tissue sampling for sturgeon, is allowed, if there is documentation that the nonlethal method provides data comparable to muscle tissue data.

7.2.4.3 Sources

The main inputs of selenium into the North Bay include contributions from the Sacramento and San Joaquin Rivers as Central Valley watershed load (4070 kg/yr), local tributaries (520 kg/yr), atmospheric deposition (< 30 kg/yr), discharges from petroleum refineries (571 kg/yr), and municipal and industrial wastewater dischargers (117 kg/yr). While loads from the Sacramento River, local tributaries, including urban runoff, and atmospheric deposition represent natural background, the San Joaquin River loads include an anthropogenic source, agricultural drainage, generated by irrigation of seleniferous soils.

7.2.4.4 Total Maximum Daily Load and Allocations

The TMDL for selenium is 5300 kg/year and represents the sum of loads from the existing major sources (Table 7.2.4-2). Because selenium bioaccumulation is a long-term process, there is no evidence that selenium bioaccumulation is notably higher at any particular time of year, despite the strong seasonal variability in loads reaching the North Bay.

The TMDL is based on long-term estimates of loads from major sources; therefore the TMDL and allocations are expressed as annual loads.

Load allocations for major source categories are presented in Table 7.2.4-2. Individual wasteload allocations for petroleum refineries and municipal and industrial wastewater dischargers are presented in Table 7.2.4-3 and Table 7.2.4-4.

Table 7.2.4-2 Selenium Load Allocations

Load Category	Load Source	**Allocations** [kg total Se per year]
Load Allocations	Central Valley Watershed	4070
	Local Tributaries[1]	520
	Atmospheric deposition	< 30
Wasteload Allocations	Petroleum Refineries	571
	Municipal Wastewater Dischargers	111
	Industrial Wastewater Dischargers	6
	Total TMDL	**5300[2]**

1 An insignificant portion of this load is from urban runoff and therefore there is no allocation

2 Total TMDL load differs from column sum due to rounding

Table 7.2.4-3 Individual Wasteload Allocations for Petroleum Refineries

Permitted Entity	**NPDES Permit**	**Allocation** [kg/yr]
Chevron Products Company	CA0005134	111
Phillips66 *(formerly ConocoPhillips)*	CA0005053	93
Shell Oil Products US	CA0005789	244
Tesoro Refining and Marketing Company	CA0004961	60
Valero Refining Company	CA0005550	63
	Total	**571**

Table 7.2.4-4 Individual Wasteload Allocations for Municipal and Industrial Dischargers

Permitted Entity	NPDES Permit	Allocation [kg/yr]
Municipal		
City of American Canyon	CA0038768	1.6
City of Benicia	CA0038091	1.1
City of Calistoga	CA0037966	0.3
Central Contra Costa Sanitation District	CA0037648	17.4
Central Marin Sanitation Agency	CA0038628	4.0
Contra Costa Co. Sanitary District No.5	CA0037885	0.1
Delta Diablo Sanitary District	CA0038547	8.1
East Bay Municipal Utility District	CA0037702	30.0
Fairfield-Suisun Sewer District	CA0038024	9.7
Las Gallinas Valley Sanitary District	CA0037851	1.2
Marin County S.D. No 5	CA0037427	0.5
Mt. View Sanitary District	CA0037770	1.1
Napa Sanitation District	CA0037575	6.7
Novato Sanitary District	CA0037958	2.5
City of Petaluma	CA0037810	3.4
City of Pinole	CA0037796	2.2
Rodeo Sanitary District	CA0037826	0.4
Sausalito-Marin City Sanitary District	CA0038067	1.9
Sewerage Agency of Southern Marin	CA0037711	1.4
Sonoma Valley County Sanitary District	CA0037800	2.1
City of St. Helena	CA0038016	0.4
Treasure Island	CA0037810	0.1
Vallejo Sanitation & Flood Control District	CA0037699	6.7
West County Agency	CA0038539	7.9
Town of Yountville	CA0038121	0.2
Industrial		
Eco Services (formerly Solvay/Rhodia, Inc.)	CA0006165	0.7
USS-Posco Industries	CA0005002	4.5
C&H Sugar Company-Crockett WWTP	CA0005240	0.5
	Total	**117**

Total load differs from column sum due to rounding

7.2.4.5 Implementation Plan

The intent of this implementation plan is to ensure attainment of selenium water quality standards. Existing selenium concentrations in the water column are below the TMDL target. Concentrations in sturgeon have been gradually decreasing since the late 1990s. For these reasons, it is appropriate to base the TMDL on current loading and focus the implementation plan on maintaining the current load into the future.

The main goal of the implementation plan is to prevent increases of selenium concentrations in North Bay waters and attain safe levels of selenium in fish, specifically sturgeon. This will be accomplished through:

- performance-based effluent limits for petroleum refineries;
- maintaining control actions to reduce loads from the San Joaquin River watershed; and
- continuation of ambient water quality monitoring in the North Bay and monitoring of flow and selenium concentrations in the lower San Joaquin River.

Because loads from the Sacramento River, local tributaries, and atmospheric deposition are representative of natural background, no implementation actions are necessary.

Petroleum Refineries

Wasteload allocations for the five North Bay petroleum refineries shall be implemented through NPDES permits with performance-based mass limits expressed as kg/day. The mass limit shall be calculated as the 95th percentile of the daily loads based on representative effluent data collected during the period of 2000 through 2012. Establishing mass limits as the 95th percentile of daily loads is consistent with the calculation of annual loads and the wasteload allocations. Petroleum refineries shall report their average annual load once per permit term. Compliance with the mass limits shall be determined on a monthly basis. The monthly average of daily loads should not exceed the mass limit. Permits shall also require the petroleum refineries to conduct or cause to be conducted monitoring to demonstrate attainment of the numeric targets.

Municipal and Industrial Wastewater Dischargers

NPDES permits for municipal and industrial wastewater dischargers are not required to have numeric effluent limits for selenium because these discharges have an insignificant impact on North Bay water quality, and no further selenium reductions are required to ensure attainment of the TMDL. To ensure ongoing protection of North Bay water quality, municipal and industrial wastewater dischargers shall be required to report their average annual load once per permit term to verify that selenium loading is consistent with the wasteload allocations identified in Table 7.2.4-4. Permits shall also require the dischargers to conduct or cause to be conducted monitoring to ensure the numeric targets are being attained in the North Bay.

Central Valley Watershed (San Joaquin River)

Selenium loads in the Sacramento River watershed are from naturally-occurring sources and are expected to remain at current levels or less. The San Joaquin River system conveys selenium-enriched agricultural drainage and runoff to the Delta and the North Bay. Attainment of the Central Valley watershed load allocation relies on continued efforts to manage and reduce discharges of agricultural subsurface drainage in the San Joaquin River watershed. The Central Valley Regional Water Quality Control Board has established three TMDLs for selenium in San Joaquin River system water bodies receiving agricultural drainage. These TMDLs are implemented through the

Grasslands Bypass Project, and implementation actions have gradually reduced the load of selenium discharged to these water bodies. Full attainment of the TMDLs is expected by 2019. Changes to the State Water or Central Valley Projects' operations, other upstream diversions, or flow modifications may cause increases of selenium loading into the North Bay, for example, from increased flows from the San Joaquin River but the magnitude and potential impacts of these changes are uncertain at this time. It is the intention of this Water Board to work with the State and the Central Valley Water Boards to ensure the current load allocation for the Central Valley watershed in the TMDL is attained.

Monitoring

Monitoring to demonstrate attainment of the TMDL targets shall be conducted by maintaining discharger-funded RMP monitoring of selenium in fish and water at a spatial scale and frequency to determine whether concentrations in fish, specifically sturgeon, remain low and water column and fish tissue targets are met.

Monitoring of loads to demonstrate that they are consistent with the wasteload allocations shall be conducted by petroleum refineries and municipal and industrial wastewater dischargers.

The Water Board will work with the State Water Board and Central Valley Water Board through their planning and regulatory processes to ensure that monitoring is conducted to evaluate changes in selenium concentrations and loads from the Central Valley Watershed and San Joaquin River and to ensure that any increases in selenium upstream are addressed through the State Water Board's or Central Valley Water Board's regulatory processes.

7.2.5 San Francisco Bay Beaches Bacteria TMDL

The following sections establish the TMDL for San Francisco Bay beaches impaired by bacteria. The numeric targets, load and waste load allocations, and implementation plan are designed to support and protect the Bay's designated beneficial use of water contact recreation (e.g., swimming and wading).

7.2.5.1 Problem Statement

The waters adjacent to several San Francisco Bay beaches are impaired by indicator bacteria. Bacteriological water quality objectives are exceeded based on elevated indicator bacteria densities, and thus, there is impairment of the water contact recreation (REC-1) beneficial use in these water bodies. Recreating in waters with elevated indicator bacteria densities has long been associated with adverse health effects. Specifically, national epidemiological studies demonstrate a causal relationship between adverse health effects and recreational water quality, as measured by indicator bacteria densities.

This TMDL addresses bacteria impaired beaches in San Francisco Bay east of the Golden Gate Bridge. The impaired beaches include:

- Aquatic Park Beach, San Francisco
- Jackrabbit, Sunnydale Cove, and Windsurfer beaches in Candlestick Point State Recreation Area, San Francisco
- Crissy Field Beach, San Francisco
- Parkside Aquatic and Lakeshore beaches on Marina Lagoon, City of San Mateo

- China Camp Beach, Marin County
- McNears Beach, Marin County

China Camp Beach and McNears Beach are on the list of impaired water bodies because levels of only one bacterial indicator in waters at these beaches, total coliform, exceeds the Basin Plan's water quality objective. Waters at the other beaches exceed the bacterial indicator for Enterococcus and other bacterial indicators.

7.2.5.2 Sources

Bacteria sources are identified based on documentation of inadequately-treated human waste discharges, such as sanitary sewer overflow reports, and the scientific evidence linking land uses in the vicinity of the beaches to elevated bacteria concentrations in urban runoff to the beaches. If not properly managed, the following source categories have the potential to discharge bacteria to San Francisco Bay beaches at levels that cause or contribute to exceedances of water quality objectives: sanitary sewer collection systems, urban runoff, pets at the beaches, vessels, and wildlife. Wet weather discharges from the City of San Francisco's combined sewer system that are authorized pursuant to U.S. EPA's Combined Sewer Overflow (CSO) Control Policy (see Section 4.9 Wet Weather Overflows) are not considered a significant source of bacteria to these San Francisco beaches.

7.2.5.3 Numeric Targets

This TMDL establishes a desired, or target, condition for water contact recreation use at impaired San Francisco Bay beaches. The numeric targets are the Enterococcus water quality objectives established for water contact recreation uses in marine and estuarine waters (Table 3-1) and on the U.S. EPA's 2012 recommended Enterococcus criteria for water contract recreation in marine and fresh water. The numeric targets for this TMDL are listed in Table 7.2.5-1.

Table 7.2.5-1 Numeric Targets for San Francisco Bay Beaches

Enterococcus	
Geometric mean	< 35 MPN/100 mL
Single sample maximum	No sample > 104 MPN/100 mL

7.2.5.4 Total Maximum Daily Loads

The TMDL for San Francisco Bay beaches is equivalent to the Basin Plan's water quality objectives and the numeric target for Enterococcus as shown in Table 7.2.5-1.

7.2.5.5 Load and Waste Load Allocations

Density-based pollutant allocations for bacteria source categories are the same as the numeric targets and the TMDL listed above. Table 7.2.5-2 summarizes the load and wasteload allocations for discharges of bacteria to impaired San Francisco Bay beaches.

Discharges of raw or inadequately-treated human waste are prohibited, and thus sanitary sewer collection systems and vessels have an allocation of zero.

All entities that discharge indicator bacteria or have jurisdiction over such discharges are responsible for meeting these allocations. Discharging entities will not be held responsible for

uncontrollable discharges originating from wildlife. If non-nuisance wildlife contributions are found to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of adaptive implementation. Implementing parties shall demonstrate achievement of allocations in the receiving water bodies (i.e., at the beach shoreline water quality monitoring stations).

All implementing parties are required to attain their respective allocations by taking a phased approach in which additional or enhanced actions are required if initial implementation actions do not result in attainment of the TMDL within approximately five years.

Table 7.2.5-2 Load and Wasteload Allocations for San Francisco Bay Beaches

Pollutant Source Category	Enterococcus Geometric Mean[a] (MPN/100 mL)	Enterococcus Single Sample Maximum (MPN/100 mL)
Sanitary Sewer Collection Systems[b]	0	0
Urban Runoff[c]	< 35	No sample > 104
Vessels (Anchor-outs, recreational, houseboats)	0	0
Wildlife[d]	< 35	No sample > 104

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

b. For the City of San Francisco, the wasteload allocation applies only to the collection system portion of the combined sewer system.

c. Wasteload allocation for discharges from municipal separate storm sewer systems (NPDES No. CAS612008, CAS000004 and CAS000003).

d. With the exception of nuisance wildlife, such as geese, wildlife is not a controllable source of bacteria. No management measures will be required for uncontrollable wildlife sources.

7.2.5.6 Implementation Plan

This Implementation Plan builds on management measures required by existing local, regional, and statewide regulations and orders to reduce or eliminate waste discharges from sanitary sewer collection systems, urban runoff, pets at beaches, and vessels. The plan requires actions consistent with existing regulations and orders, including the following:

- Water Board Municipal Regional Stormwater Permit (NPDES No. CAS612008)
- State Water Board NPDES Permit for Small Municipal Separate Storm Sewer Systems (MS4) (NPDES No. CAS000004)
- State Water Board Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ as revised by Order No. 2008-0002-EXEC)
- State Water Board Stormwater Permit for California Department of Transportation (NPDES No. CAS000003)
- Basin Plan Discharge Prohibition No. 15 (Table 4.1), which states: “It shall be prohibited to discharge raw sewage or any waste failing to meet waste discharge requirements to any waters of the Basin.”

- Regional Water Board Cease and Desist Order for the City of San Mateo, Town of Hillsborough, and Crystal Springs County Sanitation District Sanitary Sewer Waste Discharges (Order No. R2-2009-0020)
- Regional Water Board NPDES Permit for the City and County of San Francisco Southeast Water Pollution Control Plant, North Point Wet Weather Facility, Bayside Wet Weather Facilities, and Wastewater Collection System (Order No. R2-2013-0029).

The entities responsible for implementing this plan are stated below, as are the regulatory mechanisms by which the Water Board may require that the actions be taken.

Sanitary Sewer Collection Systems

Wasteload allocations for sanitary sewer collection systems will be implemented through the requirements and provisions of the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems and, for Marina Lagoon beaches, Cease and Desist Order No. R2-2009-0020 issued by the Water Board to the City of San Mateo. In the case that further investigation or reduction of pathogen sources related to sanitary sewer collection systems is needed, such actions will be initiated through the Water Board's authorities under the California Water Code.

This TMDL requires no modifications to NPDES permitting of wet weather discharges from the City of San Francisco's combined sewer system, authorized pursuant to U.S. EPA's CSO Control Policy, as they are unnecessary to achieve the TMDL. The wasteload allocation in Table 7.2.5-2 only applies to the collection system portion of San Francisco's combined sewer system.

Urban Runoff

Wasteload allocations for urban runoff (i.e., municipal stormwater runoff and dry weather flows) shall be implemented through the Municipal Regional Stormwater Permit (NPDES No. CAS612008) and the State Water Board NPDES Permit for Small MS4s (NPDES No. CAS000004).

Urban runoff from the California Department of Transportation's (Caltrans') highways has not been found to be a significant source of indicator bacteria, largely because Caltrans' highways comprise a very small area within San Francisco Bay beach watersheds. If during the course of adaptive implementation, Caltrans' facilities are found to be sources of bacteria to San Francisco Bay beaches, wasteload allocations for such discharges will be implemented through the requirements of the State Water Board Stormwater Permit for Caltrans (NPDES No. CAS000003).

Municipal stormwater entities, including national, State, or regional park systems (hereinafter referred to as park authorities), that discharge stormwater to impaired beaches are required to submit a plan to the Water Board that describes current best management practices (BMPs), their current level of implementation, and additional BMPs and/or increased levels of implementation of existing BMPs to reduce discharges of bacteria from their storm drain systems that cause or contribute to exceedance of wasteload allocations. The plan shall include a schedule for implementation of the BMPs and enhanced BMPs.

Municipal stormwater entities and/or park authorities, as applicable, shall implement pet waste control measures to reduce discharges of bacteria at the beach and shall submit a plan to do so to the Water Board, as described above.

The Water Board will establish permit requirements to implement wasteload allocations based on implementation of BMPs. The Water Board will not include numeric limits in NPDES permits if the

discharger demonstrates full implementation of technically feasible, effective, and cost efficient BMPs to control all controllable sources to, and discharges from, their storm drain systems.

Vessels

Vessels ranging in size from self-propelled row boats and kayaks to yachts operate in waters adjacent to beaches addressed by this TMDL. In addition to the Basin Plan prohibition on discharge of raw sewage, the California Health and Safety Code (§117475-117500) prohibits dumping any garbage into navigable waters of the state. Where vessels present a source of bacteria to an impaired beach, the entity with authority over vessels, such as a municipality or park authority or marina owner, shall be responsible for implementing measures to control this bacteria source.

Wildlife

Municipal stormwater entities and park authorities are responsible for control measures for nuisance wildlife, such as resident goose populations. Discharging entities will not be held responsible for uncontrollable discharges originating from wildlife.

Implementation Plan elements that are common to all or most impaired San Francisco Bay beaches are described on Table 7.2.5-3. Tables 7.2.5-4 through 7.2.5-7 list the implementation actions and schedules for the individual impaired beaches identified in 7.2.5.1, Problem Statement. The implementation schedules allow time for the implementing parties to identify and implement measures that are necessary to control bacteria discharges causing impairment.

Table 7.2.5-3 Implementation Plan Elements			
Source	**Action**	**Implementing Party**	**Completion Timeframe**
Sanitary Sewer Collection Systems	1. Comply with Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.	Sanitary sewer collection system authority	Ongoing
	2. Submit an enhanced Sewer System Management Plan that prioritizes sewer system inspections and repairs in areas within ¼ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	Sanitary sewer collection system authority	6 months 3 years
	3. Determine effectiveness of sewer system repairs: Assess beach monitoring data to determine if targets are met at the beach.	Sanitary sewer collection system authority	5 years
	After five years, begin enhanced implementation if targets not met		
	4. If targets are not met, submit an enhanced Sewer System Management Plan that prioritizes sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	Sanitary sewer collection system authority	5.5 years 8 years
	5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program.	Sanitary sewer collection system authority, and Municipalities	5 years
Sewer Collection System & Urban Runoff	Establish and implement a protocol to enhance efforts to identify and correct illicit connections to the storm drain system.	Sanitary sewer collection system authority, and Municipal stormwater entity(s)	6 months

Table 7.2.5-3 Implementation Plan Elements			
Source	**Action**	**Implementing Party**	**Completion Timeframe**
Urban Runoff	1. Submit a plan that describes BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. Include control of nuisance wildlife if it represents a likely source of bacteria to the beach. The plan shall include a schedule and milestones for implementation.	Municipal stormwater entity(s)	6 months
	2. Determine effectiveness of urban runoff controls: Assess beach monitoring data to determine if targets are met at the beach.	Municipal stormwater entity(s)	5 years
	After five years, begin enhanced implementation if targets not met		
	3. If targets are not met, submit: (a) a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include an implementation schedule and milestones. and (b) a supplemental monitoring plan (*supplemental to ongoing beach monitoring*) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rationale to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.	Municipal stormwater entity(s)	5.5 years
	4. Where pets at the beach may be a source of bacteria to a beach, establish and implement protocols to control pet waste through such measures as providing bags, trash receptacles, and signage.	Park authority or Municipal stormwater entity(s)	6 months
Vessels	Where vessels represent a potential source of bacteria to the beach, begin or boost “no dumping” education efforts; identify and implement other needed BMPs, such as improving pump outs and other infrastructure.	Port authority, or marina owner	6 months from discovery of source
Wildlife	Where nuisance wildlife represents a potential source of bacteria to the beach, and the beach is managed by a non-municipal park authority, establish and implement protocols to control this source of bacteria.	Park authority, or include in Urban Runoff enhanced BMPs plans	6 months from discovery of source

Table 7.2.5-4 Aquatic Park Beach Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
Sanitary Sewer Collection System	1. Comply with Statewide General Waste Discharge Requirements for Sanitary Sewer Systems and Order No. R2-2013-0029.	Port of San Francisco and SFPUC	Ongoing
	2. Submit an enhanced Sewer System Management Plan and Operations and Maintenance Plan for the combined sewer system (O&M Plan), as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ¼ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	SFPUC, Port of San Francisco, and San Francisco Maritime National Historic Park	6 months 3 years
	3. Determine effectiveness of sewer system repairs: Assess beach monitoring data to determine if targets are met at the beach.	SFPUC	5 years
	4. If targets are not met, submit an enhanced Sewer System Management Plan and O&M Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	SFPUC, Port of San Francisco, and San Francisco Maritime National Historic Park	5.5 years 8 years
	5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program or refocus existing lateral program efforts to address these sources.	SFPUC, Port of San Francisco, San Francisco Maritime National Historic Park, and City of San Francisco	5 years

Table 7.2.5-4 Aquatic Park Beach Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
Sewer Collection System & Urban Runoff	Establish and implement a protocol to enhance efforts to identify and correct illicit connections to the storm drain system.	SFPUC, Port of San Francisco, and San Francisco Maritime National Historic Park	6 months
Urban Runoff	1. Submit a plan acceptable to the Executive Officer describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. Include control of nuisance wildlife if it represents a likely source of bacteria to the beach. The plan shall include a schedule and milestones for implementation.	SFPUC, Port of San Francisco, San Francisco Maritime National Historic Park, and City of San Francisco	6 months
	2. Determine effectiveness of urban runoff controls: Assess beach monitoring data to determine if targets are met at the beach.	SFPUC	5 years
	3. If targets are not met, submit, acceptable to the Executive Officer: (a) a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include an implementation schedule and milestones. and (b) a supplemental monitoring plan (*supplemental to ongoing beach monitoring*) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.	SFPUC, Port of San Francisco, San Francisco Maritime National Historic Park, and City of San Francisco	5.5 years
	4. Where pet waste may be a source of bacteria to a beach, establish and implement protocols to control pet waste through such measures as providing bags, trash receptacles, and signage.	San Francisco Maritime National Historic Park	6 months

[a] Timeframe begins on the effective date of this Basin Plan amendment

Table 7.2.5-5 Candlestick Point Beaches Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
Sanitary Sewer Collection System	1. Comply with Statewide General Waste Discharge Requirements for sanitary sewer systems.	SFPUC and California State Parks	Ongoing
	2. Submit an enhanced Sewer System Management Plan and O&M Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ¼ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	SFPUC and California State Parks	6 months 3 years
	3. Determine effectiveness of sewer system repairs: Assess beach monitoring data to determine if targets are met at the beach.	SFPUC	5 years
	4. If targets are not met, submit an enhanced Sewer System Management Plan and O&M Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	SFPUC and California State Parks	5.5 years 8 years
	5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program or refocus existing lateral program efforts to address these sources.	SFPUC and City of San Francisco	5 years
Sewer Collection System & Urban Runoff	Establish and implement a protocol to enhance efforts to identify and correct illicit connections to the storm drain system.	SFPUC and California State Parks	6 months
Urban Runoff	1. Submit a plan acceptable to the Executive Officer that describes BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. Include control of nuisance wildlife if it represents a likely source of bacteria to the beach. The plan shall include a schedule and milestones for implementation.	SFPUC, California State Parks, and City of San Francisco	6 months

Table 7.2.5-5 Candlestick Point Beaches Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
	2. Determine effectiveness of urban runoff controls: Assess beach monitoring data to determine if targets are met at the beach.	SFPUC	5 years
	3. If targets are not met, submit, acceptable to the Executive Officer: (a) a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include an implementation schedule and milestones. and (b) a supplemental monitoring plan (*supplemental to ongoing beach monitoring*) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.	SFPUC, California State Parks, and City of San Francisco	5.5 years
	4. Where pet waste may be a source of bacteria to a beach, establish and implement protocols to control pet waste through such measures as providing bags, trash receptacles and signage.	California State Parks	6 months

[a] Timeframe begins on the effective date of this Basin Plan amendment

Table 7.2.5-6 Crissy Field Beach Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
Sanitary Sewer Collection System	1. Comply with Statewide General Waste Discharge Requirements for Sanitary Sewer Systems and Order No. R2-2013-0029.	Presidio Trust and SFPUC	Ongoing
	2a. Submit an enhanced Sewer System Management Plan and O&M Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ¼ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	Presidio Trust and SFPUC	6 months 3 years
	2b. Inspect laterals and all other components connecting SF Rec & Parks facilities to the sanitary sewer system. Repair all leaks. Submit annual status reports until all system components are inspected and repaired.	San Francisco Rec & Parks	1 year 3 years
	3. Determine effectiveness of sewer system repairs: Assess beach monitoring data to determine if targets are met at the beach.	SFPUC	5 years
	4. If targets are not met, submit an enhanced Sewer System Management Plan and O&M Plan as applicable, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	Presidio Trust and SFPUC	5.5 years 8 years
	5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program or refocus existing lateral program efforts to address these sources.	Presidio Trust and SFPUC	5 years

Table 7.2.5-6 Crissy Field Beach Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
Sewer Collection System & Urban Runoff	Establish and implement a protocol to enhance efforts to identify and correct illicit connections to the storm drain system.	Presidio Trust and SFPUC	6 months
Urban Runoff	1. Submit a plan acceptable to the Executive Officer that describes BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. Include control of nuisance wildlife if it represents a likely source of bacteria to the beach. The plan shall include a schedule and milestones for implementation.	Presidio Trust, Golden Gate National Recreation Area, SFPUC, and San Francisco Rec & Parks	6 months
	2. Determine effectiveness of urban runoff controls: Assess beach monitoring data to determine if targets are met at the beach.	SFPUC	5 years
	3. If targets are not met, submit, acceptable to the Executive Officer: (a) a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include an implementation schedule and milestones. and (b) a supplemental monitoring plan (*supplemental to ongoing beach monitoring*) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.	Presidio Trust, Golden Gate National Recreation Area, SFPUC, and San Francisco Rec & Parks	5.5 years
	4. Establish and implement protocols for enhancing efforts to control pet waste through such measures as providing bags, trash receptacles, signage at Crissy Beach, and increased rule enforcement during wet periods.	Golden Gate National Recreation Area	6 months

[a] Timeframe begins on the effective date of this Basin Plan amendment

Table 7.2.5-7 Marina Lagoon Beaches (Parkside Aquatic and Lakeshore) Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
Sanitary Sewer Collection System	1. Comply with Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.	City of San Mateo	Ongoing
	2. Comply with Cease and Desist Order No. R2-2009-0020 (CDO) and any future amendments. In next annual CDO report, submit enhancements to the Infrastructure Renewal and Capacity Assurance Plans, acceptable to the Executive Officer, that prioritize sewer system inspections and repairs in areas within ¼ mile of the beach to the extent possible within the framework of the CDO. Include a diagram of prioritized infrastructure and time schedule. Complete inspections and repairs in prioritized area(s).	City of San Mateo	According to due dates in Cease and Desist Order
	3. Determine effectiveness of sewer system repairs: Assess beach monitoring data to determine if targets are met at the beach.	City of San Mateo	5 years
	4. If targets are not met, submit enhanced Infrastructure Renewal and Capacity Assurance Plans, acceptable to the Executive Officer, that prioritize sewer system inspections and repairs in areas within ½ mile of the beach or otherwise connected to the beaches. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Complete inspections and repairs.	City of San Mateo	5.5 years 8 years
	5. If private laterals are a likely source of bacteria to the beach, establish and implement a private lateral replacement program or refocus existing lateral program efforts to address these sources.	City of San Mateo	2 years
Sewer Collection System & Urban Runoff	Establish and implement a protocol to enhance efforts to identify and correct illicit connections to the storm drain system.	City of San Mateo	6 months
Urban Runoff	1. Submit a plan acceptable to the Executive Officer that describes BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. Include control of nuisance wildlife. The plan shall include a schedule and milestones for implementation.	City of San Mateo	6 months

Table 7.2.5-7 Marina Lagoon Beaches (Parkside Aquatic and Lakeshore) Implementation Plan			
Source	**Action**	**Implementing Party**	**Completion Timeframe[a]**
	2. Determine effectiveness of urban runoff controls: Assess beach monitoring data to determine if targets are met at the beach.	City of San Mateo	5 years
	3. If targets are not met, submit, acceptable to the Executive Officer: (a) a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include an implementation schedule and milestones. and (b) a supplemental monitoring plan (*supplemental to ongoing beach monitoring*) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.	City of San Mateo	5.5 years

[a] Timeframe begins on the effective date of this Basin Plan amendment

7.2.5.7 China Camp and McNears Beaches Implementation

Both China Camp and McNears beaches already meet the numeric targets for Enterococcus, and therefore no further implementation actions are necessary.

7.2.5.8 Water Quality Monitoring

Implementing parties are responsible for developing and implementing a monitoring plan sufficient to assess compliance with the numeric targets at the beaches. At a minimum, implementing parties shall continue monitoring the beaches as required under California Health and Safety Code section 115880 and provide a data evaluation report annually to the Water Board. It is recommended that the implementing parties select a lead entity to assess the monitoring data and compile the annual report.

If, after approximately five years, implementation actions do not result in achievement of numeric targets at a beach, supplemental monitoring (in addition to beach monitoring) is required to investigate and identify bacteria sources in the watershed that could be contributing to the bacteria impairment. This monitoring is intended to answer questions such as:

- Could bacteria sources be reduced by placing enhanced urban runoff BMPs in a certain location?
- Could bacteria sources be reduced by focusing sewer system investigations and repairs in a certain location?

- Are natural sources of bacteria contributing to a significant degree to the impairment at the beach?

Implementing parties need not wait four years if they wish to begin supplemental monitoring earlier. At any time, implementing parties may present data indicating the presence of natural sources of bacteria to the beach, such as non-nuisance wildfowl, to the Executive Officer of the Water Board, and the Water Board may consider developing new allocations that could include a natural source exclusion. Until such action is taken by the Water Board, the implementation requirements and completion dates shall remain in effect.

Beach monitoring and supplemental monitoring requirements are included on Tables 7.2.5-4 through 7.2.5-7.

7.2.5.9 Adaptive Implementation

The Water Board will adapt the TMDL and Implementation Plans to incorporate new and relevant scientific information such that effective and efficient measures can be taken to achieve standards. At approximately six-year intervals, Water Board staff will evaluate new and relevant information from implementation actions, water quality monitoring results, and the scientific literature, including any local reference system studies, U.S. EPA's revised recommended bacteria criteria, or new or revised State bacteria water quality objectives, and assess progress toward attaining the TMDL. Water Board staff will present that information to the Water Board, and the Water Board will consider a Basin Plan amendment that reflects any necessary modifications to the targets, load and wasteload allocations, or implementation plan.

7.3 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE MARIN COASTAL BASIN (SEE FIGURE 2-3)

7.3.1 Tomales Bay Watershed Pathogens TMDL

The overall goal of the Tomales Bay Watershed Pathogens Total Maximum Daily Load (TMDL) is to ensure protection of water contact recreational uses and Bay shellfish harvesting, thereby minimizing human exposure to disease-causing pathogens. The following sections establish a density-based pathogens TMDL for Tomales Bay and its tributaries, and actions and monitoring necessary to implement the TMDL. The TMDL defines allowable density-based water quality bacteria concentrations and prohibits the discharge of human waste. The associated implementation plan specifies the actions necessary to protect and restore beneficial uses. This TMDL strives to achieve a balance that allows human activities including agriculture, recreation, commercial fishing and aquaculture, and residential use to coexist and also restores and protects water quality. As outlined in the adaptive implementation section, the effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to pathogens will be periodically reviewed and the TMDL may be adapted as warranted.

In addition to pathogens, animal and human waste contain nutrients that pose a threat to aquatic ecosystem beneficial uses. Tomales Bay, Walker Creek, and Lagunitas Creek are listed as impaired by excess nutrients. Human and animal wastes may also contain other harmful constituents such as steroids and pharmaceuticals. In addition to protecting pathogen-impaired beneficial uses such as shellfish harvesting, water contact recreation, and non-contact water recreation, by eliminating the discharge of human waste and controlling the discharge of animal waste, this TMDL will also protect aquatic ecosystem beneficial uses such as marine habitat,

estuarine habitat, cold and warm freshwater habitat, and wildlife habitat from other harmful constituents found in human and animal waste.

7.3.1.1 Problem Statement

Monitoring results for Tomales Bay and its main tributaries (Lagunitas, Walker, and Olema creeks) indicate that these waters exceed bacteria water quality objectives for shellfish harvesting and recreational waters (Table 3-1) and, as such, are impaired by pathogens. The presence of pathogens is inferred from high concentrations of fecal coliform bacteria (a commonly used indicator of human pathogenic organisms). Pathogen pollution is adversely affecting existing beneficial uses, which include shellfish harvesting (i.e., sport and commercial oyster, clam, and mussel harvesting), water contact recreation (i.e., swimming, fishing) and non-contact water recreation (i.e., boating, kayaking).

This TMDL addresses the following pathogen-impaired water bodies in the Tomales Bay Watershed:

- Tomales Bay
- Lagunitas Creek
- Walker Creek
- Olema Creek

7.3.1.2 Sources

If not properly managed, the following Tomales Bay Watershed sources have the potential to discharge pathogens to surface waters: on-site sewage disposal systems (OSDSs), small wastewater treatment facilities and sewage holding ponds, boat discharges, grazing lands, dairies, equestrian facilities, and municipal runoff. Pathogens sources are identified based on elevated coliform bacteria levels downstream of identified land uses or facilities and from documentation of inadequately treated human waste discharges.

- The Walker Creek watershed is dominated by grazing lands. Coliform bacteria levels and coliform loads from the Walker Creek watershed are extremely high during storm periods and a significant coliform source to Tomales Bay.
- High coliform levels detected in storm drains indicate that municipal runoff is a pathogens source.
- High coliform levels and loads downstream of residential homes and equestrian facilities suggest that failing septic systems, municipal runoff, and equestrian facilities are coliform sources.
- The Water Board regulates ten small wastewater treatment facilities and sewage holding ponds and prohibits direct discharges from these facilities into Tomales Bay or its tributaries. Four facilities have holding ponds and are permitted to discharge treated effluent to irrigation fields in the dry season. The other six wastewater treatment facilities utilize leach fields for dispersing treated effluent. Accidental malfunctions, including the breaching of ponds, a break in a sewage line, or land application when soil is saturated or it is raining, could result in discharge of untreated or partially treated effluent. Therefore, these facilities are considered potential sources.

In addition to the above sources, warm-blooded mammals and birds that reside in the watershed and Bay produce coliform bacteria. During non-storm periods Tomales Bay coliform levels are typically below the water quality objectives for shellfish harvesting waters, indicating that in-Bay wildlife such as seals and birds are not significant sources. Approximately 30% of the lands draining to Tomales Bay are open space forested lands. Water quality monitoring of a watershed on the western shoreline of Tomales Bay with minimal human influences suggests that waters draining open space areas are below tributary bacteria water quality objectives and therefore terrestrial wildlife are not a significant source.

7.3.1.3 Numeric Targets

Table 7.3.1-1 contains the numeric water quality targets for the Tomales Bay Watershed Pathogens TMDL. The coliform bacteria targets are based on fecal coliform bacteria concentrations aimed at protecting shellfish harvesting and contact and non-contact water recreation beneficial uses. These density-based numeric targets define bacterial densities associated with minimal risk to humans and are the same as the water quality objectives contained in Table 3-1. The Tomales Bay targets are intended to protect the most sensitive beneficial use, shellfish harvesting. The tributary targets are intended to protect recreational uses. An additional numeric target for Tomales Bay is expressed as the number of days commercial shellfish growing areas are subjected to harvest closures due to elevated water column bacteria densities. Consistent with the definition of “threatened conditions” in the California Shellfish Protection Act, Tomales Bay shellfish growing areas shall not be closed for harvest for more than 30 days per calendar year. The California Department of Health Services requires shellfish growing areas to close for harvesting when 24-hour and 10-day rainfall totals exceed established thresholds. Rainfall thresholds are established based on the relationship between rainfall and observed fecal coliform levels in Bay waters and shellfish.

In addition, no human waste (raw sewage or inadequately treated waste) shall be discharged to Tomales Bay or its tributaries. The no human waste discharge target is consistent with Discharge Prohibitions 5 and 15, contained in Table 4-1. This target is necessary because human waste is a significant source of pathogenic organisms, including viruses; and attainment of fecal coliform targets alone may not sufficiently protect human health. The coliform bacteria targets, in combination with the human waste discharge prohibitions and the shellfish harvesting closure targets, are the basis for the TMDL and load allocations, and fully protect beneficial uses.

Table 7.3.1-1 Water Quality Targets[a] for Tomales Bay and Its Tributaries
Zero discharge of human waste
Shellfish harvest closures < 30 days/year
Coliform Bacteria Levels (Expressed as Most Probable Number [MPN] of fecal coliforms per 100 mL of water) Tomales Bay Median < 14[b] and 90th percentile < 43[c] Tomales Bay Tributaries Log mean < 200[b] and 90th percentile < 400[c]
a. These targets are applicable year-round b. Based on a minimum of five consecutive samples equally spaced over a 30-day period c. No more than 10% of total samples during any 30-day period may exceed this number

7.3.1.4 Total Maximum Daily Load

Table 7.3.1-2 lists the Tomales Bay Watershed Pathogens TMDL. The TMDL consists of the density-based coliform bacteria TMDL targets. The TMDL ensures protection of water contact recreational uses and Bay shellfish harvesting, thereby minimizing human exposure to disease causing pathogens.

Table 7.3.1-2 Total Maximum Daily Load of Pathogens Indicators for Tomales Bay and its Tributaries

Waterbody	Indicator Parameter	TMDL (Most Probable Number (MPN) of fecal coliforms per 100 mL of water)
Tomales Bay	Fecal coliform	Median < 14[a] 90th Percentile < 43[b]
Major Tributaries: Walker Creek Lagunitas Creek Olema Creek	Fecal coliform	Log mean < 200[a] 90th percentile < 400[b]

[a] Based on a minimum of five consecutive samples equally spaced over a 30-day period.
[b] No more than 10% of total samples during any 30-day period may exceed this number.

7.3.1.5 Load Allocations

TMDL targets are an interpretation of water quality standards, whereas TMDL allocations specify the amount (or concentration) of a pollutant that can be discharged to a waterbody such that standards are attained in both the receiving waterbody and all downstream waters. Table 7.3.1-3 presents density-based load allocations for Tomales Bay watersheds pathogens source categories that implement tributary targets, and Table 7.3.1-4 presents allocations to major tributaries, where they discharge to Tomales Bay, and implement the Bay targets. Load allocations to the tributaries reflect the highest fecal coliform concentrations that can be discharged while still attaining and maintaining the Bay shellfish harvesting water quality objectives. All entities in a watershed are responsible for meeting their source category allocation (Table 7.3.1-3) and the applicable geographic-based allocations (Table 7.3.1-4).

Discharging entities will not be held responsible for uncontrollable coliform discharges originating from wildlife. If wildlife contributions are determined to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of the adaptive implementation program. The discharge of human waste is prohibited. All sources of human waste have an allocation of zero. Nonpoint source runoff containing coliform bacteria of animal and wildlife origin, at levels that do not result in exceedances of water objectives, does not constitute wastewater with particular characteristics of concern to beneficial uses. Therefore, animal- and wildlife-associated discharges, in compliance with the conditions of this TMDL, do not constitute a violation of applicable discharge prohibitions.

7.3.1.6 Implementation Plan

The Tomales Bay Watershed Pathogens TMDL Implementation Plan builds upon previous and ongoing successful efforts to reduce pathogen loads in Tomales Bay and its tributaries. The plan

requires actions consistent with the California Water Code (CWC 13000 et seq.), the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369), the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (State Water Resources Control Board. 2004. Policy for Implementation and Enforcement of the Nonpoint Source Pollution Prevention Control Program), and human waste discharge prohibitions (Prohibitions 5 and 15, Table 4-1).

This plan specifies required implementation measures (Table 7.3.1-5) for each of the source categories (Table 7.3.1-3). These implementation measures include evaluation of operating practices, development of comprehensive site-specific pathogens control measures and an implementation schedule for such management measures, and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or, if designated, through third parties. These progress reports will serve as documentation that source reduction measures are being implemented. While third parties may provide valuable assistance to TMDL implementation, the discharger is the entity responsible for complying with the specified regulations and regulatory controls. Responsible parties within each source category are required to implement the measures as specified in Table 7.3.1-5. The numeric targets and load allocations are not directly enforceable. For purpose of demonstrating attainment of applicable allocations, responsible parties will only be responsible for compliance with specified implementation measures and applicable waste discharge requirements or waiver conditions.

Table 7.3.1-3 Density-Based Pollutant Wasteload and Load Allocations[a] for Dischargers of Pathogens in Tomales Bay Watershed

Categorical Pollutant Source	Wasteload and Load Allocations Fecal Coliform (MPN/100 mL)		
	For Direct Discharges to the Bay		For Discharges to Major Tomales Bay Tributaries
	Median[b]	90th Percentile[c]	Log Mean[b]
Onsite Sewage Disposal Systems	0	0	0
Small Wastewater Treatment Facilities	0	0	0
Boat Discharges	0	0	N/A
Grazing Lands	< 14	< 43	< 200
Dairies	< 14	< 43	< 200
Equestrian Facilities	< 14	< 43	< 200
Municipal Runoff	< 14	< 43	< 200
Open space lands (terrestrial wildlife)[d]	<14	< 43	< 200
In-Bay Background (marine wildlife)[d]	< 14	< 43	N/A

a. These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit.

b. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

c. No more than 10% of total samples during any 30-day period may exceed this number.

d. Open space lands and the Bay contain wildlife and are therefore recognized as potential source areas. These areas are not believed to be a significant source of pathogens and their contribution is considered natural background; therefore, no management measures are required.

Table 7.3.1-4 Density-Based Pollutant Load Allocations for Tomales Bay Tributaries	
Tributary	**Allocation Fecal Coliform (MPN/100 mL) Log Mean**
Walker Creek at Highway 1 Bridge	95[a]
Lagunitas Creek at Green Bridge	95[a]

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges are regulated under waste discharge requirements (WDRs), waiver of waste discharge requirements, Basin Plan prohibitions, or some combination of these tools. Table 7.3.1-5 describes the method that will be used to regulate dischargers in each source category. The Water Board has established conditions for waiving WDRs for dairies. The Water Board intends to work with stakeholders to develop similar waiver conditions for grazing lands and equestrian facilities by 2009.

Table 7.3.1-5 Trackable Implementation Measures for the Tomales Bay Watershed Pathogens Total Maximum Daily Load

Source Category	Action	Implementing Party	Completion Dates
On-Site Sewage Disposal Systems (OSDS)	Submit to the Executive Officer for approval a plan and implementation schedule to evaluate OSDS performance for the Tomales Bay watershed and to bring identified OSDS up to County's repair standards.	Marin County, Community Development Agency	January 2007
	Report progress on implementation of OSDS evaluation and repair program.	Marin County, Community Development Agency	Starting January 2011 and biennially thereafter
Small Wastewater Treatment Facilities	Comply with applicable Waste Discharge Requirements (WDRs).	Small wastewater treatment facilities	As specified in the applicable WDRs
	Inspect and evaluate all permitted WDR facilities and update WDRs as warranted.	Water Board staff	January 2009
	Report progress on inspection and evaluation of WDR facilities.	Water Board staff	No less than once every five years starting in January 2009
Boat Discharges	In coordination with interested stakeholders in Tomales Bay, determine the adequacy of on-shore restroom facilities and boater disposal/pump out facilities, and prepare a schedule for a determination of Pumpout Facility Need and Public Hearing Notification, as appropriate.	Regional Water Board	January 2009

Source Category	Action	Implementing Party	Completion Dates
	Water Board will coordinate with participating agencies and rely on their interests and authorities to develop and implement a Tomales Bay boating management plan that includes: evaluation of existing moorings and water quality impacts; permitting and enforcement procedures to ensure compliance with applicable mooring requirements and to ensure no sewage discharge from boats.	Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board, Gulf of the Farallones National Marine Sanctuary.	January 2009
	Report progress on implementation of boating management plan.	As specified in the Boating Management Plan: Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board, Gulf of the Farallones National Marine Sanctuary	As specified in the Boating Management Plan
	Comply with boating management plan for Tomales Bay.	Boaters	As specified in the Boating Management Plan
Grazing Lands[2]	Submit a Report of Waste Discharge[1] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific grazing management measures to reduce animal waste runoff; and a schedule to implement identified management measures.	Dairies and ranchers (landowners and leasees). These Reports may be submitted individually or jointly or through a third party.	January 2009
	Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Dairies and ranchers (landowners and leasees)	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of grazing management measures that reduce animal waste runoff.	Dairies and ranchers (landowners and leasees). These reports may be submitted individually or jointly or through a third party.	As specified in applicable WDRs or waiver of WDRs

Source Category	Action	Implementing Party	Completion Dates
Dairies[3]	Comply with applicable Waiver of Waste Discharge Requirements (WDRs) for confined animal facilities or requirements specified in applicable individual WDRs.	Dairies (landowners and leasees)	As specified in applicable WDRs or waiver of WDRs
Equestrian Facilities	Submit a Report of Waste Discharge[1] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific management measures to reduce animal waste runoff; and a schedule for implementation of identified management measures.	Equestrian facilities. These Reports may be submitted individually or jointly or through a third party.	January 2009
	Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Equestrian facilities	As specified in applicable WDRs or waiver of WDRs.
	Report progress on implementation of management measures that reduce animal waste runoff.	Equestrian facilities. These reports may be submitted individually or jointly or through a third party.	As specified in applicable WDRs or waiver of WDRs
Municipal Runoff	Submit to Water Board for approval a stormwater management plan (that includes management measures to reduce pathogens runoff and a schedule for implementation of identified management measures.	Marin County, Stormwater Pollution Prevention Program	January 2009
	Report progress on implementation of pathogens reduction measures.	Marin County, Stormwater Pollution Prevention Program	As specified in approved stormwater management plan

[1] WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.

[2] Grazing lands include all land areas grazed by livestock such as ranchlands, riparian areas, and pasturelands. Confined animal facilities which are already regulated under existing WDRs or waiver of WDRs and are excluded from this requirement.

[3] These implementation actions for Dairies are for the confined animal portions of the facilities and do not include the grazing areas. Implementation actions for grazing lands associated with dairies are included under Grazing lands.

Table 7.3.1-6 Regulatory Framework for Discharges by Source Category	
Source Category	**Regulatory Tool**
On-site Sewage Disposal Systems (OSDS)	Waiver[a] of Waste Discharge Requirements Prohibition of Human Waste Discharge
Small Wastewater Treatment Facilities	Individual Waste Discharge Requirements Prohibition of Human Waste Discharge
Boat Discharges	Prohibition of Human Waste Discharge
Grazing Lands	Waiver[a] of Waste Discharge Requirements
Dairies	Waiver[a] of Waste Discharge Requirements or Individual WDRs, as appropriate
Equestrian Facilities	Waiver[a] of Waste Discharge Requirements
Municipal Runoff	NPDES Permit
[a] Water Board retains the option of requiring individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.	

Agricultural Water Quality Control Program Costs

The implementation measures for grazing lands and dairies constitute an agricultural water quality control program and therefore, consistent with California Water Code requirements (Section 13141), the cost of the program is estimated herein. The total program implementation cost for these agricultural sources is estimated to range between $900,000–$2 million per year over the next 10 years. The estimated cost will be shared by Tomales Bay watershed grazing lands operators (approximately 150). This estimate includes the cost of implementing animal waste control and grazing management measures and is based on costs associated with technical assistance and evaluation, installation of water troughs, and cattle control fencing along all streams. The program cost estimate may be high as it does not account for implementation actions already underway or areas that may not require fencing. Besides fencing, other acceptable methods of managing livestock access to streams are not included in this cost estimate due to variability in costs and site specific applicability. Potential financing sources include federal and state water quality grants and federal agricultural grants.

Evaluation and Monitoring

Dischargers, stakeholders, and Water Board staff will conduct water quality monitoring to evaluate fecal coliform concentration trends in Tomales Bay and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 7.3.1-1) and load allocations (Table 7.3.1-3 and Table 7.3.1-4).

In 2009 and approximately every five years after the adoption of the TMDL, the Water Board will evaluate site specific, sub-watershed specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.3.1-5. In evaluating compliance with the trackable implementation measures, the Water Board will consider the level of participation of each source category as well as individual dischargers (as documented by Water Board staff or third parties).

If a discharger demonstrates that all implementation measures have been undertaken or that it is infeasible to meet their allocation due to wildlife contributions, the Water Board will consider

revising allocations as appropriate. If source control actions are fully implemented throughout the Watershed and the TMDL targets are not met, the Water Board may consider re-evaluating or revising the TMDL and allocations. If, on the other hand, the required actions are not fully implemented, or are partially implemented, the Water Board may consider regulatory or enforcement action against parties or individual dischargers not in compliance.

The California Department of Health Services, working in consultation with the Shellfish Technical Advisory Committee, is encouraged to periodically evaluate, beginning in 2009, shellfish harvest closure guidelines and the relationship between precipitation, runoff, coliform levels, and water quality exceedances.

In order to assess water quality improvements and obtain additional information for further refinement of the TMDL, Water Board staff and stakeholders will collaborate in monitoring efforts. The main objectives of the Monitoring Program are to:

- Assess attainment of TMDL targets;
- Evaluate spatial and temporal water quality trends in the Bay and its tributaries;
- Further identify significant pathogens source areas;
- Evaluate coliform levels and loadings to the Bay at the terminus of major tributaries.
- Collect sufficient data to calibrate and validate the Bay hydrodynamic model to observed coliform levels; and
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of implementation actions.

Table 7.3.1-7 outlines the locations, constituents, sampling frequency, analytical methods, and the sampling entities for a baseline water quality monitoring program. Additional monitoring will be conducted as needed if funds are available. The Water Board, in coordination with the sampling entities and interested third parties, such as National Park Service, California Department of Health Services, commercial shellfish growers, the Inverness Public Utility District, and the Salmon Protection and Watershed Network will implement this long-term water quality monitoring program. All water quality monitoring (including Quality Assurance and Quality Control procedures) will be performed pursuant to the State Water Board's Quality Assurance Management Plan for the Surface Water Ambient Monitoring Program.

Table 7.3.1-7 Baseline Water Quality Monitoring Program			
Constituent	**Location**	**Frequency**	**Sampling Entities**
Tomales Bay			
Fecal Coliform[a]	California Department Health Services designated primary water quality monitoring stations	Weekly for five weeks beginning in January; Monthly March – December Weekly for five weeks during summer months	Shellfish Growers
Tributaries			
Fecal coliform Stream Flow	Olema Creek (tributary to Lagunitas)	Weekly for five weeks beginning in January; Monthly March - December Weekly for five weeks during summer months	National Park Service
Fecal coliform	West Shore tributaries	Same as above	Inverness Public Utilities District
Fecal coliform	East Shore tributaries	Same as above	Water Board
Fecal coliform Stream Flow	Lagunitas Creek	Same as above	Water Board, Salmon Protection and Watershed Network
Fecal coliform Stream Flow	Walker Creek	Same as above	Water Board

[a] *E. coli* monitoring may be used in the future to assess general water quality trends and exceedances. If E. coli is used, a Tomales Bay specific correlation factor linking fecal coliform and E. coli levels will need to be established.

Adaptive Implementation

Approximately every five years, the Water Board will review the Tomales Bay Watershed Pathogens TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Tomales Bay Watershed is also impaired. At a minimum, the following questions will be used to conduct the reviews. Additional questions will be developed in collaboration with stakeholders during each review.

- Are the Bay and the tributaries progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
- What are the pollutant loads for the various source categories (including naturally occurring background pathogen contributions and the contribution from open space lands), how have these loads changed over time, how do they vary seasonally, and how might source control measures be modified to improve load reduction?
- Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?
- The allocations assume a conservative bacterial die-off rate of 0.02 per hour. This value is based on rates reported for San Francisco Bay in 1970. If bacterial die-off is found to be higher, higher allocations may be considered. What are bacterial die-off rates in the water column and stream sediments? Do they vary by season? What are bacteria transport times from sources to the Bay?
- How does estuarine mixing and dilution of tributary waters vary by flow and season?
- What is the relationship between precipitation, runoff, tributary loads, Bay coliform levels, and water quality exceedances and shellfish harvesting closures?
- Are there bacteria in Tomales Bay sediments that enter the water column during storm events? If yes, how should this process be accounted for?

If it is demonstrated that all reasonable and feasible source control measures have been implemented for a sufficient period of time and TMDL targets are still not being met, the Water Board will reevaluate water quality standards, TMDL targets and allocations as appropriate.

7.3.2 Total Maximum Daily Load for Mercury in Walker Creek and Soulajule Reservoir

Walker Creek and Soulajule Reservoir, which is located in the Walker Creek watershed, are impaired by mercury. This TMDL applies to Soulajule Reservoir and the freshwater portions of Walker Creek. The goal of the TMDL is to establish and maintain environmental conditions that will support beneficial uses of these waters established in Chapter 2.

The following sections establish a concentration-based TMDL for mercury in the Walker Creek watershed, and prescribe actions and monitoring necessary to implement and maintain the TMDL. The numeric targets, allocations, and associated implementation plan will ensure that Walker Creek and Soulajule Reservoir attain applicable water quality standards and achieve the TMDL.

The TMDL allocations and implementation plan are designed to control the amount of mercury discharged to Walker Creek and from Soulajule Reservoir, and prescribe and promote actions to minimize the potential for mercury to be present in the toxic and bioavailable form, methylmercury. Effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed. The TMDL may be adapted as warranted.

7.3.2.1 Problem Statement

Walker Creek and Soulajule Reservoir are impaired because mercury adversely affects beneficial uses, including wildlife habitat and all uses supporting aquatic life.

- Mercury concentrations in Walker Creek exceed the mercury freshwater aquatic life acute toxicity objective established to protect aquatic organisms (Table 3.4).
- Terrestrial species that primarily or exclusively eat fish (such as piscivorous birds, the most sensitive wildlife species in the watershed) are at risk from exposure to mercury due to its tendency to bioaccumulate in the food web. Because mercury concentrations in Walker Creek fish are high enough to threaten the health of piscivorous birds, the narrative bioaccumulation objective (see Chapter 3) and numeric aquatic organism and wildlife mercury water quality objective (Table 3-4a) are not being met.
- Soulajule Reservoir is impaired because some fish in the reservoir exceed mercury levels considered safe for human consumption.
- The beneficial use aimed at protecting the health of people who choose to consume Soulajule Reservoir fish (REC1) is impaired and the narrative bioaccumulation water quality objective is not being met.
- In 2004, the California Office of Environmental Health Hazard Assessment issued an interim advisory recommending that people limit consumption of reservoir fish due to elevated mercury levels.

7.3.2.2 Sources

The following sources have the potential to discharge mercury to surface waters in the Walker Creek watershed:

- **Gambonini Mine site**—An inactive mercury mine and the largest mercury processing facility in the watershed. Mining waste was not properly contained on-site, and consequently the site discharged large quantities of mercury-laden sediments prior to cleanup (initiated in 1998).
- **Soulajule Watershed and Reservoir**—Two abandoned mercury mines are located in this watershed. Soulajule Reservoir discharges into Walker Creek just downstream of the Gambonini Mine drainage.
- **Downstream depositional features**—Mercury-laden sediments in depositional areas (creek beds, banks, and floodplains) downstream of the mercury mines, which discharge mercury to the creek during storms.
- **Background**—Mercury is present at low concentrations throughout the watershed. Background levels account for atmospheric deposition and naturally occurring mercury found in the watershed's soils. The Walker Creek watershed background suspended sediment mercury concentration is 0.2 mg mercury per kg dry sediment.

7.3.2.3 TMDL Targets

- To protect wildlife and rare and endangered species, the mercury concentration in fish consumed by piscivorous birds shall not exceed 0.05 mg mercury per kg fish, measured in whole fish 5–15 cm in length, average wet weight nor shall it exceed 0.1 mg mercury per kg fish, measured in whole fish 15–35 cm in length, average wet weight. The goal of these targets, which are consistent with the bioaccumulation objective in Chapter 3, is to ensure that controllable water quality factors do not cause detrimental mercury concentrations in Walker Creek and Soulajule Reservoir wildlife.

- To protect aquatic organisms, water column mercury concentrations shall not exceed the water quality objective of 2.4 µg/L (one-hour average).
- To protect humans who consume Soulajule Reservoir and Walker Creek fish (assuming future conditions allow for the consumption of Walker Creek fish), water column mercury concentrations shall not exceed the California Toxics Rule (CTR) criterion of 0.050 µg/L (averaged over a 30-day period).

7.3.2.4 Allocations and Total Maximum Daily Load

The TMDL for Walker Creek is 0.5 mg mercury per kg suspended sediment and the TMDL for Soulajule Reservoir is 0.04 ng dissolved methylmercury per liter water. Concentration-based load allocations for Walker Creek and Soulajule Reservoir mercury sources are shown in Table 7.3.2-1.

Table 7.3.2-1 TMDL Mercury Wasteload and Load Allocations

Source	Wasteload Allocation	Load Allocation
Gambonini Mine site NPDES Permit no. CAS000001	5 mg mercury per kg suspended sediment	
Soulajule watershed and Reservoir		0.04 ng dissolved methylmercury per liter water 0.5 mg mercury per kg suspended sediment
Downstream depositional features[1]		0.5 mg mercury per kg suspended sediment
Background[2]		0.2 mg mercury per kg suspended sediment

[1] Applies to sediment released from depositional features (creek beds, banks, and floodplains) downstream of the Gambonini Mine and Soulajule Reservoir.

[2] The background allocation applies to all areas in the Walker Creek watershed outside of the influence of the Gambonini Mine site or Soulajule Reservoir.

7.3.2.5 Implementation Plan

The implementation plan builds upon previous and ongoing successful efforts to reduce mercury loads in Walker Creek and its tributaries. Table 7.3.2-2 contains the required implementation measures for each source. It is important to note that the numeric targets and load allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate compliance with specified implementation measures and any applicable waste discharge requirements (WDRs) or waiver conditions.

Table 7.3.2-2 Implementation Measures for Walker Creek Mercury TMDL

Source	Action	Implementing Parties	Completion Date
Gambonini Mine Site	Apply for coverage under the State of California's Industrial Stormwater General Permit	Gambonini Mine Site owner(s)	2007
	Submit to the Water Board for approval a Stormwater Pollution Prevention Plan (SWPPP), implementation schedule, and monitoring plan		
Soulajule Reservoir	Submit to the Executive Officer of the Water Board, a monitoring and implementation plan and schedule to 1) characterize fish tissue, water, and suspended sediment mercury concentrations in Soulajule Reservoir and Arroyo Sausal Creek, and 2) develop and implement methylmercury production controls necessary to attain both in-reservoir and downstream TMDL targets	Marin Municipal Water District	2009
Downstream Depositional Features	Applicants seeking coverage under waste discharge requirements (WDRs) or waivers of WDRs to control pathogens, nutrients, or sediments discharges in the Walker Creek watershed shall incorporate management practices that minimize mercury discharges and methylmercury production	All creekside property owners downstream of Gambonini Mine and Soulajule Reservoir	2009
	All projects regulated under Clean Water Act Section 401 shall include provisions to minimize mercury discharges and methylmercury production		
	Comply with conditions of Marin County's Creek Permit Program		
	Update Marin County's Creek Permit Guidance for Unincorporated Areas of Marin to include specific guidance for projects in areas that may contain mercury-enriched sediments	County of Marin	2008

Cost Estimate: Agricultural Water Quality Control Program

Because the implementation measures for grazing lands constitute an agricultural water quality control plan, the cost of that program is estimated below, consistent with California Water Code requirements (Section 13141). We estimate that 100 percent of the downstream depositional areas can be considered grazing lands. Costs estimated for reducing mercury discharges and methylmercury production on grazing lands are $1.5 to 2.5 million over a ten-year period. These costs are associated with reducing sediment discharges and enhancing habitat conditions on Walker Creek and its tributaries. Considering potential benefits to the public in terms of habitat restoration and water quality, we expect that a significant portion of the costs will be paid for with public funds.

Evaluation and Monitoring

Water Board staff will conduct water quality monitoring to evaluate mercury concentrations in Walker Creek and its tributaries as part of the Surface Water Ambient Monitoring Program

(SWAMP). Marin Municipal Water District will conduct water quality monitoring to evaluate mercury concentrations in both Soulajule Reservoir and reservoir discharges to Arroyo Sausal Creek. All water quality monitoring (including quality assurance and quality control procedures) will be performed pursuant to the State Water Board's Quality Assurance Management Plan for this program. The main objectives of the monitoring are:

- Assess attainment of TMDL targets and load allocations
- Evaluate spatial and temporal water quality trends
- Refine understanding of mercury loading in downstream depositional areas
- Refine understanding of methylmercury production and bioaccumulation in Soulajule Reservoir
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions

Table 7.3.2-3 presents locations in the Walker Creek watershed for baseline water quality monitoring. These sites will be monitored for suspended particulate, methyl- and total mercury concentrations during the wet and dry seasons. Fish tissue mercury concentrations will be monitored to aid in understanding mercury and the food web. Mercury concentrations in fish of the size typically consumed by wildlife and humans will be monitored in Soulajule Reservoir to assess progress towards attaining the wildlife and human health target. Wet season sampling will focus on characterizing conditions during peak flow events. SWAMP monitoring will be conducted based on availability of funds.

Walker Creek Ranch is considered an "integration" site for the watershed. Water quality data collected at Walker Creek Ranch integrates Salmon Creek background concentrations with loads from the Gambonini Mine Site, Soulajule Reservoir, and some downstream depositional features. Mercury levels in 5–15 cm fish in Walker Creek will be monitored every five years at Walker Creek Ranch to assess progress towards attaining the wildlife target. In addition, the Water Board, in cooperation with the United States Geological Survey, maintains a continuous data recorder at Walker Creek Ranch that monitors suspended sediment and particulate mercury concentrations in Walker Creek.

Five years after adoption of this TMDL, the Water Board will evaluate monitoring results and assess progress made toward attaining targets and load allocations. Beginning in 2012 and approximately every five years thereafter, the Water Board will evaluate site specific, sub-watershed-specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.3.2-2.

Table 7.3.2-3 Baseline Monitoring Sites

Salmon Creek, upstream of the Gambonini Mercury Mine Site
Walker Creek at Walker Creek Ranch
Walker Creek at Highway 1
Chileno Creek downstream of the inactive Chileno Mine
Soulajule Reservoir
Arroyo Sausal Creek downstream of Soulajoule Reservoir

Adaptive Implementation

Approximately every five years, the Water Board will review the Walker Creek Mercury TMDL and evaluate new and relevant information from monitoring, special studies, and the scientific literature. At a minimum, the following questions will be incorporated into the reviews. Additional questions will be developed in collaboration with stakeholders during each review cycle.

- Are Walker Creek and its tributaries progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how should the implementation actions or allocations be modified?
- What are the pollutant loads for the various sources? Have these loads changed over time? How do they vary seasonally? How might source control measures be modified to improve load reduction?
- What wetland and creek restoration methods should be used to minimize mercury discharges and methylmercury production while enhancing and restoring habitat values?
- Are wildlife feeding in Soulajule Reservoir at risk? If so, how can the Reservoir be managed to reduce this risk?
- Does additional sediment, water column, or fish tissue total or methylmercury data support our understanding of linkages in the watershed or suggest an alternative allocation strategy?
- Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?

Reviews will be coordinated through the Water Board's continuing planning program, with stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan via an amendment process. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Walker Creek is also impaired.

7.3.3 Lagunitas Creek Fine Sediment Reduction and Habitat Enhancement Plan

The following sections establish:

1. A sediment TMDL defining the allowable amount of sediment that can be discharged into the Lagunitas Creek watershed, expressed as a percentage of the natural background sediment delivery rate to channels; and
2. An implementation plan to achieve the TMDL and substantial habitat enhancement in channel reaches that support coho salmon, steelhead, and/or California freshwater shrimp.

The goals of the Lagunitas Creek Sediment Reduction and Habitat Enhancement Plan (Plan) are as follows:

- To restore an annual spawning run within the Lagunitas Creek watershed of 1300-or-more adult coho salmon, achieved for at least twelve consecutive years.
- For native fish and aquatic wildlife species to be in good condition at the individual, population, and community levels.

- To protect and enhance the aesthetic and recreational values of the creek and its tributaries.

The main focus of this Plan is habitat enhancement, because habitat loss and simplification appears to be a primary cause of the declines of watershed populations of coho salmon, steelhead, and California freshwater shrimp. The Plan also establishes a regulatory program to reduce sediment delivery to channels resulting from road-related erosion, a necessary condition to support recovery of listed species and achieve water quality objectives for sediment and settleable material. Other significant land-use related sediment sources are already being reduced substantially through existing regulatory programs and/or natural recovery processes.

7.3.3.1 Problem Statement

Due to excess erosion and sedimentation in the Lagunitas Creek watershed, the narrative water quality objectives for sediment and settleable material are not being met, and cold freshwater habitat, wildlife habitat, fish spawning, recreation, and preservation of rare and endangered species beneficial uses are impaired. In addition, the narrative water quality objective for population and community ecology is not being met due to habitat simplification, which is a primary cause for the decline of coho salmon and steelhead trout populations.

Lagunitas Creek provides essential habitat for coho salmon, steelhead trout, and California freshwater shrimp, all of which are listed under the federal Endangered Species Act (coho salmon and California freshwater shrimp also are listed under the California Endangered Species Act). During the historical period - the mid-nineteenth century through present - there has been a precipitous decline in the abundance of coho salmon and steelhead in the Lagunitas Creek watershed. Coho salmon and steelhead runs once numbered in the several thousands. Up until the late 1960s, Lagunitas Creek was a popular destination for sport fisherman hoping to catch steelhead and coho salmon. In 1996, Lagunitas Creek's salmon and steelhead populations had dropped so low that they were listed under the Endangered Species Act.

The most important causes for coho salmon and steelhead population declines in the Lagunitas Creek watershed appear to be: a) the loss of about half of the potential habitat, which has been inundated and/or is no longer accessible as a result of dam construction; and b) in almost all the remaining habitat, the fact that channel incision has greatly simplified habitat and disconnected the channel from its floodplain.

Channel incision causes habitat simplification, which herein is defined as the progressive lowering over time of the streambed elevation as a result of net erosion. San Geronimo and Lagunitas creeks and alluvial reaches of their tributaries have incised substantially during the historical period. Channel incision obliterates the basic physical habitat structure of the channel, expressed by a substantial reduction in the frequency and area of gravel bars, riffles, and side channels. If a channel incises substantially, it will become disconnected from its surrounding floodplain, which further increases the rates of incision, streambed mobility, and scour depth. Another effect of incision has been a significant reduction in large woody debris input to Lagunitas Creek and its tributaries, which also greatly diminishes the capacity for these creeks to store, sort, and meter sediment.

Habitat conditions are degraded by elevated concentrations of fine sediment in the streambed (primarily sand) - caused by pervasive alteration of sediment supply, transport, and storage - which further reduces juvenile salmonid growth and survival in all freshwater life stages. As sediment supply increases or becomes finer, the streambed can respond by becoming finer and

more mobile, as has been documented in tributaries to Lagunitas Creek. Streambed scour at spawning redds can be a significant source of mortality during incubation for coho salmon.

7.3.3.2 Numeric Targets

Increased rate and fining of the bed material supply, channel incision, and a reduction in the number and size of large fallen trees in channels, have all contributed to high to very high rates of streambed mobility and scour in tributaries to Lagunitas Creek that provide important spawning habitat for coho salmon and steelhead, including Arroyo, Cheda, and San Geronimo creeks, and Devils Gulch. To restore properly functioning conditions, we call for actions to substantially reduce sand supply to Lagunitas Creek and its tributaries, to substantially increase the amount of large woody debris in channels, and, where safe and feasible, to reconnect the channel to its floodplain. As such we proposed the following targets for streambed mobility and redd scour.

Meeting the numeric targets listed in Table 7.3.3-1 will allow water quality in Lagunitas Creek and its tributaries to achieve the narrative water quality objectives for sediment, settleable material, and population and community ecology.

Table 7.3.3-1 Sediment and Habitat Targets for the Lagunitas Creek and its Tributaries

Sediment Condition Targets
Streambed Mobility (τ^*): $0.03 < \tau^* \leq 0.06$; this target applies to gravel-bedded channel reaches where the adjacent valley flat is a floodplain.
Watershed-wide median depth of redd scour (D_s) ≤ 12 cm
Habitat Condition Targets
Large Woody Debris (LWD) Loading ≥ 300 m^3/ha in Redwood Channels[c] and ≥ 100 m^3/ha in Hardwood Channels
Explanatory notes: The numeric target for reach-average value of streambed mobility at bankfull stage, or Tau-Star (τ^*), is greater than 0.03 and less than or equal to 0.06, corresponding to a partially-to-fully mobile streambed. This is the natural range of mobility in most gravel-bedded channels. The target applies only to gravel-bedded channel reaches where the adjacent valley flat is a floodplain and where: a) the streambed slope is between 0.001 and 0.03, and b) actual or potential spawning habitat is provided for anadromous salmonid species. As defined by renowned geomorphologists Thomas Dunne and Luna B. Leopold: "The floodplain is the flat area adjoining a river channel constructed by the river in the present climate and overflowed at times of high discharge. It is inundated on the average once every one or two years." The watershed-wide median value for depth of scour (D_s) at actual or potential spawning sites for coho salmon and/or steelhead shall be ≤ 12 cm below the level of the overlying streambed substrate. This target applies for discharges ≤ the 5-year recurrence interval event (annual maximum series). Channel reaches that provide actual or potential spawning habitat are as defined above. Potential spawning sites within those reaches can be identified based on the following characteristics: 1) median particle size diameter (D_{50}) in the surface layer of the streambed is between 16 and 64 mm; 2) surface area of the gravel deposit is ≥ 1.0 square meter; and 3) location at a riffle head, pool tail, pool margin, and/or a gravel deposit associated with a flow obstruction (e.g., woody debris, boulders, banks, etc.). Redwood channels are defined as those where the adjacent valley floor and/or hillslopes are vegetated primarily by coast redwood forest. Hardwood channels are defined as those where the adjacent valley flat is vegetated by a hardwood forest (typically some combination of willow species, white alder, California bay laurel, bigleaf maple, tan oak, and/or Oregon ash). The large woody debris loading targets apply to channel reaches that provide actual or potential spawning habitat for anadromous salmonids as defined above.

7.3.3.3 Sediment Sources

Field inventories conducted throughout the Lagunitas Creek watershed provide credible estimates of the rates and sizes of sediment delivered to channels in the watershed during water years 1983 through 2008. Based *on* this work, the Water Board concludes:

1. Sediment supply to Lagunitas Creek was greater than or equal to two times natural background. Hillslope erosion processes, considered together with road-related erosion, accounted for about 40 percent of sediment delivery to Lagunitas Creek. Human-caused channel incision and associated bank erosion, primarily the result of historical land-use disturbances, accounted for about 60 percent of the supply.
2. Rates of sediment supply to channels in the Lagunitas Creek watershed varied substantially, from less than 100 to about 400 metric tons per km^2 per year. Variability is a function primarily of the location of dams, large alluvial valleys (where channels have become deeply incised), road density, and bedrock geology.
3. Channel incision rates were highest in headwater channel reaches, but incision also was active further downstream (at somewhat lower rates) in the reaches that provide habitat for anadromous salmonids and California freshwater shrimp.
4. Considering the significant exposure of hard bedrock in the streambed along San Geronimo Creek, and in the mainstem of Lagunitas Creek in the Shafter and State Park reaches, it is unlikely that streambed elevation will become much lower in these reaches. Absent intervention, complex habitat that now includes riffles and bars will likely decrease, and bedrock exposure will increase, which would further impair habitat condition.
5. While the primary driver for incision is a reduction in large woody debris loading, reduction in coarse sediment supply, following construction of Kent Lake and Nicasio Reservoir, and other historical and ongoing land-use activities also are factors.

In summary, the net result is an elevated amount of fine sediment in the streambed and substantial simplification of channel habitat structure.

The total sediment load in Lagunitas Creek is estimated to have been about 230 percent of natural background upstream of Devils Gulch and about 200 percent of natural background upstream of Olema Creek during the study period. Tables 7.3.3-2 and 7.3.3-3 break down the sediment sources to Lagunitas Creek based on an annual average rate.

Table 7.3.3-2 Mean Annual Sediment Delivery to Lagunitas Creek upstream of Devils Gulch (drainage area = 89 km^2) during water years 1983 through 2008

Source	Estimated Mean Annual Delivery Rate (metric tons/yr)
Landslides, Gullies, and Soil Creep	2,600
Roads	3,600
Tributary Channels: Channel Incision and Bank Erosion	5,000
San Geronimo Creek and Lagunitas Creek: Channel Incision and Bank Erosion	2,900
Urban stormwater and wastewater discharges	100
TOTAL	14,200

Table 7.3.3-3 Mean Annual Sediment Delivery to Lagunitas Creek upstream of Olema Creek (drainage area = 213 km^2) during water years 1983 through 2008

Source	Estimated Mean Annual Delivery Rate (metric tons/yr)
Landslides, Gullies, and Soil Creep	5,600
Roads	4,000
Tributary Channels: Channel Incision and Bank Erosion	8,500
San Geronimo Creek and Lagunitas Creek: Channel Incision and Bank Erosion	4,000
Urban stormwater, wastewater, and other point source discharges	100
TOTAL	22,200

7.3.3.4 Total Maximum Daily Load and Allocations

The sediment TMDL for Lagunitas Creek upstream of Devils Gulch is established at 7,500 metric tons per year, which corresponds to about 120 percent of natural background load during the water year 1983 through 2008 period. The sediment TMDL for Lagunitas Creek upstream of Olema Creek is established at 11,900 metric tons per year, which corresponds to about 110 percent of natural background load during the water year 1983 through 2008 period. Natural background load depends upon natural processes and varies significantly. Therefore, these TMDLs and associated allocations are expressed both in terms of sediment mass and percent of natural background. Sediment delivery needs to be reduced overall by about 50 percent from the current proportion of the total load to achieve these TMDLs. Tables 7.3.3-4, 7.3.3-5 and 7.3.3-6 contain the allocations for all sources of sediment in the watershed.

TMDL attainment will be evaluated: a) immediately upstream of the confluence of Lagunitas Creek with Devils Gulch, which approximates the mid-point along the primary spawning reach for coho salmon on Lagunitas Creek; and b) immediately upstream of the confluence of Lagunitas Creek with Olema Creek, which corresponds to the downstream boundary of the TMDL project area. Attainment of the TMDL will be evaluated over a 5-to-10-year averaging period.

Table 7.3.3-4 Load Allocations for Sediment Discharges for Lagunitas Creek Upstream of Devils Gulch

Source category	Load during 1983-2008		Estimated reductions needed (percentage)	Load allocations	
	Metric tons/year	Percentage of Natural Background		Metric tons/year	Percentage of Natural Background
Landslides, Gullies, and Soil Creep	2,600	42	50	1,300	21
Roads	3,600	58	50	1,800	29
Tributary Channels: Channel Incision and Bank Erosion	5,000	80	33	3,300	53
San Geronimo Creek and Lagunitas Creek: Channel Incision and Bank Erosion	2,900	47	67	1000	16
TOTAL	14,100	227	48	7,400	119
Note: Natural background for Lagunitas upstream of Devils Gulch = 6200 metric tons/year					

Table 7.3.3-5 Load Allocations for Sediment Discharges for Lagunitas Creek Upstream of Olema Creek

Source Category	Load during 1983-2008		Estimated reductions needed (percentage)	Load allocations	
	Metric tons/year	Percentage of Natural Background		Metric tons/year	Percent of Natural Background
Landslides, Gullies, and Soil Creep	5,600	53	50	2,800	26
Roads	4,000	38	50	2,000	19
Tributary Channels: Channel Incision and Bank Erosion	8,500	80	33	5,700	53
San Geronimo Creek and Lagunitas Creek: Channel Incision and Bank Erosion	4,000	38	67	1,300	12
TOTAL	22,100	209	47	11,800	110
Note: Natural background for Lagunitas upstream of Olema Creek = 10700 metric tons/year					

Table 7.3.3-6 Wasteload Allocations for Stormwater for Lagunitas Creek Upstream of Olema Creek

Source Category	Current Load		Reductions needed (percentage)	Wasteload Allocations	
	Metric tons/year	Percentage of Natural Background		Metric tons/year	Percent of Natural Background
Construction Stormwater NPDES Permit No. CAS000002	30	0.3	0	30	0.3
Municipal Stormwater NPDES Permit No. CAS000004	70	0.7	0	70	0.7
TOTAL	100	1.0	0	100	1.0
Note: Above estimates for loads, percent reductions, and allocations are rounded to two significant figures. Natural background for Lagunitas upstream of Olema Creek = 10,700 metric tons/year					

7.3.3.5 Implementation Plan

The actions described below, including those to control sediment discharges and enhance stream-riparian habitat complexity and connectivity, are to attain allocations and achieve numeric targets for sedimentation and habitat condition.

Regulatory Tools

The only known point sources of sediment are very small and associated with municipal and construction stormwater runoff, which are regulated under existing NPDES permits that include requirements to control erosion, sedimentation, and hydromodification. Table 7.3.3-7 shows implementation measures required of these sources. The State's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires regulation of nonpoint source discharges using the Water Board's administrative permitting authorities, including waste discharge requirements (WDRs), waiver of WDRs, Basin Plan Discharge Prohibitions, or some combination of these. Consistent with this policy, Tables 7.3.3-8–7.3.3-10 specify actions and performance standards by nonpoint source category to achieve TMDL sediment targets and allocations in the Lagunitas Creek watershed.

Control of Nonpoint Sources of Sediment

The only significant nonpoint source that is not effectively controlled through existing programs and/or natural recovery processes is sediment discharge from roads. This gap applies only to publicly-owned roads, primarily unpaved roads under the jurisdiction of the State Department of Parks and Recreation in S.P. Taylor State Park and/or the U.S. National Park Service within the Golden Gate National Recreation Area. Paved public roads, almost all under the jurisdiction of the County of Marin, also may contribute significant amounts of sediment to channels, although at lower rates.

With regard to the unpaved public roads, reasonable assurances are in place through a memorandum of understanding (MOU)—for the maintenance and management of unpaved roads—that has been agreed to by all of the public agencies within the project area with jurisdiction over roads. Through this MOU, substantial progress has been made to control and reduce sediment delivery to channels. The Marin Open Space District and the Marin Municipal Water District already achieve the performance standard for unpaved roads under their jurisdiction in the Lagunitas Creek watershed.

To ensure that effective sediment source controls are implemented on all public roads—unpaved and paved—consistent with the State Nonpoint Source Program, WDRs, or a conditional waiver of WDRs, are required to meet the road sediment delivery performance standard (Table 7.3.3-9). Whether through adoption of a conditional waiver of WDRs or adoption of WDRs, the required actions are as follows:

1. The County of Marin, Department of Public Works, within five years of TMDL adoption, must conduct an inventory of its paved roads within the project area to identify sediment delivery sites and produce a schedule for treatment, as needed, to achieve road sediment delivery performance standards listed in Table 7.3.3-9.
2. The State Department of Parks and Recreation within S.P. Taylor State Park and the U.S. National Park Service, within that portion of the Golden Gate National Recreation Area that is in the TMDL project area, must control sediment delivery sites on unpaved roads to achieve the performance standard for road-related sediment delivery (Table 7.3.3-9).

3. All public agencies with jurisdiction over roads within the project area must adopt and implement road maintenance guidelines to protect aquatic habitat, water quality, and salmonid fisheries; conduct a biennial training program for road maintenance staff, and biennially submit a report that documents implementation and/or recommends adaptive updates to the maintenance practices.

Actions to Enhance Stream-Riparian Habitat Complexity and Connectivity

Although future sediment delivery from channel incision is predicted to decline substantially as a result of natural process adjustments, absent implementation of a habitat enhancement program, stream-riparian habitat condition will remain substantially degraded. Stream habitat degradation in the channel reaches that remain accessible to populations of coho salmon and steelhead is a key factor in their decline. Floodplains and large woody debris jams provide essential high quality rearing habitats and enhance food production for coho salmon, steelhead, and California freshwater shrimp. These features also reduce streambed scour and sort, meter, and store fine sediment, thereby substantially enhancing the diversity of streambed substrate patches. Therefore, the primary focus of this Plan is a program of channel habitat enhancement, presented in Table 7.3.3-10, focused on actions to substantially increase the amount of large woody debris in channels and to develop focused technical studies to identify priorities and opportunities for floodplain restoration (in channel reaches where it is safe and feasible to do so). Goals for these actions are presented in Table 7.3.3-11. Continued implementation of the *Memorandum of Understanding for Woody Debris Management in Riparian Areas of the Lagunitas Creek Watershed* by the Marin Municipal Water District and other public agencies also will contribute to increased large woody debris loading.

Problems associated with channel incision reflect and integrate multiple historical and ongoing disturbances, some of which are local and direct, and others that are indirect and distal. Effectively addressing these issues will require cooperative and coordinated actions by multiple landowners, working with public agencies, over significant distances along Lagunitas Creek and its tributaries. The Water Board will emphasize cooperative programs to achieve the floodplain restoration and/or large woody debris enhancement goals acting in coordination with the State Water Board Division of Water Rights (Table 7.3.3-11).

The Water Board also encourages stakeholders along San Geronimo Creek and its tributaries to develop reach-based stewardship groups to implement channel habitat enhancement projects in this part of the watershed. Public funding for such efforts should be prioritized for reaches where both potential gains in habitat function are significant and necessary landowner support and participation can be achieved.

Table 7.3.3-7 TMDL Implementation Measures for Sediment Discharges Associated with Point Sources

Source Category	Actions	Implementing Parties
Municipal stormwater and construction stormwater	Comply with applicable NPDES permit	County of Marin and owners or operators of construction projects > 1 acre

Table 7.3.3-8 Required TMDL Implementation Measures for Sediment Discharges Associated with Grazing[1]

Land Use Category	Performance Standards	Actions	Implementing Parties	Completion Dates
Grazing	**Surface erosion associated with livestock grazing**: Attain or exceed minimum residual dry matter values consistent with University of California Division of Agriculture and Natural Resources Guidelines; **and** **Roads**: Road-related sediment delivery to channels ≤ 350 cubic yards per mile per 20-year period; **and** **Minimize delivery of sediment to channels from unstable or potentially unstable areas:** Manage existing grazing operations, stock ponds, and roads to prevent additional erosion of legacy sediment delivery sites, and/or delivery from other potentially unstable areas.	Comply with the existing Water Board regulatory program: conditional waiver of waste discharge requirements for grazing operations in the Tomales Bay watershed (R2-2013-0039), or Other applicable WDRs or waiver of WDRs, or Submit a Report of Waste Discharge to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowner and/or ranch operator	As required by existing regulatory program under R2-2013-0039 or other applicable WDRs or waiver of WDRs. Individual waste discharge requirements also may be issued as needed, with the schedule to be determined.
		Report progress on implementation of site-specific erosion control measures.[2]	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs

[1] To achieve TMDL allocations, consistent with the State Nonpoint Source Program.

[2] These reports may be prepared individually or jointly or through a recognized third party.

Table 7.3.3-9 Required TMDL Implementation Measures for Sediment Discharges associated with Parks and Open Space and/or Municipal Public Works[1]

Landowner Type	Performance Standards	Actions	Implementing Parties	Completion Dates
Parks and Open Space and Public Works	**Roads**: Road-related sediment delivery to channels ≤ 350 cubic yards per mile per 20-year period; **and** **Minimize delivery of sediment to channels from unstable or potentially unstable areas:** Manage existing roads and other infrastructure to prevent additional erosion of legacy sediment delivery sites, and/or delivery from other potentially unstable areas.	Submit a Report of Waste Discharge to the Water Board that provides, at a minimum, the following required actions: a) description of the road network and/or segments; b) identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; c) a schedule for implementation of identified control measures; and d) development and implementation of guidelines for road maintenance, as needed to protect water quality, stream-riparian habitat, and salmonid fisheries	County of Marin, Public Works Department State of California, Department of Parks and Recreation, S.P. Taylor State Park U.S. National Park Service, Golden Gate National Recreation Area	Submit a report of waste discharge within five years of Basin Plan amendment adoption. Achieve performance standards within twenty years of Basin Plan amendment adoption.
		Comply with applicable WDRs or waiver of WDRs.	As above	As specified in applicable WDRs or waiver of WDRs
		Report progress on development and implementation of best management practices to control road-related erosion.	As above	As specified in applicable WDRs or waiver of WDRs

[1] To achieve TMDL allocations, consistent with the State Nonpoint Source Program.

Table 7.3.3-10 Actions to Enhance Habitat Complexity and Connectivity in Lagunitas Creek and its Tributaries

Stressor	Management Objective(s)	Actions	Implementing Parties	Completion Dates and Notes
Habitat degradation as a result of incision of Lagunitas Creek and its tributaries.	Enhance channel habitat complexity and connectivity as needed to support self-sustaining populations of coho salmon and steelhead and to enhance the overall health of the native fish community. Reduce rates of sediment delivery (associated with incision and accelerated bank erosion) to channels by 67 percent in Lagunitas and San Geronimo creeks and by 33 percent in tributaries to both streams.	1. Develop and implement plans to enhance large woody debris loading and restore natural rates of recruitment to channels, as needed to achieve numeric targets for large woody debris loading (Table 1) and to achieve load allocations for sediment (Tables 3a and 3b). The above plan will include a survey to quantify baseline values for large woody debris loading. 2. Develop detailed technical studies to characterize reach-specific opportunities and priorities for floodplain restoration.	Along San Geronimo Creek and its tributaries, local government agencies or non-profits in partnership with reach-based landowner stewardships will develop and implement projects to enhance habitat complexity and connectivity. Elsewhere in the Lagunitas Creek watershed, the Marin Municipal Water District will pursue partnerships to develop and implement projects to enhance habitat complexity and connectivity.	Targets for large woody debris loading will be achieved within 10 years of Basin Plan amendment adoption. Technical studies to characterize reach specific opportunities and priorities for floodplain restoration will be completed within 5 years of Basin Plan amendment adoption. Comply with conditions of Clean Water Act section 401 certifications in the implementation of projects to enhance large woody debris loading and recruitment.

Table 7.3.3-11 Goals for Floodplain Restoration and/or Large Woody Debris Enhancement in Lagunitas Creek Watershed

1. To increase side channel plus alcove area, wetted during winter baseflow and higher flows, by 100 percent-or-more. Side channels and alcoves should be accessible, nearby or adjacent to debris jams and/or undercut banks in the main channel and/or tributary junctions.
2. To establish diverse vegetation and substrate patch types that are dynamically established, evolve, and deform through time: a complex and dynamic mosaic of stream-riparian habitats.
3. To store a substantial fraction of the fine sediment supply on the floodplain: 20 percent-or-more of the total sediment supply to a given channel reach.
4. To achieve the streambed mobility and redd scour targets in all reaches where floodplains are reconnected to channels.
5. To increase gravel storage volume and average residence time and to increase the variability in the thalweg profile in S.P. Taylor State Park, Tocaloma, and Lower Lagunitas reaches.
6. To restore natural rates of recruitment of large woody debris from riparian areas of channels located on public lands.
7. To achieve or exceed targets for large woody debris loading as specified in Table 1 within 10 years of Basin Plan amendment adoption.
8. To convert one-third-or-more of the plane bed habitat in channel reaches accessible to anadromous salmonids to forced pool-riffle habitat.
9. To expand the reach length occupied by California freshwater shrimp by two kilometers-or-more.
10. To produce 10,000-or-more coho salmon smolts, and 6,000-or-more steelhead smolts, on average, each year.

Agricultural Water Quality Control Program Costs

Implementation measures for grazing lands and roads located on those same properties constitute an agricultural water quality control program and, therefore, consistent with California Water Code requirements (Section 13141), the cost of this program is estimated herein. The Tomales Bay watershed pathogens TMDL that was adopted in 2005, which includes all ranches and grazing areas within the Lagunitas Creek watershed, estimates costs to ranch operators to implement best management practices to control pathogen discharges from rangelands including maintaining adequate amounts of residual dry matter in rangelands and the costs of excluding livestock from water courses by construction and maintenance of fences in these sensitive areas. Those actions also are expected to satisfy performance standards for control of surface erosion in rangelands and control of sediment discharge from unstable areas. As such, we do not consider these existing costs, associated with compliance with the previously adopted pathogens TMDL, in calculating the agricultural water quality control program costs associated with achieving compliance with the Lagunitas Creek sediment TMDL. The only new agricultural water quality control program costs are those related to attainment of performance standards and load allocations for sediment discharge from roads to channels. In the Lagunitas Creek watershed, we estimate that there are 20 miles of roads located on privately owned ranchlands. In estimating potential cost of compliance, we reference recently completed road erosion inventories conducted on unpaved roads located on ranches and/or parklands in the Lagunitas Creek watershed that include estimates of the costs for treating all significant sediment delivery sources from those roads. Relying on these data, we estimate that the maximum total cost to ranch operators, assuming no public funding is available to support this work, could cost $420,000 over the 20-year implementation period associated with achievement of the TMDL, or about an average of $21,000 per year. However, the actual cost to agricultural landowners should be lower because it is reasonable to conclude that some projects will qualify for grant funding from public agencies.

7.3.3.6 Evaluation and Monitoring

Three types of monitoring are specified to assess progress toward achievement of numeric targets and load allocations for sediment:

1. Implementation monitoring to document actions to reduce fine sediment discharge and enhance habitat complexity and connectivity;
2. Upslope effectiveness monitoring to evaluate effectiveness of sediment control actions in reducing rates of sediment delivery to channels; and
3. In-channel effectiveness monitoring (e.g., streambed mobility and redd scour) to evaluate channel response to management actions and natural processes.

Implementation monitoring will be conducted by landowners or designated agents. The purpose of this type of monitoring is to document that sediment control and/or habitat enhancement actions specified herein actually occur.

The Water Board, working in partnership with other government agencies, plans to conduct upslope effectiveness monitoring. This will include an update to all or part of the watershed sediment budget, to re-evaluate rates of sediment delivery to channels from land-use activities and natural processes (ten years subsequent to Basin Plan amendment adoption), in the fall of 2024, when sediment delivery associated with land-use activities are projected to be reduced by 25 percent-or-more.

In-channel effectiveness monitoring should be conducted by local government agencies with scientific expertise and demonstrated capability in working effectively with private property owners (to gain permissions for access), as needed to develop a representative sample of stream habitat conditions, in relation to sediment supply and transport within the watershed. In-channel effectiveness monitoring needs to include measurements of redd scour and streambed mobility to evaluate attainment of water quality objectives for settleable material. Water Board staff will work collaboratively with local partners to develop and refine the in-channel effectiveness monitoring program.

Streambed mobility (τ^*) should be measured in gravel-bedded channel reaches along Lagunitas Creek and in its tributaries where the adjacent valley flat is a floodplain.

Redd scour should be measured at 30-or-more potential spawning sites, with 4-or-more scour measurements per spawning site, as needed, to establish a high level of statistical confidence in estimated values. Redd scour sampling sites should be stratified based on estimated average annual sediment supply rate.

Large woody debris loading in channels also needs to be surveyed and assessed to evaluate attainment of the numeric targets for large woody debris loading and to guide development of reach-specific prescriptions for installation of engineered log jams and riparian management actions to maintain or exceed the target values in future years through natural recruitment.

Desired measurement frequency for streambed mobility, redd scour, and large woody debris is once every three years.

7.3.3.7 Adaptive Implementation

In concert with the monitoring programs, described above, the Water Board will adapt the Lagunitas Creek Sediment Reduction and Habitat Enhancement Plan and TMDL. In amending the Basin Plan amendment, the Water Board will consider, at a minimum, the results of validation monitoring conducted to confirm or reject hypotheses regarding effects of actions to enhance large woody debris loading and floodplain area on population dynamics of coho salmon, steelhead, and California freshwater shrimp. The Water Board will also consider the results of salmonid population monitoring programs including juvenile population estimates, adult spawner surveys, and smolt outmigration surveys performed to evaluate the status and trends of these populations and also related analyses of smolt population dynamics in response to changes in the quantity and quality of freshwater habitat. We note that Lagunitas Creek has been identified as a life-cycle monitoring station in the California Department of Fish and Wildlife's Coastal Monitoring Plan (CMP). The Lagunitas Creek Sediment TMDL will seek to dovetail with the CMP's evaluations of salmonid population status and trends in the watershed.

7.4 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SAN MATEO COASTAL BASIN (SEE FIGURE 2-4)

7.4.1 San Pedro Creek and Pacifica State Beach Bacteria TMDL

The following sections establish the TMDL for bacteria in San Pedro Creek and at Pacifica State Beach. The numeric targets, load and wasteload allocations, and implementation plan are designed to support and protect these water bodies' designated beneficial use of water contact recreation (e.g., swimming and fishing).

7.4.1.1 Problem Statement

San Pedro Creek and Pacific Ocean waters adjacent to Pacifica State Beach are impaired by bacteria. Bacteriological water quality objectives are exceeded based on elevated indicator bacteria densities, and thus, there is impairment of the water contact recreation (REC-1) beneficial use in these water bodies. Recreating in waters with elevated indicator bacteria densities has long been associated with adverse health effects. Specifically, national epidemiological studies demonstrate that there is a causal relationship between adverse health effects and recreational water quality, as measured by indicator bacteria densities.

7.4.1.2 Sources

Bacteria sources are identified based on the results of a bacterial source tracking study completed in 2009 and from documentation of inadequately treated human waste discharges from Pacifica's sanitary sewer system. If not properly managed, the following source categories have the potential to discharge bacteria to San Pedro Creek and Pacifica State Beach: sanitary sewer systems, horse facilities, and municipal stormwater runoff and dry weather flows.

7.4.1.3 Numeric Targets

This TMDL establishes a desired, or target, condition for the water contact recreation use in San Pedro Creek and at Pacifica State Beach based on the water quality objectives for indicator bacteria. The numeric targets for San Pedro Creek are based on the Basin Plan water quality objectives for coliform bacteria for water contact recreation use in fresh water (the *E.coli* targets are the U.S. EPA bacteriological criteria for water contact recreation in fresh waters that are also contained in the Basin Plan). The numeric targets for Pacifica State Beach are based on the Ocean Plan water quality objectives for water contact recreation use in marine waters. The water quality objectives for both marine and freshwater that form the basis of the numeric targets for this TMDL are listed in Table 7.4.1-1.

Table 7.4.1-1 Bacteriological Water Quality Objectives for San Pedro Creek and Pacifica State Beach		
Indicator Type	**Pacifica State Beach (Marine REC-1) MPN/ 100 mL**	**San Pedro Creek (Freshwater REC-1) MPN/ 100 mL[1]**
	Single Sample Maximum	90th Percentile/No Sample Greater Than
E. coli	NA	235
Fecal Coliform	400	400
Enterococcus	104	NA
Total Coliform	10,000[2]	10,000
	Geometric Mean[3]	Geometric Mean/Log Mean/Median
E. coli	NA	126
Fecal Coliform	200	200
Enterococcus	35	NA
Total Coliform	1,000	240

1. Based on a minimum of five consecutive samples equally spaced over a 30-day period.
2. Total coliform density shall not exceed 1,000/100 mL, if the ratio of fecal-to-total coliform exceeds 0.1.
3. Calculated based on the five most recent samples from each site during a 30-day period.

NA: not applicable.

It is not the intent of this TMDL to require treatment or diversion of water bodies or to otherwise require treatment of natural sources of indicator bacteria. Therefore, for this TMDL, a reference system and antidegradation approach has been incorporated in the numeric targets as an allowable number of times that the water quality objectives can be exceeded. The purpose of the allowable number of exceedances of the water quality objectives is to account for the natural, and largely uncontrollable sources of bacteria (e.g., birds and wildlife feces), which have been shown can, by themselves, cause exceedances of the REC-1 water quality objectives. Hence, the numeric targets for this TMDL are the allowable number of exceedances of the single-sample water quality objectives as listed in Table 7.4.1-2.

The number of allowable exceedances is based on two criteria: (1) bacteriological water quality at any site must be at least as good as at a designated reference system; and (2) there is no degradation of existing bacteriological water quality if historical water quality at a particular site is better than the designated reference system.

Table 7.4.1-2 Numeric Targets, TMDLs, and Allocations Based on Allowable Exceedances of Single-Sample Objectives for San Pedro Creek and Pacifica State Beach					
	San Pedro Creek		**Pacifica State Beach**		
	Dry Weather	**Wet Weather[5]**	**Summer Dry Weather (Apr. 1 to Oct. 31)**	**Winter Dry Weather (Nov. 1 to Mar. 31)**	**Wet Weather[5]**
Allowable Exceedances of Single-Sample Objectives (assuming daily sampling is conducted)[1,2,3]	4	26	0	2	30
Allowable Exceedances of Single-Sample Objectives (assuming weekly sampling is conducted)[4]	1	4	0	1	5

1. Allowable exceedances are calculated by multiplying exceedance rates observed in the reference system(s) by the number of days during each respective period in the reference year (1994).
2. To end up with whole numbers, where the fractional remainder for the calculated allowable exceedance days exceeds 0.1, then the number of days is rounded up.
3. The calculated number of exceedance days assumes that daily sampling is conducted.
4. To determine the allowable number of exceedance events given a weekly sampling regime, as practiced for monitoring San Pedro Creek and Pacifica State Beach, the number of exceedance days was adjusted by solving for "X" in the following equation: X = (exceedance days x 52 weeks) / 365 days.
5. Wet weather is defined as any day with 0.1 inches of rain or more and the following three days.

The numeric targets based on the allowable exceedances of single-sample objectives are also the bacteria TMDLs and load and wasteload allocations.

7.4.1.4 Total Maximum Daily Loads

The TMDLs for San Pedro Creek and Pacifica State Beach are the same as the numeric targets listed in Table 7.4.1-2 and are expressed in terms of allowable exceedances of single-sample objectives.

7.4.1.5 Load and Wasteload Allocations

Load allocations and wasteload allocations are the same as the numeric targets and TMDLs listed in Table 7.4.1-2 and are expressed in terms of allowable exceedances of single-sample objectives. Table 7.4.1-3 summarizes the allocations for discharges of bacteria in the San Pedro Creek watershed. Dischargers that discharge to San Pedro Creek have allocations based on allowable exceedances for San Pedro Creek. Dischargers that discharge to Pacifica State Beach have allocations based on allowable exceedances for Pacifica State Beach. The TMDLs, load allocations, and wasteload allocations for Pacifica State Beach shall be attained within 8 years of the effective date of the TMDL. The TMDLs, load allocations, and wasteload allocations for San Pedro Creek shall be attained within 15 years of the effective date of the TMDL.

All entities that discharge indicator bacteria or have jurisdiction over such dischargers are collectively responsible for meeting these allocations. Dischargers shall demonstrate achievement of allocations in the receiving water bodies (i.e., at the mouth of San Pedro Creek and at the

existing San Mateo County shoreline water quality monitoring station #5 at the Pacifica State Beach).

Table 7.4.1-3 Load and Wasteload Allocations for Dischargers of Bacteria in San Pedro Creek Watershed Indicator Bacteria Sources

	Sanitary Sewer Systems	Horse Facilities	Stormwater Runoff & Dry Weather Flows
Load Allocation	Not applicable	As listed in table 7.4.1-2	Not applicable
Wasteload Allocation	Zero	Not applicable	As listed in table 7.4.1-2
Compliance Point	Existing monitoring stations in receiving water bodies[1]	Existing monitoring stations in receiving water bodies[1]	Existing monitoring stations in receiving water bodies[1]
Responsible Parties	Pacifica; private home and business owners in the San Pedro Creek watershed[2]	Existing and future horse facility owners/operators	Pacifica; San Mateo County; Caltrans
Applicable Permits	Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ)	General Waste Discharge Requirements for Confined Animal Facilities (Order No. R2-2003-0093)	Municipal Regional Stormwater NPDES Permit (Order No. R2-2009-0074, NPDES Permit No. CAS612008) Caltrans Stormwater NPDES Permit (No. CAS000003)

1. Existing monitoring stations are located at the mouth of San Pedro Creek (i.e., “Creek Mouth” station) and at Pacifica State Beach (i.e., Station #5).
2. The private sewer lateral portion of the sanitary sewer system is the responsibility of private property owners.

7.4.1.6 Implementation Plan

The San Pedro Creek and Pacifica State Beach Bacteria TMDL implementation plan specifies actions needed to attain the TMDL and allocations. The implementation plan includes actions for which requirements are already in place, and some additional new actions. The new actions include requirements for horse facility owners and operators to obtain coverage under waste discharge requirements to ensure the clean operation of their facilities; and new requirements for stormwater management. Actions for which requirements are already in place, as of the TMDL effective date, include: 1) reduction of sanitary sewer discharges by the measures required under an existing Cease and Desist Order issued to the City of Pacifica and the general waste discharge requirements for sanitary sewer systems; and 2) a Cleanup and Abatement Order issued to one of the horse facilities in the watershed.

The required implementation actions are consistent with the following existing regulations and Orders:

Water Board Orders and Discharge Prohibition

- Statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ)
- Statewide Construction Stormwater NPDES General Permit (Order No. 2009-0009-DWQ; NPDES Permit No. CAS000002)
- Municipal Regional Stormwater NPDES Permit (Order No. R2-2009-0074 and amendment Order No. R2-2011-0083; NPDES Permit No. CAS612008)
- General Waste Discharge Requirements for Confined Animal Facilities (Order No. R2-2003-0093)
- Basin Plan Discharge Prohibition No. 15 (Table 4.1), which states: "it shall be prohibited to discharge raw sewage or any waste failing to meet waste discharge requirements to any waters of the Basin."

Water Board Enforcement Orders

- Cease and Desist Order for Pacifica's Wastewater Discharges (Order No. R2-2011-0031)
- Cleanup and Abatement Order for Millwood Ranch (Order No. R2-2009-0045)

Local Regulations

- San Mateo County Confined Animal Ordinance (Section 7700)
- City of Pacifica Administrative Policy on "Standards for Keeping Animals"
- City of Pacifica Municipal Code for Animal Excreta (Section 6-1.301)
- City of Pacifica Municipal Code for Regulation of Sewer Laterals (Section 6-13.601)

Responsible Parties and Jurisdictions

Wasteload allocations for sanitary sewer systems will be implemented through the requirements and provisions of the Statewide General Waste Discharge Requirements Order for sanitary sewer systems as well as Cease and Desist Order No. R2-2011-0031 issued by the Water Board to Pacifica. Pacifica is the responsible party for implementing these requirements and provisions.

Load allocations for existing and any new horse facilities will be implemented through the requirements of the Water Board's General Waste Discharge Requirements for Confined Animal Facilities. The owners of the three horse facilities within the San Pedro Creek watershed (i.e., Millwood Ranch, Park Pacifica Stables, and Shamrock Ranch Stables), as well as any new horse facilities within the watershed, must obtain coverage under and comply with requirements of the updated or existing General Waste Discharge Requirements for Confined Animal Facilities.

Wasteload allocations for municipal stormwater runoff and dry weather flows shall be implemented through the Municipal Regional Stormwater NDPES Permit, or a new stormwater NPDES permit, issued to Pacifica and San Mateo County. No later than six months prior to the expiration date of each NPDES permit, Pacifica and San Mateo County shall submit a plan to the Water Board that describes best management practices (BMPs) that are currently being implemented and the current level of implementation, and additional BMPs that will be implemented, and or an increased level of implementation of existing BMPs, to prevent or reduce discharges of bacteria from their storm drain systems that cause or contribute to exceedance of wasteload allocations. The plan shall include an implementation schedule to account for BMP implementation, and if necessary,

trigger implementation of additional BMPs or increased level of implementation, to attain wasteload allocations.

The Water Board may establish permit requirements to implement wasteload allocations based on implementation of BMPs in lieu of numeric limits. The wasteload allocations are not designed to be implemented directly as numeric effluent limitations applicable to a discharger, Pacifica, or San Mateo County. The Water Board will not include numeric limits, based on the wasteload allocations, in NPDES permits if the discharger demonstrates that it has fully implemented technically feasible, effective, and cost efficient BMPs to control all controllable sources to and discharges from their storm drain systems.

Stormwater discharges from the California Department of Transportation's (Caltrans') stretch of Highway 1 crossing the northwestern edge of the San Pedro Creek watershed are not a significant source of indicator bacteria because that section of the highway does not include any typical bacteria-generating sources such as homeless encampments, restroom facilities, garbage bins, etc. Caltrans' existing BMPs and stormwater NPDES permit requirements, as of the effective date of the TMDL, are sufficient to attain and maintain its portion of the wasteload allocation.

Table 7.4.1-4 lists the implementation actions for each of the source categories and the phased implementation schedule. The implementation schedule allows time for the responsible parties to identify and implement measures that are necessary to control bacteria discharges resulting in exceedances of allocations.

Table 7.4.1-4 Implementation Plan Requirements and Schedule			
Source	**Implementation Requirements**	**Responsible Party**	**Schedule**
Sanitary Sewer Systems	Comply with Statewide General Waste Discharge Requirements for Sanitary Sewer Systems	Pacifica	Ongoing
	Comply with the Cease and Desist Order (CDO) for Pacifica's wastewater discharges.	Pacifica	As required by the CDO
	Ensure compliance with private sewer laterals ordinance	Pacifica	Ongoing
	Comply with Pacifica's private sewer laterals ordinance	Private home and business owners	Ongoing
Horse Facilities	Obtain coverage under and comply with Water Board's updated General Waste Discharge Requirements for Confined Animal Facilities, when the order is reissued (or the existing version, if an update to the order is not made within two years of the effective date of the TMDL).	Existing and future horse facility owners or operators	No later than two years after the TMDL effective date
	Comply with the Cleanup and Abatement Order (CAO) for Millwood Ranch	Millwood Ranch owners	As required by the CAO
	Ensure compliance with: Pacifica's administrative policy on "Standards for Keeping Animals" Pacifica's municipal code on "Animal Excreta" San Mateo County's ordinance for confined animals	Pacifica and San Mateo County	Ongoing
	Provide a report summarizing current efforts to ensure compliance with local regulations for proper management of horse waste at horse facilities	Pacifica and San Mateo County	Annually

Table 7.4.1-4 Implementation Plan Requirements and Schedule			
Source	**Implementation Requirements**	**Responsible Party**	**Schedule**
Municipal Stormwater Runoff and Dry-Weather Flows	Submit a plan to the Water Board, acceptable to the Executive Officer, which describes BMPs being implemented and additional BMPs that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule and proposed milestones.	Pacifica and San Mateo County	As soon as possible and no later than June 2014
	Submit a bacteria water quality monitoring plan for the San Pedro Creek watershed to 1) better characterize their bacteria contributions; and 2) assess compliance with the wasteload allocations. The parties may submit plans separately, but are encouraged to collaborate on a single cooperative plan. The Plan(s) shall be acceptable to the Executive Officer.		As soon as possible and no later than June 2014
	If wasteload allocations are not achieved by the end of a permit term, submit a plan acceptable to the executive officer, which describes additional BMPs or increased levels of existing BMPs that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.		Not later than six months prior to permit expiration
	Provide a report on the status of the implementation activities		Annually

7.4.1.7 Water Quality Monitoring in San Pedro Creek and at Pacifica State Beach

Pacifica and San Mateo County shall, jointly or individually, develop and implement a comprehensive monitoring plan to 1) better characterize indicator bacteria contributions from their source; and 2) assess compliance with wasteload allocations. The monitoring plan shall include applicable bacteria water quality objectives and the sampling frequency shall be adequate to assess compliance with the 30-day geometric mean objectives. Responsible parties may build upon existing monitoring program(s) for San Pedro Creek and Pacifica State Beach when developing the bacteria water quality monitoring plan. At a minimum, in addition to the existing San Mateo County sampling stations at the mouth of San Pedro Creek and at Pacifica State Beach, which will be used to evaluate achievement of the designated load and wasteload allocations, at least one sampling station shall be located in each creek reach/subwatershed, such that bacteria contributions from each of the San Pedro Creek's forks/subwatersheds are distinguished. In addition, indicator bacteria concentrations in the stormwater and dry weather discharges from the Linda Mar and Anza pump stations shall be monitored and characterized sufficient to determine their contribution to exceedances and the effects of any corrective actions. Lastly, monitoring of some of the stormwater outfalls within the watershed may be needed to characterize and identify indicator bacteria loadings from different land uses and locations and the effects of any corrective actions. Monitoring data shall be entered into the State Water Board's "Beach Watch" database as appropriate.

7.4.1.8 Adaptive Implementation

The Water Board will adapt the TMDL and implementation plan to incorporate new and relevant scientific information such that effective and efficient measures can be taken to achieve the allocations. The Water Board staff will periodically, in coordination with the implementation schedule, at 5, 8 and 15 years, evaluate new and relevant information from implementation actions, water quality monitoring results and the scientific literature, including any local reference system studies, U.S. EPA's revised recommended bacteria criteria, or new or revised State bacteria water quality objectives, and assess progress toward attaining TMDL targets and load allocations, and present that information to the Water Board. The Water Board will consider a Basin Plan amendment that reflects any necessary modifications to the targets or implementation plan.

7.4.2 Pescadero-Butano Watershed Sediment TMDL and Habitat Enhancement Plan

This sediment TMDL and habitat enhancement plan address the impairments to beneficial uses in Pescadero and Butano creeks. The following sections establish:

- The sediment TMDL, which identifies the allowable annual sediment load that can be discharged into the Pescadero-Butano watershed, expressed as a percentage of the natural background sediment delivery rate to channels; and
- An implementation plan to achieve the TMDL and habitat enhancement goals.

The goals of the Pescadero-Butano Watershed Sediment TMDL and Habitat Enhancement Plan are as follows:

- To restore water quality and attain beneficial uses.
- To conserve the steelhead trout population.
- To restore a self-sustaining coho salmon population.

- To improve water quality and habitat for native fish and aquatic wildlife species communities.

The TMDL and the implementation plan address the significant increases in sediment supply to channels, as well as simplification, loss, and/or reduction in the quality and quantity of instream habitat for listed populations of salmonids in the Pescadero-Butano watershed. To attain water quality objectives and restore properly functioning channels and habitat, the TMDL calls for actions throughout the watershed to substantially reduce sediment supply to channels and, where safe and feasible, reconnect the channels to their floodplains and enhance channel complexity by adding and retaining large woody debris in channels.

This TMDL focuses on the implementation actions within the channel network upstream of the Pescadero lagoon and marsh complex, located at the watershed-ocean interface, and does not address other water quality issues specific to the Pescadero lagoon and marsh complex. However, achievement of this TMDL is a necessary step to help restore water quality and beneficial uses throughout the watershed, including the lagoon and marsh.

7.4.2.1 Problem Statement

Populations of steelhead and salmon in the Pescadero-Butano watershed have declined substantially over the last century due to progressive changes in land use resulting in excess sediment in the channels and degradation of channel habitat. Land clearing, timber harvesting, legacy grazing and agricultural practices, channel modifications, and roads have: i) increased hillslope erosion; ii) doubled annual sediment supply to channels; iii) resulted in deep incision of Pescadero and Butano creeks and their tributaries; and iv) eliminated sediment storage along the channel and on the floodplains.

Pescadero and Butano creeks are impaired by excess erosion and sedimentation such that the narrative water quality objectives for sediment and settleable material are not being met, and cold freshwater habitat, wildlife habitat, fish spawning and migration, contact and non-contact recreation, and preservation of rare and endangered species beneficial uses are impaired. In addition, the narrative water quality objective for population and community ecology is not being met due to channel incision, which is a significant sediment source and results in habitat simplification and floodplain disconnection. Channel incision and associated simplification of habitat are primary causes of the decline of coho salmon and steelhead trout populations and are controllable water quality factors.

Habitat conditions are degraded by elevated concentrations of fine sediment in the streambed (primarily sand) – caused by pervasive alteration of sediment supply, transport, and storage, which further reduces juvenile salmonid growth and survival in all freshwater life stages. Excess amounts of fine sediment have been deposited on the streambed at potential steelhead spawning and rearing sites. Excess fine sediment in the streambed can cause poor incubation for fish eggs, resulting in high mortality prior to emergence. Fine sediment has also compromised the quality of pools as rearing habitat and reduced winter rearing habitat by filling the spaces between cobbles and boulders.

Channel incision has severely impacted the basic physical habitat structure of the channel and has caused habitat simplification expressed by a substantial reduction in the frequency and area of gravel bars, riffles, and side channels. Channel incision has isolated channels from their floodplains: floodplains no longer function as sediment storage sites and are lost as excellent rearing and refuge habitats for juvenile salmon and steelhead. In addition, a substantial reduction

in the amount of large woody debris in channels has greatly diminished the capacity for the creeks to store, sort, and meter sediment, as well as the quality and diversity of freshwater channel habitats. Lastly, significant and persistent increases in sediment supply and loss of floodplains have contributed to an order-of-magnitude increase in the sedimentation rate in the Pescadero lagoon and marsh, adversely impacting water quality.

7.4.2.2 Numeric Targets

The numeric targets for the TMDL to achieve the Basin Plan's water quality objectives for sediment, settleable material, and population and community ecology are listed in Table 7.4.2-1.

Table 7.4.2-1 Sediment TMDL and Habitat Targets for Pescadero and Butano Creeks and Their Tributaries

Sediment Condition Target	
Residual Pool Volume (V*) A unitless measure of the fraction of a pool's volume that is filled by fine sediment	Mean value ≤ 0.21 Maximum value ≤ 0.45
Substrate Composition	≤ 14% fines < 0.85 millimeter (mm), i.e., percent fines less than 0.85 mm in diameter is less than or equal to 14% of the total bulk core sample ≤ 30% fines < 6.40 mm
Habitat Condition Target	
Large Woody Debris (LWD) loading in Redwood Channels[a]	≥ 300 cubic meters per hectare of bankfull channel area (m^3/ha)
LWD loading in Hardwood Channels	≥ 100 m^3/ha
Redwood channels are defined as those where the adjacent valley floor and/or hillslopes are vegetated primarily by coast redwood forest. Hardwood channels are defined as those where the adjacent valley flat is vegetated by a hardwood forest (typically some combination of willow species, white alder, California bay laurel, bigleaf maple, tan oak, and/or Oregon ash). The large woody debris loading targets apply to channel reaches that provide actual or potential spawning habitat for anadromous salmonids as defined above.	

7.4.2.3 Sediment Sources

Field inventories and sediment modeling conducted throughout the Pescadero-Butano watershed provide credible estimates of the average rate of sediment delivery to channels between 1970 and 2010. Based on this work (Table 7.4.2-2), the Water Board concludes:

1. Sediment delivery to fish-bearing channels has doubled in the last 150 years as compared to the natural background rate. More than half of the fine sediment delivered to Pescadero and Butano creeks and their tributaries is associated with land use activities, including roads, human-caused channel incision, and legacy effects of intensive historical livestock grazing and timber harvesting.
2. The average annual rate of sediment supply to channels in the watershed is 1,200 tons per km^2 per year.

3. More than 40,000 tons of sediment that historically deposited annually on floodplains and alluvial valley (one third of the total sediment delivered from the watershed) is now transported downstream to the Pescadero lagoon and marsh complex due to channel incision. Therefore, not only has this significant storage function along the floodplains and alluvial valley been lost, but the valley itself is now a significant sediment source.
4. Contributions of sediment from municipal and construction stormwater runoff are small in comparison to other sources and are estimated to be about 500 tons per year.

Table 7.4.2-2 Mean Annual Sediment Delivery to the Pescadero-Butano Watershed (tons/year)

Sediment Source Category	Natural Background Annual Delivery Rate (tons/year)	Current Mean Annual Delivery Rate (tons/year)
Sediment Sources		
• Natural Processes:	**120,000**	**120,000**
• Human Actions:		
• Roads		51,000
• Channel incision		30,000
• Gullying on grasslands		24,000
• Landslides and debris flows		23,000
• Surface erosion on grasslands		4,500
Total from Human Actions		**132,500**
TOTAL		**252,500**

7.4.2.4 Total Maximum Daily Load and Allocations

The Pescadero-Butano watershed sediment TMDL is 150,000 tons per year, or 125 percent of the estimated natural background load and applies to Pescadero and Butano creeks and their tributaries. In order to achieve the TMDL, controllable sediment delivery resulting from human actions needs to be reduced by approximately 78 percent (Table 7.4.2-3).

Attainment of the TMDL will be evaluated immediately downstream of the confluence of Pescadero and Butano creeks at the upstream boundary of the Pescadero marsh and lagoon complex. Attainment of the TMDL will be evaluated using a 10-year averaging period.

Table 7.4.2-3 Load Allocations

Source Category	Current Load	Estimated Percentage Reductions Needed	Load Allocations	
	tons/year	Percent	tons/year	Percent of Natural Background
• Natural processes	120,000	0	120,000	100
• Human actions:				
- Roads*	51,000	78	11,500	9.5
- Channel incision	30,000	78	6,600	5.5
- Gullies	24,000	78	5,300	4.4
- Landslides	23,000	78	5,100	4.2
- Surface erosion grasslands	4,500	78	1,000	0.8
TOTAL	**252,500**		**149,500**	**124.4**

*Approximately 15% of the allowable load for roads is allocated to San Mateo County

Table 7.4.2-4 Wasteload Allocations for Stormwater Runoff

Source Category	Current Load	Percent Reductions Needed	Wasteload Allocations	
	tons/year	Percent	tons/year	Percent of Natural Background
• San Mateo County Municipal Stormwater NPDES Permit No. CAS612008	300	0	300	0.3
• Construction Stormwater NPDES Permit No. CAS000002	150	0	150	0.3
• CalTrans Stormwater NPDES Permit No. CAS000003	< 50	0	50	0
TOTAL	**500**	**0**	**500**	**0.6**

7.4.2.5 Implementation Plan

The actions described below are necessary to achieve TMDL targets, allocations, performance standards, and habitat enhancement goals within twenty years of the effective date of the Basin Plan amendment.

Stormwater Runoff

Stormwater runoff from State highways and municipal and construction stormwater runoff are the only known point sources of sediment to the Pescadero-Butano watershed and have small wasteload allocations (Table 7.4.2-4) relative to nonpoint sources of sediment. These sources are regulated under existing NPDES permits that include requirements to control erosion, sedimentation, and hydromodification from new development and requirements to maintain rural roads. Table 7.4.2-5 shows implementation measures required for these sources. Implementation to address reductions in loading for sediment discharges associated with roads under the jurisdiction of San Mateo County are included here.

Table 7.4.2-5 TMDL Implementation Measures for Sediment Discharges Associated with Stormwater Runoff and Roads

Source Category	Actions	Implementing Parties
Stormwater Runoff CalTrans, Construction	Comply with applicable NPDES permits	CalTrans Owners or operators of construction projects > 1 acre
Stormwater Runoff and Roads Municipal	Comply with applicable NPDES permits	San Mateo County

Nonpoint Sources

The State's 2004 Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program provides for regulation of nonpoint source discharges using the Water Board's administrative permitting authorities, including WDRs, waiver of WDRs, Basin Plan Discharge Prohibitions, or some combination of these. Consistent with this policy, Tables 7.4.2-6 through 7.4.2-11 specify actions and performance standards by nonpoint source category, as needed to achieve TMDL targets and allocations in the Pescadero-Butano watershed. The Water Board will consider adopting permits that apply to the nonpoint sources from roads, grazing lands, non-grazing agricultural lands, and/or timberlands listed in Tables 7.4.2-6 through 7.4.2-10. Individual landowners or coalitions may work with "third parties," such as the San Mateo Resource Conservation District, to develop and implement sediment pollutant control programs.

Habitat Enhancement

Channel incision, loss of sediment storage function, and loss of essential habitat features are the result of multiple historical and ongoing disturbances. This implementation plan calls for habitat enhancement actions. A channel and habitat restoration program that increases woody debris and re-establishes width-to-depth ratios and a modest flood plain will be the most effective means of controlling channel incision and reducing related sediment delivery to the creeks. Floodplains and large woody debris jams would provide essential high-quality rearing habitats and enhance food production for coho salmon and steelhead. These features also help create pools, reduce scouring, store sediment, and diversify habitat types within the stream. The habitat enhancement program, presented in Table 7.4.2-11, will therefore focus on actions to: (1) to the extent safe and feasible,

substantially increase the amount of large woody debris in channels that run through public lands and timber harvest lands; and (2) study safe and feasible opportunities for floodplain restoration in channel reaches on private lands. The effectiveness of implementation of actions specified in Table 7.4.2-11 to enhance habitat will be evaluated as part of the adaptive implementation program.

7.4.2.6 Agricultural Water Quality Program Costs

The implementation measures in Tables 7.4.2-6 and 7.4.2-7 for grazing and agricultural land constitute an agricultural water quality control program and therefore, consistent with Water Code section 13141, the cost of this program is estimated herein. This cost estimate includes the cost of implementing all road-related and surface erosion-related sediment control measures specified in the implementation plan and is based on costs associated with technical assistance, project design, and implementation of actions needed to achieve the TMDL.

There are no other costs to farmers or ranchers associated with actions to enhance channel habitat complexity and floodplain connection, because participation by private landowners is voluntary, and almost all of the costs of these projects are expected to be paid for from grants by public agencies and/or non-profits. In estimating costs, the Water Board estimated that owners of grazing and non-grazing agricultural businesses own up to 20 percent of the total land area. The Water Board estimates that the total cost to agricultural businesses associated with efforts to reduce sediment supply to Pescadero and Butano creeks watershed is $200,000 to $300,000 per year.

7.4.2.7 Evaluation and Monitoring

Water Board staff, working in partnership with other entities, e.g., San Mateo County and the San Mateo County Resource Conservation District, will conduct baseline monitoring to document existing residual pool volumes (V*), substrate composition, and woody debris loadings along representative reaches. In addition to baseline conditions monitoring, the following monitoring is necessary:

1) Implementation monitoring to document actions taken on individual properties to reduce fine sediment discharge and enhance habitat complexity and connectivity;
2) Upslope effectiveness monitoring to evaluate effectiveness of sediment control actions in reducing rates of sediment delivery to channels on a subwatershed basis; and
3) In-channel effectiveness monitoring (e.g., pool filling and substrate composition) to evaluate channel response to management actions and natural processes.

Implementation monitoring will be conducted by landowners or designated agents to document that sediment control actions, i.e., best management practices as specified herein, occur.

The Water Board anticipates working in partnership with the implementing parties to conduct upslope effectiveness monitoring to reevaluate rates of sediment delivered to channels from land use activities and natural processes.

In-channel effectiveness monitoring should be conducted by the Water Board and local partners with scientific expertise and demonstrated capability in working effectively with private property owners (to gain permissions for access), as needed to develop a representative sample of stream habitat conditions, in relation to sediment supply and transport within the watershed. In-channel

effectiveness monitoring is needed to evaluate: a) progress toward achieving water quality targets, and b) channel response to management measures and natural processes. The main parameters that will be monitored to assess progress toward achieving water quality targets are residual pool volume and substrate composition.

The Water Board, working in partnership with other entities, such as the San Mateo County Resource Conservation District and other organizations with scientific expertise, will assess large woody debris loading in channels to evaluate attainment of the numeric targets for large woody debris loading and to guide development of reach-specific prescriptions for installation of engineered log jams and riparian management actions to attain the target values in future years through natural recruitment.

Desired measurement frequency for pool filling, substrate composition, and large woody debris is once every five years.

7.4.2.8 Adaptive Implementation

Adaptive implementation entails taking actions commensurate with existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Water Board staff will evaluate and report to the Water Board on the progress of implementation of the TMDL and habitat enhancement actions periodically and will evaluate the need for amending the TMDL within 10 years of the effective date of the TMDL.

Key questions to be considered in the course of adaptive implementation:

- What is the population status of steelhead and coho salmon in the watershed? Do numbers of steelhead and coho salmon increase as sediment reduction and habitat enhancement measures are implemented? An improved understanding of the status of steelhead and salmon populations in the Pescadero-Butano watershed is essential for guiding adaptive updates to the management actions recognized in this plan.
- Are Pescadero and Butano creeks and their tributaries progressing toward TMDL targets and performance standards as expected? If there is a lack of adequate progress, how might the implementation actions, targets, performance standards, or allocations be modified?
- Are the specified sediment reduction measures and recommended habitat enhancement measures resulting in an improving trend in channel habitat quantity and quality?
- Are there new data or information available that warrant revision of water quality targets, allocations, or implementation measures?

Table 7.4.2-6 Required TMDL Implementation Measures for Sediment Discharges Associated with Non-Grazing Agricultural Lands of 5 Acres or Greater

Land Use	Performance Standards	Actions	Implementing Parties	Completion Dates
NON-GRAZING AGRICULTURAL LANDS	**Roads:** Design, construct, and maintain roads to i) reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; and ii) limit the length of roads that are hydrologically connected to 25 percent of total road length; and iii) ensure culvert inlets have low plug potential; and iv) install critical dips at culverted crossings that have a diversion potential; **and** **Stream corridors:** Protect streambanks, wetlands, and riparian areas from degradation through vegetated buffers; **and** **Gullies and/or shallow landslides:** Manage non-grazing agricultural practices to allow for natural recovery of gullies and/or landslides, prevent human-caused increases in sediment delivery from unstable areas, and decrease connectivity of gullies to stream channels; **and** Effectively attenuate significant increases in storm runoff, so that the runoff from non-grazing agricultural lands shall not cause or contribute to downstream increases in rates of bank or bed erosion.	**PLANNING AND PRIORITIZING** Inventory and assess natural resources, agricultural lands, and management practices that may deliver sediment to streams. Evaluate stream and riparian corridors for opportunities for improving habitat. Develop and submit a report acceptable to the Executive Officer that includes a prioritized list and schedule of actions. **EITHER** Submit a Report of Waste Discharge (ROWD) to the Water Board that provides, at a minimum, the following: a description of the land; identification of site-specific erosion control measures needed to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. **OR** Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs. Develop and begin implementing an erosion control plan that would be approved as part of WDRs or waiver of WDRs.	Non-grazing agricultural landowner and/or operator of properties ≥ 5 acres	3 years from effective date of this Basin Plan amendment 5 years from effective date of this Basin Plan amendment As specified in applicable WDRs or waiver of WDRs

Table 7.4.2-7 Required TMDL Implementation Measures for Sediment Discharges Associated with Grazing Lands of 50 Acres or Greater

Land Use	Performance Standards	Actions	Implementing Parties	Completion Dates
GRAZING LANDS	**Surface erosion associated with livestock grazing**: Attain or exceed minimal residual dry matter (RDM) values consistent with University of California Division of Agriculture and Natural Resources Guidelines[1]; **and** **Stream corridors:** Protect streambanks, wetlands, and riparian areas from degradation through grazing management, livestock access controls, and vegetated buffers; **and** **Roads**: Design, construct, and maintain roads to i) reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; and ii) limit the length of roads that are hydrologically connected to 25 percent of total road length; and iii) ensure culvert inlets have low plug potential; and iv) install critical dips at culverted crossings that have a diversion potential; **and** **Gullies and/or shallow landslides:** Manage grazing practices to allow for natural recovery of gullies and/or landslides, prevent human-caused increases in sediment delivery from unstable areas, and decrease connectivity of gullies to stream channels.	**PLANNING AND PRIORITIZING** Inventory and assess natural resources, agricultural practices, and management practices that may deliver sediment to streams. Evaluate stream and riparian corridors and water bodies for opportunities for improving habitat. Develop and submit a report acceptable to the Executive Officer that includes a prioritized list and schedule of actions for farm owner(s). **EITHER** Submit a ROWD to the Water Board that provides, at a minimum, the following: description of the property/ranch and road network; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. **OR** Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs. Develop and begin implementing Grazing Management plan that would be approved as part of WDRs or waiver of WDRs.	Landowner and/or ranch operator of properties ≥50 acres	3 years from effective date of this Basin Plan amendment 5 years from effective date of this Basin Plan amendment As specified in applicable WDRs or waiver of WDRs

[1] University of California 2002, California guidelines for residual dry matter (RDM) management on coastal and foothill annual rangelands. Rangeland Monitoring Series Publication 8092.

Table 7.4.2-8 Required TMDL Implementation Measures for Sediment Discharges associated with San Mateo County

Landowner Type	Performance Standards	Actions	Implementing Parties	Completion Dates
SAN MATEO COUNTY	**Roads:** Design, construct, and maintain roads to i) reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; and ii) limit the length of roads that are hydrologically connected to 25 percent of total road length; and iii) ensure culvert inlets have low plug potential; and iv) install critical dips at culverted crossings that have a diversion potential; **and** **Gullies and/or shallow landslides:** Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas. Manage existing roads and other infrastructure to prevent additional erosion of legacy sediment delivery sites and/or delivery from potentially unstable areas.	**PLANNING AND PRIORITIZING** Comply with NPDES Permit No. CAS612008 (also referred to as the Municipal Regional Stormwater Permit). **AND** Create an inventory of roads that may contribute to sediment delivery to streams and develop a prioritized list and schedule of actions. Where performance standards are not achieved or where road-related sediment sources are not covered by NPDES Permit No. CAS612008, do one of the following: **EITHER** Submit a Report of Waste Discharge to the Water Board that provides, at a minimum, the following: description of the road network and/or segments; identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified control measures. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standard. **OR** Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	San Mateo County	3 years from effective date of this Basin Plan amendment 5 years from effective date of this Basin Plan amendment As specified in applicable WDRs or waiver of WDRs

Table 7.4.2-9 Required TMDL Implementation Measures for Sediment Discharges associated with Parks and Open Space Lands

Landowner Type	Performance Standards	Actions	Implementing Parties	Completion Dates
PARKS/OPEN SPACE LANDS	**Roads:** Design, construct, and maintain roads to i) reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; and ii) limit the length of roads that are hydrologically connected to 25 percent of total road length; and iii) ensure culvert inlets have low plug potential; and iv) install critical dips at culverted crossings that have a diversion potential; **and** **Gullies and/or shallow landslides:** Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas. Manage existing roads and other infrastructure to prevent additional erosion of legacy sediment delivery sites and/or delivery from potentially unstable areas.	**PLANNING AND PRIORITIZING** Adopt and implement best management practices for maintenance of unpaved (dirt/gravel) roads, conduct a survey of stream-crossings associated with unpaved public roadways, and develop a prioritized implementation plan and schedule for repair and/or replacement of high priority crossings/culverts to reduce road-related erosion and protect stream-riparian habitat conditions. **EITHER** Submit a Report of Waste Discharge to the Water Board that provides, at a minimum, the following: description of the road network and/or segments; identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified control measures. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standard. **OR** Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	State of California, Department of Parks and Recreation MidPeninsula Open Space District Peninsula Open Space Trust	3 years from effective date of this Basin Plan amendment 5 years from effective date of this Basin Plan amendment As specified in in applicable WDRs or waiver of WDRs

Table 7.4.2-10 Required TMDL Implementation Measures for Sediment Discharges Associated with Timber Lands of 100 acres or Greater

Land Use	Performance Standards	Actions	Implementing Parties	Completion Dates
TIMBER LANDS	**Roads**: Design, construct, and maintain roads to i) reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; and (ii) limit the length of roads that are hydrologically connected to 25 percent of total road length; and (iii) ensure culvert inlets have low plug potential; and (iv) install critical dips at culverted crossings that have a diversion potential; **and** **Gullies, shallow landslides, and/or unstable areas:** Manage operations (e.g., tree removal (felling), hauling of trees, road construction, heavy equipment use) to prevent additional erosion of legacy sediment delivery sites, and/or delivery from other potentially unstable areas, and to decrease connectivity of gullies to stream channels.	Comply with California Forest Practice Rules, Anadromous Salmonid Protection Rules, and Road Rules or other requirements to control sediment sources from timber harvest operations that are provided by the Water Board. **PLANNING AND PRIORITIZING** Inventory and assess natural resources and management practices that may contribute to sediment delivery to streams. Evaluate stream and riparian corridors and water bodies for opportunities to improve habitat. Develop and submit a report acceptable to the Executive Officer that includes a prioritized list and schedule of actions for timberland owner(s). **EITHER** Submit a Report of Waste Discharge to the Water Board that provides, at a minimum, the following: description of the property road network; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. **OR** Comply with other applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowner and/or timber lands operator of properties ≥ 100 acres	Ongoing 3 years from effective date of this Basin Plan amendment 5 years from effective date of this Basin Plan amendment As specified in in applicable WDRs or waiver of WDRs

Table 7.4.2-11 Recommended Actions to Reduce Sediment Load and Enhance Habitat Complexity in Pescadero and Butano Creeks and Their Tributaries

Stressor	Management Objective(s)	Actions	Implementing Parties	Completion Dates
Habitat degradation as a result of incision along Pescadero and Butano creeks and their tributaries.	Reduce rates of sediment delivery (associated with incision) to channels, by 78 percent. Increase sediment storage in the channels and on the floodplains. Enhance channel habitat complexity and connectivity as needed to support self-sustaining run of steelhead and coho salmon and enhance the overall health of the native fish community.	Develop detailed technical studies to characterize reach-specific opportunities and priorities for floodplain restoration. Develop and implement plans to enhance stream-riparian habitat conditions and channel complexity. Comply with conditions of Clean Water Act section 401 certifications in the implementation of projects to increase channel-floodplain connectivity	State and local government agencies, landowners and/or designated agents, and reach-based stewardships	Technical studies to characterize reach specific opportunities and priorities for floodplain restoration will be completed within 5 years of Basin Plan amendment.
Habitat degradation as a result of reduction in large woody debris in stream channels.	Enhance quality of rearing habitat for juvenile salmonids.	Develop and implement plans to enhance large woody debris loading and restore natural rates of recruitment to channels, as needed to achieve numeric targets for large woody debris loading. This plan will include a survey to quantify baseline values for large woody debris loading. Comply with conditions of Clean Water Act section 401 certifications in the implementation of projects for large woody debris loading and recruitment.	State and local government agencies, landowners and/or designated agents, and reach-based stewardships	Targets for large woody debris loading will be achieved within 10 years of Basin Plan amendment adoption.

7.4.3 TMDL for Beaches in Pillar Point Harbor and Venice Beach

The following sections establish the TMDL for bacteria in Pillar Point Harbor and Venice Beach. The numeric targets, load and wasteload allocations, and Implementation Plan are designed to support and protect the beaches' designated beneficial use of water contact recreation (e.g., swimming and wading).

7.4.3.1 Problem Statement

Bacteria densities in the waters of the beaches in Pillar Point Harbor and Venice Beach exceed the numeric water quality objectives for *Enterococcus*, which are types of bacteria that indicate the potential for fecal contamination and an elevated risk of pathogen-induced illness to people. Monitoring data show chronic exceedances of objectives for *Enterococcus* at multiple beach segments, which has led to health advisories and beach closures. These exceedances and postings threaten and impair the water contact recreation (REC-1) and non-contact water recreation (REC-2) beneficial uses.

7.4.3.2 Sources

If not properly managed, the following sources have the potential to discharge bacteria to the beaches in Pillar Point Harbor and Venice Beach: onsite wastewater treatment systems, sanitary sewer overflows, sewer collection systems, the Sewer Authority Mid-Coastside wastewater treatment plant, Pillar Point Harbor and Marina operations, private sewer laterals, municipal stormwater, runoff from landfills, Caltrans stormwater runoff, horse boarding facilities, grazing and wildlife.

7.4.3.3 Numeric Targets

The desired or target condition for the water contact beneficial use in Pillar Point Harbor beaches and Venice Beach are listed in Table 7.4.3-1. These targets are based on protective water quality objectives for marine (estuarine) waters adopted by the State Water Board in the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

Table 7.4.3-1 Numeric Targets to Protect Water Contact Recreation in Pillar Point Harbor Beaches and Venice Beach

Indicator	Geometric Mean[a] (cfu/100 mL)[b]	Statistical Threshold Value (cfu/100 mL)[b]
Enterococci	30	110

a The waterbody geometric mean shall not be greater than the geometric mean threshold in any six-week interval, calculated weekly. The maximum daily load is 110 cfu/100 mL (i.e., equivalent to the statistical threshold value).

b cfu per 100 milliliters of sample is equivalent to most probable number per 100 milliliters of sample.

7.4.3.4 Total Maximum Daily Load

The TMDL is equivalent to the numeric targets in Table 7.4.3-1. The TMDL is expressed as the total density of *Enterococcus* indicator bacteria that can be discharged from all sources without causing the water quality at the beaches in Pillar Point Harbor and Venice Beach to exceed the protective standards. The daily load expression of this TMDL is equivalent to the statistical threshold value of 110 cfu/100 mL) for *Enterococcus*. The TMDL is applicable year-round.

7.4.3.5 Load and Wasteload Allocations

Table 7.4.3-2 summarizes the allocations for discharges of bacteria. The load allocations (LAs) and wasteload allocations (WLAs) are the same as the numeric targets specified in Table 7.4.3-1 and the TMDL, except that the allocation for onsite wastewater treatment systems, sanitary sewer collection systems, and marina vessels and harbor amenities is zero. The allocations are expressed in terms of *Enterococcus* densities. The daily load expression of the WLAs and LAs in Table 7.4.3-2 is equivalent to the appropriate STV, unless the discharge of bacteria is prohibited then the allocation is zero.

All entities that discharge indicator bacteria or have jurisdiction over such discharges are responsible for meeting these allocations. Implementing parties shall demonstrate achievement of allocations in the receiving water bodies (i.e., at the beach shoreline water quality monitoring stations). The attainment of these allocations will ensure protection of water quality and the applicable beneficial uses at the beaches. All LAs and WLAs shall be achieved for each implementing party no later than 15 years after the TMDL effective date. Successfully completing corrective action to reduce or eliminate a discharge from a particular source, as called for in the Implementation Plan, may be used to show that the corresponding source has achieved its LA or WLA.

Table 7.4.3-2 Load and Wasteload Allocations[a] of Indicator Bacteria for Beaches at Pillar Point Harbor and Venice Beach

Pollutant Source	Allocation Type	*Enterococcus* (cfu/100 mL)
Sewer Authority Mid-Coastside Wastewater Treatment Plant	WLA	Geometric mean[b] < 30 STV[c] = 110
Sanitary Sewer Collection System[d] (Sewer Authority Mid-Coastside, Granada Community Services District, Half Moon Bay Sanitary District)	WLA	0
Municipal Stormwater Runoff[d,e]	WLA	Geometric mean[b] < 30 STV[c] = 110
Caltrans Stormwater Runoff[d]	WLA	Geometric mean[b] < 30 STV[c] = 110
Ox Mountain Landfill[d]	WLA	Geometric mean[b] < 30 STV[c] = 110
Onsite Wastewater Treatment Systems (e.g., septic systems)[d]	LA	0
Marina vessels and Harbor amenities	LA	0
Operations in Pillar Point Harbor (on Pillar Point Harbor property)	LA	Geometric mean[b] < 30 STV[c] = 110
Confined Animal Facilities[d] (e.g., horse facilities)	LA	Geometric mean[b] < 30 STV[c] = 110
Grazing Lands/Operations[d] (e.g., cattle)	LA	Geometric mean[b] < 30

Pollutant Source	Allocation Type	*Enterococcus* (cfu/100 mL)
		STV[c] = 110
Wildlife[f]	LA	Geometric mean[b] < 30 STV[c] = 110

cfu/100 mL Colony forming unit per 100 milliliters of sample is equivalent to most probable number (MPN) per 100 milliliters of sample

WLA Wasteload allocation

LA Load allocation

STV Statistical threshold value

a. All allocations apply year-round and will be measured at the beach shoreline water quality monitoring stations, except for WLA for the Wastewater Treatment Plant and Ox Mountain Landfill, which shall be measured at the discharge point(s) specified in its wastewater discharge permit order CA0038598 and CA0029947, respectively.

b. The water body geometric mean shall not be greater than the applicable geometric mean magnitude in any six-week interval, calculated weekly.

c. The *Enterococcus* density shall not be greater than 110 cfu/100 mL, which defines the maximum daily load.

d. Facilities discharging to freshwater creeks draining to Pillar Point Harbor and Venice Beach shall use the freshwater objective for *E. coli* to monitor their compliance with the allocations. The *E. coli* density shall not be greater than 320 cfu/100 mL.

e. WLA for discharges from municipal stormwater runoff via the municipal separate storm sewer system includes, but is not limited to, contributions from pet waste, trash, and homeless encampments.

f. Wildlife is an uncontrollable source of bacteria and its contribution is considered natural background. No management measures will be required for wildlife sources.

7.4.3.6 Implementation Plan

The Implementation Plan specifies actions needed to attain the TMDL and allocations. This Implementation Plan builds on management measures required by existing local, regional, and statewide regulations and orders to reduce or eliminate waste discharges from sanitary sewer collection systems, OWTS, confined animal facilities, municipal stormwater runoff, and vessels. Cooperation among implementing parties is encouraged, not only to attain the TMDL but also to avoid duplicative actions, such as monitoring and reporting. To the extent possible, implementing parties should coordinate actions and water quality monitoring efforts.

Regulatory Tools

The Water Board will use its regulatory authorities to require actions in the Implementation Plan, including individual and general WDRs under Water Code section 13263; waivers of WDRs under Water Code section 13269; technical or monitoring program reports under Water Code section 13267; NPDES permits for wastewater discharges from the Sewer Authority Mid-Coastside and collection systems; NPDES permits for the Ox Mountain Landfill; NPDES permits for stormwater discharges from municipal and Caltrans separate storm sewer systems under the Clean Water Act section 402 and Water Code section 13377; and vessel sanitation requirements under the Harbors and Navigation Code section 775 et seq. The Water Board will also use its authorities to implement the State Water Board's Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy). The Water Board may also

enforce the Basin Plan's prohibition of discharges of raw sewage or any waste failing to meet WDRs.

Implementation Actions and Schedule

Tables 7.4.3-3 through 7.4.3-13 show the implementation and monitoring actions, implementing parties, and schedule to achieve the TMDL. The schedule allows time for the implementing parties to identify and implement measures that are necessary to control bacteria discharges resulting in exceedances of allocations. If source control actions are fully implemented throughout the watershed and the TMDL targets are not met, the Water Board may re-evaluate or revise the targets, TMDL, and allocations as appropriate. All implementing parties are required to attain their respective allocations by taking a phased approach in which additional or enhanced actions are required if initial implementation actions do not result in attainment of the TMDL within approximately five years. The Implementation Plan recognizes that early implementation actions, including, for example, mapping and cleaning of stormwater and sewer pipes, catch basin cleaning, and education and outreach campaigns to reduce pet waste in the past five years, are achieving progress toward attaining the TMDL load and wasteload allocations.

Table 7.4.3-3 Implementation Actions and Schedule for SAM Treatment Plant

Implementation Actions	Implementing Parties	Schedule
Comply with NPDES permit No. CA0038598	Sewer Authority Mid-Coastside (SAM)	Ongoing

Table 7.4.3-4 Phase 1 Implementation Actions and Schedule for Sanitary Ser Collection Systems

Phase 1 Implementation Actions	Implementing Parties	Schedule
Comply with Statewide General Waste Discharge Requirements for sanitary sewer systems	SAM, City of Half Moon Bay, Granada Community Services District	Ongoing
Submit an enhanced Sewer System Management Plan, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within ½ mile of beach or otherwise connected to the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term plans, and, as necessary, a schedule for developing the funds needed for the capital improvement plan.	SAM, City of Half Moon Bay, Granada Community Services District	Within six months of the effective date of the TMDL
Complete inspections identified in the enhanced Sewer System Management Plan and schedule repair of identified leaking or damaged infrastructure as expeditiously as feasible.	SAM, City of Half Moon Bay, Granada Community Services District	Within five years of the effective date of the TMDL
Determine effectiveness of sewer system repairs by assessing beach monitoring data to determine if targets are met at the beaches.	SAM, City of Half Moon Bay, Granada Community Services District	Within five years of the effective date of the TMDL
Inspect laterals and all other components connecting facilities at Venice Beach to the sanitary sewer system. Repair all leaks.	CA Parks and Recreation	Within one year of the effective date Within three years of the effective date of the TMDL
Submit annual status reports until all system components are inspected and repaired.	SAM, City of Half Moon Bay, Granada Community Services Distric CA Parks and Recreation	Annually, first report due one year from the effective date of the TMDL

Table 7.4.3-5 Phase 2 Implementation Actions and Schedule for Sanitary Sewer Collection Systems

Phase 2 Implementation Actions	Implementing Parties	Schedule
If load allocations are not met, submit an enhanced Sewer System Management Plan, acceptable to the Executive Officer that prioritizes sewer system inspections and repairs in areas further than ½ mile from the beach. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term actions, and, as necessary, a schedule for developing the funds needed for the capital improvement plan. Also submit an assessment of the potential source-control benefits of lateral replacement program options, with a conceptual work plan for the optimal option.	SAM, City of Half Moon Bay, Granada Community Services District	Within six years of the effective date of the TMDL
Complete inspections and repairs identified in Phase 2.	SAM, City of Half Moon Bay, Granada Community Services District	Within 10 years of the effective date of the TMDL
Submit to the Water Board annual status reports describing actions taken.	SAM, City of Half Moon Bay, Granada Community Services District CA Parks and Recreation	Annually

Table 7.4.3-6 Implementation Actions and Schedule for Ox Mountain Landfill

Implementation Actions	Implementing Parties	Schedule
Comply with NPDES permit No. CA0029947 and General Permit for Industrial Stormwater No. CAS000001.	Browning-Ferris Industries	Ongoing
Monitor bacteria in receiving waters at locations RSW-001, RSW-002, and RSW-003 specified in NPDES permit No. CA0029947.	Browning-Ferris Industries	Quarterly

Table 7.4.3-7 Phase 1 Implementation Actions and Schedule for Vessels and Amenities in Pillar Point Harbor

Phase 1 Implementation Actions	Implementing Parties	Schedule
Begin or enhance "no dumping" education efforts to vessel owners.	San Mateo County Harbor District	Within six months of the effective date of the TMDL
Submit a plan and implementation schedule, acceptable to the Executive Officer, listing steps to: 1) Evaluate effectiveness and proper performance of sewage collection systems (sewage dump stations, sewage pumpout stations, sewer lines, etc.) for the harbor marina and harbor amenities. 2) Inspect sewer and stormwater laterals and all other components connecting facilities at Pillar Point Harbor to the sanitary sewer system. 3) Prioritize sewer system repairs and public restrooms repairs in the harbor. 4) Establish and implement a protocol to enhance efforts to identify and correct illicit sewage dumping from boats in inner and outer harbor. 5) Begin or boost existing actions to control runoff from loading docks, dumpsters, food service and refuse areas. 6) Prevent fish waste from fish cleaning areas and squid boats from being discharged to the Harbor.	San Mateo County Harbor District	Within six months of the effective date of the TMDL
Complete implementation of the above plan.	San Mateo County Harbor District	Within five years of the effective date of the TMDL
Submit to the Water Board annual status reports describing implementation activities taken.	San Mateo County Harbor District	Annually, beginning on the second year after the effective date of the TMDL

Table 7.4.3-8 Phase 2 Implementation Actions and Schedule for Vessels and Amenities in Pillar Point Harbor

Phase 2 Implementation Actions	Implementing Parties	Schedule
If the above Phase 1 actions are insufficient to meet the load allocations within five years of the TMDL effective date, submit an enhanced plan, acceptable to the Executive Officer, describing actions being implemented and additional actions that will be implemented to reduce discharges of bacteria to the beaches. The plan shall include an implementation schedule and milestones for compliance.	San Mateo County Harbor District	Within five years of the effective date of the TMDL
Complete implementation of the enhanced (Phase 2) actions.	San Mateo County Harbor District	Within 10 years of the effective date of the TMDL
Submit to the Water Board an annual report on the status of the implementation activities. The report shall cover all the actions implemented in the previous year as well as a checklist, timeline, and discussion of the actions scheduled for implementation during the upcoming year.	San Mateo County Harbor District	Annually, beginning the second year after the effective date of the TMDL

Table 7.4.3-9 Phase 1 Implementation Actions and Schedule for Municipal Stormwater Runoff

Phase 1 Implementation Actions	Implementing Parties	Schedule
Comply with bacteria pollution prevention requirements in NPDES permit No. CAS 612008.	City of Half Moon Bay and San Mateo County	Ongoing
Submit an Initial Report to the Water Board describing actions to prevent or reduce discharges of bacteria to storm sewer systems. The report shall also include timeline and/or frequency of implementation activities for all the actions listed below, as appropriate.	City of Half Moon Bay and San Mateo County	Within three months of the effective date of the TMDL
Effectively prohibit and prevent potential illicit discharges into the storm sewer system from: ***Illicit sanitary sewer connections***. Ensure at least 20 percent of the stormwater system is evaluated and addressed for illicit connections each year, starting with the areas determined as high-risk or in close proximity to the beach. If this work has already been performed, submit the results of that evaluation and corresponding repairs in the Initial Report. ***Homeless population***. Implement an effective approach to prevent bacteria in runoff from areas inhabited by homeless people as needed, based on the size and duration of homeless encampments. ***Pet waste***. Address potential pet waste discharges into the storm sewer system through the following actions: Continue developing and implementing a visual inspection program to identify high pet waste accumulation areas and develop a cleanup plan for these areas, including specific actions before winter rains; Install new or additional dog waste cleanup signs, waste bag dispensers, and trash bins in high dog waste accumulation areas; Evaluate and improve, as needed, the service frequency of dog waste bins; and Develop and implement a comprehensive pet waste public outreach and education campaign. ***Loading docks and dumpsters***. Enhance inspection and enforcement of best management practices within ½ miles to the beach to control pollutants in runoff from loading docks, dumpsters, food service and refuse areas.	City of Half Moon Bay and San Mateo County	Complete within five years of the effective date of the TMDL
Actively deploy best management practices to capture polluted runoff and reduce trash and sediment buildup (e.g., cleanout stormwater pipes, install trash capture devices and frequently remove trash, divert runoff from the beaches).	City of Half Moon Bay and San Mateo County	Complete within five years of the effective date of the TMDL

Table 7.4.3-10 Phase 2 Implementation Actions and Schedule for Municipal Stormwater Runoff

Phase 2 Implementation Actions	Implementing Parties	Schedule
If the above Phase 1 actions are insufficient to meet the wasteload allocations within five years of the TMDL effective date, submit an enhanced plan, acceptable to the Executive Officer, describing actions being implemented and additional actions that will be implemented to reduce discharges of bacteria to the beaches or creeks draining to the beaches; a list of possible Phase 2 actions is given below. The plan shall include an implementation schedule and milestones for compliance.	City of Half Moon Bay and San Mateo County	Within five years of the effective date of the TMDL
Implement the actions listed below or document why they are not appropriate: • Inspect existing or future local parks, dog parks, and outdoor pet kennel facilities to ensure compliance with applicable codes and ordinances, and take corrective or enforcement actions as needed; • Divert runoff to the sanitary sewer system; • Develop and enforce pet or domestic animals waste disposal ordinances; • Execute better enforcement of existing litter ordinances; • Execute better enforcement of leash ordinances; • Execute better enforcement of ordinances for commercial, industrial, and multi-family garbage control, including requirements to cover trash enclosures; and • Develop and enforce guidelines for portable toilets and recreational vehicle dumping.	City of Half Moon Bay and San Mateo County	Within six years of the effective date of the TMDL
Complete implementation of the enhanced (Phase 2) stormwater actions.	City of Half Moon Bay, San Mateo County	Within 10 years of the effective date of the TMDL
Submit to the Water Board an annual report on the status of the implementation activities. The report shall cover all the actions implemented in the previous year as well as a checklist, timeline, and discussion of the actions scheduled for implementation during the upcoming year.	City of Half Moon Bay, San Mateo County	Annually, beginning the second year after the effective date of the TMDL

Table 7.4.3-11 Implementation Actions and Schedule for Caltrans

Implementation Actions	Implementing Parties	Schedule
Comply with NPDES Permit No. CAS000003.	Caltrans	Ongoing

Table 7.4.3-12 Implementation Actions and Schedule for Existing, New and Replacement Onsite Wastewater Treatment Systems (OWTS)

Implementation Actions	Implementing Parties	Schedule
Comply with local codes and ordinances pertaining to OWTS.	Owners and operators of existing, new, and replacement OWTS	Upon effective date of the TMDL and Ongoing
Maintain OWTS in good working condition, including inspecting the OWTS and pumping of solids as necessary, or as required by local ordinances.	Owners and operators of existing, new, and replacement OWTS	Ongoing
Notify the local agency if OWTS septic tank has failed, effluent is pooling, wastewater is discharging to the ground surface, or wastewater is backed up into plumbing fixtures.	Owners and operators of existing, new, and replacement OWTS	Immediately upon discovery
Obtain the required basic operational inspection report and submit the results and any other required information to the Water Board and local agency.	Owners and operators of existing, new, and replacement OWTS	Within three years of the TMDL effective date, and every ten years, thereafter
Obtain an appropriate local agency permit for the repair or replacement of an OWTS deemed by the local agency to be in need of corrective action, and complete all appropriate OWTS repairs or replacement.	Owners and operators of existing, new, and replacement OWTS	Timeline will be specified by the local agency. To be completed within 12 years of the TMDL effective date
Implement the OWTS Policy and any approved Local Agency Management Program.	San Mateo County	Ongoing
Ensure corrective actions for all OWTS that are failing or in need of major repairs[a] are completed.	San Mateo County	Ongoing
Track and report the compliance status of identified failing systems and results of all other implementation activities to the Water Board.	San Mateo County	Annually

a Needing major repair: means either means either (1) for a dispersal system, repairs required for an OWTS dispersal system due to surfacing wastewater effluent from the dispersal field and/or wastewater backed up in to plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating, or (3) if the OWTS utilizes a cesspool or a redwood tank that needs to be replaced with a conventional septic tank.

Table 7.4.3-13 Implementation Actions and Schedule for CAFs

Implementation Actions	Implementing Parties	Schedule
Obtain coverage and comply with the General Waste Discharge Requirements Order No. R2-2016-0031 for Confined Animal Facilities (CAF), as may be amended or revised (CAF Order).	Owners or operators of CAFs	Obtain coverage within one year of effective date; Comply with Order requirements per timeline specified in the CAF Order
Develop a ranch water quality plan and implement BMPs and other actions specified in the CAF Order.	Owners or operators of CAFs	According to schedule in the ranch water quality control plan and monitoring plans
Review and compile County records of all facilities with confined animal permit within the TMDL project area and submit information to the Water Board.	San Mateo County	Within three months of the effective date of the TMDL

7.4.3.7 Water Quality Monitoring

Implementing parties are responsible for developing and implementing a monitoring plan sufficient to assess compliance with the numeric targets at the beaches in Pillar Point Harbor and Venice Beach. At a minimum, implementing parties will continue monitoring the beaches as required under California Health and Safety Code section 115880 and provide a data evaluation report annually to the Water Board. It is recommended that the implementing parties select a lead entity to assess the monitoring data and compile the annual report.

If the TMDL target is not achieved after five years, i.e., following implementation of Phase 1 actions, the implementing parties can delay Phase 2 implementation for up to four years if they conduct or cause to be conducted enhanced bacteria source identification studies. Implementing parties (to include San Mateo County and Harbor District, City of Half Moon Bay, Sewer Authority Mid-Coast, Granada Community Services District and California Parks and Recreation) will be required to contribute to this effort as appropriate and may choose to begin special studies during Phase 1. For example, monitoring catchments within the watershed may help identify and characterize indicator bacteria loadings from different land uses and locations or may evaluate the effectiveness of bacteria control actions. The Water Board will collaborate with implementing parties to investigate any remaining data gaps, including the contribution of natural sources of bacteria to the impairment.

The CAF permittees are required to comply with the monitoring requirements of the Water Board's CAF Order. However, in lieu of the TMDL fecal indicator bacteria water quality monitoring, CAFs and grazing operations may demonstrate attainment of their LAs through sampling of other indicator parameters (e.g., ammonia) or by demonstrating they have implemented all required implementation measures for addressing bacteria discharges from their respective source categories.

For the OWTS source, the Water Board will track and use proof of required corrective actions taken by the property owners as evidence that they have achieved the LA. No additional water quality monitoring is required for this source to demonstrate attainment of the LA.

The Ox Mountain Sanitary Landfill shall monitor the indicator bacteria concentrations in the receiving water to demonstrate that their WLA is met.

7.5 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE CENTRAL BASIN (SEE FIGURE 2-5)

7.5.1 Richardson Bay Pathogens Total Maximum Daily Load (TMDL)

The following sections establish the TMDL for pathogens in Richardson Bay. The numeric targets, load allocations, and implementation plan are designed to support and protect the Bay's designated beneficial uses, water contact recreation and shellfish harvesting. The TMDL includes actions for adaptive implementation to evaluate the effectiveness of implementation actions, monitor progress toward targets, and review the scientific understanding pertaining to pathogens, which may result in modifying the TMDL in the future.

7.5.1.1 Problem Statement

Richardson Bay is impaired by pathogens. Monitoring results indicate that the Bay exceeds bacteria water quality objectives for shellfish harvesting (e.g., clam, mussel, and oyster harvesting), and water contact recreation (swimming, fishing; Table 3-1). The presence of pathogens is inferred from high concentrations of fecal coliform bacteria, a commonly used indicator of human pathogenic organisms. Therefore, the beneficial uses of shellfish harvesting and recreational water contact are not fully supported.

7.5.1.2 Sources

Pathogen sources are identified based on elevated coliform bacteria (pathogen indicator) levels downstream or in the vicinity of identified land uses or facilities and from documentation of inadequately treated human waste discharges. If not properly managed, the following source categories have the potential to discharge pathogens to Richardson Bay: sanitary sewer systems, stormwater runoff, houseboats, and vessels.

- High coliform levels detected downstream of storm drains, and the increase in the number of wet season exceedances as compared to the number of dry season exceedances, point to stormwater runoff as a potential pathogen source.
- Documentation of sanitary sewer overflows in Richardson Bay area municipalities suggests that sanitary sewer systems are a potential source of pathogens to the Bay.
- Consistently high coliform levels in houseboat and vessel marinas indicate that houseboat and vessel marinas' failing sewage collection systems are potential sources of pathogens.

Bacteria levels are low at monitoring sites that contain wildlife but are minimally impacted by human activities. This suggests that wildlife may not be a significant, widespread potential source of pathogens in Richardson Bay. Wildlife may be a significant source on an intermittent, localized basis.

7.5.1.3 Numeric Targets

The numeric targets (desired future long-term conditions) proposed for pathogen indicators in Richardson Bay are presented in Table 7.5.1-1.

Table 7.5.1-1 Numeric Targets for Richardson Bay[a]

Beneficial Use	Numeric Target
Shellfish Harvesting	Median fecal coliform density[b] < 14 (MPN[c]/100 mL) 90th percentile fecal coliform density < 43 (MPN/100 mL)
Water Contact Recreation	Geometric mean fecal coliform density < 200 90th percentile fecal coliform density < 400 Geometric mean Enterococci density < 35 CFU[d]/100 mL 90th percentile Enterococci density < 104 CFU/100 mL

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.
b. "Density" refers to the number of bacteria in a given volume of water (U.S. EPA, 1986, 2002, 2003). The term is analogous to "concentration," which refers to the mass of chemical pollutant in a given volume of water. "Bacterial density" and "bacterial concentration" are sometimes used interchangeably.
c. Most Probable Number (MPN) is a statistical representation of the standard coliform test results.
d. CFU stands for colony forming unit (e.g., as in number of bacterial colonies).

The bacterial density targets are based on the Basin Plan's shellfish harvesting and water contact recreation water quality objectives for fecal coliform.

7.5.1.4 Total Maximum Daily Load

Table 7.5.1-2 shows Richardson Bay's density-based pathogens TMDL, expressed as fecal coliform bacteria concentrations.

Table 7.5.1-2 Total maximum daily load for pathogen indicators (fecal coliforms) for Richardson Bay

Indicator Parameter	TMDL
Fecal coliform	Median[a] < 14 MPN/100 mL 90th Percentile[b] < 43 MPN/100 mL

a. Based on a minimum five consecutive samples equally spaced over a 30-day period.
b. No more than 10% of total samples during any 30-day period may exceed this number.

7.5.1.5 Load Allocations

Density-based fecal coliform allocations for each potential pathogen source category in Richardson Bay are presented in Table 7.5.1-3. Each discharger in the Richardson Bay watershed is responsible for meeting its source category allocation. All potential dischargers are also responsible for complying with applicable waste discharge requirements, or waste discharge prohibitions (Table 4-1, Prohibitions 5, 15, and 18).

All discharges of raw or inadequately treated human waste, including sewage from vessels, are prohibited. All sources of untreated or inadequately treated human waste have an allocation of zero.

Table 7.5.1-3 Density-Based Pollutant Wasteload and Load Allocations[a] for Richardson Bay

Categorical Pollutant Source	Wasteload and Load Allocations Fecal Coliform (MPN/100 mL)	
	For Direct Discharges to the Bay	
	Median[b]	90th Percentile[c]
Stormwater Runoff[d]	< 14	< 43
Wildlife[e]	< 14	< 43
Sanitary Sewer Systems	0	0
Houseboats	0	0
Vessels (Recreational, Live-aboard, Anchor-out Boats)	0	0

[a] These allocations are applicable year-round.

[b] Based on a minimum of five consecutive samples equally spaced over a 30-day period.

[c] No more than 10% of total samples during any 30-day period may exceed this number.

[d] Wasteload allocation for discharges from municipal separate storm sewer systems (NPDES Permit Nos. CAS000004 and CAS000003).

[e] Wildlife is not believed to be a readily controllable source of pathogens; therefore, no management measures are required.

7.5.1.6 Implementation Plan

The Richardson Bay Pathogens TMDL Implementation Plan builds upon previous and ongoing successful efforts to reduce potential pathogen loads in Richardson Bay and its tributaries. The plan requires actions consistent with the California Water Code (CWC 13000 et seq.), the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369), the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program, and human waste discharge prohibitions (Table 4-1, Prohibitions 5, 15, and 18).

Table 7.5.1-4 lists the required implementation measures for the source categories listed in Table 7.5.1-3. These measures include evaluation of operating practices, identification of comprehensive, site-specific pathogens control measures and an associated implementation schedule, and submittal of progress reports to the Water Board documenting actions taken.

Table 7.5.1-4 Trackable implementation measures for the Richardson Bay pathogens TMDL			
Source Category	**Implementing Party**	**Action**	**Completion Dates**
Sanitary Sewer Systems	Marin County Sanitary District No. 5, Sewerage Agency of Southern Marin, Tamalpais Community Services District, City of Mill Valley, Homestead Valley Sanitary District, Alto Sanitary District, Almonte Sanitary District, City of Sausalito, Sausalito Marin City Sanitary District, Richardson Bay Sanitary District	1. Comply with the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.	As specified in applicable WDR permit
Stormwater Runoff	Marin County, City of Sausalito, City of Mill Valley, City of Tiburon, City of Belvedere, Caltrans	1. Implement applicable stormwater management plan. 2. Update/amend applicable stormwater management plans, as appropriate, to include specific measures to reduce pathogen loading, including additional education and outreach efforts, and installation of additional pet waste receptacles. 3. Report progress on implementation of pathogen reduction measures to Water Board.	As specified in approved stormwater management plan and in applicable NPDES permit

Table 7.5.1-4 Trackable implementation measures for the Richardson Bay pathogens TMDL

Source Category	Implementing Party	Action	Completion Dates
Houseboats	RBRA; Marin County; local cities	1. Submit to the Executive Officer for approval a plan and schedule for 1) evaluating adequacy and performance of sewage collection systems (onboard sewage systems, pumps, sewer lines, etc.) for all houseboats in Richardson Bay, 2) biennial evaluation of sewage collection system operation and maintenance for all houseboats once they have been repaired/upgraded such that they do not discharge any sewage into the Bay.	July 2009
		2. Conduct evaluation per submitted plan.	July 2010
		3. Report progress on implementation of the plan to Water Board.	Annually
	Houseboat marina owners	1. Submit to the Executive Officer for approval a plan and schedule for 1) repairing/upgrading identified substandard/malfunctioning sewage collection systems (onboard sewage systems, pumps, sewer lines, etc.) such that they do not discharge any sewage into the Bay, 2) long-term operation and maintenance of the systems.	July 2011
		2. Report progress on implementation of the plan to Water Board.	Annually
	Houseboat owners, houseboat marina owners	1. Repair/Upgrade identified substandard/malfunctioning sewage collection systems (onboard sewage systems, pumps, sewer lines, etc.) such that they do not discharge any sewage into the Bay.	July 2013
		2. Operate and maintain sewage collection systems such that they do not discharge any sewage into the Bay.	Ongoing

Table 7.5.1-4 Trackable implementation measures for the Richardson Bay pathogens TMDL

Source Category	Implementing Party	Action	Completion Dates
Vessels	RBRA; Marin County; local cities	1. Submit to the Executive Officer for approval a plan and implementation schedule for 1) evaluating adequacy and performance of sewage collection systems (sewage dump stations, sewage pumpout stations, onboard sewage systems, sewer lines, etc.) for all vessel marinas and vessels with toilet facilities in Richardson Bay, 2) biennial evaluation of sewage collection system operation and maintenance for all vessel marinas and vessels once they have been repaired/upgraded such that they do not discharge any sewage into the Bay.	July 2009
		2. Conduct evaluation per submitted plan.	July 2010
		3. Report progress on implementation of the plan to Water Board.	Annually
	Vessel marina owners	1. Submit to the Executive Officer for approval a plan and schedule for 1) installing, as needed, an adequate number of sewage pumpout and dump stations. If no new sewage pumpout and dump stations are needed, provide an explanation as why they are not needed, 2) repairing/upgrading identified leaky/malfunctioning sewage collection systems (sewage dump stations, sewage pumpout stations, onboard sewage systems, sewer lines, etc.) such that they do not discharge any sewage into the Bay, 3) long-term operation and maintenance of the systems such that they do not discharge any sewage into the Bay.	July 2011
		2. Report progress on implementation of the plan to Water Board.	Annually
	Vessel owners, vessel marina owners	1. Repair/upgrade identified leaky/malfunctioning sewage collection systems (sewage dump stations, sewage pumpout stations, onboard sewage systems, sewer lines, etc.) such that they do not discharge any sewage into the Bay.	July 2013
		2. Operate and maintain sewage collection systems such that they do not discharge any sewage into the Bay.	Ongoing
		3. Enroll in RBRA's mobile sewage collection and disposal service for all live-aboards (both anchor-outs and marina-berthed vessels).	July 2010

Regulatory Framework

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges be regulated under waste discharge requirements, waivers of waste discharge requirements, Basin Plan discharge prohibitions, or some combination of these tools. Municipal and highway stormwater runoffs are regulated under NPDES permits. Table 7.5.1-5 describes the regulatory mechanism by which dischargers in each source category will be regulated.

Table 7.5.1-5 Regulatory Framework

Source Category	Regulatory Tool
Sanitary Sewer Systems	General WDR permit
Stormwater Runoff	NPDES permit
Houseboats	Existing prohibition of human waste discharge (Table 4-1, Prohibitions 5 and 15)
Vessels	Existing prohibition of human waste discharge (Table 4-1, Prohibitions 5, 15, and 18)

Ongoing Water Quality Monitoring in Richardson Bay

Water quality monitoring will be conducted to assess water quality improvements and obtain additional information for further refinement of the TMDL. The main objectives of the ongoing monitoring program are to:

- Assess attainment of TMDL targets
- Evaluate spatial and temporal water quality trends in the Bay
- Obtain additional information about significant potential pathogen source areas
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions

All water quality monitoring (including Quality Assurance and Quality Control procedures) will be performed pursuant to the State Water Board's Quality Assurance Management Plan for the Surface Water Ambient Monitoring Program.

Adaptive Implementation

In 2013, the Water Board will evaluate monitoring results and assess progress toward attaining TMDL targets (Table 7.5.1-1) and load allocations (Table 7.5.1-3). The Water Board will also evaluate compliance with the trackable implementation measures specified in Table 7.5.1-4, as documented by submitted progress reports.

If evaluation and monitoring show that source control actions have been fully implemented throughout the watershed, but the TMDL targets (water quality objectives) are not attained, the Water Board may re-evaluate the attainability/applicability of designated water quality objectives.

The Water Board will review the Richardson Bay Pathogens TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. At a minimum, these reviews

will aim to find answers to the following questions. Additional questions may be developed in collaboration with stakeholders.

1. Is Richardson Bay progressing toward TMDL targets? If progress is unclear, how can monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions be modified?
2. What are the pollutant contributions for the various source categories? How have these contributions changed over time? How do they vary seasonally? How might source control measures be modified to improve load reduction? If the answers to these questions are not clear, how can monitoring efforts be modified to answer these questions?
3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, or implementation actions? If so, how should the TMDL be modified?

Modifications to the targets or implementation plan will be incorporated into the Basin Plan via an amendment process.

7.6 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SOUTH BAY BASIN (SEE FIGURE 2-6)

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7.7 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SANTA CLARA BASIN (SEE FIGURE 2-7)

7.7.1 Total Maximum Daily Loads for Mercury in Waters of the Guadalupe River Watershed

The following sections establish TMDLs for mercury in impaired waters of the Guadalupe River watershed. These TMDLs and associated allocations implement the mercury water quality objectives in waters of the Guadalupe River watershed listed in Table 3-4A.

These TMDLs address seven mercury-impaired waters: five waters on the 2006 303(d) list of impaired waters, Guadalupe Reservoir, Calero Reservoir, Guadalupe Creek, Alamitos Creek, and the Guadalupe River upstream of tidal influence; and two additional waters, Almaden Reservoir and Lake Almaden, which are also impaired by mercury.

These TMDLs are closely integrated with the San Francisco Bay mercury TMDL, which addresses the lower portion of the watershed (from tidal influence to open Bay water, including the Guadalupe River below about Highway 237, both Guadalupe and Alviso sloughs, and the former salt ponds adjacent to these sloughs). Implementation actions in the Guadalupe River watershed TMDLs implementation plan implement the legacy mercury allocation of the San Francisco Bay mercury TMDL to the Guadalupe River watershed.

7.7.1.1 Problem Statement

Fish downstream of the New Almaden Mining District have extremely high concentrations of mercury in their tissues. As of 2004, Guadalupe Reservoir had the highest recorded fish mercury concentrations in California—about 20 times higher than the U.S. EPA methylmercury criterion. To protect the health of humans who consume fish that may be contaminated by mercury, in 1987 Santa Clara County issued a fish consumption advisory warning people not to eat any fish from Guadalupe, Almaden and Calero reservoirs, Guadalupe and Ala
“mitos creeks, the Guadalupe River, and percolation ponds along the river and creeks.

Terrestrial wildlife that primarily or exclusively eat fish (such as piscivorous birds, the most sensitive wildlife species in the watershed) are at risk from mercury. Because mercury concentrations in fish in waters downstream of the New Almaden Mining District exceed both the narrative bioaccumulation objective (see Section 3.3.21) and the numeric aquatic organism and wildlife mercury water quality objectives (Table 3-4A) the health of piscivorous birds is threatened. Beneficial uses of waters in the watershed that are impaired by mercury are water contact recreation (due to human consumption of fish), wildlife habitat, and preservation of rare and endangered species.

7.7.1.2 Sources

Mercury mining waste is the largest source of mercury to waters of the Guadalupe River watershed and San Francisco Bay. Mercury is a legacy pollutant from the California Gold Rush, when cinnabar mines in the Central Coast Ranges produced the mercury used to extract gold from the Sierra Nevada. The world's fifth-largest mercury mine was the historic New Almaden Mercury Mining District, located in the headwaters of the Guadalupe River watershed.

Current sources of mercury in the Guadalupe River watershed include 1) mercury mining waste, 2) reservoirs, lakes, and shallow impoundments, where mercury is converted to methylmercury, 3) urban stormwater runoff, 4) nonurban stormwater runoff, and 5) atmospheric deposition.

1) Mercury mining waste. Mercury mining waste is found at historic mine sites and downstream of them, at three categories of locations:

a) New Almaden Mining District and Guadalupe Mine. The New Almaden Mining District includes the following mines and their associated processing areas and mining wastes:

- New Almaden Mine (Mine Hill, Cora Blanca, Harry, Velasco, Central stope, Victoria, North Randol, South Randol, San Francisco, Santa Mariana, and San Pedro-Almaden mines)
- America Mine
- Providencia Mine
- Enriquita Mine
- San Antonio Mine
- San Mateo Mine
- Senador Mine
- Deep Gulch placer cinnabar deposit

Guadalupe Mine is located on Los Capitancillos Ridge contiguous with the New Almaden Mining District, but because of separate ownership, it has retained a distinct name. Because mining waste was not contained on these mine sites, the wastes continue to erode and discharge large quantities of mercury-laden sediments to streams in the watershed.

b) Santa Teresa and Bernal mercury mines. These much smaller, less productive mercury mines are located within the Guadalupe River watershed outside of the New Almaden Mining District. These mines include the mine sites, their associated processing areas, and mining wastes.

c) Depositional areas. Depositional areas downstream of mercury mines accumulate mercury mining waste and include creek beds, banks, and floodplains, percolation ponds, and shallow impoundments. Impoundments are slow-moving water bodies that form behind engineered structures and anthropogenic alterations to the landscape that pond water. Depositional areas also accumulate mercury from other sources, such as urban stormwater runoff and atmospheric deposition. Depositional areas discharge mercury mining waste (in the form of mercury-laden sediment) to surface waters during periods of erosive flows.

2) Reservoirs and lakes. Reservoirs and lakes (deep impoundments) undergo thermal stratification in the dry season. Thermal stratification increases the conversion of inorganic mercury to methylmercury, a bioaccumulative toxin, in the deep, cold waters of a reservoir or lake's hypolimnion. In the dry season, reservoirs and lakes discharge elevated methylmercury concentrations to downstream waters.

3) Urban stormwater runoff. Urban stormwater runoff contains mercury from controllable urban sources, such as improperly discarded fluorescent lamps, electrical switches, thermostats, thermometers, and other mercury-containing devices; historical and ongoing industrial activities; and naturally occurring mercury in soil. Mercury in urban stormwater runoff also results in part from atmospheric deposition to the land surface.

4) Nonurban stormwater runoff. Nonurban stormwater runoff contains mercury from atmospheric deposition to the land surface, and from naturally occurring mercury in soil.

5) Atmospheric deposition. Mercury emissions from many industrial processes are widely dispersed in the atmosphere and deposit directly on the land and water surface. Mercury deposition from the atmosphere is minimal relative to other loads in the watershed.

7.7.1.3 Targets

The numeric TMDL targets are the fish-tissue water quality objectives from Table 3-4A designed to protect aquatic organisms and wildlife. They are also protective of human health. The targets are:

- 0.05 mg methylmercury per kg fish, average wet weight concentration measured in whole trophic level 3 fish 5–15 cm in length, and
- 0.1 mg methylmercury per kg fish, average wet weight concentration measured in whole trophic level 3 fish > 15–35 cm in length.

7.7.1.4 Total Maximum Daily Loads

The TMDLs, shown in Table 7.7.1-1, are expressed as methylmercury and mercury concentrations in water and sediment.

Table 7.7.1-1 Total Maximum Daily Loads

Waters	TMDLs
Creeks and river: • Guadalupe Creek • Alamitos Creek • Guadalupe River	0.2 mg mercury per kg suspended sediment (dry wt., annual median)
Reservoirs and lakes: • Guadalupe Reservoir • Almaden Reservoir • Calero Reservoir • Lake Almaden	1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion)

7.7.1.5 Load and Wasteload Allocations

Concentration-based pollutant allocations by source category, equal to the TMDLs in Table 7.7.1-1, are shown in Table 7.7.1-2.

Table 7.7.1-2 Load and Wasteload Allocations

Source	Load Allocation	Wasteload Allocation
Total Mercury Sources		
Mercury mining waste discharged from the New Almaden Mining District, and Guadalupe, Santa Teresa, and Bernal mercury mines	0.2 mg mercury per kg erodible mercury mining waste (dry wt., median)[a, b, c]	
Mercury-laden sediment discharged from depositional areas in Alamitos Creek, Guadalupe Creek, Los Gatos Creek downstream of Vasona Dam[d], Canoas Creek, Ross Creek, Guadalupe River, tributaries to these creeks that drain mercury mines, and percolation ponds along these creeks	0.2 mg mercury per kg erodible sediment (dry wt., median)[a, b]	
Urban stormwater runoff discharges[e]: Santa Clara Valley Water District, County of Santa Clara, Town of Los Gatos, cities of Campbell, Monte Sereno, San José, Santa Clara, and Saratoga		0.2 mg mercury per kg suspended sediment (dry wt., annual median)[f]
Nonurban stormwater runoff discharges[g]	0.1 mg mercury per kg suspended sediment (dry wt., annual median)[h]	
Atmospheric deposition	0.02 mg mercury per square meter of water surface (per year)[i]	
Methylmercury production in reservoirs and lakes[j]		
Guadalupe Reservoir, Almaden Reservoir, Calero Reservoir, and Lake Almaden	1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion)[b]	

Notes:

a. Allocations to mercury mining waste and mercury-laden sediment are not cleanup standards. These allocations are equal to the mercury suspended sediment TMDLs in Table 7.7.1-1.

b. "Erodible" means material readily available for transport by stormwater runoff to surface waters.

c. The mercury mining waste allocation shall be measured in fines less than 63 microns in diameter.

d. This allocation applies to the Los Gatos Creek watershed between Vasona Dam and Lenihan Dam.

e. Urban stormwater runoff is subject to an NPDES permit. At the time of adoption, the permit no. was CAS029718
f. The urban stormwater runoff allocation is proportionally equivalent to the mass allocation (7.2 kg mercury per year) in the San Francisco Bay mercury TMDL. The urban stormwater runoff allocation is the fraction of the Santa Clara Valley Urban Runoff Pollution Prevention Program allocation attributed to the Guadalupe River watershed. The urban stormwater runoff allocation implicitly includes all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.
g. This allocation applies to waters that do not drain areas mined for mercury upstream of Lenihan Dam, Guadalupe Reservoir, Almaden Reservoir, and Calero Reservoir.
h. The nonurban stormwater runoff allocation is proportionally equivalent to the mass allocation (0.5 kg mercury per year) in the San Francisco Bay mercury TMDL. The nonurban stormwater runoff allocation is the fraction of the regionwide allocation attributed to the Guadalupe River watershed. The background mercury concentration in non-urban and non-mined areas is equal to the nonurban stormwater runoff allocation (0.1 mg mercury per kg suspended sediment), and includes mercury from both naturally occurring mercury in soil and atmospheric deposition.
i. The atmospheric deposition allocation to water surfaces in the Guadalupe River watershed is equal to the rate in the San Francisco Bay mercury TMDL.
j. The methylmercury allocation to reservoirs and lakes is equal to the methylmercury TMDL in Table 7.7.1-1.

7.7.1.6 Implementation Plan

This implementation plan:

- Implements these TMDLs, allocations, and the water quality objectives in Table 3-4A
- Builds upon past and ongoing successful efforts to reduce mercury loads both in the Guadalupe River watershed and to San Francisco Bay, and anticipates the development of new and innovative methylmercury control methods
- Encourages a coordinated watershed approach
- Reduces mercury loads in the watershed and simultaneously to the South Bay Salt Pond Restoration Project adjacent to Alviso Slough and to San Francisco Bay
- Reduces methylmercury production in the watershed, and reduces the risks from methylmercury exposure to both humans and wildlife.

The Guadalupe River watershed mercury TMDLs implementation plan will proceed in two phases, beginning [effective date of the amendment], with targets to be attained before 2029. The goals for the first phase include implementing effective source control measures for mining waste at mine sites; completing studies to reduce discharge of mining waste accumulated in Alamitos Creek; and completing studies of methylmercury and bioaccumulation controls in reservoirs and lakes, by December 31, 2018. The goal for the second 10-year phase of implementation is the attainment of the watershed fish tissue targets and the San Francisco Bay mercury TMDL allocations to urban stormwater runoff and legacy mercury sources in the Guadalupe River watershed, by December 31, 2028.

This plan establishes requirements for responsible parties to reduce or control mercury loads using available technology (see Mercury Source Control Actions). If methods under development to reduce methylmercury production and bioaccumulation prove feasible and effective, this plan also requires responsible parties to implement proven methods in Phase I (see Methylmercury

Production Control Actions). Monitoring of mercury loads, mercury and methylmercury concentrations in water and suspended sediments, and bioaccumulation will occur throughout both phases to ensure that mercury and methylmercury levels have declined and fish targets are attained (see Coordinated Watershed Monitoring Program). The adaptive implementation section describes the approach and schedule for evaluating and adapting the TMDLs and implementation plan as needed to assure water quality standards are attained.

Mercury Source Control Actions

Actions are required to control mercury mining waste and urban runoff sources. This section specifies actions required to control discharges from sources to surface waters.

Mercury mining waste control actions are phased so that mercury discharges from upstream will be eliminated or significantly reduced before downstream projects are undertaken. Erosion control actions at mercury mines shall be completed within the first 10 years (Phase 1). Water Code Chapter 5.7 contains a program for public agencies and cooperating private parties, who are not otherwise legally responsible for abandoned mine lands, to reduce the threat to water quality caused by these lands without becoming responsible for completely remediating mining waste from abandoned mines. The Water Board encourages these parties to participate in the program.

Downstream erosion control actions shall be completed within the second 10 years (Phase 2). Implementation actions that reduce loads of mercury mining waste and/or mercury-laden sediment to the waters of the Guadalupe River watershed downstream of dams will also count towards achieving the San Francisco Bay mercury TMDL allocation to legacy mercury sources in the Guadalupe River watershed.

The implementation plan for urban stormwater runoff, nonurban stormwater runoff, and atmospheric deposition source categories is contained in the San Francisco Bay mercury TMDL. Monitoring required in the Bay mercury TMDL for urban stormwater runoff is similar to the monitoring requirements herein. Consequently, the urban stormwater runoff permittees may find it is advantageous to participate in coordinated watershed monitoring. Urban stormwater runoff implementation actions in the Guadalupe River watershed that reduce loads of mercury to San Francisco Bay will also count towards achieving the Guadalupe TMDL allocation to the urban stormwater runoff source.

Implementation Actions for Mercury Mines

The Water Board will implement load allocations for mercury mining waste discharged from the New Almaden Mining District and the Guadalupe, Santa Teresa, and Bernal mercury mines through Water Code §§ 13267 and 13304 orders to compel investigation, clean up and monitoring, as well as through Basin Plan Section 4.21.4 (*Mining Program Description*) to the extent applicable. Parties responsible for investigation, cleanup, and monitoring include, but are not limited to, current mine site property owners and prior mine owners and/or operators that have caused or permitted, or threaten to cause or permit, mercury to be discharged or deposited where it will probably be discharged into waters of the State and create a condition of pollution or nuisance. Except for the cleanup and restoration projects at Hacienda Furnace Yard (including immediately adjacent reaches in Alamitos Creek); Mine Hill; San Francisco Open Cut; Senador, Enriquita and San Mateo mines; Jacques Gulch; and Deep Gulch; the Water Board will issue the §13267 no later than [six months from the effective date] and the § 13304 orders by June 30, 2011.

These orders will collectively require the responsible parties to:

1. Conduct a site investigation evaluating the erosion potential of mercury mining waste and the potential for seeps to discharge mercury from mining waste to surface waters. Submit the site investigation report for review and approval by the Executive Officer within the first two years of Phase 1, but no later than [two years from the effective date].
2. Develop plans and schedules to control mercury mining waste discharges to surface waters. Submit plans and schedules for review and approval by the Executive Officer within 6 months of approval of the investigation report. Implement the approved plans in accordance with the approved schedule.
3. Cleanup and abate discharges of mercury mining waste within the 10-year duration of Phase 1. Submit a cleanup report for review and approval by the Executive Officer no later than December 31, 2018.
4. Monitor to evaluate the following:
   a) effectiveness of erosion control measures
   b) mercury loads discharged annually to waters of the State at the points of discharge
   c) fish bioaccumulation of mercury in waters downstream of the discharge
   d) mercury loads discharged annually to San Francisco Bay, and
   e) answer the questions posed by special study 3b

Alternatively, the responsible parties may participate in a coordinated watershed monitoring program to address above monitoring requirements c) to e); see Coordinated Watershed Monitoring Program. The Water Board may consider waiving or reducing monitoring requirement b), on an individual basis, based on progress on abating discharges of mining waste and participation in an approved coordinated watershed monitoring program.

Implementation Actions for Depositional Areas

The Water Board will implement load allocations to depositional areas, as defined above, in creeks and the Guadalupe River downstream of mercury mines through Clean Water Act § 401 certifications and/or waste discharge requirements to minimize discharge of mercury-laden sediment. Specifically, when projects are proposed in depositional areas that may result in sediment discharges and/or require § 401 certifications, the Water Board will require projects designed for channel stability and implementation of measures to minimize erosion. Additionally, it will impose monitoring and reporting requirements to demonstrate the effectiveness of erosion control measures in floodplains, creek banks, creek beds, and shallow impoundments.

Examples of projects subject to these requirements include riparian habitat restoration and creek bank stability projects by the District and creekside property owners. The District may also propose projects in shallow impoundments, which will be regulated through the existing § 401 certifications and waste discharge requirements for the District's Stream Maintenance Program. The Water Board will issue § 401 certifications and/or waste discharge requirements to the District for percolation pond operations and maintenance activities unless actions are satisfactorily undertaken on a voluntary basis.

The Water Board's strategy for Alamitos Creek, which is highly polluted with mercury mining waste, is to encourage a cooperative effort among the District, local agencies, and creekside property owners to undertake a comprehensive creek bank stability and habitat restoration project. The Water Board encourages the District to be the technical lead for this project, and to seek funding for it. The Water Board will identify mercury cleanup as a grant funding priority for the San

Francisco Bay Region. Where necessary, the Water Board will invoke its cleanup authority to compel upstream dischargers who initially discharged mercury mining waste into depositional areas, to cleanup and abate mercury mining waste. Creekside property owners are responsible to provide reasonable access to the creek for project studies, construction, and monitoring, and to not take actions on their property that worsen the discharge of mercury mining waste into the creek. The Water Board urges the District and its partners to complete studies by December 31, 2016; submit plans and schedules for review and approval by the Executive Officer by December 31, 2018; and complete and report on the project within the 10-year duration of Phase 2, by December 31, 2028.

Implementation Actions for Urban Stormwater Runoff

The San Francisco Bay mercury TMDL and urban stormwater NPDES permit require control programs for mercury and monitoring (mercury is a pollutant of concern). The stormwater permit allows for a coordinated and collaborative watershed monitoring program. Urban runoff permittees may participate in a coordinated watershed monitoring program to a) determine fish bioaccumulation of mercury in waters downstream of the discharge ("studies aimed at better understanding the fate, transport, and biological uptake of mercury discharged in urban runoff to San Francisco Bay and tidal areas"), and b) determine the loads of mercury discharged annually to San Francisco Bay; see Coordinated Watershed Monitoring Program. Additionally, if the Water Board determines that special study 3b is necessary, urban runoff permittees shall participate in special study 3b during the second 10-year phase of implementation (see "Special Studies" section below), to determine whether urban stormwater runoff contributes to methylmercury production and bioaccumulation. If special study 3b is necessary and it is not undertaken voluntarily, the Water Board will compel permittees and others (see Special Studies) to undertake special study 3b through Water Code § 13267 requirements.

Methylmercury Production Control Actions

The Santa Clara Valley Water District is a leading researcher in methods of controlling methylmercury production and bioaccumulation in reservoirs and lakes. This TMDL project anticipates that before the end of the implementation period (20 years), new methylmercury production controls in reservoirs and lakes will reduce methylmercury bioaccumulation both in the reservoirs and lakes, and downstream. However, if implementation actions in the reservoirs and lakes do not result in attaining targets downstream, the District shall evaluate and test additional methods of controlling methylmercury production and bioaccumulation in shallow impoundments.

Implementation Actions for Reservoirs and Lakes

The District shall voluntarily conduct or cause to be conducted technical studies of methylmercury production and control. As necessary, the Water Board will compel the District to undertake technical studies of methylmercury production and control through Water Code § 13267 requirements. The responsible party for these studies and subsequent implementation actions is the owner and operator of the reservoirs and lakes, the District. Without methylmercury controls, construction and operation of reservoirs and lakes create nuisance conditions and discharges of methylmercury, which pollutes downstream waters.

The District shall continue to operate, maintain and improve the performance of, or replace with newer technology, existing methylmercury controls already in place on Lake Almaden, Almaden Reservoir, and Guadalupe Reservoir. The District shall install methylmercury controls in Calero Reservoir, if necessary, by December 31, 2017. The District shall report to the Water Board, by December 31 of odd years until directed to stop, on the operation and effectiveness of the methylmercury controls.

Where the Water Board finds it is feasible to reduce methylmercury production and/or bioaccumulation, the Water Board will issue cleanup and abatement orders to the District to undertake actions to reduce fish mercury concentrations to attain the targets.

The Water Code § 13267 requirements and/or cleanup and abatement orders will also require the District to a) determine the loads of mercury discharged annually to waters of the State at the points of discharge, b) monitor mercury in fish tissue, c) determine the loads of mercury discharged annually to San Francisco Bay, and to d) conduct the special studies described in the Monitoring Program below. Alternatively, the District may participate in a coordinated watershed monitoring program to address monitoring requirements b and c, and to address special study 3b); see Coordinated Watershed Monitoring Program. The Water Board may consider waiving or reducing monitoring requirement a), based on participation in an approved coordinated watershed monitoring program.

The Water Board will consider the need to control methylmercury production and bioaccumulation in shallow impoundments in the reviews described below under “Adaptive Implementation.”

Monitoring Program

The monitoring program encompasses:

1. Monitoring to ensure continued effectiveness of erosion control measures to reduce discharges of mercury mining wastes, including mercury-laden sediment (applicable to mercury mines and depositional areas)
2. Monitoring of mercury load at the points of discharge to demonstrate progress in reducing loads (applicable to mercury mines, and reservoirs and lakes)
3. Fish tissue mercury monitoring to assess progress in attaining targets (applicable to mercury mines, and reservoirs and lakes)
4. Monitoring of mercury load to San Francisco Bay to assess progress in attaining the legacy and urban stormwater runoff mass load allocations assigned by the Bay mercury TMDL (applicable to mercury mines, urban stormwater runoff, and reservoirs and lakes)
5. Special studies to inform adaptive implementation of these TMDLs (applicable to mercury mines, urban stormwater runoff, and reservoirs and lakes)

The Water Board will compel the responsible parties to conduct monitoring through NPDES stormwater permits, Water Code § 13267 requirements, and/or cleanup and abatement orders, as described above, which will require the responsible parties to submit a (individual or coordinated watershed) monitoring plan no later than [one year from the effective date] for review and approval by the Executive Officer. Although the responsible parties are required to satisfy the monitoring requirements individually, the Water Board encourages a coordinated watershed approach particularly for mercury in fish tissue and loads to San Francisco Bay. The Water Board will collaborate with other resource agencies to coordinate fish monitoring, to leverage their expertise and, where possible, to achieve multiple objectives.

Prey fish (i.e., fish that wildlife consume) methylmercury concentrations shall be estimated as a) one hundred percent of the total mercury in eviscerated fish, or b) ninety-five percent of the total mercury in whole fish, or c) a percentage of methylmercury (as total mercury) in fish tissue based on scientific studies and upon approval of the Executive Officer of the Water Board. Large predator fish (i.e., fish that humans consume) methylmercury concentrations shall be estimated as one hundred percent of the total mercury in skinless filet samples. Water quality shall be monitored at

the same time and location as fish collection for mercury species, nutrients, and general water quality parameters.

Coordinated Watershed Monitoring Program

The responsible parties may satisfy monitoring requirements 2–5 through a coordinated effort. Fish mercury monitoring is best undertaken in a coordinated effort, because fish integrate methylmercury over time and space. Monitoring of legacy (i.e., mercury mining waste) and urban stormwater runoff mercury discharges to San Francisco Bay is best undertaken in a coordinated effort, because this load to the Bay is from a combination of sources and responsible parties. The Water Board encourages a coordinated watershed approach to monitoring, and will consider reducing or waiving monitoring requirement 2 (mercury load at the points of discharge), based on progress in implementation and participation in coordinated watershed monitoring. To participate in the coordinated watershed monitoring program, participating parties shall submit a coordinated watershed monitoring plan no later than [one year from the effective date], for review and approval by the Executive Officer.

Special Studies

Additional studies may be needed to provide information to improve understanding of mercury cycling in the watershed, and to verify assumptions used in developing these TMDLs. Results of the studies will inform adaptive implementation of these TMDLs and the implementation plan. The special studies should address the following questions.

1. How do the reservoirs and lakes in the Guadalupe River watershed differ from one another? Factors to consider include, but are not limited to, area of connected wetlands, food web, water chemistry (phosphorus, pH, acid neutralizing capacity, and dissolved organic carbon), water level fluctuations, and infrastructure (outlet structure). Do outlet samples adequately represent hypolimnetic methylmercury concentrations for each reservoir? How significant are these differences?
2. Is it possible to increase the assimilative capacity for methylmercury in reservoirs and lakes? Is it feasible? If it is feasible, will this help to attain the fish tissue targets? How does increasing the assimilative capacity affect the food web: Is the resulting food chain multiplier from large (> 5 cm) trophic level 3 (TL3) to large TL4 fish significantly different from 2? If it is significantly different, where and at what frequency should large predator fish (i.e., fish that humans consume) be monitored?

If the monitoring program has not already provided the information to answer these questions, the District shall voluntarily conduct or cause to be conducted studies 1 and 2, or equivalent or alternative studies with prior approval of the Water Board Executive Officer. As necessary, the Water Board will compel the District to undertake these studies in accordance with Water Code § 13267 requirements (see “Implementation Actions for Reservoirs and Lakes”). Completing study 1 within the first five years of Phase 1 (by December 31, 2013), and completing study 2 within the 10-year duration of Phase 1 (by December 31, 2018), would meet the following goal for the first phase of implementation: “completing studies of methylmercury and bioaccumulation controls in reservoirs and lakes”.

3a. What effect do the reservoir and lake control measures have on methylmercury bioaccumulation downstream? Are the fish targets attained downstream?

3b. If not, what factors contribute to methylmercury production and bioaccumulation in creeks and rivers? Factors to consider include, but are not limited to, shallow impoundments, excess nutrients, stagnant pools, shade cover, and aquatic vegetation.

If the monitoring program has not already provided the information to answer these questions, the District shall voluntarily conduct or cause to be conducted study 3a, or equivalent or alternative studies with prior approval of the Water Board Executive Officer. As necessary, the Water Board will compel the District to undertake these technical studies in accordance with Water Code § 13267 requirements (see "Implementation Actions for Reservoirs and Lakes"). If the fish targets are not attained downstream by methylmercury controls in the reservoirs and lakes, the District together with the New Almaden Mining District and the Guadalupe, Santa Teresa and Bernal mercury mines responsible parties, and the urban stormwater runoff permittees shall conduct or cause to be conducted study 3b, or equivalent or alternative studies with prior approval of the Water Board Executive Officer, either voluntarily or in accordance with Water Code § 13267 or NPDES stormwater permit requirements (see above). Completing studies 3a and 3b within the first 5 years of Phase 2 (by December 31, 2023) would support the Water Board's effort to identify whether methylmercury production and bioaccumulation controls are necessary in shallow impoundments, in accordance with the adaptive implementation program.

4. Where the TL3 50–150 mm target is attained, is methylmercury in fish that Forster's terns consume (fish less than 50 mm in length), at or below 0.05 mg/kg? Where the TL3 >150–350 mm target is attained, is methylmercury in fish that ospreys consume (TL4 >150–350 mm target), at or below 0.20 mg/kg? If these assumptions pertaining to proportional bioaccumulation are not valid for this watershed, what monitoring should be conducted to support a revised water quality objective and target to protect piscivorous wildlife?
5. Where the larger TL3 target is attained (in fish >150–350 mm), is the smaller TL3 target also attained (fish 50–150 mm)? If so, how should the monitoring frequency for the smaller TL3 target be reduced?

If the monitoring program has not already provided the information to answer these questions, the Water Board will conduct studies 4 and 5. Completing study 4 within the 10-year duration of Phase 1 (by December 31, 2018), would provide timely information to support whether the water quality objectives require revision through the adaptive implementation process. The timing for study 5 is contingent upon the effectiveness of methylmercury controls.

Adaptive Implementation

Adaptive implementation entails taking actions commensurate with the existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Accordingly, these TMDLs will be implemented in phases starting with source controls at mine sites so that upstream mercury discharges will be eliminated or significantly reduced before downstream projects are undertaken.

The Water Board will adapt these TMDLs and the implementation plan to incorporate new and relevant scientific information, so that effective and efficient actions can be taken to attain TMDL allocations and targets. The Water Board recognizes that attaining the methylmercury allocation may be especially difficult because of the need for new and innovative control methods. The Water Board staff will present an annual progress report to the Water Board on implementation of the TMDL that includes evaluation of new and relevant information that becomes available through

implementation actions, monitoring, special studies, and current scientific literature. Within ten years of the effective date of this TMDL project (by December 31, 2018), the Water Board will consider amending this TMDL project and implementation plan as necessary to ensure attainment of fish targets in a timely manner.

Reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Water Board staff will propose modifications to the targets, allocations, implementation plan actions, or the schedule in this Basin Plan amendment. At a minimum, answers to the following questions will be included in the reviews. Water Board staff will develop additional questions in collaboration with stakeholders during each review.

- Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should this TMDL project be modified?
- Is the watershed progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how should the implementation actions or allocations be modified?
- Does additional sediment, water column, or fish tissue mercury or methylmercury data support our understanding of linkages and food webs in the watershed? Does new data suggest an alternative allocation or implementation strategy?
- What are the current pollutant loads from the various sources? Have these loads changed over time? Are they meeting the allocations? How might source control measures be modified to further reduce loads?
- Are Water Board strategies to encourage and compel implementation actions effective? If not, how should the Water Board revise its strategies to reach the goal of attaining fish tissue targets within 20 years?
- Can the assimilative capacity for mercury in reservoirs and lakes be increased? If so, how can reservoirs and lakes be managed to reduce bioaccumulation? Should the implementation actions or allocations be modified? If so, how?
- Are capital projects like the Lower, Downtown, and Upper Guadalupe Flood Control Projects helping to meet TMDL allocations or are these projects causing increasing loads of mercury and methylmercury to the Guadalupe River and San Francisco Bay? If the loads are increased over pre-project conditions, how might the loads be reduced or their effects be mitigated?

7.8 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SAN PABLO BASIN (SEE FIGURE 2-8)

7.8.1 Sonoma Creek Pathogens Total Maximum Daily Load (TMDL)

Sonoma Creek and its tributaries are impaired by pathogens. The overall goal of this TMDL is to minimize human exposure to waterborne disease-causing pathogens and to protect uses of water for recreational activities such as wading, swimming, fishing, and rafting.

The most common sources of pathogens are wastes from warm-blooded animals, including humans, livestock, domestic pets, and wildlife. The following sections establish a density-based pathogen TMDL for Sonoma Creek and its tributaries, and identify actions and monitoring necessary to implement the TMDL. The TMDL defines allowable density-based bacteria concentrations and prohibits discharge of raw or inadequately treated human waste. The implementation plan specifies actions necessary to protect and restore water contact recreation beneficial uses.

This TMDL strives to achieve a balance that allows ongoing human activities including agriculture and recreation to continue, while restoring and protecting water quality. As outlined in the adaptive implementation section, the effectiveness of implementation actions, results of monitoring to track progress toward targets, and the scientific understanding of pathogens will be reviewed periodically, and the TMDL may be adapted to future conditions as warranted.

In addition to pathogens, both animal and human wastes contain nutrients that in excess pose a threat to aquatic ecosystem beneficial uses; Sonoma Creek is also listed as impaired by excess nutrients. By eliminating the discharge of human waste and controlling the discharge of animal waste, this TMDL will also protect the beneficial uses of the Sonoma Creek watershed's aquatic ecosystem, such as cold and warm freshwater habitat, and wildlife habitat. Controlling human and animal wastes discharges will also reduce risks from other harmful constituents such as steroids and pharmaceuticals.

7.8.1.1 Problem Statement

Due to the presence of pathogens in Sonoma Creek and its tributaries, the beneficial uses of water contact and noncontact recreation are impaired. Waterborne pathogens pose a risk to human health. In ambient waters, the presence of human and animal fecal waste and associated pathogens is inferred from high concentrations of fecal coliform and *E. coli* bacteria. Bacteria levels in Sonoma Creek and its tributaries are higher than the bacteria water quality objectives established to protect people who swim, wade, and fish in these waters (Tables 3-1 and 3-2). Consequently, humans who recreate in Sonoma Creek and its tributaries are at risk of contracting waterborne disease.

7.8.1.2 Sources

The following source categories have the potential to discharge pathogens to surface waters in the Sonoma Creek watershed:

- On-site sewage disposal systems (septic systems)
- Sanitary sewer systems
- Municipal runoff
- Grazing lands

- Dairies
- Municipal wastewater treatment facility
- Wildlife

Water quality monitoring data indicate that on-site sewage disposal systems are potentially a significant pathogen source to Sonoma Creek downstream of the community of Kenwood. Municipal runoff and sanitary sewer lines are the primary pathogen sources in the urban areas. Livestock grazing and dairies are potentially significant pathogen sources in the more rural portions of the watershed.

Discharger monitoring reports from 2001-2005 indicate that the one municipal wastewater treatment facility is not a significant pathogen source. This facility is considered a potential source due to the possibility of spills or treatment system malfunction.

Wildlife are not a significant, widespread pathogen source, as evidenced by low indicator bacteria levels at sites that contain wildlife but are minimally impacted by human activities. Wildlife may be a significant source on a limited, localized basis.

7.8.1.3 Numeric Targets

The numeric water quality targets listed in Table 7.8.1-1 are derived from water quality objectives for coliform bacteria in contact recreational waters, and from U.S. EPA's bacteriological criteria (Tables 3-1 and 3-2). The last target, "zero discharge of untreated or inadequately treated human waste," is consistent with Discharge Prohibition 15 (Table 4-1). The zero human waste discharge target is necessary because human waste is a significant source of pathogenic organisms including viruses; and attainment of fecal coliform targets alone may not be sufficient to protect human health. These bacteria targets, in combination with the human waste discharge prohibitions, are the basis for the TMDL and load allocations, and fully protect beneficial uses.

Table 7.8.1-1 Water Quality Targets[a] for Sonoma Creek
E. coli density: Geometric mean < 126 CFU/100 mL[b]; 90th percentile < 409 CFU/100 mL[c]
Fecal coliform density[d]: Geometric mean < 200 CFU/100 mL[b]; 90th percentile < 400 CFU/100 mL[c]
Total coliform density[d]: Median < 240 CFU/100 mL[b]; no sample to exceed 10,000 CFU/100 mL
Zero discharge of untreated or inadequately treated human waste
[a] These targets are applicable year-round. [b] Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period [c] No more than 10 percent of total samples during any 30-day period may exceed this number. [d] The water quality targets for total and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal water quality objectives in the Basin Plan with *E. coli* based water quality objectives for contact recreation.

7.8.1.4 Total Maximum Daily Load

The TMDL, as indicated in Table 7.8.1-2, is expressed as density-based total coliform, fecal coliform, and *E. coli* bacteria limits.

Table 7.8.1-2 Total Maximum Daily Loads of Pathogen Indicators for Sonoma Creek

Indicator	TMDL (CFU/100 mL)
E. coli	Geometric mean < 126[a] 90th percentile < 409[b]
Fecal coliform[c]	Geometric mean < 200[a] 90th percentile < 400[b]
Total coliform[c]	Median < 240 [a] No sample to exceed 10,000

[a] Based on a minimum of five consecutive samples collected at approximately equa intervals over a 30-day period.

[b] No more than 10 percent of total samples during any 30-day period may exceed this number.

[c] The Total Maximum Daily Loads for total and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation.

7.8.1.5 Load Allocations

Density-based pollutant allocations for pathogen source categories are presented in Table 7.8.1-3. This table also presents the wasteload allocation for the single municipal wastewater discharger in the watershed, Sonoma Valley County Sanitation District, and for municipal runoff. Due to the inherent uncertainty in estimating pathogen loading from nonpoint sources and municipal runoff, allocations for these source categories incorporate a 10 percent margin of safety. Each entity in the watershed is responsible for meeting its source category allocation. All facilities are also responsible for meeting the requirements of applicable waste discharge requirements, waivers, or prohibitions.

All discharges of raw or inadequately treated human waste are prohibited. All sources of untreated or inadequately treated human waste have an allocation of zero.

Discharging entities will not be held responsible for uncontrollable discharges originating from wildlife. If wildlife contributions are found to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of the adaptive implementation program.

Table 7.8.1-3 Density-Based Pollutant Load and Wasteload Allocations[a] for Dischargers of Pathogens in the Sonoma Creek Watershed

Load Allocations[a]						
	E. coli		**Fecal coliform[b]**		**Total coliform[b]**	
Categorical Pollutant Source	**Geometric mean[c]**	**90th percentile[d]**	**Geometric mean[c]**	**90th percentile[d]**	**Median[c]**	**Single sample maximum**
On-site sewage disposal systems	0	0	0	0	0	0
Sanitary sewer systems	0	0	0	0	0	0
Grazing lands	< 113	< 368	< 180	< 360	< 216	9,000
Dairies	< 113	< 368	< 180	< 360	< 216	9,000
Wildlife[e]	< 113	< 368	< 180	< 360	< 216	9,000
Wasteload Allocations[a]						
	E. coli		**Fecal coliform[b]**		**Total coliform[b]**	
Categorical Pollutant Source	Geometric mean[c]	90th percentile[d]	Geometric mean[c]	90th percentile[d]	Median[c]	Single sample maximum
Sonoma Valley County Sanitation District NPDES Permit No. CA0037800	< 126	< 409	< 200	< 400	< 240	10,000
Municipal runoff (NPDES Permit No. CAS00004)[f]	< 113	< 368	< 180	< 360	< 216	9,000

[a] These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit. Load allocations and the wasteload allocation for municipal runoff reflect a 10 percent Margin of Safety.

[b] The allocations for total and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal water quality objectives in the Basin Plan with E.coli based water quality objectives for contact recreation.

[c] Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

[d] No more than 10 percent of total samples during any 30-day period may exceed this number.

[e] Wildlife are not believed to be a significant source of pathogens and their contribution is considered natural background; therefore, no management measures are required.

[f] Municipal runoff permitees are: Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other entities designated per the criteria specified in NPDES General Permit No. CAS00004.

7.8.1.6 Implementation Plan

This implementation plan builds upon previous and ongoing successful efforts to reduce pathogen loads in Sonoma Creek and its tributaries, and requires actions consistent with the California Water Code (CWC Section 13000 et seq.); the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369) and its Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program; and the human waste discharge prohibition.

Table 7.8.1-4 contains the required implementation measures for each of the source categories listed in Table 7.8.1-3. These measures include evaluation of operating practices: development of comprehensive, site-specific pathogen control measures and a corresponding implementation schedule: and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or to third parties if designated. These progress reports will serve as documentation that source reduction measures are being implemented.

It is important to note that the numeric targets and load allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with specified implementation measures and any applicable waste discharge requirements (WDRs) or waiver conditions.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges be regulated under (WDRs), waiver of WDRs, Basin Plan prohibitions, or some combination of these tools. Table 7.8.1-5 specifies the regulatory framework for each discharger source category. The Water Board intends to work with stakeholders to develop conditions for waiving WDRs for grazing lands by 2009.

Table 7.8.1-4 Trackable Implementation Measures for the Sonoma Creek Pathogen Total Maximum Daily Load

Source Category	Action	Implementing Party	Completion Dates
On-Site Sewage Disposal Systems (Septic Systems)	Submit to the Water Board Executive Officer for approval a plan and implementation schedule to evaluate septic system performance and correct deficiencies in septic systems identified as potentially discharging to surface waters. Priority should be given to systems identified as posing water quality risks.	Sonoma County Permit and Resource Management Department	January 2008
	Report progress on implementation of septic system evaluation and repair program, as related to pathogen reduction.		January 2011 and biennially thereafter
	Comply with applicable County, Water Board, or State Board requirements.	Septic system owners	As specified in applicable requirement
	Apply for coverage under the State Water Board's general WDRs for sanitary sewer systems. Comply with provisions of WDRs.	Sonoma Valley County Sanitation District	As specified in general WDRs
	Report progress on inspection and evaluation of sewer systems[a]. Priority should be given to areas identified as posing water quality risks.		Annually
Grazing Lands	Submit a Report of Waste Discharge[b] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific grazing management measures to reduce animal waste runoff; and an implementation schedule for identified management measures.	Ranchers (landowners and lessees). These Reports may be submitted individually or jointly or through a third party[c].	January 2010
	Comply with applicable WDRs, waiver conditions, or prohibitions.	Ranchers (landowners and lessees).	As specified in applicable WDRs or waiver conditions

Source Category	Action	Implementing Party	Completion Dates
	Report progress on implementation of grazing-management measures that reduce animal waste runoff.	Ranchers (landowners and leasees). These reports may be submitted individually or jointly through a third party[c].	As specified in applicable WDRs or waiver of WDRs
Dairies	Comply with applicable WDRs or waiver of WDRs.	Dairy Facility Owners	As specified in applicable WDRs or waiver of WDRs.
	Report progress on implementation of management measures that reduce animal waste runoff.		As specified in applicable WDRs or waiver of WDRs
Municipal Runoff	Comply with approved stormwater management plans and update/amend stormwater management plans as needed to include specific measures to reduce discharge of human and animal wastes.	Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other entities designated per the criteria specified in NPDES General Permit No. CAS00004.	As specified in approved stormwater management plan and in applicable NPDES permit
	Report progress on implementation of human and animal waste runoff reduction measures.		
Municipal Wastewater Discharges	Comply with applicable NPDES permit.	Sonoma Valley County Sanitation District Facility	As specified in applicable NPDES permit

a. Reports may be incorporated into annual SSMP audit reports.

b. WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.

c. While third parties may provide valuable assistance in TMDL implementation, the discharger is the entity responsible for compliance with the specified regulations and regulatory controls

Table 7.8.1-5 Regulatory Framework for Discharges by Source Category	
Source Category	**Regulatory Tool**
On-site sewage disposal systems (septic systems)	General waste discharge requirements (WDRs), individual WDRs, or waiver WDRs, as appropriate[a] Prohibition of human waste discharge
Sanitary sewer systems	General WDRs or individual WDRs, as appropriate Prohibition of human waste discharge
Grazing lands	Waiver of WDRs[b]
Dairies	Waiver of WDRs or individual WDRs, as appropriate
Municipal runoff	NPDES permit
Municipal wastewater discharges	NPDES permit

[a] Regulatory tool(s) employed will be consistent with State Board regulatory actions.

[b] The Water Board retains the option of requiring general or individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.

Cost Estimate: Agricultural Water Quality Control Program

Because the implementation measures for grazing lands constitute an agricultural water quality control plan, the cost of that program is estimated below, consistent with California Water Code requirements (Section 13141).

The average annual program implementation cost to agricultural dischargers is estimated to range from $35,000 to $134,000 for the next ten years. These costs will be shared by Sonoma Creek watershed grazing land operators (approximately 10). This estimate includes the cost of implementing animal waste control and grazing management measures, and is based on costs associated with technical assistance and evaluation, installation of water troughs, and livestock control fencing along up to 25 percent of streams in grazing lands. Besides fencing, other acceptable methods of managing livestock access to streams are not included in this cost estimate due to variability in costs and site-specific applicability. In addition to private funding, potential sources of financing include federal and state water quality grants and federal agricultural grants.

Evaluation and Monitoring

Beginning in 2011 and approximately every five years thereafter, the Water Board will evaluate site specific, subwatershed-specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.8.1-4. In evaluating compliance with the trackable implementation measures, the Water Board will consider levels of participation for each source category as well as for individual dischargers (as documented by Water Board staff or third parties).

In addition to the programmatic monitoring described above, Water Board staff, in collaboration with stakeholders, will conduct water quality monitoring to evaluate *E. coli* concentration trends in Sonoma Creek and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 7.8.1-1) and load allocations (Table 7.8.1-3). The main objectives of the Monitoring Program are to:

- Assess attainment of TMDL targets

- Evaluate spatial and temporal water quality trends
- Further identify significant pathogen source areas
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions.
- Collect sufficient data to evaluate the costs of pathogen source control measures and the existence of other pollutant reduction benefits (e.g., nutrients or sediments), if any.

Table 7.8.1-6 presents locations for baseline water quality monitoring. Each site will be sampled for *E. coli* ten times each year. Five samples will be collected weekly during one 30-day period in each wet season (November through March) and one 30-day period in each dry season (May through September). All water quality monitoring (including quality assurance and quality control procedures) will be performed pursuant to the State Water Board's Quality Assurance Management Plan for the Surface Water Ambient Monitoring Program. Additional monitoring will be conducted as needed if funds are available.

Table 7.8.1-6 Baseline Monitoring Sites
Sonoma Creek at Highway 12
Sonoma Creek Below Kenwood
Sonoma Creek at Sonoma Developmental Center
Sonoma Creek at Maxwell Park
Sonoma Creek at Watmaugh Road
Nathanson Creek at Nathanson Park
Nathanson Creek at Watmaugh Road
Schell Creek at Highway 121

If source control actions are fully implemented throughout the watershed and the TMDL targets are not met, the Water Board may consider whether the TMDL targets are attainable, and re-evaluate or revise the TMDL and allocations as appropriate. Alternatively, if the required actions are not implemented or are only partially implemented, the Water Board may consider regulatory or enforcement action against dischargers not in compliance.

Adaptive Implementation

Approximately every five years, the Water Board will review the Sonoma Creek Pathogen TMDL and evaluate new and relevant information from monitoring, special studies, and the scientific literature. At a minimum, the following questions will be used to conduct the reviews. Additional questions will be developed in collaboration with stakeholders during each review cycle.

- Are the Creek and the tributaries progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
- What are the pollutant loads for the various source categories (including naturally occurring background pathogen contributions and the contribution from open space lands), how have

these loads changed over time, how do they vary seasonally, and how might source control measures be modified to improve load reduction?

- Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?

Reviews will be coordinated through the Water Board's continuing planning program, with stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan via an amendment process. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Sonoma Creek watershed is also impaired.

7.8.2 Napa River Pathogens Total Maximum Daily Load (TMDL)

The Napa River and its tributaries are impaired by pathogens. The overall goal of this TMDL is to minimize human exposure to waterborne disease-causing pathogens and to protect uses of water for recreational activities such as wading, swimming, fishing, and rafting.

The most common sources of pathogens are wastes from warm-blooded animals, including humans, livestock, domestic pets, and wildlife. The following sections establish a density-based pathogen TMDL for the Napa River and its tributaries, and identify actions and monitoring necessary to implement the TMDL. The TMDL defines allowable density-based bacteria concentrations and prohibits discharge of raw or inadequately treated human waste. The implementation plan specifies actions necessary to protect and restore water contact recreation beneficial uses.

This TMDL strives to achieve a balance that allows ongoing human activities including agriculture and recreation to continue, while restoring and protecting water quality. As outlined in the adaptive implementation section, the effectiveness of implementation actions, results of monitoring to track progress toward targets, and the scientific understanding of pathogens will be reviewed periodically, and the TMDL may be adapted to future conditions as warranted.

In addition to pathogens, both animal and human wastes contain nutrients that in excess pose a threat to aquatic ecosystem beneficial uses; the Napa River is also listed as impaired by nutrients. By eliminating the discharge of human waste and controlling the discharge of animal waste, this TMDL will also protect the beneficial uses of the Napa River watershed's aquatic ecosystem, such as cold and warm freshwater habitat, and wildlife habitat. Controlling human and animal waste discharges will also reduce risks from other harmful constituents such as pharmaceuticals and steroids.

7.8.2.1 Problem Statement

Due to the presence of pathogens in the Napa River and its tributaries, the beneficial uses of water contact and noncontact recreation are impaired. Waterborne pathogens pose a risk to human health. In ambient waters, the presence of human and animal fecal waste and associated pathogens is inferred from high concentrations of fecal coliform and E. coli bacteria. Bacteria levels in the Napa River and its tributaries are higher than the bacteria water quality objectives established to protect people who swim, wade and fish in these waters (Tables 3-1 and 3-2). Consequently, humans who recreate in the Napa River and its tributaries are at risk of contracting waterborne disease.

7.8.2.2 Sources

The following source categories have the potential to discharge pathogens to surface waters in the Napa River watershed:

- On-site sewage disposal systems (septic systems)
- Sanitary sewer systems
- Municipal runoff
- Grazing lands
- Confined animal facilities
- Municipal wastewater treatment facilities
- Wildlife

Water quality monitoring data indicate that on-site sewage disposal systems are potentially a significant pathogen source, primarily in the Murphy Creek, Browns Valley Creek, and Salvador Channel subwatersheds. Sanitary sewer lines are a likely source, primarily in the Browns Valley Creek and Salvador Channel sub watersheds. Municipal runoff is a significant source in all urban areas, and livestock grazing and confined animal facilities are considered to be potential sources throughout the watershed.

Both discharger monitoring reports and in-stream water quality monitoring indicate that municipal wastewater treatment facility discharges are not significant pathogen sources in the Napa River watershed. These facilities are considered potential sources due to the possibility of spills or treatment system malfunction.

Wildlife are not a significant, widespread pathogen source, as evidenced by low indicator bacteria levels at sites that contain wildlife but are minimally impacted by human activities. Wildlife may be a significant source on a limited, localized basis.

7.8.2.3 Numeric Targets

The numeric water quality targets listed in Table 7.8.2-1 are derived from water quality objectives for coliform bacteria in contact recreational waters, and from U.S. EPA's bacteriological criteria (Tables 3-1 and 3-2). The last target, "zero discharge of untreated or inadequately treated human waste," is consistent with Discharge Prohibition 15 (Table 4-1). The zero human waste discharge target is necessary because human waste is a significant source of pathogenic organisms including viruses; and attainment of fecal coliform targets alone may not be sufficient to protect human health. These bacteria targets, in combination with the human waste discharge prohibitions, are the basis for the TMDL and load allocations, and fully protect beneficial uses.

Table 7.8.2-1 TMDL Water Quality Targets[a] for the Napa River
E. coli density: Geometric mean < 126 CFU/100 mL[b] ; 90th percentile < 409 CFU/100 mL[c]
Fecal coliform density[d]: Geometric mean < 200 CFU/100 mL[b]; 90th percentile < 400 CFU/100 mL[c]
Total coliform density[d]: Median < 240 CFU/100 mL[b]; no sample to exceed 10,000 CFU/100 mL
Zero discharge of untreated or inadequately treated human waste
[a] These targets are applicable year-round. [b] Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period. [c] No more than 10 percent of total samples during any 30-day period may exceed this number. [d] The numeric targets for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation.

7.8.2.4 Total Maximum Daily Load

The TMDL, as indicated in Table 7.8.2-2, is expressed as density-based total coliform, fecal coliform, and *E. coli* bacteria limits.

Table 7.8.2-2 Total Maximum Daily Loads of Pathogen Indicators for the Napa River

Indicator	TMDL (CFU/100 mL)
E. coli	Geometric mean < 126[a] 90th percentile < 409[b]
Fecal coliform[c]	Geometric mean < 200[a] 90th percentile < 400[b]
Total coliform[c]	Median < 240[a] No sample to exceed 10,000

[a] Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.
[b] No more than 10 percent of total samples during any 30-day period may exceed this number.
[c] The Total Maximum Daily Loads for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation.

7.8.2.5 Load Allocations

Density-based pollutant allocations for pathogen source categories (except wastewater treatment facilities) are shown in Table 7.8.2-3. Table 7.8.2-4 presents wasteload allocations for individual municipal wastewater dischargers. Due to the inherent uncertainty in estimating pathogen loading from nonpoint sources and municipal runoff (Table 7.8.2-3), allocations for these source categories

incorporate a 10 percent margin of safety. Each entity in the watershed is responsible for meeting its source category allocation.

All discharges of raw or inadequately treated human waste are prohibited. All sources of untreated or inadequately treated human waste have an allocation of zero.

Discharging entities will not be held responsible for uncontrollable discharges originating from wildlife. If wildlife contributions are found to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of the adaptive implementation program.

Table 7.8.2-3 Density-Based Pollutant Load Allocations and Wasteload Allocations[a] for Pathogen Dischargers in the Napa River Watershed

Categorical Pollutant Source	*E. coli*		Fecal coliform[b]		Total coliform[b]	
	Geometric mean[c]	90th percentile[c]	Geometric mean[c]	90th percentile	Median[c]	Single sample maximum
On-site sewage disposal systems	0	0	0	0	0	0
Sanitary sewer systems	0	0	0	0	0	0
Municipal runoff	< 113	< 368	< 180	< 360	< 216	9,000
Grazing lands	< 113	< 368	< 180	< 360	< 216	9,000
Confined animal facilities	< 113	< 368	< 180	< 360	< 216	9,000
Wildlife[d]	< 113	< 368	< 180	< 360	< 216	9,000

[a] These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit. Allocations reflect a 10% margin of safety. Wasteload allocations for wastewater treatment facilities are shown in Table 7.8.2-4.

[b] The allocations for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with E.coli-based water quality objectives for contact recreation.

[c] Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

[d] Wildlife are not believed to be a significant source of pathogens and their contribution is considered natural background; therefore, no management measures are required.

Table 7.8.2-4 Density-Based Wasteload Allocations[a] for Municipal Wastewater Treatment Facilities

Facility	*E. coli* Density (CFU/100 mL)						NPDES Permit #
	E. coli		Fecal coliform[b]		Total coliform[b]		
	Geometric mean[c]	90th %ile[c]	Geometric mean[c]	90th %ile	Median[c]	Single sample max	
Napa Sanitation District	< 126	< 409	< 200	< 400	< 240	10,000	CA0037575
Town of Yountville	< 126	< 409	< 200	< 400	< 240	10,000	CA0038121
City of St. Helena	< 126	< 409	< 200	< 400	< 240	10,000	CA0038016
City of Calistoga	< 126	< 409	< 200	< 400	< 240	10,000	CA0037966
City of American Canyon	< 126	< 409	< 200	< 400	< 240	10,000	CA0038768
Napa River Reclamation District #2109	< 126	< 409	< 200	< 400	< 240	10,000	CA0038644

[a] These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit.

[b] The allocations for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with E.coli-based water quality objectives for contact recreation.

[c] Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

7.8.2.6 Implementation Plan

This plan builds upon previous and ongoing successful efforts to reduce pathogen loads in the Napa River and its tributaries, and requires actions consistent with the California Water Code (CWC Section 13000 et seq.); the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369) and its Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program; and the human waste discharge prohibition.

Table 7.8.2-5 contains the required implementation measures for each of the source categories listed in Table 7.8.2-3 and 7.8.2-4. These measures include evaluation of operating practices; development of comprehensive, site-specific pathogen control measures and a corresponding implementation schedule; and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or to third parties if designated. These reports will serve as documentation that source reduction measures are being implemented.

It is important to note that the numeric targets and load allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with specified implementation measures and any applicable waste discharge requirements (WDRs) or waiver conditions.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges be regulated under WDRs, waivers of WDRs, Basin Plan prohibitions, or some combination of these tools. Table 7.8.2-6 specifies the regulatory framework for each discharger source category. The Water Board intends to work with stakeholders to develop conditions for waiving WDRs for grazing lands by 2009.

Table 7.8.2-5 Trackable Implementation Measures for the Napa River Pathogen Total Maximum Daily Load

Source Category	Action	Implementing Party	Completion Dates
On-Site Sewage Disposal Systems (OSDS)	Submit to the Water Board Executive Officer for approval a plan and implementation schedule for evaluating OSDS performance and correcting deficiencies in OSDSs identified as potentially discharging to surface waters. Priority should be given to the Browns Valley Creek, Murphy Creek, and Salvador Channel subwatersheds	Napa County	January 2008
	Report progress on implementation of OSDS evaluation and repair program		January 2011 and biennially thereafter
	Comply with applicable County, Water Board, or State Water Board requirements	Septic system owners	As specified in applicable requirements
Sanitary Sewer Systems	Apply for coverage under the State Water Board's general WDRs for sanitary sewer systems Board (Order No. 2006-0003). Comply with provisions of WDRs.	Napa Sanitation District, City of Calistoga, City of St. Helena, Yountville Joint Treatment Plant, City of American Canyon, Napa River Reclamation District #2109	As specified in general WDRs
	Report progress on inspection and evaluation of sewer systems[a]		Annually
Grazing Lands	Submit a Report of Waste Discharge[c] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific grazing management measures to reduce animal waste runoff; and an implementation schedule for identified management measures	Ranchers (landowners and lessees). These reports may be submitted individually or jointly or through a third party[c]	January 2010
	Comply with applicable WDRs, waiver conditions, or prohibitions	Ranchers (landowners and lessees)	As specified in WDRs or waiver conditions
	Report progress on implementation of grazing management measures that reduce animal waste runoff	Ranchers (landowners and lessees). These reports may be submitted individually or jointly or through a third party[c]	As specified in applicable WDRs or waiver of WDRs

Source Category	Action	Implementing Party	Completion Dates
Confined Animal Facilities	Submit a Report of Waste Discharge[b] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific management measures to reduce animal waste runoff; and a schedule for implementation of identified management measures	Confined animal facilities. These reports may be submitted individually or jointly or through a third party.	January 2010
	Comply with applicable WDRs or waiver conditions	Confined animal facilities	As specified in applicable WDRs or waiver of WDRs.
	Report progress on implementation of management measures that reduce animal waste runoff	Confined animal facilities. These reports may be submitted individually or jointly or through a third party.	As specified in applicable WDRs or waiver of WDRs
Municipal Runoff	Comply with approved stormwater management plans. Update/amend storm water management plans as needed to include specific measures to reduce discharge of human and animal wastes	Napa County, City of Napa, Town of Yountville, City of St. Helena, City of Calistoga, City of American Canyon	As specified in approved stormwater management plan and in applicable NPDES permit
	Report progress on implementation of human and animal waste runoff reduction measures		
Municipal Wastewater Discharges	Comply with applicable NPDES permits	Napa Sanitation District, City of Calistoga, City of St. Helena, Yountville Joint Treatment Plant, City of American Canyon, Napa River Reclamation District #2109	As specified in applicable NPDES permits

[a] Reports may be incorporated into annual SSMP audit reports.

[b] WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.

[c] While third parties may provide valuable assistance in TMDL implementation, the discharger is the entity responsible for compliance with the specified regulations and regulatory controls.

Table 7.8.2-6 Regulatory Framework for Discharges by Source Category	
Source Category	**Regulatory Tool**
On-site Sewage Disposal Systems	General Waste Discharge Requirements (WDRs), Individual WDRs, or Waiver of WDRs, as appropriate[a] Prohibition of Human Waste Discharge
Sanitary Sewer Systems	General WDRs or Individual WDRs, as appropriate Prohibition of Human Waste Discharge
Grazing Lands	Waiver of WDRs[b]
Confined Animal Facilities	Waiver of WDRs[b]
Municipal Runoff	NPDES Permit
Municipal Wastewater Treatment Facilities	NPDES Permit

[a]Regulatory tool(s) employed will be consistent with State Water Board regulatory actions.

[b]Water Board retains the option of requiring general or individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.

Cost Estimate: Agricultural Water Quality Control Program

Because the implementation measures for grazing lands constitute an agricultural water quality control program, the cost of that program is estimated below, consistent with California Water Code requirements (Section 13141).

The average annual program implementation cost to agricultural dischargers is estimated to range between $60,000 and $250,000 for the next 10 years. These costs will be shared by Napa River watershed grazing lands operators (approximately 20). This estimate includes the cost of implementing animal waste controls and grazing management measures, and is based on costs associated with technical assistance and evaluation, installation of water troughs, and livestock control fencing along up to 25 percent of streams in grazing lands. Besides fencing, other acceptable methods of managing livestock access to streams are not included in this cost estimate due to variability in costs and site-specific applicability. In addition to private funding, potential sources of financing include federal and state water quality grants and federal agricultural grants.

Evaluation and Monitoring

Beginning in 2011 and approximately every five years thereafter, the Water Board will evaluate site-specific, subwatershed-specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.8.2-5. In evaluating compliance with the trackable implementation measures, the Water Board will consider levels of participation for each source category as well as for individual dischargers (as documented by Water Board staff or third parties).

In addition to the programmatic monitoring described above, Water Board staff, in collaboration with stakeholders, will conduct water quality monitoring to evaluate *E. coli* concentration trends in the Napa River and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 7.8.2-1) and load allocations (Table 7.8.2-3). The main objectives of the Monitoring Program are to:

- Assess attainment of TMDL targets
- Evaluate spatial and temporal water quality trends
- Further identify significant pathogens source areas
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions
- Collect sufficient data to evaluate the costs of pathogen source control measures and the existence of other pollutant reduction benefits (e.g., nutrients or sediment), if any

Table 7.8.2-7 presents locations for baseline water quality monitoring. Each site will be sampled for *E. coli* ten times each year. Five samples will be collected weekly during one 30-day period in each wet season (November through March) and one 30-day period in each dry season (May through September). All water quality monitoring (including quality assurance and quality control procedures) will be performed pursuant to the State Water Board's Quality Assurance Management Plan for the Surface Water Ambient Monitoring Program. Additional monitoring will be conducted as needed if funds are available. In lieu of the monitoring plan described in Table 7.8.2-6, one or more implementing parties may submit an alternative monitoring plan for Executive Officer approval.

Table 7.8.2-7 Baseline Monitoring Sites
Napa River at Third Street, Napa
Napa River at Zinfandel Lane
Napa River at Calistoga Community Center
Browns Valley Creek at Browns Valley Road
Browns Valley Creek at Borrette Lane
Murphy Creek at Coombsville Road
Murphy Creek at upstream location to be determined[a]
Salvador Channel at Solano Avenue
Salvador Channel at Dry Creek Road
Four additional tributaries to be determined[a], rotated each year
[a] Sites will be determined by Water Board staff in coordination with stakeholders.

If source control actions are fully implemented throughout the watershed and the TMDL targets are not met, the Water Board may consider whether the TMDL targets are attainable, and re-evaluate or revise the TMDL and allocations as appropriate. Alternatively, if the required actions are not implemented or are only partially implemented, the Water Board may consider regulatory or enforcement action against dischargers not in compliance.

Adaptive Implementation

Approximately every five years, the Water Board will review the Napa River Pathogen TMDL and evaluate new and relevant information from monitoring, special studies, and the scientific literature. At a minimum, the following questions will be included in the reviews. Additional questions will be developed in collaboration with stakeholders during each review cycle.

1. Are the river and the tributaries progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
2. What are the pollutant loads for the various source categories (including naturally occurring background pathogen contributions and the contribution from open space lands)? How have these loads changed over time, how do they vary seasonally, and how might source control measures be modified to improve load reduction?
3. Is there new, reliable, and generally accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?

Reviews will be coordinated by the Water Board's continuing planning program, with stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan via an amendment process. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Napa River watershed is also impaired.

7.8.3 Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan

The goals of the Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan (Plan) are to:

- Conserve the steelhead trout population
- Restore water quality to meet water quality standards, including attaining beneficial uses
- Enhance the overall health of the native fish community
- Protect and enhance habitat for native aquatic species
- Enhance the aesthetic and recreational values of the creek and its tributaries

To achieve these goals, specific actions are needed to:

1. Reduce sediment loads, and fine sediment in particular, to Sonoma Creek and its tributaries
2. Attain and maintain suitable gravel quality in freshwater reaches of Sonoma Creek and its tributaries
3. Reduce and prevent channel incision
4. Reduce erosion and sedimentation
5. Repair large sources of sediment supply (e.g., landslides)
6. Enhance channel complexity (e.g., by adding and encouraging retention of large woody debris and restoring riparian vegetation)

The following sections establish:

1. A sediment total maximum daily load (TMDL) defining the allowable amount of sediment that can be discharged into Sonoma Creek, expressed as mass, and as a percentage of the natural background sediment delivery rate to channels
2. An implementation plan to achieve the TMDL and related habitat enhancement goals

7.8.3.1 Problem Statement

Steelhead populations in the Sonoma Creek watershed have declined substantially since the late 1940s. Results of recent analyses of fisheries and sediment sources indicate that:

1. Excessive amounts of fine sediment have been deposited in the streambed at potential steelhead spawning and rearing sites. Excess fine sediment in the streambed can cause poor incubation conditions for fish eggs, resulting in high mortality prior to emergence. Fine sediment also compromises the quality of pools as rearing habitat, and reduces winter rearing habitat by filling the spaces between cobbles and boulders.
2. Changes in physical habitat structure that appear to be caused by erosion of bed and banks (incision) in Sonoma Creek are resulting in significant adverse changes to steelhead habitat. Analysis of in-stream shelter in Sonoma Creek yielded a low score when considering the watershed-wide average (38, which is 13 percent of the maximum score), indicating low quality of rearing habitat for juvenile steelhead. A steelhead census performed in 2002 indicates only 10 percent of steelhead are surviving past the juvenile rearing stage. These conditions are limiting the success of steelhead fish in Sonoma Creek.
3. Stressful water temperatures, low summer flows, and migration barriers also impact the health of Sonoma Creek's coldwater fishery.

Due to excess erosion and sedimentation in the Sonoma Creek Watershed, the narrative water quality objectives for sediment and settleable material are not being met and cold freshwater habitat, wildlife habitat, fish spawning, recreation, and preservation of rare and endangered species beneficial uses are impaired. In addition, channel incision has caused habitat simplification, which has reduced and quantity and quality of spawning and rearing habitat for salmonids and other native aquatic species. Channel incision is a controllable water quality factor that is contributing to a violation of the narrative water quality objective for population and community ecology.

7.8.3.2 Numeric Targets and Desired Condition

Meeting the numeric targets and desired condition listed in Table 7.8.3-1 will allow water quality in Sonoma Creek and its tributaries to achieve the Basin Plan's narrative water quality objectives for sediment, settleable material, and population and community ecology.

Table 7.8.3-1 TMDL Sediment Targets for Sonoma Creek and its Tributaries

Spawning gravel permeability	Median value ≥ 7000 cm/hr[a]
Pool filling	Decreasing trend in the volume of fine sediment deposited in pools
Substrate Composition—Percent Fines	Percent of fine sediment less than 0.85 mm in diameter is less than or equal to 14 percent of the total bulk core sample (≤ 14% fines < 0.85 mm)[b]
	Percent of fine sediment less than 6.40 mm in diameter is less than or equal to 30 percent of the total bulk core sample (≤ 30% fines < 6.40 mm)[b]

[a] Target applies to all potential spawning sites for steelhead and salmon in Sonoma Creek and its tributaries.

[b] Target applies to wadeable streams and rivers with gradient less than 3 percent. A wadeable stream is one which an average human can safely cross on foot during the summer, low flow season while wearing chest waders.

7.8.3.3 Sources

Field assessments and sediment load modeling provide credible estimates of average rates of sediment delivery to Sonoma Creek. As shown in Table 7.8.3-2, the average annual sediment load to the freshwater reach of Sonoma Creek is estimated to be 117,000 tons per year, or 360 tons per km^2 per year. The natural background sediment delivery rate to Sonoma Creek is 52,000 tons per year, or 160 tons per km^2 per year. Therefore, the current sediment delivery rate is estimated to be 225 percent of the natural background rate.

Table 7.8.3-2 Average Annual Sediment Delivery to Sonoma Creek (tons/year)[a]

Source Categories		Estimated Rate[c] (tons/year)
Natural Processes	Channel Erosion, Incision[b]	25,400
	Colluvial Bank Erosion (Soil Creep)	16,600
	Surface Erosion[b]	6,200
	Landslides[b]	4,100
	Total- Natural Processes	52,300
Human Actions	Channel Incision and Gully Erosion[b]	43,300
	Roads and Stream Crossings	11,200
	Surface Erosion[b] from vineyards, other row crops, and rangelands	8,600
	Urban Stormwater Runoff	1,100
	Landslides[b]	900
	Total- Human Actions	65,100
GRAND TOTAL		117,400

[a] Sediment delivery rates are rounded to the nearest hundred.

[b] Channel erosion and incision, surface erosion, and landslides are occur due to both Natural Processes and Human Actions. For these sources, each component (natural processes vs. human actions) is displayed separately.

[c] The timeframe associated with the average annual rate varies from long-term average rates which were estimated for landslides, channel incision, and gully erosion to those for urban stormwater, surface erosion, and road-related erosion, which are estimated based on current/contemporary conditions.

7.8.3.4 Total Maximum Daily Load and Allocations

The Sonoma Creek sediment TMDL is established at 65,400 tons per year, which is approximately 125 percent of natural background load. Natural background load depends upon natural processes, and varies significantly. Therefore, the TMDL and allocations are expressed both in terms of sediment mass and percent of natural background. The percentage based TMDL, 125% of natural background, applies throughout the watershed. In order to achieve the TMDL, controllable sediment delivery resulting from human actions needs to be reduced by approximately 80 percent from current proportion of the total load (Table 7.8.3-3). TMDL attainment will be evaluated at the limit of tidal influence in the Sonoma Creek watershed, which approximates the downstream boundary of freshwater habitat for steelhead. Sonoma Creek has several tributaries that join the mainstem below the tidal limit; therefore, several points will be used to evaluate TMDL attainment. These points are: mainstem Sonoma Creek just downstream of the Fowler/Carriger Creek confluence, and the freshwater portions (above tidal influence) of Schell, Ramos, Carneros, and Merazo Creeks. Attainment of the TMDL will be evaluated over a 5-to-10-year averaging period. The TMDL equal to 125 percent of natural background load, can be achieved if human-related sources are reduced to the level of the allocations shown in Table 7.8.3-3.

Table 7.8.3-3 Sonoma Creek Sediment Load and Wasteload Allocations (tons/year)[a]

Source Category		Current (2005) Load[b]	Estimated Reductions Needed (Percentage)	Allocation	
				tons/year	Percent Natural Background
Load Allocations	**Natural Processes**				
	Channel Erosion, Incision	25,400	0	25,400	49
	Colluvial Bank Erosion (Soil Creep)	16,600	0	16,600	32
	Surface Erosion	6,200	0	6,200	12
	Landslides	4,100	0	4,100	8
	Human Actions				
	Channel Erosion, Incision	43,300	81	8,100	15
	Roads and Stream Crossings	11,200	81	2,100	4
	Surface Erosion, including vineyards, grazed lands, unmanaged areas, and minor agriculture	8,600	81	1,600	3
	Landslides	900	81	200	0.4
	TOTAL	116,300		64,300	123
Wasteload Allocations[c]	Municipal Stormwater - NPDES Permit No. CAS000004	600	0	600	1
	Construction Stormwater - NPDES Permit No. CAS000002	300	0	300	0.6
	Industrial Stormwater – NPDES Permit No. CAS000001	100	0	100	0.2
	Caltrans Stormwater – NPDES Permit No. CAS000003	100	0	100	0.2
	TOTAL	1,100	0	1,100	2
TOTAL ALLOCATIONS = TMDL = 125% of Natural Background				65,400	125

[a] Sediment loads and allocations are rounded to the nearest hundred. Some totals may not appear to add up due to rounding.

[b] Table 7.8.3-2 also displays the estimated current (2005) sediment loads. Total current (2005) estimated sediment load = 117,400 tons/year.

[c] Source categories included in the wasteload allocations (e.g., municipal stormwater) are described as "urban stormwater" in Table 7.8.3-2. The term "urban stormwater" in Table 7.8.3-2 incorporates municipal, construction, industrial, and Caltrans stormwater.

7.8.3.5 Implementation Plan

The implementation actions described below are to achieve TMDL targets and allocations and habitat enhancement goals. In addition, actions specified in this plan are expected to enhance steelhead population. It is important to note that the allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with required implementation measures and any applicable waste discharge requirements (WDRs), WDR waiver conditions, or NPDES permits.

Regulatory Tools

The State's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires regulation of nonpoint source discharges using the Water Board's administrative permitting authorities, including WDRs, waivers of WDRs, Basin Plan Discharge Prohibitions, or some combination of these. Consistent with this policy, Tables 7.8.3-4 – 7.8.3-7 specify actions and performance standards by nonpoint source category, as needed to achieve TMDL sediment targets and allocations in the Sonoma Creek watershed. The Water Board will consider adopting conditions for waiving WDRs that apply to the nonpoint sources (vineyards, grazing, roads, etc.) listed in Tables 7.8.3-4 – 7.8.3-7, address all pollutants of concern, protect all beneficial uses, and balance the agricultural, environmental, recreational, and residential needs of the watershed.

The wasteload allocations contained in Table 7.8.3-3 apply to point sources of sediment that are regulated by NPDES permits. Table 7.8.3-8 shows implementation measures required of these sources, which include municipal stormwater, runoff from state highways, and from industrial and construction sites.

Problems associated with channel incision, related rapid bank erosion, and loss of essential habitat features, reflect and integrate multiple historical and ongoing disturbances, some of which are local and direct, and others that are indirect and distal. Effectively addressing these issues will require cooperative and coordinated actions by multiple landowners, working with public agencies, over significant distances along the creek. The most effective means of controlling channel incision and reducing related fine sediment delivery to the creek is a channel restoration program that re-establishes width-to-depth ratios and sinuosity values conducive to formation of alternate bars and a modest flood plain. The Water Board will work with stakeholders along Sonoma Creek, through local stewardship groups, to implement such channel restoration/habitat enhancement projects. Tables 7.8.3-9 to 7.8.3-11 (Recommended Measures to Protect or Enhance Habitat), specify actions to address adverse impacts of channel incision on salmonid habitat quantity and quality, and to accomplish habitat enhancement goals for flow, temperature, and fish passage for steelhead.

Individual landowners or coalitions may work with "third parties" to develop and implement sediment pollutant control programs. With regard to achievement of actions to protect or enhance baseflow, fish passage, habitat complexity, and stream temperature, the effectiveness of the recommended actions specified in Tables 7.8.3-9 through 7.8.3-11, will be evaluated as part of the adaptive implementation program.

Agricultural Water Quality Control Program Costs

Implementation measures for grazing lands and vineyards constitute an agricultural water quality control program and therefore, consistent with California Water Code requirements (Section 13141), the cost of this program is estimated herein. This cost estimate includes the cost of implementing all actions to reduce sediment discharges and enhance habitat complexity as

specified in the implementation plan, and is based on costs associated with technical assistance and evaluation, project design, and implementation of actions needed to achieve the TMDL. In estimating costs, the Water Board has assumed that owners of agricultural businesses own 75 percent of total land area on hillside parcels, and 95 percent of the land along Sonoma Creek and lower reaches of its tributaries. Based on these assumptions, the estimated total cost for program implementation for agricultural sources is $1.3-to-2.3 million per year throughout the 20-year implementation period. More than three-quarters of these potential costs are associated with addressing channel incision and enhancing habitat conditions (to reverse the impacts of channel incision) in Sonoma Creek and its tributaries. Considering potential benefits to the public in terms of ecosystem functions, aesthetics, recreation, and water quality, it is anticipated that at least 75 percent of the cost of these actions will be paid for with public funds. Therefore, the total cost to agricultural businesses associated with efforts to reduce sediment supply and enhance habitat in Sonoma Creek is $300,000-$600,000 per year over the 20-year implementation period.

Evaluation and Monitoring

In collaboration with stakeholders in the watershed, Water Board staff will develop a detailed monitoring program to assess progress of TMDL attainment and provide a basis for reviewing and revising TMDL elements or implementation actions. As an initial milestone, by fall 2011, the Water Board and watershed partners will complete monitoring plans to evaluate: a) attainment of water quality targets; and b) suspended sediment and turbidity conditions. Initial data collection, based on the protocols established in these monitoring plans is anticipated to begin in the winter of 2011-2012.

As a whole, the monitoring program will be designed to:

1. *Assess channel response and progress towards achieving water quality targets.* In-channel effectiveness monitoring will be conducted to evaluate: a) progress toward achieving water quality targets, and b) channel response to management measures and natural processes. Parameters that will be monitored to assess progress toward achieving water quality targets are streambed permeability, pool filling, and percent fines composition of the substrate. The number of sites to be monitored will be selected based on availability/presence of the applicable habitat feature (i.e., spawning gravels and pools), as well as the number of samples needed to have a high degree of statistical confidence in estimated values. Frequency of monitoring should be once every five years, at a minimum, for streambed permeability and pool filling. If resources are available, desired monitoring frequency for all TMDL target parameters is once every two to three years. Pool filling should be monitored every two to three years to allow a trend analysis. The Water Board may establish alternative water quality parameters and/or numeric target values at a future date as part of the adaptive implementation process, when/if information becomes available to conclude with a high degree of confidence that one or more alternative parameters or target values provide a superior basis for determining attainment of water quality objectives for sediment, and the protection of fisheries-related beneficial uses.
2. Further evaluate potential impacts of suspended sediment and related turbidity. To further study potential impacts of suspended sediment and related turbidity, monitoring of turbidity should continue. The Sonoma Ecology Center maintains a continuous and automated monitoring station at the Sonoma Valley Watershed Station in Eldridge, CA. Monitoring of suspended sediment should continue to further understanding of turbidity and suspended sediment concentrations in ambient conditions, and during and after storms. Turbidity/suspended sediment data should be analyzed to determine the length of time it takes for turbidity levels to drop to pre-storm levels after a storm event.

It is expected that as sediment reduction and habitat enhancement measures (including reducing channel incision) are undertaken, suspended sediment concentrations and turbidity levels will decrease. This expectation should be confirmed with continued turbidity monitoring. In addition, turbidity monitoring can provide information regarding the effectiveness of sediment reduction measures because it is a sensitive measure of the effects of land use on streams.

3. Assess whether required sediment reduction measures are undertaken. Implementation monitoring will be conducted by landowners or designated agents, per the compliance monitoring and reporting provisions of applicable waivers of WDRs, WDRs, and NPDES permits.
4. Evaluate effectiveness of selected sediment reduction measures (both structural and management-related). The Water Board will conduct upslope effectiveness monitoring to evaluate sediment delivery to channels from land use activities and natural processes. The first sediment source analysis update will occur by 2020, when sediment delivery associated with human activities may be reduced by 25 percent or more. A subsequent update may occur, assuming the water quality targets for sediment are not already achieved, by 2025, when sediment supply associated with human activities may be reduced by 40 percent or more. An additional goal for future updates of the source analysis is to reduce uncertainty associated with estimates of sediment delivery rates.
5. Evaluate effectiveness of recommended habitat enhancement measures and assess progress towards goals of the Habitat Enhancement Plan. The Water Board and local partners should monitor habitat complexity-related water quality indicators to assess progress towards achievement of a balanced sediment budget (where the amount of fine and course sediment input to a given channel reach is equal to the amount that is transported downstream).

   Monitoring should occur to determine whether there is an increasing trend in the percent of the length of mainstem of Sonoma Creek, and in the lower alluvial reaches of its tributaries, that attain the following conditions:

   a. The bankfull channel width-to depth ratio is $\geq$ 12:1.
   b. The average spacing between alluvial and/or forced gravel bars within the active channel is $\leq$ 7 times the width of the bankfull channel.
   c. Available shear stress at bankfull flow does not exceed the amount required to initiate motion of the streambed by more than approximately 20 percent.
   d. Floodplain width is $\geq$ 4 times bankfull channel width.

   Monitoring should also assess whether there is:

   e. An increasing trend through time in the mean area and frequency of riffles and gravel bars within the mainstem channel; and
   f. A decreasing trend through time in the percent of the length of the mainstem of Sonoma Creek, and in the lower alluvial reach of its tributaries, where banks or bed are hardened, and/or where constructed levees contribute to channel instability.

   The information gained from monitoring will guide adaptive implementation.

7.8.3.6 Adaptive Implementation

In concert with the monitoring program, described above, the Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan will be regularly updated. Results of in-progress or anticipated studies that enhance understanding of the population status of steelhead trout in the Sonoma Creek watershed, and/or factors controlling those populations, may also trigger changes to the plan and TMDL. At a minimum, data in response to the following questions will be considered to guide research and monitoring efforts and focus each subsequent update of the TMDL.

Key Questions to be considered in the course of Adaptive Implementation:

- What is the population status of steelhead in the watershed? Is there an increase in the number or percentage of steelhead that survive past the juvenile rearing life stage as sediment reduction and habitat enhancement measures are implemented? An improved understanding of the current status of steelhead populations in the Sonoma Creek watershed is essential for guiding adaptive updates to the management actions recognized in this plan. Two types of monitoring data may be needed to evaluate the current population status in the watershed: 1) “smolt” production and sizes, and 2) adult spawning run-size. Smolt refers to the life stage when juvenile salmonids migrate from freshwater to the ocean. These two types of monitoring would provide a basis for assessing the influences of ocean and freshwater rearing habitat on steelhead run-size.
- Are Sonoma Creek and its tributaries progressing toward TMDL targets as expected? If there has not been adequate progress, how might the implementation actions, targets or allocations be modified?
- What are expected benefits of various actions to enhance habitat for steelhead? Which actions, and in which locations, would enhancement measures have the most benefit and be the most cost-effective?
- Are the specified sediment reduction measures and recommended habitat enhancement measures resulting in an improving trend in channel stability?
- What effect will climate change have on hydrology, sediment transport, and habitat for the watershed’s aquatic species? Is there evidence that TMDL implementation actions, together with climate change, may affect Bay tidal habitats? How will climate change effect the outcome of required and recommended measures, and how should these measured be adjusted in response?
- Are there new data or information available that warrants revision of water quality targets, allocations, or implementation measures?

Table 7.8.3-4 Required and Trackable TMDL Implementation Measures for Sediment Discharges Associated with Vineyards[1]

Performance Standards	Actions	Implementing Parties	Completion Dates
Surface Erosion associated with vineyards: Comply with the Sonoma County Vineyard Erosion and Sediment Control Ordinance (Sonoma County Code, Chapter 30, Article V) and minimize erosion from existing vineyards; and **Roads**: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and **Gullies and/or shallow landslides:** Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas; and **Effectively attenuate significant increases in storm runoff.** Runoff from vineyards shall not cause or contribute to downstream increases in rates of bank or bed erosion.	Submit a Report of Waste Discharge[2] to the Water Board that provides, at a minimum, the following: a description of the vineyard; identification of site-specific erosion control measures needed to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. OR Implement farm plan certified under Fish Friendly Farming Environmental Certification Program or other farm plan certification program approved as part of a WDR waiver policy. All dischargers applying for coverage under a WDR waiver policy also will be required to file a notice of intent (NOI) for coverage, and to comply with all conditions of the WDR waiver policy [4].	Vineyard owner and/or operator	June 2014
	Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.	Vineyard owner and/or operator	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of site specific erosion control measures.[3]	Vineyard owner and/or operator	As specified in applicable WDRs or waiver of WDRs

[1] As needed to achieve TMDL allocations and consistent with the State Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program

[2] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[3] Reports may be submitted individually or jointly through a recognized third party.

[4] This Basin Plan amendment recognizes farm plans certified under the Fish Friendly Farming Environmental Certification Program as effective with regard to control of pollutant discharges associated with vineyards. Additional conditions will be required under a General WDR and/or waiver program consistent with the State Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program, and/or as needed to avoid potentially significant environmental impacts.

Table 7.8.3-5 Required TMDL Implementation Measures for Sediment Discharges Associated with Grazing

Source(s) and Performance Standard(s)	Actions	Implementing Parties	Completion Dates
Surface erosion associated with livestock grazing: Attain or exceed minimal residual dry matter values consistent with University of California Division of Agriculture and Natural Resources guidelines; and **Roads**: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and **Gullies and/or shallow landslides**: Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge[1] to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowner and/or ranch operator	June 2014
	Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of site specific erosion control measures.[2]	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs

[1] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[2] These reports may be prepared individually or jointly or through a recognized third party.

Table 7.8.3-6 Required TMDL Implementation Measures for Sediment Discharges Associated with Rural Lands[1]

Sources and Performance Standards	Actions	Implementing Parties	Completion Dates
Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and **Gullies and/or shallow landslides:** Promote natural recovery, and minimize human caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge[2] to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowners	June 2014
	Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowners	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of site specific erosion control measures.[3]	Landowners	As specified in applicable WDRs or waiver of WDRs

[1] Rural lands include: non-farmed and non-grazing portions of parcels >10 acres that contain one or more residences, and/or a winery; vacant residential parcels >10 acres; and/or portions of 10-acres or larger parcels with secondary vineyard, orchard, and/or grazing. Parcels smaller than 10 acres, but that are identified by Water Board staff as posing a threat to water quality, may also be required to implement the specified actions.

[2] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board

[3] These reports may be prepared individually or jointly or through a recognized third party.

Table 7.8.3-7 Required TMDL Implementation Measures for Sediment Discharges associated with Parks and Open Space, and/or Municipal Public Works

Landowner Type	Sources and Performance Standards	Actions	Implementing Parties	Completion Dates
Parks and Open Space and Public Works	**Roads**: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and **Gullies and/or shallow landslides**: Promote natural recovery, and minimize human caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge[1] to Water Board that provides, at a minimum, the following: description of the road network and/or segments; identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified control measures. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standard. Adopt and implement best management practices for maintenance of unimproved (dirt/gravel) roads, and conduct a survey of stream-crossings associated with paved public roadways, and develop a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts to reduce road-related erosion and protect stream-riparian habitat conditions.	Sonoma County Stormwater Management Program (SWMP) State of California, Department of Parks and Recreation State of California, Department of Transportation County of Sonoma Transportation and Public Works	June 2014
		Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowners	As specified in applicable WDRs or waiver of WDRs, and/or the SWMP
		Report progress on development and implementation of best management practices to control road-related erosion.[2]	Landowners	As specified in applicable WDRs or waiver of WDRs, and/or SWMP

[1] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[2] These reports may be prepared individually or jointly or through a recognized third party.

Table 7.8.3-8 Required TMDL Implementation Measures for Sediment Discharges associated with Urban Land Uses

Source	Performance Standards	Actions	Implementing Parties	Completion Dates
Construction Stormwater Runoff	Control and minimize sediment and erosion from construction sites through appropriate use of Best Management Practices.	Comply with the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity (NPDES Permit No. CAS000002) or updated versions of the Construction General Permit. Develop, maintain, and implement a Storm Water Pollution Prevention Plan (SWPPP) that describes BMPs to be used to control erosion and sedimentation. Develop and implement a sediment monitoring plan if the construction site discharges directly to Sonoma Creek or its tributaries.	Owners or Operators of Sites under Construction	As specified in the Construction General Permit (NPDES Permit No. CAS000002)
Industrial Stormwater Runoff	Control discharges from industrial facilities to the standard of “best available technology economically achievable” and the “best conventional pollutant control technology.”	Comply with the requirements of the General Permit for Discharges of Stormwater Associated with Industrial Activities (NPDES Permit No. CAS000001). Develop a SWPPP and monitoring plan to identify sources of pollutants (including sediment) and the means to control them to reduce stormwater pollution.	Owners or Operators of Industrial Facility Sites	As specified in the Industrial Stormwater General Permit (NPDES Permit No. CAS000001)

Source	Performance Standards	Actions	Implementing Parties	Completion Dates
Municipal Stormwater Runoff	Reduce discharge of pollutants, including sediment, to the maximum extent practicable (MEP)[1]	Comply with approved stormwater management plans. Comply with Municipal Stormwater Permit (NPDES Permit No. CAS000004).	Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other designated entities	As specified in approved stormwater management plan and in applicable NPDES permit (NPDES Permit No. CAS000004).
	Attenuate peak flows and durations from new and redevelopment projects to MEP standards.	Amend and implement stormwater management plans to control peak flow rates and durations	Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other designated entities	No later than June 2014
State Highways Stormwater Runoff	Control runoff from state highways and associated construction activities.	Comply with the Caltrans Statewide Stormwater Permit (NPDES Permit No. CAS000003).	California Department of Transportation (Caltrans)	As specified in applicable NPDES permit (NPDES Permit No. CAS000003).

[1] MEP is the performance standard specified in Section 402(p) of the Clean Water Act. What constitutes MEP evolves with technology and feasibility, and therefore may change in the future. As of 2008, we consider MEP to be those standards specified in the Phase I Municipal Regional Stormwater Permit Revised Tentative Order (NPDES Permit No. CAS612008, provision C.3).

Table 7.8.3-9 Recommended Actions to Reduce Sediment Load and Enhance Habitat Complexity in Sonoma Creek and its Tributaries

Recommended Action	Management Objective(s)	Actions	Implementing Parties	Completion Dates and Notes
Prevent and Reduce Channel Incision	Reduce rates of sediment delivery (associated with incision and associated bank erosion) to channels, by 80 percent. Enhance channel habitat as needed to support self-sustaining run of steelhead and enhance the overall health of the native fish community. Stabilize channel banks and riparian areas to reduce sediment loads from landslides.	Develop and prioritize channel restoration projects to address unstable areas, based on level of incision and/or landslide instability.	Landowners and/or designated agents, and reach-based stewardships	Comply with conditions of Clean Water Act Section 401 certifications
Enhance Physical Habitat Structure	Enhance quality of rearing habitat for juvenile salmonids by increasing riparian canopy, large woody debris, and frequency and depth of pool habitat.	Develop, prioritize, and implement plans to increase channel complexity, including increasing riparian canopy, pool habitat, and large woody debris.	Landowners and/or designated agents, and reach-based stewardships	

Table 7.8.3-10 Recommended Actions to Protect or Enhance Baseflow

Recommended Action	Management Objective	Action(s)	Implementing Parties	Schedule/Notes
Enhance Summer Base Flows	Maintain suitable conditions for juvenile rearing, and smolt migration to Sonoma Creek estuary.	Implement a groundwater management plan to: 1) maintain groundwater levels for the support of beneficial uses, 2) increase water recycling and conservation in order to enhance summer base-flows, 3) identify and protect groundwater recharge areas, 4) enhance the recharge of groundwater where appropriate; and 5) protect against adverse interactions between groundwater and surface water flows. Identify potential groundwater recharge areas and develop pilot projects.	Sonoma County Water Agency, Valley of the Moon Water District, City of Sonoma, Basin Advisory Panel[1], and interested collaborators	The Sonoma Valley Groundwater Management Plan[2] was adopted by the Sonoma County Water Agency in November 2007. The plan includes an implementation schedule to achieve recommended actions to protect or enhance baseflow.

[1] The Basin Advisory Panel was formed to act as the groundwater management plan stakeholder group for the Sonoma Valley Basin

[2] The Sonoma Valley Groundwater Management Plan (developed by the Sonoma County Water Agency, Valley of the Moon Water District, and City of Sonoma) is a non-regulatory plan aimed at locally managing, protecting, and enhancing groundwater resources.

Table 7.8.3-11 Recommended Actions to Restore to Fish Passage

Recommended Action	Management Objective(s)	Action(s)	Implementing Parties	Schedule/Notes
Address Fish Passage Barriers	No significant structural impediments to salmonid migration or passage in mainstem or key tributaries. Reduce the number of stream miles inaccessible to fish.	Design, replace or retrofit road crossings to allow fish passage according to fish-friendly guidance such as those developed by FishNet 4C, Department of Fish and Game, or other appropriate entity with expertise in salmonid habitat restoration.	Local public agencies, watershed groups and landowners	
		Develop, prioritize, and implement plans to remove identified barriers to fish passage.	Local public agencies, watershed groups, and landowners	

7.8.4 Napa River Sediment Reduction and Habitat Enhancement Plan

The goals of the Napa River Sediment Reduction and Habitat Enhancement Plan (Plan) are to:

- Conserve the steelhead trout population
- Establish a self-sustaining Chinook salmon population
- Enhance the overall health of the native fish community
- Enhance the aesthetic and recreational values of the river and its tributaries

To achieve these goals, specific actions are needed to:

- Attain and maintain suitable gravel quality and diverse streambed topography in freshwater reaches of Napa River and its tributaries
- Protect and/or enhance base flows in tributaries and the mainstem of the Napa River
- Reduce the number and significance of human-made structures in channels that block or impede fish passage
- Maintain and/or decrease summer water temperatures in tributaries to the Napa River

The following sections establish:

1. A sediment total maximum daily load (TMDL) defining the allowable amount of sediment that can be discharged into the Napa River, expressed as a percentage of the natural background sediment delivery rate to channels

2. An implementation plan to achieve the TMDL and related habitat enhancement goals

7.8.4.1 Problem Statement

Steelhead and salmon populations in the Napa River and its tributaries have declined substantially since the late 1940s. Results of recent analyses of fisheries and sediment sources indicate that:

1. **Spawning and juvenile rearing habitat for salmon and steelhead are adversely affected by high concentrations of fine sediment (primarily sand) deposited in the bed of the Napa River and its tributaries.**

   Successful reproduction by salmon and steelhead depends on adequate flow through streambed gravels (permeability) in order for eggs to hatch and larvae to grow. As the concentration of fine sediment (primarily sand) in the streambed increases, permeability decreases, which in turn increases egg and larval mortality, and ultimately causes a decrease in the number of young fish that emerge from the streambed. Similarly, as the concentration of sand in the streambed increases, the frequency and extent of streambed scour is intensified, further increasing mortality between spawning and emergence by washing eggs and/or larvae out of the bed during common high flow events.

   Even small increases in the concentration of fine sediment in the streambed may degrade the quality of rearing habitat for juvenile steelhead and salmon. Young steelhead need open spaces between clusters of large cobbles and boulders in order to

escape high flows and predation during the winter. Similarly, as the concentration of fine sediment in the streambed increases, growth and survival of juvenile steelhead and salmon decreases as a consequence of lower biomass of aquatic insect prey species, and increasing activity level, aggressive behavior, and attacks between juvenile salmon and steelhead as they compete for food.

2. **Channel incision has greatly reduced the quantity and quality of spawning and rearing habitat for Chinook salmon in Napa River watershed. Habitat losses as a result of incision exert a significant negative influence on freshwater growth and survival of juvenile salmon, and therefore, on the number of Chinook salmon that ultimately return to spawn.**

   Channel incision, the progressive lowering over time of streambed elevation as a result of net erosion, has lowered the streambed of the mainstem of the Napa River by more than two meters since the start of the current episode of incision, which began sometime after 1965. As a result, habitat is being degraded. The channel has become isolated from its flood plain and there has been a large reduction in the size and frequency of riffles, gravel bars, side channels, and sloughs. These habitats provide essential spawning and juvenile rearing habitat for Chinook salmon. Human activities that have contributed to channel incision in the River, including (but not necessarily limited to) levee building, development projects that have increased peak runoff during storms, construction of large tributary dams, straightening of some mainstem channel reaches, filling of side channels, historical gravel mining, dredging to reduce flood risk, and intensive removal of large woody debris.

3. **Low flows and stressful water temperatures during the spring and dry season, and fish migration barriers exert a significant negative influence on the number (and fitness) of juvenile steelhead that migrate to the ocean from the watershed, and as such, on the number of adults that successfully return to spawn.**

   Drifting aquatic insects produced in riffles often are the primary source of food for juvenile steelhead. Low or no flow over riffles during the spring and dry season greatly reduces this food source. An association between low and/or negative growth rates in juvenile steelhead and poor baseflow persistence was documented in the summer and fall of 2001 in Napa River watershed. Summer water temperatures in tributaries also are often stressful to juvenile steelhead, likely contributing to poor growth rates that were documented. If low growth rates in summer are not mitigated by high rates of growth during other times of the year, significant reductions in survival rates during all subsequent life stages may result.

   Poor access to and from potential spawning and rearing habitat due to man-made structures built in channels (e.g., dams, road crossings, weirs, etc.) and human water uses have reduced the size of the steelhead run in the Napa River watershed. For example, approximately 30 percent of the land area in the Napa River watershed drains into over 400 on-channel reservoirs.

Due to excess erosion and sedimentation in the Napa River watershed, the narrative water quality objectives for sediment and settleable material are not being met, and cold freshwater habitat, wildlife habitat, fish spawning, recreation, and preservation of rare and endangered species beneficial uses are impaired. In addition, channel incision has reduced the quantity of gravel bars, riffles, side channels, and sloughs, which threatens Chinook salmon and other fish and aquatic wildlife species. Channel incision is a controllable water quality factor that is

contributing to a violation of the narrative water quality objective for population and community ecology.

7.8.4.2 Numeric Targets

Meeting the numeric targets listed in Table 7.8.4-1 will allow water quality in the Napa River and its tributaries to achieve the Basin Plan's narrative water quality objectives for sediment, settleable material, and population and community ecology.

Table 7.8.4-1 TMDL sediment targets for the Napa River and its Tributaries

Spawning gravel permeability	Median value ≥ 7000 cm/hr[a]
Streambed scour	Mean depth of scour ≤ 15 cm[b]

[a] Target applies to all potential spawning sites for steelhead and salmon in the Napa River and its tributaries, excluding those upstream of municipal water supply reservoirs.

[b] Target applies to the response of the streambed to peak flows less than the bankfull event at all potential spawning sites for salmon in gravel-bedded reaches of: 1) mainstem Napa River; and 2) alluvial reaches of tributaries where streambed slope is between 0.001 and 0.02. Potential spawning sites can be identified based on the following: 1) dominant substrate size in the streambed surface layer is between 8 and 128 mm; 2) minimum surface area of gravel deposit is 0.2 square meters in tributaries and 1.0 square meter in mainstem Napa River; or 3) located within mainstem Napa River at a riffle head, pool tail, and/or pool margin or in tributary reaches where streambed slope <0.03, or in tributary reaches where streambed slope > 0.03 in pool tails, backwater pools, and/or in gravel deposits associated with flow obstructions (e.g., woody debris, boulders, banks, etc.).

7.8.4.3 Sources

Field inventories conducted throughout the watershed provide credible estimates of the rates and sizes of sediment delivered to Napa River watershed channels between 1994 and 2004. Based on this work, and application of channel and reservoir mapping, the Water Board concludes that:

- More than half of fine sediment delivered to Napa River during the 1994–2004 period is associated with land use activities, including roads, human-caused channel incision, vineyards, intensive historical livestock grazing, and urban stormwater runoff.
- In addition to its prominence in the sediment budget, channel incision is the primary agent for isolation of the channel from its flood plain and a reduction in the quantity and frequency of spawning and rearing habitat for salmon and steelhead in Napa River and the lower reaches of its tributaries.
- Channel sediment loads vary greatly depending upon nature of underlying bedrock or sediment deposits, land use activities, and the location of dams.
- Thirty percent of the watershed drains into reservoirs constructed in tributary channels. These reservoirs capture all of the gravel and sand, and most of the finer sediment input to upstream channels. Nonetheless, anthropogenic activities, downstream of dams, are contributing enough sediment such that the fine sediment load is substantially elevated in the Napa River downstream of the reservoirs.

Mean annual sediment delivery rate to channels is estimated to have been 272,000 metric tons per year during the period from 1994 to 2004, which when considered in relation to the land

area draining into the Napa River at Soda Creek (e.g., 584 km2), equals 466 metric tons per km2 per year (Table 7.8.4-2). The natural background rate of sediment delivery during this period, absent dams and human-caused erosion is estimated to have been 252 metric tons per km2 per year, which is calculated from Table 7.8.4-2 as follows:

48,000 metric tons/year–sediment deposited in tributary reservoirs
7,000 metric tons/year–sediment discharged through dams on tributaries
92,000 metric tons/year–input to channels downstream of reservoirs
147,000 metric tons/year

147,000 metric tons/584 km^2–land area draining to Napa R. at Soda Creek
= 252 metric tons/km^2/year

Therefore total sediment load in the Napa River at Soda Creek is estimated to have been 185 percent of natural background (e.g., 466/252 = 185%) during 1994-2004. Table 7.8.4-2 breaks down the sediment sources to the Napa River, with annual average rate calculated at Soda Creek over the 10-year study period.

Table 7.8.4-2 Mean Annual Sediment Delivery to Napa River at Soda Creek (1994-2004)

Source	Estimated Mean Annual Delivery Rate (metric tons/yr)
Land areas upstream of dams (fine sediment discharged from reservoirs)	
▪ Natural Processes	7,000
▪ Human Actions	11,000
Land areas downstream of dams	
▪ Natural Processes:	92,000
▪ Human Actions:	
o Channel incision and associated bank erosion	37,000
o Road-related sediment delivery (all processes)	55,000
o Surface erosion associated with vineyards and/or livestock grazing	37,000
o Gullies and shallow landslides associated with vineyards, and/or intensive historical grazing	30,000
o Urban stormwater runoff and wastewater discharges	2,500
TOTAL	272,000
Notes: Drainage area for Napa River at Soda Creek = 584 km^2. Estimates above do not include sediment deposited and retained in tributary reservoirs, which includes all gravel and sand, and most of the finer sediment input to channels located upstream of the reservoirs. Approximately 104,000 metric tons per year of sediment are deposited in tributary reservoirs, 48,000 metric tons per year of which is derived from natural processes (Above estimates are rounded to the nearest thousand).	

7.8.4.4 Total Maximum Daily Load and Allocations

The Napa River sediment TMDL is established at 185,000 metric tons per year, which is approximately 125 percent of natural background load (based on sediment load estimates from the 1994-2004 period) calculated at Soda Creek. Natural background load depends upon natural processes, and varies significantly. Therefore, the TMDL and allocations are expressed both in terms of sediment mass and percent of natural background. The percentage based TMDL, 125% of natural background, applies throughout the watershed. In order to achieve the TMDL, controllable sediment delivery resulting from human actions needs to be reduced by approximately 50 percent from current proportion of the total load (Tables 7.8.4-3a and 7.8.4-3b). TMDL attainment will be evaluated at the confluence of Napa River with Soda Creek, which approximates the downstream boundary of freshwater habitat for salmon and steelhead. Attainment of the TMDL will be evaluated over a 5-to-10-year averaging period.

Because dams trap almost all upstream sediment inputs to channels, natural sediment input to channels downstream of dams equals only 62 percent of the total natural background load (e.g., amount that would have been input to Napa River absent dams and human caused erosion). Almost 50 percent of the TMDL can be allocated to human-caused sources. The TMDL equal to 125 percent of natural background load, can be achieved if human-related sources are reduced to the level of the allocations shown in Tables 7.8.4-3a and 7.8.4-3b).

Table 7.8.4-3a Load Allocations

Source category	Load during 1994-2004		Estimated reductions needed (percentage)	Load allocations	
	Metric tons/year	Percentage of Natural Background		Metric tons/year	Percentage of Natural Background
Land areas upstream of dams					
▪ Natural processes	7,000	4.8	0	7,000	4.8
▪ Human actions	11,000	7.5	51	5,000	3.6
Land areas downstream of dams					
▪ Natural processes	92,000	63	0	92,000	63
▪ Human actions:					
o Channel incision and associated bank erosion	37,000	25	51	18,000	12
o Roads	55,000	38	51	27,000	18
o Surface erosion associated with vineyards and grazing	37,000	25	51	18,000	12
o Gullies and shallow landslides associated with vineyards, and/or intensive historical grazing	30,000	20	51	15,000	10
TOTAL	269,000			182,000	123
Note: Above estimates for loads, percent reductions, and allocations are rounded to two significant figures					

Table 7.8.4-3b Wasteload Allocations for Urban Runoff and Wastewater Discharges

Point Source Category	Current Load		Reductions needed (percentage)	Wasteload Allocations	
	Metric tons/year	Percentage of Natural Background		Metric tons/year	Percent of Natural Background
Construction Stormwater-NPDES Permit No. CAS000002	500	0.3	0	500	0.3
Municipal Stormwater NPDES Permit No. CAS000004	800	0.5	0	800	0.5
Industrial Stormwater NPDES Permit No. CAS000001	500	0.3	0	500	0.3
Caltrans Stormwater-NPDES Permit No. CAS000003	600	0.4	0	600	0.4
Wastewater Treatment Plant Discharges[a]					
City of St. Helena NPDES Permit No. CA0038016	30	< 0.1	0	30	< 0.1
Town of Yountville/CA Veteran's Home NPDES Permit No. CA0038121	30	< 0.1	0	30	< 0.1
City of Calistoga NPDES Permit No. CA0037966	40	< 0.1	0	40	< 0.1
TOTAL	2500	2		2500	2

[a] For wastewater treatment plant discharges, compliance with existing permit effluent limit of 30 mg/L of TSS is consistent with these wasteload allocations

Note: Above estimates for loads, percent reductions, and allocations are rounded to two significant figures

7.8.4.5 Implementation Plan

The actions described below, including the processes by which sediment and runoff control practices are proposed and implemented, are necessary to achieve TMDL targets and allocations and habitat enhancement goals. In addition, actions specified in this plan are expected to enhance steelhead run size and facilitate establishment of a self-sustaining Chinook salmon run.

Regulatory Tools

The only point sources of sediment identified in Tables 7.8.4-2 and 7.8.4-3b are those associated with urban stormwater runoff (e.g., municipal stormwater, runoff from State highways, and industrial and construction discharges) and wastewater treatment plants, which are regulated by NPDES permits. Table 7.8.4-4 shows implementation measures required of these sources.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires regulation of nonpoint source discharges using the Water Board's administrative permitting authorities, including waste discharge requirements (WDRs), waiver of WDRs, Basin Plan Discharge Prohibitions, or some combination of these. Consistent with this policy, Tables 7.8.4-4a – 4d specify actions and performance standards by nonpoint source category, as needed to achieve TMDL sediment targets and allocations in Napa River watershed. The Water Board will consider adopting conditions for waiving WDRs that apply to the nonpoint sources (vineyards, grazing, roads, etc.) listed in Tables 7.8.4-4a – 4d, address all pollutants of concern, protect all beneficial uses, and balance the agricultural, environmental, recreational, and residential needs of the watershed.

Table 7.8.4-4 TMDL Implementation Measures for Sediment Discharges Associated with Urban Stormwater Runoff and Wastewater Discharges

Source Category	Actions	Implementing Parties
Urban stormwater runoff and wastewater discharges	Comply with applicable NPDES permits	Napa County, City of Napa, Town of Yountville, City of St. Helena, City of Calistoga, City of American Canyon, State of California, Department of Transportation, California Veterans' Home, owners or operators of industrial facilities and construction projects > 1 acre

Problems associated with channel incision, related rapid bank erosion, and loss of essential habitat features, reflect and integrate multiple historical and ongoing disturbances, some of which are local and direct, and others that are indirect and distal. Effectively addressing these issues will require cooperative and coordinated actions by multiple landowners, working with public agencies, over significant distances along the river. The most effective means of controlling channel incision and reducing related fine sediment delivery to the river is a channel restoration program that re-establishes width-to-depth ratios and sinuosity values conducive to formation of alternate bars and a modest flood plain. The Water Board will work with stakeholders along the Napa River, through local stewardship groups, to implement such channel restoration/habitat enhancement projects. Tables 7.8.4-5a to 7.8.4-5d (Recommended Measures to Protect or Enhance Habitat), specify actions to address adverse impacts of

channel incision on salmon habitat quantity and quality, and to accomplish habitat enhancement goals for flow, temperature, and fish passage for steelhead and salmon.

Individual landowners or coalitions may work with “third parties” to develop and implement sediment pollutant control programs. With regard to achievement of actions to protect or enhance baseflow, fish passage, habitat complexity, and stream temperature, the effectiveness of the recommended actions specified in Tables 7.8.4-5a through 7.8.4-5d, will be evaluated as part of the adaptive implementation program.

Minimization of Potential Impacts to Sensitive Natural Communities

In order to minimize potential impacts to sensitive natural communities that may not be fully protected through County regulations, Basin Plan amendment compliance actions will not be required or approved beyond the development footprint authorized by local land-use authorities in any of the following sensitive natural communities within the Napa River watershed:

- Redwood forest
- Ponderosa Pine alliance
- Tanbark Oak alliance
- Oregon white oak woodland
- Mixed serpentine chaparral
- Wet meadow grasses NFD super alliance.

Locations for these sensitive natural communities and/or land-cover types in the Napa River watershed can be determined by review of the Vegetation Map of Napa County, California (Thorne et al., 2004; http://cain.ice.ucdavis.edu/regional/napavegmap/), the Baseline Data Report (Chapter 4, Jones & Stokes, 2005) and/or the California Natural Diversity Database (http://www.dfg.ca.gov/biogeodata/cnddb/).

Table 7.8.4-4a Required and Trackable TMDL Implementation Measures for Sediment Discharges Associated with Vineyards[1]

Land Use Category	Performance Standards	Actions	Implementing Parties	Completion Dates
Vineyards	**Surface Erosion associated with vineyards**: Control excessive rates of sediment delivery to channels resulting from vineyard surface erosion[5]; **and** **Roads**: Road-related sediment delivery to channels ≤ 500 cubic yards per mile per 20-year period; **and** **Gullies and/or shallow landslides:** Accelerate natural recovery and prevent human-caused increases in sediment delivery from unstable areas; **and** **Effectively attenuate significant increases in storm runoff**, so that the runoff from vineyards shall not cause or contribute to downstream increases in rates of bank or bed erosion.	Submit a Report of Waste Discharge[2] (RoWD) to the Water Board that provides, at a minimum, the following: a description of the vineyard; identification of site-specific erosion control measures needed to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. Or Develop and begin implementing a farm plan certified under Fish Friendly Farming Environmental Certification Program or other farm plan certification program, approved as part of a waiver of WDRs. All dischargers applying for coverage under a waiver of WDRs also will be required to file a notice of intent (NOI) for coverage, and to comply with all conditions of the WDR waiver.[4]	Vineyard owner and/or operator	October 2014
		Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.	Vineyard owner and/or operator	As specified in applicable WDRs or waiver of WDRs
		Report progress on implementation of site specific erosion control measures.[3]	Vineyard owner and/or operator	As specified in applicable WDRs or waiver of WDRs

[1] To achieve TMDL allocations and consistent with the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (State Board, 2004).

[2] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[3] Reports may be submitted individually or jointly through a recognized third party.

[4] Additional conditions may be required under a General WDR and/or waiver program consistent with the Policy for Implementation and Enforcement of the Non-Point Source Control Program (State Board 2004), and/or as needed to avoid potentially significant environmental impacts.

[5] Napa County Conservation Regulations (County Code, Chapter 18.108) are effective in the control of excessive rates of sediment delivery resulting from vineyard surface erosion. Rates of sediment delivery are "excessive" when the predicted soil loss rate exceeds the tolerable soil loss rate (T), calculations as described in "The Universal Soil Loss Equation, Special Applications for Napa County, California" (USDA, 1994).

Table 7.8.4-4b Required TMDL Implementation Measures for Sediment Discharges Associated with Grazing[1]

Land Use Category	Performance Standards	Actions	Implementing Parties	Completion Dates
Grazing	**Surface erosion associated with livestock grazing**: Attain or exceed minimal residual dry matter values consistent with University of California Division of Agriculture and Natural Resources Guidelines[4]; **and** **Roads**: Road-related sediment delivery to channels ≤ 500 cubic yards per mile per 20-year period; **and** **Gullies and/or shallow landslides:** Accelerate natural recovery and prevent human-caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge[2] to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowner and/or ranch operator	October 2014
		Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs
		Report progress on implementation of site specific erosion control measures.[3]	Landowner and/or ranch operator	As specified in applicable WDRs or waiver of WDRs

[1] To achieve TMDL allocations and consistent with the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (State Board, 2004).

[2] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[3] These reports may be prepared individually or jointly or through a recognized third party.

[4] University of California 2002, California guidelines for residual dry matter (RDM) management on coastal and foothill annual rangelands. Rangeland Monitoring Series Publication 8092.

Table 7.8.4-4c Required TMDL Implementation Measures for Sediment Discharges Associated with Rural Lands[1, 3]

Land Use Category	Performance Standards	Actions	Implementing Parties	Completion Dates
Rural Lands	**Roads**: Road-related sediment delivery to channels ≤ 500 cubic yards per mile per 20-year period; **and** **Gullies and/or shallow landslides:** Accelerate natural recovery and prevent human-caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge[2] to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures.	Landowners	October 2014
		Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowners	As specified in applicable WDRs or waiver of WDRs
		Report progress on implementation of site specific erosion control measures.[4]	Landowners	As specified in applicable WDRs or waiver of WDRs

[1] To achieve TMDL allocations and consistent with the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (State Board, 2004).

[2] Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[3] Rural lands, per Napa County definition include: non-farmed and non-grazing portions of parcels >10-ac that contain one or more residences and/or a winery; vacant residential parcels >10-acres; and/or portions of 10-acre or larger parcels with secondary vineyard, orchard, and/or grazing

[4] These reports may be prepared individually or jointly or through a recognized third party.

Table 7.8.4-4d Required TMDL Implementation Measures for Sediment Discharges associated with Parks and Open Space, and/or Municipal Public Works[1]

Landowner Type	Performance Standards	Actions	Implementing Parties	Completion Dates
Parks and Open Space and Public Works	**Roads**: Road-related sediment delivery to channels ≤ 500 cubic yards per mile per 20-year period[2]; **and** **Gullies and/or shallow landslides:** Accelerate natural recovery and prevent human-caused increases in sediment delivery from unstable areas.	Submit a Report of Waste Discharge[2] to Water Board that provides, at a minimum, the following: description of the road network and/or segments; identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified control measures. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standard. Adopt and implement best management practices for maintenance of unimproved (dirt/gravel) roads, and conduct a survey of stream-crossings associated with paved public roadways, and develop a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts to reduce road-related erosion and protect stream-riparian habitat conditions.	Napa County Stormwater Management Program State of California, Department of Parks and Recreation State of California, Department of Transportation	October 2014
		Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Landowners	As specified in applicable WDRs or waiver of WDRs, and/or the SWMP
		Report progress on development and implementation of best management practices to control road-related erosion.[3]	Landowners	As specified in applicable WDRs or waiver of WDRs, and/or SWMP

[1]To achieve TMDL allocations and consistent with the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (State Board, 2004).

[2]Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

[3]These reports may be prepared individually or jointly or through a recognized third party.

Table 7.8.4-5a Recommended Actions to Reduce Sediment Load and Enhance Habitat Complexity in Napa River and its Tributaries

Stressor	Management Objective(s)	Actions	Implementing Parties	Completion Dates and Notes
Habitat degradation as a result of mainstem Napa River and lower reaches of its larger tributaries incising.	Reduce rates of sediment delivery (associated with incision and accelerated bank erosion) to channels, by 50 percent. Enhance channel habitat as needed to support self-sustaining run of Chinook salmon and enhance the overall health of the native fish community.	Develop and implement plans to enhance stream-riparian habitat conditions, and reduce fine sediment supply in mainstem Napa River and lower tributary reaches.	Landowners and/or designated agents, and reach-based stewardships	Comply with conditions of Clean Water Act Section 401 certifications (implementation of Rutherford Project completed by fall 2017, other projects by 2027)
Habitat degradation as a result of reduction in large woody debris in stream channels.	Enhance quality of rearing habitat for juvenile salmonids.	Develop and implement performance standards for protection of ecologically significant large woody debris in stream channels.	Napa County Stormwater Management Program and State Department of Parks and Recreation	Performance standards will be developed by Fall 2010, and implemented by Fall 2011

Table 7.8.4-5b Recommended Actions to Protect or Enhance Baseflow

Stressor	Management Objective	Action(s)	Implementing Parties	Schedule/Notes
Low flows during dry season	Maintain suitable conditions for juvenile rearing, and smolt migration to Napa River estuary.	Local, State, and federal agencies to participate in a cooperative partnership to develop a plan for joint resolution of water supply reliability and fisheries conservation concerns.	Local municipalities working with Water Board, State Water Board (Division of Water Rights), National Oceanic and Atmospheric Administration Fisheries Service (NOAA), and California Department Fish and Game (DFG)	Adopt plan by Fall 2012
		Install and maintain dial-up water-level gage programs and implement public education program in 10 key tributaries for steelhead.	Local public agencies	Accomplish by Spring 2012
		Develop water-level guidelines to support juvenile salmonid rearing and migration.	Local public agencies	Adopt guidelines by Spring 2012
		Conduct water rights compliance survey to protect fish and water rights.	State Water Board(Division of Water Rights)	Schedule per consultation with National Oceanic and Atmospheric Administration Fisheries Service (NOAA), California Department Fish and Game (DFG), and Water Board

Table 7.8.4-5c Recommended Actions to Restore to Fish Passage

Stressor	Management Objective(s)	Action(s)	Implementing Parties	Schedule/Notes
Structures in channels that block or impede fish migration (note: flow-related barriers are addressed above)	No significant structural impediments to salmonid migration in mainstem or in 10 key tributaries for steelhead (including but not limited to the following): Dry, Milliken, Redwood, Sulphur, and York. Designation of remaining tributaries will be determined in consultation with Napa County RCD, CDFG, NOAA Fisheries, and USEPA.	Enhance conditions for adult and juvenile salmon and juvenile steelhead passage at Zinfandel Lane.	Local public agencies and landowners	Project completed by Fall 2012
		Restore passage for adult and juvenile steelhead to-and-from York Creek upstream of Upper Dam.	City of St. Helena	Schedule to be determined based on consultation with NOAA, and DFG
		Identify and develop a plan to remedy all significant structural impediments to salmonid migration in ten key steelhead tributaries (including York).	Local public agencies and landowners	Complete comprehensive fish passage surveys in 10 key tributaries by Fall 2012. Schedule for barrier remediation to be determined based on consultation with NOAA and DFG

Table 7.8.4-5d Recommended Actions to Protect and/or Enhance Stream Temperature

Stressor	Management Objective(s)	Action(s)	Implementing Parties	Schedule/Notes
Stressful summer water temperatures in tributaries	Protect and/or enhance baseflow.	As described in Table 7.8.4-5b	As indicated in Table 7.8.4-5b	As described in Table 7.8.4-5b
	Enhance amount of ecologically significant large woody debris in channels.	As described in Table 7.8.4-5a	As indicated in Table 7.8.4-5a	As described in Table 7.8.4-5a
	Enhance potential shade along riparian corridors.	Implement management actions to accelerate recovery of native riparian tree species.	As indicated in Tables 7.8.4-4a to 4d.	As described in Tables 7.8.4-4a to 4d.

Agricultural Water Quality Control Program Costs

Implementation measures for grazing lands and vineyards constitute an agricultural water quality control program and therefore, consistent with California Water Code requirements (Section 13141), the cost of this program is estimated herein. This cost estimate includes the cost of implementing all actions to reduce sediment discharges and enhance habitat complexity as specified in the implementation plan, and is based on costs associated with technical assistance and evaluation, project design, and implementation of actions needed to achieve the TMDL. In estimating costs, the Water Board has assumed that owners of agricultural businesses (e.g., grape growers and ranchers), within the unincorporated area, own 75 percent of total land area on hillside parcels, and 95 percent of the land along Napa River and lower reaches of its tributaries. Based on these assumptions, we estimate total cost for program implementation for agricultural sources could be $1.9-to-3.4 million per year throughout the 20-year implementation period. More than two-thirds of these potential costs are associated with reducing sediment discharges and enhancing habitat conditions (to address channel incision) in Napa River. Considering potential benefits to the public in terms of ecosystem functions, aesthetics, recreation, and water quality, it is anticipated that at least 75 percent of the cost of these actions will be paid for with public funds. Therefore, the total cost to agricultural businesses associated with efforts to reduce sediment supply and enhance habitat in Napa River is $800,000 to $1.7 million per year.

7.8.4.6 Evaluation and Monitoring

Three types of monitoring are specified to assess progress toward achievement of numeric targets and load allocations for sediment:

1. Implementation monitoring to document that required sediment control and habitat enhancement actions are implemented
2. Upslope effectiveness monitoring to evaluate effectiveness of sediment control actions in reducing rates of sediment delivery to channels
3. In-channel effectiveness monitoring (e.g., spawning gravel permeability and redd scour) to evaluate channel response to management actions and natural processes

Implementation monitoring will be conducted by landowners or designated agents. The purpose of this type of monitoring is to document that sediment control and/or habitat enhancement actions specified herein actually occur.

The Water Board will conduct upslope effectiveness monitoring to evaluate sediment delivery to channels from land use activities and natural processes. The first update will occur on or before the fall of 2017, when sediment delivery associated with land use activities should be reduced by 25 percent or more. A subsequent update may occur, assuming the numeric targets for sediment are not already achieved, on or before the fall of 2022, when sediment supply associated with land use activities should be reduced by 37 percent or more.

In-channel effectiveness monitoring should be conducted by local government agencies with scientific expertise and demonstrated capability in working effectively with private property owners (to gain permissions for access), as needed to develop a representative sample of stream habitat conditions, in relation to sediment supply and transport within the watershed. In addition, the Water Board will conduct in-channel effectiveness monitoring as part of the Surface Water Ambient Monitoring Program. In-channel effectiveness monitoring needs to include measurements of redd scour and spawning gravel permeability to evaluate attainment of water quality objectives for sediment, settleable material, and population and community ecology. To establish a high level of

statistical confidence in estimated values, spawning gravel permeability will need to be measured at 150 or more potential spawning sites located in ten-or-more tributaries, and 50 or more potential spawning sites in the mainstem of the Napa River. Redd scour will need to be measured in the mainstem Napa River at approximately 30 or more potential spawning sites, with 4 or more scour measurements per spawning site. Desired frequency for measurement of permeability and redd scour is once every two to three years. At a minimum, repeat surveys will be conducted once every five years.

In addition to the above described monitoring program to evaluate attainment of numeric targets for sediment, the Water Board will monitor turbidity and residual pool volume. Monitoring will be conducted in a subset of the channel reaches where spawning gravel permeability and/or redd scour are measured. Stream temperature and baseflow persistence will be monitored as part of the Surface Water Ambient Monitoring Program.

7.8.4.7 Adaptive Implementation

In concert with the monitoring program, described above, the Napa River Sediment Reduction and Habitat Enhancement Plan and TMDL will be regularly updated. Results of in-progress or anticipated studies that enhance understanding of the population status of steelhead trout and Chinook salmon in Napa River watershed, and/or factors controlling those populations, may also trigger changes to the plan and TMDL. At a minimum, data in response to the following questions will be considered to guide research and monitoring efforts and focus each subsequent update of the TMDL.

Key Questions to be Considered in the Course of Adaptive Implementation:

1. **What is the population status of steelhead and salmon in the watershed?** An improved understanding of the status of steelhead and salmon populations in the Napa River watershed is essential for guiding adaptive updates to the management actions recognized in this plan.

Two types of monitoring data may be needed to evaluate the population status of steelhead in the Napa River watershed: 1) “smolt” production and sizes, and 2) adult spawning run-size. Smolt refers to the life stage when juvenile salmon and trout migrate from freshwater to the ocean. Estimates of smolt production and sizes, and inter-annual variation in these parameters, can provide a strong basis for evaluating population status of ocean migrating species of trout and salmon, and influence of freshwater rearing habitat conditions on number of adults that successfully return to spawn. At least five years of monitoring (trapping) of ocean migrating smolts are needed to evaluate current steelhead population status. In addition to smolt trapping, three or more years of monitoring data are needed to estimate the number of adult steelhead returning to spawn. This information, when combined with estimates of smolt production and sizes, would provide a basis for assessing the influences of ocean and freshwater habitat on steelhead run-size, for validating smolt production estimates and predictions regarding ocean survival, and ultimately for evaluating the status of the steelhead population in the watershed.

A similar monitoring program is needed to evaluate the population status of the Chinook salmon in the Napa River watershed. Such a program might include the following elements: 1) adult spawning run-size and genetic structure; 2) smolt production; and 3) egg survival from spawning to emergence (emergence trapping). During the past two years, the Napa County Resource Conservation District has conducted surveys to estimate the number of adult salmon returning to spawn. These surveys should continue for at least three more years, both to estimate the number of spawners and inter-annual variations, and to collect fin clips, as needed to evaluate origins of the spawning adults (e.g., returning adults or strays from hatcheries or other streams). The

hypothesis that Chinook salmon experience very high rates of mortality during all freshwater life stages in the Napa River watershed, could be confirmed or rejected through direct monitoring of egg survival to emergence (emergence trapping), fry survival and growth, and smolt trapping.

2. What are expected benefits of various actions to enhance habitat for steelhead and salmon? For steelhead, the results of in-progress studies of juvenile growth and survival will enhance understanding of the significance of dry season base flow and temperature as potential limiters on steelhead run-size. Other information needed to refine the understanding of primary constraints on steelhead population size includes the following: a) comprehensive fish passage evaluations in all key tributaries that provide potential habitat for steelhead; b) dry season water-level monitoring in the same tributaries conducted over two-or-more consecutive years; and c) field surveys to evaluate winter rearing habitat quantity and quality. Given the above sources of information, it may be possible to accurately predict relative increases (high, medium, low) in smolt production associated with various management actions (e.g., baseflow enhancement, fish passage enhancement, reduction in fine sediment supply, etc.) in various locations throughout the watershed.

Key information sources needed to refine understanding of primary controls on Chinook salmon population size include egg survival-to-emergence and controls (e.g., redd scour, gravel permeability), fry survival and growth, and number and sizes of juvenile salmon migrating to the ocean. To this end, pre-and-post project monitoring associated with the proposed Rutherford channel enhancement project may provide an opportunity to determine the amount and types of habitat enhancement actions needed to support a self-sustaining run of Chinook salmon, and to enhance the overall health of the native fish community within the watershed. Key parameters that might be monitored to evaluate fisheries' response to channel enhancement could include: a) changes in quantity, quality, and frequency of key habitat types (e.g., riffles, pools, side channels, gravel bars); b) spawning gravel permeability and scour; c) base flow persistence and temperature; and d) relative abundance of native and introduced fish species.

7.8.5 Petaluma River Bacteria Total Maximum Daily Load (TMDL)

The following sections establish the TMDL for bacteria in Petaluma River and its tributaries. The numeric targets, load and wasteload allocations, and Implementation Plan are designed to support and protect the water body's designated beneficial use of water contact recreation (e.g., swimming and fishing).

7.8.5.1 Problem Statement

Petaluma River and its tributaries are impaired by bacteria. Bacteriological water quality objectives are exceeded based on elevated indicator bacteria densities, and, thus, there is impairment of the water contact recreation (REC-1) beneficial use in these water bodies. Recreating in waters with elevated indicator bacteria densities has long been associated with adverse health effects. Specifically, national epidemiological studies demonstrate that there is a causal relationship between adverse health effects and recreational water quality, as measured by indicator bacteria densities. Impaired segments include the entire Petaluma River, San Antonio Creek, Lichau Creek, Willow Brook, Lynch Creek, Adobe Creek, Ellis Creek, as well as other named and unnamed tributaries.

7.8.5.2 Pollutant Sources

If not properly managed, the following source categories have the potential to discharge bacteria to Petaluma River and its tributaries: municipal wastewater treatment plant, sanitary sewer collection systems, private sewer laterals, onsite wastewater treatment systems (OWTS), vessel marinas,

homeless encampments, confined animal facilities (CAF), grazing lands/operations, domestic pets, and municipal and Californian Department of Transportation (Caltrans) stormwater runoff.

7.8.5.3 Numeric Targets

The desired or target condition for the water contact recreation beneficial use in Petaluma River and its tributaries listed in Table 7.8.5-1 are based on protective water quality objectives for fecal indicator bacteria (FIB). These targets are based on applicable water quality objectives for water contact recreation in fresh and marine (estuarine) waters adopted by the State Water Board in the

Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

Table 7.8.5-1 Numeric Targets[a,b] for Fecal Indicator Bacteria in the Petaluma River Watershed to Protect Water Contact Recreation

Indicator/Applicable Waters	Geometric Mean (cfu/100 mL)[c]	Statistical Threshold Value (cfu/100 mL)
Enterococcus (for estuarine portions where the salinity is greater than 1 ppth more than 5 percent of the time)	30	110
E. coli (for fresh water portions where the salinity is equal to or less than 1 ppth 95 percent or more of the time)	100	320

cfu/100 mL Colony forming unit per 100 milliliters of sample

ppth Parts per thousand

a. Frequency and duration: The water body geometric mean shall not be greater than the applicable geometric mean magnitude in any six-week interval, calculated weekly. The applicable STV shall not be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

b. Attainment: To determine the attainment of the bacteria water quality standards, the geometric mean values shall be applied based on a statistically sufficient number of samples, which is generally not less than five samples equally spaced over a six-week period. However, if a statistically sufficient number of samples is not available to calculate the geometric mean, then attainment of the water quality standard shall be determined based only on the STV.

c. cfu/100 mL is equivalent to Most Probable Number (MPN) per 100 milliliters of sample.

7.8.5.4 Total Maximum Daily Load

The TMDL is equivalent to the numeric targets in Table 7.8.5-1. The TMDL is expressed as the total density of either *E. coli* or *Enterococcus* indicator bacteria, depending on the water body type (freshwater or estuarine), that can be discharged from all sources while not causing the water quality in the river or its tributaries to exceed the protective standards. The “daily” load expression of this TMDL is equivalent to the STV value for Enterococcus and/or E. coli as applicable based on water body type. The TMDL is applicable year-round.

7.8.5.5 Load and Wasteload Allocations

Table 7.8.5-2 summarizes the allocations for discharges of bacteria in the Petaluma River watershed. The load allocations (LAs) and wasteload allocations (WLAs) are the same as the numeric targets specified in Table 7.8.5-1 and the TMDL, except that the allocation for sanitary sewer collection systems, OWTS, and vessel marinas is zero. The allocations are expressed in terms of applicable FIB densities. Discharges to estuarine waters have allocations based on the *Enterococcus* targets. Discharges to fresh waters have allocations based on the *E. coli* targets. The "daily" load expression of the WLAs and LAs in Table 7.8.5-2 are equivalent to the appropriate STV, unless the discharge of bacteria is prohibited and the allocation is zero.

The attainment of these allocations will ensure protection of the water quality and applicable beneficial uses of the river. All LAs and WLAs shall be achieved for each implementation party no later than 15 years of the TMDL effective date. Complete and successful implementation of corrective actions called for in the Implementation Plan may be used to show respective source categories have achieved their LAs or WLAs.

The load allocations in this TMDL are identical to the U.S. EPA criteria and State Water Board water quality objectives established as protective standards. Therefore, the margin of safety is implicitly incorporated into the proposed TMDL and LAs and WLAs. No additional or explicit margin of safety is needed for this TMDL.

While FIB densities can be greater during the winter wet season due to factors such as stormwater runoff, they can be high at any time of year. Recreational uses of the river are most prevalent during the summertime but can occur at any time of year. Therefore, the TMDL and allocations must be applied equally during all time periods and conditions. No seasonal variations to the above listed TMDLs and allocations are proposed.

Table 7.8.5-2 Load and Wasteload Allocations[a] of Fecal Indicator Bacteria for Petaluma River			
Pollutant Source Category	**Allocation Type**	**Estuarine waters** ***Enterococcus*** **(cfu/100 mL)**	**Fresh waters** ***E. coli*** **(cfu/100 mL)**
City of Petaluma Wastewater Treatment Facility	WLA	Geometric mean[b] < 30 STV[c] = 110	Not Applicable
Sanitary Sewer Collection Systems- City of Petaluma collection system; Penngrove Sanitation Zone (Sonoma County Water Agency)	WLA	0	0
Onsite Wastewater Treatment Systems (e.g., septic systems)	LA	0	0
Vessel Marinas	LA	0	0
Confined Animal Facilities (e.g., dairy, horse facilities)	LA	Geometric mean < 30 STV = 110	Geometric mean < 100 STV = 320
Grazing Lands/Operations (e.g., cattle, sheep ranches)	LA	Geometric mean < 30 STV = 110	Geometric mean < 100 STV = 320
Wildlife[d]	LA	Geometric mean < 30 STV = 110	Geometric mean < 100 STV = 320
Municipal Stormwater Runoff[e]	WLA	Geometric mean < 30 STV = 110	Geometric mean < 100 STV = 320
Caltrans Stormwater Runoff	WLA	Geometric mean < 30 STV = 110	Geometric mean < 100 STV = 320

cfu/100 mL Colony forming unit per 100 milliliters of sample, which is equivalent to Most Probable Number (MPN) per 100 milliliters of sample

LA Load allocation

STV Statistical threshold value

WLA Wasteload allocation

a. All allocations apply year-round and will be measured in the ambient water (e.g., Petaluma River and its tributaries), except for WLA for the City of Petaluma Wastewater Treatment Plant, which shall be

measured at any point in the outfall pipe between the point of discharge to the Petaluma River (Discharge Point No. 001) and the point at which all flow contributing to the outfall is present.

b. The water body geometric mean shall not be greater than the applicable geometric mean magnitude in any six-week interval, calculated weekly.

c. If a statistically sufficient number of samples is not available to calculate the geometric mean, then attainment of the water quality standard shall be determined based only on the STV. The applicable STV shall not be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

d. Wildlife is an uncontrollable source of bacteria and its contribution is considered natural background. No management measures will be required for wildlife sources.

e. WLA for discharges from municipal stormwater runoff via the municipal separate storm sewer system includes contributions from pet waste.

7.8.5.6 Implementation Plan

The Petaluma River Bacteria TMDL Implementation Plan specifies actions needed to attain the TMDL and allocations. This Implementation Plan includes new actions and actions for which requirements are already in place. The new actions include requirements for the following sources:

- Confined animal facilities not currently enrolled under the Water Board's CAF Waste Discharge Requirements (WDRs) (e.g., commercial horse boarding facilities);
- Grazing lands/grazing operations not affiliated with existing dairies;
- Vessel marinas;
- Homeless encampments;
- Sanitary sewer collection systems segments within 2000 feet of the river or major tributaries[1];
- OWTS within the Advanced Protection Management Program boundary, within 200 feet of the river or major tributaries; and
- Municipal and Caltrans stormwater runoff.

Actions for which requirements are already in place include:

- Reduction of bacteria discharges from cow dairy facilities by measures required by the CAF WDRs or conditional waiver of CAF WDRs;
- Effluent limitations required by the National Pollutant Discharge Elimination System (NPDES) permit for the City of Petaluma Ellis Creek Wastewater Treatment Facility; and
- Reduction of sanitary sewer waste discharges by the measures already required by the Statewide General WDRs for sanitary sewer systems.

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[1] Major tributaries" are any National Hydrography Dataset medium resolution (1:100,000 scale) mapped stream in the Petaluma River watershed.

Regulatory Tools

The Water Board will use its regulatory authorities to require actions in the Implementation Plan, including individual and general WDRs under Water Code section 13263; waiver of WDRs under Water Code section 13269; technical or monitoring program reports under Water Code section 13267; NPDES permits for wastewater discharges from sanitary sewer collection systems and treatment facilities and for stormwater discharges from municipal and Caltrans separate storm sewer systems under the Clean Water Act section 402, and Water Code section 13377; and vessel sanitation requirements under the Harbors and Navigation Code section 775 et seq. The Water Board will also use its regulatory authorities in connection with overseeing implementation of the State Water Board's Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy). The Water Board may also enforce the Basin Plan's prohibition of discharges of raw sewage or any waste failing to meet WDRs to any waters in the Basin.

Implementing Parties

Responsibility for reducing bacteria discharges include the following parties:

- Confined animal facilities owners/operators;
- Grazing lands owners/operators;
- Vessel marina owners/operators;
- OWTS owners within the Advanced Protection Management Program boundary;
- Sonoma County;
- Sonoma County Water Agency (Penngrove Sanitation Zone);
- City of Petaluma;
- Marin County;
- City of Novato; and
- Caltrans.

Achieving the TMDL requires action by all the implementing parties and each is required to meet its pollutant load allocation. Cooperation is encouraged not only to attain the TMDL, but also to avoid duplicative actions, such as monitoring and reporting. To the extent possible, implementing parties should coordinate actions and water quality monitoring efforts.

Implementation Actions and Schedule

This section describes the actions necessary to achieve the TMDL. Tables 7.8.5-3 through 7.8.5-11 set forth the implementation and monitoring actions, lists the implementing parties, and provides the schedule for implementation to achieve the TMDL. The implementation schedule allows time for the implementing parties to identify and implement measures that are necessary to control bacteria discharges resulting in exceedances of allocations. If source control actions are fully implemented throughout the watershed and the TMDL targets are not met, the Water Board may re-evaluate or revise the targets, TMDL, and allocations as appropriate.

The Water Board will adopt WDRs or waivers thereof for grazing operations in the Petaluma watershed, by December 2022, to require those implementation actions listed in Table 7.8.5-8 applicable to grazing lands and operations. Pursuant to Harbors and Navigation Code sections 775 et seq. and Water Code section 13267, the Water Board will require marina owners and operators to comply with the implementation actions listed in Table 7.8.5-6 applicable to vessel marinas. For

new implementation actions for sanitary sewer collection systems and municipal separate storm sewer systems listed in Tables 7.8.5-4 and 7.8.5-9, respectively, the Water Board will require the actions through amended or reissued NPDES permits and Water Code sections 13267 and 13383, as necessary. The Water Board will use its stormwater NPDES permitting and Water Code sections 13267 and 13383 authorities to require Table 7.8.5-10 implementation actions related to homeless encampments. General WDRs for sanitary sewer collection systems, general WDRs and a waiver thereof for confined animal facilities, and an NPDES permit for the Ellis Creek Wastewater Treatment Plant exist and Tables 7.8.5-4, 7.8.5-7, and 7.8.5-3, respectively, requires ongoing compliance with these requirements. Confined animal facilities not yet covered under these requirements are required to obtain coverage. OWTS implementation actions are further described below.

Advanced Protection Management Program for OWTS

Implementation of actions to eliminate OWTS waste discharges is supported by Prohibition 15 of the Basin Plan (Table 4-1), which prohibits discharges of raw sewage or any waste failing to meet WDRs to any waters of the Basin. In addition, the OWTS Policy provides a multi-tiered strategy for management of OWTS in California. For all OWTS located near a water body that has been listed as impaired due to FIB or nutrients pursuant to Section 303(d) of the Clean Water Act (e.g., Petaluma River and tributaries), an Advanced Protection Management Program (APMP) is the minimum required management program. Local agencies who are responsible for regulating OWTS (e.g., Sonoma and Marin Counties) are authorized to implement APMPs in conjunction with an approved Local Agency Management Program (LAMP). This Implementation Plan establishes APMP requirements for OWTS in the Petaluma River watershed. As required by the OWTS Policy, the relevant local agencies, Sonoma and Marin Counties, shall submit a revised LAMP to the Water Board that includes these TMDL requirements in an appropriate APMP within a year of the TMDL effective date.

Applicability

The APMP applies to OWTS, which are defined as individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal. The APMP applies to any OWTS that is partially or fully contained within the APMP boundary. Owners of existing, new, and replacement OWTS whose OWTS are located entirely outside the boundaries of the APMP are not subject to the APMP requirements, but must still comply with relevant requirements of the OWTS Policy, any approved LAMP, and if applicable, individual and/or general WDRs or waiver of WDRs.

Boundary

The APMP boundary in the Petaluma River watershed includes the following areas:

- The area within 200 linear feet from the top of the bank in the horizontal (map) direction on either side of the entire Petaluma River mainstem; or
- The area within 200 linear feet from the top of the bank in the horizontal (map) direction on either side of any National Hydrography Dataset medium resolution mapped stream in the Petaluma River watershed.

APMP Requirements

Owners of OWTS within the boundaries of the APMP shall comply with the following minimum requirements:

1. **General Operation and Maintenance Requirements –** Owners of OWTS shall maintain their OWTS in good working condition, including inspections and pumping of solids, as necessary, or as required by local ordinances and requirements established in an approved LAMP, to maintain proper function and assure adequate treatment and disposal.
2. **Basic Operational Inspection –** To facilitate timely identification and resolution of maintenance and operational issues, owners of OWTS shall obtain a basic operational inspection of the septic tank, effluent dispersal area(s), and related appurtenances of the OWTS by a qualified professional [2] within three years of the effective date of the TMDL and once every ten years thereafter. Satisfaction of operational inspection requirements may occur in conjunction with pumping of the septic tank, a property transaction, issuance of a local building permit, an in-field performance verification performed by a service provider certified by an OWTS manufacturer, or an inspection otherwise required by the local agency or Water Board. A basic operational inspection shall provide sufficient information for the Water Board or local agencies to determine that OWTS are not discharging any waste to the river or its tributaries and may include the following evaluations:
    a. Overall system
        i. A basic description and layout diagram of the existing system, including the components of the systems, north arrow, assessor's parcel number, direction of slope, and measurement to relevant features on the property, including any streams or creeks;
        ii. The units/structures served by the system;
        iii. Estimated age of the system (both tank and effluent dispersal system);
        iv. Capacity of the system components (e.g., the volume of the septic tank, the hydraulic capacity of the effluent dispersal area);
        v. Availability and condition of the reserve replacement area of the effluent dispersal area; and

2 Qualified Professional is an individual licensed or certified by a State of California agency to design OWTS and practice as professionals for other associated reports, as allowed under their license or registration. Depending on the work to be performed and various licensing and registration requirements, this may include an individual who possesses a registered environmental health specialist certificate or is currently licensed as a professional engineer or professional geologist. For the purposes of performing site evaluations, Soil Scientists certified by the Soil Science Society of America are considered qualified professionals. A local agency may modify this definition as part of its Local Agency Management Program to permit a licensed contractor (C42, C36, A license), or a pumper who has received certification from the National Association of Wastewater Technicians to perform the required inspections.

vi. Inspection of all relevant documents, when available, such as: permits, plans, operation and maintenance manuals, and recent pumpers report (within last 5 years).

b. Septic Tank

i. *Tank Water Level*

1. Measure liquid elevation with respect to tank interior bottom; and
2. Measure liquid level with respect to inlet and outlet elevations.

ii. *Tank Solids*

1. Measure vertical depth of accumulated settled solids ("sludge");
2. Measure vertical depth of accumulated floating solids ("scum"); and
3. Estimate total volume of solids present (based on i and ii above).

iii. *Tank Water-tightness and Integrity*

1. Water-tightness: Verify status. Conduct water-tightness test and record results; and
2. Integrity: After pump-out, observe general conditions, including evidence of leaks, cracks, excessive corrosion, inadequate seals, root intrusion, or other integrity compromises.

iv. *OWTS Components (e.g., distribution box, effluent filter, dosing tank)*

1. Describe equipment and current conditions. Describe any evidence of problems.

c. Pump Systems

i. Alarms (if *present*): Describe equipment and operating condition of all water-*level* alarms and pump-function alarms; and

ii. *Pumps* (if present): Describe equipment and operating conditions. Review and assess equipment settings, monitoring and operations.

d. Effluent Dispersal Area(s)

i. Investigate dispersal system area and adjacent downhill areas, for any evidence of surfacing effluent;

ii. Observe for odors;

iii. Inspect distribution box for proper settings and proper operating condition;

iv. Observe inspection ports or monitoring wells;

v. Provide depth to groundwater if information is already available; and

vi. Conduct a dye test, if one has not been conducted in the past five years.

e. Supplement Treatment or Custom-Designed Systems

i. The requirements of a basic inspection for OWTS utilizing supplemental treatment components and/or enhanced effluent distribution systems will depend on the type of individual OWTS. Applicable inspection protocol will include obtaining the information described here for all OWTS. It will include inspection requirements specified by the appropriate local agency's permits

for the OWTS, and as otherwise dressed in Local Agency OWTS codes and regulations.

3. **Need for Corrective Action –** In addition to conditions requiring corrective action set forth in section 11.0 of the OWTS Policy, OWTS meeting any of the following criteria are also deemed to be in need of corrective action and must be replaced, repaired, or modified so as to comply with requirements of an approved LAMP, WDRs, or a waiver of WDRs:

    a. OWTS discharging to the ground surface or surface waters;

    b. OWTS that do not include a septic tank and an effluent dispersal system that complies with the OWTS Policy; and

    c. OWTS with projected wastewater flow exceeding the capacity of one or more components of the treatment and disposal system.

Water Board OWTS Assessment Program

The Water Board will conduct an initial OWTS assessment to identify OWTS that are failing and/or in need of corrective action. The Water Board will assess all OWTS within the boundaries of the APMP to determine whether the OWTS is failing and/or in need of corrective action. The assessment will primarily rely on the results of the basic operational inspection performed by a qualified professional. It may also include a desktop or local record review. Information that may be used to ascertain the performance of an existing OWTS includes, but is not limited to, the OWTS type, age, approved variances, repair history, monitoring and inspection results, septic tank pumping records, maintenance records, peak hydraulic loading, and record of any un-corrected deficiencies or substantiated complaints received.

To obtain information for the OWTS assessment, the Water Board will work with local agencies to obtain records pertaining to OWTS and building permits from each local agency within three months of the TMDL effective date. It will also require each property owner within the APMP boundary to submit a basic operational inspection report to the Water Board within three years of the effective date of the TMDL. To do so, the Water Board will issue Water Code section 13267 Orders to homeowners within six months of the TMDL effective date. The Water Board staff will screen the inspection reports to classify the OWTS into three categories as follows:

- Category 1—Acceptable[3]: no actions needed;
- Category 2—Needing Possible Follow Up[4]: Within two years after receiving the basic operational inspection report, the Water Board will review, prioritize, and recommend a

[3] Acceptable: means those systems that are clearly functioning properly and are not in need of any corrective actions.

[4] Needing Possible Follow Up: means those systems that might be in need of corrective actions but would need a closer and more thorough evaluation before that determination is made.

schedule for corrective actions commensurate with the level of threat to water quality. The level of threat to water quality will be determined based on parameters such as system's age, proximity to waters, expansion without septic permit records. If Water Board staff determine that an OWTS in this category is in need of corrective actions, the Water Board staff will identify the appropriate corrective action, set an appropriate time schedule for compliance that is not more than 12 years from the TMDL effective date, notify the property owner of the requirement to contact the local agency to obtain appropriate local agency permit(s) and initiate the corrective actions, and rely on Water Board enforcement authorities, if necessary; and

- Category 3—Needing Major Repair[5]: The Water Board will report these systems to local agencies for immediate initiation of permitting process and corrective actions. The Water Board expects that all OWTS in this category will be treated by the local agencies as an immediate risk to public health. The local agencies are the lead for contacting the landowner to require corrective actions, setting an appropriate time schedule for compliance that shall be commensurate with the risk, and taking enforcement actions as necessary. The time schedule for compliance in no case shall be more than 12 years from the TMDL effective date.

OWTS Requiring Corrective Actions

Property owners with OWTS within the boundaries of the APMP that require corrective action are subject to Tier 4[6] ("OWTS requiring corrective actions") of the OWTS Policy and must follow the requirements as specified in Section 11 of the Policy. Property owners who are required to upgrade, repair, or replace an existing OWTS or acquire a new OWTS must obtain the appropriate local agency permit in accordance with the local agency's ordinances and policies. The local agencies are the lead organization for plan review, local permit issuance, construction inspection, monitoring of new and upgraded OWTS (if applicable), and overseeing repairs or replacement of existing OWTS, as provided in their permitting and enforcement process.

Local agencies shall track and report status of corrective actions for Category 2 systems on an annual basis, and for Category 3 systems (major repairs) on a quarterly basis. The local agencies shall incorporate these reporting timelines into their respective APMPs.

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[5] Needing Major Repair: means either (1) for a dispersal system, repairs required for an OWTS dispersal system due to surfacing wastewater effluent from the dispersal field and/or wastewater backed up in to plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating, or (3) if the OWTS utilizes a cesspool or a redwood tank that needs to be replaced with a conventional septic tank.

[6] Tier 4 of the OWTS Policy applies to systems that are in need of corrective actions; therefore, it applies to all the systems in Category 3 and those in Category 2 that are in need of corrective actions.

If an owner fails to comply with the corrective action requirements of Tier 4 of the OWTS Policy, the OWTS discharges will no longer be covered under the OWTS Policy's waiver of WDRs. The Water Board may require such an owner to submit a report of waste discharge for evaluation on a case-by-case basis and/or take appropriate enforcement action.

This Implementation Plan does not affect or supersede any more stringent local requirements.

7.8.5.7 Water Quality Monitoring

The implementing parties are responsible for developing and implementing a comprehensive monitoring plan to accomplish the following goals: 1) better characterize FIB contributions from their sources/jurisdictions, 2) assess best management practices (BMP) effectiveness, and 3) assess progress towards attainment of their respective LAs and WLAs. Relying on Water Code section 13267, the Water Board will require the implementing parties to submit a monitoring plan for achieving these goals within one year of the TMDL effective date. Where possible, the implementing parties may collaboratively develop and implement a joint monitoring plan. Implementing parties shall provide monitoring data (e.g., FIB, MST, or other relevant data) to the Water Board to determine if their implementation actions have resulted in achieving their respective LAs or WLAs.

The CAF permittees are still required to comply with the monitoring requirements of the Water Board's CAF Order. However, in lieu of the TMDL FIB water quality monitoring, CAFs and grazing operations may demonstrate attainment of their LAs through sampling of other indicator parameters (e.g., ammonia) or by demonstrating they have implemented all required implementation measures for addressing bacteria discharges from their respective source categories and are in full compliance with their respective WDRs. However, if these entities are found to be noncompliant with their orders, the Water Board may also require them to develop and implement a water quality monitoring program as described above.

For the OWTS source category, the Water Board will track and use proof of required corrective actions taken by the property owners as evidence that they have achieved the LA. No additional water quality monitoring is required for this source category to demonstrate attainment of the LA.

The Water Board will collect water quality data to evaluate whether TMDL targets are attained throughout the Petaluma River watershed. Sampling will occur after significant implementation actions have been taken in the watershed. Specifically, it will collect data every five years, starting after the effective date of the TMDL. Sampling stations will be identified at a number of major tributaries and along the river's main stem at locations associated with particular sources and locations where previous water quality data were collected to identify water quality trends.

7.8.5.8 Agricultural Water Quality Control Program Costs

The implementation measures or grazing lands and dairies constitute an agricultural water quality control program and, therefore, consistent with California Water Code section 13141 requirements, the cost of the program is estimated herein. The total program implementation cost for this agricultural source category is estimated to range between $131,000 and $209, 000 per year over the next 10 years. The estimated cost will be shared by approximately 190 grazing lands operators within the Petaluma River watershed. This estimate includes the costs of implanting animal waste control and grazing management measures and is based on costs associated with technical assistance and evaluation, installation of water troughs, and cattle control fencing along streams. The program cost estimate may be high as it does not account for implementation measures that ranchers have already implemented. Further, besides fencing, other acceptable methods of managing livestock access to streams are not included in this cost estimate due to variability in costs and site-specific applicability. Potential financing sources to implement this program include federal and state water quality grants and federal agricultural grants such as those provided by the Nonpoint Source Implementation Grants (319 Program) and United States Department of Agriculture Natural Resources Conservation Service.

Table 7.8.5-3 Implementation Actions and Schedule for Ellis Creek Wastewater Treatment Plant

Task No.	Implementation Actions	Implementing Parties	Schedule
1	Comply with the NPDES permit for wastewater discharge	City of Petaluma	Ongoing

NPDES National Pollutant Discharge Elimination System

Table 7.8.5-4 Implementation Actions and Schedule for Sanitary Sewer Collection Systems			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Comply with Statewide General Waste Discharge Requirements for sanitary sewer systems	City of Petaluma; Penngrove Sanitation Zone	Ongoing
2	Phase I-Submit an updated Sewer System Management Plan, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within 1000 feet of the river and its major[1] tributaries. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term actions, and, as necessary, a schedule for developing the funds needed for the capital improvement plan	City of Petaluma; Penngrove Sanitation Zone	Within one year of the effective date of the TMDL
3	Complete inspections and repairs identified in Phase I	City of Petaluma; Penngrove Sanitation Zone	Within five years of the effective date of the TMDL
4	Phase II-If load allocations are not met, submit an updated Sewer System Management Plan, acceptable to the Executive Officer, that prioritizes sewer system inspections and repairs in areas within 2000 feet of the river and its major tributaries. Include a diagram of prioritized infrastructure, a time schedule for implementing short- and long-term actions, and, as necessary, a schedule for developing the funds needed for the capital improvement plan	City of Petaluma; Penngrove Sanitation Zone	Within six years of the effective date of the TMDL
5	Complete inspections and repairs identified in Phase II	City of Petaluma; Penngrove Sanitation Zone	Within 10 years of the effective date of the TMDL
6	Report results of implementation activities to the Water Board	City of Petaluma; Penngrove Sanitation Zone	Annually, beginning on the second year after the effective date of the TMDL

TMDL Total maximum daily load

[1] "Major tributaries" are defined as any National Hydrography Dataset medium resolution (1:100,000 scale) mapped stream in the Petaluma River watershed.

Table 7.8.5-5 Implementation Actions and Schedule for Existing, New, And Replacement Onsite Wastewater Treatment Systems			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Comply with local codes and ordinances pertaining to OWTS	Owners and operators of Existing, New, and Replacement OWTS within the Advanced Protection Management Plan boundary	Upon effective date of the TMDL
2	Maintain OWTS in good working condition, including inspecting the OWTS and pumping of solids as necessary, or as required by local ordinances, to maintain proper functioning and assure adequate wastewater treatment and disposal	Owners and operators of Existing, New, and Replacement OWTS within the Advanced Protection Management Plan boundary	Ongoing
3	Obtain the required basic operational inspection report and submit results and any other required information to the Water Board and local agency	Owners and operators of Existing, New, and Replacement OWTS within the Advanced Protection Management Plan boundary	Within three years of the TMDL effective date, and every ten years, thereafter
4	Notify the local agency if OWTS has pooling effluent, discharges wastewater to the ground surface, or has wastewater backed up into plumbing fixtures	Owners and operators of Existing, New, and Replacement OWTS within the Advanced Protection Management Plan boundary	Immediately upon discovery
5	Notify the local agency if OWTS septic tank has failed such that wastewater is leaking from the tank or groundwater is infiltrating the tank	Owners and operators of Existing, New, and Replacement OWTS within the Advanced Protection Management Plan boundary	Immediately upon discovery

Table 7.8.5-5 Implementation Actions and Schedule for Existing, New, And Replacement Onsite Wastewater Treatment Systems			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
6	Obtain an appropriate local agency permit for the repair or replacement of an OWTS deemed by the Water Board or local agency to be in need of corrective action, and complete all appropriate OWTS repairs or replacement	Owners and operators of Existing, New, and Replacement OWTS within the Advanced Protection Management Plan boundary	Timeline to complete repairs or replacement will be specified by the local agency or the Water Board, at a duration not greater than 12 years from the effective date of the TMDL
7	Comply with the OWTS Policy and any approved Local Agency Management Program	County of Sonoma; County of Marin	Ongoing
8	Provide all available records pertaining to OWTS located within the APMP boundary to the Water Board, including permitting, maintenance, complaint, or enforcement records	County of Sonoma; County of Marin	Within three months after the effective date of the TMDL
9	Consistent with the OWTS Policy requirements, incorporate the APMP requirements of this TMDL Implementation Plan into the Local Agency Management Program, including the APMP boundary. Include a map and list of included OWTS	County of Sonoma; County of Marin	Within one year of the effective date of the TMDL
10	If notified by the Water Board, OWTS owners, or any other entities of failing OWTS in Category 3 (in need of major repairs), initiate corrective action process as required by the local agency codes and regulations, use local enforcement authorities, if necessary	County of Sonoma; County of Marin	Ongoing

Table 7.8.5-5 Implementation Actions and Schedule for Existing, New, And Replacement Onsite Wastewater Treatment Systems			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
11	Track and report the compliance status of identified failing systems and results of any/all other implementation activities to the Water Board	County of Sonoma; County of Marin	Quarterly, for Category 1 systems, on March 31, June 30, September 30, and December 31; and annually, for Category 2 systems, on February 1, beginning the year after the effective date of the TMDL

APMP Advanced protection management program
OWTS Onsite wastewater treatment systems
TMDL Total maximum daily load

Table 7.8.5-6 Implementation Actions and Schedule for Vessel Marinas			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Begin or boost “no dumping” education efforts to vessel owners	Marina owners or operators	Within six months of the effective date of the TMDL
2	Submit a plan and implementation schedule, acceptable to the Executive Officer, for: 1) Evaluating and ensuring adequacy and proper performance of sewage collection systems (sewage dump stations, sewage pumpout stations, sewer lines, etc.) for vessel marinas; and 2) Installing, as needed, an adequate number of sewage pumpout and dump stations. If no new sewage pumpout and dump stations are needed, provide justification as to why they are not needed	Marina owners or operators	Within one year of the effective date of the TMDL
3	Complete implementation of the above plan	Marina owners or operators	Within five years of the effective date of the TMDL
4	Report results of implementation activities to the Water Board	Marina owners or operators	Annually, beginning on the second year after the effective date of the TMDL

TMDL Total maximum daily load

Table 7.8.5-7 Implementation Actions and Schedule for Confined Animal Facilities			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Obtain coverage and comply with the Water Board's General Waste Discharge Requirements Order No. R2-2016-0031 for Confined Animal Facilities (CAF), as may be amended (CAF Order)	Owners or operators of CAFs	As soon as possible; Comply with Order requirements per timeline specified in the CAF Order
2	Implement BMPs and other actions specified in the CAF Order's ranch water quality control plan	Owners or operators of CAFs	According to schedule in the ranch water quality control plan and monitoring plans

CAF Confined animal facility

CAFs Confined animal facilities

Table 7.8.5-8 Implementation Actions and Schedule for Grazing Lands/ Operations			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Obtain coverage and comply with applicable general waste discharge requirements order (Grazing Order) or waiver thereof for grazing lands/operations in the Petaluma River watershed	Owners or operators of grazing lands/operations	Obtain coverage no later than 120 days from Grazing Order or waiver adoption by the Regional Water Board; Comply with Order or waiver requirements per timelines specified therein
2	Produce a ranch or other plan required by the Grazing Order or waiver	Owners or operators of grazing lands/operations	Per timeline specified in applicable Grazing Order or waiver
3	Implement BMPs and management actions specified in the ranch or other plan, if required	Owners or operators of grazing lands/operations	Per timeline specified in applicable Grazing Order or waiver

Table 7.8.5-9 Implementation Actions and Schedule for Municipal Stormwater Runoff			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Submit an Initial Report to the Water Board describing current actions being implemented to prevent or reduce discharges of bacteria to storm sewer systems. The report shall also include schedule, timeline, or frequency of implementation activities for all actions, as appropriate	City of Petaluma, County of Sonoma, County of Marin, City of Novato	Within three months of the effective date of the TMDL
2	**Category I Actions:** • Effectively prohibit and prevent potential illicit discharges into the storm sewer system from: o Human waste from homeless encampments. Develop an effective approach based on the size of the homeless population; and o Sanitary sewer collection system. Ensure at least 20% of the stormwater system is evaluated and addressed for illicit connections each year. If this work has already been performed under past permits, submit results of that evaluation, and corresponding repairs, in the Initial Report • Address potential pet waste discharges into the storm sewer system through the following actions: o Develop and implement a visual inspection program to identify high pet waste accumulation areas and develop a cleanup plan for these areas, including specific actions before winter rains; o Install new or additional dog waste cleanup signs, waste bag dispensers, and trash bins in high dog waste accumulation areas; o Evaluate and improve the service frequency of dog waste bins, as needed; and o Develop and implement a comprehensive pet waste public outreach and education campaign	City of Petaluma, County of Sonoma, County of Marin, City of Novato	Within five years of the effective date of the TMDL

Table 7.8.5-9 Implementation Actions and Schedule for Municipal Stormwater Runoff			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
3	**Category II Actions:** • If the implementation of the above Category I actions are insufficient to meet the wasteload allocations five years after the TMDL effective date, implement the actions listed below or justify why they are not appropriate: • Inspect existing or future local parks, dog parks, and outdoor pet kennel facilities to ensure compliance with applicable codes and ordinances, and take corrective or enforcement actions as needed • Divert runoff to the sanitary sewer system • Develop and implement a coordination and spill response plan to prevent sanitary sewer overflows from reaching the storm sewer system • Regulatory controls such as: o Develop and enforce pet or domestic animals waste disposal ordinances; o Better enforcement of existing litter ordinances; o Enforce ordinances for commercial, industrial, and multi-family garbage control, including requirements to cover trash enclosures; o Develop and enforce guidelines for portable toilets and recreational vehicle dumping	City of Petaluma, County of Sonoma, County of Marin, City of Novato	Five years after the effective date of the TMDL
4	If wasteload allocations are not met, submit an enhanced plan, acceptable to the Executive Officer, describing actions being implemented and additional actions that will be implemented to reduce discharges of bacteria to the river and its tributaries. The plan shall include an implementation schedule and milestones for compliance.	City of Petaluma, County of Sonoma, County of Marin, City of Novato	Within six years of the effective date of the TMDL
5	Complete implementation of the enhanced stormwater actions	City of Petaluma, County of Sonoma, County of Marin, City of Novato	Within 10 years of the effective date of the TMDL
6	Provide a report on the status of the implementation activities. The report shall cover all the actions implemented in the previous year as well as a listing, timeline, and discussion of the actions scheduled for implementation during the upcoming year	City of Petaluma, County of Sonoma, County of Marin, City of Novato	Annually, beginning on the second year after the effective date of the TMDL

BMPs Best management practices

TMDL Total maximum daily load

Table 7.8.5-10 Implementation Actions and Schedule for Homeless Encampments			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Submit a plan and schedule, acceptable to the Executive Officer, that includes appropriate measures to prevent human waste discharges into storm sewer systems from homeless encampments on City of Petaluma and Caltrans properties within the Petaluma River watershed	City of Petaluma; Caltrans	Within one year of the effective date of the TMDL
2	Implement the plan for addressing human waste discharges from the homeless encampment areas	City of Petaluma; Caltrans	Commence activities within 18 months of the effective date of the TMDL
3	Report results of implementation activities to the Water Board	City of Petaluma; Caltrans	Annually, beginning on the second year after the effective date of the TMDL

TMDL Total maximum daily load

Table 7.8.5-11 Implementation Actions and Schedule for Water Quality Monitoring			
Task No.	**Implementation Actions**	**Implementing Parties**	**Schedule**
1	Pursuant to the provisions of California Water Code Section 13225 or 13267, submit a representative bacteria water quality monitoring plan for the Petaluma River and its tributaries, acceptable to the Executive officer, to: 1) better characterize FIB contributions from respective sources/jurisdictions, 2) assess BMP effectiveness, and 3) assess progress towards attainment of respective load and wasteload allocations. To the extent possible, the implementing parties within each County (e.g., City of Petaluma and County of Sonoma; City of Novato and County of Marin) should collaborate on a single cooperative plan. The monitoring plan shall be designed to demonstrate implementing parties are not causing or contributing to the impairment of the river and its tributaries, and it shall be acceptable to the Executive Officer.	City of Petaluma, County of Sonoma, City of Novato, County of Marin	Within one year of the effective date of the TMDL
2	Implement the water quality monitoring plan	City of Petaluma, County of Sonoma, City of Novato, County of Marin	Within two years of the effective date of the TMDL, and every other year, thereafter
3	Submit a report on the status of all water quality monitoring activities. Include an assessment of water quality monitoring data and any newly developed, enhanced, or implemented water quality monitoring actions.	City of Petaluma, County of Sonoma, City of Novato, County of Marin	Every other year, starting one year after the commencement of the water quality monitoring program

BMP Best management practice
FIB Fecal indicator bacteria
TMDL Total maximum daily load

7.9 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SUISUN BASIN (SEE FIGURE 2-9)

7.9.1 Suisun Marsh Low Dissolved Oxygen/Organic Enrichment TMDL

The following sections establish the TMDL for dissolved oxygen (DO) in Suisun Marsh wetlands. The numeric targets, allocations, and implementation plan are designed to attain the numeric water quality objectives set forth in Section 3.3.5, reduce occurrences of anthropogenically-induced low DO in Suisun Marsh wetlands, specifically in sloughs and channels, and protect beneficial uses for aquatic life (i.e., EST, MIGR, RARE, and SPWN).

7.9.1.1 Problem Statement

Low DO events resulting from environmental conditions and management actions in some managed wetlands adversely impact the aquatic life beneficial uses in Suisun Marsh. These problems are particularly evident in the slow-flowing, low-mixing, back-end sloughs that dominate the western portion of the marsh. In fall, these sloughs experience low DO conditions caused by bacterial decomposition of vegetation in managed wetlands (e.g., duck clubs), leading to surface water that is anaerobic or has low levels of DO. When this water is drained from managed wetland properties, receiving waters in sloughs become degraded. Fish kills were observed in the western marsh with associated low DO conditions between 2000 and 2009. The extent of the environmental impacts of water released from managed wetlands depends on the residence time of the low DO water in the receiving water. Residence time is dependent on the amount of tidal circulation within the sloughs. Large tidal sloughs, such as Montezuma or Nurse sloughs, exchange water rapidly and thus are not as prone to low DO problems. Small and especially dead-end sloughs experience less tidal exchange and longer residence times and, consequently, are particularly susceptible to low DO problems.

This TMDL focuses on resolving DO impairment of named and unnamed sloughs and channels in the western part of Suisun Marsh, including but not limited to Peytonia, Boynton, Sheldrake, Cordelia, and Goodyear sloughs.

7.9.1.2 Numeric Targets

The TMDL targets in Table 7.9.1-1 are the water quality objectives for dissolved oxygen designed to protect sensitive fish and invertebrates, thereby generally protecting aquatic organisms in Suisun Marsh sloughs and channels.

Table 7.9.1-1 Numeric Targets and TMDL for Suisun Marsh

Waterbody/Timeframe	Dissolved Oxygen Concentrations
Suisun Marsh—All sloughs and channels/year-round	acute ≥ 3.8 mg/L[a]
	chronic ≥ 5.0 mg/L[b]
Montezuma, Nurse, and Denverton sloughs/January through April	chronic ≥ 6.4 mg/L[b]

[a] Expressed as 1-day average

[b] Expressed as 30-day running average

The acute DO objective (3.8 mg/L) ensures protection of juvenile and adult fish survival, and the chronic objective (5 mg/L) ensures protection of larval and juvenile growth effects under long-term

exposure. The 6.4 mg/L chronic objective protects listed juvenile salmonids using the marsh as a migratory path. The acute objective is attained when the average daily DO concentrations are at or above 3.8 mg/L, and the chronic objectives are attained when average monthly (30-day) DO concentrations are at or above 5.0 mg/L or 6.4 mg/L in the applicable waterbodies. Continuous data collected at regular intervals (every 15 to 60 minutes) are needed to fully evaluate whether the objectives are met. A daily average is the arithmetic average of all DO measurements collected within a 24-hour period. The 30-day running average is the arithmetic average of daily averages for any 30 consecutive days. Each subsequent 30-day average is computed by sliding the averaging window by one day. Attainment of these objectives will ensure that conditions in the sloughs support the most sensitive aquatic life beneficial uses present.

7.9.1.3 Sources

Low dissolved oxygen is a common aquatic system response to elevated organic matter inputs. Tidal marshes and managed wetlands are naturally rich in organic matter due to the growth of wetland plants and their subsequent decay, which consumes oxygen. The natural tendency for organic enrichment in wetland environments is exacerbated in Suisun Marsh due to wetland management activities. Flooding and draining cycles and vegetation management practices at managed wetlands induce releases of organic carbon from wetland soils and vegetation beyond what would naturally occur. Other sources of organic oxygen demanding substances (carbon and nutrients) include the treated wastewater discharge from the Fairfield-Suisun Sewer District treatment plant (municipal wastewater), municipal stormwater runoff, and natural biotic processes in the marsh.

7.9.1.4 Total Maximum Daily Load and Allocations

The TMDL is equivalent to the TMDL targets in Table 7.9.1-1. The TMDL allocations are summarized in Table 7.9.1-2. These allocations apply year-round. Marsh landowners, the Suisun Resource Conservation District (SRCD), California Department of Fish and Wildlife (CDFW), California Department of Water Resources (DWR), and U.S. Bureau of Reclamation (USBR) are collectively responsible for meeting the managed wetlands allocations.

Table 7.9.1-2 Wasteload and Load Allocations

Source	Allocations
	Wasteload Allocations
Fairfield-Suisun Sewer District (FSSD) NPDES Permit No. CA0038024	Discharge shall not cause DO concentrations in receiving waters to decrease below 5.0 mg/L June 1 – November 15 and 7.0 mg/L during all other times of the year (as 30-day running average)
Municipal stormwater runoff in tributaries draining to Suisun Marsh NPDES Permit No. CAS612008	DO concentrations in local tributaries draining urban areas and discharging to Suisun Marsh shall be ≥ 5 mg/L (as 30-day running average)
	Load Allocations
Managed wetlands	Discharges from managed wetlands shall not cause the DO concentrations in the sloughs to decrease below 3.8 mg/L (as daily average) and 5 mg/L (as 30-day running average)

7.9.1.5 Implementation Plan

The Suisun Marsh wetlands provide habitat for dozens of fish and aquatic invertebrate species, as well as a variety of resident and migratory waterfowl and shorebirds. The intended outcome of the implementation plan is to improve habitat conditions for aquatic organisms and wildlife and to minimize or avoid adverse effects of low DO concentrations. This implementation plan provides directions for implementing the TMDL and allocations and focuses on the following:

- Actions to control internal sources of low DO at managed wetlands;
- Actions to control external sources of low DO from municipal wastewater and municipal stormwater runoff; and
- Actions resulting from Estuary-wide plans and policies.

Internal Sources at Managed Wetlands

Load allocations from managed wetlands will be implemented through Clean Water Act section 401 certifications and/or waste discharge requirements issued to responsible parties to attain DO concentrations in sloughs receiving discharges from managed wetlands. The Water Board will continue to require implementation of best management practices (BMPs) and DO monitoring in sloughs to attain the load allocations as part of the 401 certification of the U.S. Army Corps of Engineers' Regional General Permit (RGP). The RGP authorizes managed wetland operation and maintenance activities, including levee stability improvements and maintenance of water control facilities and structures in the marsh. These activities are conducted by private land owners and public entities (CDFW, DWR, and USBR) and coordinated by SRCD. All aforementioned entities are collectively responsible for implementing the provisions required by the 401 certification to achieve the load allocations. The RGP also authorizes the cleaning of interior ditches, including the Goodyear Slough outfall managed by DWR. Maintaining good flow circulation in Goodyear Slough is essential to improving DO conditions in the western marsh. DWR is responsible for conducting the cleaning of the outfall as often as necessary to maintain water circulation and specifically should inspect and clean the outfall before the fall flood up begins at the managed wetlands.

Understanding of DO conditions across the entire marsh slough complex will improve with additional monitoring data over time and space. The information gained through the implementation of BMPs at the managed wetlands in the western portion of the marsh will be used to refine selection and deployment of BMPs in the future. As a result of adaptive management and monitoring, additional implementation of BMPs could be required in the western marsh or elsewhere depending on implementation progress or if water quality conditions decline in the eastern marsh.

External Sources: Municipal Stormwater Runoff and Municipal Wastewater

Municipal stormwater runoff and municipal wastewater discharges have been identified as potential sources of organic material into the marsh sloughs and a potential conveyer of other pollutants that may affect DO (e.g., nutrients). This TMDL does not require new implementation actions because the existing regulatory programs for municipal stormwater runoff and municipal wastewater are in place and will continue to address mercury and dissolved oxygen.

The wasteload allocations for municipal stormwater shall be implemented through the Municipal Regional Stormwater NPDES permit (MRP) as receiving water limitations. These allocations apply to the City of Fairfield and Suisun City.

The wasteload allocation for the FSSD wastewater treatment plant shall be implemented through its NPDES permit as receiving water limitations.

Estuary-Wide Plans and Policies

Future large-scale tidal marsh restoration efforts, mitigation projects, and new flow and salinity objectives for the Delta and Sacramento and San Joaquin Rivers may result in a more productive aquatic food web in Suisun Marsh and in localized and system-wide changes to DO concentrations. The Water Board will work with the State Water Board and other State and federal agencies managing Suisun Marsh to protect fish and wildlife beneficial uses and to better manage and improve water quality in Suisun Marsh.

Evaluation and Monitoring

Implementing parties are responsible for developing monitoring plans and conducting monitoring sufficient to assess compliance with the wasteload allocations, load allocations, and DO numeric targets established for Suisun Marsh sloughs. SRCD, together with the managed wetland owners and other agencies (CDFW, DWR, USBR), are required to conduct DO monitoring in the sloughs receiving discharge from managed wetlands, including continuous DO monitoring at compliance points, in order to evaluate whether they are achieving the load allocation and site specific objectives. These entities shall report monitoring results annually to the Water Board, document their efforts to improve water quality, describe the BMPs implemented during the fall discharge period, and coordinate details among adjacent managed wetlands, with a focus on efforts in the western marsh.

The Water Board will collaborate with other agencies, especially DWR, which operates a network of monitoring sites for the purpose of mitigating adverse impacts on salinity from the State Water Project and Central Valley Project, to identify opportunities to collect additional DO data in Suisun Marsh sloughs. This information will be used to enhance our understanding of DO variability and the extent to which deviations from the DO objectives occur under natural and anthropogenic conditions.

The MRP shall continue to require monitoring of DO to identify stormwater pollutant sources and to evaluate attainment of water quality objectives in receiving waters.

The FSSD NPDES permit shall continue to require monitoring of DO in receiving waters and implementation of BMPs to maintain optimal treatment performance in relation to DO.

The National Estuarine Research Reserve (NERR) conducts water quality monitoring in the First and Second Mallard sloughs, which represent minimally impacted tidal sloughs. Continued data collection by NERR will assist the Water Board in evaluating the potential effects of climate on the marsh and trends in DO conditions.

WATER QUALITY CONTROL PLAN
OCEAN WATERS OF CALIFORNIA

Established 1972

Revised 2019

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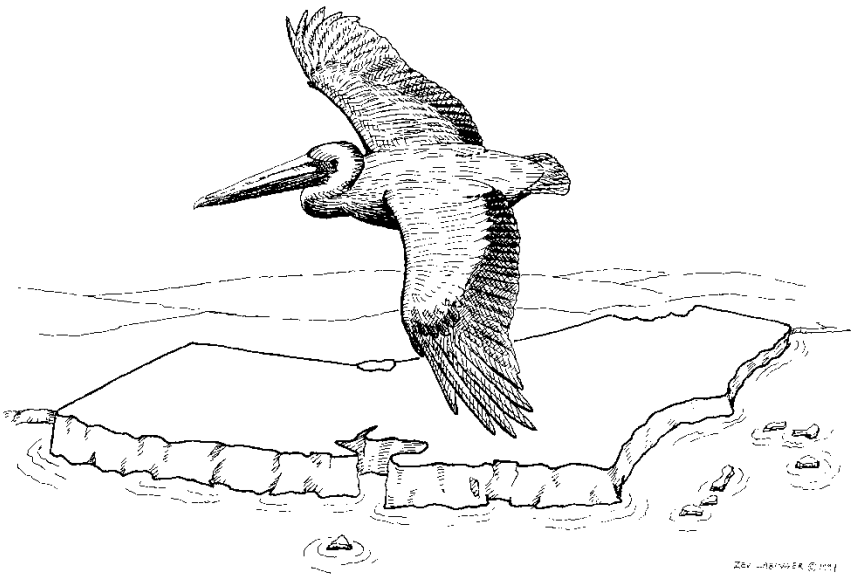

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CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

Amendments to the Water Quality Control Plan for Ocean Waters of California

Name	Date Adopted	Resolution Number	Effective Date
Amendment to the Water Quality Control Plan for Ocean Waters of California – Bacteria Provisions and a Water Quality Standards Variance Policy	8/7/2018	2018-0038	2/4/2019
Amendment to the statewide Ocean Plan of California addressing desalination facility intakes, brine discharges, and to incorporate other non-substantive changes	5/6/2015	2015-0033	1/28/2016
Amendment to the Water Quality Control Plan for Ocean Waters of California to control trash and part 1 trash provisions of the Water Quality Control Plan for inland surface waters, enclosed bays, and estuaries in California	4/7/2015	2015-0019	1/12/2016
Adoption of the California Ocean Plan Amendments regarding model monitoring, vessel discharges, and non-substantive changes	10/16/2012	2012-0057	7/1/2013
Adopting the California Ocean Plan Amendment implementing State Water Board resolutions 2010-0057 and 2011-013 regarding State Water Quality Protection Areas and Marine Protected Areas	10/16/2012	2012-0056	7/1/2013
Adoption of Proposed Amendments to the California Ocean Plan regarding total recoverable metals, compliance schedules, toxicity definitions, and the list of exceptions	9/15/2009	2009-0072	3/10/2010
Amendment to the California Ocean Plan: (1) Reasonable Potential, Determining When California Ocean Plan Water Quality-Based Effluent Limitations are Required, and (2) Minor Changes to the Areas of Special Biological Significance, and Exception Provisions	4/21/2005	2005-0035	10/12/2005
Amendment to California Ocean Plan Water Contact Bacterial Standards	1/20/2005	2005-0013	10/12/2005
Adoption of the Proposed Amendments to the California Ocean Plan regarding Table A, chemical water quality objectives, provisions of compliance, special protection for water quality and designated uses, and administrative changes	11/16/2000	2000-108	12/3/2001
Adoption of an Amendment to the Water Quality Control Plan for Ocean Waters of California regarding revisions to the list of critical life stage protocols used in testing the toxicity of waste discharges	3/20/1997	97-026	7/23/1997

Name	Date Adopted	Resolution Number	Effective Date
Approval of Amendment to the Water Quality Control Plan for Ocean Waters of California regarding new water quality objectives in Table B	3/22/1990	90-027	3/22/1990
Water Quality Control Plan for Ocean Waters of California, California Ocean Plan	9/22/1988	88-111	9/22/1988
Water Quality Control Plan for Ocean Waters of California	11/17/1983	83-087	11/17/1983
Water Quality Control Plan for Ocean Waters of California	1/19/1978	78-002	1/19/1978
Water Quality Control Plan for Ocean Waters of California	7/6/1972	72-045	7/6/1972

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CALIFORNIA OCEAN PLAN
WATER QUALITY CONTROL PLAN FOR
OCEAN WATERS OF CALIFORNIA

INTRODUCTION

A. Purpose and Authority

1. In furtherance of legislative policy set forth in section 13000 of Division 7 of the California Water Code (CWC) (Stats. 1969, Chap. 482) pursuant to the authority contained in section 13170 and 13170.2 (Stats. 1971, Chap. 1288) the State Water Resources Control Board (State Water Board) hereby finds and declares that protection of the quality of the ocean* waters for use and enjoyment by the people of the State requires control of the discharge of waste* to ocean* waters and control of intake seawater* in accordance with the provisions contained herein. The Board finds further that this plan shall be reviewed at least every three years to guarantee that the current standards are adequate and are not allowing degradation* to marine species or posing a threat to public health.

B. Principles

1. Harmony Among Water Quality Control Plans and Policies.

   a. In the adoption and amendment of water quality control plans, it is the intent of this Board that each plan will provide for the attainment and maintenance of the water quality standards of downstream waters.*

   b. To the extent there is a conflict between a provision of this plan and a provision of another statewide plan or policy, or a regional water quality control plan (basin plan), the more stringent provision shall apply except where pursuant to Chap. III.J of this Plan, the State Water Board has approved an exception to the Plan requirements, and except in chapter III.M, in which the provisions of this plan shall govern.

C. Applicability

1. This plan is applicable, in its entirety, to point source discharges to the ocean.* Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I Beneficial Uses, Chapter II - WATER QUALITY OBJECTIVES (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters*) and Chapter III - PROGRAM OF IMPLEMENTATION Parts A.2, D, E, and I.

2. This plan is not applicable to discharges to enclosed* bays and estuaries* or inland waters or the control of dredged material.*

* See Appendix I for definition of terms.

3. Provisions regulating the thermal aspects of waste* discharged to the ocean* are set forth in the Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed* Bays and Estuaries* of California.

4. Provisions regulating the intake of seawater* for desalination facilities* are established pursuant to the authority contained in section 13142.5 subdivision (b) of the California Water Code (Stats. 1976, Chap. 1330).

5. Within this Plan, references to the State Board or State Water Board shall mean the State Water Resources Control Board. References to a Regional Board or Regional Water Board shall mean a California Regional Water Quality Control Board. References to the Environmental Protection Agency, USEPA, or EPA shall mean the federal Environmental Protection Agency.

* See Appendix I for definition of terms.

I. BENEFICIAL USES

A. The beneficial uses of the ocean* waters of the State that shall be protected include industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture*; preservation and enhancement of designated Areas* of Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning and shellfish* harvesting.

* See Appendix I for definition of terms.

II. WATER QUALITY OBJECTIVES

A. General Provisions

1. This chapter sets forth limits or levels of water quality characteristics for ocean* waters to ensure the reasonable protection of beneficial uses and the prevention of nuisance. The discharge of waste* shall not cause violation of these objectives.

2. The Water Quality Objectives and Effluent Limitations are defined by a statistical distribution when appropriate. This method recognizes the normally occurring variations in treatment efficiency and sampling and analytical techniques and does not condone poor operating practices.

3. Compliance with the water quality objectives of this chapter shall be determined from samples collected at stations representative of the area within the waste* field where initial* dilution is completed.

B. Bacterial Characteristics

1. Water-Contact Standards

   Subsection (a) of this section contains bacteria water quality objectives* adopted by the State Water Board for ocean waters* used for water contact recreation. Subsection (b) describes the beach notification levels for waters adjacent to public beaches and public water contact sports areas in ocean waters*.

   a. State Water Board Water-Contact Objectives

      (1) Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Water Board (i.e., waters designated as REC-1), but including all kelp beds*, the following water quality objectives* shall be maintained throughout the water column.

      <u>Fecal coliform</u>

      A 30-day geometric mean* (GM) of fecal coliform density not to exceed 200 per 100 milliliters (mL), calculated based on the five most recent samples from each site, and a single sample maximum* (SSM) not to exceed 400 per 100 mL.

* See Appendix I for definition of terms.

Table 1. Fecal Coliform REC-1 Water Quality Objective for Water-Contact in Ocean Waters*

Indicator	Magnitude	Magnitude
	30-day GM*	SSM*
Fecal coliform density	200 per 100 mL	400 per 100 mL
GM* = geometric mean SSM* = single sample maximum mL = milliliter		

Enterococci

A six-week rolling GM* of enterococci not to exceed 30 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a statistical threshold value* (STV) of 110 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month*, calculated in a static manner. U.S. EPA recommends using U.S. EPA Method 1600 or other equivalent method to measure culturable enterococci.

Table 2. Enterococci REC-1 Water Quality Objective for Water-Contact in Ocean Waters*

Indicator	**Estimated Illness Rate (NGI):** 32 per 1,000 water contact recreators	
	Magnitude	
	GM* (cfu/100 mL)	STV* (cfu/100 mL)
Enterococci	30	110
The waterbody GM* shall not be greater than the GM* magnitude in any six-week interval, calculated weekly. The STV* shall not be exceeded by more than 10 percent of the samples collected in a calendar month*, calculated in a static manner. NGI = National Epidemiological and Environmental Assessment of Recreational Water gastrointestinal illness rate GM* = geometric mean cfu = colony forming units STV* = statistical threshold value mL = milliliter		

* See Appendix I for definition of terms.

Water Quality Standards Assessment

When applying the listing and delisting factors contained in the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, the GM*, SSM*, and STV* shall be used as follows, unless a situation-specific weight of the evidence factor is being applied: Only the GM* value shall be applied based on a statistically sufficient number of samples, which is generally not less than five samples distributed over a six-week period. However, if a statistically sufficient number of samples is not available to calculate the GM*, then attainment of the water quality objective shall be determined based only on the SSM* or STV*. When applying the situation-specific weight of the evidence factor for listing or delisting decisions, any available beach use or beach closure information shall be evaluated.

(2) The "Initial Dilution* Zone" of wastewater outfalls shall be excluded from designation as "kelp beds*" for purposes of bacterial standards, and Regional Water Boards should recommend extension of such exclusion zone where warranted to the State Water Board (for consideration under Chapter III. J.). Adventitious assemblages of kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp beds* for purposes of bacterial standards.

b. Beach Notification Levels

Minimum protective bacteriological standards for waters adjacent to public beaches and for public water-contact sports areas in ocean waters* are established in the California Code of Regulations, Title 17 (beginning at div. 1, ch. 5, § 7958 et seq.). When a public beach or public water-contact sports area fails to meet the standards, the California Department of Public Health or the local public health officer may post with warning signs or otherwise restrict use of the public beach or public water-contact sports area until the standards are met. The regulations impose more frequent monitoring and more stringent posting and closure requirements on certain high-use public beaches that are located adjacent to a storm drain that flows in the summer. The Title 17 bacteriological standards are not water quality objectives.

2. Shellfish* Harvesting Standards

a. At all areas where shellfish* may be harvested for human consumption, as determined by the Regional Water Board, the following bacterial objectives shall be maintained throughout the water column:

(1) The median total coliform density shall not exceed 70 per 100 mL, and not more than 10 percent of the samples shall exceed 230 per 100 mL.

* See Appendix I for definition of terms.

C. Physical Characteristics

1. Floating particulates and grease and oil shall not be visible.

2. The discharge of waste* shall not cause aesthetically undesirable discoloration of the ocean* surface.

3. Natural light* shall not be significantly* reduced at any point outside the initial* dilution zone as the result of the discharge of waste.*

4. The rate of deposition of inert solids and the characteristics of inert solids in ocean* sediments shall not be changed such that benthic communities are degraded.*

5. Trash* shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

D. Chemical Characteristics

1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste* materials.*

2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.

3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly* increased above that present under natural conditions.

4. The concentration of substances set forth in chapter II, Table 3, in marine sediments shall not be increased to levels which would degrade* indigenous biota.

5. The concentration of organic materials* in marine sediments shall not be increased to levels that would degrade* marine life.

6. Nutrient materials* shall not cause objectionable aquatic growths or degrade* indigenous biota.

7. Numerical Water Quality Objectives

   a. Table 3 water quality objectives apply to all discharges within the jurisdiction of this Plan. Unless otherwise specified, all metal concentrations are expressed as total recoverable concentrations.

   b. Table 3 Water Quality Objectives

* See Appendix I for definition of terms.

E. Biological Characteristics

1. Marine communities, including vertebrate, invertebrate, algae, and plant species, shall not be degraded.*

2. The natural taste, odor, and color of fish, shellfish,* or other marine resources used for human consumption shall not be altered.

3. The concentration of organic materials* in fish, shellfish* or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

F. Radioactivity

1. Discharge of radioactive waste* shall not degrade* marine life.

* See Appendix I for definition of terms.

Table 3 (formerly Table B): Water Quality Objectives

OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE

	Units of Measurement	Limiting Concentration: 6-Month Median	Limiting Concentration: Daily Maximum	Limiting Concentration: Instantaneous Maximum
Arsenic	µg/L	8.	32.	80.
Cadmium	µg/L	1.	4.	10.
Chromium (Hexavalent) (see below, a)	µg/L	2.	8.	20.
Copper	µg/L	3.	12.	30.
Lead	µg/L	2.	8.	20.
Mercury	µg/L	0.04	0.16	0.4
Nickel	µg/L	5.	20.	50.
Selenium	µg/L	15.	60.	150.
Silver	µg/L	0.7	2.8	7.
Zinc	µg/L	20.	80.	200.
Cyanide (see below, b)	µg/L	1.	4.	10.
Total Chlorine Residual (For intermittent chlorine sources see below, c)	µg/L	2.	8.	60.
Ammonia (expressed as nitrogen)	µg/L	600.	2400.	6000.
Acute* Toxicity	TUa	N/A	0.3	N/A
Chronic* Toxicity	TUc	N/A	1.	N/A
Phenolic Compounds (non-chlorinated)	µg/L	30.	120.	300.
Chlorinated Phenolics	µg/L	1.	4.	10.
Endosulfan*	µg/L	0.009	0.018	0.027
Endrin	µg/L	0.002	0.004	0.006
HCH*	µg/L	0.004	0.008	0.012
Radioactivity	Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, section 30253 of the California Code of Regulations. Reference to section 30253 is prospective, including future changes to any incorporated provisions of federal law, as the changes take effect.			

* See Appendix I for definition of terms.

Table 3 (formerly Table B) Continued

OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – NONCARCINOGENS

Chemical	30-day Average (µg/L): Decimal Notation	30-day Average (µg/L): Scientific Notation
Acrolein	220.	2.2×10^{2}
Antimony	1,200.	1.2×10^{3}
bis(2-chloroethoxy) methane	4.4	4.4×10^{0}
bis(2-chloroisopropyl) ether	1,200.	1.2×10^{3}
chlorobenzene	570.	5.7×10^{2}
chromium (III)	190,000.	1.9×10^{5}
di-n-butyl phthalate	3,500.	3.5×10^{3}
dichlorobenzenes*	5,100.	5.1×10^{3}
diethyl phthalate	33,000.	3.3×10^{4}
dimethyl phthalate	820,000.	8.2×10^{5}
4,6-dinitro-2-methylphenol	220.	2.2×10^{2}
2,4-dinitrophenol	4.0	4.0×10^{0}
ethylbenzene	4,100.	4.1×10^{3}
fluoranthene	15.	1.5×10^{1}
hexachlorocyclopentadiene	58.	5.8×10^{1}
nitrobenzene	4.9	4.9×10^{0}
thallium	2.	$2. \times 10^{0}$
toluene	85,000.	8.5×10^{4}
tributyltin	0.0014	1.4×10^{-3}
1,1,1-trichloroethane	540,000.	5.4×10^{5}

Table 3 (formerly Table B) Continued

OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS

Chemical	30-day Average (µg/L): Decimal Notation	30-day Average (µg/L): Scientific Notation
acrylonitrile	0.10	1.0×10^{-1}
aldrin	0.000022	2.2×10^{-5}
benzene	5.9	5.9×10^{0}
benzidine	0.000069	6.9×10^{-5}
beryllium	0.033	3.3×10^{-2}
bis(2-chloroethyl) ether	0.045	4.5×10^{-2}
bis(2-ethylhexyl) phthalate	3.5	3.5×10^{0}
carbon tetrachloride	0.90	9.0×10^{-1}
chlordane*	0.000023	2.3×10^{-5}
chlorodibromomethane	8.6	8.6×10^{0}
chloroform	130.	1.3×10^{2}

* See Appendix I for definition of terms.

Chemical	30-day Average (µg/L): Decimal Notation	30-day Average (µg/L): Scientific Notation
DDT*	0.00017	1.7×10^{-4}
1,4-dichlorobenzene	18.	1.8×10^{1}
3,3'-dichlorobenzidine	0.0081	8.1×10^{-3}
1,2-dichloroethane	28.	2.8×10^{1}
1,1-dichloroethylene	0.9	9×10^{-1}
dichlorobromomethane	6.2	6.2×10^{0}
dichloromethane	450.	4.5×10^{2}
1,3-dichloropropene	8.9	8.9×10^{0}
dieldrin	0.00004	4.0×10^{-5}
2,4-dinitrotoluene	2.6	2.6×10^{0}
1,2-diphenylhydrazine	0.16	1.6×10^{-1}
halomethanes*	130.	1.3×10^{2}
heptachlor	0.00005	5×10^{-5}
heptachlor epoxide	0.00002	2×10^{-5}
hexachlorobenzene	0.00021	2.1×10^{-4}
hexachlorobutadiene	14.	1.4×10^{1}
hexachloroethane	2.5	2.5×10^{0}
isophorone	730.	7.3×10^{2}
N-nitrosodimethylamine	7.3	7.3×10^{0}
N-nitrosodi-N-propylamine	0.38	3.8×10^{-1}
N-nitrosodiphenylamine	2.5	2.5×10^{0}
PAHs*	0.0088	8.8×10^{-3}
PCBs*	0.000019	1.9×10^{-5}
TCDD equivalents*	0.0000000039	3.9×10^{-9}
1,1,2,2-tetrachloroethane	2.3	2.3×10^{0}
tetrachloroethylene	2.0	2.0×10^{0}
toxaphene	0.00021	2.1×10^{-4}
trichloroethylene	27.	2.7×10^{1}
1,1,2-trichloroethane	9.4	9.4×10^{0}
2,4,6-trichlorophenol	0.29	2.9×10^{-1}
vinyl chloride	36.	3.6×10^{1}

Table 3 Notes:

a) Dischargers may at their option meet this objective as a total chromium objective.

b) If a discharger can demonstrate to the satisfaction of the Regional Water Board (subject to EPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metal cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide

* See Appendix I for definition of terms.

from metal complexes must be comparable to that achieved by the approved method in 40 CFR PART 136, as revised May 14, 1999.

c) Water quality objectives for total chlorine residual applying to intermittent discharges not exceeding two hours, shall be determined through the use of the following equation:

$$\log y = -0.43 (\log x) + 1.8$$

where: y = the water quality objective (in µg/L) to apply when chlorine is being discharged;
x = the duration of uninterrupted chlorine discharge in minutes.

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* See Appendix I for definition of terms.

III. PROGRAM OF IMPLEMENTATION

A. General Provisions

1. Effective Date

   a. The *Water Quality Control Plan, Ocean Waters of California, California Ocean Plan* was adopted and has been effective since 1972. There have been multiple amendments of the Ocean Plan since its adoption.

2. General Requirements For Management Of Waste Discharge To The Ocean*

   a. Waste* management systems that discharge to the ocean* must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community.

   b. Waste* discharged to the ocean* must be essentially free of:

      (1) Material* that is floatable or will become floatable upon discharge.

      (2) Settleable material* or substances that may form sediments which will degrade* benthic communities or other aquatic life.

      (3) Substances which will accumulate to toxic levels in marine waters, sediments or biota.

      (4) Substances that significantly* decrease the natural light* to benthic communities and other marine life.

      (5) Materials* that result in aesthetically undesirable discoloration of the ocean* surface.

   c. Waste* effluents shall be discharged in a manner which provides sufficient initial* dilution to minimize the concentrations of substances not removed in the treatment.

   d. Location of waste* discharges must be determined after a detailed assessment of the oceanographic characteristics and current patterns to assure that:

      (1) Pathogenic organisms and viruses are not present in areas where shellfish* are harvested for human consumption or in areas used for swimming or other body-contact sports.

      (2) Natural water quality conditions are not altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater.*

* See Appendix I for definition of terms.

(3) Maximum protection is provided to the marine environment.

e. Waste* that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing* and water-contact sports areas to maintain applicable bacterial standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard should be used.

3. Areas of Special Biological Significance*

a. ASBS* shall be designated by the State Water Board following the procedures provided in Appendix IV. A list of ASBS* is available in Appendix V.

4. Combined Sewer Overflow: Not withstanding any other provisions in this plan, discharges from the City of San Francisco's combined sewer system are subject to the US EPA's Combined Sewer Overflow Policy.

B. Table 4 Effluent Limitation

Table 4 (formerly Table A): Effluent Limitations

	Unit of Measurement	**Limiting Concentration: Monthly (30-day Average)**	**Limiting Concentration: Weekly (7-day Average)**	**Limiting Concentration: Maximum at any time**
Grease and Oil	mg/L	25.	40.	75.
Suspended Solids			See below +	
Settleable Solids	mL/L	1.0	1.5	3.0
Turbidity	NTU	75.	100.	225.
pH	Units		Within limit of 6.0 to 9.0 at all times	

Table 4 Notes:

\+ Suspended Solids: Dischargers shall, as a 30-day average, remove 75% of suspended solids from the influent stream before discharging wastewaters to the ocean,* except that the effluent limitation to be met shall not be lower than 60 mg/l. Regional Boards may recommend that the State Water Board (chapter III section J), with the concurrence of the Environmental Protection Agency, adjust the lower effluent concentration limit (the 60 mg/l above) to suit the environmental and effluent characteristics of the discharge. As a further consideration in making such recommendation for adjustment, Regional Water Boards should evaluate effects on existing and potential water* reclamation projects.

* See Appendix I for definition of terms.

If the lower effluent concentration limit is adjusted, the discharger shall remove 75% of suspended solids from the influent stream at any time the influent concentration exceeds four times such adjusted effluent limit.

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1. Table 4 effluent limitations apply only to publicly owned treatment works and industrial discharges for which Effluent Limitations Guidelines have not been established pursuant to sections 301, 302, 304, or 306 of the Federal Clean Water Act.

2. Table 4 effluent limitations shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.
3. The State Water Board is authorized to administer and enforce effluent limitations established pursuant to the Federal Clean Water Act. Effluent limitations established under sections 301, 302, 306, 307, 316, 403, and 405 of the aforementioned Federal Act and administrative procedures pertaining thereto are included in this plan by reference. Compliance with Table 4 effluent limitations, or Environmental Protection Agency Effluent Limitations Guidelines for industrial discharges, based on Best Practicable Control Technology, shall be the minimum level* of treatment acceptable under this plan, and shall define reasonable treatment and waste* control technology.
4. Compliance with Table 4 effluent limitations for brine discharges from desalination facilities that commingle brine and wastewater prior to discharge to the ocean may be measured after the brine has been commingled with wastewater, provided that the permittee for the commingled discharge accepts responsibly for any exceedances of the Table 4 effluent limitations.

C. Implementation Provisions for Table 3

1. Effluent concentrations calculated from Table 3 water quality objectives shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.

2. If the Regional Water Board determines, using the procedures in Appendix VI, that a pollutant is discharged into ocean* waters at levels which will cause, have the reasonable potential to cause, or contribute to an excursion above a Table 3 water quality objective, the Regional Water Board shall incorporate a water quality-based effluent limitation in the Waste Discharge Requirement for the discharge of that pollutant.

3. Effluent limitations shall be imposed in a manner prescribed by the State Water Board such that the concentrations set forth below as water quality objectives shall not be exceeded in the receiving water* upon completion of initial* dilution, except that objectives indicated for radioactivity shall apply directly to the undiluted waste* effluent.

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* See Appendix I for definition of terms.

4. Calculation of Effluent Limitations

a. Effluent limitations for water quality objectives listed in Table 3, with the exception of acute toxicity and radioactivity, shall be determined through the use of the following equation:

Equation 1: $Ce = Co + Dm (Co - Cs)$

where:

Ce = the effluent concentration limit, µg/L

Co = the concentration (water quality objective) to be met at the completion of initial* dilution, µg/L

Cs = background seawater* concentration (see Table 5 below, with all metals expressed as total recoverable concentrations), µg/L

Dm = minimum probable initial* dilution expressed as parts seawater* per part wastewater.

Table 5 (formerly Table C): Background Seawater* Concentrations (Cs)

Waste Constituent	Cs (µg/L)
Arsenic	3.
Copper	2.
Mercury	0.0005
Silver	0.16
Zinc	8.
For all other Table 3 parameters	Cs = 0

b. Determining a Mixing Zone for the Acute Toxicity* Objective

The mixing zone for the acute toxicity* objective shall be ten percent (10%) of the distance from the edge of the outfall structure to the edge of the chronic mixing zone (zone of initial dilution*). There is no vertical limitation on this zone. The effluent limitation for the acute toxicity* objective listed in Table 3 shall be determined through the use of the following equation:

* See Appendix I for definition of terms.

Equation 2: $Ce = Ca + (0.1)\ Dm\ (Ca)$

where:

Ca = the concentration (water quality objective) to be met at the edge of the acute mixing zone.

Dm = minimum probable initial* dilution expressed as parts seawater* per part wastewater (This equation applies only when Dm > 24).

c. Toxicity Testing Requirements based on the Minimum Initial* Dilution Factor for Ocean Waste* Discharges

(1) Dischargers shall conduct acute toxicity* testing if the minimum initial* dilution of the effluent is greater than 1,000:1 at the edge of the mixing zone.

(2) Dischargers shall conduct either acute or chronic toxicity* testing if the minimum initial* dilution ranges from 350:1 to 1,000:1 depending on the specific discharge conditions. The Regional Water Board shall make this determination.

(3) Dischargers shall conduct chronic toxicity* testing for ocean waste* discharges with minimum initial* dilution factors ranging from 100:1 to 350:1. The Regional Water Board may require that acute toxicity* testing be conducted in addition to chronic as necessary for the protection of beneficial uses of ocean* waters.

(4) Dischargers shall conduct chronic toxicity* testing if the minimum initial* dilution of the effluent falls below 100:1 at the edge of the mixing zone.

d. For the purpose of this Plan, minimum initial* dilution is the lowest average initial* dilution within any single month of the year. Dilution estimates shall be based on observed waste* flow characteristics, observed receiving water* density structure, and the assumption that no currents, of sufficient strength to influence the initial* dilution process, flow across the discharge structure.

e. The Executive Director of the State Water Board shall identify standard dilution models for use in determining Dm, and shall assist the Regional Board in evaluating Dm for specific waste* discharges. Dischargers may propose alternative methods of calculating Dm, and the Regional Board may accept such methods upon verification of its accuracy and applicability.

f. The six-month median shall apply as a moving median of daily values for any 180-day period in which daily values represent flow weighted average concentrations within a 24-hour period. For intermittent discharges, the daily

* See Appendix I for definition of terms.

value shall be considered to equal zero for days on which no discharge occurred.

g. The daily maximum shall apply to flow weighted 24 hour composite samples.

h. The instantaneous maximum shall apply to grab sample determinations.

i. If only one sample is collected during the time period associated with the water quality objective (e.g., 30-day average or 6-month median), the single measurement shall be used to determine compliance with the effluent limitation for the entire time period.

j. Discharge requirements shall also specify effluent limitations in terms of mass emission rate limits utilizing the general formula:

Equation 3: lbs/day = 0.00834 x Ce x Q

where:

Ce = the effluent concentration limit, µg/L

Q = flow rate, million gallons per day (MGD)

k. The six-month median limit on daily mass emissions shall be determined using the six-month median effluent concentration as Ce and the observed flow rate Q in millions of gallons per day. The daily maximum mass emission shall be determined using the daily maximum effluent concentration limit as Ce and the observed flow rate Q in millions of gallons per day.

l. Any significant* change in waste* flow shall be cause for reevaluating effluent limitations.

5. Minimum* Levels

For each numeric effluent limitation, the Regional Board must select one or more Minimum* Levels (and their associated analytical methods) for inclusion in the permit. The “reported” Minimum* Level is the Minimum* Level (and its associated analytical method) chosen by the discharger for reporting and compliance determination from the Minimum* Levels included in their permit.

a. Selection of Minimum* Levels from Appendix II

The Regional Water Board must select all Minimum* Levels from Appendix II that are below the effluent limitation. If the effluent limitation is lower than all the Minimum* Levels in Appendix II, the Regional Board must select the lowest Minimum* Level from Appendix II.

b. Deviations from Minimum* Levels in Appendix II

* See Appendix I for definition of terms.

The Regional Board, in consultation with the State Water Board's Quality Assurance Program, must establish a Minimum* Level to be included in the permit in any of the following situations:

1. A pollutant is not listed in Appendix II.

2. The discharger agrees to use a test method that is more sensitive than those described in 40 CFR 136 (revised May 14, 1999).

3. The discharger agrees to use a Minimum* Level lower than those listed in Appendix II.

4. The discharger demonstrates that their calibration standard matrix is sufficiently different from that used to establish the Minimum* Level in Appendix II and proposes an appropriate Minimum* Level for their matrix.

5. A discharger uses an analytical method having a quantification practice that is not consistent with the definition of Minimum* Level (e.g., US EPA methods 1613, 1624, 1625).

6. Use of Minimum* Levels

   a. Minimum* Levels in Appendix II represent the lowest quantifiable concentration in a sample based on the proper application of method-specific analytical procedures and the absence of matrix interferences. Minimum* Levels also represent the lowest standard concentration in the calibration curve for a specific analytical technique after the application of appropriate method-specific factors.

      Common analytical practices may require different treatment of the sample relative to the calibration standard. Some examples are given below:

Substance or Grouping	**Method-Specific Treatment**	**Most Common Factor**
Volatile Organics	No differential treatment	1
Semi-Volatile Organics	Samples concentrated by extraction	1000
Metals	Samples diluted or concentrated	½ , 2 , and 4
Pesticides	Samples concentrated by extraction	100

   b. Other factors may be applied to the Minimum* Level depending on the specific sample preparation steps employed. For example, the treatment typically applied when there are matrix effects is to dilute the sample or

* See Appendix I for definition of terms.

sample aliquot by a factor of ten. In such cases, this additional factor must be applied during the computation of the reporting limit. Application of such factors will alter the reported Minimum* Level.

c. Dischargers are to instruct their laboratories to establish calibration standards so that the Minimum* Level (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve. In accordance with section 4b, above, the discharger's laboratory may employ a calibration standard lower than the Minimum* Level in Appendix II.

7. Sample Reporting Protocols

a. Dischargers must report with each sample result the reported Minimum* Level (selected in accordance with section 4, above) and the laboratory's current MDL.*

b. Dischargers must also report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

(1) Sample results greater than or equal to the reported Minimum* Level must be reported "as measured" by the laboratory (i.e., the measured chemical concentration in the sample).

(2) Sample results less than the reported Minimum* Level, but greater than or equal to the laboratory's MDL,* must be reported as "Detected, but Not Quantified", or DNQ. The laboratory must write the estimated chemical concentration of the sample next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc.").

(3) Sample results less than the laboratory's MDL* must be reported as "Not Detected", or ND.

8. Compliance Determination

Sufficient sampling and analysis shall be required to determine compliance with the effluent limitation.

a. Compliance with Single-Constituent Effluent Limitations

Dischargers are out of compliance with the effluent limitation if the concentration of the pollutant (see section 7c, below) in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported Minimum* Level.

* See Appendix I for definition of terms.

b. Compliance with Effluent Limitations expressed as a Sum of Several Constituents

Dischargers are out of compliance with an effluent limitation which applies to the sum of a group of chemicals (e.g., PCBs*) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

c. Multiple Sample Data Reduction

The concentration of the pollutant in the effluent may be estimated from the result of a single sample analysis or by a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses when all sample results are quantifiable (i.e., greater than or equal to the reported Minimum* Level). When one or more sample results are reported as ND or DNQ, the central tendency concentration of the pollutant shall be the median (middle) value of the multiple samples. If, in an even number of samples, one or both of the middle values is ND or DNQ, the median will be the lower of the two middle values.

d. Powerplants and Heat Exchange Dischargers

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table 3 objectives on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste* streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 3. The mass emission limits will then serve as requirements applied to all in-plant waste* streams taken together which discharge into the cooling water flow, except that limits for total chlorine residual, acute (if applicable per section (3)(c)) and chronic* toxicity* and instantaneous maximum concentrations in Table 3 shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table 3 objective for radioactivity shall apply to the undiluted combined final effluent.

9. Pollutant Minimization Program

a. Pollutant Minimization Program Goal

The goal of the Pollutant Minimization Program is to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures, in order to maintain the effluent concentration at or below the effluent limitation.

* See Appendix I for definition of terms.

Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The completion and implementation of a Pollution Prevention Plan, required in accordance with CA Water Code section 13263.3 (d) will fulfill the Pollution Minimization Program requirements in this section.

b. Determining the need for a Pollutant Minimization Program

1. The discharger must develop and conduct a Pollutant Minimization Program if all of the following conditions are true:

   (a) The calculated effluent limitation is less than the reported Minimum Level*

   (b) The concentration of the pollutant is reported as DNQ

   (c) There is evidence showing that the pollutant is present in the effluent above the calculated effluent limitation.

2. Alternatively, the discharger must develop and conduct a Pollutant Minimization Program if all of the following conditions are true:

   (a) The calculated effluent limitation is less than the Method Detection Limit.*

   (b) The concentration of the pollutant is reported as ND.

   (c) There is evidence showing that the pollutant is present in the effluent above the calculated effluent limitation.

c. Regional Water Boards may include special provisions in the discharge requirements to require the gathering of evidence to determine whether the pollutant is present in the effluent at levels above the calculated effluent limitation. Examples of evidence may include:

1. health advisories for fish consumption,

2. presence of whole effluent toxicity,

3. results of benthic or aquatic organism tissue sampling,

4. sample results from analytical methods more sensitive than methods included in the permit (in accordance with section 4b, above).

5. the concentration of the pollutant is reported as DNQ and the effluent limitation is less than the MDL*

* See Appendix I for definition of terms.

d. Elements of a Pollutant Minimization Program

The Regional Board may consider cost-effectiveness when establishing the requirements of a Pollutant Minimization Program. The program shall include actions and submittals acceptable to the Regional Board including, but not limited to, the following:

1. An annual review and semi-annual monitoring of potential sources of the reportable pollutant, which may include fish tissue monitoring and other bio-uptake sampling;

2. Quarterly monitoring for the reportable pollutant in the influent to the wastewater treatment system;

3. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant in the effluent at or below the calculated effluent limitation;

4. Implementation of appropriate cost-effective control measures for the pollutant, consistent with the control strategy; and,

5. An annual status report that shall be sent to the Regional Board including:

   (a) All Pollutant Minimization Program monitoring results for the previous year;
   (b) A list of potential sources of the reportable pollutant;
   (c) A summary of all action taken in accordance with the control strategy; and,
   (d) A description of actions to be taken in the following year.

10. Toxicity Reduction Requirements

a. If a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 3, a toxicity reduction evaluation (TRE) is required. The TRE shall include all reasonable steps to identify the source of toxicity. Once the source(s) of toxicity is identified, the discharger shall take all reasonable steps necessary to reduce toxicity to the required level.

b. The following shall be incorporated into waste* discharge requirements: (1) a requirement to conduct a TRE if the discharge consistently exceeds its toxicity effluent limitation, and (2) a provision requiring a discharger to take all reasonable steps to reduce toxicity once the source of toxicity is identified.

D. Implementation Provisions for Bacterial Characteristics

1. Applicability

* See Appendix I for definition of terms.

a. The bacteria water quality objectives* do not supersede any water quality objective for bacteria established by a Regional Water Board for the REC-1 beneficial use after February 4, 2019.

b. Total maximum daily loads (TMDLs) established prior to February 4, 2019 to implement numeric water quality objectives for bacteria to support REC-1 are in effect for numerous ocean waters*. Such TMDLs remain in effect where a bacteria water quality objective* supersedes a water quality objective for bacteria for which the TMDL was established. A Regional Water Board may convene a public meeting to evaluate the effectiveness of the TMDL in attaining the bacteria water quality objective*.

c. The bacteria water quality objectives* shall be implemented, where applicable, through National Pollutant Discharge Elimination System (NPDES) permits issued pursuant to section 402 of the Clean Water Act, water quality certifications issued pursuant to section 401 of the Clean Water Act, waste discharge requirements, and waivers of waste discharge requirements.

d. The GM* and the SSM* or STV* contained in the applicable bacteria water quality objective* shall be applied in all circumstances, except in the context of a TMDL or a basin plan* amendment.

   In the context of a TMDL or a basin plan* amendment, Regional Water Boards may implement a reference system*/antidegradation approach or natural sources exclusion approach in accordance with Chapter III.D.2.b. A TMDL that implements either approach is subject to U.S. EPA's approval authority under Clean Water Act section 303(d) and such a TMDL or a basin plan* amendment that implements either approach may be subject to U.S. EPA's approval authority under Clean Water Act section 303(c).

e. The beach notification levels (Chapter II.B.1.b) for waters adjacent to public beaches and for public water-contact sports areas in ocean waters* will continue to be used for public beach notification programs.

2. Natural Sources of Bacteria

   a. Applicability

      The implementation provisions contained in Chapter III.D.2 apply to municipal stormwater discharges regulated pursuant to Clean Water Act section 402(p) and non-point source discharges except on-site wastewater treatment system discharges. These implementation provisions do not apply to NPDES discharges other than municipal storm water discharges.

   b. Reference System*/Antidegradation Approach and Natural Sources Exclusion Approach

* See Appendix I for definition of terms.

TMDLs include waste load allocations for point sources, load allocations for nonpoint sources, and natural background levels to identify and enumerate each individual source.

In the context of a TMDL or a basin plan* amendment developed to implement the applicable bacteria water quality objective*, a reference system*/antidegradation approach may be utilized to ensure: (1) bacteriological water quality is at least as good as that of an applicable reference system*, and (2) no degradation of existing water quality is allowed when the existing water quality is better than the reference system*. In such circumstances, the TMDL or basin plan* amendment may include a certain frequency of exceedance of the applicable bacteria water quality objective based on the observed exceedance frequency in the applicable reference system* or the targeted waterbody, whichever is less.

In the context of a TMDL or a basin plan* amendment developed to implement the applicable bacteria water quality objective*, a natural source exclusion approach may be utilized after all anthropogenic sources of bacteria are identified, quantified, and controlled. In such circumstances, the TMDL or basin plan* amendment may include a certain frequency of exceedance of the applicable bacteria water quality objective* based on the observed exceedance frequency of the identified and quantified natural sources of bacteria of the targeted waterbody.

E. Implementation Provisions for Marine Managed Areas*

1. Section E addresses the following Marine Managed Areas*:

   (a) State Water Quality Protection Areas (SWQPAs)* consisting of:

      (1) SWQPA – Areas of Special Biological Significance (ASBS)* designated by the State Water Board that require special protections as defined under section 4 below.

      (2) SWQPA – General Protection (GP) designated by the State Water Board to protect water quality within Marine Protected Areas (MPAs) that require protection under the provisions described under section 5 below.

   (b) Marine Protected Areas as defined in the California Public Resources Code as State Marine Reserves, State Marine Parks and State Marine Conservation Areas, established by the Fish and Game Commission, or the Parks and Recreation Commission.

2. The designation of State Marine Parks and State Marine Conservation Areas may not serve as the sole basis for new or modified limitations, substantive

* See Appendix I for definition of terms.

conditions, or prohibitions upon existing municipal point source wastewater discharge outfalls. This provision does not apply to State Marine Reserves.

3. The State Water Board may designate SWQPAs* to prevent the undesirable alteration of natural water quality within MPAs. These designations may include either SWQPA-ASBS or SWQPA-GP or in combination. In considering the designation of SWQPAs over MPAs, the State Water Board will consult with the affected Regional Water Quality Control Board, the Department of Fish and Game and the Department of Parks and Recreation, in accordance with the requirements of Appendix IV.

4. Implementation Provisions for SWQPA-ASBS*

   (a) Waste* shall not be discharged to areas designated as being of special biological significance. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.

   (b) Regional Water Boards may approve waste* discharge requirements or recommend certification for limited-term (i.e. weeks or months) activities in ASBS.* Limited-term activities include, but are not limited to, activities such as maintenance/repair of existing boat facilities, restoration of sea walls, repair of existing storm water pipes, and replacement/repair of existing bridges. Limited-term activities may result in temporary and short-term changes in existing water quality. Water quality degradation shall be limited to the shortest possible time. The activities must not permanently degrade* water quality or result in water quality lower than that necessary to protect existing uses, and all practical means of minimizing such degradation shall be implemented.

5. Implementation Provisions for SWQPAs-GP*

   (a) Implementation provisions for existing point source wastewater discharges (NPDES)

      (1) An SWQPA-GP shall not be designated over existing permitted point source wastewater outfalls or encroach upon the zone of initial dilution* associated with an existing discharge. This requirement does not apply to discharges less than one million gallons per day.

      (2) Designation of an SWQPA-GP shall not include conditions to move existing point source wastewater outfalls.

      (3) Where a new SWQPA-GP is established in the vicinity of existing municipal wastewater outfalls, there shall be no new or modified limiting condition or prohibitions for the SWQPA-GP relative to those wastewater outfalls.

* See Appendix I for definition of terms.

(4) Regulatory requirements for discharges from existing treated municipal wastewater outfalls shall be derived from the Chapter II – Water Quality Objectives and Chapter III – Program of Implementation.

(b) Implementation provisions for existing seawater* intakes

(1) Existing permitted seawater* intakes other than those serving desalination facilities* must be controlled to minimize entrainment and impingement by using best technology available. Existing permitted seawater* intakes with a capacity less than one million gallons per day are excluded from this requirement.

(2) Existing permitted seawater* intakes serving desalination facilities are governed by the provisions set forth in chapter III.M of this Plan.

(c) Implementation provisions for permitted separate storm sewer system (MS4) discharges and nonpoint source discharges.

(1) Existing waste* discharges are allowed, but shall not cause an undesirable alteration in natural water quality. For purposes of SWQPA-GP, an undesirable alteration in natural water quality means that for intermittent (e.g. wet weather) discharges, Table 3 instantaneous maximum concentrations for chemical constituents, and daily maximum concentrations for chronic toxicity,* must not be exceeded in the receiving water.*

(2) An NPDES permitting authority* may authorize NPDES-permitted non-storm water discharges* to an MS4 with a direct discharge to an SWQPA-GP only to the extent the NPDES permitting authority* finds that the discharge does not cause an undesirable alteration in natural water quality in an SWQPA-GP.

(3) Non-storm water (dry weather) flows are effectively prohibited as required by the applicable permit. Where capacity and infrastructure exists, all dry weather flows shall be diverted to municipal sanitary sewer systems. The permitting authority* may allow discharges essential for emergency response purposes, structural stability, and slope stability, which may include but are not limited the following:

a. Discharges associated with emergency fire fighting operations.
b. Foundation and footing drains
c. Water from crawl space or basement pumps.
d. Hillside dewatering.

(4) The following naturally occurring discharges are allowed:

a. Naturally occurring groundwater seepage via a storm drain

* See Appendix I for definition of terms.

b. Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(5) Existing storm water discharges into an SWQPA-GP shall be characterized and assessed to determine what effect if any these inputs are having on natural water quality in the State Water Quality Protection Area. Such assessments shall include an evaluation of cumulative impacts as well as impacts stemming from individual discharges. Information to be considered shall include:

a. Water quality;
b. Flow;
c. Watershed pollutant sources; and
d. Intertidal and/ or subtidal biological surveys.

Within each SWQPA-GP the assessment shall be used to rank these existing discharges into low, medium and high threat impact categories. Cumulative impacts will be ranked similarly as well.

(6) An initial analysis shall be performed for pre- and post-storm receiving water* quality of Table 3 constituents and chronic toxicity.* If post-storm receiving water* quality has larger concentrations of constituents relative to pre-storm, and Table 3 instantaneous maximum concentrations for chemical constituents, and daily maximum concentrations for chronic toxicity,* are exceeded, then receiving water* shall be re-analyzed along with storm runoff (end of pipe) for the constituents that are exceeded.

(7) If undesirable alterations of natural water quality and/or biological communities are identified, control strategies/measures shall be implemented for those dischargers characterized as a high threat or those contributing to higher threat cumulative impacts first.

(8) If those strategies fail, additional control strategies/measures will be implemented for dischargers characterized as medium impact dischargers. If these strategies do not result in improvement of water quality, those discharges classified as low threat shall also implement control strategies/measures.

d. Implementation Provisions for New Discharges

(1) Point Source Wastewater Outfalls

No new point source wastewater outfalls shall be established within an SWQPA-GP.

(2) Seawater* intakes

* See Appendix I for definition of terms.

No new surface water seawater* intakes shall be established within an SWQPA-GP. This does not apply to subsurface* intakes where studies are prepared showing there is no predictable entrainment, impingement, or construction-related marine life mortality.

(3) All Other New Discharges

There shall be no increase in nonpoint sources or permitted storm drains directly into an SWQPA-GP.

2. Impaired Tributaries to MPAs, SWQPA-ASBS and SWQPA-GP

All water bodies draining to, or that are designated as, MPAs and SWQPAs that appear on the State's CWA section 303(d) list shall be given a high priority to have a TMDL developed and implemented.

F. Revision of Waste* Discharge Requirements

1. The Regional Water Boards may establish more restrictive water quality objectives and effluent limitations than those set forth in this Plan as necessary for the protection of beneficial uses of ocean* waters.

2. Regional Water Boards may impose alternative less restrictive provisions than those contained within Table 3 of the Plan, provided an applicant can demonstrate that:

   a. Reasonable control technologies (including source control, material* substitution, treatment and dispersion) will not provide for complete compliance; or

   b. Any less stringent provisions would encourage water* reclamation;

3. Provided further that:

   a. Any alternative water quality objectives shall be below the conservative estimate of chronic toxicity,* as given in Table 4 (with all metal concentrations expressed as total recoverable concentrations), and such alternative will provide for adequate protection of the marine environment;

   b. A receiving water* quality toxicity objective of 1 TUc is not exceeded; and

   c. The State Water Board grants an exception (chapter III.J) to the Table 3 limits as established in the Regional Board findings and alternative limits.

* See Appendix I for definition of terms.

G. Compliance Schedules in National Pollutant Discharge Elimination System (NPDES) Permits

1. Compliance schedules in NPDES permits are authorized in accordance with the provisions of the State Water Board's Policy for Compliance Schedules in [NPDES] Permits (2008).

Table 6 (formerly Table D): Conservative Estimates of Chronic* Toxicity

Constituent	Estimate of Chronic* Toxicity (µg/L)
Arsenic	19.
Cadmium	8.
Hexavalent Chromium	18.
Copper	5.
Lead	22.
Mercury	0.4
Nickel	48.
Silver	3.
Zinc	51.
Cyanide	10.
Total Chlorine Residual	10.0
Ammonia	4000.0
Phenolic Compounds (non-chlorinated)	a) (see below)
Chlorinated Phenolics	a)
Chlorinated Pesticides and PCBs*	b)

Table 6 Notes:

a) There are insufficient data for phenolics to estimate chronic* toxicity levels. Requests for modification of water quality objectives for these waste* constituents must be supported by chronic* toxicity data for representative sensitive species. In such cases, applicants seeking modification of water quality objectives should consult the Regional Water Quality Control Board to determine the species and test conditions necessary to evaluate chronic effects.

b) Limitations on chlorinated pesticides and PCBs* shall not be modified so that the total of these compounds is increased above the objectives in Table 3.

H. Monitoring Program

1. The Regional Water Boards shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the

* See Appendix I for definition of terms.

waste* discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Water Board to provide monitoring reports. Monitoring provisions contained in waste* discharge requirements shall be in accordance with the Monitoring Procedures provided in Appendices III and VI.

2. The Regional Water Board may require monitoring of bioaccumulation of toxicants in the discharge zone. Organisms and techniques for such monitoring shall be chosen by the Regional Water Board on the basis of demonstrated value in waste* discharge monitoring.

I. Discharge Prohibitions

1. Hazardous Substances

   a. The discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste* into the ocean* is prohibited.

2. Areas Designated for Special Water Quality Protection

   a. Waste* shall not be discharged to designated Areas* of Special Biological Significance except as provided in chapter III.E Implementation Provisions for Marine Managed Areas.*

3. Sludge

   a. Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean,* or into a waste* stream that discharges to the ocean,* is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean,* or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

   b. It is the policy of the State Water Board that the treatment, use and disposal of sewage sludge shall be carried out in the manner found to have the least adverse impact on the total natural and human environment. Therefore, if federal law is amended to permit such discharge, which could affect California waters, the State Water Board may consider requests for exceptions to this section under Chapter III.J of this Plan, provided further that an Environmental Impact Report on the proposed project shows clearly that any available alternative disposal method will have a greater adverse environmental impact than the proposed project.

4. By-Passing

   a. The by-passing of untreated wastes* containing concentrations of pollutants in excess of those of Table 4 or Table 3 to the ocean* is prohibited.

* See Appendix I for definition of terms.

5. Vessels

   a. Discharges of hazardous waste (as defined in California Health and Safety Code § 25117 et seq. [but not including sewage]), oily bilge water,* medical waste (as defined in § 117600 et seq. of the California Health and Safety Code) dry-cleaning waste, and film-processing waste from large passenger vessels* and oceangoing vessels* are prohibited.

   b. Discharges of graywater* and sewage* from large passenger vessels* are prohibited.

   c. Discharges of sewage and sewage sludge from vessels are prohibited in No Discharge Zones* promulgated by U.S. EPA.

6. Trash*

   The discharge of Trash* to surface waters of the State or the deposition of Trash* where it may be discharged into surface waters of the State is prohibited. Compliance with this prohibition of discharge shall be achieved as follows:

   a. Dischargers with NPDES permits that contain specific requirements for the control of Trash* that are consistent with these Trash Provisions* shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements.

   b. Dischargers with non-NPDES waste discharge requirements (WDRs) or waivers of WDRs that contain specific requirements for the control of Trash* shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements.

   c. Dischargers with NPDES permits, WDRs, or waivers of WDRs that do not contain specific requirements for the control of Trash* are exempt from these Trash Provisions*.

   d. Dischargers without NPDES permits, WDRs, or waivers of WDRs must comply with this prohibition of discharge.

   e. Chapter III.I.6.b and Chapter III.L.3 notwithstanding, this prohibition of discharge applies to the discharge of preproduction plastic* by manufacturers of preproduction plastics*, transporters of preproduction plastics*, and manufacturers that use preproduction plastics* in the manufacture of other products to surface waters of the State, or the deposition of preproduction plastic* where it may be discharged into surface waters of the State, unless the discharger is subject to a NPDES permit for discharges of storm water* associated with industrial activity.

* See Appendix I for definition of terms.

J. State Board Exceptions to Plan Requirements

1. The State Water Board may, in compliance with the California Environmental Quality Act, subsequent to a public hearing, and with the concurrence of the Environmental Protection Agency, grant exceptions where the Board determines:

   a. The exception will not compromise protection of ocean* waters for beneficial uses, and,

   b. The public interest will be served.

2. All exceptions issued by the State Water Board and in effect at the time of the Triennial Review will be reviewed at that time. If there is sufficient cause to re-open or revoke any exception, the State Water Board may direct staff to prepare a report and to schedule a public hearing. If after the public hearing the State Water Board decides to re-open, revoke, or re-issue a particular exception, it may do so at that time.

K. Implementation Provisions for Vessel Discharges

1. Vessel discharges must comply with State Lands Commission (SLC) requirements for ballast water discharges and hull fouling to control and prevent the introduction of non-indigenous species, found in the Public Resources Code sections 71200 et seq. and title 2, California Code of Regulations, section 22700 et. seq.

2. Discharges incidental to the normal operation large passenger vessels* and ocean- going vessels must be covered and comply with an individual or general NPDES permit.

3. Vessel discharges must not result in violations of water quality objectives in this plan.

4. Vessels subject to the federal NPDES Vessel General Permit (VGP) which are not large passenger vessels* must follow the best management practices for graywater* as required in the VGP, including the use of only those cleaning agents (e.g., soaps and detergents) that are phosphate-free, non-toxic, and non-bioaccumulative.

L. Implementation Provisions for Trash* [effective January 12, 2016 (only Section L)]

1. Applicability

   a. These Trash Provisions* shall be implemented through a prohibition of discharge (Chapter III.I.6) and through NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act, waste discharge

* See Appendix I for definition of terms.

requirements (WDRs), or waivers of WDRs (as set forth in Chapter III.L.2 and Chapter III.L.3 below).

b. These Trash Provisions* apply to all surface waters of the State, with the exception of those waters within the jurisdiction of the Los Angeles Regional Water Quality Control Board (Los Angeles Water Board) for which trash Total Maximum Daily Loads (TMDLs) are in effect prior to the effective date of these Trash Provisions*[1]; provided, however, that:

(1) Upon the effective date of these Trash Provisions*, the Los Angeles Water Board shall cease its full capture system* certification process and provide that any new full capture systems* shall be certified by the State Water Board in accordance with these Trash Provisions*.

(2) Within one year of the effective date of these Trash Provisions*, the Los Angeles Water Board shall convene a public meeting to reconsider the scope of its trash TMDLs, with the exception of those for the Los Angeles River and Ballona Creek watersheds, to particularly consider an approach that would focus MS4* permittees' trash-control efforts on high-trash generation areas within their jurisdictions.

2. Dischargers Permitted Pursuant to Federal Clean Water Act Section 402(p)

Permitting authorities* shall include the following requirements in NPDES permits issued pursuant to Federal Clean Water Act section 402(p):

a. MS4* permittees with regulatory authority over priority land uses* shall be required to comply with the prohibition of discharge in Chapter III.I.6.a herein by either of the following measures:

(1) Track 1: Install, operate, and maintain full capture systems* for all storm drains that captures runoff from the priority land uses* in their jurisdictions; or

(2) Track 2: Install, operate, and maintain any combination of full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* within either the jurisdiction of the MS4* permittee or within the jurisdiction of the MS4* permittee and contiguous MS4*

[1] In the Los Angeles Region, there are fifteen (15) trash TMDLs for the following watersheds and water bodies: Los Angeles River Watershed, Ballona Creek, Malibu Creek Watershed, Santa Monica Bay Nearshore and Offshore, San Gabriel River East Fork, Revolon Slough and Beardsley Wash, Ventura River Estuary, Machado Lake, Lake Elizabeth, Lake Hughes, Munz Lake, Peck Road Park Lake, Echo Park Lake, Lincoln Park Lake and Legg Lake. Three of these were established by the U.S. EPA: Peck Road Park Lake, Echo Park Lake and Lincoln Park Lake.

* See Appendix I for definition of terms.

permittees. The MS4* permittee may determine the locations or land uses within its jurisdiction to implement any combination of controls. The MS4* permittee shall demonstrate that such combination achieves full capture system equivalency*. The MS4* permittee may determine which controls to implement to achieve compliance with full capture system equivalency*. It is, however, the State Water Board's expectation that the MS4* permittee will elect to install full capture systems* where such installation is not cost-prohibitive.

b. The California Department of Transportation (Department) shall be required to comply with the prohibition of discharge in Chapter III.I.6.a herein in all significant trash generating areas* by installing, operating, and maintaining any combination of full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* for all storm drains that captures runoff from significant trash generating areas*. The Department shall demonstrate that such combination achieves full capture system equivalency*. In furtherance of this provision, the Department and MS4* permittees that are subject to the provisions of Chapter III.L.2.a herein shall coordinate their efforts to install, operate, and maintain full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* in significant trash generating areas* and/or priority land uses*.

c. Dischargers that are subject to NPDES permits for discharges of storm water* associated with industrial activity (including construction activity) shall be required to comply with the prohibition of discharge in Chapter III.I.6.a herein by eliminating Trash* from all storm water* and authorized non-storm water* discharges consistent with an outright prohibition of the discharge of Trash* contained within the applicable NPDES permit regulating the industrial or construction facility. If the discharger can satisfactorily demonstrate to the permitting authority* its inability to comply with the outright prohibition of the discharge of Trash* contained within the applicable NPDES permit, then the permitting authority* may require the discharger to either:

(1) Install, operate, and maintain full capture systems* for all storm drains that captures runoff from the facility or site regulated by the NPDES permit; or,

(2) Install, operate, and maintain any combination of full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* for the facility or site regulated by the NPDES permit. The discharger shall demonstrate that such combination achieves full capture system equivalency*.

Termination of permit coverage for industrial and construction storm water* dischargers shall be conditioned upon the proper operation and maintenance

* See Appendix I for definition of terms.

of all controls (e.g., full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls*) used at their facility(ies).

d. A permitting authority* may determine that specific land uses or locations (e.g., parks, stadia, schools, campuses, or roads leading to landfills) generate substantial amounts of Trash*. In the event that the permitting authority* makes that determination, the permitting authority* may require the MS4* to comply with Chapter III.L.2.a.1 or Chapter III.L.2.a.2, as determined by the permitting authority*, with respect to such land uses or locations.

3. Other Dischargers

A permitting authority* may require dischargers, described in Chapter III.I.6.c or Chapter III.I.6.d, that are not subject to Chapter III.L.2 herein, to implement any appropriate Trash* controls in areas or facilities that may generate Trash*. Such areas or facilities may include (but are not limited to) high usage campgrounds, picnic areas, beach recreation areas, parks not subject to an MS4* permit, or marinas.

4. Time Schedule

The permitting authority* shall modify, re-issue, or newly adopt NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act that are subject to the provisions of Chapter III.L.2 herein to include requirements consistent with these Trash Provisions*. The permitting authorities* shall abide by the following time schedules:

a. NPDES Permits Regulating MS4* Permittees that have Regulatory Authority over Priority Land Uses*.[2]

[2] The time schedule requirement in Chapter III.L.4.a.1 requiring MS4* permittees to elect Chapter III.L.2.a.1 (Track 1) or Chapter III.L.2.a.2 (Track 2) does not apply to MS4* permittees subject to the Municipal Regional Stormwater NPDES Permit (MRP) issued by the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) or the East Contra Costa Municipal Storm Water Permit issued by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) because those permits already require control requirements substantially equivalent to Track 2. The time schedule requirement in Chapter III.L.4.a.1 requiring MS4* permittees to submit an implementation plan does not apply to the above permittees if the pertinent permitting authority* determines that such permittee has already submitted an implementation plan prior to the effective date of the Trash Provisions* that is equivalent to the implementation plan required by Chapter III.L.4.a.1. In the aforementioned permits, the pertinent permitting authority* may establish an earlier full compliance deadline than that specified in Chapter III.L.4.a.3.

* See Appendix I for definition of terms.

(1) Within eighteen (18) months of the effective date of these Trash Provisions*, for each permittee, each permitting authority* shall either:

A. Modify, re-issue, or adopt the applicable MS4* permit to add requirements to implement these Trash Provisions*. The implementing permit shall require written notice from each MS4* permittee stating whether it has elected to comply under Chapter III.L.2.a.1 (Track 1) or Chapter III.L.2.a.2 (Track 2) and such notice shall be submitted to the permitting authority* no later than three (3) months from the effective date of the implementing permit, or for MS4s* designated after the effective date of these Trash Provisions*, three (3) months from the effective date of that designation. The implementing permit shall also require that within eighteen (18) months of the effective date of the implementing permit or new designation, MS4* permittees that have elected to comply with Track 2 shall submit an implementation plan to the permitting authority*. The implementation plan shall describe: (i) the combination of controls selected by the MS4* permittee and the rationale for the selection, (ii) how the combination of controls is designed to achieve full capture system equivalency*, and (iii) how full capture system equivalency* will be demonstrated. The implementation plan is subject to approval by the permitting authority*.

B. Issue an order pursuant to Water Code section 13267 or 13383 requiring the MS4* permittee to submit, within three (3) months from receipt of the order, written notice to the permitting authority* stating whether such MS4* permittee will comply with the prohibition of discharge under Chapter III.L.2.a.1 (Track 1) or Chapter III.L.2.a.2 (Track 2). For MS4s* designated after the effective date of these Trash Provisions*, the order pursuant to Water Code section 13267 or 13383 shall be issued at the time of designation. Within eighteen (18) months of the receipt of the Water Code section 13267 or 13383 order, MS4* permittees that have elected to comply with Track 2 shall submit an implementation plan to the permitting authority* that describes: (i) the combination of controls selected by the MS4* permittee and the rationale for the selection, (ii) how the combination of controls is designed to achieve full capture system equivalency*, and (iii) how full capture system equivalency* will be demonstrated. The implementation plan is subject to approval by the permitting authority*.

(2) For MS4* permittees that elect to comply with Chapter III.L.2.a.1 (Track1), the implementing permit shall state that full compliance shall occur within ten (10) years of the effective date of the first implementing permit except as specified in Chapter III.L.4.a.5. The permit shall also

* See Appendix I for definition of terms.

require these permittees to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation. In no case may the final compliance date be later than fifteen (15) years from the effective date of these Trash Provisions*.

(3) For MS4* permittees that elect to comply with Chapter III.L.2.a.2 (Track 2), the implementing permit shall state that full compliance shall occur within ten (10) years of the effective date of the first implementing permit except as specified in Chapter III.L.4.a.5. The permit shall also require these permittees to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation. In no case may the final compliance date be later than fifteen (15) years from the effective date of these Trash Provisions*.

(4) The implementing permit shall state that for MS4* permittees designated after the effective date of the implementing permit, full compliance shall occur within ten (10) years of the effective date of the designation. The permit shall also require such designations to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation.

(5) Where a permitting authority* makes a determination pursuant to Chapter III.L.2.d that a specific land use generates a substantial amount of Trash*, that permitting authority* has discretion to determine the time schedule for full compliance. In no case may the final compliance date be later than ten (10) years from the determination.

b. NPDES Permits Regulating the Department.

(1) Within eighteen (18) months of the effective date of these Trash Provisions*, the State Water Board shall issue an order pursuant to Water Code section 13267 or 13383 requiring the Department to submit an implementation plan to the Executive Director of the State Water Board that: (i) describes the specific locations of its significant trash generating areas*, (ii) the combination of controls selected by the Department and the rationale for the selections, and (iii) how it will demonstrate full capture system equivalency*.

(2) The Department must demonstrate full compliance with Chapter III.L.2.b herein within ten (10) years of the effective date of the first implementing NPDES permit, along with achievements of interim milestones such as average load reductions of ten percent (10%) per year. In no case may the final compliance date be later than fifteen (15) years from the effective date of these Trash Provisions*.

* See Appendix I for definition of terms.

c. NPDES Permits Regulating the Discharges of Storm Water* Associated with Industrial Activity (Including Construction Activity). Dischargers that are subject to the provisions of Chapter III.L.2.c herein must demonstrate full compliance in accordance with the deadlines contained in the first implementing NPDES permits. Such deadlines may not exceed the terms of the first implementing permits.

5. Monitoring and Reporting

The permitting authority* must include monitoring and reporting requirements in its implementing permits. The following monitoring and reporting provisions are the minimum requirements that must be included within the implementing permits:

a. MS4* permittees that elect to comply with Chapter III.L.2.a.1 (Track 1) shall provide a report to the applicable permitting authority* demonstrating installation, operation, maintenance, and the Geographic Information System- (GIS-) mapped location and drainage area served by its full capture systems* on an annual basis.

b. MS4* permittees that elect to comply with Chapter III.L.2.b.2 (Track 2) shall develop and implement monitoring plans that demonstrate the effectiveness of the full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* and compliance with full capture system equivalency*. Monitoring reports shall be provided to the applicable permitting authority* on an annual basis, and shall include GIS-mapped locations and drainage area served for each of the full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* installed or utilized by the MS4* permittee. In developing the monitoring reports the MS4* permittee should consider the following questions:

(1) What type of and how many treatment controls*, institutional controls*, and/or multi-benefit projects* have been used and in what locations?

(2) How many full capture systems* have been installed (if any), in what locations have they been installed, and what is the individual and cumulative area served by them?

(3) What is the effectiveness of the total combination of treatment controls*, institutional controls*, and multi-benefit projects* employed by the MS4* permittee?

(4) Has the amount of Trash* discharged from the MS4* decreased from the previous year? If so, by how much? If not, explain why.

(5) Has the amount of Trash* in the MS4's* receiving water(s) decreased from the previous year? If so, by how much? If not, explain why.

* See Appendix I for definition of terms.

c. The Department, as subject to the provisions of Chapter III.L.2.b, shall develop and implement monitoring plans that demonstrate the effectiveness of the controls and compliance with full capture system equivalency*. Monitoring reports shall be provided to the State Water Board on an annual basis, and shall include GIS-mapped locations and drainage area served for each of the full capture systems*, multi-benefit projects*, other treatment controls*, and/or institutional controls* installed or utilized by the Department. In developing the monitoring report, the Department should consider the following questions:

(1) What type of and how many treatment controls* institutional controls*, and/or multi-benefit projects* have been used and in what locations?

(2) How many full capture systems* have been installed (if any), in what locations have they been installed, and what is the individual and cumulative area served by them?

(3) What is the effectiveness of the total combination of treatment controls*, institutional controls*, and multi-benefit projects* employed by the Department?

(4) Has the amount of Trash* discharged from the Department's MS4* decreased from the previous year? If so, by how much? If not, explain why.

(5) Has the amount of Trash* in the receiving waters decreased from the previous year? If so, by how much? If not, explain why.

d. Dischargers that are subject to the provisions of Chapter III.L.2.c herein shall be required to report the measures used to comply with Chapter III.L.2.c.

M. Implementation Provisions for Desalination Facilities*

1. Applicability and General Provisions

a. Chapter III.M applies to desalination facilities* using seawater.* Chapter III.M.2 does not apply to desalination facilities* operated by a federal agency. Chapter III.M.2, M.3, and M.4 do not apply to portable desalination facilities* that withdraw less than 0.10 million gallons per day (MGD) of seawater* and are operated by a governmental agency. These standards do not alter or limit in any way the authority of any public agency to implement its statutory obligations. The Executive Director of the State Water Board may temporarily waive the application of chapter III.M to desalination facilities* that are operating to serve as a critical short-term water supply during a state of emergency as declared by the Governor.

b. Definitions of New, Expanded, and Existing Facilities:

* See Appendix I for definition of terms.

(1) For purposes of chapter III.M, “existing facilities” means desalination facilities* that have been issued an NPDES permit and all building permits and other governmental approvals necessary to commence construction for which the owner or operator has relied in good faith on those previously-issued permits and approvals and commenced construction of the facility beyond site grading prior to January 28, 2016.

(2) For purposes of chapter III.M, “expanded facilities” means existing facilities for which, after January 28, 2016, the owner or operator does either of the following in a manner that could increase intake or mortality of all forms of marine life * beyond that which was originally approved in any NPDES permit or Water Code section 13142.5, subdivision (b) (hereafter Water Code section 13142.5(b)) determination: 1) increases the amount of seawater* used either exclusively by the facility or used by the facility in conjunction with other facilities or uses, or 2) changes the design or operation of the facility. To the extent that the desalination facility* is co-located with another facility that withdraws water for a different purpose and that other facility reduces the volume of water withdrawn to a level less than the desalination facility’s* volume of water withdrawn, the desalination facility* is considered to be an expanded facility.

(3) For purposes of chapter III.M, “new facilities” means desalination facilities* that are not existing facilities or expanded facilities.

c. Chapter III.M.2 (Water Code §13142.5(b) Determinations for New and Expanded Facilities: Site, Design, Technology, and Mitigation Measures) applies to new and expanded desalination facilities* withdrawing seawater.*

d. Chapter III.M.3 (Receiving Water Limitation for Salinity*) applies to all desalination facilities* that discharge into ocean waters* and wastewater facilities that receive brine* from seawater* desalination facilities* and discharge into ocean waters.*

e. Chapter III.M.4 (Monitoring and Reporting Programs) applies to all desalination facilities* that discharge into ocean waters.* Chapter III.M.4 shall not apply to a wastewater facility that receives brine* from a seawater* desalination facility* and discharges a positively buoyant commingled effluent through an existing wastewater outfall that is covered under an existing NPDES permit, as long as the owner or operator monitors for compliance with the receiving water limitation set forth in chapter III.M.3. For the purposes of chapter III.M.4, a positively buoyant commingled effluent shall mean that the commingled plume rises when it enters the receiving water body due to salinity* levels in the commingled discharge being lower than the natural background salinity.*

* See Appendix I for definition of terms.

f. References to the regional water board include the regional water board acting under delegated authority. For provisions that require consultation between regional water board and State Water Board staff, the regional water board shall notify and consult with the State Water Board staff prior to making a final determination on the item requiring consultation.

g. All desalination facilities must comply with all other applicable sections of the Ocean Plan.

2. Water Code section 13142.5(b) Determinations for New and Expanded Facilities: Site, Design, Technology, and Mitigation Measures Feasibility Considerations

a. General Considerations

(1) The owner or operator shall submit a request for a Water Code section 13142.5(b) determination to the appropriate regional water board as early as practicable. This request shall include sufficient information for the regional water board to conduct the analyses described below. The regional water board in consultation with the State Water Board staff may require an owner or operator to provide additional studies or information if needed, including any information necessary to identify and assess other potential sources of mortality to all forms of marine life. All studies and models are subject to the approval of the regional water board in consultation with State Water Board staff. The regional water board may require an owner or operator to hire a neutral third party entity to review studies and models and make recommendations to the regional water board.

(2) The regional water board shall conduct a Water Code section 13142.5(b) analysis of all new and expanded desalination facilities.* A Water Code section 13142.5(b) analysis may include future expansions at the facility. The regional water board shall first analyze separately as independent considerations a range of feasible* alternatives for the best available site, the best available design, the best available technology, and the best available mitigation measures to minimize intake and mortality of all forms of marine life.* Then, the regional water board shall consider all four factors collectively and determine the best combination of feasible* alternatives to minimize intake and mortality of all forms of marine life.* The best combination of alternatives may not always include the best alternative under each individual factor because some alternatives may be mutually exclusive, redundant, or not feasible* in combination.

(3) The regional water board's Water Code section 13142.5(b) analysis for expanded facilities may be limited to those expansions or other changes

* See Appendix I for definition of terms.

that result in the increased intake or mortality of all forms of marine life,* unless the regional water board determines that additional measures that minimize intake and mortality of all forms of marine life* are feasible* for the existing portions of the facility.

(4) In conducting the Water Code section 13142.5(b) determination, the regional water boards shall consult with other state agencies involved in the permitting of that facility, including, but not limited to: California Coastal Commission, California State Lands Commission, and California Department of Fish and Wildlife. The regional water board shall consider project-specific decisions made by other state agencies; however, the regional water board is not limited to project-specific requirements set forth by other agencies and may include additional requirements in a Water Code section 13142.5(b) determination.

(5) A regional water board may expressly condition a Water Code section 13142.5(b) determination based on the expectation of the occurrence of a future event. Such future events may include, but are not limited to, the permanent shutdown of a co-located power plant with intake structures shared with the desalination facility,* or a reduction in the volume of wastewater available for the dilution of brine.* The regional water board must make a new Water Code section 13142.5(b) determination if the foreseeable future event occurs.

(a) The owner or operator shall provide notice to the regional water board as soon as it becomes aware that the expected future event will occur, and shall submit a new request for a Water Code section 13142.5(b) determination to the regional water board at least one year prior to the event occurring. If the owner or operator does not become aware that the event will occur at least one year prior to the event occurring, the owner or operator shall submit the request as soon as possible.

(b) The regional water board may allow up to five years from the date of the event for the owner or operator to make modifications to the facility required by a new Water Code section 13142.5(b) determination, provided that the regional water board finds that 1) any water supply interruption resulting from the facility modifications requires additional time for water users to obtain a temporary replacement supply, or 2) such a compliance period is otherwise in the public interest and reasonably required for modification of the facility to comply with the determination.

(c) If the regional water board makes a Water Code section 13142.5(b) determination for a desalination facility* that will be co-located with a power plant, the regional water board shall condition its

* See Appendix I for definition of terms.

determination on the power plant remaining in compliance with the Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling.

b. Site is the general onshore and offshore location of a new or expanded facility. There may be multiple potential facility design configurations within any given site. The regional water board shall require that the owner or operator evaluate a reasonable range of nearby sites, including sites that would likely support subsurface intakes. For each potential site, in order to determine whether a proposed facility site is the best available site feasible* to minimize intake and mortality of all forms of marine life,* the regional water board shall require the owner or operator to:

(1) Consider whether subsurface intakes* are feasible.*

(2) Consider whether the identified need for desalinated* water is consistent with an applicable adopted urban water management plan prepared in accordance with Water Code section 10631, or if no urban water management plan is available, other water planning documents such as a county general plan or integrated regional water management plan.

(3) Analyze the feasibility of placing intake, discharge, and other facility infrastructure in a location that avoid impacts to sensitive habitats* and sensitive species.

(4) Analyze the direct and indirect effects on all forms of marine life* resulting from facility construction and operation, individually and in combination with potential anthropogenic effects on all forms of marine life* resulting from other past, present, and reasonably foreseeable future activities within the area affected by the facility.

(5) Analyze oceanographic geologic, hydrogeologic, and seafloor topographic conditions at the site, so that the siting of a facility, including the intakes and discharges, minimizes the intake and mortality of all forms of marine life.*

(6) Analyze the presence of existing discharge infrastructure, and the availability of wastewater to dilute the facility's brine* discharge.

(7) Ensure that the intake and discharge structures are not located within a MPA or SWQPA* with the exception of intake structures that do not have marine life mortality associated with the construction, operation, and maintenance of the intake structures (e.g. slant wells). Discharges shall be sited at a sufficient distance from a MPA or SWQPA* so that the salinity* within the boundaries of a MPA or SWQPA* does not exceed

* See Appendix I for definition of terms.

natural background salinity.* To the extent feasible,* surface intakes shall be sited so as to maximize the distance from a MPA or SWQPA.*

c. Design is the size, layout, form, and function of a facility, including the intake capacity and the configuration and type of infrastructure, including intake and outfall structures. The regional water board shall require that the owner or operator perform the following in determining whether a proposed facility design is the best available design feasible* to minimize intake and mortality of all forms of marine life:*

(1) For each potential site, analyze the potential design configurations of the intake, discharge, and other facility infrastructure to avoid impacts to sensitive habitats* and sensitive species.

(2) If the regional water board determines that subsurface intakes* are not feasible* and surface water intakes are proposed instead, analyze potential designs for those intakes in order to minimize the intake and mortality of all forms of marine life.*

(3) Design the outfall so that the brine mixing zone* does not encompass or otherwise adversely affect existing sensitive habitat.*

(4) Design the outfall so that discharges do not result in dense, negatively-buoyant plumes that result in adverse effects due to elevated salinity* or hypoxic conditions occurring outside the brine mixing zone.* An owner or operator must demonstrate that the outfall meets this requirement through plume modeling and/or field studies. Modeling and field studies shall be approved by the regional water board in consultation with State Water Board staff.

(5) Design outfall structures to minimize the suspension of benthic sediments.

d. Technology is the type of equipment, materials,* and methods that are used to construct and operate the design components of the desalination facility.* The regional water board shall apply the following considerations in determining whether a proposed technology is the best available technology feasible* to minimize intake and mortality of all forms of marine life:*

(1) Considerations for Intake Technology:

(a) Subject to chapter M.2.a.(2), the regional water board in consultation with State Water Board staff shall require subsurface intakes* unless it determines that subsurface intakes* are not feasible* based upon a comparative analysis of the factors listed below for surface and subsurface intakes.* A design capacity in excess of the need for desalinated* water as identified in chapter

* See Appendix I for definition of terms.

III.M.2.b.(2) shall not be used by itself to declare subsurface intakes* as not feasible.*

i. The regional water board shall consider the following factors in determining feasibility of subsurface intakes:* geotechnical data, hydrogeology, benthic topography, oceanographic conditions, presence of sensitive habitats,* presence of sensitive species, energy use for the entire facility; design constraints (engineering, constructability), and project life cycle cost. Project life cycle cost shall be determined by evaluating the total cost of planning, design, land acquisition, construction, operations, maintenance, mitigation, equipment replacement and disposal over the lifetime of the facility, in addition to the cost of decommissioning the facility. Subsurface intakes* shall not be determined to be economically infeasible solely because subsurface intakes* may be more expensive than surface intakes. Subsurface intakes* may be determined to be economically infeasible if the additional costs or lost profitability associated with subsurface intakes,* as compared to surface intakes, would render the desalination facility* not economically viable. In addition, the regional water board may evaluate other site- and facility-specific factors.

ii. If the regional water board determines that subsurface intakes* are not feasible* for the proposed intake design capacity, it shall determine whether subsurface intakes* are feasible* for a reasonable range of alternative intake design capacities. The regional water board may find that a combination of subsurface* and surface intakes is the best feasible* alternative to minimize intake and mortality of marine life and meet the identified need for desalinated water as described in chapter III.M.2.b.(2).

(b) Installation and maintenance of a subsurface intake* shall avoid, to the maximum extent feasible,* the disturbance of sensitive habitats* and sensitive species.

(c) If subsurface intakes* are not feasible,* the regional water board may approve a surface water intake, subject to the following conditions:

i. The regional water board shall require that surface water intakes be screened. Screens must be functional while the facility is withdrawing seawater.*

ii. In order to reduce entrainment, all surface water intakes must be screened with a 1.0 mm (0.04 in) or smaller slot size screen when the desalination facility* is withdrawing seawater.*

* See Appendix I for definition of terms.

iii. An owner or operator may use an alternative method of preventing entrainment so long as the alternative method results in intake and mortality of eggs, larvae, and juvenile organisms that is less than or equivalent to a 1.0 mm (0.04 in) slot size screen. The owner or operator must demonstrate the effectiveness of the alternative method to the regional water board. The owner or operator must conduct a study to demonstrate the effectiveness of the alternative method, and use an Empirical Transport Model* (ETM)/ Area of Production Forgone* (APF) approach* to estimate entrainment. The study period shall be at least 12 consecutive months. Sampling for environmental studies shall be designed to account for variation in oceanographic or hydrologic conditions and larval abundance and diversity such that abundance estimates are reasonably accurate. Samples must be collected using a mesh size no larger than 335 microns and individuals collected shall be identified to the lowest taxonomical level practicable. The ETM/APF analysis* shall evaluate entrainment for a broad range of species, species morphologies, and sizes under the environmental and operational conditions that are representative of the entrained species and the conditions at the full-scale desalination facility.* At their discretion, the regional water boards may permit the use of existing entrainment data to meet this requirement.

iv. In order to minimize impingement, through-screen velocity at the surface water intake shall not exceed 0.15 meters per second (0.5 feet per second).

(2) Considerations for Brine* Discharge Technology:

(a) The preferred technology for minimizing intake and mortality of all forms of marine life* resulting from brine* discharge is to commingle brine* with wastewater (e.g., agricultural, municipal, industrial, power plant cooling water, etc.) that would otherwise be discharged to the ocean. The wastewater must provide adequate dilution to ensure salinity* of the commingled discharge meets the receiving water limitation for salinity* in chapter III.M.3. Nothing in this section shall preclude future recycling of the wastewater.

(b) Multiport diffusers* are the next best method for disposing of brine* when the brine* cannot be diluted by wastewater and when there are no live organisms in the discharge. Multiport diffusers* shall be engineered to maximize dilution, minimize the size of the brine mixing zone,* minimize the suspension of benthic sediments, and minimize mortality of all forms of marine life.*

* See Appendix I for definition of terms.

(c) Brine* discharge technologies other than wastewater dilution and multiport diffusers,* may be used if an owner or operator can demonstrate to the regional water board that the technology provides a comparable level of intake and mortality of all forms of marine life* as wastewater dilution if wastewater is available, or multiport diffusers* if wastewater is unavailable. The owner or operator must evaluate all of the individual and cumulative effects of the proposed alternative discharge method on the intake and mortality of all forms of marine life,* including (where applicable); intake-related entrainment, osmotic stress, turbulence that occurs during water conveyance and mixing, and shearing stress at the point of discharge. When determining the intake and mortality associated with a brine* discharge technology or combination of technologies, the regional water board shall require the owner or operator to use empirical studies or modeling to:

i. Estimate intake entrainment impacts using an ETM/APF approach.*

ii. Estimate degradation of all forms of marine life* from elevated salinity* within the brine mixing zone,* including osmotic stresses, the size of impacted area, and the duration that all forms of marine life* are exposed to the toxic conditions. Considerations shall be given to the most sensitive species, and community structure and function.

iii. Estimate the intake and mortality of all forms of marine life* that occurs as a result of water conveyance, in-plant turbulence or mixing, and waste* discharge.

iv. Within 18 months of beginning operation, submit to the regional water board an empirical study that evaluates intake and mortality of all forms of marine life* associated with the alternative brine* discharge technology. The study must evaluate impacts caused by any augmented intake volume, intake and pump technology, water conveyance, waste brine* mixing, and effluent discharge. Unless demonstrated otherwise, organisms entrained by the alternative brine* discharge technology are assumed to have a mortality rate of 100 percent. The study period shall be at least 12 consecutive months. If the regional water board requires a study period longer than 12 months, the final report must be submitted to the regional water board within 6 months of the completion of the empirical study.

v. If the empirical study shows that the alternative brine* discharge technology results in more intake and mortality of all forms of

* See Appendix I for definition of terms.

marine life* than a facility using wastewater dilution or multiport diffusers,* then the facility must either: (1) cease using the alternative brine* discharge technology and install and use wastewater dilution or multiport diffusers* to discharge brine* waste, or (2) re-design the alternative brine* discharge technology system to minimize intake and mortality of all forms of marine life* to a level that is comparable with wastewater dilution if wastewater is available, or multiport diffusers* if wastewater is unavailable,* subject to regional water board approval.

(d) Flow augmentation* as an alternative brine* discharge technology is prohibited with the following exceptions:

i. At facilities that use subsurface intakes* to supply augmented flow water for dilution. Facilities that use subsurface intakes* to supply augmented flow water for dilution are exempt from the requirements of chapter III.M.2.d.(2)(c) if the facility meets the receiving water limitation for salinity* in chapter III.M.3.

ii. At a facility that has received a conditional Water Code section 13142.5(b) determination and is over 80 percent constructed by January 28, 2016. If the owner or operator of the facility proposes to use flow augmentation* as an alternative brine* discharge technology, the facility must: use low turbulence intakes (e.g., screw centrifugal pumps or axial flow pumps) and conveyance pipes; convey and mix dilution water in a manner that limits thermal stress, osmotic stress, turbulent shear stress, and other factors that could cause intake and mortality of all forms of marine life*; comply with chapter III.M.2.d.(1); and not discharge through multiport diffusers.*

e. Mitigation for the purposes of this section is the replacement of all forms of marine life* or habitat that is lost due to the construction and operation of a desalination facility* after minimizing intake and mortality of all forms of marine life* through best available site, design, and technology. The regional water board shall ensure an owner or operator fully mitigates for the operational lifetime of the facility and uses the best available mitigation measures feasible* to minimize intake and mortality of all forms of marine life.* The owner or operator may choose whether to satisfy a facility's mitigation measures pursuant to chapter III.M.2.e.(3) or, if available, M.2.e.(4), or a combination of the two.

(1) *Marine Life Mortality Report.* The owner or operator of a facility shall submit a report to the regional water board estimating the marine life mortality resulting from construction and operation of the facility after

* See Appendix I for definition of terms.

implementation of the facility's required site, design, and technology measures.

(a) For operational mortality related to intakes, the report shall include a detailed entrainment study. The entrainment study period shall be at least 12 consecutive months and sampling shall be designed to account for variation in oceanographic or hydrologic conditions and larval abundance and diversity such that abundance estimates are reasonably accurate. At their discretion, the regional water boards may permit the use of existing entrainment data from the facility to meet this requirement. Samples must be collected using a mesh size no larger than 335 microns and individuals collected shall be identified to the lowest taxonomical level practicable. The ETM/APF analysis* shall be representative of the entrained species collected using the 335 micron net. The APF* shall be calculated using a one-sided, upper 95 percent confidence bound for the 95th percentile of the APF distribution. An owner or operator with subsurface intakes* is not required to do an ETM/APF analysis* for their intakes and is not required to mitigate for intake-related operational mortality. The regional water board may apply a one percent reduction to the APF* acreage calculated in the Marine Life Mortality Report to account for the reduction in entrainment of all forms of marine life* when using a 1.0 mm slot size screen.

(b) For operational mortality related to discharges, the report shall estimate the area in which salinity* exceeds 2.0 parts per thousand above natural background salinity* or a facility-specific alternative receiving water limitation (see chapter III.M.3). The area in excess of the receiving water limitation for salinity* shall be determined by modeling and confirmed with monitoring. The report shall use any acceptable approach approved by the regional water board for evaluating mortality that occurs due to shearing stress resulting from the facility's discharge, including any incremental increase in mortality resulting from a commingled discharge.

(c) For construction-related mortality, the report shall use any acceptable approach approved by the regional water board for evaluating the mortality that occurs within the area disturbed by the facility's construction. The regional water board may determine that the construction-related disturbance does not require mitigation because the disturbance is temporary and the habitat is naturally restored.

(d) Upon approval of the report by the regional water board in consultation with State Water Board staff, the calculated marine life

* See Appendix I for definition of terms.

mortality shall form the basis for the mitigation provided pursuant to this section.

(2) The owner or operator shall mitigate for the mortality of all forms of marine life* determined in the report above by choosing to either complete a mitigation project as described in chapter III.M.2.e.(3) or, if an appropriate fee-based mitigation program is available, provide funding for the program as described in chapter III.M.2.e.(4). The mitigation project or the use of a fee-based mitigation program and the amount of the fee that the owner or operator must pay is subject to regional water board approval.

(3) *Mitigation Option 1: Complete a Mitigation Project.* The mitigation project must satisfy the following provisions:

(a) The owner or operator shall submit a Mitigation Plan. Mitigation Plans shall include: project objectives, site selection, site protection instrument (the legal arrangement or instrument that will be used to ensure the long-term protection of the compensatory mitigation project site), baseline site conditions, a mitigation work plan, a maintenance plan, a long-term management plan, an adaptive management plan, performance standards and success criteria, monitoring requirements, and financial assurances.

(b) The mitigation project must meet the following requirements:

i. Mitigation shall be accomplished through expansion, restoration or creation of one or more of the following: kelp beds,* estuaries,* coastal wetlands, natural reefs, MPAs, or other projects approved by the regional water board that will mitigate for intake and mortality of all forms of marine life* associated with the facility.

ii. The owner or operator shall demonstrate that the project fully mitigates for intake-related marine life mortality by including expansion, restoration, or creation of habitat based on the APF* acreage calculated in the Marine Life Mortality Report above. The owner or operator using surface water intakes shall do modeling to evaluate the areal extent of the mitigation project's production area to confirm that it overlaps the facility's source water body.* Impacts on the mitigation project due to entrainment by the facility must be offset by adding compensatory acreage to the mitigation project.

* See Appendix I for definition of terms.

iii. The owner or operator shall demonstrate that the project also fully mitigates for the discharge-related marine life mortality projected in the Marine Life Mortality Report above.

iv. The owner or operator shall demonstrate that the project also fully mitigates for the construction-related marine life mortality identified in the Marine Life Mortality Report above.

v. The regional water board may permit out-of-kind mitigation* for mitigation of open water or soft-bottom species. In-kind mitigation* shall be done for all other species whenever feasible.*

vi. For out-of-kind mitigation,* an owner or operator shall evaluate the biological productivity of the impacted open water or soft-bottom habitat calculated in the Marine Life Mortality Report and the proposed mitigation habitat. If the mitigation habitat is a more biologically productive habitat (e.g. wetlands, estuaries,* rocky reefs, kelp beds,* eelgrass beds,* surfgrass beds*), the regional water boards may apply a mitigation ratio based on the relative biological productivity of the impacted open water or soft-bottom habitat and the mitigation habitat. The mitigation ratio shall not be less than one acre of mitigation habitat for every ten acres of impacted open water or soft-bottom habitat.

vii. For in-kind mitigation,* the mitigation ratio shall not be less than one acre of mitigation habitat for every one acre of impacted habitat.

viii. For both in-kind* and out-of-kind mitigation,* the regional water boards may increase the required mitigation ratio for any species and impacted natural habitat calculated in the Marine Life Mortality Report when appropriate to account for imprecisions associated with mitigation including, but not limited to, the likelihood of success, temporal delays in productivity, and the difficulty of restoring or establishing the desired productivity functions.

ix. The rationale for the mitigation ratios must be documented in the administrative record for the permit action.

(c) The Mitigation Plan is subject to approval by the regional water board in consultation with State Water Board staff and with other agencies having authority to condition approval of the project and require mitigation.

* See Appendix I for definition of terms.

(4) *Mitigation Option 2: Fee-based Mitigation Program*. If the regional water board determines that an appropriate fee-based mitigation program has been established by a public agency, and that payment of a fee to the mitigation program will result in the creation and ongoing implementation of a mitigation project that meets the requirements of chapter M.2.e.(3), the owner or operator may pay a fee to the mitigation program in lieu of completing a mitigation project.

(a) The agency that manages the fee-based mitigation program must have legal and budgetary authority to accept and spend mitigation funds, a history of successful mitigation projects documented by having set and met performance standards for past projects, and stable financial backing in order to manage mitigation sites for the operational life of the facility.

(b) The amount of the fee shall be based on the cost of the mitigation project, or if the project is designed to mitigate cumulative impacts from multiple desalination facilities or other development projects, the amount of the fee shall be based on the desalination facility's* fair share of the cost of the mitigation project.

(c) The manager of the fee-based mitigation program must consult with the California Department of Fish and Wildlife, Ocean Protection Council, Coastal Commission, State Lands Commission, and State and regional water boards to develop mitigation projects that will best compensate for intake and mortality of all forms of marine life* caused by the desalination facility.* Mitigation projects that increase or enhance the viability and sustainability of all forms of marine life* in Marine Protected Areas are preferred, if feasible.*

(5) California Department of Fish and Wildlife, the regional water board, and State Water Board may perform audits or site inspections of any mitigation project.

(6) An owner or operator, or a manager of a fee-based mitigation program, must submit a mitigation project performance report to the regional water board 180 days prior to the expiration date of their NPDES permit.

(7) For conditionally permitted facilities or expanded facilities, the regional water boards may:

(a) Account for previously-approved mitigation projects associated with a facility when making a new Water Code section 13142.5(b) determination.

* See Appendix I for definition of terms.

(b) Require additional mitigation when making a new Water Code section 13142.5(b) determination for any additional mortality of all forms of marine life resulting from the occurrence of the conditional event or the expansion of the facility. The additional mitigation must be to compensate for any additional construction, discharge, or other increases in intake or impacts or an increase in intake and mortality of all forms of marine life.*

3. Receiving Water Limitation for Salinity*

a. Chapter III.M.3 is applicable to all desalination facilities discharging brine* into ocean waters,* including facilities that commingle brine* and wastewater.

b. The receiving water limitation for salinity* shall be established as described below:

(1) Discharges shall not exceed a daily maximum of 2.0 parts per thousand (ppt) above natural background salinity* measured no further than 100 meters (328 ft) horizontally from each discharge point. There is no vertical limit to this zone.

(2) In determining an effluent limit necessary to meet this receiving water limitation, permit writers shall use the formula in chapter III.C.4 that has been modified for brine* discharges as follows:

Equation 1: $Ce = Co + Dm(2.0\ ppt)$
$Ce = (2.0\ ppt + Cs) + Dm(2.0\ ppt)$

Where:

Ce= the effluent concentration limit, ppt
Co= the salinity* concentration to be met at the completion of initial* dilution= 2.0 ppt + Cs
Cs= the natural background salinity,* ppt
Dm= minimum probable initial dilution* expressed as parts seawater* per part brine* discharge

(a) The fixed distance referenced in the initial dilution* definition shall be no more than 100 meters (328 feet).

(b) In addition, the owner or operator shall develop a dilution factor (Dm) based on the distance of 100 meters (328 feet) or initial dilution,* whichever is smaller. The dilution factor (Dm) shall be developed within the brine mixing zone* using applicable water quality models that have been approved by the regional water boards in consultation with State Water Board staff.

* See Appendix I for definition of terms.

(c) The value 2.0 ppt in Equation 1 is the maximum incremental increase above natural background salinity* (Cs) allowed at the edge of the brine mixing zone.* A regional water board may substitute an alternative numeric value for 2.0 ppt in Equation 1 based upon the results of a facility-specific alternative salinity* receiving water limitation study, as described in chapter III.M.3.c below.

c. An owner or operator may submit a proposal to the regional water board for approval of an alternative (other than 2 ppt) salinity* receiving water limitation to be met no further than 100 meters horizontally from the discharge. There is no vertical limit to this zone.

(1) To determine whether a proposed facility-specific alternative receiving water limitation is adequately protective of beneficial uses, an owner or operator shall:

(a) Establish baseline biological conditions at the discharge location and at reference locations over a 12-month period prior to commencing brine* discharge. The biologic surveys must characterize the ecologic composition of habitat and marine life using measures established by the regional water board. At their discretion, the regional water boards may permit the use of existing data to meet this requirement.

(b) Conduct at least the following chronic toxicity* Whole Effluent Toxicity (WET) tests: germination and growth for giant kelp (*Macrocystis pyrifera)*; development for red abalone (*Haliotis refescens)*; development and fertilization for purple urchin (*Strongleocentrotus purpuratus)*; development and fertilization for sand dollar (*Dendraster excentricus)*; larval growth rate for topsmelt (*Atherniops affinis)*. WET tests shall be performed by an Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

(c) The regional water board in consultation with State Water Board staff may require an owner or operator to do additional toxicity studies if needed.

(2) The regional water board in consultation with the State Water Board staff may require an owner or operator to provide additional studies or information in order to approve a facility-specific alternative receiving water limitation for salinity.*

(3) The facility-specific alternative receiving water limitation shall be based on the lowest observed effect concentration (LOEC)* for the most

* See Appendix I for definition of terms.

sensitive species and toxicity endpoint as determined in the chronic toxicity* studies. The regional water board in consultation with State Water Board staff has discretion to approve the proposed facility-specific alternative receiving water limitation for salinity.*

(4) The regional water board shall review a facility's monitoring data, the studies as required in chapter III.M.4 below, or any other information that the regional water board deems to be relevant to periodically assess whether the facility-specific alternative receiving water limitation for salinity* is adequately protective of beneficial uses. The regional water board may eliminate or revise a facility-specific alternative receiving water limitation for salinity* based on its assessment of the data.

d. The owner or operator of a facility that has received a conditional Water Code section 13142.5(b) determination and is over 80 percent constructed by January 28, 2016 that proposes flow augmentation* using a surface water intake may submit a proposal to the regional water board in consultation with the State Water Board staff for approval of an alternative brine mixing zone* not to exceed 200 meters laterally from the discharge point and throughout the water column. The owner or operator of such a facility must demonstrate, in accordance with chapter III.M.2.d.(2)(c), that the combination of the alternative brine mixing zone* and flow augmentation* using a surface water intake provide a comparable level of intake and mortality of all forms of marine life* as the combination of the standard brine mixing zone* and wastewater dilution if wastewater is available, or multiport diffusers* if wastewater is unavailable. In addition to the analysis of the effects required by chapter III.M.2.d.(2)(c), the owner or operator must also evaluate the individual and cumulative effects of the alternative brine mixing zone* on the intake and mortality of all forms of marine life.* In no case may the discharge result in hypoxic conditions outside of the alternative brine mixing zone.* If an alternative brine mixing zone* is approved, the alternative distance and the areal extent of the alternative brine mixing zone* shall be used in lieu of the standard brine mixing zone* for all purposes, including establishing an effluent limitation and a receiving water limitation for salinity, in chapter III.M.

e. Existing facilities that do not meet the receiving water limitation at the edge of the brine mixing zone* and throughout the water column by January 28, 2016 must either: 1) establish a facility-specific alternative receiving water limitation for salinity* as described in chapter III.M.3.c; or, 2) upgrade the facility's brine* discharge method in order to meet the receiving watr limitation in chapter III.M.3.b in accordance with the State Water Board's Compliance Schedule Policy, as set forth in chapter III.M.3.f below. An owner or operator that chooses to upgrade the facility's method of brine* discharge:

* See Appendix I for definition of terms.

(1) Must demonstrate to the regional water board that the brine* discharge does not negatively impact sensitive habitats,* sensitive species, MPAs, or SWQPAs.*

(2) Is subject to the Considerations for Brine* Discharge Technology described in chapter III.M.2.d.(2).

f. The regional water board may grant compliance schedules for the requirements for brine* waste discharges for desalination facilities.* All compliance schedules shall be in accordance with the State Water Board's Compliance Schedule Policy, except that the salinity* receiving water limitation set forth in chapters III.M.3.b and III.M.3.c shall be considered to be a "new water quality objective" as used in the Compliance Schedule Policy.

g. The regional water board in consultation with the State Water Board staff may require an owner or operator to provide additional studies or information if needed. All studies and models are subject to the approval of the regional water board in consultation with State Water Board staff. The regional water board may require an owner or operator to hire a neutral third party entity to review studies and models and make recommendations to the regional water board.

4. Monitoring and Reporting Programs

a. The owner or operator of a desalination facility* must submit a Monitoring and Reporting Plan to the regional water board for approval. The Monitoring and Reporting Plan shall include monitoring of effluent and receiving water characteristics and impacts to all forms of marine life.* The Monitoring and Reporting Plan shall, at a minimum, include monitoring for benthic community health, aquatic life toxicity, hypoxia, and receiving water characteristics consistent with Appendix III of this Plan and for compliance with the receiving water limitation in chapter III.M.3. Receiving water monitoring for salinity* shall be conducted at times when the monitoring locations are most likely affected by the discharge. For new or expanded facilities the following additional requirements apply:

(1) An owner or operator must perform facility-specific monitoring to demonstrate compliance with the receiving water limitation for salinity,* and evaluate the potential effects of the discharge within the water column, bottom sediments, and the benthic communities. Facility-specific monitoring is required until the regional water board determines that a regional monitoring program is adequate to ensure compliance with the receiving water limitation. The monitoring and reporting plan shall be reviewed, and revised if necessary, upon NPDES permit renewal.

* See Appendix I for definition of terms.

(2) Baseline biological conditions shall be established at the discharge location and at a reference location prior to commencement of construction. The owner or operator is required to conduct biological surveys (e.g., Before-After Control-Impact study), that will evaluate the differences between biological communities at a reference site and at the discharge location before and after the discharge commences. The regional water board will use the data and results from the surveys and any other applicable data for evaluating and renewing the requirements set forth in a facility's NPDES permit.

N. Water Quality Standards Variance

Federal regulations establish an explicit regulatory framework for the adoption of a water quality standards variance (WQS Variance*) that states may use to implement adaptive management approaches to improve water quality (40 C.F.R. § 131.14 (herein referred to as the federal rule)). The State Water Board and Regional Water Boards are not required to adopt specific authorizing provisions into state law before establishing a WQS Variance* consistent with the federal rule. The following explains the existing requirements that a water board must follow to establish a WQS Variance* consistent with the federal rule.

Under the federal rule, a WQS Variance* may be adopted for one or more NPDES dischargers or for a water body or waterbody segment, but the WQS Variance* only applies to the discharger(s) or the water body or waterbody segment specified in the WQS Variance*.

The federal rule specifies that any WQS Variance* is not effective unless and until it is approved by U.S. EPA. The federal rule also specifies that a WQS Variance* is subject to the public participation requirements at 40 Code of Federal Regulations section 131.20(b), which requires that one or more public hearings be held in accordance with state law and U.S. EPA's public participation regulation (40 C.F.R. part 25).

Where a discharger-specific WQS Variance* is established by a single permit, including an individual permit or a general permit, or other order, the federal rule's public participation requirements must be satisfied, and the provisions in the permit or other order that rely upon the discharger-specific WQS Variance* must be conditioned upon U.S. EPA approval. Because the establishment of a discharger-specific WQS Variance* in such a permit or other order is not the establishment or revision of a rule, the permit action need not be accompanied by a rulemaking action. The applicable hearing requirement for any other WQS Variance* would be subject to the hearing requirement and other procedures applicable to revising a water quality control plan, which are consistent with the federal rule's public participation requirements.

* See Appendix I for definition of terms.

APPENDIX I
DEFINITION OF TERMS

ACUTE TOXICITY

a. Acute Toxicity (TUa)

Expressed in Toxic Units Acute (TUa)

$$TUa = \frac{100}{96\text{-hr LC } 50\%}$$

b. Lethal Concentration 50% (LC 50)

LC 50 (percent waste giving 50% survival of test organisms) shall be determined by static or continuous flow bioassay techniques using standard marine test species as specified in Appendix III. If specific identifiable substances in wastewater can be demonstrated by the discharger as being rapidly rendered harmless upon discharge to the marine environment, but not as a result of dilution, the LC 50 may be determined after the test samples are adjusted to remove the influence of those substances.

When it is not possible to measure the 96-hour LC 50 due to greater than 50 percent survival of the test species in 100 percent waste, the toxicity concentration shall be calculated by the expression:

$$TUa = \frac{\log (100 - S)}{1.7}$$

where:

S = percentage survival in 100% waste. If S > 99, TUa shall be reported as zero.

ALL FORMS OF MARINE LIFE includes all life stages of all marine species.

AREA PRODUCTION FOREGONE (APF), also known as habitat production foregone, is an estimate of the area that is required to produce (replace) the same amount of larvae or propagules* that are removed via entrainment at a desalination facilities* intakes. APF is calculated by multiplying the proportional mortality* by the source water body,* which are both determined using an empirical transport model.*

AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) are those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that maintenance of natural water quality is assured. All Areas of Special Biological Significance are also classified as a subset of STATE WATER QUALITY PROTECTION AREAS.* ASBS are also referred to as State Water Quality Protection Areas* – Areas of Special Biological Significance (SWQPA-ASBS).

* See Appendix I for definition of terms.

BACTERIA WATER QUALITY OBJECTIVE(S) are the bacteria water quality objectives set forth in Chapter II.B.1.a.(1).

BASIN PLAN is a water quality control plan that consists of a designation or establishment for the waters within a specified area of all of the following: (1) Beneficial uses to be protected, (2) Water quality objectives, (3) A program of implementation needed for achieving water quality objectives.

BRINE is the byproduct of desalinated* water having a salinity* concentration greater than a desalination facility's* intake source water.

BRINE MIXING ZONE is the area where salinity* may exceed 2.0 parts per thousand above natural background salinity,* or the concentration of salinity* approved as part of an alternative receiving water limitation. The standard brine mixing zone shall not exceed 100 meters (328 feet) laterally from the points of discharge and throughout the water column. An alternative brine mixing zone, if approved as described in chapter III.M.3.d, shall not exceed 200 meters (656 feet) laterally from the points of discharge and throughout the water column. The brine mixing zone is an allocated impact zone where there may be toxic effects on marine life due to elevated salinity.

CALENDAR MONTH(S) is a period of time from a day of one month to the day before the corresponding day of the next month if the corresponding day exists, or if not to the last day of the next month (e.g. from January 1 to January 31, from June 15 to July 14, or from January 31 to February 28).

CHLORDANE shall mean the sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

CHRONIC TOXICITY: This parameter shall be used to measure the acceptability of waters for supporting a healthy marine biota until improved methods are developed to evaluate biological response.

a. Chronic Toxicity (TUc)

   Expressed as Toxic Units Chronic (TUc)

$$TUc = \frac{100}{NOEL}$$

b. No Observed Effect Level (NOEL)

   The NOEL is expressed as the maximum percent effluent or receiving water* that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Appendix III, Table III-1.

DDT shall mean the sum of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

* See Appendix I for definition of terms.

DEGRADE: Degradation shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant* differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected, or are not the only ones affected.

DESALINATION FACILITY is an industrial facility that processes water to remove salts and other components from the source water to produce water that is less saline than the source water.

DICHLOROBENZENES shall mean the sum of 1,2- and 1,3-dichlorobenzene.

DOWNSTREAM OCEAN WATERS shall mean waters downstream with respect to ocean currents.

DREDGED MATERIAL: Any material* excavated or dredged from the navigable waters of the United States, including material* otherwise referred to as "spoil".

EELGRASS BEDS are aggregations of the aquatic plant species of the genus *Zostera*.

EMPIRICAL TRANSPORT MODEL (ETM) is a methodology for determining the spatial area known as the source water body* that contains the source water population, which are the organisms that are at risk of entrainment as determined by factors that may include but are not limited to biological, hydrodynamic, and oceanographic data. ETM can also be used to estimate proportional mortality,* P_m.

ENCLOSED BAYS are indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes but is not limited to: Humboldt Bay, Bodega Harbor, Tomales Bay, Drakes Estero, San Francisco Bay, Morro Bay, Los Angeles Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay.

ENDOSULFAN shall mean the sum of endosulfan-alpha and -beta and endosulfan sulfate.

ESTUARIES AND COASTAL LAGOONS are waters at the mouths of streams that serve as mixing zones for fresh and ocean* waters during a major portion of the year. Mouths of streams that are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters will generally be considered to extend from a bay or the open ocean to the upstream limit of tidal action but may be considered to extend seaward if significant* mixing of fresh and salt water occurs in the open coastal waters. The waters described by this definition include but are not limited to the Sacramento-San Joaquin Delta as defined by section 12220 of the

* See Appendix I for definition of terms.

California Water Code, Suisun Bay, Carquinez Strait downstream to Carquinez Bridge, and appropriate areas of the Smith, Klamath, Mad, Eel, Noyo, and Russian Rivers.

ETM/APF APPROACH or ANALYSIS. For guidance on how to perform an ETM/APF analysis please see Appendix E of the Staff Report for Amendment to the Water Quality Control Plan For Ocean Waters of California Addressing Desalination Facility Intakes, Brine Discharges, And The Incorporation Of Other Non-substantive Changes.

FEASIBLE for the purposes of chapter III.M, shall mean capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors.

FLOW AUGMENTATION is a type of in-plant dilution and occurs when a desalination facility* withdraws additional source water for the specific purpose of diluting brine* prior to discharge.

FULL CAPTURE SYSTEM is a treatment control*, or series of treatment controls*, including but not limited to, a multi-benefit project* or a low-impact development control* that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

[Rational equation is used to compute the peak flow rate: $Q = C \bullet I \bullet A$, where Q = design flow rate (cubic feet per second, cfs); C = runoff coefficient (dimensionless); I = design rainfall intensity (inches per hour, as determined per the rainfall isohyetal map specific to each region, and A = subdrainage area (acres).]

Prior to installation, full capture systems* must be certified by the Executive Director, or designee, of the State Water Board. Uncertified full capture systems* will not satisfy the requirements of these Trash Provisions*. To request certification, a permittee shall submit a certification request letter that includes all relevant supporting documentation to the State Water Board's Executive Director. The Executive Director, or designee, shall issue a written determination approving or denying the certification of the proposed full capture system* or conditions of approval, including a schedule to review and reconsider the certification. Full capture systems* certified by the Los Angeles Regional Water Board prior to the effective date of these Trash Provisions* and full capture systems* listed in Appendix I of the Bay Area-wide Trash Capture Demonstration Project, Final Project Report (May 8, 2014) will satisfy the requirements of these Trash Provisions*, unless the Executive Director, or designee, of the State Water Board determines otherwise.

FULL CAPTURE SYSTEM EQUIVALENCY is the Trash* load that would be reduced if full capture systems* were installed, operated, and maintained for all storm drains

* See Appendix I for definition of terms.

that capture runoff from the relevant areas of land (priority land uses*, significant trash generating areas*, facilities or sites regulated by NPDES permits for discharges of storm water* associated with industrial activity, or specific land uses or areas that generate substantial amounts of Trash*, as applicable). The full capture system equivalency* is a Trash* load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of permitting authority*. Examples of such approaches include, but are not limited to, the following:

(1) Trash Capture Rate Approach. Directly measure or otherwise determine the amount of Trash* captured by full capture systems* for representative samples of all similar types of land uses, facilities, or areas within the relevant areas of land over time to identify specific trash capture rates. Apply each specific Trash* capture rate across all similar types of land uses, facilities, or areas to determine full capture system equivalency*. Trash* capture rates may be determined either through a pilot study or literature review. Full capture systems* selected to evaluate Trash* capture rates may cover entire types of land uses, facilities, or areas, or a representative subset of types of land uses, facilities, or areas. With this approach, full capture system equivalency* is the sum of the products of each type of land use, facility, or area multiplied by Trash* capture rates for that type of land use, facility, or area.

(2) Reference Approach. Determine the amount of Trash* in a reference receiving water in a reference watershed where full capture systems* have been installed for all storm drains that capture runoff from all relevant areas of land. The reference watershed must be comprised of similar types and extent of sources of trash* and land uses (including priority land uses* and all other land uses), facilities, or areas as the permittee's watershed. With this approach, full capture system equivalency* would be demonstrated when the amount of Trash* in the receiving water is equivalent to the amount of Trash* in the reference receiving water.

GEOMETRIC MEAN (GM) is a type of mean or average that indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum). The geometric mean is defined as the nth root of the product of n numbers. The formula is expressed as: GM = $\sqrt[n]{(x_1)(x_2)(x_3)\dots(x_n)}$, where *x* is the sample value and *n* is the number of samples taken.

GRAYWATER is drainage from galley, dishwasher, shower, laundry, bath, and lavatory wash basin sinks, and water fountains, but does not include drainage from toilets, urinals, hospitals, or cargo spaces.

HALOMETHANES shall mean the sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

* See Appendix I for definition of terms.

HCH shall mean the sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

INDICATOR BACTERIA includes total coliform bacteria, fecal coliform bacteria (or *E. coli*), and/or Enterococcus bacteria.

IN-KIND MITIGATION is when the habitat or species lost is the same as what is replaced through mitigation.

INSTITUTIONAL CONTROLS are non-structural best management practices (i.e., no structures are involved) that may include, but not be limited to, street sweeping, sidewalk Trash* bins, collection of the Trash*, anti-litter educational and outreach programs, producer take-back for packaging, and ordinances.

INITIAL DILUTION is the process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum induced velocity of the discharge ceases to produce significant* mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

KELP BEDS, are aggregations of marine algae of the order Laminariales, including species in the genera *Macrocystis, Nereocystis, and Pelagophycus*. Kelp beds include the total foliage canopy throughout the water column.

LARGE PASSENGER VESSELS are vessels of 300 gross registered tons or greater engaged in carrying passengers for hire. The following vessels are not large passenger vessels:

(1) Vessels without berths or overnight accommodations for passengers;
(2) Noncommercial vessels, warships, vessels operated by nonprofit entities as determined by the Internal Revenue Service, and vessels operated by the state, the United States, or a foreign government;
(3) Oceangoing vessels,* as defined below (e.g. those used to transport cargo).

LOW-IMPACT DEVELOPMENT CONTROLS are treatment controls* that employ natural and constructed features that reduce the rate of storm water* runoff, filter out

* See Appendix I for definition of terms.

pollutants, facilitate storm water* storage onsite, infiltrate storm water* into the ground to replenish groundwater supplies, or improve the quality of receiving groundwater and surface water. (See Water Code § 10564.)

LOEC is the lowest observed effect concentration or the lowest concentration of effluent that causes observable adverse effects in exposed test organisms.

MARICULTURE is the culture of algae, plants, and animals in marine waters independent of any pollution source.

MARINE MANAGED AREAS are named, discrete geographic marine or estuarine areas along the California coast designated by law or administrative action, and intended to protect, conserve, or otherwise manage a variety of resources and their uses. According to the California Public Resources Code (§§ 36600 et seq.) there are six classifications of marine managed areas, including State Marine Reserves, State Marine Parks and State Marine Conservation Areas, State Marine Cultural Preservation Areas, State Marine Recreational Management Areas, and State Water Quality Protection Areas.*

MARKET SQUID NURSURIES are comprised of numerous egg capsules, each containing approximately 200 developing embryos, attached in clusters or mops to sandy substrate with moderate water flow. Market squid (*Doryteuthis opalescens*) nurseries occur at a wide range of depths; however, mop densities are greatest in shallow, nearshore waters between ten and 100 meters (328 feet) deep.

MATERIAL: (a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of this Ocean Plan relating to waste disposal, dredging and the disposal of dredged material* and fill, MATERIAL means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the United States. See also, DREDGED MATERIAL.* For the purposes of chapter III.M.2.d, materials relates to the common usage in (a).

METHOD DETECTION LIMIT (MDL) is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, as defined in 40 CFR PART 136 Appendix B.

MINIMUM LEVEL (ML) is the concentrations at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.

MULTI-BENEFIT PROJECT is a treatment control* project designed to achieve any of the benefits set forth in section 10562, subdivision (d) of the Water Code. Examples

* See Appendix I for definition of terms.

include projects designed to: infiltrate, recharge or store storm water* for beneficial reuse; develop or enhance habitat and open space through storm water* and non-storm water management; and/or reduce storm water* and non-storm water runoff volume.

MULTIPORT DIFFUSERS are linear structures consisting of spaced ports or nozzles that are installed on submerged marine outfalls. For the purposes of chapter III.M, multiport diffusers discharge brine* waste into an ambient receiving water body and enable rapid mixing, dispersal, and dilution of brine* within a relatively small area.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) has the same meaning set forth in 40 Code of Federal Regulations section 122.26(b)(8).

NATURAL BACKGROUND SALINITY is the salinity* at a location that results from naturally occurring processes and is without apparent human influence. For purposes of determining natural background salinity, the regional water board may approve the use of:

(1) the mean monthly natural background salinity. Mean monthly natural background salinity shall be determined by averaging 20 years of historical salinity* data in the proximity of the proposed discharge location and at the depth of the proposed discharge, when feasible.* For historical data not recorded in parts per thousand, the regional water boards may accept converted data at their discretion. When historical data are not available, natural background salinity shall be determined by measuring salinity* at depth of proposed discharge for three years, on a weekly basis prior to a desalination facility* discharging brine,* and the mean monthly natural salinity* shall be used to determine natural background salinity; or

(2) the actual salinity at a reference location, or reference locations, that is representative of natural background salinity at the discharge location. The reference locations shall be without apparent human influence, including wastewater outfalls and brine discharges.

Either method to establish natural background salinity may be used for the purpose of determining compliance with the receiving water limitation or an effluent limitation for salinity. If a reference location(s) is used for compliance monitoring, the permit should specify that historical data shall be used if reference location data becomes unavailable. An owner or operator shall submit to the regional water board all necessary information to establish natural background salinity.

NATURAL LIGHT: Reduction of natural light may be determined by the Regional Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the Regional Board.

* See Appendix I for definition of terms.

NO DISCHARGE ZONE (NDZ) is an area in which both treated and untreated sewage discharges from vessels are prohibited. Within NDZ boundaries, vessel operators are required to retain their sewage discharges onboard for disposal at sea (beyond three miles from shore) or onshore at a pump-out facility.

NON-STORM WATER DISCHARGE is any runoff that is not the result of a precipitation event. This is often referred to as "dry weather flow."

OCEAN WATERS are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays,* estuaries, and coastal lagoons.* If a discharge outside the territorial waters of the State could affect the quality of the waters of the State, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

OCEANGOING VESSELS (i.e., oceangoing ships) means commercial vessels of 300 gross registered tons or more calling on California ports or places, excluding active military vessels.

OILY BILGE WATER includes bilge water that contains used lubrication oils, oil sludge and slops, fuel and oil sludge, used oil, used fuel and fuel filters, and oily waste.

OUT-OF-KIND MITIGATION is when the habitat or species lost is different than what is replaced through mitigation.

PAHs (polynuclear aromatic hydrocarbons) shall mean the sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

PCBs (polychlorinated biphenyls) shall mean the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

PERMITTING AUTHORITY means the State Water Board or Regional Water Board, whichever issues the permit.

PREPRODUCTION PLASTIC has the same meaning set forth in section 13367(a) of the Water Code.

PRIORITY LAND USES are those developed sites, facilities, or land uses (i.e., not simply zoned land uses) within the MS4* permittee's jurisdiction from which discharges of Trash* are regulated by this Ocean Plan as follows:

(1) **High-density residential:** all land uses with at least ten (10) developed dwelling units/acre.

* See Appendix I for definition of terms.

(2) **Industrial**: land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).

(3) **Commercial**: land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.)

(4) **Mixed urban**: land uses where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).

(5) **Public transportation stations**: facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).

Equivalent alternate land uses: An MS4* permittee with regulatory authority over priority land uses* may issue a request to the applicable permitting authority* that the MS4* permittee be allowed to substitute one or more land uses identified above with alternates land use within the MS4* permittee's jurisdiction that generates rates of Trash* that are equivalent to or greater than the priority land use(s)* being substituted. The land use area requested to substitute for a priority land use* need not be an acre-for-acre substitution but may involve one or more priority land uses*, or a fraction of a priority land use*, or both, provided the total trash* generated in the equivalent alternative land use is equivalent to or greater than the total Trash* generated from the priority land use(s)* for which substitution is requested. Comparative Trash* generation rates shall be established through the reporting of quantification measures such as street sweeping and catch basin cleanup records; mapping; visual trash presence surveys, such as the "Keep America Beautiful Visible Litter Survey"; or other information as required by the permitting authority*.

PROPAGULES are structures that are capable of propagating an organism to the next stage in its life cycle via dispersal. Dispersal is the movement of individuals from their birth site to their reproductive grounds.

PROPORTIONAL MORTALITY, P_m, is percentage of larval organisms or propagules* in the source water body* that is expected to be entrained at a desalination facility's* intake. It is assumed that all entrained larvae or propagules* die as a result of entrainment.

RECEIVING WATER, for permitted storm water discharges and nonpoint sources, should be measured at the point of discharge(s), in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

* See Appendix I for definition of terms.

REFERENCE SYSTEM is a watershed or waterbody segment determined by the Water Board to be minimally disturbed by anthropogenic stresses but otherwise is representative of conditions of the assessed site, watershed, or water body segment.

SALINITY is a measure of the dissolved salts in a volume of water. For the purposes of this Plan, salinity shall be measured using a standard method approved by the regional water board (e.g. Standard Method 2520 B, EPA Method 120.1, EPA Method 160.1) and reported in parts per thousand (ppt). For historical salinity data not recorded in parts per thousand, the regional water boards may accept converted data at their discretion.

SEAWATER is salt water that is in or from the ocean. For the purposes chapter III.M, seawater includes tidally influenced waters in coastal estuaries and coastal lagoons* and underground salt water beneath the seafloor, beach, or other contiguous land with hydrologic connectivity to the ocean.

SENSITIVE HABITATS, for the purposes of this Plan, are kelp beds,* rocky substrate, surfgrass beds,* eelgrass beds,* oyster beds, spawning grounds for state or federally managed species, market squid nurseries,* or other habitats in need of special protection as determined by the Water Boards.

SHELLFISH are organisms identified by the California Department of Public Health as shellfish for public health purposes (i.e., mussels, clams and oysters).

SIGNIFICANT difference is defined as a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

SIGNIFICANT TRASH GENERATING AREAS means all locations or facilities within the Department's jurisdiction where Trash* accumulates in substantial amounts, such as:

(1) Highway on- and off-ramps in high density residential, commercial, and industrial land uses (as such land uses are defined under priority land uses* herein).
(2) Rest areas and park-and-rides.
(3) State highways in commercial and industrial land uses (as such land uses are defined under priority land uses* herein).
(4) Mainline highway segments to be identified by the Department through pilot studies and/or surveys.

SINGLE SAMPLE MAXIMUM (SSM) is a maximum value not to be exceeded in any single sample.

SOURCE WATER BODY is the spatial area that contains the organisms that are at risk of entrainment at a desalination facility* as determined by factors that may include, but are not limited to, biological, hydrodynamic, and oceanographic data.

* See Appendix I for definition of terms.

STATE WATER QUALITY PROTECTION AREAS (SWQPAs) are nonterrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All Areas of Special Biological Significance (ASBS)* that were previously designated by the State Water Board in Resolutions 74-28, 74-32, and 75-61 are now also classified as a subset of State Water Quality Protection Areas and require special protections afforded by this Plan.

STATE WATER QUALITY PROTECTION AREAS – GENERAL PROTECTION (SWQPA-GP) designated by the State Water Board to protect marine species and biological communities from an undesirable alteration in natural water quality within State Marine Parks and State Marine Conservation Areas.

STATISTICAL THRESHOLD VALUE (STV) for the bacteria water quality objective* is a set value that approximates the 90th percentile of the water quality distribution of a bacterial population. The STV* for the bacteria water quality objective* is 110 cfu/100mL.

STORM WATER has the same meaning set forth in 40 Code of Federal Regulations section 122.26(b)(13) (Nov. 16, 1990).

SUBSURFACE INTAKE, for the purposes of chapter III.M, is an intake withdrawing seawater* from the area beneath the ocean floor or beneath the surface of the earth inland from the ocean.

SURFGRASS BEDS are aggregations of marine flowering plants of the genus *Phyllospadix*.

TCDD EQUIVALENTS shall mean the sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

* See Appendix I for definition of terms.

Isomer Group	Toxicity Equivalence Factor
2,3,7,8-tetra CDD	1.0
2,3,7,8-penta CDD	0.5
2,3,7,8-hexa CDDs	0.1
2,3,7,8-hepta CDD	0.01
octa CDD	0.001
2,3,7,8 tetra CDF	0.1
1,2,3,7,8 penta CDF	0.05
2,3,4,7,8 penta CDF	0.5
2,3,7,8 hexa CDFs	0.1
2,3,7,8 hepta CDFs	0.01
octa CDF	0.001

TRASH means all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

TRASH PROVISIONS are the water quality objective for Trash*, as well as the prohibition of discharge set forth in Chapter III.I and implementation requirements set forth in Chapter III.L herein.

TREATMENT CONTROLS are structural best management practices to either (a) remove pollutants and/or solids from storm water* runoff, wastewater, or effluent, or (b) capture, infiltrate or reuse storm water* runoff, wastewater, or effluent. Treatment controls include full capture systems* and low-impact development controls*.

WASTE: As used in this Plan, waste includes a discharger's total discharge, of whatever origin, i.e., gross, not net, discharge.

WATER RECLAMATION: The treatment of wastewater to render it suitable for reuse, the transportation of treated wastewater to the place of use, and the actual use of treated wastewater for a direct beneficial use or controlled use that would not otherwise occur.

WQS VARIANCE: A water quality standards variance, as defined by 40 Code of Federal Regulations section 131.3(o), is a time-limited designated use and criterion for a specific pollutant(s) or water quality parameter(s) that reflect the highest attainable condition during the term of the water quality standards variance.

* See Appendix I for definition of terms.

APPENDIX II
MINIMUM* LEVELS

The Minimum* Levels identified in this appendix represent the lowest concentration of a pollutant that can be quantitatively measured in a sample given the current state of performance in analytical chemistry methods in California. These Minimum* Levels were derived from data provided by state-certified analytical laboratories in 1997 and 1998 for pollutants regulated by the California Ocean Plan and shall be used until new values are adopted by the State Water Board. There are four major chemical groupings: volatile chemicals, semi-volatile chemicals, inorganics, pesticides & PCBs.* "No Data" is indicated by "--".

Table II-1
Minimum* Levels – Volatile Chemicals

Volatile Chemicals	CAS Number	Minimum* Level (µg/L): GC Method[a]	Minimum* Level (µg/L): GCMS Method[b]
Acrolein	107028	2.	5
Acrylonitrile	107131	2.	2
Benzene	71432	0.5	2
Bromoform	75252	0.5	2
Carbon Tetrachloride	56235	0.5	2
Chlorobenzene	108907	0.5	2
Chlorodibromomethane	124481	0.5	2
Chloroform	67663	0.5	2
1,2-Dichlorobenzene (volatile)	95501	0.5	2
1,3-Dichlorobenzene (volatile)	541731	0.5	2
1,4-Dichlorobenzene (volatile)	106467	0.5	2
Dichlorobromomethane	75274	0.5	2
1,1-Dichloroethane	75343	0.5	1
1,2-Dichloroethane	107062	0.5	2
1,1-Dichloroethylene	75354	0.5	2
Dichloromethane	75092	0.5	2
1,3-Dichloropropene (volatile)	542756	0.5	2
Ethyl benzene	100414	0.5	2
Methyl Bromide	74839	1.	2
Methyl Chloride	74873	0.5	2
1,1,2,2-Tetrachloroethane	79345	0.5	2
Tetrachloroethylene	127184	0.5	2
Toluene	108883	0.5	2
1,1,1-Trichloroethane	71556	0.5	2

* See Appendix I for definition of terms.

Volatile Chemicals	CAS Number	Minimum* Level (µg/L): GC Method[a]	Minimum* Level (µg/L): GCMS Method[b]
1,1,2-Trichloroethane	79005	0.5	2
Trichloroethylene	79016	0.5	2
Vinyl Chloride	75014	0.5	2

Table II-1 Notes

a) GC Method = Gas Chromatography
b) GCMS Method = Gas Chromatography / Mass Spectrometry
* To determine the lowest standard concentration in an instrument calibration curve for these techniques, use the given ML (see chapter III, "Use of Minimum* Levels").

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* See Appendix I for definition of terms.

Table II-2
Minimum* Levels – Semi Volatile Chemicals

Semi-Volatile Chemicals	CAS Number	Minimum* Level (µg/L): GC Method [a, *]	Minimum* Level (µg/L): GCMS Method [b, *]	Minimum* Level (µg/L): HPLC Method [c,*]	Minimum* Level (µg/L): COLOR Method [d]
Acenapthylene	208968	--	10	0.2	--
Anthracene	120127	--	10	2	--
Benzidine	92875	--	5	--	--
Benzo(a)anthracene	56553	--	10	2	--
Benzo(a)pyrene	50328	--	10	2	--
Benzo(b)fluoranthene	205992	--	10	10	--
Benzo(g,h,i)perylene	191242	--	5	0.1	--
Benzo(k)floranthene	207089	--	10	2	--
Bis 2-(1-Chloroethoxy) methane	111911	--	5	--	--
Bis(2-Chloroethyl)ether	111444	10	1	--	--
Bis(2-Chloroisopropyl)ether	39638329	10	2	--	--
Bis(2-Ethylhexyl) phthalate	117817	10	5	--	--
2-Chlorophenol	95578	2	5	--	--
Chrysene	218019	--	10	5	--
Di-n-butyl phthalate	84742	--	10	--	--
Dibenzo(a,h)anthracene	53703	--	10	0.1	--
1,2-Dichlorobenzene (semivolatile)	95504	2	2	--	--
1,3-Dichlorobenzene (semivolatile)	541731	2	1	--	--
1,4-Dichlorobenzene (semivolatile)	106467	2	1	--	--
3,3-Dichlorobenzidine	91941	--	5	--	--
2,4-Dichlorophenol	120832	1	5	--	--
1,3-Dichloropropene	542756	--	5	--	
Diethyl phthalate	84662	10	2	--	--
Dimethyl phthalate	131113	10	2	--	--
2,4-Dimethylphenol	105679	1	2	--	--
2,4-Dinitrophenol	51285	5	5	--	--
2,4-Dinitrotoluene	121142	10	5	--	--
1,2-Diphenylhydrazine	122667	--	1	--	--
Fluoranthene	206440	10	1	0.05	--
Fluorene	86737	--	10	0.1	--
Hexachlorobenzene	118741	5	1	--	--

* See Appendix I for definition of terms.

Table II-2 (Continued)
Minimum* Levels – Semi Volatile Chemicals

Semi-Volatile Chemicals	CAS Number	Minimum* Level (µg/L): GC Method [a, *]	Minimum* Level (µg/L): GCMS Method [b, *]	Minimum* Level (µg/L): HPLC Method [c,*]	Minimum* Level (µg/L): COLOR Method [d]
Hexachlorobutadiene	87683	5	1	--	--
Hexachlorocyclopentadiene	77474	5	5	--	--
Hexachloroethane	67721	5	1	--	--
Indeno(1,2,3-cd)pyrene	193395	--	10	0.05	--
Isophorone	78591	10	1	--	--
2-methyl-4,6-dinitrophenol	534521	10	5	--	--
3-methyl-4-chlorophenol	59507	5	1	--	--
N-nitrosodi-n-propylamine	621647	10	5	--	--
N-nitrosodimethylamine	62759	10	5	--	--
N-nitrosodiphenylamine	86306	10	1	--	--
Nitrobenzene	98953	10	1	--	--
2-Nitrophenol	88755	--	10	--	--
4-Nitrophenol	100027	5	10	--	--
Pentachlorophenol	87865	1	5	--	--
Phenanthrene	85018	--	5	0.05	--
Phenol	108952	1	1	--	50
Pyrene	129000	--	10	0.05	--
2,4,6-Trichlorophenol	88062	10	10	--	--

Table II-2 Notes:

a) GC Method = Gas Chromatography
b) GCMS Method = Gas Chromatography / Mass Spectrometry
c) HPLC Method = High Pressure Liquid Chromatography
d) COLOR Method = Colorimetric
* To determine the lowest standard concentration in an instrument calibration curve for this technique, multiply the given ML* by 1000 (see chapter III, “Use of Minimum* Levels”).

* See Appendix I for definition of terms.

Table II-3
Minimum* Levels – Inorganics

Inorganic Substances	CAS Number	Minimum * Level (µg/L): COLOR Method[a]	Minimum * Level (µg/L): DCP Method[b]	Minimum * Level (µg/L): FAA Method[c]	Minimum * Level (µg/L): GFAA Method[d]	Minimum * Level (µg/L): HYDRIDE Method[e]	Minimum * Level (µg/L): ICP Method[f]	Minimum * Level (µg/L): ICPMS Method[g]	Minimum * Level (µg/L): SPGFAA Method[h]	Minimum * Level (µg/L): CVAA Method[i]
Antimony	7440360	--	1000.	10.	5.	0.5	50.	0.5	5.	--
Arsenic	7440382	20.	1000.	--	2.	1.	10.	2.	2.	--
Beryllium	7440417	--	1000.	20.	0.5	--	2.	0.5	1.	--
Cadmium	7440439	--	1000.	10.	0.5	--	10.	0.2	0.5	--
Chromium (total)	--	--	1000.	50.	2.	--	10.	0.5	1.	--
Chromium (VI)	18540299	10.	--	5.	--	--	--	--	--	--
Copper	7440508	--	1000.	20.	5.	--	10.	0.5	2.	--
Cyanide	57125	5.	--	--	--	--	--	--	--	--
Lead	7439921	--	10000.	20.	5.	--	5.	0.5	2.	--
Mercury	7439976	--	--	--	--	--	--	0.5	--	0.2
Nickel	7440020	--	1000.	50.	5.	--	20.	1.	5.	--
Selenium	7782492	--	1000.	--	5.	1.	10.	2.	5.	--
Silver	7440224	--	1000.	10.	1.	--	10.	0.2	2.	--
Thallium	7440280	--	1000.	10.	2.	--	10.	1.	5.	--
Zinc	7440666	--	1000.	20.	--	--	20.	1.	10.	--

Table II-3 Notes

a) COLOR Method = Colorimetric
b) DCP Method = Direct Current Plasma
c) FAA Method = Flame Atomic Absorption

* See Appendix I for definition of terms.

d) GFAA Method = Graphite Furnace Atomic Absorption
e) HYDRIDE Method = Gaseous Hydride Atomic Absorption
f) ICP Method = Inductively Coupled Plasma
g) ICPMS Method = Inductively Coupled Plasma / Mass Spectrometry
h) SPGFAA Method = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., US EPA 200.9)
i) CVAA Method = Cold Vapor Atomic Absorption

* To determine the lowest standard concentration in an instrument calibration curve for these techniques, use the given ML* (see chapter III, “Use of Minimum* Levels”).

* See Appendix I for definition of terms.

Table II-4
Minimum* Levels – Pesticides and PCBs*

Pesticides – PCBs	CAS Number	Minimum* Level (µg/L): GC Method[a,*]
Aldrin	309002	0.005
Chlordane*	57749	0.1
4,4'-DDD	72548	0.05
4,4'-DDE	72559	0.05
4,4'-DDT	50293	0.01
Dieldrin	60571	0.01
a-Endosulfan	959988	0.02
b-Endosulfan	33213659	0.01
Endosulfan Sulfate	1031078	0.05
Endrin	72208	0.01
Heptachlor	76448	0.01
Heptachlor Epoxide	1024573	0.01
a-Hexachlorocyclohexane	319846	0.01
b-Hexachlorocyclohexane	319857	0.005
d-Hexachlorocyclohexane	319868	0.005
g-Hexachlorocyclohexane (Lindane)	58899	0.02
PCB 1016	--	0.5
PCB 1221	--	0.5
PCB 1232	--	0.5
PCB 1242	--	0.5
PCB 1248	--	0.5
PCB 1254	--	0.5
PCB 1260	--	0.5
Toxaphene	8001352	0.5

Table II-4 Notes

a) GC Method = Gas Chromatography

* To determine the lowest standard concentration in an instrument calibration curve for this technique, multiply the given ML* by 100 (see chapter III, “Use of Minimum* Levels”).

* See Appendix I for definition of terms.

APPENDIX III
STANDARD MONITORING PROCEDURES

1. INTRODUCTION

The purpose of this appendix is to provide guidance to the Regional Water Boards on implementing the Ocean Plan and to ensure the reporting of useful information. Monitoring should be question driven rather than just gathering data and should be focused on assuring compliance with narrative and numeric water quality standards, the status and attainment of beneficial uses, and identifying sources of pollution.

It is not feasible to prescribe requirements in the Ocean Plan that encompass all circumstances and conditions that could be encountered by all dischargers, nor is it desirable to limit the flexibility of the Regional Water Boards in the monitoring of ocean* waters. This appendix should therefore be considered the basic framework for the design of an ocean discharger monitoring program. The Regional Water Boards are responsible for issuing monitoring and reporting programs (MRPs) that will implement this monitoring guidance. Regional Water Boards can deviate from the procedures required in the appendix only with the approval of the State Water Resources Control Board.

This monitoring guidance utilizes a model monitoring framework. The model monitoring framework has three components that comprise a range of spatial and temporal scales: (1) core monitoring, (2) regional monitoring, and (3) special studies.

(1) Core monitoring consists of the basic site-specific monitoring necessary to measure compliance with individual effluent limits and/or impacts to receiving water* quality. Core monitoring is typically conducted in the immediate vicinity of the discharge by examining local scale spatial effects.

(2) Regional monitoring provides information necessary to make assessments over large areas and serves to evaluate cumulative effects of all anthropogenic inputs. Regional monitoring data also assists in the interpretation of core monitoring studies. It is recommended that the Regional Water Boards require participation by the discharger in an approved regional monitoring program, if available, for the receiving water.* In the event that a regional monitoring effort takes place during a permit cycle in which the MRP does not specifically address regional monitoring, a Regional Water Board may allow relief from aspects of core monitoring components in order to encourage participation.

(3) Special studies are directed monitoring efforts designed in response to specific management or research questions identified through either core or regional monitoring programs. Often they are used to help understand core or regional monitoring results, where a specific environmental process is not well understood, or to address unique issues of local importance. Regional Water Boards may require special studies as appropriate. Special studies are not addressed further in this guidance because they are beyond its scope.

* See Appendix I for definition of terms.

The Ocean Plan does not address all site-specific monitoring issues and allows the Regional Water Boards to select alternative protocols with the approval of the State Water Board. If no direction is given in this appendix for a specific provision of the Ocean Plan, it is within the discretion of the Regional Water Boards to establish the monitoring requirements for that provision.

2. QUALITY ASSURANCE

All receiving* and ambient water monitoring conducted in compliance with MRPs must be comparable with the Quality Assurance requirements of the Surface Water Ambient Monitoring Program (SWAMP).

SWAMP comparable means all sample collection and analyses shall meet or exceed the measurement quality objectives (MQOs) – including all sample types, frequencies, control limits and holding time requirements – as specified in the SWAMP Quality Assurance Project Plan (QAPrP)

The SWAMP QAPrP is located at:
http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa.

For those measurements that do not have SWAMP MQOs available, then MQOs shall be at the discretion of the Regional Water Board. Refer to the USEPA guidance document (EPA QA/G-4) for selecting data quality objectives, located at http://www.epa.gov/quality/qs-docs/g4-final.pdf.

Water Quality data must be reported according to the California Environmental Data Exchange Network (CEDEN) “Data Template” format for all constituents that are monitored in receiving and ambient water. CEDEN Data Template are available at: http://ceden.org.

3. TYPE OF WASTE DISCHARGE SOURCES

Discharges to ocean waters* are highly diverse and variable, exhibiting a wide range of constituents, effluent quality and quantity, location and frequency of discharge. Different types of discharges will require different approaches. This Appendix provides specific direction for three broad types of discharges: (1) Point Sources, (2) Storm Water Point Sources and (3) Non-point Sources.

3.1. Point Sources

Industrial, municipal, marine laboratory and other traditional point sources of pollution that discharge wastewater directly to surface waters and are required to obtain NPDES permits.

3.2. Storm Water Point Sources

Storm Water Point Sources, hereafter referred to as Storm Water Sources, are those NPDES permitted discharges regulated by Construction or Industrial Storm Water General Permits or municipal separate storm sewer system (MS4s) Permits. MS4

* See Appendix I for definition of terms.

Permits are further divided into Phase I and II Permits. A Phase I MS4 Permit is issued by a Regional Water Board for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 or more people) municipalities. A Phase II MS4 General Permit is issued by the State Water Resources Control Board for the discharge of storm water for smaller municipalities, and includes nontraditional Small MS4s, which are governmental facilities such as military bases, public campuses, prison and hospital complexes.

3.3. Non-point Sources

A Non-point Source is any source of pollutants that is not a Point Source described in section 3.1 or a Storm Water Source as described in section 3.2. Land use categories contributing to non-point sources include but are not limited to:

a. Agriculture
b. Grazing
c. Forestry/timber harvest
d. Urban not covered under an NPDES permit
e. Marinas and mooring fields
f. Golf Courses not covered under an NPDES Permit

Only agricultural and golf course related non-point source discharge monitoring is addressed in this Appendix, but Regional Water Boards may issue MRPs for other non-point sources at their discretion. Agriculture includes irrigated lands. Irrigated lands are where water is applied for the purpose of producing crops, including, but not limited to, row and field crop, orchards, vineyard, rice production, nurseries, irrigated pastures, and managed wetlands.

4. INDICATOR BACTERIA*
4.1. Point Sources

Primary questions to be addressed:

1. Does the effluent comply with the water quality standards in the receiving water*?
2. Does the sewage effluent reach water contact zones or commercial shellfish* beds?

To answer these questions, core monitoring shall be conducted in receiving water* on the shoreline for the indicator bacteria* at a minimum weekly for any point sources discharging treated sewage effluent:

a. within one nautical mile of shore, or
b. within one nautical mile of a commercial shellfish* bed, or

* See Appendix I for definition of terms.

c. if the discharge is in excess of 10 million gallons per day (MGD).

Alternatively, these requirements may be met through participation in a regional monitoring program to assess the status of marine contact recreation water quality. If the permittee participates in a regional monitoring program, in conjunction with local health organization(s), core monitoring may be suspended for that period at the discretion of the Regional Water Board. Regional monitoring should be used to answer the above questions, and may be used to answer additional questions. These additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* indicator bacteria* problems, or the sources of indicator bacteria.*

4.2. Storm Water

Primary questions to be addressed:

1. Does the receiving water* comply with water quality standards?
2. Is the condition of the receiving water* protective of contact recreation and shellfish* harvesting beneficial uses?
3. Are the indicator bacteria* levels in receiving water* getting better or worse?
4. What is the relative contribution of indicator bacteria* to the receiving water* from storm water runoff?

To answer these questions, core monitoring for indicator bacteria* shall be required periodically for storm water discharges representative of the area of concern. At a minimum, for municipal storm water discharges, all receiving water* at outfalls greater than 36 inches in diameter or width must be monitored (ankle depth, point zero) at the following frequencies:

a. During wet weather with a minimum of three storms per year, and
b. When non-storm water discharges* occur (flowing during dry weather), and if located at an AB 411 beach, at least weekly. (An AB 411 Beach is defined as a beach visited by more than 50,000 people annually and located on an area adjacent to a storm drain that flows in the summer. (Health & Saf. Code § 115880.)).

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled indicator bacteria.*

Alternatively, these requirements may be met through participation in a regional monitoring program to assess the status of marine contact recreation water quality. If the permittee participates in a regional monitoring program, in conjunction with local health organization(s), core monitoring may be suspended for that period at the discretion of the Regional Water Board. Regional monitoring should be used to answer

* See Appendix I for definition of terms.

the above questions, and may be used to answer additional questions. These additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* indicator bacteria* problems, or the sources of indicator bacteria.*

4.3. Non-point Sources

Primary questions to be addressed:

1. Does the receiving water* comply with water quality standards?
2. Do agricultural and golf course non-point source discharges reach water contact or shellfish* harvesting zones?
3. Are the indicator bacteria* levels in receiving water* getting better or worse?
4. What is the relative contribution of indicator bacteria* to the receiving water* from agricultural and golf course non-point sources?

To answer these questions, core monitoring of representative agricultural irrigation tail water and storm water runoff, at a minimum, will be conducted in receiving water* (ankle depth, point zero) for indicator bacteria*:

a. During wet weather, at a minimum of two storm events per year, and
b. When non-storm water discharges* occur (flowing during dry weather), and if located at an AB 411 beach or within one nautical mile of shellfish* bed, at least weekly.

Alternatively, these requirements may be met through participation in a regional monitoring program to assess the status of marine contact recreation water quality. If the discharger participates in a regional monitoring program, in conjunction with local health organization(s), core monitoring may be suspended for that period at the discretion of the Regional Water Board. Regional monitoring should be used to answer the above questions, and may be used to answer additional questions. These additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* indicator bacteria* problems, or the sources of indicator bacteria.*

5. CHEMICAL CONSTITUENTS
5.1. Point Sources

Primary questions addressed:

1. Does the effluent meet permit effluent limits thereby ensuring that water quality standards are achieved in the receiving water*?
2. What is the mass of the constituents that are discharged annually?
3. Is the effluent concentration or mass changing over time?

* See Appendix I for definition of terms.

Consistent with Appendix VI, the core monitoring for the substances in Table 3 and Table 4 shall be required periodically. For discharges less than 10 MGD, the monitoring frequency shall be at least one complete scan of the Table 3 substances annually. Discharges greater than 10 MGD shall be required to monitor at least semiannually.

5.2. Storm Water

Primary questions addressed:

1. Does the receiving water* meet the water quality standards?
2. Are the conditions in receiving water* getting better or worse?
3. What is the relative runoff contribution to pollution in the receiving water*?

For Phase I and Phase II MS4 dischargers, core receiving water* monitoring will be required at a minimum for 10 percent of all outfalls greater than 36 inches in diameter or width once per year. If a discharger has less than five outfalls exceeding 36 inches in diameter or width, they shall conduct monitoring at a minimum of only once per outfall during a five year period. Monitoring shall be for total suspended solids, oil & grease, total organic carbon, pH, temperature, biochemical oxygen demand, turbidity, Table 3 metals, PAHs,* and pesticides determined by the Regional Water Boards. Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled pollutants.

For industrial storm water discharges, runoff monitoring must be conducted at all outfalls at least two storm events per year. In addition, at least one representative receiving water* sample must be collected per industrial storm water permittee during two storm events per year. Monitoring shall be conducted for total suspended solids, oil & grease, total organic carbon, pH, temperature, biochemical oxygen demand, turbidity, and Table 3 metals and PAHs.*

The requirements for individual core monitoring for Table 3 metals, PAHs* and pesticides may be waived at the discretion of the Regional Water Board, if the permittee participates in a regional program for monitoring runoff and/or receiving water* to answer the above questions as well as additional questions. Additional questions may include, but are not limited to, questions regarding the extent and magnitude of current or potential receiving water* problems from storm water runoff, or sources of any runoff pollutants.

5.3. Non-point Sources

The primary questions are:

1. Does the agricultural or golf course runoff meet water quality standards in the receiving water*?

* See Appendix I for definition of terms.

2. Are nutrients present that would contribute to objectionable aquatic algal blooms or degrade* indigenous biota?
3. Are the conditions in receiving water* getting better or worse?
4. What is the relative agricultural runoff or golf course contribution to pollution in the receiving water*?

To answer these questions, a statistically representative sample (determined by the Regional Water Board) of receiving water* at the sites of agricultural irrigation tail water and storm water runoff, and golf course runoff in each watershed will be monitored for Ocean Plan Table 3 metals, ammonia as N, nitrate as N, phosphate as P, and pesticides determined by the Regional Board:

a. During wet weather, at a minimum of two storm events per year, and
b. During dry weather, when flowing, at a frequency determined by the Regional Boards.

This requirement may be satisfied by core monitoring individually, or through participation in a regional program for monitoring runoff and receiving water* at the discretion of the Regional Water Board to answer the above questions as well as additional questions. Additional questions may include, but are not limited to, questions regarding the sources of agricultural pollutants.

6. SEDIMENT MONITORING

All Sources:

1. Is the dissolved sulfide concentration of waters in sediments significantly* increased above that present under natural conditions?
2. Is the concentration of substances set forth in Table 3, for protection of marine aquatic life, in marine sediments at levels which would degrade* the benthic community?
3. Is the concentration of organic pollutants in marine sediments at levels that would degrade* the benthic community?

6.1. Point Sources

For discharges greater than 10 MGD, acid volatile sulfides, OP Pesticides, Table 3 metals, ammonia N, PAHs,* and chlorinated hydrocarbons will be measured in sediments annually in a core monitoring program approved by the Regional Water Board. Sediment sample locations will be determined by the Regional Water Board. If sufficient data exists from previous water column monitoring for these parameters, the Regional Water Board at its discretion may reduce the frequency of monitoring, or may allow this requirement to be satisfied through participation in a regional monitoring program.

* See Appendix I for definition of terms.

6.2. Storm Water

For Phase I MS4 permittees, discharges greater than 72 inches in diameter or width discharging to low energy coastal environments with the likelihood of sediment deposition, acid volatile sulfides, OP Pesticides, Ocean Plan Table 3 metals, ammonia N, PAHs,* and chlorinated hydrocarbons will be measured in sediments once per permit cycle.

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled pollutants.

This requirement may be satisfied by core monitoring individually or through participation in a regional monitoring program at the discretion of the Regional Water Board. Sediment sample locations will be determined by the Regional Water Board.

7. AQUATIC LIFE TOXICITY

Toxicity tests are another method used to assess risk to aquatic life. These tests assess the overall toxicity of the effluent, including the toxicity of unmeasured constituents and/or synergistic effects of multiple constituents.

7.1. Point Sources

1. Does the effluent meet permit effluent limits for toxicity thereby ensuring that water quality standards are achieved in the receiving water*?
2. If not:
    a. Are unmeasured pollutants causing risk to aquatic life?
    b. Are pollutants in combinations causing risk to aquatic life?

Core monitoring for Table 3 effluent toxicity shall be required periodically. For discharges less than 0.1 MGD the monitoring frequency for acute and/or chronic toxicity* shall be twice per permit cycle. For discharges between 0.1 and 10 MGD, the monitoring frequency for acute and/or chronic toxicity* of the effluent should be at least annually. For discharges greater than 10 MGD, the monitoring frequency for acute and/or chronic toxicity* of the effluent should be at least semiannually.

For discharges greater than 10 MGD in a low energy coastal environment with the likelihood of sediment deposition, Core monitoring for acute sediment toxicity is required and will utilize alternative amphipod species (*Eohaustorius estuarius, Leptocheirus plumulosus, Rhepoxynius abronius*).

If an exceedance is detected, six additional toxicity tests are required within a 12-week period. If an additional exceedance is detected within the 12-week period, a toxicity reduction evaluation (TRE) is required, consistent with chapter III.C.10 that requires a

* See Appendix I for definition of terms.

TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 3.

7.2. Storm Water

1. Does the runoff meet objectives for toxicity in the receiving water*?
2. Are the conditions in receiving water* getting better or worse with regard to toxicity
3. What is the relative runoff contribution to the receiving water* toxicity?
4. What are the causes of the toxicity and the sources of the constituents responsible?

For Phase I MS4, Phase II MS4, and industrial storm water discharges, core toxicity monitoring will be required at a minimum for 10 percent of all outfalls greater than 36 inches in diameter or width at a minimum of once per year. Receiving water* monitoring shall be for Table 3 critical life stage chronic toxicity* for a minimum of one invertebrate species.

For storm water discharges greater than 72 inches in diameter or width in a low energy coastal environment with the likelihood of sediment deposition, core sediment monitoring for acute sediment toxicity is required and will utilize alternative amphipod species (*Eohaustorius estuarius, Leptocheirus plumulosus, Rhepoxynius abronius*).

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled toxicity.

If an exceedence is detected, an additional toxicity test is required during the subsequent storm event. If an additional exceedance is detected at that time, a TRE is required, consistent with chapter III.C.10 that requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 3. A sufficient volume must be collected to conduct a TIE, if necessary, as a part of a TRE.

The requirement for core toxicity monitoring may be waived at the discretion of the Regional Water Board, if the permittee participates in a regional monitoring program to answer the above questions, as well as any other additional questions that may be developed by the regional monitoring program.

7.3. Non-point Sources

1. Does the agricultural and golf course runoff meet water quality standards for toxicity in the receiving water*?
2. Are the conditions in receiving water* getting better or worse with regard to toxicity?

* See Appendix I for definition of terms.

3. What is the relative agricultural and golf course runoff contribution to receiving water* toxicity?
4. What are the causes of the toxicity, and the sources of the constituents responsible?

To answer these questions, a statistically representative sample (determined by the Regional Water Board) of receiving water* at the sites of agricultural irrigation tail water and storm water runoff, and golf course runoff, in each watershed will be monitored:

a. During wet weather, at a minimum of two storm events per year, and
b. During dry weather, when flowing, at a frequency determined by the Regional Boards.

Core receiving water* monitoring shall include Table 3 critical life stage chronic toxicity* for a minimum of one invertebrate species.

For runoff in a low energy coastal environment with the likelihood of sediment deposition, core sediment monitoring shall include acute sediment toxicity utilizing alternative amphipod species (*Eohaustorius estuarius, Leptocheirus plumulosus, Rhepoxynius abronius*) at a minimum once per year.

If an exceedence is detected, an additional toxicity test is required during the subsequent storm event. If an additional exceedance is detected, a TRE is required, consistent with chapter III.C.10 that requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 3. A sufficient volume must be collected to conduct a TIE, if necessary, as a part of a TRE.

The requirement for core monitoring may be waived at the discretion of the Regional Water Board, if the permittee participates in a regional monitoring program to answer the above questions, as well as any other additional questions that may be developed by the regional monitoring program.

8. BENTHIC COMMUNITY HEALTH

8.1. Point Sources

1. Are benthic communities degraded* as a result of the discharge?

To answer this question, benthic community monitoring shall be conducted

a. for all discharges greater than 10 MGD, or
b. those discharges greater than 0.1 MGD and one nautical mile or less from shore, or
c. discharges greater than 0.1 MGD and one nautical mile or less from a State Water Quality Protection Area* or a State Marine Reserve.

* See Appendix I for definition of terms.

The minimum frequency shall be once per permit cycle, except for discharges greater than 100 MGD the minimum frequency shall be at least twice per permit cycle.

This requirement may be satisfied by core monitoring individually or through participation in a regional monitoring program at the discretion of the Regional Board.

9. BIOACCUMULATION

9.1. Point Sources

1. Does the concentration of pollutants in fish, shellfish,* or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
2. Does the concentration of pollutants in marine life bioaccumulate to levels that degrade* marine communities?

To answer these questions, bioaccumulation monitoring shall be conducted, at a minimum, once per permit cycle for:

a. discharges greater than 10 MGD, or
b. those discharges greater than 0.1 MGD and one nautical mile or less from shore, or
c. discharges greater than 0.1 MGD and one nautical mile or less from a State Water Quality Protection Area* or a State Marine Reserve, Park or Conservation Area.

Constituents to be monitored must include pesticides (at the discretion of the Regional Board), Table 3 metals, and PAHs.* Bioaccumulation may be monitored by a mussel watch program or a fish tissue program. Resident mussels are preferred over transplanted mussels. Sand crabs and/or fish may be added or substituted for mussels at the discretion of the Regional Water Board.

This requirement may be satisfied individually as core monitoring or through participation in a regional monitoring program at the discretion of the Regional Water Board.

9.2. Storm Water

1. Does the concentration of pollutants in fish, shellfish,* or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
2. Does the concentration of pollutants in marine life bioaccumulate to levels that degrade* marine communities?

For Phase I MS4 dischargers, bioaccumulation monitoring shall be conducted, at a minimum, once per permit cycle. Constituents to be monitored must include OP

* See Appendix I for definition of terms.

Pesticides, Ocean Plan Table 3 metals, Table 3 PAHs,* Table 3 chlorinated hydrocarbons, and pyrethroids. Bioaccumulation may be monitored by a mussel watch program or a fish tissue program. Sand crabs, fish, and/or Solid Phase Microextraction may be added or substituted for mussels at the discretion of the Regional Water Board.

This requirement may be satisfied individually as core monitoring or through participation in a regional monitoring program at the discretion of the Regional Water Board.

10. RECEIVING WATER* CHARACTERISTICS
All Sources:

1. Is natural light* significantly* reduced at any point outside the zone of initial dilution* as the result of the discharge of waste*?
2. Does the discharge of waste* cause a discoloration of the ocean surface?
3. Does the discharge of oxygen demanding waste* cause the dissolved oxygen concentration to be depressed at any time more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding* waste* materials*?
4. Does the discharge of waste* cause the pH to change at any time more than 0.2 units from that which occurs naturally?
5. Does the discharge of waste* cause the salinity* to become elevated in the receiving water*?
6. Do nutrients cause objectionable aquatic growth or degrade* indigenous biota?

10.1. Point Sources

For discharges greater than 10 MGD, turbidity (alternatively light transmissivity or surface water transparency), color [Chlorophyll-A and/or color dissolved organic matter (CDOM)], dissolved oxygen and pH shall be measured in the receiving water* seasonally, at a minimum, in a core monitoring program approved by the Regional Water Board. If sufficient data exists from previous water column monitoring for these parameters, the Regional Water Board, at its discretion, may reduce the frequency of water column monitoring, or may allow this requirement to be satisfied through participation in a regional monitoring program. Use of regional ocean observing programs, such as the Southern California Coastal Ocean Observing System (SCCOOS) and the Central and Northern California Ocean Observing System (CeNCCOOS) is encouraged.

Salinity* must also be monitored by all point sources discharging brine* as part of their core monitoring program. Seawater desalination facilities* discharging brine* into ocean waters* and wastewater facilities that receive brine from seawater desalination facilities and discharge into ocean waters shall monitor salinity as described in chapter III.M.4.

* See Appendix I for definition of terms.

10.2. Storm Water

At a minimum, 10 percent of Phase I MS4 discharges greater than 36 inches, receiving water* turbidity, color, dissolved oxygen, pH, nitrate, phosphate, and ammonia shall be measured annually in a core monitoring program approved by the Regional Water Board.

Regional Water Boards may waive monitoring once structural best management practices have been installed, evaluated and determined to have successfully controlled pollutants. The Regional Water Board, at its discretion, may also allow this requirement to be satisfied through participation in a regional monitoring program.

10.3. Non-point Sources

Representative agricultural and golf course discharges shall be measured, at a minimum twice annually (during two storm season and irrigation season) for receiving water* turbidity, color, dissolved oxygen, pH, nitrate, phosphate, ammonia in a core monitoring program approved by the Regional Water Board. The Regional Water Board, at its discretion, may allow this requirement to be satisfied through participation in a regional monitoring program.

11. ANALYTICAL REQUIREMENTS

Procedures, calibration techniques, and instrument/reagent specifications shall conform to the requirements of 40 CFR PART 136. Compliance monitoring shall be determined using an US EPA approved protocol as provided in 40 CFR PART 136. All methods shall be specified in the monitoring requirement section of waste* discharge requirements.

Where methods are not available in 40 CFR PART 136, the Regional Water Boards shall specify suitable analytical methods in waste* discharge requirements. Acceptance of data should be predicated on demonstrated laboratory performance.

Laboratories analyzing monitoring data shall be certified by the California Department of Public Health, in accordance with the provisions of Water Code section 13176, and must include quality assurance quality control data with their reports.

Sample dilutions for total and fecal coliform bacterial analyses shall range from 2 to 16,000. Sample dilutions for enterococcus bacterial analyses shall range from 1 to 10,000 per 100 mL. Each test method number or name (e.g., EPA 600/4-85/076, Test Methods for *Escherichia coli* and *Enterococci* in Water by Membrane Filter Procedure) used for each analysis shall be specified and reported with the results.

Test methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR PART 136, unless alternate methods have been approved in advance by U.S. EPA pursuant to 40 CFR PART 136.

* See Appendix I for definition of terms.

Test methods used for enterococcus shall be those presented in U.S. EPA publication EPA 600/4-85/076, Test Methods for *Escherichia coli* and *Enterococci* in Water by Membrane Filter Procedure or any improved method determined by the Regional Board to be appropriate. The Regional Water Board may allow analysis for *Escherichia coli* (*E. coli)* by approved test methods to be substituted for fecal coliforms if sufficient information exists to support comparability with approved methods and substitute the existing methods.

The State or Regional Water Board may, subject to U.S. EPA approval, specify test methods which are more sensitive than those specified in 40 CFR PART 136. Because storm water and non-point sources are not assigned a dilution factor, sufficient sampling and analysis shall be required to determine compliance with Table 3 Water Quality Objectives. Total chlorine residual is likely to be a method detection limit effluent limitation in many cases. The limit of detection of total chlorine residual in standard test methods is less than or equal to 20 µg/L.

Toxicity monitoring requirements in permits prepared by the Regional Water Boards shall use marine test species instead of freshwater species when measuring compliance. The Regional Water Board shall require the use of critical life stage toxicity tests specified in this Appendix to measure TUc. For Point Sources, a minimum of three test species with approved test protocols shall be used to measure compliance with the toxicity objective. If possible, the test species shall include a fish, an invertebrate, and an aquatic plant. After a screening period, monitoring can be reduced to the most sensitive species.

Dilution and control water should be obtained from an unaffected area of the receiving waters.* The sensitivity of the test organisms to a reference toxicant shall be determined concurrently with each bioassay test and reported with the test results.

Use of critical life stage bioassay testing shall be included in waste* discharge requirements as a monitoring requirement for all Point Source discharges greater than 100 MGD

Procedures and methods used to determine compliance with benthic monitoring should use the following federal guidelines when applicable: Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters (1990) -- EPA/600/4-90/030 (PB91-171363). This manual describes guidelines and standardized procedures for the use of macroinvertebrates in evaluating the biological integrity of surface waters.

Procedures used to determine compliance with bioaccumulation monitoring should use the U.S. EPA Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (November 2000, EPA 823-B-00-007), NOAA Technical Memorandum NOS ORCA 130, Sampling and Analytical Methods of the National Status and Trends Program Mussel Watch Project (1998 update), and/or State Mussel Watch Program, 1987-1993 Data Report, State Water Resources Control Board 94-1WQ.

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* See Appendix I for definition of terms.

Table III-1
Approved Tests – Chronic Toxicity* (TUc)

Species	Effect	Tier	Reference
giant kelp, Macrocystis pyrifera	percent germination; germ tube length	1	1,3
red abalone, Haliotis rufescens	Abnormal shell development	1	1,3
oyster, Crassostrea gigas; mussels, Mytilus spp.	Abnormal shell development; percent survival	1	1,3
urchin, Strongylocentrotus purpuratus; sand dollar, Dendraster excentricus	Percent normal development	1	1,3
urchin, Strongylocentrotus purpuratus; sand dollar, Dendraster excentricus	Percent fertilization	1	1,3
shrimp, Holmesimysis costata	Percent survival; growth	1	1,3
shrimp, Mysidopsis bahia	Percent survival; growth; fecundity	2	2,4
topsmelt, Atherinops affinis	Larval growth rate; percent survival	1	1,3
Silversides, Menidia beryllina	Larval growth rate; percent survival	2	2,4

Table III-1 Notes

The first tier test methods are the preferred toxicity tests for compliance monitoring. A Regional Water Board can approve the use of a second tier test method for waste* discharges if first tier organisms are not available.

Protocol References

1. Chapman, G.A., D.L. Denton, and J.M. Lazorchak. 1995. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to west coast marine and estuarine organisms. U.S. EPA Report No. EPA/600/R-95/136.
2. Klemm, D.J., G.E. Morrison, T.J. Norberg-King, W.J. Peltier, and M.A. Heber. 1994. Short-term methods for estimating the chronic toxicity of effluents and receiving water to marine and estuarine organisms. U.S. EPA Report No. EPA-600-4-91-003.
3. SWRCB 1996. Procedures Manual for Conducting Toxicity Tests Developed by the Marine Bioassay Project. 96-1WQ.
4. Weber, C.I., W.B. Horning, I.I., D.J. Klemm, T.W. Nieheisel, P.A. Lewis, E.L. Robinson, J. Menkedick and F. Kessler (eds). 1988. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. National Information Service, Springfield, VA.

* See Appendix I for definition of terms.

APPENDIX IV
PROCEDURES FOR THE NOMINATION AND DESIGNATION OF STATE WATER QUALITY PROTECTION AREAS.*

1. Any person may nominate areas of ocean* waters for designation as SWQPA-ASBS or SWQPA-GP by the State Water Board. Nominations shall be made to the appropriate Regional Water Board and shall include:

   (a) Information such as maps, reports, data, statements, and photographs to show that:

      (1) Candidate areas are located in ocean* waters as defined in the "Ocean Plan".
      (2) Candidate areas are intrinsically valuable or have recognized value to man for scientific study, commercial use, recreational use, or esthetic reasons.
      (3) Candidate areas need protection beyond that offered by waste* discharge restrictions or other administrative and statutory mechanisms.

   (b) Data and information to indicate whether the proposed designation may have a significant* effect on the environment.

      (1) If the data or information indicate that the proposed designation will have a significant* effect on the environment, the nominee must submit sufficient information and data to identify feasible changes in the designation that will mitigate or avoid the significant* environmental effects.

2. The State Water Board or a Regional Water Board may also nominate areas for designation as SWQPA-ASBS or SWQPA-GP on their own motion.

3. A Regional Water Board may decide to (a) consider individual SWQPA-ASBS or SWQPA-GP nominations upon receipt, (b) consider several nominations in a consolidated proceeding, or (c) consider nominations in the triennial review of its water quality control plan (basin plan). A nomination that meets the requirements of 1. above may be considered at any time but not later than the next scheduled triennial review of the appropriate basin plan or Ocean Plan.

4. After determining that a nomination meets the requirements of paragraph 1. above, the Executive Officer of the affected Regional Water Board shall prepare a Draft Nomination Report containing the following:

   (a) The area or areas nominated for designation as SWQPA-ASBS or SWQPA-GP.

   (b) A description of each area including a map delineating the boundaries of each proposed area.

   (c) A recommendation for action on the nomination(s) and the rationale for the recommendation. If the Draft Nomination Report recommends approval of the proposed designation, the Draft Nomination Report shall comply with the CEQA

* See Appendix I for definition of terms.

documentation requirements for a water quality control plan amendment in section 3777, title 23, California Code of Regulations.

5. The Executive Officer shall, at a minimum, seek informal comment on the Draft Nomination Report from the State Water Board, Department of Fish and Game, other interested state and federal agencies, conservation groups, affected waste dischargers, and other interested parties. Upon incorporation of responses from the consulted agencies, the Draft Nomination Report shall become the Final Nomination Report.

6. (a) If the Final Nomination Report recommends approval of the proposed designation, the Executive Officer shall ensure that processing of the nomination complies with the CEQA consultation requirements in section 3778, Title 23, California Code of Regulations and proceed to step 7 below.

   (b) If the Final Nomination Report recommends against approval of the proposed designation, the Executive Officer shall notify interested parties of the decision. No further action need be taken. The nominating party may seek reconsideration of the decision by the Regional Water Board itself.

7. The Regional Water Board shall conduct a public hearing to receive testimony on the proposed designation. Notice of the hearing shall be published three times in a newspaper of general circulation in the vicinity of the proposed area or areas and shall be distributed to all known interested parties 45 days in advance of the hearing. The notice shall describe the location, boundaries, and extent of the area or areas under consideration, as well as proposed restrictions on waste* discharges within the area.

8. The Regional Water Board shall respond to comments as required in section 3779, Title 23, California Code of Regulations, and 40 C.F.R. Part 25 (July 1, 1999).

9. The Regional Water Board shall consider the nomination after completing the required public review processes required by CEQA.

   (a) If the Regional Water Board supports the recommendation for designation, the board shall forward to the State Water Board its recommendation for approving designation of the proposed area or areas and the supporting rationale. The Regional Water Board submittal shall include a copy of the staff report, hearing transcript, comments, and responses to comments.

   (b) If the Regional Water Board does not support the recommendation for designation, the Executive Officer shall notify interested parties of the decision, and no further action need be taken.

10. After considering the Regional Water Board recommendation and hearing record, the State Water Board may approve or deny the recommendation, refer the matter to the Regional Water Board for appropriate action, or conduct further hearing itself. If

* See Appendix I for definition of terms.

the State Water Board acts to approve a recommended designation, the State Water Board shall amend Appendix V, Table V-1, of this Plan. The amendment will go into effect after approval by the Office of Administrative Law and US EPA. In addition, after the effective date of a designation, the affected Regional Water Board shall revise its water quality control plan in the next triennial review to include the designation.

11. The State Water Board Executive Director shall advise other agencies to whom the list of designated areas is to be provided that the basis for an SWQPA-ASBS or SWQPA-GP designation is limited to protection of marine life from waste* discharges.

* See Appendix I for definition of terms.

APPENDIX V
STATE WATER QUALITY PROTECTION AREAS*
AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE*

Table V-1
State Water Quality Protection Areas*
Areas of Special Biological Significance*
(Designated or Approved by the State Water Resources Control Board)

No.	ASBS Name	Date Designated	State Water Board Resolution No.	Region No.
1.	Jughandle Cove	March 21, 1974,	74-28	1
2.	Del Mar Landing	March 21, 1974,	74-28	1
3.	Gerstle Cove	March 21, 1974,	74-28	1
4.	Bodega	March 21, 1974,	74-28	1
5.	Saunders Reef	March 21, 1974,	74-28	1
6.	Trinidad Head	March 21, 1974,	74-28	1
7.	King Range	March 21, 1974,	74-28	1
8.	Redwoods National Park	March 21, 1974,	74-28	1
9.	James V. Fitzgerald	March 21, 1974,	74-28	2
10.	Farallon Islands	March 21, 1974,	74-28	2
11.	Duxbury Reef	March 21, 1974,	74-28	2
12.	Point Reyes Headlands	March 21, 1974,	74-28	2
13.	Double Point	March 21, 1974,	74-28	2
14.	Bird Rock	March 21, 1974,	74-28	2
15.	Año Nuevo	March 21, 1974,	74-28	3
16.	Point Lobos	March 21, 1974,	74-28	3
17.	San Miguel, Santa Rosa, and Santa Cruz Islands	March 21, 1974,	74-28	3
18.	Julia Pfeiffer Burns	March 21, 1974,	74-28	3
19.	Pacific Grove	March 21, 1974,	74-28	3
20.	Salmon Creek Coast	March 21, 1974,	74-28	3
21.	San Nicolas Island and Begg Rock	March 21, 1974,	74-28	4
22.	Santa Barbara and Anacapa Islands	March 21, 1974,	74-28	4
23.	San Clemente Island	March 21, 1974,	74-28	4
24.	Laguna Point to Latigo Point	March 21, 1974,	74-28	4

* See Appendix I for definition of terms.

No.	ASBS Name	Date Designated	State Water Board Resolution No.	Region No.
25.	Northwest Santa Catalina Island	March 21, 1974,	74-28	4
26.	Western Santa Catalina Island	March 21, 1974,	74-28	4
27.	Farnsworth Bank	March 21, 1974,	74-28	4
28.	Southeast Santa Catalina	March 21, 1974,	74-28	4
29.	La Jolla	March 21, 1974,	74-28	9
30.	Heisler Park	March 21, 1974,	74-28	9
31.	San Diego-Scripps	March 21, 1974,	74-28	9
32.	Robert E. Badham	April 18, 1974	74-32	8
33.	Irvine Coast	April 18, 1974	74-32	8,9
34.	Carmel Bay	June 19, 1975	75-61	3

* See Appendix I for definition of terms.

APPENDIX VI
REASONABLE POTENTIAL ANALYSIS PROCEDURE FOR DETERMINING WHICH TABLE 3 OBJECTIVES REQUIRE EFFLUENT LIMITATIONS

In determining the need for an effluent limitation, the Regional Water Board shall use all representative information to characterize the pollutant discharge using a scientifically defensible statistical method that accounts for the averaging period of the water quality objective, accounts for and captures the long-term variability of the pollutant in the effluent, accounts for limitations associated with sparse data sets, accounts for uncertainty associated with censored data sets, and (unless otherwise demonstrated) assumes a lognormal distribution of the facility-specific effluent data.

The purpose of the following procedure (see also Figure VI-1) is to provide direction to the Regional Water Boards for determining if a pollutant discharge causes, has the reasonable potential to cause, or contributes to an excursion above Table 3 water quality objectives in accordance with 40 CFR 122.44 (d)(1)(iii). The Regional Water Board may use an alternative approach for assessing reasonable potential such as an appropriate stochastic dilution model that incorporates both ambient and effluent variability. The permit fact sheet or statement of basis will document the justification or basis for the conclusions of the reasonable potential assessment. This appendix does not apply to permits or any portion of a permit where the discharge is regulated through best management practices (BMP) unless such discharge is also subject to numeric effluent limitations.

Step 1: Identify C_o, the applicable water quality objective from Table 3 for the pollutant.

Step 2: Does information about the receiving water* body or the discharge support a reasonable potential assessment (RPA) without characterizing facility-specific effluent monitoring data? If yes, go to *Step 13* to conduct an RPA based on best professional judgment (BPJ). Otherwise, proceed to *Step 3*.

Step 3: Is facility-specific effluent monitoring data available? If yes, proceed to *Step 4.* Otherwise, go to *Step 13.*

Step 4: Adjust all effluent monitoring data C_e, including censored (ND or DNQ) values to the concentration X expected after complete mixing. For Table 3 pollutants use $X = (C_e + D_m C_s) / (D_m + 1)$; for acute toxicity* use $X = C_e / (0.1 D_m + 1)$; where D_m is the minimum probable initial dilution* expressed as parts seawater* per part wastewater and C_s is the background seawater* concentration from Table 5. For ND values, C_e is replaced with "<MDL*;" for DNQ values C_e is replaced with "<ML.*" Go to *Step 5*.

Step 5: Count the total number of samples n, the number of censored (ND or DNQ) values, c and the number of detected values, d, *such that* $n = c + d$.

* See Appendix I for definition of terms.

Is any *detected* pollutant concentration after complete mixing greater than C_o? If yes, the discharge causes an excursion of C_o; go to *Endpoint 1*. Otherwise, proceed to *Step 6*.

Step 6: Does the effluent monitoring data contain three or more detected observations ($d \geq 3$)? If yes, proceed to *Step 7* to conduct a parametric RPA. Otherwise, go to *Step11* to conduct a nonparametric RPA.

Step 7: Conduct a parametric RPA. Assume data are lognormally distributed, unless otherwise demonstrated. Does the data consist entirely of detected values ($c/n = 0$)? If yes,

- calculate summary statistics M_L and S_L, the mean and standard deviation of the natural logarithm transformed effluent data expected after complete mixing, ln(X),
- go to *Step 9*.

Otherwise, proceed to *Step 8*.

Step 8: Is the data censored by 80% or less ($c/n \leq 0.8$)? If yes,

- calculate summary statistics M_L and S_L using the censored data analysis method of Helsel and Cohn (1988),
- go to *Step 9*.

Otherwise, go to Step 11.

Step 9: Calculate the UCB i.e., the one-sided, upper 95 percent confidence bound for the 95th percentile of the effluent distribution after complete mixing. For lognormal distributions, use $UCBL_{(.95,.95)} = \exp(M_L + S_L\, g'_{(.95,.95,n)})$, where g' is a normal tolerance factor obtained from the table below (Table VI-1). Proceed to *Step 10*.

Step 10: Is the UCB greater than C_o? If yes, the discharge has a reasonable potential to cause an excursion of C_o; go to *Endpoint 1*. Otherwise, the discharge has no reasonable potential to cause an excursion of C_o; go to *Endpoint 2*.

Step 11: Conduct a non-parametric RPA. Compare each data value X to C_o. Reduce the sample size n by 1 for each tie (i.e., inconclusive censored value result) present. An adjusted ND value having C_o < MDL* is a tie. An adjusted DNQ value having C_o < ML* is also a tie.

Step 12: Is the adjusted $n > 15$? If yes, the discharge has no reasonable potential to cause an excursion of C_o; go to *Endpoint 2*. Otherwise, go to *Endpoint 3*.

Step 13: Conduct an RPA based on BPJ. Review all available information to determine if a water quality-based effluent limitation is required, notwithstanding the above analysis in *Steps 1* through *12*, to protect beneficial uses. Information that may be used includes: the facility type, the discharge type, solids loading analysis, lack of dilution,

* See Appendix I for definition of terms.

history of compliance problems, potential toxic impact of discharge, fish tissue residue data, water quality and beneficial uses of the receiving water,* CWA 303(d) listing for the pollutant, the presence of endangered or threatened species or critical habitat, and other information.

Is data or other information unavailable or insufficient to determine if a water quality-based effluent limitation is required? If yes, go to *Endpoint 3.* Otherwise, go to either *Endpoint 1* or *Endpoint 2* based on BPJ.

Endpoint 1: An effluent limitation must be developed for the pollutant. Effluent monitoring for the pollutant, consistent with the monitoring frequency in Appendix III, is required.

Endpoint 2: An effluent limitation is not required for the pollutant. Appendix III effluent monitoring is not required for the pollutant; the Regional Board, however, may require occasional monitoring for the pollutant or for whole effluent toxicity as appropriate.

Endpoint 3: The RPA is inconclusive. Monitoring for the pollutant or whole effluent toxicity testing, consistent with the monitoring frequency in Appendix III, is required. An existing effluent limitation for the pollutant shall remain in the permit, otherwise the permit shall include a reopener clause to allow for subsequent modification of the permit to include an effluent limitation if the monitoring establishes that the discharge causes, has the reasonable potential to cause, or contributes to an excursion above a Table 3 water quality objective.

Appendix VI References:

Helsel D. R. and T. A. Cohn. 1988. Estimation of descriptive statistics for multiply censored water quality data. Water Resources Research, Vol 24(12):1977-2004.

Hahn J. H. and W. Q. Meeker. 1991. Statistical Intervals, A guide for practitioners. J. Wiley & Sons, NY.

* See Appendix I for definition of terms.

Table VI-1: Tolerance Factors $g'_{(.95,.95,n)}$ for calculating normal distribution one-side upper 95 percent tolerance bounds for the 95th percentile (Hahn & Meeker 1991)

n	$g'_{(.95,.95,n)}$
2	26.260
3	7.656
4	5.144
5	4.203
6	3.708
7	3.399
8	3.187
9	3.031
10	2.911
11	2.815
12	2.736
13	2.671
14	2.614
15	2.566
16	2.524
17	2.486
18	2.453
19	2.423
20	2.396
21	2.371
22	2.349
23	2.328
24	2.309
25	2.292
26	2.275
27	2.260
28	2.246
29	2.232
30	2.220
35	2.167
40	2.125
50	2.065
60	2.022
120	1.899
240	1.819
480	1.766
∞	1.645

* See Appendix I for definition of terms.

Figure VI-1. Reasonable potential analysis flow chart

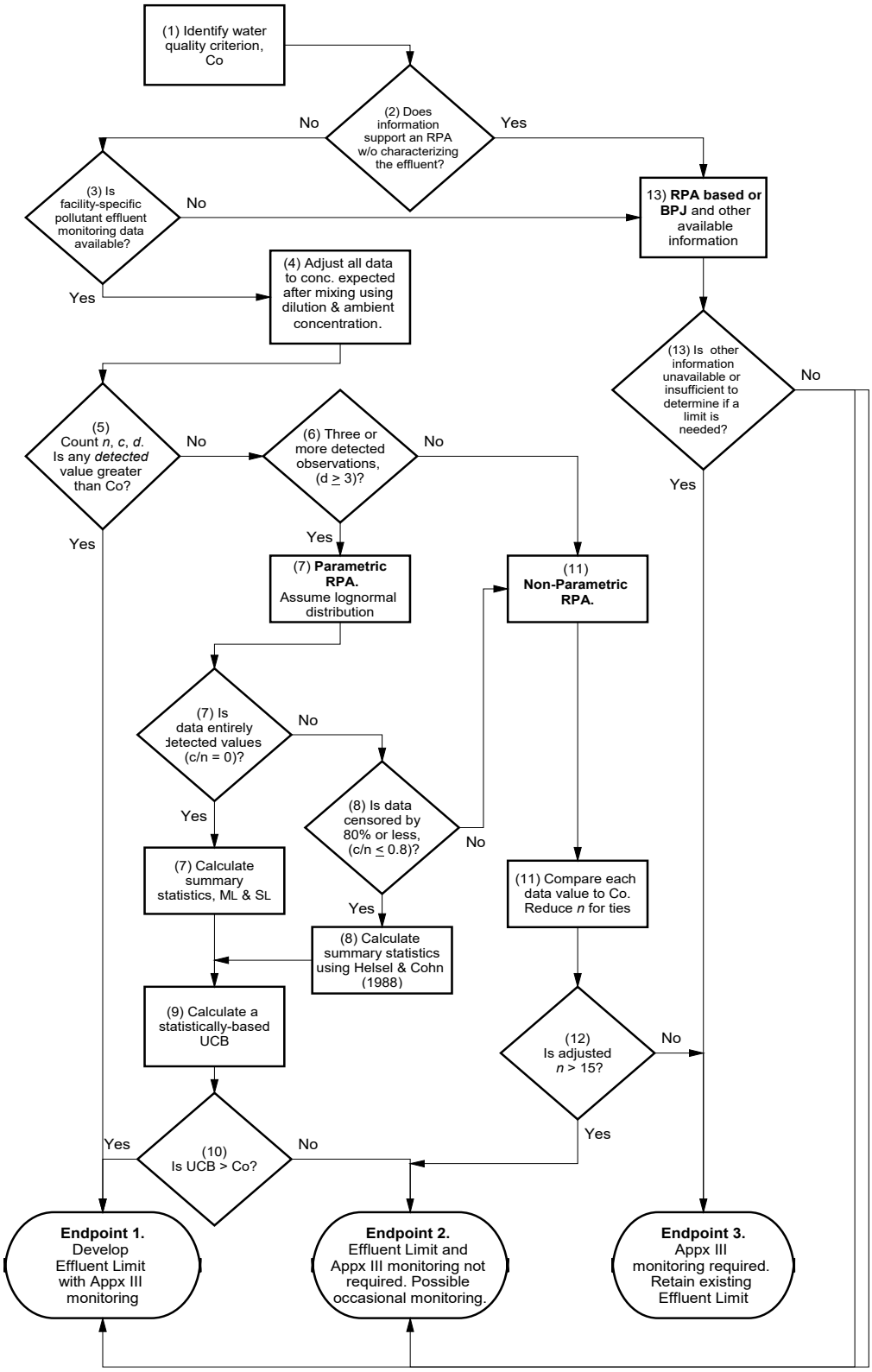

* See Appendix I for definition of terms.

APPENDIX VII
EXCEPTIONS TO THE CALIFORNIA OCEAN PLAN

Table VII-1
Exceptions to the Ocean Plan
(GRANTED BY THE STATE WATER RESOURCES CONTROL BOARD)

Year	Resolution	Applicable Provision	Discharger
1977	77-11	Discharge Prohibition, ASBS #23	US Navy San Clemente Island
1979	79-16	Discharge Prohibition for wet weather discharges from combined storm and wastewater collection system.	The City and County of San Francisco
1983	83-78	Discharge Prohibition, ASBS #7	Humboldt County Resort Improvement District No.1
1984	84-78	Discharge Prohibition, ASBS #34	Carmel Sanitary District
1988	88-80	Total Chlorine Residual Limitation	Haynes Power Plant Harbor Power Plant Scattergood Power Plant Alamitos Power Plant El Segundo Power Plant Long Beach Power Plant Mandalay Power Plant Ormond Beach Power Plant Redondo Power Plant
1990	90-105	Discharge Prohibition, ASBS #21	US Navy San Nicolas Island
2004	2004-0052	Discharge Prohibition, ASBS #31	UC Scripps Institution of Oceanography
2006	2006-0013	Discharge Prohibition, ASBS #25	USC Wrigley Marine Science Center
2007	2007-0058	Discharge Prohibition, ASBS #4	UC Davis Bodega Marine Laboratory
2011	2011-0049	Discharge Prohibition, ASBS #6	HSU Telonicher Marine lab
2011	2011-0050	Discharge Prohibition, ASBS #19	Monterey Bay Aquarium
2011	2011-0051	Discharge Prohibition, ASBS #19	Stanford Hopkins Marine Station
2012	2012-0012, as amended on June 19 2012; in 2012-0031	ASBS Discharge Prohibition, General Exception for Storm Water and Nonpoint Sources	27 applicants for the General Exception

* See Appendix I for definition of terms.

APPENDIX VIII
MAPS OF THE OCEAN, COAST, AND ISLANDS

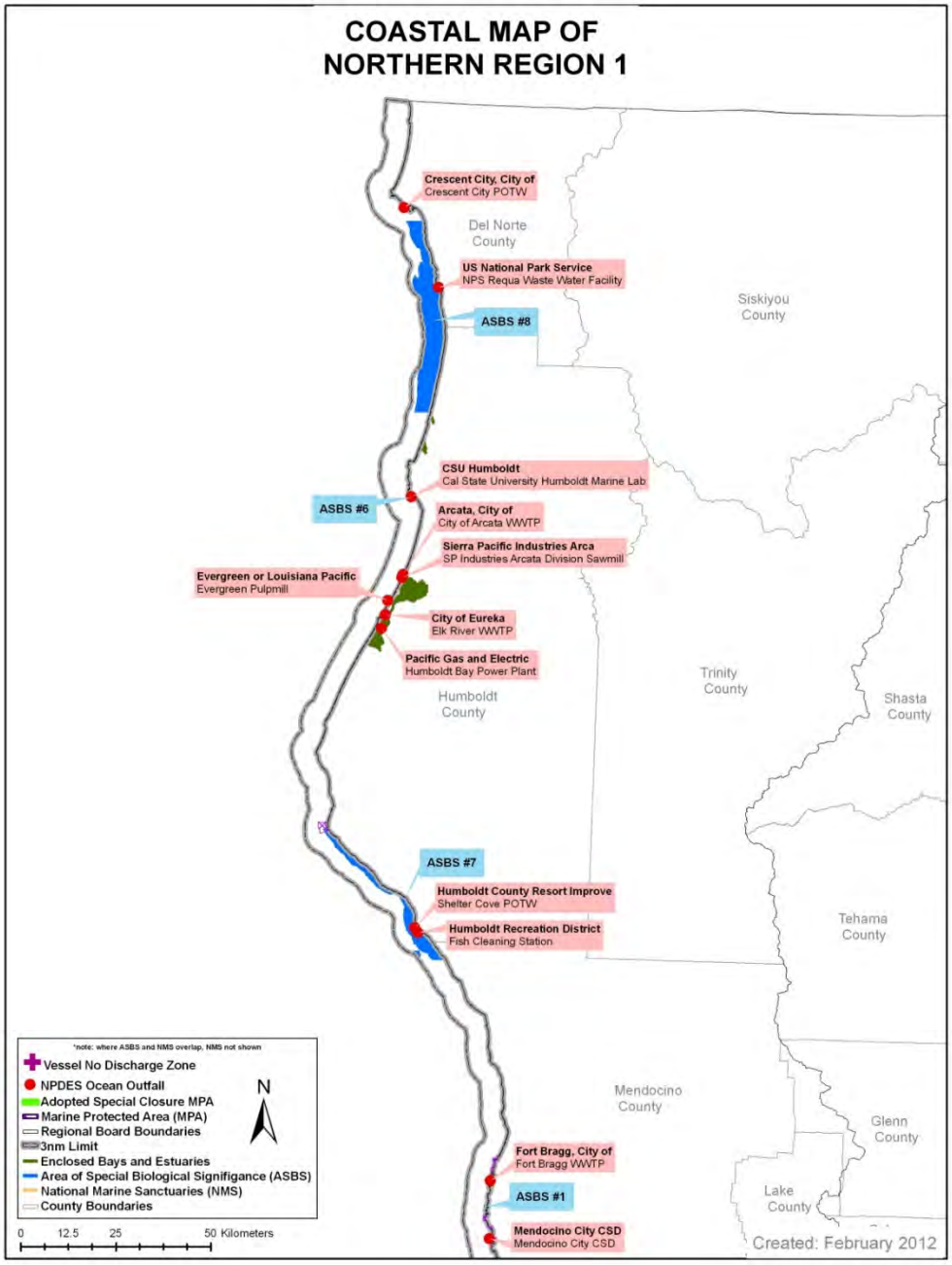

Figure VIII-1. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in northern Region 1.

* See Appendix I for definition of terms.

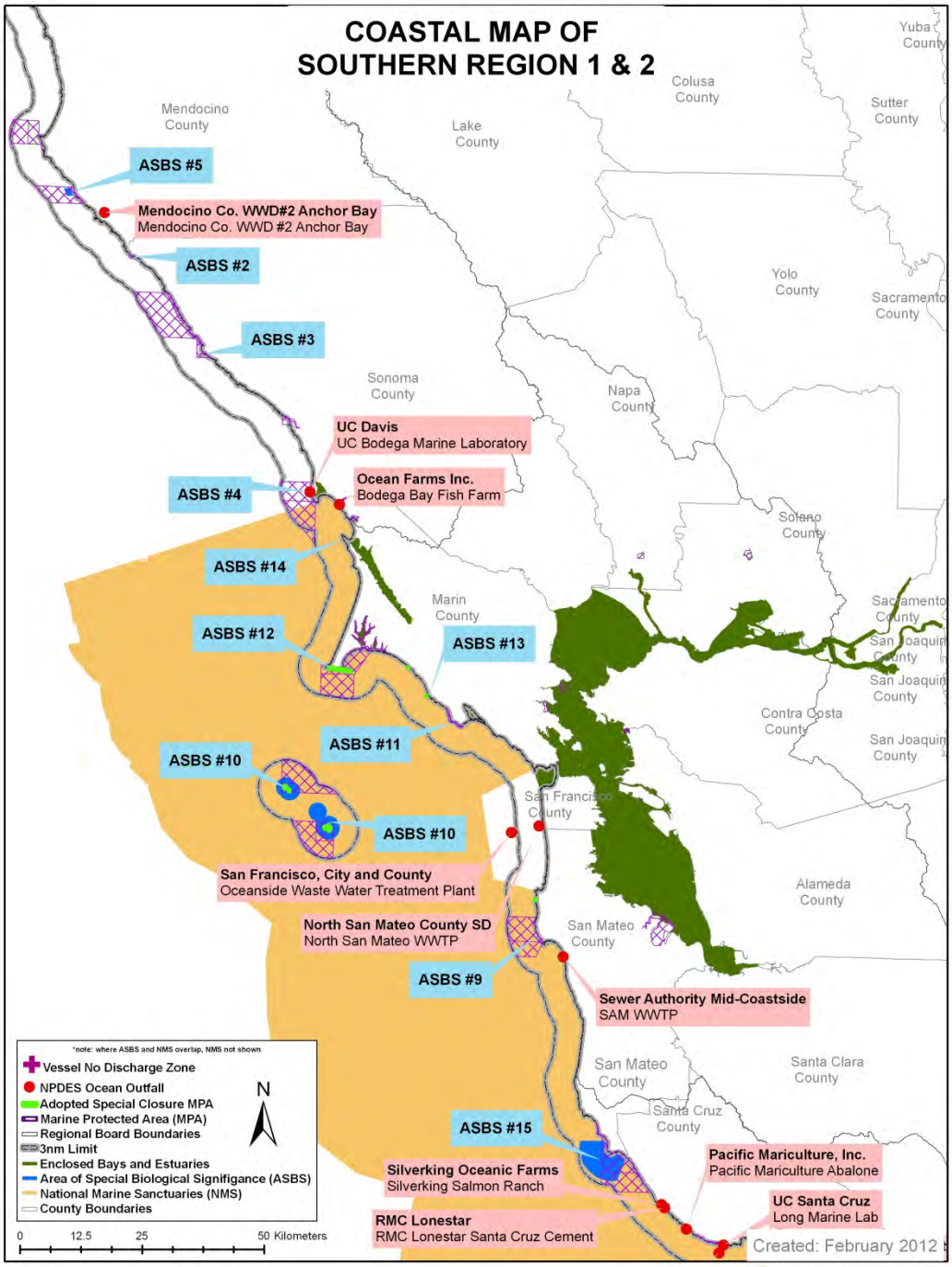

Figure VIII-2. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in southern Region 1 and Region 2.

* See Appendix I for definition of terms.

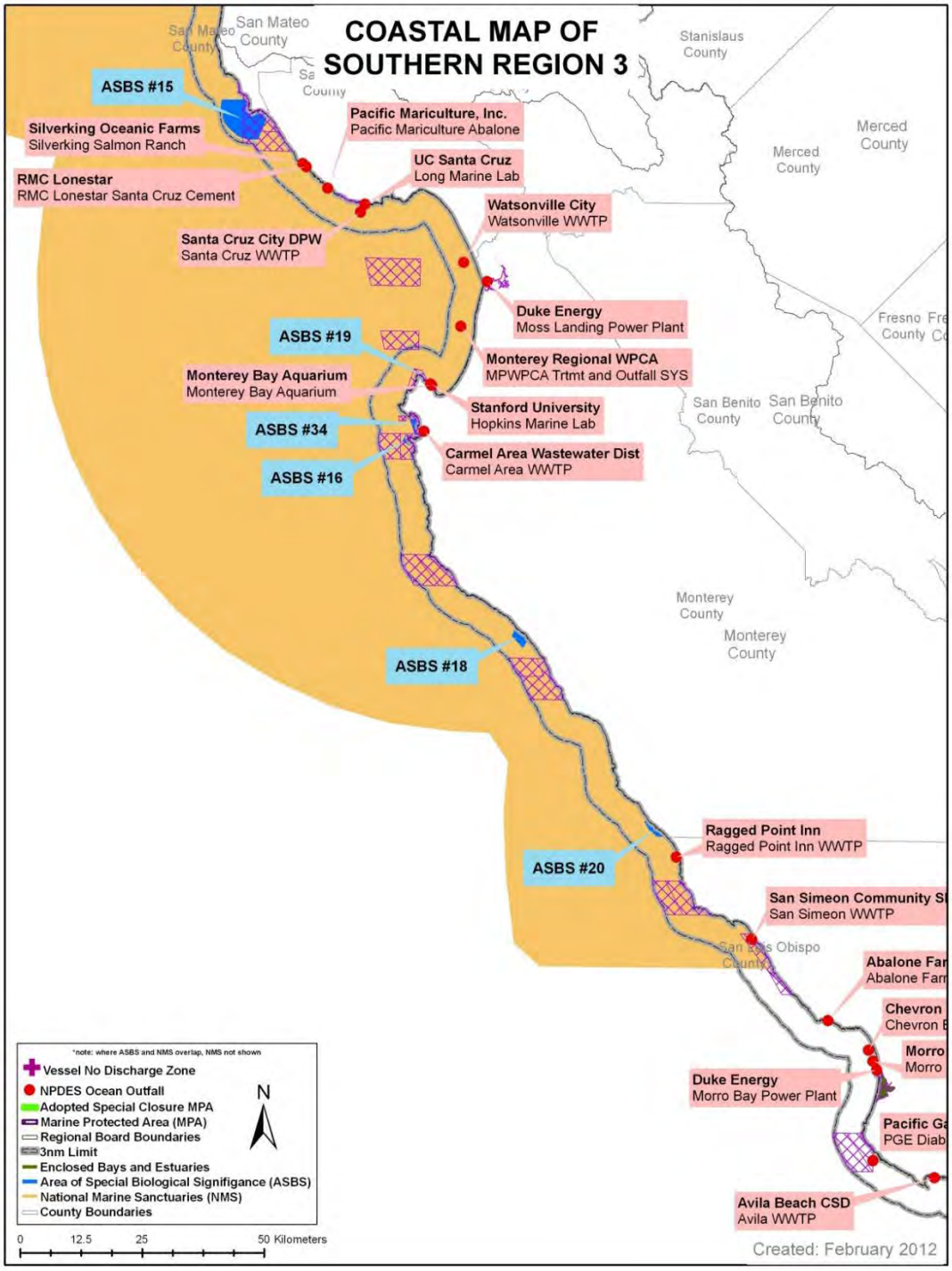

Figure VIII-3. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in northern Region 3.

* See Appendix I for definition of terms.

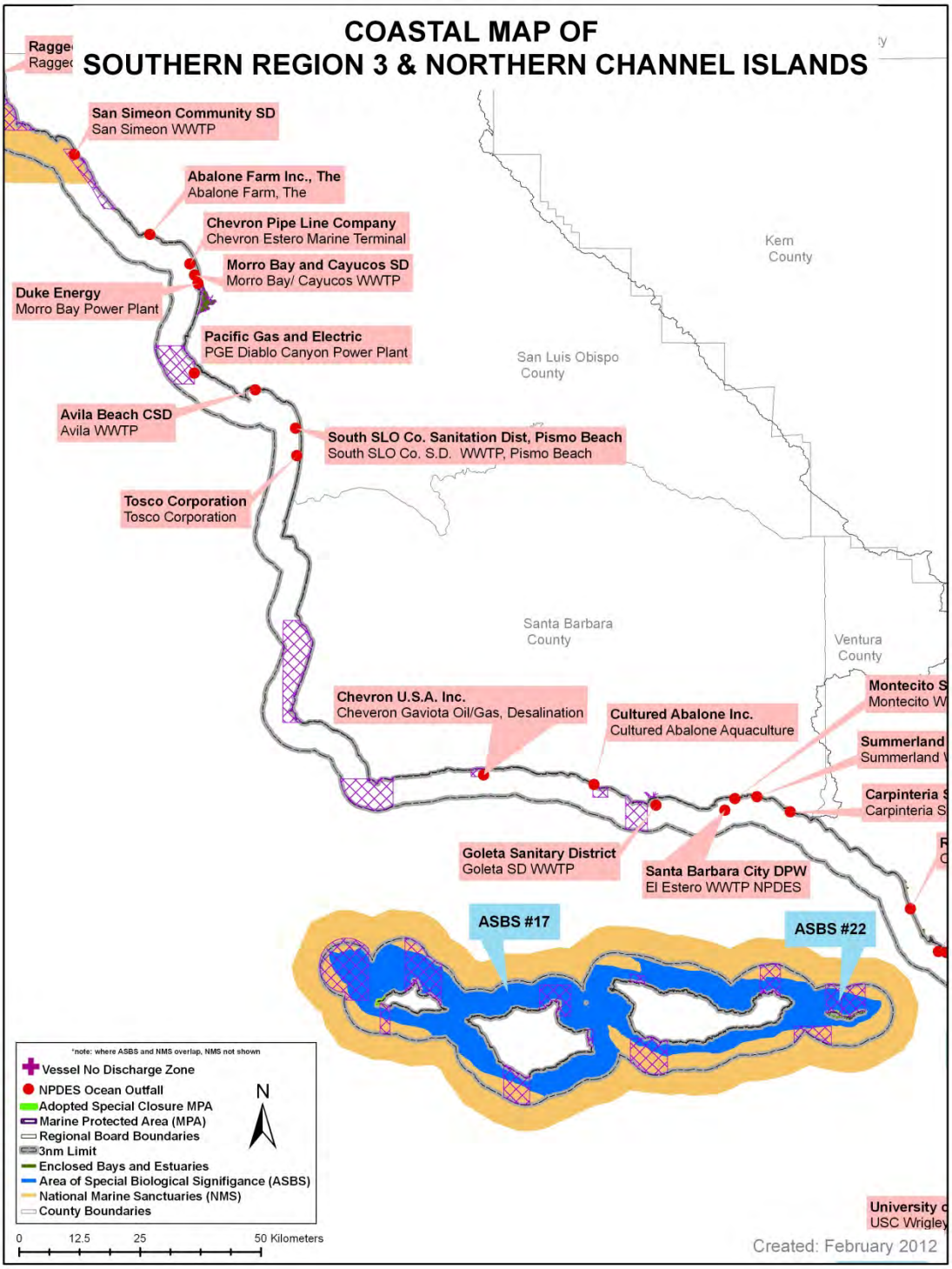

Figure VIII-4. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in southern Region 3 and northern Channel Islands.

* See Appendix I for definition of terms.

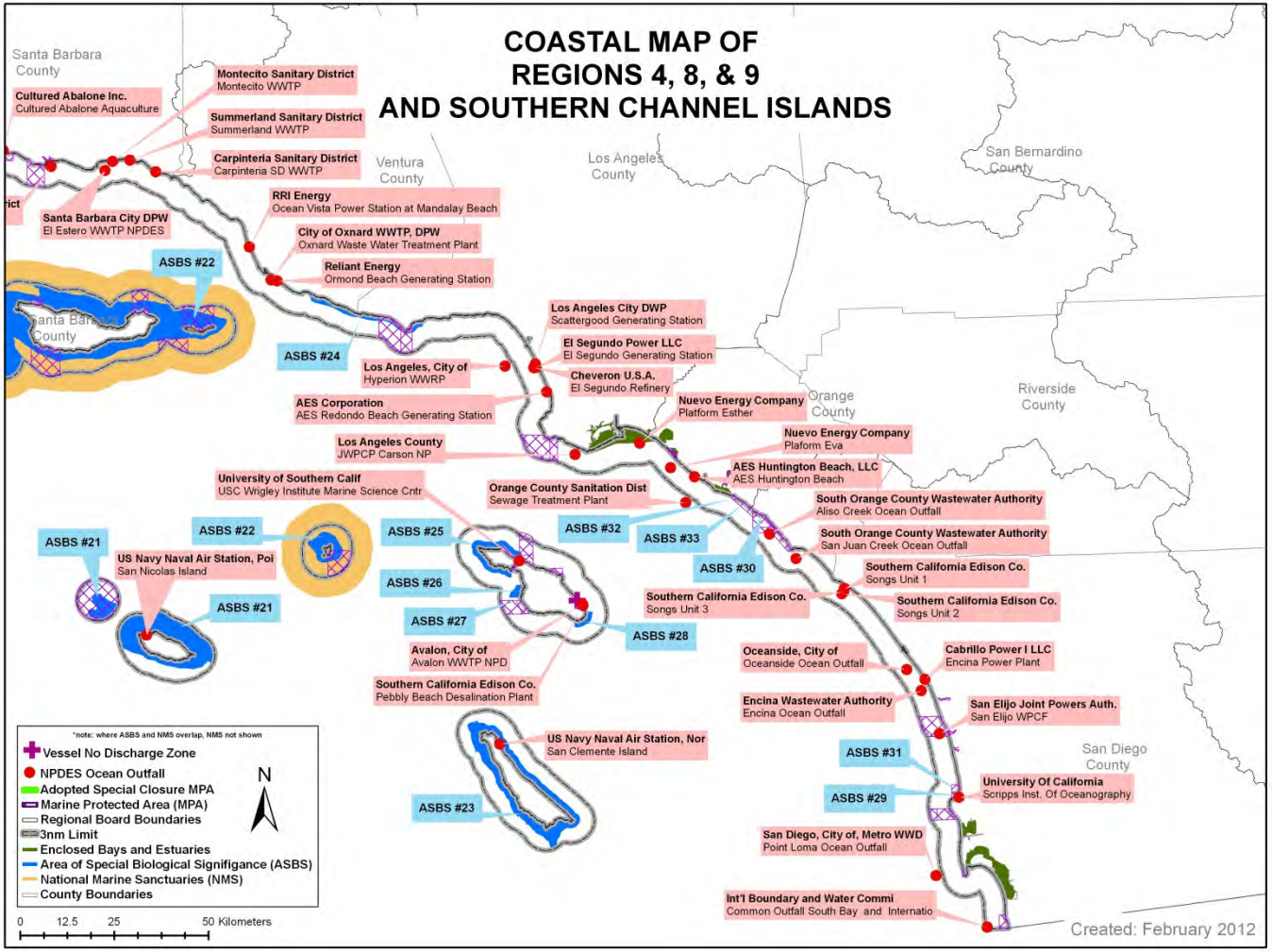

Figure VIII-5. ASBS Boundaries, MPA Boundaries, Wastewater Outfall Points, Marine Sanctuary Boundaries, and Enclosed Bays in southern Channel Islands and Regions 4, 8 and 9.

* See Appendix I for definition of terms.

APPENDIX E: FINAL PART 1 TRASH PROVISIONS OF THE WATER QUALITY CONTROL PLAN FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF CALIFORNIA[97]

Text of the final Part 1 Trash Provisions proposed to Chapter III – Water Quality Objectives of the ISWEBE Plan

A. Trash

TRASH shall not be present in inland surface waters, enclosed bays, estuaries, and along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

Draft text of the final Part 1 Trash Provisions proposed to Chapter IV – Implementation of Water Quality Objectives of the ISWEBE Plan

A. Trash

1. Applicability

a. These TRASH PROVISIONS shall be implemented through a prohibition of discharge (Chapter IV.A.2) and through NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act, waste discharge requirements (WDRs), or waivers of WDRs (as set forth in Chapter IV.A.3 and Chapter IV.A.4 below).

b. These TRASH PROVISIONS apply to all surface waters of the State, with the exception of those waters within the jurisdiction of the Los Angeles Regional Water Quality Control Board (Los Angeles Water Board) for which trash Total Maximum Daily Loads (TMDLs) are in effect prior to the effective date of these TRASH PROVISIONS[1]; provided, however, that:

(1) Upon the effective date of these TRASH PROVISIONS, the Los Angeles Water Board shall cease its FULL CAPTURE SYSTEM certification process and provide that any new FULL CAPTURE SYSTEMS shall be certified by the State Water Board in accordance with these TRASH PROVISIONS.

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[97] The State Water Board intends to amend the Water Quality Control Plan for Enclosed Bays and Estuaries of California to create the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California Plan (ISWEBE Plan). The State Water Board intends that the Part 1 Trash Provisions will be incorporated into the ISWEBE Plan, once it is adopted.

[1] In the Los Angeles Region, there are fifteen (15) trash TMDLs for the following watersheds and water bodies: Los Angeles River Watershed, Ballona Creek, Malibu Creek Watershed, Santa Monica Bay Nearshore and Offshore, San Gabriel River East Fork, Revolon Slough and Beardsley Wash, Ventura River Estuary, Machado Lake, Lake Elizabeth, Lake Hughes, Munz Lake, Peck Road Park Lake, Echo Park Lake, Lincoln Park Lake and Legg Lake. Three of these were established by the USEPA: Peck Road Park Lake, Echo Park Lake and Lincoln Park Lake.

(2) Within one year of the effective date of these TRASH PROVISIONS, the Los Angeles Water Board shall convene a public meeting to reconsider the scope of its trash TMDLs, with the exception of those for the Los Angeles River and Ballona Creek watersheds, to particularly consider an approach that would focus MS4 permittees' trash-control efforts on high-trash generation areas within their jurisdictions.

2. Prohibition of Discharge

The discharge of TRASH to surface waters of the State or the deposition of TRASH where it may be discharged into surface waters of the State is prohibited. Compliance with this prohibition of discharge shall be achieved as follows:

a. Dischargers with NPDES permits that contain specific requirements for the control of TRASH that are consistent with these TRASH PROVISIONS shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements.

b. Dischargers with non-NPDES WDRs or waivers of WDRs that contain specific requirements for the control of TRASH shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements.

c. Dischargers with NPDES permits, WDRs, or waivers of WDRs that do not contain specific requirements for the control of TRASH are exempt from these TRASH PROVISIONS.

d. Dischargers without NPDES permits, WDRs, or waivers of WDRs must comply with this prohibition of discharge.

e. Chapter IV.A.2.b and Chapter IV.A.4 notwithstanding, this prohibition of discharge applies to the discharge of PREPRODUCTION PLASTIC by manufacturers of PREPRODUCTION PLASTICS, transporters of PREPRODUCTION PLASTICS, and manufacturers that use PREPRODUCTION PLASTICS in the manufacture of other products to surface waters of the State, or the deposition of PREPRODUCTION PLASTIC where it may be discharged into surface waters of the State, unless the discharger is subject to a NPDES permit for discharges of STORM WATER associated with industrial activity.

3. Dischargers Permitted Pursuant to Federal Clean Water Act Section 402(p)

PERMITTING AUTHORITIES shall include the following requirements in NPDES permits issued pursuant to Federal Clean Water Act section 402(p):

a. MS4 permittees with regulatory authority over PRIORITY LAND USES shall be required to comply with the prohibition of discharge in Chapter IV.A.2.a herein by either of the following measures:

(1) Track 1: Install, operate, and maintain FULL CAPTURE SYSTEMS for all storm drains that captures runoff from the PRIORITY LAND USES in their jurisdictions; or

(2) Track 2: Install, operate, and maintain any combination of FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS within either the jurisdiction of the MS4 permittee or within the jurisdiction of the MS4 permittee and contiguous MS4 permittees. The MS4 permittee may determine the locations or land uses within its jurisdiction to implement any combination of controls. The MS4 permittee shall demonstrate that such combination achieves FULL CAPTURE SYSTEM EQUIVALENCY. The MS4 permittee may determine which controls to implement to achieve compliance with the FULL CAPTURE SYSTEM EQUIVALENCY. It is, however, the State Water Board's expectation that the MS4 permittee will elect to install FULL CAPTURE SYSTEMS where such installation is not cost-prohibitive.

b. The California Department of Transportation (Department) shall be required to comply with the prohibition of discharge in Chapter IV.A.2.a herein in all SIGNIFICANT TRASH GENERATING AREAS by installing, operating, and maintaining any combination of FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS for all storm drains that captures runoff from SIGNIFICANT TRASH GENERATING AREAS. The Department shall demonstrate that such combination achieves FULL CAPTURE SYSTEM EQUIVALENCY. In furtherance of this provision, the Department and MS4 permittees that are subject to the provisions of Chapter IV.A.3.a herein shall coordinate their efforts to install, operate, and maintain FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS in SIGNIFICANT TRASH GENERATING AREAS and/or PRIORITY LAND USES.

c. Dischargers that are subject to NPDES permits for discharges of STORM WATER associated with industrial activity (including construction activity) shall be required to comply with the prohibition of discharge in Chapter IV.A.2.a herein by eliminating TRASH from all STORM WATER and authorized non-STORM WATER discharges consistent with an outright prohibition of the discharge of TRASH contained within the applicable NPDES permit regulating the industrial or construction facility. If the

discharger can satisfactorily demonstrate to the PERMITTING AUTHORITY its inability to comply with the outright prohibition of the discharge of TRASH contained within the applicable NPDES permit, then the PERMITTING AUTHORITY may require the discharger to either:

(1) Install, operate, and maintain FULL CAPTURE SYSTEMS for all storm drains that captures runoff from the facility or site regulated by the NPDES permit; or,

(2) Install, operate, and maintain any combination of FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS for the facility or site regulated by the NPDES permit. The discharger shall demonstrate that such combination achieves FULL CAPTURE SYSTEM EQUIVALENCY.

Termination of permit coverage for industrial and construction STORM WATER dischargers shall be conditioned upon the proper operation and maintenance of all controls (i.e., FULL CAPTURE SYSTEMS, other TREATMENT CONTROLS, INSTITUTIONAL CONTROLS, and/or MULTI-BENEFIT PROJECTS) used at their facility(ies).

d. A PERMITTING AUTHORITY may determine that specific land uses or locations (e.g., parks, stadia, schools, campuses, or roads leading to landfills) generate substantial amounts of TRASH. In the event that the PERMITTING AUTHORITY makes that determination, the PERMITTING AUTHORITY may require the MS4 to comply with Chapter IV.A.3.a.1 or Chapter IV.A.3.a.2, as determined by the PERMITTING AUTHORITY, with respect to such land uses or locations.

4. Other Dischargers

A PERMITTING AUTHORITY may require dischargers, described in Chapter IV.A.2.c or Chapter IV.A.2.d, that are not subject to Chapter IV.A.3 herein, to implement any appropriate TRASH controls in areas or facilities that may generate TRASH. Such areas or facilities may include (but are not limited to) high usage campgrounds, picnic areas, beach recreation areas, parks not subject to an MS4 permit, or marinas.

5. Time Schedule

The PERMITTING AUTHORITY shall modify, re-issue, or newly adopt NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act that are subject to the provisions of Chapter IV.A.3 herein to include requirements consistent with these TRASH PROVISIONS. The PERMITTING AUTHORITIES shall abide by the following time schedules:

a. **NPDES Permits Regulating MS4 Permittees that have Regulatory Authority over Priority Land Uses.**[2]

(1) Within eighteen (18) months of the effective date of these TRASH PROVISIONS, for each permittee, each PERMITTING AUTHORITY shall either:

A. Modify, re-issue, or adopt the applicable MS4 permit to add requirements to implement these TRASH PROVISIONS. The implementing permit shall require written notice from each MS4 permittee stating whether it has elected to comply under Chapter IV.A.3.a.1 (Track 1) or Chapter IV.A.3.a.2 (Track 2) and such notice shall be submitted to the PERMITTING AUTHORITY no later than three (3) months from the effective date of the implementing permit, or for MS4s designated after the effective date of these TRASH PROVISIONS, three (3) months from the effective date of that designation. The implementing permit shall also require that within eighteen (18) months of the effective date of the implementing permit or new designation, MS4 permittees that have elected to comply with Track 2 shall submit an implementation plan to the PERMITTING AUTHORITY. The implementation plan shall describe: (i) the combination of controls selected by the MS4 permittee and the rationale for the selection, (ii) how the combination of controls is designed to achieve FULL CAPTURE SYSTEM EQUIVALENCY, and (iii) how FULL CAPTURE SYSTEM EQUIVALENCY will be demonstrated. The implementation plan is subject to approval by the PERMITTING AUTHORITY.

B. Issue an order pursuant to Water Code section 13267 or 13383 requiring the MS4 permittee to submit, within three (3) months from receipt of the order, written notice to the PERMITTING AUTHORITY stating whether such MS4 permittee will comply

[2] The time schedule requirement in Chapter IV.A.5.a.1 requiring MS4* permittees to elect Chapter IV.A.3.a.1 (Track 1) or Chapter IV.A.3.a.2 (Track 2) does not apply to MS4* permittees subject to the Municipal Regional Stormwater NPDES Permit (MRP) issued by the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) or the East Contra Costa Municipal Storm Water Permit issued by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) because those permits already require control requirements substantially equivalent to Track 2. The time schedule requirement in Chapter IV.A.5.a.1 requiring MS4 permittees to submit an implementation plan does not apply to the above permittees if the pertinent PERMITTING AUTHORITY determines that such permittee has already submitted an implementation plan prior to the effective date of the TRASH PROVISIONS that is equivalent to the implementation plan required by Chapter IV.A.5.a.1. In the aforementioned permits, the pertinent PERMITTING AUTHORITY may establish an earlier full compliance deadline than that specified in Chapter IV.A.5.a.3.

with the prohibition of discharge under Chapter IV.A.3.a.1 (Track 1) or Chapter IV.A.3.a.2 (Track 2). For MS4s designated after the effective date of these TRASH PROVISIONS, the order pursuant to Water Code section 13267 or 13383 shall be issued at the time of designation. Within eighteen (18) months of the receipt of the Water Code section 13267 or 13383 order, MS4 permittees that have elected to comply with Track 2 shall submit an implementation plan to the PERMITTING AUTHORITY that describes: (i) the combination of controls selected by the MS4 permittee and the rationale for the selection, (ii) how the combination of controls is designed to achieve FULL CAPTURE SYSTEM EQUIVALENCY, and (iii) how FULL CAPTURE SYSTEM EQUIVALENCY will be demonstrated. The implementation plan is subject to approval by the PERMITTING AUTHORITY.

(2) For MS4 permittees that elect to comply with Chapter IV.A.3.a.1 (Track 1), the implementing permit shall state that full compliance shall occur within ten (10) years of the effective date of the first implementing permit except as specified in Chapter IV.A.5.a.5. The permit shall also require these permittees to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation. In no case may the final compliance date be later than fifteen (15) years from the effective date of these TRASH PROVISIONS.

(3) For MS4 permittees that elect to comply with Chapter IV.A.3.a.2 (Track 2), the implementing permit shall state that full compliance shall occur within ten (10) years of the effective date of the first implementing permit except as specified in Chapter IV.A.5.a.5. The permit shall also require these permittees to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation. In no case may the final compliance date be later than fifteen (15) years from the effective date of these TRASH PROVISIONS.

(4) The implementing permit shall state that for MS4 permittees designated after the effective date of the implementing permit, full compliance shall occur within ten (10) years of the effective date of the designation. The permit shall also require such designations to demonstrate achievement of interim milestones such as average load reductions of ten percent (10%) per year or other progress to full implementation.

(5) Where a PERMITTING AUTHORITY makes a determination pursuant to Chapter IV.A.3.d that a specific land use generates a substantial amount of TRASH, that permitting authority has discretion to determine the time schedule for full compliance. In no case may the final compliance date be later than ten (10) years from the determination.

b. **NPDES Permits Regulating the Department.**

(1) Within eighteen (18) months of the effective date of these TRASH PROVISIONS, the State Water Board shall issue an order pursuant to Water Code section 13267 or 13383 requiring the Department to submit an implementation plan to the Executive Director of the State Water Board that: (i) describes the specific locations of its SIGNIFICANT TRASH GENERATING AREAS, (ii) the combination of controls selected by the Department and the rationale for the selections, and (iii) how it will demonstrate FULL CAPTURE SYSTEM EQUIVALENCY.

(2) The Department must demonstrate full compliance with Chapter IV.A.3.b herein within ten (10) years of the effective date of the first implementing NPDES permit, along with achievements of interim milestones such as average load reductions of ten percent (10%) per year. In no case may the final compliance date be later than fifteen (15) years from the effective date of these TRASH PROVISIONS.

c. **NPDES Permits Regulating the Discharges of Storm Water Associated with Industrial Activity (Including Construction Activity).**

Dischargers that are subject to the provisions of Chapter IV.A.3.c herein must demonstrate full compliance in accordance with the deadlines contained in the first implementing NPDES permits. Such deadlines may not exceed the terms of the first implementing permits.

6. Monitoring and Reporting

The PERMITTING AUTHORITY must include monitoring and reporting requirements in its implementing permits. The following monitoring and reporting provisions are the minimum requirements that must be included within the implementing permits:

a. MS4 permittees that elect to comply with Chapter IV.A.3.a.1 (Track 1) shall provide a report to the applicable PERMITTING AUTHORITY demonstrating installation, operation, maintenance, and the Geographic Information System- (GIS-) mapped location and drainage area served by its full capture systems on an annual basis.

b. MS4 permittees that elect to comply with Chapter IV.A.3.a.2 (Track 2) shall develop and implement monitoring plans that demonstrate the effectiveness of the FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS and compliance with FULL CAPTURE SYSTEM EQUIVALENCY. Monitoring reports shall be provided to the applicable PERMITTING AUTHORITY on an annual basis, and shall include GIS-mapped locations and drainage area served for each of the FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS installed or utilized by the MS4 permittee. In developing the monitoring reports the MS4* permittee should consider the following questions:

(1) What type of and how many TREATMENT CONTROLS, INSTITUTIONAL CONTROLS, and/or MULTI-BENEFIT PROJECTS have been used and in what locations?

(2) How many FULL CAPTURE SYSTEMS have been installed (if any), in what locations have they been installed, and what is the individual and cumulative area served by them?

(3) What is the effectiveness of the total combination of TREATMENT CONTROLS, INSTITUTIONAL CONTROLS, and MULTI-BENEFIT PROJECTS employed by the MS4 permittee?

(4) Has the amount of TRASH discharged from the MS4 decreased from the previous year? If so, by how much? If not, explain why.

(5) Has the amount of TRASH in the MS4's receiving water(s) decreased from the previous year? If so, by how much? If not, explain why.

c. The Department, as subject to the provisions of Chapter IV.A.3.b, shall develop and implement monitoring plans that demonstrate the effectiveness of the controls and compliance with FULL CAPTURE SYSTEM EQUIVALENCY. Monitoring reports shall be provided to the State Water Board on an annual basis, and shall include GIS-mapped locations and drainage area served for each of the FULL CAPTURE SYSTEMS, MULTI-BENEFIT PROJECTS, other TREATMENT CONTROLS, and/or INSTITUTIONAL CONTROLS installed or utilized by the Department. In developing the monitoring report, the Department should consider the following questions:

(1) What type of and how many TREATMENT CONTROLS, INSTITUTIONAL CONTROLS, and/or MULTI-BENEFIT PROJECTS have been used and in what locations?

(2) How many FULL CAPTURE SYSTEMS have been installed (if any), in what locations have they been installed, and what is the individual and cumulative area served by them?

(3) What is the effectiveness of the total combination of TREATMENT CONTROLS, INSTITUTIONAL CONTROLS, and MULTI-BENEFIT PROJECTS employed by the Department?

(4) Has the amount of TRASH discharged from the Department's MS4 decreased from the previous year? If so, by how much? If not, explain why.

(5) Has the amount of TRASH in the receiving waters decreased from the previous year? If so, by how much? If not, explain why.

d. Dischargers that are subject to the provisions of Chapter IV.A.3.c herein shall be required to report the measures used to comply with Chapter IV.A.3.c.

Text of the final Part 1 Trash Provisions proposed to Appendix A: Glossary of the ISWEBE Plan

FULL CAPTURE SYSTEM: A TREATMENT CONTROL, or series of TREATMENT CONTROLS, including but not limited to, a MULTI-BENEFIT PROJECT or a LOWIMPACT DEVELOPMENT CONTROL that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

[Rational equation is used to compute the peak flow rate: Q = C•I•A, where Q = design flow rate (cubic feet per second, cfs); C = runoff coefficient (dimensionless); I = design rainfall intensity (inches per hour, as determined per the rainfall isohyetal map specific to each region, and A = subdrainage area (acres).]

Prior to installation, FULL CAPTURE SYSTEMS must be certified by the Executive Director, or designee, of the State Water Board. Uncertified FULL CAPTURE SYSTEMS will not satisfy the requirements of these TRASH PROVISIONS. To request certification, a permittee shall submit a certification request letter that includes all relevant supporting documentation to the State Water Board's Executive Director. The Executive Director, or designee, shall issue a written determination approving or denying the certification of the proposed FULL CAPTURE SYSTEM or conditions of approval, including a schedule to review and reconsider the certification. FULL CAPTURE SYSTEMS certified by the Los Angeles Regional Water Board prior to the effective date of these TRASH PROVISIONS and FULL CAPTURE SYSTEMS listed in Appendix I of the Bay Area-wide Trash Capture Demonstration Project, Final Project Report (May 8, 2014) will satisfy the requirements of these TRASH PROVISIONS,

unless the Executive Director, or designee, of the State Water Board determines otherwise.

FULL CAPTURE SYSTEM EQUIVALENCY: The TRASH load that would be reduced if FULL CAPTURE SYSTEMS were installed, operated, and maintained for all storm drains that capture runoff from the relevant areas of land (PRIORITY LAND USES, SIGNIFICANT TRASH GENERATING AREAS, facilities or sites regulated by NPDES permits for discharges of STORM WATER associated with industrial activity, or specific land uses or areas that generate substantial amounts of TRASH, as applicable). The FULL CAPTURE SYSTEM EQUIVALENCY is a TRASH load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of PERMITTING AUTHORITY. Examples of such approaches include, but are not limited to, the following:

(1) Trash Capture Rate Approach. Directly measure or otherwise determine the amount of TRASH captured by FULL CAPTURE SYSTEMS for representative samples of all similar types of land uses, facilities, or areas within the relevant areas of land over time to identify specific TRASH capture rates. Apply each specific TRASH capture rate across all similar types of land uses, facilities, or areas to determine FULL CAPTURE SYSTEM EQUIVALENCY. TRASH capture rates may be determined either through a pilot study or literature review. FULL CAPTURE SYSTEMS selected to evaluate TRASH capture rates may cover entire types of land uses, facilities, or areas, or a representative subset of types of land uses, facilities, or areas. With this approach, FULL CAPTURE SYSTEM EQUIVALENCY is the sum of the products of each type of land use, facility, or area multiplied by TRASH capture rates for that type of land use, facility, or area.

(2) Reference Approach. Determine the amount of TRASH in a reference receiving water in a reference watershed where FULL CAPTURE SYSTEMS have been installed for all storm drains that capture runoff from all relevant areas of land. The reference watershed must be comprised of similar types and extent of sources of TRASH and land uses (including PRIORITY LAND USES and all other land uses), facilities, or areas as the permittee's watershed. With this approach, FULL CAPTURE SYSTEM EQUIVALENCY would be demonstrated when the amount of TRASH in the receiving water is equivalent to the amount of TRASH in the reference receiving water.

INSTITUTIONAL CONTROLS: Non-structural best management practices (i.e., no structures are involved) that may include, but not be limited to, street sweeping, sidewalk TRASH bins, collection of the TRASH, anti-litter educational and outreach programs, producer take-back for packaging, and ordinances.

LOW-IMPACT DEVELOPMENT CONTROLS: TREATMENT CONTROLS that employ natural and constructed features that reduce the rate of STORM WATER runoff, filter out pollutants, facilitate STORM WATER storage onsite, infiltrate STORM WATER into

the ground to replenish groundwater supplies, or improve the quality of receiving groundwater and surface water. (See Water Code § 10564.)

MULTI-BENEFIT PROJECT: A TREATMENT CONTROL project designed to achieve any of the benefits set forth in section 10562, subdivision (d) of the Water Code. Examples include projects designed to: infiltrate, recharge or store STORM WATER for beneficial reuse; develop or enhance habitat and open space through STORM WATER and non-STORM WATER management; and/or reduce STORM WATER and non-STORM WATER runoff volume.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4): Same meaning set forth in 40 Code of Federal Regulations section 122.26(b)(8).

PREPRODUCTION PLASTIC: Same meaning set forth in section 13367(a) of the Water Code.

PRIORITY LAND USES: Those developed sites, facilities, or land uses (i.e., not simply zoned land uses) within the MS4 permittee's jurisdiction from which discharges of TRASH are regulated by these TRASH PROVISIONS as follows:

(1) High-density residential: all land uses with at least ten (10) developed dwelling units/acre.
(2) Industrial: land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).
(3) Commercial: land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.)
(4) Mixed urban: land uses where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).
(5) Public transportation stations: facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).

Equivalent alternate land uses: An MS4 permittee with regulatory authority over PRIORITY LAND USES may issue a request to the applicable PERMITTING AUTHORITY that the MS4 permittee be allowed to substitute one or more land uses identified above with alternate land uses within the MS4 permittee's jurisdiction that generates rates of TRASH that is equivalent to or greater than the PRIORITY LAND USE(S) being substituted. The land use area requested to substitute for a PRIORITY LAND USE need not be an acre-for-acre substitution but may involve one or more PRIORITY LAND USES, or a fraction of a PRIORITY LAND USE, or both, provided the total TRASH generated in the equivalent alternative land use is equivalent to or greater than the total TRASH generated from the PRIORITY LAND USE(S) for which substitution is requested. Comparative TRASH generation rates shall be established through the reporting of quantification measures such as street sweeping and catch basin cleanup records; mapping; visual trash presence surveys, such as the "Keep America

Beautiful Visible Litter Survey"; or other information as required by the PERMITTING AUTHORITY.

PERMITTING AUTHORITY: The State Water Board or Regional Water Board, whichever issues the permit.

SIGNIFICANT TRASH GENERATING AREAS: All locations or facilities within the Department's jurisdiction where TRASH accumulates in substantial amounts, such as:

(1) Highway on- and off-ramps in high density residential, commercial, and industrial land uses (as such land uses are defined under PRIORITY LAND USES herein).
(2) Rest areas and park-and-rides.
(3) State highways in commercial and industrial land uses (as such land uses are defined under PRIORITY LAND USES herein).
(4) Mainline highway segments to be identified by the Department through pilot studies and/or surveys.

STORM WATER: Same meaning set forth in 40 Code of Federal Regulations section 122.26(b)(13) (Nov. 16, 1990).

TREATMENT CONTROLS: Structural best management practices to either (a) remove pollutants and/or solids from STORM WATER runoff, wastewater, or effluent, or (b) capture, infiltrate or reuse STORM WATER runoff, wastewater, or effluent. TREATMENT CONTROLS include FULL CAPTURE SYSTEMS and LOW-IMPACT DEVELOPMENT CONTROLS.

TRASH: All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

TRASH PROVISIONS: The water quality objective for TRASH, as well as the prohibition of discharge and implementation requirements set forth in Chapter IV.A herein.

Final Staff Report

Including the Substitute Environmental Documentation

Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California

DIVISION OF WATER QUALITY

STATE WATER RESOURCES CONTROL BOARD

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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LIST OF ABBREVIATIONS

AB	Assembly Bill
ASBS	Areas of Special Biological Significance
Basin Plans	Regional Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CEQA	California Environment Quality Act
CGP	Construction General Permit
Colorado River Basin Water Board	Colorado River Basin Regional Water Resource Control Board
CWA	Clean Water Act
GIS	Geographic Information System
LID	Low-Impact Development Controls
Los Angeles Water Board	Los Angeles Regional Water Quality Control Board
IGP	Industrial Storm Water General Permit
ISWEBE Plan	Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California
MFAC	Minimum Frequency of Assessment and Collection
MRP	San Francisco Bay Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
NOAA	National Oceanic and Atmospheric Administration
North Coast Water Board	North Coast Regional Water Quality Control Board
NPDES	National Pollutant Discharge Elimination System
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
Porter-Cologne	Porter-Cologne Water Quality Control Act
Regional Water Board	Regional Water Quality Control Board
San Francisco Bay Water Board	San Francisco Bay Regional Water Quality Control Board
SB	Senate Bill
SED	Substitute Environmental Documentation
State Water Board	State Water Resources Control Board
TMDLs	Total Maximum Daily Loads
Trash Amendments	Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California
U.S. EPA	United States Environmental Protection Agency
Wat. Code	California Water Code
Water Boards	State and Regional Water Quality Control Boards
WDR	Waste Discharge Requirements

1 INTRODUCTION

Trash is junk or rubbish generated by human activity that frequently ends up in waterways. Trash is items such as cigarette butts, paper, fast food containers, plastic grocery bags, cans and bottles, used diapers, construction site debris, industrial preproduction plastic pellets, old tires, and appliances. Trash discarded on land frequently ends up in waterways and the ocean as rainstorms wash it into gutters and storm drains, and then into creeks and rivers. The presence of trash in waterways adversely affects beneficial uses, including but not limited to threats to aquatic life, wildlife, and public health.

The State Water Resources Control Board and Regional Water Quality Control Boards (collectively, the Water Boards) are controlling trash primarily through Total Maximum Daily Loads (TMDLs) and permits. The Los Angeles Regional Water Quality Control Board (Los Angeles Water Board) led the way with effective trash management strategies with the Los Angeles River Watershed Trash TMDL. The San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) is following this lead with trash components to their Municipal Regional Storm Water National Pollutant Discharge Elimination System (NPDES) Permit. These approaches are not entirely consistent, and there are still ongoing trash problems across the state waterways. There is a strong need for a statewide consistency within the Water Boards regarding trash control.

The State Water Resources Control Board (State Water Board) is proposing an Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. This Staff Report shall collectively refer to the amendment to control trash and Part 1 Trash Provisions as "Trash Amendments".[1] The provisions proposed in the Trash Amendments include six elements: (1) water quality objective, (2) applicability, (3) prohibition of discharge, (4) implementation provisions, (5) time schedule, and (6) monitoring and reporting requirements. The proposed provisions would apply to all surface waters of the state, with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the Trash Amendments.

This Final Staff Report analyzes the need for the final Trash Amendments and alternative options to the Trash Amendments considered by the State Water Board. This document also serves as the State Water Board's Substitute Environmental Documentation (SED) required to meet the requirements of the California

[1] The State Water Board intends to amend the Water Quality Control Plan for Enclosed Bays and Estuaries of California to create the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California Plan (ISWEBE Plan). The State Water Board intends that the Part 1 Trash Provisions will be incorporated into the ISWEBE Plan, once it is adopted.

Environmental Quality Act (CEQA)[2], pursuant to Public Resources Code sections 21080.5, 21159 and CEQA Guidelines sections 15250 – 15253; and the State Water Board's Regulations for Implementation of the Environmental Quality Act of 1970, 23 California Code of Regulations (CCR) sections 3720 – 3781.

1.1 Purpose of the Staff Report

The purpose of this Final Staff Report is to present the State Water Board's analysis of the need for and the effects of the final Trash Amendments and meet the State Water Board's requirement to comply with CEQA.

CEQA authorizes the Secretary for Natural Resources to certify that state regulatory programs meeting certain environmental standards are exempt from many of the procedural requirements of CEQA (CCR, Title 14, § 15251(g)). The Secretary for Natural Resources has certified the State Water Board regulations for adoption or approval of standards, rules, regulations, or plans to be used in the Basin/208 Planning program for the protection, maintenance, and enhancement of water quality in California (23 CCR § 3775 – 3781). Therefore, this Final Staff Report includes the documentation (i.e., draft SED) required for compliance with CEQA, and a separate CEQA document will not be prepared.

According to the State Water Board regulations for the implementation of CEQA (23 CCR § 3777), the SED shall consist of a written report prepared for the Board containing an environmental analysis of the project; a completed environmental checklist (where the issues identified in the checklist must be evaluated in the checklist or elsewhere in the SED); and other documentation as the board may include. The SED is required to include, at a minimum, the following information:

1) A brief description of the proposed project;
2) An identification of any significant or potentially significant adverse environmental impacts of the proposed project;
3) An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and
4) An environmental analysis of the reasonably foreseeable methods of compliance. The environmental analysis shall include, at a minimum, all of the following:
    a) An identification of the reasonably foreseeable methods of compliance with the project;

[2] CEQA provides that certain regulatory programs of state agencies may be certified by the Secretary for Natural Resources as being exempt from the requirements for preparing Environmental Impact Reports (EIR), Negative Declarations, and Initial Studies if the Secretary finds that the program meets certain criteria. A certified program remains subject to other provisions in CEQA such as the policy of avoiding significant adverse effects on the environment where feasible. The Secretary has certified the State Water Resource Control Board regulatory program for adoption or approval of standards, rules, regulations, or plans to be used in the Basin/208 Planning program for the protection, maintenance, and enhancement of water quality in California as an exempt certified state regulatory program (Pub. Res. Code § 21080.5; Cal. Code Regs., tit.14, § 15251, subd. (g)).

b) An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;
c) An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and,
d) An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance.

In the preparation of this Final Staff Report, the State Water Board utilizes numerical ranges or averages to assess the potential environmental impacts over a broad range of geographic areas within the state covering all nine regional water board jurisdictions. Per the direction of CEQA and the State Water Board regulations, however, the analysis contained in this Final Staff Report does not engage in speculation or conjecture and the environmental analysis does not attempt to provide a site-specific project level analysis of the methods of compliance (which CEQA may otherwise require of those agencies who are responsible for complying with the plan or policy when they determine the manner in which they comply). The analysis does take into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites. (Pub Res Code § 21159; 14 CCR § 15144, 15145; 23 CCR § 3777(c)). Responses to comments and consequent revisions to the information in the Draft Staff Report will be subsequently presented in a Final Staff Report for consideration by the State Water Board. After the State Water Board has certified the document as adequate, the title of the document becomes the Final Staff Report.

1.2 Regulatory Framework

In 1969, the Porter-Cologne Water Quality Control Act (Porter-Cologne) (California Water Code (Wat. Code § 13000 et seq.) was adopted as the principal law governing water quality in California. Porter-Cologne institutes a comprehensive program to protect the quality and "beneficial uses" (or "designated uses" under federal parlance) of the state's water bodies. Beneficial uses include, but are not limited to, "domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Wat. Code § 13050, subd. (f)). Regulatory protection of beneficial uses is carried out, in part, through water quality objectives established in each regional water quality control plan (basin plan) (Wat. Code § 13241). Under Porter-Cologne, the regional water quality control boards (regional water boards) adopt basin plans in which they designate the beneficial uses of the waters of the region and establish water quality objectives to protect those beneficial uses. Basin plans are required to include a plan of implementation to ensure that waters achieve the water quality objectives.

As proposed, the Trash Amendments would apply to all surface waters of the state, including: ocean waters, enclosed bays and estuaries, and inland surface waters. "Waters of the state" are defined under Porter-Cologne as any surface water or groundwater, including saline waters, within the boundaries of the state (Wat. Code § 13050(e)). Under California state law, territorial boundaries extend three nautical miles

beyond the outermost islands, reefs, and rocks and include all waters between the islands and the coast (Cal. Gov. Code § 170).

In 1972, Congress enacted the federal Clean Water Act (CWA) with the goal to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (33 U.S. Code § 1251(a)). The CWA directs states, with oversight by the U.S. Environmental Protection Agency (U.S. EPA), to adopt water quality standards to protect the public health and welfare, enhance the quality of water, and serve the purposes of the CWA. Ultimately, states must provide comprehensive protection of their waters through the application of water quality standards. State standards must include: (1) designated uses for all water bodies within their jurisdictions, and (2) water quality criteria (referred to as objectives under California law) sufficient to protect the most sensitive of the uses. The CWA established the NPDES Permit Program to regulate point source discharges of pollutants to waters of the United States (33 U.S. Code § 1342). In California, the Water Boards issue and administer NPDES permits under a program approved by the U.S. EPA (Wat. Code § 13377), and in conjunction with the requirements of Porter-Cologne.

NPDES permits are required to contain effluent limitations reflecting pollution reduction achievable through technological means, as well as more stringent limitations necessary to ensure that receiving waters meet state water quality standards (33 U.S. Code § 1311(b)(1)(A)-(C)). Section 303, subdivision (c)(2)(B) of the CWA requires states to adopt water quality criteria for all priority pollutants established in section 307(a). As part of its efforts to comply with section 303, subdivision (c)(2)(B), the State Water Board adopted two statewide plans in accordance with Water Code section 13170: the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) in 1972 and the Enclosed Bays and Estuaries Plan in 2008. These statewide plans supersede basin plans to the extent that any conflict exists (Wat. Code § 13170).

The CWA and Porter-Cologne direct the Water Boards to regulate the discharge of pollutants into waters of the United States and waters of the State. Trash is considered a pollutant and where runoff and storm water transport trash into these waters, it is considered discharge of waste subject to Water Board authority.

1.3 Effect on Existing Basin Plans, Trash-Related TMDLs and Permits

Antidegradation

Any relaxation of water quality standards that may occur as a result of the final Trash Amendments must comply with federal and state antidegradation policies, which require the protection of all existing beneficial uses (40 CFR § 131.12, State Water Board Resolution No. 68-16). If the initial water quality exceeds that which is necessary to protect every beneficial use, the water quality can be lowered, as long as certain criteria are met. Dischargers are not allowed to degrade water bodies to levels below that which is necessary to protect existing beneficial uses. The antidegradation analysis for the final Trash Amendments is found in Section 9.

Basin Plans

Following adoption by the State Water Board, the final Trash Amendments would supersede basin plans to the extent that any conflict exists (Wat. Code § 13170).

TMDLs

The final Trash Amendments would apply to all surface waters in the state, with the exception of those waters with the jurisdiction of the Los Angeles Water Board that have trash TMDLs in effect prior to the Trash Amendments. As the fifteen trash TMDLs in the Los Angeles Region have more stringent provisions than the final Trash Amendments, the final Trash Amendments would not result in a degradation of water quality standards in those waters. While the final Trash Amendments do not apply to existing trash TMDLs in the Los Angeles Region, the final Trash Amendments direct the Los Angeles Water Board to reconsider the scope of its trash TMDLs within one year of the Trash Amendments' effective date and focus its permittees' trash control efforts on high trash generation areas rather than all areas within each permittee's jurisdiction. The reconsideration would occur for all existing trash TMDLs, except for the Los Angeles River Watershed and Ballona Creek Trash TMDLs, because those two TMDLs are approaching final compliance deadlines of September 30, 2016 and September 30, 2015, respectively.

Permits

The final Trash Amendments would require permitting authorities to re-open, re-issue, or newly adopt NPDES permits for Municipal Separate Storm Sewer System (MS4) Phase I permittees, MS4 Phase II permittees, and California Department of Transportation (Caltrans) permittees, as well as Industrial Storm Water General Permit (IGP) and Construction General Permit (CGP) permittees, to incorporate the prohibition of discharge and implementation requirements of the final Trash Amendments within those permits. Until such permits are amended, the final Trash Amendments would not apply to dischargers covered under those permits.

A Water Board could, however, adopt storm water NPDES permits with stricter trash-discharge provisions, such as broadening the scope of regulated land uses.

1.4 Beneficial Uses Impacted by Trash

The final Trash Amendments are directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Beneficial uses, as defined by Porter-Cologne section 13050, are the uses of surface water and groundwater that may be protected against water quality degradation. The Water Boards are charged with protecting all beneficial uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of surface waters, ground waters, marshes, and wetlands serve as a basis for establishing water quality objectives and discharge prohibitions to attain these goals and are defined in the basin plans for each regional water board and the Ocean Plan.

There are many beneficial uses in California that can be affected by trash. This section discusses the impacts of trash on beneficial uses associated with aquatic life and public health.

Trash is a threat to aquatic habitat and life as soon as it enters state waters. Mammals, turtles, birds, fish, and crustaceans are threatened following the ingestion of or entanglement by trash (Moore et al. 2001, U.S. EPA 2002). Ingestion and

entanglement can be fatal for freshwater, estuarine, and marine life. Similarly, habitat alteration and degradation due to trash can make natural habitats unsuitable for spawning, migration, and preservation of aquatic life. These negative effects of trash to aquatic life can impact twelve beneficial uses. A summary of specific impacts associated with each aquatic life beneficial use is presented in Table 13, Appendix A.

Trash in state waters can impact humans by means of jeopardizing public health and safety and posing harm and hindrance in recreational, navigational, and commercial activities. Trash can also affect the traditional and cultural rights of indigenous people or subsistence fishers to waters of the state. Specific impacts associated with each public health beneficial use is presented in Table 14, Appendix A.

1.5 Trash in the Environment

The presence of trash in surface waters, especially coastal and marine waters, is a serious issue in California. Trash discarded on land is frequently transported through storm drains and to waterways, shorelines, the seafloor, and the ocean. Statewide and local studies have documented the presence of trash in state waters and the accumulation of land-based trash in the ocean. Street and storm drain trash studies conducted in regions across California have provided insight into the composition and quantity of trash that flows from urban streets into the storm drain system and out to adjacent waters.

Trash in state waters is related to the direct and indirect activities of inhabitants inland, along coastal shorelines, and offshore (NOAA 2008a). A major source of trash is either intentionally or accidentally improperly discarded waste, thrown or deposited on land and in water bodies. If trash occurs on land, it is commonly transported to nearby water bodies by wind and/or rain or dry weather runoff. The five primary sources and transport mechanisms for trash to reach state waters are:

1) Littering by the public on or adjacent to waterways;
2) Storm events draining watersheds and carrying trash originating from littering, inadequate waste handling or illegal dumping via the storm drain system to receiving waters;
3) Wind-blown trash, also originating from littering, inadequate waste handling or illegal dumping;
4) Illegal dumping into or adjacent to water bodies, and;
5) Direct disposal (overboard disposal and/or dumping) of trash into water bodies from vessels involved in commercial, military, fishing or recreational activities.

Studies show that trash is predominantly generated on land and then transported to a receiving water body. The main transport pathway of trash to receiving water bodies is through storm water transport. Several studies have been conducted to determine the sources of land-based trash generation and the rates of trash generation areas. The land areas evaluated in these studies typically included the following: high density residential, low density residential, commercial services, industrial, public facilities, education institutions, military institution, transportation, utilities, mixed urban, open space, agriculture, water, and recreation land uses (City of Los Angeles 2002, County of

Los Angeles Department of Public Works 2004a; 2004b, City of Cupertino 2012, City of San Jose 2012, EOA, Inc. 2012a; 2012b).

Additional details about the composition of trash, the transport of transport of trash in the environmental, and trash assessment studies can be found in Appendix A.

1.6 Current Efforts to Address Concerns Related to Trash in California Waters

Regulations and policies are currently implemented in California to address trash in state waters. These efforts are discussed in the following sections and in greater detail in Appendix A.

State Laws and Local Ordinances

Numerous statewide laws and local ordinances have been adopted in California to address trash. For instance, California prohibits littering where such litter "creates a public health and safety hazard, a public nuisance, or a fire hazard" (Penal Code § 374.4). The California Vehicle Code provides that no one may throw or trash, including cigarettes onto highways and adjacent areas (§ 23111 and 23112).

California is the leader in implementing local ordinances with goals of reducing trash, specifically plastics. At least 65 jurisdictions have either banned expanded polystyrene foam food containers completely or have prohibited use by government agencies or at public events (Clean Water Action 2011b). In 2006, the City of San Francisco passed a ban on single-use carryout bags in grocery stores and pharmacies. Since then, at least 72 local jurisdictions have adopted city and county ordinances for single-use carryout bags (Environment California Research and Policy Center 2011). Statewide, several attempts have been made to pass single-use plastic bag ban bills over the past several years, including Assembly Bill (AB) 1998 in 2010 and Senate Bill (SB) 405 in 2013, although none have been passed in the State Legislature (West Coast Governors' Alliance on Ocean Health 2013).

On September 30, 2014, Governor Edmund G. Brown Jr. signed the nation's first statewide ban on single-use plastic bags—Senate Bill 270 (Sen. Padilla) (2014 Stat. Ch. 850) (adding Chapter 5.3 to Part 3 of Division 30 of the Public Resources Code). Senate Bill 270 aligns state law with the ordinances passed by local governments in California to reduce plastic waste. The new law prohibits grocery stores and pharmacies that have a specified amount of sales in dollars or retail floor space from providing single-use carry-out plastic bags as of July 1, 2015, and enacts the same ban for convenience stores and liquor stores on or after the following year. The legislation prohibits stores from selling or distributing a recycled paper bag or compostable bags at the point of sale for at a cost of less than $0.10.

No Existing Trash-Specific Water Quality Objectives

Each regional water board has adopted narrative objective(s) for pollutants in its basin plan. These narrative objectives refer to trash-related pollutants and other pollutants such as foam and sediment in general terms (i.e., floatable, suspended, and settleable material), but do not specifically refer to trash as a specific pollutant. The Ocean Plan also has similar floatable, suspended, and settleable material objectives, but no specific mention of trash as a pollutant.

Current NPDES Permits and Existing Trash TMDLs

The CWA establishes the NPDES permit as the primary mechanism for achieving water quality standards in navigable waters. NPDES permits are issued to point source dischargers and include effluent and receiving water limitations. Existing NPDES permits, such as Phase I, Phase II, and Caltrans, have some existing requirements for trash reduction in the form of institutional controls, such as street sweeping and educational programs (Gordon and Zamist 2003). These existing requirements can be applicable to multiple types of urban storm water pollutants, including trash.

For those waters that do not attain water quality standards even after NPDES permits are issued to point sources with the effluent limitations described above, the CWA requires states to adopt TMDLs for the pollutants causing the impairment in a water body. TMDLs are designed to restore water quality by controlling the pollutants that cause or contribute to such impairments.

The presence of trash in California waters has resulted in a number of waters listed as impaired on the CWA section 303(d) list of Water Quality Limited Segments over the past several listing cycles. According to California's 2008-2010 section 303(d) list of impaired waters, there are 73 listings due to trash in California waters. Although listings occur in four regions (San Francisco Bay, Los Angeles, Colorado River Basin, and San Diego), TMDLs have only been developed to date in the Los Angeles Region and the Colorado River Basin Region. In the Colorado River Basin, a TMDL for trash was adopted for the New River (at the international boundary) that included a numeric target of zero trash (Colorado River Basin Water Board 2006). In the Los Angeles Region, fifteen TMDLs were adopted for trash and debris by either the Los Angeles Water Board or U.S. EPA: San Gabriel River East Fork, Ballona Creek, Los Angeles River Watershed, Revolon Slough, and Beardsley Wash, Ventura River Estuary, Malibu Creek Watershed, Lake Elizabeth, Munz Lake, Lake Hughes, Legg Lake, Machado Lake, Santa Monica Bay Nearshore and Offshore, Peck Road Park Lake, Echo Park Lake, and Lincoln Park Lake (Table 16; Los Angeles Water Board 2000; 2004; 2007a; 2007b; 2007c; 2007d; 2007e; 2007f; 2008g; 2010, U.S. EPA 2012a).

The Los Angeles Water Board's trash and debris TMDLs set the numeric target for trash in the applicable water bodies to zero, as derived from the water quality objective in the basin plans. The TMDLs have all also defined trash to be "man-made litter," as defined by the California Government Code (§ 68055.1(g)). Implementation plans vary slightly but are mostly based on phased percent reduction goals that can be achieved through discharge permits, best management practices (BMPs), and structural controls.

The San Francisco Bay Water Board uses provisions in the San Francisco Bay Municipal Regional Stormwater Permit (MRP) to address trash in the 27 303(d) listed water bodies in the Region (Order No. R2-2009-0074). The San Francisco Bay MRP applies to 76 large, medium and small municipalities and flood control agencies in the San Francisco Bay Region. The San Francisco Bay MRP prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas." The trash-related receiving water limitations identified in the San Francisco Bay MRP do not place numeric targets on trash but uses

narrative language to prohibit trash discharges. The San Francisco Bay MRP requires that permittees reduce trash from their storm sewer systems by 40 percent by July 1, 2014. The San Francisco Bay MRP permittees are developing and implementing a Short-Term Trash Load Reduction Plan to attain the 40 percent (City of Cupertino 2012, City of San Jose 2012).

State Policy Efforts

In response to the increasing problem of trash within California, particularly plastic trash, policymakers have initiated efforts such as the California Ocean Protection Council's Resolution on Reducing and Preventing Marine Debris (2007) and subsequent Implementation Strategy for Reducing Marine Litter (2008). These policies respectively proposed targeted reductions of trash within a set timeline, and prioritize state efforts for source reduction of the "worst offenders" of trash, such as cigarette butts, plastic bottle caps, plastic bags, and polystyrene. In 2013, the West Coast Governor's Alliance on Ocean Health introduced a Marine Debris Strategy. The Strategy provides a toolbox of key actions that may be implemented collaboratively or individually by western states at its discretion and allows for the successful achievement of target milestones through various reduction methods.

1.7 Current Trash Cleanup Costs

A report, commissioned by U.S. EPA Region 9, estimated that West Coast communities (California, Oregon, and Washington) are spending approximately $13 per resident per year to combat and clean up trash that would otherwise end up as marine debris. The report conservatively suggested that West Coast coastal communities are spending more than $520 million to combat trash and marine debris. Cost information was sought for six different trash management activities: beach and waterway cleanup, street sweeping, installation of storm water capture devices, storm drain cleaning and maintenance, manual cleanup of trash, and public anti-trash campaigns. Data was collected from 90 different communities ranging in size from 200 to over four million residents (Stickel et al. 2012). A follow-up study conducted by the Natural Resources Defense Council and Kier Associates focused on the cost of current trash abatement activities for 95 California communities. The study found that California communities annually spend approximately $428 million ($10.5 per resident) to reduce trash and prevent trash from entering state waters. The study found that the average annual reported per capita cost ranged from $8.94 for large communities to $18.33 for small communities (fewer than 15,000 people) with the largest of communities (over 250,000 people) averaging $11.24 (Stickel et al. 2013).

2 PROJECT DESCRIPTION

The Water Board's regulations for implementation of CEQA require the SED to include a brief description of the project (23 CCR 3777(b)(1)). The following section: (1) describes the final Trash Amendments; (2) provides an overview of the objectives of the Plan; and (3) contains non-exclusive lists of: (a) the agencies that are expected to use this SED in their decision making and permits, (b) other approvals required to implement the project, and (c) related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies.

The complete texts of the final Trash Amendments are included in this Final Staff Report as Appendix D for the Ocean Plan and Appendix E for the ISWEBE Plan.

2.1 Trash Amendments' Description and Project Objective[3]

The State Water Board proposes to adopt the Trash Amendments into both the Ocean Plan and the ISWEBE Plan. The provisions proposed in the Trash Amendments include six elements: (1) water quality objective, (2) applicability, (3) prohibition of discharge, (4) implementation provisions, (5) time schedule, and (6) monitoring and reporting requirements. The proposed provisions would apply to all surface waters of the state, with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the Trash Amendments.

The State Water Board's project objective for the final Trash Amendments is to address the impacts of trash to the surface waters in California (with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the final Trash Amendments) through development of a statewide plan to control trash. The project objective for the final Trash Amendments is to provide statewide consistency for the Water Boards' regulatory approach to protect aquatic life and public health beneficial uses, and reduce environmental issues associated with trash in state waters, while focusing limited resources on high trash generating areas.

A central element of the final Trash Amendments is a land-use based compliance approach to focus trash controls to the areas with high trash generation rates. Within this land-use based approach, a dual alternative compliance Track approach is proposed for permitted storm water dischargers (i.e., MS4 Phase I, MS4 Phase II, Caltrans, IGP, and CGP) to implement a prohibition of discharge for trash. Table 1 outlines the proposed dual alternative compliance Tracks for permitted storm water dischargers.

[3] The State CEQA Guidelines state that a project description should include "a statement of the objectives sought by the proposed project....[And] should include the underlying purpose of the project" (14 CCR 15124(b)).

Table 1. Overview of Proposed Compliance Tracks for NPDES Storm Water Permits.

	Track 1	Track 2
NPDES Storm Water Permit	MS4 Phase I and II IGP/CGP*	MS4 Phase I and II Caltrans IGP/CGP*
Plan of Implementation	Install, operate and maintain full capture systems in storm drains that capture runoff from one or more of the priority land uses/facility/site.	Implement a plan with a combination of full capture systems, multi-benefit projects, institutional controls, and/or other treatment controls to achieve full capture system equivalency.
Time Schedule	10 years from first implementing permit but no later than 15 years from the effective date of the Trash Amendments.**	10 years from first implementing permit but no later than 15 years from the effective date of the Trash Amendments.**
Monitoring and Reporting	Demonstrate installation, operation, and maintenance of full capture systems and provide mapped location and drainage area served by full capture systems.***	Develop and implement set of monitoring objectives that demonstrate effectiveness of the selected combination of controls and compliance with full capture system equivalency.***

* IGP/CGP permittees would first demonstrate inability to comply with the outright prohibition of discharge of trash.

** Where a permitting authority makes a determination that a specific land use or location generates a substantial amount of trash, the permitting authority has the discretion to determine a time schedule with a maximum of ten years. IGP/CGP permittees would demonstrate full compliance with deadlines contained in the first implementing permit.

*** No trash monitoring requirements for IGP/CGP, however, IGP/CGP permittees would be required to report trash controls.

2.2 Water Quality Objective

To provide consistency statewide with a water quality objective, the final Trash Amendments would establish the following narrative water quality objectives for the Ocean Plan and the ISWEBE Plan.

The narrative water quality objective for the Ocean Plan would be: Trash shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

The narrative water quality objective for the ISWEBE Plan would be: Trash shall not be present in inland surface waters, enclosed bays, estuaries, and along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

2.3 Prohibition of Discharge

The Trash Amendments propose to implement the water quality objective for trash through a conditional prohibition of discharge of trash directly into waters of the state or where trash may ultimately be deposited into waters of the state. The prohibition of discharge applies to both permitted and non-permitted dischargers. Dischargers with NPDES permits would comply with the prohibition as outlined with the plan of implementation when such implementation plan is incorporated into the dischargers' NPDES permits. The final Trash Amendments clarify that dischargers with non-NPDES WDRs or waivers of WDRs that contain specific requirements for the control of trash shall be determined to be in compliance with the prohibition of discharge if the dischargers are in full compliance with such requirements. Under the original language, a discharger subject to an existing non-NPDES WDR or waiver of WDR could have been potentially in compliance with the requirements of the WDR, or Waiver of WDR, yet simultaneously out of compliance with prohibition of discharge included in the Draft Trash Amendments. Non-permitted dischargers must comply with the prohibition of discharge or be subject to direct enforcement action.

In addition, the prohibition of discharge specifically applies to the discharge to surface waters of the state of preproduction plastic by all manufacturers and transporters of preproduction plastics and manufacturers that use preproduction plastics in the manufacture of other products, or the deposition of preproduction plastic where it may be discharged into surface waters of the State. To ensure that the Trash Amendments do not interfere with existing permits requirements, the proposed Final Trash Amendments have been clarified to state that for dischargers subject to NPDES permits for discharges associated with industrial activity (e.g., IGP), those permittees would continue to comply with the "Preproduction Plastic Debris Program" under Water Code section 13367(a) and the requirements in the IGP (Order No. 2014-0057-DWQ) to comply with the prohibition concerning preproduction plastics.

2.4 Plan of Implementation

2.4.1 Permitted Storm Water Dischargers

One of the main transport mechanisms of trash to receiving waters is through the storm water system. The final Trash Amendments therefore focus on trash discharge reduction by requiring that NPDES storm water permits, specifically the MS4 Phase I and Phase II Permits, Caltrans Permit, the CGP, and the IGP, contain provisions that require permittees to comply with the prohibition of discharge. These provisions focus on trash control in the locations with high trash generation rates, in order to maximize the value of limited resources spent on addressing the discharge of trash into state waters.

MS4 Phase I and Phase II Permits

Municipalities are a source of trash generation, especially in areas with urban land uses and large population densities. MS4 Phase I and Phase II NPDES permits, which regulate discharges of storm water from MS4 systems throughout the state, have existing requirements for trash reduction in the form of institutional controls such as street sweeping and educational programs. Even with these existing provisions,

municipalities, however, continue to be significant dischargers of trash to waters of the state.

Under the final Trash Amendments, MS4 Phase I and Phase II NPDES permittees with regulatory authority over land uses can comply with the prohibition of discharge of trash under a dual alternative compliance approach or "Tracks". The Track requirements would be inserted into NPDES permits. Both Tracks have permittees focus their trash control efforts on priority land uses (i.e., those land uses that studies have shown generate significant sources of trash) (City of Los Angeles 2002, County of Los Angeles Department of Public Works 2004a; 2004b, City and County of San Francisco 2007, Moore et al. 2011, City of Cupertino 2012, City of San Jose 2012, EOA, Inc. 2012a). The final Trash Amendments define priority land uses as land uses that are actually developed (i.e., not simply zoned) as high density residential, industrial, commercial, mixed urban, and public transportation stations[4]. In addition, the final Trash Amendments provide that an MS4 may request that its permitting authority approve an equivalent alternative land use (i.e., an alternative to the land uses listed above) if that MS4 has land use(s) within its jurisdiction that generate trash at rates that are equivalent to or greater than one or more of the priority land uses listed This alternative option would help MS4s and their permitting authorities focus on controlling trash in each MS4's highest trash generating areas. The intent of this prioritization of land uses is to allow MS4s to allocate trash-control resources to the developed areas that generate the highest sources of trash.

Under Track 1, a permittee would install, operate and maintain full capture systems[5] for storm drains that capture runoff from priority land uses in their respective jurisdictions. Under Track 2, a permittee would develop and implement a plan that uses any combination of controls, such as full capture systems, other treatment controls (e.g., partial capture devices and green infrastructure and low impact development controls (LID)), institutional controls, and/or multi-benefit projects[6] to achieve the same performance results as Track 1 would achieve, referred to as, and defined as "full

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[4] The final Trash Amendments specifically define each of these five regulated land uses for purposes of implementation of the water quality objective and the prohibition of discharge; so, these definitions may differ substantially from an MS4's own local definition of those land uses in its ordinances, general plan, etc.

[5] Full capture systems for storm drains are defined in the final Trash Amendments as treatment controls (either a single device or a series of devices) that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain. Examples of full capture systems are described in greater detail in Section 5.2 of this document.

[6] Multi-benefit projects are treatment control projects that achieve any of the benefits set forth in Section 10562, subdivision (d) of Division 6 of the Water Code (the Watershed, Clean Beaches, and Water Quality Act). These projects could be designed to infiltrate, recharge or store storm water for beneficial reuse, to develop or enhance habitat and open space through storm water management, and/or reduce storm water runoff volume while removing the transport of trash. Multi-benefit projects can be implemented between contiguous permittees within a watershed for increased effectiveness and cost-sharing to reduce trash and improve storm water.

capture system equivalency".[7] Due to particular site conditions, types of trash, and the available resources for maintenance and operation within a municipality, the combination of full capture systems, multi-benefit projects, other treatment controls, and institutional controls used to comply with the prohibition of discharge will vary by permittee. However, it is the State Water Board's expectation that full capture systems should be preferentially selected by a permittee in executing the implementation plan to control the discharge of trash and achieve compliance with full capture system equivalency so long as such installation is not cost prohibitive.

MS4 storm water permittees that opt to comply under Track 2 would have to submit implementation plans to their permitting authority, which is the Water Board that issues the permit. The implementation plans must: (a) describe the combination of controls selected by each MS4, and the rationale for the selection, (b) describe how the combination of selected controls is designed to achieve full capture system equivalency, and (c) how the full capture system equivalency will be demonstrated. The implementation plans are subject to the approval by the permitting authority. The intention for the implementation plans is to assist in long term plan efforts and provide specifics on the trash controls effort to be incorporated into the implementing permit.

Non-Traditional Small MS4s or Other Land Uses or Areas within an MS4

The final Trash Amendments allow for the Water Boards to determine that at the local or regional level, areas outside of the scope of the priority land uses within an MS4 may generate substantial amounts of trash. Possible areas may include locations such parks, stadia, schools, campuses, and roads leading to landfills. Some Non-Traditional Small MS4s[8] maybe outside or lack jurisdictional authority over priority land uses. After reaching that determination in consultation with the applicable MS4, the appropriate Water Board may require the MS4 to adopt Track 1 or Track 2 control measures over such land uses or locations. The proposed final Trash Amendments have been modified to more accurately reflect this intent.

California Department of Transportation

Caltrans designs and operates California's state highway system. Caltrans' operation of this linear transportation system requires that it have its own MS4 permit distinct from the MS4 permits for Phase I and Phase II municipalities with regulatory authority over land uses. For example, the locations of high trash generating areas within Caltrans' jurisdiction are different than the priority land uses within municipalities' jurisdictions. Based on information from Caltrans' trash studies (Caltrans 2000, Caltrans 2004), coordination with Caltrans, Adopt-A-Highway program, and Keep California Beautiful program (Mid Atlantic Solid Waste Consultants 2009), the final Trash Amendments focus Caltrans' compliance efforts on the significant trash generating areas within the state's linear transportation system. Significant trash generating areas may include

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[7] See section 2.4.1 for Full Capture System Equivalency discussion.

[8] Federal and State operated facilities that can include universities, prisons, hospitals, and military bases (e.g., State Army National Guard barracks, parks and office building complexes).

areas such as: (1) highway on- and off- ramps in high-density residential, commercial, mixed urban, and industrial land uses; (2) rest areas and park-and-rides; and (3) state highways in commercial and industrial land uses. Additionally, the final Trash Amendments give Caltrans the opportunity to identify other significant trash generating areas (i.e., mainline highway segments) by conducting pilot studies and/or surveys.

To comply with the prohibition of discharge of trash, Caltrans must comply with requirements in all significant trash generating areas, similar to Track 2 for MS4 Phase I and II permittees, by installing, operating, and maintaining any combination of full capture systems, multi-benefit projects, other treatment controls, and/or institutional controls. Caltrans must demonstrate that such combination of controls achieves full capture system equivalency. Furthermore, in areas where Caltrans' operations overlap with the jurisdiction of an MS4 Phase I or II permittee with regulatory authority over priority land uses, the final Trash Amendments direct the applicable parties to coordinate efforts to install, operate, and maintain treatment and institutional controls.

Similar to MS4 Phase I and Phase II permittees, the final Trash Amendments require Caltrans to submit an implementation plan that: (a) describes the specific locations of its significant trash generating areas, (b) the combination of controls selected and the rationale for the selection, and (c) how the combination of controls will achieve full capture system equivalency.

Industrial and Construction Permittees

Under the final Trash Amendments, dischargers with industrial or construction NPDES permits (e.g., IGP or CGP) would be required to eliminate trash from all storm water discharges and authorized non-storm water discharges. This outright prohibition includes discharges associated with the site or facility, as well as any additional space such as a parking lot. If the industrial or construction permittee, however, demonstrates to the Water Board that it is unable to comply with the outright prohibition, then the permittee, through the discretion of the Water Board, may require the discharger to comply with one of two options. Under the first option, the permittee would install, operate, and maintain full capture systems for storm drains that service the facility or site. As a second option, the permittee could develop and execute an implementation plan that committed to any combination of controls, such as full capture systems, other treatment controls (e.g. partial capture devices and green infrastructure and low impact development controls), institutional controls, and/or multi-benefit projects to achieve full capture system equivalency. As specified in Section 2.3, IGP permittees would continue to comply with the preproduction plastic provisions as specified by the "Preproduction Plastic Debris Program" under Water Code section 13367(a) and the requirements in the IGP (Order No. 2014-0057-DWQ).

Full Capture System Equivalency

The following entities must establish full capture system equivalency: (1) MS4 Phase I and Phase II permittees that elect Track 2, (2) Caltrans, and (3) IGP permittees that elect implementation provisions similar to Track 2. The final Trash Amendments define full capture system equivalency as:

> [T]he trash load that would be reduced if full capture systems were installed, operated, and maintained for all storm drains that capture runoff from the relevant areas of land (priority land uses, significant trash generating areas, facilities or sites regulated by NPDES permits for discharges of storm water associated with industrial activity, or specific land uses or areas that generate substantial amounts of trash, as applicable). The full capture system equivalency is a trash load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of permitting authority.

During the public participation process for the Trash Amendments, many commenters requested clarification as to how Track 1 equivalency could be determined. While the permittee is responsible for determining the trash load reduction target, the proposed final Trash Amendments provide two examples of approaches that a permittee could use to determine full capture system equivalency: a trash capture rate approach and a reference approach. Other approaches may be more appropriate for any individual permittee's situation. The two methods identified in the amendment include:

1) Trash Capture Rate Approach. Directly measure or otherwise determine the amount of Trash captured by full capture systems for representative samples of all similar types of land uses, facilities, or areas within the relevant areas of land over time to identify specific trash capture rates. Apply each specific trash capture rate across all similar types of land uses, facilities, or areas to determine full capture system equivalency. Trash capture rates may be determined either through a pilot study or literature review. Full capture systems selected to evaluate trash capture rates may cover entire types of land uses, facilities, or areas, or a representative subset of types of land uses, facilities, or areas. With this approach, full capture system equivalency is the sum of the products of each type of land use, facility, or area multiplied by trash capture rates for that type of land use, facility, or area.

2) Reference Approach. Determine the amount of trash in a reference receiving water in a reference watershed where full capture systems have been installed for all storm drains that capture runoff from all relevant areas of land. The reference watershed must be comprised of similar types and extent of sources of trash and land uses (including priority land uses and all other land uses), facilities, or areas as the permittee's watershed. With this approach, full capture system equivalency would be demonstrated when the amount of trash in the receiving water is equivalent to the amount of trash in the reference receiving water.

As an example, an MS4 Phase I or Phase II permittee could determine trash capture rates for representative types of priority land uses where full capture devices had already been installed (e.g. for high density residential, commercial, industrial, mixed urban, and transportation station land uses). The trash capture rate should be

expressed as an amount of trash captured per time per area (e.g., pounds of trash per day per acre). The permittee could determine these trash capture rates by directly measuring the amount of trash collected by full capture systems over a defined period of time, such as 6 months, in each of the representative priority land use types. The representative land use types could be either the entire land use or a subset of a land use. The permittee could also utilize trash capture rates for similar land uses in other jurisdictions that have conducted trash capture rate studies, such as through a trash or debris TMDL.

Once the permittee has determined representative trash capture rates, those representative trash capture rates are applied to all similar priority land uses, where for instance the trash capture rate for high density residential is multiplied by the total area of all high density residential land uses in the permittee's jurisdiction. The full capture system equivalency would be determined by summing the trash capture loads for all priority land uses. The trash reduction target should be expressed as the amount of trash captured per time, e.g., pounds of trash per day or tons of trash per year.

The Trash Capture Rate Approach is focused on quantifying the amount of trash capture in particular land uses or location. Alternatively, the Reference Approach is focused on the condition of the receiving water by assessing and comparing the trash conditions of a reference receiving water with the receiving water from the permittee's jurisdiction. The permittee determines the amount of trash in a reference receiving water within a reference watershed where full capture systems have been installed for all storm drains that capture runoff from all relevant areas of land (e.g., priority land uses, significant trash generating areas, or facilities or sites). This means the reference watershed must be comprised of similar types and extent of land uses (including priority land uses and all other land uses), facilities, or areas as the permittee's watershed. The Reference Approach would be best executed using a reference receiving water that has a fully or nearly full implemented trash or debris TMDL.

Within the scope of the Trash Amendments, full capture system equivalency must be established after the permittee elects Track 2 or implementation provisions similar to Track 2 prior to implementation of trash controls. The details of how the selected controls are designed to achieve full capture system equivalency and how full capture system equivalency will be demonstrated are to be included in the permittee's implementation plan. The implementation plan is subject to the approval of the permitting authority. Therefore, the permitting authority has the discretion to require changes to the quantification of full capture system equivalency. As trash controls are implemented, the focus of monitoring program is to assess and monitor the progress towards achievement of the full capture system equivalency, and thus the prohibition of discharge.

2.4.2 Nonpoint Source Dischargers

Under the final Trash Amendments, nonpoint source dischargers subject to WDRs or waivers of WDRs, and not covered under an NPDES permit, required, at the discretion of the Water Board, to implement any appropriate trash controls in areas or facilities that generate substantial amounts of trash (e.g., high usage campgrounds, picnic areas, or

beach recreation areas). Trash control requirements for such nonpoint dischargers would be discharger specific, varying from treatment controls to institutional controls.

2.5 Time Schedule

Compliance with the water quality objective and plan for implementing the prohibition of discharge would be demonstrated by permittees in accordance with a time schedule set forth in the final Trash Amendments. The time schedule would be contingent on the effective date of the first implementing permit (whether such permit is modified, re-issued, or newly adopted). MS4 Phase I and II permittees with regulatory authority over land uses complying under Track 1 or Track 2 would have ten years from the effective date of the implementing permit to demonstrate full compliance with Track 1 or Track 2, as the case may be.

For MS4 Phase I and Phase II permittees that are newly designated as part of an existing MS4 it may not be feasible to expect compliance within ten years from the effective date of the first implementing permit (e.g., where designation occurs nine years after the first implementing permit). To address this, the final Trash Amendments have been clarified so that for MS4 Phase I and Phase II permittees that are designated after the effective date of the Trash Amendments, full compliance must be demonstrated within ten years of the effective date of the designation.

Several of the time schedule provisions in the proposed final Trash Amendments do not apply to MS4 permittees subject to the San Francisco Bay MRP or the East Contra Costa Municipal Storm Water Permit, because those permits already require control requirements substantially equivalent to Track 2. As a result, those MS4 permittees need not elect whether they will proceed with Track 1 or Track 2. Additionally, many of those MS4 permittees have already submitted a Short-Term Trash Load Reduction Plan and Long-Term Trash Load Reduction Plan that may be equivalent to the implementation plan required by the Trash Amendments. In order to reduce duplicative efforts, the Trash Amendments' requirement that MS4 permittees submit implementation plans does not apply to a San Francisco Bay MRP or the East Contra Costa Municipal Storm Water Permit, because those permits already require control requirements substantially equivalent to Track 2." "In order to reduce duplicative effort, the Trash Amendments' requirement that MS4 permittees submit implementation plans does not apply to a San Francisco Bay MRP or an East Contra Costa permittee if the San Francisco Bay Water Board or the Central Valley Water Board determines that the Short-Term Trash Load Reduction Plan and Long-Term Trash Load Reduction Plan for that permittee are equivalent to the implementation plan required by the Trash Amendments. Additionally, the pertinent permitting authority for the aforementioned permits may establish an earlier full compliance deadline than the ten-year compliance schedule specified for Track 2.

For Non-Traditional Small MS4s permittees or other land uses or areas within an MS4 that determined by the Water Boards to generate substantial amounts of trash and require trash controls, the Water Boards has the discretion to determine the time schedule for compliance with a maximum allotment of ten years from the determination. The determined time schedules for these areas should be relative to the size of the area and type of trash controls.

Caltrans, too, would have ten years from the effective date of its implementing permit to demonstrate compliance. For MS4 Phase I and II permittees with regulatory authority over land uses and Caltrans, in no case would their final compliance date be later than fifteen years from the effective date of the final Trash Amendments. Within the ten-year compliance periods discussed above, the Water Board can set interim compliance milestones within a specific permit. These interim milestones could be set, for example, as a percent reduction or percent installation per year.

Industrial and construction permittees would need to demonstrate full compliance within the deadlines specified in their respective implementing permits. Such deadlines may not exceed the terms of the first implementing permits (whether such permits are modified, re-issued or newly adopted).

Reaching full compliance with the prohibition of discharge would require planning efforts on the part of MS4 Phase I, MS4 Phase II, and Caltrans permittees. To assist in effective planning, within 18 months of the effective date of the final Trash Amendments the applicable Water Board would issue a Water Code section 13267 or 13383 order to its MS4 Phase I and MS4 Phase II permittees requesting notification within three months of each permittees' elected compliance track (i.e., either Track 1 or Track 2). If a permittee elects to comply under Track 2, then such a permittee needs to submit an implementation plan to the applicable Water Board within 18 months of receiving the 13267 or 13383 order.

To assist Caltrans with its planning efforts, the State Water Board would issue a Water Code section 13267 or 13383 order within 18 months of the effective date of the final Trash Amendments requesting an implementation plan.

~~2.6~~ Time Extension for Achieving Full Compliance

The proposed draft Trash Amendments provided a time extension to MS4 Phase I and II permittees with regulatory authority over land uses for each regulatory source control adopted by a MS4 Phase I or II permittee. Each regulatory source control adopted by a permittee could provide such permittee with a one-year time extension to achieve final compliance with either Track 1 or Track 2. The time extension option was proposed to receive public input on the potential advantages and disadvantages to this approach.

However, subsequent to the State Water Board's public workshop and the public hearing on the proposed Trash Amendments, Senate Bill 270 (2014 Stats. Ch. 850) was enacted. That new law enacts a state-wide plastic bag carry-out ban pertaining to grocery stores and pharmacies that have a specified amount of sales in dollars or retail floor space, which goes into effect July 1, 2015, and imposes the same ban on convenience stores and liquor stores a year later. The new law will implement a product ban, which was generally the type of regulatory source control contemplated by the State Water Board and discussed with the public with regard to consideration of the time extension option. Essentially, enactment of Senate Bill 270 removed the need for regulatory source controls, particularly product bans that would reduce trash, in the proposed Trash Amendments. As a result, the final Trash Amendments omit "regulatory source controls" from a method to comply with Track 2 and omit any corresponding allowance of time extensions.

2.7 Monitoring and Reporting Requirements

Under the final Trash Amendments, the Water Boards would require monitoring and reporting requirements (with monitoring objectives) in MS4 Phase I, MS4 Phase II, and Caltrans permits to ensure adequate trash control. The requirements in the final Trash Amendments represent the minimum requirements to be included in such permits.

The proposed monitoring requirements vary among NPDES storm water permits and tailored to the type of compliance option and permittee. For example, MS4 permittees complying under Track 1 (by installing, maintaining, and operating a network of full capture systems in the priority land uses) would not have minimum monitoring requirements. Instead, permittees would need to provide an annual report to the applicable Water Board demonstrating installation, operation, and maintenance of full capture systems. The annual report would include a Geographic Information System (GIS) based map depicting the locations of each installed full capture system and the drainage area that serves each full capture system. The reporting requirements could be included into annual reports requested by the Water Board.

MS4 permittees complying under Track 2, on the other hand, do have minimum monitoring requirements. They would develop and implement annual monitoring that demonstrates the effectiveness of the selected combination of treatment and institutional controls and compliance with full capture system equivalency. Such permittees would be required to submit a monitoring report to the applicable Water Board on an annual basis. The monitoring reports must include a GIS map depicting the locations and drainage area served by each treatment control, institutional control, and/or multi-benefit project. In addition to the GIS map, the annual monitoring report should consider a number of questions designed to demonstrate the effectiveness of the selected controls and compliance with full capture system equivalency. Using a questions-based approach provides flexibility to the permit writers to select the most relevant monitoring techniques and expectations for their respective permits.

The final Trash Amendments would require the Caltrans permit to contain monitoring requirements that Caltrans develop and implement annual monitoring plans that demonstrate the effectiveness of the selected combination of treatment and institutional controls and compliance with full capture system equivalency. The annual monitoring reports would be provided to the State Water Board and the reports must include a GIS map with the locations of each of the treatment controls and institutional controls. In addition to the GIS map, each annual monitoring report should consider a number of questions designed to demonstrate the effectiveness of the selected controls and compliance with full capture system equivalency.

The IGP and CGP are statewide permits that regulate discharges of storm water and authorized non-storm water discharges associated with very specific industrial activities. These permits apply to thousands of projects with diverse features and characteristics between facilities and sites. As such, prescribing appropriate and consistent trash monitoring and reporting requirements for all permittees poses significant challenges. While the final Trash Amendments do not contain trash monitoring requirements for IGP and CGP permits, permittees could, however, be required to report the measures used to either (1) achieve the outright prohibition or (2) achieve equivalent trash control

through alternative methods. The reporting would occur in reissuances or through regional water board actions aimed at adding monitoring and requirements to permittees. Additional trash monitoring and reporting can be required through existing authorities in the California Water Code, and in some cases directly through language in the IGP and CGP.

2.8 Full Capture System Certification

At present, the Los Angeles Water Board oversees a full capture system certification process (Bishop 2004, 2005, 2007, Dickerson 2004, Smith 2007, Unger 2011). In addition, the San Francisco Water Board evaluated effectiveness of full capture systems listed in Appendix I of the Bay Area-wide Trash Capture Demonstration Project (Demonstration Project), Final Project Report (San Francisco Estuary Partnership 2014). For statewide consistency, the State Water Board would take responsibility for the certification process for new full capture systems. The process for the certification would follow a similar process established by the Los Angeles Water Board (Yang 2004). Prior to installation, the full capture systems must be certified by the Executive Director, or designee, of the State Water Board. Uncertified systems will not satisfy the Trash Amendments. To request certification, the permittee would submit a certification request letter, including supporting documentation, to the State Water Board's Executive Director. The Executive Director or designee will issue a written response either approving or denying the proposed certification. However, to ensure efficient use of resources and prevent municipalities from having to remove properly functioning capture systems, full capture systems previously certified by the Los Angeles Water Board or identified by the Demonstration Project would be considered certified for use by permittees.

2.9 Reasonably Foreseeable Methods of Compliance

The State Water Board's SED for the proposed project is required to include an analysis of the reasonably foreseeable methods of compliance with the project (see 23 CCR 3777; Pub. Res Code § 21159). Although the State Water Board is not required to conduct a site-specific project level analysis of the methods of compliance (23 CCR 3777(c); Pub. Res Code § 21159(d)), a general description of the reasonably foreseeable methods of compliance is contained in Section 5 of the Final Staff Report.

2.10 Location and Boundaries of the Proposed Project

The State CEQA Guidelines require identification of "the precise location and boundaries of the proposed project [to be] shown on a detailed map" (14 CCR 15124(d)). The location of the State Water Board's proposed project to adopt the Trash Amendments is all surface waters of the State, with the exception of waters within the jurisdiction of the Los Angeles Water Board for which trash TMDLs are in effect prior to the effective date of the Trash Amendments. This necessarily includes the geographies of the nine regional water boards within California, as set forth in the Environmental Setting section and the maps located therein (Section 3) of the Final Staff Report.

2.11 Agencies Expected to use this Staff Report in their Decision Making and Permits

The State CEQA Guidelines require that the project description include, among other things, "a statement briefly describing the intended uses of the EIR" (14 CCR 15124(d)). The State Water Board will use this Final Staff Report in determining whether to adopt the final Trash Amendments. A Water Board may use the information contained within this Final Staff Report for future decision making and/or permitting. Furthermore, in order to achieve the water quality objective, all NPDES permits would contain provisions to implement the final Trash Amendments. Therefore, if the proposed project is approved, the following entities, where they are considered public agencies for purposes of CEQA, may be considered Responsible Agencies and may use the Final SED adopted by the State Water Board in their decision making actions to comply with the final Trash Amendments:

- NPDES permitted storm water dischargers
- Dischargers with WDRS or waivers of WDRs
- Water Boards

2.12 Other Approvals Required to Implement the Trash Amendments

Except as may be required by other environmental review and consultation requirements as described below, no other agency approvals are expected to be required to implement the final Trash Amendments. However, governing bodies of NPDES permittees may determine that separate approval actions are necessary to formally approve the approach they would take to comply with permits that implement the final Trash Amendments (e.g., whether to comply under Track 1 or Track 2). Beyond analyzing the reasonably foreseeable methods of compliance, the Final Staff Report is not required to, and therefore does not analyze the detail related to the project specific actions that might be implemented by any particular permittee as a result of the State Water Board's proposed project (see 23 CCR 3777(c); Pub. Res Code § 21159(d)).

After adoption by the State Water Board, the Trash Amendments must be submitted to the California Office of Administrative Law for review and approval. Because the Trash Amendments include the adoption of a new water quality standard, they must also be approved by U.S. EPA.

2.13 Environmental Review and Consultation Requirements

As described in other portions of the Final Staff Report, depending on the location, size, and particular compliance method, reasonably foreseeable methods of compliance could involve impacts to specific environmental resources that may trigger related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies. Since the Final Staff Report does not conduct a project-level analysis of the reasonably foreseeable methods of compliance, it is not possible to determine the specific environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies (nor the particular magnitude of any specific environmental impact). Compliance with any specific environmental review and

consultations would need to be conducted by the MS4s or NPDES permittees complying with the provisions in their permits that incorporate the requirements of the final Trash Amendments.

2.14 Public Process

Initial Scoping Meetings

In July 2007, the first scoping meeting was held in San Francisco to provide opportunity for public comment on several proposed Ocean Plan projects, including trash in ocean waters. Oral and written comments were received, but development of a trash project was delayed due to shifting resources to other priority plans and policies.

A subsequent scoping meeting was conducted to provide an additional forum for public comment on the preparation of the Draft Staff Report for breadth of a Statewide Policy for Trash Control in Waters of the State. State Water Board staff held scoping meetings on October 7, 2010, at Central Valley Water Quality Control Board Headquarters in Rancho Cordova, California, and on October 14, 2010, at Inland Empire Utility Agency Headquarters in Chino, California. Comments were provided by stakeholders regarding the scope and content of the environmental information required by federal and state regulations. Additionally, information was submitted on the range of actions, alternatives, mitigation measures, and possible significant effects to be analyzed within this document. Since that time, the scope of the project has transition from a statewide policy to amendments to statewide water quality control plans.

On March 15, 2011, in Resolution 2011-0013, the State Water Board adopted the Ocean Plan Triennial Review Workplan for the period 2011-2013. In the Triennial Review Workplan, the State Water Board made the regulation of plastic debris and other trash a very high priority.

Public Advisory Group

As part of the scoping process and in response to the Scoping Meeting, State Water Board staff convened a Public Advisory Group to assist with the initial development of the Trash Amendments. The Public Advisory Group consisted of a diverse group of stakeholders representing municipalities, Caltrans, industry, and environmental groups. The Public Advisory Group included:

- Sean Bothwell, California Coastkeeper Alliance
- Geoff Brosseau, The California Stormwater Quality Association
- Miriam Gordon, Clean Water Action
- Gary Hildebrand, Los Angeles County
- Kirsten James, Heal the Bay
- Scott McGowen, Caltrans
- Charles Moore, Algalita Marine Research Institute
- Tom Reeves, City of Monterey
- Tim Shestek, American Chemistry Council
- Leslie Tamminen, Seventh Generation Advisors

The Public Advisory Group held six meetings closed to the public to discuss the proposed Trash Amendments (Table 2). At these meetings, the Public Advisory Group

provided comments and feedback to the development of the proposed Trash Amendments and the Draft Staff Report.

Table 2. Public Advisory Group.

Date	Location
March 6, 2013	CalEPA Bldg, Sacramento
August 13, 2012	CalEPA Bldg, Sacramento
May 22, 2012	CalEPA Bldg, Sacramento
October 12 & 13, 2011	Cabrillo Aquarium, San Pedro
August 30, 2011	CalEPA Bldg, Sacramento
July 26, 2011	CalEPA Bldg, Sacramento

Focused Stakeholder Outreach Meetings

In March, April, and May 2013, State Water Board staff held fourteen focused meetings with stakeholders from industry, municipal governments, environmental interest groups, and staff from the San Francisco Water Board, Los Angeles Water Board, Caltrans, and CalRecycle (Table 3). The objective of the meetings was to provide an overview of the development of the proposed Trash Amendments and to receive feedback on key issues before the public release of the Draft Staff Report for the proposed Trash Amendments from focused sets of stakeholders. Selected meeting participants were provided an issue paper that provided an overview of the fundamentals of the proposed Trash Amendments and five key unresolved options to discuss regarding the content of the proposed Trash Amendments. The five unresolved options included:

1) Options to address the existing trash TMDLs and the San Francisco Bay Region Municipal Regional Storm Water Permit.
2) Options regarding the level of specificity to include in the Track 2 monitoring plan requirements.
3) Options for full capture system definition.
4) Options for incentivizing regulatory source controls.
5) Considerations regarding preproduction plastics.

Table 3. Focused Stakeholder Meetings.

Stakeholder Group	Meeting Date and Location
Caltrans	3/13/13 Sacramento, CA
Industrial Permittees	4/3/13 Sacramento, CA
Environmental Groups	4/3/13 Sacramento, CA
Los Angeles Water Board	4/5/13 Los Angeles, CA
MS4 Permittees	4/8/13 Sacramento, CA
MS4 Permittees	4/10/13 Santa Rosa, CA
MS4 Permittees	4/15/13 San Jose, CA
MS4 Permittees	4/16/13 San Luis Obispo, CA
MS4 Permittees	4/19/13 Santa Clarita, CA
MS4 Permittees	4/22/13 Costa Mesa, CA
CalRecycle	5/15/13 Sacramento, CA
Industrial Permittees	5/17/13 Riverside, CA
San Francisco Bay & Los Angeles Water Board MS4 Permittees	5/24/13 Sacramento, CA
San Francisco Bay Water Board	5/24/13 Sacramento, CA

Public Workshop and Public Hearing

On June 10, 2014, the State Water Board provided the Draft Staff Report, including the Draft SED for the proposed Trash Amendments to the public and public with an accompanying notice of the dates the State Water Board would hold a public workshop and a public hearing.

On July 16, 2014, State Water Board held a public workshop at the CalEPA Headquarters Building in Sacramento. The purpose of the public workshop was to provide information and answer questions from the public on the proposed Trash Amendments; no action was taken by the State Water Board. At the public workshop, State Water Board staff presented an overview of the proposed Trash Amendments. The staff presentation was followed by three presentations from PAG members: 1) Algalita Marine Research Institute, California Coastkeeper Alliance, Heal the Bay, and Seventh Generation Advisors, 2) American Chemistry Council, and 3) CASQA. In addition to presentations, fourteen groups provided public comment.

The State Water Board held a public hearing on the proposed Trash Amendments on August 5, 2014 at the CalEPA Headquarters Building in Sacramento, the date of which coincided with the close of the written comment period. The purpose of the public hearing was to receive oral comments and testimony on the proposed Trash Amendments, Draft Staff Report, including the Draft SED. Participants were given an opportunity to supplement their written comments with oral statements. No action was taken by the State Water Board. At the public hearing, there was a staff presentation and twenty-three groups provided public comment. At the close of the comment period at noon on August 5th, a total of seventy-six written comment letters were received. The State Water Board shall develop complete written response to the written comments timely received within the August 5th deadline.

2.15 Project Contact

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3 ENVIRONMENTAL SETTING[9]

A variety of environmental conditions exist in California. For water quality management, section 13200 of Porter-Cologne divides the state into nine different hydrologic regions. Brief descriptions of the regions and the water bodies addressed by this Final Staff Report are presented below. The information provided in this section is extracted from the ten basin plans created by each of the nine regional water boards. In addition to a description of each region, the land coverage of each region is addressed. This analysis provides an estimate of the area across California where NPDES permittees, specifically land uses for MS4 Phase I and MS4 Phase II permittees, with the exception of waters with existing trash and debris TMDLs within the jurisdiction of the Los Angeles Water Board, would have to comply with the prohibition of discharge for trash and the implementation provisions.

3.1 Trash in California

Throughout California, trash is found in streams, rivers, lakes, estuaries, beaches, and the ocean. The continued presence of trash in state waters is shown through data from the California Coastal Commission and Ocean Conservancy organized Coastal Cleanup Day. Since 1986, volunteers have collected trash from beaches, inland waterways, coastal waters, and underwater. Volunteers have removed approximately 690,322 pieces of trash from up to 2,023 miles of Coastal Cleanup sites. The top ten items collected from 1989-2012, which represented nearly 90 percent of the items removed, were: (1) cigarette butts; (2) bags (paper and plastic); (3) food wrappers and containers; (4) caps and lids; (5) cups, plates, forks, knives, and spoons; (6) straws and stirrers; (7) glass beverage bottles; (8) plastic beverage bottles; (9) beverage cans; and (10) building materials. The snapshot of the trash collected from Coastal Cleanup Day provides a clear baseline of trash pollution throughout the surface waters in California.

To address trash pollution, municipalities across California spend about half a billion dollars each year to combat, clean up, and prevent trash from entering state waters (Stickel et. al 2013). There are six main trash-control strategies employed by a municipality: waterway and beach cleanup, street sweeping, installation of full capture devices, storm drain cleaning and maintenance, manual cleanup of trash, and public education.

While municipalities employ at least a minimal amount of trash management, there are several regions with comparatively more extensive management strategies. In the Los Angeles and San Francisco Bay regions, municipalities have extensive trash control measures in response to 303(d) listed water bodies for trash and debris. The Los Angeles Water Board has adopted fifteen TMDLs with a numeric target of zero trash.

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[9] CEQA directs that the environmental setting normally be used as the baseline for determining significant impacts of a proposed project (Cal. Code Regs., tit.14, §15125, subd. (a)). This section presents a broad overview of the environmental setting for the state of California related to the proposed final Trash Amendments. The section presenting the impact analysis in this Final Staff Report, including SED will identify, where relevant, any specific setting information relevant to the detailed assessment of environmental impacts of the proposed action.

While the San Francisco Bay MRP applies trash provisions to 76 municipalities to address the 27 303(d) listed water bodies in the region. Caltrans has multiple trash management strategies such as installation of gross separation systems, street sweeping, manual collection of trash with the Adopt-A-Highway Program, and public education with Don't Trash California. The CGP (2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ) prohibits the discharge of any debris from construction sites and encourages the uses of more environmentally safe, biodegradable materials on construction sites. Facilities enrolled under the IGP must comply with the "Preproduction Plastic Debris Program" (Wat. Code § 13367(a)) by following the BMPs in the manufacturing, handling, and transporting of preproduction plastics.

The presence of trash and efforts to address trash in California are described in further detail in Appendix A.

3.2 Developed Land by Land Cover and Regional Water Board

The final Trash Amendments focus on areas with high trash generation rates, i.e., priority land uses for MS4 Phase I and Phase II permittees and significant trash generating areas for Caltrans. There is no existing data on the location of priority land uses are. A GIS analysis was used to determine the possible geographic scope of the final Trash Amendments. Land cover data within census designated places and regional water board boundaries were used to provide an estimate the area covered under the final Trash Amendments. These estimates do not represent exact locations for trash controls, but provide an approximate area. The U.S. Census Bureau uses census designated places to delineate settled concentrations of population that are identifiable by name but are not legal designations incorporated under the laws of the state. Census designated places are delineated cooperatively by state and local officials and the Census Bureau before each Decennial Census. The 2012 Census Designated Places boundary (the legal boundary designation as of January 1, 2012) shapefile can be accessed at: http://www.census.gov/geo/maps-data/data/tiger-line.html. The 2012 California Census Designated Place category identified 1517 cities, with a total area of 9,621,423 acres (Figure 1).

Since counties do not have a uniform classification of land cover codes or divisions, urban land cover data was extracted from USGS Multi-Resolution Land Characteristics Consortium Land Cover Data 2006. The data can be accessed at: http://www.mrlc.gov/nlcd2006.php. To estimate the area covered under the final Trash Amendments, Land Use/Land Cover categories for developed low intensity, medium intensity, and high intensity were identified:

- Land Use (LU) 22 or "Developed, Low Intensity". This is defined as developed low intensity includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

- Land Use (LU) 23 or “Developed, Medium Intensity”. This is defined as developed medium intensity includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.

- Land Use (LU) 24 is “Developed, High Intensity”. This is defined as developed high intensity includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80-100 percent total cover.

Although there was a lack of statewide consistency in land use planning and GIS data from individual municipalities, “Developed, High Intensity” was assumed to be analogous proxy to the priority land uses of the final Trash Amendments: high density residential, industrial, commercial, mixed urban, and public transportation stations. A representative estimate for Caltrans’ significant trash generating areas was not included in the estimate. Additionally, the priority land uses does not include low density residential, as represented by “Developed, Low Intensity”.

The number of acres for the three developed land cover classes was calculated for each regional water board (Figure 2,

Table 4). Distribution of land cover classes varies by regional water board. The Central Valley Water Board has the most total acreage, but a very low percentage of Central Valley Region total area is highly developed

(2.38 percent). Higher coverage of developed land is generally seen in the southern coastal regions. The Los Angeles Water Board has the most acres of high intensity developed area (4.09 percent), while the Santa Ana Water Board has the highest number of total developed acres (28.74 percent) (

Table 5). The number of acres for the three classes was also calculated within census designated place boundaries (

Table 5). As with the total regional water board area, distribution of land cover classes with census designated places varies by a regional water board. When only considering areas with concentrated populations (i.e., within census designated places), Los Angeles Water Board has the most developed acres as well as the highest percentage of medium intensity, high intensity, and total developed land, followed closely by Santa Ana Water Board (Table 6). As previously noted, many of the priority land uses with the Los Angeles Water Board have waste load allocations for trash or debris TMDLs, and thus not applicable to the final Trash Amendments.

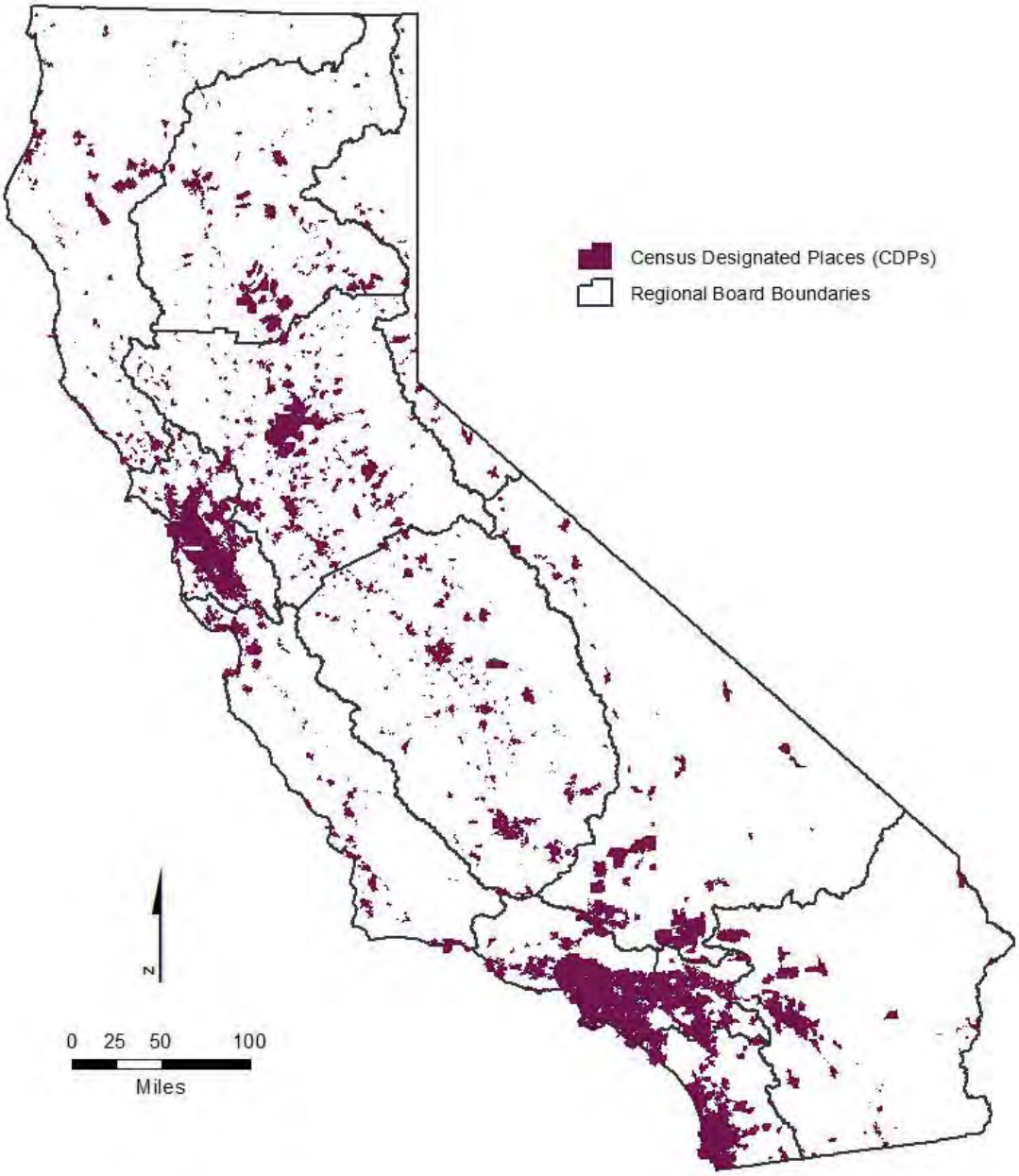

Figure 1. 2012 California Census Designated Places.

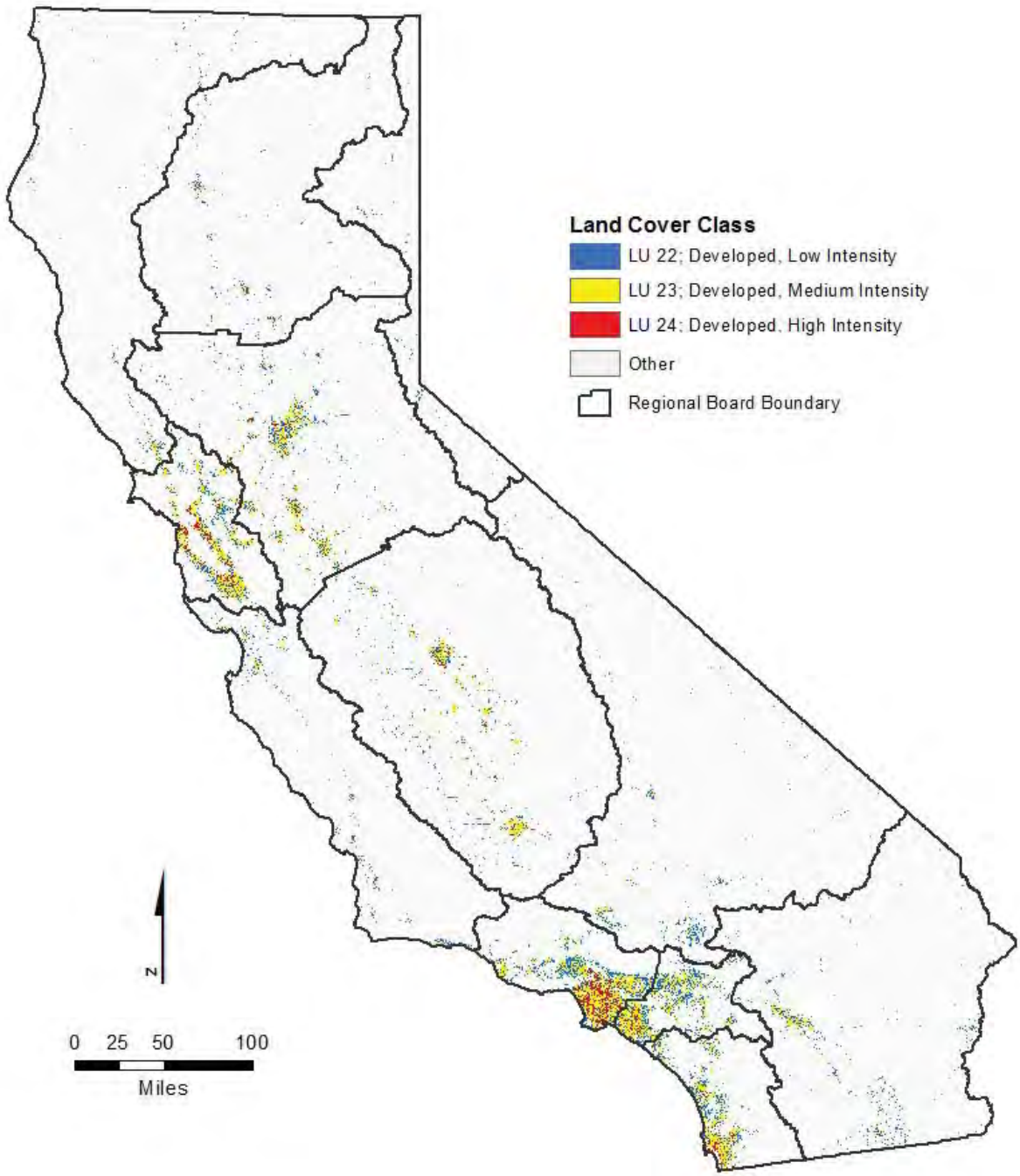

Figure 2. Developed Land Coverage by Regional Water Boards.

Table 4. Acres of Developed Land by Land Cover and Regional Water Board.

Regional Water Board	Developed, Low Intensity (acres)	Developed, Medium Intensity (acres)	Developed High Intensity (acres)	Other (acres)	Total (acres)
North Coast	53,897	28,435	3,362	12,355,869	12,441,564
San Francisco Bay	189,894	283,806	79,220	2,339,394	2,892,314
Central Coast	96,760	65,716	7,371	7,183,662	7,353,509
Los Angeles	234,649	369,182	116,470	2,127,311	2,847,612
Central Valley	422,468	394,517	88,186	37,075,180	37,980,350
Lahontan	124,387	38,374	5,517	20,818,762	20,987,040
Colorado River	119,633	56,414	6,829	12,528,939	12,711,815
Santa Ana	216,149	256,567	42,048	1,276,620	1,791,384
San Diego	153,175	196,314	41,780	2,092,315	2,483,584
Total (acres)	1,611,012	1,689,325	390,782	97,798,052	101,489,172

Table 5. Percent of Regional Water Board Designated as Developed Land by Land Cover Type.

Regional Water Board	Developed, Low Intensity (%)	Developed, Medium Intensity (%)	Developed High Intensity (%)	Total Developed (%)
North Coast	0.43%	0.23%	0.03%	0.69%
San Francisco Bay	6.57%	9.81%	2.74%	19.12%
Central Coast	1.32%	0.89%	0.10%	2.31%
Los Angeles	8.24%	12.96%	4.09%	25.29%
Central Valley	1.11%	1.04%	0.23%	2.38%
Lahontan	0.59%	0.18%	0.03%	0.80%
Colorado River	0.94%	0.44%	0.05%	1.44%
Santa Ana	12.07%	14.32%	2.35%	28.74%
San Diego	6.17%	7.90%	1.68%	15.75%

Table 6. Percent of Census Designated Places as Developed Land by Land Cover Type and Regional Water Board.

Regional Board	Developed, Low Intensity (%)	Developed, Medium Intensity (%)	Developed High Intensity (%)	Total Developed (%)
1	5.60%	4.67%	0.51%	10.78%
2	14.35%	23.98%	6.48%	44.82%
3	12.90%	11.77%	1.39%	26.06%
4	18.88%	30.55%	9.39%	58.82%
5R	4.13%	2.75%	0.65%	7.53%
5S	11.68%	14.66%	3.51%	29.85%
5F	7.78%	13.78%	2.58%	24.14%
5 All	8.50%	11.33%	2.48%	22.31%
6SLT	8.26%	1.92%	0.55%	10.73%
6V	7.06%	2.89%	0.35%	10.30%
6 All	7.22%	2.76%	0.38%	10.35%
7	8.37%	6.94%	0.85%	16.16%
8	20.58%	25.12%	3.87%	49.57%
9	15.84%	23.43%	5.21%	44.48%

3.3 Permitted Storm Water Dischargers in California

The final Trash Amendments includes implementation provisions for permitted storm water dischargers, specifically MS4 Phase I and II, Caltrans, IGP, and CGP permittees. In 2012-2013 Annual Performance Report[10], the Water Boards reported16,996 Storm Water facilities regulated under the Storm Water Construction, Storm Water Industrial and Storm Water Municipal Permits. The number of facilities and municipalities, separated by regional water board, are presented in Table 7.

[10] The California Water Boards' Annual Performance Report - Fiscal Year 2012-13 released on September 2013. http://www.waterboards.ca.gov/about_us/performance_report_1213/regulate/21200_npdes_sw_facilities.shtml

Table 7. Facilities Regulated Under the California Water Board's Storm Water Program.

Regional Water Board	Construction General Permittees	Industrial General Permittees	Municipal Storm Water Permittees (Phase I and II)	Total
North Coast	179	337	14	538
San Francisco Bay	1,069	1,316	109	2,494
Central Coast	457	401	45	903
Los Angeles	1,193	2,683	100	3,976
Central Valley	1,614	1,745	95	3,454
Lahontan	379	230	10	619
Colorado River	253	172	19	444
Santa Ana	1,136	1,583	62	2,781
San Diego	924	784	79	1,787
Total	7,204	9,251	532	16,996

3.4 North Coast Region

The North Coast Region comprises all watershed basins, including Lower Klamath Lake and Lost River Basins, draining into the Pacific Ocean from the California-Oregon State line southern boundary and includes the watershed of the Estero de San Antonio and Stemple Creek in Marin and Sonoma Counties (Figure 3, Figure 4). Two natural drainage basins, the Klamath River Basin and the North Coastal Basin, divide the region. The region covers all of Del Norte, Humboldt, Trinity, and Mendocino Counties, major portions of Siskiyou and Sonoma Counties, and small portions of Glenn, Lake, and Marin Counties. It encompasses a total area of approximately 19,390 square miles, including 340 miles of coastline and remote wilderness areas, as well as urbanized and agricultural areas.

Beginning at the Smith River in northern Del Norte County and heading south to the Estero de San Antonio in northern Marin County, the region encompasses a large number of major river estuaries. Other North Coast streams and rivers with significant estuaries include the Klamath River, Redwood Creek, Little River, Mad River, Eel River, Noyo River, Navarro River, Elk Creek, Gualala River, Russian River, and Salmon Creek (this creek mouth also forms a lagoon). Northern Humboldt County coastal lagoons include Big Lagoon and Stone Lagoon. The two largest enclosed bays in the North Coast Region are Humboldt Bay and Arcata Bay (both in Humboldt County). Another enclosed bay, Bodega Bay, is located in Sonoma County near the southern border of the region. Distinct temperature zones characterize the North Coast Region. Precipitation is greater than for any other part of California, and damaging floods are a fairly frequent hazard. Ample precipitation in combination with the mild climate found over most of the North Coast Region has provided a wealth of fish, wildlife, and scenic resources. The numerous streams and rivers of the region contain anadromous fish and the reservoirs, although few in number, support both cold and warm water fish.

Tidelands and marshes are extremely important to many species of waterfowl and shore birds, both for feeding and nesting. Cultivated land and pasturelands also provide supplemental food for many birds, including small pheasant populations. Tideland areas along the north coast provide important habitat for marine invertebrates and nursery areas for forage fish, game fish, and crustaceans. Offshore coastal rocks are used by many species of seabirds as nesting areas.

Major land uses in the region are tourism and recreation; logging and timber milling; aggregate mining; commercial and sport fisheries; sheep, beef and dairy production; and vineyards and wineries. Approximately two percent of California's total population resides in the North Coast region. The largest urban centers are Eureka in Humboldt County and Santa Rosa in Sonoma County.

Eight Areas of Special Biological Significance (ASBS) are located in the North Coast Region: Jughandle Cove (#1), Del Mar Landing (#2), Gerstle Cove (#3), Bodega (#4), Saunders Reef (#5), Trinidad Head (#6), King Range (#7), and Redwoods National Park (#8).

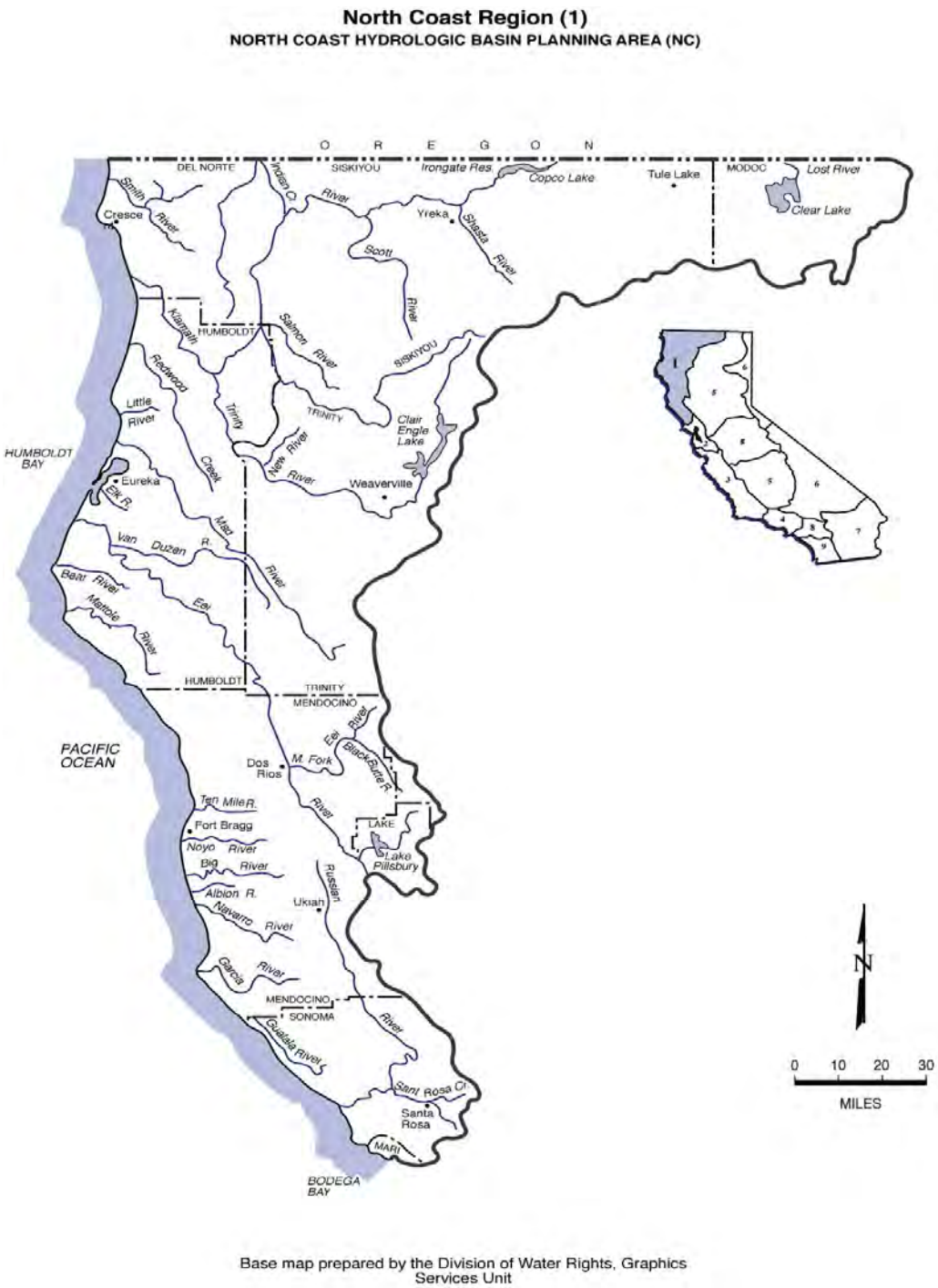

Figure 3. North Coast Region Hydrologic Basin.

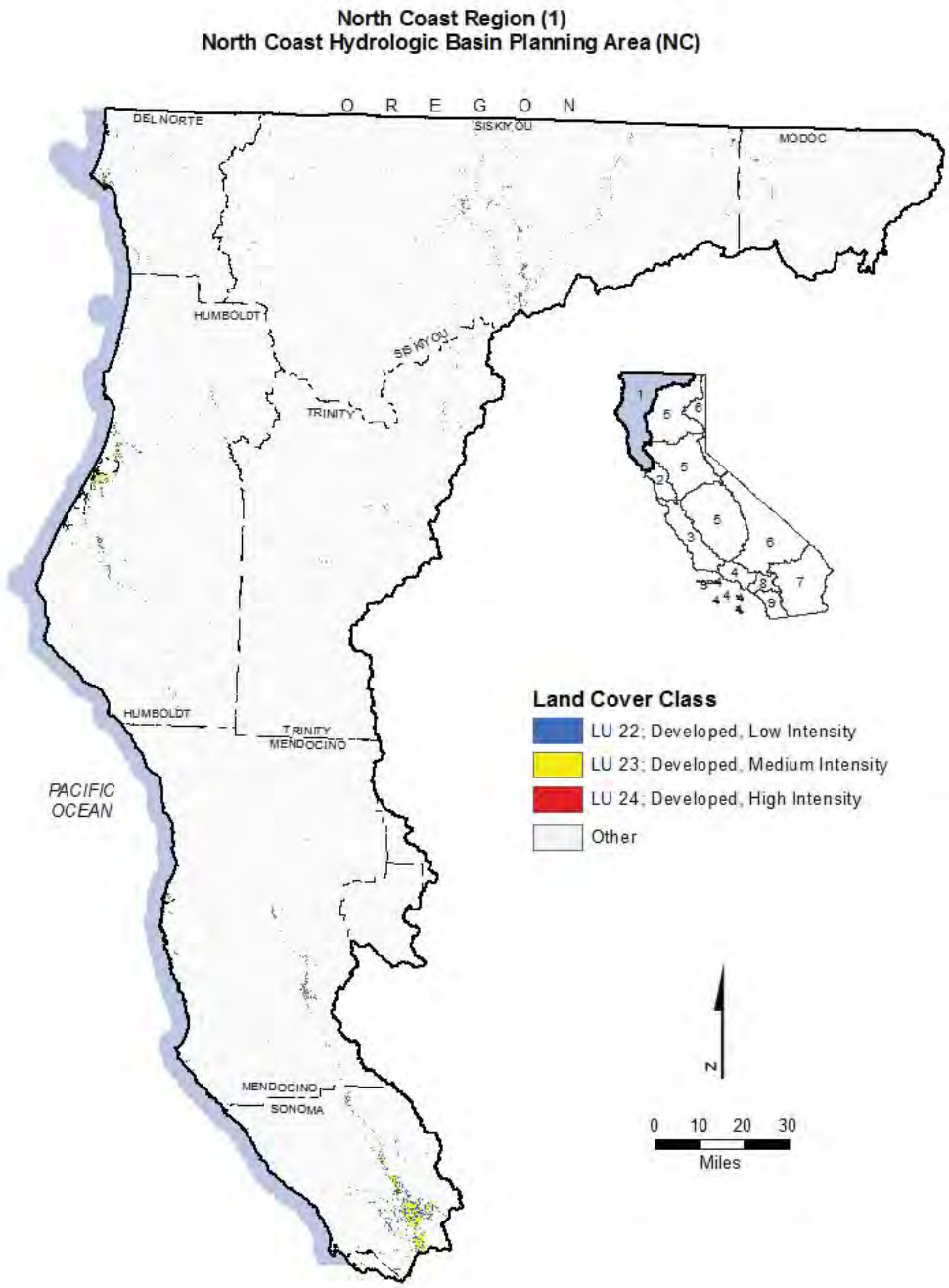

Figure 4. North Coast Region Developed Land Coverage.

3.5 San Francisco Region

The San Francisco Bay Region comprises San Francisco Bay, Suisun Bay beginning at the Sacramento River, and San Joaquin River westerly, from a line which passes between Collinsville and Montezuma Island (Figure 5, Figure 6). The region's boundary follows the borders common to Sacramento and Solano counties, and Sacramento and Contra Costa counties west of the Markely Canyon watershed in Contra Costa County. All basins west of the boundary and all basins draining into the Pacific Ocean between

the southern boundary of the North Coast Region and the southern boundary of the watershed of Pescadero Creek in San Mateo and Santa Cruz counties are included in the region.

The region comprises most of the San Francisco Estuary to the mouth of the Sacramento-San Joaquin Delta. The San Francisco Estuary conveys the waters of the Sacramento and San Joaquin Rivers to the Pacific Ocean. Located on the central coast of California, the San Francisco Bay system functions as the only drainage outlet for waters of the Central Valley. The region includes the fourth largest metropolitan area in the United States, including all or major portions of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

The San Francisco Water Board has jurisdiction over the part of the San Francisco Estuary, which includes all of the San Francisco Bay segments extending east to the Delta (Winter Island near Pittsburg). Within each section of the San Francisco Bay system lie deepwater areas that are adjacent to large expanses of very shallow water. Salinity levels range from hypersaline to fresh water and water temperature varies widely. The San Francisco Bay system's deepwater channels, tidelands, marshlands, fresh water streams, and rivers provide a wide variety of habitats within the Region. Coastal embayments including Tomales Bay and Bolinas Lagoon are also located in this Region.

The Sacramento and San Joaquin Rivers enter the San Francisco Bay system through the Delta at the eastern end of Suisun Bay and contribute almost all of the fresh water inflow into the Bay. Many smaller rivers and streams also convey fresh water to the Bay system. The rate and timing of these fresh water flows influence the physical, chemical and biological conditions in the Bay. Flows in the region are highly seasonal, with more than 90 percent of the annual runoff occurring during the winter rainy season between November and April.

The San Francisco Estuary is made up of many different types of aquatic habitats that support a great diversity of organisms. Suisun Marsh in Suisun Bay is the largest brackish water marsh in the United States. San Pablo Bay is a shallow embayment strongly influenced by runoff from the Sacramento and San Joaquin Rivers. The Central Bay is the portion of the Bay most influenced by oceanic conditions. The South Bay, with less freshwater inflow than the other portions of the Bay, acts more like a tidal lagoon. Together these areas sustain rich communities of aquatic life and serve as important wintering sites for migrating waterfowl and spawning areas for anadromous fish.

Six ASBS are located in the San Francisco Bay Region: James V. Fitzgerald (#9), Farallon Islands (#10), Duxbury Reef (#11), Point Reyes Headlands (#12), Double Point (#13), and Bird Rock (#14).

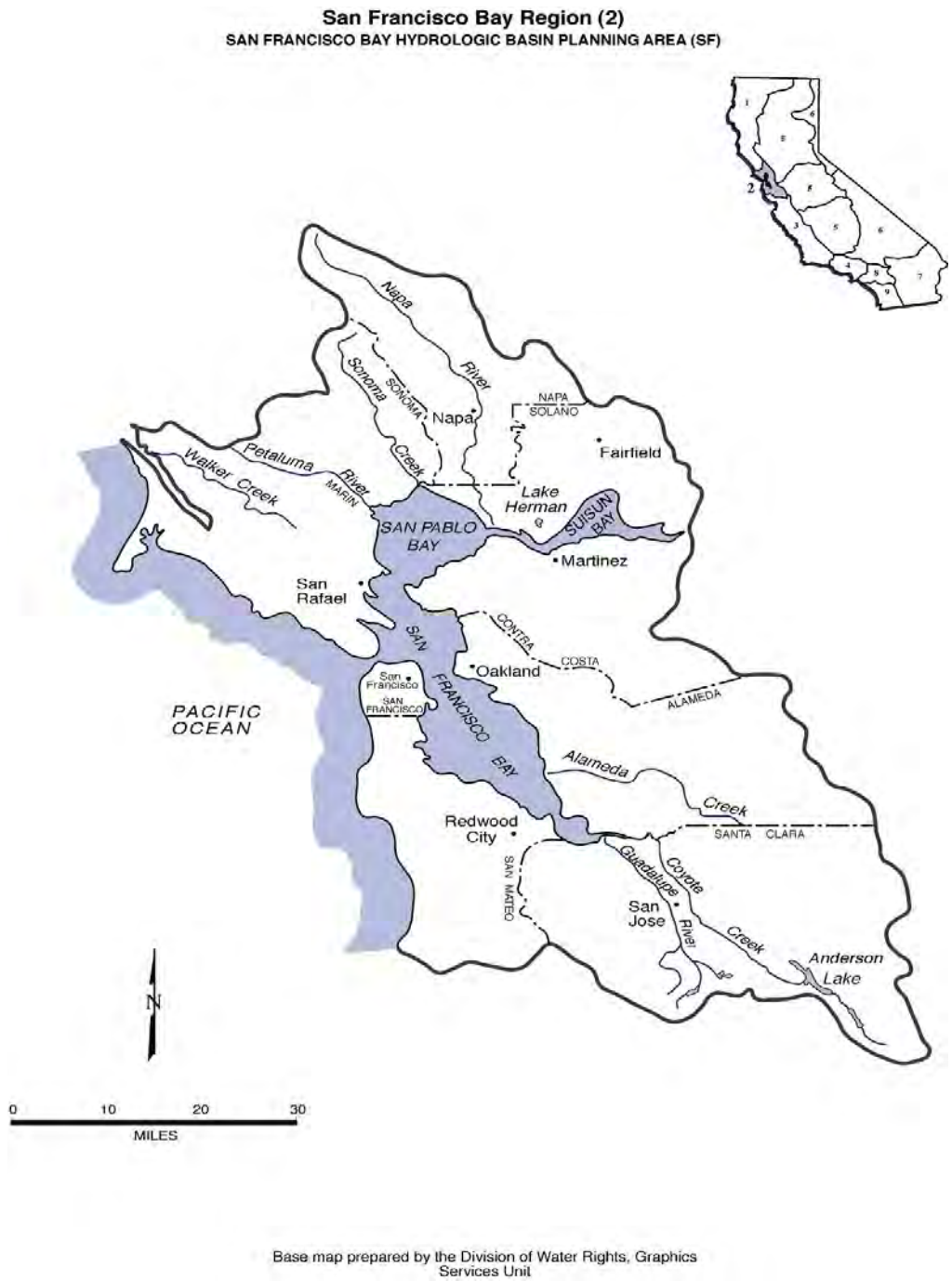

Figure 5. San Francisco Bay Region Hydrologic Basin.

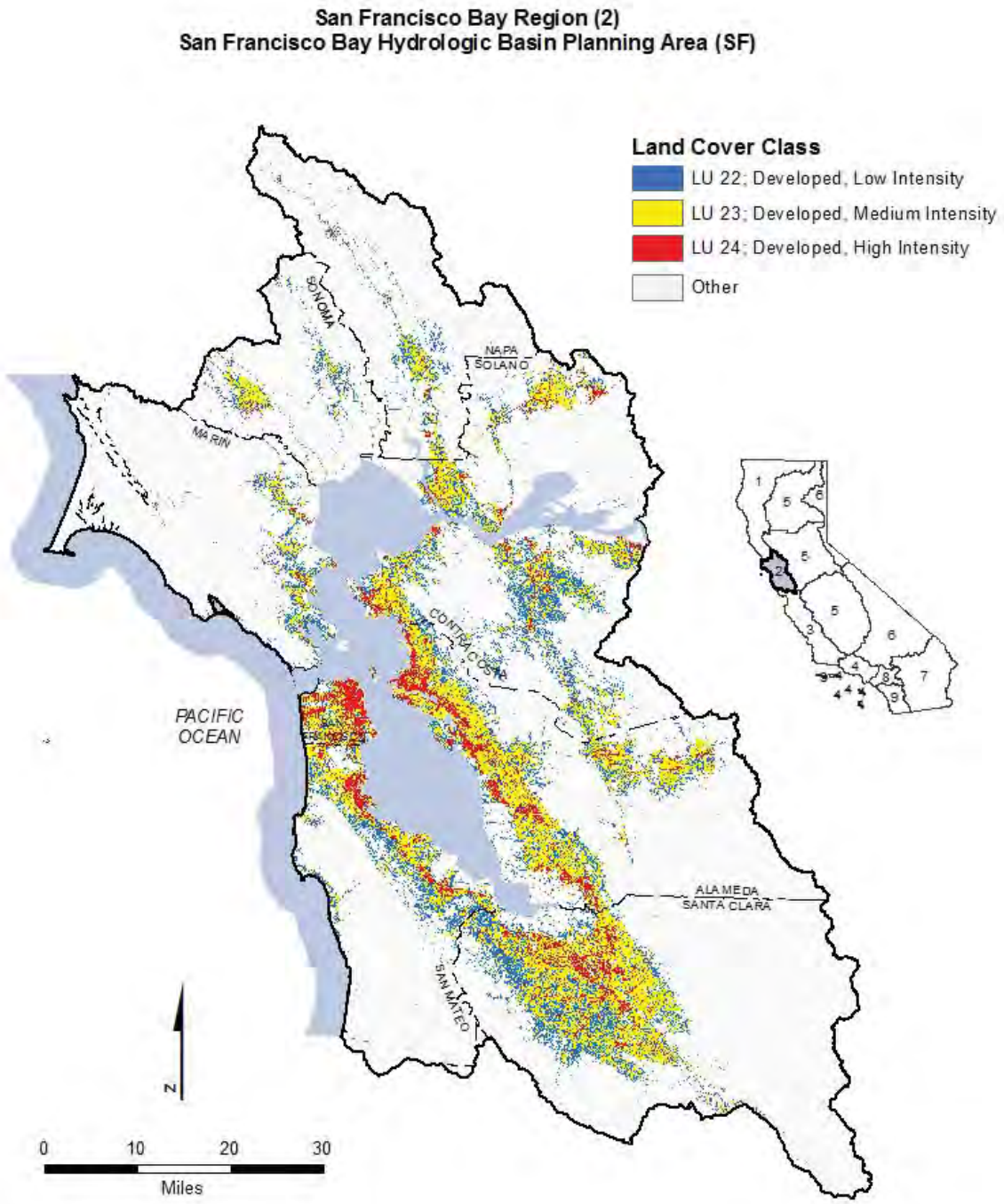

Figure 6. San Francisco Bay Region Developed Land Coverage.

3.6 Central Coast Region

The Central Coast Region comprises all basins (including Carrizo Plain in San Luis Obispo and Kern Counties) draining into the Pacific Ocean from the southern boundary of the Pescadero Creek watershed in San Mateo and Santa Cruz Counties; to the southeastern boundary of the Rincon Creek watershed, located in western Ventura County (Figure 7, Figure 8). The region extends over a 300-mile long by 40-mile wide section of the state's central coast. Its geographic area encompasses all of Santa Cruz, San Benito, Monterey, San Luis Obispo, and Santa Barbara Counties as well as the southern one-third of Santa Clara County, and small portions of San Mateo, Kern, and Ventura Counties. Included in the region are urban areas such as the Monterey Peninsula and the Santa Barbara coastal plain; prime agricultural lands such as the Salinas, Santa Maria, and Lompoc Valleys; National Forest lands; extremely wet areas such as the Santa Cruz Mountains; and arid areas such as the Carrizo Plain.

Water bodies in the Central Coast Region are varied. Enclosed bays and harbors in the region include Morro Bay, Elkhorn Slough, Tembladero Slough, Santa Cruz Harbor, Moss Landing Harbor, San Luis Harbor, and Santa Barbara Harbor. Several small estuaries also characterize the region, including the Santa Maria River Estuary, San Lorenzo River Estuary, Big Sur River Estuary, and many others. Major rivers, streams, and lakes include San Lorenzo River, Santa Cruz River, San Benito River, Pajaro River, Salinas River, Santa Maria River, Cuyama River, Estrella River and Santa Ynez River, San Antonio Reservoir, Nacimiento Reservoir, Twitchel Reservoir, and Cuchuma Reservoir.

Located in the Central Coast Region are 7 ASBS: Año Nuevo (#15); Pacific Grove (#19); Carmel Bay (#34); Point Lobos (#16); Julia Pfeiffer Burns (#18); San Miguel, Santa Rosa, and Santa Cruz Islands (#17); and Salmon Creek Coast (#20).

The land use activities in the basin have been primarily agrarian. While agriculture and related food processing activities are major industries in the region, land uses also include oil production, tourism, and manufacturing. Total population of the region is estimated at 1.22 million people.

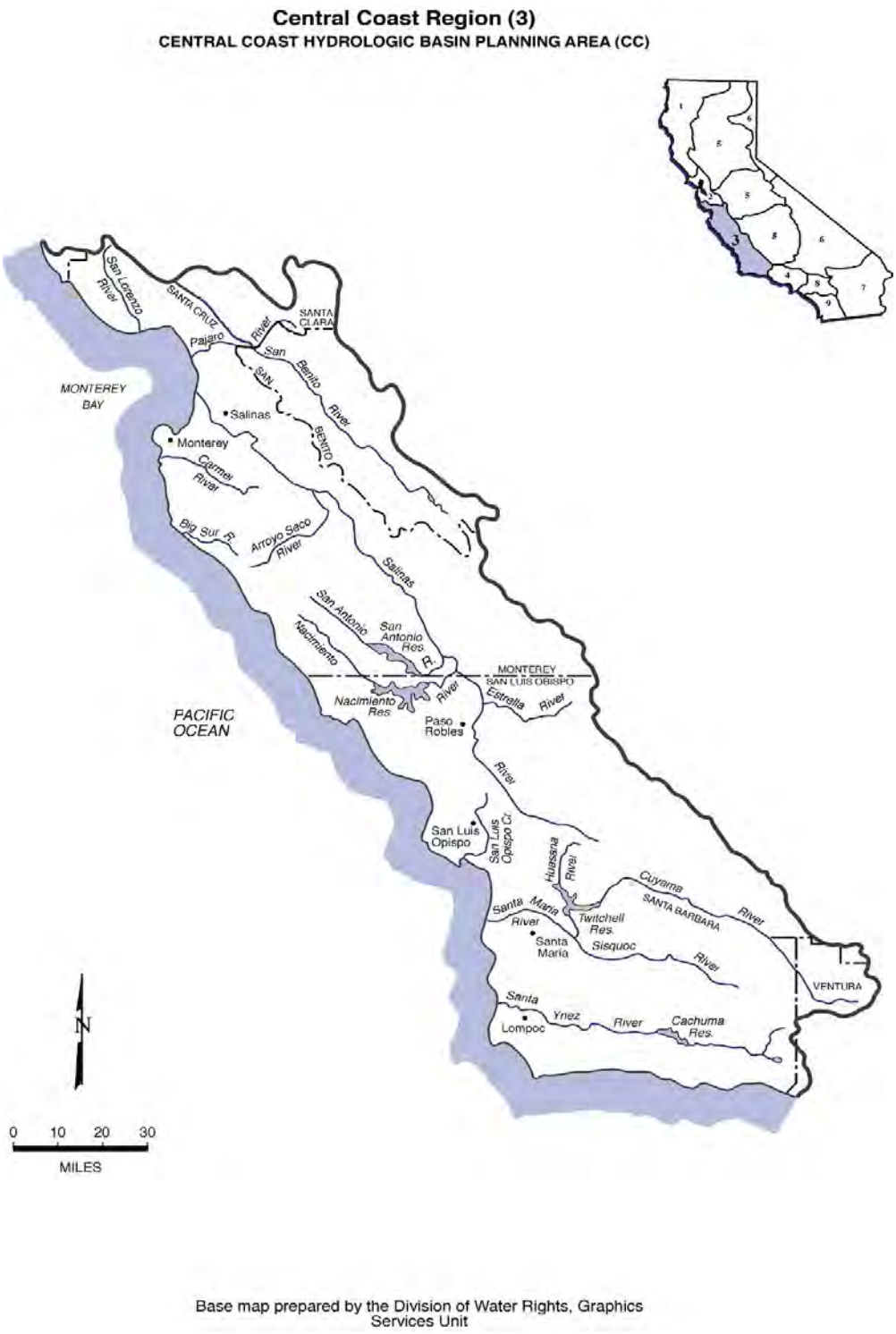

Figure 7. Central Coast Region Hydrologic Basin.

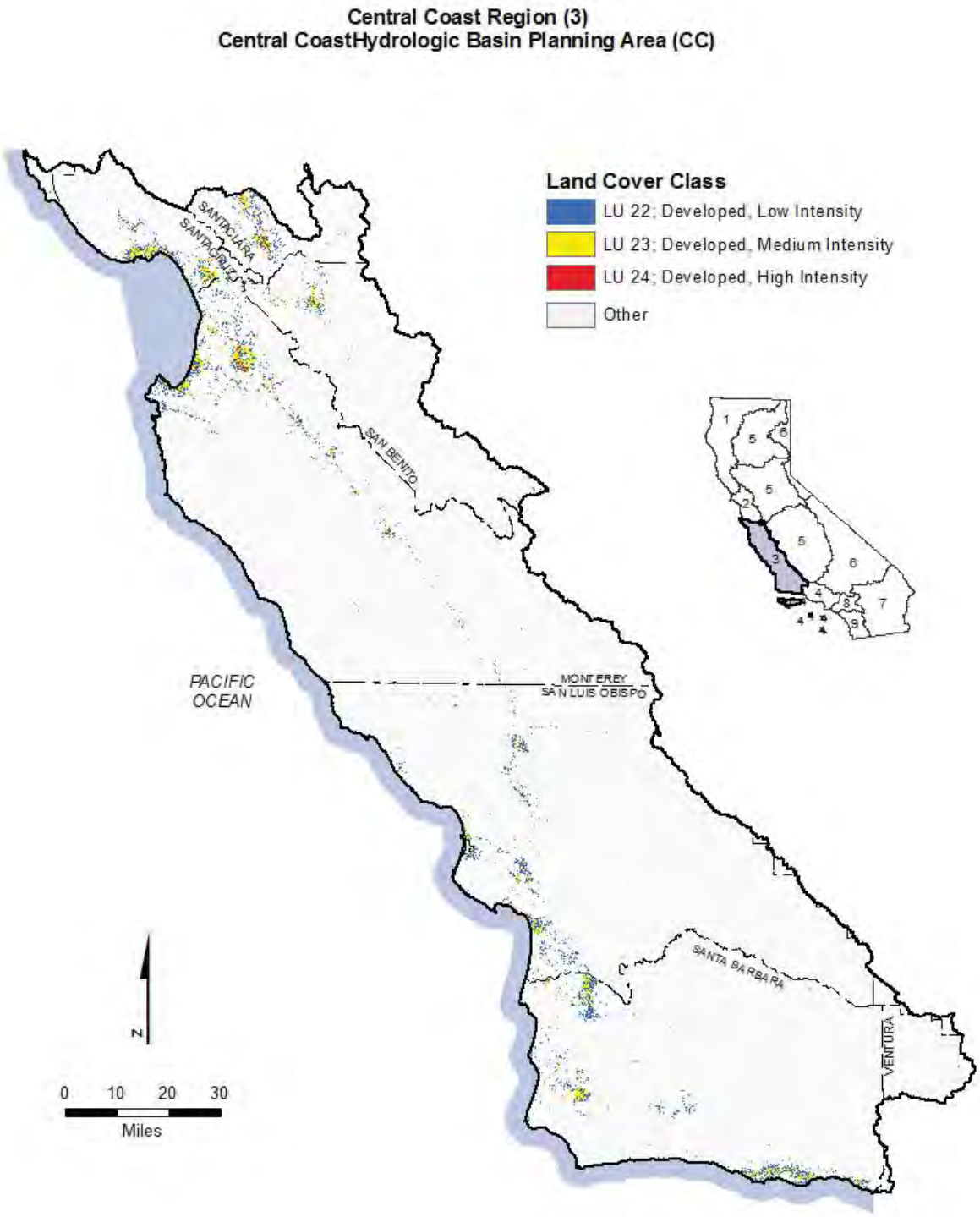

Figure 8. Central Coast Region Developed Land Coverage.

3.7 Los Angeles Region

The Los Angeles Region comprises all basins draining into the Pacific Ocean between the southeastern boundary of the watershed of Rincon Creek, located in western Ventura County, and a line which coincides with the southeastern boundary of Los Angeles County, from the Pacific Ocean to San Antonio Peak, and follows the divide, between the San Gabriel River and Lytle Creek drainages to the divide between Sheep Creek and San Gabriel River drainages (Figure 9, Figure 10).

The region encompasses all coastal drainages flowing into the Pacific Ocean between Rincon Point (on the coast of western Ventura County) and the eastern Los Angeles County line, as well as the drainages of five coastal islands (Anacapa, San Nicolas, Santa Barbara, Santa Catalina and San Clemente). In addition, the region includes all coastal waters within three miles of the continental and island coastlines. Two large deepwater harbors (Los Angeles and Long Beach Harbors) and one smaller deepwater harbor (Port Hueneme) are contained in the region. There are small craft marinas within the harbors, as well as tank farms, naval facilities, fish processing plants, boatyards, and container terminals. Several small-craft marinas also exist along the coast (Marina del Ray, King Harbor, and Ventura Harbor); these contain boatyards, other small businesses and dense residential development.

Several large, primarily concrete-lined rivers (Los Angeles River and San Gabriel River) lead to unlined tidal prisms which are influenced by marine waters. Salinity may be greatly reduced following rains since these rivers drain large urban areas composed of mostly impermeable surfaces. Some of these tidal prisms receive a considerable amount of freshwater throughout the year from publicly owned treatment works discharging tertiary-treated effluent. Lagoons are located at the mouths of other rivers draining relatively undeveloped areas (Mugu Lagoon, Malibu Lagoon, Ventura River Estuary, and Santa Clara River Estuary). There are also a few isolated coastal brackish water bodies receiving runoff from agricultural or residential areas.

Santa Monica Bay, which includes the Palos Verdes Shelf, dominates a large portion of the open coastal water bodies in the region. Eight ASBS are located in the Los Angeles Region: San Nicolas Island and Begg Rock (#21), Santa Barbara and Anacapa Islands (#22), San Clemente Island (#23), Laguna Point to Latigo Point (#24), Northwest Santa Catalina Island (#25), Western Santa Catalina Island (#26), Farnsworth Bank (#27), and Southeast Santa Catalina (#28).

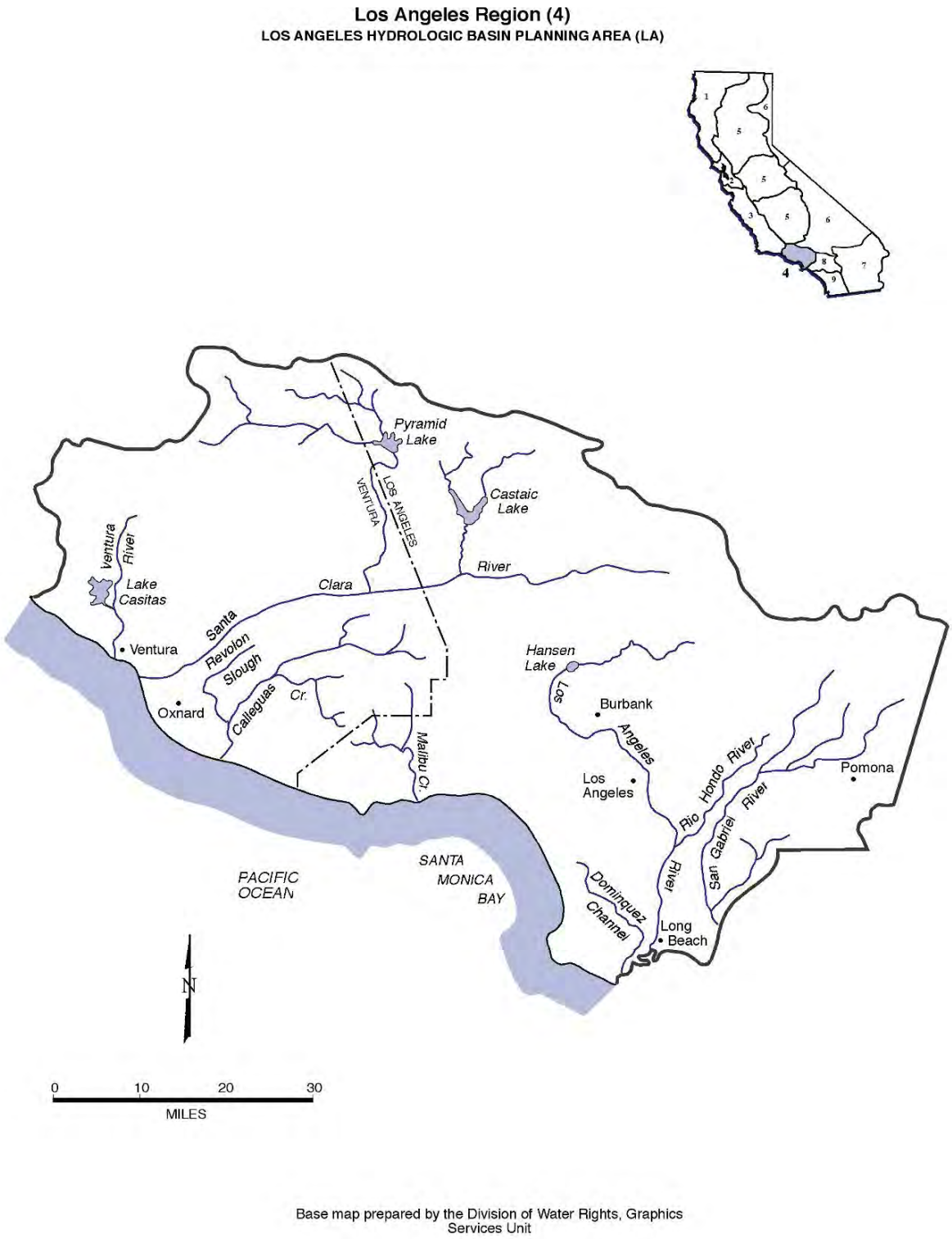

Figure 9. Los Angeles Region Hydrologic Basin.

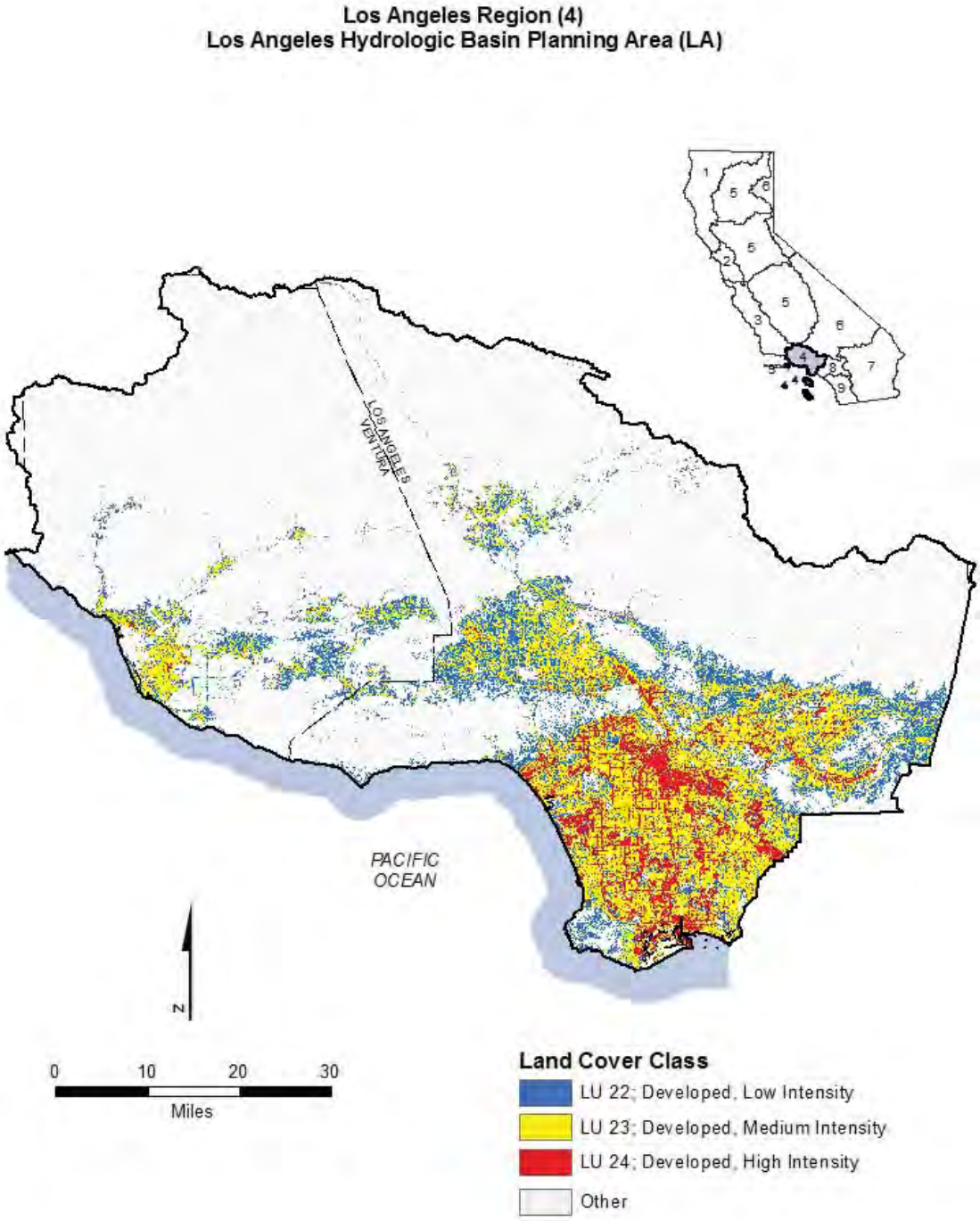

Figure 10. Los Angeles Region Developed Land Coverage.

3.8 Central Valley Region

The Central Valley Region includes approximately 40 percent of the land in California stretching from the Oregon border to the Kern County-Los Angeles County line. The region is divided into three basins. For planning purposes, the Sacramento River and the San Joaquin River Basins are covered under one basin plan, and the Tulare Lake Basin is covered under a separate basin plan.

The Sacramento River Basin covers 27,210 square miles and includes the entire area drained by the Sacramento River (Figure 11, Figure 12). The principal streams are the Sacramento River and its larger tributaries: the Pitt, Feather, Yuba, Bear, and American Rivers to the East; and Cottonwood, Stony, Cache, and Putah Creek to the west. Major reservoirs and lakes include Shasta, Oroville, Folsom, Clear Lake, and Lake Berryessa.

The San Joaquin River Basin covers 15,880 square miles and includes the entire area drained by the San Joaquin River (Figure 13, Figure 14). Principal streams in the basin are the San Joaquin River and its larger tributaries: the Consumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers. Major reservoirs and lakes include Pardee, New Hogan, Millerton, McClure, Don Pedro, and New Melones.

The Tulare Lake Basin covers approximately 16,406 square miles and comprises the drainage area of the San Joaquin Valley south of the San Joaquin River (Figure 15, Figure 16). The planning boundary between the San Joaquin River Basin and the Tulare Lake Basin is defined by the northern boundary of Little Pinoche Creek basin eastward along the channel of the San Joaquin River to Millerton Lake in the Sierra Nevada foothills, and then along the southern boundary of the San Joaquin River drainage basin. Main Rivers within the basin include the King, Kaweah, Tule, and Kern Rivers, which drain to the west face of the Sierra Nevada Mountains. Imported surface water supplies enter the basin through the San Luis Drain-California Aqueduct System, Friant-Kern Channel, and the Delta Mendota Canal.

The two northern most basins are bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. They extend about 400 miles from the California-Oregon border southward to the headwaters of the San Joaquin River. These two river basins cover about one fourth of the total area of the state and over 30 percent of the state's irrigable land. The Sacramento and San Joaquin Rivers furnish roughly 50 percent of the state's water supply. Surface water from the two drainage basins meets and forms the Delta, which ultimately drains into the San Francisco Bay.

The Delta is a maze of river channels and diked islands covering roughly 1,150 square miles, including 78 square miles of water area. Two major water projects located in the South Delta, the Federal Central Valley Project and the State Water Project, deliver water from the Delta to Southern California, the San Joaquin Valley, Tulare Lake Basin, the San Francisco Bay Area, as well as within the Delta boundaries.

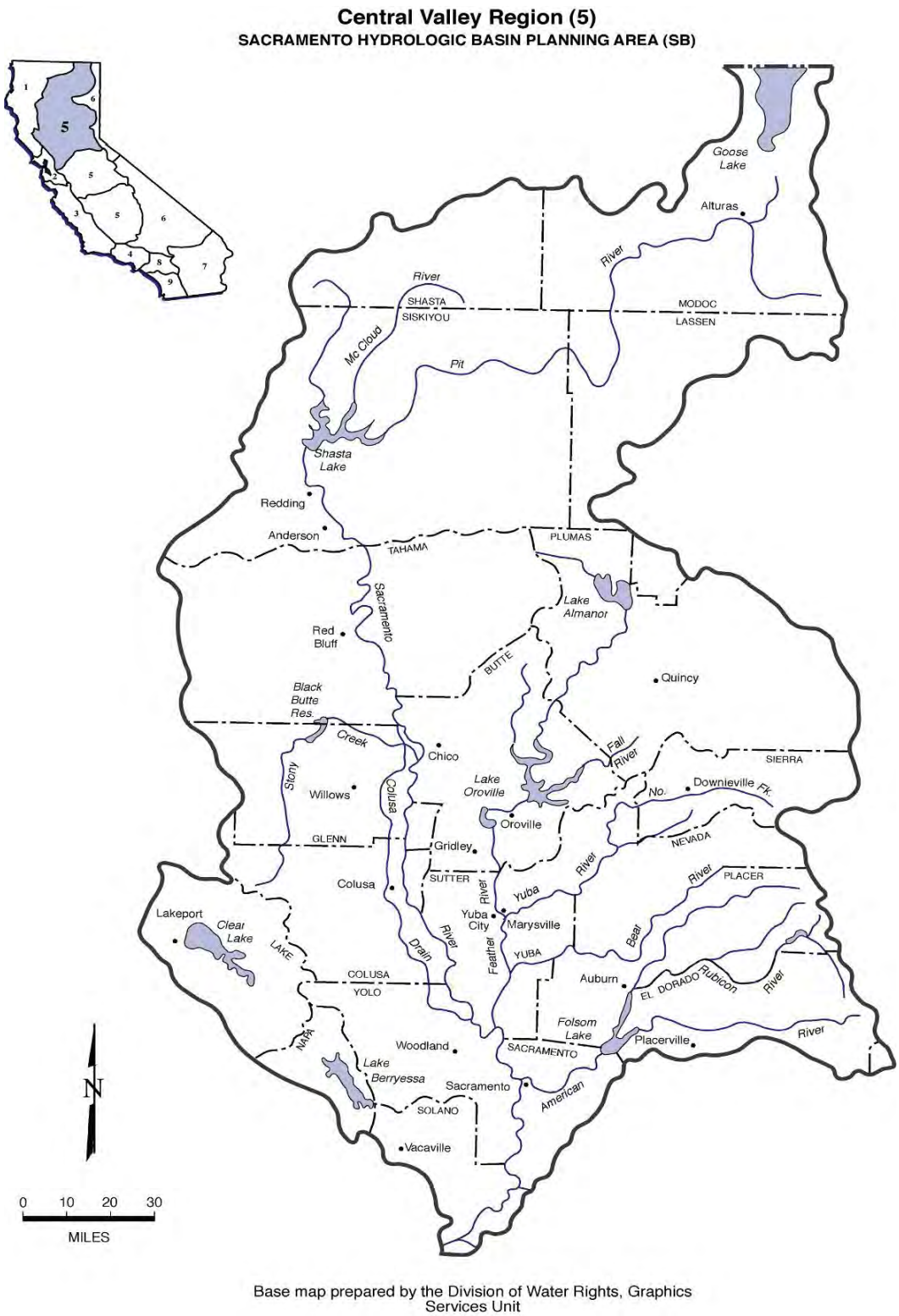

Figure 11. Central Valley Region, Sacramento Region Hydrologic Basin.

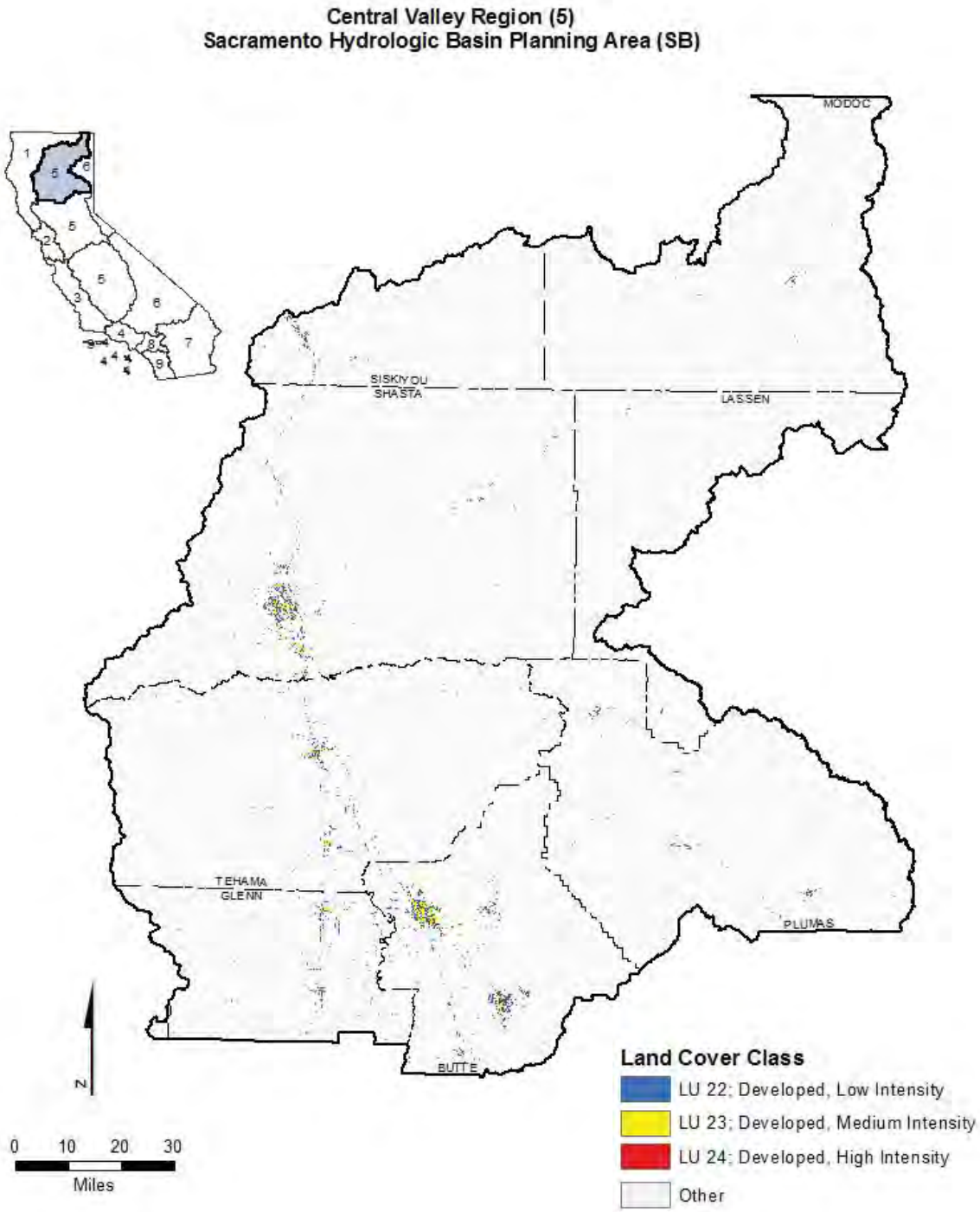

Figure 12. Central Valley Region, Sacramento Region Developed Land Coverage.

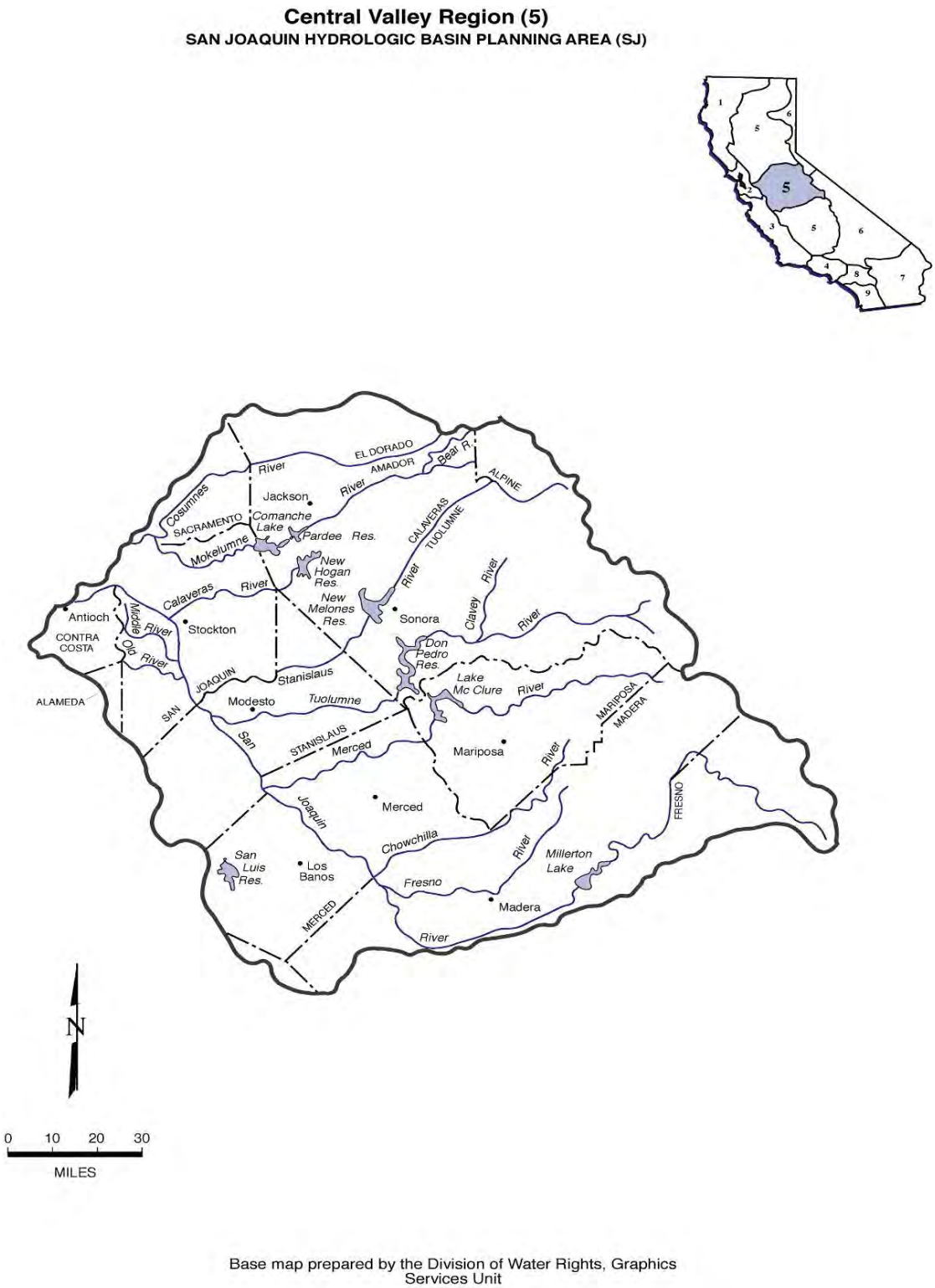

Figure 13. Central Valley Region, San Joaquin Hydrologic Basin.

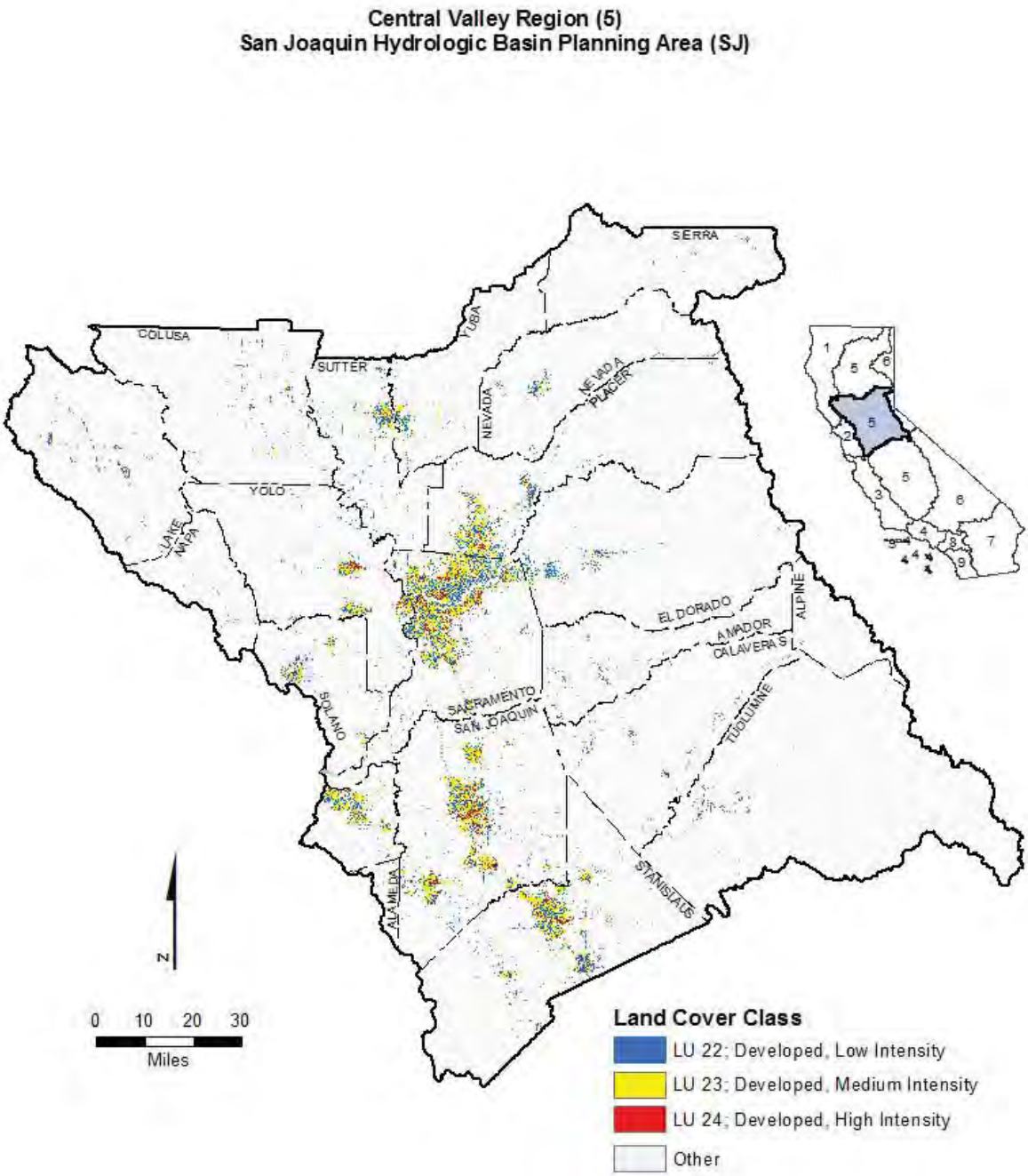

Figure 14. Central Valley Region, San Joaquin Developed Land Coverage.

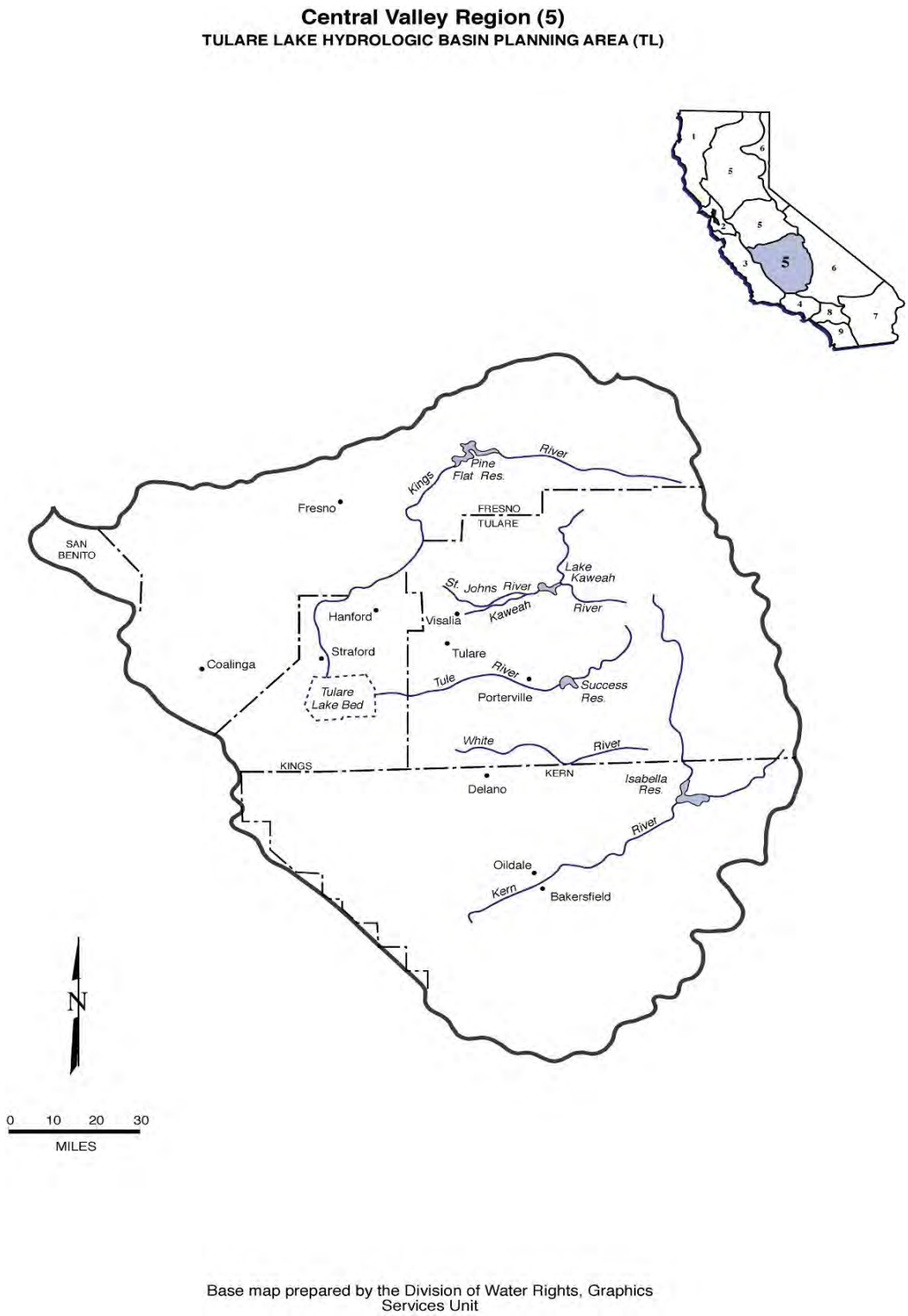

Figure 15. Central Valley Region, Tulare Lake Hydrologic Basin.

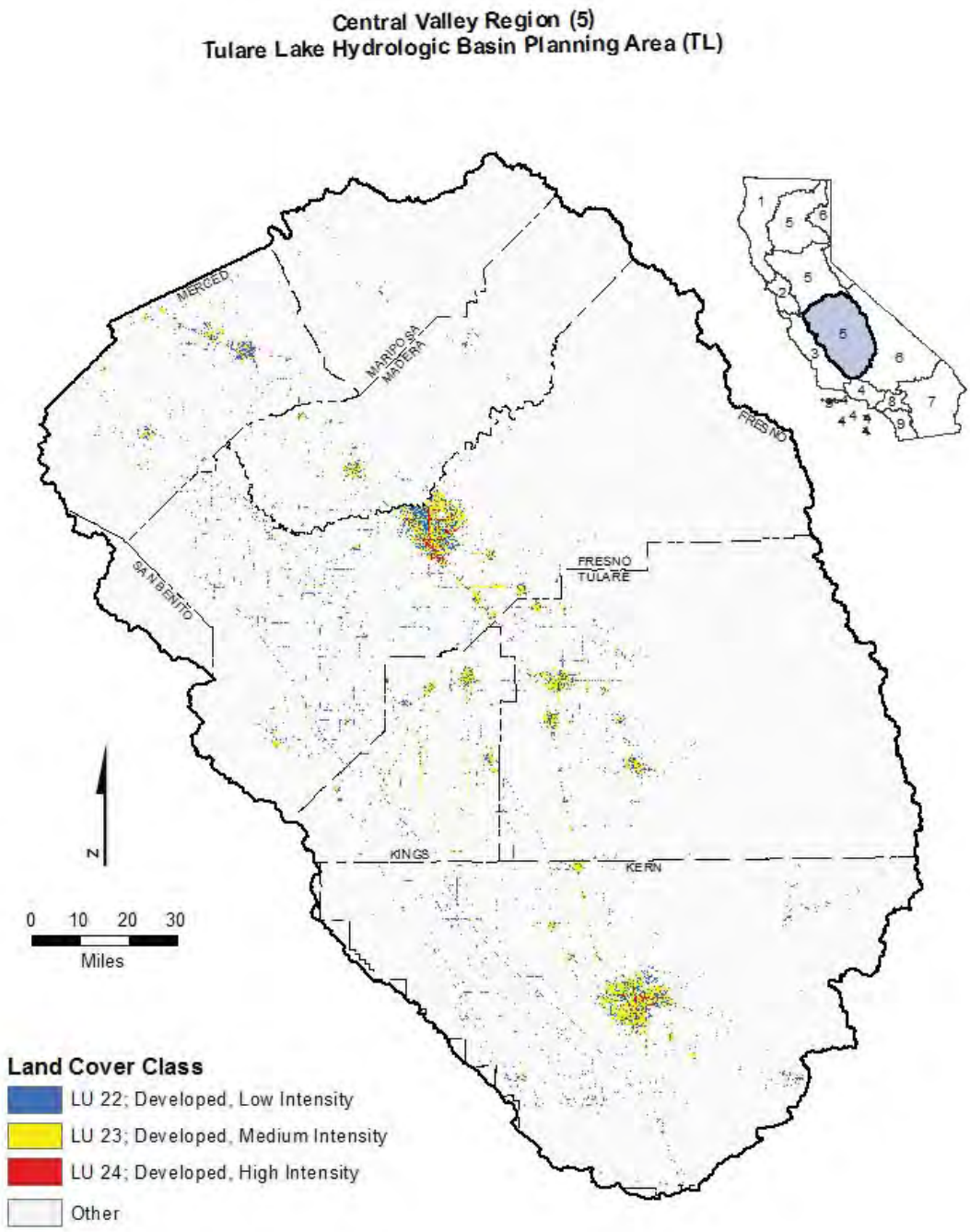

Figure 16. Central Valley Region, Tulare Lake Developed Land Coverage.

3.9 Lahontan Region

The Lahontan Region is divided into North and South Lahontan Basins at the boundary between the Mono Lake and East Walker River watersheds (Figure 17, Figure 18, Figure 19, Figure 20). It is about 570 miles long and has a total area of 33,131 square miles. The Lahontan Region includes the highest (Mount Whitney) and lowest (Death Valley) points in the contiguous United States. The region includes the eastern slopes of the Warner, Sierra Nevada, San Bernardino, Tehachapi and San Gabriel Mountains, and all or part of other ranges including the White, Providence, and Granite Mountains. Topographic depressions include the Madeline Plains, Surprise, Honey Lake, Bridgeport, Owens, Antelope, and Victor Valleys.

The region includes over 700 lakes, 3,170 miles of streams, and 1,581 square miles of groundwater basins. There are 12 major watersheds in the North Lahontan Basin. Among these are the Eagle Lake, Susan River/Honey Lake, Truckee, Carson, and Walker River watersheds. The South Lahontan Basin includes three major surface water systems (the Mono Lake, Owens River, and Mojave River watersheds) and a number of separate closed groundwater basins.

Although annual precipitation amounts can be high (up to 70 inches) at higher elevations, most precipitation in the mountainous areas falls as snow. Desert areas receive relatively little annual precipitation (less than two inches in some locations) but this can be concentrated and lead to flash flooding. The varied topography, soils, and microclimates of the Lahontan Region support a corresponding variety of plant and animal communities. Wetland and riparian plant communities, including marshes, meadows, sphagnum bogs, riparian deciduous forest, and desert washes, are particularly important for wildlife, given the general scarcity of water in the region.

Both developed (e.g., camping, skiing, and day use) and undeveloped (e.g., hiking, fishing) recreation are important land uses in the region. In addition to tourism, other land uses include resource extraction (mining, energy production, and silviculture), agriculture (mostly livestock grazing), and defense-related activities.

Much of the Lahontan Region is in public ownership, with land use controlled by agencies, such as the U.S. Forest Service, National Park Service, and Bureau of Land Management, various branches of the military, the California State Department of Parks and Recreation, and the City of Los Angeles Department of Water and Power. While the permanent resident population (about 500,000 in 1990) of the Region is low, most of it is concentrated in high-density communities in the South Lahontan Basin. In addition, millions of visitors use the Lahontan Region for recreation each year. Rapid population growth has occurred in the Victor and Antelope Valleys, and within commuting distance of Reno, Nevada. Principal communities of the North Lahontan Basin include Susanville, Truckee, Tahoe City, South Lake Tahoe, Markleeville, and Bridgeport. The South Lahontan Basin includes the communities of Mammoth Lakes, Bishop, Ridgecrest, Mojave, Adelanto, Palmdale, Lancaster, Victorville, and Barstow.

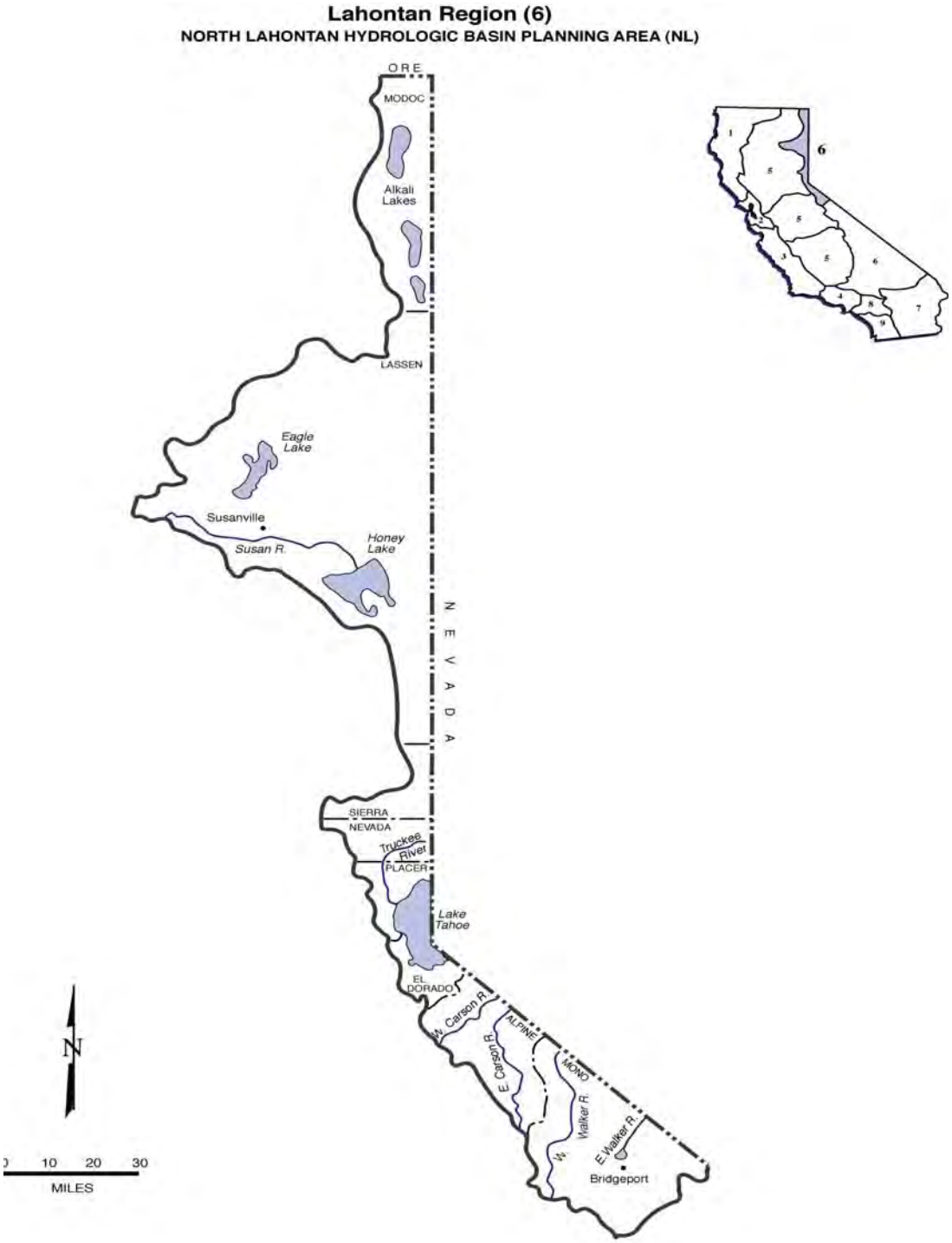

Figure 17. Lahontan Region, North Lahontan Hydrologic Basin.

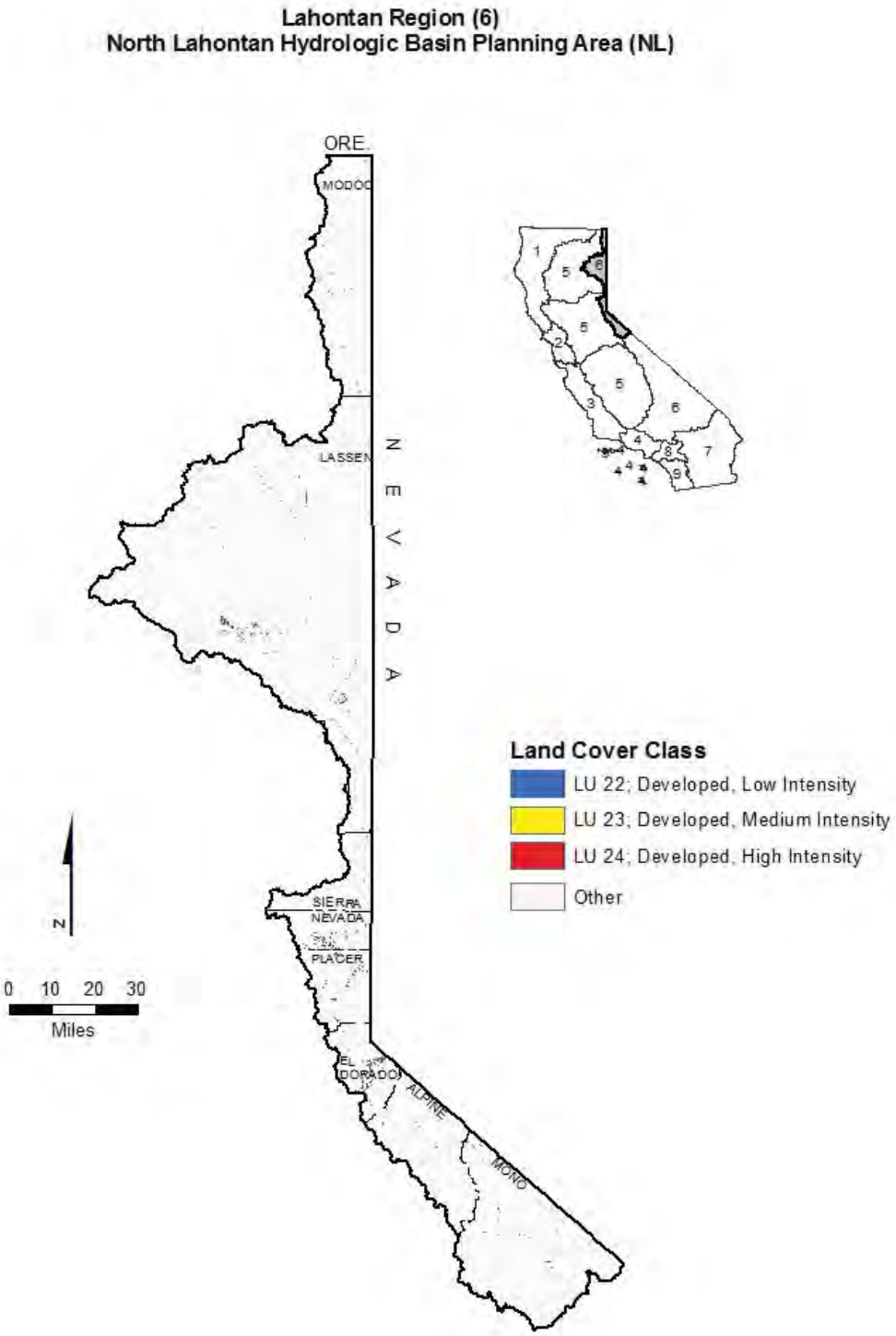

Figure 18. Lahontan Region, North Lahontan Developed Land Coverage.

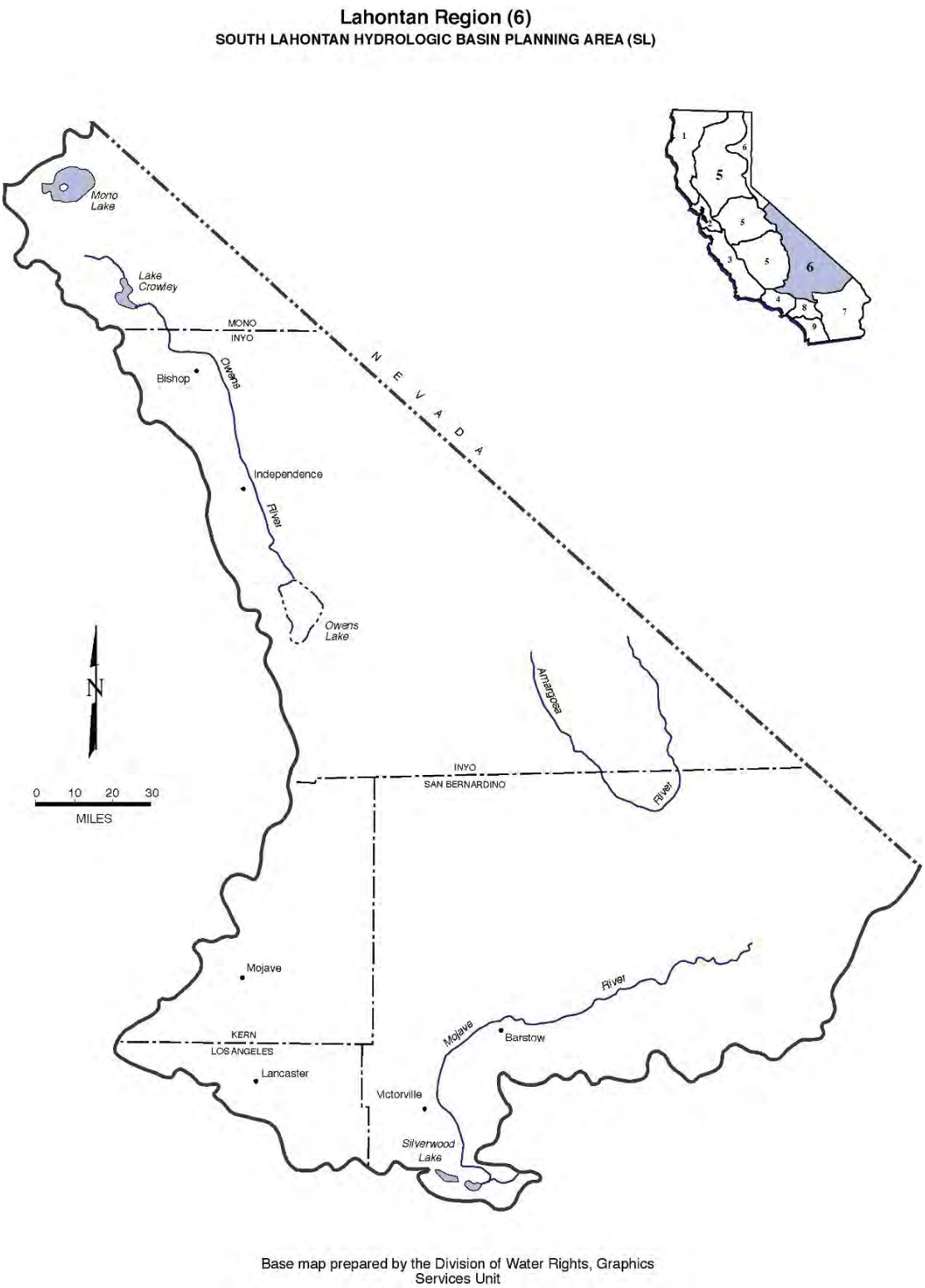

Figure 19. Lahontan Region, South Lahontan Hydrologic Basin.

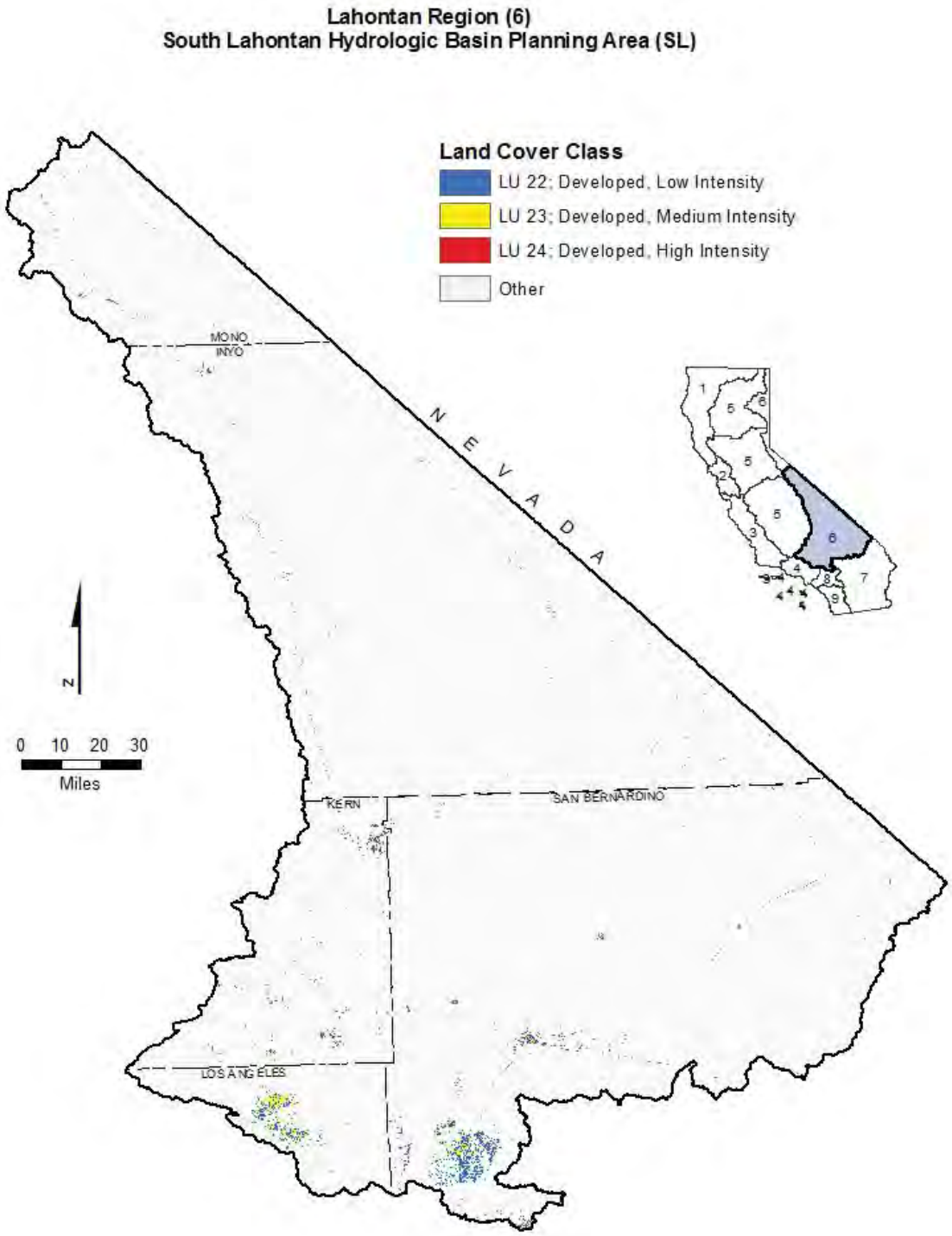

Figure 20. Lahontan Region, South Lahontan Developed Land Coverage.

3.10 Colorado River Basin Region

The Colorado River Basin Region covers approximately 13 million acres (20,000 square miles) in the southeastern portion of California (Figure 21, Figure 22). It includes all of Imperial County and portions of San Bernardino, Riverside, and San Diego Counties. It shares a boundary for 40 miles on the northeast with the State of Nevada. The New York, Providence, Granite, Old Dad, Bristol, Rodman, and Ord Mountain ranges border the region to the north, the San Bernardino, San Jacinto, and Laguna Mountain ranges border the region to the west, the Republic of Mexico borders the Region to the south, and the Colorado River and State of Arizona border the region to the east. Geographically the region represents only a small portion of the total Colorado River drainage area, which includes portions of Arizona, Nevada, Utah, Wyoming, Colorado, New Mexico, and Mexico. A significant geographical feature of the region is the Salton Trough, which contains the Salton Sea and the Coachella and Imperial Valleys. The two valleys are separated by the Salton Sea, which covers the lowest area of the depression. The Salton Sea is California's largest inland body of water and provides wildlife habitat and sport fishery.

Much of the agricultural economy and industry of the region is located in the Salton Trough. There are also industries associated with agriculture, such as sugar refining as well as increasing development of geothermal industries. The Salton Sea serves as a drainage reservoir for irrigation return water and storm water from the Coachella Valley, Imperial Valley, and Borrego Valley, and also receives drainage water from the Mexicali Valley in Mexico. Development along California's 230 mile reach of the Colorado River, which flows along the eastern boundary of the Region, include agricultural areas in Palo Verde Valley and Bard Valley, urban centers at Needles, Blythe, and Winterhaven, several transcontinental gas compressor stations, and numerous small recreational communities. Some mining operations are located in the surrounding mountains. Also the Fort Mojave, Chemehuevi, Colorado River, and Yuma Indian Reservations are located along the River.

The region has the driest climate in California. Snow falls in the region's higher elevations, with mean seasonal precipitation ranging from 30 to 40 inches in the upper San Jacinto and San Bernardino Mountains. The lower elevations receive relatively little rainfall. An average of four inches of precipitation occurs along the Colorado River, with much of this coming from late summer thunderstorms moving north from Mexico. Typical mean seasonal precipitation in the desert valleys is 3.6 inches at Indio and 3.2 inches at El Centro. Precipitation over the entire area occurs mostly from November through April, and August through September, but its distribution and intensity are often sporadic. Local thunderstorms may contribute all the average seasonal precipitation at one time or only a trace of precipitation may be recorded at any locale for the entire season.

The region provides habitat for a variety of native and introduced species of wildlife. Animals tolerant of arid conditions, including small rodents, coyotes, foxes, birds, and a variety of reptiles, inhabit large areas within the region. Along the Colorado River and in the higher elevations of the San Bernardino and San Jacinto Mountains, where water is more abundant, and where deer, bighorn sheep, and a diversity of small animals exist. Practically all of the fishes inhabiting the region are introduced species. The Salton Sea

National Wildlife Refuge and state waterfowl management areas are located in or near the Salton Sea. The refuge supports large numbers of waterfowl in addition to other types of birds. Located along the Colorado River are the Havasu, Cibola and Imperial National Wildlife Refuges. The region provides habitat for certain endangered/threatened species of wildlife including desert pupfish, razorback sucker, Yuma clapper rail, black rail, least Bell's vireo, yellow billed cuckoo, desert tortoise, and peninsular bighorn sheep.

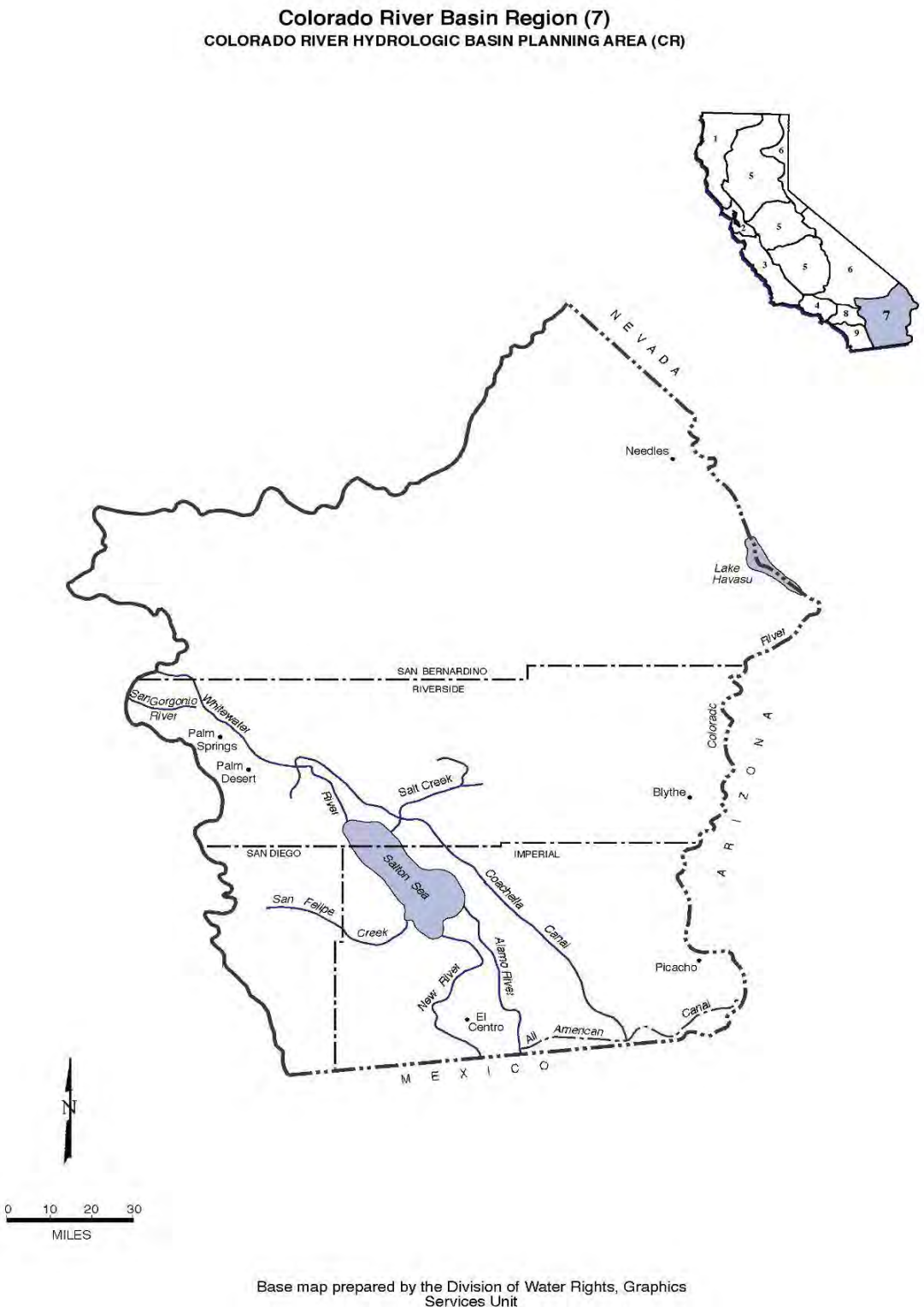

Base map prepared by the Division of Water Rights, Graphics Services Unit

Figure 21. Colorado River Region Hydrologic Basin.

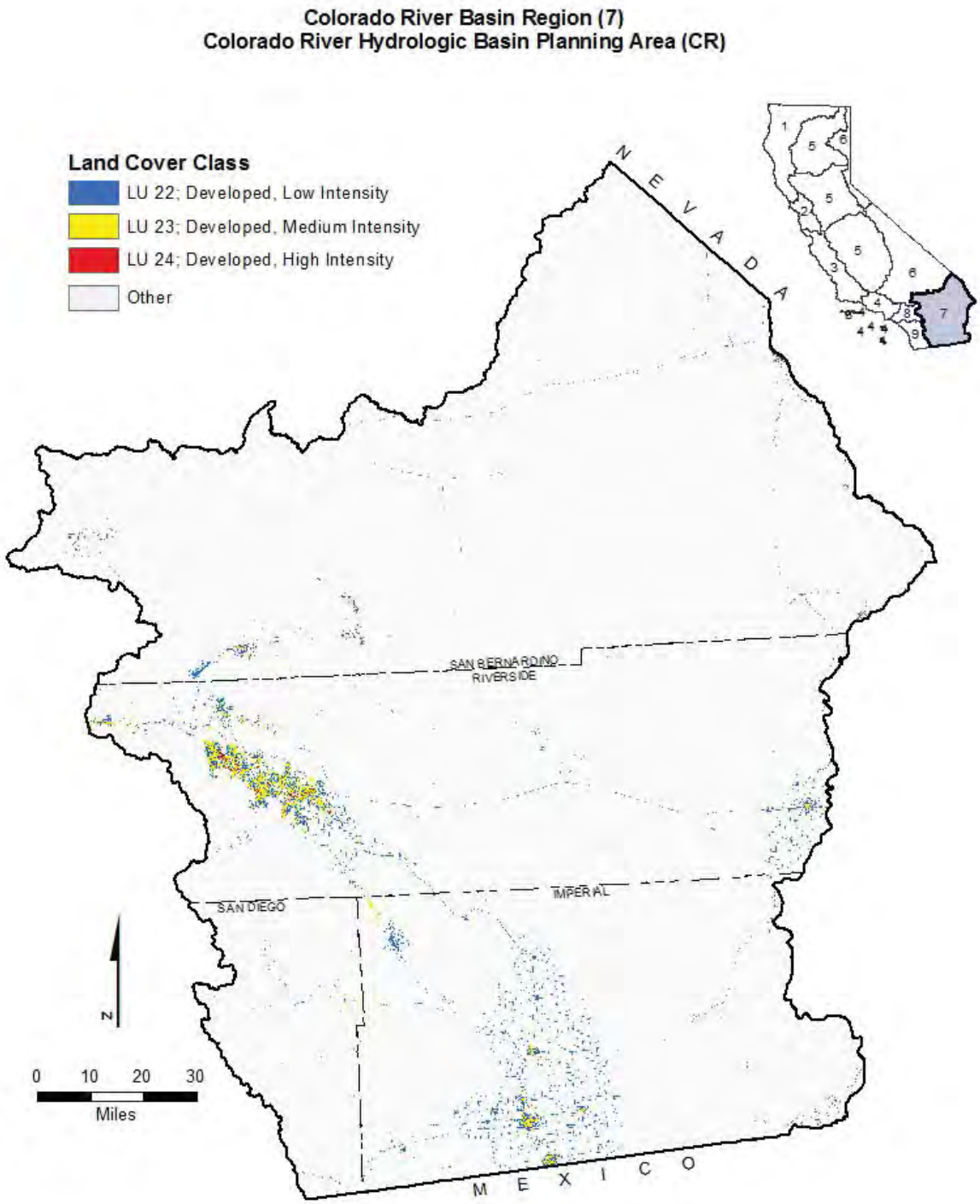

Figure 22. Colorado River Region Developed Land Coverage.

3.11 Santa Ana Region

The Santa Ana Region comprises all basins draining into the Pacific Ocean between the southern boundary of the Los Angeles Region and the drainage divide between Muddy and Moro Canyons, from the ocean to the summit of San Joaquin Hills; along the divide between lands draining into Newport Bay and Laguna Canyon to Niguel Road; along

Niguel Road and Los Aliso Avenue to the divide between Newport Bay and Aliso Creek drainages; and along the divide and the southeastern boundary of the Santa Ana River drainage to the divide between Baldwin Lake and Mojave Desert drainages; to the divide between the Pacific Ocean and Mojave Desert drainages (Figure 23, Figure 24). The Santa Ana Region is the smallest of the nine regions in the state (2,800 square miles) and is located in southern California, roughly between Los Angeles and San Diego. Although small geographically, the region's four million-plus residents (1993 estimate) make it one of the most densely populated regions.

The climate of the Santa Ana Region is generally dry in the summer with mild, wet winters). The average annual rainfall in the region is about 15 inches, most of it occurring between November and March. The enclosed bays in the region include Newport Bay, Bolsa Bay (including Bolsa Chica Marsh), and Anaheim Bay. Principal rivers include Santa Ana, San Jacinto and San Diego. Lakes and reservoirs include Big Bear, Hemet, Mathews, Canyon Lake, Lake Elsinore, Santiago Reservoir, and Perris Reservoir. Two ASBS are located in the Santa Ana Region: Robert E. Badham (#32) and Irvine Coast (also located in the San Diego Region) (#33).

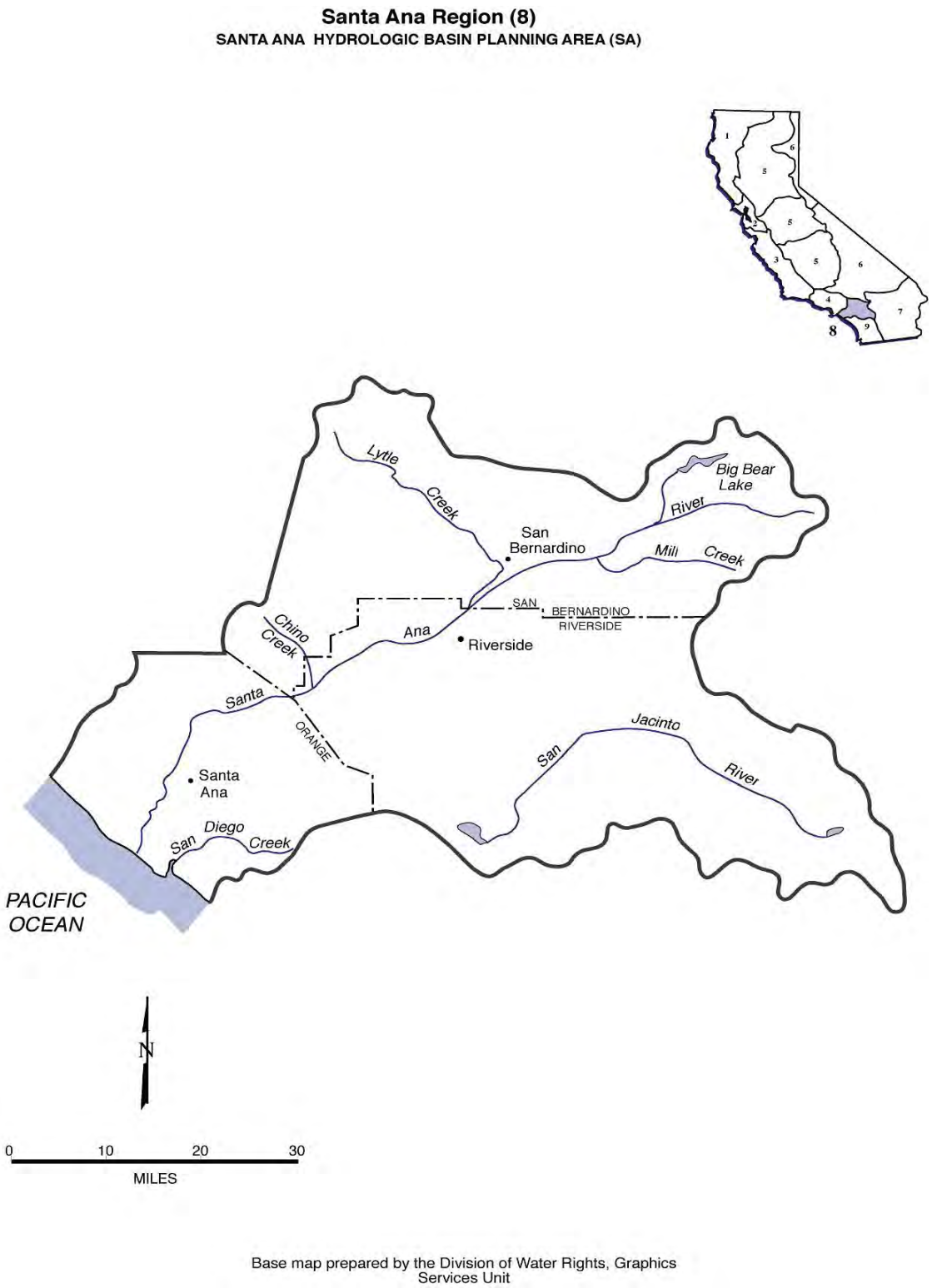

Figure 23. Santa Ana Region Hydrologic Basin.

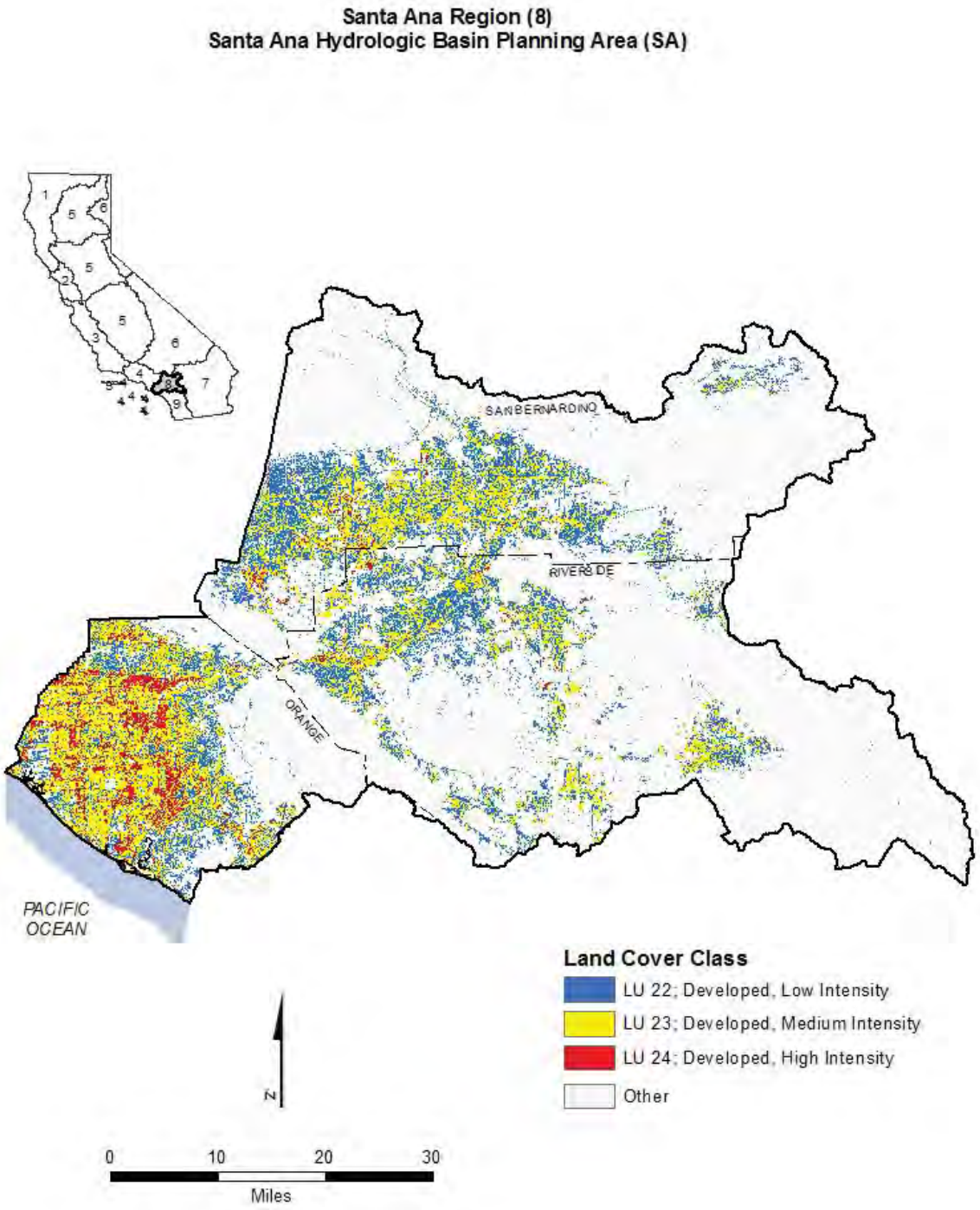

Figure 24. Santa Ana Region Developed Land Coverage.

3.12 San Diego Region

The San Diego Region comprises all basins draining into the Pacific Ocean between the southern boundary of the Santa Ana Region and the California-Mexico boundary (Figure 25, Figure 26). The San Diego Region is located along the coast of the Pacific Ocean from the Mexican border to north of Laguna Beach. The Region is rectangular in shape and extends approximately 80 miles along the coastline and 40 miles east to the crest of the mountains. The Region includes portions of San Diego, Orange, and Riverside Counties. The cities of San Diego, National City, Chula Vista, Coronado, and Imperial Beach surround San Diego Bay in the southern portion of the Region.

The population of the region is heavily concentrated along the coastal strip. Six deep water sewage outfalls and one across the beach from the new border plant at the Tijuana River empty into the ocean. Two harbors, Mission Bay and San Diego Bay, support major recreational and commercial boat traffic. Coastal lagoons are found along the San Diego County coast at the mouths of creeks and rivers.

San Diego Bay is long and narrow, 15 miles in length and approximately one mile across. A deep-water harbor, San Diego Bay has experienced waste discharge from former sewage outfalls, industries, and urban runoff. Up to 9,000 vessels may be moored there. San Diego Bay also hosts four major U.S. Navy bases with approximately 80 surface ships and submarines. Coastal waters include bays, harbors, estuaries, beaches, and open ocean.

Weather patterns are generally dry in the summer with mild, wet winters, with an average rainfall of approximately ten inches per year occurring along the coast.

Deep draft commercial harbors include San Diego Bay and Oceanside Harbor and shallower harbors include Mission Bay and Dana Point Harbor. Tijuana Estuary, Sweetwater Marsh, San Diego River Flood Control Channel, Kendal-Frost Wildlife Reserve, San Dieguito River Estuary, San Elijo Lagoon, Batiquitos Lagoon, Agua Hedionda Lagoon, Buena Vista Lagoon, San Luis Rey Estuary, and Santa Margarita River Estuary are the important estuaries of the region. There are 13 principal stream systems in the region originating in the western highlands and flowing to the Pacific Ocean. From north to south these are Aliso Creek, San Juan Creek, San Mateo Creek, San Onofre Creek, Santa Margarita River, San Luis Ray River, San Marcos Creek, Escondido Creek, San Dieguito River, San Diego River, Sweetwater River, Otay River, and the Tijuana River. Most of these streams are interrupted in character having both perennial and ephemeral components due to the rainfall pattern in the region. Surface water impoundments capture flow from almost all the major stream. Four ASBS are located in the San Diego Region: Irvine Coast (also located in the Santa Ana Region) (#33), La Jolla (#29), Heisler Park (#30), and San Diego-Scripps (#31).

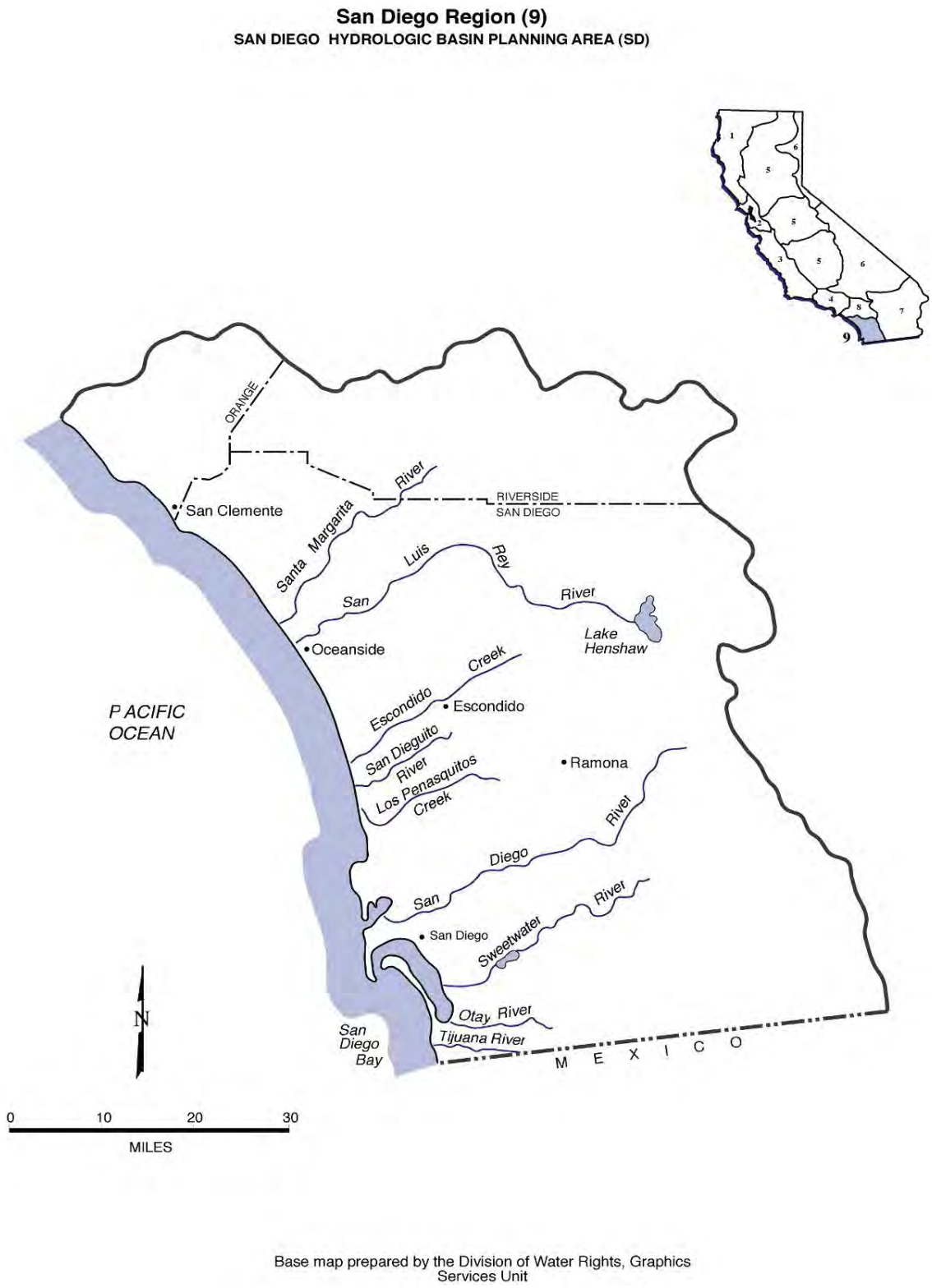

Figure 25. San Diego Region Hydrologic Basin.

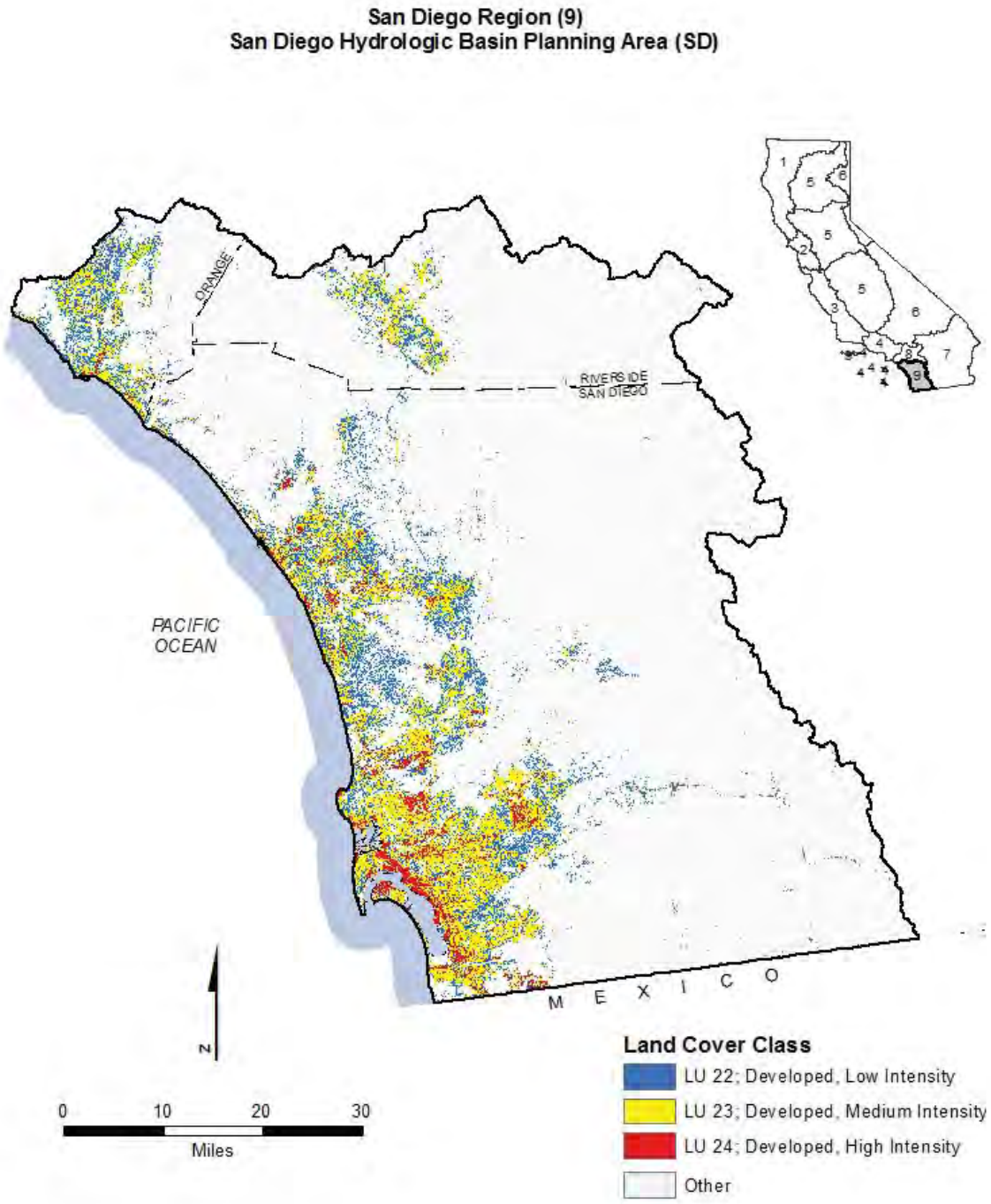

Figure 26. San Diego Region Developed Land Coverage.

4 ANALYSIS OF ISSUES AND CONSIDERATIONS

This section describes the major amendment-related issues identified during the scoping and development process, and provides a discussion of the State Water Board's rationale for the final Trash Amendments as currently proposed in this Final Staff Report. Each issue discussion is organized as follows:

Issue: A brief question framing the issue.

Current Conditions: A description of how the Water Boards currently act on the issue, where applicable.

Considerations: For each issue or topic, at least two considerations are provided. Each consideration is evaluated with respect to the program needs and the appropriate sections within Division 7 of the California Water Code. The considerations presented here also inform the requirement to analyze the reasonable range of alternatives to the project to avoid or reduce any potentially significant adverse environmental impacts, as described in Section 8.

Recommendation: In this section, State Water Board's recommended consideration (or combination of considerations) is identified and proposed for adoption.

4.1 Issue 1: How should the Trash Amendments define "trash"?

Current Conditions:

Waste and litter are currently defined in California law. As defined by the California Water Code, "waste" includes:

> "Sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal." (§ 13050(d))

The California Government Code defines "litter" as:

> "All improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing." (§ 68055.1(g))

Considerations:

1. **No Project: No definition.** Each Water Board would define "trash" for itself in its respective basin plans. This option potentially would result in a wide variety of definitions, and result in a failure to achieve statewide consistency. Therefore, this approach is not recommended.

2. **Define "trash" by using Basin Plans, California Government Code, and the California Water Code.** This definition would combine the definitions of "litter" in the California Government Code and "waste" in the California Water Code to include litter, waste, and types of trash including but not limited to plastic, expanded styrene, cigarette butts, wood, glass, cardboard, metal, and green waste. The resulting definition would read as follows:

   Trash *means all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.*

   This definition includes smaller trash, such as preproduction plastics and other materials. These small forms of trash have an impact on beneficial uses and should be addressed by the objective. This approach is recommended.

3. **Define "trash" by using the California Government Code and the California Water Code, and include size limitation to definition consistent with current technology.** This definition would combine the definitions of "litter" in the California Government Code, with "waste" in the California Water Code to include litter, waste, and other debris of concern such as plastic, expanded styrene, cigarette butts, wood, cardboard, metal, and green waste. The definition would state that it only applies to trash greater than 5 mm in size, consistent with full capture systems.

   Trash *means all improperly discarded solid material over 5 mm in size from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.*

   The drawback to including a size limitation is that it does not effectively address smaller trash, such as preproduction plastic and other materials that have an impact on beneficial uses. Therefore this approach is not recommended.

Recommendation: Adopt a definition of "trash" with no size limitation (Consideration 2).

4.2 Issue 2: What type of water quality objective for trash should be considered?

The U.S. EPA must approve objectives in statewide water quality control plans. Once the objectives have been approved, they become federally mandated and enforceable. Water quality objectives can be narrative or numeric with discrete targets. A narrative objective is as enforceable as a numeric objective.

Current Conditions:

Although language varies by each regional water board, in general, the basin plans contain narrative water quality objectives that prohibit the presence of floatable, solid, suspended, and settleable materials in amounts that adversely affect beneficial uses.

There are currently 33 existing narrative objectives in the eleven different water quality control plans that apply to the discharge of trash to state waters.

In addition to the water quality standard, as discussed above, the 303(d) listing methodology defines trash as a "nuisance"[11] and states that water segments may be listed as impaired if there is a "significant nuisance condition compared to reference conditions." The existing trash TMDLs establish numeric targets of zero trash based on the interpretation of the narrative water quality objectives in the Los Angeles and Colorado River Basin Plans. Thus, the water bodies with 303(d) listings for trash are found to lack an assimilative capacity for any amount of trash (Los Angeles Water Board 2000; 2004; 2007a; 2007b; 2007c; 2007d; 2007e; 2007f; 2008g; 2010).

Furthermore, multiple assessment methods, using varying objectives, have been implemented by the Regional Water Boards. Assessment parameters presented in the *Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurements in Streams* included: level of trash, actual number of trash items found, threat to aquatic life, threat to public health, illegal dumping and littering, and accumulation of trash (Surface Water Ambient Monitoring Program 2007).

Considerations:

1. **No Project: No new objective.** The Water Boards would have to continue to rely on existing basin plans and Ocean Plan, which do not contain trash-specific narratives; instead the objectives refer to trash-related pollutants and other pollutants such as foam and sediment in general terms (i.e., floatable, suspended, and settleable material). Similarly, there currently is no water quality objective specifically for trash in the Ocean Plan and ISWEBE Plan. In addition, the existing regional water boards' basin plan narrative objectives lack consistency. Therefore, this approach is not recommended.

2. **Create a statewide numeric water quality objective of "zero trash."** This objective would create a new statewide numeric water quality objective of "zero trash." The numeric objective could be adopted in individual basin plans by regional water boards or by the State Water Board in statewide water quality control plans (i.e., the Ocean Plan and ISWEBE Plan).

   Specifically, this objective would require that all surface waters not contain trash. Effectively, this performance-based numeric objective would result in an absolute

[11] According to California Water Code (§ 13050(m)), nuisance is defined as anything which meets all of the following requirements:

(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes.

trash discharge prohibition. Such a discharge prohibition could be implemented in phases to address high trash generating areas first. These areas would be determined by either: (1) state-defined categorical areas or, (2) municipalities or responsible jurisdictions.

A numeric objective of "zero trash" could be an efficient regulatory tool because the measurement of compliance is clearly defined. This option would establish a quantitative objective as a statewide numeric standard. While zero trash is the desirable goal, it may not be a feasible numeric objective. On a feasible level, a single piece of trash found in a water body may or may not constitute impairment, and it may or may not be aesthetically unpleasing. Therefore, this approach is not recommended.

3. **Standardize the existing narrative objectives that vary among the water quality control plans.** Individual regional water boards have existing narrative objectives in their basin plans associated with trash. The standardized narrative objective would reflect the concept that the waters of the state shall be *free from floatable, settleable, and suspended materials.*

   Under this alternative, the State Water Board would adopt an order directing each Regional Water Board to adopt a standardized narrative objective in each basin plan through individual amendments. This would be a complex and resource intensive activity, and there is no guarantee that the narrative objectives ultimately adopted would be consistent from region to region. Therefore, this approach is not recommended.

4. **Establish a new statewide narrative objective specifically for trash in the Ocean Plan and ISWEBE Plan.** This option would create a new statewide narrative objective specifically addressing trash with standardized language in all statewide water quality control plans. The objective would be amended into the Ocean Plan and ISWEBE Plan. Statewide water quality control plans supersede basin plans, thereby eliminating the necessity of adopting a narrative objective in each basin plan. This would make more efficient use of Water Board resources. Therefore, this approach is recommended.

Recommendation: Adopt a statewide narrative water quality objective specifically for trash in the Ocean and ISWEBE Plan (Consideration 4).

4.3 Issue 3: Which surface waters should the Trash Amendments be applicable to?

Current Conditions:

There are 73 listed impairments for trash in California waters. TMDLs have been developed to date in the Los Angeles Region and the Colorado River Basin Region. In the Colorado River Basin, a TMDL for trash was adopted for the New River (at the international boundary) that included a numeric target of zero trash (Colorado River Basin Water Board 2006). In the Los Angeles Region, fifteen TMDLs were adopted for trash and debris by either the Los Angeles Water Board or U.S. EPA (Los Angeles

Water Board 2000; 2004; 2007a; 2007b; 2007c; 2007d; 2007e; 2007f; 2008g; 2010, U.S. EPA 2012a).

Considerations:

1. **No Project.** Water Boards may address trash control through a mixture of regional planning efforts and water body specific TMDLs. Because No Project would not meet the trash objectives to provide a consistent statewide program to address trash in state waters, this approach is not recommended.
2. **Applicable to all surface waters.** In this option, the Trash Amendments would apply to all surface waters covered by the Ocean Plan and the ISWEBE Plan. This would provide statewide consistency for trash control. However, permittees within the Los Angeles Region have made much progress towards compliance with the existing trash and debris TMDLs, so superseding the Los Angeles Water Board's Basin Plan could be counter-productive. Therefore, this approach is not recommended.
3. **Applicable to all surface waters with the exception to those covered by an existing trash and debris TMDL within the jurisdiction of the Los Angeles Water Board.** In this option, the Trash Amendments would apply to all surface waters covered by the Ocean Plan and the ISWEBE Plan with the exception of those covered by an existing trash and debris TMDLs within the Los Angeles Region. The fifteen trash TMDLs in the Los Angeles Region would continue to have more stringent provisions than the final Trash Amendments. This option is not intended to reduce statewide consistency for trash controls, as the Trash Amendments would propose similar set of compliance measures as the trash and debris TMDLs. Instead, the final Trash Amendments would build on lessons learned from the extensive trash control efforts in the Los Angeles Region. However, the final Trash Amendments would direct the Los Angeles Water Board to reconsider the scope of its trash TMDLs within one year of the Trash Amendments' effective date to consider focusing its permittees' trash control efforts on high trash generation areas rather than all areas within each permittee's jurisdiction. The reconsideration would occur for all existing trash TMDLs, except for the Los Angeles River Watershed and Ballona Creek Trash TMDLs, because those two TMDLs are approaching final compliance deadlines of September 30, 2016 and September 30, 2015, respectively. Because this approach creates statewide consistency regarding the concept of trash controls in state water while acknowledging the progress made in the Los Angeles Region, this approach is recommended.

Recommendation: The Trash Amendments should apply to all surface waters in the state with the exception of those waters within the jurisdiction of the Los Angeles Water Board that have existing trash and debris TMDLs. The Los Angeles Water Board should reconsider the scope of all existing trash TMDLs, except for the Los Angeles River Watershed and Ballona Creek Trash TMDLs (Consideration 3).

4.4 Issue 4: What should the scope of a discharge of prohibition for trash, including preproduction plastic[12], be?

Current Conditions:

There is no statewide prohibition of discharge of trash to state waters. Instead, various programs exist in parts of the state to address the elimination of trash from state waters. Region-specific NPDES permits, such as in the San Francisco Bay Region, have existing requirements to minimize trash, and trash and debris TMDLs in the Los Angeles Region have similar implementation measures. Trash control measures can range from structural controls (e.g., partial capture systems and full capture systems) to institutional controls (e.g., increased street sweeping, enforcement of litter laws, and adoption of municipal ordinances prohibiting specific products), and combinations of controls.

Through AB 258, the "Preproduction Plastic Debris Program" became effective in the California Water Code (§ 13367) on January 1, 2008. This tasks the Water Boards to implement a program to control discharges of preproduction plastics from point and nonpoint sources. Preproduction plastic can be improperly discharged during transport, packaging, and processing when proper housekeeping practices are not employed. Once spilled or released into the environment, their small size of 5 mm or less can preclude effective cleanup. In compliance with Water Code section 13367(d), the IGP contains minimum BMPs to regulate plastic manufacturing, handling, or transportation facilities.

Considerations:

1. **No Project.** The Water Boards would continue to regulate trash through either TMDLs and/or region-specific NPDES permit requirements. For preproduction plastics, the Water Boards would continue to implement AB 258 through the IGP permit, which does not cover discharges from locations such as railroad trans-loading stations. Because No Project would not meet the trash objectives to provide a consistent statewide program to address trash in state waters, this approach is not recommended.

2. **Implement the water quality objective through a conditional prohibition of discharge.** Under this option, the water quality objective for trash would be implemented through a conditional prohibition of discharge of trash directly into waters of the state or where trash may ultimately be deposited into waters of the state. The prohibition of discharge would apply to both permitted and non-permitted dischargers. Non-permitted dischargers would either comply with prohibition of discharge or be subject to direct enforcement action. Dischargers with NPDES storm water permits (i.e., MS4 Phase I, MS4 Phase II, Caltrans, IGP, and CGP), WDRs, and waivers of WDRs would comply with the prohibition through a plan of implementation contained in the respective permits. The plan

[12] California Water Code section 13367 states that "preproduction plastic includes plastic resin pellets and powdered coloring for plastics."

of implementation would provide options for permittees to choose from a variety of treatment and institutional controls to minimize the discharge of trash.

There are a wide variety of treatment and institutional controls that have been found to be effective in reducing or eliminating trash in waters. Treatment control options include full capture systems, partial capture systems, LID, and multi-benefit projects. Institutional controls are non-structural BMPs, such as street sweeping, trash collection, anti-litter educational outreach programs, and regulatory source controls.

In addition, the prohibition of discharge would specifically apply to the discharge of preproduction plastic by all manufacturers and transporters of preproduction plastics, and manufacturers that use preproduction plastics.

The conditional prohibition of discharge allows for the implementation of the water quality objective for trash through Water Board permits or through direct enforcement of non-permitted dischargers. Additionally, this option provides flexibility to permittees to determine the most effective means of trash control in light of site conditions, types of trash, and the resources available for maintenance and operation. Therefore, this approach is recommended.

3. **Outright prohibition of discharge for preproduction plastic.** This option would prohibit the discharge of preproduction plastic to waters of the state. Preproduction plastic can be as small as one millimeter, and as such it would not be caught by full capture system. Once released into the environment, drainage system, or waterway, their small size prevents effective cleanup. Because this approach does not build upon implementation efforts achieved in the IGP, a stronger alternative is recommended below.

4. **Use both the existing Industrial General Permit and an outright prohibition of discharge for preproduction plastic.** In this option, the prohibition of discharge for preproduction plastic could continue to be implemented through the IGP, as well as directly through the enforcement of the prohibition of discharge on facilities and industrial activities that are not subject to the IGP. This provides the widest and most efficient approach to controlling the discharge of preproduction plastic, and is therefore recommended.

Recommendation: The Trash Amendments should implement the water quality objective through a conditional prohibition of discharge of trash (Consideration 2). The existing IGP and an outright prohibition of discharge should be used to address the prohibition of discharge of preproduction plastic (Consideration 4).

4.5 Issue 5: Where should trash control measures be employed?

Current Considerations:

In the Los Angeles Region, fifteen TMDLs were adopted for trash and debris by either the Los Angeles Water Board and/or U.S. EPA (Table 16). The existing trash and debris TMDLs targets all land uses within the scope of the TMDL, regardless of the

trash generations rates within those land uses. In 2001, the City of Los Angeles Watershed Protection Division performed a geographical analysis of trash generation in the City of Los Angeles. The study showed that trash is most severe in Downtown LA and nearby communities where commercial, industrial, and residential land uses are predominant (City of Los Angeles 2002). According to the 2004 Trash Baseline Monitoring results in Los Angeles County, the highest trash-generating land-uses were high-density residential, mixed use urban, commercial, and industrial land uses in the Ballona Creek and Los Angeles River Watershed, respectively (County of Los Angeles Department of Public Works 2004a; 2004b).

Under the San Francisco Bay MRP, permittees are developing and implementing Short-Term Trash Load Reduction Plans. The Bay Area Stormwater Management Agencies Association (BASMAA) worked collaboratively with the San Francisco Bay MRP permittees to develop a regionally consistent method to establish baseline trash loads from their municipality. The resulting BASMAA Baseline Trash Generation Rates Project assisted the permittees in establishing a baseline by which to demonstrate progress towards trash load reduction goals. The project determined that the four land uses with the highest trash generation rates are (1) retail and wholesale, (2) high-density residential, (3) K-12 schools, and (4) commercial/services and industrial. It also developed a conceptual model for trash generation rates (EOA, Inc. 2012a). The project focused on developing baseline generation rates and categorizing the permittees' jurisdictions as high, medium, and low trash generation rates. This allows the San Francisco Bay MRP permittees to strategize and focus trash controls to effectively achieve trash load reductions. The results of the Los Angeles and San Francisco studies indicate that trash is generated at higher rates in highly populated and/or highly visited areas that attract high volumes of vehicular and pedestrian traffic.

Considerations:

1. **No Project: No prioritization regarding the location of trash controls.** In this option, there is no prioritization regarding of the location of trash control for permitted storm water dischargers. This option lacks statewide clarity and consistency for the permitting authority and permittees. Therefore, this approach is not recommended.
2. **All storm drains in all land uses regardless of trash generation rates.** In this option, all areas under the jurisdiction of the permitted storm water dischargers would require trash controls. This option would provide statewide consistency, specifically with the trash and debris TMDLs in the Los Angeles Region. However, trash reduction measures would be required in locations with low trash generation rates, and therefore very little negative impact. This option would be resource intensive when compared to the benefit derived. Therefore, this approach is not recommended.
3. **Focus trash controls on areas with high trash generation rates.** In this option, implementation of the prohibition of discharge would be focused on areas with high trash generation rates.

   The studies from the development and implementation of the trash and debris TMDLs in the Los Angeles Region found that the land uses of highest trash

generation are high density residential, commercial, and industrial land uses (County of Los Angeles Department of Public Works 2004a, Los Angeles Regional Water Board 2007f). While each municipality and country has different land use definitions and codes, an approximate 15-30 dwelling units per acre definition for high density residential is offered as an example of the dwelling unit standards used in local general plans by the Governor's Office of Planning and Research in its 2003 General Plan Guidelines (Governor's Office of Planning and Research 2003). For MS4 Phase I and Phase II permittees high trash generating land use areas or what the final Trash Amendments refer to as "priority land uses" would include: high density residential, commercial, industrial, mixed urban, and public transportation areas. Additionally, a permittee would have the ability to propose alternative equivalent land uses to continue to focus limited resources to the areas with the highest trash generation rates.

Caltrans has jurisdiction over a linear system, and the high trash generating areas under its jurisdiction are different than the priority land uses for a municipality. Based on Caltrans trash studies and consultation (Caltrans 2000, Caltrans 2004), the Adopt-A-Highway program, and the Keep California Beautiful program, the "significant trash generating areas" for Caltrans could include areas such as: (1) highway on- and off- ramps in high-density residential, commercial, mixed urban, and industrial land uses; (2) rest areas and park-and-rides; (3) state highways in commercial and industrial land uses; and (4) other mainline highway segments that can be identified by Caltrans through pilot studies and/or surveys.

In comparison to MS4 Phase I, MS4 Phase II, and Caltrans permittees, industrial facilities or construction sites with NPDES permits are substantially smaller in size. Thus, IGP and CGP permittees would have the ability to control trash for all storm water discharges and authorized non-storm water discharges in their jurisdiction.

Because the Los Angeles and San Francisco studies teach that prioritization of the areas with the highest trash generation rates will substantially reduce the discharge of trash to surface waters while maximizing the allocation of trash control resources, this approach is recommended.

Recommendation: Focus trash controls to areas with high trash generation rates (Consideration 3).

4.6 Issue 6: What implementation measures should be employed for trash control in NPDES storm water permits (i.e., point sources)?

Current Considerations:

Trash is currently addressed through the water quality objectives in basin plans and water body specific TMDLs (Table 15). There is a lack of statewide consistency regarding how the water quality objectives are implemented in NPDES permits. Each NPDES storm water permit has a varying set of requirements, ranging from minimal institutional controls, such as street sweeping and education, to control of the entire jurisdiction's discharge of trash through treatment and institutional controls.

For example, in the Los Angeles Region, fifteen TMDLs were adopted for trash and debris by either the Los Angeles Water Board and/or U.S. EPA (Table 16). Implementation plans for point source responsible parties to achieve waste load allocations vary slightly but are based on phased percent reduction goals that can be achieved either implementing full capture systems within all land uses or implementing other treatment and/or non-structural BMPs to comply with the TMDL. Under the San Francisco Bay MRP, compliance with the discharge prohibition and trash-related receiving water limitations is met through a timely implementation of control measures, BMPs and any trash reduction ordinances or mandatory full trash capture systems to reduce trash loads from MS4s by set percent reductions over three phases.

State Water Board MS4 Phase II (Order No. 2013-001) and Caltrans (Order No. 2012-0011) permits have street sweeping and education requirements. The CGP prohibits the discharge of any debris from construction sites, and encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality. The IGP contains minimum BMP provisions to regulate the discharge of preproduction plastic from manufacturing, handling, or transportation facilities.

Considerations:

1. **No Project: No establishment of implementation measures for NPDES storm water permits.** An absence of implementation measures in the final Trash Amendments would mean that no trash control guidance would be provided to the Water Boards when reissuing their NPDES storm water permits. MS4 Phase I and MS4 Phase II permits could require the reduction of trash in their storm water discharges to the Maximum Extent Practicable. IGP and CGP permittees would be left to a myriad of different standards depending on the site, receiving waters, listing and TMDL status, and basin plan language, resulting in unclear permitting requirements and the potential for trash discharges to not be effectively prohibited.

   This approach is not recommended because of the potential lack of consistency regarding trash control across NPDES storm water permits.

2. **Require the sole use of full capture systems.** Under this option, all permitted storm water dischargers would implement the use of full capture systems to reduce and eliminate trash discharged into the water bodies of California. The definition of full capture systems could mirror the same definition as provided in the Los Angeles River Watershed trash TMDL (Los Angeles 2007f). The definition is as follows:

   > *"A full capture system is treatment control (either a single device or a series of devices) that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain."*

Installation of full capture systems would demonstrate compliance for the relevant drainage area, provided that the full capture systems were adequately designed, sized, installed, and maintained. The installation of a full capture system by a permittee would not establish any presumption that the system was adequately sized, and the Water Boards would reserve the right to review sizing or other data in the future to validate that a system would satisfy the definition of a full capture system. Maintenance records indicating trash loads removed and overall system efficiency would be reported regularly and made available for inspection by the regional water boards and public viewing.

The maintenance of such systems on private properties, especially those which have been demonstrated to have extensive internal drainage systems with multiple storm drain inlets (e.g., schools, sports complexes, residential/ industrial/ commercial developments) would also be addressed in this option.

This option would require that all NPDES storm water permittees to install full capture systems without other options to control trash. This option does not take into consideration particular conditions within jurisdictions or sites. This could cause an undue burden on areas and communities that would better benefit from focusing their resources on more cost-effective methods of trash control. Therefore, this approach is not recommended.

3. **Require the sole use of institutional controls.** In this option, NPDES storm water permits would contain requirements that permittees comply with the prohibition of discharge through the sole use of institutional controls (such as street sweeping, clean-up events, education programs, additional public trash cans and increased collection frequency expanded recycling and composting efforts, and adoption of regulatory source controls). This option would meet the goal of preventing trash from entering state waters and provide statewide consistency. However, permittees should have flexibility to determine the most effective means of controlling trash because of particular conditions of sites, types of trash, and the resources available for maintenance and operation. Therefore, this approach is not recommended.

4. **Establish a dual alternative "compliance Track" approach.**

In this option, implementation of the prohibition of discharge would be tailored for each NPDES storm water permit category.

<u>MS4 Phase I and Phase II Permits</u>

For MS4 Phase I and Phase II permits, implementation of the prohibition of discharge would focus on areas with high trash generation rates. Based on Los Angeles and San Francisco studies, the municipal areas with high trash generation rates are identified as "priority land uses". The "priority land uses" would consist of high density residential, industrial, commercial, mixed urban and public transportation stations or equivalent alternative land uses.

As each Phase I and Phase II MS4 has individual site-specific characteristics, permittees could comply with the prohibition of discharge of trash through one of two compliance Tracks.

Under Track 1, permittees would install a network of full capture systems for all storm drains that capture runoff from one or more “priority land uses”.

Under Track 2, permittees would install, operate, and maintain a combination of controls (structural and institutional), as long as the combination of controls achieves the same performance results as compliance under Track 1, namely full capture system equivalency. Structural controls could include any combination of full capture systems, other treatment controls, such as LID, and multi-benefit projects.

Caltrans

For the Caltrans permit, implementation of the prohibition of discharge world focus on “significant trash generating areas”, which may include area such as: on- and off-ramps in “priority land uses”, rest areas and park-and-rides, state highways in commercial and industrial land uses and other segments identified by Caltrans. As Caltrans is a linear system, exclusive use of full capture systems might not be appropriate to achieve the water quality objective for trash. Caltrans would comply with requirements similar to Track 2 to develop and execute an implementation plan to install, operate, and maintain full capture systems, other treatment controls (e.g., partial capture systems and LID), or institutional controls, and/or multi-benefit projects.

IGP/CGP

In comparison to jurisdictions under MS4 Phase I, Phase II and Caltrans permits, industrial facilities or construction sites with NPDES permits are substantially smaller in size. Thus, IGP and CGP permittees would comply with an outright prohibition of discharge trash from all storm water discharges and authorized non-storm water discharges. If the industrial or construction permittee, however, can demonstrate that it is unable to comply with the outright prohibition of discharge, then the permittee may comply through one of two Tracks.

Under Track 1, the permittee would install, operate, and maintain full capture systems for storm drains that service the facility or site.

Under Track 2, the permittee would develop and execute an implementation plan that committed to any combination of controls, such as full capture systems, other treatment controls (e.g. partial capture systems and LID), institutional controls, and/or multi-benefit projects to achieve the same performance results as installation, operation and maintenance of full capture systems would achieve.

A dual alternative “compliance Track” approach tailored to each NPDES storm water permit category would provide flexibility to permittees to determine the

most effective means of controlling trash while taking into consideration particular site conditions, types of trash, and the available resources for maintenance and operation. This option is therefore recommended.

Recommendation: Implement the water quality objective and prohibition of discharge with a dual alternative "compliance Track" approach tailored to each NPDES storm water permit category (Consideration 4).

4.7 Issue 7: What implementation measures should be employed for trash from nonpoint sources (such as open space recreational areas)?

Current Conditions:

Currently, many open space recreational land uses, such as beaches, marinas, campgrounds, and picnic areas experience intensive use and littering. These are often not covered by MS4 permits.

In the Los Angeles Region, the fifteen trash and debris TMDLs address discharges from nonpoint sources through load allocations. At present, the load allocations are implemented through a conditional waiver from waste discharge requirements. Nonpoint source dischargers may achieve compliance with the load allocations by implementing a minimum frequency of assessment and collection/best management practice (MFAC/BMP) program. The MFAC/BMP Program includes an initial minimum frequency of trash assessment and collection and suite of structural and/or non-structural BMPs.

Considerations:

1. **No Project: No establishment of implementation measures for nonpoint sources.** Without statewide implementation measures for trash control for nonpoint sources, nonpoint sources of trash would continue to either lack implementation provisions or contain load allocation within individual water body TMDLs. Because No Project would not meet the trash objectives to provide a consistent statewide program to address trash in state waters, this approach is not recommended.

2. **Assessment, collection and management practices for trash control would be required of all nonpoint source dischargers.** Nonpoint source dischargers would be required to develop and implement a program of management practices for control of trash within a WDR or a waiver of WDR. Management practices could include enforcement of litter laws, education, recycling programs, more or better trash receptacles, and/or more frequent servicing of trash receptacles. Assessment, collection and management practices may include initial and annual assessments of trash generation, a determination of collection frequency necessary to meet the water quality objective, and a suite of structural and/or nonstructural management practices that prevent trash from entering or accumulating in waters of the state.

   The discharger would be required within a WDR or a Waiver of a WDR to facilitate the initial annual assessment collection and disposal of all trash found in or adjacent to surface waters, including along shorelines, channels, or

river/stream banks, and would implement an initial suite of BMPs based on current trash management practices in land areas that are found to be sources of trash to a water body.

Considering regions with large publicly owned rural areas, it may be most appropriate to address nonpoint source trash on federal and state-owned lands through State Water Board Management Agency Agreements or Memoranda of Understanding with the corresponding land management agencies and/or through statewide waivers or discharge permits.

In regards to responsible jurisdictions, the responsibility of collection and disposal of trash extends to upstream land owners as well as shoreline owners.

One drawback to requiring this approach in all jurisdictions is that most open space land usage is not a significant generator of trash. Requiring this level of effort for large swaths of public land would not be cost-effective or result in significant trash reductions. Certain high usage nonpoint source areas, however, such as beaches, marinas, campgrounds, and picnic areas, often experience substantial littering. Therefore, this approach is not recommended.

3. **Trash control measures for nonpoint source dischargers would be each Water Boards' discretion.** Statewide, nonpoint source discharges of trash cause less of an impact to state water than do point sources; however, at the local or regional level nonpoint sources can be a substantial source of trash. These areas may include high usage campgrounds, picnic areas, beach recreation areas, and marinas, which can be subject to WDRs or conditional waivers of WDRs. These types of areas would be assessed by the Water Boards to determine if trash controls are necessary. For such areas determined to require trash controls within a WDR or waiver of a WDR, management practices could include enforcement of litter laws, education, recycling programs, more or better trash receptacles, and/or more frequent servicing of trash receptacles. This approach is recommended as it targets regional regulation of the discharge of trash from locations with high trash generating rates.

Recommendation: Trash control measures for nonpoint sources that generate large amounts of trash at the local or regional level would be at the Water Boards' discretion (Consideration 3).

4.8 Issue 8: How should the Trash Amendments address time schedules?

Current Conditions:

In accordance with the California Water Code section 13242, implementation programs for achieving water quality objectives shall include a description of necessary actions, a time schedule for actions to be taken, and a description of surveillance to be undertaken to determine compliance with the water quality objectives. All compliance schedules in NPDES storm water permits (i.e., MS4 Phase I, MS4 Phase II, Caltrans, IGP, and CGP) need to follow the Policy for Compliance Schedules in NPDES Permits as adopted by the State Water Board on April 15, 2008 (Resolution No. 2008-0025). TMDL compliance schedules are adopted by the applicable regional water board.

Considerations:

1. **No Project: No time schedule.** This option would leave policies and practices as they are currently under permits and TMDLs. If this option is selected, then compliance schedules would continue to vary among regions, resulting in statewide inconsistency. Therefore, this approach is not recommended.

2. **Require immediate compliance.** Immediate compliance could be required for all permittees except those operating under existing trash and debris TMDLs in the Los Angeles Region. This alternative may be unpopular with permittees that are unfamiliar with trash monitoring and implementation and may find immediate compliance difficult to achieve; their inability to meet the proposed objective may result in enforcement actions that might otherwise have been avoided through the adoption of compliance schedules. Therefore, this approach is not recommended.

3. **Adopt a single statewide time schedule for all categories of permits.** This alternative would designate a single specific time schedule during which all permittees, regardless of category, would be required to implement necessary controls in order to achieve compliance. For example, all permittees may be required to come into full compliance within a single permit cycle. This might require a planning and funding burden for municipalities committing to the installation of certified full capture systems. Due to the differences in the size and scope of the jurisdiction of storm water permittees, this approach is not recommended.

4. **Adopt different statewide time schedules for different categories of permits.** This alternative would designate specific amounts of time during which different categories of NPDES permittees would be required to achieve compliance. For MS4 permittees with regulatory authority over priority land uses, compliance schedules would be set at ten years of the effective date of the first implementing permit with a cap of fifteen years from the effective date of the Trash Amendments for achieving full compliance. Ten years would allow for up to two permitting cycles. The second permit could build on the first permit with lessons learned from permittees' trash control efforts. The fifteen year cap provides certainty of a full-compliance end date, and also gives Water Boards up to five years to incorporate trash requirements into their respective permits. For Caltrans, the time schedule would be based on the effective date of the implementing NPDES permit with a ten-year compliance schedule. For permittees under the IGP and CGP, full compliance would be accomplished as specified by the time schedule set in the first implementing permit. To allow for differences in NPDES permit types, this approach is recommended.

Staff Recommendation: Adopt different statewide time schedules for different categories of permits (Consideration 4).

4.9 Issue 9: Should time extensions be provided for employing regulatory source controls?

Current Conditions:

California is the leader in implementing local ordinances with goals of reducing trash. The two types of local government ordinances focus on single-use disposable items, such as expanded polystyrene foam and single-use carryout bags. At least 65 jurisdictions have either banned extended polystyrene foam food containers completely or have prohibited use by government agencies or at public events. A few jurisdictions that have banned or partially banned polystyrene for takeout food packaging, which includes the City and County of San Francisco, Los Angeles County, Sonoma County, the City of Malibu, and the City of Berkeley. In 2006, the City and County of San Francisco passed a ban on single-use carryout bags in grocery stores and pharmacies. Since then, at least 72 local jurisdictions adopted city and county ordinances for single-use carryout bags. Most ordinances have a paper bag fee (10-25 cents) as well as a ban on plastic due to the desire to promote reusable bags as the bag of choice.

Considerations:

1. **No Project: No allowance for time extensions to create incentives for employing regulatory source controls.** Regulatory source controls are a subset of the suite of institutional controls that a MS4 permittee may utilize to control trash under Track 2. Therefore, additional time for final compliance may not be warranted to create an incentive for adoption of an ordinance that may also be employed for final compliance with the prohibition of discharge.

2. **Provide a time extension for new regulatory source control ordinances.** The aim of adopting regulatory source controls is to remove a specific type of item from the waste stream. Regulatory source controls require intensive collaboration and support among local governments, public, and retailers. This process can take several years to adopt and become effective. Providing a time extension for final compliance would provide an additional incentive for a local government to pass regulatory source control ordinances. Under this consideration, the time extension would only be afforded to municipal permittees that pass an ordinance following the effective date of the Trash Amendments. Limiting the time extension to only new regulatory source controls would have the effect of penalizing municipalities that have already adopted regulatory source control ordinances to control trash.

3. **Provide a time extension for regulatory source control ordinances enacted up to three years prior to the effective date of the Trash Amendments.** Because regulatory source controls require intensive collaboration and support among local governments, public, and retailers, and can take several years to adopt and become effective, providing a time extension for final compliance would provide an additional incentive for a local governments to adopt regulatory source control ordinances. Extending the time extension to municipalities that have passed regulatory source controls prior to the effective date of the Trash Amendments provides statewide consistency and equal benefits to all municipal

permittees who have taken effort to reduce trash with regulatory source controls. For the time extension to be granted, however, a regulatory source control would need to take effect with three years of the effective date of the Trash Amendments in order to achieve performance results with the compliance schedule.

Recommendation: This Issue is being proposed as an option for State Water Board consideration in order to receive public comment and feedback on the pros and cons of this Issue. After receiving public input on the potential advantages and disadvantages to this approach, the recommendation is to not allow time extensions for a MS4 permittee's adoption of regulatory source controls (Consideration 1).

4.10 Issue 10: How should the Trash Amendments structure monitoring and reporting of trash control efforts?

Current Conditions:

In accordance with the California Water Code section 13242, implementation programs for achieving water quality objectives shall include a description of necessary actions, a time schedule for actions to be taken, and a description of surveillance to be undertaken to determine compliance with the water quality objectives.

Considerations:

1. **No Project: No monitoring or reporting required above what is already required.** This approach would be consistent with any monitoring or reporting that is currently required by regional water boards. Although it would not cost permittees any additional resources, it would be insufficient to evaluate compliance with the final Trash Amendments and would run counter to California Water Code section 13242. Therefore, this approach is not recommended.

2. **Monitoring and cleanup in receiving waters by all permittees, regardless of method of compliance.** There are several approaches to monitoring that may be employed:

    a. **Minimum frequency of assessment and collection (MFAC).** The MFAC program includes an initial minimum frequency of trash assessment and collection. The MFAC program would include collection and disposal of all trash found in the receiving waters and shoreline. The initial minimum frequency may be established based on seasonal use of the area, regionally-specified storm sizes, and after major public events at certain locations, such as the county fairgrounds.

    b. **Establishment of Daily Generation Rate.** An area's trash discharges may be estimated using a mass balance approach, based on the daily generation rate for the specific area. The daily generation rate is the average amount of trash deposited within a specified drainage area over 24-hour period. The daily generation rate can be used in a mass balance to estimate the amount of trash discharged during a rain event.

The daily generation rate may be determined by local jurisdictions from direct measurement of trash deposited in the drainage area during any 30-day period from June 22nd to September 22nd of a given year and recalculated every year thereafter. This three-month period is assumed to encompass high outdoor activity when trash is most likely to be deposited on the ground.

Accounting of daily generation rate as well as trash removal via street sweeping, catch basin clean outs, garbage and cigarette butt receptacles, etc. would be tracked in a central spreadsheet or database to facilitate the calculation of discharge for each rain event. The spreadsheet and/or database would be available to the Water Boards for inspection during normal working hours. The database/spreadsheet system would allow for the computation of calculated discharges and could be coordinated with enforcement.

c. **Alternate compliance monitoring programs.** Water Boards could approve, at their discretion, alternative compliance monitoring programs upon finding that an alternative program would provide a scientifically-based estimate of the amount of trash discharged from the storm drain system.

These approaches are not prescriptive as each permittee will have a unique implementation strategy, and the monitoring approach needs to be suited for each strategy.

3. **Monitoring and reporting tailored to the type of compliance.**

As the compliance options vary among NPDES permits for storm water discharges, the monitoring and reporting options could be tailored to the type of compliance. Within this option under consideration, the balance between the need for consistency and flexibility would be achieved through standardized objectives in the monitoring program. The final Trash Amendments could establish minimum monitoring and reporting provisions, and Water Boards could include more extensive provision in implementing permits.

MS4 permittees complying under Track 1 would provide a report to the applicable Water Board demonstrating installation, operation, and maintenance of full capture systems on an annual basis. MS4 permittees complying under Track 2 would develop and implement annual monitoring plans to demonstrate effectiveness of the controls and compliance with full capture system equivalency. This requires that permittees collect monitoring data about existing trash levels prior to implementation of institutional controls to set a baseline for comparison to trash levels after implementation of controls. Monitoring reports developed by MS4 Permittees should consider the following questions:

1) What type of and how many treatment controls, institutional controls, and/or multi-benefit projects have been used, and in what locations?

2) How many full capture systems have been installed (if any), and in what locations have they been installed, and what is the individual and cumulative area served by them?
3) What is the effectiveness of the total combination of treatment controls, institutional controls, and/or multi-benefit projects employed by the permittee?
4) Has the amount of trash discharged from the MS4 decreased from the previous year? If so, by how much? If not, explain why.
5) Has the amount of trash in the MS4's receiving water(s) decreased from the previous year? If so, by how much? If not, explain why.

Caltrans should develop and implement annual monitoring plans to demonstrate effectiveness of the controls and compliance with full capture system equivalency. Monitoring reports developed by Caltrans should consider the following questions:

1) What type of and how many treatment controls, institutional controls, and/or multi-benefit projects have been used, and in what locations?
2) How many full capture systems have been installed (if any), and in what locations have they been installed, and what is the individual and cumulative area served by them?
3) What is the effectiveness of the total combination of treatment controls, institutional controls, and multi-benefit projects employed by Caltrans?
4) Has the amount of trash discharged from Caltrans' MS4 decreased from the previous year? If so, by how much? If not, explain why.
5) Has the amount of trash in the receiving waters decreased from the previous year? If so, by how much? If not, explain why.

Industrial and construction permittees would not have specific monitoring requirements. The controls and measures used to comply with the prohibition of discharge can be required to be reported and included in the Storm Water Pollution Prevention Plan.

The tailored approach would provide flexibility to Water Board permit writers to design monitoring programs that reflect the compliance methods elected by permittees along with regional characteristics. For statewide consistency, all monitoring programs would be striving to answers the same fundamental questions. Therefore, this approach is recommended.

Recommendation: Monitoring and reporting should be tailored to the type of compliance (Consideration 3).

5 REASONABLY FORESEEABLE METHODS OF COMPLIANCE

The final Trash Amendments do not specify a manner of compliance and accordingly, the actual compliance strategies would be selected by the local agencies and other permittees. Although the final Trash Amendments do not mandate the manner of compliance, the State Water Board's SED for the proposed project is required to include an analysis of the reasonably foreseeable methods of compliance with the project (see 23 CCR 3777; Pub. Res Code § 21159). Several of the reasonably foreseeable methods of compliance are well known, and a discussion of a reasonable range of these methods of compliance and design parameters is presented below. In addition, the possible environmental effects that could be caused by these compliance methods are presented in Section 6.

During the development of the final Trash Amendments, numerous stakeholder and public meetings were held during which the manner of compliance was discussed. Some of the most likely measures discussed included treatment controls (e.g., partial capture systems and full capture systems) and institutional controls (e.g., increased street sweeping, enforcement of litter laws, and development of municipal ordinances prohibiting food packaging with polystyrene materials). This section provides a description of storm water systems and of sites where treatment controls might be placed to comply with the final Trash Amendments. In addition, this section discusses treatment control alternatives, such as catch basin inserts and vortex separators, and institutional control alternatives, such as street sweeping, public education, and ordinances.

5.1 Treatment Controls - Storm Drain Systems

Underground storm drains are typically designed to carry the runoff from up to a ten-year storm event. Open channels are typically designed to carry the runoff from up to a 50-year storm event, and in some cases, this design flow rate is increased to accommodate debris laden flows. The rate of runoff a drain can safely convey, expressed in cubic feet per second, is called its peak capacity. While a drain's capacity would not diminish over the years, the amount of runoff generated by a given storm event can increase over the years. This potential increase could be due to a number of factors including: an increase in the amount of development and impervious surfaces within the tributary area, and the addition of smaller upstream tributary drains that deliver runoff more quickly to the collecting drain. The potential for such increases at a particular site is a consideration in the applicability of a particular treatment control method of compliance with the final Trash Amendments.

Storms are commonly referred to by their "frequency." For example: a one-year storm event, having a long-term probability of happening at least once a year is a very common occurrence. On the other hand, a 50-year storm event is a much rarer occurrence, with a long-term probability of occurring only once in 50 years. The actual rate of runoff from storms of a given size or frequency depends on a number of factors, including the intensity and duration of the rainfall, the size of the tributary area, the topography, the soil types within the tributary drainage area, and the overall connected imperviousness of the tributary area.

5.1.1 Reasonably Foreseeable Methods of Compliance: Design and Installation of Devices for Trash Removal

The treatment controls likely to be used for compliance with the final Trash Amendments are devices that would be installed in existing storm drains. Older storm drains may be physically limited in expansion capability and maintenance right-of-way and the complying permittees must consider these factors when designing and siting new trash devices within existing facilities.

A factor to consider when designing and siting devices is drain capacity. For instance, if a treatment control is to be installed mid-drain, the storm drain system must have sufficient capacity, or the storm drain must be modified to maintain sufficient capacity. Start-of-pipe devices such as catch basin opening screens and excluders or end-of-pipe devices such as trash racks, fabric mesh socks and wire screens, may have less impact on hydraulic drain capacity under certain hydraulic conditions than devices installed mid-pipe. The smaller the amount of flow a retrofitted device or system must treat; the less hydraulic impact it will have on the storm drain system as a whole.

In addition, the definition of "full capture system" in the final Trash Amendments includes reference to capturing trash particles that are the size of 5 mm or greater. The 5 mm size limit is approximately the diameter of a pencil or cigarette butt. A smaller particle size implies a smaller filtering mesh or screen size, and a smaller mesh or screen size implies more resistance to the flow passing through it. When designing and siting controls, assuming that a certain percentage of a screen would be blocked by trash during a storm event, the total area of the screen openings would have to be larger than the area of the drain's cross section by that percentage.

In addition to the requirement of removing litter with a size of 5 mm, the design of a full capture system should take into account reliability and performance sensitivity under varying loads. Based on current industry standards for existing facilities, a typical full capture system is expected to meet the following minimum criteria:

- It must not adversely affect the level of flood protection provided by the drainage system;
- It should be vector-resistant, or not pond water for more than 48 hours after the end of a storm;
- It should not worsen water quality by re-suspending trash, sediments, or bacteria, or by leaching heavy metals or semi-volatile organic compounds;
- It should have no plastic or fiberglass interior parts that would break or shatter in the path of direct flow;
- Its pipes, conduits and vaults should not be more than 32 feet below ground, and should be easily accessible by a vacuum truck hose for clean-out, be reasonably accessible by a qualified maintenance worker, have provisions for confined space entry and safety guard rails around the rim; and
- It should provide means to block off the inflow and tail water backflow to isolate the device for safe maintenance and repair of the unit.

5.1.2 Catch Basins and Catch Basin Inserts

Treatment controls likely to be used for compliance with the final Trash Amendments may include installation of catch basins or inserts within existing catch basins. A catch basin or storm drain inlet is an inlet to the storm drain system that typically includes a grate or curb opening where storm water enters the catch basin, and a sump to capture sediment, debris and associated pollutants. They are also used in combined sewer watersheds to capture floatables and settle some solids. Catch basins act as pretreatment for other treatment practices by capturing large particles. The performance of catch basins at removing sediment and other pollutants depends on the design of the catch basin (e.g., the size of the sump), and routine maintenance to retain the storage available in the sump to capture sediment.

Catch basins are used in drainage systems throughout the United States. Many catch basins, however, are not designed for trash capture. Ideal application of catch basins as a reasonably foreseeable method of compliance with the final Trash Amendments is as pretreatment to another storm water management practice. Retrofitting existing catch basins may help to improve their performance substantially. A reasonably foreseeable method of compliance may include a simple retrofit of catch basins to ensure that all catch basins have a hooded outlet to prevent floatable materials, such as trash and debris, from entering the storm drain system.

The performance of catch basins is related to the volume in the sump (i.e., the storage in the catch basin below the outlet). Optimal catch basin sizing criteria which relates all catch basin dimensions to the diameter of the outlet pipe.

Maintenance of the installed catch basins is expected to include trash removal if a screen or other debris capturing device is used, and removal of sediment using a vactor truck. Operators will need to be properly trained in catch basin maintenance. When sediment fills greater than 60 percent of their volume, catch basins reach steady state. Therefore, storm flows may then bypass treatment and may also re-suspend sediments trapped in the catch basin. Regular clean-outs will typically be required to retain the volume in the catch basin sump available for treatment of storm water flows.

At a minimum, catch basins would be expected to be cleaned once or twice per year to maintain effectiveness (Aronson et al. 1993). Two studies suggest that increasing the frequency of maintenance can improve the performance of catch basins, particularly in industrial or commercial areas. One study of 60 catch basins in Alameda County, California, found that increasing the maintenance frequency from once per year to twice per year could increase the total sediment removed by catch basins on an annual basis (Mineart and Singh 1994). These results suggest that, at least for industrial uses, more frequent cleaning of catch basins would improve removal efficiency. The cost of operation and maintenance would, however, be expected to increase with installation of catch basins (or inserts).

Within a catch basin, a "catch basin insert" may also be perforated metal screens placed horizontally or vertically within a catch basin. There are a multitude of inserts of various shapes and configurations. One device suitable for compliance with the final Trash Amendments is a grated plastic box or metal screen that fits directly into the

curbside catch basin. As the storm water passes through the box, trash, rubbish, and sediment remain in the box while storm water exits.

Metal screening inserts may be deployed in a vertical or horizontal configuration within the catch basin for the retention of trash. These inserts would be expected to maximize much of the existing catch basin volume and concurrently pass through flow.

Catch basin screens design is expected to be open to curb flow in order to reduce the potential for flooding during wet weather. For example, American Storm Water has a catch basin screen with an automatic retractable screen gate design which can be adjusted to "un-lock" and open up to storm water curb flow from 20 percent to 60 percent of curb height. This device which is termed the “Surf Gate” is also designed with a special "locking" application, which keeps children safe and large debris from getting into the catch basin.

Grate inserts may also be utilized as a compliance method and are typically found in parking lots, alleys, and sloping streets. Inserts installed in these basins mainly capture trash smaller than an inch due to the standardized grating spacing. Inserts designed for curb opening basins would be best suited for capturing larger debris like water bottles and plastics bags, as the opening under the curb may range from four to eight inches.

5.1.3 Vortex Separation Systems

The treatment controls likely to be used for compliance with the final Trash Amendments may include installation of vortex separation system units. Vortex separation systems units are designed to capture almost all trash deposited into a storm drain system. A vortex separation system unit diverts the incoming flow of storm water and pollutants into a pollutant separation and containment chamber. Solids within the separation chamber are kept in continuous motion, and are prevented from blocking the screen so that water can pass through the screen and flow downstream. Solid pollutants including trash, debris and coarse sediments are retained in a centrally located solids catchment chamber with the heavier solids ultimately settling into the base of the unit or sump. This would be expected to be a permanent device that would be retrofitted for oil separation as necessary. Outfitting a large drainage with a number of large vortex separation system units may be less costly than using a larger number of small vortex separation system units.

An example of vortex separation system technology is the Continuous Deflective Separation unit, developed by Continuous Deflective Separation Technologies, Inc. When applied to storm water, the Continuous Deflective Separation unit is designed to capture and retain sediments, floatable and settleable trash and debris over a wide range of flow conditions (up to 300 cubic feet per second). The fine screens used in storm water applications vary in size from 1.2 – 4.7 millimeter (0.048 - 0.185 inches). The Continuous Deflective Separation units are placed underground and would be expected to be utilized in highly urbanized areas where space is limited. In general, a Continuous Deflective Separation unit typically occupies about 4-1/2 square feet of surface area for each cubic feet per second that it treats, with the bulk of the installation being well below grade. The solids would be removed using a vactor truck, a removable basket, or a clam shell depending on the user's preference and size of the unit. For new installations, it is expected that continued monitoring of the condition of

the unit would be required after every runoff event for the first 30 days. Based on the behavior of the unit relative to storm events, inspections may be scheduled on projections using storm events vs. pollutant buildup. For ongoing operation, unit inspections are expected to occur at least once every 30 days during the wet weather season. As part of the expected maintenance, floatables would be removed and the sump cleaned when the sump is above 85 percent full. Also, at least once a year, it is expected that the unit would be pumped down and the screen carefully inspected for damage and to ensure that the screen is properly fastened.

The City of San Jose analyzed the relative capital and operation/maintenance cost of small devices (connector pipe screens and automatic retractable screens at the curb) and the hydrodynamic separator capturing trash from an area of 1000 acres, over 10 and 20-year time frames, accounting for repair and replacement of small units and increases in labor costs. The City of San Jose found that small devices were more economical in the first decade, but the cost advantage disappears in the second decade (San Francisco Estuary Partnership 2014).

5.1.4 Trash Nets

A treatment control likely to be used for compliance with the final Trash Amendments may include installation of trash nets. These are devices that use the natural energy of the flow to trap trash, floatables and solids in disposable mesh nets. One type of trash net, developed by Fresh Creek Technologies, Inc. may be reasonably foreseeable as a method of compliance because it was certified by the Los Angeles Water Board on April 29, 2004 for use on the Los Angeles River Watershed TMDL (Dickerson 2004). Currently, three modular models are available from Fresh Creek Technologies, Inc.:

- The *In-Line Netting* TrashTrap® model is a modular chamber containing the capture apparatus for holding the disposable nets. The system is installed in-line with the outfall pipe. A prefabricated chamber minimizes site work and cost. Inline units are underground and out of sight, particularly well-suited for densely populated locations.
- The *End-of-Pipe Netting* TrashTrap® model is installed at the end of the pipe. These units are often installed as a retrofit to an existing outfall structure. When this opportunity exists, the End-of-Pipe system is highly cost effective.
- The *Floating Netting* TrashTrap® model is a modular pontoon structure that floats at the end of the outfall. Floating units are an economical solution where site conditions (minimum water depth of two feet and a relatively sheltered site) permit its use. They are often installed with only minor modifications to the existing site.

Model selection and sizing of trash nets would be based on site-specific criteria including peak volume, peak velocity, and trash/floatables volume. Modularity and capacity of the installation would be achieved by varying the number of nets in the system. Installations, consistent with current practice, are expected to range from single net units to systems with 10 nets handling flows above 3,000 cubic feet per second. The standard mesh net would handle flows up to 30 cubic feet per second or 22 million gallons per day and velocities up to five feet per second at the mouth of the

net. A truck with a hoist for changing the nets, and a container for holding the full nets would be expected for servicing trash nets. A crew of two accomplishes the net change out in a matter of a few minutes. Road access to the site would be required for the service vehicle.

The *End-of-Pipe* nets are another control that is reasonably foreseeable as a method of satisfying the final Trash Amendments because of the low cost, the ease of maintenance, and also because the devices can be relocated after a set period at one location (provided the pipe diameters are the same). With limited funding, installation could be spread over several land uses and lead to valuable monitoring results. For smaller systems the total installation time can be as short as one day. Since the devices require attachment to the end of a pipe, this can severely reduce the number of locations within a drainage system that can be monitored. In addition, these nets cannot be installed on very large channels (seven feet in diameter is the maximum).

5.1.5 Gross Solids Removal Devices

A treatment control likely to be used for compliance with the final Trash Amendments may include installation of Gross Solids Removal Devices. Several types of these devices were developed by Caltrans to be retrofitted into existing highway drainage systems or implemented in future highway drainage systems. Gross Solids Removal Devices are structures that would remove litter and solids five millimeters (0.25 inches nominal) and larger from the storm water runoff using various screening technologies. Overflow devices would be expected to be incorporated; usual design of the overflow release device is based upon the design storm for the roadway. Though designed to capture litter, the devices would also be expected to capture vegetation debris. The devices described below are generally limited to accept flows from pipes 30 inches in diameter and smaller.

To assess the feasibility of utilizing Gross Solids Removal Devices, Caltrans developed a Pilot Program with multiple phase pilot studies. A pilot study generally consisted of one or more devices that were developed from concept, advanced through design and installation, and placed in service for two years of testing to evaluate overall performance (Caltrans 2003). Based on the Pilot Program, three types of Gross Solids Removal Devices have been shown the most promising and are therefore considered within the reasonably foreseeable methods of compliance: linear radial and two versions using an inclined screen. On October 7, 2004, the Los Angeles Water Board certified two Caltrans' Gross Solids Removal Devices, Linear Radial – Configuration 1 (LR1 I-10) and Inclined Screen – Configuration 1 (IS1 SR-170), to comply with the Ballona Creek and Los Angeles River Trash TMDLs (Bishop 2004).

Linear Radial Device

This device is relatively long and narrow, with flow entering one end and exiting the other end. It is suited for narrow and flat rights-of-way with limited space. It utilizes modular well screen casings with 5 mm (0.25-inch nominal) louvers and is contained in a concrete vault, although it also could be attached to a headwall at a pipe outfall. While runoff flows enter into the screens, they pass radially through the louvers and trap litter in the casing. A smooth bottom to convey litter to the end of the screen sections is required, so a segment of the circumference of each screen is uncovered. The

louvered sections have access doors for cleaning with vacuum truck or other equipment. Under most placement conditions the goal would be to capture within the casing one year's volume of litter. This device has been configured with an overflow/bypass for larger storm events and if the unit becomes plugged.

Inclined Screen Devices

Two Inclined Screen Devices have been developed. Each device requires about one meter (three feet) of hydraulic head and is better suited for fill sections. In the Type 1 device, the storm water runoff flows over the weir and falls through the inclined bar rack. The screen has five millimeter maximum spacing between the bars. Flow passes through the screen and exits via the discharge pipe. The trough distributes influent over the inclined screen. Storm water pushes captured litter toward the litter storage area. The gross solids storage area is sloped to drain to prevent standing water. This device has been configured with an overflow/bypass for larger storm events and if the unit becomes plugged. It has a goal of litter capture and storage for one year. The Type 2 Inclined Screen only comes in a sloped sidewall version.

5.2 Institutional Controls

The non-structural actions likely to be used for compliance with the final Trash Amendments include institutional controls. These types of actions are methods to control trash loading to state waters and may include enforcement of existing litter laws, increased street sweeping, cleaning of storm water conveyance structures, such as catch basins and storm drain inlets, and ordinances.

Institutional controls may also offer societal benefits that are associated with reducing litter in our city streets, parks and other public areas. For example, institutional controls employed by the City of Los Angeles for the Los Angeles River Watershed trash TMDL have demonstrated a 12.5 percent reduction in the total WLA (Black & Veatch 2012). Institutional controls can typically be implemented in a relatively short period of time. The capital investment required to implement institutional controls is generally less than for full capture systems.

The final Trash Amendments define "institutional controls" as follows:

> Institutional controls are non-structural best management practices (i.e., no structures are involved) that may include, but not be limited to, street sweeping, sidewalk trash bins, collection of the trash, anti-litter educational and outreach programs, producer take-back for packaging, and ordinances.

"Regulatory source controls" was previously included within the definition of institutional controls in the proposed Trash Amendments as one of the several treatment controls that could be utilized by MS4 permittees with regulatory authority over priority land uses to comply with the prohibition of trash under Track 2. In turn, "regulatory source controls" was previously defined in the proposed Trash Amendments as:

> Institutional controls that are enforced by an ordinance of the municipality to stop and/or reduce pollutants at their point of generation so that they do not come into contact with storm water. Regulatory source controls could consist of, but not be limited to, bans of single use consumer products.

Regulatory source controls were generally proposed as a tool for MS4 permittees to enact ordinances. A primary type of regulatory source control contemplated by this Policy was a bag ban ordinance to prohibit retailers from distributing carry-out plastic bag. The proposed final Trash Amendments omit regulatory source controls (and its definition) as a method for demonstrating Track 2 compliance.

The proposed Final Staff Report retains "ordinances," however, as a permissible type of institutional control an MS4 permittee could employ to achieve compliancy with Track 2 (even though the proposed final Trash Amendments removed "regulatory source controls" as a permissible method). Contrary to ordinances or laws that prohibit distribution of plastic carry-out bags, which are typically accompanied with requirements and/or incentives to utilize reusable bags to avoid a product-substitution effect (such as Senate Bill 270), other types of product bans enacted by an ordinance, such as take-out items, may involve a substitution of the banned item. Mere substitution would not result in reduced trash generation if such product substitution would be discarded in the same manner as the banned item. Any such product ban enacted by an ordinance that would not reduce trash would not assist in achieving compliance. It is possible that an MS4 permittee's adoption of other types of ordinances could include anti-litter laws or bans on smoking that would meet the requirements.

5.2.1 Enforcement of Litter Laws

An institutional control that would likely to be used for compliance with the final Trash Amendments would be enforcement of existing liter laws. By enforcing litter laws in sensitive areas or in areas that generate substantial amounts of litter, an ultimate source of trash loading to a given water body would be reduced or eliminated. Ordinances that prohibit litter are already in place in most municipalities. For example, the Los Angeles City Municipal Code prohibits the disposal of trash anywhere such trash could pollute the storm drain system:

> No person shall throw, deposit, leave, cause or permit to be thrown, deposited, placed, or left, any refuse, rubbish, garbage, or other discarded or abandoned objects, articles, and accumulations, in or upon any street, gutter, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structures, business place, or upon any public or private lot of land in the City so that such materials, when exposed to storm water or any runoff, become a pollutant in the storm drain system (City of Los Angeles Municipal Code § 64.70.02.C.1(a)).

Ensuring compliance with existing statewide and local litter laws and ordinances would eliminate the substantial adverse environmental and economic impacts from the litter, and the need for additional structural or institutional controls that generate their own nominal adverse environmental impacts.

5.2.2 Street Sweeping

An institutional control that would likely to be used for compliance with the final Trash Amendments would be continuation of or increasing street sweeping. Street sweeping minimizes trash loading to storm drain systems and water bodies by removing trash from streets and curbs. Maintaining a regular street sweeping schedule reduces the buildup of trash on streets and prevents trash from entering catch basins and the storm drain system. Street sweeping can also improve the appearance of roadways and urban areas. There are three types of street sweepers expected to be utilized for compliance with the final Trash Amendments: mechanical, vacuum filter, and regenerative air sweepers (U.S. EPA 2012b).

- Mechanical sweepers use a broom to remove particles from the street curb and a water spray to control dust. The removed particles are carried by a cylindrical broom to a conveyor belt and into a storage hopper (Federal Highway Administration 2012).

- Vacuum-assisted sweepers also use brooms to remove particles. The removed particles, however, are saturated with water and transported by a vacuum intake to the hopper. Vacuum-assisted dry sweepers use a specialized brush that allows the vacuum system to recover almost all particulate matter. A continuous filtration system prevents very fine particulate matter from leaving the hopper and trailing on the street behind the sweeper (Federal Highway Administration 2012).

- Regenerative air sweepers blow air onto the pavement and immediately vacuum it back to entrain and capture accumulated sediments. A dust separation system regenerates air for blowing back onto the pavement (Federal Highway Administration 2012).

No definitive independent studies have yet been staged to determine the best sweeping system (U.S. EPA 2012b). It is expected, however, that local agencies may use a combination of types of street sweeper to maximize efficiency (CASQA 2003a). In the Los Angeles Region, use of certain sweeper types is dictated by South Coast Air Quality Management District Rule 1186, which requires local agencies to acquire or use only respirable particulate matter certified sweepers beginning January 1, 2000. Furthermore, Rule 1186.1 requires local agencies to acquire alternative fuel or less polluting street sweepers beginning July 1, 2002 (South Coast Air Quality Management District 2006).

Increasing the frequency of street sweeping in areas with high traffic volume and trash accumulation would further reduce trash loading to the waterways. Increases in street sweeping are expected before the rainy season begins. A successful street sweeping program would be expected to include accurate recordkeeping of curb-miles swept, proper storage and disposal of street sweepings, regular equipment maintenance, and

parking policies that restrict parking in problematic areas and notify residents of sweeping schedules (CASQA 2003a).

Using modern and efficient street sweepers may reduce the need for other structural storm water controls and may prove to be more cost-effective than certain structural controls, especially in more urbanized areas with greater areas of pavement (U.S. EPA 2012b).

5.2.3 Storm Drain Cleaning

Another institutional control that would likely to be used for compliance with the final Trash Amendments would be continuation of or increasing cleaning of storm drain systems. Routine cleaning of the storm drain system reduces the amount of trash entering water bodies, prevents clogging, and ensures the flood control capacity of the system. Cleanings may occur manually or with pump eductors, vacuums, or bucket loaders. A successful storm drain cleaning program would be expected to include regular inspection and cleaning of catch basins and storm drain inlets, increased inspection and cleaning in areas with high trash accumulation, accurate recordkeeping, cleaning immediately prior to the rainy season to remove accumulated trash, and proper storage and disposal of collected material (CASQA 2003a).

5.2.4 Public Education

An additional institutional control that would likely to be used for compliance with the final Trash Amendments would be continuation of or increasing public education programs. Public education can be an effective implementation alternative to reduce the amount of trash entering water bodies. The public is often unaware that trash littered on the street ends up in receiving waters, much less the cost of abating it.

Community outreach is expected to be one way to educate the public about the effects of littering on the quality of receiving waters. Local agencies would provide educational materials to the public via television, radio, print media (e.g., brochures, flyers, and community newsletters), information hotlines outreach to educators and schools, community event participation, and support of volunteer monitoring and cleanup programs. Storm drain inlet stenciling would be another means of educating the public about the direct discharge of storm water to receiving waters and the effects of littering and dumping on receiving water quality. Stenciling can be conducted in partnership with other agencies and organizations to garner greater support for educational programs (U.S. EPA 2005).

Public education programs are already in place in some jurisdictions. Under the Los Angeles County Municipal Storm Water Permit, for example, permittees are required to implement educational storm water outreach programs (Order No. R4-2012-0175). The residential component of this program includes:

- Conducting storm water pollution prevention public service announcements and advertising campaigns.
- Distribute public education materials regarding the proper handling of waste materials.

- Maintaining a storm water website that includes educational material and opportunities for the public to participate in storm water pollution prevention and clean-up activities.
- Using culturally diverse educational strategies.

Public education materials have already been developed and are available through the Erase the Waste campaign, sponsored by the Water Boards. Erase the Waste is a public education program, working to reduce harmful storm water pollution and improve the environment of the region's coastal and inland communities. The campaign started in Los Angeles County, and materials produced during its three-year run have now been packaged for state and nationwide use. It is built around the theme, *Erase the Waste* – a positive, empowering theme that encourages all residents and stakeholders to take ownership of their communities, help reduce and prevent storm water pollution from the local landscape and "become part of the pollution solution."

The Water Boards have made available the *California Storm Water Toolbox*[13] which includes the following tools for residents, community and civic groups, educators, municipalities and public agencies:

- Advertisements, posters, collateral materials and a comprehensive Neighborhood Action Kit in English, Spanish, Chinese, Korean and Vietnamese – a comprehensive "how-to" guide to community-focused pollution prevention.
- A landmark Water Quality Service Learning Model for grades four through six that meets the state's curriculum standards.
- The Water Quality Detectives After-School Program, an adapted version of the curriculum for middle school and after school setting.
- The California Storm Water Resource Directory, an online inventory of storm water materials developed in partnership with CASQA.

5.2.5 Ordinances

Ordinances are a municipal regulation and type of institutional control. Ordinances can range from litter laws, smoking bans, to product bans. Ordinances may focus on eliminating or reducing the sources of trash by removing potential products from the waste stream. These methods focus on preventing pollution versus employing methods of controlling pollution. Across California, cities, counties, and the state have litter laws and other existing ordinances. In addition to the enforcement of existing litter laws, reasonably foreseeable methods of achieving compliance could include new litter laws and other ordinances. Contrary to ordinances or laws that prohibit distribution of plastic carry-out bags, which are typically accompanied with requirements and/or incentives to utilize reusable bags to avoid a product-substitution effect (such as Senate Bill 270), other types of product bans enacted by ordinance, such as take-out items, may involve a substitution of the banned item. Mere substitution would not result in reduced trash

[13] The *California Storm Water Toolbox* is accessible at: http://www.waterboards.ca.gov/water_issues/programs/outreach/erase_waste/index.shtml#toolbox.

generation if such product substitution would be discarded in the same manner as the banned item. Any such product ban enacted by an ordinance that would not reduce trash would not be an allowable Track 2 method to assist in achieving compliance. It is possible that an MS4 permittee's adoption of other types of ordinances could include mandatory fees on disposable item (like cups) that encourage customers to bring red-usable, and anti-littler laws or bans on smoking that would meet the requirements.

5.3 Overview of Installation, Operation and Maintenance Activities for Trash Treatment Controls

This section discusses the installation, and operation and/or maintenance activities associated with the reasonably foreseeable methods of compliance with the final Trash Amendments. This information should provide a frame of reference in determining potential environmental impacts of these alternatives described in Section 6 (Environmental Effects of the Trash Amendments) and Section 8 (Alternatives Analysis). Some reasonably foreseeable installation activities for compliance with the final Trash Amendments would consist of the installation of improvements to the storm drain system to attain "full capture". These improvements include installation of screens and inserts for catch basins, Gross Solids Removal Devices within the alignment of storm drain pipes, and trash collection nets in storm drain outlets. Temporary impacts to natural resources from these types of installation activities typically include air pollution from dust and construction equipment, increased runoff and soil erosion, and installation noise.

Installation of storm drain improvements to comply with the final Trash Amendments would likely be located throughout the developed areas of the state. The final Trash Amendments provide up to ten years to complete the installation of storm drain improvements. The installation would occur at different locations at different periods. Equipment to be installed would likely include filters, metal screen, fabric nets, and Gross Solids Removal Devices. Some of the equipment would be mounted on small steel structures. Equipment weights range from several hundred pounds to 100,000 pounds, therefore the installation rigs would range from small truck-mounted cranes to larger track-mounted units. The equipment would be electrically connected together by cable or by buss (open air copper or aluminum tubes). The installation would be either through the inlets or outlets or with the piping. Gross Solids Removal Device station sites would typically be finished with fencing around the site.

5.3.1 Storm Drain Improvement Installation Staging and Methods

Most sites for installation activities and staging would be in high density residential, mixed urban, commercial, or industrial areas, as well as public transportation stations, and along portions of State highways. Site preparation would include clearing, grubbing and grading with bulldozers and dump trucks. Access roads would be prepared concurrently with the site operations.

Catch Basin Inserts

Improvements to catch basins are expected to include concrete work, installation of filters within the catch basins and installation of screens at the catch basin inlets. These

activities entail concrete demolition and refinishing and field fabrication methods such as welding and mechanical bolting. These improvements would be located in existing catch basins within existing storm drain systems. Construction of new catch basins is not specifically required to comply with the final Trash Amendments, although damaged catch basins may require replacement or new catch basins may be an element of the discretionary compliance program under Track 2. Existing catch basins are located below sidewalks and streets with openings flush with the curb.

Catch basin improvements may include:

- Removal of manhole cover and accessing bottom of catch basin and manually inserting prefabricated catch basin inserts in the bottom or interior of the catch basin.
- Concrete demolition and removal if the entire catch basin needs replacement.
- Catch basin installation – this task pertains to catch basins that require replacement.
- Concrete drilling and welding – this task is required to install fasteners and bracing for screens and brushes at the storm drain inlets. These screens can be welded onto the installed bracing.
- Concrete finishing – to restore site after installation is completed.

Installation of catch basin improvements would likely require the following types of tools: compressor, hand power tools, hand tools, backhoe, welder, light-duty truck.

Gross Solid Removal Device and Vortex Separation System Installation

Gross Solids Removal Devices would be for new installations that are located in transportation rights of way. These devices are typically fabricated off-site and transported to the site for installation. The installation sites are typically not located in areas of sensitive receptors[14]. Installation activities are expected to include:

- Site Preparation – a flat area of sufficient size to locate a concrete equipment pad is required. Vegetation removal might be required, as well as placement of a gravel sub-base for the area. The site should be selected for access by an equipment crane, maintenance vehicles and trash collection vehicles.
- Fencing – security fencing is generally preferred for water quality treatment systems located within existing structures in watersheds. Chain link fencing is often selected which involves installation of fence poles. Fence screens are often used in areas where a Gross Solids Removal Device causes adverse visual impacts.
- Concrete pad – Gross Solids Removal Devices are generally fabricated as modular units that are transported to the site and bolted to a concrete pad. This

[14] Sensitive receptors include, but are not limited to, hospitals, schools, daycare facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants.

task involves preparing a level sub-base, placement of rebar and forms, and pouring ready-mix concrete to form a pad of sufficient dimensions to support the Gross Solids Removal Devices.

- Gross Solids Removal Device placement – the Gross Solids Removal Devices are placed onto the concrete with an equipment crane and secured with anchor bolts.
- Pipe fitting/connection – the storm drain conveyance piping is connected to the Gross Solids Removal Device with standard plumbing connects such as unions or joints. The connections are leak tested.
- Utility service – for Gross Solids Removal Devices which require electrical service, wiring from a nearby service connector would be made to a switchbox located on the concrete pad. Appropriate conduit and wiring for outdoor service would be used.

Equipment required to install Gross Solids Removal Devices is expected to include: equipment crane, concrete mix truck, hand power tools, hand tools, backhoe, and light duty truck. Caltrans provided descriptions of installation of Gross Solids Removal Device in the report Phase I Pilot Study – Gross Solid Removal Devices (Caltrans 2003).

Trash Nets

Trash nets would be installed at the outlets of storm drains and channels. These locations are typically located within the interior of the storm drain system where there is limited public access. Installation of trash nets includes field joining techniques and may include concrete repair. Trash net installation is expected to include:

- Preparation of concrete for installation of bracing to hold trash nets. Concrete preparation may entail simple cleaning of the concrete surfaces to patching and resurfacing of areas where the trash nets are to be attached.
- Installation of net bracing – net bracing is typically installed with anchor bolts.
- Attachment of the net to the bracing – simple mechanical devices is used to attach the flexible netting to the metal bracing.

Tools required to install trash netting include: hand power tools, hand tools, backhoe, and light duty truck. Impacts to air quality from installation equipment is expected to be minimal and of a short duration, particularly if equipment is tuned and maintained in good working condition to minimize emissions of criteria pollutants and particulates. Noise impacts are expected to also be short term and are expected to be minimized through installation practices, such as using noise barriers and modified work hours.

5.3.2 Maintenance of Treatment Controls and BMPs

Maintenance activities expected to occur for compliance with the final Trash Amendments would include removing trash from catch basins, Gross Solids Removal Devices, and trash nets and providing any mechanical service and repair that may be required. Because each device is limited in the volume of trash that can be collected, it is likely that relatively light-duty trucks can be used. Additionally, there is opportunity to

consolidate the trash collected from catch basins, Gross Solids Removal Devices, and trash nets with other trash to lessen the impacts associated with transport and disposal of trash collected from storm drain improvements.

The impacts from maintenance activities associated with the final Trash Amendments are expected to be minimized through modified work hours and dust suppression methods. Spoils resulting from installation of storm drain improvements are expected to be in relatively small in quantity. These spoils are expected to be disposed of in licensed facilities.

5.4 Low-Impact Development Controls and Multi-Benefit Projects

The Storm Water Program at the Water Boards encourages the management of storm water as a resource as identified in the California Water Code section 10562. The main objective of treating storm water as a resource is to protect and restore those watershed processes that are critical to watershed health. Multi-benefit projects that infiltrate and treat storm water runoff are encouraged within MS4 Phase I and Phase II permits.

The final Trash Amendments would allow for the use of LID as part of Track 2 implementation. LID approaches attempt to mimic a site's predevelopment hydrology through a series of practices including filtering storm water with natural media, detaining storm water for infiltration into the ground, and retaining water onsite for reuse. LID is often implemented through BMPs, including conservation designs, low impact landscaping, and practices promoting improved infiltration, runoff storage, runoff conveyance, and filtration (Metres 2013).

The final Trash Amendments would also allow for the use of multi-benefit projects as part of Track 2 implementation. Multi-benefit projects should be designed to maximize water supply, water quality, and environmental and other community benefits (Wat. Code § 10562(b)(2)). Multi-benefit projects lead to collaborations with other agencies and stakeholders to develop storm water infrastructure that improves storm water, urban runoff quality, and improve wildlife habitat. Multi-benefit projects should focus on regional and watershed-wide benefits.

While LID and multi-benefit projects have not directly addressed trash as a traditional pollutant in the past, additional measures can be included so that such projects specifically address trash. For example, the City of Anaheim, as part of the Brookhurst Street Improvement Project, converted impervious surfaces into a greenbelt area with an earthen swale that accepts storm flows from the street, acts as a natural treatment system, allows for limited infiltration, and drains to an existing storm drain inlet (City of Anaheim 2010). Trash can get captured within the bioswales, which infiltrates the storm water. A multi-benefit project should separate the storm water from the trash, thus removing the ability for trash to be transported to a receiving water body via storm water. The trash that accumulates within the bioswale should still be removed. To capture the remaining trash in storm water, an insert could be placed in the storm drain inlet to prevent trash from entering the storm water system. Another example of a multi-benefit project could be a retention basin, where the primary function is to recharge the local groundwater aquifer. To capture trash in the retention basin, a trash net at the retention basin overflow could be installed to capture any trash leaving the retention

basin when storm water inflow exceeds the capacity of the retention basin. LID and multi-benefit projects provided many environmental benefits from improved water quality, reduced number of flooding events, restored aquatic habitat, improved groundwater recharge, and enhanced urban aesthetics. By incorporating trash controls into LID and multi-benefit projects, a permittee can address numerous water quality pollutants within the urban and storm water landscape.

6 ENVIRONMENTAL EFFECTS OF TRASH AMENDMENTS

6.1 Introduction

The Water Quality Control/208 Planning Program, found in title 23, California Code of regulations sections 3775-3781 has been certified as an exempt regulatory program by the Secretary for Resources (Cal. Code Regs., tit. 14,§ 15251, subd. (g)) and, therefore, the State Water Board is exempt from the requirements of preparing separate documents in compliance with CEQA. However, the State Water Board must conduct an environmental analysis of its actions in a draft SED as part of its approval or adoption according to California Code of Regulations, title 23, section 3777 (see also, Pub. Res. Code § 21159). This Final Staff Report is being used to satisfy this requirement.

CEQA's "certified regulatory program" exemption is limited, however, and the State Water Board in the SED must still comply with CEQA's overall objectives to: inform the decision makers and the public about the potentially significant environmental effects of a proposed project; identify ways that significant adverse environmental impacts may be mitigated; and prevent significant, avoidable adverse environmental impacts by changing the proposed project or requiring mitigation measures. There are certain guiding principles that are contained in the CEQA Guidelines that help to inform the Water Board's certified regulatory process and preparation of the draft SED:

> Forecasting: Drafting an EIR or preparing a Negative Declaration necessarily involves some degree of forecasting. While foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can (Cal. Code Regs., tit. 14, § 15144).
>
> Speculation: If, after thorough investigation, a Lead Agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact (Cal. Code Regs., tit. 14, § 15145).
>
> Specificity: the degree of specificity required in an Environmental Impact Report [or an Environmental Impact Report – equivalent document, such as an SED] will correspond to the degree of specificity involved in the underlying activity which is described in the Environmental Impact Report" (Cal. Code Regs., tit. 14, § 15146)
>
> Standards for Adequacy: An EIR (or Negative Declaration) should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR (or Negative declaration) is to be reviewed in the light of what is reasonably feasible. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure (Cal. Code Regs., tit. 14, § 15151).

This section of the Final Staff Report, as well as the Environmental Checklist in Appendix B, identifies and evaluates the potential environmental impacts that may arise from final Trash Amendments and the reasonably foreseeable methods of compliance.

It also discusses mitigation, where applicable, for the identified potentially significant impacts (Cal. Code Regs., tit. 23, § 3777(b)). The implementation alternatives for achieving compliance with the final Trash Amendments are described in detail in Section 8 of this document. Impacts believed to be potentially significant are described in this section, while impacts that are considered less than significant or where there is no effect are described in Environmental Checklist contained in Appendix B. The following resource areas are included in this section, each of which includes a description of potential impacts, and mitigations.

- Section 6.2 Air Quality
- Section 6.3 Biological Resources
- Section 6.4 Cultural Resources
- Section 6.5 Geology/Soils
- Section 6.6 Greenhouse Gas Emissions
- Section 6.7 Hazards and Hazardous Materials
- Section 6.8 Hydrology/Water Quality
- Section 6.9 Land Use/Planning
- Section 6.10 Noise and Vibration
- Section 6.11 Public Services
- Section 6.12 Transportation/Traffic
- Section 6.13 Utilities/Service Systems

6.1.1 Impact Methodology

Any potential environmental impacts associated with the final Trash Amendments depend upon the specific compliance methods selected by the complying permittee, most of whom will be public agencies subject to their own CEQA obligations (see Pub. Res. Code § 21159.2). This document identifies broad mitigation approaches that could be considered at a statewide level. Consistent with Public Resources Code section 21159 and the State Water Board's certified regulatory program, the document does not engage in speculation or conjecture, but rather considers the potential environmental impacts of the final Trash Amendments and reasonably foreseeable methods of compliance, the feasible mitigation measures, and feasible alternatives (including alternative means of compliance) which would meet the project objectives and avoid or reduce the potentially significant impacts of the proposed project.

Within each of the subsections listed above, this document evaluates the potentially significant impacts of the proposed project and each implementation alternative relative to the subject resource area. The implementation alternatives evaluated in this document are evaluated on a statewide level for impacts for each resource area. Project-level analysis is expected to be conducted by the appropriate public agencies prior to implementation of project specific methods of compliance with the final Trash Amendments. The environmental analysis in this document assumes that the project specific methods of compliance with the final Trash Amendments would be designed, installed, and maintained following all applicable state and local laws, regulations, and ordinances. Several handbooks are available and currently used by municipal agencies

that provide guidance for the selection and implementation of BMPs (CASQA 2003a; 2003b, Water Environment Research Foundation 2005, Caltrans 2010).

6.1.2 Level of Analysis

The State Water Board is the lead agency for the final Trash Amendments, while the responsible agencies identified in Section 2.11 (Agencies Expected to use this Staff Report in their Decision Making and Permits) may be the lead agency for CEQA compliance for approval and implementation of a project specific method of compliance with the final Trash Amendments.

The State Water Board does not specify the actual means of compliance by which permittees choose to comply with the final Trash Amendments. However, as required by the State Water Board's certified regulatory program, this draft SED analyzes the potential environmental impacts of the final Trash Amendments and the reasonably foreseeable methods of compliance on a statewide level. The specificity of the "activity" described in this draft SED related to the reasonably foreseeable methods of compliance is of a general nature and the level of analysis of the potentially significant adverse environmental effects is commensurate with that level of detail. At the time of approval of a project-specific compliance project where the detail of the method of compliance is known, a project-level environmental analysis may be performed by the local approval agency.

Project-level impacts of the reasonably foreseeable methods of compliance will necessarily vary depending on the choice of compliance and the size, location, and type of discharger and the environmental resources in and around the project site. It would be speculative to estimate the specific impacts of the final Trash Amendments caused by implementation of a project-specific compliance method. It is possible that, at a specific site with particularly sensitive environmental resources, implementation with compliance measures in either in Track 1 or 2 could cause potentially significant impacts as compared to baseline conditions. Since it is speculative to estimate the type, size, and location of any particular compliance method (e.g., type of construction activities and type of resources adversely affected by those activities), this evaluation makes no attempt to quantify the impacts associated with implementation or maintenance of a particular compliance method.

Per the requirements of the State Water Board's environmental regulations, the resource analysis in this section includes:

- An identification of any significant or potentially significant adverse environmental impacts of the proposed project;
- An analysis of reasonable alternatives to the project and mitigation measures to avoid or reduce any significant or potentially significant adverse environmental impacts; and
- An environmental analysis of the reasonably foreseeable methods of compliance, including:
    - An identification of the reasonably foreseeable methods of compliance with the project;

- An analysis of any reasonably foreseeable significant adverse environmental impacts associated with those methods of compliance;
- An analysis of reasonably foreseeable alternative methods of compliance that would have less significant adverse environmental impacts; and
- An analysis of reasonably foreseeable mitigation measures that would minimize any unavoidable significant adverse environmental impacts of the reasonably foreseeable methods of compliance. (23 CCR § 3777)

6.1.3 Environmental Setting

CEQA directs that the environmental setting normally be used as the baseline for determining significant impacts of a proposed project (Cal. Code Regs., tit.14, § 15125, subd. (a)). Section 3 presents a broad overview of the environmental setting for the state of California related to the final Trash Amendments. As such, the environmental setting and baseline for determining impacts is presented at a general level as each regional water board and permittee may address trash with a range of treatment and institutional controls. The following resource sections present additional specific setting information relevant to the assessment of environmental impacts of the final Trash Amendments.

6.2 Air Quality

Daily emissions and pollutant concentrations are two ways to quantify air pollution. The term “emissions” means the quantity of pollutant released into the air and has unit of pounds per day (lbs /day). The term “concentrations” means the amount of pollutant material per volumetric unit of air and has unit of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$).

Criteria Pollutants

The Air Resources Board has established state ambient air quality standards (state standards) to identify outdoor pollutant levels considered safe for the public. After state standards are established, state law requires Air Resources Board to designate each area as attainment, nonattainment, or unclassified for each state standard. The area designations, which are based on the most recent available data, indicate the healthfulness of air quality throughout the state. In addition to state standards, the federal Clean Air Act requires U.S. EPA to set national ambient air quality standards (federal standards or national standards). The Air Resources Board makes area designations for ten pollutants: ozone, suspended particulate matter (PM10 and PM2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, hydrogen sulfide, and visibility reducing particles. Ambient air quality standards define clean air, and are established to protect even the most sensitive individuals in our communities. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health.

The gaseous criteria pollutants, particulate matter, and toxic air contaminants, and the associated adverse health effects of these air quality contaminants are summarized below.

Carbon Monoxide

Exposure to high concentrations of carbon monoxide, a colorless and odorless gas, reduces the oxygen-carrying capacity of the blood, and therefore can cause dizziness and fatigue, impair central nervous system functions, and induce angina in persons with serious heart disease. Carbon monoxide is emitted almost exclusively from the incomplete combustion of fossil fuels. In urban areas, motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains emit carbon monoxide. Motor vehicle exhaust releases most of the carbon monoxide in urban areas. Vehicle exhaust contributes approximately 56 percent of all carbon monoxide emissions nationwide and up to 95 percent in cities. Carbon monoxide is a non-reactive air pollutant that dissipates relatively quickly. As a result, ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic. Carbon monoxide concentrations are influenced by local meteorological conditions; primarily wind speed, topography, and atmospheric stability. Carbon monoxide from motor vehicle exhaust can become locally concentrated when surface-based temperature inversions combine with calm atmospheric conditions.

Ozone

While ozone serves a beneficial purpose in the upper atmosphere (stratosphere) by reducing potentially harmful ultraviolet radiation, when it reaches elevated concentrations in the lower atmosphere it can be harmful to the human and to sensitive species of plants. Short-term ozone exposure can reduce lung function and increase an individual's susceptibility to respiratory infection. Long-term exposure can impair lung defense mechanisms and lead to emphysema and/or chronic bronchitis. Ozone concentrations build to peak levels during periods of light winds or stagnant air, bright sunshine, and high temperatures. Ideal conditions occur during summer and early autumn. Sensitivity to ozone varies among individuals. About 20 percent of the population is sensitive to ozone, with exercising children being particularly vulnerable. Ozone is formed in the atmosphere by a complex series of chemical reactions under sunlight that involve "ozone precursors." Ozone precursors are categorized into two families of pollutants: oxides of nitrogen and reactive organic compounds. Oxides of nitrogen and reactive organic compounds are emitted from a variety of stationary and mobile sources. While oxides of nitrogen are considered a criteria pollutant, reactive organic compounds are not in this category, but are included in this discussion as ozone precursors. Ozone is the chief component of urban smog and the damaging effects of photochemical smog generally relate to the concentration of ozone. Meteorology and terrain play major roles in ozone formation. The greatest source of smog producing gases is the automobile.

Nitrogen Dioxide

The major health effect from exposure to high levels of nitrogen dioxide is the risk of acute and chronic respiratory disease. Like ozone, nitrogen dioxide typically is not directly emitted, but it is formed through a rapid reaction between nitric oxide and atmospheric oxygen. Nitric oxide and nitrogen dioxide are collectively called oxides of nitrogen and are major contributors to ozone formation. Nitrogen dioxide also contributes to the formation of respirable particulate matter (see discussion of respirable particulate matter below) and fine particulate matter through the formation of nitrate compounds. At atmospheric

concentrations, nitrogen dioxide is only potentially irritating. In high concentrations, the result is a brownish-red cast to the atmosphere and reduced visibility.

Sulfur Dioxide

The major health effect from exposure to sulfur dioxide is acute and chronic respiratory disease. Exposure may cause narrowing of the airways, which may cause wheezing, chest tightness, and shortness of breath. Sulfur dioxide can also react with water in the atmosphere to form acids (or “acid rain”), which can cause damage to vegetation and man-made materials. The main source of sulfur dioxide is coal and fuel oil combustion in power plants and industries, as well as diesel fuel combustion in motor vehicles. Generally, the highest levels of sulfur dioxide are found near large industrial complexes. In recent years, sulfur dioxide concentrations have been reduced by the increasingly stringent controls placed on stationary source emissions of sulfur dioxide and by limiting the sulfur content in fuel. Sulfur dioxide concentrations in southern California have been reduced to levels well below the state and national ambient air quality standards, but further reductions in emissions are needed to attain compliance with ambient air quality standards for sulfates, respirable particulate matter, and fine particulate matter, to which sulfur dioxide is a contributor.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Particulate matter is regulated as respirable particulate matter (inhalable particulate matter less than ten micrometers in diameter). More recently it has been subdivided into coarse and fine fractions, with particulate matter less than 2.5 micrometers in diameter constituting the fine fraction. Major sources of respirable particulate matter include crushing or grinding operations; dust stirred up by vehicles traveling on roads; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Fine particulate matter results from fuel combustion (e.g., from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. In addition, fine particulate matter can be formed in the atmosphere from gases such as sulfur dioxide, oxides of nitrogen, reactive organic compounds, and ammonia, and elemental carbon. Fine particulate matter is a subset of respirable particulate matter.

The health effects from long-term exposure to high concentrations of particulate matter are increased risk of chronic respiratory disease like asthma and altered lung function in children. Particles with 2.5 to 10 microns in diameter tend to collect in the upper portion of the respiratory system. Particles that are 2.5 microns or less are so tiny that they can penetrate deeper into the lungs and damage lung tissues. These substances can be absorbed into the bloodstream and cause damage elsewhere in the body. Short-term exposure to high levels of particulate matter has been shown to increase the number of people seeking medical treatment for respiratory distress, and to increase mortality among those with severe respiratory problems. Particulate matter also results in reduced visibility. Ambient particulate matter has many sources. It is emitted directly by combustion sources

like motor vehicles, industrial facilities, and residential wood burning, and in the form of dust from ground-disturbing activities such as construction and farming. It also forms in the atmosphere from the chemical reaction of precursor gases.

Toxic Air Contaminants

Toxic air contaminants include air pollutants that can produce adverse public health effects, including carcinogenic effects, after long-term (chronic) or short-term (acute) exposure. One source of toxic air contaminants is combustion of fossil fuels or digester gas. Human exposure occurs primarily through inhalation, although non-inhalation exposure can also occur when toxic air contaminants in particulate form deposit onto soil and drinking water sources and enter the food chain or are directly ingested by humans. Many pollutants are identified as toxic air contaminants because of their potential to increase the risk of developing cancer. For toxic air contaminants that are known or suspected carcinogens, it has been found that there are no levels or thresholds below which exposure is risk free. No ambient air quality standards exist for toxic air contaminants, except that standards for lead, hydrogen sulfide, and vinyl chloride are provided in California Ambient Air Quality Standards. Instead, numerous national, state, and local rules that affect both stationary and mobile emission sources regulate toxic air contaminants emissions. Individual toxic air contaminants vary greatly in the risk they present; at a given level of exposure one toxic air contaminants may pose a hazard that is many times greater than another. Where data are sufficient to do so, a “unit risk factor” can be developed for cancer risk. The unit risk factor expresses assumed risk to a hypothetical population, the estimated number of individuals in a million who may develop cancer as the result of continuous, lifetime (70-year) exposure to 1 $\mu g/m^3$ of the toxic air contaminants. Unit risk factors provide a standard that can be used to establish regulatory thresholds for permitting purposes. This is, however, not a measure of actual health risk because actual populations do not experience the extent and duration of exposure that the hypothetical population is assumed to experience. For non-cancer health effects, a similar factor called a Hazard Index is used.

Areas with monitored pollutant concentrations that are lower than ambient air quality standards are designated as “attainment areas” on a pollutant-by-pollutant basis. When monitored concentrations exceed ambient standards, areas are designated as “nonattainment areas.” An area that recently exceeded ambient standards, but is now in attainment, is designated as a “maintenance area.” Nonattainment areas are further classified based on the severity and persistence of the air quality problem as “moderate” “severe” or “serious.” Classifications determine the applicability and minimum stringency of pollution control requirements.

6.2.1 Regulatory Setting

Federal

The U.S. EPA is the federal agency charged with administering the federal Clean Air Act Amendments of 1990, which established a number of requirements. The U.S. EPA oversees state and local implementation of federal Clean Air Act requirements. The Clean Air Act Amendments require the U.S. EPA to approve State Implementation Plans to meet and/or maintain the national ambient standards. The federal (and California) ambient air quality standards are shown in Table 8.

Table 8. Federal and California Ambient Air Quality Standards.

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone	1 Hour	0.09 ppm (180 μg/m^3)	-	Same as Primary Standard
	8 Hour	0.070 ppm (137 μg/m^3)	0.075 ppm (147 μg/m^3)	
Respirable Particulate Matter	24 Hour	50 μg/m^3	150 μg/m^3	Same as Primary Standard
	Annual Arithmetic Mean	20 μg/m^3	-	
Fine Particulate Matter	24 Hour	No Separate State Standard	35 μg/m^3	35 μg/m^3
	Annual Arithmetic Mean	12 μg/m^3	12.0 μg/m^3	15.0 μg/m^3
Carbon Monoxide	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	-
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	-	-
Nitrogen Dioxide	Annual Arithmetic Mean	0.030 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as Primary Standard
	1 Hour	0.18 ppm (339 μg/m^3)	100 ppm (188 μg/m^3)	-
Sulfur Dioxide	Annual Arithmetic Mean	-	0.030 ppm	-
	24 Hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	-
	3 Hour	-	-	0.5 ppm (1300 μg/m^3)
	1 Hour	0.25 ppm (655 μg/m^3)	75 ppb (195 μg/m^3)	-
Lead	30 Day Average	1.5 μg/m^3	-	-
	Calendar Quarter	-	1.5 μg/m^3	Same as Primary Standard

State

The California Air Resources Board is the state agency responsible for coordinating both state and federal air pollution control programs in California. In 1988, the State Legislature adopted the California Clean Air Act, which established a statewide air pollution control program. The California Clean Air Act's requirements include annual emission reductions, increased development and use of low emission vehicles, and submittal of air quality attainment plans by air districts. The California Air Resources Board has established state

ambient air quality standards, shown in Table 8. Additionally, the California Air Resources Board has established state standards for pollutants that have no federal ambient air quality standard, including sulfate, visibility, hydrogen sulfide, and vinyl chloride.

Local

There are 35 local air districts within the state. Each district (referred to as either an Air Pollution Control District or an Air Quality Management District) is responsible for controlling emissions, primarily from stationary sources of air pollution, within their area. Each district develops and adopts an Air Quality Management Plan, which serves as the blueprint to bring their respective areas into compliance with federal and state clean air standards. Rules are adopted to reduce emissions from various sources.

6.2.2 Thresholds of Significance

Air quality impacts would be considered significant if the final Trash Amendments or reasonably foreseeable methods of compliance would:

- Conflict with or obstruct the implementation of the applicable air quality plan (although there are many applicable air quality plans in the state, this analysis utilized the South Coast Air Quality Management District Plan as the representative air quality plan for assessing impacts).
- Violate any air quality standards or contribute substantially to an existing or projected air quality violation (although there are many applicable air quality standards, depending on the air basin in the state, this analysis utilized the South Coast Air Quality Management District's standards as the representative air quality standards for assessing impacts).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under any applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors). This impact threshold is addressed in Section 7.2.

6.2.3 Impacts and Mitigation

The Los Angeles Water Board conducted an analysis of potential air quality impacts of the identified alternatives for compliance with the Los Angeles River Trash TMDL (Trash TMDL) (Los Angeles Water Board 2007f). This analysis is incorporated by reference and summarized here. Staff has reviewed this analysis and has concluded that it is an appropriate representation of the potential impacts that could occur in other areas of the state with implementation of the final Trash Amendments, including the reasonably foreseeable methods of compliance.

The South Coast Air Basin (which includes the area covered by the Trash TMDL) is home to more than 42 percent of California's population. Pollutant concentrations in parts of the South Coast Air Basin are among the highest in the nation. South Coast Air Basin

emissions improved between 2005 and 2010 and are expected to further improve and become somewhat constant through 2035 (ARB 2013). With its high population and pollutant concentrations, potential impacts to air quality are likely to be greater in the South Coast Air Basin than in other parts of the state and serves as a maximum possible impact related to air quality. Therefore, potential impacts identified in this analysis would likely be less in all other air basins.

Impact Assessment Methodology

This evaluation addresses impacts that have the potential to occur from the final Trash Amendments, including the reasonably foreseeable methods of compliance, including both short -and long-term activities. The evaluation is based on a calculation of the total emissions from travel of construction and maintenance vehicles that might be affected by implementation of the final Trash Amendments. This comparative evaluation was done instead of examining the emissions from each individual source alone and comparing them to a threshold level.

Vehicle Emissions

Vehicle emissions were calculated in the Trash TMDL analysis using forecasts of total vehicle miles traveled based on data provided in MOBILE6, which is a vehicle emission software developed by U.S. EPA (U.S. EPA 2003; 2004; 2006). MOBILE6 is used for predicting gram per mile emissions of hydrocarbons, carbon monoxide, oxides of nitrogen, carbon dioxide, PM, and toxics from cars, trucks, and motorcycles under various conditions. The data which this calculation is based on are from technical documents of MOBILE6 (U.S. EPA 2003). Considering the type of work involved in implementation of the final Trash Amendments, the calculation assumed that non-tampered heavy-duty diesel vehicles (HDDV Class 6) would be used for installation/construction/maintenance activities. The mileage was assumed to be 50,000 miles, which is the median mileage for HDDVs. The year of vehicle was assumed to be 2001+ for hydrocarbons, carbon monoxide, oxides of nitrogen, and sulfur dioxide and 1994+ for particulate matter.

Based on assumptions above, the exhaust emission rates were found to be 2.1, 9.92, and 6.49 grams per mile for hydrocarbons, carbon monoxide, and oxides of nitrogen, respectively. The particulate matter standard for HDDVs is 0.1 g/bhp-hr. By applying a conversion factor of 1.942 bhp-hr/mi (from Update Heavy-Duty Engine Emission Conversion Factors for Mobile6 – Analysis of BSFCs and Calculation of Heavy-Duty Engine Emission Conversion Factors), the exhaust emission rate for particulate matter was found to be 0.1942 grams per mile. There was no exhaust emission rate information available for SO_x in MOBILE6. Instead by using diesel fuel sulfur level of eight ppm (from MOBILE6 for years after 2006), diesel fuel economy of 8.71 miles per gallon (from Update Heavy-Duty Engine Emission Conversion Factors for Mobile6 – Analysis of BSFCs and Calculation of Heavy-Duty Engine Emission Conversion Factors), and diesel fuel density of 7.099 pounds per gallon (from Update Heavy-Duty Engine Emission Conversion Factors for MOBILE6 – Analysis of Fuel Economy, Non-Engine Fuel Economy Improvements and Fuel Densities), the exhaust emission rate for sulfur dioxide could be 0.00592 grams per mile, assuming all sulfur in fuel would be transformed to sulfur dioxide.

Catch Basin Inserts

Long-term increases in traffic caused by ongoing maintenance of catch basin inserts (e.g., delivery of materials, street sweeping) are potential sources of increased air pollutant emissions.

As an example, the Trash TMDL analysis estimated that approximately 150,000 catch basins could be retrofitted with inserts in the urban portion of watershed. As discussed previously, the Los Angeles River Watershed has 474 square miles highly developed with commercial, industrial, or residential uses. Assuming that 150,000 catch basin inserts were placed evenly in the 474 square miles developed area, each catch basin insert covered 0.00316 square miles. The distance between two catch basin inserts was about 0.056 mile. The total distance for a truck to travel through all 150,000 catch basin inserts units was about 8,342 miles. Assuming catch basins need to be cleaned twice a year. This translated to approximately 822 vehicle trips per day in the watershed. Assuming the 822 trips were arranged at shortest distance, which is reasonable by arranging a round trip, the total travel distance for 822 trips was about 52 miles (9497 miles divided by 183 days, or 822 trips times 0.063 mile). The vehicle emissions for traveling 52 miles are listed in Table 9. Emission levels for all the pollutants were well below the South Coast Air Quality Management District Air Quality Significance thresholds. If all trips were arranged in one day, emission levels for HC, CO, PM, and sulfur dioxide were still well below the significance thresholds. The maximum potential impact of the proposed project for level for oxides of nitrogen was about twice the significance threshold level of 55 lbs/day.

Measures are available to alleviate any potential impacts to air quality due to increased traffic due to catch basin cleanings. Such measures could include: (1) use of construction, maintenance, and street sweeper vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters; (3) use of emulsified diesel fuel; (4) use of vacuum-assisted street sweepers to eliminate potential re-suspension of sediments during sweeping activity; and (5) the design of trash removal devices to minimize the frequency of maintenance trips (e.g., design for smaller drainage areas).

<u>Toxic Air Contaminants</u> Because the emission levels of criteria pollutants during installation and maintenance of catch basin inserts can be below the South Coast Air Quality Management District Air Quality Significance thresholds, the emission of toxic air contaminants is expected to be below the other Air Quality Management District thresholds as well. With its high population and pollutant concentrations, South Coast Air Quality Management District's thresholds are likely to be the most stringent of other Districts in other parts of the state and serves as a maximum threshold related to Toxic Air Contaminants. Therefore, a significant increase in toxic air contaminants is not expected in other areas of the state due to implementation of the final Trash Amendments.

<u>Odor Impacts</u> To the extent improper disposal of, for instance, household hazardous wastes result in them being kept on the street or in inserts, and potentially allowing a release of chemical odors, local residents could be exposed to those effects. Those effects are already occurring in watersheds, however, and should be considered baseline impacts. Nevertheless, to the extent the locality that originated the risk would become newly potentially exposed instead of downstream receptors, those impacts could be potentially significant in those locales. Such impacts could be avoided or mitigated by

educating the local community of the effects of improper disposal of such wastes, enforcing litter ordinances, and timely cleaning out inserts.

Vortex Separation Systems

Criteria Pollutants Short term increases in traffic during the construction and installation of vortex separation systems and long-term increases in traffic caused by ongoing maintenance of these devices (e.g., delivery of materials and deployment of vacuum trucks) are potential sources of increased air pollutant emissions. For example, the Trash TMDL analysis estimated that approximately 3700 large capacity vortex separation systems could be installed to collect all the trash generated in the urban portion of the Los Angeles River watershed. Maintenance requirements for trash removal devices demonstrate that devices should be emptied when they reach 85 percent capacity. Vortex separation systems can be designed so that they need be cleaned only once per storm season.

As an example of truck travel within a particular watershed used as a representative maximum possible effect of the proposed project, the Los Angeles River Watershed covers a land area of over 834 square miles, of which 599 square miles are highly developed with commercial, industrial, or residential uses. The remaining area is covered by forest or open space. Assuming that 3700 vortex separation systems were placed evenly in the 599 square miles developed area, each vortex separation system would cover 0.162 square miles. The distance between two vortex separation system units was about 0.40 mile. The total distance for a truck to travel through all 3700 vortex separation system units was about 1489 miles. A vortex separation system would need to be cleaned at minimum once per storm season, i.e., once per year.[15] There are about 247 business days a year. This translated to approximately 15 vehicle trips per business day in the watershed. Assuming the 15 trips were arranged at shortest distance, the total travel distance for 15 trips was about six miles (1489 miles divided by 247 days, or 15 trips times 0.40 mile). The vehicle emissions for traveling six miles are listed in Table 9. Emission levels for all the pollutants are far below the South Coast Air Quality Management District Air Quality Significance thresholds. If all trips are conducted in one day, emission levels for all the pollutants are still well below the significance thresholds (Table 9).

[15] Annual frequency of the cleaning the vortex separation systems may vary across California in response to rain events. However, this variation would not substantially change the conclusions of this analysis.

Table 9. Vehicle Emissions within the Los Angeles River Watershed Example.

Device	Trips per day	HC (lbs/day)	CO (lbs/day)	NO_x (lbs/day)	PM (lbs/day)	SO_2 (lbs/day)
Vortex Separation System	15*	0.029	0.132	0.086	0.0026	0.000079
Vortex Separation Systems	3700**	6.9	32.5	21.3	0.64	0.019
Catch Basin Insert	21,429*	0.2	1.1	0.7	0.0	0.00068
Catch Basin Insert	150,000**	43.7	206.5	135.1	4.0	0.12
SCAQMD significance threshold		55	550	55	150	150
*trips conducted over 247 business days, **trips conducted in a single day						

Using the South Coast Air Quality Management District daily construction emissions thresholds as a representative of air quality standards for assessing impacts, the emissions generated by construction equipment for the proposed project are expected to be lower than the daily construction emissions thresholds. However, detailed analysis can only be done at project level. In case daily construction emissions exceed significance thresholds, which are unlikely, construction projects for different vortex separation system units can be conducted on different days to reduce emissions rates.

Measures to decrease air emissions from increased vehicle trips or increased use of construction equipment include: (1) use of construction, and maintenance vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters; and (3) use of emulsified diesel fuel.

Toxic Air Contaminants The emission levels of criteria pollutants during installation and maintenance of vortex separation system units are far below the South Coast Air Quality Management District Air Quality Significance thresholds, the emissions of toxic air contaminants are expected to be far below the other Air Quality Management District thresholds as well. With its high population and pollutant concentrations, South Coast Air Quality Management District's thresholds are likely to be the most stringent of other Air Quality Management Districts in other parts of the state and serves as a maximum threshold related to Toxic Air Contaminants. Therefore, a significant increase in toxic air contaminants is not expected in other areas of the state due to implementation of the final Trash Amendments.

Odor Impacts During construction of the vortex separation system units, it is possible that foul air could be temporarily released to the atmosphere while enclosed sources are uncovered or piping is reconfigured. These releases could create objectionable odors at the nearest receptors. These impacts are temporary and unpleasant odors, if any, would be at minimum with completion of the installation.

Vortex separation system units may be a source of objectionable odors if design allows for water stagnation or collection of water with sulfur-containing compounds. Storm water runoff is not likely to contain sulfur-containing compounds, but stagnant water could create objectionable odors. Measures to eliminate odors caused by stagnation could include covers, aeration, filters, barriers, and/or odor suppressing chemical additives. Devices could be inspected to ensure that intake structures are not clogged or pooling water. During maintenance, odorous sources could be uncovered for as short of a time period as possible. To the extent possible, trash removal devices could be designed to minimize stagnation of water (e.g., allow for complete drainage within 48 hours) and installed to increase the distance to sensitive receptors in the event of any stagnation.

The potential re-suspension of sediments and associated pollutants during construction could also impact air quality. An operations plan for the specific construction and/or maintenance activities could be completed to address the variety of available measures to limit the air quality impacts. These could include vapor barriers and moisture control to reduce transfer of small sediments to air.

To the extent improper disposal of, for instance, household hazardous wastes result in them being trapped in structural compliance measures, potentially allowing a release of such chemicals, local residents could be exposed to those effects. On balance, however, it is not unfair that the residents of the localities where improper disposal of such materials occurs should suffer those risks rather than allowing the wastes to be conveyed through the water body, to expose downstream citizens to risk instead. Those effects are already occurring in the watershed and should be considered baseline impacts. Nevertheless, to the extent the locality that originated the risk would become newly potentially exposed instead of downstream receptors, those impacts could be potentially significant in those locales. Such impacts could be avoided or mitigated by educating the local community of the effects of improper disposal of such wastes, enforcing litter ordinances, and timely cleaning out vortex separation systems.

Trash Nets

Trash nets are end-of-pipe devices. The number of end-of-pipe trash nets installed would be limited by the number of suitable locations within a watershed. Short term increases in traffic during the construction and installation of trash nets and long-term increases in traffic caused by ongoing maintenance of these devices (e.g., replacement of nets) are potential sources of increased air pollutant emissions. After installation, trash nets can be replaced once per year. It is not clear how many trash nets are going to be installed at this point. If the responsible parties make decisions on the numbers of trash nets that are going to be installed, the impacts on air quality caused by installation and maintenance of trash nets should be analyzed at project level. Nevertheless, many fewer trash nets are currently being installed than catch basin inserts, and, anticipating this trend to continue, the impacts of installation and maintenance of trash nets on air quality are expected to be much less than those of catch basin inserts.

Measures to lessen the impacts of increased air emissions caused by increased vehicle trips or construction equipment due to the installation of trash nets include: (1) use of construction, and maintenance vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters; and (3) use of emulsified diesel fuel.

Trash trapped in trash nets may be a source of objectionable odors. Measures to eliminate odors could include covers, aeration, filters, barriers, and/or odor suppressing chemical additives. During maintenance, odorous sources could be uncovered for as short of a time period as possible. Notably, the current conditions result in significant impacts from odor. The impacts from odor could be alleviated by employing alternative structural devices, such as in-line trash nets, or by employing non-structural controls, for instance, increased litter enforcement.

Gross Solids Removal Devices

Short term increases in traffic during the construction and installation of Gross Solids Removal Devices and long-term increases in traffic caused by ongoing maintenance of these devices (e.g., replacement of nets) are potential sources of increased air pollutant emissions. Each Gross Solids Removal Device was designed to capture annual load of gross solids, which would result in one cleaning per year. It is not clear how many Gross Solids Removal Devices are going to be installed at this point. If the responsible parties determine that Gross Solids Removal Devices should be installed, the impacts on air quality caused by installation and maintenance Gross Solids Removal Devices should be analyzed at project level. Nevertheless, many fewer Gross Solids Removal Devices are currently being installed than catch basin inserts, and, anticipating these trends to continue, the impacts of installation and maintenance of Gross Solids Removal Devices on air quality are expected to be much less than those of catch basin inserts.

Measures to lessen the increase of air emissions caused by increased vehicle trips or construction equipment due to the installation of Gross Solids Removal Devices include: (1) use of construction, and maintenance vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters; and (3) use of emulsified diesel fuel.

Trash trapped in Gross Solids Removal Devices may be a source of objectionable odors. Measures to eliminate odors could include covers, aeration, filters, barriers, and/or odor suppressing chemical additives. During maintenance, odorous sources could be uncovered for as short of a time period as possible. By employing nonstructural controls, for instance, increased litter enforcement, the impacts from odor could be alleviated.

Enforcement of Litter Laws

It is possible that the final Trash Amendments may require more workers and vehicles to enforce litter laws. Air pollutant emissions might be increased due to increased driving to enforce litter laws. The increase in traffic due to enforcement of litter laws, however, is expected to be very limited and would not have a noticeable impact on air quality.

Increased Street Sweeping

Increased street sweeping would increase traffic and therefore increase air pollutant emissions. Increased street sweeping would not foreseeably be implemented alone for the final Trash Amendments. It is not clear how often street sweeping would be increased to comply with the final Trash Amendments at this point. If the responsible parties determine that a given frequency of street sweeping is necessary, the impacts on air quality caused by increased street sweeping should be analyzed at project level.

Increased street sweeping may increase objectionable odors on street. Nonetheless, measures are available to reduce any potential impacts to air quality due to increased

street sweeping. Such measures could include: (1) use of street sweeper vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters, (3) use of emulsified diesel fuel; (4) use of vacuum-assisted street sweepers to eliminate potential re-suspension of sediments during sweeping activity.

Public Education

Similar to enforcement of litter laws, public education is not expected to have noticeable impact on air quality.

Ordinances

Similar to enforcement of litter laws and public education, ordinances are expected to have no impact or less-than-significant impact on air quality.

Exposure of sensitive receptors to substantial pollutant concentrations

Implementation of the final Trash Amendments is expected to cause a minor amount of construction activities, causing impacts to air quality over baseline conditions. This construction is expected to take place within a short timeframe of several days, spread out over many urban and suburban sites. Due to the short term and dispersed nature of the implementation of the final Trash Amendments, there is no expectation that sensitive receptors will be exposed to substantial pollutant concentrations. In addition, the reasonably foreseeable methods of compliance will be conditioned with standard procedures requiring that the general population not have access to construction areas. Further, maintenance activities would be intermittent and are not expected to create substantial pollutant concentrations. Therefore, potential impacts due to exposure of sensitive receptors to substantial pollutant concentrations are expected to be less than significant for the reasonably foreseeable methods of compliance with the final Trash Amendments.

6.2.4 Summary

Installation and maintenance of full capture systems and treatment controls could result in potentially significant environmental effects with regard to air quality. Measures, however, can be applied to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the responsible agencies subject to the final Trash Amendments and can or should be adopted by them. The State Water Board does not direct which compliance measures responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Although this analysis concludes that, based on substantial evidence on the record, on a statewide level analysis, all impacts would be less than significant with mitigation; it is foreseeable that these measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments. All foreseeable methods of compliance listed above would not be of the size or scale to result

in alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally.

6.3 Biological Resources

A general description of the environmental setting is presented in Section 3 of this document. Those portions of the state where the final Trash Amendments would be implemented are densely urbanized and the presence of fish and wildlife species and their supporting habitat severely limited. Any watercourses, riparian habitat or wetlands downstream from the implementation areas would not be adversely impacted by implementation measures. Rather, these areas would be improved by the reduction in trash entering these habitats from upstream sources.

6.3.1 Regulatory Setting

Federal Regulatory Setting

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act, the U. S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration Fisheries Service, formerly National Marine Fisheries Service, have regulatory authority over federally listed species. Under the Endangered Species Act, a permit is required for any federal action that may result in “take” of a listed species. Section 9 of the Endangered Species Act defines take as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Under federal regulations, take is further defined to include the modification or degradation of habitat where such activity results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Clean Water Act

Section 404 of the CWA requires project proponents to obtain a permit from the U.S. Army Corps of Engineers before performing any activity that involves discharge of dredged or fill material into “waters of the United States,” including wetlands. Dredge and fill activities involve any activity, such as construction, that results in direct modification (e.g., alteration of the banks, deposition of soils) of an eligible waterway. Waters of the United States include navigable waters, interstate waters, and other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States.

In accordance with section 401 of the CWA, projects that apply for a U.S. Army Corps of Engineers permit for discharge of dredged or fill material must obtain water quality certification from the Water Boards indicating that the project would uphold state water quality standards.

State Regulatory Setting

California Endangered Species Act

Pursuant to the California Endangered Species Act, a permit from the California Department of Fish and Wildlife is required for projects that could result in take of a plant or animal species that is state listed as threatened or endangered. Under California Endangered Species Act, "take" is defined as an activity that would directly or indirectly kill an individual of a species. Authorization for take of state-listed species can be obtained through a California Fish and Wildlife Code section 2080.1 consistency determination or a section 2081 incidental take permit.

Section 1600 of the California Fish and Wildlife Code

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream or lake in California that supports wildlife resources is subject to regulation by the California Department of Fish and Wildlife, under sections 1600–1603 of the California Fish and Wildlife Code. Section 1601 states that it is unlawful for any agency to substantially divert or obstruct the natural flow or substantially change the bed, channel or bank of any river, stream or lake designated by California Department of Fish and Wildlife, or use any material from the streambeds, without first notifying California Department of Fish and Wildlife of such activity. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. California Department of Fish and Wildlife's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. Accordingly, a California Department of Fish and Wildlife Streambed Alteration Agreement must be obtained for any project that would result in diversions of surface flow or other alterations to the bed or bank of a river, stream, or lake.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne, "waters of the state" fall under the jurisdiction of the appropriate regional water board. The regional water board must prepare and periodically update Basin Plans. Each Basin Plan establishes numerical or narrative water quality objectives to protect established beneficial uses, which include wildlife, fisheries and their habitats. Projects that affect wetlands or waters of the state must meet discharge requirements of the regional water board, which may be issued in addition to a water quality certification or waiver under section 401 of the CWA.

Local Regulations

Numerous California cities and counties have adopted ordinances regulations and policies for the protection and enhancement of natural resources, including heritage trees, important natural features, habitat alteration, and common and special status species.

6.3.2 Thresholds of Significance

A project would normally have a significant effect on biological resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on a species identified as a candidate, sensitive, or special status species in local or

regional plans, policies or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on federally protected wetlands as defined by section 404 of the CWA (including, but not limited to marsh, riparian scrub, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provision of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional, or state habitat conservation plan.

6.3.3 Impacts and Mitigation

This is a statewide analysis of the potential impacts from each implementation measure. The specific location of each implementation measure would be determined during the implementation of the final Trash Amendments. In general, the activities that would take place with the implementation of the full capture and/or partial capture trash capture systems would be similar in nature to current urban activities that are already occurring in the watersheds. The implementation of additional trash control measures would not foreseeably:

- Cause a substantial reduction of the overall habitat of a wildlife species.
- Produce a drop in a wildlife population below self-sustaining levels.
- Eliminate a plant or animal community.
- Have a substantial adverse effect on federally protected wetlands.
- Conflict with any local policies or ordinances protecting biological resources.

It is not reasonably foreseeable that either the construction/implementation or maintenance phase of potential projects would result in a significant long-term impact to general wildlife species adapted to developed environments.

An objective of the final Trash Amendments is to improve conditions for aquatic life. Removing trash from the State's rivers, streams, and lakes would have an overall positive impact on biological resources.

Catch Basins

Catch basin inserts fit directly into curbside catch basins, requiring no expansion of footprint or additional excavation, in urbanized areas where native habitat or special-status species usually are absent. As such, impacts to biological resources would likely not occur, including impacts to species diversity, impacts to special-status species, impacts to habitat, or impacts to wildlife migration. Furthermore, because installation of catch basin inserts requires no construction or ground disturbance and is accomplished within the existing footprint of the facility, the installation of catch basin inserts would not impact biological resources. Implementation of the Trash Amendments and the use of catch basin inserts would considerably improve habitat for biological resources by removing trash from water bodies, as well as surrounding beaches. No mitigation is required since no potentially significant impacts are anticipated.

Vortex Separation Systems

Vortex separation systems would be implemented in currently urbanized areas. Since these areas are already fully urbanized, it is unlikely that the installation of vortex separation systems would cause the removal, disturbance or change in diversity of any plant species or cause a change or reduction in the number of any unique, rare or endangered species of plants. Depending on the final location of facilities, however, potential impacts to biological resources including special-status species and habitat, wetlands, and trees protected under local ordinances or policies could occur.

It is not reasonably foreseeable that implementation of vortex separation systems would result in the introduction of exotic or invasive plant species into an area. Nor would it result in a barrier to the normal replenishment of existing species. In the case that landscaping is incorporated into the specific project design, however, there is a possibility of disruption of resident native species.

It is possible that direct or indirect impacts to special-status animal species may occur at the project level. Because these animal species are protected by state and/or federal Endangered Species Acts, impacts to them would be considered potentially significant. Even though it is expected that potential projects would occur in previously developed areas it is possible for special-status species to occur in what would generally be described as urban areas. If these species are present during activities such as ground disturbance, construction, and operation and maintenance activities associated with the potential projects, it could conceivably result in direct impacts to special status species including the following:

- Direct loss of a sensitive species.
- Increased human disturbance in previously undisturbed habitats.
- Mortality by construction or other human-related activity.
- Impairing essential behavioral activities, such as breeding, feeding or shelter/refugia.
- Destruction or abandonment of active nest(s)/den sites.
- Direct loss of occupied habitat.

In addition, potential indirect impacts may include but are not limited to, the following:

- Displacement of wildlife by construction activities.
- Disturbance in essential behavioral activities due to an increase in ambient noise levels and/or artificial light from outdoor lighting around facilities.

It is not reasonably foreseeable that implementation of vortex separation systems would result in the introduction of new species. In addition, because potential projects would be established in previously heavily developed areas it is not expected that potential project sites would act as a travel route or regional wildlife corridor. Construction of these facilities would not considerably restrict wildlife movement. A travel route is generally described as a landscape feature (such as a ridgeline, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g. water, food, and den sites). Wildlife corridors are generally an area of habitat, usually linear in nature, which connect two or more habitat patches that would otherwise be fragmented or isolated from one another. It is considered unlikely that vortex separation systems would be constructed in areas such as these.

Constructed vortex separation systems, however, may potentially impact wildlife crossings. A wildlife crossing is a small narrow area relatively short and constricted, which allows wildlife to pass under or through obstacles that would otherwise hinder movement. Crossings are typically manmade and include culverts, underpasses, and drainage pipes to provide access across or under roads, highways, or other physical obstacles.

Construction activities associated with the implementation of vortex separation systems may impact migratory avian species. These avian species may use portions of potential project sites, including ornamental vegetation, during breeding season and may be protected under the Migratory Bird Treaty Act while nesting. The Migratory Bird Treaty Act includes provisions for protection of migratory birds under the authority of the U.S. Fish and Wildlife Service and California Fish and Wildlife. The Migratory Bird Treaty Act protects over 800 species including, geese, ducks, shorebirds, raptors, songbirds, and many other relatively common species.

It is not reasonably foreseeable that the implementation of vortex separation systems would result in the deterioration of existing fish and or wildlife habitat. Potential vortex separation systems would be located in previously developed areas and would not result in the removal of sensitive biological habitats.

Vortex separation systems would not be located within the river channel, but rather in the storm drain itself. As such, a foreseeable deterioration of existing fish habitat is not anticipated. It is foreseeable, however, that the implementation of the final Trash Amendments would considerably improve fish habitat by removing trash from water bodies, as well as surrounding beaches.

The following measures should be implemented to reduce or avoid potential project-level impacts to biological resources:

Assuming any unique species are present, plant number and species diversity could be maintained by either preserving them prior, during, and after the construction of vortex separation systems or by re-establishing and maintaining the plant communities post construction.

When the specific projects are developed and sites identified, a search of the California Natural Diversity Database could be employed to confirm that any potentially sensitive plant species or biological habitats in the site area are properly identified and protected as necessary. Focused protocol plant surveys for special-status-plant species could be conducted at each site location, if appropriate. If sensitive plant species occur on the project site mitigation would be required consistent with appropriate expert analysis. Mitigation measures shall be developed in coordination with U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. Responsible agencies should endeavor to avoid compliance measures that could result in reduction of the numbers of any unique, rare or endangered species of plants, and instead opt for such measures as enforcing litter ordinances in sensitive habitat areas, or siting physical compliance measures sufficiently upstream or downstream of sensitive areas to avoid any impacts.

In the case that landscaping is incorporated into the specific project design, the possibility of disruption of resident native species could be avoided or minimized by using only plants native to the area. Use of exotic invasive species or other plants listed in the Exotic Pest Plant of Greatest Ecological Concern in California should be prohibited (California Exotic Pest Plant Council 1999).

Responsible agencies should endeavor to avoid compliance measures that could result in significant impacts to unique, rare or endangered (special-status) species, should any such species be present at locations where such compliance measures might otherwise be performed, and instead opt for such measures as enforcing litter ordinances in sensitive habitat areas. Mitigation measures, however, could be implemented to ensure that potentially significant impacts to special status animal species are less than significant. When the specific projects are developed and sites identified a search of the California Natural Diversity Database could be employed to confirm that any potentially special-status animal species in the site area are properly identified and protected as necessary. Focused protocol animal surveys for special-status animal species should be conducted at each site location.

If special-status animal species are potentially near the project site area two weeks prior to grading or the construction of facilities and per applicable U.S. Fish and Wildlife Service and/or California Department of Fish and Wildlife protocols, pre-construction surveys to determine the presence or absence of special-status species would be conducted. The surveys should extend off site to determine the presence or absence of any special-status species adjacent to the project site. If special-status species are found to be present on the project site or within the buffer area, mitigation should be required consistent with appropriate expert analysis. To this extent, mitigation measures would be developed in coordination with the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife to reduce potential impacts.

If vortex separation systems are implemented at locations where they would foreseeably adversely impact species migration or movement patters, mitigation measures previously described could be implemented to ensure that impacts which may result in a barrier to the migration or movement of animal is less than significant. Any site-specific wildlife crossings should be evaluated in consultation with California Department of Fish and Wildlife. If a wildlife crossing would be significantly impacted in an adverse manner, then the design of the project should include a new wildlife crossing in the same general location.

If construction occurs during the avian breeding season for special status species and/or Migratory Bird Treaty Act -covered species, generally February through August, then prior (within two weeks) to the onset of construction activities, surveys for nesting migratory avian species would be conducted on the project site following U.S. Fish and Wildlife Service and/or California Department of Fish and Wildlife guidelines. If no active avian nests are identified on or within 200 feet of construction areas, no further mitigation would be necessary.

Alternatively, to avoid impacts, the agencies implementing the final Trash Amendments may begin construction after the previous breeding season for covered avian species and before the next breeding season begins. If a protected avian species was to establish an active nest after construction was initiated and outside of the typical breeding season (February – August), the project sponsor, would be required to establish a buffer of 200 feet or other measure that would result in equivalent mitigation between the construction activities and the nest site.

If active nest for protected avian species are found within the construction footprint or within the 200-foot buffer zone, construction would be required to be delayed within the construction footprint and buffer zone until the young have fledged or appropriate mitigation measures responding to the specific situation are developed in coordination with U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. These impacts are highly site specific, and assuming they are foreseeable, they would require a project-level analysis and mitigation plan.

Finally, to the extent feasible, responsible agencies should endeavor to avoid compliance measures that could result in significant barriers to the beneficial migration or movement of animals, and instead opt for such measures as enforcing litter ordinances in sensitive areas. No significant impact is anticipated after mitigation.

Trash Nets

Trash nets are installed within the storm drain systems either inline or at the end of pipe in urbanized areas where native habitat or special-status species usually are absent. As such, impacts to biological resources would likely not occur, including impacts to species diversity, impacts to special-status species, impacts to habitat, or impacts to wildlife migration. Trash nets used for the purposes of compliance with the final Trash Amendments would not be located within a stream channel, but rather in the storm drain itself and would not result in a foreseeable deterioration of existing fish habitat. Furthermore, because installation of trash nets requires minimal construction and ground disturbance and is accomplished within the existing pipeline, the installation of trash nets does not have the potential to cause a significant impact on biological resources. No mitigation is required since no impact is anticipated.

Gross Solids Removal Devices

Like vortex separation systems, Gross Solids Removal Devices are inline structural trash removal devices that are implemented in urbanized areas. As such, the project-level impacts on biological resources due to implementation of Gross Solids Removal Devices would be similar to the project-level impacts associated with vortex separation systems.

The proposed measures to lessen impacts from Gross Solids Removal Devices would be similar to the proposed measures for vortex separation systems. No potentially significant impact is anticipated after measures are applied.

Enforcement of Litter Laws

Enforcement of litter laws would involve no relative change to the baseline physical environment related to biological resources, either directly or indirectly and would have no impact on biological resources. Complying with existing statewide and local litter laws and ordinances would eliminate the substantial adverse environmental impacts from the litter, and the need for additional controls that could potentially generate their own nominal biological impacts. No mitigation is required since no impact is anticipated.

Increased Street Sweeping

Increased street sweeping and storm drain cleaning would involve no direct change to the physical environment related to biological objectives. Indirect impacts could include an increase in ambient noise levels, but this would not result in a significant impact to general wildlife species adapted to developed environments. No mitigation is required since no significant impact is anticipated.

Public Education

Public education would involve no change to the physical environment related to biological resources, either directly or indirectly and would have no impact on biological resources. Successful public education strategies would eliminate the substantial adverse environmental impacts from the litter, and the need for additional structural controls that generate their own nominal biological impacts. No mitigation is required since no impact is anticipated.

Ordinances

Similar to enforcement of litter laws and public education, ordinances are expected to have no impact or less-than-significant impact on biological conditions. Successful ordinances would eliminate the substantial adverse environmental impacts from the litter. No mitigation is required since no impact is anticipated.

6.3.4 Summary

Adverse impacts to biological resources are not expected to occur due to the nature of the areas where potential implementation measures used to comply with the final Trash Amendments would be located. Most areas are already extensively developed and the presence of significant biological resources is unlikely. In the event that specific compliance projects do encounter biological resources, measures have been identified to avoid or reduce potential impacts to less than significant levels, and these projects would need to have an independent environmental review done by the agency conducting the work.

6.4 Cultural Resources

6.4.1 Historic Resources

An historical resource includes resources listed in or eligible for listing in the California Register of Historical Resources. The California Register includes resources on the National Register of Historic Places, as well as California State Landmarks and Points of Historical Interest. Properties that meet the criteria for listing also include districts which reflect California's history and culture, or properties which represent an important period or work of an individual, or yield important historical information. Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified as local historical resources are also considered a historical resource (California Office of Historical Preservation 2006). Based on substantial evidence within the administrative record, any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may also be considered to be an historical resource (CEQA Guidelines 15064.5(a)).

6.4.2 Archeological Resources

An archeological site may be considered an historical resource if it is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military or cultural annals of California (PRC § 5020.1(j)) or if it meets the criteria for listing on the California Register (14 CCR § 4850).

If an archeological site is not an historical resource, but meets the definition of a "unique archeological resource" as defined in PRC Section 21083.2, then it should be treated in accordance with the provisions of that section.

6.4.3 Thresholds of Significance

A project would normally have a significant effect on cultural resources if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in section 15064.5 of the CEQA Guidelines.
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5 of the CEQA Guidelines.
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.
- Disturb any human remains, including those interred outside of formal cemeteries.

6.4.4 Impacts and Mitigation

This is a statewide level analysis of the potential impacts from the final Trash Amendments. The specific location of potential impacts would be determined during the implementation of the final Trash Amendments.

Catch Basin Inserts

Catch basin inserts fit directly into curbside catch basins in urbanized areas and require no construction or ground disturbance. There is therefore no potential to impact cultural

resources from this alternative means of compliance. No mitigation is required since no impact is anticipated.

Vortex Separation Systems

Vortex separation systems would be installed in currently urbanized areas where ground disturbance has previously occurred. Because these areas are already fully urbanized it is unlikely that their implementation would cause a substantial adverse change to historical or archeological resources, destroy paleontological resources, or disturb human remains. Depending, however, on the final location of facilities, potential impacts to cultural resources could occur. Paleontological resources can be found in areas containing fossil-bearing formations. Archaeological resources have been found within urbanized areas. Historic and architectural resources have also been found within urbanized areas. The site-specific presence or absence of these resources is unknown because the specific locations for vortex separation systems would be determined by responsible agencies at the project level. Installation of these systems could result in minor ground disturbances, which could impact cultural resources if they are sited in locations containing these resources and where disturbances have not previously occurred.

Upon determination of specific locations for vortex separation systems, responsible agencies should complete further investigation, including consultation with Native American tribes, to make an accurate assessment of the potential to affect historic, archaeological, or historic resources or to impact any human remains. If potential impacts are identified, measures to reduce impact could include project redesign, such as the relocation of facilities outside the boundaries of archeological or historical sites. According to the California Office of Historic Preservation, avoidance and preservation in place are the preferable forms of mitigation for archeological sites. When avoidance is infeasible, a data recovery plan should be prepared which adequately provides for recovering scientifically consequential information from the site. Studies and reports resulting from excavations must be deposited with the California Historical Resources Regional Information Center. No potentially significant impact is anticipated after these measures are taken.

Trash Nets

Trash nets are installed within the storm drain system either inline or at the end of pipe. Installation requires no ground disturbance which might impact cultural resources. No mitigation is required since no impact is anticipated.

Gross Solids Removal Devices

Like vortex separation systems, Gross Solids Removal Devices are inline structural trash removal devices that are implemented in urbanized areas. As such, the project-level impacts on cultural resources due to implementation of Gross Solids Removal Devices would be similar to the project-level impacts associated with vortex separation systems.

The proposed measures to lessen the impacts from Gross Solids Removal Devices would be similar to the proposed measures for vortex separation systems. No potentially significant impact is anticipated after these measures are applied.

Enforcement of Litter Laws

Enforcement of litter laws would involve no change to the physical environment related to cultural resources, either directly or indirectly and would have no impact on cultural resources. No mitigation is required since no impact is anticipated.

Increased Street Sweeping

Increased street sweeping and storm drain cleaning would occur in urbanized areas along public rights of way and would have no potential to impact cultural resources. No mitigation is required since no impact is anticipated.

Public Education

Public education would involve no change to the physical environment related to cultural resources, either directly or indirectly and would have no impact on cultural resources. No mitigation is required since no impact is anticipated.

Ordinances

Ordinances would involve no change to the physical environment related to cultural resources, either directly or indirectly, and would have no impact on cultural resources. No mitigation is required since no impact or less-than significant is anticipated.

6.4.5 Summary

While the potential for adverse impacts to cultural resources is low, there still exists a chance that cultural resources may occur at specific locations where implementation measures could be installed. Measures have been identified that could reduce potential impacts to less than significant levels and should be incorporated into site-specific projects carried out by the local agency.

6.5 Geology/Soils

6.5.1 Thresholds of Significance

A project would normally have a significant effect on the environment if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publication 42);
    - Strong seismic ground shaking;
    - Seismic-related ground failure, including liquefaction; and/or
    - Landslides.
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or

- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water.

6.5.2 Impacts and Mitigation

This is a statewide level analysis of the potential impacts from each compliance measure. The specific location of each compliance measure would be determined during the implementation of the final Trash Amendments.

Catch Basin Inserts

Catch basin inserts fit directly into curbside catch basins in urbanized areas and require no construction or ground disturbance. There is, therefore, no potential to impact geology or soils resources from this alternative means of compliance. No mitigation is required since no impact is anticipated.

Vortex Separation Systems

No impact due to exposure of people to, or property to, geologic hazards such as rupture of a known earthquake fault, strong seismic ground shaking, liquefaction, or landslides is expected from the implementation of vortex separation systems. Although areas of the state are subject to geologic hazards, compliance with standard design and construction specifications and the recommendations of geotechnical studies prepared at the project level would reduce the risk of damage from seismic-related hazards. Furthermore, it is not reasonably foreseeable that responsible agencies would choose to comply with the final Trash Amendments through structural means in areas where doing so would result in exposure of people or property to geologic hazards. Rather, it is foreseeable that localities would avoid such compliance measures in lieu of other compliance measures, such as enforcing litter ordinances in sensitive areas.

Wind or water erosion of soils may occur as a short-term impact during installation of vortex separation systems. Siltation or deposition within the vortex separation systems may occur, resulting in reduction in siltation or deposition in downstream areas. Reduction in siltation and deposition in downstream areas may be considered a positive impact as fine sediments may contain toxic pollutants. Little or no impact on erosion of affected watercourses is expected since the flow rate in the watercourses is not impacted by foreseeable methods of compliance.

Installation and operation of vortex separation systems would not cause or accelerate instability due to on- or off-site landslides, lateral spreading, subsidence, expansive soils, liquefaction, or collapse. Vortex separation systems would not be of the size or scale to result in unstable earth conditions, changes in geologic substructures, topography or ground surface relief features, or destruction, covering or modification of any unique geologic or physical features. Typical units occupy about 4-1/2 square feet of plan view area for each cubic foot per second that they treat. Implementation of the final Trash Amendments may result in minor surface soil excavation during installation of vortex separation systems and result in temporarily unstable soil but would not, due to small size, however, lead to landslides, lateral spreading, subsidence, expansive soils, liquefaction, or collapse. Most of the relevant areas are already urbanized, and

have already suffered soil compaction and hardscaping. Installation of vortex separation systems would occur within the existing storm drain systems.

Compliance with the final Trash Amendments would not require the use of septic tanks or alternative wastewater disposal systems. The presence or absence of soils incapable of adequately supporting their use is not relevant.

To the extent that vortex separation systems are installed in areas subject to geologic hazards, such as, ground shaking, liquefaction, liquefaction-induced hazards, or landslides, geotechnical studies prepared as part of the pre-design process would identify site-specific soil and subsurface conditions and specify design features would keep potential seismic related impacts within acceptable levels. Compliance with existing regulations, building codes, and standards specifications would also keep potential impacts within acceptable levels. The most appropriate measure for potential fault rupture hazards is avoidance (e.g., building setbacks), as most surface faulting is confined to a relatively narrow zone a few feet to tens of feet wide (California Geological Survey 2002).

To the extent that the installation of vortex separation systems causes an increase in erosion, typical established best management practices would be used during implementation to minimize offsite sediment runoff or deposition. Construction sites are required to retain sediments on site, either under a CGP permit or through the construction program of the applicable MS4 Phase I and II permit, which are already designed to minimize or eliminate erosion impacts on receiving water. No potentially significant impact is anticipated after these measures are taken.

To the extent that installation and operation of vortex separation systems could result in ground instability, potential impacts could be avoided or mitigated through mapping to site facilities away areas with unsuitable soils or steep slopes; design and installation in compliance with existing regulations; standard specifications and building codes; ground improvements such as soil compaction; and groundwater level monitoring to ensure stable conditions. No potentially significant impact is anticipated after these measures are taken.

To the extent that any soil is disturbed during installation of vortex separation systems, standard construction techniques, including but not limited to, shoring, piling, and soil stabilization can alleviate any potential impacts. Prior to earthwork, a geotechnical study would be conducted to evaluate geology and soil conditions. No potentially significant impact is anticipated after these measures are taken.

Trash Nets

Trash nets are installed within the storm drain system either inline or at the end of pipe. Installation requires no ground disturbance which might impact geology or soils resources. No mitigation is required since no impact is anticipated.

Gross Solids Removal Devices

Like vortex separation systems, Gross Solids Removal Devices are inline structural trash removal devices that are implemented in urbanized areas. As such, the project-level impacts on geology and soils resources due to implementation of Gross Solids

Removal Devices would be similar to the project-level impacts associated with vortex separation systems.

The proposed measures to lessen the impacts from Gross Solids Removal Devices would be similar to the proposed measures for vortex separation systems. No potentially significant impact is anticipated after these measures are taken.

Enforcement of Litter Laws

Enforcement of litter laws would involve no change to the physical environment related to geologic and soil resources either directly or indirectly and would have no impact on geology and soils resources. No mitigation is required since no impact is anticipated.

Increased Street Sweeping

Increased street sweeping and storm drain cleaning would occur in urbanized areas along public rights of way and would have no potential to impact geology and soils resources. No mitigation is required since no impact is anticipated.

Ordinances

Ordinances would involve no change to the physical environment related to geologic and soil resources, either directly or indirectly, and would have no impact on geologic and soil resources. No mitigation is required since no impact to less-than-significant impact is anticipated.

6.5.3 Summary

Installation and maintenance of some full capture devices and treatment controls are not expected to result in potentially significant environmental effects with regard to geology and soils, because municipalities would not reasonably site BMPs where they would risk such impacts. Further, in the unlikely occurrence of such an impact, mitigation measures, which can be applied to reduce and/or eliminate these impacts, are available as described above. These mitigation measures are within the responsibility and jurisdiction of the responsible agencies subject to the final Trash Amendments and can or should be adopted by them (CCR, title 14, § 15091(a)(2)). The State Water Board does not direct which compliance measures responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Although this analysis concludes that, based on substantial evidence on the record, on a statewide level analysis, all impacts would be less than significant with mitigation; it is foreseeable that these measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.6 Greenhouse Gas Emissions

General scientific consensus and increasing public awareness regarding global warming and climate change have placed new focus on the CEQA review process as a means to address the effects of greenhouse gas emissions from proposed projects on climate change.

Global warming refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. Global warming itself, however, represents only one aspect of climate change.

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

Increases in the concentrations of greenhouse gases in the Earth's atmosphere are thought to be the main cause of human-induced climate change. Greenhouse gases naturally trap heat by impeding the exit of infrared radiation that results when incoming ultraviolet solar radiation is absorbed by the Earth and re-radiated as infrared radiation. The principal greenhouse gases associated with anthropogenic emissions are carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, perfluorocarbon, nitrogen trifluoride, and hydrofluorocarbon (Health and Safety Code, § 38505, subdivision (g); CEQA Guidelines, § 15364.5). Water vapor is also an important greenhouse gas, in that it is responsible for trapping more heat than any of the other greenhouse gases. Water vapor, however, is not a greenhouse gas of concern with respect to anthropogenic activities and emissions. Each of the principal greenhouse gases associated with anthropogenic climate warming has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat trapping ability of each of these gases vary significantly from one another. Methane for instance is 23 times more potent than carbon dioxide, while sulfur hexaflouride is 22,200 times more potent than carbon dioxide (Intergovernmental Panel on Climate Change 2001). Conventionally, greenhouse gases have been reported as "carbon dioxide equivalents." Carbon dioxide equivalents take into account the relative potency of non-carbon dioxide greenhouse gases and convert their quantities to an equivalent amount of carbon dioxide so that all emissions can be reported as a single quantity.

The primary man-made processes that release these greenhouse gases include: (1) burning of fossil fuels for transportation, heating and electricity generation, which release primarily carbon dioxide; (2) agricultural practices, such as livestock grazing and crop residue decomposition and application of nitrogen fertilizers, that release methane and nitrous oxide; and (3) industrial processes that release smaller amounts of high global warming potential gases.

In 2005, Executive Order S-3-05 proclaimed that California is vulnerable to the effects of climate change. To combat those concerns, the Executive Order established a long-range greenhouse gas reduction target of 80percent below 1990 levels by 2050.

Subsequently, Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006, enacting § 38500-38599 of the Health and Safety Code) was signed. AB 32 requires California to reduce statewide greenhouse gas emissions to 1990 levels by 2020. AB 32 directed the California Air Resources Board to develop and implement regulations that reduce statewide greenhouse gas emissions.

The Climate Change Scoping Plan approved by the California Air Resources Board in December 2008, outlines the State's plan to achieve the greenhouse gas reductions required in AB 32.

Senate Bill (SB) 97, signed in August 2007 (Chapter 185, Statutes of 2007, enacting § 21083.05 and 21097 of the Public Resources Code), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the Office of Planning and Research to prepare, develop, and transmit guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions to the California Resources Agency. Office of Planning and Research developed a technical advisory suggesting relevant ways to address climate change in CEQA analyses. The technical advisory also lists potential mitigation measures, describes useful computer models, and points to other important resources. In addition, amendments to CEQA guidelines implementing SB 97 became effective on March 18, 2010.

6.6.1 Thresholds of Significance

A project would normally have a significant effect on the environment if it would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, amendment or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

6.6.2 Impacts and Mitigation

The operation of construction equipment for the installation of trash collection devices and the operation of new or increase in maintenance equipment and street sweepers would generate greenhouse gas emissions over baseline conditions. Consistent with the air quality analysis in Section 6.2, greenhouse gas emissions due to construction equipment would be short-term and limited to minor amounts of construction equipment and therefore would not significantly increase greenhouse gas levels in the environment. Greenhouse gas levels are not expected to rise significantly since mitigation measures are available to reduce greenhouse gas emissions due to construction, maintenance and street sweeping activities.

The California Department of Water Resources has developed a set of BMPs to reduce greenhouse gas emissions from California Department of Water Resources construction and maintenance activities (California Department of Water Resources 2012). These BMPs can be used and/or modified to fit specific situations by the implementing agencies to reduce greenhouse gas emissions from their activities:

BMP 1. Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high efficiency technologies are appropriate and feasible for the project or specific elements of the project.

BMP 2. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.

BMP 3. Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.

BMP 4. Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the site as possible.

BMP 5. Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize greenhouse gas emissions from cement production and curing while preserving all required performance characteristics.

BMP 6. Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by the State airborne toxics control measure [Title 13, § 2485 of the CCR]). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.

BMP 7. Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an Air Quality Control Plan prior to commencement of construction.

BMP 8. Implement tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction.

BMP 9. Develop a project specific ride share program to encourage carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.

BMP 10. Reduce electricity use in temporary construction offices by using high efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement

procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

BMP 11. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay[16] certified truck would be used to the maximum extent feasible.

The final Trash Amendments would not conflict with any plan, amendment, or regulation adopted for the purpose of reducing greenhouse gas emissions. Most greenhouse gas reduction plans include replacing government owned vehicles with low or zero-emission vehicles (Marin County 2006, City of Pasadena 2009, City of Citrus Heights 2011, California Department of Water Resources 2012). Implementation of greenhouse gas reduction plans would reduce greenhouse gas emissions from activities undertaken to comply with the final Trash Amendments.

In 2007, the California Air Resources Board adopted the Off-Road Diesel Vehicle Regulation (CCR, title 13, article 4.8, chapter 9) which, when fully implemented, would significantly reduce emissions from off-road, non-agricultural, diesel vehicles with engines greater than 25 horsepower—the types of vehicles typically used in construction activities. The regulation required owners to replace the engines in their vehicles, apply exhaust retrofits, or replace the vehicles with new vehicles equipped with cleaner engines. The regulation also limited vehicle idling, required sales disclosure requirements, and reporting and labeling requirements. The first compliance date for large fleets was March 1, 2010; however, amendments have been made several times to extend the deadlines. When the regulation is fully implemented, owners of fleets of construction, mining, and industrial vehicles would have to upgrade the performance of their vehicle fleets to comply with the regulation.

The California Air Resources Board Scoping Plan (California Air Resources Board 2008) proposes a comprehensive set of actions designed to achieve the 2020 greenhouse gas emissions reductions required under AB 32. While some of the regulations would not be implemented until later, when they do take effect, they would likely result in reduced emissions from construction and maintenance activities. Specific actions in the Scoping Plan that would impact construction and maintenance activities include: low carbon fuel standard (Measure Transportation-2), tire inflation regulation (Measure Transportation-4), the heavy-duty tractor truck regulation (Measure Transporation-7), and commercial recycling (Measure Recycling and Waste-3).

In addition, other efforts by the California Air Resources Board would reduce air pollutant emissions through 2020, including the Diesel Risk Reduction Plan (California Air Resources Board 2000) and the 2007 State Implementation Plan. Measures in these plans would result in the accelerated phase-in of cleaner technology for virtually

[16] The U.S EPA has developed the SmartWay truck and trailer certification program to set voluntary standards for trucks and trailers that exhibit the highest fuel efficiency and emissions reductions. These tractors and trailers are outfitted at point of sale or retrofitted with equipment that significantly reduces fuel use and emissions including idle reduction technologies, improved aerodynamics, automatic tire inflation systems, advanced lubricants, advanced powertrain technologies, and low rolling resistance tires.

all of California's diesel engine fleets including trucks, buses, construction equipment, and cargo handling equipment at ports.

6.6.3 Summary

With the incorporation of BMPs and compliance with any plans, amendments, or regulations adopted for the purpose of reducing greenhouse gas emissions, projects undertaken to comply with the final Trash Amendments would not have a significant impact on the environment due to greenhouse gas emissions.

6.7 Hazards and Hazardous Materials

Hazards and hazardous materials are located throughout the urbanized portion of the state either as naturally occurring or man-made hazards. Contaminated soil and groundwater from commercial and industrial sites such as gas stations, dry cleaners, and manufacturing facilities are located throughout the state. Aboveground and underground storage tanks contain vast quantities of hazardous substances. Thousands of these tanks have leaked or are leaking, discharging petroleum fuels, solvents, and other hazardous substances into the subsurface. These leaks as well as other discharges to the subsurface that result from inadequate handling, storage, and disposal practices can seep into the subsurface and pollute soils and groundwater.

Both naturally occurring hazards and anthropogenic contaminated soils and groundwater could be encountered during the installation of structural treatment alternatives for implementation of the reasonably foreseeable compliance methods for the final Trash Amendments.

Individual projects also may generate hazardous emissions, as the full capture system would, by design, trap substances which could become hazardous to the public or to maintenance workers if not handled in a timely manner and disposed of appropriately. To the extent improper disposal of, for instance, household hazardous wastes result in them being trapped in structural compliance measures, and potentially allowing a release of such chemicals, local residents could be exposed to those effects. To a large extent, those effects are already occurring in the watershed (but further downstream) and should be considered baseline impacts. Nevertheless, the locality that originated the risk would become newly potentially exposed instead of downstream receptors, those impacts could be potentially significant in those locales. Such impacts could be avoided or diminished by educating the local community of the effects of improper disposal of such wastes, enforcing litter ordinances, and timely cleaning out inserts and structural controls.

There is also the potential for public health hazards associated with the installation, operation, and maintenance of structural trash removal devices. Use of heavy equipment during installation and maintenance of structural trash removal devices may add to the potential for construction accidents. Unprotected sites may also result in accidental health hazards for people. In addition, certain structural devices may become a source of standing water. Any source of standing water can potentially become a source of vector production.

6.7.1 Thresholds of Significance

A project would normally have a significant effect on the environment if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment.
- Reasonably be anticipated to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- The project is located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area.
- For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures to the risk of loss, injury or death involving wild land fires, including where wild lands are adjacent to urbanized areas or where residences are intermixed with wild lands.

6.7.2 Impacts and Mitigation

Catch Basin Inserts

Catch basin inserts fit directly into curbside catch basins in urbanized areas and require no construction or ground disturbance. There is, therefore, no potential to encounter contaminated soils or groundwater or other hazards from this alternative means of compliance. Since no construction is required, the use of hazardous materials or potential for construction accidents is unlikely during installation. Catch basin cleaning and maintenance, however, could pose risks to maintenance workers.

To the extent that catch basin cleaning and maintenance could pose risks to maintenance workers, measures to avoid these risks include requiring workers to obtain hazardous materials maintenance, record keeping, and disposal activities training, California Occupational Health and Safety Administration -required Health and Safety Training, and California Occupational Health and Safety Administration Confined Space Entry training.

Vortex Separation Systems

It is reasonably foreseeable that hazards or hazardous materials could be encountered during the installation of vortex separation systems. Contamination could exist depending on the current and historical land uses of the area. Depending on their location, vortex separation systems could be proposed in areas of existing oil fields and/or methane zones or in areas with contaminated soils or groundwater. The use of hazardous materials (e.g., paint, oil, gasoline) and potential for accidents is also likely during installation.

Trash that is trapped by vortex separation systems could become hazardous to the public or to maintenance workers who collect and transport the trash if it is not handled in a timely manner and disposed of appropriately.

Installation of vortex separation systems could result in the temporary interference of emergency response or evacuation plans if construction equipment, road closures, or traffic interfered with emergency vehicles traveling through the installation area.

As vortex separation systems would be located in urbanized areas, it is not reasonably foreseeable that their installation would expose people to wildland fires. Furthermore, these are structural trash removal devices that would not serve as residences or places of employment. They would not result in a safety hazard for people residing or working within two miles of public airport or public use airport.

To the extent that installation of vortex separation systems could involve work with or near hazards or hazardous materials, potential risks of exposure can be alleviated with proper handling and storage procedures. The health and safety plan prepared for any project should address potential effects from cross contamination and worker exposure to contaminated soils and water and should include a plan for temporary storage, transportation and disposal of contaminated soils and water. Compliance with the requirements of California Occupational Health and Safety Administration and local safety regulations during installation, operation, and maintenance of these systems would prevent any worksite accidents or accidents involving the release of hazardous materials into the environment, which could harm the public, nearby residents and sensitive receptors such as schools. Systems can be redesigned and sites can be properly protected with fencing and signs to prevent accidental health hazards.

To the extent that trash trapped by vortex separation systems could become hazardous, impacts to maintenance workers and the public could be avoided or alleviated by educating the local community of the effects of improper disposal of such wastes, enforcing litter ordinances, and timely cleaning out inserts and structural controls.

To the extent that installation of vortex separation systems could interfere with emergency response or evacuation plans, traffic control plans should be used to manage traffic through installation zones.

To the extent that vortex separation systems become a source of standing water and vector production, design at the project-level can help reduce vector production from standing water. Netting can be installed over devices to further mitigate vector production. Vector control agencies may also be employed as another source of mitigation. Systems that are prone to standing water can be selectively installed away from high-density areas and away

from residential housing and/or by requiring oversight and treatment of those systems by vector control agencies.

Trash Nets

Trash nets are installed within the storm drain system either inline or at the end of pipe. There is therefore no potential to encounter contaminated soils or groundwater or other hazards from this alternative means of compliance. Since no construction is required, the use of hazardous materials or potential for construction accidents is unlikely during installation. No mitigation is required since no impact is anticipated.

To the extent that trash net cleaning and maintenance could pose risks to maintenance workers, measures to avoid these risks include requiring workers to obtain hazardous materials maintenance, record keeping, and disposal activities training, California Occupational Health and Safety Administration -required Health and Safety Training, and California Occupational Health and Safety Administration Confined Space Entry training.

Gross Solids Removal Devices

Like vortex separation systems, Gross Solids Removal Devices are inline structural trash removal devices that are implemented in urbanized areas. As such, the project-level impacts related to hazards and hazardous materials due to implementation of Gross Solids Removal Devices would be similar to the project-level impacts associated with vortex separation systems.

The proposed measures to decrease impacts from Gross Solids Removal Devices would be similar to the proposed measures for vortex separation systems.

Enforcement of Litter Laws

Enforcement of litter laws would involve no change to the physical environment related to hazards and hazardous materials, either directly or indirectly and would have no impact related to hazards, hazardous materials, or public health. No mitigation is required since no impact is anticipated.

Increased Street Sweeping

Increased street sweeping and storm drain cleaning would occur in urbanized areas along public rights of way and would have no potential impact related to hazards, hazardous materials, or public health. No mitigation is required since no impact is anticipated.

Public Education

Public education would involve no change to the physical environment related to hazards and hazardous materials, either directly or indirectly and would have no impact related to hazards, hazardous materials, or public health. No mitigation is required since no impact is anticipated.

Ordinances

Ordinances would involve no change to the physical environment related to hazards and hazardous materials, either directly or indirectly, and would have no impact on hazards

and hazardous materials, or public health. No mitigation is required since no impact to less-than-significant impact is anticipated.

6.7.3 Summary

Installation and maintenance of some treatment trash-reduction BMPs could result in potentially significant environmental effects with regard to hazards, hazardous materials, and public health. Measures can be applied, however, to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the responsible agencies subject to the final Trash Amendments and can or should be adopted by them (CCR, title 14, § 15091(a)(2)). The State Water Board does not direct which compliance measures responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduce or avoid potential environmental impacts. Although this analysis concludes that, based on substantial evidence on the record, on a statewide level analysis, all impacts would be less than significant with mitigation; it is foreseeable that these measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.8 Hydrology/Water Quality

6.8.1 Thresholds of Significance

The proposed project would result in a significant impact on hydrology or water quality if it would:

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate of surface runoff in a manner that causes flooding on- or off-site, creating or contributing to an existing local or regional flooding problem;
- Create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;

- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures that would impede or redirect floodflows; or
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam;
- Contribute to inundation by seiche, tsunami, or mudflow.

6.8.2 Impacts and Mitigation

The final Trash Amendments would not violate any water quality standards or waste discharge requirements; in fact, they are designed to improve water quality. Several reasonably foreseeable methods of compliance may have the potential to cause localized flooding and are described below. It is not reasonably foreseeable that increased street sweeping, enforcement of litter laws, or public education would negatively impact hydrology or water quality.

The installation, operation, and maintenance of full capture systems do not entail the use of groundwater resources, nor would it interfere with groundwater recharge. Multi-purpose projects may include a groundwater recharge component which would be beneficial for groundwater resources. No impacts to groundwater resources are anticipated.

The installation, operation, and maintenance of full capture systems would not alter the drainage pattern of the target areas nor increase the amount of runoff within those areas. Full capture systems are placed at the inlet (catch basin inserts) or outlet (trash nets) of the storm drain system, or inline (vortex separation systems) and do not require any type of re-contouring of the surrounding area nor alteration of any stream courses. The main concern is localized flooding caused by clogging of the trash capture devices, which is discussed below. No other impacts are anticipated.

Compliance with the final Trash Amendments would not place housing or other structures within a 100-year flood hazard area, nor would it expose people and structures to a significant risk of loss, injury, or death by flooding, seiche, tsunami, or mudflow. No impacts are anticipated.

Catch Basin Inserts

Catch basin inserts are manufactured frames that typically incorporate filters or fabric and placed in a curb opening or drop inlet to remove trash, sediment, or debris. They can also be perforated metal screens placed horizontally or vertically within a catch basin. These devices have less hydraulic effect than the vortex separation systems or the Gross Solids Removal Devices, however, flooding is still a potential hazard if the filters or screens became blocked by trash and debris and prevents the discharge of storm water into the drain causing localized flooding. This would be of particular concern in areas susceptible to high leaf-litter rates. This potential impact can be diminished through the use of inserts that are designed with automatic release

mechanisms or retractable screens that allow flow-through during wet-weather and by performing regular maintenance to prevent the buildup of trash and debris. Therefore, the exposure of people and property to flooding hazards after mitigation is considered less than significant.

Vortex Separation Systems

Vortex separation systems are devices designed to allow the incoming flow of urban runoff or storm water to pass through the device while capturing trash and other debris within the unit. These types of devices may result in a potentially significant impact due to flooding if the screens became blocked by trash and debris and prevent the discharge of storm water or if the vortex separation systems are not properly designed and constructed to allow for bypass of storm water during storm events that exceed the design capacity. This potential impact can be alleviated through the design of the vortex separation systems with overflow/bypass structures and by performing regular maintenance to prevent the build-up of trash and debris. Therefore, the exposure of people and property to flooding hazards after mitigation is considered less than significant.

The vortex separation systems would not alter the direction or slope of the stream channels in the lower watershed, therefore, no change in the direction of surface water flow would occur.

Trash Nets

Trash nets are devices that use the natural energy of the flow to trap trash, floatables and solids in disposable mesh nets. Trash nets can be installed at or below grade within existing storm water conveyance structures or retrofitted to an existing outfall structure with only minor modifications. These devices have less hydraulic effect than the vortex separation systems or the Gross Solids Removal Devices; however, flooding is still a potential hazard if the nets became blocked by trash and debris. This potential impact can be alleviated through sizing and designing trash nets to allow for bypass when storm events exceed the design capacity and by performing regular maintenance to prevent the buildup of trash and debris. Therefore, the exposure of people and property to flooding hazards after mitigation is considered less than significant.

Gross Solids Removal Devices

Gross Solids Removal Devices are devices designed to allow the incoming flow of urban runoff or storm water to pass through the device while capturing trash and other debris within the unit. These types of devices may result in a potentially significant impact due to flooding hazards if the screens became blocked by trash and debris and prevent the discharge of storm water or if the Gross Solids Removal Devices are not properly designed and constructed to allow for bypass of storm water during storm events that exceed the design capacity. This potential impact can be diminished through the design of the Gross Solids Removal Devices with overflow/bypass structures and by performing regular maintenance to prevent the buildup of trash and debris. Therefore, the exposure of people and property to flooding hazards after mitigation is considered less than significant.

The Gross Solids Removal Devices units would not alter the direction or slope of the stream channels in the lower watershed, therefore, no change in the direction of surface water flows would occur.

6.8.3 Summary

Installation and maintenance of some treatment trash-reduction BMPs could result in potentially significant environmental effects with regard to hydrology. Measures, however, can be applied to reduce and/or eliminate these impacts, as described above. These measures are within the responsibility and jurisdiction of the responsible agencies subject to the final Trash Amendments and can or should be adopted by them (CCR, title 14, § 15091(a)(2)). The State Water Board does not direct which compliance measures responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduced or avoid potential environmental impacts. It is foreseeable that these measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. In the event that a specific measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.9 Land Use/Planning

6.9.1 Thresholds of Significance

The proposed project would have a significant environmental impact on land use if it would:

- Physically divide an established community.
- Conflict with any applicable land use plan, policy, or regulation to an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

6.9.2 Impacts and Mitigation

Due to where they are currently located or would be planned for implementation, it is not expected that the final Trash Amendments and the reasonably foreseeable methods of compliance would either physically divide an established community or conflict with any applicable habitat conservation plan or natural community conservation plan.

Catch Basin Inserts

Since, catch basin inserts can be installed at or below grade within existing storm water catch basins with minor modifications to the storm water conveyance structure no adverse impacts are expected on present or planned land use.

Vortex Separation Systems

Vortex separation systems (i.e., Continuous Deflective Separation units) are installed below grade and are appropriate for highly urbanized areas where space is limited. In general, a vortex separation system occupies about 4-1/2 square feet of plan view area for each treated cubic feet per second of runoff, with the bulk of the plan view area being well below grade. Maintenance of the Continuous Deflective Separation unit involves the removal of the solids either by using a vactor truck, a removable basket or a clamshell excavator depending on the design and size of the unit.

The installation of vortex separation systems may require modification of storm water conveyance structures; however, these units would generally be sited below grade and within existing storm drain infrastructure. The installation of vortex separation systems is not expected to result in substantial alterations or adverse impacts to a present or planned land use. To the extent that there could be land use impacts at a specific location, these potential land use conflicts are best addressed at the project level. Since the State Water Board cannot specify the manner of compliance with the final Trash Amendments, the State Water Board cannot specify the exact location of trash removal devices. The various municipalities that might install these devices would need to identify local land use plans as part of a project-level analysis to ensure that projects comply with the final Trash Amendments as well as permitted land-use regulations and are consistent with land use plans, general plans, specific plans, conditional uses, or subdivisions.

Trash Nets

Since, trash nets can be installed at or below grade within existing storm water conveyance structures or retrofitted to an existing outfall structure with only minor modifications no adverse impacts are expected on present or planned land use.

Gross Solid Removal Devices

Gross Solids Removal Devices were developed by Caltrans to be retrofitted below grade into existing highway drainage systems or installed in future highway drainage systems. These devices are appropriate for highly urbanized areas where space is limited. The Gross Solids Removal Devices s can be designed to accommodate vehicular loading. Maintenance of the devices involves the removal of the solids either by using a vactor truck or other equipment.

The installation of Gross Solids Removal Devices may require modification of storm water conveyance structures; however, these units would generally be sited below grade and within existing storm drain infrastructure. The installation of Gross Solids Removal Devices is not expected to result in substantial alterations or adverse impacts to present or planned land use. To the extent that there could be land use impacts at a specific location, these potential land use conflicts are best addressed at the project level. Since the State Water Board cannot specify the manner of compliance with the final Trash Amendments, the State Water Board cannot specify the exact location of trash removal devices. The various municipalities that might install these devices would need to identify local land use plans as part of a project-level analysis to ensure that projects comply with permitted land-use regulations and are consistent with land use

plans, general plans, specific plans, conditional uses, or subdivisions.

Institutional Controls

It is not reasonably foreseeable that increased street sweeping, enforcement of litter laws, ordinances, or public education would alter present or planned land use.

6.9.3 Summary

Construction of vortex separation systems and Gross Solids Removal Devices would not result in permanent features such as aboveground infrastructure that would disrupt, divide, or isolate existing communities or land uses.

6.10 Noise and Vibration

6.10.1 Background

Noise

California Health and Safety Code section 46022 defines noise as “excessive undesirable sound, including that produced by persons, pets and livestock, industrial equipment, construction, motor vehicles, boats, aircraft, home appliances, electric motors, combustion engines, and any other noise-producing objects”. The degree to which noise can affect the human environment range from levels that interfere with speech and sleep (annoyance and nuisance) to levels that cause adverse health effects (hearing loss and psychological effects). Human response to noise is subjective and can vary greatly from person to person. Factors that influence individual response include the intensity, frequency, and pattern of noise; the amount of background noise present before the intruding noise; and the nature of work or human activity that is exposed to the noise source.

Sound results from small and rapid changes in atmospheric pressure. These cyclical changes in pressure propagate through the atmosphere and are often referred to as sound waves. The greater the amount of variation in atmospheric pressure (amplitude) leads to a greater loudness (sound level). Sound levels are most often measured on a logarithmic scale of decibels (dB). The decibel scale compresses the audible acoustic pressure levels which can vary from 20 micropascals (3 Pa), the threshold of hearing and reference pressure (0 dB), to 20 million 3 Pa, the threshold of pain (120 dB) (Air & Noise Compliance 2006).

Table 10 provides examples of noise levels from common sounds.

Table 10. Common Sound Levels.

Outdoor Sound Levels	Sound Pressure (μPa)	Sound Level (dBA)	Indoor Sound Level
	6,324,555	110	Rock Band at 5m
Jet Over-flight at 300m		105	
	2,000,000	100	Inside NY Subway Train
Gas Lawn Mower at 1m		95	
	632,456	90	Food Blender at 1m
Diesel Truck at 15 m		85	
Noisy Urban Area (daytime)	200,000	80	Garbage Disposal at 1m
		75	Shouting at 1m
Gas Lawn Mower at 30m	63,246	70	Vacuum Cleaner at 3m
Suburban Commercial Area		65	Normal Speech at 1m
	20,000	60	
Quiet Urban Area (daytime)		55	Quiet Conversation at 1m
	6,325	50	Dishwasher in Adjacent Room
Quiet Urban Area (nighttime)		45	
	2,000	40	Empty Theater of Library
Quiet Suburb (nighttime)		35	
	632	30	Quiet Bedroom at Night
Quiet Rural Area (nighttime)		25	Empty Concert Hall
Rustling Leaves	200	20	
		15	Broadcast and Recording Studios
	63	10	
		5	
Reference Pressure Level	20	0	Threshold of Hearing

Source: Air & Noise Compliance 2006.

To determine ambient (existing) noise levels, noise measurements are usually taken using various noise descriptors. The following are brief definitions of typical noise measurements:

Community Noise Equivalent Level

The community noise equivalent level is an average sound level during a 24-hour day. The community noise equivalent level noise measurement scale accounts for noise source, distance, single-event duration, single-event occurrence, frequency, and time of day. Humans react to sound between 7:00 p.m. and 10:00 p.m. as if the sound were actually 5 decibels higher than if it occurred from 7:00 a.m. to 7:00 p.m. From 10:00 p.m. to 7:00 a.m., humans perceive sound as if it were 10 dBA higher than if it occurred from 7:00 a.m. to 7:00 p.m. due to the lower background noise level. Hence, the community noise equivalent level noise measurement scale is obtained by adding an additional 5 decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m., and 10 dBA to sound levels in the night after 10:00 p.m. and before 7:00 a.m. Because community noise equivalent level accounts for human sensitivity to sound, the community noise equivalent level 24-hour figure is always a higher number than the actual 24-hour average.

Equivalent Noise Level

Equivalent noise level is the average noise level on an energy basis for any specific time period. The equivalent noise level for 1 hour is the energy average noise level during the hour. The average noise level is based on the energy content (acoustic energy) of the sound. Equivalent noise level can be thought of as the level of a continuous noise that has the same energy content as the fluctuating noise level. The equivalent noise level is expressed in units of dBA.

Sound Exposure Level

Sound exposure level is a measure of the cumulative sound energy of a single event. This means that louder events have greater sound exposure level than quieter events. Additionally, events that last longer have greater sound exposure level than shorter events.

Audible Noise Changes

Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 decibels. A change of at least 5 decibels would be noticeable and likely would evoke a community reaction. A 10-decibel increase is subjectively heard as a doubling in loudness and would most certainly cause a community response. Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a stationary noise source, or “point source,” would decrease by approximately 6 decibels over hard surfaces and 9 decibels over soft surfaces for each doubling of the distance. For example, if a noise source produces a noise level of 89 dBA at a reference distance of 50 feet, then the noise level would be 83 dBA at a distance of 100 feet from the noise source, 77 dBA at a distance of 200 feet, and so on over hard surfaces. Generally, noise is most audible when traveling along direct line-of-sight. Barriers, such as walls, berms, or buildings that break the line-of-sight between the source and the receiver greatly reduce noise

levels from the source because sound can reach the receiver only by bending over the top of the barrier (diffraction). Sound barriers can reduce sound levels by up to 20 dBA. If a barrier, however, is not high or long enough to break the line-of-sight from the source to the receiver, its effectiveness is greatly reduced.

Sensitive Receptors

Land uses that are considered sensitive to noise impacts are referred to as "sensitive receptors." Noise-sensitive receptors consist of, but are not limited to, schools, religious institutions, residences, libraries, parks, hospitals, and other care facilities.

Vibration

In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving and operating heavy earth-moving equipment. The effects of ground-borne vibration include feelable movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. A vibration level that causes annoyance would be well below the damage threshold for normal buildings.

The background vibration velocity level in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans which is around 65 VdB. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB to 100 VdB. Background vibration is usually well below the threshold of human perception and is of concern only when the vibration affects very sensitive manufacturing or research equipment. Electron microscopes and high-resolution lithography equipment are typical of equipment that is highly sensitive to vibration.

6.10.2 General Setting

Noise

Existing noise environments will vary considerably based on the diversity of land uses and densities. In most urban environments automobile, truck, and bus traffic is the major source of noise. Traffic generally produces background sound levels that remain fairly constant with time. Individual high-noise-level events that can occur from time to time include honking horns, sirens, operation of construction equipment, and travel of noisy vehicles like trucks or buses. Air and rail traffic and commercial and industrial activities are also major sources of noise in some areas. In addition, air conditioning and ventilating systems contribute to the noise levels in residential areas, particularly during the summer months.

Regulatory Framework

The no longer extant California Office of Noise Control, California Department of Health Services developed guidelines showing a range of noise standards for various land use categories in the *1976 Noise Element Guidelines*. These guidelines are now found in Appendix C of the State of California General Plan Guidelines (Governor's Office of Planning and Research 2003). Cities within the state have generally incorporated this compatibility matrix into their General Plan noise elements. These guidelines are meant to maintain acceptable noise levels in a community setting based on the type of land use. Noise compatibility by different types of land uses is a range from "Normally Acceptable" to "Clearly Unacceptable" levels. The guidelines are used by cities within the state to help determine the appropriate land uses that could be located within an existing or anticipated ambient noise level.

Some of the reasonably foreseeable methods of compliance have the potential to affect noise levels. Noise within counties and cities are regulated by noise ordinances, which are found in the municipal code of the jurisdiction These noise ordinances limit intrusive noise and establish sound measurements and criteria, minimum ambient noise levels for different land use zoning classifications, sound emission levels for specific uses, hours of operation for certain activities (such as construction and trash collection), standards for determining noise deemed a disturbance of the peace, and legal remedies for violations.

Vibration

Major sources of groundborne vibration would typically include trucks and buses operating on surface streets, and freight and passenger train operations. The most significant sources of construction-induced groundborne vibrations are pile driving and blasting – neither of which would be involved in the installation or maintenance of structural implementation alternatives. Currently, the state of California has no vibration regulations or guidelines.

6.10.3 Thresholds of Significance

A project would normally have a significant effect on the environment if it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

- Exposure of persons residing or working in the project area, for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, to excessive noise levels.

- Exposure of persons residing or working in the project area to excessive noise levels, for a project within the vicinity of a private airstrip.

6.10.4 Impacts and Mitigation

Implementation of the final Trash Amendments would not cause a permanent increase in ambient noise levels. All construction and maintenance activities would be intermittent. The remaining thresholds may be exceeded for limited durations depending on the location and ambient noise levels at sites selected for installation of trash removal devices.

Increases in noise levels during installation and/or maintenance of some of the implementation alternatives would vary depending on the existing ambient levels at each site. Once a site has been selected, project-level analysis to determine noise impacts would involve: (i) identifying sensitive receptors within a quarter-mile vicinity of the site, (ii) characterizing existing ambient noise levels at these sensitive receptors, (iii) determining noise levels of any and all installation and maintenance equipment, and (iv) adjusting values for distance between noise source and sensitive receptor. In addition, the potential for increased noise levels due to installation of trash reduction structural controls is limited and short-term. Given the size of the individual projects and the fact that installation would occur in small discrete locations, noise impacts during installation would not foreseeably be greater, and would likely be less onerous than, other types of typical construction activities in urbanized areas, such as ordinary road and infrastructure maintenance activities, building activities, etc. These short-term noise impacts can be mitigated by implementing commonly-used noise abatement procedures, standard construction techniques such as sound barriers, mufflers and employing restricted hours of operation. Applicable and appropriate mitigation measures could be evaluated when specific projects are determined, depending upon proximity of construction activities to receptors.

Overall, noise levels for installation of several of the reasonably foreseeable methods of compliance are governed primarily by the noisiest pieces of equipment. For most construction equipment the engine is the dominant noise source. Typical maximum noise emission levels (Lmax) are summarized, based on construction equipment operating at full power at a reference distance of 50 feet, and an estimated equipment usage factor based on experience with other similar installation projects. The usage factor is a fraction that accounts for the total time during an eight-hour day in which a piece of installation equipment is producing noise under full power. Although the noise levels in Table 11 represent typical values, there can be wide fluctuations in the noise emissions of similar equipment based on two important factors: (1) the operating condition of the equipment (e.g., age, presence of mufflers and engine cowlings); and (2) the technique used by the equipment operator (aggressive vs. conservative).

Table 11. Typical Installation Equipment Noise Emission Levels.

Equipment	Maximum Noise Level, (dBA) 50 feet from source	Equipment Usage Factor	Total 8-hr Leq exposure (dBA) at various distances	
			50ft	100ft
Foundation Installation			83	77
Concrete Truck	82	0.25	76	70
Front Loader	80	0.3	75	69
Dump Truck	71	0.25	65	59
Generator to vibrate concrete	82	0.15	74	68
Vibratory Hammer	86	0.25	80	74
Equipment Installation			83	77
Flatbed Truck	78	0.15	70	64
Forklift	80	0.27	74	69
Large Crane	85	0.5	82	76

Source: Los Angeles Water Board 2007f.

Vortex Separation Systems

Installation of vortex separation systems would potentially involve removal of asphalt and concrete from streets and sidewalks, excavation and shoring, installation of reinforced concrete pipe, installation of the unit, and repaving of the streets and sidewalks. It is anticipated that installation activities would occur in limited, discrete, and discontinuous areas over a short duration. No major long term or geographically extensive construction activities are anticipated. It is anticipated that excavation, for the purpose of installation, and repaving would result in the greatest increase in noise levels during the period of installation. Table 11 provides noise levels generated by different machinery that may be used in installing the vortex separation systems. The manufacturer of the Continuous Deflective Separation unit (described in detail in Section 5) recommends that the unit receive maintenance 2 to 4 times a year depending on amount and frequency of precipitation. Maintenance involves cleaning using vacuum trucks, which would increase ambient noise levels. The increase in noise levels would be dependent on the proximity of sensitive receptors to the site. Maintenance is also expected to generate 2-4 vehicle trips per year, which is not expected to increase ambient noise levels noticeably.

Contractors and equipment manufacturers have been addressing noise problems for many years, and through design improvements, technological advances, and a better understanding of how to minimize exposures to noise, noise effects can be minimized. An operations plan for the specific construction and/or maintenance activities could be

developed to address the variety of available measures to limit the impacts from noise to adjacent homes and businesses. To minimize noise and vibration impacts at nearby sensitive sites, installation activities should be conducted during daytime hours to the extent feasible. There are a number of measures that can be taken to reduce intrusion without placing unreasonable constraints on the installation process or substantially increasing costs. These include noise and vibration monitoring to ensure that contractors take all reasonable steps to minimize impacts when near sensitive areas; noise testing and inspections of equipment to ensure that all equipment on the site is in good condition and effectively muffled; and an active community liaison program. A community liaison program should keep residents informed about installation plans so they can plan around noise or vibration impacts; it should also provide a conduit for residents to express any concerns or complaints.

The following measures would minimize noise and vibration disturbances at sensitive areas during installation:

- Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All installation equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
- Perform all installation in a manner to minimize noise and vibration. Use installation methods or equipment that will provide the lowest level of noise and ground vibration impact near residences and consider alternative methods that are also suitable for the soil condition. The contractor should select installation processes and techniques that create the lowest noise levels.
- Perform noise and vibration monitoring to demonstrate compliance with the noise limits. Independent monitoring should be performed to check compliance in particularly sensitive areas. Require contractors to modify and/or reschedule their installation activities if monitoring determines that maximum limits are exceeded at residential land uses.
- Conduct truck loading, unloading and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent. Ingress and egress to and from the staging area should be on collector streets or higher street designations (preferred).
- Turn off idling equipment.
- Temporary noise barriers shall be used and relocated, as practicable, to protect sensitive receptors against excessive noise from installation activities. Consider mitigation measures such as partial enclosures around continuously operating equipment or temporary barriers along installation boundaries.

- The installation contractor should be required by contract specification to comply with all local noise and vibration ordinances and obtain all necessary permits and variances.

These and other measures can be classified into three distinct approaches as outlined in Table 12.

Table 12. Noise Abatement Measures**.**

Type of Control	Description
Source Control	*Time Constraints* – Prohibiting work during sensitive nighttime hours *Scheduling* – performing noisy work during less sensitive time periods *Equipment Restrictions* – restricting the type of equipment used *Substitute Methods* –using quieter equipment when possible *Exhaust Mufflers* – ensuring equipment have quality mufflers installed *Lubrication and Maintenance* – well maintained equipment is quieter *Reduced Power Operation* – use only necessary power and size *Limit equipment on-site* – only have necessary equipment onsite *Noise Compliance Monitoring* – technician on-site to ensure compliance
Path Control	*Noise barriers* – semi-portable or portable concrete or wooden barriers *Noise curtains* – flexible intervening curtain systems hung from supports Increased distance – perform noisy activities further away from receptors
Receptor Control	*Community participation* –open dialog to involve affected parties *Noise complaint process* – ability to log and respond to noise complaints

Source: Adapted from Thalheimer 2000.

Increases in ambient noise levels are expected to be less than significant once measures have been properly applied to reduce potential impacts.

Catch Basin Inserts

Installation of catch basin inserts should not involve any construction activity or the use of major equipment therefore no significant increase in ambient noise levels is anticipated.

Catch basins need to be cleaned regularly. Frequency of cleaning depends on the amount of trash flowing into the insert. Increased street sweeping can decrease the amount of trash, caught by catch basin inserts. Catch basins are cleaned out on varying schedules at a minimum frequency of once a year as a requirement of the MS4 Phase I or Phase II permit. This implementation measure does not require an increase in cleaning frequency above what is already required for existing permits, therefore no significant increase in noise levels over baseline are anticipated. It is not anticipated that ambient noise levels will be increased by the use of catch basin inserts. To the contrary it is expected that since the design of many of these inserts act to prevent trash from entering the catch basins, the frequency of cleanouts of these basins may be reduced as a result of reduced trash loading. In the unlikely event, however, that there should be an increase in noise levels generated by current clean-out practices, the

source, path and receptor control measures presented in Table 12 should be applied. Therefore, increases in ambient noise levels are expected to be less than significant once measures have been properly applied to reduce potential impacts.

Trash Nets

Installation of trash nets should not involve any construction activity or the use of major equipment therefore no significant increase in ambient noise levels is anticipated. Maintenance of the trash nets involves replacing the nets when full or after each major storm event as necessary. Frequency of maintenance would depend on the trash volumes generated in the catchment area of the net. Equipment used to detach and haul away the trash nets may result in temporary increases in ambient noise levels. In the unlikely event that there should be an increase in noise levels generated by the equipment used to detach and haul away nets, the source, path and receptor control measures presented in Table 12 should be applied. Therefore, increases in ambient noise levels are expected to be less than significant once measures have been properly applied to reduce potential impacts.

Gross Solid Removal Devices

Gross Solids Removal Devices are the full capture systems being used by Caltrans for highway drainage systems and as such would be located adjacent to freeways and major highways under Caltrans' jurisdiction. Installation of Gross Solids Removal Devices would involve activities similar to those for vortex separation system installation. Clean-outs of Gross Solids Removal Devices are expected to occur only once per year. Equipment and/or machinery employed in this exercise may not significantly increase ambient noise levels as the potential sites for these units would already be subject to high traffic noise levels. In addition, increase in noise levels due to clean-outs would be of low frequency and short duration. Therefore, the installation of Gross Solids Removal Device is not expected to cause any potentially significant impacts.

Increased Street Sweeping

Increased street sweeping would involve an increase in current street sweeping frequencies in order to reduce the amount of trash accumulating on streets between cleanings. Any increases in street sweeping frequencies would be geared towards high trash generation areas such as those with commercial and industrial land-uses. The increase in ambient noise levels is expected to be limited in duration. Therefore, any increase in ambient noise levels over baseline conditions are expected to be less than significant.

Other Institutional Controls

Litter enforcement, ordinances, and public education are not expected to create any increases in ambient noise levels, and no mitigation would be required.

6.10.6 Summary

Installation and maintenance of some structural trash-reduction BMPs could result in potentially significant environmental effects with regard to noise. Measures, however, can be applied to reduce and/or eliminate these impacts are available as described

above. These mitigation measures are within the responsibility and jurisdiction of the responsible agencies subject to the final Trash Amendments and can or should be adopted by them. The State Water Board does not direct which compliance measures responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduced or avoid potential environmental impacts. It is foreseeable that these measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific mitigation measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.11 Public Services

6.11.1 Thresholds of Significance

A project would normally have a significant effect on the environment if it would result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: (a) Fire protection, (b) Police protection, (c) School, (d) Parks, and (e) Other public facilities. (See Environmental Checklist in Appendix B for discussion).

6.11.2 Impacts and Mitigation

While, implementation of the final Trash Amendments may require some activities at or in the vicinity of public service facilities, the final Trash Amendments would not require the establishment of new or altered government facilities to provide the services outlined above. However, response times for fire and police protection may be temporarily affect during installation of trash collection devices and are discussed below.

Catch Basin Inserts

Although the delays due to installations would be more localized and of shorter duration than installation of vortex separation systems, since the installation of catch basin inserts is not as complicated as the other structural BMPs, more maintenance may be required depending on the design of these units, since the capacity for trash collection may be limited to the size of the unit. However, the environmental impacts, and mitigation for those impacts, associated with the installation, maintenance and monitoring of catch basin inserts are expected to be similar to those for the vortex separation systems. Therefore, the potential delays in response times for fire and police vehicles due to installation of catch basin inserts after mitigation are less then significant.

Vortex Separation Systems

There is potential for temporary delays in response times of fire and police vehicles due to road closure/traffic congestion during installation of the vortex separation systems. To mitigate potential delays the responsible agencies could notify local emergency and police service providers of construction activities and road closures, if any, and coordinate with the local fire and police providers to establish alternative routes and traffic control during the installation activities. Most jurisdictions have in place established procedures to ensure safe passage of emergency and police vehicles during periods of road maintenance, construction, or other attention to physical infrastructure, and there is no evidence to suggest that installation of these structural devices would create any more significant impediments than other such typical activities. Any construction activity would be subject to applicable building and safety codes and permits. Therefore, the potential delays in response times for fire and police vehicles after mitigation are less then significant.

Since the installation of vortex separation systems would not result in development of land uses for residential, commercial, and/or industrial uses nor would the these units result in an increase of growth, it is reasonably foreseeable that the vortex separation systems would not result in a need for new or altered fire or police protection services. In addition, Emergency Preparedness Plans could be developed in consultation with local emergency providers to ensure that the new vortex separation systems would not contribute to an increase in the cumulative demand for fire and police emergency services.

Once the vortex separation systems are installed and operating, maintenance and monitoring of the devices would be required to verify that the structural BMP is performing properly and as expected. Maintenance and monitoring activities may also cause road closures and/or traffic congestion, but the same measures can be implemented as those for installation of the structures.

Trash Nets

The environmental impacts associated with the installation, maintenance and monitoring of trash nets are similar to those for the catch basin inserts. As with the catch basin inserts, more maintenance may be required depending on the design of these units since, the capacity for trash collection may be limited to the size of the trash net. With implementation of the mitigation presented for the vortex separation systems, this impact would be less than significant.

Gross Solids Removal Devices

There is potential for temporary delays in response times of fire and police vehicles due to road closure/traffic congestion during installation of the Gross Solids Removal Devices. To mitigate potential delays the responsible agencies could notify local emergency and police service providers of construction activities and road closures, if any, and coordinate with the local fire and police providers to establish alternative routes and traffic control during the installation activities. Most jurisdictions have in place established procedures to ensure safe passage of emergency and police vehicles during periods of road maintenance, construction, or other attention to physical

infrastructure, and there is no evidence to suggest that installation of these structural devices would create any more significant impediments than other such typical activities. Any construction activity would be subject to applicable building and safety codes and permits. Therefore, the potential delays in response times for fire and police vehicles after mitigation are less then significant.

Since, the installation of Gross Solids Removal Devices would not result in development of land uses for residential, commercial, and/or industrial uses nor would the these units result in increased growth, it is reasonable foreseeable that the vortex separation system units would not result in a need for new or altered fire or police protection services. In addition, Emergency Preparedness Plans could be developed in consultation with local emergency providers to ensure that the new Gross Solids Removal Devices would not contribute to an increase in the cumulative demand for fire and police emergency services.

Once the Gross Solids Removal Devices are installed and operating, maintenance and monitoring of the devices would be required to verify that the structural BMP is performing properly and as expected. Maintenance and monitoring activities may also cause road closures and/or traffic congestion, but the same measures can be implemented as those for installation of the structures.

Increased Street Sweeping

Non-structural BMPs may include increased street sweeping. The impacts of these increases can be minimized by efficient timing of the increased street sweeping, for example, prior to storm events. By identifying land uses where trash production is high (e.g., commercial retail), an increase in street sweeping would yield the greatest results.

Ordinances

Ordinances are not expected to create any impacts to public services, and no mitigation would be required.

6.11.3 Summary

Installation and maintenance of structural trash-reduction BMPs could result in less than significant environmental effects with regard to public services. Measures, however, can be applied to reduce and/or eliminate these impacts, as described above. These mitigation measures are within the responsibility and jurisdiction of the responsible agencies subject to the final Trash Amendments and can or should be adopted by them. The State Water Board does not direct which compliance measures responsible agencies choose to adopt or the mitigation measures they employ. The State Water Board does, however, recommend that appropriate measures be applied to reduced or avoid potential environmental impacts. It is foreseeable that these measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific mitigation measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.12 Transportation/Traffic

6.12.1 Thresholds of Significance

A project would normally have a significant effect on the environment if it would:

- Conflict with an applicable plan, ordinance or amendment establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

- Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.

- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks.

- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). Result in inadequate emergency access.

- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

6.12.2 Impacts and Mitigation

Implementation of the final Trash Amendments would not result in a change in air traffic patterns or substantially increase hazards due to design features or incompatible uses.

Vortex Separation Systems

The installation of vortex separation systems may result in additional vehicular movement. These impacts would be temporary and limited in duration to the period of installation. Maintenance requirements for trash removal devices demonstrate that devices could be emptied when they reach 85 percent capacity. Trash removal devices, however, can be designed so that they need be cleaned only once per storm season.

For example, the Los Angeles Water Board staff estimated that 3700 vortex separation systems would be needed in the Los Angeles River watershed. Assuming that these devices are cleaned once per storm season (November 1 to March 31, or 150 days), this translates to approximately 25 vehicle trips per day in the Los Angeles River watershed. An additional 25 trips per day, watershed-wide, would not foreseeably result in a substantial or significant change to traffic flow, other than short-term congestion on limited roadway segments. The approximately 25 trips per day are fewer than the number of trips that would trigger the requirement of a traffic impact analysis per the Los Angeles County Congestion Management Plan (Metropolitan Transit Authority 2004).

Consequently, the proposed project would be in conformance with the existing Los Angeles County Congestion Management Plan, and this impact would be less than significant (Los Angeles Water Board 2007f). As traffic in Los Angeles County represents the maximum impacts related to traffic congestion, impacts of the final Trash Amendments to traffic circulation are expected to be less than or similar to these results throughout the state.

To the extent that site-specific projects entail excavation in roadways, such excavations should be marked, barricaded, and traffic flow controlled with signals or traffic control personnel in compliance with authorized local police or California Highway Patrol requirements. These methods would be selected and implemented by responsible local agencies considering project level concerns. Standard safety measures should be employed including fencing, other physical safety structures, signage, and other physical impediments designed to promote safety and minimize pedestrian/bicyclists accidents. It is not foreseeable that this proposal would result in significant increases in traffic hazards to motor vehicles, bicyclists or pedestrians, especially when considered in light of those hazards currently endured in an ordinary urbanized environment.

In order to reduce the impact of construction traffic, implementation of a construction management plan for specified facilities could be developed to minimize traffic impacts upon the local circulation system. A construction traffic management plan could address traffic control for any street closure, detour, or other disruption to traffic circulation. The plan could identify the routes that construction vehicles would use to access the site, hours of construction traffic, and traffic controls and detours. The plan could also include plans for temporary traffic control, temporary signage, location points for ingress and egress of construction vehicles, staging areas, and timing of construction activity which appropriately limits hours during which large construction equipment may be brought on or off site. Potential impacts could also be reduced by limiting or restricting hours of construction so as to avoid peak traffic times and by providing temporary traffic signals and flagging to facilitate traffic movement. It is anticipated that impacts after mitigation would be less than significant.

Catch Basin Inserts

No construction activity or use of heavy equipment is anticipated for catch basin insert installation. Therefore additional vehicular movement during installation of the catch basin inserts to control trash is unlikely to be significant. Also, it is not anticipated that any such increase would have an adverse effect on traffic and transportation, as they would be limited and short-term. With respect to maintenance, catch basins need to be cleaned regularly. Frequency of cleaning depends on the amount of trash flowing in through the insert. This implementation measure does not require an increase in cleaning frequency above baseline conditions for what is already required for existing permits, therefore no significant increase in traffic is anticipated. Impacts from other maintenance activities, such as street sweeping, are not expected to be significant.

Trash Nets

The number of end-of-pipe trash nets installed would be limited by the number of suitable locations. Installation and maintenance of trash nets would create environmental impacts similar to those of the vortex separation systems.

Mitigation measures to be applied would be the same as those for the vortex separation systems. It is anticipated that impacts after mitigation would be less than significant.

Gross Solids Removal Devices

Gross Solids Removal Devices are the implementation alternatives developed by Caltrans for trash reduction from roadways. Hence their installation would foreseeably be limited to rights of way over which Caltrans has jurisdiction. Clean-outs of Gross Solids Removal Devices are expected to occur only once per year. Therefore, fewer Gross Solids Removal Devices would be installed than vortex separation systems within a given jurisdiction and, cleanout would be less frequent, so the impacts of installation and maintenance of Gross Solids Removal Devices on traffic are expected to be much less than those of vortex separation systems. Consequently, this impact would be a less than significant impact.

Increased Street Sweeping

The number of trips generated by increased street sweeping would depend of the magnitude of increase in sweeping frequency determined by any responsible agency choosing to use this implementation alternative. Increased street sweeping would not foreseeably be implemented alone for the final Trash Amendments. It is not clear how often street sweeping would be increased to comply with the final Trash Amendments at this point. If the stakeholders make decisions on the frequency of street sweeping, the impacts on traffic and transportation caused by increased street sweeping could be analyzed at the project level. Nevertheless, the impacts of increased street sweeping have been included in the reasonably foreseeable methods of compliance, such as catch basin inserts, that may also include increased street sweeping. It is not anticipated that such increases would have a significant impact on traffic and transportation.

Ordinances

Ordinances are not expected to create any impacts to transportation/traffic, and no mitigation would be required.

6.12.3 Summary

The foreseeable methods of compliance may entail short-term disturbances during installation of treatment controls to control trash. The specific project impacts can be mitigated by appropriate mitigation methods during installation. To the extent that significant adverse traffic impacts occur in a given locality, those effects are already occurring and should be considered baseline impacts. Nevertheless, to the extent the locality that originated the trash would become newly exposed to increased traffic from the need to properly dispose of trash generated locally instead of downstream jurisdictions; those impacts could be potentially significant in those locales. Under the final Trash Amendments, municipalities would abate locally generated trash, rather than causing the downstream cities and other stakeholders to suffer the effect of the trash or the cost of cleaning up the trash.

Installation and maintenance of full capture systems and treatment controls could result in potentially significant environmental effects with regard to transportation/traffic. Mitigation measures are available to be applied to reduce and/or eliminate these

impacts; these are described above. These mitigation measures are within the responsibility and jurisdiction of the responsible agencies and can or should be adopted by them. The State Water Board does not direct which compliance measures responsible agencies choose to adopt or which mitigation measures they employ. The State Water Board does, however, recommend that appropriate mitigation measures be applied in order that potential environmental impacts be reduced or avoided. It is foreseeable that these mitigation measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific mitigation measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.13 Utilities/Service Systems

6.13.1 Thresholds of Significance

A project would normally have a significant effect on the environment if it would:

- Exceed wastewater treatment requirements of the applicable Regional Water Board. (See Environmental Checklist in Appendix B for discussion).
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (See Environmental Checklist in Appendix B for discussion).
- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Have insufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed. (See Environmental Checklist in Appendix B for discussion).
- Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments. (See Environmental Checklist in Appendix B for discussion).
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs. (See Environmental Checklist in Appendix B for discussion).
- Fail to comply with federal, state, and local statutes and regulations related to solid waste. (See Environmental Checklist in Appendix B for discussion).

6.13.2 Impacts and Mitigation

Potential projects undertaken to comply with the final Trash Amendments would not result in the need for a new or substantial alteration to water supply utilities. The implementation of the final Trash Amendments would not result in the development of any large residential, retail, industrial or any other development projects that would significantly increase the demand on the current water supply facilities or require new water supply facilities. There would be no impacts related to water supply and no mitigation is required.

Implementation of the final Trash Amendments involves a progressive reduction in trash discharges to the water bodies of the State through structural BMPs, enforcement of existing litter laws, and institutional controls. These strategies to reduce trash are not related to sewer systems[17] and would not affect Publicly Owned Treatment Works nor would they impact any septic tank systems. The implementation of the final Trash Amendments would not result in the need for a new or alterations to existing sewer or septic tank systems. The structural BMPs that may be implemented such as catch basin inserts would be implemented to update the storm drain system and reduce trash entering state waters. Except as otherwise noted, storm drain systems in California are completely separate from the sewer systems and septic tank systems. Thus, there would be no impacts related to sewer and septic tank systems and no mitigation is required.

Compliance with the final Trash Amendments would require that significant amounts of solid waste that would otherwise enter storm drains, be collected by institutional controls and structural methods for collecting trash, or by source control and proper litter disposal by citizens. To the extent that decreases in available landfill space may occur in a local upstream region, those effects are likely already occurring in downstream communities as a result of the improper disposal of trash by the upstream communities; such effects should be considered baseline impacts, as they are presently carried by downstream communities.

For example, the City of Long Beach uses “clam shell” tractors, other heavy duty equipment, and many, many truck trips to cart away the tons of trash generated from all the upstream cities. So while upstream communities may see an increase in the amount of solid waste delivered to their landfill as a result of the final Trash Amendments, downstream communities would see a proportionate decrease. The overall capacity of landfills throughout the state would not be affected. Furthermore, it is reasonably foreseeable that the final Trash Amendments would precipitate education about the environmental and economic effects of litter, and thereby stimulate greater

[17] The City of Sacramento (downtown area) and the City and County of San Francisco have combined sewer and storm water systems where storm water is conveyed to the Publicly Owned Treatment Works. (The City of Fresno also has a combined system, but its wastewater is discharged to infiltration basins, not to surface water.) Since any trash carried by storm water to the Publicly Owned Treatment Works would be collected at the Publicly Owned Treatment Works and not discharged to surface waters, these systems would not be subject to the final Trash Amendments. However, the Publicly Owned Treatment Works owners may want to implement the controls identified for the proposed Trash Amendments to reduce the amount of trash entering their facilities.

efforts to use less disposable materials, and to recycle more, thus reducing the use of resources and the amount of trash entering the landfills. Increased recycling would be considered a positive environmental impact.

In addition, to trash collected as part of compliance with the final Trash Amendments, there would be nominal amounts of construction debris generated by the installation of structural BMPs. Existing landfills should have adequate capacity to accommodate this limited amount of construction debris. In addition, many municipalities have construction and demolition debris recycling and reuse programs. Recycling and reuse of construction and demolition material has been shown to considerably reduce the amount of debris sent to landfills. For example, according to the County of Los Angeles, except under unusual circumstances, it is feasible to recycle or reuse at least 50% of construction and demolition debris (Los Angeles County Department of Public Works 2005). Impacts on the disposal of solid waste would be less than significant and no mitigation is required.

Storm Water Drainage

In order to achieve compliance with the final Trash Amendments, the storm water drainage systems may need to be retrofitted with structural BMPs such as catch basin inserts and or full capture systems. These structural BMPs have the potential to significantly impact the storm water drainage system. Impacts to the storm drains may range from potentially significant to less than significant with mitigation depending on the specific structural BMP implemented. The agencies implementing and complying with the final Trash Amendments would plan and implement the best full capture systems for their municipality. Overall, the installation of full and partial capture systems may substantially alter storm drain systems.

The most critical potential impact related to implementation of full or partial capture systems is the risk of increased flooding due to improperly designed or maintained structural controls. The trash collected by these devices (not the devices themselves) has the potential to impede the course and flow of flood waters through the storm drain system. This risk is considerably lower with properly designed and maintained full capture systems that include a flood event bypass system. Under large storm conditions, the trash capture unit would be bypassed and the storm water flows and the trash would be directly discharged to the receiving waters. The risk of increased street flooding is greater for the catch basin inserts. In general, the inserts are simple screens that are placed inside the catch basin to prevent large pieces of trash from being discharged into water bodies. If under storm conditions these screens were to become clogged with trash it would impede the flow of the storm water and could possibly cause flooding and adversely affect the operation of the public service facility (also discussed in Section 6.8 Hydrology/Water Quality).

The potential risk of increased flooding can be mitigated by proper design and maintenance. For example, the screens can be engineered to be removable and or retractable; the screens could be removed prior to forecasted large storm events to reduce the risk of flooding and adversely affect the operation of the public service facility (also discussed in Section 6.8 Hydrology/Water Quality).

The prevention and removal of trash from state waters through structural BMPs of catch basin inserts and full capture systems ultimately would lead to improved water quality and protection of aquatic life and habitat; expansion of opportunities for public recreational access; enhancement of public interest in our rivers, lakes, and ocean; public participation in restoration activities; and enhancement of the quality of life of riparian and shoreline residents. These improvements outweigh the risk of potentially increased flooding and adversely affect the operation of the public service facility (also discussed in Section 6.8 Hydrology/Water Quality); furthermore, proper design and maintenance of structural BMPs, as discussed above, would mitigate this risk. This impact is considered potentially significant and mitigation should be incorporated.

Recommended mitigation measures: (i) Design and install full capture systems by a licensed civil engineer or environmental engineer in consultation with a hydrologist to ensure there would be adequate capacity for storm water flows and or a storm water bypass system; and, (ii) Regularly maintain full capture systems to remove trash and to prevent the accumulation of trash -- especially prior to forecasted storm events.

Installation and maintenance of full capture systems and treatment controls would result in potentially significant environmental effects with regard to storm water drainage. Mitigation measures, which can be applied to reduce and/or eliminate these impacts, however, are available as described above. These mitigation measures are within the responsibility and jurisdiction of the agencies responsible for implementing the final Trash Amendments and can or should be adopted by them. The State Water Board directs neither the compliance measures responsible agencies choose to adopt, nor the mitigation measures they employ. The State Water Board does, however, recommend that appropriate mitigation measures be applied in order that potential environmental impacts be reduced or avoided. It is foreseeable that these mitigation measures may not always be capable of reducing these impacts to levels that are less than significant in every conceivable instance. Although there is no information on the record that this would occur, in the event that a specific mitigation measure or alternative may not reduce impacts to levels that are less than significant, the project proponent may need to consider an alternative strategy or combination of strategies to comply with the final Trash Amendments.

6.14 Other Dischargers

The final Trash Amendments would apply to discharges of trash not covered by a NPDES permit. The Water Boards may require the implementation of trash controls in areas or facilities that may generate trash, such as, high usage campgrounds, picnic areas, beach recreation areas, marinas, etc. The discharge of trash into water bodies from these areas usually occurs by direct deposition into the water or wind-borne deposition of trash from nearby areas.

The most likely means of compliance for these areas would be institutional controls including public education (e.g., signage to dispose of trash properly) and providing an appropriate level of trash collection (e.g., the frequency of trash collection is appropriate to prevent the overflow and spillage of trash from trash bins, which can then make its way to nearby waterways). Potential environmental impacts from these activities are

similar to those discussed for institutional controls in the previous sections. The implementation of institutional controls in these areas would not have a significant impact on the environment.

6.15 Time Extension

The proposed Trash Amendments provided a time extension to MS4 Phase I and II permittees with regulatory authority over land uses for each regulatory source control adopted by a MS4 Phase I or II permittee. Each regulatory source control adopted by a permittee could provide such permittee with a one-year time extension to achieve final compliance with either Track 1 or Track 2. The time extension option was proposed to receive public input on the potential advantages and disadvantages to this approach. However, subsequent to the State Water Board's public workshop and the public hearing on the proposed Trash Amendments, Senate Bill 270 (2014 Stats. Ch. 850) was enacted. That new law enacts a state-wide plastic bag carry-out ban pertaining to grocery stores and pharmacies that have a specified amount of sales in dollars or retail floor space, which goes into effect July 1, 2015, and imposes the same ban on convenience stores and liquor stores a year later. Such product ban was generally the type of regulatory source control contemplated and discussed with regard to consideration of the time extension option. Effectively enactment of Senate Bill 270 removed the need for regulatory source controls in the proposed Trash Amendments. With the enactment of Senate Bill 270, the final Trash Amendments omit "regulatory source controls" from a method to comply with Track 2. As a result, the final Trash Amendments omit any allowance of time extensions and will not be evaluated further.

6.16 Low-Impact Development Controls and Multi-Benefit Projects

The final Trash Amendments include compliance options referred to as LID controls and multi-benefit projects. Examples of LID controls are treatment controls that employ natural and constructed features that reduce the rate of storm water runoff, filter out pollutants, facilitate storm water storage onsite, infiltrate storm water into the ground to replenish groundwater supplies, or improve the quality of receiving groundwater and surface water. Examples of multi-benefit projects include projects that are designed to infiltrate, recharge or store storm water for beneficial reuse, develop or enhance habitat and open space through storm water and non-storm water management, prevent water pollution, and/or reduce storm water and non-storm water runoff volume.

Because LID controls and multi-benefit projects are part of a larger suite of compliance options and because these types of projects are highly site specific, the array of potential LID and multi-benefit projects is too vast to discuss within this statewide analysis. The range of potential environmental impacts can vary greatly between projects. For example, the City of Anaheim prepared a Mitigated Negative Declaration for its Brookhurst Street Improvement Project and found potential significant impacts to air quality, biological resources, and cultural resources unless mitigation measures were incorporated into the project (City of Anaheim 2010). The City of Pasadena is preparing an EIR for its Hahamongna Multi-Benefit/Multi-Use Project (City of Pasadena 2012). It has tentatively identified potential impacts to aesthetics, air quality, biological resources,

cultural resources, greenhouse gas emissions, hydrology and water quality, noise, and transportation/traffic.

Potential environmental impacts from LID or multi-benefit projects would depend on the size and location of the project. It is foreseeable that the overall project could have a significant effect on the environment. It would be speculation, however, as to what those impacts might be at this level of review. Furthermore, measures that may be incorporated into the project to account for trash issues would most likely be a minor part of the project as a whole. The final Trash Amendments would not affect what those impacts might be, and as such would not cause or increase the level of impact future LID or multi-benefit projects may or may not have. The permitting authority responsible for future LID and/or multi-benefit projects would need to conduct project-specific environmental reviews pursuant to CEQA, as appropriate.

6.17 Regulatory Source Controls (Ordinances)

"Regulatory source controls" was included in the proposed Trash Amendments as one of the several treatment controls that could be utilized by MS4 permittees with regulatory authority over priority land uses to comply with the prohibition of trash under Track 2. "Regulatory source controls" was defined in the proposed Trash Amendments as:

> Institutional controls that are enforced by an ordinance of the municipality to stop and/or reduce pollutants at their point of generation so that they do not come into contact with storm water. Regulatory source controls could consist of, but not be limited to, bans of single use consumer products.

Single use plastic bag bans are not anticipated to be enacted as ordinances in response to the Trash Amendments because (1) Senate Bill 270 has already enacted a mandatory statewide single use plastic bag ban, (2) the upcoming referendum on Senate Bill 270 won't succeed without a statewide majority vote, and (3) approximately 140 cities and counties have already adopted similar bans, which reflects a significant level of popular support for such bans. If, however, a permittee were to adopt a single use plastic bag ban or other ban as a means of complying with Track 2, it is expected that any such bans would be enacted in a manner similar to those previously adopted, in that they would not result in product substitutions or any significant environmental impacts. As with previously-adopted bans, the impacts of any new bans would be evaluated by the permittee. The courts have already upheld the use of negative declarations or categorical exemptions from CEQA for single use plastic bag bans. As a result, this Final Staff Report does not provide an environmental analysis of a ban on single use plastic bags.

Similar to the prior draft, however, the proposed Final Staff Report retains "institutional controls" as a permissible method an MS4 permittee could employ to comply with Track 2. The proposed final Trash Amendments' definition for "institutional controls" includes "ordinances":

> Institutional controls are non-structural best management practices (i.e., no structures are involved) that may include, but not be limited to, street sweeping, sidewalk trash bins, collection of the trash, anti-litter

educational and outreach programs, producer take-back for packaging, and ordinances.

Pursuant to that definition, a permittee's enactment of an ordinance remains an allowable type of institutional control which may be implemented to comply with Track 2, even though the proposed final Trash Amendments removed "regulatory source controls" as a permissible method. Contrary to ordinances or laws which prohibit distribution of plastic carry-out bags, which are typically accompanied with requirements and/or incentives to utilize reusable bags to avoid a product-substitution effect (such as Senate Bill 270), other types of product bans enacted by ordinance, such as take-out items, may involve a substitution of the banned item. Mere substitution would not result in reduced trash generation if such product substitution would be discarded in the same manner as the banned item. Any such product ban enacted by ordinance would not reduce trash and would not be an allowable Track 2 method to assist in achieving compliance. It is possible that an MS4 permittee's adoption of other types of ordinances (e.g., anti-litter laws or bans on smoking), may still be a reasonably foreseeable method of compliance, but those types of ordinances are not expected to cause potential environmental impacts through use of replacement products or through other indirect impacts.

The other types of institutional controls (e.g., street sweeping, sidewalk trash bins, collection of the trash, etc.) available for a permittee to comply with the trash prohibition under Track 2 are evaluated in the preceding sections under the resource potentially at issue.

7 OTHER ENVIRONMENTAL CONSIDERATIONS

This section of the Final Staff Report identifies and evaluates potential growth-inducing impacts[18] and cumulative impacts[19] that may arise from the final Trash Amendments.

7.1 Growth-Inducing Impacts

In compliance with the requirements to prepare a draft SED and meet the substantive requirements of CEQA, this section describes the potential for the final Trash Amendments to cause potential environmental impacts through the inducement of growth (see also Appendix B, Environmental Checklist, Population and Housing). Growth inducement occurs when projects affect the timing or location of either population or land use growth, or create a surplus in infrastructure capacity. Direct growth inducement occurs when, for example, a project accommodates populations in excess of those projected by local or regional planning agencies. Indirect growth inducement occurs when, for example, a project that accommodates unplanned growth consequently (i.e., indirectly) establishes substantial new permanent employment opportunities (for example, new commercial, industrial, or governmental enterprises). Another example of indirect growth is if a construction project generates substantial short-term employment opportunities that indirectly stimulate the need for additional housing and services.

7.1.1 Types of Growth

The primary types of growth that occur are: (1) development of land and (2) population growth. (Economic growth, such as the creation of additional job opportunities, also

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[18] The State CEQA Guidelines describe growth-inducing impacts as follows:

> …[T]he ways in which a proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are impacts which would remove obstacles to population growth…Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects... [In addition,] the characteristics of some projects...may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. (14 CCR § 15126.2(d).)

[19] The State CEQA Guidelines define cumulative impacts as follows:

> "Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts:
>
> (a) The individual effects may be changes resulting from a single project or a number of separate projects.
>
> (b) The cumulative impact from several projects is the change in the environment, which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. (14 CCR § 15355.)

could occur; however, such growth generally would lead to population growth and, therefore, is included indirectly in population growth.)

Growth in Land Development

Growth in land development considered in this analysis is the possible physical development of residential, commercial, and industrial structures in and around where implementation of the final Trash Amendments and reasonably foreseeable methods of compliance may be located. Land use growth is subject to general plans, community plans, parcel zoning, and applicable entitlements and is dependent on adequate infrastructure to support development.

Population Growth

Possible population growth considered in this analysis is the possible growth in the number of persons that live and work in the areas in and around where implementation of the final Trash Amendments and reasonably foreseeable methods of compliance may be located. Population growth occurs from natural causes (births minus deaths) and net emigration from or immigration to other geographical areas. Emigration or immigration can occur in response to economic opportunities, life style choices, or for personal reasons. Although land use growth and population growth are interrelated, land use and population growth could occur independently from each other. This has occurred in the past where the housing growth is minimal, but population within the area continues to increase. Such a situation results in increasing population densities with a corresponding demand for services, despite minimal land use growth.

Overall development in the state is governed by local General Plans (developed by counties or cities), which are intended to plan for land use development consistent with California law. The General Plan is the framework under which development occurs, and, within this framework, other land use entitlements (such as variances and conditional use permits) can be obtained.

7.1.2 Existing Obstacles to Growth

The environmental analysis is required to discuss ways in which the proposed project could foster economic or population growth or the construction of additional housing. Included in this analysis is consideration as to whether the final Trash Amendments (or reasonably foreseeable methods of compliance) remove obstacles to population growth or may encourage and facilitate other activities that could significantly affect the environment. See 14 CCR section 15126.2(d). Obstacles to growth could include such things as inadequate infrastructure or public services, such as an inadequate water supply that results in rationing, or inadequate wastewater treatment capacity that results in restrictions in land use development. Policies that discourage either natural population growth or immigration also are considered to be obstacles to growth.

7.1.3 Potential for Compliance with the Trash Amendments to Induce Growth

Direct Growth Inducement

As some of the reasonably foreseeable methods of compliance of the final Trash Amendments focus on non-structural BMPs and improvements to storm drain systems located throughout urbanized portions of the watershed, the final Trash Amendments

would not result in the construction of new housing and, therefore, would not directly induce growth.

Indirect Growth Inducement

Two areas of potential indirect growth inducement are relevant to a discussion of the final Trash Amendments: (1) the potential for compliance with the final Trash Amendments to generate economic opportunities that could lead to additional immigration; and, (2) the potential for the final Trash Amendments to remove an obstacle to land use or population growth.

Installation of full capture systems or other methods of compliance within Track 2 to comply with the final Trash Amendments would occur over a ten-year time period. Installation and maintenance spending for compliance would generate jobs throughout the region and elsewhere where goods and services are purchased or used to install full capture systems. The alternatives would result in direct jobs and indirect jobs.

Although the construction activities associated with implementation of the final Trash Amendments would increase the economic opportunities in an area or region, this construction is not expected to result in or induce substantial or significant growth related to population increase or land use development. The majority of the new jobs that would be created by this construction are expected to be filled by persons already employed and residing in the area or region. The second area of potential indirect growth inducement is through the removal of obstacles to growth. The final Trash Amendments would require retrofit of existing public services or additional design requirements to new services (services that would occur without the final Trash Amendments). The drainage systems would not increase as a result of the final Trash Amendments. As discussed above, any obstacles that may exist to the location of public services and commensurate land use development or to population growth within an area affected by the final Trash Amendments would not be altered by the implementation of the final Trash Amendments.

7.2 Cumulative Impacts Analysis

In compliance with the requirements to prepare a draft SED and meet the substantive requirements of CEQA, this section describes the potential for the final Trash Amendments to cause a considerable contribution to a cumulatively significant impact (see also Appendix B, Environmental Checklist, Mandatory Findings of Significance).The fundamental purpose of the cumulative impacts analysis is to ensure that the potential environmental impacts of any individual project are not considered in isolation. Impacts that may be individually less than significant on a project specific basis, could pose a potentially significant impact when considered with the impacts of other past, present, and probable future projects.

The cumulative impact analysis need not be performed at the same level of detail as a “project level” analysis but must be sufficient to disclose potential combined effects that could constitute a cumulative significant adverse impact. The CEQA Guidelines direct that the cumulative impacts analysis either include a list of the past, present and probable future projects producing related or cumulative impacts or provide a summary

of projections and cumulative impact analysis contained in an applicable adopted plan or related planning document. (§ 15130, subd. (b)(1).)

This draft SED discusses whether the proposed Trash Amendments' incremental effect is cumulatively considerable and, where that is the case, describes the significant cumulative impacts of the proposed project in combination with past, present, and probable future projects. CEQA Guidelines direct that this cumulative impact analysis be either provided through the "list approach" of "projections approach". The cumulative impacts from implementation of the final Trash Amendments are discussed, for this statewide analysis, through analyzing the possible projects that could occur to cause impacts in combination of the final Trash Amendments in relation to existing land use planning throughout the state, in the following two sections: (1) the program level cumulative impacts, and (2) the project level cumulative impacts. On the program level, impacts from reasonably foreseeable statewide water quality actions and regional activities, including multiple TMDLs and permit requirements, are analyzed across the nine regional water boards, on a statewide basis. On the project level, it is not possible to provide an environmental analysis of individual probable future projects that could occur to cause impacts that would combine with impacts of the final Trash Amendments. The cumulative impacts analysis entails a general consideration of construction and other project-level activities that may occur in the vicinity of trash control implementation measures.

7.2.1 Program Cumulative Impacts

The State Water Board currently is developing a wide range of Statewide Policies and Significant General Permits. The entire list of Statewide Policies and Significant General Permits can be found in the State Water Board's Executive Director's report, which is updated on monthly basis.[20] In the April 22, 2014 Executive Director's Report, the active Statewide Policies and Significant General Permits are listed in Appendix B of the report (State Water Board 2014). The majority of these actions are not yet formally proposed but are considered reasonably foreseeable probable future projects, within the temporal scope of implementation of the final Trash Amendments.

Of the Statewide Polices and Significant General Permits actively being addressed by State Water Board, the following four projects have potential nexus to the scope of the final Trash Amendments thereby causing environmental impacts that may, in conjunction with impacts of the final Trash Amendments, cause a cumulative impact: (1) Proposed Toxicity Amendment to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Toxicity Provisions); (2) Water Quality Control Policy for Wetland Area Protection and Dredge or Fill Permitting (Wetlands Policy); (3) Proposed Amendment to the Statewide Water Quality Control Plan for Ocean Waters to Address Desalination Intakes and Discharges, and to Incorporate Non-Substantive Changes (Desalination Amendment); and (4) Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan).

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[20] State Water Board Executive Director's Reports are accessible at: http://www.waterboards.ca.gov/board_info/exec_dir_rpts/

The State Water Board anticipates creating the ISWEBE Plan through the adoption of Toxicity Provisions. The goals of the Toxicity Provisions include: (a) a new method to determine the toxicity of discharges, (b) statewide numeric objectives, and (c) further standardization of toxicity provisions for NPDES dischargers and facilities subject to WDR and conditional waivers.

The Wetlands Policy has the goal of developing: (a) a wetland definition that would reliably define the diverse array of California wetlands based on the United States Army Corps of Engineers' wetland delineation methods to the extent feasible, (b) a regulatory mechanism for discharges of dredged or fill material into waters of the state, based on the 404 (b)(1) guidelines (40 C.F.R. parts 230-233) that includes a watershed focus, and (c) an assessment method for collecting wetland data to monitor progress toward wetland protection and to evaluate program development.

As with the Trash Amendments, the Desalination Amendment proposes to amend the Ocean Plan. The Desalination Amendment has four components: (a) implementation procedures for regional water boards to evaluate the best site, design, technology, and mitigation measures to minimize adverse impacts to aquatic life at new or expanding desalination facilities; (b) industry specific receiving water limits for salinity; (c) alternative implementation procedures for discharges of waste brine; and (d) provisions protecting sensitive habitats, species, Marine Protected Areas, and State Water Quality Protection Areas from degradation associated with desalination intakes and discharges.

The State Water Board is pursuing a four-phased process to develop and implement updates to the Bay-Delta Plan and flow objectives for priority tributaries to the Delta to protect beneficial uses in the Bay-Delta watershed. Phase 1 proposes to update the San Joaquin River flow and southern Delta water quality requirements included in the Bay-Delta Plan. Phase 2 proposes other comprehensive changes to the Bay-Delta Plan to protect beneficial uses not addressed in Phase 1. Phase 3 focuses on changes to water rights and other measures to implement changes to the Bay-Delta Plan from Phases 1 and 2. Phase 4 involves developing and implementing flow objectives for priority Delta tributaries outside of the Bay-Delta Plan updates.

In addition to the State Water Board actions, the regional water boards are in the process of developing a variety of basin plan amendments including TMDLs for different pollutants, as well as issuing various permits throughout the state. Examples include: Aquatic Ecosystem Restoration Policy (North Coast Water Board), Stream and Wetland Protection Policy (San Francisco Bay Water Board), TMDLs for Nitrogen Compounds and Orthophosphates in the Lower Salinas River Watershed (Central Coast Water Board), Implementation Plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries (Los Angeles Water Board), Central Valley Salinity Alternatives for Long-Term Sustainability (Central Valley Water Board), Pesticide Prohibition Basin Plan Amendment (Lahontan Water Board), Revise Indicator Bacteria for a 17-Mile Reach of the Coachella Valley Storm Water Channel (Colorado River Water Board), Recreation Standards for Inland Fresh Surface Waters (Santa Ana Water Board), and Rainbow Creek Nitrogen and Phosphorus TMDLs (San Diego Water Board).

The goal of all of the Water Board's actions is to protect and improve the quality of the state's waters. Implementation measures identified during the development of these policies, amendments, and Basin Plan amendments, as well as the reasonably foreseeable methods of compliance for these actions, may have similar potential impacts as those identified for the final Trash Amendments. As such, there may be a cumulative impact to certain resources depending on the location and timing of the implementation measures. Potential cumulative impacts are discussed further in the following section.

7.2.2 Project Cumulative Impacts

Implementation of the final Trash Amendments would occur throughout the entire state and it would be speculative to attempt to estimate the specific project-level actions that could occur in and around the areas of implementation that would contribute to a cumulative effect of the final Trash Amendments and reasonably foreseeable methods of compliance. The reasonably foreseeable methods of compliance would typically occur in urban areas. The other types of actions that may occur in and around these urban areas are infrastructure maintenance, redevelopment projects, and infill projects. The impacts of these types of actions typically involve air quality, noise and traffic associated with construction and, depending on the timing of the implementation of the reasonably foreseeable methods of compliance, these impacts could combine with the potential impacts of the final Trash Amendments. The cumulative impacts of specific projects that will comply with the requirements of the final Trash Amendments should be considered by the implementing municipality or agency. Implementation of projects related to other nearby projects, however, may result in cumulative effects of the following nature:

1. Noise and Vibration - Local residents in the near vicinity of installation and maintenance activities related to compliance with the final Trash Amendments may be exposed to noise and possible vibration. The cumulative effects, both in terms of added noise and vibration at multiple implementation sites, and in the context of other unrelated projects, would most likely not be considered cumulatively significant due to the typically minor and temporary nature of the installation and maintenance activities that could cause the noise and possible vibration. However, if deemed a considerable contribution to a cumulative impact, mitigation methods include: (1) scheduling installation and maintenance activities during daytime hours; (2) noise and vibration monitoring; (3) noise testing and inspections of equipment; and (4) an active community liaison program.

2. Air Quality - Implementation of the final Trash Amendments, including the reasonably foreseeable methods of compliance, may cause additional emissions of criteria pollutants and slightly elevated levels of carbon monoxide during trash device installation activities and, to a lesser extent, possible maintenance activities. Implementation of the final Trash Amendments, in conjunction with all other activities within the area, may contribute to a region's nonattainment status during the installation period. Since installation and maintenance-related emissions are typically minor and temporary, compliance with the final Trash Amendments is not expected to not result in long-term significant cumulative air quality impacts. In the

short-term, cumulative impacts could be significant if the combined emissions from the individual projects exceed the threshold criteria for the individual pollutants. In this case, mitigation measures include: (1) use of construction, and maintenance vehicles with lower-emission engines; (2) use of soot reduction traps or diesel particulate filters; and (3) use of emulsified diesel fuel.

3. Transportation and Circulation - Compliance with the final Trash Amendments may involve contemporaneous installation activities at a number of sites. Further, installation of treatment controls may occur in the same general time and space as other related or unrelated projects. In these instances, construction activities from all projects could produce cumulative traffic effects which may be significant, depending upon a range of factors including the specific location involved and the precise nature of the conditions created by the dual construction activity. Mitigation to address this potentially significant cumulative impact would involve special coordination efforts by local, regional, and state entities regarding the timing of various construction and other activities adversely affecting traffic. Overall, with this mitigation, significant cumulative impacts are not anticipated since coordination can occur and, as appropriate, transportation mitigation methods are available as discussed previously.

4. Utilities and Service Systems – Compliance with the final Trash Amendments would involve the disposal of trash that is removed or prevented from entering state waters. The amount of trash collected as a result of the final Trash Amendments is not expected to increase substantially over baseline conditions. In addition, the final Trash Amendments are not expected to substantially affect other public services. Therefore, the cumulative effects of compliance activities, construction activities and other related projects on utilities such as land disposal sites is not a considerable contribution to the cumulative impact.

5. Greenhouse Gas Emissions - Compliance with the final Trash Amendments may involve contemporaneous installation activities at a number of sites. Further, installation of trash devices and other compliance measures, including maintenance activities and additional street sweeping, may occur in the same general time and space as other related or unrelated projects. In these instances, construction activities from all projects could produce greenhouse gas emissions which may have a significant cumulative impact, depending upon a range of factors (e.g., location, vehicular activity, machinery usage, etc.). As stated previously, the construction and maintenance activities associated with implementation of the final Trash Amendments would be short term and are not expected to cause substantial greenhouse gas emissions. However, the cumulative effect of greenhouse gases has been identified as a concern within California, the United States, and global climate and, therefore, this impact are considered potentially significant. With the incorporation of BMPs (see Section 6.6.2) and compliance with greenhouse gas reduction plans, amendments, or regulations, the cumulative effect of greenhouse gas emissions could be reduced to less-than-significant levels.

8 ALTERNATIVES ANALYSIS

State Water Board regulations require this SED to contain an analysis of range of reasonable alternatives to the project and reasonably foreseeable methods of compliance that could feasibly meet the project objectives and to avoid or substantially reduce any potentially significant adverse environmental impacts.[21] The State Water Board has identified the following six alternatives for analysis in the SED.

8.1 No Project Alternative

The purpose of assessing a No Project Alternative in an environmental document such as this SED is to allow decision makers and the public to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The No Project Alternative would involve the State Water Board deciding not to approve any amendments to the Ocean Plan or the ISWEBE Plan.

Under the No Project Alternative, trash would continue to accumulate in state waters and the adverse effects identified in Section 1 and Appendix A would continue to occur. Consistent with baseline conditions, beneficial uses of water would not be protected. Additionally, the number of trash-related 303(d) listing and TMDLs would continue for an increasing number of water bodies with a lack of statewide consistency. The lack of consistency would continue from a lack of a water quality objective specific for trash and variability between existing trash-related water quality objectives among Basin Plans. For this reason, the State Water Board determines that this is not the preferred alternative.

8.2 Regional Water Board Alternative

In the Regional Water Board Alternative, each regional water board would either adopt a water quality objective for trash to the respective basin plan or adopt individual TMDLs for 303(d) listed water bodies for trash. If the individual amendments and TMDLs (as well as their respective implementation strategies) were similar to the final Trash Amendments, the potential environmental impacts would also be similar. There is, however, the potential that the individual regional water boards would develop different trash water quality objectives and implementation provisions, resulting in a continued lack of statewide consistency. Furthermore, it would be an inefficient use of staff time (and corresponding costs) to develop up to eight different approaches to trash-control in state waters. For these reasons, the State Water Board determines that this is not the preferred alternative.

8.3 Full Capture System Alternative

The Full Capture System Alternative would meet the goals of preventing trash from entering state waters, provide consistency statewide, and establish a water quality objective. In this alternative, NPDES permittees would have installation, operation and maintenance requirements across all land uses, regardless of trash generation rates,

[21] 23 CCR § 3777, subd. (b)(3).

and only have a single option for compliance. The potential, however, for environmental impacts to occur would increase due to the increase in the amount of required construction and maintenance. Furthermore, costs associated with implementing this alternative would be significantly higher than under the final Trash Amendments. The incremental improvement of this alternative over using the final Trash Amendments' targeted land-use approach with dual compliance track options, which include institutional controls in combination with treatment controls and multi-benefit projects, does not appear to provide substantial benefits related to trash removal versus potential impacts to the environment. For these reasons, the State Water Board determines that this is not the preferred alternative.

8.4 Institutional Control Alternative

The Institutional Control Alternative would meet the goal of preventing trash from entering state waters, provide consistency, and establish a water quality objective. In this alternative, NPDES storm water permits would contain requirements that permittees increase their use of institutional controls (such as street sweeping, clean-up events, education programs, additional public trash cans and increased collection frequency expanded recycling and composting efforts, and adoption of ordinances) in order to comply with the prohibition of discharge. This alternative's focus on the use of institutional controls rather than full capture systems could potentially decrease the environmental impacts from the installation of full capture systems and retrofitting of catch basins. The increase of institutional controls, such as street sweeping, collection of trash cans, and construction of recycling and composting facilities, however, could also result in environmental impacts, such as increased noise and vibration, or and poorer air quality caused by the increased frequency of street sweeping. Because street sweeping trucks move slowly, there may be an impact on transportation within high trash generating areas, which would require coordination with street parking rules. Nevertheless, the potential environmental impacts from this Institutional Control Alternative are not predicted to be significant. Permittees should have flexibility to determine the most effective means of controlling trash because of particular conditions within each jurisdiction, such as conditions of sites, types of trash, and the resources available for maintenance and operation. Therefore, the Trash Amendments propose the dual compliance options of Track 1 and Track 2.

8.5 Reduced Land Use Alternative

To reduce potential environmental impacts from trash control strategies, the Reduced Land Use Alternative would focus on a fewer number of land uses within a municipality. As a representative example, the City of Los Angeles monitored trash generation rates and found that the three highest trash generating land uses were residential (36 percent), commercial (33 percent), and industrial (19 percent) (City of Los Angeles 2002). The priority land uses for the Reduced Land Use Alternative would focus on the top two trash generating land uses: residential (high density and mixed urban) and commercial. Reducing the number of priority land uses would still reduce the discharge of trash from a municipality and reduce the number of treatment and institutional controls that would need to be implemented by permittees in California.

In addition, the Reduced Land Use Alternative would provide consistency statewide, establish a water quality objective, and prevent some trash from entering state waters; however it would not reduce the discharge of trash as much as the final Trash Amendments would. The final Trash Amendments focus on controlling the discharge of trash from more high trash generating areas than this alternative would, namely: high-density residential, commercial, industrial, mixed urban, and public transportation station land uses.

By reducing the number of implementation measures necessary for compliance, the potential environmental impacts of this approach would also be reduced. The reduction in impacts could include less noise and vibrations from installation and maintenance of full capture systems, comparatively fewer emissions of criteria pollutants, carbon monoxide, and greenhouse gases due to the reduced amount of construction and installation of full capture systems, and less impact to land disposal sites. This Alternative, however, would not be as protective of beneficial uses as the final Trash Amendments would be, because land uses such as industrial land uses, would not be captured. The goals of the project to protect beneficial uses and reduce the discharge of trash would only be partially achieved under this alternative. For these reasons, the State Water Board determines that this is not the preferred alternative.

8.6 Reduced NPDES Permittee Alternative

The Reduced NPDES Permittee Alternative would reduce the number of permits with specific trash-control requirements. While the Reduced NPDES Permittee Alternative would establish a water quality objective, and prevent some trash from entering State Waters, it would not reduce the discharge of trash as much as the final Trash Amendments. The final Trash Amendments focus on controlling the discharge of trash from the dominant transport pathway – storm water. Thus, the final Trash Amendments require implementation provisions to be incorporated into NPDES permits, namely the MS4 Phase I, MS4 Phase II, Caltrans, IGP, and CGP.

The potential for the transport of trash via storm water to receiving water bodies is highest among the MS4 Phase I, MS4 Phase II, and Caltrans permittees due to the combination of land use types, area of land, and number of people within these MS4 permittees' respective jurisdictions. At present, the IGP and CGP already contain components of the final Trash Amendments. Specifically, the IGP has a prohibition of discharge of preproduction plastics, and the CGP contains a prohibition of discharge of any debris from construction sites. Therefore, the Reduced NPDES Permittee Alternative would focus specific requirements for trash in MS4 Phase I, MS4 Phase II, and Caltrans permits.

In this alternative, comparatively fewer permittees would be required to institute increased trash controls. To this end, programmatically is it is possible that there would be reduced environmental impacts. The reduction in impacts may include less noise and vibrations from installation and maintenance of full capture systems, comparatively fewer emissions of criteria pollutants, carbon monoxide, and greenhouse gases due to the construction and installation of full capture systems, and less impact to land disposal sites. At a programmatic level, the potential environmental impacts may be slightly reduced with the Reduced NPDES Permittee Alternative. This Alternative, however,

would not be as protective of beneficial uses, as trash from light industrial facilities would not be removed from storm water. The goals of the project to protect beneficial uses and reduce the discharge of trash would only be partially achieved under this Alternative. For these reasons, the State Water Board determines that this is not the preferred alternative.

9 WATER CODE SECTIONS 13241 AND 13242 AND ANTIDEGRADATION

California Water Code section 13241 requires assessment of specific factors when adopting water quality objectives. These factors consist of:

- Past, present, and probable future beneficial uses of water.
- Environmental characteristics and water quality of the hydrographic unit under consideration.
- Water quality conditions that could be reasonably attained through coordinated control of all factors affecting water quality.
- Economic considerations.
- The need for developing new housing.
- The need to develop and use recycled water.

The final Trash Amendments would alter existing water quality objectives for state waters; therefore, CWC section 13241 does apply to these final Trash Amendments.

9.1 Past, Present and Future Beneficial Uses of Water

The presence of trash impairs the established beneficial uses present in basin plans and the Ocean Plan, as discussed in Section 1 and Appendix A.

The final Trash Amendments, including the water quality objective for trash, would protect all beneficial uses in state waters. The final Trash Amendments support the Water Boards' existing water quality control plans and policies, and provide a better means to ensure that any future beneficial uses are also protected from trash impairments.

9.2 Environmental Characteristics and Water Quality of the Hydrographic Unit Under Consideration

The final Trash Amendments apply to all waters of the state. More specifically, the final Trash Amendments are primarily focused on areas of high trash generation within the jurisdictions of NPDES MS4 Phase I and MS4 Phase II municipalities, Caltrans, and facilities and sites covered under the IGP and CGP. The environmental characteristics of all hydrographic units affected by the final Trash Amendments are described in Section 3.

9.3 Water Quality Conditions that Could Reasonable be Attained Through Coordinated Control of All Factors Affecting Water Quality

The Water Boards are required to ensure that all discharges, regardless of type, comply with all water quality control plans and policies. The proposed water quality objective for trash can be implemented through a prohibition of discharge to all surface waters of the state, with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the Trash Amendments. Compliance of the prohibition of discharge would be specified through NPDES permits issued pursuant to section 402(p) of the Federal Clean Water Act, WDRs, and waivers of WDRs.

9.4 Economic Considerations

Under the requirements of Water Code sections 13170 and 13241, subdivision (d) and 23 CCR section 3777, subdivisions (b)(4) and (c), the State Water Board must consider economics when establishing water quality objectives. This consideration of economics is not a cost-benefit analysis, but a consideration of potential costs of a suite of reasonably foreseeable measures to comply with the final Trash Amendments. This economic analysis utilized two basic methods to estimate the incremental cost of compliance for permitted storm water discharge: the first method was based on cost of compliance per capita, and the second method was based on land cover.

This economic analysis estimated the incremental annual cost to comply with the requirements of the final Trash Amendments ranged from $4 to $10.67 per year per capita for MS4 Phase I NPDES permittees and from $7.77 to $7.91 per year per capita for smaller communities regulated under MS4 Phase II permits. For IGP facilities, the estimated compliance cost is $33.9 million or $3,671 per facility. To comply with the final Trash Amendments, expenditures by Caltrans are estimated to increase by $34.5 million in total capital costs and $14.7 million per year for operation and maintenance of structural controls.

The full economic consideration is described in Appendix C.

9.5 The Need for Developing Housing

The adoption of the final Trash Amendments is not expected to constrain housing development in California. The implementation requirements of the final Trash Amendments would need to be incorporated into the CGP and requirements for new urban development within MS4 Phase I or MS4 Phase II Permits. The trash requirements are anticipated to be minimal in cost to the overall costs of development. Additionally, the incorporation of trash treatment controls during the construction and development of storm drain inlets in new housing developments would be lower in cost than retrofitting storm drains with trash treatment controls. As a result, the final Trash Amendments would not interfere with the need for developing new housing.

9.6 The Need to Develop and Use Recycled Water

The adoption of the final Trash Amendments is not expected to restrict the need to develop and use recycled water. Currently, there are no restrictions on recycling of water due to trash. Therefore, the final Trash Amendments and possible alternatives are consistent with the need to develop and use recycled water. Removing trash from the wastewater should be beneficial to the recycled water treatment process.

9.7 Water Code Section 13242

California Water Code section 13242 requires that the program of implementation for achieving the water quality objective within the final Trash Amendments include a description of the nature of the actions which are necessary to achieve the objective, time schedules for actions to be taken, and a description of surveillance to be undertaken to determine compliance with the water quality objective. In compliance with CWC section 13242, the final Trash Amendments include a prohibition of discharge

and program of implementation in order to achieve the objective, time schedules for compliance, and monitoring and reporting requirements - all as described in Section 2 as well as Appendix D for the Ocean Plan and Appendix E for the ISWEBE Plan.

9.8 Antidegradation

Federal and state antidegradation policies found at 40 CFR section 131.12 and in State Water Board Resolution No. 68-16, respectively, impose levels of protection for state waters depending on the highest quality of the receiving water at issue since 1968 – the year that the State Water Board adopted California's antidegradation policy. Where a receiving water is of higher quality than applicable water quality standards, that higher quality must be maintained unless certain conditions are met.

The State Water Board does not anticipate any degradation of water quality as a result of the adoption and implementation of the final Trash Amendments. Upon adoption of the final Trash Amendments, the state would, for the first time, have a water quality objective for trash and implementation provisions that would apply to all surface waters of the state, with the exception of those waters within the jurisdiction of the Los Angeles Water Board with trash or debris TMDLs that are in effect prior to the effective date of the final Trash Amendments. The final Trash Amendments would not result in a degradation of water quality standards in those waters, as the existing TMDL provisions are more stringent than the final Trash Amendments.

Furthermore, the San Francisco Water Board's San Francisco Bay MRP (Order No. R2-2009-0074) requires MS4 permittees to develop and implement "Short-Term Trash Load Reduction Plans". This includes implementation of a mandatory minimum level of trash capture; cleanup and abatement progress on a mandatory minimum number of trash hot spots; and implementation of other control measures and best management practices, such as trash reduction ordinances, to prevent or remove trash loads from MS4s to attain a 40% reduction in trash loads by July 1, 2014. The San Francisco Bay MRP has an existing set of annual monitoring and reporting requirements. The required trash load reduction through the Short-Term Trash Load Reduction Plans does not conflict with the implementation provisions set forth in the proposed final Trash Amendments. The San Francisco Water Board can determine a San Francisco Bay MRP permittee implementing controls substantially equivalent to Track 2 has a submitted an implementation plan that is equivalent to the implementation plan requirement in the Trash Amendments. As such, the proposed final Trash Amendments would not result in a degradation of water quality standards in waters regulated by the San Francisco Bay MRP, because the final Trash Amendments are at least as protective of water quality as the San Francisco Bay MRP.

As a result, the adoption and implementation of the final Trash Amendments would not lead to the degradation of any water quality standards, and would instead enhance water quality across the state.

10 Scientific Peer Review

California Health and Safety Code section 57004 requires external scientific peer review of the scientific basis for any rule proposed by any board, office or department within CalEPA. Scientific peer review is a mechanism for ensuring that regulatory decisions and initiatives are based on sound science. Scientific peer review also helps strengthen regulatory activities, establishes credibility with stakeholders, and ensures that public resources are managed effectively. Scientific peer review on the scientific elements of the proposed Trash Amendments and Draft Staff Report was conducted through an Interagency Agreement between CalEPA and the University of California. The Peer Review process commenced on March 10, 2014 with a Request for External Scientific Peer Review and concluded on July 14, 2014. Three peer reviewers were selected and participated in reviewing the scientific elements of the Draft Staff Report. Peer Review was overall supportive of the proposed Trash Amendments and Draft Staff Report with recommendations to strength the scientific basis of the analysis. The proposed Final Staff Report contains the additional scientific studies recommended following Peer Review.

The three peer reviewers are following:

- Tamara Galloway, Ph.D.
  Professor of Ecotoxicology
  College of Life & Environmental Sciences
  University of Exeter
- David Barnes, Ph.D.
  Professor, Civil & Environmental Engineering
  College of Engineering and Mines
  University of Alaska
- Detlef Knappe, Ph.D.
  Professor, Department of Civil, Construction, & Environmental Engineering
  North Carolina State University

The Peer Review response is available at:
http://www.waterboards.ca.gov/water_issues/programs/peer_review/trash_control/

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

OFFICE OF THE REGIONAL ADMINISTRATOR

JAN 12 2016

Tom Howard, Executive Director
State Water Resources Control Board
P.O. Box 100
Sacramento, California 95812-100

Subject: USEPA Clean Water Act Approval Action on State Trash Water Quality Standards

Dear Mr. Howard:

Pursuant to section 303(c) of the Clean Water Act ("CWA") and 40 C.F.R. Part 131, I am pleased to approve California's groundbreaking water quality standards aimed specifically at curbing water pollution by trash throughout the state.

Section 303(c) of the CWA requires the U.S. Environmental Protection Agency to approve or disapprove new or revised state water quality standards. The standards subject to today's action were adopted by State Water Resources Control Board Resolution 2015-0019 on April 7, 2015 as part of Amendments to the Water Quality Control Plan for Ocean Waters of California to Control Trash (Appendix D of the Staff Report) and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters and Enclosed Bays and Estuaries of California (Appendix E of the Staff Report) (collectively the "Trash Amendments" or "Amendments"),[1] and approved by the California Office of Administrative Law on December 3, 2015. The standards are in the form of the following narrative water quality criteria (referred to as "water quality objectives" by applicable California law and the Amendments):

> For the Ocean Plan: "Trash shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance."
>
> For the Inland Surface Waters and Enclosed Bays and Estuaries Plan: "Trash shall not be present in inland surface waters, enclosed bays, estuaries, and along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance."

[1] The public process leading to Resolution 2015-0019, which included notice of opportunity for public comment, public meetings, and written response to comments, is consistent with the procedural requirements of CWA section 303(c) and its implementing regulations, including 40 C.F.R. §131.20.

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The narrative criteria apply to all surface waters of the state.[2] While existing narrative criteria in the Ocean Plan and individual regional Basin Plans refer only in general and varied terms to trash-related pollutants (such as floatables, foam, and sediments), these criteria define "trash" as "[a]ll improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials." As noted in the State Board's Final Staff Report for the Trash Amendments, this new definition of trash is meant to be inclusive: it encompasses both "litter" in the California Government Code and "waste" in the California Water Code and has no size limitation. Its coverage ranges broadly from plastic bags and bottles, expanded styrene, cigarette butts, cardboard, green waste, to smaller forms of trash such as preproduction plastic pellets.

Together, the water quality criteria for trash approved by EPA today[3] mark California's - and the Nation's - first articulation of a uniform water quality standard to address the far reaching impacts of trash of all types as a specific pollutant on a statewide scale. This is a milestone development in breadth of scope and clarity of focus towards our collective goal of trash-free waters, especially given California's considerable size, population, and coastline. With EPA's approval action, these narrative water quality criteria take effect for CWA purposes and are to be implemented and complied with through the National Pollutant Discharge Elimination System (NDPES) permits - the chief federal point source pollution control mechanism.

The Trash Amendments further couple the trash criteria with a comprehensive program of implementation built on the substantial experience developed at regional and local levels, especially the Los Angeles Region. Although this implementation program is not part of today's Section 303(c) approval action, it is worth highlighting here.

Much trash is generated on land and transported to waterways, riverbeds, shorelines, seafloor, and oceans via storm drains. The implementation program tackles this problem by prohibiting the discharge of trash through tailored and practical land-based controls and making them enforceable and reportable NPDES storm water permit requirements for municipal separate storm sewer systems, the California Department of Transportation, and industrial, commercial and construction activities. Under this scheme, California's municipalities and other applicable storm water permit holders must comply with the prohibition either by installing full trash capture systems in high trash-generating areas, or by demonstrating full capture system equivalency with a combination of trash capture devices and institutional and structural controls, such as increased street sweeping, educational outreach, and low impact or multi-benefit development. Rigorously implemented, these measures will advance statewide consistency in meeting the narrative trash criteria.

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[2] The exceptions are waters within the Los Angeles Water Quality Control Board with existing total maximum daily loads for trash.

[3] EPA has initiated consultation on this approval action with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service under Section 7(a)(2) of the Endangered Species Act and retains the discretion to revise the approval in the unlikely event that the consultation results in the need for further EPA action.

Trash has widespread adverse effects on aquatic and marine habitats and life, public health, navigation, commerce, and recreation. The enormity of trash accumulating in our oceans has made marine debris a pressing global environmental challenge. I commend the State Board for its leadership in making the Trash Amendments a statewide regulatory mandate and a national model, and your staff for their tireless fact-finding and public engagement work in the years leading to the Amendments. I look forward to our continued cooperation to rid our rivers, lakes and marine environments of trash.

Sincerely,

Jared Blumenfeld

cc: Felicia Marcus, Chair, State Board
Rik Rasmussen, Division of Water Quality, State Board

United States
Environmental Protection
Agency

Office oF water
(4203)

EPA 833-D-96-001
September 1996

EPA

Interim Permitting Approach For Water Quality-Based Effluent Limitations In Storm Water Permits

INTERIM PERMITTING APPROACH FOR WATER QUALITY-BASED EFFLUENT LIMITATIONS IN STORM WATER PERMITS

In response to recent questions regarding the type of water quality-based effluent limitations that are most appropriate for National Pollutant Discharge Elimination System (NPDES) storm water permits, the Environmental Protection Agency (EPA) is adopting an interim permitting approach for regulating wet weather storm water discharges. Due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA will use an interim permitting approach for NPDES storm water permits.

The interim permitting approach uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards. In cases where adequate information exists to develop more specific conditions or limitations to meet water quality standards, these conditions or limitations are to be incorporated into storm water permits, as necessary and appropriate. This interim permitting approach is not intended to affect those storm water permits that already include appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best professional judgement, that are incorporated into storm water permits.

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.

This interim permitting approach applies only to EPA; however, EPA also encourages authorized States and Tribes to adopt similar policies for storm water permits. This interim permitting approach provides time, where necessary, to more fully assess the range of issues and possible options for the control of storm water discharges for the protection of water quality. This interim permitting approach may be modified as a result of the ongoing Urban Wet Weather Flows Federal Advisory Committee policy dialogue on this subject.

Qs & As FOR INTERIM PERMITTING APPROACH FOR WATER QUALITY-BASED EFFLUENT LIMITATIONS IN STORM WATER PERMITS

Question 1: Must EPA require that storm water dischargers, industrial or municipal, be subject to numeric water quality-based effluent limitations (expressed as concentration and mass) in order to attain water quality standards (WQS)?

Answer 1: No. Although National Pollutant Discharge Elimination System (NPDES) permits must contain conditions to ensure that water quality standards are met, this does not require the use of numeric water quality-based effluent limitations. Under the Clean Water Act (CWA) and NPDES regulations, permitting authorities may employ a variety of conditions and limitations in storm water permits, including best management practices, performance objectives, narrative conditions, monitoring triggers, action levels (e.g., monitoring benchmarks, toxicity reduction evaluation action levels), etc., as the necessary water quality-based limitations, where numeric water quality-based effluent limitations are determined to be unnecessary or infeasible.

Analysis:

A. The Clean Water Act does not require numeric effluent limitations.

Section 301 of the CWA requires that discharger permits include effluent limitations necessary to meet State or Tribal WQS. Section 502 defines "effluent limitation" to mean <u>any</u> restriction on quantities, rates, and concentrations of constituents discharged from point sources. The CWA does not say that effluent limitations need be numeric. As a result, EPA and States have flexibility in terms of how to express effluent limitations.

B. EPA's regulations do not always require numeric effluent limitations.

EPA has, through regulation, interpreted the statute to allow for non-numeric limitations (e.g., "best management practices" or BMPs, see 40 CFR 122.2) to supplement or replace numeric limitations in specific instances that meet the criteria specified at 40 CFR 122.44(k). This regulation essentially codifies a court case addressing storm water discharges. <u>NRDC</u> v. <u>Costle</u>, 568 F.2d 1369 (D.C. Cir. 1977). In that case, the Court stated that EPA need not establish numeric effluent limitations where such limitations were infeasible.

C. EPA has interpreted the statute and regulations to allow BMPs in lieu of numeric limitations.

EPA has defended use of BMPs as a substitute for numeric limitations in litigation involving storm water discharges (CBE v. EPA, 91-70056 (9th Cir.)(brief on merits)) and in correspondence (Letter from Michael Cook, EPA, to Peter Lehner, NRDC, May 31, 1995). EPA has found that numeric limitations for storm water permits can be very difficult to develop at this time because of the existing state of knowledge about the intermittent and variable nature of these types of discharges and their effects on receiving waters. Some storm water permits, however, currently do contain numeric water quality-based effluent limitations where adequate information exists to derive such limitations.

Question 2: Has EPA provided guidance on a methodology for deriving numeric water quality-based effluent limitations?

Answer 2: Yes, but primarily for continuous wastewater discharges at low flow conditions in the receiving water, not intermittent wet weather discharges during high flow conditions. Regulations at 40 CFR 122.44(d) specify the requirements under which permitting authorities establish water quality-based effluent limitations when a facility has the "reasonable potential" to cause or contribute to an excursion of numeric or narrative water quality criteria. In addition, EPA guidance in the Technical Support Document for Water Quality-Based Toxics Control (TSD) and the NPDES Permit Writers Training Manual, supplemented with total maximum daily load (TMDL) and modeling guidance, supports issuing permits that include numeric water quality-based effluent limitations. This guidance was based on crafting numeric water quality-based effluent limitations using TMDLs, or calculations similar to those used in developing TMDLs, and wasteload allocations (WLAs) derived through modeling. EPA expects the Urban Wet Weather Flows Federal Advisory Committee (60 FR 21189, May 1, 1995) will review this issue at greater length and may provide recommendations on how to proceed.

Question 3: Why can numeric water quality-based effluent limitations be difficult to derive for storm water permits?

Answer 3: Storm water discharges are highly variable both in terms of flow and pollutant concentrations, and the relationships between discharges and water quality can be complex. The water quality impacts of storm water discharges are related to the uses designated by States and

Tribes in their WQS, the quality of the storm water discharge (e.g., conventional or toxic pollutants conveyed to the receiving water) and quantity of the storm water (e.g., erosion and loss of habitat caused by increased flows and velocity). Uses may be impacted by both water quality and water quantity. Depending on site-specific considerations, some of the water quality impacts of storm water discharges may be more related to the physical effects (e.g. stream bank erosion, streambed scouring, extreme temperature variations, sediment smothering) than the type and amount of pollutants present in the discharge. For municipal storm water discharges in particular, the current use of system-wide permits and a variety of jurisdiction-wide BMPs, including educational and programmatic BMPs, does not easily lend itself to the existing methodologies for deriving numeric water quality-based effluent limitations. These methodologies were designed primarily for process wastewater discharges which occur at predictable rates with predictable pollutant loadings under low flow conditions in receiving waters. Using these methodologies, limitations are typically derived for each specific outfall to be protective of low flows in the receiving water. Because of this, permit writers have not made wide-spread use of the existing methodologies and models for storm water discharge permits. In addition, wet weather modeling is technically more difficult and expensive than the simple dilution models generally used in the permitting process.

Question 4: Has EPA previously recognized the technical difficulty in deriving numeric water quality-based effluent limitations for storm water discharges?

Answer 4: Yes. EPA recognized the technical difficulty in deriving numeric water quality-based effluent limitations for wet weather discharges in its brief on the merits in Citizens for a Better Environment (CBE) v. United States Environmental Protection Agency, 91-70056 (9th Cir.) and in the Great Lakes Water Quality Guidance (58 FR 20841, April 16, 1993).

In the CBE case, EPA explained why it was technically infeasible to derive numeric water quality-based effluent limitations for the discharge of metals in storm water into South San Francisco Bay and asserted that a water quality-based effluent limitation could take the form of a narrative statement, such as a BMP, if it was infeasible to derive a numeric limitation. In explaining its arguments in the CBE case, EPA cited 40 CFR 122.44(k)(2), which provides that BMPs may be imposed in NPDES permits "to control or abate the discharge of pollutants when ... (2) [n]umeric effluent limitations are infeasible."

In the Great Lakes Water Quality Guidance, EPA did not extend the method for calculating wasteload allocations, the basis for numeric water quality-based effluent limitations, to storm water or combined sewer overflow (CSO) discharges because the varying nature of these discharges is inconsistent with the assumptions used in developing the guidance. The Great Lakes Water Quality Guidance defers to national guidance and policy on wet weather and does not seek to establish a separate and distinct set of wet weather requirements. EPA expects the Urban Wet Weather Flows Advisory Committee to provide recommendations about how to address the broader technical issues involved in achieving compliance with WQS in a wet weather context.

Question 5: What are the potential problems of using standard methodologies to derive numeric water quality-based effluent limitations for storm water permits?

Answer 5: Correctly derived numeric water quality-based effluent limitations provide a greater degree of confidence that a discharge will not cause or contribute to an exceedance of the WQS, because numeric water quality-based effluent limitations are derived directly from the numeric component of those standards. In addition, numeric water quality-based effluent limitations can avoid the expense associated with overly protective treatment technologies because numeric water quality-based effluent limitations provide a more precisely quantifed target for permittees. Potential problems of incorporating inappropriate numeric water quality-based effluent limitations rather than BMPs in storm water permits at this time are significant in some cases. Deriving numeric water quality-based effluent limitations for any NPDES permit without an adequate effluent characterization, or an adequate receiving water exposure assessment (which could include the use of dynamic modeling or continuous simulations) may result in the imposition of inappropriate numeric limitations on a discharge. Examples of this include the imposition of numeric water quality criteria as end-of-pipe limitations without properly accounting for the receiving water assimilation of the pollutant or failure to account for a mixing zone (if allowed by applicable State or Tribal WQS). This could lead to overly stringent permit requirements, and excessive and expensive controls on storm water discharges, not necessary to provide for attainment of WQS. Conversely, an inadequate effluent characterization could lead to water quality-based effluent limitations that are not stringent enough to provide for attainment of WQS. This could result because effluent characterization and exposure assessments for discharges with high variability of pollutant

concentrations, loadings, and flow are more difficult than with process wastewater discharges at low flows.

Question 6: How are water quality-based effluent limitations developed for combined sewer overflow (CSO) discharges?

Answer 6: The CSO Control Policy issued by EPA on April 19, 1994 (59 FR 18688) provides direction on compliance with the technology-based and water quality-based requirements of the CWA for communities with combined sewer systems. The CSO Policy provides for implementation of technology-based requirements (expressed as "nine minimum controls") by January 1, 1997.

In addition, under the CSO Policy, communities are also expected to develop long-term control plans that will provide for attainment of WQS through either the "presumption approach" or the "demonstration approach." Under the presumption approach, CSO controls would be presumed to attain WQS if certain performance criteria are met. A program that meets the criteria specified in the CSO policy is presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA, provided the permitting authority determines that such presumption is reasonable based on characterization, monitoring, and modeling of the system, including consideration of sensitive areas. Under the demonstration approach, the permittee would demonstrate that the selected CSO controls, when implemented, would be adequate to meet the water quality-based requirements of the CWA.

The CSO Policy anticipates that it will be difficult in the early stages of permitting to determine whether numeric water quality-based effluent limitations are necessary for CSOs, and, if so, what the limitations should be. For that reason, in the absence of sufficient data to evaluate the need for numeric water quality-based effluent limitations, the Policy recommends that the first phase of CSO permits ("Phase I") contain a narrative requirement to comply with WQS. Further, so-called "Phase II" permits would contain water quality-based effluent limitations, as provided in 40 CFR 122.44(d)(1) and 122.44(k), that may take the form of numeric performance or design standards, such as a certain number of overflow events or a certain percent volume capture. Generally, only after the long-term control plan is in place and after collection of sufficient water quality data (including applicable wasteload allocations developed during a TMDL process) would numeric water quality-based effluent limitations be included in the permit. This would likely occur only after several permitting cycles.

Question 7: If BMPs alone are demonstrated to provide adequate water quality protection, are additional controls necessary?

Answer 7: No. If the permitting authority determines that, through implementation of appropriate BMPs required by the NPDES storm water permit, the discharges have the necessary controls to provide for attainment of WQS and any technology-based requirements, additional controls need not be included in the permit. Conversely, if a discharger (municipal or industrial) fails or refuses to adopt and implement adequate BMPs , the permitting authority may have to consider other approaches to ensure water quality protection.

If, however, the permitting authority has adequate information on which to base more specific conditions or limitations, such limitations are to be incorporated into storm water permits, as necessary and appropriate. Such conditions or limitations may include an integrated suite of BMPs, performance objectives, narrative standards, monitoring triggers, numeric water quality-based effluent limitations, action levels, etc. Storm water permits may also need to include additional requirements to receive State or Tribal 401 certifications.

Question 8: What is EPA doing to develop information about the linkage between BMPs and water quality and to facilitate a watershed-based approach to storm water permitting?

Answer 8: The Agency has cooperative agreements with WERF (Water Environment Research Foundation) and ASCE (American Society of Civil Engineers) to research which BMPs are most effective under which circumstances. The results of this research should provide permitting authorities and permittees with information about how to evaluate the effectiveness of different kinds of BMPs in different circumstances and to select the most appropriate controls to achieve water quality objectives. EPA also has cooperative agreements with the Watershed Management Institute and other organizations to conduct research over the next two to four years that will examine the capability of storm water BMPs to improve receiving water quality and restore/protect the biological integrity of those waters. EPA expects the Urban Wet Weather Flows Federal Advisory Committee to provide recommendations on how to permit storm water discharges on a watershed basis.

Question 9: The interim permitting approach states that permits should include monitoring programs to generate necessary

information to determine the extent to which permits are providing for the attainment of water quality standards. What types of monitoring should be included and how much monitoring is necessary?

Answer 9: The amount and types of monitoring necessary will vary depending on the individual circumstances of each storm water discharge. EPA encourages dischargers and permitting authorities to carefully evaluate monitoring needs and storm water program objectives so as to select useful and cost-effective monitoring approaches. For most dischargers, storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements in water quality.

Under the NPDES storm water program, large and medium municipal separate storm sewer system permittees are required to conduct monitoring. EPA recommends that each such municipal permittee design the monitoring effort to be supportive of the goals and objectives of its storm water management program when developing such a program for the term of its NPDES permit. To accomplish this, a municipal permittee may use a variety of storm water monitoring tools including receiving water chemistry; receiving water biological assessments (benthic invertebrate surveys, fish surveys, habitat assessments, etc.); effluent monitoring; including chemical, whole effluent and visual examinations; illicit connections screening; and combinations thereof, or other methods. Techniques that assess receiving waters will help to identify the degree to which storm water discharges are contributing to any water quality problems. Techniques that assess storm water discharge characteristics will help to identify potential causes of any identified water quality problems. The municipal permittee, in conjunction with the applicable NPDES permitting authority, should determine which monitoring approaches would be most appropriate given the objectives of the storm water management program. If municipal permittees conduct ambient monitoring, it may be most cost-effective to pool resources with other organizations (including, for example, other municipalities, States, and Tribes) conducting monitoring within the same watershed. This could be best accomplished through a coordinated watershed monitoring strategy.

For industrial storm water dischargers, monitoring may be required under the terms of an NPDES permit for storm water discharges. For those industrial storm water permits that do require monitoring, this is typically done to characterize contaminants that might be found in the

industrial runoff and/or to assess the effectiveness of the industrial storm water pollution prevention plan in reducing these contaminants. This typically involves end-of-pipe chemical-specific monitoring. End-of-pipe monitoring may be more appropriate for an industrial facility than for a municipal permittee, given the industrial facility's more discrete site characteristics, which make management strategies such as collection and treatment more feasible. Industries, for the most part, have readily defined storm water conveyances into which runoff flows from discrete drainage areas. Industries may more readily identify and control existing on-site sources of storm water contamination or provide collection and treatment within these discrete drainage areas to control pollutant concentrations in their storm water discharges.

EPA and other organizations are currently working to improve approaches for monitoring storm water and the potential effects upon water quality. These new approaches are called storm water program "environmental indicators." Environmental indicators are designed to be more meaningful monitoring tools that storm water dischargers can use to conduct storm water monitoring for the purposes described above. A manual describing each of the recommended storm water program environmental indicators is being prepared by the Center for Watershed Protection in Silver Spring, Maryland. That manual is expected to be ready by the end of August 1996 and should provide useful information for storm water dischargers contemplating the need to develop a cost-effective, meaningful storm water monitoring program. In addition, EPA expects the Urban Wet Weather Flows Federal Advisory Committee to provide recommendations on how to better monitor storm water and other wet weather discharges using a watershed approach.

Question 10: Does this interim permitting approach apply to both storm water discharges associated with industrial activity and storm water discharges from municipal separate storm sewer systems?

Answer 10: Yes. The interim permitting approach is applicable to both discharges from municipal separate storm sewer systems and storm water discharges associated with industrial activity (as defined by 40 CFR 122.26(b)(14)). The interim permitting approach would not affect, however, permits that already incorporate appropriately derived numeric water quality-based effluent limitations. Since the interim permitting approach only addresses water quality-based effluent limitations, it also does not affect technology-based effluent limitations, such as those based on effluent limitations guidelines or developed using best

professional judgement, that are incorporated into storm water permits. In addition, particularly for some industries, adequate information may already have been collected with which to assess the reasonable potential for a storm water discharge to cause or contribute to an excursion of a WQS, and from which a numeric water quality-based effluent limitation can be (or has been) appropriately derived. An adequate amount of storm water pollutant source information may also exist with which to assess the effectiveness of the industrial storm water control measures in complying with the limitations and in reducing storm water contaminants for protecting water quality.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 26 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

FROM: Andrew D. Sawyers, Director
Office of Wastewater Management

Benita Best-Wong, Director
Office of Wetlands, Oceans and Watersheds

TO: Water Division Directors
Regions 1 - 10

This memorandum updates aspects of EPA's November 22, 2002 memorandum from Robert H. Wayland, III, Director of the Office of Wetlands, Oceans and Watersheds, and James A. Hanlon, Director of the Office of Wastewater Management, on the subject of "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" (hereafter "2002 memorandum"). Today's memorandum replaces the November 12, 2010, memorandum on the same subject; the Water Division Directors should no longer refer to that memorandum for guidance.

This memorandum is guidance. It is not a regulation and does not impose legally binding requirements on EPA or States. EPA and state regulatory authorities should continue to make permitting and TMDL decisions on a case-by-case basis considering the particular facts and circumstances and consistent with applicable statutes, regulations, and case law. The recommendations in this guidance may not be applicable to a particular situation. EPA may change or revoke this guidance at any time.

Background

Stormwater discharges are a significant contributor to water quality impairment in this country, and the challenges from these discharges are growing as more land is developed and more impervious surface is created. Stormwater discharges cause beach closures and contaminate shellfish and surface drinking water supplies. The increased volume and velocity of stormwater discharges causes streambank erosion, flooding, sewer overflows, and basement backups. The decreased natural infiltration of rainwater reduces groundwater recharge, depleting

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our underground sources of drinking water.[1] There are stormwater management solutions, such as green infrastructure, that can protect our waterbodies from stormwater discharges and, at the same time, offer many other benefits to communities.

Section III of the 2002 memorandum recommended that for NPDES-regulated municipal and small construction stormwater discharges, effluent limits be expressed as best management practices (BMPs) or other similar requirements, rather than as numeric effluent limits. The 2002 memorandum went on to provide guidance on using "an iterative, adaptive management BMP approach" for improving stormwater management over time as permitting agencies, the regulated community, and other involved stakeholders gain more experience and knowledge. EPA continues to support use of an iterative approach, but with greater emphasis on clear, specific, and measurable permit requirements and, where feasible, numeric NPDES permit provisions, as discussed below.

Since 2002, States and EPA have obtained considerable experience in developing TMDLs and WLAs that address stormwater sources (see Box 1 in the attachment for specific examples). Monitoring of the impacts of stormwater discharges on water quality has become more sophisticated and widespread.[2] The experience gained during this time has provided better information on the effectiveness of stormwater controls to reduce pollutant loadings and address water quality impairments. In many parts of the country, permitting agencies have issued several rounds of stormwater permits. Notwithstanding these developments, stormwater discharges remain a significant cause of water quality impairment in many places, highlighting a continuing need for more meaningful WLAs and more clear, specific, and measurable NPDES permit provisions to help restore impaired waters to their beneficial uses.

With this additional experience in mind, on November 12, 2010, EPA issued a memorandum updating and revising elements of the 2002 memorandum to better reflect current practices and trends in permits and WLAs for stormwater discharges. On March 17, 2011, EPA sought public comment on the November 2010 memorandum and, earlier this year, completed a nationwide review of current practices used in MS4 permits[3] and industrial and construction stormwater discharge permits. As a result of comments received and informed by the reviews of EPA and state-issued stormwater permits, EPA is in this memorandum replacing the

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[1] See generally Urban Stormwater Management in the United States (National Research Council, 2009), particularly the discussion in Chapter 3, *Hydrologic, Geomorphic, and Biological Effects of Urbanization on Watersheds*.

[2] Stormwater discharge monitoring programs have expanded the types pollutants and other indices (e.g., biologic integrity) being evaluated. This information is being used to help target priority areas for cleanup and to assess the effectiveness of stormwater BMPs. There are a number of noteworthy monitoring programs that are ongoing, including for example those being carried out by Duluth, MN, Capitol Region Watershed District, MN, Honolulu, HI, Baltimore or Montgomery County, MD, Puget Sound, WA, Los Angeles County, CA, and the Alabama Dept. of Transportation, among many others. See also Section 4.2 (Monitoring/Modeling Requirements) of EPA's *Municipal Separate Storm Sewer System Permits: Post-Construction Performance Standards & Water Quality-Based Requirements – A Compendium of Permitting Approaches* (EPA, June 2014), or "MS4 Compendium" available at http://water.epa.gov/polwaste/npdes/stormwater/upload/sw_ms4_compendium.pdf, for other examples of note.

[3] See EPA's MS4 Permit Compendium, referenced in the above footnote.

November 2010 memorandum, updating aspects of the 2002 memorandum and providing additional information in the following areas:

- Including clear, specific, and measurable permit requirements and, where feasible, numeric effluent limitations in NPDES permits for stormwater discharges;
- Disaggregating stormwater sources in a WLA; and
- Designating additional stormwater sources to regulate and developing permit limits for such sources.

Including Clear, Specific, and Measurable Permit Requirements and, Where Feasible, Numeric Effluent Limitations in NPDES Permits for Stormwater Discharges

At the outset of both the Phase I and Phase II stormwater permit programs, EPA provided guidance on the type of water quality-based effluent limits (WQBELs) that were considered most appropriate for stormwater permits. See Interim Permitting Policy for Water Quality-Based Limitations in Storm Water Permits [61 FR 43761 (August 26, 1996) and 61 FR 57425 (November 6, 1996)] and the Phase II rulemaking preamble 64 FR 68753 (December 8, 1999). Under the approach discussed in these documents, EPA envisioned that in the first two to three rounds of permit issuance, stormwater permits typically would require implementation of increasingly more effective best management practices (BMPs). In subsequent stormwater permit terms, if the BMPs used during prior years were shown to be inadequate to meet the requirements of the Clean Water Act (CWA), including attainment of applicable water quality standards, the permit would need to contain more specific conditions or limitations.

There are many ways to include more effective WQBELs in permits. In the spring of 2014, EPA published the results of a nationwide review of current practices used in MS4 permits in *Municipal Separate Storm Sewer Systems Permits: Post-Construction Performance Standards & Water Quality-Based Requirements – A Compendium of Permitting Approaches* (June 2014). This MS4 Compendium demonstrates how NPDES authorities have been able to effectively establish permit requirements that are more specifically tied to a measurable water quality target, and includes examples of permit requirements expressed in both numeric and non-numeric form. These approaches, while appropriately permit-specific, each share the attribute of being expressed in a clear, specific, and measurable way. For example, EPA found a number of permits that employ numeric, retention-based performance standards for post-construction discharges, as well as instances where permits have effectively incorporated numeric effluent limits or other quantifiable measures to address water quality impairment (see the attachment to this memorandum).

EPA has also found examples where the applicable WLAs have been translated into BMPs, which are required to be implemented during the permit term to reflect reasonable further progress towards meeting the applicable water quality standard (WQS). Incorporating greater specificity and clarity echoes the approach first advanced by EPA in the 1996 Interim Permitting Policy, which anticipated that where necessary to address water quality concerns, permits would be modified in subsequent terms to include "more specific conditions or limitations [which] may include an integrated suite of BMPs, performance objectives, narrative standards, monitoring triggers, numeric WQBELs, action levels, etc."

EPA also recently completed a review of state-issued NPDES industrial and construction permits, which also revealed a number of examples where WQBELs are expressed using clear, specific, and measurable terms. Permits are exhibiting a number of different approaches, not unlike the types of provisions shown in the MS4 Compendium. For example, some permits are requiring as an effluent limitation compliance with a numeric or narrative WQS, while others require the implementation of specific BMPs that reduce the discharge of the pollutant of concern as necessary to meet applicable WQS or to implement a WLA and/or are requiring their permittees to conduct stormwater monitoring to ensure the effectiveness of those BMPs. EPA intends to publish a compendium of permitting approaches in state-issued industrial and construction stormwater permits in early 2015.

Permits for MS4 Discharges

The CWA provides that stormwater permits for MS4 discharges "shall require controls to reduce the discharge of pollutants to the maximum extent practicable … and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." CWA section 402(p)(3)(B)(iii). Under this provision, the NPDES permitting authority has the discretion to include requirements for reducing pollutants in stormwater discharges as necessary for compliance with water quality standards. *Defenders of Wildlife v. Browner*, 191 F.3d 1159, 1166 (9th Cir. 1999).

The 2002 memorandum stated "EPA expects that most WQBELs for NPDES-regulated municipal and small construction stormwater discharges will be in the form of BMPs, and that numeric limitations will be used only in rare instances." As demonstrated in the MS4 Compendium, NPDES permitting authorities are using various forms of clear, specific, and measurable requirements, and, where feasible, numeric effluent limitations in order to establish a more objective and accountable means for reducing pollutant discharges that contribute to water quality problems.[4] Where the NPDES authority determines that MS4 discharges have the reasonable potential to cause or contribute to a water quality standard excursion, EPA recommends that the NPDES permitting authority exercise its discretion to include clear, specific, and measurable permit requirements and, where feasible, numeric effluent limitations[5] as necessary to meet water quality standards.

NPDES authorities have significant flexibility in how they express WQBELs in MS4 permits (see examples in Box 1 of the attachment). WQBELs in MS4 permits can be expressed as system-wide requirements rather than as individual discharge location requirements such as

[4] The MS4 Compendium presents examples of different permitting approaches that EPA has found during a nationwide review of state MS4 permits. Examples of different WQBEL approaches in the MS4 Compendium include permits that have (1) a list of applicable TMDLs, WLAs, and the affected MS4s; (2) numeric limits and other quantifiable approaches for specific pollutants of concern; (3) requirements to implement specific stormwater controls or management measures to meet the applicable WLA; (4) permitting authority review and approval of TMDL plans; (5) specific impaired waters monitoring and modeling requirements; and (6) requirements for discharges to impaired waters prior to TMDL approval.

[5] For the purpose of this memorandum, and in the context of NPDES permits for stormwater discharges, "numeric" effluent limitations refer to limitations with a quantifiable or measurable parameter related to a pollutant (or pollutants). Numeric WQBELs may include other types of numeric limits in addition to end-of-pipe limits. Numeric WQBELs may include, among others, limits on pollutant discharges by specifying parameters such as on-site stormwater retention volume or percentage or amount of effective impervious cover, as well as the more traditional pollutant concentration limits and pollutant loads in the discharge.

effluent limitations on discharges from individual outfalls. Moreover, the inclusion of numeric limitations in an MS4 permit does not, by itself, mandate the type of controls that a permittee will use to meet the limitation.

EPA recommends that NPDES permitting authorities establish clear, specific, and measurable permit requirements to implement the minimum control measures in MS4 permits. With respect to requirements for post-construction stormwater management, consistent with guidance in the 1999 Phase II Rule, EPA recommends, where feasible and appropriate, numeric requirements that attempt to maintain pre-development runoff conditions (40 CFR § 122.34(b)(5)) be incorporated into MS4 permits. EPA's MS4 Compendium features examples from 17 states and the District of Columbia that have already implemented retention performance standards for newly developed and redeveloped sites. See Box 2 of the attachment for examples.

Permits for Industrial Stormwater Discharges

The CWA requires that permits for stormwater discharges associated with industrial activity comply with section 301 of the Act, including the requirement under section 301(b)(1)(C) to contain WQBELs to achieve water quality standards for any discharge that the permitting authority determines has the reasonable potential to cause or contribute to a water quality standard excursion. CWA section 402(p)(3)(A), 40 CFR § 122.44(d)(1)(iii). When the permitting authority determines, using the procedures specified at 40 CFR § 122.44(d)(1)(ii), that the discharge causes or has the reasonable potential to cause or contribute to an in-stream excursion of the water quality standards, the permit must contain WQBELs as stringent as necessary to meet any applicable water quality standard for that pollutant. EPA recommends that NPDES permitting authorities use the experience gained in developing WQBELs to design effective permit conditions to create objective and accountable means for controlling stormwater discharges. See box 3 in the attachment for examples.

Permits should contain clear, specific, and measurable elements associated with BMP implementation (*e.g.*, schedule for BMP installation, frequency of a practice, or level of BMP performance), as appropriate, and should be supported by documentation that implementation of selected BMPs will result in achievement of water quality standards. Permitting authorities should also consider including numeric benchmarks for BMPs and associated monitoring protocols for estimating BMP effectiveness in stormwater permits. Benchmarks can support an adaptive approach to meeting applicable water quality standards. While exceeding the benchmark is not generally a permit violation, exceeding the benchmark would typically require the permittee to take additional action, such as evaluating the effectiveness of the BMPs, implementing and/or modifying BMPs, or providing additional measures to protect water quality.[6] Permitting authorities should consider structuring the permit to clarify that failure to implement required corrective action, including a corrective action for exceeding a benchmark, is a permit violation. EPA notes that, as many stormwater discharges are authorized under a general permit, NPDES authorities may find it more appropriate where resources allow to issue

[6] For example, Part 6.2.1 of EPA's 2008 MSGP provides: "This permit stipulates pollutant benchmark concentrations that may be applicable to your discharge. The benchmark concentrations are not effluent limitations; a benchmark exceedance, therefore, is not a permit violation. Benchmark monitoring data are primarily for your use to determine the overall effectiveness of your control measures and to assist you in knowing when additional corrective action(s) may be necessary to comply with the effluent limitations ..."

individual permits that are better tailored to meeting water quality standards for large industrial stormwater discharges with more complex stormwater management features, such as multiple outfalls and multiple entities responsible for permit compliance.

All Permitted Stormwater Discharges

As stated in the 2002 memorandum, where a State or EPA has established a TMDL, NPDES permits must contain effluent limits and conditions consistent with the assumptions and requirements of the WLAs in the TMDL. See 40 CFR § 122.44(d)(1)(vii)(B). Where the TMDL includes WLAs for stormwater sources that provide numeric pollutant loads, the WLA should, where feasible, be translated into effective, measurable WQBELs that will achieve this objective. This could take the form of a numeric limit, or of a measurable, objective BMP-based limit that is projected to achieve the WLA. For MS4 discharges, CWA section 402(p)(3)(B)(iii) provides flexibility for NPDES authorities to set appropriate deadlines for meeting WQBELs consistent with the requirements for compliance schedules in NPDES permits set forth in 40 CFR § 122.47.

The permitting authority's decision as to how to express the WQBEL(s), either as numeric effluent limitations or as BMPs, with clear, specific, and measurable elements, should be based on an analysis of the specific facts and circumstances surrounding the permit, and/or the underlying WLA, including the nature of the stormwater discharge, available data, modeling results, and other relevant information. As discussed in the 2002 memorandum, the permit's administrative record needs to provide an adequate demonstration that, where a BMP-based approach to permit limitations is selected, the BMPs required by the permit will be sufficient to implement applicable WLAs. Permits should also include milestones or other mechanisms where needed to ensure that the progress of implementing BMPs can be tracked. Improved knowledge of BMP effectiveness gained since 2002[7] should be reflected in the demonstration and supporting rationale that implementation of the BMPs will attain water quality standards and be consistent with WLAs.

EPA's regulations at 40 CFR § 122.47 govern the use of compliance schedules in NPDES permits. Central among the requirements is that the effluent limitation(s) must be met "as soon as possible." 40 CFR § 122.47(a)(1). As previously discussed, by providing discretion to include "such other provisions" as deemed appropriate, CWA section 402(p)(3)(B)(iii) provides flexibility for NPDES authorities to set appropriate deadlines towards meeting WQBELs in MS4 permits consistent with the requirements for compliance schedules in NPDES permits set forth in 40 CFR § 122.47. See *Defenders of Wildlife v Browner*, 191 F.3d at 1166. EPA expects the permitting authority to document in the permit record the basis for determining that the compliance schedule is "appropriate" and consistent with the CWA and 40 CFR § 122.47. Where a TMDL has been established and there is an accompanying implementation plan that provides a schedule for an MS4 to implement the TMDL, or where a comprehensive, integrated plan addressing a municipal government's wastewater and stormwater obligations under the NPDES program has been developed, the permitting authority should consider such schedules as it decides whether and how to establish enforceable interim requirements and interim dates in the permit.

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[7] See compilation of current BMP databases and summary reports available at http://water.epa.gov/infrastructure/greeninfrastructure/gi_performance.cfm, which has compiled current BMP databases and summary reports.

EPA notes that many permitted stormwater discharges are covered by general permits. Permitting authorities should consider and build into general permits requirements to ensure that permittees take actions necessary to meet the WLAs in approved TMDLs and address impaired waters. A general permit can, for example, identify permittees subject to applicable TMDLs in an appendix, and prescribe the activities that are required to meet an applicable WLA.

Lastly, NPDES permits must specify monitoring requirements necessary to determine compliance with effluent limitations. See CWA section 402(a)(2); 40 CFR 122.44(i). The permit could specify actions that the permittee must take if the BMPs are not performing properly or meeting expected load reductions. When developing monitoring requirements, the NPDES authority should consider the variable nature of stormwater as well as the availability of reliable and applicable field data describing the treatment efficiencies of the BMPs required and supporting modeling analysis.

Disaggregating Stormwater Sources in a WLA

In the 2002 memorandum, EPA said it "may be reasonable to express allocations for NPDES-regulated stormwater discharges from multiple point sources as a single categorical wasteload allocation when data and information are insufficient to assign each source or outfall individual WLAs." EPA also said that, "[i]n cases where wasteload allocations are developed for categories of discharges, these categories should be defined as narrowly as available information allows." Furthermore, EPA said it "recognizes that the available data and information usually are not detailed enough to determine waste load allocations for NPDES-regulated stormwater discharges on an outfall-specific basis."

EPA still recognizes that "[d]ecisions about allocations of pollutant loads within a TMDL are driven by the quantity and quality of existing and readily available water quality data," but has noted the difficulty of establishing clear, specific, and measurable NPDES permit limitations for sources covered by WLAs that are expressed as single categorical or aggregated wasteload allocations. Today, TMDL writers may have more information—such as more ambient monitoring data, better spatial and temporal representation of stormwater sources, and/or more permit-generated data—than they did in 2002 to develop more disaggregated TMDL WLAs.

Accordingly, for all these reasons, EPA is again recommending that, "when information allows," WLAs for NPDES-regulated stormwater discharges be expressed "as different WLAs for different identifiable categories" (*e.g.*, separate WLAs for MS4 and industrial stormwater discharges). In addition, as EPA said in 2002, "[t]hese categories should be defined as narrowly as available information allows (*e.g.*, for municipalities, separate WLAs for each municipality and for industrial sources, separate WLAs for different types of industrial stormwater sources or dischargers)." EPA does not expect states to assign WLAs to individual MS4 outfalls; however, some states may choose to do so to support their implementation efforts. These recommendations are consistent with the decision in *Anacostia Riverkeeper, Inc. v. Jackson*, 2011 U.S. Dist. Lexis 80316 (July 25, 2011).

In general, states are encouraged to disaggregate the WLA when circumstances allow to facilitate implementation. TMDL writers may want to consult with permit writers and local authorities to collect additional information such as sewer locations, MS4 jurisdictional

boundaries, land use and growth projections, and locations of stormwater controls and infrastructure, to facilitate disaggregation. TMDLs have used different approaches to disaggregate stormwater to facilitate MS4 permit development that is consistent with the assumptions and requirements of the WLA. For example, some TMDLs have used a geographic approach and developed individual WLAs by subwatershed[8] or MS4 boundary (*i.e.*, the WLA is subdivided by the relative estimated load contribution to the subwatershed or the area served by the MS4). TMDLs have also assigned percent reductions[9] of the loading based on the estimated wasteload contribution from each MS4 permit holder. Where appropriate, EPA encourages permit writers to identify specific shares of an applicable wasteload allocation for specific permittees during the permitting process, as permit writers may have more detailed information than TMDL writers to effectively identify reductions for specific sources.

Designating Additional Stormwater Sources to Regulate and Developing Permit Limits for Such Sources

The 2002 memorandum states that "stormwater discharges from sources that are not currently subject to NPDES regulation may be addressed by the load allocation component of a TMDL." Section 402(p)(2) of the Clean Water Act (CWA) requires industrial stormwater sources, certain municipal separate storm sewer systems, and other designated sources to be subject to NPDES permits. Section 402(p)(6) provides EPA with authority to identify additional stormwater discharges as needing a permit.

In addition to the stormwater discharges specifically identified as needing an NPDES permit, the CWA and the NPDES regulations allow for EPA and NPDES authorized States to designate additional stormwater discharges for regulation. See:
40 CFR §§122.26 (a)(9)(i)(C), (a)(9)(i)(D), (b)(4)(iii), (b)(7)(iii), (b)(15)(ii) and 122.32(a)(2). Accordingly, EPA encourages permitting authorities to consider designation of stormwater sources in situations where coverage under NPDES permits would, in the reasonable judgment of the permitting authority and, considering the facts and circumstances in the waterbody, provide the most appropriate mechanism for implementing the pollution controls needed within a watershed to attain and maintain applicable water quality standards.

If a TMDL had previously included a newly permitted source as part of a single aggregated or gross load allocation for all unregulated stormwater sources, or all unregulated sources in a specific category, the NPDES permit authority could identify an appropriate allocation share and include a corresponding limitation specific to the newly permitted stormwater source. EPA recommends that any additional analysis used to identify that share and develop the corresponding limit be included in the administrative record for the permit. The permit writer's additional analysis would not change the TMDL, including its overall loading cap.

In situations where a stormwater source addressed in a TMDL's load allocation is not currently regulated by an NPDES permit but may be required to obtain an NPDES permit in the

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[8] Wissahickon Creek Siltation TMDL (Pennsylvania) www.epa.gov/reg3wapd/tmdl/pa_tmdl/wissahickon/index.htm.
[9] Liberty Bay Watershed Fecal Coliform Bacteria TMDL (Washington). https://fortress.wa.gov/ecy/publications/SummaryPages/1310014.html and Upper Minnehaha Creek Watershed Nutrients and Bacteria TMDL (Minnesota) http://www.pca.state.mn.us/index.php/view-document.html?gid=20792

future, the TMDL writer should consider including language in the TMDL explaining that the allocation for the stormwater source is expressed in the TMDL as a "load allocation" contingent on the source remaining unpermitted, but that the "load allocation" would later be deemed a "wasteload allocation" if the stormwater discharge from the source were required to obtain NPDES permit coverage. Such language would help ensure that the allocation is properly characterized by the permit writer should the source's regulatory status change. This will help the permit writer develop limitations for the NPDES permit applicable to the newly permitted source that are consistent with the assumptions and requirements of the TMDL's allocation to that source.

If you have any questions please feel free to contact us or Deborah Nagle, Director of the Water Permits Division, or Tom Wall, Director of the Assessment and Watershed Protection Division.

cc: Association of Clean Water Administrators
TMDL Program Branch Chiefs, Regions 1 – 10
NPDES Permits Branch Chiefs, Regions 1 – 10

Attachment: MS4 and Industrial Stormwater Permit Examples

ATTACHMENT: MS4 and Industrial Stormwater Permit Examples

BOX 1. Examples of WQBELs in MS4 Permits:

1. Numeric expression of the WQBEL: The MS4 Permit includes a specific, quantifiable performance requirement that must be achieved within a set timeframe. For example:
   - Reduce fine sediment particles, total phosphorus, and total nitrogen loads by 10 percent, 7 percent, and 8 percent, respectively, by September 30, 2016 (2011 Lake Tahoe, CA MS4 permit)
   - Restore within the 5-year permit term 20 percent of the previously developed impervious land (2014 Prince George's County, MD MS4 permit)
   - Achieve a minimum net annual planting rate of 4,150 planting annually within the MS4 area, with the objective of an MS4-wide urban tree canopy of 40 percent by 2035 (2011 Washington, DC MS4 permit)
   - Discharges from the MS4 must not cause or contribute to exceedances of receiving water limits for Diazinon of 0.08μg/L for acute exposure (1 hr averaging period) or 0.05μg/L for chronic exposure (4-day averaging period), OR must not exceed Diazinon discharge limits of 0.072 μg/L for acute exposure or 0.045μg/L for chronic exposure (2013 San Diego, CA Regional MS4 permit)

2. Non-numeric expressions of the WQBEL: The MS4 Permit establishes individualized, watershed-based requirements that require each affected MS4 to implement specific BMPs within the permit term, which will ensure reasonable further progress towards meeting applicable water quality standards.
   - To implement the corrective action recommendations of the Issaquah Creek Basin Water Cleanup Plan for Fecal Coliform Bacteria (part of the approved Fecal Coliform Bacteria TMDL for the Issaquah Creek Basin), King County is required during the permit term to install and maintain animal waste education and/or collection stations at municipal parks and other permittee owned and operated lands reasonably expected to have substantial domestic animal use and the potential for stormwater pollution. The County is also required to complete IDDE screening for bacteria sources in 50 percent of the MS4 subbasins, including rural MS4 subbasins, by February 2, 2017 and implement the activities identified in the Phase I permit for responding to any illicit discharges found (2013 Western Washington Small MS4 General Permit)
   - For discharges to Segment 14 of the Upper South Platte River Basin associated with WLAs from the approved *E. coli* TMDL, the MS4 must identify outfalls with dry weather flows; monitor priority outfalls for flow rates and *E. coli* densities; implement a system maintenance program for listed priority basins (which includes storm sewer cleaning and sanitary sewer investigations); install markers on at least 90% of storm drain inlets in areas with public access; and conduct a public outreach program focused on sources that contribute *E. coli* loads to the MS4. By November 30, 2018, dry weather discharges from MS4 outfalls of concern must not contribute to an exceedance of the *E. coli* standard (126 cfu per 100 ml for a geometric mean of all samples collected at a specific outfall in a 30-day period) (2009 Denver, CO MS4 Permit)

3. Hybrid approach with both numeric and non-numeric expressions of the WQBEL:
   - Discharges of trash from the MS4 to the LA River must be reduced to zero by Sept. 2016. Permittees also have the option of complying via the installation of defined "full capture systems" to prevent trash from entering the MS4 (2012 Los Angeles County, CA MS4 Permit).
   - To attain the shared, load allocation of 27,000 metric tons/year of sediment in the Napa River sediment TMDL, municipalities shall determine opportunities to retrofit and/or reconstruction of road crossings to minimize road-related sediment delivery (≤ 500 cubic yards/mile per 20-year period) to stream channels (2013 CA Small MS4 General Permit).

Box 2. Examples of Retention Post Construction Standards for New and Redevelopment in MS4 Permits

- 2009 WV small MS4 permit: Keep and manage on site the first one inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation.
- 2011 DC Phase I MS4 permit: Achieve on-site retention of 1.2" of stormwater from a 24-hour storm with a 72-hour antecedent dry period through evapotranspiration, infiltration and/or stormwater harvesting.
- 2012 Albuquerque, NM Phase I MS4 permit: Capture the 90th percentile storm event runoff to mimic the predevelopment hydrology of the previously undeveloped site.
- 2010 Anchorage, AK Phase I MS4 permit: Keep and manage the runoff generated from the first 0.52 inches of rainfall from a 24 hour event preceded by 48 hours of no measureable precipitation.
- 2013 Western WA small MS4 permit: Implement low impact development performance standards to match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year flow to 50% of the 2-year flow.

BOX 3. Examples of WQBELs in Industrial (including Construction) Stormwater Permits:

1. Numeric expression of the WQBEL: The permit includes a specific, quantifiable performance requirement that must be achieved:
   - Pollutant concentrations shall not exceed the stormwater discharge limits specified in the permit (based on state WQS), including (for example): Cadmium-0.003 mg/l; Mercury-0.0024 mg/l; Selenium-0.02 mg/l (2013 Hawaii MSGP)
   - Beginning July 1, 2010, permittees discharging to impaired waters without an EPA-approved TMDL shall comply with the following effluent limits (based on state WQS), including (for example): Turbidity-25 NTU; TSS-30 mg/l; Mercury-0.0021 mg/l; Phosphorus, Ammonia, Lead, Copper, Zinc-site-specific limits to be determined at time of permit coverage (2010 Washington MSGP)
   - If discharging to waters on the 303(d) list (Category 5) impaired for turbidity, fine sediment, or phosphorus, the discharge must comply with the following effluent limit for turbidity: 25 NTU (at the point of discharge from the site), or no more than 5 NTU above background turbidity when the background turbidity is 50 NTU or less, or no more than a 10% increase in turbidity when background turbidity is more than 50 NTU. Discharges to waterbodies on the 303(d) list (Category 5) for high pH must comply with the numeric effluent limit of pH 6.5 to 8.5 su (2010 Washington CGP) (2010 Washington CGP)

2. Narrative expression of the WQBEL: The permit includes narrative effluent limits based on applicable WQS:
   - New discharges or new dischargers to an impaired water are not eligible for permit coverage, unless documentation or data exists to show that (1) all exposure of the pollutant(s) of concern to stormwater is prevented; or (2) the pollutant(s) of concern are not present at the facility; or (3) the discharge of the pollutant(s) of concern will meet instream water quality criteria at the point of discharge (for waters without an EPA-approved TMDL), or there is sufficient remaining WLAs in an EPA-approved TMDL to allow the discharge and that existing dischargers are subject to compliance schedules to bring the waterbody into attainment with WQS (2011 Vermont MSGP; similar requirements in RI, NY, MD, VA, WV, SC, AR, TX, KS, NE, AZ, CA, AK, OR, and WA permits)
   - In addition to other applicable WQBELs, there shall be no discharge that causes visible oil sheen, and no discharge of floating solids or persistent foam in other than trace amounts. Persistent foam is foam that does not dissipate within one half hour of point of discharge (2014 Maryland MSGP)

3. Requirement to implement additional practices or procedures for discharges to impaired waters:
   - For sediment-impaired waters (without an approved TMDL), the permittee is required to maintain a minimum 50-foot buffer zone between any disturbance and all edges of the receiving water (2009 Kentucky CGP)
   - For discharges to impaired waters, implement the following: (1) stabilization of all exposed soil areas immediately, but in no case later than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased (as compared to 14 days for no-impaired waters); (2) temporary sediment basins must meet specified design standards if they will serve an area of 5 or more acres (as compared to 10 or more acres for other sites); (3) retain a water quality volume of 1 inch of runoff from the new impervious surfaces created by the project (though this volume reduction requirement is for discharges to all waters, not just impaired waters) (2013 Minnesota CGP).
   - If the site discharges to a water impaired for sediment or turbidity, or to a water subject to an EPA-approved TMDL, the permittee must implement one or more of the following practices: (1) compost berms, compost blankets, or compost socks; (2) erosion control mats; (3) tackifiers used with a perimeter control BMP; (4) a natural buffer of 50 feet (horizontally) plus 25 feet (horizontally) for 5 degrees of slope; (5) water treatment by electro-coagulation, flocculation, or filtration; and/or (6) other substantially equivalent sediment or turbidity BMP approved by the state (2010 Oregon CGP)

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order R2-2009-0074
NPDES Permit No. CAS612008
October 14, 2009

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER R2-2009-0074
NPDES PERMIT NO. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

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Attachment K: Standard NPDES Stormwater Permit Provisions

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Appendix I) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference.

Existing Permits

2. **Alameda County—**The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 26, 2007, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS0029831 issued by Order No. R2-2003-0021 on February 19, 2003, and amended by Order No. R2-2007-0025 on March 14, 2007, to the Alameda Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

3. **Contra Costa County—**The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated September 30, 2003, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS0029912 issued by Order No. 99-058 on July 21, 1999, amended by Order No. R2-2003-0022 on February 9, 2003, amended by Order Nos. R2-2004-059 and R2-2004-0061 on July 21, 2004, and amended by Order No. R2-2006-0050 on July 12, 2006, to the Contra Costa Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

4. **San Mateo County—**The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District and San Mateo County have joined together to form the San Mateo Countywide Water Pollution Prevention

Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated January 23, 2004, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS0029921 issued by Order No. 99-059 on July 21, 1999, amended by Order No. R2-2003-0023 on February 19, 2003, amended by Order Nos. R2-2004-0060 and R2-2004-0062 on July 21, 2004, and amended by Order R2-2007-0027 on March 14, 2007, to the San Mateo Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County—**The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated February 25, 2005, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS029718 issued by Order No. 01-024 on April 21, 2001, amended by Order No. 01-119 on October 17, 2001, and Order No. R2-2005-0035 on July 20, 2005, to the Santa Clara Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun—**The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated October 17, 2007, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612005 issued by Order No. R2-2003-0034 on April 16, 2003, and amended by Order R2-2007-0026 on March 14, 2007, to the Fairfield-Suisun Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo—**The City of Vallejo and the Vallejo Sanitary District (hereinafter referred to as the Vallejo Permittees) are currently subject to NPDES Permit No. CAS612006 issued by the United States Environmental Protection Agency (USEPA) on April 27, 1999, and that became effective on May 30, 1999, for the discharge of stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions.

8. The Alameda, Contra Costa, San Mateo, Santa Clara, Fairfield-Suisun, and Vallejo Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, USEPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, USEPA published an Interpretive Policy

Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Board), Office of Administrative Law and the USEPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, and selenium in San Francisco Bay segments; pesticide associated toxicity in all urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish TMDLs for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. The San Francisco Estuary Project, established pursuant to CWA Section 320, culminated in June 1993 with completion of its Comprehensive Conservation and Management Plan (CCMP) for the preservation, restoration, and enhancement of the San Francisco Bay-Delta Estuary. The 2007 update of the CCMP includes new and revised actions, while retaining many of the original plan's actions. The CCMP includes recommended actions in the areas of aquatic resources, wildlife, wetlands, water use, pollution prevention and reduction, dredging and waterway modification, land use, public involvement and education, and research and monitoring. Recommended actions which may, in part, be addressed through implementation of this Permit include, but are not limited to, the following:

    (1) ACTION AR-9.1 (New 2007)
    Improve understanding of sources, types, and impacts of marine debris in the Estuary.

    (5) ACTION AR-9.2 (New 2007)
    Expand existing marine debris prevention and cleanup programs and develop new initiatives to reduce discharge of debris to waterways.

    (10) ACTION PO-1.2 (Revised 2007)
    Recommend institutional and financial changes needed to place more focus on pollution prevention.

    (12) ACTION PO-1.6 (Revised 2007)
    Implement a comprehensive strategy to reduce pesticides coming into the Estuary.

    (13) ACTION PO-1.7.1 (New 2007)
    Develop product stewardship program for new commercial products to minimize future pollutant releases.

(14) ACTION PO-1.8 (New 2007)
Develop and implement programs to prevent pollution of the Estuary by other harmful pollutants like trash, bacteria, sediments, and nutrients.

(15) ACTION PO-2.1 (Revised 2007)
Pursue a mass emissions strategy to reduce pollutant discharges into the Estuary from point and nonpoint sources and to address the accumulation of pollutants in estuarine organisms and sediments.

(16) ACTION PO-2.4 (Revised 2007)
Improve the management and control of urban runoff from public and private sources.

(18) ACTION PO-3.3 (New 2007)
Accomplish large-scale improvements to Bay-Delta area infrastructure and implement pollution prevention strategies to prevent pollution threats to public health and wildlife.

(19) ACTION PO-4.1 (New 2007)
Increase regulatory incentives for municipalities, through urban runoff and other programs, to invest in projects that restore or enhance stream and wetland functions.

(20) ACTION LU-1.1 (Revised 2007)
Local land use jurisdiction's General Plans should incorporate watershed protection goals for wetlands and stream environments and to reduce pollutants in runoff.

(21) ACTION LU-1.1.1 (New 2007): Provide assistance to local agencies to ensure that applicable nonpoint source control elements are incorporated into local government and business practices.

(22) ACTION LU-1.5 (LU-3.2 in 1993 CCMP; Revised 2007)
Provide incentives and promote the use of building, planning, and maintenance guidelines for site planning and implementation of best management practices (BMPs) as related to stormwater and encourage local jurisdictions to adopt these guidelines as local ordinances.

(23) ACTION LU-1.6 (New 2007)
Continue and enhance training and certification for planners, public works departments, consultants, and builders on sustainable design and building practices with the goal of preventing or minimizing alteration of watershed functions (e.g., flood water conveyance, groundwater infiltration, stream channel and floodplain maintenance), and preventing construction-related erosion and post-construction pollution.

(24) ACTION LU-2.7 (New 2007)
Adopt and implement policies and plans that protect and restore water quality, flood water storage, and other natural functions of stream and wetland systems.

(25) ACTION LU-3.1 (New 2007)
Promote, encourage, and support collaborative partnerships with broad stakeholder representation, such as watershed councils, in order to develop diverse community-based approaches to long-term stewardship.

(26) ACTION LU-4.1 (Revised 2007)
Educate the public about how human actions impact the Estuary and its watersheds.

(28) ACTION PI-2.5 (Revised 2007)
Assist in the development of long-term educational programs designed to prevent pollution to the Estuary's ecosystem and provide assistance to other programs as needed.

13. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

14. Stormwater runoff is generated from various land uses in all the hydrologic sub basins in the Basin and discharges into watercourses, which in turn flow into Central, Lower and South San Francisco Bay.

15. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not limited to, support for aquatic life; and other pollutants which can cause aquatic toxicity in the receiving waters.

16. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to US EPA Phase II stormwater regulations. Under Phase II, the Water Board can permit these federal, State, and regional entities through use of the Statewide Phase II NPDES General Permit.

17. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

18. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

19. This Order supersedes and rescinds Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, R2-2003-0034, and supersedes NPDES Permit Nos. CAS0029831, CAS0029912, CAS0029921, CAS029718, CAS0612005, and CAS612006.

    This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective December 1, 2009, provided the Regional Administrator, USEPA, Region 9, has no objections.

IT IS HEREBY ORDERED that the Permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act as amended and regulations and guidelines adopted hereunder, shall comply with the following:

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into, storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

- **a.** Floating, suspended, or deposited macroscopic particulate matter, or foam;
- **b.** Bottom deposits or aquatic growths;
- **c.** Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
- **d.** Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- **e.** Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.15.

If exceedance(s) of water quality standards or water quality objectives (collectively, WQSs) persist in receiving waters, the Permittees shall comply with the following procedure:

C.1.a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable WQS, the Permittee(s) shall notify, within no more than 30 days, and thereafter, except for any exceedances of WQSs for pesticides, trash, mercury, polychlorinated biphenols, copper, polybrominated diphenyl ethers, and selenium that are addressed pursuant to Provisions C.8 through C.14 of this Order, submit a report to the Water Board that describes BMPs that are currently being implemented, and the current level of implementation, and additional BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQSs. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

C.1.b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as the Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same WQSs unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure development and implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. Task Description – Asphalt/Concrete Removal, Cutting, Installation and Repair - The Permittees shall develop and implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving or repair maintenance activities, such as those described in the California Stormwater Quality Association's Handbook for Municipal Operations.

ii. Implementation Levels

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer system is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from such work sites upon completion of work. The Permittees shall require cleanup of all construction remains, spills and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) Blueprint for a Clean Bay.

iii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. Task Description – The Permittees shall implement, and require to be implemented, BMPs for pavement washing, mobile cleaning, pressure wash operations in such locations as parking lots and garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning, which prohibit the discharge of polluted wash water and non-stormwater to storm drains. The Permittees shall implement the BMPs included in BASMAA's Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. Task Description

(1) The Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. Implementation Levels

(1) The Permittees shall prevent all debris, including structural materials and coating debris, such as paint chips, or other debris and pollutants generated in bridge and structure maintenance or graffiti removal from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall determine the proper disposal method for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts about these proper capture and disposal methods for the wastes generated.

iii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.d. Stormwater Pump Stations

The objective of this sub-provision is to prevent the discharge of water with low dissolved oxygen (DO) from pump stations, and to explore the use of pump stations for trash capture and removal from waters to protect beneficial uses of receiving waters.

i. Task Description – Operation and Maintenance of Stormwater Pump Stations – The Permittees shall develop and implement measures to operate, inspect, and maintain these facilities to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in the stormwater discharges to comply with WQSs.

ii. Implementation Levels – The Permittees shall comply with the following implementation measures to reduce polluted water discharges from Permittee-owned or operated pump stations:

(1) Complete an inventory of pump stations within each Permittee's jurisdiction, including locations, and key characteristics[1] by March 1, 2010.

(2) Inspect and collect DO data from all pump stations twice a year during the dry season after July 1, starting in 2010. DO monitoring is exempted where all discharge from a pump station remains in the stormwater collection system or infiltrates into a dry creek immediately downstream.

(3) If DO levels are at or below 3 milligrams per liter (3 mg/L), apply corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 mg/L. Verify corrective actions are effective by increasing DO monitoring interval to weekly until two weekly samples are above 3 mg/L.

(4) Starting in fall 2010, inspect pump stations a minimum of two times during the wet season in the first business day after ¼-inch and larger storm events after a minimum of a two week antecedent period with no precipitation. Post-storm inspections shall collect and report presence and quantity estimates of trash, including presence of odor, color, turbidity, and floating hydrocarbons. Remove debris and trash and replace any oil absorbent booms, as needed.

iii. Reporting – The Permittees shall report information resulting from C.2.d.ii.(2)-(4), including DO monitoring data and subsequent corrective actions taken to verify compliance with the 3 mg/L implementation level, in their Annual Report, and maintain records of inspection and maintenance activities and volume or mass of waste materials removed from pump stations.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance - For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Game and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

[1] Characteristics include name of pump station, latitude and longitude in WGS 84, number of pumps, drainage area in acres, dominant land use(s), first receiving water body, maximum pumping capacity of station in gallons per minute (gpm), flow measurement capability (Y or N), flow measurement method, average wet season discharge rate in gpm, dry season discharge (Y, N, or unknown), nearest municipal wastewater treatment plant, wet well storage capacity in gallons, trash control (Y or N), trash control measure, and date built or last updated.

ii. Implementation Level

(1) The Permittees shall develop, where they do not already exist, and implement BMPs for erosion and sediment control measures during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities, by April 1, 2010.

(2) The Permittees shall develop and implement appropriate BMPs for the following activities, which minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities:

(a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identification and prioritization of rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Construction of roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Development and implementation of an inspection program to maintain rural roads' structural integrity and prevent impacts on water quality;

(e) Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion;

(f) Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacement of existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall develop or incorporate existing training and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction to avoid water quality impacts.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for the rural public works construction and maintenance activities in their Annual Report, including reporting on increased maintenance in priority areas.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall prepare, implement, and maintain a site specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment and maintenance vehicle parking areas, and material storage facilities to comply with water quality standards. Each SWPPP shall incorporate all applicable BMPs that are described in the California Stormwater Quality Association's Handbook for Municipal Operations and the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003, and its addenda, as appropriate.

(2) The requirements in this provision shall apply only to facilities that are not already covered under the State Board's Industrial Stormwater NPDES General Permit.

(3) The site specific SWPPPs for corporation yards shall be completed by July 1, 2010.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters and street sweeper, vactor, and other related equipment cleaning wash water. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that no non-stormwater discharges are entering the storm drain system and, during storms, pollutant discharges are prevented to the maximum extent practicable. At a minimum, an inspection shall occur before the start of the rainy season.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal

wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing waste pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting – The Permittees shall report on implementation of SWPPPs, the results of inspections, and any follow-up actions in their Annual Report.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. Task Description – At a minimum each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain stenciling.

- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:
  - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
  - Dumpster drips from covered trash and food compactor enclosures.
  - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
  - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
  - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the Bay-Friendly Landscape Guidelines).

ii. Implementation Level – Most of the elements of this task should already be fully implemented because they are required in the Permittees' existing stormwater permits.

Due Dates for Full Implementation – Immediate for C.3.a.i.(1)-(5), May 1, 2010 for C.3.a.i.(6)-(7), and December 1, 2010 for C.3.a.i.(8). For Vallejo Permittees: December 1, 2010 for C.3.a.i.(1)-(8)

iii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1)–(8) in the 2011 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility[2] in accordance with Provisions C.3.c and C.3.d, unless the Provision C.3.e alternate compliance options are evoked. For adjacent Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by

[2] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other,

the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

Regulated Projects, as they are defined in this Provision, do not include detached single-family home projects that are not part of a larger plan of development.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Uncovered parking lots that are stand-alone or part of any other development project. This category includes the top uncovered portion of parking structures unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels;

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement,
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **more than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(e) For any private development project in the categories specified in Provisions C.3.b.ii.(1)(a)(i)-(iv) for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for the 5000 square feet threshold, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the lower 5000 square feet impervious surface threshold specified in Provision C.3.b.ii.(1).

(f) For any private development project in the categories specified in Provisions C.3.b.ii.(1)(a)(i)-(iv) with an application deemed complete after the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011, for the 5000 square feet threshold.

(g) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the lower 5000 square feet of impervious surface threshold (for classification as a Regulated Project) shall not apply.

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

Beginning December 1, 2011, all references to 10,000 square feet in Provision C.3.b.ii.(1) change to 5,000 square feet.

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

- Interior remodels.
- Routine maintenance or repair such as:
  - roof or exterior wall surface replacement, or
  - pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **more than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of **more than 50 percent** of the impervious surface of an existing street or road that was not subject to Provision C.3, **the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design** (i.e.,

stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration **of less than 50 percent** of the impervious surface of an existing street or road that was not subject to Provision C.3, **only the new and/or replaced impervious surface of the project must be included in the treatment system design** (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system must be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) are:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.
- Bicycle lanes that are built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[3]
- Caltrans highway projects and associated facilities.

(e) For any private road or trail project described by Provisions C.3.b.ii.(4)(b) or (c) for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, the requirements of Provisions C.3.b.ii.(4)(b) or (c) to classify the project as a Regulated Project shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for Provisions C.3.b.ii.(4)(b) and (c), the project applicant has not taken

[3] **Permeable surfaces** include pervious concrete, porous asphalt, unit pavers, and granular materials.

any action to obtain the necessary approvals from the Permittee, the project will then be classified as a Regulated Project under Provisions C.3.b.ii.(4)(b) or (c).

(f) For any private road or trail project with an application deemed complete after the Permit effective date, the requirements of Provisions C.3.b.i.(4)(b) or (c) to classify the project as a Regulated Project shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011, for Provisions C.3.b.ii.(4)(b) and (c).

(g) For any public road or trail project for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.b.i.(4)(b) or (c) to classify the project as a Regulated Project shall not apply.

Effective Date – Immediate for C.3.b.ii.(4)(a) and (d)-(g), and December 1, 2011, for C.3.b.ii.(4)(b) and (c). For Vallejo Permittees: Immediate for C.3.b.ii.(4)(d)-(g), and December 1, 2011 for C.3.b.ii.(4)(a)-(c).

iii. Green Street Pilot Projects

The Permittees shall cumulatively complete ten pilot green street projects that incorporate LID techniques for site design and treatment in accordance with Provision C.3.c and that provide stormwater treatment sized in accordance with Provision C.3.d. It is also desirable that they meet or exceed the Bay-Friendly Landscape Scorecard minimum requirements (see www.BayFriendly.org).

(1) Parking lot projects that provide LID treatment in accordance with Provisions C.3.c and Provision C.3.d. for stormwater runoff from the parking lot and street may be considered pilot green street projects.

(2) A Regulated Project (as defined in Provision C.3.b.ii) may not be counted as one of the ten pilot green street projects.

(3) At least two pilot green street projects must be located in each of the following counties: Alameda, Contra Costa, San Mateo, and Santa Clara.

(4) The Permittees shall construct the ten pilot green street projects in such a manner that they, as a whole:

(a) Are representative of the various types of streets: arterial, collector, and local; and

(b) Contain the following key elements:

(i) Stormwater storage for landscaping reuse or stormwater treatment and/or infiltration for groundwater replenishment through the use of natural feature systems;

(ii) Creation of attractive streetscapes that enhance neighborhood livability by enhancing the pedestrian environment and introducing park-like elements into neighborhoods;

(iii) Service as an urban greenway segment that connects neighborhoods, parks, recreation facilities, schools, mainstreets, and wildlife habitats;

(iv) Parking management that includes maximum parking space requirements as opposed to minimum parking space requirements, parking requirement credits for subsidized transit or shuttle service, parking structures, shared parking, car sharing, or on-street diagonal parking;

(v) Meets broader community goals by providing pedestrian and, where appropriate, bicycle access; and

(vi) Located in a Priority Development Area as designated under the Association of Bay Area Government's and Metropolitan Transportation Commission's FOCUS[4] program.

(5) The Permittees shall conduct appropriate monitoring of these projects to document the water quality benefits achieved. Appropriate monitoring may include modeling using the design specifications and specific site conditions.

Due Date – All pilot green street projects shall be completed by December 1, 2014.

iv. Implementation Level – All elements of Provision C.3.b.i.-iii shall be fully implemented by the effective/due dates set forth in their respective sub-provision, and a database or equivalent tabular format shall be developed and maintained that contains all the information listed under Reporting (Provision C.3.b.v.).

Due Dates for Full Implementation – See specific Effective Dates listed under Provisions C.3.b.ii& iii. .The database or equivalent tabular format required by Provision C.3.b.iv shall be developed by December 1, 2010. (For Vallejo Permittees: December 1, 2011)

v. Reporting

(1) **Annual Reporting – C.3.b.ii. Regulated Projects**
For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the attached Provision C.3.b. Sample Reporting Table):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multiunit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

[4] FOCUS is a regional incentive-based development and conservation strategy for the Bay Area.

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date);

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project.

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

(i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.v.(a) – (l) for the offsite project; and

(ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.v.(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g.) – If not required, state why not. If required, state control method used.

(2) **Pilot Green Streets Project Reporting - Provision C.3.b.iii.**

(a) On an annual basis, the Permittees shall report on the status of the pilot green street projects.

(b) For each completed project, the Permittees shall report the capital costs, operation and maintenance costs, legal and procedural arrangements in place to address operation and maintenance and its associated costs, and the sustainable landscape measures incorporated in the project including, if relevant, the score from the Bay-Friendly Landscape Scorecard.

(c) The 2013 Annual Report shall contain a summary of all green street projects completed by January 1, 2013. The summary shall include for each completed project the following information:

(i) Location of project

(ii) Size of project, including total impervious surface treated

(iii) Map(s) of project showing areas where stormwater runoff will be treated by LID measures

(iv) Specific type(s) of LID treatment measures included
(v) Total and specific costs of project
(vi) Specific funding sources for project and breakdown of percentage paid by each funding source
(vii) Lessons learned, including recommendations to facilitate funding and building of future projects
(viii) Identification of responsible party and funding source for operation and maintenance.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) **Source Control Requirements**

Require all Regulated Projects to implement source control measures onsite that at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste and compactor enclosures;
- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.[3]

(b) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment.

(ii) A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

(iii) Infeasibility to implement harvesting and re-use, infiltration, or evapotranspiration at a project site may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

(iv) By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report on the criteria and procedures the Permittees shall employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. This report shall, at a minimum, contain the information required in Provision C.3.c.iii.(1).

(v) By December 1, 2013, the Permittees, collaboratively or individually, shall submit a report on their experience with determining infeasibility of harvesting and re-use, infiltration, or evapotranspiration at Regulated Project sites. This report shall, at a minimum, contain the information required in Provision C.3.iii.(2).

(vi) Biotreatment systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate. The planting and soil media for biotreatment systems shall be designed to sustain plant growth and maximize stormwater runoff retention and pollutant removal. By December 1, 2010, the Permittees, working collaboratively or individually, shall submit for Water Board approval, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(3). Once the Water Board approves biotreatment soil media specifications and soil infiltration testing methods, the Permittees shall ensure that biotreatment systems installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications and soil infiltration testing methods.

(vii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. By May 1, 2011, the Permittees shall submit for Water Board approval, proposed minimum specifications for green roofs.

This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(4). Once the Water Board approves green roof minimum specifications, the Permittees shall ensure that green roofs installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications.

(c) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(b) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Implementation Level – All elements of the tasks described in Provision C.3.c.i shall be fully implemented.

Due Date for Full Implementation – December 1, 2011

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provision C.3.c.i shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.c.i.

(2) For any private development project with an application deemed complete after the Permit effective date, the requirements of Provision C.3.c.i shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011.

(3) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provision C.3.c.i shall not apply.

iii. Reporting

(1) Feasibility/Infeasibility Criteria Report - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Literature review and discussion of documented cases/sites, particularly in the Bay Area and California, where infiltration, harvesting and reuse, or evapotranspiration have been demonstrated to be feasible and/or infeasible.
- Discussion of proposed feasibility and infeasibility criteria and procedures the Permittees shall employ to make a determination of when biotreatment will be allowed at a Regulated Project site.

(2) Status Report on Application of Feasibility/Infeasibility Criteria – By December 1, 2013, the Permittees shall submit a report to the Water Board containing the following information:

- Discussion of the most common feasibility and infeasibility criteria employed since implementation of Provision C.3.c requirements, including site-specific examples;
- Discussion of barriers, including institutional and technical site specific constraints, to implementation of harvesting and reuse, infiltration, or evapotranspiration, and proposed strategies for removing these identified barriers;
- If applicable, discussion of proposed changes to feasibility and infeasibility criteria and rationale for the changes; and
- Guidance for the Permittees to make a consistent and appropriate determination of the feasibility of harvesting and reuse, infiltration, or evapotranspiration for each Regulated Project.

(3) Model Biotreatment Soil Media Specifications - By December 1, 2010, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Proposed soil media specifications for biotreatment systems;
- Proposed soil testing methods to verify a long-term infiltration rate of 5-10 inches/hour;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria; and
- Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.

(4) Green Roof Minimum Specifications - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Proposed minimum design specifications for green roofs;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria;
- Discussion of data and lessons learned from already installed green roofs;
- Discussion of barriers, including institutional and technical site specific constraints, to installation of green roofs and proposed strategies for removing these identified barriers; and

- Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.

(5) Report the method(s) of implementation of Provisions C.3.c.i above in the 2012 Annual Report. For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.v, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of the California Stormwater Quality Association's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flowrate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Implementation Level – The Permittees shall immediately require the controls in this task.

Due Date for Full Implementation – Immediate, except December 1, 2010, for Vallejo Permittees.

iii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.v.

iv. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and

underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.c.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.c in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[5] to treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at a Regional Project.[6] The Regional Project must achieve a net environmental benefit.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite projects must be constructed by the end of construction of the Regulated Project. If more time is needed to construct the offsite project, for each additional year, up to three years, after the construction of the Regulated Project, the offsite project must provide an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading. Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of the Regional Project may be

[5] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

[6] **Regional Project –** A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.

extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

(1) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Special Projects.

(2) By December 1, 2010, the Permittees shall submit a proposal to the Water Board containing the following information:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this Permit for each type of project;
- Identification of institutional barriers and/or technical site-specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite;
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations;
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite;
- Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit; and
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.

iii. Effective Date – December 1, 2011.

iv. Implementation Level

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provisions C.3.e.i-ii shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary

approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.e.i-ii.

(2) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.e.i-ii shall not apply.

(3) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer

(4) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

v. Reporting –The Permittees shall submit the ordinance/legal authority and procedural changes made, if any, to implement Provision C.3.e with their 2012 Annual Report. Annual reporting thereafter shall be done in conjunction with reporting requirements under Provision C.3.b.v.

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in the 2012 Annual Report and all subsequent Annual Reports.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. Task Description – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third party reviewer must be a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California, or staff of another Permittee subject to the requirements of this Permit.

ii. Implementation Level – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, California

Stormwater Quality Association (CASQA), or the equivalent, may be considered qualifying training.

iii. Reporting – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. Hydromodification Management (HM) Projects are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded within the requirements of Attachments B–F. A project that does not increase impervious surface area over the pre-project condition is not an HM Project. All HM Projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.

ii. HM Standard

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 % of the pre-project 2-year peak flow[7] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow. Contra Costa Permittees, when using pre-sized and pre-designed Integrated Management Practices (IMPs) per Attachment C of this Order, are not required to meet the low-flow criterion of 10% of the 2-year peak flow. These IMPs are designed to control 20% of the 2-year peak flow. After the Contra Costa Permittees conduct the required monitoring specified in Attachment C, the design of these IMPs will be reviewed.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent

[7] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

over more than 10 percent of the length of the curve corresponding to the range of flows to control.

(3) **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.

(4) **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

(5) **Existing HM Control Requirements:** The Water Board has adopted HM control requirements for all Permittees (except for the Vallejo Permittees), and these adopted requirements are attached to this Order as listed below. The Permittees shall comply with all requirements in their own Permittee-specific Attachment, unless otherwise specified by this Order. In all cases, the HM Standard shall be achieved.

- Attachment B for Alameda Permittees
- Attachment C for Contra Costa Permittees
- Attachment D for Fairfield-Suisun Permittees
- Attachment E for San Mateo Permittees
- Attachment F for Santa Clara Permittees

iii. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof.

(1) **Onsite HM controls** are flow duration control structures and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[8]

iv. Reporting

For each HM Project approved during the reporting period, the following information shall be reported electronically in tabular form. This information shall be added to the required reporting information specified in Provision C.3.b.v.

(1) Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control;

(2) Method used by the project proponent to design and size the device or method used to meet the HM Standard; and

(3) Other information as required in the Permittee's existing HM requirements, as shown in Attachments B–F.

v. Vallejo Permittees shall complete the following tasks in lieu of complying with Provisions C.3.g.i-iv.

(1) Develop a Hydrograph Modification Management Plan (HMP) for meeting the requirements of Provisions C.3.g.i–iv. The Vallejo Permittees' HMP shall be subject to approval by the Water Board.

(2) Vallejo Permittees shall include the following in their HMP:

(a) A map of the City of Vallejo, delineating areas where the HM Standard applies. The HM Standard shall apply in all areas except where a project:

- discharges stormwater runoff into creeks or storm drains that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete) downstream to their outfall in San Francisco Bay;
- discharges to an underground storm drain discharging to the Bay; or
- is located in a highly developed watershed.[9]

[8] In-stream control projects require a Stream Alteration Agreement from the California Department of Fish & Game, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

[9] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or subcatchments that are 65% impervious or more.

However, plans to restore a creek reach may reintroduce the applicability of HM controls, and would need to be addressed in the HMP;

(b) A thorough technical description of the methods project proponents may use to meet the HM Standard. Vallejo Permittees shall use the same methodologies, or similar methodologies, to those already in use in the Bay Area to meet the HM Standard. Contra Costa sizing charts may be used on projects up to ten acres after any necessary modifications are made to the sizes to control runoff rates and durations from ten percent of the pre-project 2-year peak flow to the pre-project 10-year peak flow, and adjustments are made for local rainfall and soil types;

(c) A description of any land use planning measures the City of Vallejo will take (e.g., stream buffers and stream restoration activities, including restoration-in-advance of floodplains, revegetation, and use of less-impacting facilities at points of discharge) to allow expected changes in stream channel cross sections, stream vegetation, and discharge rates, velocities, and/or durations without adverse impacts on stream beneficial uses;

(d) A description of how the Vallejo Permittees will incorporate these requirements into their local approval processes, and a schedule for doing so; and

(e) Guidance for City of Vallejo project proponents explaining how to meet the HM Standard.

(3) Vallejo Permittees shall complete the HMP according to the schedule below. All required documents shall be submitted acceptable to the Executive Officer, except the HMP, which shall be submitted to the Water Board for approval. Vallejo Permittees shall report on the status of HMP development and implementation in each Annual Report and shall also provide a summary of projects incorporating measures to address Provision C.3.g and the measures used.

- By April 1, 2011, submit a detailed workplan and schedule for completion of the information required in Provision C.3.g.v.(2).
- By December 1, 2011, submit the map required in Provision C.3.g.v.(2)(a).
- By April 1, 2012, submit a draft HMP.
- By December 1, 2012, provide responses to Water Board comments on the draft HMP so that the final HMP is submitted for Water Board approval by July 1, 2013.
- Upon adoption by the Water Board, implement the HMP, which shall include the requirements of this measure. Before approval of the HMP by the Water Board, Vallejo Permittees shall encourage early implementation of measures likely to be included in the HMP.

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. Task Description – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. Implementation Level – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the O&M of the installed onsite, joint, and/or offsite stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the O&M of the onsite, joint, and/or offsite installed stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed onsite, joint, and/or offsite stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the O&M responsibility for the installed onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing O&M inspections of the installed stormwater treatment system(s) and HM control(s) (if any).

(4) A written plan and implementation of the plan that describes O&M (including inspection) of all Regional Projects and regional HM controls that are Permittee-owned and/or operated.

(5) A database or equivalent tabular format of all Regulated Projects (public and private) that have installed onsite, joint, and/or offsite stormwater

treatment systems. This database or equivalent tabular format shall include the following information for each Regulated Project:

(a) Name and address of the Regulated Project;

(b) Specific description of the location (or a map showing the location) of the installed stormwater treatment system(s) and HM control(s) (if any);

(c) Date(s) that the treatment system(s) and HM controls (if any) is/are installed;

(d) Description of the type and size of the treatment system(s) and HM control(s) (if any) installed;

(e) Responsible operator(s) of each treatment system and HM control (if any);

(f) Dates and findings of inspections (routine and follow-up) of the treatment system(s) and HM control(s) (if any) by the Permittee; and

(g) Any problems and corrective or enforcement actions taken.

(6) A prioritized plan for inspecting all installed stormwater treatment systems and HM controls. At a minimum, this prioritized plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed stormwater treatment systems and HM controls within 45 days of installation to ensure approved plans have been followed;

(b) Inspection by the Permittee of at least 20 percent of the total number (at the end of the preceding fiscal year) of installed stormwater treatment systems and HM controls;

(c) Inspection by the Permittee of at least 20 percent of the total number (at the end of the preceding fiscal year) of installed vault-based systems; and

(d) Inspection by the Permittee of all installed stormwater treatment systems subject to Provision C.3, at least once every five years.

iii. Maintenance Approvals: The Permittees shall ensure that onsite, joint, and offsite stormwater treatment systems and HM controls installed by Regulated Projects are properly operated and maintained for the life of the projects. In cases where the responsible party for a stormwater treatment system or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment system or HM control, but these approvals are not granted, the Permittees shall be deemed to be in compliance with this Provision. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the O&M requirements contained therein.

Due Date for Full Implementation: Immediate for Provisions C.3.h.i, C.3.h.ii.(1), and C.3.h.iii, and December 1, 2010, for Provisions C.3.h.ii.(2)-(6). For Vallejo Permittees: December 1, 2010, for Provisions C.3.h.i-iii.

iv. Reporting: Beginning with the 2010 Annual Report

(1) For each Regulated Project inspected during the reporting period (fiscal year) the following information shall be reported to the Water Board electronically in tabular form as part of the Annual Report (as set forth in the Provision C.3.h. Sample Reporting Table attached):

- Name of facility/site inspected.
- Location (street address) of facility/site inspected.
- Name of responsible operator for installed stormwater treatment systems and HM controls.
- For each inspection:
  - Date of inspection.
  - Type of inspection (e.g., initial, annual, follow-up, spot).
  - Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well, etc.) and an indication of whether the treatment system is an onsite, joint, or offsite system.
  - Type of HM controls inspected.
  - Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation, maintenance required immediately, etc.).
  - Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, administrative citation, administrative order).

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) A discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(b) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development projects, which create and/or replace $\geq$ 2500 ft^2 to < 10,000 ft^2 of impervious surface, and

detached single-family home projects,[10] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[3]

This provision applies to all development projects that require approvals and/or permits issued under the Permittee's' planning, building, or other comparable authority.

ii. **Implementation Level** – All elements of this task shall be fully implemented by December 1, 2012.

iii. **Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

iv. **Task Description** – The Permittees shall develop standard specifications for lot-scale site design and treatment measures (e.g., for roof runoff and paved areas) as a resource for single-family homes and small development projects.

v. **Implementation Level** – This task may be fulfilled by the Permittees cooperating on a countywide or regional basis.

Due Date for Full Implementation – December 1, 2012.

vi. **Reporting** – A report containing the standard specifications for lot-scale treatment BMPs shall be submitted by December 1, 2012.

[10] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites which could reasonably be considered to cause or contribute to pollution of stormwater runoff, with inspections and effective follow-up and enforcement to abate actual or potential pollution sources consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent discharge of pollutants and impacts on beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have sufficient legal enforcement authority to obtain effective stormwater pollutant control on industrial sites. Permittees shall have the ability to inspect and require effective stormwater pollutant control and to escalate progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. Implementation Level

(1) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial to address pollutant sources associated with outdoor process and manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, outdoor drainage from indoor areas, rooftop equipment, and contaminated and erodible surface areas, and other sources determined by the Permittees or Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

(2) Permittees shall notify the discharger of any actual or potential pollutant sources and violations and require problem correction within a reasonably short and expedient time frame commensurate with the threat to water quality. Permittees shall require timely correction of problems involving rapid temporary repair, and may allow longer time periods for implementation of more permanent solutions, if these require significant capital expenditure or construction. Violations shall be corrected prior to the next rain event or within 10 business days after the violations are noted. If more than 10 business days are required for correction, a rationale shall be given in the tabulated sheets.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. Task Description – Permittees shall develop and implement an inspection plan that will serve as a prioritized inspection workplan. This inspection plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

The Inspection Plan shall contain the following information:

(1) Total number and a list of industrial and commercial facilities requiring inspection, within each Permittee's jurisdiction, to be determined on the basis of a prioritization criteria designed to assign a more frequent inspection schedule to the highest priority facilities per Section C.4.b.ii. below.

(2) A description of the process for prioritizing inspections and frequency of inspections. If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan. A mechanism to include newly opened businesses that warrant inspection shall be included.

ii. Implementation Level – Each Permittee shall annually update and maintain a list of industrial and commercial facilities in the Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plans:

(1) Sites that include the following types of functions that may produce pollutants when exposed to stormwater include, but are not limited to:

(a) Outdoor process and manufacturing areas

(b) Outdoor material storage areas

(c) Outdoor waste storage and disposal areas

(d) Outdoor vehicle and equipment storage and maintenance areas

(e) Outdoor wash areas

(f) Outdoor drainage from indoor areas

(g) Rooftop equipment

(h) Other sources determined by the Permittee or Water Board to have a reasonable potential to contribute to pollution of stormwater runoff

(2) The following types of Industrial and Commercial businesses that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges:

(a) Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the State General NPDES Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);

(b) Vehicle Salvage yards;

(c) Metal and other recycled materials collection facilities, waste transfer facilities;

(d) Vehicle mechanical repair, maintenance, fueling, or cleaning;

(e) Building trades central facilities or yards, corporation yards;

(f) Nurseries and greenhouses;

(g) Building material retailers and storage;

(h) Plastic manufacturers; and

(i) Other facilities designated by the Permittee or Water Board to have a reasonable potential to contribute to pollution of stormwater runoff.

(3) **Prioritization of Facilities**

Facilities of the types described in Provision 4.b.ii.(2) above and identified by the Permittees as having the reasonable potential to contribute to pollution of stormwater runoff shall be prioritized on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of concern, proximity to a waterbody, violation history of the facility, and other relevant factors.

(4) **Types/Contents of Inspections**

Each Permittee shall conduct inspections to determine compliance with its ordinances and this Permit. Inspections shall include but not be limited to the following:

(a) Prevention of stormwater runoff pollution or illicit discharge by implementing appropriate BMPs;

(b) Visual observations for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater;

(c) Noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(5) **Inspection Frequency** – Permittees shall establish appropriate inspection frequencies for facilities based on Provision 4.b.ii (3) priority, potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(6) **Record Keeping** – For each facility identified in Provision 4.b.ii, the Permittee shall maintain a database or equivalent of the following information at a minimum:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity including SIC code;

(c) Inspection priority and inspection frequency; and

(d) If coverage under the Industrial General Permit is required.

iii. Reporting – The Permittees shall include the following in the Annual Report:

(1) The list of facilities identified in Provision 4.b.ii in the 2010 Annual Report and revisions or updates in subsequent annual reports; and

(2) The list of facilities scheduled for inspection during the current fiscal year.

C.4.c. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) **Required enforcement actions** – including timeframes for corrections of problems – for various field violation scenarios. The ERP will provide guidance on appropriate use of the various enforcement tools, such as verbal and written notices of violation, citations, cleanup requirements, administrative and criminal penalties.

(2) **Timely Correction of Violations** – All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

A description of the Permittee's procedures for follow-up inspections and enforcement actions or referral to another agency, including appropriate time periods for each level of corrective action.

(3) **Referral and Coordination with Water Board** – Each Permittee shall enforce its stormwater ordinances as necessary to achieve compliance at sites with observed violations. For cases in which Permittee enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney or other relevant agencies for additional enforcement.

(4) **Recordkeeping** – Permittees shall maintain adequate records to demonstrate compliance and appropriate follow-up enforcement responses for facilities inspected.

Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial commercial site inspections:

(a) Name of Facility/Site Inspected
(b) Inspection Date
(c) Industrial General Permit coverage required (Yes or No)
(d) Compliance Status
(e) Type of Enforcement (if applicable)
(f) Type of Activity or Pollutant Source

Examples: Outdoor process/manufacturing areas, Outdoor material storage areas, Outdoor waste storage/disposal areas, outdoor vehicle and equipment storage/maintenance areas, Outdoor parking areas and access roads, Outdoor wash areas, Rooftop equipment, Outdoor drainage from indoor areas

(g) Specific Problems

(h) Problem Resolution

(i) Additional Comments

The electronic database or equivalent tabular system shall be made readily available to the Executive Officer and during inspections and audits by the Water Board staff or its representatives.

(5) The ERP shall be developed and implemented by April 1, 2010.

iii. Reporting – Permittees shall include the following information in each Annual Report:

(1) Number of inspections conducted, Number of violations issued (excluding verbal warnings), Percentage of sites inspected in violation, and number and percent of violations resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner;

(2) Frequency and Types/categories of violations observed, Frequency and type of enforcement conducted;

(3) Summary of types of violations noted by business category; and

(4) Facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

C.4.d. Staff Training

i. Task Description

Permittees shall provide focused training for inspectors annually. Trainings may be Program-wide, Region-wide, or Permittee-specific.

ii. Implementation Level

At a minimum, train inspectors, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Illicit Discharge Detection, Elimination and follow-up; and

(4) Implementation of typical BMPs at Industrial and Commercial Facilities.

Permittees, either countywide or regionally, if they have not already done so, are encouraged to create or adopt guidance for inspectors or reference existing inspector guidance including the California Association of Stormwater Quality Agencies (CASQA) Industrial BMP Handbook.

iii. Reporting

The Permittees shall include the following information in the Annual Report:

(1) Dates of trainings;

(2) Training topics that have been covered; and

(3) Percentage of Permittee inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to ensure illicit discharges are detected and controlled that are not otherwise controlled under provision C4, Industrial and Commercial Site Controls and C6, Construction Site Controls. Permittees shall develop and implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and follow-up component to target illicit discharge and non-stormwater sources. Permittees shall maintain a complaint tracking and follow-up data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. Task Description – Permittees shall have the legal authority to prohibit and control illicit discharges and escalate stricter enforcement to achieve expedient compliance.

ii. Implementation Level

(1) Permittees shall have adequate legal authority to address stormwater and non-stormwater pollution associated with, but not limited to the following:

(a) Sewage;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces and pavement, or the equipment and other facilities of any commercial business, or any other public or private facility;

(c) Discharges of runoff from material storage areas, including containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(f) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to storm drains.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than storm water to storm drains.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as guidance for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges.

ii. Implementation Level – The ERP shall contain the following:

(1) Recommended responses and enforcement actions – including timeframes for corrections of problems – for various types and degree of violations. The ERP shall provide guidelines on when to employ the range of regulatory responses from warnings, citations and cleanup and cost recovery, to administrative or criminal penalties.

(2) Timely Correction of Violations: All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system. Immediate correction can be temporary and short-term if a long-term, permanent correction will involve significant resources and construction time. An example would be replumbing of a wash area to the sanitary sewer, which would involve an immediate short-term, temporary fix followed by permanent replumbing.

(3) If corrective actions are not implemented promptly or if there are repeat violations, Permittees shall escalate responses as needed to achieve compliance, including referral to other agencies were necessary.

(4) The ERP shall be developed and implemented by April 1, 2010.

C.5.c. Spill and Dumping Response, Complaint Response, and Frequency of Inspections

i. Task Description – Permittees shall have a central contact point, including a phone number for complaints and spill reporting, and publicize this number to both internal Permittee staff and the public. If 911 is selected, also maintain and publicize a staffed, non-emergency phone number with voicemail, which is checked during normal business hours.

Permittees shall develop a spill/dumping response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittees immediate capabilities. The list shall be maintained and updated as changes occur.

Permittees shall conduct reactive inspections in response to complaints and follow-up inspections as needed to ensure that corrective measures have been implemented to achieve and maintain compliance.

ii. Implementation Level – Permittees will have the phone number and contact information available and integrated into training and outreach both to Permittee staff and the public by July 1, 2010.

iii. Reporting – Submit the complaint and spill response phone number and spill contact list with the 2010 Annual Report and update annually if changes occur.

C.5.d. Control of Mobile Sources

i. Task Description – The purpose of this section is to establish oversight and control of pollutants associated with mobile business sources.

ii. Implementation Level – Each Permittee shall develop and implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses such as automobile washing, power washing, steam cleaning, and carpet cleaning. This guidance can be developed via county-wide or regional collaboration.

(b) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses.

(c) Outreach to mobile businesses operating within the Permittee's jurisdiction with minimum standards and BMP requirements and local ordinances through an outreach and education strategy.

(d) Inspection of mobile businesses as needed.

(2) Permittees should cooperate regionally in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

iii. Reporting – Permittees shall report on implementation of minimum standards and BMPs for mobile business and their enforcement strategy in each Annual Report.

C.5.e. Collection System Screening - Municipal Separate Storm Sewer System (MS4) Map Availability

i. Task Description – Permittees shall perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for other maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets and catch basins, in coordination with public works/flood control maintenance surveys, video inspections of storm drains, and during other routine Permittee maintenance and inspection activities when Permittee staff are working in or near the MS4 system.

ii. Implementation Level – Permittees shall develop and implement a screening program utilizing the USEPA/Center for Watershed Protection publication, "Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment." Permittees shall implement the screening program by conducting a survey of strategic collection system check points (one screening point per square mile of Permittee urban and suburban jurisdiction area, less open space) including some key major outfalls draining industrial areas as defined in 40 CFR 122.26 (b)(5) once each year in dry weather conditions meaning no significant rainfall within the past 3 weeks. Routine surveys that occur on an ongoing basis during regular conveyance system inspections may be credited toward this requirement. Make maps of the MS4 publicly available, either electronically or in hard copy by July 1, 2010. The public availability shall be through a publicized single point of contact that

is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

iii. Reporting – Permittees shall provide a summary of their collection screening program, a summary of problems found during collection system screening, and any changes to the screening program in each Annual Report.

C.5.f. Tracking and Case Follow-up

i. Task Description – All incidents or discharges reported to the complaint/spill system that might pose a threat to water quality shall be logged to track follow-up and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems, and inter/intra-agency coordination, where appropriate.

ii. Implementation Level – Create and maintain a water quality spill and discharge complaint tracking and follow-up in an electronic database or equivalent tabular system by April 1, 2010.

The spill and discharge complaint tracking system shall contain the following information:

(1) Complaint information:
- (a) Date and time of complaint
- (b) Type of pollutant
- (c) Problem Status (potential or actual discharge.)

(2) Investigation information:
- (a) Date and time started
- (b) Type of pollutant
- (c) Entered storm drain and/or receiving water
- (d) Date abated
- (e) Type of enforcement (if applicable)

(3) Response time (days)
- (a) Call to investigation
- (b) Investigation to abatement
- (c) Call to abatement

The electronic database or equivalent tabular system shall be made available to Water Board staff as needed for review of enforcement response through problem resolution.

iii. Reporting – Permittees shall provide the following information in the Annual Report:

(1) Number of discharges reported;

(2) Number of discharges reaching storm drains and/or receiving waters;

(3) Number and percentage of discharges resolved in a timely manner; and

(4) Summary of major types of discharges and complaints.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers; and reporting shall demonstrate the effectiveness of this inspection and problem solution activity by the Permittees.

C.6.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have the ability to require effective stormwater pollutant controls, and escalate progressively stricter enforcement to achieve expedient compliance and clean up at all public and private construction sites.

ii. Implementation Level

(1) Permittees shall have the legal authority to require at all construction sites year round effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non storm water management through all phases of construction (including but not limited to site grading, building, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and clean up at all construction sites year round.

iii. Reporting – Permittees shall certify adequacy of their respective legal authority in the 2010 Annual Report.

C.6.b. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all public and private construction site owners/operators.

ii. Implementation Level

(1) The ERP shall include required enforcement actions – including timeframes for corrections of problems – for various field violation scenarios. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

(2) If site owners/operators do not implement appropriate corrective actions in a timely manner, or if violations repeat, Permittees shall take progressively stricter responses to achieve compliance. The ERP shall include the structure for progressively stricter responses and various violation scenarios that evoke progressively stricter responses.

(3) The ERP shall be developed and implemented by April 1, 2010.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site specific, and seasonally- and phase-appropriate, effective Best Management Practices (BMPs) in the following six categories:

- Erosion Control
- Run-on and Run-off Control
- Sediment Control
- Active Treatment Systems (as necessary)
- Good Site Management
- Non Stormwater Management.

Theses BMP categories are listed in State General NPDES Permit for Stormwater Discharges Associated with Construction Activities (hereinafter the Construction General Permit).

ii. Implementation Level

The BMPs targeting specific pollutants within the six categories listed in C.6.c.i. shall be site specific. Site specific BMPs targeting specific pollutants from the six categories listed in C.6.c.i. can be a combination of BMPs from:

- California BMP Handbook, Construction, January 2003.
- Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, March 2003, and addenda.
- California Regional Water Quality Control Board, San Francisco Bay Region, Erosion and Sediment Control Field Manual, 2002.
- New BMPs available since the release of these Handbooks.

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements, appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for coverage under the Construction General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in C.6.c.i. are planned;

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction General Permit; and

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in C.6.c.i.; and Permittees shall require timely corrections of all actual and threatened violations of local ordinances observed.

ii. Implementation Level

(1) **Wet Season Notification**
By September 1st of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil to prepare for the upcoming wet season.

(2) **Frequency of Inspections**
Inspections shall be conducted monthly during the wet season[11] at the following sites:

(a) All construction sites disturbing one or more acre of land; and

(b) **High Priority Sites** – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

(iii) Project size and type;

(iv) Sensitivity or receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

[11] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

(3) **Contents of Inspections**

Inspections shall focus on the adequacy and effectiveness of the site specific BMPs implemented for the six categories listed in C.6.c.i. Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site specific BMPs implemented for the six categories listed in C.6.c.i.;

(c) Visual observations for:

- actual discharges of sediment and/or construction related materials into stormdrains and/or waterbodies.
- evidence of sediment and/or construction related materials discharges into stormdrains and/or waterbodies.
- illicit connections.
- potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) **Tracking**

All inspections must be recorded on a written or electronic inspection form. Inspectors shall follow the ERP if a violation is noted and shall require timely corrections of all actual and threatened violations of local ordinances observed. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded on the inspection form.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available to the Executive Officer and during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) Has there been rainfall with runoff since the last inspection?;

(e) Enforcement Response Level (Use ERP);

(f) Problem(s) observed using Illicit Discharge and the six BMP categories listed in C.6.c.i.;

(g) Specific Problem(s) (List the specific problem(s) within the BMP categories);

(h) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(i) Comments, which shall include all Rationales for Longer Compliance Time, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) In each Annual Report, each Permittee shall summarize the following information:

(a) Total number of active sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing 1 acre or more of soil;

(c) Total number of inspections conducted;

(d) Number and percentage[12] of violations in each of the six categories listed in C.6.c.i.;

(e) Number and percentage[13] of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(g) Number of sites with discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(h) Number and percentage[14] of violations fully corrected prior to the next rain event but no longer than 10 business days after the violations are discovered or otherwise considered corrected in a timely, though longer period; and

(i) Number and percentage[15] of violations not fully corrected 30 days after the violations are discovered.

(2) In each Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in C.6.e.ii.(4) above. This evaluation shall include findings on the program's strength, comparison to previous years' results, as well as areas that need

[12] Percentage shall be calculated as number of violations in each category divided by total number of violations in all six categories.

[13] Percentage shall be calculated as number of each type of enforcement action divided by the total number of enforcement actions.

[14] Percentage shall be calculated as follows: number of violations fully corrected prior to the goal of the next rain event but no later than10 business days after the violations are discovered divided by the total number of violations for the reporting year.

[15] Percentage shall be calculated as follows: number of violations not fully corrected 30 days after the violations are discovered divided by the total number of violations for the reporting year.

more focused education for site owners, operators, and developers the following year.

(3) The Executive Officer may require that the information recorded and tracked by C.6.e.ii.(4) be submitted electronically or in a tabular format. Permittees shall submit the information within 10-working days of the Executive Officer's requirement. Submittal of the information in tabular form for the reporting year is not required in each Annual Report but encouraged.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to municipal staff responsible for conducting construction site stormwater inspections. Training topics will include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information: training topics covered, dates of training, and the percentage of Permittees' inspectors attending each training. If no training in that year, so state.

C.7. Public Information and Outreach

Each Permittee shall increase the knowledge of the target audiences regarding the impacts of stormwater pollution on receiving water and potential solutions to mitigate the problems caused; change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution.

C.7.a. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain at least 80 percent of municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as "No dumping, drains to Bay" or equivalent. At least 80% of municipally-maintained storm drain inlet markings shall be inspected and maintained at least once per 5-year permit term. For newly approved, privately maintained streets, Permittees shall require inlet marking by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain markings of at least 80 percent of municipality maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Verify that newly developed streets are marked prior to acceptance of the project.

iii. Reporting

(1) In the 2013 Annual Report, each Permittee shall report prior years' annual percentages of municipality maintained inlet markings inspected and maintained as legible with a no dumping message or equivalent.

(2) In the 2013 Annual Report, each Permittee shall report prior years' annual number of projects accepted after inlet markings were verified.

C.7.b. Advertising Campaigns

i. Task Description – Permittees shall participate in or contribute to advertising campaigns on trash/litter in waterways and pesticides with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audience.

ii. Implementation Level

(1) Target a broad audience with two separate advertising campaigns, one focused on reducing trash/litter in waterways and one focused on reducing the impact of urban pesticides. The advertising campaigns may be coordinated regionally or county-wide.

(2) Permittees shall conduct a pre-campaign survey and a post-campaign survey to identify and quantify the audiences' knowledge, trends, and

attitudes and/or practices; and to measure the overall population's awareness of the messages and behavior changes achieved by the two advertising campaigns. These surveys may be done regionally or county-wide.

iii. Reporting

(1) In the Annual Report following the pre-campaign survey, each Permittee (or the Countywide Program, if the survey was done county-wide or regionally) shall provide a report of the survey completed, which at a minimum, shall include the following:

- A summary of how the survey was implemented.
- A copy of the survey.
- A copy of the survey results.
- An analysis of the survey results.
- A discussion of the outreach strategies based on the survey results.
- A discussion of the planned or future advertising campaigns to influence awareness and behavior changes regarding trash/litter and pesticides.

(2) In the Annual Report following the post campaign survey, each Permittee (or the Countywide Program, if survey was done county-wide or regionally) shall provide a report of the survey completed, which at minimum shall include the information required in the pre-campaign report (C.7.b.iii.(1)) and the following:

- A discussion of the campaigns.
- A discussion of the measurable changes in awareness and behavior achieved.
- An update of outreach strategies based on the survey results.

C.7.c. Media Relations – Use of Free Media

i. Task Description – Permittees shall participate in or contribute to a media relations campaign. Maximize use of free media/media coverage with the objective of significantly increasing the overall awareness of stormwater pollution prevention messages and associated behavior change in target audiences, and to achieve public goals.

ii. Implementation Level – Conduct a minimum of six pitches (e.g., press releases, public service announcements, and/or other means) per year at the county-wide program, regional, and/or local levels.

iii. Reporting – In each Annual Report, each Permittee (or the Countywide Program, if the media relations campaign was done county-wide or regionally) shall include the details of each media pitch, such as the medium, date, and content of the pitch.

C.7.d. Stormwater Point of Contact

i. Task Description – Permittees shall individually or collectively create and maintain a point of contact, e.g., phone number or website, to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives.

ii. Implementation Level – Maintain and publicize one point of contact for information on stormwater issues. Permittees may combine this function with the complaint/spill contact required in C.5.

iii. Reporting – In the 2010 Annual Report, each Permittee shall discuss how this point of contact is publicized and maintained. If any change occurs in this contact, report in subsequent annual report.

C.7.e. Public Outreach Events

i. Task Description – Participate in and/or host events such as fairs, shows, workshops, (e.g., community events, street fairs, and farmers' markets), to reach a broad spectrum of the community with both general and specific stormwater runoff pollution prevention messages. Pollution prevention messages shall include encouraging residents to (1) wash cars at commercial car washing facilities, (2) use minimal detergent when washing cars, and (3) divert the car washing runoff to landscaped area.

ii. Implementation Level – Each Permittee shall annually participate and/or host the number of events according to its population, as shown in the table below:

Table 7.1 Public Outreach Events[16]

Permittee Population	Number of Outreach Events
< 10,000	2
10,001– 40,000	3
40,001 – 100,000	4
100,001 – 175,000	5
175,001 – 250,000	6
> 250,000	8
Non-population-based Permittees[17]	6

Should a public outreach event contain significant citizen involvement elements, the Permittee may claim credit for both Public Outreach Events (C.7.e.) and Citizen Involvement Events (C.7.g.).

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in and assess the effectiveness

[16] Permittees may claim individual credits for all events in which their Countywide Program or BASMAA participates, supports, and/or hosts, which are publicized to reach the Permittees jurisdiction.

[17] Alameda County Flood Control and Water Conservation District, Contra Costa Flood Control and Water Conservation District, Santa Clara Valley Water District, Vallejo Sanitation and Flood Control District, and Zone 7 of the Alameda County Flood Control and Water Conservation District

of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event survey results, quantity/volume materials cleaned up and comparisons to previous efforts).

C.7.f. Watershed Stewardship Collaborative Efforts

i. Task Description – Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts of community groups such as the Contra Costa Watershed Forum, the Santa Clara Basin Watershed Management Initiative, "friends of creek" groups, and other organizations that benefit the health of the watershed such as the Bay-Friendly Landscaping and Gardening Coalition. If no such organizations exist, encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. Coordinate with existing groups to further stewardship efforts.

ii. Implementation Level – Annually demonstrate effort.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, describe the support given, state what efforts were undertaken and the results of these efforts, and provide an evaluation of the effectiveness of these efforts.

C.7.g. Citizen Involvement Events

i. Task Description – Permittees shall individually or collectively, support citizen involvement events, which provide the opportunity for citizens to directly participate in water quality and aquatic habitat improvement, such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, service learning activities such as storm drain inlet marking, community riparian restoration activities, community grants, other participation and/or host volunteer activities.

ii. Implementation Level – Each Permittee shall annually sponsor and/or host the number of citizen involvement events according to its population, as shown in the table below:

Table 7.2 Community Involvement Events[18]

Permittee Population	Number of Involvement Events
< 10,000	1
10,001 – 40,000	1
40,001 – 100,000	2
100,001 – 175,000	3
175,001 – 250,000	4
> 250,000	5
Non-population-based Permittees	2

[18] Permittees can claim individual credit for all events sponsored or hosted by their Countywide Program or BASMAA, which are publicized to reach the Permittee's jurisdiction.

Should a citizen involvement event contain significant public outreach elements, the Permittee may claim credit for both Citizen Involvement Events (C.7.g.) and Public Outreach Events (C.7.e.).

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in and assess the effectiveness of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event survey results, number of inlets/creeks/shores/parks/and such adopted, quantity/volume materials cleaned up, data trends, and comparisons to previous efforts).

C.7.h. School-Age Children Outreach

i. Task Description – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12).

ii. Implementation Level – Implement annually and demonstrate effectiveness of efforts through assessment.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, spectrum of children reached, and methods used, and provide an evaluation of the effectiveness of these efforts.

C.7.i. Outreach to Municipal Officials

i. Task Description – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. Implementation Level – At least once per permit cycle, or more often.

iii. Reporting – Permittees shall summarize efforts in the 2013 Annual Report.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

i. Regional Collaboration – All Permittees shall comply with the monitoring requirements in C.8, however, Permittees may choose to comply with any requirement of this Provision through a collaborative effort to conduct or cause to be conducted the required monitoring in their jurisdictions. Where all or a majority of the Permittees collaborate to conduct water quality monitoring, this shall be considered a regional monitoring collaborative.

Where an existing collaborative body has initiated plans, before the adoption of this Permit, to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request the Executive Officer adjust the due date(s) to synchronize with such efforts.

The types, quantities, and quality of data required within Provision C.8 establish the minimum level-of-effort that a regional monitoring collaborative must achieve. Provided these data types, quantities, and quality are obtained, a regional monitoring collaborative may develop its own sampling design. For Pollutants of Concern and Long-Term monitoring required under C.8.e, an alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described under C.8.e; or an equivalent level of monitoring effort is employed to answer the management information needs stated under C.8.e.

ii. Implementation Schedule – Monitoring conducted through a regional monitoring collaborative shall commence data collection by October 2011. All other Permittee monitoring efforts shall commence data collection by October 2010. By July 1, 2010, each Permittee shall provide documentation to the Water Board, such as a written agreement, letter, or similar document that confirms whether the Permittee will conduct monitoring individually or through a regional monitoring collaborative.[19]

iii. Permittee Responsibilities – A Permittee may comply with the requirements in Provision C.8 by performing the following:

(1) Contributing to its stormwater countywide program, as determined appropriate by the Permittee members, so that the stormwater countywide Program conducts monitoring on behalf of its members;

(2) Contributing to a regional collaborative effort;

[19] This documentation will allow the Water Board to know when monitoring will commence for each Permittee. Permittees who commit to monitoring individually may join the regional monitoring collaborative at any time. Any Permittee who discontinues monitoring through the regional collaborative must commence complying with all requirements of Provision C.8 immediately.

(3) Fulfilling monitoring requirements within its own jurisdictional boundaries; or

(4) A combination of the previous options, so that all requirements are fulfilled.

iv. Third-party Monitoring – Permittees may choose to fulfill requirements of Provision C.8 using data collected by citizen monitors or other third-party organizations, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.h. Where an existing third-party organization has initiated plans to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request that the Executive Officer adjust the due date(s) to synchronize with such efforts.

C.8.b. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[20] such as:

- Are chemical concentrations in the Estuary potentially at levels of concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?
- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP), by contributing their fair-share financially on an annual basis.

C.8.c. Status Monitoring/Rotating Watersheds

i. Status Monitoring is intended to answer these questions: Are water quality objectives, both numeric and narrative, being met in local receiving waters,

[20] These are the management questions approved by the Regional Monitoring Program's Steering Committee on May 9, 2008, and stated at http://www.sfei/rmp/rmp_steering_meetings/rmp_steering_meeting_5_09_08/Item%2010a%20Attachment%201%20%20Draft%20RMP%20Management%20Questions%2005-02-08%20Annotated.pdf. While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

including creeks, rivers and tributaries? Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

ii. Parameters and Methods – Permittees shall conduct Status Monitoring using the parameters, methods, occurrences, durations, and minimum number of sampling sites as described in Table 8.1. Spring sampling shall be conducted during the April - June timeframe; dry weather sampling shall be conducted during the July - September timeframe. Minor variations of the parameters and methods may be allowed with Executive Officer concurrence.

iii. Frequency – Permittees shall complete the Status Monitoring in Table 8.1 at the following frequencies:

- Alameda Permittees – annually
- Contra Costa Permittees – annually
- Fairfield-Suisun Permittees – twice during the Permit term
- San Mateo Permittees – annually
- Santa Clara Permittees – annually
- Vallejo Permittees – once during the Permit term

Table 8.1 Status Monitoring Elements

Status Monitoring Parameter	Sampling and/or Analytical Method[21]	Minimum Sampling Occurrence[22]	Duration of Sampling	Minimum # Sample Sites to Monitor/Yr[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.
Biological Assessment[24] (Includes Physical Habitat Assessment and General Water Quality Parameters[25]) Nutrients (total phosphorus, dissolved orthophosphate, total nitrogen, nitrate, ammonia, silica, chloride,	SWAMP Std Operating Procedure[26,27,28] for Biological Assessments & PHab; SWAMP	1/yr (Spring Sampling)	Grab sample	Spring 20 / 10 / 4	BMI metrics that indicate substantially degraded community as per Attachment H, Table H-1 For Nutrients: 20% of results in one waterbody exceed one or more water quality standard

[21] Refers to field protocol, instrumentation and/or laboratory protocol.

[22] Refers to the number of sampling events at a specific site in a given year.

[23] The number of sampling sites shown is based on the relative population in each Regional Stormwater Countywide Program and is listed in this order: Santa Clara & Alameda Countywide / Contra Costa & San Mateo Countywide / Vallejo & Fairfield-Suisun Programs.

[24] The same general location must be used to collect benthic community, sediment chemistry, and sediment toxicity samples. General Water Quality Parameters need not be collected twice, where it is collected by a multi-parameter probe at a subset of these sample sites (see next row of Table 8.1).

[25] Includes dissolved oxygen, temperature, conductivity, and pH.

[26] Ode, P.R. 2007. Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised (http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/phab_sopr6.pdf). Permittees may coordinate with Water Board staff to modify their sampling procedures if these referenced procedures change during the Permit term.

[27] Biological assessments shall include benthic macroinvertebrates and algae. Bioassessment sampling method shall be multihabitat reach-wide. Macroinvertebrates shall be identified according to the Standard Taxonomic Effort Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists, using the most current SWAMP approved method. Current methods are documented in (1) SWAMP Standard Operating Procedure (SOP) and Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 5-21-07, and (2) Amendment to SWAMP Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 9-17-08. For algae, include mass (ash-free dry weight), chlorophyll a, diatom and soft algae taxonomy, and reachwide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP basic method plus 1) depth and pebble count + CPOM, 2) cobble embeddedness, 3) discharge measurements, and 4) in-stream habitat. Permittees may coordinate with Water Board staff to modify these sampling procedures if SWAMP procedures change during the Permit term.

[28] Algae shall be collected in a consistent timeframe as Regional SWAMP. For guidance on algae sampling and evaluation: Fetscher, A. and K. McLaughlin, May 16, 2008. Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP). Technical Report 563 and current SWAMP-approved updates to Standard Operating Procedures therein. Available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf.

Status Monitoring Parameter	**Sampling and/or Analytical Method**[21]	**Minimum Sampling Occurrence**[22]	**Duration of Sampling**	**Minimum # Sample Sites to Monitor/Yr**[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	**Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.**
dissolved organic carbon, suspended sediment concentration)	comparable methods for Nutrients				or established threshold
General Water Quality[29]	Multi-Parameter Probe	2/yr (Concurrent with bioassessment & during the Aug. - Sept. timeframe)	15-minute intervals for 1-2 weeks	3 / 2 / 1	20% of results in one waterbody exceed one or more water quality standard or established threshold
Chlorine (Free and Total)	USEPA Std. Method 4500 Cl F[30]	2/yr Spring & Dry Seasons	Grab sample	Spring 20 / 10 / 2 Dry 3 / 2 / 1	After immediate resampling, concentrations remain > 0.08 mg/L
Temperature	Digital Temperature Logger	60-minute intervals	60-minute intervals April through Sept.	8 / 4 / 1	20% of results in one waterbody exceed applicable temperature threshold[31]
Toxicity – Water Column[32]	Applicable SWAMP Comparable Method	2/yr (1/Dry Season & 1 Storm Event)	Grab or composite sample	3 / 2 / 1	If toxicity results < 50% of control results, repeat sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

[29] Includes dissolved oxygen, temperature, conductivity, and pH.

[30] The method of analysis shall achieve a method detection limit at least as low as that achieved by the Amperometric Titration Method (4500-Cl from *Standard Methods for Examination of Water and Wastewater*, Edition 20).

[31] If temperatures exceed applicable threshold (e.g., Maximum Weekly Average Temperature, Sullivan K., Martin, D.J., Cardwell, R.D., Toll, J.E., Duke, S. 2000. *An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria, Sustainable Ecosystem Institute*) or spike with no obvious natural explanation observed.

[32] *US EPA three species toxicity tests: Selenastrum* growth and *Ceriodaphnia* and *Pimephales* with lethal and sublethal endpoints. Also H*yalella azteca with lethal endpoint.*

Status Monitoring Parameter	**Sampling and/or Analytical Method**[21]	**Minimum Sampling Occurrence**[22]	**Duration of Sampling**	**Minimum # Sample Sites to Monitor/Yr**[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	**Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.**
Toxicity– Bedded Sediment, Fine-grained[33]	Applicable SWAMP Comparable Method	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pollutants – Bedded Sediment,[34] fine-grained	Applicable SWAMP Comparable Method inc. grain size	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pathogen Indicators[35]	U.S. EPA protocol[36]	1/yr (During Summer)	Follow U.S. EPA protocol	5 / 5 / * *Fairfield-Suisun & Vallejo Permittees: 3 sites twice in permit term	Exceedance of USEPA criteria
Stream Survey (stream walk & mapping)[37]	USA[38] or equivalent	1 waterbody/yr	N/A	9 / 6 / 3 stream miles/year	N/A

00921
962

[33] Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Coordinate with TMDL Provision requirements as applicable.

[34] Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Analytes shall include all of those reported in MacDonald et al. 2000 (including copper, nickel, mercury, PCBs, DDT, chlordane, dieldrin) as well as pyrethroids (see Table 8.4 for list of pyrethroids). Coordinate with TMDL Provision requirements as applicable. MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

[35] Includes fecal coliform and *E. Coli.*

[36] Rather than collecting samples over five separate days, Permittees may use Example #2, pg. 54, of USEPA's *Implementation Guidance for Ambient Water Quality Criteria for Bacteria*, March 2004 Final.

[37] The Stream Surveys need not be repeated on a watershed if a Stream Survey was completed on that waterbody within the previous five years. The number of stream miles to be surveyed in any given year may be less than that shown in Table 8-1 in order to avoid repeating surveys at areas surveyed during the previous five years.

[38] Center for Watershed Protection, Manual 10: *Unified Stream Assessment: A User's Manual,* February 2005.

iv. **Locations** – For each sampling year (per C.8.c.iii.), Permittees shall select at least one waterbody to sample from the applicable list below. Locations shall be selected so that sampling is sufficient to characterize segments of the waterbody(s). For example, Permittees required to collect a larger number of samples should sample two or more waterbodies, so that each sampling effort represents a reasonable segment length and/or type. Samples shall be collected in reaches that receive urban stormwater discharges, except in possible infrequent instances where non-urban-impacted stream samples are needed for comparison[39]. Waterbody selection shall be based on factors such as watershed area, land use, likelihood of urban runoff impacts, and existing monitoring data.

Table 8.2 Status Monitoring Locations – Waterbodies

SCVURPPP	ACCWP	CCCWP	SMCWPPP	FSUMRP	VALLEJO
Coyote Creek and tributaries	Arroyo Valle (below Livermore or lower)	Kirker Creek	San Pedro Creek and tributaries	Laurel Creek	Chabot Creek
Guadalupe River and tributaries	Arroyo Mocho	Mt. Diablo Creek	Pilarcitos Creek	Ledgewood Creek	Austin Creek & tributaries
San Tomas Creek and tributaries	Tassajara Creek	Walnut Creek and tributaries	Colma Creek		
Calabazas Creek	Alamo Creek	Rodeo Creek	San Bruno Creek and tributaries		
Permanente Creek and tributaries	Arroyo de la Laguna	Pinole Creek	Millbrae Creek and tributaries		
Stevens Creek and tributaries	Alameda Creek (at Fremont or below)	San Pablo Creek	Mills Creek and tributaries		
Matadero Creek and tributaries	San Lorenzo Creek & tribs	Alhambra Creek	Easton Creek and tributaries		
Adobe Creek	San Leandro Creek & tribs	Wildcat Creek	Sanchez Creek and tributaries		
Lower Penitencia Creek and tributaries	Oakland, Berkeley, or Albany Creeks		Burlingame Creek and tributaries		
Barron Creek			San Mateo Creek (below dam only)		
San Francisquito Creek & tributaries			Borel Creek & tributaries		
			Laurel Creek & tribs		
			Belmont Creek & tribs		
			Pulgas Creek & tribs		
			Cordilleras & tributaries		
			Redwood Creek & tribs		
			Atherton Creek & tribs		
			San Francisquito Creek and tributaries		

[39] Sampling efforts shall focus on stream reaches with urban stormwater system discharges. Sampling upstream of urban outfalls is not precluded where needed to meet sampling plan objectives.

v. Status Monitoring Results – When Status Monitoring produces results such as those described in the final column of Table 8.1, Permittees shall conduct Monitoring Project(s) as described in C.8.d.i.

C.8.d. Monitoring Projects – Permittees shall conduct the Monitoring Projects listed below.

i. Stressor/Source Identification – When Status results trigger a follow-up action as indicated in Table 8.1, Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, proceed directly to step 2. The first follow-up action shall be initiated as soon as possible, and no later than the second fiscal year after the sampling event that triggered the Monitoring Project.

(1) Conduct a site specific study (or non-site specific if the problem is wide-spread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE)[40] or Toxicity Identification Evaluations (TIE).[41] A TRE, as adapted for urban stormwater data, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE.

(2) Identify and evaluate the effectiveness of options for controlling the cause(s) of the trigger stressor/source.

(3) Implement one or more controls.

(4) Confirm the reduction of the cause(s) of trigger stressor/source.

(5) Stressor/Source Identification Project Cap: Permittees who conduct this monitoring through a regional collaborative shall be required to initiate no more than ten Stressor/Source Identification projects during the Permit term in total, and at least two must be toxicity follow-ups, unless monitoring results do not indicate the presence of toxicity. If conducted through a stormwater countywide program, the Santa Clara and Alameda

[40] USEPA. August 1999. *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*. EPA/833B-99/002. Office of Wastewater Management, Washington, D.C.

[41] Select TIE methods from the following references after conferring with SWAMP personnel: For sediment: (1) Ho KT, Burgess R., Mount D, Norberg-King T, Hockett, RS. 2007. *Sediment toxicity identification evaluation: interstitial and whole methods for freshwater and marine sediments*. USEPA, Atlantic Ecology Division/Mid-Continental Ecology Division, Office of Research and Development, Narragansett, RI, or (2) Anderson, BS, Hunt, JW, Phillips, BM, Tjeerdema, RS. 2007. *Navigating the TMDL Process: Sediment Toxicity*. Final Report- 02-WSM-2. Water Environment Research Federation. 181 pp. For water column: (1) USEPA. 1991. *Methods for aquatic toxicity identification evaluations. Phase I Toxicity Characterization Procedures.* EPA 600/6-91/003. Office of Research and Development, Washington, DC., (2) USEPA. 1993. *Methods for aquatic toxicity identification evaluations. Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity*. EPA 600/R-92/080. Office of Research and Development, Washington, DC., or (3) USEPA. 1996. *Marine Toxicity Identification Evaluation (TIE), Phase I Guidance Document*. EPA/600/R-95/054. Office of Research and Development, Washington, DC.

Permittees each shall be required to initiate no more than five (two for toxicity); the Contra Costa and San Mateo Permittees each shall be required to initiate no more than three (one for toxicity); and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate no more than one Stressor/Source Identification project(s) during the Permit term.

(6) As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.

ii. BMP Effectiveness Investigation – Investigate the effectiveness of one BMP for stormwater treatment or hydrograph modification control. Permittees who do this project through a regional collaborative are required to initiate no more than one BMP Effectiveness Investigation during the Permit term. If conducted through a stormwater countywide program, the Santa Clara, Alameda, Contra Costa, and San Mateo Permittees shall be required to initiate one BMP Effectiveness Investigation each, and the Fairfield-Suisun and Vallejo Permittees shall be exempt from this requirement. The BMP(s) used to fulfill requirements of C.3.b.iii., C.11.e. and C.12.e. may be used to fulfill this requirement, provided the BMP Effectiveness Investigation includes the range of pollutants generally found in urban runoff. The BMP Effectiveness Investigation will not trigger a Stressor/Source Identification Project. Data from this Monitoring Project need not be SWAMP-comparable.

iii. Geomorphic Project – This monitoring is intended to answer the questions: How and where can our creeks be restored or protected to cost-effectively reduce the impacts of pollutants, increased flow rates, and increased flow durations of urban runoff?

Permittees shall select a waterbody/reach, preferably one that contains significant fish and wildlife resources, and conduct one of the following projects within each county, except that only one such project must be completed within the collective Fairfield-Suisun and Vallejo Permittees' jurisdictions:

(1) Gather geomorphic data to support the efforts of a local watershed partnership[42] to improve creek conditions; or

(2) Inventory locations for potential retrofit projects in which decentralized, landscape-based stormwater retention units can be installed; or

(3) Conduct a geomorphic study which will help in development of regional curves which help estimate equilibrium channel conditions for different-sized drainages. Select a waterbody/reach that is not undergoing changing land use. Collect and report the following data:

- Formally surveyed channel dimensions (profile), planform, and cross-sections. Cross-sections shall include the topmost floodplain terrace and

[42] A list of local watershed partnerships may be obtained from Water Board staff.

be marked by a permanent, protruding (not flush with ground) monument.

- Contributing drainage area.
- Best available information on bankfull discharges and width and depth of channel formed by bankfull discharges.
- Best available information on average annual rainfall in the study area.

Permittees shall complete the selected geomorphic project so that project results are reported in the Integrated Monitoring Report (see Provision C.8.g.v).

C.8.e. Pollutants of Concern and Long-Term Trends Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of Pollutants of Concern to the Bay from local tributaries and urban runoff, assess progress toward achieving wasteload allocations (WLAs) for TMDLs and help resolve uncertainties associated with loading estimates for these pollutants. In particular, there are four priority management information needs toward which POC monitoring must be directed: 1) identifying which Bay tributaries (including stormwater conveyances) contribute most to Bay impairment from pollutants of concern; 2) quantifying annual loads or concentrations of pollutants of concern from tributaries to the Bay; 3) quantifying the decadal-scale loading or concentration trends of pollutants of concern from small tributaries to the Bay; and 4) quantifying the projected impacts of management actions (including control measures) on tributaries and identifying where these management actions should be implemented to have the greatest beneficial impact.

Permittees shall implement the following POC monitoring components or pursue an alternative approach that addresses each of the aforementioned management information needs. An alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described; or an equivalent level of monitoring effort is employed to answer the management information needs.

Long-Term monitoring is intended to assess long-term trends in pollutant concentrations and toxicity in receiving waters and sediment, in order to evaluate if stormwater discharges are causing or contributing to toxic impacts on aquatic life. Permittees shall implement the following Long-Term monitoring components or, following approval by the Executive Officer, an equivalent monitoring program.

i. Pollutants of Concern Loads Monitoring Locations – Permittees shall conduct Pollutants of Concern monitoring at stations listed below. Permittees may install these stations in two phases providing at least half of the stations are monitored in the water year beginning October 2010, and all the stations are monitored in the water year beginning October 2012. Upon approval by the Executive Officer, Permittees may use alternate POC monitoring locations.

(1) Castro Valley Creek S3 at USGS gauging station in Castro Valley

(2) Guadalupe River

(3) Zone 4 Line A at Chabot Road in Hayward

(4) Rheem Creek at Giant Road in Richmond

(5) Walnut Creek at a downstream location

(6) Calabazas Creek at Lakeside Drive in Sunnyvale, at border with Santa Clara

(7) San Mateo Creek at downstream location

(8) Laurel Creek at Laurie Meadows park, off Casanova Drive in City of San Mateo.

ii. Long-Term Monitoring Locations – Permittees shall conduct Long-Term monitoring at stations listed below. After conferring with the Regional SWAMP program, and upon approval by the Executive Officer, Permittees may use alternate Long-Term monitoring locations.

Table 8.3. Long-Term Monitoring Locations

Stormwater Countywide Program	Waterbody	Suggested Location
Alameda Permittees	Alameda Creek OR	East of Alvarado Blvd*
	Lower San Leandro Creek	Empire Road*
Contra Costa Permittees	Kirker Creek OR	Floodway*
	Walnut Creek	Concord Avenue*
Santa Clara Permittees	Guadalupe River OR	USGS Gaging Station 11169025*
	Coyote Creek	Montague*
San Mateo Permittees	San Mateo Creek	Gateway Park*

* SWAMP is scheduled to collect sediment toxicity and sediment chemistry samples annually at these stations during the month of June.

iii. Parameters and Frequencies – Permittees shall conduct Pollutants of Concern sampling pursuant to Table 8.4, Categories 1 and 2. In Table 8.4, Category 1 pollutants are those for which the Water Board has active water quality attainment strategies (WQAS), such as TMDL or site-specific objective projects. Category 2 pollutants are those for which WQAS are in development. The lower monitoring frequency for Category 2 pollutants is sufficient to develop preliminary loading estimates for these pollutants.

Permittees shall conduct Long-Term monitoring pursuant to Table 8.4, Category 3. SWAMP has scheduled collection of Category 3 data at the Long-Term monitoring locations stated in C.8.e.ii. As stated in Provision C.8.a.iv., Permittees may use SWAMP data to fulfill Category 3 sampling requirements.

iv. Protocols – At a minimum, sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii).

v. **Methods** – Methyl mercury samples shall be grab samples collected during storm events that produce rainfall of at least 0.10 inch, shall be frozen immediately upon collection, and shall be kept frozen during transport to the laboratory. All other Category 1 and 2 samples shall be wet weather flow-weighted composite samples, collected during storm events that produce rainfall of at least 0.10 inch. Sampled storms should be separated by 21 days of dry weather, but, at a minimum, sampled storms must have 72 hours of antecedent dry weather. Samples must include the first rise in the hydrograph. Category 3 monitoring data shall be SWAMP-comparable.

Table 8.4 Pollutants of Concern Loads & Long-Term Monitoring Elements

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Category 1 • Total and Dissolved Copper • Total Mercury[43] • Methyl Mercury • Total PCBs[44] • Suspended Sediments (SSC) • Total Organic Carbon • Toxicity – Water Column • Nitrate as N • Hardness	Annually	Average of 4 wet weather events per year For methyl mercury only: average of 2 wet & 2 dry weather events per year	Flow-weighted composite For methyl mercury only: grab samples collected during the first rise in the hydrograph of a storm event.
Category 2 • Total and Dissolved Selenium • Total PBDEs (Polybrominated Diphenyl Ethers) • Total PAHs (Poly-Aromatic Hydrocarbons) • Chlordane • DDTs (Dichloro-Diphenyl-Trichloroethane) • Dieldrin • Nitrate as N • Pyrethroids - bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin • Carboryl and fipronil • Total and Dissolved Phosphorus	Oct. 2010 - 2011 water year and Oct. 2012 - 2013 water year	2 times per year	Flow-weighted composite
Category 3 Toxicity – Bedded Sediment, fine-grained[45]	Biennially, Coordinate	Once per year, during April-June,	Grab sample

[43] The monitoring type and frequency shown for mercury is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

[44] The monitoring type and frequency shown for PCBs is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Pollutants – Bedded Sediment, fine-grained	with SWAMP	coordinate with SWAMP	

vi. Sediment Delivery Estimate/Budget – The objective of this monitoring is to develop a strong estimate of the amount of sediment entering the Bay from local tributaries and urban drainages. By July 1, 2011, Permittees shall develop a design for a robust sediment delivery estimate/sediment budget in local tributaries and urban drainages. Permittees shall implement the study by July 1, 2012.

vii. Emerging Pollutants – Permittees shall develop a work plan and schedule for initial loading estimates and source analyses for emerging pollutants: endocrine-disrupting compounds, PFOS/PFAS (Perfluorooctane Sulfonates (PFOS), Perfluoroalkyl sulfonates (PFAS); these perfluorocompounds are related to Teflon products), and NP/NPEs (nonylphenols/nonylphenol esters —estrogen-like compounds). This work plan, which is to be implemented in the next Permit term, shall be submitted with the Integrated Monitoring Report (see Provision C.8.g.).

C.8.f. Citizen Monitoring and Participation

i. Permittees shall encourage Citizen Monitoring.

ii. In developing Monitoring Projects and evaluating Status & Trends data, Permittees shall make reasonable efforts to seek out citizen and stakeholder information and comment regarding waterbody function and quality.

iii. Permittees shall demonstrate annually that they have encouraged citizen and stakeholder observations and reporting of waterbody conditions. Permittees shall report on these outreach efforts in the annual Urban Creeks Monitoring Report.

C.8.g. Reporting

i. Water Quality Standard Exceedence – When data collected pursuant to C.8.a.-C.8.f. indicate that stormwater runoff or dry weather discharges are or may be causing or contributing to exceedance(s) of applicable water quality standards, including narrative standards, a discussion of possible pollutant sources shall be included in the Urban Creeks Monitoring Report. When data collected pursuant to C.8.a.-C.8.f. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. The preceding reporting requirements shall not apply to

[45] If Ceriodaphnia, H*yalella azteca,* or Pimephales survival or Selenastrum growth is < 50% of control results, repeat wet weather sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.8 through C.14 of this Order in accordance with Provision C.1.

ii. **Status Monitoring Electronic Reporting** – Permittees shall submit an Electronic Status Monitoring Data Report no later than January 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Electronic Status Monitoring Data Reports shall be in a format compatible with the SWAMP database.[46] Water Quality Objective exceedances shall be highlighted in the Report.

iii. **Urban Creeks Monitoring Report** – Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period, with the initial report due March 15, 2012, unless the Permittees choose to monitor through a regional collaborative, in which case the due date is March 15, 2013. Each Urban Creeks Monitoring Report shall contain summaries of Status, Long-Term, Monitoring Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:

(1) Maps and descriptions of all monitoring locations;

(2) Data tables and graphical data summaries; Constituents that exceed applicable water quality standards shall be highlighted;

(3) For all data, a statement of the data quality;

(4) An analysis of the data, which shall include the following:

- Calculations of biological metrics and physical habitat endpoints.
- Comparison of biological metrics to:
  - Each other
  - Any applicable, available reference site(s)
  - Any applicable, available index of biotic integrity
  - Physical habitat endpoints.
- Identification and analysis of any long-term trends in stormwater or receiving water quality.

(5) A discussion of the data for each monitoring program component, which shall:

- Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans.

[46] See http://mpsl.mlml.calstate.edu/swdataformats.htm. Permittees shall maintain an information management system that will support electronic transfer of data to the Regional Data Center of the ***California Environmental Data Exchange Network*** (***CEDEN***), located within the San Francisco Estuary Institute.

- Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness.
- Identify and prioritize water quality problems.
- Identify potential sources of water quality problems.
- Describe follow-up actions.
- Evaluate the effectiveness of existing control measures.
- Identify management actions needed to address water quality problems.

iv. Monitoring Project Reports – Permittees shall report on the status of each ongoing Monitoring Project in each annual Urban Creeks Monitoring Report. In addition, Permittees shall submit stand-alone summary reports within six months of completing BMP Effectiveness and Geomorphic Projects; these reports shall include: a description of the project; map(s) of project locations; data tables and summaries; and discussion of results.

v. Integrated Monitoring Report – No later than March 15, 2014, Permittees shall prepare and submit an Integrated Monitoring Report through the regional collaborative monitoring effort on behalf of all participating Permittees, or on a countywide basis on behalf of participating Permittees, so that all monitoring conducted during the Permit term is reported.[47] This report shall be in lieu of the Annual Urban Creeks Monitoring Report due on March 15, 2014.

The report shall include, but not be limited to, a comprehensive analysis of all data collected pursuant to Provision C.8., and may include other pertinent studies. For Pollutants of Concern, the report shall include methods, data, calculations, load estimates, and source estimates for each Pollutant of Concern Monitoring parameter. The report shall include a budget summary for each monitoring requirement and recommendations for future monitoring. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit.

vi. Standard Report Content –All monitoring reports shall include the following:

- The purpose of the monitoring and briefly describe the study design rationale.
- Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data.
- Brief descriptions of sampling protocols and analytical methods.
- Sample location description, including waterbody name and segment and latitude and longitude coordinates.
- Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue).
- Concentrations detected, measurement units, and detection limits.

[47] Permittees who do not participate in the Regional Monitoring Group or in a stormwater countywide program must submit an individual Integrated Receiving Water Impacts Report.

- Assessment, analysis, and interpretation of the data for each monitoring program component.
- Pollutant load and concentration at each mass emissions station.
- A listing of volunteer and other non-Permittee entities whose data are included in the report.
- Assessment of compliance with applicable water quality standards.
- A signed certification statement.

vii. Data Accessibility – Permittees shall make electronic reports available through a regional data center, and optionally through their web sites. Permittees shall notify stakeholders and members of the general public about the availability of electronic and paper monitoring reports through notices distributed through appropriate means, such as an electronic mailing list.

C.8.h. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP)[48] for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent Standard Operating Procedures. A Regional Monitoring Collaborative may adapt the SWAMP QAPP for use in conducting monitoring in the San Francisco Bay Region, and may use such QAPP if acceptable to the Executive Officer.

[48] The current SWAMP QAPP at the time of Permit issuance is dated September 1, 2008, and is available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses their own and others' use of pesticides within their jurisdictions that pose a threat to water quality and that have the potential to enter the municipal conveyance system. This provision implements requirements of the TMDL for Diazinon and Pesticide related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. However, urban runoff management agencies (i.e., the Permittees) are not solely responsible for attaining the allocations because their authority to regulate pesticide use is constrained by federal and State law. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Pesticides of concern include: organophosphorous pesticides (chlorpyrifos, diazinon, and malathion); pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin); carbamates (e.g., carbaryl); and fipronil. The Permittees may coordinate with BASMAA, the Urban Pesticide Pollution Prevention Project, the Urban Pesticide Committee, the Bay-Friendly Landscaping and Gardening Coalition, and other agencies and organizations in carrying out these activities.

C.9.a. Adopt an Integrated Pest Management (IPM) Policy or Ordinance

i. Task Description – In their IPM policies or ordinances, the Permittees shall include provisions to minimize reliance on pesticides that threaten water quality and to require the use of IPM in municipal operations and on municipal property.

ii. Implementation Level – If not already in place, the Permittees shall adopt IPM policies or ordinances no later than July 1, 2010.

iii. Reporting – The Permittees shall submit a copy of their IPM ordinance(s) or policy(s) in their 2010 Annual Report.

C.9.b. Implement IPM Policy or Ordinance

i. Task Description – The Permittees shall establish written standard operating procedures for pesticide use that ensure implementation of the IPM policy or ordinance and require municipal employees and contractors to adhere to the IPM standard operating procedures.

ii. Reporting

(1) In their Annual Reports, the Permittees shall report on IPM implementation by showing trends in quantities and types of pesticide used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphorous pesticides, pyrethroids, carbaryl, and fipronil.

(2) The Permittees shall maintain pesticide application standard operating procedures and submit them upon request.

C.9.c. Train Municipal Employees

i. Task Description – The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides that threaten water quality are trained in IPM practices and the Permittee's IPM policy. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program and EcoWise Certified.

ii. Reporting

(1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in IPM policy and IPM standard operating procedures within the last three years.

(2) The Permittees shall submit training materials (e.g., course outline, date, attendees) upon request.

C.9.d. Require Contractors to Implement IPM

i. Task Description – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM no later than July 1, 2010.

ii. Reporting – In their Annual Reports, the Permittees shall submit documentation to confirm compliance, such as the Permittee's standard contract specification or copy of contractors' certification(s).

C.9.e. Track and Participate in Relevant Regulatory Processes (may be done jointly with other Permittees, such as through CASQA or BASMAA and/or the Urban Pesticide Pollution Prevention Project)

i. Task Description

(1) The Permittees shall track USEPA pesticide evaluation and registration activities as they relate to surface water quality, and when necessary, encourage USEPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track California Department of Pesticide Regulation (DPR) pesticide evaluation activities as they relate to surface water quality, and when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and County Agricultural Commissioners in

ensuring that pesticide applications comply with water quality standards; and

(4) As appropriate, the Permittees shall submit comment letters on USEPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. Reporting – In their Annual Reports, the Permittees who participate in a regional effort to comply with C.9.e. may reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected. All other Permittees shall list their specific participation efforts, information submitted, and how regulatory actions were affected.

C.9.f. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain regular communications with county agricultural commissioners (or other appropriate State and/or local agencies) to (1) get input and assistance on urban pest management practices and use of pesticides, (2) inform them of water quality issues related to pesticides, and (3) report violations of pesticide regulations (e.g., illegal handling) associated with stormwater management.

ii. Reporting – In their Annual Reports, the Permittees shall summarize improper pesticide usage reported to county agricultural commissioners and report follow-up actions to correct violations.

C.9.g. Evaluate Implementation of Source Control Actions Relating to Pesticides

i. Task Description – The Permittees shall evaluate the effectiveness of the control measures implemented, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (Provision C.8.), and identify improvements to existing control measures and/or additional control measures, if needed, to attain targets with an implementation time schedule.

ii. Reporting – In their 2013 Annual Reports, the Permittees shall report the evaluation results, and if needed, submit a plan to implement improved and/or new control measures.

C.9.h. Public Outreach (may be done jointly with other Permittees, such as through CASQA or BASMAA and/or the Urban Pesticide Pollution Prevention Project or the Bay-Friendly Landscaping and Gardening Coalition).

i. Point of Purchase Outreach: The Permittees shall:

(1) Conduct outreach to consumers at the point of purchase;

(2) Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and

(3) Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.

ii. **Reporting** – In their Annual Reports, the Permittees who participate in a regional effort to comply with C.9.h.i. may reference a report that summarizes these actions. All other Permittees shall summarize activities completed and document any measurable awareness and behavior changes resulting from outreach.

iii. **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural or landscape pest control and shall:

(1) Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control, including IPM;

(2) Incorporate IPM messages into general outreach;

(3) Provide information to residents about "Our Water, Our World" or functionally equivalent program;

(4) Provide information to residents about EcoWise Certified IPM certification in Structural Pest Management, or functionally equivalent certification program; and

(5) Coordinate with household hazardous-waste programs to facilitate appropriate pesticide waste disposal, conduct education and outreach, and promote appropriate disposal.

iv. **Reporting** – In their 2013 Annual Reports, the Permittees who participate in a regional effort to comply with C.9.h.iii. may reference a report that summarizes these actions. All other Permittees shall document the effectiveness of their actions in their 2013 Annual Reports. This documentation may include percentages of residents hiring certified IPM providers and the change in this percentage.

v. **Outreach to Pest Control Operators:** The Permittees shall conduct outreach to pest control operators (PCOs) and landscapers; Permittees are encouraged to work with DPR, county agricultural commissioners, UC-IPM, BASMAA, the Urban Pesticide Committee, the EcoWise Certified Program (or functionally equivalent certification program), the Bio-integral Resource Center and others to promote IPM to PCOs and landscapers.

vi. **Reporting** – In each Annual Report, the Permittees who participate in a regional effort to comply with C.9.h.v. may reference a report that summarizes these actions. All other Permittees shall summarize how they reached PCOs and landscapers and reduced pesticide use.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022 as further specified below.

During this permit term, the Permittees shall develop and implement a Short-Term Trash Load Reduction Plan. This includes implementation of a mandatory minimum level of trash capture; cleanup and abatement progress on a mandatory minimum number of Trash Hot Spots; and implementation of other control measures and best management practices, such as trash reduction ordinances, to prevent or remove trash loads from MS4s to attain a 40% reduction in trash loads by July 1, 2014. The Permittees shall also develop and begin implementation of a Long-Term Trash Load Reduction Plan to attain a 70% reduction in trash loads from their MS4s by 2017 and 100% by 2022. Flood management agencies, which are non-population-based Permittees that do not have jurisdiction over urban watershed land, are not subject to these trash reduction requirements except for minimum full trash capture and Trash Hot Spot requirements, as specified in subsections C.10.a.iii and C.10.b below.

C.10.a. Short-Term Trash Load Reduction

i. **Short-Term Trash Loading Reduction Plan** – Each Permittee shall submit a Short-Term Trash Load Reduction Plan, including an implementation schedule, to the Water Board by February 1, 2012. The Plan shall describe control measures and best management practices, including any trash reduction ordinances, that are currently being implemented and the current level of implementation and additional control measures and best management practices that will be implemented, and/or an increased level of implementation designed to attain a 40% trash load reduction from its MS4 by July 1, 2014.

   The Short-Term Trash Load Reduction Plan shall account for required mandatory minimum Full Trash Capture devices called for in Provision C.10.a.iii and Trash Hot Spot Cleanup called for in Provision C.10.b.

ii. **Baseline Trash Load and Trash Load Reduction Tracking Method** – Each Permittee, working collaboratively or individually, shall determine the baseline trash load from its MS4 to establish the basis for trash load reductions and submit the determined load level to the Water Board by February 1, 2012, along with documentation of methodology used to determine the load level. The submittal shall also include a description of the trash load reduction tracking method that will be used to account for trash load reduction actions and to demonstrate progress and attainment of trash load reduction levels. The submittal shall account for the drainage areas of a Permittee's jurisdiction that are associated with the baseline trash load from its MS4, and the baseline trash load level per unit area by land use type and drainage area characteristics used to derive the total baseline trash load level for each Permittee.

   In the determination of applicable areas that generate trash loads for inclusion in the Baseline Trash Load, the Permittees may propose areas for exclusion, with supporting documentation, which meet Discharge Prohibition A.2 and trash-

related Receiving Water Limitations. Documentation demonstrating no material trash presence or adverse impact may include data from the maintenance of existing trash capture devices, data from trash flux measurements in the MS4 and the water column of streams during wet weather, Trash Hot Spot assessments, and litter audits of street curb and gutter areas in high pedestrian traffic and high commercial activity areas.

If proposed areas for exclusion are commercial, industrial, or high density residential areas, or adjacent to schools or event venues, the Permittee shall collect and submit by February 1, 2013, an additional year of documentation to further support the basis for the exclusion. If the data continue to support the exclusion determination, further trash reduction actions are not required in these areas, unless the Water Board notifies the Permittee otherwise.

Each Permittee shall submit a progress report by February 1, 2011, that indicates whether it is determining its baseline trash load and trash load reduction method individually or collaboratively with other Permittees and a summary of the approach being used. The report shall also include the types and examples of documentation that will be used to propose exclusion areas, and the land use characteristics and estimated area of potentially excluded areas.

iii. **Minimum Full Trash Capture** – Except as excluded below, population-based Permittees shall install and maintain a mandatory minimum number of full trash capture devices by July 1, 2014, to treat runoff from an area equivalent to 30% of Retail/Wholesale Land[49] that drains to MS4s within their jurisdictions (see Table 10.1 in Attachment J). If the sum of the areas that generate trash loads determined pursuant to C.10.a.ii above is a smaller acreage than the required trash capture acreage, a population-based Permittee may reduce its minimum full trash capture requirement to the smaller acreage. A population-based Permittee with a population less than 12,000 and retail/wholesale land less than 40 acres, or a population less than 2000, is exempt from this trash capture requirement. The minimum number of trash capture devices required to be installed and maintained by non-population-based Permittees is included in Attachment J.

All installed devices that meet the following full trash capture definition may be counted toward this requirement regardless of date of installation. A full capture system or device is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour, storm in the sub-drainage area.

C.10.b. Trash Hot Spot Selection and Cleanup

Trash Hot Spots in receiving waters shall be cleaned annually to achieve the multiple benefits of beginning abatement of these impacts as mitigation and to learn more about the sources and patterns of trash loading.

[49] [http://quake.abag.ca.gov/mitigation/pickdbh2.html] and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

i. **Hot Spot Cleanup and Definition** – The Permittees shall cleanup selected Trash Hot Spots to a level of "no visual impact" at least one time per year for the term of the permit. Trash Hot Spots shall be at least 100 yards of creek length or 200 yards of shoreline length.

ii. **Hot Spot Selection** – Population-based Permittees shall identify high trash-impacted locations on State waters totaling at least one Trash Hot Spot per 30,000 population, or one per 100 acres of Retail/Wholesale Commercial Land Area, within their jurisdictions based on Association of Bay Area Governments (ABAG) 2005 data1, whichever is greater. If the hot spot number by one of the two determination methods is more than twice that determined by the other method, double the smaller hot spot number shall be used. Otherwise, the larger hot spot number determined by the two methods shall be the Trash Hot Spot assignment for a population-based Permittee. Each population-based Permittee shall select at least one Trash Hot Spot. The Permittees shall each submit selected Trash Hot Spots to the Water Board by July 1, 2010. The list should include photo documentation (one photo per 50 feet) and initial assessment results for the proposed hot spots. The minimum number of Trash Hot Spots per Permittee is included in Attachment J for population and non-population-based Permittees. The Permittees shall proceed with cleanup of selected Trash Hot Spots unless informed otherwise by the Water Board.

iii. **Hot Spot Assessments** – The Permittees shall quantify the volume of material removed from each Trash Hot Spot cleanup, and identify the dominant types of trash (e.g., glass, plastics, paper) removed and their sources to the extent possible. Documentation shall include the trash condition before and after clean up of the entire hot spot using photo documentation with a minimum of one photo per 50 feet of hot spot length. Trash Hot Spots may also be assessed using either the Rapid Trash Assessment (RTA v.8) or the SCVURPPP Urban RTA variation of that method.

C.10.c. Long-Term Trash Load Reduction

Each Permittee shall submit a Long-Term Trash Load Reduction Plan, including an implementation schedule, to the Water Board by February 1, 2014. The Plan shall describe control measures and best management practices, including any trash reduction ordinances, that are being implemented and the level of implementation and additional control measures and best management practices that will be implemented, and/or an increased level of implementation designed to attain a 70% trash load reduction from its MS4 by July 1, 2017, and 100% by July 1, 2022.

C.10.d. Reporting

i. In each Annual Report, each Permittee shall provide a summary of its trash load reduction actions (control measures and best management practices) including the types of actions and levels of implementation, the total trash loads and dominant types of trash removed by its actions, and the total trash loads and dominant types of trash for each type of action. The latter shall include each Trash Hot Spot selected pursuant to C.10.b. Beginning with the 2012 Annual

Report, each Permittee shall also report its percent annual trash load reduction relative to its Baseline Trash Load.

ii. The Permittees shall retain records for review providing supporting documentation of trash load reduction actions and the volume and dominant type of trash removed from full trash capture devices, from each Trash Hot Spot cleanup, and from additional control measures or best management practices implemented. Data may be combined for specific types of full trash capture devices deployed in the same drainage area. These records shall have the specificity required for the trash load reduction tracking method established pursuant to subsection C.10.a.iii.

C.11. Mercury Controls

The Permittees shall implement the following control programs for mercury. The Permittees shall perform the control measures and provide reporting on those control measures according to the provisions below. The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay mercury TMDL and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury load allocation established for the TMDL. The aggregate, regionwide, urban runoff wasteload load allocation is 82 kg/yr. This allocation should be achieved by February 2028 and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved by February 2018. If the interim loading milestone is not achieved, the Permittees shall demonstrate reasonable and measurable progress toward achieving the milestone. The Permittees may comply with any requirement of this provision through a collaborative effort.

C.11.a. Mercury Collection and Recycling Implemented throughout the Region

i. **Task Description** – The Permittees shall promote, facilitate, and/or participate in collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs).

ii. **Reporting** – The Permittees shall report on these efforts in their Annual Report, including an estimate of the mass of mercury collected.

C.11.b. Monitor Methylmercury

i. **Task Description** – The Permittees shall monitor methymercury in runoff discharges. The objective of the monitoring is to investigate a representative set of drainages and obtain seasonal information and to assess the magnitude and spatial/temporal patterns of methylmercury concentrations.

ii. **Implementation Level** – The Permittees shall analyze aqueous grab samples already being collected for total mercury analysis for methylmercury as specified in Provision C.8.f.

iii. **Reporting** – The Permittees shall report monitoring results annually beginning with their 2010 Annual Report.

C.11.c. Pilot Projects To Investigate and Abate Mercury Sources in Drainages, Including Public Rights-Of-Way, and Stormwater Conveyances with Accumulated Sediment that Contains Elevated Mercury Concentrations.

i. **Task Description** – The Permittees shall investigate and abate mercury sources in or to their storm drain systems in conjunction with the Water Board and other appropriate regulatory agencies with investigation and cleanup authorities. The purpose of this task is to implement and evaluate the benefit of a suite of abatement measures at five pilot project locations. The Permittees shall document the knowledge and experience gained through pilot implementation,

and this documentation will provide a basis for determining the scope of abatement implementation in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads abated resulting from implementation of these measures.

ii. **Implementation Level** – Reducing loads of PCBs is the main pilot location selection factor for this Provision, and reducing loads of mercury is a secondary criterion. Accordingly, for PCB pilot project locations selected as part of Provision C.12.c, the Permittees shall conduct reconnaissance in the pilot project drainage areas. The Permittees shall test sediments in storm drains and conveyances to characterize the extent and magnitude of mercury concentrations. They shall evaluate monitoring data and determine if a mercury sediment abatement program would reduce mercury loading significantly. If so determined, the Permittees shall cause abatement activities to be conducted at those sites under Permittee jurisdiction with identified remedial activities. When contamination is located on private property, a Permittee must either exercise direct authority to require cleanup or notify and request other appropriate authorities to exercise their cleanup authority.

iii. **Reporting** – Report on mercury-related aspects of work and loads abated as part of reporting requirements for Provision C.12.c.

C.11.d. Pilot Projects to Evaluate and Enhance Municipal Sediment Removal and Management Practices

i. **Task Description** – The Permittees shall jointly evaluate ways to enhance mercury load reduction benefits of operation and maintenance actives that remove or manage sediment. The purpose of this task is to implement these management practices at the pilot scale in five drainages during this permit term. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of enhanced sediment removal and management practices in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of enhanced sediment removal management practices in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. **Implementation Level** – In all pilot program drainages selected as part of Provision C.12.c, the Permittees shall jointly evaluate ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits for the control of mercury. This evaluation shall also include consideration of street flushing and capture, collection, or routing to the sanitary sewer (in coordination and consultation with local sanitary sewer agencies) as a potential enhanced management practice in coordination and consultation with local sanitary sewer agencies.

Beginning July 1, 2011, the Permittees shall implement pilot studies for the most potentially effective measures(s) based on the evaluation of Provision C.11.d.ii in all drainages for which PCB pilot projects are being conducted.

iii. Reporting

(1) The Permittees shall present a progress report on the results of the evaluation in their 2010 Annual Report and the final evaluation results in their 2011 Annual Report.

(2) In their March 15, 2014 Integrated Monitoring Report, the Permittees shall report the effectiveness of enhanced practices pilot implementation, report estimates of loads reduced, and present a plan and schedule for possible expanded implementation for subsequent permit terms.

C.11.e. Conduct Pilot Projects to Evaluate On-Site Stormwater Treatment via Retrofit

i. Task Description – The Permittees shall evaluate and quantify the removal of mercury by on-site treatment systems via retrofit of such systems into existing storm drain systems. The purpose of this task is to implement on-site treatment projects at the pilot scale in ten locations during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of on-site treatment retrofits in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. Implementation Level – The Permittees, working collaboratively, shall identify at least ten locations throughout the Permittees' jurisdictions that present opportunities to install and evaluate[50] on-site treatment systems (e.g., detention basins, bioretention units, sand filters, infiltration basins, treatment wetlands) and shall assess best treatment options for those locations. Every county (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano) should have at least one location. This effort shall identify potential locations draining a variety of land uses; evaluate technical feasibility; and discuss economical feasibility. The pilot locations may be the same as those chosen for Provision C.12.e, but consideration should be given to areas of elevated mercury concentrations.

On the basis of the Provision C.11.e.ii report, the Permittees shall select sites to perform pilot studies and shall conduct pilot studies in ten selected locations. Pilot studies shall span treatment types and drainage characteristics.

iii. Reporting –

(1) In their 2011 Annual Report, the Permittees shall report on candidate locations and types of treatment retrofit for each location. The report shall include assessment of at least ten locations.

[50] Permittees may evaluate a maximum of two pre-existing treatment systems of the ten total required systems to be evaluated provided that these existing treatment systems are applicable to the intent of this provision..

(2) In their March 15, 2014 Integrated Monitoring Report, the Permittees shall report status, results, mercury removal effectiveness, and lessons learned from the ten pilot studies and their plan for implementing this type of treatment on an expanded basis throughout their jurisdictions during the next permit term.

C.11.f. Diversion of Dry Weather and First Flush Flows to Publicly Owned Treatment Works (POTWs)

i. Task Description – The Permittees shall evaluate the reduced loads of mercury from diversion of dry weather and first flush stormwater flows to sanitary sewers. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. Implementation Level – The Permittees shall implement pilot projects to divert dry weather and first flush flows to POTWs to address these flows as a source of PCBs and mercury to receiving waters. The Permittees are strongly encouraged to make use of stormwater pump stations in this effort because pump station characterization work performed pursuant to Provisions C.2 and C.10, addressing dissolved oxygen depletion and trash impacts, may be efficiently leveraged for the initial phase of these diversion pilot projects. The objectives of this Provision are to: implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from each diversion; and gather information to guide the selection of additional diversion projects in future permits. Collectively, the Permittees shall select five stormwater pump stations and five alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with local POTWs on a watershed, county, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select five pump stations and five alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially-dominated catchments where elevated PCB concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at five pilot pump stations. As part of the pilot studies, the Permittees shall monitor, measure, and report mercury load reduction.

iii. Reporting

(1) The Permittees shall summarize the results of the feasibility evaluation in their 2010 Annual Report, including:

- Selection criteria leading to the identification of the five candidate and five alternate pump stations for pilot studies.
- Time schedules for conducting the pilot studies.
- A proposed method for distributing mercury load reductions to participating wastewater and stormwater agencies.

(2) The Permittees shall report annually on the status of the pilot studies in each subsequent Annual Report.

(3) The Permittees shall include in their March 15, 2014 Integrated Monitoring Report:

- Evaluation of pilot program effectiveness.
- Mercury loads reduced.
- Updated feasibility evaluation procedures to guide future diversion project selection.

C.11.g. Monitor Stormwater Mercury Pollutant Loads and Loads Reduced

i. Task Description – The Permittees shall develop and implement a monitoring program to quantify mercury loads and loads reduced through source control, treatment and other management measures as required in Provision C.8.f.

ii. Implementation Level – The Permittees shall demonstrate progress toward (a) the interim loading milestones, or (b) attainment of the program area allocations, by using the following methods:

(1) Quantify through estimates the annual average mercury load reduced by implementing pollution prevention, source control and treatment control efforts required by the provisions of this permit or other relevant efforts; or

(2) Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations; or

(3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the target of 0.2 mg mercury/kg dry weight.

iii. Reporting

(1) The Permittees shall report in their 2010 Annual Report methods used to assess progress toward meeting WLA goals and a full description of the

measurement and estimation methodology and rationale for the approaches.

(2) The Permittees shall report in their March 15, 2014 Integrated Monitoring Report results of chosen monitoring/measurement approach concerning loads assessment and estimation of loads reduced.

C.11.h. Fate and Transport Study of Mercury in Urban Runoff

i. Task Description – The Permittees shall conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of mercury discharged in urban runoff to San Francisco Bay and tidal areas.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, and the identification of drainages where urban runoff mercury is particularly important in food web accumulation.

iii. Reporting – The Permittees shall submit in their 2010 Annual Report a work plan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a schedule. The Permittees shall report on status of these studies in their 2010, 2011, and 2012 Annual Reports. In the March 15, 2014 Integrated Monitoring Report, the Permittees shall report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.11.i. Development of a Risk Reduction Program Implemented Throughout the Region.

i. Task Description – The Permittees shall develop and implement or participate in effective programs to reduce mercury-related risks to humans and quantify the resulting risk reductions from these activities.

ii. Implementation Level – The risk reduction activities shall include investigating ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Permittees may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning. The risk reduction activities may be performed by a third party if the Permittees wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

iii. Reporting – The Permittees shall submit in their 2010 Annual Report the specific manner in which these risk reduction activities will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report on the status of the risk reduction efforts in their 2011 and 2012 Annual Reports. The Permittees shall report the findings and results of the studies completed, planned, or in progress as well as the status of other risk reduction actions in their March 15, 2014 Integrated Monitoring Report.

C.11.j. Develop Allocation Sharing Scheme with Caltrans.

i. Task Description – The wasteload allocations for urban stormwater developed through the San Francisco Bay mercury TMDL implicitly include California Department of Transportation (Caltrans) roadway and non-roadway facilities within the geographic boundaries of urban runoff management agencies. Consistent with the TMDL, the Permittees are required to develop an equitable mercury allocation-sharing scheme in consultation with Caltrans to address the Caltrans facilities in the program area, and report the details to the Water Board. Alternatively, Caltrans may choose to implement mercury load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agencies' mercury allocation. In such a case, the Water Board will consider a separate allocation for Caltrans for which it may demonstrate progress toward attaining an allocation or load reduction in the same manner as municipal programs.

ii. Reporting – The Permittees shall report on the status of the efforts to develop this allocation sharing scheme in their 2010, 2011, and 2012 Annual Reports. The Permittees shall submit in their March 15, 2014 Integrated Monitoring Report the manner in which the urban runoff mercury TMDL allocation will be shared between the Permittees and Caltrans.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control programs for PCBs. The Permittees shall perform the control measures and provide reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the urban runoff requirements of the PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs load allocation. The Permittees may comply with any requirement of this Provision through a collaborative effort.

C.12.a. Implement Project throughout Region to Incorporate PCBs and PCB-Containing Equipment Identification into Existing Industrial Inspections

i. Task Description – The Permittees shall develop training materials and train municipal industrial building inspectors to identify, in the course of their existing inspections, PCBs or PCB-containing equipment. The Permittees shall incorporate such PCB identification into industrial inspection programs.

ii. Implementation Level – Where inspectors identify during inspections PCBs or PCB-containing equipment, the Permittees shall document incidents in inspection reports and refer to appropriate regulatory agencies (e.g. county health departments, Department of Toxic Substances Control, California Department of Public Health, and the Water Board) as necessary.

iii. Reporting – The Permittees shall report the results of training in their 2010 Annual Report and report on both ongoing training development and inspections for PCB identification in their 2011, and following, Annual Reports.

C.12.b. Conduct Pilot Projects to Evaluate Managing PCB-Containing Materials and Wastes during Building Demolition and Renovation (e.g., Window Replacement) Activities

i. Task Description – The Permittees shall evaluate potential presence of PCBs at construction sites, current material handling and disposal regulations/programs (e.g., municipal ordinances, RCRA, TSCA) and current level of implementation.

ii. Implementation Level –

(1) The Permittees shall develop a sampling and analysis plan to evaluate PCBs at construction sites that involve demolition activities (including research on when, where, and which materials potentially contained PCBs).

(2) The Permittees shall implement a sampling and analysis plan at a minimum of 10 sites distributed throughout the combined Permittees' jurisdiction areas.

(3) The Permittees shall develop/select BMPs to reduce or prevent discharges of PCBs during demolition/remodeling. The BMPs will focus on methods

to identify, handle, contain, transport and dispose of PCB-containing building materials.

(4) The Permittees shall develop model ordinances or policies, train and deploy inspectors, and pilot test BMPs at 5 sites.

iii. Reporting –

(1) In their 2010 Annual Report, the Permittees shall submit the sampling and analysis plan (of Provision C.12.b.ii.).

(2) In their 2010 Annual Report, the Permittees shall submit a status report on sampling and analysis along with whatever sampling results are available.

(3) In their 2011 Annual Report, the Permittees shall submit the results of the evaluation (Provision C.12.b.i.) of current regulations, level of implementation, and regulatory gaps as well as the final sampling and analysis report, a list of appropriate BMPs, BMP training program, and model ordinances and policies to prevent PCB discharges from building demolition and improvement activities.

(4) In the March 15, 2014 Integrated Monitoring Report, the Permittees shall submit the results of pilot program effectiveness evaluation.

C.12.c. Pilot Projects to Investigate and Abate On-land Locations with Elevated PCB Concentrations, Including Public Rights-of-way, and Stormwater Conveyances with Accumulated Sediments with Elevated PCBs Concentrations.

i. Task Description – The Permittees shall investigate and abate PCBs sources in or to their storm drain systems in conjunction with the Water Board and other appropriate regulatory agencies with investigation and cleanup authorities. The purpose of this task is to implement and evaluate the benefit of a suite of abatement measures at five pilot project locations. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of abatement projects in subsequent permit terms. The Permittees shall also quantify and report the amount of PCBs loads abated resulting from implementation of these measures.

ii. Implementation Level –

(1) The Permittees, working collaboratively, shall identify 5 drainage areas that contain high levels of PCBs and conduct pilot projects to investigate and abate these high PCB concentrations. To accomplish this, the Permittees shall interview municipal staff and review municipal databases, data collected or compiled through grant-funded efforts, other agency files, and other available information to identify potential PCB source areas and areas where PCB-contaminated sediment accumulates, including within stormwater conveyances. The Permittees shall qualitatively rank and map potential PCB source areas within each drainage. Investigation of mercury (Provision C.11.c.) shall be included in these efforts unless not

appropriate. When contamination is located on private property, the Permittees must either exercise direct authority to require cleanup or notify and request other appropriate authorities to exercise their cleanup authority.

(2) The Permittees shall conduct reconnaissance surveys of the identified drainages and gather information concerning past or current use of PCBs to further identify potential source areas and determine whether runoff from such locations is likely to convey soils/sediments with PCBs to municipal stormwater conveyances.

(3) The Permittees shall validate existence of elevated PCB concentrations through surface soil/sediment sampling and analysis where visual inspections and/or other information suggest potential source areas within each drainage.

Where data confirm significantly elevated PCB concentrations in surface soils/sediments within the subject pilot drainage, the Permittees shall provide available information on current site conditions and owner/operators and other potentially responsible parties to Water Board and other appropriate regulatory agencies to facilitate their issuance of orders for further investigation and remediation of subject sites. The Permittees shall assist the Water Board and other appropriate agencies to identify/evaluate funding to perform abatement and/or responsible parties and abatement options.

(4) The Permittees shall identify areas for expedited abatement on the basis of loading potential including factors such as PCB concentration, mass of sediment, and mobilization potential and/or human health protection thresholds, such as California Human Health Screening Levels.

(5) The Permittees shall conduct an abatement program in portions of drainages under their jurisdiction in conjunction with the Water Board and other appropriate agencies.

iii. Reporting

(1) The Permittees shall report on the identified suspect drainage areas [Provision C.12.c.ii (1)] in their 2010 Annual Report and results of the surveys [Provision C.12.c.ii.(2)] in their 2011 Annual Report.

(2) The Permittees shall report sampling and chemical analysis results at pilot locations [Provision C.12.c.ii.(3)] in their 2011 Annual Reports.

(3) The Permittees shall report on proposed abatement opportunities and activities [Provision C.12.c.ii.(4) and (5)], responsible parties, funding, agency oversight, and schedules in their 2012 Annual Report.

(4) The Permittees shall report results of abatement program effectiveness and estimates of loads reduced (see C.11.g) in the March 15, 2014 Integrated Monitoring Report.

C.12.d. Conduct Pilot Projects to Evaluate and Enhance Municipal Sediment Removal and Management Practices

i. **Task Description** – The Permittees shall jointly evaluate ways to enhance PCBs load reduction benefits of operation and maintenance activities that remove or manage sediment. The purpose of this task is to implement these management practices at the pilot scale in five drainages during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of enhanced sediment removal and management practices in subsequent permit terms. The Permittees shall also quantify and report the amount of PCBs loads removed or avoided resulting from implementation of these measures.

ii. **Implementation Level** – In all pilot program drainages selected as part of Provision C.12.c, the Permittees shall jointly evaluate ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. This evaluation shall also include consideration of street flushing and capture, collection, or routing to the sanitary sewer (in coordination and consultation with local sanitary sewer agency) as a potential enhanced management practice. The Permittees shall also jointly evaluate existing information on high-efficiency street sweepers. The goal is to evaluate the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads. The Permittees shall develop recommendations for follow-up studies to be conducted.

iii. **Reporting** – The Permittees shall submit a progress report on the results of these two evaluations in their 2010 Annual Report and the final evaluation results in their 2011 Annual Report.

iv. Beginning July 1, 2011, the Permittees shall implement pilot studies for the most potentially effective measure(s) based on the evaluation of Provision C.12.d. ii. throughout the region.

v. **Reporting** – The Permittees shall report effectiveness of enhanced practices pilot implementation in the March 15, 2014 Integrated Monitoring Report, and their plan for implementing enhanced practices in the next permit term.

C.12.e. Conduct Pilot Projects to Evaluate On-Site Stormwater Treatment via Retrofit

i. **Task Description** – The Permittees shall evaluate and quantify the removal of PCBs by on-site treatment systems via retrofit of such systems into existing storm drain systems. The purpose of this task is to implement on-site treatment projects at the pilot scale in ten locations during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of on-site treatment retrofits in subsequent permit terms.

ii. Implementation Level – The Permittees, working collaboratively, shall identify at least 10 locations throughout the Permittees' jurisdictions that present opportunities to install and evaluate[51] on-site treatment systems (e.g., detention basins, bioretention units, sand filters, infiltration basins, treatment wetlands) and shall assess the best treatment options for those locations. Every county (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano) should have at least one location. This assessment shall identify potential locations draining a variety of land uses, discuss technical feasibility, and discuss economical feasibility. The Permittees shall choose pilot study locations primarily on the basis of elevated PCBs concentrations with additional consideration to mercury concentrations.

iii. On the basis of the Provision C.12.e.ii. report, the Permittees shall select sites to perform pilot studies and shall conduct pilot studies in selected locations. Taken as a group, these 10 pilot study locations should span treatment types and drainage characteristics.

iv. Reporting –

(1) In their 2011 Annual Report, the Permittees shall report on candidate locations with types of treatment retrofit for each location. The report shall include assessment of at least 10 locations.

(2) In the March 15, 2014 Integrated Monitoring Report, the Permittees shall report status, results, PCBs-removal effectiveness, and lessons learned from the pilot studies and their plan for implementing this type of treatment on an expanded basis throughout the region during the next permit term.

C.12.f. Diversion of Dry Weather and First Flush Flows to POTWs

i. Task Description – The Permittees shall evaluate the reduced loads of PCBs from diversion of dry weather and first flush stormwater flows to sanitary sewers. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of urban runoff diversion in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms.

ii. Implementation Level – The Permittees shall implement pilot projects to address the role of pump stations as a source of pollutants of concern (primarily PCBs and secondarily mercury). This work is in addition to Provisions C.2 and C.10 that address dissolved oxygen depletion and trash impacts in receiving waters. The objectives of this provision are: to implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from the diversion; and gather

[51] The Permittees may evaluate a maximum of two pre-existing treatment systems of the ten total required systems to be evaluated provided that these existing treatment systems are applicable to the intent of this provision.

information to guide the selection of additional diversion projects required in future permits. Collectively, the Permittees shall select 5 stormwater pump stations and 5 alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with the local POTW on a watershed, program, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select 5 pump stations and 5 alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially dominated catchments where elevated PCB concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at the 5 pilot pump stations. As part of the pilot studies, they shall monitor and measure PCBs load reduction.

iii. Reporting –

(1) The Permittees shall summarize the results of the feasibility evaluation in their 2010 Annual Report, including:

- Selection criteria leading to the identification of the 5 candidate and 5 alternate pump station for pilot studies.
- Time schedules for conducting the pilot studies.
- A proposed method for distributing PCBs load reductions to participating wastewater and stormwater agencies.

(2) The Permittees shall report annually on the status of the pilot studies in each subsequent annual report.

(3) The March 15, 2014 Integrated Monitoring Report shall include:

- Evaluation of pilot program effectiveness.
- PCBs loads reduced.
- Updated feasibility evaluation procedures to guide future diversion project selection.

C.12.g. Monitor Stormwater PCB Pollutant Loads and Loads Reduced

The Permittees shall develop and implement a monitoring program as required in Provision C.8.f to quantify PCBs loads and loads reduced (see C.11.g for details) through the source control, treatment and other management measures implemented as part of the pilot studies of C.12.a through C.12.f.

C.12.h. Fate and Transport Study of PCBs in Urban Runoff

i. **Task Description** – The Permittees shall conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of PCBs discharged in urban runoff.

ii. **Implementation Level** – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2010 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a schedule. The Permittees shall report on status of the studies in their 2011 and 2012 Annual Reports. The Permittees shall report in the March 15, 2014 Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.12.i. Development of a Risk Reduction Program Implemented throughout the Region

i. **Task Description** – The Permittees shall develop and implement or participate in effective programs to reduce PCBs-related risks to humans and quantify the resulting risk reductions from these activities.

ii. **Implementation Level** – The risk reduction activities shall include investigating ways to address public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by PCBs in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Permittees may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning. The risk reduction activities may be performed by a third party if the Permittees wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

iii. **Reporting** – The Permittees shall submit in their 2010 Annual Report the specific manner in which these risk reduction activities will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report on status of the studies in their 2011 and 2012 Annual Reports. The Permittees shall report the findings and results of the studies completed, planned, or in progress as well as the status of other risk reduction actions in the March 15, 2014 Integrated Monitoring Report.

C.13. Copper Controls

The control program for copper is detailed below. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of C.13 Provisions through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. Task Description – The Permittees shall ensure that local ordinance authority is established to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of the surface of copper architectural features, including copper roofs to storm drains.

ii. Implementation Level

(1) The Permittees shall develop BMPs on how to manage the waste during and post-construction.

(2) The Permittees shall require use of appropriate BMPs when issuing building permits.

(3) The Permittees shall educate installers and operators on appropriate BMPs.

(4) The Permittees shall enforce against noncompliance.

iii. Reporting

(1) The Permittees shall certify adequate legal authority in their 2011 Annual Report or otherwise provide justification for schedule not to exceed one year to comply.

(2) The Permittees shall report annually, starting with their 2012 Annual Report, on training, permitting and enforcement activities.

(3) In their 2013 Annual Report, the Permittees shall evaluate the effectiveness of these measures, including BMP implementation and propose any additional measures to address this source.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. Task Description – By adopting local ordinances, the Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. Implementation Level – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including

connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. Reporting – The Permittees shall certify adequate legal authority in their 2011 Annual Report or otherwise provide justification for schedule not to exceed one year to comply.

C.13.c. Vehicle Brake Pads

i. Task Description – The Permittees shall engage in efforts to reduce the copper discharged from automobile brake pads to surface waters via urban runoff.

ii. Implementation Level – The Permittees shall participate in the Brake Pad Partnership (BPP) process to develop California legislation phasing out copper from certain automobile brake pads sold in California.

iii. Reporting – The Permittees shall report on legislation development and implementation status in Annual Reports during the permit term. In their 2013 Annual Report, the Permittees shall assess status of copper water quality issues associated with automobile brake pads and recommend brake pad-related actions for inclusion in subsequent permits if needed.

C.13.d. Industrial Sources

i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. Implementation Level –

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on-site.

iii. Reporting

The Permittees shall highlight copper reduction results in the industrial inspection component in the C.13 portion of each Annual Report beginning September 2010.

C.13.e. Studies to Reduce Copper Pollutant Impact Uncertainties

i. **Task Description** – The Permittees shall conduct or cause to be conducted technical studies to investigate possible copper sediment toxicity and technical studies to investigate sub-lethal effects on salmonids.

ii. **Implementation Level** – Technical uncertainties regarding copper effects in the Bay are described in the Basin Plan's implementation program for copper site-specific objectives. These uncertainties include toxicity to Bay benthic organisms possibly caused by high copper concentrations as well as possible impacts to the olfactory system of salmonids. The Permittees shall ensure that these studies are supported and conducted. Similar requirements are included in NPDES permits for wastewater discharges. The Permittees shall submit in their 2010 Annual Report the specific manner in which these information needs will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report the findings and results of the studies completed, planned, or in progress in their 2012 Annual Report.

C.14. Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium

The control program for PBDEs, legacy pesticides, and selenium is detailed below. The Permittees shall perform the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to gather concentration and loading information on a number of pollutants of concern (e.g., PBDEs, DDT, dieldrin, chlordane, selenium) for which TMDLs are planned or are in the early stages of development. The Permittees may comply with any requirement of C.14 Provisions through a collaborative effort.

C.14.a. Control Program for PBDEs, Legacy Pesticides, and Selenium.

i. **Task Description** – To determine if urban runoff is a conveyance mechanism associated with the possible impairment of San Francisco Bay for PBDEs, legacy pesticides (such as DDT, dieldrin, and chlordane), and selenium, the Permittees shall work with the other municipal stormwater management agencies in the Bay Region to implement a plan (PBDEs/Legacy Pesticides/Selenium Plans) to identify, assess, and manage controllable sources of PBDEs, legacy pesticides, and selenium found in urban runoff, if any. The Water Board recognizes that these three pollutants are distinct in terms of origin and transport, but they have been grouped into a single permit provision because the requirements are identical. The Water Board anticipates that some of the control measures that are developed for PCBs consistent with aforementioned efforts warrant consideration for the control of PBDEs and possibly legacy pesticides.

ii. **Implementation Level** – The PBDEs/Legacy Pesticides/Selenium Plan shall include actions to do the following:

Characterize the representative distribution of PBDEs, legacy pesticides, and selenium in the urban areas of the Bay Region covered by this permit to determine:

(1) If PBDEs, legacy pesticides, and selenium are present in urban runoff;

(2) If PBDEs, legacy pesticides, or selenium are distributed relatively uniformly in urban areas; and

(3) Whether storm drains or other surface drainage pathways are sources of PBDEs, legacy pesticides, or selenium in themselves, or whether there are specific locations within urban watersheds where prior or current uses result in land sources contributing to discharges of PBDEs, legacy pesticides, or selenium to San Francisco Bay via urban runoff conveyance systems.

iii. Report on progress in 2010 and 2011 Annual Reports. Submit in the 2012 Annual Report a report with the results of the characterization of PBDEs, legacy pesticides, and selenium in urban areas throughout the Bay Region.

iv. Provide information to allow calculation of PBDEs, legacy pesticides, and selenium loads to San Francisco Bay from urban runoff conveyance systems.

v. Submit in the 2013 Annual Report a report with the information required to compute such loads to San Francisco Bay of PBDEs, legacy pesticides, and selenium from urban runoff conveyance systems throughout the Bay.

vi. Identify control measures and/or management practices to eliminate or reduce discharges of PBDEs, legacy pesticides, or selenium conveyed by urban runoff conveyance systems.

vii. Submit in the 2013 Annual Report a report identifying such control measures/management practices.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. Discharge Type – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers; and

(8) NPDES permitted discharges (individual or general permits).

ii. Implementation Level – The non-stormwater discharges listed in Provision C.15.a.i above are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-viii below.

i. Discharge Type – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non Drinking Water Aquifers** – Groundwater pumped from monitoring wells, used for groundwater basin management, which are owned and/or operated by the Permittees who pump groundwater as drinking water. These aquifers tend to be shallower, when compared to drinking water aquifers.

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards consistent with the existing effluent limitations in the Water Board's NPDES General Permits, such as NPDES Nos. CAG912002 and CAG912003 for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by fuel and VOCs, respectively, and NPDES No. CAG912004 for discharges of low-level, incidental, and potentially contaminated groundwater.

(ii) The water samples shall be analyzed using approved USEPA Methods (e.g., (a) USEPA Method 160.2 for total suspended solids; (b) USEPA Method 8015 Modified for total petroleum hydrocarbons; (c) USEPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (d) USEPA Method 3005 for metals.

(iii) The water samples shall be analyzed for pH and turbidity.

(iv) If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs** – When uncontaminated (meeting the criteria in C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Discharges shall be properly controlled and maintained to prevent erosion at the discharge point and at a rate that avoids scouring of banks and excess sedimentation in the receiving waterbody.

(ii) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(iii) Turbidity of the discharged groundwater shall be maintained below 50 NTUs for discharges to dry creeks, 110 percent of the

ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(iv) pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5.

(c) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[52] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements.

(b) Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(c) If the discharge options in C.15.b.i.(2)(b) above are not feasible and these discharges must enter a storm drain, sampling shall be done to verify that the discharge is uncontaminated.

(i) The discharge shall meet water quality standards consistent with the existing effluent limitations in the Water Board's NPDES General Permits, such as NPDES Nos. CAG912002 and CAG912003 for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by fuel and VOCs, respectively, and NPDES No. CAG912004 for discharges of low-level, incidental, and potentially contaminated groundwater.

(ii) The Permittees shall require that water samples from these discharge types be analyzed using approved USEPA Methods (e.g., (a) USEPA Method 160.2 for total suspended solids; (b) USEPA Method 8015 Modified for total petroleum hydrocarbons; (c) USEPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (d) USEPA Method 3005 for metals.

(d) **Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in C.15.b.i.(2)(c) above, the Permittees shall require the following during discharge:

(i) Proper control and maintain to prevent erosion at the discharge point and at a rate that avoids scouring of banks and excess sedimentation in the receiving waterbody.

(ii) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include

[52] Pumped groundwater not exempted in C.15.a or conditionally exempted in C.15.b.i.(1).

the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(iii) Testing of water samples for turbidity and pH on the first two consecutive days of dewatering.

(iv) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(v) pH of discharged water shall be maintained within the range of 6.5 to 8.5.

(e) If a Permittee determines that a discharger or a project proponent is unable to comply with the above criteria, the discharger shall be directed to obtain approval or permits directly from the Water Board.

(f) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Types – Planned,[53] Unplanned,[54] and Emergency Discharges of the Potable Water System

(1) **Planned Discharges** – Planned discharges are routine operation and maintenance activities in the potable water distribution system that can be scheduled in advance, such as disinfecting water mains, testing fire hydrants, storage tank maintenance, cleaning and lining pipe sections, routine distribution system flushing, reservoir dewatering, and water main dewatering activities. The following requirements only apply to those Permittees that are water purveyors and pertain to their planned discharges of potable water to their storm drain systems.

(a) **Required BMPs**[55] – The Permittees shall implement appropriate BMPs for dechlorination, and erosion and sediment controls for all planned potable water discharges.

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[53] Planned discharges typically result from required routine operation and maintenance activities that can be scheduled in advance. Planned discharges are easier to control than unplanned discharges, and the BMPs are significantly easier to plan and implement.

[54] Unplanned discharges are non-routine, the result of accidents or incidents that cannot be scheduled or planned for in advance.

[55] Reference for BMPs, monitoring methods: *Guidelines for the Development of Your BMP Manual for Drinking Water System Releases.* Developed by the California-Nevada Sections of the American Water Works Association (CA-NV AWWA), Environmental Compliance Committee (ECC) 2005.

(b) **Notification Requirements**

(i) The Permittees shall notify the Water Board staff at least one week in advance for planned discharges with a flow rate of 250,000 gallons per day or more, or a total volume of 500,000 gallons or more. The Permittees shall also notify other interested parties who may be impacted by planned discharges, such as flood control agencies, downstream jurisdictions, and non-governmental organizations such as creek groups, before discharge. The notification shall include the following information, but is not limited to: (1) project name; (2) type of discharges; (3) receiving waterbody(ies); (4) date of discharge; (5) time of discharge (in military time); (6) estimated volume (gallons); and (7) estimated flow rate (gallons per day); and (8) monitoring plan of the discharges and receiving water. If receiving water monitoring is infeasible or is not practicable, justification shall be provided.

(c) **Monitoring and Reporting Requirements**

(i) The Permittees shall monitor planned discharges for pH, chlorine residual, and turbidity.

(ii) The following discharge benchmarks shall be used to evaluate the effectiveness of BMPs for all planned discharges:

- Chlorine residual 0.05 mg/L using the field test (Standard Methods 4500-Cl F and F) or equivalent
- pH ranges between 6.5 and 8.5
- Turbidity of 50 NTU post-BMPs or limit increase in turbidity above background level as follows:

Receiving Water Background	Incremental Increase
Dry Creek	50 NTU
< 50 NTU	5 NTU
50–100 NTU	10 NTU
> 100 NTU	10% of background

(iii) The Permittees shall submit the following information with the Annual Report in tabular form for all planned discharges. Reporting content shall include, but is not limited to the following parameters: (1) project name; (2) type of discharge; (3) receiving waterbody(ies); (4) date of discharge; (5) duration of discharge (in military time); (6) estimated volume (gallons); (7) estimated flow rate (gallons per day); (8) chlorine residual (mg/L); (9) pH; (10) turbidity (NTU) for receiving water where feasible and point of discharge, and (11) description of implemented BMPs or corrective actions.

(2) **Unplanned Discharges** – Unplanned discharges are non-routine activities such as water line breaks, leaks, overflows, fire hydrant shearing, and emergency flushing. The following requirements only apply to those Permittees that are water purveyors and pertain to their unplanned discharges of potable water to their storm drain systems.

(a) **Required BMPs** – The Permittees shall implement appropriate BMPs for dechlorination and erosion and sediment control for all unplanned discharges upon containing the discharge and attaining safety of the discharge site.

(b) **Administrative BMPs** – In some instances, the Permittees shall implement Administrative BMPs, such as source control measures, managerial practices, operations and maintenance procedures, or other measures to reduce or prevent potential pollutants from being discharged during unplanned discharges upon containing the discharge and attaining safety of the discharge site.

(c) **Notification Requirements**

(i) The Permittees shall report to the State Office of Emergency Services as soon as possible, but no later than two hours after becoming aware of (1) any aquatic impacts (e.g., fish kill) as a result of the unplanned discharges, or (2) when the discharge might endanger or compromise public health and safety.

(ii) The Permittees shall report to Water Board staff, by telephone or email as soon as possible, but no later than 24 hours after becoming aware of any unplanned discharges, where the total chlorine residual is greater than 0.05 mg/L and the total volume is approximately 50,000 gallons or more.

- Within five working days after the 24-hour telephone or email report, the Permittees shall submit a report documenting the discharge and corrective actions taken to Water Board staff and other interested parties.

(d) Monitoring and Reporting Requirements

(i) The Permittees shall monitor at least 10% of their unplanned discharges for pH and chlorine residual, and visually assess each discharge for turbidity immediately downstream of implemented BMPs to demonstrate their effectiveness. After the implementation of appropriate BMPs, the discharge pH levels outside the discharge ranges (below 6.5 and above 8.5), chlorine residual above 0.05 mg/l, or moderate and high turbidity shall trigger BMP improvement. If the Permittees monitor more than 10% of the unplanned discharges, all monitoring results shall be included in the Annual Report.

(ii) The Permittees shall submit the following information with the Annual Report in tabular form for all unplanned discharges. The reporting format and content shall be as described in Provision C.15.b.ii.(1)(c)(iii) of the Planned Discharges above. In addition, these reports shall also state the time of discharge discovery, notification time, inspector arrival time, and responding crew arrival time.

(iii) After 18 months of consecutive data gathering, a Permittee may propose, to the Executive Officer, a reduced monitoring plan targeting specific "high-risk" or "environmentally sensitive"

areas (i.e., areas that are prone to erosion and excess sedimentation at high flows, support rare or endangered species, or provide aquatic habitat with proven effective BMPs). Until the Executive Officer approves the reduced monitoring plan, the Permittee shall continue the monitoring plan prescribed in C.15.b.iii.(2)(d)(i).

(3) **Emergency Discharges** – Emergency discharges are the result of firefighting, unauthorized hydrant openings, natural or man-made disasters (e.g., earthquakes, floods, wildfires, accidents, terrorist actions).

Required BMPs

(a) The Permittees shall implement or require fire fighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located.

(b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). The Permittees or fire fighting personnel shall control the pollution threat from their activities to the extent that time and resources allow.

(c) **Reporting Requirements** – Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

Required BMPs

(1) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their MS4s.

(2) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, wash cars at commercial car wash facilities, etc.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) **Required BMPs**

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no

other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[56] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and,

(e) Implementing the Illicit Discharge Enforcement Response Plan from C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their MS4s.

[56] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

(2) **Reporting** – The Permittees shall provide implementation summaries in their Annual Report.

vii. Additional Discharge Types –The Permittees shall identify and describe additional types and categories of discharges not yet listed in Provision C.15.b that they propose to conditionally exempt from Prohibition A.1 in periodic submissions to the Executive Officer. For each such category, the Permittees shall identify and describe, as necessary and appropriate to the category, either documentation that the discharges are not sources of pollutants to receiving waters or circumstances in which they are not found to be sources of pollutants to receiving waters. Otherwise, the Permittees shall describe control measures to eliminate adverse impacts of such sources, procedures and performance standards for their implementation, procedures for notifying the Water Board of these discharges, and procedures for monitoring and record management.

viii. Permit Authorization for Exempted Non-Stormwater Discharges

(1) Discharges of non-stormwater from sources owned or operated by the Permittees are authorized and permitted by this Permit, if they are in accordance with the conditions of this provision.

(2) The Water Board may require dischargers of non-stormwater, other than the Permittees, to apply for and obtain coverage under an NPDES permit and to comply with the control measures pursuant to Provision C.15.b. Non-stormwater discharges that are in compliance with such control measures may be accepted by a Permittee and are not subject to Prohibition A.1.

(3) The Permittees may propose, as part of their annual updates consistent with the requirements of Provision C.15.b of this Permit, additional categories of non-stormwater discharges with BMPs, to be included in the exemption to Prohibition A.1. Such proposals may be subject to approval by the Executive Officer as a minor modification of the Permit.

C.16. Annual Reports

C.16.a. The Permittees shall submit Annual Reports electronically and in paper copy upon request by September 15 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.15. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more that ten business days unless otherwise agreed to by the Executive Officer.

C.16.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2010. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following annual report, to more accurately reflect the reporting requirements of Provisions C.1 – C.15, with the agreement of the Permittees and by the approval of the Executive Officer.

C.16.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit in the Annual Report the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.17. Modifications to this Order

This Order may be modified, or alternatively, revoked or reissued, before the expiration date as follows:

C.17.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.17.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Board or amendments to the Basin Plan approved by the State Board; or

C.17.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order. The Order as modified or reissued under this paragraph shall also contain any other requirements of the CWA then applicable.

C.18. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment K of this Order.

C.19. Expiration Date

This Order expires on November 30, 2014, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.20. Rescission of Old Orders

Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, and R2-2003-0034 are hereby rescinded on the effective date of this Order, which shall be December 1, 2009, provided that the Regional Administrator of USEPA, Region IX, does not object.

C.21. Effective Date

The Effective Date of this Order and Permit shall be December 1, 2009, provided that the Regional Administrator of USEPA, Region IX, does not object.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 14, 2009.

Digitally signed by Bruce Wolfe
Date: 2009.10.15 17:21:01 -07'00'

Bruce H. Wolfe
Executive Officer

Appendix I: Municipal Regional Stormwater Permit Fact Sheet
Attachment A: Provision C.3.b. Sample Reporting Table
Attachment B: Provision C.3.g. Alameda Permittees Hydromodification Requirements
Attachment C: Provision C.3.g. Contra Costa Permittees Hydromodification Requirements
Attachment D: Provision C.3.g. Fairfield-Suisun Permittees Hydromodification Requirements
Attachment E: Provision C.3.g. San Mateo Permittees Hydromodification Requirements
Attachment F: Provision C.3.g. Santa Clara Permittees Hydromodification Requirements
Attachment G: Provision C.3.h. Sample Reporting Table
Attachment H: Provision C.8. Status & Long-Term Monitoring Follow-up Analysis and Actions
Attachment I: Provision C.8. Standard Monitoring Provisions
Attachment J: Provision C.10. Minimum Trash Capture Areas and Minimum Number of Trash Hot Spots
Attachment K: Standard NPDES Stormwater Permit Provisions

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CWA	Federal Clean Water Act
CWC	California Water Code
DCIA	Directly Connected Impervious Area
ERP	Enforcement Response Plan
FR	Federal Register
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable
MRP	Municipal Stormwater Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission

NAFSMA	National Association of Flood & Stormwater Management Agencies
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
O&M	Operation and Maintenance
PBDE	Polybrominated Diphenyl Ether
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RMP	Regional Monitoring Program
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SIC	Standard Industrial Classification
SMWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Toxic Substances Control Act
USEPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations

GLOSSARY

Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the state protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.
Construction Site	Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, paving, disturbances to ground such as stockpiling, and excavation. Construction sites are all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of water quality standards because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.
Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs

	naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Full Trash Capture Device	Full trash capture systems are defined as "any device or series of devices that traps all particles retained by a 5mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area." Trash collection booms and sea curtains do not meet this definition, but are effective for removal of floating trash if properly maintained. Because these devices do not meet the Full Trash Capture Device definition, only ¼ of the catchment area treated by these measures is credited toward meeting the trash management area requirement of C.10.a.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State of California has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.
Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Regional Water Board Executive Officer.
Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under

	Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes French drains).
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other,
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.
Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. Clean Water Act (CWA) 402(p)(3)(B)(iii) requires that municipal stormwater permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Also see State Board Order WQ 2000-11.
Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in

	40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.
Pervious Pavement	Pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste) litter and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and

	highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.
Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).
Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMP	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Standard Industrial Classification (SIC)	A federal system for classifying establishments by the type of activity in which they are engaged using a four-digit code.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet water quality standards even after application of technology-based controls,

	more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.
Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Resources Control Board, U.S. EPA, and the Office of Administrative Law where required. The latest version is effective as of December 22, 2006.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and USEPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the water quality criteria that must be met to protect designated uses. Water quality standards also include the federal and state anti-degradation policy.
Wet Season	October 1 through April 30 of each year

APPENDIX I

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2009-0074

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program

The City of Vallejo and the Vallejo Sanitation and Flood Control District

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I. CONTACT INFORMATION

Water Board Staff Contact: Dale Bowyer, 1515 Clay Street, Suite 1400, Oakland, CA 94612, 510-622-2323, 510-622-2501 (fax), email: dbowyer@waterboards.ca.gov

The Permit and other related documents can be downloaded from the Water Board website at: http://www.waterboards.ca.gov/sanfranciscobay/mrp.htm

Comments can be electronically submitted to mrp@waterboards.ca.gov.

All documents referenced in this Fact Sheet and in the Order are available for public review at the Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 9:00 am to 4:00 pm, Monday through Friday, 12 - 1 pm excluded. Per the Governor's order calling for furloughs, the Water Board office will be closed the first three Fridays of each month through June 2010. To schedule an appointment to inspect public records, contact Melinda Wong at 510-622-2430.

II. PERMIT GOALS AND PUBLIC PROCESS

Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) Development Process include:

1. Consolidate six Phase I municipal stormwater NPDES permits into one consistent permit which is regional in scope.
2. Include more specificity in NPDES permit order language and requirements. Create (A) required stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.
3. Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.
4. Implement and enhance actions to control 303(d) listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.
5. Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d) listed pollutants.

Public Process

Water Board staff conducted a series of stakeholder meetings and workshops with the Permittees and other interested parties to develop this Permit over the past 3 years. These meetings included Water Board staff, representatives of the Permittees, representatives of

environmental groups, homebuilders, private citizens, and other interested parties. The following is a summary of the lengthy stakeholder process.

(2004–2005) Water Board staff and the Bay Area Stormwater Management Agencies Association (BASMAA) agreed to develop a municipal regional stormwater permit. Board staff and BASMAA held monthly meetings to agree on the regional permit approach and developed concepts and ground rules for a Steering Committee. The Steering Committee for the Permit began regular monthly meetings, and there was agreement to form work groups to develop options for permit program components in table format.

(2006) Water Board staff, BASMAA, and nongovernmental groups met and discussed the Performance Standard (i.e., actions, implementation levels, and reporting requirements) tables from six workgroups. In addition to the Steering Committee, Work Group Stakeholder meetings focused on the six program elements to complete the Performance Standard Tables and discuss other issues in preparation for creating the first Draft Permit Provisions. Two large public workshops were held in November with all interested stakeholders to discuss Work Group products.

(2007) The Water Board held a public workshop in March to receive public input. Board staff distributed an Administrative Draft Permit dated May 1, 2007, held multiple meetings and received comment.

(2007- 2008) On December 14, 2007, Board staff distributed the Tentative Order for a 77-day written public comment period ending February 29, 2008. A public hearing for oral testimony was held on March 11, 2008. During the remainder of 2008 there were additional meetings with stakeholders, and Board staff worked on revisions to the Tentative Order and produced responses to both written comments received by February 29, 2008, and oral comments received at the March 11, 2008, hearing. The Revised Tentative Order for the MRP was released on February 11, 2009, and a May 13, 2009, hearing before the Water Board was scheduled. Written comments on the revisions to the Tentative Order were received until April 3, 2009.

(2009) After the May 2009 MRP Public Hearing, Water Board staff held numerous meetings with the Permittees (via the Bay Area Stormwater Management Agencies Association) and other key stakeholders including Save the Bay, NRDC, the Northern California Homebuilders, S.F. BayKeeper and the U.S. EPA. These meetings have been focused on discussion of revisions to the MRP Tentative Order in response to comments received, in an effort to resolve issues primarily related to Provisions C.3 New Development, C.8 Monitoring, C.10 Trash Load Reduction, C.11 Mercury Controls, C.12 PCBs Controls, and C.15 Exempt Non-Stormwater Discharges.

Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is

requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in Provisions C.1 through C.15 of this Permit and section 402(p) of the CWA. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is deemed compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and may reopen this Permit pursuant to Provisions C.1 and C.15 of this Permit to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

Early Permitting Approach

The federal Clean Water Act (CWA) was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the Water Board issued a municipal storm water Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa Counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, to pool resources and expertise, and share information, public outreach and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics which were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the stormwater Plans for implementation details. Often specific aspects of permit and Plan implementation evolved during the five year permit cycle, with relatively significant changes approved at the Water Board staff level without significant public review and comment.

Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

US EPA stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The current and previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the current permits, due to the lack of specific requirements and measurable outcomes of some required actions. Furthermore, federal stormwater regulations require that modifications to stormwater management programs, such as annual revisions to urban runoff management plans, be approved through a public process.

Recent court decisions have reiterated that federal regulations and State law require that the implementation specifics of Municipal Stormwater NPDES permits be adopted after adequate public review and comment, and that no significant change in the permit requirements except minor modifications can occur during the permit term without a similar level of public review and comment.

This Permit introduces a modification to these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the Permit Development Process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the federal Clean Water Act and the State Water Code. An advantage for Permittees and the public of this approach is that the permit requirements are known at the time of permit issuance and not left to be determined later through iterative review and approval of work plans. While it may still be necessary to amend the Permit prior to expiration, any need to this should be minimized.

This Permit does not include approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require significantly increased staff resources. Instead, minimum measures have been established to simplify assessment of compliance and allow the public to more easily assess each Permittee's compliance. Each Permit provision and its reporting requirements are written with this in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites, etc.), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each individual Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to provide the flexibility described above considering the different sizes and resources while ensuring that the Permit is still enforceable. To achieve this, the Permit frequently prescribes minimum measurable

outcomes, while providing Permittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Permit.

Current Permit Approach

In the previous permit issuances, the detailed actions to be implemented by the Permittees were contained in Stormwater Management Plans, which were separate from the NPDES permits, and incorporated by reference. Because those plans were legally an integral part of the permits and were subject to complete public notice, review and comment, this permit reissuance incorporates those plan level details in the permit, thus merging the Permittees' stormwater management plans into the permit in one document. This Permit specifies the actions necessary to reduce the discharge of pollutants in stormwater to the maximum extent practicable, in a manner designed to achieve compliance with water quality standards and objectives, and effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses within the Permittees' jurisdictions. This set of specific actions is equivalent to the requirements that in past permit cycles were included in a separate stormwater management plan for each Permittee or countywide group of Permittees. With this permit reissuance, that level of specific compliance detail is integrated into permit language and is not a separate document.

The Permit includes requirements for the following components:

- Municipal Operations
- New Development and Redevelopment
- Industrial and Commercial Site Controls
- Illicit Discharge and Elimination
- Construction Site Controls
- Public Information and Outreach
- Water Quality Monitoring
- Pesticides Toxicity Controls
- Trash Reduction
- Mercury Controls
- PCBs Controls
- Copper Controls
- Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides, and Selenium
- Exempt and Conditionally Exempt Discharges

IV. ECONOMIC ISSUES

Economic discussions of urban runoff management programs tend to focus on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, when considering the cost of implementing the urban runoff programs, it is also important

to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation.

It is very difficult to ascertain the true cost of implementation of the Permittees' urban runoff management programs because of inconsistencies in reporting by the Permittees. Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin that is not easily explained.[57] Despite these problems, efforts have been made to identify urban runoff management program costs, which can be helpful in understanding the costs of program implementation.

In 1999, United States Environmental Protection Agency (USEPA) reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 per household annually.[58]

A study on program cost was also conducted by the Los Angeles Regional Water Quality Control Board (LARWQCB), where program costs reported in the municipalities' annual reports were assessed. The LARWQCB estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.

The State Water Resources Control Board (State Water Board) also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study is current and includes an assessment of costs incurred by the City of Encinitas in implementing its program. Annual cost per household in the study ranged from $18-46, with the City of Encinitas representing the upper end of the range.[59] The cost of the City of Encinitas' program is understandable, given the City's coastal location, reliance on tourism, and consent decree with environmental groups regarding its program. For these reasons, as well as the general recognition the City of Encinitas receives for implementing a superior program, the City's program cost can be considered as the high end of the spectrum for Permittee urban runoff management program costs.

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38% of program costs are new costs fully attributable to MS4 permits. The remainder of program costs were either pre-existing or resulted from enhancement of pre-exiting programs.[60] The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement its Drainage Area Management Plan, its municipal

[57] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003.p.2
[58] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.
[59] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii
[60] Ibid. P. 58.

stormwater permit requirements, is less than 20% of the total budget. The remaining 80% is attributable to pre-existing programs.[61]

It is also important to acknowledge that the vast majority of costs that will be incurred as a result of implementing the Order are not new. Urban runoff management programs have been in place in this region for over 15 years. Any increase in cost to the Permittees will be incremental in nature.

Urban runoff management programs cannot be considered in terms of their costs only. The programs must also be viewed in terms of their value to the public. For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[62] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study corroborates USEPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180.[63] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Another important way to consider urban runoff management program costs is to consider the implementation cost in terms of costs incurred by not improving the programs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[64] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8% among bathers at those beaches resulted in about $3 million annually in health-related expenses.[65] Extrapolation of such numbers to the beaches and other water contact recreation in San Francisco Bay and the tributary creeks of the region could result in huge expenses to the public.

Urban runoff and its impact on receiving waters also places a cost on tourism. the California Division of Tourism has estimated that each out-of-state visitor spends $101.00 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999, impacting beach visitation and the local economy.

Finally, it is important to consider the benefits of urban runoff management programs in conjunction with their costs. A recent study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could

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[61] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

[62] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.

[63] State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.

[64] Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

[65] Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.

reach $18 billion.[66] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[67]

V. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R2-2009-0074: CWA, California Water Code (CWC), 40 CFR Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), 40 CFR 131Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R2-2009-0074, and provide the Water Board with ample underlying authority to require each of the directives of Order No. R2-2009-0074.. Legal authority citations are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,D,E, and F) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all

[66] LARWQCB, 2004. Alternative Approaches to Stormwater Control.
[67] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R2-2009-0074 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Francisco Bay Region. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses, as established in the Basin Plan.

State Mandates

This Permit does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Permit implements federally mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-stormwater discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held that these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. USEPA

(9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.) The authority exercised under this Permit is not reserved state authority under the CWA's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements that are not less stringent than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for MS4. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Association of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Likewise, the provisions of this Permit to implement total maximum daily loads (TMDLs) are federal mandates. The CWA requires TMDLs to be developed for waterbodies that do not meet federal water quality standards. (33 U.S.C. § 1313(d).) Once USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable WLA. (40 CFR 122.44(d)(1)(vii)(B).)

Second, the local agencies' (Permittees') obligations under this Permit are similar to, and in many respects less stringent than, the obligations of nongovernmental dischargers who are issued NPDES permits for stormwater discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (Water Code, section 13263), both without regard to the source of the pollutant or waste. As a result, the costs incurred by local agencies to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The CWA and the Porter-Cologne Water Quality Control Act largely regulate stormwater with an even hand, but to the extent that there is any relaxation of this evenhanded regulation, it is in favor of the local agencies. Except for MS4s, the CWA requires point source dischargers, including discharges of stormwater associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial stormwater discharges must strictly comply with water quality standards].) As discussed in prior State Water Board decisions, this Permit does not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) The Permit, therefore, regulates the discharge of waste in municipal stormwater more leniently than the discharge of waste from nongovernmental sources.

Third, the Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Permit. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the MS4. Permittees can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Association of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising

taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. To the extent Permittees have voluntarily availed themselves of the Permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the Permittees have voluntarily sought a program-based municipal stormwater permit in lieu of a numeric limits approach. (See City of Abilene v. USEPA (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The Permittees' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the Permittees' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

This Permit is based on the federal CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Board, the Basin Plan, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion: In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and Regional Water Quality Control Boards (Water Boards) have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Water Boards to set water quality objectives via adoption of Basin Plans that conform to all state policies for water quality control. As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Water Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the Water Board has issued area-wide MS4 NPDES permits. The Permit will re-issue Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, R2-2003-0034 to comply with the CWA and attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by urban runoff. Further discussions of the legal authority associated with the prohibitions and directives of the Permit are provided in section V. of this document.

This Permit supersedes NPDES Permit Nos. CAS029718, CAS029831, CAS029912, CAS029921, CAS612005, and CAS612006.

Basin Plan

The Urban Runoff Management, Comprehensive Control Program section of the Basin Plan requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. A summary of the regulatory provisions is contained in Title 23 of the California Code of Regulations at section 3912. The Basin Plan identifies beneficial uses and establishes water quality objectives for surface waters in the Region, as well as effluent limitations and discharge prohibitions intended to protect those uses. This Permit implements the plans, policies, and provisions of the Water Board's Basin Plan.

Statewide General Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under NPDES permitting pursuant to USEPA Phase II stormwater regulations. Under Phase II, the Water

Board intends to permit these federal, State, and regional entities through use of a Statewide Phase II NPDES General Permit.

Discussion: Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though urban runoff comes from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in States with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, 2006 Revision, Chapter 4 Implementation, Table 4-1, Prohibition 7.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – Receiving Water Limitations are retained from previous Municipal Stormwater Runoff NPDES permits. They reflect applicable water quality standards from the Basin Plan.

Receiving Water Limitation B.2. Legal Authority – Receiving Water Limitations are retained from previous Municipal Stormwater Runoff NPDES permits. They reflect applicable water quality standards from the Basin Plan.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each water board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

California Water Code Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

State Water Resources Control Board ("State Water Board") Order WQ 1999-05, is a precedential order requiring that municipal stormwater permits achieve water quality standards and water quality standard based discharge prohibitions through the implementation of control measures, by which Permittees' compliance with the permit can be determined. The State Water Board Order specifically requires that Provision C.1 include language that Permittees shall comply with water quality standards based discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges. State Water Board Order WQ 2001-15 refines Order 1999-05 by requiring an iterative approach to compliance with water quality standards that involves ongoing assessments and revisions.

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), California Water Code (CWC) section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires, "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires, "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires, "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires, "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires, "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Sediment accumulated on paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, is the major source of point source pollutants found in urban runoff. Thus, Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention efforts as set forth in this Permit. Such prevention measures include, but are not limited to, activities as described below. The work of municipal maintenance personnel is vital to minimize stormwater pollution, because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges.

C.2-2 Road construction and other activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, impacting water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b)Identification and prioritization of rural roads maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources; (c) Road and culvert construction designs that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability; (d) Development and implement an inspection program to maintain roads structural integrity and prevent impacts on water quality; (e) Provide adequate maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, re-grade roads to slope outward where consistent with road engineering safety standards, and install water bars; and (f) When replacing existing culverts or redesigning new culverts or bridge crossings use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

Road construction, culvert installation, and other rural maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly

designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other rural public works activities, including those the BMP approach would address, have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways. This Provision would help ensure that these impacts are appropriately controlled.

Specific Provision C.2 Requirements

Provision C.2.a-f. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations) In late 2005, Board staff investigated the occurrence of low salinity and dissolved oxygen conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Game in Alameda County.

In the case of Old Alameda Creek, discharge of black-colored water from the Alvarado pump station to the slough was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L dissolved oxygen water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The dissolved oxygen sag was detected surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Board staff's investigations of these incidents, documented in a memorandum,[68] found that "storm water pump stations, universally operated by automatic float triggers, have been confirmed as the cause in at least one instance, and may represent an overlooked source of controllable pollution to the San Francisco Bay Estuary and its tidal sloughs. . . the discharges of dry weather urban runoff from these pump stations are not being

[68] Internal Water Board Memo dated December 2, 2005: "Dry Weather Urban Weather Urban Runoff Causing or Contributing to Water Quality Violations: Low Dissolved Oxygen (DO) in Old Alameda Creek and Alviso Slough"

managed to protect water quality, and [that] surveillance monitoring has detected measurable negative water quality consequences of this current state of pump station management."

Pump station discharges of dry weather urban runoff can cause violations of water quality objectives. These discharges are controllable point sources of pollution that are virtually unregulated. The Water Board needs a complete inventory of dry weather urban runoff pump stations and to require BMP development and implementation for these discharges now. In the long term, Water Board staff should prioritize the sites from the regional inventory for dry weather diversion to sanitary sewers and encourage engineering feasibility studies to accomplish the diversions in a cost-effective manner. Structural treatment alternatives should be explored for specific pump stations.

To address the short term goals identified in the previous paragraph, Provision C.2.g. requires the Permittees to implement the following measures to reduce pollutant discharges to stormwater runoff from Permittee-owned or operated pump stations:

1. Establish an inventory of pump stations within each Permittee's jurisdiction, including pump station locations and key characteristics, and inspection frequencies.
2. Inspect these pump stations regularly, but at least two times a year, to address water quality problems, including trash control and sediment and debris removal.
3. Inspect trash racks and oil absorbent booms at pump stations in the first business day after ¼-inch within 24 hours and larger storm events. Remove debris in trash racks and replace oil absorbent booms, as needed.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation and most of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the assumption that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions. The goal of Provision C.3. is for Permittees to use their planning authority to include appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques. Neither Provision C.3. nor any of its requirements are intended to restrict or control local land use decision-making authority.

C.3-3 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-4 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to regulation pursuant to Sections 401 or 404 of the federal Clean Water Act. Water Board staff is working with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) to identify how maintenance for stormwater treatment controls required under permits such as this Permit can be appropriately streamlined, given CDFG and USFWS requirements, and particularly those that address special status species. This Permit requires Permittees to ensure that constructed wetlands installed by

Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-5 The Permit requires Permittees to ensure that onsite, joint, and offsite stormwater treatment systems and HM controls installed by Regulated Projects are properly operated and maintained for the life of the projects. In cases where the responsible parties for the treatment systems or HM controls have worked diligently and in good faith with the appropriate state and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment systems or HM controls, but these approvals are not granted, the Permittees shall be considered by the Water Board to be in compliance with Provision C.3.h.iii. of the Permit.

Specific Provision C.3 Requirements

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) sets forth essentially the same legal authority, development review and permitting, environmental review, training, and outreach requirements that are contained in the existing permits. This Provision also requires the Permittees to encourage all projects not regulated by Provision C.3., but that are subject to the Permittees' planning, building, development , or other comparable review, to include adequate source control and site design measures, which include discharge of appropriate wastestreams to the sanitary sewer, subject to the local sanitary agency's authority and standards. Lastly, this Provision requires Permittees to revise, as necessary, their respective General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies. Adequate implementation time has been allocated to Provisions C.3.a.i.(6)-(8), which may be considered new requirements.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

Provision C.3.b.ii.(1) lists Special Land Use Categories that are already regulated under the current stormwater permits. Therefore, extra time is not necessary for the Permittees to comply with this Provision, so the Permit Effective Date is set as the required implementation date. For these categories, the impervious surface threshold (for classification as a Regulated Project subject to Provision C.3.) will be decreased from the current 10,000 ft^2 to 5,000 ft^2 beginning two years from the Permit Effective Date. These special land use categories represent land use types

that may contribute more polluted stormwater runoff. Regulation of these special land use categories at the lower impervious threshold of 5,000 square feet is considered the maximum extent practicable and is consistent with State Board guidance, court decisions, and other Water Boards' requirements. In the precedential decision contained in its WQ Order No. 2000-11, the State Board upheld the SUSMP (Standard Urban Stormwater Mitigation Plan) requirements issued by the Los Angeles Water Board's Executive Officer on March 8, 2000, and found that they constitute MEP for addressing pollutant discharges resulting from Priority Development Projects. The State Board re-affirmed that SUSMP requirements constitute MEP in their Order WQ 2001-15. Provision C.3.b.ii.(1)'s requirement that development projects in the identified Special Land Use Categories adding and/or replacing > 5000 ft^2 of impervious surface shall install hydraulically sized stormwater treatment systems is consistent with the SUSMP provisions upheld by the State Board. Provision C.3.b.ii.(1) is also consistent with Order No. R9-2007-0001 issued by the San Diego Water Board, Order Nos. R4-2009-0057 and R4-2001-182 issued by the Los Angeles Water Board, Order No. 2009-0030 issued by the Santa Ana Water Board, and State Board's Order WQ 2003-0005 issued to Phase II MS4s. Under Order WQ 2003-0005, Phase II MS4s with populations of 50,000 and greater must apply the lower 5000 ft^2 threshold for requiring stormwater treatment systems by April 2008. The MRP allows two years from the MRP effective date for the Permittees to implement the lower 5000 ft^2 threshold for the special land use categories, three and half years later than the Phase II MS4s. However, the additional time is necessary for the Permittees to revise ordinances and permitting procedures and conduct training and outreach.

This Provision contains a "grandfathering" clause, which allows any private development project in a special land use category for which a planning application has been deemed complete by a Permittee on or before the Permit effective date to be exempted from the lower 5,000 square feet impervious surface threshold (for classification as a Regulated Project) as long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for the 5000 square feet threshold, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the lower 5000 square feet impervious surface threshold specified in Provision C.3.b.ii.(1).

For any private development project in a special land use category with an application deemed complete after the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011 for the 5000 square feet threshold.

Previous stormwater permits also used the "application deemed complete" date as the date for determining Provision C.3. applicability, but it was tied to the implementation date for new requirements and not the Permit effective date. The Permit Streamlining Act requires that a public agency must determine whether a permit application is complete within 30 days after receipt; if the public agency does not make this determination, the application is automatically deemed complete after 30 days. Data we have collected from audits and file reviews as well as reported to us by Permittees confirm that in many cases, the development permit applications have indeed not been reviewed for compliance with Provision C.3. requirements and yet have automatically been deemed complete 30 days after the application submittal date. As soon as the Permit is adopted, there is certainty about any new requirements that must be implemented during the Permit term. Therefore, the "application deemed complete" date should only be used to exempt projects that have reached this milestone by the Permit effective date and not years later at a new requirement's implementation date. However, this change requires consideration of those applications that are deemed complete after the Permit effective date. Because there is certainty with regard to new requirements as soon as the Permit becomes effective, we have tied the "final discretionary approval" date to a new requirement's implementation date for determining whether to exempt the projects with applications deemed complete after the Permit effective date. After a project receives "final discretionary approval" it would be too late in the permitting process to implement new requirements, particularly since this type of approval requires actions by city councils or boards of supervisors. Therefore, the "grandfathering" language is a hybrid that makes use of both the "application deemed complete" date and the "final discretionary approval" date, two known and recognized milestones in development planning.

As for private projects, public projects should be far enough along in the design and approval process to warrant being grandfathered and essentially exempted from complying with the lower 5000 ft^2 threshold when it becomes effective. Previous stormwater permits grandfathered projects that only had funds committed by the new threshold's effective date, which was too early because projects can be held for years before design can begin, well after funding commitments have been made. Conversely, application of the grandfathering exemption to projects that have construction scheduled to begin by the threshold effective date (or 2 years after the MRP effective date) may be too late in the permitting process to implement new threshold requirements, particularly since this type of approval requires actions by city councils or boards of supervisors. Therefore, the Permit provides the grandfathering exemption for projects that have construction set to begin within 1 year of the threshold effective date (or 3 years after the MRP effective date).

Provisions C.3.b.ii.(2)-(3) describe land use categories that are already regulated under the current stormwater permits; therefore, extra time is not necessary for the Permittees to comply with these Provisions and the implementation date is the Permit effective date. Because the Vallejo Permittees do not have post-

construction requirements in their current stormwater permit, the Permit allows an extra year for them to comply with these Provisions.

Provision C.3.b.ii.(4) applies to road projects adding and/or replacing 10,000 ft^2 of impervious surface, which include the construction of new roads and sidewalks and bicycle lanes built as part of the new roads; widening of existing roads with additional traffic lanes; and construction of impervious trails that are greater than 10 feet wide or are creekside (within 50 feet of the top of bank). Although widening existing roads with bike lanes and sidewalks increases impervious surface and therefore increases stormwater pollutants because of aerial deposition, they have been excluded from this Provision because we recognize the greater benefit that bike lanes and sidewalks provide by encouraging less use of automobiles. Likewise, this Provision also contains specific exclusions for: sidewalks built as part of a new road and built to direct stormwater runoff to adjacent vegetated areas; bike lanes built as part of a new road but not hydraulically connected to the new road and built to direct stormwater runoff to adjacent vegetated areas; impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees; and sidewalks, bike lanes, or trails constructed with permeable surfaces.

In the case of road widening projects where additional lanes of traffic are added, the 50% rule also applies. That is, the addition of traffic lanes resulting in an alteration of more than 50 percent of the impervious surface of an existing street or road that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system must be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e., the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

Because road widening and trail projects belong to a newly added category of Regulated Projects, adequate implementation time has been included as well as "grandfathering" language. (See discussion under Provision C.3.b.ii.(1).)

Provision C.3.b.iii. requires that the Permittees cumulatively complete 10 pilot "green street" projects within the Permit term. This Provision was originally intended to require stormwater treatment for road rehabilitation projects on

arterial roads that added and/or replaced > 10,000 ft^2 of impervious surface. We acknowledge the logistical difficulties in retrofitting roads with stormwater treatment systems as well as the funding challenges facing municipalities in the Bay Area. However, we are aware that some cities have or will have funding for "green street" retrofit projects that will provide water quality benefits as well as meet broader community goals such as fostering unique and attractive streetscapes that protect and enhance neighborhood livability, serving to enhance pedestrian and bike access, and encouraging the planting of landscapes and vegetation that contribute to reductions in global warming. Therefore, instead of requiring post-construction treatment for all road rehabilitation of arterial streets, this Provision requires the completion of 10 pilot "green street" projects by the Permittees within the Permit term. These projects must incorporate LID techniques for site design and treatment in accordance with Provision C.3.c. and provide stormwater treatment pursuant to Provision C.3.d. and must be representative of the three different types of streets: arterial, collector, and local. To ensure equity and an even distribution of projects, at least two pilot projects must be located in each of the following counties: Alameda, Contra Costa, San Mateo, and Santa Clara. Parking lot projects are acceptable as pilot projects as long as both parking lot and street runoff is addressed. Because these are pilot projects, we have not specified a minimum or maximum size requirement and the details of which cities will have these projects are to be determined by the Permittees.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy[69]. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treat stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, permeable pavement, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(1) lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of

[69] USEPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) http://www.epa.gov/o**wow/nps/lid/costs07)**

businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff. The current stormwater permits also list these methods; however, they are encouraged rather than required. By requiring these source control measures, this Provision sets a consistent, achievable standard for all Regulated Projects and allows the Board to more systematically and fairly measure permit compliance. This Provision retains enough flexibility such that Regulated Projects are not forced to include measures inappropriate, or impracticable, to their projects. This Provision does not preclude Permittees from requiring additional measures that may be applicable and appropriate.

Provision C.3.c.i.(2)(a) lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. On the basis of the Board staff's review of the Permittees' Annual Reports and CWA section 401 certification projects, these measures are already being done at many projects. One design element requires all Regulated Projects to include at least one site design measure from a list of six which includes recycling of roof runoff, directing runoff into vegetated areas, and installation of permeable surfaces instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.

Provision C.3.c.i.(2)(b) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility. LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment. A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site. Infeasibility may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

This Provision recognizes the benefits of harvesting and reuse, infiltration and evapotranspiration and establishes these methods at the top of the LID treatment hierarchy. This Provision also acknowledges the challenges, both institutional and technical, to providing these LID methods at all Regulated Projects. There

are certainly situations where biotreatment is a valid LID treatment measure and this Provision allows Permittees the flexibility to make this determination so that Regulated Projects are not forced to include measures inappropriate or impracticable to the project sites. However, Permittees are required to submit a report within 18 months of the Permit effective date and prior to the required implementation date on the criteria and procedures that Permittees will employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. The Permittees are also required to submit a second report two years after implementing the new LID requirements that documents their experience with determining the feasibility and infeasibility of harvesting and reuse, infiltration, and evapotranspiration at Regulated Project sites. This report shall also discuss barriers, including institutional and technical site specific constraints, to implementation of infiltration, harvesting and reuse, or evapotranspiration and proposed strategies for removing these identified barriers.

This Provision specifies minimum specifications for biotreatment systems to be considered as LID treatment and requires Permittees to develop soil media specifications. Because this Provision recognizes green roofs as biotreatment systems for roof runoff, it also requires Permittees to develop minimum specifications for green roofs.

Provision C.3.c.ii. establishes the implementation date for the new LID requirements of Provision C.3.c.i. to be two years after the Permit effective date. Grandfathering language consistent with Provision C.3.b.ii.(1) has been included in this Provision to exempt private development projects (that are far along in their permitting and approval process) and public projects (that are far along in their funding and design) from the requirements of Provision C.3.c.i.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) lists the hydraulic sizing design criteria that the stormwater treatment systems installed for Regulated Projects must meet. The volume and flow hydraulic design criteria are the same as those required in the current stormwater permits. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects. Provision C.3.d. also adds a new combined flow and volume hydraulic design criteria to accommodate those situations where a combination approach is deemed most efficient.

Provision C.3.d.iv. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites. This Provision requires infiltration devices to be located a minimum of 10 feet

(measured from the base) above the seasonal high groundwater mark and a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials, and other measures to ensure that any potential threat to the beneficial uses of ground water is appropriately evaluated and avoided.

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.c.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

Provision C.3.e.i. In keeping with LID concepts and strategies, we expect new development projects to provide LID treatment onsite and to allocate the appropriate space for these systems because they do not have the site limitations of redevelopment and infill site development in the urban core. However, this Provision does not restrict alternative compliance to redevelopment and infill projects because the Permittees have requested flexibility to make the determination of when alternative compliance is appropriate. Based on the lack of offsite alternative compliance projects installed during the current stormwater permit terms, it seems that having to find offsite projects is already a great disincentive. Therefore, this Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite and Regional Projects are in the same watershed as the Regulated Project.

For the LID Treatment at an Offsite Location alternative compliance option, offsite projects must be constructed by the end of construction of the Regulated Project. We acknowledge that a longer timeframe may be required to complete construction of offsite projects because of administrative, legal, and/or construction delays. Therefore, up to 3 years additional time is allowed for construction of the offsite project; however, to offset the untreated stormwater runoff from the Regulated Project that occurs while construction of the offsite project is taking place, the offsite project must be sized to treat an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading for each year that it is delayed. Permittees have commented that for projects that are delayed, requiring treatment of an additional (10-30)% of stormwater runoff may result in costly re-design of treatment systems. In those cases, payment of in-lieu fees to provide the additional treatment at a Regional Project is a viable alternative.

For the Payment of In-Lieu Fees to a Regional Project alternative compliance option, the Regional Project must be completed within 3 years after the end of construction of the Regulated Project. We acknowledge that a longer timeframe may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended, up to 5 years after the completion of the Regulated

Project, with prior Water Board Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

Provision C.3.e.ii. (Special Projects) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Special Projects.

This Provision requires that by December 1, 2010, Permittees shall submit a proposal to the Water Board containing the following information:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this permit for each type of project..
- Identification of institutional barriers and/or technical site specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite.
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations.
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite.
- Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit.
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.

Provision C.3.f (Alternative Certification of Adherence to Numeric Sizing Criteria for Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed. That is, any consultant, contractor or their employees hired to design and/or construct a stormwater treatment system for a Regulated Project can not also be the certifying third party.

Provision C.3.g. (Hydromodification Management, HM) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Background for Provision C.3.g. Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Within Provision C.3.g, the major common elements of these HM requirements are restated. Attachments B–F contain the HM requirements as adopted by the Water Board, with some changes to correct minor errors and to provide consistency across the Region. Attachment F contains updated HM requirements for the Santa Clara Permittees. Permittees will continue to implement their adopted HM requirements; where Provision C.3.g. contradicts the Attachments, Provision C.3.g. shall be implemented. Additional requirements and/or options contained in the Attachments, above and beyond what is specified in Provision C.3.g., remain unaltered by Provision C.3.g. In all cases, the HM Standard must be achieved.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[70] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[71] All Permittees may use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. Attachment C requires the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices. Following the satisfactory conclusion of this monitoring program, or conclusion of other study(s) that demonstrate devices built according to Attachment C specifications satisfactorily protect streams from excess erosive flows, the Water Board intends to allow the use of the Contra Costa sizing charts, when tailored to local conditions, by other stormwater programs and Permittees. Similarly, any other control strategies or criteria approved by the Board would be made available across the Region. This would be accomplished

[70] http://www.ecy.wa.gov/programs/wq/stormwater/wwhm_training/wwhm/wwhm_v2/instructions_v2.html
[71] See www.bayareahydrologymodel.org , Resources.

through Permit amendment or in another appropriate manner following appropriate public notification and process.

The Fairfield-Suisun Permittees have developed design procedures, criteria, and sizing factors for infiltration basins and bioretention units. These procedures, criteria, and sizing factors have been through the public review process already, and are not subject to public review at this time. Water Board staff's technical review found that the procedures, criteria, and sizing factors are acceptable in all ways except one: they are based on an allowable low flow rate that exceeds the criteria established in this Permit. Fairfield-Suisun Permittees may choose to change the design criteria and sizing factors to the allowable criterion of 20 percent of the 2-year peak flow, and seek Executive Officer approval of the modified sizing factors. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data. Following approval by the Executive Officer and notification of the public through such mechanism as an email list-serve, project proponents in the Fairfield-Suisun area may meet the HM Standard by using the Fairfield-Suisun Permittees' design procedures, criteria, and sizing factors for infiltration basins and/or bioretention units.

Attachments B and F allow the Alameda and Santa Clara Permittees to prepare a user guide to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This user guide would reiterate and collate established stream stability assessment methods that have been presented in these Programs' HMPs, which have undergone Water Board staff review and been made available for public review. After the Programs have collated their methods into user guide format, received approval of the user guide from the Executive Officer, and informed the public through such process as an email list-serve, the user guide may be used to guide preparation of technical reports for: implementing the HM standard using in-stream or regional measures; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in this Permit); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp[72] for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow).

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal stormwater Permittees jointly conduct investigations as appropriate. Any future

[72] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

- Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;
- The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;
- The effectiveness of self-retaining areas for management of post-project flows and durations; and/or
- The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

Within Attachments B-F, this Permit allows for alternative HM compliance when on-site and regional HM controls and in-stream measures are not practicable. Alternative HM compliance includes contributing to or providing mitigation at other new or existing development projects that are not otherwise required by this Permit or other regulatory requirements to have HM controls. The Permit provides flexibility in the type, location, and timing of the mitigation measure. The Board recognizes that handling mitigation funds may be difficult for some municipalities because of administrative and legal constraints. The Board intends to allow flexibility for project proponents and/or Permittees to develop new or retrofit stormwater treatment or HM control projects within a broad area and reasonable time frame. Toward the end of the Permit term, the Board will review alternative projects and determine whether the impracticability criteria and options should be broadened or made narrower.

Provision C.3.g.i. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded within Attachments B–F of the Permit. Within these Attachments, the Permittees have identified areas where the potential for single-project and/or cumulative development impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[73]

Provision C.3.g.ii. establishes the standard hydromodification controls must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

[73] Within the context of Provision C.3.g., "highly developed watersheds; refer to catchments or sub-catchments that are 65 percent impervious or more.

Provision C.3.g.iii. identifies and defines three methods of hydromodification management.

Provision C.3.g.iv. sets forth the information on hydromodification management to be submitted in the Permittees' Annual Reports.

Provision C.3.g.v. requires the Vallejo Permittees to develop a Hydromodification Management Plan (HMP), because the Vallejo Permittees have not been required to address HM impacts to date. Vallejo's current permit was issued by USEPA and does not require the Vallejo Permittees' to develop an HMP. The Vallejo Permittees may choose to adopt and implement one or a combination of the approaches in Attachments B–F.

Provision C.3.h (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the project is provided for all onsite, joint, and offsite stormwater treatment systems installed. The Provision requires Permittees to inspect at least 20% of these systems annually, at least 20% of all vault-based systems annually, and every treatment system at least once every 5 years. Requiring inspection of at least 20% of the total number of treatment and HM controls serves to prevent failed or improperly maintained systems from going undetected until the 5th year. We have the additional requirement to inspect at least 20% of all installed vault-based systems because they require more frequent maintenance and problems arise when the appropriate maintenance schedules are not followed. Also, problems with vault systems may not be as readily identified by the projects' regular maintenance crews. Neither of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor maintained systems, maintenance history, etc. This Provision also requires the development of a database or equivalent tabular format to track the operation and maintenance inspections and any necessary enforcement actions against Regulated Projects and submittal of Reporting Table C.3.h., which requires standard information that should be collected on each operation and maintenance inspection. We require this type of information to evaluate a Permittee's inspection and enforcement program and to determine compliance with the Permit. Summary data alone without facility-specific inspection findings does not allow us to determine whether Permittees are doing timely follow-up inspections at problematic facilities and taking appropriate enforcement actions.

Stormwater treatment system maintenance has been identified as a critical aspect of addressing urban runoff from Regulated Projects by many prominent urban runoff authorities, including CASQA, which states that "long-term performance of BMPs [stormwater treatment systems] hinges on ongoing and proper maintenance."[74] USEPA also stresses the importance of BMP [stormwater treatment system] maintenance,

[74] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment, p. 6-1.

stating that "Lack of maintenance often limits the effectiveness of stormwater structure controls such as detention/retention basins and infiltration devices."[75]

Provision C.3.i. (Required Site Design Measures for Small Project and Detached Single-Family Homes Projects) introduces new requirements on single-family home projects that create and/or replace 2500 square feet or more of impervious surface and small development projects that create and/or replace > 2500 ft^2 to <10,000 ft^2 impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small; however, the cumulative impacts could be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees. To assist these small development and single-family home projects, this Provision also requires the Permittees to develop standard specifications for lot-scale site design and treatment measures.

[75] USEPA. 1992. *Guidance Manual for the Preparation of Part II of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems*. EPA 833-B-92-002.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires, "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Specific Provision C.4. Requirements

Provision C.4.a (Legal Authority for Effective Site Management)

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section also describes requirements for effective follow-up and resolution of actual or threatened discharges of either polluted non-stormwater or polluted stormwater runoff from industrial/commercial sites.

Provision C.4.b (Inspection Plan)

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit requires Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Provision C.4.b.ii.(1) (Commercial and Industrial Source Identification)

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

USEPA requires "measures to reduce pollutants in storm water discharges to municipal separate storm sewers from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of

1986 (SARA)."[76] USEPA "also requires the municipal storm sewer Permittees to describe a program to address industrial dischargers that are covered under the municipal storm sewer permit."[77] To more closely follow USEPA's guidance, this Permit also includes operating and closed landfills, and hazardous waste treatment, disposal, storage and recovery facilities.

The Permit requires Permittees to identify various industrial sites and sources subject to the General Industrial Permit or other individual NPDES permit. USEPA supports the municipalities regulating industrial sites and sources that are already covered by an NPDES permit:

> Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.[78]

And:

> Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, USEPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.[79]

Provision C.4.b.ii.(5) (Inspection Frequency)
USEPA guidance[80] says, "management programs should address minimum frequency for routine inspections." The USEPA Fact Sheet—Visual Inspection[81] says, "To be effective, inspections must be carried out routinely."

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[76] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. P. 48056.
[77] Ibid.
[78] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48006.
[79] Ibid. P. 48000
[80] USEPA. 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[81] USEPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

Provision C.4.c (Enforcement Response Plan) requires the Permittees to establish an Enforcement Response Plan (ERP) that ensures timely response to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP also provides for progressive enforcement of violations of ordinances and/or other legal authorities. The ERP will provide guidance on the appropriate use of the various enforcement tools, such as verbal and written notices of violation, when to issue a citations, and require cleanup requirements, cost recovery, and pursue administrative or and criminal penalties. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered.

Provision C.4.d (Staff Training) section of the Permit requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application, "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application, "The location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have, "adequate legal authority to prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall, "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires, "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires, "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires, "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires, "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires, "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Illicit and inadvertent connections to MS4 systems result in the discharge of waste and chemical pollutants to receiving waters. Every Permittee must have the ability to discover, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

C.5-2 Illicit discharges to the storm drain system can be detected in several ways. Permittee staff can detect discharges during their course of other tasks, and business owners and other aware citizens can observe and report suspect discharges. The Permittee must have a direct means for these reports of suspected polluted discharges to receive adequate documentation, tracking, and response through problem resolution.

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to effectuate cessation, abatement, and/or clean up of non-exempt non-stormwater discharges per Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in the discharge of waste and chemical pollutants to receiving waters. Every Permittee must have the ability to discover, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (ERP) requires Permittees to establish an ERP that ensures timely response to illicit discharges and connections to the MS4 and provides progressive enforcement of violations of ordinances and/or other legal authorities. This section also requires Permittees to establish criteria for triggering follow-up investigations. Additional language has been added to this section to clarify the minimum level of effort and time frames for follow-up investigations when violations are discovered. Timely investigation and follow up when action levels are exceeded is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for all violations to be corrected before the next rain event but no longer than 10 business days when there is evidence of illegal non-stormwater discharge, dumping, or illicit connections having reached municipal storm drains is necessary to ensure timely response by Permittees.

Provision C.5.c (Spill and Dumping Response, Complaint Response, and Frequency of Inspections) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spill and complaint reporting. Reports from the public are an essential tool in discovering and investigating illicit discharge activities. Maintaining contact points will help ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a direct means for these reports of suspected polluted discharges to receive adequate documentation, tracking, and response through problem resolution.

Provision C.5.d (Control of Mobile Sources) requires each Permittee to develop and implement a program to reduce the discharge of pollutants from mobile businesses. The purpose of this section is to establish oversight and control of pollutants associated with mobile business sources to the MEP.

Provision C.5.e (Collection System Screening and MS4 Map Availability) Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water." This Provision of the Permit requires the Permittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections. Permittees shall implement a program to actively seek and eliminate illicit connections and discharges during their routine collection system screening and during screening surveys at strategic check points. Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel are used in the program to observe and report these illicit discharges and connections when they are working the system.

This section also requires the Permittees to develop or obtain a map of their entire MS4 system and drainages within their jurisdictions and provide the map to the public for review. As part of the permit application process federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[82] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[83] The requirement in this Provision of the Permit for

[82] 40 CFR 124.3 (applicable to state programs, see section 123.25).
[83] 40 CFR. 122.26(d)(1)(iv)(E).

Permittees to prepare maps of the MS4 system will help ensure that Permittees comply with federal NPDES permit application requirements that are more than 10 years old.

Provision C.5.f (Tracking and Case Follow-up) section of the Permit requires Permittees to track and monitor follow-up for all incidents and discharges reported to the complaint/spill response system that could pose a threat to water quality. This requirement is included so Permittees can demonstrate compliance with the ERP requirements of Section C.5.b and to ensure that illicit discharge reports receive adequate follow up through to resolution.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires, "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires, "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires, "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires, "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires, "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that, "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to, "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute

to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as *stop work* orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into receiving waters. According to the 2004 National Water Quality Inventory[84], States and Tribes report that sediment is one of the top 10 causes of impairment of assessed rivers and streams, next to pathogens, habitat alteration, organic enrichment or oxygen depletion, nutrients, metals, etc.. Sediment impairs 35,177 river and stream miles (14% of the impaired river and stream miles). Sources of sedimentation include agriculture, urban runoff, construction, and forestry. Sediment runoff rates from construction sites, however, are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[85]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the

[84] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[85] USEPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure*. EPA 833-F-00-008. Fact Sheet 2.6.

authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management, and non stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority. Permittees shall certify adequacy of their respective legal authority in the 2010 Annual Report.

Inspectors should have the authority to take immediate enforcement actions when appropriate. Immediate enforcement will get the construction site's owner/operator to quickly implement corrections to violations, thereby minimizing and preventing threats to water quality. When inspectors are unable to take immediate enforcement actions, the threat to water quality continues until an enforcement incentive is issued to correct the violation. In its Phase II Compliance Assistance Guidance, USEPA says that, "Inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[86] To issue warnings and assess penalties during inspections, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to develop and implement an escalating enforcement process that serves as reference for inspection staff to take consistent actions to achieve timely and effective corrective compliance from all public and private construction site owners/operators. Under this section, each Permittee develops its own unique ERP tailored for the specific jurisdiction; but all ERPs must make it a goal to correct all violations before the next rain event but no longer than 10 business days after the violations are discovered. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access the eroded area. The Permittees' tracking data need to provide a rationale for the longer compliance timeframe.

Water Board staff has noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. USEPA supports enforcement of ordinances and permits at construction sites stating, "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[87] In addition, USEPA expects permits issued to municipalities to address "weak inspection and enforcement."[88] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round seasonally appropriate effective Best Management Practices (BMPs) in the following six categories: (1)

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[86] USEPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, P.4-31
[87] USEPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.
[88] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48058.

erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories are listed in the State General NPDES Permit for Stormwater Discharges Associated with Construction Activities (General Construction Permit). The Water Board staff decided it was too prescriptive and inappropriate to require a specific set of BMPs that are to be applicable to all sites. Every site is different with regards to terrain, soil type, soil disturbance, and proximity to a waterbody. The General Construction Permit recognizes these different factors and requires site specific BMPs through the Storm Water Pollution Prevention Plan that addresses the six specified BMP categories. This Permit allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate. This Permit also allows the Permittees and the project proponents the necessary flexibility to make immediate decisions on appropriate, cutting-edge technology to prevent the discharge of construction pollutants into stormdrains, waterways, and right-of-ways. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals. Therefore, this Permit is consistent with the General Construction Permit in its requirements for BMPs in the six specified categories.

Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This can even occur in conjunction with unexpected rain events during the so-called *dry-season*. Although rare, significant rains can occur in the San Francisco Bay Region during the dry season. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the dry season.

Normally, stormwater restrictions on grading should be implemented during the wet season from October 1st through April 30th. Section C.6.c.ii.(1).d of the Permit requires, "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent feasible." If grading does occur during the wet season, Permittees shall require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

Slope stabilization is necessary on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. These requirements are needed because unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. "Steep slopes are the most highly erodible surface of a construction site, and require special attention."[89] USEPA emphasizes the importance of slope stabilization when it states, "slope length

[89] Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.

and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[90] In lieu of vegetation preservation or replanting, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[91] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, Permittees must ensure that slope stabilization is implemented on sites, as appropriate.

It is also necessary that Permittees ensure that construction sites are revegetated as early as feasible. Implementation of revegetation reduces the threat of polluted stormwater discharges from construction sites. Construction sites should permanently stabilize disturbed soils with vegetation at the conclusion of each phase of construction.[92] A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[93] USEPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[94]

To ensure the MEP standard and water quality standards are met, advanced treatment systems may be necessary at some construction sites. In requiring the implementation of advanced treatment for sediment at construction sites, Permittees should consider the site's threat to water quality. In evaluating the threat to water quality, the following factors shall be considered: (1) soil erosion potential; (2) the site's slopes; (3) project size and type; (4) sensitivity of receiving waterbodies; (5) proximity to receiving waterbodies; (6) non-stormwater discharges; and (7) any other relevant factors. Advanced treatment is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.[95] Advanced treatment consists of a three part treatment train of coagulation, sedimentation, and polishing filtration. Advanced treatment has been effectively implemented extensively in the other states and in the Central Valley Region of California.[96] In addition, Water Board's inspectors have observed advanced treatment being effectively implemented at both large sites greater than 100 acres, and at small, 5-acre sites. Advanced treatment is often necessary for Permittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards.

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[90] USEPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
[91] Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection*. p. 5.
[92] Ibid.
[93] Ibid. p. 11.
[94] USEPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
[95] SWCRB. September 2, 2009. *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities – Order No. 2009-0009-DWQ.*
[96] SWRCB. 2004. Conference on Advanced Treatment at Construction Sites.

Provision C.6.d. Plan Approval Process. This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures. USEPA states that it is often easier and more effective to incorporate stormwater quality controls during the site plan review process or earlier.[97] In the Phase I stormwater regulations, USEPA states that a primary control technique is good site planning.[98] USEPA goes on to say that the most efficient controls result when a comprehensive stormwater management system is in place.[99] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[100] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[101]

Provision C.6.e. (Inspections) The Water Board allows flexibility on the exact legal authority language, ERP, and BMPs required on a site. This section of the Permit pulls together the accountability of the whole Provision through regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the stormdrain and waterbodies.

Currently, Annual Reports show that some Permittees provide no information on its construction inspection and enforcement programs; some Permittees only provide information on pre rainy season inspections; another group of Permittees conduct inspections through December and provide just the date each site was inspected; yet another group of Permittees provides a very brief summary of their respective overall inspection program; and there is a small group of Permittees who report meaningful inspection and enforcement information. Inspections of construction sites by Water Board staff have noted deficiencies in stormwater inspections and enforcement. Therefore, this section clearly identifies the level of effort necessary by all Permittees to minimize construction pollutant runoff into stormdrains and ultimately, waterbodies.

This section requires monthly inspections during the wet season of all construction sites disturbing one or more acre of land and at all high priority sites as determined by the Permittee or the Water Board as significant threats to water quality. Inspections shall focus on the adequacy and effectiveness of the site specific BMPs implemented for the six BMP categories. Permittees shall implement its ERP and require timely corrections of all actual and potential problems observed. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer

[97] USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 6.3.2.1.
[98] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.
[99] Ibid.
[100] USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 4.6.2.4, pp. 4–30.
[101] Ibid. pp. 4–31.

than 10 business days after the violations are discovered. All inspections shall be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format. The tracked information provides meaningful data for evaluating compliance. An example tabular format is included as Table 6 – Construction Inspection Data. Submittal of this Table is not required in each Annual Report but encouraged. Each Permittee will need to use the information in the electronic database or tabular format to compile its Annual Reports. The Executive Officer may require that the tracked information be submitted electronically or in a tabular format. When required, Permittees shall submit that data within 10-working days of the requirement. The recommended submittal format is in Table 6 – Construction Inspection Data.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct annual staff trainings for municipal staff. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

Table 6 – Construction Inspection Data

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Run-on and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	9/30/08	Dry	0	Written Notice			x					Driveway not stabilized				
Panoramic Views	10/15/08	Dry	0.5										x			50' of driveway rocked.
Panoramic Views	11/15/08	Rain	3	Stop Work	x		x				x	Uncovered graded lots eroding; Sediment entering a stormdrain that didn't have adequate protection.				
Panoramic Views	11/15/08	Drizzling	0.25										x			Lots blanketed. Storm drains pumped. Street cleaned.
Panoramic Views	12/1/08	Dry	4	Verbal Warning					x			Porta potty next to stormdrain.	x			Porta potty moved away from stormdrain.
Panoramic Views	1/15/08	Rain	3.25	Written Warning	x					x		Fiber rolls need maintenance; Tire wash water flowing into street				
Panoramic Views	1/25/09	Dry	0										x			Fiber rolls replaced.

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Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Run-on and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	2/28/09	Rain	2.4	Stop Work	x		x				x	Slope erosion control failed. Fiber rolls at the bottom of the hill flattened. Sediment laden discharge skipping protected stormdrains and entering unprotected stormdrains.				
Panoramic Views	2/28/09	Rain	0.1											x		Fiber rolls replaced. Silt fences added. More stormdrains protected. Streets cleaned. Slope too soggy to access.
Panoramic Views	3/15/09	Dry	1	Citation with Fine					x		x	Paint brush washing not designated	x			Street and storm drains cleaned. Slopes blanketed.
Panoramic Views	4/1/09	Dry	0.5	Citation with Fine							x	Concrete washout overflowed; Evidence of illicit discharge				
Panoramic Views	4/15/09	Dry	0										x			Concrete washout replaced; Storm drain and line cleaned.

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C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires, "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires , "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires, "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Finding in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.[102]

[102] USEPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.103

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[104]

Specific Provision C.7 Requirements

Provision C.7.a. Storm Drain Inlet Marking. Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, it is important to set a goal of ensuring that all municipally-maintained inlets are legible labeled with a no dumping message. If storm drain marking can be conducted as a volunteer activity, it has additional public involvement value.

Provision C.7.b. Advertising Campaigns. Use of various electronic and/or print media on trash/litter in waterways and pesticides. Advertising campaigns are long-established outreach management practices. Specifically, the Bay Area Management Agencies Association (BASMAA) already implements an advertising campaign on behalf of the Permittees. While the Permittees have been successful at reaching certain goals for its Public Information/Participation programs, it must continue to increase public awareness of specific stormwater issues. This Permit also requires a pre-campaign survey and a post-campaign survey. These two surveys will help identify and quantify the audiences' knowledge, trends, and attitudes and/or practices; and to measure the overall population awareness of the messages and behavioral changes.

Provision C.7.c. Media Relations. Public service media time is available and allows the Permittees to leverage expensive media purchases to achieve broader outreach goals.

Provision C.7.d. Stormwater Point of Contact. As the public has become more aware, citizens are more frequently calling their local jurisdictions to report spills and other polluting behavior impacting stormwater runoff and causing non-stormwater prohibited discharges. Permittees are required to have a centralized, easily accessible point of contact both for citizen reports and to coordinate reports of problems identified by Permittee staff, permitting follow-up and pollution cleanup or prevention. Often the follow-up, cleanup, and/or prevention provide the opportunity to educate the immediate neighborhood through established public outreach mechanisms such as distributing door hangers in the neighborhood describing the remedy for the problem discovered. Permittees already have existing published stormwater point of contacts.

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103 State Water Board. 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

104 USEPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

Provision C.7.e. Public Outreach Events. Staffing tables or booths at fairs, street fairs or other community events are a long-established outreach mechanism employed by Permittees to reach large numbers of citizens with stormwater pollution prevention information in an efficient and convenient manner. These have been ongoing in the Region for several municipal stormwater permit cycles and are MEP outreach actions. Permittees shall continue with such outreach events utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events such as the Bringing Back the Natives Garden Tour.

Provision C.7.f. Watershed Stewardship Collaborative Efforts. Watershed and Creek groups are comprised of active citizens, but they often need support from the local jurisdiction and certainly need to coordinate actions with Permittees such as flood districts and cities.

Provision C.7.g. Citizen Involvement Events. Citizen involvement and volunteer efforts both accomplish needed creek cleanups and restorations, and serve to raise awareness and provide outreach opportunities. These have been ongoing in the Region for several municipal stormwater permit cycles and are MEP outreach actions.

In previous municipal stormwater permits, Public Information/Participation encompassed both Citizen Involvement Events and Public Outreach Events. Citizen Involvement Events are important because they provide the community opportunities to actively practice being good stewards of our environment. Therefore, this Permit separates out the Public Outreach Events from the Citizen Involvement Events to ensure that citizens in all Bay Area communities are given the opportunity to be involved. In addition, the Permit allows Permittees to claim both Public Outreach and Citizen Involvement credits if the event contains significant elements of both. The combined specified number of events for Public Outreach and Citizen Involvement are very close to current performance standards and/or level of effort for respective Public Information/Participation Programs.

Provision C.7.h. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision makers and consumers.

Provision C.7.i. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform Municipal Officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii); CWC section 13377; Federal
NPDES regulations 40 CFR 122.26(d)(2)(iv)

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.48, 40 CFR 122.44(i), 40 CFR 122.26.(d)(1)(iv)(D), and 40 CFR 122.26(d)(2)(ii)-(iv).

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of water quality-based effluent limitations that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, USEPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[105]

According to USEPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

- Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;
- Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.[106]

C.8-2 Provision C.8 requires Permittees to conduct water quality monitoring, including monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management

[105] USEPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf
[106] USEPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

actions pursuant to this Permit and, accordingly, demonstrate compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

- Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;
- Characterize stormwater discharges;
- Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;
- Assess progress toward reducing receiving water concentrations of impairing pollutants;
- Assess compliance with numeric and narrative water quality objectives and standards;
- Identify sources of pollutants;
- Assess stream channel function and condition, as related to urban stormwater discharges;
- Assess the overall health and evaluate long-term trends in receiving water quality; and
- Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-3 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the MEP standard. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1, Water Quality Standards Exceedances, could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs, and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-4 Water quality monitoring requirements in previous permits were less detailed than the requirements in this Permit. Under previous permits, each program could design its own monitoring program, with few permit guidelines. A decision by the California Superior Court[107] regarding two of the programs' permits stated:

Federal law requires that all NPDES permits specify "[r]equired monitoring including type, intervals, and frequency sufficient to yield

[107] San Francisco Baykeeper vs. Regional Water Quality Control Board, San Francisco Bay Region, Consolidated Case No. 500527, filed Nov. 14, 2003.

data which are representative of the monitored activity." 40 C.F.R. § 122.48(b). Here, there is no monitoring program set forth in the Permit. Instead, an annual Monitoring Program Plan is to be prepared by the dischargers to set forth the monitoring program that will be used to demonstrate the effectiveness of the Stormwater Management Plan. This does not meet the regulatory requirements that a monitoring program be set forth including the types, intervals, and frequencies of the monitoring.

The water quality monitoring requirements in Provision C.8 comply with 40 CFR 122.44(i) and 122.48(b), and the Superior Court decision.

C.8-5 The Water Quality Monitoring Provision is intended to provide answers to five fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, each of the five management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

C.8-6 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Board staff requested major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP). The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. The Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-7 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Quality Control Boards, and to coordinate with other monitoring programs. Provision C.8 contains a

framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources.

C.8-8 In 1998 BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[108] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.
>
> This same concept is found in the optional provision for Permittees to form a regional monitoring collaborative. Such a group is meant to provide efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level. Further benefits are expected from closer cooperation between this group, the Regional Monitoring Program, and SWAMP.

C.8-9 This Permit includes monitoring requirements to verify compliance with adopted TMDL WLAs and to provide data needed for TMDL development and/or implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-10 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local waterbodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

Provision C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to

[108] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

- Promote cost savings through economies of scale and elimination of redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality;
- Simplify reporting; and
- Make data and reports readily publicly available.

In the past, each Stormwater Countywide Program has conducted water quality monitoring on behalf of its member Permittees, and some data were collected by wider collaboratives, such as the Regional Monitoring Program. In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

Provision C.8.b. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.b requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the San Francisco Estuary Regional Monitoring Program for Trace Substances. Provision C.8.b requires such monitoring to continue.

Provisions C.8.c. & C.8.e.ii. Status Monitoring and Long-Term Monitoring. Status Monitoring and Long-Term Monitoring serve as surrogates to monitoring the discharge from all major outfalls, of which the Permittees have many. By sampling the sediment and water column in urban creeks, the Permittees can determine where water quality problems are occurring in the creeks, then work to identify which outfalls and land uses are causing or contributing to the problem. In short, Status and Long-Term Monitoring are needed to identify water quality problems and assess the health of streams; they are the first step in identifying sources of pollutants and an important component in evaluating the effectiveness of an urban runoff management program.

Provisions C.8.c.i. and C.8.e.iii. Parameters and Methods
Status & Long-Term parameters and methods reflect current accepted practices, based on the knowledge and experience of personnel responsible for water quality monitoring, including state and Regional SWAMP managers, Permittee representatives, and citizen monitors. Many Status and Long-Term Monitoring parameters are consistent with parameters the Permittees have been monitoring to date. The following parameters are new for some of the Permittees:

- Biological Assessment—to provide site-specific information about the health and diversity of freshwater benthic communities within a specific reach of a creek, using standard procedures developed and/or used by the State Water

Resources Control Board Surface Water Ambient Monitoring Program.[109] It consists of collecting samples of benthic communities and conducting a taxonomic identification to measure community abundance and diversity, which is then compared to a reference creek to assess benthic community health. This monitoring can also provide information on cumulative pollutant exposure/impacts because pollutant impacts to the benthic community accumulate and occur over time.

- Chlorine—to detect a release of potable water or other chlorinated water sources, which are toxic to aquatic life.
- Nutrients—recent monitoring data indicate nutrients, which can increase algal growth and decrease dissolved oxygen concentrations, are present in significant concentrations in Bay area creeks.
- Toxicity and Pollutants in Bedded Sediment—to determine the presence of, and identify, chemicals and compounds that bind to sediment in a creek bed and are toxic to aquatic life.
- Pathogen Indicators—to detect pathogens in waterbodies that could be sources of impairment to recreational uses at or downstream of the sampling location.
- Stream Survey (stream walk and mapping)—to assess the overall physical health of the stream and to gain information potentially useful in interpreting monitoring results.

In consideration of economic impacts to Permittees, the minimum number of Status & Long-Term samples ("Minimum # Sample Sites" columns in Tables 8.1 and 8.3) reflects the Programs' populations, not waterbody size. Permittees must select exact sample locations that will yield adequate information on the status of their waterbodies; in some cases, additional sampling above the minimum might be necessary.

Provisions C.8.c.ii. and C.8.e.iii. Frequency
Status Monitoring continues to be an annual requirement for the Permittees, except for two much smaller Permittees, Fairfield-Suisun and Vallejo. In considering costs, the frequency of Status Monitoring is established at twice per Permit term for Fairfield-Suisun, and once per Permit term for Vallejo. It is common for Permit terms to be extended through a lengthy Permit reissuance process. Thus, these frequencies are considered the minimum; costs are minimized while data necessary for successful stormwater management are obtained.

Long-Term Monitoring is required every second year (biennially), rather than annually, in order to balance data needs and Permittee costs. To further reduce costs, the Fairfield-Suisun and Vallejo Permittees have no Long-Term Monitoring requirements.

Provisions C.8.c.iii. and C.8.e.ii. Locations
Status Monitoring is to be conducted on a rotating-watershed basis, in similar fashion to the Statewide SWAMP. Provision C.8.c.iii. identifies the major waterbodies, and Permittees are to select which of these waterbodies will be sampled during the Permit

[109] Ode, P.R. 2007. Standard Operating Procedures for Collecting Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised.

term. The exact sample locations within each waterbody are critical in terms of determining the monitoring program's effectiveness. If correctly sited, the stations are expected to be very useful in answering the monitoring program's management questions and meeting its goals. For this reason, Provision C.8.c.iii. requires sample locations to be based on surrounding land use, likelihood of urban runoff impacts, existing data gaps, and similar considerations. This will help maximize the utility of the sample locations, while also providing the Permittees with adequate flexibility to ultimately choose practical Status Monitoring locations.

Long-Term Monitoring is to be conducted at fixed stations, which are intended to be lower reaches of urban creeks. This monitoring is intended to help assess progress toward reducing receiving water concentrations of impairing pollutants, among other purposes. Provision C.8.e.ii. establishes the waterbodies on which to locate fixed stations, and suggests that fixed stations be co-located with SWAMP fixed stations so that Permittees can use SWAMP data to fulfill some of their monitoring requirements. However, Permittees may select alternate locations based on their knowledge of such factors as site access and stream characteristics and provided that similar data types, data quality, and data quantity are collected.

Provision C.8.d. Monitoring Projects. Monitoring Projects are necessary to meet several water quality monitoring objectives under this Permit, including characterize stormwater discharges; identify sources of pollutants; identify new or emerging pollutants; assess stream channel function and condition; and measure and improve the effectiveness of Stormwater Countywide Programs and implemented BMPs. In consideration of economic impacts to Permittees, the number of Monitoring Projects required reflects the Permittees' populations.

Provision C.8.d.i. Stressor/Source Identification
Minimizing sources of pollutants that could impair water quality is a central purpose of urban runoff management programs. Monitoring which enables the Permittees to identify sources of water quality problems aids the Permittees in focusing their management efforts and improving their programs. In turn, the Permittees' programs can abate identified sources, which will improve the quality of urban runoff discharges and receiving waters. This monitoring is needed to address the management question, "What are the sources to urban runoff that contribute to receiving water problems?"

When Status or Long-Term Monitoring results indicate an exceedance of a water quality objective, toxicity threshold, or other "trigger", Permittees must identify the source of the problem and take steps to reduce any pollutants discharged from or through their municipal storm sewer systems. This requirement conforms to the process, outlined in Provision C.1., of complying with the Discharge Prohibition and Receiving Water Limitations. If multiple "triggers" are identified through monitoring, Permittees must focus on the highest priority problems; a cap on the total number of source identification projects conducted within the Permit term is provided to cap Permittees' potential costs.

Provision C.8.d.ii. BMP Effectiveness Investigation
U.S. EPA's stated approach to NPDES stormwater permitting uses BMPs in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.[110] The purpose of this monitoring project is to investigate the effectiveness of one currently in-use BMP to determine how it might be improved. Permittees may choose the particular stormwater treatment or hydromodification control BMP to investigate. As with other monitoring requirements, Permittees may work collaboratively to conduct one investigation on a region-wide basis, or each stormwater countywide program may conduct an investigation.

Provision C.8.d.iii. Geomorphic Project
The physical integrity of a stream's bed, bank and riparian area is integral to the stream's capacity to withstand the impacts of discharged pollutants, including chemical pollutants, sediment, excess discharge volumes, increased discharge velocities, and increased temperatures. At present, various efforts are underway to improve geomorphic conditions in creeks, primarily through local watershed partnerships. In addition, local groups are undertaking *green stormwater projects* with the goal of minimizing the physical and chemical impacts of stormwater runoff on the receiving stream. Such efforts ultimately seek to improve the integrity of the waterbodies that receive urban stormwater runoff.

The purpose of the Geomorphic Project is to contribute to these ongoing efforts in each Stormwater Countywide Program area. Permittees may select the geomorphic project from three categories specified in the Permit.

C.8.e. Pollutants of Concern[111] Monitoring. Federal CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure the effectiveness of the TMDL point and nonpoint source control measures and the progress the waterbody is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.8.e. establishes a monitoring program to measure of the effectiveness of TMDL control measures in progressing toward WLAs. Locations, parameters, methods, protocols, and sampling frequencies for this monitoring are specified. A sediment delivery estimate/budget is also required to improve the Permittees' estimates of their loading estimates. In addition, a workplan is required for estimating loads and analyzing sources of emerging pollutants, which are likely to be present in urban runoff, in the next Permit term.

C.8.f. Citizen Monitoring and Participation. CWA section 101(e) and 40 CFR Part 25 broadly require public participation in all programs established pursuant to the CWA, to foster public awareness of environmental issues and decision-making processes. Provision C.8.f. is intended to do the following:

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[110] USEPA. 1996. *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits*. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf
[111] See section C.9, C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

- Support current and future creek stewardship efforts by providing a framework for citizens and Permittees to share their collective knowledge of creek conditions; and
- Encourage Permittees to use and report data collected by creek groups and other third-parties when the data are of acceptable quality.

C.8.g. Reporting. CWC section 13267 provides authority for the Water Board to require technical water quality reports. Provision C.8.g. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14 pertain to pollutants of concern, including those for which TMDLs are being developed or implemented.

Legal Authority

The following legal authority applies to provisions C.9 through C.14:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal stormwater permits to include any requirements necessary to, "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to, "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Basin Plan Requirements: Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) requires that stormwater permits include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. In the first phase, the Water Board requires implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the MEP. If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions that might require implementation of additional control measures. For example, the control measures required as a result of TMDLs may go beyond the measures required in the first phase of the program.

General Strategy for Sediment-Bound Pollutants (Mercury, PCBs, legacy pesticides, PBDEs)

The control measures for mercury are intended to implement the urban runoff requirements stemming from TMDLs for this pollutant. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan that has been approved by the Water Board and is pending approval by the State Board, the Office of Administrative Law, and U.S. EPA. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an assessment of controls to reduce

PCBs to the MEP, and that is the intended approach of the required provisions for all pollutants of concern. Many of the control actions addressing PCBs and mercury will result in reductions of a host of sediment-bound pollutants, including legacy pesticides, mercury, PBDEs, and PCBs. The strategy for these pollutants is to use PCBs control guide decisions concerning where to focus effort, but implementation of the control efforts would taken into account the benefits for controlling other pollutants of concern. Further, because many of the control strategies addressing these pollutants of concern are relatively untested, the Water Board will implement control measures in the following modes:

1. Full-scale implementation throughout the region.
2. Focused implementation in areas where benefits are most likely to accrue.
3. Pilot-testing in a few specific locations.
4. Other: This may refer to experimental control measures, Research and Development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding level of experience and confidence in the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during this permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. On the other hand there may be some control measures in which there is sufficient confidence, on the basis of prior experience, that the control action should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions that will constitute MEP for the following permit term. In fact, in additional to implementing control measures, gathering the necessary information about control measure effectiveness is a vital part of what needs to be accomplished by Permittees during this permit term. In the next permit term, control measures will be implemented on the basis of what we learn in this term, and we will, thus, achieve iterative refinement and improvement through time.

Background on Specific Provisions: Provisions C.9 through C.14 contain both technology-based requirements to control pollutants to the MEP and water quality based requirements to prevent or reduce discharges of pollutants that may cause or contribute to violations of water quality standards. Provisions C.9 and C.11 of the Permit incorporate requirements for the two TMDLs that have been fully approved and are effective for the Permittees. These TMDLs are for pesticide-related toxicity in urban creeks and mercury in San Francisco Bay. Additionally, Provision C.12 contains measures that address PCBs. The Regional Water Board has adopted a PCB TMDL, but it is still pending approval by State Board, the Office of Administrative Law, and U.S. EPA. This PCBs TMDL includes requirements that would be consistent with this

provision. Finally, Provision C.13 contains measures to implement the copper site-specific objective in San Francisco Bay.

Where a TMDL has been approved, NPDES permits must contain effluent limitations and conditions consistent with the requirements and assumptions in the TMDL.[112] Effluent limitations are generally expressed in numerical form. However, USEPA recommends that for NPDES-regulated municipal and small construction stormwater discharges, effluent limitations should be expressed as BMPs or other similar requirements rather than as numeric effluent limitations.[113] Consistent with USEPA's recommendation, this section implements WQBELs expressed as an iterative BMP approach capable of meeting the WLAs in accordance with the associated compliance schedule. The Permit's WQBELs include the numeric WLA as a performance standard and not as an effluent limitation. The WLA can be used to assess if additional BMPs are needed to achieve the TMDL Numeric Target in the waterbody.

[112] 40 CFR 122.44(d)(1)(vii)(B)
[113] USEPA, 2002. Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs. P. 4.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9.

C.9-1 This Permit fulfills the Basin Plan amendments the Water Board adopted that establish a Water Quality Containment Strategy and TMDL for diazinon and pesticide-related toxicity for Bay Area urban creeks on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Containment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, and lead monitoring efforts. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff to the MEP.

C.9-2 **(Allocations):** The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

Specific Provision C.9 Requirements

C.9 provisions fully implement the TMDL for Urban Creeks Pesticide Toxicity. All C.9 provisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with the Urban Pesticide Pollution Prevention Project, the Urban Pesticide Committee, and other agencies and organizations. The Urban Pesticide Pollution Prevention (UP3) Project has been funded by a grant from the State Water Board and its goal is to prevent water pollution from urban pesticide use. The Urban Pesticides Committee serves as an information clearinghouse and as a forum for coordinating pesticide TMDL implementation.

The UP3 Project provides resources and information on integrated pest management (IPM) and tools to municipalities to support their efforts to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control. In addition, it provides technical assistance to municipalities to encourage the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation to prevent water quality problems from pesticides. It also maintains and manages the Urban Pesticides Committee, a statewide network of agencies, nonprofits, industry, and other stakeholders that are working to solve water quality problems from pesticides.

Specific tools provided by the UP3 Project that relate to permit requirements include:

- Guidance and resources to help agencies create contracts and bid documents for structural pest management services that help them meet their integrated pest management goals
- IPM policies and ordinances
- IPM training workshops and materials

- Outreach program design resources
- Resources for evaluating effectiveness

Provisions C.9.a through C.9.d are designed to insure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is a pest control strategy that uses an array of complementary methods: natural predators and parasites, pest-resistant varieties, cultural practices, biological controls, various physical techniques, and pesticides as a last resort. If implemented properly, it is an approach that can significantly reduce or eliminate the use of pesticides. The implementation of IPM will be assured through training of municipal employees and the requirement that municipalities only hire IPM-certified contractors.

Provision C.9.e requires that municipalities (through cooperation or participation with BASMAA) track and participate in pesticide regulatory processes like the USEPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation (DPR) pesticide evaluation activities. The goal of these efforts is to encourage both the state and federal pesticide regulatory agencies to accommodate water quality concerns within the pesticide regulation or registration process. Through these efforts, it could be possible to prevent pesticide-related water quality problems from happening by affecting which products are brought to market.

Provision C.9.g is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the permit. The particulars of assessment will depend on the nature of the control measure.

Provision C.9.h directs the municipalities to conduct outreach to consumers at point of purchase and provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control. One way in which this can be accomplished is for the Permittees to participate in and provide resources for the "Our Water, Our World" program (www.ourwaterourworld.org) or a functionally equivalent pesticide use reduction outreach program. The "Our Water, Our World" program has developed a Web site with many resources, "to assist consumers in managing home and garden pests in a way that helps protect" the environment.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires, "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires, "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

San Francisco Bay Basin Plan, Chapter 4 – Implementation, Table 4-1 Prohibitions, Prohibition 7, which is consistent with the State Water Board's Enclosed Bays and Estuaries Policy, Resolution 95-84, prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. This prohibition was adopted by the Water Board in the 1975 Basin Plan, primarily to protect recreational uses such as boating.

Fact Sheet Findings in Support of Provision C.10

C.10-1 Trash and litter are a pervasive problem near and in creeks and in San Francisco Bay. Controlling trash is one of the priorities for this Permit reissuance not only because of the trash discharge prohibition, but also because trash and litter cause particularly major impacts on our enjoyment of creeks and the Bay. There are also significant impacts on aquatic life and habitat in those waters and eventually to the global ocean ecosystem, where plastic often floats, persists in the environment for hundreds of years, if not

forever, concentrates organic toxins, and is ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared and can ingest plastic that looks like prey, losing the ability to feed properly.

For the purposes of this provision, trash is defined to consist of litter and particles of litter. Man made litter is defined in California Government Code section 68055.1 (g): *Litter* means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

C.10-2 Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[114] over the 2003–2005 period,[115] suggest that the current approach to managing trash in waterbodies is not reducing the adverse impact on beneficial uses. The levels of trash in the waters of the San Francisco Bay Region are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. On the basis of 85 surveys conducted at 26 sites throughout the Bay Area, staff have found an average of 2.93 pieces of trash for every foot of stream, and all the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with higher trash in waters—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Results of the trash in waterbodies assessment work by staff show that rather than adjacent neighborhoods polluting the sites at the bottom of the watershed, these areas, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-3 A number of key conclusions can be made on the basis of the trash measurement in streams:

- Lower watershed sites have higher densities of trash.
- All watersheds studied in the San Francisco Bay Region have high levels of trash.
- There are trash source hotspots, usually associated with parks, schools, or poorly kept commercial facilities, near creek channels, that appear to contribute a significant portion of the trash deposition at lower watershed sites.

[114] SWAMP Rapid Trash Assessment Protocol, Version 8
[115] SWAMP S.F. Bay Region Trash Report, January 23, 2007

- Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.
- The majority of trash is plastic at lower watershed sites where trash accumulates in the wet season. This suggests that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris.
- Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

C.10-4 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-5 Trash in urban waterways of coastal areas can become *marine debris*, known to harm fish and wildlife and cause adverse economic impacts.[116] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-6 Trash adversely affects numerous beneficial uses of waters, particularly recreation and aquatic habitat. Not all litter and debris delivered to streams are of equal concern with regards to water quality. Besides the obvious negative aesthetic effects, most of the harm of trash in surface waters is imparted to wildlife in the form of entanglement or ingestion.[117,118] Some elements of trash exhibit significant threats to human health, such as discarded medical waste, human or pet waste, and broken glass.[119] Also, some household and industrial wastes can contain toxic batteries, pesticide containers, and fluorescent light bulbs that contain mercury. Large trash items such as discarded appliances can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash *hotspots* where illegal dumping, littering, and/or accumulation of trash occur.

C.10-7 The narrative water quality objectives applicable to trash are Floating Material (Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely

[116] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. *Mar. Poll. Bull*. 40:83-88.
[117] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs*. Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.
[118] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol*. 13(4):925-929.
[119] Sheavly, S.B. 2004. *Marine Debris: an Overview of a Critical Issue for our Oceans*. 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

affect beneficial uses), Settleable Material (Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses), and Suspended Material (Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses).

C.10-8 The Water Board, at its February 11, 2009 hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment 10.1 – 303(d) Trash Resolution and Staff Report Feb 2009.

Specific Provision C.10 Requirements

Provision C.10. Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022 as further specified below.

C.10.a.i. Short-Term Trash Load Reduction Plan
The Short-Term Trash Load Reduction Plan is intended to describe actions to incrementally reduce trash loads toward the 2014 requirement of a 40% reduction and eventual abatement of trash loads to receiving waters.

C.10.a.ii. Baseline Trash Load and **Trash Load Reduction Tracking Method**
In order to achieve the incremental trash load reductions in an accountable manner, the Permittees will propose Baseline Trash Loads and a Trash Load Reduction Tracking Method. The Tracking will account for additional trash load reducing actions and BMPs the Permittees implement. Permittees are also able to propose, with documentation, areas for exclusion from the Tracking Method accounting, by demonstrating that these areas already meet the Discharge Prohibition A.2 and have no trash loads.

C.10.a.iii. Minimum Full Trash Capture
Installation of full trash capture systems to prevent trash loads through the MS4 is MEP as demonstrated by the significant implementation of these systems occurring in the Los Angeles region. The minimum full trash capture installation requirements in this permit represent a moderate initial step toward employing this tool for trash load reduction.

C.10.b.i, ii. Trash Hot Spot Selection and Clean Up
Trash Hot Spots must be cleaned up as an interim measure until complete abatement of trash loads occurs. Eventually, with adequate source controls and trash loading abatement, trash hot spots will not occur in the receiving waters. In addition, Permittees will be credited for trash volume removed from hot spots in the trash load reduction tracking.

C.10.b.iii. Hot Spot Assessments
Trash Hot Spot assessments have been simplified and streamlined. Rather than counting individual trash items, which can vary in size from small plastic of glass particles to shopping carts, volume of material removed is measured, along with dominant types of trash removed. Photographs are recorded both before and after cleanup, to add to the record and verify cleanup.

C.10.c. Long Term Trash Load Reduction
Each Permittee will submit a Plan to achieve the incremental progress of 70% trash load reduction by 2017 during the following permit term, and the 100% reduction of trash loading by 2022.

C.10.d. Reporting
This sub-provision sets forth the reporting required in this provision, including the specific submittals and reports, and the annual reporting requirements.

Costs of Trash Control

Costs for either enhanced trash management measure implementation or installation and maintenance of trash capture devices are significant, but when spread over several years, and when viewed on a per-capita basis, are reasonable. Also, Trash capture devices have been installed by cities in California and in the Bay Region.

Trash and litter are costly to remove from our aquatic resource environments. Staff from the California Coastal Commission report that the Coastal Cleanup Day budget statewide: $200,000-250,000 for staff Coastal Commission staff, and much more from participating local agencies. The main component of this event is the 18,000 volunteer-hours which translates to $3,247,200 in labor, and so is equivalent to $3,250,000-3,500,000 per year to clean up 903,566 pounds of trash and recyclables at $3.60 to $3.90 per pound. This is one of the most cost-effective events because of volunteer labor and donations. The County of Los Angeles spends $20 million per year to sweep beaches for trash, according to Coastal Commission staff.

In Oakland, the Lake Merritt Institute is currently budgeted at $160,000 per year, with trash and litter removal from the Lake as a major task. The budget has increased from about $45,000 in 1996 to current levels. In the period of 1996-2005 the Lake Merritt Institute staff, utilizing significant volunteer resources, and accomplishing other education tasks, removed 410,859 pounds of trash from the Lake at cost of $951,725 at $2.3 per pound.

The City of Oakland reports that installation of two vortex and screen separators, titled by their brand name of CDS units, which cost, according to the table below, $821,000 for installations that treat tributary catchments of 192 acres before discharge to Lake Merritt at $4,276 per acre.

City of Oakland—CDS Unit Overview 9-07

Existing CDS unit location	Outfall number	Treatment area (acres)	Cost of implementation	Sizing	Maintenance requirements	Comments
Intersection of 27th and Valdez Streets	56*	71	$203,000 to contactor; plus ~$100,000 City costs	73 cfs peak flow; 36" stormdrain; Unit sizing: 18'6'6' box with 10'11"diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Required relocation of electrical conduit. Water main and gas line were also in the way; the box was adjusted to accommodate these conflicts.
Intersection of 22nd and Valley Streets	56*	121	$368,000 to contactor; plus ~$150,000 City costs	115 cfs peak flow; 54" stormdrain; Unit sizing: 18'8.5'6' box with 12'diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Installation costs were higher than anticipated. Sewer lines and PGE facilities were exposed that were not known before. Unit had to be modified and poured-in-place.

* The city is treating 192 acres or 72 percent of the 252 acres draining to outfall 56.

Mr. Morad Sedrak, the TMDL Implementation Program Manager, Bureau of Sanitation, Department of Public Works, City of Los Angeles, reports that the City plans to invest $72 million dollars for storm drain catch basin based capture device installation primarily, for a City of 4 million population, for a per-capita cost of $18 dollars. This effort is occurring over a span of over five years, for an annual per-capita cost of under $4.

Mr. Sedrak reports that O&M costs are not anticipated to increase, as the City of L.A. is already budgeted for 3 catch basin cleanings per year. He also states that catch basin inserts installed inside the catch basin in front of the lateral pipe, which have been certified by the Los Angeles Regional Water Board as total capture trash control devices, cost approximately $800 to $3,000 depending on the depth of the catch basin. The price quoted includes installation and the insert is made of Stainless Steel 316.

Furthermore, the price for catch basin opening screen covers, which are designed to retain trash at the street level for removal by sweepers, and also to open if there is a potential flooding blockage, ranges roughly from $800 to $4,500, depending on the opening size of the catch basin.

The City of Los Angeles has currently spent 27 million dollars on a retrofit program to install catch basin devices in approximately 30% of its area, with either inserts or screens

or both. Mr. Sedrak states that Los Angeles plans to spend $45 million over the next 3 years to retrofit the remaining catch basins within the City. The total number of catch basins within the City is approximately 52,000.

Here are some links to information about the Los Angeles trash control approach:

http://www.lastormwater.org/Siteorg/program/TMDLs/trashtmdl.htm

http://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdf)

http://www.lastorhttp://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdfmwater.org/Siteorg/program/poll_abate/cbscreens.htm)

http://www.lastormwater.org/Siteorg/program/poll_abate/cbinserts.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbscreens.htm

Additional cost information on various trash capture devices are included in the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) BMP Trash Toolbox (July 2007). The Toolbox contains cost information for both trash capture devices and enhanced trash management measure implementation, covers a broad range of options and also discusses operation and maintenance costs. Catch basin screens are included with an earlier estimate by the City of Los Angeles of $44 million over 10 years to install devices in 34,000 inlets.

Litter booms are also discussed with an example from the City of Oakland. The Damon Slough litter boom or sea curtain cost $36,000 for purchase and installation, including slough side access improvements for maintenance and trash removal. Annual maintenance costs have been $77,000 for weekly maintenance, which includes use of a crane for floating trash removal.

The costs of the full trash capture device installation required in the Order is significantly less than the previous tentative orders requirements for trash capture, as set forth in the table below.

Trash Capture Cost Estimates – Final TO versus previous TOs

Trash Capture Device Requirement	Acres of Capture	Cost for Trash Capture Installation	Percent of Retail/Wholesale Commercial (ABAG 2005)	Per capita $, Population = 4,533,634
Final TO: Implemented in Year 4 – 30% of Retail/Wholesale Commercial	5527	**$ 27,635,000**	30%	$6.06
Previous TOs: Implement in Year 4, 5% of Urban/suburban land	0.05 X 529,712 = 26,485 (BASMAA) or ABAG 0.05 X 655,015 = 32,750	$132,425,000 or $163,750,000	5% of Urban/suburban land	$29 or $36

30**%** X 18,426 acres = 5527 acres X $5000/acre = **$27,635,000** for four counties for installation; maintenance will add an additional cost. The Permittees may work cooperatively to achieve this capture installation requirement, and there is the potential for Regional revenue development. The previous requirement was 5% of (.05 X 655,015) (529,712 by BASMAA's count) acres of urban land (from ABAG 2005 table) = 32,750 acres, ((26,486 according to BASMAA) X $5000 = $132,000,000).

C.11. Mercury Controls

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board has approved this Basin Plan amendment, and USEPA approval is pending. C.11-2 through C.11-6 are components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 The 2003 load of mercury from urban runoff is 160 kg/yr, and the aggregate WLAs for urban runoff is 80 kg/yr and shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and Caltrans. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, *source category*) including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

C.11-4 The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff to the MEP and remain consistent with the section of this chapter titled, *Surface Water Protection and Management—Point Source Control—Stormwater Discharges*.

C.11-5 The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

a. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

b. Develop and implement a mercury source control program;

c. Develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

d. Monitor levels of methylmercury in discharges;

e. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

f. Develop an equitable allocation-sharing scheme in consultation with Caltrans (see below) to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board;

g. Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

h. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Individual WLAs (see Table 4-w of the Basin Plan amendment), by using one of the following methods:

(1) Quantify the annual average mercury load reduced by implementing

i. Pollution prevention activities, and
ii. Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

(2) Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

(3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

C.11-6 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Specific Provision C.11 Requirements

The C.11 provisions implement the mercury TMDL and follow the general approach for sediment-bound pollutants discussed above where we seek to build our understanding and level of certainty concerning control actions by implementing actions in a phased approach. We then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective. Accordingly, there are some provisions that will be implemented throughout the Region, some that will be tested on a limited basis first before making the decision to expand region-wide in the next permit term. Some of the measures are companion measures for efforts targeting PCBs.

Provision C.11.a. Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and Provision C.11.a requires promotion, facilitation and/or participation in these region-wide recycling efforts to increase effectiveness and public participation.

Provision C.11.b. The remand resolution of the SF Bay Mercury TMDL made it clear that methyl mercury monitoring must be required of all NPDES Permittees. Methyl mercury is the most toxic form of mercury, and there is very little information, if any, regarding the concentrations of methyl mercury found in urban runoff. The purpose of the monitoring required through this provision is to obtain seasonal information and to assess the magnitude and spatial/temporal patterns of methylmercury concentrations in urban runoff.

Provisions C.11.c through Provision C.11.f relate to identical C.12 Provisions for PCBs. For each of these, sites for pilot studies will primarily be chosen on the basis of the potential for reducing PCB loads, but consideration will be given to mercury removal in the final design and implementation of the studies. For more information, see the fact sheet discussions for
Provisions C.12.c, d, e, and f and Provision C.2.g.

Provision C.11.g implements the TMDL requirement that Permittees measure mercury loads and loads reduced from program activities. There are three options for accomplishing this requirement: quantifying mercury loads reduced through implemented control measures, quantify mercury loading into the Bay from urban runoff, or demonstrating that the concentration of mercury on suspended sediment particles is below the sediment target of 0.2 ppm. It is likely that the first option will be chosen, and this will require development of an accounting system to establish what load reductions result from program activities. This will not be difficult for those measures that involve capture and measurement of mercury-containing sediment, but it will be more challenging for efforts that do not involve direct measurement.

Provision C.11.h is equivalent to Provision C.12.h for PCBs and is motivated by the same remaining technical uncertainties.

Provision C.11.i requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities.

Provision C.11.j requires an allocation sharing scheme to be developed in cooperation with Caltrans. The urban runoff TMDL allocation implicitly includes loads from Caltrans facilities.

C.12. PCBs Controls

The C.12 provisions are consistent with the regulatory approach and implementation plan of the San Francisco Bay PCBs TMDL adopted by the Water Board. They follow the general approach for sediment-bound pollutants discussed above where we seek to build our understanding and level of certainty concerning control actions by implementing actions in a phased approach. We then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective. Accordingly, there are some provisions that will be implemented throughout the region, some that will be tested on a limited basis first before making the decision to expand region-wide in the next permit term.

Fact Sheet Findings in Support of Provision C.12

C.12-2 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. Approval by the State Water Board and USEPA is pending. The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit.

"Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on best available technology economically achievable. All permits shall remain consistent with Section 4.8 - Stormwater Discharges.

In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in

attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Stormwater runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an stormwater runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question."

C.12-3 **Some PCB congeners have dioxin-like properties.** Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

Specific Provision C.12 Requirements

Provision C.12.a. PCBs were used in a variety of electrical devices and equipment, some of which still can be found during industrial inspections. Provision C.12.a requires the stormwater management agencies to ensure that industrial inspectors can identify PCBs or PCB-containing equipment during their inspections and make sure appropriate agencies are notified if they are found. There is enough experience and/or background knowledge about the presence of such PCB-containing equipment that this measure should be implemented region-wide during this permit term.

Provision C.12.b. PCBs are used in a variety of building materials like caulks and adhesives. PCBs contained in such materials can be liberated and transported in runoff during and after demolition and renovation activities. At this point, it is not known how extensive this type of PCB contamination is in the region. Therefore, the expectation for

this permit term is that Permittees conduct pilot studies (Provision C.12.b) that includes evaluation of the presence of PCBs in such materials, sampling and analysis, and BMP development to prevent PCBs in these materials from being released into the environment during demolition and renovation. Conducting these pilot tests and reporting results will help determine if control measures for PCBs from these sources should be implemented in a more widespread fashion in the next permit term.

Provisions C.12.c and C.12.d form the core of PCB-related efforts for this permit term, and these efforts are crucial for the iterative development of effective control measures for PCBs and other sediment-bound pollutants in future permit terms. The overarching purpose of these two provisions is to conduct five comprehensive pilot studies in locations known to contain high levels of PCBs. The pilot studies will involve a combination of efforts including abatement of the on-land PCB contamination (Provision C.12.c) as well as exploration of sediment management practices (C.12.d) that can be implemented by municipalities to control migration of the PCBs away from the source of contamination. We expect that a suite of control measures will be applied in these five pilot regions to determine the optimum suite of measures for controlling PCB contamination and preventing its transport through the storm drain system. The lessons learned through these pilot efforts will inform the direction of future efforts targeting contaminated zones throughout the Region in subsequent permit terms.

Provision C.12.e. One promising management practice for addressing a wide range of sediment-bound contaminants, including PCBs is on-site treatment. Provision C.12.e requires selection of 10 locations for pilot studies spanning treatment types as described in the Provision. This effort can be conducted in conjunction with Provision C.12.d such that on-site treatment efforts conducted as part of C.12.d can be counted toward accomplishing C.12.e requirements.

Provision C.12.f. Another promising management practice is the diversion of certain flows to the sanitary sewers to be treated by the local POTWs. Provision C.12.f requires an evaluation of locations for diversion pilot studies and implementation of pilot studies at five pump stations. This effort can be conducted in conjunction with Provision C.12.d such that POTW diversion efforts conducted as part of C.12.d can be counted toward accomplishing C.12.f requirements. Also see discussion under Provision C.2.g.

Provision C.12.g requires, consistent with the approach taken in the PCBs TMDL, development of a monitoring system to quantify PCBs loads and loads reduced through source control, treatment and other management measures. This monitoring system will be used to determine progress toward meeting TMDL load allocations. This system should establish the baseline loading or loads reduced against which to compare future loading and load reductions.

Provision C.12.h. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.h requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed.

Provision C.12.i. requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes two types of actions for urban runoff management agencies. These actions from the SSO implementation are implemented through this permit as provisions to control urban runoff sources of copper as well as measures to resolve remaining technical uncertainties for copper fate and effects in the Bay.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[120] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the permit provisions target major sources of copper including vehicle brake pads, architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 Site specific water quality objectives for dissolved copper have already been adopted for South San Francisco Bay will soon be adopted for the rest of the Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the site-specific water quality objectives.

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. The provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

[120] TDC (TDC Environmental). 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. The provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Vehicle brake pads are a large source of copper to the urban environment. There are cooperative efforts (e.g., the Brake Pad Partnership) evaluating the potential effects of brake wear debris on water quality. This cooperative effort could result in voluntary actions to reduce the amount of copper in automobile brake pads. However, this voluntary reduction is uncertain, and some aftermarket brake pads are possibly unaffected by the voluntary action. Moreover, the benefits of copper content reduction might be slowly realized because there is a great deal of wear debris already deposited on watersheds, and this wear debris will continue to be deposited as long as copper-containing brake pads are in use. Therefore, there might need to be additional measures addressing copper-containing wear debris on the part of urban stormwater management agencies. Provision C.13.c requires ongoing participation in the cooperative efforts of the Partnership.

Provision C.13.d Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

The most recent Staff Report[121] for the SSOs north of the Dumbarton Bridge also describes several areas of remaining technical uncertainty, and **Provision C.13.e** requires studies to address these uncertainties. Two of these areas are of particular concern, and urban runoff management agencies are required to conduct or cause to be conducted studies to help resolve these two uncertainties.

The first uncertainty concerns copper's tendency, even at low concentrations, to cause a variety of sublethal (not resulting in death, but in impaired function) effects. The studies documenting such effects have, so far, been conducted in the laboratory in experiments modeling freshwater systems, and many of them have not yet been published. A number of uncertainties need to be resolved before interpretation and extension to marine or estuarine systems can be attempted.[122]

The second uncertainty is that surface sediment samples have exhibited toxicity to test organisms at a number of sites throughout the Bay. Research has shown that sediment toxicity to bivalve embryos is caused by "elevated concentrations of divalent cations….with copper as the most probable cause of toxicity." Additional studies are needed to further examine whether water and sediment toxicity tests used in the RMP are accurate predictors of impacts on the Bay's aquatic and benthic communities.

[121] SFBRWQCB (San Francisco Bay Regional Water Quality Control Board). 2007. *Copper Site-Specific Objectives in San Francisco Bay: Proposed Basin Plan Amendment and Draft Staff Report.* June.
[122] Ibid.

C.14. Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium

This section is predicated on the fact that legacy pesticides, PBDEs, and selenium are either known to impair or potentially impair Bay and tributary beneficial uses. Further, urban stormwater is a likely or potential cause or contributor to such impairment. The requirements for this permit term are primarily information gathering consistent with Provision C.1. Namely, this provision requires that Permittees gather information on a number of pollutants of concern (e.g., PBDEs, DDT, dieldrin, chlordane, selenium) for which TMDLs are planned or are in the early stages of development.

The goals of the provisions in this section are the following: One goal is to determine the concentrations and distribution of these pollutants and if urban runoff is a conveyance mechanism associated with their possible impairment of San Francisco Bay.

A second goal is to gather and provide information to allow calculation of PBDEs, legacy pesticides, and selenium loads to San Francisco Bay from urban runoff conveyance systems. A third goal is to identify control measures and/or management practices to eliminate or reduce discharges of PBDEs, legacy pesticides, or selenium conveyed by urban runoff conveyance systems. The Permittees are encouraged to work with the other municipal stormwater management agencies in the Bay Region to implement a plan to identify, assess, and manage controllable sources of these pollutants in urban runoff. The control actions initiated for PCBs will form the core of initial actions targeting sediment bound pollutants like these. It is very likely that some of these PCB control measures (see Provision C.12) warrant consideration for the control of sediment bound pollutants like PBDEs, legacy pesticides, and possibly others as well.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC section 1337, and Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators, "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges.

Fact Sheet Findings in Support of Provision C.15.

Prohibition A.1. effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, we recognize that certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1. if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1. if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1. if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall develop and implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b.'s requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective

pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

Provision C.15.b.i.(1). Pumped Groundwater from Non Drinking Water Aquifers. These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Pumped groundwater from non drinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit.

Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains. This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

Provision C.15.b.ii. Air Conditioning Condensate. Small air conditioning units are usually operated during the warm weather months. The condensate from these units are uncontaminated and unlikely to reach a storm drain or waters of the State because they tend to be low in volume and tend to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the condensate tends to be uncontaminated, it picks up contaminates on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

Provision C.15.b.iii. Planned, Unplanned, and Emergency Discharges of the Potable Water System.. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two very toxic chemicals to aquatic life. Potable water discharges can cause erosion and scouring of stream and creek banks, and sedimentation can result if effective BMPs are not implemented. Therefore, appropriate dechlorination and monitoring of chlorine residual, pH and turbidity, particularly for planned discharges of potable water, are crucial to prevent adverse impacts in the receiving waters.

This section of the Permit requires Permittees to notify Water Board staff at least one week in advance for planned discharges of potable water with a flowrate of 250,000 gpd or more or a total 500,000 gallons or more. These planned discharges must meet specified discharge benchmarks for chlorine residual, pH, and turbidity.

To address unplanned discharges of potable water such as non-routine water line breaks, leaks, overflows, fire hydrant shearing, and emergency flushing, this section of the Permit requires Permittees to implement administrative BMPs such as source control measures, managerial practices, operations and maintenance procedures or other measures to reduce or prevent potential pollutants from being discharged during these events. This Provision also contains specific notification and monitoring requirements to assess immediate and continued impacts to water quality when these events happen.

This section of the Permit acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs that do not interfere with immediate emergency response operations or impact public health and safety. Reporting requirements for such events shall be determined by Water Board staff on a case-by-case basis.

Provision C.15.b.iv. Individual Residential Car Washing. Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.

Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges. These types of discharges can potentially contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This Provision also requires Permittees to coordinate with local sanitary agencies in these efforts.

Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering. Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the use fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

Provision C.15.b.vii. requires Permittees to identify and describe additional types and categories of discharges not listed in Provision C.15.b., that they propose to conditionally exempt from Prohibition A.1., in periodic submittals to the Executive Officer.

Provision C.15.b.viii. establishes a mechanism to authorize under the Permit non-stormwater discharges owned or operated by the Permittees.

Attachment J: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment J includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with USEPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment J.

Fact Sheet Attachment 6.1

Construction Inspection Data

Construction Inspection Data

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Runon and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	9/30/08	Dry	0	Written Notice			x					Driveway not stabilized				
Panoramic Views	10/15/08	Dry	0.5										x			50' of driveway rocked.
Panoramic Views	11/15/08	Rain	3	Stop Work	x		x				x	Uncovered graded lots eroding; Sediment entering a stormdrain that didn't have adequate protection.				
Panoramic Views	11/15/08	Drizzling	0.25										x			Lots blanketed. Storm drains pumped. Street cleaned.
Panoramic Views	12/1/08	Dry	4	Verbal Warning					x			Porta potty next to stormdrain.	x			Porta potty moved away from stormdrain.
Panoramic Views	1/15/08	Rain	3.25	Written Warning	x					x		Fiber rolls need maintenance; Tire wash water flowing into street				
Panoramic Views	1/25/09	Dry	0										x			Fiber rolls replaced.

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Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Runon and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	2/28/09	Rain	2.4	Stop Work	x		x				x	Slope erosion control failed. Fiber rolls at the bottom of the hill flattened. Sediment laden discharge skipping protected stormdrains and entering unprotected stormdrains.				
Panoramic Views	2/28/09	Rain	0.1											x		Fiber rolls replaced. Silt fences added. More stormdrains protected. Streets cleaned. Slope too soggy to access.
Panoramic Views	3/15/09	Dry	1	Citation with Fine					x		x	Paint brush washing not designated	x			Street and storm drains cleaned. Slopes blanketed.
Panoramic Views	4/1/09	Dry	0.5	Citation with Fine							x	Concrete washout overflowed; Evidence of illicit discharge				
Panoramic Views	4/15/09	Dry	0										x			Concrete washout replaced; Storm drain and line cleaned.

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Fact Sheet Attachment 10.1

303(d) Trash Resolution and Staff Report February 2009

Available at
http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0008.pdf

ATTACHMENT A

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/08 to 06/09
City of Eden Annual Report FY 2008-09

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/07, Application deemed complete 1/30/08, Project approved 7/16/08	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/08, Application deemed complete 8/2/08, Project approved 12/12/08	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/08 to 06/09
City of Eden Annual Report FY 2008-09

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/09, Application deemed complete 4/10/09; Project approved 6/30/09	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/06, Application deemed complete 10/6/08, Project approved 12/9/08, Construction scheduled to begin 7/10/09	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

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Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address** – Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description** – Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed** – State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area** – For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project –** Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date

8. **Source Control Measures** – List all source control measures that have been or will be included in the project.

9. **Site Design Measures –** List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed** – List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism –** List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used** – List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1))** – On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2))** – On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

ATTACHMENT B

Provision C.3.g.
Alameda Permittees
Hydromodification Management Requirements

Alameda Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control*: Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[123] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 6 of this Attachment.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[124]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 6 of this Attachment.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[125]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User's Manual.[126] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with the requirements of this Attachment and Provision C.3.f.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[127] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the

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[123] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[124] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[125] *The Bay Area Hydrology Model – A Tool for Analyzing Hydromodification Effects of Development Projects and Sizing Solutions,* Bicknell, J., D. Beyerlein, and A. Feng, September 26, 2006. Available at http://www.scvurppp-w2k.com/permit_c3_docs/Bicknell-Beyerlein-Feng_CASQA_Paper_9-26-06.pdf

[126] *The Bay Area Hydrology Model – A Tool for Analyzing Hydromodification Effects of Development Projects and Sizing Solutions,* Bicknell, J., D. Beyerlein, and A. Feng, September 26, 2006. Available at http://www.scvurppp-w2k.com/permit_c3_docs/Bicknell-Beyerlein-Feng_CASQA_Paper_9-26-06.pdf

[127] Such models include US EPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Surface Water Management Model (SWMM).

pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a-e above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[128] runoff to the maximum extent practicable. In addition, the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure that is not otherwise required by the Water Board or other regulatory agency. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

[128] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media and include bioretention units, bioswales, basins, planter boxes, tree wells, media filters, and green roofs.

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM Project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are in areas of HM applicability shown in the Alameda Permittees' HM Map.[129] (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

To assist in location and evaluation of project applicability, the Alameda Permittees' HM Map depicts a number of features including the following:

- Hardened channels and culverts at least 24 inches in diameter (green solid or dashed lines);
- Natural channels (red lines);
- Boundaries of major watersheds (light blue lines); and
- Surface streets and highways (gray or black lines).

These data are of varying age, precision and accuracy and are not intended for legal description or engineering design. Watersheds extending beyond the County boundaries are shown for illustration purposes only. Project proponents are responsible for verifying and describing actual conditions of site location and drainage.

5. Alameda Permittees' HM Map is color-coded as follows:

a. Solid pink areas – Solid pink designates hilly areas, where high slopes (greater than 25 percent) occur. The HM Standard and all associated requirements apply in areas shown in solid pink on the map. In this area, the HM Standard does *not* apply if a project proponent demonstrates that all project runoff will flow through enclosed storm drains, existing concrete culverts, or fully hardened (with bed and banks continuously concrete-lined) channels to the tidal area shown in light gray.

b. Purple/red hatched areas – These are upstream of areas where hydromodification impacts are of concern because of factors such as bank instability, sensitive habitat, or restoration projects. The HM Standard and all associated requirements apply in areas

[129] The watercourses potentially susceptible to hydromodification impacts are identified based on an assessment approach developed by Balance Hydrologics (2003).

shown in purple/red (printer-dependant) hatch marking on the map. Projects in these areas may be subject to additional agency reviews related to hydrologic, habitat or other watershed-specific concerns.

c. **Solid white areas** – Solid white designates the land area between the hills and the tidal zone. This area may be susceptible to hydromodification unless the site is connected to storm drains that discharge to the tidal area. The HM Standard and all associated requirements apply to projects in solid white areas *unless* a project proponent demonstrates that all project runoff will flow through fully hardened channels.[130] Short segments of engineered earthen channels (length less than 10 times the maximum width of trapezoidal cross-section) can be considered resistant to erosion if located downstream of a concrete channel of similar or greater length and comparable cross-sectional dimensions. Plans to restore a hardened channel may affect the HM Standard applicability in this area.

d. **Solid gray areas** – Solid gray designates areas where streams or channels are tidally influenced or primarily depositional near their outfall in San Francisco Bay. The HM Standard does not apply to projects in this area. Plans to restore a hardened channel may affect the HM Standard applicability in this area.

e. **Dark gray, *Eastern County* area** – Dark gray designates the portion of eastern Alameda County that lies outside the discharge area of this NPDES permit. This area is in the Central Valley Regional Water Quality Control Board's jurisdiction.

6. Potential Exceptions to Alameda Permittees' HM Map Designations

The Program may choose to prepare a User Guide[131] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[132] After the Program has collated its methods into a User Guide format, received approval of the User Guide from the Executive Officer,[133] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional HM controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

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[130] In this paragraph, *fully hardened channels* include enclosed storm drains, existing concrete culverts, or channels whose bed and banks are continuously concrete-lined to the tidal area shown in light gray on the map.
[131] The User Guide may be offered under a different title.
[132] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[133] The User Guide shall not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

ATTACHMENT C

Provision C.3.g.
Contra Costa Permittees
Hydromodification Management Requirements

Contra Costa Permittees Hydromodification Management Requirements

1. Demonstrating Compliance with the Hydromodification Management (HM) Standard

Contra Costa Permittees shall ensure that project proponents shall demonstrate compliance with the HM Standard by demonstrating that any one of the following four options is met:

a. *No increase in impervious area.* The project proponent may compare the project design to the pre-project condition and show that the project will not increase impervious area and also will not facilitate the efficiency of drainage collection and conveyance.

b. *Implementation of hydrograph modification IMPs.* The project proponent may select and size IMPs to manage hydrograph modification impacts, using the design procedure, criteria, and sizing factors specified in the Contra Costa Clean Water Program's *Stormwater C.3 Guidebook*. The use of flow-through planters shall be limited to upper-story plazas, adjacent to building foundations, on slopes where infiltration could impair geotechnical stability, or in similar situations where geotechnical issues prevent use of IMPs that allow infiltration to native soils. Limited soil infiltration capacity in itself does not make use of other IMPs infeasible.

c. *Estimated post-project runoff durations and peak flows do not exceed pre-project durations and peak flows.* The project proponent may use a continuous simulation hydrologic computer model such as USEPA's Hydrograph Simulation Program—Fortran (HSPF) to simulate pre-project and post-project runoff, including the effect of proposed IMPs, detention basins, or other stormwater management facilities. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, using limitations and instructions provided in the Program's *Stormwater C.3 Guidebook*, and shall show that the following criteria are met:

i. For flow rates from 10 percent of the pre-project 2-year runoff event (0.1Q2) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10 percent over more than 10 percent of the length of the flow duration curve.

ii. For flow rates from 0.5Q2 to Q2, the post-project *peak flows* shall not exceed pre-project peak flows. For flow rates from Q2 to Q10, post-project peak flows may exceed pre-project flows by up to 10 percent for a 1-year frequency interval. For example, post-project flows could exceed pre-project flows by up to 10 percent for the interval from Q9 to Q10 or from Q5.5 to Q6.5, but not from Q8 to Q10.

d. *Projected increases in runoff peaks and durations will not accelerate erosion of receiving stream reaches.* The project proponent may show that, because of the specific characteristics of the stream receiving runoff from the project site, or because of proposed stream restoration projects, or both, there is little likelihood that the cumulative impacts from new development could increase the net rate of stream erosion to the extent that beneficial uses would be significantly impacted. To use this option, the project proponent shall evaluate the receiving stream to determine the relative risk of erosion impacts and take the appropriate actions as described below and in Table A-1. Projects 20 acres or larger in total area shall not use the medium risk methodology in *(d)ii* below.

i. ***Low Risk.*** In a report or letter report, signed by an engineer or qualified environmental professional, the project proponent shall show that all downstream channels between the project site and the Bay/Delta fall into one of the following *low-risk* categories.

(1) Enclosed pipes.

(2) Channels with continuous hardened beds and banks engineered to withstand erosive forces and composed of concrete, engineered riprap, sackcrete, gabions, mats, and such. This category excludes channels where hardened beds and banks are not engineered continuous installations (i.e., have been installed in response to localized bank failure or erosion).

(3) Channels subject to tidal action.

(4) Channels shown to be aggrading (i.e., consistently subject to accumulation of sediments over decades) and to have no indications of erosion on the channel banks.

ii. ***Medium Risk.*** Medium risk channels are those where the boundary shear stress could exceed critical shear stress as a result of hydrograph modification but where either the sensitivity of the boundary shear stress to flow is low (e.g., an oversized channel with high width to depth ratios) or where the resistance of the channel materials is relatively high (e.g., cobble or boulder beds and vegetated banks). In *medium-risk* channels, accelerated erosion due to increased watershed imperviousness is not likely but is possible, and the uncertainties can be more easily and effectively addressed by mitigation than by additional study.

In a preliminary report, the project proponent's engineer or qualified environmental professional shall apply the Program's *Basic Geomorphic Assessment*[134] methods and criteria to show each downstream reach between the project site and the Bay/Delta is either at *low-risk* or *medium-risk* of accelerated erosion due to watershed development. In a following, detailed report, a qualified stream geomorphologist[135] shall use the Program's Basic Geomorphic Assessment methods and criteria, available information, and current field data to evaluate each *medium-risk* reach. For *each medium-risk* reach, the detailed report shall show one of the following:

[134] Contra Costa Clean Water Program *Hydrograph Modification Management Plan*, May 15, 2005, Attachment 4, pp. 6-13. This method must be made available in the Program's *Stormwater C.3 Guidebook.*

[135] Typically, detailed studies will be conducted by a stream geomorphologist retained by the lead agency (or, on the lead agency's request, another public agency such as the Contra Costa County Flood Control and Water Conservation District) and paid for by the project proponent.

(1) A detailed analysis, using the Program's criteria, showing the particular reach may be reclassified as *low-risk.*

(2) A detailed analysis, using the Program's criteria, confirming the *medium-risk* classification, and:

(a) A preliminary plan for a mitigation project for that reach to stabilize stream beds or banks, improve natural stream functions, and/or improve habitat values, and

(b) A commitment to implement the mitigation project timely in connection with the proposed development project (including milestones, schedule, cost estimates, and funding), and

(c) An opinion and supporting analysis by one or more qualified environmental professionals that the expected environmental benefits of the mitigation project substantially outweigh the potential impacts of an increase in runoff from the development project, and

(d) Communication, in the form of letters or meeting notes, indicating consensus among staff representatives of regulatory agencies having jurisdiction that the mitigation project is feasible and desirable. In the case of the Regional Water Board, this must be a letter, signed by the Executive Officer or designee, specifically referencing this requirement. (This is a preliminary indication of feasibility required as part of the development project's Stormwater Control Plan. All applicable permits must be obtained before the mitigation project can be implemented.)

iii. ***High Risk.*** High-risk channels are those where the sensitivity of boundary shear stress to flow is high (e.g., incised or entrenched channels, channels with low width-to-depth ratios, and narrow channels with levees) or where channel resistance is low (e.g., channels with fine-grained, erodible beds and banks, or with little bed or bank vegetation). In a *high-risk* channel, it is presumed that increases in runoff flows will accelerate bed and bank erosion.

To implement this option (i.e., to allow increased runoff peaks and durations to a high-risk channel), the project proponent must perform a comprehensive analysis to determine the design objectives for channel restoration and must propose a comprehensive program of in-stream measures to improve channel functions while accommodating increased flows. Specific requirements are developed case-by-case in consultation with regulatory agencies having jurisdiction. The analysis will typically involve watershed-scale continuous hydrologic modeling (including calibration with stream gauge data where possible) of pre-project and post-project runoff flows, sediment transport modeling, collection and/or analysis of field data to characterize channel morphology including analysis of bed and bank materials and bank vegetation, selection and design of in-stream structures, and project environmental permitting.

2. IMP Model Calibration and Validation

The Program shall monitor flow from Hydrograph Modification Integrated Management Practices (IMPs) to determine the accuracy of its model inputs and assumptions. Monitoring

shall be conducted with the aim of evaluating flow control effectiveness of the IMPs. The Program shall implement monitoring where feasible at future new development projects to gain insight into actual versus predicted rates and durations of flow from IMP overflows and underdrains.

At a minimum, Permittees shall monitor five locations for a minimum of two rainy seasons. If two rainy seasons are not sufficient to collect enough data to determine the accuracy of model inputs and assumptions, monitoring shall continue until such time as adequate data are collected.

Permittees shall conduct the IMP monitoring as described in the IMP Model Calibration and Validation Plan in Section 5 of this Attachment. Monitoring results shall be submitted to the Executive Officer by June 15 of each year following collection of monitoring data. If the first year's data indicate IMPs are not effectively controlling flows as modeled in the HMP, the Executive Officer may require the Program to make adjustments to the IMP sizing factors or design, or otherwise take appropriate corrective action. The Permittees shall submit an IMP Monitoring Report by August 30 of the second year[136] of monitoring. The IMP Monitoring Report shall contain, at a minimum, all the data, graphic output from model runs, and a listing of all model outputs to be adjusted, with full explanation for each. Board staff will review the IMP Monitoring Report and require the Program to make any appropriate changes to the model within a 3-month time frame.

3. Stormwater C.3 Guidebook and IMP Design Criteria

The Current Contra Costa Clean Water Program C.3 Guidebook, 4th Edition (September 2008) shall be implemented until the expiration of this permit (November 2014). Any significant changes in the designs of the IMPs, their sizing factors or manner of implementation shall be approved by the Water Board.

4. IMP Model Calibration and Validation Plan Objective

Monitoring shall be conducted with the aim of evaluating flow control effectiveness of the IMPs. The IMPs were redesigned in 2008 to meet a low flow criterion of 0.2Q2, not 0.1Q2, which is current HMP standard for Contra Costa County. The Program shall implement monitoring at future new development projects at a minimum of five locations and for a minimum of two rainy seasons to gain insight into actual versus predicted rates and durations of flow from IMP overflows and underdrains. If two rainy seasons are not sufficient to collect enough data to determine the accuracy of model inputs and assumptions, monitoring shall continue until such time as adequate data are collected.

a. **The Dischargers Shall Identify and Establish Monitoring Sites – Program staff** shall work with municipal Co-Permittees to identify potential monitoring sites on development projects that implement IMPs. Proposed sites shall be identified during review of planning and zoning applications so that monitoring stations can be designed and constructed as part of the development project. Monitoring shall begin after the development project is complete and the site is in use.

   Criteria for appropriate sites include, but are not limited to, the following:

[136] If the monitoring extends beyond 2 years, an IMP Monitoring Report shall be submitted by August 30 annually until model calibration and validation is complete.

- To ensure applicability of results, the development project and IMPs should be typical of development sites and types of IMPs foreseen throughout the County. In particular, at least one each of the infiltration planter, flow-through planter, and *dry* swale shall be selected for monitoring.
- The area tributary to the IMP should be clearly defined, should contain and direct runoff at all rainfall intensities to the IMP. Two monitoring locations shall contain tributary areas that are a mix of pervious and impervious areas to test the pervious area simplifying assumptions used in the HMP, Table 14, Attachment 2, page 49. If no such locations are constructed by the monitoring period, modeling of mixed (pervious and impervious) tributary areas can substitute for direct monitoring of this type of location.
- The site shall be easily accessible at all times of day and night to allow inspection and maintenance of measurement equipment.
- Hourly rain gauge data representative of the site's location shall be available.

b. Documentation of Monitoring Sites – The Dischargers shall record and report (i.e., document) pertinent information for each monitoring site. Documentation of each monitoring site shall include the following:

- Amount of tributary area;
- Condition of roof or paving;
- Grading and drainage to the IMP, including calculated time of concentration.
- Locations and elevations of inlets and outlets;
- As-built measurements of the IMP including depth of soil and gravel layers, height of underdrain pipe above the IMP floor or native soil;
- Detailed specifications of soil and gravel layers and of filter fabric and other appurtenances; and
- Condition of IMP surface soils and vegetation.

c. Design, Construction, and Operation of Monitoring Sites – The Dischargers shall ensure that IMPs selected for monitoring are equipped with a manhole, vault, or other means to install and access equipment for monitoring flows from IMP overflows and underdrains.

Development of suitable methods for monitoring the entire range of flows may require experiment. The Program and Water Board are interested in the timing and duration of very low flows from underdrains, as well as higher flows from IMP overflows. The Dischargers shall ensure that equipment is configured to measure the entire range of flows and to avoid potential clogging of orifices used to measure low flows.

The Dischargers shall ensure that construction of IMPs is inspected carefully to ensure that IMPs are installed as designed and to avoid potential operational problems. For example, gravel used for underdrain layers should be washed free of fines, and filter fabric should be installed without breaks.

The Dischargers shall ensure that, following construction, artificial flows are applied to the IMP to verify the IMP and monitoring equipment are operating correctly and to resolve any operational problems prior to measuring flows from actual rain storms.

The Dischargers shall ensure that monitoring equipment is properly maintained. Maintenance of monitoring equipment will require, initially, inspections during and after storms that produce runoff. The inspection and maintenance schedule may be adjusted as additional experience is gained.

d. Data to be Obtained – The Dischargers shall collect the following data for each IMP, during the monitoring period:

- Hourly rainfall and more frequent rainfall data where available;
- Hourly IMP outflow and 15-minute outflow for all time periods in which sub-hourly rainfall data are available;
- Hourly IMP inflow (if possible) and more frequent inflow (if possible) when sub-hourly rainfall data are available; and
- Notes and observations.

e. Evaluation of Data – The principal use of the monitoring data shall be a comparison of predicted to actual flows. The Dischargers shall ensure that the HSPF model is set up as it was to prepare the curves in Attachment 2 of the HMP, with appropriate adjustments for the drainage area of the IMP to be monitored and for the actual sizing and configuration of the IMP. Hourly rainfall data from observed storms shall be input to the model, and the resulting hourly predicted output recorded. Where sub-hourly rainfall data are available, the model shall be run with, and output recorded for, 15-minute time steps.

The Dischargers shall compare predicted hourly outflows to the actual hourly outflows. As more data are gathered, the Dischargers may examine aggregated data to characterize deviations from predicted performance at various storm intensities and durations.

Because high-intensity storms are rare, it will take many years to obtain a suitable number of events to evaluate IMP performance under overflow conditions. Underdrain flows will occur more frequently, but possibly only a few times a year, depending on rainfall and IMP characteristics (e.g., extent to which the IMP is oversized, and actual, rather than predicted, permeability of native soils). However, evaluating a range of rainfall events that do *not* produce underflow will help demonstrate the effectiveness of the IMP.

5. Record Keeping and Reporting

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A list and thorough technical explanation of any changes in design criteria for HM Controls, including IMPs. Permittees shall submit this list and explanation annually with the Annual Report.

6. The current Contra Costa Clean Water Program C.3 Guidebook, 4th Edition (C.3 Guidebook) (September 2008) design approach and IMPs shall be used to comply with Provision C.3.g flow requirements until this permit expires and is reissued, pending model verification studies as described below. The IMPs shall be an implementation option as the flow control implementation for development projects up to a footprint of 30 acres

By April 1, 2014, the Contra Costa Clean Water Program shall submit a proposal containing one or a combination of the following three options (a.-c.) for implementation after the expiration and reissuance of this permit:

a. Present model verification monitoring results demonstrating that the IMPs are sufficiently overdesigned and perform to meet the 0.1Q2 low flow design criteria; or

b. Present study results of Contra Costa County streams geology and other factors that support the low flow design criteria of 0.2Q2 as the limiting HMP design low flow; or

c. Propose redesigns of the IMPs to meet the low flow design criteria of 0.1Q2 to be implemented during the next permit term.

ATTACHMENT D

Provision C.3.g.
Fairfield-Suisun Permittees
Hydromodification Management Requirements

Fairfield-Suisun Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control*: Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 20 percent of the pre-project 2-year peak flow[137] up to the pre-project 10-year peak flow.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Qcp[138]) shall be no greater than 20 percent of the pre-project 2-year peak flow.

d. *Standard HM modeling:* On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[139]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual.[140] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this Attachment and Provision C.3.g.

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[137] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[138] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[139] See www.bayareahydrologymodel.org , Resources

[140] *The Bay Area Hydrology Model User Manual* is available at http://www.bayareahydrologymodel.org/downloads.html.

e. *Alternate HM modeling and design:* The project proponent may use a continuous simulation hydrologic computer model[141] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a–c above are met.

f. *Sizing Charts:* The Program developed design procedures, criteria, and sizing factors for infiltration basins and bioretention units, based on a low flow rate that exceeds the allowable low flow rate. After the Program has modified its sizing factors[142] to the allowable criteria, received approval of the modified sizing factors from the Executive Officer,[143] and informed the public through such mechanism as an electronic mailing list, project proponents may meet the HM Standard by using the Program's design procedures, criteria, and sizing factors for infiltration basins and/or bioretention units.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[144] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d. treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls*: A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability*: In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

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[141] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[142] Current sizing factors and design criteria are shown in Appendix D of the FSURMP HMP.

[143] The modified sizing factors will not introduce a new concept but rather make an existing compliance mechanism more stringent; therefore, Executive Officer approval is appropriate.

[144] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, tree wells, media, filters, and green roofs.

d. *Financial contribution to an alternative HM project*: The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects discharge into the upstream reaches of Laurel or Ledgewood Creeks, as delineated in the Fairfield-Suisun Permittees' HM Maps (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf.). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

ATTACHMENT E

Provision C.3.g.
San Mateo Permittees
Hydromodification Management Requirements

San Mateo Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[145] up to the pre-project 10-year peak flow.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Qcp[146]) shall be no greater than 10 percent of the pre-project 2-year peak flow.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[147]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the

[145] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[146] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[147] See www.bayareahydrologymodel.org , Resources

most current BAHM User Manual.[148] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with the requirements of Provision C.3.g.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[149] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a.–c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[150] runoff to the maximum extent practicable. In addition, , if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project*: The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or

[148] The Bay Area Hydrology Model User Manualis available at http://www.bayareahydrologymodel.org/downloads.html

[149] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[150] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, tree wells, media filters, and green roofs.

in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality, or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of startup, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are in the HM control areas shown in the San Mateo Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

The HM Standard and all associated requirements apply in areas that are shown in green on the map and noted in the map's key as *areas subject to HMP*. The other areas are exempt from the HM Standard because they drain to hardened channels or low gradient channels (a characteristic applicable to San Mateo County's particular shoreline properties), or are in highly developed areas. Plans to restore a hardened channel may affect areas of applicability.

Areas shown in the San Mateo Permittees' HM Map may be modified as follows:

b. **Street Boundary Interpretation** – Streets are used to mark the boundary between areas where the HM Standard must be met and exempt areas. Parcels on the boundary street are considered within the area exempted from the hydromodification requirements. Nonetheless, there might be cases where the drainage from a particular parcel(s) on the boundary street drains westward into the hydromodification required area and, as such, any applicable project on such a parcel(s) would be subject to the hydromodification requirements.

c. **Hardened Channel/Drainage to Exempt Area** – If drainage leaving a proposed project subject to the HM Standard is determined to flow only through a hardened channel and/or enclosed pipe along its entire length before directly discharging into a waterway in the exempt area or into tidal waters, the project would be exempted from the HM Standard and its associated requirements. The project proponent must demonstrate, in a statement signed by an engineer or qualified environmental professional, that this condition is met.

d. **Boundary Re-Opener** – If the municipal regional permit or future permit reissuances or amendments modify the types of projects subject to the hydromodification requirements, the appropriate location for an HMP boundary or boundaries will be reevaluated at the same time.

ATTACHMENT F

Provision C.3.g.
Santa Clara Permittees
Hydromodification Management Requirements

Santa Clara Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[151] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 5 of this Attachment.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[152]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 5 of this Attachment.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[153]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the

[151] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[152] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[153] See www.bayareahydrologymodel.org , Resources.

most current BAHM User Manual.[154] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this attachment and Provision C.3.g.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[155] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a. – c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a Regional HM control[156] within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[157] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project shall contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM control:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative

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[154] *The Bay Area Hydrology Model User Manual* is available at http://www.bayareahydrologymodel.org/downloads.html.

[155] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[156] *Regional HM controls* are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which should incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional control measure discharges.

[157] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, sand filters, and green roofs.

HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are located in areas of HM applicability as described below and shown in the Santa Clara Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).

a. Purple areas: These areas represent catchments that drain to hardened channels that extend continuously to the Bay or to tidally influenced sections of creeks. The HM Standard and associated requirements do not apply to projects in the areas designated in purple on the map.

Plans to restore a creek reach may reintroduce the applicability of HM requirements, unless the creek restoration project is designed to accommodate the potential hydromodification impacts of future development; if this is not the case, in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

b. Red areas: These areas represent catchments and subwatersheds that are greater than or equal to 65% impervious, based on existing imperviousness data sources. The HM Standard and associated requirements do not apply to projects in the areas designated in red on the map.

c. Pink areas: These are areas that are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicate that the actual level of imperviousness of a particular area is greater than or equal

to 65% impervious. Any new data will be submitted to the Water Board in one coordinated submittal within one year of permit adoption.

d. Green area: These areas represent catchments and subwatersheds that are less than 65% impervious and are not under review by the Permittees. The HM Standard and associated requirements apply to projects in areas designated as green on the map.

5. Potential Exceptions to Map Designations

The Program may choose to prepare a User Guide[158] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[159] After the Program has collated its methods into User Guide format, received approval of the User Guide from the Executive Officer,[160] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

[158] The User Guide may be offered under a different title.
[159] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[160] The User Guide will not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

ATTACHMENT G

Provision C.3.h.
Sample Reporting Table

Table C.3.h. – Operation and Maintenance of Stormwater Treatment Systems
City of Eden Annual Report FY 2008-09

Facility/Site Inspected and Responsible Party for Maintenance	Date of Inspection	Type of Inspection (annual, follow-up, etc.)	Type of Treatment System or HM Control Inspected	Inspection Findings or Results	Enforcement Action Taken (Warning, NOV, administrative citation, etc.)	Comments
ABC Company 123 Alphabet Road San Jose	12/06/08	annual	offsite bioretention unit	proper operation	none	Unit is operating properly and is well maintained.
DEF site 234 Blossom Drive Santa Clara	12/17/08	annual	onsite media filter	ineffective filter media	verbal warning	Media filter is clogged and needs to be replaced.
	12/19/08	follow-up	onsite media filter	proper operation	none	New media filter in place and unit is operating properly.
	1/19/09	follow-up	onsite media filter	proper operation	none	Unit is operating properly.
GHI Hotel 1001 Grand Blvd 227 Touring Parkway	12/21/08	annual	onsite swales	proper operation	notice of violation	Bioretention unit #2 is badly eroded because of flow channelization. Stormwater is flowing over the eroded areas, bypassing treatment and running off into parking area.
			onsite bioretention unit #1	proper operation		
			onsite bioretention unit #2	eroded areas due to flow channelization		
	12/27/08	follow-up	onsite bioretention unit #2	proper operation	none	Entire bioretention unit #2 has been replanted and re-graded. Raining heavily but no overflow observed.
Rolling Hills Estates Homeowners' Association 543 Rolling Hill Drive Pleasanton	01/17/09	annual	onsite pond	sediment and debris accumulation	notice of violation	Pond needs sediment removal and check dam needs debris removal.
	01/24/09	follow-up	onsite pond	sediment and debris accumulation	administrative citation $1000	Pond still a mess. Administrative citation requires maintenance within a week.
	01/31/09	follow-up	onsite pond	proper maintenance	none	Pond maintenance completed.
	02/18/09	spot inspection	onsite pond	proper operation and maintenance	none	Proper operation and maintenance.

ATTACHMENT H

Provision C.8.
Status and Long-Term Monitoring
Follow-up Analysis and Actions

Status and Long-Term Monitoring Follow-up Analysis and Actions for Biological Assessment, Bedded Sediment Toxicity, and Bedded Sediment Pollutants

When results from Biological Assessment, Bedded Sediment Toxicity, and/or Bedded Sediment Pollutants monitoring indicate impacts at a monitoring location, Permittees shall evaluate the extent and cause(s) of impacts to determine the potential role of urban runoff as indicated in Table H-1.

Table H-1. Sediment Triad Approach to Determining Follow-Up Actions

Chemistry Results[161]	Toxicity Results[162]	Bioassessment Results[163]	Action
No chemicals exceed Threshold Effect Concentrations (TEC), mean Probable Effects Concentrations (PEC) quotient < 0.5 and pyrethroids < 1.0 Toxicity Unit (TU)[164]	No Toxicity	No indications of alterations	No action necessary
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources causing toxicity; initiate no later than the second fiscal year following the sampling event.

[161] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

[162] Toxicity is exhibited when *Hyallela* survival statistically different than and < 20 percent of control.

[163] Alterations are exhibited if metrics indicate substantially degraded community.

[164] Toxicity Units (TU) are calculated as follows: TU = Actual concentration (organic carbon normalized) ÷ Reported *H. azteca* LC_{50} concentration (organic concentration normalized). Weston, D.P., R.W. Holmes, J. You, and M.J. Lydy, 2005. Aquatic Toxicity Due to Residential Use of Pyrethroid Insecticides. *Environ. Science and Technology* 39(24):9778–9784.

Chemistry Results[161]	Toxicity Results[162]	Bioassessment Results[163]	Action
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	No Toxicity	Indications of alterations	Identify the most probable cause(s) of the alterations in biological community. Where impacts are under Permittee's control, take management actions to minimize the impacts causing physical habitat disturbance; initiate no later than the second fiscal year following the sampling event.
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to minimize impacts; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	Indications of alterations	(1) Identify cause of impacts. (2) Where impacts are under Permittee's control, take management actions to minimize the impacts caused by urban runoff; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	No Indications of alterations	If PEC exceedance is Hg or PCBs, address under TMDLs
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to address impacts.

ATTACHMENT I

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.
8. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-

compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

9. If the discharger monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT J

Minimum Trash Capture Area
and
Minimum Number of Trash Hot Spots

Table 10.1 Minimum Trash Capture Area and Trash Hot Spots for Population Based Permittees

Data Source: http://quake.abag.ca.gov/mitigation/pickdbh2.html and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Alameda County						
San Leandro	73,402	721	**216**	2	7	4
Oakland	420,183	759	**228**	14	8	8
Dublin	46,934	377	**113**	1	3	**3**
Emeryville	9,727	69	**21**	1	1	1
Albany	16,877	95	**28**	1	1	1
Berkeley	106,697	183	**55**	3	1	3
Alameda County Unincorporated.	140,825	375	**112**	4	3	4
Alameda	75,823	402	**121**	2	4	**4**
Fremont	213,512	698	**209**	7	6	7
Hayward	149,205	726	**218**	4	7	**7**
Livermore	83,604	423	**127**	2	4	**4**
Newark	43,872	314	**94**	1	3	**3**
Piedmont	11,100	1	**0.3**	1	1	1
Pleasanton	69,388	366	**110**	2	3	**3**
Union City	73,402	183	**55**	2	1	2

[165] 30% of Retail / Wholesale Commercial Acres
[166] If the hot spot # based on % commercial area is more than twice that based on population, the minimum hot spot # is double the population based #.

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
San Mateo County						
San Mateo County Unincorporated.	65,844	71	**21**	2	1	2
Atherton	7,475	0	**0**	1	1	1
Belmont	26,078	58	**17**	1	1	1
Brisbane	3,861	16	**5**	1	1	1
Burlingame	28,867	123	**37**	1	1	1
Colma	1,613	106	**32**	1	1	1
Portola Valley	4,639	9	**3**	1	1	1
Daly City	106,361	242	**73**	3	2	3
East Palo Alto	32,897	59	**18**	1	1	1
Foster City	30,308	67	**20**	1	1	1
Half Moon Bay	13,046	49	**15**	1	1	1
Hillsborough	11,272	0	**0**	1	1	1
Menlo Park	31,490	83	**25**	1	1	1
Millbrae	21,387	68	**20**	1	1	1
Pacifica	39,616	100	**30**	1	1	1
Redwood City	77,269	309	**93**	2	3	**3**
San Bruno	43,444	137	**41**	1	1	1
San Carlos	28,857	129	**39**	1	1	1
San Mateo	95,776	275	**82**	3	2	3
South San Francisco	63,744	195	**58**	2	1	2
Woodside	5,625	9	**3**	1	1	1

	Population	Retail / Wholesale Commercial Acres		**Minimum Trash Capture Catchment Area (Acres)**[165]		# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Contra Costa County								
Contra Costa County Unincorporated.	173,573	524		**157**		5	5	5
Concord	123,776	1016		**305**		4	10	8
Walnut Creek	65,306	329		**99**		2	3	**3**
Clayton	10,784	21		**6**		1	1	1
Danville	42,629	134		**40**		1	1	1
El Cerrito	23,320	105		**32**		1	1	1
Hercules	24,324	37		**11**		1	1	1
Lafayette	23,962	68		**20**		1	1	1
Martinez	36,144	142		**43**		1	1	1
Moraga	16,138	108		**32**		1	1	1
Orinda	17,542	24		**7**		1	1	1
Pinole	19,193	140		**42**		1	1	1
Pittsburg	63,652	520		**156**		2	5	4
Pleasant Hill	33,377	219		**66**		1	2	**2**
Richmond	103,577	391		**117**		3	3	3
San Pablo	31,190	131		**39**		1	1	1
San Ramon	59,002	274		**82**		1	2	**2**

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Santa Clara County						
Santa Clara County Unincorporated	99,122	270	**81**	3	3	3
Cupertino	55,551	213	**64**	2	2	2
Los Altos	28,291	65	**20**	1	1	1
Los Altos Hills	8,837	0	**0**	1	1	1
Los Gatos	30,296	163	**49**	1	1	1
Milpitas	69,419	457	**137**	2	4	**4**
Monte Sereno	3,579	0	**0**	1	1	1
Mountain View	73,932	375	**112**	2	3	**3**
Santa Clara	115,503	560	**168**	3	5	**5**
Saratoga	31,592	41	**12**	1	1	1
San Jose	989,496	2983	**895**	32	29	32
Sunnyvale	137,538	548	**164**	3	5	**5**
Palo Alto	63,367	282	**84**	2	2	2
Solano County						
Vallejo	120,416	559	**168**	4	5	**5**
Fairfield	106,142	486	**146**	3	4	**4**
Suisun	28,031	75	**22**	1	1	1
Totals	4,930,339	19057	**5718**	165	184	349

Table 10-2. Non-Population Based Permittee Trash Hot Spot and Trash Capture Assignments

Non population based Permittee	Number of Trash Hot Spots	Trash Capture Requirement
Santa Clara Valley Water District	12	4 trash booms or 8 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda County Flood Control Agency	9	3 trash booms or 6 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda Co. Zone 7 Flood Control Agency	3	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Contra Costa County Flood Control Agency	6	2 trash booms or 4 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
San Mateo County Flood Control District	2	1 trash booms or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Vallejo Sanitation and Flood District	1	1 trash boom or 2 outfall capture devices or equivalent measures (minimum 2 ft. diameter outfall)

ATTACHMENT K

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements for NPDES Stormwater Discharge Permits

February 2009

A. GENERAL PROVISIONS

1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.
2. All discharges authorized by this Order shall be consistent with the terms and conditions of this Order.
3. **Duty to Comply**
   a. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in a Board adopted Order, discharger must comply with the new standard or prohibition. The Board will revise or modify the Order in accordance with such toxic effluent standard or prohibition and so notify the discharger.
   b. If more stringent applicable water quality standards are approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the discharger must comply with the new standard. The Board will revise and modify this Order in accordance with such more stringent standards.
   c. The filing of a request by the discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 122.41(f)]
4. **Duty to Mitigate**

   The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this order and permit which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation. [40 CFR 122.41(d)]
5. Pursuant to U.S. Environmental Protection Agency regulations the discharger must notify the Water Board as soon as it knows or has reason to believe (1) that they have begun or expect to begin, use or manufacture of a pollutant not reported in the permit application,

or (2) a discharge of toxic pollutants not limited by this permit has occurred, or will occur, in concentrations that exceed the limits specified in 40 CFR 122.42(a).

6. The discharge of any radiological, chemical, or biological warfare agent waste is prohibited.

7. All facilities used for transport, treatment, or disposal of wastes shall be adequately protected against overflow or washout as the result of a 100-year frequency flood.

8. Collection, treatment, storage and disposal systems shall be operated in a manner that precludes public contact with wastewater, except where excluding the public is inappropriate, warning signs shall be posted.

9. Property Rights

This Order and Permit does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws, nor create a vested right for the discharge to continue the waste discharge or guarantee the discharger a capacity right in the receiving water. [40 CFR 122.41(g)]

10. Inspection and Entry

The Board or its authorized representatives shall be allowed:

a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the order and permit;

b. Access to and copy at, reasonable times, any records that must be kept under the conditions of the order and permit;

c. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under the order and permit; and

d. To photograph, sample, and monitor, at reasonable times for the purpose of assuring compliance with the order and permit or as otherwise authorized by the Clean Water Act, any substances or parameters at any locations. [40 CFR 122.41(i)]

11. Permit Actions

This Order and Permit may be modified, revoked and reissued, or terminated in accordance with applicable State and/or Federal regulations. Cause for taking such action includes, but is not limited to any of the following:

a. Violation of any term or condition contained in the Order and Permit;

b. Obtaining the Order and Permit by misrepresentation, or by failure to disclose fully all relevant facts;

c. Endangerment to public health or environment that can only be regulated to acceptable levels by order and permit modification or termination; and

d. Any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

12. Duty to Provide Information

The discharger shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit. The discharger shall also furnish to the Board, upon request, copies of records required to be kept by its permit. [40 CFR 122.41(h)]

13. Availability

A copy of this permit shall be maintained at the discharge facility and be available at all times to operating personnel.

14. Continuation of Expired Permit

This permit continues in force and effect until a new permit is issued or the Board rescinds the permit. Only those dischargers authorized to discharge under the expiring permit are covered by the continued permit.

B. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

a. All reports required by the order and permit and other information requested by the Board or USEPA Region 9 shall be signed by a principal executive officer or ranking elected official of the discharger, or by a duly authorized representative of that person. [40 CFR 122.22(b)]

b. Certification

All reports signed by a duly authorized representative under Provision E.1.a. shall contain the following certification:
"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. [40 CFR 122.22(d)]

2. Should the discharger discover that it failed to submit any relevant facts or that it submitted incorrect information in any report, it shall promptly submit the missing or correct information. [40 CFR 122.41(l)(8)]

3. False Reporting

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall be subject to enforcement procedures as identified in Section F of these Provisions.

4. Transfers

a. This permit is not transferable to any person except after notice to the Board. The Board may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

b. Transfer of control or ownership of a waste discharge facility under an National Pollutant Discharge Elimination System permit must be preceded by a notice to the Board at least 30 days in advance of the proposed transfer date. The notice must include a written agreement between the existing discharger and proposed discharger containing specific dates for transfer of responsibility, coverage, and liability between them. Whether an order and permit may be transferred without modification or revocation and reissuance is at the discretion of the Board. If order and permit modification or revocation and reissuance is necessary, transfer may be delayed 180 days after the Board's receipt of a complete application for waste discharge requirements and an NPDES permit.

5. Compliance Reporting

a. Planned Changes

The discharger shall file with the Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

b. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final compliance dates contained in any compliance schedule shall be submitted within 10 working days following each scheduled date unless otherwise specified within this order and permit. If reporting noncompliance, the report shall include a description of the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance and an estimated date for achieving full compliance. A final report shall be submitted within 10 working days of achieving full compliance, documenting full compliance

c. Non-compliance Reporting (Twenty-four hour reporting:)

i. The discharger shall report any noncompliance that may endanger health or the environment. All pertinent information shall be provided orally within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five working days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

C. ENFORCEMENT

1. The provision contained in this enforcement section shall not act as a limitation on the statutory or regulatory authority of the Board.

2. Any violation of the permit constitutes violation of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act, and is the basis for enforcement action, permit termination, permit revocation and reissuance, denial of an application for permit reissuance; or a combination thereof.
3. The Board may impose administrative civil liability, may refer a discharger to the State Attorney General to seek civil monetary penalties, may seek injunctive relief or take other appropriate enforcement action as provided in the California Water Code or federal law for violation of Board orders.
4. It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this order and permit.
5. A discharger seeking to establish the occurrence of any upset (See Definitions, G. 24) has the burden of proof. A discharger who wishes to establish the affirmative defense of any upset in an action brought for noncompliance shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:
   a. an upset occurred and that the Permittee can identify the cause(s) or the upset;
   b. the permitted facility was being properly operated at the time of the upset;
   c. the discharger submitted notice of the upset as required in paragraph E.6.d.; and
   d. the discharger complied with any remedial measures required under A.4.

   No determination made before an action for noncompliance, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.
   In any enforcement proceeding, the discharger seeking to establish the occurrence of any upset has the burden of proof. [40 CFR 122.41(n)]

D. DEFINITIONS

1. DDT and Derivatives shall mean the sum of the p,p' and o,p' isomers of DDT, DDD (TDE), and DDE.
2. Duly authorized representative is one whose:
   a. Authorization is made in writing by a principal executive officer or ranking elected official;
   b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general manager in a partnership, manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
   c. Written authorization is submitted to the USEPA Region 9. If an authorization becomes no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board and USEPA Region 9 prior to

or together with any reports, information, or applications to be signed by an authorized representative.

3. Hazardous substance means any substance designated under 40 CFR 116 pursuant to Section 311 of the Clean Water Act.

4. HCH shall mean the sum of the alpha, beta, gama (Lindane), and delta isomers of hexachlorocyclohexane.

5. Overflow is defined as the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g. through manholes, at pump stations, and at collection points) upstream from the plant headworks or from any treatment plant facilities.

6. Priority pollutants are those constituents referred to in 40 CFR S122, Appendix D and listed in the USEPA NPDES Application Form 2C, (dated 6/80) Items V-3 through V-9.

7. Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

8. Toxic pollutant means any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act or under 40 CFR S401.15.

9. Total Identifiable Chlorinated hydrocarbons (TICH) shall be measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, PCBs and other identifiable chlorinated hydrocarbons.

10. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in this order and permit. The requirements of this order and permit are applicable to the entire volume of water, and the material therein, which is disposed of to surface and ground waters of the State of California.

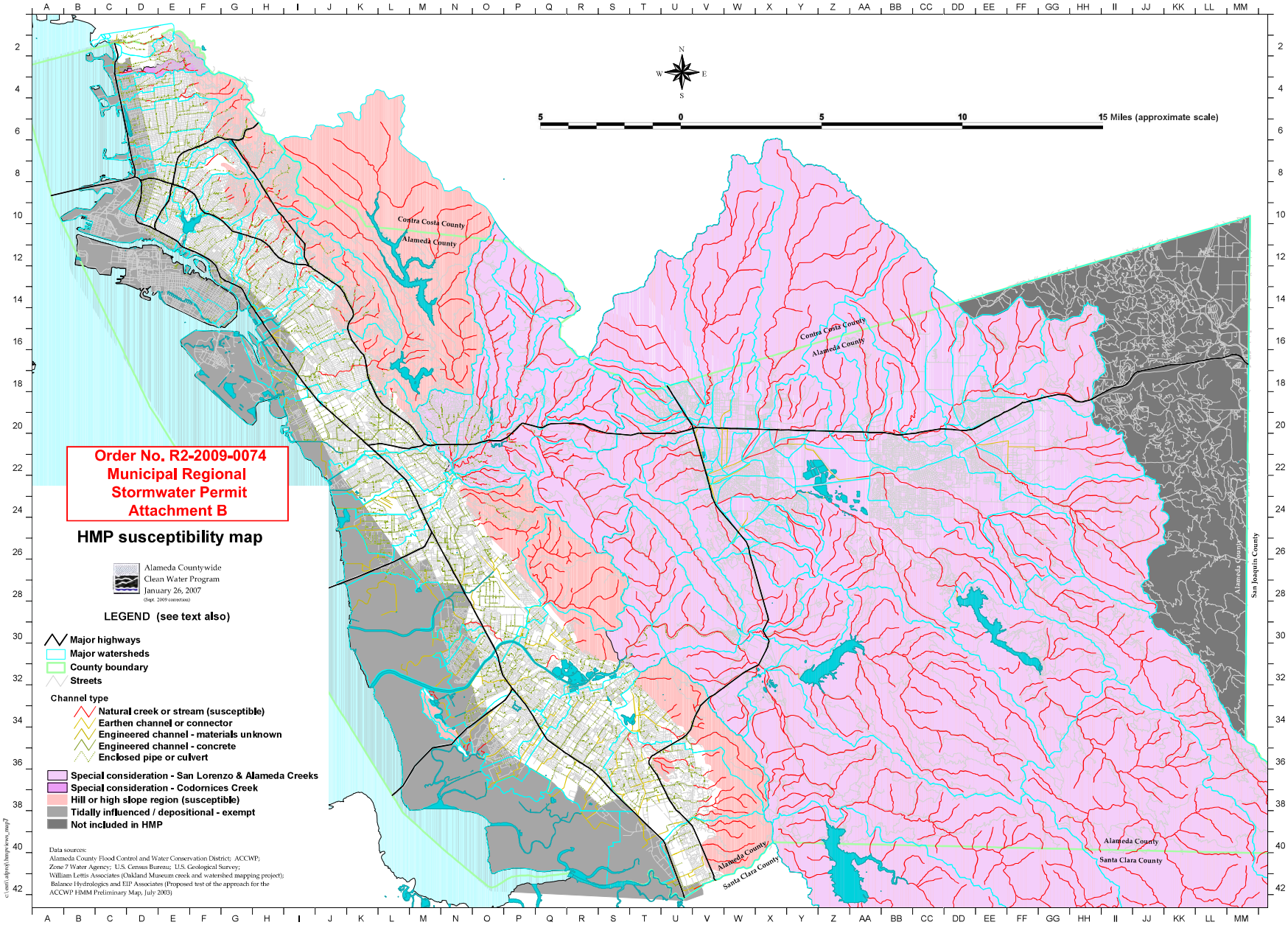
Order No. R2-2009-0074
Municipal Regional
Stormwater Permit
Attachment B
HMP susceptibility map
Alameda Countywide
Clean Water Program
January 26, 2007
(Sept. 2009 correction)
LEGEND (see text also)
Major highways
Major watersheds
County boundary
Streets
Channel type
Natural creek or stream (susceptible)
Earthen channel or connector
Engineered channel - materials unknown
Engineered channel - concrete
Enclosed pipe or culvert
Special consideration - San Lorenzo & Alameda Creeks
Special consideration - Codornices Creek
Hill or high slope region (susceptible)
Tidally influenced / depositional - exempt
Not included in HMP
Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)
N
W
E
S
5
0
5
10
15 Miles (approximate scale)
Contra Costa County
Alameda County
Contra Costa County
Alameda County
Alameda County
Santa Clara County
Alameda County
Santa Clara County
Alameda County
San Joaquin County

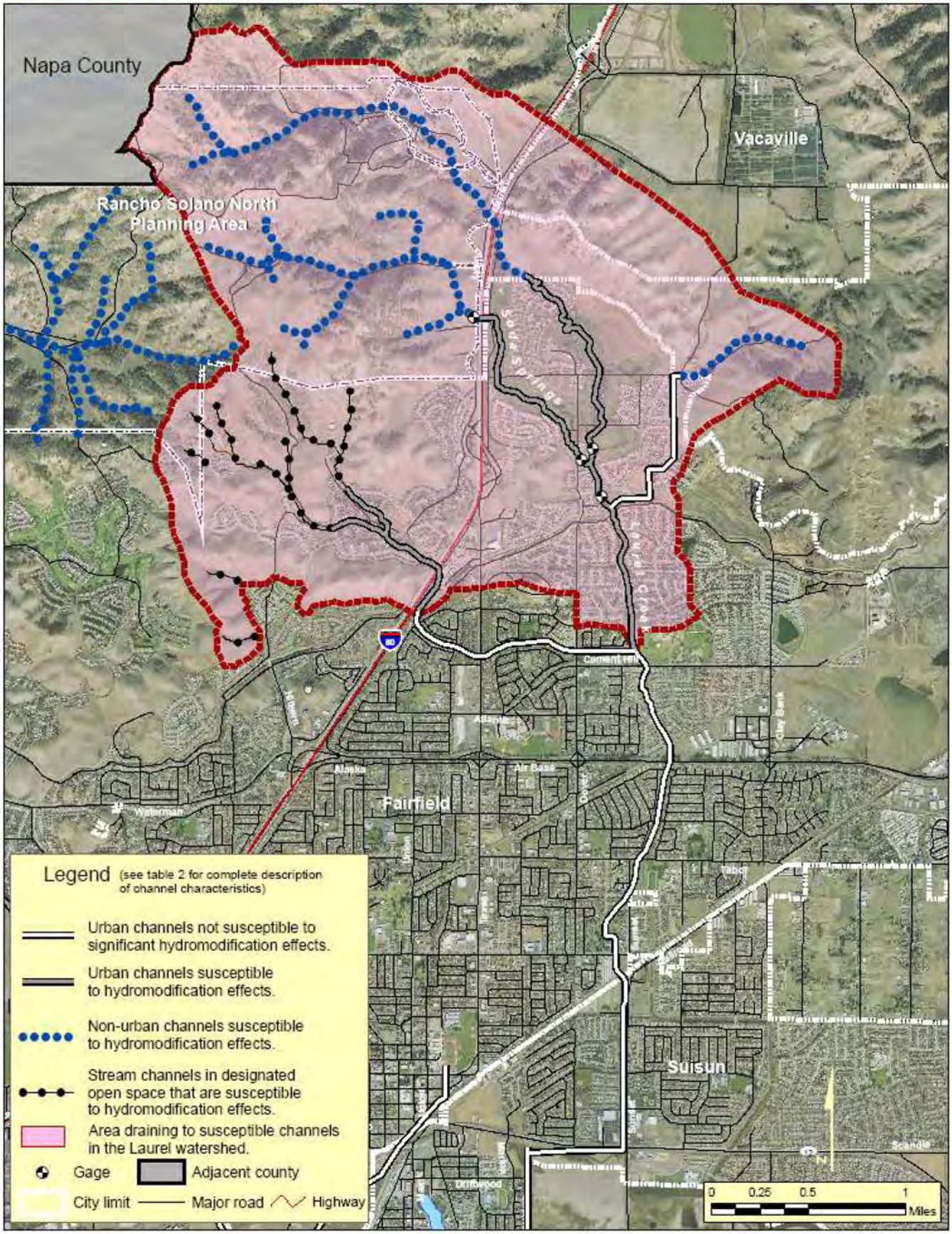

Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure2_edits.mxd

©2006 Balance Hydrologics, Inc.

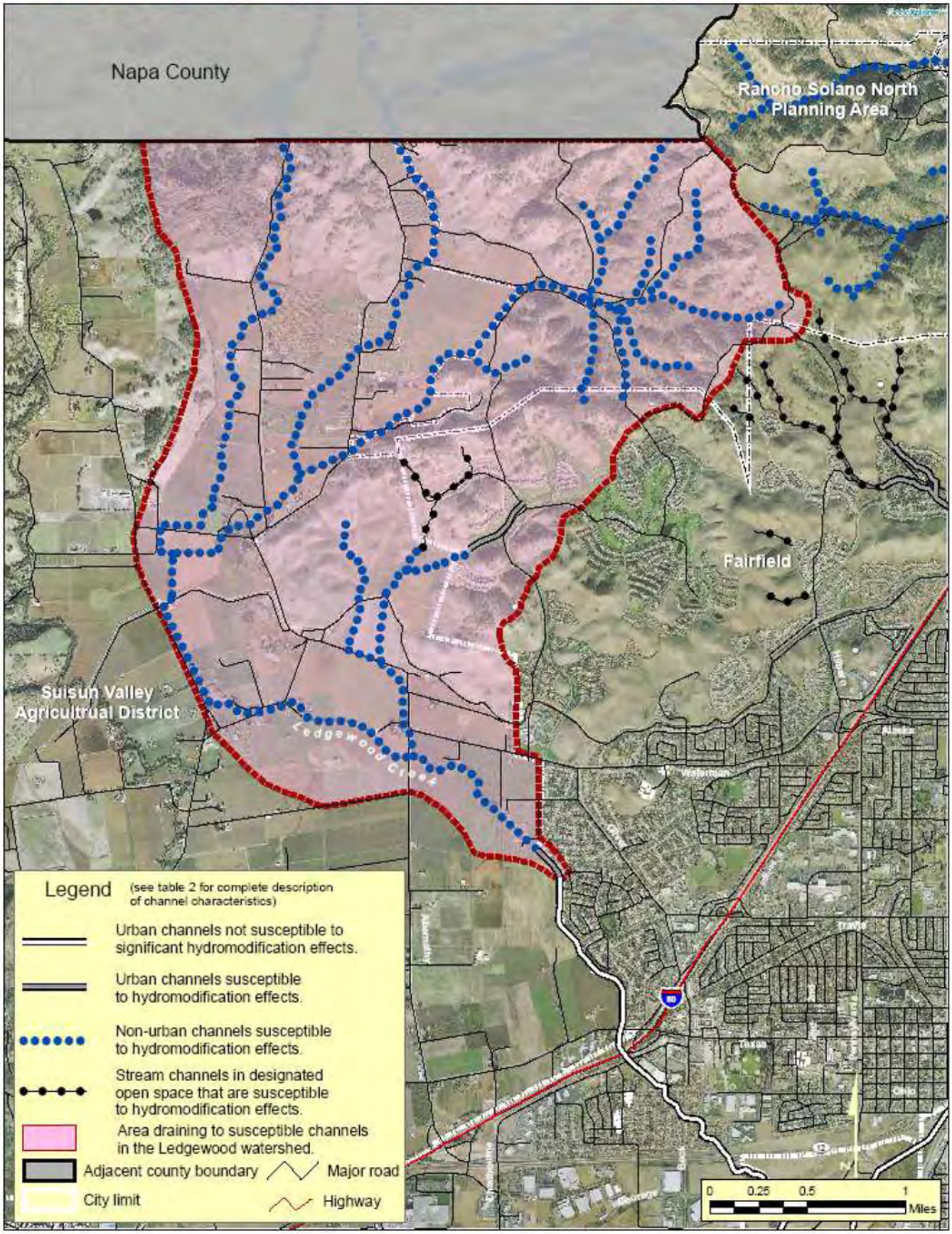

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure3_edits.mxd

©2006 Balance Hydrologics, Inc.

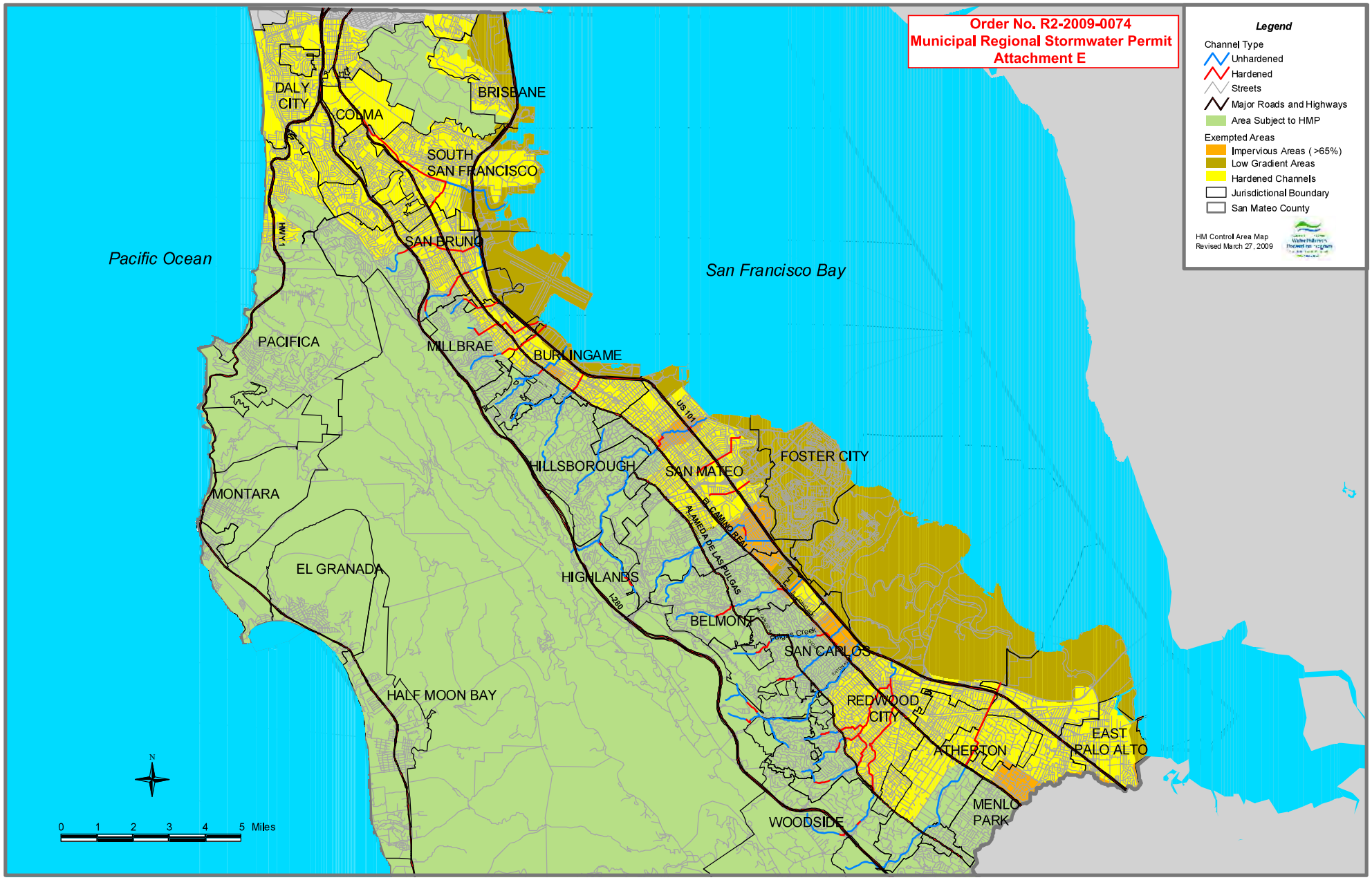
Order No. R2-2009-0074
Municipal Regional Stormwater Permit
Attachment E
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
MONTARA
HILLSBOROUGH
SAN MATEO
FOSTER CITY
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
WOODSIDE
HWY 1
US 101
I-280
EL CAMINO REAL
ALAMEDA DE LAS PULGAS
Pulgas Creek
N
0 1 2 3 4 5 Miles

Classification of Subwatersheds and Catchment Areas for Determining Applicability of HMP Requirements

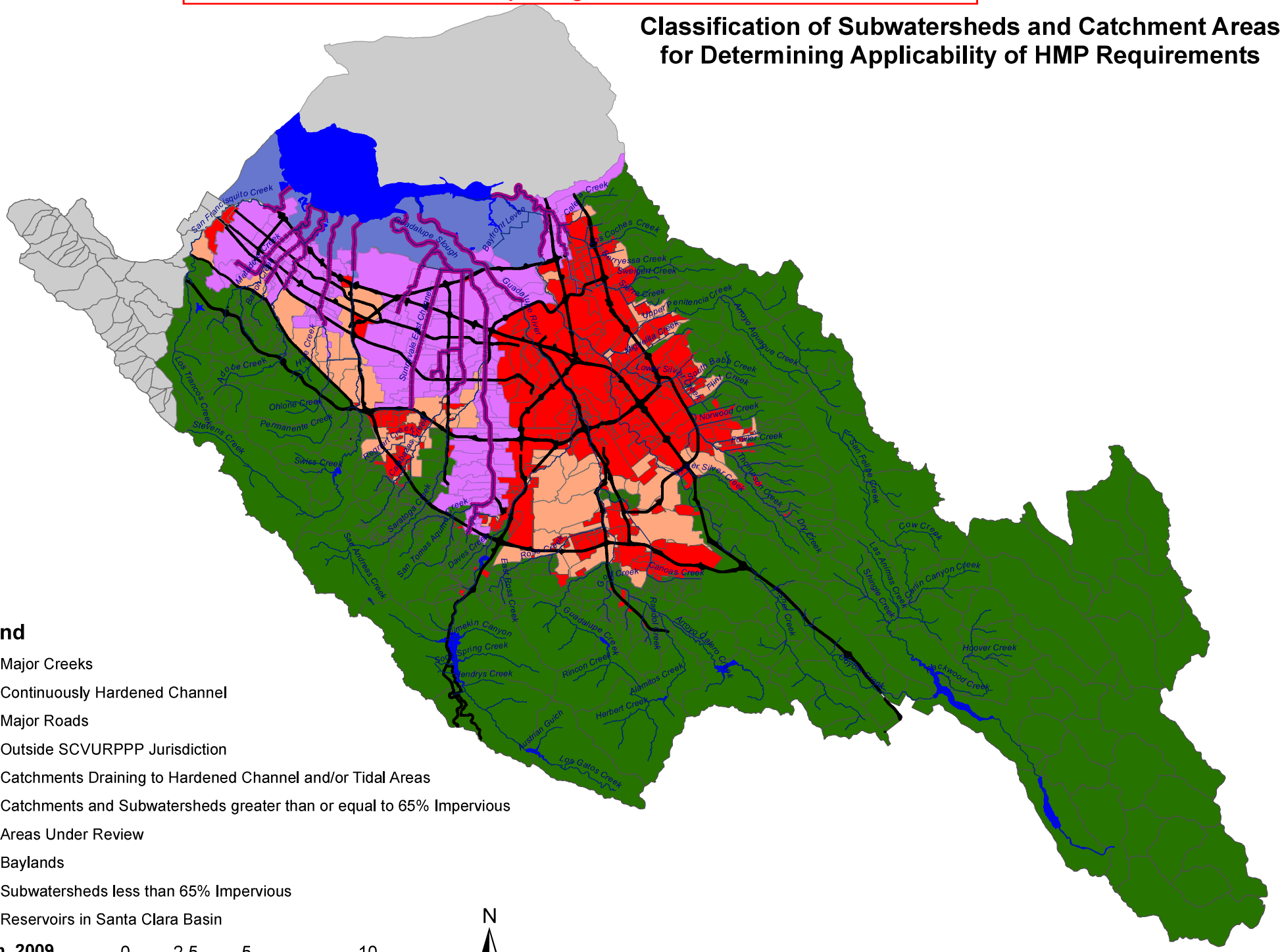

This map contains: 1) a revision to the November 2007 version to correct a mapping error; and 2) two revisions to Areas Under Review in Palo Alto and North Santa Clara County to reflect updated impervious surface data, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER NO. R2-2011-0083
NPDES PERMIT NO. CAS612008

AMENDMENT REVISING ORDER NO. R2-2009-0074 for the following jurisdictions and entities:

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

Findings:

1. On October 14, 2009, the Water Board adopted Order No. R2-2009-0074, NPDES No. CAS612008, prescribing Waste Discharge Requirements under the San Francisco Bay Municipal Regional Stormwater Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the named Permittees.
2. Provision C.3.b. of Order No. R2-2009-0074 establishes the scope of development projects that must implement post-construction stormwater treatment and defines them as Regulated Projects.
3. Provision C.3.c. of Order No. R2-2009-0074 requires Permittees to implement Low Impact Development (LID) requirements by December 1, 2011. Under Provision C.3.c., Permittees must require all Regulated Projects to implement source control and site design measures and to treat 100% of the amount of runoff identified in Provision C.3.d. for the Regulated Project's drainage area with LID treatment measures onsite or at a joint stormwater treatment facility.
4. Provision C.3.e.ii.(1) of Order No. R2-2009-0074 acknowledges that certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. This Provision further states that incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these types of Regulated Projects that are considered "Special Projects."
5. Provision C.3.e.ii.(2) of Order No. R2-2009-0074 requires the Permittees to submit a proposal by December 1, 2010, to the Water Board identifying the types of projects proposed as Special Projects and therefore eligible for LID Treatment Reduction Credit. The proposal was required to include specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, other appropriate limitations, and the proposed LID Treatment Reduction Credit.
6. On December 1, 2010, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted a Special Projects proposal on behalf of the Permittees, which defined the types of Special Project Categories and their corresponding LID Treatment Reduction Credits.
7. BASMAA's stormwater proposal was posted on the Water Board's website and circulated for public comment on December 10, 2010. Comments on the proposal were received from USEPA, NRDC, San Francisco Baykeeper, the Building Industry Association, other building industry groups, and developers.
8. Water Board staff has met on a regular basis with representatives of BASMAA and within these negotiations, revisions of the December 10, 2010, proposal have been made and considered. Representatives of USEPA, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) have participated in some of these meetings. Water Board staff has also met separately with representatives of NRDC and San Francisco Baykeeper.

9. This Order amends Order No. R2-2009-0074 to add criteria for determining which types of Regulated Projects may be considered Special Projects. This Order establishes different categories of Special Projects based on size, land use type, and density.
10. For each category of Special Projects, this Order establishes corresponding LID Treatment Reduction Credits that may be used to reduce the amount of stormwater runoff that must be treated with LID stormwater treatment systems.
11. This Order requires that when LID Treatment Reduction Credits are applied, the percentage of stormwater runoff not treated by LID treatment systems to be treated with specific non-LID treatment systems.
12. Provisions C.3.c.i.(2)(vi) and C.3.c.iii.(3) of Order No. R2-2009-0074 require Permittees to submit to the Water Board by May 1, 2011, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour.
13. The Permittees submitted a proposal for the soil media specifications and soil infiltration testing methods on December 1, 2010, which was distributed for public comment on December 15, 2010. Comments were received on January 28, 2011, from Roger James of Resources Management and from the Natural Resources Defense Council.
14. Provisions C.3.c.i.(2)(vii) C.3.c.iii.(4) of Order No. R2-2009-0074 require Permittees to submit to the Water Board by December 1, 2011, proposed minimum specifications for green roofs to be considered biotreatment systems.
15. The Permittees submitted a proposal for the minimum green roof specifications on April 29, 2011, which was distributed for public comment on May 4, 2011. No comments were received.
16. This Order approves the model biotreatment soil media specifications, soil infiltration testing methods, and minimum green roof specifications submitted by the Permittees.
17. Provision C.3.g.ii.(5) of Order No. R2-2009-0074 requires the Santa Clara Permittees to comply with all the requirements in Attachment F of the same Order. Requirement 4. of Attachment F (pages F-3 and F-4 of Order No. R2-2009-0074) defines geographical areas where applicable Regulated Projects are required to meet the HM Standard and associated requirements. These areas of HM applicability described in Requirement 4. are shown in the Santa Clara Permittees' HM Map available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).
18. Requirement 4.c. of Attachment F states that Pink areas on the HM Map are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicates that the actual level of imperviousness of a particular area is greater than or equal to 65% impervious. Any new data is to be submitted to the Water Board in one coordinated submittal within one year of permit adoption.
19. The Santa Clara Permittees submitted new impervious data and a revised HM Map that reflects the new data to the Water Board on October 14, 2010. On March 11, 2011, the Santa Clara Permittees submitted a revised HM Map to correct a small error in the October 2010 HM Map, and to provide additional information per Water Board staff request. The revised HM Map shows that in the majority of the Pink area of the original, approved, Santa Clara Permittees' HM

Map, the HM Standard and associated requirements do apply. In the revised HM Map, these areas are now shown in green to represent the applicability of the HM Standard and associated requirements. The remaining small portion of the Pink area in the original HM Map is now shown in red to represent areas where the HM Standard and associated requirements do not apply.

20. This Order approves the revised Santa Clara Permittees' HM Map and replaces the HM Map originally adopted by Order No. R2-2009-0074.
21. The Fact Sheet attached to this Order as Appendix III contains background information and rationale for this Order's requirements. It is hereby incorporated into this Order and therefore constitutes part of the findings for this Order
22. This Order is exempt from the provisions of the California Environmental Quality Act pursuant to California Water Code Section 13389
23. The Water Board notified the Permittees named in this Order and interested agencies and persons of its intent to consider adoption of this Order, and provided an opportunity to submit written comments.
24. In a public meeting, the Water Board heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED, pursuant to the provisions of California Water Code Division 7 and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, that the Permittees shall comply with the following:

1. Provision C.3. and Attachment F of Order No. R2-2009-0074, are hereby modified and amended as shown in Appendix I. Additions to Provision C.3. and Attachment F are displayed as underlined type and deletions of text are displayed as ~~strikeout~~ format.
2. Attachments L and M as shown in Appendix II are hereby added to Order No. R2-2009-0074.
3. This Order shall become effective on December 1, 2011.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 28, 2011.

Digitally signed by Bruce Wolfe
Date: 2011.11.30 13:53:13 -08'00'

Bruce H. Wolfe
Executive Officer

Appendix I: Revisions to Provision C.3. and Attachment F of Order No. R2-2009-0074
Appendix II: Attachments L and M to be added to Order No. R2-2009-0074
Appendix III: Fact Sheet

APPENDIX I

Revisions to Provision C.3. and Attachment F
of
Water Board Order No. R2-2009-0074

November 28, 2011

C.3. New Development and Redevelopment

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) **Source Control Requirements**

Require all Regulated Projects to implement source control measures onsite that at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste and compactor enclosures;
- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.[3]

(b) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment.

(ii) A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

(iii) Infeasibility to implement harvesting and re-use, infiltration, or evapotranspiration at a project site may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.

- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

(iv) By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report on the criteria and procedures the Permittees shall employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. This report shall, at a minimum, contain the information required in Provision C.3.c.iii.(1).

(v) By December 1, 2013, the Permittees, collaboratively or individually, shall submit a report on their experience with determining infeasibility of harvesting and re-use, infiltration, or evapotranspiration at Regulated Project sites. This report shall, at a minimum, contain the information required in Provision C.3.iii.(2).

(vi) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, and infiltrate runoff at a minimum of 5 inches per hour during the life of the facility. The ~~planting and~~ soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in Attachment L.

~~By December 1, 2010, the Permittees, working collaboratively or individually, shall submit for Water Board approval, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(3). Once the Water Board approves biotreatment soil media specifications and soil infiltration testing methods, the Permittees shall ensure that biotreatment systems installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications and soil infiltration testing methods.~~

(vii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. ~~By May 1, 2011, the Permittees shall submit for Water Board~~

~~approval, proposed minimum specifications for green roofs. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(4). Once the Water Board approves green roof minimum specifications, the~~ Permittees shall ensure that green roofs installed at Regulated Projects ~~to~~ meet the following ~~requirements of Provision C.3.c and d comply with the Water Board approved~~minimum specifications~~.~~:

- The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).
- The green roof system planting media shall be sufficiently deep to support the long term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(c) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(b) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Implementation Level – All elements of the tasks described in Provision C.3.c.i shall be fully implemented.

Due Date for Full Implementation – December 1, 2011

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provision C.3.c.i shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.c.i.

(2) For any private development project with an application deemed complete after the Permit effective date, the requirements of Provision C.3.c.i shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011.

(3) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provision C.3.c.i shall not apply.

iii. Reporting

(1) Feasibility/Infeasibility Criteria Report - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Literature review and discussion of documented cases/sites, particularly in the Bay Area and California, where infiltration, harvesting and reuse, or evapotranspiration have been demonstrated to be feasible and/or infeasible.
- Discussion of proposed feasibility and infeasibility criteria and procedures the Permittees shall employ to make a determination of when biotreatment will be allowed at a Regulated Project site.

(2) Status Report on Application of Feasibility/Infeasibility Criteria – By December 1, 2013, the Permittees shall submit a report to the Water Board containing the following information:

- Discussion of the most common feasibility and infeasibility criteria employed since implementation of Provision C.3.c requirements, including site-specific examples;
- Discussion of barriers, including institutional and technical site specific constraints, to implementation of harvesting and reuse, infiltration, or evapotranspiration, and proposed strategies for removing these identified barriers;
- If applicable, discussion of proposed changes to feasibility and infeasibility criteria and rationale for the changes; and
- Guidance for the Permittees to make a consistent and appropriate determination of the feasibility of harvesting and reuse, infiltration, or evapotranspiration for each Regulated Project.

~~(3) Model Biotreatment Soil Media Specifications - By December 1, 2010, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:~~

- ~~Proposed soil media specifications for biotreatment systems;~~
- ~~Proposed soil testing methods to verify a long-term infiltration rate of 5-10 inches/hour;~~
- ~~Relevant literature and field data showing the feasibility of the minimum design specifications;~~
- ~~Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria; and~~
- ~~Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.~~

~~(4) Green Roof Minimum Specifications - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:~~

- ~~Proposed minimum design specifications for green roofs;~~

- ~~Relevant literature and field data showing the feasibility of the minimum design specifications;~~
- ~~Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria;~~
- ~~Discussion of data and lessons learned from already installed green roofs;~~
- ~~Discussion of barriers, including institutional and technical site specific constraints, to installation of green roofs and proposed strategies for removing these identified barriers; and~~
- ~~Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.~~

(3) Report the method(s) of implementation of Provisions C.3.c.i above in the 2012 Annual Report. For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.v, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of the California Stormwater Quality Association's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flowrate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Implementation Level – The Permittees shall immediately require the controls in this task.

Due Date for Full Implementation – Immediate, except December 1, 2010, for Vallejo Permittees.

iii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.v.

iv. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a

main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.c.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.c in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**

Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**

Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[5] to treat the remaining portion of the Provision

[5] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

C.3.d runoff with LID treatment measures at a Regional Project.[6] The Regional Project must achieve a net environmental benefit.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite projects must be constructed by the end of construction of the Regulated Project. If more time is needed to construct the offsite project, for each additional year, up to three years, after the construction of the Regulated Project, the offsite project must provide an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading. Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of the Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as ~~types of~~ smart growth, high density, ~~and~~ or transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID T~~t~~reatment R~~r~~eduction C~~c~~redits approved by the Water Board may be applied to these ~~types of~~ Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provisions C.3.e.ii.(2),(3)&(4). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible. Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of LID treatment for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(2) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

[6] **Regional Project –** A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(3) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash

and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs) for commercial and mixed-use development projects and in Dwelling Units per Acre (DU/Ac) for residential development projects.

(i) 50% Maximum LID Treatment Reduction Credit

- For any commercial or mixed use Category B Special Project with a FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75% Maximum LID Treatment Reduction Credit

- For any commercial or mixed use Category B Special Project with a FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100% Maximum LID Treatment Reduction Credit

- For any commercial or mixed use Category B Special Project with a FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(4) Category C Special Project Criteria (Transit-Oriented Development)

(a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals

or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria:

(i) Be characterized as a non auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.

(ii) If a commercial or mixed-use development project, achieve at least an FAR of 2:1.

(iii) If a residential development project, achieve at least a density of 25 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.

(c) Location Credits

(i) A Category C Special Project may qualify for the following Location Credits:

- 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub.
- 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub.
- 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.((4)(c) above.

(i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits:

- 10% Density Credit: Achieve an FAR of at least 2:1.
- 20% Density Credit: Achieve an FAR of at least 4:1.
- 30% Density Credit: Achieve an FAR of at least 6:1.

(ii) A Category C Special Project that is a residential development project may qualify for the following Density Credits:

- 10% Density Credit: Achieve a density of at least 30 DU/Ac.
- 20% Density Credit: Achieve a density of at least 60 DU/Ac.
- 30% Density Credit: Achieve a density of at least 100 DU/Ac.

(iii) Commercial and mixed-use Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR.

(iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(4)(c) above.

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

- 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at-grade surface parking. The at-grade surface parking must be treated with LID treatment measures.
- 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.

(5) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.)

~~(2) By December 1, 2010, the Permittees shall submit a proposal to the Water Board containing the following information:~~

- ~~Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this Permit for each type of project;~~
- ~~Identification of institutional barriers and/or technical site-specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite;~~
- ~~Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations;~~
- ~~Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite;~~
- ~~Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit; and~~
- ~~Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.~~

iii. Effective Date – December 1, 2011.

iv. Implementation Level

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provisions C.3.e.i-ii shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain

the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.e.i-ii.

(2) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.e.i-ii shall not apply.

(3) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer

(4) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

v. Reporting –The Permittees shall submit the ordinance/legal authority and procedural changes made, if any, to implement Provision C.3.e with their 2012 Annual Report. Annual reporting thereafter shall be done in conjunction with reporting requirements under Provision C.3.b.v.

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in the 2012 Annual Report and all subsequent Annual Reports.

vi. Reporting on Special Projects

(1) Beginning December 1, 2011, Permittees shall track any identified potential Special Projects that have submitted planning applications but that have not received final discretionary approval.

(2) By March 15 and September 15 of each year, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no potential Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment, onsite and offsite. Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Density in DU/Ac: Number of dwelling units per acre.

(e) Density in FAR: Floor Area Ratio

(f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(g) LID Treatment Reduction Credit Available: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied.

(h) List of Stormwater Treatment Systems: List all LID stormwater treatment systems approved. For each type of LID treatment system, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area that will be treated.

(i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project Name and No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Density DU/Ac	Density FAR	Special Project Category	LID Treatment Reduction Credit Available	List of LID Stormwater Treatment Systems	List of Non-LID Stormwater Treatment Systems
								Category A: Category B: Category C: Location: Density: Parking:	Category A: Category B: Category C: Location: Density: Parking:	Indicate each type of LID treatment system and the percentage of total runoff treated	Indicate each type of non-LID treatment system and the percentage of total runoff treated. Indicate whether minimum design criteria met or certification received (see footnotes).

Project Name and No: Name of the Special Project and Project No. (if applicable)

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Acreage: Total site area in acres.

Density in DU/Ac: Number of dwelling units per acre.

Density in FAR: Floor Area Ratio

Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

LID Treatment Reduction Credit Available: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.

List of LID Stormwater Treatment Systems: List all LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area.

List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

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ATTACHMENT F

Provision C.3.g.
Santa Clara Permittees
Hydromodification Management Requirements

Santa Clara Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[4] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 5 of this Attachment.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[5]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 5 of this Attachment.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[6]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual.[7] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this attachment and Provision C.3.g.

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[4] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[5] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[6] See www.bayareahydrologymodel.org , Resources.

[7] *The Bay Area Hydrology Model User Manual* is available at http://www.bayareahydrologymodel.org/downloads.html.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[8] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a. – c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a Regional HM control[9] within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[10] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project shall contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM control:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

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[8] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[9] *Regional HM controls* are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which should incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional control measure discharges.

[10] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, sand filters, and green roofs.

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are located in areas of HM applicability as described below and shown in the revised Santa Clara Permittees' HM Map (see Attachment M). ~~the Santa Clara Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).~~

a. **Purple areas**: These areas represent catchments that drain to hardened channels that extend continuously to the Bay or to tidally influenced sections of creeks. The HM Standard and associated requirements do not apply to projects in the areas designated in purple on the map.

Plans to restore a creek reach may reintroduce the applicability of HM requirements, unless the creek restoration project is designed to accommodate the potential hydromodification impacts of future development; if this is not the case, in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

b. **Red areas**: These areas represent catchments and subwatersheds that are greater than or equal to 65% impervious, based on existing imperviousness data sources. The HM Standard and associated requirements do not apply to projects in the areas designated in red on the map.

~~**c. Pink areas**: These are areas that are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicate that the actual level of imperviousness of a particular area is greater than or equal to 65% impervious. Any new data will be submitted to the Water Board in one coordinated submittal within one year of permit adoption.~~

c. **Green area**: These areas represent catchments and subwatersheds that are less than 65% impervious ~~and are not under review by the Permittees~~. The HM Standard and associated requirements apply to projects in areas designated as green on the map.

5. Potential Exceptions to Map Designations

The Program may choose to prepare a User Guide[11] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[12] After the Program has collated its methods into User Guide format, received approval of the User Guide from the Executive Officer,[13] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

[11] The User Guide may be offered under a different title.
[12] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[13] The User Guide will not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

APPENDIX II

Attachments L and M
to be added to
Water Board Order No. R2-2009-0074

ATTACHMENT L

Provision C.3.c.i.(1)(b)(vi)

Specification of soils for Biotreatment or Bioretention Facilities

Soils for biotreatment or bioretention areas shall meet two objectives:

- Be sufficiently permeable to infiltrate runoff at a minimum rate of 5" per hour during the life of the facility, and
- Have sufficient moisture retention to support healthy vegetation.

Achieving both objectives with an engineered soil mix requires careful specification of soil gradations and a substantial component of organic material (typically compost).

Local soil products suppliers have expressed interest in developing 'brand-name' mixes that meet these specifications. At their sole discretion, municipal construction inspectors may choose to accept test results and certification for a 'brand-name' mix from a soil supplier.

Tests must be conducted within 120 days prior to the delivery date of the bioretention soil to the project site.

Batch-specific test results and certification shall be required for projects installing more than 100 cubic yards of bioretention soil.

SOIL SPECIFICATIONS

Bioretention soils shall meet the following criteria. "Applicant" refers to the entity proposing the soil mixture for approval by a Permittee.

1. General Requirements – Bioretention soil shall:
   a. Achieve a long-term, in-place infiltration rate of at least 5 inches per hour.
   b. Support vigorous plant growth.
   c. Consist of the following mixture of fine sand and compost, measured on a volume basis:

      60%-70% Sand

      30%-40% Compost
2. Submittal Requirements – The applicant shall submit to the Permittee for approval:
   a. A sample of mixed bioretention soil.
   b. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.
   c. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
   d. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in 4.

e. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".

f. Grain size analysis results of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

g. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

h. Provide the name of the testing laboratory(s) and the following information:

(1) Contact person(s)

(2) Address(s)

(3) Phone contact(s)

(4) E-mail address(s)

(5) Qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal

3. Sand for Bioretention Soil

a. Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be non-plastic.

b. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40, #30, #16. #8, #4, and 3/8 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

4. Composted Material

Compost shall be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

a. Compost Quality Analysis – Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). The lab report shall verify:

(1) Feedstock Materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.

(2) Organic Matter Content: 35% - 75% by dry wt.

(3) Carbon and Nitrogen Ratio: C:N < 25:1 and C:N >15:1

(4) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable. In addition any one of the following is required to indicate stability:

(i) Oxygen Test < 1.3 O2 /unit TS /hr

(ii) Specific oxy. Test < 1.5 O2 / unit BVS /

(iii) Respiration test < 8 C / unit VS / day

(iv) Dewar test < 20 Temp. rise (°C) e.

(v) Solvita® > 5 Index value

(5) Toxicity: any one of the following measures is sufficient to indicate non-toxicity.

(i) NH4- : NO3-N < 3

(ii) Ammonium < 500 ppm, dry basis

(iii) Seed Germination > 80 % of control

(iv) Plant Trials > 80% of control

(v) Solvita® > 5 Index value

(6) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.

(i) Total Nitrogen content 0.9% or above preferred.

(ii) Boron: Total shall be <80 ppm; Soluble shall be <2.5 ppm

(7) Salinity: Must be reported; < 6.0 mmhos/cm

(8) pH shall be between 6.5 and 8. May vary with plant species.

b. Compost for Bioretention Soil Texture – Compost for bioretention soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight) *Min*	*Max*
1 inch	99	100
1/2 inch	90	100
1/4 inch	40	90
No. 200	2	10

c. Bulk density shall be between 500 and 1100 dry lbs/cubic yard

d. Moisture content shall be between 30% - 55% of dry solids.

e. Inerts – compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.

f. Weed seed/pathogen destruction – provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

g. Select Pathogens – Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.

h. Trace Contaminants Metals (Lead, Mercury, Etc.) – Product must meet US EPA, 40 CFR 503 regulations.

i. Compost Testing – The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

VERIFICATION OF ALTERNATIVE BIORETENTION SOIL MIXES

Bioretention soils not meeting the above criteria shall be evaluated on a case by case basis. Alternative bioretention soil shall meet the following specification: "Soils for bioretention facilities shall be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and provide sufficient retention of moisture and nutrients to support healthy vegetation."

The following steps shall be followed by municipalities to verify that alternative soil mixes meet the specification:

1. General Requirements – Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. The applicant refers to the entity proposing the soil mixture for approval.

   a. Submittals – The applicant must submit to the municipality for approval:

      (1) A sample of mixed bioretention soil.

      (2) Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

      (3) Certification from an accredited geotechnical testing laboratory that the Bioretention Soil has an infiltration rate between 5 and 12 inches per hour as tested according to Section 1.b.(2)(ii).

      (4) Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".

      (5) Grain size analysis results of mixed bioretention soil performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

      (6) A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

      (7) The name of the testing laboratory(s) and the following information:

         (i) contact person(s)

         (ii) address(s)

         (iii) phone contact(s)

         (iv) e-mail address(s)

         (v) qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal

   b. Bioretention Soil

      (1) Bioretention Soil Texture

      Bioretention Soils shall be analyzed by an accredited lab using #200, and 1/2" inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight) *Min*	*Max*
1/2 inch	97	100
No. 200	2	5

      (2) Bioretention Soil Permeability testing

      Bioretention Soils shall be analyzed by an accredited geotechnical lab for the following tests:

(i) Moisture – density relationships (compaction tests) shall be conducted on bioretention soil. Bioretention soil for the permeability test shall be compacted to 85 to 90 percent of the maximum dry density (ASTM D1557).

(ii) Constant head permeability testing in accordance with ASTM D2434 shall be conducted on a minimum of two samples with a 6-inch mold and vacuum saturation.

MULCH FOR BIORETENTION FACILITIES

Mulch is recommended for the purpose of retaining moisture, preventing erosion and minimizing weed growth. Projects subject to the State's Model Water Efficiency Landscaping Ordinance (or comparable local ordinance) will be required to provide at least two inches of mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Aged mulch can be obtained through soil suppliers or directly from commercial recycling yards. It is recommended to apply 1" to 2" of composted mulch, once a year, preferably in June following weeding.

Order No. R2-2009-0074
Municipal Regional Stormwater Permit
Attachment M
November 28, 2011

Classification of Subwatersheds and Catchment Areas for Determining Applicability of Hydromodification Management (HM) Requirements

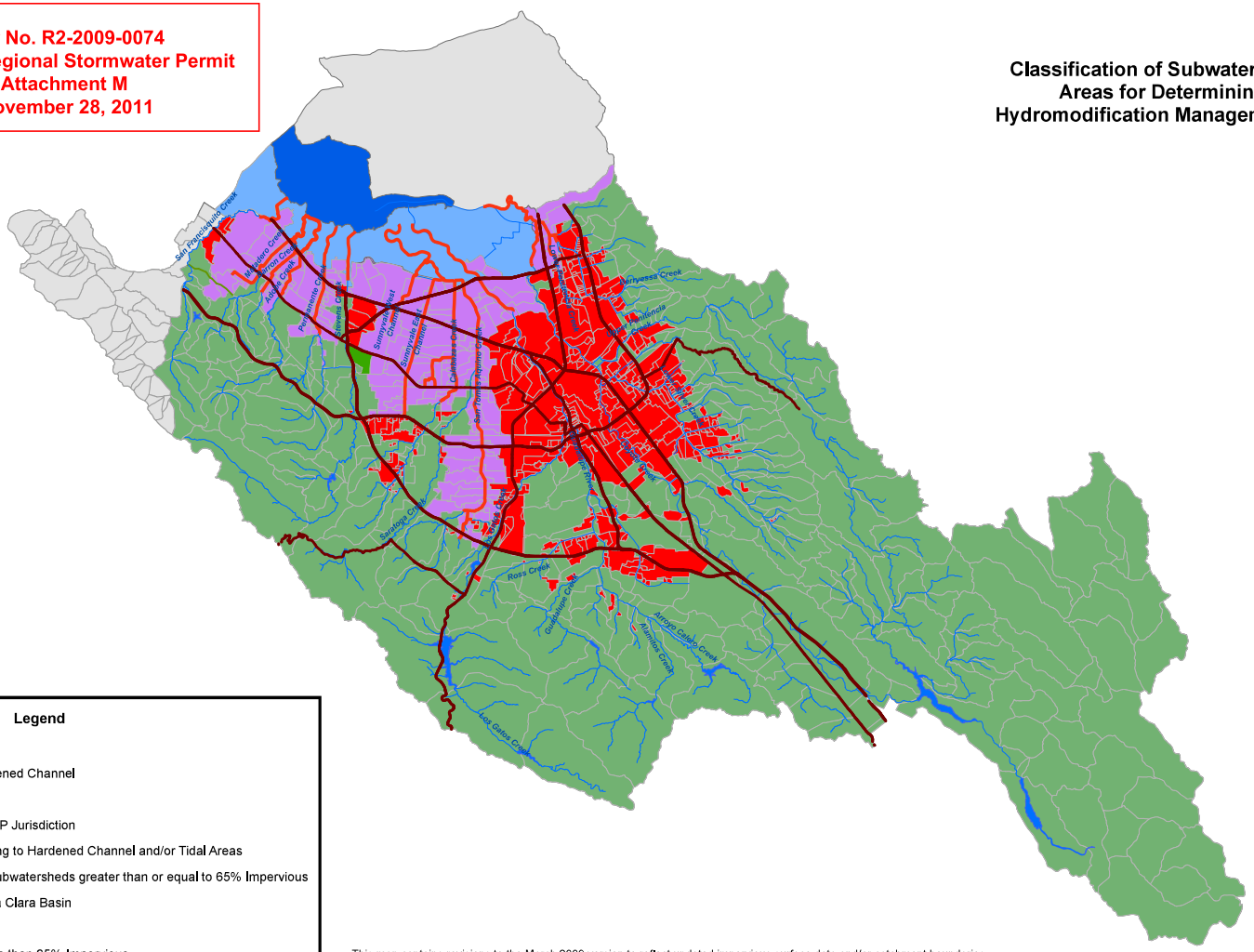
San Francisquito Creek
Matadero Creek
Barron Creek
Adobe Creek
Permanente Creek
Stevens Creek
Sunnyvale East Channel
Calabazas Creek
Saratoga Creek
Ross Creek
Guadalupe Creek
Alamitos Creek
Arroyo Calero Creek
Los Gatos Creek
Thompson Creek
Coyote Creek
Upper Penitencia Creek
Lower Penitencia Creek
Berryessa Creek
Tularcitos Creek
Yellow Creek
Arroyo Del Valle
Arroyo Las Positas
Alameda Creek
Calaveras Creek
Arroyo Del Cierbo
Arroyo Del Rey
Arroyo Del Ciervo
Arroyo Del Gato
Arroyo Del Valle
Arroyo Las Positas

APPENDIX III

Fact Sheet

This Fact Sheet describes the legal requirements and technical rationale that serve as the basis for this Order's requirements. This Fact Sheet constitutes a portion of the findings for the Order.

Purpose

The purpose of the Order is to amend Water Board Order No. R2-2009-0074, the San Francisco Bay Municipal Regional Stormwater Permit, to add criteria for determining which types of Regulated Projects may be considered Special Projects and to allow these Special Projects to reduce the amount of stormwater runoff that must be treated with Low Impact Development (LID) stormwater treatment systems.

Background and Summary of Existing Requirements

On October 14, 2009, the Water Board adopted Order No. R2-2009-0074, NPDES No. CAS612008, prescribing Waste Discharge Requirements under the San Francisco Bay Municipal Regional Stormwater Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the named Permittees.

Provision C.3. of Order No. R2-2009-0074 requires the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. Provision C.3. requires that the source control, site design, and stormwater treatment measures be LID measures.

Provision C.3.b. of Order No. R2-2009-0074 defines Regulated Projects as the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

Provision C.3.c. of Order No. R2-2009-0074 recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy[1]. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treat stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, permeable pavement, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

[1] USEPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) http://www.epa.gov/owow/nps/lid/costs07)

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(2)(b) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility. LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment. A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

Provision C.3.c.i.(2)(b)(vi) requires the Permittees to propose specifications for soil installed in all biotreatment or bioretention facilities built under the provisions of this permit. These minimum specifications are contained in Attachment L. These specifications were proposed by the Permittees pursuant to Provision C.3.c.iii.(3) after research performed under their direction.[2, 3, 4]

Provision C.3.c.i.(2)(b)(vii) requires minimum specifications for green roofs which are installed as treatment measures under this permit. The Permittees proposed green roof minimum specifications pursuant to Provision C.3.c.iii.(4) and submitted a brief report in support of their proposal.[5]

Special Projects

Provision C.3.e.ii.(1) of Order No. R2-2009-0074 was included based on the Permittees' and building industry stakeholders' comments and testimony during order adoption that certain types of smart growth, high density, and transit-oriented development projects cannot practicably implement LID treatment including biotreatment. LID treatment measures, including infiltration, harvest for use, evapotranspiration and green roofs can be infeasible to implement in a dense urban context in some cases, from a physical or cost basis. The urban centers in this region are often underlain by tight clay soils that make infiltration difficult, requiring storage at possibly prohibitive cost. Stormwater harvest for internal, non-potable use still meets regulatory obstacles from implementation of the plumbing code and lack of winter water demand. Green roofs continue to be very expensive, and evapotranspiration is lowest in the cold winter when rains fall. Many dense, central business district developments lack room for planted areas for biotreatment.

Moreover, these projects have various environmental benefits, including either reducing existing impervious surfaces associated with commercial or residential development due to increased

[2] Technical Memorandum – Regional Bioretention Soil Guidance & Model Specification, Bay Area Stormwater Management Agencies Association – WRA Environmental Consultants, November 12, 2010

[3] Technical Memorandum – Regional Bioretention Installation Guidance, Bay Area Stormwater Management Agencies Association – WRA Environmental Consultants, November 12, 2010

[4] Annotated Bibliography – Regional Biotreatment Soil Guidance, Bay Area Stormwater Management Agencies Association – WRA Environmental Consultants, November 12, 2010

[5] Green Roof Minimum Specifications, Bay Area Stormwater Management Agencies Association, April 29, 2011.

density, or creating less "accessory" impervious areas and less auto-related pollutant impacts. Auto use in general and its associated pollution is reduced because residential areas are closer to commercial areas for jobs and services, and closer to transit hubs. In addition, concentrating development in urban centers should reduce pressure to develop green fields on the urban perimeter.

Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Regulated Projects that are considered "Special Projects."

Provision C.3.e.ii.(2) of Order No. R2-2009-0074 required the Permittees to submit by December 1, 2010, a proposal to the Water Board identifying the types of projects proposed as Special Projects and therefore eligible for LID Treatment Reduction Credit. The proposal was required to include specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, other appropriate limitations, and the proposed LID Treatment Reduction Credit. Specifically, the Provision required the proposal to contain the following:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this permit for each type of project.
- Identification of institutional barriers and/or technical site specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite.
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations.
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite.
- Proposed LID Treatment Reduction Credit for each type of Special Project and justification for the proposed Credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit.
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total Credit.

On December 1, 2010, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted a Special Projects proposal on behalf of the Permittees, which defined the types of Special Project Categories and their corresponding LID Treatment Reduction Credits.

BASMAA's stormwater proposal was posted on the Water Board's website and circulated for public comment on December 10, 2010. Comments on the proposal were received from U.S. EPA, the Natural Resources Defense Council (NRDC), San Francisco Baykeeper, the Building Industry Association, other building industry groups, and developers.

Water Board staff has met on a regular basis with representatives of BASMAA and, within these meetings, revisions of the December 10, 2010, proposal have been made and publicly circulated. Representatives of U.S. EPA, the Metropolitan Transportation Commission (MTC) and the

Association of Bay Area Governments (ABAG), among other stakeholders, have participated in some of these meetings. Water Board staff has also met separately with representatives of NRDC and San Francisco Baykeeper.

In the Permittees' original submittal and at subsequent meetings, the Permittees' have provided Water Board staff with estimates of the number and type of projects that may potentially qualify as Special Projects and the percentage of LID Treatment Reduction Credit that may be applied for the various projects.

The proposed revision to Provision C.3.e.ii. of Order No. R2-2009-0074 establishes specific criteria for determining which types of Regulated Projects may be considered Special Projects, which are more stringent than originally proposed by the Permittees. The proposed revision establishes three categories of Special Projects, with different amounts of maximum allowable non-LID treatment, based on size, land use type, and density. Projects that are the most dense and would have the greatest infeasibility problems with LID implementation are allowed to use the most non-LID treatment. Category A projects (Provision C.3.e.ii), which represents the smallest Special Projects, must be under a half acre, built in a pedestrian-oriented business district and have 85% lot coverage. Category B projects (Provision C.3.e.iii) must also have 85% lot coverage, a minimum density, and be between a half acre and 2 acres. Category C, transit-oriented development projects (Provision C.3.e.iv), have no size limitation, but must have a minimum density, and are allowed an additional non-LID treatment percentage based on proximity to transit, density, and parking criteria to establish a tiered approach for determining the total LID Treatment Reduction available. The amount of Provision C.3.d. design stormwater runoff not treated with LID measures, must be treated with one or a combination of the following two specific non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

If LID treatment measures are not feasible, these are the best controls for qualifying Special Projects to reduce pollutants in stormwater discharges to the maximum extent practicable.

Provision C.3.e.ii.(2) of Board Order No. R2-2009-0074 is now superseded by a new Provision C.3.e.ii.(2) and Provisions C.3.e.ii.(3) and C.3.e.ii.(4), which specify criteria in three categories for determining which types of Regulated Projects may be considered Special Projects and which are more stringent than originally proposed by the Permittees.

Qualifying Special Projects are dense urban development projects that will reduce development pressure on the greenfield suburban fringe by concentrating residences and commercial development in urban centers. These projects have many more commercial square feet and dwelling units per square foot of impervious surface. Dense urban "smart growth" tends to be more pedestrian-friendly, allowing reduced auto use and reduction of associated pollution.

Transit-oriented developments are designed to reduce automobile use and will reduce associated urban runoff pollution. Typically, high density residential developments are designed to be within ½ mile of a major transit hub, with commercial development also included in the developments so that shops and jobs are all clustered in a central location, with easy transit access. These elements add up to fewer automobile trips and more use of transit.

Page 6 of *New Places, New Choices: Transit-Oriented Development in the San Francisco Bay Area,* November 2006, by the MTC, states:

> In 2002, the Bay Area's "Smart Growth Strategy" —a landmark, long-range regional visioning effort —found that promoting transit-oriented development and focusing housing, jobs and retail along transit corridors would preserve as much as 66,000 acres of open space by 2020, compared with current development trends. Such a strategy also would reduce average weekday driving by as much as 3.6 million vehicle miles in 2020, conserving 150,000 gallons of gasoline a day and reducing daily carbon dioxide emissions (the principal greenhouse gas) by 2.9 million pounds per day. Already, Bay Area households located close to transit stations make fewer driving trips than do others in the region. Households within a half-mile of train stations and ferry stops log only 20 vehicle miles of travel per day, just 56 percent of the regional average. The fewer trips people make, the fewer the pollution-producing "cold starts" of their cars. These factors combine to result in lower fuel use and lower tailpipe emissions by those households living close to transit — and they also add up to powerfully persuasive evidence of the environmental benefits of TOD in the Bay Area.

Page 8 of the same MTC report also states:

> ...Proximity Matters - Bay Area residents who live within a half-mile of rail or ferry stops are four times as likely to use transit, three times as likely to bike, and twice as likely to walk as are those who live at greater distances.

The proposed reporting requirements (Provision C.3.e.vi) provides Water Board staff with early notice of the Special Projects that are being considered by the Permittees prior to the Permittees granting final planning approval. This allows Water Board staff to validate the Permittees' analysis of the number and size of potential Special Projects that may be approved during the remainder of the MRP's permit term. The reporting requirements also require the Permittees to describe in detail the basis for infeasibility of implementing LID treatment when non-LID treatment is used. Also, the Permittees must describe the types of filter vaults or tree filters used, and the certification these systems have achieved. Water Board staff intends to use the data collected in the proposed reporting requirements to revise the Special Projects criteria as appropriate for the next MRP permit term.

Biotreatment Soil Media and Green Roof Minimum Specifications

Provisions C.3.c.i.(2)(vi) and C.3.c.iii.(3) of Order No. R2-2009-0074 required the Permittees to submit to the Water Board by May 1, 2011, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour.

The Permittees submitted a proposal for the soil media specifications and soil infiltration testing methods on December 1, 2010, which was distributed for public comment on December 15, 2010. Comments were received on January 28, 2011, from Roger James of Resources Management and from NRDC.

Provisions C.3.c.i.(2)(vii) and C.3.c.iii.(4) of Order No. R2-2009-0074 require the Permittees to submit to the Water Board by December 1, 2011, proposed minimum specifications for green roofs to be considered biotreatment systems.

The Permittees submitted a proposal for the minimum green roof specifications on April 29, 2011, which was distributed for public comment on May 4, 2011. No comments were received.

This Order approves the model biotreatment soil media specifications, soil infiltration testing methods, and minimum green roof specifications submitted by the Permittees.

Hydromodification Management (HM) – Santa Clara Permittees

Provision C.3.g. of Order No. R2-2009-0074 requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Based on Hydrograph Modification Management Plans that were developed for the Permittees on a countywide basis, the Water Board adopted HM requirements specific to the Permittees in each county, prior to the 2009 adoption of the MRP. Provision C.3.g. of Order No. R2-2009-0074 restates the major common elements of the specific HM requirements for all Permittees. Within Provision C.3.g., Attachment F contains the specific HM requirements for the Santa Clara Permittees.

Provision C.3.g.ii.(5) of Order No. R2-2009-0074 requires the Santa Clara Permittees to comply with all the requirements in Attachment F of the same Order. Requirement 4. of Attachment F (pages F-3 and F-4 of Order No. R2-2009-0074) defines geographical areas where applicable Regulated Projects are required to meet the HM Standard and associated requirements. These areas of HM applicability described in Requirement 4. are shown in the Santa Clara Permittees' HM Map available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf.

Requirement 4.c. of Attachment F states that pink areas on the HM Map are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicates that the actual level of imperviousness of a particular area is greater than or equal to 65% impervious. Any new data is to be submitted to the Water Board in one coordinated submittal within one year of permit adoption.

The Santa Clara Permittees submitted new impervious data and a revised HM Map that reflects the new data to the Water Board on October 14, 2010. On March 11, 2011, the Santa Clara Permittees submitted a revised HM Map to correct a small error in the October 2010 HM Map, and to provide additional information per Water Board staff request. The revised HM Map shows that in the majority of the pink area of the originally-approved Santa Clara Permittees' HM Map, the HM Standard and associated requirements do apply. In the revised HM Map, these areas are now shown in green to represent the applicability of the HM Standard and associated

requirements. The remaining small portion of the pink area in the original HM Map is now shown in red to represent areas where the HM Standard and associated requirements do not apply.

This Order approves the revised Santa Clara Permittees' HM Map and replaces the HM Map originally adopted by Order No. R2-2009-0074.

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order No. R2-2015-0049
NPDES Permit No. CAS612008
November 19, 2015

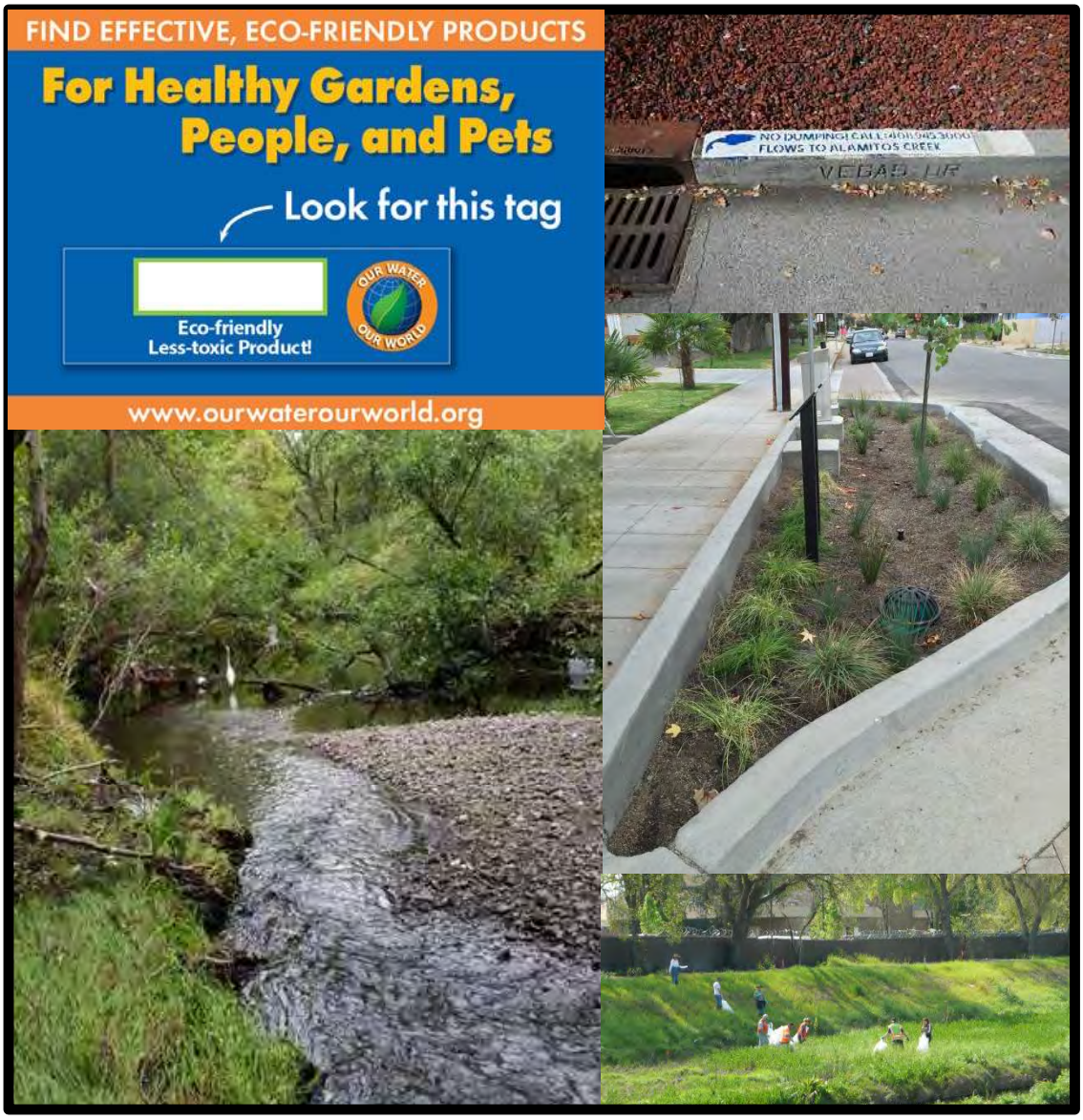

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California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER No. R2-2015-0049
NPDES PERMIT No. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Attachment A) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. The Fact Sheet, including any supplements thereto, is hereby incorporated by reference.

Existing Permit

2. **Alameda County—**The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated May 30, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

3. **Contra Costa County—**The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated June 2, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

4. **San Mateo County—**The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District and San Mateo County have joined together to form the San Mateo Countywide Water

Pollution Prevention Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated May 30, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County—**The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated May 29, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun—**The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated June 2, 2014, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083 on November 28, 2011, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo—**The City of Vallejo and the Vallejo Sanitary District (hereinafter referred to as the Vallejo Permittees) have submitted permit applications (Report of Waste Discharge), dated July 3 and June 2, 2014, respectively, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions. The Vallejo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2009-0074 on October 14, 2009, and amended by Order No. R2-2011-0083, to discharge stormwater runoff from storm drains and watercourses within the their jurisdictions.

8. The Alameda, Contra Costa, San Mateo, Santa Clara, Fairfield-Suisun, and Vallejo Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including

construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, USEPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, USEPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and USEPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, trash, and selenium in San Francisco Bay segments; pesticide associated toxicity, and trash in urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

13. Stormwater runoff is generated from various land uses in all the hydrologic sub-basins in the Basin and discharges into watercourses, which in turn flow into Central, Lower and South San Francisco Bay, and Suisun and San Pablo Bays.

14. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not

limited to, support for aquatic life; and other pollutants that can cause aquatic toxicity in the receiving waters.

15. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to USEPA stormwater regulations.
16. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.
17. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.
18. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments and recommendations.
19. The Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.
20. This Order supersedes and rescinds Order Nos. R2-2009-0074 and R2-2011-0083.
21. This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective January 1, 2016, provided the Regional Administrator, USEPA, Region 9, has no objections.

THEREFORE, IT IS HEREBY ORDERED that Order No. R2-2009-0074 and R2-2011-0183 are rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Permittees shall comply with the following requirements in this Order. This action in no way prevents the Water Board from taking enforcement action for past violations of the previous orders.

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

- **a.** Floating, suspended, or deposited macroscopic particulate matter, or foam;
- **b.** Bottom deposits or aquatic growths;
- **c.** Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
- **d.** Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- **e.** Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Water Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.15. Compliance with Provisions C.9 through C.12 and C.14 of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), and bacteria, shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provision C.10, which prescribes requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of (WQS), except for exceedances of water quality standards for pesticides, trash, mercury, PCBs, and bacteria that are managed pursuant to Provisions C.9 through C.12 and C.14, persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:

a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable (WQS), the Permittee(s) shall notify, within no more than 30 days, and thereafter submit a report to the Water Board that describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. Task Description – Asphalt/Concrete Removal, Cutting, Installation, and Repair

The Permittees shall implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving, or repair maintenance activities, such as those described in the California Stormwater Quality Association's (CASQA's) Handbook for Municipal Operations.

ii. Implementation Levels

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer system is available for the wastewater generated from these activities provided that appropriate approvals are obtained and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from such work sites upon completion of work. The Permittees shall require cleanup of all construction debris, spills, and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) Blueprint for a Clean Bay.

iii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. Task Description – The Permittees shall implement and require to be implemented BMPs that prevent the discharge of polluted wash water and non-stormwater to storm drains for pavement washing; sidewalk and plaza cleaning; mobile cleaning; pressure washing operations in locations such as parking lots and garages; trash areas; and gas station fueling areas. The Permittees shall implement the BMPs included in BASMAA's Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. Task Description

(1) The Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. Implementation Levels

(1) The Permittees shall prevent all debris, including structural materials and coating debris, such as paint chips, and other debris and pollutants generated in bridge and structure maintenance or graffiti removal from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks, or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste, or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall use proper disposal methods for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts the proper capture and disposal methods for the wastes generated.

iii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.d. Stormwater Pump Stations

i. Task Description –The Permittees shall implement measures to operate, inspect, and maintain stormwater pump stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in stormwater discharges to comply with WQSs.

ii. Implementation Levels – The Permittees shall comply with the following at Permittee-owned or -operated pump stations:

(1) Upon becoming aware that the discharge from a pump station has a dissolved oxygen (DO) concentration below 3.0 mg/L, implement corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 milligrams per liter (mg/L) and verify the effectiveness of the corrective actions with monitoring. Corrective actions do not need to be implemented on discharges from pump stations that

remain in the stormwater collection system or infiltrate into a dry creek immediately downstream.

(2) Ensure that pump stations are free from debris and trash and replace any oil absorbent booms, as needed, and investigate and abate illicit discharges. Pump stations excluded from C.2.d.ii.(1) above are not excluded from this requirement.

(3) The Permittees shall maintain records of inspection, maintenance, implementation of corrective actions, and any monitoring records at Permittee-owned or -operated pumped stations. These records shall be made available to Water Board staff or its representatives during inspections and audits, or otherwise upon request.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance

For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing, or open space uses. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Wildlife (CDFW), and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

ii. Implementation Level

(1) The Permittees shall continue to implement BMPs for erosion and sediment control measures during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities.

(2) The Permittees shall implement appropriate BMPs for the following activities. BMPs shall minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities:

(a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identification and prioritization of rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Construction of roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Implementation of an inspection program to maintain rural roads' structural integrity and prevent impacts to water quality;

(e) Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, and address excessive erosion;

(f) Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacement of existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall incorporate existing training and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction to avoid water quality impacts.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for the rural public works construction and maintenance activities in their Annual Report, including reporting on increased maintenance in priority areas.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment, and maintenance vehicle parking areas, and material storage facilities, to comply with water quality standards. Each SWPPP shall incorporate all applicable BMPs that are described in the California Stormwater Quality Association's (CASQA's) Handbook for Municipal Operations and the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003, and its addenda, as appropriate.

(2) The requirements in this provision shall apply only to facilities that are not covered under the State Water Board's Industrial Stormwater NPDES General Permit.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters and street sweeper, vactor, and other related equipment wash water. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that non-stormwater discharges are not entering the storm drain system and pollutant discharges are prevented to the maximum extent practicable. At a minimum, each corporation yard shall be fully inspected each year between September 1 and September 30, beginning the 2016-2017 reporting year. Active non-stormwater discharges shall cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting

(1) In the 2015-2016 Annual Report, Permittees shall report on implementation of SWPPPs, the results of inspections, and any followup actions in their Annual Report.

(2) Beginning with the 2016-2017 Annual Report, Permittees shall list activities conducted in the corporation yards that have BMPs in the site-specific SWPPP, date of inspections, the results of inspections, and any followup actions, including the date of any necessary corrective actions implemented, in their Annual Report.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. Task Description – At a minimum, each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain inlet stenciling.

- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs, such as Bay-Friendly Landscaping.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:
  - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
  - Dumpster drips from covered trash and food compactor enclosures.
  - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
  - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
  - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the Bay-Friendly Landscape Guidelines).

ii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1)–(8) in the 2016 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility[1] in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked. For adjacent Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

(1) Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d. under a previous MS4

[1] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects.

permit is exempt from the requirements of Provision C.3.c. (low impact development requirements).

(2) Any Regulated Project that was approved with no Provision C.3. stormwater treatment requirements under a previous MS4 permit and that has not begun construction by the effective date of this permit, shall be required to fully comply with the requirements of C.3.c. and C.3.d. Permittees may grant exemptions from this requirement as follows:

(a) An exemption may be granted to:

(i) Any Regulated Project that was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the ordinance, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law.

(ii) Any Regulated Project for which the Permittee has no legal authority to require changes to previously granted approvals, such as projects that have been granted building permits.

(b) An exemption from the LID requirements of Provision C.3.c. may be granted to any Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.

Regulated Projects, as they are defined in this Provision, do not include detached single-family home projects that are not part of a larger plan of development.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is

connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels; and

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement, and/or
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This

category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

- Interior remodels; and
- Routine maintenance or repair such as:
  - roof or exterior wall surface replacement, and/or
  - pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3., only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat

stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.
- Bicycle lanes built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[2]
- Caltrans highway projects and associated facilities.

iii. Implementation Level – All elements of Provision C.3.b.i.-ii. shall be fully implemented immediately, including a database or equivalent tabular format that contains all the information listed under Reporting (Provision C.3.b.iv.)

iv. Reporting

(1) **C.3.b.i.(2) Reporting**

In the 2017 Annual Report, each Permittee shall provide a complete list of the development projects that are subject to the requirements of Provision C.3.b.i.(2). For each such project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). If a Permittee has no projects subject to Provision C.3.b.i.(2), it shall so state in the 2017 Annual Report.

(2) **Annual Reporting – C.3.b.ii. Regulated Projects**

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the

[2] Permeable surfaces include pervious concrete, porous asphalt, unit pavers, and granular materials.

fiscal year Annual Report, in tabular form (as set forth in the attached Provision C.3.b. Sample Reporting Table):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date);

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project;

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

  (i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.iv.(2)(a) – (l) for the offsite project; and

  (ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.iv.(2)(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g.) – If not required, state why not. If required, state control method used.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing,

detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) **Source Control Requirements**
Require all Regulated Projects to implement source control measures onsite that, at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste, and compactor enclosures;
- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes

and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with pervious pavement systems.[3]
- Construct driveways, bike lanes, and/or uncovered parking lots with pervious pavement systems.

(b) Permittees shall collectively, on a regional or countywide basis, develop and adopt design specifications for pervious pavement systems, subject to the Executive Officer's approval. If countywide design specifications have been adopted and are contained in countywide stormwater handbooks, Permittees may reference these documents in the Annual Reports.

(c) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment.

(ii) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour, and maximize infiltration to the native soil during the life of the Regulated Project. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention

[3] Pervious pavement systems include pervious asphalt, pervious concrete, pervious pavers, and grid pavers.

and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in Attachment L of the previous permit (Order No. R2-2009-0074), dated November 28, 2011. Permittees may collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the soil media minimum specifications, subject to the Executive Officer's approval.

(iii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. Permittees shall ensure that green roofs installed at Regulated Projects meet the following minimum specifications:

(i) The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).

(ii) The green roof system planting media shall be sufficiently deep to support the long term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(d) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(c) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Reporting

(1) Permittees shall collectively submit in the 2016 Annual Report, design specifications for pervious pavement systems that have been developed and adopted on a regional or countywide basis. If Permittees within a countywide program are using countywide design specifications that have been adopted and are contained in a countywide stormwater handbook, those Permittees may reference the countywide stormwater handbook in-lieu of submitting the actual design specifications.

(2) For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.iv, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flow rate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.iv.(2)

iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil.

Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the

level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.b in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[4] to treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at a Regional Project.[5] The Regional Project must achieve a net environmental benefit.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite and Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of a Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth, high density, or transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts.

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[4] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

[5] **Regional Project –** A regional or municipal stormwater treatment facility that discharges into the same watershed as the Regulated Project.

Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-

oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is

expressed in Floor Area Ratios (FARs[6]) for commercial development projects, in Dwelling Units per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density[7] of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100% Maximum LID Treatment Reduction Credit

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[6] **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

[7] **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.

- For any commercial Category B Special Project with an FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Transit-Oriented Development)

(a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria:

(i) Be characterized as a non-auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.

(ii) If a commercial development project, achieve at least an FAR of 2:1.

(iii) If a residential development project, achieve at least a gross density of 25 DU/Ac.

(iv) If a mixed use development project, achieve at least an FAR of 2:1 or a gross density of 25 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.

(c) Location Credits

(i) A Category C Special Project may qualify for the following Location Credits:

a. 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub.

b. 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub.

c. 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve an FAR of at least 2:1.

b. 20% Density Credit: Achieve an FAR of at least 4:1.

c. 30% Density Credit: Achieve an FAR of at least 6:1.

(ii) A Category C Special Project that is a residential or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve a gross density of at least 30 DU/Ac.

b. 20% Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 30% Density Credit: Achieve a gross density of at least 100 DU/Ac.

(iii) Commercial Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR. Mixed use Category C Projects may use Density Credits based on either DU/Ac or FAR, but not both.

(iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at-grade surface parking. The at-grade surface parking must be treated with LID treatment measures.

b. 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.

(6) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) The definitions of FAR and gross density applicable to Provisions C.3.e.ii.(4) and (5) are effective July 1, 2016, and shall apply to all Special Projects granted final discretionary approval on or after July 1, 2016.

(3) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the

Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Gross Density in DU/Ac: Number of dwelling units per acre.

(e) Density in FAR: Floor Area Ratio.

(f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(g) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied.

(h) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. Task Description – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third party reviewer must be a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California or staff of another Permittee subject to the requirements of this Permit.

ii. Implementation Level – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three

years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, CASQA, or the equivalent, may be considered qualifying training.

iii. Reporting – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. Hydromodification Management (HM) Projects are Regulated Projects that create and/or replace one acre or more of impervious surface except where one of the following applies. All HM Projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.

(1) The post-project impervious surface area is less than, or the same as, the pre-project impervious surface area.

(2) The project is located in a catchment that drains to a hardened (e.g., continuously lined with concrete) engineered channel or channels or enclosed pipes that extend continuously to the Bay, Delta, or flow-controlled reservoir, or drains to channels that are tidally influenced.

(3) The project is located in a catchment or subwatershed that is highly developed (i.e., that is 70% or more impervious).[8]

The Hydromodification Applicability Maps developed by the Permittees in the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Programs, and the City of Vallejo, under the Previous Permit remain in effect and are provided in Attachment C to this Permit. Permittees that do not have the location-based applicability criteria (Provision C.3.g.i.(2) – (3)) shown on existing maps shall develop, or require to be developed, new maps, overlays to existing maps, or other equivalent information that demonstrates whether a project falls under one of those two criteria. Such maps, overlays, or other equivalent information shall be acceptable to the Executive Officer and shall not be effective until accepted by the Executive Officer.

ii. HM Standard

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-

[8] The Permittees' maps accepted for the Previous Permit were prepared using this standard, adjusted to 65% imperviousness to account for the presence of vegetation on the photographic references used to determine imperviousness. Thus, the maps for the Previous Permit are accepted as meeting the 70% requirement.

project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, and the City of Vallejo, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[9] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

(3) **Standard HM Modeling:** Permittees shall use, or shall cause to be used, a continuous simulation hydrologic computer model to simulate pre-project and post-project runoff, or sizing factors or charts developed using such a model, to design onsite or regional HM controls. The Permittees shall compare, or shall cause to be compared, the pre-project and post-project model output for a long-term rainfall record and shall show that applicable performance criteria in C.3.g.ii.(1)-(3) above are met. HM controls designed using the Bay Area Hydrology Model (BAHM) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual. Modifications to the BAHM shall be acceptable to the Executive Officer, shall be consistent with the requirements of this Provision, and shall be reported as required below:

- **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.
- **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating

[9] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include U.S. EPA's Hydrologic Simulation Program—Fortran (HSPF), the U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and U.S. EPA's Storm Water Management Model (SWMM).

post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

iii. HM Standard – Methodology for Direct Simulation of Erosion Potential

The Permittees may, collectively, propose an additional method, using direct simulation of erosion potential, by which to meet the HM Standard in Provision C.3.g.ii. Such a method shall be submitted to the Water Board for review and shall not be effective until approved by the Executive Officer. At a minimum, a proposal to use this additional method shall demonstrate that stormwater discharges from HM Projects using the method will not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition, and that increases in runoff flow and volume will be managed so that post-project runoff does not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. Such demonstration shall include, but not be limited to:

(1) An appropriately detailed discussion of the theoretical approach behind the method and the results for the areas to which it is proposed to be applied;

(2) Appropriate continuous simulation hydrologic modeling using Region-specific field data, including creek data (cross sections, longitudinal data, etc.), precipitation data (a record of at least 30 years of hourly data that is appropriately representative of the areas where the method is to be applied), safety factor(s), and HM control designs; and

(3) A description of how the method will be applied, including any models produced and how they will be used by the Permittees and/or project proponents. Such description shall include a listing of HM controls that may be used to comply with the HM requirements of this Permit, a description, with appropriate technical support, of how they will be sized to comply and how the Permittees will ensure appropriate implementation of the method, and all other necessary information, as appropriate.

iv. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof:

(1) **Onsite HM controls** are flow duration control structures, LID features and facilities, and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed

such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[10]

v. Implementation Level

All HM Projects shall meet the HM Standard in Provision C.3.g.ii immediately. For Contra Costa Permittees, Projects receiving final planning entitlements on or before January 3, 2018, may be allowed to use the Contra Costa design standards from the Previous Permit. After January 3, 2018, for Contra Costa Permittees, Projects shall comply with the Contra Costa design standards, including any modifications made.

vi. Reporting

(1) New HM Applicability Maps or equivalent information prepared pursuant to Provision C.3.g.i, for those Permittees who do not have an approved Map, shall be submitted, acceptable to the Executive Officer, not later than the second Annual Report following the Permit's effective date.

(2) Contra Costa Permittees shall, with the 2017 Annual Report , submit a technical report, acceptable to the Executive Officer, consisting of an HM Management Plan describing how Contra Costa will implement the Permit's HM requirements (e.g., how it will update or modify its practices to meet Permit requirements). At a minimum, the technical report shall

[10] In-stream control projects require a Stream Alteration Agreement from CDFW, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

provide additional analysis and discussion as to how existing data appropriately evaluates how existing practices available for use meet the Permit's HM requirements, including limit conditions. The report shall, as necessary, propose modifications to Contra Costa's current HM practices, or propose alternate practices that have been accepted by the Water Board, to meet the Permit's HM requirements. The report may also: provide additional data on monitored installations; provide additional analysis and discussion as to how existing and additional data appropriately evaluates existing practices, including limit conditions and the range of conditions present across Contra Costa County; and provide other information or discussion, as appropriate.

(3) Reporting of HM projects shall be as described in Provision C.3.b.

(4) Permittees shall report collectively, with each Annual Report, a listing, summary, and date of modifications made to the BAHM, including the technical rationale. This shall be prepared at the countywide program level and submitted on behalf of participating Permittees.

(5) In addition, for each HM Project approved during the reporting period, Permittees shall collect and make available the following information. Information shall be reported electronically, and, where appropriate, in tabular form.

- Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control(s);
- Method used by the project proponent to design and size the device or method used to meet the HM Standard;
- Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;
- For projects using standard sizing charts, a summary of sizing calculations used;
- For projects using the BAHM, a listing of model inputs; and
- For projects using custom modeling, a summary of the modeling calculations with a corresponding graph showing curve matching (existing, post-project, and post-project-with HM controls curves).

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. Task Description – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. Implementation Level – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the O&M of the pervious pavement system(s) (if any), onsite, joint, and/or offsite installed stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the O&M responsibility for the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing O&M inspections of the installed pervious pavement system(s) (if any), stormwater treatment system(s) and HM control(s) (if any).

(4) A database or equivalent tabular format of the following:

(a) All pervious pavement system(s) that total 3000 square feet or more installed at Regulated Projects, offsite, or at a Regional Project. The total square footage should not include pervious pavement systems installed as private-use patios for single family homes, townhomes, or condominiums.

(b) All stormwater treatment systems installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(c) All HM controls installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(5) The database or equivalent tabular format required in Provision C.3.h.ii.(4) shall include the following information for each Regulated Project, offsite project, and Regional Project:

(a) Name and address of the project;

(b) Names of the owner(s) and responsible operator(s) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and/or HM control(s);

(c) Specific description of the location (or a map showing the location) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and HM control(s) (if any);

(d) Date(s) that the pervious pavement system(s) (if any), stormwater treatment system(s), and HM controls (if any) was/were installed;

(e) Description of the type and size of the pervious pavement systems (if any), stormwater treatment system(s), and HM control(s) (if any) installed;

(f) Detailed information on O&M inspections. For each inspection, include the following:

(i) Date of inspection.

(ii) Type of inspection (e.g., installation, annual, followup, spot).

(iii) Type(s) of pervious pavement systems inspected (e.g., pervious concrete, pervious asphalt, pervious pavers).

(iv) Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well) and an indication of whether the treatment system is an onsite, joint, or offsite system.

(v) Type of HM controls inspected.

(vi) Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation or maintenance, maintenance required immediately).

(vii) Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, compliance schedule, administrative citation, administrative order).

(6) A prioritized O&M Inspection Plan for inspecting all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems and HM controls installed at Regulated Projects, offsite locations, and/or at joint or Regional Projects. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient.

At a minimum, the O&M Inspection Plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls (at Regulated Projects, offsite locations, and/or at joint or Regional Projects) at the completion of installation to ensure approved plans have been followed. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(b) Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal year) of Regulated Projects, offsite projects, or Regional Projects. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(c) Inspection by the Permittee of all Regulated Projects, offsite projects, or Regional Projects at least once every five years. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; and

(d) For vault-based stormwater treatment systems, Permittees may accept 3rd party inspection reports in lieu of conducting Permittee O&M inspections only if the 3rd party inspections are conducted at least annually. Information from each 3rd party inspection shall be included in the database or tabular format required in Provision C.3.h.ii.(5) and each inspection shall be clearly identified as a 3rd party inspection.

Each 3rd party inspection report must clearly document the following:

(i) Name of 3rd party inspection company.

(ii) Date of inspection.

(iii) Condition of the treatment unit(s) at the time of inspection.

(iv) Description of maintenance activities performed during the inspection.

(v) Date- and time-stamped photographs of the inside of the vault unit(s) before and after maintenance activities.

(7) An Enforcement Response Plan (ERP) for all O&M inspections that serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. At a minimum, the ERP must contain the following:

(a) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for recognizing common problems with the different types of pervious pavement systems, stormwater treatment systems, and/or HM controls, remedies for the problems, and appropriate enforcement actions, followup inspections, and appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(b) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools appropriate for different field scenarios of problems identified with the pervious pavement systems, stormwater treatment systems, and/or HM controls as well as for different types of inadequate response to enforcement actions taken.

(c) Timely Correction of Identified Problems – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all identified problems with the pervious pavement systems, stormwater treatment systems, and/or HM controls.

Corrective actions shall be implemented no longer than 30 days after a problem is identified by an inspector. Corrective actions can be temporary and more time may be allowed for permanent corrective actions. If more than 30 days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

iii. Due Date for Implementation: Immediate, except as follows:

(1) July 1, 2016, for Provision C.3.h.ii.(6) and all requirements pertaining to pervious pavement systems in Provisions C.3.h.ii.(1)-(5), C.3.h.iv., and C.3.h.v.

(2) July 1, 2017, for Provision C.3.h.ii.(7).

iv. Maintenance Approvals: The Permittees shall ensure that all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed onsite, offsite, or at a joint or Regional Project by development proponents are properly operated and maintained for the life of the projects. In cases where the responsible party for a pervious pavement system, stormwater treatment system or HM control has

worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities, but these approvals are not granted, the Permittees shall be deemed to be in compliance with this Provision. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the O&M requirements contained therein.

v. Reporting

(1) The database or equivalent tabular format required in Provisions C.3.b.ii.(4) and (5) shall be maintained by the Permittees. Upon request from the Executive Officer, information from this database or equivalent tabular format shall be submitted to Water Board staff for review. The requested information may include specific details on each inspection conducted within particular timeframes, such as several fiscal years.

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) Total number of Regulated Projects in the Permittee's database or tabular format as of the end of the reporting period (fiscal year).

(b) Total number of Regulated Projects, offsite projects, and Regional Projects inspected during the reporting period (fiscal year).

(c) Percentage of the total number of Regulated Projects that were inspected during the reporting period (fiscal year).

(d) A discussion of the inspection findings for the year and any common problems encountered with various types of pervious pavement systems, treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(e) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

(f) For the 2016 Annual Report, Permittees may report on the total number and percentage of treatment and HM controls inspected, and exclude discussion of inspection findings for pervious pavement systems.

(4) Each Permittee shall certify in the 2017 Annual Report that an Enforcement Response Plan has been completed by July 1, 2017.

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development projects, which create and/or replace ≥ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, and detached single-family home projects,[11] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[2]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[2]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. Reporting – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

C.3.j. Green Infrastructure Planning and Implementation

The Permittees shall complete and implement a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements.

The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is being required, in part, as an alternative to expanding the definition of Regulated Projects prescribed in Provision C.3.b to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. It also provides a mechanism to establish and implement alternative or

[11] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

in-lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.

Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

The Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash, PCBs, mercury, and other pollutants.

The Permittees may comply with any requirement of this Provision through a collaborative effort.

i. Green Infrastructure Program Plan Development

Each Permittee shall:

(1) Prepare a framework or workplan that describes specific tasks and timeframes for development of its Green Infrastructure Plan. This framework or workplan shall be approved by the Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. At a minimum, the framework or workplan shall include a statement of purpose, tasks, and timeframes to complete the elements listed in Provision C.3.j.i.(2) below.

(2) Prepare a Green Infrastructure Plan, subject to Executive Officer approval, that contains the following elements:

(a) A mechanism (e.g., SFEI's GreenPlanIT tool or another tool) to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area-specific basis, for implementation over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12:

(i) By 2020;

(ii) By 2030; and

(iii) By 2040.

The mechanism shall include criteria for prioritization (e.g., specific logistical constraints, water quality drivers (e.g., TMDLs), opportunities to treat runoff from private parcels in retrofitted street

right-of-way) and outputs (e.g., maps, project lists) that can be incorporated into the Permittee's long-term planning and capital improvement processes.

(b) Outputs from the mechanism described above, including, but not limited to, the prioritization criteria, maps, lists, and all other information, as appropriate. Individual project-specific reviews completed using these mechanisms are not required to be submitted with the Plan, but shall be made available upon request.

(c) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12:

(i) By 2020;

(ii) By 2030; and

(iii) By 2040.

(d) A process for tracking and mapping completed projects, public and private, and making the information publically available (e.g., SFEI's GreenPlanIT tool).

(e) General guidelines for overall streetscape and project design and construction so that projects have a unified, complete design that implements the range of functions associated with the projects. For example, for streets, these functions include, but are not limited to, street use for stormwater management, including treatment, safe pedestrian travel, use as public space, for bicycle, transit, vehicle movement, and as locations for urban forestry. The guidelines should call for the Permittee to coordinate, for example, street improvement projects so that related improvements are constructed simultaneously to minimize conflicts that may impact green infrastructure.

(f) Standard specifications and, as appropriate, typical design details and related information necessary for the Permittee to incorporate green infrastructure into projects in its jurisdiction. The specifications shall be sufficient to address the different street and project types within a Permittee's jurisdiction, as defined by land use and transportation characteristics.

(g) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. For street projects not subject to Provision C.3.b.ii. (i.e., non-Regulated Projects), Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d sizing requirements. The single approach can include different options to address specific issues or scenarios. That is, the approach shall identify the specific constraints that would preclude meeting the sizing requirements and the design approach(es) to take in that

situation. The approach should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate, plus all other information, as appropriate (e.g., how to account for load reduction for the PCBs or mercury TMDLs).

(h) A summary of the planning documents the Permittee has updated or otherwise modified to appropriately incorporate green infrastructure requirements, such as: General Plans, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure. Permittees are expected to complete these modifications as a part of completing the Green Infrastructure Plan, and by not later than the end of the permit term.

(i) To the extent not addressed above, a workplan identifying how the Permittee will ensure that green infrastructure and low impact development measures are appropriately included in future plans (e.g., new or amended versions of the kinds of plans listed above).

(j) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation.

(k) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, State, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.

(3) Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this provision.

(4) Conduct outreach and education in accordance with the following:

(a) Conduct public outreach on the requirements of this provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design.

(b) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this provision and methods of implementation.

(c) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on the requirements of this provision and methods of implementation.

(5) Report on Green Infrastructure Planning as follows:

(a) Each Permittee shall submit documentation in the 2017 Annual Report that its framework or workplan for development of its Green Infrastructure Plan was approved by its governing body, mayor, city manager, or county manager by June 30. 2017.

(b) Each Permittee shall submit its completed Green Infrastructure Plan with the 2019 Annual Report.

(c) Each Permittee shall submit documentation of its legal mechanisms to ensure implementation of its Green Infrastructure Plan with the 2019 Annual Report.

(d) Each Permittee shall submit a summary of its outreach and education efforts in each Annual Report.

ii. Early Implementation of Green Infrastructure Projects (No Missed Opportunities)

Each Permittee shall:

(1) Prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures.

(2) Submit the list with each Annual Report and a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

iii. Participate in Processes to Promote Green Infrastructure

(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.

(2) In each Annual Report, Permittees shall report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

(3) In the 2019 Annual Report, Permittees shall submit a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure.

iv. Tracking and Reporting Progress

(1) The Permittees shall, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.

(2) In each Annual Report, Permittees shall report progress on development and implementation of the tracking methods.

(3) In the 2019 Annual Report, Permittees shall submit the tracking methods and report implementation of green infrastructure measures including treated area, and connected and disconnected impervious area on both public and private parcels within their jurisdictions.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Gross Density DU/Ac	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No: Number of the Special Project as it appears in Table 3.1

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Acreage: Total site area in acres.

Gross Density in DU/Ac: Number of dwelling units per acre.

FAR: Floor Area Ratio

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

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C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites that could reasonably be considered to cause or contribute to pollution of stormwater runoff. Permittees shall conduct inspections, effective followup, and enforcement to abate potential and actual non-stormwater discharges, consistent with each Permittee's respective Enforcement Response Plan. These combined efforts will prevent the discharge of pollutants and impacts to beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have sufficient legal authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. **Implementation Level –** Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial facilities to address pollutant sources associated with outdoor process and manufacturing areas; outdoor material storage areas; outdoor waste storage and disposal areas; outdoor vehicle and equipment storage and maintenance areas; outdoor parking areas and access roads; outdoor wash areas; outdoor drainage from indoor areas, rooftop equipment; and contaminated and erodible surface areas; and other sources determined by the Permittees or the Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. **Task Description** – Permittees shall continue to update and implement an Inspection Plan that will serve as a prioritized inspection workplan. This Inspection Plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

ii. **Implementation Level**

(1) Facilities For Prioritization Into Inspection Plan

Commercial and industrial facilities with the functional aspects and types described below, and other facilities identified by the Permittees as reasonably likely to contribute to pollution of stormwater runoff, shall be prioritized for inspection on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of

concern, proximity to a waterbody, potential and actual discharge history of the facility, and other relevant factors. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plan:

(a) Sites that include the following types of functions that may produce pollutants when exposed to stormwater include, but are not limited to:

- Outdoor process and manufacturing areas
- Outdoor material storage areas
- Outdoor waste storage and disposal areas
- Outdoor vehicle and equipment storage and maintenance areas
- Outdoor wash areas
- Outdoor drainage from indoor areas
- Rooftop equipment
- Other sources determined by the Permittee or Water Board as reasonably likely to contribute to pollution of stormwater runoff.

(b) The following types of industrial and commercial businesses that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges:

- Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the Statewide NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);
- Vehicle Salvage yards;
- Metal and other recycled materials collection facilities, and waste transfer facilities;
- Vehicle mechanical repair, maintenance, fueling, or cleaning facilities;
- Building trades central facilities or yards, corporation yards;
- Nurseries and greenhouses;
- Building material retailers and storage;
- Plastic manufacturers; and
- Other facilities designated by the Permittee or Water Board to be reasonably likely to contribute to pollution of stormwater runoff.

(2) Inspection Plan – The Inspection Plan shall be updated annually and shall contain the following information:

(a) A description of the process for prioritizing inspections and frequency of inspections. The prioritization criteria shall assign a more frequent inspection schedule to the highest priority facilities per Provision C.4.b.ii.(1). If any geographical areas are to be targeted for

inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan.

(b) Assign appropriate inspection frequency for each industrial and commercial facility based on the priority established in Provision C.4.b.ii.(2)(a) above, potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(c) A mechanism to include new businesses that warrant inspections.

(d) Total number and a list of all industrial and commercial facilities requiring inspections, within each Permittee's jurisdiction, based on the prioritization criteria established in Provision C.4.(b)ii.(2)(a). This list shall be updated annually.

(e) List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual update. Previous fiscal years' inspection lists shall remain in the Inspection Plan.

(3) **Record Keeping** – For each facility identified in Provision C.4.b.ii.(2)(d), the Permittee shall maintain a database or equivalent tabular system of at least the following information:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity or pollutant source, including SIC code. Examples: outdoor process/manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, rooftop equipment, and outdoor drainage from indoor areas;

(c) Inspection priority and inspection frequency; and

(d) If coverage under the Industrial General Permit is required.

iii. Reporting – The Permittees shall include the list of all industrial and commercial facilities requiring inspections identified in Provision C.4.b.ii.(2)(d) in each Annual Report.

C.4.c. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures, from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions,

and the roles and responsibilities of staff responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to potential discharges (e.g., housekeeping issues, evidence of actual non-stormwater discharges, lack of BMPs, inadequate BMPs, and inappropriate BMPs), actual non-stormwater discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual non-stormwater discharges.

(3) Timely Correction of Potential and Actual Non-stormwater Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all potential and actual non-stormwater discharges. Permittees shall require active non-stormwater discharges to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual non-stormwater discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business day are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual non-stormwater discharges required in Discharge Prohibition A.1. For cases in which Permittee enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement.

C.4.d. Inspections

i. Task Description – Each Permittee shall conduct inspections according to the Inspection Plan in Provision C.4.b.ii.(2) and the ERP in Provision C.4.c.ii. to enforce its ordinance to prevent stormwater pollution.

ii. Implementation Level

(1) Inspections – Inspections shall be conducted to include at least the following activities:

(a) Observations for appropriate BMPs to prevent stormwater runoff pollution or illicit discharge;

(b) Observations for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater;

(c) Observations for noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(2) Record Keeping – Permittees shall maintain adequate records to demonstrate compliance and appropriate followup enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial and commercial site inspections:

(a) Name of facility/site inspected

(b) Inspection date

(c) Industrial General Permit coverage required (Yes or No)

(d) Compliance status

(e) Specific problems

(f) Type of enforcement (if applicable)

(g) Problem resolution date

(h) Additional comments

The electronic database or equivalent tabular system shall be made readily available to Water Board staff or its representative during inspections and audits.

(3) Data Evaluation – Permittees shall evaluate the frequency of potential and actual non-stormwater discharges by business category. Note trends and, as needed, implement focused inspections or education in subsequent years to address trends.

iii. Reporting

(1) Permittees shall include the following information in the 2015-2016 Annual Report:

(a) Number of inspections conducted, Number of violations issued (excluding verbal warnings), Percentage of sites inspected in violation, and number and percent of violations resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner;

(b) Frequency and types/categories of violations observed, Frequency and type of enforcement conducted;

(c) Summary of types of violations noted by business category; and

(d) Facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

(2) Beginning with the 2016-2017 Annual Report, Permittees shall include the following information in each Annual Report:

(a) Number of inspections conducted;

(b) Number of each type of enforcement action, as listed in each Permittee's ERP, issued;

(c) Number of enforcement actions or discreet number of potential and actual discharges fully resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner;

(d) Frequency of potential and actual non-stormwater discharges by business category; and

(e) A list of facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

C.4.e. Staff Training

i. Task Description – Permittees shall provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee-specific.

ii. Implementation Level – At a minimum, provide inspection training, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Business Inspection Plan;

(4) Enforcement Response Plan;

(5) Illicit Discharge Detection and Elimination; and

(6) Appropriate BMPs to be used at different industrial and commercial facilities.

iii. Reporting – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Percentage of industrial and commercial site inspectors attending training; and

(4) Percentage of Illicit Discharge, Detection, and Elimination inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to ensure illicit discharges are detected and controlled that are not otherwise controlled under provisions C.4. – Industrial and Commercial Site Controls and C.6. – Construction Site Controls. Permittees shall implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and followup component to detect and eliminate illicit discharges into the MS4. Permittees shall maintain a complaint tracking and followup data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. Task Description – Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.

ii. Implementation Level

(1) Permittees shall have adequate legal authority to address illicit discharges to the MS4, including, but not limited to, the following:

(a) Sewage;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces and pavement, or the equipment and other facilities of any commercial business, or any other public or private facility, including discharges from mobile cleaning businesses;

(c) Discharges of runoff from material storage areas, including those containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(f) Discharges of food-related wastes (e.g., grease, fish processing wastes, restaurant kitchen mat and trash bin wash water).

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to the MS4.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than storm water to the MS4.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to

achieve timely and effective abatement of illicit discharges and compliance from responsible parties.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of a problem through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to potential discharges (e.g., housekeeping issues, evidence of actual discharges, lack of BMPs, inadequate BMPs, and inappropriate BMPs), actual discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and/or actual discharges. Active discharges shall be required to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

C.5.c. Spill, Dumping, and Complaint Response Program

i. Task Description – Each Permittee shall implement a program to respond to spills, dumping, and complaints.

ii. Implementation Level

(1) Each Permittee shall have a central contact point for the public and Permittee's staff to report spills, dumping, and complaints. At a minimum, this central contact point shall include a phone number. Permittee shall also include, as feasible, user friendly web reporting for spills and dumping.

(2) Each Permittee shall publicize the phone number and web reporting address, if used, to internal Permittee's staff and the public. The Permittee's website shall be one of the places the central contact point is publicized. The Permittee's website shall be updated with the central contact point to report spills and dumping by June 30, 2016. This central contact point shall be readily searchable on the Permittee's website.

(3) Each Permittee shall require its municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point so that illicit discharge staff can investigate and track.

(4) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and/or phone tree for the Permittee's staff responsible for the spill and dumping response program. At a minimum, this flow chart and/or phone tree shall identify staff or positions responsible for receiving the complaints and investigating and abating the complaints.

(5) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittee's immediate capabilities.

(6) Each Permittee shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct followup inspections, as needed, to ensure that corrective measures have been effectively implemented to achieve and maintain compliance.

iii. Reporting – Permittees shall provide the following information in the 2016 and 2020 Annual Reports:

(1) The spill and dumping reporting phone number and the web address, if used;

(2) A screen shot of the Permittee's website showing the central contact point; and

(3) A discussion of how the central contact point – spill and dumping reporting phone number and, if used, the web address – is being publicized to Permittees' staff and the public.

C.5.d. Tracking and Case Followup

i. Task Description – All incidents or discharges reported to the spill, dumping, and complaints central contact point, that might discharge into the MS4, shall be logged to track followup and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems and inter/intra-agency coordination, where appropriate. It is not necessary to track and report data according to this provision if they are tracked and reported according to State Water Resource Control Board Order No. 2006-0003-DWQ.

ii. Implementation Level – Maintain a water quality spills, dumping, and complaints tracking and followup in an electronic database or equivalent tabular system.

The spill and discharge complaint tracking system shall contain the following information:

(1) Complaint information:
  (a) Date and time of complaint,
  (b) Type of pollutant, and
  (c) Problem Status (potential or actual discharge.).

(2) Investigation information:
  (a) Date and time started,
  (b) Type of pollutant,
  (c) Entered storm drain and/or receiving water,
  (d) Date and time abated, and
  (e) Type of enforcement based on the Permittee's ERP.

The electronic database or equivalent tabular system shall be made available to Water Board staff or representatives during audits or inspections.

iii. Reporting – Permittees shall provide the following information in the Annual Report:

(1) Number of discharges reported;

(2) Number of discharges reaching storm drains and/or receiving waters; and

(3) Number discharges resolved in a timely manner.

C.5.e. Control of Mobile Sources

i. Task Description – Permittees shall have oversight and control of pollutants associated with mobile businesses.

ii. Implementation Level – Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:
  (a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.
  (b) Implementation of an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.
  (c) Regularly updating mobile business inventories.
  (d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.
  (e) Inspection of mobile businesses, as needed.

(2) Permittees may cooperate county-wide and/or region-wide with the implementation of their programs for mobile businesses, including sharing

of mobile business inventories, BMP requirements, enforcement action information, and education.

iii. Reporting

(1) In the 2017 Annual Report, each Permittee shall provide the following: (a) minimum standards and BMPs for each of the various types of mobile businesses; (b) its enforcement strategy; (c) a list and summary of the specific outreach events and education conducted to the different types of mobile businesses operating within the Permittee's jurisdiction; (d) the number of inspections conducted at mobile businesses and/or job sites in 2016-2017; (e) discuss enforcement actions taken against mobile businesses in 2016-2017; (f) Permittee's inventory of mobile businesses operating within the Permittee's jurisdiction; and (g) a list and summary of the county-wide or regional activities conducted, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education (Permittees' annual reports may refer to the county-wide or regional reports for this information.).

(2) In the 2019 Annual Report, each Permittee shall include at least the following: (a) changes to minimum standards and BMPs for each of the various types of mobile businesses since the 2017 Annual Report; (b) changes to the Permittee's enforcement strategy; (c) minimum standards and BMPs developed for additional types of mobile businesses; (d) a list and summary of specific outreach events and education conducted to each type of mobile businesses operating within the Permittee's jurisdiction during the Permit term; (e) a discussion of the inspections conducted at mobile businesses and/or job sites; (f) Permittee's inventory of mobile businesses operating within the Permittee's jurisdiction; and (g) a discussion of the enforcement actions taken against mobile businesses during the permit term.

C.5.f. Municipal Separate Storm Sewer System (MS4) Map

i. Task Description – Each Permittee shall make the map(s) of its MS4 available.

ii. Implementation Level – Permittees shall make maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

iii. Reporting – In the 2016 and 2019 Annual Reports, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with followup and enforcement consistent with each Permittee's respective ERP, to prevent construction site discharges of pollutants into the storm drains. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers. Each Permittee shall in its reporting demonstrate the effectiveness of its inspections and enforcement activities to prevent polluted construction site discharges into storm drains.

C.6.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have the ability to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and implement progressively stricter enforcement to achieve expedient compliance and cleanup at all public and private construction sites.

ii. Implementation Level

(1) Permittees shall have the legal authority to require at all construction sites year-round effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non-storm water management through all phases of construction (including, but not limited to, site grading, building, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and cleanup at all construction sites year-round.

C.6.b. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance at all public and private construction sites.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of the problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, evidence of actual discharges, lack of ERP, inadequate BMPs, and inappropriate

BMPs), actual discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all potential and actual discharges. Permittees shall require actual non-stormwater discharges to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site-specific, and seasonally and phase-appropriate, effective BMPS) in the following six categories:

- Erosion Control
- Run-on and Run-off Control
- Sediment Control
- Active Treatment Systems, as necessary
- Good Site Management
- Non-Stormwater Management.

ii. Implementation Level

The BMPs targeting specific construction site pollutants within the six categories listed in C.6.c.i. shall be site-specific. Site-specific BMPs targeting specific pollutants from the six categories listed in C.6.c.i. may be a combination of BMPs from:

- CASQA, BMP Handbook, Construction, January 2009.
- Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, March 2003, and addenda.
- New BMPs available since the release of these handbooks.
- Other BMPs shown to provide equivalent protection.

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in C.6.c.i. are planned;

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction General Permit; and

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in C.6.c.i. in preventing the discharge of construction pollutants into the storm drain; and Permittees shall require timely corrections of all actual and potential discharges observed.

ii. Implementation Level

(1) **Wet Season Notification**
By September 1 of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season.

(2) **Frequency of Inspections**
Inspections shall be conducted monthly during the wet season[12] at the following sites:

(a) All construction sites disturbing one or more acre of land;

(b) All hillside projects[13] (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with ≥15% slope) disturbing greater than or equal to 5,000 square feet; and

(c) High Priority Sites – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

[12] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

[13] Effective July 1, 2016.

(iii) Project size and type;

(iv) Sensitivity or receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

(3) **Contents of Inspections**

Inspections shall focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in C.6.c.i. Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in C.6.c.i.;

(c) Visual observations for:

- actual discharges of sediment and/or construction related materials into storm drains and/or waterbodies.
- evidence of sediment and/or construction related materials discharges into storm drains and/or waterbodies.
- illicit connections, and
- potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) **Tracking**

All inspections shall be recorded on a written or electronic inspection form. Inspectors shall follow the ERP for all actual and potential discharges discovered during the inspection.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) Enforcement Response Level (Use ERP);

(e) Problem(s) observed using Illicit Discharge and the six BMP categories listed in C.6.c.i.;

(f) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(g) Comments, which shall include all Rationales for Longer Compliance Time, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) In the 2016 Annual Report, each Permittee shall certify the criteria it uses to determine hillside developments. If the Permittee is using maps of hillside developments areas or other written criteria, include a copy in the Annual Report.

(2) In the 2015-2016 Annual Report, each Permittee shall summarize the following information:

(a) Total number of active sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing one acre or more of soil;

(c) Total number of inspections conducted;

(d) Number and percentage[14] of violations in each of the six categories listed in C.6.c.i.;

(e) Number and percentage[15] of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(g) Number of sites with discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(h) Number and percentage[16] of violations fully corrected prior to the next rain event but no longer than 10 business days after the violations are discovered or otherwise considered in a timely, though longer period; and

(i) Number and percentage[17] of violations not fully corrected 30 days after the violations are discovered.

(3) Beginning with the 2016-2017 Annual Report, each Permittee shall summarize the following information:

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[14] Percentage shall be calculated as number of violations in each category divided by total number of violations in all six categories.

[15] Percentage shall be calculated as number of each type of enforcement action divided by the total number of enforcement actions.

[16] Percentage shall be calculated as follows: number of violations fully corrected prior to the goal of the next rain event but no later than 10 business days after the violations are discovered divided by the total number of violations for the reporting year.

[17] Percentage shall be calculated as follows: number of violations not fully corrected 30 days after the violations are discovered divided by the total number of violations for the reporting year.

(a) Total number of active hillside sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing 1 acre or more of soil;

(c) Total number of active sites disturbing less than one acre of soil identified as High Priority sites in C.6.e.ii.(2)(c) requiring inspections;

(d) Total number of inspections conducted;

(e) Number of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of illicit discharges, actual and those inferred through evidence, of sediment or other construction-related materials;

(g) Number of enforcement actions or discrete number of potential and actual discharges fully corrected prior to the next rain event, but no longer than 10 business days after the potential and actual discharges[18] are discovered or otherwise considered corrected in a timely, though longer period.

(4) In each Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in C.6.e.ii.(4) above. This evaluation shall include findings on the program's strength, comparison to previous years' results, as well as areas that need more focused education for site owners, operators, and developers the following year.

(5) The Executive Officer may require that the information recorded and tracked by C.6.e.ii.(4) be submitted electronically or in a tabular format. Permittees shall submit the information within 10 working days of the Executive Officer's requirement. Submittal of the information in tabular form for the reporting year is not required in each Annual Report, but it is encouraged.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to municipal staff responsible for conducting construction site stormwater inspections. Training topics shall include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and the ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information: training topics covered, dates of training, and the number of the Permittees' inspectors attending each training. If there was no training in that year, so state.

[18] Permittees who track by discrete potential and actual discharges shall report by discrete discharges. Permittees who track by enforcement actions shall report by enforcement actions.

C.7. Public Information and Outreach

Each Permittee shall increase the awareness of a broad spectrum of the community, including a diversity of socioeconomic groups and ethnic communities, regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate the problems caused; positively influence the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution. Outreach required in other provisions may be conducted under Provision C.7.

C.7.a. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as "No dumping, drains to Bay" or equivalent. For newly-approved, privately maintained streets, Permittees shall require storm drain inlet markings with an appropriate stormwater pollution prevention message by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings on the storm drain inlets shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain storm drain inlet markings of at least 80 percent of municipality-maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Storm drain inlet markings of newly developed privately-maintained streets shall be verified prior to acceptance of the project. Permittees shall require maintenance of the storm drain inlet markings through the development maintenance entity.

iii. Reporting – In the 2020 Annual Report, each Permittee shall (1) state how many municipally-maintained storm drain inlets it has, (2) certify that at least 80 percent of municipality-maintained storm drain inlet markings are legibly labeled with an appropriate stormwater pollution prevention message during the permit term; (3) include a picture of a labeled municipality-maintained inlet; and (4) certify that all privately-maintained streets had storm drain inlet markings verified prior to acceptance of the project and were required to maintain the storm drain inlet markings through the development maintenance entity.

C.7.b. Outreach Campaigns

i. Task Description – Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences.

ii. Implementation Level

(1) Target a broad audience with a minimum of one outreach campaign with specific stormwater runoff pollution prevention messages. The outreach

campaign(s) should utilize various electronic and print media, and paid and free media to best reach the different target audiences. The outreach campaign(s) may be coordinated regionally or county-wide.

(2) Permittees shall conduct a post-campaign effectiveness assessment/evaluation to identify and quantify the audiences' knowledge, trends, and attitudes and/or practices; and to measure the overall population's awareness of the messages and behavior changes achieved by the outreach campaigns. Effectiveness assessment/evaluation may be done regionally or county-wide.

iii. Reporting – In the Annual Report following the post-campaign effectiveness assessment/evaluation, each Permittee (or the Countywide Program, if the effectiveness assessment/evaluation was done county-wide or the regional program, if the effectiveness assessment/evaluation was done regionally) shall provide a report of the effectiveness assessment/evaluation completed, which, at minimum, shall include the following:

(1) A description of the outreach campaign.

(2) A summary of how the effectiveness assessment/evaluation was implemented.

(3) An analysis of the effectiveness assessment/evaluation results.

(4) A discussion of the measurable changes in awareness and behavior achieved.

(5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages.

C.7.c. Stormwater Pollution Prevention Education

i. Task Description – Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information.

ii. Implementation Level

(1) Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively and Permittees may combine this function with the spill and dumping complaint central contact point required in C.5.

(2) Each Permittee shall place and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website. In lieu of posting the detailed informational pages directly on their individual websites, Permittees may choose to provide links from their websites to the countywide program's and/or BASMAA's websites. Each Permittee shall publicize its website.

iii. Reporting – In the 2016 Annual Report, each Permittee shall list the point of contact, discuss how this point of contact and stormwater pollution website are publicized and maintained, and certify that it has a website dedicated to providing and maintaining information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives.

C.7.d. Public Outreach and Citizen Involvement Events

i. Task Description – Public outreach shall include a variety of pollution prevention message such as car washing; proper use, storage and disposal of vehicle waste fluids; household waste materials disposal; pesticide use; and trash. Public outreach events may include venues such as fairs, shows, and workshops. Citizen involvement events may include venues such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, storm drain inlet marking, riparian restoration activities, community grants.

ii. Implementation Level – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events according to its population, as shown in the table below:

Table 7.1 Public Outreach and Citizen Involvement Events[19]

Permittee Population	Number of Events
< 10,000	2
10,001– 40,000	4
40,001 – 100,000	5
100,001 – 175,000	7
175,001 – 250,000	8
> 250,000	10
Non-population-based Permittees[20]	6

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in; identity whether the event is public outreach or citizen involvement; and assess the effectiveness of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event effectiveness assessment/evaluation results, quantity/volume of materials cleaned up and comparisons to previous efforts).

C.7.e. Watershed Stewardship Collaborative Efforts

i. Task Description – Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts of community groups such as the Contra Costa Watershed Forum, the Santa Clara Basin Watershed

[19] Permittees may claim individual credits for all events in which their Countywide Program or BASMAA participates, supports, and/or hosts, which are publicized to reach the Permittee's jurisdiction.

[20] Alameda County Flood Control and Water Conservation District, Contra Costa Flood Control and Water Conservation District, Santa Clara Valley Water District, Vallejo Sanitation and Flood Control District, and Zone 7 of the Alameda County Flood Control and Water Conservation District

Management Initiative, "friends of creek" groups, and other organizations that benefit the health of the watershed, such as the Bay-Friendly Landscaping and Gardening Coalition. If no such organizations exist, encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. Coordinate with existing groups to further stewardship efforts.

ii. Implementation Level – Annually demonstrate effort.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, describe the support given, state what efforts were undertaken and the results of these efforts, and provide an evaluation of the effectiveness of these efforts.

C.7.f. School-Age Children Outreach

i. Task Description – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12).

ii. Implementation Level – Implement annually and demonstrate effectiveness of efforts through assessment.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, spectrum of children reached, and methods used, and provide an evaluation of the effectiveness of these efforts.

C.7.g. Outreach to Municipal Officials

i. Task Description – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. Implementation Level – At least once per permit cycle, or more often.

iii. Reporting – Permittees shall summarize efforts in the 2020 Annual Report.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

All Permittees shall comply with all the monitoring requirements in this Provision. Permittees may choose any of the following mechanisms, or a combination of these mechanisms, to meet the monitoring requirements:

i. **Regional Collaboration.** Permittees are encouraged to continue contributing to the Regional Monitoring Collaborative (RMC), which coordinates water quality monitoring conducted by all the Permittees. Permittees are encouraged to consider and assign additional duties to the RMC for purposes of increased efficiencies, particularly, but not limited to, reporting duties.

ii. **Area-wide Stormwater Program.** Permittees may contribute to their countywide or area-wide Stormwater Program, so that the Stormwater Program conducts monitoring on behalf of its members.

iii. **Third-party Monitoring.** Permittees may use data collected by a third-party organization, such as the Water Board or Department of Pesticide Regulation, to fulfill a monitoring requirement, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.b.

C.8.b. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPrP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

C.8.c. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[21] such as:

- Are chemical concentrations in the Estuary potentially at levels of potential concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?
- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?

[21] http://www.sfei.org/rmp/objectives (9/15/2014). While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

The Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program by contributing their fair-share financially on an annual basis.

C.8.d. Creek Status Monitoring

Creek status monitoring is intended to assess the chemical, physical, and biological impacts of urban runoff on receiving waters. In particular, the monitoring required by this provision is intended to answer the following questions:

- Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers and tributaries?
- Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

i. Biological Assessment including Nutrients and General Water Quality Parameters

(1) Field and Laboratory Method – The Permittees shall conduct biological assessments (also referred to herein as bioassessments) in accordance with SWAMP Standard Operating Procedures[22,23,24] and shall include collection and reporting of in-stream biological and physical habitat data according to the *SWAMP Standard Operating Procedures for Bioassessment,*[3] including benthic algae, benthic macroinvertebrates, water chemistry, and full characterization of physical habitat. The bioassessment sampling method shall be multihabitat reach-wide. For algae, the assessment shall include all analytes in the protocol, including diatom and soft algae taxonomy, biomass (ash-free dry weight), chlorophyll a, pebble count algae information, and reach-wide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP full physical habitat characterization method.

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[22] Ode, P.R. 2007. *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California,* State Water Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised [http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/swamp_sop_bio.pdf].

[23] Current methods are documented in (1) *SWAMP Standard Operating Procedure (SOP) and Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode*, *May 21, 2007*, and (2) *Amendment to SWAMP Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, September 17, 2008* both available at http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#methods.

[24] The Standard Operating Procedure for algae sampling and evaluation is available in the following: Fetscher, A. and K. McLaughlin, May 16, 2008. *Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP).* Technical Report 563 and current SWAMP-approved updates to Standard Operating Procedures therein. Available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf.

(2) The sampling crew shall be trained by a SWAMP-approved trainer and possess a Scientific Collection Permit from the California Department of Fish and Wildlife and participate in a SWAMP-approved inter-calibration exercise at least once in the Permit term. The Permittee may, but is not required to, modify its sampling procedures if these referenced procedures change during the Permit term. In such case, the Permittee shall notify the Water Board and follow the updated SWAMP procedures.

(3) Macroinvertebrates shall be identified and classified according to the *Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT)*[25] (except Chironomids should be identified to subfamily) using a fixed count of 600 organisms per sample. The laboratory shall follow the *SWAMP Standard Operating Procedures for Laboratory Processing and Identification of Benthic Macroinvertebrates in California*.[26] Soft-bodied algae and diatom algae shall be identified to the species level. Algae identifications must be harmonized with the SWAMP master taxa list. All quality assurance and quality control steps specified in the *SWAMP Quality Assurance Program Plan*[1] shall be performed.

(4) The Permittees shall measure general water quality parameters using a sonde and collect nutrient samples at a site when biological samples are collected. The general water quality parameters shall include temperature, dissolved oxygen, pH, and specific conductance. Nutrients samples shall be analyzed for total ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen (calculated), dissolved orthophosphate and total phosphorous, silica, and chloride.

(5) In conducting the required bioassessment monitoring, the Permittees shall take precautions to prevent the introduction or spread of aquatic invasive species.

(6) Sample Design/Locations – The Permittees shall continue to use the probabilistic sample design developed in the previous Permit term to select sample locations. Also, Permittees shall continue to use the sampling site order and the rationale to exclude potential sites as previously defined by the sample design and reconnaissance standard operating procedures. After a statistically representative data set (i.e., approximately 30 samples) has been collected to address management questions related to condition of aquatic life, Permittees may select up to 20% of sample locations on a targeted basis to evaluate temporal trends in or other impacts to aquatic life condition.

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[25] The current SAFIT STEs (November 28, 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at http://www.waterboards.ca.gov/water_issues/programs/swamp/safit.shtml. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

[26] http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/bmi_lab_sop_final.pdf.

(7) Frequency, Timeframe and Number of Sites – Sampling shall occur once per year during the appropriate index period (April 15-June 30) with consideration of antecedent rainfall. Sampling is a one-time grab sample for biological communities, nutrients, and general water quality collected on the same day. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Samples
Alameda Permittees	20 per year
Santa Clara Permittees	20 per year
Contra Costa Permittees	10 per year
San Mateo Permittees	10 per year
Fairfield-Suisun Permittees	8 per 5-year period
Vallejo Permittees	4 per 5-year period

(8) Followup – Sites scoring less than 0.795 according to the California Stream Condition Index[27] (CSCI) are appropriate for a Stressor Source Identification (SSID) project as defined in C.8.e. Such a score indicates a substantially degraded biological community relative to reference conditions. Sites where there is a substantial difference in CSCI score observed at a location relative to upstream or downstream sites are also appropriate for a SSID project. If many samples show a degraded biological condition, sites where water quality is most likely to cause and contribute to this degradation may be prioritized by the Permittee for a SSID project.

ii. Chlorine

(1) Field and Laboratory Method – Permittees shall collect a grab sample and analyze for free and total chlorine using methods specified in the BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures.

(2) Sample Design/Locations – Sample locations may be selected by the Permittees to monitor locations near known or suspected potable water line breaks; to coincide with bioassessment sites; to coincide with creek restoration sites; or to resample a location where chlorine has been found in the past.

(3) Frequency, Timeframe, and Number of Samples – Samples shall be collected in spring or summer. Vallejo and Fairfield-Suisun Permittees each shall collect their samples by the end of the second year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

[27] Documentation for the CSCI and information on calculating scores can be found at http://www.swrcb.ca.gov/plans_policies/biological_objective.shtml.

Sampling Agency	Minimum Number of Locations Sampled
Alameda Permittees	20 per year
Santa Clara Permittees	20 per year
Contra Costa Permittees	10 per year
San Mateo Permittees	10 per year
Fairfield-Suisun Permittees	8 per 5-year period
Vallejo Permittees	4 per 5-year period

(4) Followup – The Permittees shall immediately resample if the chlorine concentration is greater than 0.1 mg/L. If the resample is still greater than 0.1 mg/L, then Permittees shall report the observation to the appropriate Permittee central contact point for illicit discharges so that the illicit discharge staff can investigate and abate the associated discharge in accordance with its Provision C.5.e - Spill and Dumping Complaint Response Program.

iii. Temperature

(1) Field Method – The Permittees shall monitor temperature of their streams using a digital temperature logger or equivalent.

(2) Sample Design/Locations – The Permittees shall monitor stream reaches that are documented to support cold water fisheries and where either past data or best professional judgment indicates that temperatures may negatively affect that beneficial use.

(3) Frequency, Timeframe and Number of Sites – Loggers shall be installed so that water temperatures are recorded at 60-minute intervals from April through September at the number of sites specified below. Vallejo and Fairfield-Suisun Permittees each shall collect their samples by the end of the second year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Stream Reaches Sampled
Alameda Permittees	8 per year
Santa Clara Permittees	8 per year
Contra Costa Permittees	4 per year
San Mateo Permittees	4 per year
Fairfield-Suisun Permittees	2 per 5-year period
Vallejo Permittees	2 per 5-year period

(4) Followup – The Permittees shall identify a site for which results at one sampling station exceed the applicable temperature trigger or demonstrate a spike in temperature with no obvious natural explanation as a candidate SSID project. The temperature trigger is defined as when two or more weekly average temperatures exceed the Maximum Weekly Average Temperature of 17.0°C for a Steelhead stream, or when 20% of the results

at one sampling station exceed the instantaneous maximum of 24°C.[28] Permittees shall calculate the weekly average temperature by breaking the measurements into non-overlapping, 7-day periods.

iv. Continuous Monitoring of Dissolved Oxygen, Temperature, and pH

(1) Field and Laboratory Method – The Permittees shall monitor general water quality parameters of streams using a water quality sonde or equivalent. Parameters shall include dissolved oxygen (mg/L and % saturation), pH, specific conductance (µS), and temperature (°C).

(2) Sample Design/Locations – The Permittees shall monitor stream reaches that are documented to support cold water fisheries or where either past data or best professional judgment indicates that temperature may negatively affect the cold water beneficial use.

(3) Frequency, Timeframe, and Number of Sites – The Permittees shall install sondes so that parameters are recorded at 15-minute intervals over 1-2 weeks in the spring concurrent with bioassessment sampling and 1-2 weeks in summer at the same sites. The Permittees shall monitor at least the minimum number of sites as shown below:

Sampling Agency	Minimum Number of Sample Sites in Spring	Minimum # of Sample Sites in Summer
Alameda Permittees	3 per year	3 per year
Santa Clara Permittees	3 per year	3 per year
Contra Costa Permittees	2 per year	2 per year
San Mateo Permittees	2 per year	2 per year
Fairfield-Suisun Permittees	2 per permit term	2 per 5-year period
Vallejo Permittees	2 per permit term	2 per 5-year period

(4) Followup – When results at one sampling station exceed the applicable temperature or dissolved oxygen trigger or demonstrate a spike in temperature or drop in dissolved oxygen with no obvious natural explanation, the Permittees shall identify that sample site as a candidate SSID project. The Permittees shall calculate the weekly average temperature and dissolved oxygen by separating the measurements into non-overlapping, 7-day periods. The temperature trigger is defined as any of the following:

a. Maximum Weekly Average Temperature exceeds 17.0°C for a Steelhead stream, or 20 percent of the instantaneous results exceed 24°C[8];

[28] This maximum weekly average temperature trigger corresponds to a 10% reduction in growth as listed in Table 7.3 in Sullivan K., Martin, D.J., Cardwell, R.D., Toll, J.E., Duke, S. 2000. *An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria, Sustainable Ecosystem Institute*). The 24° C acute lethal threshold is the more protective threshold cited on page 4-1 in Sullivan et al. (2000).

b. 20 percent of instantaneous pH results are < 6.5 or > 8.5;

c. 20 percent of the instantaneous specific conductance results are > 2000µS, or there is a spike in readings with no obvious natural explanation; or

d. 20 percent of instantaneous dissolved oxygen results are < 7 mg/L in a cold water fishery stream.

v. Pathogen Indicators

(1) Field and Laboratory Method – The Permittees shall collect and analyze samples for Enteroccoci and *E. coli* in accordance with the most recent U.S. EPA protocols.[29]

(2) Sample Design/Locations – The Permittees shall collect one or more samples in a creek and at an area where water-contact recreation is likely or at an opportunistic location where there is potential to detect leaking sewerage infrastructure.

(3) Frequency, Timeframe and Number of Sites – The Permittees shall collect samples in the dry season. Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	5 per year
Santa Clara Permittees	5 per year
Contra Costa Permittees	5 per year
San Mateo Permittees	5 per year
Fairfield-Suisun Permittees	3 per 5-year period
Vallejo Permittees	3 per 5-year period

(4) Followup – If U.S. EPA's statistical threshold value[30] for 36 per 1000 primary contact recreators is exceeded, the water body reach shall be identified as a candidate SSID project.

C.8.e. Stressor/Source Identification (SSID) Projects

When any monitoring result triggers a candidate for a SSID project followup as indicated within the provisions of C.8.d and C.8.g, the Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, the Permittee(s) shall take appropriate followup action to reduce the water quality stressor or source and count this action as a completed SSID Project.

SSID projects are intended to be oriented toward taking action(s) to alleviate stressors and reduce sources of pollutants; thus the Permittees shall attempt to

[29] U.S. EPA protocols available at http://water.epa.gov/scitech/methods/cwa/methods_index.cfm. Analytical methods listed here are also acceptable: http://water.epa.gov/grants_funding/beachgrants/chapter4.cfm

[30] U.S. EPA. 2012. *Recreational Water Quality Criteria*. Office of Water 820-F-12-058. Table 4.

complete all steps for half their required SSID projects, at a minimum, during the permit term.

i. Review monitoring (C.8.d and C.8.g) results annually and maintain a list of all results exceeding thresholds described therein. Pollutant of Concern Monitoring (C.8.f) results may be included on the list as appropriate.

ii. Select followup SSID projects from the list developed in C.8.e.i. based on criteria such as magnitude of threshold exceedance; parameter (for a variety of parameters); likelihood stormwater management action(s) could address the exceedance; and similar priorities.

(1) Permittees who conduct SSID projects through a regional collaborative shall collectively initiate a minimum of eight new SSID projects (minimum of one for toxicity) during the Permit term. Because these SSID projects are being conducted through a regional collaborative, all SSID project reports shall be presented in a unified, regional-level report when submitted to the Water Board. In the case that no sample exhibits toxicity, as defined within the method required in this section, during the permit term, a SSID project for toxicity is not required.

(2) If conducted through a countywide Stormwater Program, the Santa Clara and Alameda Permittees each shall be required to initiate five (minimum of one for toxicity) SSID projects; the Contra Costa and San Mateo Permittees each shall be required to initiate three SSID (one for toxicity) projects; and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate one SSID project(s) during the Permit term. In the case that no sample exhibits toxicity, as defined within the method required in this section, within a countywide program area during the permit term, a SSID project for toxicity is not required.

iii. The Permittees shall conduct site specific SSID project(s) (or non-site specific if the problem is wide-spread) in the stepwise process described below:

(1) Step 1: The Permittees shall develop a work plan for each SSID project and submit the work plans with the Urban Creeks Monitoring Report (UCMR) such that a minimum of half the required number of SSID projects are started (at a minimum, have a workplan) by the third year of the permit term, with the goal of completing Step 2, at a minimum, for half the required SSID projects within the permit term. The work plan shall:

(a) Define the problem (e.g., magnitude and temporal and geographic extent) to the extent known;

(b) Describe the SSID project objectives, including the management context within which the results of the investigation will be used;

(c) Consider the problem within a watershed context and look at multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);

(d) List candidate causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);

(e) Establish a schedule for investigating the cause(s) of the trigger stressor/source to begin upon completion of the workplan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data.

(f) Conduct a site specific study (or non-site specific if the problem is wide-spread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE) or Toxicity Identification Evaluations (TIE)[18]. A TRE, as adapted for urban stormwater, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE. For toxicity studies where there is no chemical pollutant associated with the creek status monitoring sample exhibiting toxicity, a TIE should be conducted. Where chemical data indicate a pollutant, such as fipronil or a pyrethroid, is present at adverse effects levels in the sample location, it is not necessary to conduct a TIE, and the SSID project would be considered complete;

(g) For physical habitat, physiochemical pollutants (dissolved oxygen, pH, conductivity, temperature), nutrients, metals, and other stressors, the investigation shall generally follow Step 5 (Identify Probably Causes) of the Causal Analysis/Diagnosis Decision Information System (CADDIS); [31]

(h) For pathogen indicators, the study shall generally follow the California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (2013) or equivalent process or method;[32] and

(i) The Permittees may modify the SSID Work Plan in subsequent years of the Permit term in order to address new Creek Status (or POC) results that exceed applicable thresholds and are of a higher priority based on the criteria in C.8.e.ii.

(2) Step 2: The Permittees shall conduct SSID investigations according to the schedule in each SSID project work plan and shall report on the status of SSID investigations annually in the UCMR. Local stormwater Permittees shall be advised of the SSID project and consulted regarding

[31] http://www.epa.gov/caddis/si_step5_overview.html
[32] http://www.swrcb.ca.gov/water_issues/programs/beaches/cbi_projects/docs/sipp_manual.pdf

possible local sources and potential management actions during the work plan phase and periodically throughout the SSID project.

(3) Step 3: Follow-up actions.

(a) When a Permittee(s) determines that discharges to its stormwater collection system(s) contribute to an exceedance of a water quality standard or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, the Permittee(s) shall submit a report in the UCMR that describes BMPs that are currently being implemented, and the current level of implementation, and additional BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report shall include an implementation schedule.

(b) If a Permittee(s) determines that discharges from its (their) stormwater collection system(s) are not contributing to an exceedance of a water quality standard, the Permittee(s) may end the SSID project. The Executive Officer must concur in writing before an SSID project is determined to be completed.

In cases where SSID investigations prove inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable methods do not reveal a stressor/source), the Permittee(s) may request that the Executive Officer consider the SSID project complete.

(c) Reporting: The Permittees shall submit an SSID status report in each UCMR which summarizes the actions taken in C.8.e.i-iii above. The SSID status report shall include a running summary of all SSID projects (C.8.e.ii), including start date, brief problem definition, and schedule for each project. As projects progress, the SSID report shall describe findings and monitoring results and outline steps for the upcoming year for each ongoing project. The Permittees shall submit the SSID status report with each UCMR.

iv. As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.

C.8.f. Pollutants of Concern Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants.

In particular, monitoring required by this provision must be directed toward addressing the following five priority POC management information needs:

1. **Source Identification** - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;
2. **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);
3. **Management Action Effectiveness** - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;
4. **Loads and Status** - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and
5. **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

Not all information needs apply to all POCs (see Table 8.2 below for details).

i. **Sampling Methods** – The Permittees shall implement or cause to be implemented the monitoring components shown in Table 8.1 in order to address each of the five POC management information needs.

Table 8.1 POC Monitoring Methods

Monitoring Type	Information Need	Monitoring Methods
1	Identify Source Areas	Monitoring methods to identify watershed sources of POCs should include: • Collection and analysis of POCs on sediments in urban stormwater runoff that are transported through MS4s or receiving waters during stormwater runoff events; or • Collection and analysis of POCs on bedded sediments deposited in MS4s or receiving waters; or • Collection and analysis of POCs in stormwater runoff or bedded sediments on source area properties (e.g. private property); or, • Other monitoring methods designed to identify specific sources or uses of POCs (e.g., caulk in roadways or building materials) or watershed source areas.
2	Identify watershed areas contributing most to Bay impairment	Monitoring methods to identify watershed areas contributing most to Bay impairment should include: • Methods described for Monitoring Type #1; or • Collection of small fish tissue (or equivalent indicator) near tributary confluences with the Bay and analysis for POCs; or • Collection of bedded sediments near tributary confluences with the Bay and analysis for POCs.
3	Provide support for future or existing management actions	Monitoring methods to support future or existing management actions should include: • Methods described for Monitoring Type #1, with a focus on monitoring the effectiveness of specific management actions in reducing or avoiding POCs in MS4 discharges.
4	Provide information on POC loads, concentrations, or presence / absence	Monitoring methods to provide information on POC loads, concentrations or presence/absence should include: • Methods described for Monitoring Type #1, in combination with quantitative modeling associated with quantifying POC loads from MS4s or small tributaries to the Bay.
5	Evaluate POC trends	Monitoring methods to provide information on trends in POC loads and concentrations overtime may include: Methods described for Monitoring Type #1 or #2.

ii. **Parameters and Monitoring Frequency** – The Permittees shall conduct POC monitoring consistent with the monitoring intensity and frequency specified in Table 8.2. Monitoring frequencies are described as the total and minimum number of samples that Permittees within a countywide Stormwater Program shall collectively collect and analyze in a Water Year (October 1 – September 30). Minimum number of samples that Permittees within a countywide Stormwater Program shall collect by the end of the Permit term to address each monitoring type are also specified.

Table 8.2 POC Monitoring Parameters, Effort and Type

Pollutant of Concern	**Total Samples[a] Collected /Analyzed (yearly minimum) for each Countywide Program: Alameda, Contra Costa, Santa Clara, and San Mateo**	**Minimum Number of Samples for each Monitoring Type[b]**
Polychlorinated Biphenyls (PCBs)	80 (8)	8 samples minimum for monitoring types 1-5
Total Mercury	80 (8)	8 samples minimum for monitoring types 1-5
Copper	20 (2)	4 samples minimum for monitoring types 4-5
Emerging Contaminants[c]: Must include but not limited to: Perfluorooctane Sulfonates (PFOS, in sediment) Perfluoroalkyl sulfonates (PFAS, in sediment) Alternative flame retardants	See footnote c	See footnote c
Ancillary Parameters[d]: Total organic carbon Suspended sediments (SSC) Hardness	as necessary to address management questions for other POCs – see footnote d	
Nutrients: Ammonium, Nitrate, Nitrite, Total Kjeldahl Nitrogen, Orthophosphate, Total Phosphorus (all nutrients collected together for each sample)	20 (2) for each nutrient species	20 samples for monitoring type 4 for each nutrient species.

[a] This column indicates the total number of samples, across all applicable monitoring types (i.e., monitoring types 1-5 from Table 8.1), that must be collected during the permit term. The number in parentheses indicates the minimum number of samples that must be collected, across all applicable monitoring types, during each of the five years of the permit. For example, 80 total samples must be collected for both total PCBs and mercury by each set of Santa Clara County, San Mateo County, Alameda County, and Contra Costa County Permittees during the term of the permit. Permittees must collect a minimum of 8 PCBs samples every year of the permit term, including the final year.

[b] This column indicates the monitoring types from Table 8.1 that are applicable to this POC along with the minimum number of samples that shall be collected by each set of Permittees (i.e., Santa Clara County, San Mateo County, Alameda County, and Contra Costa County) by the end of year four of the permit. The applicable monitoring type(s) is also stated to illustrate the management information need(s) motivating the collected data. For example, each set of Permittees (i.e., the Countywide Programs for Santa Clara, San Mateo, Alameda, and Contra Costa counties) must collect and analyze at least 8 samples to address monitoring types 1-5 in Table 8.1 for both total PCBs and total mercury. Some collected samples may address multiple management questions.

[c] The Permittees shall conduct or cause to be conducted a special study that addresses relevant management information needs for emerging contaminants. The special study must account for relevant CECs in stormwater and would address at least PFOS, PFAS, and alternative flame retardants being used to replace PBDEs.

[d] Total Organic Carbon (TOC) data are not used independently. Rather, TOC can be useful for normalizing PCBs data collected in water and sediment. TOC shall be collected concurrently with PCBs data that should be normalized to TOC. Similarly, suspended sediment concentrations (SSC) samples should be collected and analyzed when water samples are collected that will be used to assess loads, loading trends, or BMP effectiveness for PCBs and Mercury. Hardness data are used in conjunction with copper concentrations collected in fresh water.

iii. **POC Parameters and Analytical Methods** – Samples collected consistent with Table 8.2 shall be analyzed for parameters listed in Table 8.3. Where no laboratory method is listed in Table 8.3, Permittees shall use U.S. EPA or SWAMP-approved methods.

Table 8.3 POC Analytes and Analytical Methods

Pollutant of Concern	Matrix	Analyte(s) or Test Species	Laboratory Analytical Methods
Polychlorinated Biphenyls (PCBs)	Water	Total PCBs	U.S. EPA 1668 (RMP 40)
		Total Organic Carbon	
		Suspended sediments (SSC)	
	Bedded Sediment	Total PCBs	As appropriate to address the management information need: U.S. EPA 1668 (RMP 40), 8082A, or 8270D modified by Method 1625
		Total organic carbon	
Mercury	Water	Total Mercury	
	Bedded Sediment	Total Mercury	
Copper	Water	Total Copper	
		Dissolved Copper	
		Hardness	
Nutrients	Water	Ammonium	
		Nitrate	
		Nitrite	
		Total Kjeldahl Nitrogen	
		Orthophosphate	
		Total Phosphorus	

C.8.g. Pesticides and Toxicity Monitoring

The Permittees shall conduct wet weather and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides-related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Executive Officer modify, reduce or eliminate this monitoring requirement, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

i. Toxicity in Water Column - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of receiving water using applicable SWAMP comparable methodology. These samples shall be analyzed for the test organisms listed, and by the methods described, on Table 8.4.

Toxicity shall be evaluated using the Test of Significant Toxicity (TST) statistical approach.[33] Each sample shall be subject to determination of "Pass" or "Fail" and shall indicate "Percent Effect" from toxicity using nondiluted samples. The TST null hypothesis shall be "mean sample response ≤ 0.75 × mean control response." A test result that rejects this null hypothesis shall be reported as "Pass." A test result that does not reject this null hypothesis shall be reported as "Fail." The relative "Percent Effect" of the sample is defined and reported as: ((Mean control response – Mean sample response) ÷ Mean control response)) × 100.

Table 8.4 Water Column Aquatic Toxicity Analytical Procedures

Test Species	Test Endpoint(s)	Units	U.S. EPA Method
Pimephales promelas (Fathead Minnow)	Larval Survival and Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013[34] EPA 833-R-10-003[35]
Ceriodaphnia dubia (Freshwater Crustacean)	Survival[a]	Pass or Fail, % Effect <25% Passes, >25% Fails	EPA-821-R-02-013 EPA 833-R-10-003
Ceriodaphnia dubia (Freshwater Crustacean)	Reproduction	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Selenastrum capricornutum (Green Algae)	Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Hyalella azteca (Freshwater Amphipod)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012[36] EPA 833-R-10-003
Chironomus dilutus (midge)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012 EPA 833-R-10-003

[33] National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003, 2010), Appendix A, Figure A-1, and Table A-1.

[34] *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136.

[35] *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003) 2010.

[36] *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). See Appendix B, page 238, for *H.azteca* and *C.dilutus* methods.

[a] The *Ceriodaphnia dubia* chronic toxicity test design for the survival endpoint is not amenable to the TST, Welch's t-test so the survival endpoint will be determined as a percent effect using the TST approach. A percent effect less than 25 percent will be considered a "pass," and a percent effect equal to or greater than 25 percent will be considered a "fail."
[b] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent.

(2) Sample Design/Locations – Sample locations may be selected by the Permittees to monitor locations where toxicity could be likely; to coincide with bioassessment sites; to coincide with creek restoration sites; or to resample a location where toxicity has been found in the past.

(3) Frequency, Timeframe and Number of Sites – The Permittees shall collect samples annually in the dry season. Vallejo and Fairfield-Suisun Permittees each shall collect their sample by the end of the second water year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	2 per year
Santa Clara Permittees	2 per year
Contra Costa Permittees	1 per year
San Mateo Permittees	1 per year
Fairfield-Suisun & Vallejo Permittees collectively	1 per 5-year period

ii. Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of creek sediment using applicable SWAMP comparable methodology. These samples shall be analyzed for the pollutants and organisms listed and by the methods described on Table 8.5. Where no laboratory method is listed in Table 8.5, Permittees shall use U.S. EPA or SWAMP-approved methods.

Table 8.5 Sediment Toxicity & Pollutants Analytical Procedures

Test Species or Pollutant	Units	Laboratory Method
Hyalella azteca and *Chironomus dilutus survival*[a]	Pass/Fail using TST, % Effect[a]	EPA-600/R-99-064[37]
Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin		EPA 3540C followed by EPA 8270D by NCI-GCMS
Carbaryl		
Fipronil		
Total PAHs		
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc		
Total organic carbon		
Grain size		

[37] *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (EPA 600/R-99-064) Second Edition. March 2000.

[a] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent. The false positive rate (beta error) is 0.05 and the negative rate (alpha error) is 0.25 for these test methods.

(2) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past, for example.

(3) Frequency, Timeframe, and Number of Sites – The Permittees shall collect samples annually during the dry season. Vallejo and Fairfield-Suisun Permittees each shall collect their sample by the end of the second year of the permit term. Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	2 per year
Santa Clara Permittees	2 per year
Contra Costa Permittees	1 per year
San Mateo Permittees	1 per year
Fairfield-Suisun & Vallejo Permittees collectively	1 per 5-year period

iii. Wet Weather Pesticides and Toxicity Monitoring

(1) Field and Laboratory Method – The Permittees shall collect water column samples and analyze them for the following parameters using the methods specified in Tables 8.4 and 8.5. For imidacloprid, Permittees shall specify an analytical method that achieves a reporting level as close to 0.05 ppb as possible, but in no case exceeds 0.1 ppb).

- Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin
- Imidacloprid
- Indoxacarb[38]
- Fipronil
- Toxicity

(2) Sample Design/Locations – The Permittees shall collect samples annually during storm events. Sample locations shall be representative of urban watersheds (i.e., bottom of watershed locations).

(3) Frequency, Timeframe, and Number of Sites – If this (C.8.g.iii) sampling is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term, with a minimum of six (6) samples collected by the end of the third water year of the permit term. If this (C.8.g.iii)

[38] Indoxacarb shall be a required analyte in the water year following notification by the Executive Officer that an analytical method with appropriate quality assurance and sensitivity is available. At the time of Permit issuance, an analytical method has not been developed.

sampling is conducted by Countywide Stormwater Programs, Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency	Minimum Number of Sample Sites
Alameda Permittees	1 per year
Santa Clara Permittees	1 per year
Contra Costa Permittees	1 per year
San Mateo Permittees	1 per year
Fairfield-Suisun & Vallejo Permittees collectively	1 per 5-year period

iv. Followup – The Permittees shall identify a site as a candidate SSID project when analytical results indicate any of the following:

(1) A toxicity test of growth, reproduction, or survival of any test organism is reported as "fail" in both the initial sampling and a second, followup sampling, and both have ≥ 50% Percent Effect;

(2) A pollutant is present at a concentration exceeding its water quality objective in the Basin Plan;

(3) For pollutants without WQOs, results exceed Probable Effects Concentrations or Threshold Effects Concentrations.[39]

C.8.h. Reporting

i. Water Quality Standard Exceedence – When data collected pursuant to C.8.a.- C.8.g. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a followup report in accordance with Provision C.1 requirements. This reporting requirement shall not apply to continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.9 through C.14 of this Order, consistent with Provision C.1.

ii. Electronic Reporting – The Permittees shall submit to the California Environmental Data Exchange Network (CEDEN) all results from monitoring conducted pursuant to Provisions C.8.d. Creek Status, C.8.e. SSID Projects (as applicable), C.8.f. Pollutants of Concern and C.8.g. Pesticides and Toxicity. Data that CEDEN cannot accept are exempt from this requirement.

(1) Data shall be submitted in SWAMP formats and with the quality controls required by CEDEN.

[39] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31. More recent TECs and PECs may be used if lower than stated in MacDonald 2000.

(2) Data collected during the previous October 1–September 30 period shall be submitted by March 31 of each year.

iii. **Urban Creeks Monitoring Report** – The Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 31 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Each Urban Creeks Monitoring Report shall contain summaries of Creek Status, SSID Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:

(1) Immediately following the Table of Contents, a completed Water Year Summary Table that lists each Program's monitoring sites, with a row for each site. The table columns contain: Site ID; creek name; land use; latitude; longitude; bioassessment, nutrient; chlorine; water column toxicity; sediment toxicity and chemistry; pathogens; temperature loggers; and general water quality (sonde data). For each site, list the site information and check the parameters sampled at that site. This will provide a summary of all Creek Status Monitoring conducted that water year.

(2) An SSID status report pursuant to Provision C.8.e.iv.

(3) For all data, a statement of the data quality.

(4) An analysis of the data, which shall include the following:

(a) Identification and analysis of any trends in stormwater or receiving water quality which shall include:

- Calculations of CSCI scores and physical habitat endpoints;
- Comparison of CSCI scores to:
  - Each other;
  - Any applicable, available reference site(s); and
  - Physical habitat endpoints.

(b) A discussion of the data for each monitoring program component, which shall:

- Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans;
- Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;
- Identify and prioritize water quality problems;
- Identify potential sources of water quality problems;
- Describe followup actions;
- Evaluate the effectiveness of existing control measures; and
- Identify management actions needed to address water quality problems.

iv. **Pollutants of Concern Monitoring Reports** – By October 15 of each year of the permit (beginning in 2016), the Permittees shall submit a report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year. The report shall include (for preceding year and projected for forthcoming year): monitoring locations, number and types of samples collected, purpose of sampling (management question addressed), and analytes measured. Any data not reportable to CEDEN should be included in the following Urban Creeks Monitoring Report due annually on March 31.

v. **Integrated Monitoring Report** – No later than March 31 of the fifth year of the Permit term, Permittees shall submit an Integrated Monitoring Report in lieu of the annual Urban Creeks Monitoring Report. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit. The Integrated Monitoring Report shall report on all the data collected since the previous Integrated Monitoring Report and shall contain the following:

(1) The Water Year Summary Table, as described in Provision C.8.h.iii, containing information pertaining to the fourth year monitoring data;

(2) A comprehensive analysis of all data collected pursuant to Provision C.8. since the previous Integrated Monitoring Report, and may include other pertinent studies;

(3) For POCs, the report shall include methods, data, calculations, load estimates, and source estimates for each POC parameter, as applicable; and

(4) The Integrated Monitoring Report shall include a budget summary for each monitoring requirement and recommendations for future monitoring.

vi. **Standard Report Content** – All monitoring reports shall include the following:

(1) The purpose of the monitoring and briefly describe the study design rationale;

(2) Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data;

(3) Brief descriptions of sampling protocols and analytical methods;

(4) Sample location description, including water body name and segment and latitude and longitude coordinates;

(5) Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue);

(6) Concentrations detected, measurement units, and detection limits;

(7) Assessment, analysis, and interpretation of the data for each monitoring program component;

(8) A listing of volunteer and other non-Permittee entities whose data are included in the report; and

(9) Assessment of compliance with applicable water quality standards.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system.

This provision implements requirements of the TMDL for Diazinon and Pesticide-Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur, because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Urban-use pesticides of concern to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin); and carbamates (e.g., carbaryl and aldicarb).

C.9.a. Maintain and Implement an Integrated Pest Management (IPM) Policy or Ordinance and Standard Operating Procedures

All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of IPM[40] and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance.

[40] IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. IPM techniques could include biological controls (e.g., ladybugs and other natural enemies or predators); physical or mechanical controls (e.g., hand labor or mowing, caulking entry points to buildings); cultural controls (e.g., mulching, alternative plant type selection, and enhanced cleaning and containment of food sources in buildings); and reduced risk chemical controls (e.g., soaps or oils).

i. Task Description – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides do not cause or contribute to pesticide-caused toxicity in receiving waters.

ii. Implementation - Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property.

iii. Reporting

(1) In their Annual Reports, the Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of pesticides of concern to water quality as listed in the introduction section of this Provision. Trends and quantities of pesticide active ingredient usage shall be reported beginning with the September 2017 Annual Report.

(2) In their Annual Reports, the Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and examples of integration of several strategies into a cohesive whole, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term.

(3) IPM policies or ordinances and IPM standard operating procedures shall be submitted to the Water Board upon request.

C.9.b. Train Municipal Employees

i. Task Description– The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy or ordinance and standard operating procedures. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided.

ii. Reporting

(1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in their IPM policy or ordinance and IPM standard operating procedures

within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc.

(2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.

C.9.c. Require Contractors to Implement IPM

i. Task Description – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall observe contractor pesticide applications to verify that contractors implement their contract specifications in accordance with the Permittee's IPM policies or ordinance and standard operating procedures. Permittees shall note that contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee an individual employee will always use IPM strategies. Thus, periodic Permittee observation of contractor performance is necessary.

ii. Implementation – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used.

iii. Reporting – In their Annual Reports, the Permittees shall state how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.

C.9.d. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (http://www.cdpr.ca.gov/docs/legbills/rulepkgs/11-004/text_final.pdf).

ii. Reporting – In their Annual Reports, the Permittees shall briefly describe the communications they have had with county agricultural commissioners and report followup actions to correct violations of pesticide regulations.

C.9.e. Public Outreach

i. Task Description – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce their reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.

ii. Implementation – The Permittees shall conduct each of the following:

(1) **Point of Purchase Outreach**: The Permittees shall:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally-equivalent pesticide use reduction outreach program.

(2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

(3) **Outreach to Pest Control Professionals:** The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by Ecowise Certified or a functionally-equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BASMAA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators.

iii. Reporting – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f.).

C.9.f. Track and Participate in Relevant Regulatory Processes

i. Task Description – The Permittees shall conduct the following activities, which may be done at a county, regional, or state wide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. Reporting – In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or state wide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

C.9.g. Evaluate Implementation of Pesticide Source Control Actions

i. Task Description – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.

ii. Implementation – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule.

iii. Reporting – In their 2019 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-e and g; a discussion of any improvements

made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges, Discharge Prohibition A.2, and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of this provision. Flood management agencies are not subject to these trash reduction requirements except for continued implementation of requirements for trash full capture systems and Trash Hot Spot cleanups, as specified in subsections C.10.b.i and C.10.c.

C.10.a. Trash Reduction Requirements

Permittees shall implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by July 1, 2022.

i. Schedule – Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule:

a. 70 percent by July 1, 2017; and
b. 80 percent by July 1, 2019.

In addition, Permittees should achieve 60 percent reduction by July 1, 2016. This is not a mandatory deadline; rather, it shall be used as a performance guideline to meet the mandatory July 1, 2017 deadline. Permittees that do not attain the 60 percent performance guideline shall submit documentation of a plan and schedule of implementation of additional trash load reduction control actions that will attain the July 1, 2017 deadline.

ii. Trash Generation Area Management – Permittees shall demonstrate attainment of the C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long Term Trash Reduction Plans, submitted in February 2014, in accordance with the requirements and accounting set forth in this provision. The February 2014 maps provide the 2009 trash levels and delineate trash generation areas within Permittees' jurisdictions into the following trash generation rate categories

Low = less than 5 gal/acre/yr;
Moderate = 5-10 gal/acre/yr;
High = 10-50 gal/acre/yr; and
Very High = greater than 50 gal/acre/yr.

Permittees also designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, within which they will implement trash control actions. Permittees shall have an opportunity to correct and/or revise, based on improved information, the 2009 trash levels and trash generation areas in their February 2014 maps by submitting the correction and/or revision no later than the 2016 Annual Report deadline.

a. Permittees shall implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better. Actions equivalent to full trash capture means actions that send no more trash down the storm drain system than a full trash capture device would allow, which is essentially no trash discharge except in very large storm flows. The C.10.a.i percent reductions shall be demonstrated by percent of 2009 Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation by the C.10.a.i mandatory deadlines.

b. Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of the latter shall be assessed with visual assessments in accordance with C.10.b.ii. If there is a full trash capture device downstream of these lands, no other trash control is required. Permittees shall map the location, or otherwise record the location, of all such lands greater than 10,000 ft^2 that are plumbed directly to their storm drain systems by July 1, 2018, including the trash control status of these areas. This information shall be retained by the Permittees for inspection upon request.

iii. Mandatory Minimum Full Trash Capture Systems - Permittees shall install and maintain a mandatory minimum number of full trash capture devices, to treat runoff from an area equivalent to 30 percent of retail/wholesale land area, as documented by the Association of Bay Area Governments, which drains to the storm drain system within their jurisdictions. A city Permittee with a population less than 12,000 and retail/wholesale land less than 40 acres, or a population less than 2,000, is exempt from this full trash capture requirement. Table 2 in Attachment E contains the minimum amount of drainage areas that must be treated with full trash capture devices by each city or county Permittee, and the minimum number of trash capture devices required to be installed and maintained by flood management agency Permittees.

A full capture system is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the sub-drainage area or designed to carry at least the same flow as the storm drain connected to the inlet. The device(s) must also have a trash reservoir large enough to contain a reasonable amount of trash safely without overflowing trash into the overflow outlet between maintenance events. Types of systems certified by the State Water Resources Control Board are deemed full capture systems. A stormwater treatment facility implemented in accordance with Provision C.3 is also deemed a full capture system if the facility, including its maintenance prevents the discharge of trash to the downstream MS4 and receiving waters

and discharge points from the facility, including overflows, are appropriately screened or otherwise configured to meet the full trash capture screening specification for storm flows up to the full trash capture one year, one hour storm hydraulic specification (C.10.a.iii.).

C.10.b. Demonstration of Trash Reduction Outcomes

i. Full Trash Capture Systems – Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system.

a. **Maintenance** – The maintenance of each full capture device shall be adequate to prevent plugging, including plugging of the 5 mm screen leading to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. All full trash capture devices shall be inspected and maintained at least once per year. All such devices in high or very high trash generation areas shall be inspected at least two times per year, with the inspections spaced at least three months or more apart. If this frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year.

If any such device is found to have a plugged or blinded screen or is greater than 50 percent full of trash during a maintenance event, the maintenance frequency shall be increased so that the device is neither plugged nor more than half full of trash at the next maintenance event.

b. **Maintenance Records** – Permittees shall retain device specific maintenance records, including, at a minimum: the date(s) of maintenance, the capacity condition of the device at the time of maintenance (full and overflowing or with storage capacity remaining), any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, damage reducing function, or other negative conditions. A summary of this information shall be reported in each Annual Report which may be limited to the number of full capture devices maintained that exhibited a plugged, full or overflowing condition upon maintenance.

c. **Certification** – Permittees shall certify annually that each of their full trash capture systems is operated and maintained to meet full trash capture system requirements. Drainage areas served by an adequately maintained full trash capture system will be considered equivalent to or better than a Low trash generation area.

ii. Other Trash Management Actions – Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.

a. **Implementation Documentation** – Permittees shall maintain documentation of trash control actions that describes each action or combination of actions, the level of implementation, the timing and frequency of implementation, standard operating procedures if applicable, location(s) of implementation actions including mapped location(s) and drainage area(s) affected or description of areal extent, tracking and enforcement procedures if applicable, and other information relevant to effective implementation of the action or combination of actions.

b. **Visual Assessment of Outcomes of Other Trash Management Actions** – Permittees shall conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see C.10.b.ii.b.(iv.)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions. Permittees may assess and account for one or more trash generation areas in a single trash management area within which a control action or combination of control actions is implemented. The visual on-land assessment method used shall meet or exceed the following criteria:

(i) Conduct observations within a trash management area of the sidewalk, curb and gutter, or locations associated with trash generation sources.

(ii) Conduct observations at randomly selected locations covering at least ten percent of a trash management area's street miles; or conduct observations at strategic locations with justification they are representative of trash generation in the management area and they will represent the effectiveness of the control action(s) implemented or planned in the management area.

(iii) Conduct observations at a frequency consistent with known or estimated trash generation rate(s) within a trash management area and the time frequency of implementation of the control action(s) implemented or planned in the management area. Conduct observations for effectiveness approximately at the halfway point of the interval between instances of recurring trash control actions such as street sweeping and on-land cleanup.

(iv) Permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Such a proposal shall be made to the Executive Officer as a submittal separate from any other submittals or reports. If this evidence is accepted by the Executive Officer, the Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within certain trash management areas to the same performance standard accepted by the Executive Officer.

iii. Percentage Discharge Reduction – Percentage discharge reduction from 2009 from Very High generation areas reduced to High, Moderate, and Low, High

generation areas reduced to Moderate and Low, and Moderate trash generation areas reduced to Low trash generation category to meet the required total percent reduction ($\%_{Reduction}$) shall be calculated based on the following formula:

$$\% \text{ Reduction} = 100\ [(12A_{VH(2009)} + 4A_{H(2009)} + A_{M(2009)}) - (12A_{VH} + 4A_H + A_M)] / (12A_{VH2009} + 4A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$	=	total amount of the 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of the 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of the 2009 moderate trash generation category jurisdictional area
A_{VH}	=	total amount of very high trash generation category jurisdictional area in the reporting year
A_H	=	total amount of high trash generation category jurisdictional area in the reporting year
A_M	=	total amount of moderate trash generation category jurisdictional area in the reporting year
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
100	=	fraction to percentage conversion factor

iv. Source Control – Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items, may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions. To claim a load percentage reduction value, Permittees must provide substantive and credible evidence that these actions reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides evidence that the implementation of source control in its jurisdiction is similarly implemented as the source control assessed in the reference studies.

v. Receiving Water Monitoring – Permittees shall conduct receiving water monitoring and develop receiving water monitoring tools and protocols and a monitoring program designed, to the extent possible, to answer the following questions:

- Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
- Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
- Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
- Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?

The monitoring tools and protocols shall include direct measurements and/or observations of trash in receiving water(s), or in scenarios where direct measurements or observations are not feasible, surrogates for trash in receiving waters, such as measurement or observations of trash on stream banks or shorelines.

a. **Development and Testing Plan** – Permittees shall submit a plan acceptable to the Executive Officer by July 1, 2017, to develop and test a proposed receiving water monitoring program that includes the following:
   (i) Description of the tools and protocols;
   (ii) Description of discharge and receiving water scenarios, which will be considered, that accounts for the various receiving waters and watershed, community, and drainage characteristics within Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s);
   (iii) Description of factors, in addition to those in C.10.b.v.a.(ii), that will be considered and evaluated to determine scenarios and spatial and temporal representativeness;
   (iv) Identification of sites, representative of all the Permittees and discharge and receiving water scenarios, that will be monitored during this permit term;
   (v) Development of a system to manage and access monitoring results;
   (vi) Opportunity for input and participation by interested parties;
   (vii) Scientific peer review of the tools and protocols and testing results; and
   (viii) Schedule for development and testing; with monitoring at representative sites starting no later than October 2017.

   If the Permittees conduct this work through an independent third party, approved by the Executive Officer, the Plan may be submitted by July 2018, with monitoring to begin no later than October 2018.

b. **Report and Proposed Monitoring Program** – Permittees shall report progress in the 2018 Annual Report, and submit a preliminary report by July 1, 2019 and a final report by July 1, 2020 on the proposed trash receiving water monitoring program. The progress report is not required if the Permittees conduct this work through an independent third party, approved by the Executive Officer, that provides input and participation by interested parties and scientific peer review of the tools and protocols and testing results and proposed receiving monitoring program.

C.10.c. Trash Hot Spot Selection and Cleanup

Trash Hot Spots in receiving waters shall be cleaned annually to achieve the multiple benefits of abatement of impacts and to learn more about the sources and transport routes of trash loading.

i. Trash Hot Spot Cleanup and Definition – The Permittees shall clean selected Trash Hot Spots to a level of "no visual impact" at least one time per year for the

term of the permit. Trash Hot Spots shall be sections of creek or shoreline significantly impacted by trash of at least 100 yards of creek length or 200 yards of shoreline length.

ii. **Trash Hot Spot Selection** – Permittees shall maintain the same number of trash hot spots identified in the previous permit term, which are included in Attachment E. Permittees may select new trash hot spot locations if past locations are no longer trash hotspots or if other locations may better align with trash management areas.

iii. **Trash Hot Spot Assessments** – The Permittees shall quantify the volume of material removed from each Trash Hot Spot cleanup and attempt to identify sources to the extent readily feasible. Documentation of the cleanup activity to be retained by the Permittee shall include the trash condition before and after cleanup of the entire hot spot using photo documentation with a minimum of one photo per 100 feet of hot spot length and the total volume of trash and litter removed from the hot spot. Permittees shall report the volume removed for the most recent five years of hot spot cleanup in each Annual Report, or if a new trash hot spot location is selected, Permittees shall report the volume removed for the years of cleanup of that hotspot.

C.10.d. Trash Load Reduction Plans

Each Permittee shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report. The Plan shall describe trash load reduction control actions being implemented or planned and the trash generation areas or trash management areas where the actions are or will be implemented, including jurisdiction-wide actions, such as source control ordinances

The Plans may include actions to control sources outside of the Permittee's jurisdiction that are causing or contributing to adverse trash impacts in the receiving water(s). Permittees who choose to implement such control actions may account for them towards meeting the C.10.a Trash Load Reduction requirements as long as they can demonstrate the controls will be sustained and they quantify the sustained load reduction benefit relative to control actions in the trash generation areas or trash management areas in their jurisdiction that drained to the affected receiving water.

C.10.e. Optional Trash Load Reduction Offset Opportunities

i. **Additional Creek and Shoreline Cleanup** – A Permittee may offset part of its provision C.10.a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot cleanups required by C.10.c if the additional cleanup efforts are conducted at a frequency of at least twice per year and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent.

A Permittee may claim a load reduction offset of one percent for each total of trash volume removed from additional cleanups that is three and a third percent

for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, and ten percent for the 2019 mandatory trash load reduction deadline, of the Permittee's 2009 trash load volume estimates, based on its trash generation maps and average categorical trash generation rates (see C.10.a.ii), in accordance with the following formula:

$$1\% \text{ Reduction Offset (Volume)} = (12\ A_{VH(2009)} + 4\ A_{H(2009)} + A_{M(2009)})\ OF$$

where:

$A_{VH(2009)}$	=	total amount of 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of 2009 moderate trash generation category jurisdictional area
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
OF	=	offset factor equal to (7.5 x 0.033) for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.033 is the three to one offset ratio, or (7.5 x 0.1) for the 2019 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

ii. Direct Trash Discharge Controls – A Permittee may offset an additional part of its provision C.10.a trash load percent reduction requirement by implementing a comprehensive plan approved by the Executive Officer for control of direct discharges of trash to receiving waters from non-storm drain system sources. The maximum offset that may be claimed is fifteen percent using the C.10.e.i formula. The plan shall be submitted not later than February 1 of the first year in which the offset will be reported in the following Annual Report and shall include the following:

a. description of sources of the directly discharged trash;
b. description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads in a systematic and comprehensive manner;
c. map of the affected receiving water area and associated watershed; and
d. description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.

C.10.f. Reporting

Each Permittee shall provide the following in each Annual Report:

i. A summary of trash control actions within each trash management area, including the types of actions, levels of implementation, areal extent of implementation, and whether the actions are ongoing or new, including initiation date.

ii. Upon request by the Executive Officer, an updated trash generation area map or maps, which include trash management areas, including the locations and associated drainage areas and of full trash capture systems and other trash control actions, and the location of Trash Hot Spots, with highlight or other indication of any revisions or changes from the previous year map(s). These maps can be used to illustrate progress toward achieving the trash reduction requirements in C.10.a.i.

iii. Should a Permittee correct and/or revise its 2009 trash generation map submitted in February 2014, the corrected or revised 2009 trash generation map shall be submitted in the 2016 Annual Report, if the Permittee has not already submitted the corrected or revised map. Certification that each of its full trash capture systems is operated and maintained to meet full trash capture system requirements; a description of any systems that did not meet full trash capture system requirements (e.g., due to plugging or overflowing); and any corrective actions taken.

iv. An accounting of its non-full trash capture system trash control actions assessments by providing a summary description of assessments in each of its trash management areas, including the number and dates of observations.

v. An accounting of progress toward or attainment of C.10.a.i trash discharge reduction performance guidelines and mandatory deadlines using the C.10.a.ii trash generation area mapping methodology and formula.

a. If a Permittee cannot demonstrate attainment of the 2016 performance guideline, it shall submit a detailed plan and schedule of implementation of additional trash load reduction control actions that will attain the 2017 mandatory deadline.

b. If a Permittee cannot demonstrate attainment of the 2017 or 2019 mandatory trash load reduction deadline, it shall submit a report of non-compliance with the associated Annual Report, or in advance of the Annual Report, that describes actions to comply with the mandatory reduction deadline in a timely manner. The report shall include a plan and schedule for implementation of full trash capture systems sufficient to attain the required reduction. A Permittee may submit a plan and schedule for implementation of other trash management actions to attain the required reduction in an area where implementation of a full trash capture system is not feasible. In such cases, the report shall include identification of the area and documentation of the basis of the Permittee's determination that implementation of a full trash capture system is not feasible.

vi. In the 2018 Annual Report, progress on development and testing of the receiving water monitoring program.

vii. The volume removed for the most recent five years of hot spot cleanup for each of its trash hot spots, or for the years of cleanup if a new trash hot spot location has been selected.

viii. For Permittees claiming a C.10.e.i offset, based on additional cleanup of creek and shoreline areas, a summary description of the additional cleanup actions.

ix. For Permittees claiming a C.10.e.ii offset, based on non-storm drain system trash controls, a summary description of control actions receiving water assessment results, quantification of trash volume controlled, and assessment of resulting improvements in receiving water condition, the claimed offset and documentation of information used in the C.10.e.i formula.

C.11. Mercury Controls

The Permittees shall implement the following control program for mercury. The Permittees shall perform the control measures (source control, treatment control, and pollution prevention strategies) and report on those control measures according to the provisions below. The provisions implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury load allocations established for the TMDLs. The aggregate, regionwide, urban runoff wasteload allocation from the San Francisco Bay mercury TMDL is 82 kg/yr. The TMDL implementation plan calls for attainment of the allocation by February 2028 and, as a way to measure progress, attainment of an interim loading milestone by February 2018 of 120 kg/yr, halfway between the 2003 estimated load, 160 kg/yr, and the aggregate allocation. The Permittees may comply with any requirement of this provision through a collaborative effort.

C.11.a. Implement Control Measures to Achieve Mercury Load Reductions

i. Task Description – Permittees shall implement mercury source and treatment control measures and pollution prevention strategies to reduce mercury loads throughout the area covered by this Permit (permit-area).

ii. Implementation level – To comply with this provision element, Permittees shall:

(1) Identify the watersheds or portions of watersheds (management areas) in which mercury control measures are currently being implemented and those in which new control measures will be implemented during the term of this Permit (many or most may be the same watersheds as those identified for C.12.a.ii(1));

(2) Identify the control measures that are currently being implemented and those that will be implemented in each watershed and management area (may be the same as those identified for C.12.a.ii(2));

(3) Submit a schedule of control measure implementation; and

(4) Implement mercury source and treatment control measures and pollution prevention strategies and quantify mercury load reductions achieved by using the accounting methods established according to provision C.11.b.

iii. Reporting

(1) The Permittees shall report by April 1, 2016, progress toward developing a list of the watersheds and management areas where mercury control measures are currently being implemented and those in which control measures will be implemented (C.11.a.ii(1)) during the term of this Permit as well as the monitoring data and other information used to select these watersheds and management areas.

(2) The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit (C.11.a.ii(1)) along with the specific control measures (C.11.a.ii(2)) that are currently being implemented and those that will be implemented in these watersheds and management areas and an implementation schedule (C.11.a.ii(3)) for these control measures. In addition to the list of watersheds and management areas, this report shall include:

a. The number, type, and locations and/or frequency (if applicable) of control measures;

b. The description, scope, and start date of pollution prevention measures;

c. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural BMPs or other relevant implementation milestones for structural and non-structural BMPs) and a schedule for milestone achievement; and

d. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.11.a.ii(2).

(3) Beginning with the 2017 Annual Report and continuing in all Annual Reports, Permittees shall update all the information required under C.11.a.iii(2) as necessary to account for new control measures implemented, but not described, in the 2016 Annual Report.

C.11.b. Assess Mercury Load Reductions from Stormwater

i. Task Description – The Permittees shall develop and implement an assessment methodology and data collection program to quantify in a technically sound manner mercury loads reduced through implementation of pollution prevention, source control, and treatment control measures, including mercury source control, stormwater treatment, green infrastructure, and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations.

A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by the Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each control measure implemented.

ii. Implementation Level – The Permittees shall adequately quantify the mercury load reductions achieved through implementing pollution prevention, source control, and treatment control efforts.

iii. Reporting

(1) In their 2016 Annual Report the Permittees shall submit, for Executive Officer approval, the assessment methodology and data collection program required in C.11.b.i.

(2) Beginning with the 2017 Annual Report, Permittees shall report annually the loads reduced using the default (from Fact Sheet) or alternative approved assessment methodology to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates, including appropriate reference to the control measures described in the reporting required under C.11.a.

(3) In their 2018 and subsequent Annual Reports, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions in the subsequent permit.

C.11.c. Plan and Implement Green Infrastructure to reduce mercury loads

i. Task Description – Permittees shall implement green infrastructure projects during the term of the Permit to achieve the mercury load reductions performance criteria in Table 11.1. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, Permittees shall prepare a reasonable assurance analysis (see below and Fact Sheet) to demonstrate quantitatively that mercury load reductions of at least 10 kg/yr will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.

ii. Implementation Level

(1) The Permittees shall implement sufficient green infrastructure projects so that mercury loads are collectively reduced by 48 g/yr by June 30, 2020, which shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. Permittees shall demonstrate achievement of these load reductions by using the accounting methods approved under provision C.11.b.iii(1). Load reductions from green infrastructure projects implemented prior to the effective date of this Permit may be counted toward the required green infrastructure reductions of this Permit term if these projects were established and implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term.

The Permittees may meet the load reduction as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 11.1. If neither the permit-area-wide total load reduction nor the county-specific load reduction is achieved, Permittees shall achieve load reductions consistent with their share of the county total. The individual Permittee share of the county load reduction is the proportion of county population in each municipality.

If all the Permittees in a county wish to use an alternative method of distributing the county load reductions, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2017 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

Table 11.1 Mercury Load Reduction Performance Criteria via Green Infrastructure Implementation by County

County Permittees	**Mercury Load Reduction (g/yr) by June 30, 2020, through green infrastructure**
Alameda Permittees	15
Contra Costa Permittees	9
San Mateo Permittees	6
Santa Clara Permittees	16
Solano Permittees: Suisun City, Vallejo, Fairfield	2
Totals	**48**

(2) Permittees shall prepare a reasonable assurance analysis of future mercury load reductions by doing the following:

a. Quantify the relationship between areal extent of green infrastructure implementation and mercury load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies.

b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040.

c. Estimate the amount of mercury load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.

d. Quantitatively demonstrate that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects.

e. Ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill C.11.c.ii(2)(a-d) have been validated through a peer review process.

iii. Reporting

(1) The Permittees shall submit in their 2018 Annual Report, as part of reporting for C.11.b.iii(2), the quantitative relationship between green infrastructure implementation and mercury load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship.

(2) The Permittees shall submit in their 2020 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

(3) The Permittees shall submit in their 2020 Annual Report a reasonable assurance analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis.

(4) The Permittees shall submit as part of reporting for C.11.b.iii(2), beginning with their 2019 Annual Report, an estimate of the amount of mercury load reductions resulting from green infrastructure implementation during the term of the Permit. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

(5) All Permittees in a county may submit, in the 2017 Annual Report, an alternative (different from the population-based default described in C.11.c.ii(1)) and supporting information to derive Permittee-specific proportions of load reduction criteria.

C.11.d. Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

i. Task Description – Permittees shall prepare a plan and schedule for mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028. This plan may share many elements of a similar plan developed for PCBs according to Provision C.12.d.

ii. Implementation level – Permittees shall prepare a mercury control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028. The plan must:

(1) Identify all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented;

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

iii. Reporting

Permittees shall submit the plan and schedule in the 2020 Annual Report.

C.11.e. Implement a Risk Reduction Program

i. Task Description – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

ii. Implementation Level

(1) At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement.

(2) In year four of the permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. Reporting – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2020 Annual Report.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control program for PCBs. The Permittees shall implement PCBs control measures (source control, treatment control, and pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to the provisions below. The provisions implement the urban runoff requirements of the PCBs TMDL. Permittees shall reduce PCBs loads by a specified amount during the term of the Permit, thereby making substantial progress toward achieving the urban runoff PCBs wasteload allocation in the Basin Plan. The allocation, on an aggregate and regionwide basis, is 2 kg/yr (1.6 kg/yr allocated to Permittees) to be achieved by March 2030. This wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 18 kg/yr (14.4 kg/yr from Permittees) compared to loads estimated using data collected in 2003. The Permittees may comply with any requirement of this Provision through a collaborative effort.

C.12.a. Implement Control Measures to Achieve PCBs Load Reductions.

i. Task Description – Permittees shall implement PCBs source and treatment control measures and pollution prevention strategies to achieve PCBs load reductions in Table 12.1 throughout the area covered by this Permit (permit-area).

ii. Implementation level –To comply with this provision element, Permittees shall:

(1) Identify the watersheds or portions of watersheds (management areas) in which PCBs control measures are currently being implemented and those in which new control measures will be implemented during the term of this permit;

(2) Identify the control measures that are currently being implemented and those that will be implemented in each watershed and management area;

(3) Submit a schedule of control measure implementation; and

(4) Implement sufficient control measures to achieve the permit-area-wide reduction stated below or the county-specific load reduction performance criteria shown in Table 12.1. The Permittees shall demonstrate achievement of these load reductions as required in provision C.12.b. Load reductions from control measures implemented prior to the effective date of this Permit may be counted toward the required reductions of this Permit term if these control measures were established or implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term (e.g., they were implemented after the 2014 Integrated Monitoring Report was submitted).

For all Permittees combined, these county-specific average annual PCBs load reduction performance criteria shall total 0.5 kg/yr by June 30, 2018, and 3.0 kg/yr by June 30, 2020. The June 30, 2020, deadline shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. The Fact Sheet describes the amount of PCBs load reduction benefit associated with implementing a number of control measures.

The Permittees may meet the load reductions as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 12.1. If neither the permit-area-wide total load reduction criteria nor the county-specific load reduction criterion is achieved, Permittees shall achieve load reductions consistent with their share of the county total. The individual Permittee share of the county load reduction performance criteria is the proportion of county population in each municipality.

If all the Permittees in a county wish to use an alternative method of distributing the county load reductions, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2017 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

Table 12.1 PCBs Load Reductions Performance Criteria by County

County	**PCBs load reduction (g/yr) by June 30, 2018**	**PCBs Load Reduction (g/yr) by June 30, 2020**
Alameda Permittees	160	940
Contra Costa Permittees	90	560
San Mateo Permittees	60	370
Santa Clara Permittees	160	940
Solano Permittees: Suisun City, Vallejo, Fairfield	30	190
Totals	**500**	**3000**

iii. Reporting

(1) The Permittees shall report by April 1, 2016, progress toward developing a list of the watersheds and management areas where PCBs control measures are currently being implemented and those in which control measures will be implemented (C.12.a.ii(1)) during the term of this Permit as well as the monitoring data and other information used to select these watersheds and management areas. This list should include watersheds containing contaminated sites referred to the Water Board as well.

(2) The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit (C.12.a.ii(1)) along with the specific control measures (C.12.a.ii(2)) that are currently being implemented and those that will be implemented in these watersheds and management areas

and an implementation schedule (C.12.a.ii(3)) for these control measures. In addition to the list of watersheds and management areas, this report shall include:

a. The number, type, and locations and/or frequency (if applicable) of control measures;
b. A cumulative listing of all potentially PCB-contaminated sites Permittees have discovered and referred to the Water Board to date, with a brief summary description of each site and where to obtain further information;
c. The description, scope, and start date, of PCBs control measures;
d. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement; and
e. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.12.a.ii(2).

(3) Beginning with the 2017 Annual Report and continuing in all Annual Reports, Permittees shall update all the information required under C.12.a.iii(2) as necessary to account for new control measures implemented but not described in the 2016 Annual Report.

(4) All Permittees in a county may submit, in the 2017 Annual Report, an alternative (different from the default described in C.12.a.ii(4)) and supporting information to derive Permittee-specific proportions of load reduction criteria.

C.12.b. Assess PCBs Load Reductions from Stormwater

i. Task Description – The Permittees shall develop, document, and implement an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, including PCBs source control, stormwater treatment, green infrastructure and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations.

A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each unit of activity.

ii. Implementation Level – The Permittees shall adequately quantify the PCBs load reductions achieved through all the pollution prevention, source control, and

treatment control measures Permittees will implement in this Permit term, except for measures to manage PCB-containing materials and wastes during building demolitions (C.12.f).

For this Permit term, the Permittees will receive a total of 2000 g/yr (2 kg/yr) PCBs load reduction value if they have developed and implemented effective protocols for managing PCB-containing materials during demolition so that PCBs do not drain into the MS4 as required in provision C.12.f. The 2000 g/yr PCBs load reduction value shall be in furtherance of meeting the June 30, 2020, 3000 g/yr requirement in Table 12.1.

The Permittee-specific portion of the 2000 g/yr PCBs load reduction value shall be based on the proportion of county population in each municipality. If all the Permittees in a county wish to use an alternative method of distributing the county load reductions for managing PCB-containing materials during demolition, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2019 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

iii. Reporting

(1) In their 2016 Annual Report the Permittees shall submit for approval by the Executive Officer the assessment methodology and data collection program required in C.12.b.i. and described in C.12.b.ii.

(2) Beginning with the 2017 Annual Report, Permittees shall report annually the loads reduced using the default (from the Fact Sheet) or alternative approved assessment methodology to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates, including appropriate reference to the control measures described in the reporting required under C.12.a.

(3) In their 2018 and subsequent Annual Reports, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions in the subsequent Permit.

(4) All Permittees in a county may submit, in the 2019 Annual Report, an alternative (different from the default population-based method) and supporting information to derive Permittee-specific shares of load reduction value associated with implementation of C.12.f.

C.12.c. Plan and Implement Green Infrastructure to reduce PCBs loads

i. Task Description – Permittees shall implement green infrastructure projects during the term of the Permit to achieve PCBs load reduction performance criteria in Table

12.2 in furtherance of meeting the 3000 g/year load reduction criteria required in C.12.a.ii.(4) and Table 12.1. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, Permittees shall prepare a reasonable assurance analysis (see below and the Fact Sheet) to demonstrate quantitatively that PCBs load reductions of at least 3 kg/yr will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.

Table 12.2 PCBs Load Reduction Performance Criteria via Green Infrastructure Implementation by County

County Permittees	PCBs Load Reduction (g/yr) by June 30, 2020, through green infrastructure
Alameda Permittees	37
Contra Costa Permittees	23
San Mateo Permittees	15
Santa Clara Permittees	37
Solano Permittees: Suisun City, Vallejo, Fairfield	8
Totals	**120**

ii. Implementation Level

(1) The Permittees shall implement green infrastructure projects so that PCBs loads are collectively reduced by 120 g/yr by June 30, 2020, which shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. Permittees shall demonstrate achievement of these load reductions by using the accounting methods approved under provision C.12.b.iii(1). Load reductions from green infrastructure projects implemented prior to the effective date of this Permit may be counted toward the required green infrastructure reductions of this Permit term if these projects were established and implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term.

The Permittees may meet the load reduction as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 12.2. If neither the permit-area-wide total load reduction nor the county-specific load reduction is achieved, Permittees shall achieve load reductions consistent with their share of the county total under provision C.12.a.ii(4).

(2) Permittees shall prepare a reasonable assurance analysis that demonstrates how green infrastructure will be implemented in order to achieve a PCBs load reduction of 3 kg/yr across the permit-area by 2040. This analysis shall include the following:

a. Quantify the relationship between areal extent of green infrastructure implementation and PCBs load reductions, taking into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies;

b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040;

c. Estimate the amount of PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040;

d. Quantitatively demonstrate that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects; and

e. Ensure that the calculation methods, models, model inputs and modeling assumptions used to fulfill C.12.c.ii(2)a-d have been validated through a peer review process.

iii. Reporting

(1) The Permittees shall submit in their 2018 Annual Report, as part of reporting for C.12.b.iii(3), the quantitative relationship between green infrastructure implementation and PCBs load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship.

(2) The Permittees shall submit in their 2020 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

(3) The Permittees shall submit in their 2020 Annual Report a reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis.

(4) The Permittees shall submit as part of reporting for C.12.b.iii(4), beginning with their 2019 Annual Report an estimate of the amount of PCBs load reductions resulting from green infrastructure implementation during the term of the Permit. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

C.12.d. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. Task Description – Permittees shall prepare a plan and schedule for PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030.

ii. Implementation level – Permittees shall prepare a PCBs control measures implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan must:

(1) Identify all technically and economically feasible PCBs control measures to be implemented (including green infrastructure projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

iii. Reporting

Permittees shall submit the plan and schedule in the 2020 Annual Report.

C.12.e. Evaluate PCBs Presence in Caulks/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way

i. Task Description –Permittees shall collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era.

ii. Implementation Level

Permittees shall collect at least 20 composite samples (throughout the permit-area) of the caulks and sealants used in storm drains or roadway infrastructure in public rights-of-way and analyze this material for PCBs in such a way as to be able to detect a minimum PCBs concentration of 200 parts per billion. This sampling and analysis will count toward partial fulfillment of the monitoring effort aimed at finding PCBs sources (see management information need in C.8.f).

iii. Reporting

Permittees shall report on the results (including all data gathered) of this investigation no later than the 2018 Annual Report.

C.12.f. Manage PCB-Containing Materials and Wastes During Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains

i. Task Description – Permittees shall develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition so that PCBs do not enter MS4s. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, or stormwater runoff.

Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed or remodeled between the years 1950 and 1980 with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt.

A Permittee is exempt from this requirement if it provides evidence acceptable to the Executive Officer that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

ii. Implementation Level

(1) The Permittees shall develop a protocol by June 30, 2019, that includes each of the following components, at a minimum:

a. The necessary authority to ensure that PCBs do not enter MS4s from PCB-containing materials in applicable structures at the time such structures undergo demolition;

b. A method for identifying applicable structures prior to their demolition; and

c. Method(s) for ensuring PCBs are not discharged to the storm drain from demolition of applicable structures.

(2) By July 1, 2019, and thereafter, the Permittees shall implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to MS4s from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.

(3) By July 1, 2019, Permittees shall develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

iii. Reporting

(1) In their 2016, 2017, and 2018 Annual Reports, the Permittees shall summarize the steps they have taken to begin implementing this requirement, which could include working with State and local agencies on inter-agency coordination regarding building demolitions, developing ordinances or policies, obtaining information materials, updating or supplementing permit application materials, developing a tracking tool for potential PCB-containing structures, and training relevant staff as needed to comply with this sub-provision.

(2) Each Permittee seeking exemption from C.12.f requirements must submit in its 2017 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

(3) In their 2020 Annual Report, the Permittees shall provide documentation demonstrating implementation with each of the minimum requirements in C.12.f.ii(1)(a)-(c).

(4) In their 2020 Annual Report and thereafter, the Permittees shall provide documentation of each of the following items:

a. The number of applicable structures that applied for a demolition permit during the reporting year; and
b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

(5) In their 2020 Annual Report, Permittees shall submit an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition. This should be reported at the regional level on behalf of all Permittees.

C.12.g. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

i. Task Description – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. Reporting – The Permittees shall submit in their 2017 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2018 Annual Report. The Permittees shall report in the March 15, 2020, Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.12.h. Implement a Risk Reduction Program

i. Task Description – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. Implementation Level

(1) At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement.

(2) In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. Reporting – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2020 Annual Report.

C.13. Copper Controls

The Permittees shall implement the following control program for copper. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of C.13 Provisions through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. Task Description – The Permittees shall prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of the surface of copper architectural features, including copper roofs.

ii. Implementation Level

(1) The Permittees shall require, when issuing building permits, use of appropriate BMPs for managing waste during and post-construction.

(2) The Permittees shall educate installers and operators on appropriate BMPs for managing copper-containing wastes.

(3) The Permittees shall enforce against noncompliance.

iii. Reporting

(1) In the 2016 Annual Report, the Permittees shall certify that legal authority currently exists to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of copper architectural features, including copper roofs.

(2) In the 2016 Annual Report, the Permittees shall report how copper architectural features are addressed through the issuance of building permits.

(3) The Permittees shall report annually permitting and enforcement activities.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. Task Description – Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. Implementation Level – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. Reporting

(1) In the 2016 Annual Report, the Permittees shall certify that legal authority currently exists to prohibit the discharges to storm drains of water containing copper-based chemicals from pools, spas, and fountains.

(2) In the 2016 Annual Report, the Permittees shall report how copper-containing discharges from pools, spas, and fountains are addressed to accomplish the prohibition of the discharge.

(3) The Permittees shall report annually on any enforcement activities.

C.13.c. Industrial Sources

i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. Implementation Level

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site.

iii. Reporting

The Permittees shall highlight copper reduction results in the industrial inspection component in the C.13 portion of each Annual Report.

C.14. City of Pacifica and San Mateo County Fecal Indicator Bacteria Controls

The City of Pacifica (City) and San Mateo County (County) Permittees shall implement Provision C.14 for fecal indicator bacteria. The City and County shall implement fecal indicator bacteria control measures in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to this provision. The goal of this provision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek (Creek) and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL) and reduce exceedances of the bacterial water quality objectives for the water contact recreation beneficial use during the term of the Permit, thereby making substantial progress toward achieving the TMDL wasteload allocations. The wasteload allocations and the dates they must be attained by are listed in Table 14.1 below. The City and County may comply with any requirement of this provision through a collaborative effort.

Table 14.1. Numeric Targets, TMDLs, and Allocations Based on Allowable Exceedances of Single-Sample Bacteria Objectives for San Pedro Creek and Pacifica State Beach

	San Pedro Creek		Pacifica State Beach		
	Dry Weather	Wet Weather	Summer Dry Weather (Apr. 1 to Oct. 31)	Winter Dry Weather (Nov. 1 to Mar. 31)	Wet Weather[4]
Allowable Exceedances of Single-Sample Objectives (assuming daily sampling is conducted) [1,2,]	4	26	0	2	30
Allowable Exceedances of Single-Sample Objectives (assuming weekly sampling is conducted) [3]	1	4	0	1	5
Attainment Date	August 1, 2028	August 1, 2028	August 1, 2021	August 1, 2021	August 1, 2021

1. Allowable exceedances are calculated by multiplying exceedance rates observed in the Reference System(s) by the Number of Days during each respective period in the reference year (1994).
2. To end up with whole numbers, where the fractional remainder for the calculated allowable exceedance days exceeds 0.1, the number of days is rounded up.
3. To determine the allowable number of exceedance events given a weekly sampling regime, as practiced for monitoring San Pedro Creek and Pacifica State Beach, the number of exceedance days was adjusted by solving for "X" in the following equation: X = (exceedance days x 52 weeks) / 365 days.
4. Wet weather is defined as any day with 0.1 inches of rain or more and the following three days.

C.14.a. Implement Control Measures to Achieve Indicator Bacteria Wasteload Allocations.

i. Task Description – The City and County shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to meet the stormwater TMDL

wasteload allocations in the San Pedro Creek watershed and Pacifica State Beach Indicator Bacteria TMDL (TMDL Project Area).

ii. Implementation Level – In order to comply with this provision element:

(1) The County shall effectively prohibit potential illicit discharges into its storm sewer system from sanitary sewer overflows or the sanitary sewer lines within its jurisdiction.

(2) The County shall address bacteria discharges from the existing and future commercial horse and dog kennel facilities (facilities) into its storm sewer sytem within its jurisdiction as follows:

(a) Conduct annual site inspections of each facility for code compliance by June 30 of each year, beginning in 2016.

(b) Conduct an annual compliance review of each facility's current manure, stormwater, and drainage management plans by June 30 of each year, beginning in 2016.

(c) Enforcement actions for noncompliant facilities will be in line with the County's Confined Animal Ordinance.

(3) The City shall address bacteria discharges from the existing and future commercial horse facilities (facilities) within its jurisdiction as follows:

(a) Review each facility's compliance with the City's Administrative Policy on "Standards for Keeping Animals."

(b) Review each facility's compliance with the City's Municipal Code on "Animal Excreta."

(c) Conduct annual compliance review and inspection of each facility by June 30 of each year, beginning in 2016.

(d) Take progressive enforcement action(s), as needed, to bring noncompliant facilities into compliance with the City's Administrative Policy on "Standards for Keeping Animals" and Municipal Code on "Animal Excreta."

(4) The City shall install new dog waste clean-up signs, waste bag dispensers, and trash cans at a minimum of 10 (ten) high priority locations within the TMDL Project Area (each site to receive all three elements: sign, bag dispenser, and trash can, unless some of the elements are already in place) by June 30, 2016. The high priority sites for these installations shall be determined via visual inspections of popular dog walking areas and their potential to discharge improperly deposited dog waste to the Creek or Beach.

(5) The City shall develop and implement a visual inspection and cleanup plan for high dog waste accumulation areas along San Pedro Creek and its tributaries by June 30, 2016. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain

events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteorological Station), and at a frequency of no less than once a month.

(6) The City shall develop and implement an enhanced pet waste public outreach and education campaign by June 30, 2016, that, at a minimum, includes all the following:

(a) Explore the possibility of establishing a new public pet waste management stakeholder group (e.g., formal or informal dog owners club).

(b) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Creek and Beach to play on the local television station and to include in print ads in the Pacifica Tribune.

(c) Distribute a mailer with an informational brochure to residents and businesses describing proper pet waste management, the linkage of the watershed to the Creek and Beach, and the adverse impact on those water bodies and those recreating in them from improper pet waste management.

(d) Add a new web page to the City website with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Creek and Beach and public health.

(e) Create and implement a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Creek and Beach.

(f) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(7) The City and County, based on the results of the source characterization and BMP effectiveness, and wasteload allocation attainment analyses described in sections C.14.b-c, shall modify or refocus control measure implementation efforts as appropriate, at a frequency of no less than every two years.

iii. Reporting

(1) No later than March 15 of each year, the City and County shall submit a comprehensive TMDL Status and Monitoring Report, reporting on the specific control measures (as listed in section C.14.a.ii above) that have been implemented in the TMDL Project Area during the forgoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description, scope, and start date of pollution prevention measures; and

(c) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

(2) Beginning with the 2017 TMDL Status and Monitoring Report and continuing in all TMDL Status and Monitoring Reports, the City and County shall update all the information as necessary to account for new control measures implemented, but not described in the 2016 TMDL Status and Monitoring Report or revisions to control measures.

C.14.b. Conduct Water Quality Monitoring to Assess Attainment of Wasteload Allocations

i. Task Description - The purpose of the attainment monitoring is to determine whether or not the TMDL wasteload allocations are attained.

ii. Implementation Level - In order to comply with this provision element, the City and County shall conduct attainment water quality monitoring activities as follows:

(1) Sample Locations – Two stations shall be monitored to assess attainment of wasteload allocations for stormwater runoff and dry weather flows: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (Linda Mar #5).

(2) Sampling Frequency – The two attainment stations shall be monitored weekly on an ongoing basis for fecal indicator bacteria. The weekly sampling shall occur year-round regardless of weather conditions, provided the conditions are safe for field staff to collect the samples.

(3) Constituents –Fecal indicator bacteria species measured in freshwater samples collected from the Creek Mouth shall include E. coli and total coliform. Fecal indicator bacteria species measured in ocean water samples collected from Linda Mar #5 station shall include enterococci, fecal coliform, and total coliform.

iii. Reporting

(1) In their Annual TMDL Status and Monitoring Reports submitted on March 15 each year, the City and County shall analyze, summarize, and report the results of the ongoing attainment monitoring, as follows:

(a) The City and County shall complete a data evaluation, which shall focus on determining whether the TMDL wasteload allocations are being attained in San Pedro Creek and at Pacifica State Beach.

(b) The indicator bacteria results from the attainment monitoring stations (Creek Mouth and Linda Mar #5 stations) shall be compared to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL (Table 14.1).

(c) The data evaluation shall include tabulation and review of local rainfall data to determine whether the weekly attainment monitoring sampling events occurred during dry weather or wet weather.

(d) An ongoing quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives at the two attainment stations shall be conducted and reported annually.

(e) A detailed and comprehensive assessment of wasteload allocation attainment by the end of year 4 of the Permit term shall be completed. If wasteload allocations are not achieved by the end of the Permit term, no later than 180 days prior to Permit expiration, the City and County shall submit a plan in their Report Of Waste Discharge, acceptable to the Executive Officer, that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.

C.14.c. Conduct Water Quality Monitoring to Characterize Sources of Bacteria in The Project Area and to Assess BMP Effectiveness

i. Task Description – The purpose of characterization monitoring is to better characterize indicator bacteria contributions from specific sources and to evaluate control measure effectiveness. The characterization monitoring shall provide data to:

(1) Characterize indicator bacteria densities in subwatersheds, storm drain outfalls, and pump stations that have not been sampled in the past. Results of the investigation may be used to drive future control measure actions.

(2) Establish baseline (or current) conditions against which future monitoring results can be compared following new or ongoing control measure implementation.

Characterization monitoring shall be conducted every other year on a water year basis (i.e., October 1 through September 30) beginning with Water Year 2016 (WY2016) (i.e., October 1, 2015 – September 30, 2016). WY2016 characterization monitoring shall assess *E. coli* densities throughout the San Pedro Creek watershed, with a focus on the culverted branches of the North Fork. The City and County may elect to focus on other areas with potential or suspected bacteria sources during subsequent years. In WY2016, human-, horse-, and dog-specific genetic markers shall be analyzed for a subset of the samples to investigate whether these species contribute fecal contamination to the Creek. The characterization monitoring shall be iterative in nature and allow for flexibility of design and details in future years. Subsequent years of characterization monitoring, at a minimum, shall have the same level of effort as WY2016; however, in future years, based on the results of the WY2016 monitoring, alternative sampling stations may be targeted, sampling intensities may be modified, sampling frequencies may be adjusted, and/or the species-specific genetic marker sampling may be revised.

ii. Implementation Level – The City and County shall conduct characterization monitoring activities as follows:

(1) Sample Locations – in WY2016, a minimum of twelve sampling stations shall be monitored. The selected sampling stations for the WY2016 characterization monitoring are divided into three separate categories, as follows:

(a) Subwatersheds – Four subwatersheds shall be targeted in WY2016: the North Fork (three stations), Middle Fork (one station), Sanchez Fork (one station), and Main Stem (three stations);

(b) Pump stations – The Linda Mar and Anza pump stations shall be sampled during wet weather discharge events to the Beach (during dry weather, flows entering these stations are pumped to a wastewater treatment facility and do not discharge to the Creek or Beach);

(c) Stormwater outfalls – The Crespi Canal, which is an engineered and concrete-lined drainage ditch, shall be sampled if it has flowing water.

In addition to the above stations, the Creek mouth shall be also sampled during events when species-specific genetic marker samples are collected (see section C.14.c.ii.3).

In monitoring years subsequent to the WY2016 monitoring year, based on the results of the WY2016 monitoring, the sample locations and quantity may be modified. However, in each subsequent monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(2) Sampling Frequency – in WY2016, the characterization stations shall be sampled a minimum of ten times over the course of the water year, as follows:

(a) Characterization monitoring shall begin in WY2016 with the first sample collected in Winter 2016;

(b) Wet season – Five sampling events shall be conducted during each of the wet season months (November through March). To the extent possible, wet season sampling events shall occur during wet weather, which as defined in the TMDL is any day with 0.1 inch of rain or more and the following three days;

(c) Dry season – Five sampling events shall be conducted during the dry season on a monthly basis from May through September.

In subsequent monitoring years, based on the results of the WY2016 monitoring, the sampling frequency may be modified. However, in each subsequent monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(3) Constituents – All samples shall be analyzed for *E. coli*. In addition, during each monitoring year (i.e., WY2016, and every other water year thereafter), at a minimum, samples collected at four stations during four sampling events (two wet season, two dry season) shall be analyzed for

human-, horse-, and dog-specific genetic markers to assess whether the targeted host species contribute fecal contamination to the Creek and Beach.

(4) Monitoring Protocols and Data Quality – Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

(5) Future Revisions – Any and all changes to the characterization monitoring plan in subsequent years (e.g., WY2018, WY2020, etc.) shall be submitted to the Executive Officer for review and acceptance no later than 90 days prior to implementation.

iii. Reporting

(1) In their Annual TMDL Status and Monitoring Reports beginning with the 2016 report submitted on March 15, 2017, and every other year's report thereafter, the City and County shall submit a comprehensive Characterization Monitoring Report reporting on all data collected during the preceding October 1 through September monitoring period.

(2) Data evaluation shall focus on addressing the following questions:

(a) Which land uses and/or sources contribute most to bacteria impairments in San Pedro Creek watershed?

(b) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed?

(c) What are the multi-year indicator bacteria density trends in the Creek and at the Beach (i.e., do control measures appear to be reducing bacteria)?

(3) As appropriate, the Report shall include the following:

(a) Immediately following the Table of Contents, a Data Tables section that includes all the data collected pursuant to Provision C.14.d. and contains the following information pertaining to the foregoing monitoring period:

(i) A map showing all monitoring locations;

(ii) Immediately following the map, a single completed Locations and Parameters Table containing the following columns or rows for each location sampled: numeric site identifier, a short-hand site name such as "Creek Mouth," latitude, longitude, and parameters assessed;

(iii) Immediately following the Locations and Parameters Table, a single completed Results Table containing the following columns or rows for each location sampled: the short-hand site name and

datum/result for each constituent analyzed. Constituents that exceed applicable water quality objectives shall be highlighted.

(b) For all data, a statement of the data quality.

(c) An analysis of the data, which includes the following:

(i) Basic descriptive statistics using indicator bacteria data;

(ii) Identification and evaluation of any controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed;

(iii) Identification and analysis of any trends in stormwater or receiving water quality; and

(iv) Consideration of variability in the data sets.

(d) A discussion of the data, which shall:

(i) Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin or the Ocean plans;

(ii) Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

(iii) Identify and prioritize water quality problems;

(iv) Identify potential sources of water quality problems;

(v) Describe followup actions;

(vi) Evaluate the effectiveness of existing control measures; and

(vii) Identify management actions needed to address water quality problems.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. Discharge Type – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers (excludes well development); and

(8) NPDES permitted discharges (individual or general permits).

ii. Implementation Level – The non-stormwater discharges listed in Provision C.15.a.i above are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-vi below.

i. Discharge Type – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non-Drinking Water Aquifers**

Groundwater pumped from a monitoring well, used for groundwater basin management, which is owned and/or operated by a Permittee is allowed if the following requirements are met:

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards consistent with the existing effluent limitations or pollutant triggers in the Water Board's NPDES Groundwater General Permit, NPDES No. CAG912002.

(ii) The water samples shall be analyzed using approved U.S. EPA methods: (a) U.S. EPA Method 8015 Modified for total petroleum hydrocarbons; (b) U.S. EPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (c) approved U.S. EPA methods to meet the triggers for the metals listed in the general permit discussed in C.15.(b)i.(1)(a)(i) above.

(iii) The water samples shall be analyzed for pH and turbidity.

If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs and Monitoring** – When greater than 2,500 gallons per day of uncontaminated (meeting the criteria in C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of banks, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flowrate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of the discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(vii) The pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(c) If the Permittee is unable to comply with the criteria in Provision C.15.b.i.(1)(b)(i)-(vii), discharge shall cease immediately and the Permittee shall employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES Groundwater General Permits.

(d) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[41] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements. Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(b) If the groundwater cannot be discharged to a landscaped area or bioretention unit and the discharge is greater than 2,500 gallons per day, it can only be considered for discharge once the following sampling is done to verify that the discharge is uncontaminated:

(i) The discharge shall meet WQS consistent with the existing effluent limitations or pollutant triggers in theWater Board's NPDES Groundwater General Permit, NPDES No. CAG912002.

[41] Pumped groundwater not exempted in C.15.a or conditionally exempted in C.15.b.i.(1).

(ii) The Permittees shall require that water samples from these discharge types be analyzed using the following approved U.S. EPA methods:

- U.S. EPA Method 8015 Modified for total petroleum hydrocarbons, and U.S. EPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds.
- The approved U.S. EPA Methods for the metals listed below that meet the corresponding Reporting Limits:

Metal	Reporting Limit
Antimony	6 µg/l
Arsenic	10 µg/l
Beryllium	4 µg/l
Cadmium	1.1 µg/l
Chromium VI	11 µg/l
Copper[42]	5.9 µg/l
Copper[43]	3.4 µg/l
Copper[44]	4.7 µg/l
Lead	3.2 µg/l
Mercury	0.025 µg/l
Nickel	19 µg/l
Selenium	5 µg/l
Silver	2.2 µg/l
Thallium	1.7 µg/l
Zinc	86 µg/l
Cyanide	2.9 µg/l

(c) **Monitoring and Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in C.15.b.i.(2)(b) above, the Permittees shall require the following:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream or if accessing the sampling points poses safety to personnel.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of bank, nuisance, contamination, and excess sedimentation in the receiving waters.

[42] Applicable to Suisun Bay and San Pablo Bay segments of San Francisco Bay.
[43] Applicable to Central Bay and Lower Bay segments of San Francisco Bay.
[44] Applicable to South San Francisco Bay segments of San Francisco Bay.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(vii) The pH of discharged water shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(d) If a Permittee determines that a discharger or a project proponent is unable to comply with the criteria in C.15.b.i.(2)(c)(i)-(vii), the Permittee shall require the discharge to cease immediately and require that the discharger employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES Groundwater General Permit.

(e) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be reused or directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Type – Emergency Discharges of Potable Water

(1) **Emergency Discharges** –Discharges resulting from firefighting activities.

(2) Required BMPs

(a) The Permittees shall implement or require firefighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located.

(b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). The

Permittees or firefighting personnel shall control the pollution threat from their activities to the extent that time and resources allow.

(3) **Reporting Requirements** – Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

Required BMPs

(1) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their storm drain systems.

(2) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, or wash cars at commercial car wash facilities.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) **Required BMPs**

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[45] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

[45] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa, and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and

(e) Implementing the Illicit Discharge Enforcement Response Plan from C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their storm drain systems.

(2) **Reporting** – The Permittees shall provide implementation summaries in their Annual Report.

C.16. Discharges to Areas of Special Biological Significance

This Provision applies to stormwater discharges from the County of San Mateo into James V. Fitzgerald Marine Reserve Area of Special Biological Significance (ASBS). As set forth in the Fact Sheet, the State Water Board granted an exception to the ASBS discharge prohibition (ASBS Exception) in the Ocean Plan to applicants including the County of San Mateo for their existing stormwater discharges into ASBSs, provided they receive authorization to discharge by an NPDES permit; the discharges comply with all applicable terms, prohibitions, and special conditions of Attachment B - Special Protections (Special Protections) attached to and part of the ASBS Exception; and the discharges are essential for flood control or slope stability, designed to prevent soil erosion, occur only during wet weather, and are composed of only stormwater runoff. This Provision serves as the authorization for the County of San Mateo to discharge stormwater into the ASBS in accordance with the requirements below.

C.16.a. Discharges to the James V. Fitzgerald Marine Reserve ASBS

i. If the County of San Mateo meets all of the conditions set forth in Provision C.16.a.i. and C.16.a.ii., its stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS from MS4 outfalls that were constructed or were under construction prior to January 1, 2005, are permitted for those discharges that:

(1) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

(2) Are designed to prevent soil erosion;

(3) Occur only during wet weather; and

(4) Are composed only of stormwater runoff.

ii. The County of San Mateo shall comply with all of the applicable terms, prohibitions, and special conditions of the Special Protections of the ASBS Exception set forth in State Water Board Resolution No. 2012-0012, as amended by State Water Board Resolution No. 2012-0031, including monitoring requirements, as they apply to stormwater. The Special Protections are hereby incorporated by reference into this Order and attached hereto as Attachment F. Notwithstanding anything to the contrary in this Order, the County of San Mateo shall not alter the natural ocean quality of the ASBS; shall not discharge trash into the ASBS; and shall not discharge non-stormwater into the ASBS except as provided in the Special Protections. As required by the Special Protections, the County of San Mateo shall address the preceding requirements (other than trash) in an ASBS Compliance Plan to be approved by the State Water Board Executive Director or the Regional Water Board Executive Officer and comply with the compliance schedule set forth in the Special Protections.

iii. Reporting – In addition to the monitoring requirements of the Special Restrictions, the County of San Mateo shall submit, upon approval by the State Water Board Executive Director, a copy of its approved ASBS Compliance Plan.

C.17. Annual Reports

C.17.a. The Permittees shall submit Annual Reports electronically in all cases by September 30 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.16. A paper copy of each Annual Report shall be submitted by October 15 of each year. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.

C.17.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2016. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.16, with the agreement of the Permittees and by the approval of the Executive Officer.

C.17.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit, in the cover letter of the Annual Report, the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.18. Modifications to this Order

This Order may be modified, or alternatively, revoked or reissued, before the expiration date as follows:

C.18.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.18.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Water Board or amendments to the Basin Plan approved by the State Water Board;

C.18.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order. The Order as modified or reissued under this paragraph shall also contain any other requirements of the CWA then applicable; or

C.18.d. To approve and incorporate an alternative method or methods of distributing the county load reductions for mercury or PCBs on a Permittee-specific basis, as allowed by Provisions C.11 and C.12.

C.19. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment G of this Order.

C.20. Expiration Date

This Order expires on December 31, 2020, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.21. Rescission of Old Order

Order No. R2-2009-0074 is hereby rescinded on the effective date of this Order, which shall be January 1, 2016, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

C.22. Effective Date

The Effective Date of this Order and Permit shall be January 1, 2016, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 19, 2015.

Digitally signed by Bruce H. Wolfe
DN: cn=Bruce H. Wolfe, o=SWRCB, ou=Region 2, email=bwolfe@waterboards.ca.gov, c=US
Date: 2015.12.09 17:43:51 -08'00'

Bruce H. Wolfe
Executive Officer

Attachment A: Municipal Regional Stormwater Permit Fact Sheet
Attachment B: Provision C.3.b. Sample Reporting Table
Attachment C: Provision C.3.g. Hydromodification Applicability Maps
Attachment D: Provision C.8. Standard Monitoring Provisions
Attachment E: Provision C.10. Supporting Information
Attachment F: Provision C.16. ASBS Special Protection Zone
Attachment G: Standard NPDES Stormwater Permit Provisions

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and **W**ildlife
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CSCI	California Stream Condition Index
CWA	Federal Clean Water Act
CWC or Water Code	California Water Code
DCIA	Directly Connected Impervious Area
DPR	California Department of Pesticide Regulation
ERP	Enforcement Response Plan
FR	Federal Register
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable

MRP	Municipal Stormwater Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
NAFSMA	National Association of Flood & Stormwater Management Agencies
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
O&M	Operation and Maintenance
PAHs	Polynuclear Aromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ether
PCA	Pest Control Advisor
PCBs	Polychlorinated Biphenyls
PHAB	Physical Habitat (e.g., of streams)
POTW	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan
RAA	Reasonable Assurance Analysis
RCRA	Federal Resource Conservation and Recovery Act
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Federal Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SIC	Standard Industrial Classification
SMWPPP	San Mateo Countywide Water Pollution Prevention Program
SSID	Stressor Source Identification
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan

State Water Board	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Federal Toxic Substances Control Act
TST	Test of Significant Toxicity
TU	Toxicity Units
UCMR	Urban Creeks Monitoring Report
U.S. EPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations
WQS	Water Quality Standards

GLOSSARY

Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the State protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.
Construction Site	Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, paving, disturbances to ground such as stockpiling, and excavation. Construction sites are all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this Permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of WQS because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge.
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size.
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.

Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Floor Area Ratio	The ratio of the total floor area on all floors of all buildings at a project site (except structures or floors dedicated to parking) to the total project site area.
Full Trash Capture Device	Full trash capture systems are defined as "any device or series of devices that traps all particles retained by a 5mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area." Trash collection booms and sea curtains do not meet this definition, but are effective for removal of floating trash if properly maintained. Because these devices do not meet the Full Trash Capture Device definition, only ¼ of the catchment area treated by these measures is credited toward meeting the trash management area requirement of C.10.a.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Green Infrastructure	Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.
Gross Density	The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.

Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, State, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Executive Officer.
Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes french drains).
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other.
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.

Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. CWA 402(p)(3)(B)(iii) requires that municipal stormwater permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the state determines appropriate for the control of such pollutants." Also see State Water Board Order WQ 2000-11.
Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law...including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in 40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; and/or (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.

Pervious Pavement	Pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and PAHs; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste); and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.
Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by the San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).

Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMPs	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Standard Industrial Classification (SIC)	A federal system for classifying establishments by the type of activity in which they are engaged using a four-digit code.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain WQS. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet WQS even after application of technology-based controls, more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.
Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the State, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and U.S. EPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the WQS that must be met to protect designated uses. Water quality standards also include the federal and State anti-degradation policy.
Wet Season	October 1 through April 30 of each year

ATTACHMENT A

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2015-0049

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program

The City of Vallejo and the Vallejo Sanitation and Flood Control District

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I. CONTACT INFORMATION

Water Board Staff Contact: Dale Bowyer, 1515 Clay Street, Suite 1400, Oakland, CA 94612, 510-622-2323, 510-622-2501 (fax), email: dbowyer@waterboards.ca.gov

The Permit and other related documents can be downloaded from the Water Board website at:

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/mrp_sw_reissuance.shtml

Comments can be electronically submitted to mrp.reissuance@waterboards.ca.gov.

All documents referenced in this Fact Sheet and in the Order are available for public review at the Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 9:00 am to 4:00 pm, Monday through Friday, 12 - 1 pm excluded. To schedule an appointment to inspect public records, contact Melinda Wong at 510-622-2430.

II. PERMIT GOALS AND PUBLIC PROCESS

Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) include:

1. Continue regulating six Phase I municipal stormwater NPDES permits in one consistent permit that is regional in scope.
2. Include more specificity in NPDES permit requirements than the pre-2009 permits which lacked concrete requirements and thus did not result in the desired improvement of water quality. Continue requiring (A) stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.
3. Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.
4. Implement and enhance actions to control 303(d) listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.
5. Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d) listed pollutants.

Public Process

Water Board staff conducted stakeholder meetings with the Permittees and other interested parties to develop this Permit. These meetings included Water Board staff, representatives of the Permittees, and representatives of environmental groups.

Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in section 402(p) of the CWA. In addition, this Permit contains water quality-based effluent limitations to implement TMDLs. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is deemed compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and C.18 to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

Early Permitting Approach

The federal Clean Water Act (CWA) was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations that would implement the amendment), the Water Board issued municipal stormwater Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, pool

resources and expertise, and share information, public outreach and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics that were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the Plans for implementation details. Often specific aspects of permit and Plan implementation evolved during the five year permit cycle, with relatively significant changes approved at the Water Board staff level without significant public review and comment.

Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

U.S. Environmental Protection Agency (U.S. EPA) stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided maximum flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the permits, due to the lack of specific requirements and measurable outcomes of some required actions in the plans.

Moreover, these stormwater management plans and amendments thereto made by the Permittees were not subject to public input, contrary to the U.S. Ninth Circuit Court's decision in the Phase II stormwater context that public participation is required for a stormwater management plan, because the substantive information about how an operator will reduce pollutants to the maximum extent possible was found in the stormwater management plan rather than the permit itself. (*Environmental Defense Center v. EPA* (9th Cir. 2003) 344 F.3d 832, 857.)

This Permit continues to modify these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the Permit Development Process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the federal Clean Water Act and the California Water Code. An advantage for Permittees and the public of this approach is that the permit requirements are known at the time of permit issuance and not left to be determined later through an iterative review and approval of stormwater management plan process, during which time was spent more on getting an acceptable plan than on-the-ground actions. While it may still be necessary to amend the Permit prior to expiration where allowed, any need to do this should be minimized.

This Permit does not include approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require

significantly increased staff resources. Instead, minimum measures have been established to simplify assessment of compliance and allow the public to more easily assess each Permittee's compliance. Each Permit provision and its reporting requirements are written with this in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each individual Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to provide the flexibility described above considering the different sizes and resources of the numerous Permittees, while ensuring that the Permit is still enforceable. To achieve this, the Permit frequently prescribes minimum measurable outcomes, while providing Permittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. A balance between flexibility and enforceability has been crafted into the Permit.

Current Permit Approach

As stated above, because stormwater management plans were legally an integral part of the permits and were subject to complete public notice, review and comment, this permit reissuance continues to incorporate those plan level details in the Permit, thus merging the Permittees' stormwater management plans into the Permit in one document. This Permit specifies the following: 1) requirements to effectively prohibit non-stormwater discharges into the storm drain system, pursuant to CWA § 402(p)(3)(B)(ii); 2) technology-based effluent limitations that require controls to reduce the discharge of pollutants to the "maximum extent practicable" (MEP)[1] pursuant to CWA § 402(p)(3)(B)(iii); and 3) water quality-based effluent limitations (WQBELs) pursuant to CWA § 402(p)(3)(B)(iii), which authorizes the inclusion of "such other provisions as the Administrator or the State determines appropriate for the control of [] pollutants," for pesticides, trash, mercury, PCBs, and bacteria, in addition to technology-based effluent limitations. WQBELs for these pollutants are appropriate for control because water quality standards are not being met and these pollutants have impaired Bay Area waters. The Permit includes requirements for the following components:

- Discharge Prohibitions and Receiving Water Limitations

[1] The Clean Water Act and its regulations have not specifically defined "MEP"; rather, it is a flexible and evolving standard. Congress established this flexible MEP standard so that administrative bodies would have "the tools to meet the fundamental goals of the Clean Water Act in the context of storm water pollution."(*Building Industry Ass'n of San Diego County v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866, 884.) This standard was designed to allow permit writers flexibility to tailor permits to the site-specific nature of MS4s and to use a combination of pollution controls that may be different in different permits. (*In re City of Irving, Texas, Municipal Storm Sewer System* (July 16, 2001) 10 E.A.D. 111 (E.P.A.).) The MEP standard is also expected to evolve in light of programmatic improvements, new source control initiatives, and technological advances that serve to improve the overall effectiveness of storm water management programs in reducing pollutant loading to receiving waters. This is consistent with USEPA's interpretation of storm water management programs. As explained by USEPA in its 1990 rulemaking, "EPA anticipates that storm water management programs will evolve and mature over time" (55 Fed.Reg. 47990, 48052 (Nov. 16, 1990)).

- Municipal Operations
- New Development and Redevelopment
- Industrial and Commercial Site Controls
- Illicit Discharge and Elimination
- Construction Site Controls
- Public Information and Outreach
- Water Quality Monitoring
- Pesticides Toxicity Controls
- Trash Reduction
- Mercury Controls
- PCBs Controls
- Copper Controls
- Pacifica and San Mateo County Beach and San Pedro Creek Bacteria Controls for Beach and San Pedro Creek
- Exempt and Conditionally Exempt Discharges
- San Mateo County Discharges to ASBS

IV. ECONOMIC ISSUES

California Water Code (CWC) section 13241 requires the Water Board to consider certain factors, including economic considerations, in the adoption of water quality objectives. CWC section 13263 requires the Water Board to take into consideration the provisions of CWC section 13241 in adopting waste discharge requirements.

In *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, the California Supreme Court considered whether regional water boards must comply with CWC section 13241 when issuing waste discharge requirements under CWC section 13263(a) by taking into account the costs a permittee will incur in complying with the permit requirements. The Court concluded that whether it is necessary to consider such cost information "depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act." (*Id*. at p. 627.) The Court ruled that regional water boards may not consider the factors in CWC section 13241, including economics, to justify imposing pollutant restrictions that are less stringent than applicable federal law requires. (*Id*. at pp. 618, 626-627 ["[Water Code section 13377 specifies that [ ] discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act...Because CWC section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a [ ] discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards."]). However, when pollutant restrictions in an NPDES permit are more stringent than federal law requires, CWC section 13263 requires that the regional water boards consider the factors described in CWC section 13241 as they apply to those specific restrictions.

As discussed in Section V.C., State Mandates, the Water Board finds that the requirements in this Order are not more stringent than the minimum federal requirements. Among other requirements, federal law requires MS4 permits to include requirements to effectively prohibit non-storm water discharges into the MS4s, in addition to requiring controls to reduce the discharge of pollutants in stormwater to the MEP, and other provisions as USEPA or the State determines are appropriate for the control of pollutants in MS4 discharges.

The requirements in this Order may be more specific or detailed than those enumerated in federal regulations under 40 CFR 122.26 and guidance; however, the requirements have been designed to be consistent with and within the federal statutory mandates described in CWA section 402(p)(3)(B)(ii) and (iii) and the related federal regulations and guidance. Consistent with federal law, all of the conditions in this Order could have been included in a permit adopted by USEPA in the absence of the in lieu authority of California to issue NPDES permits.

Moreover, the inclusion of numeric WQBELs in this Order does not cause this Order to be more stringent than federal law. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The inclusion of WQBELs as discharge specifications in an NPDES permit in order to achieve compliance with water quality standards is not a more stringent requirement than the inclusion of BMP-based permit limitations to achieve water quality standards (State Water Board Order No. WQ 2006-0012 (Boeing)). Therefore, consideration of the factors set forth in CWC section 13241 is not required for permit requirements to implement the effective prohibition on the discharge of non-stormwater discharges into the MS4 or for controls to reduce the discharge of pollutants in stormwater to the MEP, or other provisions that the Water Board has determined appropriate to control such pollutants, as those requirements are mandated by federal law.

While the Water Board need not consider costs under CWC section 13241, the Water Board nevertheless has considered cost information, especially since it is a consideration in the implementation of technology controls to the MEP.

In 2000, the State Water Board issued a precedential order (Order WQ 2000-11 (Cities of Bellflower, et al.)) stating that cost of compliance with the programs and requirements of a municipal stormwater permit is a relevant factor in determining MEP. The Order also explicitly stated that a cost benefit analysis is not required. The State Water Board discussed costs as follows:

> While the standard of MEP is not defined in the storm water regulations or the Clean Water Act, the term has been defined in other federal rules. . . . .
>
> These definitions focus mostly on technical feasibility, but cost is also a relevant factor. There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective

> BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis.

(State Water Board Order WQ 2000-11, supra, p.20.) The cost of complying with TMDL waste load allocations is not required to be considered since TMDLs are not subject to the MEP standard. Federal law requires that NPDES permits contain effluent limitations consistent with the assumptions of any applicable wasteload allocation in a TMDL. (40 C.F.R. §122.44(d)(1)(vii)(B).) With that background, we turn to economic considerations.

Economic discussions of urban runoff management programs tend to focus on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, when considering the cost of implementing the urban runoff programs, it is also important to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits that result from program implementation.

It is very difficult to ascertain the true cost of implementation of the Permittees' urban runoff management programs because of inconsistencies in reporting by the Permittees. Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin that is not easily explained.[2] Despite these problems, efforts have been made to identify urban runoff management program costs, which can be helpful in understanding the costs of program implementation.

In 1999, U.S. EPA reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. U.S. EPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 per household annually.[3]

A study on program cost was also conducted by the Los Angeles Regional Water Quality Control Board (LARWQCB), where program costs reported in the municipalities' annual reports were assessed. The LARWQCB estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.

The State Water Board also commissioned a study by the California State University, Sacramento, to assess costs of the Phase I MS4 program. This study is current and includes an assessment of costs incurred by the City of Encinitas in implementing its program. Annual cost per household in the study ranged from $18-46, with the City of Encinitas representing the upper end of the range.[4] The cost of the City of Encinitas' program is understandable, given the City's coastal location, reliance on tourism, and consent decree with environmental groups regarding its program. For these reasons, as well as the general recognition the City of Encinitas receives for implementing a superior program, the City's program cost can be considered as the high end of the spectrum for Permittee urban runoff management program costs.

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[2] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003.p.2
[3] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.
[4] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38% of program costs are new costs fully attributable to MS4 permits. The remainder of program costs were either pre-existing or resulted from enhancement of pre-exiting programs.[5] The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement its Drainage Area Management Plan, its municipal stormwater permit requirements, is less than 20% of the total budget. The remaining 80% is attributable to pre-existing programs.[6]

It is also important to acknowledge that the vast majority of costs that will be incurred as a result of implementing the Order are not new. Urban runoff management programs have been in place in this region for over 25 years. Any increase in cost to the Permittees will be incremental in nature.

Urban runoff management programs cannot be considered in terms of their costs only. The programs must also be viewed in terms of their value to the public. For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by U.S. EPA to be $158-210 annually or $13 - $17.50 monthly.[7] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento, study corroborates U.S. EPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180 or $15 monthly.[8] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Another important way to consider urban runoff management program costs is to consider the implementation cost in terms of costs incurred by not improving the programs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[9] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8% among bathers at those beaches resulted in about $3 million annually in health-related expenses.[10] Extrapolation of such numbers to the beaches and other water contact recreation in San Francisco Bay and the tributary creeks of the region could result in huge expenses to the public.

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5 Ibid. P. 58.

6 County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

7 Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.

8 State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.

9 Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

10 Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.

Urban runoff and its impact on receiving waters also places a cost on tourism. The California Division of Tourism has estimated that each out-of-state visitor spends $101.00 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999, impacting beach visitation and undoubtedly impacting the local economy.

Finally, it is important to consider the benefits of urban runoff management programs in conjunction with their costs. A study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could reach $18 billion.[11] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by U.S. EPA, which found that the benefits of implementation of its Phase II stormwater rule would also outweigh the costs.[12]

Considering the above, the Water Board finds that the requirements in this Order are reasonably necessary to protect beneficial uses identified in the Basin Plan and the economic information related to costs of compliance supports protecting those beneficial uses.

V. RELEVANT STATUTES, REGULATIONS, PLANS AND POLICIES

A. Legal Authorities.

This Order is issued pursuant to section 402 of the CWA and implementing regulations adopted by the U.S. EPA and chapter 5.5, division 7 of the CWC (commencing with section 13370). This Order serves as an NPDES permit for point source discharges to surface waters. This Order also serves as waste discharge requirements pursuant to article 4, chapter 4, division 7 of the CWC (commencing with section 13260).

In addition to the legal authority citations below, they are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

[11] LARWQCB, 2004. Alternative Approaches to Stormwater Control.
[12] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,D,E, and F) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "[n]otwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

B. State and Federal Regulations, Policies, and Plans

1. Water Quality Control Plan. The CWA requires the Water Board to establish water quality standards for each water body in its region. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect beneficial uses, and an antidegradation policy to prevent degrading of waters. The Water Board adopted the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs

and policies to achieve those objectives for all waters addressed through the plan. The Urban Runoff Management, Comprehensive Control Program section of the Basin Plan requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan's comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. Pursuant to Water Code sections 13263 and 13377, the requirements in this Order implement the Basin Plan.

2. Water Quality Control Plan for Ocean Waters of California, California Ocean Plan

   In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amended Ocean Plan on October 16, 2012, and it was approved by the Office of Administrative Law and USEPA. The Ocean Plan is applicable, in its entirety, to ocean waters of the state. In order to protect beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Pursuant to Water Code sections 13263 and 13377, the requirements of this Order implement the Ocean Plan.

   The Ocean Plan prohibits the discharge of waste to designated Areas of Special Biological Significance (ASBS). ASBS are ocean areas designated by the State Water Board as requiring special protection through the maintenance of natural water quality. The California Ocean Plan states that the State Water Board may grant an exception to California Ocean Plan provisions where the State Water Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served. In 2012, the State Water Board adopted Resolutions 2012-0012 and 2012-0031 (ASBS Exception), which grant an exception to the Ocean Plan prohibition on discharges to ASBS for a limited number of applicants, including San Mateo County for stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS. The ASBS Exception contains "Special Protections" to maintain natural water quality and protect the beneficial uses of the ASBS. In order to legally discharge into an ASBS, San Mateo County must comply with the terms of the Special Protections and obtain coverage under this Order. This Order incorporates the terms of the Special Protections for San Mateo's discharges into the ASBS.

3. National Toxics Rule (NTR) and California Toxics Rule (CTR). U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995 and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, U.S. EPA adopted the CTR. The CTR promulgated new toxics criteria for California and incorporated the previously adopted NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001. These rules contain water quality criteria for priority pollutants.

4. Antidegradation Policy. Federal regulations (40 CFR 131.12) require that the state water quality standards include an antidegradation policy consistent with the federal antidegradation policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining the Quality of the Waters of the State"). State Water Board Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law.

   The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Resolution No. 68-16 and 40 CFR section 131.12 require the Water Board to maintain high quality waters of the State unless degradation is justified based on specific findings. First, the Water Board must ensure that "existing instream uses and the level of water quality necessary to protect the existing uses" are maintained and protected. Second, if the baseline quality of a water body for a given constituent exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected through the requirements of the Order unless the Water Board makes findings that (1) any lowering of the water quality is necessary to accommodate important economic or social development in the area in which the waters are located; (2) water quality adequate to protect existing uses fully is assured; and (3) the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control are achieved.

   The Water Board must also comply with any requirements of State Water Board Resolution No. 68-16 beyond those imposed through incorporation of the federal antidegradation policy. In particular, the Water Board must find that not only present, but also anticipated future uses of water are protected, and must ensure best practicable treatment or control of the discharges. The baseline quality considered in making the appropriate findings is the best quality of the water since 1968, the year of the adoption of Resolution No. 68-16, or a lower level if that lower level was allowed through a permitting action that was consistent with the federal and state antidegradation policies. The discharges permitted in this Order are consistent with the antidegradation provisions of 40 CFR section 131.12 and Resolution 68-16 as set out below:

   a. Many of the waters within the area covered by this Order are impaired and by multiple pollutants discharged through MS4s and are not high quality waters with regard to these pollutants. In most cases, there are insufficient data to determine whether these water bodies were impaired as early as 1968, but the limited available data shows impairment dating back for more than two decades. Many such water bodies are listed on the State's CWA Section 303(d) List and the Water Board has established TMDLs to address the impairments (see V.6). This Order ensures that instream (beneficial) water uses and the level of water quality necessary to protect the existing uses is maintained and protected. This Order requires the Permittees to comply with permit provisions to implement the wasteload allocations set forth in the TMDLs in order to restore the beneficial uses of the impaired water bodies

consistent with the assumptions and requirements of the TMDLs. This Order further requires compliance with receiving water limitations to meet water quality standards in the receiving water either by showing compliance or by implementing actions to comply with water-quality based requirements (limitations) set forth in specific pollutants of concern provisions.

b. To the extent that some of the water bodies within the area covered by this Order are high quality waters with regard to some constituents, the Board finds as follows:

   Allowing limited degradation of high quality water bodies through MS4 discharges is necessary to accommodate important economic or social development in the area and is consistent with the maximum benefit to the people of the state. The discharge of stormwater in certain circumstances is to the maximum benefit to the people of the State because it can assist with maintaining instream flows that support beneficial uses, may spur the development of multiple-benefit projects, and may be necessary for flood management, and public safety as well as to accommodate development in the area. The alternative – capturing all stormwater from all storm events – would be an enormous opportunity cost that would preclude MS4 permittees from spending substantial funds on other important social needs. The Order ensures that any limited degradation does not affect existing and anticipated future uses of the water and does not result in water quality less than established standards. The Order requires compliance with receiving water limitations that act as a floor to any limited degradation.

   The Order requires the highest statutory and regulatory requirements and requires that the Permittees meet best practicable treatment or control. The Order prohibits all non-stormwater discharges, with a few enumerated exceptions, through the MS4 to the receiving waters. As required by 40 CFR section 122.44(a), the Permittees must comply with the "maximum extent practicable" technology-based standard set forth in CWA section 402(p), and implement extensive minimum control measures in a stormwater management program. Recognizing that best practicable treatment or control may evolve over time, the Order includes new and more specific requirements as compared to Order No. R2-2009-0074.

5. Anti-backsliding Regulations. Section 402(o)(2) and 303(d)(4) of the CWA and federal regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. While this Order allows implementation of alternative compliance paths in Provisions C.9 to C.12 and C.1 to comply with receiving water limitations for pollutants and receiving waters identified therein, the availability of the alternatives and the corresponding availability of additional time to come into compliance with receiving water limitations does not violate the anti-backsliding provisions.

The receiving water limitations provisions of this Order are imposed under section 402(p)(3)(B) of the Clean Water Act rather than based on best professional judgment, or based on section 301(b)(1)(C) or sections 303(d) or (e), and are, accordingly, not subject to the anti-backsliding requirements of section 402(o). Although the non-applicability is less clear with respect to the regulatory anti-backsliding provisions in 40 CFR 122.44(l), the regulatory history suggests that USEPA's intent was to establish the anti-backsliding regulations with respect to evolving technology standards for traditional point sources. (See, e.g., 44 Fed.Reg. 32854, 32864 (Jun. 7, 1979)). Assuming the regulatory anti-backsliding provisions apply, it is not violated for two reasons. First, the actual requirements in Provisions C.9 to C.12 and C.1 are as or more stringent than the requirements in the previous permit. Second, to the extent explicitly allowing compliance with the receiving water limitations through implementation of C.9 to C.12 and C.14 is comparable to and less stringent than what the previous permit required, the exception to backsliding based on new information and changed circumstances since the last permit applies.

The alternative compliance paths in Provisions C.9 to C.12 and C.14 of this Order were informed by new information available to the Board from experience and knowledge gained through implementation of actions required by the previous permit and results of source identification studies and control measure effectiveness studies since the adoption of the previous permit. In particular, the Water Board recognizes the need and significance of explicitly allowing time to plan, design, fund, operate and maintain controls necessary to attain water quality improvements and comply with receiving water limitations. This is especially true where, as here, the alternative compliance paths allowed by this Order requires implementation of controls that are more stringent than controls of the previous permit. Thus, even if the receiving water limitations are subject to anti-backsliding requirements, they were revised based on changed circumstances and new information that would support an exception to the anti-backsliding provisions. (40 C.F.R. § 122.44(l)(1); 40 C.F.R. § 122.62(a)(2); 40 C.F.R. §122.44(l)(2)(i)(B)(1)).

6. Impaired Waters on CWA 303(d) List. CWA section 303(d)(1) requires each state to identify specific water bodies within its boundaries where water quality standards are not being met or are not expected to be met after implementation of technology-based effluent limitations on point sources. Water bodies that do not meet water quality standards are considered impaired and are placed on the state's "303(d) List." Periodically, U.S. EPA approves the state's 303(d) List. In October 2011, U.S. EPA approved a revised list of impaired waters prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for non-point sources, and are established to achieve the water quality standards for the impaired waters.

The Water Board has established TMDLs for pesticide-related toxicity, mercury, PCBs, pathogens, among others, to remedy water quality impairments in various water bodies in and around San Francisco Bay. These TMDLs identify MS4 discharges as a source of pollutants to these water bodies, and, as required, establish wasteload allocations (WLAs) for MS4 discharges to reduce the amount of pollutant discharged to receiving waters. CWA section 402(p)(3)(B)(iii) requires the Water Board to impose permit conditions, including: "management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Federal regulations also require that NDPES permits contain WQBELs consistent with the assumptions and requirements of all available WLAs (40 CFR 122.44(d)(1)(vii)(B)). CWC sections 13263 and 13377 also require that permits include limitations necessary to implement water quality control plans. Therefore, this Order includes WQBELs and other provisions to implement the TMDL WLAs assigned to Permittees regulated by this Order.

7. California Environmental Quality Act. The action to adopt an NPDES Permit is exempt from the provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) ("CEQA") pursuant to Water Code section 13389, since the adoption or modification of a NPDES permit for an existing source is statutorily exempt and this Order only serves to implement a NPDES permit (*County of Los Angeles v. State Water Resources Control Board (2006) 143 Cal.App.4th 985*; *Pacific Water Conditioning Assn, Inc. v. City Council of City of Riverside* (1977) 73 Cal.App.3d 546, 555-556.).

8. Endangered Species Act Requirements. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. Each Permittee is responsible for meeting all applicable federal and State Endangered Species Act requirements.

C. State Mandates

Article XIII B, Section 6(a) of the California Constitution provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service." The requirements in this Permit do not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons.

First, this Permit implements federally-mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal

requirements to effectively prohibit non-stormwater discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held that these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (*Natural Resources Defense Council, Inc. v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.) The authority exercised under this Permit is not reserved state authority under the CWA's savings clause (cf. *Burbank v. State Water Resources Control Bd*. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements that are not less stringent than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for MS4. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, *City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region* (2006) 135 Cal.App.4th 1377, 1389; *Building Industry Association of San Diego County v. State Water Resources Control Bd*. (2004) 124 Cal.App.4th 866, 882-883.)

The requirements of this Permit do not constitute a new program or a higher level of service as compared to the requirements contained in the previous permits. The overarching requirement to impose controls to reduce the pollutants in discharges from MS4s is dictated by the CWA and is not new to this permit cycle (33 USC section 1342(p)(3)(B)). The inclusion of new and advanced measures as the MS4 programs evolve and mature over time is anticipated under the CWA (55 FR 47990, 48052 (Nov. 16, 1990)), and to the extent requirements in this Permit are interpreted as new advanced measures, they do not constitute a new program or higher level of service.

The maximum extent practicable standard under CWA section 402(p)(3)(B)(iii) is a flexible standard that balances a number of considerations, including technical feasibility, cost, public acceptance, regulatory compliance, and effectiveness. (*Building Ind. Ass'n. of San Diego v. State Water Resources Control Bd*. (2004) 124 Cal.App.4th 866, 873-874, 889.) Such considerations change over time with advances in technology and with experience gained in stormwater management (55 FR 47990, 48052 (Nov. 16, 1990)). Accordingly, the determination of whether the Permit conditions exceed the requirements of federal law cannot be based on a point by point comparison of the permit conditions and the six minimum measures that are required "at a minimum" to reduce pollutants to the maximum extent practicable and to protect water quality (40 C.F.R. §122.34). Likewise, individual permit provisions cannot be considered in isolation. When implementing the federal requirement to reduce pollutants to the maximum extent practicable, the entire permit must be evaluated as a whole. The Second Appellate District of the Court of Appeal has affirmed this approach in a case that is now pending before the California Supreme Court. (*State Department of Finance v. Commission on State Mandates* (2014) 316 P.3d 1218, review granted (2013) 220 Cal.App.4th 740.)

Furthermore, in the analogous Phase II MS4 context, U.S. EPA has issued an MS4 Permit Improvement Guide (April 2010, available at: http://www.epa.gov/npdes/pubs/ms4permit_improvement_guide.pdf) that

recommends many provisions for Phase II MS4 permits not explicitly specified in the six minimum measures established at Code of Federal Regulations, title 40, section 122.34.

The requirements of the Permit are necessary to reduce the discharge of pollutants to the MEP. The Water Board finds that the requirements of the Permit are practicable, do not exceed federal law, and thus do not constitute an unfunded mandate. These findings are the expert conclusions of the principal state agency charged with implementing the NPDES program in California (CWC sections 13001, 13370). The provisions in this to effectively prohibit non-stormwater discharges are also mandated by the CWA (33 USC section 1342(p)(3)(B)(ii)). Likewise, the provisions of this Permit to implement TMDLs are federal mandates. The CWA requires TMDLs to be developed for waterbodies that do not meet federal water quality standards. (33 U.S.C. § 1313(d).) Once U.S. EPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable WLA. (40 CFR 122.44(d)(1)(vii)(B).)

Second, the Permittees' obligations under this Permit are similar to the obligations of nongovernmental dischargers who are issued NPDES permits for stormwater discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342), and the Porter-Cologne regulates the discharge of waste (Water Code section 13263), both without regard to the source of the pollutant or waste. As a result, the costs incurred by local agencies to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

Third, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. To the extent Permittees have voluntarily availed themselves of the Permit, the program is not a state mandate. (Accord *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 107-108.) Likewise, the Permittees have voluntarily sought a program-based municipal stormwater permit in lieu of a numeric limits approach. (See *City of Abilene v. U.S. EPA* (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The Permittees' voluntary decision to file a Report of Waste Discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See *Environmental Defense Center v. U.S. EPA* (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fourth, the Permittees' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

Finally, even if any of this Permit's provisions could be considered unfunded mandates, under Government Code section 17556, subdivision (d), a state mandate is not subject to reimbursement if the local agency has the authority to charge a fee. The Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Order, subject to certain voting requirements contained in the California Constitution. (See Cal. Const., Art. XIII D, section 6, subd. (c); see also *Howard Jarvis Taxpayers Ass'n v. City of Salinas* (2002) 98 Cal.App.4th 1351, 1358-1359.) The Fact Sheet demonstrates that numerous activities contribute to the pollutant loading in the MS4. Permittees can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., *Apartment Association of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention. (*County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487-488.)

D. Statewide General Industrial and Construction Stormwater Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

E. Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

F. Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered

by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under NPDES permitting pursuant to U.S. EPA Phase II stormwater regulations. Under Phase II, the Water Board intends to permit these federal, State, and regional entities through use of a statewide Phase II NPDES General Permit.

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, Chapter 4 Implementation, Table 4-1, Prohibition 7.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – San Francisco Bay Basin Plan, Chapter 3, Water Quality Objectives.

Receiving Water Limitation B.2. Legal Authority – Federal regulations require each NPDES permit to include limitations necessary to achieve water quality standards. 40 CFR 122.44(d)(1)(i). The State Water Board has previously determined that limitations necessary to meet water quality standards are appropriate for the control of pollutants discharged by MS4s and must be included in MS4 permits. (State Water Board Orders WQ 91-03, 98-01, 99-05, and 2001-15).). This Order accordingly requires that discharges shall not cause or contribute to violations of water quality standards.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

<u>Legal Authority</u>

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains water quality objectives as well as the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of

pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each water board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

California Water Code Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires NPDES permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director

determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

State Water Board Orders WQ 98-01 and 99-05 are precedential orders that require municipal stormwater permits to not cause or contribute to exceedances of water quality standards in the receiving water. The State Water Board Order 95-01 specifically requires that Provision C.1 include language that Permittees shall comply with discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges, whereby adopting an iterative approach to complying with the limitations. Courts have held that compliance with the iterative process does not excuse liability for violations of water quality standards. (*Building Industry Assn. of San Diego v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866; *City of Rancho Cucamonga v. Regional Water Quality Control Bd*. (2006) 135 Cal.App.4th 1377; *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2011) 673 F.3d. 880, rev'd on other grounds sub nom. *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2013) 133 S.Ct. 710, mod. by *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2013) 725 F.3d 1194, cert. den. *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2014) 134 S.Ct. 2135.)

State Water Board Order WQ 2015-0075 directs regional water boards to consider reasonable alternative compliance options for meeting receiving water limitations. Order WQ 2015-0075 specifically directs regional water boards to follow the principles stated below when issuing a municipal stormwater permit, unless a board makes a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons.

1. The receiving water limitations provisions of Phase I MS4 permits should continue to require compliance with water quality standards in the receiving water and should not deem good faith engagement in the iterative process to constitute such compliance. The Phase I MS4 permits should therefore continue to use the receiving water limitations provisions as directed by State Water Board Order WQ 99-05.
2. The Phase I MS4 permits should include a provision stating that, for water body-pollutant combinations with a TMDL, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination.
3. The Phase I MS4 permits should incorporate an ambitious, rigorous, and transparent alternative compliance path that allows permittees appropriate time to come into compliance with receiving water limitations without being in violation of the receiving water limitations during full implementation of the compliance alternative.
4. The alternative compliance path should encourage watershed-based approaches, address multiple contaminants, and incorporate TMDL requirements.

5. The alternative compliance path should encourage the use of green infrastructure and the adoption of low impact development principles.
6. The alternative compliance path should encourage multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply.
7. The alternative compliance path should have rigor and accountability. Permittees should be required, through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions. Permittees should be further required, again through a transparent process, to monitor the results and return to their analysis to verify assumptions and update the solutions. Permittees should be required to conduct this type of adaptive management on their own initiative without waiting for direction from the regional water board.

Alternative Path to Compliance with Discharge Prohibitions and Receiving Water Limitations for Certain Pollutants

This Order, as did the previous order, goes beyond requiring an open-ended iterative approach to compliance with water quality standards by including pollutant-specific provisions, C.9 through C.12 and C.14, with numerical WQBELs or narrative WQBELs with milestones and deadlines. The provisions and limitations implement adopted TMDL wasteload allocations and the associated implementation plans in the Basin Plan and specify what Permittees must do during the term of the Order to manage discharges of the specific pollutants that may cause or contribute to violations of water quality standards. If complied with, the Permittees will be deemed in compliance with Receiving Water Limitations B.1 and B.2 for these pollutants. The requirements of C.9 through C.12 and C.14 are ambitious and rigorous because they will require Permittees to fully commit to and implement challenging but achievable tasks to ultimately meet water quality objectives, including objective interim numeric effluent limitations. Accordingly, this Order explicitly applies principles 1, 2, and 3 (above) of State Water Board Order WQ 2015-0075 and provides an alternative path to compliance with Discharge Prohibitions and Receiving Water Limitations for the following pollutant – water body combinations: pesticides and pesticide-caused toxicity in all receiving waters (Provision C.9); trash in all receiving waters (Provision C.10); mercury in all San Francisco Bay segments and receiving waters in the Guadaloupe River watershed (Provision C.11); polychlorinated biphenyls (PCBs) in all San Francisco Bay segments (Provision C.12); and fecal indicator bacteria in San Pedro Creek and Pacifica State Beach receiving waters (Provision C.14).

This rigorous compliance alternative also applies Order WQ 2015-0075 principle 4. It implements all applicable TMDL requirements and calls for or allows for implementation of trash, mercury, and PCBs controls in watershed and drainage areas where they are most needed and most likely to be effective and promotes and allows use of controls with multiple pollutant benefits. The watershed-based approach addressing multiple pollutants is not appropriate for the pesticides and pesticide-caused toxicity requirements. Consistent with the TMDL wasteload allocation and implementation plan, these requirements are pollution prevention management practices specific to urban use

pesticides and apply to all watersheds and drainage areas. The fecal indicator bacteria requirements for discharges to San Pedro Creek and Pacifica State Beach receiving waters implement TMDL requirements and call for fecal indicator bacteria-specific pollution prevention controls consistent with current knowledge of sources and activities in the watershed.

Provision C.3 of the Order calls for adoption and implementation of low impact development consistent with Order WQ 2015-0075 principles 5 and 6. The mercury and PCBs provisions (C.11 and C.12) explicitly recognize and call for use of green infrastructure to meet pollutant load reduction requirements. The trash provision allows use of low impact development green infrastructure as full trash capture systems, if appropriately designed, operated, and maintained. Although not directly required in the pesticides and fecal indicator bacteria provisions, low impact development principles and development and implementation of green infrastructure plans, including consideration of multi-benefit regional projects, could also have pesticides and bacteria load reduction benefits.

Consistent with Order WQ 2015-0075 principle 7, each of the pollutant-specific provisions also contain concrete milestones and deadlines and reporting requirements that provide rigor and accountability. All reports, plans, and other required submittals will be made available to all interested parties and input and feedback from interested parties will be considered in the evaluation of all submittals.

The Order also includes monitoring requirements (Provision C.8) to assess water body and watershed conditions and effectiveness of control actions towards attainment of water quality standards and to inform selection and implementation of new control actions or adaptive improvements of control actions.

Consistent with the TMDLs, more time than the term of the Order will be necessary to attain water quality standards for mercury and PCBs. In these cases, the associated Order provision includes an additional requirement for the Permittees to submit a proposed plan of additional or improved control actions and schedule of implementation to attain water quality standards or TMDL wasteload allocations for the Water Board's consideration of numerical or narrative WQBELs in the subsequent order.

This Order also includes specific requirements to control copper in discharges to all San Francisco Bay segments (Provision C.13) in accordance with the Basin Plan implementation plan of the site-specific water quality objectives for copper in these receiving waters. However, the Permittees already comply with Receiving Water Limitations for copper in all San Francisco Bay segments since these copper objectives are attained in these receiving waters.

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), California Water Code (CWC) sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires "[a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires "[a] description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires "[a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires "[a] description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Sediment accumulated on paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, is the major source of point source pollutants found in urban runoff. Thus, Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention efforts as set forth in this Permit. Such prevention measures include, but are not limited to, activities as described below. The work of municipal maintenance personnel is vital to minimize stormwater pollution because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges.

C.2-2 Road construction and other activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, impacting water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b) Identification and prioritization of rural roads maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources; (c) Road and culvert construction designs that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability; (d) Development and implementation of an inspection program to maintain road structural integrity and prevent impacts to water quality; (e) Provide adequate maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, re-grade roads to slope outward where consistent with road engineering safety standards, and install water bars; and (f) When replacing existing culverts or redesigning new culverts or bridge crossings use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

Road construction, culvert installation, and other rural maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly

designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other rural public works activities, including those the BMP approach would address, have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways. This Provision would help ensure that these impacts are appropriately controlled.

Specific Provision C.2 Requirements

Provision C.2.a-e. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities, such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations) Water Board staff investigated the occurrence of low salinity and dissolved oxygen (DO) conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Water Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Wildlife in Alameda County.

Discharge of black-colored water from the Alvarado pump station to Old Alameda Creek was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L (DO) water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The (DO) sag was detected from surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Investigations of these incidents found that stormwater pump stations, universally operated by automatic float triggers, have been confirmed as the cause in at least one instance and may represent an overlooked source of controllable pollution to the San Francisco Bay Estuary and its tidal sloughs. The discharges of dry weather urban runoff from these pump stations were not being managed to protect water quality and surveillance monitoring detected measurable negative water quality consequences of this current state of pump station management.

Pump station discharges are controllable point sources of pollution that are virtually unregulated, causing violations of water quality objectives. Therefore, the Previous Permit required (1) an inventory of pump stations, (2) inspection of pump stations twice a year during the dry season to collect (DO) data and implement corrective actions for DO

at or below 3 milligrams per liter (mg/l), and (3) inspection of pump stations after two storm events during the wet season to collect data on the presence of trash and other water quality parameters.

The Permittees have submitted a list of all pump stations. DO data in annual reports shows that turning on the pumps aerates the water, thereby increasing the DO of the water to at least 3 (mg/l), the minimum DO requirement.

40 CFR 122.26(d)(2)(I)(f) requires Permittees to carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with permit conditions, including the prohibition on illicit discharges to the MS4. Pump stations, which collect and discharge from the storm drain systems, cannot contribute discharges with dissolved oxygen (DO) level below 3 mg/L. Previous pump station reporting shows that implementation of corrective actions (i.e., BMPs) prior to the pumps, combined with using the pumps to discharge collected water, as opposed to simply allowing it to overflow, aerates the water to a DO level of at least 3 mg/L. Thus, this Permit removes the specific requirements for the monitoring of DO at pump stations and allows the Permittees greater flexibility to ensure that all water discharged from pumps stations is at least 3 mg/l. The reporting requirement has also been removed from this Permit, but Permittees must maintain any sampling records and make them available upon request.

The Previous Permit also wanted to explore the use of the pump stations for trash capture to protect the beneficial uses of the receiving waters. Information collected shows that pump stations as trash capture devices are inefficient because their reservoirs are too small to contain trash. At the same time, many municipalities have installed full and partial trash capture devices at select storm drain inlets.

Provision C.2.f. (Corporation Yard BMP Implementation) requires Permittees to implement the BMP in site-specific Stormwater Pollution Prevention Plans (SWPPPs) to minimize pollutant discharges in stormwater and non-stormwater discharges. The Previous Permit required SWPPPs to be developed and implemented by July 1, 2010. SWPPPs should have specific BMPs for different functions of the corporation yard and provide guidance for frequent mini inspections to ensure that appropriate BMPs are implemented. During the Previous Permit term, Water Board staff and U.S. EPA staff inspected a few of the Permittees' corporation yards and evaluated the corresponding SWPPPs. All inspected corporation yards had actual and/or potential discharges. Most of the countywide programs developed templates for the SWPPPs. Individual Permittees were supposed to customize the template to fit their corporation yards. Some Permittees did not fully customize the SWPPP template. A few Permittees have comprehensive, site-specific SWPPPs. Water Board staff also evaluated this Provision in annual reports. The Previous Permit required routine inspections in different areas of the corporation yard and at least one inspection prior to the start of the rainy season. The intent of the inspection requirement was to have regular mini-inspections and one full corporation yard inspection sometime in late August or in September, right before the start of the rainy season in October, to make sure the corporation yard was clean and all issues were resolved before the start of the rainy season. Some Permittees inspected in the spring or early summer and documented that as the inspection for the year to comply with this

Provision in the annual report due the following September. Other Permittees did not inspect until late fall or winter. Some Permittees documented issues but the annual reports either did not document the corrective actions or corrective actions were implemented weeks or months later. Therefore, this Permit clearly identifies the timeframe of when the annual inspections must occur and requires corrective actions to be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. This is consistent with the timeframe for implementation of corrective actions in provisions C.4. and C.5.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the premise that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions. The goal of Provision C.3. is for Permittees to use their planning authority to reduce pollutant discharges and runoff flow into the storm drain system primarily through the implementation of low impact development (LID) techniques.

C.3-3 To accomplish this goal, Permittees shall require new development and redevelopment projects to implement appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from these projects. Permittees shall also complete and implement a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs and other storm drain infrastructure elements. Neither Provision C.3. nor any of its requirements are intended to restrict or control local land use decision-making authority.

C.3-4 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-5 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to

regulation pursuant to Sections 401 or 404 of the federal Clean Water Act. This is consistent with the stayed 2015 Clean Water Rule exempting stormwater control features from the definition of "waters of the U.S." (80 Fed. Reg. 37054 (June 29, 2015).) Water Board staff is working with the California Department of Fish and (CDFW) and U.S. Fish and Wildlife Service (USFWS) to identify how maintenance for stormwater treatment controls required under permits such as this Permit can be appropriately streamlined, given CDFW and USFWS requirements, and particularly those that address special status species. This Permit requires Permittees to ensure that constructed wetlands installed by Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-6 The Permit requires Permittees to ensure that pervious pavement systems of 3000 square feet or more, onsite, joint, and offsite stormwater treatment systems, and HM controls installed by Regulated Projects are properly operated and maintained for the life of the Projects. In cases where the responsible parties for the treatment systems or HM controls have worked diligently and in good faith with the appropriate state and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment systems or HM controls, but these approvals are not granted, the Permittees shall be considered by the Water Board to be in compliance with Provision C.3.h.iv. of the Permit.

Specific Provision C.3 Requirements

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) sets forth essentially the same legal authority, development review and permitting, environmental review, training, and outreach requirements that are contained in the previous permit.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

This permit is a 3rd generation permit containing stormwater treatment requirements for development projects. Past permits have grandfathered development projects approved prior to those permits' effective dates, essentially exempting the projects and allowing them to provide no or insufficient stormwater treatment. Water Board staff believe a small number of these development projects that were approved more than a decade ago have still not begun construction. A decade is sufficient time to justify requiring the Permittees to revise and update these stagnant development permits to include current LID treatment requirements. Therefore, this provision removes the grandfathering of

development projects approved with no stormwater treatment requirements and that have not begun construction. However, this provision allows exemptions for some of these previously approved projects in situations where the Permittees lack legal authority to retroactively change their previous approvals. This provision also allows some of these previously approved projects to use non-LID stormwater treatment instead of LID treatment because of space constraints.

To confirm that the total number of Projects previously approved without any Provision C.3. compliant stormwater treatment is indeed small, Provision C.3.b.iv.(1) includes a requirement for Permittees to provide in their 2017 Annual Report a complete list of these types of development projects. For each such Project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). This reporting requirement only applies to Permittees that have Projects subject to Provision C.3.b.i.(2).

Regulated Projects approved with non-LID stormwater treatment measures in compliance with the hydraulic sizing criteria of Provision C.3.d. will continue to be grandfathered.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy.[13] The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, pervious pavement systems, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes. This is a standard, current, ordinary, and regular practice being implemented in numerous jurisdictions in California, the U.S., and internationally, including: the Permittees' jurisdictions, Los Angeles, San Diego, San Francisco, Portland, OR, Seattle, Minneapolis, Milwaukee, Kansas City, Chicago, New York City, Philadelphia, Auckland, New Zealand, Chinese "sponge cities" such as Wuhan and Changde, and others.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(1) lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of

[13] U.S. EPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) http://water.epa.gov/polwaste/green/upload/2008_01_02_NPS_lid_costs07uments_reducingstormwatercosts-2.pdf)

businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff.

Provision C.3.c.i.(2)(a) lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. One design element requires each Regulated Project to include at least one site design measure from a list of six that includes recycling of roof runoff, directing runoff into vegetated areas, and installation of pervious pavement systems instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.

Provision C.3.c.i.(2)(b) requires the Permittees to collectively develop and adopt design specifications for pervious pavement systems, subject to the Executive Officer's approval. However, this subprovision allows Permittees to reference pervious pavement design specifications previously developed by countywide programs and adopted into countywide stormwater handbooks. Design specifications are necessary because improperly designed and engineered pervious pavement systems may cause flooding and the discharge of insufficiently treated stormwater runoff.

Provision C.3.c.i.(2)(c) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

Provision C.3.c.i.(2)(c)(i) defines LID treatment measures as harvesting and use, infiltration, evapotranspiration, or biotreatment.

The Previous Permit required that a properly engineered and maintained biotreatment system may be considered only if it was infeasible to implement harvesting and use, infiltration, or evapotranspiration at a project site. Infeasibility may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

The Previous Permit also required the Permittees to produce two reports during the permit term. The first report[14] established criteria and procedures for Permittees to follow to implement the hierarchy of LID treatment measures listed above (i.e., harvesting and use, infiltration, and evapotranspiration must be considered prior to biotreatment). The second report[15] reviewed data from two years of the Permittees' Annual Reports to evaluate the results of applying the feasibility / infeasibility criteria. The conclusions of the second report were:

- Infiltration of some runoff is feasible on most projects, although in the clay soils typical of the Bay Area, the amount of runoff than can be infiltrated is unpredictable and highly variable.
- Very few development projects create the quantity and timing of non-potable water demand required to feasibly harvest and use the amount of runoff specified in Provision C.3.d.
- Bioretention facilities, when designed according to the criteria in current Permittee guidance, could infiltrate 40% - 80% of the total runoff, depending on rainfall patterns and facility size. However, the amount of runoff that would be infiltrated over the life of a particular project is variable and unpredictable because of uncertainty in the near-term and long-term infiltration performance of underlying soils. Infiltration can be maximized by ensuring project designs meet current design criteria and by ensuring treatment systems are constructed as designed.

The Permittees completed a "White Paper" on Provision C.3. on February 27, 2015.[16] The White Paper concluded that the pollutant removal performance of biotreatment facilities, overall and on average, is equivalent or better than the likely real-world performance of harvest and use facilities and as good as the likely performance of infiltration facilities when considered over the long term. The White Paper also noted that biotreatment facilities require less maintenance and are less prone to failure than harvest and use facilities, and in some cases, are also preferable to direct infiltration facilities.

Based on the data provided by the above Permittee reports, this Permit removes the Previous Permit's restriction on allowing properly engineered and maintained biotreatment systems only after an infeasibility analysis of harvesting and use, infiltration, or evapotranspiration treatment measures.

Provision C.3.c.i.(2)(c)(ii) requires biotreatment systems to meet minimum performance specifications in order to be considered as LID treatment. This subprovision also requires biotreatment soil media to meet the current minimum specifications developed and included in the Previous Permit.[17] However, this subprovision recognizes that the current soil media specifications may need to be

[14] *Harvest and Use, Infiltration and Evapotranspiration Feasibility/ Infeasibility Criteria Report (2011)*
[15] *Status Report on the Application of Feasibility / Infeasibility Criteria for Low Impact Development (2013)*
[16] BASMAA, February 27, 2015. "White Paper" on Provision C.3 in MRP 2.0: Final Report.
[17] Attachment L of Board Order No. R2-2009-0074, adopted October 14, 2009, and revised November 27, 2011.

modified because of variability in climate, rainfall, and compost composition among the different counties. Therefore, this subprovision allows for the Permittees to collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the current soil media minimum specifications, subject to the Executive Officer's approval.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) lists the hydraulic sizing design criteria that the stormwater treatment systems installed for Regulated Projects must meet. The volume and flow hydraulic design criteria are the same as those required in the Previous Permit. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects.

Provision C.3.d.iv. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices. The restriction that infiltration devices have to be deeper than wide has been removed to reflect current design practices. The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites.

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.b.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

Provision C.3.e.i. This Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite or Regional Project is in the same watershed as the Regulated Project and constructed within 3 years of the end of construction of the Regulated Project. The 3 years of additional time are allowed because more time may be required to complete construction of offsite and Regional projects because of administrative, legal, and/or construction delays. We acknowledge in some instances, an even longer time may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended up to 5 years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

Provision C.3.e.ii. (Special Projects) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these types of Special Projects. This Provision includes specific criteria for determining which types of Regulated Projects may be considered Special Projects and establishes different categories of Special Projects based on size, land use type, and density. Except for Category A, which represents the smallest Special Projects, this Provision also uses location, density, and parking criteria to establish a tiered approach for determining the total LID Treatment Reduction Credit available for any given Special Project. The total available LID Treatment Reduction Credit may be used to reduce the amount of stormwater runoff that must be treated with LID stormwater treatment systems. The remaining amount of stormwater runoff must be treated with one or a combination of the following two specific non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

This Provision is the same as in the Previous Permit except for the following three changes:

- Density LID Treatment Reduction Credits are allowed for mixed use development projects, which consist of a mix of residential and commercial land uses, based on density measured by either the dwelling units per acre or floor area ratio. This change acknowledges that mixed use development projects can vary from mostly commercial to mostly residential. The Previous Permit did not accommodate this variability and penalized dense mixed use projects that are mostly residential by restricting density LID Treatment Reduction Credits to only floor area ratio criteria.
- Definitions of gross density and floor area ratio have been included in Provision C.3.b.ii. to aid consistent implementation of this Provision by all Permittees. Gross Density is defined as the total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses. Floor Area Ratio (FAR) is defined as the ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area. Gross density and FAR have been purposely defined to include public rights-of-way, recreational, civic, commercial, and other non-residential uses so as to raise the bar for Regulated Projects to qualify for the LID Reduction Credits allowed in Provision C.3.e.ii. That is, these more conservative gross density and FAR values may result in some Regulated Projects qualifying for less LID Reduction Credits or not qualifying at all.

  The reporting data for Special Projects under the current permit shows that "lack of space to provide full LID stormwater treatment" is the most frequent reason invoked for why 100% LID treatment onsite is infeasible. Therefore, it is appropriate that the space reserved for public rights-of-way, recreation, civic,

commercial, and other non-residential uses are included in the calculations for gross density and FAR, especially since many of these areas may be used for installation of LID treatment measures.

- To reduce the burden of reporting, the semi-annual reporting of Special Projects that are being considered by Permittees prior to the Permittees granting final planning approval has been reduced to annual, within the Annual Report. Although the frequency of reporting has been reduced, the current reporting requirements for this Provision are unchanged because the data is necessary for Water Board staff to validate the Permittees' analysis of the number and size of potential Special Projects that may be approved during this permit term. Water Board staff intends to use the data collected in the proposed reporting requirements to revise the Special Projects criteria as appropriate for the next permit term.

Provision C.3.f (Alternative Certification of Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed.

Provision C.3.g. (Hydromodification Management) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Background for Provision C.3.g. Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Those HM requirements are stated in Provision C.3.g., and Attachment C includes maps prepared by the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees showing areas where HM requirements apply.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[18] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[19] All Permittees may

[18] http://www.ecy.wa.gov/programs/wq/stormwater/wwhm_training/wwhm/wwhm_v2/instructions_v2.html
[19] See www.bayareahydrologymodel.org, Resources.

use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. The Previous Permit allowed the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices and to identify whether streams to which Contra Costa Permittees discharge may have a different susceptibility to HM impacts, thus justifying a different threshold for control of flows resulting in those impacts. The Contra Costa Permittees submitted an IMP Monitoring Report,[20] which found that Contra Costa HM measures generally, but not entirely, met the Previous Permit's HM requirements for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. The Contra Costa Permittees did not submit information showing that Contra Costa creeks had a different susceptibility to erosion. That is, they did not submit a justification for using erosion thresholds different than those accepted for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. Under the Previous Permit, the Water Board had accepted a higher threshold for control of HM effects (i.e., controlling the range of flows beginning at 20% of the 2-year pre-project peak flow, as opposed to 10% of the 2-year pre-project peak flow). Because this additional information was not submitted, and Contra Costa streams are generally similar to other Bay Area streams, the Permit extends the 10% standard to Contra Costa, and includes requirements for Contra Costa to complete modifications to its HM approach to ensure that projects implement that consistent approach within a specified time.

The Previous Permit Provision C.3.g.v. required the City of Vallejo to complete a hydrograph modification management plan (HMP) by July 1, 2013, in lieu of complying with Previous Permit Provision C.3.g.i-iv. The City submitted its Final HMP on April 24, 2013,[21] and the HMP was subsequently accepted by Board staff. The Final HMP incorporates the same requirements as for the Alameda, Santa Clara, and San Mateo Permittees. The Permit requires the City to comply with those requirements.

The Fairfield-Suisun Permittees are required to comply with the HM criteria established in this Permit. However, they have a threshold for control of erosive flows that is greater than the other Permittees: 20 percent of the 2-year peak flow. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data.

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal

[20] Contra Costa Clean Water Program, September 15, 2013. IMP Monitoring Report: IMP Model Calibration and Validation Project.

[21] City of Vallejo (Geosyntec), April 2013. Final Hydromodification Management Plan (HMP).

stormwater Permittees jointly conduct investigations as appropriate. Any future proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

- Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;
- The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;
- The effectiveness of self-retaining areas for management of post-project flows and durations; and/or
- The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

Provision C.3.g.i. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded by the conditions expressed in C.3.g.i.(1)-(3). Those conditions identify areas where the potential for single-project and/or cumulative development hydromodification impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[22] The Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees have developed maps showing where HM controls are required (Attachment C). This Provision requires Permittees that have not previously submitted an HM Applicability Map or equivalent information to prepare and submit that information, acceptable to the Executive Officer, consistent with the requirements of Provision C.3.g.

Provision C.3.g.ii. establishes the standard HM controls that all HM Projects must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

Provision C.3.g.iii. provides a procedure for the Permittees to propose an additional method for demonstrating compliance with HM requirements. This method would directly simulate erosion potential, and would be required to ensure that projects implementing HM controls with this method, if accepted by the Executive Officer, meet the Permit's HM criteria. This provision requires submittal of appropriate analyses demonstrating that the method will substantively comply with HM requirements; it may not be implemented on projects until accepted by the Executive Officer.

[22] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or sub-catchments that are 70 percent impervious or more.

Provision C.3.g.iv. identifies and defines three methods of hydromodification management.

Provision C.3.g.v. establishes the timeframes for meeting the HM Standard defined in Provision C.3.g.ii.

Provision C.3.g.vi. describes the information required to be collected and/or submitted in the Permittees' Annual Reports regarding HM Projects. This Provision also describes specific required information for Contra Costa Permittees to submit with the 2017 Annual Report.

Provision C.3.h (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the Regulated Project is provided for all pervious pavement systems of 3,000 square feet or more; onsite, joint, and offsite stormwater treatment systems; and HM controls installed.

This Provision adds a requirement for Permittees to include pervious pavement systems of 3,000 square feet or more in their Operation and Maintenance Agreements, database of Regulated Projects, and inspection checklists. Pervious pavement systems serve as site design measures that directly reduce the amount of impervious surface area and therefore, the size of the stormwater treatment system(s) required to comply with Provision C.3.d. Adequate routine maintenance of pervious pavement systems is essential because clogged systems become impervious and may result in untreated stormwater runoff or additional load on stormwater treatment systems that result in inadequately treated stormwater runoff. To lessen the burden of inspecting so many pervious pavement systems, only those of 3,000 square feet or more are required to be inspected and patios for private-use at single-family homes, townhomes, or condominiums are specifically excluded. In the case of large subdivisions where the total pervious pavement system area is equal to or greater than 3,000 square feet, but the pervious pavement installations are on individual driveways that are less than 3,000 square feet, inspection of a representative number of driveways will suffice.

Provision C.3.h.ii.(6) The Previous Permit required Permittees to inspect at least 20% of all stormwater treatment systems annually, at least 20% of all vault-based systems annually, and every treatment system at least once every 5 years. Permittees have indicated that each inspection of a Regulated Project routinely includes inspection of pervious pavement systems, stormwater treatment systems and HM controls installed at the Project. Therefore, this Provision revises the inspection frequency requirements such that the minimum number of inspections required annually is tied to a percentage of the total number of Regulated Projects, instead of the total number of individual treatment systems and HM controls. This lessens the tracking burden for the Permittees and better reflects the way actual inspections are conducted.

This Provision requires each Permittee to inspect all its Regulated Projects at least once every 5 years and inspect an average of 20%, but no less than 15% of the total number of Regulated Projects annually. This requirement serves to prevent failed or improperly maintained pervious pavement systems, stormwater treatment systems, or

HM controls from going undetected until the 5th year. Neither of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor maintained systems, maintenance history, past compliance problems at certain Projects, etc.

Provision C.3.h.ii.(6)(d) This Provision allows Permittees to accept third party inspection reports for vault-based stormwater treatment systems in lieu of conducting Permittee inspections, but only if the third party inspections are conducted at least annually, which is the normal frequency for maintenance of these systems. Each third party inspection must be included in the database or tabular format required in Provision C.3.h.ii.(4) and (5) and clearly identified as a third party inspection, Each third party inspection report must document the third party inspection company, date of inspection, condition of the treatment unit(s) at the time of inspection, maintenance activities performed, and appearance of the inside of the vault units (with photos) before and after maintenance.

Provision C.3.h.ii.(7) As the number of Regulated Projects grows, the Permittees' O&M inspection programs must grow as well. Therefore, this Provision requires each Permittee to develop and implement an Enforcement Response Plan (ERP) for O&M inspections. The ERP serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. This Provision establishes minimum requirements for the ERPs. One of these requirements is that corrective actions must be implemented within 30 days after a problem is identified by an inspector. Thirty days is more than adequate time, considering that many of the problems identified in past O&M inspection reports have been lack of maintenance service or build-up of sediment or debris. The correction of such deficiencies should not take more than 30 days. This Provision also allows for greater than 30 days to complete permanent corrective actions, such as installing additional curb cuts and making grading or vegetation improvements.

Provision C.3.h.iv. This Provision sets the implementation dates for adding pervious pavement to Permittees' O&M programs and complying with the revised minimum inspection frequencies to July 1, 2016, so as to align with the Permittees' fiscal years. This allows time for the Permittees to revise their O&M programs and budget for the revisions. This Provision also specifies a July 1, 2017, due date for implementation of an ERP for the same reasons.

Provision C.3.h.v. As in the Previous Permit, this Provision requires the Permittees to maintain a database or equivalent tabular format with detailed information on each O&M inspection and any necessary enforcement actions against Regulated Projects. To lessen the burden of reporting, this Provision only requires summary data on inspections conducted each fiscal year to be reported in the Annual Report, instead of detailed information on each O&M inspection. However, upon request by the Executive Officer, detailed information from the database or tabular format must be submitted.

Provision C.3.i. (Required Site Design Measures for Small Project and Detached Single-Family Homes Projects) contains requirements on single-family home projects that create and/or replace 2,500 square feet or more of impervious surface and small development projects that create and/or replace > 2,500 ft^2 to <10,000 ft^2 impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development. This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small; however, the cumulative impacts could be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees.

Provision C.3.j. (Green Infrastructure Planning and Implementation) requires Permittees to complete and implement a Green Infrastructure Plan (Plan) for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements.

The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff Total Maximum Daily Load (TMDL) wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is in lieu of expanding the definition of Regulated Projects prescribed in Provision C.3.b.ii. to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. However, subsequent permits may include different impervious surface thresholds or other criteria for Regulated Projects. The Plan also provides a mechanism to establish and implement alternative or in lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.ii.

Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and

evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

The Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash and PCBs, mercury, and other pollutants. Permittees may comply with any requirement of this Provision through a collaborative effort.

Provision C.3.j.i.(1) This Provision requires each Permittee to prepare a framework or workplan that describes specific tasks and timeframes for developing its Green Infrastructure Plan. The framework or workplan is required to be approved by each Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. This approval process provides assurance to the Water Board that Permittees are committed to the development of the Plan and implementation of green infrastructure.

Provision C.3.j.i.(2) This Provision specifies minimum elements that each Green Infrastructure Plan must contain to ensure that each Plan is robust and appropriately identifies the means and methods that each Permittee will employ to implement green infrastructure over time. These minimum elements (discussed below) are not overly prescriptive, so as to allow Permittees flexibility in developing their Plans.

(a) A mechanism to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area specific basis. Implementation of these projects is required to be projected over the same timeframes as specified in Provisions C.11. and C.12. for assessing mercury and PCB load reductions because green infrastructure and projects are an acknowledged means of pollutant load reductions. Each Permittee has flexibility in choosing the mechanism as long as it includes criteria for prioritization and outputs that can be incorporated into its long-term planning and capital improvement processes.

(b) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the same timeframes as specified in Provisions C.11. and C.12. for assessing mercury and PCB load reductions. These self-determined targets represent the green infrastructure work that each Permittee has proactively identified will be completed beyond what would be completed in its community anyway.

(c) A process for tracking and mapping completed projects, public and private, and making the information publicly available. Again, each Permittee has flexibility in what they use to comply with this Provision.

(d) General guidelines and standard specifications for overall streetscape and project design and construction to ensure that projects have a unified, complete design that implements the range of functions associated with the projects. These

guidelines and standard specifications, while crucial to a Green Infrastructure Plan, already exist in many reference documents for green infrastructure design and are readily available.

(e) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. In recognition of space and drainage constraints that may occur for public green infrastructure road projects not subject to Provision C.3.b.ii. (i.e., non-Regulated Projects), this Provision allows Permittees to collectively propose a single approach for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements. The single approach can include different options to address specific issues, constraints, or scenarios.

(f) A summary of the planning documents the Permittee has updated or otherwise modified as well as how the Permittee will ensure that green infrastructure requirements will be included in future plans. The purpose of this element is to show that each Permittee is considering green infrastructure in all aspects of its urban planning.

(g) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation.

(h) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, state, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.

At U.S. EPA's request, Water Board staff has included at the end of this Fact Sheet section an outline of information used in part by MS4 permittees in the Los Angeles area in their preparation of watershed management plans. We recommend that Permittees consider this information as they prepare Green Infrastructure Plans.

Provision C.3.j.i.(5) requires each Permittee to document in its 2017 Annual Report that the framework or workplan for development of its Green Infrastructure Plan was approved by June 30, 2017, as required by Provision C.3.j.i.(1). This Provision also requires each Permittee to submit its Green Infrastructure Plan and documentation of the legal mechanisms to implement the Plan with the 2019 Annual Report. Based on other cities' past experiences in developing Green Infrastructure Plans, Water Board staff believes the deadlines specified provide adequate time for each Permittee to complete the framework or workplan as well as the Green Infrastructure Plan itself. Allowing the entire permit term to complete the Green Infrastructure Plans is too much time and prevents any of the Plans from being used by Board staff to inform the development of the MRP in the next permit term.

Provision C.3.j.ii.(1) requires each Permittee to prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation that have potential for green infrastructure measures.

Provision C.3.j.ii.(2) requires the list to be submitted with each Annual Report along with a summary of planning or implementation status for each public green

infrastructure project and each private green infrastructure project that is not also a Regulated Project under Provision C.3.b.ii. This Provision also requires each Permittee to include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, the Permittee is required to submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

The purpose of Provision C.3.j.ii. is to ensure that each Permittee is proactively developing green infrastructure projects and including green infrastructure elements into already planned infrastructure projects as much as possible, while the Green Infrastructure Plan is being developed.

Provision C.3.j.iii. requires the Permittees, individually or collectively, to track processes, assemble and submit information, and provide information, materials, and presentations as needed to assist relevant regional, state, and federal agencies to plan, design , and fund green infrastructure measures into local infrastructure projects, including transportation projects.

Provision C.3.j.iv. requires the Permittees, individually or collectively, to develop and implement regionally-consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.

Attachment A to U.S. EPA's Comments on the May 11, 2015 Tentative Order Suggested Components of Green Infrastructure Plans

Outlined below are some potential ideas for Green Infrastructure (GI) plans.to be developed by Bay Area permittees during MRP 2.0. Components provided below primarily arise from Los Angeles Regional Water Board guidance for reasonable assurance in watershed management plans as part of MS4 permit. Many components, but perhaps not all, will be applicable to GI plans for Bay Area. EPA encourages the Water Board to consider these ideas, modify as they deem appropriate, and include similar description of GI framework in the MRP 2.0 Fact Sheet. We recognize the continued partnership of MS4 permittees, the Water Board, EPA, and other stakeholders to discuss these ideas prior to inclusion into final GI plans.

A. Identify the water quality priorities with watershed.
   1. Include any applicable required water quality milestones and compliance deadlines
   2. Describe watershed features, waterbodies any other relevant environmental setting information
   3. Outline other municipal specific goals to be addressed; e.g., flood risk, sea level protection, groundwater infiltration.

B. Describe current BMPs and estimate existing pollutant loads
   1. List pollutant sources in watershed
   2. Provide map of major MS4 outfalls
   3. List any current BMPs within watershed (structural and non-structural)
   4. Using existing data (up to 10 yrs), give estimates of pollutant loads from watershed. (could be cone-based if no flow measurements available)
   5. Define on pollutant specific basis
   6. To extent data available and feasible, assess critical condition loads
   7. Describe variability of estimations.

C. Estimate required pollutant load reductions
   1. To extent feasible, provide estimate of pollutant load reductions, if mass-based then calculate difference between current and allowable loads; if concentration- based then define the two values.

D. Identify future control measures/BMPs/strategies to be implemented
   1. Describe drainage areas for implementation
   2. Identify control measures for stormwater and non-stormwater discharges; include number, location(s) and type; i.e., structural or non-structural controls, within new development, retrofit of existing development, stream/habitat restoration projects,
   3. Clarify pollutants to be addressed
   4. Define/map location of each control measure in watershed/jurisdiction
   5. Quantify upstream drainage area captured by each BMP
   6. Clarify if municipal effort only, private efforts or public/private projects
   7. Identify if project is within local jurisdiction or regional and describe cities involved.

E. Provide schedule of implementation
   1. Identify interim milestones and dates for achievement (within this permit cycle)
   2. Identify all future and final dates for achievement

3. Demonstrate that existing and future control measures will yield final pollutant load reductions and/or meet receiving water limits.

F. Provide Pollutant Reduction Plan
1. Identify compliance points (should be consistent with any existing regulatory compliance locations; e.g., TMDL monitoring sites expected to assess compliance)
2. Consider assessment locations in association with MS4 outfalls to monitor pollutant load responses due to upstream control measures.
3. Describe and evaluate selected control measures - appropriate for pollutant and sizing for load capture
4. Demonstrate selected control measures have reasonable assurance to meet interim/final requirements.
5. Describe adaptive management process if pollutant milestones are not met and added BMPs are needed
6. Include timeframe for future re-assessments.

G. If model used, provide description of watershed model
1. Identify model type; e.g., watershed, receiving water, BMP performance, empirical
2. Provide (minimum required) model components: input data, parameters, BMP performance parameters, output
3. Describe model calibration acceptance criteria
4. Describe efficiency for BMP performance parameters
5. Demonstrate model outputs for existing pollutant loads will be addressed by combination of control measures/BMPs to achieve final milestones.

H. Describe corresponding water quality monitoring program
1. Identify parameters of concern, all monitoring sites, sampling frequency (including wet and dry weather events)
2. Clarify which monitoring sites are MS4 outfalls
3. Briefly describe analytical methods and QA procedures to support monitoring
4. Describe any future monitoring locations and anticipated timeframe of data collection
5. Briefly describe pollutant sources upstream of monitoring sites.

I. Identify post-implementation tracking assessment efforts
1. Once completed, describe the BMPs implemented, including any modifications from original project design
2. Describe assessment procedures for evaluating effectiveness of control measure and corresponding pollutant load reductions for each implemented BMP, as necessary
3. Provide schedule for re-evaluation of BMP load reductions over long term.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires "[a] description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system." Other specific legal authority is cited below.

Specific Provision C.4. Requirements

Provision C.4. has been revised from the Previous Permit so that related topics are grouped together better. A new Provision C.4.d. – Inspections has been created. It essentially consolidates, from the Previous Permit, the inspection requirements in Provision C.4.d. – Inspection Plan and Provision C.4.c. – Enforcement Response Plan.

Provision C.4.a (Legal Authority)

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Provision C.4.b (Inspection Plan)

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit continues to require Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "[p]rovide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

The Permit continues to require Permittees to identify various industrial sites and sources subject to the Industrial General Permit or other individual NPDES permit. U.S. EPA supports the municipalities regulating industrial sites and sources that are already covered by an NPDES permit:

> Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.[23]

And:

> Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, USEPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.[24]

This Permit does not require the Permittees to submit the list of facilities scheduled for inspection each year with annual reports. Instead, Permittees are to add each year's inspection list to the Inspection Plan as part of the annual update to the Inspection Plan. Permittees may choose to keep their annual lists in their databases or in electronic form. The annual lists must be made readily available to Water Board staff or its representatives upon request.

Water Board staff reviewed about 20% of the Permittees' Inspection Plans during the Previous Permit term. A few of those Inspection Plans also provide detailed flow charts or instructions on how to conduct inspections, fill out the inspect forms, execute enforcement actions, conduct follow-up, and fulfill tracking and reporting for the MRP. These comprehensive Inspection Plans help ensure inspection consistency and serve as excellent training documents for new inspection staff.

Provision C.4.c (Enforcement Response Plan) requires the Permittees to implement and update, as needed, their Enforcement Response Plan (ERP) that serves as a reference for inspection staff to take consistent and timely responses to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for

[23] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48056
[24] Ibid

implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP. ERPs are unique to each Permittee. As such, this Permit continues to have broad requirements for the ERP. This allows the individual Permittee maximum flexibility to customize the ERP to fit its legal authority and the way it does business. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Short timeframes for implementing corrective actions encourage businesses to take care of the issues promptly, thus prevent mobilizing potential discharges. Permittees must also require immediate cessation of active non-stormwater discharges, timely implementation of corrective actions to clean up the discharge, and implementation of measures to prevent future active discharges.

This Permit standardizes and clarifies the ERP requirements in provisions C.4., C.5, and C.6. to eliminate any ambiguity in the requirements.

Provision C.4.d (Inspections) takes the inspection requirements from the Previous Permit's Provision C.4.b. Inspection Plan and C.4.c. ERP and consolidates them together into this Provision. Inspection frequencies are determined by each Permittee in its Inspection and Enforcement Response Plans.

U.S. EPA guidance states "management programs should address minimum frequency for routine inspections." The U.S. EPA Fact Sheet—Visual Inspection says "[t]o be effective, inspections must be carried out routinely." [25]

Permittees have asked that this Permit reduce the record keeping and reporting requirements. The specific record keeping requirements are minimal information that needs to be recorded for each inspection and it is essential to document each inspection to develop a history for the facility. Water Board staff evaluations of MS4 programs showed that many Permittees have very comprehensive inspection database records. Annual reports need to provide enough information to show compliance. During the Previous Permit term, annual reports showed few violations for the corresponding number of inspections completed. This did not match with the field inspection experience of Water Board staff. Further investigation showed that some Permittees do not consider potential discharges to be violations.

The Previous Permit exempted verbal warnings from being reported in the annual reports. Water Board staff expected verbal warnings to have very limited use and only given for very minor issues that do not warrant anything in writing. However, from Water Board inspections, and annual report and ERP reviews, we concluded that many Permittees report minimal violations for the number of inspections completed because only observed non-stormwater discharges were considered violations and issued some type of written enforcement action. Potential discharges were all given verbal warnings and it was unclear if these potential discharges were corrected in a timely manner because there was no written documentation on the potential discharges or verbal warnings issued. Examples of potential discharges include housekeeping issues, evidence of actual non-stormwater discharges that are not ongoing during an inspection, lack of BMPs,

[25] U.S. EPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection."

inadequate BMPs, and inappropriate BMPs. Potential discharges need timely corrective actions.

Some Permittees feel that a 10-business day window to implement corrective action is not necessary and even unreasonable during the dry months for potential discharges and especially for minor potential discharges. Permittees have the discretion to add a rationale for allowing a longer time period, especially for corrective actions that require things such as capital improvements, revisions to standard operating procedures, and staff training. However, Water Board staff thinks that prompt implementation of corrective actions for most potential discharges minimizes the risk of potential discharges becoming actual discharges when things are knocked over, when the area is hosed with water, and/or during the next rain event. The Water Board staff has been told by a couple of Permittees that they prefer shorter corrective action timeframes because sites tend to take care of them right away versus forgetting about the corrective actions when given a longer corrective action timeframe. Throughout the Previous Permit term, Water Board staff asked Permittees for a list of minor potential discharges. The only minor issue listed was open dumpster/garbage can lids. Water Board staff concurred that open dumpster/garbage can lids is minor, can be corrected immediately, and would not require any additional follow-up. Water Board industrial and construction inspectors consider open dumpster/garbage can lids and small amounts of trash/debris on the ground to be minor violations that can quickly be corrected, because staff at the industrial or construction sites can immediately cover the dumpsters and pick up and appropriately dispose of the trash. Water Board inspectors note those issues and corrective actions in their inspection reports. This Permit now requires reporting of all potential and actual non-stormwater discharges based on the enforcement levels in each Permittee's ERP, so that Water Board staff can evaluate whether Permittees are conducting appropriate followup.

This Permit becomes effective half way through the 2015-2016 reporting year. The reporting requirements for this Permit are slightly different than the reporting requirements for the Previous Permit. In response to the Permittees commenting on the difficulties of reporting under two different permits, this Permit, C.4.d.iii.(1), continues the reporting requirements from the Previous Permit to the end of the 2015-2016 reporting year. The new reporting requirements, C.4.d.iii.(2), become effective the 2016-2017 reporting year.

Provision C.4.f (Staff Training) section of the Permit requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application "[t]he location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have adequate legal authority to "[p]rohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(F) provides that the Permittee shall have adequate legal authority to "[c]arry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires that the Permittee have a " description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires a "program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires a "description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires a "description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires a "description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires a "description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires a "description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Illicit discharges that are not comprised entirely of stormwater are not authorized to enter the MS4 and are considered to be illicit discharges, unless authorized by a separate NPDES permit, or exempted or conditionally exempted in Provision C.15.

C.5-2 Every Permittee must have the ability to effectively prohibit non-stormwater discharges to the MS4 by actively detecting and eliminating illicit discharges and disposal into its MS4.

C.5-3 Illicit discharges to the storm drain system can be detected in several ways. Permittee staff can detect discharges during their course of other tasks, and business owners and other aware citizens can observe and report suspect discharges. The Permittee must have a direct means for these reports of suspected polluted discharges to the MS4 to be received, responded to in a timely manner, and to receive adequate documentation, tracking, and response through problem resolution.

Removal of Routine Collection System Screening Requirement

The Previous Permit required the Permittees to perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets, and catch basins, to seek and eliminate illicit connections and discharges. The results of the screenings were reported in annual reports. No illicit connections were reported. However, Permittees have found illicit discharges during the screenings and they were cleaned up. It is unclear if personnel conducting the screenings reported these illicit discharges to the illicit discharge staff for investigation and tracking. We have added language to C.5.c. – Spill, Dumping, and Complaint Response Program to ensure that illicit discharges found by municipal staff conducting routine maintenance and inspection activities on the collection system are reported to the illicit discharge staff for investigation and tracking. This is based on the federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3), which requires "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to prohibit illicit discharges to storm sewers as required by federal regulations at 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in a discharge into the MS4 that is not comprised entirely of stormwater. Every Permittee must have the ability to discover, inspect, enforce its ordinance, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (ERP) requires Permittees to implement and update, as needed, their ERP to ensure consistent and timely response to illicit discharges and connections to the MS4. The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) follow-up inspection, (3) referral to another agency, (3) appropriate time periods for implementation of corrective actions, and (4) the roles and responsibilities of staff responsible for implementing the ERP. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Permittees must also require immediate cessation of active discharges, and timely implementation of corrective actions to clean up the discharge and implementation of measures to prevent future active discharges.

Water Board staff reviewed more than half of the Permittees' ERPs during the Previous Permit term. Almost all of those Permittees have one ERP to satisfy the ERP requirements in provisions C.4., C5., and C.6. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in the Previous Permit. Therefore, the ERP requirements in this Permit are standardized in provisions C.4., C5., and C.6.

Provision C.5.c (Spill, Dumping, and Complaint Response Program) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spills, dumping, and complaints reporting. Reports from the public and other Permittee staff are an essential tool in discovering and investigating illicit discharge activities into the MS4. Maintaining contact points will help ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a means to adequately track the suspected polluted discharges from reporting through problem resolution.

Provision C.5.d (Tracking and Case Followup) section of the Permit requires Permittees to track and monitor followup for all incidents and discharges reported to the spills, dumping, and complaint response system that could discharge into the MS4. This requirement is included so Permittees can demonstrate compliance with the ERP requirements in Provision C.5.b and to ensure that illicit discharge reports receive adequate follow up through to resolution.

All municipalities, counties, district, and other public entities that own or operate sanitary sewer systems greater than one mile in length that collect and/or convey untreated or partially treated wastewater to a publicly owned treatment facility in California are

required to report sanitary sewer overflows to the California Integrated Water Quality System Project pursuant to the State Water Board's Order No. 2006-003-DWQ (Statewide General Waste Discharge Requirements for Sanitary Sewer Systems) and Order WQ 2013-0058-EXEC (Adopting Amended Monitoring Requirements for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems order. Sewage discharges that are reported to the California Integrated Water Quality System Project do not need to be tracked and reported in Provision C.5.

Provision C.5.e (Control of Mobile Sources) requires each Permittee to implement a program to reduce the discharge of pollutants from mobile businesses. The purpose of this section is to implement oversight and control of pollutants associated with mobile business sources to the MEP. The Previous Permit required Permittees to develop and implement a program to reduce the discharge of pollutants from mobile businesses. Water Board staff evaluated five Permittees' implementation of Provision C.5., which included Provision C.5.e. – Control of Mobile Sources. Water Board staff evaluated one Permittee in each of the five counties with Permittees covered under the Previous Permit. Three of the Permittees evaluated complied with this Provision. It was evident that they had put in the thought and actions to comply. Two of the Permittees evaluated did not comply with this Provision. They were dependent on the county-wide and/or regional programs to implement this Provision for them. The regional program was supposed to expand the existing regional Surface Cleaner Training and Recognition Program to include two new mobile business categories: automotive washing and carpet cleaning; develop marketing materials, training videos, and self-test applications for those two new mobile business categories; create Spanish tracks of the information for each new business type; and create a web-based application to share information about mobile businesses among the Permittees. At the time of the 2013-2014 Annual Report, none of those regional tasks had been completed. In order to understand what Permittees are doing to control pollutants from mobile sources, this Permit continues the requirements of the Previous Permit and collects data on each Permittee's implementation of the provision.

Provision C.5.f (Municipal Separate Storm Sewer System (MS4) Map) As part of the permit application process, federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[26] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[27] All Permittees have complied with this requirement. This Permit

[26] 40 CFR 124.3 (applicable to state programs, see section 123.25).
[27] 40 CFR 122.26(d)(1)(iv)(E).

continues to require the Permittees to advertise the availability of the maps of their MS4 system and to make available these maps to the public upon request.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires "[a] description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires "[a] description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires "[a] description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires "[a] description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires "[a] description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "[t]he following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed the natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants, such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as stop work orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into the MS4 and then into receiving waters. According to the 2004 National Water Quality Inventory,[28] States and Tribes report that sediment is one of the top 10 causes of impairment of assessed rivers and streams, next to pathogens, habitat alteration, organic enrichment or oxygen depletion, nutrients, metals, etc. Sediment impairs 35,177 river and stream miles (14% of the impaired river and stream miles). Sources of sedimentation include agriculture, urban runoff, construction, and forestry. Sediment runoff rates from construction sites, however, are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[29]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management, and non stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority.

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[28] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[29] U.S. EPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure*. EPA 833-F-00-008. Fact Sheet 2.6.

In its Phase II Compliance Assistance Guidance, U.S. EPA says that "[i]nspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[30] To issue warnings and assess penalties during inspections to achieve timely corrective actions from sites, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to implement and update, as needed, its Enforcement Response Plan (ERP), which serves as a reference for inspection staff to take consistent actions and timely response to achieve effective, timely corrective compliance from all public and private construction site owners/operators.

U.S. EPA supports enforcement of ordinances and permits at construction sites, stating "[e]ffective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[31] In addition, U.S. EPA expects permits issued to municipalities to address "weak inspection and enforcement."[32] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program. Prior to the issuance of the Previous Permit, Water Board staff had noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. Therefore, the Previous Permit required Permittees to develop ERPs.

The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP. ERPs are unique to each Permittee. As such, this Permit continues to have broad requirements for the ERP. This allows the individual Permittee maximum flexibility to customize the ERP to fit its legal authority and ordinary business practices. Permittees must require immediate cessation of active non-stormwater discharges, timely implementation of corrective actions to clean up the discharge, and implementation of measures to prevent future active discharges. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Construction sites are required by the statewide NPDES General Permit for Stormwater Discharges Associated with Construction Activities (Construction General Permit) to keep supplies on hand to address BMP issues rapidly. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access an eroded area. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. The Permittees' tracking data needs to provide a rationale for the longer compliance timeframe.

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[30] U.S. EPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, pp.4-31
[31] U.S. EPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.
[32] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p.48058.

Water Board staff reviewed more than half of the Permittees' ERPs during the Previous Permit term. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in the Previous Permit. Therefore, this Permit standardizes and clarifies the ERP requirements in provisions C.4., C.5., and C.6. to eliminate any ambiguity in the requirements.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round seasonally appropriate effective BMPs in the following six categories: (1) erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories are listed in the Construction General Permit. The Water Board decided it was too prescriptive and inappropriate to require a specific set of BMPs that are to be applicable to all sites. Every site is different with regards to terrain, soil type, soil disturbance, and proximity to a waterbody. The Construction General Permit recognizes these different factors and requires site-specific BMPs through the (SWPPP), which addresses the six specified BMP categories. This Permit similarly allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate. This Permit also allows the Permittees and the project proponents the necessary flexibility to make immediate decisions on appropriate, cutting-edge technology to prevent the discharge of construction pollutants into storm drains, waterways, and rights-of-way. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals. Therefore, this Permit is consistent with the Construction General Permit in its requirements for BMPs in the six specified categories.

Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff into the MS4, and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed the natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This can even occur in conjunction with unexpected rain events during the dry season (defined as May 1 through September 30). Although rare, significant rains can occur in the San Francisco Bay Region during the dry season. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the whole year, including during the dry season.

Normally, stormwater restrictions on grading should be implemented during the wet season from October 1 through April 30. Section C.6.c.ii.(1).d of the Permit requires "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent feasible." If grading does occur during the wet season, Permittees shall require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

Slope stabilization is necessary on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. These

requirements are necessary because unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. "Steep slopes are the most highly erodible surface of a construction site, and require special attention."[33] U.S. EPA emphasizes the importance of slope stabilization when it states "slope length and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[34] In lieu of vegetation preservation or replanting, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[35] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, Permittees must ensure that slope stabilization is implemented on sites, as appropriate.

It is also necessary that Permittees ensure that construction sites are revegetated as early as feasible. Implementation of revegetation reduces the threat of polluted stormwater discharges from construction sites. Construction sites should permanently stabilize disturbed soils with vegetation at the conclusion of each phase of construction.[36] A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[37] U.S. EPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[38]

To ensure the MEP standard and water quality standards are met, active treatment systems may be necessary at some construction sites. Requirements for active system requirements are located in the Construction General Permit, Attachment F.

Provision C.6.d. Plan Approval Process. This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures. U.S. EPA states that it is often easier and more effective to incorporate stormwater quality controls during the site plan review process or earlier.[39] In the Phase I stormwater regulations, U.S. EPA states that a primary control technique is good site planning.[40] U.S. EPA goes on to note that the most efficient controls result when a comprehensive stormwater management system is in place.[41] To determine if a construction site is in compliance with construction and grading ordinances and permits, U.S. EPA states that the "MS4 operator should review

[33] Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.
[34] U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
[35] Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection*. p. 5.
[36] Ibid.
[37] Ibid. p. 11.
[38] U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
[39] U.S. EPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 6.3.2.1.
[40] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.
[41] Ibid.

the site plans submitted by the construction site operator before ground is broken."[42] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[43]

Provision C.6.e. (Inspections) The Water Board allows flexibility on the legal authority language, ERP, and BMPs required on a site. This section of the Permit pulls together the accountability of the whole Provision through regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the storm drain and waterbodies.

This section clearly identifies the level of effort necessary by Permittees to minimize construction pollutant runoff into storm drains and ultimately, waterbodies, including tracking and reporting sufficient to demonstrate and document Permittee compliance.

This section requires monthly inspections during the wet season of all construction sites disturbing one or more acre of land, all hillside projects, and all high priority sites determined by the Permittee or the Water Board to be significant threats to water quality. Inspections must focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six BMP categories. Each Permittee must implement its ERP and require timely corrections of all actual and potential problems observed. All corrective actions must be implemented before the next rain event, but no longer than 10 business days after the violations are discovered. A longer time period to implement corrective actions is allowed with a reasonable rationale. All inspections must be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format.

The Previous Permit required Permittees to have the legal authority to require effective construction stormwater controls at all construction sites, regardless of the amount of soil disturbed. Water Board staff has observed disturbed construction sites where minimal BMPs were being implemented, and has seen stormwater transport construction site pollutants into the storm drain. For these reasons, ideally, all construction sites with a grading permit from a Permittee should have stormwater inspections during the rainy season to ensure adequate BMPs are implemented and construction pollutants are not entering the storm drain. Construction sites with steeper slopes pose a more-significant threat of discharging construction-related pollutants to the storm drain because they are likely to have higher runoff velocities and because their BMPs must be more robust and more-robustly installed and maintained in order to control pollutants, as compared to less-steep sites. Water Board staff has observed storm water move sediment and other construction-related pollutants into storm drains at sites ranging from those with flat slopes to those with slopes greater than 15%. Because of the relatively greater threat posed by steeper sites, this Permit adds a specific requirement to inspect all hillside projects disturbing greater than or equal to 5,000 square feet of soil. For those Permittees that do not have a hillside development

[42] U.S. EPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 4.6.2.4, pp. 4–30.
[43] Ibid. pp. 4–31.

map or definition, this Permit defines hillside development as development occurring on land with a slope greater than or equal to 15%.

The Previous Permit required Permittees to report the number of violations fully corrected prior to the next event, but no longer than 10 business days after the potential and actual discharges are discovered or otherwise considered corrected in a timely, though longer period. This proved challenging for many Permittees because they track enforcement actions and not discreet violations. While Water Board staff does want to understand how many potential and actual discharges are discovered and resolved in a timely manner, this would require significant changes in databases for some Permittees. The big picture of how many violations or enforcement actions for annual reporting will suffice, as inspection forms are available for more detailed review. Therefore, this Permit allows Permittees to either report by enforcement actions or discreet number of potential and actual discharges.

The Permittees asked that this Permit reduce the reporting since all of the tracking data are available to Water Board staff. This Permit reduces the reporting to what is minimally necessary to provide meaningful data and demonstrate permit compliance.

This Permit becomes effective half way through the 2015-2016 reporting year. The reporting requirements for this Permit are slightly different than the reporting requirements for the Previous Permit. In response to the Permittees commenting on the difficulties of reporting under two different permits, this Permit, Provision C.6.e.iii.(1), continues the reporting requirements from the Previous Permit to the end of the 2015-2016 reporting year. The new reporting requirements, C.6.3.iii.(3), become effective the 2016-2017 reporting year.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct annual staff trainings for municipal staff. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires "[a] description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Finding in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.[44]

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.

[44] U.S. EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[45]

Removal of Media Relations

The Previous Permit had specific requirements for Permittees to participate in or contribute to a media relations campaign. This Permit removes these specific requirements to allow Permittees more flexibility on how to conduct public outreach on different stormwater runoff pollution messages that they feel are most urgent. It is anticipated that Permittees will continue to use public service announcements, social media, and other free media as part of the public outreach required in Provision C.7.b.

Specific Provision C.7 Requirements

Provision C.7.a. Storm Drain Inlet Marking. Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, it is important to set a goal of ensuring that all municipally-maintained inlets are legible labeled with a no dumping message. If storm drain marking can be conducted as a volunteer activity, it has additional public involvement value.

Provision C.7.b. Outreach Campaigns. Permittees have long been implementing outreach campaigns to educate their residents on different stormwater runoff pollution prevention messages. The Permit requires a minimum of one public outreach campaign. It is anticipated that the Bay Area Stormwater Management Agencies Association (BASMAA) will continue implementing the *Our Water, Our World* pesticide use reduction outreach campaign. It is anticipated that individual Permittees, and/or their respective countywide program, and/or BASMAA, will either continue existing public outreach campaigns or start new ones. This Permit removes specificity regarding the expected public outreach campaigns and how they must be conducted. This recognizes that the Permittees have decades of public outreach experience and allows maximum flexibility to best reach their residents regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate the problems caused, and positively influence waste disposal practices and runoff pollution generation by encouraging the implementation of appropriate solutions. Permittees can utilize various electronic and print media, and paid and free media to best reach the different various target audiences. This Permit still requires an effectiveness assessment/evaluation after each outreach campaign. This provides the opportunity for the Permittees to evaluate whether they have best reached residents with the utilized stormwater pollution prevention messages in the outreach campaigns and how to move forward with future outreach campaigns.

Provision C.7.c. Stormwater Pollution Prevention Education. As the public becomes more aware of water quality issues and how certain behaviors negatively impact stormwater runoff, they will need more information on how to minimize stormwater

[45] U.S. EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

pollution. The Previous Permit required Permittees to have and publicize a centralized stormwater point of contact to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives. The Permittees already disseminate numerous brochures, pamphlets, and fact sheets on a number of different stormwater pollution prevention messages which have a stormwater point of contact on them. Some Permittees also have these materials in other languages to reach their populations for whom English is not a first language. Many Permittees have also placed these pollution prevention materials on their websites. Since citizens increasingly use the internet to search for information, this Permit goes further to require all Permittees to place information on watershed characteristics and stormwater pollution prevention materials on their websites.

Provision C.7.d. Public Outreach and Citizen Involvement Events. This Permit combines Public Outreach and Citizen Involvement. Permittees need informed citizens to influence positive stormwater pollution behavior. Therefore, Permittees need to continue communicating with a broach spectrum of citizens with stormwater pollution prevention information through long-established outreach mechanism such as staffing tables or booths at fairs, street fairs, and other community events. Permittees shall continue utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events, such as the Bringing Back the Natives Garden Tour. Combining Citizen Involvement Events with Public Outreach in this Permit does not minimize the importance of Citizen Involvement in events such as creek cleanups and restorations. It is important to provide opportunities for citizens to actively practice being good stewards of our environment. The combined specified numbers of events for Public Outreach and Citizen Involvement in this Permit are, for the most part, slightly less than the combined specified numbers in the Previous Permit. However, many Permittees claimed credit for both public outreach and citizen involvement for a number of events each year. In addition, this Permit has new requirements for each Permittee to have and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website and to advertise this website. It is anticipated that this website will provide the needed stormwater pollution prevention information to citizens more readily.

Provision C.7.e. Watershed Stewardship Collaborative Efforts. Watershed and Creek groups are comprised of active citizens, but they often need support from the local jurisdiction and certainly need to coordinate actions with Permittees such as flood districts and cities.

Provision C.7.f. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision-makers and consumers.

Provision C.7.g. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform Municipal Officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA § 308; Federal NPDES regulations 40 CFR §§122.26(d)(2), 122.41(h), (j)-(l), 122.42(c), 122.44(i), and 122.48.

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program and submit reports as required under Federal NPDES regulations cited above. CWC Section 13383 further authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements.

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of WQBELs that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, U.S. EPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[46]

According to U.S. EPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

- Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;
- Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.[47]

C.8-2 Provision C.8 requires Permittees to conduct water quality monitoring, including ambient monitoring and monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management actions pursuant to this Permit and, accordingly, demonstrate

[46] U.S. EPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf
[47] U.S. EPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

- Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;
- Characterize stormwater discharges;
- Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;
- Assess progress toward reducing receiving water concentrations of impairing pollutants;
- Assess compliance with numeric and narrative water quality objectives and standards;
- Identify sources of pollutants;
- Assess stream channel function and condition, as related to urban stormwater discharges;
- Assess the overall health and evaluate long-term trends in receiving water quality; and
- Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-3 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the Maximum Extent Practicable (MEP) standard where applicable. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1, Water Quality Standards Exceedances, could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs, and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-4 Under the CWA, NPDES permits must contain conditions that require both monitoring and reporting of monitoring results to ensure compliance. (See 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1)-(2).) The regulations provide, in pertinent part:

> *In addition to the conditions established under §122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable.*
>
> > *(i) Monitoring requirements. In addition to § 122.48, the following monitoring requirements:*
> >
> > *(1) To assure compliance with permit limitations, requirements to monitor:*

> *(i) The mass (or other measurement specified in the permit) for each pollutant limited in the permit;*
>
> *(ii) The volume of effluent discharged from each outfall;*
>
> *(iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f); frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.*
>
> *(iv) According to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR part 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR chapter 1, subchapter N or O. . . .*
>
> *(2) Except as provided in paragraphs (i)(4) and (i)(5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. . . .*
>
> *40 C.F.R. § 122.44(i)(1)-(2). This section allows "for monitoring other than mass or volume, namely some 'other measurement specified in the permit [ ] for each pollutant limited in the permit.'" (NRDC v. U.S.EPA, No. 13-1745, 2015 WL 5780393 at *20 (2nd Cir. Oct. 5, 2015).) The regulations at 40 C.F.R. § 122.48 state that all permits specify the "[r]equired monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring."*

Consistent with the federal regulations, water quality monitoring requirements in Provision C.8 require specific monitoring that will yield data that is both representative of the monitored activity and necessary to assure compliance with the requirements of the Permit, as described below.

C.8 requires monitoring[48]:

> *(1) At or near outfalls during storm events to obtain flow-weighted concentrations (mass) of pollutants of concern. Flow-weighted monitoring is required to assess progress on attaining TMDLs, including assuring compliance with the required load reductions in the permit (C.8.f. Pollution of Concern Monitoring). This monitoring supports estimates of MS4 pollutant loads to receiving waters and requires data collection to support planning for control actions. The latter includes monitoring effectiveness of control measures and identifying pollutant source areas; and*

[48] Provisions C.2-C.4, C.6, C8, C.10, C.13-C.16 contain additional monitoring and reporting requirements to assure compliance with the requirements therein.

(2) In receiving waters during wet and dry weather to assess the physical, chemical and biological impacts of MS4 discharges to urban streams (C.8.d. Creek Status Monitoring).

Creek Status Monitoring requires receiving water monitoring of the types, frequencies and intervals sufficient to yield information on the physical, chemical and biological status of those water bodies. Receiving water monitoring is specified here in lieu of outfall monitoring for the following reasons. First, there are no end-of-pipe limits in the permit to measure. Instead, the permit requires, for example, PCB load reductions; outfall monitoring would not allow the Board to assess whether the PCB limits are met. Second, there are hundreds if not thousands of outfalls in the Permittees' jurisdictions and it is impractical to monitor every single outfall due to both cost and safety concerns. Monitoring a subset of outfalls would provide information about MS4 discharges at those specific locations at only one limited point in time, which leads to the third point that outfall monitoring is time- and spatially limited. In contrast, the required receiving water monitoring integrates the physical, biological and chemical effects to the water body of all MS4 discharges from multiple outfalls over multiple storms (i.e., time and space), yielding more useful data than outfall monitoring to determine compliance with the permit. Receiving water monitoring is done in a probabilistic or rotating basis, depending on the parameter, again yielding more useful data than fixed-location monitoring. Also, both dry weather and storm flows are addressed in receiving water monitoring, whereas outfall monitoring is normally conducted only during storm events. Dry weather discharges can constitute a significant portion of annual pollutant loadings from storm systems in urban areas (NRC 2008).

To provide an example of how receiving water monitoring better captures permit compliance, consider an illicit discharge of chloramine from a swimming pool to an MS4. Both outfall and receiving water monitoring could detect the discharge. However, outfall monitoring would need to be done at the exact location and time of an illicit discharge otherwise it would go undetected, because the discharge would have moved through the outfall and into receiving waters. In contrast, receiving water monitoring could detect chloramine for a longer period of time (depending on pH, organic carbon and temperature) from upstream outfalls to the point where dilution prevents detection. Chloramine can be fairly stable and could be detected in urban waters in summer months, when outfall monitoring is generally not conducted. Receiving water monitoring, which is required in both dry and wet weather, can and has detected chlorine (a break-down product of chloramine), leading to efforts to correct the illicit discharge problem.

Receiving water monitoring as a means to evaluate compliance with permit conditions is supported by the National Research Council (NRC). In *Urban Stormwater Management in the United States*, NRC states that the quality of stormwater from urbanized areas has been well-characterized.[49] Continuing

[49] National Research Council. 2008. Urban Stormwater Management in the United States.

MS4 end-of-pipe monitoring produces data of limited usefulness because of a variety of shortcomings (as detailed in the report). The NRC strongly recommends[50] that MS4 programs modify their evaluation metrics and methods to include biological and physical monitoring and an increased emphasis on watershed scale analyses to ascertain what is actually going on in receiving waters, much like what is required in the permit. Further, NRC finds that biological assessments (as required in the Permit) respond to the range of non-chemical stressors identified as being important in urban waterways including habitat degradation, hydrological alterations, and sediment and siltation impacts, as well as to the influence of nutrients and other chemical stressors where chemical criteria do not exist or where their effects are difficult to measure directly (e.g., episodic stressors).

U.S. EPA Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits notes that:

> …storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in reducing contaminants and making improvements in water quality.

Section C.8 of this permit satisfies these two objectives by requiring monitoring that will provide Permittees with sufficient data to pinpoint sources of pollutants and assess the effectiveness of efforts to reduce pollutants, both at the source and in receiving waters.

C.8-5 The Water Quality Monitoring Provision is intended to provide answers to fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, management questions that include the following:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

C.8-6 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Water

[50] U.S. EPA has endorsed the NRC's recommendation. (See, e.g., EPA's District of Columbia MS4 Permit No. DC0000221 Fact Sheet, 2011.)

Board staff requested major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program (RMP). The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. Because the RMP monitors waters in each Permittee's jurisdiction and gathers data on the pollutants discussed in this Permit, the Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-7 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Boards, and to coordinate with other monitoring programs. Provision C.8 contains a framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources. In working cooperatively with SWAMP, Permittees can develop a monitoring program that evaluates waters in its jurisdiction and gathers data on each of the pollutants of concern discussed in this Permit.

C.8-8 In 1998, BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[51] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.

In the Previous Permit, Permittees were given the option to implement this same concept by forming a regional monitoring collaborative, which they did. In conducting some of the monitoring required in this Provision, the Regional Monitoring Collaborative (RMC) provides efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level on behalf of

[51] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

all Permittees. Further benefits are expected as more monitoring requirements are fulfilled through the RMC.

C.8-9 This Permit includes monitoring requirements to verify compliance with adopted TMDL WLAs and to provide data needed for TMDL development and/or implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-10 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local water bodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

Provision C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to achieve the following:

- Promote cost savings through economies of scale and eliminate redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality; and
- Simplify reporting.

In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

Provision C.8.b. Monitoring Protocols and Data Quality. Clean Water Act regulations (40 CFR 122.41(j)(1)) require that data submitted pursuant to a NPDES permit meet certain quality standards. To achieve this, and to obtain data of known quality that can be compared to data collected in other California urban creeks, the permit requires monitoring data be collected and analyzed in accordance with the SWAMP Quality Assurance Project Plan and Standard Operating Procedures or U.S. EPA methods. The BASMAA Regional Monitoring Coalition's Creek Status Monitoring Program Quality Assurance Project Plan (January 2014) and Standard Operating Procedures (January 2014) have been deemed to be SWAMP comparable. These two BASMAA documents may be updated to reflect the changing state-of-the-science with Executive Officer's approval.

Provision C.8.c. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.c requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the RMP. Provision C.8.c requires such monitoring to continue.

Provisions C.8.d. Creek Status Monitoring. Based on the stated goals of the CWA, Creek Status Monitoring employs a three-pronged approach to monitoring water quality which includes chemical-specific monitoring, toxicity testing, and bioassessments (U.S. EPA 1991a). Each of the three elements has distinct advantages and all three work together to ensure that the physical, chemical and biological integrity of our waters are protected. Creek Status Monitoring includes probabilistic and targeted sampling of urban creeks and serves as a surrogate to monitoring the discharge from all major outfalls. Sampling the Permittees' numerous outfalls is impractical due to costs and safety factors and the resulting data would not provide commensurately better information. By sampling the sediment, biota and water column in urban creeks, the Permittees can determine where water quality problems are occurring in the creeks, then work to identify which outfalls and land uses are causing or contributing to the problem. In short, Creek Status Monitoring is needed and useful for identifying water quality problems and assessing the health of streams; it is the first step in identifying sources of pollutants and an important component in evaluating the effectiveness of an urban runoff management program. Requirements for number, frequency and general locations of samples are established to sufficiently indicate whether water quality is supportive, or likely to be supportive, of beneficial uses and whether water quality objectives are being met, at a minimum.

Provision C.8.d.i. Biological Assessment including Nutrients and General Water Quality Parameters. Biological Assessment is needed to provide site-specific information about the health and diversity of freshwater benthic communities within a specific reach of a creek, using standard procedures developed and/or used by the SWAMP. It consists of collecting samples of benthic communities and conducting a taxonomic identification to measure community abundance and diversity. Urban creek sampling can be directly compared to a non-urban or reference creek to assess benthic community health. Biological indicators, including the California Stream Condition Index (CSCI), are developed using reference streams, so the calculation of a CSCI score at an urban site already takes comparison to reference conditions into account. This monitoring can also provide information on cumulative pollutant exposure/impacts because pollutant impacts to the benthic community accumulate and occur over time. Nutrient monitoring is necessary because recent monitoring data indicate nutrients, which can increase algal growth and decrease dissolved oxygen concentrations, are present in significant concentrations in Bay Area creeks. The sampling timeframe (generally between April 15 and June 30) is when invertebrates are developed enough to be captured in the sampling equipment but not developed enough to have emerged (flown off), and thus is the timeframe in which necessary information concerning biological integrity can be obtained.

Provision C.8.d.ii. Chlorine monitoring is needed to detect a release of potable water or other chlorinated water sources, which are toxic to aquatic life.

Provision C.8.d.iii. Temperature monitoring is needed to determine if conditions in creeks to which urban runoff is discharged are supportive of cold-water and warm-water beneficial uses, as appropriate.

Provision C.8.d.iv. Continuous monitoring of dissolved oxygen, temperature, and pH is required because these parameters are fundamental to supporting aquatic life beneficial uses and they impact the effect of pollutants in freshwater (e.g., ammonia toxicity is dependent on pH and temperature).

Provision C.8.d.v. Pathogen Indicator monitoring is needed to detect pathogens in waterbodies that could be sources of impairment to recreational uses at or near the sampling location.

Provision C.8.d. (All Parameters) **Monitoring Frequency, Duration, and Location.** Creek Status Monitoring continues to be an annual requirement for the Permittees, except for two much smaller Permittees, Fairfield-Suisun and Vallejo. For each of the Creek Status Monitoring parameters, the number or frequency of samples required is based on the relative population within the countywide stormwater program. Costs are minimized while data necessary for successful stormwater management are obtained. Monitoring durations are based on the amount of data needed to understand the potential effects related to each Creek Status Monitoring parameter. Monitoring frequencies and durations are specified for each parameter.

Creek Status Monitoring locations are to be selected on a probabilistic (random) or targeted basis, depending on the parameter, in similar fashion to SWAMP. If correctly sited, sampling stations are expected to be very useful in answering the monitoring program's management questions and meeting its goals. For this reason, Provision C.8.d. requires sample locations to be based on surrounding land use, likelihood of urban runoff impacts, existing data gaps, and similar considerations. This will help maximize the utility of the sample locations, while also providing the Permittees with adequate flexibility to ultimately choose practical Creek Status Monitoring locations.

Provision C.8.e. Stressor/Source Identification (SSID) Projects are necessary to identify sources of pollutants; identify new or emerging pollutants; and improve stormwater management actions. When Creek Status Monitoring results indicate an exceedance of a water quality objective, a temperature or toxic effect threshold, or other "trigger," these results become candidates for SSID projects. The trigger provides a threshold for considering follow up, and Permittees select which results will be followed up on via a SSID project based on criteria such as magnitude of threshold exceedance; parameter (for a variety of parameters); and likelihood stormwater management action(s) could address the exceedance. A minimum number of SSID Projects is required, rather than a SSID for every monitoring result that exceeds a "trigger" threshold. Every trigger exceedance need not result in a SSID project because (1) triggers are not water quality objectives in most cases and (2) this approach requires investigation of potential water quality issues without duplicating efforts.

Through SSID projects, Permittees must identify the source of the problem and take steps to reduce any pollutants discharged from or through their municipal storm sewer systems. This requirement conforms to the process, outlined in Provision C.1., of complying with the Discharge Prohibition and Receiving Water Limitations. The timeframes for initiating and completing follow-up actions acknowledge the realities of budgeting for these studies, some, but not all of which could require funding above the level available in a given fiscal year. If multiple "triggers" are identified through monitoring, Permittees must focus on the highest priority problems; a cap on the total number of source identification projects conducted within the Permit term is provided to cap Permittees' potential costs.

C.8.f. Pollutants of Concern[52] Monitoring. CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure the effectiveness of the TMDL point and nonpoint source control measures and the progress the water body is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.8.f. Pollutants of Concern (POC) monitoring is intended to assess inputs of Pollutants of Concern to the Bay from local tributaries and urban runoff; provide information to support implementation of TMDLs and other pollutant control strategies; assess progress toward achieving wasteload allocations (WLAs) for TMDLs; and help resolve uncertainties in loading estimates and impairments associated with these pollutants.

In particular, POC monitoring addresses five priority POC management information needs:

1) Source Identification - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

2) Contributions to Bay Impairment - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

3) Management Action Effectiveness - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;

4) Loads and Status - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and

5) Trends - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

The Permit specifies monitoring methods that can be used to address these information needs and which information needs apply to each pollutant of concern. The Permit provides flexibility in the number of samples, or level of effort, but requires minimums to be met annually and over the Permit term. The level of effort (expressed as required number of samples collected and analyzed) is similar to the level of sampling and analysis effort for pollutants of concern monitoring required in the Previous Permit term.

[52] See sections C.9, C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

The approach for POC monitoring does not specify specific monitoring locations or monitoring frequencies at those specific locations. Rather, the Permit requires that monitoring be intelligently and flexibly directed toward answering the management information needs (that apply to a given pollutant), and this flexibility allows the monitoring strategy to be adapted and improved based on information obtained from monitoring conducted early in the permit term. The flexibility also allows the Permittees to continue collecting useful information even during drought years in which conditions limit some types of data collection (e.g., storm even sampling) but not others (e.g., collection of bed sediment). As is true of Creek Status Monitoring, it is impractical to sample all of the urban runoff outfalls in the region, and these outfall data (obtained at great expense) would not provide commensurately better information relative to the management information needs for pollutants of concern. By strategically sampling the sediment and water column in urban creeks and conveyances, the Permittees can better address the five information needs stated above.

To some extent, POC monitoring builds on what we already know about pollutants in creeks (also referred to as tributaries to the Bay) and leads to more effective actions to control those pollutants. For example, we know that pesticide-related toxicity has been widespread and results from approved pesticide uses. POC monitoring for toxicity therefore is tailored to provide information on which pesticides are currently a concern to water quality; a limited number of toxicity samples provides adequate information. Other requirements for number, frequency and general locations of samples are similarly tailored to information needs.

Provisions C.8.g. Pesticides and Toxicity Monitoring. Toxicity testing provides a tool for assessing toxic effects (acute and chronic) of all the chemicals in samples of stormwater, receiving waters or sediments and allows the cumulative effect of the pollutants present in the sample to be evaluated, rather than the toxic responses to individual chemicals. Toxicity in water and on sediment also are monitored in order to determine whether the numeric targets of the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL are being achieved, and to help provide evidence on whether pesticide-related toxicity is decreasing in urban creek waters.

This subprovision combines all the pesticide and toxicity into one place, where previous permits had pesticide and toxicity monitoring in both Creek Status and Pollutants of Concern Monitoring subprovisions. This format is intended to provide for more thoughtful dry weather and wet weather sampling designs that may provide more meaningful data for the region and potentially for statewide studies. Since the Urban Creeks TMDL was adopted by the Water Board in 2005, it has become more apparent that pesticide related toxicity water quality problems are similar in urban waterways across the State. At this time, efforts have begun to develop a statewide coordinated pesticides and pesticide-related toxicity monitoring program. In addition, pesticide-related water quality issues are subject to change as different pesticide products gain market share and increase in urban usage. For these reasons, Permittees may request the Executive Officer modify, reduce or eliminate the requirements of this subprovision during the permit term, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

This Permit describes type, interval and frequency of pesticides and toxicity monitoring sufficient to yield data which are representative of both dry weather and wet weather urban runoff. Required analytes include toxicity and pesticides that are being found at or near concentrations that cause chronic or acute effects to aquatic organisms. Required test methods include the relatively recent Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136) for chronic toxicity. The test species are selected as the most sensitive species to pollutants currently known or suspected to be present in stormwater discharges. All required methods and test species are consistent with those used by SWAMP as well as those required in other California MS4 permits, including the statewide Caltrans permit.

The non-pesticide pollutants arsenic, cadmium, chromium, copper, lead, nickel, and zinc are included in this subprovision in order to facilitate the synoptic collection of these pollutants in sediment with toxicity in sediment during the dry season.

C.8.h. Reporting. CWC section 13383 provides authority for the Water Board to require technical water quality reports. Provision C.8.h. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14 pertain to pollutants of concern, including those for which TMDLs have been adopted.

Legal Authority

The following legal authority applies to provisions C.9 through C.14:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13383, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The TMDL-based requirements for pesticides, mercury, PCBs, and bacteria have been imposed in accordance with 40 Code of Federal Regulations section 122.44(d)(1)(vii)(B). Pursuant to 40 Code of Federal Regulations section 122.44(d)(1)(vii)(B), the effluent limitations for NPDES permits must be consistent with the assumptions and requirements of any available Waste Load Allocation (WLA) for the discharge prepared by the state and approved by U.S. EPA, or established by U.S. EPA. In addition, Water Code section 13263, subdivision (a), requires that waste discharge requirements implement any relevant water quality control plans (basin plans), including TMDL requirements that have been incorporated into the basin plans. In addition, under CWA section 402(p)(3)(B)(iii), MS4 discharges "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." (33 U.S.C. § 1342(p)(3)(B)(iii).) Under this provision, the Water Board may include requirements for reducing pollutants in stormwater discharges as necessary for compliance with water quality standards. (*See Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166.) This includes requirements to meet TMDLs since TMDL targets are an interpretation of water quality standards.

The Water Board may impose WQBELs effluent limitations that are BMPs or numeric effluent limitations. (33 U.S.C. §1342(p)(3)(B)(iii); 40 C.F.R. §122.44(k)(2)&(3) and § 122.44(d)(1)(vii)(B).) This is consistent with U.S. EPA's November 26, 2014, "Revision to the November 22, 2002, Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs'" (2014 U.S. EPA Memo.) This memorandum, while not binding authority, states "[w]here the TMDL includes WLAs for stormwater sources that provide numeric pollutant loads, the WLA should, where feasible, be translated into effective, measurable WQBELs that will achieve this objective. This could take the form of a numeric limit, or of a measurable, objective BMP-based limit that is projected to achieve the WLA." The 2014 U.S. EPA Memo further acknowledges that the permitting authority should consider the schedules in the TMDL as it decides whether and how to establish enforceable interim requirement and interim dates in the Permit. The interim deadlines in the Provisions are consistent with and in furtherance of the deadlines in the TMDLs.

For trash, the Water Board is authorized to impose effluent limitations under 40 CFR 122.44(d)(1)(i), which requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Trash is being discharged at levels that cause an excursion above the water quality objectives for floating, settleable and suspended materials. For copper, the Permit requires best management practices and copper control measures to prevent urban runoff discharges from causing or contributing to exceedances of copper site-specific water quality objectives for the Bay, consistent with the Basin Plan. Water Code section 13263 requires that waste discharge requirements implement the Basin Plan.

Basin Plan Requirements: Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) states that NPDES stormwater permits issued to municipalities will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. The Water Board has been taking a phased approach of first requiring technically and economically feasible controls to reduce pollutant discharges to the maximum extent practicable. Where this does not result in attainment of water quality objectives, the Basin Plan states the Water Board will require implementation of additional control measures to meet water quality objectives. The Basin Plan also contains urban stormwater TMDL implementation requirements at sections 7.1.1, 7.2.2, 7.7.1, 7.2.3, and 7.4.1 for pesticide-related toxicity, mercury, PCBs, and bacteria. The Basin Plan also requires urban stormwater requirements for copper in section 7.2.1. Finally, the Basin Plan Table 4-1 includes Prohibition 7, which prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas."

General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)

The control measures for mercury are intended to implement the urban runoff requirements stemming from TMDLs for these pollutants. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an implementation of controls to reduce PCBs, and that is the intended approach of the required provisions for all pollutants of concern. Many of the control actions addressing PCBs and mercury will result in reductions of a host of sediment-bound pollutants, including legacy pesticides, PBDEs, and others. The strategy for these pollutants is to use PCBs control to guide decisions concerning where to focus effort, but implementation of the control efforts would take into account the benefits for controlling other pollutants of concern. The POC strategy also includes a phased approach that provides for pilot scale testing (in the 2009 issuance of this permit) and for identifying areas with POC sources. The overall strategy for addressing sediment bound POCs includes the following modes:

1. Pilot-testing in a few specific locations.

2. Focused implementation in areas where benefits are most likely to accrue.
3. Full-scale implementation throughout the region.
4. Other: This may refer to experimental control measures, Research and Development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during a permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. Conversely, the benefits of other control measures may be well known, and these control measures should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering additional information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions.

During the Previous Permit term, a large part of the effort was focused on gathering necessary information about control measure effectiveness. In effect, most of the control measures were implemented at the pilot scale. In this Permit term, the emphasis will shift toward focused and perhaps full-scale implementation of the most effective control measures, and progress will be measured through accounting for specific load reductions. In subsequent permit terms control measures will be implemented on the basis of what we learn in this term, and we will, thus, achieve iterative refinement and improvement through time.

Background on Specific Provisions: Pursuant to CWA§ 402(p)(3)(B)(ii)-(iii) and 40 CFR § 122.44(d)(1)(vii)(B) , Provisions C.9 through C.14 contain technology-based requirements to control pollutants to the MEP, such other provisions the Water Board has determined appropriate for the control of pollutants under CWA, water quality-based requirements consistent with the assumptions and requirements of any WLAs in the applicable TMDLs, and requirements to effectively prohibit non-stormwater discharges into storm sewers. Provision C.9 contains requirements to implement the TMDL for pesticide-related toxicity in urban creeks. Provision C.10 contains requirements to implement narrative water quality objectives related to trash in all receiving water. Provision C.11 contains requirements to implement the San Francisco Bay mercury TMDL WLAs and the TMDL WLAs for mercury in the Guadalupe River Watershed. Provision C.12 contains requirements to implement the San Francisco Bay PCBs TMDL WLAs. Provision C.13 contains requirements to implement the copper site-specific objectives for San Francisco Bay. Provision C.14 contains requirements to implement the TMDL WLAs for San Pedro Creek and Pacifica State Beach Bacteria.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9

C.9-1 This Permit implements the Basin Plan amendments adopted by the Water Board that establish a Water Quality Containment Strategy and TMDL for diazinon and pesticide-related toxicity for Bay Area urban creeks on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Containment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, lead monitoring efforts, and take actions related to pesticide regulatory programs. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff.

C.9-2 The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

C.9-3 This provision is consistent with 2014 U.S. EPA Memo[53] providing guidance on implementing TMDL WLAs in NPDES storm water permits. Specifically, this provision establishes clear actions to achieve pesticide load reductions as well as other requirements (see C.9.f) necessary to achieve receiving water limits. The timeline for achieving the TMDL is not a fixed date for the following reasons. Pesticide-related toxicity continues to occur because state and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. The TMDL implementation plan recognizes that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and state law; and (2) because a realistic date for achieving allocations cannot be discerned given the current pesticide regulatory framework, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline.

Specific Provision C.9 Requirements

C.9 provisions implement the TMDL for Urban Creeks Pesticide Toxicity. All C.9 provisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with the Urban Pesticide Committee and other agencies and organizations. The Urban Pesticides Committee has served as an information clearinghouse and as a forum for coordinating pesticide TMDL implementation. The list of urban-use pesticides of concern to water quality includes

[53] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

pesticides for which local area monitoring data exceed or approach benchmarks and pesticides currently linked to toxicity in surface waters.

Provisions C.9.a through C.9.d are designed to insure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is a pest control strategy that uses an array of complementary methods: natural predators and parasites, pest-resistant varieties, cultural practices, biological controls, various physical techniques, and pesticides as a last resort. If implemented properly, it is an approach that can significantly reduce or eliminate the use of pesticides. The implementation of IPM will be assured through training of municipal employees and contractor requirements.

Provision C.9.e directs the municipalities to conduct outreach to consumers at point of purchase, to residents who contract for pest control, and to pest control professionals. Such targeted outreach is often intended to make the public and pest control professionals aware of the water quality impacts of current-use pesticides that are impacting or have potential to negatively impact urban creeks.

Provision C.9.f requires that municipalities (through cooperation or participation with BASMAA and CASQA track and participate in pesticide regulatory processes like the U.S. EPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation pesticide evaluation activities. The goal of these efforts is to provide pertinent water quality data and encourage both the state and federal pesticide regulatory agencies to fully evaluate aquatic impacts and to mitigate for impacts to urban water bodies within the pesticide regulation or registration process. Accomplishing this goal would represent the most efficient and effective means to prevent pesticide-related water quality problems in the future.

Provision C.9.g requires Permittees to evaluate the effectiveness of their pesticide source control actions and is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the Permit. The particulars of assessment will depend on the nature of the control measure.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13383, 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), 40 CFR 122.26(d)(2)(iv) , and 40 CFR § 122.44(d)(1)(i).

Specific Legal Authority: Federal NPES regulations 40 CFR 122.26(d)(2)(i) requires "a demonstration that the [Permittee] can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the [Permittee] at a minimum to . . . (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water . . . ."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1) requires "a description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires "a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR § 122.44(d)(1)(i) requires limitations for pollutants which are or may be discharged at a level which has the reasonable potential to cause or contribute to an excursion above any water quality standard, including any narrative criteria for water quality.

San Francisco Bay Basin Plan contains these narrative water quality objectives applicable to trash: floating material (waters shall not contain floating material,

including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses); settleable material (waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses); and suspended material (waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses). Trash is being discharged at levels that have the reasonable potential to cause or contribute to excursions of these narrative water quality objectives. There are currently 26 waterbodies in the Region impaired by trash on the Clean Water Act section 303(d) list and most are receiving waters of discharges from Permittees' municipal storm drain systems. In additional, all Permittees have identified trash hot spots in their receiving water in a July 2010 submittal required by the previous permit. NPDES permitting authorities have discretion to include requirements for reducing pollutants in storm water as necessary for compliance with water quality standards. (*Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166.) U.S. EPA recommends that for MS4 discharges with reasonable potential to cause or contribute to a water quality excursion, a permitting authority exercises its discretion to include clear, specific, and measurable requirements and, where feasible, numeric effluent limitations as necessary to meet water quality standards.[54] The permit contains such requirements to meet water quality standards.

The Basin Plan also contains includes Chapter 4 – Implementation, Table 4-1 Prohibitions, Prohibition 7, which prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. This prohibition was adopted by the Water Board in the 1975 Basin Plan, primarily to protect recreational uses such as boating.

In addition to the foregoing, it should be noted that the State Water Board on April 7, 2015, adopted amendments to the Ocean Plan and the Inland Surface Waters and Inland Bays and Estuaries Plans that establish a narrative water quality objective for trash; establish a prohibition on the discharge of trash; provide implementation requirements for permitted storm water and other dischargers; set a time schedule for compliance, and provide a framework for monitoring and reporting requirements (collectively, Trash Amendments). These Trash Amendments are subject to review by the Office of Administrative Law and U.S. EPA and are not yet effective. Nonetheless, the C.10 requirements of this Permit are consistent with the Trash Amendments.

[54] U.S. EPA, November 26, 2014, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load Waste Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs.'"

Fact Sheet Findings in Support of Provision C.10

C.10-1 Trash is a pervasive problem near and in creeks and in San Francisco Bay. Controlling trash continues to be one of the priorities for this Permit reissuance, not only because of the trash discharge prohibition, but also because trash causes major impacts on our enjoyment of creeks and the Bay. There are also significant impacts on aquatic life and habitat in those waters, and eventually to the global ocean ecosystem, where plastic often floats; persists in the environment for hundreds of years - if not forever; concentrates organic toxins; and is ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared, and can ingest plastic that looks like prey, losing the ability to feed properly.

For the purposes of this provision, trash is defined to consist of litter and particles of litter. Manmade litter is defined in California Government Code section 68055.1 (g): *Litter* means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

C.10-2 Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[55] over the 2003–2005 timeframe,[56] suggested that the approach to managing trash in waterbodies was not reducing the adverse impact on beneficial uses. The levels of trash in the waters of the San Francisco Bay Region were and are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. On the basis of 85 surveys conducted at 26 sites throughout the Bay Area, staff has found an average of 2.93 pieces of trash for every foot of stream. All the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with significantly higher trash in waters relative to other counties—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Results of the trash in waterbodies assessment work by staff show that rather than adjacent neighborhoods polluting the sites at the bottom of the watershed, these areas, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-3 A number of key conclusions can be made on the basis of the trash measurement in streams:

[55] SWAMP Rapid Trash Assessment Protocol, Version 8
[56] SWAMP S.F. Bay Region Trash Report, January 23, 2007

- Lower watershed sites have higher densities of trash.
- All watersheds studied in the San Francisco Bay Region have high levels of trash.
- There are trash source hotspots (usually associated with parks, schools, or poorly-kept commercial facilities located near creek channels) that appear to contribute a significant portion of the trash deposition at lower watershed sites.
- Homeless encampments and creekside litter from a variety of sources is a significant source of trash directly dumped and placed in the riparian zone where it can be swept into receiving waters by storm flows.
- Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.
- The majority of trash is plastic at lower watershed sites where trash accumulates in the wet season. This suggests that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris. While much of the initial trash deposited and washed into receiving waters is paper, the plastic trash, both floatable and non-floatable is the most persistent trash that survives, significantly impacting the Bay and Ocean.
- Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

C.10-4 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-5 Trash in urban waterways of coastal areas can become marine debris, known to harm fish and wildlife and cause adverse economic impacts.[57] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-6 Trash adversely affects numerous beneficial uses of waters, particularly recreation and aquatic habitat. Not all trash and debris delivered to streams are of equal concern with regards to water quality. Besides the obvious negative aesthetic effects, most of the harm of trash in surface waters is imparted to wildlife in the form of entanglement or ingestion.[58,59] Some elements of trash exhibit significant threats to human health, such as discarded medical waste,

[57] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. *Mar. Poll. Bull*. 40:83-88.

[58] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs*. Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.

[59] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol*. 13(4):925-929.

human or pet waste, and broken glass.[60] Also, some household and industrial wastes can contain toxic batteries, pesticide containers, and fluorescent light bulbs that contain mercury. Large trash items, such as discarded appliances, can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash hotspots where illegal dumping, littering, and/or accumulation of trash occur.

C.10-7 The Water Board, at its February 11, 2009, hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment 10.1 – 303(d) Trash Resolution and Staff Report Feb 2009.

C.10-8 The trash control strategies, monitoring requirements, and mandatory deadlines for trash reductions meet the "Maximum Extent Practicable" (MEP) standard contemplated by the CWA and include such other provisions as the Board determines appropriate for control to ultimately meet the narrative water quality objectives for floating material, settleable material, and suspended material. (CWA §402(p)(3)(B)(iii)) This Permit builds on the data and information collected in the last permit term and increases expectations of Permittees in this Permit. In particular, this Permit requires that the Permittees make significant progress toward having no trash impact on receiving waters by implementing a combination of increased full trash capture, and trash reduction and elimination measures that have similar effect to full trash capture. This is consistent with the statewide amendment to the Ocean Plan and the Inland Surface Waters, Bays and Estuaries Plan relating to trash controls. This Permit includes trash generation source identification and control, visual assessment data collection, and development of receiving water monitoring protocols. These requirements reflect the most current knowledge and data available concerning effectiveness of trash control strategies such as full trash capture, enhanced maintenance methods and current thinking regarding the best methods to assess trash reduction outcomes for the various trash reduction methods.

Specific Provision C.10 Requirements

C.10.a. Trash Reduction Requirements

C.10.a.i. Trash Reduction Schedule – This provision includes compliance deadlines of 70 percent trash load reduction by 2017 and 80 percent trash load reduction by 2019. To provide assurance that Permittees are making timely progress towards meeting the 2017 deadlines, this provision includes a performance guideline of 60 percent trash load reduction by 2016.. This performance guideline is a reporting requirement, but not an enforceable end point. It is a benchmark for assessing progress, and Permittees that do not attain the 60 percent performance guideline are

[60] Sheavly, S.B. 2004. *Marine Debris: an Overview of a Critical Issue for our Oceans*. 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

required to provide documentation in a report to the Water Board that adequate trash management actions to attain the forthcoming 2017 mandatory deadline is underway or scheduled. The compliance deadlines are consistent with the previous permits goals of 70 percent trash load reduction by 2017 and 100 percent trash load reduction (or no adverse trash impact) by 2022.

C.10.a.ii. Trash Generation Area Management – The overarching strategy for reducing trash involves mapping trash generation areas within a Permittee's jurisdiction, then applying effective trash reduction actions to the areas of trash generation and assessing the effectiveness of those actions in delineated trash generation areas, until trash generation is reduced to the no impact level over a Permittee's entire jurisdiction. The Permittees reported these trash generation maps with their Long Term Trash Reduction Plans February, 2014, and these maps provide the 2009 trash generation levels, which were required by the previous permit. Permittees that find inaccuracies in their submitted maps may submit corrected 2009 trash generation maps with their 2016 Annual Reports. Permittees developed their 2009 generation maps by dividing their jurisdiction into Very High, High, Moderate, and Low trash generation areas based on the following ranges of trash generation rates:

Low = less than 5 gal/acre/yr;
Moderate = 5-10 gal/acre/yr;
High = 10-50 gal/acre/yr; and
Very High = greater than 50 gal/acre/yr.

C.10.a.ii.a. Actual trash loading values, particularly in areas of high and very high trash generation areas, may vary significantly, but these delineated ranges provide a frame of reference for tracking and demonstrating trash load reductions and provide relative trash generation weight of these four categories. Permittees likely will need to reduce trash generation to at least Low to attain the ultimate required water quality-based outcome of no trash loads that cause or contribute to adverse trash impacts in receiving waters, i.e., the 2022 goal. Whether attainment of Low trash generation rates are sufficient will be evaluated and considered in the development of requirements in the next permit. Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to a Low trash generation rate during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the 2017 and 2019, 70 and 80 percent trash load reduction requirements, respectively, and consideration of the 2016 performance guideline.

C.10.a.ii.b. Permittees are responsible for trash discharges from their storm drain systems. Permittees have direct control over their properties and right of way, but must also exert control over other lands, such as commercial parking lots, that are plumbed directly into their storm drain system, since trash washed into such conveyance by stormwater will then directly impact receiving waters without encountering trash control actions on public right of way. Permittees may use a variety of means to ensure that either full trash capture devices are installed on such conveyances prior to intersection with the public storm drain system or that other

control actions equivalent to full trash capture are implemented on those private lands and such actions are verified through assessment, similar to the on-land visual assessment. Permittees must report the status of all such lands in parcel sizes over 10,000 ft^2 and place them on their trash generation maps or otherwise record location and status information about them. While Permittees are responsible for all such land in their jurisdictions, the Permit sets a reporting threshold of 10,000 ft^2 with the goal of balancing appropriate oversight over those lands and limiting the total number of specific parcels or area that must be identified and mapped.

C.10.a.iii. Minimum Full Trash Capture - This provision requirement is carried forward from the previous permit. Full trash capture systems provide a direct and effective mean to control trash discharges to and from storm drain systems. Commercial retail/wholesale land use area is a simple surrogate of trash generation area, and the minimum amount of area that was required to be treated with full trash capture systems was considered reasonable and achievable. Most, if not all, Permittees have already met or exceeded the minimum full trash capture requirement. Full trash capture system screening and treatment flow capacity specifications are the same as those specified in the previous permit. They are also the same as the full trash capture specifications in the Trash Amendments adopted by the State Water Board.

C.10.b Demonstration of Trash Reduction Outcomes

C.10.b.i.(a.-c.) Full Trash Capture Systems - Full trash capture systems must be maintained to be effective. If a full trash capture systems enters a rain period with a full trash reservoir, or is clogged with leaves or trash, trash may bypass the device and it will not function as a full trash capture device. Therefore these devices must be frequently inspected and maintained at a sufficient level. These requirements allow for Permittees to conduct inspections and maintenance in a flexible, as-needed, manner. Permittees are required to maintain adequate maintenance records and report any full trash capture devices found to be not adequately maintained or improperly functioning. Permittees are also required to certify annually that all of their full trash capture devices are adequately operated and maintained.

C.10.b.ii. Other Trash Management Actions

C.10.b.ii.a. Implementation Documentation – Documentation of trash management or control actions implemented and areas of implementation is essential to support trash reduction effectiveness and trash condition improvement.

C.10.b.ii.b.((i)-(iv)) Visual Assessment of Outcomes of Other Trash Management Actions – The primary tool currently available for determining trash reduction action success and positive outcomes is visual assessment, with photo documentation of trash generation and conditions in areas that drain to storm drains. Visual assessment involves observing a sufficient portion of each, e.g., sidewalk and curb area, at a frequency that adequately represents the trash management area condition relative to the type(s) of management actions implemented in the area. The frequency of required visual assessments depends on the rate of trash generation, the sources and types of trash, trash management actions deployed, and time of year. During the wet season, October through April, visual assessments in a trash

management area must be conducted at a frequency that determines whether there may be trash discharges to the storm drain system from sources or areas of trash accumulations before a trash management action or combination of actions is implemented or between recurring trash management actions. The degree of trash reduction that a Permittee claims also affects the frequency of visual assessment necessary to make the claim. Higher reduction claims typically require higher frequency of assessments.

During the wet season, for claims that a trash generation area has been reduced to a low trash generation area, this should be at least once per month in what was a very high trash generation area, at least twice per quarter in what was a high trash generation area, and once per quarter in what was a moderate trash generation area. Permittees, with justification, may conduct less frequent visual assessments for claims that a trash generation area has been reduced from what was a very high trash generation area to a high or moderate trash generation area or from what was a high trash generation area to a moderate trash generation area. Frequency of visual assessments during the dry season, May through September, should be at least once per quarter, including, and preferably, within the month (September) before the wet season begins. Higher frequencies of visual assessments than those illustrated above may be required to demonstrate effectiveness of trash control actions and claimed trash reduction. Lower frequencies than those illustrated above may also be acceptable with justification.

At this point in time, due to the lack of a standard method or protocol to effectively measure trash in receiving waters from municipal storm drains, visual assessment is the best type of monitoring to assure compliance with the Permit's requirements to implement trash management actions to reduce trash discharges into municipal storm drains. (See 40 CFR § 122.44(i).) The required amount, type, interval and frequency will yield data that is representative of the monitored activity, as required by 40 CFR § 122.48(b). This graphic demonstrates four trash visual conditions that correspond to the four trash generation categories of Very High (D), High (C), Moderate (B) and Low (A).

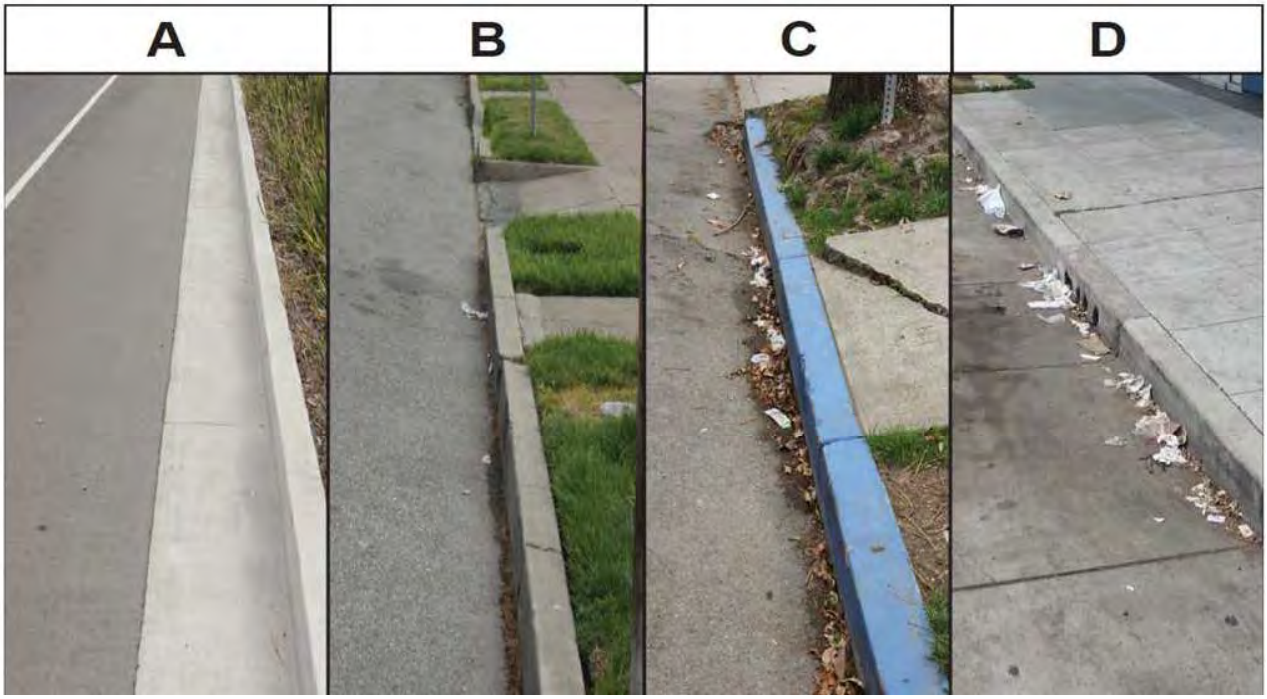

It is also possible to assess trash reduction outcome by documenting and verifying that trash management actions in a trash management area are equivalent to trash management actions implemented in an equivalent trash management area, and the actions in the equivalent trash management area have been assessed to be effective in accordance with a specified performance standard and the assessment results are reproducible. In such cases, it may be possible to extrapolate the performance assessment results to the equivalent trash management area with some verification. If this evidence is proposed by Permittees and accepted by the Executive Officer, Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within similar trash management areas to the same performance standard.

C.10.b.iii. Percentage Discharge Reduction – Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to lower trash generation categories and the Low generation status during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the 70 and 80 percent trash load reduction deadlines and consideration of the 2016 performance guideline (C.10.a.ii.a)**.** However, trash management actions in Very High and High trash generation areas will result in more trash load reduction than actions in Moderate trash generation. Accordingly, a trash reduction demonstration methodology that provides relative benefit weight to actions in Very High and High areas is preferable to one that just considers percentage change in Very High, High, and Moderate trash generation area. The trash generation rates used by Permittees to delineate and map their 2009 trash generation area maps provide a means to provide a relative benefit weight to demonstrated reductions in the areas of Very High and High trash generation, even if they are not reduced all the way to Low generation.

The delineation of trash generation areas were based on ranges of trash generation rates (C.10.a.ii.). Therefore, the ratios of the approximate midpoints of the categorical trash generation ranges provides a means of weighing relative benefit to actions in Very High and High areas compared to actions in Moderate areas. The Moderate range is 5-10 gal/acre/yr, with a midpoint of 7.5 gal/acre/yr. The High range is 10-50 gal/acre/yr with a midpoint of 30 gal/acre/yr. Therefore, the weighed ratio of High to Moderate is 30/7.5 = 4. The Very High range, greater than 50 gal/acre/yr, does not have a specified upper bound that allows calculation of a midpoint. An alternative that provides reasonable weighing of Very High is 90 gal/acre/yr, which is 40 percent higher than the low end of the Very High range. This results in a weighed ratio of Very High to Moderate of 90/7.5 = 12.

The following formula provides a means of demonstrating attainment of the percent trash load reduction deadline and performance guidelines with weighted benefit of Very High and High trash generation area percent reductions relative to Moderate trash generation area percent reductions:

$$\% \text{ Reduction} = 100\,[(12\,A_{VH(2009)} + 4\,A_{H(2009)} + A_{M(2009)}) - (12\,A_{VH} + 4\,A_{H} + A_{M})] \,/\, (12\,A_{VH2009} + 4\,A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$ = total amount of the 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of the 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of the 2009 moderate trash generation category jurisdictional area

A_{VH} = total amount of very high trash generation category jurisdictional area in the reporting year

A_{H} = total amount of high trash generation category jurisdictional area in the reporting year

A_{M} = total amount of moderate trash generation category jurisdictional area in the reporting year

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

100 = fraction to percentage conversion factor

C.10.b.iv. Source Control – Jurisdiction-wide source control actions will have trash generation and load reduction benefit beyond what can be accounted for in trash management area specific assessment-based percentage discharge reduction (C.10.b.iii). These include Permittee efforts to adopt and implement source control on certain types of trash, particularly persistent, floating litter and other particularly difficult types of trash that are easily blown by the wind or clog full trash capture devices. This type of trash has been documented to be a significant percentage of the trash collected in full trash capture devices, and Permittees that have implemented such source control have documented significantly less such litter types in their hand collection of trash and litter on land. Permittees will be allowed to claim load

reduction compliance value of up to ten percent load reduction total for all such actions. This would be added to the % Reduction amount calculated by the C.10.b.iii - Percentage Discharge Reduction formula in demonstrating attainment of the percent trash load reduction deadline requirements and performance guideline. To claim a load percentage reduction value, Permittees must provide substantial evidence that these actions reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides evidence that the implementation of source control in its jurisdiction is similarly implemented as the source control assessed in the reference studies. Source control load reduction value(s) will be reviewed during reissuance of the Permit, and value(s) for source control load reductions might not be continued and allowed in the next permit, particularly in areas where the value of source controls will be accounted for in observed reductions in trash in trash generation areas, to avoid double counting. Also, the focus of the next permit will move to attainment of the 2022 goal and consideration of receiving water condition compliance indicators, and source control load reduction values may no longer be relevant.

C.10.b.v. Receiving Water Monitoring – Receiving water monitoring for trash provides additional evidence and can verify that full trash capture systems and other trash management actions are preventing trash from discharging into receiving waters and whether additional actions may be necessary associated with sources within a Permittee's jurisdiction. They can also show whether there are ongoing sources outside of the Permittee's jurisdiction that are causing or contributing to adverse trash impacts in the receiving water(s). There are currently no standard methods and protocols for monitoring trash in receiving waters. However, BASMAA is developing and testing some trash monitoring tools and protocols via a California Proposition 84 grant funded project (Agreement # 12-420-550), *Tracking California's Trash*. During this Permit term, the Permittees will develop and test trash receiving water monitoring tools and protocols designed, to the extent possible, to answer the following questions:

1. Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
2. Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
3. Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
4. Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?

The monitoring tools and protocols may include direct measurements and/or observation of trash in receiving waters. In scenarios where direct measurements or observations are not feasible, surrogates for trash in receiving waters, such as measurement or observation of trash on shorelines or creek banks may provide a practicable means of monitoring trash. This includes consideration and appropriate simplification of the shoreline and creek bank trash assessment method developed by

Water Board staff, *Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams. Surface Water Ambient Monitoring Program.* April 2007.

The goal is to establish the least expensive and simplest to use monitoring methods and protocols that are applicable to the various discharge and receiving water scenarios that accounts for the various receiving waters and watershed, community, and drainage characteristics within Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s). These and other factors, such as feasibility, location logistics, types of trash, complexity, and costs, provide a means to focus and limit the number of monitoring tools and protocols, and determine spatial and temporal representativeness of the tools and protocols, representativeness of scenarios that will be tested.

Keys to establishing the least expensive and simplest to use monitoring methods and protocols include: their acceptance and use by interested parties; ensuring their scientific integrity by having them peer reviewed; and a user-friendly system to manage and access monitoring results. To provide a balance between allowing time to develop and test the tools and protocols and allowing enough time to review the proposed monitoring program in advance of reissuance of the Permit, Permittees must submit a preliminary report on the proposed monitoring program by July 1, 2019, a year in advance of the final proposed monitoring program due July 1, 2020, six months before the Permit expires. This should allow for early resolution of some monitoring program issues that are not dependent on completion of tests. Given the interest in receiving water monitoring by multiple parties, Permittees are encouraged to conduct development and testing of the tools and protocols and development of the monitoring program through an independent third party, such as the San Francisco Estuary Institute, that provides for interested party participation and scientific peer review of the work. Permittees will not be required to submit the preliminary monitoring program report if the work is conducted by an independent third party.

C.10.c. Trash Hot Spot Selection and Clean Up

The previous permit included a requirement for Permittees to cleanup a minimum number of Trash Hot Spots in receiving waters or on shorelines or creek banks associated with their jurisdictions. Trash Hot Spot cleanups remove trash discharged from a Permittee's jurisdiction and lessen the adverse impacts from the discharges until they are abated by a Permittee's trash management actions. Trash Hot Spot cleanups have an added benefit in that may also remove discharges of trash from non-storm drain sources, e.g., direct dumping or homeless encampments. They also provide an additional means of assessing the effectiveness or Permittees' trash management actions and identification of the types and sources of trash. The required Trash Hot Spot assessment is based on the SWAMP Rapid Trash Assessment Protocol.

C.10.d. Trash Load Reduction Plans

The previous permit required Permittees to prepare a Plan to achieve the 2017 and 2022 trash reduction deadline requirements. A Trash Load Reduction Plan provides a means for Permittees to determine and account for appropriate trash management actions in their

trash management areas and their schedule of implementation, and it provides documentation of planned actions that can be referenced if annual performance guidelines are not met. It also provides a basis for justifying and accounting for the types and locations of Permittees' assessments of trash management actions, and for optional trash load offset opportunities allowed by C.10e.

C.10.e. Optional Trash Load Reduction Offset Opportunities

C.10.e.i. Additional Creek and Shoreline Cleanup - Some Permittees cleanup more than the minimum required C.10.c Trash Hot Spot cleanups. These additional creek and shoreline cleanups are of value in removing trash from shorelines and creeks or creek banks that are causing or may cause adverse impacts to receiving waters. Permittees conduct some of these additional cleanups with community volunteers, which creates additional public outreach and participation benefits.

The volume of trash removed in these cleanups tends to be high compared to the estimated volume rate loads calculated using the average (nominal midpoint) trash generation rates (C.10.a.ii). This is due in part to Trash Hot Spot locations, which are often downstream of Very High and High trash generation areas with actual generation rates at the upper end of those category ranges. Another reason may be that these cleanups likely remove trash from direct discharges other than from Permittees' storm drain systems. Also, these cleanups sometimes occur just one-time so the volume of trash removed cannot be directly compared with required trash reduction rate volumes.

One way to recognize the value of these additional cleanups and to account for the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume /time) is to use an offset ratio of three to one for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, and ten to one for the 2019 mandatory trash load reduction deadline, when comparing additional cleanup volumes with 2009 trash load estimates based on using average trash generation category values and to cap the offset amount. The following formula generates a Permittee-specific trash volume amount, based on its 2009 categorical trash generation areas and a three to one or ten to one offset ratio, which may be used to offset one percent of a required percent load reduction value:

$$1\% \text{ Reduction Offset (volume)} = (12\ A_{VH(2009)} + 4\ A_{H(2009)} + A_{M(2009)})\ OF$$

where:

$A_{VH(2009)}$	=	total amount of 2009 very high trash generation category jurisdictional area
$A_{H(2009)}$	=	total amount of 2009 high trash generation category jurisdictional area
$A_{M(2009)}$	=	total amount of 2009 moderate trash generation category jurisdictional area
12	=	Very High to Moderate weighing ratio
4	=	High to Moderate weighing ratio
OF	=	offset factor equal to (7.5 x 0.033) for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash

generation rates and 0.033 is the three to one offset ratio, or (7.5 x 0.1) for the 2019 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

A Permittee can compare trash volumes collected from additional cleanups to this calculated offset volume and apply one percent offset to a C.10.a.i percent load reduction requirement for each collected volume that equals the 1% Reduction Offset (volume). However, the total offset that can be claimed to avoid over-compensation associated with the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume/time) is limited to ten percent. Furthermore, to justify the offset the associated cleanups must occur more than once per year and preferably at a frequency sufficient to demonstrate sustained improvement of a creek or shoreline area. Offset values will be reviewed during reissuance of the permit, and value(s) for cleanups might not be continued and allowed in the next permit, particularly in areas where Permittees have responsibility for discharges of trash to a cleanup area. The focus of the next permit will move to attainment of the 2022 goal and consideration of receiving water condition compliance indicators, and cleanup values may no longer be relevant.

C.10.e.ii. Direct Discharge Controls - Some Permittees are faced with the challenge that large amounts of trash are discharged to receiving waters in their jurisdiction from homeless encampments and direct dumping. These trash discharges are separate from and in addition to discharges from Permittee storm drain systems. Elimination and prevention of adverse water quality impacts due to trash and attainment of water quality standards in receiving waters will require management of these non-storm drain system discharges in addition to control of storm drain system trash discharges by Permittees. Accordingly, some Permittees are taking or are willing to take actions to control these other sources by implementing a comprehensive plan to control all sources of trash discharged to receiving waters in their jurisdiction. Accordingly, Permittees should be allowed to offset some of their percent load reduction requirements if they control these other sources.

Permittees have and likely will continue to demonstrate the benefit of controlling these additional sources by accounting for the volume of trash collected. As with additional creek and shoreline cleanups, the volume of trash removed cannot be compared directly with trash load discharge rate (volume/time).The simplest, and possibly only way to account for these additional control actions, until more rigorous assessment and accountability methods are developed, is to allow a Permittee to offset part of its C.10.a trash load percent reduction requirement using the C.10.e.i formula to determine an offset from additional creek and shoreline cleanup. However, since control of these other sources by Permittees will be through implementation of a comprehensive and sustained program, Permittees that implement a comprehensive plan approved by the Executive Officer merit a higher offset cap than that allowed by C.10.e.i for additional creek and shoreline cleanup. A fifteen percent offset-cap based on the C.10.e.i formula provides a balance between incentive and reward for control of these non-storm drain system sources and the uncertainties associated with the

simple formula. It is likely that this offset will be removed from this provision during the next permit term. This will occur as the 2022 target deadline approaches and the focus turns to determining the condition of the receiving waters to determine compliance.

C.10.f. Reporting

The reporting requirements reflect the minimum amount of information needed to demonstrate compliance with all Provision C.10 requirements.

Costs of Trash Control

With the assistance of a $5 million grant from the American Recovery and Reinvestment Act obtained and distributed by the San Francisco Estuary Partnership, the Permittees cumulatively exceeded the full trash capture permit requirement acreage by over a factor of four. Therefore, it would appear that the following cost estimate produced in 2008 significantly over-estimated the costs of full trash capture installation at the time.

Costs for either enhanced trash management measure implementation or installation and maintenance of trash capture devices are significant, but when spread over several years, and when viewed on a per-capita basis, are reasonable.

Trash is costly to remove from our aquatic resource environments. Staff from the California Coastal Commission report that the Coastal Cleanup Day budget statewide: $200,000-250,000 for Coastal Commission staff, and much more from participating local agencies. The main component of this event is the 18,000 volunteer-hours, which translates to $3,247,200 in labor, and so is equivalent to $3,250,000-3,500,000 per year to clean up 903,566 pounds of trash and recyclables at $3.60 to $3.90 per pound. This is one of the most cost-effective events because of volunteer labor and donations. The County of Los Angeles spends $20 million per year to sweep beaches for trash, according to Coastal Commission staff.

Mr. Morad Sedrak, the TMDL Implementation Program Manager, Bureau of Sanitation, Department of Public Works, City of Los Angeles, reports that the City plans to invest $72 million dollars for storm drain catch basin based capture device installation primarily, for a City of 4 million population, for a per-capita cost of $18 dollars. This effort is occurring over a span of over five years, for an annual per-capita cost of under $4.

Mr. Sedrak reports that O&M costs are not anticipated to increase, as the City of L.A. is already budgeted for 3 catch basin cleanings per year. He also states that catch basin inserts installed inside the catch basin in front of the lateral pipe, which have been certified by the Los Angeles Regional Water Board as total capture trash control devices, cost approximately $800 to $3,000 (including installation) depending on the depth of the catch basin. .

Furthermore, the price for catch basin opening screen covers, which are designed to retain trash at the street level for removal by sweepers, and also to open if there is a potential flooding blockage, ranges roughly from $800 to $4,500, depending on the opening size of the catch basin.

The City of Los Angeles has currently spent 27 million dollars on a retrofit program to install catch basin devices in approximately 30% of its area, with either inserts or screens or both. Mr. Sedrak states that Los Angeles plans to spend $45 million over the next 3 years to retrofit the remaining catch basins within the City. The total number of catch basins within the City is approximately 52,000.

The following are links to information about the Los Angeles trash control approach:

http://www.lastormwater.org/Siteorg/program/TMDLs/trashtmdl.htm

http://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdf)

http://www.lastorhttp://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdfmwater.org/Siteorg/program/poll_abate/cbscreens.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbinserts.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbscreens.htm

In Oakland, the Lake Merritt Institute is currently budgeted at $160,000 per year, with trash and litter removal from the Lake as a major task. The budget has increased from about $45,000 in 1996 to current levels. In the period of 1996-2005 the Lake Merritt Institute staff, utilizing significant volunteer resources, and accomplishing other education tasks, removed 410,859 pounds of trash from the Lake at cost of $951,725, or $2.30 per pound.

The City of Oakland reports that installation of two vortex and screen separators cost $821,000 for installations and treat tributary catchments of 192 acres before discharge to Lake Merritt (a cost of $4,276 per acre). The following table details these costs and other pertinent information

City of Oakland—CDS Unit Overview 9-07

Existing CDS unit location	Outfall number	Treatment area (acres)	Cost of implementation	Sizing	Maintenance requirements	Comments
Intersection of 27th and Valdez Streets	56*	71	$203,000 to contactor; plus ~$100,000 City costs	73 cfs peak flow; 36" stormdrain; Unit sizing: 18'6'6' box with 10'11"diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Required relocation of electrical conduit. Water main and gas line were also in the way; the box was adjusted to accommodate these conflicts.
Intersection of 22nd and Valley Streets	56*	121	$368,000 to contactor; plus ~$150,000 City costs	115 cfs peak flow; 54" storm drain; Unit sizing: 18'8.5'6' box with 12'diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Installation costs were higher than anticipated. Sewer lines and PGE facilities were exposed that were not known before. Unit had to be modified and poured-in-place.

* The City is treating 192 acres or 72 percent of the 252 acres draining to outfall number 56.

Additional cost information on various trash capture devices is included in the Santa Clara Valley Urban Runoff Pollution Prevention Program BMP Trash Toolbox (July 2007). The Toolbox contains cost information for both trash capture devices and enhanced trash management measure implementation, covers a broad range of options and also discusses operation and maintenance costs. Catch basin screens are included with an earlier estimate by the City of Los Angeles of $44 million over 10 years to install devices in 34,000 inlets.

The City of Oakland provided information on the cost of trash booms. The Damon Slough trash boom or sea curtain cost $36,000 for purchase and installation, including slough side access improvements for maintenance and trash removal. Annual maintenance costs have been $77,000 for weekly maintenance, which includes use of a crane for floating trash removal.

C.11. Mercury Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury wasteload allocations established for the TMDLs.

The C.11 provisions follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)) and accordingly, build on understanding gained from pilot testing many control measures during the Previous Permit term. During this Permit term Permittees are expected to continue to improve the level of certainty concerning control measure benefit and effectiveness by implementing actions in a phased approach, and then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective.

However in contrast to the Previous Permit term, this Permit does not specify control measures to implement to achieve load reductions. Rather, the permit requires development and implementation of a load reduction accounting scheme along with a quantitative demonstration of the load reductions that result from implementation of all relevant control measures. The Permittees may comply with any requirement of this provision through a collaborative effort. Many of the control measures may be chosen primarily for the purpose of achieving PCBs load reductions, but substantial mercury load reductions may result as a tangential benefit and should be accounted for.

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. C.11-3 through C.11-7 are components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 On October 8, 2008, the Water Board adopted a Basin Plan amendment including a TMDL for mercury in the Guadalupe River Watershed (GRW) and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. The GRW mercury TMDL assigns an urban stormwater runoff allocation proportionally equivalent to the mass allocation in the San Francisco Bay mercury TMDL. Accordingly, the GRW urban stormwater runoff mercury allocation is simply the fraction of the Santa Clara Valley Urban Runoff Pollution Prevention Program allocation attributed to the Guadalupe River watershed. The urban stormwater runoff allocation implicitly includes all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public

facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The 2003 load of mercury from urban runoff was estimated to be 160 kg/yr, and the aggregate WLAs for urban runoff is 82 kg/yr and shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and Caltrans. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, *source category*) including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-4 The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

C.11-5 The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff and remain consistent with the section of the Basin Plan chapter titled, *Surface Water Protection and Management—Point Source Control—Stormwater Discharges*.

C.11-6 The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

a. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

b. Continue to develop and implement a mercury source control program;

c. Implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

d. Monitor levels of methylmercury in discharges. This requirement was satisfactorily accomplished during the last permit term and will not be included in the permit during this permit term;

e. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal

areas. This requirement is not necessary at the moment and will not be included in the permit during this permit term;

f. Develop an equitable allocation-sharing scheme in consultation with Caltrans to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board (This was satisfactorily accomplished during the last permit term);

g. Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

h. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Individual WLAs (see Table 4-w of the Basin Plan amendment), by using one of the following methods:

(1) Quantify the annual average mercury load reduced by implementing

i. Pollution prevention activities, and
ii. Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

(2) Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

(3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

C.11-7 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

C.11-8 Recent estimates using the latest available data suggest that the urban runoff mercury loading to San Francisco Bay is on the order of 115 kg/yr (McKee and Yee 2015[61]). While this figure is based on environmental data and thus has

[61] McKee, L.J. and Yee, D., 2015. Sources, Pathways and Loadings: Multi-Year Synthesis. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). San Francisco Estuary Institute, Richmond, California.

inherent uncertainty associated with it, it suggests that current mercury loading is approximately equal to the interim TMDL loading milestone (to be reached at the half-way point of TMDL implementation, 2017) of 120 kg/yr. If mercury loads can be reduced by approximately 35 additional kg/yr, urban runoff loading would meet the TMDL wasteload allocation.

C.11-9 Mercury is distributed more uniformly throughout the urban landscape than PCBs. For example, loading from older industrial and other polluted source areas accounts for only 6% of the average annual mercury load, but these areas account for over 50% of the average annual PCBs load (McKee and Yee 2015). The likely stronger role of atmospheric deposition in the case of mercury, which may account for up to 50% of the mercury found in urban runoff, is part of the reason for the more uniform mercury distribution in the landscape (McKee and Yee 2015).

C.11-10 Monitoring data indicate that, while not always the case, watersheds with high PCB~~s~~ concentrations often contain high or moderately high mercury concentrations (McKee and Yee 2015). Therefore, control strategies focused on finding and managing PCBs-contaminated drainages will often yield mercury load reduction benefits as well.

C.11-11 This provision is consistent with a recent U.S. EPA memorandum[62] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear and concrete milestones and deadlines (see C.11.a.iii) for the activities associated with achieving mercury load reductions as well as other requirements (see C.11.b-h.), necessary to achieve receiving water limits of this Permit term relative to the mercury TMDL WLA.

Specific Provision C.11 Requirements

Provision C.11.a. requires Permittees to implement control measures to achieve mercury load reductions. In order to comply with this requirement, Permittees must identify the mercury control measures and the watersheds and management areas in which these measures will be implemented and a time schedule for implementation. Moreover, Permittees must demonstrate quantitatively the load reductions achieved through use of the accounting scheme developed through C.11.b.

This provision is critical to the successful implementation of the urban runoff requirements from the mercury TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds and management areas, 2) a commitment to an implementation schedule, and 3) the quantification of load reductions resulting from control measure implementation. Many or most of the control measures that will generate mercury reduction benefits will be chosen based on the benefit for PCBs load reductions.

[62] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

Available data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances. However, there are conceivable control measures that are unique to mercury, like those addressing collection and recycling of mercury-containing devices, and these are, in fact, required by household hazardous waste and producer responsibility laws.

Recent loading estimates suggest that current mercury loading to the Bay is at or below the interim loading milestone established in the TMDL. Moreover, mercury is more evenly distributed in the landscape than PCBs so there are fewer opportunities to find and address heavily contaminated (with mercury) sites to achieve substantial, short-term load reductions. Instead, much of the additional benefit to reduce mercury urban runoff loads will come from a combination of proper disposal and management of mercury containing products as well as much more extensive treatment elements (e.g., green infrastructure) incorporated into the stormwater infrastructure. For these reasons, short-term load reduction performance criteria are not included in C.11.a (in contrast to C.12.a for PCBs).

Provision C.11.b. requires Permittees to develop and implement an assessment methodology and data collection program to quantify mercury loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required by the provisions of this Permit.

Permittees submitted land-use mass yields of mercury in their 2014Integrated Monitoring Report (IMR) for the Previous Permit. When these yields were multiplied by the total area of various land-use categories, the estimated regionwide (for the entire region that discharges to the Bay) mercury load was lower than the load estimated in the mercury TMDL by approximately a factor of 1.3. Therefore, the land-use yields were multiplied by a factor of 1.3 in order to normalize to the estimated baseline mercury load in the mercury TMDL and to agree with recent load estimates from runoff. The resultant (adjusted) mass yields for three land-use types shown here are based on data Permittees collected during the Previous Permit term and provide a reasonable means of calculating the mercury load reductions for control measures implemented in corresponding areas. Permittees may refine these yields when they submit supporting documentation in their 2016 Annual Report.

- Old Industrial Land Use = 1300 mg mercury/acre/year
- Old Urban Land Use = 215 mg mercury/acre/year
- New Urban areas and Other = 33 mg mercury/acre/year

The land-use yield provides a convenient way to calculate the resulting load reduction of various sorts of control measure strategies. For example, when contaminated areas are **newly or redeveloped**, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). So, the amount of mercury load reduction can be obtained by multiplying the area of new/redevelopment by the difference in yield (either old industrial minus new urban or old urban minus new urban, whichever pre-development land-use is applicable).

The mercury load reductions for **retrofits or other treatment controls** (including green infrastructure) can be calculated by multiplying the area treated by the assumed land-use yield of the treated area multiplied by the efficiency factor of the treatment method (using a default value of 70 percent or an efficiency established through documentation of implemented method and reported in annual reports).

For **contaminated private properties** that are referred to the Water Board or other agencies for subsequent remediation, the estimated load reduction can be derived by assuming that the mercury yield of the source area is reduced over the course of site cleanup from a high yield to the old urban yield (215 mg mercury/acre/year). Source areas identified for the purpose of referral tend to have much higher areal yields, but data are not currently available to provide an interim estimate for the mercury yield of such contaminated sites. Permittees would need to provide this information prior to receiving mercury load reduction credit from referral of private properties for cleanup.

This provision allows the opportunity for Permittees to update their default load reduction accounting factors, as adjusted by the Water Board, and in some cases extending the accounting framework presented in the IMR, justifying assumptions and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected to confirm the load reduction for each type of implemented control measure. Any adjustments to the default accounting framework must be submitted for Executive Officer approval.

Provision C.11.c Available information suggests that mercury is distributed more uniformly throughout the Bay Area landscape than is the case for PCBs. Therefore, a focus on highly contaminated areas (with mercury) may not be enough to achieve the TMDL-required load reductions. A critical part of the strategy to reduce urban runoff mercury loads will be the widespread implementation of green infrastructure control measures to intercept mercury-containing sediment and stormwater before it is discharged to receiving water. Provision C.11.c requires Permittees to implement green infrastructure projects during the term of the permit to achieve mercury load reductions of 48 g/year by June 30, 2020. This green infrastructure load reduction requirement is feasible in that these load reductions are approximately equivalent to the scale of load reduction achieved during the Previous Permit term through green infrastructure and C.3-related treatment controls (Integrated Monitoring Report 2014). It is reasonable to expect that a similar or greater pace of redevelopment plus green infrastructure implementation on public property can be achieved during this Permit term. The green infrastructure load reduction requirement is warranted because it is important to provide a clear performance expectation for Permittees for green infrastructure implementation because widespread and effective green infrastructure implementation will be an important component of achieving the load reductions necessary to achieve the mercury TMDL wasteload allocation.

County-specific load reductions are derived from the allocations and load reductions stated in the mercury TMDL. Namely, the TMDL-required load reduction for a county was divided by the total TMDL-required load reduction for the permit area (the area covered by this Permit) and this fraction was multiplied by 48 g/yr to derive the county-

specific green infrastructure load reduction requirement. While not required in the Permit, it will be essential to develop effective and easy-to-use tracking and visualization tools so Permittees, regulators, and stakeholders can monitor progress of green infrastructure implementation and its water quality impacts.

Because mercury is distributed throughout the urban landscape, extensive implementation of green infrastructure elements is going to be necessary to achieve the load reductions required by the TMDL. However, the planning, financing and implementation of green infrastructure is going to take a long time, perhaps as much as 25 years or more. This also means that the load reduction benefits of such implementation will also be realized over an extended time frame. To ensure that Bay Area municipalities are working effectively and expeditiously in implementing appropriate green infrastructure controls to reduce loads of mercury, PCBs and other pollutants of concern, the Permit requires Permittees to prepare a reasonable assurance analysis to rigorously and quantitatively demonstrate that mercury load reductions of at least 10 kg/yr throughout the permit area will be achieved over the course of the next 25 years (i.e., by 2040) through implementation of green infrastructure throughout the permit area..

Preparing the reasonable assurance analysis will be a step-wise process. Permittees must: establish the relationship between areal extent of green infrastructure implementation and mercury load reductions, estimate the amount and characteristics of land area that will be treated through green infrastructure in future years, and estimate the amount of mercury load reductions that will result from green infrastructure implementation by specific future years. Ultimately, the reasonable assurance analysis will require the use of one or more models. Permittees must therefore ensure that the calculation methods, models, model inputs and modeling assumptions used to make the demonstration have been validated through a peer review process.

Fortunately, the permittees in the Bay Area can take advantage of related (reasonable assurance analysis) efforts already underway in Southern California. The Los Angeles Regional Water Board has produced a useful set of guidelines for conducting a Reasonable Assurance Analysis (RAA) for the watershed management programs that are required through their MS4 permits.[63] These guidelines provide an excellent reference and starting point for the RAA required through C.11/12.c in terms of the mechanics of the analysis, BMP identification, critical condition selection, choice of models, model calibration criteria, modeling inputs, and model outputs. The crucial feature of the Southern California RAAs is that they must demonstrate with sufficient analytical rigor that the suite of foreseeable control measures to reduce loads will result in compliance with final WLAs. The RAA performed for PCBs and mercury for the San Francisco Bay Area will be similar in many respects to the type of analysis described in the Southern California guidance document, but they must also account for the local watershed characteristics as well as what has been learned about the distribution, fate, and transport characteristics of PCBs and mercury.

[63] Los Angeles Regional Water Quality Control Board (LARWQCB) 2015. *Guidelines for Conducting Reasonable Assurance Analysis in a Watershed Management Program, Including an Enhanced Watershed Management Program*.

Provisions C.11.d requires Permittees to prepare a long-term plan and schedule for mercury control measure implementation and corresponding reasonable assurance analysis quantitatively demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations. The type of analysis for this provision shares many features with the one conducted as part of C.11.c.

The mercury TMDL anticipated the challenge of achieving the urban runoff mercury load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that

> *"the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:"*

- *A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;*
- *Documentation has been prepared that demonstrates that all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;*
- *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
- *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.*

Provision C.11.d provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. For example, as explained previously the load reductions for mercury are going to depend heavily on long-term implementation of control strategies (like green infrastructure) that extend beyond the current implementation timeframe of the mercury TMDL. The long-term plan and schedule required as part of this provision will lay the foundation for a formal recognition of an implementation timeframe that is longer than originally conceived in the TMDL.

Provision C.11.e requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in the previous permit term, which funded community based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.12. PCBs Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs wasteload allocations established for the TMDL. In order to make substantial progress, Permittees must implement PCBs control measures strategically during this Permit term. Moreover, aggressive control measure implementation combined with thoughtful planning for the future (see C.12.d) are conditions that must be satisfied before the Water Board can consider an implementation timeframe longer than the 20 years provided in the TMDL.

The C.12 requirements follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)) and accordingly, build on understanding gained during the Previous Permit term. During the Previous Permit, Permittees were required to pilot test a variety of control measures in a limited number of watersheds or portions of a watershed (management area). Building on that knowledge, this provision requires Permittees to implement PCBs control measures (source control, treatment control and/or pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and to report on the loads reduced through implementation of those control measures.

In contrast to the Previous Permit, this Permit does not require implementation of specific control measures. Rather, the Permittees must use their judgment and knowledge of their watersheds to choose the optimum suite of control measures in order to optimize PCBs load reductions. A technically sound load reduction accounting method, based on information gained during the testing phase and based on information reported at the end of the Previous Permit, is provided in this Permit Fact Sheet to provide certainty for Permittees.

As discussed below, based on information gained during control measure pilot testing and reported during the Previous Permit term, load reductions on the order of those required by this Permit are achievable (see Basis for Required PCBs Load Reductions in MRP *2*, February 23, 2015) and necessary in order to make progress toward achieving the regionwide urban runoff wasteload allocation of 2 kg/yr (representing a load reduction from all urban runoff sources of approximately 18 kg/yr compared to loads estimated using data collected in 2003) within the 20-year TMDL timeframe. Further, load reductions resulting from a variety of PCBs control measures may be feasibly calculated in a straightforward manner (see below), and numeric load reduction requirements provide an unambiguous accountability metric against which to evaluate the sufficiency of control measure implementation. In contrast, it is problematic to assess the sufficiency of Permit requirements that merely call for the implementation of BMPs without a specification of the extent or intensity of such BMP implementation. Because specific load reductions are called for by the TMDL, the approach employed in the Permit (specific load reduction requirements) is both more straightforward and appropriate.

The area covered by the Permit (permit area) is smaller than the region that discharges to the Bay. The discharges in the permit area have been allocated 1.6 kg/yr of the total 2 kg/yr wasteload allocation and the total load reductions required from Permittees in the permit area during TMDL implementation is 14.4 kg/yr of the 18 kg/yr regionwide total.

Fact Sheet Findings in Support of Provision C.12

C.12-1 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. U.S. EPA approved the TMDL on March 29, 2010.

C.12-2 The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit:

"The 2003 load of PCBs from urban runoff is 20 kg/yr, and the aggregate WLAs for urban runoff total 2 kg/yr. Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities … shall reduce PCBs in stormwater runoff to the maximum extent practicable….

In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the

load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section."

C.12-3 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question. If these sources are contributing to urban runoff loads (as opposed to direct Bay discharge), load reductions from these sources will count toward meeting the urban runoff wasteload allocations.

C.12-4 Some PCB congeners have dioxin-like properties. Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

C.12-5 Recent estimates using the latest available data suggest that the urban runoff PCBs loading to San Francisco Bay is on the order of 19 kg/yr (McKee and Yee 2015). While this figure is based on environmental data and thus has inherent uncertainty associated with it, it agrees very well with the regional urban runoff load estimate of 20 kg/yr provided in the TMDL report.

C.12-6 Studies suggest that PCBs load reductions of approximately 6 kg/yr are possible by 2030 through control measures like street sweeping, control of PCBs during building demolition and renovation, drop inlet cleaning, treatment retrofits, redevelopment of contaminated areas, pump station diversion, and street flushing (McKee and Yee 2015). While there are substantial uncertainties associated with these estimates, these results suggest that a substantial portion of the additional load reductions (~ 12 kg/yr) necessary to achieve the PCBs TMDL may need to come from identification and cleanup of PCBs-contaminated properties.

C.12-7 The distribution of PCBs in the urban landscape is much more variable than it is for mercury. For example, data indicate that PCBs-contaminated land uses yield perhaps 800 times more PCBs per unit area compared to the least contaminated land uses. By contrast, there is a 70-fold difference between the highest and lowest yielding land uses for mercury (McKee and Yee 2015). A large proportion (about 53 percent) of annual average urban runoff PCB loading is

likely coming from old industrial or other contaminated areas (McKee and Yee 2015).

C.12-8 A significant recent accomplishment of the Sources, Pathways, and Loadings workgroup of the Regional Monitoring Program has been the development and refinement of a regional watershed spreadsheet model (RWSM). This GIS-based model estimates relative land use and source area yields, and integrates them to provide a transparent, mutually accepted, and peer-reviewed analysis of relative watershed scale yield. Outputs from model runs to date suggest yields for the most polluted watershed in excess of 1000 g/km^2 for PCBs and mercury and a variation between watersheds of ~100,000-fold for PCBs and ~200-fold for mercury. To date, modeling results have a large amount of uncertainty in terms of absolute magnitude, but the results are capturing the patterns of contaminant distribution and transport. The model output is generally consistent with what is known about the distribution of these contaminants in the landscape from stormwater and bedded sediment data. The results are also consistent with what monitoring data tell us about the relative mercury and PCBs loads from land use and source area categories. The predictive power of this modeling tool will be improved as more data are available to characterize PCBs and mercury concentrations in the watersheds and will be useful in predicting regional and sub-regional scale loads of PCBs and other contaminants under a variety of management scenarios (McKee and Yee 2015).

C.12-9 Sufficient information is available to establish default factors for PCBs load reduction credit resulting from foreseeable control measures implemented during this permit term (see information under C.12.b below). For treatment controls, the estimated load reductions can be calculated by multiplying the assumed land-use PCB yearly mass yield by the treated area and by a treatment efficiency factor. The load reduction resulting from cleaning up contaminated properties can be estimated by recognizing that the yield of the contaminated property will be reduced to an assumed background level over the course of site cleanup. The load reduction resulting from controlling PCBs in building materials during demolition can be estimated by estimating the amount of PCBs in the building, the fraction of those PCBs that would enter the storm drain system in the absence of controls, and the efficiency of control measures applied to the demolished building to prevent such PCBs release.

C.12-10 Limited sampling data from Bay Area structures built between 1950 and 1980 suggest that PCB concentrations in caulks here are similar to those in other parts of North America and Europe. Samples collected in about 1350 buildings in Switzerland constructed between 1950 and 1980 found almost half the buildings contained PCBs in caulk, with most samples containing >100 ppm and 20 percent containing 10,000 ppm or more. In Bay Area samples, 40 percentcontained > 50 ppm PCBs and 20% contained > 10,000 ppm PCBs. The study estimates that certain types of Bay Area structures built 1950-1980 contain a mid-range average of 4.7 kg PCBs per building. An estimated 6300 currently standing non-residential buildings in the MRP area were built between

1954 and1974. The mid-range estimate of the total PCB mass in caulk in these buildings is 10,500 kg[64].

C.12-11 Currently there are no protocols for identifying PCBs-containing structures at the time of demolition so that PCBs do not enter municipal storm drains. Some demolition sites, especially high-profile sites such as hospitals, bridges and sports arenas, comply with federal law (Toxic Substances Control Act) and State regulations (California Code of Regulations Title 22) that require a project proponent to determine the presence of PCBs and other hazardous substances and to follow applicable disposal requirements. Soil sampling data from such demolition projects indicate that significant concentrations of PCBs can be present in site soils. Such PCB-laden sediment, particularly at a demolition site without adequate controls, is transported by vehicle tracking, wind erosion or precipitation runoff to the storm drain. PCBs entering the storm drain system during dry weather are non-stormwater discharges that must be effectively prohibited pursuant to CWA § 402(p)(3)(B)(ii). PCBs that are discharged into storm drain systems and waters of the U.S. through stormwater runoff are appropriate for control in order to make progress in achieving the PCBs TMDL wasteload allocations for urban runoff, pursuant to CWA § 402(p)(3)(B)(iii).

C.12-12 U.S. EPA has developed guidelines, available at its "Steps to Safe Renovation and Abatement of Buildings That Have PCB-Containing Caulk" website, for identifying and removing PCBs in building materials that can help in the effort to manage PCBs so that they do not enter municipal storm drains. In addition, during the Previous Permit term, starting in 2009, the Permittees participated in the grant-funded "PCBs in Caulk Project", which addressed potential impacts of PCBs released into stormwater runoff during demolition or remodeling projects in the San Francisco Bay Area. This project fulfilled the permit requirement to investigate the costs, effectiveness, and technical feasibility of PCBs control measures to minimize the release of PCBs in caulks and sealants to stormwater runoff during demolition or remodeling projects. Products developed through this grant-funded project include a fact sheet for developers; a fact sheet on sampling methods; BMPs to control PCBs in caulk at demolition or renovation sites; a Model Implementation Process to incorporate a requirement to use BMPs into the municipal demolition permitting process; a training strategy to train and deploy municipal staff, such as hazardous material or building inspectors, to ensure proper implementation of BMPs; and a technical memorandum on relevant regulations and policies.

C.12-13 This provision is consistent with a recent U.S. EPA memorandum[65] providing guidance on implementing TMDL WLAs in NPDES stormwater permits.

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[64] Klosterhaus S. and McKee L. et al. 2014. *Polychlorinated Biphenyls in the exterior caulk of San Francisco Bay Area buildings, California, USA*. Environment International 66 (2014) 38–43.

[65] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs."

Specifically, this provision establishes clear and concrete milestones and deadlines (see C.12.a.iii) for the achievement of specific PCBs load reductions as well as other requirements (see C.12.b-h.), necessary to achieve receiving water limits of this permit term relative to the PCBs TMDL WLAs.

Specific Provision C.12 Requirements

Provision C.12.a. requires Permittees to implement control measures to achieve specific PCBs load reductions. In order to comply with this requirement, Permittees must identify the PCBs control measures and the watersheds and management areas in which these measures will be implemented and a time schedule for implementation.

In the first year, the Permittees have to identify watersheds and management areas and control measures sufficient to achieve the near term load reduction performance criterion (0.5 kg/yr by June 30, 2018). In subsequent years, the Permittees have to report annually any new watersheds and management areas and control measures necessary to achieve the ultimate PCB load reduction performance criterion (3 kg/yr) by June 30, 2020.

Moreover, Permittees must quantitatively demonstrate the load reductions achieved through use of the load reduction accounting scheme described below and/or further developed through the actions required under C.12.b. This provision element is critical to the successful implementation of the urban runoff requirements of the PCBs TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds, 2) a commitment to an implementation schedule, and 3) the quantification of load reductions resulting from control measure implementation.

This provision requires that Permittees achieve annual PCBs load reductions totaling 0.5 kg/yr by June 30, 2018, and 3.0 kg/yr by June 30, 2020. These load reductions are achievable with the associated deadlines and are based on an assessment of BMPs and control measures controls to reduce PCBs as further described below.

The PCBs load reductions achieved through implementation of Provision C.12.a can be estimated for a unit of activity for a number of anticipated control measures. The effectiveness and benefits of control measures remain uncertain because of limited implementation experience and relatively scarce data on control measure effectiveness for a range of conditions. However, there are sufficient data to develop a starting point for a reasonable system of estimating load reductions as a function of the scale and intensity of control measure implementation.

A simple approach for estimating the load reductions associated with certain control measures involves use of a land-use pollutant yield. A land-use yield is an estimate of the mass of a contaminant contributed by an area of a particular land-use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historical or ongoing use of pollutants in those land uses. PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas where PCBs were never intensively used.

Permittees submitted land-use mass yields of PCBs in their 2014 Integrated Monitoring Report. When these yields were multiplied by the total area of various land-use categories, the estimated region-wide (the entire region that discharges to the Bay) PCBs load was lower than the load estimated in the PCBs TMDL by approximately a factor of 1.73. Therefore, the land-use yields were multiplied by a factor of 1.73 in order to normalize to the estimated baseline PCBs load in the PCBs TMDL and to agree with recent load estimates from runoff. The resultant (adjusted) mass yields for three land-use types shown below are based on data Permittees collected during the Previous Permit term and provide a reasonable means of establishing the PCBs load reductions for control measures implemented in corresponding areas[66]. Permittees may refine these yields when they submit supporting documentation in their 2016 Annual Report.

- Old Industrial Land Use = 86.5 mg PCBs/acre/year
- Old Urban Land Use = 30.3 mg PCBs/acre/year
- New Urban areas and Other = 3.5 mg PCBs/acre/year
- Open Space = 4.3 mg/acre/year

The land-use yield provides a convenient way to estimate the load reduction of various sorts of control measure strategies. For example, when contaminated areas are **newly or redeveloped**, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). So, the amount of PCBs load reduction can be obtained by multiplying the area of new/redevelopment by the difference in yield (either old industrial minus new urban or old urban minus new urban, whichever pre-development land-use is applicable).

The PCBs load reductions for **retrofits or other treatment controls** (including green infrastructure) can be calculated by multiplying the area treated by the assumed land-use yield of the treated area multiplied by the efficiency factor of the treatment method (using a default value of 70 percent or an efficiency established through documentation of implemented method and reported in annual reports).

For **contaminated private properties** that are referred to the Water Board or other agencies for subsequent remediation, the estimated load reduction can be derived by assuming that the PCBs yield of the source area is reduced over the course of site cleanup. Source areas identified for the purpose of referral tend to have much higher areal yields, based on an analysis of the Ettie Street pump station watershed in Oakland. Information adapted from the IMR suggests that 3975 mg PCBs/acre/year is a reasonable interim estimate for the yield of such contaminated sites (Geosyntec 2015). The cleanups will be assumed to take ten years from the date of referral to the Water Board. The assumed result of the cleanup is that the PCBs yield will be reduced over the course of ten years from 3975 mg PCBs/acre/year to the old urban yield of 30.3 mg PCBs/acre/year, or a reduction of 3940 mg PCBs/acre/yr.

Fifty percent of this load reduction will be credited during this Permit term for properties that are referred to the Water Board during the first three years of the Permit term and for which Permittees implement enhanced operation and maintenance measures in the vicinity of the referred property. Often, contaminated properties have a "halo" of

[66] *PCBs Yield Coefficients for MRP 2.0*. Geosyntec Consultants. September 23, 2015.

contamination, and contaminated sediments in this halo can be transported to receiving waters through the stormwater conveyance system. Further, pollutants from the source area may continue to be transported offsite while remediation occurs. Therefore, enhancing operation and maintenance measures in areas immediately adjacent to the source area while the source property is being remediated is a priority to prevent PCBs transport to receiving waters. If enhanced maintenance measures are not implemented in the immediate vicinity of the referred property, the calculated load reduction will be recognized upon completion of the cleanup project.

PCBs load reductions resulting from implementing control measures to prevent discharge to storm drains of **PCBs in building materials during demolition** will be computed as: the mass of PCBs contained in applicable buildings[67] multiplied by the fraction of PCBs entering stormwater conveyances in the absence of controls multiplied by the effectiveness of controls preventing PCBs from entering stormwater conveyances. Each term in this calculation can be represented by a range of values, and information is limited on some of these terms (particularly the fraction of PCBs entering storm drains). However, reasonable values, derived from information available from Klosterhaus (2011) are:

- Mass of PCBs per building = 5 kg
- Number of regulated buildings demolished = 50
- Average fraction of PCBs that enters MS4s during demolition without controls = 1 percent
- Average effectiveness of controls at preventing PCBs from entering storm drains = 80 percent

Multiplying these parameters suggests that about 2 kg/yr of PCBs loads can be reduced by effectively controlling PCBs during demolition. The actual number of demolitions will vary, but 2 kg represents a reasonable estimate and is the basis for establishing the yearly load reduction credit for controlling the release of PCBs to storm drains from such demolitions. If a Permittee implements a control program consistent with these assumptions, a share of the 2 kg/yr credit, pro-rated by population, will be allocated to that Permittee. Permittees may propose an alternative means (other than population-based) of allocating the permit-area-wide load reduction credit associated with implementing C.12.f with the 2019 Annual Report.

Permittees will also likely employ **enhanced operation and maintenance control measures** to reduce loads of mercury and PCBs. These strategies include: street sweeping, drain inlet cleaning, pump station maintenance, PCBs captured by full trash capture devices, etc. It is not possible to state, in advance, specific parameters to allow for load reduction estimates. However, the load reduction calculation is straightforward. The pollutant load reduction (either baseline or enhanced) is the product of the volume of material collected by the control measure multiplied by the percent of the collected material that is sediment multiplied by the density of that sediment multiplied by the concentration of the pollutant in that sediment. The load reduction credit is then simply

[67] Applicable buildings include buildings (excluding single family residential and wood frame buildings) constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm.

the difference between the load reductions achieved with enhanced effort and those achieved with a baseline level of effort (which may be zero if the control measure is new rather than an increased intensity of an existing measure).

PCBs load reduction from other activities can be similarly established and documented through quantification of the amount of material (e.g., sediment or water or other waste) prevented from entering receiving waters multiplied by the concentration of PCBs in that material. The load reduction calculated for all implemented measures shall be summed and compared to the load reduction requirements in Tables 12.1 and 12.2. Permittees can demonstrate compliance with the load reduction requirements by summing the load reduction assigned to each type of activity they undertake. For example, if Permittees meet the Permit requirements for demolitions of regulated buildings (C.12.f) designed to achieve the control effectiveness consistent with the calculation outlined above, then a permit-area-wide load reduction of 2 kg/yr will be applied to the 3 kg/yr by the June 30, 2020, load reduction requirement. Further, Permittees would account for the area treated by green infrastructure, apply the appropriate land use PCB yield, and sum the load reduction over all such treatment installations. Similarly, the calculated load reduction resulting from property referrals and enhanced operation and maintenance can be accounted for using the approach described previously. Summing up all PCBs load reductions from all relevant control measures would constitute the permit-area-wide PCBs load reduction, county-specific, or Permittee-specific PCBs load reduction. Permittees, as a group, are encouraged to implement PCBs controls in the locations with the greatest opportunities for load reduction and be held accountable as a group. However, if the overall load reduction criteria (for all Permittees combined) are not met, the Permit provides an accountability mechanism in the form of load reduction performance criteria for each county in the permit area, calculated according to the proportions used to establish county-specific load allocations in the PCBs TMDL. For example, the load allocation for all Permittees within Alameda County in the PCBs TMDL is 0.5 kg/yr. The estimated baseline load according to the TMDL is 5 kg/yr. This represents achieving a load reduction over 20 years of 4.5 kg/yr (of the 18 kg/yr reduction from urban runoff sources to the Bay overall). However, the Permittees' jurisdictions have an estimated total load reduction responsibility of 14.4 kg/yr, because some of the urban runoff load comes from areas not under the Permittees' jurisdiction. Therefore, the Permittees within Alameda County are responsible for 4.5/14.4 (~ 31.25 %) of the load reductions from the permit area. Applying this same fraction to the required 3,000 g/yr load reduction results in a load reduction for the Alameda County Permittees of 940 g/yr. The load reduction for other counties (e.g., all Contra Costa Permittees combined, all Santa Clara Permittees combined, all San Mateo Permittees combined, and Solano Permittees [Suisun City, Vallejo, Fairfield] combined) can be derived similarly by subtracting the TMDL load allocations from the baseline load estimates and then dividing by 14.4 and then multiplying by either 500 g/yr (for the June 30, 2018, load reductions) or 3,000 g/yr (for the June 30, 2020, load reductions).

Load reduction opportunities almost certainly vary by jurisdiction. Some jurisdictions (e.g., those with a higher proportion of old industrial land use) may have more PCBs-contaminated sites and, hence, greater potential opportunities to implement control measures to reduce loads. Further, the total PCBs load reduction across the entire area

covered under this Permit is relevant to the recovery of San Francisco Bay. Therefore, as long as the total load reductions (500 g/yr by June 30, 2018, and 3 kg/yr by June 30, 2020) are achieved, the load reduction distribution among the counties is much less of a concern.

However, if the permit-areawide total load reduction performance criteria are not achieved, the Permittees in counties meeting the county-level load reduction criteria in the Permit will be deemed in compliance with the performance criteria. If both the permit-area-wide total load reduction criterion and county-specific load reduction criterion are not achieved, those Permittees will be deemed in compliance if they have achieved load reductions consistent with their proportion of the county total established under C.12.b.iii(1). Allocation of the county-wide load reduction responsibility to individual Permittees is based on the fraction of county population in each Permittees' municipality. This is consistent with the assumptions and requirements of the PCBs TMDL in that the permit-area-wide load allocation was distributed to each county based on the proportion of permit-area-wide population contained in each county. Other methods could be used to distribute the county-wide PCBs load reduction performance criteria to individual municipalities (e.g., proportion of county total of certain land-uses associated with PCB presence contained in each municipality). Permittees may propose another alternative as part of reporting on C.12.b.iii(2).

Provision C.12.b. requires Permittees to develop and implement an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required by the provisions of this Permit. The default approach for establishing load reductions for various implementation activities is described above. Early in the Permit term (2016), Permittees will submit documentation supporting this default approach for load reduction accounting along with a description of the data to be collected to establish load reduction value. In particular, C.11/12.b.iii(1) requires Permittees to submit specific details showing how they will perform the calculations to account for mercury and PCBs load reductions from all types of control measures for the reduction of these pollutants. This information includes what data will be used to assign treated areas; how to assign land use to select a yield; and how material will be sampled to determine the contaminant concentration (for control measures requiring such information). Permittees should also identify the types of supporting information that will be submitted so that the calculations can be reproduced. As Permittees gain implementation experience and collect information on this implementation, they may request refinement of the accounting system for use in subsequent Permit terms.

Permittees are encouraged to build on the framework developed in response to a Previous Permit requirement and submitted by Permittees in January 2014 in their Integrated Monitoring Report. This could include updating and in some cases extending the framework presented in that document, justifying assumptions and selected parameters used for each type of control measure, and indicating what information will be collected and submitted to calculate the load reduction for each implemented control measure. The accounting scheme for use in this Permit term and summarized above along with the

refined accounting scheme submitted near the end of the permit term (for use in subsequent Permits) must both be submitted for Executive Officer approval.

Many of the legacy sources of PCBs are found in Bay margins contaminated by historical industrial activity. These legacy sources may be contributing to storm drain runoff conveyances, but Permittees may have jurisdictional challenges in addressing the sources in private property. In addition, Permittees are responsible for contamination in public rights of way. Permittees are expected to make diligent efforts both to address contamination on public property and to refer source properties to the Water Board for possible cleanup and abatement.

Provision C.12.c. requires Permittees to implement green infrastructure projects during the term of the Permit to achieve PCBs load reductions of 120 g/year by June 30, 2020. The county-specific responsibilities for this load reduction are shown in Table 12.2 of the Permit. These county-specific green infrastructure load reduction requirements were derived using the same methodology described above for Provision C.12.a.

Some Bay Area drainages contain notably elevated PCBs concentrations in suspended or bedded sediment (e.g., > 500 ppb in bedded sediment). A recent analysis of soil PCBs and mercury data collected in the Bay Area identifies 15 sites where maximum concentrations exceed 3.8 mg/kg for PCBs and 1.6 mg/kg for total mercury. Areas with moderately high PCBs concentrations (e.g., 100-500 ppb) were found throughout areas where historical industrial activity involved use of PCBs (McKee and Yee 2015). Placing green infrastructure in highly- and moderately-contaminated areas will form an important element in achieving the PCBs TMDL-required load reductions. However, green infrastructure implementation is a long-term proposition and there is value in placing green infrastructure across the broader landscape to intercept PCBs before they are discharged to receiving water.

To ensure that Bay Area municipalities are working effectively and expeditiously in implementing appropriate green infrastructure controls to reduce loads of mercury, PCBs, and other pollutants of concern, the Permit requires Permittees to prepare a reasonable assurance analysis that rigorously and quantitatively demonstrates PCBs load reductions of at least 3 kg/yr throughout the permit area will be achieved by 2040 through implementation of green infrastructure throughout the permit area. The effort to prepare a reasonable assurance analysis is described above under C.11.c.

Provision C.12.d. requires Permittees to prepare a plan and schedule for PCBs control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations. The Permit requires that this plan must: identify all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented; include a schedule according to which these technically and economically feasible control measures will be fully implemented; and provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation:

The PCBs TMDL anticipated the challenge of achieving the urban runoff load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that

> *"... achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:*
>
> - *A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;*
> - *Documentation has been prepared that demonstrates that all technically and economically feasible and cost-effective control measures recognized by the Water Board have been fully implemented, and evaluates and quantifies the PCBs load reduction of such measures;*
> - *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
> - *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.*"

Provision C.12.d provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. The load reductions for PCBs are difficult and time-consuming to achieve because of the distribution of sources in the landscape; challenges associated with finding and reducing these existing sources; and unpredictability related to demolition of PCBs containing structures. Further, some part of the expected PCB load reduction will come from long-term implementation of control strategies (like green infrastructure) that extend beyond the current implementation timeframe of the TMDL. The long-term plan and schedule required by this provision will help lay the foundation for an implementation timeframe that is longer than that stated in the TMDL.

Provision C.12.e. requires that Permittees collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era. The Washington Department of Ecology discovered that PCBs-containing caulk (sealant) was used inside the City of Tacoma's storm drains during a 1970s repair. There is reason to believe that such use was not isolated to this one location. The sampling and analysis required by this Provision C.12 element will count toward partial fulfillment of the monitoring effort aimed at finding PCBs sources (see management information need in C.8.f).

Provision C.12.f. requires Permittees to develop a protocol for controlling PCBs during building demolition so that PCBs are not transmitted to storm drains via vehicle trackout, airborne releases, soil erosion or stormwater runoff during or after demolition. Because this is a new management practice, three years are allotted to working with entities, such as the Bay Air Quality Management District, U.S. EPA, and waste management entities,

to coordinate oversight functions and otherwise develop a coordinated protocol. After the development period, Permittees shall implement the protocol such that PCBs are controlled during the demolition of applicable structures so that they do not enter municipal storm drains. During this Permit term, applicable structures are limited to potential PCB-containing industrial, public, and commercial structures. Single-family residential and wood frame structures are excluded. In future permits, other types of structures and renovations may be included in the protocol.

The Integrated Monitoring Report (IMR)[68] presents estimates of the mass of PCBs per building (constructed or renovated prior to 1979) ranging from 0.6-16 kg and contribution to stormwater ranging from 0.8 to 4000 grams/year. This is one of the largest known sources of PCBs, although it is distributed throughout the region. For a building with 4.7 kg of PCBs and current control measures of medium effectiveness, there may be 280 grams of PCBs released to stormwater during demolition, assuming control measures are only moderately effective. If only control measures of low effectiveness were in place, such a building would release 560 grams PCBs during demolition.

Permittee 2014 Annual Reports, New and Redevelopment Section "Projects Approved" tables (C.3.b.v.(1)) provided a means to gauge the potential number of redevelopment projects involving applicable structures. While these tables are not required to list all the information necessary to determine if applicable structures will be demolished during redevelopment, in some cases enough information is provided. In 6 of the 11 Permittees reviewed, potential PCB-containing structures are planned to be demolished, including one project in which 14 buildings likely built between 1950 and 1980 will be demolished.

Water Board staff also contacted Bay Area waste management entities, such as county recycling and construction debris recovery programs. Brief discussions revealed the following:

- In general, demolition project proponents must submit debris recovery plans to these entities prior to commencing demolition. These plans could be modified to include information on the likelihood and/or actual existence of PCB-containing materials in the structure.
- Waste management entities tend to have technical advisory committees that could advise on appropriate approaches/frameworks for controlling PCBs during demolition so that they do not enter storm drains.
- Applicable structures are a small subset of all demolitions in the Bay Area.
- Some cities use software for recording demolition projects that could be modified by adding a form(s) for applicable structures.
- There are a limited number (approximately 30-40) of construction and debris processing facilities in the Bay Area, and they are listed on county web sites. At least two of these facilities are known PCB-containing sites, although both include metal processing facilities in addition to other debris recycling.
- One waste management entity has produced a video documenting a large-scale demolition project at a former Army Base that had a variety of hazardous

[68] Integrated Monitoring Report Part B: PCB and Mercury Loads Avoided and Reduced via Stormwater (IMR). Prepared by Geosyntec Consultants for the Bay Area Stormwater Management Agencies Association. 2013.

materials to dispose of, including PCBs. Another pointed to You-Tube videos showing how to remove PCB-containing caulk prior to demolition.

These facts (see also C.10, C.11 and C.12 above) indicate that a workable protocol for controlling PCBs during demolition so that they do not enter storm drain systems could be built upon existing demolition requirements and utilize existing information resources.

Some municipalities may have no applicable structures (i.e., the only structures that existed pre-1980 were single-family residential or wood-frame structures). Such Permittees may provide documentation acceptable to the Executive Officer in their 2017 Annual Reports to seek exemption from the requirement to develop a PCBs demolition control program. This allows time for compilation of this documentation, such as historic maps or other historic records, and for determining which Permittees are exempt prior to year the July 1, 2019, requirement to begin implementing the protocols.

Provision C.12.g. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.g requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed. The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

Provision C.12.h. requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes three types of actions for urban runoff management agencies. These actions are implemented through this Permit as provisions to control urban runoff sources of copper.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[69] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the Permit provisions target major sources of copper including architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 SSOs for dissolved copper have been adopted for all segments of San Francisco Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the SSOs.

C.13-5 One of the major sources of copper to urban runoff has been addressed through passage of Senate Bill 346 in 2010, which requires brake pad manufacturers to reduce the use of copper in brake pads sold in California to no more than 5% by weight by 2021, and no more than 0.5% by 2025. The law also provides an objective process to ensure that any new brake materials meet all applicable safety and performance standards. To make sure that new materials will not cause future environmental problems, the law requires brake manufacturers to screen potential alternatives for their impacts on human health and the environment using the Toxic Information Clearinghouse, and to select less hazardous options.

C.13-6 A scientific uncertainty regarding sediment toxicity was identified during the development of SSOs for copper. Bay sediment copper concentrations are somewhat elevated above the natural background (from native soils). Local soils contain 30- 35 ppm (DW, dry weight) based on deep (> 2 meter) sediment core results for SF Bay. The copper ERL (effects range low) is 34 ppm (DW)

[69] TDC (TDC Environmental), 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

and the ERM (effect range median) is 240 ppm (DW). Thus, the natural concentration of local soils is very close to the ERL. There has never been an exceedance of the ERM in the 975 samples collected and analyzed through RMP data. The maximum copper sediment concentration ever recorded in RMP samples (94 ppm DW) is well below the LC50 of the amphipod *Eohaustorius estaurius* (534 ppm) or the amphipod crustacean *Hyalella azteca* (260 ppm). Surface sediment copper concentrations have trended lower over the last 20 years according to monitoring in the Bay. The median surface concentration of copper was 40 ppm (DW) during the period 1993-2004 and dropped to 38 ppm in 2005-2014. This reduced concentration occurred despite significant population increases in the Bay Area and despite the fact that much more sampling effort was conducted in the shallower parts of the Bay (where copper concentrations would be expected to be higher due to human activities and urban sources) during the latter period because of a re-design of RMP sampling strategies. There was some evidence of possible copper-related toxicity in the late 1990s, but there has not been additional evidence of this phenomenon. The possible sediment toxicity occurred in the northern portions of San Francisco Bay (Suisun Bay and San Pablo Bay) where sediment copper concentrations are higher. However, the decrease in median sediment copper concentrations in the northern estuary from the time period 1993-2004 (52 ppm DW) to 2005-2014 (45 ppm DW) has been even more pronounced than the reduction for the Bay as a whole. Because there has not been additional evidence of copper sediment toxicity and copper concentrations in surface sediments appear to be decreasing over time, Permit requirements to further investigate copper sediment toxicity in San Francisco Bay were satisfied by information collected under MRP 1.0 and are no longer needed. If more evidence of such toxicity does appear, this requirement may be re-instated.

C.13-7 A scientific uncertainty regarding the olfactory impairment of salmonids was identified during development of SSOs for copper. Exposure to dissolved copper has been shown to cause olfactory impairment at relatively low concentrations in freshwater fish, resulting in an impaired avoidance response to predators. When the SSOs were established, studies were planned to address whether or not this phenomenon occurred in estuarine water. The studies[70] were supported in part through requirements in the Previous Permit and were conducted by David Baldwin of NOAA's Northwest Fisheries Science Center. Dr. Baldwin measured the firing of neurons in response to exposure to odorant chemicals. The studies indicate that salmon in saline or moderately saline water are much less sensitive than salmon in freshwater, and that the potential effect of copper on salmon olfaction is not a concern in the Bay.

[70] David Baldwin, NOAA Fisheries, Northwest Fisheries Science Center, 2015. *Impact of dissolved copper on the olfactory system of juvenile salmon, Phase II: Effect of estuarine salinity on olfactory toxicity.*

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. Provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. Provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, and auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

C.14. Bacteria Controls

The purpose of this provision is to implement the stormwater runoff and dry weather flow (urban runoff) requirements of the San Pedro Creek and Pacifica State Beach Bacteria TMDL (TMDL) and reduce bacteria loads to make substantial progress toward achieving the urban runoff bacteria wasteload allocations established for the TMDL.

Fact Sheet Findings in Support of Provision C.14

C.14-1 This Permit implements the Basin Plan amendment adopted by the Water Board on November 14, 2012, that establishes a TMDL and an Implementation Plan for bacteria in San Pedro Creek and at Pacifica State Beach. The State Water Board and U.S. EPA have also approved this Basin Plan amendment.

C.14-2 The implementation plan requires the City of Pacifica and San Mateo County (the Pacifica and San Mateo Permittees) to implement bacteria control measures, conduct education and outreach to others, and conduct water quality monitoring efforts. Control measures implemented by the Pacifica and San Mateo Permittees shall reduce bacteria in urban runoff to achieve TMDL wasteload allocations.

C.14-3 The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s and Caltrans facilities. The allocations are expressed in terms of allowable exceedances of single sample bacteria water quality objectives for the water contact recreation beneficial use and shall be achieved by August 2021 for Pacifica State Beach and August 2028 for San Pedro Creek.

C.14-4 The Pacifica and San Mateo Permittees may comply with any requirement of this provision through a collaborative effort.

Specific Provision C.14 Requirements

Provision C.14.a. requires the Pacifica and San Mateo Permittees to implement various control measures and education and outreach activities to achieve bacteria load reductions. In order to comply with this requirement, the Pacifica and San Mateo Permittees must implement measures such as: effectively prohibit potential illicit discharges to the storm drain from the sanitary sewer collection system; address bacteria discharges from existing and future commercial horse facilities; install dog waste-clean-up signs, waste bag dispensers, and trash receptacles at high priority areas; develop and implement a visual inspection and clean-up plan for high dog waste accumulation areas; and develop and implement an enhanced public outreach and education campaign for managing pet waste. This provision also requires the Pacifica and San Mateo Permittees to modify or refocus control measure implementation efforts as appropriate.

This provision is critical to the successful implementation of the urban runoff requirements for the TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds or locations, 2) a commitment to an implementation schedule, and 3) the quantification of the benefit resulting from control measure implementation.

Provision C.14.b. requires the Pacifica and San Mateo Permittees to conduct a water quality monitoring program to assess attainment of wasteload allocations. The monitoring and reporting requirements of Provision C.14 are authorized under Clean Water Act § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h),(j) and (l), 122.42(c), 122.44(i) and 122.48, and Water Code § 13383. In order to comply with this requirement, the Pacifica and San Mateo Permittees are required to monitor bacteria levels in San Pedro Creek and at Pacifica State Beach and analyze, summarize, and report the results of the monitoring to the Water Board. Further, they must provide an annual report of the quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives. This provision is necessary to determine whether or not wasteload allocations are being attained, so additional or enhanced measures are implemented, if necessary.

Provision C.14.c. requires the Pacifica and San Mateo Permittees to conduct a water quality monitoring program to 1) better characterize bacteria sources and 2) evaluate the effectiveness of the bacteria control measures. The results of the monitoring shall be reported to the Water Board on an annual basis. The findings from these assessments will be used throughout this and future Permit terms to revise, refocus, and enhance bacteria control measures to make them as effective and efficient as possible. Future permits will be based on an updated assessment of bacteria sources and control measure effectiveness. This provision is necessary to allow the Pacifica and San Mateo Permittees to identify and implement effective BMPs in an efficient manner.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges. Illicit discharge means "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities" (40 CFR 122.26(b)(2)).

Fact Sheet Findings in Support of Provision C.15.

Prohibition A.1. effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1. if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

Removal of Conditional Exemption for Planned and Unplanned Discharges of the Potable Water System

The Previous Permit contained requirements for planned and unplanned discharges from the potable water systems owned and/or operated by Permittees who are water purveyors. The discharges were conditionally exempted provided the Permittees complied with the BMP, monitoring, and reporting requirements in the Previous Permit. The requirements were necessary because potable water discharges contain chlorine and chloramines, two very toxic chemicals to aquatic life, and can cause erosion, scouring of stream and creek banks, and sedimentation. The conditional exemption and requirements were included as an interim measure until such time an NPDES permit regulating potable water discharges was adopted. The State Water Board has since adopted the statewide General NPDES Permit for Drinking Water System Discharges to Waters of the United States, Order WQ 2014-0194-DWQ (Potable Water General Permit) on November 18, 2014. Therefore, the conditional exemption and requirements for planned and unplanned discharges from the Permittees' potable water systems is no longer necessary. The Permittees should seek coverage under the Potable Water General Permit for their potable water system discharges. NPDES-permitted discharges, such as those permitted by the Potable Water General Permit, are exempt from Discharge Prohibition A.1.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1. if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1. if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b.'s requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

Provision C.15.b.i.(1). Pumped Groundwater from Non Drinking Water Aquifers. These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Discharges of pumped groundwater from nondrinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit.

Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains. This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

Provision C.15.b.ii. Air Conditioning Condensate. Small air conditioning units are usually operated during the warm weather months. The condensate from these units is uncontaminated and unlikely to reach a storm drain or waters of the State because it tends to be low in volume and tends to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the

condensate tends to be uncontaminated, it picks up contaminates on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

Provision C.15.b.iii. Emergency Discharges of the Potable Water. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two very toxic chemicals to aquatic life. Potable water discharges can cause erosion and scouring of stream and creek banks, and sedimentation can result if effective BMPs are not implemented. This section of the Permit acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs that do not interfere with immediate emergency response operations or impact public health and safety. Reporting requirements for such events shall be determined by Water Board staff on a case-by-case basis.

Provision C.15.b.iv. Individual Residential Car Washing. Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.

Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges. These types of discharges can contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or a waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This provision also requires Permittees to coordinate with local sanitary agencies in these efforts.

Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering. Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the use of fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

C.16. Discharges to Areas of Special Biological Significance

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority:
In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amendment to the Ocean Plan on October 16, 2012, and the plan was subsequently approved by the State Office of Administrative Law and U.S. EPA. The State Water Board is responsible for reviewing the Ocean Plan water quality standards and for modifying and adopting standards in accordance with CWA section 303(c)(1) and CWC section 13170.2. Pursuant to CWA sections 13263 and 13377, this Permit implements the Ocean Plan. In accordance with the Ocean Plan, the State Water Board granted an exception to the prohibition of stormwater discharges to Areas of Special Biological Significance (ASBSs), as discussed further below.

Fact Sheet Findings in Support of Provision C.16.

The Ocean Plan prohibits the discharge of waste to designated ASBSs. ASBSs are designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. On March 20, 2012, the State Water Board approved Resolution No. 2012-0012, approving a general exception to the Ocean Plan prohibition against discharges to ASBSs for certain nonpoint source discharges and NPDES-permitted municipal storm water discharges (ASBS Exception), as long as those discharges are covered under an appropriate authorization to discharge, such as this Order and comply with the Special Protections contained in Attachment B (Special Protections) to that resolution, among other requirements. The ASBS Exception was subsequently amended by State Water Board Resolution No. 2012-0031, which required pollutant reductions to be achieved within six years, in accordance with ASBS Compliance Plans. This provision applies to discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve ASBS. The provision authorizes the County of San Mateo's stormwater discharge as set forth in the provision and implements the Ocean Plan and the exceptions granted under it by the State Water Board to allow the County of San Mateo to discharge stormwater into the ASBS. The requirements of the Provision are from the ASBS Exception and its Special Protections, which are incorporated into the Order as Attachment E.

Attachment G: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment G includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with USEPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment G.

Fact Sheet Attachment C10

303(d) Trash Resolution and Staff Report February 2009

Available at http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0008.pdf

ATTACHMENT B

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/14, Application deemed complete 1/30/15, Project approved 7/16/15	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/15, Application deemed complete 8/2/15, Project approved 12/12/15	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/16, Application deemed complete 4/10/16; Project approved 6/30/16	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/15, Application deemed complete 10/6/15, Project approved 12/9/15, Construction scheduled to begin 7/10/16	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.iv.(2)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.iv.(2)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

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Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address –** Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description –** Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed –** State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area –** For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project –** Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date

8. **Source Control Measures –** List all source control measures that have been or will be included in the project.

9. **Site Design Measures –** List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed –** List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism –** List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used –** List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1)) –** On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2)) –** On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

ATTACHMENT C

Provision C.3.g.
Hydromodification Applicability Map

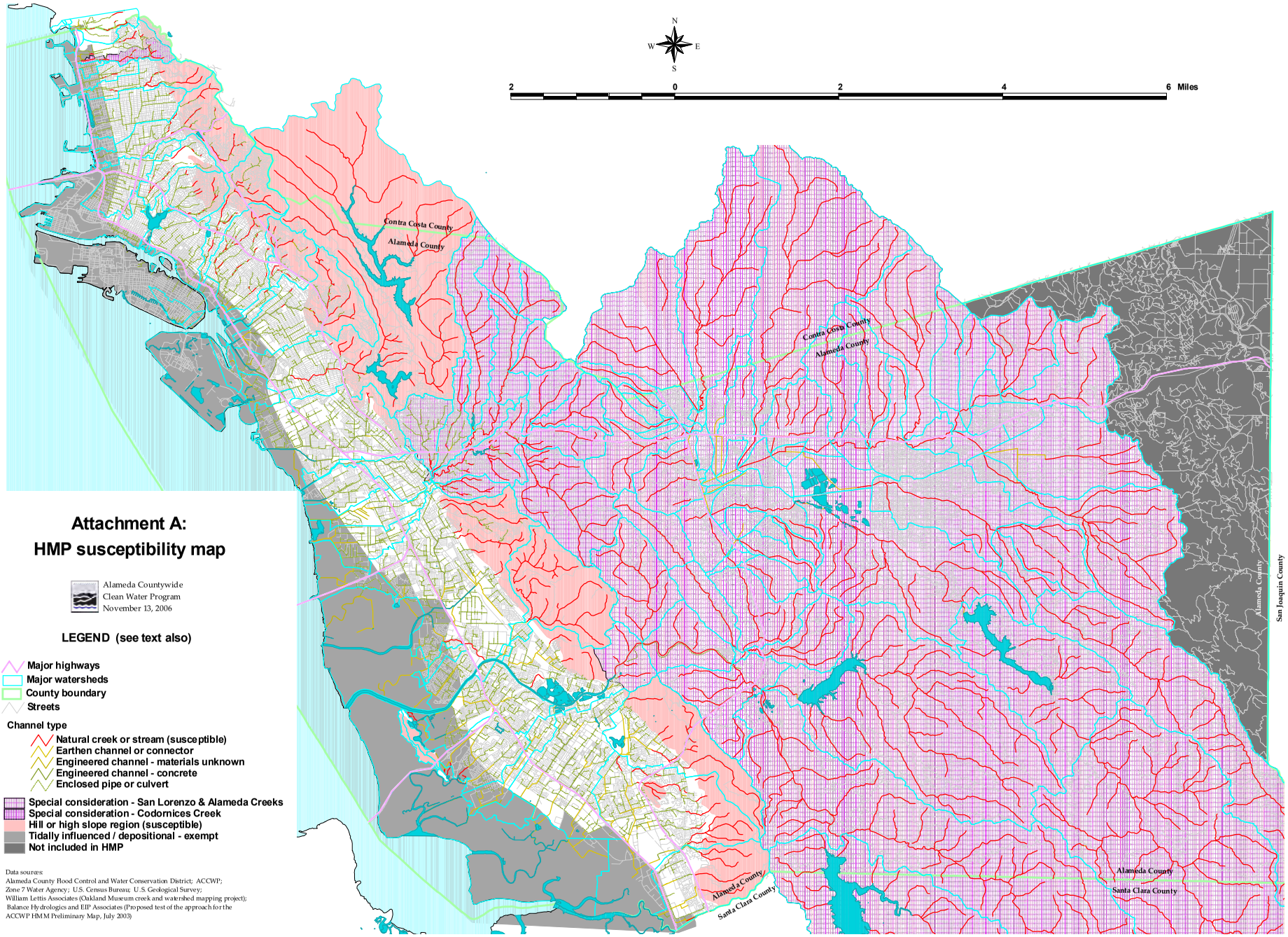

Attachment A:
HMP susceptibility map

Alameda Countywide
Clean Water Program
November 13, 2006

LEGEND (see text also)

- Major highways
- Major watersheds
- County boundary
- Streets

Channel type

- Natural creek or stream (susceptible)
- Earthen channel or connector
- Engineered channel - materials unknown
- Engineered channel - concrete
- Enclosed pipe or culvert

- Special consideration - San Lorenzo & Alameda Creeks
- Special consideration - Codornices Creek
- Hill or high slope region (susceptible)
- Tidally influenced / depositional - exempt
- Not included in HMP

Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)

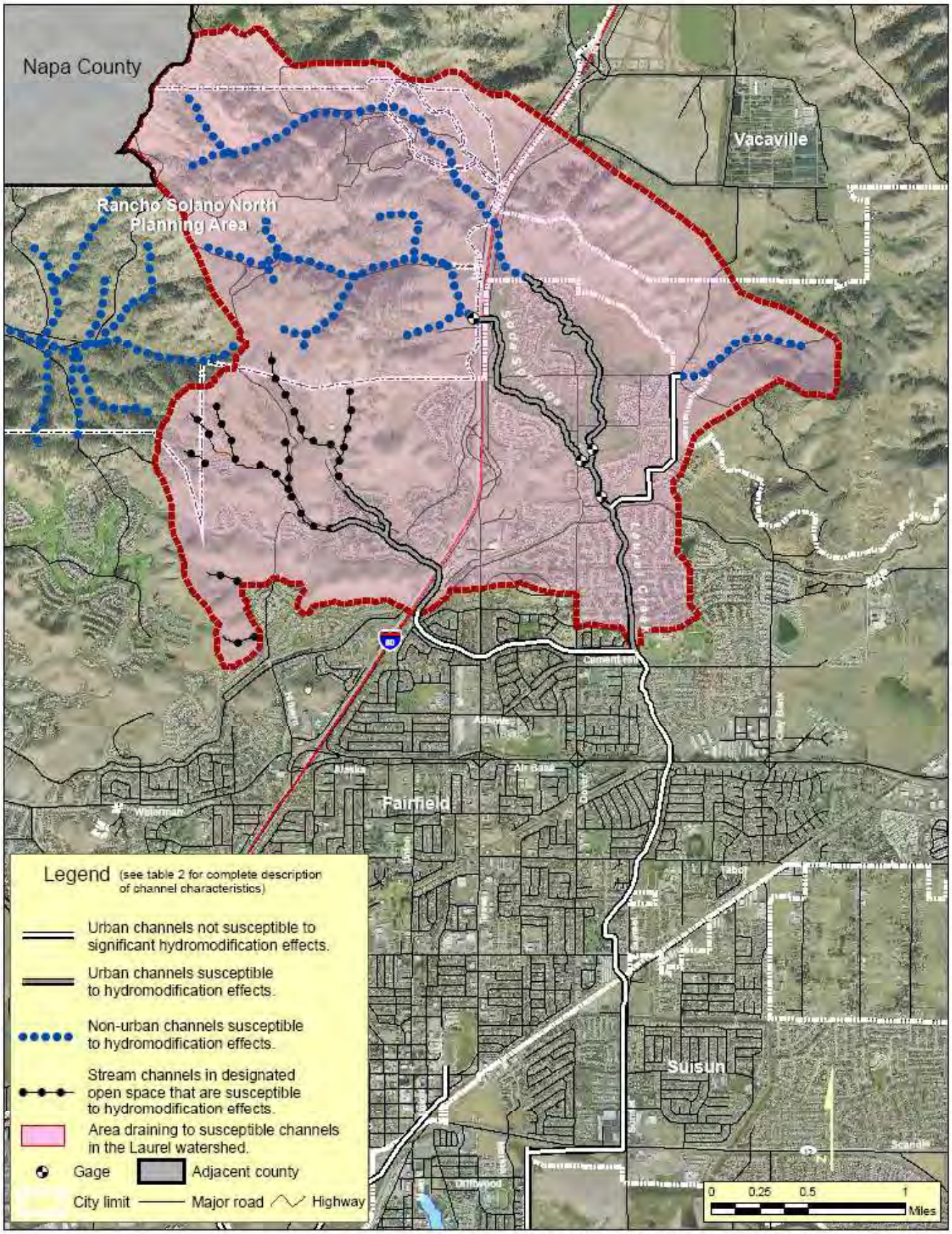

Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure2_edits.mxd

©2006 Balance Hydrologics, Inc.

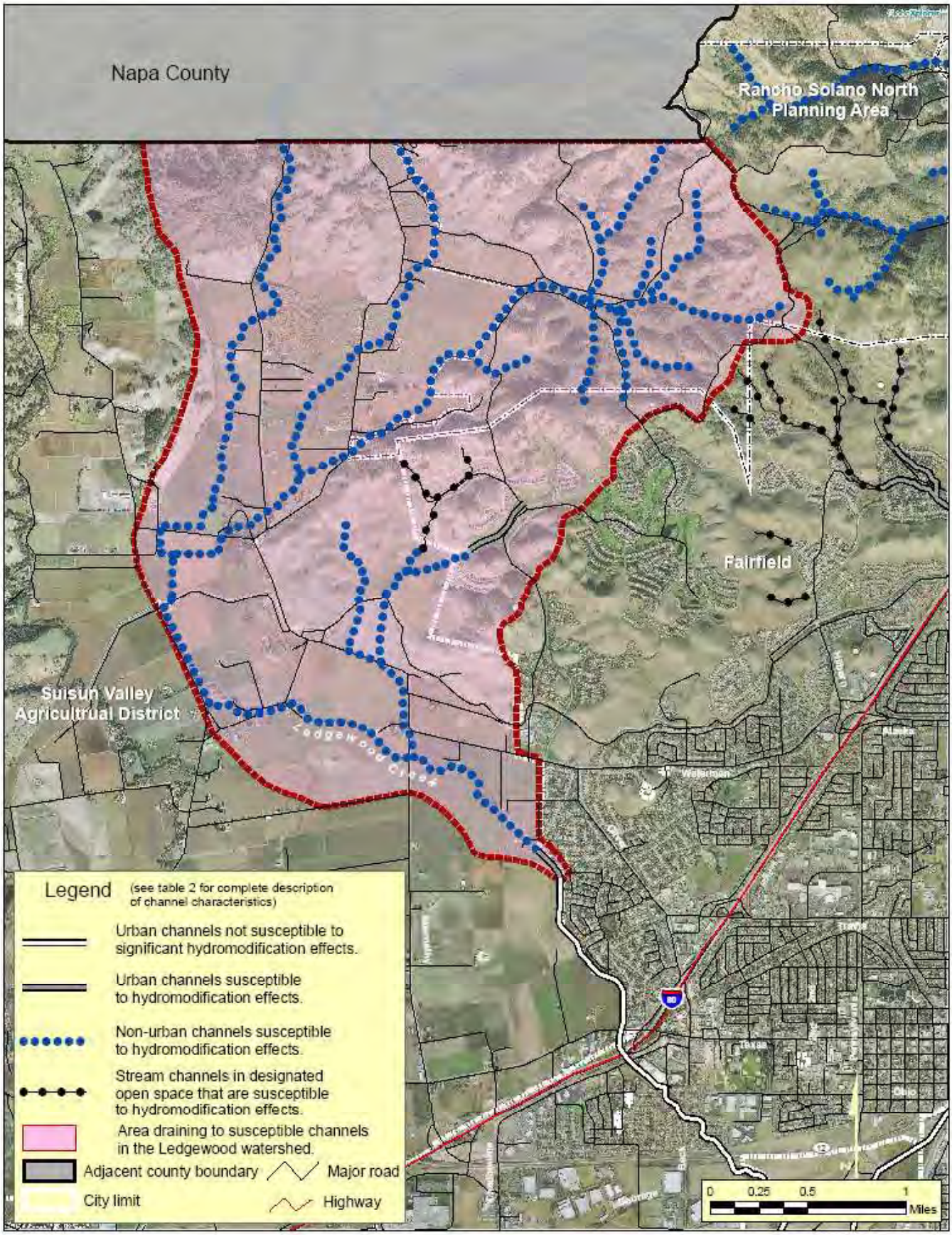

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure3_edits.mxd

©2006 Balance Hydrologics, Inc.

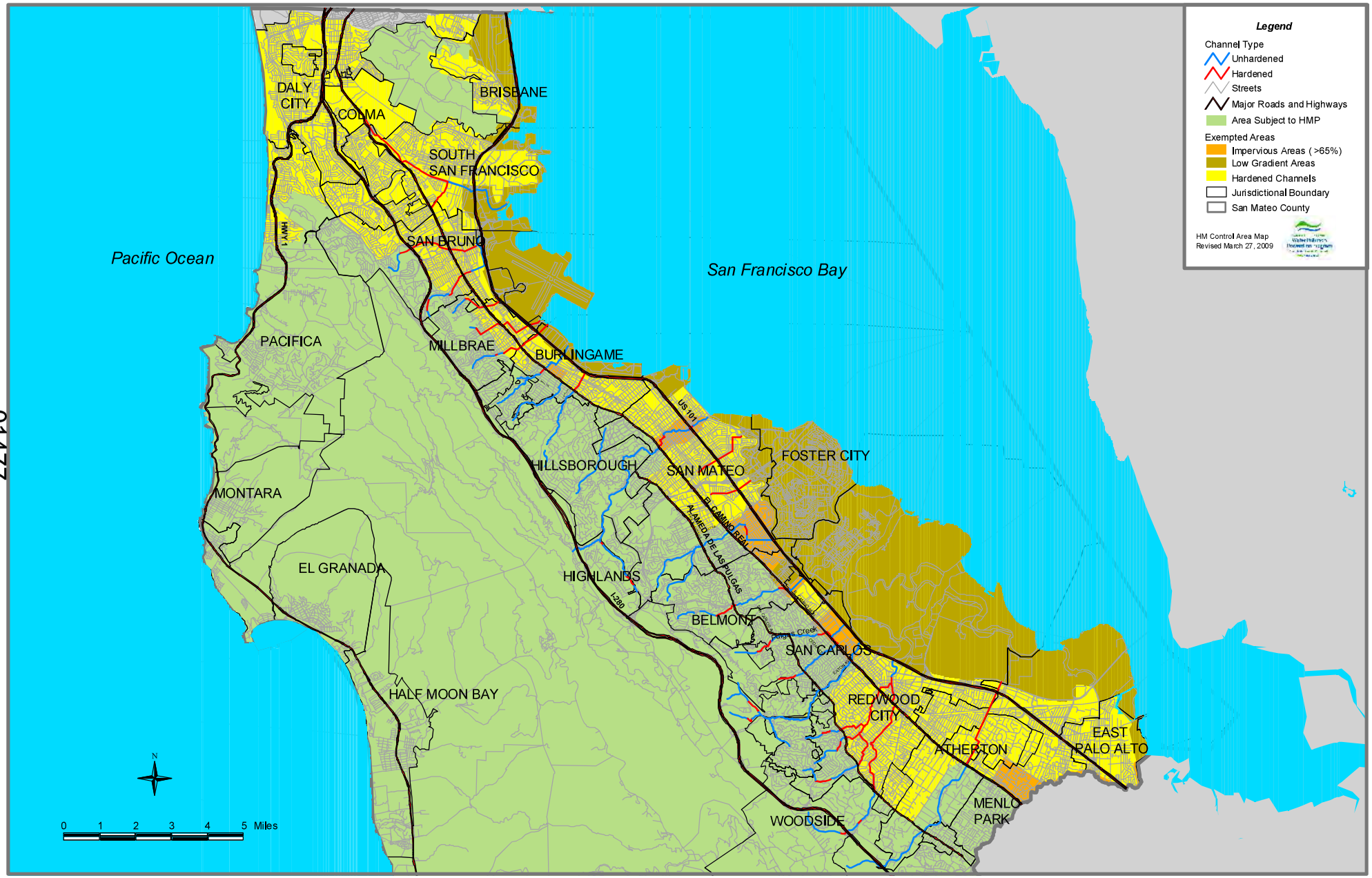
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
MONTARA
HILLSBOROUGH
SAN MATEO
FOSTER CITY
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
WOODSIDE
HWY 1
US 101
I-280
EL CAMINO REAL
ALAMEDA DE LAS PULGAS
Pulgas Creek
N
0 1 2 3 4 5 Miles

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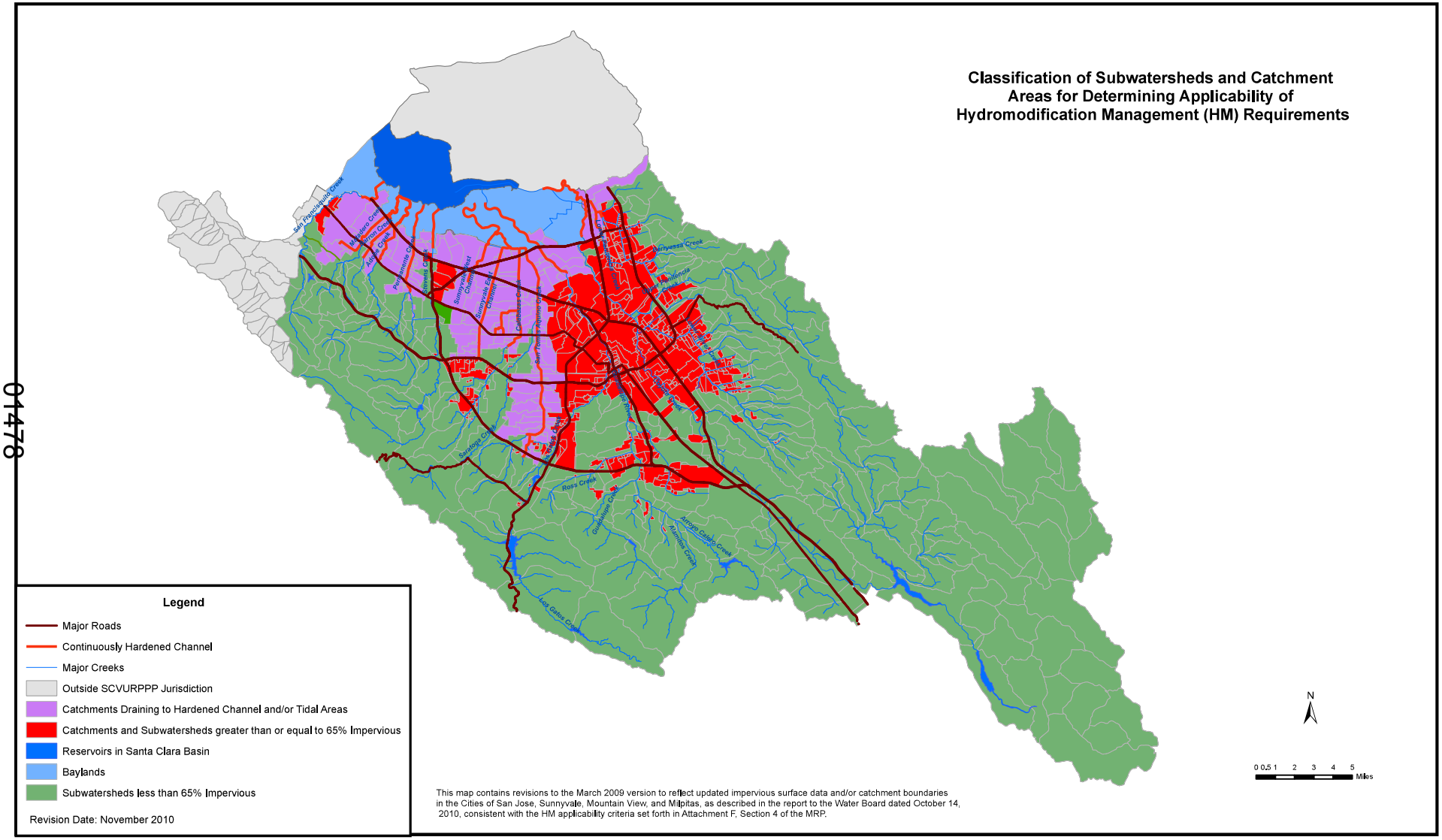
Classification of Subwatersheds and Catchment Areas for Determining Applicability of Hydromodification Management (HM) Requirements
Legend
Major Roads
Continuously Hardened Channel
Major Creeks
Outside SCVURPPP Jurisdiction
Catchments Draining to Hardened Channel and/or Tidal Areas
Catchments and Subwatersheds greater than or equal to 65% Impervious
Reservoirs in Santa Clara Basin
Baylands
Subwatersheds less than 65% Impervious
Revision Date: November 2010
This map contains revisions to the March 2009 version to reflect updated impervious surface data and/or catchment boundaries in the Cities of San Jose, Sunnyvale, Mountain View, and Milpitas, as described in the report to the Water Board dated October 14, 2010, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP.
N
0 0.5 1 2 3 4 5
Miles

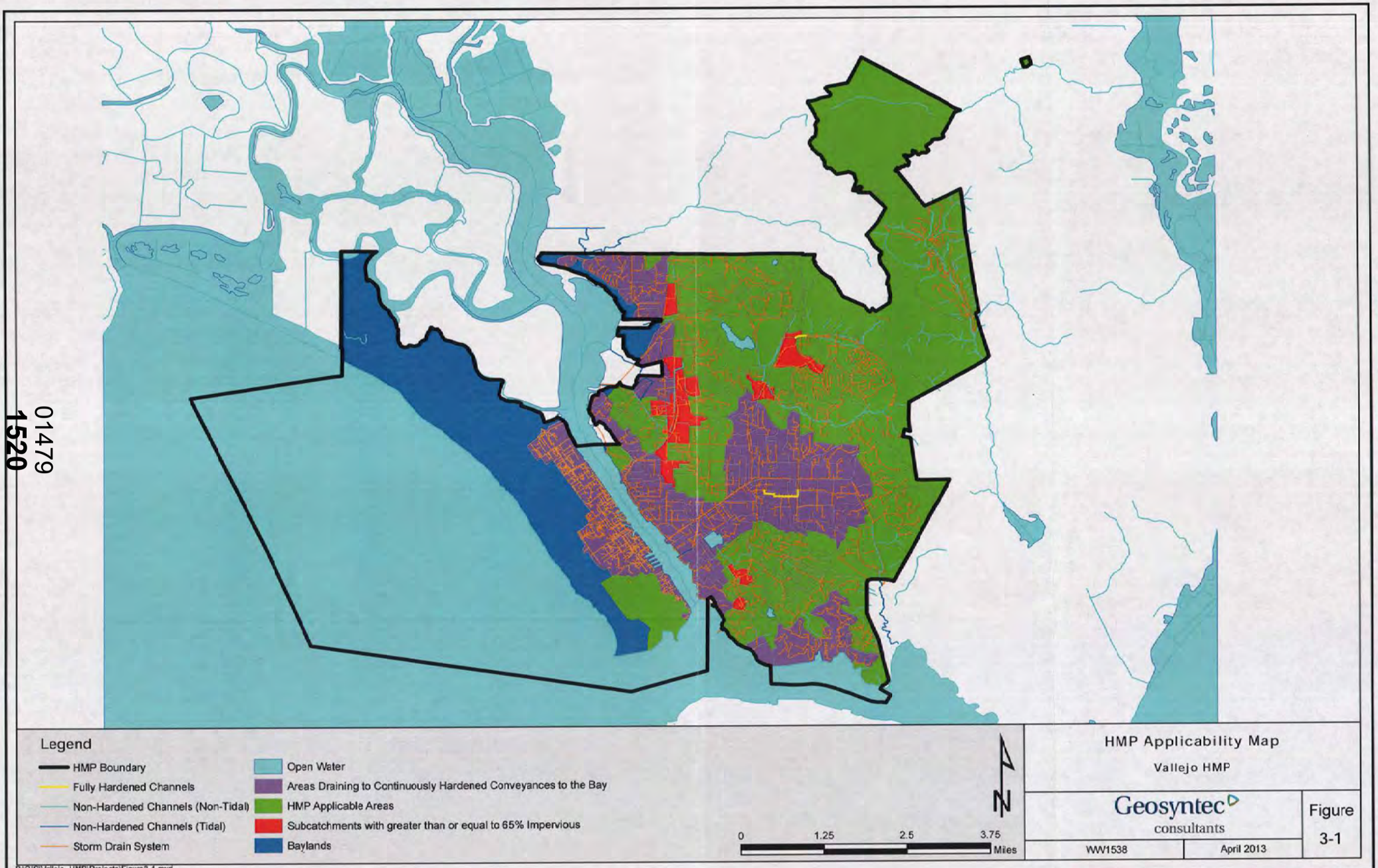
Legend
HMP Boundary
Fully Hardened Channels
Non-Hardened Channels (Non-Tidal)
Non-Hardened Channels (Tidal)
Storm Drain System
Open Water
Areas Draining to Continuously Hardened Conveyances to the Bay
HMP Applicable Areas
Subcatchments with greater than or equal to 65% Impervious
Baylands
N
0
1.25
2.5
3.75
Miles
HMP Applicability Map
Vallejo HMP
Geosyntec consultants
WW1538
April 2013
Figure 3-1
P:\GIS\Vallejo_HMP\Projects\Figure3-1.mxd

ATTACHMENT D

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.

8. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]
9. If a Permittee monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT E

Supporting Information for Provision C.10.

Permittee 2009 Mapped Acreages of Trash Generation Rates

Minimum Full Trash Capture Area

Minimum Trash Hot Spots to be Annually Cleaned

And

Example Trash Generation Rate Map

Table 1. Trash Generation Areas Mapped as of June 2015

County	Permittee	Trash Generation Category (acres) as presented in Long-Term Trash Reduction Plans				
		Low	Moderate	High	Very High	Total
Alameda	Alameda	3,729	1,496	263	10	**5,498**
Alameda	Alameda County	229,012	2,434	347	-	**231,793**
Alameda	Albany	555	305	119	12	**991**
Alameda	Berkeley	2,792	2,317	763	216	**6,088**
Alameda	Dublin	6,498	859	289	-	**7,645**
Alameda	Emeryville	68	351	171	125	**715**
Alameda	Fremont	30,166	6,465	740	-	**37,372**
Alameda	Hayward	10,745	7,008	1,395	165	**19,312**
Alameda	Livermore	11,355	3,325	534	-	**15,214**
Alameda	Newark	2,918	1,816	631	25	**5,391**
Alameda	Oakland	14,432	5,663	4,860	3,465	**28,420**
Alameda	Piedmont	977	109	1	-	**1,086**
Alameda	Pleasanton	13,172	1,416	176	-	**14,765**
Alameda	San Leandro	2,818	4,044	790	77	**7,729**
Alameda	Union City	10,234	1,660	228	-	**12,122**
Contra Costa	Concord	10,832	2,415	678	72	**13,997**
Contra Costa	Contra Costa County	174,854	3,707	1,717	118	**180,396**
Contra Costa	Danville	11,282	106	3	-	**11,391**
Contra Costa	El Cerrito	1,817	311	169	4	**2,301**
Contra Costa	Hercules	3,753	188	12	-	**3,952**
Contra Costa	Lafayette	9,252	245	1	-	**9,498**
Contra Costa	Martinez	5,004	1,777	93	1	**6,875**
Contra Costa	Moraga	5,711	92	125	-	**5,929**
Contra Costa	Orinda	7,764	232	50	-	**8,046**
Contra Costa	Pinole	2,827	136	171	-	**3,134**
Contra Costa	Pittsburg	5,824	2,892	210	132	**9,058**

County	Permittee	Trash Generation Category (acres) as presented in Long-Term Trash Reduction Plans				
		Low	Moderate	High	Very High	Total
Contra Costa	Pleasant Hill	2,873	1,080	371	22	**4,346**
Contra Costa	Richmond	10,704	4,538	1,774	269	**17,285**
Contra Costa	San Pablo	325	682	481	72	**1,560**
Contra Costa	San Ramon	10,536	1,184	-	-	**11,720**
Contra Costa	Walnut Creek	11,329	963	115	-	**12,407**
San Mateo	Atherton	2,984	230	-	-	**3,214**
San Mateo	Belmont	2,517	240	62	-	**2,820**
San Mateo	Brisbane	1,220	473	60	21	**1,775**
San Mateo	Burlingame	1,964	592	99	-	**2,654**
San Mateo	Colma	1,026	122	74	4	**1,225**
San Mateo	Daly City	2,553	1,015	407	-	**3,975**
San Mateo	East Palo Alto	97	879	356	97	**1,428**
San Mateo	Foster City	2,187	109	-	-	**2,296**
San Mateo	Half Moon Bay	3,657	187	51	-	**3,895**
San Mateo	Hillsborough	3,944	7	-	-	**3,950**
San Mateo	Menlo Park	4,811	292	3	-	**5,106**
San Mateo	Millbrae	1,512	369	79	-	**1,959**
San Mateo	Pacifica	7,321	472	104	-	**7,898**
San Mateo	Portola Valley	5,786	5	-	-	**5,790**
San Mateo	Redwood City	7,128	398	1,576	398	**9,502**
San Mateo	San Bruno	2,065	965	57	-	**3,088**
San Mateo	San Carlos	2,584	604	78	-	**3,265**
San Mateo	San Mateo	4,340	2,343	302	-	**6,985**
San Mateo	San Mateo County	172,050	272	362	-	**172,683**
San Mateo	South San Francisco	2,724	2,321	337	-	**5,382**
San Mateo	Woodside	6,989	2	-	-	**6,991**
Santa Clara	Campbell	2,335	1,133	273	-	**3,741**
Santa Clara	Cupertino	5,446	1,161	274	-	**6,881**
Santa Clara	Los Altos	3,966	10	14	-	**3,990**
Santa Clara	Los Altos Hills	5,377	6	-	-	**5,383**
Santa Clara	Los Gatos	6,275	698	-	-	**6,973**
Santa Clara	Milpitas	5,065	3,002	98	2	**8,167**

County	Permittee	Trash Generation Category (acres) as presented in Long-Term Trash Reduction Plans				
		Low	Moderate	High	Very High	Total
Santa Clara	Monte Sereno	1,018	9	-	-	**1,027**
Santa Clara	Mountain View	3,882	2,626	460	-	**6,968**
Santa Clara	Palo Alto	12,592	1,539	53	-	**14,184**
Santa Clara	San Jose	73,366	21,823	5,709	549	**101,447**
Santa Clara	Santa Clara	5,217	4,855	841	12	**10,925**
Santa Clara	Santa Clara County	380,316	678	1,123	-	**382,117**
Santa Clara	Saratoga	7,207	409	-	-	**7,616**
Santa Clara	Sunnyvale	7,082	4,075	907	11	**12,075**
Solano	Fairfield	18,578	240	57	-	**18,875**
Solano	Suisun City	2,043	12	9	-	**2,064**
Solano	Vallejo	10,980	4,314	1,948	476	**17,718**
	Total	**1,404,362**	**118,302**	**33,046**	**6,355**	**1,562,066**

Table 2. Minimum Trash Capture Area and Trash Hot Spots for Population Based Permittees

Data Source: http://quake.abag.ca.gov/mitigation/pickdbh2.html and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)**[1]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[2]
Alameda County						
San Leandro	73,402	721	**216**	2	7	4
Oakland	420,183	759	**228**	14	8	8
Dublin	46,934	377	**113**	1	3	**3**
Emeryville	9,727	69	**21**	1	1	1
Albany	16,877	95	**28**	1	1	1
Berkeley	106,697	183	**55**	3	1	3
Alameda County Unincorporated.	140,825	375	**112**	4	3	4
Alameda	75,823	402	**121**	2	4	**4**
Fremont	213,512	698	**209**	7	6	7
Hayward	149,205	726	**218**	4	7	**7**
Livermore	83,604	423	**127**	2	4	**4**
Newark	43,872	314	**94**	1	3	**3**
Piedmont	11,100	1	**0**	1	1	1
Pleasanton	69,388	366	**110**	2	3	**3**
Union City	73,402	183	**55**	2	1	2

[1] 30% of Retail / Wholesale Commercial Acres – If population under 12,000 and Retail/Wholesale Commercial < 40 acres, Permittee is exempt from Minimum Full Trash Capture Requirement – C.10.iii.a.

[2] If the hot spot # based on % commercial area is more than twice that based on population, the minimum hot spot # is double the population based #.

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)[1]**	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots[2]**
San Mateo County						
San Mateo County Unincorporated.	65,844	71	**21**	2	1	2
Atherton	7,475	0	**0**	1	1	1
Belmont	26,078	58	**17**	1	1	1
Brisbane	3,861	16	**0**	1	1	1
Burlingame	28,867	123	**37**	1	1	1
Colma	1,613	106	**0**	1	1	1
Portola Valley	4,639	9	**0**	1	1	1
Daly City	106,361	242	**73**	3	2	3
East Palo Alto	32,897	59	**18**	1	1	1
Foster City	30,308	67	**20**	1	1	1
Half Moon Bay	13,046	49	**15**	1	1	1
Hillsborough	11,272	0	**0**	1	1	1
Menlo Park	31,490	83	**25**	1	1	1
Millbrae	21,387	68	**20**	1	1	1
Pacifica	39,616	100	**30**	1	1	1
Redwood City	77,269	309	**93**	2	3	**3**
San Bruno	43,444	137	**41**	1	1	1
San Carlos	28,857	129	**39**	1	1	1
San Mateo	95,776	275	**82**	3	2	3
South San Francisco	63,744	195	**58**	2	1	2
Woodside	5,625	9	**0**	1	1	1

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)** [1]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[2]
Contra Costa County						
Contra Costa County Unincorporated.	152,744	524	**157**	5	5	5
Concord	123,776	1016	**305**	4	10	8
Walnut Creek	65,306	329	**99**	2	3	**3**
Clayton	10,784	21	**(0)**	1	1	1
Danville	42,629	134	**40**	1	1	1
El Cerrito	23,320	105	**32**	1	1	1
Hercules	24,324	37	**11**	1	1	1
Lafayette	23,962	68	**20**	1	1	1
Martinez	36,144	142	**43**	1	1	1
Moraga	16,138	108	**32**	1	1	1
Orinda	17,542	24	**7**	1	1	1
Pinole	19,193	140	**42**	1	1	1
Pittsburg	63,652	520	**156**	2	5	4
Pleasant Hill	33,377	219	**66**	1	2	**2**
Richmond	103,577	391	**117**	3	3	3
San Pablo	31,190	131	**39**	1	1	1
San Ramon	59,002	274	**82**	1	2	**2**
Santa Clara County						
Santa Clara County Unincorporated	99,122	270	**47**	3	3	3
Campbell	38,889	137	**41**	1	1	1
Cupertino	55,551	213	**64**	2	2	2
Los Altos	28,291	65	**20**	1	1	1

	Population	Retail / Wholesale Commercial Acres	**Minimum Full Trash Capture Catchment Area (Acres)** [1]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[2]
Los Altos Hills	8,837	0	**0**	1	1	1
Los Gatos	30,296	163	**49**	1	1	1
Milpitas	69,419	457	**137**	2	4	**4**
Monte Sereno	3,579	0	**0**	1	1	1
Mountain View	73,932	375	**112**	2	3	**3**
Santa Clara	115,503	560	**168**	3	5	**5**
Saratoga	31,592	41	**12**	1	1	1
San Jose	989,496	2983	**895**	32	29	32
Sunnyvale	137,538	548	**164**	3	5	**5**
Palo Alto	63,367	282	**84**	2	2	2
Solano County						
Vallejo	120,416	559	**168**	4	5	**5**
Fairfield	106,142	486	**146**	3	4	**4**
Suisun	28,031	75	**22**	1	1	1
Totals	4,930,339	19057	**5718**	165	184	349

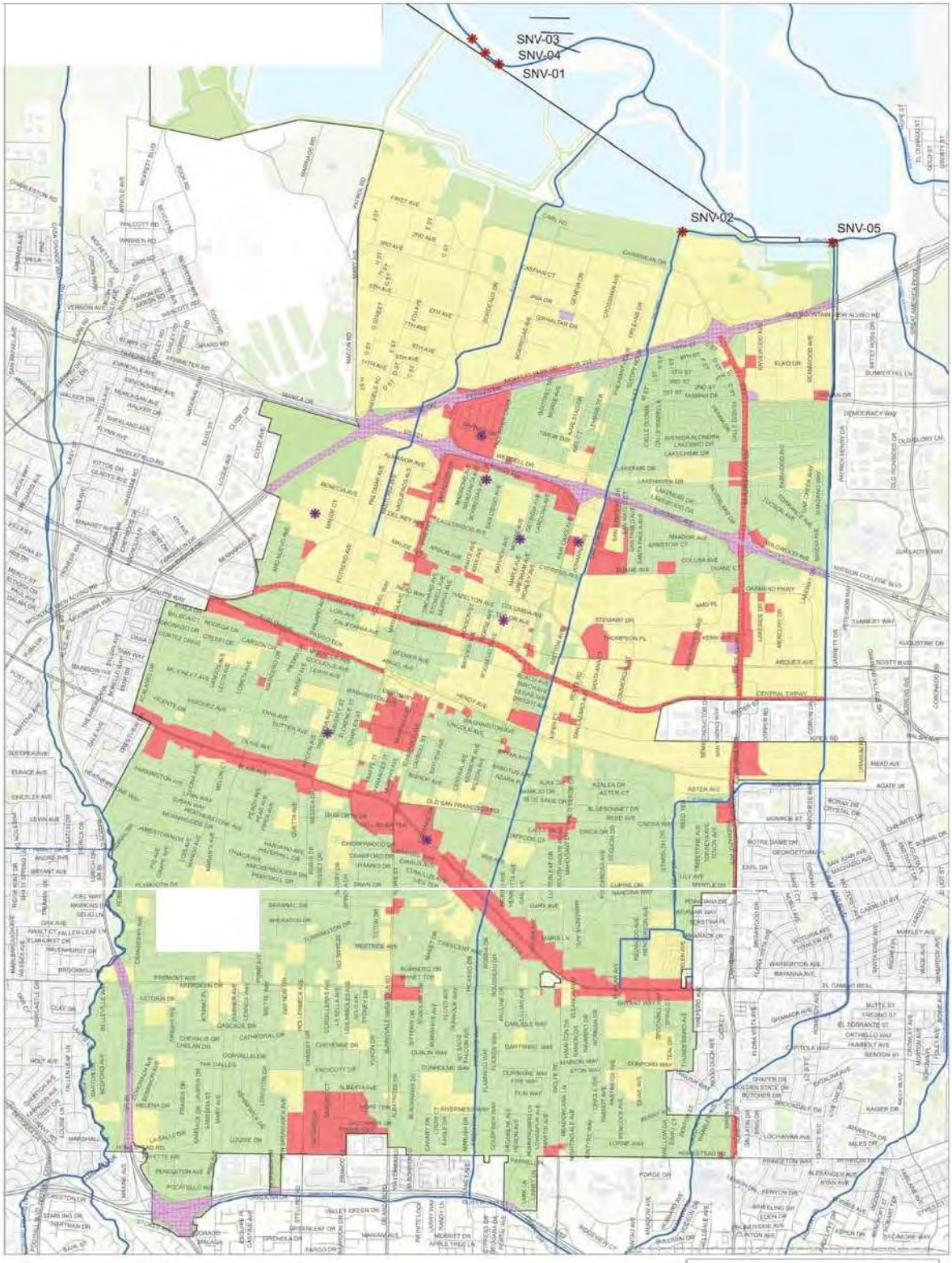
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ATTACHMENT F

State Water Resources Control Board
Resolution No. 2012-0031, Attachment B
Special Protections for Areas of Biological Significance

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2012-0031

Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER AND NONPOINT SOURCE WASTE DISCHARGES

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

b . Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). "Existing storm water outfalls" are those that were constructed or under construction prior to January 1, 2005. "New contribution of waste" is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) (i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.

(b) Foundation and footing drains.

(c) Water from crawl space or basement pumps.

(d) Hillside dewatering.

(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).

The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance

plan for ASBS discharges. The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:

(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and

(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, Permittees must first consider, and use where feasible, LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site, if LID practices would be the most effective at reducing pollutants from entering the ASBS.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger shall submit a draft written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type. The final ASBS Compliance Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe

the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

B. NONPOINT SOURCE DISCHARGES

1. General Provisions for Nonpoint Sources

   a. Existing nonpoint source waste discharges are allowed into an ASBS only under the following conditions:

      (1) The discharges are authorized under waste discharge requirements, a conditional waiver of waste discharge requirements, or a conditional prohibition issued by the State Water Board or a Regional Water Board.

      (2) The discharges are in compliance with the applicable terms, prohibitions, and special conditions contained in these Special Protections.

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only existing nonpoint source waste discharges are allowed. "Existing nonpoint source waste discharges" are discharges that were ongoing prior to January 1, 2005. "New nonpoint source discharges" are defined as those that commenced on or after January 1, 2005. A change to an existing nonpoint source discharge, in terms of relocation or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges from nonpoint sources (those not subject to an NPDES Permit) are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability, or occur naturally:

(i) Discharges associated with emergency fire fighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

f. At the San Clemente Island ASBS, discharges incidental to military training and research, development, test, and evaluation operations are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed in the two military closure areas in the vicinity of Wilson Cove and Castle Rock. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

g. At the San Nicolas Island and Begg Rock ASBS, discharges incidental to military research, development, testing, and evaluation of, and training with, guided missile and other weapons systems, fleet training exercises, small-scale amphibious warfare training, and special warfare training are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

h. All other nonpoint source discharges not specifically authorized above are prohibited.

2. Planning and Reporting

a. The nonpoint source discharger shall develop an ASBS Pollution Prevention Plan, including an implementation schedule, to address storm water runoff and any other nonpoint source discharges from its facilities. The ASBS Pollution Prevention Plan must be equivalent in contents to an ASBS Compliance Plan as described in I (A)(2) in this document. The ASBS Pollution Prevention Plan is subject to approval by the Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements).

b. The ASBS Pollution Prevention Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff that are necessary to comply with these special conditions, will be achieved through Management Measures and associated Management Practices (Management Measures/Practices). Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director or Regional Water Board Executive Officer that such installation would pose a threat to health or safety. Management Measures to control storm water runoff during a design storm shall achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

c. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff or other nonpoint source pollution is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and the Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents that alter natural water quality and the sources of these constituents.

(2) The report shall describe Management Measures/Practices that are currently being implemented, Management Measures/Practices that are identified in the ASBS Pollution Prevention Plan for future implementation, and any additional Management Measures/Practices that may be added to the Pollution Prevention Plan to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the Management Measures/Practices.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements), the discharger shall revise its ASBS Pollution Prevention Plan to incorporate any new or modified Management Measures/Practices that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised ASBS Pollution Prevention Plan, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger~~s~~ shall submit a draft written ASBS Pollution Prevention Plan to the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) that describes its strategy to comply with these special conditions, including the requirement to maintain natural ocean water quality in the affected ASBS. The Pollution Prevention Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls to comply with these special conditions for inclusion in the discharger's Pollution Prevention Plan. The final ASBS Pollution Prevention Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these Special Protections shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Pollution Prevention Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with parks and recreation facilities shall comply with the following:

A. The discharger shall include a section in an ASBS Compliance Plan (for NPDES dischargers) or an ASBS Pollution Prevention Plan (for nonpoint source dischargers) to address storm water runoff from parks and recreation facilities.

1. The plan shall identify all pollutant sources, including sediment sources, which may result in waste entering storm water runoff. Pollutant sources include, but are not limited to, roadside rest areas and vistas, picnic areas, campgrounds, trash receptacles, maintenance facilities, park personnel housing, portable toilets, leach fields, fuel tanks, roads, piers, and boat launch facilities.

2. The plan shall describe BMPs or Management Measures/Practices that will be implemented to control soil erosion (both temporary and permanent erosion controls) and reduce or eliminate pollutants in storm water runoff in order to achieve and maintain natural water quality conditions in the affected ASBS. The plan shall include BMPs or

Management Measures/Practices to ensure that trails and culverts are maintained to prevent erosion and minimize waste discharges to ASBS.

3. The plan shall include BMPs or Management Measures/Practices to prevent the discharge of pesticides or other chemicals, including agricultural chemicals, in storm water runoff to the affected ASBS.

4. The plan shall include BMPs or Management Measures/Practices that address public education and outreach. The goal of these BMPs or Management Measures/Practices is to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The BMPs or Management Measures/Practices shall include signage at camping, picnicking, beach and roadside parking areas, and visitor centers, or other appropriate measures, which notify the public of any applicable requirements of these Special Protections and identify the ASBS boundaries.

5. The plan shall include BMPs or Management Measures/Practices that address the prohibition against the discharge of trash to ASBS. The BMPs or Management Measures/Practices shall include measures to ensure that adequate trash receptacles are available for public use at visitor facilities, including parking areas, and that the receptacles are adequately maintained to prevent trash discharges into the ASBS. Appropriate measures include covering trash receptacles to prevent trash from being wind blown and periodically emptying the receptacles to prevent overflows.

6. The plan shall include BMPs or Management Measures/Practices to address runoff from parking areas and other developed features to ensure that the runoff does not alter natural water quality in the affected ASBS. BMPs or Management Measures/Practices shall include measures to reduce pollutant loading in runoff to the ASBS through installation of natural area buffers (LID), treatment, or other appropriate measures.

B. Maintenance and repair of park and recreation facilities must not result in waste discharges to the ASBS. The practice of road oiling must be minimized or eliminated, and must not result in waste discharges to the ASBS.

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with waterfront and marine operations shall comply with the following:

A. For discharges related to waterfront and marine operations, the discharger shall develop a Waterfront and Marine Operations Management Plan (Waterfront Plan). This plan shall contain appropriate Management Measures/Practices to address nonpoint source pollutant discharges to the affected ASBS.

1. The Waterfront Plan shall contain appropriate Management Measures/Practices for any waste discharges associated with the operation and maintenance of vessels, moorings, piers, launch ramps, and cleaning stations in order to ensure that beneficial uses are protected and natural water quality is maintained in the affected ASBS.

2. For discharges from marinas and recreational boating activities, the Waterfront Plan shall include appropriate Management Measures, described in The Plan for California's Nonpoint Source Pollution Control Program, for marinas and recreational boating, or equivalent practices, to ensure that nonpoint source pollutant discharges do not alter natural water quality in the affected ASBS.

3. The Waterfront Plan shall include Management Practices to address public education and outreach to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The management practices shall include appropriate signage, or similar measures, to inform the public of the ASBS restrictions and to identify the ASBS boundaries.

4. The Waterfront Plan shall include Management Practices to address the prohibition against trash discharges to ASBS. The Management Practices shall include the provision of adequate trash receptacles for marine recreation areas, including parking areas, launch ramps, and docks. The plan shall also include appropriate Management Practices to ensure that the receptacles are adequately maintained and secured in order to prevent trash discharges into the ASBS. Appropriate Management Practices include covering the trash receptacles to prevent trash from being windblown, staking or securing the trash receptacles so they don't tip over, and periodically emptying the receptacles to prevent overflow.

5. The discharger shall submit its Waterfront Plan to the by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) within six months of the effective date of these special conditions. The Waterfront Plan is subject to approval by the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The plan must be fully implemented within 18 months of the effective date of the Exception.

B. The discharge of chlorine, soaps, petroleum, other chemical contaminants, trash, fish offal, or human sewage to ASBS is prohibited. Sinks and fish cleaning stations are point source discharges of wastes and are prohibited from discharging into ASBS. Anthropogenic accumulations of discarded fouling organisms on the sea floor must be minimized.

C. Limited-term activities, such as the repair, renovation, or maintenance of waterfront facilities, including, but not limited to, piers, docks, moorings, and breakwaters, are authorized only in accordance with Chapter III.E.2 of the Ocean Plan.

D. If the discharger anticipates that the discharger will fail to fully implement the approved Waterfront Plan within the 18 month deadline, the discharger shall submit a technical report as soon as practicable to the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The technical report shall contain reasons for failing to meet the deadline and propose a revised schedule to fully implement the plan.

E. The State Water Board or the Regional Water Board may, for good cause, authorize additional time to comply with the Waterfront Plan. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in Section III.A.5. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality. The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration of significant hardship by showing that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate.

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected during the same storm and at approximately the same time when post-

storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.

   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

      (3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates); and

      (3) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. Ocean Receiving Water and Reference Area Monitoring Program

In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled prior to (pre-storm) and during (or immediately after) the same storm (post storm). Post storm sampling shall be during the same storm and at approximately the same time as when the runoff is sampled. Reference water quality shall also be sampled three times annually and analyzed for the same constituents pre-storm and post-storm, during the same storm seasons when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,

using the amphipod *Eohaustorius estuarius* must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

   a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)

listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm during the same storm season that receiving water is sampled. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected during the same storm event when storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

Glossary

At the point of discharge(s) – Means in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

Areas of Special Biological Significance (ASBS) – Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of State Water Quality Protection Areas.

Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit.

Development – Relevant to reference monitoring sites, means urban, industrial, agricultural, grazing, mining, and timber harvesting land uses.

Higher threat discharges - Permitted storm drains discharging equal to or greater than 18 inches, industrial storm drains, agricultural runoff discharged through an MS4, discharges associated with waterfront and marina operations (e.g., piers, launch ramps, mooring fields, and associated vessel support activities, except for passive discharges defined below), and direct discharges associated with commercial or industrial activities to ASBS.

Low Impact Development (LID) – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which entails collecting and conveying storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID focuses on using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall.

Marine Operations – Marinas or mooring fields that contain slips or mooring locations for 10 or more vessels.

Management Measure (MM) - Economically achievable measures for the control of the addition of pollutants from various classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. For example, in the "marinas and recreational boating" land-use category specified in the Plan for California's Nonpoint Source Pollution Control Program (NPS Program Plan) (SWRCB, 1999), "boat cleaning and maintenance" is considered a MM or the source of a specific class or type of NPS pollution.

Management Practice (MP) - The practices (e.g., structural, non-structural, operational, or other alternatives) that can be used either individually or in combination to address a specific MM class or classes of NPS pollution. For example, for the "boat cleaning and maintenance" MM, specific MPs can include, but are not limited to, methods for the selection of environmentally sensitive hull paints or methods for cleaning/removal of hull copper anti-fouling paints.

Municipal Separate Storm Sewer System (MS4) – A municipally-owned storm sewer system regulated under the Phase I or Phase II storm water program implemented in compliance with Clean Water Act section 402(p). Note that an MS4 program's boundaries are not necessarily congruent with the permittee's political boundaries.

Natural Ocean Water Quality - The water quality (based on selected physical, chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of: (a) man-made constituents (*e.g.,* DDT); (b) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial), and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question; and (c) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man. Discharges "*shall not alter natural ocean water quality*" as determined by a comparison to the range of constituent concentrations in reference areas agreed upon via the regional monitoring program(s). If monitoring information indicates that *natural ocean water quality* is not maintained, but there is sufficient evidence that a discharge is not contributing to the alteration of natural water quality, then the Regional Water Board may make that determination. In this case, sufficient information must include runoff sample data that has equal or lower concentrations for the range of constituents at the applicable reference area(s).

Nonpoint source – Nonpoint pollution sources generally are sources that do not meet the definition of a point source. Nonpoint source pollution typically results from land runoff, precipitation, atmospheric deposition, agricultural drainage, marine/boating operations or hydrologic modification. Nonpoint sources, for purposes of these Special Protections, include discharges that are not required to be regulated under an NPDES permit.

Non-storm water discharge – Any runoff that is not the result of a precipitation event. This is often referred to as "dry weather flow."

Non-structural control – A Best Management Practice that involves operational, maintenance, regulatory (e.g., ordinances) or educational activities designed to reduce or eliminate pollutants in runoff, and that are not structural controls (i.e. there are no physical structures involved).

Physical impossibility - Means any act of God, war, fire, earthquake, windstorm, flood or natural catastrophe; unexpected and unintended accidents not caused by discharger or its employees' negligence; civil disturbance, vandalism, sabotage or terrorism; restrain by court order or public authority or agency; or action or non-action by, or inability to obtain the necessary authorizations or approvals from any governmental agency other than the permittee.

Representative sites and monitoring procedures – Are to be proposed by the discharger, with appropriate rationale, and subject to approval by Water Board staff.

Sheet-flow – Runoff that flows across land surfaces at a shallow depth relative to the cross-sectional width of the flow. These types of flow may or may not enter a storm drain system before discharge to receiving waters.

Storm Season – Also referred to as rainy season, means the months of the year from the onset of rainfall during autumn until the cessation of rainfall in the spring.

Structural control – A Best Management Practice that involves the installation of engineering solutions to the physical treatment or infiltration of runoff.

Surf Zone - The surf zone is defined as the submerged area between the breaking waves and the shoreline at any one time.

Surface Water Ambient Monitoring Program (SWAMP) comparable – Means that the monitoring program must 1) meet or exceed 2008 SWAMP Quality Assurance Program Management Plan (QAPP) Measurement Quality Objectives, or 2) have a Quality Assurance Project Plan that has been approved by SWAMP; in addition data must be formatted to match the database requirements of the SWAMP Information Management System. Adherence to the measurement quality objectives in the Southern California Bight 2008 ASBS Regional Monitoring Program QAPP and data base management comprises being SWAMP comparable.

Waterfront Operations - Piers, launch ramps, and cleaning stations in the water or on the adjacent shoreline.

Attachment 1
Special Protections Sections I(A)(3)(e) and I(B)(3)(e)
Flowchart to Deteremine Compliance with natural Water Quality

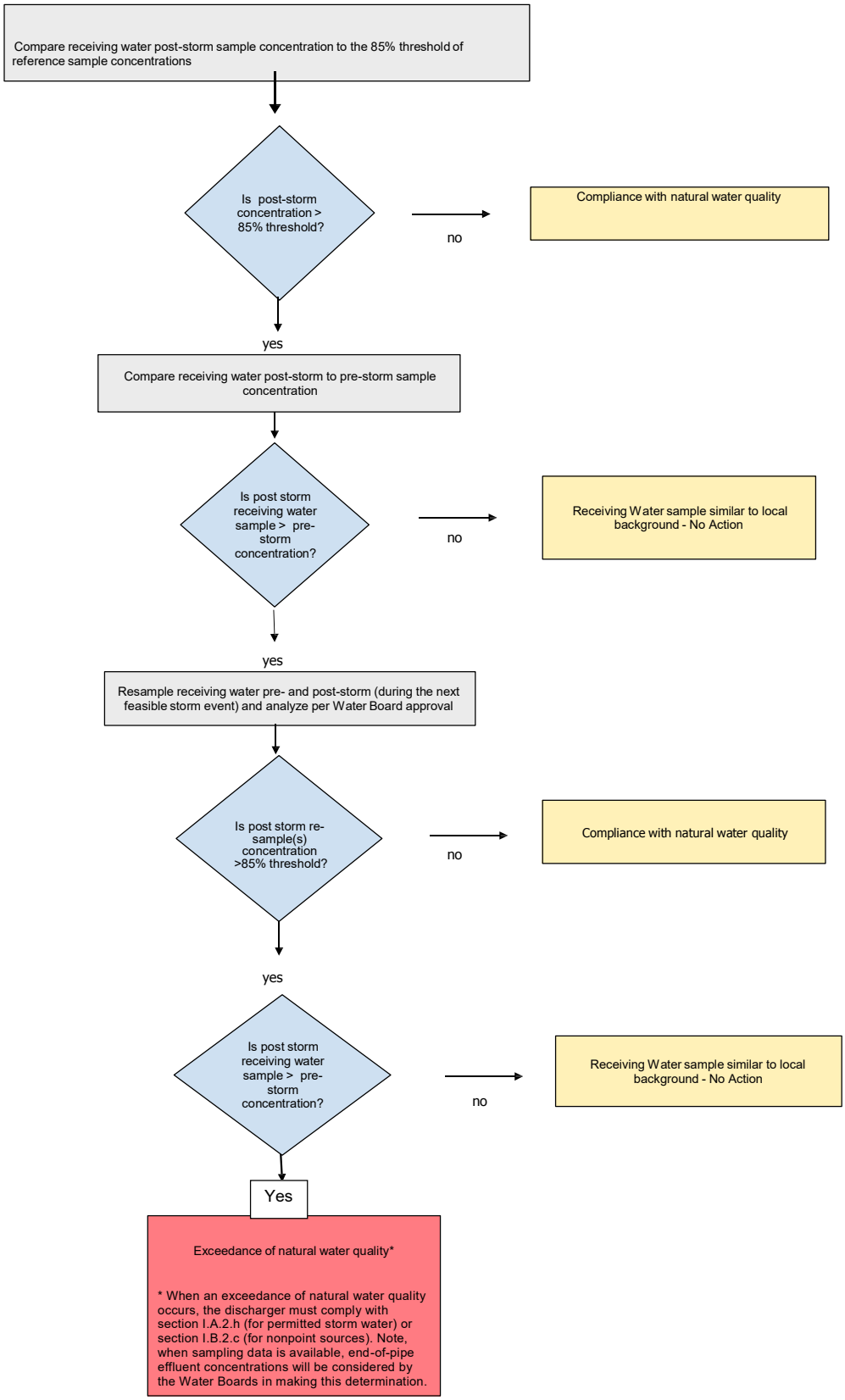

ATTACHMENT G

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements for NPDES Stormwater Discharge Permits

November 19, 2015

A. GENERAL PROVISIONS

1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.
2. All discharges authorized by this Order shall be consistent with the terms and conditions of this Order.
3. **Duty to Comply**
   a. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in a Board adopted Order, discharger must comply with the new standard or prohibition. The Board will revise or modify the Order in accordance with such toxic effluent standard or prohibition and so notify the discharger.
   b. If more stringent applicable water quality standards are approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the discharger must comply with the new standard. The Board will revise and modify this Order in accordance with such more stringent standards.
   c. The filing of a request by the discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 122.41(f)]
4. **Duty to Mitigate**

   The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this order and permit which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation. [40 CFR 122.41(d)]
5. Pursuant to U.S. Environmental Protection Agency regulations the discharger must notify the Water Board as soon as it knows or has reason to believe (1) that they have begun or expect to begin, use or manufacture of a pollutant not reported in the permit application,

or (2) a discharge of toxic pollutants not limited by this permit has occurred, or will occur, in concentrations that exceed the limits specified in 40 CFR 122.42(a).

6. The discharge of any radiological, chemical, or biological warfare agent waste is prohibited.

7. All facilities used for transport, treatment, or disposal of wastes shall be adequately protected against overflow or washout as the result of a 100-year frequency flood.

8. Collection, treatment, storage and disposal systems shall be operated in a manner that precludes public contact with wastewater, except where excluding the public is inappropriate, warning signs shall be posted.

9. Property Rights

This Order and Permit does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws, nor create a vested right for the discharge to continue the waste discharge or guarantee the discharger a capacity right in the receiving water. [40 CFR 122.41(g)]

10. Inspection and Entry

The Board or its authorized representatives shall be allowed:

a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the order and permit;

b. Access to and copy at, reasonable times, any records that must be kept under the conditions of the order and permit;

c. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under the order and permit; and

d. To photograph, sample, and monitor, at reasonable times for the purpose of assuring compliance with the order and permit or as otherwise authorized by the Clean Water Act, any substances or parameters at any locations. [40 CFR 122.41(i)]

11. Permit Actions

This Order and Permit may be modified, revoked and reissued, or terminated in accordance with applicable State and/or Federal regulations. Cause for taking such action includes, but is not limited to any of the following:

a. Violation of any term or condition contained in the Order and Permit;

b. Obtaining the Order and Permit by misrepresentation, or by failure to disclose fully all relevant facts;

c. Endangerment to public health or environment that can only be regulated to acceptable levels by order and permit modification or termination; and

d. Any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

12. Duty to Provide Information

The discharger shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit. The discharger shall also furnish to the Board, upon request, copies of records required to be kept by its permit. [40 CFR 122.41(h)]

13. Availability

A copy of this permit shall be maintained at the discharge facility and be available at all times to operating personnel.

14. Continuation of Expired Permit

This permit continues in force and effect until a new permit is issued or the Board rescinds the permit. Only those dischargers authorized to discharge under the expiring permit are covered by the continued permit.

B. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

a. All reports required by the order and permit and other information requested by the Board or U.S. EPA Region 9 shall be signed by a principal executive officer or ranking elected official of the discharger, or by a duly authorized representative of that person. [40 CFR 122.22(b)]

b. Certification

All reports signed by a duly authorized representative under Provision E.1.a. shall contain the following certification:
"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." [40 CFR 122.22(d)]

2. Should the discharger discover that it failed to submit any relevant facts or that it submitted incorrect information in any report, it shall promptly submit the missing or correct information. [40 CFR 122.41(l)(8)]

3. False Reporting

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall be subject to enforcement procedures as identified in Section F of these Provisions.

4. Transfers

a. This permit is not transferable to any person except after notice to the Board. The Board may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

b. Transfer of control or ownership of a waste discharge facility under an National Pollutant Discharge Elimination System permit must be preceded by a notice to the Board at least 30 days in advance of the proposed transfer date. The notice must include a written agreement between the existing discharger and proposed discharger containing specific dates for transfer of responsibility, coverage, and liability between them. Whether an order and permit may be transferred without modification or revocation and reissuance is at the discretion of the Board. If order and permit modification or revocation and reissuance is necessary, transfer may be delayed 180 days after the Board's receipt of a complete application for waste discharge requirements and an NPDES permit.

5. Compliance Reporting

a. Planned Changes

The discharger shall file with the Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

b. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final compliance dates contained in any compliance schedule shall be submitted within 10 working days following each scheduled date unless otherwise specified within this order and permit. If reporting noncompliance, the report shall include a description of the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance and an estimated date for achieving full compliance. A final report shall be submitted within 10 working days of achieving full compliance, documenting full compliance

c. Non-compliance Reporting (Twenty-four hour reporting:)

i. The discharger shall report any noncompliance that may endanger health or the environment. All pertinent information shall be provided orally within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five working days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

C. ENFORCEMENT

1. The provision contained in this enforcement section shall not act as a limitation on the statutory or regulatory authority of the Board.
2. Any violation of the permit constitutes violation of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act, and is the basis for enforcement action, permit termination, permit revocation and reissuance, denial of an application for permit reissuance; or a combination thereof.
3. The Board may impose administrative civil liability, may refer a discharger to the State Attorney General to seek civil monetary penalties, may seek injunctive relief or take other appropriate enforcement action as provided in the California Water Code or federal law for violation of Board orders.
4. It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this order and permit.
5. A discharger seeking to establish the occurrence of any upset (See Definitions, G. 24) has the burden of proof. A discharger who wishes to establish the affirmative defense of any upset in an action brought for noncompliance shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:
   a. an upset occurred and that the Permittee can identify the cause(s) or the upset;
   b. the permitted facility was being properly operated at the time of the upset;
   c. the discharger submitted notice of the upset as required in paragraph E.6.d.; and
   d. the discharger complied with any remedial measures required under A.4.

   No determination made before an action for noncompliance, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.
   In any enforcement proceeding, the discharger seeking to establish the occurrence of any upset has the burden of proof. [40 CFR 122.41(n)]

D. DEFINITIONS

1. Duly authorized representative is one whose:
   a. Authorization is made in writing by a principal executive officer or ranking elected official;
   b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general manager in a partnership, manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
   c. Written authorization is submitted to the U.S. EPA Region 9. If an authorization becomes no longer accurate because a different individual or position has

responsibility for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board and U.S. EPA Region 9 prior to or together with any reports, information, or applications to be signed by an authorized representative.

2. Hazardous substance means any substance designated under 40 CFR 116 pursuant to Section 311 of the Clean Water Act.

3. Priority pollutants are those constituents referred to in 40 CFR S122, Appendix D and listed in the U.S. EPA NPDES Application Form 2C, (dated 6/80) Items V-3 through V-9.

4. Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

5. Toxic pollutant means any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act or under 40 CFR S401.15.

6. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in this order and permit. The requirements of this order and permit are applicable to the entire volume of water, and the material therein, which is disposed of to surface and ground waters of the State of California.

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER NO. R2-2019-0004
NPDES PERMIT NO. CAS612008

AMENDMENT REVISING ORDER NO. R2-2015-0049 for the following jurisdictions and entities:

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

The California Regional Water Quality Control Board, San Francisco Bay Region, finds that:

FINDINGS

1. Contra Costa County watersheds are under two Regional Water Quality Control Boards' jurisdiction, the San Francisco Bay Water Board and the Central Valley Water Board. The cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County (County) and the Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) (the East County Permittees) in Contra Costa County are in the Central Valley Water Board's jurisdiction.
2. The East County Permittees are member agencies of the Contra Costa Clean Water Program (CCCWP). CCCWP assists its member agencies – most of whom are within the San Francisco Bay Water Board's jurisdictional boundaries – with tasks that can be done consistently throughout the County.
3. In 1992, the San Francisco Bay Water Board issued the first NPDES permit with requirements for stormwater discharges from municipal separate storm sewer systems (MS4s) in Contra Costa County cities and towns, and the portions of the County and CCCFCWCD located in its jurisdiction. In 1993, the Central Valley Water Board used the permit issued by the San Francisco Bay Water Board as a model and issued an NPDES permit with waste discharge requirements for stormwater discharges from MS4s within the East County Permittees' jurisdictions. In subsequent permit reissuance cycles, each Regional Water Board adopted stormwater permits for Contra Costa County with similar provisions, exercising an inter-regional, collaborative approach for the East County Permittees.
4. On October 14, 2009, the San Francisco Bay Water Board issued its first region-wide NPDES permit, Order No. R2-2009-0074, NPDES Permit No. CAS612008, for stormwater discharges from MS4s in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District.

   The Central Valley Water Board used Order No. R2-2009-0074 as a model and adopted Order No. R5-2010-0102, reissuing NPDES Permit No. CAS083313 (for the East County Permittees to discharge stormwater from MS4s in their jurisdictions on September 23, 2010. Where Order No. R2-2009-0074 provisions were sufficient to meet the requirements of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Central Valley Basin Plan) and other Central Valley Water Board policies, the provisions in Order No. R5-2010-0102 were the same as those in Order No. R2-2009-0074. Where different or additional provisions were required to meet the requirements of the Central Valley Basin Plan or other Central Valley Water Board policies, including the Sacramento-San Joaquin Delta Estuary Methylmercury Total Maximum Daily Load (TMDL), those different or additional provisions were included in Order No. R2-2009-0074.
5. On November 19, 2015, the San Francisco Bay Water Board adopted Order No. R2-2015-0049, updating and reissuing waste discharge requirements for stormwater discharges from MS4s in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District.

6. The East County Permittees submitted to the Central Valley Water Board a report of waste discharge, dated March 4, 2015, for reissuance of their waste discharge requirements under NPDES permit to discharge stormwater runoff from storm drains and watercourses within their jurisdictions. The East County Permittees anticipated that the Central Valley Water Board would reissue their stormwater permit with requirements consistent with the San Francisco Bay Water Board 's Order No. R2-2015-0049. However, the Central Valley Water Board was already preparing a region-wide General Waste Discharge Requirements and NPDES Permit for stormwater discharges from MS4s (General Permit) within the Central Valley region.
7. The Central Valley Water Board did not support adopting separate waste discharge requirements for stormwater discharges from the East County Permittees, which would be consistent with the San Francisco Bay Water Board's Order No. R2-2015-0049. The General Permit is significantly different from Order No. R2-2015-0049 and thus would not allow the East County Permittees to continue the collaborative approach through CCCWP. The Central Valley Water Board offered the East County Permittees two options: request a transfer of jurisdiction for stormwater permitting to the San Francisco Bay Water Board or obtain coverage under the General Permit.
8. In the Fall of 2016, the East County Permittees asked the Central Valley Water Board to designate the San Francisco Bay Water Board as the permitting entity for stormwater discharges from their MS4s.
9. In a letter dated January 6, 2017, the San Francisco Bay Water Board and the Central Valley Water Board designated the San Francisco Bay Water Board to regulate MS4 discharges from the East County Permittees. The designation set forth the following conditions:
    a. The designation is only for MS4 permitting;
    b. Each Regional Water Board reserves the right to take enforcement actions authorized by law against an East County Permittee for violations of an MS4 permit provision that affects that Regional Water Board's watershed;
    c. The San Francisco Bay Water Board will consult and coordinate with the Central Valley Water Board in the development of MS4 permit provisions to ensure they adequately reflect and implement the Central Valley Water Board's Basin Plan and policies; and
    d. The Central Valley Water Board will approve any plans and/or studies required for compliance with the Central Valley Water Board's Basin Plan and policies.
10. This Order amends Order No. R2-2015-0049 to add the East County Permittees. It also allows them extended timelines to come into compliance with specific Order No. R2-2015-0049 provisions and identifies and exempts those Order No. R2-2015-0049 provisions that do not apply to the East County Permittees, and incorporates requirements for the Sacramento-San Joaquin Delta Estuary Methylmercury TMDL and the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL.
11. The Fact Sheet attached to this Order contains background information and rationale for this Order's requirements. It is hereby incorporated into this Order and therefore constitutes part of the findings for this Order.

12. This Order is exempt from the provisions of the California Environmental Quality Act pursuant to California Water Code Section 13389.
13. The San Francisco Bay Water Board notified the Permittees named in this Order and interested agencies and persons of its intent to consider adoption of this Order and provided an opportunity to submit written comments.
14. In a public meeting, the San Francisco Bay Water Board heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED, pursuant to the provisions of California Water Code Division 7 and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, that the Permittees shall comply with the following:

1. Order No. R2-2015-0049 is hereby amended as shown in Appendix I and Appendix III. Additions are displayed as underlined type and deletions are displayed as ~~strikeout~~ format.
2. Provision C.16.5, as shown in Attachment II, is hereby added to Order No. R2-2015-0049.
3. This Order shall become effective on March 4, 2019.

I, Thomas Mumley, Interim Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 13, 2019.

Thomas Mumley
Interim Executive Officer

Appendix I: Revisions to Table of Contents of Order No. R2-2015-0049
Appendix II: Provision C.16.5. to be added to Order No. R2-2015-0049
Appendix III: Revisions to Provisions C.1. and C.17. of Order No. R2-2015-0049
Appendix IV: Fact Sheet

APPENDIX I

Revisions to Table of Contents of Order No. R2-2015-0049

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APPENDIX II

Provision C.16.5. to be added to Order No. R2-2015-0049

C.16.5. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Inclusion into NPDES Permit No. CAS612008

The cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District (East County Permittees), located in the Central Valley Water Board's geographic jurisdiction, are included in the definition of "Permittees" as used throughout and shall comply with all requirements of Order No. R2-2015-0049, except as provided for in this Provision. This Provision identifies those Order provisions that do not apply to the East County Permittees, and allows the East County Permittees additional time to come into compliance with the specific provisions listed below. Additionally, it incorporates requirements for the Central Valley Board's TMDLs that apply to the East County Permittees.

C.16.5.a. Green Infrastructure Planning and Implementation

i. **Implementation Level** – Each East County Permittee shall comply with Provision C.3.j. immediately, except for the deadlines listed below.

ii. **Due Dates**

The cities of Antioch, Brentwood, and Oakley shall:

(1) By November 30, 2019, have their Green Infrastructure framework or workplan for development of their Green Infrastructure Plan approved by their governing bodies, mayor, or city managers (as required by Order Provisions C.3.j.i.(1));

(2) By December 31, 2019, submit documentation that their Green Infrastructure frameworks or workplans for development of their Green Infrastructure Plans were approved by their governing bodies, mayors, or city managers (as required by Order Provisions C.3.j.i.(1)) by November 30, 2019, and

(3) By December 31, 2020, submit their completed Green Infrastructure Plan (as described in Order Provision C.3.j.i.(2)).

(4) By December 31, 2020, submit documentation of their legal mechanisms to ensure implementation of its Green Infrastructure Plan.

C.16.5.b. Inspections for Construction Site Control at Hillside Projects

i. **Implementation Level** – Each East County Permittee shall comply with Provision C.6.e. immediately, except for the deadline for C.6.e.ii.(2)(b).

ii. **Due Dates**

(1) Beginning July 1, 2020, each East County Permittee shall inspect all hillside projects (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with >15% slope)

disturbing greater than or equal to 5,000 square feet monthly, during the wet season.

(2) In the 2020 Annual Report, each East County Permittee shall certify the criteria it uses to determine hillside developments. If the Permittee is using maps of hillside development areas or other written criteria, include a copy in the Annual Report.

C.16.5.c. Trash Load Reductions

i. Implementation Level – Each East County Permittee shall comply with Provision C.10. immediately, except for the following requirements and deadlines in Provisions C.10.a.i, C.10.a.ii, and C.10.f.v.b, which are modified as follows.

ii. Due Dates and Reporting

(1) C.10.a.i.

By December 31, 2019, each East County Permittee shall reduce trash discharges to receiving waters by 70 percent, from baseline trash loads as depicted in the Permittee's baseline trash generation rate maps submitted in its 2016 Annual Report, or 2019 Annual Report, if the Permittee submitted a corrected baseline trash generation rate map.

(2) C.10.a.ii.

The East County Permittees shall have an opportunity to correct and/or revise, based on improved information, the trash levels and trash generation areas maps that were submitted to Central Valley Regional Water Board in the 2016 Annual Report. Should an East County Permittee correct and/or revise its trash generation map submitted in the 2016 Annual Report, the corrected or revised trash generation map(s) shall be submitted in the 2019 Annual Report.

(3) C.10.a.ii.a.

The C.10.a.i. percent reductions shall be demonstrated by percent of 2016 or 2019, if a revised baseline map was submitted, of Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation.

(4) C.10.a.ii.b.

The East County Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of the latter shall be assessed with visual assessments in accordance with C.10.b.ii. If there is a full trash capture device downstream of these lands, no other trash control is required. The East County Permittees shall (i) map the location or otherwise record the location, and (ii) provide the

trash control status of all such lands greater than 10,000 ft^2 that are plumbed directly to their storm drain systems by December 31, 2020. This information shall be retained by the East County Permittees for inspection upon request.

(5) C.10.f.v.b.

If an East County Permittee cannot demonstrate attainment of the 2019 mandatory trash load reduction by the deadline, it shall submit a report of non-compliance in advance of the deadline or with the submittal that describes actions to comply with the mandatory reduction in a timely manner. The report shall include a plan and schedule for implementation of full trash capture systems installation sufficient to attain the required reduction. An East County Permittee may submit a plan and schedule for implementation of other trash management actions to attain the required reduction in an area where implementation of a full trash capture system is not feasible. In such cases, the report shall include identification of the area and documentation for the basis of the East County Permittee's determination that implementation of a full trash capture system is not feasible.

C.16.5.d. Mercury Controls

East County Permittees are exempted from Provision C.11, Mercury Controls.

C.16.5.e. Polychlorinated Biphenyls (PCBs) Controls

East County Permittees are exempted from Provision C.12, PCBs Controls.

C.16.5.f. Diazinon and Chlorpyrifos Controls

Task Description – The East County Permittees shall maintain wasteload allocations for diazinon and chlorpyrifos.

Implementation Level – The East County Permittees shall implement Provision C.9.

C.16.5.g. Methylmercury Monitoring

Task Description – The East County Permittees shall implement methylmercury monitoring. With the Executive Officer's approval, the East County Permittees may participate in the Delta Regional Monitoring Program (Delta RMP) or other collective monitoring efforts in lieu of some or all of the individual monitoring requirements required by this Provision. Participation in the Delta RMP shall consist of providing funds and/or in-kind services to the Delta RMP at least equivalent to discontinued monitoring efforts.

Implementation Level – The East County Permittees shall:

(1) Conduct monitoring in Marsh Creek, downstream of Marsh Creek Reservoir, to analyze aqueous methylmercury in at least eight (8) samples each year using U.S. EPA or SWAMP-approved methods.

(2) Direct monitoring to address the following management questions:

- What is the annual average methylmercury load from the Marsh Creek watershed?
- How much of the Marsh Creek methylmercury load results from discharges from the MS4?
- What is the methylmercury load reduction from the MS4 by implementation of reasonable, foreseeable control measures to the maximum extent practicable?
- Does eutrophication and low dissolved oxygen increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March through mid-November), and if so:
  - Under what circumstances do those effects reach the Delta?
  - Are there reasonable and foreseeable management actions to ameliorate that condition?

iii. Reporting

(1) Urban Creeks Monitoring Report (UCMR) – The East County Permittees shall report monitoring and assessment results relevant to the Delta Mercury Control Program (Delta Methylmercury TMDL) as a separate section within the UCMR required under Provision C.8.h.iii. A copy of each UCMR shall also be submitted to the Central Valley Water Board.

(2) Pollutants of Concern Monitoring Report – The East County Permittees shall report monitoring and assessment activities relevant to the Delta Methylmercury TMDL from the past water year and planned for the next water year as a separate section within the Pollutants of Concern Monitoring Report required under Provision C.8.h.iv. A copy of each Pollutants of Concern Monitoring Report shall also be submitted to the Central Valley Water Board.

(3) Integrated Monitoring Report – The East County Permittees shall report the monitoring and assessment results as a separate section within the Integrated Monitoring Report as required under Provision C.8.h.v. A copy of each Integrated Monitoring Report shall also be submitted to the Central Valley Water Board.

(4) The East County Permittees shall report progress on the Delta Methylmercury TMDL and recommendations for the next permit re-issuance as a separate section within the Report of Waste Discharge (ROWD) required by Provision C.20. A copy of the ROWD shall also be submitted to the Central Valley Water Board.

C.16.5.h. Delta Mercury Control Program

The WLAs for methylmercury by Delta subarea are as follows:

- Central Delta subarea: 0.75 grams/year

- Marsh Creek subarea: 0.30 grams/year
- West Delta subarea: 3.2 grams/year

Methylmercury waste load allocations shall be met as soon as possible, but no later than the Final Compliance Date of December 31, 2030, unless the Central Valley Regional Water Board modifies the Delta Methylmercury TMDL implementation schedule and Final Compliance Date.

At a minimum, the East County Permittees shall implement the following BMPs to reduce inorganic mercury discharges and make substantial progress toward achieving the urban runoff methylmercury load allocation established for the Delta Methylmercury TMDL.

(1) **Mercury Collection and Recycling**

i. Task Description – This Provision requires ongoing implementation of mercury collection and recycling to minimize mercury in storm water.

ii. Implementation Level – The East County Permittees shall continue implementing:

(a) Collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs); and

(b) Collection, recycling and/or diversion of mercury-containing waste products (e.g., gauges, batteries, fluorescent and other lamps, switches, relays and sensors) from the waste stream from industrial and commercial entities (e.g., auto dismantlers), and municipal facilities.

iii. Reporting – The East County Permittees shall report on these efforts in their Annual Report.

(2) **Enhanced Municipal Management Practices to Reduce Sediment Discharges**

i. Task Description – This Provision requires the ongoing implementation of BMPs to minimize sediment discharges from municipal operations and municipal maintenance activities.

ii. Implementation Level – The East County Permittees shall continue to implement BMPs to minimize sediment discharges during municipal operations and municipal maintenance activities. Municipal operations and municipal maintenance activities include but are not limited to the following: storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning.

iii. Reporting – In each Annual Report, the East County Permittees shall list the municipal operations and municipal maintenance activities that BMPs are implemented to minimize sediment discharges.

(3) **Public Education and Risk Reduction**

i. **Task Description** – This Provision requires the East County Permittees to conduct ongoing education to the public on mercury pollution prevention and mercury risk reduction.

ii. **Implementation Level** – The East County Permittees shall continue to:

(a) Provide mercury pollution prevention messages to residents, commercial businesses, and industrial facilities with mercury-containing products or emissions. This may be implemented as part of Provision C.7; and

(b) Provide notices to communities on the health risk associated with eating mercury contaminated fish. These notices shall also include the Office of Environmental Health Hazard Assessment's fish consumption advisories.

iii. **Reporting** – The East County Permittees shall:

(a) Discuss the mercury pollution prevention messages provided under Provision C.7. and

(b) Summarize tasks implemented to provide notices on the health risk associated with eating mercury contaminated fish.

APPENDIX III

Revisions to Provisions C.1. and C.17. of Order No. R2-2015-0049

Other Changes to Order No. R2-2015-0049 as noted below in underlined type and ~~strikeout~~ format:

C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through ~~C.15~~ C.16.5. Compliance with Provisions C.9 through C.12, ~~and~~ C.14, and C.16.5 of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), ~~and~~ bacteria, diazinon and chlorpyrifos, and methylmercury shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provisions C.10 and C.16.5, which prescribes requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of (WQS), except for exceedances of water quality standards for pesticides, trash, mercury, PCBs, ~~and~~ bacteria, diazinon and chlorpyrifos, and methylmercury that are managed pursuant to Provisions C.9 through C.12, ~~and~~ C.14, and C.16.5 persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:

C.17. Annual Reports

C.17.a. The Permittees shall submit Annual Reports electronically in all cases by September 30 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.16.5. A paper copy of each Annual Report shall be submitted by October 15 of each year. The East County Permittees shall also submit an electronic copy of each Annual Report to the Central Valley Water Board. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.

C.17.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2016. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.16.5, with the agreement of the Permittees and by the approval of the Executive Officer.

APPENDIX IV

Fact Sheet

This Fact Sheet describes the legal requirements and technical rationale that serve as the basis for this Amendment Order's requirements. This Fact Sheet constitutes a portion of the findings for the Order.

Purpose

The purpose of the Order is to amend Water Board Order No. R2-2015-0049, the San Francisco Bay Municipal Regional Stormwater Permit (Permit), to add the Contra Costa County cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County and Contra Costa County Flood Control and Water Conservation District that drain to the Central Valley Regional Water Board's watershed (collectively East County Permittees).

Relevant Statues, Regulations, Plans, and Policies

The finding pertaining to unfunded mandates has been augmented as follows:

C.1 State Mandates Findings for Permit Amendment to add East Contra Costa Permittees

Section C of this Fact Sheet contains findings on state mandates for the issuance of this Municipal Regional Stormwater Permit (MRP), Order No. R2-2015-0049. The findings made in that section are applicable to this MRP Amendment to add several dischargers in eastern Contra Costa County to the permit (MRP Amendment). The following additional findings are made specific to this MRP Amendment:

<u>The MRP Amendment does not constitute a New Program or Higher Level of Service</u>

Article XIII B, Section 6(a) of the California Constitution provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service." The requirements of the MRP Amendment do not constitute a new program or a higher level of service.

The MRP Amendment adds the East County Permittees to the existing MRP for the San Francisco Bay Region. The East County Permittees were previously permitted under Central Valley Water Board Order No. R5-2010-0102, which closely matched the requirements of an earlier iteration of the MRP in effect at the time of its issuance. The East County Permittees requested to be added to the MRP, in lieu of enrolling under a new regional permit Order No. R5-2016-0040 adopted by the Central Valley Water Board, specifically so that their requirements could continue to align with the requirements of the other local governments in Contra Costa County under the MRP. Even if the requirements under the MRP are not identical to the requirements of R5-2010-0102, they do not constitute a new program of higher level of service.

First, having requested to be permitted under the MRP, the East County Permittees are precluded from advancing any argument that the permitting action they specifically requested constitutes a new program and therefore an unfunded mandate. The permittees are free to enroll under Order No. R5-2016-0040 instead. Second, and as discussed in Section C, the overarching requirement to impose controls to reduce

or prevent pollutants in MS4 discharges is dictated by the Clean Water Act (CWA)[1] and is not new to the MRP Amendment, nor does the MRP Amendment constitute an enhanced level of service of preventing pollutants compared to prior permits. Importantly, the inclusion of new and advanced measures as the MS4 programs evolve and mature over time is specifically anticipated under the CWA (55 FR 47990, 48052 (Nov. 16, 1990)), and to the extent requirements in the MRP Amendment are interpreted as more advanced measures as compared to the prior permit, they are refining existing measures and do not constitute a new program or higher level of service.

The Permit Amendment Falls under Several Exceptions to Mandates Rules

Even if some of the requirements imposed on the East County Permittees with the MRP Amendment could be considered a new program or higher level of service, the following exceptions to a finding of unfunded mandates preclude subvention here:

The permit amendment provisions are required by federal law:

One of the exceptions to the subvention requirements is if the mandate imposes a requirement that is mandated by a federal law or regulation and results in costs mandated by the federal government, unless the statute or executive order mandates costs that exceed the mandate in that federal law or regulation (Gov. Code, §17556, subd. (c)). The MRP Amendment provisions, just like the MRP provisions, are mandated by federal law or regulation and do not exceed that mandate for the same reasons articulated in Section C. Here, the Board expressly finds that all requirements imposed on the East Contra Costa County Permittees are necessary to implement the federal CWA requirements for MS4 permitting.

With regard to TMDL requirements, the East County Permittees are subject to a different set of TMDLs than the existing permittees under the MRP and therefore must attain a separate set of WLAs. Federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable WLA (40 CFR 122.44(d)(1)(vii)(B)). The fact that the East Contra Costa County Permittees' requirements that are derived from TMDLs differ from those of the existing permittees does not mean that those requirements are based in authority other than federal law.[2]

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[1] In this sense, and as a threshold matter, MS4 permitting is not a "program" as that term is used in Article XIII B, Section (6). The California Supreme Court has defined a "program" for purposes of article XIIIB, section 6, as: (1) programs that carry out the governmental function of providing services to the public, or (2) laws which, to implement a state policy, impose unique requirements on local governments and do not apply generally to all residents and entities in the state (*San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874 (reaffirming the test set forth in *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56); *Lucia Mar Unified School District v. Honig* (1988) 44 Cal.3d 830, 835). The CWA forbids everyone–individuals, businesses, state governments, tribal governments, local governments, etc.–from discharging pollutants from point sources to waters of the United States without an NPDES permit (33 USC §§ 1311(a), 402, 502(5); see also 40 CFR §§ 122.21, 122.22, 123.25); with regard to pollutants in storm water, the CWA requires permitting of private and governmental (federal, state, and local) sources of storm water alike (33 USC §1342(p)).

[2] Regardless, MRP Amendment requirements based in TMDLs cannot constitute a new program or higher level of service. TMDLs are developed for the purpose of specifying requirements for the achievement of water quality

Permittees have authority to fund the costs through fees:

Permittees' fee authority is detailed in Section C. As stated, the Constitution has an exception to the voter approval requirements of Proposition 218, "for fees or charges for sewer, water, and refuse collection services" (Cal. Const. Article XIII D, section 6, subd. (c)). In recent years, the Legislature enacted two important pieces of legislation confirming fee authority without the need for voter approval. In Assembly Bill 2043 (2014), effective January 1, 2015, the Legislature amended the definition of "water" for purposes of articles XIII C and XIII D to mean "water from any source" (Gov. Code, § 53750, subd. (n), amended by Assembly Bill 2043 (Stats. 2014, ch. 78, § 2). In doing so, the Legislature stated that its act "is declaratory of existing law" (Stats. 2014, ch. 78, § 1(c)). With Senate Bill 231 (2017), effective January 1, 2018, the Legislature "reaffirm[ed] and reiterate[d]" that the definition of "sewer" for purposes of article XIII D includes:

> systems, all real estate, fixtures, and personal property owned, controlled, operated, or managed in connection with or to facilitate sewage collection, treatment, or disposition for sanitary *or drainage* purposes, including lateral and connecting sewers, interceptors, trunk and outfall lines, sanitary sewage treatment or disposal plants or works, drains, *conduits*, outlets for *surface or storm waters*, and any and all other works, property, or structures necessary or convenient for the collection or disposal of sewage, industrial waste, *or surface or storm waters*.

(Gov. Code, § 53750, subd. (f), and § 53751, subd. (i), added by Senate Bill 231, Stats. 2017, ch. 536, § 2 (emphases added))

In addition, Health and Safety Code section 5471, subdivision (a), gives dischargers fee authority for "services and facilities furnished…in connection with its water, sanitation, *storm drainage*, or sewerage system" (Health & Safety Code, § 5471, subd. (a) (emphasis added)).

Specific Provision C.16.5 Requirements

Provision C.16.5.a. (Green Infrastructure Planning and Implementation), Provision C.16.5.b. (Inspection for Construction Site Control at Hillside Projects), and Provision C.16.5.c. (Trash Load Reductions) extend the deadlines for the specific Permit tasks that do not exist or are on a less aggressive timeline in the East County Permittees' Previous Permit.

Provision C.16.5.d. (Mercury Controls) exempts the East County Permittees from Provision C.11 – Mercury Controls because the East County Permittees are not named as point sources of mercury in the San Francisco Bay Mercury TMDL. Therefore, they do not have San Francisco

standards in impaired water bodies (33 USC 1313(d); 40 CFR §130.7). Several generations of the MS4 permits issued in California have prohibited discharges that cause or contribute to exceedances of water quality standards in the receiving water. TMDL provisions simply add a process for meeting this requirement based on a compliance schedule.

Bay Mercury TMDL wasteload allocations (WLAs) for mercury (See Provision 16.5.h concerning compliance with the Delta Methylmercury TMDL).

Provision C.16.5.e. (Polychlorinated Biphenyls (PCBs) Controls) exempts the East County Permittees from Provision C.12 – PCBs Controls because the East County Permittees are not named as point sources of PCBs in the San Francisco Bay PCBs TMDL. Therefore, they do not have San Francisco Bay Mercury TMDL WLAs for PCBs.

Provision C.16.5.f. (Diazinon and Chlorpyrifos Controls) implements the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. The Central Valley Regional Water Board adopted a Basin Plan amendment including a TMDL for diazinon and chlorpyrifos in the Sacramento-San Joaquin Delta Waterways (Delta Waterways)[3] on June 23, 2006. The State Water Board and U.S. EPA both approved this Basin Plan Amendment. This TMDL includes waste load allocations (WLAs) for diazinon and chlorpyrifos applicable to the East County Permittees.

This TMDL states that levels of diazinon and chlorpyrifos shall not exceed the sum (S) of one (1) as defined below:

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1.0$$

where:

C_D = diazinon concentration in ug/L of point source discharge
C_C = chlorpyrifos concentration in ug/L of point source discharge
WQO_D = acute or chronic diazinon water quality criterion (0.160 and 0.100 ug/L, respectively)
WQO_C = acute or chronic chlorpyrifos water quality criterion (0.025 and 0.015 ug/L, respectively)

For the purpose of calculating the sum (S) above, non-detectable concentrations are considered to be zero.

The East County Permittees' previous Permit included requirements for the Diazinon and Chlorpyrifos TMDL. The Final Compliance Deadline for this TMDL was December 1, 2011.

The East County Permittees submitted a letter dated September 13, 2018, demonstrating their discharge has not exceeded the TMDL WLAs or water quality objective concentrations for diazinon and chlorpyrifos since 2008. The letter summarizes the results of diazinon and chlorpyrifos monitoring from 2012-2014 under Contra Costa Clean Water Program's Pollutants of Concern Load Monitoring at Lower Marsh Creek. This sampling location is directly

[3] The Delta Waterways include only those reaches that are located within the "Legal" Delta, as defined in Section 12220 of the California Water Code (CWC). The Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin Appendix 42 lists the Delta Waterways to which the site-specific diazinon and chlorpyrifos water quality objectives and implementation and monitoring provisions apply.

downstream from one of the largest continuous urbanized areas in East County and samples characterized critical storm runoff events.

In addition, the letter includes diazinon and chlorpyrifos summary monitoring data from other County locations, in areas with both urban and agricultural lands from 2001-2017 by three programs: the State of California's Surface Water Ambient Monitoring Program (SWAMP), the Department of Pesticide Regulation (DPR) Statewide Pesticide Monitoring Program, and the San Francisco Estuary Institute (SFEI) Small Tributaries Loading Strategy. The SWAMP monitoring data includes 16 chlorpyrifos samples with no detections or exceedances, and 16 diazinon samples with 9 detections and 9 exceedances from 2001–2005. The DPR monitoring data includes 13 chlorpyrifos samples with 1 detection and 1 exceedance, and 13 diazinon samples with 1 detection and 1 exceedance from 2008-2009 and 2017. The chlorpyrifos and diazinon exceedances occurred in 2009 and could have been from agricultural sources. The SFEI monitoring data includes 5 chlorpyrifos samples with no detections or exceedances, and 5 diazinon samples with no detections or exceedances from 2013-2014. The monitoring data from SWAMP, DPR, and SFEI show that water quality objectives for diazinon and chlorpyrifos have not been exceeded since 2009, providing additional data to reflect the trend of reduced diazinon and chlorpyrifos concentrations in urban runoff.

The decline in concentrations of diazinon and chlorpyrifos in East County is consistent with observations of declines in urban runoff concentrations in the Central Valley Watershed following cancellation of urban uses of these chemicals. U.S. EPA cancelled the sale of nearly all non-agricultural diazinon and chlorpyrifos products by 2004. However, residents could still be storing diazinon and chlorpyrifos products, and old supplies remain legal to use. Because use of these products is still allowed and out of the direct control of the East County Permittees, there still is potential that such use could make consistent attainment of numeric effluent limits infeasible. The existing monitoring for toxicity and pesticides in Provision C.8. will be sufficient to demonstrate continued compliance with the diazinon and chlorpyrifos TMDL.

Therefore, the East County Permittees are required to implement Provision C.16.5.f. to maintain WLAs for diazinon and chlorpyrifos, and no additional actions are needed for the East County Permittees to comply with this TMDL.

Provision C.16.5.g. (Methylmercury Monitoring) requires methylmercury monitoring to assess compliance with the TMDL and the WLAs. Federal CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure the effectiveness of the TMDL point and nonpoint source control measures and the progress the waterbody is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.16.5.g. is intended to assess inputs of methylmercury to the Delta from Marsh Creek and urban runoff; provide information to support implementation of pollutant control strategies; and assess progress toward achieving WLAs for the TMDL; and help resolve uncertainties in loading estimates and impairments associated with methylmercury.

In particular, methylmercury monitoring addresses four management questions:

1. Watershed Loads – What is the annual average methylmercury load from the Marsh Creek watershed?
2. Urban Discharge Loads – How much of the Marsh Creek methylmercury load results form discharges from the MS4 system?
3. Management Action Effectiveness – What is the methylmercury load reduction from the MS4 system by implementation of reasonable, foreseeable control measures to the maximum extent practicable?
4. Does eutrophication and low dissolved oxygen increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March through mid-November), and if so:
    - Under what circumstances do those effects reach the Delta?
    - Are there reasonable and foreseeable management actions to ameliorate that condition?

CWA section 402, subdivision (a)(2); 40 CFR sections 122.44, subdivision (i)(1), and 122.48, subdivision (b); and CWC section 13383 provide authority for the Water Board to require monitoring and technical water quality reports. Provision C.16.5.g. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements and (2) provide information useful in evaluating compliance with all Permit requirements.

To inform the permit reissuance, the East County Permittee's Report of Waste Discharge will include the status of its implementation of the Delta Mercury Control Program.

Provision C.16.5.h. (Delta Mercury Control Program) implements the Delta Methylmercury TMDL. On April 22, 2010, the Central Valley Regional Water Board adopted a Basin Plan amendment to the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* for the Control of Methylmercury and Mercury in the Sacramento-San Joaquin Delta Estuary (Resolution No. R5-2010-0043) to address the mercury impairments. The Delta Methylmercury TMDL was approved by the State Water Resources Control Board and the California Office of Administrative Law. Final approval by the U.S. EPA was received on October 20, 2011.

The Delta is impaired because of elevated levels of methylmercury in fish. The Delta is on the CWA 303(d) list for mercury and the State Water Resources Control Board has designated the Delta as a toxic hot spot under the Bay Protection and Toxic Hot Spot Cleanup Program. Mercury problems are evident throughout the Central Valley Watershed. The main concern with inorganic mercury is that it can develop into methylmercury, a powerful neurotoxin that bioaccumulates in the aquatic food chain to harmful levels. Health advisories have been issued which recommend limiting consumption of fish from the Bay/Delta, tributaries to the Delta, and many lakes and reservoirs in the Central Valley. Concentrations of mercury in fish in other water bodies approach or exceed National Academy of Science (NAS), U.S. EPA, and/or U.S. Food and Drug Administration (FDA) guidelines for wildlife and human protection. Mercury levels also exceed water quality objectives for the Delta and elsewhere. In addition to these concerns, fish-eating birds taken from some bodies of water in the Basins have levels of mercury that can be expected to cause toxic effects. Bird-kills from mercury also have been documented in Lake Berryessa.

Components of the Delta Methylmercury TMDL relevant to implementation through the municipal storm water permits are as follows:

1. The methylmercury waste load allocations for the East County Permittees, by Delta subarea, are:

   Central Delta 0.75 grams/year;

   Marsh Creek 0.30 grams/year; and

   West Delta 3.2 grams/year

   Compliance with the methylmercury waste load allocations shall be met as soon as possible, but no later than 2030, unless the Central Valley Regional Water Board modifies the TMDL implementation schedule and Final Compliance Date.

2. The NPDES Permits for urban runoff management agencies shall require pollution prevention measures and the implementation of BMPs to minimize total mercury discharges. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to human health and wildlife. Requirements in the Permit issued or reissued and applicable for the term of the Permit shall be based on an updated assessment of pollution prevention measures and BMPs to minimize total (inorganic) mercury discharges to the MEP.

3. Annual methylmercury loads in urban runoff in MS4 service area within the Delta and Yolo Bypass may be calculated by the following method or by an alternate method approved the Central Valley Regional Water Board Executive Officer. The annual methylmercury load in urban runoff for a given MS4 service area during a given year may be calculated by the sum of wet weather and dry weather methylmercury loads. To estimate wet weather methylmercury loads discharged by MS4 urban areas, the average of wet weather methylmercury concentrations observed at the MS4's compliance locations maybe multiplied by the wet weather runoff volume estimated for all urban areas within the MS4 service area within the Delta and Yolo Bypass. To estimate dry weather methylmercury loads, the average dry weather methylmercury concentrations observed at the MS4's compliance locations may be multiplied by the estimated dry weather urban runoff volume in the MS4 service area within the Delta and Yolo Bypass. This method is consistent with that used to develop load estimates in the Delta Methylmercury TMDL.

4. Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury or methylmercury loads to the Delta or is outside the jurisdiction authority of any agency, the Central Valley Regional Water Board may consider issuing additional allocations and regulatory requirements for the source in question.

In their Previous Permit, the East County Permittees were required to implement Phase 1 of the Delta Methylmercury TMDL. Phase 1 required them to conduct methylmercury control studies to monitor and evaluate the effectiveness of existing BMPs to control methylmercury; and to develop and evaluate additional BMPs effectiveness to control methylmercury. A report

documenting the results of their control studies was submitted to the Central Valley Water Board October 2018. This marked the end of Phase 1.

The Central Valley Regional Water Board will use the control studies to conduct a Phase 1 Delta Methylmercury TMDL Review that considers:

- Modification of methylmercury goals, objectives, allocations and/or the Final Compliance Date;
- Implementation of management practices and schedules for methylmercury controls; and
- Adoption of a mercury offset program for dischargers who cannot meet their load and waste load allocations after implementing all reasonable load reduction strategies.

The findings of the control studies and other information will also be used to re-evaluate the fish tissue objectives, the linkage analysis between objectives and sources, and the attainability of the allocations. The linkage analysis, fish tissue objectives, allocations, and time schedules may also be adjusted. In addition, the Central Valley Regional Water Board will use the Phase 1 Control Studies' results and other information to consider amendments to the Delta Methylmercury TMDL during the Phase 1 Delta Methylmercury TMDL Review.

Phase 2 of the Delta Methylmercury TMDL begins after the Phase 1 Delta Methylmercury TMDL Review. If Phase 2 begins during this Permit term, this Permit may be amended to include additional requirements.

Provision C.16.5.h contains minimum BMPs to reduce inorganic mercury loads and make substantial progress toward achieving the urban runoff methylmercury load allocations established for the Delta Methylmercury TMDL. Preventing sediment bound inorganic mercury from entering wet environments is critical in preventing it from methylating. The BMPs may, or may not, on their own be adequate for achieving compliance with the WLAs. If the East County are not making progress to achieve the WLAs by the compliance date, they will implement additional BMP (structural or non-structural).

<u>Mercury Collection and Recycling</u>

Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and this Provision requires continued implementation of collection and recycling of mercury containing devices and waste products and alternative procedures to improve proper handling, disposal, and recycling of mercury-containing products.

<u>Enhanced Municipal Management Practices to Reduce Sediment Discharges</u>

Unless appropriate BMPs are implemented, municipal operations and maintenance activities are potential sources of sediment discharges. Sediment accumulated on sidewalks, corporation yards, roads, parking lots, and landscaping, is a major source of point source pollutants found in urban runoff. The enhanced municipal management practices to reduce sediment discharges are intended to minimize total (inorganic) mercury discharges required by the Delta Methlymercury

TMDL. Thus, Provision C.16.5.h requires the East County permittees to implement minimum BMPs for municipal facilities and activities as part of their ongoing pollution prevention efforts. Such prevention measures include, but are not limited to, storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning. The work of municipal maintenance personnel vital to minimize stormwater pollution because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting, and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain.

Public Education and Risk Reduction

An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues and its importance and influences positive stormwater pollution prevention behavior.

The East County Permittees have been implementing public outreach campaigns to educate their community on mercury pollution prevention. This Permit requires the East County Permittees to continue implementing a public education, outreach and participation program that is designed to reach residential, commercial, and industrial sources of mercury-containing products or emissions. The East County Permittees can utilize various electronic and print media, and paid and free media to best reach the different various target audiences. Additionally, the East County Permittees need to continue communicating with a broad spectrum of citizens with stormwater pollution prevention information through long-established outreach mechanisms such as staffing tables or booths at fairs, street fairs, and other community events. An informed community ensures greater compliance with the stormwater program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of local waters.

Methylmercury is a toxicant that is harmful to the brain and nervous system of infants, children, and the developing fetus. Nearly all fish caught in the Delta contain traces of methylmercury, the methylated form of mercury. However, larger fish that have lived longer have the highest levels of methylmercury because they have had more time to accumulate it. These large fish pose the greatest risk to children and pregnant women who eat them regularly. This Provision requires continual actions to manage human health risk due to mercury in Delta fish. This includes effort to communicate the health risks of eating Delta fish to high risk-communities.

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order No. R2-2022-0018
NPDES Permit No. CAS612008
May 11, 2022

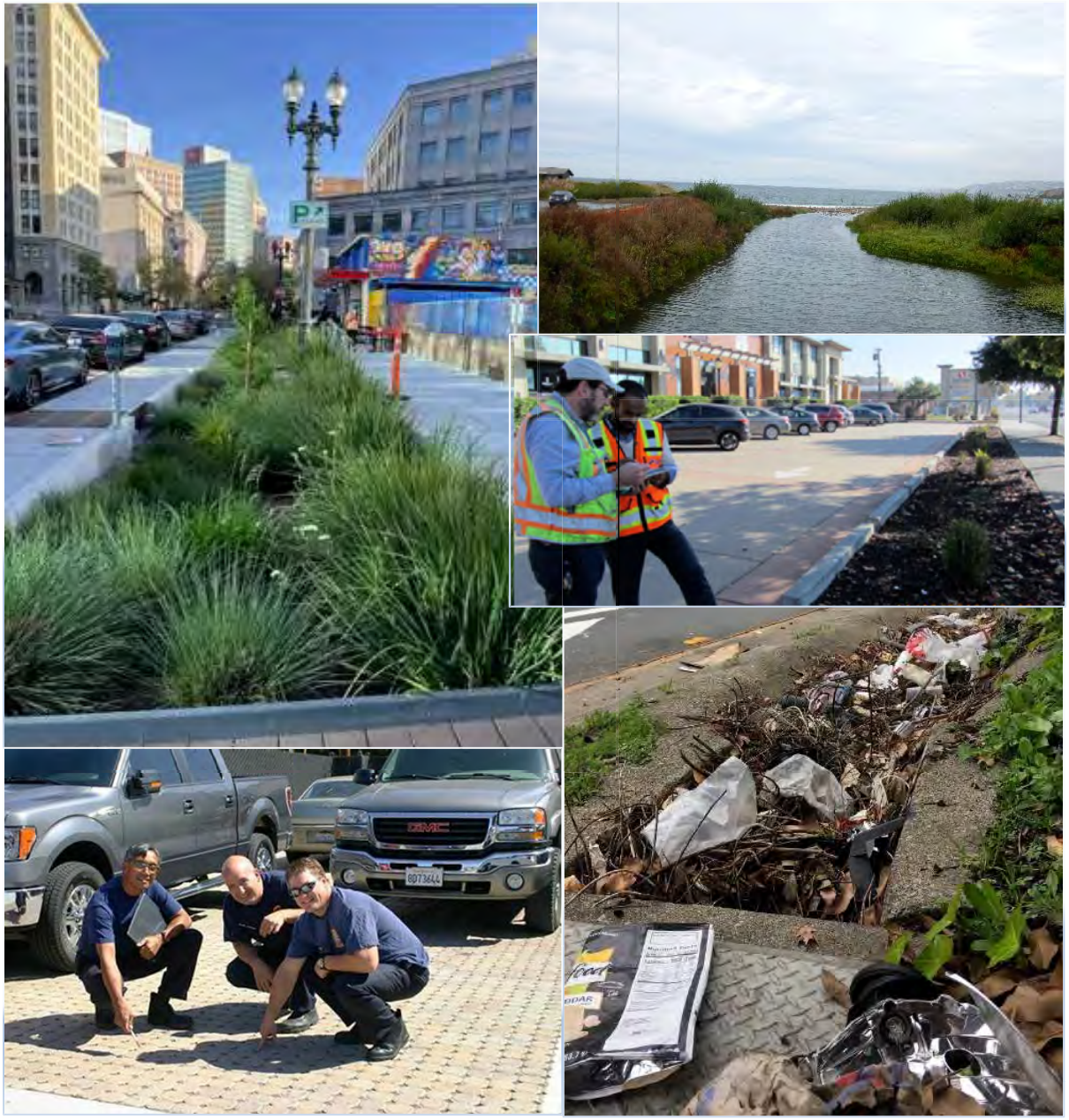

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER No. R2-2022-0018
NPDES PERMIT No. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance (Solano Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Attachment A) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. The Fact Sheet, including any supplements thereto, is hereby incorporated by reference.

Existing Permit

2. **Alameda County—**The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 1, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.
3. **Contra Costa County—**The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 1, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.
4. **San Mateo County—**The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City,

San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County have joined together to form the San Mateo Countywide Water Pollution Prevention Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 2, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County—**The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 2, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun—**The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 3, 2020, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo—**The City of Vallejo and Vallejo Flood & Wastewater District (hereinafter referred to as the Vallejo Permittees) have submitted permit applications (Report of Waste Discharge), dated June 25 and June 29, 2020, respectively, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions. The Vallejo Permittees are currently subject to NPDES Permit No. CAS612008 issued by Order No. R2-2015-0049 on November 19, 2015, and amended by Order No. R2-2019-0004 on February 13, 2019, to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

8. The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater

District have joined together to form the Solano Stormwater Alliance (hereinafter referred to as the Solano Permittees). The Alameda, Contra Costa, San Mateo, Santa Clara, and Solano Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, U.S. EPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, U.S. EPA published an Interpretive Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and U.S. EPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, trash, and selenium in San Francisco Bay segments; pesticide associated toxicity, and trash in urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish Total Maximum Daily Loads (TMDLs) for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

13. Stormwater runoff is generated from various land uses in all the hydrologic sub-basins in the Basin and discharges into watercourses, which in turn flow into Central,

Lower and South San Francisco Bay, and Suisun and San Pablo Bays.

14. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not limited to, support for aquatic life; and other pollutants that can cause aquatic toxicity in the receiving waters.

15. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to U.S. EPA stormwater regulations.

16. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

17. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

18. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments and recommendations.

19. The Water Board, in a public meeting, heard and considered all comments pertaining to the discharge.

20. This Order supersedes and rescinds Order Nos. R2-2015-0049 as amended by R2-2019-0004.
21. This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective July 1, 2022, provided the Regional Administrator, U.S. EPA, Region 9, has no objections.

THEREFORE, IT IS HEREBY ORDERED that Order No. R2-2015-0049, as amended by Order No. R2-2019-0004, is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Permittees shall comply with the following requirements in this Order. This action in no way prevents the Water Board from taking enforcement action for past violations of the previous order.

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. Permittees are also subject to the trash discharge prohibition in the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California and the Water Quality Control Plan for Ocean Waters of California.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

B.1.a. Floating, suspended, or deposited macroscopic particulate matter, or foam;

B.1.b. Bottom deposits or aquatic growths;

B.1.c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

B.1.d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

B.1.e. Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are

adopted and approved by the State Water Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.24. Compliance with Provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), bacteria, sediment, diazinon and chlorpyrifos, and methylmercury, shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provision C.10 which prescribes requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of WQS, except for exceedances of WQS for pesticides, trash, mercury, PCBs, bacteria, sediment, diazinon and chlorpyrifos, and methylmercury that are managed pursuant to Provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f, persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:

C.1.a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable (WQS), the Permittee(s) shall notify, within no more than 30 days, and thereafter submit a report to the Water Board that describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

C.1.b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring

exceedances of the same receiving water limitations unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. Task Description – Asphalt/Concrete Removal, Cutting, Installation, and Repair

The Permittees shall implement appropriate BMPs, such as those described in the California Stormwater Quality Association (CASQA) Municipal Stormwater BMP Handbook and Construction Stormwater BMP Handbook, at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving, repair, or maintenance activities.

ii. Implementation Levels

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if wastewater generated from road construction, repair, and maintenance activities may be discharged to the sanitary sewer system, provided appropriate approvals are obtained and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from work sites upon completion of work. The Permittees shall require cleanup of all construction debris, spills, and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association (BASMAA) Blueprint for a Clean Bay or the CASQA Municipal Stormwater BMP Handbook.

iii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. Task Description – The Permittees shall implement and require to be implemented BMPs that prevent the discharge of polluted wash water and non- stormwater to storm drains from pavement, sidewalk and plaza cleaning, mobile cleaning, outdoor pressure washing operations, and washing down of trash areas and gas station or mobile fueling service areas. BMPs for washing down outside areas of human habitation shall include sanitizing procedures. The Permittees shall implement BMPs such as those included in the BASMAA Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. Task Description

(1) The Permittees shall implement appropriate BMPs to prevent the discharge of polluted stormwater and non-stormwater from bridges and structural maintenance activities directly into surface waters or storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. Implementation Levels

(1) The Permittees shall prevent all debris and pollutants, including structural materials and coating debris, such as paint chips, generated in bridge and structure maintenance or graffiti removal, from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks, or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste, or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall use proper disposal methods for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts the proper capture and disposal methods for the wastes generated.

iii. Reporting

(1) The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.

(2) Permittees shall make applicable supporting BMP documents available to Water Board staff or representatives during audits or inspections, and upon request.

C.2.d. Stormwater Pump Stations

i. Task Description –The Permittees shall implement measures to operate, inspect, and maintain stormwater pump stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in stormwater discharges to comply with WQS.

ii. Implementation Levels – The Permittees shall comply with the following at Permittee-owned or -operated pump stations:

(1) Upon becoming aware that the discharge from a pump station has a dissolved oxygen (DO) concentration below 3.0 mg/L, implement corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 milligrams per liter (mg/L) and verify the effectiveness of the corrective actions with monitoring. Corrective actions are not necessary for discharges from pump stations that remain in the stormwater collection system or infiltrate into a dry creek immediately downstream.

(2) Ensure that pump stations are free of debris and trash, replace any oil-absorbent booms, as needed, and investigate and abate illicit discharges. Pump stations excluded from C.2.d.ii.(1) above are not excluded from this requirement.

(3) The Permittees shall maintain records of inspection, maintenance, implementation of corrective actions, and any monitoring records at Permittee-owned or -operated pump stations. These records shall be made available to Water Board staff or its representatives during inspections and audits, or otherwise upon request.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance

For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing, or open space uses. Rural roads include paved, unpaved, utility, and access roads in rural areas. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, such as those in the CASQA Construction Stormwater BMP Handbook, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Wildlife (CDFW), and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

San Mateo County has additional rural road requirements for the Pescadero-Butano Sediment TMDL described in Provision C.18 and shall also implement that provision.

ii. Implementation Level

(1) The Permittees shall continue to implement erosion and sediment control BMPs, in addition to those described in Provision C.2.a, during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities.

(2) The Permittees shall implement appropriate BMPs to minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities by:

(a) Selecting road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identifying and prioritizing rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Constructing roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Implementing an inspection program to maintain rural roads' structural integrity and prevent impacts to water quality;

(e) Maintaining rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, and address excessive erosion;

(f) Re-grading unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacing existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall incorporate information about the importance of planning and construction in avoiding water quality impacts into existing training and guidance on permitting requirements for rural public works activities.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for rural public works construction and maintenance activities, including reporting on increased maintenance in priority areas, in the Annual Report.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle and heavy equipment maintenance yards and parking areas, and material storage facilities, to comply with water quality standards. Each SWPPP shall incorporate all appropriate BMPs, such as those described in the current versions of the CASQA Municipal Stormwater BMP Handbook or the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, and addenda, as applicable.

(2) The requirements in this provision shall apply only to facilities that are not covered under the State Water Board's Industrial Stormwater NPDES General Permit.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters from street sweepers, vactor trucks, or other related equipment. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that non-stormwater discharges are not entering the storm drain system and that pollutant discharges are prevented to the maximum extent practicable. At a minimum, each corporation yard shall be fully inspected each year between August 1 and September 30. Permittees shall cease or cause to be ceased any active non-stormwater discharges immediately after they are discovered. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency. In areas where a sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to an alternative sanitary sewer connection or municipal wastewater treatment plant, or implement appropriate BMPs to collect, properly treat, and reuse wash water onsite without any discharge.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where a sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting

(1) In each Annual Report, Permittees shall list activities conducted in the corporation yards that have BMPs in the site-specific SWPPP, the date(s) of inspections, the results of inspections, and any follow-up actions, including the date of any necessary corrective actions implemented. The information may be reported in a narrative or tabular format.

(2) In the 2023 Annual Report, Permittees shall make their corporation yard SWPPPs available to the Water Board by providing links to online documents or submitting the documents as part of the Annual Report.

C.2.g. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as “No dumping, drains to Bay” or equivalent. For newly approved, privately maintained streets, Permittees shall require storm drain inlet markings with an appropriate stormwater pollution prevention message by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings on the storm drain inlets shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain storm drain inlet markings of at least 80 percent of municipality-maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Storm drain inlet markings of newly developed, privately maintained streets shall be verified prior to acceptance of the project. Permittees shall require maintenance of the storm drain inlet markings through the development maintenance entity.

(3) Certify that all privately maintained streets had storm drain inlet markings verified prior to acceptance of the project and were required to maintain the storm drain inlet markings through the development maintenance entity.

iii. Reporting – In the 2026 Annual Report, each Permittee shall (1) state how many municipally-maintained storm drain inlets it has, (2) certify that at least 80 percent of municipality-maintained storm drain inlet markings are legibly labeled with an appropriate stormwater pollution prevention message during the permit term; and (3) include a picture of a labeled municipality-maintained inlet.

C.2.h. Staff Training

i. Task Description – Permittees shall ensure municipal maintenance staff conducting routine repair and maintenance activities of municipal facilities and infrastructure, or activities related to the implementation of corporation yard SWPPPs, are appropriately trained on the requirements of Provision C.2 and methods of implementation. Trainings may be program-wide, region-wide, or Permittee-specific.

ii. Implementation Level – At a minimum, provide training at least once within the 5-year term of this Permit to municipal staff on the following topics as relevant to municipal staff responsible for maintenance activities:

(1) Stormwater pollution prevention;

(2) Appropriate BMPs for maintenance and cleanup activities;

(3) Street and Road Repair and Maintenance BMPs;

(4) Sidewalk/Plaza Maintenance and Pavement Washing;

(5) Bridge and Structure Maintenance and Graffiti Removal;

(6) Corporation Yard SWPPPs and BMPs; and

(7) Spill and discharge response and notification procedures and contacts.

iii. Reporting – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Total number of Permittee maintenance staff;

(4) Number and percentage of Permittee maintenance staff who attended training;

(5) If there was no training in a given year, so state.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and significant redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. Task Description – At a minimum, each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; and protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable

review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain inlet stenciling.
- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs, such as ReScape California.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:
    - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
    - Dumpster drips from covered trash and food compactor enclosures.
    - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
    - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
    - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the ReScape California Guidelines).

ii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1) - (8) in the 2023 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and

stormwater treatment onsite or at a joint stormwater treatment facility[1] in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked. For Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

(1) Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d. under a previous MS4 permit is exempt from the requirements of Provision C.3.c. (low impact development requirements).

(2) Any Regulated Project that was approved with no Provision C.3. stormwater treatment requirements under a previous MS4 permit and that has not begun construction by the effective date of this Permit, shall be required to fully comply with the requirements of Provisions C.3.c. and C.3.d. Permittees may grant exemptions from this requirement as follows:

(a) An exemption may be granted to:

(i) Any Regulated Project that was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the ordinances, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law.

(ii) Any Regulated Project for which the Permittee has no legal authority to require changes to previously granted approvals, such as projects that have been granted building permits.

(b) An exemption from the LID requirements of Provision C.3.c. may be granted to any such Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.

(3) Any pending Regulated Project that has not yet been approved as of June 30, 2023, and for which a Permittee has no legal authority to require new requirements under Government Code sections 66474.2 or 65589.5., subd. (o), is subject to the Provision C.3 requirements in effect on the Permit's effective date.

[1] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee, including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the project:[2]

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv):

(i) The following interior and exterior practices are excluded:

a. Interior remodels; and

b. Routine maintenance or repair such as roof or exterior wall surface replacement.

(ii) The following pavement maintenance practices are excluded;

a. Pothole and square cut patching;

b. Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage;

[2] This does not include separate additional portions of the public right of way that Permittees require treatment of, which the Regulated Project is not disturbing. This is typically enforced through local ordinance, such as what is described in Provision C.3.j.ii.(2)(j).

c. Shoulder grading;

d. Reshaping/regrading drainage systems;

e. Crack sealing;

f. Pavement preservation activities that do not expand the road prism;

g. Upgrading from a bituminous surface treatment (e.g., chip seal)[3] with an overlay of asphalt or concrete, without expanding the area of coverage;[4]

h. Applying a bituminous surface treatment to existing asphalt or concrete pavement, without expanding the area of coverage; and

i. Vegetation maintenance.

j. Layering gravel over an existing gravel road, without expanding the area of coverage.

(iii) The following pavement maintenance practices are not excluded. For Road Reconstruction Projects, these practices are included only if they trigger <u>all</u> criteria specified in Provision C.3.b.ii.(5), including the criteria regarding contiguousness.

a. Removing and replacing an asphalt or concrete pavement to the top of the base course[5] or lower, or repairing the pavement base (including repair of the pavement base in preparation for bituminous surface treatment, such as chip seal), as these are considered replaced impervious surfaces;

b. Extending the pavement edge without increasing the size of the road prism, or paving graveled shoulders, as these are considered new impervious surfaces; and

c. Resurfacing by upgrading from dirt to gravel, to a bituminous surface treatment (e.g., chip seal),[3] to asphalt, or to concrete; or upgrading from gravel to a bituminous surface treatment, to asphalt, or to concrete, as these are considered new impervious surfaces.

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[3] This is defined further in the Glossary

[4] This includes wedge grinding that is implemented as part of the upgrade project, so long as the area of coverage is not expanded. See definition of wedge grinding in Glossary.

[5] See definition in Glossary.

(iv) For a project consisting of a combination of exempted pavement maintenance practices (pursuant to Provision C.3.b.ii.(1)(b)(ii)), non-exempted pavement maintenance practices (pursuant to Provision C.3.b.ii.(1)(b)(iii)), and/or practices that fall under any other Regulated Project category (pursuant to Provision C.3.b.ii.(1)-(6)), the parts of the project that are not exempt shall be evaluated as a Regulated Project.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(e) The calculations in Provision C.3.b.ii.(1)(c)-(d) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(2) **Other Development Projects**

New development projects that create 5,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects (other than public road projects), including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the projects.[2] This category includes development projects on public or private land that fall under the planning and building authority of a Permittee.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, new and reconstructed private roads and private trails, and public projects (other than public road and trail projects),[6] including sidewalks and any other portions of the public right of way that are developed or redeveloped as part of the projects.[2] Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions that apply to this category are listed in Provision C.3.b.ii.(1)(b). Public works projects that are additionally excluded from this category – unless they create and/or replace 5,000 contiguous[8] square feet or more of impervious surface – include the following examples: sidewalk gap closures,[7] sidewalk section replacement, and ADA curb ramps. However, as noted above, portions of the public right of way that are developed or redeveloped as part of Regulated Projects (e.g., curb extensions, pavement replacement, and curb and gutter replacement) shall be included in the total created and/or replaced impervious surface that must be treated by those Regulated Projects.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in

[6] Examples of such public projects are construction/reconstruction of: streetlights, signals, and signs; curb extensions, sidewalks, and medians; crosswalk enhancements, bulb-outs, curb ramps, and ADA improvements; and sidewalk extensions.

[7] The filling of gaps between sections of sidewalks, with pavement (e.g., where a block has a sidewalk, but it is not continuous because it is missing across a parcel, completing the sidewalk across that parcel).

the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(c) The calculations in Provision C.3.b.ii.(3)(a)-(b) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(4) **New or Widening Road Projects**

Any of the following types of road projects that create 5,000 square feet or more of newly constructed contiguous[8] impervious surface, that are both public and private road projects, and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

[8] Project areas interrupted by cross streets or intersections are considered contiguous.

(c) Construction of impervious[9] trails that are greater than or equal to 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

(i) Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.

(ii) Bicycle lanes built as part of new streets or roads, but that are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.

(iii) Impervious trails that direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area.

(iv) Sidewalks, bicycle lanes, or trails constructed as pervious pavement systems.[10]

(v) Caltrans highway projects and associated facilities.

(5) **Road Reconstruction Projects**

Road projects that involve the reconstruction of existing streets or roads,[11] which create and/or replace greater than or equal to one contiguous[8] acre of impervious surface and that are public road projects and/or fall under the building and planning authority of a Permittee, including sidewalks and bicycle lanes that are built or rebuilt as part of the existing streets or roads. This Regulated Project category includes utility trenching projects which are - on average, over the entire length of the project - greater than or equal to 8 feet wide. It also includes public pavement maintenance practices listed in Provision C.3.b.ii.(1)(b)(iii)(b).

Project activities that are included and excluded, which apply to this category, are listed in Provision C.3.b.ii.(1)(b)(ii)-(iv). Pavement maintenance practices that are not excluded (as detailed in Provision C.3.b.ii.(1)(b)(iii)) are considered Road Reconstruction Projects if they meet the other definitions therein.

[9] Gravel layers are considered impervious, excluding gravel layers that are included in pervious pavement systems (as defined in the Glossary).

[10] As defined in the Glossary.

[11] The definition of roads includes roads on levees.

(a) Where the reconstruction project results in an alteration of greater than or equal to 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that was reconstructed).

(b) Where the reconstruction project results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new and/or replaced impervious surface within the project footprint). However, if the stormwater runoff from the existing impervious surface and the added impervious surface cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added impervious surface.

(c) Road Reconstruction Projects shall comply with Provision C.3.d. However, with cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the Provision C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019, to size Road Reconstruction Projects. If so, Permittees must comply with the Water Board's June 21, 2019, conditional approval of that submittal, which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used.

(d) Permittees may credit the acreage of impervious surface created or replaced for Road Reconstruction Projects towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

(6) **Large Detached Single-Family Home Projects**

Detached single-family home projects that create and/or replace 10,000 ft^2 or more of impervious surface (collectively over the entire project site) and are not part of a larger development or redevelopment plan regulated under Provision C.3.b.ii.(2)-(3).

(a) Where a single family home project results in an alteration of **50 percent or more** of the impervious surface of a previously existing project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire project).

(b) Where a single family home project results in an alteration **of less than 50 percent** of the impervious surface of a previously existing project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(c) The calculations in Provision C.3.b.ii.(6)(a)-(b) shall include portions of the public right of way that are developed or redeveloped as part of the Regulated Project.

(d) Included in this Regulated Project category is the addition of an accessory dwelling unit (ADU) on an existing parcel with one single-family home, without a subdivision.

iii. Implementation Level

(1) Provision C.3.b.i shall be effective immediately.

(2) Beginning July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii are effective.

(3) Prior to July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii in Attachment I are effective, which are definitions from the Previous Permit.

(4) For Provisions C.3.b.iii.(1)-(3), this shall include a database or equivalent tabular format that contains all the information under Reporting (Provision C.3.b.iv.).

iv. Reporting

(1) **C.3.b.i.(2) Reporting**

In the 2023 Annual Report, each Permittee shall provide a complete list of the development projects that are subject to the requirements of Provision C.3.b.i.(2). For each such project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). If a Permittee has no projects subject to Provision C.3.b.i.(2), it shall so state in the 2023 Annual Report.

(2) **Annual Reporting – C.3.b.ii. Regulated Projects**

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the Provision C.3.b. Sample Reporting Table included in Attachment B):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date), and whether the project has been completed. If not, the estimated project completion date;

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project;

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

(i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.iv.(2)(a) – (l) for the offsite project; and

(ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.iv.(2)(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g) – If not required, state why not. If required, state control method used.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

i. Task Description – The Permittees shall, at a minimum, implement the following LID requirements:

(1) Source Control Requirements

Require all Regulated Projects to implement source control measures onsite that, at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste, and compactor enclosures;

- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) Site Design and Stormwater Treatment Requirements

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.

- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with pervious pavement systems.[12]
- Construct driveways, bike lanes, and/or uncovered parking lots with pervious pavement systems.

(b) Permittees shall implement the design specifications for pervious pavement systems contained within their countywide stormwater handbooks.

(c) Require each Regulated Project and all projects implemented pursuant to Provision C.3.j to treat 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's or Provision C.3.j project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment.

(ii) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour, and maximize infiltration to the native soil during the life of the Regulated Project. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in the Revised Model Biotreatment Soil Media Specifications submitted by BASMAA on behalf of the Permittees on February 5, 2016, and approved on April 18, 2016, pursuant to the requirements of Provision C.3.c.i.(2)(c)(ii) of MRP 2. Permittees may collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the soil media minimum specifications, subject to the Executive Officer's approval.

a. The Permittees may convene a workgroup with Water Board staff to discuss and investigate the pollutant removal

[12] Pervious pavement systems include pervious asphalt, pervious concrete, pervious pavers, and grid pavers, and are defined in the Glossary.

effectiveness and hydrologic equivalency of – and suggested criteria for – high flow-rate media treatment systems in combination with retention/detention measures, such as silva cells and structural soils, as compared to conventional bioretention. The workgroup should consider issues including: the MEP standard in relation to the use of such systems; the pollutant removal benefits and hydrologic criteria associated with the Permit's LID design approach and which are included in other MS4 permits, such as the Western Washington Phase II Municipal Stormwater Permit (NPDES Permit No. WAR045717) and the Los Angeles Regional MS4 Permit (NPDES Permit No. CAS004004); and additional issues, such as the feasibility of obtaining high flow rate media at construction and, as needed, for the life of a project.

(iii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. Permittees shall ensure that green roofs installed at Regulated Projects meet the following minimum specifications:

a. The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).

b. The green roof system planting media shall be sufficiently deep to support the long-term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(d) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(c) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Reporting

(1) For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.iv, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects and for projects implemented pursuant to Provision C.3.j meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flow rate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.iv.(2).

iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects and for all projects implemented pursuant to Provision C.3.j, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil.

Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project and for any project implemented pursuant to Provision C.3.j that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by

highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

iv. Tree Runoff Reduction and Tree-Based Stormwater Treatment Systems

(1) The Permittees collectively may submit a proposal, subject to the Executive Officer's approval, which evaluates the benefit and associated criteria of runoff reduction associated with trees with respect to treatment control sizing, which evaluates and includes as appropriate the findings of the Healthy Watersheds, Resilient Baylands project,[13] and which will be considered for incorporation into a subsequent Permit. Such a proposal shall characterize the multiple benefits of green infrastructure beyond standard designs (e.g., urban forestry), develop recommendations for Permittees to achieve the benefits (e.g., beneficial modifications to GI designs, guidelines for coordinating with work such as stream restoration, parks and urban forestry), and suggest opportunities to modify Provision C.3 language in a future Permit to better recognize broader benefits.

The proposal may include treatment control sizing and design criteria for tree-based stormwater treatment systems in combination with systems that provide additional hydrologic benefit (such as structural soils, suspended pavement systems, or other methods to provide tree rooting volume), which provide water quality and hydrologic benefit equivalent to bioretention.

(2) Tree Interceptor Credits, as described in the 2011 BASMAA Feasibility/Infeasibility Criteria Report submitted pursuant to Provision C.3.c.i.(2)(b)(iv) of MRP 1, shall not be used to reduce the stormwater treatment required pursuant to Provision C.3.

v. Reporting

(1) If the Permittees collectively submit a proposal pursuant to Provision C.3.d.iv, the proposal shall be submitted by no later than with the 2025 Annual Report.

[13] The San Francisco Estuary Partnership (SFEP) and Association of Bay Area Governments (ABAG) along with several other partners (including Water Board staff) secured a U.S. EPA Water Quality Improvement Fund (WQIF) grant to pursue the Healthy Watersheds, Resilient Baylands project, which in part investigates the stormwater treatment benefit provided by trees within the urban landscape.

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.b in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**

Treat a portion (this portion may be zero; Permittees should treat as much onsite as possible) of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an Offsite Project[14] in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provisions C.3.d and C.3.g, as appropriate) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**

Treat a portion (this portion may be zero; Permittees should treat as much onsite as possible) of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[15] to treat the remaining portion of the Provision C.3.d runoff (and comply with Provision C.3.g, as appropriate) with LID treatment measures at a Regional Project[16] or Offsite Project. The Regional Project must achieve a net environmental benefit, through a net increase in impervious surface treated, and/or a net reduction in flow and/or pollutant load.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above (Options 1 and 2), all Offsite Projects and Regional Projects must be completed within three years after the end of construction of the

[14] **Offsite Project** – A stormwater treatment facility that discharges into the same watershed as the Regulated Project and is located at a different public or private parcel or property (e.g., right-of-way) from the Regulated Project.

[15] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Offsite Project or Regional Project.

[16] **Regional Project –** A regional or municipal stormwater treatment facility that captures runoff from a drainage area larger than the parcel on which it is located and discharges into the same watershed as the Regulated Project.

Regulated Project. However, the timeline for completion of an Offsite Project or Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Offsite Project or Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

(4) Reporting

(a) Annual reporting on Alternative Compliance projects shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth or high density can either reduce existing impervious surfaces or create less “accessory” impervious areas and automobile-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d for the Special Project’s drainage area that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.v, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85 percent coverage for the entire project site by permanent structures. The remaining 15 percent portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100 percent LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1).

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85 percent coverage for the entire project site by permanent structures. The remaining 15 percent portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs[17]) for commercial development projects, in Dwelling Units[18] per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50 percent Maximum LID Treatment Reduction Credit

a. For any commercial Category B Special Project with an FAR of at least 2:1, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two

[17] **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

[18] **Dwelling Unit** – A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

types of non-LID treatment systems listed in Provision C.3.e.ii.(1).

b. For any residential Category B Special Project with a gross density[19] of at least 50 DU/Ac, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75 percent Maximum LID Treatment Reduction Credit

a. For any commercial Category B Special Project with an FAR of at least 3:1, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

b. For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed-use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100 percent Maximum LID Treatment Reduction Credit

[19] **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public rights-of-way, recreational, civic, commercial, and other non-residential uses.

a. For any commercial Category B Special Project with an FAR of at least 4:1, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

b. For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

c. For any mixed-use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to 100 percent of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Affordable Housing)

(a) For the purposes of attributing Affordable Housing Credits, affordable housing is defined as preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income, and which meets the following income levels specified in the Federal Department of Housing and Urban Development's (HUD's) definition of affordable housing in metropolitan areas: For metropolitan areas, HUD defines Extremely Low household incomes as 0 - 30 percent of area median household income (AMI), Very Low household incomes as 31 - 50 percent of AMI, Low household incomes as 51-80 percent of AMI, and Moderate household incomes as 81-120 percent of AMI.

To be considered a Category C Special Project, a Regulated Project must additionally meet both of the following criteria:

(i) Be primarily a residential development project.

(ii) Achieve at least a gross density of 40 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of four different types of credits that the Category C Special Project may qualify for, namely: Affordable Housing, Location, Density, and Minimized Surface Parking Credits.

(c) Affordable Housing Credits: A Category C Special Project may qualify for Affordable Housing Credits, according to the following criteria. The income limits that shall be used for these criteria are the most current Official State Income Limits (adjusted for household size), which are defined on the California Department of Housing and Community Development's website.[20,21] All qualifying affordable housing DUs must be preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income.

(i) To qualify for 70 percent Affordable Housing Credit:

100 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 75 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 25 percent of the project's DU's must have monthly rent/mortgage rates[22] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).

(ii) To qualify for 50 percent Affordable Housing Credit:

At least 75 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 15 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).

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[20] https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml

[21] As of December 31, 2021, they are: https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf

[22] Including utilities.

(iii) To qualify for 25 percent Affordable Housing Credit:

At least 50 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 15 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 5 percent of the project's DUs must have monthly rent/mortgage rates[22] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).

AMI	Minimum Percentage of DUs		
	70% credit	50% credit	25% credit
Moderate (≤120% of AMI)	100	75	50
Low (≤80% of AMI)	75	50	25
Very Low (≤50% of AMI)	50	25	15
Extremely Low (≤30% of AMI)	25	15	5

(d) Location Credits: To qualify for any Location Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Location Credits:

a. 5 percent Location Credit: Located within a ¼-mile radius of an existing or planned transit hub.

b. 10 percent Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's/Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional

incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) One hundred percent of a Category C Special Project's site must be located within the ¼-mile radius of an existing or planned transit hub to qualify for the corresponding Location Credit listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised September 2008), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(e) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits listed in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Density Credits:

a. 5 percent Density Credit: Achieve a gross density of at least 40 DU/Ac.

b. 10 percent Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 15 percent Density Credit: Achieve a gross density of at least 100 DU/Ac.

(ii) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(f) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Affordable Housing Credits listed in Provision C.3.e.ii.(5)(c).

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 5 percent Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(g) Category C Special Projects receiving final discretionary approval prior to July 1, 2022, may use the Category C Special Project criteria included in the Previous Permit.

(6) Any Regulated Project that meets the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

(3) Prior to July 1, 2023, Permittees shall implement Provision C.3.e.ii in Attachment I, which are requirements from the Previous Permit.

(4) Beginning July 1, 2023, Permittees shall implement Provision C.3.e.ii.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100 percent LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications, but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end

of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100 percent LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Total Impervious Surface Created/Replaced: The total impervious surface in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

(e) Gross Density in DU/Ac: Number of dwelling units per acre.

(f) Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, and Extremely Low area median household income levels specified in Provision C.3.e.ii.(5)(c).

(g) Density in FAR: Floor Area Ratio.

(h) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(i) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits applied.

(j) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(k) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. Task Description – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third-party reviewer must be a Civil Engineer, or a Licensed Architect or Landscape Architect registered in the State of California or staff of another Permittee subject to the requirements of this Permit.

ii. Implementation Level – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any

consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, CASQA, or the equivalent, may be considered qualifying training.

iii. **Reporting** – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. **Hydromodification Management (HM) Projects** are Regulated Projects that create and/or replace one acre or more of impervious surface except where one of the following applies.

(1) The post-project impervious surface area is less than, or the same as, the pre-project impervious surface area.

(2) The project is located in a catchment that drains to a hardened (e.g., continuously lined with concrete) engineered channel or channels or enclosed pipes, which extend continuously to the Bay, Delta, or flow-controlled reservoir, or, in a catchment that drains to channels that are tidally influenced.

(3) The project is located in a catchment or subwatershed that is highly developed (i.e., that is 70 percent or more impervious).[23]

All HM Projects shall meet the HM Standard of either Provision C.3.g.ii or Provision C.3.g.iii.

The Hydromodification Applicability Maps developed by the Permittees in the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Programs, and the

[23] The Permittees' maps accepted for Order No. R2-2009-0074 were prepared using this standard, adjusted to 65 percent imperviousness to account for the presence of vegetation on the photographic references used to determine imperviousness. Thus, the maps for Order No. R2-2009-0074 are accepted as meeting the 70 percent requirement.

City of Vallejo, under Order No. R2-2009-0074 remain in effect and are provided in Attachment C to this Permit.

Permittees that do not have the location-based applicability criteria (Provision C.3.g.i.(2) – (3)) shown on existing maps shall develop, or cause to be developed, new maps, overlays to existing maps, or other equivalent information that demonstrates whether a project falls under one of those two criteria (whether or not areas are subject to HM requirements). Such maps, overlays, or other equivalent information shall be acceptable to the Executive Officer and shall not be effective until accepted by the Executive Officer.

ii. HM Standard

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, and the City of Vallejo, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[24] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

[24] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include U.S. EPA's Hydrologic Simulation Program—Fortran (HSPF), the U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and U.S. EPA's Storm Water Management Model (SWMM).

(3) **Standard HM Modeling:** Permittees shall use, or shall cause to be used, a continuous simulation hydrologic computer model to simulate pre-project and post-project runoff, or sizing factors or charts developed using such a model, to design onsite or regional HM controls. The Permittees shall compare, or shall cause to be compared, the pre-project and post-project model output for a long-term rainfall record and shall show that applicable performance criteria in Provision C.3.g.ii.(1)-(3) are met. HM controls designed using the Bay Area Hydrology Model (BAHM) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual. Modifications to the BAHM shall be acceptable to the Executive Officer, shall be consistent with the requirements of this Provision, and shall be reported as required below:

- **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.
- **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

iii. HM Standard – Direct Simulation of Erosion Potential

HM control shall be achieved by maintaining the erosion potential in receiving streams at a value of equal to or less than 1.0. In order to use the Provision C.3.g.iii HM Standard – Direct Simulation of Erosion Potential, for their HM Projects, the CCCWP Permittees shall distinguish the range of situations present within their jurisdictions and incorporate an associated range of sizing factors for HM controls (described below in Provision C.3.g.vi.(2)) to address that range of situations, sufficient to demonstrate that appropriately-sized HM controls in those respective situations would achieve the HM Standard. The CCCWP Permittees shall submit a Technical Report describing and justifying these criteria, subject to the Executive Officer's approval.

iv. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof:

(1) **Onsite HM controls** are flow duration control structures, LID features and facilities, and hydrologic source controls that collectively result in the HM

Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[25]

v. Implementation Level

(1) For Alameda, Santa Clara, San Mateo, and Solano Permittees, HM Projects shall meet the HM Standard in Provision C.3.g.ii immediately.

(2) For CCCWP Permittees, HM Projects receiving final planning entitlements prior to Executive Officer approval of CCCWP's submittal pursuant to Provisions C.3.g.iii and C.3.g.vi.(2) shall use the methods and criteria specified in CCCWP's Stormwater C.3 Guidebook, 7th Edition (2017), or most current version. Subsequent to Executive Officer approval of CCCWP's submittal pursuant to Provisions C.3.g.iii and C.3.g.vi.(2), HM

[25] In-stream control projects require a Stream Alteration Agreement from CDFW, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

Projects shall use the methods and criteria specified (and/or acknowledged and approved) in the Executive Officer's approval or conditional approval of that submittal; CCCWP Permittees may alternatively implement the HM Standard in Provision C.3.g.ii.

vi. Reporting

(1) New HM Applicability Maps or equivalent information prepared pursuant to Provision C.3.g.i, for those Permittees who do not have an approved Map, shall be submitted, acceptable to the Executive Officer, not later than with the 2023 Annual Report.

(2) With the 2023 Annual Report, the CCCWP Permittees shall submit a Technical Report subject to the Executive Officer's approval, consisting of a HM Management Plan describing how the CCCW Permittees will implement the HM Standard specified in Provision C.3.g.iii. The Technical Report shall include:

(a) A complete suite of sizing factors – for each type of HM control that may be used in the County – that is protective of all likely site and watershed characteristics, for sites with soils in Hydrologic Soil Groups (HSG) A, B, C, and D, with equations for adjustments to the sizing factors based on geographic differences (including, but not limited to, annual rainfall intensity and frequency, land use, and other hydrologic characteristics), based on the methods and criteria in the CCCWP Hydromodification Technical Report (September 29, 2017), and pursuant to the recommendations provided in the Water Board's Response to CCCWP's Hydromodification Management Memo of November 4, 2020 (March 19, 2021). The complete suite of sizing factors shall ensure each type of HM control achieves the Provision C.3.g.iii HM Standard.

For the complete suite of sizing factors, the base case sizing factor for HM controls at sites with HSG D soils shall be 6.5 percent.[26]

(b) The Technical Report may optionally identify geographic areas or criteria for site-by-site determination, where the use of the prescribed methods, criteria, and suite of sizing factors may result in HM Projects failing to comply with the Provision C.3.g.iii HM Standard. For those areas, the Technical Report shall propose additional onsite mitigation measures, which when implemented in addition to the complete suite

[26] This is a conservative value, based on sites with project-scale built-out imperviousness in the upper watershed for the Lower Control Threshold of 0.1Q2, for soil percolation rates of 0.024 inches per hour, as presented in Table 5-7 on page 58 of the CCCWP Hydromodification Technical Report (September 29, 2017).

of sizing factors specified in Provision C.3.g.vi.(2)(a), ensure that HM controls achieve the Provision C.3.g.iii HM Standard.

The additional onsite mitigation measures include, but are not limited to: site grading to produce self-retaining areas, specific guidance on augmentation of HM control design (e.g., increasing the size of the storage layer), and increases to the HM control sizing factors.

The additional mitigation measures shall not include: reliance on land development restrictions, or on open space preservation, or on the presence of existing or future HM and LID controls located elsewhere within the catchment.

The Technical Report may additionally propose alternative or supplemental methods of compliance with the Provision C.3.g.iii HM Standard, including any combination of: undersized onsite HM controls, additional new HM controls located offsite within the same catchment as the receiving stream, and in-stream controls (e.g., as described in SCVURPPP's 2005 Hydromodification Management Plan Final Report), which when implemented together achieve the Provision C.3.g.iii HM Standard.

(3) Reporting of HM projects shall be as described in Provision C.3.b.

(4) Permittees allowing the use of BAHM shall report collectively, with each Annual Report, a listing, summary, and date of modifications made to the BAHM, including the technical rationale. This shall be prepared at the countywide program level and submitted on behalf of participating Permittees.

(5) In addition, for each HM Project approved during the reporting period, Permittees shall collect and make available the following information. Information shall be reported electronically, and, where appropriate, in tabular form.

- Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control(s);
- Method used by the project proponent to design and size the device or method used to meet the HM Standard;
- Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;
- For projects using standard sizing charts, a summary of sizing calculations used;

- For projects using the BAHM, a listing of model inputs; and
- For projects using custom modeling, a summary of the modeling calculations with a corresponding graph showing curve matching (existing, post-project, and post-project-with HM controls curves).

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. Task Description – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. Implementation Level – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects and for all projects implemented pursuant to Provision C.3.j that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the operation and maintenance of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the operation and maintenance of the pervious pavement system(s) (if any), onsite, joint, and/or offsite installed stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the operation and maintenance responsibility for the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing operation and maintenance inspections of the installed pervious pavement system(s) (if any), stormwater treatment system(s) and HM control(s) (if any).

(4) A database or equivalent tabular format of the following:

(a) All pervious pavement system(s) that total 3,000 square feet or more installed at Regulated Projects, offsite, or at a Regional Project. The total square footage should not include pervious pavement systems installed as private-use patios for single family homes, townhomes, or condominiums.

(b) All stormwater treatment systems installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(c) All HM controls installed onsite at Regulated Projects, offsite, or at a joint or Regional Project.

(5) The database or equivalent tabular format required in Provision C.3.h.ii.(4) shall include the following information for each Regulated Project, offsite project, and Regional Project, and shall be made available to Water Board staff upon request:

(a) Name and address of the project;

(b) Names of the owner(s) and responsible operator(s) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and/or HM control(s);

(c) Specific description of the location (or a map showing the location) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and HM control(s) (if any);

(d) Date(s) that the pervious pavement system(s) (if any), stormwater treatment system(s), and HM controls (if any) was/were installed;

(e) Description of the type and size of the pervious pavement systems (if any), stormwater treatment system(s), and HM control(s) (if any) installed;

(f) Detailed information on operation and maintenance inspections. For each inspection, include the following:

(i) Date of inspection.

(ii) Type of inspection (e.g., installation, annual, followup, spot).

(iii) Type(s) of pervious pavement systems inspected (e.g., pervious concrete, pervious asphalt, pervious pavers).

(iv) Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well) and an indication of whether the treatment system is an onsite, joint, or offsite system.

(v) Type of HM controls inspected.

(vi) Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation or maintenance, maintenance required immediately).

(vii) Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, compliance schedule, administrative citation, administrative order).

(6) A prioritized O&M Inspection Plan for inspecting all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems and HM controls installed at Regulated Projects, offsite locations, and/or at joint or Regional Projects. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient.

At a minimum, the O&M Inspection Plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls (at Regulated Projects, offsite locations, and/or at joint or Regional Projects) at the completion of installation to ensure approved plans have been followed. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(b) Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal

year) of Regulated Projects, offsite projects, or Regional Projects. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient;

(c) Inspection by the Permittee of all Regulated Projects, offsite projects, or Regional Projects at least once every five years. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; and

(d) For vault-based stormwater treatment systems, Permittees may accept 3rd party inspection reports in lieu of conducting Permittee operation and maintenance inspections only if the 3rd party inspections are conducted at least annually. Information from each 3rd party inspection shall be included in the database or tabular format required in Provision C.3.h.ii.(5) and each inspection shall be clearly identified as a 3rd party inspection.

Each 3rd party inspection report must clearly document the following:

(i) Name of 3rd party inspection company.

(ii) Date of inspection.

(iii) Condition of the treatment unit(s) at the time of inspection.

(iv) Description of maintenance activities performed during the inspection.

(v) Date- and time-stamped photographs of the inside of the vault unit(s) before and after maintenance activities.

(7) An Enforcement Response Plan (ERP) for all operation and maintenance inspections that serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. At a minimum, the ERP must contain the following:

(a) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for recognizing common problems with the different types of pervious pavement systems, stormwater treatment systems, and/or HM controls, remedies for the problems, and appropriate enforcement actions, follow-up inspections, and appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP.

(b) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools appropriate for different field scenarios of problems identified with the pervious pavement systems, stormwater treatment systems, and/or HM controls as well as for different types of inadequate response to enforcement actions taken.

(c) Timely Correction of Identified Problems – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all identified problems with the pervious pavement systems, stormwater treatment systems, and/or HM controls.

Corrective actions shall be implemented no longer than 30 days after a problem is identified by an inspector. Corrective actions can be temporary, in which case more time may be allowed for permanent corrective actions. If more than 30 days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

iii. Due Date for Implementation: Immediate.

iv. Maintenance Approvals: The Permittees shall ensure that all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed onsite, offsite, or at a joint or Regional Project by development proponents are properly operated and maintained for the life of the projects. In cases where the responsible party for a pervious pavement system, stormwater treatment system, or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities, but these approvals are not granted, the Permittees shall be deemed to be in compliance with Provision C.3.h. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of

Constructed Wetlands for Urban Runoff Pollution Control and the operation and maintenance requirements contained therein.

v. Reporting

(1) The database or equivalent tabular format required in Provisions C.3.b.ii.(4) and (5) shall be maintained by the Permittees. Upon request from the Executive Officer, information from this database or equivalent tabular format shall be submitted to Water Board staff for review. The requested information may include specific details on each inspection conducted within particular timeframes, such as several fiscal years.

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency, and include a copy of that communication with the Annual Report. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) Total number of Regulated Projects in the Permittee's database or tabular format as of the end of the reporting period (fiscal year).

(b) Total number of Regulated Projects, offsite projects, and Regional Projects inspected during the reporting period (fiscal year).

(c) Percentage of the total number of Regulated Projects that were inspected during the reporting period (fiscal year).

(d) A discussion of the inspection findings for the year and any common problems encountered with various types of pervious pavement systems, treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(e) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

C.3.i. Required Site Design Measures for Small Development and Redevelopment Projects and Smaller Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development and redevelopment projects, which create and/or replace $\geq$ 2,500 ft^2 to < 5,000 ft^2

of impervious surface, and detached single-family home projects,[27] which create and/or replace ≧ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[10]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[10]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. Implementation Level

(1) Beginning July 1, 2023, Permittees shall implement Provision C.3.i.

(2) Prior to July 1, 2023, Permittees shall implement Provision C.3.i in Attachment I, which are requirements from the Previous Permit.

iii. Reporting – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

C.3.j. Green Infrastructure Planning and Implementation

i. Task Description – The Permittees shall continue to implement their Green Infrastructure Plans (completed during the term of the Previous Permit), as may be updated and/or supplemented to comply with this Order, for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm

[27] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

drains, parking lots, building roofs, and other storm drain infrastructure elements.

(1) The Plans are intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs and the Urban Creeks Pesticides TMDL) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

(2) Over the long term, the Plans are intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

(3) Green infrastructure project prioritization is described in the Green Infrastructure Plans based on local characteristics and priorities, and therefore green infrastructure projects will typically be designed to achieve multiple benefits in addition to mercury and PCBs load reduction. Furthermore, this Provision establishes a separate impervious surface retrofit requirement for other-than Regulated Projects.

ii. Implementation Level

(1) **Programmatic Implementation**

The Permittees shall, individually or in a coordinated manner, update and/or supplement their Green Infrastructure Plans as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned, by:

(a) Revising implementation mechanisms to include consideration, or reconsideration, of cooperation with non-municipal entities such as schools on green infrastructure implementation, and otherwise updating implementation mechanisms as appropriate.

(b) Following through with the development or updates of general plans, specific plans, urban forestry plans, climate change adaptation plans, complete streets plans and other planning documents with a green infrastructure nexus to include language which is more supportive of green infrastructure implementation, as identified by Permittees in

their Green Infrastructure Plans. Upon request by Water Board staff, Permittees shall provide justifications for planning documents that they assert do not need to be updated to further support green infrastructure implementation.

(c) Developing funding and funding mechanisms identified in the Green Infrastructure Plans, such as by working with the relevant agencies to expand the scope of transportation grants to include allocation for green infrastructure; establishing green infrastructure-based or green infrastructure-incorporating stormwater fees, including work that sets the foundation for additional future stormwater fees; establishing or increasing application review fees, and evaluating other opportunities to leverage municipal approval of private development to fund green infrastructure implementation.

(d) Reviewing countywide green infrastructure implementation guidance documents and adapting them as necessary to account for local considerations if this has not already been completed during the Previous Permit term, and otherwise reviewing and updating general guidelines and standard specifications as appropriate.

(e) Continuing to implement the tools developed during the Previous Permit term to track and map completed public and private green infrastructure projects, and making the information publicly available.

(f) Continuing to adopt or amend policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this Provision, as necessary.

(g) Continuing to conduct outreach and education as follows:

(i) Conduct public outreach on the requirements of this Provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design.

(ii) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this Provision and methods of implementation.

(iii) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on

the requirements of this Provision and methods of implementation.

(2) **Numeric Implementation**

(a) By June 30, 2027, the Permittees shall implement, or cause to be implemented, green infrastructure projects within their jurisdictions which are not already defined as Regulated Projects pursuant to Provision C.3.b, such that the impervious surface retrofits listed in Table H-1 of Attachment H are achieved.

(b) The Permittees may meet the numeric retrofit requirements listed in Table H-1 of Attachment H on a countywide basis. If Permittees within a given county do not collectively achieve their numeric retrofit requirements, each Permittee within that county shall be separately responsible for achieving its individual retrofit requirement.

(c) Though Permittees may meet their total individual numeric retrofit requirements on a countywide basis, each Permittee shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction, where that project is not already defined as a Regulated Project pursuant to Provision C.3.b. Alternatively, a Permittee may contribute substantially to such a green infrastructure project(s) outside of its jurisdiction and within its County.

(d) Impervious surfaces treated by non-Regulated Projects may be counted towards the numeric requirements in Table H-1 of Attachment H.

Impervious surfaces treated by Regulated Projects, beyond the minimum required by Provisions C.3.c-d for such Regulated Projects, may be counted towards the numeric requirements in Table H-1 of Attachment H.

If a portion of the impervious surface treated by such a Non-Regulated Project or by Regulated Projects (beyond the minimum required by Provisions C.3.c-d for such Regulated Projects) is later used as part of an Alternative Compliance exchange to offset the treatment required by a Regulated Project pursuant to Provision C.3.e.i, then that portion may no longer be counted towards the Provision C.3.j.ii.(2) retrofit requirements listed in Table H-1 of Attachment H.

(e) Projects completed after January 1, 2021, shall be counted towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

(f) Projects completed by June 30, 2027, shall be counted towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

If a project is not completed by June 30, 2027, it may still count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded. Permittees that count such projects towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements shall certify in their Annual Reports that the projects are approved and funded by June 30, 2027.

(g) Controls implemented to satisfy Provision C.3 requirements, including the numeric retrofit requirements specified in Provision C.3.j.ii.(2), may also be used to satisfy Provision C.11 Mercury Controls requirements, and Provision C.12 PCBs Controls requirements, as long as they satisfy the other aspects of those requirements, such as location (i.e., for PCBs, controls that are implemented in areas of old industrial land use or otherwise in areas with identified relatively high concentrations of PCBs).

(h) Permittees may credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects, specified in Provision C.3.b.ii.(5), towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

(i) Permittees with small rural jurisdictions (e.g., whose stormwater conveyance systems are dominated by roadside ditches) may collectively submit a proposal, subject to the Executive Officer's approval, for pilot projects investigating the use of alternative green infrastructure techniques to comply with the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, with construction completed by June 30, 2027. If a project is not completed by June 30, 2027, it may still count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded. Permittees that count such projects towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements shall certify in their Annual Reports that the projects are approved and funded by June 30, 2027.

The proposal shall include a discussion describing the small rural jurisdiction, including density, developed versus undeveloped areas, and piped stormwater conveyances versus roadside ditches.

(j) Permittees with existing ordinances (or that adopt new ordinances by June 30, 2023) that require Regulated Projects to treat significantly more impervious surface than the minimum required by Provision C.3.c-d, may offset their Numeric Implementation retrofit requirements

specified in Provision C.3.j.ii.(2) by a one-time credit of up to 25 percent, and by no greater than one acre. The claimed offset shall not reduce Permittees' Numeric Implementation retrofit requirements below 0.2 acres as specified in Provision C.3.j.ii.(2)(c).

In order to claim this offset, Permittees shall submit a report subject to Executive Officer approval estimating the benefit that will be realized by the adopted ordinance(s) in the current Permit term and the subsequent Permit terms (i.e., until June 30, 2032), as specified in Provision C.3.j.v.(5). The offset claimed shall be no greater than the benefit of the offset estimated in the report. Permittees shall not use the offset prior to Executive Officer approval of the report.

(3) **Design and Other Criteria** - Green infrastructure projects built pursuant to Provision C.3.j shall:

(a) Comply with Provision C.3.c and Provisions C.3.e-h.

(b) Comply with Provision C.3.d. With cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019, to size Non-Regulated green streets projects. If so, Permittees must comply with the Water Board's June 21, 2019, conditional approval of that submittal, which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used for Non-Regulated green streets projects.

(4) **Long-Term Green Infrastructure Implementation**

(a) The Permittees and their representatives may, together with Water Board staff and impartial science experts (e.g., SFEI, SFEP, U.S. EPA Region 9), collectively form a Technical Working Group (TWG) to discuss long-term green infrastructure goals and recommend long-term percentage reductions in Permittees' impervious surfaces, at individual, countywide and regional scales. The TWG should prioritize discussion of long-term green infrastructure goals for development and redevelopment projects not already captured by Provision C.3.b, and in particular, public road and right of way reconstruction projects that are not already defined as Regulated Projects by Provision C.3.b.ii.(5). The TWG should additionally review BMPs and

performance metrics, and should consider linkages to climate change impacts and resiliency.

(b) Prior to the submittal of a report containing the TWG's recommendations for long-term percentage reductions in Permittees' impervious surfaces – as prescribed by Provision C.3.j.v.(6) – the TWG should meet at a minimum biannually, and subsequent to that submittal should meet at a minimum annually.

iii. No Missed Opportunities

Each Permittee shall:

(1) Continue to maintain a list of green infrastructure projects, public and private, that are planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures.

(2) Submit the list with each Annual Report and a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

iv. Participate in Processes to Promote Green Infrastructure

(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.

(2) In each Annual Report, Permittees shall report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

v. Tracking and Reporting Progress

(1) The Permittees shall continue to implement the existing regionally-consistent tracking and mapping tools developed pursuant to Provision C.3.j.i.(2).(d) of the Previous Permit to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met. The tracking and mapping tools shall be used by Permittees to inform issues relevant to program management, such as life cycle costs, asset management, operation and maintenance frequency, and beneficial design changes.

(a) Non-regulated green infrastructure projects built pursuant to Provision C.3.j shall be tracked and mapped in the same manner as Regulated Projects. These projects shall be reported in a separate table from Regulated Projects.

(b) The tracking and mapping tools shall include a component that is available to the public, which is advertised on individual Permittee websites and on County stormwater program websites, and as appropriate is advertised in other locations. This component must include the following basic information: a brief description of design (e.g., whether bioretention or bioswale), location, land use type, and area treated. If the tools contain additional information which has not been made available to the public such as detailed design information, incurred or planned O&M costs and O&M frequency, condition assessments, and pollutant loads treated, that information shall be made available to Water Board staff upon request.

(c) The Permittees shall certify in the 2023 Annual Reports that the tracking and mapping tools have been completed and are being implemented.

(d) In each Annual Report, Permittees shall provide summary reports on the implementation of the tracking and mapping tools and shall provide a link to the component which is available to the public.

(2) In the 2024 and 2026 Annual Reports, report on updates, addenda, and changes to their programmatic implementation, including, but not limited to, the items listed in Provision C.3.j.ii.(1).

(3) In each Annual Report, Permittees shall report on progress made towards the retrofit requirements described in Provision C.3.j.ii.(2).

(4) With the 2026 Annual Reports, Permittees shall provide a summary of lessons learned to-date with regard to Provision C.3.j.ii.(1), including topics such as operation and maintenance, sizing, infiltration and other design criteria for stormwater treatment controls, implementation of tracking and mapping tools, cooperation with non-municipal entities, regional project efforts, funding initiatives and opportunities to leverage municipal approval of private development, education and outreach, and development or updates of plan documents with a green infrastructure nexus. In the summary, Permittees shall also discuss attainment of the numeric retrofit requirements prescribed in Provision C.3.j.ii.(2).

In that summary, as applicable, Permittees shall report on how they have addressed deficiencies identified in Provision C.3.j.ii.(1).

(5) Pursuant to Provision C.3.j.ii.(2)(i), Permittees whose jurisdictions are dominated by rural areas may collectively submit a proposal, subject to the Executive Officer's approval, for the use of alternative green infrastructure techniques. This proposal shall be submitted by no later than with the 2023 Annual Reports.

(6) Each Permittee that wishes to use the one-time offset specified in Provision C.3.j.ii.(2)(j) shall submit a report estimating the benefit realized by the adopted ordinance(s) in the current Permit term, and until June 30, 2032, by no later than with the 2023 Annual Report, subject to Executive Officer approval. Permittees shall not use the offset prior to Executive Officer approval of the Report. The benefit of the estimated offset shall be no less than the offset claimed during the current Permit term.

In each Annual Report, each Permittee claiming the offset shall report on the acreage of retrofit produced by the implementation of the offset in that Fiscal Year, as well as the cumulative acreage of retrofit produced by the implementation of the offset up to that point in time during the current Permit term.

(7) By no later than with the 2025 Annual Reports, the Permittees shall collectively submit a report summarizing any TWG efforts and recommendations, as specified in Provision C.3.j.ii.(4).

(8) Pursuant to Provision C.3.j.ii.(2)(f) and Provision C.3.j.ii.(2)(i), Permittees shall certify in the 2027 Annual Report that any projects counting towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, which have not been completed by June 30, 2027, have been approved and fully funded by June 30, 2027.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Total Impervious Surface Created/ Replaced	Gross Density DU/Ac	Category C Projects: Number of DUs in each AMI Category	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No.: Number of the Special Project as it appears in Table 3.1.

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Total Acreage: Total site area in acres.

Total Impervious Surface Created/Replaced: The total impervious surfaced in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

Gross Density in DU/Ac: Number of dwelling units per acre.

Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities)

01620
1661

no less than 30 percent of the Moderate, Low, Very Low, and Extremely Low area median household income levels specified in Provision C.3.e.ii.(5)(c).

FAR: Floor Area Ratio.

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

01621
1662

C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites that could reasonably be considered to cause or contribute to pollution of stormwater runoff. Permittees shall conduct inspections, effective follow-up, and enforcement to abate potential and actual non-stormwater discharges, consistent with each respective Enforcement Response Plan. These combined efforts will prevent the discharge of pollutants and impacts to beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have sufficient legal authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. **Implementation Level** – Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites that may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial facilities to address pollutant sources associated with outdoor process and manufacturing areas; outdoor material storage areas; outdoor waste storage and disposal areas; outdoor vehicle and equipment storage and maintenance areas; outdoor parking areas and access roads; outdoor wash areas, for example, areas used to wash restaurant equipment and mats,; outdoor drainage from indoor areas; rooftop equipment; vehicle fueling activities; contaminated and erodible surface areas; and other sources determined by the Permittees or the Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. **Task Description** – Permittees shall continue to update and implement an Inspection Plan that will serve as a prioritized inspection workplan. This Inspection Plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

ii. Implementation Level

(1) Facilities to Prioritize for Inspection

Commercial and industrial facilities with the functional aspects and types described below, and other facilities identified by the Permittees as reasonably likely to contribute to pollution of stormwater runoff, shall be prioritized for inspection on the basis of the potential for water quality impact using criteria such as pollutant sources on site, use of pollutants of concern, proximity to a waterbody, and the enforcement history of potential discharges and actual discharges at the facility. Permittees may use a variety of sources to develop and update the business inspection prioritization, including, but not limited to, business license applications, tax records, and inspectors' observations. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plan:

(a) Sites with the following functions or facilities that may be sources of pollutants when exposed to stormwater:

(i) Outdoor process and manufacturing areas

(ii) Outdoor material storage areas

(iii) Outdoor waste storage, handling, and disposal areas

(iv) Outdoor vehicle and equipment storage and maintenance areas

(v) Outdoor wash areas

(vi) Outdoor drainage from indoor areas

(vii) Fueling Areas

(viii) Rooftop equipment

(ix) Other sources determined by the Permittee or Water Board as reasonably likely to contribute to pollution of stormwater runoff.

(b) Sites that support industrial and commercial activities that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges, including:

(i) Industrial facilities, as defined at 40 CFR 122.26(b)(14), including facilities subject to the Statewide NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);

(ii) Vehicle Salvage yards;

(iii) Metal and other recycled materials collection facilities, and waste transfer facilities;

(iv) Vehicle mechanical repair, maintenance, fueling, or cleaning facilities;

(v) Nurseries and greenhouses;

(vi) Restaurants and other food service businesses at which food is prepared or that have onsite eating and drinking areas for customers;

(vii) Supermarkets or large grocery stores with outdoor waste storage or cardboard compacting areas;

(viii) Building trades facilities or yards, corporation yards;

(ix) Building material retailers and storage;

(x) Plastics manufacturers; and

(xi) Other facilities designated by the Permittee or Water Board to be reasonably likely to contribute to pollution of stormwater runoff.

(2) Inspection Plan – The Inspection Plan shall be updated annually and shall contain the following information:

(a) A description of the process for prioritizing inspections and frequency of inspections. The prioritization criteria shall assign a more frequent inspection schedule to the highest priority facilities per Provision C.4.b.ii.(1). If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan.

(b) Assign appropriate inspection frequency for each industrial and commercial facility based on the priority established in Provision C.4.b.ii.(2)(a), potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(c) A mechanism to include new businesses that warrant inspections.

(d) Total number and a list of all industrial and commercial facilities requiring inspections, within each Permittee's jurisdiction, based on the prioritization criteria established in Provision C.4.(b)ii.(2)(a). This list shall be updated annually.

(e) List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual

update. Previous fiscal years' inspection lists shall remain in the Inspection Plan.

(f) If a Permittee relies on multiple entities to perform business and commercial inspections, a list of the entities and their responsibilities with regard to this Permit. Describe how the Permittee oversees and coordinates the entities performing inspections and assures that all sites with the potential to pollute stormwater are inspected.

(3) Record Keeping – For each facility identified in Provision C.4.b.ii.(2)(d), the Permittee shall maintain a database or equivalent tabular system of at least the following information:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity or pollutant source, including SIC or NAICS code. Examples: outdoor process/manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, rooftop equipment, outdoor drainage from indoor areas, and use of mobile businesses for outdoor fueling, washing, etc.;

(c) Inspection priority and inspection frequency; and

(d) Whether facility requires coverage under the Industrial General Permit.

iii. Reporting

(1) Permittees shall include the following information in the 2023 Annual Report:

(a) A brief description of which Permittee entity or entities are responsible for reviewing and approving business license applications or a link to the Permittee's website for business license applications.

(2) Permittees shall make the list required by Provision C.4.b.ii.(2)(d) available upon Water Board request.

C.4.c. Enforcement Response Plan

i. Task Description – Each Permittee shall implement and update, as needed, its Enforcement Response Plan (ERP), a reference document to guide inspection staff in achieving timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's enforcement and compliance procedures, from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual non-stormwater discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.4.d. Inspections

i. Task Description – Each Permittee shall conduct inspections according to the Inspection Plan in Provision C.4.b.ii.(2) and the ERP in Provision C.4.c.ii. to enforce its ordinance to prevent stormwater pollution.

ii. Implementation Level

(1) Inspections – Inspections shall be conducted to include at least the following activities:

(a) Observations for appropriate BMPs to prevent stormwater runoff pollution, or unauthorized or illicit discharge;

(b) Observations for evidence of unauthorized or illicit discharges, illicit connections, and potential discharge of pollutants to stormwater by the Discharger or contractors, such as and including mobile businesses, that operate on the facility;

(c) Observations for noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(2) Record Keeping – Permittees shall maintain adequate records to demonstrate compliance and appropriate follow-up enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial and commercial site inspections:

(a) Name of facility/site inspected

(b) Inspection date

(c) Industrial General Permit coverage required (Yes or No)

(d) Compliance status

(e) Specific problems, including inadequate and ineffective BMPs

(f) Type of enforcement (if applicable)

(g) Problem resolution date

(h) Additional comments

The electronic database or equivalent tabular system and any supporting documentation shall be made readily available to Water Board staff or its representative during inspections, audits, or upon request.

(3) Data Evaluation – Permittees shall evaluate the frequency of potential and actual non-stormwater discharges by business category. Note trends and, as needed, implement focused inspections or education in subsequent years to address trends.

iii. Reporting

(1) Permittees shall include the following information in each Annual Report:

(a) Number of inspections conducted;

(b) Number of each type of enforcement action, as listed in each Permittee's ERP, issued;

(c) Number of enforcement actions or discrete number of potential and actual discharges fully resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner; and

(d) Frequency of potential and actual non-stormwater discharges by business category.

(2) Permittees shall make the list of facilities required to have coverage under the Industrial General Permit, but that have not filed for coverage, available upon Water Board request. For facilities added to the list or re-inspected during this Permit term, the list shall include the date when the facility was first identified and the date when it was most recently inspected or evaluated.

C.4.e. Staff Training

i. Task Description – Permittees shall provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee- specific.

ii. Implementation Level – At a minimum, provide inspection training, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Business Inspection Plan;

(4) Enforcement Response Plan;

(5) Illicit Discharge Detection and Elimination; and

(6) Appropriate BMPs to be used at different industrial and commercial facilities.

iii. Reporting – The Permittees shall include the following information in each Annual Report:

(1) Dates of training;

(2) Training topics covered;

(3) Total number and percentage of industrial and commercial site inspectors attending training; and

(4) Total number and percentage of illicit discharge detection and elimination inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to detect and control illicit discharges not otherwise controlled under Provisions C.4. – Industrial and Commercial Site Controls, C.6. – Construction Site Controls, and C.17 – Discharges Associated with Unsheltered Homeless Populations. Permittees shall implement an illicit discharge program that includes active surveillance and centralized complaint collection and follow-up to detect and eliminate illicit discharges into the MS4. Permittees shall maintain a complaint tracking and follow-up data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. **Task Description** – Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.

ii. **Implementation Level**

(1) Permittees shall have adequate legal authority to address illicit discharges to the MS4, including, but not limited to, the following:

(a) Discharges of sewage, trash, or other potentially polluting or hazardous materials;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces, pavement, equipment, and other facilities of any commercial business, or any other public or private facility, including discharges from mobile businesses;

(c) Discharges of runoff from material storage areas, including those containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes;

(f) Discharges of food-related wastes (e.g., grease, fish processing wastes, restaurant kitchen mat and trash bin wash water); and

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to the MS4.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than stormwater to the MS4.

(4) Permittees shall have adequate legal authority to hold mobile businesses, and the businesses, property managers, property owners, and other associated entities that hire a mobile business, responsible for stormwater pollution discharged by the mobile business operating at their location.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges and compliance from responsible parties.

ii. Implementation Level – The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and/or actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.5.c. Spill, Dumping, and Complaint Response Program

i. Task Description – Each Permittee shall implement a program to respond to spills, dumping, and complaints.

ii. Implementation Level

(1) Each Permittee shall have a central contact point for the public and Permittee's staff to report spills, dumping, and complaints. At a minimum, this central contact point shall include a phone number. Permittees shall also include, as feasible, a user-friendly web address for reporting for spills and dumping or a link to a web-based reporting application.

(2) Each Permittee shall publicize the phone number on its website, and, if used, a web reporting address or link to a web-based reporting application, to the Permittee's staff and the public. The contact information on the Permittee's website shall be kept up-to-date, and updated at least annually when changed. This central contact point shall be readily searchable and accessible on the Permittee's website.

(3) Each Permittee shall require the municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point so that illicit discharge staff can investigate and track.

(4) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and/or phone tree for the staff responsible for the spill and dumping response program. At a minimum, this flow chart and/or phone tree shall identify staff or positions responsible for receiving the complaints and investigating and abating the complaints.

(5) Each Permittee shall also maintain and update, as needed, a spill, dumping, and complaint response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittee's immediate capabilities.

(6) Each Permittee shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct follow-up inspections, as needed, to ensure that corrective measures have been effectively implemented to achieve and maintain compliance. The start of the investigation of a spill or discharge shall not exceed 3 business days from the date the complaint was received by the Permittee. If additional time is required, the Permittee shall document the rationale for the delay.

iii. Reporting

(1) Permittees shall provide the following information in the 2024 and 2026 Annual Reports:

(a) The spill, dumping, and complaint reporting phone number and, if used, a web reporting address or a link to a web-based reporting application;

(b) A screen shot of the Permittee's website showing the central contact point; and

(c) A discussion of how the central contact point – spill and dumping reporting phone number and, if used, the web address or web-based reporting application – is being publicized to Permittees' staff and the public.

(2) Copies of the phone trees and contact lists required in Provision C.5.c.ii (4) and (5) shall be provided as attachments to, or links in, the 2026 Annual Report. The lists may be redacted to remove references to private cell phone numbers. The unredacted phone trees and contact lists shall be made available to Water Board staff or representatives during audits or inspections, and upon request

C.5.d. Tracking and Case Follow-up

i. Task Description – All incidents or discharges reported to the spill, dumping, and complaints central contact point, that might discharge into the MS4, shall be logged to track follow-up and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems and inter/intra-agency coordination, where appropriate. It is not necessary to track and report data according to this provision if they are tracked and reported according to State Water Resources Control Board Order No. 2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

ii. Implementation Level – Maintain records for tracking and follow-up to water quality spills, dumping, and complaints that might discharge into the MS4 in an electronic database or equivalent tabular system.

The water quality spills, dumping, and complaint tracking system shall contain the following information:

(1) Complaint information:

(a) Date that complaint is received by the Permittee;

(b) Type of pollutant; and

(c) Problem Status (potential or actual discharge).

(2) Investigation information:

(a) Date and time investigation of spill or discharge started;

(b) Date and time response to illegal dumping report or complaint started;

(c) Agency, department, or other entities responding to the complaint or discharge;

(d) Type of pollutant;

(e) Identify the entered storm drain or approximate location, and/or receiving water;

(f) Date and time abated; and

(g) Type of enforcement based on the Permittee's ERP.

(3) Responses to discharges or dumping associated with unsheltered populations, including those living in homeless encampments or vehicles, shall be coordinated with the Permittee's Provision C.10 Trash Control efforts, Provision C.17 Homeless Encampment Discharge Control efforts, and other agencies and entities addressing homelessness issues, as appropriate.

iii. Reporting

(1) Permittees shall provide the following information in the Annual Report:

(a) Number of discharges reported;

(b) Number of discharges reaching storm drains and/or receiving waters;

(c) Number of discharges resolved in a timely manner; and

(2) The electronic database or equivalent tabular system and supporting documentation shall be made available to Water Board staff or representatives during audits or inspections, and upon request.

C.5.e. Control of Mobile Sources

i. Task Description – Permittees shall have oversight and control of pollutants associated with mobile businesses.

ii. Implementation Level – Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, including, but not limited to, automobile washing, vehicle fueling, power washing, steam cleaning, graffiti removal, and carpet cleaning;

(b) Implementation of an enforcement strategy that specifically addresses mobile businesses;

(c) Updating and maintaining a mobile business inventory at least annually;

(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction; and

(e) Inspection of mobile businesses.

(2) Permittees may cooperate countywide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business information, BMP requirements, enforcement action information, and educational materials.

iii. Reporting

(1) In the 2026 Annual Report, each Permittee shall provide the following:

(a) Minimum standards and BMPs for each of the various types of mobile businesses;

(b) Enforcement strategy;

(c) A list and summary of the countywide or regional activities conducted, including BMP requirements, enforcement action information, and educational materials (Permittees' annual reports may refer to the countywide or regional reports for this information);

(d) A list and summary of specific outreach events and education conducted for each type of mobile business operating within the Permittee's jurisdiction; and

(e) A copy of the most recent version of the mobile business inventory.

(2) In each Annual Report, each Permittee shall include at least the following:

(a) The total number of inspections conducted of mobile businesses;

(b) The number of each type of mobile business inspected; and

(c) A summary of the enforcement actions taken against mobile businesses during the reporting year.

C.5.f. Municipal Separate Storm Sewer System (MS4) Map

i. Task Description – Each Permittee shall make the current map(s) of its MS4 available to the public.

Permittees shall identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition. This information will be used to update Permittee maps and databases.

ii. Implementation Level

(1) Current MS4 Maps – Permittees shall make current maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web-accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

(2) Updates to MS4 Maps – During the current Permit term, each Permittee shall complete the following:

(a) Determine information missing from the Permittee's current MS4 map(s), which may include Oakland Museum watershed maps, existing MS4 maps or drawings in the Permittee files, or other storm sewer system information databases.

(b) Identify and make available upon Water Board request maps of the storm sewer system and other stormwater controls installed after publication of the Oakland Museum watershed maps within the Permittee's jurisdictional area.

(c) Develop a plan and schedule for updating the Permittee's storm sewer system information. Permittees or countywide stormwater programs may work together or with the Oakland Museum of California to develop a plan and schedule for updating existing information, maps, drawings, and databases. The plan will consider the potential to identify storm sewer system component locations, size or specifications, materials of construction, and condition.

iii. Reporting

(1) In the 2024 Annual Report, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.

(2) Submit a plan and schedule with the 2026 Annual Report to update existing storm sewer system information as described above.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan, to prevent construction site discharges of pollutants into the storm drains. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers. Each Permittee shall in its reporting demonstrate the effectiveness of its inspections and enforcement activities to prevent polluted construction site discharges into storm drains.

C.6.a. Legal Authority for Effective Site Management

i. **Task Description** – Permittees shall have the authority to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and to implement progressive enforcement to achieve expedient compliance and cleanup at all public and private construction sites.

ii. **Implementation Level**

(1) Permittees shall have the legal authority to require, at all construction sites year-round, effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non-stormwater management through all phases of construction (including, but not limited to, grubbing, clearing, site grading, filling, excavation, leveling, building, landscaping, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and cleanup at all construction sites year-round.

C.6.b. Enforcement Response Plan (ERP)

i. **Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance at all public and private construction sites.

ii. **Implementation Level –** The ERP shall contain the following:

(1) Enforcement Procedures – A description of the Permittee's procedures from discovery of problems through confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, follow-up inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of all persons responsible for implementing the ERP.

(2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, inadequate waste or materials management, evidence of actual discharges, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs); actual discharges (observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4); non-compliance with previous enforcement actions; and sites with a history of potential and/or actual discharges.

(3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and actual discharges. Permittees shall require actual discharges to cease immediately. Corrective actions shall be implemented before the next rain event, and no longer than 10 business days after the potential or actual discharges are discovered. Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, the rationale, including the expected time frame for compliance, shall be recorded in the electronic database or equivalent tabular system.

(4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual discharges, including compliance required by Discharge Prohibition A.1. For cases in which the Permittee's enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement. Permittees may also contact and coordinate with Water Board staff for joint inspections and parallel enforcement of large, complex, or noncompliant sites.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site-specific, and seasonally- and phase-appropriate, effective BMPS in the following six categories:

(1) Erosion Control

(2) Run-on and Runoff Control

(3) Sediment Control, including entrance/exit and perimeter controls

(4) Active Treatment Systems, as necessary

(5) Good Site Management, including materials and waste management

(6) Non-Stormwater Management

ii. Implementation Level

The BMPs targeting specific construction site pollutants within the six categories listed in Provision C.6.c.i. shall be site-specific. Permittees may select site-specific BMPs, or BMP combinations, from resources such as:

(1) CASQA BMP Handbook, Construction, December 2019

(2) Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, May 2017, and addenda

(3) Other BMPs shown to provide equivalent or better protection

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs for each site before issuing grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction Stormwater General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in Provision C.6.c.i. are planned.[28]

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction Stormwater General Permit.

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in Provision C.6.c.i. in

[28] If SWPPPs do not include erosion control plan drawings for use by construction workers and managers at the site, erosion, sediment, and site control plans and drawings must also be submitted and reviewed.

preventing the discharge of construction pollutants into the storm drain. Permittees shall require timely corrections of all actual and potential discharges observed.

ii. Implementation Level

(1) Wet Season Notification

By September 1 of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season.

(2) Frequency of Inspections

Inspections shall be conducted monthly during the wet season[29] at the following sites:

(a) All construction sites disturbing one or more acre of land;

(b) All hillside projects (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with ≥15 percent slope) disturbing greater than or equal to 5,000 square feet; and

(c) High Priority Sites – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

(iii) Project size and type;

(iv) Sensitivity of receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

[29] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

(3) Contents of Inspections

Inspections shall focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in Provision C.6.c.i.

Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from Provision C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in Provision C.6.c.i;

(c) Visual observations for:

(i) Actual discharges of sediment and/or construction-related materials into storm drains and/or waterbodies.

(ii) Evidence of sediment and/or construction-related materials discharges into storm drains and/or waterbodies.

(iii) Illicit connections, and

(iv) Potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) Tracking

All inspections shall be recorded on a written or electronic inspection form. Inspectors shall follow the ERP for all actual and potential discharges discovered during the inspection.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) The department, agency, or other entity performing the inspection.

(e) Enforcement Response Level (Use ERP);

(f) Problem(s) observed using Illicit Discharge and the six BMP categories listed in Provision C.6.c.i;

(g) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(h) Comments, which shall include all rationale for longer compliance times, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) Each Permittee shall summarize the following information in the Annual Report:

(a) Total number of construction sites requiring inspections during at least part of the Permit year;

(b) Total number of active hillside sites disturbing less than one acre of soil requiring inspection;

(c) Total number of active sites disturbing one acre or more of soil;

(d) Total number of active sites disturbing less than one acre of soil identified as High Priority sites in Provision C.6.e.ii.(2)(c) requiring inspections;

(e) Total number of inspections conducted;

(f) Number of enforcement actions taken by type, organized by the categories in each Permittee's ERP;

(g) Number of illicit discharges, actual and potential, of sediment or other construction-related materials; and

(h) Number of enforcement actions or discrete number of potential and actual discharges fully corrected prior to the next rain event, but no longer than 10 business days after the potential and actual discharges[30] are discovered or otherwise considered corrected in a timely, though longer period.

(2) In the 2027 Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in Provision C.6.e.ii.(4). This evaluation shall include findings on the

[30] Permittees who track by discrete potential and actual discharges shall report by discrete discharges. Permittees who track by enforcement actions shall report by enforcement actions

program's strength, comparison to previous years' results, as well as areas that need more focused education for site owners, operators, and developers the following year.

(3) An electronic copy of the construction site and inspection database(s) shall be made available to the Water Board during inspections, audits, or upon request.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for all staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to staff responsible for conducting construction site stormwater inspections. Training topics shall include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and the ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information:

(1) Dates of training;

(2) Training topics covered;

(3) Total number of inspectors, including both municipal and non-municipal staff; and

(4) The number of inspectors attending each training, including both municipal and non-municipal staff.

If there was no training in that year, so state.

C.7. Public Information and Outreach

Each Permittee shall increase the awareness of the community, including diverse socioeconomic groups, government elected officials and staff, and ethnic communities, regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate these impacts; positively influence the public's waste disposal and runoff pollution generation behavior; and involve various citizens in mitigating the impacts of stormwater pollution. Outreach required in other provisions may be conducted under Provision C.7.

C.7.a. Outreach Campaigns

i. Task Description – Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences.

ii. Implementation Level

(1) Target a broad audience with a minimum of one outreach campaign with specific stormwater runoff pollution prevention messages. The outreach campaign(s) should utilize various electronic and print media, and paid and free media, including social media, as practicable, to best reach different demographics. The outreach campaign(s) may be coordinated regionally or countywide.

(2) Permittees shall conduct timely evaluations to measure the effectiveness of the outreach campaigns. Effectiveness assessment/evaluation may be done regionally or countywide.

C.7.b. Stormwater Pollution Prevention Education

i. Task Description – Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information.

ii. Implementation Level

(1) Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively, and Permittees may combine this function with the spill and dumping complaint central contact point required in Provision C.5 – Illicit Discharge Detection and Elimination.

(2) Each Permittee shall place and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website. In lieu of posting the detailed informational pages directly on their individual websites, Permittees may choose to

provide links from their websites to the countywide program's websites and/or websites for other collaborative efforts between Permittees. Each Permittee shall publicize its website.

C.7.c. Public Outreach and Citizen Involvement Events

i. **Task Description** – Public outreach shall include a variety of pollution prevention messages such as for car washing; proper use, storage, and disposal of vehicle waste fluids; household waste materials disposal; pesticide use; and trash. Public outreach events may include venues such as fairs, shows, workshops, and household waste collection events. Citizen involvement events may include venues such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, storm drain inlet marking, riparian restoration activities, and community grants.

ii. **Implementation Level** – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events according to its population, as shown in the table below:

Table 7.1 Public Outreach and Citizen Involvement Events[31]

Permittee Population	Number of Events
< 10,000	2
10,001– 40,000	4
40,001 – 100,000	5
100,001 – 175,000	7
175,001 – 250,000	8
> 250,000	10
Non-population-based Permittees	6

C.7.d. Watershed Stewardship Collaboration

i. **Task Description** – Permittees shall individually or collectively collaborate with other organizations to encourage and support community watershed stewardship activities. This may include collaborating with community groups such as local watershed forums and "friends of creek" groups; encouraging and supporting the development of grassroots watershed groups; or engaging

[31] Permittees may claim individual credits for events in which their Countywide Program participates, that the County Program supports or hosts, or other collaborative efforts, provided such events are publicized in the Permittee's jurisdiction.

existing groups, such as neighborhood associations, in watershed stewardship activities. This may also include collaboration with other organizations that benefit the health of the watershed, such as ReScape California, or collaboration to introduce community watershed stewardship activities into organizations focused on other environmental or sustainability efforts.

ii. **Implementation Level** – Annually demonstrate effort.

C.7.e. School-Age Children Outreach

i. **Task Description** – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-aged children (K through 12).

ii. **Implementation Level** – Implement annually and demonstrate effectiveness of efforts through assessment.

C.7.f. Outreach to Municipal Officials

i. **Task Description** – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. **Implementation Level** – At least once per permit cycle, or more often.

C.7.g. Tracking and Reporting

i. **Task Description** – Permittees shall electronically track outreach efforts in a table or spreadsheet. The tracking document should include, at a minimum:

(1) Outreach event or campaign type;

(2) Dates;

(3) Target Audience;

(4) Number of participants and number of participants compared to previous events, if applicable;

(5) Location(s) or website address, as applicable;

(6) Contact information for venues and coordinators, if applicable;

(7) Materials and activities, as applicable;

(8) Level of effort;

(9) Evaluation of effectiveness;

(10) Lessons learned; and

(11)Planned changes in approach or implementation, if any.

ii. Implementation Level – The tracking document shall be made available to the Water Board staff during inspections, audits, or upon request.

iii. Reporting

(1) In each Annual Report, each Permittee (or the Countywide Program, if the tracking was done countywide or regionally) shall submit a table listing the types of outreach programs implemented during that Permit year along with a brief description. The table should be a cumulative table showing the number, if applicable, of each type of outreach campaigns or events occurring during each Permit year.

(2) In the 2023 Annual Report, each Permittee shall list the Permittee's point of contact and the URL for its stormwater pollution website. The Permittee shall discuss how the point of contact and website are publicized and maintained and certify that it has a website dedicated to providing and maintaining information on stormwater issues, watershed characteristics, and stormwater pollution prevention approaches. Changes in this information shall be reported in the Annual Report for the year in which the change occurs.

(3) In the 2027 Annual Report, each Permittee (or the Countywide Program, if the effectiveness assessment/evaluation was done countywide or regionally) shall submit a summary of the effectiveness assessments/evaluations by type of outreach described in Provisions C.7.a through C.7.f. The summary shall include plans for continuing or modifying each outreach type during the next permit term.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

All Permittees shall comply with all the monitoring requirements in this Provision. Permittees may choose any of the following mechanisms, or a combination of these mechanisms, to meet the monitoring requirements:

i. **Regional Collaboration.** Permittees are encouraged to continue contributing to the Regional Monitoring Collaborative (RMC), which coordinates water quality monitoring conducted by all the Permittees. Permittees are encouraged to consider and assign additional duties to the RMC for purposes of increased efficiencies, particularly, but not limited to, reporting duties.

ii. **Area-wide Stormwater Program.** Permittees may contribute to their countywide or area-wide Stormwater Program, so that the Stormwater Program conducts monitoring on behalf of its members.

iii. **Third-party Monitoring.** Permittees may use data collected by a third-party organization, such as the Water Board or Department of Pesticide Regulation, to fulfill a monitoring requirement, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.b.

C.8.b. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Program Plan (QAPrP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

C.8.c. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[32] such as:

- Are chemical concentrations in the Estuary potentially at levels of potential concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?

[32] https://www.sfei.org/sites/default/files/biblio_files/MYP%202021%20FINAL.pdf (SF Bay Regional Monitoring Program (RMP) Multi-Year Plan, January 2021). While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

The Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program by contributing their fair share financially on an annual basis.

C.8.d. Low Impact Development (LID) Monitoring

LID Monitoring is intended to measure compliance and effectiveness of LID controls. It will improve the understanding of the benefit of LID implementation, in particular, green stormwater infrastructure, on pollutant loading and hydrology of receiving waters within Permittees' jurisdictions, at different space and time scales, and inform the design, construction, operation and maintenance (O&M) and future implementation of LID. LID Monitoring may also be used to calibrate and validate models that estimate pollutant removal effectiveness and inform sizing of LID facilities (e.g., countywide C.3 technical guidance documents, reasonable assurance analysis models, and other sizing and assessment models).

LID Monitoring is intended to answer both of the following two management questions:

- What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, at different spatial scales (e.g., single control vs watershed or catchment scale), and how do they change over time?
- What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?

i. LID Monitoring Plans

(1) The Permittees shall, at the regional or countywide level, develop LID Monitoring Plans to implement the requirements in Provision C.8.d.iii-iv. The LID Monitoring Plans shall, at a minimum:

(a) Explain how the study(s) will address both management questions and propose monitoring questions necessary that will address both management questions.

(b) Describe the LID facility(s) or system(s) and study area(s), including the characteristics, land use and management actions within the tributary drainage area to the LID facility(s) or system(s) that will be monitored.

(c) List the monitoring stations, monitoring parameters, and associated measurement, sample and analytical methods that will be utilized.

(d) Establish a monitoring schedule, including number and type (wet weather and dry weather) of monitoring events for each site, that may result in a greater number of total and/or annual monitoring events than the minimum required in Table 8.d.2, and including a discussion of the allocation of samples between and within sites.

(e) Describe the data evaluation methods, such as statistical analyses to test whether differences in concentrations are statistically significant.

(f) Include study-specific Quality Assurance Project Plans (QAPPs), which, at a minimum, are comparable to the SWAMP QAPrP.

(g) Provide annual cost estimates for the implementation of the LID Monitoring Plan.

(h) Explain how sampling and analytical methodologies will be regionally consistent.

(2) Permittees shall implement no later than the deadline set forth in Provision C.8.d.v, the approved or conditionally approved LID Monitoring Plans as meeting the requirements herein (including consideration of countywide and regional representativeness and whether the information generated will reliably address the LID Monitoring management questions).

ii. Regional Collaboration

To assist with the development and implementation of scientifically-sound LID Monitoring Plans, to facilitate regional consistency with respect to sampling and analytical methodology, and to make recommendations about allocation of samples between and within different sites, the Permittees shall form and convene a Technical Advisory Group (TAG) which includes impartial science advisors (e.g., SFEI, SCCWRP) and Water Board staff, to review and make recommendations regarding the LID Monitoring Plans (including their study design, analysis methods, results, and conclusions) prior to submission of the LID Monitoring Plans to the Executive Officer. In order to effectuate this review, the Permittees shall submit their draft LID Monitoring Plans to the TAG by March 1, 2023. Prior to the Executive Officer's approval or conditional approval of the LID Monitoring Plans, the TAG shall be convened at least biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation of Provision C.8.d, including but not limited to study design, sample locations, and analysis methods.

iii. Methods

The Permittees shall implement or cause to be implemented the LID effectiveness monitoring methods listed in Table 8.d.1.

iv. Parameters and Intensities

(1) Permittees shall conduct LID Monitoring consistent with the parameters and intensities specified in Table 8.d.2.

(2) Monitoring must be conducted according to test procedures in 40 CFR part 136 for analyses of pollutants unless another method is required under 40 CFR chapter 1, subchapter N. For PFAS, if there are no standard methods in 40 CFR part 136, Permittees may use other methods, such as those recommended by U.S. EPA for non-potable water and other environmental media.

(3) In a given water year, if there are not enough storm events for Permittees to sample (i.e., due to weather/climate), Permittees may certify that in their subsequent LID Monitoring Status Report and perform the missed sample events in the subsequent water year.

v. Implementation Level – Permittees shall begin implementation of the approved or conditionally approved LID Monitoring Plans by no later than the start of the 2024 Water Year, which is October 1, 2023.

vi. Reporting – The Permittees shall submit their LID Monitoring Plans for Executive Officer approval by May 1, 2023.

Table 8.d.1 LID Monitoring Methods

	Management Question	Monitoring Methods
1	What are the pollutant removal and hydrologic benefits of LID components, facilities and/or systems (and of different combinations of components, facilities and/or systems), including variations in design and how do they change over time?	Monitoring methods to investigate pollutant removal benefits shall consist of: • Required: Collection and analysis of the parameters listed in Table 8.d.2, in stormwater influent and effluent (simultaneously) – using automated samplers to collect flow-weighted composite EMCs (time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites) – at the component, facility, site, and/or watershed scale; and • Optional: sampling of sediment and other technically sound and accepted monitoring methods designed to investigate pollutant removal benefits. Monitoring methods to investigate hydrologic performance (flow) shall consist of: • Required: Measurement of stormwater runoff quantity and/or flow at the component, facility, site and/or watershed scale, in both the influent and effluent of the LID BMP(s). • Optional: Measurement of stream flow to evaluate watershed scale benefits; development of runoff hydrographs; water balance monitoring; collection and analysis of infiltration rates or water depth at the facility and/or site scale; or other technically sound and accepted monitoring methods designed to investigate hydrologic performance. Monitoring methods to investigate changes over time include: • Longitudinal study(s), using the above monitoring methods applied at the component, facility, and/or system scales, over different time scales.
2	What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance?	• Monitoring methods assigned to Management Question 1 above, applied at the component, facility, system, and/or site scale; and • Condition assessments at the component, facility, system, and/or site scale.

Table 8.d.2 LID Monitoring Intensities and Parameters

Countywide Stormwater Program	Anticipated Type(s) of LID Facilities Monitored	Total Minimum Number of Water Quality Sample Events During Permit Term (Annual Minimum)[33]	Parameters[34,35]
Alameda	High flow rate tree well filters and/or a combination of several LID measures.	25 (3)	**Required:** • Total Hg; • Total PCBs; • TSS • PFAS; • TPH; • Total and Dissolved Copper; • Flow; • Total Hardness; and • pH. **Optional:** • Other emerging contaminants;[36] and • Other ancillary parameters.[37]
Contra Costa	Bioretention and/or other infiltration-based LID measures.	25 (3)	
San Mateo	Regional multi-benefit stormwater capture facility(s).	25 (3)	
Santa Clara	Bioretention and/or other LID measures.	25 (3)	
Solano	Bioretention and/or other LID measures.	12 (1)	

[33] This column indicates the total minimum number of sample events that must take place during the Permit term, and the minimum number of sample events that must take place during each year of the Permit term. Samples shall be collected via automated sampler as flow-weighted composite event mean concentrations (EMCs); time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites. In order to assess performance, each sample event must include simultaneous sampling of the influent and effluent. The Permittees are encouraged to additionally collect sediment samples (e.g., to analyze for total PCBs and total mercury), however such sediment sample collection shall not count towards the required water quality samples specified in this column. The LID Monitoring Plans shall propose how to address both of the Management Questions, by specifying the locations of sampling stations, the matrix (surface water, bedded sediment, etc.), the number of samples to be collected at each site each year in the dry season versus in the wet season, and analytical methods.

[34] Each flow-weighted (or time-weighted) composite EMC sample shall be analyzed for all of the required parameters listed in this column. LID Monitoring Plans may include additional parameters not listed in this column.

[35] Data must be SWAMP comparable.

[36] Other emerging contaminants may include but are not limited to: microplastics and tire compounds such as 6PPD-quinone.

[37] Other ancillary parameters may include, but are not limited to: zinc (and other metals), temperature, conductivity, polycyclic aromatic hydrocarbons (PAHs), turbidity, pathogens (FIB), total methylmercury, total organic carbon (TOC), dissolved organic carbon (DOC), pesticides of concern to water quality (e.g., pyrethroids, fipronil and its degradants, and neonicotinoids such as imidacloprid), major cations (Ca, Mg, Na, K), and major anions (SO_4, Cl).

C.8.e. Trash Monitoring

Trash Monitoring is intended to: 1) verify whether Permittees' trash control actions to-date have effectively prevented trash from their jurisdictions from discharging to receiving waters, and 2) evaluate whether discharges of trash from areas of Permittees' jurisdictions where full trash capture equivalency (full trash capture devices or other actions verified with on-land visual trash assessments, as referenced in Provision C.10.b.iii) has been achieved are causing and/or contributing to adverse trash impacts in receiving waters.

Trash monitoring shall address the following management and monitoring questions:

Management Questions

- Have Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?

Monitoring Questions

- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

i. Monitoring Components

The Permittees shall implement or cause to be implemented the monitoring components as described below, to address each management and monitoring question. Permittees should use comparable assessment methods to facilitate regional consistency.

To ensure comparable data, for each monitoring site, Permittees and the TAG shall consider incorporating the implementation of steps 1-6 as specified in the Statewide Trash Monitoring Methods Project Trash Monitoring Playbook[38] into the Trash Monitoring Plan. Permittees and the TAG shall consider adapting and repeating these six steps for all methods specified in Provision C.8.e.ii, to

[38] https://sites.google.com/sfei.org/trash

reflect site information that can be collected regardless of method and can increase comparability between methods. The six steps are as follows:

(1) Event Preparation

(2) Gather Standard Equipment

(3) Set up the Assessment Area

(4) Record the Site Information and Assessment Area Dimensions

(5) Record Assessment Area Photographs

(6) Determine, Document, and Map the Locations of Storm Drain Outfalls, Homeless Encampments, and Illegal Dumping Hotspots Which May Impact the Assessment Area.

ii. Monitoring Methods

(1) Permittees shall collect and analyze the amount of trash discharged from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.

Sampling of MS4 outfalls includes the use of netting devices attached to the end of the outfall pipe (that capture trash discharging through the MS4), or other equivalent end-of-pipe (or in-line) devices and structures, whether existing, modified, or new. The device used to monitor the trash at the end of the MS4 outfall (or in-line, within the MS4) shall not be used itself as the trash control that grants the Low trash generation status to the tributary drainage area; the monitored tributary drainage area may only be controlled to the Low trash generation level by controls upstream of the monitoring device.

(2) Permittees shall implement a pilot program to directly (in-stream) sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system. Permittees should not select in-stream sites that are downstream of direct discharge sites (e.g., homeless encampments and illegal dumping sites).

To the extent feasible, in-stream monitoring sites should be co-located with MS4 outfall monitoring sites, as follows: They should be no further than 300 feet downstream or upstream of them; failing that, they should be no further than 300 feet downstream of them, or, any distance upstream of them; failing that, they should be anywhere within the same receiving

water; failing that, in-stream monitoring sites do not have to be co-located with MS4 outfall monitoring sites.

Sampling a receiving water directly (in-stream) involves the use of trawls, nets, or other equivalent devices, that are designed to capture as much of the width and depth of the receiving water's cross section (especially the thalweg) as is feasible and safe, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.

Indirect methods (on-land), such as shoreline and/or streambank assessments, are not a satisfactory surrogate or replacement for these direct measurements of trash within receiving waters.

(3) Permittees may additionally implement shoreline and/or streambank assessment methods (with an appropriate frequency, timing, and assessment length), not to indirectly measure trash loading in MS4 outfalls and receiving waters, but instead to gain a synoptic view of on-land trash conditions adjacent to MS4 outfall and in-stream monitoring sites. Such methods include: the riverine volumetric method, the riverine quantitative tally method, the unoccupied aerial system (UAS) method,[39] or other equivalent methods. The riverine qualitative visual assessment method may be merited but requires additional study, refinement, and calibration, and its use is subject to the Executive Officer's approval.

(4) In order to be able to characterize loading rather than only concentration, Permittees shall directly measure flow at both MS4 outfall sites (flow through the MS4 pipe) and at in-stream receiving water sites (flow through the receiving water). Examples of methods to collect flow data include stream gages, manning's equation, and other methods recommended in Chapter 3.2 of the International Stormwater BMP Database's October 2009 Urban Stormwater BMP Performance Monitoring document.[40]

(5) All methods shall include collection of data on material type. For example, the volume or tally of cigarette butts collected.

[39] https://sites.google.com/sfei.org/trash

[40] https://bmpdatabase.org/monitoring

iii. Monitoring Sites, Events, Frequency, and Intervals

(1) Permittees shall conduct MS4 outfall monitoring annually, starting October 1, 2023, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan.

County	MS4 Outfall Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	3	3
Contra Costa	2	3
Solano	1	3
San Mateo	2	3
Santa Clara	3	3

(2) Permittees shall implement a pilot program for direct in-stream monitoring. Permittees shall conduct this monitoring annually, starting October 1, 2024, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan.

County	Direct In-Stream Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	2	3
Contra Costa	1	3
Solano	0	0
San Mateo	1	3
Santa Clara	2	3

(3) Permittees should monitor storm events that trigger trash discharge and transport trash through the MS4 (e.g., 0.25 inches of rain over 24 hours), and that are preceded by at least 48 hours of limited or no trash discharge from the tributary drainage area. Each wet season, Permittees should sample the first forecasted significant storm event, and at least one storm event that is forecast to be greater than the one-year, one-hour storm event (i.e., full capture design standard).

(4) To the extent possible, Permittees should monitor the same monitoring sites during each year of the Permit term. With cause, justification, and reporting in the Annual Trash Monitoring Progress Report, they can change monitoring sites.

(5) Tributary drainage areas to monitoring sites should be representative with respect to the types of trash controls present across the region.

For example, some monitoring sites receive runoff from areas controlled primarily by one type of full trash capture device (e.g., an inlet-based device) while other monitoring sites receive runoff from areas controlled primarily by another type of full trash capture device (e.g., a HDS unit). And/or, some monitoring sites receive runoff from areas controlled primarily by full trash capture devices while other monitoring sites receive runoff from areas controlled primarily by Other Actions.

(6) Permittees are exempt from outfall and receiving water sampling during dangerous and unsafe weather conditions.

(7) In a given water year, if there are not enough qualifying storm events for Permittees to sample (i.e., due to weather/climate) – or if safety concerns preclude sampling during a qualifying storm event such that Permittees would not achieve the mandatory minimums set forth in Provisions C.8.e.iii.(1)-(2) – the Permittees may certify that in their subsequent Annual Trash Monitoring Progress Report, and perform the missed sample events in the subsequent water year.

(8) Permittees shall use the results of Trash Monitoring to inform and investigate their trash management actions. If Trash Monitoring results indicate that discharges are causing or contributing to adverse impacts in receiving waters, Permittees shall implement new or enhanced actions to comply with the trash discharge prohibition and receiving water limitations. Examples of results that could trigger follow up actions are provided in the Fact Sheet.

iv. Regional Trash Monitoring Technical Advisory Group

(1) To assist with the development and implementation of scientifically-sound trash monitoring, the Permittees shall form and convene a Technical Advisory Group (TAG), which includes impartial science advisors (e.g., SFEI) and Water Board staff, to review and provide input on ongoing trash monitoring, site selection, analysis methods, results, and conclusions.

Prior to the submission of the Trash Monitoring Plan, the TAG shall meet at least biannually. Subsequent to the submission of the Trash Monitoring Plan, the TAG shall meet at least annually.

(2) The Permittees shall solicit input and feedback from the TAG on:

(a) The spatial representativeness of each site;

(b) The adequacy of the methods employed at each site;

(c) The recommended minimum intensity, size, and/or recurrence interval for storms that are sampled;

(d) The number of sites and monitoring events, as described in the monitoring schedule in the Trash Monitoring Plan;

(e) The timing of sampling during storm events. For example, it is likely that Permittees should prioritize sampling during the rising limb of the hydrograph (and towards the beginning of the rising limb, at that), because that is when most of the trash load is mobilized and discharged to MS4 outfalls and receiving waters;

(f) Implementation of Provision C.8.e.iii.(8);

(g) Permitting; and

(h) Recommendations for alternative approaches to answering the management and monitoring questions.

v. Trash Monitoring Plan - Permittees shall collectively submit a Trash Monitoring Plan by July 31, 2023, subject to Executive Officer approval, that, at a minimum, includes the following information:

(1) Selected site locations (latitudinal and longitudinal coordinates), including maps and characteristics (e.g., type of outfall, receiving water);

(2) For each site, describe the land use, trash conditions/levels, trash controls present, and other relevant characteristics (trash generation rates, types of controls present, etc.) of the tributary drainage areas of the MS4, and also delineate the tributary drainage areas of the MS4;

(3) A description of factors that were considered when selecting monitoring sites and events, including spatial and temporal representativeness;

(4) For each site, a description of the monitoring methods and protocols that will be used;

(5) A monitoring schedule, which shall include the timing (of sampling during and between storm events), number and type of monitoring events at each site;

(6) Plans for implementation of Provision C.8.e.iii.(8);

(7) A summary of permitting efforts;

(8) Opportunities provided for input and participation by interested parties and scientific experts other than those participating in the TAG; and

(9) Input, feedback, and recommendations from the TAG on the capacity of the Trash Monitoring Plan to answer the management and monitoring questions.

C.8.f. Pollutants of Concern Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to assess compliance with receiving water limitations, support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants.

In particular, monitoring required by this provision must be directed toward addressing the following six priority POC management information needs:

(1) **Source Identification** - identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

(2) **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

(3) **Management Action Effectiveness** - evaluating the effectiveness or impacts of existing management actions, including compliance with TMDLs and other POC requirements and providing support for planning future management actions;

(4) **Loads and Status -** providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges;

(5) **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time; and

(6) **Compliance with Receiving Water Limitations –** providing information to assess whether receiving water limitations (RWLs) are achieved.

Not all information needs apply to all POCs (see Table 8.2 below for details).

i. Sampling Methods – The Permittees shall implement or cause to be implemented the monitoring components shown in Table 8.1 to address each of the six POC management information needs.

Table 8.1 POC Monitoring Methods

Monitoring Type	Information Need	Monitoring Methods
1	Identify Source Areas	Monitoring methods to identify watershed sources of POCs shall include: • Collection and analysis of POCs (in dissolved phase or on suspended sediment particles as appropriate for pollutant) in urban stormwater runoff transported through MS4s or receiving waters during stormwater runoff events; or • Collection and analysis of POCs (in dissolved phase or on suspended sediment particles as appropriate for pollutant) in urban stormwater runoff at outfall locations (i.e., as runoff from MS4 enters receiving waters) during stormwater runoff events; or • Collection and analysis of POCs on bedded sediments deposited in MS4s, treatment facilities, or receiving waters; or • Collection and analysis of POCs in stormwater runoff or bedded sediments on source area properties (e.g. private property) or public rights of way; or • Other monitoring methods designed to identify specific sources or uses of POCs (e.g., caulk in roadways or building materials) or watershed source areas.
2	Identify watershed areas contributing most to Bay impairment	Monitoring methods to identify watershed areas contributing most to Bay impairment shall include: • Methods described for Monitoring Type #1; or • Collection and chemical analysis of small fish tissue (or other relevant indicator) near tributary confluences with the Bay; or • Collection of bedded sediments near tributary confluences with the Bay and analysis for POCs.
3	Effective-ness of, and provide support for future, management actions	Monitoring methods to evaluate effectiveness of, and provide support for future, management actions shall include: • Methods described for Monitoring Type #1, but focused on characterizing the effectiveness of specific management actions in reducing or avoiding POCs in MS4 discharges; or • Collection of information to characterize or develop models of control measure performance

Monitoring Type	Information Need	Monitoring Methods
		(e.g., treatment controls, demolition debris program, green infrastructure, etc.). This information could include data for model calibration and validation, or other information needed to estimate or compute model parameters.
4	Provide information on POC loads, concentra-tions, or presence/ absence	Monitoring methods to provide information on POC loads, concentrations, or presence/absence shall include: • Methods described for Monitoring Type #1, in combination with quantitative modeling associated with quantifying POC loads from MS4s or small tributaries to the Bay; or • Collection of information to support development of conceptual models of watershed fate and transport; or • Collection of information to support watershed loading models such as data for model calibration and validation or other information needed to estimate or compute model parameters.
5	Evaluate POC trends	Monitoring methods to provide information on trends in POC loads and concentrations over time shall include methods described for Monitoring Type #1 or #2
6	RWLs Assessment	Monitoring in receiving waters to assess compliance with RWLs. Monitoring methods shall include: • Collection and analysis of analytes during the wet season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by urban stormwater runoff. • Collection and analysis of analytes during the dry season in receiving waters (i.e., creeks and rivers that flow to San Francisco Bay) influenced by dry season urban runoff. • Sampling locations for RWLs assessment monitoring shall be spatially and temporally representative of the sampled waterbody. Sampled waterbodies shall be representative of the range of receiving waterbody types.

ii. **Parameters and Monitoring Frequency –** The Permittees shall conduct POC monitoring consistent with the monitoring intensity and frequency specified in Table 8.2. Monitoring frequencies are described as the total and minimum number of samples that Permittees within a countywide Stormwater Program shall collectively collect and analyze in a Water Year (October 1- September 30). Minimum number of samples that Permittees within a countywide Stormwater Program shall collect by the end of the Permit term to address each monitoring type are also specified.

Table 8.2 POC Monitoring Parameters, Effort and Type

Pollutant of Concern	Total Samples[a] Collected /Analyzed (yearly minimum) for each Countywide Program: Alameda, Contra Costa, Santa Clara, and San Mateo	Minimum Number of Samples for each Monitoring Type[b]
Polychlorinated Biphenyls (PCBs)	75 (8) Alameda, Santa Clara 65 (8) Contra Costa, San Mateo	8 samples minimum for monitoring types 1-3 and 16 samples minimum for monitoring types 4-5
Total Mercury	60 (8) Alameda, Santa Clara 50 (8) Contra Costa, San Mateo	8 samples minimum for monitoring types 1-5
Copper	5	all samples for monitoring type 4
Emerging Contaminants [c] Must include but not limited to: • contaminants likely in stormwater and associated with vehicles; • per- and polyfluoroalkyl substances (PFAS); • organophosphate ester plastic additives/flame retardants; • bisphenol plastic additives; and • ethoxylated surfactants	25 See footnote c	all samples for monitoring type 4 See footnote c
Ancillary Parameters[d]: • Total organic carbon • Suspended sediments (SSC) • Hardness	as necessary to address management questions for other POCs – see footnote d	
RWLs Assessment: copper, zinc, fecal indicator bacteria, and additional analytes determined under Provision C.8.h.iv	4 wet season samples 1 dry season sample	5 samples for monitoring type 6

[a] This column indicates the total number of samples, across all applicable monitoring types (i.e., monitoring types 1-5 from Table 8.1), that must be collected during the Permit term. The number in parentheses indicates the minimum number of samples that must be collected, across all applicable monitoring types, during each of the five years of the permit. For example, 75 total samples must be collected for total PCBs and 60 total samples for mercury by each set of Santa Clara County and Alameda County during the term of the permit. San Mateo and Contra Costa Counties, because of smaller program size, must collect 65 PCBs and 50 total samples for mercury. Permittees must collect a minimum of 8 PCBs and 8 mercury samples every year of the Permit term, including the final year. It is possible that data can satisfy multiple monitoring types. However, the intent of the Permit is to achieve a distribution of monitoring effort across all applicable monitoring information needs. Therefore, no more than 25 percent of samples for any pollutant may be used to satisfy requirements for multiple monitoring categories for that pollutant. This requirement is intended to ensure that monitoring is focused to provide the best information to answer specific management questions.

[b] This column indicates the monitoring types from Table 8.1 that are applicable to this POC along with the minimum number of samples that shall be collected by each set of Permittees (i.e., Santa Clara County, San Mateo County, Alameda County, and Contra Costa County) by the end of the Permit term. The applicable monitoring type(s) is also stated to illustrate the management information need(s) motivating the collected data. For example, each set of Permittees (i.e., the Countywide Programs for Santa Clara, San Mateo, Alameda, and Contra Costa counties) must collect and analyze at least 8 samples to address monitoring types 1-5 in Table 8.1 for both total PCBs and total mercury. Some collected samples may address multiple management questions.

[c] Permittees, collectively, shall produce or cause to be produced a stormwater monitoring strategy for emerging contaminants (ECs) April 1, 2023 that prioritizes ECs for stormwater monitoring listed in this table and possibly others and establishes an approach for sampling stormwater ECs based on specific or likely physico-chemical properties, sources, transport pathways, and fate of prioritized ECs. Permittees must conduct or cause to be conducted ECs stormwater monitoring to execute the ECs stormwater monitoring strategy at a level of effort indicated in the table. This level of effort can be satisfied either through sampling and analysis of the number of samples indicated in this table or through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.

[d] Total Organic Carbon (TOC) data are not used independently. Rather, TOC can be useful for normalizing PCBs data collected in water and sediment. TOC shall be collected concurrently with PCBs data that should be normalized to TOC. Similarly, suspended sediment concentrations (SSC) samples should be collected and analyzed when water samples are collected that will be used to assess loads, loading trends, or BMP effectiveness for PCBs and Mercury. Hardness data are used in conjunction with copper concentrations collected in fresh water.

iii. **POC Parameters and Analytical Methods –** Samples collected consistent with Table 8.2 shall be analyzed for parameters listed in Table 8.3. Where no laboratory method is listed in Table 8.3, Permittees shall use U.S. EPA or SWAMP-approved methods. There are no analytical methods listed in Table 8.3 for ECs as there are not U.S. EPA-approved methods for most of these contaminants. Monitoring for ECs is investigatory monitoring to provide information on EC loads, concentrations, and presence/absence rather than compliance determination. Accordingly, specification of analytical method is not mandatory. Moreover, the sampling and analysis is likely to be conducted through the San Francisco Bay Regional Monitoring Program, which has a robust and well-established quality assurance process, and the laboratories chosen for the EC analyses will be applying state-of-the-science analytical methods for the detection and quantification of ECs in stormwater samples.

Table 8.3 POC Analytes and Analytical Methods

Pollutant of Concern	Matrix	Analyte(s) or Test Species	Laboratory Analytical Methods
Polychlorinated Biphenyls (PCBs)	Water	Total PCBs	U.S. EPA 1668 (RMP 40)
		Total Organic Carbon	SM5310B
		Suspended sediments (SSC)	ASTM D3977-97
	Bedded Sediment	Total PCBs	As appropriate to address the management information need: U.S. EPA 1668 (RMP 40), 8082A, or 8270D modified by Method 1625
		Total organic carbon	U.S. EPA 9060
Mercury	Water	Total Mercury	U.S. EPA 1631 Rev E
	Bedded Sediment	Total Mercury	U.S. EPA 7473
Copper	Water	Total Copper	U.S. EPA 200.7
		Dissolved Copper	U.S. EPA 200.8
		Hardness	U.S. EPA 130.1 or 130.2

C.8.g. Pesticides and Toxicity Monitoring

Permittees shall conduct wet and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides-related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Water Board modify, reduce or eliminate this monitoring requirement, provided the resultant change would result in overall improvement of pesticide monitoring data collection.

In fulfilling the requirements of Provision C.8.g, Permittees may collaborate with the California Department of Pesticide Regulation (CDPR) for data collection and analysis. For data collected through such collaboration, CDPR's standard operating procedures and quality assurance/quality control methods

may be used in place of the SWAMP comparability requirements in subprovisions C.8.b and in C.8.g.

i. Toxicity in Water Column - Dry Weather

(1) Field and Laboratory Method – Permittees shall collect grab samples of receiving water using applicable SWAMP comparable methodology. These samples shall be analyzed for the test organisms listed, and by the methods described, in Table 8.4.

Toxicity shall be evaluated using the Test of Significant Toxicity (TST) statistical approach.[41] Each sample shall be subject to determination of "Pass" or "Fail" and shall indicate "Percent Effect" from toxicity using nondiluted samples. The TST null hypothesis shall be "mean sample response ≤ 0.75 × mean control response." A test result that rejects this null hypothesis shall be reported as "Pass." A test result that does not reject this null hypothesis shall be reported as "Fail." The relative "Percent Effect" of the sample is defined and reported as: ((Mean control response – Mean sample response) ÷ Mean control response)) × 100.

(2) Sample Design/Locations – Sample locations may be selected by Permittees to monitor locations where toxicity could be likely; to coincide with creek restoration sites; or to resample a location where toxicity has been found in the past.

(3) Frequency, Timeframe and Number of Sites – Permittees shall annually collect in the dry season at least the minimum number of samples as shown below.

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

[41] *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* (EPA 833-R-10-003, 2010), Appendix A, Figure A-1, and Table A-1.

Table 8.4 Water Column Aquatic Toxicity Analytical Procedures

Test Species	Test Endpoint(s)	Units	U.S. EPA Method
Pimephales promelas (Fathead Minnow)	Larval Survival and Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013[42] EPA 833-R-10-003[43]
Ceriodaphnia dubia (Freshwater Crustacean)	Survival[a]	Pass or Fail, % Effect <25% Passes, >25% Fails	EPA-821-R-02-013 EPA 833-R-10-003
Ceriodaphnia dubia (Freshwater Crustacean)	Reproduction	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Selenastrum capricornutum (Green Algae)	Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Hyalella azteca (Freshwater Amphipod)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012[44] EPA 833-R-10-003
Chironomus dilutus (midge)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012 EPA 833-R-10-003

[a] The *Ceriodaphnia dubia* chronic toxicity test design for the survival endpoint is not amenable to the TST, Welch's t-test so the survival endpoint will be determined as a percent effect using the TST approach. A percent effect less than 25 percent will be considered a "pass," and a percent effect equal to or greater than 25 percent will be considered a "fail."

[b] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent.

[42] Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136.

[43] National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003) 2010.

[44] *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012, 2002; Table IA, 40 CFR Part 136). See Appendix B, page 238, for *H.azteca* and *C.dilutus* methods.

ii. Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of creek sediment using applicable SWAMP-comparable methodology. These samples shall be analyzed for the pollutants and organisms listed and by the methods described on Table 8.5. Where no laboratory method is listed in Table 8.5, Permittees shall use U.S. EPA- or SWAMP-approved methods.

(2) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, or to resample a location where toxicity has been found in the past, for example.

Table 8.5 Sediment Toxicity & Pollutants Analytical Procedures

Test Species or Pollutant	Units	Laboratory Method
Hyalella azteca and Chironomus dilutus survival[a]	Pass/Fail using TST, % Effect[a]	EPA-600/R-99-064[45]
Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin		EPA 3540C followed by EPA 8270D by NCI-GCMS
Fipronil and its degradates (fipronil-sulfone, fipronil-desulfinyl, fipronil sulfide)		
Total PAHs		
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc		
Total organic carbon		
Grain size		

[a] For *Hyalella* and *Chironomus* acute toxicity test methods, the test result will be considered a "pass," regardless of a TST determination of "fail" if the percent survival in the receiving water is equal to or greater than 90 percent. The false positive rate (beta error) is 0.05 and the negative rate (alpha error) is 0.25 for these test methods.

[45] *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates* (EPA 600/R-99-064) Second Edition. March 2000.

(3) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past, for example.

(4) Frequency, Timeframe, and Number of Sites – Permittees shall collect at least the minimum number of samples annually as shown:

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

iii. Wet Weather Pesticides and Toxicity Monitoring

(1) Field and Laboratory Method – Permittees shall collect water column samples and analyze them for the following parameters using the methods specified in Tables 8.4 and 8.5. For imidacloprid, Permittees shall specify an analytical method that achieves a reporting level of 0.01 ppb.

- Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin
- Imidacloprid
- Fipronil and its degradates fipronil-sulfone, fipronil-desulfinyl, fipronil sulfide and fipronil amide (amide is optional – do it if lab offers the suite)
- Toxicity

(2) Sample Design/Locations – Permittees shall collect samples annually during storm events. Sample locations shall be representative of urban watersheds (i.e., bottom of watershed locations).

(3) Frequency, Timeframe, and Number of Sites – If this (Provision C.8.g.iii) sampling is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term, with a minimum

of six (6) samples collected by the end of the third water year of the permit term. If this (Provision C.8.g.iii) sampling is conducted by Countywide Stormwater Programs, Permittees shall collect at least the minimum number of samples as shown below:

Permittees	Minimum Number of Sample Sites
Alameda County Permittees	2 per year
Santa Clara County Permittees	2 per year
Contra Costa County Permittees	1 per year
San Mateo County Permittees	1 per year
Solano County Permittees	1 by the end of water year 2023-24

iv. **Follow-up** – Permittees shall provide notification in the next Urban Creeks Monitoring Report when analytical results indicate any of the following:

(1) A toxicity test of growth, reproduction, or survival of any test organism is reported as "fail" in both the initial sampling and a second, follow-up sampling, and both have ≥ 50% Percent Effect;

(2) A pollutant is present at a concentration exceeding its water quality objective in the Basin Plan; or

(3) For pollutants without water quality objectives, results exceed Probable Effects Concentrations or Threshold Effects Concentrations.[46]

C.8.h. Reporting

i. **Water Quality Standard Exceedance –** When data collected pursuant to Provisions C.8.a.-C.8.g. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. This reporting requirement shall not apply to continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are addressed pursuant to

[46] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31. More recent TECs and PECs may be used if lower than stated in MacDonald 2000.

Provisions C.9 through C.12, C.14, C.18, and C.19, consistent with Provision C.1.

ii. **Electronic Reporting –** The Permittees shall submit to the California Environmental Data Exchange Network (CEDEN) all results from monitoring conducted pursuant to Provisions C.8.d LID Monitoring, C.8.e Trash Monitoring, C.8.f Pollutants of Concern Monitoring, and C.8.g Pesticides and Toxicity Monitoring. Data that CEDEN cannot accept are exempt from this requirement.

(1) Data shall be submitted in SWAMP formats and with the quality controls required by CEDEN.

(2) Data collected during the previous October 1–September 30 period shall be submitted by March 31 of each year.

iii. **Urban Creeks Monitoring Report –** The Permittees shall submit a comprehensive Urban Creeks Monitoring Report at the countywide level no later than March 31 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Each Urban Creeks Monitoring Report shall contain summaries of C.8.d LID Monitoring, C.8.e Trash Monitoring, C.8.f Pollutants of Concern Monitoring, and C.8.g Pesticides and Toxicity Monitoring, including the following:

(1) **A LID Monitoring Status Report**, which, at a minimum, includes the following information:

(a) A summary of the LID Monitoring Methods and study designs used in the preceding water year, at each sampled LID component, facility or system.

(b) A summary table that lists monitoring samples collected during the preceding water year during the Permit term, including at a minimum, the following information for each sample location: Site ID; the name or ID of the LID component, facility or system name; latitude and longitude of the LID component, facility or system; type of LID component, facility or system (e.g., bioretention); characteristics and land use of the tributary drainage area of the LID component, facility or system; other management actions and controls present in the tributary drainage area of the LID component, facility or system; sample dates; and concentrations of parameters measured.

(c) A summary of lessons learned, progress made, and interim conclusions, for all samples collected during the previous water year.

(d) For all data generated during the preceding water year, a statement of data quality.

(e) The raw data generated by the preceding water year, made available to the Water Board and third parties.

(f) An outline of steps (including but not limited to study designs, methods and sites) for the upcoming water year.

(g) An analysis of the data, including the following:

(i) Identification and analysis of any trends in stormwater or receiving water quality.

(ii) A discussion of the data for each monitoring program component, which includes:

a. Monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, the California Toxics Rule, and other applicable water quality control plans;

b. Where appropriate, hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

c. Identification and prioritization of water quality problems;

d. Identification of potential sources of water quality problems;

e. Description of follow-up actions;

f. Evaluation of the effectiveness of existing control measures; and

g. Identification of management actions needed to address water quality problems.

(2) **An Annual Trash Monitoring Progress Report,**[47] which, at a minimum, includes the following information:

(a) Narrative description of monitoring conducted, including the number of sites monitored and the number of monitoring events completed;

(b) Description of storms events that were sampled, including the date(s) and times when samples were collected, intensity and duration of the storm event, a description of where along the hydrograph the storm event was sampled, and justification used to determine the storm event was of appropriate size to displace and/or mobilize the transport of trash though the MS4 system;

[47] The Annual Trash Monitoring Progress Report shall be a single collective regionwide report. With their UCMRs, all Permittees shall include a copy of the Annual Trash Monitoring Progress Report.

(c) Narrative description, including maps, of any MS4 outfalls, homeless encampments and illegal dumping sites, located upstream of each Outfall Monitoring sample site;

(d) Description and the results of data analysis methods, including statistical analyses;

(e) Results and lessons learned;

(f) Data quality assurance procedures that were implemented for samples collected;

(g) Monitoring events (including locations and methods) planned for the subsequent fiscal year(s);

(h) A comprehensive detailed discussion of implementation of Provision C.8.e.iii.(8); and

(i) Updates of required Trash Monitoring Plan elements.

(3) **A Pesticides and Toxicity Monitoring Status Report**, which includes the following information:

(a) A complete Water Year Summary Table that lists the monitoring sites, with a row for each site. The table columns contain: Site ID; creek name; latitude; longitude; permittee jurisdiction(s); water column toxicity (acute); water column toxicity (chronic); sediment toxicity (acute); sediment toxicity (chronic); and sediment chemistry. For each site, list the site information and check the parameters sampled at that site. Provide a statement of the data quality and an analysis of the data, including:

(i) Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, Ocean Plan, and California Toxics Rule and other applicable water quality control plans;

(ii) Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

(iii) Identify and prioritize water quality impairments;

(iv) Identify and potential sources (and actual, if known) of water quality impairments, and provide sufficient justification for those potential sources;

(v) Describe follow-up actions;

(vi) evaluate the effectiveness of existing management actions; and

(vii) identify additional management actions needed to address water quality impairments.

iv. Pollutants of Concern Monitoring Reports

(1) In each Urban Creeks Monitoring Report, the Permittees shall submit a report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year. The report shall include (for preceding year and projected for forthcoming year): monitoring locations, number and types of samples collected, purpose of sampling (management question addressed), and analytes measured. Any data not reportable to CEDEN should also be included in the Urban Creeks Monitoring Report due annually on March 31.

(2) Receiving Water Limitations Assessment Report

(a) By no later than March 31, 2023, Permittees shall submit a report with the following information:

(i) Relevant water quality objectives against which to compare monitoring data;

(ii) Analytes in addition to those listed in Table 8.2 to monitor based on assessment of the potential that discharges of these analytes may result in levels in receiving waters approaching or exceeding water quality objectives and the basis of the determination; and

(iii) Identification of waterbodies to be sampled, sampling locations within those waterbodies, and sampling schedule consistent with the requirements in Tables 8.1 and 8.2.

(b) The report shall be subject to approval by the Executive Officer for compliance and technical adequacy. Upon approval by the Executive Officer, Permittees shall augment the RWLs assessment monitoring required in Tables 8.1 with the analytes identified in the report.

(c) By no later than March 31, 2026, or as part of the Integrated Monitoring Report, Permittees shall submit an updated Receiving Water Limitations Assessment Report with proposed monitoring to be conducted during the next permit term.

v. Integrated Monitoring Report – By no later than March 31, 2026, Permittees shall submit an Integrated Monitoring Report in lieu of the annual Urban Creeks Monitoring Report. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit. The Integrated Monitoring Report

shall report on all the data collected since the previous Integrated Monitoring Report[48] and shall contain the following:

(1) The information described in Provisions C.8.h.iii.(1)-(3), pertaining to the monitoring data collected during the preceding (third) water year of the Permit term;

(2) A comprehensive analysis of all data collected pursuant to Provision C.8. since the previous Integrated Monitoring Report,[48] and may include other pertinent studies.

For LID Monitoring and Trash Monitoring, this shall additionally include a summary of the methods and study designs used in all preceding water years, at each sample location. And, a summary of lessons learned, progress made, data, results, analyses, and conclusions, for all samples collected during all prior water years during the Permit term;

(3) For POCs, methods, data, calculations, load estimates, and source estimates for each POC parameter, as applicable;

(4) A budget summary for each monitoring requirement (for each year of the Permit term); and

(5) With cause and justification, recommendations for changes to any of the elements of Provision C.8 in future Permit terms.

vi. Comprehensive Bioassessment Final Report – By no later than March 31, 2024, the Permittees shall collectively submit a comprehensive analysis of all bioassessment monitoring conducted by the RMC during MRP 1 and MRP 2, for Water Years 2012-2021.

vii. Standard Report Content – All monitoring reports shall be clear, concise, and well-organized, and shall include the following information:

(1) An Executive Summary;

(2) The purpose of the monitoring and brief description of the study design rationale;

(3) Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data;

(4) Brief descriptions of sampling protocols and analytical methods;

(5) Sample location description, including water body name and segment and latitude and longitude coordinates;

[48] Excluding Creek Status Monitoring conducted subsequent to the submittal of the Integrated Monitoring Report during the Previous Permit.

(6) Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue);

(7) Concentrations detected, measurement units, and detection limits;

(8) Assessment, analysis, and interpretation of the data for each monitoring program component;

(9) A listing of volunteer and other non-Permittee entities whose data are included in the report; and

(10) Assessment of compliance with applicable water quality standards.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system.

This provision implements requirements of the TMDL for Diazinon and Pesticide-Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Urban-use pesticides of concern (Pesticides of Concern) to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin); carbamates (e.g., carbaryl and aldicarb); and neonicotinoids (e.g., imidacloprid, acetamiprid, and dinotefuran).

C.9.a. Maintain and Implement an Integrated Pest Management Policy or Ordinance and Standard Operating Procedures

All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of Integrated Pest Management (IPM)[49] and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance.

[49] The Glossary attached to this Permit includes IPM definitions adapted from the draft UP Provisions.

i. **Task Description** – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides does not cause or contribute to pesticide-related toxicity in receiving waters.

ii. **Implementation** – Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property.

iii. **Reporting**

(1) In each Annual Report, Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of Pesticides of Concern to water quality.

(2) In each Annual Report, Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and integration of several strategies, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term.

(3) In their 2023 Annual Reports, the Permittees shall provide links to their IPM policies or ordinances and IPM standard operating procedures. Permittees shall submit updated links in subsequent Annual Reports, if those links change.

C.9.b. Train Municipal Employees

i. **Task Description** – The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy and/or ordinance and standard operating procedures. This training may also include other training opportunities, such as the ReScape California Landscape Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided.

ii. Reporting

(1) In each Annual Report, Permittees shall report the percentage of municipal employees who apply pesticides who have received training in the Permittees' IPM policy and/or ordinance and IPM standard operating procedures within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc.

(2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.

C.9.c. Require Contractors to Implement IPM

i. Task Description – The Permittees shall include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall monitor contractor pesticide applications to ensure that contractors implement their contract specifications in accordance with the Permittee's IPM policies and/or ordinances and standard operating procedures. Contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee that an individual employee will always use IPM strategies. Thus, periodic Permittee observation and verification of contractor performance is necessary.

ii. Implementation – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used.

iii. Reporting – In each Annual Report, Permittees shall describe how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.

C.9.d. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (https://www.cdpr.ca.gov/docs/legbills/calcode/040501.htm#a6970).

ii. Reporting – In each Annual Report, Permittees shall briefly describe the communications they have had with county agricultural commissioners and report follow-up actions to correct violations of pesticide regulations.

C.9.e. Public Outreach

i. Task Description – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.

ii. Implementation – The Permittees shall conduct each of the following:

(1) **Point of Purchase Outreach**: The Permittees shall:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.

(2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

(3) **Outreach to Pest Control Professionals:** The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by EcoWise Certified or a functionally equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BAMSC; CASQA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators.

iii. Reporting – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that

respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience.

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description** – The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting** – In each Annual Report, Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

C.9.g. Evaluate Implementation of Pesticide Source Control Actions

i. **Task Description** – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.

ii. **Implementation** – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors,

evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule.

iii. Reporting – In their 2025 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-f (including the effectiveness of outreach efforts required by Provision C.9.e); a discussion of any improvements made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges, Discharge Prohibition A.2, and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of this provision. Flood management agencies are not subject to these trash reduction requirements except for those included in Provision C.10.c.

C.10.a. Trash Reduction Requirements

Permittees shall implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025.

i. **Schedule** - Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule:

(1) 90 percent by June 30, 2023; and

(2) 100 percent by June 30, 2025.

Permittees that do not attain the 90 percent compliance benchmark by June 30, 2023, shall submit a revised trash load reduction plan as described in Provision C.10.d and a schedule of implementation of additional trash load reduction control actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent compliance benchmark by June 30, 2025.

ii. **Trash Generation Area Management** - Permittees shall demonstrate attainment of the Provision C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long-Term Trash Reduction Plans, submitted in February 2014, in accordance with the requirements and accounting set forth in this provision. The February 2014 maps provide the 2009 trash levels and delineate trash generation areas within Permittees' jurisdictions into the following trash generation rate categories:

Low = less than 5 gal/acre/yr;

Moderate = 5-10 gal/acre/yr;

High = 10-50 gal/acre/yr; and

Very High = greater than 50 gal/acre/yr.

Permittees also designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, within which they will implement trash control actions. With the 2024 Annual Report, Permittees shall submit a revised Trash Generation Area Map that includes trash management areas, as well as private land drainage areas (See Provision C.10.a.ii.b) that will be retrofitted with full trash capture devices, or equivalent, by June 30, 2025. The updated trash generation map(s) shall include GIS layers and appropriate metadata (including tables etc.) that identify locations and associated drainage areas of full trash capture systems, and other trash control actions, and shall highlight any revisions or changes from the previous map(s). Permittees may provide access to multilayered GIS maps that account for other trash control action details and locations rather than submitting that information in a document. Maps and data generated through this effort may be used to illustrate progress toward achieving the trash reduction requirements in Provision C.10.a.i.

(a) Permittees shall implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better.

A full capture device or system is a treatment control, or series of treatment controls, including, but not limited to, a multi-benefit project (as defined in the Trash Amendments) or a low-impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain. The device(s) must also have a trash reservoir large enough to contain a reasonable amount of trash safely without overflowing trash into the overflow outlet between maintenance events. Types of systems certified by the State Water Resources Control Board are deemed full capture systems. A stormwater treatment facility implemented in accordance with Provision C.3 is also deemed a full capture system if the facility, including its maintenance, prevents the discharge of trash to the downstream MS4 and receiving waters and discharge points from the facility, including overflows, are appropriately screened or otherwise configured to meet the full trash capture screening specification for storm flows up to the full trash capture one-year, one-hour storm hydraulic specification.

Actions equivalent to full trash capture are actions that send no more trash down the storm drain system than a full trash capture device would allow, which is essentially no trash discharge except in very large storm flows. The Provision C.10.a.i percent reductions shall be demonstrated by percent of 2009 Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation by the Provision C.10.a.i mandatory deadlines.

(b) By July 1, 2025, Permittees shall ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of actions equivalent to or better than full trash capture systems shall be assessed with visual assessments in accordance with Provision C.10.b.iii. If there is a full trash capture device downstream of these private lands that is designed, operated, and maintained to control trash discharges from that land area, no other trash control is required.

C.10.b. Demonstration of Trash Reduction Outcomes

i. Full Trash Capture Systems – Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each full trash capture system, including the mapped location and drainage area served by each system. Permittees shall provide their respective vector control agencies with the names and locations of new and existing full trash capture devices.

(a) **Inspection and Maintenance** – Permittees shall inspect and maintain full trash capture devices to ensure that they are operating appropriately and have sufficient operating capacity to capture trash consistent with the requirements of this Provision. The inspection and maintenance of each full capture device shall be at a frequency sufficient to prevent plugging, including plugging of the 5 mm screen leading to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. At a minimum, all full trash capture devices shall be inspected and maintained once per year. In High and Very High trash generation areas, all full trash capture devices shall be inspected at least twice per year (and maintained as necessary), with the inspections spaced at least three months or more apart.

(b) For catch basin insert type full capture systems, if any such device is found to have a plugged or blinded screen, or is 50 percent full or greater, during an inspection or a maintenance event, the inspection and maintenance frequency shall be increased so that the device is neither plugged nor 50 percent or more full of trash at the next inspection or maintenance event. For high-flow capacity devices, if any such device is found to have a plugged or blinded screen, or exhibits a condition that exceeds the manufacturer's guidelines for requiring maintenance, the inspection and maintenance frequency shall be increased so that the device is neither plugged nor exceeds the manufacturer's guidelines during the next inspection or maintenance event.

ii. Maintenance Records – Permittees shall retain device-specific maintenance records, including, at a minimum: device type, date of installation, location, drainage area, date(s) of inspection and maintenance, the capacity condition of the device at the time of inspection and maintenance (full and overflowing or with storage capacity remaining), any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, any damage reducing function, or other negative conditions. A summary of this information shall be reported in each Annual Report and may be limited to the number of full capture devices maintained that exhibited a plugged, 50 percent or more full, or overflowing condition upon inspection or maintenance.

(a) **Certification** – Permittees shall certify annually that each full trash capture system is operated and maintained to meet full trash capture system requirements. Drainage areas served by an adequately maintained full trash capture system will be considered equivalent to or better than a Low trash generation rate area.

iii. Other Trash Management Actions – Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.

(a) **Implementation Documentation** – Permittees shall maintain documentation of trash control actions that describes each action or combination of actions, the level of implementation, the timing and frequency of implementation, standard operating procedures if applicable, location(s) of implementation actions including mapped location(s) and drainage area(s) affected or description of areal extent, tracking and enforcement procedures if applicable, and other

information relevant to effective implementation of the action or combination of actions.

(b) **Visual Assessment of Outcomes of Other Trash Management Actions** – Permittees shall conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see ProvisionC.10.b.iii.(b)(iv)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions. Permittees may assess and account for one or more trash generation areas in a single trash management area within which a control action or combination of control actions is implemented. The visual on-land assessment method used shall meet or exceed the following criteria:

(i) Conduct observations of the sidewalk, curb and gutter within each trash management area, or locations associated with sources of trash.

(ii) Conduct observations at randomly selected locations covering at least ten percent of a trash management area's street miles or at strategic locations, provided they are representative of trash generation in the management area and they will represent the effectiveness of the control action(s) implemented or planned in the management area.

(iii) Conduct observations at a frequency consistent with known or estimated trash generation rate(s) within a trash management area and the time frequency of the control action(s) implemented or planned in the management area. Conduct observations for effectiveness approximately at the halfway point of the interval between instances of recurring trash control actions such as street sweeping and on-land cleanup.

(iv) Permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Permittees shall submit such evidence to the Executive Officer as a submittal separate from any other submittals or reports. If this evidence is accepted by the Executive Officer, the Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these management actions at the specified performance standard.

iv. **Percentage Discharge Reduction** – Percentage discharge reduction from 2009 from Very High generation areas reduced to High, Moderate, and Low, High generation areas reduced to Moderate and Low, and Moderate trash generation areas reduced to Low trash generation category to meet the required total percent reduction (% Reduction) shall be calculated based on the following formula:

$$\% \text{ Reduction} = 100\,[(12A_{VH(2009)} + 4A_{H(2009)} + A_{M(2009)}) - (12A_{vh} + 4A_h + A_M)]\,/(12A_{VH2009} + 4A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$ = total amount of the 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of the 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of the 2009 moderate trash generation category jurisdictional area

A_{VH} = total amount of very high trash generation category jurisdictional area in the reporting year

A_H = total amount of high trash generation category v jurisdictional area in the reporting year

A_M = total amount of moderate trash generation category jurisdictional area in the reporting year

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

100 = fraction to percentage conversion factor

v. **Source Control** – Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items other than those addressed under previous Permits (foam foodware and single-use plastic bags) may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions. To claim a load percentage reduction value, Permittees must provide substantive and credible evidence that new source control actions are being implemented jurisdiction-wide and reduce trash by the claimed value. A Permittee may support its claimed source reduction value with reference studies from other jurisdictions provided that it also provide credible evidence that the chosen source control action would achieve comparable trash reduction if implemented in the Permittee's jurisdiction.

A jurisdiction-wide source control load reduction value cannot be claimed after June 30, 2025. However, Permittees may demonstrate and claim full trash capture equivalence of a source control in specific trash generation areas or in combination with other controls in an area if the control or combination of controls are documented, assessed, and verified in accordance with Provision C.10.b.iii.

vi. **Partial Trash Reduction – Curb Inlet Screens** – Studies conducted by the Permittees during MRP 2 assessed the benefit of other control measures, such as curb inlet screens in combination with street sweeping, in reducing the amount of trash discharged through MS4s. However, additional information is needed to determine the effectiveness of curb inlet screens in reducing trash within a given trash management area. Permittees may demonstrate through further assessment and study, as described below, that the installation and appropriate maintenance of curb inlet screens, accompanied by street sweeping at an appropriate frequency, within Moderate trash generation areas can effectively reduce the trash generation rate to Low under the following conditions:

(a) Permittees shall propose an acceptable method to verify that the area where curb inlet screens have been or will be installed are Moderate trash generating. Permittees shall also propose an appropriate method and frequency of verification, post installation, on the change (if any) in the trash generation rate following the installation of curb inlet screens.

(b) Permittees shall propose an appropriate street sweeping frequency where curb inlet screens are installed that, when implemented, effectively reduces the area's trash generation rate to Low.

(c) At a minimum, Permittees shall evaluate street sweeping effectiveness based on multiple factors other than frequency, and sufficient to allow a determination of proper and effective street sweeper access. Examples of additional evaluations that could be completed include effectiveness associated with enhanced street/curb accessibility via proper signage, ticketing, and towing vehicles when appropriate.

(d) The inspection and maintenance of each curb inlet screen shall be conducted at a frequency sufficient to ensure the screen is functioning appropriately, e.g., a screen is not stuck in an open position or plugged, including plugging of the screen leading to opening of the screen under flows less than those described in Provision C.10.a.ii.(a).

(e) Permittees shall propose an appropriate method of covering/blocking horizontal surface grates during street sweeping events (to prevent

trash from being swept into the grates), and an appropriate method for capturing smaller pieces of trash/debris from entering the MS4 via the horizontal surface grates.

(f) Permittees shall submit the results of the additional study, as described above, for Executive Officer approval. The report must appropriately describe and demonstrate the conditions under which the combined use of curb inlet screens and street sweeping effectively reduce the trash generation rate of an area from Moderate to Low.

C.10.c. Requirements for Flood Management Agencies

Flood management agencies must continue to implement requirements for trash capture systems, as specified in Table 10-1, below. Flood management agencies must also implement trash control measures such as trash pickups and installation of trash receptacles, to control Moderate, High, and Very High trash generation areas within their jurisdiction including, but not limited to, parking lots, trailhead areas, and along recreational paths and trails, and demonstrate effectiveness of these trash control measures as specified in Provision C.10.b.iii.

Table 10-1. Requirements for Flood Management Agencies

Flood Management Agency	Trash Capture Requirement
Santa Clara Valley Water District	4 trash booms or 8 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda County Flood Control Agency	3 trash booms or 6 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda Co. Zone 7 Flood Control Agency	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Contra Costa County Flood Control Agency	2 trash booms or 4 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
San Mateo County Flood and Sea Level Rise Resiliency District	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Vallejo Flood & Wastewater District	1 trash boom or 2 outfall capture devices or equivalent measures (minimum 2 ft. diameter outfall)

C.10.d. Trash Load Reduction Plans

i. Permittees shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the Provision C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report. The Plan shall describe trash load reduction control actions being implemented or planned and the trash generation areas or trash management areas where the actions are or will be implemented, including jurisdiction-wide actions such as source control ordinances. The Plans may include actions to control sources outside of the Permittees' jurisdictions that are causing or contributing to adverse trash impacts in the receiving water(s). Permittees that choose to implement such control actions may account for them towards meeting the Provision C.10.a Trash Load Reduction requirements as long as they can demonstrate the controls will be sustained, and they quantify the sustained load reduction benefit (relative to control actions in the trash generation areas or trash management areas in their jurisdiction that drained to the affected receiving water).

ii. Permittees shall calculate their trash load reduction, relative to 2009 baseline conditions, without the trash load reduction offsets described in Provision C.10.f, as of June 30, 2023. If that reduction is less than 90 percent, then Permittees shall develop and implement an updated Trash Load Reduction Plan. Pursuant to Provision C.22.c, the updated Trash Load Reduction Plan shall include a schedule of additional trash load reduction implementation actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent reduction from 2009 levels, achieved through implementation of full trash capture, or other equivalent actions, consistent with the requirements of this Provision, by June 30, 2025. Permittees shall submit their updated Trash Load Reduction Plans with their 2023 Annual Report.

iii. Permittees unable to attain 100 percent trash load reduction, relative to 2009 baseline conditions, by June 30, 2025, while accounting for credits from new source controls (as described in Provision C.10.b.v) may be granted additional time until December 31, 2025, and East Contra Costa County Permittees until June 30, 2026, to achieve 100 percent reduction via full trash capture, or equivalent, contingent on developing and implementing an approved Direct Discharge Control Plan as described in Provision C.10.f.ii.

C.10.e. Impracticability Report

Permittees may collectively submit a programmatic report by March 31, 2023, for the approval of the Executive Officer, that describes conditions under which

it is impracticable to control trash via full trash capture devices. The impracticability report shall include, but not be limited to, the following:

i. A description of the engineering constraints that prevent the installation of full trash capture devices.

ii. A process for evaluating and determining impracticability of full trash capture devices.

iii. Alternative Controls: The report shall include alternative controls or a combination of controls that may be implemented to reduce trash loads to meet the requirements and deadlines in Provision C.10.a. Examples of alternative controls include, but are not limited to, requiring businesses or property owners to pick up litter, successful implementation of excess trash receptacles and collection services, increased code enforcement or parking enforcement/ticketing/towing, additional trash pick-ups, street sweeping, assessment and execution of cooperative implementation opportunities with Caltrans or neighboring Permittees, curb inlet screens, and long term measures such as pump station or storm drain retrofits, implementation of green stormwater infrastructure that controls trash, or changes to the catchment to allow effective implementation of full trash capture measures.

iv. Permittees shall use an approved trash impracticability report in developing the updated Trash Load Reduction Workplans required by Provision C.10.d.

C.10.f. Optional Trash Load Reduction Offset Opportunities

i. Creek and Shoreline Cleanup – A Permittee may offset part of its Provision C.10.a trash load percent reduction requirement by conducting cleanup of creek and shoreline areas. The creek and shoreline cleanup efforts should be conducted at a minimum frequency of twice per year, and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent. Offsets for creek and shoreline cleanups will no longer be applicable after June 30, 2025.

A Permittee may claim a load reduction offset of one percent for the June 30, 2023 mandatory trash reduction compliance benchmark for each total of trash volume removed from cleanups that is ten percent of the Permittees' 2009 trash load volume estimates, based on its trash generation maps and average categorical trash generation rates (see Provision C.10.a.ii), in accordance with the following formula:

1% Reduction Offset (Volume) = $(12 + 4\ A_{H(2009)} + A_{M(2009)})\ OF$

where:

$A_{VH(2009)}$ = total amount of 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of 2009 moderate trash generation category jurisdictional area

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

OF = offset factor equal to (7.5 x 0.1) for the 2023 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

ii. Direct Trash Discharge Controls – Permittees with an approved Direct Discharge Control Plan (DDCP) may claim up to fifteen percent using the Provision C.10.f.i formula towards offsetting their Provision C.10.a trash load percent reduction requirement. The DDCP shall include a detailed description of control measures the Permittee will implement to control the direct discharge of trash to receiving waters from non-storm drain system sources. Offsets for direct discharge controls will no longer be applicable after June 30, 2025.

Permittees wishing to submit a new DDCP pursuant to Provision C.10.d.iii shall submit the DDCP for approval no later than April 1, 2024. Permittees with an existing DDCP approved during the Previous Permit shall submit an updated DDCP for approval no later than January 3, 2023, in order to continue claiming trash load percent reduction offsets. DDCPs shall be sufficient to provide trash reduction benefits equivalent to or greater than the areas not yet in compliance, as calculated using the formula in Provision C.10.b.iv, and shall include:

(a) A description of sources of the directly discharged trash;

(b) A description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads, including those associated with unsheltered homeless populations and illegal dumping, in a systematic and comprehensive manner;

(i) For Permittees whose DDCPs address significant discharges from populations experiencing unsheltered homelessness,

systematic and comprehensive implementation of control actions shall include a commitment to, and a plan for, increasing the provision of emergency, transitional, and/or permanent housing, and the following services: trash and sanitary services, and other services which are necessary to reduce discharges associated with unsheltered homelessness, such as RV safe parking areas and pump out services, and social services that can help the unsheltered homeless transition to housing.

The DDCP shall prioritize providing housing and services to people experiencing unsheltered homelessness who are living near receiving waters.

The DDCP shall document the existing capacities for housing and services as of the time of the DDCP's submittal, and include projections of changes to those capacities for each subsequent year during the Permit term.

(ii) For Permittees whose DDCPs address significant discharges from illegal dumping, systematic and comprehensive implementation of control actions shall include a commitment to, and a plan for, actions that will prevent direct discharges of trash to receiving waters from illegal dumping. Such actions include, but are not limited to, abating illegal dumping sites, providing dumping vouchers (particularly to socioeconomically disadvantaged communities), holding free waste drop-off events, and implementing onsite structural BMPs to prevent direct discharges from illegal dumping sites to receiving waters.

The DDCP shall prioritize addressing illegal dumping that occurs near receiving waters.

The DDCP shall document existing sites where illegal dumping occurs, controls at illegal dumping sites, voucher and free waste drop-off programs, and include projections for reductions in illegal dumping, increases of controls at illegal dumping sites, and expansions of (or the creation of) programs to control illegal dumping, such as dumping voucher programs and waste drop-off events, for each subsequent year during the Permit term.

(iii) For Permittees whose DDCPs address significant discharges from both unsheltered homeless populations and illegal dumping sites, Permittees shall submit DDCPs in compliance with both Provisions C.10.f.ii.b.(i) and C.10.f.ii.b.(ii).

(c) A map of the affected receiving water area and associated watershed; and

(d) A description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.

C.10.g. Reporting

Each Permittee shall provide the following in each Annual Report or otherwise by the date specified:

i. With each Annual Report, a summary of trash control actions within each trash management area, including the types of actions, levels of implementation, areal extent of implementation, and whether the actions are ongoing or new, including initiation date.

ii. With their 2024 Annual Report, Permittees shall submit a revised trash generation area map or maps, as described in Provision C.10.a.ii.

iii. With each Annual Report, a summary of implementation actions and progress toward meeting the July 1, 2025, requirement for all private lands to implement full trash capture systems, or be managed with trash discharge control actions equivalent to or better than full trash capture systems, as required in Provision C.10.a.ii.(b).

iv. With each Annual Report, certification that each of its full trash capture systems is operated and maintained to meet full trash capture system requirements; a description of any system(s) that did not meet full trash capture system requirements (e.g., due to plugging or overflowing); and any corrective actions taken.

v. With each Annual Report, an accounting of its non-full trash capture system trash control actions assessments by providing a summary description of assessments in each of its trash management areas, including the number and dates of observations.

vi. Permittees unable to attain the 90 percent mandatory trash reduction compliance benchmark by June 30, 2023, via full trash capture, or equivalent, shall, by June 30, 2023, submit a notice of noncompliance, pursuant to Provision C.22.c and an updated Trash Load Reduction Plan as described in Provision C.10.d.ii.

vii. With their 2023 Annual Report, Permittees shall submit a report evaluating their trash reduction, relative to 2009 baseline conditions, as of June 30, 2023, without including offsets. Permittees unable to meet the 90 percent mandatory trash reduction compliance benchmark without the trash load reduction offsets

described in Provision C.10.f shall submit, with their 2023 Annual Report, an updated Trash Load Reduction Plan as described in Provision C.10.d.ii.

viii. Permittees unable to attain 100 percent trash load reduction, relative to 2009 baseline conditions, by June 30, 2025, while accounting for credits from new source control (as described in Provision C.10.b.v) shall, by June 30, 2025, submit a notice of noncompliance pursuant to Provision C.22.c, including a plan to come into compliance with the 100 percent trash load reduction requirement. Permittees may be granted additional time until December 31, 2025, and East Contra Costa County Permittees until June 30, 2026, to achieve 100 reduction via full trash capture, or equivalent, contingent on developing and implementing a direct discharge control plan (DDCP) as described in Provision C.10.f.ii.

Permittees, except East Contra Costa County Permittees, that are granted additional time until December 31, 2025, to attain 100 percent reduction via full trash capture, or equivalent, shall submit by December 31, 2025, either a report that confirms that they reached 100 percent trash load reduction by December 31, 2025, or a notice of noncompliance pursuant to Provision C.22.c.

ix. By March 31, 2023, Permittees may collectively submit a programmatic report for the approval of the Executive Officer, that describes typical conditions where it may be impracticable to control trash via full trash capture devices, as described in Provision C.10.e.

x. With the 2024 Annual Report, Permittees that offset part of their Provision C.10.a trash load percent reduction requirement through additional cleanup of creek and shoreline areas, as described in Provision C.10.f.i, shall submit a summary of the additional cleanup actions implemented, and the benefit to water quality achieved through those actions.

xi. Starting with the 2023 Annual Report, Permittees with approved DDCPs shall provide the following information in each Annual Report for which they use an offset from the implementation of Provision C.10.f.ii towards their trash load percent reduction:

(1) For Permittees whose DDCPs address significant discharges from unsheltered homeless populations, the following information for the current year, and for each prior year of the Permit term:

The estimated number of people experiencing unsheltered homelessness in their jurisdiction; the estimated number of people experiencing unsheltered homelessness living within approximately 500 feet of receiving waters; the estimated portion of those populations provided housing as described in Provision C.10.f.ii.b.(i); the estimated portion of

those populations served with the services described in Provision C.10.f.ii.b.(i); the number and scope of sanitation controls and services provided to homeless encampments; the number and scope of trash controls and services provided to homeless encampments; and the number and scope of sanitary cleanouts and other services provided to RVs. Each of these reporting elements shall be accompanied by a narrative description.

(2) For Permittees whose DDCPs address significant discharges from illegal dumping sites, the following information for the current year, and for each prior year of the Permit term:

The total number of active illegal dumping sites; the number of active illegal dumping sites within approximately 500 feet of receiving waters; the number of illegal dumping sites where trash was collected and the amount of material collected; dumping vouchers provided (and who they are provided to); dumping vouchers used; and outreach and education provided to the public regarding illegal dumping and the availability of dumping vouchers. Each of these reporting elements shall be accompanied by a narrative description.

(3) For Permittees whose DDCPs address significant discharges from both unsheltered homeless populations and illegal dumping sites, the Permittees shall report on both Provision C.10.g.xi.(1) and C.10.g.xi.(2) in each Annual Report.

C.11. Mercury Controls

The Permittees shall implement the following control program for mercury. This control program consists of load reduction assessment, source control measures, treatment control measures, measures to reduce risk to consumers of Bay fish, and reporting on all these measures according to the provisions below. The provisions implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs for those waters identified therein and reduce mercury loads by approximately 10 kg/yr, making substantial progress toward achieving the urban runoff mercury load allocations established for the TMDLs. The San Francisco Bay mercury TMDL implementation plan calls for attainment of the regionwide, urban runoff wasteload allocation of 82 kg/yr by February 2028. This mercury wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 78 kg/yr compared to loads estimated using data collected prior to development of the TMDL. To measure progress, the TMDL implementation plan calls for attainment of an interim loading milestone by February 2018 of 120 kg/yr, halfway between the 2003 estimated load, 160 kg/yr, and the aggregate allocation. This interim loading milestone has been achieved. The Permittees may comply with any requirement of this Provision through a collaborative effort and are encouraged to do so.

C.11.a. Assess Mercury Load Reductions from Stormwater

i. **Task Description** – The Permittees shall implement an assessment methodology and data collection program to quantify, in a technically sound manner, mercury loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the mercury control program defined by this provision. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area mercury TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

ii. **Implementation Level** – The Permittees shall quantify the mercury load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented

during this Permit term as described in Provisions C.11.b through C.11.e. For this Permit term, the Permittees will achieve a regionwide total load reduction of approximately 10 kg mercury/yr if they implement effective mercury control measures consistent with all requirements of Provisions C.11.b through C.11.g. The Permittee-specific portion of the regionwide mercury load reduction estimate shall be based on the proportion of county population in each municipality.

iii. Reporting

(1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

(2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

(3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.

C.11.b. Program for Source Property Identification and Abatement

i. Task Description – Permittees shall investigate, using both conventional sampling and laboratory analysis techniques, land areas that likely contribute mercury to municipal separate storm sewer system (MS4s). These investigations will likely focus on land areas where industrial activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). For those properties or land areas found to be contributing substantial amounts of mercury or where high mercury concentrations are found (generally areas with sediment concentrations greater than 0.5 mg Hg/kg), Permittees shall take action to abate the mercury sources into their MS4s or refer the properties to the Water Board for follow-up measures. Historical monitoring data suggest that mercury concentrations on or near source properties are similar to those found in urban areas in general so identification of source properties for referral may be based on presence of high PCBs concentrations (generally 0.5 mg PCBs/kg) alone. For each source property referred to the Water Board,

Permittees shall implement interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implement a stormwater treatment system downstream of the property. These enhanced O&M measures shall be sufficient to intercept historically deposited contaminated sediment in the vicinity of the source area and prevent further contaminated sediment from being discharged from the source area to the storm drain system.

ii. Implementation Level – Permittees shall investigate the following acreage of likely mercury source properties (accomplished through C.12.b investigations) during the permit term.

- Alameda County: 2,620 acres
- Contra Costa County: 1,700 acres
- San Mateo County: 1,411 acres
- Santa Clara County: 913 acres
- Solano County: 21 acres

If high mercury concentrations associated with a likely source property are detected, Permittees may submit monitoring information to support estimation of the aerial yield to receive mercury load reduction credit, contingent upon implementation of interim enhanced O&M measures in the street or storm drain infrastructure adjacent to the source property or implementation of a stormwater treatment system downstream of the property.

iii. Reporting

(1) In each of the 2022 through 2026 Annual Reports, Permittees shall report progress on the acreage of land areas investigated, including progress toward investigation of 100 percent of the old industrial land use indicated above. The reporting shall indicate what action was taken for the parcels investigated (e.g., abatement, referral, enforcement, etc.). Permittees shall submit all supporting data and information including referral reports.

(2) Permittees shall report annually on ongoing enhanced O&M activities associated with all past contaminated property referrals. Prior to all new referrals, Permittees shall submit, for staff review and comment, a detailed description of the enhanced O&M plan for the referred properties.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.11.a.iii(2) on total acreage of land area investigated, area and description of properties referred, description of enhanced O&M measures, and the estimated total mercury mass load reduced (consistent with the approved accounting procedures) resulting from implementing this control measure.

C.11.c. Program for Control Measure Implementation in Old Industrial Areas

i. **Task Description** – Permittees shall implement or cause to be implemented treatment control measures, stormwater diversion to wastewater treatment facilities, redevelopment (provided GSI is implemented in compliance with C.3.b), or other control measures to achieve mercury load reductions. Permittees have substantial (totaling over 33,100 acres) areas of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure or other treatment controls.

- Alameda County: 9,374 acres
- Contra Costa County: 11,199 acres
- San Mateo County: 4,450 acres
- Santa Clara County: 6,647 acres
- Solano County: 1,426 acres

Implementation of treatment control measures on 2,580 acres (which is nearly 8 percent of the land area shown above) will result in a total estimated load reduction of about 108 g mercury/yr (2,580 acres x 70% efficiency x 60 mg mercury/acre/yr estimated yield from old industrial areas, see Fact Sheet) in the area covered by the Permit. Implementation of control measures with efficiency lower than 70% will result in reduced acreage credit (for those lower efficiency control measures) toward fulfillment of the total acreage requirement shown below. The acres credited will be proportional to the ratio of implemented control measure efficiency relative to the efficiency of treatment controls (see Fact Sheet for more explanation and examples). The old industrial land use acreages to be addressed by control measure implementation by the end of the permit term and the estimated mercury load reductions (for 70% control measure efficiency) are shown below. Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on implementation of 70% efficient control measures, or through accounting for the mass reduction of mercury shown in parentheses. If control measures are less than 70% efficient, the required acreage shall be calculated as set forth above.

- Alameda County: 664 acres (28 grams/yr)
- Contra Costa County: 664 acres (28 grams/yr)
- San Mateo County: 445 acres (19 grams/yr)
- Santa Clara County: 664 acres (28 grams/yr)
- Solano County: 142 acres (6 grams/yr)

ii. Implementation Level – Permittees shall, within the permit term, implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) to comply with the performance metrics in Provision C.11.c.i. Use of conditionally-approved sizing criteria cited in section C.3.j(3)(b) for treatment control systems will be considered provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria. If a Permittee chooses to comply by demonstrating mercury load reductions, it shall use accounting methods consistent with Provision C.11.a. Implementation of treatment controls and stormwater diversion in mercury-contaminated catchments not designated as old industrial may count toward fulfillment of the required acreage. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence of moderate to high mercury or PCBs soil concentrations (generally soil/sediment concentrations greater than 0.3 mg mercury/kg or 0.2 mg PCBs/kg). Treatment control systems must be designed and sized consistent with Provision C.3.d – (Numeric Sizing Criteria for Stormwater Treatment Systems). Permittees may choose to implement diversions to wastewater treatment systems to address this requirement. Because of the higher removal efficiency of wastewater treatment facilities, each acre addressed by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements provided that the diversion facilities are sized and operated consistent with the sizing requirements used for non-diversion treatment facilities.

iii. Reporting

(1) By March 31, 2023, Permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address mercury load reduction requirements included in this provision. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report Permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of

catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.11.a.iii(2) on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total mercury mass load reduced resulting from this implementation.

C.11.d. Mercury Collection and Recycling Implemented throughout the Region

i. Task Description – Permittees shall promote, facilitate, and/or participate in collection and recycling of mercury containing consumer products, devices, and equipment (e.g., thermometers, thermostats, switches, bulbs). Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermostats, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and Provision C.11.d requires promotion, facilitation and/or participation in these region-wide recycling efforts to increase effectiveness and public participation.

ii. Implementation Level – Permittees shall promote recycling of mercury-containing products and make efforts to increase effectiveness of these recycling efforts throughout the region. Recycling of mercury-containing bulbs and thermostats alone results in a regionwide load reduction of approximately 10 kg mercury per year.[50]

iii. Reporting

(1) In each of the 2023 through 2026 Annual Reports, Permittees shall report on efforts to promote recycling of mercury-containing products and efforts to increase effectiveness of these recycling efforts. Permittees shall also report on the mass of mercury-containing material collected throughout the region along with an estimate of the mass of mercury contained in recycled material using the methodology contained in load reduction accounting system described and cited in the Fact Sheet.

C.11.e. Plan and Implement Green Stormwater Infrastructure to Reduce Mercury Loads

i. Task Description – Permittees shall implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j. Implementation of green

[50] Geosyntec Consultants and San Francisco Estuary Institute. 2010. “Desktop Evaluation of Controls for Polychlorinated Biphenyls and Mercury Load Reduction.”

stormwater infrastructure will result in a total estimated load reductions of 108 g mercury/yr (see Fact Sheet for basis of estimate).

ii. Implementation Level – The level of implementation is determined by the requirements of Provision C.3.j.

iii. Reporting

(1) In their 2026 Annual Report, Permittees shall report as part of Provision C.11.a.iii(2)) on all green stormwater projects (e.g., parcel-based, street ROW, and regional projects) implemented during the permit term and provide the total acreage treated and an estimate of the total mercury mass load reduced resulting from this implementation. This reporting shall include summary descriptions of the implemented projects including GSI type, location, and area.

C.11.f. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. Task Description – In 2020, Permittees submitted a Reasonable Assurance Analysis and plan (RAA) demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028. Permittees shall evaluate the effectiveness of all mercury control measures and update the RAA as necessary. Updates can be focused on those control measures for which new information is available and for control measures not evaluated in previous efforts. Permittees shall also prepare detailed implementation plans for all control measures to be implemented in and inform permit requirements for the subsequent permit term.

ii. Implementation level – Permittees shall update, as necessary, their mercury control measures implementation plan and corresponding reasonable assurance analysis from the previous permit term (2015-2020, MRP 2). The update may be focused on control measures for which new information is available or for those control measures not previously evaluated. The long-term plan must:

(1) Identify all technically and economically feasible mercury control measures to be implemented (including GSI projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Additionally, Permittees shall identify all specific control measures to be implemented, the intensity of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term. This implementation plan must include:

(4) Identification of all control measures implemented during the current permit term and any additional control measures to be implemented in the subsequent permit term;

(5) A description of the intensity or extent of control measure implementation (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.);

(6) Identification of accountability metrics to track during the subsequent permit corresponding to the proposed implementation intensity; and

(7) Estimates for load reductions to be achieved through implementation of control measures during subsequent permit term at the proposed intensity.

iii. Reporting – Permittees shall submit the updated plan and schedule no later than March 31, 2026.

C.11.g. Fate and Transport Study of Mercury: Urban Runoff Impact on San Francisco Bay Margins

i. Task Description – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of mercury discharged from urban runoff to San Francisco Bay margin areas. The studies should focus on near-shore areas contaminated with mercury from historical activity and the expected trajectory of recovery as sources from local watersheds are reduced.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the sediment and food web mercury concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, especially in Bay margins, and the identification of drainages where urban runoff mercury are particularly important in food web accumulation.

iii. Reporting – The Permittees shall submit in their 2023 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2023 Annual Report. The Permittees shall report in the March 15, 2026, Integrated Monitoring Report the findings and results of the studies completed, planned,

or in progress as well as implications of studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.11.h. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence anglers and their families. The risk reduction framework developed in the previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level** – At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2026 Annual Report.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control program for PCBs. This control program consists of load reduction assessment, source control measures, treatment control measures, measures to reduce risk to consumers of Bay fish, and reporting on all these measures according to the provisions below. The provisions implement the urban runoff requirements of the PCBs TMDL for those waters identified therein. By implementing the PCBs control measure program requirements, Permittees will make substantial progress (an estimated 1.47 kg/yr of additional load reduction) toward achieving the urban runoff PCBs wasteload allocation from the TMDL. Of the 2 kg/yr overall load allocation for urban runoff sources for the entire region, 1.47 kg/yr has been allocated to Permittees, and loads must be reduced to this level by March 2030. This PCBs wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 18 kg/yr (14.4 kg/yr from Permittees) compared to loads estimated using data collected in 2003. The Permittees may comply with any requirement of this Provision through a collaborative effort and are encouraged to do so.

C.12.a. Assess PCBs Load Reductions from Stormwater

i. **Task Description** – The Permittees shall implement an assessment methodology and data collection program to quantify, in a technically sound manner, PCBs loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the PCBs control program defined by this provision. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area PCBs TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

ii. **Implementation Level** – The Permittees shall quantify the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures implemented during this Permit term as described in Provisions C.12.b through C.12.g. For this Permit term, the Permittees will achieve an estimated regionwide total load reduction of 1.47 kg/yr PCBs if they implement effective PCBs control measures consistent with all requirements of Provisions C.12.b through

C.12.g. The Permittee-specific portion of the regionwide PCBs load reduction estimate shall be based on the proportion of county population in each municipality.

iii. Reporting

(1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

(2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

(3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.

C.12.b. Program for Source Property Identification and Abatement

i. Task Description – Permittees shall investigate, using both conventional sampling and laboratory analysis techniques, land areas that likely contribute PCBs to MS4s. These investigations will likely focus on land areas where industrial activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). For those properties or land areas found to be contributing substantial amounts of PCBs or where high PCBs concentrations are found (generally areas with sediment concentrations greater than 0.5 mg PCBs/kg), Permittees shall take actions to abate the PCB sources into their MS4s or refer the properties to the Water Board for follow-up measures. For each source property referred to the Water Board, Permittees should implement interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implement a stormwater treatment system downstream of the property. These enhanced O&M measures shall be sufficient to intercept historically deposited contaminated sediment in the vicinity of the source area and prevent further contaminated sediment from being discharged from the source area to the storm drain system.

ii. Implementation Level – Permittees shall investigate the following acreage of likely PCBs source properties during the permit term.

- Alameda County: 2,620 acres
- Contra Costa County: 1,700 acres
- San Mateo County: 1,411 acres
- Santa Clara County: 913 acres
- Solano County: 21 acres

Based on data collected through investigating land areas for the presence of source properties during the previous permit terms, this level of implementation will result in PCBs load reductions of approximately 740 g PCBs/yr, 50 percent of which would be credited during this permit term contingent upon implementation of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the referred source property or implementation of a stormwater treatment system downstream of the property.

iii. Reporting

(1) In each of the 2022 through 2026 Annual Reports, Permittees shall report progress on the acreage of land areas investigated, including progress toward investigation of 100 percent of the old industrial land use indicated above. The reporting shall indicate what action was taken for the parcels investigated (e.g., abatement, referral, enforcement, etc.). Permittees shall submit all supporting data and information including referral reports.

(2) Permittees shall report annually on ongoing enhanced O&M activities associated with all past contaminated property referrals. Prior to all new referrals, Permittees shall submit, for staff review and comment, a detailed description of the enhanced O&M plan for the referred properties.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii(2) on total acreage of land area investigated, area and description of properties referred, description of enhanced O&M measures, and the estimated total PCBs mass load reduced (consistent with the approved accounting procedures) resulting from implementing this control measure.

C.12.c. Program for Control Measure Implementation in Old Industrial Areas

i. Task Description – Permittees shall implement or cause to be implemented treatment control measures, stormwater diversion to wastewater treatment facilities, redevelopment (provided GSI is implemented in compliance with

Provision C.3.b), or other control measures to achieve PCBs load reductions. Permittees have substantial (totaling over 33,100 acres) areas of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure or other treatment controls.

- Alameda County: 9,374 acres
- Contra Costa County: 11,199 acres
- San Mateo County: 4,450 acres
- Santa Clara County: 6,647 acres
- Solano County: 1,426 acres

Implementation of treatment control measures on 2,580 acres (which is about 8 percent of the land area shown above) will result in a total estimated load reduction of about 467 g PCBs/yr (2,580 acres x 10% of area x 70% efficiency x 259 mg PCBs/acre/yr estimated yield from old industrial areas, see Fact Sheet) in the area covered by the Permit. Implementation of control measures with efficiency lower than 70 percent will result in reduced acreage credited (for those lower efficiency control measures) toward fulfillment of the total acreage requirement shown below. The acres credited will be proportional to the ratio of implemented control measure efficiency relative to the efficiency of treatment controls (see Fact Sheet for more explanation and examples). The old industrial land use acreages to be addressed by control measure implementation by the end of the permit term and the estimated PCBs load reductions (for 70 percent control measure efficiency) are shown below. Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on implementation of 70 percent efficient control measures, or through accounting for the mass reduction of PCBs shown in parentheses. If control measures are less than 70 percent efficient, the required acreage shall be calculated as set forth above.

- Alameda County: 664 acres (121 grams/yr)
- Contra Costa County: 664 acres (121 grams/yr)
- San Mateo County: 445 acres (81 grams/yr)
- Santa Clara County: 664 acres (121 grams/yr)
- Solano County: 142 acres (26 grams/yr)

ii. **Implementation Level** – Permittees shall, within the permit term, implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) to comply with the performance metrics in Provision C.12.c.i. If a Permittee chooses to comply by demonstrating PCBs load

reductions, it shall use accounting methods consistent with Provision C.12.a. Implementation of treatment controls and stormwater diversion in PCBs-contaminated catchments not designated as old industrial may count toward fulfillment of the required acreage. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence of moderate to high PCBs soil concentrations (generally soil/sediment concentrations greater than 0.3 mg mercury/kg or 0.2 mg PCBs/kg). Treatment control systems must be designed and sized consistent with Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems). Use of conditionally-approved sizing criteria cited in section C.3.j(3)(b) for treatment control systems will be considered provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria. Permittees may choose to implement diversions to wastewater treatment systems to address this requirement. Because of the higher removal efficiency of wastewater treatment facilities, each acre addressed by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements provided that the diversion facilities are sized and operated consistent with the sizing requirements used for non-diversion treatment facilities.

iii. Reporting

(1) By March 31, 2023, Permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address PCBs load reduction requirements included in this provision. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report Permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii(2) on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total PCBs mass load reduced resulting from this implementation.

C.12.d. Program for Controlling PCBs from Bridges and Overpasses

i. **Task Description** – Permittees shall implement a Caltrans specification (to be developed through proposed requirement in Caltrans stormwater permit, see Fact Sheet for details) to manage, as part of bridge and overpass roadway replacement or major repair, potential PCBs-containing material in bridge roadway expansion joints. Implementation of this specification will result in a total estimated load reductions of 300 g PCBs/yr (see Fact Sheet for calculation details in the program area). Countywide programs and their member municipalities will be credited with a portion of this total load reduction in proportion to their share of population. Load reduction credit for this program will begin upon submittal of documentation demonstrating full implementation of the Caltrans specification for applicable roadway structures.

ii. **Implementation Level** – Permittees shall track the development of the Caltrans specification and develop an inventory of bridges in their jurisdictions that includes bridge ownership and a replacement/repair schedule. Finally, Permittees shall, by December 31, 2022, or six months after availability of the specification, implement or cause to be implemented the Caltrans specification during applicable replacement activities that are under the direction of the Permittee.

iii. **Reporting**

(1) In their 2022 Annual Report or the Annual Report immediately following availability of the specification, Permittees shall include a description of the Caltrans specification for managing PCBs-containing materials in bridge or roadway expansion joints during roadway replacement or repair.

(2) In their 2023 Annual Report, Permittees shall submit an inventory of bridges in the program area that includes bridge ownership and the bridge roadway replacement schedule.

(3) In their 2022 through 2026 Annual Reports, Permittees shall submit documentation confirming the use of the Caltrans specification (once it is available) during all instances of bridge roadway replacement or repair in their jurisdiction during that reporting year and provide an estimate of the volume of material managed and total PCBs mass load reduced resulting from implementation of the specification.

(4) In their 2026 Annual Report, Permittees shall report as part of reporting under Provision C.12.a.iii.(2) an estimate of the total PCBs mass load reduced, consistent with approved accounting procedures, resulting from implementing this control measure.

C.12.e. Program for Controlling PCBs from Electrical Utilities

i. Task Description – Permittees shall (1) develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for municipally-owned electrical utilities in the MRP program area and (2) collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities.

ii. Implementation Level – Permittees shall do the following:

(1) Develop or improve standard operating procedures to respond to, clean up, and report spills and releases from municipally owned OFEE and fully implement these procedures.

(2) Develop and implement a plan to maintain and upgrade municipally owned OFEE.

(3) Document the PCBs loads avoided through existing and ongoing OFEE removal and replacement programs.

(4) Collaborate with the Water Board to request information from non-municipally owned electrical utilities. Permittees shall utilize the information to (a) determine the locations of PCBs-containing OFEE, (b) improve estimates of the total baseline mass of PCBs in OFEE in the MRP permit area, (c) evaluate the actions the non-municipally owned electrical utilities are taking to reduce or prevent the release of PCBs from their equipment and to respond to potential releases of PCBs from their equipment; and (d) identify opportunities to improve the response and cleanup protocols.

iii. Reporting

(1) Permittees shall submit in their 2023 Annual Report the estimated PCBs loads avoided (along with supporting documentation) resulting from the removal of municipally-owned PCBs-containing OFEE through maintenance programs and system upgrades for the period 2002 to the beginning of this permit term (2023).

(2) Permittees shall submit in their 2023 Annual Report a description of the improved spill response and reporting practices implemented by municipally owned electrical utilities.

(3) Permittees shall submit in their 2024 Annual Report a summary of their plans to maintain and upgrade OFEE for municipally owned electrical utilities.

(4) Permittees shall submit in every Annual Report, beginning with the 2023 report, a summary of the actions undertaken during that reporting year

that remove municipally owned PCBs-containing OFEE along with the loads avoided and the details of the calculations and assumptions used to estimate the load reduced.

(5) Permittees shall submit in their 2026 Annual Report, as part of reporting under Provision C.12.a.iii(2), the estimated PCBs loads reduced during the permit term associated with municipally owned OFEE removal resulting from maintenance programs and system upgrades.

(6) Within 12-months of the Water Board transmitting to the Permittees information from the non-municipally owned electrical utilities, Permittees shall submit a report discussing the following, to the extent possible given any data limitations: (a) locations of the PCBs-containing OFEE still in service, (b) previous locations of PCBs-containing OFEE, and (c) opportunities to improve non-municipally owned electrical utilities' standard operating procedures for spill response, reporting, cleanup, and sampling and analysis.

C.12.f. Plan and Implement Green Stormwater Infrastructure to reduce PCBs loads

i. Task Description – Permittees shall implement green stormwater infrastructure (GSI) projects during the term of the Permit consistent with implementing requirements in Provision C.3.j. Implementation of green stormwater infrastructure will result in a total estimated load reductions of 200 g PCBs/yr (see Fact Sheet for basis of estimate).

ii. Implementation Level – The level of implementation is determined by the requirements of Provision C.3.j.

iii. Reporting

(1) In their 2026 Annual Report, Permittees shall report as part of Provision C.12.a.iii(2)) on all green stormwater projects (e.g., parcel-based, street right-of-way, and regional projects) implemented during the permit term and provide the total acreage treated and an estimate of the total PCBs mass load reduced resulting from this implementation. This reporting shall include summary descriptions of the implemented projects including GSI type, location, and area.

C.12.g. Manage PCB-Containing Materials and Wastes During Building Demolition Activities

i. Task Description – Prior to issuing a demolition permit, Permittees shall implement the protocol developed during the previous permit term (see Fact Sheet for protocol description) for managing PCB-containing materials and wastes during building demolition so that PCBs do not enter MS4s. Permittees

shall also ensure construction sites are inspected during demolition and obtain verification that materials from demolished buildings are appropriately disposed.

Provision C.12.g. applies to applicable structures containing building materials with PCBs concentrations of 50 ppm or greater at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, or stormwater runoff. Applicable structures include, at a minimum, commercial, public, institutional, and industrial structures constructed or remodeled between the years 1950 and 1980. Single-family residential and wood frame structures are exempt.

Structures that are constructed or remodeled between the years 1950 and 1980 and require emergency demolition to protect public health and/or safety are exempt from implementing the protocol, but they must be reported in accordance to Provision C.12.g.iii.(3)(d)

The Town of Clayton is exempt from the requirements of Provision C.12.g. because it has demonstrated it has no applicable structures. Other Permittees may be exempted from the requirements in Provision C.12.g. if they provide evidence acceptable to the Executive Officer in their 2023 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.

Implementation of this protocol will result in a total estimated load reduction of 2 kg PCBs/yr (see Fact Sheet for calculation details) in the program area. This constitutes an ongoing rather than a new load reduction.

ii. Implementation Level

(1) Permittees shall implement their established protocol prior to issuing a demolition permit.

(2) For demolition of applicable structures containing building materials with PCBs concentrations of 50 ppm or greater approved beginning July 1, 2023, Permittees shall require demolition contractors to provide notification to the Permittees, the Water Board, and U.S. EPA at least one week before any demolition is to occur.

(3) Beginning the 2023 rainy season, Permittees shall inspect demolition sites with applicable structures containing building materials with PCBs concentrations of 50 ppm or greater pursuant to Provision C.6 to ensure that effective construction pollutant controls are used to prevent discharge into the MS4.

(4) Permittees shall enhance their construction site control program to minimize migration of PCBs into the MS4 from applicable structures containing building materials with PCBs concentrations of 50 ppm or greater during demolition activities. Enhancements may include inspecting demolition sites monthly during demolition activities in the dry season (May – September) and requiring the demolition contractors to sweep the project sites and the streets around the property with street sweepers that will effectively remove sediment and dust. Implementation of enhancements shall begin no later than July 1, 2023.

(5) For demolition of applicable structures containing building materials with PCBs concentrations of 50 ppm or greater approved after July 1, 2023, Permittees shall verify that PCBs in demolished buildings are properly managed to minimize transport to the MS4 by obtaining official documentation that the building materials with PCBs concentrations of 50 ppm or greater in these demolished applicable structures were disposed appropriately according to state and federal regulations.

(6) Permittees may elect to update for use in the subsequent permit term the assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

iii. Reporting

(1) Each Permittee seeking exemption from Provision C.12.g requirements based on lack of applicable structures must submit in its 2023 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 were single-family residential and/or wood-frame structures.

(2) In their 2023 Annual Report, Permittees shall discuss enhancements to their construction site control program to minimize migration of PCBs from demolition activities into the MS4.

(3) Beginning with their 2023 Annual Report, the Permittees shall provide each of the following items:

(a) The number of applicable structures that applied for a demolition permit during the reporting year;

(b) A running list of the applicable structures that applied for a demolition permit since July 1, 2019, the number of samples each structure collected, and the concentration of PCBs in each sample.

(c) For each applicable structure, with PCBs concentrations of 50 mg/kg or greater, include the following: the project address, the demolition date, and a brief description of the PCBs-containing materials.

(d) For each structure that was constructed or remodeled between the years 1950 and 1980 and requires emergency demolition to protect public health and/or safety, provide the following: address, date building was constructed, and date of demolition.

(4) Beginning with their 2024 Annual Report, Permittees shall provide the following: whether the site was inspected during demolition, and for those cases where notification and advance approval from the U.S. EPA is not required and were approved for demolition after June 30, 2023, the hazardous waste manifest prepared for transportation of the material to a disposal facility.

(5) In their 2026 Annual Report, Permittees shall submit an evaluation of the effectiveness of the protocol for controlling PCBs during building demolition as well as supporting data. This should be conducted and reported at the regional level on behalf of all Permittees and shall be considered the Report of Waste Discharge for Provision C.12.g for the next permit reissuance.

(6) In their 2026 Annual Report, Permittees may submit for use in the subsequent permit term an updated assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs-containing materials and wastes during demolition of applicable structures.

C.12.h. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

i. Task Description – In 2020, Permittees submitted a Reasonable Assurance Analysis and plan (RAA) demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030. Permittees shall evaluate the effectiveness of all PCBs control measures and update the RAA as necessary. Updates can be focused on those control measures for which new information is available and for control measures not evaluated in previous efforts. Permittees shall also prepare detailed implementation plans for all control measures to be implemented in and inform permit requirements for the subsequent permit term.

ii. Implementation level – Permittees shall update, as necessary, their PCBs control measures implementation plan and RAA. The update may be focused on control measures for which new information is available or for those control measures not previously evaluated. The long-term plan must:

(1) Identify all technically and economically feasible PCBs control measures to be implemented (including GSI projects); and

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Additionally, Permittees shall identify all specific control measures to be implemented, the intensity of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term. This implementation plan must include:

(a) Identification of all control measures implemented during the current permit term and any additional control measures to be implemented in the subsequent permit term;

(b) A description of the intensity or extent of control measure implementation (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied);

(c) Identification of accountability metrics to track during the subsequent permit corresponding to the proposed implementation intensity; and

(d) Estimates for load reductions to be achieved through implementation of control measures during subsequent permit term at the proposed intensity.

iii. Reporting – Permittees shall submit the updated plan and schedule no later than March 31, 2026.

C.12.i. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

i. Task Description – The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. The studies should focus on near-shore areas contaminated with PCBs from historical activity and the expected trajectory of recovery as sources from local watersheds are reduced.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban

runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. **Reporting** – The Permittees shall submit in their 2023 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2023 Annual Report. The Permittees shall report in the March 15, 2026, Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.12.j. Implement a Risk Reduction Program

i. **Task Description** – The Permittees shall conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence anglers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.

ii. **Implementation Level** – At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.

iii. **Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2026 Annual Report.

C.13. Copper Controls

The Permittees shall implement the following control program for copper. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of Provision C.13 through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. Task Description – The Permittees shall prohibit the discharge of wastewater to storm drains generated from installing, cleaning, treating, or washing copper architectural features, including copper roofs.

ii. Implementation Level

(1) The Permittees shall require, when issuing building permits, use of appropriate BMPs for managing copper-containing waste during and post-construction.

(2) The Permittees shall educate installers and operators on appropriate BMPs for managing copper-containing wastes.

(3) The Permittees shall enforce against noncompliance.

iii. Reporting

(1) In the 2022 Annual Report, those Permittees that have not previously done so shall certify that legal authority currently exists to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of copper architectural features, including copper roofs.

(2) In the 2022 Annual Report, the Permittees shall report how copper architectural features are addressed through the issuance of building permits.

(3) The Permittees shall report annually permitting and enforcement activities.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. Task Description – Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. Implementation Level – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. Reporting

(1) In the 2022 Annual Report, the Permittees that have not previously done so shall certify that legal authority currently exists to prohibit the discharges to storm drains of water containing copper-based chemicals from pools, spas, and fountains.

(2) In the 2022 Annual Report, the Permittees shall report how copper-containing discharges from pools, spas, and fountains are addressed to accomplish the prohibition of the discharge.

(3) The Permittees shall report annually on any enforcement activities.

C.13.c. Industrial Sources

i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. Implementation Level

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site.

iii. Reporting

The Permittees shall highlight copper reduction results in the industrial inspection component in the Provision C.13 portion of each Annual Report.

C.14. Bacteria Control for Impaired Water Bodies

Provisions C.2 through C.7 contain requirements to control sources of pollutants to the Permittees' MS4s. Implementation of these requirements should control sources of bacteria[51]; still, exceedances of bacteria water quality objectives occur in some water bodies that receive urban runoff. Permittees identified in this Provision shall demonstrate compliance with bacteria related Receiving Water Limitations during this Permit term through the timely implementation of control measures and other actions to reduce bacteria discharges from their municipal separate storm sewer systems in accordance with the requirements of this Provision. Provision C.14.a applies to the cities of Mountain View and Sunnyvale for their discharges that are causing or contributing to exceedances of bacteria water quality objectives in Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough, water bodies without bacteria TMDLs. Provision C.14.b applies to Permittees with San Pedro Creek and Pacifica State Beach Indicator Bacteria TMDL wasteload allocations, Provision C.14.c applies to Permittees with San Francisco Bay Beaches Bacteria TMDL wasteload allocations, and Provision C.14.d applies to Permittees with Pillar Point Harbor Beaches and Venice Beach Bacteria TMDL wasteload allocations.

C.14.a. Enhanced Bacteria Control

Enhanced bacteria control requirements are applicable to the cities of Mountain View and Sunnyvale for discharges that are causing or contributing to exceedances of applicable bacteria water quality objectives in Stevens Creek (both cities), Calabazas Creek (Sunnyvale), and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale).[52] "Cities" as used in this Provision C.14.a refers to these cities.

The actions described in this Provision shall be implemented where controllable bacteria sources are located within the Cities' jurisdiction, in order to reduce bacteria inputs to the water body with bacteria exceedances.

i. Municipal Operations Bacteria Control

(1) **Task Description** – Evaluate the potential for municipal operations to generate and cause bacteria to be transported to surface waters. Where such potential is determined to exist, develop and implement BMPs to minimize the transport of bacteria.

[51] Bacteria as used herein refers to fecal indicator bacteria.

[52] The geometric mean of indicator bacteria levels in a waterbody shall not be greater than the applicable geometric mean water quality objective in any six-week interval, calculated weekly. The indicator bacteria levels shall not be greater than the applicable statistical threshold value water quality objective in more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

(2) **Implementation Level** – The Cities shall develop and implement BMPs to minimize potential bacteria sources, including, but not limited to, trash, human and animal fecal sources, and excessive biofilm, for the following municipal operations:

(a) Street and road cleaning

(b) Parks and municipal open space maintenance

(c) Sidewalk, plaza, and pavement cleaning

(d) MS4 component maintenance, such as cleaning biofilm from catch basins, piping, and pump stations.

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, frequency and location for actions taken to reduce bacteria sources related to municipal operations.

ii. Industrial/Commercial Site Bacteria Control and Illicit Discharge Detection and Elimination

(1) **Task Description** – Train municipal staff responsible for inspecting and enforcing industrial and commercial site controls and for detecting and eliminating illicit discharges to enhance their focus on potential bacteria sources. The Cities shall use enforcement authorities to ensure bacteria sources are controlled.

(2) **Implementation Level** – The Cities shall enhance their efforts to ensure transport to surface waters from the following potential bacteria sources is minimized:

(a) Roof and exterior washoff of commercial and industrial structures and surfaces, where these sources are likely to contain bacteria, such as from rodent and bird wastes, and are likely to be discharged to receiving water

(b) Outdoor garbage and recycle bins

(c) Outdoor floor-mat washoff

(d) Portable toilets

(e) Illicit discharges to the MS4

(3) **Reporting** –In each Annual Report, the Cities shall describe BMP, frequency, and location for actions taken to reduce bacteria sources related to Industrial and Commercial Site Bacteria Control and Illicit Discharge Detection and Elimination.

iii. Control of Bacteria Sources Related to Unsheltered Homeless Populations

(1) **Task Description** – Evaluate the potential for bacteria transport to surface waters from areas inhabited by unsheltered homeless persons. Where such potential is determined to exist develop and implement BMPs to minimize such bacteria sources and transport.

(2) **Implementation Level** – The Cities shall minimize the transport of bacteria from areas inhabited by unsheltered homeless persons by taking actions that may include, but are not limited to, the following:

(a) Provide pump-out stations, mobile pumping services, or voucher programs for proper disposal of sanitary sewage where unsheltered homeless persons reside in recreational vehicles

(b) Provide sanitation services, including access to running water, where feasible, at locations where homeless people live or congregate

(c) Establish and update sidewalk, street, and/or plaza cleaning standards for the cleanup and appropriate disposal of human waste

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, numbers or frequency (as applicable), and locations of actions taken to reduce bacteria discharges from areas inhabited by unsheltered persons.

iv. Pet and Livestock Bacteria Source Control

(1) **Task Description** – Evaluate the potential for domestic animal sources, such as pet waste, kennels, horse boarding facilities and trails, to generate and cause to be transported to surface waters. Where such potential is determined to exist, develop and implement BMPs to minimize such bacteria sources and prevent transport.

(2) **Implementation Level** – The Cities shall ensure transport of bacteria from domestic animal sources to surface waters is minimized by taking the following actions:

(a) Enhance numbers of, and maintenance of, pet waste stations

(b) Inspect pet boarding facilities to ensure pet waste is managed to prevent offsite discharges

(c) Inspect horse boarding facilities, if any, to ensure manure is managed to prevent offsite discharges. Notify Water Board staff of facilities that should enroll in the Confined Animal Facility program.

(3) **Reporting** – In each Annual Report, the Cities shall describe the BMPs, numbers or frequency (as applicable), and locations of actions taken to reduce bacteria from domestic animal sources.

v. Public Outreach on Bacteria Source Control

(1) **Task Description** – Evaluate public outreach currently conducted to encourage bacteria pollution prevention and determine how to improve such outreach, such as, for example, by focusing outreach on certain populations or at certain locations.

(2) **Implementation Level** – The Cities shall enhance public outreach where it is likely to improve human behavior regarding bacteria pollution prevention practices, such as, but not limited to, the following:

(a) Cleaning up pet waste

(b) Eliminating litter

(c) Eliminating outdoor restaurant floor mat washdown

(d) Using proper BMPs for sidewalk cleaning

(e) Covering trash storage areas

(f) Maintaining porta-potties properly.

(3) **Reporting** – In each Annual Report, the Cities shall describe the outreach messages, methods of delivery, audiences, and number of repetitions.

vi. Coordination with Sanitary Sewerage System Entities

(1) **Task Description** – Overflows and leaks from sanitary sewage conveyance systems can cause bacteria to be transported to MS4s, and commonly the Cities are not responsible for maintenance and repair of the sanitary sewerage system. This task encourages the Cities to collaborate with the entities responsible for the sanitary sewerage system to minimize overflows and leaks.

(2) **Implementation Level** – The Cities shall, to the extent necessary and within the limits of their authorities, collaborate with their counterparts who are responsible for maintenance of the sanitary sewerage system to assist with the following:

(a) Prioritize maintenance and repair in areas contributing to bacteria loads to surface waters with elevated bacteria

(b) Ensure rapid and thorough response to cleanup sanitary sewer system overflows

(c) Develop lateral maintenance and replacement programs for consideration by the appropriate legal authority.

(3) **Reporting** – In each Annual Report, the Cities shall describe the status of any actions taken to coordinate with sanitary sewer entities.

vii. Prioritize Trash Removal to Control Bacteria Sources

(1) **Task Description** – Evaluate the potential bacteria-reduction benefit of prioritizing trash control efforts required in Provision C.10 in areas where trash generation may be contributing to bacteria exceedances in local surface waters. Where such benefit appears significant, reprioritize trash control actions accordingly.

(2) **Implementation Level** – The Cities shall focus some of their trash reduction efforts to areas where trash generation likely contributes to bacteria exceedances in local surface waters.

(3) **Reporting** – In each Annual Report, the Cities shall describe how the bacteria-reduction benefit of focused trash-control efforts was evaluated, the conclusions reached, and any actions taken during the reporting period to reprioritize trash control areas.

viii. Water Quality Monitoring

(1) **Task Description** – The Cities shall develop and implement a monitoring program to identify and characterize potential bacteria sources to receiving waters that have been found to exceed bacteria water quality objective(s), to help focus source control efforts and evaluate effectiveness of controls, and to ultimately demonstrate attainment of bacteria receiving water limitations. The monitoring program shall be designed and adapted to answer the following questions:

(a) What is the spatial and temporal extent of dry weather flows in the MS4?

(b) Are indicators of human fecal material present in both dry and wet weather flows observed in the MS4?

(i) If so, in which stormwater catchments are sources most prominent?

(ii) Where are the likely locations of these sources in the catchments?

(iii) What measures can be implemented to control these sources?

(c) Are water quality objectives being achieved during dry weather?

(d) Are water quality objectives being achieved during wet weather?

(2) **Implementation Level** – At a minimum, the monitoring program shall include the following:

(a) Sampling of all MS4 outfalls with flow during three dry weather creek walks. One to be scheduled during July / August 2022, one to be scheduled January / February 2023, and one in April / May 2023;

(b) Desktop and field methods based on elements described in the California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (Griffith et al. 2013);

(c) Geographic information system analysis of potential sources and existing bacteria control action locations to evaluate existing and identify and optimize additional bacteria controls;

(d) MS4 bacteria characterization monitoring at least monthly through September 2023, including two events that coincide with wet weather discharges, at a minimum of 14 sites each year to identify sources of bacteria discharges to and from the MS4 using microbial source tracking techniques to detect human genetic markers (i.e., HF183) and to evaluate effectiveness of bacteria controls, including the following:

(i) Identification of stormwater catchments where monitoring will be conducted;

(ii) Characterization of indicator bacteria, i.e., E coli, densities in subwatersheds, storm drains, outfalls, and pump stations that drain to receiving waters with excessive levels of indicator bacteria; and

(iii) Determination of baseline (or current) conditions against which future monitoring results can be compared following new, enhanced, or ongoing control measure implementation.

(e) Receiving water monitoring at least monthly, from October 2023 through September 2024, including two events that coincide with, or within 48 hours, of a storm event forecasted to be at least 0.5 inch in 24 hours, to determine E. coli densities, where salinity is less than 1 ppt, and Enterococci densities, where salinity is greater than 1 ppt, at a minimum total of 5 sites in Stevens Creek, 3 sites in Calabazas Creek, and 1 site in Sunnyvale East Channel, including the following:

(i) Stevens Creek immediately downstream of Homestead;

(ii) Stevens Creek La Avenida;

(iii) Sunnyvale East Channel upstream of Tasman (above tidal influence);

(iv) Calabazas Creek downstream of Homestead; and

(v) Calabazas Creek upstream of Tasman.

(3) **Reporting** – In each Annual Report, the Cities submit the results of all monitoring conducted the previous year, including parameters analyzed, frequencies, and locations, and planned monitoring for the current year, including parameters, frequencies, and locations.

ix. Compliance with Receiving Water Limitations

(1) **Task Description** – The Cities shall determine whether discharges from their MS4s are causing or contributing to exceedances of bacteria water quality objectives in receiving waters after implementation of control measures required by C.14.a.i-vii. The Cities are expected to meet Receiving Water Limitations B.2 for applicable bacteria water quality objectives by June 30, 2027. If receiving water limitations are not met, despite a diligent effort to quantify levels and the sources of bacteria in MS4 discharges and documentation of completion of controls required by C.14.a.i-vii, then the Cities shall submit a plan for additional actions to attain the receiving water limitations.

(2) **Implementation Level** – The Cities shall provide a comprehensive assessment of bacteria sources and bacteria controls to demonstrate compliance with receiving water limitations for applicable bacteria water quality objectives. If compliance cannot be achieved by June 30, 2027, the assessment shall describe additional control measures or increased levels of implementation for existing control measures, with an implementation schedule, and proposed milestones, that will be implemented to attain bacteria receiving water limitations as soon as possible.

(3) **Reporting** – The Cities shall submit a Mid-Permit Interpretive Report and a Final Interpretive Report.

(a) The Mid-Permit Interpretive Report shall be submitted by March 31, 2025, which includes the following:

(i) All data collected through September 2024 and description of data validation and quality;

(ii) Description of progress towards answering questions in C.14.a.viii.(1);

(iii) Description of specific bacteria sources and/or specific geographic areas that receive implementation of existing control

measures, as well as. recommended new, modified, or enhanced control that will be evaluated or implemented;

(iv) Description of monitoring, subject to approval by the Water Board through a Permit amendment, to be conducted through the remainder of the Permit term to answer the questions in C.14.a.viii.(1). The monitoring shall be as comprehensive, systematic, and robust as what is required in Provision C.14.a.viii while being commensurate with the need to address and resolve bacteria exceedances in the receiving waters.

(b) The Final Interpretive Report shall be submitted by December 31, 2026, which includes the following:

(i) All data collected through September 2026 and description of data validation and quality;

(ii) Description of progress towards answering questions in C.14.a.viii.(1);

(iii) Description of specific bacteria sources and/or specific geographic areas that received implementation of existing control measures, as well as. new, modified, or enhanced control that were evaluated or implemented;

(iv) Determination if bacteria receiving water limitations have or will be met, by June 30, 2027; and

(v) If bacteria receiving water limitations will not be met by June 30, 2027, description of additional control measures or increased levels of implementation for existing control measures, with an implementation schedule, and proposed milestones, that will be implemented to attain bacteria receiving water limitations as soon as possible, and a proposed monitoring program designed to answer the questions in C.14.a.viii.(1) that will be implemented in the next permit term.

C.14.b. City of Pacifica and San Mateo County Bacteria Controls

The City of Pacifica (City) and San Mateo County (County) Permittees shall implement the actions in this subprovision to control fecal indicator bacteria. The City and County shall focus implementation of bacteria control measures in areas where benefits are most likely to accrue. The goal of this subprovision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek and Pacifica State Beach Indicator Bacteria TMDL. In accordance with the TMDL, the City and County are required to meet the wasteload allocations for Pacifica State Beach by August

1, 2021, and for San Pedro Creek by August 1, 2028. The City and County may comply with any requirement of this provision through a collaborative effort.

i. Control Measures to Achieve Indicator Bacteria Wasteload Allocations

(1) **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to meet the stormwater TMDL wasteload allocations in the San Pedro Creek (Creek) watershed and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL Project Area).

(2) **Implementation Level** – To comply with this element:

(a) The City and County, as appropriate, shall prohibit potential illicit discharges into their storm sewer system from sanitary sewer overflows or the sanitary sewer lines within their jurisdictions as follows:

(i) Ensure all sanitary sewer lines within a 2,000-foot radius of the Creek and Beach are inspected, assessed, and repaired, as needed, within 60 months of the Permit effective date;

(ii) Ensure at least 20 percent of the storm sewer system discharging to San Pedro Creek or Pacifica State Beach is evaluated and addressed for illicit sanitary sewer connections each year to prevent discharges from the sanitary sewer lines; and

(iii) Coordinate with the responsible sanitary sewer collection agency to identify and implement BMPs to prevent sanitary sewer overflows, such as developing or enhancing a spill response plan for significant sanitary sewer overflow incident areas to decrease potential sewage discharges into the storm sewer system.

(b) The County shall continue to address bacteria discharges from commercial horse and dog kennel facilities (facilities) into its storm sewer system as follows:

(i) Inspect each facility annually for code compliance by June 30 of each year.

(ii) Review each facility's current manure, stormwater, and drainage management plans for code compliance by June 30 of each year.

(iii) Provide a copy of the facilities inspection and review reports to the Water Board in each annual report.

(iv) Take progressive enforcement, as needed, for facilities found to be noncompliant with the County's Confined Animal Ordinance.

(c) The City shall continue to address bacteria discharges from commercial horse facilities (facilities) into its storm sewer system as follows:

(i) Review each facility's compliance with the City's Administrative Policy on "Standards for Keeping Animals."

(ii) Review each facility's compliance with the City's Municipal Code on "Animal Excreta."

(iii) Conduct annual compliance review and inspection of each facility by June 30 of each year.

(iv) Provide a copy of the facilities inspection and review reports to the Water Board in each annual report.

(v) Take progressive enforcement action(s), as needed, to bring noncompliant facilities into compliance with the City's Administrative Policy on "Standards for Keeping Animals" and Municipal Code on "Animal Excreta."

(d) The City shall continue to maintain existing and any new dog waste clean-up signs, waste bag dispensers, and trash cans within the TMDL Project Area.

(e) The City shall continue to implement a visual inspection and cleanup plan for high dog waste accumulation areas along the Creek and its tributaries. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteorological Station, or comparable site), and at a frequency of no less than once a month.

(f) The City shall continue to implement a pet waste public outreach and education campaign that, at a minimum, includes all the following:

(i) Establish a public pet waste management stakeholder group (e.g., formal or informal dog owners club).

(ii) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Creek and Beach to play on the local television station and to include in print ads in the Pacifica Tribune.

(iii) Distribute a mailer with an informational brochure to residents and businesses describing proper pet waste management, the linkage of the watershed to the Creek and Beach, and the adverse impact on those water bodies and those recreating in them from improper pet waste management.

(iv) Maintain a web page to the City website with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Creek and Beach and public health.

(v) Create and implement a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Creek and Beach.

(vi) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(g) The City and County, based on the results of the source characterization and BMP effectiveness, and wasteload allocation attainment analyses described in Provision C.14.b-iii, shall modify or refocus control measure implementation efforts as appropriate, at a frequency of no less than every two years.

(3) **Reporting –** No later than March 15 of each year, the City and County shall submit a comprehensive TMDL Status and Monitoring Report, reporting on the specific control measures (as listed in Provision C.14.b.1.ii) that have been implemented in the TMDL Project Area during the foregoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description, scope, and start date of pollution prevention measures; and

(c) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

ii. Water Quality Monitoring to Assess Attainment of Wasteload Allocations

(1) **Task Description** – Permittees shall determine whether the TMDL wasteload allocations are attained.

(2) **Implementation Level** – The City and County shall conduct attainment water quality monitoring activities as follows:

(a) Sample Locations – Two stations shall be monitored: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (the original station, as of the TMDL's adoption date of November 2012, which was located approximately 300 feet north of the Creek mouth, and at shin depth, originally referred to as Linda Mar #5 in the TMDL Staff Report, but currently referred to as Linda Mar #7). The locations of these stations are shown in the TMDL Staff Report.

(b) Sampling Frequency – The two attainment stations shall be monitored weekly on an ongoing basis for fecal indicator bacteria. The weekly sampling shall occur year-round regardless of weather conditions, provided the conditions are safe for field staff to collect the samples.

(c) Sampling Constituents – Samples collected from the Creek Mouth shall be analyzed for *E. coli* and total coliform. Samples collected from Linda Mar #5 station shall be analyzed for *Enterococcus*, fecal coliform, and total coliform.

(d) The City and County shall analyze the results of the attainment monitoring and compare the results to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL.

(3) **Reporting** – In Annual TMDL Status and Monitoring Reports submitted on March 15 each year, the City and County shall analyze, summarize, and report the results of the ongoing attainment monitoring, as follows:

(a) The City and County shall complete a data evaluation, which shall focus on determining whether the TMDL wasteload allocations are being attained in the Creek and at the Beach.

(b) The indicator bacteria results from the attainment monitoring stations (Creek Mouth and original Linda Mar #5 station (currently called Linda Mar #7), located 300 feet north of the Creek mouth at shin depth) shall be compared to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL (Total Maximum Daily Load for Bacteria in San Pedro Creek and at Pacifica State Beach: Final Staff Report for Proposed Basin Plan Amendment. Water Board, 2012. Accessible at:

https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/pacificabacteria/Final%20Staff%20Report.pdf).

(c) The data evaluation shall include tabulation and review of local rainfall data to determine whether the weekly attainment monitoring sampling events occurred during dry weather or wet weather.

(d) An ongoing quantitative analysis of trends (from initial year) in bacteria densities and exceedances of applicable water quality objectives at the two attainment stations shall be conducted and reported annually.

(e) A detailed and comprehensive assessment of wasteload allocation attainment by the end of year 4 of the Permit term shall be completed. If wasteload allocations are not achieved by the end of the Permit term, no later than 180 days prior to Permit expiration, the City and County shall submit a plan in their Report Of Waste Discharge, acceptable to the Executive Officer, that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm sewer systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.

iii. Water Quality Monitoring – Characterize Bacteria Sources, Assess BMP Effectiveness

(1) **Task Description** – The purpose of characterization monitoring is to better characterize indicator bacteria contributions from specific sources and to evaluate control measure effectiveness. The characterization monitoring shall provide data to:

(a) Characterize indicator bacteria densities in subwatersheds, storm drain outfalls, and pump stations that have not been sampled in the past. Results of the investigation may be used to drive future control measure actions.

(b) Establish baseline (or current) conditions against which future monitoring results can be compared following new or ongoing control measure implementation.

(c) Characterization monitoring shall be conducted every other year on a water year basis (i.e., October 1 through September 30), continuing on the existing ongoing monitoring schedule. Characterization monitoring shall assess E. coli densities throughout the San Pedro Creek watershed. Human-, horse-, and dog-specific genetic markers shall be analyzed for a subset of the samples to investigate whether these species contribute fecal contamination to the Creek. The

characterization monitoring shall be iterative in nature and allow for flexibility of design and details in future years. Subsequent years of characterization monitoring, at a minimum, shall have the same level of effort as previous years; however, in future years, based on the results of the previous monitoring, alternative sampling stations may be targeted, sampling intensities may be modified, sampling frequencies may be adjusted, and/or the species-specific genetic marker sampling may be revised.

(2) **Implementation Level** – The City and County shall conduct characterization monitoring activities as follows:

(a) Sampling Locations – while based on the previous year's results appropriate sampling locations can be selected for each monitoring year, the "Creek Mouth" site shall always be sampled during events when species-specific genetic marker samples are collected.

(b) Number of Samples – in each monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected.

(c) Sampling Frequency – the characterization stations shall be sampled a minimum of eight times over the course of the water year, as follows:

(i) Wet season – four sampling events shall be conducted during the wet season months (November through March). To the extent possible, wet season sampling events shall occur during wet weather, which as defined in the TMDL is any day (e.g. 24-hour period) with 0.1 inch of rain or more and the following three days;

(ii) Dry season – four sampling events shall be conducted during the dry season months (May through September).

(iii) In subsequent monitoring years, based on the results of the previous year's monitoring, the sampling frequency may be modified, as appropriate, to provide the most useful results.

(d) Constituents – All samples shall be analyzed for *E. coli*. In addition, during each monitoring year, at a minimum, samples collected at four stations during four sampling events (two wet season, two dry season) shall be analyzed for human-, horse-, and dog-specific genetic markers to assess temporal and spatial fecal waste contributions from the targeted host species to the Creek and Beach.

(e) Monitoring Protocols and Data Quality – Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance

Project Plan (QAPP) for applicable parameters, including data quality objectives, field, equipment, and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.

(f) Future Revisions – Any and all changes to the characterization monitoring plan in future years shall be submitted to the Executive Officer for review and acceptance no later than 90 days prior to implementation.

(3) **Reporting**

(a) In their Annual TMDL Status and Monitoring Reports the City and County shall submit a comprehensive Characterization Monitoring Report reporting on any data collected during the preceding October 1 through September 30 monitoring period.

(b) Data evaluation shall focus on addressing the following questions:

(i) Which land uses and/or sources contribute most to bacteria impairments in San Pedro Creek watershed?

(ii) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed?

(iii) What are the multi-year indicator bacteria density trends in the Creek and at the Beach (i.e., do control measures appear to be reducing bacteria)?

(c) As appropriate, the Report shall include the following:

(i) Immediately following the Table of Contents, a Data Tables section that includes all the data collected pursuant to Provision C.14.b.iii. and contains the following information pertaining to the foregoing monitoring period:

a. A map showing all monitoring locations;

b. Immediately following the map, a single completed Locations and Parameters Table containing the following columns or rows for each location sampled: numeric site identifier, a short-hand site name such as “Creek Mouth,” latitude, longitude, and parameters assessed;

c. Immediately following the Locations and Parameters Table, a single completed Results Table containing the following columns or rows for each location sampled: the short-hand site name and datum/result for each constituent analyzed. Constituents that exceed applicable water quality objectives shall be highlighted.

(ii) For all data, a statement of the data quality.

(iii) An analysis of the data, which includes the following:

a. Basic descriptive statistics using indicator bacteria data;

b. Identification and evaluation of any controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed;

c. Identification and analysis of any trends in stormwater or receiving water quality; and

d. Consideration of variability in the data sets.

(iv) A discussion of the data, which shall:

a. Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin or the Ocean plans;

b. Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

c. Identify and prioritize water quality problems;

d. Identify potential sources of water quality problems;

e. Describe follow-up actions;

f. Evaluate the effectiveness of existing control measures; and

g. Identify management actions needed to address water quality problems.

C.14.c. City of San Mateo Marina Lagoon Beaches Bacteria Controls

The City of San Mateo (City) shall implement the actions in this subprovision to control fecal indicator bacteria. For each requirement, the City shall focus implementation in areas where benefits are most likely to accrue, i.e., where bacteria reduction is likely to reduce bacteria densities in San Mateo Lagoon and particularly at Parkside Aquatic Park Beach and Lakeshore Park Beach. Many of the required implementation actions are described in the City's TMDL Basin Plan Amendment Implementation Plan, 2018 (TMDL Implementation Plan). This subprovision implements the urban runoff requirements of the San Francisco Bay Beaches Bacteria TMDL (TMDL) applicable to the City.

i. Control Measures to Achieve Indicator Bacteria Wasteload Allocations

(1) **Task Description** – The City shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to San Mateo Lagoon to the maximum extent practicable.

(2) **Implementation Level** – In order to comply with this element:

(a) The City shall enhance its efforts to prohibit potential illicit discharges into its storm sewer system.

(b) The City shall expand or enhance dog waste management strategy, including installing and/or maintaining dog waste clean-up signs, waste bag dispensers, and trash cans at a minimum of two parks/open spaces near San Mateo Lagoon beaches.

(c) The City shall enhance its public outreach and education regarding proper management of pet waste management, dumpsters and garbage bins; proper outdoor washdown procedures (restaurant mats, dining areas, commercial areas, mobile cleaner operations) by taking a minimum of three of the following actions:

(i) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Lagoon.

(ii) Distribute a mailer to residents and businesses describing the adverse impact on water quality and recreation of improper pet waste management.

(iii) Add information to the City website about the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Lagoon and public health.

(iv) Create and broadcast a pre-rain pet waste cleanup public service announcement to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Lagoon.

(v) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

(d) The City shall continue its goose control program, as described in its TMDL Implementation Plan.

(e) The City shall continue implementing its “Illegal Dumping Screening Program,” its “Spill, Dumping, and Complaint Response Program,” and its “Commercial/Industrial Business Inspection Plans,” including implementing associated enforcement, with a focus near the beaches as appropriate.

(f) Once during the Permit term, determine if boaters in San Mateo Lagoon could be a source of bacteria; if yes, conduct or enhance outreach to improved boaters’ behaviors regarding bacteria sources (e.g., litter and human waste).

(3) **Reporting**

(a) In each Annual Report, the City shall summarize the actions it took to satisfy the requirements in Provision C.14.c.i.(2). during the foregoing October 1 through September 30 period. This report shall include:

(i) The number, type, and locations and/or frequency (if applicable) of control measures; and

(ii) The description and scope of pollution prevention measures; and

(iii) A data table and graphs showing Enterococcus data collected during the reporting year for the two San Mateo Lagoon beaches, Parkside Aquatic Park Beach and Lakeshore Park Beach.

(b) For the Annual Report due in 2023, quantitatively and qualitatively evaluate the effectiveness of the City’s actions toward wasteload allocation attainment and modify or refocus control measure implementation efforts as appropriate.

ii. Phase Two Measures

(1) **Task Description** – If wasteload allocations are not met by December 13, 2021, the City shall implement additional bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to San Mateo Lagoon.

(2) **Implementation Level** – In order to comply with this element:

(a) By July 1, 2022, the City shall submit a plan describing BMPs being implemented and additional BMPs that will be implemented to reduce discharges of bacteria to the beach. The plan shall include all actions described in Provision C.14.a that are likely to reduce bacteria loads to San Mateo Lagoon and particularly at Parkside Aquatic Park Beach and Lakeshore Park Beach. The plan also shall include an implementation schedule and milestones.

(b) By July 1, 2022, the City shall implement this plan.

(c) By September 30, 2022, the City shall submit a supplemental monitoring plan (supplemental to ongoing beach monitoring) to investigate remaining bacteria sources to the beach. This plan may develop data and a quantitative rational to support (i) locations and types of enhanced bacteria BMPs, and/or (ii) revision of the numeric targets to reflect bacteria contributions from non-controllable sources. Include an implementation schedule.

(3) **Reporting** – Starting with the 2023 Annual Report and for Annual Reports submitted in following years, the City shall summarize the actions it took to satisfy the requirements in Provision C.14.c.ii.(2) during the foregoing October 1 through September 30 period. This report shall include:

(a) The number, type, and locations and/or frequency (if applicable) of control measures;

(b) The description and scope of pollution prevention measures; and

(c) A data table and graphs showing enterococcus data collected during the reporting year for the two San Mateo Lagoon beaches, Parkside Aquatic Park Beach and Lakeshore Park Beach.

iii. Planning for Future Actions

(1) **Task Description** – If wasteload allocations are not met by December 13, 2026, Permittees shall prepare a plan for additional actions to attain the water quality objective in the next permit term.

(2) **Implementation Level** – Permittees shall prepare a plan that includes an assessment of bacteria sources and describes additional control

measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. The plan shall include an implementation schedule and proposed milestones. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

(3) **Reporting** – Submit the plan no later than 180 days prior to Permit expiration.

C.14.d. City of Half Moon Bay and San Mateo County Bacteria Controls

The City of Half Moon Bay (City) and San Mateo County (County) shall implement the actions in this subprovision to control bacteria. The City and County shall focus implementation of bacteria control measures in areas where benefits are most likely to accrue, i.e., where controls are likely to reduce bacteria mass in Pillar Point Harbor and Venice Beach. The goal of this subprovision is to implement the municipal stormwater runoff requirements of the Pillar Point Harbor and Venice Beach Bacteria TMDL and achieve the TMDL wasteload allocations. The City and County may comply with any requirement of this subprovision through a collaborative effort.

i. Control Measures to Achieve Bacteria Wasteload Allocations

(1) **Task Description** – The City and County shall implement bacteria control measures and pollution prevention strategies within their respective jurisdictions to prevent or reduce discharges of bacteria from storm drain systems to meet the municipal stormwater runoff TMDL wasteload allocations listed in the Pillar Point Harbor and Venice Beach Bacteria TMDL.

(2) **Implementation Level** – To comply with this element:

(a) The City and County each shall prepare an Initial Report acceptable to the Water Board Executive Officer that describes actions they are taking and will take to prevent or reduce discharges of bacteria to and from storm sewer systems. This report shall be submitted to the Water Board **by July 1, 2022**. The report shall include a schedule, timeline, or frequency of implementation activities for all actions, including, but not limited to, the actions described in Provision C.14.d.i.(2).(b), below.

(b) The City and County shall prohibit and prevent, to the maximum extent possible, discharges of bacteria into the storm sewer system within five years of the effective date of the TMDL as follows:

(i) Illicit sanitary sewer connections: The City and County shall train the staff responsible for enforcing industrial and commercial site

control and for detecting and eliminating illicit discharges to investigate potential connections of sanitary sewer lines to stormwater lines. The City and County shall ensure that staff conduct illicit sanitary sewer connection investigations and include such investigations in their routine inspections as well. The City and County shall use enforcement authorities to ensure transport to surface waters of the following potential bacteria sources is minimized:

(ii) Illicit discharges to the MS4, by increasing illicit discharge investigations in the vicinity of Pillar Point Harbor and Venice Beach

a. Roof and exterior washoff of commercial and industrial structures and surfaces, where these sources are likely to contain bacteria, such as from rodent and bird wastes, that are likely to be discharged to receiving water

b. Outdoor garbage and recycle bins

c. Outdoor floor mat washoff

d. Portable toilet spills and leakage

(iii) Human waste from homeless encampments, by implementing Provision C.14.a.iii in areas likely to discharge to the beaches;

(iv) Pet waste

a. Develop and implement a visual inspection program to identify high pet waste accumulation areas and develop a cleanup plan for these areas, including specific actions before winter rains;

b. Install new or additional dog waste cleanup signs, waste bag dispensers, and trash bins in high dog waste accumulation areas;

c. Evaluate and improve the service frequency of dog waste bins, as needed; and

d. Enhance pet waste public outreach and education campaign that includes at least three of the following:

- Prepare and broadcast public service announcements regarding pet waste management and associated impacts to the beaches and their catchments on social media, local television, and/or local newspapers;

- Distribute a mailer to residents and businesses describing proper pet waste management, and the adverse impact to the beaches and those recreating on them from improper pet waste management;
- Add to or maintain web pages on the City and County websites with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality and public health;
- Broadcast a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the beaches; and
- Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.).

e. The City and County shall include additional actions described in Provision C.14.a. in their Initial Reports and in their actions to prohibit and prevent discharges of bacteria into the storm sewer system to the extent and in the locations they deem helpful for achieving the TMDL wasteload allocation.

(3) **Reporting** – No later than March 30 of each year, the City and County shall submit a comprehensive TMDL Implementation Status and Monitoring Report, reporting on the specific control measures (as listed in Provision C.14.d.i.(2)) that have been implemented in the TMDL Project Area during the foregoing July 1 through June 30 period. This report shall include:

(a) The number, type, and locations and/or frequency of control measures;

(b) The description, scope, and start date of pollution prevention measures;

(c) Listing, timeline, and discussion of the actions scheduled for implementation during the upcoming year; and

(d) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures.

ii. Water Quality Monitoring

(1) **Task Description** – The City and County shall ensure the beaches are sampled weekly (i.e., that current bacteria sampling continues) and shall evaluate beach monitoring data. The purposes of the water quality monitoring are to determine whether the TMDL wasteload allocations are attained; further identify and characterize the source areas or land uses with the greatest bacteria contributions; and direct adaptive implementation of controls to reduce or eliminate bacteria discharges from different sources over time.

(2) **Implementation Level** – At a minimum, the City and County shall continue monitoring the beaches as required under California Health and Safety Code section 115880 and evaluate the resulting data. The City and County may collaboratively or individually develop and conduct a source assessment study to better characterize sources and spatial and temporal extent of bacteria impairment at the beaches and to evaluate the contribution of bacteria from natural sources.

(3) **Reporting** -- No later than March 30 of each year, the City and County shall submit a comprehensive TMDL Implementation Status and Monitoring Report describing the monitoring that has been conducted in the TMDL Project Area during the foregoing October 1 through September 30 period. The City and County are encouraged to collaborate so as to prepare a single report on all the data. This report shall include:

(a) Data evaluation that addresses the following questions:

(i) Are the TMDL targets and allocations met at the beaches?

(ii) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) being contained and do control measures appear to be effective in reducing bacteria loads?

(iii) Which land uses and/or sources contribute most to bacteria impairments?

(b) The Report shall include the following:

(i) Information about the sampling locations, timing and frequency of sampling, analytical method(s), and a map of monitoring sites

(ii) An analysis of the data, which includes the following:

a. Basic descriptive statistics using indicator bacteria data

b. Identification and evaluation of available data that indicate the presence of controllable sources of fecal contamination (e.g., human, horses, and dogs)

c. Identification and analysis of any trends in stormwater or receiving water quality

d. Consideration of variability in the data sets.

(iii) A discussion of the data, which shall:

a. Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Pillar Point Harbor and Venice Beach Bacteria TMDL;

b. Identify potential sources of water quality problems;

c. Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;

d. Evaluate the effectiveness of existing control measures; and

e. Identify and describe the follow-up management actions needed to address water quality problems.

iii. Planning for Phase Two Actions

(1) **Task Description** – If wasteload allocations are not met within five years of the TMDL effective date, Permittees shall develop a Phase Two Report that describes the actions being implemented and additional actions that will be taken to reduce the discharge of bacteria to the beaches.

(2) **Implementation Level** – In preparing the Phase Two Report, Permittees shall assess bacteria sources; describe control actions taken; and describe additional control measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. The report shall contain an implementation schedule and proposed milestones. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

(3) **Reporting** – Submit the Phase Two Report within five years of the TMDL effective date.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. **Discharge Type** – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers (excludes well development); and

(8) NPDES permitted discharges (individual or general permits).

ii. **Implementation Level** – The non-stormwater discharges listed in Provision C.15.a.i, above, are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b, below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed

and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-vi, below.

i. Discharge Type – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non-Drinking Water Aquifers**

Groundwater pumped from a monitoring well, used for groundwater basin management, which is owned and/or operated by a Permittee is allowed if the following requirements are met:

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards, including effluent limitations in the VOC and Fuel General Permit, NPDES Permit No. CAG912002.

(ii) The water samples shall be analyzed using approved U.S. EPA methods: (a) U.S. EPA Method 8015 Modified for total petroleum hydrocarbons; (b) U.S. EPA Method 624.1 and 625.1 or equivalent for volatile and semi-volatile organic compounds, respectively; and (c) approved U.S. EPA methods to meet the triggers for the metals listed in the General Permit discussed in Provision C.15.b.i.(1)(a)(i), above.

(iii) The water samples shall be analyzed for pH and turbidity.

If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs and Monitoring** – When greater than 2,500 gallons per day of uncontaminated (meeting the criteria in Provision C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of banks, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of the discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(vii) The pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(c) If the Permittee is unable to comply with the criteria in Provision C.15.b.i.(1)(b)(i)-(vii), discharge shall cease immediately and the Permittee shall employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES VOC and Fuel General Permit, or Groundwater General Permit, as appropriate.

(d) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[53] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements. Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(b) If the groundwater cannot be discharged to a landscaped area or bioretention unit and the discharge is greater than 2,500 gallons per day, it can only be considered for discharge once the following sampling is done to verify that the discharge is uncontaminated:

(i) The discharge shall meet water quality standards, including effluent limitations in the VOC and Fuel General Permit, NPDES Permit No. CAG912002.

(ii) The Permittees shall require that water samples from these discharge types be analyzed using the following approved U.S. EPA methods:

- U.S. EPA Method 8015 Modified for total petroleum hydrocarbons, and U.S. EPA Method 624.1 and 625.1 for volatile and semi-volatile organic compounds, respectively.
- The sufficiently sensitive (as identified in Attachment G of NPDES Permit No. CAG912002) approved U.S. EPA Methods (40 C.F.R Part 136) for the constituents listed below that meet the corresponding Reporting Limits:

[53] Pumped groundwater not exempted in Provision C.15.a, or conditionally exempted in Provision C.15.b.i.(1).

Constituent	Reporting Limit
Antimony	6 µg/l
Arsenic	10 µg/l
Beryllium	4 µg/l
Cadmium	0.90 µg/l
Chromium III	50 µg/l
Chromium VI	8.1 µg/l
Copper	3.4 µg/l
Lead	2.6 µg/l
Manganese	50 µg/l
Mercury	4 ng/l
Nickel	10 µg/l
Selenium	4.1 µg/l
Silver	1.1 µg/l
Thallium	1.7 µg/l
Zinc	47 µg/l
Cyanide	2.9 µg/l
Chlorine, total residual	0.05 µg/l
Total Petroleum Hydrocarbons	50 µg/l

(c) **Monitoring and Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in Provision C.15.b.i.(2)(b), above, the Permittees shall require the following:

(i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream or if accessing the sampling points poses safety to personnel.

(ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering.

(iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of bank, nuisance, contamination, and excess sedimentation in the receiving waters.

(iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters.

(v) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(vi) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(vii) The pH of discharged water shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.

(d) If a Permittee determines that a discharger or a project proponent is unable to comply with the criteria in Provision C.15.b.i.(2)(c)(i)-(vii), the Permittee shall require the discharge to cease immediately and require that the discharger employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES VOC and Fuel General Permit (NPDES Permit No. CAG912002), or Groundwater General Permit (NPDES Permit No. CAG912004), as appropriate.

(e) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be reused or directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Type – Emergency Discharges of Firefighting Water and Foam

(1) Emergency Discharges – Discharges resulting from emergency firefighting activities.

(2) Regional Coordination

(a) Permittees shall collectively convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff – and other stakeholders identified in Provision C.15.b.iii.(2)(vi), below – to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated

with firefighting activity. The Permittees shall collectively (e.g., through the Working Group):

(i) Prior to the submittal of the Firefighting Discharges Report, convene the Working Group at least twice per year. Thereafter, convene the Working Group at least annually.

(ii) Assess the adequacy of existing BMPs and standard operating procedures (SOPs) to address the potential adverse water quality impacts of firefighting water and foam discharged during emergencies (e.g., containment and cleanup),[54] including coordination within and between municipal departments, districts and jurisdictions, coordination between firefighting personnel and containment and cleanup crews, coordination with contracted staff, and coordination with relevant agencies (e.g., CalFire), as appropriate.

If the existing BMPs and SOPs need updates or are otherwise inadequate, suggest changes to those BMPs and SOPs so that they are updated and adequate. If new BMPs and SOPs are needed, recommend model BMPs and SOPs.

(iii) Assess the adequacy of existing resources (e.g., MS4 maps and maps that identify environmentally sensitive areas) used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters,[55] in order to address pollutant discharges (e.g., by facilitating containment and cleanup).

(iv) Investigate which firefighting foams are the least environmentally harmful (i.e., have the least adverse water quality and beneficial use effects, including those related to biodegradation, biomagnification, bioaccumulation, and acute and chronic toxicity), both for Class A foams and Class B foams. Then, develop SOPs to use the least environmentally harmful firefighting foams (and dispose of the more environmentally harmful foams) and to reduce the use of firefighting foams, without jeopardizing the protection of life or property, during emergencies.

[54] The Working Group does not necessarily have to review every single Permittee's BMPs and SOPs. It may review a representative subset.

[55] The Working Group does not necessarily have to review every single Permittee's resources. It may review a representative subset.

(v) Prepare outreach materials on containment and cleanup BMPs and SOPs for contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities within their jurisdictions. Additionally, prepare outreach materials – regarding good housekeeping practices and preventive measures – for sites that are prone to firefighting emergencies. Distribute those outreach materials to all such contractors and sites by September 30, 2025.

Subsequently, if it is identified that the outreach materials need to be revised or updated, they shall be revised or updated, and then redistributed.

(vi) Pursue coordination, information sharing, feedback and Working Group participation, from relevant agencies and organizations such as the California Department of Forestry and Fire Protection (Cal Fire), the California Department of Toxic Substances Control (DTSC), the U.S. Forest Service (USFS), the State and Regional Water Boards, permittees of other NPDES municipal stormwater permits, other state and federal agencies, and external workgroups (such as Petro-Chemical Mutual Aid), regarding interagency coordination and communication, BMPs, SOPs, and the least environmentally harmful firefighting foams.

(vii) Discuss reporting on emergency discharges of firefighting water and foam. The purpose of this reporting is first to provide transparency about the usage and water quality impacts of firefighting water and foam, and second to track reductions in those impacts over time, which is an anticipated outcome of the implementation of Provision C.15.b.iii.

This shall include discussion of the timing of such reporting, and how that reporting will be submitted to the Water Board. This shall additionally include discussion of how reporting is triggered (e.g., if a certain level of discharge enters the MS4 system, if any level of discharge enters a receiving water, and if any level of PFAS foam is used pursuant the exemptions in SB 1044), as well as the content of the reporting (e.g., the date and time of the discharge, Material Safety Data Sheet (MSDS) and any supplemental information for that foam, the quantity of water and foam concentrate used, the quantity and rate of water and foam concentrate discharged to the MS4 and/or receiving water, the point of discharge to the MS4 and/or receiving water, and

controls implemented to contain and/or mitigate discharges and impacts).

(b) Reporting – The Permittees shall collectively submit a Firefighting Discharges Report by September 30, 2025, that describes progress on, and recommendations regarding, the implementation of the items listed in Provision C.15.b.iii.(2)(a)(i)-(vii). The Firefighting Discharges Report shall be updated as needed on an ongoing basis, to incorporate recommendations by the Working Group.

(3) Ongoing Implementation Practices

(a) When the Firefighting Discharges Report is submitted, the Permittees shall begin implementation of the recommendations included therein.

(b) Permittees shall ensure proper BMPs and SOPs are included in contracts for non-municipal (contracted) staff hired by Permittees to assist with containment and cleanup, and to assist with prevention and mitigation of adverse impacts, of discharges associated with firefighting emergencies.

(c) For large industrial sites within Permittees' jurisdictions – such as IGP sites, gas plants, gas concentration facilities, and chemical plants – Permittees shall evaluate the adequacy of those sites' BMPs and SOPs for the prevention, containment and cleanup of emergency firefighting discharges into storm drains and receiving waters within Permittees' jurisdictions, and cause those BMPs and SOPs to be improved as appropriate.

(d) By June 30, 2027, Permittees shall require all municipal staff and contracted staff hired by Permittees that participate in the containment and cleanup of (and as appropriate, that assist with any other activities associated with mitigating the adverse environmental impacts of) discharges of firefighting water and foam from firefighting emergencies within their jurisdictions to attend at least one training on containment and cleanup BMPs and SOPs (and other BMPs and SOPs, as appropriate). Trainings may be region-wide, program wide, or Permittee-specific. Permittees are encouraged to make these trainings available to contractors hired by private parties.

(e) Reporting

(i) In their Annual Reports, Permittees shall report on the implementation of Provisions C.15.b.iii.(3).(a)-(c).

(ii) In the 2027 Annual Reports, Permittees shall report on trainings conducted pursuant to Provision C.15.b.iii.(3)(d), including the

date(s) of training(s), topics covered, and the percentage of applicable municipal and contracted staff involved in containment and cleanup activities in attendance.

(4) Required BMPs

(a) The Permittees shall implement and/or require firefighting personnel acting within their jurisdictions to implement BMPs and SOPs for emergency discharges – in order to reduce potential and actual water quality impacts – to the extent that the implementation of such BMPs does not interfere with immediate emergency response operations or impact public health and safety.[56]

(b) During emergency firefighting situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). Permittee staff, contractors, or firefighting personnel shall control the pollution threat from their activities during emergency firefighting situations to the extent that time and resources allow.

(5) Reporting

(a) Upon submittal of the Firefighting Discharges Report, Permittees shall implement the reporting recommendations and guidance therein.

(b) Otherwise, reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

(1) Required BMPs

(a) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their storm drain systems.

(b) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, or wash cars at commercial car wash facilities.

[56] Examples of BMPs to be considered are listed in the Fact Sheet. Where firefighting personnel may not be under the direct control of a Permittee, implement BMPs and SOPs, such as coordination and communication, identified in the Firefighting Discharges Report.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) Required BMPs

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[57] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from Provision C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa, and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

[57] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and

(e) Implementing the Illicit Discharge Enforcement Response Plan from Provision C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their storm drain systems.

(2) **Reporting** – The Permittees shall provide implementation summaries in each Annual Report.

C.16. Discharges to Areas of Special Biological Significance

This Provision applies to stormwater discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve Area of Special Biological Significance (ASBS). As set forth in the Fact Sheet, the State Water Board granted an exception to the ASBS discharge prohibition (ASBS Exception) in the Ocean Plan to applicants, including the County of San Mateo, for their existing stormwater discharges into ASBSs, provided they receive authorization to discharge by an NPDES permit; the discharges comply with all applicable terms, prohibitions, and special conditions of Attachment B - Special Protections (Special Protections) attached to and part of the ASBS Exception; and the discharges are essential for flood control or slope stability, designed to prevent soil erosion, occur only during wet weather, and are composed of only stormwater runoff. (See State Water Board Resolution No. 2012-0012, as amended by Resolution No. 2012-0031.) This Provision serves as the NPDES authorization for the County of San Mateo to discharge stormwater into the ASBS, provided the discharge meets the requirements below.

C.16.a. Discharges to the James V. Fitzgerald Marine Reserve ASBS

i. If the County of San Mateo meets all of the conditions set forth in Provision C.16.a.i. and C.16.a.ii., its stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS from MS4 outfalls that were constructed or were under construction prior to January 1, 2005, are permitted. Permitted discharges must comply with the following:

(1) Be essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

(2) Be managed or controlled to prevent soil erosion;

(3) Occur only during wet weather; and

(4) Be composed only of stormwater runoff, except as provided in the Special Protections of the ASBS Exception.

ii. The County of San Mateo shall comply with all applicable terms, prohibitions, and special conditions of the Special Protections of the ASBS Exception, including monitoring requirements, as they apply to stormwater. The Special Protections are hereby incorporated by reference into this Order and attached hereto as Attachment F. Notwithstanding anything to the contrary in this Order, the County of San Mateo shall not alter the natural ocean quality of the ASBS; shall not discharge trash into the ASBS; and shall not discharge non-stormwater into the ASBS except as provided in the Special Protections. As required by the Special Protections, the County of San Mateo shall address the preceding requirements (other than trash) in an ASBS Compliance Plan to

be approved by the Regional Water Board Executive Officer and comply with the compliance schedule set forth in the Special Protections.

iii. Reporting

(1) In addition to the monitoring requirements of the Special Protections, the County of San Mateo shall submit a copy of its ASBS Compliance Plan for approval by the Regional Water Board Executive Officer.

(2) If the results of any monitoring required under the Special Protections indicate that stormwater runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the County of San Mateo shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results according to the guidelines provided in the Special Protections.

(a) Within 30 days of the approval of the report by Regional Water Board Executive Officer, the County of San Mateo shall revise its ASBS Compliance Plan according to the guidelines provided in the Special Protections.

C.17. Discharges Associated with Unsheltered Homeless Populations

The purpose of this Provision is to identify and ensure the implementation of appropriate control measures, by all Permittees, to address non-stormwater discharges into MS4s associated with unsheltered homeless populations, including discharges from areas where unsheltered people congregate (e.g., formal and informal encampments including, but not limited to, informal tent or small cabin encampments, areas where people living in vehicles park, and safe parking areas). This Provision refers to such discharges collectively as discharges associated with homelessness.

C.17.a. Permittee Requirements

i. Task Description

(1) Permittees shall use results from biennial point-in-time census surveys and related information, such as municipal reports, databases, complaint logs, and other efforts, to gain a better understanding of unsheltered homeless population numbers within the Permittee's jurisdiction, the locations of unsheltered homeless residents, discharges and water quality-related impacts associated with homelessness, and associated sanitation-related needs.

(2) To encourage ongoing regional, countywide, and municipal coordination efforts, Permittees shall collectively develop a best management practice report that identifies effective practices to address non-storm water discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges within a given timeframe. The report shall:

(a) Describe practices that may be implemented by Permittees, including those currently being implemented, to address discharges associated with homelessness that are impacting water quality;

(b) Identify regional and/or countywide efforts and implementation actions to address discharges associated with homelessness (including how those efforts and actions have been affected by unsheltered homeless population growth). Include recommendations for engaging in these efforts and incorporating discharge-reduction strategies that also help meet the unsheltered population's clean water needs; and

(c) Identify actions taken during the COVID-19 pandemic to reduce the spread of the virus in homeless populations, such as temporarily housing homeless people in hotels, that may have reduced discharges associated with homelessness. Permittees shall consider the practicability of such actions for longer-term implementation.

This task's broader goals are to recognize non-stormwater pollutant sources associated with unsheltered homeless populations, reasons for discharges, and means by which they occur, and develop useful information that can be used toward prioritizing individual Permittee and collaborative best management practices for reducing or managing such discharges, while ensuring the protection of public health. Examples of collaborative implementation programs could include collaborative efforts between Permittees, Caltrans, sanitary sewer agencies, railroads, non-governmental organizations (NGOs), social service agencies and organizations, and other agencies.

ii. Implementation Level

(1) Each Permittee shall submit a map identifying, within its jurisdiction, the approximate location(s) of unsheltered homeless populations, including homeless encampments and other areas where other unsheltered homeless people live. The map shall identify those location(s) in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface water bodies within the Permittee's jurisdiction. The map shall be updated once during the Permit term, in 2025. Where Permittees are working collaboratively to address discharges associated with homelessness, they may collaborate to submit a joint map that covers their respective jurisdictions.

(2) Permittees shall report on the programmatic efforts being implemented within their jurisdiction, or at the countywide or regional level, to address MS4 discharges associated with homelessness. Examples of these efforts may include, but are not limited to: funding initiatives; adoption of ordinances to implement service programs; coordination with social services departments and NGOs; efforts to establish relationships with homeless populations; and alternative actions to reduce discharges to surface waters associated with homelessness, such as efforts towards providing housing, jobs, and related services for residents experiencing homelessness.

(3) Each Permittee shall identify and implement appropriate best management practices to address MS4 discharges associated with homelessness that impact water quality, including those impacts that can lead to public health impacts. In addition, Permittees shall also evaluate and assess the effectiveness of those practices, specifically by reporting on the BMP control measures being implemented, the approximate portion of the Permittee's unsheltered homeless population and locations being served by those control measures, and the portion and locations of the Permittee's unsheltered homeless population not reached, or not fully reached by the implemented control measures. Examples of actions that

may be implemented include, but are not limited to, access to emergency shelters; the provision of social services and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV "safe parking" areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing trash and waste cleanup or pickup programs within the Permittee's jurisdiction, or at the countywide or regional level.

(4) Permittees shall use the information generated through the biennial point-in-time census surveys and related information, and the regional coordination tasks (as described above) to review and update their implementation practices.

iii. Reporting

(1) With the 2023 Annual Report, Permittees shall collectively submit, acceptable to the Executive Officer, a best management practice report as described in Provision C.17.a.i.(2).

(2) With the 2023 and 2025 Annual Reports, Permittees shall submit a map as described in Provision C.17.a.ii.(1).

With the 2023 and 2025 Annual Reports, each Permittee shall report on the best management practices being implemented and include the effectiveness evaluation reporting required in Provision C.17.a.ii.(3) and additional actions or changes to existing actions that the Permittee will implement to improve existing practices.

C.18. Control of Sediment Discharges from Coastal San Mateo County Roads

San Mateo County shall implement the following control program for sediment. San Mateo County shall perform and report on the control measures according to this Provision, which implements requirements of the Pescadero-Butano Sediment TMDL and actions being taken on San Gregorio Creek to reduce sediment delivery from road-related erosion on San Mateo County-maintained roads to stream channels. For the purpose of this Provision, road-related erosion includes, but is not limited to, erosion of the road surface, road shoulder, road drainage structures such as ditches and culverts, and erosional features such as gullies, landslides, or sloughing that are road-related. Road-related means either i) the road is the primary cause of an observed erosion feature that, without the road, would not have formed or ii) the road is significantly increasing erosion rates from an erosion feature that existed prior to road construction.[58] This Provision does not apply to erosion sites that are not road-related, such as erosion from a private property that discharges onto a County-maintained road during a rain event. This Provision applies to San Mateo County-maintained roads in the Pescadero and Butano Creek watersheds (Pescadero-Butano Creek watershed), and in the San Gregorio Creek watershed in San Mateo County. This Provision is in addition to and does not supersede Provision C.2.e for Rural Road and Public Works Construction and Maintenance.

C.18.a. Road Erosion Inventory

i. **Task Description** – San Mateo County shall prepare a road erosion inventory to identify and prioritize actions to reduce road-related erosion from hydrologically connected County roads. Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. A hydrologically connected road is any road or road segment that has a continuous surface flow path to a natural stream channel during a storm runoff event.[59] A suitable design runoff event for most purposes is a 1-year 6-hour storm, with antecedent moisture conditions corresponding to the wettest month of the year. Connectivity usually occurs through road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces.

[58] For example, a landslide that existed prior to road construction would not be a road-related erosion feature, but a significant increase in erosion from the landslide caused by a poorly located road cross-drain would be a road-related erosion feature. Only the increased erosion caused by the cross-drain would need to be addressed under this provision.

[59] Weaver, W.E., Weppner, E.M. and Hagans, D.K. 2015. *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Rev. 1st ed.),* prepared by Pacific Watershed Associates for Mendocino County Resource Conservation District, Ukiah, California, pp. 8 – 10, 50 – 51, and 332.

ii. Implementation Level – To comply with this subprovision, San Mateo County shall:

(1) Inventory all San Mateo County roads and include the following information: i) road location; ii) road segments that are hydrologically connected, iii) type of road (e.g., all-weather, seasonal, or abandoned); and iv) type of road surface (e.g., paved, gravel, or native soil).

For hydrologically connected road segments only, the Permittee shall comply with (2), (3), and (4) as follows:

(2) All road-related erosion sites with the potential to discharge at least 5 cubic yards of sediment to streams or other water bodies shall be documented. At a minimum, the location, type, and approximate dimensions of the erosion feature, an estimate of the sediment volume that could erode, its potential for delivery to a waterbody (e.g., high, moderate, or low), a site photo, a brief description of the proposed treatment for erosion repair, and permits required for the repair shall be documented.

(3) The location, shape (e.g., circular, elliptical, arch, box), size, and condition of all culverts along the roadway shall be documented. The following shall also be assessed:

(a) whether the culvert opening is clear and free of debris or sediment,

(b) the potential for the culvert to plug with debris carried from upstream during future runoff events; and

(c) the potential for flow diversion onto the roadway if the culvert is overtopped during a future runoff event.

Culvert plugging and flow diversion potential shall at a minimum be documented as 'none,' 'low,' 'moderate,' or 'high,' consistent with appropriate standards.[60,61,62]

(4) For culverts with a moderate to high plugging potential, the Permittee shall develop a brief description of the proposed improvement(s), priority for treatment, and required permits.

iii. Reporting – The road erosion inventory for the Pescadero-Butano Creek watershed shall be submitted to the Water Board in the 2023 Annual Report. The road erosion inventory for the San Gregorio Creek watershed shall be submitted to the Water Board in the 2025 Annual Report. The road erosion inventory shall be submitted in ArcGIS and Google Earth KML format with an accompanying report that provides all the information listed in the subprovision above, in addition to:

(1) A summary table for both the Pescadero-Butano Creek and San Gregorio Creek watersheds that lists the total drainage area, the total length of all San Mateo County roads, the total length of all hydrologically connected San Mateo County roads; and the percentage of unpaved San Mateo County roads that are hydrologically connected.

(2) Summary tables documenting the results of the road erosion inventory by watershed, where watershed means either the Pescadero-Butano Creek watershed or the San Gregorio Creek watershed.

New erosion sites identified during routine patrols shall be added to the road erosion inventory. San Mateo County shall provide a status update of these new erosion sites each year as part of its Annual Report.

C.18.b. Prioritized List and Schedule of Actions

i. Task Description – Based on the results of the road erosion inventory (C.18.a), San Mateo County shall develop a prioritized list and schedule of

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[60] Weaver, W.E., Weppner, E.M. and Hagans, D.K. 2015. *Handbook for Forest, Ranch and Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing Wildland Roads (Rev. 1st ed.),* prepared by Pacific Watershed Associates for Mendocino County Resource Conservation District, Ukiah, California, pp. 99 – 106 and 136 – 150.

[61] Cafferata, P., Lindsay, D., Spittler, T., Wopat, M., Bundros, G., Flanagan, S., Coe, D. and Short, W. 2017. *Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood and Sediment (Updated 2017)*, California Forestry Report No. 1 (revised), State of California Department of Forestry and Fire Protection, Sacramento, California, pp. 23 - 43.

[62] Furniss, M.J, Flanagan, S. and McFadin, B. 2000. *Hydrologically-connected roads: an indicator of the influence of roads on chronic sedimentation, surface water hydrology, and exposure to toxic chemicals*, Stream Notes, July 2000. Stream Systems Technology Center, U.S. Forest Service, Rock Mountain Research Station, Fort Collins, Colorado.

actions to reduce road-related erosion and sediment delivery to stream channels. The goal of these efforts is to attain the following performance standards for San Mateo County roads identified in the Pescadero-Butano Sediment TMDL implementation plan:

(1) **For Roads**: Design, construct, and maintain roads to reduce road-related sediment delivery to channels to ≤ 500 cubic yards per mile per 20-year period; or i) limit the length of unpaved roads that are hydrologically connected to 25 percent of total road length; ii) ensure culvert inlets have low plugging potential; and, iii) install appropriate best management practices, such as critical dips,[63] at culverted crossings that have a diversion potential; and

(2) **For Gullies and/or shallow landslides**: Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas. Manage existing roads and other infrastructure to prevent additional erosion of legacy sediment delivery sites and/or delivery from potentially unstable areas.

ii. Implementation Level – To comply with this provision element, San Mateo County shall:

(1) Develop a prioritized list of control measures and pollution prevention strategies for all road-related erosion sites and for all culvert crossings to achieve the performance standards described in C.18.b.i(1). The list shall include a brief description of the control measure(s) to be taken and a projected completion date for each control measure. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standards.

(2) Develop a schedule to implement the prioritized list of control measures such that twenty percent (20%)[64] of the control measures for the Pescadero-Butano Creek watershed are scheduled for completion by June 30, 2027. Implementation of control measures for San Gregorio Creek is not required during this Permit term.

(3) If the length of hydrologically connected unpaved roads identified in C.18.a exceeds 25 percent of the total San Mateo County unpaved road length in a watershed,[65] then the prioritized list and schedule shall include

[63] A critical dip is a low berm and/or a dip in the road surface constructed across the roadway, used to divert flow off the road that would otherwise flow down the road surface.

[64] 20 percent means 20 percent of the total estimated cubic yards of potential sediment erosion identified in the road erosion inventory required by Provision C.18.a. .

[65] 25 percent is measured from road segments located within the watershed. It excludes road segments located outside the watershed.

an implementation plan and schedule of actions to reduce the percentage of hydrologically connected unpaved roads to 25 percent or less. Examples of treatments to reduce overall hydrologic connectivity of roads are provided by Weaver et al. (2015, Chapter 4).

iii. **Reporting** – The prioritized list and schedule for the Pescadero-Butano watershed shall be completed and submitted to the Water Board in the 2023 Annual Report. The prioritized list and schedule for the San Gregorio Creek watershed shall be completed and submitted to the Water Board in the 2025 Annual Report. San Mateo County shall update the prioritized list and schedule annually thereafter and submit it each year with its Annual Report. The submittal shall include a list of completed, in-progress, and scheduled control measure and pollution prevention strategies and shall include at a minimum the following information for each control measure:

(1) The project name

(2) The project location and a brief project description

(3) Authorizations required to implement the project, including status

(4) The actual or estimated project start and end dates

C.18.c. Implement Control Measures to Attain Performance Standards

i. **Task Description** – San Mateo County shall implement control measures and pollution prevention strategies to reduce road-related sediment delivery from County roads to stream channels in the Pescadero-Butano Creek and San Gregorio Creek Watersheds. At least twenty percent (20%) of the control measures identified in Provision C.18.b.ii shall be implemented and completed in the Pescadero-Butano Creek watershed by 2027.

ii. **Implementation Level** – To comply with this subprovision, San Mateo County shall:

(1) Continue to follow all the requirements of Provision C.2.e for Rural Road and Public Works Construction and Maintenance.

(2) Based on the priority list and schedule of actions developed in C.18.b, implement the control measures and pollution prevention strategies for road related erosion sites and culvert crossings to achieve the road performance standards described in C.18.b.i.(1).

(3) New County-maintained roads constructed on hillslopes exceeding 5 percent shall be constructed as storm-proofed roads, as defined by Weaver et al. (2015, Chapter 6), and shall meet the following specifications where applicable:

(a) Stream crossings have a drainage structure designed for the 100-year flood flow including woody debris and sediment (Cafferata, et al., (2017)).

(b) Stream crossings do not have the potential for flow diversion onto the roadway if the culvert is overtopped during a future runoff event.

(c) Culvert inlets have a low plug potential (trash barriers or deflectors are installed where needed).

(d) Culverts are installed at the base of the fill and in line with the natural channel.

(e) Emergency overflow culverts that emerge higher in the fill have full round, anchored downspouts that extend to the natural channel.

(f) Deep fills (deeper than a backhoe can reach from the roadbed) with undersized culverts or culverts with high plugging potential are fitted with an emergency overflow culvert.

(g) Bridges have stable, non-eroding abutments and do not significantly restrict 100-year flood flow.

(h) Stream crossing fills are stable.

(i) Approaching road surfaces and ditches are hydrologically disconnected from streams and stream crossing culverts to the maximum extent feasible using road shaping and road drainage structures.

(j) Class I (fish-bearing) stream crossings meet California Department of Fish and Wildlife and National Marine Fisheries Service fish passage criteria.

(k) Road surfaces and ditches are hydrologically disconnected from streams and stream crossing culverts to the maximum extent feasible. Road surface runoff is dispersed, rather than collected and concentrated.

(l) Ditches are drained by functional ditch relief culverts and/or rolling dips.

(m) Outflow from ditch relief culverts does not discharge to streams.

(n) Ditches and road surfaces drainage does not discharge (through culverts and/or rolling dips) onto active or potential landslides and/or into gullies.

(o) Fine sediment contributions from roads, cutbanks, and ditches are minimized by utilizing seasonal closures and installing a variety of

surface drainage techniques including road surface shaping (outsloping, insloping, or crowning), rolling dips, ditch relief culverts, water bars, and other measures to disperse road surface runoff and reduce or eliminate sediment delivery to the stream.

New County-maintained roads that are under construction within one year of the start of this Permit term shall be exempt from this requirement (C.18.c.ii.(3)).

iii. **Reporting** – A report documenting project status shall be submitted with the Annual Report each year starting the first year of project implementation. The report shall include a list of projects from the priority list and schedule of actions in Provision C.18.b that have been completed or are in-progress, including:

(1) An estimate of the potential sediment delivery to stream channels prevented by the implemented control measure or pollution prevention strategy.

(2) The percent of control measures in the prioritized list completed to date so that progress in achieving the implementation of 20 percent of the control measures for the Pescadero-Butano Creek watershed by June 30, 2027, is documented.

(3) A summary of projects scheduled for completion since the last Annual Report submittal that were delayed or not completed and an explanation of why they were delayed or not completed.

C.18.d. Monitoring

i. **Task Description** – San Mateo County shall conduct implementation, effectiveness, and forensic monitoring to assess the performance of implemented control measures.

ii. **Implementation Level** – To comply with this provision element, San Mateo County shall:

(1) Conduct implementation monitoring to assess whether the implemented control measure from C.18.c was fully and properly carried out as specified. Monitoring shall be performed once and conducted via a visual observation of the completed project.

(2) Conduct effectiveness monitoring to assess whether each of the implemented control measure(s) from C.18.c is adequately protective of water quality. Effectiveness monitoring shall be performed once and conducted via a visual inspection of the construction or repair site and the adjacent area. It shall be performed after the control measure has gone

through one year or one winter season in order to evaluate the effectiveness of the control measure during winter rain events.

(3) Conduct forensic monitoring in cases where an implemented control measure has failed. Forensic monitoring shall be conducted via a visual inspection of the failed control measure. Site photos shall be taken to adequately document the failure and a brief description of the mechanism and/or circumstances of failure shall be documented.

(4) Conduct routine monitoring of San Mateo County roads per the guidelines set forth in the County of San Mateo Routine Maintenance Program Manual (San Mateo County 2020, as may be amended).

iii. Reporting – San Mateo County shall document the results of the implementation, effectiveness, and forensic monitoring in a monitoring report submitted with the Annual Report each year starting in the first year of project implementation. If preferred, implementation monitoring information may be included with the implementation reporting required pursuant to Provision C.18.c.iii. The report shall include the following:

(1) Results of implementation and effectiveness monitoring, including:

(a) The monitoring point location and description of the project, or a reference to the specific project in the completed projects report.

(b) A brief description of the visual observations made during the monitoring inspection.

(c) The date the monitoring inspection was conducted.

(2) Results of any forensic monitoring conducted in the past year, including:

(a) The monitoring point location and description of the project, or a reference to the specific project in the completed projects report.

(b) Site photos documenting the failed control measure

(c) A brief description of the mechanism and/or circumstances of failure

(d) Proposed corrective measures to be taken and timeline for completion

(e) The date the monitoring inspection was conducted

(3) Results of annual monitoring conducted in the past year, including:

(a) A summary of all unpaved roads inspected at the end of the rainy season.

(b) A brief description of general road conditions and any specific problems noted, particularly with regard to sediment delivery to stream

channels. These observations will be used to make annual updates to the Road Erosion Inventory as required by Provision C.18.a. Any new road-related erosion sites identified during this effort shall be documented in the report and added to the Road Erosion Inventory required by Provision C.18.a.

(c) The date(s) the monitoring inspections were conducted.

C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements

The cities of Antioch, Brentwood, and Oakley, unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District (collectively, East County Permittees), located in the Central Valley Regional Water Quality Control Board's (Central Valley Water Board's) geographic jurisdiction, are included in the definition of "Permittees" as used throughout and shall comply with all requirements of this Order No. R2-2022-0018 except as provided for in this Provision. This Provision also incorporates requirements from Central Valley Water Board's TMDLs and control programs applicable to the East County Permittees.

C.19.a. Mercury Controls

The East County Permittees are exempt from Provision C.11, Mercury Controls.

C.19.b. Polychlorinated Biphenyls (PCBs) Controls

The East County Permittees are exempt from Provision C.12, PCBs Controls.

C.19.c. Diazinon and Chlorpyrifos Controls

i. **Task Description** – The East County Permittees shall continue compliance with the Central Valley Water Board's Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL and continue to meet wasteload allocations for diazinon and chlorpyrifos.

ii. **Implementation Level –** The East County Permittees shall implement Provision C.9.

C.19.d. Methylmercury Control Measure Plan and Monitoring

The methylmercury wasteload allocations for the East County Permittees in the Sacramento-San Joaquin Delta Methylmercury TMDL (Resolution No. R5-2010-0043) by Delta subarea are as follows:

- Central Delta subarea: 0.75 grams/year
- Marsh Creek subarea: 0.30 grams/year
- West Delta subarea: 3.2 grams/year

Methylmercury wasteload allocations shall be met as soon as possible, but no later than the final compliance date of January 1, 2030. As part of the Delta Mercury Control Program Review, the Central Valley Water Board may adopt revised wasteload allocations and a new final compliance date.

i. **Task Description** – Pursuant to the Central Valley Water Board's Water Quality Control Plan for the Sacramento San Joaquin Basins' Delta Mercury Control Program and associated Methylmercury TMDL, the East County Permittees were required to develop, conduct, and report on a methylmercury control study for urban runoff. The submitted control study[66] proposed conducting a Reasonable Assurance Analysis (RAA) to determine the achievable methylmercury load reduction. The control study also stated that monitoring will be conducted to answer the management questions outlined in Provision C.19.d.ii(2)a-e. Therefore, the East County Permittees shall submit a control measure plan and conduct a corresponding RAA as well as implement methylmercury monitoring as described below. With the Central Valley Water Board's Executive Officer's approval, the East County Permittees may participate in the Delta Regional Monitoring Program (Delta RMP) or other collective monitoring efforts in lieu of some or all of the individual monitoring requirements required by this Provision. Participation in the Delta RMP or other collective monitoring efforts shall consist of providing funds and/or in-kind services to the Delta RMP or other collective monitoring effort at least equivalent to the discontinued monitoring efforts in order for the Central Valley Water Board Executive Order to approve the alternative monitoring.

ii. **Implementation Level** – The East County Permittees shall:

(1) Prepare and submit by November 1, 2022, a Control Measure Plan and schedule to achieve the TMDL wasteload allocations. The Plan shall include a corresponding RAA for total mercury and methylmercury demonstrating that sufficient control measures will be implemented during this Permit term to attain the methylmercury Delta Mercury Control Plan wasteload allocations by January 1, 2030, or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review. The Control Measure Plan, including RAA, shall comply with the following:

(a) The Plan shall identify all technically and economically feasible mercury and methylmercury MS4 control measures to be implemented (including green stormwater infrastructure (GSI) projects).

(b) The Plan shall include a schedule according to which these technically and economically feasible control measures will be fully implemented.

(c) The Plan shall provide an evaluation and quantification of mercury and methylmercury load reductions of such measures as well as an

[66] *Contra Costa Clean Water Program Methylmercury Control Study Final Report (Rev. 1),* September 2020.

evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

(d) The RAA for total mercury must be evaluated using the California Toxics Rule for mercury (0.05 µg/L).

(e) The RAA for methylmercury must be evaluated using the methylmercury load allocations specific to each Delta subarea within Contra Costa County subject to the DMCP (i.e., the Central Delta, Marsh Creek, and West Delta subareas).

(f) The RAA shall demonstrate quantitatively that the plan will result in mercury and methylmercury load reductions sufficient to attain the methylmercury wasteload allocations by January 1, 2030, (or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review) and address the following questions:

(i) What are the annual mercury and methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?

(ii) Do the mercury and methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?

(iii) What is the achievable mercury and methylmercury load reduction in discharges from the MS4 by implementation of reasonable, foreseeable controlmeasures?

(iv) What controllable MS4 water quality factors affect methylmercury production and transport in the MS4 discharge and in the receiving waters draining to the Delta?

(v) Are there MS4 design features that increase or decrease mercury methylation.

(vi) Are there reasonable and foreseeable managementactions to reduce methylmercury concentrations within the MS4 boundary?

(g) Permittees shall ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill Provision C.19.ii.(1)(a)-(f) have been validated through a peer review process. The East County Permittees may use the approach developed by the Contra Costa Clean Water Program or an equivalent approach developed by another program during the previous permit term.

(2) Conduct annual monitoring in waterways within the East County Permittees' MS4 boundary to answer the questions in Provision

C.19.d.ii(2)(a)-(e). Monitoring shall include, but is not limited to, Marsh Creek, downstream of Marsh Creek Reservoir, and Central and West Delta Subarea tributaries within the MS4 boundary. Permittees shall collect fifty (50) samples throughout the Permit term, with at least eight (8) samples annually, for aqueous methylmercury analysis. Samples shall be collected in each subarea to be representative of the discharge during wet and dry year conditions and analyzed using U.S. EPA- or SWAMP-approved methods.

(a) What are the annual methylmercury loads from the MS4 discharge to the Central Delta, Marsh Creek, and West Delta subareas?

(b) Do the methylmercury loads to each subarea meet the assigned methylmercury wasteload allocations?

(c) Are there any MS4 design features that increase mercury methylation in the discharge?

(d) What MS4 water quality controls have been implemented or are planned to be implemented to reduce methylmercury production and transport in the MS4 discharge?

(e) By January 1, 2024, address whether eutrophication and low dissolved oxygen concentrations increase methylmercury in ponded areas of Marsh Creek during low flow periods (depending on the year, low flow periods can range between mid-March and mid-November), and, if so:

(i) Under what hydrologic or seasonal circumstances do increased methylmercury concentrations reach the Delta?

(ii) Are there reasonable and foreseeable management actions to ameliorate increased methylmercury concentrations?

(3) Prepare an Annual Mercury Monitoring Plan and submit it to the Central Valley Water Board for Executive Officer approval. The monitoring plan shall describe the annual monitoring design and specify the proposed sampling locations for methylmercury sampling required under Provision C.19.d.ii.(2).

iii. Reporting

(1) Annual Mercury Monitoring Plan – by October 1, 2022, and annually thereafter with the Urban Creeks Monitoring Report due March 31.

(2) Annual Report **–** The East County Permittees shall provide the following:

(a) Monitoring and assessment results answering the questions required under Provision C.19.d.ii.(2), and

(b) Upon completion by the deadline in Provision C.19.d.ii.(1), submit the Control Measure Plan, including RAA.

A copy of each Annual Report shall also be submitted to the Central Valley Water Board.

(3) Pollutants of Concern Monitoring Report **–** The East County Permittees shall report monitoring and assessment activities relevant to the Delta Methylmercury TMDL from the past water year and planned for the next water year as a separate section within the Pollutants of Concern Monitoring Report required under Provision C.8.h.iv. A copy of each Pollutants of Concern Monitoring Report shall also be submitted to the Central Valley Water Board.

(4) Integrated Monitoring Report **–** The East County Permittees shall report the monitoring and assessment results as a separate section within the Integrated Monitoring Report as required under Provision C.8.h.v. A copy of each Integrated Monitoring Report shall also be submitted to the Central Valley Water Board.

(5) The East County Permittees shall report progress on the Delta Methylmercury TMDL and recommendations for the next permit re-issuance as a separate section within the Report of Waste Discharge (ROWD) required by Provision C.25. A copy of the ROWD shall also be submitted to the Central Valley Water Board.

C.19.e. Delta Mercury Control Program Minimum BMPs

i. Task Description – The East County Permittees shall implement inorganic mercury reduction BMPs as well as provide ongoing education and outreach to address mercury pollution prevention and risk reduction.

ii. Implementation Level – At a minimum, the East County Permittees shall implement the following inorganic mercury reduction BMPs, consistent with the Delta Methylmercury TMDL.

(1) **Mercury Collection and Recycling** - To minimize mercury in storm water the East County Permittees shall continue implementing:

(a) Collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs); and

(b) Collection, recycling and/or diversion of mercury-containing waste products (e.g., gauges, batteries, fluorescent and other lamps, switches, relays and sensors) from the waste stream from industrial and commercial entities (e.g., auto dismantlers), and municipal facilities.

(2) **Enhanced Municipal Management Practices to Reduce Sediment Discharges** - The East County Permittees shall continue to implement BMPs to minimize sediment discharges during municipal operations and municipal maintenance activities. Municipal operations and municipal maintenance activities include but are not limited to the following: storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning.

(3) **Public Education and Risk Reduction** - The East County Permittees shall continue to conduct ongoing education to the public on mercury pollution prevention and mercury risk reduction. The East County Permittees shall continue to:

(a) Provide mercury pollution prevention messages to residents, commercial businesses, and industrial facilities with mercury-containing products or emissions. This may be implemented as part of Provision C.7; and

(b) Provide notices to communities on the health risk associated with eating mercury contaminated fish. These notices shall also include the Office of Environmental Health Hazard Assessment's fish consumption advisories.

(4) **Methylmercury Controls** – the East County Permittees shall implement control measures that reduce mercury methylation potential and retrofit existing BMPs that show an increase of mercury methylation.

(a) New development projects shall use BMPs that either prevent an increase of methylmercury or have been shown to decrease methylmercury.

(b) For existing BMPs that increase methylmercury within subareas that are meeting the assigned wasteload allocation, retrofitting of these BMPs may occur as part of any capital improvement, redevelopment, operation, or maintenance plan as resources are available.

(c) For existing BMPs that increase methylmercury within subareas that are not meeting the assigned wasteload allocation, retrofitting of these BMPs shall occur as soon as feasibly possible, but no later than the final compliance date of January 1, 2030 (or any revised final compliance date adopted by the Central Valley Water Board as part of the Delta Mercury Control Program Review).

iii. Reporting – In each Annual Report, the East County Permittees shall:

(1) Describe Mercury Collection and Recycling efforts.

(2) List the municipal operations and municipal maintenance activity BMPs that are implemented to minimize sediment discharges.

(3) Discuss the mercury pollution prevention messages provided and

(4) Summarize tasks implemented to provide notices on the health risk associated with eating mercury contaminated fish.

(5) Report on implementation of methylmercury controls required in C.19.2.ii.(4).

C.19.f. Pyrethroid Control Program

i. Task Description – The East County Permittees shall comply with the Central Valley Water Board's conditional prohibition of the discharges of pyrethroid pesticides and associated monitoring and reporting requirements established in the Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the control of Pyrethroid Pesticide Discharges (Resolution No. R5-2017-0057).

ii. Implementation Level – The East County Permittees shall:

(1) Continue to implement a pesticide control program as required by Provision C.9, which is consistent with Central Valley Water Board requirements for a pyrethroid management plan.

(2) Continue pesticides and toxicity monitoring as specified in Provision C.8.g. In addition to the pollutants and organisms listed in Table 8-5, the East County Permittees shall also analyze total and particulate organic carbon, as required by the Central Valley Water Board's Basin Plan Amendment (R5-2017-0057).

(3) Submit a baseline monitoring report by September 19, 2022, that:

(a) Summarizes the pyrethroid and toxicity monitoring results from 2012 through 2019;

(b) Assesses the compliance of the discharge with the conditional prohibition triggers in the Basin Plan established by Resolution No. R5-2017-0057;

(c) Summarizes toxicity of water and sediment samples to the test organism Hyalella azteca; and

(d) Summarizes any other pyrethroid monitoring data collected by the East County Permittees during the above period.

iii. Reporting – The East County Permittees shall:

(1) With the 2024 and subsequent Annual Reports, provide a progress report to document the management practices that have been implemented, evaluate pyrethroid concentrations with respect to the pyrethroid triggers, and identify effective control actions to be taken in the future. A copy shall be provided to the Central Valley Water Board.

(2) Urban Creeks Monitoring Report (UCMR) – The East County Permittees shall report monitoring, assessment results, relevant to the Pyrethroids Control Program as a separate Pyrethroid Trend Monitoring section within the 2024 UCMR required under Provision C.8.h.iii. A copy of the 2024 UCMR shall also be submitted to the Central Valley Water Board. The Pyrethroid Trend Monitoring section of the 2024 UCMR, shall include an analysis of data collected in East County Permittees receiving waters for pesticides and toxicity from 2019 through 2024 to assess the following:

(a) Whether discharges from MS4s are exceeding the acute and chronic pyrethroid triggers set forth in the Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges (Resolution No. R5-2017-0057);

(b) Whether pyrethroid pesticides are causing or contributing to exceedances of the narrative water quality objective for toxicity in surface waters or bed sediments.

(c) The effectiveness of management practices that are implemented to reduce pyrethroid levels in discharges;

(d) Whether alternatives to pyrethroid pesticides are being discharged at concentrations with the potential to cause or contribute to exceedances of applicable water quality objectives.

C.20. Cost Reporting

C.20.a. Task Description – Each Permittee shall annually prepare and submit a fiscal analysis of the capital and operation and maintenance costs incurred to comply with this Order's requirements listed in Provision C.20.b.(iii).

C.20.b. Implementation Level

i. The Permittees shall develop a cost reporting framework and methodology to perform the fiscal analysis. Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost-savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with this Order's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time.

ii. The analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds, and identify any funding resources shared on a regional or countywide basis. The analysis shall include the costs incurred to comply with this Permit, and an estimate of costs for the upcoming Permit year.

iii. The analysis shall include the following program areas, specifically as required under this Order**:**

(1) Program management

(2) Municipal operations

(3) New development and redevelopment

(4) Industrial and commercial site controls

(5) Illicit discharge detection and elimination

(6) Construction site controls

(7) Public information and outreach

(8) Water quality monitoring

(9) Pesticides toxicity control

(10) Trash load reduction

(11) Mercury controls

(12) PCBs controls

(13)Copper controls

(14)Bacteria controls

(15)Discharges associated with unsheltered homeless populations

(16)Asset management plan development and implementation

iv. The costs reported for each program area shall address the following categories:

(1) Total cost

(2) Capital expenditures

(3) Land costs

(4) Personnel costs

(5) Consultant costs

(6) Overhead costs

(7) Construction costs

(8) Operation and maintenance costs

(9) Other costs

C.20.c. Reporting

i. The Permittees shall submit the cost reporting framework and methodology, acceptable to the Regional Water Board Executive Officer, by June 30, 2023.

ii. The Permittees shall submit their fiscal analyses annually according to the accepted cost reporting framework and methodology starting with the 2025 Annual Report.

C.21. Asset Management

C.21.a. Task Description – Each Permittee shall develop and implement an Asset Management Plan in order to ensure the satisfactory condition of all hard assets[67] constructed during this and Previous Permit terms pursuant to Provisions C.2 Municipal Operations, C.3 New Development and Redevelopment, C.10 Trash Load Reduction, C.11 Mercury Controls, C.12 PCBs Controls, C.13 Copper Controls, C.14 Bacteria Controls for Impaired Water Bodies, C.17 Discharges Associated with Unsheltered Homeless Populations, C.18 San Mateo County Sediment Controls, and C.19 Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements.

C.21.b. Implementation Level – Each Permittee shall:

i. Develop an Asset Management Plan by June 30, 2025, which, at a minimum, shall include the following:

(1) A description of the asset categories to be included.

(2) An inventory (or link to such an inventory) of Permittees' existing hard assets built pursuant to the Provisions cited in Provision C.21.a, including at a minimum all LID/GSI systems and trash capture devices.

(3) An Operation, Maintenance, Rehabilitation, and Replacement Plan (Asset Management O&M Plan), to evaluate data obtained through asset assessment in order to inform a strategy for prioritizing and scheduling maintenance, rehabilitation, and replacement of inventoried assets, including:

(a) A process for prioritizing and scheduling operation and maintenance activities.

(b) A process(es) for evaluating the current condition, and identifying the need for and carrying out, as appropriate, the rehabilitation and replacement of inventoried assets. The process(es) shall account for:

(i) The minimum condition necessary to achieve minimum performance level(s) for each type of hard asset, including an assessment of stormwater volume and pollutant load reduction, necessary to comply with applicable Permit Provisions and TMDLs.

[67] Hard assets are structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash receptacles, and pet waste stations.

(ii) Current performance level and effectiveness, as indicated by condition. Permittees may implement a risk-based condition assessment, or comparable assessment method, to cost-effectively and -efficiently assess condition. Permittees shall base the effectiveness evaluation on, at a minimum, factors such as design, capacity, and condition and function relative to the asset's design, intended operating conditions, and intended function.

(iii) Consequence of failure and likelihood of failure.

(c) An evaluation or forecast of costs necessary for the implementation of (a)-(b) above, at least through the end of the current permit term. On an ongoing basis, the Permittees shall compare these projections with available funding sources to determine the best manner in which to fund the operation, maintenance, rehabilitation, and replacement of inventoried assets. This evaluation or forecasting may supplement Permittees' compliance with Provision C.20 Cost Reporting.

(4) Recommendations for a reporting strategy, which may have a nexus with the tracking systems referenced in Permittees' Green Infrastructure Plans, to include:

(a) Municipality-specific reporting;

(b) Assessment of the programmatic benefit from countywide or regional roll-up of collected information.

ii. Begin implementation of the Asset Management Plan no later than July 1, 2025.

iii. Reassess and update their Asset Management Plan on an as-needed basis, to address changing conditions and resources.

iv. Provide the latest version of the Asset Management Plan to Water Board staff during inspections and audits, or otherwise upon request.

v. Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of Permittees' inventoried hard assets over the next 50 years, and identify approaches that Permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale.

C.21.c. Reporting

i. The Permittees shall submit their Asset Management Plans with the 2025 Annual Reports.

ii. The Permittees shall report on the implementation of their Asset Management Plans annually, starting with the 2026 Annual Reports, as follows:

(1) Provide (or link to) an inventory of all assets accounted for in the Asset Management Plan.

(a) Different categories of assets (e.g., trash controls, LID/GSI controls, bacteria controls) may be maintained in separate inventories.

(2) At a minimum, for each asset in the inventory, provide the following: category or type of water quality control; relevant design information; tributary drainage area; location; condition based on periodic inspections either by municipal or contracted staff; and operation and maintenance need (for example, while most assets may require normal operation & maintenance, Permittees may identify a subset of assets in need of rehabilitation or replacement).

This information does not have to be submitted in tabular format in the Annual Report; it may be provided externally, at the linked location identified in Provision C.21.c.ii.(1) above.

iii. The Permittees shall submit the Climate Change Adaptation Report described in Provision C.21.b.v with their 2026 Annual Reports. The Permittees may submit the Climate Change Adaptation Report(s) on an all-Permittee (regional) scale or countywide scale.

C.22. Annual Reports

C.22.a. The Permittees shall submit Annual Reports electronically, including a verified electronic signature (e.g., Adobe e-signature, DocuSign, or equivalent), in all cases by September 30 of each year, in the manner specified by the Water Board. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.21, with the exception of the 2022 annual reporting requirements for Provisions C.2 – C.9, which are set forth in Provisions C.2 - C.9 of the previous Permit, Order No. R2-2015-0049, as amended. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.

C.22.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by March 1, 2023. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by March 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.21, with the agreement of the Permittees and by the approval of the Executive Officer.

C.22.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit, in the cover letter of the Annual Report, the reason for its failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.23. Modifications to this Order

The Water Board may modify or reopen this Order, or alternatively, revoke or reissue it, before the expiration date in any of the following circumstances or as authorized by law:

C.23.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.23.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Water Board or amendments to the Basin Plans for the San Francisco Bay and the Sacramento and San Joaquin River Basins approved by the State Water Board;

C.23.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) or other applicable provision of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order;

C.23.d. To provide an alternative compliance program for exchanges of impervious surface treatment credits in Provision C.3.e.i; or

C.23.e. To incorporate applicable requirements from the Central Valley Regional Water Board's Phase 1 Delta Mercury Control Program Review under the Basin Plan for the Sacramento and San Joaquin River Basin.

C.24. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment G of this Order.

C.25. Expiration Date

This Order expires on June 30, 2027, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.26. Rescission of Old Order

Order No. R2-2015-0049, as amended by Order No. R2-2019-0004, is hereby rescinded, except for enforcement purposes, on the effective date of this Order, which shall be July 1, 2022, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

C.27. Effective Date

The Effective Date of this Order and Permit shall be July 1, 2022, provided that the Regional Administrator of U.S. EPA, Region IX, does not object.

I, Thomas Mumley, Interim Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on May 11, 2022.

Thomas Mumley
Interim Executive Officer

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BAMSC	Bay Area Municipal Stormwater Collaborative
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
Central Valley Water Board	California Regional Water Quality Control Board, Central Valley Region
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CSCI	California Stream Condition Index
CWA	Federal Clean Water Act
CWC or Water Code	California Water Code
DCIA	Directly Connected Impervious Area
DDCP	Direct Discharge Control Plan
DPR	California Department of Pesticide Regulation

East County Permittees or East Contra Costa Permittees	The cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County and the Contra Costa County Flood Control and Water Conservation District that are in the Central Valley Water Board's region
ERP	Enforcement Response Plan
FR	Federal Register
FSURMP	Fairfield-Suisun Urban Runoff Management Program
GI or GSI	Green Stormwater Infrastructure
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
ISWEBE	Inland Surface Waters, Enclosed Bays, and Estuaries Plan
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable
MRP	Municipal Stormwater Regional Permit (see Glossary for MRP 1, MRP 2, MRP 3)
MSDS	Material Safety Data Sheet
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
NAFSMA	National Association of Flood & Stormwater Management Agencies
NAICS	North American Industry Classification System
NGO	Non-governmental Organization
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System

NRDC	Natural Resources Defense Council
Ocean Plan	California Water Quality Control Plan for Ocean Waters of California
OFEE	Oil Filled Electrical Equipment
O&M	Operation and Maintenance
PAHs	Polynuclear Aromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ether
PCA	Pest Control Advisor
PCBs	Polychlorinated Biphenyls
PHAB	Physical Habitat (e.g., of streams)
POTW	Publicly Owned Treatment Works
QAPP	Quality Assurance Project Plan
RAA	Reasonable Assurance Analysis
RCRA	Federal Resource Conservation and Recovery Act
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
ROW	Right of Way
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Federal Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SIC	Standard Industrial Classification
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SSA	Solano Stormwater Alliance
SSID	Stressor Source Identification

SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
State Water Board	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Federal Toxic Substances Control Act
TST	Test of Significant Toxicity
TU	Toxicity Units
UCMR	Urban Creeks Monitoring Report
U.S. EPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations
WQBEL	Water Quality Based Effluent Limitation
WQS	Water Quality Standards

GLOSSARY

Actual Discharge	Observed or documented flow of unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4.
Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the State protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Base Course	A layer of constructed material (typically aggregate base – a construction aggregate typically composed of crushed rock or of recycled asphalt or concrete, capable of passing through a sieve with a certain pore diameter) located above the subbase course and/or subgrade course, and below the surface layer (which consists of a wearing course, and sometimes an extra binder course), applied to serve one or more functions, such as supporting the surface layer and distributing load.
Bituminous Surface Treatment	A thin protective wearing surface, which can provide, among other services, a waterproof layer to protect underlying pavement and a filler for existing cracks or raveled surfaces. This includes, but is not limited to: • Chip seal – a single layer of asphalt emulsion binder that is covered by embedded aggregate; • Slurry seal – a thick, cold mix paving treatment that contains aggregates, asphalt emulsion, binder and fines, water, and additives; and • Seal coat – an emulsion containing liquid asphalt and/or coal tar, mineral fillers and other anti-oxidation additives and admixtures. • Cape seal – a chip seal covered with a slurry or micro-surface, applied to existing pavements. Micro-surfacing is a polymer-modified cold-mix paving system that begins as a mixture of dense-graded aggregate, asphalt emulsion, water and mineral fillers.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.

Construction Site	Any project, including projects requiring coverage under the Construction General Permit, that involves soil-disturbing activities including, but not limited to, grubbing, clearing, grading, paving, disturbances to ground such as stockpiling, leveling, fill, and excavation. Construction sites include all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit. Construction sites are considered active until site surfaces are permanently stabilized to control erosion and other polluted stormwater discharges effectively.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this Permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of WQS because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge.
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size.
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.
Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Floor Area Ratio	The ratio of the total floor area on all floors of all buildings at a project site (except structures or floors dedicated to parking) to the total project site area.

Full Trash Capture Device	A Full Capture Device or System is a treatment control, or series of treatment controls, including, but not limited to, a multi-benefit project (as defined in the Trash Amendments) or a low-impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Green Infrastructure	Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.
Gross Density	The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.
Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, State, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Executive Officer.

Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes french drains).
Integrated Pest Management[68]	An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines (and when it has been concluded that the use of non-chemical controls is insufficient), and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment (DPR, 2018).

[68] Roadmap for Integrated Pest Management, CDPR 2018, https://www.cdpr.ca.gov/docs/pestmgt/ipm_roadmap.pdf

Integrated Pest Management, Biological Controls	Biological controls are the beneficial action of predators, parasites, pathogens, and competitors to control pests and pest damage. These controls rely on predation, parasitism, herbivory, or other natural mechanisms, but typically require active human intervention, such as releasing ladybugs.
Integrated Pest Management, Least Hazardous Chemical Controls	Chemical controls involve targeted application of traditional chemical pesticides, as well as alternative products, such as oils and soaps.
Integrated Pest Management, Cultural Controls	Cultural controls reduce pest establishment, reproduction, dispersal, and survival. Examples include scheduling planting, irrigation, and fertilization; soil solarization; and planting native vegetation and xeriscape to reduce water, pesticide, and fertilizer needs. Changing irrigation practices can reduce pest problems, since too much water can increase root disease and weeds.
Integrated Pest Management, Mechanical and Physical Controls	Mechanical and physical controls kill pests directly, exclude pests, or make the environment unsuitable for pests. Physical controls may involve manual removal of pests or mowing. Barriers (screens, mesh, caulk and other sealants) are physical controls that keep pests out of buildings and structures, and may be used to enclose sensitive plants. Mulch is a physical control that inhibits weed growth. Rodent traps are mechanical controls.
Integrated Pest Management, Pest Action Threshold	The point at which pest populations or environmental conditions indicate that one or more pest control actions must be taken. Sighting a single pest does not always mean control is needed. The level at which pests will either become an economic or health threat is critical to guide appropriate, least toxic pest control decisions.
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other.
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.
Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. CWA 402(p)(3)(B)(iii) requires that municipal stormwater permits “shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the state determines appropriate for the control of such pollutants.” Also see State Water Board Order WQ 2000-11.

Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
MRP 1	Order No. R2-2009-0074, as amended by Order No. R2-2011-0083.
MRP 2 or Previous Permit	Order No. R2-2015-0049, as amended by Order No. R2-2019-0004.
MRP 3, Permit, or Order	Order No. R2-2022-0018.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law...including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in 40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; and/or (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA sections 307, 402, 318, and 405.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, or other date as specified, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.

Pervious Pavement	A pavement system consisting of permeable interlocking concrete pavement (PICP), pervious or permeable concrete unit pavers, pervious grid pavements, pervious concrete, porous asphalt, turf block, grasscrete, and bricks and stones, set on a gravel base with gravel joints, which stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and PAHs; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste); and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Potential Discharge	Conditions with the potential to result in unauthorized, illicit, or pollutant-containing stormwater discharges to the MS4. These include, but are not limited to, housekeeping issues, inadequate waste or materials management, evidence of actual discharges that are not ongoing, lack of emergency response plans, lack of BMPs, inadequate BMPs, and inappropriate BMPs.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.

Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by the San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).
Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMPs	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain WQS. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet WQS even after application of technology-based controls, more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.

Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the State, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and U.S. EPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the WQS that must be met to protect designated uses. Water quality standards also include the federal and State anti-degradation policy.
Water Year	The Water Year spans twelve months and begins on October 1 of each year. It is designated by the calendar year in which it ends. For example, the 2023 Water Year starts on October 1, 2022, and ends on September 30, 2023.

Wedge Grinding	The process of milling the asphalt areas directly adjacent to concrete curbs, gutter pans and metal structures (e.g., manhole covers) to a specified width and depth. To tie into the elevations of the existing concrete and metal structures, asphalt is removed along the perimeter to allow proper depth of asphalt on the edge and to preserve the appropriate drainage patterns on the asphalt surface.
Wet Season	October 1 of a given year through April 30 of the following year.

ATTACHMENT A

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2022-0018

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield, Suisun City, and Vallejo, and the Vallejo Sanitation & Flood Control District which have joined together to form the Solano Stormwater Alliance (Solano Permittees)

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I. CONTACT INFORMATION

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II. PERMIT GOALS AND PUBLIC PROCESS

A. Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) include:

(1) Continue regulating six Phase I municipal stormwater NPDES permits in one consistent permit that is regional in scope.

(2) Include concrete, rigorous, and enforceable requirements building on the expertise gained during the previous permit cycle. Continue requiring (A) stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.

(3) Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.

(4) Implement and enhance actions to control federal Clean Water Act (CWA) section 303(d)-listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.

(5) Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d)-listed pollutants.

B. Public Process

Water Board staff conducted stakeholder meetings with the Permittees and other interested parties to develop this Permit. These meetings included Water Board staff, representatives of the Permittees, the U.S. Environmental Protection Agency (U.S. EPA), and representatives of environmental groups.

C. Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to

occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in CWA section 402(p). In addition, this Permit contains water quality-based effluent limitations to implement TMDLs. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is considered compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and C.18 to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

A. Early Permitting Approach

The CWA was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations that would implement the amendment), the Water Board issued municipal stormwater Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, pool resources and expertise, and share information, public outreach, and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics that were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the Plans for implementation details. Often specific

aspects of permit and Plan implementation evolved during the five-year permit cycle without significant public review and comment.

B. Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

U.S. EPA stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the permits, due to the lack of specific requirements and measurable outcomes of some required actions in the plans.

Moreover, these stormwater management plans and amendments thereto made by the Permittees were not subject to public input, contrary to the U.S. Ninth Circuit Court's decision in the Phase II stormwater context that public participation is required for a stormwater management plan, because the substantive information about how an operator will reduce pollutants to the maximum extent possible was found in the stormwater management plan rather than the permit itself (*Environmental Defense Center v. EPA* (9th Cir. 2003) 344 F.3d 832, 857.).

This Permit continues to modify these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the permit development process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the CWA and the California Water Code (CWC). An advantage for Permittees and the public is that the permit requirements are known at the time of permit issuance and not determined later through an iterative review and approval of stormwater management plan amendments, during which time was spent more on getting an acceptable plan than on-the-ground actions. While it may still be necessary to amend the Permit prior to expiration where allowed, any need to do this should be minimized.

This Permit does not require approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require significantly increased staff resources. Instead, minimum measures have been established to simplify compliance determinations for the Water Board and make Permittees' performance more transparent to the public. Each Permit provision and its reporting requirements are written with transparency and

(comparative) administrative efficiency in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to set the rigorous enforceable baseline described above, while still allowing flexibility to numerous Permittees with a range of sizes and resources. To achieve this, the Permit frequently prescribes minimum measurable outcomes, while allowing Permittees to tailor the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. A balance between flexibility and enforceability has been crafted into the Permit.

C. Current Permit Approach

This Permit specifies the following: 1) requirements to effectively prohibit non-stormwater discharges into the storm drain system, pursuant to CWA § 402(p)(3)(B)(ii); 2) technology-based effluent limitations that require controls to reduce the discharge of pollutants to the "maximum extent practicable" (MEP)[1] pursuant to CWA § 402(p)(3)(B)(iii); and 3) water quality-based effluent limitations (WQBELs) pursuant to CWA § 402(p)(3)(B)(iii), which authorizes the inclusion of "such other provisions as the Administrator or the State determines appropriate for the control of…pollutants," for pesticides, trash, mercury, PCBs, bacteria, and sediment, in addition to technology-based effluent limitations. WQBELs for these pollutants are appropriate for control because water quality standards are not being met and these pollutants have impaired waters. The Permit includes requirements for the following components:

- Provision A. Discharge Prohibitions

[1] The CWA and its regulations have not specifically defined "MEP"; rather, it is a flexible and evolving standard. Congress established this flexible MEP standard so that administrative bodies would have "the tools to meet the fundamental goals of the Clean Water Act in the context of stormwater pollution"(*Building Industry Ass'n of San Diego County v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866, 884.). This standard was designed to allow permit writers flexibility to tailor permits to the site-specific nature of MS4s and to use a combination of pollution controls that may be different in different permits (*In re City of Irving, Texas, Municipal Storm Sewer System* (July 16, 2001) 10 E.A.D. 111 (E.P.A.).). The MEP standard is also expected to evolve in light of programmatic improvements, new source control initiatives, and technological advances that serve to improve the overall effectiveness of stormwater management programs in reducing pollutant loading to receiving waters. This is consistent with U.S. EPA's interpretation of stormwater management programs. As explained by U.S. EPA in its 1990 rulemaking, "EPA anticipates that storm water management programs will evolve and mature over time" (55 Fed.Reg. 47990, 48052 (Nov. 16, 1990)).

- Provision B. Discharge Prohibitions and Receiving Water Limitations
- Provision C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations
- Provision C.2. Municipal Operations
- Provision C.3. New Development and Redevelopment
- Provision C.4. Industrial and Commercial Site Controls
- Provision C.5. Illicit Discharge Detection and Elimination
- Provision C.6. Construction Site Control
- Provision C.7. Public Information and Outreach
- Provision C.8. Water Quality Monitoring
- Provision C.9. Pesticides Toxicity Control
- Provision C.10. Trash Load Reduction
- Provision C.11. Mercury Controls
- Provision C.12. PCBs Controls
- Provision C.13. Copper Controls
- Provision C.14. Bacteria Control for Impaired Water Bodies
- Provision C.15. Exempted and Conditionally Exempted Discharges
- Provision C.16. Discharges to Areas of Special Biological Significance
- Provision C.17. Discharges Associated with Unsheltered Homeless Populations
- Provision C.18. San Mateo County Sediment Controls
- Provision C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements
- Provision C.20. Cost Reporting
- Provision C.21. Asset Management
- Provision C.22. Annual Reports
- Provision C.23. Modifications to this Order
- Provision C.24. Standard Provisions

- Provision C.25. Expiration Date
- Provision C.26. Rescission of Old Order
- Provision C.27. Effective Date

IV. ECONOMIC ISSUES AND WATER CODE SECTION 13241

CWC section 13241 requires the Water Board to consider certain factors, including economic considerations, in the adoption of water quality objectives. CWC section 13263 requires the Water Board to take into consideration the provisions of CWC section 13241 in adopting waste discharge requirements.

In *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, the California Supreme Court considered whether regional water boards must comply with CWC section 13241 when issuing waste discharge requirements under CWC section 13263(a) by taking into account the costs a permittee will incur in complying with the permit requirements. The Court concluded that whether it is necessary to consider such cost information "depends on whether those restrictions meet or exceed the requirements of the federal Clean Water Act" (*Id*. at p. 627.). The Court ruled that regional water boards may not consider the factors in CWC section 13241, including economics, to justify imposing pollutant restrictions that are less stringent than applicable federal law requires (*Id*. at pp. 618, 626-627 ["[Water Code section 13377 specifies that…discharge permits issued by California's regional boards must meet the federal standards set by federal law. In effect, section 13377 forbids a regional board's consideration of any economic hardship on the part of the permit holder if doing so would result in the dilution of the requirements set by Congress in the Clean Water Act.... Because CWC section 13263 cannot authorize what federal law forbids, it cannot authorize a regional board, when issuing a…discharge permit, to use compliance costs to justify pollutant restrictions that do not comply with federal clean water standards."]). However, when pollutant restrictions in an NPDES permit are more stringent than federal law requires, CWC section 13263 requires that the regional water boards consider the factors described in CWC section 13241 as they apply to those specific restrictions.

As discussed in Section V.C, State Mandates, the Water Board finds that the requirements in this Order are not more stringent than the minimum federal requirements. Among other requirements, federal law (CWA section 402(p)(3)(B)(ii)) requires MS4 permits to include requirements to effectively prohibit non-storm water discharges into the MS4s, in addition to requiring controls to reduce the discharge of pollutants in stormwater to the MEP, and other provisions as U.S. EPA or the State determines are appropriate for the control of pollutants in MS4 discharges. The permitting agency must therefore include provisions when it finds it is appropriate to do so and to determine what permit conditions are necessary to control pollutants in a specific geographic area.

MS4 discharges in the San Francisco Bay region are a continuing and significant source of pollutants to receiving waters, many of them impaired. As such, the Water Board finds that inclusion of all of the requirements in the Order are necessary and appropriate to control pollutants in MS4 discharges including, but not limited to, requirements for non-stormwater discharges, technology and water quality-based effluent limitations, TMDLs, receiving water limitations, and monitoring and reporting to ensure that the requirements of the Order are being met.

The requirements in this Order may be more specific or detailed than those enumerated in federal regulations under 40 CFR 122.26 and guidance; however, the requirements have been designed to be consistent with and within the federal statutory mandates described in CWA section 402(p)(3)(B)(ii) and (iii) and the related federal regulations and guidance. The conditions in this Order are no more stringent than federal law (See *Defenders of Wildlife v. Browne*r (9th Cir. 1999) 191 F.3d 1159, 1166.). Each of the requirements in the Order, especially when implemented together, constitute the critical means towards achieving the requirements and goals of the CWA.

Moreover, the inclusion of numeric WQBELs in this Order does not cause this Order to be more stringent than federal law (See State Water Board Order No. WQ2021-0052-EXEC, p. 72.). Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The inclusion of WQBELs as discharge specifications in an NPDES permit in order to achieve compliance with water quality standards is not a more stringent requirement than the inclusion of BMP-based permit limitations to achieve water quality standards (*Ibid.*; State Water Board Order No. WQ 2006-0012 (Boeing)). This is supported by U.S. EPA in its guidance on incorporating TMDL WLAs for stormwater in NPDES permits, which explains that the permit's administrative record needs to demonstrate that WQBELs will achieve the WLAs, whether the WQBEL is expressed numerically or as a BMP.[2]

In light of the foregoing, consideration of the factors set forth in CWC section 13241 is not required for permit requirements to implement the effective prohibition on the discharge of non-stormwater discharges into the MS4 or for controls to reduce the discharge of pollutants in stormwater to the MEP, or other provisions that the Water Board has determined appropriate to control such pollutants, as those requirements are mandated by federal law.

While the Water Board need not consider the CWC section 13241 factors, the Water Board nevertheless considers them below, namely the past, present, and probable future beneficial uses of water; the environmental characteristics of the

[2] U.S. EPA, Memorandum, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs,'" (Nov. 26, 2014), p. 6; U.S. EPA, Memorandum, "Establishing Total Maximum Daily Load Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" (Nov. 22, 2002) (2002 U.S. EPA Memorandum).

hydrographic unit under consideration, including the quality of water available thereto; the water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area; economic considerations; the need for developing housing within the region; and the need to develop and use recycled water.

Water Code section 13241 "does not specify how a water board must go about considering the specified factors. Nor does it require the board to make specific findings on the factors" (*City of Arcadia et al v. State Water Resources Control Board and Los Angeles Regional Water Quality Control Board* (2011) 191 Cal.App.4th 156, 177.). In *City of Duarte v. State Water Resources Control Board* (2021) 60 Cal.App.5th 258, 272, the Court of Appeal held that the "manner in which the Water Control Boards consider and comply with Water Code section 13241 is within their discretion" and that "the Water Control Boards are charged with taking into account economic considerations, not merely costs of compliance with a permit.… [E]conomic considerations also include, among other things, the costs of not addressing the problems of contaminated water" (*Id*. at p. 276.). Lastly, consideration of section 13241 does not require a "cost-benefit analysis" (*See* State Water Board Order WQ 2020-0038 (*In the Matter of Review of Approval of Watershed Management Programs and an Enhanced Watershed Management Program Submitted Pursuant to Los Angeles Regional Water Quality Control Board Order R4-2012-0175*) at p. 31.).

The Water Board finds that the requirements in the Order are necessary to ensure the reasonable protection of beneficial uses of waterbodies and the prevention of nuisance. None of the factors of section 13241, including costs of compliance, is sufficient to justify failing to protect those beneficial uses. Nor is it sufficient to justify omitting any requirement in the Order, as the Board finds that doing so would unreasonably affect the designated beneficial uses of the region's waters. Additionally, it would be wholly inconsistent with federal requirements not to include the requirements in the Order, as the Board has deemed them necessary for the control of MS4 discharges. Where appropriate, the Board has provided Permittees with additional time to implement control measures to achieve final WQBELs and/or receiving water limitations and provided significant flexibility where appropriate. The Order builds on the knowledge gained from implementing the Previous Permit. In addition, the Board has provided significant flexibility for Permittees to choose how to implement the requirements of the Order, including by working with other Permittees to implement cost-effective control measures. The Order allows Permittees the flexibility to address critical water quality priorities, particularly discharges to waters subject to TMDLs, but aims to do so in a focused and cost-effective manner while maintaining the level of water quality protection mandated by the CWA.

The CWC section 13241 factors are considered as follows:

A. Past, Present, and Probable Future Uses of Water and Environmental Characteristics of the Hydrographic Unit Under Consideration

With respect to the "past, present, and probable future uses of water" and "environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto": the beneficial uses of the region's waters affected by MS4 storm water discharges are set forth in the Basin Plan, the Ocean Plan, and the Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) Plan, (as well as the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, applicable to the East County Permittees), which the Water Board has considered. The environmental characteristics of the waters under consideration, including water quality, have been affected by MS4 discharges of stormwater and non-stormwater, which convey myriad pollutants to surface waters, including hydrocarbons, heavy metals, pesticides, trash, mercury, PCBs, bacteria, and sediment, which have impaired waters in the regions, ultimately impacting present and probable future beneficial uses. For example, this has led to fish consumption advisories, adverse ecosystem and recreational impacts from trash and debris, and toxic conditions for aquatic life, among others. The requirements of the Order are necessary to protect and restore the past, present, and probable future beneficial uses of surface waters in the region.

B. Water Quality Conditions Reasonably Achievable

The "water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area" are not reconsidered when issuing waste discharge requirements, as water quality objectives have already been established and the purpose of permitting is to regulate a particular type of discharge or a discharge from a specific source, not all possible sources of pollutants to a receiving water. The water quality objectives implemented by the Order have already been subject to separate regulatory processes, and those water quality objectives were deemed reasonable and achievable when they were promulgated. The Water Board has found that water quality objectives can reasonably be achieved, in many cases over time in accordance with implementation schedules, such as those in TMDLs, through the coordinated control of all factors which affect water quality in the area. Achieving and maintaining water quality objectives is a coordinated effort and all regulated dischargers must contribute, including the Permittees, since MS4 discharges are a significant source of pollutants in receiving waters. The requirements in this Order are key to ensuring reasonable achievement of water quality objectives.

C. Housing Needs

With respect to the "need to develop housing within the region," the Water Board is mindful that housing demands have not kept up with population growth in the Bay Area. An increase in population creates a higher demand for water, exacerbates usage of natural resources, and increases generation of waste and pollution. In order to conserve and protect the quantity and quality of our natural resources, development must be done systematically. To protect human health and the environment, create economic opportunities, and provide attractive and affordable neighborhoods, U.S. EPA encourages smart growth and low impact development.[3] Stormwater management is an essential smart growth strategy. According to U.S. EPA, using smart growth and low impact development strategies, communities and developers can reduce runoff quantity, protect water quality, and conserve water by developing compactly, preserving ecologically critical open space, and using green infrastructure strategies.[4]

The Order helps to address the water needs associated with the need for housing by controlling the quality and quantity of MS4 discharges, and requiring some stormwater to be recycled and re-used. The low impact development requirements of the Order help to balance growth with the protection of water quality, by requiring new development to implement cost effective, lot-level strategies that replicate the natural hydrology of the site and reduce the negative impacts of development. By avoiding the installation of more costly conventional stormwater management strategies and harnessing runoff at the source, LID practices enhance the environment while providing cost savings to both developers and local governments.

The Order also incentivizes much-needed affordable housing in the Bay Area by providing regulatory flexibility for affordable housing projects in meeting low impact development requirements. The new requirements to address discharges associated with unsheltered homelessness may also encourage the development of housing, as Permittees may control discharges associated with homelessness by providing and expanding access to temporary or permanent housing.

D. Recycled Water Needs

On the "need to develop and use recycled water" factor, the Order allows Permittees, via their green infrastructure planning and alternative compliance

[3] According to U.S. EPA, "'[s]mart growth' covers a range of development and conservation strategies that help protect our health and natural environment and make our communities more attractive, economically stronger, and more socially diverse." Principles of smart growth include, but are not limited to, use of compact building design, creating a range of housing opportunities and choices, and preserving open space and critical environmental areas. United States Environmental Protection Agency. About Smart Growth. https://www.epa.gov/smartgrowth/about-smart-growth. Accessed on June 23, 2020.

[4] U.S. EPA. Smart Growth and Water. https://www.epa.gov/smartgrowth/smart-growth-and-water

processes in Provision C.3, to support or implement multi-benefit projects that capture and use runoff. During MRP 2, the City of South San Francisco and the San Mateo Countywide Water Pollution Prevention Program developed the Orange Memorial Park design, which incorporates water capture and use and is expected to be constructed during the Permit term. Permittees, in their Green Infrastructure Plans and Stormwater Resource Plans completed during MRP 2, have identified additional opportunities for such projects, and Order Provision C.3.j allows credit for their implementation.

E. Economic Considerations

Finally, with respect to the "economic considerations" factor, the Water Board has considered cost of compliance, especially since it is a consideration in the implementation of technology controls to the MEP. In 2000, the State Water Board issued a precedential order (State Water Board Order WQ 2000-11 (*Cities of Bellflower, et al*.) stating that cost of compliance with the programs and requirements of a municipal stormwater permit is a relevant factor in determining MEP. The Order also explicitly stated that a cost benefit analysis is not required. The State Water Board discussed costs as follows:

> *While the standard of MEP is not defined in the stormwater regulations or the Clean Water Act, the term has been defined in other federal rules....*
>
> *These definitions focus mostly on technical feasibility, but cost is also a relevant factor. There must be a serious attempt to comply, and practical solutions may not be lightly rejected. If, from the list of BMPs, a permittee chooses only a few of the least expensive methods, it is likely that MEP has not been met. On the other hand, if a permittee employs all applicable BMPs except those where it can show that they are not technically feasible in the locality, or whose cost would exceed any benefit to be derived, it would have met the standard. MEP requires permittees to choose effective BMPs, and to reject applicable BMPs only where other effective BMPs will serve the same purpose, the BMPs would not be technically feasible, or the cost would be prohibitive. Thus while cost is a factor, the Regional Water Board is not required to perform a cost-benefit analysis.*

(State Water Board Order WQ 2000-11, *supra*, p.20; see also State Water Board Order WQ 2020-0038, *supra*, p. 31.) The cost of complying with TMDL waste load allocations is not required to be considered since TMDLs are not subject to the MEP standard. Federal law requires that NPDES permits contain effluent limitations consistent with the assumptions of any applicable wasteload allocation in a TMDL

(40 C.F.R. §122.44(d)(1)(vii)(B).). Nevertheless, for purposes of CWC section 13241, these costs are considered.

Economic discussions of urban runoff management programs focus primarily on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, the true cost of implementation of the Permittees' urban runoff management programs is difficult to ascertain because reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin.[5] Permittees do not have a standardized approach to reporting costs, and in some cases attribute the full cost of pre-existing programs, program elements that serve purposes other than stormwater control, and grant-funded projects to the cost of complying with the stormwater permit. Below, we discuss these challenges in more detail, consider cost estimates from other regions, and provide estimates of both past and projected costs of this region's identify urban runoff management programs. In addition, we have also attempted to quantify both costs that would be incurred by not fully implementing the programs, as well as the benefits that result from program implementation.

1. Difficulties in Estimating Costs

Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, and stormwater pollution reduction approaches and costs are difficult to standardize. There are appropriate grounds for differences among municipal stormwater permits: what is practicable and prudent in one community may not work in another because of differences in population, hydrology, pollution sources, water uses, and municipal infrastructure, among other factors. In addition, Permittees have discretion in deciding how to comply with permit requirements, including requirements to implement TMDL wasteload allocations and achieve full-trash capture equivalency. Nevertheless, differences of a very wide margin are not easily explained.[6] While Permittees may be in a better position than Water Board staff to estimate the costs of compliance, they may have incentives to over-report costs or report costs they would have incurred regardless of the permit requirements. Thus, it continues to be difficult to ascertain the cost, for planning purposes, of fully implementing decades-long stormwater and urban runoff management programs, especially where significant flexibility has been provided to the Permittees to comply, both with regard to the manner of compliance and the timeframes for achieving compliance.

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[5] LA Regional Water Board, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003. p.2

[6] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Board, January 2003. p. 2. Web. June 20, 2019.

In addition, challenges in projecting costs include:

- Innovations in BMPs over time may reduce costs and/or increase pollutant removal;
- Changes in consumer products, land use, and demographics may increase, reduce or eliminate pollutants in MS4 discharges;
- Limitations of modeling used to identify appropriate BMPs to achieve required water quality outcomes, requiring water quality data for verification and periodic recalibration;
- Imprecise data at the planning stage on site-specific conditions for siting BMPs, which can significantly affect BMP sizing requirements as well as the types of BMPs that can be used at a site;
- Evolving science and evaluation of local conditions that may support site-specific water quality objectives; and
- Infrastructure age and condition, which may require significant rehabilitation or reconstruction projects to which Permit-required BMPs could be added at a reduced incremental cost relative to a standalone BMP retrofit project;[7]
- BMP implementation drivers outside the Permit, such as climate change, which may result in changes to the depth, duration, and frequency of precipitation events, as well as changes to urban temperatures and water availability; urban land use changes such as densification or multi-modal ("active") transportation design implementation; modified urban designs to improve air quality around transportation infrastructure; or modified street tree planting designs to improve street tree health, size, and longevity, leading to green stormwater infrastructure implementation for other purposes, that coincidentally satisfies Permit requirements.

Several ongoing initiatives seek to address the challenges described above, including efforts by the State Water Board's Office of Research, Planning, and Performance (ORPP)[8] to provide guidance on estimating TMDL implementation costs, and a project of the Environmental Finance Center (EFC) at California State

[7] As an example, in its 2019 stormwater fee funding initiative, the City of Alameda noted that "on average, the industry-standard life expectancy of a storm drain system is approximately 60 years. The majority of the City's storm drainage pipes were installed more than 50 years ago, leaving the City with a system that is approaching the end of its useful life." (City of Alameda, July 2019. *Fee Report: Water Quality and Flood Protection Fee*. p. 1). Many of the MRP Permittees own and operate MS4s that were built prior to or shortly after WWII and, as such, are systems due for significant rehabilitative or restorative maintenance. This has been one driver for MS4 master planning efforts by Permittees including the cities of Alameda (2008), Oakland (bids solicited in 2020), Palo Alto (2015 update), San Jose (2017), and Vallejo.

[8] State Water Board, ORPP, 2019. *Guidance for Future Total Maximum Daily Load (TMDL) Municipal Storm Water Cost Estimation,* p.2.

University, Sacramento's to compile existing resources on stormwater infrastructure costs and develop best practices for estimating costs. EFC's effort is evolving from CSU Sacramento's 2005 work, presented below in part, and will include estimates of costs for permit compliance activities, technical resources that assist stormwater managers, and project costs for both green and grey stormwater infrastructure.

ORPP's guidance describes methods for obtaining information on compliance approaches and associated costs and for completing an independent analysis of costs. The guidance promotes greater consistence and transparency related to estimation of costs to implement TMDLs. ORPP notes that, even with improved guidance, precise cost estimation remains challenging and the level of precision possible may be low in many cases. For example, industry-wide, there is no uniform database of projects' components and costs to date. [9]

The Permit specifies expectations for cost reporting in Provision C.20, Cost Reporting, which is intended to improve the Board's understanding of Permittee costs to comply with the Permit. The Water Board hopes that in conjunction with ORPP's guidance and the EFC's resources, Provision C.20 will provide valuable cost information that will improve the Water Boards' consideration of economic factors in issuing future permits.

a. Differentiating Stormwater Program Costs from Other Municipal Program Costs

Reported program costs are not all attributable to compliance with MS4 permits. Many program components and associated costs predate the MS4 permitting program, while other program components serve multiple purposes, only one of which is stormwater control, or would have been implemented irrespective of a permitting requirement. Therefore, true program cost resulting from MS4 permit requirements is sometimes some fraction of reported costs.

In the San Francisco Bay Region, most costs that will be incurred to implement the Order will not be new. Urban runoff management programs have been in place in this region for over 25 years. Municipalities have funded street sweeping and trash collection for decades, so their costs are not solely or even principally attributable to MS4 permit compliance. Some municipalities' source control ordinances, such as Berkeley's 1988 ban on Styrofoam, predated the stormwater permit's source control credits. Many municipalities had creek cleanup initiatives, long before doing so was eligible for a credit under the stormwater permit. Thus, any increase in cost to the Permittees as a result of this Order's requirements will be incremental in nature. This incremental increase may be quite low. A California State University, Sacramento study found that only 38 percent of program costs are new costs fully attributable to

[9] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Board, January 2003. p. 2. Web.

MS4 permits. The remainder of program costs were either preexisting or resulted from enhancement of preexisting programs.[10] The County of Orange found that an even smaller percentage, 20 percent, of its total stormwater management program budget was attributable to MS4 permit compliance. The remaining 80 percent is attributable to preexisting programs.[11]

In some cases, stormwater control is only one element of a larger project. For instance, stormwater control measures may be integrated into multi-benefit projects serving many objectives, such as green stormwater infrastructure elements of sidewalks and bike paths that also reduce the urban heat island effect and improve pedestrian and cyclist safety. Another example is the stormwater filtration pond at Northside Drive in Dublin, Alameda County, which filters runoff from upstream residential and commercial land use while serving as a significant urban park amenity. Other measures may start out as stormwater control measures only to become expected by residents for their other benefits (e.g., dog waste bags along trails or in public parks, trash receptacles at trailheads and parking areas, and restrooms or portable toilets at trailheads and in public parks). As for the costs associated with upgrading existing programs, only a fraction of the cost of a multi-benefit project should be attributed to MS4 permit implementation.

2. Current Permit Costs - Estimates from Other Regions

Despite the challenges in quantifying permit implementation costs, past efforts to identify urban runoff management program costs have produced useful information.

Studies on urban runoff management program costs and have found annual per-household costs ranging from about $15 – 67 (2021 dollars).[12]

For example, in 1999, U.S. EPA reported on multiple studies it conducted to determine the cost of urban runoff management programs.[13] A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 ($14.58)[14] per household per year. U.S. EPA also studied 35

[10] State Water Board, 2005. NPDES Stormwater Cost Survey. p. 58.

[11] County of Orange, 2000. A NPDES Annual Progress Report. p. 60. More current data from the County of Orange is
not used in this discussion because the County of Orange no longer reports such information.

[12] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. pp. 68791-68792.
State Water Board, 2005. NPDES Stormwater Cost Survey. p. ii

[13] U.S. EPA, 1999. *Preliminary Data Summary of Urban Storm Water Best Management Practices, EPA 821-R99-012*. Web.

[14] Figures in parentheses reflect adjustments for inflation to 2021 dollars using the U.S. Bureau of Labor Statistics' CPI Inflation Calculator: https://www.bls.gov/data/inflation_calculator.htm

Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 ($14.46) per household per year.[15]

The Los Angeles Regional Water Board also conducted a study on program cost based on costs reported in the municipalities' annual reports.[16] The Los Angeles Regional Water Board estimated that average per-household cost to implement the MS4 program in Los Angeles County was $12.50 ($18.18) per year.

The State Water Board commissioned a study by CSU Sacramento to assess costs of the Phase I MS4 program. Annual cost per household in the study ranged from $18 to $46 ($25.98 to $66.51) with the City of Encinitas in San Diego County representing the upper end of the range.[17] The higher cost of the City of Encinitas' program reflects its coastal location, reliance on tourism, consent decree with environmental groups, and overall superior program. In a separate review, the Central Coast Regional Water Board estimated that the costs imposed by its Phase I MS4 Permit for the City of Salinas (Order No. R3-2012-0005) were similar to those for Encinitas, since the Salinas permit's requirements were similar to those for Encinitas. Other MS4s assessed in the CSU Sacramento study were the cities of Corona and Santa Clarita, which were found to expend $32 ($46.76) and $39 ($40.53) per household on their stormwater programs, respectively. The range of costs for broadly similar programs in Southern California is likely representative of Permittees' costs to implement the programs.

3. Estimates of Permit Costs in the San Francisco Bay Region

Because the Permittees have not been required to report comprehensively on program implementation costs, estimates like those developed in CSU Sacramento's study are not available for the San Francisco Bay Region. Nevertheless, stormwater management fees implemented by certain Permittees provide some indication of the previous permit's implementation costs. The MRP Permittees' generally successful implementation of their urban runoff management programs for the past 25 years demonstrates that they have the resources available to implement them. We consider these costs below:

In 2019, the City of Alameda property owners approved the Water Quality and Flood Protection Initiative, which increased Alameda's existing Clean Water Program fee, originally adopted in 1992, to comply with state and federal clean

[15] National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Dischargers, Final Rule. Federal Register 64 (December 8, 1999): 68791. Web.

[16] Radulescu, Dan, and Xavier Swamikannu. *Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003*. Los Angeles Regional Water Quality Control Board, January 2003. p. 2. Web.

[17] State Water Board, 2005. Currier, Brian K., et al. *NPDES Storm Water Cost Survey Final Report.* Office of Water Programs, CS Sacramento, January 2005. pp. ii, iv

water requirements (28 percent); operate and maintain Alameda's MS4 (56 percent); and complete capital improvements to protect flooding (16 percent).[18] The initiative increased Alameda's existing fee revenues to $5.45 million per year from $2.89 million per year, and to $69.40 per capita from about $36.80 per capita. While the allocation of the fee funds suggests Alameda's costs to implement Permit requirements may not be more than about $20 per capita per year ($69.40 x 28 percent). However, because costs are not clearly separated and because Alameda incurs other costs that are recovered outside of the fee (e.g., costs for plan review for Provision C.3 projects, inspection of commercial, industrial, and construction facilities pursuant to Provisions C.4 and C.6, with recovery of those costs via fees for plan review or inspection), the true program cost is greater.

In April 2017, Palo Alto property owners approved a Storm Water Management Fee of about $164 per year for a typical single-family residence. This new fee replaced Palo Alto's then-existing Storm Drainage Fee, increasing it by about 2.3 percent. The fee was originally established in 1989 at $39 per year per "equivalent residential unit" and was raised to $51 per year in 1994-95, for a typical single-family residence.[19] The 2017 fee was to fund: storm drain system construction projects; green stormwater infrastructure projects; commercial and residential rebate programs to encourage installation of green stormwater infrastructure; floodplain management programs; debris and litter reduction; and public and residential integrated pest management activities. Palo Alto noted that the funding necessary to support "a minimum level of storm drainage service" would cost approximately $3.5 million per year, consisting of $2.5 million in baseline staff and expenses, and $1 million in annual debt service for past storm drain capital project revenue bonds, or about $52.60 per capita.[20]

Both fee increases provide a Bay Area estimate of current program costs and indicate the challenges of determining stormwater program-specific costs. While the fees include costs to comply with Permit, they also include other costs associated with MS4 construction, operation, and maintenance, which are not required by the Permit. At the same time, the fees do not cover all costs to implement the Permit. For example, the cities incur costs under Provision C.3 associated with plan review and approval, inspection of urban runoff treatment, and in some cases hydromodification control systems. In addition, they may incur costs for Permit-required inspections of construction sites and commercial and industrial businesses, and actions to address illicit discharges pursuant to Provisions C.4, C.5, and C.6. These costs are recovered through other fees, e.g., for plan review, permitting, and inspections, and business licenses. Permit-required work such as commercial and

[18] City of Alameda, 2019. *City of Alameda Water Quality & Flood Protection Initiative Official Ballot Information Guide.* Web. July 22, 2021.

[19] https://www.paloaltoonline.com/weekly/morgue/cover/2000_Sep_13.SIDEBAR.html

[20] City of Palo Alto, Sept. 22, 2015. *Finance Committee Staff Report: Storm Drainage Fee Renewal.* p.7.

industrial business inspections may be combined with inspections for purposes not required by the Permit, such as hazardous materials inspections completed by the local Certified Unified Program Agency (CUPA).

Similarly, Permittees may use General Fund revenues for purposes such as capital improvement projects, which could include provision of matching funds for grant-funded green stormwater infrastructure projects. The City of East Palo Alto experienced budget surpluses of up to $17.2 million per year from 2011 to 2019, and in 2019 transferred a portion of the surplus to provide cost match for grant-funded water infrastructure projects. Other cities experiencing surpluses in 2019 included Palo Alto ($76 million) and Mountain View ($118 million).[21] These expenditures may not be reflected in storm water fees.

Palo Alto's and Alameda's fees are similar to the reported costs for other municipalities to implement broadly similar MS4 permits. Given the significant limits noted herein, the Water Board concludes that the discussion describes costs that are generally representative of costs to implement the Previous Permit.

4. Program Costs

Below, we consider in greater detail the costs associated with compliance with the renewed Permit.

This economic analysis combines cost estimates at a macro level (e.g., per capita costs based on typical implementation costs compiled from multiple sources) and, where possible, estimated costs for Permittees to comply with specific Permit provisions.

For estimates of the projected costs to comply with the Permit, Water Board staff sought examples from published sources and experts, including:

- Permittees' stormwater program managers and staff
- Stormwater program managers around the State
- Stormwater staff at the Regional and State Water Boards
- Grant funding applications (e.g., Props. 1 and 84) and reports submitted to the State Water Board's Division of Financial Assistance (e.g., Storm Water Resource Plans)
- Information on projects implemented cooperatively with the California Department of Transportation (Caltrans)

[21] East Palo Alto Daily Post, Feb. 5, 2020. *East Palo Alto Posts a $15.6 million surplus.* Web. July 25, 2021.

- Total Maximum Daily Loads adopted by the Water Board and other Regional Water Boards
- Economic analyses conducted for other Regional and State Water Board orders and amendments to Water Quality Control Plans (e.g., the Trash Amendments)
- Available peer-reviewed and gray literature on the implementation of measures similar to those that are reasonably foreseeable under the Permit (e.g., reports on green stormwater infrastructure implementation for Philadelphia's Green City, Clean Waters program and others; collected cost information available at the International Stormwater BMP Database; and published reports and articles from the American Society of Civil Engineers and the Water Environment Federation)

Possible errors in cost estimates can result from extrapolating costs from other jurisdictions to the Permittees' on a per capita or per area basis because of differences in regional economies, population density, and other factors. A more accurate estimation of costs would seek to normalize cost factors before extrapolating in this manner. However, as discussed herein, because of limitations in the available data and uncertainties regarding Permittees' methods of compliance with the Permit, further effort to refine the estimates provided here would not necessarily improve them.

The Permittees' determination of a method of compliance will also affect cost. Permittees can choose to implement the least expensive measures that are effective in meeting the Permit requirements. The Permit also does not require Permittees to fully implement all requirements within a single permit term. Where appropriate, the Water Board has provided Permittees with additional time to implement control measures to achieve water quality objectives. In addition, changes to the Permit are typically incremental in nature, expanding upon or better defining existing programs or requirements. Estimates of new program costs can be inflated if they reflect the unit costs for grant-funded projects, often pilots being completed for the first time, that include measures that would be excluded if they were not being subsidized by grant funding.

The Permit generally maintains existing requirements, such that many MS4 program costs are continuing costs that may be well represented by the discussion above. At the same time the Permit's continuing requirements may result in additional implementation actions, which can result in new costs. In addition, the Permit includes new or revised expectations as described below, which may result in program costs not captured by the above analysis.

a. Continuing Requirements

Provisions for which requirements are substantially continuing, or continuing in a manner likely to result in similar costs to Permittees as under MRP 2, include:

- C.1 – Compliance with discharge prohibitions
- C.2 – Municipal operations
- C.4 – Industrial and commercial site controls
- C.5 – Illicit discharge detection and elimination
- C.6 – Construction site control
- C.7 – Public information and outreach
- C.9 – Pesticides toxicity control
- C.13 – Copper controls
- C.14.b – City of Pacifica and San Mateo County bacteria controls
- C.15 – Exempted and conditionally exempted discharges
- C.16 – Discharges to areas of special biological significance
- C.19 – East Contra Costa County Permittees

Provision C.5 includes a continuing requirement that Permittees maintain their MS4 maps, along with a requirement to develop a plan and schedule to update their existing maps. Permittees are likely to incur modest costs to develop this plan and schedule. Those permittees who have recently updated maps are likely to incur lower costs.

In addition, while Provision C.8, Monitoring, incorporates certain revised monitoring expectations, they are expected to result in costs similar to those incurred by the Permittees during MRP 2, including for monitoring conducted pursuant to Provision C.10, which has been moved into Provision C.8. That is because while some monitoring has been maintained (e.g., pesticides and pollutants of concern monitoring) or added (e.g., green stormwater infrastructure monitoring), other monitoring expectations were removed (e.g., creek status monitoring) and replaced with monitoring that is expected, overall, to have similar total costs. In addition, the provision incorporates flexibility to allow Permittees to complete monitoring efforts collectively and/or collaboratively, or in coordination with other efforts, such as the San Francisco Bay Regional Monitoring Program. All monitoring requirements are relevant and necessary to demonstrate compliance with permit requirements and to answer or to inform answer to critical specified management questions related to pollutant source identification, effectiveness of pollutant controls and management practices and actions, and attainment of water quality objectives in receiving waters. The monitoring requirements reflect a balance between minimizing monitoring costs and ensuring monitoring is scientifically sound and sufficient to provide usable

results. Any increased costs associated with new or revised monitoring requirements are modest compared to the costs of implementation of pollutant controls and management practices and actions, and the benefit of better-informed basis for cost-effective pollutant controls and management practices and actions, which will cost hundreds of millions of dollars over time, far outweigh any additional monitoring costs. In addition, reduced or inadequate monitoring efforts that do not produce usable results is a consequential waste of resources.

Further, trash monitoring requirements have been moved to Provision C.8 from Provision C.10. While they have been updated to reflect next steps based on work the Permittees completed during MRP 2, they are expected to involve a similar level of effort and cost.

Provision C.15 includes a continuing requirement to implement appropriate BMPs for non-stormwater discharges, including emergency firefighting discharges. This includes a requirement to convene a workgroup to update practices for emergency firefighting discharges and to implement training on the updated practices once during the permit term. This may result in costs to attend workgroup meetings, prepare updated BMPs and outreach materials, and train affected municipal staff.

Provision C.19 incorporates changes reflecting that subject East Contra Costa County Permittees, who were added to MRP 2 during the MRP 2 permit term, were granted time during MRP 2 to come up to speed with requirements of other Order provisions. Those Permittees are thus expected to be affected similarly to the other Permittees with respect to costs, as described elsewhere in this analysis. In addition, Provision C.19 incorporates requirements to achieve applicable wasteload allocations for mercury, in part by completing a study on Marsh Creek. However, those costs are roughly offset by reduced costs associated with work completed during MRP 2 that is now no longer required.

b. Continuing Requirements with additional costs

The Permit includes a number of provisions with requirements that may increase program costs. In many cases, these costs may be offset in whole or in part through collection of additional fees (e.g., for plan review and inspections), grant funding, completion of cooperative projects with other entities (e.g., Caltrans), or other sources.

The Permit would require additional costs as compared to MRP 2 to implement updated requirements for the following Provisions:

- C.3 – New and Redevelopment
- C.10 – Trash Control

- C.11 – Mercury Control and
- C.12 – PCBs Control

For Provisions C.3, C.10, C.11, and C.12, substantial portions of the Provisions' expectations are continuing requirements and expected to have costs similar to MRP 2. They also incorporate updated requirements, and the costs to implement those updated requirements are likely to be dominated by costs for green stormwater infrastructure implementation and implementation of full trash capture devices or measures equivalent to full trash capture, as described below. That is in part because building projects on the ground is more expensive than implementing municipal planning processes to require others to do so, to evaluate contaminated sites for referral to other agencies for cleanup, etc.

Green stormwater infrastructure implementation costs have a substantial potential range, depending on factors including project type, size, location, and constraints. In general, larger district- or regional-scale projects may have lower unit costs (i.e., costs per acre of impervious surface treated, or per unit of pollutants reduced) than smaller green street or parcel-scale projects.[22] In their Green Infrastructure planning processes and in comments on the Order's Administrative Draft, Permittees expressed the expectation that they would seek to implement a cost-efficient combination of measures sufficient to address Order requirements. Thus, it is likely that Permittees will choose to implement a combination of projects that is below the highest-cost analysis considered here.

To the extent these provisions contain updated measures that would impose additional costs on Permittees to implement, it is likely that those additional costs are within the range of implementation costs for green stormwater infrastructure and trash capture.

c. Continuing provisions with updated requirements

The Order includes post-construction stormwater requirements, including requirements to reduce discharges of mercury and PCBs, which green stormwater infrastructure will help achieve. Low impact development (LID), as a mode of implementing post-construction requirements, has been shown to be cost-effective and compares favorably to conventional stormwater management. "As LID was [originally] developed by a local government, it is sensitive to addressing local government's unique environmental and regulatory needs in the most economical manner possible by reducing costs associated with stormwater infrastructure design, construction, maintenance, and enforcement. LID also provides for local governments' need for economic vitality through reasonable and continued growth and redevelopment. LID allows for greater development potential with less environmental impact using smarter designs and

[22] WEF, Dec. 2, 2015. *Spotlight: The Real Cost of Green Infrastructure.*

advanced technologies to achieve a better balance between conservation, growth, ecosystem protection, and public health/quality of life."[23]

Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced cost. Other LID techniques, such as grassed swales, can be sued to infiltrate roadway runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. LID techniques can reduce creek and flood control channel maintenance needed due to erosion and sedimentation, and reduce the size and cost of flood control structures.[24]

The Water Board considered costs of implementing LID measures. In comments on the Administrative Draft of the Permit, the Permittees submitted an estimated average cost of $215,000 per impervious acre treated by bioretention.[25] However, the ACCWP noted a per-acre cost of approximately $660,000 for a single high-cost project, Union City's grant-funded H Street Green Street retrofit pilot project,[26] which incorporated substantial amounts of relatively more-expensive pervious pavement and concrete work. It is likely that increased municipal experience over time will reduce unit costs from this high number. Additionally, it is unlikely that municipalities implementing retrofit projects would incorporate cost drivers like large areas of pervious pavers and substantial underlying concrete work, when less-expensive options (e.g., bioretention bulb-outs, district- or regional-scale projects) are available.

In addition, costs to implement GSI include operation and maintenance costs. The Water Board reviewed available estimates of annual O&M costs, including general estimates about $1,120 – 2,240 (2021 dollars) per treated acre of impervious surface for bioretention cells, with somewhat higher numbers for porous and pavement and porous pavers (about $1,680 – 2,800 per acre

[23] Coffman, Larry. *Low Impact Development: Smart Technology for Clean Water, Definitions, Issues, Roadblocks, and Next Steps.* American Society of Civil Engineers, 2004. Web. August 3, 2021. p.1.

[24] U.S. EPA. *Reducing Stormwter Costs Through Low Impact Development (LID) Strategies and Practices*. EOA 841-F-07-006, December 2007.

[25] E.g., SCVURPPP and CCCWP comment letters of April 8, 2021, on MRP 3.0 Administrative Draft.

[26] ACCWP comment letter on MRP 3 Administrative Draft, April 8, 2021. p.7 of 31.

treated, 2021 dollars).[27] An ASCE survey of maintenance costs found that annual bioretention maintenance costs varied substantially, from $70 – 5,450 per acre treated, but averaged about 5-7 percent of capital costs, which was consistent with U.S. EPA guidance.[28] O&M costs may be borne by a Permittee or an implementing private party. The costs are incremental; in the absence of an O&M cost for GSI, a Permittee or private party typically would incur an O&M cost for the landscaping or other surface that would have been present if the GSI had not been built.

Further cost estimates are discussed below. This analysis considers a range of costs running from $50,000 per treated impervious acre as a potentially low cost for larger district- or regional-scale projects; $213,000 per treated acre as a potentially typical cost, and $660,000 per treated acre as a potentially high-end implementation cost for implementation of green stormwater infrastructure.

Provision C.3 would require Permittees to implement green stormwater infrastructure retrofit of up to 216.92 ac, while providing flexibility to include projects that may already be under way but not yet constructed (pursuant to Provision C.3.j.ii.(2)(e)), as well as certain projects that have not been completed by the end of the Permit term (pursuant to Provision C.3.j.ii.(2)(f)). In addition, it allows a reduction in GSI retrofit requirements for Permittees who implement ordinances to more broadly incorporate retrofit requirements into their planning and approval processes for C.3 Regulated Projects.

As a result, Permittees would be expected to incur costs ranging from $13.7 million to $181 million, with a more-typical expectation of about $58 million, to comply with the Permit's GSI retrofit requirements during the coming Permit term. As noted above, those costs are likely overstated because of flexibility provided within the Permit.

In a 2013 study,[29] the County of Orange, on behalf of the Orange County Stormwater Program, partnered with the Construction Industry Coalition on Water Quality to develop estimates of the costs of incorporating different combinations of LID BMPs into several of the most commonly encountered Orange County development scenarios. The study examined four different development project scenarios in Orange County, ranging in size from a small urban mixed-use commercial retail and residential property with no parking provided (0.14 ac), up to a large "big-box" type commercial retail center on 12.4

[27] WEF, Dec. 2, 2015. *Spotlight: The Real Cost of Green Infrastructure.*

[28] U.S. EPA, 199. *Preliminary data summary of urban stormwater best management practices.* EPA-821-R-99-012, Washington, DC.
Clary and Piza, 2017. *Cost of Maintaining Green Infrastructure*. EWRI of the American Society of Civil Engineers, ch. 3.

[29] Grey et al., March-April 2013. *The costs of LID: low-impact-development BMP installation and operation and maintenance costs in Orange County, CA.* Stormwater Magazine.

ac. In three of four scenarios, the percentage of impervious area assumed was 90 percent, with LID BMPs sited predominantly within landscaping and parking areas. The study considered five different LID BMPs for application within four categories of LID BMPs: infiltration basins and concrete pavers, harvest and use cisterns, green roofs, and biofiltration systems.

The study found that "infiltration and biofiltration systems were the least-cost practice to manage the Design Capture Volume for a given project, and the least costly BMPs to operate and maintain over a 20-year period. This finding is generally consistent with a small amount of published literature and reports on LID BMP costs in the U.S." Specific costs for LID BMP installation and O&M "ranged from just over $50,000 for an infiltration paver system serving the small urban mixed-use residential and commercial scenario (0.14 ac, 2,800-gal design capture volume) up to $4.7 million for a cistern and green roof combination serving the 12.4-ac big-box commercial project.

The Orange County study found: "Assuming no technical infeasibility constraints, the least-cost LID BMPs are infiltration and biofiltration systems, regardless of volume managed or project type…. Where space is available within a project site (the case studies assumed 3 percent or less of the total site area) to install an infiltration basin or biofiltration system, the cost of installing these two types of LID BMPs is under…$2 per square foot [about $87,000 per acre] of [impervious area]."

A 2011 study from the Minnesota Pollution Control Agency[30] reported data on 69 BMP projects and illustrates a wide variability in costs of different LID BMPs (Table A-1). In addition, costs are with a given BMP type are expected to vary substantially depending on factors described above.

Table A-1. BMP scost estimates.

Stormwater BMP	Dollars/Cubic Foot of Runoff
Large wet detention basin	$3.20 (treating more than 100,000 cubic feet)
Small detention basin	$231.67 (treating less than 10,000 cubic feet)
Constructed wetland	$1.60
Infiltration trench	$17.58
Bioretention basin	$92.67
Underground infiltration	$12.78
Pervious pavement	$25.56

Finally, Alcosan completed a GSI cost literature review that found an estimated cost of about $311,500 (2021 dollars) per acre of impervious surface treated for

[30] Minnesota Pollution Control Agency, 2011. *Best Management Practices Construction Costs, Maintenance Costs, and Land Requirements.* Prepared by Barr Engineering Company.

a range of projects that included BMPs including bioretention, infiltration trenches, pervious pavements, underground storage, and tree trenches.[31] Together, these estimates support the range of estimates used to estimate Permittee costs during the Permit term.

While substantial portions of Provision C.3 are the same as during MRP 2, the provision includes updated expectations for Regulated Projects, including roads, that are expected to result in additional municipal costs. Those include changes to Regulated Project definitions, including roads. To the extent those create additional oversight costs, the costs should be recoverable through fees including permitting, plan review, and inspection fees. To the extent they create additional construction costs for municipal road projects, the costs are likely to be funded through funding sources including Prop 1 gas tax funding and through reprioritization of work that excludes water quality measures.

SCVURPPP estimated that the road reconstruction requirements would cost Santa Clara County Permittees up to $300 million during the Permit term to treat about 1,400 acres of new or reworked impervious surface at an average cost of $213,000 per acre treated.[32] That estimate was prepared based on an expansive identification of what might qualify as a Regulated Project in this category, including ADA curb cuts, and particularly included a significant number of maintenance projects, as well as distributed, non-contiguous projects, that would not be expected to be regulated. That cost estimate is conservative and well in excess of Provision C.3's effect. Other commenters noted that the road reconstruction requirements would apply primarily, if not exclusively, to full-street reconstruction projects, such as active transportation/complete streets projects. While the total cost is unknown because the range of municipal projects that would be completed during the Permit term is unknown, costs are expected to be incremental relative to the total costs of those projects and within the range of unit costs described above.

Provision C.3 includes updated expectations for Special Project category C that are expected to result in minimal costs to Permittees, because implementing the category is optional, costs to implement it can be recovered via plan review and related fees, and because it replaces a similar, but more-expansive, category from MRP 2.

Provision C.3 includes an option for the Contra Costa Permittees to submit a hydromodification management report that would consist of refinements to work largely completed during MRP 2. This is expected to result in a modest cost for staff and consultant time.

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[31] Alcosan, 2012. *Starting at the Source: How our Region Can Work Together for Clean Water.* Appendix C: GSI Cost Literature Review. Pittsburgh.

[32] SCVURPPP, April 8, 2021. Comment letter on Administrative Draft. p.4.

Finally, Provision C.3 includes expectations that Permittees implement and, as appropriate, update the Green Infrastructure Plans they completed during MRP 2. This represents a lower level of effort from MRP 2, with likely some level of cost savings relative to MRP 2. Overall, it is continuing implementation, including programmatic work generally tied to ongoing practices (e.g., no missed opportunities, specific and general planning, policy review, outreach to elected officials and policy makers), and work that is consistent with what the Permittees determined was feasible in their GI Plans. Green infrastructure planning expectations include the retrofit requirement discussed above.

Provision C.10 will require Permittees to incur costs to control discharges of trash. These are largely continuing costs to implement controls required under MRP 2. Permittees will incur additional costs to proceed from MRP 2's required 80 percent reduction in trash discharges to the Permit's required 100 percent reduction, to be achieved using a combination of measures determined by each Permittee, and consisting of full trash capture, or implementation of a range of controls equivalent to full trash capture.

Absent more information on the specific costs the Permittees would incur for trash reduction, this economic analysis presents a range of costs from the economic analysis completed for the Trash Amendments.[33] Statewide, the economic analysis estimates that between $2.93 and 7.77 more per resident might need to be spent each year for the next ten years to implement the proposed Trash Amendments. The economic analysis provides estimates of compliance costs and considers the incremental costs (those beyond current costs) MS4 dischargers may incur based on implementation provisions and time scheduled in the Trash Amendments.

Permittees typically use a combination of full trash capture devices and equivalent measures. The economic analysis calculated an average per capita cost of $9.68 for a mix of measures implemented by MS4 permittees outside the Los Angeles Region. The economic analysis also found that a broad range of compliance options is available to permittees. For example, the selection of full capture systems depends on many site-specific factors and conditions. The analysis reports that capital cost per unit ranges from $300 per catch basin insert for installation and $330 for annual maintenance, to $80,000 per vortex separator system for installation (capital costs) and $30,000 for annual maintenance. Different methods may cover different areas. For example, a drop inlet filter may cover only one acre, whereas a vortex separator system may

[33] State Water Board Resolution No. 2015-0019. Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

cover many acres, and therefore a normalized cost per acre was estimated at $800 in capital cost and $342 in annual O&M.[34]

Large full trash capture devices may have substantially lower per-acre capital and O&M costs. For example, Permittees have successfully executed 18 cooperative implementation agreements (CIAs) with Caltrans as of the end of FY 2021, with a total funding contribution of over $55 million. These municipal partnership projects could potentially treat approximately 2,000 acres and 30,500 acres of Caltrans' and municipalities' significant trash generating areas, respectively.

In addition, Permittees may claim the benefit from other implemented controls, such as GSI, that also control trash. Thus, this estimate is conservative because there would not be additional cost to implement trash controls where GSI has been implemented, and in many cases the GSI will be implemented by a private party, so that Permittees will not incur the cost of construction, operation, or maintenance, although they would incur recoverable costs for plan review and inspection.

Water Board staff's December 2019 analysis of Permittee trash control found that as of July 1, 2019, Permittees reported having controlled trash from 65,900 acres with a moderate, high, or very high trash generation rate, and that 52,600 acres remained to be controlled.[35] Permittee work has continued since July 1, 2019, including substantial areas controlled by cooperative projects implemented in part with Caltrans funding (Table A-2). Caltrans funding will continue to be available to Permittees for qualifying projects, partly offsetting project costs.

In addition, Permittees would incur costs to prepare an impracticability report and to complete continuing reporting. These costs are expected to be within the estimate above.

[34] State Water Bboard, June 2014. Draft Staff Report Including the Draft Substitute Environmental Documentation, Draft Amendments to Statewide Water Quality Control Plans to Control Trash, Appendix C: Economic Considerations for the Proposed Amendments to Statewide Water Quality Control Plans to Control Trash, p.C-44.

[35] Kalyan, December 11, 2019. Staff Summary Report: Item 8. Municipal Regional Stormwater NPDES Permit, Permittee Compliance with the 80 Percent Trash Load Reduction Requirement – Information Item. Water Board meeting of December 11, 2019.

Table A-2. Caltrans-funded cooperative projects by FY 2021.

County	Permittee	Location/Project Name	Funding Agreement Year	Estimated Caltrans Acres Treated	Estimated Permittee Acres Treated	Caltrans Contribution
San Mateo	San Mateo	Memorial Park - Phase 1	2017/2018	234.0	6,336.0	$9,500,000
San Mateo	San Mateo	Memorial Park - Phase 2	2018/2019			$6,000,000
Contra Costa	Richmond	Parkway and S. 8th Street	2017/2018	74.0	960.0	$2,500,000
San Mateo	San Mateo	Poplar/Dore (implemented in 2019) and Coyote Point	2017/2018	42.0	765.0	$2,123,000
Contra Costa	Richmond	Meeker Slough	2018/2019	41.4	2,265.0	$3,000,000
Santa Clara	San Jose	Various	2017/2018	480.0	2,728.0	$5,500,000
Alameda	Hayward	2 locations - Tennyson Arf funded	2020	119.0	1,128.0	$1,841,000
Solano	Vallejo Waste Water	3 locations- BW Williams and Solano Ave + Austin Creek (amended)	2020	379.4	7,992.0	$3,338,000
San Mateo	City of San Mateo	Poplar Golf Course	2019/2020	16.0	333.0	$830,000
San Mateo	East Palo Alto	O'Connor Pump Station	2019/2020	39.0	864.0	$521,000
Alameda	Alameda County	Estudillo Canal	2019/2020	256.0	2,620.0	$2,175,000
San Mateo	Daly City	Vista Grande	2019/2020	154.0	1,915.8	$3,440,000

County	Permittee	Location/Project Name	Funding Agreement Year	Estimated Caltrans Acres Treated	Estimated Permittee Acres Treated	Caltrans Contribution
Contra Costa	Concord	Hillcrest Park Regional Project	2019/2020	90.0	509.3	$4,300,000
Contra Costa	Contra Costa County	Tara Hills	2019/2020	41.0	457.8	$3,945,000
Contra Costa	Richmond/El Cerrito	Bayview	2020/2021	31.0	840.0	$2,300,000
Alameda	Oakland	Mandela & 24th	2020/2021	16.8	583.9	$2,900,000
Alameda	Emeryville	MacArthur	2020/2021	3.8	77.0	$680,000
Santa Clara	Palo Alto	Embarcadero	2020/2021	20.5	189.0	$598,000
Total				2,038	30,563	$55,491,000

Provision C.11 will require Permittees will incur costs to control discharges of mercury. Those costs are largely for continuing requirements and, thus, are expected to be broadly similar to MRP 2. To the extent that Permittees implement GSI retrofit to achieve mercury reductions, that work would also reduce PCBs loads. Because the same control action is likely to reduce both mercury and PCBs, estimated costs for implementation have been considered below, under the Provision C.12 discussion.

Provision C.12 will require Permittees to continue to implement measures to reduce discharges of PCBs consistent with the applicable TMDL. Key aspects of this provision are consistent, or roughly consistent, with expectations under MRP 2. Lower costs should be incurred for some expectations. For example, in MRP 2, the Permittees developed a demolition debris control program, which they are now implementing. The cost to develop the program was likely higher than the implementation cost, which consists significantly of outreach and education using materials prepared during MRP 2. There are some small additional costs (relative to the current cost of implementing the current demolition debris program) associated with enhanced requirements for the demolition debris program. These include small costs for additional efforts to obtain official

documentation to ensure that building materials from demolished buildings containing PCBs concentrations greater than 50 ppm were properly disposed. There will also be small additional costs for demolition site inspection to ensure implementation of control measures at project sites to minimize off-site migration of PCBs. These inspection costs should be minor as economies of scale can be realized by integrating these inspections into the inspection program required pursuant to Provision C.6. Permittees will continue to investigate contaminated sites for referral to the Water Board, DTSC, or U.S. EPA for cleanup. While that may result in continuing costs or somewhat increased costs as compared to MRP 2, overall the requirements are expected to be roughly equivalent.

Permittees are expected to continue to implement actions to reduce discharges of PCBs to the MS4. These include implementing controls to capture PCBs before they can discharge to the MS4, which could include GSI, diversion of flows to the sanitary sewer for treatment, or other controls. To demonstrate progress towards achieving the wasteload allocation during the Permit term, Permittees are expected to address discharges from about 3,000 ac of impervious surface in old industrial areas using a combination of measures that they determine.

Based on the above GSI unit cost estimates, the cost to accomplish that reduction is likely to range from about $150 million to $2 billion, with a typical cost of about $639 million. This estimate is likely to be conservative (i.e., likely greater than the actual cost incurred) because GSI or treatment control measures implemented by private parties would reduce Permittee costs to self-implement controls; Permittees can account for benefit from other actions, including their GSI retrofit work pursuant to Provision C.3 and implementation of trash controls pursuant to Provision C.10, and Permittees are likely to implement a mix of BMPs that is less costly than the maximum, and to include less-costly district-scale or regional BMPs. In addition, costs for diversion to sanitary sewers may be lower on a unit cost basis than GSI costs. A portion of project funding will be available from Caltrans pursuant to alternative compliance associated with its MS4 permit, and Caltrans ROW is constrained, so off-ROW implementation is a preferred path for Caltrans, which has indicated its intent to continue to support cooperative projects, including through its Clean California initiative.

Provision C.12 also requires the creation of a two new program to control PCBs. The first program is to control PCBs when bridge and overpass roadways are replaced or undergo major repair. The costs associated with creation of this new program will be small because the effort consists in ensuring that roadway crews follow a protocol (to be developed by Caltrans) to ensure proper management and disposal of PCB-containing caulk in roadway expansion joints when bridge and overpass roadways are replaced or substantially repaired. Small additional

costs should be expected associated with the creation of the second new program Permittees must develop to ensure proper management of PCBs in oil-filled electrical equipment (OFEE) for municipally owned electrical utilities and collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities. Costs for both of these new programs is expected to be small because both involve simply making sure that proper procedures are being followed.

Provision C.14 requires Permittees to control discharges of bacteria consistent with applicable TMDLs or to address identified exceedances of water quality objectives.

Provision C.14.a requires two Permittees, the cities of Mountain View and Sunnyvale, to implement measures to control bacteria to address identified exceedances of water quality objectives. While this work is being called out in a subprovision that was not present in MRP 2, the expectations largely reflect continuation of work the cities were implementing during MRP 2 pursuant to MRP 2's, and the Permit's, prohibition on discharges of non-stormwater to the MS4. That includes evaluation of municipal operations for bacteria discharges, inspect for illicit connections of sanitary flows to the storm sewer system, incorporation of bacteria concerns into commercial and industrial business inspections, provision of pet waste stations, collection of trash, control of bacteria sources associated with unsheltered homeless populations, and public outreach. C.14.a requires the Permittees to focus or increase these actions, which are also conducted across municipalities broadly, in areas near the known bacteria water quality exceedance locations. The cities may incur additional incremental costs associated with additional inspections, coordination with the sanitary sewer agencies on collection system operation and maintenance, and greater levels of effort in each of the categories. These costs are expected to be recoverable through inspection fees with existing staff resources. Where new actions are required, their unit costs are expected to be similar to those presented in the San Pedro Creek and Pacifica State Beach Bacteria TMDL Staff Report, Section 12.3: Economic Considerations,[36] and with estimates presented above for green stormwater infrastructure implementation.

Provision C.14.c requires the City of San Mateo to control discharges of bacteria to its Marina Lagoon beaches. Similar to Provision C.14.a, the initial measures are continued effort, with incremental expansion, of existing work required under MRP 2, like illicit discharge detection and elimination, trash control, and public information and outreach. The City is expected to incur some additional costs for a potentially elevated level of effort, including monitoring. If water quality objectives are not achieved, then the City will incur costs to complete a report

[36] San Francisco Bay Regional Water Board, Nov. 2012. *TMDL for Bacteria in San Pedro Creek and at Pacifica State Beach: Staff Report.* pp.105-110).

evaluating additional actions sufficient to achieve the objectives, which may lead to costs in this permit term. Depending on the report content, an outside contractor may charge approximately $70,000 – 200,000 to complete this report (assuming a contractor rate of $150/hr).

Provision C.14.d requires the City of Half Moon Bay and San Mateo County to control bacteria discharging to Pillar Point Harbor and Venice Beach. Similar to Provision C.14.a, the initial measures are continued effort, with incremental expansion, of existing work required under MRP 2, like beach bacteria monitoring, illicit discharge detection and elimination, trash control, and public information and outreach. Expansion of work includes, for example, including bacteria control in staff training. The City and County may incur some additional costs for a potentially elevated level of effort. If water quality objectives are not achieved, then the City and County will incur costs to complete a report evaluating additional actions sufficient to achieve the objectives, which may lead to costs in a subsequent permit term.

The Permittees covered by the above C.14 subprovisions could implement green stormwater infrastructure to eliminate discharges and reduce bacteria concentrations in remaining discharges. Where GSI is implemented pursuant to Provision C.3 requirements, there is not expected to be an additional cost to the Permittees for a bacteria control benefit to be realized. Similarly, trash control measures implemented pursuant to Provision C.10 may provide some bacteria control benefit, but would not result in additional incremental costs to the Permittees. However, where the Permittees undertake control actions, such as green stormwater infrastructure retrofit, that go beyond Provision C.3 requirements, then the cost of that work would be expected to be consistent with the estimates presented above for Provisions C.3 and C.12.

Provision C.18 requires the County of San Mateo to control discharges of sediment in the Pescadero-Butano watershed consistent with the applicable TMDL. Specifically, the County would be required to create a prioritized list of road projects with the potential to contribute sediment to the Pescadero-Butano and San Gregorio watersheds. The County would be required to take measures to reduce sediment delivery from County roads in the Pescadero-Butano watershed. The Water Board staff report for the TMDL economic analysis estimated such costs at about $35,000 per mile for unpaved roads, and $60,000 per mile per paved roads. The total lengths of roads to be controlled under the TMDL are 325 (unpaved) and 325 (paved), and the total costs for the work were estimated at about $37 million over a 20-year implementation period.[37] The Permit requires implementation of actions in 20 percent of the Pescadero-Butano watershed, but none in the San Gregorio Creek watershed during this

[37] San Francisco Bay Regional Water Quality Control Board, Dec. 11, 2018. *TMDL for Sediment and Habitat Enhancement Plan for Pescadero-Butano Watershed: Staff Report.*

Permit term. As a result, implementation costs are estimated conservatively at about $7.2 million during the Permit term. However, projects may be completed as part of other prioritized maintenance projects or otherwise such that the Permittee does not incur that full level of costs, but rather a reduced amount that is offset by the Permittee's costs for projects it would have completed anyway. In addition, the Permittee may incur costs associated with creating the prioritized list and with monitoring the effectiveness of completed projects.

d. New provisions

Although C.17, C.20, and C.21 are new provisions, their substantive requirements generally reflect work that was already required or already being completed, as described further below. Permittees may incur costs for going beyond required or continuing work.

Provision C.17 requires Permittees to coordinate internally and use existing resources to report on the locations of homeless populations in their jurisdictions. Permittees already have this information at different levels of detail. Some permittees, such as Fremont, Oakland, and San Jose, have detailed databases or maps of populations; other Permittees are small enough that municipal staff are familiar with where the populations are located; others rely on heat maps for a general understanding. The Permit allows flexibility in this reporting, but Permittees would be expected to incur a modest cost to collect and report this information.

Permittees must collectively prepare a BMP report that identifies what Permittees and stakeholders are doing to control discharges associated with unsheltered homelessness, and the effectiveness of these controls. Permittees are likely to incur costs for coordination and report preparation. In addition, Permittees must prepare two reports on their implementation of BMPs, including the portion(s) of the population reached and the gap—that is, the work left to be done.

MRP 2 required the Permittees to control illicit non-stormwater discharges, including discharges of trash and human waste from unsheltered homeless populations. To the extent that Provision C.17 simply refines and clarifies the pre-existing mandate, it is a continuing requirement, with an additional expectation for coordination and reporting as noted above.

Overall, the solutions to homelessness are broadly outside Permit requirements. A 2015 report found that effective implementation of such solutions, such as providing housing to unsheltered individuals, could reduce costs to government, because shifting costs from emergency services and the justice system use to housing and jobs would be cheaper and generate more revenue than the *status*

quo.[38] Thus, while there is a cost to implementing measures to address unsheltered homelessness, the overall effect of implementing effective measures, including those to control discharges of trash and human waste, could be to reduce costs to government.

Provision C.20 requires Permittees to develop a cost reporting methodology by December 31, 2022, and then to submit fiscal analyses annually starting in 2024. Permittees are expected to incur costs to collectively develop the methodology and then to implement it. In general, this provision requires tracking and reporting of information that should be available, but for which there will be needed internal coordination. The work to prepare a methodology allows flexibility to understand the form that cost information is available and develop efficient means for reporting. The work likely to be completed using existing Permittee staff resources and consulting assistance available within the programs.

Provision C.21 requires development of an asset management program to manage Permittee (i.e., public) hard assets (e.g., bioretention cells, pervious pavements, trash capture devices). The asset management plan is expected to improve the Permittees' understanding of the condition and performance of their stormwater infrastructure, to account for additional stressors related to climate change, and to identify cost factors to support more-accurate forecasting and budget development.

U.S. EPA's Water Finance Clearinghouse and the CSU Sacramento Office of Water Program's Environmental Finance Center (EFC) are conducting work to support stormwater asset management. The EFC has developed draft stormwater finance and asset management guidance and toolkits, including resources for estimating stormwater costs, and is supporting California municipal stormwater programs to test and refine the toolkit with the intent of using the results of asset management planning to support the development of stormwater utilities to fund stormwater programs.[39]

The Permittees have implemented measures to support asset management planning. They have mapped many of their hard assts (e.g., structural stormwater control measures) and regularly inspected them to determine their condition. They use modern data collection tools, including databases and GIS systems, to improve information collection and tracking efficiencies and improve their understanding of the condition and performance of their stormwater assets. The Water Board expects the Permittees' costs to comply with the Permit's

[38] Flaming et al., 2015. *Home not found: The cost of homelessness in Silicon Valley.* Destination Home and the County of Santa Clara.

[39] Odusoga, March 28, 2019. "Asset Management Storm Water Roundtable Presentation," U.S. EPA, slide 28.

asset management requirements to be mitigated to some degree by these efforts.

Asset management results in potential cost savings over time and may provide a sound basis for establishing utility fees to support sustained funding of stormwater programs, but the initial investment of resources and time can be high. The City of San Diego's much more comprehensive asset management plan (including, for example, hard assets like flood management infrastructure and soft assets like outreach materials) was developed over a period of about five years and cost approximately $2 million, not including staff time.[40] Since 2013, when the plan was finished, San Diego has spent as much or more on follow-up work, like expanding its asset inventory. $4 million is a significant investment, but for context, San Diego has a roughly $3 billion stormwater quality and flood management program over 18 years. There are also cost-saving benefits for an effective asset management program.[41]

San Diego's asset management plan is significantly larger in scope than that required by the Permit, which focuses on publicly owned hard assets. As a result, Permittee costs to develop asset management plans are expected to be substantially less, in part because, as noted above, they are primarily tracking and reporting on existing controls for which MRP 2 already required tracking and reporting efforts, and for which the Permittees have established systems to accomplish that work. As such, the asset management approach primarily will require organization of existing efforts with an additional incremental cost.

5. Costs of Not Implementing the Permit

While it is important to consider the cost of compliance, it is also important to consider the costs that would be incurred by not fully regulating or controlling MS4 discharges to receiving waters. The Water Boards have long recognized that water quality impairment negatively impacts the economy, while improved water quality can have a positive impact (see, for example, Order WQ 2000-11). The costs of not implementing the Permit are likely to be significant and could include adverse impacts to public health associated with illness from water contact recreation and ingestion of water with harmful levels of pathogens; increased threat of disease, including cancer, from consumption of fish containing harmful levels of mercury and PCBs; threats to public and private infrastructure, properties, and aquatic habitat from erosion and sedimentation; impacts to contact and non-contact water recreation, including swimming, boating, surfing, wind- and kite-surfing, wading, birding, walking, and hiking, associated with discharges of trash; impacts to property

[40] Region 3 Water Board Fact Sheet for Order No. R3-2019-0073, Citing personal communication with Drew Kleis, Deputy Director, City of San Diego Transportation and Storm Water Department Storm Water Division, April 22, 2019.

[41] URS Corporation. July 19, 2013. Transportation and Storm Water Department Storm Water Division: Watershed Asset Management Plan, City of San Diego. p.7.

values associated with the short- or long-term presence of pollutants in receiving waters, and associated impacts to the Bay Area quality of life, that includes a significant outdoor component engaged with the Bay Area's water bodies. Below, a few of these costs are discussed in more detail.

Impairments in water quality can lead directly to increased health care costs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[42] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8 percent among bathers at those beaches resulted in about $3 million annually in health-related expenses.[43] These numbers can likely be extrapolated to the Bay Area, where many beaches support significant contact recreation while at the same time exhibiting bacteria impairments. Thus, failure to bacteria controls could result in significant health expenses to the public, while implementing such controls could result in significant savings.

Urban runoff and its impact on receiving waters also place a cost on tourism. The California Division of Tourism has estimated that each out-of-state visitor spends $101 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999 due to bacteria exceedances, impacting beach visitation and undoubtedly impacting the local economy.

Similarly, proper trash management can save a municipality significant amounts of money in addition to providing water quality benefits. Even with the changes in recycling markets over the past few years, certain items, such as metals, remain profitable to divert from residential waste streams.[44] Similarly, adequate trash pickup and collection can cut down on complaints by residents and the resources associated with responding to them[45] and can also reduce the costs of maintaining full-trash capture devices.[46] Finally, source control methods, such as bans, taxes, or fees that reduce the use of certain items, can generate an income stream for local

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[42] Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa
Monica Bay. Santa Monica Bay Restoration Project.

[43] Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of
Treatment and Lost Wages for Beachgoers Who Get Sick.

[44] Brosnahan, Cori. "Despite Recycling Success, S.F.'s Zero Waste Goal Remains Elusive," *San Francisco Public Press* (Nov. 6, 2020).

[45] Daly, Clara-Sophia. "Newsom's experiment to get rid of public trash bins in San Francisco seems to have failed," *Mission Local* (March 21, 2021).

[46] San Francisco Estuary Partnership, "Bay Area-wide Trash Capture Demonstration Project," (May 8, 2014), pp. 39-40.

governments, reduce full trash capture maintenance costs, and reduce tipping fees for disposing of the materials removed from the devices.[47]

As noted above, the costs of not implementing the Permit are likely to be significant, including economic and non-economic: adverse impacts to public health associated with illness from water contact recreation and ingestion of water with harmful levels of pathogens; increased threat of disease, including cancer, from consumption of fish containing harmful levels of mercury and PCBs; threats to public and private infrastructure, properties, and aquatic habitat from erosion and sedimentation; impacts to contact and non-contact water recreation, including swimming, boating, surfing, wind- and kite-surfing, wading, birding, walking, and hiking, associated with discharges of trash; impacts to property values associated with the short- or long-term presence of pollutants in receiving waters, and associated impacts to the Bay Area quality of life, that includes a significant outdoor component engaged with the Bay Area's water bodies.

The Santa Clara Valley Open Space Authority, focusing on open space, estimated that ecosystem services in Santa Clara County provide an estimated benefit of $1.6 to 3.8 billion annually, or about $1,900 to 4,600 per acre, noting they were provided by "natural capital like…wetlands, rivers and streams…as well as urban parks and open spaces.[48] In the absence of the Permit, as noted above, those services are likely to be impaired, resulting in reduced economic value to Santa Clara County and the Bay Area. Extrapolating that estimate to the other four counties with MRP Permittees shows a potentially even more significant economic impact from not implementing the Permit.

The Center for Neighborhood Technology issued a 2010 guide to recognizing the value of one component of the Permit's program, green infrastructure.[49] The guide includes descriptions of impacts in the absence of GI implementation, including higher costs for alternate means of accomplishing the benefits, reduced community livability, and impacts to public health.

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[47] EOA, City of Milpitas Trash Capture Feasibility Study, 2017, pp. 1, 13 (estimating reduction achieved by plastic bag ban and achievable by polystyrene ban.); see also Stieb, Matt. "Maine Makes U.S. Recycling Actually Work Again," *New York Magazine* (July 21, 2021).

[48] Santa Clara Valley Open Space Authority, 2014. *Healthy Lands and Healthy Economies: Nature's Value in Santa Clara County.* https://www.openspaceauthority.org/system/user_files/Documents/NaturesValue_SCC_int.pdf.
Santa Clara Valley Open Space Authority, 2018. *Healthy Lands and Healthy Economies: Natural Capital in Santa Clara, Santa Cruz, and Sonoma Counties.* https://www.openspaceauthority.org/system/user_files/Documents/HLHE%20-%20Regional%20Report.pdf.

[49] Center for Neighborhood Technology, 2010. *The Value of Green Infrastructure: A guide to recognizing its economic, environmental and social benefits. https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf.*

6. Benefits associated with implementing the Permit

Permit implementation must also be viewed in terms of its value, both quantitative and qualitative, to the public. One way of measuring this value quantitatively is by estimating how willing residents are to pay for improvements to water quality. However, benefits from stormwater controls go beyond improving water quality. They include reducing the urban heat island effect, helping to make the water supply more reliable and cost effective, and supplying ecosystem services. These benefits are discussed in more detail below.

a. Public Willingness to Pay for Water Quality Improvement

U.S. EPA estimated household willingness to pay for such improvements to be $158 - 210 annually or $13 - $17.50 monthly.[50] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento, study corroborates U.S. EPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180, or $15 monthly.[51] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Los Angeles voters' 2018 approval of Measure W, which imposes a parcel tax that is projected to raise approximately $300 million per year to clean stormwater runoff, promote capture and use projects, and add urban green space, is another indication of willingness to pay for water quality improvement. Measure W, which imposes an impervious surface-based fee, was estimated to cost a typical household about $83/year.[52] That cost is necessarily in addition to existing expenditures in LA for clean water, which include, but are not limited to, urban runoff management program costs of up to $67 per household. This is consistent with the U.S. EPA and California State University, Sacramento findings above.

A study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to

[50] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. p. 68793.

[51] State Water Board, 2005. NPDES Stormwater Cost Survey. p. iv.

[52] McNary, Oct. 19, 2018. *Measure W: A needless tax on rain, or LA's best solution to drought?* LAist. https://laist.com/news/measure-w-a-new-tax-on-landowners-to-catch-las-rain.

$7.4 billion, while benefits could reach $18 billion.[53] Costs are anticipated to be borne over many years – probably ten years at least. Thus, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by U.S. EPA, which found that the benefits of implementation of its Phase II stormwater rule would also outweigh the costs.[54]

b. Urban Heat Island Mitigation

Installing green infrastructure mitigates urban heat island effects, with greater returns on investment for installations located in areas lacking tree canopies and green spaces. In urban areas, buildings and pavement retain heat, making them hotter than surrounding non-urban areas, known as the urban heat island effect. Climate change will continue to exacerbate urban heat island effects, but trees and vegetation can decrease local temperatures, particularly if they are distributed throughout an area. Reduced temperatures during hot weather not only make it more comfortable for people to recreate outside, but can also save lives during extreme heat events. The San Francisco Estuary Institute found that if Los Angeles County had tree coverage at 40 percent, as opposed to the baseline of 16 percent, during a September 2010 dry Santa Ana event, there would have been a 29 percent reduction in mortality, equivalent to saving 23 lives. In Los Angeles, De Guzman et al. (2020) found that relative to the average mortality rate, during an average five-day heat wave in Los Angeles County there are 4.1 percent more deaths on the first day and 11.9 percent more deaths on the fifty day.[55] While the study only modeled mortality, it can reasonably be expected that hospitalizations and health conditions brought on by heat stress would be reduced, as well. In addition to trees, other GSI, such as bioswales, rain gardens, and green roofs can also reduce temperatures.[56]

Installing green infrastructure in economically disadvantaged areas may have additional benefits. In metropolitan areas nationwide, neighborhoods with lower median household incomes are associated with less urban tree cover.[57] In areas where the federal government historically redlined, current average incomes tend to be lower and temperatures tend to be hotter because of historic

[53] LA Regional Water Board, 2004. Alternative Approaches to Stormwater Control.

[54] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

[55] De Guzman, et al., 2020. *Rx for Hot Cities: Climate Resilience Through Urban Greening and Cooling in Los Angeles.* TreePeople. https://www.treepeople.org/wp-content/uploads/2020/09/RX-for-hot-cities-report.PDF

[56] Georgetown Climate Center. ND. Green infrastructure strategies and techniques. https://www.gerogetownclimate.org/adaptation/toolkits/green-infrastructure-toolkit/green-infrastructure-strategies-and-techniques.html

[57] Schwarz et al., 2015. *Trees grow on money: Urban tree canopy cover and environmental justice.* PLoS ONE 10(4): e0122051. https://doi.org/10.1371/journal.pone.0122051

disinvestment in those neighborhoods.[58] Deaths from heat waves are disproportionately suffered by the poor.[59] Accordingly, green infrastructure projects in economically disadvantaged areas could help to alleviate longstanding inequities and improve health outcomes for particularly vulnerable populations.

c. Water Supply Cost Savings and Co-Benefits

Stormwater capture can be an effective way for Permittees to achieve the goals of the CWA and Permit requirements by preventing stormwater and associated pollutants from discharging to receiving waters, although Bay Area soils with limited infiltration rates can limit the applicability of measures that rely substantially on infiltration. Stormwater capture has also become the focus of intense interest during California's current drought and in the wake of California's most-recent 2012-2019 drought. The Water Boards have recognized the importance of treating stormwater as a valuable resource where capture and use can result in water supply cost savings, as well as multiple other benefits within a watershed. Among other efforts, the State Water Board's Strategy to Optimize Resource Management of Stormwater (STORMS) seeks to promote stormwater capture and use. STORMS' recent 2018 report, *Enhancing Urban Runoff Capture and Use*, points out that among a variety of benefits, "stormwater capture can also reduce reliance on imported water from distant sources, which reduces inter-basin (or inter-region) transfers and polluted runoff. Stormwater supports the fit-for-purpose water supply concept by satisfying less-sensitive water demands, such as certain household, landscaping, and commercial needs, with mildly polluted water. Runoff from roads and driveways can be captured and harvested locally using distributed hybrid systems (for example, bioretention with an underdrain that feeds a cistern used for irrigation) configured to provide non-potable water for human use."[60]

The Permit supports investment in infrastructure to create a resilient local water supply. The potential for water usage from stormwater is significant, with Diringer et al. (2020) from the Pacific Institute estimating that stormwater capture from paved surfaces and rooftops in the urbanized Bay Area and Southern

[58] Hoffman, et al., 2020. *The effects of historical housing policies on resident exposure to intra-urban heat: a study of 108 U.S. urban areas.* Climate. https://www.mdpi.com/2225-1154/8/1/12/htm

[59] Kesslen, Ben. "Heat waves fall hardest on poor and elderly, experts say," *NBC News* (July 20, 2019); Kaplan, Sarah, "Heat waves are dangerous. Isolation and inequality make them deadly," *Washington Post* (July 21, 2021).

[60] State Water Board, April 10, 2018. STORMS: Projects 1a Promote Stormwater Capture and Use and 1b Identify and Eliminate Barriers to Stormwater Capture and Use. Products 1 – CSU Sacramento. Final Report: Enhancing Urban Runoff Capture and Use. pp. 18-19/

California could add 420,000 to 630,000 acre-feet in average annual water supply, or about 6 to 10 percent of annual water usage in those areas in 2014.[61]

The Permit gives Permittees the flexibility to develop multi-benefit stormwater management projects that will improve water quality while also providing benefits such as recharging of groundwater basins for local water supply and implementation of LID and green streets policies. Shimabaku et al. (2018) from the Pacific Institute emphasizes that effective urban stormwater capture provides an opportunity to address multiple benefits, including flood control, water quality impairments, improving water supply reliability, providing habitat, reducing urban temperatures, reducing energy use, creating community recreation spaces, and increasing property values.[62]

Diringer et al. analyzed stormwater capture project costs and benefits as they affect the cost of an acre-foot of water. They found that failing to consider the effects of co-benefits results in inflated net project costs. They gathered data from rounds 1 and 2 of Prop 1E and Prop 84 project proposals. Of a total of fifty projects, 26 addressed urban runoff and 24 dealt with non-urban runoff. The authors found that after accounting for the projects' benefits, the net levelized cost for urban stormwater capture projects decreased from $1,030/acre-foot to $150/acre-foot, with some projects yielding net benefits. Monetized benefits considered in their calculation included flood damage reduction, water quality, energy savings, community recreation, public use, property values, habitat value, CO_2 equivalents, and avoided costs. Because many projects reported limited benefits categories, the overall cost per acre-foot would likely be even lower than $150 when other cobenefits are considered.

d. Ecosystem Services Benefits

In addition to the foregoing, there are various other environmental benefits resulting from the Permit. For example, the 2018 STORMS report describes a range of benefits of capture and use, suggesting that "designing stormwater infrastructure to directly support ecosystems broadens the traditional approach to stormwater management. In this broader sense, retained stormwater can be put into soil where soil biota, macrophytes, and stream interflow systems improve water quality and ecosystems supported by baseflow or high groundwater. Ecosystem benefits include habitat improvement, increased food sources, carbon sequestration, pollutant uptake, reduced ozone, and reduced heat island effects…. Improved baseflow results in decreased water temperatures and prolonged dry weather flows, and increased amounts and

[61] Diringer et al., March 24, 2020. *Economic evaluation of stormwater capture and its multiple benefits in California.* PLoS ONE 15(3): e0230549.

[62] Shimabuku et al., June 2018. *Stormwater capture in California: Innovative policies and funding opportunities.* Pacific Institute. p.2.

types of soil biota will aid in carbon sequestration and pollutant uptake. Local stormwater capture can also lead to energy-saving schemes that (1) capture water before it becomes contaminated with the pollutants on streets and in sewers; (2) rely on energy-efficient processes for removing contaminants; (3) treat water only to the extent necessary for intended use (fit-for-purpose water); and (4) obviate the need for diversion and large, centralized, energy-intensive treatment and distribution approaches."[63]

e. Other Benefit Considerations

The Pacific Institute and the University of Santa Barbara's Bren School of Environmental Science and Management framed the topic of moving towards multiple benefit approaches for water management. The organizations plan to develop a systematic framework for identifying and incorporating the costs and benefits of water management strategies into decision making. They find a broader consideration of the benefits associated with water management decisions will achieve broader project support, avoid unintended consequences, optimize resources and cost sharing, and increase transparency."[64]

Such a framework would support a more robust consideration of potential economic benefits of stormwater management projects not considered in this economic analysis, such as:

- Reduced frequency, area, and impact of flooding. Stormwater BMPs that reduce runoff volumes and consequently flood volumes. The decrease in potential damage provides economic benefit.
- Reduced cost of public infrastructure. On-site volume control and stormwater BMPs can downsize or eliminate stormwater conveyance infrastructure, and reduce costs to address downstream erosion and sedimentation, resulting in reduced costs.
- Reduced water treatment costs. A reduction in runoff volume can reduce downstream costs of water treatment, while also increasing the value of riparian properties and the utility of recreational visitors. Stormwater BMPs that include infiltration can improve and sustain stream baseflow conditions to better maintain downstream habitat.65
- Increased property values where GSI and LID projects are implemented. In a series of studies listed in a 2013 U.S. EPA report, the benefit-to-cost ratios of

[63] State Water Board, April 10, 2017. *Enhancing Urban Runoff Capture and Use.* STORMS Projects 1a and 1b.

[64] Pacific Institute and Bren School, April 2019. *Executive Summary: Moving toward a multi-benefit approach for water management.* UCSB. pp. II-III.

[65] WERF, 2010. *Using rainwater to grow livable communities.* Web.

> four LID/GSI projects in Sun Valley were listed. All four showed a ratio of greater than 1, indicating that, over the 50-year evaluation period, the benefits of these projects are higher than their cost.66

Considering the foregoing, the Water Board finds that the requirements in this Order are reasonably necessary to protect beneficial uses and the economic cost information supports protecting those beneficial uses.

V. RELEVANT STATUTES, REGULATIONS, PLANS AND POLICIES

A. Legal Authorities

This Order is issued pursuant to CWA section 402 and implementing regulations adopted by the U.S. EPA and CWC chapter 5.5, division 7 (commencing with section 13370). This Order serves as an NPDES permit for point source discharges to surface waters. This Order also serves as waste discharge requirements pursuant to CWC article 4, chapter 4, division 7 (commencing with section 13260).

In addition to the legal authority citations below, they are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: (A) Control through ordinance …or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity; (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate

[66] U.S. EPA, August 2013. *Case studies analyzing the economic benefits of low impact development and green infrastructure programs*, EPA 841-R-13-004.

storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "[n]otwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

B. State and Federal Regulations, Policies, and Plans

1. Water Quality Control Plans – San Francisco Bay and Sacramento and San Joaquin River Basins

The CWA requires the Water Board to establish water quality standards for each water body in its region. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect beneficial uses, and an antidegradation policy to prevent degrading of waters. The Water Board adopted the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), which designates beneficial uses, establishes water quality

objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan.

Section 4.14, the Urban Runoff Management, Comprehensive Control Program section, of the Basin Plan, requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan's comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. Pursuant to CWC sections 13263 and 13377, the requirements in this Order implement the Basin Plan.

Section 4.8 - Stormwater Discharges of the Basin Plan established the Water Board's phased approach towards attainment of water quality objectives in waters that receive stormwater discharges and recurrent permit term consideration of water quality based effluent limitations, wherein the Water Board will first require entities subject to NPDES permits for stormwater discharges to complete implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the maximum extent practicable. NPDES permits for stormwater discharges will require completion of technically and economically feasible control measures as soon as possible. If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions which may require implementation of additional control measures. In such circumstances, the Water Board may consider dischargers' proposed schedules for identification and implementation of additional control measures designed to attain water quality objectives. Such schedules shall be as short as practicable and will only be considered for inclusion in permits when a discharger has demonstrated the following:

(a) A diligent effort to quantify pollutant levels and the sources of the pollutant in stormwater discharges; and

(b) Documentation of completion of implementation of all technically and economically reasonable control measures.

The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Region 5 Basin Plan) similarly includes water quality standards for each water body it covers, including total maximum daily loads. It contains requirements for MS4 permittees that discharge into waters covered by the plan, such as the East Contra Costa Permittees.

2. Ocean Plan

In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amended Ocean Plan on October 16, 2012, and it was approved by the Office of Administrative Law and U.S. EPA. The Ocean Plan is applicable, in its entirety, to ocean waters of the state. In order to protect beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Pursuant to CWC sections 13263 and 13377, the requirements of this Order implement the Ocean Plan.

The Ocean Plan prohibits the discharge of waste to designated Areas of Special Biological Significance (ASBS). ASBS are ocean areas designated by the State Water Board as requiring special protection through the maintenance of natural water quality. The California Ocean Plan states that the State Water Board may grant an exception to California Ocean Plan provisions where the State Water Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served. In 2012, the State Water Board adopted Resolutions 2012-0012 and 2012-0031 (ASBS Exception), which grant an exception to the Ocean Plan prohibition on discharges to ASBS for a limited number of applicants, including San Mateo County for stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS. The ASBS Exception contains “Special Protections” to maintain natural water quality and protect the beneficial uses of the ASBS. In order to legally discharge into an ASBS, San Mateo County must comply with the terms of the Special Protections and obtain coverage under this Order. This Order incorporates the terms of the Special Protections for San Mateo’s discharges into the ASBS.

3. Inland Surface Waters, Enclosed Bays, and Estuaries Plan

The State Water Board adopted various provisions that collectively which make up the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) of California. Part 1 Trash Provisions was adopted by the State Water Board on April 7, 2015 through Resolution No. 2015-0019. OAL approved it on December 2, 2015 and U.S. EPA approved it on January 12, 2016. Part 2 Tribal Subsistence Beneficial Uses and Mercury Provisions was adopted by State Board on May 2, 2017 through Resolution No. 2017-0027. OAL approved it on June 28, 2017 and U.S. EPA approved it on July 14, 2017. Part 3 Bacteria Provisions and Variance Policy was adopted by State Board on August 7, 2018 through Resolution No. 2018-0038. OAL approved it on February 4, 2019 and U.S. EPA approved it on March 22, 2019. This Order implements the ISWEBE.

4. Statewide Trash Provisions

To control trash, the State Water Board on April 7, 2015, adopted trash provisions into both the Ocean Plan and the ISWEBE. Together, they are collectively referred

to as "the Trash Amendments." The Trash Amendments: (1) establish a narrative water quality objective for trash, (2) establish a prohibition on the discharge of trash, (3) provide implementation requirements for permitted storm water and other discharges, (4) set a time schedule for compliance, and (5) provide a framework for monitoring and reporting requirements. The Water Board is required to implement the new Trash Provisions through NPDES permits for MS4 permits. The water quality objective established by the Trash Provisions serves as a water quality standard federally mandated under CWA section 303(c) and the federal regulations (33 U.S.C. § 1312, 40 CFR § 131.). This water quality standard was specifically approved by U.S. EPA following adoption by the State Water Board and approval by the Office of Administrative Law. This Order implements the Trash Amendments.

5. Enclosed Bays and Estuaries Plan

In 2008, the State Water Board adopted the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality Provisions. It is was most recently amended on June 5, 2018 and became effective on March 11, 2019. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries. This Order implements the Sediment Quality Provisions to the extent they are applicable.

6. National Toxics Rule (NTR) and California Toxics Rule (CTR)

U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995 and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, U.S. EPA adopted the CTR. The CTR promulgated new toxics criteria for California and incorporated the previously adopted NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001. These rules contain water quality criteria for priority pollutants. This Order is consistent with NTR and CTR

7. Antidegradation Policy

Federal regulations at 40 CFR section 131.12 require that state water quality standards include an antidegradation policy consistent with federal requirements. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California"). Where the federal antidegradation policy is applicable, the State Water Board has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy.[67] The Basin Plan implements both the State and federal antidegradation policies. A permitted discharge must be consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16. These policies require that

[67] State Water Board Order WQ 86-17 (Fay), pp. 16-19.

high quality waters be maintained unless degradation is justified based on specific findings. The Water Board finds that the permitted discharges authorized by this Order are consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16, as set forth herein.

In the context of this Order, a federal NPDES permit, compliance with the federal antidegradation policy requires consideration of the following. First, the Water Board must ensure that "existing instream uses and the level of water quality necessary to protect the existing uses" are maintained and protected.[68] Second, if the baseline quality of a waterbody for a given constituent "exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected" through the requirements of the Order unless the Water Board makes findings that: (1) any lowering of the water quality is "necessary to accommodate important economic or social development in the area in which the waters are located"; (2) "water quality adequate to protect existing uses fully" is assured; and (3) "the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control" are achieved.[69] Under this second tier review, the Board may identify the waters for protection through the public process of a permitting action, as it is here. Before allowing any lowering of high quality water, the Board must conduct an analysis of alternatives that evaluates practicable alternatives that would prevent or lessen the degradation associated with the discharges permitted. In the context of 40 CFR § 131.12(a)(2)(ii), practicable means "technologically possible, able to be put into practice, and economically viable."[70]

The Order must also comply with any requirements of State Water Board Resolution No. 68-16 beyond those imposed through incorporation of the federal antidegradation policy.[71] Resolution No. 68-16 requires findings that any lowering of water quality is "consistent with the maximum benefit to the people of the State" and "will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies" and further that the discharge is subject to "waste discharge requirements which will

[68] 40 CFR § 131.12(a)(1). This provision has been interpreted to mean that, "[i]f baseline water quality is equal to or less than the quality as defined by the water quality objective, water quality shall be maintained or improved to a level that achieves the objectives." (State Water Board, Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), p. 4.)

[69] 40 CFR § 131.12(a)(2).

[70] 40 CFR § 131.3(n).

[71] See State Water Board Order WQ 86-17 (Fay), p. 23, fn. 11.

result in the best practicable treatment or control of the discharge."[72] The baseline quality considered in making the appropriate findings is the best quality of the water since 1968, the year of adoption of Resolution No. 68-16, or a lower level if that lower level was allowed through a permitting or other regulatory action, such as establishing a water quality objective, that was consistent with the federal and state antidegradation policies.[73]

Here, the baseline water quality is the level authorized under the previous permit consistent with federal and state antidegradation policies. To the extent some water bodies are high quality waters with regard to some constituents, the Water Board allowed limited degradation of such waters in the Previous Permit. This Order does not authorize lowering water quality as compared to the level of discharge authorized in the Previous Permit such that no antidegradation analysis is required. The Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), provides that no antidegradation analysis is required where the regional water board has no expectation that water quality will be reduced by the permitting action. Nevertheless, the Water Board undertakes herein an antidegradation analysis, assuming, without deciding, that the baseline for antidegradation analysis is the best water quality since 1968.[74]

a. The Board Is Not Required to Make Waterbody by Waterbody and Pollutant by Pollutant Antidegradation Findings:

The Water Board finds that it is not required to conduct a waterbody by waterbody and pollutant by pollutant antidegradation analysis for this Order. The Water Board makes this finding for two reasons. First, APU 90-004, which

[72] State Water Board Resolution No. 68-16, Resolve 2. Best practicable treatment or control is not defined in Resolution No. 68-16; however, the State Water Board has evaluated what level of treatment or control is technically achievable using "best efforts" (See State Water Board Orders WQ 81-5 (City of Lompoc), WQ 82-5 (Chino Basin Municipal Water District), WQ 90-6 (Environmental Resources Protection Council).). A Questions and Answers document on Resolution No. 68-16 by the State Water Board states as follows: "To evaluate the best practicable treatment or control method, the discharger should compare the proposed method to existing proven technology; evaluate performance data, e.g. through treatability studies; compare alternative methods of treatment or control; and/or consider the method currently used by the discharger or similarly situated dischargers . . .The costs of the treatment or control should also be considered . . . " (Questions and Answers, Resolution No. 68-16, State Water Board (Feb. 16, 1995), pp. 5-6.).

[73] APU 90-004, p.4. The baseline for application of the federal antidegradation policy is 1975, which is the date used in 40 CFR § 131.3(e) to define existing uses of a waterbody. For state antidegradation requirements, see also *Asociacion de Gente Unida por el Agua (AGUA) v. Central Valley Water Board* (2012) 210 Cal.App.4th 1255,1270. The baseline for the application of the state antidegradation policy is generally the highest water quality achieved since 1968, the year the policy was adopted.

[74] For ease of analyses, 1968 is used herein. As stated above, a permitting action with appropriate antidegradation findings allowing degradation may establish a new baseline, as occurred under the Previous Permit. In addition, the appropriate baseline is determined by the date on which a policy establishing the level of water quality to protect was effective (Resolution No. 68-16, Resolve 1.). The Basin Plan has been updated and amended several times since it was first adopted to include new or revised water quality objectives.

specifies a waterbody by waterbody and pollutant by pollutant analysis for some permitting actions, does not address permitting for diffuse MS4 discharges. Second, APU 90-004 itself indicates that a waterbody by waterbody and pollutant by pollutant analysis is only required when conducting a "complete" antidegradation analysis; a complete analysis is not required where any reduction in water quality is temporally limited and would not result in any long-term deleterious effects on water quality."[75] Here, the Order requires compliance with the non-stormwater discharge prohibition, receiving water limitations, TMDL requirements designed to bring MS4 discharges and receiving waters into compliance with water quality objectives, and other requirements for pollutants of concern. The discussion below elaborates on these two reasons.

i. APU 90-004 is a State Water Board internal guidance document establishing methods for implementing the federal and state antidegradation policies in NPDES permits. APU 90-004 suggests that an antidegradation analysis requires a pollutant by pollutant and waterbody by waterbody analysis in certain contexts, specifically where the discharge at issue is a discrete discharge from a singular facility. However, APU 90-004 has limited value when considering antidegradation in the context of MS4 discharges from diffuse sources, conveyed through multiple outfalls, with multiple pollutants impacting multiple water bodies within region.[76] This interpretation is sensible for this Order, given that reliable data on the baseline water quality is not readily available since 1968 for a region that spans about 4,600 square miles, including hundreds of miles of coastline, hundreds of rivers and streams, tens of thousands of acres of wetlands, lakes, and impoundments, and the 1,600-square-mile San Francisco Bay Estuary. The Water Board estimates that there are thousands or tens of thousands of combinations of waterbodies and pollutants that could potentially require individual consideration in the Region.[77] The antidegradation analysis for

[75] APU 90-004, p. 2.

[76] The State Water Board held so in Order WQ 2021-0052-EXEC. In *Natural Resources Defense Council v. State Water Resources Control Board*, the superior court did not invalidate this particular conclusion. (Super. Ct. Los Angeles County, No. BS156962, Order, March 29, 2021). The State Water Board's interpretation of its own guidance is entitled to deference. See also State Water Board Order WQ 2018-0002, p. 77 (reaching the same conclusion for agricultural discharges).

[77] See Basin Plan Chapter 2, Beneficial Uses; Surface Water Body Beneficial Use Tables at: https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/amendments/WaterBodies/Documt%20tables%20FINAL%20new%20cover%20BOOKMARKS%204-6-2012.pdf**;** and Chapter 3, Water Quality Objectives. While the Basin Plan designates beneficial uses for many waterbodies in the Region, there are thousands or tens of thousands of water bodies (e.g., headwaters creeks, isolated seasonal wetlands, seeps, and ponds) for which beneficial uses have not been specifically designated. Thus, the number of potential combinations of waterbodies and pollutants that could require individual consideration could be substantially higher than estimated here. If it could be done at all, a waterbody by waterbody antidegradation analysis would be extremely time-consuming and take years to complete.

this Order instead relies on a general assessment of the existing water quality data that is reasonably available and makes findings regarding the social and economic benefits and costs of permitting stormwater and non-stormwater MS4 discharges in accordance with the Order terms.

ii. The Water Board additionally finds that even if APU 90-004 applies to the issuance of this Order, it requires at most a "simple" antidegradation analysis. APU 90-004 contemplates that a "simple" antidegradation analysis is appropriate under specified circumstances. In particular, as stated above, APU 90-004 states that a simple antidegradation analysis is allowed when a "Regional Board determines the reduction in water quality is temporally limited and will not result in any long-term deleterious effects on water quality" or where a "Regional Board determines the proposed action will produce minor effects which will not result in a significant reduction of water quality."[78] Here, the Order continues the requirements of the Previous Permit or imposes equivalent or more protective requirements such that the water quality established under the prior permit is expected to be maintained and improved. Generally, the Previous Permit instituted controls such as a prohibition on non-stormwater discharges that are a source of pollutants through the MS4s, receiving water limitations, WQBELs based on TMDLs, and monitoring programs to help ensure that water quality will be maintained at the level it is now, or improve it, and this new Order institutes further controls. Any degradation permitted while controls are continuing to be implemented and refined will be temporally limited and will not result in any long-term deleterious effects on water quality.[79] Such a finding would not be appropriate if, for example, the Order declined to require long-term compliance with water quality objectives, but that is not the case here.

APU 90-004 does not provide guidance on the scope and content of a simple antidegradation analysis. The Water Board determines that the findings made below meet the requirements of a simple antidegradation analysis and are also consistent with an antidegradation analysis done at a generalized level, as appropriate for this Order. With these findings, based on the information available to it and using its best professional judgment, the Water Board concludes that the discharge will not be adverse to the intent and purpose of the State and federal antidegradation policies.

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[78] APU 90-004, p. 2. In an unpublished decision, the Second District Court of Appeal affirmed that a simple antidegradation analysis applied to the 2012 Los Angeles County MS4 permit (*Natural Resources Defense Council v. State Water Resources Control Board* (2018) 2018 WL 6735201, at *6).

[79] The Order's requirements put the Permittees on a path to achieving TMDL wasteload allocations for impairing pollutants and meet water quality objectives, consistent with what the TMDL implementation schedules established as feasible and appropriate. For impairing pollutants like trash for which there is no TMDL, the Order requires 100 percent trash load reduction or no adverse impact to receiving waters from trash within the term of the Order.

b. The Water Board Makes the Following Antidegradation Findings:

The discharges permitted in the Order are consistent with the antidegradation provisions of 40 CFR section 131.12 and Resolution No. 68-16. The Water Board's conclusion is based on the following analysis.

i. Water bodies that do not meet water quality objectives (water bodies that are not high quality):

Many of the waters within the area covered by this Order are impaired by multiple pollutants discharged through MS4s and are not high quality waters with respect to these pollutants. They are not attaining water quality objectives necessary to protect beneficial uses. This is evidenced in part by the fact that many of these waterbodies are listed on the State's CWA section 303(d) List of impaired waters and the Water Board has established numerous TMDLs to address many of the impairments.[80] Under both federal and state antidegradation policies, these receiving waters are not considered "high quality" waters for these pollutants. In most cases, there are insufficient data to determine whether the waters addressed by this Order were impaired as early as 1968, but limited available data shows impairment dating back for more than several decades.[81]

For receiving waters that are not high quality waters, the federal antidegradation policy requires that regulatory actions ensure that existing instream uses and the level of water quality necessary to protect the existing uses is maintained and protected (40 CFR § 131.12(a)(1).). The Order ensures that existing instream (beneficial) uses and the level of water quality necessary to protect the existing uses is maintained and protected through requirements to not cause or contribute to exceedances of water quality

[80] It should be noted that impaired waters, or waters that are not high quality, are not confined to those listed only on the 303(d) List. There are several reasons for this, including, but not limited to, the fact that the Water Board's ability to comprehensively evaluate the water quality of each of the substantial numbers of waterbodies and waterbody segments within the Region's 4,600 square miles is limited by available staff resources and data sufficient to justify a 303(d) listing. Accordingly, the 303(d) List itself does not reflect all of the waterbodies in the Region that are impaired or fail to meet water quality standards.

[81] For example, the 1975 Water Quality Control Plan San Francisco Bay Basin Part II points to poor water quality in the Bay for numerous parameters. (See p. 14-5 to 14-18.) There was, among other problems, widespread toxicity, heavy metals, periodic fish kills, and low dissolved oxygen. (*Ibid*.) The South Bay had some of the poorest bacteriological quality, with a mean coliform concentration of 20,000 MPN/ml (the then-water quality objective for total coliform for contact recreation was 240 MPN/ml). (*Id*, p. 14-9; 1975 Water Quality Control Plan San Francisco Bay Basin Abstract, p. 21.)

objectives in the receiving water and to restore impaired water bodies.[82] This is achieved through the following provisions:

(1) The Order requires compliance with receiving water limitations to meet water quality standards in the receiving water through timely implementation of control measures and other actions specified in Provisions C.2 through C.24. The Order requires implementation of specific structural and non-structural stormwater and non-stormwater controls, consistent with TMDL implementation plans, including an adaptive implementation strategy, that are demonstrated to have a reasonable assurance of achieving compliance with receiving water limitations and that must be implemented in accordance with the deadlines set forth in the Permit.

(2) The Order requires Permittees to comply with WQBELs and/or receiving water limitations consistent with the assumptions and requirements of TMDL WLAs assigned to MS4 discharges established in TMDLs to restore water quality sufficient to protect the beneficial uses of the impaired water bodies.

(3) The Order requires Permittees to effectively prohibit non-stormwater discharges that are a source of pollutants through the MS4 to receiving waters.

(4) The Order includes requirements for monitoring and reporting designed to identify pollutants in receiving waters and the effectiveness of implemented measures to meet water quality objectives.

These provisions are collectively designed to halt any further degradation of impaired water bodies and improve the quality of such waters to a level protective of existing uses over a time schedule that is as short as possible. The antidegradation policies do not explicitly or implicitly override the authority and discretion the Clean Water Act and the Water Code grant to the Water Board as to how it structures a permit to ensure water quality necessary to protect beneficial uses. The law does not require immediate restoration of impaired water bodies nor does it require an immediate prohibition of discharges that contribute to an exceedance in the waterbody. Rather, federal regulations at 40 CFR section 122.47 allow NPDES permits, including MS4 permits, to have compliance schedules. Similarly, Water Code section 13263, subdivision (c), authorizes the Water Board to include a time schedule for achieving water quality objectives in waste discharge requirements. Where a TMDL has been established, CWC section 13242

[82] These actions also ensure that discharges will not unreasonably affect present and anticipated beneficial uses and will not result in water quality less than water quality objectives, as required by Resolution No. 68-16.

states that the TMDL implementation plan, as incorporated into the water quality control plan, shall include a time schedule for actions to be taken. When issuing waste discharge requirements, CWC section 13263 requires regional boards to implement any relevant water quality control plans that have been adopted. Certainly, water quality objectives must be achieved; but the law, as cited above, recognizes and allows for the fact that it can take time to restore or achieve the objectives.[83] This period of time before improvement may be as long as multiple years. This is not contrary to the authorities for compliance schedules stated above and is not contrary to the antidegradation policies.[84]

ii. High quality water bodies:

Some of the waterbodies within the area covered by the Order may be high quality waters with regard to some pollutants. Some of these waterbodies may be currently high quality as compared to currently applicable objectives. Others of these waterbodies may be currently impaired, but may be classified as high quality waters because they were historically high quality for certain pollutants. MS4 discharges of stormwater and non-stormwater into such water bodies may have resulted in lowering of the quality of the water bodies since 1968 with regard to the pollutants in the discharge.

For high quality water bodies,[85] the Water Board finds as follows:

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[83] Additionally, while MS4 permits must include a technology-based standard of effectively prohibiting non-storm water discharges through the MS4 and reducing pollutants in the discharge to the MEP, requiring strict compliance with water quality standards (e.g., by requiring immediate compliance with receiving water limitations or water quality based effluent limitations) is at the discretion of the permitting agency (33 U.S.C. § 1342(p)(3)(B); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166-67). This Order imposes water quality-based effluent limitations to implement TMDL WLAs and requires compliance with receiving water limitations for all constituents in the MS4 discharges. The fact that the Board also allows reasonable time schedules to achieve compliance with the effluent limitations and receiving water limitations is not contrary to the law for this additional reason.

[84] With regard to waterbodies that are not high quality, the antidegradation policies do not require socioeconomic findings justifying any continued degradation of such waterbodies that may occur while the Permittees implement requirements in accordance with a compliance schedule. Even if such findings were required, the Water Board finds that this potential, limited, and temporary further lowering of water quality is justified for the same reasons articulated below related to high quality water bodies.

[85] The quality of some currently high quality waters that are close to or at objectives may degrade below water quality objectives temporarily while Permittees implement appropriate controls in accordance with the compliance schedules in the Order and some historically high quality waters may stagnate or continue to degrade below water quality objectives during the same period. The Water Board finds that the potential, limited, and temporary lowering of water quality below the objectives is authorized by 40 CFR § 122.47 and the time schedule provisions of the Water Code set out above in the subsection entitled "Water bodies that do not meet the water quality objectives (water bodies that are not high quality)" , and, to the extent any findings are required under the antidegradation policies, is justified for the same reasons articulated in this subsection entitled "High quality water bodies."

(1) Practicable Alternatives: The Water Board has evaluated a range of practicable alternatives that would prevent or lessen any degradation associated with permitted MS4 discharges to high quality waters. These alternatives are discussed below.

(a) Alternative 1 - Complete prohibition on some or all pollutants in MS4 non-stormwater discharges to high quality waters: This alternative would prohibit MS4 discharges of some or all pollutants in non-stormwater to high quality receiving waters. By eliminating these discharges, pollutants from non-stormwater discharges would not reach high quality receiving waters during dry weather and thus not cause any degradation. In high quality water areas, this alternative could require the Permittees to either divert all non-stormwater to a facility for treatment, or retain all non-stormwater through retention basins, infiltration galleries, and other controls that would prevent non-stormwater from reaching surface waters through storage, infiltration, or reuse. Alternatively, Permittees could install specific pollutant control measures that prevent specific pollutants from being discharged through the MS4.

(b) Alternative 2 – Complete prohibition on some or all pollutants in MS4 stormwater discharges to high quality waters: This alternative would prohibit MS4 discharges of some or all pollutants in stormwater to high quality receiving waters. By eliminating these discharges, pollutants from stormwater would not reach high quality receiving waters during wet weather and not cause any degradation. As wet weather will always occur, this alternative could require the permittees to either divert all stormwater in the MS4 to a facility for treatment, or retain all stormwater through retention basins, infiltration galleries, and other controls that would prevent stormwater from reaching surface waters through storage, infiltration, or reuse. Permittees could also install pollutant control measures that are specific to preventing specific pollutants from being discharged through the MS4.

(c) Alternative 3 – Implement controls consistent with Permit requirements, applicable TMDL Implementation Plans, and adaptive management. This alternative would require Permittees to implement a mix of structural and non-structural controls and associated actions sufficient to achieve receiving water limitations, WQBELs, and other requirements, with flexibility to allow implementation of controls that are relatively more effective with respect to pollutant control, feasibility, or cost, while still achieving

required outcomes. Alternative 3 includes, or may include, controls that could be implemented under Alternatives 1 and 2.

(i) Alternative 3, Option A:

Under Alternative 3, where requirements and controls reflect those established in applicable TMDLs, the controls would constitute compliance with receiving water limitations for the waterbody-pollutant combinations addressed by the relevant TMDL, but Option A would not allow for implementation of control measures to constitute compliance with receiving water limitations for waterbody-pollutant combinations not addressed by a TMDL.

(ii) Alternative 3, Option B:

Option B would add one component to Alternative 3. Under Option B, implementation of the controls would additionally constitute compliance with receiving water limitations for a narrow set of waterbody-pollutant combinations not subject to a TMDL where the pollutant of concern is addressed in a comparable TMDL applicable to other water bodies and the controls reflect the controls and timeline of the comparable TMDL.

(d) Alternative 4 – Establish WQBELs for MS4 discharges to high quality waters: This alternative includes the Board establishing WQBELs for MS4 discharges of certain pollutants to high quality waters. These WQBELs would apply to both stormwater and non-stormwater discharges. MRP 2 only includes WQBELs where they are based on either TMDL wasteload allocations applicable to MS4 discharges (i.e., for impaired waters and not high quality waters) or the trash provisions in the Ocean Plan and ISWEBE. This alternative would require the Board to establish WQBELs where no TMDLs have been established.

(2) Economic and Social Development Considerations and Consistency with Maximum Benefit to the People of the State: The Water Board incorporated Alternative 3, Option B, and included aspects of Alternatives 1 and 2, into the Permit. This alternative could allow limited degradation of high quality water bodies by MS4 discharges, but ultimately requires MS4 discharges to meet and not fall below water quality standards.

Such degradation of high quality waters is necessary to accommodate important economic or social development in the area and is consistent

with the maximum benefit to the people of the state for the following reasons:

(a) Alternatives 1 and 2, if implemented as full prohibitions, would hamper important social and economic development.

(i) The MS4 discharges of stormwater and non-stormwater in certain circumstances are to the maximum benefit to the people of the state because they may be necessary for flood control and public safety. MS4 discharges also can assist with maintaining, or comprise the flows necessary to maintain, instream flows that support beneficial uses.[86] In addition, complete diversion or retention of MS4 discharges that would reach the MS4 and receiving water would require extensive structural controls that are not technologically feasible in many locations, for example due to: lack of available space at those sites; soils with limited infiltration capacity or landslide proclivity; challenging topography; conflicts with utilities and existing infrastructure; lack of available sanitary sewer collection system connections or capacity; typical Bay Area MS4 system designs, which involve relatively short runs of storm drain that discharge into local creeks, streams, or the Bay. That system would require substantial replumbing, often against available grades, to direct flows to controls or the sanitary sewer system.[87]

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[86] The Permittees' MS4 systems are frequently relatively short, discharging into headwaters or low-order creeks and providing all or substantial portions of those creeks' flows. Diversion of flows to the sanitary sewer could substantially reduce flows, impacting beneficial uses, including associated riparian habitat and vegetation. While use of infiltration basins could recharge local groundwater, beneficially increasing creek baseflows, that benefit is likely to be most-pronounced in the limited areas of Bay Area soils that are more infiltrative, and less so in the majority of the Bay Area that is comprised of less-infiltrative C and D soils. In an example in the Los Angeles Region, the Los Angeles River Flows Project studied the impacts of reduced flows on beneficial uses in the Los Angeles River as a pilot application of the California Environmental Flows Framework. At the beginning of this project, Los Angeles Water Board staff presented on the importance of minimum flows for recreation and wildlife in both concrete and soft-bottom channels of the river (https://www.waterboards.ca.gov/water_issues/programs/docs/lar/002_r4_la_river_info_item_20171103rev.pdf) Wading shorebirds, for example, rest and feed in the shallow waters of the concrete lined portion of the lower Los Angeles River. The final report for the project, "Process and Decision Support Tools for Evaluating Flow Management Targets to Support Aquatic Life and Recreational Beneficial Uses of the Los Angeles River," quantified the flow ranges associated with different species, habitats, and recreational uses in the river and evaluated the impacts of various combinations of reductions in wastewater, stormwater, and non-stormwater discharges. In general, if all discharges were eliminated, there would not be enough flow to protect beneficial uses including habitat for local plant and animal species.

[87] E.g., SCVURPPP, August 2019. *Santa Clara Basin Stormwater Resource Plan*; CCAG, January 2021. *San Mateo Countywide Sustainable Streets Master Plan*, App. B, pp. 27-28.

(ii) The vast majority of the Permittees are cities and counties that provide essential and valuable public services. This Fact Sheet considers economics, including Permittees' compliance costs associated with meeting the requirements of the Order. Controlling storm water discharges to the point that there is no potential degradation of any potentially high quality waters by requiring complete diversion or retention would be an enormous opportunity cost that could preclude MS4 permittees from spending substantial funds on other important social and economic needs. This may manifest itself in the reduction of some public services or prevent other public services from being provided in the first place. Permittees have previously provided public comments (on the Administrative Draft of the Permit and during consideration of MRP 2) that spending limited municipal resources on immediately addressing all pollutants in MS4 discharges (all stormwater and non-stormwater discharges) will adversely impact municipal budgets, public health priorities, such as implementing active transportation projects including Safe Routes to Schools or measures to reduce unsheltered homelessness, such as provision of housing and supportive services, and other social services.[88]

(iii) As another example, unsheltered homelessness, in a context of limited municipal budgets, the high Bay Area cost of living, driven in part by local land use planning decisions that have produced insufficient affordable housing, and limited supportive services, results in substantial public expenditures including emergency medical care, and police and justice system engagement.[89] Those public expenditures can be significant, without reducing unsheltered homelessness or preventing discharges of trash and human waste associated with it. Municipal efforts to provide affordable housing, supportive services, and related needs, while expensive, can

[88] For example, in comments on the February 2021 Administrative Draft of the Permit, many Permittees identified that limited resources are available to protect water quality, and some Permittees expressed concern that Permit requirements could lead to a reduction in needed road maintenance (Santa Clara Valley Urban Runoff Pollution Protection Program comment letter of April 8, 2021) or reduced implementation of active transportation (multi-modal) projects (City of San Pablo comment letter of April 6, 2021, Town of Danville comment letter of April 7, 2021), and that a focus on addressing the water quality impacts associated with unsheltered homelessness could reduce resources used for housing or provision of supportive services (Contra Costa Countywide Clean Water Program letter of April 8, 2021), and that fiscal impacts associated with the COVID-19 pandemic emphasized the need to prioritize certain actions to protect water quality (e.g., Alameda Countywide Clean Water Program comment letter of April 8, 2021).

[89] Flaming et al., 2015. *Home Not Found: The Cost of Homelessness in Silicon Valley*.

be relatively much less expensive than jail and emergency services. In addition, by reducing homelessness, they have the potential to reduce associated discharges of trash and human waste. Alternatives 1 and 2, by prohibiting non-stormwater or stormwater discharges, respectively, would preclude this kind of equivalent benefit weighing analysis and the more-efficient achievement of water quality goals.

The Los Angeles Water Board conducted an analysis that estimates the equivalent public benefit that may be provided through affordable housing and services if full retention and diversion were not required under Region's MS4 permit. The results of the analysis support the finding that the social and economic benefits of a society where there would be significantly fewer unhoused residents would be far greater than the additional benefits created by taking water quality from the point where water quality standards are achieved to a level of higher quality that may only be achieved with full retention.[90] The same funds that would have to be used to

[90] In 2012, Los Angeles County projected that it would cost $120B, or $134.8B in 2019 dollars, for complete diversion or retention of MS4 discharges, whereas the cost of implementing enhanced watershed management programs (EWMPs), which require addressing the 85th percentile, 24-hour storm event or otherwise reducing or treating stormwater discharges to attain water quality standards, was estimated by Board staff to be $21.0B - $21.3B (see Section XIII, Economic Considerations). Instead of using this cost differential of $113.5B - $113.8B to further improve waters that would already have achieved water quality standards, thereby already being able to support designated beneficial uses, this money could be better spent addressing the homeless problem in the region. In 2020, there were an estimated 66,436 unhoused residents in Los Angeles County (Los Angeles Homeless Services Authority. 2021. 2020 Greater Los Angeles Homeless Count – Total Point-In-Time Homeless Population by Geographic Areas. https://www.lahsa.org/documents?id=4692-2020-greater-los-angeles-homeless-count-total-point-in-time-homeless-population-by-geographic-areas.pdf.). The median cost in Los Angeles County of constructing a permanent housing unit for the homeless is about $531,000 (Galperin, Ron. 2019. The High Cost of Homeless Housing: Review of Proposition HHH. Ron Galperin LA Controller. https://lacontroller.org/audits-and-reports/high-cost-of-homeless-housing-hhh/.). Supportive services to address the homeless housing gap were estimated in 2016 to be $428.8M per year, or $455.3M in 2019 dollars (Los Angeles Homeless Services Authority. 2016. Report on Homeless Housing Gaps in the County of Los Angeles. https://homeless.lacounty.gov/wp-content/uploads/2019/02/Report-on-Homeless-Housing-Gaps-in-the-County-of-Los-Angeles-1-2016-1....pdf). Adjusting for the increase in the homeless population since then yields an estimated annual cost in supportive services of $1.2B in 2019 dollars. (Assuming the same supportive services cost per person estimated in 2016, multiplied by the number of homeless residents in LA County in 2020.) The stormwater capture cost differential could build enough units to house every homeless person in Los Angeles County and pay for supportive services for the next 67 years, even with the conservative assumption of one person per housing unit. Housing a homeless person in Los Angeles County results in average cost savings of about $2,731 per person per month in 2019 dollars in terms of reduced need for public services, such as medical and policing expenses (Economic Roundtable. 2008. Where We Sleep: Costs when Homeless and Housed in Los Angeles. https://economicrt.org/wp-content/uploads/2009/11/Where_We_Sleep_2009.pdf). This means that there

prevent all MS4 discharges (as opposed to only 85 percent of those discharges) could be invested instead in addressing homelessness, and could support affordable housing and several decades of supportive services for a significant number of residents at-risk of being unhoused. The Bay Area faces similar challenges and drivers associated with unsheltered homelessness, as well as similar costs associated with pollution control. Permittees are currently facing the kinds of tradeoffs described above because they are implementing a range of measures to address unsheltered homelessness as described in the Fact Sheet section for Provision C.17, and which provide an indirect benefit to water quality, including provision of permanent supportive housing, job programs, and services. Those are in addition to measures, like trash collection and provision of sanitary waste services, that provide a direct water quality benefit. As a result, the Los Angeles Regional Water Board's conclusion is expected to be generally applicable to the Bay Area.

(iv) The prohibition on discharges of pollutants in Alternatives 1 and 2 is not practicable without substantial diversion to the sanitary sewer. Stormwater BMPs that do not fully retain, evapotranspire, and/or infiltrate all flows into the groundwater generally will discharge low, but non-zero, amounts of pollutants downstream.[91] Those kinds of controls (e.g., bioretention cells, flow-through planters) are common in the Bay Area because of the preponderance of Bay Area soils with

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would be annual cost savings of about $2.2B from housing all homeless residents in Los Angeles County, and over 67 years the cost savings would be about $145.1B-$145.8B, greater than the storm water capture cost differential of $113.5B-$113.8B. An analysis of Ventura County finds similar results where each of its 1,743 unhoused residents could be provided permanent housing for at least 55 years with its stormwater capture cost differential, assuming that Ventura County's cost of full capture would be their estimated MS4 compliance costs multiplied by the same ratios of Los Angeles County's E/WMP costs to cost of full stormwater capture, yielding cost differentials ranging from $2.5B-$23.4B (https://www.vcstar.com/story/news/2020/12/12/covid-ventura-county-continuum-of-care-2021-homeless-count/3868785001/). This analysis was also based on an average cost per unit of $480,000 for housing the homeless in Ventura County in 2019 and the same supportive services cost per person as in LA County (https://humanimpact.org/wp-content/uploads/2020/10/HIP-Ventura-County-Lets-Invest-Sources-2020.pdf). It can be expected that there would be substantial additional benefits for these housed residents and for the local economy from being more fully able to engage in society.
A similar opportunities analysis for unsheltered homeless populations in the South San Francisco Bay Area can be found in Flaming et al., 2015. *Home Not Found: The Cost of Homelessness in Silicon Valley.*

[91] Clary, et al., 2020. *International Stormwater BMP Database: Summary Statistics.* Water Research Foundation.

limited infiltration rates. As such, they would not achieve the Alternative 1 or 2 goals.

(v) The significantly higher cost of complete storm water diversion or retention could lead to increased fees for residents with little benefit in return after water quality standards have been met. To achieve retention, stormwater control sizes would need to increase substantially over the post-construction stormwater treatment control sizing in Provision C.3.d. That sizing is based on work by Urbonas and Guo that determined a point of diminishing returns for control sizing. That work found that, while larger controls could control larger storms, the size increased out of proportion to the declining marginal benefit gained, in part because of the need to capture the larger storms that are relatively infrequent and comprise a relatively small portion of average annual rainfall. As noted above, storm water diversion would require substantial replumbing of existing systems.

The literature is sparse on the impact of MS4 project costs on user fees, but Kea et al. (2016) found higher rates of user fee establishment in the years directly before and after MS4 permit deadlines,[92] indicating that utilities often rely on user fees to meet permit requirements.

It is also possible that higher costs could be passed down to residents through increased housing prices driven by higher impact fees, which cities often charge developers to help fund public services, or higher construction costs. The literature finds that overall impact fees lead to higher home prices.[93] Requiring complete storm water diversion or retention from properties could also lead to higher construction costs for

[92] Kea, Kandace, Randel Dymond, Warren Campbell. 2016. An Analysis of Patterns and Trends in United States Stormwater Utility. Journal of the American Water Resources Association, 52(6). See, also, Comment Letter on 2012 Los Angeles MS4 Permit from City of Lakewood, Lisa A. Rapp, Director of Public Works, July 23, 2012, Comment Letter from City of La Verne, Daniel W. Keesey, Director of Public Works, July 23, 2012, and Comment Letter from LA Permit Group, July 23, 2012 (discussing the need to, and difficulty of, levying additional special taxes to pay for the permit).

[93] Mathur, Shishir, Paul Waddell, and Hilda Blanco. 2004. The Effect of Impact Fees on the Price of New Single-family Housing. Urban Studies, 41(7); Ihlanfeldt, Keith R. and Timothy M. Shaughnessy. 2004. An empirical investigation of the effects of impact fees on housing and land markets. Regional Science and Urban Economics, 34(6); Mathur, Shishir. 2013. Do All Impact Fees Affect Housing Prices the Same? Journal of Planning Education and Research, 33(4).

housing, which is one of the drivers of higher home prices.[94] There is extensive literature showing that higher housing prices are associated with proximity to cleaner waterbodies,[95] which provide benefits to society. However, higher housing prices driven by higher impact fees or construction costs that do not contribute toward discernible improvements in water quality would likely provide lower marginal benefits compared to a scenario where residents could avoid additional housing costs by not having to pay higher impact fees or construction costs in a region where housing costs are already high, or a scenario where this cost could be spent on more pressing public services or societal problems.

(vi) Because waterbodies may be high quality for some pollutants and not others it is difficult, if not impossible, to designate specific areas as high quality waters. As a result, Alternatives 1 and 2 are inconsistent with achieving the maximum benefit to the people of the state because they may require broader-than-necessary implementation of measures to ensure their prohibitions are met. The inconsistency stems from potential impacts to other municipal and public services associated with those increased expenditures.

(b) Aspects of Alternatives 1 and 2 that are practicable are part of Alternative 3 and have been incorporated into this Order. The Order generally implements a prohibition on trash discharges through the installation of full capture systems or controls to achieve full capture equivalency. The Order also largely prohibits the discharge of non-stormwater into and through the MS4 to receiving waters. While there are some limited exceptions where the non-stormwater discharge is expected not to be a source of pollutants, where the discharge is determined to be a source of pollutants it must be prohibited. The Order, through its green infrastructure planning and implementation provision (Provision C.3.j) and its alternative compliance provision (Provision C.3.e), also supports efforts to maximize the capture of stormwater through retention basins, infiltration galleries, and other controls.

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[94] Emmons, William R. 2019, Sept. 5. Construction Costs, Not Another Housing Bubble, Are Driving House Prices Higher. St. Louis Fed On the Economy Blog. https://www.stlouisfed.org/on-the-economy/2019/september/construction-costs-housing-bubble-driving-housing-prices-higher

[95] See, e.g., Guignet, Dennis, Matthew T. Heberling, Michael Papenfus, Olivia Griot, and Ben Holland. 2020. Property values, water quality, and benefit transfer: A nationwide meta-analysis. Working Papers 20-04, Department of Economics, Appalachian State University. https://ideas.repec.org/p/apl/wpaper/20-04.html

(c) Alternative 3, if implemented, could result in limited degradation of high quality water bodies. Any degradation that would occur under the alternative is consistent with the maximum benefit to the people of the state because the combination of structural and non-structural controls implemented under the alternative will ultimately be effective at maintaining and restoring water quality protective of beneficial uses, and allow a greater benefit to the people of the state than full prohibitions of discharge when considering social and economic parameters that could be affected, such as employment, housing, community services, income, tax revenues, and land value.

The Permit terms require implementation of objective technical solutions that must be designed to meet the Permit's maximum extent practicable- or water quality standards-based regulatory standards. Such controls necessarily take time to design and construct, but it is to the maximum benefit of the people of the state that such controls be designed and implemented properly so as to be protective of water quality in the long run. These measures that control impacts from stormwater and non-stormwater discharges in the Order are typically effective across multiple pollutants. The alternatives would concurrently address other constituents of concern that may not be causing impairment, but may still be leading to degradation, resulting in improvements in levels of all pollutants, including those for which the receiving water may be high quality.

(d) Alternative 3 avoids the high economic and social costs associated with decreased public services associated with Alternatives 1 and 2. At the same time, Alternative 3 is still structured to encourage retention of stormwater and non-stormwater. As incorporated into the Permit, Alternative 3 provides additional economic and social benefits to the people of the state by incentivizing and incorporating multi-benefit and green infrastructure projects that include benefits beyond water quality protection such as increased local water supplies, beautified streets, plazas, and parking areas, facilities that support habitat and recreation, and climate change resiliency, such as reduced flood flows and reduced temperatures on the urban surface. For example, both the regional stormwater treatment wetland in the City of Fremont's Pacific Commons project and the stormwater pond in the city park downhill of the City of Dublin's Dublin Ranch protect clean water while providing an opportunity for recreation and urban connections with nature. Bioretention cells along streets and in parking lots can reduce the urban heat island

effect, help calm traffic, and protect cyclists and pedestrians, increasing the benefit of active transportation designs.

Multi-benefit projects are projects that provide multiple benefits, which may include not just runoff treatment, but water capture and use, climate change resilience, encouragement of active transportation and protection of multi-modal users, greenhouse gas reductions, and improvements to urban quality of life– are actively encouraged by the State of California, which administers Proposition 1 funds ($200 million in grant funds) for such multi-benefit projects. In the Bay Area, such projects have received funding through Proposition 1 and other state and federal grant programs, as well as Caltrans, pursuant to requirements of its statewide MS4 NPDES permit, and through its cooperative funding program for projects that also provide benefit for discharges from Caltrans rights of way. For example, the Rumrill Boulevard green street retrofit in San Pablo, which will control pollutants of concern, improve pedestrian safety, and provide climate change resilience.[96] Table A-3 provides further examples of multi-benefit grant-funded projects completed by the Permittees. While Prop 1 funding has been expended, construction of multi-benefit projects from Permittee Green Infrastructure Plans and Stormwater Resource Plans will likely qualify for these types of grant monies in the future. Additionally, the construction of these projects also creates good-paying jobs that do not require advanced degrees, accessible to those in disadvantaged communities.[97]

Capacity-building projects are projects that build Permittee understanding of and the allow for planning or increase the toolbox of measures available to address pollutants in MS4 discharges. As shown in Table A-3, funded projects have included the

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[96] U.S. EPA, *Rumrill Boulevard: Complete Green Street* (web). Accessed August 2, 2021. https://www.epa.gov/sfbay-delta/rumrill-boulevard-complete-green-street
City of San Pablo, *Rumrill Boulevard Complete Streets Project* (web). Accessed August 2, 2021. https://www.sanpabloca.gov/2590/Rumrill-Boulevard-Complete-Streets-Proje

[97] Sustainable Business Network, May 2021. *Green Stormwater Infrastructure (GSI): A tool for economic recovery and Growth in Pennsylvania*, reviewed ten years of GSI implementation in Pennsylvania, and found that GSI was supporting 34,000 jobs in Philadelphia, with more than half paying at least $15 per hour, even without requiring a high school diploma. Building on the findings by Economic Roundtable, Los Angeles Alliance for a New Economy estimated that over 30 years, the Safe, Clean Water Program (Measure W) in the Los Angeles Water Board region will create about 6,530 construction jobs and 1,347 O&M jobs, as well as about 1,559 annual indirect and induced jobs. This would yield about $14B in overall regional economic benefits from $9B in investment. Furthermore, many of these jobs created would be good-paying jobs that do not require an advanced degree, accessible to those in disadvantaged communities (Los Angeles Alliance for a New Economy (LAANE). Liquid Assets. How Stormwater Infrastructure Builds Resilience, Health, Jobs, and Equity. March 2018.).

development of Permittee stormwater resource plans, efforts to enact building code changes to support low impact development and green stormwater infrastructure implementation, and the Tracking California's trash project. It is likely that such projects could qualify for funds from similar grant programs in the future.

Table A-3. Multi-benefit and capacity-building grant-funded projects

Grant Program	Permittee	Project	Funded Amount
Prop 84 2011 Stormwater Implementation Grants	San Jose	Park Avenue: Green Avenue Pilot Project	$859,128
(same)	San Jose	Martha Gardens Green Alleys Pilot Project	$945,180
(same)	Union City	South Decoto Green Streets Project (Implementing LID)	$3,000,000
(same)	Alameda County Public Works Agency	Alameda County Public Works Agency Low Impact Development Implementation and Demonstration Project: Parking Lot Stormwater Treatment Improvements	$1,600,000
Prop 84 2011 Stormwater Planning and Monitoring Grants	Contra Costa County	Bay Area Green Infrastructure Master Planning Project	$597,901
(same)	Multiple counties in Water Board Regions 2 and 4	Tracking California's Trash	$870,000
(same)	Statewide	Removing Barriers to LID in Local and State Codes: Technical Assistance for Municipal Code Updates and Evaluation of the California Building Standards Code	$996,135
Prop 84 2013 Stormwater Implementation Grants	Albany	Brighton Avenue Pilot Green Street Project	$296,000

Grant Program	Permittee	Project	Funded Amount
(same)	San Jose	Ocala Avenue Green Street Project	$1,429,355
(same)	Town of San Anselmo	SADPW Stormwater LID Demonstration	$546,517
(same)	Union City	H Street - Green Street Improvements	$3,000,000
(same)	Bay Area Rapid Transit District	BART Lafayette Station Parking Lots Improvement Project	$2,245,259
2014 Drought Response Outreach Program for Schools	StopWaste	DROPS - OPS (Oakland and Piedmont Schools)	$1,491,503
Prop 1 2016 Stormwater Implementation Grants	City of San Mateo	City of San Mateo Sustainable Streets and Parking Lot	$630,031
2016 Storm Water - Proposition 1 - Implementation Grants - Round 1	Daly City	Vista Grande Drainage Basin Improvement Project	$10,000,000
2016 Storm Water - Proposition 1 - Implementation Grants - Round 1	Redwood City	Redwood City Sustainable Streets	$608,099
2016 Storm Water - Proposition 1 - Planning Grants	Santa Clara County	SWRP for the Santa Clara Basin in Santa Clara County	$471,708
2016 Storm Water - Proposition 1 - Planning Grants	Contra Costa County Flood Control & Water Conservation District	Contra Costa Watersheds Storm Water Resource Plan	$499,420

Grant Program	Permittee	Project	Funded Amount
2020 Prop 1 Round 2 Storm Water Grant Program	San Pablo	Sutter Avenue Green Street Project	$1,560,000

As discussed above, Alternative 3 provides important socioeconomic benefits such as creation of new jobs, increased local water supplies, beautified streets, plazas, and parking areas, and facilities that support habitat and recreation, while allowing the local governments to maintain important public services. This alternative therefore has the greatest chance of success, within the shortest time frame, and furthers the goal of maintaining and achieving water quality standards.

(e) Alternative 3 could result in limited degradation of high quality waters, in particular currently impaired waters that may nevertheless be considered high quality waters based on a historic baseline. The federal antidegradation policy does not require consideration of economic and social costs associated with degradation; it only requires findings that "allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located." The state antidegradation policy does not define the exact factors that must be considered in determining "maximum benefit to the people of the state." APU 90-004 states that factors to be considered in a complete antidegradation analysis include economic and social costs of the discharge compared to its benefits, but this Order is subject only to a simple antidegradation analysis.[98] The Water Board has nevertheless considered the costs associated with water quality degradation that may occur under Alternative 3, but has done so necessarily at a generalized level. Specifically, in choosing Alternative 3, the Water Board finds as follows:

(i) There are significant environmental, public health, and economic costs associated with exceedances of water quality objectives. The Bay Area economy thrives on a healthy environment, as does the health of its population. By way of

[98] Outside of the complete antidegradation analysis context, APU 90-004 states only that the "findings should indicate . . . [t]he socioeconomic and public benefits that result from lowered water quality" (APU 90-004, p. 1.).

example, the failure to control stormwater runoff (which would result in exceedances of water quality objectives) would, among other things, negatively impact Bay and ocean water quality, which would negatively impact tourism and the fishing industry. Similarly, the failure to meet water quality objectives in Bay and ocean waters would negatively impact recreation and public health of beachgoers. These costs are discussed in detail in the Economic Analysis section of this Fact Sheet.

(ii) The considered costs are associated with exceedances of water quality objectives rather than limited degradation of high quality waters to a level that remains better than objectives. This is because the objectives are set to protect beneficial uses in the first place.

(iii) Where Alternative 3 may allow a currently high quality waterbody to degrade below water quality objectives, or where it will allow a currently impaired, but historically high quality waterbody to stagnate or worsen in quality, even for multiple years, this allowance is for a finite period of time defined by the compliance schedule specified in the Permit. The Water Board finds that the temporary degradation is justified based on the social and economic benefits discussed in these findings, notwithstanding the potential costs of degradation. In particular, the Water Board anticipates that the combination of non-structural controls and structural controls that are designed and built over a longer timeframe are more likely to lead to water quality improvements than other measures.

(iv) Alternative 3 Option A, as compared to Option B, could potentially avoid some of the costs discussed above if some Permittees are able to correct some exceedances earlier if required to comply immediately with receiving water limitations for all waterbody-pollutant combinations with no applicable TMDL. From a practical perspective, however, the Water Board finds that immediate compliance, particularly for those waters that may have been high quality historically but are not high quality currently, is unrealistic even if required, given the technical and financial constraints faced by Permittees. There are no known specific sources of bacteria that can be controlled immediately. There are also no viable means to control bacteria in discharges by treating discharges. Some stormwater treatment or retention systems may reduce levels of bacteria in discharges, but they cannot be implemented

immediately and there are constraints that affect locating them where they would intercept discharges from bacteria sources, e.g., land availability and underground utilities. Most importantly, even though they may have viability due other benefits, such as control of other pollutants and water supply augmentation using captured stormwater, none are able to reduce levels of bacteria equivalent to water quality objectives.[99] They also have hydraulic capacity constraints that result in bypassing of untreated runoff during large storm events. Even municipal wastewater treatment systems cannot reduce bacteria to such low levels of bacteria without disinfection of the treated wastewater through chlorination/dichlorination, ozone disinfection, or ultra-violet light disinfection, which are not feasible for episodic stormwater discharges. Since it is unrealistic for Permittees to comply immediately, any costs avoided would be non-existent to minimal. Further, the Permit limits application of Option B to the receiving water limitations for bacteria in water bodies (specifically, Stevens Creek, Calabazas Creek and Sunnyvale East Channel/Guadalupe Slough) receiving discharges from Mountain View and Sunnyvale and monitoring demonstrates that these water bodies are not currently high quality for bacteria.[100]

(f) Regarding Alternative 4, WQBELs are for the most part set to be protective of beneficial uses, which is the floor of the level of protection required under the antidegradation policies and may not be protective of water quality higher than necessary to protect beneficial uses. Therefore, this alternative is not more protective of high quality water bodies than requiring compliance with receiving water limitations, which already require permittees' MS4 discharges to not cause or contribute to exceedances of water quality objectives. This alternative would impose a significant analytical hurdle on development and adoption of a permit by requiring the Water Board to spend extensive efforts to analyze tens or hundreds of thousands of waterbody-pollutant combinations and then further

[99] Clary et al., 2020. International Stormwater BMP Database: 2020 Summary Statistics. Water Research Foundation, pp. 21-33. Accessed at: https://www.waterrf.org/system/files/resource/2020-11/DRPT-4968_0.pdf

Clary, Pitt, and Steets, August 2014. Pathogens in Urban Stormwater Systems. ASCE. Accessed at: https://collaborate.ewrinstitute.org/ewri/ourlibrary/viewdocument?DocumentKey=fffe8a76-18b2-4f85-9b54-b0eac23f12a0

[100] See, e.g., Exhibit A of Baykeeper Notices of Violation and Intent to File Suit Under the Clean Water Act to the cities of Mountain View and Sunnyvale, December 4, 2019.

conduct an infeasible set of reasonable potential analyses to determine whether the permittees' discharges are impacting high quality waters and for what pollutants. Ultimately, the alternative would divert staff resources from oversight of the implementation of potentially more effective and practical permit requirements, as well diverting staff from the Water Board's other programs.

(3) Requirement for Highest Statutory and Regulatory Requirements and Best Practicable Treatment and Control: The Order requires the highest statutory and regulatory requirements and requires that the Permittees meet best practicable treatment or control.

(a) The Order prohibits all non-stormwater discharges, with a few enumerated exceptions, through the MS4 to all receiving waters.

(b) The Permittees must comply with the "maximum extent practicable" technology-based standard set forth in CWA section 402(p)(3)(B)(iii) and implement control measures under the program elements of a stormwater management program.

(c) As required by CWA section 402(p)(3)(B)(iii) and 40 CFR section 122.44(d)(1)(vii)(B), the Permittees must comply with applicable WQBELs based on TMDL WLAs.

(d) The Order also contains provisions to require treatment of stormwater from the 85th percentile, 24-hour storm event and, via the Permit's low impact development design philosophy, to implement measures that will reduce and retain runoff. This stormwater design standard is based on robust engineering and technical evaluations to determine state-of-the-art design standards for post-construction site scale BMPs and catchment scale regional BMPs.[101]

(e) The measures that control impacts from stormwater and non-stormwater discharges in the Order are typically effective across multiple pollutants.[102] For example, retention basins, low-impact development controls, and low flow diversions can prevent stormwater and non-stormwater from reaching the receiving water at all—preventing degradation to the receiving water from all types of constituents. The Order's provisions are designed to achieve

[101] See, for example, State Water Board Order WQ 2000-11, the "LA SUSMP Order" and Concept Development: Design Storm for Water Quality in the Los Angeles Region (SCCWRP, Technical Report 520, October 2007).

[102] Clary, et al., 2020. *International Stormwater BMP Database: Summary Statistics.* Water Research Foundation.

water quality standards for those constituents that are impairing the receiving water, as well as to address other constituents of concern that may not be causing impairment as defined in CWA section 303(d) and State policy. The measures implemented pursuant to these provisions will likely result in improvements in levels of all pollutants, including those for which the receiving water may be high quality.

As a final backstop against degradation, the Order includes an extensive monitoring and reporting program, including:

(i) Stormwater control monitoring to ensure controls implemented pursuant to Provision C.3 are installed and operating consistent with their design and intended function;

(ii) Participation in a San Francisco Estuary monitoring program to answer the management questions identified in Provision C.8.c;

(iii) Specified low impact development (LID) control measure monitoring pursuant to Provision C.8.d, intended to measure the compliance and effectiveness of LID controls.

(iv) Trash monitoring pursuant to Provision C.8.e, intended to verify whether Permittees' trash control actions have effectively prevented trash from their jurisdictions from discharging to receiving waters, and to evaluate whether a no adverse effect condition in receiving waters has been achieved where controls have been installed;

(v) Pollutants of concern monitoring pursuant to Provision C.8.f., intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants;

(vi) Pesticides and toxicity monitoring pursuant to Provision C.8.g, on wet and dry weather pesticide discharges and toxicity in receiving waters;

(vii) Monitoring of full trash capture devices installed pursuant to Provision C.10 to ensure that they are installed and operating consistent with their design and intended function;

(viii) Visual monitoring of measures equivalent to full trash capture implemented pursuant to Provision C.10, to ensure their effectiveness;

(ix) Bacteria monitoring pursuant to applicable subprovisions of Provision C.14, intended to assess progress toward achieving wasteload allocations for TMDLs and inform adaptive management to achieve them; and

(x) Monitoring and reporting on populations experiencing unsheltered homelessness, and the portion(s) of those populations receiving services, as a proxy for control of discharges of associated materials, such as trash and human waste, to the MS4.

8. Anti-backsliding Regulations

The CWA contains both statutory anti-backsliding provisions in section 402(o) and regulatory anti-backsliding provisions in 40 CFR section 122.44(l). The CWA's statutory prohibition against backsliding applies under a narrow set of criteria specified in section 402(o). Section 402(o)(1) prohibits relaxing technology based effluent limitations (TBELs) originally established based on best professional judgment (BPJ) to reflect subsequently promulgated effluent limitation guideline. This section is inapplicable here since none of the WQBELs in the Order are TBELs based on BPJ. Section 402(o)(1) also prohibits relaxing of WQBELs imposed pursuant to CWA sections 301(b)(1)(C) or 303(d) or (e), unless an exception in CWA section 402(o)(2) applies. Relaxation of WQBELs may also be allowed if such backsliding is consistent with the provisions in CWA section 303(d)(4). CWA section 303(d)(4) allows backsliding in the following circumstances. First, "CWA section 303(d)(4)(A) allows the establishment of a less stringent effluent limitation when the receiving water has been identified as not meeting applicable water quality standards (i.e., a nonattainment water)" if: (a) the existing WQBEL is based on a TMDL or other WLA ; (b) the cumulative effect of such revisions assures attainment of water quality standards; or (c) the designated use is removed." Second, section 303(d)(4)(B) applies to "waters where the water quality equals or exceeds levels necessary to protect the designated use, or to otherwise meet applicable water quality standards (i.e., an attainment water). Under CWA section 303(d)(4)(B), a WQBEL may be relaxed as long as relaxation complies with the state's antidegradation policy." "U.S. EPA has consistently interpreted CWA section 402(o)(1) to allow relaxation of WQBELs and effluent limitations based on state standards if the relaxation is consistent with the provisions of CWA section 303(d)(4) or if … [certain] of the exceptions in CWA section 402(o)(2)… [apply]. The two provisions [303(d)(4) and 402(o)(2)] constitute independent exceptions to the prohibition against relaxation of effluent limitations. If either is met, relaxation is

permissible." This Order complies with anti-backslidin[g] requirements because no WQBEL has been relaxed from the Previous Permit.

9. Impaired Waters on CWA 303(d) List

CWA section 303(d)(1) requires each state to identify specific water bodies within its boundaries where water quality standards are not being met or are not expected to be met after implementation of technology-based effluent limitations on point sources. Water bodies that do not meet water quality standards are considered impaired and are placed on the state's "303(d) List." Periodically, U.S. EPA approves the state's 303(d) List. In June 2021, U.S. EPA approved a revised list of impaired waters prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met af[t]er implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for nonpoint sources, and are established to achieve the water quality standards for the impaired waters.

The Water Board has established TMDLs or Water Quality Improvement Plans for pesticide-related toxicity, mercury, PCBs, pathogens (bacteria), and sediment to remedy water quality impairments in water bodies in and around San Francisco Bay. These TMDLs identify MS4 discharges as a source of pollutants to these water bodies, and, as required, establish wasteload allocations (WLAs) for MS4 discharges to reduce the amount of pollutant discharged to receiving waters. CWA section 402(p)(3)(B)(iii) requires the Water Board to impose permit conditions, including: "management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Federal regulations also require that NDPES permits contain WQBELs consistent with the assumptions and requirements of all available WLAs (40 CFR 122.44(d)(1)(vii)(B)). CWC sections 13263 and 13377 also require that permits include limitations necessary to implement water quality control plans. Therefore, this Order includes WQBELs and other provisions to implement the TMDL WLAs assigned to Permittees regulated by this Order.

10. California Environmental Quality Act

The action to adopt an NPDES Permit is exempt from the provisions of the California Environmental Quality Act (Pub. Resources Code, § 21000 et seq.) pursuant to CWC section 13389, since the adoption or modification of a NPDES permit for an existing source is statutorily exempt and this Order only serves to implement a NPDES permit (County of Los Angeles v. State Water Resources Control Board (2006) 143 Cal.App.4th 985; Pacific Water Conditioning Assn, Inc. v. City Council of City of Riverside (1977) 73 Cal.App.3d 546, 555-556.).

11. Endangered Species Act Requirements

This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with discharge prohibitions, receiving water limits, and other requirements to protect the beneficial uses of waters of the state, including protecting rare, threatened, or endangered species. Permittees remain independently responsible for meeting all applicable federal and state Endangered Species Act requirements.

12. Climate Change

The observed and predicted impacts of climate change in Northern California include an increase in temperatures, heightened frequency of extreme weather conditions including extreme precipitation, flooding, and droughts, wildfires, and sea level rise. Sea level rise threatens to drown the tidal marshes that sustain the health of the Bay and Delta, increase the risk of catastrophic floods in low-lying neighborhoods, inundate crucial shoreline infrastructure, including wastewater treatment plants and storm sewers, and increase erosion and beach/land loss along the Pacific Coast. The combined impacts of climate change will affect water quality and many beneficial uses of waters.

The State Water Board adopted on March 7, 2017, a resolution that requires a proactive approach to climate change in all State Water Board actions, including drinking water regulation, water quality protection, and financial assistance (Resolution No. 2017-0012). The resolution lays the foundation for a response to climate change that is integrated into all State Water Board actions, by giving direction to the State Water Board divisions and encouraging coordination with the regional water boards. In addition, Executive Order N-10-19, signed on April 29, 2019, directs the California Natural Resources Agency, the California Environmental Protection Agency, and the California Department of Food and Agriculture to prepare a water resilience portfolio that meets the needs of California's communities, economy, and environment, and expand and/or reassess the priorities in the California Water Action Plan.

This Order follows the guiding principles of the State Water Board Resolution and well as Executive Order N-10-19 by contributing to an adaptive climate change and water resilience strategy. Through low impact development and green infrastructure projects, stormwater and non-stormwater runoff can be captured, infiltrated, and used to mitigate periodic drought conditions, reduce flood hazards and erosion rates, and recharge depleted groundwater aquifers and other water supply sources, all while reducing pollutant loads, maintaining beneficial uses in receiving waters and improving community health.

13. Human Right to Water

The Order is consistent with CWC section 106.3, which establishes the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. The Order implements CWC section 106.3 and promotes the State Water Board's resolution adopting the human right to water as a core value and directing its implementation in Water Board programs and activities (Resolution No. 2016-0010) by requiring receiving waters to meet adopted water quality standards that are designed to protect human health and ensure that water is safe for domestic use and by regulating discharges to minimize loading to attain the highest water quality which is reasonable, considering all demands being made on those waters and the total values involved (Wat. Code, §§13000, 13050, subdivisions (i)-(m), 13240, 13241, 13263; State Water Board Resolution No. 68-16.).

C. State Mandates

Article XIII B, section 6(a) of the California Constitution provides that whenever "any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse that local government for the costs of the program or increased level of service." No provision of the Order constitutes an unfunded state mandate subject to subvention under Article XIII B, section (6)(a) of the California Constitution.

1. Renewal of the Permit Is Not a New Program or Higher Level of Service.

As a threshold matter, MS4 permitting is not a "program" as that term is used in Article XIII B, section 6. The California Supreme Court has defined a "program" for purposes of Article XIII B, section 6, as: (1) programs that carry out the governmental function of providing services to the public, or (2) laws which, to implement a state policy, impose unique requirements on local governments and do not apply generally to all residents and entities in the state (*San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874 (reaffirming the test set forth in County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 56); Lucia Mar Unified School District v. Honig (1988) 44 Cal.3d 830, 835.).

Although a requirement can be a program if it meets either prong (see *Dept. of Finance v. Comm'n on State Mandates* (2021) 59 Cal.App.5th 546,557; *County of Los Angeles v. Dept. of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1545), the two prongs are interrelated. As the California Supreme Court put it, "the intent underlying section 6 was to require reimbursement to local agencies for the costs involved in carrying out functions peculiar to government, not for expenses incurred by local agencies as an incidental impact of laws that apply generally to all state residents and entities" (*San Diego Unified School Dist. v. Com. on State Mandates* (2004) 33 Cal.4th 859, 875 [citing *County of Los Angeles v. State of Cal*. (1987) 43 Cal.3d 46, 56–57.]). Thus, the applicability of a requirement to entities other than local governments can indicate that the requirement does not carry out a governmental function that provides services to the public (See *County of Los Angeles v. Dept. of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1546 [Requirement that all elevators, including county elevators, be equipped with fire and earthquake safety features "simply [was] not a governmental function of providing services to the public," even if county elevators, specifically, were used to obtain governmental services.]; see also *San Diego Unified School Dist., supra,* 33 Cal.4th at 876 [noting that state-mandated requirements applicable to both private- and public-sector employers to provide employee benefits did not increase or enhance government services, even if such requirements could indirectly improve the public employee applicant pool].).

Here, updated low impact development (LID) and trash provisions do not discharge a governmental service or apply only to local government. The LID requirements, including the reduced impervious surface threshold for implementing LID, do not, in any direct way, mandate the provision of a service to the public. LID will contribute in a general way to the overall reduction of pollution in stormwater, but its primary benefits will be localized, in many cases sited on private property and not shared broadly with the public.

LID provisions do not impose unique requirements on local governments, either. Other permits impose similar size thresholds on both public and private permittees as a way of reducing runoff or generating other water quality benefits. See Fact Sheet for Provision C.3, *infra* (listing other permits containing a 5,000 sf impervious surface threshold); see also, e.g., Construction Stormwater General Permit (Order No. 2009-0009-DWQ) (imposing 1-acre threshold); Overwater Structures WDRs (Order No. R2-2018-0009) (imposing general permit requirements for small overwater structure construction projects).

Similarly, the green infrastructure requirements are not unique to local agencies. The Regional Water Board imposes stormwater treatment requirements on independently-permitted development projects (See, *e.g.,* Order No. R2-2018-0019, pp. 7-8 [requiring stormwater treatment proportionate to amount of impervious surface constructed]; see also Order No. R2-2015-0020, pp. 4-5 [establishing

WDRs for voluntary habitat restoration, including low impact/green erosion control measures].). The Regional Water Board also requires stormwater control measures to be installed on roads maintained by private parties in multiple permits (See generally, *e.g.*, Order No. R2-2017-0033 [requiring erosion control measures for roads on vineyards]; Order No. R2-2016-0031 [requiring erosion-control measures for roads at confined animal facilities].).

As with the adjusted LID thresholds, changes in trash provisions do not discharge a governmental function that provides services to the public. As demonstrated by the statewide applicability of the Trash Amendments and the regionwide applicability of the Water Board's prohibition on the discharge of trash, the elimination of trash discharges is not a uniquely governmental function, but a responsibility that private and public entities, as well as individuals, collectively share.

Indeed, the requirements of the Trash Amendments apply to private and public entities across California. The Amendments require Caltrans, a state agency, private industrial dischargers, private or public operators of recreational facilities, and municipalities alike to comply with the prohibitions on trash discharges by implementing full trash capture systems or their equivalent.[103] Cease and Desist Order No. R2-2019-0007, which determined that Caltrans was out of compliance with its NPDES MS4 Permit requirement to timely implement trash control measures in all high trash generating areas in the San Francisco Bay Region, requires Caltrans to "implement structural and non-structural trash controls to meet full trash capture equivalency" in all significant trash-generating areas within its right-of-way by 2030 (Order No. R2-2019-0007, pp 5-6.). This requirement and its deadlines are comparable to the requirements and deadlines with which Permittees must comply. Indeed, as discussed further below, Caltrans and numerous permittees have jointly implemented full-trash capture projects that meet both of their permit requirements.[104]

Even if MS4 requirements could be considered a "program," the requirements of the Order do not constitute a *new* program or a *higher level of service* as compared to the requirements contained in the previous permits issued by the Water Board to the Permittees. The overarching requirement to impose controls to reduce the pollutants in discharges from MS4s is dictated by the CWA (33 U.S.C. § 1342(p)(3)(B)) and is not new to this permit cycle. The Permittees have been required to have stormwater permits for the past three decades, and to comply with

[103] State Water Board, Final Part I Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, p. E-2 – E-4; see also Basin Plan, Table 4-1, Prohibitions 7 & 8 (prohibiting the discharge of all "rubbish, refuse…or other solid wastes" and "floating materials" by any discharger, public or private, in the San Francisco Bay Region).

[104] Yan, Qi. *Summary of Caltrans' Trash Control Cooperative Implementation Agreement Projects* (July 2021).

prohibitions on the discharge of trash, sediment, untreated human waste, spills, pesticides, and toxic substances, like PCBs and mercury, for a half-century. (Basin Plan, Table 4-1, Prohibitions 6, 7, 8, 9, 11, 13 & 15.) Similarly, Permittees carried out tasks like street sweeping, pollution prevention, public education about litter and illegal dumping, and elimination of illicit connections, long before MS4 permits required it. The MRP's LID provisions have been in place for four permit cycles. The inclusion of improved measures as the MS4 programs evolve and mature over time is specifically anticipated under the CWA (55 Fed. Reg. 47990, 48052 (Nov. 16, 1990); 61 Fed. Reg. 43761 (Aug. 26, 1996); U.S. EPA "*Interim Permitting Approach for Water Quality Based Effluent Limitations in Storm Water Permits*," EPA 833-D-96-001 (September 1996)) because the experience gained in implementation of existing permits and ongoing technological developments help direct appropriate adaptation of the programs to better address pollution. Such refinements improve the effectiveness of the ongoing program and do not constitute a new program or higher level of service. And while the new or advanced measures may result in additional costs to the Permittees, resulting new costs is not the test for a higher level of service. "If the Legislature had intended to continue to equate 'increased level of service' with 'additional costs,' then the provision would be circular: 'costs mandated by the state' are defined as 'increased costs' due to 'an increased level of service,' which, in turn would be defined as 'additional costs'" (*County of Los Angeles v. Com. on State Mandates* (2003) 110 Cal.App.4th 1176, 1191, quoting *Workers' Compensation Mandates Decision*, *supra*, 43 Cal.3d. at p. 55.).

2. The Permit Requirements Fall Under Several Exceptions to Mandates Rules

Even if some of the requirements imposed on the Permittees with this reissuance could be considered to be new programs or higher levels of service, the following exceptions to a finding of unfunded mandates preclude subvention here:

a. The permit provisions are required by the CWA and its implementing regulations:

Where a law imposes a requirement that is mandated by a federal law or regulation and results in costs mandated by the federal government, no subvention is required unless the statute or executive order mandates costs that exceed the mandate in that federal law or regulation (Gov. Code, § 17556(c).). The MRP implements federally mandated requirements under the CWA and implementing regulations, so its requirements are therefore not subject to subvention of funds. This includes federal requirements to: (i) effectively prohibit non-storm water discharges through the MS4 to receiving waters; (ii) reduce the discharge of pollutants in stormwater to the maximum extent practicable; (iii) include such other provisions as the permitting authority (here, the Water Board) determines appropriate for the control of such pollutants; (iv) attain applicable TMDL wasteload allocations; and (v) conduct monitoring and reporting.

i. Non-stormwater discharge prohibition: Federal law requires that an MS4 permit effectively prohibit non-stormwater discharges through the MS4 to receiving waters (33 U.S.C. § 1342(p)(3)(B)(ii).). The Order's requirements to achieve the effective prohibition of non-stormwater discharges are thus compelled by federal law. For instance, firefighting foam and water discharges are non-stormwater discharges that can have significant impacts on water quality. The requirements to control these discharges, which include the development and implementation of BMPs to prevent firefighting foam and water from entering storm drains, implement the prohibition on non-stormwater discharges.

Other permit requirements implement the federal mandate to reduce pollutants to the maximum extent practicable and the effective prohibition on non-stormwater discharges at different times of year. For instance, trash enters waterways as a non-stormwater discharge during dry weather, when it can reach storm drains by direct discharge or in non-stormwater, and as a pollutant in stormwater discharges during wet weather. On-land trash control efforts, such as pollution prevention, street-sweeping, source control initiatives, and controls applicable to private lands apply in both dry and wet weather, and are necessary both to reduce pollutants in stormwater to the maximum extent practicable and to eliminate non-stormwater discharges of trash to the storm drain system (See *Environmental Protection Information Center v. Pacific Lumber* Co. (N.D. Cal. 2004) 301 F.Supp.2d 1102, 1111 [where stormwater runoff was mixed with pollutants, it was "not 'composed entirely of stormwater']..).

Similarly, new controls to manage discharges from unsheltered homeless populations largely implement the non-stormwater discharge prohibition by supplementing Permittees' existing Direct Discharge Programs, and by targeting illicit discharges of human waste and trash to the storm drain system. To the extent that enhanced bacteria controls require Sunnyvale and Mountain View to intensify efforts to discover leaks and illicit connections, manage municipal operations to prevent dry-weather discharges to the storm drain, and reduce illegal dumping, these provisions also implement the prohibition on non-stormwater discharges.

ii. TMDL requirements:

The CWA requires TMDLs to be established for waterbodies that do not meet federal water quality standards (33 U.S.C. § 1313(d).). The CWA also requires that MS4 permits include "such other provisions as the Administrator or the State determines appropriate for the control of [] pollutants" (33 U.S.C. § 1342(p)(3)(B)(iii).). U.S. EPA interprets this provision to mandate "controls to reduce the discharge of pollutants to the

maximum extent practicable, *and where necessary water quality-based controls*."[105]

Once U.S. EPA or a state establishes a TMDL, federal law requires that NPDES permits must contain water quality-based effluent limitations (WQBELs) consistent with the assumptions and requirements of any applicable wasteload allocation. (40 C.F.R. § 122.44(d)(1)(vii)(B); see also State Water Board Order No. WQ 2021-0052-EXEC, p. 73.) Indeed, TMDLs are developed for the purpose of specifying requirements for the achievement of water quality standards in impaired waters (33 U.S.C. § 1313(d); 40 C.F.R. § 130.7). The Order's requirements for attainment of TMDL wasteload allocations are therefore compelled by federal law.

Several generations of the MS4 permits issued in California have prohibited discharges that cause or contribute to exceedances of water quality standards in the receiving water. TMDL provisions, including WQBELs, simply add a process for meeting this requirement, generally based on a compliance schedule.

iii. Monitoring and reporting requirements:

Federal law requires that NPDES permits incorporate monitoring and reporting provisions (33 U.S.C. §§ 1318(a); 1342(a)(2); 40 C.F.R. §§ 122.26(d)(2)(i)(F); 122.41(h), (j)-(l); 122.42(c); 122.44(i); 122.48.). The Order's monitoring and reporting requirements are thus imposed pursuant to federal law.

iv. Maximum Extent Practicable (MEP) standard:

The CWA mandates that the Order "require controls to reduce the discharge of pollutants to the maximum extent practicable" (33 U.S.C. § 1342(p)(3)(B)(iii).). *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, as modified on denial of rehearing (Nov. 16, 2016) (*Department of Finance*) analyzed whether the CWA's MEP standard required four particular provisions concerning trash receptacles and inspections in the 2001 Los Angeles County MS4 permit. In concluding that the provisions were not required by federal law, the Supreme Court stated that, "[h]ad the Regional Board found when imposing the disputed permit conditions, that those conditions were the only means by which the maximum extent practicable standard could be implemented, deference to the board's expertise in reaching that finding would be appropriate" (*Department of Finance, supra*, 1 Cal.5th at p. 768.). The Supreme Court

[105] Phase I Stormwater Regulations, Final Rule, 55 Fed. Reg. 47990, 47994 (Nov. 16, 1990) (emphasis added); see also *Building Industry Ass'n of San Diego County v. State Water Resources Control Bd*. (2004) 124 Cal.App.4th 866, 882-887; Phase II Stormwater Regulations, Final Rule, 64 Fed. Reg. 68722, 68737.

further stated that "[s]uch findings are "case specific, based among other things on factual circumstances" (*Id*., fn. 15.).

To be entitled to deference, regional water boards must make an express finding that the particular set of permit conditions in a given permit is required to meet that federal standard and must support that finding with evidence. The Water Board expressly finds that the Order specifies requirements necessary for the Permittees to reduce the discharge of pollutants in MS4 discharges to the MEP. The requirements relate to municipal operations, new development and redevelopment, industrial and commercial controls, construction controls, and public information and outreach. The mix of program elements in the Order reflects the necessary pollutant reduction expected by the demanding federal MEP standard, but also represents a balancing of competing interests such as effectiveness, ease of implementation, and practicability. To the extent there may be multiple means of achieving pollutant reductions and that there could be trade-offs between program areas with potentially higher costs and greater pollutant reductions, the permit programs are structured to provide the optimum reduction of pollutants necessary to reduce pollutants to MEP. This finding is the expert conclusion of the principal state agency charged with implementing the NPDES program in California and therefore entitled to deference under *Department of Finance*.

The Order's requirements represent structural and non-structural water quality control measures that are effective, technically feasible, and generally accepted as appropriate. They are necessary to meet the MEP standard, an ever evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge and technology regarding controlling stormwater runoff continue to evolve, so too must the actions that are taken to comply with the standard.[106]

For example, based on advancing knowledge and technology related to limiting stormwater pollutants from impervious surfaces through low impact development strategies, economic considerations, and consideration of the evolving MEP standard, this Order contains new requirements for smaller new developments and redevelopments, including roads, and green infrastructure. They are necessary to meet the federal MEP standard and consistent with other U.S. EPA-issued municipal storm water permits, as explained in the Fact Sheet for Provision C.3. The Supreme Court in

[106] See also 55 Fed. Reg. 47990, 48052 ("EPA anticipates that storm water management programs will evolve and mature over time."); 64 Fed. Reg. 68722, 68754; Dec. 8, 1999 ("EPA envisions application of the MEP standard as an iterative process."); and Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits (Sept. 1, 1996) ("The interim permitting approach uses BMPs in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.").

Department of Finance suggested that the inclusion of equivalent or substantially similar provisions by the U.S. EPA in other permits may support a finding that the provisions are necessary to achieve MEP (*Dept. of Finance*, supra, 1 Cal.5th at p. 772.).

Similarly, enhanced bacteria provisions do not require affected Permittees to implement sweeping new programs or state-of-the-art technologies. Instead, they require Permittees whose stormwater discharges contribute to bacteria exceedances to ensure that streets are clean, storm drain catchments are clean, and that litter and pet waste laws are enforced. The fact that all elements of enhanced bacteria controls are already in place demonstrates that these elements are practicable. Intensifying use of these existing controls ensures that they do, in fact, reduce bacteria pollution to the MEP.

b. Permittees have authority to fund the costs through service charges, fees, or assessments:

Even if any of the permit provisions could be considered unfunded state mandates, under Government Code section 17556, subdivision (d), a state mandate is not subject to reimbursement if the local agency has the authority to fund the costs through service charges, fees, or assessments (*Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 398.). Here, Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with the Order. Permittees certainly have fee authority under their police powers (See, Cal. Const., art. XI, § 7; *Freeman v. Contra Costa County Water Dist.* (1971) 18 Cal.App.3d 404, 408 ("It cannot be denied that prevention of water pollution is a legitimate governmental objective, in furtherance of which the police power may be exercised."); *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 561-62 (holding in part that local governments have the authority sufficient to pay for inspection requirements for commercial and industrial facilities and construction sites to ensure compliance with various environmental regulations in an MS4 permit under their police powers for the prevention of water pollution).

This Fact Sheet demonstrates that numerous activities contribute to the pollutant loading from the MS4. Local agencies can levy service charges, fees, or assessments on these activities, independent of real property ownership (See, e.g., *Apartment Ass'n of Los Angeles County, Inc. v. City of Los Angeles* (2001) 24 Cal.4th 830, 842 (upholding inspection fees associated with renting property).). The authority of a local agency to defray the cost of a program without raising taxes indicates that a program does not entail a cost subject to subvention (*Clovis Unified School Dist. v. Chiang* (2010) 188 Cal.App.4th 794, 812 ["To the extent a local agency or school district 'has the authority' to charge for the mandated program or increased level of service, that charge cannot be recovered as a state-mandated cost."], quoting *Connell v. Superior Court* (1997)

59 Cal.App.4th 382, 401; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487-488.).

Permittees have argued in the past that their fee or taxation authority is constrained by California Constitution article XIII D, section 6, also known as Proposition 218 (Cal. Const., art. XIII D, § 6, subd. (c); *see also Howard Jarvis Taxpayers Association v. City of Salinas* (2002) 98 Cal.App.4th 1351, 1358-1359.). However, Proposition 218 is not an impediment to this Permittees' fee authority.[107] The Constitution has an exception to the voter approval requirements of Proposition 218, "for fees or charges for sewer, water, and refuse collection services" (Cal. Const. Article XIII D, section 6, subd. (c).).

The Legislature recently enacted two important pieces of legislation confirming fee authority without the need for voter approval. In Assembly Bill 2043 (2014), effective January 1, 2015, the Legislature amended the definition of "water" for purposes of articles XIII C and XIII D to mean "water from any source" (Gov. Code, § 53750, subd. (n), amended by Assembly Bill 2043 (Stats. 2014, ch. 78, § 2.). In doing so, the Legislature stated that its act "is declaratory of existing law." (Stats. 2014, ch. 78, § 1(c).) With Senate Bill 231 (2017), effective January 1, 2018, the Legislature "reaffirm[ed] and reiterate[d]" that the definition of "sewer" for purposes of article XIII D includes: systems, all real estate, fixtures, and personal property owned, controlled, operated, or managed in connection with or to facilitate sewage collection, treatment, or disposition for sanitary or drainage purposes, including lateral and connecting sewers, interceptors, trunk and outfall lines, sanitary sewage treatment or disposal plants or works, drains, conduits, outlets for surface or storm waters, and any and all other works, property, or structures necessary or convenient for the collection or disposal of sewage, industrial waste, or surface or storm waters (Gov. Code, § 53750, subd. (k); see also Gov. Code § 53751, subds. (h) and (i), added by Senate Bill 231, Stats. 2017, ch. 536, § 2.). These legislative actions confirm that the Permittees have authority to raise fees or charges, without voter approval, for costs related to their MS4s (See *Paradise Irrigation Dist. v. Com. on State Mandates* (2019) 33 Cal.App.5th 174, 197 [noting that effect of Senate Bill 231 was to exempt stormwater systems from voter approval requirement].).

In addition, Health and Safety Code section 5471, subdivision (a), gives dischargers fee authority for "services and facilities furnished…in connection with its water, sanitation, *storm drainage*, or sewerage system" (Health & Safety Code, § 5471, subd. (a) (emphasis added).). Similarly, Public Resources Code section 40059, subdivision (a)(1), also confers fee authority on counties, cities, districts, or other local governmental agencies for "[a]spects of solid waste

[107] Such authority is also undiminished by Proposition 26, which specifically excludes assessments and property-related fees imposed in accordance with Proposition 218 from the definition of taxes (Cal. Const., art. XIII C, § 1, subd. (e)(7).).

handling which are of local concern, including, but not limited to, frequency of collection, means of collection and transportation, level of services, charges and fees, and nature, location, and extent of providing solid waste handling services."

The ability of the Permittees to levy fees, assessments, or service charges to pay for compliance with the requirements of the Order cannot be disputed. In addition to the general authority above, some of the Permittees have specific authority to levy funds to pay for permit compliance through many means, including inspection fees, stormwater fees, development impact fees, trash fees, parks fees, and business improvement districts. Thus, the City of Palo Alto adopted an increased Storm Water Management Fee in 2017 to help pay for both routine maintenance of stormwater infrastructure, as well as new initiatives, including stormwater recycling and green infrastructure.[108] Voters in the City of Berkeley approved an increased stormwater fee in 2018 with provisions for annual increases of no more than 3 percent.[109] Voters in the City of Alameda adopted a stormwater management fee in 2019 for capital improvement, operation, and maintenance of the storm drain system, including clean water controls.[110] The City of Moraga included as part of its increased development impact fee schedule a "Storm Drainage Fee" to be "assessed on all types of development (within Town boundaries) that results in the addition of impervious surface, and which thereby increases demand on the Town's storm drainage facilities."[111] Many permittees impose park admissions fees or parks fees as a component of their development impact fees, which can help ensure improvements to park infrastructure (e.g., installation of pet waste stations) or operational costs (e.g., implementation of integrated pest management to comply with the pesticides TMDL).[112] Many, if not all, other municipalities and counties assess trash collection fees, which help cover the costs of implementing the trash provisions[113] and homeless encampment BMPs.[114] The

[108] City of Palo Alto, Storm Water Management Fee (2021); accessed at: https://www.cityofpaloalto.org/Departments/Public-Works/Engineering-Services/Storm-Water-Management-Fee

[109] City of Berkeley, Approval and Levy of 2018 Clean Stormwater Fee in FY 2020, p. 4 (July 16, 2019).

[110] City of Alameda, 2019 Water Quality & Flood Protection: Frequently Asked Questions (alamedaca.gov).

[111] Town of Moraga, 2016 Comprehensive Development Impact Fee Update (May 2016), p. 36.

[112] See, e.g., Sunnyvale Municipal Code, § 18.10.020, subd. (d).

[113] See, e.g., Alameda County Department of Environmental Health Fee Schedule (2021), pp. 6-8 (Several pages of waste managmement-related fees, including fees for inspections), accessed at: https://deh.acgov.org/deh-assets/docs/General-Fees.pdf

[114] City of San Jose, "BeautifySJ Trash and Waste Services Expand" (November 20, 2020) (City Council approved $3 million to pay for trash pickup at homeless encampments); see also Wipf, Carly. "Update:

City of Oakland has ten business improvement districts, or BIDs, in which businesses help to fund maintenance costs, including the costs of trash pickup and graffiti removal, in their respective districts.[115] The Permittees have authority to levy fees for firefighting and prevention.[116] In short, Permittees have multiple sources of fee funding to implement permit requirements.

Even if voter approval may be required prior to levying fees, that does not mean that a local agency lacks the authority to levy fees. In *Paradise Irrigation Dist. v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 182, the Court considered whether the majority protest procedure added by Proposition 218 deprived local agencies of authority to impose fees for water service. Article XIII D, section 6(a) requires a local agency to identify parcels subject to a new fee, calculate the fee amount, and provide notice to affected property owners (Cal. Const., art. XIII D, § 6, subd. (a)(1).). If a majority of the property owners submit written protests against the fee, the fee may not be imposed (*Id*., subd. (a)(2).). The Court held that the "majority protest procedures are properly construed as a power-sharing arrangement between the districts and their customers, rather than a deprivation of fee authority" (33 Cal.App.5th at p. 182.). It explained that, when considering how voter powers affect the ability of local governments to impose fees, courts "presume local voters will give appropriate consideration and deference to state mandated requirements . . . " (*Id*. at p. 194, citing *Bighorn Desert View Water Agency v. Verjil* (2006) 39 Cal.4th 205, 220.). "Although this power-sharing arrangement has the potential for conflict, we must presume that both sides will act reasonably and in good faith" (Id., at p. 192.) Further, the fact that, "as a matter of practical reality, the majority protest procedure allows water customers to defeat the District's authority to levy fees" was not dispositive; "the inquiry into fee authority constitutes an issue of law rather than a question of fact." (Id. at p. 195, citing Connell, supra, 59 Cal.App.4th at p. 401.). "Fee authority is a matter governed by statute rather than by factual considerations of practicality;" it is not controlled by whether municipalities have tried and failed to levy fees (Id.). If there is statutory authority to levy fees, then there is no right to subvention (Id.).

Grants, both state and federal, can also offset the costs of stormwater implementation. For instance, the State of California administers the Clean Water State Revolving Fund, which the 2021-2022 Intended Use Plan

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Spend $3 million more to pick up San Jose trash, officials recommend," *San Jose Spotlight* (Sept. 14, 2020); see also Bond Graham, Darwin. "Oakland's new budget doesn't 'defund' the police, but it boosts funding for alternatives," *The Oaklandside* (June 25, 2021) (Oakland approving extension of sanitation services to 107 homeless encampments.)

[115] See, e.g., maintenance services performed by Downtown Oakland Association (https://downtownoakland.org/clean-safe/).

[116] Markovich, Ally. "Berkeley firefighters get $12.7M to tackle growing wildfire threat," *Berkleyside* (July 1, 2021) (Measure FF funds to pay for additional staff, ambulances, vegetation management, and training);

specifically notes may be used to fund "[s]tormwater and dry weather runoff reduction from Municipal Separate Storm Sewer Systems" in the San Francisco Bay Region.[117] Proposition 1 authorized $200 million for "green infrastructure, rainwater and stormwater capture projects, and stormwater treatment facilities," and stormwater project planning.[118] The City of San Pablo is a recipient of a 2021 Proposition 1 grant award. Caltrans also provides significant funding for cooperative implementation of trash control projects. Atherton, Richmond, Vallejo, Hayward, Emeryville, San Jose, Palo Alto, East Palo Alto, San Mateo, Oakland and unincorporated Alameda County have all completed or received funding to implement full trash capture projects jointly with Caltrans.[119] The 2021 Clean California program expands Caltrans' funding for litter abatement and public education and incorporates a nearly $300 million local grant program.[120]

U.S. EPA also administers grant programs for various activities that this permit requires, such as TMDL implementation, nonpoint source control, and training.[121]

D. Statewide Industrial and Construction Stormwater General Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

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[117] State Water Resources Control Board, CWSRF, Prop 1, and Prop 68 Intended Use Plan (June 15, 2021), p. 12.

[118] Wat. Code § 79747.

[119] Correspondence with Qi Yan (July 23, 2021).

[120] Caltrans, Clean California (2021), p. 2; see also, Governor's Office, "Governor Newsom Kicks Off Clean California Day of Action Highlighting New Initiative to Clean and Revitalize Neighborhoods Across the State" (July 7, 2021).

[121] See generally, U.S. EPA Water Infrastructure and Resiliency Finance Center, "Federal and State Funding Programs -Stormwater &Green Infrastructure Projects" (April 2017).

E. Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region and, with respect to the East Contra Costa County Permittees, the Sacramento and San Joaquin River basins. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

F. Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, state or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities. Most of these facilities are regulated under the State Water Resources Control Board's general permit for stormwater discharges from small municipal separate storm sewer systems (WQ Order 2013-0001-DWQ, as amended) and are required to control the discharge of pollutants from their systems. The Water Board will consider additional such facilities for coverage under that NPDES permit or otherwise pursuant to U.S. EPA Phase II stormwater regulations..

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Neither the CWA nor federal regulations specifically define "non-stormwater." The definition of "non-storm water" is derived from the definition of "storm water." Fe[d]eral regulations define "storm water" as "storm water runoff, snow melt runoff, and surface runoff and drainage" (40 CFR § 122.26(b)(13).). While "surface runoff and drainage" is not defined in federal law, U.S. EPA's preamble to the federal regulations demonstrates that the term is related to precipitation events such as rain and/or snowmelt (55 Fed.Reg. 47990, 47995-96 (Nov. 16, 1990)). For example, U.S. EPA states:

"In response to the comments [on the proposed rule] which requested EPA to define the term 'storm water' broadly to include a number of classes of discharges which are not in any way related to precipitation events, EPA believes that this rulemaking is not an appropriate forum for addressing the appropriate regulation under the NPDES program of such non-storm water discharges . . . . Consequently, the final definition of storm water has not been expanded from what was proposed."

(*Ibid*.) The storm water regulations themselves identify numerous categories of discharges including landscape irrigation, diverted stream flows, discharges from drinking water supplier sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, and street wash water as "non-storm water." While these types of discharges may be regulated under storm water permits, they are not considered storm water discharges (40 CFR §122.26(d)(2)(iv)(B)). This review of the storm water regulations and U.S. EPA's discussion of the definition of storm water in its preamble to these regulations strongly supports the interpretation that storm water includes only precipitation-related discharges. Therefore, non-precipitation related discharges are not storm water discharges and are not subject to the MEP standard in CWA section 402(p)(3)(B)(iii). Rather, non-storm water discharges are effectively prohibited pursuant to CWA section 402(p)(3)(B)(ii).

While federal regulations have no definition for "non-storm water discharges," "illicit discharges" is defined and the terms are often used interchangeably (See, e.g., 40 CFR § 122.26(d)(2)(iv)(B)(1).). "Illicit discharge" is defined by U.S. EPA as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit . . . and discharges

resulting from firefighting activities"[122] (40 CFR § 122.26(b)(2).). The federal regulations require that non-stormwater discharges be controlled if they are a significant source of pollutants and the permitting authority is expected to include permit conditions to prohibit or control specified categories of non-stormwater discharges if they are determined to be a source of pollutants to waters of the United States (40 CFR § 122.26(d)(2)(iv)(B)(1).).

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, Chapter 4 Implementation, Table 4-1, Prohibition 7, and the trash discharge prohibitions in the ISWEBE and Ocean Plan.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – San Francisco Bay Basin Plan, Chapter 3, Water Quality Objectives.

Receiving Water Limitation B.2. Legal Authority – CWA section 402(p)(3)(B)(iii) requires MS4 permits to include "such other provisions as the Administrator or the State determines appropriate for the control of [] pollutants." EPA interprets this provision to mandate "controls to reduce the discharge of pollutants to the maximum extent practicable, and *where necessary water quality-based controls*."[123]U.S. EPA has reiterated that MS4 "permit conditions must provide for attainment of applicable water quality standards (including designated uses), allocations of pollutant loads established by a TMDL, and timing requirements for implementation of a TMDL."[124] The State Water Board has also determined that limitations necessary to meet water quality standards are appropriate for the control of pollutants discharged by MS4s and must be included in MS4 permits (State Water Board Orders WQ 91-03, 98-01, 99-05, 2001-15,2021-0052-EXEC), and 2020-0038.). This Order accordingly requires that discharges shall not cause or contribute to violations of water quality standards. The receiving water limitations are necessary and appropriate to control MS4 discharges because storm water discharges can cause or contribute to excursions above water quality standards. The inclusion of receiving water limitations is also consistent with the Ninth Circuit Court of Appeal's ruling in *Defenders of Wildlife v. Browner* (191 F.3d 1159, 1166 (1999)) that the permitting authority has discretion regarding the nature and timing of requirements that it includes as MS4 permit conditions to attain water quality standards.

[122] While not illicit discharges, discharges from firefighting activities may be regulated where they contribute significantly to pollution in stormwater. 40 C.F.R. 122.26(d)(2)(iv)(B)(1); see also 64 Fed. Reg. 68722, 68756, 68758.

[123] Phase I Stormwater Regulations, Final Rule, 55 Fed. Reg. 47990, 47994 (Nov. 16, 1990) (emphasis added); see also Building Industry Ass'n of San Diego County v. State Water Bd. (2004) 124 Cal.App.4th 866, 882-887).

[124] See, e.g., Phase II Stormwater Regulations, Final Rule, 64 Fed. Reg. 68722, 68737.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains water quality objectives, as well as the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in [CWC] Section 13050, is prohibited."

CWC section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

CWC section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

CWC section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

CWC Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

CWC Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires NPDES permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(vii) requires water quality-based effluent limits that are consistent with the assumptions and requirements of any available wasteload allocation.

State Water Board Orders WQ 98-01 and 99-05 are precedential orders that require municipal stormwater permits to not cause or contribute to exceedances of water quality standards in the receiving water. State Water Board Order WQ 99-05 specifically requires that Provision C.1 include language that Permittees shall comply with discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges and adopted an iterative approach to complying with the limitations where there are exceedances. Courts have held that compliance with the iterative process does not excuse liability for violations of water quality standards (*Building Industry Assn. of San Diego v. State Water Resources Control Board* (2004) 124 Cal.App.4th 866; *City of Rancho Cucamonga v. Regional Water Quality Control Bd*. (2006) 135 Cal.App.4th 1377; *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2011) 673 F.3d. 880, rev'd on other grounds sub nom; *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2013) 133 S.Ct. 710, mod. by *Natural Resources Defense Council v. County of Los Angeles* (9th Cir. 2013) 725 F.3d 1194, cert. den. *Los Angeles County Flood Control Dist. v. Natural Resources Defense Council* (2014) 134 S.Ct. 2135.).

State Water Board Order WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, also affirmed that good faith implementation of the iterative process does not excuse liability for violations of water quality standards. It, however, allowed an alternative path to permit compliance that allows MS4 dischargers that are willing to pursue significant undertakings to be deemed in compliance with the receiving water limitations. It specifically directs regional water boards to follow the principles stated below when issuing a municipal stormwater permit, unless a board makes a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons.

The receiving water limitations provisions of Phase I MS4 permits should continue to require compliance with water quality standards in the receiving water and should not deem good faith engagement in the iterative process to constitute such compliance. The Phase I MS4 permits should therefore continue to use the receiving water limitations provisions as directed by State Water Board Order WQ 99-05.

(1) The Phase I MS4 permits should include a provision stating that, for water body-pollutant combinations with a TMDL, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination.

(2) The Phase I MS4 permits should incorporate an ambitious, rigorous, and transparent alternative compliance path that allows permittees appropriate time to come into compliance with receiving water limitations without being in violation of the receiving water limitations during full implementation of the compliance alternative.

(3) The alternative compliance path should encourage watershed-based approaches, address multiple contaminants, and incorporate TMDL requirements.

(4) The alternative compliance path should encourage the use of green infrastructure and the adoption of low impact development principles.

(5) The alternative compliance path should encourage multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply.

(6) The alternative compliance path should have rigor and accountability. Permittees should be required, through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions. Permittees should be further required, again through a transparent process, to monitor the results and return to their analysis to verify assumptions and update the solutions. Permittees should be required to conduct this type of adaptive management on their own initiative without waiting for direction from the regional water board.

In State Water Board Order WQ 2020-0038, the State Water Board applied and further explained the alternate compliance path principles in Order WQ 2015-0075 when it reviewed the Los Angeles Regional Water Board's Los Angeles County MS4 permittees' watershed management plans and an enhanced watershed management program (LA County MS4 Permit), which were used as alternative paths to compliance. The State Water Board directed changes to those plans, reiterating State Board Order WQ 2015-0075's standards for rigor, transparency, and accountability for alternate compliance. The State Water Board referred regional water boards using alternative compliance approaches to ensure consistency with certain additional principles in Order

WQ 2020-0038, including "ensuring plans approved clearly explain their development process, identify enforceable milestones, and detail the water body-pollutant combinations to which the plans apply and, to the extent limiting-pollutant or similar approaches are used, that their use is justified such that there is confidence treatment of the limiting pollutant will address the other water body-pollutant combinations to be addressed" (State Water Board Order WQ 2020-0038 [Los Angeles County], p. 164.). At the same time, the State Water Board recognized its order is not intended to curtail the flexibility of the regional water boards to adopt alternative compliance approaches that best fit their particular regions or to restrain the evolution of the regional water boards' approaches to alternative compliance.

Alternative Path to Compliance with Receiving Water Limitations for Certain Pollutants and Consistency with State Water Board Precedent

This Order, as did the previous order, goes beyond requiring an open-ended iterative approach to compliance with water quality standards by including pollutant-specific provisions, C.9 through C.12. C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f, with numerical or narrative WQBELs with milestones and deadlines. These provisions, other than C.10, which implements the statewide Trash Amendments, and C.14.a, which address bacteria exceedances in two water bodies that have not been listed as impaired for bacteria, implement adopted TMDL wasteload allocations or Water Quality Improvement Plans and the associated implementation plans in the Basin Plan and the Water Quality Control Plan for the Sacramento and San Joaquin Basins and specify what Permittees must do during the term of the Order to manage discharges of the specific pollutants that may cause or contribute to violations of water quality standards. Provision C.10 requires controls to meet water quality objectives applicable to trash in the Basin Plan, ISWEBE, and Ocean Plan.

Provision C.1 provides a bridge between the receiving water limitations, which state that discharges shall not cause or contribute to a violation of any applicable water quality standard, and these pollutant-specific provisions that include enforceable water quality-based requirements that Permittees must meet during the term of this Order to manage their contributions to violations or to prevent violations of water quality standards in receiving waters. In accordance with Basin Plan Section 4.8 – Stormwater Discharges and the applicable TMDL implementation requirements specified in the implementation plans adopted into the Basin Plan for and with TMDLs associated with these provisions, the requirements in these pollutant specific provisions are based on an updated assessment and consideration of technically and economically feasible control measures to reduce pollutants in stormwater discharges. As such, each of these provisions establishes a path to compliance with associated receiving water limitations. These requirements are a direct outgrowth of knowledge and experience with the presence of these pollutants in receiving waters (e.g., San Francisco Bay segments and urban tributaries) based on monitoring and special studies conducted by the San Francisco Bay Regional Monitoring Program, required monitoring from previous permits,

special studies conducted by municipalities, and other studies conducted by the San Francisco Estuary Institute.

The alternative path to compliance in the Permit is structured differently than the LA County MS4 Permit's watershed management program-based alternative compliance path reviewed by the State Water Board in State Water Board Orders WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, and 2020-0038. Specifically, an alternative compliance path is incorporated into the permit as follows:

- The requirements constituting the alternative compliance path are spelled out in sections C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f. In the LA County MS4 Permit, permittees were required to propose and develop watershed management programs with structural and non-structural controls that would then be approved by the Los Angeles Water Board as appropriate for alternative compliance. Here, Permittee requirements and controls are specified in the Permit itself rather than proposed by the Permittees in a plan.
- With one exception,[125] the alternative compliance path is available only for waterbody-pollutant combinations for which there is an established TMDL or Water Quality Improvement Plan (WQIP). The requirements and controls specified in the relevant alternative compliance sections closely track the requirements and controls specified in the TMDL or WQIP implementation plans including, as consistent with the implementation plans, refinements and updates based on the experience of the Board and the Permittees in implementing the TMDLs in prior permit terms. Sections C9 through C12, C.14, C.18, and C.19 of this Fact Sheet include a thorough discussion of the bases for these requirements and controls. Because the alternative compliance path follows established TMDLs or WQIP, milestones and deadlines in those TMDLs that occur within the term of the Permit are incorporated into the Permit. In this sense, the alternative compliance path in the Permit is largely the implementation of TMDLs or WQIPs that were duly adopted by the Board and incorporated into the Basin Plan, as is already required by the law even in the absence of an alternative compliance option. (Water Code §13263(a) (waste discharge requirements must implement the Basin Plan); 40 CFR 122.44(d)(1)(vii) (NPDES permits must include water quality-based effluent limits that are consistent with the assumptions and requirements of any available wasteload allocation).)
- The Permit allows alternative compliance where there is no established TMDL or WQIP for one set of waterbody-pollutant combinations. This alternative compliance path is specified in Section C.14.a. The section applies to "the cities of Mountain View and Sunnyvale for discharges that are causing or contributing to exceedances

[125] Although there is no TMDL for trash, Provision C.10 implements the statewide Trash Amendments, which establish a framework for coming into compliance with the statewide prohibition on trash discharges.

of applicable bacteria water quality objectives in Stevens Creek (both cities), Calabazas Creek (Sunnyvale), and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale)." The requirements, controls, and timelines in Section C.14.a. mirror the requirements, controls, and timelines in bacteria TMDLs established for other waterbody segments in the region. (See Sections C.14.b.-14.d.) Accordingly, the Board relied on the analysis and planning that supported the development of those TMDLs as support for provisions in Section C.14.a.

- The Permit incorporates requirements and incentives for the use of green infrastructure, the adoption of low impact development principles, and multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply. Some of the alternative compliance path provisions specifically identify such projects as means of compliance with the provisions, including Provision C.11 for mercury discharges to San Francisco Bay and Provision C.12 for PCBs discharges to San Francisco Bay. Generally, however, the requirements are layered on top of the alternative compliance provisions, rather than built into provisions C.9 through C.12, C.14, C.18 (pertaining to the Pescadero-Butano Sediment TMDL), and C.19.c-f. Specifically, all Permittees, and not only Permittees with discharges subject to the alternative compliance path provisions, must comply with section C.3.

As stated above, State Water Board Orders WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, and 2020-0038 acknowledge that there is more than one acceptable approach to providing for an alternative compliance path in an MS4 Permit. (See, e.g. State Water Board Order WQ 2021-0052-EXEC, p. 64 ("[W]e acknowledge that regional differences may dictate a variation on the [watershed management program] approach."); State Water Board Order WQ 2020-0038, p. 164 ("This order is not intended to curtail the flexibility of the regional water boards. . . to adopt and develop alternative compliance plans that best fit their particular regions, and does not require modification of programs adopted by other regional water boards.") While structured differently than the alternative compliance path in the LA County MS4 Permit, the alternative compliance path in provisions C.9 through C.12, C.14, C.18, and C.19.c-f, is nevertheless consistent with the direction in State Water Board Orders WQ 2015-0075, as amended, and 2020-0038 as described below and in the sections of the Fact Sheet discussing the bases for the requirements and controls in those sections.

The requirements of provisions C.9 through C.12, C.14, C.18, and C.19.c-f are ambitious and rigorous because they require Permittees to fully commit to and implement challenging, but achievable, tasks to ultimately meet water quality objectives, including objective interim narrative or numeric effluent limitations. Accordingly, this Order explicitly applies principles 1, 2, and 3 (above) of State Water Board Order WQ 2015-0075, as amended, and provides an alternative path to compliance with Discharge Prohibitions and Receiving Water Limitations for the following pollutant – water body combinations: pesticides and pesticide-caused toxicity in all receiving waters (Provision

C.9); trash in all receiving waters (Provision C.10); mercury in all San Francisco Bay segments and receiving waters in the Guadalupe River watershed (Provision C.11); polychlorinated biphenyls (PCBs) in all San Francisco Bay segments (Provision C.12); fecal indicator bacteria in various impaired water bodies (Provision C.14); sediment in Pescadero and Butano creeks (Provision C.18); and diazinon and chlorpyrifos in the Sacramento/San Joaquin River Delta (Provision C.19.c), methylmercury in the Sacramento/San Joaquin River Delta (Provision C.19.d-e), and pyrethroid pesticides in the Sacramento and San Joaquin river systems (Provision C.19.f).

This rigorous compliance alternative also applies Order WQ 2015-0075, as amended, principle 4. It implements all applicable TMDL requirements and calls for or allows for implementation of trash, mercury, and PCBs controls in watershed and drainage areas where they are most needed and most likely to be effective and promotes and allows use of controls with multiple pollutant benefits. In particular, Provision C.10 allows compliance through use of low impact development and green infrastructure controls that may be implemented for other pollutants, e.g., mercury and PCBs, upon a demonstration that such controls provide full trash capture system equivalency, and alternatively Permittees may use full trash capture systems as a means of meeting provisions C.11 (mercury) and C.12 (PCBs) requirements. Also, by design, provisions C.11 (mercury) and C.12 (PCBs) include consistent categorical control measure requirements, e.g., Source Property Identification and Abatement, Control Measure Implementation in Old Industrial Areas, and Plan and Implement Green Stormwater Infrastructure, based on recognition of the multipollutant benefits of these actions.

However, the watershed-based approach addressing multiple pollutants is less or not appropriate for the pesticides and pesticide-caused toxicity requirements. Consistent with the TMDL wasteload allocation and implementation plan, these requirements are pollution prevention management practices specific to urban use pesticides and apply to all watersheds and drainage areas since urban use pesticides are used everywhere. Similarly, Provision C.14 fecal indicator bacteria requirements for discharges to receiving waters that are or may be impaired by bacteria implement or, where there is no TMDL, are consistent with TMDL requirements, and call for fecal indicator bacteria-specific pollution prevention controls consistent with current knowledge of sources and activities in the watersheds of these receiving waters. Provision C.14 does recognize there will be bacteria reduction benefits associated with control of some trash sources. Although there may be some pesticides and bacteria reduction benefits of low impact development and green infrastructure controls that may be implemented for other pollutants, those benefits are likely minimal.

Order Provision C.3 calls for adoption and implementation of low impact development consistent with Order WQ 2015-0075, as amended, principles 5 and 6. The mercury and PCBs provisions (C.11 and C.12) explicitly recognize and call for use of green infrastructure to meet pollutant load reduction requirements. The trash provisions in C.10 allow use of low impact development green infrastructure as full trash capture

systems, if appropriately designed, operated, and maintained. Although not directly required in the pesticides and fecal indicator bacteria provisions, low impact development principles and development and implementation of green infrastructure plans, including consideration of multi-benefit regional projects, could also have pesticides and bacteria load reduction benefits. However, there are no current available and viable treatment controls, including green infrastructure, that can reduce concentrations of pesticides or fecal bacteria to low levels consistent with applicable water quality objectives.

Consistent with Order WQ 2015-0075, as amended, principle 7, each of the pollutant-specific provisions also contain concrete milestones and deadlines and reporting requirements that provide rigor and accountability. Unlike the MS4 permit evaluated in Order WQ 2015-0075, as amended, where water quality objectives were to be achieved through watershed management plans or programs to be submitted, this Order explicitly sets forth the requirements for achieving over time receiving water limitations instead of relying on plans. As such, it is abundantly transparent as to what is required. The pollutant-specific requirements track the controls and the timelines for attaining the wasteload allocations established in adopted TMDLs; therefore, the analyses supporting the requirements for achieving receiving water limitations over time were provided in the first instance, in a transparent, public process, through the adoption of the TMDLs. Additionally, this Fact Sheet summarizes data and information collected under the prior permit's implementation of the TMDL and additional requirements and provides the analyses supporting additions and adjustments made to the pollutant-specific requirements and controls in this Permit. Moreover, as implementation of the Permit's alternative compliance provisions proceeds, all reports, plans, and other required submittals will be made available to all interested parties and input and feedback from interested parties will be considered in the evaluation of all submittals. State Water Board Order WQ 2015-0075, as amended, requires that an MS4 permit show "through a transparent process" that it has "analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions," but it does not require a specific type or form of analytical exercise to meet this principle. (See, e.g., State Water Board Order WQ 2020-0038, p. 81, acknowledging that evaluations other than modeling are acceptable.) The analyses supporting the TMDLs implemented in the Permit, as well as the additional analyses provided or referred to in this Fact Sheet, meet the direction provided by the State Water Board in principle 7.

The Order also includes monitoring requirements (Provision C.8 and Provision C.14) to assess water body and watershed conditions and effectiveness of control actions towards attainment of water quality standards and to inform selection and implementation of new control actions or adaptive improvements of control actions.

Consistent with the TMDLs, more time than the term of the Order will be necessary to attain water quality standards for mercury, PCBs, and fecal bacteria. In these cases, the associated Order provision includes an additional requirement for the Permittees to

submit updated plans of additional or improved control actions and schedule of implementation to attain water quality standards and TMDL wasteload allocations for the Water Board's consideration of numerical or narrative WQBELs in the subsequent order. It also requires updates to corresponding reasonable assurance analyses demonstrating sufficient control measures will be implemented to attain the TMDLs and water quality standards.

With respect to compliance with the trash discharge prohibition, the Trash Amendments provide that Permittees "with NPDES permits that contain specific requirements for the control of Trash that are consistent with these Trash Provisions shall be determined to be in compliance with this prohibition if the dischargers are in full compliance with such requirements." The requirements of this Order are consistent with the Trash Provisions, which include the water quality objective for trash, the discharge prohibition, and the implementation requirements of the Trash Amendments (see Fact Sheet for Provision 10).

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii) and 402(a), California Water Code (CWC) sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires "[a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires "[a] description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires "[a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires "[a] description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways [sic] and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Discharges from paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, can contain many pollutants, such as sediment, copper, petroleum products, trash, and pathogens. Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention. This Provision sets the minimum implementation level for such preventive measures, but does not bar Permittees from implementing additional pollution prevention actions.

Municipal maintenance personnel play a vital role in minimizing stormwater pollution because they work directly on municipal storm drains and at other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in identifying, reporting, and cleaning up illicit discharges.

C.2-2 Road construction and other municipal activities can disturb soil and drainage patterns in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, degrading water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b) Identifying and prioritizing rural roads maintenance on the basis of soil erosion potential, slope steepness, and receiving water habitat resources; (c) Developing and implementing road and road crossing (e.g., bridge and culvert) construction designs that do not impact creek functions, do not create a migratory fish passage barrier, where migratory fish are present, and do not lead to stream bank instability; (d) Developing and implementing an inspection program to maintain road structural integrity and prevent impacts to water quality; and (e) Adequately maintaining rural roads adjacent to streams and riparian habitat to reduce erosion, such as by replacing damaging shotgun culverts, re-grading roads to slope outward where consistent with road engineering safety standards, and installing water bars.

Specific Provision C.2 Requirements

Provision C.2.a-e. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities, such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations). Stormwater pump stations can be sources of pollutants including low dissolved oxygen, oxygen-demanding substances, and trash to receiving waters. As described below, the Permit requires Permittees to continue to inspect their pump stations and, as needed, take corrective actions to prevent adverse water quality impacts.

Water Board staff investigated the occurrence of low salinity and dissolved oxygen (DO) conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Water Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Wildlife in Alameda County.

Discharge of black-colored water from the Alvarado pump station to Old Alameda Creek was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L (DO) water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The (DO) sag was detected from surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Inspections of stormwater pump stations, which transport water from the storm drain system to receiving waters and operate during both dry and wet weather, indicate that pump stations may represent an overlooked source of controllable pollution, in particular low dissolved oxygen (DO) and trash, to the San Francisco Bay Estuary and its tidal sloughs. The discharges of dry weather urban runoff from these pump stations were historically not managed to protect water quality and surveillance monitoring detected measurable negative water quality consequences of this current state of pump station management.

Previous iterations of the MRP required Permittees to inventory and inspect pump stations during the dry season to identify and correct low-DO discharges. Permittees

now have inventories of pump stations, and this permit continues the requirements to inspect pump stations and implement corrective action if receiving water is found to have low DO. Pump stations within the storm drain system and pump stations that discharge to dry creeks are excluded because any low DO in discharges will not impact water quality.

This permit also continues to require Permittees to inspect all pump stations for trash and evidence of illicit discharges, and maintain or replace oil-absorbent booms, in order to comply with the prohibition on non-stormwater discharges.

40 CFR 122.26(d)(2)(I)(f) requires Permittees to carry out all inspection, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with permit conditions, including the prohibition on illicit discharges to the MS4. Pump stations cannot contribute discharges with dissolved oxygen (DO) level below 3 mg/L. Previous pump station reporting shows that implementing corrective actions (i.e., BMPs) prior to the pumps, combined activating the pumps to discharge collected water, as opposed to simply allowing it to overflow, aerates the water to a DO level of at least 3 mg/L. Thus, this Permit removes the specific DO monitoring requirements and allows the Permittees greater flexibility to ensure that all water discharged from pumps stations is at least 3 mg/l. The reporting requirement has also been removed from this Permit, but Permittees must maintain any sampling records and make them available upon request.

Provision C.2.f. (Corporation Yard BMP Implementation). This provision continues the requirement for Permittees to implement BMPs in site-specific Stormwater Pollution Prevention Plans (SWPPPs) to minimize pollutant discharges in stormwater and non-stormwater discharges in municipal corporation yards. SWPPPs, which Permittees have been required to have in place since 2010, should have specific BMPs for different functions of the corporation yard and provide guidance for regular inspections to ensure that appropriate BMPs are implemented. After Water Board staff and U.S. EPA staff inspections indicated that despite the use of SWPPPs, corporation yards had actual and/or potential discharges, the Water Board required Permittees to customize their SWPPPs and conduct routine inspections in different areas of the corporation yard and at least one inspection prior to the start of the rainy season. However, subsequent annual reports indicated that Permittees' inspections were not consistently scheduled at times when they would detect potential discharges or runoff issues prior to the start of the rainy season. In addition, Permittees' reporting on corrective actions was too spotty for the Water Board to make compliance determinations. Therefore, this Permit clearly identifies the timeframe for the annual inspections to occur and requires corrective actions to be implemented before the next rain event, but no later than 10 business days after the potential and/or actual discharges are discovered. This is consistent with the timeframe for implementation of corrective actions in provisions C.4. and C.5.

Provision C.2.g. Storm Drain Inlet Marking. This requirement has been moved from Provision C.7, Public Information and Outreach, of the Previous Permit (Order No. R2-

2015-0049, as amended). Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, the Permit continues to require all municipally maintained inlets to be legibly labeled with a “no dumping” message. Volunteer storm drain marking events have additional public involvement value and may further raise awareness and compliance.

Provision C.2.h. Staff Training. This provision continues to require Permittees to conduct annual trainings for municipal staff. Trainings are necessary to keep staff current on implementation and maintenance of BMPs for municipal operations to control stormwater discharges. Since municipal employees are largely responsible for implementing Provision C.2, staff training is an essential component of controlling discharges from municipal operations.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires "a] description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(2) requires "[a] description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires "[a] description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires "[a] description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the premise that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions for new development and redevelopment, including road improvement projects, and determining how to operate and maintain streets, roads, and highways, including reducing pollutants discharged from them. The goal of Provision C.3. is for Permittees to use their planning authority to reduce

pollutant discharges and runoff flow into the storm drain system primarily through the implementation of low impact development (LID) techniques.

C.3-3 To accomplish this goal, Permittees must require new development and redevelopment projects to implement appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from these projects. Permittees are also required to implement their Green Infrastructure Plans for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs and other storm drain infrastructure elements. Provision C.3. is not intended to restrict or control local land use decision-making authority.

C.3-4 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-5 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to regulation pursuant to CWA Sections 401 or 404. This is consistent with the stayed 2015 Clean Water Rule exempting stormwater control features from the definition of “waters of the U.S.” (80 Fed. Reg. 37054 (June 29, 2015).) This Permit requires Permittees to ensure that constructed wetlands installed by Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-6 The Permit requires Permittees to ensure that pervious pavement systems of 3,000 square feet or more, onsite, joint, and offsite stormwater treatment systems, and HM controls installed by Regulated Projects are properly operated and maintained for the life of the Projects.

<u>Specific Provision C.3 Requirements</u>

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) continues the requirements related to having adequate legal authority to address storm water, development review and permitting, environmental review, training, and outreach requirements of MRP 1.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

This permit is a 4th generation permit containing stormwater treatment requirements for development projects. Past permits have grandfathered development projects approved prior to those permits' effective dates, essentially exempting the projects and allowing them to provide no or insufficient stormwater treatment. The Water Board believes a small number of these development projects that were approved more than a decade ago have still not begun construction. A decade is sufficient time to justify requiring the Permittees to revise and update these stagnant development permits to include current LID treatment requirements. Therefore, this provision does not grandfather development projects approved with no stormwater treatment requirements and that have not begun construction. However, this provision allows exemptions for some of these previously approved projects in situations where the Permittees lack legal authority to retroactively change their previous approvals. For a pending Regulated project that has not been approved as of June 30, 2023, and a Permittee has no legal authority to require changes under Government Code sections 66474.2 or 65589.5, subd. (o), this provision does not require the Permittee to require compliance with the new requirements of this Order, because it cannot.

To confirm that the total number of projects previously approved without any Provision C.3-compliant stormwater treatment is indeed small, Provision C.3.b.iv.(1) includes a requirement for Permittees to provide in their 2023 Annual Report a complete list of these types of development projects. For each such Project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). This reporting requirement only applies to Permittees that have Projects subject to Provision C.3.b.i.(2).

Regulated Projects approved under previous permits with non-LID stormwater treatment measures in compliance with the hydraulic sizing criteria of Provision C.3.d. will continue to be grandfathered.

Provision C.3.b clarifies that sidewalks and any other portions of the public right of way that are developed or redeveloped as part of a Regulated Project must be included in the total impervious surface count when evaluating whether projects meet the Regulated Project thresholds, and when evaluating the area that must be treated by the Regulated Project. These impervious surfaces generate urban stormwater pollutants in

the form of aerially-deposited particulates and pollutants deposited by bicyclists (e.g., bicycle tire wear particles, and petroleum products) and pedestrians (e.g., PAH loading from adjacent roadways, and trash), they are a source of thermal pollution of runoff (which may contribute to adverse impacts threatening cold water wildlife habitat), and they contribute to hydromodification of receiving waters.[126]

The pavement maintenance practices defined in Provision C.3.b.ii.(1)(b) are adapted from Appendix 1 of the current (effective August 1, 2019) Western Washington Phase II MS4 Permit.[127] These definitions clarify which rehabilitative road maintenance/reconstruction practices do and do not qualify as Regulated Projects. For additionally clarity, bituminous surface treatments have been defined in the Glossary.

- Upgrading from a bituminous surface treatment with a layer of asphalt or concrete is an excluded pavement maintenance practice because a bituminous surface treatment itself results in an impervious surface, and therefore that upgrade will not produce a new impervious surface (as long as it does not also involve the removal or replacement of the pavement to the base course or lower). For example, if there is an existing dirt or gravel surface, over which there is an existing bituminous surface treatment, then the subsequent application of a new asphalt or concrete layer above the existing bituminous surface treatment is considered an excluded pavement maintenance practice because it does not produce a new impervious surface.

To preclude confusion, Provision C.3.b.ii.(1)(b)(iii) provides a redundant caveat that the listed pavement maintenance practices are included (i.e., not excluded) in the Road Reconstruction Projects category only if they trigger all the criteria specified in Provision C.3.b.ii.(5), including the criteria regarding contiguousness.

Provision C.3.b.ii.(1)(b)(iv) clarifies that, in the scenario in which a project includes a portion of work that is exempted (e.g., applying a bituminous surface treatment to an existing asphalt layer) and a portion of work that is *not* exempted (e.g., removing and replacing asphalt pavement to the base course, or reconstructing a sidewalk), the portion of work that is not exempted must be evaluated as to whether it meets the criteria for a Regulated Project. In other words, a Permittee may not exclude such a project altogether by categorizing it as the exempted portion; what must be evaluated is whether the non-exempted portion meets the criteria for a Regulated Project.

Public right of way projects (other than public road projects) are explicitly included within the definitions for Other Development Projects and Other Redevelopment Projects. Public right of way projects (other than public road projects) do not have the same constraints and challenges that public road projects have.

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[126] *The pollution conveyed by urban runoff: A review of sources*. December 2019. Alexandra Muller, Helene Osterlund, Jiri Marsalek, Maria Viklander. https://doi.org/10.1016/j.scitotenv.2019.136125

[127] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Western-Washington-Phase-II-Municipal-Stormwater

- Language has been added which clarifies that piecemeal public works projects which are not part of Regulated Projects – examples given are sidewalk gap closures, sidewalk section replacement, and ADA curb ramps (certain pavement maintenance practices within the road prism, such as pothole patching, are already excluded pursuant to Provision C.3.b.ii.(1)(b)(ii)) – are excluded from the Other Redevelopment Projects category, unless they create and/or replace 5,000 contiguous square feet or more of impervious surface. These types of public works projects are typically included in municipalities' CIPs as a budget line item for small patchwork projects to be completed through their jurisdictions, which individually may not create and/or replace 5,000 contiguous square feet of impervious surface, but which may (if combined together) create and/or replace 5,000 non-contiguous square feet of impervious surface. As we do not intend to consider the latter a Regulated Project, we have added clarifying language to Provision C.3.b.ii.(5) Other Redevelopment Projects, because this is the category under which these projects would likely qualify.
    - Sidewalk gap closures typically consist of the filling of gaps between sections of sidewalks, with pavement. For example, where a block has a sidewalk, but it is not continuous because it is missing across a parcel, completing the sidewalk across that parcel.
    - Sidewalk section replacement typically consists of repairing or replacing sidewalk sections that have been damaged or buckled by tree roots, tectonic action, etc.

Private road reconstruction projects are explicitly included within the definition for Other Redevelopment Projects. Permittees do not bear the burden of the design and capital construction costs of private road projects, and Permittees are able to recoup all or a significant portion of the cost of accounting for private road projects, for example, by charging project application review fees. Therefore, private road reconstruction projects are treated the same as all other types of private non-road reconstruction projects.

The Regulated Project category for Road Projects has been renamed from the Previous Permit to New or Widened Road Projects, and applies to both public and private projects.

The impervious surface thresholds for Other Development Projects, Other Redevelopment Projects, and New and Widened Road Projects are set at 5,000 square feet. These thresholds are MEP for this Permit and its Permittees, because:

(1) They align with the impervious surface area threshold of 5,000 square feet in Provision C.3.b.ii.(1) Special Land Use Categories, which has been in place since the Previous Permit term (Order No. R2-2015-0049).

(2) The 5,000 square foot threshold (or lower thresholds) for Regulated Projects is consistent with numerous other MS4 permits, including, but not limited to: the California State Water Board's NPDES Permit for WDRs for Stormwater

Discharges from Small MS4s (effective July 1, 2013),[128] the California Regional Water Quality Control Board Central Valley Region's NPDES and WDR General Permit for Discharges from MS4s (effective October 1, 2016),[129] the California Regional Water Quality Control Board Los Angeles Region's Regional MS4 NPDES Permit for Los Angeles and Ventura Counties,[130] the California Regional Water Quality Control Board Central Coast Region's NPDES MS4 Permit for the City of Salinas (effective October 1, 2019),[131] the City of Portland's NPDES MS4 Permit (effective January 31, 2011),[132] the State of Oregon's NPDES MS4 General Permit (effective March 1, 2019),[133] the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019),[134] Eastern Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[135] Western Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[136] the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010),[137] the City of Chicago's Stormwater Management Plan[138] for the State of Illinois's General Permit for Discharges from Small MS4s (effective March 1, 2016),[139] U.S. EPA's NPDES Stormwater Permit for the Boise/Garden City Area (effective October 1, 2021),[140] the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010),[141] U.S. EPA's

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[128] https://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.html

[129] https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2016-0040_ms4.pdf

[130] Order No. R4-2021-0105, NPDES Permit No. CAS004004, https://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/

[131] https://www.waterboards.ca.gov/centralcoast/water_issues/programs/stormwater/salinas.html

[132] https://www.portlandoregon.gov/bes/37485

[133] https://www.oregon.gov/deq/FilterPermitsDocs/ms4ph2genpermit.pdf

[134] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Municipal-Stormwater-Phase-I-Permit#:~:text=The%20Phase%20I%20Municipal%20Stormwater,populated%20areas%20in%20the%20state

[135] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Eastern-Washington-Phase-II-Municipal-Stormwat-(1)

[136] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Western-Washington-Phase-II-Municipal-Stormwater

[137] https://www.cityofsalem.net/Pages/ms4-permits-and-annual-reports.aspx#:~:text=The%20City%20of%20Salem%20operates,directly%20to%20our%20local%20streams

[138]https://www.chicago.gov/content/dam/city/depts/water/general/Engineering/MS4/MS4_Stormwater_Plan.pdf

[139] https://www2.illinois.gov/epa/topics/forms/water-permits/storm-water/Pages/ms4.aspx

[140] https://www.epa.gov/npdes-permits/npdes-stormwater-permit-boisegarden-city-area-ms4s-idaho

[141] https://www.eugene-or.gov/476/NPDES-Municipal-Stormwater-Permit

Washington, D.C. NPDES MS4 Permit (effective June 22, 2018),[142] and the State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 31, 2018).[143] The 5,000 square feet threshold is, therefore, consistent with reducing the discharge of pollutants from storm water to the MEP.

(3) The Permittees submitted a report[144] that the benefit provided by additionally capturing Regulated Projects in the 5,000-10,000 square foot range would likely provide similar benefit (with respect to acres of impervious surface treated) and similar cost (with respect to the burden on Permittees to review project applications and conduct inspections as well as other administrative burdens) as compared to Regulated Projects already captured, such as the 10,000-15,000 square foot range and the 15,000-20,000 square foot range.

(4) According to the Permittees' 2019 Green Infrastructure Plans,[145] existing and future Regulated Projects and Non-Regulated, public and private, development and redevelopment projects under the Previous Permit will result in about 2 percent of impervious surface collectively retrofitted in the five Permittee counties with clean water controls by 2020, 4 percent by 2030, and 6 percent by 2040. That pace of retrofit would not address stormwater pollutants discharged from Permittees' jurisdictions to the MEP. Therefore, in combination with other changes proposed for Provision C.3, this expansion of the Regulated Project threshold provides a significant incremental step towards increasing the amount of impervious surface within Permittees' jurisdictions retrofitted by clean water controls, regionwide.

(5) Permittees are able to recoup all or a significant portion of the cost of accommodating additional Regulated Projects in the 5,000-10,000 square foot range, for example, by charging fees for project application review and inspection.

(6) U.S. EPA supports the 5,000 square foot threshold for impervious surface area, as it is well understood that untreated stormwater contributes to the degradation of the San Francisco Bay and local creeks and streams, and dense urbanization,

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[142] https://www.epa.gov/npdes-permits/dc-municipal-separate-storm-sewer-system-ms4

[143] https://mde.maryland.gov/programs/water/stormwatermanagementprogram/pages/npdes_ms4_new.aspx

[144] "'White Paper' on Provision C.3 in MRP 2.0," Final Report, Bay Area Stormwater Management Agencies Association, February 27, 2015.

[145] https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/GIPlans2019.html

infrastructure, and impervious surfaces ring San Francisco Bay and contribute to an increase of contaminants that degrade receiving waters.[146,147]

The Permit includes language in Provision C.3.b.ii.(4) clarifying that a gravel surface is an impervious surface, except when it is constructed as part of appropriately designed pervious pavement system. Provision C.3.b.ii.(4) also identifies situations when a gravel surface may be excluded from treatment requirements, reflecting their landscape context, which is expected to often allow drainage to a vegetated area or other pervious area that is at least half the size of the contributing graveled surface. Gravel is considered impervious because it is typically compacted by design or by use. U.S. EPA has defined as impervious surfaces "…areas such as gravel roads…that will be compacted through design or use to reduce their impermeability."[148] It further has defined impervious surfaces as "[a]ny surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil."[149] The Ohio EPA includes gravel roads in its required calculations for impervious surfaces.[150] Municipalities including Asheville and Durham, North Carolina, and Avon, Ohio, consider gravel driveways impervious for the purpose of calculating those cities' stormwater utility fees, because compaction results in increased runoff from those surfaces.[151]

The Road Reconstruction Projects category (projects creating or replacing greater than or equal to one contiguous acre of impervious surface) is distinct from the New and Widening Road Projects category (which addresses only new road projects) because it addresses the significant reconstruction of existing public roads (reconstruction of private roads is addressed separately, in the Other Development Projects category). The definition of contiguous includes project areas interrupted by cross streets or intersections. Provision C.3.b.ii.(1)(b) distinguishes which public road reconstruction projects are and are not excluded.

- The treatment requirements for Road Reconstruction Projects are consistent with other MS4 permits, including, but not limited to: the City of Portland's NPDES MS4 Permit (effective January 31, 2011),[132] the State of Oregon's NPDES MS4 General

[146] SFEI, Wu, J., Trowbridge, P., Yee, D., McKee, L., and Gilbreath, A., 2018.

[147] Regional Monitoring Program Small Tributaries Loading Strategy: SFEI, McKee et al., 2006.

[148] U.S. EPA, July 2016. Summary of State Post Construction Stormwater Standards, p.13.

[149] Ibid., p.19

[150] Ohio EPA, Oct. 2018. Post-Construction Storm Water Questions and Answers, p.1. "What surfaces should be considered impervious? (…) rooftops, paved or gravel roads…."
and Ohio EPA, Oct. 2019. Guidance on Post-Construction Storm Water Controls for Solar Panel Arrays, p.1, "Paved or gravel roads…must also include post-construction storm water management."

[151] https://www.ashevillenc.gov/department/public-works/stormwater-services-utility/stormwater-fees/
https://www.durhamnc.gov/864/Impervious-Surface. Durham specifically references compacted gravel.

https://www.cityofavon.com/DocumentCenter/View/4298/Exhibit-A---Ordinance-No-105-17-Chapter-1056-FINAL?bidId=. "Impervious surfaces include…compacted gravel surface[s]" (p.2).

Permit (effective March 1, 2019),[133] the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019),[134] Eastern Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[135] Western Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[136] the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010),[137] the City of Chicago's Stormwater Management Plan[138] for the State of Illinois's General Permit for Discharges from Small MS4s (effective March 1, 2016),[139] U.S. EPA's NPDES Stormwater Permit for the Boise/Garden City Area (effective October 1, 2021),[140] the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010),[141] U.S. EPA's NPDES MS4 Permit for Washington, D.C. (effective June 22, 2018),[142] and the State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 31, 2018).[143]

The Road Reconstruction Regulated Projects category – in addition to the Numeric Implementation retrofit requirements in Provision C.3.j.ii.(2) – is intended to address the significant pollutant loading and hydrologic impact to receiving waters from Permittees' existing public roads and to clarify the amount of road reconstruction that is redevelopment justifying an investment of resources to retrofit the road with clean water controls.

In subsequent Permits, the Water Board may consider removing or revising Provision C.3.b.ii.(5)(c), which allows the Permittees to use alternative sizing criteria for Road Reconstruction Projects, as well as Provision C.3.b.ii.(5)(d), which allows the Permittees to credit the acreage of impervious surface created or replaced for Road Reconstruction Projects towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2).

This Regulated Project category includes utility trenching projects which are - on average, over the entire length of the project - greater than or equal to 8 feet wide. This is intended to include utility trenching projects that alter a portion of the roadway sufficient to warrant retrofit with clean water controls. The Water Board will use information collected during the Permit term to consider modifying the utility trenching criteria in a subsequent permit.

The Large Detached Single-Family Home Projects category for Regulated Projects captures such projects that create and or replace 10,000 square feet or more of impervious surface, collectively over the entire project site, and that are not part of a larger development or redevelopment plan. This Regulated Project category coincides with Provision C.3.i, which prescribes site design measures for small detached single-family home projects which create and/or replace 2,500-10,000 square feet of impervious surface. Recognizing that SB 9 also allows for the construction of an

accessory dwelling unit (ADU) on a lot with an existing single-family home, without subdividing the lot, C.3.b.ii.(6)(d) clarifies that such an action would fall under the large single-family home threshold of 10,000 sq. ft. of impervious surface. This category for Regulated Projects is necessary and MEP because:

(1) Large Detached Single-Family Home Projects can cause the same urban runoff pollutant and hydromodification impacts that projects of similar sizes in any of the other Regulated Projects categories can produce, because of the created/replaced impervious surface, because those surfaces are similar in nature to other pollutant-generating surfaces in the urban environment, and because aerially deposited urban pollutants are deposited and discharged from those projects to the MS4. Additionally, when flows from these projects flow on-land (e.g., along public streets, ditches and gutters) prior to entering the MS4 system and discharging to receiving waters, they can mobilize stormwater pollutants from those surfaces, eventually transporting them to receiving waters.

(2) In certain Permittees' jurisdictions, a significant portion of development and redevelopment projects consists of large detached single-family home projects because a significant portion of those Permittees' land use is large lot single-family residential.[152] Therefore, this new category has been added to control the pollutant discharges associated with this category of development and redevelopment.

(3) Permittees are able to recoup all or a significant portion of the cost of accommodating this new category of Regulated Projects, for example, by charging project application review and inspection fees.

[152] For example: The City of Los Altos' zoning map is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of 20,000 to 40,000 square feet: (https://www.losaltosca.gov/sites/default/files/fileattachments/community_development/page/39021/los_altos-land_use_final_w_labels-24x36-20181026.pdf); the Town of Los Altos Hills's zoning map is dominated by residential zoning, and all residential lots have a minimum lot size of one acre: (http://www2.lynxgis.com/Html5Viewer/Index.html?configBase=http://www2.lynxgis.com/Geocortex/Essentials/REST/sites/Los_Altos_Hills/viewers/LAH/virtualdirectory/Resources/Config/Default); the Town of Atherton's zoning map (other than park space) is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of one acre, and the remainder have a minimum lot size of 10,000-15,000 square feet: (https://www.ci.atherton.ca.us/209/Maps); the Town of Woodside's zoning map (ignoring conservation areas and park space) is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of one or three acres, and the remainder have a minimum lot size of 20,000 square feet: (https://www.woodsidetown.org/planning/town-woodside-zoning-map); the Town of Portola Valley's zoning map is dominated by residential zoning, and within that residential zoning, the majority of lots have a minimum lot size of at least one acre, and the remainder have a minimum lot size of 15,000-20,000 square feet: (https://www.portolavalley.net/home/showpublisheddocument/6770/635634073606070000; https://library.municode.com/ca/portola_valley/codes/code_of_ordinances); and the Town of Hillsborough's zoning map is dominated by a single residential zone, which has a minimum lot size of half an acre: (https://isd.smcgov.org/gis-data-download).

(4) There are many other MS4 Permits that consider it MEP to include analogous treatment requirements for large detached single-family home projects, including, but not limited to: the Los Angeles Regional Water Board's Regional MS4 NPDES Permit (effective September 11, 2021),[153] the City of Portland's NPDES MS4 Permit (effective January 31, 2011),[132] the State of Oregon's NPDES MS4 General Permit (effective March 1, 2019),[133] the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019),[134] Western Washington's NPDES and State Waste Discharge General Permit for Discharges from Small MS4s (effective August 1, 2019),[136] the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010),[137] the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010),[141] U.S. EPA's NPDES MS4 Permit for Washington, D.C. (effective June 22, 2018),[142] and the State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 30, 2018).[143] The 10,000 square foot threshold for this category is, therefore, consistent with reducing the discharge of pollutants from stormwater to the MEP.

(5) U.S. EPA Region 9 supports the expansion of these Regulated Project categories, as it is well understood that untreated stormwater contributes to the degradation of the San Francisco Bay and local creeks and streams, and dense urbanization, infrastructure and impervious surfaces ring San Francisco Bay and contribute to an increase of contaminants that degrade receiving waters.[146,147]

Provision C.3.b.iii Implementation Level directs the Permittees to implement the Regulated Project definitions in Provision C.3.b.ii beginning July 1, 2023.

Prior to July 1, 2023, the Regulated Project definitions in Provision C.3.b.ii in Attachment I, which are requirements from the Previous Permit, are effective and apply.

The purpose of this delayed implementation date for Provision C.3.b.ii is to allow Permittees the time needed to arrange all relevant planning authorities and municipal processes, train their staff, etc., regarding changes to Provision C.3.b.ii relative to the Previous Permit.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy.[154] The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed

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[153] https://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/regional_permit.html

[154] U.S. EPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) http://water.epa.gov/polwaste/green/upload/2008_01_02_NPS_lid_costs07uments_reducingstormwatercosts-2.pdf)

areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, pervious pavement systems, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes. This is a standard, current, ordinary, and regular practice being implemented in numerous jurisdictions in California, the U.S., and internationally, including: the Permittees' jurisdictions, Los Angeles, San Diego, San Francisco, Portland, OR, Seattle, Minneapolis, Milwaukee, Kansas City, Chicago, New York City, Philadelphia, Auckland, New Zealand, Chinese "sponge cities" such as Wuhan and Changde, and others.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

- **Provision C.3.c.i.(1)** lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff.
- **Provision C.3.c.i.(2)(a)** lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. One design element requires each Regulated Project to include at least one site design measure from a list of six that includes recycling of roof runoff, directing runoff into vegetated areas, and installation of pervious pavement systems instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.
- **Provision C.3.c.i.(2)(b)** requires the Permittees to implement design specifications for pervious pavement systems. Design specifications are necessary because improperly designed and engineered pervious pavement systems may cause flooding and the discharge of insufficiently treated stormwater runoff.
- **Provision C.3.c.i.(2)(c)** requires each Regulated Project and all projects implemented pursuant to Provision C.3.j to treat 100 percent of the Provision C.3.d.

runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

- **Provision C.3.c.i.(2)(c)(i)** defines LID treatment measures as harvesting and use, infiltration, evapotranspiration, or biotreatment.

  The Permittees completed a "White Paper" on Provision C.3. on February 27, 2015.[155] The White Paper concluded that the pollutant removal performance of biotreatment facilities, overall and on average, is equivalent or better than the likely real-world performance of harvest and use facilities and as good as the likely performance of infiltration facilities when considered over the long term. The White Paper also noted that biotreatment facilities require less maintenance and are less prone to failure than harvest and use facilities, and in some cases, are also preferable to direct infiltration facilities.

- **Provision C.3.c.i.(2)(c)(ii)** requires biotreatment systems to meet minimum performance specifications in order to be considered as LID treatment. This subprovision also requires biotreatment soil media to meet the current minimum specifications developed and included in MRP 1.[156] However, this subprovision recognizes that the current soil media specifications may need to be modified because of variability in climate, rainfall, and compost composition among the different counties. Therefore, this subprovision allows for the Permittees to collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the current soil media minimum specifications, subject to the Executive Officer's approval.

- **Provision C.3.c.i.(2)(c)(ii)(a)** prompts the formation of a workgroup to discuss and investigate the pollutant removal effectiveness and hydrologic equivalency of – and suggested criteria for – high flow-rate media treatment systems in combination with retention/detention measures such as silva cells and structural soils, as compared to conventional bioretention, specifically for use in projects with significant technical site constraints. The workgroup should consider issues including: the MEP standard in relation to the use of such systems; the pollutant removal benefits and hydrologic criteria associated with the MRP's LID design approach and which are included in other MS4 permits, such as the Western Washington Phase II Municipal Stormwater Permit and the Los Angeles Regional MS4 Permit (NPDES Permit No. CAS004004).

  The outcomes of this workgroup may inform modifications to the Permit in a subsequent term.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) sets forth the hydraulic sizing design criteria that the stormwater treatment systems installed for

[155] BASMAA, February 27, 2015. "White Paper" on Provision C.3 in MRP 2.0: Final Report.

[156] Attachment L of Board Order No. R2-2009-0074, adopted October 14, 2009, and revised November 27, 2011.

Regulated Projects must meet. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects.

- **Provision C.3.d.iii**. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices. The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites.
- **Provision C.3.d.iv** is optional and allows the Permittees to collectively submit a proposal which evaluates the benefit of runoff reduction associated with trees and treatment control sizing of tree-based stormwater treatment in combination with structural soils and suspended pavement systems (or other methods which provide tree rooting volume), which will be considered for incorporation into a subsequent permit. This proposal is intended to learn from the findings of the ongoing Healthy Watersheds, Resilient Baylands project,[157] a San Francisco Estuary Partnership-led U.S. EPA Water Quality Improvement Fund (WQIF) project that is investigating similar criteria, and which has a technical action committee (TAC) that Water Board staff and Permittee representatives are participating in, to support the Permittees' submittal, and to ensure it has regional application. The purpose of this subprovision is to characterize the stormwater treatment and hydrologic benefit that new tree-based treatment systems provide when designed and maintained to a defined standard, not to credit existing trees that provide little water quality and hydrologic benefit because of the capacity and manner of treatment provided.

  This subprovision clarifies the status of the Permittees' collectively-submitted 2011 Feasibility/Infeasibility Criteria Report, submitted pursuant to Provision C.3.i.(2)(b)(iv) of MRP 1 (Order No. R2-2009-0074), in which the Permittees proposed to grant Interceptor Tree Credits for Regulated Projects. The credits would have allowed Regulated Projects to reduce the calculated amount of impervious surface that has to be treated by LID, thus reducing treatment control sizing. Interceptor Tree Credits are not allowed during the current Permit term because the 2011 Feasibility/Infeasibility Criteria Report did not sufficiently justify them, because they have not yet been sufficiently studied, and because the Water Board has not approved their use. In addition, this subprovision allows the Permittees to submit a report on this issue as described above that could be incorporated into a subsequent permit.

[157] https://www.sfei.org/projects/healthy-watersheds-resilient-baylands

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.b.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

- **Provision C.3.e.i.** This Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite or Regional Project is in the same watershed as the Regulated Project and constructed within three years of the end of construction of the Regulated Project. The three years of additional time are allowed because more time may be required to complete construction of offsite and Regional projects because of administrative, legal, and/or construction delays. The Water Board acknowledges, in some instances, an even longer time may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended up to 5 years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

  Provision C.3.e.i language noting that Offsite Projects or Regional Projects must comply with Provision C.3.g “as appropriate” means that those projects (either Provision C.3.e.i.(1) or Provision C.3.e.i.(2)) must comply with Provision C.3.g if the original site seeking alternative compliance would otherwise be required to comply with Provision C.3.g.

  To increase the flexibility available to Permittees, Provision C.3.e.i.(1) alternative compliance projects may provide 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area at Offsite Projects in the same watershed. Likewise, Provision C.3.e.i.(2) alternative compliance projects may provide 100 percent of the amount of runoff identified in Provision C.3.d for the Regulated Project’s drainage area at Offsite Projects or Regional Projects through payment to an in-lieu fee program. However, Provision C.3.e.i.(1) and Provision C.3.e.i.(2) qualify that by requiring Permittees to include as much LID onsite as possible, to the MEP.

  During the Permit term, the Permittees may submit new information for an alternative compliance program for exchanges of impervious surface treatment credits at the regional, county, and/or municipal level, resulting in offsite treatment or payment for equivalent offsite compliance for 100 percent of the required Provision C.3.c-d stormwater runoff (and Provision C.3.g, as appropriate).

Any such program should include at least the following: a clear organizational framework; demonstration of the treatment of an equivalent quantity of both stormwater runoff and pollutant loading (e.g., through the equivalent or net increase in impervious surface treated, and the equivalent or net reduction in flow and/or pollutant load, but not necessarily in the same watershed) and the achievement of net environmental benefit; an accounting and reporting system; a process for collection and timely use of funds; compliance with Provisions C.3.c-d and C.3.f-h; program oversight by an entity or entities; and expectations for timing and location. If or when such a program proposal is submitted, the Water Board will consider the new information and may consider amending the Permit to include a third option in Provision C.3.e.i that formally recognizes and allows the program specified in the proposal. This is in part a response to the City of San Pablo-led U.S. EPA Water Quality Improvement Fund (WQIF)-funded Regional Compliance for a Sustainable Bay project, which is investigating such a program that would facilitate alternative compliance exchanges between Permittees within Contra Costa County, but may be of interest in other counties and regionally.

As Permittees implement Provision C.3.e.i – which increases the flexibility available to Permittees when planning LID required by Regulated Projects – over the course of this Permit term, they will further incorporate their implementation of it into their municipal administrative and planning processes. Over the course of the Permit term, as Permittees become more accustomed to using Provision C.3.e.i, the Permittees will not be as reliant on Provision C.3.e.ii during their planning processes. Therefore, the Water Board will consider removing Provision C.3.e.ii in the subsequent Permit term, whose utility will be replaced by the Permittees' increased implementation of Provision C.3.e.i.

- **Provision C.3.e.ii. (Special Projects)** When considered at the watershed scale, certain types of smart growth and high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts, to the extent they replace or reduce development projects that do not have those characteristics. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these types of Special Projects.

  This Provision includes specific criteria for determining which types of Regulated Projects may be considered Special Projects and establishes different categories of Special Projects based on size, land use type, and density. Except for Category A, which represents the smallest Special Projects, Category B and C also use location, density, and parking criteria to establish a tiered approach for determining the total LID Treatment Reduction Credit available for any given Special Project.

  Category C additionally includes affordable housing criteria for determining the total LID Treatment Reduction Credit available for Category C Special Projects. Affordable housing criteria are included in Category C, for two primary reasons.

First, affordable housing projects typically have high DUs/acre (as further incentivized by the Density Credits) and are typically located near public transportation (as further incentivized by the Location Credits), and thus they likely produce less automobile traffic (i.e., less pollutant loading to the MS4) compared to other development and redevelopment projects that do not have those characteristics. Second, affordable housing credited by this Provision will help reduce unsheltered homelessness, which will reduce pollutant discharges (e.g., of trash and sewage) from homeless encampments and other sources (e.g., RVs) into MS4s.[158] The Water Board recognizes that whether to allow for affordable housing is entirely within the Permittee's land use and zoning authority and discretion. Since such development can reduce pollutants from MS4 systems, the Affordable Housing Credits are provided in the Permit. It will benefit the unhoused population, as follows: The affordable housing criteria are structured in such a way that significant portions of the allowable rent/mortgage rates are capped for Extremely Low income households (0-30% of AMI), Very Low income households (31-50% of AMI), and Low income households (51-80% of AMI), rather than allowing all affordable housing units to qualify even if they only are affordable for Moderate income households (81-120% of AMI) which limit affordability to a significant portion of the population. The link to water quality improvement is expected to decline as rent/mortgage rates increase, as rent/mortgage rates as high as the Moderate level are likely to reduce unsheltered homelessness and its associated impacts at a much lower rate.

The other Category C credits (location, density, and parking criteria) are maintained from the Previous Permit, but reduced so that Affordable Housing Credits are the dominant credit for Category C projects while still recognizing the benefits provided by location, density, and parking criteria, and so that the total possible credit available for Category C Special Projects remains 100 percent. Category C of the Previous Permit primarily credited transit-oriented development (via Location Credits) and resulted in the treatment of approximately 324 acres of impervious surface by non-LID measures region-wide, most of which is attributable to projects for which the Permittees' reporting did not clearly demonstrate that it would have been infeasible to incorporate onsite LID or contribute to offsite LID, as allowed by Provision C.3.e.i. Therefore, Category C has been revised to solely target affordable housing development and redevelopment projects, as Provision C.3.e.i in this Permit already provides sufficient flexibility for other non-affordable housing development and redevelopments that would have qualified as Category C Special Projects in the Previous Permit.

[158] Batko, Oneto, and Shroyer, Dec. 2020. Unsheltered Homelessness: Trends, Characteristics, and Homeless Histories. Urban Institute, pp. 12-13.

Area Household Median Income (AMI) uses the most current Official State Income Limits (adjusted for household size), which are defined on the California Department of Housing and Community Development's website.[159,160]

The definitions included in Category C for affordable housing are adapted from the Metropolitan Transportation Commission (MTC),[161] the Association of Bay Area Governments (ABAG),[162] the East Bay Housing Organizations (EBHO),[163] and the Federal Department of Housing and Urban Development (HUD).[164] For example, HUD defines Affordable Housing as housing for which rent or mortgage costs (including utilities) are no greater than 30 percent of total household income;[165,166] for metropolitan areas, HUD defines Moderate household incomes as 81-120 percent of area median household income (AMI), Low household incomes as 51-80 percent of AMI, Very Low household incomes as 31-50 percent of AMI, and Extremely Low household incomes as 0-30 percent of AMI.[167,168,169,170] Furthermore, Affordable Housing is defined by the Metropolitan Transportation Commission (MTC) as housing with deed restrictions running at least 55 years.[171,172]

To be considered a Category C Special Project, the Regulated Project must be primarily a residential development project, achieve at least a gross density of 40 DU/acre, and the project's DUs must comply with the criteria outlined in Provision C.3.e.ii.(5)(c), which are: for 70 percent Affordable Housing Credit, 100 percent of the DUs within a Category C Special Project must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 75 percent of the DUs must have rent/mortgage rates

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[159] https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml

[160] As of December 31, 2021, they are: https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf

[161] https://mtc.ca.gov/whats-happening/news/mtc-offers-cities-counties-big-carrot-spur-affordable-housing

[162] https://abag.ca.gov/sites/default/files/rhna_methodology_technical_documentation.pdf

[163] http://ebho.org/resources/what-is-affordable-housing/

[164] https://www.hud.gov/topics/rental_assistance

[165] https://archives.hud.gov/local/nv/goodstories/2006-04-06glos.cfm#:~:text=Affordable%20Housing%3A%20Affordable%20housing%20is,Reference%3A%20www.hud.gov

[166] https://www.hud.gov/program_offices/administration/hudclips/acts/nah-ac

[167] https://www.ffiec.gov/

[168] https://www.spur.org/news/2018-06-21/what-we-talk-about-when-we-talk-about-affordable-housing-primer

[169] https://www.planbayarea.org/2050-plan/plan-bay-area-2050-blueprint/plan-bay-area-2050-final-blueprint-documents

[170] https://abag.ca.gov/sites/default/files/rhna_methodology_technical_documentation.pdf

[171] https://mtc.ca.gov/whats-happening/news/mtc-offers-cities-counties-big-carrot-spur-affordable-housing

[172] https://mtc.ca.gov/our-work/fund-invest/investment-strategies-commitments/focused-growth/affordable-housing/housing

(including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 50 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 25 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). Likewise, for 50 percent Affordable Housing Credit, 75 percent of the affordable housing DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 50 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). These criteria, when implemented for Category C Special Projects, will reduce pollutant discharges from unhoused peoples into MS4s when they are housed by the newly-provided affordable housing. Finally, for 25 percent Affordable Housing Credit, 50 percent of the affordable housing DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 5 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI).

Density Credits for Category C may only use DU/acre, whereas in MRP 2 they could also use FAR. This is because Category C may only be used by primarily residential projects rather than also by nonresidential and mixed development projects.

In MRP 1 and MRP 2, applicable Category C Special Projects were required to first qualify for Location Credits before qualifying for any Density Credits or Minimized Surface Parking Credits. In the current Permit Term, applicable projects must first qualify for Affordable Housing Credits before qualifying for any Location Credits, Density Credits, or Minimized Parking Credits. This is because the primary credit by which Category C Special Projects are allowed to qualify is the Affordable Housing Credit – if a project does not meet any of the criteria required to achieve one of the Affordable Housing Credits, it does not qualify as a Category C Special Project.

The gross density required for 5 percent Density Credit for Category C Special Projects has been reduced from 45 DU/ac to 40 DU/ac, to match the required minimum density included for Category C Affordable Housing Projects.

Definitions of Gross Density and Floor Area Ratio are included in Provision C.3.b.ii to facilitate consistent implementation of this Provision by all Permittees. Gross

Density is defined as the total number of residential units divided by the acreage of the entire site area, including land occupied by public rights-of-way, recreational, civic, commercial and other non-residential uses. Floor Area Ratio (FAR) is defined as the ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area. Gross Density and FAR have been purposely defined to include public rights-of-way, recreational, civic, commercial, and other non-residential uses so as to raise the bar for Regulated Projects to qualify for the LID Reduction Credits allowed in Provision C.3.e.ii. That is, these more conservative Gross Density and FAR values may result in some Regulated Projects qualifying for less LID Reduction Credits or not qualifying at all.

The reporting data for Special Projects under the Previous Permit showed that “lack of space to provide full LID stormwater treatment” is among the most frequent reason invoked for why 100 percent LID treatment onsite is infeasible. Therefore, it is appropriate that the space reserved for public rights-of-way, recreation, civic, commercial, and other non-residential uses are included in the calculations for gross density and FAR, especially since many of these areas may be used for installation of LID treatment measures.

Density LID Treatment Reduction Credits are allowed for mixed use development projects, which consist of a mix of residential and commercial land uses, based on density measured by either DU/acre or FAR for Category B Special Projects and by DU/acre for Category C Special Projects. A prior permit (R2-2009-0074) did not accommodate this variability and penalized dense mixed-use projects that are mostly residential by restricting density LID Treatment Reduction Credits to only floor area ratio criteria.

The total available LID Treatment Reduction Credit may be used to reduce the amount of stormwater runoff that must be treated with LID stormwater treatment systems. The remaining amount of stormwater runoff must be treated with one or a combination of the following two specific non-LID treatment systems:

(1) Tree-box-type high flowrate biofilters

(2) Vault-based high flowrate media filters

An additional reporting requirement has been added to Provision C.3.e.v.(3) and to Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects, Total Impervious Surface Created/Replaced: The total impervious surface in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1). The purpose of this additional reporting requirement is to better characterize the extent and lost opportunity (regarding no or reduced LID treatment) of Special Projects.

To reduce the burden of reporting, the semi-annual reporting of Special Projects that are being considered by Permittees prior to the Permittees granting final planning approval has been reduced to annual, within the Annual Report. Although the frequency of reporting has been reduced, the current reporting requirements for this Provision are not diminished because the data is necessary for Water Board staff to validate the Permittees' analysis of the number and size of potential Special Projects that may be approved during this permit term, and to ensure Permittees are taking all reasonable steps to ensure that the Special Projects Provision is only used when they certify that neither onsite nor offsite LID are feasible. The Water Board intends to use the data collected in the reporting requirements to revise the Special Projects criteria as appropriate for the next permit term.

The narrative summaries included in Permittees' Annual Reports generally have not properly justified the need for the Category C Special Projects Provision as it existed in MRP 2, because those narrative summaries have not sufficiently demonstrated the infeasibility of onsite or offsite LID. This further supports the change that has been made to Category C.

Provision C.3.e.ii Special Projects is temporarily retained in this Permit term, and will be considered for removal in subsequent permit terms. This is because Permittees will have had three Permit terms (Order Nos. R2-2009-0074, R2-2015-0049, and R2-2022-0018) to develop the alternative compliance programs allowed by Provision C.3.e.i. Provision C.3.e.ii Special Projects is intended to serve as an interim measure while Permittees further develop their Provision C.3.e.i alternative compliance programs, because Provision C.3.e.i is capable of providing the flexibility needed to accommodate the technical infeasibility of onsite LID for Regulated Projects, without foregoing the water quality and hydrologic benefits provided by LID. The non-LID treatment measures allowed by Provision C.3.e.ii Special Projects do not provide those benefits to the same degree, although that reduction may be somewhat offset by the water quality benefits associated with avoidance of or potential reductions in unsheltered homelessness.

Provision C.3.e.iii. Implementation Level directs the Permittees to implement Provision C.3.e.ii beginning July 1, 2023. Prior to July 1, 2023, Provision C.3.e.iii.(5) directs Permittees to implement Provision C.3.e.ii in Attachment I, which are requirements from the Previous Order, with dates adjusted for consistency. The rationale for these requirements is set forth in the Previous Permit's Fact Sheet and is incorporated herein. The purpose of the delayed implementation date for Provision C.3.e.ii is to allow Permittees the time needed to arrange all relevant planning authorities and municipal processes to implement changes to Provision C.3.e.ii relative to the Previous Permit.

Provision C.3.f. (Alternative Certification of Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the

staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed.

Provision C.3.g. (Hydromodification Management) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Those HM requirements are stated in Provision C.3.g., and Attachment C includes maps prepared by the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees showing areas where HM requirements apply.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[173] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[174] All Permittees may use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. MRP 1 allowed the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices and to identify whether streams to which Contra Costa Permittees discharge may have a different susceptibility to HM impacts, thus justifying a different threshold for control of flows resulting in those impacts. The Contra Costa Permittees submitted an IMP Monitoring Report,[175] which

[173] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Stormwater-manuals/Western-Washington-Hydrology-Model

[174] See www.bayareahydrologymodel.org, Resources.

[175] Contra Costa Clean Water Program, September 15, 2013. IMP Monitoring Report: IMP Model Calibration and Validation Project.

found that Contra Costa HM measures generally, but not entirely, met MRP 1's HM requirements for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. The Contra Costa Permittees did not submit information showing that Contra Costa creeks had a different susceptibility to erosion. That is, they did not submit a justification for using erosion thresholds different than those accepted for the Alameda, Santa Clara, and San Mateo Permittees, and the City of Vallejo. Under MRP 1, the Water Board had accepted a higher threshold for control of HM effects (i.e., controlling the range of flows beginning at 20 percent of the 2-year pre-project peak flow, as opposed to 10 percent of the 2-year pre-project peak flow). Because this additional information was not submitted, and Contra Costa streams are generally similar to other Bay Area streams, MRP 2 extended the 10 percent standard to Contra Costa, and included requirements for Contra Costa to complete modifications to its HM approach to ensure that projects implement that consistent approach within a specified time.

Pursuant to Provision C.3.g.iii of MRP 2, the Contra Costa Permittees submitted a HM Technical Report[176] with the 2017 Annual Report, which suggested changes to sizing factors for an array of HM controls used by Contra Costa Permittees to comply with the HM Standard in Provision C.3.g.ii. Water Board staff's review of the 2017 HM Technical Report[177] and subsequent discussion with the Contra Costa Permittees culminated in modifications to Provision C.3.g.iii of this Permit, which requires the Contra Costa Permittees to revise their 2017 HM Technical Report so that HM Projects comply with the HM Standard of Provision C.3.g.iii, by excluding data that are not representative and assumptions that are not supported, and by producing a complete suite of sizing factors that are protective of all likely site and watersheds characteristics within Contra Costa County, for all types of HM controls that may be used in the County and for sites with Hydrologic Soil Group A, B, C, and D soils.

The CCCWP Permittees are required to use a base case sizing factor of 6.5 percent for the complete suite of sizing factors, which is a conservative sizing factor based on sites with project-scale built-out imperviousness in the upper watershed for the Lower Control Threshold of 0.1Q2, for soil percolation rates of 0.024 inches per hour, as presented in Table 5-7 on page 58 of the 2017 HM Technical Report. In developing the complete suite of sizing factors, the CCCWP Permittees are required to justify deviations from the base case as conditions of exception that could allow alternative sizing while still being protective (adhering to the HM Standard of maintaining EP ≤ 1) – for different soil types and different applicable geographic characteristics.

This requirement in Provision C.3.g.iii is attached to the reporting requirement in Provision C.3.g.vi.(2).

[176] Contra Costa Clean Water Program Hydromodification Technical Report. September 29, 2017.

[177] Lichten, March 19, 2021. Response to CCCWP's Hydromodification Management Memo of November 4, 2020, and next steps. SF Bay Water Board.

Within Provision C.3.g.vi.(2)(b): (A) "The additional mitigation measures shall not include: reliance on… the presence of existing or future HM and LID controls located elsewhere within the catchment," is distinct from: (B) "The Technical Report may additionally propose alternative or supplemental methods of compliance with Provision C.3.g.iii. HM Standard, including any combination of: ...additional new HM controls located offsite within the same catchment as the receiving stream..."

A) refers to hydromodification management controls that are outside the control of a project proponent and may be speculative or below the point of discharge to a receiving water body (e.g., a creek).

(B) refers to controls constructed concurrently and in combination with other controls specified in C.3.g.vi.(2)(b), as an alternative or supplemental method of compliance with the C.3.g.ii. HM Standard: "undersized onsite HM controls... and in-stream controls... which when implemented together achieve the C.3.g.iii HM Standard."

Provision C.3.g.v. of MRP 1 required the City of Vallejo to complete a hydrograph modification management plan (HMP) by July 1, 2013, in lieu of complying with that order's Provision C.3.g.i-iv. The City submitted its Final HMP on April 24, 2013,[178] and the HMP was subsequently accepted by Board staff. The Final HMP incorporates the same requirements as for the Alameda, Santa Clara, and San Mateo Permittees. The Permit requires the City to comply with those requirements.

The Fairfield-Suisun Permittees are required to comply with the HM criteria established in this Permit. However, they have a threshold for control of erosive flows that is greater than the other Permittees: 20 percent of the 2-year peak flow. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data.

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal stormwater Permittees jointly conduct investigations as appropriate. Any future proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

(1) Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;

(2) The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;

[178] City of Vallejo (Geosyntec), April 2013. Final Hydromodification Management Plan (HMP).

(3) The effectiveness of self-retaining areas for management of post-project flows and durations; and/or

(4) The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

- **Provision C.3.g.i**. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded by the conditions expressed in C.3.g.i.(1)-(3). Those conditions identify areas where the potential for single-project and/or cumulative development hydromodification impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[179] The Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Permittees have developed maps showing where HM controls are required (Attachment C).

  This Provision requires Permittees that have not previously submitted an HM Applicability Map or equivalent information to prepare and submit that information, acceptable to the Executive Officer, consistent with the requirements of Provision C.3.g. This targets the Contra Costa Permittees, who submitted a HM Applicability Map[180,181] with the 2017 Annual Report, which was not satisfactory because it included areas that were not yet resolved (whether or not projects in those areas would be HM Projects), and it claimed certain channels are not hardened, which are in fact hardened. This requirement is attached to the reporting requirement in Provision C.3.g.vi.(1), which requires submittal of new or revised HM Applicability Maps by no later than with the 2023 Annual Report.

- **Provision C.3.g.ii.** establishes the standard HM controls that all HM Projects must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

- **Provision C.3.g.iii.** provides a procedure for the Permittees to propose an additional method for demonstrating compliance with HM requirements. This method would

[179] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or sub-catchments that are 70 percent impervious or more.

[180] Attachment 3.1 to 2017 CCCWP Annual Report: Hydromodification Applicability Mapping Methodology Technical Memorandum. September 11, 2017.

[181] Attachment 3.2 to 2017 CCCWP Annual Report: Hydromodification Applicability Map. September 28, 2017.

directly simulate erosion potential, and would be required to ensure that projects implementing HM controls with this method, if accepted by the Executive Officer, meet the Permit's HM criteria. This provision requires submittal of appropriate analyses (with the 2023 Annual Report, pursuant to the reporting requirement in Provision C.3.g.vi.(2)) demonstrating that the method will substantively comply with HM requirements; it may not be implemented on projects until accepted by the Executive Officer.

- **Provision C.3.g.iv.** identifies and defines three methods of hydromodification management.
- **Provision C.3.g.v.** establishes the timeframes for meeting the HM Standard defined in Provision C.3.g.ii.
- **Provision C.3.g.vi.** describes the information required to be collected and/or submitted in the Permittees' Annual Reports regarding HM Projects. This Provision also describes specific required information for Contra Costa Permittees to submit with the 2023 Annual Report, which follows from the requirements in Provision C.3.g.i (HM Applicability Map) and in Provision C.3.g.iii (revised HM Technical Report).

  Regarding the information to be submitted by the Contra Costa Permittees, Provision C.3.g.vi.(2)(b) includes two distinct criteria:

  (A) "The additional mitigation measures shall not include: reliance on… the presence of existing or future HM and LID controls located elsewhere within the catchment which do or will satisfy other NPDES or CWA requirements," is distinct from:

  (B) "The Technical Report may additionally propose alternative or supplemental methods of compliance with Provision C.3.g.iii. HM Standard, including any combination of: ...additional new HM controls located offsite within the same catchment as the receiving stream..."

  That's because (A) refers to existing and potential/future controls that have been (or that may or will be) implemented to satisfy other NPDES or CWA (e.g., mitigation required for 401 certification) requirements. For example, new bioretention cells that will be constructed for an anticipated or upcoming Regulated Project, or existing bioretention cells that were constructed several years ago for a Regulated Project, or potential bioretention cells that would be constructed if a potential Regulated Project becomes an actual Regulated Project at some point in the future.

  On the other hand, (B) refers to controls constructed concurrently and in combination with other controls specified in Provision C.3.g.vi.(2)(b), as an alternative or supplemental method of compliance with the Provision C.3.g.ii.

HM Standard: "undersized onsite HM controls... and in-stream controls... which when implemented together achieve the Provision C.3.g.iii HM Standard." This *does not* include taking credit for controls that are required for other NPDES or other CWA requirements; it's referring to new controls that are implemented specifically to mitigate hydromodification impacts for a given HM Project, that are not double-counted.

Provision C.3.h. (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the Regulated Project is provided for all pervious pavement systems of 3,000 square feet or more; onsite, joint, and offsite stormwater treatment systems; and HM controls installed.

This Provision adds a requirement for Permittees to include pervious pavement systems of 3,000 square feet or more in their Operation and Maintenance Agreements, database of Regulated Projects, and inspection checklists. Pervious pavement systems serve as site design measures that directly reduce the amount of impervious surface area and therefore, the size of the stormwater treatment system(s) required to comply with Provision C.3.d. Adequate routine maintenance of pervious pavement systems is essential because clogged systems become impervious and may result in untreated stormwater runoff or additional load on stormwater treatment systems that result in inadequately treated stormwater runoff. To lessen the burden of inspecting so many pervious pavement systems, only those of 3,000 square feet or more are required to be inspected and patios for private-use at single-family homes, townhomes, or condominiums are specifically excluded. In the case of large subdivisions where the total pervious pavement system area is equal to or greater than 3,000 square feet, but the pervious pavement installations are on individual driveways that are less than 3,000 square feet, inspection of a representative number of driveways will suffice.

- **Provision C.3.h.ii.(6).** MRP 1 required Permittees to inspect at least 20 percent of all stormwater treatment systems annually, at least 20 percent of all vault-based systems annually, and every treatment system at least once every 5 years. Permittees have indicated that each inspection of a Regulated Project routinely includes inspection of pervious pavement systems, stormwater treatment systems and HM controls installed at the Project. Therefore, this Provision requires the inspection frequency requirements such that the minimum number of inspections required annually is tied to a percentage of the total number of Regulated Projects, instead of the total number of individual treatment systems and HM controls. This lessens the tracking burden for the Permittees and better reflects the way actual inspections are conducted.

  This Provision requires each Permittee to inspect all its Regulated Projects at least once every 5 years and inspect an average of 20 percent, but no less than 15 percent of the total number of Regulated Projects annually. This requirement serves to prevent failed or improperly maintained pervious pavement systems, stormwater treatment systems, or HM controls from going undetected until the 5th year. Neither

of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor-maintained systems, maintenance history, past compliance problems at certain Projects, etc.

- **Provision C.3.h.ii.(6)(d)** This Provision allows Permittees to accept third party inspection reports for vault-based stormwater treatment systems in lieu of conducting Permittee inspections, but only if the third party inspections are conducted at least annually, which is the normal frequency for maintenance of these systems. Each third party inspection must be included in the database or tabular format required in Provision C.3.h.ii.(4) and (5) and clearly identified as a third party inspection. Each third party inspection report must document the third party inspection company, date of inspection, condition of the treatment unit(s) at the time of inspection, maintenance activities performed, and appearance of the inside of the vault units (with photos) before and after maintenance.
- **Provision C.3.h.ii.(7)** As the number of Regulated Projects grows, the Permittees' O&M inspection programs must grow as well. Therefore, this Provision requires each Permittee to develop and implement an Enforcement Response Plan (ERP) for O&M inspections. The ERP serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. This Provision establishes minimum requirements for the ERPs. One of these requirements is that corrective actions must be implemented within 30 days after a problem is identified by an inspector. Thirty days is more than adequate time, considering that many of the problems identified in past O&M inspection reports have been lack of maintenance service or build-up of sediment or debris. The correction of such deficiencies should not take more than 30 days. This Provision also allows for greater than 30 days to complete permanent corrective actions, such as installing additional curb cuts and making grading or vegetation improvements.
- **Provision C.3.h.iv.** This Provision requires Permittees to ensure that pervious pavement systems that total 3,000 square feet or more, stormwater treatment systems, and hydromodification controls are appropriately operated and maintained for the life of those systems and controls, which maintenance is necessary to ensure the systems and controls are operating effectively and protecting water quality consistent with their designs. It recognizes situations where maintenance may be delayed due to the need to obtain certain federal or state permits (e.g., special status species take authorization from a state or federal agency), and sets expectations regarding how Permittees should proceed. Specifically, Permittees should ensure a system's or controls' responsible party is working in good faith to obtain those authorizations. It directs Permittees to abide by the expectations set in the Water Board's Resolution No. 94-102 for applicable systems, including the maintenance thereof.

- **Provision C.3.h.v.** As in MRP 1 and MRP 2, this Provision requires the Permittees to maintain a database or equivalent tabular format with detailed information on each O&M inspection and any necessary enforcement actions against Regulated Projects. To lessen the burden of reporting, this Provision only requires summary data on inspections conducted each fiscal year to be reported in the Annual Report, instead of detailed information on each O&M inspection. However, upon request by the Executive Officer, detailed information from the database or tabular format must be submitted.

Provision C.3.i. (Required Site Design Measures for Small Projects and Detached Single-Family Homes Projects) contains requirements for detached single-family home projects that create and/or replace ≥ 2,500 ft^2 to <10,000 ft^2 of impervious surface and small development and redevelopment projects that create and/or replace ≥ 2,500 ft^2 to <5,000 ft^2 of impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development. Projects with new or replaced impervious surface of this size transport storm water pollutants that can be controlled through basic site design measures.

This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small relative to other types of development and redevelopment projects; however, the cumulative impacts are likely to be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees.

Provision C.3.i.ii. Implementation Level directs the Permittees to implement Provision C.3.i beginning July 1, 2023.

Provision C.3.i.ii.(2) is as follows: Prior to July 1, 2023, it directs Permittees to implement Provision C.3.i in Attachment I, which are requirements from the Previous Permit. The rationale for these requirements is set forth in the Previous Permit's Fact Sheet and is incorporated herein. The purpose of this delayed implementation date for Provision C.3.i is to allow Permittees the time needed to arrange all relevant planning authorities and municipal processes, train their staff, etc., regarding changes made to Provision C.3.i relative to the Previous Permit.

Provision C.3.j. (Green Infrastructure Planning and Implementation) MRP 2 required Permittees to complete and begin implementation of a Green Infrastructure Plan (GI Plan) for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements. In particular, green infrastructure sited in the public right of way that collects stormwater from adjacent tributary parcels can be a more efficient use of public and private resources than treatment of individual parcels, and can also result in additional treatment compared to parcel-based treatment.[182] As such, Permittees have used green infrastructure approaches when siting treatment systems for Regulated Projects, such as for Provision C.3.e.i Alternative Compliance projects.

Public Law 115-436 Water Infrastructure Improvement Act approved on January 14, 2019, established section 402(s) of the CWA authorizing integrated plans that address both municipal wastewater and stormwater management as a potential compliance path that may be incorporated into an NPDES permit. Integrated planning is designed to help municipalities identify efficiencies in implementing requirements that arise from distinct permitting programs, particularly how best to make capital investments (Integrated Municipal Stormwater and Wastewater Planning Approach Framework, U.S. EPA, June 5, 2012). Under this law, an integrated plan can be used to implement any requirements relating to a combined sewer overflow, sanitary sewer collection system, municipal stormwater discharge, municipal wastewater discharge, and a water quality-based effluent limitation to implement an applicable wasteload allocation in a total maximum daily load. The integrated planning approach does not relax or change regulatory permitting standards, but rather recognizes existing flexibilities in the CWA to sequence and schedule compliance projects that may be relevant to multiple permitting programs (33 U.S.C. § 1342(s)(5).). Notably, Congress recognized the value of green infrastructure in meeting CWA requirements in allowing green infrastructure in integrated plans (*Id*. at subd. (s)(3)(b)(ii).). While this Order is not an integrated plan under CWA section 402(s), it shares the same principle of promoting integrated

[182] For example, see:

WEF, Dec. 2, 2015. *The Real Cost of Green Infrastructure*. WEF Stormwater Report. Web. July 24, 2021.

McGlynn, Dec. 2019. *Clock Ticking for Cities to Commit to Urban Greening*. Estuary News, the San Francisco Estuary Partnership.

CCAG, January 2021. *San Mateo Countywide Sustainable Streets Master Plan.*

Clary et al., 2020. *International Stormwater BMP Database: 2020 Summary Statistics.* The Water Research Foundation.

Sustainable Business Network, May 2021. *Green Stormwater Infrastructure (GSI): A Tool for Economic Recovery and Growth in Pennsylvania.*

Sustainable Business Network, 2021. *Excellence in GSI Awards,* Philadelphia, PA.

Stutz, Bruce, March 29, 2018. *With a Green Makeover, Philadelphia is Tackling Its Stormwater Problem.* Yale Environment 360.

planning in meeting various regulatory requirements, especially with regard to green infrastructure.

The GI Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For MRP 2, the development of the GI Plan was in lieu of expanding the definition of Regulated Projects prescribed in Provision C.3.b.ii to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. However, this Permit includes (and subsequent Permits may further include) different impervious surface thresholds or other criteria for Regulated Projects. The GI Plan also provides a mechanism to establish and implement alternative or in lieu compliance options for Regulated Projects.

Over the long term, the GI Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

The GI Plan also identifies means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it includes means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it incorporates plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash and PCBs, mercury, and other pollutants. Permittees may comply with the requirements of this Provision through collaborative efforts.

MRP 2 specified minimum elements that each GI Plan must contain to ensure that each GI Plan is robust and appropriately identifies the means and methods that each Permittee will employ to implement green infrastructure over time. These minimum elements are not overly prescriptive, so as to allow Permittees flexibility in developing their GI Plans. They are repeated here, to guide the Permittees' ongoing updates and addenda to their Plans as prescribed by Provision C.3.j.ii.(1):

(1) A mechanism to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area specific basis. Implementation of these projects is required to be projected over the same timeframes as specified

in Provisions C.11. and C.12. for assessing mercury and PCB load reductions because green infrastructure and projects are an acknowledged means of pollutant load reductions. Each Permittee has flexibility in choosing the mechanism as long as it includes criteria for prioritization and outputs that can be incorporated into its long-term planning and capital improvement processes.

(2) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the same timeframes as specified in Provisions C.11. and C.12. for assessing mercury and PCB load reductions. These self-determined targets represent the green infrastructure work that each Permittee has proactively identified will be completed beyond what would be completed in its community anyway.

(3) A process for tracking and mapping completed projects, public and private, and making the information publicly available. Again, each Permittee has flexibility in what they use to comply with this Provision.

(4) General guidelines and standard specifications for overall streetscape and project design and construction to ensure that projects have a unified, complete design that implements the range of functions associated with the projects. These guidelines and standard specifications, while crucial to a Green Infrastructure Plan, already exist in many reference documents for green infrastructure design and are readily available.

(5) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. In recognition of space and drainage constraints that may occur for public green infrastructure road projects not subject to Provision C.3.b.ii (i.e., non-Regulated Projects), this Provision allows Permittees to collectively propose a single approach for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements. The single approach can include different options to address specific issues, constraints, or scenarios.

(6) A summary of the planning documents the Permittee has updated or otherwise modified as well as how the Permittee will ensure that green infrastructure requirements will be included in future plans. The purpose of this element is to show that each Permittee is considering green infrastructure in all aspects of its urban planning.

(7) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation.

(8) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, state, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.

In addition to the development of the GI Plans, MRP 2 required each Permittee to:

(1) Prepare a framework or workplan that describes specific tasks and timeframes for developing its GI Plan. The framework or workplan was required to be approved by each Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. This approval process provided assurance to the Water Board that Permittees are committed to the development and implementation of the GI Plan and green infrastructure.

(2) Document in its 2017 Annual Report that the framework or workplan for development of its GI Plan was approved by June 30, 2017, as required by Provision C.3.j.i.(1) of MRP 2. This Provision also required each Permittee to submit its GI Plan and documentation of the legal mechanisms to implement the GI Plan with the 2019 Annual Report.

(3) Prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation that have potential for green infrastructure measures.

The Permittees were required to submit the list with each Annual Report along with a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project under Provision C.3.b.ii. This Provision also required each Permittee to include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, the Permittee was required to submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.

The purpose was to ensure that each Permittee is proactively developing green infrastructure projects and including green infrastructure elements into already planned infrastructure projects as much as possible, both while the GI Plan was being developed, and subsequent to its development.

This requirement is retained in the Permit, in Provision C.3.j.iii, No Missed Opportunities.

(4) Individually or collectively, to track processes, assemble and submit information, and provide information, materials, and presentations as needed to assist relevant regional, state, and federal agencies to plan, design, and fund green infrastructure measures in local infrastructure projects, including public transportation projects.

(5) Individually or collectively, to develop and implement regionally consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.

The GI Plans were completed during MRP 2; therefore, the focus of Provision C.3.j in the Permit shifts from planning to implementation. U.S. EPA supports the Permit's movement from planning to implementation of green infrastructure on a more regional basis.[183] Provision C.3.j.i. Task Description requires the Permittees to (continue to) implement their GI Plans, as may be updated and supplemented to comply with this Order.

Provision C.3.j.ii Implementation Level, prescribes programmatic requirements, numeric requirements, and design criteria that Permittees must comply with when implementing their GI Plans during the Current Permit Term.

Provision C.3.j.ii.(1) describes the Programmatic Implementation requirements requiring Permittees to update and supplement their GI Plans to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned, by:

(1) Revising the implementation mechanisms in the GI Plans to include consideration or reconsideration of cooperation with non-municipal entities such as schools on green infrastructure implementation, and otherwise updating implementation mechanisms as appropriate.

This is necessary because Permittees may need to update their implementation mechanisms as certain processes are refined or adapted to better support green infrastructure implementation. Cooperation with non-municipal entities like school districts is required to be considered or reconsidered because schools can offer excellent opportunities for green infrastructure implementation for a number of reasons, including their likely coverage under the California Small MS4 General Permit, which is expected to clarify the clean water role they can play going forward; their role in climate change adaptation planning efforts; their often substantial impervious surface coverage; and the ability of municipalities to

[183] U.S. EPA provides many resources at a national level that document the multiple benefits that green infrastructure can have on water quality and community well-being: https://www.epa.gov/green-infrastructure/benefits-green-infrastructure

regulate discharges from schools into their MS4s.[184] Often, schools have some of the most-available area for green infrastructure implementation, along with budget needs that can facilitate cooperation when municipalities or others contribute sources of funding. Because of the opportunities for implementation, funding, and shared need, GI Plans should be revised to include, in their prioritization approaches, green infrastructure projects that may be implemented in a joint or cooperative manner, including not only those coordinated with schools, but also those coordinated with Bay Area Rapid Transit (BART), Caltrans, and others as appropriate.

(2) Following through with the development or updates of general plans, specific plans, urban forestry plans, climate change adaptation plans, complete streets plans and other planning documents with a green infrastructure nexus to include language which is more supportive of green infrastructure implementation, as identified by the Permittees in their GI Plans. Upon request by Water Board staff, Permittees are required to provide justifications for planning documents that they assert do not need to be updated to further support green infrastructure implementation.

This is necessary because not all Permittees sufficiently updated their planning documents as required in the Previous Permit term to demonstrate that they are considering green infrastructure in all aspects of urban planning. In many cases, it was unclear how the planning documents supported green infrastructure implementation. Water Board staff's complete review of the GI Plans, which provides guidance on this and other facets of Provision C.3.j.ii.(1), is detailed in an October 2020 memo.[185]

GI Plans that identify overarching policy or planning documents are worthwhile for other Permittees to consider. For example, San Mateo County references the City/County Association of Governments of San Mateo County's (C/CAG's) Sustainable Streets Master Plan, which prioritizes locations to integrate green infrastructure into street rights of way and considers how those projects may contribute to climate change resilience. This opportunity to more legibly consider and coordinate the multiple benefits of green infrastructure could facilitate implementation over time.

Several GI Plans reference specific plans, neighborhood plans, street master plans, or similar documents, which can allow municipalities to focus their green infrastructure implementation in an intentional and targeted manner. Examples

[184] For example, L.A. Unified School District: Storm Water Management and Low Impact Development. http://learninggreen.laschools.org/stormwater-management.html. Accessed July 26, 2021.
Sharon Danks, *A vision for green schoolyards across California*. Green Technology Magazine, Web. accessed July 26, 2021. https://www.green-technology.org/magazinenews/a-vision-for-green-schoolyards-across-california/

[185] *Water Board Staff's Review of the 2019 Green Infrastructure Plans.* October 1, 2020.

include the City of El Cerrito's 2014 San Pablo Avenue Specific Plan, which, among other things, charges private development with impact fees to fund frontage improvements on San Pablo Avenue, and the City of Berkeley's 2019 Adeline Corridor Specific Plan, which has identified several promising green infrastructure opportunities. Master planning efforts like those framed in specific plans have long been tools for effective green infrastructure implementation. More than twenty years ago, Fremont's plan for the 840-acre Pacific Commons site enabled comprehensive district-scale stormwater planning and expectation setting in advance of development of parcels within the district. The Water Board supports the use of specific plans and related plans to facilitate green infrastructure implementation, and as part of a range of green infrastructure implementation tools that should be applied throughout Permittee jurisdictions.

The expectation of this Provision is that Permittees continue to update existing plans to include, as appropriate, and to incorporate into new plans, low impact development and green infrastructure expectations, including implementation. Similar to El Cerrito's and Berkeley's approaches, Permittees' updated and new specific plans and similar documents should incorporate green infrastructure requirements for the plan areas. For example, the City of Campbell's GI Plan noted several neighborhood and street master plans that could be updated to incorporate and coordinate green infrastructure expectations, and referenced development by this year of a schedule to complete those updates. That was similar to other municipality plans in western Santa Clara County, and is a reasonable model for addressing updates during the Permit term.

(3) Developing funding and funding mechanisms identified in the GI Plans, such as by working with the relevant agencies to expand the scope of transportation grants to include allocation for green infrastructure; establishing green infrastructure-based or green infrastructure-incorporating stormwater fees, including work that sets the foundation for additional future stormwater fees; establishing or increasing application review fees, and evaluating other opportunities to leverage municipal approval of private development to fund green infrastructure implementation.

The most common existing funding sources identified in the GI Plans are State grants and internal revenues. Many GI Plans commit to incorporating consideration of green infrastructure into the Permittees' Capital Improvement Plans (CIP) so that green infrastructure funding may be tied to CIP projects where incorporation of green infrastructure has been identified as otherwise feasible. Given existing funding constraints, most Permittees are prioritizing maintenance of existing infrastructure over addressing pollutant discharges (from yet-untreated impervious surfaces) with clean water controls.

To overcome this challenge, the GI Plans describe widespread interest in establishing new long-term funding sources, such as alternative compliance

programs, Prop. 218- and SB 231-compliant stormwater utility fees, and permit fees. A few GI Plans describe existing stormwater utility fees enacted prior to Prop. 218, and others note how these fees are currently being pursued. Oakland's GI Plan includes a useful summary letter (App. F, Oakland 100RC Stormwater Program Financing Memo) that describes a range of available funding opportunities, in addition to citing BASMAA's 2018 Roadmap of Funding Solutions for Sustainable Streets.[186] Nearly every GI Plan that expressed hesitance in pursuing such fees now stresses 1) the risk associated with legal challenges, and 2) the need to wait for another Permittee to be the legal test subject for this approach.

Permittees such as the Cities of San Mateo and Redwood City are leading the way by more fully recognizing the extent of development project urban runoff impacts and requiring developers to fund green infrastructure that is either beyond the Permit's minimum requirements or based on a reinterpretation of the Permit's requirements as a condition of approval.

During the Permit term, Permittees with regulated projects should evaluate opportunities to pursue approaches similar to those being implemented by the Cities of San Mateo and Redwood City.

Funding approaches that the Water Board did not see broadly considered in the GI Plans include: impervious surface fees targeting all impervious surface, including single- and multi-family residential parcels, tied to the operation and maintenance of the storm drain system; and maintaining or increasing development application review and post-construction green infrastructure operation and maintenance inspection fees to a level sufficient to allow for a self-sustaining program. The Water Board welcomes opportunities to discuss and support Permittees' funding approaches.

There are some interesting countywide proposals unique to certain counties. For example, the GI Plans for Permittees within Contra Costa County include a discussion of legislative constraints to the use of Contra Costa Transportation Authority Sales Tax Revenue for green infrastructure implementation, and of pursuing a ruling from MTC on the Highway User Gas Tax Account. The GI Plans for Permittees within San Mateo County include a discussion of the planned Flood and Sea Level Rise Resiliency Agency, which would help fund regional green infrastructure projects. The Water Board looks forward to working with the Permittees to support these and any other new or similar countywide efforts. Most GI Plans also, appropriately, reference BASMAA's 2018 Roadmap of Funding Solutions for Sustainable Streets.[186]

[186] https://basmaa.org/wp-content/uploads/2021/01/roadmap_funding_solutions_sustainable_streets_final.pdf

(4) Reviewing countywide green infrastructure implementation guidance documents and adapting them as necessary to account for local considerations if this has not already been completed during the Previous Permit term, and otherwise reviewing and updating general guidelines and standard specifications as appropriate.

The primary goal of this requirement is to ensure that there are no barriers to green infrastructure implementation based on the availability and status of guidance documents and standard specifications and details during the Permit term. In addition, some Permittees did not demonstrate that they adapted guidance documents to local considerations in the Previous Permit.[185]

(5) Continuing to implement the tools developed during the Previous Permit to track and map completed public and private green infrastructure projects, and making the information publicly available.

Nearly all GI Plans reference tracking tools currently in development by the County stormwater programs, with a statement that the tools include or will include components to make certain information publicly available. However, some GI Plans suggest that green infrastructure implementation information submitted in tabular format in Annual Reports satisfies this subprovision. It does not. The tools in development generally appear appropriate to meet this Provision, but additional information is needed as discussed below. Each GI Plan that references a County stormwater program's tracking tool, many of which are based on ArcGIS online or AGOL, and a few of which utilize GreenPlan-IT, appropriately commits to contributing data to it once the tool is ready, and many GI Plans discuss local tracking tools that will likely be discontinued once the County tracking tools are ready. However, most GI Plans do not say when the respective County tracking tool will be completed, or whether or how the tools will be available to the public, and if yes, what information will be made available. Some GI Plans say only that the tools have or will have mapping capabilities accessible at least by Permittee staff, but not necessarily by the public. Some plans say that "non-regulated project installations of green infrastructure are tracked as feasible in the same manner as regulated projects."

The requirements for the tracking tool during the Current Permit term are further specified in Provision C.3.j.v. (see below).

(6) Continuing to adopt or amend policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Plan in accordance with the requirements of this Provision, as necessary.

This requirement ensures implementation of green infrastructure and is based on the need to reduce the discharge of pollutants in storm water in a more resilient, sustainable way as described above.

(7) Continuing to conduct outreach and education.

Education and outreach, both internally and externally, are important to realizing green infrastructure projects to reduce the discharge of pollutants in storm water.

Provision C.3.j.ii.(2) describes the Numeric Implementation requirements, which are summarized below followed by a rationale for the requirements:

(1) By June 30, 2027, the Permittees are required to implement, or cause to be implemented, green infrastructure retrofit projects within their jurisdictions in the acreages set forth in Table H-1 of Attachment H. The retrofit acreages cannot encompass Regulated Projects under Provision C.3.b.

For Table H-1 of Attachment H, Permittees were assigned three acres of non-Regulated Project impervious surface retrofit per 50,000 population using the 2019 U.S. Census Bureau Population Estimate, prorated, with a minimum requirement of 0.2 acres and a maximum requirement of five acres. That retrofit expectation, to be accomplished during the Permit term as described in Provision C.3.j.ii, is far below the ultimate need for retrofit in the Permittees' jurisdictions, considering drivers such as the need to accomplish TMDL wasteload allocations and to reduce the discharge generally of urban runoff pollutants through the MS4. However, the retrofit requirement ensures each Permittee builds capacity by completing or meaningfully participating in at least one project. Permittees are expected to use their GI Plans to help inform the selection of retrofit projects. In addition, the retrofit requirement uses population as a rough proxy for Permittee capacity to complete retrofit work. In combination with the acreage maximum of five acres, the retrofit requirement is intended to be a flexible and doable goal during this Permit term. The minimum retrofit requirement ensures that each Permittee uses that experience to build its institutional capacity for implementing green infrastructure within its jurisdiction. The maximum retrofit requirement reduces the retrofit requirements only for a handful of the larger Permittees, one of which (the City of San Jose) will likely exceed five acres of non-Regulated Project retrofit in any case because of its consent decree with San Francisco Baykeeper, as discussed in the subsequent paragraph. These retrofit assignments, when summed regionally for the Permittees will result in about 217 acres of non-Regulated Project impervious surface retrofitted by the expiration date of the Permit, which will make a significant incremental step towards addressing the otherwise unaddressed adverse stormwater quality impacts of Permittee's rights of way, particularly those smaller public streets projects that are not otherwise subject to the same clean water controls as Provision C.3.b. Regulated Projects.

(2) The retrofit acreages are required to address pollutants discharges from MS4s because the Permittees have substantial areas of impervious surface—

comprised in large part of their existing public roads and parking areas—that discharge urban runoff pollutants to the MS4, but on which projects are not being completed that fall into Regulated Project categories. As such, they are unlikely to be retrofitted with clean water controls and will continue to discharge urban runoff pollutants in the absence of a retrofit requirement. Regulated Projects addressed in Provision C.3.b are only a fraction of the thousands of acres of impervious surfaces in the area covered by this Order. All impervious surfaces contribute pollutants to stormwater runoff, with those in higher density land uses contributing more pollutants. Accordingly, in order to reduce the discharge of storm water pollutants from MS4s to the maximum extent practicable and help attain TMDL wasteload allocations, additional impervious surface areas must be addressed beyond the Regulated Projects. As explained below, other jurisdictions in the State of California and elsewhere in the United States have MS4 NPDES Permits with similar non-Regulated Project numeric retrofits requirements that supplement their retrofit requirements for Regulated Projects.

(3) Pursuant to its consent decree with San Francisco Baykeeper (effective August 11, 2016),[187] and through projected rates of public and private development and redevelopment, as reported in its GI Plan,[188] the City of San Jose is required to appropriate $100 million over the next ten years, subject to meet and confer and other terms of the consent decree, to implement the projects in its Green Stormwater Infrastructure Plan. The Green Stormwater Infrastructure Plan forecasts retrofit of roughly 1750 acres of impervious surface between 2020 and 2030, and roughly an additional 8,500 acres of impervious surface between 2030 and 2040, much of which will necessarily be comprised of non-Regulated Projects. Therefore, San Jose alone is likely to satisfy 100 percent of the Santa Clara County Permittees' Provision C.3.j.ii.(2) Numeric Implementation retrofit requirement (other than the minimum 0.2 acres required for each Permittee).

(4) The San Mateo County Permittees' Orange Memorial Park Regional Project is located in the City of South San Francisco, and will address runoff from over 6,500 acres of land from six neighboring jurisdictions: portions of the City of Colma, the City of Daly City, the City of Pacifica, South San Francisco, Caltrans ROW, and Unincorporated San Mateo County.[189] This regional project may satisfy a portion of the San Mateo County Permittees' Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements, depending on the outcome of

[187] https://baykeeper.org/sites/default/files/press_release/Baykeeper-San%20Jose%20Stormwater%20suit%20settlement%20agreement.pdf

[188] https://www.sanjoseca.gov/your-government/environment/our-creeks-rivers-bay/green-infrastructure

[189] https://www.ssf.net/departments/public-works/engineering-division/capital-improvement-program/orange-memorial-park-regional-storm-water-capture-project

Provision C.3.c.i.(2)(c)(ii).a. (e.g., if it results in a Permit amendment allowing the crediting of certain alternative treatment systems).

(5) A study in Washington State found that imperviousness could serve as a proxy for aquatic system health.[190] It found that ten percent impervious area was a threshold at or above which there was demonstrable, and probably irreversible, loss of aquatic system function, reflected by measured changes in channel morphology, fish and amphibian populations, vegetation succession, and water chemistry. Even lower levels of urban development were observed to cause significant degradation in sensitive waterbodies and a reduced, but less well quantified, degree of loss throughout the system as a whole. This suggests that successful corrective measures must not simply protect or restore the structure of individual stream or wetland elements; buffers around waterbodies must be combined with watershed-level restrictions on the rate and duration of stormwater discharge, as loss of instream fish habitat cannot be repaired by in-stream engineered structures alone. The study did not establish an imperviousness threshold for degradation of San Francisco Bay Area streams. However, in finding significant degradation of waters in Washington State at levels of imperviousness that are well below those of many Bay Area watersheds, the study suggested that there is a need for substantial reductions over time from current levels of directly connected impervious surface. This adds support for the Permit's requirements to implement measures to control discharges from both existing and new impervious surfaces, including public roads.

Many Permittees' jurisdictions have untreated impervious area cover that is substantially larger than ten percent. The Permittees' GI Plans' projected retrofit by Regulated Projects and non-Regulated Projects by 2020 (the existing condition), 2030, and 2040, demonstrate that this amount is expected to continue during this and future Permit terms. Therefore, the requirements included in Provision C.3.j.ii.(2) are intended to increase the pace at which Permittees address the pollutant loading and hydromodification impacts from their impervious surfaces.

(6) The Permittees' existing commitments for green infrastructure implementation in GI Plans are insufficient to address the problem associated with impervious surfaces. With few exceptions, the GI Plans do not commit to accelerate the existing rate of green infrastructure implementation, or to retrofit existing impervious surfaces (particularly, in the public right of way), with clean water controls to address urban runoff discharges, beyond what MRP 2 already required for Regulated Projects using an LID approach. Consequently, the GI

[190] Consequences of Urbanization on Aquatic Systems – Measured Effects, Degradation Thresholds, and Corrective Strategies. Derek B. Booth and Lorin E. Reinelt. King County Surface Water Management Division, Seattle, WA. 1993.

Plans are limited in the extent to which they would reduce the adverse water quality impacts of urban runoff on receiving waters over time.

For example, one Permittee's Capital Improvement Plan indicates consideration of numerous projects with potential for green infrastructure implementation, including miles of street projects, but its GI Plan sets a retrofit target of only 0.8 acres of public impervious surface by 2040, for both Regulated and non-Regulated public projects. Another Permittee's GI Plan sets a retrofit target of only one acre of public impervious surface by 2040.

These outcomes represent a missed opportunity, in that the Previous Permit's green infrastructure planning requirement was included as an alternative to expanding the Regulated Project definitions to include all new and redevelopment projects that create or replace 5,000 square feet of impervious surface, and road projects that just replace existing impervious surface area. That is, in the Previous Permit, green infrastructure planning was included in part to provide municipalities the opportunity to evaluate and account for smaller area regulated projects and road replacement projects as part of their GI Plans, and develop commitments to implementation that would be more efficient and effective for them than a Permit requirement to include all such projects.

(7) Many GI Plans do include some public projects in their green infrastructure retrofit targets, but among those public projects, most are Regulated Projects. One GI Plan, the City of San Jose's, includes substantial public non-Regulated Project green infrastructure implementation, but as described previously, that is largely an outcome of San Jose's 2016 consent decree with the San Francisco Baykeeper, demonstrating that municipal commitment of funding to green infrastructure retrofit has the potential to result in substantial implementation. Overall, the contribution to the retrofits targets presented in the GI Plans by non-Regulated (public) Projects is small relative to the contribution by Regulated (private) Projects.

(8) When the green infrastructure retrofit targets as presented in the GI Plans are summed and considered against estimates of county and regional impervious surface cover, the resulting data describes the relative retrofit that is projected to take place through 2040 at the regional scale. According to the GI Plans, based on the Regulated Project definitions from the Previous Permit and without the numeric implementation requirements included in this Provision in the Permit, for private and public, Regulated and non-Regulated, parcel based, green streets and regional projects, the projected retrofits by 2020, 2030, and 2040 by county stormwater programs are summarized in Table A-4:

Table A-4. GI Plan-estimated retrofit

Permittees	2020	2030	2040
Alameda	2%	3%	3%
Contra Costa	1%	2%	3%
San Mateo	1%	2%	4%
Santa Clara	2%	5%	12%
Solano	6%	8%	10%
Total	2%	4%	6%

GI Plan Long-Term Retrofit. The numbers in each County's row in this table have the respective County's total impervious surface as a denominator, based on the NLCD 2016 Developed Imperviousness Descriptor (CONUS).[191] The numbers in the final row of this table, Total, has the five Counties' total impervious surface as a denominator; since these numbers are percentages of the total five-County impervious surface, they do not sum the above columns.

This shows that despite the opportunity given to flexibly capture smaller projects in GI Plans in lieu of a numeric permit requirement in MRP 2, the Permittees have not committed to accelerating the existing rate of green stormwater infrastructure implementation, or to retrofit existing impervious surfaces with clean water controls to address urban runoff pollutant discharges from existing impervious surfaces, beyond what MRP 2 already required for Regulated Projects.

(9) The inclusion of numeric retrofit acreages is consistent with other relevant NPDES Stormwater Permits, which include similar non-Regulated Project numeric retrofits requirements that supplement their retrofit requirements for Regulated Projects.

The City of Portland's MS4 NPDES Discharge Permit (effective January 31, 2011)[132] requires each co-permittee to implement one non-regulated public right-of-way project before the end of the permit term. Analogous requirements for the completion of at least one public retrofit project are included in the City of Salem's NPDES MS4 Discharge Permit (effective December 30, 2010)[137] and the City of Eugene's NPDES MS4 Discharge Permit (effective December 30, 2010).[141]

The State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s (effective August 1, 2019)[134] requires Permittees to achieve 300 Structural Stormwater Control (SSC)

[191] https://www.mrlc.gov/data

Program Points (225 points from projects in the design stage and 75 points from completed projects) by the third year of the permit term. Appendix 12[192] of that permit provides instructions regarding which types of projects are qualifying, and regarding how to calculate the SSC Program Points that those projects are worth (starting with Table 3 of Appendix 12).

The points system offers a flexible approach to retrofit. It requires implementation of retrofit actions that are beyond work that would otherwise be required under that permit. However, it allows implementation of a range of actions to protect and improve water quality, such as new LID BMPs, retrofit of existing controls to expand capacity, permanent removal of impervious surfaces, and landscape restoration to reduce hydromodification impacts.

Similar to the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s,[134] in U.S. EPA's Draft NPDES Stormwater Permit for the City of Tacoma's MS4,[193] the permittee is required to implement a Structural Stormwater Controls Program to prevent or reduce impacts to receiving waters caused by discharges from the MS4 that are not adequately controlled by other existing actions required by the permittee's Stormwater Management Program (SWMP) Plan;[194] towards that end the permittee's SWMP Plan requires it to achieve 300 SSC Program Points by December 31, 2022, to address impacts that are not adequately controlled by the other required actions of the SWMP Plan. Structural stormwater control program points are calculated per Appendix 12[192] of the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s.[134]

Likewise, in U.S. EPA's Draft NPDES Stormwater Permit for Pierce County's MS4,[195] the permittee is required to implement a Structural Stormwater Controls Program to prevent or reduce impacts to receiving waters caused by discharges from the MS4 that are not adequately controlled by other existing actions required by the permittee's Stormwater Management Program (SWMP) Plan;[196] towards that end the permittee's SWMP Plan requires it to achieve 300 SSC Program Points by December 31, 2022 (225 design-stage retrofit incentive

[192] Accessed on July 30, 2021, from: https://apps.ecology.wa.gov/paris/DownloadDocument.aspx?id=279051

[193] U.S. EPA NPDES Permit No. WAS026689, accessed on July 30, 2021, from: https://www.epa.gov/npdes-permits/draft-npdes-stormwater-permit-city-tacoma-ms4-washington

[194] City of Tacoma, Stormwater Management Program (SWMP) Plan, March 2021. Accessed on July 30, 2021, from: https://www.cityoftacoma.org/UserFiles/Servers/Server_6/File/cms/Surfacewater/SWMPUpdates/Final%20Draft%20SWMP%20Update_2021.pdf

[195] https://www.epa.gov/npdes-permits/proposed-stormwater-permit-pierce-county-ms4

[196] Pierce County, Stormwater Management Program Plan, 2020. Accessed on July 30, 2021, from: https://www.piercecountywa.gov/DocumentCenter/View/92121/2020-SWMP?bidId=

points; 75 complete or maintenance stage incentive points), to address impacts that are not adequately controlled by the other required actions of the SWMP Plan. Structural stormwater control program points are calculated per Appendix 12[192] of the State of Washington's NPDES and State Waste Discharge General Permit for Discharges from Large and Medium MS4s.[134]

The State of Maryland's NPDES General Permit for Discharges from Small MS4s (effective October 31, 2018)[143] makes progress towards the nutrient and sediment load reductions required to address the Chesapeake Bay TMDL, as specified in Maryland's Watershed Implementation Plan, by requiring its permittees to commence restoration efforts for twenty percent of existing developed lands that have little or no stormwater management by 2025, such as by requiring its permittees to perform watershed assessments, identify water quality improvement opportunities, secure appropriate funding, and develop an implementation schedule to show the twenty percent impervious area restoration requirement will be achieved by 2025. Such restoration efforts may include the use of environmental site design practices, structural stormwater BMPs, retrofitting, stream restoration, or other alternative restoration practices. The actions taken by those Maryland permittees to address the Chesapeake Bay TMDL are similar in nature to actions the Permittees could take to achieve wasteload allocations for pollutants including mercury and PCBs. Though it is likely that the Permittees will implement actions similar to those in Maryland because they are reasonable and cost effective given the suite of available options, they have alternative options, such as diversion to the sanitary sewer.

Driven by Chesapeake Bay and Anacostia River TMDLs, the 2010 MS4 permit issued to Montgomery County by the State of Maryland required the County to retrofit 20 percent (4,292 acres) of its "older, untreated, or poorly-treated impervious surfaces by 2015."[197,198] Those retrofits may consist of the use of environmental site design and other nonstructural techniques, structural stormwater practice retrofitting, and stream channel restoration. The permit's retrofit requirement was primarily a TMDL-driven goal. Provision C.3.j.ii.(2)'s retrofit requirement is based both on reducing pollutants to the MEP and achieving the Hg and PCBs TMDL WLAs (see, e.g., Provisions C.11.e and C.12.f). Montgomery County's permit indicates a level of retrofit effort that exists elsewhere, which is far above what Provision C.3.j cumulatively requires (216.92 acres) for multiple jurisdictions.

U.S. EPA's NPDES Permit for Washington, D.C. (effective June 22, 2018)[142] requires the permittee – in order to achieve pollutant reductions, demonstrate progress toward achieving applicable TMDL WLAs by achieving a collective

[197] https://www.montgomerycountymd.gov/water/stormwater/ms4.html

[198] Cameron, et al., 2011. *Green Stormwater Retrofits: Objectives and Costing.* In Low Impact Development Technology: Design Methods and Case Studies, ASCE, Clar et al., eds.

reduction in all TMDL pollutants of concern in stormwater other than trash per the permit's retention requirements, and meeting other water quality objectives – to implement a total of 1,038 new Acres Managed by the end of the Permit term beyond the existing Acres Managed at the time of the Permit effective date, divided between three major basins, of which at least 62 acres must be located in public rights of way. One "Acre Managed" is one acre of land treated by stormwater control measures to the applicable standard established in the permittee's stormwater regulations or consistent with the relevant voluntary program. Further explanation of this concept is provided in the Washington, D.C., NPDES MS4 Permit. For example, a development project required to meet the 1.2 inch retention standard for development and redevelopment greater than or equal to 5,000 square feet, which will implement 1.2 inches of retention across five acres through any combination of onsite and/or offsite retention controls, is equivalent to five "Acres Managed." The permittee is also required to install 350,000 square feet of new green roofs by the end of the permit term, and plant 6,705 trees annually during the permit term. Like the Montgomery County permit, the Washington D.C. permit also indicates a level of retrofit effort that exists elsewhere, which is far above what Provision C.3.j cumulatively requires (216.92 acres) for multiple jurisdictions.

Provision C.3.j.ii.(2)(b)-(c) allows Permittees to meet the retrofit requirements in Table H-1 of Attachment H on a countywide basis or outside their jurisdictions, but requires them provide no less than 0.20 acres of green infrastructure within their jurisdictions, or contribute substantially to such a green infrastructure project outside of their jurisdictions (but within their County). A substantial contribution could mean that Permittees are providing a significant portion of project funding, including in-kind funding or staff services such as development of designs, provision of land, or contracting for project implementation.

- This affords Permittees flexibility in meeting the retrofit acreages, and ensures that a minimum amount of green infrastructure is implemented in the Permittees' jurisdictions to address storm water pollutants. It also ensures that Permittees build the institutional capacity necessary to implement green infrastructure projects within their jurisdictions. There is also a requirement to ensure that countywide total retrofit acreages are met.

Provision C.3.j.ii.(2)(d) allows non-Regulated Projects and green infrastructure beyond the minimum required by Provision C.3.d for a Regulated Project to be counted towards the numeric requirements in Table H-1 of Attachment H. If any portion of such projects is later used as a part of an Alternative Compliance exchange to offset the treatment required by a Regulated Project pursuant to Provision C.3.e.i, then that portion may no longer be counted towards the retrofit acreage requirements in Table H-1 of Attachment H. This allows Permittees to benefit from requiring more than the minimum requirements to achieve cleaner storm water.

Provision C.3.j.ii.(2)(e)-(f) provides the timeframe for counting projects for the acreage requirements in Table H-1. Including projects completed after January 1, 2021, accounts for and encourages early green infrastructure projects completed by Permittees. June 30, 2027, is used as the end of the timeframe because that is when the Permit expires. For project not yet completed by this date, funding them by this date provides the necessary assurance of their completion; in the subsequent permit term, the Water Board may consider requiring such projects to be completed by the end of that permit term.

Provision C.3.j.ii.(2)(g) explains that Numeric Implementation pursuant to Provision C.3.j.ii.(2) can be counted towards analogous Provision C.12 numeric implementation retrofit requirements for old industrial areas, as long as they satisfy other aspects of the Provision C.12 requirement. This ensures that the Permittees get credit for work done under Provision C.3.j.

Provision C.3.j.ii.(2)(h) allows Permittees to credit the acreage of impervious surface created or replaced as part of Provision C.3.b.ii.(5) Road Reconstruction Projects to count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

- This allowance is temporary, for this Permit term, as by the end of the Permit term, the Permittees will have further developed the institutional capacity necessary for continued green infrastructure implementation and, as such, may have a future-looking plan that will incorporate regulated road projects into the Permittees' broader retrofit expectations.

Provision C.3.j.ii.(2)(i) recognizes the unique challenges inherent in the implementation of green infrastructure in small rural Permittee jurisdictions by allowing those Permittees to collectively submit an optional proposal for pilot projects investigating alternative green infrastructure techniques. If approved (or conditionally approved) by the Executive Officer, this proposal will allow (or conditionally allow) Permittees with small rural jurisdictions to meet part or all of their Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements via alternative green infrastructure techniques.

Provision C.3.j.ii.(2)(j) allows Permittees to submit reports pursuant to Provision C.3.j.v.(5) estimating the benefit provided by new or existing ordinances that require Regulated Projects to treat significantly more impervious surface than the minimum required by Provision C.3, where such additional treatment may count towards the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements. Permittees whose reports are approved by the Executive Officer may use the benefit estimated for the current Permit term in the reports to offset up to 25 percent – but by no more than 1 acre – of their individual Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements.

- The offset is a one-time credit and its purpose is to help Permittees complete the planning and policy work sufficient to leverage private development and redevelopment projects within their jurisdictions to assist Permittees with achieving

compliance with the Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements. The Provision C.3.j.ii.(2)(j) offset is temporary, for this Permit term.

Provision C.3.j.ii.(3) describes the Design and Other Criteria that all green infrastructure projects built pursuant to Provision C.3.j must comply with Provisions C.3.c and C.3.e-h because they represent the Water Board's determination of maximum extent practicable-compliant designs that appropriately address identified water quality impacts.

- All green infrastructure projects built pursuant to Provision C.3.j are also required to comply with Provision C.3.d. However, with cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by the Permittees), and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects, submitted in June 2019[199] as allowed by Provision C.3.j.i.(2)(g) of the Previous Permit, to size non-Regulated green streets projects (green infrastructure projects sited in the public road right of way). If they do so, the Permit requires Permittees to comply with the Water Board's June 21, 2019, conditional approval of that submittal,[200] which provides qualifiers to, and the conditions under which, the alternative sizing criteria may be used for non-Regulated green streets projects.

Provision C.3.j.ii.(4) describes a Technical Working Group (TWG) that Water Board encourages Permittees to participate in, along with staff and impartial science experts, to discuss and recommend long-term green infrastructure goals, targeting, in particular, Permittees' public streets. The goals will likely inform subsequent Permit terms, with the idea that each subsequent Permit term would make significant progress towards the goals. The purpose of this Provision is therefore to, over the long-term, address pollutant loading and hydrologic impact from areas of Permittees' jurisdictions that are not otherwise addressed by Provision C.3.b Regulated Projects. The goals will likely inform changes to Provision C.3.j.ii.(2) Numeric Implementation retrofit requirements. The long-term goal may include consideration of crediting public and private projects that implement non-bioretention stormwater controls which provide water quality and hydrologic benefit that are reasonably comparable to the Permit's expectations in

[199] *Guidance for Sizing Green Infrastructure Facilities in Street Projects with companion Analysis: Green Infrastructure Facility Sizing for Non-Regulated Street Projects*. BASMAA, June 2019. https://www.ccleanwater.org/userfiles/kcfinder/files/BASMAA_Guidance%20for%20Sizing%20Green%20Infrastructure%20Facilities%20in%20Street%20Projects%20with%20companion%20Analysis%20June%202019.pdf. Accessed on July 27, 2021. Or: https://basmaa.org/wp-content/uploads/2021/08/BASMAA-Guidance-for-Sizing-Green-Infrastructure-Facilities-in-Street-Projects-with-Companion-Analysis.pdf; accessed on August 8, 2021

[200] *Conditional Acceptance of Guidance for Sizing Green Infrastructure Facilities in Street Projects*. June 21, 2019.

Provisions C.3.c-d and C.3.g. The long-term goal may include consideration of other LID practices such as those proposed pursuant to Provision C.3.d.iv.

Provisions C.3.j.iii-iv. (No Missed Opportunities and Participate in Processes to Promote Green Infrastructure) are required to ensure green infrastructure projects remain a critical part of the Permittees' storm water control and outreach efforts.

Provision C.3.j.v. (Tracking and Reporting Progress) is necessary to track the progress of green infrastructure projects and Permit compliance. It requires Permittees to track and map non-Regulated green infrastructure projects built pursuant to Provision C.3.j, in the same manner as Regulated Projects, using the tracking and mapping tools developed during the Previous Permit. This Provision requires that the tools must include a component that is available to the public, which is advertised on individual Permittee websites and on County stormwater program websites and as appropriate is advertised in other locations. This Provision lists the minimum level of detail that must be provided by the tracking and mapping tool for each project built pursuant to Provision C.3.j. If the tools contain additional information which has not been made available to the public such as detailed design information, incurred or planned operation and maintenance costs and operation and maintenance frequency, condition, and pollutant loads treated, that information is required be made available to Water Board staff upon request. The tracking and mapping tools were required to be completed in the Previous Permit, and therefore the Permit requires the Permittees to certify in the 2023 Annual Reports that the tracking and mapping tools have been completed and are being implemented. Reporting by the Permittees on the implementation of non-Regulated Projects may inform modifications to Provision C.3.j in future permits.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires "[a] description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system." Other specific legal authority is cited below.

Specific Provision C.4. Requirements

Provision C.4.a (Legal Authority) Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Provision C.4.b (Inspection Plan) Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit continues to require Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "[p]rovide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

The Water Board has added to this Permit additional types of businesses for Permittees to include in their Industrial and Commercial Business Inspection Plan (Inspection Plan). These are restaurants and other food service businesses, as well as supermarkets or large grocery stores with outdoor waste storage or cardboard compacting areas. Waste from these types of businesses is reasonably likely to contribute stormwater runoff pollution, and they are a common focus area of other stormwater program inspection requirements. Restaurants and other food service businesses have the potential to discharge pollutants associated with their activities such as food debris, trash, and other

wastes, including those from disposable food packaging and utensils. Similarly, supermarkets and large grocery stores have an elevated threat of potential discharges of trash, fluid milk products, food debris, and other wastes.

Vehicle fueling facilities were previously included in MRP 2 due to the reasonable likelihood to contribute to stormwater discharges of hydrocarbons, heavy metals and other chemicals used as fuel additives. The Water Board has now specified sites with "fueling activities" as a type of business to include in Permittees' Inspection Plans. This is to clarify that sites with those activities are still considered a fueling facility, even if found in business types that perform other activities, and they have the same associated pollutants with the potential to discharge in stormwater.

These additional business types and similar activities are also components of business inspection requirements in other Phase I MS4 permits, including Los Angeles, Salinas, the City of South Lake Tahoe, El Dorado County, Placer County, and Seattle, WA.

The Permit continues to require Permittees to identify industrial sites and sources subject to the Industrial General Permit or other individual NPDES permit. U.S. EPA recognized that stormwater from industrial facilities would be regulated by both municipal and industrial stormwater programs, finding that:

> 1. *Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.*[201]

and:

> 2. *Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, U.S. EPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are*

[201] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48056

> *responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.*[202]

This Permit does not require the Permittees to submit the list of facilities scheduled for inspection each year with annual reports. Instead, Permittees are to add each year's inspection list to the Inspection Plan as part of the annual update to the Inspection Plan. Permittees may choose to keep their annual lists in their databases or in electronic form. The annual lists must be made readily available to Water Board staff or its representatives upon request.

Water Board staff reviewed about 20 percent of the Permittees' Inspection Plans during the MRP 1 term. A few of those Inspection Plans also provide detailed flow charts or instructions on how to conduct inspections, fill out the inspect forms, execute enforcement actions, conduct follow-up, and fulfill tracking and reporting for the MRP. These comprehensive Inspection Plans help ensure inspection consistency and serve as excellent training documents for new inspection staff.

Provision C.4.c (Enforcement Response Plan) requires the Permittees to implement and update, as needed, their Enforcement Response Plan (ERP) that serves as a reference for inspection staff to take consistent and timely responses to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP provides guidance on (1) progressively stricter enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP.

Because ERPs are unique to each Permittee, this Permit continues to allow each Permittee flexibility to customize the ERP to fit its legal authority and its regulatory program. However, all ERPs must require corrective actions to be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered; and short timeframes for implementing corrective actions encourage businesses to prevent potential discharges from becoming actual discharges. Permittees must also require active non-stormwater discharges to cease immediately, timely implementation of corrective actions to clean up the discharge, and timely implementation of measures to prevent future active discharges.

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[202] Ibid

This Permit standardizes and clarifies the ERP requirements in provisions C.4, C.5, and C.6. to eliminate ambiguity in the requirements.

Provision C.4.d (Inspections) continues MRP 2's consolidation of the inspection requirements from MRP 1's Provision C.4.b. Inspection Plan and C.4.c. ERP together into this Provision. Inspection frequencies are determined by each Permittee in its Inspection and Enforcement Response Plans.

U.S. EPA guidance states "management programs should address minimum frequency for routine inspections." The U.S. EPA Fact Sheet—Visual Inspection says "[t]o be effective, [visual] inspections must be carried out routinely." [203]

The Water Board has declined to reduce the record keeping and reporting requirements of this permit. The Permit requires that only basic information be recorded for each inspection. This information is necessary to document each inspection to develop a history for the facility.

This information is also needed for Water Board staff to evaluate MS4 programs. Annual reports need to provide enough detail to show compliance with the Permit terms. For instance, during the MRP 1 term, annual reports showed few violations relative to the number of inspections completed. This did not match with the field inspection experience of Water Board staff. Further investigation showed that some Permittees did not consider potential discharges to be violations. Such investigation by Water Board staff would be made more difficult without the required information about inspections.

MRP 1 exempted verbal warnings from being reported in the annual reports. Water Board staff expected verbal warnings to have very limited use and only given for very minor issues that do not warrant anything in writing. However, from Water Board inspections, and annual report and ERP reviews, we concluded that many Permittees issue warnings in response to potential discharges, such as housekeeping issues, evidence of actual non-stormwater discharges that are not ongoing during an inspection, lack of BMPs, inadequate BMPs, and inappropriate BMPs. Even though potential discharges need timely corrective actions, it was unclear if these potential discharges were corrected in a timely manner because there was no written documentation on the potential discharges or verbal warnings issued. Only observed non-stormwater discharges were considered violations and issued some type of written enforcement action. Examples of potential discharges.

MRP 2 required, and this Permit continues to require, reporting of all potential and actual non-stormwater discharges based on the enforcement levels in each Permittee's ERP, so that Water Board staff can evaluate whether Permittees are conducting appropriate follow-up.

[203] U.S. EPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection."

Some Permittees feel that a 10-business day window to implement corrective action is not necessary and even unreasonable during the dry months for potential discharges and especially for minor potential discharges. Permittees have the discretion to add a rationale for allowing a longer time period, especially for corrective actions that require things such as capital improvements, revisions to standard operating procedures, and staff training. However, prompt implementation of corrective actions for most potential discharges minimizes the risk of potential discharges becoming actual discharges. A number of Permittees communicated that they prefer shorter corrective action timeframes because sites tend to take care of them right away versus forgetting about the corrective actions when given a longer corrective action timeframe. Throughout the MRP 1 term, Water Board staff asked Permittees for a list of minor potential discharges. The only minor issue listed was open dumpster/garbage can lids. Water Board staff concurred that open dumpster/garbage can lids is minor, can be corrected immediately, and would not require any additional follow-up. Water Board industrial and construction inspectors consider open dumpster/garbage can lids and small amounts of trash/debris on the ground to be minor violations that can quickly be corrected, because staff at the industrial or construction sites can immediately cover the dumpsters and pick up and appropriately dispose of the trash. Water Board inspectors note those issues and corrective actions in their inspection reports.

Provision C.4.f (Staff Training) requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application "[t]he location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have adequate legal authority to "[p]rohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(F) provides that the Permittee shall have adequate legal authority to "[c]arry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires that the Permittee have a " description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires a "program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires a "description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires a "description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires a "description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires a "description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires a "description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Discharges not comprised entirely of stormwater, not authorized by another NPDES permit, and neither exempted nor conditionally exempted in Provision C.15 are not authorized to enter the MS4 and are considered to be illicit discharges

C.5-2 Every Permittee must have the ability to effectively prohibit non-stormwater discharges to its MS4 by detecting and eliminating illicit discharges and disposal into its MS4.

C.5-3 Illicit discharges to the storm drain system may be detected in several ways. Permittee staff may detect discharges incidentally, and members of the public may report suspected discharges. The Permittee must have a direct means to receive, investigate, respond to, and track these reports.

Removal of Routine Collection System Screening Requirement

MRP 1 required the Permittees to perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets, and catch basins, to seek and eliminate illicit connections and discharges. The results of the screenings were reported in annual reports. No illicit connections were reported. However, Permittees have found illicit discharges during the screenings and they were cleaned up. It is unclear if personnel conducting the screenings reported these illicit discharges to the illicit discharge staff for investigation and tracking. In MRP 2, we added language to C.5.c. – Spill, Dumping, and Complaint Response Program to ensure that illicit discharges found by municipal staff conducting routine maintenance and inspection activities on the collection system are reported to the illicit discharge staff for investigation and tracking. This is based on the federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3), which requires "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to prohibit illicit discharges to storm sewers as required by federal regulations at 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in a discharge into the MS4 that is not comprised entirely of stormwater. Every Permittee must have the ability to discover, inspect, enforce its ordinance, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (Enforcement Response Plan) continues to require Permittees to implement and update, as needed, their Enforcement Response Plans (ERPs) to ensure consistent and timely responses to illicit discharges and connections to the MS4. The ERP provides guidance on (1) progressively strict enforcement to achieve timely compliance, (2) follow-up inspection, (3) referral to another agency, (3) appropriate time periods for implementation of corrective actions, and (4) the roles and responsibilities of staff responsible for implementing the ERP. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Permittees must also require immediate cessation of active discharges, and timely implementation of corrective actions to clean up the discharge and implementation of measures to prevent future active discharges.

Water Board staff reviewed more than half of the Permittees' ERPs during MRP 1. Almost all of those Permittees have one ERP to satisfy the ERP requirements in provisions C.4, C.5, and C.6. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in MRP 1. Therefore, the ERP requirements in this Permit are standardized in provisions C.4, C.5, and C.6.

Provision C.5.c (Spill, Dumping, and Complaint Response Program) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spills, dumping, and complaints reporting. Reports from the public and other Permittee staff are an essential tool in discovering and investigating illicit discharge activities into the MS4. Maintaining contact points helps ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a means to adequately track suspected polluted discharges from the time they are reported until they are resolved.

Provision C.5.d (Tracking and Case Follow-up) implements the requirement in 40 CFR 122.26(d)(2)(iv)(B)(4) for permittees to have procedures to "respond to spills" by requiring Permittees to substantiate, track, and monitor illicit discharges reported to the spills, dumping, and complaint response system (Provision C.5.c). This requirement is included so Permittees can demonstrate compliance with the ERP requirements in

Provision C.5.b and to ensure that illicit discharge reports receive adequate follow-up and resolution.

All municipalities, counties, district, and other public entities that own or operate sanitary sewer systems greater than one mile in length that collect and/or convey untreated or partially treated wastewater to a publicly owned treatment facility in California are required to report sanitary sewer overflows to the California Integrated Water Quality System Project pursuant to the State Water Board's Order No. 2006-003-DWQ (Statewide General Waste Discharge Requirements for Sanitary Sewer Systems) and Order WQ 2013-0058-EXEC (Adopting Amended Monitoring Requirements for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems order. Sewage discharges that are reported to the California Integrated Water Quality System Project do not need to be tracked and reported in Provision C.5.

Provision C.5.e (Control of Mobile Sources) requires each Permittee to implement a program to reduce the discharge of pollutants from mobile businesses. Examples of mobile businesses include mobile cleaners that wash vehicles, building exteriors, sidewalks, and plazas, cleaners that wash restaurant smoke hood filters, mats, and other equipment, and mobile fueling businesses that fill up gas tanks for vehicles owned by carshare companies or certain technology company employees. The purpose of this section is to implement oversight and control of pollutants associated with mobile business sources to the MEP.

MRP 2 required Permittees to develop and implement a program to reduce the discharge of pollutants from mobile businesses and to develop an inventory of mobile businesses. Permittee experience during the previous permit term showed that it is difficult to track and register mobile businesses. Mobile businesses may have a business license from another municipality, another county, or have no business license. They often work outside of normal business hours (e.g., restaurant cleaners may work late at night when restaurants are closed), and so are difficult to observe and inspect. This Permit shifts the enforcement approach focus from developing an inventory of mobile businesses and direct observation of mobile business activities to reiterating that the entity hiring the mobile business and the mobile business themselves are responsible for any polluted discharge from the business or property.

This Permit keeps the outreach requirement to develop and distribute educational materials about stormwater pollution prevention to mobile businesses. Permittees may develop their own education and outreach materials, or may participate in a countywide or regional program. In order to understand what Permittees are doing to control pollutants from mobile sources, this Permit continues most requirements of MRP 2 and collects data on each Permittee's implementation of the provision.

Provision C.5.f (Municipal Separate Storm Sewer System (MS4) Map) As part of the permit application process, federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of

any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[204] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[205] All Permittees have complied with this requirement. This Permit continues to require the Permittees to advertise the availability of the maps of their MS4 system and to make available these maps to the public upon request.

In addition to the mapping information previously submitted, this Permit also requires Permittees to identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information. Previous permits did not require Permittees to submit regular updates to their MS4 system maps, so the current status of the overall MS4 systems as compared to previous maps is unknown. To effectively manage and respond to illicit discharges, as well as potential impacts from conditionally exempted discharges like emergency firefighting discharges, it is essential for Permittees to understand their current MS4 system layout and conditions, as well as how discharge sources are connected to outfalls that discharge to their system.

The proposed updates that this Permit requires are consistent with the requirements of other stormwater permits in the state. For instance, the California Permit for Small MS4s,[206] the City of Long Beach MS4 Permit,[207] and the City of Salinas MS4 Permit[208] also require Permittees to keep their MS4 system maps up to date by submitting annual revisions or verifying that no modifications to the system occurred during the annual reporting period.

The City of Salinas MS4 Permit requires the city to maintain a Stormwater Information Management System that includes a map of MS4 system components with information

[204] 40 CFR 124.3 (applicable to state programs, see section 123.25).

[205] 40 CFR 122.26(d)(1)(iv)(E).

[206] California State Water Board, NPDES Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), NPDES Permit No. CAS000004, Order No. 2013-0001-DWQ, as amended.

[207] Los Angeles Regional Water Board, Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges from the City of Long Beach, NPDES Permit No. CAS004003, Order No. R4-2014-0024.

[208] Central Coast Regional Water Board, NPDES Permit and WDR for the City of Salinas Municipal Stormwater Discharges, NPDES Permit No. CA0049981, Order No. R3-2019-0073, adoption date: September 20, 2019, effective date: October 1, 2019.

such as the name, type, location, and discharge information. The map must identify open channels and other conveyance features, inlets to the MS4, and connections over 8 inches in diameter to MS4 conveyances. The map must also include components that influence maintenance capacity and conveyance, such as cleanouts, pump stations, diversion structures, and trash capture devices.

The City of Long Beach MS4 Permit requires an electronic map that includes the location and length of all open channel and underground pipes 18 inches in diameter or greater, as well as storm drain outfall catchment areas for each major outfall. The Los Angeles County MS4 Permit also requires an up-to-date and accurate electronic map of the county's MS4.[209] In addition to outfalls, the required map components include the location and length of open channels and underground storm drain pipes with a diameter of 36 inches or greater.

[209] Los Angeles Regional Water Board, NPDES Permit for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach, NPDES Permit No. CAS004001, Order No. R4-2012-0175, as amended.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires "[a] description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires "[a] description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires "[a] description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires "[a] description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires "[a] description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that "[t]he following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed the natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants, such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as stop work orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into the MS4 and then into receiving waters. According to the 2004 National Water Quality Inventory,[210] States and tribes report that sediment is a major cause of impairment of assessed rivers and streams. The Inventory found that sediment impairs 35,177 river and stream miles (14 percent of the impaired river and stream miles). Sediment runoff rates from construction sites are typically 10 to 20 times greater than runoff rates from agricultural lands, and 1,000 to 2,000 times greater than runoff rates from forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[211]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management,

[210] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[211] U.S. EPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure*. EPA 833-F-00-008. Fact Sheet 2.6.

and non-stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority.

In its Phase II Compliance Assistance Guidance, U.S. EPA says that "[i]nspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[212] To issue warnings and assess penalties during inspections to achieve timely corrective actions from sites, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to implement and update, as needed, its Enforcement Response Plan (ERP), which serves as a reference for inspection staff to take consistent actions and timely response to achieve effective, timely corrective compliance from all public and private construction site owners/operators.

U.S. EPA supports enforcement of ordinances and permits at construction sites, stating "[e]ffective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[213] In addition, U.S. EPA expects permits issued to municipalities to address "weak inspection and enforcement."[214] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program. Prior to the issuance of MRP 1, Water Board staff had noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. Therefore, MRP 1 required Permittees to develop ERPs. MRP 2 required Permittees to implement the ERPs, and the Permit continues to require Permittees to implement the ERPs.

ERPs are unique to each Permittee. As such, this Permit continues to frame ERP requirements broadly. For instance, at minimum, an ERP must include: (1) progressively strict enforcement to achieve timely compliance, (2) enforcement scenarios, (3) follow-up inspections, (4) referral to another agency, (5) appropriate time periods for implementation of corrective actions, and (6) the roles and responsibilities of staff responsible for implementing the ERP. The broad framework allows each Permittee flexibility to customize the ERP to fit its legal authority and ordinary business practices. However, for an ERP to be effective, Permittees must require immediate cessation of active non-stormwater discharges, timely implementation of corrective actions to clean up the discharge, and implementation of measures to prevent future active discharges. Corrective actions must be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are

[212] U.S. EPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, pp.4-31

[213] U.S. EPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.

[214] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p.48058.

discovered. Construction sites are required by the statewide NPDES General Permit for Stormwater Discharges Associated with Construction Activities (Construction General Permit) to keep supplies on hand to address BMP issues rapidly. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access an eroded area. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. The Permittees' tracking data needs to provide a rationale for the longer compliance timeframe.

Water Board staff reviewed more than half of the Permittees' ERPs during the MRP 1 term. While a couple of Permittees have detailed, comprehensive plans, more than half of the ERPs reviewed did not comply with the ERP requirements in MRP 1. Therefore, this Permit standardizes and clarifies the ERP requirements in provisions C.4, C.5, and C.6 to eliminate any ambiguity in the requirements.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round and seasonally appropriate and effective BMPs in the following six categories: (1) erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories match those listed in the Construction General Permit and reflect the nature of the potential water quality threats posed by construction sites, as well as the means of addressing those potential threats. Because sites' terrain, soil type, soil disturbance, and proximity to waterbodies differ, it would be unduly prescriptive and inappropriate to require all sites to implement a specific set of BMPs. This Permit, like the Construction General Permit, allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate and to change BMPs quickly to prevent discharges into storm drains, waterways, and rights-of-way. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals, such as CASQA's Construction BMP Handbook.[215]

Sediment runoff at construction sites without adequate BMP implementation greatly exceeds natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This is because the vegetation clearing, mass grading, lot leveling, and excavation at construction sites expose soil to wind and water, increasing sediment mobilization, runoff into the MS4, and deposition in receiving waters. This occurs in both the wet season and in unexpected rain events during the dry season (defined as May 1 through September 30), which can be significant. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the whole year, including during the dry season.

Provision C.6.c.ii.(1).d requires "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent

[215] CASQA, 2019. *Construction BMP Online Handbook. https://www.casqa.org/resources/bmp-handbooks/construction*

feasible." If grading does occur during the wet season, Permittees must require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

"Steep slopes are the most highly erodible surface of a construction site,"[216] and unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. Therefore, this Permit requires slope stabilization on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. As noted by U.S. EPA, "slope length and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[217] Where vegetation preservation or replanting is not possible, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[218] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, this Permit requires Permittees to ensure that sites implement slope stabilization techniques that are appropriate for the grade and height of the affected slopes.

This Permit also requires Permittees to ensure that construction sites permanently stabilize disturbed soils, e.g., by revegetation, at the conclusion of each phase of construction.[219] To maximize the degree to which vegetation can effectively stabilize soils, Permittees must ensure that construction sites are revegetated as early as feasible. Revegetation reduces the threat of polluted stormwater discharges from construction sites. A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[220] U.S. EPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[221]

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[216] Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.

[217] U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.

[218] Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection*. p. 5.

[219] Ibid.

[220] Ibid. p. 11.

[221] U.S. EPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.

To ensure the MEP standard and water quality standards are met, active treatment systems may be necessary at some construction sites. Requirements for active system requirements are located in the Construction General Permit, Attachment F.

Provision C.6.d. Plan Approval Process. U.S. EPA guidance emphasizes the importance of good site planning,[222] early incorporation of stormwater controls into a construction project, and implementation of a comprehensive stormwater management system—that is, an effective combination of controls appropriate to the project and site.[223] This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures before ground is broken on a construction project, and during the site plan review process or earlier, as recommended by U.S. EPA.[224] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[225]

Provision C.6.e. Inspections. This Provision requires permittees to ensure accountability of construction site managers through a program of regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the storm drain and waterbodies.

The level of effort required by this section remains unchanged from the previous permit. The monthly or more frequent inspections during the wet season of all construction sites disturbing one or more acre of land, all hillside projects, and all high priority sites reflects the need to ensure that potentially changing conditions on sites are appropriately being addressed during the part of the year when there is a greater threat associated with a greater probability of precipitation, and has been shown during previous permit terms to adequately identify problem sites. Inspections must focus on the adequacy and effectiveness of the site-specific BMPs implemented for the six BMP categories. Each Permittee must implement its ERP and require timely corrections of all actual and potential problems observed. All corrective actions must be implemented before the next rain event, but no longer than 10 business days after the violations are discovered. A longer time period to implement corrective actions is allowed with a reasonable rationale. All inspections must be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format.

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[222] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.

[223] Ibid.

[224] U.S. EPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 4.6.2.4,
pp. 4–30.

[225] Ibid. pp. 4–31.

MRP 1 required Permittees to have the legal authority to require effective construction stormwater controls at all construction sites, regardless of the amount of soil disturbed. Water Board staff has observed disturbed construction sites where minimal BMPs were being implemented, and has seen stormwater transport construction site pollutants into the storm drain. For these reasons, ideally, all construction sites with a grading permit from a Permittee should have stormwater inspections during the rainy season to ensure adequate BMPs are implemented and construction pollutants are not entering the storm drain. Construction sites with steeper slopes pose a more-significant threat of discharging construction-related pollutants to the storm drain because they are likely to have higher runoff velocities and because their BMPs must be more robust and more-robustly installed and maintained in order to control pollutants, as compared to less-steep sites. Water Board staff has observed stormwater move sediment and other construction-related pollutants into storm drains at sites ranging from those with flat slopes to those with slopes greater than 15 percent. Because of the relatively greater threat posed by steeper sites, MRP 2 added, and this Permit continues a specific requirement to inspect all hillside projects disturbing greater than or equal to 5,000 square feet of soil. For those Permittees that do not have a hillside development map or definition, this Permit defines hillside development as development occurring on land with a slope greater than or equal to 15 percent.

MRP 1 required Permittees to report the number of violations fully corrected prior to the next event, but no longer than 10 business days after the potential and actual discharges are discovered or otherwise considered corrected in a timely, though longer period. This proved challenging for many Permittees because they track enforcement actions and not discreet violations. While information on how many potential and actual discharges are discovered and resolved would be valuable, the Water Board recognizes that such reporting requirements would require significant changes in databases for some Permittees. Therefore, this Permit allows Permittees to either report by enforcement actions or discrete number of potential and actual discharges.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct staff trainings for municipal staff at least every other year. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires "[a] description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways [sic] and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires "[a] description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Findings in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.[226]

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.

[226] U.S. EPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[227]

Specific Provision C.7 Requirements

Provision C.7.a. Outreach Campaigns. Permittees have long implemented outreach campaigns to educate their residents on different stormwater runoff pollution prevention messages. The Permit continues to require a minimum of one public outreach campaign. It is anticipated that Permittees will continue cooperatively implementing the *Our Water, Our World* pesticide use reduction outreach campaign developed by BASMAA. Individual Permittees, their respective countywide programs, and cooperative inter-Permittee efforts, will either continue existing public outreach campaigns or start new ones. This Permit removes specificity regarding the expected public outreach campaigns and how they must be conducted, recognizing that the Permittees have decades of public outreach experience and allowing flexibility to determine how best reach their residents. Permittees can utilize various electronic and print media, and paid and free media to target different audiences. This Permit still requires an effectiveness assessment/evaluation after each outreach campaign to enable Permittees to determine whether stormwater messaging has reached residents and resulted in behavior changes.

Provision C.7.b. Stormwater Pollution Prevention Education. The public needs information on how to minimize stormwater pollution. MRP 1 and MRP 2 required Permittees to have and publicize a centralized stormwater point of contact to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives. The Permittees list this point of contact on the brochures, pamphlets, and fact sheets they circulate on stormwater pollution prevention issues. Some Permittees provide these materials in languages other than English. Many Permittees have also placed these pollution prevention materials on their websites. Since citizens increasingly use the internet to search for information, this Permit continues to require all Permittees to place information on watershed characteristics and stormwater pollution prevention on their websites.

Provision C.7.c. Public Outreach and Citizen Involvement Events. This Permit continues to require Permittees to host citizen involvement events to ensure that pollution prevention messaging reaches a broad spectrum of citizens. Long-established outreach mechanisms, such as staffing tables or booths at fairs, street fairs, and other community events, help to ensure that citizens who do not actively search for information on Permittees' website may still have access to information. Permittees shall continue utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events, such as the Bringing Back the Natives Garden Tour. It is important to provide opportunities for citizens to actively practice being good stewards of our

[227] Ibid.

environment. The combined specified numbers of events for Public Outreach and Citizen Involvement in this Permit are, for the most part, slightly less than the combined specified numbers in MRP 1. However, many Permittees claimed credit for both public outreach and citizen involvement for a number of events each year.

Provision C.7.d. Watershed Stewardship Collaboration. Community watershed groups are comprised of active citizens, but they function best when they receive support from and can coordinate actions with Permittees.

Provision C.7.e. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision-makers and consumers.

Provision C.7.f. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform municipal officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA §§ 308(a), 402(a)(2); Federal NPDES regulations 40 CFR §§122.26(d)(2)(i)(F), 122.41(h), (j), (l), 122.42(c), 122.44(i), and 122.48.

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program and submit reports as required under the laws cited above. CWC Section 13383 further authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements.

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of WQBELs that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, U.S. EPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[228]

According to U.S. EPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

(1) Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;

(2) Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;

(3) Identifying potential sources of pollutants; and

(4) Eliminating or controlling identified sources more specifically through permit conditions.[229]

[228] U.S. EPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. In it, U.S. EPA recognizes that storm water discharges are highly variable both in terms of flow and pollutant concentrations and the relationships between discharges and water quality can be complex.

[229] U.S. EPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

C.8-2 A workshop held by U.S. EPA Region 9[230] identified key attributes of a more effective approach to monitoring, and how that monitoring may intersect with other evaluation, tracking, and reporting efforts:

(1) Clear management questions related to water quality outcomes and activity implementation.

(2) A process for conducting effectiveness assessment that is tailored to the program element and the management questions being asked.

(3) Use of improved monitoring designs (location, scale, frequency, methods) to detect a "signal" or change in pollutant loading in stormwater or receiving waters for POCs.

(4) Monitoring efforts that complement activity tracking and assessment to better evaluate effectiveness of treatment or source controls (e.g., are they implemented correctly, receiving proper maintenance, and operating as expected?) and improve the basis for assessing cause and effect.

(5) Documented monitoring and evaluation designs coupled with identification of program modifications envisioned to improve effectiveness, inform program adjustment and new stormwater management initiatives, and achieve intended outcomes.

The workshop recommended elements to be included in a national-level guide on monitoring and assessing program effectiveness; in the meantime, those elements on their own are a useful guide for monitoring and evaluation programs:

(1) Framing key monitoring/evaluation questions and designing approaches to fit the questions. This could include alternative program designs with advice on assembling the components (e.g., receiving water, outfall, and in-system water monitoring; BMP effectiveness evaluation; activity tracking of treatment and source controls; modeling) to inform assessment of the overall program and demonstrate effectiveness. This should show how to build a sound analytical framework up front to demonstrate why a set of approaches will likely succeed in assisting program management and defining or tracking compliance and effectiveness.

(2) Considerations for adapting monitoring/evaluation questions over time, with a reasonable limit on the creation of new questions.

[230] Improving Stormwater Program Monitoring, Evaluation, Tracking, and Reporting: Workshop Report and Recommendations. U.S. EPA Region 9, October 12, 2018. https://www.epa.gov/sites/production/files/2018-10/documents/improving_stormwater_program_monitoring-10-12-2018.pdf

(3) Examples of successful local approaches that better associate monitoring/evaluation design with program effectiveness, compliance assessment, and the ability for program managers to make management decisions.

(4) Suggested evaluation methods to assess BMP effectiveness over time.

(5) Available monitoring technologies and best practices that clearly link the monitoring objectives with the experimental design, including all aspects of data collection, data management, data analysis, and reporting formats.

(6) Compiling monitoring program costs to help show the wide range of program expenditures, how monitoring data are used to inform program decisions, and how to better articulate the value of the data.

(7) Explanations of modeling approaches and how they can relate to monitoring and adaptive management.

The workshop identified the following performance metrics to establish more meaningful MS4 program evaluation and monitoring:

(1) Percent of impervious areas addressed for stormwater management.

(2) Condition or “cleanliness” of streets as an indicator of potential pollution from runoff.

(3) Percent of impervious surface areas directly connected to the storm drain system.

(4) Modeled volume of flow to the storm drain system used as a surrogate for pollutant contributions.

(5) Percent of waterbodies in a community that are fishable and swimmable.

(6) Loss of beneficial use of a waterbody (e.g., beach closure downtimes).

(7) Measured level of awareness of citizens regarding stormwater pollution and the community’s program.

(8) Increasing number of illicit discharges reported annually; indicating heightened awareness.

(9) Budget for stormwater infrastructure improvements.

The workshop identified an overall need for permitting authorities to improve the clarity of monitoring and evaluation permit requirements and to use thoughtful methods/designs that will yield actionable data. Further, some participants noted that permits may be able to provide choices or flexibility for monitoring approaches and help incentivize better designs. Flexible permit requirements can support adaptation of monitoring to evolve with program

needs, with the potential questions to be addressed changing over time. Critically, for such an approach to succeed, it may be necessary to discontinue some monitoring efforts to redirect resources to more pertinent or valuable monitoring. The Water Board intends to pursue that recommended approach, as this Permit has replaced the Creek Status Monitoring and Stressor/Source Identification Projects Subprovisions with LID Monitoring which has been identified as a more useful program at this point in time, and the Water Board will consider changes to LID Monitoring in the subsequent permit to further increase its utility.

C.8-3 Provision C.8 requires Permittees to conduct water quality monitoring, including ambient monitoring, MS4 outfall monitoring and monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management actions pursuant to this Permit and, accordingly, demonstrate compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

(1) Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;

(2) Characterize stormwater discharges;

(3) Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;

(4) Assess progress toward reducing receiving water concentrations of impairing pollutants;

(5) Assess compliance with numeric and narrative water quality objectives and standards;

(6) Identify sources of pollutants;

(7) Assess stream channel function and condition, as related to urban stormwater discharges;

(8) Assess the overall health and evaluate long-term trends in receiving water quality; and

(9) Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-4 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the Maximum Extent

Practicable (MEP) standard where applicable. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1 related to water quality standards exceedances could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-5 Under the CWA, NPDES permits must contain conditions that require both monitoring and reporting of monitoring results to ensure compliance (see 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i).). The regulations provide, in pertinent part:

> *In addition to the conditions established under §122.43(a), each NPDES permit shall include conditions meeting the following requirements when applicable. . . .*
>
> *(i) Monitoring requirements. In addition to § 122.*48, the following monitoring requirements:
>
> *(1) To assure compliance with permit limitations, requirements to monitor:*
>
> *(i) The mass (or other measurement specified in the permit) for each pollutant* limited in the permit;
>
> *(ii) The volume of effluent discharged from each outfall;*
>
> *(iii) Other measurements as appropriate including pollutants in internal waste streams under § 122.45(i); pollutants in intake water for net limitations under § 122.45(f);* frequency, rate of discharge, etc., for noncontinuous discharges under § 122.45(e); pollutants subject to notification requirements under § 122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the CWA.
>
> *(iv) According to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR part 136 for the analysis of pollutants or pollutant parameters or required under* 40 CFR chapter 1, subchapter N or O. . . .

> *(2) Except as provided in paragraphs (i)(4) and (i*)(5) of this section, requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. . . .

40 C.F.R. § 122.44(i)(1)-(2). This section allows "for monitoring other than mass or volume, namely some 'other measurement specified in the permit [ ] for each pollutant limited in the permit'" (*NRDC v. U.S.EPA*, (2nd Cir. 2015) 808 F3d 556, 582.). The regulations at 40 C.F.R. § 122.48 state that all permits specify the "[r]equired monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring."

Consistent with the federal regulations, water quality monitoring requirements in Provision C.8 require specific monitoring that will yield data that is both representative of the monitored activity and necessary to assure compliance with the requirements of the Permit, as described below.

C.8 includes monitoring[231]:

(1) At or near outfalls during storm events to determine the concentrations (mass) of pollutants of concern and to obtain information to identify source areas or contaminated watersheds. These concentration data, in combination with other information, are used to provide modeled loading estimates to assess progress on attaining TMDLs, including assuring compliance with the required load reductions in the permit (C.8.f. Pollutants of Concern Monitoring). This monitoring supports estimates of MS4 pollutant loads to receiving waters and requires data collection to support planning for control actions (e.g., identification of source areas or contaminated watersheds). The latter includes monitoring effectiveness of control measures and identifying pollutant source areas; and

(2) In receiving waters, during wet and dry weather, to assess the extent to which LID controls and trash controls mitigate the physical, chemical and biological impacts of MS4 discharges to those receiving waters, and to therefore guide the management and implementation of existing and future LID controls and trash controls (C.8.d. LID Monitoring and C.8.e Trash Receiving Water Monitoring).

Provision C.8.d LID Monitoring requires monitoring of LID facilities, systems, components, including different LID design variations, in order to measure compliance and determine the effectiveness of LID controls, including the

[231] Provisions C.14, C.16, C.18, and C.19 contain additional monitoring and reporting requirements to assure compliance with the requirements therein.

extent to which LID controls address the physical, chemical and biological impacts to receiving waters caused by MS4 discharges. Provision C.8.d outlines the minimum requirements that Permittees' LID Monitoring programs must comply with and what must be included in LID Monitoring Plans. A Technical Advisory Group (TAG) consisting of Permittee representatives will guide the development and implementation of the LID Monitoring Plans.

Provision C.8.e Trash Monitoring requires monitoring of MS4 outfalls, direct monitoring of receiving waters, and indirect monitoring of receiving waters (adjacent on-land areas, when direct in-stream monitoring is not practicable). The types, frequencies, and intervals of monitoring are expected to yield information that will verify whether implemented full trash capture systems or equivalent trash controls result in no or low levels of trash discharges from MS4s.

Receiving water monitoring is specified here in addition to, and in some cases as a substitute for, outfall monitoring, for the following reasons. First, there are no end-of-pipe limits in the Permit to measure. Instead, the Permit requires, for example, PCB load reductions; outfall monitoring would not allow the Water Board to assess whether the PCB limits are met. Second, there are hundreds if not thousands of outfalls in the Permittees' jurisdictions and it is impractical to monitor every single outfall due to both cost and safety concerns. Monitoring a subset of outfalls would provide information about MS4 discharges at those specific locations at only one limited point in time, which leads to the third point that outfall monitoring is time- and spatially limited. In contrast, the required receiving water monitoring integrates the physical, biological and chemical effects to the water body of all MS4 discharges from multiple outfalls over multiple storms (i.e., time and space), yielding more useful data than outfall monitoring to determine compliance with the Permit. Receiving water monitoring is done in a probabilistic or rotating basis, depending on the parameter, again yielding more useful data than fixed-location monitoring. Also, both dry weather and storm flows are addressed in receiving water monitoring, whereas outfall monitoring is normally conducted only during storm events. Dry weather discharges can constitute a significant portion of annual pollutant loadings from storm systems in urban areas (NRC 2008).

To provide an example of how receiving water monitoring better captures permit compliance, consider an illicit discharge of chloramine from a swimming pool to an MS4. Both outfall and receiving water monitoring could detect the discharge. However, outfall monitoring would need to be done at the exact location and time of an illicit discharge; otherwise it would go undetected, because the discharge would have moved through the outfall and into receiving waters.

Receiving water monitoring as a means to evaluate compliance with permit conditions is supported by the National Research Council (NRC). In *Urban Stormwater Management in the United States*, NRC states that the quality of stormwater from urbanized areas has been well-characterized.[232] Continuing MS4 end-of-pipe monitoring produces data of limited usefulness because of a variety of shortcomings (as detailed in the report). The NRC strongly recommends[233] that MS4 programs modify their evaluation metrics and methods to include biological and physical monitoring and an increased emphasis on watershed scale analyses to ascertain what is actually going on in receiving waters, much like what is required in the permit. Further, NRC finds that biological assessments respond to the range of non-chemical stressors identified as being important in urban waterways including habitat degradation, hydrological alterations, and sediment and siltation impacts, as well as to the influence of nutrients and other chemical stressors where chemical criteria do not exist or where their effects are difficult to measure directly (e.g., episodic stressors).

Prior to the current Permit, Permittees completed substantial biological and physical creek status monitoring to evaluate MS4 impacts on streams. Continuing creek status monitoring will not generate substantial new actionable information. Baseline monitoring of all creeks has been completed and there is no near-term expectation for change. Consideration of additional or updated biological and physical monitoring will be relevant in future permit terms to evaluate long-term management actions that would cause a measurable change in creek conditions. Creek status monitoring and the associated stressor source Identification monitoring have been replaced in the current Permit with LID systems and trash control effectiveness monitoring, which are high priorities due to the high benefit costs of those actions, and more specific and near-term relevant pollutants of concern receiving water monitoring requirements.

U.S. EPA Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits notes that:

> *…storm water monitoring can be conducted for two basic reasons: 1) to identify if problems are present, either in the receiving water or in the discharge, and to characterize the cause(s) of such problems; and 2) to assess the effectiveness of storm water controls in*

[232] National Research Council. 2008. Urban Stormwater Management in the United States.

[233] U.S. EPA has endorsed the NRC's recommendation (See, e.g., EPA's District of Columbia MS4 Permit No. DC0000221 Fact Sheet, 2011.).

reducing contaminants and making improvements in water quality.

Permit Provision C.8 satisfies these two objectives by requiring monitoring that will provide Permittees with sufficient data to pinpoint sources of pollutants and assess the effectiveness of efforts to reduce pollutants, both at the source and in receiving waters.

C.8-6 The Water Quality Monitoring Provision is intended to provide answers to fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, management questions that include the following:

(1) Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?

(2) What is the extent and magnitude of the current or potential receiving water problems?

(3) What is the relative urban runoff contribution to the receiving water problem(s)?

(4) What are the sources of urban runoff that contribute to receiving water problem(s)?

(5) Are conditions in receiving waters getting better or worse?

(6) What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time?

(7) What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance?

C.8-7 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Water Board staff requested major permit holders in the region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program (RMP), which produces world-class datasets on estuarine

contaminants.[234] The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. Because the RMP monitors waters in each Permittee's jurisdiction and gathers data on the pollutants controlled in this Permit, the Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-8 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Boards, and to coordinate with other monitoring programs. Provision C.8 contains a framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources. In working cooperatively with SWAMP, Permittees can develop a monitoring program that evaluates waters in its jurisdiction and gathers data on each of the pollutants of concern discussed in this Permit.

C.8-9 In 1998, BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[235] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> *BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.*

In a prior permit, Permittees were given the option to implement this same concept by forming a regional monitoring collaborative, which they did. In conducting some of the monitoring required in this Provision, the Regional Monitoring Collaborative (RMC) provides efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level on behalf

[234] https://www.sfei.org/programs/sf-bay-regional-monitoring-program

[235] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

of all Permittees. Further benefits are expected as more monitoring requirements are fulfilled through the RMC.

C.8-10 This Permit includes monitoring requirements to ensure compliance with adopted TMDL WLAs and to provide data needed for TMDL implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-11 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local water bodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to achieve the following:

- Promote cost savings through economies of scale and eliminate redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality; and
- Simplify reporting.

In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

C.8.b. Monitoring Protocols and Data Quality. CWA regulations (40 CFR 122.41(j)(1)) require that data submitted pursuant to a NPDES permit meet certain quality standards. To achieve this, and to obtain data of known quality that can be compared to data collected in other California urban creeks, the permit requires monitoring data be collected and analyzed in accordance with the SWAMP Quality Assurance Project Plan and Standard Operating Procedures or U.S. EPA methods. The BASMAA Regional Monitoring Coalition's Creek Status Monitoring Program Quality Assurance Project Plan (January 2014) and Standard Operating Procedures (January

2014) have been deemed to be SWAMP comparable. These two BASMAA documents may be updated to reflect the changing state-of-the-science with Executive Officer's approval.

C.8.c. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.c requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the RMP. Provision C.8.c requires such monitoring to continue. The monitoring conducted through the RMP is an important component of determining compliance with receiving water limit (RWLs) in the MRP, and this monitoring complements the tributary-focused RWL and other monitoring required in Provision C.8 along with the tracking and accounting of required Permittee control actions.

RMP monitoring includes both wet season and dry season data collection in San Francisco Bay water, sediment, fish, shellfish, and birds. The analytes monitored in these media provide a comprehensive assessment of water quality in the estuary. Data are collected both in the sub-tidal (deeper) region as well as the shallow areas of the Bay where tributaries (many influenced by urban runoff) enter the Bay. The contaminant concentrations in Bay water, sediment and biota integrate all sources of contaminants (e.g., urban runoff, atmospheric deposition, wastewater treatment). Comparison of RMP data to water quality objectives allows water quality managers to determine if RWLs are achieved in the ultimate receiving water, San Francisco Bay.

C.8.d. Low Impact Development (LID) Monitoring. LID Monitoring is intended to measure compliance and effectiveness of LID implementation. It will improve the understanding of the following two management questions (which are repeated in Finding C.8-6 above) related to the implementation of LID controls:

(1) What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time?

(2) What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance?

The purpose of the first management question is to confirm that Permittees' LID controls are functioning as expected over time. Perhaps some design variations provide greater performance than others. The purpose is not only to compare relative performance between different types of MRP Permittee controls but also to compare their performance against the publicly-available databases of LID performance data, such as

those of the International Stormwater BMP Database[236] and SCCWRP's California BMP Effectiveness Calculator.[237]

The purpose of the second management question is straightforward: to assess whether LID controls that receive relatively insufficient O&M perform relatively poorly compared to LID controls that receive relatively sufficient O&M, which will directly inform management actions (such as, what O&M activities to perform, and how much of it to perform how frequently).

The Permittees are required to submit LID Monitoring Plans subject to review by a Technical Advisory Group and Executive Officer approval during the first year of the Permit term, detailing how exactly they will answer these two management questions, guided by the confines and structure of Provision C.8.d.i which describes what must be included in the LID Monitoring Plans, Provision C.8.d.ii which outlines a process for ongoing Regional Collaboration, Provision C.8.d.iii which outlines the Methods to be used to answer the Management Questions, and Provision C.8.d.iv which prescribes the Parameters that must be sampled and analyzed as well as the sampling Intensities. Once their LID Monitoring Plans have been approved or conditionally approved, the Permittees will begin implementing them by no later than the beginning of the second Water Year to occur during the Permit term, which is October 1, 2023. LID Monitoring during the first Water Year of the Permit term is not required because Permittees will need that time to develop their LID Monitoring Plans.

C.8.d.i. This Provision sets forth the minimum contents of the LID Monitoring Plans to ensure that they are properly designed to address the two management questions and to implement the requirements in Provisions C.8.d.iii-v. Executive Officer approval will ensure the LID Monitoring Plans conform to Provision C.8.d's requirements.

C.8.d.ii. Regional Collaboration requires the Permittees to form a Technical Advisory Group (TAG) to review and make recommendations on the drafting of the LID Monitoring Plans so that they are scientifically sound, and to ensure that the Permittees' sampling and analytical methodologies are regionally consistent. To further this, Water Board staff and impartial science advisors (e.g., SFEI, SCCWRP) may participate in the TAG. As the approved or conditionally approved LID Monitoring Plans are implemented, it is necessary for the TAG to provide ongoing feedback because LID Monitoring is new and therefore may need adjustments and ongoing improvements to (and adaptive management of) study design and methodology in real time during the Permit term. Impartial science advisors participating in the TAG will support these needs and will also provide feedback on lessons learned from LID Monitoring as it occurs, which will culminate in recommendations for changes to the LID Monitoring in the subsequent Permit. This Provision requires that the Permittees submit the draft LID Monitoring Plans to the TAG by March 1, 2023, so that the TAG can provide feedback, and so that

[236] https://bmpdatabase.org/get-data

[237] https://sccwrp.shinyapps.io/bmp_eval/

the Permittees can incorporate that feedback, before the final LID Monitoring Plans are required to be submitted to the Water Board for Executive Officer approval (or conditional approval) by May 1, 2023, pursuant to Provision C.8.d.vi.

C.8.d.iii. Methods describes the methods that, when implemented by the Permittees, will address the LID Monitoring Management Questions. Permittees are required to use automated samplers to collect flow-weighted composite EMCs (time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites), simultaneously at both the inlet and outlet of each control/site (this is needed to calculate both geomean and percent reduction), because this will generate the highest quality data, and because this is the same data type as the data in the databases used to perform the power analysis (see below). Flow- or time-weighted composite EMCs involve the collection of a sample aliquot at a certain increment of flow passing through the monitored orifice, or at a certain increment of time, which is then added to a storage container to form a single composite sample. These are explained in greater detail, including different types of flow-weighted composite EMC methodologies (e.g., volume proportional to flow rate, volume proportional to flow volume increment, and time proportional to flow volume increment), in the International Stormwater BMP Database's 2009 monitoring guidance document.[241] Because this method is required, flow data can be collected using the same automated samplers.

C.8.d.iv. Parameters and Intensities defines the parameters that are fundamental to characterizing the pollutant and hydrologic mitigation that LID facilities, systems, components and design variations provide. There are two types of parameters, those that are required and those that are optional. The required parameters are: Total Hg, Total PCBs, TSS, PFAS, TPH, Total and Dissolved Copper, Flow, Total Hardness, and pH. The optional parameters are: Other Emerging Contaminants (e.g., microplastics and 6PPD-quinone) and Other Ancillary Parameters. Other Ancillary Parameters may include, but are not limited to: zinc (and other metals), temperature, conductivity, polycyclic aromatic hydrocarbons (PAHs), turbidity, pathogens (FIB), total organic carbon (TOC), dissolved organic carbon (DOC), pesticides of concern to water quality (e.g., pyrethroids, fipronil and its degradants, and neonicotinoids such as imidacloprid),[238] major cations (Ca, Mg, Na, K), and major anions (SO_4, Cl). These parameters are typically found in and are of particular concern for urban stormwater discharges within the Permittees' jurisdictions. The LID Monitoring Plans must implement monitoring for the required parameters.

The LID Monitoring Plans may or may not implement monitoring for the optional parameters at each site, for example, depending on whether they will inform the relevant LID Monitoring Management Questions, and whether they are appropriate for a given site due to the characteristics of the tributary drainage area. Characteristics that

[238] And other pesticides of concern to water quality, listed in Provision C.9, Pesticides Toxicity.

Permittees may consider include soil type, land use, types and loading from actual and potential sources of stormwater pollution (e.g., IGP sites and traffic loading), existing management actions and stormwater controls (both natural and engineered), and imperviousness.

Provision C.8.d.iv also specifies the minimum total number of sample events that must be collected during the Permit term as well as the minimum number of sample events that must be collected annually. The minimum annual samples are set at a level that ensures satisfactory annual progress towards the total number of required sample events, that ensures a certain minimum frequency of data collection which is important for the quality of the dataset, but that also allows for additional flexibility and cost savings by Permittees in their planning of sample events.

The total number of samples events are based on power analysis. Water Board staff utilized a method from Helsel (2020)[239] to compute the power of a nonparametric test of differences between geometric means of two distributions. Water Board staff adapted an R script (power.WMW from Chapter 13) provided on a website[240] providing supporting material for Helsel (2020). For more information on the method, please see Chapter 13 of Helsel (2020). The existing data were for total copper (combined data from SCCWRP California BMP Effectiveness Tracker and the International Stormwater BMP Database), TSS (International Stormwater BMP Database), TSS (SCCWRP California BMP Effectiveness Calculator) and Dissolved Zinc (SCCWRP California BMP Effectiveness Calculator). No data filtering was performed on these data (which possibly include outliers and instances where input:output is < 1). No transformations of the data were required because the nonparametric method does not require the data to be normally distributed.

The power analysis runs a series of t-tests to estimate how many sample events of the Permittees' LID BMPs during MRP 3 would need to be collected to determine whether such BMPs – and to the extent that those BMPs are a representative sample of the population of LID BMPs in the region, then this may be extrapolated to that regional population – belong (statistically) to the data population represented by the existing data in the databases of the International Stormwater BMP Database and the SCCWRP California BMP Effectiveness calculator.

The null hypothesis is that the geomean of the Permittees' sample data is the same as the geomean of the population of the databases, and the alternative hypothesis is the converse. A significance level and power level are specified, which are recommended as 5% and 80%, respectively, by the International Stormwater BMP Database's 2009

[239] Helsel, D.R., Hirsch, R.M., Ryberg, K.R., Archfield, S.A., and Gilroy, E.J., 2020, Statistical methods in water resources: U.S. Geological Survey Techniques and Methods, book 4, chap. A3, 458 p., https://doi.org/10.3133/tm4a3.

[240] https://www.sciencebase.gov/catalog/item/5bf30260e4b045bfcae0c205

monitoring guidance document.[241] The significance level is the probability (5%) of incorrectly rejecting the null hypothesis, and 100% percent minus the power level of 80% is the probability that a significant change will be overlooked (i.e., 20% chance that the null hypothesis will not be rejected when it should have been).

Next, the power analysis explores how many sample events are needed to reject the null hypothesis for a given magnitude of difference in the geomeans, for a given power level, using different combinations of a sample event size and the difference to detect.

For each dataset that is tested, the geomean of the performance ratios (input:output) of each sample event is calculated, which consists of a flow-weighted (or time-weighted) composite event mean concentration (EMC) taken simultaneously at an inlet and outlet of a particular bioretention cell, for a particular storm event.

Flow- or time-weighted composite EMCs involve the collection of a sample aliquot at a certain increment of flow passing through the monitored orifice, or at a certain increment of time, which is then added to a storage container to form a single composite sample. These are explained in greater detail, including different types of flow-weighted composite EMC methodologies (e.g., volume proportional to flow rate, volume proportional to flow volume increment, and time proportional to flow volume increment), in the International Stormwater BMP Database's 2009 monitoring guidance document.[241] These are the sample collection methodologies used for the data in the two aforementioned databases, and they are as well what the Permittees are required to use pursuant to Provision C.3.d.iii.

After the distributions (principally, the geomean) of the performance ratios of each sample event in a dataset are calculated, the power analysis tests for the differences between that ratio of the geometric mean of the database data to the geometric mean of the future to-be-collected data, where each such geometric mean is the geometric mean of the ratios of input:output ratios for each sample event.

For each number of total sample events to be collected over the five-year permit term (e.g., 10, 15, 20, 25…), this produces a range at 80% power, which if the geomean of future sample events falls within that range, would confirm the null hypothesis. The upper and lower bounds of the range are the ratios of the future geomean (of input:output ratios) to the database geomean (of input:output ratios); geomeans closer to the upper bound represent overperformance relative to the distribution of the database, while geomeans closer to the lower bound represent underperformance relative to the distribution of the database. In the center of the range, where the ratio of future geomean to database geomean = 1, their performance is identical. Each range represents a given number of sample events, and the range constricts incrementally as the number of sample events increases. What that translates to is that, as the number

[241] https://bmpdatabase.org/monitoring

of sample events increases, it is less likely to incorrectly affirm the null hypothesis, though there are diminishing returns, which is discussed next.

The next step in power analysis involves assessing diminishing returns in the constriction of the geomean ranges with increasing numbers of sample events. For example, whereas an increase in sample events from N=10 to N=100 would correspond with a very large constriction in the lower and upper bounds of the geomean ratio (performance) range, an increase in sample events from N=100 to N=110 would correspond with a dramatically lesser constriction.

For the TSS, Copper and Zinc data that were tested, the sweet spot for the number of water quality sample events to be collected during the upcoming Permit term is N=30. However, N=25 has a significant but relatively acceptable consequence with respect to the size of the geomean range (particularly for the TSS data from the International Stormwater BMP Database) relative to N=30, and therefore it has been used as a modest reduction in effort (from N=30 down to N=25) for the ACCWP, CCCWP, SCVURPPP, and SMCWPPP Permittees. Above N=30, successive constrictions in the geomean range suffer increasingly dramatic diminishing returns. Below N=25, the opposite is true because the geomean range becomes much larger, and therefore the efficacy and utility of the monitoring program drops off dramatically.

Following are the tabular data and visualizations for each of the four datasets that were produced by the power analysis. Diminishing returns can be visualized as the point at which the slope of the rate of change in geomean range (x-axis = number of sample events; y-axis = change in geomean range), starts to flatten out as it approaches a horizontal asymptote.

International Stormwater BMP Database, TSS

N	GM ratio		Future GM	
	low	high	low	high
10	0.174	5	0.858864	24.68
15	0.248	4.026	1.224128	19.87234
20	0.302	3.306	1.490672	16.31842
25	0.344	2.905	1.697984	14.33908
30	0.378	2.645	1.865808	13.05572
50	0.468	2.137	2.310048	10.54823
100	0.573	1.743	2.828328	8.603448

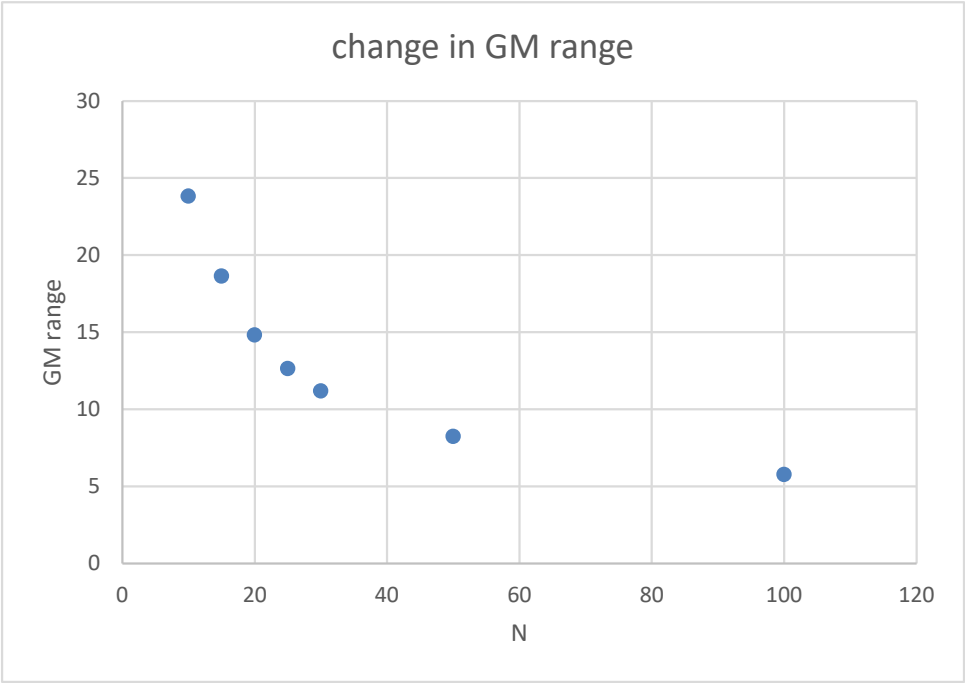

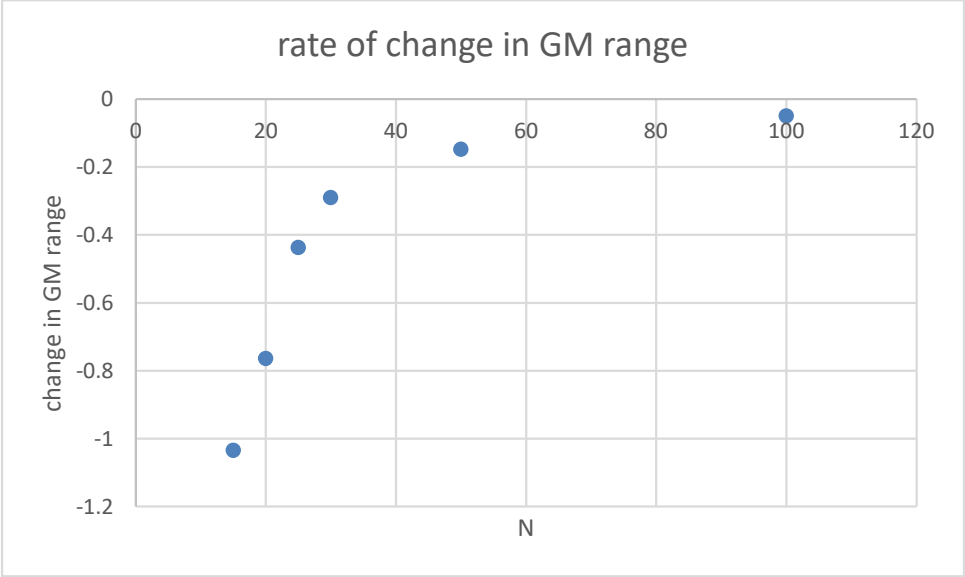

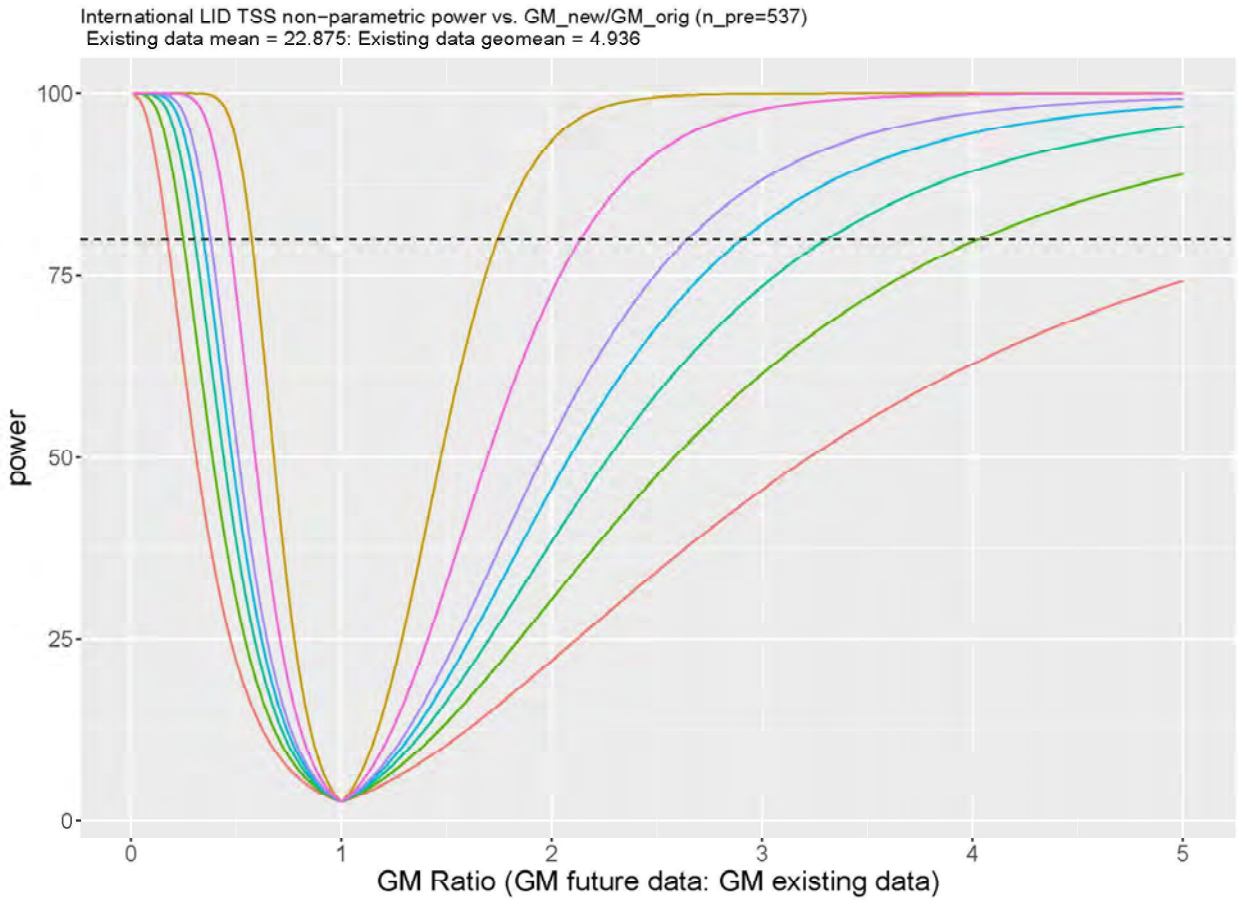

SCCWRP California BMP Effectiveness Calculator, TSS

N	GM ratio		Future GM	
	low	high	low	high
10	0.222	4	4.189584	75.488
15	0.29	3.442	5.47288	64.95742
20	0.334	2.991	6.303248	56.44615
25	0.365	2.735	6.88828	51.61492
30	0.389	2.57	7.341208	48.50104
50	0.445	2.246	8.39804	42.38651
100	0.498	2.005	9.398256	37.83836

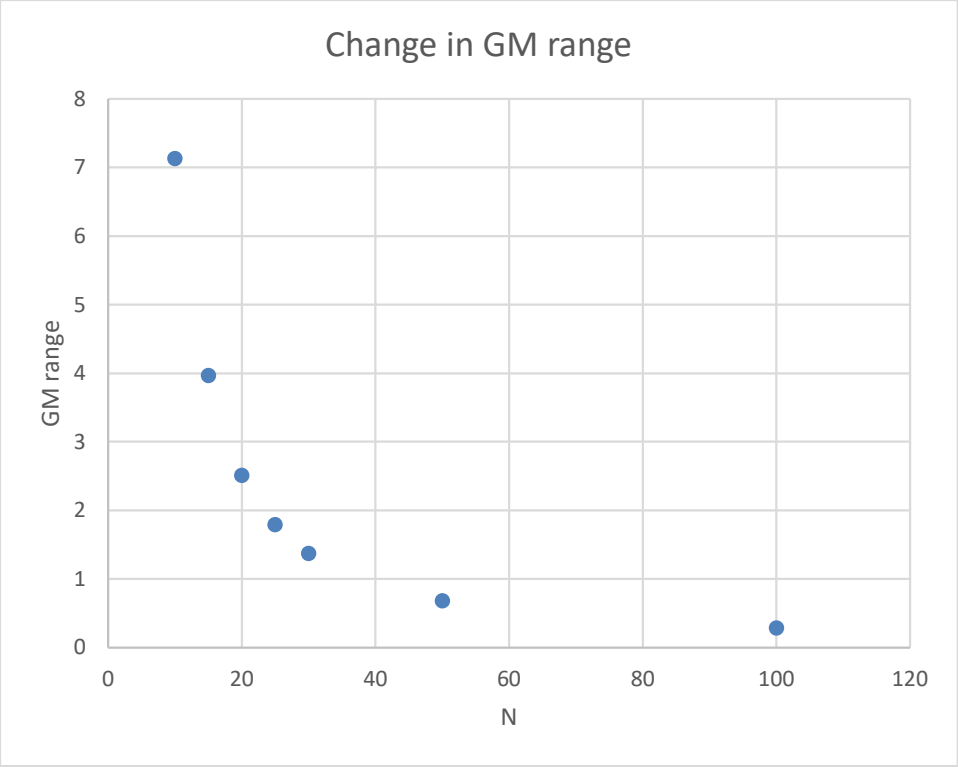
Change in GM range
GM range
N
0
1
2
3
4
5
6
7
8
0
20
40
60
80
100
120

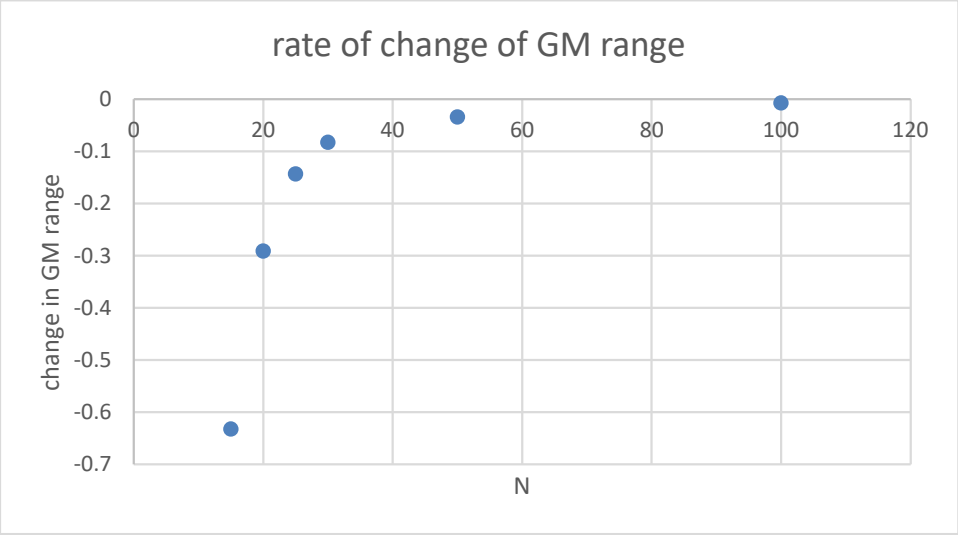
rate of change of GM range
change in GM range
N
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
0
20
40
60
80
100
120

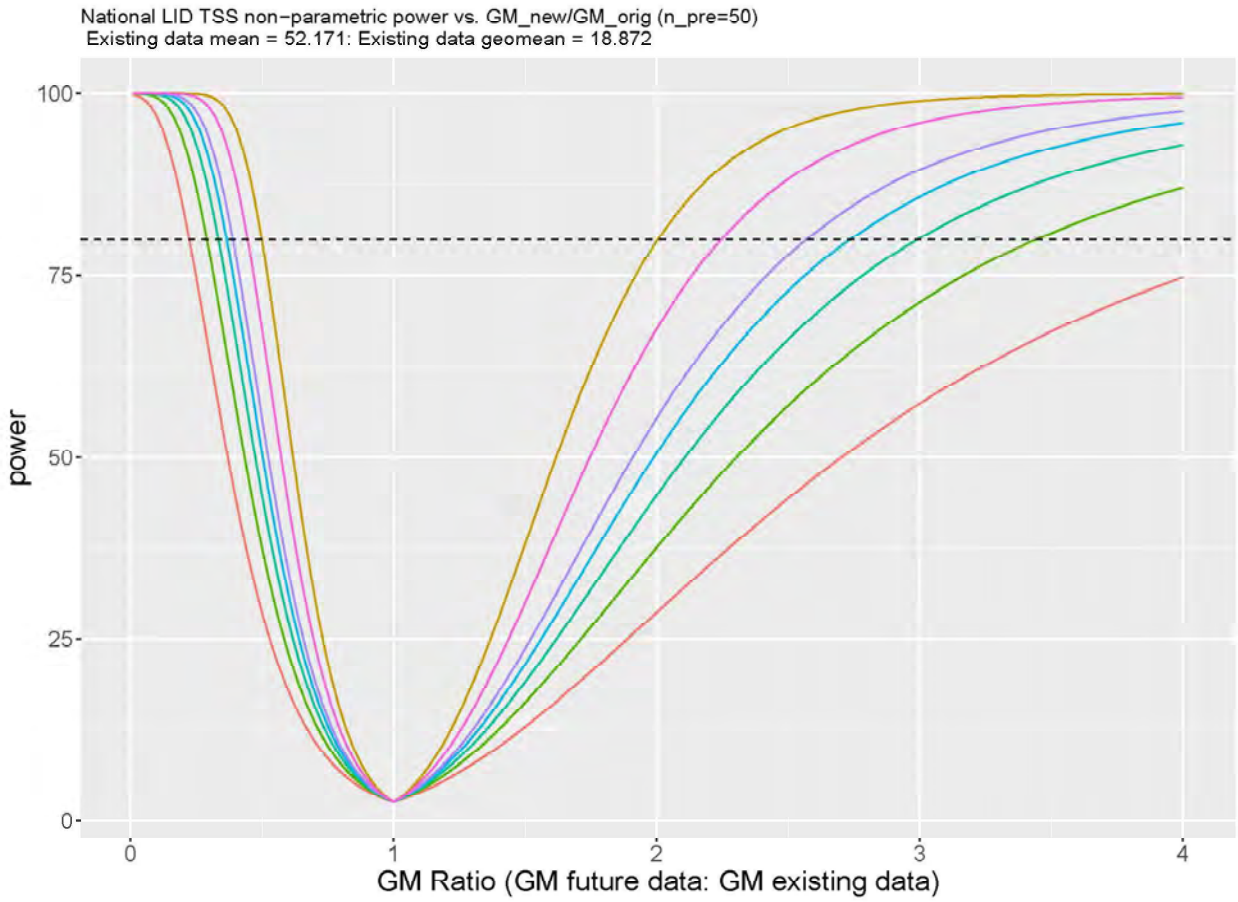

SCCWRP California BMP Effectiveness Calculator, Dissolved Zn

N	GM ratio		Future GM	
	low	high	low	high
10	0.316	3.165	1.54524	15.47685
15	0.365	2.741	1.78485	13.40349
20	0.392	2.552	1.91688	12.47928
25	0.409	2.445	2.00001	11.95605
30	0.421	2.376	2.05869	11.61864
50	0.446	2.243	2.18094	10.96827
100	0.466	2.146	2.27874	10.49394

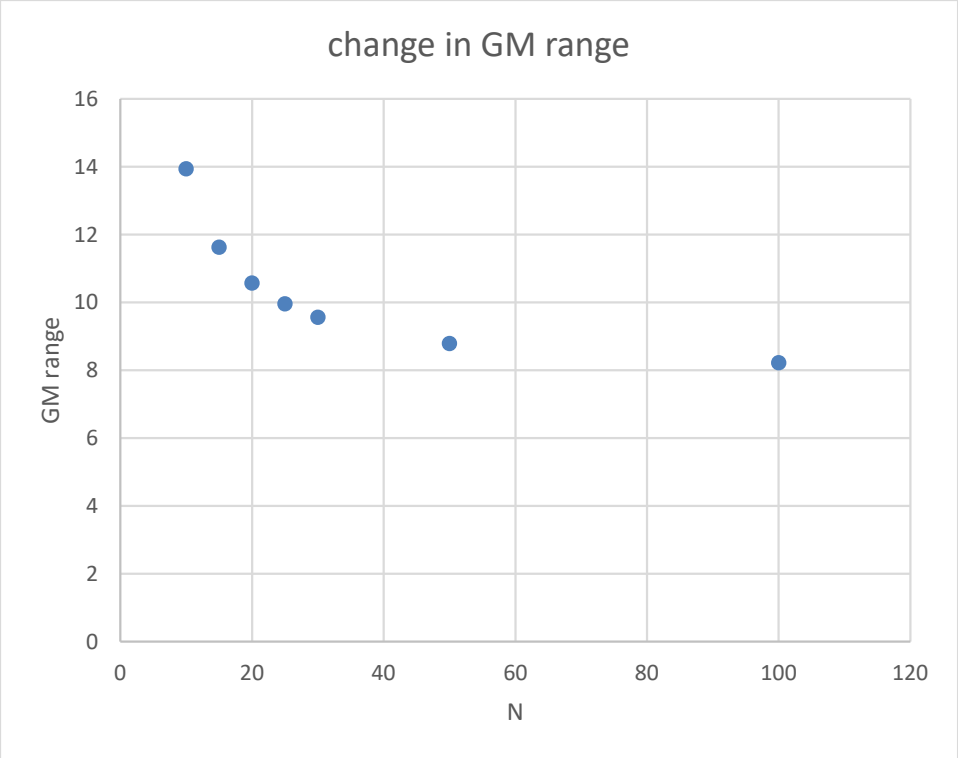
change in GM range
GM range
N
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120

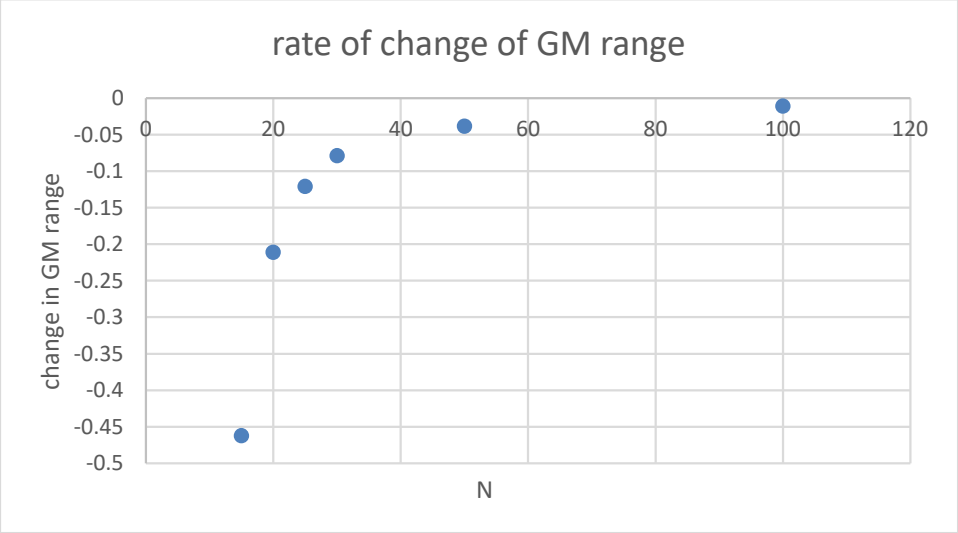
rate of change of GM range
change in GM range
N
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-0.4
-0.45
-0.5
0
20
40
60
80
100
120

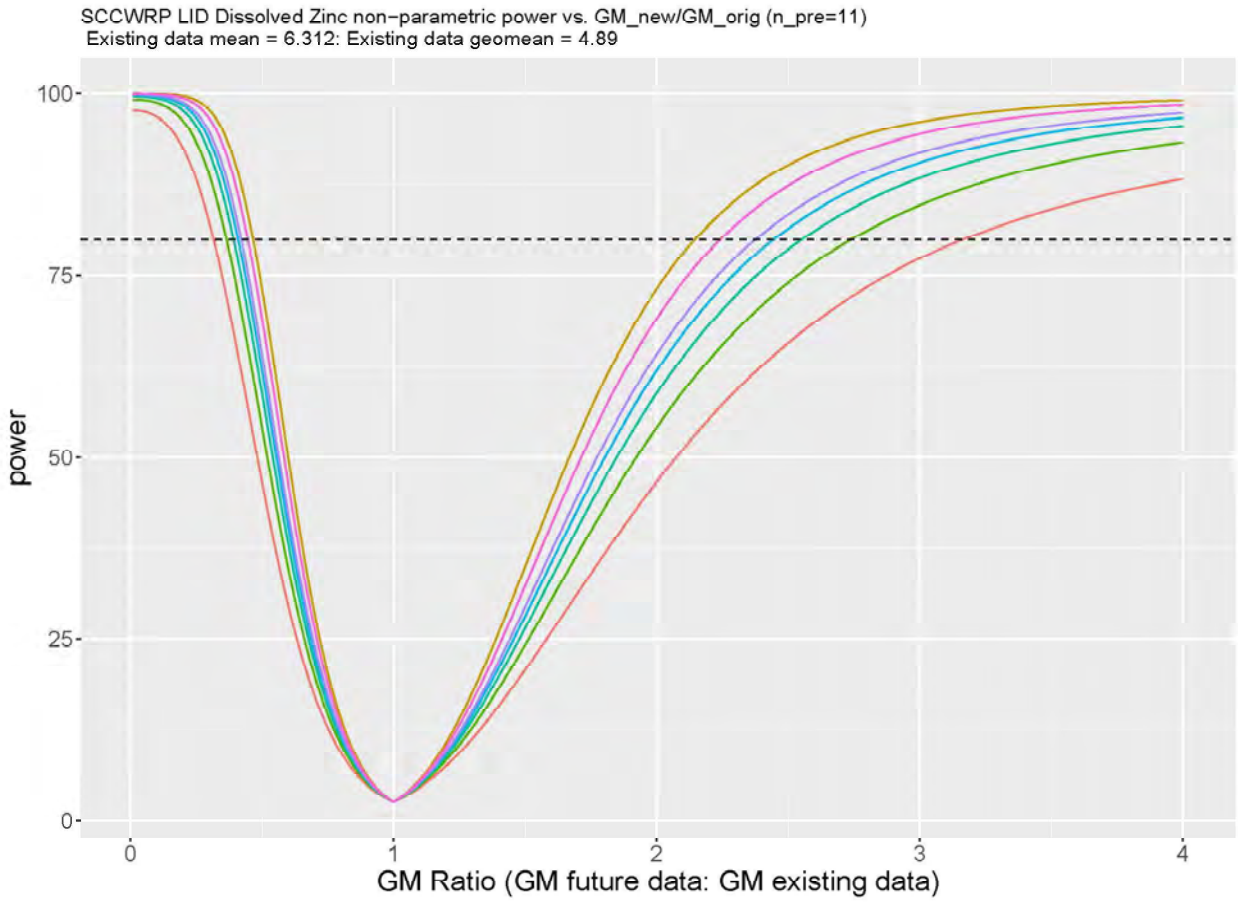

International Stormwater BMP Database & SCCWRP California BMP Effectiveness Calculator, Total Copper

N	GM ratio		Future GM	
	low	high	low	high
10	0.496	2.014	2.346576	9.528234
15	0.56	1.785	2.64936	8.444835
20	0.597	1.673	2.824407	7.914963
25	0.623	1.606	2.947413	7.597986
30	0.641	1.561	3.032571	7.385091
50	0.681	1.468	3.221811	6.945108
100	0.717	1.394	3.392127	6.595014

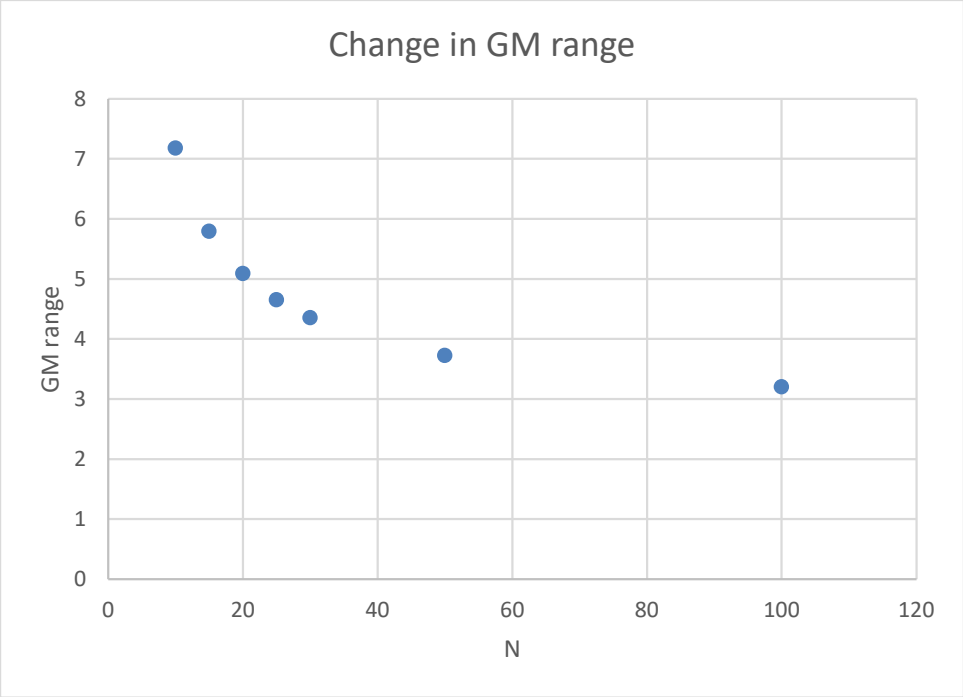
Change in GM range
GM range
N
0
1
2
3
4
5
6
7
8
0
20
40
60
80
100
120

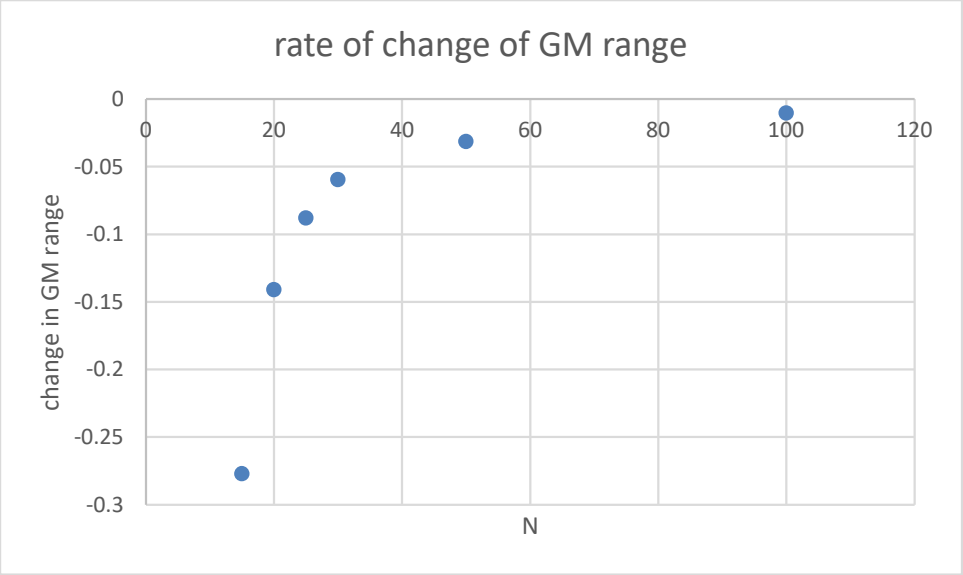
rate of change of GM range
change in GM range
N
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
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40
60
80
100
120

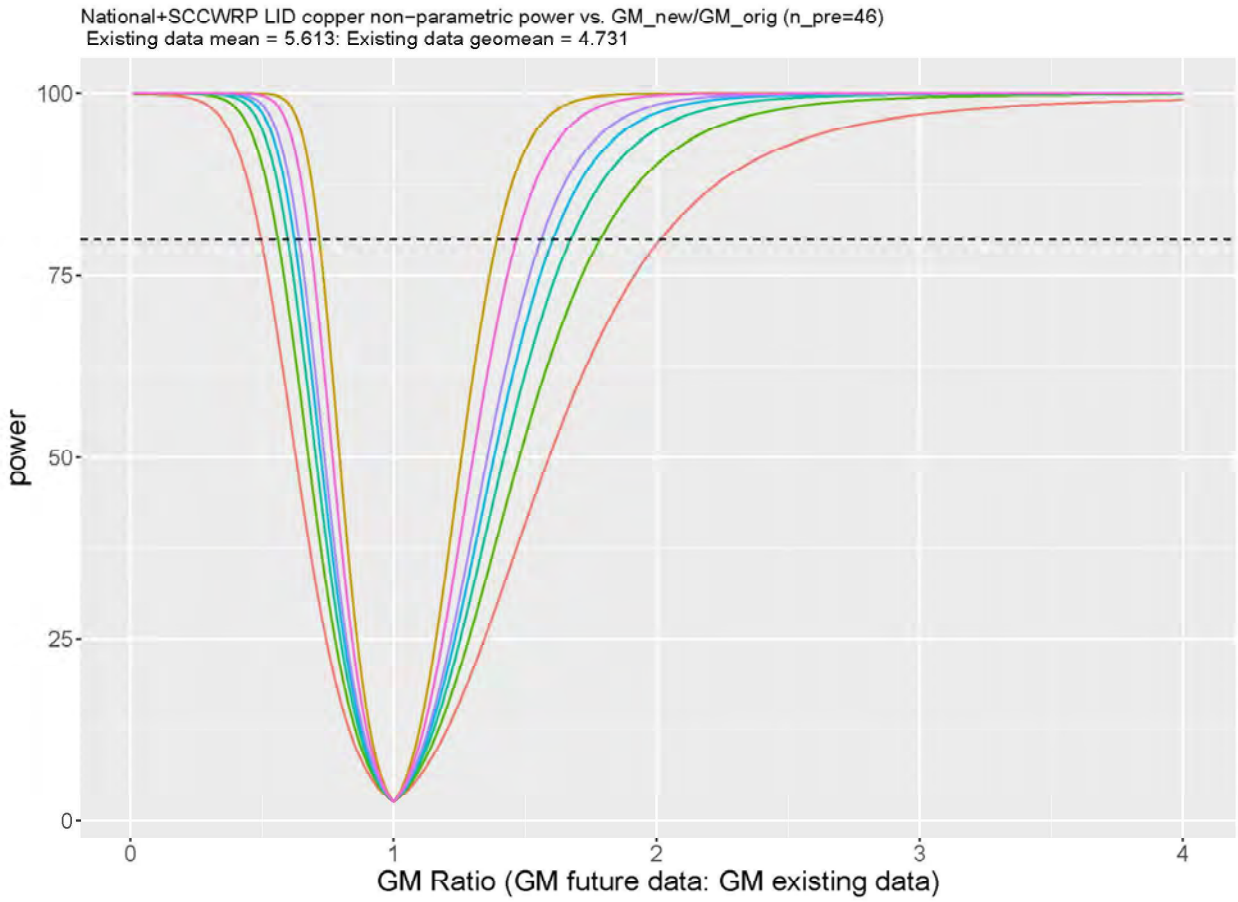

C.8.d.v. Implementation Level requires the Permittees to begin implementing their LID Monitoring Plans by no later than October 1, 2023, which is the beginning of the 2024 Water Year, the second Water Year of the Permit term. This start date provides five months from the submittal date of the final LID Monitoring Plans (May 1, 2023) for the Water Board to approve or conditionally approve the final LID Monitoring Plans, and will allow the Permittees sufficient time after that approval or conditional approval to prepare to monitor storm events starting in the 2024 Water Year, including the first storm event of that wet season.

C.8.d.vi. Reporting requires the Permittees to submit their LID Monitoring Plans to the Water Board, subject to Executive Officer approval, by no later than May 1, 2023. This is two months after the March 1, 2023, required submittal date of the LID Monitoring Plans to the TAG, which will provide the Permittees sufficient time to make changes to their LID Monitoring Plans based on feedback from the TAG, prior to the submittal date to the Water Board. As explained for Provision C.8.d.v above, it will also provide five months for the Water Board to approve or conditionally approve the LID Monitoring Plans, and subsequently for the Permittees to incorporate any changes including in any conditional approvals, and to prepare to begin implementing their LID Monitoring Plans, prior to the October 1, 2023, LID Monitoring start date.

C.8.e. Trash Monitoring. Trash monitoring at MS4 outfalls or adjacent receiving waters provides a viable method to determine whether control actions implemented by Permittees (full trash capture systems or the implementation of other management actions equivalent to full trash capture) have been effective in preventing trash from discharging to receiving waters. Additionally, trash monitoring can be used to determine whether additional actions may be necessary and associated with sources within a Permittee's jurisdiction. Trash monitoring can also inform whether direct (non-MS4) discharges of trash are causing and/or contributing to adverse trash impacts in the receiving water(s).

The purpose of this trash monitoring is to answer the following management questions and monitoring questions:

Management Questions

- Have Permittees' trash control actions effectively prevented trash within Permittees' jurisdiction from discharging into receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?

Monitoring Questions

- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

There are currently no regulatory standard methods and protocols for monitoring trash exiting (or traveling through) MS4 outfalls/pipes or in receiving waters. However, there are numerous examples of trash capture devices attached to the end of MS4 outfall pipes, and "in-line" trash capture devices which are within the MS4 prior to discharge into a receiving water (e.g., hydrodynamic separators), and if such monitoring sites satisfy all other criteria included in Provision C.8.e (namely, that the tributary drainage areas are already controlled to the Low trash generation level), then it is reasonable that such devices can be used to monitor trash loading, simply by cleaning them out prior to the sample event, then performing a maintenance event after the sample event. For example, the vendor Stormwater Systems cites uses of such trash capture (monitoring) systems in Carrolton, Texas at Josey Ranch Lake, St. Louis, Missouri, and the Anacostia River Watershed in Maryland.[242] There are many other examples of

[242] https://stormwatersystems.com/stormx-netting-trash-trap/

implementation of end-of-pipe and in-line systems, such as The Sock in the City of Kwinana, south of Perth, Australia,[243] the TrashTrap in Oxnard, CA, and in Narragansett Bay, RI,[244] Los Angeles County,[245] a large device controlling flows from a pump station prior to discharge into San Francisquito Creek and the Bay in the City of East Palo Alto,[246] HDS units in the Cities of Livermore and Vallejo, and others. The San Francisco Estuary Partnership implemented, tested, and monitored 42 high-capacity trash control devices (both end-of-pipe and in-line) in more than 60 Bay Area municipalities, in a project that concluded in November 2013, many of which could be adapted as trash monitoring systems if they satisfy the other criteria included in Provision C.8.e.[247] Here is a presentation that includes lessons learned for implementation in Philadelphia, PA (knowing the stormwater outfalls was an important consideration): https://delawareestuary.s3.amazonaws.com/pdf/Summit15/BallA/W-O'DayDel_Summit_Monit_Stormwater_Trash.pdf. Regarding in-stream monitoring, as discussed below, methods have been successfully piloted by 5 Gyres.[248] Caltrans installed trash capture devices at four trash capture pilot site locations in 2018,[249] which are examples of devices that could readily be modified and used as monitoring devices for Provision C.8.e Trash Monitoring.

In March 2017, BASMAA published a final version of a report titled “Tracking CA’s Trash: On-land Visual Assessments[17]” that was funded in part via a California Proposition 84 grant funded project (Agreement # 12-420-550). The primary objectives of this project were to: test trash trends monitoring methods for a) trash in lowing receiving waters and b) on-land visual trash assessments; evaluate the effectiveness and costs of trash control measures; and develop a web-based portal to disseminate related information. More recently, in December 2020, the San Francisco Estuary Institute published the “California Trash Monitoring Methods and Assessments

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[243] https://www.abc.net.au/news/2019-06-09/drain-sock-kwinana-pollution-solution-takes-world-by-storm/11190266?nw=0&r=HtmlFragment

[244] https://stormtrap.com/products/trashtrap/#trashtrap-Projects

[245] https://www.pw.lacounty.gov/wmd/irwmp/docs/Prop%2084%20Round%202%20Implementation%20Grant%20Application/Attachment%207%20Technical%20Justification%202%20of%2015.pdf#page=97

[246] https://www.waterboards.ca.gov/sanfranciscobay/board_info/agendas/2019/February/7b_ssr.pdf

[247] https://www.sfestuary.org/trashcapture/

[248] https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/58dd932f414fb5663b5a4f79/1490916184178/TCT+Creek+Monitoring+Report_FINAL.pdf

[249] Caltrans Site Identification Number: 4-430, Post Mile: 04-Ala-880-PM 23.73, Interchange: Davis Street, Device Type: StormTrap (FreshCreek), Construction Completion Date: 07/05/2018; Caltrans Site Identification Number: 4-431, Post Mile: 04-Ala-880-PM 16.58, Interchange: Highway 880/State Route 92, Device Type: Old Castle (KriStar), Construction Completion Date: 07/05/2018; Caltrans Site Identification Number: 4-432, Post Mile: 04-Ala-880-PM 7.37, Interchange: Mowry Avenue, Device Type: Modified Old Castle (KriStar), Construction Completion Date: 12/20/2018; Caltrans Site Identification Number: 4-433, Post Mile: 04-Ala-880-PM 6.29, Interchange: Stevenson Boulevard, Device Type: StormTrap (FreshCreek), Construction Completion Date: 12/04/2018.

Playbook."[250] The objective of this report was to create a foundation for developing a consistent, standardized approach to trash monitoring statewide. The project team identified four trash monitoring methods and then performed a method comparison analysis based on two seasons of fieldwork, culminating in numerous conclusions, including the following: some methods are more accurate than others, some methods are more subjective than others, some methods are more labor-intensive than others, and some methods are more expensive than others. Water Board staff have reviewed both of these reports and the information presented within them has been used towards developing the trash monitoring requirements of this Order.

Though we do not yet have evidence that those on-land methods are reliable indirect indicators of trash loading through MS4s and receiving waters, we think many of those methods are well-suited for characterizing on-land trash conditions, including on-land areas adjacent to MS4 outfalls and receiving waters. When combined with direct measurements of trash loading in MS4s and receiving waters, these on-land methods may help provide a synoptic view of trash loading within Permittees' jurisdictions.

Factors such as feasibility, location logistics, types of trash, complexity, and costs, provide a means for Permittees to focus and limit the number of monitoring locations while still providing spatial and temporal representativeness of the impact of implemented trash controls on the receiving water.

The Trash Monitoring program to be implemented by the Permittees during this Permit term essentially constitutes a pilot project, and the Water Board may consider expanding the scope of the program in a future Permit term by increasing the number of sites and/or events.

- **C.8.e.i. Monitoring Components** calls for the Trash Monitoring program to address the specified management and monitoring questions, and to the extent possible, requests for regional consistency in methods employed to answer those management and monitoring questions. trash monitoring method components demonstrated and implemented in the Statewide Trash Monitoring Methods Project (Trash Monitoring Playbook[250]) ensure the use of comparable data for each monitoring site. These components entail six steps which include 1) event preparation; 2) gathering standard equipment; 3) setup of the assessment area; 4) recording of site information and assessment area dimensions; 5) recording assessment areas photos; and 6) determining the location of storm drain outfalls, homeless encampments, and illegal dumping hotspots that can impact the assessment area.

  The establishment of a technical advisory group (TAG) that includes Water Board staff, Permittees, and impartial science advisors (e.g. SFEI, SCCWRP, etc.) is crucial in order to provide the necessary guidance needed to answer the

[250] https://sites.google.com/sfei.org/trash/

management questions and to provide peer review sufficient to ensure that work is appropriately science-based.

- **C.8.e.ii. Monitoring Methods** describes the monitoring methods that may be used to address the management and monitoring questions. The methods described provide flexibility with respect to siting and methodology.
- **C.8.e.ii.(1)** calls for the direct monitoring of MS4 outfalls that drain tributary drainage areas that are controlled to the Low level, via full trash capture devices, other actions verified by on-land visual trash assessments, and any combination thereof. Several possible methods are listed.
- **C.8.e.ii.(2)** calls for direct (in-stream) monitoring of receiving waters. Several possible methods are listed. It also requests (but does not require) that such monitoring be co-located with MS4 outfall sites, which (to the extent possible and realized) would help to distinguish between background levels of trash in the receiving water and the relative contribution of trash discharging through the respective MS4 outfall. This could help answer questions such as:
  - Are discharges from MS4 service areas controlled to the Low trash generation level, nevertheless, causing or contributing to adverse impacts in receiving waters?
  - Failing an adverse impact definition, how does the loading from the MS4 outfall compare to loading present in the receiving water? Is it greater or lesser by an order of magnitude?
  - How does trash loading from the sampled MS4 outfall compare to the estimated contribution of other nearby sources of trash loading to the receiving water, such as other upstream/downstream MS4 outfalls, homeless encampments, and illegal dumping sites, relative to the background level present in the receiving water?

The answers to these questions could help inform/prioritize/trigger management actions. For example, given the loading measured in a given receiving stream, perhaps an upstream MS4 outfall is a greater priority than the sampled MS4 outfall, or vice-versa.

However, recognizing that such questions are not easily answered, that the end-of-pipe/in-line and in-stream trash monitoring methods are relatively new to the Permittees, and that it is difficult to site both MS4 outfall sites and receiving water sites (not to mention the difficulty in siting them close together), co-location is not required in this Permit term.

Permittees may use methods which only partially screen and capture the cross section of a receiving water, such as the methods piloted by 5 Gyres.[248] This means they will need to extrapolate the sample to the remainder of the cross section.

Extrapolation may be more appropriate (/accurate) for channels experiencing supercritical flow (which are likely to have good mixing of trash because of the higher turbulence), which is more likely for a hardened channel. Conversely, the opposite is likely the case for natural channels. Natural channels are more likely to have subcritical flows (less turbulence) which means there will be less mixing of trash, more concentration of trash in the thalweg, and samples will be less easily extrapolated to the rest of the cross section.

- **C.8.e.ii.(3)** recommends, but does not require, the implementation of on-land methods coincident with MS4 outfall and receiving water sites. The purpose of this is to gain a synoptic view of on-land trash conditions adjacent to outfall and/or in-stream monitoring sites. However, recognizing the cost and level of effort associated with MS4 outfall and receiving water monitoring, this monitoring element is optional, as it is not as high of a priority as MS4 outfall and receiving water monitoring.
- **C.8.e.ii.(4)** requires that all trash monitoring sites additionally characterize flow rates and recommends methods that can be used.
- **C.8.e.ii.(5)** explains that all methods must include collection of data on material type collected, which is important for assessing the water quality impact caused by different types of trash because different kinds of trash may cause different types of impacts to aquatic life and may create different types of pollution.[250,251] This may additionally inform the eventual definition of no adverse impact to receiving waters, as different types of trash are likely to cause different levels of impact. Data collected on material type will also inform the Permittees' implementation of source controls and other management actions for controlling trash.
- **C.8.e.iii**. describes the minimum number of sites and monitoring events that Permittees are required to sample (and analyze) on an annual basis, which will be revised based on review by the Technical Advisory Group. Although these trash monitoring methods are not new to the world, they are relatively new to the Permittees, and therefore we do not want to overtask the Permittees while they are learning and piloting these methods. However, it is reasonable that in a future Permit term, the Water Board may consider increasing the Trash Monitoring level of effort, with cause. For example, if statistical analysis (i.e. power analysis) suggests that more sites and samples are needed to be able to assess whether data from a future monitoring program (e.g., a revised Trash Monitoring Provision in MRP 4) belongs to the same distribution as the data collected during MRP 3, MRP 2, or some other dataset, then Water Board staff will make that recommendation. Towards that end,

[251] *A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams*. San Francisco Bay Regional Water Quality Control Board, April 2007. Accessed on September 2, 2021, from: https://www.waterboards.ca.gov/sanfranciscobay/docs/swampthrashreport.pdf

Water Board staff may perform power analysis during MRP 3 on the data collected by that time, to inform, support, and justify changes to Provision C.8.e for MRP 4.

- There are two required components of monitoring, MS4 outfall monitoring and (direct) in-stream monitoring. Permittees are allotted one year of planning before they must begin MS4 outfall monitoring, and two years before they must begin in-stream monitoring, to choose monitoring sites, secure permits, and practice/refine sample methodologies. It is appropriate that they are given an additional year for in-stream monitoring (relative to MS4 outfall monitoring) because that may take more time to find sites and secure permits. The number of sites is also reduced for in-stream monitoring, because it is a pilot project, and to reduce the overall level of effort for Permittees.
- There is no minimum requirement for number of sites or events for on-land monitoring, as that monitoring component is optional (though recommended).
- Pursuant to Provision C.8.e.iii.(8), Permittees are required to use the results of Trash Monitoring to inform and investigate their trash management actions. If Trash Monitoring results indicate that discharges are causing or contributing to adverse trash impacts in receiving waters, Permittees shall implement new or enhanced actions to comply with the trash discharge prohibition and receiving water limitations. For example, if the amount of trash discharged from an MS4 outfall exceeds 5 gallons/acre/year, then that should trigger an investigation into why trash loading from that MS4 outfall is greater than expected (based on trash generation rates and controls present in the tributary drainage area), be it inadequate/poor O&M, design, and/or construction of FTCDs, short-circuiting of trash controls, or a number of other potential causes/contributors. Other examples of what might trigger Permittee investigations include the discharge of trash items that should be prohibited by credited source control ordinances, and the discharge of trash items greater than 5mm (e.g., cigarette butts) during storm events which are less than or equal to the design storm (i.e., when bypass should not be occurring). Provision C.8.e.iv.(2)(f) requires the Permittees to solicit feedback from the TAG on the implementation of Provision C.8.e.iii.(8), Provision C.8.e.v.(6) requires the Permittees to discuss in the Trash Monitoring Plan their plans for implementation of Provision C.8.e.iii.(8), and Provision C.8.h.iii.(2)(h) requires the Permittees to report on implementation of Provision C.8.e.iii.(8).
- **C.8.e.iv.** calls for formation of a Technical Advisory Group (TAG), which includes impartial science advisors (e.g., SFEI, SCCWRP, etc.) and Water Board staff, to review and provide input, feedback, and recommendations on Trash Monitoring, including site selection, methods and analyses, results, and conclusions. The TAG is also critical to determining the adequacy of the methods and minimum storm size, number of sites, events, frequencies, and intervals, and recommendations for alternatives, to answer the management and monitoring questions.

The TAG is required to meet biannually during the development of the Trash Monitoring Plan, to aid in its development. Subsequently, the TAG is required to meet at a minimum annually, which is sufficient for the TAG to – on an ongoing basis – review and provide feedback on the Permittees' implementation of Provision C.8.e. However, the TAG should meet more frequently as needed, especially during the beginning of the Permit term when the Permittees' implementation of the Trash Monitoring program is being carried out for the first time.

Among the tasks assigned to the TAG is to discuss the timing of sampling during storm events; a recent publication by the 5 Gyres Institute recommends that sampling is prioritized during the rising limb of the hydrograph, as that is when most of the trash load is mobilized through the MS4 system.[248] Another task is discussion of permitting, which is intended to help the Permittees secure permits; the TAG can strategize how best to secure permits, and can even invite participation and input from permitting agencies such as CDFW and the Corps.

- **C.8.e.v.** calls for the development and submittal of a Trash Monitoring Plan prior to the inception of trash monitoring.

  The Trash Monitoring Plan includes a requirement that the Permittees submit a monitoring schedule that includes the timing, number, and type of monitoring events at each site. Timing encompasses, but is not limited to, decisions such as at which point in the water year that storms are sampled (e.g., whether near in the beginning, middle, or end of a given water year), the time during individual storms that samples are taken (e.g., during the rising limb of the hydrograph, the peak of the hydrograph, or the falling limb of the hydrograph, which decision is influenced by factors such as the delineation of the tributary drainage area to the MS4 outfall and the time of concentration), and consideration of antecedent dry periods (trash accumulation) and timing of sampling relative to cleanup activities in the assessment area and/or in the tributary drainage area to the MS4 outfall.

C.8.f. Pollutants of Concern[252] Monitoring. Provision C.8.f. requires monitoring for the following select pollutants of concern (POC): PCBs, mercury, copper, zinc, fecal indicator bacteria and certain emerging contaminants. The emerging contaminants to be monitored have been characterized as moderate concern for the Bay (SF Bay occurrence data suggest a high probability of a low-level effect on wildlife) and are likely transported in stormwater. The monitoring requirements for these emerging contaminants will support RMP efforts to better characterize concentrations in stormwater. The PCBs and mercury TMDLs require monitoring to measure loads reduced and the progress the water body is making toward attaining water quality objectives. The Basin Plan requires Permittees to monitor copper loading to the Bay to track loading. Provision C.8.f. monitoring is intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff; provide information to support

[252] See sections C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

implementation of TMDLs and other pollutant control strategies; assess progress toward achieving wasteload allocations (WLAs) for TMDLs; assess compliance with receiving water limitations (RWLs), and help resolve uncertainties in loading estimates and impairments associated with these pollutants.

In particular, POC monitoring addresses six priority POC management information needs:

(1) Source Identification - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;

(2) Contributions to Bay Impairment - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);

(3) Management Action Effectiveness - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;

(4) Loads and Status/Trends - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and

(5) Status/Trends - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

(6) Compliance with Receiving Water Limitations – providing information to assess whether receiving water limitations (RWLs) are achieved.

The Permit specifies monitoring methods that can be used to address these information needs and which information needs apply to each pollutant of concern. The Permit provides flexibility in the number of samples, or level of effort, but requires minimums to be met annually and over the Permit term. The level of effort (expressed as required number of samples collected and analyzed) is identical to the manner in which the level of sampling and analysis effort for pollutants of concern monitoring was specified in the Previous Permit.

The approach for POC monitoring does not pre-determine specific monitoring locations. Rather, the Permit requires that monitoring be intelligently and flexibly directed toward answering the management information needs (that apply to a given pollutant), and this flexibility allows the monitoring strategy to be adapted and improved based on information obtained from monitoring conducted early in the Permit term. The flexibility also allows the Permittees to continue collecting useful information even during drought years in which conditions limit some types of data collection (e.g., storm event sampling) but not others (e.g., collection of bed sediment). In fact, bed sediment data collected at all times of the year offers a valuable and efficient means of locating source areas and characterizing contamination in watersheds. During storm events of sufficient

intensity, the pollutants attached to sediment are mobilized and transported from source areas, but some of this contaminated sediment is often deposited near the source area so there is a “fingerprint” of the source that can be detected through sampling this bed sediment.

It is impractical to sample all of the urban runoff outfalls in the region. Monitoring at outfalls can provide valuable information and be an important component of an overall pollutants of concern monitoring strategy. For example, strategic outfall sampling for pollutants of concern is necessary to identify source areas and contaminated portions of watersheds near the outfalls (to support control measure implementation). However, these outfall data (obtained at great expense) cannot address all management information needs for pollutants of concern. By strategically sampling the sediment and water column, the Permittees can better address the six information needs stated above.

There are two components that address assessing compliance with RWLs (sixth management information need). First, Provision C.8.e requires receiving water monitoring in the San Francisco Estuary, which is conducted through the RMP. The RMP monitoring provides a comprehensive assessment of water quality in the estuary. San Francisco Bay is the ultimate receiving water for the tributaries in the region. The contaminant concentrations in Bay water, sediment and biota thus represent an integration of all the sources of contaminants (e.g., urban runoff, atmospheric deposition, wastewater treatment). Comparison of RMP data to water quality objectives allows water quality managers to determine if RWLs are achieved in the ultimate receiving water, San Francisco Bay. The RMP monitoring in San Francisco Bay includes both wet season and dry season data collection in water, sediment, fish, shellfish, and birds. The suite of analytes monitored in these media adaptively change over time in response to available information about evolving water quality threats. For example, initial RMP efforts in the early 1990s focused on metals contamination. Improvements in wastewater treatment and banning lead from gasoline led to sharp declines in Bay metals concentrations. Accordingly, the RMP adapted to focus more attention on mercury, PCBs, organic contaminants and, today, a wide range of emerging contaminants. However, the program continues to monitor for many metals to maintain appropriate surveillance and monitor for trends. Thus, the RMP provides valuable information on a large number of pollutants that can be used to assess compliance with RWLs at the level of San Francisco Bay.

The second component of RWL monitoring is required through Provision C.8.f and C.8.h.iv and is focused on tributaries to the Bay, which are directly influenced by discharges from MS4s.This monitoring will consist of sampling during the wet season (primarily) and dry season to generate water quality data to assess compliance with RWLs. Because it is not possible to sample all waterbodies in the region, waterbodies will be selected to be representative of the range of waterbody types in the region. It is also not possible to collect data at all times and locations in a waterbody so sampling

locations in this subset of waterbodies will be selected to obtain water quality data spatially and temporally representative of the water bodies being sampled.

It is also not possible to sample for every one of the thousands of possible analytes. It would be an expensive and even impossible undertaking to monitor for all possible analytes, and not a good use of resources. Monitoring should be focused on those pollutants for which there is a reasonable risk of an exceedance of applicable water quality objectives and for which stormwater discharges cause or contribute to such exceedances. Table 8.2 in Provision C.8.f contains a list of candidate pollutants to monitor, but the Water Board, at present, lacks reliable and comprehensive information to determine the suite of analytes for tributary-focused monitoring to assess RWLs. Accordingly, the waterbodies to sample, the locations in those waterbodies, and the full list of analytes to quantify will be specifically determined, based on criteria set forth in the permit, through a report required by Provision C.8.h.iv(2).a due no later than March 31, 2023. Requiring focused pollutant monitoring based on water quality impacts is consistent with the monitoring approach used in NPDES permits for wastewater. The report required under Provision C.8.h.iv(2).a requires Permittees to use existing information to identify the suite of analytes that have the potential to exceed water quality objectives. Sources of information relevant for identifying candidate analytes include RMP data, monitoring data collected in Bay Area tributaries through the MRP and other programs. If local RMP or tributary monitoring data are not available, Permittees should review monitoring data collected in tributaries in other urban areas as well as relevant information from the literature. Once the report is approved by the Executive Officer for compliance with the requirement and technical adequacy, Permittees will then execute the monitoring specified in the report for the representative waterbodies in a manner to collect temporally and spatially representative data and report these data under Provision C.8.h(ii) (Electronic Reporting) and in the Integrated Monitoring Report required by Provision C.8.h.v.

Pollutants of concern broadly, and PCBs and mercury in particular, present special challenges for the design of an effective management strategy because they are widely distributed in the urban landscape, and they are transported to receiving waters on sediment particles mobilized from watersheds during intermittent precipitation events. These challenges led to the identification of the first five of six broad management information needs mentioned above that could be addressed through monitoring, and monitoring data can certainly provide useful information to address these questions. However, it is also important to be aware of the limitations of monitoring data in addressing all management information needs, especially with respect to pollutants like PCBs and mercury. Mercury is distributed widely throughout the urban landscape through a combination of presence in consumer products (lightbulbs and thermometers) and also because it can be deposited from the atmosphere. Therefore, although one does occasionally find elevated concentrations in some locations, one generally finds moderately elevated concentrations spread over a wide geographic area. PCBs are distributed somewhat differently because they were used in industrial activity so one

finds high concentrations associated with historical land uses (generally old industrial) where PCBs were used intensively.[284]

Despite the differences in their distribution and chemical properties, both PCBs and mercury tend to be associated with sediment particles (slightly more so for PCBs).[253] This means that these contaminants are transported through watersheds to receiving waters attached to sediment particles during precipitation events. However, contaminant transport is a very complicated and highly variable process that depends on the features of the source area, the slope of the watershed where the contamination exists, the soil and other land use features, the intensity of the rainfall event, antecedent soil moisture conditions, and other factors.[253]

For pollutants like methyl mercury that are transported in the aqueous phase (not attached to particles) and whose aqueous concentrations do not vary substantially across monitoring events during a monitoring season, one can generate reasonable load estimates using a simple method of multiplying runoff volume by the average of the measured aqueous pollutant concentrations. This method requires the average of the concentrations to represent reasonably well the typical pollutant concentration in the flowing stormwater. However, for particle-bound pollutants that have more complex source release and transport processes, more intensive monitoring strategies making use of continuous monitoring of turbidity in conjunction with grab samples (during storm events of sufficient size to mobilize sediment particles containing PCBs and mercury) of suspended sediment along with contaminant concentrations must be employed to accurately measure the amount of PCBs or mercury moving past some monitoring location in a receiving water during a particular time period (e.g., during the months of a single wet season).[254] This intensive method of generating load estimates from continuous turbidity and grab sampled concentrations is called the turbidity surrogate method because the continuously-measured turbidity serves as a surrogate for suspended sediment concentrations established through regression relationships with measured suspended sediment collected via grab samples during storms.[254] The Bay Area climate is among the most variable of any in the world so the pattern and amounts of rainfall vary substantially from year-to-year because of this variability. Therefore, in order to obtain an estimate of the typical load through monitoring, this intensive continuous monitoring activity would need to be employed over several years.

This measurement difficulty also applies to the scale of an individual control measure or a single watershed where control measures are implemented. For example, if a control measure were put in place to address PCBs or mercury loads in a single watershed,

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[253] McKee, Lester; Leatherbarrow, Jon; Pearce, Sarah; Davis, Jay (2003) *A Review of Urban Runoff Processes in the Bay Area – Existing Knowledge, Conceptual Models, and Monitoring Recommendations*. San Francisco Estuary Institute Contribution 66.

[254] McKee, Lester et al. (2017). *Long-term variation in concentrations and mass loads in a semi-arid watershed influenced by historic mercury mining and urban pollutant sources.* Science of the Total Environment Volumes 605-606, pages 482-497.

some portion of the PCBs or mercury load from that site may be reduced. However, there could be other pollutant sources in the watershed and the pollutants from the controlled source may already be distributed somewhat through the watershed awaiting transport to the receiving water. In any case, the actual load reduction effect from any one or group of control measures is likely to be small and the impact on downstream loads would take time to manifest as the residual contamination was transported through the watershed. Individual control measures likely result in small incremental changes in loads.

In order to detect (through monitoring) these small load reductions in a watershed where control measures are implemented, one should attempt to measure all of the pollutant load flowing out of the watershed. This is practically impossible. Instead, the same intensive monitoring procedure (turbidity surrogate method) described above should be employed for several years after implementation in order to attempt to capture enough storm events over several years to account for the climatic variability. This intensive monitoring procedure can provide a reasonable estimate (with moderate uncertainty) for the amount of sediment moving past the monitoring location through use of continuous turbidity monitoring and establishing the relationship with suspended sediment.[254] The PCBs and mercury concentrations, by contrast, are measured through grab samples during storms for which field crews can be mobilized. It is impossible to mobilize field crews for *all* storms in a single watershed, much less for every storm in every watershed (there are potentially hundreds) where control measures may be implemented. These pollutant concentrations from individual storms are used to develop estimates for the pollutant concentrations (attached to sediment particles since these pollutants move with sediment) for the storms that are not measured. Finally, the estimated PCBs or mercury sediment concentrations (from the grab sample data) are multiplied by the estimate of the suspended sediment (from continuous turbidity versus suspended sediment regressions) to arrive at an estimate for the total mass load of mercury or PCBs that flowed past the site during the storm season.

Because of the way the pollutant concentrations are estimated based on the data collected from a few storms, the calculated mass load has moderate to considerable uncertainty for that storm season. The scale of the uncertainty is likely greater than the scale of the load reduction resulting from any single control action, even if the load reduction occurred immediately upon implementation (which is unlikely because of how pollutants are distributed and transported in watersheds). What is worse, the actual loads can vary from year to year by at least a factor of ten and often more. Therefore, if one wanted to be sure to assess the load reduction effects of control measures through monitoring, one would need to carry out this turbidity surrogate method over several years to arrive at a long-term average mass load. This amount of effort would be needed just to measure the impacts of control measures in a single watershed. There are hundreds of watersheds in the Bay Area where control measures may be implemented. Implementing the turbidity surrogate method on even a single watershed is not a practical means of assessing the impact of control measures on loads. An

intensive program of continuous monitoring at hundreds of locations upstream and downstream of control measure implementation over several years would be required to correctly measure PCBs and mercury loads. The effort and expense to undertake such a monitoring program would consume all or nearly all available resources that would be better spent on control measure implementation.

Using watershed models to estimate loads and changes in loads offers an alternative, practical approach instead of trying to assess loads through monitoring alone. The general idea is that the watershed model simulates sediment and water movement through watersheds in order to estimate sediment and pollutant mass loading at times and places where data are not available because the model is calibrated against available monitoring data from the turbidity surrogate method and also pollutant concentrations measured from grab samples in multiple watersheds during storm events. The models can therefore predict water, sediment, and contaminant transport to estimate PCBs and mercury loads and changes in loads due to management intervention and land use changes over time. The modeled estimates have uncertainty associated with them so they would also not be able to reliably demonstrate small changes in loading. Because the models are using data collected over several watersheds (over the entire Bay Area) collected over several years, they generally perform better in predicting loads at larger spatial scales. In order to understand why, consider the case of modeling the load for a single watershed. The modeled load estimate for a small watershed area would be highly uncertain because the monitoring data used to calibrate the model may not be available for that watershed. In other words, monitoring data from the entire Bay Area is being used for model calibration, and these data may not be applicable for any single watershed. At the aggregated level of multiple watersheds or the entire Bay Area, these uncertainties (a set of over predictions and under predictions of watershed loads compared to monitoring data) tend to cancel out so the aggregated load estimate from the model at the regional scale is usually more certain than the estimate for any single watershed.

The problems associated with climate variability impacting load variability cannot be entirely avoided by using models, but the models can be used to simulate loading over multiple years to generate an average load over several years where rainfall amounts (and hence loads) may have varied. In this way, the models can smooth out climate variability and generate something like an average loading. The models ultimately rely on monitoring data for their calibration and validation, however. If actual loading changes have not manifested in monitoring data, then the models will not show loading changes either. Because control measures for PCBs and mercury, even if effective, result in relatively small loading changes during any particular year or even five-year period (e.g., about 1.6 kg/yr estimated PCBs load reduction during this permit term), the monitoring data on which the models rely are highly unlikely to detect the impact of these load reduction changes in measured concentrations. Therefore, modeled loading estimates are not likely to be sensitive enough to confirm this level of change. The models will be more useful with longer time scales such that enough land use change

and concentration change has occurred such that model can detect the change. In other words, the model works best at large spatial and temporal scales.

Both the mercury and PCBs TMDLs anticipated the challenges associated with using either monitoring alone or a combination of modeling and monitoring to assess how loading responds to control measure implementation. The mercury TMDL requires that Permittees "*develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts",* and the PCBs TMDL requires stormwater Permittees *"to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions."* Consistent with these TMDL requirements and in recognition of the difficulty of assessing control measure loading changes through monitoring or modeling, the Permit employs an accountability strategy known as the programmatic approach to confirm the sufficiency of control measure implementation and provide estimates of the load reductions likely occurring as a result of these control measures. This accountability strategy is described later in this Fact Sheet.

Provisions C.8.g. Pesticides and Toxicity Monitoring. Toxicity testing provides a tool for assessing toxic effects (acute and chronic) of all the chemicals in samples of stormwater, receiving waters or sediments and allows the cumulative effect of the pollutants present in the sample to be evaluated, rather than the toxic responses to individual chemicals. Toxicity in water and on sediment also are monitored in order to determine whether the numeric targets of the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL are being achieved, and to help provide evidence on whether pesticide-related toxicity is decreasing in urban creek waters.

This subprovision combines all the pesticide and toxicity into one place. This format is intended to provide for more thoughtful dry weather and wet weather sampling designs that may provide more meaningful data for the region and potentially for statewide studies. Since the Urban Creeks TMDL was adopted by the Water Board in 2005, it has become more apparent that pesticide related toxicity water quality problems are similar in urban waterways across the State. At this time, efforts have begun to develop a statewide coordinated pesticides and pesticide-related toxicity monitoring program. In addition, pesticide-related water quality issues are subject to change as different pesticide products gain market share and increase in urban usage. For these reasons, Permittees may request the Water Board modify, reduce or eliminate the requirements of this subprovision during the Permit term, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

This Permit describes type, interval and frequency of pesticides and toxicity monitoring sufficient to yield data which are representative of both dry weather and wet weather urban runoff. Required analytes include toxicity and pesticides that are being found at or near concentrations that cause chronic or acute effects to aquatic organisms. Required

test methods include the relatively recent Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136) for chronic toxicity. The test species are selected as the most sensitive species to pollutants currently known or suspected to be present in stormwater discharges. All required methods and test species are consistent with those used by SWAMP as well as those required in other California MS4 permits, including the statewide Caltrans permit.

The non-pesticide pollutants arsenic, cadmium, chromium, copper, lead, nickel, and zinc are included in this subprovision in order to facilitate the synoptic collection of these pollutants in sediment with toxicity in sediment during the dry season.

C.8.h. Reporting. Provision C.8.h. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14, C.18, C.19. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14, C.18, and C.19.c-f pertain to pollutants of concern, including those for which TMDLs have been adopted.

Legal Authority

The following legal authority applies to provisions C.9 through C.14, C.18, and C.19.c-f:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13383, and Federal NPDES regulations 40 CFR § 122.26(d)(2)(i)(A, B, C, E, and F) and 40 CFR § 122.26(d)(2)(iv).

Specific Legal Authority: The TMDL-based requirements for pesticides, mercury, methylmercury, PCBs, bacteria, and sediment (in the Pescadero-Butano watershed only) have been imposed in accordance with 40 CFR 122.44(d)(1)(vii)(B), which requires the effluent limitations in NPDES permits to be consistent with the assumptions and requirements of any available waste load allocation (WLA) for the discharge. Water Code section 13263, subdivision (a), requires that waste discharge requirements implement any relevant water quality control plans (basin plans), including TMDL requirements that have been incorporated into the basin plans. In addition, under CWA section 402(p)(3)(B)(iii), MS4 discharges "shall require controls to reduce the discharge of pollutants to the maximum extent practicable . . . and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants" (33 U.S.C. § 1342(p)(3)(B)(iii).). Under this provision, the Water Board may include requirements for reducing pollutants in stormwater discharges as necessary for compliance with water quality standards (*See Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1166.). This includes requirements to meet TMDLs since TMDL targets are an interpretation of water quality standards.

The Water Board may impose WQBELs that are BMPs or numeric effluent limitations (see, e.g., 40 CFR. §122.44(k)(2) and (3)). This is consistent with U.S. EPA's November 26, 2014, "Revision to the November 22, 2002, Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs'" (2014 U.S. EPA Memo.). This memorandum, while not binding authority, states "[w]here the TMDL includes WLAs for stormwater sources that provide numeric pollutant loads, the WLA should, where feasible, be translated into effective, measurable WQBELs that will achieve this objective. This could take the form of a numeric limit, or of a measurable, objective BMP-based limit that is projected to achieve the WLA." The 2014 U.S. EPA Memo further acknowledges that the permitting authority should consider the schedules in the TMDL as it decides whether and how to establish enforceable interim requirement and interim dates in the permit. The interim deadlines in the Provisions are consistent with and in furtherance of the deadlines in the TMDLs.

The Trash Amendments updated the Ocean Plan and the Inland Surface Waters and Enclosed Bays and Estuaries Plan to include a narrative water quality objective for trash, a trash prohibition, and a framework for implementation of the water quality objective and prohibition in municipal stormwater permits. This framework sets up two tracks for permittees to implement the prohibition; the San Francisco Bay Region Permittees are in Track 2, which means that they implement the prohibition through a combination of full-trash capture devices and other control measures deemed equivalent to full-trash capture.

For copper, the Permit requires best management practices and copper control measures to prevent urban runoff discharges from causing or contributing to exceedances of copper site-specific water quality objectives for the Bay, consistent with the Basin Plan. Water Code section 13263 requires that waste discharge requirements implement the Basin Plan.

Basin Plan Requirements:

Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) states that NPDES stormwater permits issued to municipalities will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. The Water Board has been taking a phased approach of first requiring technically and economically feasible controls to reduce pollutant discharges to the maximum extent practicable. Where this does not result in attainment of water quality objectives, the Basin Plan states the Water Board will require implementation of additional control measures to meet water quality objectives. The Basin Plan also contains urban stormwater TMDL implementation requirements at sections 7.1.1, 7.2.2, 7.7.1, 7.2.3, 7.4.1, and 7.4.2 for pesticide-related toxicity, mercury, PCBs, bacteria, and sediment. The Basin Plan also requires urban stormwater requirements for copper in section 7.2.1.The Basin Plan Table 4-1 includes Prohibition 7, which prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas." The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins also contain requirements related to pesticides and methylmercury relevant to Permittees in eastern Contra Costa County.

General Strategy for Sediment-Bound Pollutants (Mercury and PCBs):

The control measures for mercury and PCBs are intended to implement the urban runoff requirements stemming from TMDLs for these pollutants. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an implementation of controls to reduce PCBs, and that is the intended approach of the required provisions for all pollutants of concern. Control actions addressing PCBs and mercury are expected to reduce loadings of other sediment-

bound pollutants, including legacy pesticides and PBDEs. Permittees can achieve multiple water quality benefits by strategically siting PCB and mercury controls. The POC strategy also includes a phased approach that provides for pilot scale testing (in MRP 1) and for identifying areas with pollutants of concern other than PCBs and mercury. The overall strategy for addressing sediment bound POCs uses the following framework, which is to implement controls more widely as Permittees test measures and gain confidence in their efficacy:

(1) Pilot-testing in a few specific locations.

(2) Focused implementation in areas where benefits are most likely to accrue.

(3) Full-scale implementation throughout the region.

(4) Additional Work. Permittees may also try out experimental control measures and devote resources to research and development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during a permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. Conversely, the benefits of other control measures may be well known, and these control measures should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering additional information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions.

During the MRP 1 permit term, Permittees focused on gathering necessary information about control measure effectiveness. In effect, most of the control measures were implemented at the pilot scale. During the MRP 2 term, the emphasis shifted toward focused and some full-scale implementation of the most effective control measures, and progress was measured through accounting for specific load reductions. In this Permit term, the mercury and PCBs provisions require specific programmatic control measures deemed effective based on implementation experience and analyses in previous Permit terms (a "programmatic approach").

Experience implementing PCBs and mercury control measures in the first two versions of the MRP along with monitoring data and other information, including modeling, informs the design of the programmatic approach. Permittees use a load reduction accounting system (see Provisions C.11.a and C.12.a) to estimate mercury and PCBs load reductions for each type of programmatic control measure consistent with an expected level of control measure implementation intensity. Permittees are required to

track and report on their level of implementation through enforceable control measure-specific performance metrics that are associated with the estimated load reductions. In subsequent permit terms, control measures will be implemented based on what is learned in this term, resulting in even more refined, improved, and effective controls.

Fact Sheet section C.8.f, above, describes the challenge of measuring (through monitoring) PCBs and mercury loads and load reductions due to how these pollutants are distributed in watersheds and transported during storm events and the variability of the Bay Area's climate. These challenges in measuring load reductions through monitoring data also necessitate a programmatic approach to control measure implementation. Over the past two decades, however, Water Board staff has compiled and analyzed a large quantity of monitoring data and other information to understand the relationship between control measure implementation and load reductions and thereby establish a solid technical foundation for the programmatic approach.

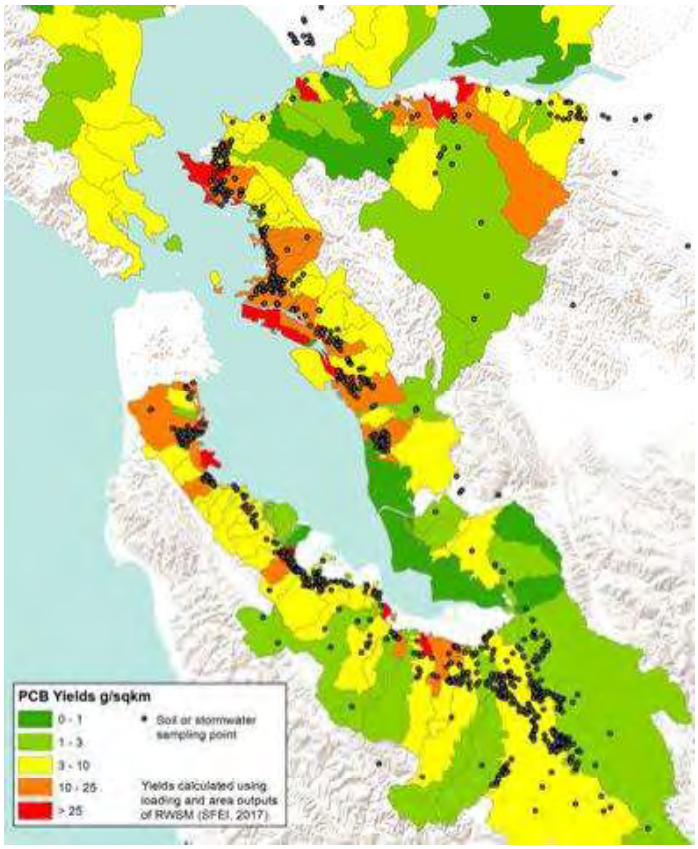

PCBs and mercury data in bedded sediment (i.e., in storm drains or street sediment) and flowing stormwater have been collected through the RMP and also by the stormwater programs over the last two decades. Through the RMP and Permittee sampling, over 100 Bay Area watersheds have been sampled. In these watersheds, over 1,500 sediment samples have been taken, and samples have been taken at over 140 locations for flowing stormwater (see dots on figure, personal communication Alicia Gilbreath, San Francisco Estuary Institute). These monitoring data provide a clear picture about how PCBs and mercury are distributed in Bay Area watersheds and what type of watersheds contribute more or less pollutant load. Notice in the figure that the highest PCBs-yielding watersheds (mass loading of PCBs per unit area) are concentrated largely along the shore of San Francisco Bay. These high yielding watersheds are generally old industrial areas. These yields were estimated through models calibrated and validated with the monitoring information from those dots on the map along with information about hydrology and sediment transport.

The knowledge gained through monitoring and illustrated in this figure is the foundation for the programmatic control measure approach employed in this permit term to reduce PCBs and mercury loads. Because we now know that old bayside industrial lands are generally where we find higher PCBs concentrations, this helps to refine the control measures in the permit. Thus, we have required Permittees to search for contaminated source properties (see Provisions C.11/12.b) in old industrial areas and to focus implementation of control measures in the moderately contaminated portions of old industrial land use (see Provisions C.11/12.c). Finding contaminated properties and addressing ongoing moderate contamination in these formerly old industrial bayside areas is an important element in reducing PCBs loads to the Bay. Moreover, addressing these areas has an environmental justice dimension as well. These old industrial areas are often near where historically disadvantaged communities have been compelled to live because of the unaffordability of less contaminated upland areas. Removing contamination from these areas helps improve the quality of life for these communities. Additionally, the PCBs and other contaminants from these older industrial areas are transported to the Bay and can cause some popular fish species caught from nearby shoreline fishing locations used by local anglers to be unsafe to consume.

The Water Board also uses the available monitoring data to develop mathematical relationships between a unit of control measure implementation activity (e.g., a referral of a source property or a treatment device installed in old industrial land use) and an estimated load reduction. This accounting program is fully described in work produced and refined by the programs during the MRP 2 permit term.[286] These data were also used to calibrate and validate a variety of watershed loading models to generate estimates of the PCBs and mercury load reductions from green stormwater infrastructure (GSI) implementation as part of the Reasonable Assurance Analyses prepared by the Permittees during the MRP 2 permit term.

In addition to monitoring data, the programmatic approach is also informed by other information related to control measure implementation. For example, Permittees (as part of their 2019-2020 Annual Reports) estimated the PCBs and mercury load reductions that will be realized as GSI is implemented through time. In order to do this, Permittees estimated the pace of GSI implementation and used information about GSI performance, concentrations of PCBs and mercury in watersheds (from monitoring data), combined with information about rainfall, hydrology, soil type, slope, amount of impervious area, and other inputs.

Permittees also gathered information that allowed the Water Board to estimate the magnitude of PCBs load reductions by implementing BMPs when buildings containing PCBs (in caulks and sealants) are demolished. There is information on the typical amount of PCBs in such buildings and the effectiveness of control measures and the number of buildings that are demolished in a typical year.[290, 286] This information is used to establish factors to estimate the load reduction benefit of this program. It is too difficult, impractical, and time-consuming to implement monitoring efforts in the vicinity

of these demolition sites to generate these load reduction estimates, as previously described. A similar approach is used to derive a mathematical relationship between the number of bridges whose roadways are replaced and the amount of PCBs load reduction achieved through removal of the PCBs-containing caulk. Permittees developed the relationship by measuring the amount of PCBs in such caulk and calculating how much caulk is removed during a typical bridge refurbishment project.[286]

The programmatic approach for PCBs and mercury control measures is a practical means of ensuring accountability for control measure implementation. This approach relies on the above-described monitoring data and other information, which are used in a technically sound manner to derive the mathematical relationships between units of control measure implementation activity and load reduction. While it is theoretically possible to assess load reductions through an intensive program of monitoring (see discussion under Provision C.8.f, above) at hundreds of locations upstream and downstream of control measure implementation, the effort and expense to undertake such a monitoring program would consume all or nearly all available resources that would be better spent on control measure implementation, as discussed above in the Fact Sheet for Provision C.8. The Permit's more practical and resource-efficient approach is to use monitoring data to inform control measure design and accountability metrics, as well as to calibrate and validate quantitative models to estimate loads and changes in loads. In this way, we use models to extrapolate from those places and times for which we have monitoring data to those times and places where we do not.

Background on Specific Provisions:

Pursuant to CWA§ 402(p)(3)(B)(ii)-(iii) and 40 CFR § 122.44(d)(1)(vii)(B), Provisions C.9 through C.14, C.18, and C.19 contain technology-based requirements to control pollutants to the MEP, such other provisions the Water Board has determined appropriate for the control of pollutants under CWA, water quality-based requirements consistent with the assumptions and requirements of any WLAs in the applicable TMDLs, and requirements to effectively prohibit non-stormwater discharges into storm sewers. Provision C.9 contains requirements to implement the TMDL for pesticide-related toxicity in urban creeks. Provision C.10 contains requirements to implement narrative water quality objectives related to trash in all receiving water and water quality control plan prohibitions on trash discharges. Provision C.11 contains requirements to implement the San Francisco Bay mercury TMDL WLAs and the TMDL WLAs for mercury in the Guadalupe River Watershed. Provision C.12 contains requirements to implement the San Francisco Bay PCBs TMDL WLAs. Provision C.13 contains requirements to implement the copper site-specific objectives for San Francisco Bay. Provision C.14 contains requirements to implement the TMDL WLAs for bacteria at San Pedro Creek and Pacifica State Beach; San Francisco Bay Beaches (in the City of San Mateo); and Pillar Point Harbor and Venice Beach. It also contains requirements for the cities of Mountain View and Sunnyvale for their discharges that are causing or contributing to exceedances of water quality standards in Stevens Creek (both cities),

Calabazas Creek (Sunnyvale) and Sunnyvale East Channel/Guadalupe Slough (Sunnyvale) for which there are no TMDLs. These requirements are consistent with these bacteria TMDL WLA implementation requirements. Provision C.18 contains requirements to implement the Pescadero-Butano Watershed Sediment TMDL and the Water Quality Improvement Plan for sediment in the San Gregorio Creek watershed. Provision C.19 contains requirements to implement the pesticides and methylmercury TMDLs and other requirements in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins applicable to Permittees in eastern Contra Costa County.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9

C.9-1 This Permit implements the TMDL and Water Quality Attainment Strategy for diazinon and pesticide-related toxicity for all Bay Area urban creeks, as defined in the Basin Plan Amendment adopted by the Water Board on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Attainment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, lead monitoring efforts, and take actions related to pesticide regulatory programs. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff.

C.9-2 The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

This provision is consistent with 2014 U.S. EPA Memo [255] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve pesticide load reductions as well as other requirements (see Provision C.9.f) necessary to achieve receiving water limits. The timeline for achieving the TMDL is not a fixed date for the following reasons. Pesticide-related toxicity continues to occur because state and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. The TMDL implementation plan recognizes that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and state law; and (2) because a realistic date for achieving allocations cannot be discerned given the current pesticide regulatory framework. Thus, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline.

Specific Provision C.9 Requirements

Provision C.9 implements the TMDL for Urban Creeks Pesticide Toxicity. All C.9 subprovisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with other agencies and organizations. The list of urban-use pesticides of concern to water quality includes pesticides for which local

[255] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

area monitoring data exceed or approach benchmarks and pesticides currently linked to toxicity in surface waters.

Pesticides monitoring is specified in Provision C.8.g. Pesticides and Toxicity Monitoring.

C.9.a through C.9.d are designed to ensure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of complementary techniques such as biological control (e.g., natural predators and parasites), habitat manipulation, modification of cultural practices, use of resistant varieties, various physical techniques, and considers pesticide treatments as a last resort. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. The implementation of IPM will be assured through training of municipal employees and contractor requirements. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. IPM techniques could include biological controls (e.g., ladybugs and other natural enemies or predators); physical or mechanical controls (e.g., hand labor or mowing, caulking entry points to buildings); cultural controls (e.g., mulching, alternative plant type selection, and enhanced cleaning and containment of food sources in buildings); and reduced risk chemical controls (e.g., soaps or oils). IPM is defined broadly by the University of California Agriculture & Natural Resources Statewide IPM Program,[256] and an example IPM plan is provided by UC Davis.[257] University of California Agriculture and Natural Resources provides guidance to public agencies on the development of IPM policies and programs.[258] More resources are provided by the California Department of Pesticide Regulation[259] and by the National Pesticide Information Center.[260] The Glossary attached to this Permit includes expanded IPM definitions adapted from the UP Provisions.

C.9.e directs the municipalities to conduct outreach to consumers at point of purchase, to residents who contract for pest control, and to pest control professionals. Such targeted outreach is intended to make the public and pest control professionals aware of the water quality impacts of current-use pesticides that are impacting or have potential to negatively impact urban creeks.

C.9.f requires that municipalities (through cooperation or participation with BAMSC and CASQA) track and participate in pesticide regulatory processes like the U.S. EPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation pesticide evaluation activities. The goal of

[256] https://www2.ipm.ucanr.edu/What-is-IPM/

[257] https://ucdavis.app.box.com/v/UCDavisIPMPlan2014PDF

[258] https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8093

[259] https://www.cdpr.ca.gov/docs/schoolipm/

[260] http://npic.orst.edu/pest/ipm.html

these efforts is to provide pertinent water quality data and encourage both the state and federal pesticide regulatory agencies to fully evaluate aquatic impacts and to mitigate for impacts to urban water bodies within the pesticide regulation or registration process. Accomplishing this goal would represent the most efficient and effective means to prevent pesticide-related water quality problems in the future.

C.9.g requires Permittees to evaluate the effectiveness of their pesticide source control actions and is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the Permit. The particulars of assessment will depend on the nature of the control measure.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Clean Water Act: CWA sections 402(p)(3)(B)(ii) and (iii) require municipal stormwater permits to effectively prohibit non-stormwater discharges and to reduce the discharge of pollutants in stormwater to the maximum extent practicable. Trash can be considered both a non-stormwater discharge (see 40 CFR 122.26, subd. (b)(2)) and a pollutant. Accordingly, the Order's requirements to reduce trash loading are required to implement both the non-stormwater discharge prohibition and the reduction of pollutants to the maximum extent practicable.

Basin Plan: Trash load reductions are also required to protect beneficial uses and achieve water quality objectives in the receiving water. Basin Plan Prohibition 7 prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters, or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. The Basin Plan also contains narrative water quality objectives applicable to trash: floating material (waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses); settleable material (waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses); and suspended material (waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses).

Trash Amendments: The trash load reduction provisions of this Order are also consistent with the State Water Board's 2015 amendments to the Ocean Plan and Inland Surface Waters and Enclosed Bays to control trash (Trash Amendments). The Trash Amendments establish a narrative water quality objective for trash; prohibit "the discharge of Trash to surface waters of the State or the deposition of Trash where it may be discharged into surface waters of the State;" provide implementation requirements for permitted storm water dischargers; set a time schedule for compliance and provide a framework for monitoring and reporting requirements.

Because trash overwhelmingly reaches receiving waters via stormwater, the Trash Amendments anticipate that NPDES stormwater permits will implement the trash prohibitions. NPDES stormwater Permittees have two "tracks," or alternative pathways, for achieving compliance with this prohibition. Permittees in Track 1 must install, operate, and maintain full capture systems for all storm drains that captures runoff from the priority land uses in their jurisdictions;" while Permittees in Track 2 must install, operate, and maintain any combination of full capture systems, multi-benefit projects, other treatment controls, and/or institutional controls within either the jurisdiction of the MS4 permittee or within the jurisdiction of the MS4 permittee and contiguous MS4 permittees." The State Water Board determined that the Trash Load Reduction

requirements of the previous MRP were "substantially equivalent" to Track 2 (Trash Amendments, p. D-5, fn. 2.).

Permittees in Track 2 are required to demonstrate that the combination of methods achieves full capture system equivalency. The C.10 requirements of this Permit are consistent with the Statewide Trash Amendments and the trash controls Permittees are required to implement are designed to achieve full trash equivalency. Permittees are required to implement a trash control plan using a combination of controls, such as full capture systems, or other controls (e.g., street sweeping, on-land pickups) that are equivalent to trash full capture systems and that can be verified through visual assessment as described in Provision C.10.b.iii, below. The Statewide Trash Amendments require Track 2 Permittees to fully comply with the Trash Amendments (trash water quality objective, trash prohibition, and implementation requirements) within ten years of the effective date of the first implementing NPDES MS4 permit. MRP 2 became effective on January 1, 2016, and is the first permit implementing the Trash Amendments. Therefore, MRP Permittees must fully comply with the Trash Amendments no later than December 31, 2025, except the East Contra Costa County Permittees, which were not subject to MRP 2 when it became effective in 2016.

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(i) requires "a demonstration that the [Permittee] can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the [Permittee] at a minimum to . . . (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water . . . ."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A)(1) requires "a description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires "a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR § 122.44(d)(1)(i) requires limitations for pollutants which are or may be discharged at a level which has the reasonable potential to cause or contribute to an excursion above any water quality standard, including any narrative criteria for water quality.

Trash is being discharged at levels that have the reasonable potential to cause or contribute to excursions of these narrative water quality objectives. There are currently 27 waterbodies in the Region impaired by trash on the Clean Water Act section 303(d) list; most of these receiving waters receive discharges from Permittees' municipal storm drain systems. Elsewhere, trash is being discharged at levels that have the reasonable potential to cause or contribute to excursions of these narrative water quality objectives. U.S. EPA recommends that for MS4 discharges with reasonable potential to cause or contribute to a water quality excursion, a permitting authority exercises its discretion to include clear, specific, and measurable requirements and, where feasible, numeric effluent limitations as necessary to meet water quality standards.[261] In Water Quality Order Nos. 2015-0075, amended by 2021-0052-EXEC, and 2020-0038, the State Water Board affirmed the obligation of stormwater permittees to comply with receiving water limitations, including the requirement that discharges not cause or contribute to water quality standards exceedances. Where a permit allows alternative, or deemed, compliance with receiving water limitations, the alternative compliance pathway must have "appropriate rigor, transparency, and accountability," and be "designed to ultimately achieve receiving water limitations."[262] More specifically, "any alternative compliance path should 'encourage watershed-based approaches, address multiple contaminants, . . . incorporate TMDL requirements,' 'encourage the use of green infrastructure and the adoption of low impact development principles,' 'have rigor and accountability,' and require Permittees, 'through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions.'"[263] The State Water Board also reaffirmed the requirement to require adequate monitoring "to verify assumptions and update the solutions." This permit's alternative compliance measures contain the elements required by Order Nos. 2020-0038 and 2015-0075, amended by 2021-0052-EXEC are designed to meet water quality standards as quickly as possible and to implement the trash discharge prohibition by 2025.

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[261] U.S. EPA, November 26, 2014, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load Waste Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs.'"

[262] Order No. 2020-0038, p. 13.

[263] Order No. 2020-0038, p. 14, citing Order No. 2015-0075.

Fact Sheet Findings in Support of Provision C.10

C.10-1 The State Water Board's Trash Amendments define trash to encompass "all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials."

C.10-2 Trash is a pervasive problem within the San Francisco Bay, as well as in creeks and shoreline areas throughout the Bay Area. Controlling trash from municipalities' jurisdictions continues to be a priority for this Permit reissuance, not only because implementation of the trash discharge prohibition is imminent, but because trash adversely impacts the public's enjoyment of the Bay, Ocean, and their watersheds and poses a serious threat to aquatic life and habitat. Plastic has pernicious effects in the ocean environment, where it can persist for hundreds of years, if not longer; can serve as a substrate for organic toxins; and can entangle or be ingested by aquatic life.

C.10-3 The levels of trash in the waters of the San Francisco Bay Region were and are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[264] over the 2003–2005 timeframe,[265] suggested that then-existing approaches to managing trash in waterbodies were not reducing the adverse impact on beneficial uses. In 85 surveys conducted at 26 sites throughout the Bay Area, staff found an average of 2.93 pieces of trash for every foot of stream. All the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with significantly higher trash in waters relative to other counties—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Neighborhoods at the bottom of the watershed, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-4 Trash generation in the United States has increased in the years since the SWAMP RTA trash assessments. For instance, figures from the U.S. EPA indicate that overall and per capita municipal solid waste generation have increased between 2005 and 2018, the last year for which data are

[264] SWAMP Rapid Trash Assessment Protocol, Version 8

[265] SWAMP S.F. Bay Region Trash Report, January 23, 2007

available.[266] Packaging waste generation has increased by 7 percent, while plastic packaging waste generation, specifically, has increased 14 percent, during that same time period.[267] Furthermore, the plastic going into the oceans is on course to rise from 11 million tons now to 29 million by 2040, according to a study published in June by Pew Trusts, an independent public interest group.[268] It is reasonable to assume that trash generation in the Bay Area has increased in parallel with national trends, and that when overall trash generation is higher, more trash ends up in stormwater.

C.10-5 A number of key conclusions can be made on the basis of the trash measurement in streams:

(1) Lower watershed sites have higher densities of trash.

(2) All watersheds studied in the San Francisco Bay Region have high levels of trash.

(3) There are trash source hotspots (usually associated with parks, schools, or poorly kept commercial facilities located near creek channels) that appear to contribute a significant portion of the trash deposition at lower watershed sites.

(4) Homeless encampments and creekside litter from a variety of sources are a significant source of trash directly dumped and placed in the riparian zone where it can be swept into receiving waters by storm flows.

(5) Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.

(6) Most trash is plastic at lower watershed sites where trash accumulates in the wet season. This is likely the result of several factors, including the increase in use of plastic as a packaging material and the material's persistence in the environment. The accumulation of plastic in downstream areas indicates that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris.

(7) Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

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[266] Advancing Sustainable Materials Management: 2018 Fact Sheet; accessed at: https://www.epa.gov/sites/production/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf

[267] U.S. EPA, 2018. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific-data

[268] Verdon, Joan, April 27, 2021. "Global E-Commerce Sales To Hit $4.2 Trillion As Online Surge Continues, Adobe Reports," Fortune.

C.10-6 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-7 Trash in urban waterways of coastal areas can become marine debris, known to harm fish and wildlife and cause adverse economic impacts.[269] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-8 Trash adversely affects numerous beneficial uses of waters, particularly recreation, wildlife and estuarine habitats, and rare and endangered species preservation. Besides the obvious negative aesthetic effects, trash can threaten the health and safety of beachgoers or other recreators. Medical waste, pet waste, and discarded diapers can spread disease, while metal and broken glass can cause injury.[270] Entanglement in trash and marine debris is a major hazard to marine wildlife,[271] affecting at least 115 species of animals in the United States alone.[272] Marine species, including turtles and sea birds, are also widely known to ingest marine debris, particularly small pieces of plastic, causing injury, illness, and death,[273] In addition, trash can contaminate water and sediments, as some household and industrial wastes contain toxic batteries, pesticide residues, and mercury and other heavy metals. Large trash items, such as discarded appliances, can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash hotspots where illegal dumping, littering, and/or accumulation of trash occur.

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[269] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. Mar. Poll. Bull. 40:83-88.

[270] Sheavly, S.B. 2004. Marine Debris: an Overview of a Critical Issue for our Oceans. 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

[271] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs*. Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.

[272] Entanglement of Marine Species in Marine Debris with and Emphasis on the United States, https://marinedebris.noaa.gov/sites/default/files/mdp_entanglement.pdf; see also Oceana, Choked, Strangled and Drowned (2020) https://usa.oceana.org/sites/default/files/2020/11/25/report_single_pagesdoi_choked_strangled_drowned_final.pdf

[273] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol*. 13(4):925-929; Gilbert, J.M. et al. 2016. Plastic Ingestion in Marine and Coastal Bird Species of Southeastern Australia, *Marine Ornithology.* 44: 21-26. https://sora.unm.edu/sites/default/files/44_1_21-26.pdf

C.10-9 The Water Board, at its February 11, 2009, hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment E - 303(d) Trash Resolution and Staff Report, February 2009.

C.10-10 The trash control strategies, monitoring requirements, and mandatory deadlines for trash reductions meet the "Maximum Extent Practicable" (MEP) standard contemplated by the CWA and include such other provisions as the Board determines appropriate for control to ultimately meet the narrative water quality objectives for floating material, settleable material, and suspended material (CWA §402(p)(3)(B)(iii)). This Permit builds on the data and information collected in the last permit term and increases expectations of Permittees in this Permit. In particular, this Permit requires that the Permittees make significant progress toward having no trash impact on receiving waters by increasing implementation of full trash capture devices and ensuring that other trash reduction and elimination measures have similar effects to full trash capture. This is consistent with the statewide amendment to the Ocean Plan and the Inland Surface Waters, Bays and Estuaries Plan relating to trash controls. This Permit includes trash generation source identification and control, visual assessment data collection, and development of trash monitoring protocols. These requirements reflect the most current knowledge and data available concerning effectiveness of trash control strategies such as full trash capture, enhanced maintenance methods and current thinking regarding the best methods to assess trash reduction outcomes for the various trash reduction methods.

C.10-11 The COVID-19 pandemic has produced a surge in trash from multiple sources, including discarded personal protective equipment, shipping materials, and takeout containers.[274] Some of this trash has made it into waterways,[275] and the Coastal Commission found that masks were one of the top 15 discarded items at its coastal cleanups.[276]

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[274] See, e.g., 2020 Beach Cleanup Annual Report, Surfrider (July 2021), p. 5; Ford, Don. "COVID In Oakland: Pandemic Sending Additional Trash Into Bay Area Waterways," CBS San Francisco (Nov. 18, 2020); Kramer, Anna. "Eco-conscious Bay Area reckons with flood of plastic waste as coronavirus wears on," *San Francisco Chronicle* (July 20, 2020); Chua, Jasmin Malik. "Online shopping has boomed in the pandemic. But what about all the packaging?" Vox (Jan. 8, 2021). Takeout orders increased 127% from March 2020 through March 2021. NPD, "U.S. Restaurant Carry-Out and Delivery Digital Orders Soar During the Pandemic" (May 11, 2021).

[275] See, e.g., 2020 Beach Cleanup Annual Report, Surfrider, *supra*; "COVID In Oakland: Pandemic Sending Additional Trash Into Bay Area Waterways," CBS San Francisco (Nov. 18, 2020); Alexander, Curtis. "First rain of season unveils a new pollution problem: masks and gloves - pandemic PPE," *San Francisco Chronicle* (Nov. 18, 2020).

[276] Alexander, Curtis. "First rain of season unveils a new pollution problem: masks and gloves - pandemic PPE," *San Francisco Chronicle* (Nov. 18, 2020).

Even before the pandemic, the United States was the largest generator, per capita, of plastic packaging waste.[277] Americans' packaging consumption has only grown during the pandemic, [278] as some plastic bag bans, including California's, were suspended, grocery pickup and delivery soared, and online shopping increased in the United States by approximately 32 percent from 2019 to 2020.[279] Shipping materials waste in particular has ballooned.[280] Of the 465 million pounds of packaging waste that Amazon, alone, was estimated to have generated worldwide pre-pandemic, approximately 4.8 percent, or 22.4 million pounds, went into waterways.[281] In 2020, these figures can be assumed to have grown, as Amazon's profits soared by 84 percent.[282]

C.10-12 While some pandemic-related trash increases may subside during this permit term, other sources of increased trash may not. For instance, online shopping is projected to continue growing,[283] and the concomitant heaps of shipping waste can be expected to keep growing, too. To accommodate this projected increase in waste, successful implementation of trash controls, particularly full-trash capture devices, is critical.

Specific Provision C.10 Requirements

C.10.a. Trash Reduction Requirements

C.10.a.i. Trash Reduction Schedule – This provision includes compliance benchmarks of 90 percent trash load reduction by June 30, 2023, and 100 percent trash load reduction by June 30, 2025. The 100 percent deadline represents a three-year extension of the 100 percent trash load reduction (or no adverse trash impact) target in MRP 2 of July 1, 2022. This extension is appropriate because it recognizes the Permittees' economic challenges associated with the COVID-19 pandemic, as well as

[277] Parker, Laura. "Plastic Bag Bans Are Spreading. But Are They Truly Effective?" *National Geographic* (April 17, 2019).

[278] Flexible Plastic Packaging Global Market Report 2021: COVID-19 Growth And Change (July 2021) (despite plastic bag bans and growing concern about the environmental impacts of packaging waste, the flexible plastic packaging sector grew 5.7% in 2020 due to the e-commerce boom.); Kickham, Victoria. "Strong Demand, Rising Costs Affect Packaging Strategies." DC Velocity (July 9, 2021) (shipments of corrugated cardboard reached a record high in 2020, an increase of 3.5 percent over 2019.)

[279] Palmer, Annie. "Groceries and sporting goods were big gainers in the Covid e-commerce boom of 2020," CNBC (Feb. 19, 2021).

[280] See Chua (2021), supra; see also Corkery, Michael. With 3 Billion Packages to Go, Online Shopping Faces Tough Holiday Test." *New York Times* (Dec. 5, 2020) (estimating that 800 million more holiday packages would be shipped in 2020 versus 2019).

[281] Oceana, Amazon's Plastic Problem Revealed (Dec. 15, 2020), pp.14-15.

[282] Kohan, Shelley, "Amazon's Net Profit Soars 84% With Sales Hitting $386 Billion," Forbes (Feb. 2, 2021); Thomas, Lauren. "As e-commerce sales proliferate, Amazon holds on to top online retail spot." CNBC (June 18, 2021).

[283] Verdon, Joan. "Global E-Commerce Sales To Hit $4.2 Trillion As Online Surge Continues, Adobe Reports," *Fortune* (April 27, 2021).

challenges associated with controlling trash from the Permittees' remaining uncontrolled areas. Permittees have appropriately prioritized controlling trash from the highest trash generation areas in MRP 1 and MRP 2 and must now address a large area of moderate-level significant trash generating areas from which trash must be controlled.

C.10.a.ii. Trash Generation Area Management – The overarching strategy for reducing trash involves mapping trash generation areas within a Permittee's jurisdiction, then applying effective trash reduction actions to the areas of trash generation and assessing the effectiveness of those actions in delineated trash generation areas, until trash generation is reduced to the no impact level over a Permittee's entire jurisdiction. The Permittees reported these trash generation maps with their Long Term Trash Reduction Plans February, 2014, and these maps provide the 2009 trash generation levels, which were required under MRP 1. Permittees that found inaccuracies in their submitted maps had the opportunity to submit corrected 2009 trash generation maps with their 2016 Annual Reports. Permittees developed their maps by dividing their jurisdiction into Very High, High, Moderate, and Low trash generation areas based on the following ranges of trash generation rates:

- Low = less than 5 gal/acre/yr;
- Moderate = 5-10 gal/acre/yr;
- High = 10-50 gal/acre/yr; and
- Very High = greater than 50 gal/acre/yr.

C.10.a.ii.a. Actual trash loading values, particularly in areas of high and very high trash generation areas, may vary significantly, but these delineated ranges provide a frame of reference for tracking and demonstrating trash load reductions and provide relative trash generation weight of these four categories. Permittees will likely need to reduce trash generation to at least Low to attain the ultimate required water quality-based outcome of no trash loads that cause or contribute to adverse trash impacts in receiving waters by June 30, 2025. Whether attainment of Low trash generation rates will be sufficient will be evaluated and considered in the development of requirements in the next permit. Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to a Low trash generation rate during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the June 30, 2023, and June 30, 2025, 90 and 100 percent trash load reduction requirements, respectively. Permittees are required to implement trash prevention and control measures, including full trash capture systems (as defined in Provision C.10.a.ii.a), or other trash management actions, or a combination of actions equivalent to or better than full trash capture systems, to meet the required load reductions as described above in section C.10.a.i and to achieve the trash reduction outcomes required by the Trash Amendments.

C.10.a.ii.b. Permittees are responsible for trash discharges from their storm drain systems, including trash generated and discharged from private land areas that are either moderate, high, or very high trash generating and plumbed to the Permittees MS4 system. Permittees have direct control over their properties and right of way, but must also exert control over the private lands described above, such as commercial parking lots, that are plumbed to municipal storm sewer systems, since trash washed into such conveyances by stormwater directly impacts receiving waters without encountering trash controls on public rights of way. Permittees may use a variety of means to ensure that either full trash capture devices are installed at storm drain inlets on private land prior to intersection with the public storm drain system, or that other control actions, equivalent to full trash capture, are implemented on those private lands and such actions are verified through assessment, similar to the on-land visual assessment. Also, if there is a full trash capture device downstream of these lands that is designed, operated, and maintained to control trash discharges from that land area, no other trash control would be necessary.

C.10.b Demonstration of Trash Reduction Outcomes

C.10.b.i.(a-b) Full Trash Capture Systems - Full trash capture systems must be appropriately maintained to be effective. If a full trash capture system enters the wet season clogged with leaves or trash, trash will bypass the device, preventing it from functioning appropriately. During device inspections over the course of the previous permit term, Water Board staff observed roughly 20 percent of the inspected full trash capture devices required cleaning and/or repair or replacement. This Permit maintains the MRP 2 requirement for Permittees to inspect and maintain their full trash capture devices at a minimum frequency of once per year and, sufficient to prevent plugging (including plugging of the 5 mm screen) that could otherwise lead to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. Within High and Very High trash generation areas, Permittees are expected to inspect (and maintain if necessary) their full trash capture devices at a minimum frequency of twice per year, with the inspections spaced at least three months apart. Justification for the higher maintenance frequency within High and Very High trash generation areas is due to the increased speed with which full trash capture devices are expected to get plugged with trash and/or debris if not maintained. Permittees are required to maintain adequate maintenance records and report any full trash capture devices found to be not adequately maintained or improperly functioning. Permittees are also required to certify annually that all their full trash capture devices are adequately operated and maintained.

C.10.b.iii. Other Trash Management Actions

C.10.b.iii.a. Implementation Documentation – Documentation of trash management or control actions implemented and areas of implementation is essential to support trash reduction effectiveness and trash condition improvement.

C.10.b.iii.b.((i)-(iv)) Visual Assessment of Outcomes of Other Trash Management Actions – The primary tool currently available for determining trash reduction action success and positive outcomes is visual assessment, with photo documentation of trash generation and conditions in areas that drain to storm drains. Visual assessment involves observing a sufficient portion of each, e.g., sidewalk and curb area, at a frequency that adequately represents the trash management area condition relative to the type(s) of management actions implemented in the area. The frequency of required visual assessments depends on the rate of trash generation, the sources and types of trash, trash management actions deployed, and time of year. During the wet season, October through April, visual assessments in a trash management area must be conducted at a frequency that determines whether there may be trash discharges to the storm drain system from sources or areas of trash accumulations before a trash management action or combination of actions is implemented or between recurring trash management actions. The degree of trash reduction that a Permittee claims may also affect the frequency of visual assessment necessary to make the claim.

Permittees, with justification, may conduct fewer frequent visual assessments for claims that a trash generation area has been reduced from what was a very high trash generation area to a high or moderate trash generation area or from what was a high trash generation area to a moderate trash generation area. Frequency of visual assessments during the dry season, May through September, should be at least once per quarter, including, and preferably, within the month (September) before the wet season begins. Higher frequencies of visual assessments than those illustrated above may be required to demonstrate effectiveness of trash control actions and claimed trash reduction. Lower frequencies than those illustrated above may also be acceptable with justification.

Visual assessment is an effective, simple, and comparatively inexpensive method of monitoring to assure compliance with the Permit's requirements to implement trash management actions to reduce trash discharges into municipal storm drains (See 40 CFR § 122.44(i).). The required amount, type, interval and frequency of on-land visual trash assessments should yield data that is representative of the monitored activity, as required by 40 CFR § 122.48(b). This graphic demonstrates four trash visual conditions that correspond to the four trash generation categories of Low (A), Moderate (B), High (C), and Very High (D).

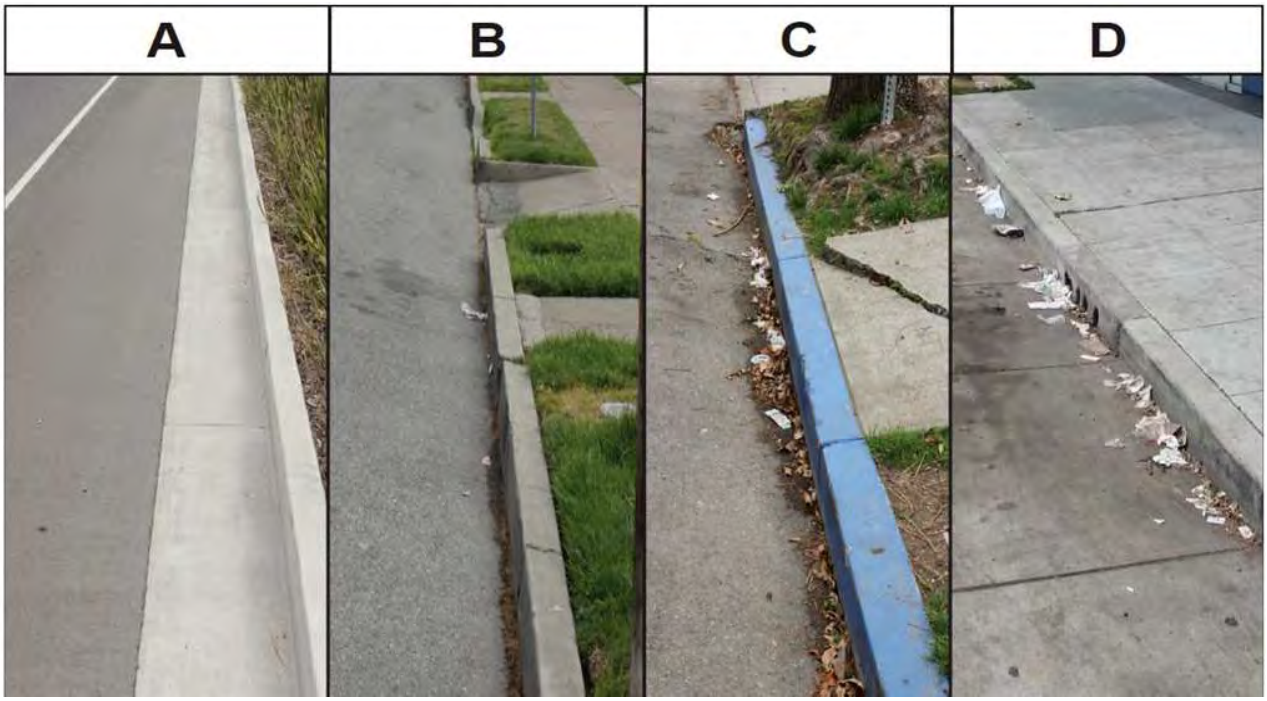

It is also possible to assess trash reduction outcome by documenting and verifying that trash management actions in a trash management area are equivalent to trash management actions implemented in an equivalent trash management area, and the actions in the equivalent trash management area have been assessed to be effective in accordance with a specified performance standard and the assessment results are reproducible. In such cases, it may be possible to extrapolate the performance assessment results to the equivalent trash management area with some verification. If this evidence is proposed by Permittees and accepted by the Executive Officer after public review, Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within similar trash management areas to the same performance standard.

C.10.b.iv. Percentage Discharge Reduction – Demonstration that trash management actions reduce trash generation from Very High, High, or Moderate to lower trash generation categories and the Low generation status during this permit term provides a practicable means of demonstrating trash load reduction and attainment of the 90 and 100 percent trash load reduction requirements (Provision C.10.a.ii.a)**.** However, trash management actions within Very High and High trash generation areas will result in more trash load reduction than actions within Moderate trash generation areas. Accordingly, a trash reduction demonstration methodology that provides weighted benefit to actions in Very High and High areas is preferable to one that just considers percentage change in Very High, High, and Moderate trash generation areas. The trash generation rates used by Permittees to delineate and map their 2009 trash generation area maps have been used to provide a weighted benefit to the demonstrated

reductions in the areas of Very High and High trash generation, even if they are not reduced all the way to Low trash generation.

The delineation of trash generation areas were based on ranges of trash generation rates (Provision C.10.a.ii). Therefore, the ratios of the approximate midpoints of the categorical trash generation ranges provides a means of weighing relative benefit to actions in Very High and High areas compared to actions in Moderate areas. The Moderate range is 5-10 gal/acre/yr, with a midpoint of 7.5 gal/acre/yr. The High range is 10-50 gal/acre/yr with a midpoint of 30 gal/acre/yr. Therefore, the weighed ratio of High to Moderate is 30/7.5 = 4. The Very High range, greater than 50 gal/acre/yr, does not have a specified upper bound that allows calculation of a midpoint. An alternative that provides reasonable weighing of Very High is 90 gal/acre/yr, which is 40 percent higher than the low end of the Very High range. This results in a weighed ratio of Very High to Moderate of 90/7.5 = 12.

The following formula provides a means of calculating the percent trash load reduction achieved (relative to the 2009 baseline conditions) with assigned weighted benefit factors for Very High and High trash generation areas relative to Moderate trash generation areas:

$$\% \text{ Reduction} = 100\,[(12\,A_{VH(2009)} + 4\,A_{H(2009)} + A_{M(2009)}) - (12\,A_{VH} + 4\,A_{H} + A_{M})] \,/\, (12\,A_{VH2009} + 4\,A_{H2009} + A_{M2009})$$

where:

$A_{VH(2009)}$ = total amount of the 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of the 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of the 2009 moderate trash generation category jurisdictional area

A_{VH} = total amount of very high trash generation category jurisdictional area in the reporting year

A_{H} = total amount of high trash generation category jurisdictional area in the reporting year

A_{M} = total amount of moderate trash generation category jurisdictional area in the reporting year

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

100 = fraction to percentage conversion factor

C.10.b.v. Source Control – Permittee jurisdiction-wide actions to reduce trash at the source, e.g. through ordinances banning or taxing certain waste items, have trash generation and load reduction benefits. beyond what can be accounted for in trash management area specific assessment-based percentage discharge reductions (Provision C.10.b.iii). For example, persistent floating litter and other particularly difficult types of trash that are easily blown by the wind or clog full trash capture devices (such as polystyrene food ware, plastic bags, fragmented plastic, etc.) have been documented to be a significant percentage of the trash collected in full trash capture devices. Permittees that have implemented source control measures have documented a decrease in such items within their trash management area. Permittees will be allowed to claim up to ten percent load reduction for implementing appropriate source control actions to reduce persistent trash items other than those addressed under previous Permits (foam foods are and single-use plastic bags). The 10 percent credit stems from a study done by Santa Clara Valley Urban Runoff Pollution Prevention (SCVURPP) program in 2015 that looked at pre- and post-ordinance characteristics of trash. The study found that approximately 70 percent fewer single use bags were observed in stormwater after the source control ordinance went into effect. Based on these results, the City estimated that an approximate 70 percent reduction in the number of single use bags in stormwater equates to an offset benefit of up to 10 percent in the overall volume

of trash discharged through the City's MS4 system. This is an interim credit (added to the percent Reduction amount calculated by the Provision C.10.b.iv - Percentage Discharge Reduction formula) that will be phased out at the end of the permit term. To claim the ten percent load percentage reduction value, Permittees must provide substantial and credible evidence that the source control actions implemented reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides credible evidence that the source control actions implemented would achieve comparable trash reduction if implemented in the Permittee's jurisdiction.

Permittees may no longer claim a jurisdiction-wide source control load reduction value after June 30, 2025, because they must comply with the 100 percent reduction after that date through full trash capture or full trash capture equivalent controls. Furthermore, applying a jurisdiction-wide source control load reduction value to areas managed with full trash capture or full trash capture equivalent controls would result in an unrealistic claim of greater than 100 percent trash load reduction in those areas. However, Permittees may demonstrate and claim full trash capture equivalence of a source control in specific trash generation areas or in combination with other controls in an area if the control or combination of controls are documented, assessed, and verified in accordance with Provision C.10.b.iii.

C.10.b.vi. Partial Trash Reduction – Curb Inlet Screens – During MRP 2, Permittees assessed the benefit of curb inlet screens, in combination with street sweeping, in reducing the amount of trash discharged through MS4s. The study showed that curb inlet screens, when paired with a appropriate street sweeping program, can be effective in blocking larger trash items (such as bottles or plastic bags) from discharging through the MS4 system. However, the study also showcased several drawbacks of curb inlet screens. For instance, the effectiveness of curb inlet screens in preventing larger trash items from discharging through the MS4 was dependent on the presence of horizontal surface grates installed to support the device. In the absence of horizontal surface grates, the study concluded that the increase in hydraulic pressure from stormwater flows could potentially force open the retractable screens and thus allow more trash and/or debris to enter the curb inlet and negate the benefit of the installed device. In addition, the study did not evaluate the use of a 5mm screen, within the horizontal surface grate, to prevent trash items greater than 5 mm in diameter from discharging into the MS4. As a result, smaller persistent trash items (e.g., cigarette butts, straws, fragmented plastic, and polystyrene foodware) could readily enter the MS4 through the unscreened horizontal surface grate despite the installation of a curb inlet screen. These smaller trash items are more effectively removed from storm drain inlets that have a full trash capture device (due to the 5 mm minimum screen threshold requirement). Finally, the effectiveness of curb inlet screens was contingent upon the proper implementation of a street sweeping program that collected trash items that would otherwise have accumulated in the streets and washed into the curb inlet. Inadequate street sweeping in areas with high levels of trash generation can lead to

trash accumulation against the screen and reduce screen performance. However, the study did not evaluate the effects of street sweeping on curb inlet screen performance.

Despite the promise of curb inlet screens for trash control in areas where full trash capture devices cannot be installed, there is a need for further investigation into the deficiencies of curb inlet screens and the complementary actions, such as street sweeping, that can help overcome these deficiencies. The Water Board supports: 1) recognizing the potential benefit curb inlet screens may provide, 2) characterizing that benefit appropriately (e.g., whether it gets Moderate areas all the way to Low, or whether it only gets part of the way there), and 3) better understanding how curb inlet screens can fit into Permittees' long-term trash control strategies. The requirement in C.10.b.vi. for additional study of the effectiveness of curb inlet screens will help to substantiate their benefits.

C.10.c. Requirements for Flood Management Agencies

Flood management agencies are required to continue implementing trash contol measures such as trash pickups and installation of trash receptacles to control Moderate, High, and Very High trash generation areas within their jurisdiction, as well as the continued implementation of trash capture requirements as specified in Table 10-1 of Provision C.10.c.

C.10.d. Trash Load Reduction Plans

Similar to the previous permit requirement, Permittees are required to maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the 90 percent trash load reduction requirement by June 30, 2023 and the 100 percent trash load reduction requirement by June 30, 2025. A Trash Load Reduction Plan provides a means for Permittees to determine and account for appropriate trash management actions in their trash management areas and their schedule of implementation, and it provides documentation of planned actions that can be referenced if annual performance guidelines are not met. It also provides a basis for justifying and accounting for the types and locations of Permittees' assessments of trash management actions, and for optional trash load offset opportunities allowed by Provision C.10.f

C.10.e. Impracticability Report

In some areas within a Permittees' jurisdiction, engineering constraints such as flood risk, flat pipe grade, and/or safety concerns may make it impracticable to control trash to a Low generation rate via a full trash capture device. This Provision allows Permittees to develop an impracticability report to document the constraints in installing full trash capture devises and focus their efforts on planning for alternative control actions to meet the requirements and deadlines in Provision C.10.a.. Once approved, the trash impracticability report shall be used in developing the updated Trash Load Reduction plan as described in Provision C.10.d. An impracticability report is an optional submittal to assist with compliance.

C.10.f. Optional Trash Load Reduction Offset Opportunities

C.10.f.i. Creek and Shoreline Cleanup - Permittees may offset part of their Provision C.10.a trash load percent reduction requirement by conducting cleanup of creek and shoreline areas. These creek and shoreline cleanups are of value in the interim until full trash capture or equivalency is implemented by removing trash from shorelines and creeks or creek banks that are causing or may cause adverse impacts to receiving waters. Permittees conduct some of these additional cleanups with community volunteers, which creates additional public outreach and participation benefits.

One way to recognize the value of these additional cleanups and to account for the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume /time) is to use an offset ratio of ten to one for the mandatory 90 percent compliance benchmark by June 30, 2023. The following formula generates a Permittee-specific trash volume amount, based on its 2009 categorical trash generation areas and a ten to one offset ratio, which may be used to offset one percent of a required percent load reduction value:

1% Reduction Offset (volume) = $(12\ A_{VH(2009)} + 4\ A_{H(2009)} + A_{M(2009)})\ OF$

where:

$A_{VH(2009)}$ = total amount of 2009 very high trash generation category jurisdictional area

$A_{H(2009)}$ = total amount of 2009 high trash generation category jurisdictional area

$A_{M(2009)}$ = total amount of 2009 moderate trash generation category jurisdictional area

12 = Very High to Moderate weighing ratio

4 = High to Moderate weighing ratio

OF = offset factor equal to (7.5 x 0.1) for the 2023 mandatory trash load reduction deadline performance guideline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.

A Permittee can compare the volume of trash collected from additional cleanups to this calculated offset volume and apply one percent offset to a Provision C.10.a.i percent load reduction requirement for each collected volume that equals the 1 percent Reduction Offset (volume). However, the total offset that can be claimed to avoid over-compensation associated with the short-term benefit (volume) of cleanups compared to ongoing trash load discharges (average volume/time) is limited to ten percent. Furthermore, to justify the offset the associated cleanups must occur more than once per year and preferably at a frequency sufficient to demonstrate sustained improvement of a creek or shoreline area. Offset values for creek and shoreline cleanups will no longer be applicable after June 30, 2025, when compliance with the 100 percent trash load reduction requirement is required through implementation of full trash capture systems or equivalent controls. The State Trash Amendments do not allow offset credit for creek or shoreline cleanups in lieu of implementing MS4 controls to meet the Trash Discharge Prohibition.

C.10.f.ii. **Direct Trash Discharge Controls -** Some Permittees are faced with the challenge that large amounts of trash are discharged to receiving waters in their jurisdiction from homeless encampments and direct dumping. These trash discharges are separate from and in addition to discharges from Permittee storm drain systems. Elimination and prevention of adverse water quality impacts due to trash and attainment of water quality standards in receiving waters will require management of these non-storm drain system discharges in addition to control of storm drain system trash discharges by Permittees. In MRP 2, several Permittees developed Direct Discharge Control Plans (DDCPs), which are comprehensive plans that describe actions the Permittee will implement to control these other sources of trash discharged to receiving

waters in their jurisdiction. Accordingly, Permittees should be allowed to offset some of their percent load reduction requirements if they control these other sources, both by removing trash after it has already impacted receiving waters, and by taking steps to permanently reduce direct discharges of trash through the provision of housing and services to unsheltered homeless populations (particularly those located near receiving waters) and by abating and implementing controls at illegal dumping sites (particularly those located near receiving waters).

When Permittees meet the needs for housing and associated services of people experiencing unsheltered homelessness, they are likely to reduce the number of people experiencing homelessness, and the presence of homeless encampments from which direct discharges may occur. Therefore, a key best management practice for mitigating the adverse water quality impacts associated with homelessness is to provide housing and services. If Permittees provide housing, but not services, unsheltered homeless people whose needs for services are not met may leave the provided housing and re-establish homeless encampments. If Permittees provide services, but not housing, it is likely that there will be ongoing direct discharges of trash at homeless encampments, because services provided at homeless encampments have often insufficiently prevented direct discharges. If the needs for both housing and services by people experiencing unsheltered homelessness *are* satisfied, those people are less likely to re-establish homeless encampments, and therefore they are less likely to directly discharge trash from homeless encampments.

Likewise, providing dumping vouchers and holding free waste drop-off events, especially to socioeconomically disadvantaged communities, is likely to avoid and reduce direct discharges at illegal dumping sites.

Examples of sanitary controls include opening restrooms in public buildings, porta potties, hand washing stations and showers that are provided at a sufficient number and provisioned and cleaned at a sufficient rate. Examples of trash controls include trash receptacles that are sufficiently large depending on the homeless encampment, and that are emptied at a sufficient rate.

The Permit's expectation is that housing and services provided to populations experiencing unsheltered homelessness, and structural and institutional mitigation of illegal dumping sites, will increase over the course of the Permit term. This will be tracked by the reporting required in Provision C.10.g.xi.

Because the criteria for what is an acceptable DDCP have changed from the Previous Permit, and because Permittees may have updated their DDCPs over the course of the Previous Permit, this Permit requires Permittees with existing DDCPs to submit their updated DDCPs for approval before the first new water year during the Permit term, in order to continue claiming trash load percent reduction offsets.

Permittees have and likely will continue to demonstrate the benefit of controlling these additional sources by accounting for the volume of trash collected. As with additional

creek and shoreline cleanups, the volume of trash removed cannot be compared directly with trash load discharge rate (volume/time).The simplest, and possibly only way to account for these additional control actions, until more rigorous assessment and accountability methods are developed, is to allow a Permittee to offset part of its Provision C.10.a trash load percent reduction requirement using the Provision C.10.f.i formula to determine an offset from additional creek and shoreline cleanup. However, since control of these other sources by Permittees will be through implementation of a comprehensive and sustained program, Permittees that implement a comprehensive plan approved by the Executive Officer merit a higher offset cap than that allowed by Provision C.10.f.i for additional creek and shoreline cleanup. A fifteen percent offset-cap based on the Provision C.10.f.i formula provides a balance between incentive and reward for control of these non-storm drain system sources and the uncertainties associated with the simple formula.

This offset will no longer be applicable after June 30, 2025, when compliance with the 100 percent trash load reduction requirement is required through implementation of full trash capture systems or equivalent controls. The State Trash Amendments do not allow offset credit for direct discharge controls in lieu of implementing MS4 controls to meet the Trash Discharge Prohibition.

Permittees that develop and implement DDCPs are generally challenged with greater volumes and areas of trash to control, so it is reasonable to allow those Permittees additional time to reach the 100 percent trash load reduction compliance benchmark as they continue to implement their DDCPs. Those Permittees, other than the East Contra Costa County Permittees, that implement an approved DDCP may be granted additional time until December 31, 2025, which is the latest compliance date allowed by the Statewide Trash Amendments, to attain 100 percent trash load reduction. Permittees that are allowed until December 31, 2025, to attain 100 percent trash load reduction must report compliance status as described in C.10.g.viii. The East Contra Costa County Permittees that implement an approved DDCP may be granted until June 30, 2026, to attain 100 percent trash load reduction, because they are not subject to the same December 31, 2025, deadline under the Trash Amendments. These permittees were subject to MRP 2 after its effective date in 2016.

C.10.g. Reporting - The reporting requirements reflect the minimum amount of information needed to demonstrate compliance with all Provision C.10 requirements.

C.11. Mercury Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay and Guadalupe River watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury wasteload allocations established for the TMDLs.

The C.11 provisions follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)) and accordingly, build on understanding gained from control measure implementations during the previous permit terms. During the Previous Permit, Permittees were required to implement mercury control measures (source control, treatment control and/or pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and to report on the loads reduced through implementation of those control measures.

In this permit term, the mercury control provision requires specific programmatic control measures deemed effective based on implementation experience and analyses in previous permit terms implemented at full-scale (a “programmatic approach”). For mercury, these control measures include: mercury collection and recycling, source property identification and abatement, control measure implementation in old industrial areas, and green stormwater infrastructure implementation.

The “programmatic approach” to mercury control measures means that the Permit provisions estimate anticipated mercury load reductions for each of these programmatic control measures consistent with an expected level of control measure implementation intensity along with trackable implementation performance metrics to be reported consistent with the stipulated load reductions. Load reductions will be calculated based on the technically sound load reduction accounting methods[286] developed and refined during previous permit terms. Many of the control measures may be chosen primarily for the purpose of achieving PCBs load reductions, but mercury load reductions will often result as a tangential benefit (because of possible co-located PCBs and mercury contamination) and should be accounted for.

As discussed below, based on information gained during control measure pilot testing and reported during the previous permit term, mercury load reductions on the order of those anticipated (approximately 10 kg mercury/year) through implementation of control measures required by this Permit are achievable and necessary in order to make progress toward achieving the regionwide urban runoff wasteload allocation of 82 kg/yr (representing a load reduction from all urban runoff sources of approximately 80 kg/yr compared to loads estimated using data collected in 2003) within the 20-year TMDL timeframe. In the sections below, the mercury-specific control measures will be described along with estimates of load reductions resulting from each.

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. C.11 includes components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 On October 8, 2008, the Water Board adopted a Basin Plan amendment including a TMDL for mercury in the Guadalupe River Watershed (GRW) and an implementation plan to achieve the TMDL. The State Water Board and U.S. EPA have also approved this Basin Plan amendment. The GRW mercury TMDL assigns an urban stormwater runoff allocation proportionally equivalent to the mass allocation in the San Francisco Bay mercury TMDL. Accordingly, the GRW urban stormwater runoff mercury allocation is simply the fraction of the Santa Clara Valley Urban Runoff Pollution Prevention Program allocation attributed to the Guadalupe River watershed. The urban stormwater runoff allocation implicitly includes all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The 2003 load of mercury from urban runoff was estimated to be 160 kg/yr, and the aggregate WLAs for urban runoff is 82 kg/yr. The mercury TMDL provides as follows:

> *"[The WLAs] shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and [Caltrans]. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, 'source category') including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.*
>
> *The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between*

the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff and remain consistent with the section of the Basin Plan chapter titled, Surface Water Protection and Management—Point Source Control—Stormwater Discharges. The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

Continue to develop and implement a mercury source control program;

Implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

Monitor levels of methylmercury in discharges [Note: this requirement was satisfactorily accomplished during MRP 1 and is not included in the Permit.];

Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

Develop an equitable allocation-sharing scheme in consultation with Caltrans to address Caltrans roadway and non-roadway facilities in the program area, and

report the details to the Water Board [Note: Caltrans has mercury-related requirements in its draft permit pursuant to this requirement.]);

Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in [individual WLAs (see Table 4-w of the Basin Plan)], by using one of the following methods:

Quantify the annual average mercury load reduced by implementing

Pollution prevention activities, and

Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an

allocation, load reduction, and/or other regulatory requirements for the source in question."

C.11-4 Loading estimates using recently available data suggest that the urban runoff mercury loading to San Francisco Bay is on the order of 115 kg/yr (McKee and Yee 2015[284]). While this figure is based on environmental data and thus has inherent uncertainty associated with it, it suggests that current mercury loading is approximately equal to the interim TMDL loading milestone (to be reached at the half-way point of TMDL implementation, 2017) of 120 kg/yr. If mercury loads can be reduced by approximately 35 additional kg/yr, urban runoff loading would meet the TMDL wasteload allocation.

C.11-5 Mercury is distributed more uniformly throughout the urban landscape than PCBs. For example, loading from older industrial and other polluted source areas accounts for only 6% of the average annual mercury load, but these areas account for over 50% of the average annual PCBs load (McKee and Yee 2015). The likely stronger role of atmospheric deposition in the case of mercury, which may account for up to 50% of the mercury found in urban runoff, is part of the reason for the more uniform mercury distribution in the landscape (McKee and Yee 2015).

C.11-6 Monitoring data indicate that, while not always the case, watersheds with high PCBs concentrations often contain high or moderately high mercury concentrations (McKee and Yee 2015). Therefore, control strategies focused on finding and managing PCBs-contaminated drainages will often yield mercury load reduction benefits as well.

C.11-7 This provision is consistent with a 2014 U.S. EPA memorandum[285] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear and concrete milestones and deadlines (see Provision C.11.a.iii) for the activities associated with achieving mercury load reductions as well as other requirements (see Provision C.11.b-h.), necessary to achieve receiving water limits of this permit term relative to the mercury TMDL WLA.

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[284] McKee, L.J. and Yee, D., 2015. *Sources, Pathways and Loadings: Multi-Year Synthesis. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS)*. San Francisco Estuary Institute, Richmond, California.

[285] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

Specific Provision C.11 Requirements

Background: The specific requirements in C.11 require Permittees to implement effective control measures to implement the urban runoff requirements from the San Francisco Bay mercury TMDL and achieve mercury load reductions. Permittees must quantitatively document the estimated load reductions achieved through use of the accounting scheme developed and refined during the Previous Permit.

The largest reductions in mercury loads in the urban environment will come from the collection of and recycling of mercury-containing devices, and these activities are, in fact, required by household hazardous waste and producer responsibility laws. Most of the *readily controllable* mercury loads one finds in the urban environment originate in these products, and so eliminating these sources of mercury for subsequent transport is an important and effective strategy for mercury load reductions.[289]

As previously mentioned (in Fact Sheet section C.8), mercury is much more evenly distributed in watersheds than are PCBs so there are fewer opportunities to find and address heavily contaminated (with mercury) sites to achieve substantial, short-term load reductions. Both PCBs and mercury are, however, transported attached to sediment particles so many of the same control measures that capture sediment (e.g., green stormwater infrastructure, other treatment control, trash capture devices, routing stormwater to treatment facilities) will be effective in reducing loads for both contaminants. Consequently, much of the additional benefit to reduce mercury urban runoff loads will come from a combination of proper disposal and management of mercury containing products as well as much more extensive treatment elements (e.g., green infrastructure) incorporated into the stormwater infrastructure.[289] Because PCBs are more concentrated in some locations, the choice of where to implement control measures may be more influenced by known areas of PCBs contamination. However, the mercury removal benefit can be an important contribution to overall mercury load reductions, and available data indicate that this strategy of focusing on PCBs will yield mercury load reductions in many circumstances.

Another reason that control measure implementation tends to focus on addressing PCBs is that the scale of urban runoff load reductions required by the PCBs TMDL (about 90 percent) is far greater than that required by the mercury TMDL (about 50 percent). Moreover, recent loading estimates suggest that current mercury loading to the Bay is at or below the interim loading milestone established in the TMDL.

Provision C.11.a requires Permittees to assess mercury load reductions through use of a previously-developed assessment methodology and data collection program[286] to quantify mercury loads reduced through implementation of any and all pollution prevention, source control and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required

[286] *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* (January 2022). Prepared for Bay Area Storm Water Management Agencies by Geosyntec Consultants.

by the provisions of this Permit. As Permittees gain implementation experience and collect information on this implementation, they may request refinement of the accounting system for use in subsequent permit terms.

Permittees are encouraged to build on the loads assessment framework developed in previous permit terms and refine the load assessment methodologies if appropriate. This could include updating and, in some cases, extending the framework presented in that document, justifying assumptions and selected parameters used for each type of control measure, and indicating what information will be collected and submitted to calculate the load reduction for each implemented control measure. The accounting scheme submitted (if necessary) near the end of the permit term (for use in subsequent permits) must be submitted for Executive Officer approval. For more information, please see the discussion under Provision C.12.a, below.

Provision C.11.a also requires Permittees to submit documentation confirming that that all control measures initiated or implemented during the previous permit term for which ongoing load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction. Examples of this include the enhanced operation and maintenance activities associated with source property referrals, green stormwater infrastructure implementation, trash collection devices with mercury and PCBs-reduction benefit, and other control measures. Appropriate documentation may include dated photographic evidence, maintenance records, and other types of relevant records showing that the control measures continue to be implemented in a manner consistent with the load reduction credit established when they were initiated.

Provision C.11.b requires Permittees to investigate land areas (general older industrial land use areas) that may contribute mercury to MS4s. For those properties or land areas found to be contributing substantial amounts of mercury or where high mercury concentrations are found (generally areas with sediment concentrations greater than 0.5 mg mercury/kg), this provision element requires Permittees to take actions to abate the mercury sources into their MS4s or refer the properties to the Water Board for follow-up measures. Historical monitoring data suggest that mercury concentrations on or near source properties are similar to those found in urban areas in general so identification of source properties for referral is more likely to be based on presence of high PCBs concentrations (generally 0.5 mg PCBs/kg) alone. Please see the discussion under C.12.b for more information about development of the accountability and load reduction estimate methodology.

A logical performance metric for the source area investigations required by Provision C.11.b is the number of acres of investigated relevant (old industrial) land area. These types of investigations have been performed by the programs for over a decade so there is a basis to establish a reasonable pace for investigations.

In selecting a performance metric for the pace of source property investigations during MRP 3, the following criteria are applied:

- Take into consideration the pace of past investigative efforts. This is consistent with the Basin Plan's requirement that the permit must include TMDL WLA implementation provisions based on an updated assessment of best management practices and control measures intended to reduce mercury in urban stormwater runoff to the maximum extent practicable.
- Endeavor to bring the countywide programs to similar levels of completion (of source property investigation) by the end of the permit term.
- Establish regular, clearly presented, enforceable, non-contingent milestones and deadlines for compliance.

All countywide programs have performed desktop screening of their old industrial land use to remove low-likelihood areas from consideration. Thus, the remaining acres of old industrial land use must be actively investigated, often requiring sampling of sediment or stormwater to find possible source properties. The programs have been, over the last (approximately) 10 years, performing active investigations (Landuse Summary[287]) at varying paces. These amounts of land area actively screened can be compared to the amount of land area that originally required investigation, and a percent completion can be computed. The percent completion of these active investigations ranges from 11 to 98 percent among the countywide programs.

- Santa Clara: 4,214 acres investigated (of 5,127, 82 percent of total requiring investigation)
- San Mateo: 2,869 acres investigated (of 4,280, 67 percent of total requiring investigation)
- Alameda: 753 acres investigated (of 6,746, 11 percent of total requiring investigation)
- Contra Costa: 976 acres investigated (of 5,005, 20 percent of total requiring investigation)
- Solano: 1,075 acres investigated (of 1,096, 98 percent of total requiring investigation)

From these data, the average of the investigatory pace of the two fastest programs is 1700 acres in a period of five years, and this pace constitutes the baseline pace for source property investigations for MRP 3. Provision C.11.b requires a slightly faster pace for those programs that would not reach at least 50 percent completion by the end

[287] Source Property Investigation Summary with Performance Metric Calculation (5-14-21). Data Submitted by BASMAA.

of the permit term if they merely achieved the baseline pace. Therefore, the required pace for source property investigations during MRP 3 is the greater of:

(1) A number of acres such that at least 50 percent of the initial amount of old industrial land use requiring investigation (desktop excluded) will be investigated, OR

(2) a baseline pace of 1,700 acres.

According to this performance metric, the programs will complete the following investigations and have the following percent completion by end of MRP 3.

- Santa Clara: 913 acres during MRP 3
    - for total of 5,127 acres, 100 percent of total requiring investigation by end of MRP 3
- San Mateo: 1,411 acres
    - for total of 4,280 acres, 100 percent of required by end of MRP 3
- Alameda: 2,620 acres
    - for total of 3,373 acres, 50 percent of required by end of MRP 3
    - requires pace above baseline
- Contra Costa: 1,700 acres
    - for total of 2,676 acres, 53 percent of required by end of MRP 3
- Solano: 21 acres
    - for total of 1,096, 100 percent of required by end of MRP 3

Summing the required acreage for source property investigations for the countywide programs results in a total of 5,752 acres to be investigated during MRP 3. Making the conservative assumption that the rate of referral (acres referred:acres investigated) will be one-third of the historical ratio of acres referred:acres investigated for each program during MRP 3, approximately 147 acres of source properties will be referred for follow-up action during the MRP 3 permit term.

A simple approach for estimating the load reductions associated with certain control measures involves use of a land-use pollutant yield. A land-use yield is an estimate of the mass of a contaminant contributed by an area of a particular land-use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historical or ongoing use of pollutants in those land uses. For example, PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas where PCBs

were never intensively used. However, this is generally not the case for mercury, where uses were more widespread. This more widespread use and the greater role of atmospheric deposition for mercury in determining the distribution of contamination reduces the likelihood of finding areas with high concentrations of mercury.

Estimated load reductions for source property referral are based on the expectation that the source property will yield less mercury upon cleanup such that the mercury yield will be more like the yield from older commercial areas rather than older industrial areas. For example, when contaminated areas are newly or redeveloped, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). There may be some mercury load reduction from source property referral (which is mainly based on PCBs contamination), but this can be determined on a case-by-case basis provided that pre-cleanup sediment concentration data are available and greater than the typical yield in old industrial, old commercial, and old residential areas of about 50 mg mercury/acre/year.[286]

Contaminated properties often have a “halo” of contamination in the vicinity of the property, and contaminated sediments in this halo can be transported to receiving waters through the stormwater conveyance system. Further, pollutants from the source area may continue to be transported offsite while remediation occurs. Therefore, implementing enhanced O&M both in areas immediately adjacent to the source area and onsite (to prevent offsite migration) while the source property is being remediated is a priority to prevent PCBs or mercury transport to receiving waters. If enhanced O&M measures are not implemented in the immediate vicinity of the referred property, the calculated load reduction will be recognized upon completion of the cleanup project. In order to confirm effective implementation of enhanced O&M plans to address the prevention of pollutants migrating offsite and the “halo” of contamination in the vicinity of the contaminated property, the Permit requires that these plans be submitted to Water Board staff for review and acceptance prior to the referral.

Provision C.11.c requires Permittees to implement control measures (treatment controls, diversion to wastewater treatment plants, or enhanced operation and treatment controls) on 2,580 acres of old industrial land use (see below for more information on this performance metric). Note that this provision is identical to Provision C.12.c, and that the choice of locations for control measures will often be based on PCBs concentrations, and that mercury-related load reduction benefits will, therefore, be largely coincidental. However, there are locations of high mercury concentrations that provide good opportunities for control measure implementation. In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence moderate to high PCBs soil concentrations (generally sediment concentrations greater than 0.3 mg Hg/kg or greater than 0.2 mg PCBs/kg, approximately the 75th percentile concentrations of these pollutants in old industrial areas). These concentrations should not be considered a “bright line” as there are likely

areas of moderate contamination for these pollutants just under these concentrations that would still be good locations for implementation, especially if these locations have a large reservoir of readily transportable, moderately contaminated sediment. Moreover, the available data have uncertainty so a measured concentration under but near 0.3 mg Hg/kg or 0.2 mg PCBs/kg may indicate an area of moderate contamination such that additional monitoring would reveal concentrations higher than these thresholds. Permittees have discretion to choose control measures appropriate to the circumstances. The reason that PCBs concentrations will be generally be more useful for selecting locations is that it is easier to find old industrial areas that are highly elevated in PCBs concentrations than it is to find areas highly elevated in mercury. As an illustration, in over 1,200 sediment samples collected in old industrial areas, the 90th percentile PCBs concentration was 22 times higher than the median. In other words, the more contaminated areas are much more contaminated than the typical (median concentration) value. By contrast, the 90th percentile mercury concentration in over 1,000 samples collected in old industrial areas was only five times higher than the median.[286] See Fact Sheet section for Provision C.12.c for more information and background on this provision element.

As stated previously, all countywide programs have performed desktop screening of their old industrial land use areas. From this information, we can estimate the extent of old industrial land use that may benefit from treatment or other control measures to address the moderately high PCBs and mercury contamination. In the information submitted by the counties, this area is the amount of old industrial land use in 2002 minus the amount redeveloped since 2002 minus the amount not draining to MS4 (see Landuse Summary[287]). The sum of these areas for each county is as follows.

- Santa Clara: 6,647 acres
- San Mateo: 4,450 acres
- Alameda: 9,374 acres
- Contra Costa: 11,199 acres
- Solano: 1,426 acres

These sum to 33,100 acres for the MRP Permit area. The performance metric for MRP 3 is to implement treatment or other controls on 2,580 acres (which represents just less than 8 percent as currently understood) of this old industrial land use across the entire MRP area. Applying the mercury yield from old industrial area (60 mg mercury/acre/year) to this area and a 70 percent treatment efficiency (efficiency factor for green infrastructure or retrofit treatment control[288]), the expected mercury load reduction by the end of the permit is 108 grams/year. It is important to note that the

[288] Geosyntec Consultants (2017). *Interim Accounting Methodology for TMDL Loads Reduced*. Prepared for Bay Area Stormwater Management Agencies Association.

performance metric is expressed as an amount of old industrial land use to address with control measure implementation or, equivalently, the calculated amount of load reduction from this implementation. With our current understanding of the amount of old industrial land use in the region, the areal performance metric is 2,580 acres of old industrial land use throughout the region. The expected scale of implementation (2,580 acres throughout the region) is very similar to the anticipated level of effort for Caltrans in the SF Bay Region, in which Caltrans will implement treatment controls on approximately 11 percent of their 27,000 acres of right-of-way for a total of more than 2,900 acres (draft Caltrans permit). Permittees may provide updated information concerning the actual amount of old industrial land use, and this amount may differ from the 33,100-acre estimate used here. For example, some of this land use may drain directly to the Bay or may not drain to MS4s. If the amount of old industrial land use is reduced with such new information, it may be the case that the old industrial acreage performance metric may constitute greater than 8 percent of the remaining old industrial land use. The performance metric was designed in part based on the level of effort expected of Caltrans in their draft permit and also to make meaningful progress in addressing old industrial land use, thereby reducing loads of mercury and PCBs. The fact that the acreage represents 8 percent of old industrial land use (as currently understood) is coincidental.

The performance metric (acreage to be addressed by the end of the permit term or corresponding estimated load reduction) can also be shown by county along with the estimated mercury load reductions (for 70 percent control measure efficiency, e.g., retrofit treatment control measures) are as follows:

- Alameda County: 664 acres (28 grams/yr)
- Contra Costa County: 664 acres (28 grams/yr)
- San Mateo County: 445 acres (19 grams/yr)
- Santa Clara County: 664 acres (28 grams/yr)
- Solano County: 142 acres (6 grams/yr)

Compliance with the provision element can be accomplished in one of two ways. Permittees within the county can implement control measures on the listed amount of old industrial land use (assuming 70 percent control measure efficiency, amounts could vary depending on efficiencies of control measures actually implemented) or account for the mass reduction of mercury shown in parentheses. These are equivalent performance metrics because the mass reductions were calculated using the listed old industrial acreage multiplied by the old industrial mass yield and 70 percent efficiency for control measures. For example, consider a county that must address 1,000 acres of old industrial land use when implementing control measures with an efficiency of 70 percent (for a load reduction of 42 grams of mercury). If this county chose instead to implement only control measures with 20 percent efficiency (e.g., efficiency of

hydrodynamic separators), the required acreage would be: 1,000 acres x (70% / 20%) = 3,500 acres. However, the load reduction would be calculated as 3,500 acres x 60 mg mercury/acre/year) x 20% treatment efficiency, or 42 grams of mercury.

If treatment control systems are used, they must be designed and sized consistent with Provision C.3.d(2) (Numeric Sizing Criteria for Stormwater Treatment Systems). Because of the higher removal efficiency of wastewater treatment facilities, each acre treated by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements. This factor is based on the fact[295] that wastewater treatment facilities remove well over 90 percent of suspended sediment particles (to which mercury and PCBs are attached), and the ratio of 0.9 to 0.7 is 1.3. Conversely, if control measures having less than 70 percent efficiency are implemented, the acreage credited will be proportional to the ratio of efficiencies (e.g., acreage credited in the ratio of 0.5/0.7 for control measures with 50 percent efficiency – see example calculation above).

Provision C.11.d requires Permittees to promote, facilitate, and/or participate in collection and recycling of mercury containing consumer products, devices, and equipment (e.g., thermometers, thermostats, switches, bulbs) and report on the amount of material recycled and approximate mass of mercury in this material. The load reduction accounting system[286] contains methodologies developed for estimation of such quantities. Collection and recycling of mercury containing devices are vital to reducing urban runoff mercury loads from the urban environment because of the large amount of mercury contained within such devices.

In the Bay Area, households and small businesses use about 1.8 million fluorescent bulbs annually, and large businesses use 10.2 million annually.[289] The number of bulbs available for recycling each year ranges from 3 to 16 million. Recycled bulbs are estimated to be largely tube lamps, which have an average amount of mercury per tube of 21.4 mg. If fluorescent bulbs, which contain mercury, are broken, it is possible for some of the mercury to volatilize and enter the environment. Some of the volatilized mercury may later become attached to particulates and be deposited, via wet and dry deposition, onto the ground or directly onto the Bay. During wet weather, some of this sediment containing mercury can be mobilized, enter the stormwater system, and potentially be conveyed to the Bay. If bulbs are properly disposed of and recycled, much less mercury enters the Bay.[289] Thermostats are a smaller potential source of mercury in that there is approximately 9.3 kg of mercury contained in the 1,500 thermostats recycled in 2006. However, if these devices are not properly disposed of, the mercury from thermostats can also be transported to receiving waters via the same processes described for fluorescent bulbs. Since 2006, California's Universal Waste Rule has

[289] Geosyntec Consultants (2010). *Desktop Evaluation of Controls for Polychlorinated Biphenyls and Mercury Load Reduction*. SFEI Contribution 613

prohibited landfill disposal of mercury-containing products (fluorescent tubes, switches, and thermostats). These waste products must be separated and properly recycled.

The Desktop Evaluation[289] estimates that the amount of mercury load reduction (mercury prevented from reaching receiving waters) achieved through recycling fluorescent bulbs increases from about 2.4 kg mercury/yr in 2010 to 13 kg mercury/yr by 2030. The same report estimates that the amount of mercury load reduction from thermometer recycling increases from 0.8 to 2.4 kg mercury/yr between 2010 and 2030. Interpolating these load reduction estimates, one calculates that, by the end of MRP3, approximately 8.8 kg mercury/yr load reduction will result from fluorescent tube recycling and 1.3 kg mercury/yr load reduction from thermostat recycling.

Provision C.11.e requires Permittees to implement green infrastructure projects during the term of the Permit at a level consistent with the requirements in Provision C.3.j. The Previous Permit required Permittees "to develop RAAs to estimate the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040." The analysis and resulting estimates for acres treated and mercury load reductions are contained in the Annual Reports for the countywide programs submitted in Fall 2020. Interpolating between the 2020 and 2030 results provides an estimate for the acreage and mercury load reductions resulting from green infrastructure implementation by 2025:

- Alameda County: 1,230 acres 35 g/yr
- Contra Costa County: 950 acres 25 g/yr
- San Mateo County 314 acres 8 g/yr
- Santa Clara County 856 acres 21 g/yr
- Solano County Permittees 821 acres 19 g/yr

The Santa Clara County and San Mateo RAAs did not include green stormwater infrastructure load reduction estimates for mercury. The average mercury load reduction per acre of implemented green infrastructure from Alameda, Contra Costa, and Solano was multiplied by the acres of planned green stormwater infrastructure implemented in these two counties to generate an estimated load reduction. Summing these estimated load reductions across countywide programs results in a regionwide total estimated mercury load reduction from green stormwater implementation of about 108 g/yr by the end of the permit term. Please see the discussion under Provision C.12.f for more information how modeling was used to develop the accountability and load reduction estimate methodology for GSI.

Available information suggests that mercury is distributed more uniformly throughout the Bay Area landscape than is the case for PCBs. Therefore, a focus on highly or even moderately contaminated areas (with mercury) may not be enough to achieve the TMDL-required load reductions. A significant component of the overall strategy to

reduce urban runoff mercury loads will be the implementation of green infrastructure control measures to intercept mercury-containing sediment and stormwater before it is discharged to receiving water. However, the planning, financing and implementation of green infrastructure is going to take a long time, perhaps as much as 25 years or more. This also means that the load reduction benefits of such implementation will also be realized over an extended time frame.

Provisions C.11.f requires Permittees to update (as needed) the plans and schedules prepared during the previous permit for mercury control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations. The updates should focus on those control measures for which new information is available and for control measures not evaluated in previous efforts. The Permit requires that these plans must: identify all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented; include a schedule according to which these technically and economically feasible control measures will be fully implemented; and provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

Provision C.11.f also requires Permittees to submit information to inform mercury-related requirements in the subsequent permit term. Namely, Permittees must identify all specific control measures to be implemented along with the expected intensity (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.) of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term.

The mercury TMDL anticipated the challenge of achieving the urban runoff mercury load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that:

> 3. *"the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:*
>
> - *A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;*
> - *Documentation has been prepared that demonstrates that all technically and economically feasible and cost-*

effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;

- *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
- *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate."*

Provision C.11.f provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. The load reductions for mercury are difficult and time-consuming to achieve because mercury is distributed relatively uniformly throughout the urban landscape, and there are few areas of substantial contamination to address in an aggressive fashion. Proper recycling and disposal of mercury-containing materials (Provision C.11.d) will continue to play an important role in reducing mercury loads in urban runoff. The RAAs submitted during the previous Permit Term emphasize that expected mercury load reductions will come from long-term implementation of control strategies (like source control, cleanup of contaminated sites, green infrastructure, and others) that extend beyond the current implementation timeframe of the TMDL. The updates to the long-term plans and schedules required by this provision could potentially support an amendment to TMDL implementation timeframe.

Provision C.11.g. There are still uncertainties surrounding the magnitude and nature of mercury reaching the Bay in urban runoff and the ultimate fate of such mercury, including biological uptake. Provision C.11.g requires that Permittees ensure that fate and transport studies of mercury in urban runoff are completed. The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the sediment and food web mercury concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, especially in Bay margins, and the identification of drainages where urban runoff mercury are particularly important in food web accumulation.

Provision C.11.h requires actions to mitigate human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish to be aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in a previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.12. PCBs Controls

The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs wasteload allocations established for the TMDL. In order to make substantial progress, Permittees must implement PCBs control measures strategically during this permit term. Moreover, aggressive control measure implementation combined with thoughtful planning for the future (see Provision C.12.h) are conditions that must be satisfied before the Water Board can consider an implementation timeframe longer than the 20 years provided in the TMDL.

The C.12 requirements follow the general approach for sediment-bound pollutants discussed above (General Strategy for Sediment-Bound Pollutants (Mercury and PCBs)). Accordingly, they build on understanding gained during the Previous Permit term, during which Permittees were required to implement PCBs control measures (source control, treatment control and/or pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and to report on the loads reduced through implementation of those control measures.

In this Permit term, the PCBs provision requires specific programmatic control measures deemed effective based on implementation experience and analyses in previous permit terms implemented at full-scale (a “programmatic approach”). For PCBs, these control measures include: source property identification and abatement, control measure implementation in old industrial areas, controlling PCBs in stormwater infrastructure, controlling PCBs from electrical utilities, green stormwater infrastructure, and managing PCBs-containing material during building demolition.

The programmatic approach to PCBs control measures means that the Permit provisions estimate, based on calculations, anticipated PCBs load reductions for each of these programmatic control measures consistent with an expected level of control measure implementation intensity along with trackable implementation performance metrics to be reported consistent with the estimated load reductions. Load reductions will be calculated based on the technically sound load reduction accounting methods[286] developed and refined during previous permit terms.

As discussed below, based on information gained during control measure pilot testing and reported during the Previous Permit term, load reductions on the order of those anticipated (approximately 1.47 kg PCBs/year) through implementation of control measures required by this Permit are achievable and necessary in order to make progress toward achieving the regionwide urban runoff wasteload allocation of 2 kg/yr (representing a load reduction from all urban runoff sources of approximately 18 kg/yr compared to loads estimated using data collected in 2003) within the 20-year TMDL timeframe. Further, load reductions resulting from a variety of PCBs control measures may be feasibly calculated in a straightforward manner (see below) and a clear

accountability metric against which to evaluate the sufficiency of control measure implementation can be applied.

The area covered by the Permit (permit area) is smaller than the region that discharges to the Bay. The discharges in the permit area have been allocated 1.6 kg/yr of the total 2 kg/yr wasteload allocation and the total load reductions required from Permittees in the permit area during TMDL implementation is 14.4 kg/yr of the 18 kg/yr regionwide total.

Fact Sheet Findings in Support of Provision C.12

C.12-1 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. U.S. EPA approved the TMDL on March 29, 2010.

C.12-2 The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit:

> *"The 2003 load of PCBs from urban runoff is* 20 kg/yr, and the aggregate WLAs for urban runoff total 2 kg/yr. Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.
>
> *Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of* best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities … shall reduce PCBs in stormwater runoff to the maximum extent practicable….
>
> *In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot*

*scale to determin*e their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost-efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

*In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through tr*eatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section."

C.12-3 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question. If these sources are contributing to urban runoff loads (as opposed to direct Bay discharge), load reductions from these sources will count toward meeting the urban runoff wasteload allocations.

C.12-4 Some PCB congeners have dioxin-like properties. Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions

targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

C.12-5 Estimates using the latest available data suggest that the urban runoff PCBs loading to San Francisco Bay is on the order of 19 kg/yr (McKee and Yee 2015). While this figure is based on environmental data and thus has inherent uncertainty associated with it, it agrees very well with the regional urban runoff load estimate of 20 kg/yr provided in the TMDL report.

C.12-6 Studies suggest that PCBs load reductions of approximately 6 kg/yr are possible by 2030 through control measures like street sweeping, control of PCBs during building demolition and renovation, drop inlet cleaning, treatment retrofits, redevelopment of contaminated areas, pump station diversion, and street flushing (McKee and Yee 2015[284]). While there are substantial uncertainties associated with these estimates, these results suggest that a substantial portion of the additional load reductions (~ 12 kg/yr) necessary to achieve the PCBs TMDL may need to come from identification and cleanup of PCBs-contaminated properties.

C.12-7 The distribution of PCBs in the urban landscape is much more variable than it is for mercury. For example, data indicate that PCBs-contaminated land uses yield perhaps 800 times more PCBs per unit area compared to the least contaminated land uses. By contrast, there is a 70-fold difference between the highest and lowest yielding land uses for mercury (McKee and Yee 2015). A large proportion (about 53 percent) of annual average urban runoff PCB loading is likely coming from old industrial or other contaminated areas (McKee and Yee 2015).

C.12-8 A significant recent accomplishment of the Sources, Pathways, and Loadings workgroup (SPLWG) of the Regional Monitoring Program has been the development and refinement of a Regional Watershed Spreadsheet Model (RWSM). This GIS-based model estimates relative land use and source area yields, and integrates them to provide a transparent, mutually accepted, and peer-reviewed analysis of relative watershed scale yield. Outputs from model runs to date suggest yields for the most polluted watershed in excess of 1,000 g/km^2 for PCBs and mercury and a variation between watersheds of ~100,000-fold for PCBs and ~200-fold for mercury. To date, modeling results have a large amount of uncertainty in terms of absolute magnitude, but the results are capturing the patterns of contaminant distribution and transport. The model output is generally consistent with what is known about the distribution of these contaminants in the landscape from stormwater and bedded sediment data. The results are also consistent with what monitoring data tell us about the relative mercury and PCBs loads from land use and source area categories. The SPLWG is currently developing a more sophisticated dynamic watershed loading model that will provide a much better modeling tool to predict

watershed scale loads of PCBs and other contaminants under a variety of management scenarios.

C.12-9 Sufficient information is available to establish default factors for PCBs load reduction credit resulting from foreseeable control measures implemented during this permit term (see information under Provision C.12.a, below). For treatment controls, the estimated load reductions can be calculated by multiplying the assumed land-use PCB yearly mass yield by the treated area and by a treatment efficiency factor. The load reduction resulting from cleaning up contaminated properties can be estimated by recognizing that the yield of the contaminated property will be reduced to an assumed background level over the course of site cleanup. The load reduction resulting from controlling PCBs in building materials during demolition can be estimated by estimating the amount of PCBs in the building, the fraction of those PCBs that would enter the storm drain system in the absence of controls, and the efficiency of control measures applied to the demolished building to prevent such PCBs release.

C.12-10 Limited sampling data from Bay Area structures built between 1950 and 1980 suggest that PCB concentrations in caulks here are similar to those in other parts of North America and Europe. Samples collected in about 1,350 buildings in Switzerland constructed between 1950 and 1980 found almost half the buildings contained PCBs in caulk, with most samples containing >100 ppm and 20 percent containing 10,000 ppm or more. In Bay Area samples, 40 percent contained > 50 ppm PCBs and 20 percent contained > 10,000 ppm PCBs. The study estimates that certain types of Bay Area structures built 1950-1980 contain a mid-range average of 4.7 kg PCBs per building. An estimated 6,300 currently standing non-residential buildings in the MRP area were built between 1954 and1974. The mid-range estimate of the total PCB mass in caulk in these buildings is 10,500 kg.[290]

C.12-11 During the Previous Permit, Permittees were required to develop and implement protocols for identifying PCBs-containing structures at the time of demolition so that PCBs do not enter municipal storm drains. Some demolition sites, especially high-profile sites such as hospitals, bridges and sports arenas, comply with federal law (Toxic Substances Control Act) and State regulations (California Code of Regulations Title 22) that require a project proponent to determine the presence of PCBs and other hazardous substances and to follow applicable disposal requirements. Soil sampling data from such demolition projects indicate that significant concentrations of PCBs can be present in site soils. Such PCB-laden sediment, particularly at a demolition site without adequate controls, is transported by vehicle tracking, wind erosion or precipitation runoff to the storm drain. PCBs entering the storm drain system

[290] Klosterhaus S. and McKee L. et al. 2014. *Polychlorinated Biphenyls in the exterior caulk of San Francisco Bay Area buildings, California, USA*. Environment International 66 (2014) 38–43.

during dry weather are non-stormwater discharges that must be effectively prohibited pursuant to CWA § 402(p)(3)(B)(ii). PCBs that are discharged into storm drain systems and waters of the U.S. through stormwater runoff are appropriate for control in order to make progress in achieving the PCBs TMDL wasteload allocations for urban runoff, pursuant to CWA § 402(p)(3)(B)(iii).

C.12-12 The protocol for requiring applicable structures to sample for PCBs prior to receiving a demolition permit, developed during the Previous Permit term, allowed for identification of structures that contain PCBs. But the Previous Permit did not allow for collection of information that could demonstrate PCBs were properly disposed so they are not transported to water bodies via the MS4. That shortcoming is addressed in this Permit, for those structures where notification and advance approval from the U.S. EPA is not required. This Permit includes a requirement for Permittees to include in their annual reports verification, such as the hazardous waste manifest prepared for transportation of the material to a disposal facility, that demonstrates proper disposal of the building materials with PCBs concentrations of 50 ppm or greater.

C.12-13 U.S. EPA has developed guidelines, available at its "Steps to Safe Renovation and Abatement of Buildings That Have PCB-Containing Caulk" website, for identifying and removing PCBs in building materials that can help in the effort to manage PCBs so that they do not enter municipal storm drains. In addition, during the MRP 1 term, starting in 2009, the Permittees participated in the grant-funded "PCBs in Caulk Project", which addressed potential impacts of PCBs released into stormwater runoff during demolition or remodeling projects in the San Francisco Bay Area. This project fulfilled the permit requirement to investigate the costs, effectiveness, and technical feasibility of PCBs control measures to minimize the release of PCBs in caulks and sealants to stormwater runoff during demolition or remodeling projects. Products developed through this grant-funded project include a fact sheet for developers; a fact sheet on sampling methods; BMPs to control PCBs in caulk at demolition or renovation sites; a Model Implementation Process to incorporate a requirement to use BMPs into the municipal demolition permitting process; a training strategy to train and deploy municipal staff, such as hazardous material or building inspectors, to ensure proper implementation of BMPs; and a technical memorandum on relevant regulations and policies.

C.12-14 This provision is consistent with a recent U.S. EPA memorandum[291] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear and concrete accountability metrics and deadlines for the achievement of specific anticipated PCBs load reductions

[291] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs."

from effective control measures as well as other requirements, necessary to achieve receiving water limits of this permit term relative to the PCBs TMDL WLAs.

Specific Provision C.12 Requirements

Provision C.12.a requires Permittees to assess PCBs load reductions through use of a previously-developed assessment methodology and data collection program[286] to quantify PCBs loads reduced through implementation of any and all pollution prevention, source control, and treatment control efforts required by the provisions of this Permit or load reductions achieved through other relevant efforts not explicitly required by the provisions of this Permit. The load reduction assessment methodology is consistent with the PCBs TMDL requirement that *"stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions"* (there is a similar requirement in the SF Bay mercury TMDL). As Permittees gain implementation experience and collect information on this implementation, they may request refinement of the accounting system for use in subsequent permit terms.

The goals of the assessment methodology required in this provision element are two-fold. First, it establishes a system of accountability for control measure implementation with which to measure the sufficiency of control measure implementation intensity. Second, it provides an accounting system that relates control measure implementation intensity with estimated PCBs and mercury load reductions. This allows tracking of implementation intensity to assess compliance rather than having to measure actual load reductions to assess compliance, which is impractical. See discussion above under Provision C.8.f on the special challenges of monitoring PCBs and mercury and also in the introduction to pollutants of concern provisions where we describe the for PCBs and mercury control measure implementation. For each provision element, the Fact Sheet describes how data and information are used to develop the trackable accountability metric and load reduction estimate corresponding to the trackable metric.

Permittees are encouraged to build on the loads assessment framework developed in previous permit terms and refine the load assessment methodologies if appropriate. This could include updating and, in some cases, extending the framework presented in that document, justifying assumptions and selected parameters used for each type of control measure, and indicating what information will be collected and submitted to calculate the load reduction for each implemented control measure. The accounting scheme submitted (if necessary) near the end of the Permit term (for use in subsequent permits) must be submitted for Executive Officer approval.

Provision C.12.a also requires Permittees to submit documentation confirming that that all control measures initiated or implemented during the Previous Permit term for which ongoing load reduction credit was recognized continue to be implemented at an

intensity sufficient to maintain the credited load reduction. Examples of this include the enhanced operation and maintenance activities associated with source property referrals, GSI implementation, trash collection devices with mercury and PCBs-reduction benefit, and other control measures. Appropriate documentation may include dated photographic evidence, maintenance records, and other types of relevant records showing that the control measures continue to be implemented in a manner consistent with the load reduction credit established when they were initiated.

Many of the legacy sources of PCBs are found in Bay margins contaminated by historical industrial activity. These legacy sources may be contributing to storm drain runoff conveyances, but Permittees may have jurisdictional challenges in addressing the sources in private property. In addition, Permittees are responsible for contamination in public rights of way. Permittees are expected to make diligent efforts both to address contamination on public property and to refer source properties to the Water Board for possible cleanup and abatement.

Provision C.12.b requires Permittees to investigate land areas (generally older industrial land use areas) that likely contribute PCBs to MS4s. For those properties or land areas found to be contributing substantial amounts of PCBs or where high PCBs concentrations are found (generally areas with sediment concentrations greater than 0.5 mg PCBs/kg), this provision requires Permittees to take actions to abate the PCB sources into their MS4s or refer the properties to the Water Board for follow-up measures.

Permittees have developed a systematic investigatory process (described in appendix C of the load reduction accounting report[286]) to identify source properties, and this process includes the following steps:

(1) Identify areas that should be considered for source area investigations (completed);

(2) Conduct screening-level investigations using desktop analyses or monitoring data in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;

(3) Conduct targeted source area investigations (e.g., records review, ROW surveys, site visits, sampling) in areas prioritized as high or moderate likelihood source areas in (2) to identify and confirm source areas; and

(4) Determine next steps for confirmed source areas.

A useful performance metric for the source area investigations required by Provision C.12.b is the number of acres of investigated relevant (old industrial) land area. These types of investigations have been performed by the programs for over a decade so there is a basis to establish a reasonable pace for investigations. The reason why the Permit uses the acres investigated rather than the acres referred for follow-up action as

the performance metric is that it is not known in advance if the investigation is going to reveal a contaminated property suitable for referral.

In selecting a performance metric for the pace of source property investigations during MRP 3, the following criteria are applied:

- Take into consideration the pace of past investigative efforts. This is consistent with the Basin Plan's requirement that the permit must include TMDL WLA implementation provisions based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff to the maximum extent practicable.
- Endeavor to bring the countywide programs to similar levels of completion (of source property investigation) by the end of the permit term.
- Establish regular, clearly presented, enforceable, non-contingent milestones and deadlines for compliance.

All countywide programs have performed desktop screening of their old industrial land use to remove low-likelihood areas from consideration. Thus, the remaining acres of old industrial land use must be actively investigated, often requiring sampling of sediment or stormwater to find possible source properties. The programs have been, over the last (approximately) 10 years, performing active investigations (Landuse Summary[287]) at varying paces. These amounts of land area actively screened can be compared to the amount of land area that originally required investigation, and a percent completion can be computed. The percent completion of these active investigations ranges from 11 to 98 percent among the countywide programs.

- Santa Clara: 4,214 acres investigated (of 5,127, 82 percent of total requiring investigation)
- San Mateo: 2,869 acres investigated (of 4,280, 67 percent of total requiring investigation)
- Alameda: 753 acres investigated (of 6,746, 11 percent of total requiring investigation)
- Contra Costa: 976 acres investigated (of 5,005, 20 percent of total requiring investigation)
- Solano: 1,075 acres investigated (of 1,096, 98 percent of total requiring investigation)

From these data, the average of the investigatory pace of the two fastest programs is 1,700 acres in a period of five years, and this pace constitutes the baseline pace for source property investigations for MRP 3. Provision C.12.b requires a slightly faster pace for those programs that would not reach at least 50 percent completion by the end

of the permit term if they merely achieved the baseline pace. Therefore, the required pace for source property investigations during MRP 3 is the greater of:

- A number of acres such that at least 50 percent of the initial amount of old industrial land use requiring investigation (desktop excluded) will be investigated, OR
- a baseline pace of 1,700 acres.

According to this performance metric, the programs will complete the following investigations and have the following percent completion by end of MRP3.

- Santa Clara: 913 acres during MRP 3
  - for total of 5,127 acres, 100 percent of total requiring investigation by end of MRP 3
- San Mateo: 1,411 acres
  - for total of 4,280 acres, 100 percent of required by end of MRP 3
- Alameda: 2,620 acres
  - for total of 3,373 acres, 50 percent of required by end of MRP 3
  - requires pace above baseline
- Contra Costa: 1,700 acres
  - for total of 2,676 acres, 53 percent of required by end of MRP 3
- Solano: 21 acres
  - for total of 1,096, 100 percent of required by end of MRP 3

Summing the required acreage for source property investigations for the countywide programs results in a total of 5,752 acres to be investigated during MRP 3. Making the conservative assumption that the rate of referral (acres referred:acres investigated) will be one-third of the historical ratio of acres referred:acres investigated for each program during MRP 3, approximately 147 acres of source properties will be referred for follow-up action during the MRP 3 permit term. The ratio of acres referred:acres investigated was assumed to be one-third the historical ratio to account for the fact that the easier to find source properties may have already been identified. Therefore, the success rate of finding new source properties as old industrial acres are investigated may decline. The outcome of investigations during MRP 3 can confirm this assumption.

A simple approach for estimating the load reductions associated with certain control measures involves use of a land-use pollutant yield. A land-use yield is an estimate of the mass of a contaminant contributed by an area of a particular land-use per unit time. Essentially, different types of land uses yield different amounts of pollutants because

land use types differ in their degree of contamination resulting from differing intensities of historical or ongoing use of pollutants in those land uses. PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas where PCBs were never intensively used.

The land use-specific yields were developed by matching the predictions of a watershed model against monitoring data.[292] The inputs to the model include: 1) GIS layers identifying the composition of various types of land use in Bay Area watersheds (e.g., old industrial, old commercial, old residential, new urban, agriculture/open space), 2) information about the volume of water and sediment transported to receiving waters from these watersheds, and 3) PCBs and mercury monitoring data in a subset of these watersheds. The adjustable parameters in the model are the concentrations of pollutants in stormwater or sediment from the various types of land uses, and the final values for these concentrations are selected through an iterative process where the model predictions are matched against the actual data, and the values of the land use-specific concentrations are modified until a best solution is found for the water and sediment pollutant concentrations from various land uses that results in the best match with the monitoring data. This process is known as calibration. The resulting yields for water and sediment are simply the model-selected concentrations divided by the total volume of water or sediment originating from each land use type during a typical year divided by the total acreage of that land use type, and these yields are shown in Tables A-5 and A-6 below.

[292] Wu, J., Gilbreath, A.N., McKee, L.J., 2016. Regional Watershed Spreadsheet Model (RWSM): Year 5 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 788. San Francisco Estuary Institute, Richmond, California.

Table A-5. Average PCBs and Mercury Yields by Land Use Category

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

1 The model calibration for PCBs is reasonable but there remains a lower confidence in the calibration for mercury.[292]

Table A-6. Total PCBs and Mercury by Land Use Category

Land Use Category	Total PCBs (mg/ac/yr)	Total Mercury[1] (mg/ac/yr)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1 The model calibration for PCBs is reasonable but there remains a lower confidence in the calibration for mercury.[292]

Because source properties represent a small fraction of the total Bay Area land use, the above calibration procedure will not work so a separate procedure was used to estimate the PCBs yield from source properties. There are no mercury source properties from which to develop a yield so the yield value for old industrial/source areas will be used for load reduction accounting. The PCBs source property yield (5,078 mg PCBs/acre*year) was derived as the product of a representative PCBs concentration from over 670 PCBs surface soil samples collected at known source properties multiplied by a representative soil/sediment yield for old industrial areas obtained through watershed modeling.

Estimated load reductions for source property abatement or referral are based on the expectation that the source property will yield less PCBs upon cleanup such that the PCBs yield will be more like the yield from older commercial areas rather than older industrial areas. For example, when contaminated areas are newly or redeveloped, the pollutant yield of the area will be reduced through a variety of mechanisms (i.e., removal, capping, paving of contaminated sediment). Accordingly, the amount of reduction can be calculated as the referred-acres multiplied by the difference between the source property yield (5,078 mg PCBs/acre*year[286]) minus the old commercial yield (49 mg PCBs/acre*year). Therefore, controlling the load from the expected acreage of abated or referred properties will ultimately result in an estimated load reduction of 740 g/yr, one-half of which (370 g/yr) can be recognized during MRP 3 provided that effective enhanced operation and measurement (O&M) measures are implemented to prevent off-site migration and address the contamination in the vicinity of the property due do historical off-site migration of PCBs.

PCBs-contaminated properties often have a “halo” of contamination in the vicinity of the property, and contaminated sediments in this halo can be transported to receiving waters through the stormwater conveyance system. Further, pollutants from the source area may continue to be transported offsite while remediation occurs. Therefore, implementing enhanced O&M both in areas immediately adjacent to the source area and onsite (to prevent offsite migration) while the source property is being remediated is a priority to prevent PCBs transport to receiving waters. If enhanced O&M measures are not implemented in the immediate vicinity of the referred property, the calculated load reduction will be recognized upon completion of the cleanup project. In order to confirm effective implementation of enhanced O&M plans to address the prevention of PCBs migrating offsite and the halo of contamination in the vicinity of the contaminated property, the Permit requires that these plans be submitted to Water Board staff for review and acceptance prior to the referral.

Provision C.12.c requires Permittees to implement control measures (treatment controls, diversion to wastewater treatment plants, or enhanced operation and treatment controls) on 2,580 acres of old industrial land use (see below). In choosing locations for treatment controls and diversions, Permittees should focus on public rights-of-way and storm drain infrastructure in catchments containing known or suspected source areas or evidence moderate to high PCBs soil concentrations (generally sediment concentrations greater than 0.3 mg Hg/kg or greater than 0.2 mg PCBs/kg, approximately the 75th percentile concentrations in old industrial areas). These concentrations should not be considered a “bright line” as there are likely situations of moderate contamination for these pollutants just under these concentrations that would still be good locations for implementation, especially if these locations have a large reservoir of readily transportable sediment at these moderate concentrations. Moreover, the available data have uncertainty so a measured concentration under but near 0.3 mg Hg/kg or 0.2 mg PCBs/kg may indicate an area of moderate contamination such that additional

monitoring would reveal concentrations higher than these thresholds. Permittees have discretion to choose control measures appropriate to the circumstances.

In addition to finding and remediating source areas, there is also a need to address the moderate contamination that exists now and will remain even if source properties are identified and abated or referred for additional action. Below is a plot of data representing more than 1,500 PCBs samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019.[286] These data establish a contextual framework to interpret new monitoring data to determine if the new data represent areas of high or moderately high PCBs concentrations. This helps guide decision making for site selection for control measure implementation, especially in old industrial areas. One can see from the figure that there were about 500 of the 1,500 samples with PCBs concentrations over 0.1mg/kg (approximately 70th percentile of the data) and about 200 samples exceeding 0.5 mg/kg (86th percentile of the data). Areas with moderately high PCBs concentrations (e.g., 0.1-0.5 mg/kg) were found throughout areas where historical industrial activity involved use of PCBs[284]). In general, Permittees will search for source properties in areas with measured concentrations at or above 0.5 mg/kg and will implement control measures to address residual moderate contamination in areas with measured PCBs concentrations of about 0.2 mg/kg.

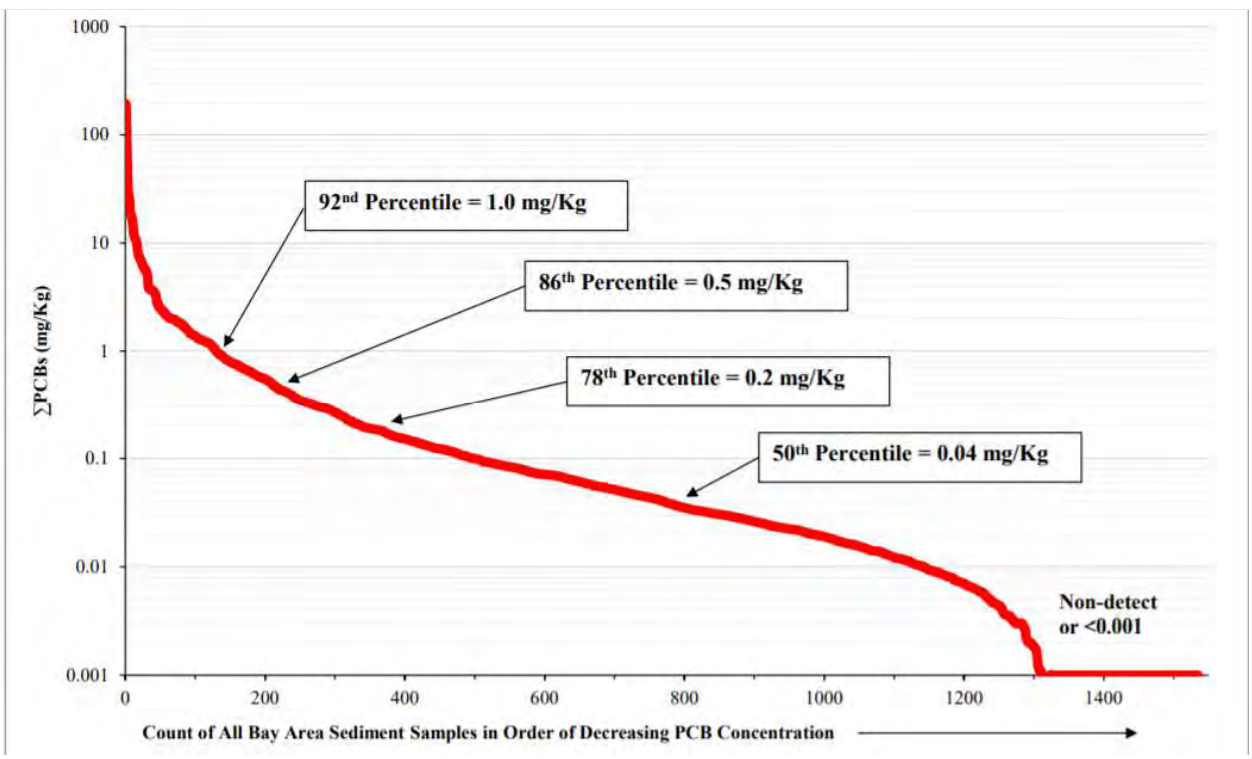

Treatment and other control measures focusing on these highly- and moderately contaminated areas form an important element in achieving the PCBs TMDL-required load reductions. It is also important to attend to these old industrial areas because they are generally located near historically disadvantaged communities and reducing PCBs

and other contamination promotes better health for the residents and helps improve quality of life for these communities. Additionally, PCBs from these old industrial areas are transported to the Bay near many popular shoreline fishing locations so popular fish species caught and consumed by anglers fishing from shoreline fishing locations near these old industrial areas generally have high PCBs concentrations.

As stated previously, all countywide programs have performed "desktop" screening of their old industrial land use areas. From this information, we can estimate the extent of old industrial land use that may benefit from treatment or other control measures to address the moderately high PCBs and mercury contamination. In the information submitted by the Permittees, this area is the amount of old industrial land use in 2002 minus the amount redeveloped since 2002 minus the amount not draining to MS4 (see Landuse Summary[287]). The sum of these areas for each county is as follows.

- Santa Clara: 6,647 acres
- San Mateo: 4,450 acres
- Alameda: 9,374 acres
- Contra Costa: 11,199 acres
- Solano: 1,426 acres

These sum to 33,100 acres for the MRP Permit area. The performance metric for MRP3 is to implement treatment or other controls on 2,580 acres of old industrial land use (which represents slightly less than 8 percent of this old industrial land use area as currently understood) across the entire MRP area. Applying the PCBs yield from old industrial area (259 mg PCBs/acre/year, see discussion under C.12.b for details of derivation) to this area and a 70 percent treatment efficiency (efficiency factor for green infrastructure or retrofit treatment control[288]), the expected PCBs load reduction by the end of the permit term is 467 g/yr.

It is important to note that the performance metric is expressed as an amount of old industrial land use to address with control measure implementation or, equivalently, the calculated amount of load reduction from this implementation. With our current understanding of the amount of old industrial land use in the region, the areal performance metric is 2,580 acres of old industrial land use throughout the region. Permittees may provide updated information concerning the amount of old industrial land use, and this amount may differ from the 33,100-acre estimate used for this requirement. For example, some old industrial land use may drain directly to the Bay or may not drain to MS4s and thus not properly counted in the total. If the amount of old industrial land use is reduced with such new information, it may be the case that the old industrial acreage performance metric may constitute greater than 8 percent of the remaining old industrial land use. However, it should be clearly understood that the performance metric was designed to make meaningful progress in addressing old industrial land use in terms of the calculated amount of load reduction. The acreage

requirement is the performance metric, not the percentage of remaining old industrial land use addressed.

The performance metric of 2,580 acres of old industrial land use throughout the region is very similar to the anticipated level of effort for Caltrans in the SF Bay Region, in which Caltrans will implement treatment controls on approximately 11 percent of their 27,000 acres of right-of-way for a total of more than 2,900 acres (draft Caltrans permit). The performance metric (acreage to be addressed by the end of the permit term or corresponding estimated load reduction) can also be shown by county along with the estimated PCBs load reductions (for 70 percent control measure efficiency, e.g., retrofit treatment control measures) are as follows:

- Alameda County: 664 acres (121 grams/yr)
- Contra Costa County: 664 acres (121 grams/yr)
- San Mateo County: 445 acres (81 grams/yr)
- Santa Clara County: 664 acres (121 grams/yr)
- Solano County: 142 acres (26 grams/yr)

The performance metrics presented in the draft of this Order resulted in large disparities in required implementation effort among the four major countywide stormwater management programs. The Alameda and Contra Costa county performance metrics were substantially greater than those for Santa Clara and San Mateo counties. In order to reduce these disparities in level of effort, the greater of the performance metrics for San Mateo and Santa Clara 664 acres) was assigned both to Alameda and Contra Costa counties. The performance metrics for Solano, Santa Clara and San Mateo counties remain unchanged. With this change, the four large countywide programs have performance metrics of a similar magnitude.

The reduced performance metrics in this Order represent a substantial amount of control measure implementation and PCBs load reduction. According to McKee et al. (2015[284]), about 1.5 kg PCBs/yr loading originates from old industrial landuse. The original C.11/12.c performance metric acreage in the draft of this Order (3,300 acres) would have resulted in about 600 g/yr load reductions, which represents about 40% of the total from McKee et al. 2015. The revised performance metric (2580 acres of old industrial landuse for entire MRP area) represents about a 31% reduction.

The RMP has funded special studies in four representative “Priority Margin Units”, or PMUs. A PMU is a high priority margin area for management and monitoring. The four PMUs are San Leandro Bay (SLB), Emeryville Crescent, Steinberger Slough, and Richmond Harbor. The PMU studies develop conceptual and quantitative models of how PCBs is transported into and through these PMUs. These studies also provide analysis of how the PMUs would respond to load reductions. Because the loads to the PMUs enter a relatively isolated (from Bay influence), the trajectory of recovery is

dominated by what happens to loading directly to the PMU, rather than the overall loading to the Bay as a whole.

The plot below (from the SLB PMU report[293]) shows the modeled recovery of PCBs mass in the system, which is a useful proxy for the scale of reductions in biota. The plot shows the trajectory in PCBs mass in SLB if loads to the system are perturbed but suspended sediment concentrations and tidal export rate parameters remain unchanged. For this representative PMU, the one-box model shows substantial declines in the mass of PCBs in the subembayment. For SLB, reducing loads by 50% resulted in about a 50% reduction in the PCBs mass in SLB in about five years according to the model. If other San Francisco Bay margin areas receiving loads (from local urban runoff sources) respond similarly to SLB, load reductions of this magnitude should manifest in reductions in total mass (in local embayments) of approximately the same order of magnitude. This would result in substantially less PCBs available in these receiving waters for uptake into biota, including the fish caught by local anglers. For the Emeryville Crescent PMU, the recovery is not as dramatic according to the modeling, but the Emeryville Crescent PMU report suggests that the dynamic transport in Emeryville Crescent may not be as amenable to application of a box model[294].

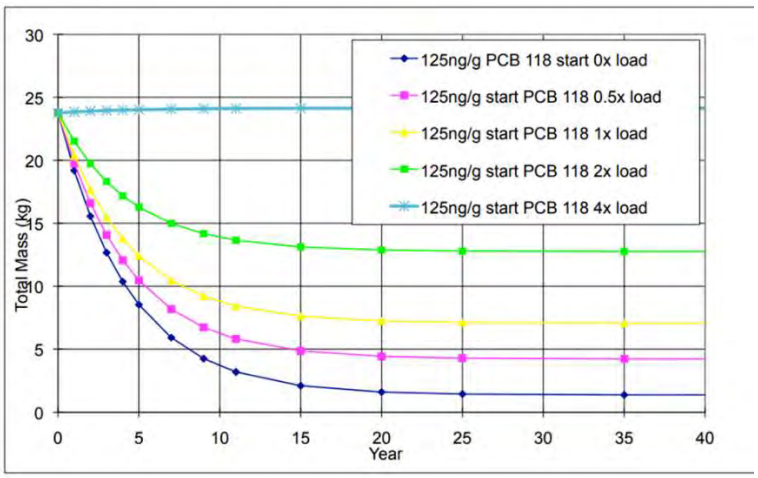

- Figure showing modeled PCBs recovery trajectory in SLB as a function of reduced PCBs loading to SLB subembayment[293]

Compliance with the performance metrics of this provision element can be accomplished in one of two ways. Permittees within the county can implement control measures on the listed amount of old industrial land use (assuming 70 percent control

[293] Conceptual Model to Support PCB Management and Monitoring in the San Leandro Bay Priority Margin Unit – Final Report. Prepared by Donald Yee, Alicia N. Gilbreath, Lester J. McKee, and Jay Davis. San Francisco Estuary Institute. Contribution No. 928. November 2019.

[294] Conceptual Model to Support PCB Management and Monitoring in the Emeryville Crescent Priority Margin Unit – Final Report. Prepared by Jay Davis, Donald Yee, Alicia N. Gilbreath, and Lester J. McKee. San Francisco Estuary Institute. Contribution No. 824. April 2017.

measure efficiency, amounts could vary depending on efficiencies of control measures actually implemented) or account for the mass reduction of PCBs shown in parentheses. Control measure efficiencies are stated in the accounting document along with supporting information for the value. These are equivalent performance metrics because the mass reductions were calculated using the listed old industrial acreage multiplied by the old industrial mass yield and 70 percent efficiency for control measures. For example, consider a county that must address 1,000 acres of old industrial land use when implementing control measures with an efficiency of 70 percent (for a load reduction of 181 grams of PCBs). If this county chose instead to implement only control measures with 20 percent efficiency (e.g., efficiency of hydrodynamic separators), the required acreage would be: 1,000 acres x (70% / 20%) = 3500 acres. However, the load reduction would be calculated as 3,500 acres x 259 mg PCBs/acre/year x 20% treatment efficiency, or 181 grams of PCBs.

If treatment control systems are used, they must be designed and sized consistent with Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems). Because of the higher removal efficiency of wastewater treatment facilities, each acre treated by routing stormwater to wastewater treatment facilities will be credited as 1.3 acres toward satisfying the treatment requirements. This factor is based on the fact that wastewater treatment facilities remove well over 90 percent[295] of suspended sediment particles (to which mercury and PCBs are attached), and the ratio of 0.9 to 0.7 is 1.3. Conversely, as previously stated, if control measures having less than 70 percent efficiency are implemented, the acreage credited will be proportional to the ratio of efficiencies (e.g., acreage credited in the ratio of 0.5/0.7 for control measures with 50 percent efficiency). As an example, full-trash capture systems will remove some particles (and hence PCBs), and these have an efficiency of about 20 percent so the acreage credited for these systems will be in the ratio of 0.2/0.7). The PCBs in sediment data described above were also analyzed to determine land-use specific sediment concentrations. For example, the average PCBs concentration in old industrial areas was found to be 790 ppb, and the average concentration in new urban areas was just 66 ppb. These average landuse-specific PCBs and mercury concentrations are used in the loads reduction accounting for control measures where the amount of sediment removed can be determined such as in pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting. All of these load reduction accounting methods[286] have been reviewed by Water Board staff and approved by the Executive Officer.

Provision C.12.d requires Permittees to ensure proper management of potential PCBs-containing material in bridge and overpass roadway expansion joints when these facilities are replaced or repaired. They will do so through implementation of a Caltrans specification (to be developed through proposed requirement in Caltrans stormwater permit, likely adopted by late 2022). The requirement for Caltrans to develop this

[295] TSS Removal data for EBMUD and EBDA facilities from May 2016 through April 2021 (spreadsheet of data).

specification is included in the draft version of the statewide Caltrans permit currently under development. The standard operating procedure (SOP) for dealing with the material will likely be similar to that used for the 2018 demolition of the old eastern span of San Francisco Bay Bridge and will involve the removal and proper disposal of PCBs-containing caulk prior to the rehabilitation of existing roadways containing such material. The accountability metric is, therefore, demonstration by Permittees that the Caltrans SOP is applied to management of PCBs-containing material when bridge and overpass roadway surfaces are replaced or repaired.

In order to generate data to develop the load reduction estimate resulting from SOP implementation, the Bay Area Stormwater Management Agencies Association (BASMAA) evaluated PCBs in caulk and sealants in public roadways and storm drain infrastructure by sampling caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area.[286] The sample locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970s, the most recent time period PCBs were still in widespread use. This effort resulted in 54 caulk or sealant samples from public infrastructure in these locations. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges, and these ranged in concentration from non-detect to 5,000 mg PCB/kg. Through a maximum likelihood statistical approach applied to the data after estimating values for non-detects, a technically defensible value for the PCBs concentration was derived as 184 mg PCB/kg. The total amount of PCBs in roadway caulk or sealant was estimated using this concentration along with information about the dimensions of Bay Area bridges. The report estimates that the total amount of PCBs in the roadway caulk and longitudinal seal material on the 1,477 bridges in the MRP area is 39 kg.[286]

There are no available data in the literature for the rate at which PCBs leach from this caulk and sealing material, so the report authors evaluated a range of scenarios for the rate at which the PCBs in the material would leach from the joint and sealant material over time. The load reduction associated with this control measure occurs when this leaching process is interrupted through the removal of the material. A high (1% per year) and low (0.5 percent per year) leaching rate were evaluated.[286] Based on the expected replacement rate of bridges, the expected load reduction ranged from 195 to 390 g PCBs/year, assuming that joints and longitudinal seal material would be removed. The estimated load reduction resulting from implementation of this provision element assumes an intermediate leaching rate (0.75 percent per year) and is thus 300 g PCBs/year.

The load reduction calculation method involves generating an estimate of the typical concentration of PCBs in roadway caulking and multiplying this by an estimate for the amount of material removed each year and an estimate for the PCBs leach rate is a sound and practical method for estimating the load reduction. As previously discussed,

attempts to use monitoring data or even modeling to estimate the load reduction resulting from removal of this PCBs-containing caulk would involve great expense and effort and would, despite these efforts, still yield a load reduction estimate with considerable uncertainty. The Water Board has reviewed the data collected, the statistical approach used to generate the typical PCBs concentration, as well as the analytical approach used to generate the load reduction estimate from the concentration data. These data are reliable and the statistical and calculation methodologies are logically consistent and technically sound.

Provision C.12.e requires Permittees to develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for municipally owned electrical utilities and collaborate with the Water Board to determine PCBs loadings in OFEE from non-municipally owned electrical utilities. The Water Board is committed to collaborating with Permittees to request and obtain the needed information from these non-municipally owned electrical utilities. The reporting requirements are contingent upon the Water Board formally transmitting the requested information from the non-municipally owned electrical utilities to the Permittees.

Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may have elevated concentrations of PCBs in surface soils that can be released to the MS4. The cumulative releases of PCBs-laden soils from these properties was investigated by McKee et al. (2006[296]), and McKee estimated the net mass input of PCBs to MS4s in the Bay Area in 2005 was approximately 28 kg per year. Of this total, roughly 29 percent (8 kg/yr) was estimated to have originated from controlled closed systems (transformers and large capacitors). This estimate suggests that because of both current and past use, transformers and large capacitors, which are both electrical utility applications, may continue to contribute nearly one-third of the net PCBs mass to MS4s in the Bay Area. Therefore, this potential source warrants further investigation and control**.**

BASMAA[286] estimates the annual load reductions from removing OFEE as the estimated annual load of PCBs that entered the MS4 from OFEE at the start of the PCBs TMDL (1.1 kg in 2005) multiplied by the estimated annual percentage of remaining OFEE equipment removed. In other words, all existing OFEE in 2005 were, combined, contributing 1.1 kg PCBs/yr loading to MS4s. Further, a permanent yearly load reduction is realized when a unit of OFEE is removed. The report provides a low, medium, and high estimate for the annual load reduction based on low, medium, and high estimates for the annual removal rate of OFEE (the percentage of remaining equipment removed each year since the start of the PCBs TMDL (in 2005). Using the starting point of 1.1 kg PCBs per year from OFEE in 2005 along with the medium estimate (2.3 percent per year) for the equipment removal rate, there would be 758

[296] McKee, L., Mangarella, P., Williamson, B., Hayworth, J., and Austin, L., 2006. *Review of methods used to reduce urban stormwater loads: Task 3.4. A Technical Report of the Regional Watershed Program*: SFEI Contribution #429. San Francisco Estuary Institute, Oakland, CA.

grams PCB/year mass loading from OFEE entering the MS4 at the start of MRP 3. Using this same 2.3 percent per year removal rate, the estimated cumulative load reduction by the end of MRP 3 is 90 g PCBs/year in consideration of the development of improved standard operating procedures to address spill response and reporting required by the Permit.

The load reduction calculation method for OFEE involves relying on a technically sound PCBs mass loading estimate from 2005 and applying reasonable factors for the removal rate of such equipment. As for other control measures, attempts to use monitoring data or even modeling to estimate the load reduction resulting from OFEE removal would involve great expense and effort and would, despite these efforts, still yield a load reduction estimate with considerable uncertainty. Water Board staff concurs with the calculation method used to generate the load reduction estimate and accept it as logically consistent and technically sound.

Provision C.12.f requires Permittees to implement green infrastructure projects during the term of the Permit at a level consistent with the requirements in Provision C.3.j. Provisions C.11.c and C.12.c of MRP 2 required Permittees "to develop RAAs to estimate the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040." The analysis and resulting estimates for acres treated and PCBs load reductions are contained in the Annual Reports for the countywide programs submitted in Fall 2020.

The Permittees developed a variety of approaches (using models) to estimate the future PCBs and mercury load reductions resulting from future GSI implementation. The approaches were all consistent with guidance developed for the RAA modeling.[297] In addition, all countywide programs' modeling approaches were peer reviewed, and the peer review packages and final Reasonable Assurance Analysis modeling reports are contained in the FY 2019-2020 Annual Reports. There were some differences in the modeling approaches among the countywide programs, but the approach used by Alameda County and Contra Costa County illustrates the general concepts.

Baseline pollutant loading (prior to the application of land use changes or GSI implementation) was accomplished through a continuous simulation hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across a county during the TMDL baseline period (i.e., 2003 – 2005).[297] The baseline model depends on a hydrology model component that produces average annual runoff across an area (e.g., Alameda County) for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (e.g., imperviousness, underlying soil characteristics, slope) present within each county for a unit area drainage catchment. The hydrology output is combined with average annual concentrations estimated by the

[297] Bay Area Stormwater Management Agencies Association (BASMAA, June 2017). *Bay Area Reasonable Assurance Analysis Guidance Document.* Prepared for BASMAA by Geosyntec Consultants.

Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM[292]) developed by SFEI to produce average annual PCBs and mercury loading for the period of record. To obtain pollutant loading, average annual concentrations estimated by the RWSM, for each land use category (i.e., Old Industrial, Old Urban Commercial/Transportation, Old Urban Residential, New Urban, and Open Space) are multiplied by the calibrated average annual runoff volume estimated using the HRU approach. The average annual PCBs and mercury loading for the baseline period of record was validated using available in-stream concentration data, as described in Appendix E.

After baseline modeling, future load reduction modeling scenarios were developed to predict how future land use changes and control measure implementation would reduce pollutant loading. Future land use changes resulting from new development and redevelopment often reduce pollutant loading through use of newer building materials and improved runoff management practices. The POC load reductions through GSI implementation were developed through a combination of hydraulic modeling of GSI facilities combined with empirically derived effluent concentration estimates. Loads reduced from baseline are estimated based on projected land use changes and control measure implementation. To calculate pollutant load reductions associated with land use changes and GSI and source control implementation for future scenarios, the difference between the pollutant loading in the baseline scenario and the total pollutant loading associated with each future implementation scenario were calculated. Future scenarios included implementation in years 2030, 2040, and beyond 2040.

Interpolating between the 2020 and 2030 results presented in the RAA GSI modeling documentation for each countywide program (contained in RAA documentation in the FY 2019-20 Annual Reports) provides an estimate for the acreage and PCBs load reductions resulting from green infrastructure implementation by 2025:

- Alameda County: 1,230 acres 75 g/yr
- Contra Costa County: 950 acres 20 g/yr
- San Mateo County 314 acres 20 g/yr
- Santa Clara County 856 acres 13.5 g/yr
- Solano County Permittees 821 acres 76 g/yr

Summing these estimated load reductions across countywide programs results in a regionwide total estimated load reduction from green stormwater implementation of about 200 g/yr by the end of the permit term.

GSI are often watershed-based approaches that can be effective at reducing loads of PCBs and mercury. Because GSI uses a variety of physical removal mechanisms to filter water and remove particles, these control measures will also be effective at reducing loads of most other contaminants in urban stormwater. Thus, GSI implementation provides an effective multi-contaminant benefit in addition to the

benefits of reducing peak runoff and ameliorating the effects of hydromodification. The load reduction credit for GSI implementation will encourage watershed-based approaches, address multiple contaminants encourage the use of green infrastructure and the adoption of low impact development principles.

Some Bay Area drainages contain notably elevated PCBs concentrations in suspended or bedded sediment (e.g., > 500 ppb in bedded sediment). A recent analysis of soil PCBs and mercury data collected in the Bay Area identifies 15 sites where maximum concentrations exceed 3.8 mg/kg for PCBs and 1.6 mg/kg for total mercury. Areas with moderately high PCBs concentrations (e.g., 100-500 ppb) were found throughout areas where historical industrial activity involved use of PCBs (McKee and Yee 2015). Decisions guiding placement of green stormwater infrastructure depend on many factors involving opportunity and feasibility. Contaminant concentrations represent one factor among many and, thus, may not be the chief consideration in many circumstances. Nevertheless, placing green infrastructure in highly- and moderately contaminated areas may form an important element in achieving the PCBs TMDL-required load reductions. However, green infrastructure implementation is a long-term proposition and there is also value in placing green infrastructure across the broader landscape to intercept PCBs before they are discharged to receiving water.

Provision C.12.g requires Permittees to require applicable structures to sample for PCBs prior to receiving a demolition permit, inspect demolition projects during demolition activities, enhance their construction site controls for demolition projects, and for those cases where notification and advance approval from the U.S. EPA is not required, submit a copy of the hazardous waste manifest prepared for transportation of the material to a disposal facility.

After a year of requiring applicable structures to sample for PCBs in five priority building materials (caulk, fiberglass insulation, thermal insulation, adhesive mastic, and rubber window gasket or bulk product waste) prior to issuing a demolition permit, the Permittees' 2019-2020 Annual Reports show that 18 applicable structures had bulk product waste with PCBs concentrations of 50 ppm or greater. As of January 2022, U.S. EPA's database indicated that eight of those applicable structures have submitted hazardous wastes manifest to U.S. EPA, thus demonstrating that the bulk wastes with PCBs concentrations of 50 ppm or greater were disposed appropriately. U.S. EPA was overseeing the demolition and site remediation for all eight structures. For the remaining 10 sites that are undergoing demolition without U.S. EPA oversight, we have no information on whether bulk product wastes with PCBs concentrations of 50 ppm or greater were handled and disposed appropriately. This Provision requires the Permittees to submit a copy of the hazardous waste manifest to document that the PCBs-containing materials were disposed consistent with federal and state regulations, thus ensuring the PCBs in the bulk product waste will not be available to be discharged into the MS4. The hazardous waste manifests can be used as supporting data for the effectiveness of the protocol for controlling PCBs during building demolition.

PCBs can readily migrate to storm drains through vehicle track out of contaminated soils, airborne releases, soil erosion or stormwater runoff during or after demolition. Provision C.6 requires monthly inspections of construction sites, through all phases of construction, during the rainy season to determine the effectiveness of BMPs in preventing the discharge of pollutants into the MS4. Demolition is a phase of construction. This Provision requires the Permittees to enhance their construction site control programs to minimize the migration of PCBs from demolition sites into the MS4. Enhancement of construction site control programs could include dry season monthly inspections, street sweeping during active work hours at demolition sites, post-demolition of surrounding streets after any airborne releases are likely to have settled, and use of street sweepers that are designed to effectively remove sediment and dust from paved surfaces.

Soil and sediment characterizations at demolition sites with bulk product waste, including the Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project in Oakland, show that soils up to 10 feet from the building and up to 4 feet deep, and sediment in storm drains can have PCBs concentrations between 0.24 ppm and 50 ppm. If an applicable structure does not require notification and advance approval from U.S. EPA for disposal, soil and storm drain sediments may not be tested for PCBs. Contaminated soils and sediment in the storm drains may not be removed and properly disposed during the demolition of the applicable structure. As such, they will continue to be sources of PCBs to the MS4. For this Permit term, the requirement to demonstrate proper disposal of PCB-containing wastes is a proxy to demonstrate that the entire demolition project, including surrounding soils, is managed properly. However, the Permittees are encouraged to take additional steps as needed to prevent PCBs-containing soils from demolition sites from entering the MS4.may want to consider a special project designed to characterize, at demolition projects, the concentration of PCBs in soils near the applicable structures and in the sediment in the storm drains.

Klosterhaus et al.(2014)[290] estimated that 10,500 kg of PCBs remain in interior and exterior caulk in buildings located in the permit area, which equates to an average of 4.7 kg PCBs per building with PCBs. The 2013 Integrated Monitoring Report (IMR)[298] presents estimates of the mass of PCBs per building (constructed or renovated prior to 1979) ranging from 0.6-16 kg and contribution to stormwater ranging from 0.8 to 4000 grams/year. PCBs from building materials is one of the largest known sources of PCBs and it is distributed throughout the region. For a building containing the average amount of 4.7 kg of PCBs and control measures of medium effectiveness, there may be 280 grams of PCBs released to stormwater during demolition, assuming control measures are only moderately effective. If only control measures of low effectiveness were in place, such a building would release 560 grams PCBs during demolition.[298]

[298] Integrated Monitoring Report Part B: PCB and Mercury Loads Avoided and Reduced via Stormwater (IMR). Prepared by Geosyntec Consultants for the Bay Area Stormwater Management Agencies Association. 2013.

The PCBs load reductions expected through this control measure will be the same as those estimated for MRP2 because the same control measures are in place, and the method for calculating the load reductions remains the same. In other words, no additional load reductions are expected. The PCBs load reductions resulting from implementing control measures to prevent discharge to storm drains of PCBs in building materials during demolition can be computed as: the mass of PCBs contained in applicable buildings multiplied by the fraction of PCBs entering stormwater conveyances in the absence of controls multiplied by the effectiveness of controls preventing PCBs from entering stormwater conveyances. Each term in this calculation can be represented by a range of values, and information is limited on some of these terms (particularly the fraction of PCBs entering storm drains). However, reasonable values, derived from information available from Klosterhaus,[290] are:

- Mass of PCBs per building = 5 kg
- Number of regulated buildings demolished/year = 50
- Average fraction of PCBs in building material that enters MS4s during demolition without controls = 1 percent
- Average effectiveness of controls at preventing PCBs from entering storm drains = 80 percent

Multiplying these parameters suggests that about 2 kg/yr of PCBs loads can be reduced by effectively controlling PCBs-containing material during demolition. The actual number of demolitions will vary, but 2 kg represents a reasonable estimate for the load reduction in the Bay Area during a typical year and is the basis for establishing the yearly estimated load reduction for controlling the release of PCBs to storm drains from such demolitions.

As previously discussed, using monitoring data or even modeling to estimate the load reduction resulting from controlling the PCBs-containing demolition debris would be a complex and expensive undertaking. Despite these efforts, the monitoring data would still yield a load reduction estimate with considerable uncertainty. The Water Board has reviewed and approved the method to estimate the PCBs load reduction using information from the Klosterhaus technical paper. The calculation methodology is logically consistent and technically sound.

The Previous Permit allowed Permittees to seek exemption from implementing Provision C.12.f – Manage PCB-Containing Materials and Wastes During Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains (Provision C.12.f). For this exemption, Permittees were required to provide documentation acceptable to the Executive Officer in their 2017 Annual Reports that the only structures that existed pre-1980 within their jurisdiction are single-family residential and/or wood-frame structures. Only the Town of Clayton requested and received exemption form Provision C.12.f. This Permit extends the deadline for requesting and receiving this

exemption to the 2023 Annual Report, because there are a few Permittees who were unable to gather the needed documentation by the exemption deadline. The Water Board does not anticipate another extension of this exemption deadline.

Provision C.12.h requires Permittees to update (as needed) the plans and schedules prepared during MRP2 for PCBs control measure implementation and corresponding reasonable assurance analysis to quantitatively demonstrate that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations. The updates should focus on those control measures for which new information is available and for control measures not evaluated in previous efforts. The Permit requires that these plans must: identify all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented; include a schedule according to which these technically and economically feasible control measures will be fully implemented; and provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

Provision C.12.h also requires Permittees to submit information to inform PCBs-related requirements in the subsequent permit term. Namely, Permittees must identify all specific control measures to be implemented along with the expected intensity (e.g., acres treated, acres investigated for source areas, types of roadway projects for which protocols applied, etc.) of control measure implementation, and the estimated load reduction benefit from control measures implemented during the subsequent permit term.

The PCBs TMDL anticipated the challenge of achieving the urban runoff load reductions required to meet the TMDL allocations within the twenty-year implementation time frame. The TMDL implementation plan states that

> 4. *"... achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:*
>
> - *A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;*
> - *Documentation has been prepared that demonstrates that all technically and economically feasible and cost-effective control measures recognized by the Water Board have been fully implemented, and evaluates and quantifies the PCBs load reduction of such measures;*

- *A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and*
- *A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate."*

Provision C.12.h provides the opportunity for Permittees to describe the full suite of actions that will be required to achieve the TMDL along with realistic timelines for this achievement. The load reductions for PCBs are difficult and time-consuming to achieve because of the distribution of sources in the landscape; challenges associated with finding and reducing these existing sources; and unpredictability related to demolition of PCBs containing structures. The RAAs submitted during MRP 2 emphasize that expected PCB load reductions will come from long-term implementation of control strategies (like source control, cleanup of contaminated sites, green infrastructure, and others) that extend beyond the current implementation timeframe of the TMDL. The updates to the long-term plans and schedules required by this provision could potentially support an amendment to the TMDL implementation timeframe.

Provision C.12.i. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.g requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed. The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

Provision C.12.j requires actions to mitigate human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish to be aimed at high risk-communities such as subsistence fishers and their families. The risk reduction framework developed in a previous permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes three types of actions for urban runoff management agencies. These actions are implemented through this Permit as provisions to control urban runoff sources of copper.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[299] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the Permit provisions target major sources of copper including architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 SSOs for dissolved copper have been adopted for all segments of San Francisco Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the SSOs.

C.13-5 One of the major sources of copper to urban runoff has been addressed through passage of Senate Bill 346 in 2010, which requires brake pad manufacturers to reduce the use of copper in brake pads sold in California to no more than 5 percent by weight by 2021, and no more than 0.5 percent by 2025. The law also provides an objective process to ensure that any new brake materials meet all applicable safety and performance standards. To make sure that new materials will not cause future environmental problems, the law requires brake manufacturers to screen potential alternatives for their impacts on human health and the environment using the Toxic Information Clearinghouse, and to select less hazardous options.

C.13-6 A scientific uncertainty regarding sediment toxicity was identified during the development of SSOs for copper. Bay sediment copper concentrations are somewhat elevated above the natural background (from native soils). Local

[299] TDC (TDC Environmental), 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

soils contain 30- 35 ppm (DW, dry weight) based on deep (> 2 meter) sediment core results for SF Bay. The copper ERL (effects range low) is 34 ppm (DW) and the ERM (effect range median) is 240 ppm (DW). Thus, the natural concentration of local soils is very close to the ERL. There has never been an exceedance of the ERM in the 975 samples collected and analyzed through RMP data. The maximum copper sediment concentration ever recorded in RMP samples (94 ppm DW) is well below the LC50 (concentration that kills 50 percent of test organisms) of the amphipod *Eohaustorius estaurius* (534 ppm) or the amphipod crustacean *Hyalella azteca* (260 ppm). Surface sediment copper concentrations have trended lower over the last 25 years according to monitoring in the Bay. The median surface concentration of copper was 40 ppm (DW) during the period 1993-2004 and dropped to 36 ppm in 2009-2018 (data from SFEI's Contaminant Data Download and Display system, https://cd3.sfei.org/). This reduced concentration occurred despite significant population increases in the Bay Area and increased sampling in the shallower parts of the Bay (where copper concentrations would be expected to be higher due to human activities and urban sources) during the latter period because of a re-design of RMP sampling strategies. There was some evidence of possible copper-related toxicity in the late 1990s, but there has not been additional evidence of this phenomenon. Possible sediment toxicity occurred in the northern portions of San Francisco Bay (Suisun Bay and San Pablo Bay) where sediment copper concentrations are higher. However, the decrease in median sediment copper concentrations in the northern estuary from the time period 1993-2004 (52 ppm DW) to 2009-2018 (43 ppm DW) has been even more pronounced than the reduction for the Bay as a whole. Because there has not been additional evidence of copper sediment toxicity and copper concentrations in surface sediments appear to be decreasing over time, Permit requirements to further investigate copper sediment toxicity in San Francisco Bay were satisfied by information collected under MRP 1.0 and are no longer needed. If more evidence of such toxicity does appear, this requirement may be reinstated.

C.13-7 Scientific uncertainty regarding the olfactory impairment of salmonids was identified during development of SSOs for copper. Exposure to dissolved copper has been shown to cause olfactory impairment at relatively low concentrations in freshwater fish, resulting in an impaired avoidance response to predators. When the SSOs were established, studies were planned to address whether or not this phenomenon occurred in estuarine water. The studies[300] were supported in part through requirements under MRP 1 and were conducted by David Baldwin of NOAA's Northwest Fisheries Science Center.

[300] David Baldwin, NOAA Fisheries, Northwest Fisheries Science Center, 2015. *Impact of dissolved copper on the olfactory system of juvenile salmon, Phase II: Effect of estuarine salinity on olfactory toxicity.*

Dr. Baldwin measured the firing of neurons in response to exposure to odorant chemicals. The studies indicate that salmon in saline or moderately saline water are much less sensitive than salmon in freshwater, and that the potential effect of copper on salmon olfaction is not a concern in the Bay.

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. Provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. Provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, and auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

C.14. Bacteria Controls

Fact Sheet Findings in Support of Provision C.14

C.14-1 This Permit Provision implements the urban runoff requirements of TMDLs that contain wasteload allocations for MS4 discharges of bacteria. Each subprovision references applicable TMDL approval and effective dates. A separate subprovision (C.14.a) requires actions Permittees must take when MS4 discharges may be causing or contributing to exceedances of applicable bacteria water quality objectives in a receiving water for which a TMDL has not been established.

Specific Provision C.14 Requirements

C.14.a. Enhanced Bacteria Control

The provision applies to the cities of Sunnyvale and Mountain View (referred to as the Cities in C.14.a), which may be causing or contributing to exceedances of applicable bacteria water quality objectives in a receiving water (hereafter referred to as waters with elevated bacteria densities). The provision calls for strategic and enhanced implementation of BMPs that are required in other provisions of this Permit; thus, the authorities for Provision C.14.a. are stated in the fact sheet for Provisions C.2, C.4, C.7, C.10, and C.15. This Provision also requires the Cities to conduct additional water quality monitoring to identify sources of bacteria to the receiving water and to determine whether the applicable bacteria objectives have been achieved after implementation of BMPs. The monitoring and reporting requirements of Provision C.14.a. are authorized under Clean Water Act § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h), (j) and (l), 122.42(c), 122.44(i) and 122.48, and Water Code § 13383.

The pollution control and reporting requirements of this provision are consistent with the phased implementation strategies of the bacteria TMDLs adopted in the San Francisco Bay Region. This Provision requires implementation of the source control actions required in phase one of adopted TMDLs. The Cities are expected to meet Receiving Water Limitations B.2 for applicable bacteria water quality objectives by the June 30, 2027. If receiving water limitations are not met, despite a diligent effort to quantify levels and the sources of bacteria in MS4 discharges and documentation of completion of controls required by C.14.a.i-vii, then the Cities must submit a plan for additional actions to attain the receiving water limitations as soon as possible.

This Provision applies to the City of Mountain View for discharges to Stevens Creek and the City of Sunnyvale for discharges to Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough. Data collected by San Francisco Baykeeper indicated that discharges from these cities' MS4s may have caused or contributed to exceedances of the bacteria water quality objectives, and both Mountain View and Sunnyvale have submitted to the Water Board notification and a report of proposed actions as set forth in Provision C.1. The enhanced bacteria controls required

by this Provision are based on controls proposed by the Cities and phase one bacteria controls required of municipalities with bacteria wasteload allocations in adopted TMDLs. They are also consistent with management strategies for bacteria in stormwater described in the Minnesota Stormwater Manual.

Other Permittees that find their MS4 discharges may be causing or contributing to exceedances of applicable bacteria water quality objectives in a receiving water, in accordance with Provision C.1.a. of this Permit, must notify the Water Board and submit a report that describes controls or BMPs currently being implemented and the current level of implementation, and proposes additional controls or BMPs and/or an increased level of implementation, to prevent or reduce exceedances of bacteria water quality objectives. If such controls and BMPs are consistent with Provision C.1.a requirements, the Water Board will consider amending this Permit to require implementation of the controls and BMPs.

Path to Compliance with Bacteria Receiving Water Limitations

Provision C.14.a provides a directed path, with enforceable requirements, that allow the Cities appropriate time to come into compliance with receiving water limitations without being in violation of bacteria receiving water limitations during full implementation of the directed path to compliance. This directed path to compliance is consistent and conforms with State Board Orders WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, and WQ 2020-0038.

WQ 2015-0075, as amended, directs regional water boards to consider and allow a path to compliance with receiving water limitations guided by a set of principles unless a regional water board makes a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons. The path to compliance directed by Provision C.14.a meets each of the applicable principles (see further detail below).

In WQ 2020-0038, the State Water reiterated WQ 2015-0075's standards for rigor, transparency, and accountability for alternate compliance, and further emphasized that regional water boards must ensure any approved alternative compliance plans regional water boards using alternative compliance approaches to ensure plans approved clearly explain their development process and identify enforceable milestones. However, the State Water Board recognized WQ 2020-0038 is not intended to curtail the flexibility of the regional water boards to adopt alternative compliance approaches that best fit their particular regions or to restrain the evolution of the regional water boards' approaches to alternative compliance. The path to compliance directed by Provision C.14.a is based on rigorous and transparent consideration of the state of science and understanding of sources of fecal indicator bacteria and options to control them and includes enforceable requirements. However, rather than approval of compliance plans submitted by the Cities, Provision C.14.a directly specifies actions that must be implemented by the Cities that are consistent with bacteria TMDLs requirements in the region and informed

by the Water Board's knowledge and expertise regulating bacteria and the plans submitted by the Cities. These required actions are clear, transparent, and directly enforceable rather than reliance on a plan.

The path to compliance directed by Provision C.14.a is based on the following points that describe state of science and understanding of sources of fecal indicator bacteria and options to control them.

- Fecal indicator bacteria, E. coli and enterococci, are bacteria that are normally prevalent in the intestines and feces of warm-blooded animals.
- Levels of bacteria are measured as number of colony forming units (cfu) of bacteria in a 100 mL of sample. Maximum level (statistical threshold value) water quality objectives are 320 cfu/mL for E. coli and 100 cfu/100 mL for enterococci. Levels in the parts of the Cities' receiving waters have periodically been as high as about 4,000 cfu/mL during dry weather and 17,000 cfu/100mL, but they are substantially lower—about a billion times less—than levels of these bacteria in raw sewage (trillions of cfu/100mL). Accordingly, the levels in receiving waters are likely not associated with discrete ongoing discharges of untreated raw sewage.
- Bacteria sources and discharges in municipal stormwater runoff and dry weather discharges are episodic, not constant, except where there is an illicit connection from a sanitary sewer or other ongoing discharge of sewage.
- It is not possible to model sources and loading of bacteria in MS4s using watershed pollutant loading models due to the episodic and variable nature of bacteria sources. Some quantitative analysis of loading may be possible through monitoring; however, since bacteria discharge volumes are highly variable both spatially and temporally and difficult to measure, the analysis would inevitably involve a great deal of uncertainty and be unreliable for purposes of quantifying loads from drainage areas. However, mapping of potential sources areas and targeting of control efforts can be tracked and analyzed using geographic information systems.
- Controllable sources to the Cities' MS4s or surface waters located within the Cities' boundaries include the following:
    - Direct sources of human fecal matter (e.g., homeless encampments, recreational vehicle discharges, illegal dumping of human waste/diapers);
    - Sanitary sewer sources of human fecal matter (e.g., sanitary sewer overflows, exfiltration, illicit connections);
    - Pet waste (e.g., dogs, domestic and feral cats, backyard chickens, livestock);
    - Trash receptacle leachate. Trash bins may also contain discarded pet waste or diapers; and

  - Wildlife waste (e.g., birds, rodents, deer, raccoons, coyotes) if associated with human activities, such as littering and exposed trash receptacles, which can attract wildlife by creating scavenging areas. Some wildlife waste may be moderately controllable; however, most is uncontrollable.

- Uncontrollable sources to the Cities' MS4s or surface waters located within the Cities' boundaries include:
  - Wildlife waste (e.g., birds, rodents, deer, raccoons, squirrels, rabbits, skunks, opossums, coyotes, wild turkey, bobcats, mountain lions) from wildlife in open space, creek corridors, and in creeks and stormwater conveyance systems. Given these are predominantly natural corridors, elimination of natural wildlife from creeks would not be desirable; and
  - Bacteria naturally present in the environment, such as biofilms, organic matter, soils, and sediments in the watershed, and creeks.
- Effective control of bacteria sources and discharges requires a comprehensive surveillance and source identification and control program in drainages to creeks experiencing elevated bacteria.
- Existing efforts may or may not be sufficient. After initial source identification and control of the most likely or possible sources that contribute to segments of creeks experiencing elevated bacteria, there must be ongoing surveillance and discharge response and control actions, including outreach and enforcement, to maintain existing controls, and if necessary to identify additional sources and enhanced or additional controls.
- Treatment of runoff to reduce fecal indicator bacteria levels below water quality objectives is not feasible. While some treatment systems that provide biofiltration and bioretention and/or capture runoff will reduce levels of bacteria in runoff discharges, reduction to levels below water quality objectives requires disinfection, as in municipal wastewater treatment systems. Disinfection of stormwater runoff is not feasible with episodic and variable runoff discharges, and if chlorine were to be used for disinfection, due to its high toxicity, a system would also have to include dichlorination, which is also not feasible for episodic and variable runoff discharges. Strategic routing of contaminated runoff to the sanitary system may have some viability.
- Basin Plan Section 4-8 - Stormwater Discharges provides a phased approach towards attainment of water quality objectives in MS4 receiving waters, wherein if a first phase of actions does not result in attainment of water quality objectives, the Water Board will consider subsequent permit conditions that require implementation of additional control measures. In such circumstances, the Water Board may consider dischargers' proposed schedules for identification and implementation of additional control measures designed to attain water quality objectives. Such

schedules shall be as short as practicable and will only be considered for inclusion in permits when a discharger has demonstrated the following:

(a) A diligent effort to quantify pollutant levels and the sources of the pollutant in stormwater discharges; and

(b) Documentation of completion of implementation of all technically and economically reasonable control measures.

- The Water Board has adopted numerous TMDLs for bacteria and pathogens for select impaired waters. The TMDLs and wasteload allocations are based on rigorous analyses of the problems associated with these pollutants and the solutions to address them. Their implementation plans to achieve the MS4 wasteload allocations rely on source identification and control for MS4 discharges and a phased approach toward achieving water quality objectives, namely implementing source-specific controls and monitoring to find sources and determine effectiveness of controls. Where wasteload allocations are not met after the first phase of actions, additional and enhanced actions and monitoring are required.

Based on these points, the Order provides time for the Cities to comprehensively evaluate their existing bacteria control actions, systematically conduct surveillance and monitoring to identify sources, implement existing or appropriate new or enhanced controls where necessary, and monitor effectiveness of those controls to comply with bacteria receiving water limitations by the end of the permit term. The source identification and source control requirements are practical and robust and represent a logical first phase that could or should result in elimination of bacteria sources that result in MS4 discharges that cause or may cause or contribute to exceedances of bacteria water quality objectives in receiving waters. Given the completeness and thoroughness of what is required to find and control bacteria sources, the Water Board expects compliance with bacteria receiving water limitations by the end of the Permit term. However, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges and known and unknown uncertainties associated with identifying and controlling possible sources, it is impossible to assert with certainty at the onset of the Permit term that source identification and control actions will result in compliance by the end of the Permit term. For this reason, the expectation to comply with receiving water limitations by June 30, 2027, is not expressed in the Permit as an enforceable final deadline.

Given the challenges and uncertainties with bacteria source identification and control actions, there is the possibility that phase one actions will not result in compliance by the end of the permit term. As such, the Order calls for a mid-term report to document progress and communicate adaptation of efforts based on initial successes and challenges, and an end of Permit term report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term.

Phase two actions, if necessary, will depend on the actions taken during the permit term (phase one), and, therefore, cannot yet be specified. This adaptive phased implementation approach is consistent with bacteria TMDL wasteload allocation implementation requirements for municipal stormwater dischargers adopted by the Regional Water Board and approved by the State Water Board and is the most effective way to achieve compliance with bacteria receiving water limitations in a timely manner.

The path to compliance directed by Provision C.14.a meets each of the applicable principles in State Water Board WQ Order 2015-0075, as amended by Order 2021-0052-EXEC.

- In accordance with principle 1, this Order continues to use the receiving water limitations provisions as directed by State Water Board Order WQ 99-05 and does not deem good faith engagement in the iterative process to constitute compliance with receiving water limitations. Rather, it includes prescriptive requirements (Provision C.14.a) with deliverables and deadlines for the Cities to implement actions and controls to comply with receiving water limitations for bacteria, which are based on best available science and knowledge of bacteria sources and controls.
- Principle 2, that permits should include a provision stating that, for water body-pollutant combinations with a TMDL, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination, is not applicable. There is not a bacteria TMDL for any of the Cities' receiving waters; however, the requirements in Provision C.14.a are based on the requirements of adopted and approved bacteria TMDLs for other waterbodies. The requirements reflect the Water Board's determination in these TMDLs of the most effective way to resolve bacteria impairments in the region.
- In accordance with principle 3, this Order incorporates an ambitious, rigorous, and transparent alternative compliance path that allows the Cities appropriate time to come into compliance with receiving water limitations without being in violation of the receiving water limitations during full implementation of the compliance alternative. It includes requirements to implement a comprehensive monitoring and surveillance program and source control actions to identify all controllable sources of bacteria and to control them in a timely manner. The requirements necessarily involve planning and studying because it is unknown where the bacteria sources are.[301] As discussed previously, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges, at the onset of the Permit term, it

[301] The State Water Board has held that the "safe harbor" in the planning phase is appropriate if it is clearly constrained in a manner that sustains incentives to move on from planning to approval of plans in the case of the Los Angeles Regional Water Board's MS4 permit and is structured with clear, enforceable provisions. (WQ Order 2021-0052-EXEC, p. 62.) The evaluations that must be done here are clear and have enforceable deadlines. (See, e.g., Provision C.14.a.viii(2).) In addition, the requirements have built-in source control actions informed by the evaluations, such that progress can be made and compliance achieved.

is impossible to assert with certainty that specific water quality improvement milestones can be achieved during the Permit term. Furthermore, given the challenges and uncertainties with bacteria source identification and control actions, there is the possibility that phase one actions will not result in compliance by the end of the Permit term. The Order calls for a mid-Permit term report to adapt efforts based on initial successes and challenges, and an end of Permit report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term. The State Water Board supports this kind of adaptive management where compliance is not achieved. (WQ Order 2021-0052-EXEC, p. 65-66.)

- In accordance with principle 4, this Order calls for a watershed-based approach to identify and control likely or potential sources of bacteria in storm drain drainage areas that discharge to receiving waters. This Order partly conforms to the part of principle 4 to address multiple contaminants to the extent that source controls for other contaminants or pollutants, such as trash, may also control bacteria. The Provision C.14.a compliance path does not incorporate TMDL requirements as called for in principle 4, because there is not a bacteria TMDL for the affected receiving waters. However, the requirements are consistent with implementation requirements for other bacteria TMDLs.

- Partially in accordance with principle 5 and principal 6, this Order calls for use of green infrastructure and the adoption of low impact development principles and encourage multi-benefit regional projects that capture, infiltrate, and reuse stormwater and support a local sustainable water supply. The Provision C.3 New and Redevelopment requirements call for use of green infrastructure and low impact development principles, including multi-benefit regional projects that capture, infiltrate, and reuse stormwater, on projects and plans for implementing green infrastructure over time with a mandatory minimum during the permit term. These actions will result in some bacteria reduction. However, there are no current available and viable treatment controls, including green infrastructure, that can reduce concentrations of fecal bacteria to low levels consistent with applicable water quality objectives.

- Consistent with principle 7, the Provision C.14.a compliance path has rigor and accountability. The compliance path provided by this provision is based on the rigorous analyses done for other bacteria TMDLs and thus reflect the most effective way to address bacteria in MS4 discharges. The requirements also reflect rigor, accountability, and transparency in that the Cities are required to conduct a comprehensive monitoring and surveillance program based on watershed and drainage area characteristics to systematically identify bacteria sources and implement and assess control actions in a timely manner, and subsequently conduct further monitoring to evaluate the effectiveness of controls. This includes geographic

information analysis of potential sources and existing bacteria control action locations to optimize additional controls, which analysis is a form of quantitative analysis for bacteria (modeling and quantitative analyses of bacteria loading is infeasible or unreliable, as explained above). The Order calls for annual reporting on completed and planned actions and monitoring results, a mid-Permit term report to adapt efforts based on initial successes and challenges, and an end of Permit term report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term. Again, as discussed previously, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges, at the onset of the Permit term, it is impossible to assert with certainty that specific water quality improvement milestones can be achieved during the Permit term. **Provision C.14.a.**I. requires the Cities to evaluate the potential for municipal operations to generate bacteria that can be discharged in runoff and, where needed, to enhance existing BMPs to minimize the transport of bacteria. In this subprovision, “municipal operations” refers to street, sidewalk, and plaza cleaning; maintenance of parks and open spaces; and cleaning of catch basins, pump stations, and other storm sewer system components. Examples of enhanced maintenance activities that help to reduce bacteria loading include (Geosyntec Consultants 2012):

- Street Cleaning. Street Cleaning Measurements of fecal coliform bacteria on sediment collected during street cleaning have ranged up to 108 colonies per pound of sediment (Bannerman 1993, Snyder 2012). Street and parking lot cleaning reduces sediment, trash, and other pollutant loading to urban storm drains. High efficiency street sweepers, such as regenerative air sweepers and vacuum assisted sweepers, remove more sediment from roadways, and capture the fine particles with which bacteria are typically associated (UWRRC 2014).

- Storm Sewer Cleaning: Cleaning by jet spraying and vacuuming of wash water removes accumulated trash, sediment, organic matter and animal waste, thereby reducing both fecal indicator bacteria and other pollutants. Features and locations to be cleaned can be prioritized based on proximity to receiving waters, magnitude of threat, and similar considerations.

- Catch Basin Cleaning: The dark, humid environment and presence of wildlife (e.g., raccoons and rats in storm drain catch basins) provide conditions favorable to the persistence of bacteria in storm drain systems. A San Diego study found that commercial catch basins had significantly higher bacteria than residential catch basins (Weston Solutions 2010b); thus, prioritizing catch basin cleaning in commercial areas is expected to yield more significant bacteria reductions.

Provision C.14.a.ii. requires the Cities to enhance industrial and commercial site stormwater inspections such that illicit discharges and other bacteria sources are identified and controlled. Bacteria sources at these sites may include connection of

sanitary sewer lines to the stormwater system (indicated by evidence of dry weather flows); leaking or poorly maintained porta-potties; outdoor washing of floor mats; and overflowing garbage and recycle bins.

Provision C.14.a.iii. requires the Cities to evaluate the potential for bacteria transport to surface waters from areas inhabited by unsheltered homeless persons, and to implement BMPs to minimize such transport. This Provision is intended to require Permittees to implement or enhance BMPs described in the Fact Sheet and Permit for Provision C.17 in areas with unsheltered homeless populations that discharge to water bodies with elevated bacteria densities.

Provision C.14.a.iv. requires the Cities to evaluate the potential for bacteria transport from areas where domestic animals are present to surface waters with elevated bacteria densities. The waste from dogs, cats, horses, and other domestic animals can contain bacteria and parasites like *E. coli*, *Salmonella*, *Giardia*, and tape worms, which can infect and cause illness in humans, as well as wildlife and domestic animals. Pet waste left on the ground either passes through storm sewers untreated or washes directly into water bodies. Appropriate BMPs include inspections of pet and horse boarding facilities and installation and maintenance of pet waste stations.

Provision C.14.a.v. requires the Cities to enhance public outreach where it is likely to improve human behavior regarding bacteria pollution prevention practices. Such practices include cleaning up pet waste and litter, eliminating outdoor restaurant floor mat washdown, using proper BMPs for sidewalk cleaning, covering trash areas, and maintaining porta-potties properly.

Pet waste is a significant contributor to bacteria in runoff; in a study of the Patapsco River in Maryland, for instance, pet waste was estimated to contribute approximately 26% of bacteria pollution.[302] The degree of behavior change resulting from pet waste outreach campaigns has been measured in association with bacteria TMDLs in southern California and other places. A report on the Dog Waste Management Plan for Dog Beach and Ocean Beach found that public compliance with the “scoop the poop” policy was highly dependent on awareness of the policy and availability of waste disposal bags and trash cans (Weston 2004). In Bellingham, Washington, public outreach over two years increased respondents’ awareness of bacteria impacts from dog waste and was correlated with a 6% increase in the number of respondents who cleaned up their dogs’ waste at home.[303] Scoop the poop pledges can be successful; for instance, in Kirkland, Washington, a follow up survey of several hundred people who signed a pledge to scoop their pet waste indicated that 94% of them scooped their pets’

[302] Maryland Dept. of the Environment, Total Maximum Daily Loads of Fecal Bacteria for the Patapsco River Lower North Branch Basin in Anne Arundel, Baltimore, Carroll, and Howard Counties, and Baltimore City, Maryland (Aug. 2009) Fig. C-2, p. C14.

[303] Squalicum Residential Dog Waste Post-Program Survey Findings (2015)

poop all the time.[304] The City of Austin, Texas, conducted public surveys and found their educational campaign resulted in a 9% improvement in the number of pet owners who claim to regularly pick up waste (UWRRC 2014), and its twenty-year-old program of deploying poop bag dispensers and trash cans throughout the city has reduced bacteria levels in receiving waters. (*Austin Statesman* 2019[305]).Studies in San Diego have shown that installation of pet waste stations with trash cans and disposal bags has resulted in a 37% reduction in the total amount of pet waste in city parks (UWRRC 2014).

Where controllable wildfowl may be contributing to elevated bacteria densities in water bodies, control strategies have been developed by the University of Nebraska at Lincoln (Cleary 1994, Internet Center for Wildlife Damage Management 2015) and the U.S. Department of Agriculture APHIS (Preusser 2008), and some of these strategies are appropriate for waterfowl in general. In Alaska, a lake was delisted for bacteria after the state implemented goose management practices, including egg harvesting, habitat alteration, and hunting, and a pet waste campaign that included outreach and installation of pet waste stations.[306]

Provision C.14.a.vi. requires the Cities to collaborate with entities responsible for maintenance and repair of the sanitary sewerage system to minimize the transport of sanitary sewer overflows to surface waters with elevated bacteria densities. Sewer line backups, overflows and leaks commonly occur during periods of wet weather, creating a potential source of bacteria on land surface that may be transported to surface water via urban runoff. The Cities should work with sanitary sewerage system entities to prioritize maintenance and repair in areas contributing to bacteria loads in surface waters with elevated bacteria densities; ensure rapid response to cleaning up overflows; and developing sewer lateral maintenance and replacement programs for consideration by the appropriate local authority.

Provision C.14.a.vii requires the Cities to evaluate the potential bacteria-reduction benefit of prioritizing trash control efforts in areas discharging to waters with elevated bacteria densities. This Provision is intended to require Permittees to implement or enhance BMPs described in the Fact Sheet and Permit for Provision C.10 in areas that discharge to surface waters with elevated bacteria.

Provision C.14.a.viii. requires the Cities to monitor their receiving waters, outfalls, and stormwater catchments to identify sources of bacteria, i.e., through microbial source testing, observations, and fecal indicator bacteria measurements, and to evaluate effectiveness of controls and determine whether the bacteria water quality objectives

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[304] City of Kirkland, Pet Waste Bacteria, Monitoring, Outreach and Education (2020), p. 11. Available at: https://www.kirklandwa.gov/files/sharedassets/public/public-works/2020-kcd-pet-waste-final-report.pdf)

[305] https://www.statesman.com/news/20190813/scoop-poop-dog-waste-on-greenbelts-affecting-more-than-bottom-of-your-shoes

[306] U.S. EPA, Reducing Animal Sources of Bacteria Restores Water Quality (2011).

and/or bacteria receiving water limitations are achieved. For the latter, it may be possible to show that bacteria water quality objectives exceedances occur but MS4 discharges do not cause or contribute to them. The regulatory authority and supporting information for monitoring are provided in the Fact Sheet for Provision C.8.

Identification of sources, evaluation of effectiveness of controls, and determination of compliance with bacteria receiving water limitations can be demonstrating through a monitor program designed to answer the following logical questions:

- What is the spatial and temporal extent of dry weather flows in the MS4?
- Are indicators of human fecal material present in both dry and wet weather flows observed in the MS4?
    - If so, in which stormwater catchments are sources most prominent?
    - Where are the likely locations of these sources in the catchments?
    - What measures can be implemented to control these sources?
- Are water quality objectives being achieved during dry weather?
- Are water quality objectives being achieved during wet weather?

The required levels of implementation to answer these questions, e.g., location and number of sites, sampling events, frequencies, and methods are based on the monitoring program and information provided by the Cities in their Fecal Indicator Bacteria Monitoring and Source Identification Program (April 2022). The required monitoring provides an initial comprehensive and robust means to identify sources, evaluate effectiveness of controls, and determine compliance or progress towards compliance with bacteria receiving water limitations. Monitoring at the required numbers of monitoring sites, events, and frequencies may be sufficient to answer some of the questions for some areas in the Cities' jurisdictions. It is likely that the monitoring will have to be adapted to respond to the results of the required surveillance and monitoring. For example, the results could show that the bacteria exceedances in the receiving waters have been resolved or are worse and more extensive than is currently understood. In either case, different monitoring will be needed to respond to the new information. Since it is not possible to prescribe new monitoring requirements until the results of the required monitoring are known, the Cities are required to include proposed monitoring in the Mid-Permit Interpretive Report to be conducted through the remainder of the Permit term to answer the questions in C.14.a.viii.(1). The proposed monitoring must be as comprehensive, systematic, and robust as what is currently required while being commensurate with the need to address and resolve bacteria exceedances in the receiving waters. The Water Board will subsequently amend the Permit to include approved second phase monitoring requirements.

Provision C.14.a.ix. requires the Cities to conduct a comprehensive assessment of their bacteria source identification and control actions and determine whether discharges from their MS4s are causing or contributing to exceedances of bacteria water quality objectives in receiving waters after implementation of control measures required by C.14.a.i-vii. It is possible that implementation of these requirements in conjunction with C.14.a.viii monitoring requirements will result in compliance with bacteria receiving water limitation requirements, as discussed above in this Fact Sheet under Path to Compliance with Bacteria Receiving Water Limitations, but it is not possible to justify a date by which compliance must be achieved due to the modeling or quantitative analysis limitations discussed above and known and unknown uncertainties associated with identifying and controlling possible sources. Accordingly, C.14.a.xi sets an expectation to achieve compliance by the end of the permit term, June 30, 2022, but if compliance will not be achieved despite diligent efforts to identify and control sources and compliance with C.14.a.i-viii, those efforts, successes, and lessons learned should inform determination of additional or enhanced efforts and a schedule to implement additional or enhanced efforts to achieve receiving water limitations as soon as possible.

The required Mid-Permit Interpretive Report and Final Interpretive Report provide a means to demonstrate progress towards answering the monitoring program questions and achieving bacteria receiving water limitations, based on monitoring results and description of source identification and control efforts, to provide justification for monitoring program revisions, and to either provide documentation that bacteria receiving water limitations have been or will be achieved by the end of the Permit term, or if not, documentation and justification for new or enhanced efforts to achieve compliance in a timely manner and a proposed monitoring program to further inform and evaluate those efforts.

C.14.b. City of Pacifica and San Mateo County Bacteria Controls

This Permit Provision implements the San Pedro Creek and Pacifica State Beach Bacteria TMDL adopted by the Water Board on November 14, 2012, and approved by the U.S. EPA on August 1, 2013, which is the effective date of the TMDL. The water quality attainment strategy included in this TMDL requires urban runoff management agencies to implement controls and take other actions to reduce bacteria loads in urban runoff.

The TMDL contains allocations for urban runoff, including urban runoff associated with MS4s and Caltrans facilities. The allocations are the same as the Numeric Targets and are expressed in terms of allowable exceedances of single-sample objectives.

This provision is consistent with 2014 U.S. EPA Memo[307] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve bacteria reductions necessary to achieve receiving water limits. The timeline for achieving wasteload allocations for Pacifica State Beach is by August 1, 2021 (8 years from the TMDL effective date) and by August 1, 2028 for San Pedro Creek (15 years from the TMDL effective date).

Provision C.14.b.i requires the Pacifica and San Mateo Permittees to implement control measures and education and outreach activities to achieve bacteria load reductions, such as: prohibit potential illicit discharges to the storm drain from the sanitary sewer collection system; repair the fence along the Crespi Canal and clean up trash from the Canal; address bacteria discharges from horse facilities; maintain dog waste-clean-up signs, waste bag dispensers, and trash receptacles; implement a visual inspection and clean-up plan for high dog waste accumulation areas; and implement an enhanced public outreach and education campaign for managing pet waste. This provision is critical to the successful implementation of the urban runoff requirements for the TMDL. The accountability mechanism for control measure implementation consists of three parts: 1) the identification of control measures and associated watersheds or locations, 2) a commitment to an implementation schedule, and 3) the quantification of the benefit resulting from control measure implementation.

Provision C.14.b.ii requires the Pacifica and San Mateo Permittees to monitor water quality to assess attainment of wasteload allocations. To comply with this requirement, the Pacifica and San Mateo Permittees are required to monitor bacteria levels in San Pedro Creek and at Pacifica State Beach and report the results to the Water Board. Further, they must provide an annual report of the quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives. This provision is necessary to determine whether wasteload allocations are being attained, so additional or enhanced measures are implemented, if necessary.

Provision C.14.b.iii requires the Pacifica and San Mateo Permittees to conduct a water quality monitoring program to 1) better characterize bacteria sources and 2) evaluate the effectiveness of the bacteria control measures. The results of the monitoring shall be reported to the Water Board on an annual basis. The findings from these assessments will be used throughout this and future Permit terms to revise, refocus, and enhance bacteria control measures to make them as effective and efficient as possible. Future permits will be based on an updated assessment of bacteria sources and control measure effectiveness. This provision is necessary to allow the Pacifica and San Mateo Permittees to identify and implement effective BMPs in an efficient manner.

C.14.c. City of San Mateo Marina Lagoon Beaches Bacteria Controls

[307] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

This Permit Provision implements the San Francisco Bay Beaches Bacteria TMDL adopted by the Water Board April 13, 2016 and approved by the U.S. EPA on February 23, 2017. The State Office of Administrative Law approved the TMDL on December 13, 2016, which is the effective date of the TMDL. The implementation plan included in this TMDL requires urban runoff management agencies to implement controls and take other actions to reduce bacteria loads in urban runoff.

The TMDL contains allocations for urban runoff associated with MS4s in the City of San Mateo (City). The allocations are the same as the Numeric Targets and are expressed in terms of a geometric mean for Enterococcus. The Numeric Targets must be achieved in Parkside Aquatic and Lakeshore beaches on Marina Lagoon.

This provision is consistent with 2014 U.S. EPA Memo (see C.14.b) providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve bacteria reductions necessary to achieve receiving water limits. The TMDL requires the City to attain its wasteload allocation by taking a phased approach in which additional or enhanced actions are required if initial implementation actions do not result in attainment of the TMDL within five years.

Provision C.14.c.i. requires the City to implement control measures and education and outreach activities to achieve bacteria load reductions. The City is also required to report on the control measures on an annual basis. This provision is critical to the successful implementation of the urban runoff requirements for the TMDL. This provision requires the actions described above in this Fact Sheet for Provisions:

- C.14.a.1 and C.14.a.2, to control potential bacteria discharges from the sources as described above for these Provisions.
- C.14.a.4 and C.14.a.5, because pets and controllable wildlife were found to be significant sources to Parkside Aquatic and Lakeshore beaches.
- C.14.a.6, because sanitary sewer overflows were found to be the greatest potential source of bacteria to Parkside Aquatic and Lakeshore beaches.
- C.14.a.8, to monitor as describe in the Fact Sheet above.

Provision C.14.c.ii. requires the City to implement additional BMPs to reduce bacteria loads if the wasteload allocation is not met by December 13, 2021. The TMDL calls for a phased approach to achieving the wasteload allocation, wherein additional BMPs must be implemented if targets are not achieved after implementing Phase 1 actions within five years of the TMDL effective date. This provision calls for Phase 2 actions and is critical to the successful implementation of the urban runoff requirements for the TMDL.

Provision C.14.c.iii. requires the City to prepare a plan of additional actions to take if wasteload allocations are not met by December 13, 2026, six months before the end of the Permit Term. The plan shall include an assessment of bacteria sources with a schedule and description of additional control measures or increased levels of existing

control measures that will be implemented to attain bacteria water quality objectives. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

C.14.d. City of Half Moon Bay and San Mateo County Bacteria Controls

This Permit Provision implements the TMDL for Bacteria in Beaches in Pillar Point Harbor and Venice Beach adopted by the Water Board February 10, 2021. The implementation plan included in this TMDL requires urban runoff management agencies to implement controls and take other actions to reduce bacteria loads in urban runoff.

The TMDL contains wasteload allocations for urban runoff, including urban runoff associated with MS4s in the City of Half Moon Bay (City) and San Mateo County (County). The wasteload allocations are the same as the Numeric Targets and are expressed in terms of a geometric mean for Enterococcus. The Numeric Targets must be achieved in Venice Beach in the City and in the following beaches in Pillar Point Harbor (County): Inner Harbor Beach, Mavericks Beach, Pillar Point Marsh Beach, Yacht Club Beach, Capistrano Beach and Beach House Beach.

This provision is consistent with 2014 U.S. EPA Memo[308] providing guidance on implementing TMDL WLAs in NPDES stormwater permits. Specifically, this provision establishes clear actions to achieve bacteria reductions necessary to achieve receiving water limits. The TMDL requires the City and County to attain wasteload allocations by taking a phased approach in which additional or enhanced actions are required if initial implementation actions do not result in attainment of the TMDL within five years.

Provision C.14.d.i. requires the City of Half Moon Bay (City) and County of San Mateo (County) to submit a written plan for and to implement control measures and education and outreach activities to achieve bacteria load reductions, including the elements described in the Fact Sheet above for Provisions C.14.a.1 through C.14.a.8. The City and County are required to report on the control measures on an annual basis. This provision is critical to the successful implementation of the urban runoff requirements for the TMDL.

Provision C.14.d.ii. requires the City and County to obtain and evaluate water quality monitoring data for bacteria at the beaches included in this TMDL, and to submit a report on the data annually. The monitoring and reporting requirements of Provision C.14 are authorized under Clean Water Act § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h), (j) and (l), 122.42(c), 122.44(i) and 122.48, and Water Code § 13383.

Provision C.14.d.iii. requires the City and County to prepare a plan of additional actions to take if wasteload allocations are not met within five years of the TMDL effective date, as called for in the TMDL. The plan shall include an assessment of

[308] U.S. EPA. November 26, 2014. Revisions to the November 22, 2002 Memorandum "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs"

bacteria sources; a summary of control actions taken; and a schedule and description of additional control measures or increased levels of existing control measures that will be implemented to attain bacteria water quality objectives. Additional monitoring studies to identify sources, track, and/or quantify the risk of bacteria in the receiving water may be included in this effort.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges. Illicit discharge means "any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities" (40 CFR 122.26(b)(2)).

Fact Sheet Findings in Support of Provision C.15.

C.15-1 Prohibition A.1 effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1 if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

C.15-2 Removal of Conditional Exemption for Planned and Unplanned Discharges of the Potable Water System

MRP 1 contained requirements for planned and unplanned discharges from the potable water systems owned and/or operated by Permittees who are water purveyors. The discharges were conditionally exempted provided the Permittees complied with the BMP, monitoring, and reporting requirements in the Previous Permit. The requirements were necessary because potable water discharges contain chlorine and chloramines, two very toxic chemicals to aquatic life, and can cause erosion, scouring of stream and creek banks, and sedimentation. The conditional exemption and requirements were included as an interim measure until such time an NPDES permit regulating potable water discharges was adopted. The State Water Board adopted the statewide General NPDES Permit for Drinking Water System Discharges to Waters of the United States, Order WQ 2014-0194-DWQ (Potable Water General Permit) on

November 18, 2014.[309] Therefore, the conditional exemption and requirements for planned and unplanned discharges from the Permittees' potable water systems is no longer necessary. The Permittees should seek coverage under the Potable Water General Permit for their potable water system discharges. NPDES-permitted discharges, such as those permitted by the Potable Water General Permit, are exempt from Discharge Prohibition A.1.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1 if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1 if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b's requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

- **Provision C.15.b.i.(1). Pumped Groundwater from Non-Drinking Water Aquifers.** These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Discharges of pumped groundwater from nondrinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit. U.S. EPA Method 8260B and 8270C for volatile and semi-volatile organic compounds have been replaced with U.S. UPA Method 624.1 and 625.1, respectively, to be consistent with 40 C.F.R. Part 136 (p. 4).

[309] https://www.waterboards.ca.gov/water_issues/programs/npdes/general_permits.html

- **Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains.** This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

  Updates have been made to the Provision C.15.b.i.(2)(b)(ii). U.S. EPA Method 8260B and 8270C for volatile and semi-volatile organic compounds have been replaced with U.S. EPA Method 624.1 and 625.1, respectively, to be consistent with 40 C.F.R. Part 136 (p. 4). Several of the reporting limits in the Provision C.15.b.i.(2)(b)(ii) Constituent Reporting Limit table have been updated or modified, to reflect the latest reissuance of the VOC and Fuel General Permit, NPDES Permit No. CAG912002 (Order No. R2-2017-0048, as amended by Order No. R2-2018-0050), which covers discharges from groundwater treatment facilities that extract or treat groundwater polluted by volatile organic compounds (VOCs), fuel leaks, fuel additives, or other related wastes (e.g., semi-volatile organic compounds [SVOCs], polycyclic aromatic hydrocarbons [PAHs], and metals).

- **Provision C.15.b.ii. Air Conditioning Condensate.** Small air conditioning units are usually operated during the warm weather months. The condensate from these units is uncontaminated and unlikely to reach a storm drain or waters of the State because it tends to be low in volume and tends to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the condensate tends to be uncontaminated, it picks up contaminants on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

- **Provision C.15.b.iii. Emergency Discharges of Firefighting Water and Foam.** According to 40 C.F.R §122.26, MS4 Permits may address discharges or flows from firefighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States. Discharges from firefighting activities are excluded from the definition of illicit discharges, but may be regulated where they are

significant contributors to water pollution.[310] This is consistent with U.S. EPA's treatment of firefighting discharges to small MS4s.[311] U.S. EPA envisions that significance is determined with reference to the category of discharges, not individual fires.[312]

At the same time, water quality impacts from individual fires illustrate the significance of the category of discharges. For instance, in April 2019, the discharge of firefighting foam through the storm drain to Codornices Creek in Berkeley caused a fish kill of at least 60 fish, including steelhead.[313]

Potable water is also used to fight fires. In the Bay Area, chloramines are typically used to control pathogens in potable water, and they are toxic to aquatic life.[314] Discharges of chloraminated potable water to Bay Area receiving waters have caused fish kills.[315] As a result, discharges of chloraminated potable water used for firefighting have the potential to impact aquatic life, including by causing fish kills.

The Water Board observes the following: fish kills from potable water discharges almost every year; small volumes of potable water discharges (between 4,000 and 10,000 gallons) kill fish; and many species of fish (steelhead, rainbow trout, three-spine stickleback, Sacramento suckers, hitch, California roach, mosquitofish, green sunfish, bluegill, fathead minnows, sculpin, golden shiners) and crayfish have been killed by potable water discharges.

There are several recent examples of potable water discharges that resulted in fish kills (and fines) in the Bay Area, listed below. It is important to note that this list is inexhaustive. It includes all fines since 2007, but not all fish kills since 2007. That is because it excludes potable water discharges (resulting in fish kills) between 2018

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[310] 40 C.F.R. 122.26(d)(2)(iv)(B)(1)

[311] 64 Fed. Reg. 68722, 68756: "[D]ischarges or flows from fire fighting activities are excluded from the definition of illicit discharge and only need to be addressed where they are identified as significant sources of pollutants to waters of the United States."

[312] 64 Fed. Reg. 68722, 68758: "If an MS4 is concerned that flows from firefighting are, as a category, contributing substantial amounts of pollutants to their system, they could develop a program to address those flows prospectively. The program may include an analysis of the flow from several sources, steps to minimize the pollutant contribution, and a plan to work with the sources of the discharge to minimize any adverse impact on water quality. During the development of such a program, the MS4 may determine that only certain types of flows within a particular category are a concern, for example, fire fighting flows at industrial sites where large quantities of chemicals are present."

[313] McKenney, Hope. Fire Retardant Linked to Fish Deaths in Berkeley Creek Identified by State Fish and Wildlife, *KQED* April 12, 2019; accessed at https://www.kqed.org/news/11739651/fire-retardant-linked-to-fish-deaths-in-berkeley-creek-identified-by-state-fish-and-wildlife.

[314] SFPUC, September, 2010. *Questions and Answers Regarding Chloramine.* Accessed on August 30, 2020, from: https://www.sfdph.org/dph/files/EHSdocs/ehsWaterdocs/Chloramine/SFDPH_Chloramine_in_Drinking_Water_Document_Collection.pdf

[315] Aaron Kinney, November 18, 2014. "Cal Water hit with $3 million penalty for fish-killing San Mateo pipe leak." San Jose Mercury News.

and 2022 which normally would have resulted in fines, because the Water Board chose not to enforce; review of the Water Board's Enforcement Policy resulted in coordination with water purveyors to improve their asset management programs in lieu of penalties.

(1) Cal Water Service Company, $200,000 ACL, 137,640 gallon discharge to Polhemus Creek in September 2007, killed 21 steelhead + 2 stickleback (R2-2009-0006);

(2) EBMUD, $72,000 ACL, 4,200 gallon discharge to Sausal Creek in August 2010 killed 25+ rainbow trout and 23,400 gallon discharge to Reliez Valley Creek in January 2010 with unknown impact. (R2-2012-0008);

(3) CalTrans, $31,250 ACL, 8,250 gallon discharge to Bear Gulch Creek in May 2011, resulted in fish kill (R2-2012-0009);

(4) SFPUC, $608,310 ACL for 4 violations, including a 37,500 gallon discharge to San Mateo Creek in Jan 2011 killing 5 rainbow trout and 16,500 gallon discharge to San Mateo Creek in October 2012 killing 64 fish including 28 steelhead. (R2-2014-1003);

(5) CA Water Service Company, $1,020,000 ACL for 8,207,560-gallon discharge to Polhemus Creek and San Mateo Creek in October 2013 killing 231 fish including rainbow trout and 1 crayfish (R2-2016-1012);

(6) Town Hillsborough, $221,030 ACL for 153,000-gallon discharge to San Mateo Creek in September 2015 killing 505 fish including threatened species under the Endangered Species Act (R2-2017-1028);

(7) EBMUD, $893,190 ACL for 3 discharges: (1) a 72,000-gallon discharge to San Ramon Creek in October 2015 killing 104 fish including mosquitofish, Sacramento suckers, hitch, and California roach; (2) 2,200,000-gallon discharge to Las Trampas Creek in November 2015 killing 17 California roach and 2 Sacramento suckers; and (3) 191,400-gallon discharge to San Ramon Creek killing 140 California roach, 100 three-spined stickleback, 75 mosquitofish, 6 green sunfish, 4 bluegill, and 2 fathead minnows (R2-2017-1031);

(8) Marin Municipal Water District, $129,250 ACL for 105,000-gallon discharge to San Anselmo Creek in July 2016 killing an unquantified number of fish that included sculpin, California roach, and rainbow trout or steelhead (R2-2018-1004);

(9) Dublin-San Ramon Services District, $129,250 ACL for 61,000-gallon discharge to Alamo Creek in September 2017 killing 130 golden shiners and 1 bluegill (R2-2018-1006);

(10) San Jose Water Company, $75,000 ACL for 111,250-gallon discharge to Babb Creek in September 2017 killing 565 fish (R2-2018-1011); and

(11) City of San Mateo, $73,700 ACL for 7,720-gallon discharge to San Mateo Creek in May 2021 killing 44 steelhead, 26 prickly sulpin, 19 Sacramento suckers, 8 threespine stickleback, and 1 crayfish (R2-2022-1001).

The Berkeley incident and the use of chloraminated potable water for firefighting demonstrate that flows from firefighting activities can contribute substantial amounts of pollutants to receiving waters if not managed. As a result, the Water Board has determined that firefighting discharges can contribute significant pollution to receiving waters and require management by Permittees.

This Provision addresses discharges of firefighting water and foam associated with emergency firefighting activities. Discharges of firefighting water and foam associated with non-emergency firefighting activities such as training are neither exempted nor conditionally exempted by this Provision; they are prohibited pursuant to Discharge Prohibition A.1. If there are discharges to storm drain systems or watercourses of firefighting water and/or foam (or other non-stormwater) associated with non-emergency (e.g., training) firefighting activities, which would violate Discharge Prohibition A.1, then Permittees must comply with the reporting specified in Provision C.23.c.

This Provision acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs only when they do not interfere with immediate emergency response operations or impact public health and safety.

The requirements in Provision C.15.b.iii ensure that Permittees reduce or eliminate the significant pollution from firefighting foam and water discharged during firefighting emergencies, without compromising the ability of firefighting personnel to protect lives and property. Permittees are required to evaluate and improve the efficacy of their BMPs and SOPs for the containment and cleanup of firefighting water and foam discharged during firefighting emergencies. These discharges are significant contributors to pollution in waters of the U.S., for the following reasons:

(1) Potable water is used in emergency firefighting situations, often in combination with firefighting foams. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two chemicals that are toxic to aquatic life. Such discharges can also cause erosion and scouring of stream and creek banks and can result in sedimentation if effective BMPs are not implemented.

(2) Discharges of Class A firefighting foams contribute pollution to water quality in receiving waters, because they contain constituents that are acutely toxic to

aquatic species.[316,317,318,319] In April 2019, a vehicle fire in the City of Berkeley resulted in the discharge of 4,500-12,000 gallons of potable water and 20 gallons of a Class A firefighting foam (for which the primary/active ingredient is a hydrocarbon surfactant; 96-hr LC_{50} Rainbow Trout = 16.8 mg/L) into the City's MS4, which discharged to Codornices Creek and resulted in the deaths of at least 63 Central Coast California Steelhead Trout and 1 sculpin. Similar discharges of other Class A foams with comparable acute aquatic toxicity[316] are likely to cause similar impacts.

(3) Class B firefighting foams are generally divided into two types, fluorinated and fluorine-free. Discharges of both types of Class B firefighting foams[320] contribute pollution to water quality in receiving waters, because they contain constituents that are toxic to aquatic species. Fluorine-free Class B foams do not contain PFAS, but are still acutely toxic to aquatic species[321] because their primary active ingredient is typically a hydrocarbon surfactant.[322] Fluorinated Class B foams typically contain perfluoroalkyl and polyfluoroalkyl substances (PFAS), which are environmentally persistent and toxic to both human health and aquatic species.[323,324,325]

(4) California Senate Bill 1044,[326] approved by the Governor on September 29, 2020, and effective January 1, 2022, prohibits the sale and use of Class B firefighting foams that contain intentionally added PFAS chemicals, with phaseouts for certain continued applications of such foams. This Provision requires the Permittees to recommend reporting requirements (for example,

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[316] https://www.fs.fed.us/rm/fire/wfcs/sds.php

[317] https://www.fs.fed.us/rm/fire/wfcs/documents/NONCONFIDENTIAL-EcoRA-Foams%20June2020draft.pdf

[318]https://www.fs.fed.us/rm/fire/wfcs/documents/307b_Wildland%20Foam_Master%20Draft%20(for%20Public%20release).pdf

[319] https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/rotenone/appendix-f.pdf

[320] Class B firefighting foams are commercial surfactant solutions that are used for fire suppression (in particular, of flammable liquids like gasoline, oil and jet fuel) and flammable vapor suppression at military installations and civilian facilities and airports, as well as at petroleum refineries and bulk storage facilities, and chemical manufacturing plants and storage facilities. Municipal fire departments also use Class B firefighting foams for emergency response. Accessed on August 2, 2021, from: https://www4.des.state.nh.us/nh-pfas-investigation/?page_id=148

[321] https://store.danko.net/files/documents/SDS_PC-1-Fluorine-Free-OSHA-WHMIS-GHS_2019-09-13_EN-23.pdf. Web. Viewed <August 2, 2021>

[322] https://serdp-estcp.org/Program-Areas/Weapons-Systems-and-Platforms/Waste-Reduction-and-Treatment-in-DoD-Operations/WP-2738/WP-2738. Web. Viewed <August 2, 2021>

[323] https://www.epa.gov/pfas/basic-information-pfas

[324] https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201920200SB1044

[325] https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfas

[326]https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB1044

reporting if any of the exemptions in Senate Bill 1044 are invoked by parties acting within Permittees' jurisdictions, such that firefighting foams containing PFAS chemicals are used during firefighting emergencies) then implement those recommendations. Reporting on discharges of PFAS and other foams is necessary to ensure transparency about continued PFAS use within the Permit region, and transparency about discharges of other firefighting foams which also have adverse environmental impacts.

Provision C.15.b.iii.(2), Regional Coordination, requires the Permittees to convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff, to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activities. The Permittees will collectively (e.g., through the Working Group) evaluate the adequacy of existing BMPs, SOPs and resources used for the containment and cleanup of firefighting foam discharged during firefighting emergencies, culminating in a Firefighting Discharges Report by September 30, 2025, containing recommendations to the Permittees regarding the implementation of BMPs, SOPs, and resources used for the containment and cleanup of firefighting water and foam discharged during firefighting emergencies. A footnote in the Provision clarifies that the Working Group does not have to review every single Permittee's BMPs/SOPs/resources, but that the Working Group can review a representative subset of them. Regarding resources used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters (e.g., maps), the intent is not to task firefighting personnel with developing/providing/utilizing those resources at each emergency on the spot, but instead, to preemptively consider the availability, need, and utility of the resources, then incorporate the resources that will be helpful (i.e., helpful for mitigating adverse environmental impacts) into the collective municipality's BMPs and SOPs. The Fact Sheet, below, gives examples of BMPs and SOPs that the Working Group should consider. In addition, the Working Group should consider identifying areas where more information or effective BMPs and SOPs may be needed or desirable, if it or they are not yet otherwise available, and as noted above the Group is expected to include reporting recommendations associated with firefighting discharges, and particularly firefighting foams. The requirement for a region-wide Working Group and for the report will help to create administrative efficiencies by allowing Permittees to pool resources and avoid the duplication of work that might occur if they studied these issues individually. The Water Board may consider requiring the Working Group to continue to convene on an ongoing basis in subsequent permit terms, to update the recommendations in the Firefighting Discharges Report as needed.

The Permittees estimate that a portion of fires are responded to (for containment and cleanup) not with municipal resources, but by private contractors. Therefore, Provision C.15.b.iii.(2) additionally requires the Permittees to collectively (e.g., through the Working Group): 1) develop (and revise on an ongoing basis, as-

needed) outreach materials regarding BMPs and SOPs for the containment and cleanup of discharges of firefighting water and foam, for private contractors hired by either Permittees or by private parties to conduct firefighting, containment and cleanup within Permittees' jurisdictions, because a significant portion of fires on private properties are responded to (for containment and cleanup) by private contractors hired by the owners of those private properties. Separately, it is also true that there are some private firefighting crews within the region, such as at large industrial sites like the Chevron refinery in Richmond; the Working Group is encouraged to discuss coordination with these private firefighting crews, as needed (for example, if it is likely that there are emergency discharges from such sites to Permittees' MS4s).

This provision also requires the Permittees to collectively (e.g., through the Working Group) evaluate the environmental impacts of foams and make recommendations about which foams are least environmentally harmful while still performing well. Certain firefighting foams appear to be less environmentally harmful than others (within and between Class A and Class B foams).[327] Then the Permittees are instructed to collectively (e.g., through the Working Group) develop SOPs for the use of those foams, and coordinate with relevant federal, state and local entities, such as the California Department of Forestry and Fire Protection, because those entities may be undergoing similar exercises and may be able to share information that could inform these and other tasks required by Provision C.15.b.iii.(2).

The Working Group could consider addressing reasonably related issues that are beyond the scope of this Provision, such as addressing prohibited (not conditionally-exempted) discharges associated with non-emergency firefighting activities, such as training.

Provision C.15.b.iii.(3), Ongoing Implementation Practices, requires the Permittees to implement the recommendations, to the extent they apply to Permittees' individual firefighting programs, that are included in the Firefighting Discharges Report developed pursuant to Provision C.15.b.iii.(2)(b).

Provision C.15.b.iii.(4), Required BMPs, requires Permittees to implement BMPs and SOPs for the containment and cleanup of discharges of firefighting water and foam associated with emergency firefighting activities, only to the extent that the implementation of such BMPs and SOPs does not jeopardize the ability of firefighting personnel to protect public health and safety. If and when the recommended BMPs and SOPs are implemented, they are likely to prevent or

[327] Fluorine-free foams have been on the market for approximately twenty years, though even these foams have toxic effects, as the fish kill in Berkeley shows. Clean Production Action, a nonprofit based in Somerville, Massachusetts, has developed an environmental screening tool for firefighting foams, which could be a starting point for the Working Group. See Thorpe, Bev. "GreenScreen Certified for Fire Fighting Foam Launched" (Sept. 2020) (accessible at: https://www.cleanproduction.org/resources/entry/fff-launched).

reduce impacts to receiving waters that would otherwise be caused by the discharges associated with the emergency firefighting activities.

BMPs and SOPs may include, but are not limited to, the following:

(1) Plugging of the storm drain collection system for temporary storage;

(2) Dechlorination prior to discharge to the MS4 and receiving waters;

(3) Proper disposal of water and foam according to jurisdictional requirements;

(4) Use of the least environmentally harmful firefighting foams;

(5) Avoiding the use of firefighting foam when it is not necessary;

(6) Use of the proper firefighting foam depending on the type of fire;

(7) When firefighting foam is used, limiting the amount used;

(8) Communication and coordination between both municipal responding departments (e.g., fire, public works, environmental services) and external responding agencies (e.g., CalFire, special district fire departments);

(9) Categorizing fire types and establishing expectations for BMP and SOP implementation based on that categorization; and

(10) Discouraging the use of firefighting foam where it may discharge to receiving waters, particularly receiving waters that may have sensitive habitat, such as habitat for special status species, including certain salmonids.

These recommended BMPs and SOPs will be discussed in the Firefighting Discharges Working Group, including which scenarios they are appropriate for.

Provision C.15.b.iii.(5) requires the Permittees to implement the reporting that is recommended by the Firefighting Discharges Working Group in the Firefighting Discharges Report. Provision C.15.b.iii.(2)(a)(vii) specifies the reporting requirements that Permittees must consider, including what type of information will be reported, as well as how reporting will be triggered, such as: in the case that any amount of any firefighting foam discharges to a receiving water,[328] in the case that five or more gallons of any firefighting foam concentrate discharges to the MS4, regardless of whether or not it impacts a receiving water,[329] and in the case that any amount of PFAS-containing firefighting foam concentrate is used during an emergency, regardless of whether it discharges to the MS4 or a receiving water. The purpose of these additional reporting requirements is to increase transparency about

[328] Pursuant to California Fish and Game Code, Section 5650, there is no minimum reportable quantity for discharges of firefighting foam to waters of the state. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=FGC&sectionNum=5650

[329] For firefighting personnel, the reportable quantity of HAZMAT released to the environment is five gallons. Additionally, five gallons of firefighting foam is the size of a typical concentrated foam container.

the use of and discharges of non-stormwater to MS4s and receiving waters, as well as to provide direct feedback on the Permittees' implementation of Provision C.15.b.iii.

The Working Group should also discuss notification of the California State Warning Center and the California Department of Fish and Wildlife, for discharges to marine waters (pursuant to CGC 8670.25.5 and 8670.26, FWPCA 311, 33 CFR 153.203, and 40 CFR 302.6), and for discharges to non-marine waters (pursuant to 23 CCR 2250(a), HSC 5411, CWC 13271(a)).

The Water Board may consider including more specific reporting requirements in a future Permit term, based on the reporting recommendations (and the Permittees' implementation of those recommendations) in the Firefighting Discharges Report.

- **Provision C.15.b.iv. Individual Residential Car Washing.** Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.
- **Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges.** These types of discharges can contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or a waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This provision also requires Permittees to coordinate with local sanitary agencies in these efforts.
- **Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering.** Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the

use of fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

C.16. Discharges to Areas of Special Biological Significance

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F), and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: In 1972, the State Water Board adopted the Water Quality Control Plan for Ocean Waters of California, California Ocean Plan (Ocean Plan). The State Water Board adopted the most recent amendment to the Ocean Plan on October 16, 2012, and the plan was subsequently approved by the State Office of Administrative Law and U.S. EPA. The State Water Board is responsible for reviewing the Ocean Plan water quality standards and for modifying and adopting standards in accordance with CWA section 303(c)(1) and CWC section 13170.2. Pursuant to CWA sections 13263 and 13377, this Permit implements the Ocean Plan. In accordance with the Ocean Plan, the State Water Board granted an exception to the prohibition of stormwater discharges to Areas of Special Biological Significance (ASBSs), as discussed further below.

Fact Sheet Findings in Support of Provision C.16.

C.16-1 The Ocean Plan prohibits the discharge of waste to designated ASBSs. ASBSs are designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. On March 20, 2012, the State Water Board approved Resolution No. 2012-0012, approving a general exception to the Ocean Plan prohibition against discharges to ASBSs for certain nonpoint source discharges and NPDES-permitted municipal storm water discharges (ASBS Exception), as long as those discharges are covered under an appropriate authorization to discharge, such as this Order and comply with the Special Protections contained in Attachment B (Special Protections) to that resolution, among other requirements. The ASBS Exception was subsequently amended by State Water Board Resolution No. 2012-0031, which required pollutant reductions to be achieved within six years, in accordance with ASBS Compliance Plans.

C.16-2 This provision applies to discharges from the County of San Mateo into the James V. Fitzgerald Marine Reserve ASBS. The provision authorizes the County of San Mateo's stormwater discharge as set forth in the provision and implements the Ocean Plan and the exceptions granted under it by the State Water Board to allow the County of San Mateo to discharge stormwater into the ASBS. The requirements of the Provision are from the ASBS Exception and its Special Protections, which are incorporated into the Order as Attachment F.

C.16-3 The County of San Mateo began development of the Fitzgerald ASBS Pollution Reduction Program in 2011 to comply with the ASBS Exception. The program

is led by the San Mateo County Department of Public Works in collaboration with the San Mateo County Resource Conservation District and the San Francisco Estuary Institute. The project includes implementation of targeted stormwater BMPs, water quality studies, BMP effectiveness monitoring, and education and outreach.

C.16-4 In addition to these efforts, the Water Board has developed a Water Quality Improvement Plan for Bacteria in San Vicente Creek,[330] which is tributary to the Fitzgerald ASBS. In 2016, the Water Board also delisted the Fitzgerald Marine Reserve Beach for bacteria from the 303(d) List based on water quality improvements from BMP implementation, identification and removal of illicit septic system connections, and education and outreach activities.

[330] San Francisco Bay Regional Water Board, "Supporting Implementing a Water Quality Improvement Plan to Achieve Water Quality Objectives for Bacteria in San Vicente Creek, and Recommending Delisting of the Fitzgerald Marine Reserve for Bacteria Pursuant to Section 303(d) of the Clean Water Act," Resolution No. R2-2016-0024.

C.17. Discharges Associated with Unsheltered Homeless Populations

Legal Authority

Broad and Specific Legal Authority: CWA §§ 308(a), 402(p)(3)(B)(ii-iii); CWC §§ 13377, 13263, and 13383; 40 CFR § 122.26(d)(1)(v)(B); 40 CFR § 122.26(d)(2)(i)(B, C, D, E, and F); and 40 CFR § 122.26(d)(2)(iv); Basin Plan Discharge Prohibitions 7, 8, and 15; and Statewide Prohibition on Trash: "The discharge of trash to surface waters of the State or the deposition of trash where it may be discharged into surface waters of the State is prohibited."

Fact Sheet Findings in Support of Provision C.17.

Driven in part by a lack of affordable housing and the high cost of living, a significant number of Bay Area residents are experiencing homelessness. That number increased markedly during MRP 2. For example, according to the latest Point-in-Time counts, between 2017 and 2019, the South Bay, East Bay, and the San Francisco Peninsula saw an approximate 25 percent increase (with individual increases of 17 to 43 percent) in their unsheltered homeless populations. Discharges associated with people experiencing unsheltered homelessness, including human waste and trash, are unauthorized discharges that are prohibited under the MRP. Such discharges are a significant water quality concern because they adversely impact water quality and public health (through the spread of disease). At the same time, these water quality and sanitation issues can be difficult to address because sanitation services can be challenging to provide and homeless populations may not always be receptive to the services being provided. In addition, while longer-term measures to address unsheltered homelessness, such as the provision of housing and supportive services may over time reduce problematic discharges, they do not effectively reduce ongoing discharges over the short term. Thus, actions to reduce and/or eliminate MS4 discharges associated with unsheltered homelessness are necessary to prevent and minimize impacts to water quality and public health. Such actions also can improve overall water quality and sanitary conditions for people experiencing unsheltered homelessness.

In 2015, the Water Board adopted Resolution No. R2-2015-0024, which identified discharges of trash and human waste from homeless encampments as significant water quality and public health concern. The resolution encouraged municipalities to consider water quality issues while addressing the broader social issue of homelessness and undertake efforts to prevent or eliminate discharges from homeless encampments. The resolution further recommended that municipal efforts "…include clear and measurable goals for preventing trash and human waste from discharging" to receiving waters. The resolution also affirmed the Board's authority to issue cleanup and abatement

orders or waste discharge requirements to regulate discharges associated with homeless encampments.

Since adoption of the resolution, some Bay Area municipalities have made progress towards controlling discharges associated with unsheltered homelessness under the Provision C.10 Direct Discharge Control Program. Although efforts under that program have provided benefit with respect to reducing discharges of trash and certain other pollutants, they have not fully addressed discharges associated with unsheltered homelessness that impact water quality. Furthermore, only five Permittees have an approved Direct Discharge Control Plan.

A number of Permittees are taking actions that help address problematic discharges. For example, East Palo Alto and Mountain View have established formalized RV encampments or RV safe parking areas where RV waste can be appropriately collected and disposed using mobile services. In Oakland, where the unsheltered homeless population increased to about 4,000 in 2020, an increase of about 63 percent from 2017,[331] the city has established formalized encampments and is directing resources into affordable housing with the aim of getting those who are willing into housing. In 2020, Oakland adopted a new ordinance regarding where homeless encampments could be located, and is also working to provide sanitary services and manage sites for RVs, and has been targeting services to encampments that are within 500 feet of waterways.[332] Similarly, San Jose has a dedicated outreach team that provides emergency shelter, meals, showers, and other basic needs while working to match individuals experiencing homelessness with an appropriate housing program. The City of San Jose also coordinates with Santa Clara Valley Water District to address discharges associated with unsheltered homelessness in and around creeks.

As noted above, the Bay Area population of people experiencing unsheltered homelessness has continued to grow, and is expected to grow further as eviction moratoria implemented during the COVID-19 pandemic expire. Meanwhile, outbreaks of *Shigella* and Hepatitis A, both spread through fecal-oral contact, among homeless people in California underscore the risks posed by unregulated discharges, particularly of untreated human waste, from encampments.[333] To encourage Permittees' efforts, gain a better understanding of populations experiencing unsheltered homelessness, the location of encampments in relation to storm drain inlets and receiving waters,

[331] Rodriguez, October 21, 2020. Oakland Approves Rules to Restrict Homeless Encampments. U.S. News.

[332] Ibid.

[333] Liu, et al. Communicable Disease Among People Experiencing Homelessness in California, in Epidemiology and Infection (2020).

water quality related impacts, and associated sanitation-related needs, and to better understand the portion of discharges that are being addressed by Permittee efforts, and the extent to which practices may be effective, Provision C.17 requires that Permittees use results from biennial point-in-time census surveys and related information (e.g., databases, complaint logs) to review and update municipalities' implementation practices.

To encourage regional coordination between cities, Caltrans, sanitary sewer agencies, flood control districts, and other agencies (e.g., railroads, non-governmental organizations), Provision C.17 requires that Permittees collectively develop a BMP report that identifies effective practices to address MS4 discharges associated with unsheltered homelessness that impact water quality. The clearing and abating of homeless encampments, in response to public complaints, can often result in the encampment simply moving to a different location and continuing the discharges in the new location. The intent of this BMP report is therefore to foster (and prioritize) regional collaboration that takes into account the transient nature of unsheltered homeless populations, and the inherent benefit to Permittees sharing knowledge and resources on proven and effective strategies to managing the associated discharges from homeless encampments that impact water quality. The three main components of this report include:

(1) Identifying practices (e.g., outreach, cleanup, sanitation) that could be implemented by Permittees to address discharges associated with unsheltered homelessness that are impacting water quality;

(2) Identifying regional and/or countywide efforts and implementation actions towards addressing discharges associated with unsheltered homelessness. Permittees should include recommendations for engaging in such efforts that aim to provide clean water and sanitation needs for the homeless population; and

(3) Identifying practices implemented by municipalities during the COVID-19 pandemic to reduce the spread of the virus in homeless populations (such as providing temporary housing, etc.) that may have contributed towards a water quality benefit.

The tasks identified above are intended to assist Permittees in developing a framework for controlling and eliminating MS4 discharges associated with homeless encampments, and refining individual and collaborative best management practices (associated with unsheltered homelessness) to ensure the protection of water quality and public health. Practices that harm or criminalize unsheltered homeless residents, such as encampment sweeps, are discouraged under this provision. To evaluate BMP effectiveness, Provision C.17 requires that Permittees report on the control measures being

implemented, the approximate portion and locations of the unsheltered homeless population being served by those measures, and the portion (number of people) and location not reached, or not fully served by those measures. Examples of control measures include, but are not limited to, access to emergency shelters; the provision of social services, clean drinking water, and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV “safe parking” areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing various cleanup or pickup programs within the Permittees jurisdiction, or at the countywide or regional level.

C.18. Control of Sediment Discharges from Coastal San Mateo County Roads

Legal Authority

This is a TMDL-derived Provision, for which the legal authority is cited in the Fact Sheet section on Provisions C.9-C.14.

Fact Sheet Findings in Support of Provision C.18

C.18-1 This Permit Provision implements the Pescadero and Butano Creeks Watershed Sediment TMDL adopted by the Water Board June 13, 2018 and approved by the U.S. EPA on June 24, 2019. The implementation plan included in this TMDL requires San Mateo County to complete a roads assessment, including a prioritized list of road repair projects, stormproof unpaved roads, and implement other BMPs to reduce sediment in runoff from County roads in the Pescadero Creek and Butano Creek watersheds. A similar strategy is being developed for the San Gregorio watershed to address sediment impairment; thus, this Permit Provision includes the San Gregorio watershed as well. For the San Gregorio Creek watershed, the Water Quality Improvement Plan calls for San Mateo County to complete twenty percent of the sediment reductions actions described above by June 30, 2029, and fifty percent by 2032.

C.18-2 The TMDL contains allocations for sediment loading from County road runoff expressed in tons per year and as a percentage of the natural background sediment load. Attainment of this allocation is required to achieve the Numeric Targets for the Pescadero and Butano Creek Watershed. Consequently, this provision is critical to the successful implementation of the sediment reduction requirements of the TMDL.

Specific Provision C.18 Requirements

Provision C.18.a Road Erosion Inventory requires the County to prepare a road erosion inventory to identify and prioritize actions to reduce road-related erosion from hydrologically connected County roads. Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. The County is required to report on the road erosion inventory as part of the 2023 Annual Report.

Provision C.18.b Prioritized List and Schedule of Actions requires the County to develop a prioritized list and schedule of actions, such as culvert repair or replacement, to reduce road related sediment delivery to stream channels, based on the results of the Road Erosion Inventory conducted in Provision C.18.a. The County is required to submit the prioritized list and schedule of actions as part of the 2023 Annual Report.

Provision C.18.c Implement Control Measures to Attain Performance Standards requires the County to implement control measures and pollution prevention strategies to reduce road related sediment delivery from County roads to stream channels, based on the Prioritized List and Schedule of Actions completed in Provision C.16.b. The County is required to implement and complete at least twenty percent (20%) of the control measures identified in the Prioritized List and Schedule of Actions by 2027. The County is required to report on the status of completed control measures in the Annual Report each year starting the first year of project implementation.

Provision C.18.d. Monitoring requires the County to conduct implementation, effectiveness and forensic monitoring to assess the performance of implemented control measures. The County is required to provide a monitoring report as part of the Annual Report each year starting in the first year of project implementation. The monitoring and reporting requirements of Provision C.18 are authorized under CWA § 308, 40 C.F.R. §§ 122.26(d)(2), 122.41(h), (j) and (l), 122.42(c), 122.44(i) and 122.48, and CWC § 13383.

C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements

Findings in Support of Provision C.19

C.19-1 Contra Costa County watersheds are under two Regional Water Quality Control Boards' jurisdiction, the San Francisco Bay Water Board and the Central Valley Water Board. The cities of Antioch, Brentwood, and Oakley, and portions of Unincorporated Contra Costa County and the Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) (the East County Permittees) in Contra Costa County are in the Central Valley Water Board's jurisdiction.

C.19-2 The East County Permittees are member agencies of the Contra Costa Clean Water Program (CCCWP). CCCWP assists its member agencies – most of whom are within the San Francisco Bay Water Board's jurisdictional boundaries – with tasks that can be done consistently throughout the County.

C.19-3 In 1992, the San Francisco Bay Water Board issued the first NPDES permit with requirements for stormwater discharges from municipal separate storm sewer systems (MS4s) in Contra Costa County cities and towns, and the portions of the County and CCCFCWCD located in its jurisdiction. In 1993, the Central Valley Water Board used the permit issued by the San Francisco Bay Water Board as a model and issued an NPDES permit with waste discharge requirements for stormwater discharges from MS4s within the East County Permittees' jurisdictions. In subsequent permit reissuance cycles, each Regional Water Board adopted stormwater permits for Contra Costa County with similar provisions, exercising an inter-regional, collaborative approach for the East County Permittees.

C.19-4 On October 14, 2009, the San Francisco Bay Water Board issued its first region-wide NPDES permit, Order No. R2-2009-0074, NPDES Permit No. CAS612008, for stormwater discharges from MS4s in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District. The Central Valley Water Board used Order No. R2-2009-0074 as a model and adopted Order No. R5-2010-0102, reissuing NPDES Permit No. CAS083313 for the East County Permittees to discharge stormwater from MS4s in their jurisdictions on September 23, 2010. Where Order No. R2-2009-0074 provisions were sufficient to meet the requirements of the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Central Valley Basin Plan) and other Central Valley Water Board policies, the provisions in Order No. R5-2010-0102 were the same as those in Order No. R2-2009-0074. Where different or additional provisions were required to meet

the requirements of the Central Valley Basin Plan or other Central Valley Water Board policies, including the Sacramento-San Joaquin Delta Estuary Methylmercury Total Maximum Daily Load (TMDL), those different or additional provisions were included in Order No. R2-2009-0074.

C.19-5 On November 19, 2015, the San Francisco Bay Water Board adopted Order No. R2-2015- 0049, updating and reissuing waste discharge requirements for stormwater discharges from MS4s in Alameda, Contra Costa, San Mateo, and Santa Clara counties, the cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District.

C.19-6 The East County Permittees submitted to the Central Valley Water Board a report of waste discharge, dated March 4, 2015, for reissuance of their waste discharge requirements under NPDES permit to discharge stormwater runoff from storm drains and watercourses within their jurisdictions. The East County Permittees anticipated that the Central Valley Water Board would reissue their stormwater permit with requirements consistent with the San Francisco Bay Water Board ’s Order No. R2-2015-0049. However, the Central Valley Water Board was already preparing a region-wide General Waste Discharge Requirements and NPDES Permit for stormwater discharges from MS4s (General Permit) within the Central Valley region.

C.19-7 The Central Valley Water Board did not support adopting separate waste discharge requirements for stormwater discharges from the East County Permittees, which would be consistent with the San Francisco Bay Water Board’s Order No. R2-2015-0049. The General Permit is significantly different from Order No. R2-2015-0049 and thus would not allow the East County Permittees to continue the collaborative approach through CCCWP. The Central Valley Water Board offered the East County Permittees two options: request a transfer of jurisdiction for stormwater permitting to the San Francisco Bay Water Board or obtain coverage under the General Permit.

C.19-8 In the fall of 2016, the East County Permittees asked the Central Valley Water Board to designate the San Francisco Bay Water Board as the permitting entity for stormwater discharges from their MS4s.

C.19-9 In a letter dated January 6, 2017, the San Francisco Bay Water Board and the Central Valley Water Board designated the San Francisco Bay Water Board to regulate MS4 discharges from the East County Permittees. The designation set forth the following conditions:

(1) The designation is only for MS4 permitting

(2) Each Regional Water Board reserves the right to take enforcement actions authorized by law against an East County Permittee for violations of an MS4 permit provision that affects that Regional Water Board’s watershed

(3) The San Francisco Bay Water Board will consult and coordinate with the Central Valley Water Board in the development of MS4 permit provisions to ensure they adequately reflect and implement the Central Valley Water Board's Basin Plan and policies; and

(4) The Central Valley Water Board will approve any plans and/or studies required for compliance with the Central Valley Water Board's Basin Plan and policies.

C.19-10 Order No. R2-2019-0004 amended Order No. R2-2015-0049 to add the East County Permittees. It also allowed them extended timelines to come into compliance with specific Order No. R2-2015-0049 provisions and identified and exempted those Order No. R2-2015-0049 provisions that do not apply to the East County Permittees, and incorporated requirements for the Sacramento-San Joaquin Delta Estuary Methylmercury TMDL and the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL.

Specific C.19 requirements

Provision C.19.a (Mercury Controls) exempts the East County Permittees from Provision C.11, Mercury Controls, because the East County Permittees are not subject to the San Francisco Bay Mercury TMDL. Therefore, they do not have San Francisco Bay Mercury TMDL wasteload allocations (WLAs) for mercury (See Provision 19.d concerning compliance with the Delta Methylmercury TMDL).

Provision C.19.b (Polychlorinated Biphenyls (PCBs) Controls) exempts the East County Permittees from Provision C.12, PCBs Controls, because the East County Permittees are not subject to the San Francisco Bay PCBs TMDL. Therefore, they do not have San Francisco Bay PCBs TMDL WLAs.

Provision C.19.c (Diazinon and Chlorpyrifos Controls) implements the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. The Central Valley Water Board adopted a basin plan amendment including a TMDL for diazinon and chlorpyrifos in the Sacramento-San Joaquin Delta Waterways (Delta Waterways)[334] on June 23, 2006. The State Water Board and U.S. EPA both approved the basin plan amendment. The TMDL includes WLAs for diazinon and chlorpyrifos applicable to the East County Permittees.

(1) The TMDL states that levels of diazinon and chlorpyrifos shall not exceed the sum (S) of one (1) as defined below:

[334] The Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin Appendix 42 lists the Delta Waterways to which the site-specific diazinon and chlorpyrifos water quality objectives and implementation and monitoring provisions apply.

$$S = \frac{C_D}{WQO_D} + \frac{C_C}{WQO_C} \leq 1.0$$

where:

C_D = diazinon concentration in ug/L of point source discharge

C_C = chlorpyrifos concentration in ug/L of point source discharge

WQO_D = acute or chronic diazinon water quality criterion (0.160 and 0.100 ug/L, respectively)

WQO_C = acute or chronic chlorpyrifos water quality criterion (0.025 and 0.015 ug/L, respectively)

For the purpose of calculating the sum (S) above, non-detectable concentrations are considered to be zero.

The East County Permittees' previous permit included requirements for the Diazinon and Chlorpyrifos TMDL. The final compliance deadline for the TMDL was December 1, 2011.

The East County Permittees submitted a letter dated September 13, 2018, demonstrating their discharge has not exceeded the TMDL WLAs or water quality objective concentrations for diazinon and chlorpyrifos since 2008. The letter summarizes the results of diazinon and chlorpyrifos monitoring from 2012 - 2014 under the CCCWP's Pollutants of Concern Load Monitoring at Lower Marsh Creek. This sampling location is directly downstream from one of the largest continuous urbanized areas in East County and samples characterized critical storm runoff events.

In addition, the letter includes diazinon and chlorpyrifos summary monitoring data from other County locations, in areas with both urban and agricultural lands from 2001-2017 by three programs: the State of California's Surface Water Ambient Monitoring Program (SWAMP), the Department of Pesticide Regulation (DPR) Statewide Pesticide Monitoring Program, and the San Francisco Estuary Institute (SFEI) Small Tributaries Loading Strategy. The SWAMP monitoring data includes 16 chlorpyrifos samples with no detections or exceedances, and 16 diazinon samples with 9 detections and 9 exceedances from 2001 - 2005. The DPR monitoring data includes 13 chlorpyrifos samples with 1 detection and 1 exceedance, and 13 diazinon samples with 1 detection and 1 exceedance from 2008 - 2009 and 2017. The chlorpyrifos and diazinon exceedances occurred in 2009 and could have been from agricultural sources. The SFEI monitoring data includes 5 chlorpyrifos samples with no detections or exceedances, and 5 diazinon samples with no detections or exceedances from 2013 -

2014. The monitoring data from SWAMP, DPR, and SFEI show that water quality objectives for diazinon and chlorpyrifos have not been exceeded since 2009, providing additional data to reflect the trend of reduced diazinon and chlorpyrifos concentrations in urban runoff.

The decline in concentrations of diazinon and chlorpyrifos in the waters to which the East County Permittees discharge is consistent with observations of declines in urban runoff concentrations in the Central Valley Watershed following cancellation of urban uses of these chemicals. U.S. EPA cancelled the sale of nearly all non-agricultural diazinon and chlorpyrifos products by 2004. However, residents could still be storing diazinon and chlorpyrifos products, and old supplies remain legal to use. Because use of these products is still allowed and out of the direct control of the East County Permittees, there still is potential that such use could make consistent attainment of numeric effluent limits infeasible. The implementation of Provision C.9 by the East County permittees is consistent with the requirements of the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. Provision C.9 requirements are in the implementation plan for the Sacramento-San Joaquin Delta Diazinon and Chlorpyrifos TMDL. The existing monitoring for toxicity and pesticides in Provision C.8. will be sufficient to demonstrate continued compliance with the diazinon and chlorpyrifos TMDL.

Provision C.19.d (Methylmercury Control Measure Plan and Monitoring) requires the East County Permittees to submit a methylmercury control plan and conduct a corresponding reasonable assurance analysis. The East County Permittees proposed completing these documents as part of their Delta Mercury Control Study Final Report that was submitted to meet Phase 1 of the Central Valley Water Board's Water Quality Control Plan for the Sacramento River and San Joaquin River Basin's Sacramento-San Joaquin River Delta Mercury Control Program and associated Methylmercury TMDL (see Fact Sheet for Provision C.19.e, below). Provision C.19.d requires methylmercury monitoring intended to assess inputs of methylmercury to the Delta from Marsh Creek and urban runoff; provide information to support implementation of pollutant control strategies; and assess progress toward achieving WLAs for the TMDL; and help resolve uncertainties in loading estimates and impairments associated with methylmercury. In particular, methylmercury monitoring addresses the management questions proposed by the CCCWP and set forth in Provision C.19.d.ii.(1)(f)

CWA section 402 (a)(2); 40 CFR sections 122.42(c)(4), 122.44(i), and 122.48(b); and CWC section 13383 provide authority for the Water Board to require monitoring and technical water quality reports. Provision C.19.d. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements and (2) provide information useful in evaluating compliance with all Permit requirements.

Provision C.19.e (Delta Mercury Control Program) implements the Delta Methylmercury TMDL in. the Water Quality Control Plan for the Sacramento River and

San Joaquin River Basins to address the mercury impairments (See Resolution No. R5-2010-0043.). The Delta Methylmercury TMDL was approved by the State Water Resources Control Board and the California Office of Administrative Law. Final approval by the U.S. EPA occurred on October 20, 2011.

The Delta is impaired because of elevated levels of methylmercury in fish. The Delta is on the CWA 303(d) list for mercury and the State Water Resources Control Board has designated the Delta as a toxic hot spot under the Bay Protection and Toxic Hot Spot Cleanup Program. Mercury problems are evident throughout the Central Valley watershed. The main concern with inorganic mercury is that it can develop into methylmercury, a powerful neurotoxin that bioaccumulates in the aquatic food chain to harmful levels. Health advisories have been issued which recommend limiting consumption of fish from the Bay/Delta, tributaries to the Delta, and many lakes and reservoirs in the Central Valley. Concentrations of mercury in fish in other water bodies approach or exceed National Academy of Science (NAS), U.S. EPA, and/or U.S. Food and Drug Administration (FDA) guidelines for wildlife and human protection. Mercury levels also exceed water quality objectives for the Delta and elsewhere. In addition to these concerns, fish-eating birds taken from some bodies of water in the basins have levels of mercury that can be expected to cause toxic effects. Bird-kills from mercury also have been documented in Lake Berryessa.

Components of the Delta Methylmercury TMDL relevant to municipal stormwater that are implemented through Provisions C.19.d and C.19.e are as follows:

(1) The methylmercury wasteload allocations for the East County Permittees, by Delta subarea, are:

   (a) Central Delta 0.75 grams/year;

   (b) Marsh Creek 0.30 grams/year; and

   (c) West Delta 3.2 grams/year

(2) Compliance with the methylmercury waste load allocations are required to be met as soon as possible, but no later than January 1, 2030, unless the Central Valley Regional Water Board modifies the TMDL implementation schedule and final compliance date. The wasteload allocations for the Central and West Delta subareas are associated with a 0% reduction requirement while the wasteload allocation for the Marsh Creek subarea is associated with a 73% reduction requirement.

(3) The NPDES permits for urban runoff management agencies shall require pollution prevention measures and the implementation of BMPs to minimize total mercury discharges, as well BMPs to control erosion and sediment discharges with the goal of reducing mercury discharges. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to human health and wildlife. Requirements in the permit issued or reissued

and applicable for the term of the permit shall be based on an updated assessment of pollution prevention measures and BMPs to minimize total (inorganic) mercury discharges.

(4) Annual methylmercury loads in urban runoff in MS4 service area within the Delta and Yolo Bypass may be calculated by the following method or by an alternate method approved the Central Valley Water Board Executive Officer. The annual methylmercury load in urban runoff for a given MS4 service area during a given year may be calculated by the sum of wet weather and dry weather methylmercury loads. To estimate wet weather methylmercury loads discharged by MS4 urban areas, the average of wet weather methylmercury concentrations observed at the MS4's compliance locations maybe multiplied by the wet weather runoff volume estimated for all urban areas within the MS4 service area within the Delta and Yolo Bypass. To estimate dry weather methylmercury loads, the average dry weather methylmercury concentrations observed at the MS4's compliance locations may be multiplied by the estimated dry weather urban runoff volume in the MS4 service area within the Delta and Yolo Bypass. This method is consistent with that used to develop load estimates in the Delta Methylmercury TMDL.

(5) Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury or methylmercury loads to the Delta or is outside the jurisdiction authority of any agency, the Central Valley Water Board may consider issuing additional allocations and regulatory requirements for the source in question.

Since a methylmercury reduction was not required for the West or Central subareas, the Delta Mercury Control Study Final Report did not identify any new mercury control measures beyond implementing green infrastructure in new and retrofitted urban developments and continuing to implement the control measures consistent with the Delta Methylmercury TMDL. The Delta Mercury Control Study Final Report states that additional information is required to determine if elevated methylmercury in Marsh Creek can be controlled as part of the actions to also prevent eutrophication conditions. This study will be completed as part of the methylmercury control plan and corresponding reasonable assurance analysis.

Provision C.19.e requires the East County Permittees to implement the following pollution prevention measures, BMPs, and risk reduction measures.

Mercury Collection and Recycling – Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs, thermometers) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and this Provision requires continued implementation of collection and recycling of

mercury containing devices and waste products and alternative procedures to improve proper handling, disposal, and recycling of mercury-containing products.

Enhanced Municipal Management Practices to Reduce Sediment Discharges – Unless appropriate BMPs are implemented, municipal operations and maintenance activities are potential sources of sediment discharges. Sediment accumulated on sidewalks, corporation yards, roads, parking lots, and landscaping, is a major source of point source pollutants found in urban runoff. The enhanced municipal management practices to reduce sediment discharges are intended to minimize total (inorganic) mercury discharges required by the Delta Methlymercury TMDL. Thus, Provision C.19.e requires the East County permittees to implement minimum BMPs for municipal facilities and activities as part of their ongoing pollution prevention efforts. Such prevention measures include, but are not limited to, storm drain drop inlet and pipeline cleaning, landscaping, road construction, road repair, and pump station cleaning. The work of municipal maintenance personnel vital to minimize stormwater pollution because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting, and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain.

Public Education and Risk Reduction – An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues and its importance and influences positive stormwater pollution prevention behavior.

The East County Permittees have been implementing public outreach campaigns to educate their community on mercury pollution prevention. This Permit requires the East County Permittees to continue implementing a public education, outreach and participation program that is designed to reach residential, commercial, and industrial sources of mercury-containing products or emissions. The East County Permittees can utilize various electronic and print media and paid and free media to best reach the different various target audiences. Additionally, the East County Permittees need to continue communicating with a broad spectrum of citizens with stormwater pollution prevention information through long-established outreach mechanisms such as staffing tables or booths at fairs, street fairs, and other community events. An informed community ensures greater compliance with the stormwater program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of local waters.

Methylmercury is a toxicant that is harmful to the brain and nervous system of infants, children, and the developing fetus. Nearly all fish caught in the Delta contain traces of methylmercury, the methylated form of mercury. However, larger fish that have lived longer have the highest levels of methylmercury because they have had more time to

accumulate it. These large fish pose the greatest risk to children and pregnant women who eat them regularly. This Provision requires continual actions to manage human health risk due to mercury in Delta fish. This includes effort to communicate the health risks of eating Delta fish to high risk-communities.

Methylmercury Controls - In a previous permit (Order No. R5-2010-0102), the East County Permittees were required to implement Phase 1 of the Delta Methylmercury TMDL. Phase 1 required them to conduct methylmercury control studies to monitor and evaluate the effectiveness of existing BMPs to control methylmercury and to develop and evaluate additional BMPs effectiveness to control methylmercury. In October 2018, the East County Permittees submitted the Delta Methylmercury Control Study Final Report to the Central Valley Water Board documenting the results of their control studies. As was shown in bioretention cell LAU3, construction of bioretention cells with an underdrain in areas allowing tidal inundation of the media may lead to an increase in mercury methylation. Therefore, this Provision requires the Permittees to implement control measures that reduce mercury methylation potential and retrofit existing BMPs that show an increased potential for mercury methylation. This Provision is also intended to require the Permittees to implement any other methylmercury controls identified in the methylmercury control plan and corresponding reasonable assurance analysis.

The Central Valley Regional Water Board will use the results of the control studies to conduct a Phase 1 Delta Methylmercury TMDL Review that considers:

- Modification of methylmercury goals, objectives, allocations and/or the final compliance date;
- Implementation of management practices and schedules for methylmercury controls; and
- Adoption of a mercury offset program for dischargers who cannot meet their load and waste load allocations after implementing all reasonable load reduction strategies.

The findings of the control studies and other information will also be used to re-evaluate the fish tissue objectives, the linkage analysis between objectives and sources, and the attainability of the allocations. The linkage analysis, fish tissue objectives, allocations, and time schedules may also be adjusted. In addition, the Central Valley Water Board will use the Phase 1 Control Studies' results and other information to consider amendments to the Delta Methylmercury TMDL during the Phase 1 Delta Methylmercury TMDL Review.

Phase 2 of the Delta Methylmercury TMDL begins after the Phase 1 Delta Methylmercury TMDL Review. If Phase 2 begins during this Permit term, this Permit may be amended to include additional requirements.

C.19.f (Pyrethroid Control Program) implements the Central Valley Water Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins' conditional prohibition of the discharges of pyrethroid pesticides as well as monitoring and reporting requirements (adopted through Resolution No. R5-2017-0057). On August 31, 2020, the East Contra Costa Permittees submitted for approval as a pyrethroid management plan the actions required under Provision C.9. On December 30, 2020, the Central Valley Water Quality Board sent a letter to the East County Permittees stating that the elements of the Pesticide Control Program in Provision C.9 were consistent with the Pyrethroid Basin Plan Amendment requirements for a pyrethroid management plan and included all the management practices required to be considered for inclusion in a pyrethroid management plan. Additionally, this provision implements the requirement to submit a baseline monitoring report to the Central Valley Water Board as required in the Pyrethroid Basin Plan Amendment of municipal dischargers discharging to non-pyrethroid TMDL waters.

C.20. Cost Reporting

Legal Authority

The following legal authority applies to Provision C.20:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR 122.26(d).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(1)(vi) requires "[for] each fiscal year to be covered by the permit, a description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs."

Federal NPDES regulation 40 CFR 122.26(d)(2)(vi) requires "[for] each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2) (iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."

Fact Sheet Findings in Support of Provision C.20

C.20-1 Fiscal analysis and cost reporting provide a useful tool to evaluate program implementation and effectiveness. U.S. EPA has found that "examining the levels of proposed spending and funding allows the permitting authority to gauge the ability of the applicant to implement the program and predict its effectiveness. The fiscal analysis also will help determine whether the applicant has met the statutory requirement of reducing the discharge of pollutants to the MS4 to the maximum extent practicable. Finally, the estimates help the applicant evaluate the feasibility and cost-effectiveness of its program."[335]

C.20-2 Standardization and comparison of cost reporting is supported by the State Water Board-funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities."[336]

[335] "Guidance Manual for the Preparation of Part II of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems," U.S. EPA 833-B-92-002, November 1992.

[336] "NPDES Storm Water Cost Survey Final Report. Office of Water Programs," California State University, Currier, Brian K., et al. 2005.

C.20-3 The State Water Board's Office of Research, Planning, and Performance (ORPP) has also developed guidance[337] for Water Board staff on obtaining MS4 Permit implementation costs from permittees. This guidance describes the benefits from greater detail and more standardization in cost reporting because stormwater issues vary from system to system, often making it difficult to compare compliance costs for individual MS4 permits. Collecting standardized data on what permittees spend to comply with their MS4 permits will allow the Water Boards and stakeholders to broadly compare across regions and systems and to identify trends over time.

C.20-4 The City of Salinas MS4 Permit provides another example of standardized cost reporting data being used to evaluate the effectiveness of program implementation.[338] It finds that "consistent and reliable cost information is critical for the Permittee to manage its assets, programs, funding strategies, and potential future credit programs and stormwater utility fees."

C.20-5 The cost reporting categories were developed considering the ORPP guidance, as well as the cost reporting requirements of the City of Salinas MS4 Permit and the Regional MS4 Permit for Los Angeles and Ventura Counties.[339]

C.20-6 To provide additional flexibility to Permittees in developing a reporting methodology that considers the unique aspects of each program, while also allowing for broad comparisons between program components and costs, the Permit allows Permittees to engage in a collaborative approach to developing a consistent framework.

[337] "Guidance for Staff on Obtaining MS4 Permit Implementation Costs from Permittees and Factors Permittees Could Consider When Reporting to the Water Boards," State Water Board Office of Research, Planning, and Performance (ORPP), April 16, 2019.

[338] Central Coast Regional Water Board, NPDES Permit and WDR for the City of Salinas Municipal Stormwater Discharges, NPDES Permit No. CA0049981, Order No. R3-2019-0073, adoption date: September 20, 2019, effective date: October 1, 2019.

[339] Los Angeles Regional Water Board, NPDES Permit for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles and Ventura County, NPDES Permit No. CAS004004, Order No. R4-2021-0105, NPDES Permit No. CAS004004.

C.21. Asset Management

Legal Authority

The following legal authority applies to Provision C.21:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC sections 13377 and 13263, and Federal NPDES regulations 40 CFR section 122.26(d).

Specific Legal Authority: Federal NPDES regulation 40 CFR section 122.41(e) requires a permittee to properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with its permit.

Federal NPDES regulation 40 CFR section 122.26(d)(1)(v) requires permittees to supply information on implementation and operation and maintenance measures for structural controls.

Federal NPDES regulation 40 CFR section 122.26(d)(1)(iii)(B)(5) requires permittees to provide, “the location of major structural controls for stormwater discharge (retention basins, detention basins, major infiltration devices, etc.).”

Federal NPDES regulation 40 CFR section 122.26(d)(2)(iv) requires permittees to provide, “a description of structural control measures to reduce pollutants in runoff from commercial and residential areas.” It also requires permittees to “describe priorities for implementing controls.”

Federal NPDES regulation 40 CFR section 122.26(d)(1)(vi) requires permittees to provide, “A description of the municipality’s budget for existing storm water programs, including an overview of the municipality’s financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs.”

Federal NPDES regulation 40 CFR section 122.26(d)(2)(vi) requires an annual fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under 40 CFR sections 122.26(d)(2)(iii) and (iv).

Fact Sheet Findings in Support of Provision C.21

C.21-1 This Order requires each Permittee to develop and implement an Asset Management Plan to ensure the satisfactory condition of all hard assets constructed during this and previous permit terms, by continuing to improve its understanding of its stormwater infrastructure condition and performance, by accounting for additional stressors on those assets, such as those related to climate change, and by identifying cost factors to support more accurate forecasting and budget development.

C.21-2 Asset management has been defined as an integrated optimization process of "managing infrastructure assets to minimize the total cost of owning and operating them, while continuously delivering the service levels customers desire, at an acceptable level of risk."[340]

C.21-3 Asset management is important to ensure proper operation and maintenance of all facilities and controls used to comply with an NPDES permit. U.S. EPA has also recognized the importance of incorporating asset management provisions into permits to ensure permittees implement sound system operation and maintenance practices, properly plan for needed system replacements and upgrades, and meet water quality protection requirements.[341]

C.21-4 An MS4 permittee must establish appropriate quality assurance procedures to ensure that its discharge meets MEP and water-quality based requirements. Asset management plans provide a framework for setting and operating these quality assurance procedures and ensure that the MS4 permittee has sufficient financial and technical resources to continually maintain a minimum performance level of its hard assets, in compliance with 40 CFR § 122.41(e).

C.21-5 40 CFR sections 122.26(d)(1)(iii)(B)(5) and 122.26(d)(2)(iv) support the inclusion of structural controls in the asset inventory.

C.21-6 The fiscal requirements at 40 CFR sections 122.26(d)(1)(vi) and 122.26(d)(2)(vi) are integral components of the Asset Management Plan required by this Order. They support the requirement to evaluate or forecast costs necessary for the implementation of the Operation, Maintenance, Rehabilitation, and Replacement plan, as well as the overall concept of the asset management program to identify assets and describe the financial plan to manage those assets.

C.21-7 U.S. EPA Support for Asset Management and Available Guidance and Examples: U.S. EPA has emphasized the development of asset management programs in recent years as a useful tool for ensuring consistent performance of water infrastructure systems while minimizing the costs associated with the operation of these systems. U.S. EPA has required stormwater utilities to develop and implement asset management plans to provide the tracking and planning framework needed to meet these requirements in their permitting.[342] The growing concern for aging infrastructure among entities responsible for

[340] Association of Metropolitan Sewerage Agencies (AMSA), et al. 2002.

[341] "Asset Management: Incorporating Asset Management Planning Provisions into NPDES Permits," December 2014, U.S. EPA, Region 9.

[342] U.S. EPA issued NPDES Permit No. GUS040001, authorizing the Guam Department of Public Works to discharge under the National Pollutant Discharge Elimination System, issuance date: December 20, 2018. Provisions requiring an Asset Management Plan are found on page 38 of the Guam Permit.

operating, maintaining, and improving stormwater, wastewater, and drinking water systems has led to development and implementation of formal asset management programs to reduce unexpected and expensive repairs and increase overall system performance. The CWA specifies that NPDES permits must include requirements for discharging facilities to develop and implement operation and maintenance procedures and financial plans sufficient to ensure their future operational integrity and help them comply with permit discharge conditions. U.S. EPA has encouraged stormwater utilities to develop and implement asset management planning tools to provide the tracking and planning framework needed to meet these requirements. U.S. EPA has also encouraged water utilities to use modern analytical planning tools to support deployment of greener, more sustainable, better integrated water infrastructure improvements to help implement NPDES permit requirements. U.S. EPA anticipates formal asset management requirements in NPDES permits increasing in the future, as the benefits of asset management plans are realized.[343]

C.21-8 The City of San Diego (San Diego) provides an example of asset management planning for stormwater. San Diego developed an integrated Watershed Asset Management Plan for its stormwater management system in order to anticipate and justify current and projected costs of complying with federal, state, and local stormwater regulations.[344] San Diego took approximately five years to complete its Watershed Asset Management Plan. San Diego's Watershed Asset Management Plan identifies and prioritizes potential water quality and flood risk management. San Diego is currently developing the database capabilities to support its plan.

C.21-9 U.S. EPA's Water Finance Clearinghouse and the California State University Sacramento Office of Water Program's Environmental Finance Center (Region 9 U.S. EPA Environmental Finance Center) are conducting work to support stormwater asset management. For example, the U.S. EPA Region 9 Environmental Finance Center has developed draft stormwater finance and asset management guidance and toolkits, including resources for estimating stormwater costs, and is supporting a few California municipal stormwater programs to test out and refine the toolkit with the intent of using the asset management results to support the development of stormwater utilities to fund stormwater programs. Additionally, Region 9 U.S. EPA Environmental Finance Center is disseminating information through asset management forums, developing an asset management mobile assistance app, has supported the State Water Board's Strategy to Optimize Resource Management of Storm

[343] "Asset Management Programs for Stormwater and Wastewater Systems: Overcoming Barriers to Development and Implementation," March 6, 2017, p. ii. Prepared for U.S. EPA by PG Environmental.

[344] "Case Study: City of San Diego Watershed Asset Management Planning," p. 1, U.S. EPA, Region 9.

Water (STORMS) Stormwater Funding Report,[345] and is supporting other asset management-related tools and resources.[346]

C.21-10 The Order's asset management requirements are consistent with: U.S. EPA's asset management plan requirements in Guam's municipal stormwater Permit;[347] U.S. EPA, Region 9's 2014 guidance for incorporating asset management planning requirements into NPDES permits, which includes suggestions for an inventory of MS4 assets, an identification of the required performance, a plan for maintenance, rehabilitation and replacement of assets, cost projections, and an assessment of climate change impacts;[348] San Diego's Watershed Asset Management Plan;[349] and the California Regional Water Quality Control Board, Central Coast Region's asset management plan requirements in the City of Salinas' municipal stormwater permit.[350]

C.21-11 Many of the provisions in the Previous Permit (Order No. R2-2015-0049, as amended) required the Permittees to develop and maintain effective information management systems to track hard assets. It required, and this Order continues to require, Permittees to implement various measures which support the development and implementation of the Asset Management Plan. For example, in both this Order and the Previous Permit, Provision C.3.b requires Permittees to track and report on hard assets built pursuant to the requirements for Regulated Projects and Provision C.3.h requires Permittees to implement an Operation and Maintenance Verification Program, which compels, for example, inspections by Permittees or their agents. In both the current and Previous Permit, Provision C.10.b requires Permittees to maintain Full Trash Capture Systems within their jurisdictions, maintain records of those systems, and certify annually that those systems are operated and maintained to meet the requirements for Full Trash Capture Systems, and Provision C.10.f requires Permittees to retain and update trash generation maps depicting the location and tributary drainage area of all Full Trash Capture Systems within

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[345] "Strategy to Optimize Resource Management of Storm Water (STORMS): Project 4b: Eliminate Barriers to Funding Stormwater Programs and Identify Funding for Stormwater Capture and Use Projects," May 31, 2018.

[346] "Asset Management Storm Water Roundtable Presentation," by Bola Odusoga, U.S. EPA Region 9, March 28, 2019, slide 28.

[347] U.S. EPA issued NPDES Permit No. GUS040001, authorizing the Guam Department of Public Works to discharge under the National Pollutant Discharge Elimination System, issuance date: December 20, 2018.

[348] "Asset Management: Incorporating Asset Management Planning Provisions into NPDES Permits," December 2014, U.S. EPA, Region 9.

[349] "Transportation and Storm Water Department Storm Water Division: Watershed Asset Management Plan," July 19, 2013, Prepared for City of San Diego by URS Corporation.

[350] Central Coast Regional Water Quality Control Board, NPDES Permit and WDR for the City of Salinas Municipal Stormwater Discharges, NPDES Permit No. CA0049981, Order No. R3-2019-0073, adoption date: September 20, 2019, effective date: October 1, 2019.

their jurisdictions which they are receiving credit for towards their Trash Reduction Requirements.

C.21-12 This Order includes requirements in other provisions that support components of the Asset Management Plan. For example, Provision C.5.f requires Permittees to identify information missing from their current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, including component locations, size or specifications, materials of construction, and condition, which will be used to update Permittee maps and databases. The Permittees' implementation of Provision C.5.f will support the Permittees' implementation of Provision C.21 because it will help them understand where and how their hard assets are connected to their MS4s.

C.21-13 Provision C.20 requires Permittees to undertake a fiscal analysis of the capital and operation and maintenance costs incurred to comply with this Order's requirements listed in Provision C.20.b.(iv), which includes the capital, operation, and maintenance costs of hard assets. Therefore, some of the information generated by the Permittees' implementation of Provision C.20 is likely to directly inform the Permittees' implementation of and reporting on Provision C.21. This is further discussed below under the Specific Provision C.21 Requirements for Provision C.21.b, Implementation level.

Specific Provision C.21 Requirements

Provision C.21. Asset Management requires Permittees to develop, implement, and report on asset management programs. Each component of the asset management provision is necessary to address the objectives, information needs, and questions listed in findings C.21-1 through C.21-12, above.

Provision C.21.a. Task Description. Provision C.21.a requires Permittees to develop and implement an Asset Management Plan in order to ensure the satisfactory condition of all hard assets constructed during this and previous permit terms pursuant to Provisions C.2. Municipal Operations, C.3. New Development and Redevelopment, C.10. Trash Load Reduction, C.11. Mercury Controls, C.12. PCBs Controls, C.13. Copper Controls, C.14. Bacteria Control for Impaired Water Bodies, C.17. Discharges Associated with Unsheltered Homeless Populations, C.18. San Mateo County Sediment Controls, and C.19. Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District Requirements. These Provisions contain requirements to implement, track, operate and maintain hard assets (structural controls). The inclusion of the development and implementation of the Asset Management Plans in this Order is necessary to comply with the federal regulations cited above.

Provision C.21.b. Implementation Level. Provision C.21.b describes the Asset Management Plans, which Permittees must develop by June 30, 2025.[351]

An integral component of the Asset Management Plan is the development of an Operation, Maintenance, Rehabilitation, and Replacement Plan (Asset Management O&M Plan), which is prescribed in Provision C.21.b.i.(3), to effectuate sound asset management. The evaluation or forecasting of costs necessary for the implementation of the Asset Management O&M Plan is likewise necessary for this purpose. Such evaluation may supplement Permittees' compliance with Provision C.20. Cost Reporting, because Provision C.20 includes requirements for Permittees to report on the costs associated with their hard assets; however, it does not include the level of detail specified in Provision C.21.b.(i)(3)(c). Therefore, although the implementation of Provision C.21 may inform the cost reporting required in Provision C.20, the information that will be generated by the two Provisions is distinct.

Provision C.21.b further requires the Permittees to begin implementation of the Asset Management Plans no later than July 1, 2025,[352] to reassess and update the Asset Management Plans on an as-needed basis to address changing conditions and resources, to provide the latest version of the Asset Management Plans to Water Board staff during inspections and audits or otherwise upon request, and to complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. In subsequent permits, Permittees will likely be expected to reassess and update their Asset Management Plans at least once per permit term, likely by no later than the end of the fourth year of the Permit terms.

The purpose of the Climate Change Adaptation Report is to ensure that in the long term, as climate change impacts increase, Permittees are able to make any necessary adjustments to the design, operation, and maintenance of their hard assets to ensure their satisfactory condition and performance, in response to impacts to those assets associated with climate change. U.S. EPA, Region 9's 2014 guidance for incorporating asset management planning requirements into NPDES permits includes a requirement for the assessment of climate change impacts.[348]

Provision C.21.c. Reporting. Provision C.21.c requires Permittees to submit their individual Asset Management Plans with their 2025 Annual Reports, to report individually on the implementation of their Asset Management Plans starting with the 2026 Annual Reports,[353] as detailed in Provision C.21.c.ii, and to submit their Climate Change Adaptation Report(s) with the 2027 Annual Reports (on an all-Permittee scale or countywide scale). This schedule provides Permittees three years from the start of the Permit term to develop and ultimately submit the Asset Management Plans, an

[351] This date is the last day of the third fiscal year of the permit term.

[352] This date is the first day of the fourth fiscal year of the Permit term.

[353] By this reporting date, the Permittees will have had a full year of implementation of their Asset Management Plans, pursuant to Provision C.21.b.ii.

additional year after that submittal before they must implement the Asset Management Plans, and five years from the start of the Permit term to complete their Climate Change Adaptation Report(s). This timing is sufficient and necessary for the Permittees to develop robust Asset Management Plans, and will allow the Water Board and stakeholders enough time prior to the Permit's subsequent reissuance to consider necessary changes to Provision C.21.

VII. Attachment G: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment G:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment G includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with U.S. EPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment G.

ATTACHMENT B

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/14, Application deemed complete 1/30/15, Project approved 7/16/15	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/15, Application deemed complete 8/2/15, Project approved 12/12/15	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/16, Application deemed complete 4/10/16; Project approved 6/30/16; estimated completion date 9/30/17	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/15, Application deemed complete 10/6/15, Project approved 12/9/15, Construction scheduled to begin 2/10/16 and estimated to	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/15 to 06/16
City of Eden Annual Report FY 2015-16

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
						complete by 9/30/16							

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.iv.(2)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.iv.(2)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address** – Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description** – Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed** – State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area** – For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project –** Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date
   - Whether the project has been completed. If not, the estimated project completion date.

8. **Source Control Measures** – List all source control measures that have been or will be included in the project.

9. **Site Design Measures –** List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed** – List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism –** List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used** – List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1))** – On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2))** – On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

ATTACHMENT C

Provision C.3.g.
Hydromodification Applicability Maps

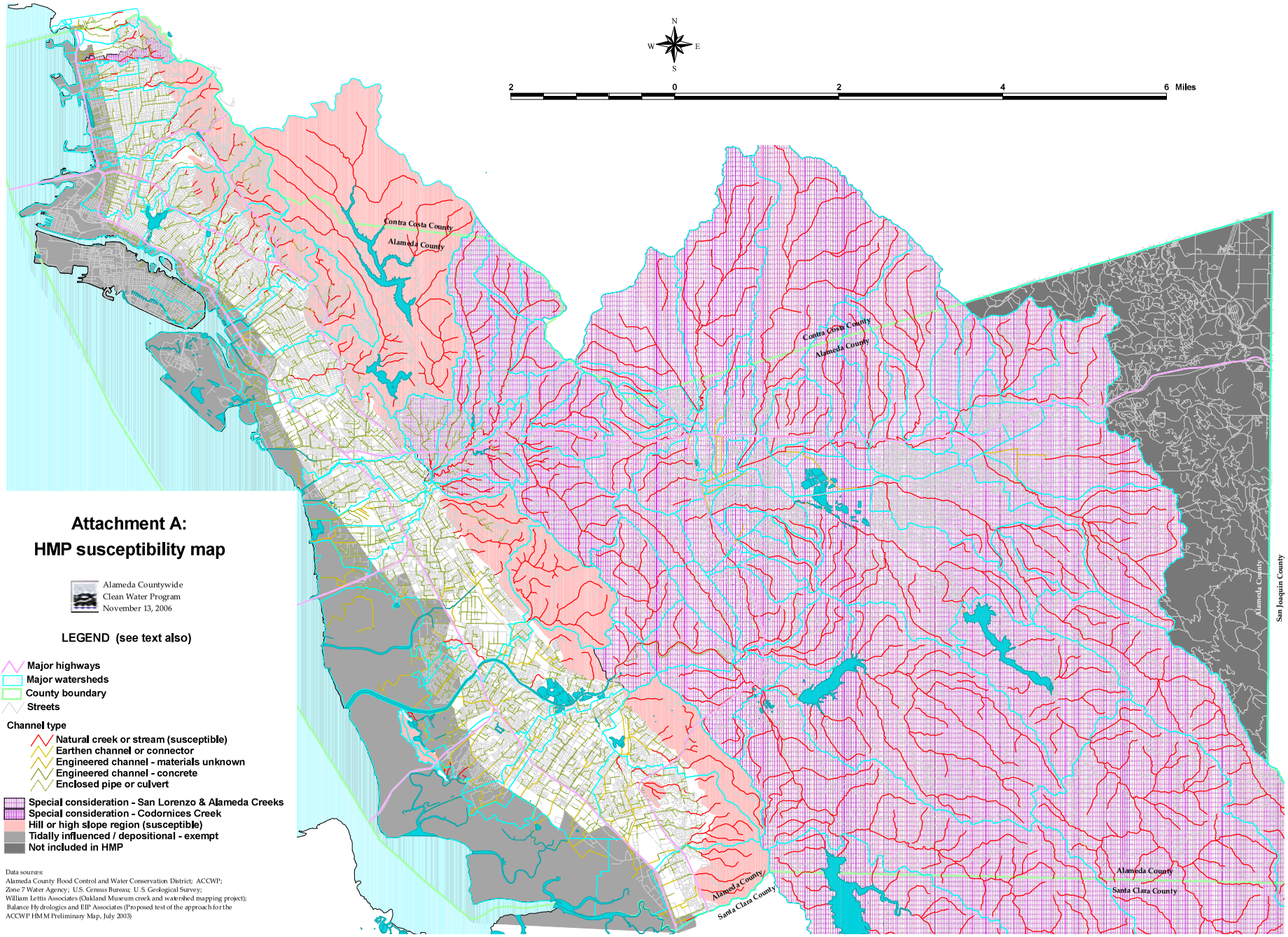

Attachment A:
HMP susceptibility map

Alameda Countywide
Clean Water Program
November 13, 2006

LEGEND (see text also)

- Major highways
- Major watersheds
- County boundary
- Streets

Channel type

- Natural creek or stream (susceptible)
- Earthen channel or connector
- Engineered channel - materials unknown
- Engineered channel - concrete
- Enclosed pipe or culvert

- Special consideration - San Lorenzo & Alameda Creeks
- Special consideration - Codornices Creek
- Hill or high slope region (susceptible)
- Tidally influenced / depositional - exempt
- Not included in HMP

Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)

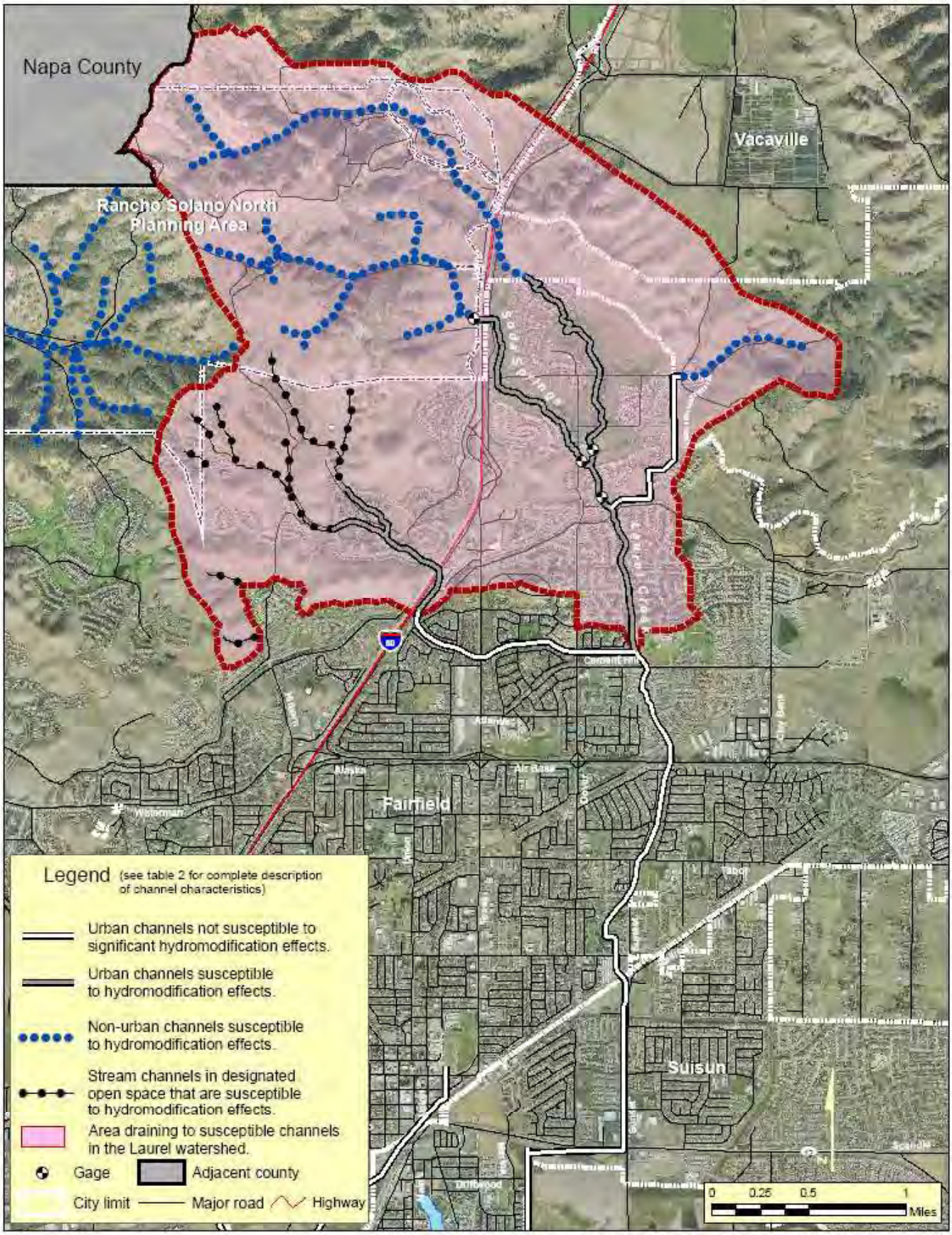

Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure2_edits.mxd

©2006 Balance Hydrologics, Inc.

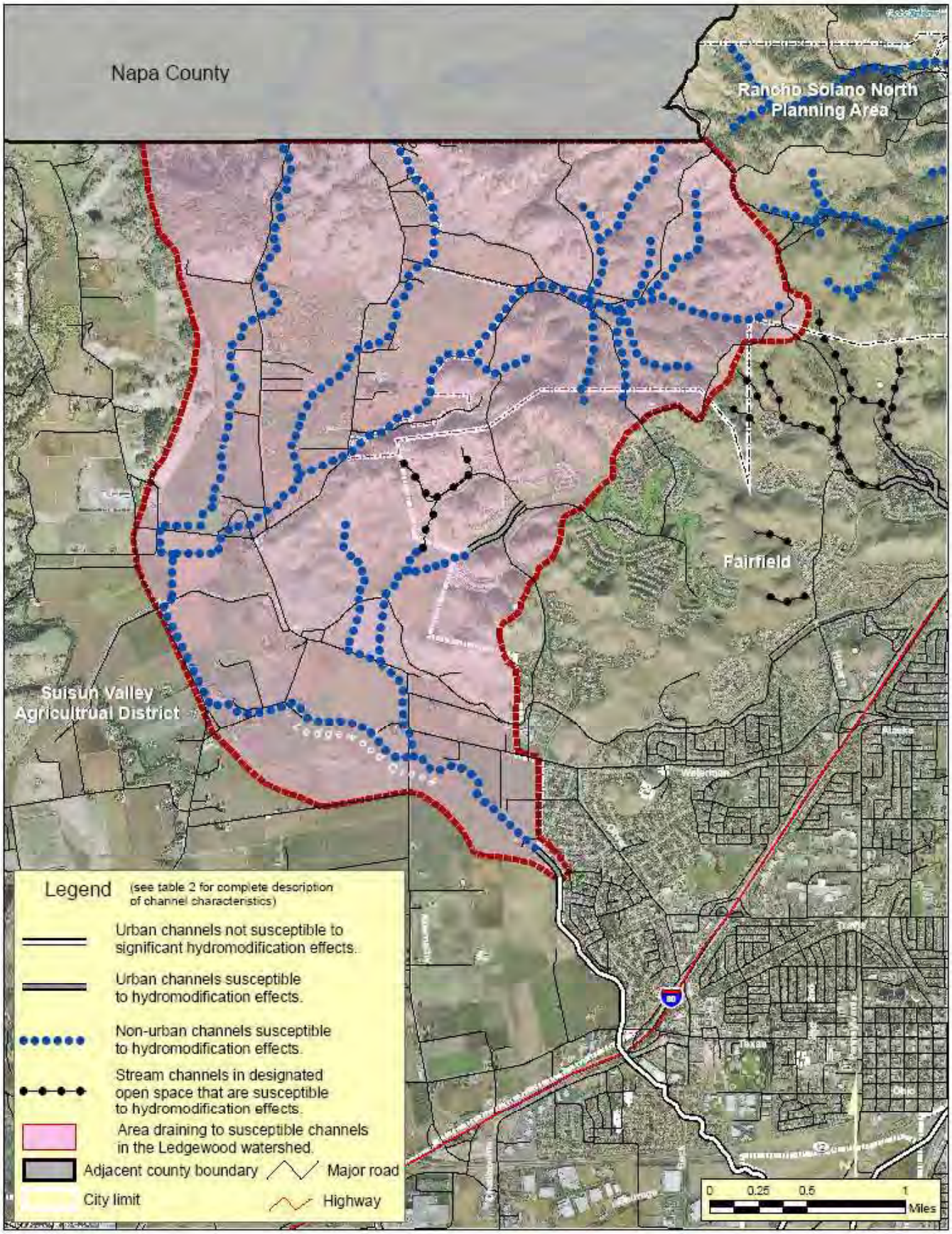

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure3_edits.mxd

©2006 Balance Hydrologics, Inc.

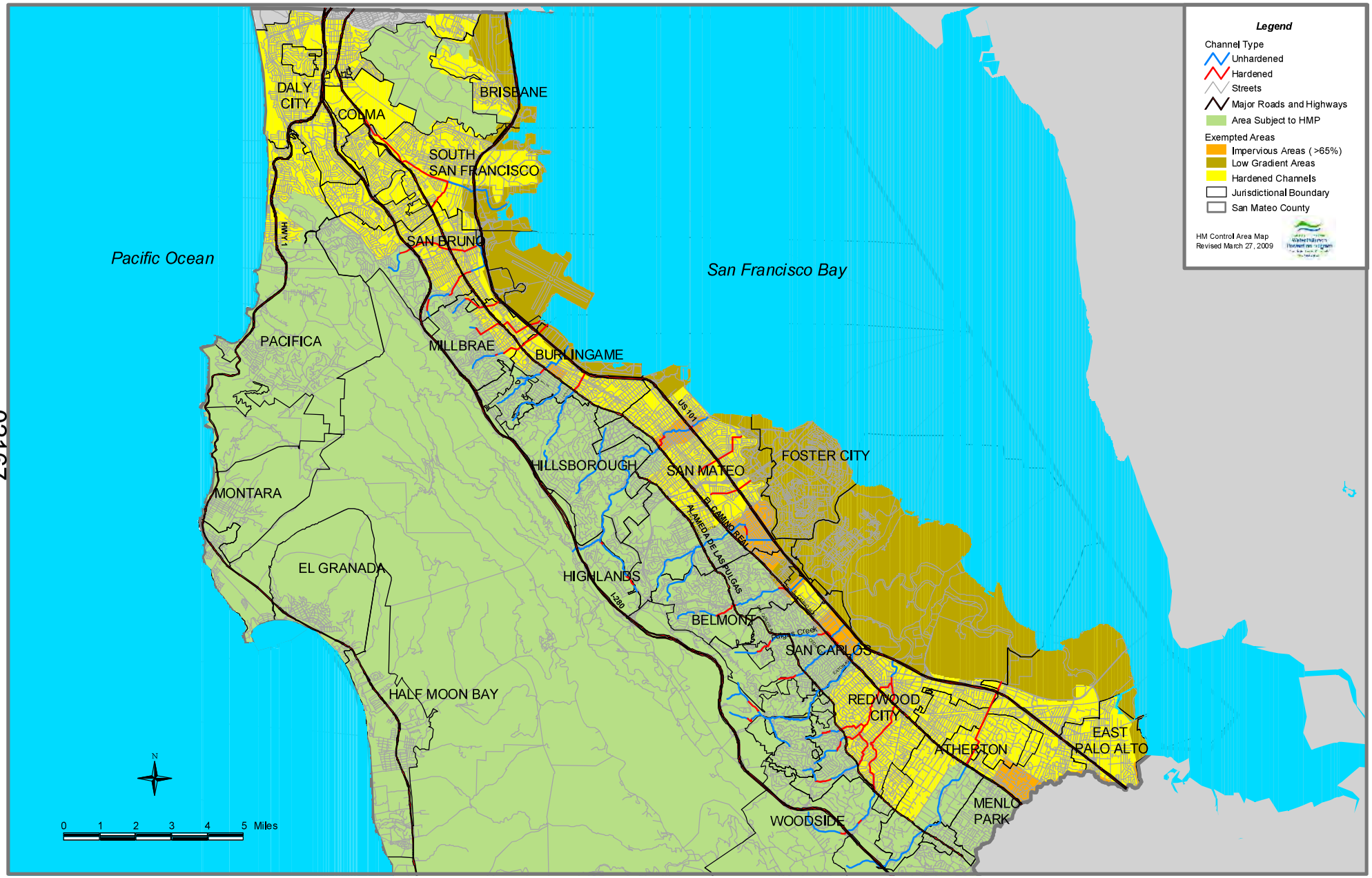
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
MONTARA
HILLSBOROUGH
SAN MATEO
FOSTER CITY
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
WOODSIDE
HWY 1
US 101
I-280
EL CAMINO REAL
ALAMEDA DE LAS PULGAS
Pulgas Creek
N
0 1 2 3 4 5 Miles

02167
2208

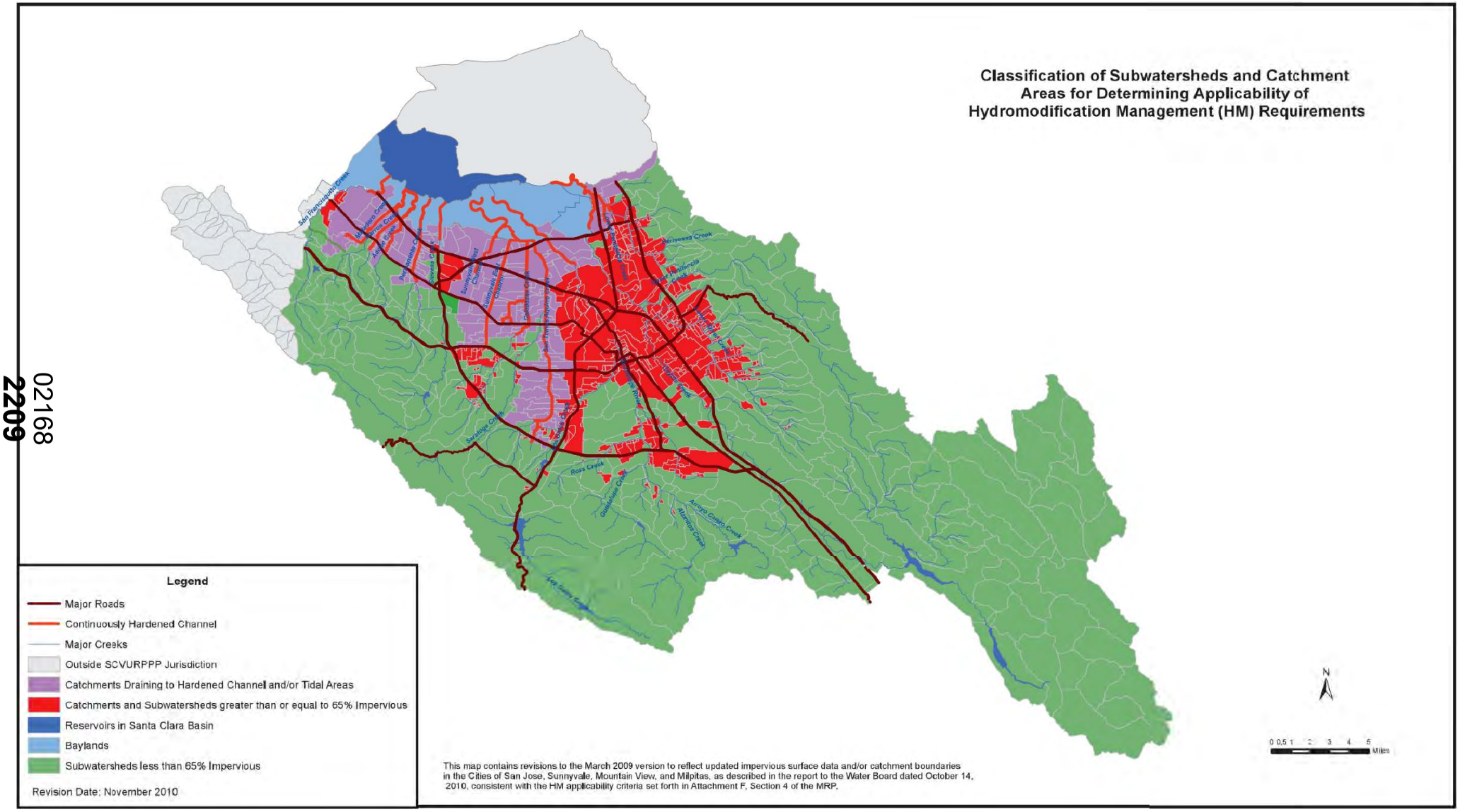
Classification of Subwatersheds and Catchment Areas for Determining Applicability of Hydromodification Management (HM) Requirements
Legend
Major Roads
Continuously Hardened Channel
Major Creeks
Outside SCVURPPP Jurisdiction
Catchments Draining to Hardened Channel and/or Tidal Areas
Catchments and Subwatersheds greater than or equal to 65% Impervious
Reservoirs in Santa Clara Basin
Baylands
Subwatersheds less than 65% Impervious
Revision Date: November 2010
This map contains revisions to the March 2009 version to reflect updated impervious surface data and/or catchment boundaries in the Cities of San Jose, Sunnyvale, Mountain View, and Milpitas, as described in the report to the Water Board dated October 14, 2010, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP.
N
0 0.5 1 2 3 4 5
Miles
San Francisquito Creek
Los Alamos Creek
Adobe Creek
Permanente Creek
Stevens Creek
Sunnyvale East Channel
Calabazas Creek
Saratoga Creek
Guadalupe Creek
San Tomas Aquino Creek
Saratoga Creek
Ross Creek
Guadalupe Creek
Alamitos Creek
Arroyo Calero Creek
Los Gatos Creek
Coyote Creek
Berryessa Creek
Milpitas Creek
Penitencia Creek
Lower Silver Creek
Upper Silver Creek

02168

2209

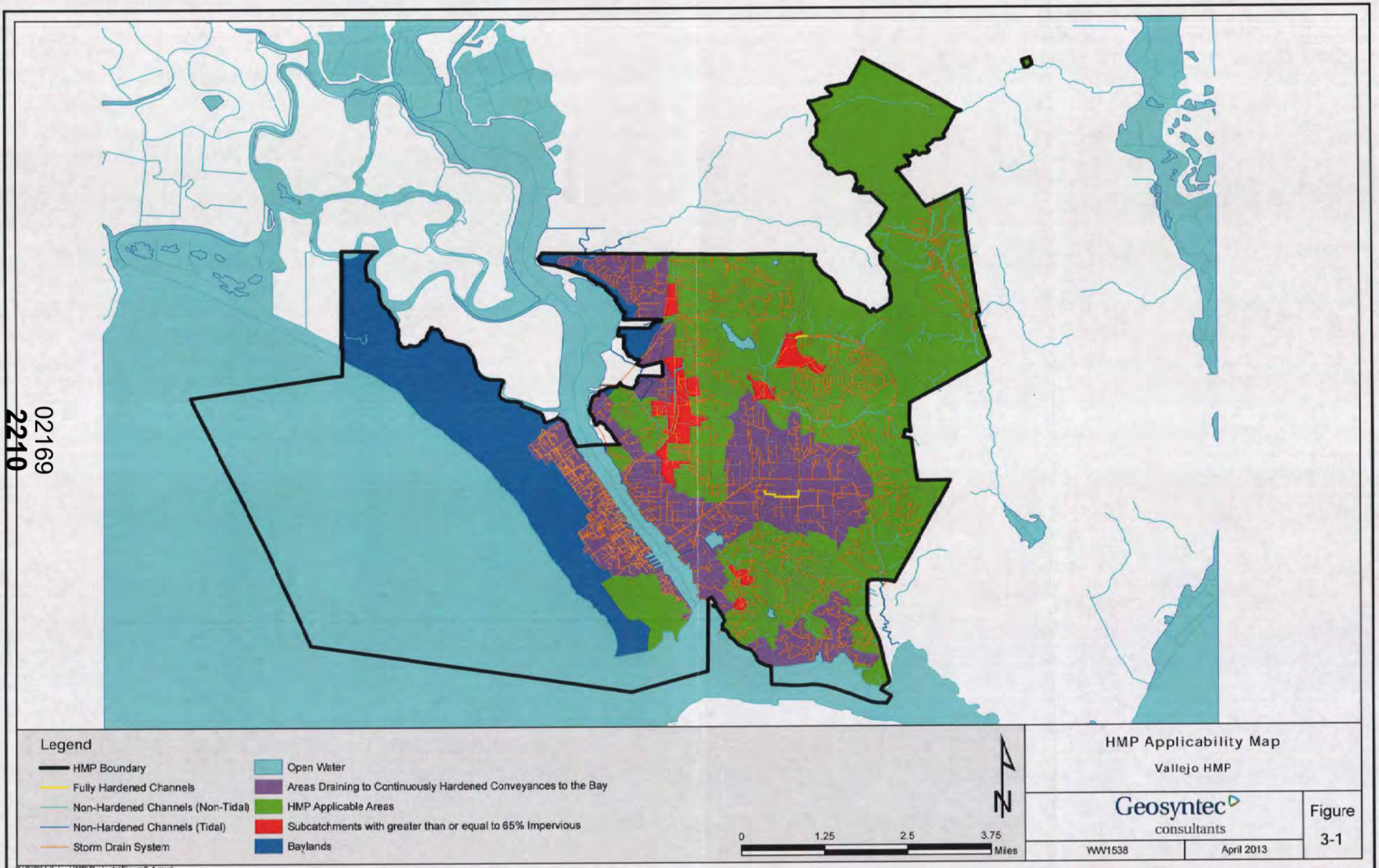
Legend
HMP Boundary
Fully Hardened Channels
Non-Hardened Channels (Non-Tidal)
Non-Hardened Channels (Tidal)
Storm Drain System
Open Water
Areas Draining to Continuously Hardened Conveyances to the Bay
HMP Applicable Areas
Subcatchments with greater than or equal to 65% Impervious
Baylands
N
0
1.25
2.5
3.75
Miles
HMP Applicability Map
Vallejo HMP
Geosyntec consultants
WW1538
April 2013
Figure 3-1
P:\GIS\Vallejo_HMP\Projects\Figure3-1.mxd

ATTACHMENT D

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct their laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The

Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.

8. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]
9. If a Permittee monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT E

Supporting Information for Provision C.10.

Example Trash Generation Rate Map

303(d) Trash Resolution and Staff Report
February 2009

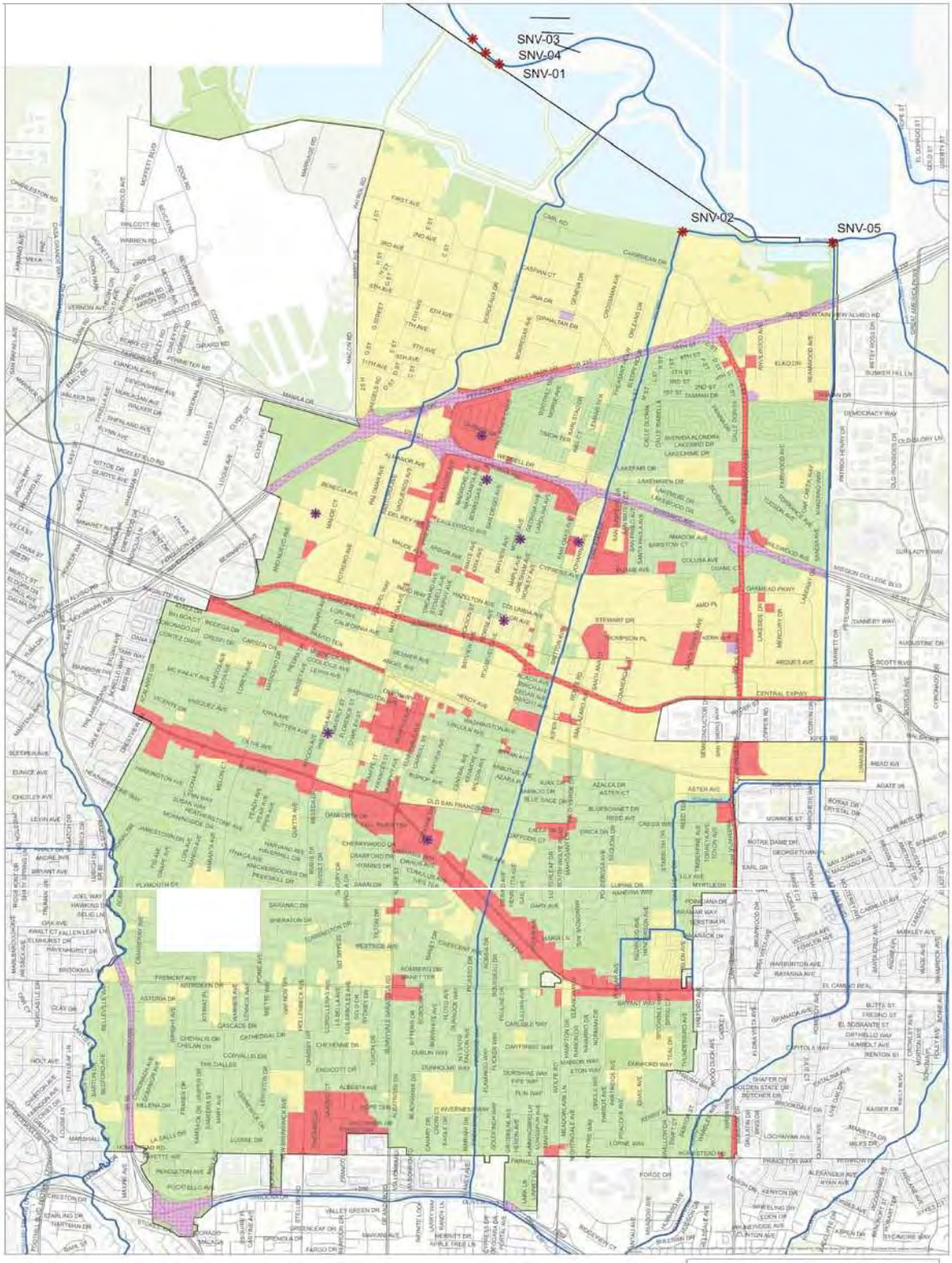
SNV-03
SNV-04
SNV-01
SNV-02
SNV-05

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

RESOLUTION NO. R2-2009-0008

RECOMMENDING CHANGES TO THE LIST OF WATER BODIES AS REQUIRED IN SECTION 303(d) OF THE CLEAN WATER ACT

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

1. Section 305(b) of the federal Clean Water Act requires the State to prepare a biennial update of an assessment of the waters within the State; and

2. Section 303(d) of the federal Clean Water Act requires the State to identify waters within the State for which water quality standards are not attained; and

3. The Water Board actively solicited water quality information from the public on December 4, 2006, and received 16 data and information submittals; and

4. Water Board staff assembled and considered all readily available data to assess water quality conditions and prepared fact sheets supporting recommendations for additions, deletions and changes to the existing list of impaired water bodies consistent with the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy); and

5. Water Board staff provided advanced notice and opportunity for public comment on the draft recommendations for public review during a 45-day public comment period commencing on October 30, 2008; and

6. Water Board staff developed written responses to all public comments received and revised the supporting staff report and water body fact sheets for the Water Board's consideration; and

7. The Listing Policy requires that the Water Board consider and approve each proposed list change as documented in a water body fact sheet; and

8. On January 14, 2009, the Water Board held a public hearing to consider the recommendations to change the 303(d) list; and

9. On February 11, 2009, the Water Board held a second public hearing to consider all testimony and comments, both oral and written, regarding the 2008 Water Quality Assessment and 303(d) list for the San Francisco Bay Region.

THEREFORE, BE IT RESOLVED that the Water Board approves each proposed 303(d) list addition, deletion or change as documented in the attached Staff Report.

BE IT FURTHER RESOLVED that the Water Board, in fulfillment of the requirements described in Sections 305(b) and 303(d) of the federal Clean Water Act, hereby authorizes the Executive Officer to transmit the Water Board's assessment, including recommended modifications to the section 303(d) list, as detailed in the attached Staff Report dated February 11, 2009, and associated water body Fact Sheets to the State Water Resources Control Board for approval of the 303(d) list and inclusion in the 2008 California Integrated Report on Water Quality.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the Water Board, San Francisco Bay Region, on February 11, 2009.

Digitally signed by Bruce Wolfe
Date: 2009.02.13 16:42:14 -08'00'

BRUCE H. WOLFE
Executive Officer

Attachment: Staff Report dated February 11, 2009, Evaluation of Water Quality Conditions for the San Francisco Bay Region - Proposed Revisions to Section 303(d) List

STAFF REPORT

EVALUATION OF WATER QUALITY CONDITIONS FOR THE SAN FRANCISCO BAY REGION

PROPOSED REVISIONS TO SECTION 303(d) LIST

February 2009

San Francisco Bay Regional
Water Quality Control Board

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1 Introduction

One of the San Francisco Bay Water Board's functions is to evaluate the water quality condition of waters in the San Francisco Bay Region. To accomplish this goal, staff gathers and evaluates data that are the basis of its water quality assessments. This staff report presents the results of staff's review and consideration of the available water quality data for the Region, including data submitted by the public. One important outcome of the assessment process is the identification of water bodies that are being proposed for inclusion on the list of impaired water bodies. Under federal Clean Water Act (CWA) regulations, the State is required every two years to report to the U.S. EPA on the status of water quality in the State (Section 305(b) water quality assessment), and provide a list of impaired water bodies (Section 303(d) list). Impaired water bodies are those where water quality standards are not met or expected to be met after implementation of technology based requirements of the CWA.

The 303(d) list of impaired waters must include a description of the pollutants causing the violation of water quality standards. As defined in CWA and federal regulations, water quality standards include the designated uses of a water body, the adopted water quality criteria, and the State's antidegradation policy. For water quality limited segments included on the 303(d) list, the State is required to develop a Total Maximum Daily Load (TMDL) to address the impairment. A TMDL is defined as the "sum of the individual waste load allocations for point sources and load allocations for non-point sources and natural background" (40 CFR130.2) such that the capacity of the water body to assimilate pollutant loadings (the loading capacity) is not exceeded. The federal requirement for setting priorities on which TMDLs will be developed is addressed in the State Board's *2004 Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List* (Listing Policy) by the establishment of schedules for TMDL development.

The last review of the 303(d) list and update occurred in 2006. The review was based on the Listing Policy developed in 2004. For the 2008 update, the Water Board is considering for approval, recommendations on the conditions of waters in the Region, applying the Listing Policy in the process.

This staff report presents the current status of water quality in the San Francisco Bay Region for water bodies with readily available data, and identifies the methods and data used to evaluate water quality status. The report identifies the proposed additions, deletions, and changes to the 2006 303(d) list. The water quality assessments also result in the identification of water bodies where water quality standards are met or where not enough information is available to accurately assess water quality. The results of the water quality assessments are compiled into a statewide integrated report referred to as the 303(d)/305(b) Integrated Report (Integrated Report) by the State Board.

The State Board will include the Water Boards' listing/delisting recommendations in its preparation of the statewide 303(d) list for submission to the U.S. EPA. The statewide 303(d) list will be part of the Integrated Report. The State Board's deliberative process will be conducted in 2009.

Appendix A of this staff report includes the public solicitation letters requesting that the public submit any and all available data to support the assessment of water quality in the Region. Appendix B provides a summary of the data received from the public and an assessment of data quality. Appendix C refers to the Fact Sheets supporting the 303(d) list change recommendations The Fact Sheets are available online at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml

Fact Sheets showing water bodies that support at least some beneficial uses, water bodies not listed due to insufficient information and revisions to the 2006 303(d) list are also available for viewing by following the link above.

2 Listing Policy and Evaluation Criteria

The proposed 2008 303(d) list of impaired water bodies in the San Francisco Bay Region was developed in accordance with the Listing Policy (SWRCB 2004). The Listing Policy establishes a standardized approach for developing California's section 303(d) list. It outlines an approach that provides the rules for making listing decisions based upon different kinds of data and establishes a systematic framework for statistical analysis of water quality data. The Listing Policy also establishes requirements for data quality, data quantity, and administration of the listing process. Decision rules for listing and delisting are provided for: chemical-specific water quality standards; bacterial water quality standards; health advisories; bioaccumulation of chemicals in aquatic life tissues; nuisances such as trash, odor, and foam; nutrients; water and sediment toxicity; adverse biological response; and degradation of aquatic life populations and communities.

Listing and delisting decisions were made in accordance with the Listing Policy, using all applicable narrative and numeric water quality criteria contained in the San Francisco Bay Basin Plan and in the California and National Toxic Rules. The Listing Policy specifies the frequency of exceedance of applicable water quality objectives that is necessary to make a determination that the water is impaired. When applying narrative water quality criteria, staff used guidelines developed by the U.S. EPA and other government agencies together with findings published in the scientific peer-reviewed literature to interpret data and evaluate the water quality conditions.

3 Information Received and Analyzed

3.1 Data solicitation

Federal regulation [(40 CFR § 130.7(b)(5)] states that "Each State shall assemble and evaluate all existing and readily available water quality-related data and information" when developing the 303(d) list. In December 2006, Water Board staff solicited the public to submit any and all water quality data to be considered in preparation of the 2008 303(d) list and 305(b) report.

This solicitation established a data submittal deadline of February 28, 2007. On January 30, 2007, staff transmitted a notice clarifying that there were no limits on the type or format of data and information that the public could provide to the Water Boards for their assessment. The notices provided to the public can be found in Appendix A of this report.

Appendix B contains a summary of the data and information submitted to the Water Board for consideration in the 2008 303(d) listing process. We received 15 submissions in response to the data solicitation, including multiple requests to list water bodies, two requests to delist and/or not to list water bodies as well as data sets without any accompanying request to list or delist. Water Board staff evaluated the submitted data in accordance with the Listing Policy, taking into account spatial and temporal representativeness and quality (Appendix B). The submissions and listing requests covered four major categories of pollutants and stressors including (1) trash; (2) general water quality parameters such as dissolved oxygen and temperature; (3) nutrients and biostimulatory substances; and (4) suspended solids, sedimentation /siltation.

3.2 Data analysis and recommendations

The assessment process began by identifying and compiling all readily available water quality data as described above. Then, staff systematically reviewed these data sets. Due to the relatively limited number of data sets identified through the solicitation process, much of the effort focused on reviewing the available data collected by the Surface Water Ambient Monitoring Program (SWAMP) and the Regional Monitoring Program (RMP). Staff also developed an approach for interpreting the photographic and narrative documentation for trash relative to applicable water quality standards, consistent with the Listing Policy. In addition, beach water quality data collected by county health departments and stored in the State Board Beach Water Quality Database were evaluated to determine whether the most recently collected data would result in new listing or de-listing decisions for our Region. No changes to the 2006 303(d) list were identified.

The SWAMP data include field surveys of water column chemistry, sediment chemistry, sediment toxicity, and water toxicity data as well as ancillary data on factors such as flows, biological community and physical habitat indicators. SWAMP was designed to provide information necessary to effectively manage the State's water resources and, subsequently, facilitate assessment of water quality under sections 305(b) and 303(d) of the Clean Water Act. Objectives of SWAMP include: (1) assessing the physical, chemical, and biological condition of water bodies in each region in order to determine if water bodies are impaired and beneficial uses are being protected; (2) generating data and information during different seasonal conditions; and (3) generating data and information that is somewhat evenly distributed across a water body to provide a screening level assessment of water quality. These objectives ensure that the SWAMP data meet all quality requirements of the Listing Policy.

For the purpose of analyzing the data and developing the proposed revisions to the 303(d) list, the Listing Policy recommends a "line of evidence" approach to establish both whether a water

body is impaired and what pollutant is causing the impairment. The lines of evidence in support of listing and/or delisting decisions for each affected water body are summarized in a water body-specific fact sheet. Fact sheets were developed for each water body for which sufficient data were available to evaluate during the review.

3.2.1 SWAMP data evaluation

Over the 5-year period (2001 – 2005) SWAMP conducted water quality monitoring in 37 watersheds in the Region (SFBRWQCB 2007c, 2007d). Data were collected at multiple locations within each water body over three hydrologic cycles including the wet season (January through March), the spring/decreasing flow season (April through May) and the dry season (June through October). Altogether data from over 190 sampling locations were evaluated. Selected sites in each water body were sampled to determine benthic macroinvertebrate assemblages, temperature, dissolved oxygen, nutrients, trace metals, trace organic compounds, toxicity, and coliforms. Temporal variability in basic water quality (temperature, dissolved oxygen (DO), pH, and specific conductance) was determined by continuous deployment of field measurement devices. These continuous deployments typically lasted one to two weeks and were conducted three to four times per year. Water, sediment and tissue samples that were collected were analyzed to determine concentrations of more than 230 constituents.

The first step of the water quality assessment involved screening all the data against the available water quality criteria and guidelines. For pollutants with applicable numeric water quality criteria, the impairment status was evaluated by comparing the concentration data with existing water and sediment objectives and standards contained chiefly in the San Francisco Bay Basin Plan, California and National Toxic Rules and U.S. EPA guidelines. When only narrative water quality objectives existed, staff identified evaluation guidelines protective of the beneficial use and specified the conditions above which impacts were minimal. Table 1 and Table 2 show a complete list of numeric criteria and evaluation guidelines used in this assessment.

Table 1: Water quality thresholds for 303(d) data screening of freshwater creeks for selected beneficial uses including aquatic life, municipal and domestic supply (MUN), agricultural supply (AGR) and water contact recreation (REC1)

Analyte	***Description of Standard***	***Numeric Limit***	***Units***	***Reference***
Field measures				
Temperature	Maximum, salmonid	24	° C	USEPA, 1977
	7-day mean, coho	14.8	° C	Sullivan *et al.*, 2000
	7-day mean, steelhead	17	° C	Sullivan *et al.*, 2000
Oxygen, dissolved	Minimum, warmwater	5	mg/L	Basin Plan, 2007b
	Minimum, coldwater	7	mg/L	Basin Plan, 2007b
pH	Range	6.5 to 8.5	S.U.	Basin Plan, 2007b
Specific conductance	Min for AGR	200	µS	Basin Plan, 2007b
	Max for AGR	3000	µS	Basin Plan, 2007b
	Max for MUN	900	µS	Basin Plan, 2007b
Salts – AGR only	***Salt thresholds apply only to waters with AGR beneficial use assigned.***			
Boron	Maximum	0.5	mg/L	Basin Plan, 2007b
Chloride	Maximum	142	mg/L	Basin Plan, 2007b
Metals	***Cadmium, copper, nickel, silver, and zinc values assume a hardness of 100 mg/L CaCO3. Values at other hardness levels must be calculated using formulas in the Basin Plan.***			
Arsenic, dissolved	1-hour average WQO	340	µg/L	Basin Plan, 2007b
	4-day average WQO	150		
Cadmium, total	1-hour average WQO	3.9	µg/L	Basin Plan, 2007b
	4-day average WQO	1.1		
Chromium VI, dissolved	1-hour average WQO	16	µg/L	Basin Plan, 2007b
	4-day average WQO	11		
Copper, dissolved	1-hour average WQO	13	µg/L	Basin Plan, 2007b
	4-day average WQO	9		
Lead, dissolved	1-hour average WQO	65	µg/L	Basin Plan, 2007b
	4-day average WQO	2.5		
Mercury, total	1-hour average WQO	2.4	µg/L	Basin Plan, 2007b
	4-day average WQO	0.025		
Nickel, dissolved	1-hour average WQO	470	µg/L	Basin Plan, 2007b
	4-day average WQO	52		
Selenium, total	4-day average WQO	5	µg/L	Basin Plan, 2007b
	1-hour average WQO	20		
Silver, dissolved	1-hour average WQO	3.4	µg/L	Basin Plan, 2007b
Zinc, dissolved	1-hour average WQO	120	µg/L	Basin Plan, 2007b
	4-day average WQO	120		
Metals -- MUN only	***These Metals thresholds apply only to waters with MUN beneficial use assigned.***			
Manganese, total	Maximum	50	µg/L	Basin Plan, 2007b
Mercury, total	Maximum	2	µg/L	Basin Plan, 2007b
Organics				
PCBs	Freshwater Criterion Continuous Concentration	0.014	µg/L	CTR
Chlorpyrifos	4-day average (chronic)	0.015	µg/L	CVRWQCB, 2006
Dacthal (DCPA)	Instantaneous maximum AWQC	14300	µg/L	CVRWQCB, 2008
Diazinon	1-hour average	0.1	µg/L	SFBRWQCB, 2005
Disulfoton (Disyston)	Instantaneous maximum	0.05	µg/L	CVRWQCB, 2008

Analyte	***Description of Standard***	***Numeric Limit***	***Units***	***Reference***
Field measures				
	AWQC			
Endosulfan	Continuous 4-day average Instantaneous maximum	0.056 0.22	µg/l	CTR CTR
HCH, gamma- (gamma-BHC, Lindane)	Maximum 1-hour average	0.95	µg/L	CTR
Parathion, methyl	Instantaneous maximum AWQC	0.08	µg/L	CDFG
Thiobencarb	Instantaneous maximum AWQC	3.1	µg/L	CDFG
Pathogens – Water Contact Recreation (REC1)				
E. coli (freshwater)	Steady state (all areas) Designated beach (max)	126 235	MPN /100 mL	US EPA, 1986
Fecal coliform	Geometric mean 90th percentile	200 400	MPN /100 mL	Basin Plan, 2007b
Total coliform	Median Maximum	240 10000	MPN /100 mL	Basin Plan, 2007b
Coliforms – MUN only	***MUN thresholds are DOHS recommendations for surface water that serves as drinking water source.***			
Fecal coliform Total coliform	Geometric mean Geometric mean	<20 <100	MPN /100 mL	Basin Plan, 2007b
Toxicity -- Basin Plan	***Two-sample t-tests (one-tailed, alpha = 0.05) were performed on station data versus control data.***			
For *Ceriodaphnia and Pimephales*, the null hypothesis tested was that the station response was less than (less growth, survival, etc) the control response.		80	%	Basin Plan (2007b) - "There shall be no chronic/acute toxicity in ambient waters." (3.3.18)
For Selenastrum, where we are testing that station responses are greater than (more growth) or less than (less growth) the control, these two-sample tests have an alpha of 0.10.		80	%	

CTR - (Federal Register, Part III; EPA; 40 CFR Part 131 Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule. May 18, 2000)

CDFG - California Department of Fish and Game, Office of Spill Prevention and Emergency Response, Hazard Assessment and Water Quality Criteria documents for pesticides (various dates), http://www.cdpr.ca.gov/docs/sw/hazasm.htm

Table 2: Freshwater sediment quality pollutant thresholds for 303(d) data screening

SQG type: ***Analyte***	**Probable effect concentration** *mg/kg*	*µg/kg*	***Reference***
Metals			MacDonald et al. 2000
Arsenic	33		
Cadmium	4.98		
Chromium	111		
Copper	149		
Lead	128		
Mercury	1.06		
Nickel	48.6		
Zinc	459		
Organics			MacDonald et al. 2000
Anthracene		845	
Fluorene		536	
Naphthalene		561	
Phenanthrene		1170	
Benz(a)anthracene		1050	
Benzo(a)pyrene		1450	
Chrysene		1290	
Fluoranthene		2230	
Pyrene		1520	
PAH (total)		22800	
PCB (total)		676	
Chlordane		17.6	
Dieldrin		61.8	
DDD (sum op + pp)		28	
DDE (sum op + pp)		31.3	
DDT (sum op + pp)		62.9	
DDT (total)		572	
Endrin		207	
Heptachlor epoxide		16	
HCH, gamma		4.99	
Toxicity	***Two-sample t-tests (one-tailed, alpha = 0.05) were performed on station data versus control data.***		
For *Hyalella*, the null hypothesis tested was that the station response was less than (less growth, survival, etc) the control response. 80% of the control group was the threshold for sediment toxicity.			Basin Plan (2007b) - "There shall be no chronic/acute toxicity in ambient waters." (3.3.18)

3.2.2 Trash

Trash is not a new problem for the Bay Region, but it is a continuing problem both as an aesthetic nuisance, as a serious threat to aquatic life in tributaries, and as a threat to marine life in estuaries and oceans. Data suggest that plastic from trash persists for hundreds of years in the environment and can pose a threat to wildlife through ingestion, entrapment and entanglement, and this plastic can leach potentially harmful chemicals to the aquatic environment. During the 2002 303(d) listing update effort, Staff discussed the water quality impacts associated with trash at some length (SFRWQCB 2001). Water Board staff found that trash threatened water quality in all urban creeks, lakes, and shorelines. Rather than listing all urban creeks at that time, the Water Board urged municipalities to implement trash control measures, assess trash impairments in their jurisdictions and document these assessments in annual reports submitted to the Board. Since 2002, Water Board staff has developed, refined, and implemented (2002 through 2005) a rapid trash assessment method as part of SWAMP (SFBRWQCB 2007a). Other local entities, e.g., the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), also collected trash assessment data. The water quality assessments for trash conducted for this 303(d) update are based on the results of the rapid trash assessment method and interpretation of data submitted by the public using a similar approach.

The data solicitation for this update resulted in the submission of a large quantity of trash-related data and accompanying requests for 303(d) listings. These data consisted mainly of photographs and narrative documentation on the status of trash levels for specific water bodies. In addition to these data, staff compiled and considered rapid trash assessment data collected by SWAMP as well as similar trash assessment data collected by SCVURPPP. The two types of trash data, photographs and trash assessment results, required distinct evaluation methodologies described below. Because there are no numeric water quality criteria for trash, the trash data were reviewed according to the "weight of evidence" guidelines established in section 3.11 of the Listing Policy. After reviewing these data in accordance with the Listing Policy, there were several water bodies for which we did not have compelling evidence to place them on the 303(d) list. These water bodies are identified in Table 3 below. The water bodies recommended for placement on the 303(d) list for trash impairment are identified in Table 4 below, and the lines of evidence are described in detail in the Fact Sheets (Appendix C).

Relevant Beneficial Uses and Water Quality Objectives

Several beneficial uses may be adversely impacted by trash, including recreation, aquatic life, wildlife habitat, and navigation. However, data were not readily available to allow staff to evaluate all beneficial uses possibly impaired by trash. Instead, we focused our review on evaluating impairment of the non-contact water recreation (REC-2) and wildlife habitat (WILD) beneficial uses, because these uses can be most easily evaluated through review of available trash data. Impairment of REC-2 can be readily evaluated based on the level of trash present. Impairment of WILD can be evaluated based on the level of certain types of trash associated with threat to wildlife, a beneficial use that implicitly includes aquatic life.

Beneficial uses adversely impacted by trash are, in turn, supported by the following set of narrative water quality objectives and Basin Plan prohibitions. The Basin Plan (Table 4-1,

Prohibition Number 7) prohibits discharge of "rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas." The Basin Plan (Section 3.3.6) also has a narrative objective for floating material, "waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses." Last, the Basin Plan (Section 3.3.13) has a narrative objective for settleable material, "waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses."

Table 3: List of water bodies with insufficient evidence to establish trash impairment

Water Body	Designated/Potential Uses	Supporting Data
Adobe Creek	Non-Contact Recreation and Wildlife Habitat	RTA [1], Photos
Alamitos Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Alhambra Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Arroyo Corte Madera del Presidio	Non-Contact Recreation and Wildlife Habitat	Photos
Arroyo Los Positas	Non-Contact Recreation and Wildlife Habitat	RTA
Arroyo Mocho	Non-Contact Recreation and Wildlife Habitat	RTA
Arroyo Seco	Non-Contact Recreation and Wildlife Habitat	Photos
Barron Basin	Non-Contact Recreation and Wildlife Habitat	RTA
Berryessa Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Calabazas Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Corte Madera Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Lagunitas Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Las Trampas Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Lafayette Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Ledgewood Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Los Gatos Creek	Non-Contact Recreation and Wildlife Habitat	RTA, Photos
McCoy Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Pacheco Slough	Non-Contact Recreation and Wildlife Habitat	Photos
Randall Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Rodeo Creek	Non-Contact Recreation and Wildlife Habitat	RTA
San Gregorio Creek	Non-Contact Recreation and Wildlife Habitat	RTA
San Ramon Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Sulphur Creek	Non-Contact Recreation and Wildlife Habitat	Photos
Thompson Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Upper Penitencia Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Vista Grande Canal	Non-Contact Recreation and Wildlife Habitat	Photos
Walnut Creek	Non-Contact Recreation and Wildlife Habitat	Photos

Wildcat Creek	Non-Contact Recreation and Wildlife Habitat	RTA
Yerba Buena Creek	Non-Contact Recreation and Wildlife Habitat	RTA

[1] RTA – Rapid Trash Assessment

Evaluation of Trash Assessment Results

The Water Board's rapid trash assessment method generates site-specific scores on a scale from 0 to 120, with higher scores indicating cleaner sites. The method also documents the number of pieces of trash per one hundred feet of stream or shoreline, and the rate of return of trash under different hydrologic conditions. The trash assessment protocol involves picking up and tallying all of the trash items found within the defined boundaries of a site. When repeated several times throughout a year, this procedure allows for the assessment of temporal changes in impairment, usage patterns, and trash deposition rates under wet and dry weather conditions (SFBRWQCB 2007a).

The Rapid Trash Assessment (RTA) method evaluates six parameters of trash impacts (level of trash, number of items found, threat to wildlife, threat to human health, illegal dumping, and trash accumulation). For purposes of determining impairment status, Water Board staff evaluated the magnitudes of the "level of trash" and "threat to aquatic life" parameters. If the "level of trash" parameter score fell in the 'poor condition category' (scores 0-5), REC-2 is deemed not supported. According to the RTA, the "poor condition" score corresponds to a level of trash that "distracts the eye on first glance. Stream, bank surfaces, and immediate riparian zone contain substantial levels of litter and debris (>100 pieces). This score suggests that the site is being used frequently by people: many cans, bottles, and food wrappers, blankets, clothing." SCVURPPP developed a similar "level of trash" parameter that can be interpreted similarly. Water Board staff reason that if there is sufficient trash to "distract the eye on first glance" and there are substantial levels of litter and debris, then the non-contact beneficial use would be impaired.

The second RTA parameter considered is the "threat to aquatic life" category. If this parameter score fell in the 'poor condition' category (scores 0-5), then WILD is deemed not supported. According to the RTA, the 'poor condition' score corresponds to a "large amount (>50 pieces) of transportable, persistent, buoyant litter (such as hard or soft plastics, balloons, styrofoam, cigarette butts); toxic items (such as batteries, lighters, or spray cans); large clumps of yard waste or dumped leaf litter; or large amount (>50 pieces) of settleable glass or metal."

Water Board staff used the "threat to aquatic life" parameter to assess impairment to wildlife habitat beneficial uses (WILD) because the type of trash measured by this parameter is particularly problematic for wildlife (including aquatic life). The two primary problems that trash poses to wildlife are entanglement and ingestion. Mammals, turtles, birds, fish, and crustaceans all have been affected by entanglement in or ingestion of floatable debris. Many of the species most vulnerable to the problems of floatable debris are endangered or threatened. Entanglement is harmful to wildlife because it can cause wounds that can lead to infections or loss of limbs and also cause strangulation, suffocation, drowning, or limited escape from predators (EPA 2002). Ingestion of trash can lead to starvation or malnutrition if the ingested items block the intestinal tract, preventing digestion, or accumulate in the digestive tract, making the animal feel "full" and lessening its desire to feed. Ingestion of sharp objects can damage the mouth, digestive tract and/or stomach lining and cause infection or pain. Ingested items can also block air passages and prevent breathing, thereby causing death (EPA 2002).

The Urban Rapid Trash Assessment (URTA) developed by SCVURPPP is a very slightly modified version of the original SWAMP RTA. It was modified to make it easier to apply in urban creeks, and the way in which category scores are interpreted was also modified. However, the URTA has an identical parameter assessing threat to aquatic life (wildlife) by characterizing the amount of "Transportable, Persistent, Buoyant Litter." If the raw score for this parameter fell in the marginal urban or poor condition category (scores 0-10, corresponding to a count of 76-200 pieces of such litter), then WILD is deemed not supported.

Although Water Board staff only considered the "level of trash" and "threat to aquatic life" parameters for determining impairment status, the SWAMP and SCVURPPP trash assessment methods have four additional parameters that can provide additional information about both the condition and cause of the trash encountered during assessment (SFBRWQCB 2007a). The assessments include a parameter indicating the total number of trash items counted on the 100-foot stream reach, both above and below the high water line. This is an efficient parameter to use to obtain a rough comparison of the trash impacts between sites, but it can be misleading because sometimes trash items are broken into many pieces, thus inflating the count.

The "threat to human health" parameter accounts for the number of items that are dangerous to humans who wade or swim in the water, and the presence of pollutants that could accumulate in fish in the downstream environment, such as mercury. The worst conditions for this parameter have the potential for the presence of dangerous bacteria or viruses, such as with medical waste, diapers, and human or pet waste. The "illegal dumping and littering" parameter relates to direct placement of trash items at a site, with "poor" conditions assigned to sites that appear to be dumping or littering locations based on adjacent land use practices or site accessibility. Finally, the "accumulation of trash" parameter can be used to distinguish trash that is transported from upstream locations from dumped trash. This is accomplished by noting indications of age and transport. Faded colors, silt marks, trash wrapped around roots, and signs of decay suggest downstream transport, indicating that the local drainage system facilitates conveyance of trash to water bodies.

Evaluation of Photographic Evidence for Trash

Nearly 900 photos of trash impacts were submitted and evaluated to make impairment determinations. These photos presented a fundamental impairment assessment challenge: how to interpret what can be seen in the photos relative to beneficial use impairment? The method we employed was to view the photos as if the water body was being assessed according to the RTA procedure. One of the co-authors of the RTA inspected every photograph and attempted to establish the RTA score for the "level of trash" and "threat to aquatic life" parameters, which relates to impairment of REC-2 and WILD, respectively. One of the first objectives of this photo inspection was to determine if the quantity and quality of the photos were sufficient to establish these parameter scores. Some photos were not clear enough to accomplish this.

In order to establish that the "Level of Trash" parameter was in the poor condition category, we required that reach-scale (i.e., showing most or all of the reach of the creek being photographed) and close-up photos of stream reaches must demonstrate a similar level of

trashiness as the 'poor condition' category of the RTA assessment parameter. In other words, we determined if the visual impression of the photos was consistent with the visual impression the evaluator might have experienced during actual RTA assessments for locations scoring in the 'poor condition" category. A similar determination was made for each photo relative to the "threat to aquatic life" parameter.

Spatial and Temporal Representativeness of Trash Impairment

As a general rule, water bodies recommended for inclusion on the 303(d) list for trash are those for which there is evidence of trash problems persisting through space and time. We applied this rule to trash assessment data and photographic data. In order to recommend listing, we typically required both that the water body contain two or more sites that show evidence of trash impairment (according to assessment or photo documentation) and that evidence of trash impairment existed on two or more occasions. There were instances in which a listing recommendation was made based on data for multiple occasions but only at one location if there were no other data available, but these were very rare exceptions. For San Francisco Bay listings, if shoreline or creek mouth sites satisfied these data sufficiency requirements, we recommended that the applicable bay segment be listed. In fact, for the bay segments recommended for listing (Central and Lower), there were at least two shoreline or creek mouth locations with unacceptably high levels of trash.

3.3 Fact sheet development

Water Board staff developed a Fact Sheet for each water body - pollutant combination that resulted in a listing or delisting recommendation, summarizing the data used to make the decision, the criteria used, and the basic water body characteristics. Figure 1 shows a template provided by the State Board and lists all categories of information required to develop a fact sheet and characterize the cause of impairment.

Region:
Water Body Segment:

Pollutant:
Decision: *List/De-List*

Weight of Evidence
RWQCB Staff Recommendation

Line of Evidence:

Fraction:	*Options for this field are none, not recorded, total, dissolved (does not include suspended), and total dissolved.*
Matrix:	*Options for this field are tissue, water, sediment, N/A. This is the monitoring data sample medium.*
Beneficial use(s):	*Find appropriate beneficial use in your Region's Basin Plan.*
Water Quality Objective/Criteria:	*Find in Basin Plan or use CTR or other appropriate water quality objective or criterion and completely cite it here and reference where you found it.*
Evaluation Guideline:	*If the objective is narrative, use the appropriate evaluation guideline and completely cite it here and reference where you found it.*
Data Used to Assess Water Quality:	*Summarize data assessed here. What is the total number of samples? How many of these samples exceed the objective/criterion/guideline?*
Data References:	*Cite the data reference used for this assessment.*
Spatial Representation:	*Where were the samples collected? How many stations, etc?*
Temporal Representation:	*When were the samples collected? What was the sampling timeframe, etc?*
Water Body Specific Information:	*Environmental conditions or factors that might effect data used in assessment [e.g. Fire/Flood/Dry Year event, etc.]*
Data Quality Assessment	*Excellent, good, fair, poor, unknown, and none*
QAPP Information:	*Clearly describe the quality assurance plan or document that applies to the data used for this assessment. Reference the QA plan that was used. For example: "Quality Control for the chemical analysis portion of this study was conducted in accordance with Standard Operating Procedure QAQC001.00 (Segawa, 1995)."*

Figure 1: Fact sheet template for the 303(d) List

4 Listing Decisions

4.1 Proposed additions to the 303(d) list of impaired water bodies

Table 4 shows all proposed additions to the 303(d) list. Much more comprehensive information is available regarding these new proposed listings in the Fact Sheets (Appendix C). Locations of the water bodies evaluated as impaired during the 2008 listing period are shown in Figure 2 and Figure 3.

Table 4: Proposed 2008 additions to 303(d) list of impaired water bodies

Water Body	Beneficial Uses	Pollutant/ Cause of impairment
Almaden Lake	Commercial and Recreational Collection of Fish, Shellfish, or organisms	Mercury (tissue)[1]
Almaden Reservoir	Commercial and Recreational Collection of Fish, Shellfish, or organisms	Mercury (tissue)[1]
Arroyo Las Positas Creek	Warm Freshwater Habitat	Nutrient/Eutrophication Biological Indicators
Arroyo Mocho Creek	Cold Freshwater Habitat (potential)	Temperature
Codornices Creek	Cold Freshwater Habitat	Temperature
Kirker Creek	Warm Freshwater Habitat	Pyrethroids[2] Water Toxicity
Mount Diablo Creek	Cold Freshwater Habitat	Water Toxicity
Permanente Creek	Cold Freshwater Habitat	Selenium Water Toxicity
San Mateo Creek Lower	Wildlife Habitat	Sediment Toxicity
Stevens Creek	Cold Freshwater Habitat	Temperature
Suisun Creek	Cold Freshwater Habitat	Dissolved Oxygen Temperature
Old Alameda Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Baxter Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Cerrito Creek	Non-Contact Recreation and Wildlife Habitat	Trash

[1] The Guadalupe River Watershed TMDL is expected to address this impairment

[2] San Francisco Bay Urban Creeks Diazinon and Pesticide-Related Toxicity TMDL approved by USEPA on 5/16/07 will address pyrethroids impairment in Kirker Creek.

Water Body	Beneficial Uses	Pollutant/ Cause of impairment
Codornices Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Colma Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Coyote Creek	Non-Contact Recreation and Wildlife Habitat	Trash
Damon Slough	Non-Contact Recreation and Wildlife Habitat	Trash
Grayson Creek	Wildlife Habitat	Trash
Guadalupe River	Non-Contact Recreation and Wildlife Habitat	Trash
Kirker Creek	Wildlife Habitat	Trash
Matadero Creek	Wildlife Habitat	Trash
Permanente Creek	Wildlife Habitat	Trash
Petaluma River	Non-Contact Recreation and Wildlife Habitat	Trash
Rindler Creek	Non-Contact Recreation and Wildlife Habitat	Trash
San Francisco Bay (Central) shoreline	Non-Contact Recreation and Wildlife Habitat	Trash
San Francisco Bay (Lower) shoreline	Non-Contact Recreation and Wildlife Habitat	Trash
San Francisquito Creek	Non-Contact Recreation and Wildlife Habitat	Trash
San Leandro Creek Lower	Non-Contact Recreation and Wildlife Habitat	Trash
San Mateo Creek	Non-Contact Recreation and Wildlife Habitat	Trash
San Pablo Creek	Non-Contact Recreation	Trash
San Tomas Creek	Wildlife Habitat	Trash
Saratoga Creek	Wildlife Habitat	Trash
Sausal Creek	Wildlife Habitat	Trash
Silver Creek	Wildlife Habitat	Trash
Stevens Creek	Wildlife Habitat	Trash
Strawberry Creek	Non-Contact Recreation and Wildlife Habitat	Trash

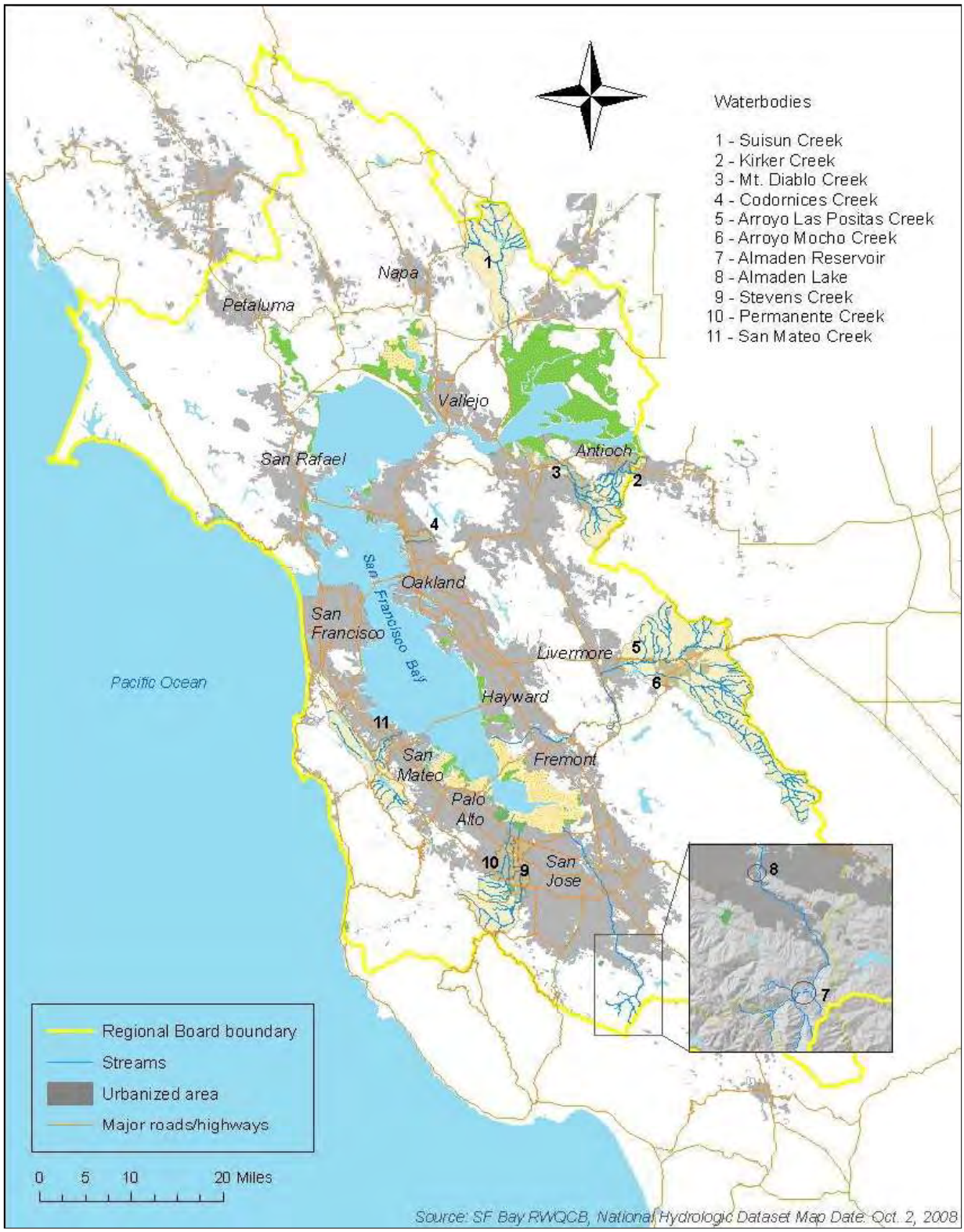

Figure 2: Proposed 2008 new 303(d) listings for toxicants and conventional pollutants

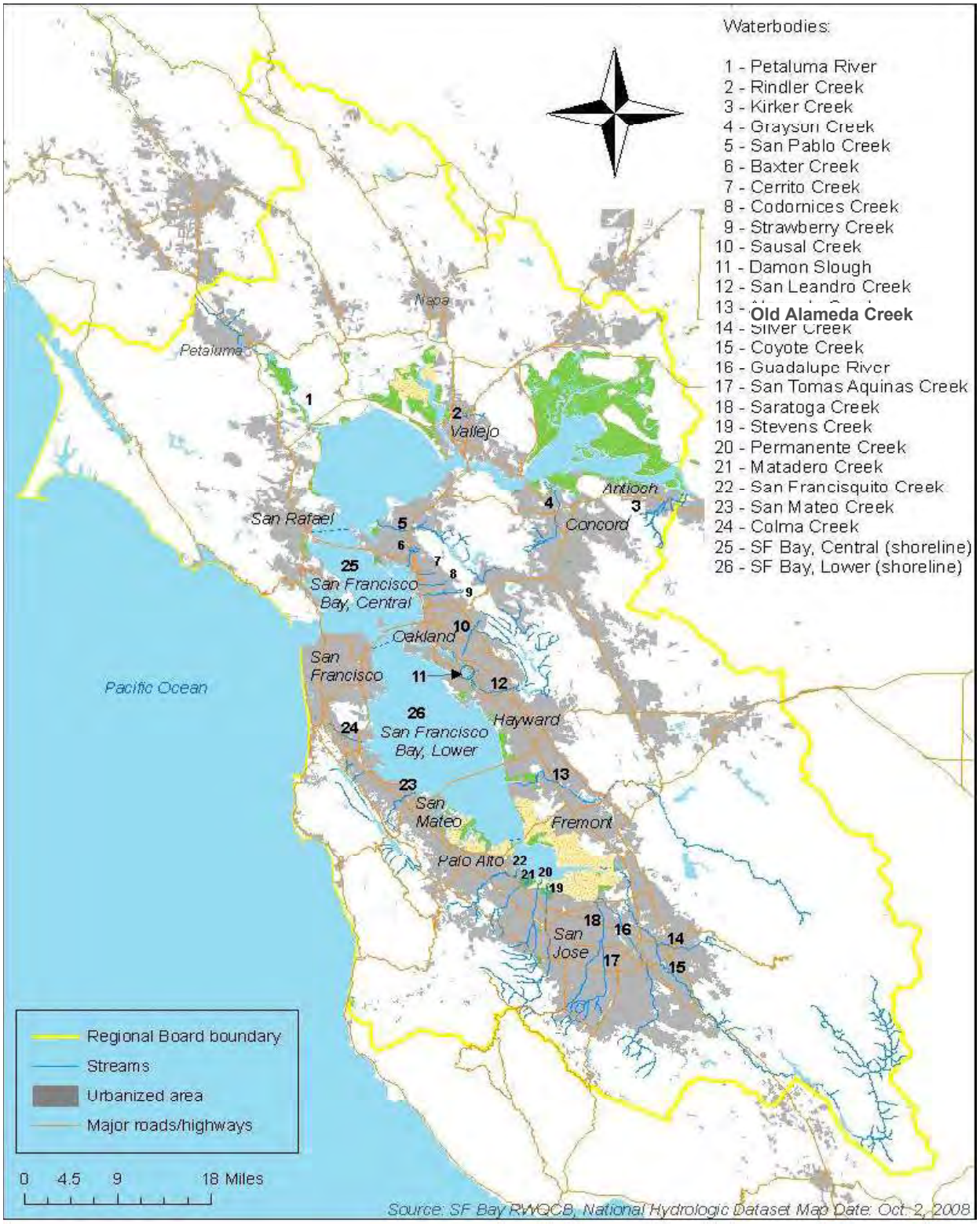

Figure 3: Proposed 2008 303(d) listings for trash

4.2 Proposed delisting and status change

Delist nickel in Sacramento San Joaquin Delta, San Pablo Bay, Suisun Bay

Based on the readily available data and information, there is strong justification for removing these water segment-pollutant combinations from the section 303(d) list in the Water Quality Limited Segments category. The Basin Plan contains nickel water quality objectives of 8.2µg/L as a 4-day average and 74µg/L as a 1-hour average. Data collected by the Regional Monitoring Program and Special Copper/Nickel study from 1993 through 2005 showed that none of the 59 analyzed water samples from the Sacramento San Joaquin Delta exceeded the water quality objectives, none of the 107 analyzed water samples from San Pablo Bay exceeded the water quality objectives, and none of the 96 analyzed water samples from Suisun Bay exceeded the objectives.

Change listing status: Castro Cove, Richmond (San Pablo Basin) - addressed by action other than TMDL

This water body was listed in 2006. Since that time a cleanup and abatement order (Order No. R2-2006-0078) requiring remediation of sediment contamination in the listed portion of Castro Cove was issued. The cleanup action involves removal of contaminated sediment and supports other abatement measures in place, such as the mercury TMDL approved by USEPA on February 12, 2008. Cleanup is underway and, upon its completion, it is expected that this water body will meet applicable water quality standards.

In November 2007, the Water Board received a Monitoring and Risk Management Plan that includes post-dredging confirmation monitoring to demonstrate that chemical contamination in the sediment has been reduced to levels that no longer pose unacceptable ecological risk. The cleanup completion is scheduled for 2010, and it is expected that this action will attain beneficial uses. Therefore, we recommend that Castro Cove be moved from the 303(d) list requiring a TMDL to the 303(d) list of water bodies being addressed by an action other than a TMDL.

4.3 TMDL schedule

All water body-pollutant combinations on the section 303(d) list are assigned with a proposed TMDL completion date. The maximum time that can elapse between 303(d) listing and TMDL completion is 13 years. Accordingly, we have assigned all new listings a TMDL completion date of 2021. This does not suggest that all new listings have the same priority, but rather that the factors determining TMDL priorities have not yet been evaluated as part of this listing process. These factors will be considered through our continuing planning process and with input from our Board and stakeholders. These factors include:

- Water body significance;
- Severity of pollution;
- Degree of impairment;

- Potential threat to human health and the environment;
- Water quality benefits of ongoing activities in the watershed;
- Potential for beneficial use protection and recovery;
- Degree of public concern;
- Availability of funding; and
- Availability of data and information to address the water quality problem.

4.4 Do-Not-List recommendations

This section presents two categories of water bodies for which a "do not list" decision was made. Table 5 lists good quality waters. For these waters there are sufficient data to determine that at least some beneficial uses are supported, and no data are available that suggest non-attainment of beneficial uses. Fact sheets for each of these recommendations are available online (Appendix C).

Table 5: Do Not List recommendations: Some beneficial uses supported

Water Body	Designated/Potential Uses	Supporting Data
Easkoot Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Pine Gulch Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Redwood Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Rodeo Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Tennessee Valley Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen
Webb Creek	Aquatic Life/ Cold Freshwater Habitat	Benthic macroinvertebrate bioassessment Temperature Dissolved Oxygen

Table 6 lists water body-pollutant combinations, for which there was insufficient information

to determine whether or not water quality standards are being attained. In some cases, there are a small number of water quality standard exceedances, but they are insufficient to demonstrate impairment in accordance with the Listing Policy. Thus, for these water body-pollutant combinations, more data should be collected to allow for a definitive determination ina subsequent listing cycle. The Fact Sheets for these water body-pollutant combinations, other than for trash assessment, are provided in Appendix C, online.

Table 6: Do Not List recommendations: Insufficient information to determine if beneficial uses are attained

Water Body	Designated/Potential Uses	Supporting Data
Arroyo Viejo Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity sediment Cr , Cu, As, Ni – sediment
Audubon Canyon Creek	Aquatic Life/ Cold Freshwater Habitat	Nitrate
Codornices Creek	Aquatic Life / Warm Freshwater Habitat	Dissolved oxygen
Glen Echo Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity sediment As, Cr, Cd, Cu, Pb, Hg, Ni – sediment Cu, Pb, Ni, Zn – water
Lion Creek	Aquatic Life/ Warm Freshwater Habitat	Dissolved oxygen
Lobos Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity water Toxicity sediment
Morses Gulch Creek	Aquatic Life/ Cold Freshwater Habitat	Nitrate
Mt Diablo Creek	Aquatic Life / Warm Freshwater Habitat	Dissolved oxygen Toxicity sediment
Peralta Creek	Aquatic Life / Warm Freshwater Habitat	Toxicity sediment Pyrethroids Diazinon
Permanente Creek	Aquatic Life / Cold Freshwater Habitat	Toxicity sediment
San Leandro Creek, Lower	Aquatic Life / Warm Freshwater Habitat	Chromium
Stevens Creek	Aquatic Life / Warm Freshwater Habitat	Dissolved oxygen
Temescal Creek	Aquatic Life/ Warm Freshwater Habitat	Toxicity water Cu, Pb, Ni, Zn – water
Walker Creek	Aquatic Life / Cold Freshwater Habitat	Temperature

4.5 Editorial revisions to the 2006 303(d) list

In addition to the proposed status changing actions, we reviewed and clarified the decision language for water bodies on the 303(d) list adopted in 2006. In particular, careful consideration was given to updating the expected schedules for TMDL completion. In addition, the updated list reflects U.S. EPA approval of TMDLs adopted since the 2006 303(d) list was approved. All of these revisions are editorial in nature and do not change the listing status of any water body. These revisions to the 2006 303(d) list of impaired water bodies are shown in Appendix C, online.

5 303(d)/305(b) Integrated Report

The 303(d)/305(b) Integrated Report will be prepared by State Board based on the information submitted in this report and similar information prepared by all the other Regions. The Integrated Report will then be submitted to the U.S. EPA. All of the assessments reflected in the Fact Sheets included in this report will be used to determine which category to assign to the evaluated water bodies. Additional Fact Sheets may be prepared for non-303(d) listed water bodies for inclusion in the Integrated Report.

The US EPA defines five non-overlapping categories for use in the integrated assessment (USEPA 2005). These categories include:

Category 1: All designated uses are supported, no use is threatened;

Category 2: Available data and/or information indicate that some, but not all of the designated uses are supported (see Table 5 above);

Category 3: There is insufficient available data and/or information to make a use support determination (see Table 6 above);

Category 4: Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed; and

Category 5: Available data and/or information indicate that at least one designated use is not being supported or is threatened, and a TMDL is needed (Table 4 above).

The 2008 Integrated Report adopted by State Board will include the 303(d) listing changes approved by each Regional Water Board. Categories 4 and 5 reflect those water bodies placed on the 303(d) list.

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APPENDIX A

PUBLIC SOLICITATION
for Water Quality Information

available online at

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml

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APPENDIX B

SUMMARY OF DATA RECEIVED AND DATA QUALITY EVALUATION

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Summary of Data Received as a Result of Solicitation Process in February 2007

REQUESTS TO LIST					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
Guadalupe River, Los Gatos Creek, Richmond Marsh, San Rafael Creek, Wildcat Creek, Stevens Creek	**Trash**	**Save the Bay** Photographic documentation and estimates of trash loads	1-4 locations on each water body	Data collected in January and February 2007	Medium – photographic documentation
Guadalupe River, Coyote Creek	**Trash**	**GCRCD**: Guadalupe-Coyote Resource Conservation District Photographic and narrative documentation of trash, debris, channel blockages, encampments and dumping	5 locations on Coyote Creek and 1 location on Guadalupe River	Data collected in March 2002, May 2005, and May 2006	Medium – photographic documentation
Bay area storm drain channels, creeks, wetlands and San Francisco Bay Damon Slough, Eastshore Park, Strawberry Creek, Temescal Creek, Adobe Creek, Alameda Creek, Alhambra Creek, Arroyo Seco, Coyote Creek, Richardson Bay shoreline, Aquatic Park Lagoon, Calabazas Creek, Colma Creek, Corte Madera Creek, Middle Harbor Park shoreline, Frontage Road Beach, Grayson Creek, Guadalupe River, Lafayette Creek, Lake Merritt,	**Trash/Gross pollutants**	Roger B. James & Lawrence P. Kolb Photographic and narrative documentation over a 10-year period	1-5 locations on each water body	Data collected mainly in winter months from 1997-2007, majority in 2006 and 2007	Medium – photographic documentation

REQUESTS TO LIST					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
Las Trampas Creek, Ledgewood Creek, Matadero Creek, McCoy Creek, Pacheco Slough, Rindler Creek, San Leandro Creek, San Mateo Creek, San Rafael Creek, San Pablo Creek, San Ramon Creek, San Tomas Aquino Creek, Sausal Creek, Stevens Creek, Sulphur Creek, Vista Grande Canal, Walnut Creek, 54th Ave. Creek (tidal near Oakport)					
Rodeo Creek	**Sediment**	**Muir Heritage Land Trust** No quantitative data, geomorphic assessment and creek analysis (*Geomorphic and Hydrologic Assessment of Fernandez Ranch* prepared by Watershed Sciences	N/A	N/A	No data submitted
Willow Creek (tributary of Wildcat Creek near Saratoga)	**Sediment**	Margaret Giberson of Los Gatos	Willow Creek	1985-1991, 2002	Law – old (1985-1991, 2002) photographic documentation of sediment runoff
San Francisco Bay – areas adjacent to dredge material disposal sites	**Suspended sediment**	Fred Krieger of Berkeley Narrative evidence and references to USGS mapping, SFEI assessments of sediment loadings, RMP data and a White Paper on	San Francisco Bay	N/A	No data submitted

REQUESTS TO LIST					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
		Herring			
Abbotts Lagoon and associated tributaries in Point Reyes National Park	**Biostimulatory substances, dissolved oxygen, un-ionized ammonia**	Fred Krieger of Berkeley Link to the USGS report http://pubs.usgs.gov/sir/2005/5261/sir_2005-5261.pdf *Assessment of Hydrologic and Water Quality Data Collected in Abbotts Lagoon Watershed, Point Reyes National Seashore, California, during Water Years 1999 and 2000*	Eleven monitoring locations including 3 locations in Abbotts Lagoon and 8 locations in unnamed tributaries draining into Abbotts Lagoon	Old data collected from November 1998 through August 1999. Quarterly sampling at the 3 lagoon sites and one perennial tributary and sampling of two storm events at several tributary sites	Old data. Medium quality – limited quality control procedures
Lake Chabot and its tributary Rindler Creek (Solano County)	**Trash, dissolved oxygen, sediment**	**Friends of Lake Chabot** Data not submitted, reference made to the data collected by the Vallejo Sanitation and Flood Control District	N/A	N/A	No data submitted
California Ocean Waters	**Carbon dioxide**	**Center for Biological Diversity** No data submitted. Scientific papers and supporting documentation on acidification of ocean waters	N/A	N/A	No numerical data submitted

REQUESTS NOT TO LIST / DE-LIST / OTHER					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
Urban Creeks – Santa Clara Basin Adobe Creek, Alamitos Creek, Barron Creek, Berryessa Creek, Calabazas Creek, Coyote Creek, El Camino Storm Drain Channel, Guadalupe River, Los Gatos Creek, Silver Creek, Matadero Creek, Penitencia Creek, Permanente Creek, Randall Creek, Rodeo Creek, San Francisquito Creek, San Tomas Creek, Saratoga Creek, Stevens Creek, Thompson Creek	**Trash and water quality data**	**SCVURPPP:** Santa Clara Valley Urban Runoff Pollution Prevention Program Photographic and narrative documentation of creeks impacted by trash including additional physical, chemical and biological data	1-3 locations on each water body	Data collected 1 to 3 times per location from 2004 through 2006	High Quantitative Trash Assessment Methodology documented in separate report
Lake Merced	**Dissolved oxygen, pH**	**San Francisco Public Utilities Commission** Data submitted in support of not listing Lake Merced on the 303(d) list	Four monitoring locations in Lake Merced including 2 locations in South Lake Merced and 1 location in North and 1 in North East section of the lake.	DO and pH measured from 4 to 8 times a year over a period from 05/27/2004 to 12/20/2006	Quality control procedures unknown
Lake Del Valle Reservoir	**Basic water quality, conventional chemistry, E. coli, Total coliform, Giardia and Cryptosporidium**	**Alameda Food Control and Water Conservation District** Data submitted to document good quality of the drinking water supply. Request to modify the current 303(d) listing of the	Seven monitoring locations at 3 water bodies - including 3 locations at the Lake Del Valle and 4 locations at major inputs to the South Bay Aqueduct	Samples collected from December 2005 through March 2006	Description of the QA/QC protocols not included

REQUESTS NOT TO LIST / DE-LIST / OTHER					
Water Body	**Pollutant/ Water quality parameter**	**Data Source**	**Spatial Representation**	**Temporal Representation**	**Data Quality**
		reservoir for Hg and PCBs to state that there is no threat to treated drinking water supply.			
San Francisco Bay	**Selenium**	**Western State Petroleum Association** Request to de-list Literature review and interpretation of selenium concentration data in San Francisco Bay and the likely toxicological effects of selenium.	N/A	N/A	RMP data available – high quality
Mount Diablo Creek	**Temperature, dissolved oxygen, pH, conductivity, bacteria**	**Friends of Mount Diablo Creek** Data provided for ongoing assessment of Mount Diablo Ck.	Six sampling locations (3 sites on the main stem of Mount Diablo Ck and 3 sites on the local tributaries)	Physico-chemical parameters measured monthly from March 2006 through February 2007. E coli and total coliforms measured at 3 sites in July and August 2006	QA/QC protocols included
N/A	**Pesticides**	**DPR**[1]: Department of Pesticide Regulation - links to the Surface Water Database containing pesticides data for California waterways. **No specific data submitted.**	Contra Costa, San Mateo, Solano and Santa Clara County,	Old data (1992-1998)	High

[1] The database comprises a limited amount of pesticide data (diazinon, chloropyrifos, diuron, metha diuron) collected more than 10 years ago from 12 creeks within Region 2 boundaries.

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APPENDIX C

WATER BODY FACT SHEETS

available online at

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/303dlist.shtml

ATTACHMENT F

State Water Resources Control Board
Resolution No. 2012-0031, Attachment B
Special Protections for Areas of Biological Significance

State Water Resources Control Board
Resolution No. 2012-0031
Attachment B - Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER ANDNONPOINT SOURCE WASTE DISCHARGES

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water and nonpoint source discharges. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

The special conditions are organized by category of discharge. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will determine categories and the means of regulation for those categories [e.g., Point Source Storm Water National Pollutant Discharge Elimination System (NPDES) or Nonpoint Source].

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). “Existing storm water outfalls” are those that were constructed or under construction prior to January 1, 2005. “New contribution of waste” is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term “non-storm water discharges” means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) (i) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(a) Discharges associated with emergency fire fighting operations.

(b) Foundation and footing drains.

(c) Water from crawl space or basement pumps.

(d) Hillside dewatering.

(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(ii) An NPDES permitting authority may authorize non-storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP).

The discharger shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an

ASBS Compliance Plan to be included in its SWMP or a SWPPP, as appropriate to permit type. If a statewide permit includes a SWMP, then the discharger shall prepare a stand-alone compliance plan for ASBS discharges. The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (for permits issued by Regional Water Boards).

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. For Municipal Separate Storm Sewer System (MS4s), the ASBS Compliance Plan shall require minimum inspection frequencies as follows:

   (1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

   (2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

   (3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season; and

   (4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

   (1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider, and use where feasible, LID practices to infiltrate, use, or evapotranspirate storm water runoff on-site, if LID practices would be the most effective at reducing pollutants from entering the ASBS.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWMP or SWPPP for future implementation, and any additional BMPs that may be added to the SWMP or SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits), the discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised SWMP or SWPPP, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger shall submit a draft written ASBS Compliance Plan to the State Water Board Executive Director (statewide permits) or Regional Water Board Executive Officer (Regional Water Board permits) that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls (implementation schedule) to comply with these special conditions for inclusion in the discharger's SWMP or SWPPP, as appropriate to permit type. The final ASBS Compliance Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe

the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. for municipalities, a demonstration of significant hardship to discharger ratepayers, by showing the relationship of storm water fees to annual household income for residents within the discharger's jurisdictional area, and the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for other governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

B. NONPOINT SOURCE DISCHARGES

1. General Provisions for Nonpoint Sources

   a. Existing nonpoint source waste discharges are allowed into an ASBS only under the following conditions:

      (1) The discharges are authorized under waste discharge requirements, a conditional waiver of waste discharge requirements, or a conditional prohibition issued by the State Water Board or a Regional Water Board.

      (2) The discharges are in compliance with the applicable terms, prohibitions, and special conditions contained in these Special Protections.

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only existing nonpoint source waste discharges are allowed. "Existing nonpoint source waste discharges" are discharges that were ongoing prior to January 1, 2005. "New nonpoint source discharges" are defined as those that commenced on or after January 1, 2005. A change to an existing nonpoint source discharge, in terms of relocation or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges from nonpoint sources (those not subject to an NPDES Permit) are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability, or occur naturally:

(i) Discharges associated with emergency fire fighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

f. At the San Clemente Island ASBS, discharges incidental to military training and research, development, test, and evaluation operations are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed in the two military closure areas in the vicinity of Wilson Cove and Castle Rock. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

g. At the San Nicolas Island and Begg Rock ASBS, discharges incidental to military research, development, testing, and evaluation of, and training with, guided missile and other weapons systems, fleet training exercises, small-scale amphibious warfare training, and special warfare training are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

h. All other nonpoint source discharges not specifically authorized above are prohibited.

2. Planning and Reporting

a. The nonpoint source discharger shall develop an ASBS Pollution Prevention Plan, including an implementation schedule, to address storm water runoff and any other nonpoint source discharges from its facilities. The ASBS Pollution Prevention Plan must be equivalent in contents to an ASBS Compliance Plan as described in I (A)(2) in this document. The ASBS Pollution Prevention Plan is subject to approval by the Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements).

b. The ASBS Pollution Prevention Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff that are necessary to comply with these special conditions, will be achieved through Management Measures and associated Management Practices (Management Measures/Practices). Structural BMPs need not be installed if the discharger can document to the satisfaction of the State Water Board Executive Director or Regional Water Board Executive Officer that such installation would pose a threat to health or safety. Management Measures to control storm water runoff during a design storm shall achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges.

The baseline for these determinations is the effective date of the Exception, except for those structural BMPs installed between January 1, 2005 and adoption of these Special Protections, and the reductions must be achieved and documented within six (6) years of the effective date.

c. If the results of the receiving water monitoring described in IV.B. of these special conditions indicate that the storm water runoff or other nonpoint source pollution is causing or contributing to an alteration of natural ocean water quality in the ASBS, the discharger shall submit a report to the State Water Board and the Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents that alter natural water quality and the sources of these constituents.

(2) The report shall describe Management Measures/Practices that are currently being implemented, Management Measures/Practices that are identified in the ASBS Pollution Prevention Plan for future implementation, and any additional Management Measures/Practices that may be added to the Pollution Prevention Plan to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the Management Measures/Practices.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements), the discharger shall revise its ASBS Pollution Prevention Plan to incorporate any new or modified Management Measures/Practices that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the discharger has complied with the procedures described above and is implementing the revised ASBS Pollution Prevention Plan, the discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural water quality conditions due to the same constituent.

(5) The requirements of this section are in addition to the terms, prohibitions, and conditions contained in these Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within eighteen (18) months from the effective date of the Exception, the discharger~~s~~ shall submit a draft written ASBS Pollution Prevention Plan to the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) that describes its strategy to comply with these special conditions, including the requirement to maintain natural ocean water quality in the affected ASBS. The Pollution Prevention Plan shall include a description of appropriate non-structural controls and a time schedule to implement structural controls to comply with these special conditions for inclusion in the discharger's Pollution Prevention Plan. The final ASBS Pollution Prevention Plan, including a description and final schedule for structural controls based on the results of runoff and receiving water monitoring, must be submitted within thirty (30) months from the effective date of the Exception.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these Special Protections shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Pollution Prevention Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all dischargers must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the discharger must re-sample the receiving water pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart.

f. The Executive Director of the State Water Board (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with parks and recreation facilities shall comply with the following:

A. The discharger shall include a section in an ASBS Compliance Plan (for NPDES dischargers) or an ASBS Pollution Prevention Plan (for nonpoint source dischargers) to address storm water runoff from parks and recreation facilities.

1. The plan shall identify all pollutant sources, including sediment sources, which may result in waste entering storm water runoff. Pollutant sources include, but are not limited to, roadside rest areas and vistas, picnic areas, campgrounds, trash receptacles, maintenance facilities, park personnel housing, portable toilets, leach fields, fuel tanks, roads, piers, and boat launch facilities.

2. The plan shall describe BMPs or Management Measures/Practices that will be implemented to control soil erosion (both temporary and permanent erosion controls) and reduce or eliminate pollutants in storm water runoff in order to achieve and maintain natural water quality conditions in the affected ASBS. The plan shall include BMPs or

Management Measures/Practices to ensure that trails and culverts are maintained to prevent erosion and minimize waste discharges to ASBS.

3. The plan shall include BMPs or Management Measures/Practices to prevent the discharge of pesticides or other chemicals, including agricultural chemicals, in storm water runoff to the affected ASBS.

4. The plan shall include BMPs or Management Measures/Practices that address public education and outreach. The goal of these BMPs or Management Measures/Practices is to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The BMPs or Management Measures/Practices shall include signage at camping, picnicking, beach and roadside parking areas, and visitor centers, or other appropriate measures, which notify the public of any applicable requirements of these Special Protections and identify the ASBS boundaries.

5. The plan shall include BMPs or Management Measures/Practices that address the prohibition against the discharge of trash to ASBS. The BMPs or Management Measures/Practices shall include measures to ensure that adequate trash receptacles are available for public use at visitor facilities, including parking areas, and that the receptacles are adequately maintained to prevent trash discharges into the ASBS. Appropriate measures include covering trash receptacles to prevent trash from being wind blown and periodically emptying the receptacles to prevent overflows.

6. The plan shall include BMPs or Management Measures/Practices to address runoff from parking areas and other developed features to ensure that the runoff does not alter natural water quality in the affected ASBS. BMPs or Management Measures/Practices shall include measures to reduce pollutant loading in runoff to the ASBS through installation of natural area buffers (LID), treatment, or other appropriate measures.

B. Maintenance and repair of park and recreation facilities must not result in waste discharges to the ASBS. The practice of road oiling must be minimized or eliminated, and must not result in waste discharges to the ASBS.

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

In addition to the provisions in Section I (A) or I (B), respectively, a discharger with waterfront and marine operations shall comply with the following:

A. For discharges related to waterfront and marine operations, the discharger shall develop a Waterfront and Marine Operations Management Plan (Waterfront Plan). This plan shall contain appropriate Management Measures/Practices to address nonpoint source pollutant discharges to the affected ASBS.

1. The Waterfront Plan shall contain appropriate Management Measures/Practices for any waste discharges associated with the operation and maintenance of vessels, moorings, piers, launch ramps, and cleaning stations in order to ensure that beneficial uses are protected and natural water quality is maintained in the affected ASBS.

2. For discharges from marinas and recreational boating activities, the Waterfront Plan shall include appropriate Management Measures, described in The Plan for California's Nonpoint Source Pollution Control Program, for marinas and recreational boating, or equivalent practices, to ensure that nonpoint source pollutant discharges do not alter natural water quality in the affected ASBS.

3. The Waterfront Plan shall include Management Practices to address public education and outreach to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in these Special Protections. The management practices shall include appropriate signage, or similar measures, to inform the public of the ASBS restrictions and to identify the ASBS boundaries.

4. The Waterfront Plan shall include Management Practices to address the prohibition against trash discharges to ASBS. The Management Practices shall include the provision of adequate trash receptacles for marine recreation areas, including parking areas, launch ramps, and docks. The plan shall also include appropriate Management Practices to ensure that the receptacles are adequately maintained and secured in order to prevent trash discharges into the ASBS. Appropriate Management Practices include covering the trash receptacles to prevent trash from being windblown, staking or securing the trash receptacles so they don't tip over, and periodically emptying the receptacles to prevent overflow.

5. The discharger shall submit its Waterfront Plan to the by the State Water Board Executive Director (statewide waivers or waste discharge requirements) or Executive Officer of the Regional Water Board (Regional Water Board waivers or waste discharge requirements) within six months of the effective date of these special conditions. The Waterfront Plan is subject to approval by the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The plan must be fully implemented within 18 months of the effective date of the Exception.

B. The discharge of chlorine, soaps, petroleum, other chemical contaminants, trash, fish offal, or human sewage to ASBS is prohibited. Sinks and fish cleaning stations are point source discharges of wastes and are prohibited from discharging into ASBS. Anthropogenic accumulations of discarded fouling organisms on the sea floor must be minimized.

C. Limited-term activities, such as the repair, renovation, or maintenance of waterfront facilities, including, but not limited to, piers, docks, moorings, and breakwaters, are authorized only in accordance with Chapter III.E.2 of the Ocean Plan.

D. If the discharger anticipates that the discharger will fail to fully implement the approved Waterfront Plan within the 18 month deadline, the discharger shall submit a technical report as soon as practicable to the State Water Board Executive Director or the Regional Water Board Executive Officer, as appropriate. The technical report shall contain reasons for failing to meet the deadline and propose a revised schedule to fully implement the plan.

E. The State Water Board or the Regional Water Board may, for good cause, authorize additional time to comply with the Waterfront Plan. Good cause means a physical impossibility or lack of funding.

If a discharger claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the discharger first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in Section III.A.5. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the discharger to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The discharger shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality. The discharger may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration of significant hardship by showing that the discharger has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate.

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all dischargers to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected during the same storm and at approximately the same time when post-

storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.

   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

      (3) If an applicant has no outfall greater than 36 inches, then storm water runoff from the applicant's largest outfall shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further collected during the same storm as receiving water samples and analyzed for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates); and

      (3) samples of storm water runoff shall be collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

c. For an applicant not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. Ocean Receiving Water and Reference Area Monitoring Program

In addition to performing the Core Discharge Monitoring Program in Section II.A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, dischargers may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled prior to (pre-storm) and during (or immediately after) the same storm (post storm). Post storm sampling shall be during the same storm and at approximately the same time as when the runoff is sampled. Reference water quality shall also be sampled three times annually and analyzed for the same constituents pre-storm and post-storm, during the same storm seasons when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs,

pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the discharger's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (statewide permits) or Executive Officer of the Regional Water Board (Regional Water Board permits) may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Dischargers may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

   a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d)

listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis. Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm during the same storm season that receiving water is sampled. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected during the same storm event when storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS dischargers that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur monthly from May through October on a high use weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

Glossary

At the point of discharge(s) – Means in the surf zone immediately where runoff from an outfall meets the ocean water (a.k.a., at point zero).

Areas of Special Biological Significance (ASBS) – Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of State Water Quality Protection Areas.

Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit.

Development – Relevant to reference monitoring sites, means urban, industrial, agricultural, grazing, mining, and timber harvesting land uses.

Higher threat discharges - Permitted storm drains discharging equal to or greater than 18 inches, industrial storm drains, agricultural runoff discharged through an MS4, discharges associated with waterfront and marina operations (e.g., piers, launch ramps, mooring fields, and associated vessel support activities, except for passive discharges defined below), and direct discharges associated with commercial or industrial activities to ASBS.

Low Impact Development (LID) – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which entails collecting and conveying storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID focuses on using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall.

Marine Operations – Marinas or mooring fields that contain slips or mooring locations for 10 or more vessels.

Management Measure (MM) - Economically achievable measures for the control of the addition of pollutants from various classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives. For example, in the "marinas and recreational boating" land-use category specified in the Plan for California's Nonpoint Source Pollution Control Program (NPS Program Plan) (SWRCB, 1999), "boat cleaning and maintenance" is considered a MM or the source of a specific class or type of NPS pollution.

Management Practice (MP) - The practices (e.g., structural, non-structural, operational, or other alternatives) that can be used either individually or in combination to address a specific MM class or classes of NPS pollution. For example, for the "boat cleaning and maintenance" MM, specific MPs can include, but are not limited to, methods for the selection of environmentally sensitive hull paints or methods for cleaning/removal of hull copper anti-fouling paints.

Municipal Separate Storm Sewer System (MS4) – A municipally-owned storm sewer system regulated under the Phase I or Phase II storm water program implemented in compliance with Clean Water Act section 402(p). Note that an MS4 program's boundaries are not necessarily congruent with the permittee's political boundaries.

Natural Ocean Water Quality - The water quality (based on selected physical, chemical and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, *i.e.*, an absence of significant amounts of: (a) man-made constituents (*e.g.,* DDT); (b) other chemical (*e.g.,* trace metals), physical (temperature/thermal pollution, sediment burial), and biological (*e.g.*, bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question; and (c) non-indigenous biota (*e.g.,* invasive algal bloom species) that have been introduced either deliberately or accidentally by man. Discharges "*shall not alter natural ocean water quality*" as determined by a comparison to the range of constituent concentrations in reference areas agreed upon via the regional monitoring program(s). If monitoring information indicates that *natural ocean water quality* is not maintained, but there is sufficient evidence that a discharge is not contributing to the alteration of natural water quality, then the Regional Water Board may make that determination. In this case, sufficient information must include runoff sample data that has equal or lower concentrations for the range of constituents at the applicable reference area(s).

Nonpoint source – Nonpoint pollution sources generally are sources that do not meet the definition of a point source. Nonpoint source pollution typically results from land runoff, precipitation, atmospheric deposition, agricultural drainage, marine/boating operations or hydrologic modification. Nonpoint sources, for purposes of these Special Protections, include discharges that are not required to be regulated under an NPDES permit.

Non-storm water discharge – Any runoff that is not the result of a precipitation event. This is often referred to as "dry weather flow."

Non-structural control – A Best Management Practice that involves operational, maintenance, regulatory (e.g., ordinances) or educational activities designed to reduce or eliminate pollutants in runoff, and that are not structural controls (i.e. there are no physical structures involved).

Physical impossibility - Means any act of God, war, fire, earthquake, windstorm, flood or natural catastrophe; unexpected and unintended accidents not caused by discharger or its employees' negligence; civil disturbance, vandalism, sabotage or terrorism; restrain by court order or public authority or agency; or action or non-action by, or inability to obtain the necessary authorizations or approvals from any governmental agency other than the permittee.

Representative sites and monitoring procedures – Are to be proposed by the discharger, with appropriate rationale, and subject to approval by Water Board staff.

Sheet-flow – Runoff that flows across land surfaces at a shallow depth relative to the cross-sectional width of the flow. These types of flow may or may not enter a storm drain system before discharge to receiving waters.

Storm Season – Also referred to as rainy season, means the months of the year from the onset of rainfall during autumn until the cessation of rainfall in the spring.

Structural control – A Best Management Practice that involves the installation of engineering solutions to the physical treatment or infiltration of runoff.

Surf Zone - The surf zone is defined as the submerged area between the breaking waves and the shoreline at any one time.

Surface Water Ambient Monitoring Program (SWAMP) comparable – Means that the monitoring program must 1) meet or exceed 2008 SWAMP Quality Assurance Program Management Plan (QAPP) Measurement Quality Objectives, or 2) have a Quality Assurance Project Plan that has been approved by SWAMP; in addition data must be formatted to match the database requirements of the SWAMP Information Management System. Adherence to the measurement quality objectives in the Southern California Bight 2008 ASBS Regional Monitoring Program QAPP and data base management comprises being SWAMP comparable.

Waterfront Operations - Piers, launch ramps, and cleaning stations in the water or on the adjacent shoreline.

Attachment 1
Special Protections Sections I(A)(3)(e) and I(B)(3)(e)
Flowchart to Deteremine Compliance with natural Water Quality

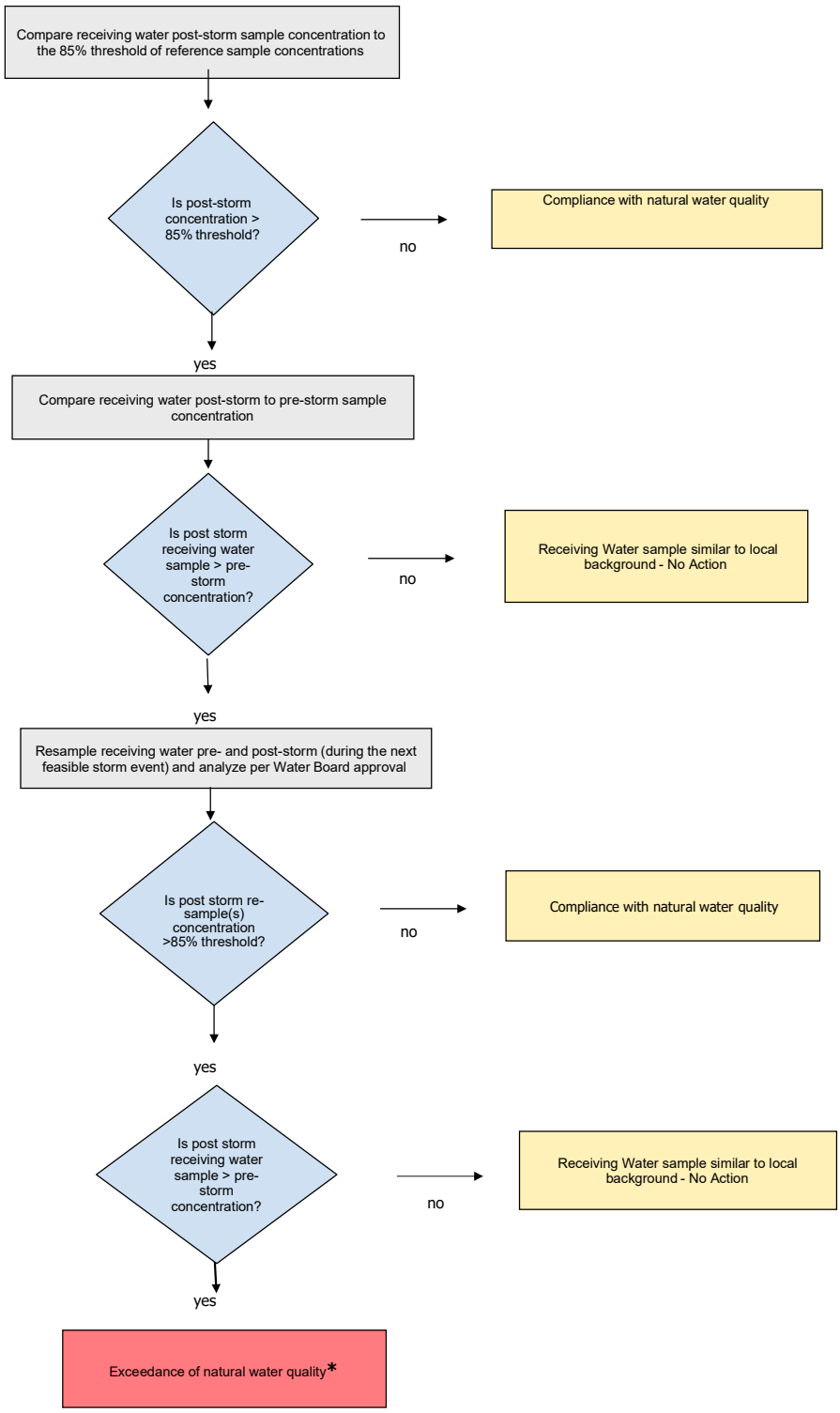

*** When an exceedance of natural water quality occurs, the discharger must comply with section I.A.2.h (for permitted storm water) or section I.B.2.c (for nonpoint sources). Note, when sampling data is available, end-of-pipe effluent concentrations will be considered by the Water Boards in making this determination.**

ATTACHMENT G

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements
for
NPDES Stormwater Discharge Permits

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Permittees (hereinafter individually referred to as Discharger) must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); California Water Code, §§ 13261, 13263, 13265, 13000, 13001, 13304, 13350, 13385.)

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violationof this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar

systems that are installed by a Discharger only when necessary to achieve compliance with theconditions of this Order. (40 C.F.R. § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)
2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. §122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be requiredby law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); California Water Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); California Water Code, § 13383);
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); CaliforniaWater Code, §13383);
3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); California Water Code, § 13383); and
4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); California Water Code, § 13383.)

G. Bypass

1. **Definitions**
   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)
   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur inthe absence of a bypass. Severe property damage does not mean economic loss

caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. (40 C.F.R. § 122.41(m)(2).)

3. **Prohibition of bypass.** Bypass is prohibited, and the Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

   c. The Discharger submitted notice to the Water Board as required under Standard Provisions notice requirements. (40 C.F.R.§ 122.41(m)(4)(i)(C).)

4. The Water Board may approve an anticipated bypass, after considering its adverse effects, if the Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance Part I.G.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

H. Notice

a. **Anticipated bypass.** If the Discharger knows in advance of the need for a bypass, itshall submit prior notice, if possible at least 10 days before the date of the bypass. The notice shall be sent to the Water Board. As of December 21, 2020, all notices must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

b. **Unanticipated bypass.** The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting Part V.E of this Attachment G (24-hour notice). The notice shall be sent to the Water Board. As of December 21, 2020, all notices must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40

C.F.R. part 127.(40 C.F.R. § 122.41(m)(3)(ii).)

I. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond thereasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance Part I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

2. **Conditions necessary for a demonstration of upset.** A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40C.F.R. § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 C.F.R. §122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions –
   Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. **Burden of proof.** In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration dateof this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Water Board. The Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as maybe necessary under the CWA and the Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative ofthe monitored activity. (40 C.F.R. § 122.41(j)(1).)

B. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or as required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, andeither the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapter N, monitoringmust be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3), 122.41(j)(4), 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order,

for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Water Board Executive Officer or U.S. EPA at any time. (40 C.F.R. § 122.41(j)(2);California Water Code § 13383(a))

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 C.F.R. §122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1));and

2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Water Board, State Water Board, or U.S. EPAwithin a reasonable time, any information which the Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking andreissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); California Water Code, §13383.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions – Reporting Parts V.B.2, V.B.3, V.B.4, V.B.5, and V.B.6 below. (40 C.F.R. § 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having

responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3)).

3. All reports required by this Order and other information requested by the Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting Part V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

e. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 C.F.R. § 122.22(b)(1));

f. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

g. The written authorization is submitted to the Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting Part V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting Part V.B.3 above must be submitted to the Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting Parts V.B.2 or V.B.3 above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared undermy direction or supervision in accordance with a system designed to assure that qualifiedpersonnel properly gather and evaluate the information submitted. Based on my inquiry ofthe person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowingviolations." (40 C.F.R. § 122.22(d).)

6. Any person providing the electronic signature for documents described in Standard Provisions – Parts V.B.1, V.B.2, or V.B.3 above that are submitted electronically shall meet all relevant requirements of this Standard Provisions – Reporting Part V.B, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R § 122.22(e).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the this Order. (40 C.F.R. § 122.41(l)(4).)
2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Water Board or State Water Board. As of December 21, 2020, all reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G and comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R.
§ 122.41(l)(4)(i).)
3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)
4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written report shall contain a description of the noncompliance and its cause; the period ofnoncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is

expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 C.F.R. § 122.41(l)(6)(i).)

For noncompliance events related to combined sewer overflows, sanitary sewer overflows,or bypass events, these reports must include the data described above (with the exceptionof time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 21, 2020, all reports related to combined sewer overflows, sanitary seweroverflows, or bypass events must be submitted to the Water Board and mustbe submitted electronically to the initial recipient defined in Standard Provisions – Reporting Part V.J of this Attachment G. The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours underthis paragraph (40 C.F.R. § 122.41(l)(6)(ii)):

a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

c. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Water Board in this Order [40 CFR Section (l)(6)(ii)(C) and 122.44(g)].

3. The Water Board may waive the above-required written report under this provision on a case by case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i));or

2. The alteration or addition could significantly change the nature or increase the quantity ofpollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting Parts V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in StandardProvision – Reporting Part V.E above and the applicable required data in appendix A to 40 C.F.R. part 127. The Water Board may also require the Discharger to electronicallysubmit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Water Board, State Water Board, or U.S. EPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

J. Initial Recipient for Electronic Reporting Data

The owner, operator, or the duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient definedin 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. section 127.2(c)]. U.S. EPA will update and maintain this listing. (40 C.F.R. § 122.41(l)(9).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and13387.

B. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such Sections in a permit issued under Section 402, or any

requirement imposed in a pretreatment program approved under Sections 402(a)(3) or 402(b)(8) of the CWA is subject to a civil penalty not to exceed
$25,000 per day for each violation. The CWA provides that any person who negligently violatesSections 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such Sections in a permit issued under Section 402 of the CWA, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8)of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more

than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such Sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit conditionor limitation implementing any of such Sections in a permit issued under Section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than
$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions [40 CFR Section 122.41(a)(2)] [California Water Code Sections 13385 and 13387].

C. Any person may be assessed an administrative penalty by the Water Board for violating Section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such Sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with themaximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for ClassII violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 [40 CFR Section 122.41(a)(3)].

D. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be

maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two (2) years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or both [40 CFR Section122.41(j)(5)].

E. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, uponconviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both [40 CFR Section 122.41(k)(2)].

IV. CONTINUATION OF EXPIRED PERMIT

A. This Order continues in force and effect until the effective date of a new permit or the Water Board rescinds this Order. (40 C.F.R. section 122.6(d).) Only those dischargers authorized to discharge under the expiring Order are covered by the continued Order.

ATTACHMENT H

Provision C.3.j.ii.(2)

Numeric Implementation Retrofit Requirements

Table H-1. Numeric Retrofit Requirements

County	**Permittee**	2019 US Census Bureau Population Estimate	MRP 3 Provision C.3.j Retrofit Assignment (acres)	County Total (acres)
Alameda	Alameda	77,624	4.66	58.42
Alameda	Alameda County	147,218	5.00	
Alameda	Albany	19,696	1.18	
Alameda	Berkeley	121,363	5.00	
Alameda	Dublin	64,826	3.89	
Alameda	Emeryville	12,086	0.73	
Alameda	Fremont	241,110	5.00	
Alameda	Hayward	159,203	5.00	
Alameda	Livermore	90,189	5.41	
Alameda	Newark	49,149	2.95	
Alameda	Oakland	433,031	5.00	
Alameda	Piedmont	11,135	0.67	
Alameda	Pleasanton	81,777	4.91	
Alameda	San Leandro	88,815	5.00	
Alameda	Union City	74,107	4.45	
Contra Costa	Antioch	111,502	5.00	57.32
Contra Costa	Brentwood	64,474	3.87	
Contra Costa	Clayton	12,265	0.74	
Contra Costa	Concord	129,295	5.00	

Contra Costa	Contra Costa County	185,589	5.00	
Contra Costa	Danville	44,510	2.67	
Contra Costa	El Cerrito	25,508	1.53	
Contra Costa	Hercules	26,276	1.58	
Contra Costa	Lafayette	26,638	1.60	
Contra Costa	Martinez	38,297	2.30	
Contra Costa	Moraga	17,783	1.07	
Contra Costa	Oakley	42,543	2.55	
Contra Costa	Orinda	19,926	1.20	
Contra Costa	Pinole	19,250	1.16	
Contra Costa	Pittsburg	72,588	4.36	
Contra Costa	Pleasant Hill	34,839	2.09	
Contra Costa	Richmond	110,567	5.00	
Contra Costa	San Pablo	30,990	1.86	
Contra Costa	San Ramon	75,995	4.56	
Contra Costa	Walnut Creek	70,166	4.21	
Santa Clara	Campbell	41,793	2.51	46.09
Santa Clara	Cupertino	59,276	3.56	
Santa Clara	Los Altos	30,089	1.81	
Santa Clara	Los Altos Hills	8,423	0.51	
Santa Clara	Los Gatos	30,222	1.81	
Santa Clara	Milpitas	84,196	5.00	

Santa Clara	Monte Sereno	3,427	0.21	
Santa Clara	Mountain View	82,739	4.96	
Santa Clara	Palo Alto	65,364	3.92	
Santa Clara	San Jose	1,021,795	5.00	
Santa Clara	Santa Clara	130,365	5.00	
Santa Clara	Santa Clara County	98,110	5.00	
Santa Clara	Saratoga	30,153	1.81	
Santa Clara	Sunnyvale	152,703	5.00	
San Mateo	Atherton	7,137	0.43	43.31
San Mateo	Belmont	26,941	1.62	
San Mateo	Brisbane	4,671	0.28	
San Mateo	Burlingame	30,889	1.85	
San Mateo	Colma	1,489	0.20	
San Mateo	Daly City	106,280	5.00	
San Mateo	East Palo Alto	29,314	1.76	
San Mateo	Foster City	33,901	2.03	
San Mateo	Half Moon Bay	12,932	0.78	
San Mateo	Hillsborough	11,387	0.68	
San Mateo	Menlo Park	34,698	2.08	
San Mateo	Millbrae	22,394	1.34	
San Mateo	Pacifica	38,546	2.31	
San Mateo	Portola Valley	4,568	0.27	

San Mateo	Redwood City	85,925	5.00	
San Mateo	San Bruno	42,807	2.57	
San Mateo	San Carlos	30,185	1.81	
San Mateo	San Mateo	104,430	5.00	
San Mateo	San Mateo County	64,832	3.89	
San Mateo	South San Francisco	67,789	4.07	
San Mateo	Woodside	5,458	0.33	
Solano	Fairfield	117,133	5.00	11.78
Solano	Suisun City	29,663	1.78	
Solano	Vallejo	121,692	5.00	
Total		5,917,090.00	216.92	

Table H-1. The retrofit assignment is three acres per 50,000 population, prorated, with a minimum expectation of 0.20 acres and a maximum expectation of five acres. The population data in this table is from the 2019 U.S. Census Bureau Population Estimate.

ATTACHMENT I

Applicable C.3 Requirements from Previous Permit, Order No. R2-2015-0049

C.3. New Development and Redevelopment

C.3.b. Regulated Projects

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels; and

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement, and/or
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50**

percent of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

Interior remodels; and

Routine maintenance or repair such as:

roof or exterior wall surface replacement, and/or

pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing

development that was not subject to Provision C.3., only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.

- Bicycle lanes built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[1]
- Caltrans highway projects and associated facilities.

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.b.

ii. Special Projects

(1) When considered at the watershed scale, certain land development projects characterized as smart growth, high density, or transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems:

Tree-box-type high flowrate biofilters

Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible.

(2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite;

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the

[1] Permeable surfaces include pervious concrete, porous asphalt, unit pavers, and granular materials.

Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project.

For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility.

Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied.

(3) Category A Special Project Criteria

(a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace one half acre or less of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(4) Category B Special Project Criteria

(a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:

(i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.

(ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.

(iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.

(iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.

(b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs[2]) for commercial development projects, in Dwelling Units per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.

(i) 50% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density[3] of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the

[2] **Floor Area Ratio** – The ratio of the total floor area on all floors of all buildings at a project site (except structures, floors, or floor areas dedicated to parking) to the total project site area.

[3] **Gross Density** – The total number of residential units divided by the acreage of the entire site area, including land occupied by public right-of-ways, recreational, civic, commercial and other non-residential uses.

two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

- For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(ii) 75% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(iii) 100% Maximum LID Treatment Reduction Credit

- For any commercial Category B Special Project with an FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- For any mixed use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to

100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.

(5) Category C Special Project Criteria (Transit-Oriented Development)

(a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria:

(i) Be characterized as a non-auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.

(ii) If a commercial development project, achieve at least an FAR of 2:1.

(iii) If a residential development project, achieve at least a gross density of 25 DU/Ac.

(iv) If a mixed use development project, achieve at least an FAR of 2:1 or a gross density of 25 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.

(c) Location Credits

(i) A Category C Special Project may qualify for the following Location Credits:

a. 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub.

b. 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub.

c. 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area

Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.

(ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.

(iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

(iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.

(d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve an FAR of at least 2:1.

b. 20% Density Credit: Achieve an FAR of at least 4:1.

c. 30% Density Credit: Achieve an FAR of at least 6:1.

(ii) A Category C Special Project that is a residential or mixed-use development project may qualify for the following Density Credits:

a. 10% Density Credit: Achieve a gross density of at least 30 DU/Ac.

b. 20% Density Credit: Achieve a gross density of at least 60 DU/Ac.

c. 30% Density Credit: Achieve a gross density of at least 100 DU/Ac.

(iii) Commercial Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR. Mixed use Category C Projects may use Density Credits based on either DU/Ac or FAR, but not both.

(iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.

(e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above.

(i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:

a. 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at-grade surface parking. The at-grade surface parking must be treated with LID treatment measures.

b. 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

(ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.

(6) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).

iii. Implementation Level

(1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer.

(2) The definitions of FAR and gross density applicable to Provisions C.3.e.ii.(4) and (5) are effective July 1, 2022, and shall apply to all Special Projects granted final discretionary approval on or after July 1, 2022.

(3) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

iv. Reporting – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2).

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report.

v. Reporting on Special Projects

(1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but that have not received final discretionary approval.

(2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following:

(a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite.

(b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

(c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project.

Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

(3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:

(a) Submittal Date: Date that a planning application for the Special Project was submitted.

(b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

(c) Site Acreage: Total site area in acres.

(d) Gross Density in DU/Ac: Number of dwelling units per acre.

(e) Density in FAR: Floor Area Ratio.

(f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

(g) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied.

(h) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

(i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development projects, which create and/or replace $\geq$ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, and detached single-family home projects,[4] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.

[4] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[1]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[1]

This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority.

ii. **Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

STAFF SUMMARY REPORT: Keith Lichten
MEETING DATE: May 11, 2022

ITEM: 6

Municipal Regional Stormwater NPDES Permit – Municipalities and Flood Management Agencies in Alameda County, Contra Costa County, San Mateo County, Santa Clara County, and Solano County – Reissuance of NPDES Permit

DISCUSSION

The Revised Tentative Order would reissue the Municipal Regional Stormwater NPDES Permit (MRP) for 79 municipalities and local agencies (Permittees) in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano counties (Permittees). Appendix A contains the Revised Tentative Order, including the revised Fact Sheet, showing changes to the September 2021 Tentative Order. Appendix B contains errata and clarification changes made to the Revised Tentative Order since it was public noticed on April 11, 2022. Appendix C contains responses to comments received on the Tentative Order, and all comment letters received within the allowed comment period are in Appendix D.

The Tentative Order and Fact Sheet were available for public comment for 68 days from September 10 through November 16, 2021. During the public comment period, the Board held a two-day hearing on the Tentative Order. At that hearing, interested stakeholders, including the Permittees, U.S. EPA, environmental groups, industry representatives, and the public communicated their concerns and interests directly to the Board. Additionally, Board members asked questions of staff and stakeholders and gave their individual input on aspects of the Tentative Order. In addition, U.S. EPA provided written comments consistent with its testimony at the Board hearing, supporting the MRP provisions and reissuance process.

In addition to these formal opportunities for comment, we worked extensively with the Permittees and other stakeholders over the three years leading up to the release of the Tentative Order and subsequent to its release. This included regular MRP steering committee meetings with a broad cross section of Permittees and U.S. EPA staff; meetings with groups of Permittees, including the stormwater program managers and public works and planning directors' meetings; provision-specific meetings with the Permittees and interested parties; and meetings with individual stakeholders, including U.S. EPA, Baykeeper, Save the Bay, and industry representatives.

In response to oral and written comments, we revised the Tentative Order, including the Fact Sheet, and, on April 11, 2022, public noticed both the Revised Tentative Order and the responses to comments received during the public comment period. Since that time, we issued Errata Sheet #1 to correct an error in the Revised Tentative Order and make related clarifications and revisions. Errata Sheet #2 includes additional minor corrections and clarifications to the Revised Tentative Order. We expect further testimony at the Board hearing on the Revised Tentative Order.

The most significant concerns and issues raised by commenters were on the requirements for Compliance with Discharge Prohibitions and Receiving Waters Limitations (Provision C.1); New Development and Redevelopment (Provision C.3); Water Quality Monitoring (Provision C.8); Trash Load Reduction (Provision C.10); Polychlorinated Biphenyls (PCBs) Controls (Provisions C.12); Bacteria Control for Impaired Water Bodies (Provision C.14); Exempted and Conditionally Exempted Discharges (Provision C.15); and Discharges Associated with Unsheltered Homeless Populations (Provision C.17).

These provisions and the highlights of comments and issues raised, and the responses thereto, are described below, as well as any associated revisions in the Revised Tentative Order.

In addition, commenters and the Board raised concerns and expressed interest in general topics including ensuring that MRP reporting requirements consider the burden imposed by reporting and the associated water quality benefit and that new or significantly revised MRP requirements from the existing permit are appropriately phased to allow effective implementation.

- **Reporting.** We considered the MRP's reporting requirements, including the number of reports, timing, and need, and their priority with respect to water quality benefit. The Revised Tentative Order reflects a reduction in the amount of reporting and number of reports required. In some cases, we delayed the due dates for required reports. In other cases, we consolidated reports, resulting in fewer reports, or we deferred desirable, but relatively minor changes, to a future permit reissuance, which reduced the associated reporting.
- **Review of changes with respect to water quality benefit.** The Revised Tentative Order generally retains the most significant expectations from the Tentative Order, such as trash control benchmarks, expansion of the scope of new and redevelopment projects required to implement clean water controls, and expectations to reduce discharges of mercury and PCBs. However, we revised Provision C.8, water quality monitoring, to clarify the level of effort needed for trash and low impact development treatment control monitoring and to incorporate additional receiving water monitoring, in response to San Francisco Baykeeper's comments.

  In addition, we considered and reduced, or deferred to a subsequent permit term, changes to tracking and reporting in a number of provisions (e.g., C.2, municipal operations; C.4, industrial and commercial site controls; C.5, illicit discharge detection and elimination; and C.6, construction site control). Permittees are generally performing well under those provisions, and while the changes were likely to improve performance, we reduced those changes to allow Permittees to better focus on areas of greater water quality impact.

The Revised Tentative Order would generally cover all Permittees with the same consistent requirements as in the existing permit, with some adjustment for permittee size, type, and location, and continues to reflect the following priorities:

- **Consistent and Accountable Actions –** Requirements specify, with accountability, the level of effort constituting "implementation of controls to reduce pollutants to the maximum extent practicable," the federal regulatory standard, for the basic elements of a municipal stormwater management program, which are maintained with minor changes from previous permits. These elements include municipal operations, industrial and construction site controls, illicit discharge abatement, public outreach and participation, and control of allowed non-stormwater discharges. The elements also include new and redevelopment, which was modified as described further below.
- **Prioritization and Phasing of New and Revised Requirements –** Priority areas include new or revised requirements to reduce discharges of trash, bacteria, PCBs, and mercury; green infrastructure implementation; and tracking and reporting requirements for discharges associated with unsheltered homelessness, asset management, and stormwater program cost reporting. These new or revised requirements will demand new resources or coordination. For that reason, the requirements are generally phased over several years.
- **Implementation of TMDLs –** This permit is the implementation vehicle for wasteload allocations for urban runoff associated with Board-adopted Total Maximum Daily Loads (TMDLs), and permit requirements are consistent with implementation plans adopted with the TMDLs. The requirements reflect the current state of knowledge and implementation potential of controls to reduce these pollutants.

Compliance with Discharge Prohibitions and Receiving Waters Limitations (Provision C.1). This provision specifies that compliance with Provisions C.9 through C.12, C.14, C.18, and C.19.c-f (pertaining to pesticides, trash, mercury, PCBs, bacteria, and sediment) constitutes compliance, during the term of the permit, with Receiving Water Limitations (RWLs), which state the discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. It also specifies that compliance with Provision C.10, Trash Load Reduction, constitutes compliance with Discharge Prohibitions and RWLs for trash.

The San Francisco Baykeeper objected to what it called the “safe harbor" provided by Provision C.1, commenting that the Tentative Order does not satisfy the State Water Board’s Orders WQ 2015-0075 and 2020-0038, which pertain to compliance with RWLs. The permit requirements comply with these orders and are based on thorough analyses of water quality problems posed by the pollutants in question and the solutions to address them, specifically through TMDLs and the Statewide Water Quality Control Plans for Trash (Trash Amendments). The requirements reflect the latest knowledge and expertise gained by the Water Board over many years trying to resolve the impairments caused by the subject pollutants. The requirements are ambitious, rigorous, and transparent in that they require challenging but doable actions; include milestones and deadlines; and require monitoring to ensure progress in meeting RWLs and inform adaptive implementation. The permit requirements are consistent with the requirements and deadlines of TMDLs and the Trash Amendments, except for Provision C.14.a, which applies to bacteria discharges from the cities of Mountain View and Sunnyvale but is based on the analyses and requirements from other bacteria TMDLs. The State Water Board has held that full compliance with the requirements of a TMDL constitutes compliance with RWLs.

In response to the Baykeeper’s comments, Provision C.14.a. has been revised to be clearer that the cities of Sunnyvale and Mountain View are expected to achieve compliance with bacteria RWLs by the end of the permit term on June 30, 2027. This expectation is based on the rigor, completeness, and thoroughness of what is required to find and control bacteria sources, consistent with the State Water Board orders. If despite diligent efforts that does not occur, the cities are required to submit a comprehensive assessment to achieve compliance as soon as possible. The monitoring program for the cities has also been revised to systematically identify and characterize bacteria sources, focus control efforts, evaluate effectiveness of controls, and to demonstrate attainment of bacteria RWLs in the subject waters. A new mid-permit interpretive report is required to assess progress and propose monitoring for the remainder of the permit, as the monitoring will have to be adapted to respond to the results of the required surveillance and monitoring. The adapted monitoring requirements will be imposed through a permit amendment. A new, final interpretive report is also required, which includes a determination of whether bacteria RWLs have been met by June 30, 2027.

New Development and Redevelopment (Provision C.3). The Revised Tentative Order would largely maintain the changes proposed in the Tentative Order (relative to the current permit), which include: lowering the impervious surface threshold to 5,000 square feet from 10,000 square feet for the existing Regulated Project categories; adding two new Regulated Project categories for Large Detached Single-Family Home Projects that create and/or replace at least 10,000 square feet of impervious surface and for Road Reconstruction Projects that create and/or replace at least one acre or more of impervious surface; changing the low impact development exemption credits for Category C Special Projects from transit oriented development to affordable housing; and shifting the focus from green infrastructure planning to implementation.

The Permittees expressed concern that it would be challenging to immediately implement changes in impervious surface thresholds and the two new Regulated Project categories. They also expressed concern about the cost associated with the impervious surface retrofit requirement. In response to comments received, revisions to Provision C.3 include: delay by one year the implementation date for the impervious surface threshold reductions; delay by one year the implementation start date of the two

new Regulated Project categories (Road Reconstruction Projects and Large Detached Single-Family Home Projects); and reduction of the green infrastructure numeric implementation cap to 5 acres from 10 acres. The cap change reduces the required implementation for the largest population Permittees, and results in a 20 percent reduction in the total retrofit that would be required during the coming permit term. The Revised Tentative Order also allows projects in the new Road Reconstruction Regulated Project Category to count towards Permittee's green infrastructure retrofit requirement.

Special Projects Category C has also been revised to better align with the approach in the state's density bonus law and to refer to the state HUD's regularly published income limits, which are also used in the density bonus law. In response to comments regarding the MRP's regulation of gravel roads, the distinction between pervious pavement systems (which can be considered self-treating) and gravel overlays/roads (which are not) has been clarified and affirmed the continuing regulation, from MRP 2 to MRP 3, of gravel roads as impervious surfaces. Also, aligning the MRP with state goals to increase housing production, the Revised Tentative Order clarifies that an accessory dwelling unit constructed on a lot that has an existing single-family home, as is allowed under SB 9, would fall under the larger 10,000 square foot single-family home impervious surface threshold.

Recognizing testimony supporting expansion of the toolbox of clean water controls to treat runoff from new and redevelopment projects, the Revised Tentative Order includes an option for a new workgroup to discuss the pollutant removal and hydrologic equivalency of – and suggested criteria for – high flow-rate media treatment systems in combination with retention/detention measures, such as Silva cells and structural soils.

Water Quality Monitoring (Provision C.8). Numerous comments were submitted by Permittees and Baykeeper regarding the proposed monitoring requirements in the Tentative Order. The Permittees are concerned with the costs of the proposed monitoring, particularly for trash and low impact development. The Baykeeper raised concerns regarding the adequacy of the overall monitoring requirements, particularly with respect to assessing compliance with RWLs. The proposed monitoring requirements are an outgrowth of over 30 years of experience with monitoring of municipal stormwater in the Region and the use of monitoring to inform decision-making. They reflect a balance between the costs of monitoring and the monitoring information needed to inform decisions on the implementation of management actions, while ensuring that the monitoring necessary to demonstrate compliance with permit requirements is conducted. The proposed monitoring requirements are also informed by and consistent with the San Francisco Bay Regional Monitoring Program's Tributary Loading Strategy, our Surface Water Ambient Monitoring Program, U.S. EPA guidance on municipal stormwater monitoring, and recommendations in the 2009 National Research Council report to Congress, "Urban Stormwater Management in the United States."

In response to comments, the Revised Tentative Order includes changes to the Low Impact Development (LID) Monitoring requirements. Permittees expressed concerns about the difficulty of doing a power analysis to inform the monitoring schedule. We completed the analysis, removed the requirement for the Permittees to do it, and revised Table 8.d.2 accordingly. To provide flexibility given the potential for ongoing drought years with limited storm events, the required annual minimum number of sample events has been reduced in the Revised Tentative Order and includes language allowing the events to roll over to the subsequent water year if there are not enough storm events to sample. In response to comments about report timing, the submittal of the draft and final LID Monitoring Plans has been delayed. The Revised Tentative Order clarifies aspects of sampling, including what constitutes a sample event, and the list of parameters to be monitored has been segregated into required and optional parameters.

The Trash Monitoring requirements have also been revised. In response to Permittees comments that co-locating required outfall monitoring and receiving water monitoring could substantially limit the

number of potential monitoring sites, the requirement has been removed, although the permit still encourages co-locating the sites. In response to concerns about whether the amount of time allowed was sufficient to prepare and implement a trash monitoring plan, the Revised Tentative Order delays the due date for the Trash Monitoring Plan by 10 months, the start date of outfall monitoring by one year, and the start date of in-stream monitoring by two years. In response to concerns about trash monitoring costs, and particularly streambank monitoring for trash, and recognizing the inclusion of outfall and receiving water monitoring that monitor trash directly, the Revised Tentative Order removes the requirement to conduct streambank monitoring in addition to outfall and in-stream trash load monitoring and reduces the number of in-stream trash monitoring sites, by one for each county stormwater program.

The Revised Tentative Order includes monitoring requirements to assess compliance with RWLs in creeks and rivers flowing into the Bay, in response to comments from the Baykeeper that RWLs monitoring is lacking. This monitoring would require the collection of four wet season and one dry season sample per countywide program. Permittees would submit a report, subject to Executive Officer approval, that identifies representative waterbodies to sample and the list of monitored analytes with a potential to exceed water quality objectives. This receiving water monitoring in creeks would supplement the receiving water monitoring conducted in the Bay through the San Francisco Bay Regional Monitoring Program to enhance the overall assessment of RWLs. The minimum required number of samples for other pollutants of concern monitoring has been reduced to offset the additional cost of the new RWLs monitoring.

Trash Load Reduction (Provision C.10). The Revised Tentative Order maintains the Tentative Order's proposed compliance benchmarks for Permittees to install and maintain trash capture devices, or implement other equivalent trash control measures, to reduce trash loads by 90 percent from 2009 baseline conditions by June 30, 2023, and 100 percent (or no adverse impacts to receiving waters) by June 30, 2025. This is a three-year extension from the 100 percent trash reduction target of July 1, 2022, in the current permit. Permittees unable to achieve the 100 percent trash reduction requirement by June 30, 2025, which have an approved Direct Discharge Control Plan (DDCP), would have an additional six months, until December 31, 2025, to achieve the 100 percent reduction requirement.

Some Permittees requested that due to the COVID-19 pandemic, the deadlines to achieve the 90 percent and 100 percent trash reductions be extended by at least two years each, to July 1, 2025, and July 1, 2027, respectively, and that the mandatory 90 percent reduction deadline be made advisory. By contrast, Save the Bay recognized MRP 2's stated 2022 target for 100 percent reduction and requested that deadlines be shortened. The existing three-year extension of the 100 percent trash reduction target acknowledges the economic challenges faced by Permittees related to the COVID-19 pandemic, as well as challenges with implementing trash controls in the remaining uncontrolled trash generation areas. It is also intended to give Permittees more time to work with Caltrans on cooperative projects to control trash. The mandatory 90 percent reduction has not been changed because mandatory targets were a driver for progress during MRP 2 and the Statewide Water Quality Control Plans for Trash require interim milestones.

Permittees also requested that the permit maintain credits of up to ten percent toward trash reduction benchmarks for their existing and new source control measures and stated that the elimination of these credits would discourage the meaningful and effective initiation, implementation, and enforcement of source control ordinances. While we agree that source control measures can be an effective tool in controlling and preventing discharges of trash to receiving waters, continuing to allow a ten percent credit for source control measures, in addition to documentation that trash generation areas have been converted from very high, high, or moderate to low trash generation, results in double counting trash reduction. If Permittees were to get the source control percentage credit in addition to the reduced trash loads that should be reflected in their trash generation maps due to implementation and verification of

trash controls, the effect would be to allow the percentage portion of Permittees' trash loads to continue to discharge to receiving waters. Recognizing a percentage credit for source controls or percentage offsets for DDCPs and creek and shoreline cleanups, as described below, beyond the 100 percent compliance benchmark is not consistent with the Trash Amendments, which prohibit the discharge of trash to surface waters of the State or the deposition of trash where it may be discharged into surface waters of the State. The Revised Tentative Order still allows Permittees to claim up to ten percent credit toward trash load reduction compliance for new jurisdiction-wide source control actions, but only until June 30, 2025. After June 30, 2025, Permittees may demonstrate and claim full trash capture equivalence of a source control in specific trash generation areas, or in combination with other controls in an area, if the control or combination of controls are documented, assessed, and verified via visual assessments.

Permittees also commented that the permit should maintain trash load reduction offsets of up to ten percent for creek and shoreline cleanups and up to fifteen percent for implementation of DDCPs. There are interim benefits to creek and shoreline cleanups and DDCPs, such as community engagement and awareness of reduced direct trash discharges associated with illegal dumping and unsheltered homelessness. However, the Trash Amendments do not allow such offsets and require trash to be controlled before it is discharged from a Permittee's MS4 to receiving waters. Continuing to allow offsets would mean a Permittee that claims 100 percent trash load reduction that includes a percentage offset would still have trash discharges, equivalent to the claimed offset, from moderate, high, and/or very high trash generating areas.

Permittees also commented that the intangible benefits generated from the organization and implementation of creek and shoreline cleanup efforts are significant. As such, it is in the Permittees' interest to continue to support creek and shoreline cleanups irrespective of whether they receive offsets for them. In addition, Permittees may use creek and shoreline cleanups as part of an effective education and outreach program recognized under Provision C.7.

Errata Sheet #1 includes corrections of an error that allowed Permittees that implement a DDCP an additional year, until June 30, 2026, to achieve the 100 percent trash load reduction requirement. This extension deadline for most Permittees is not consistent with the Trash Amendments, which require full compliance with the Trash Amendments (i.e., the water quality objective for trash, the trash prohibition, and the implementation requirements such as installing full capture systems or achieving full capture system equivalency) within ten years of the effective date of the first NPDES MS4 permit implementing the Trash Amendments. The current permit became effective on January 1, 2016, and is the first implementing permit, and, therefore, the Permittees must achieve 100 percent trash load reduction within ten years of that date (i.e., by December 31, 2025), except the East Contra Costa County Permittees, which were subject to MRP 2 after its effective date. Errata Sheet #1 changes the extension deadline from June 30, 2026, to December 31, 2025, for all Permittees except the East Contra Costa County Permittees.

In response to comments, the optional trash reduction impracticability report in C.10.e has been revised to focus on implementing alternative controls in those areas where Permittees determine it is impracticable to control trash via full trash capture devices.

Lastly, a number of Permittees' comments questioned the requirement that they ensure that private lands within their jurisdictions, regardless of size, that are plumbed to their MS4 system and are moderate, high, or very high trash generating are controlled by full trash capture systems or control measures equivalent to full trash capture systems. Some Permittees claimed this was an expansion of trash control requirements in the current and previous permit. Control of trash from private lands, regardless of area, that discharges into Permittee MS4s has been a requirement since the first MRP was issued in 2009, and 100 percent trash load reduction from 2009 levels must be attained for all MS4 discharges from all public and private lands by June 30, 2025.

PCBs Control (Provisions C.12). This Provision includes requirements to implement specific PCBs control measures to achieve load reductions toward attainment of applicable San Francisco Bay PCBs TMDL wasteload allocations. It builds on lessons learned both from more than two decades of stormwater monitoring as well as control measure implementation experience from the current and previous permits. The required control measures to achieve PCBs load reductions include identifying and abating contaminated source properties, implementation of control measures in old industrial land use, managing PCBs in bridge roadway caulk, managing PCBs in oil-filled electrical equipment, managing PCBs-containing material in demolition waste material, and implementing green stormwater infrastructure. The Provision also established, for each control measure, an enforceable accountability metric that specifies an expected implementation intensity which will be used both to track performance and determine compliance.

One of the Permittees' main concerns expressed in comment letters was that the magnitude of the performance metric for the old industrial control measure implementation provision, which required 3,100 acres of old industrial land use to be addressed throughout the region, would be very difficult to achieve. Moreover, commenters noted a large disparity in the performance metrics for the individual countywide programs because of differing amounts of this land use in the counties. In response to these concerns, the Revised Tentative Order reduces the old industrial land use performance metrics for Contra Costa and Alameda counties to 664 acres from 1,119 acres for Contra Costa County, and to 664 acres from 937 acres for Alameda County. This acreage is the larger of the performance metrics for Santa Clara and San Mateo counties, which were not modified. This change eliminates the wide disparity in level of effort while still leaving in place a substantial overall implementation target for the region of 2,580 acres of old industrial land use.

Permittees also expressed concern in comments that requirements for the 2022 Annual Report did not provide adequate time for Permittees to accomplish the reportable activities. In response to these concerns, the Revised Tentative Order includes several changes. First, the due date has been moved from the 2022 Annual Report to March 31, 2023, for reporting plans and schedules for control measure implementation in old industrial areas. The reporting due dates have been moved from the 2022 to the 2023 Annual Report for provisions related to PCBs in bridge and roadway expansion joints, PCBs in oil-filled electrical equipment, and for providing enhanced documentation of demolished structures containing PCBs in their building materials. The Revised Tentative Order clarifies that implementation and reporting requirements pertain only to demolition of structures containing building materials with PCBs concentrations 50 ppm or greater whose demolition permits were approved after July 1, 2023.

Bacteria Control for Impaired Waterbodies (Provision C.14). This Provision includes updated requirements for the City of Pacifica and San Mateo County to attain their San Pedro Creek and Pacifica State Beach Bacteria TMDL wasteload allocations. It also includes new requirements to attain wasteload allocations for two bacteria TMDLs adopted after the current permit was issued. These are for the Marina Lagoon Beaches Bacteria TMDL that applies to the City of San Mateo and the Pillar Point Harbor/Venice Beach Bacteria TMDL that applies to City of Half Moon Bay and San Mateo County.

The Provision also includes requirements for the cities of Mountain View and Sunnyvale for discharges that may be violating bacteria RWLs, i.e., discharges that may be causing or contributing to exceedances of bacteria water quality objectives in waters. These requirements are consistent with bacteria TMDLs wasteload allocation implementation requirements for bacteria discharges adopted with bacteria TMDLs and are the most effective way to achieve compliance with bacteria RWLs in a timely manner. Revisions made in response to comments are described in the discussion of Provision C.1 above.

Exempted and Conditionally Exempted Discharges (Provision C.15). This provision authorizes discharges of certain types of non-stormwater from MS4s if they are properly managed. These include discharges of firefighting water and foam resulting from emergency firefighting activities. It requires Permittees to develop and implement Best Management Practices (BMPs) and Standard Operating Procedures (SOPs) to reduce the adverse water quality and hydrologic impacts associated with those discharges, to the extent that such implementation does not interfere with immediate emergency response operations or impact public health and safety.

In response to fish kills caused by discharges of firefighting foam and potable water to receiving waters in recent years, the Tentative Order included several changes to the current permit. Those changes were to form a workgroup to evaluate the efficacy of Permittees' BMPs and SOPs and make recommendations for improvement, which Permittees would implement (as applicable) upon submittal of a report during the permit term. Generally, comments were about perceived impacts to firefighting personnel's emergency response, the perception that examples of BMPs included in the provision were instead requirements, and the additional burden of the proposed reporting requirements.

In response, the Revised Tentative Order includes clarifications on the workgroup's role, the BMPs and SOPs to be considered (example BMPs and SOPs were moved to the Fact Sheet), and expectations for coordination with internal departments and external agencies. Also in response to comments, the Revised Tentative Order includes examples of potable water spills resulting in fish kills, clarifies adverse water quality impacts associated with firefighting foams, simplifies reporting by consolidating two Firefighting Discharges Reports into a single Firefighting Discharges Report, and reverts reporting on emergency discharges to be consistent with the current permit.

Discharges Associated with Unsheltered Homeless Populations (Provision C.17) – This new provision would require Permittees to use results from biennial point-in-time surveys and/or other available information (e.g., databases, complaint logs) to identify the scope of and help manage discharges of trash and sewage associated with unsheltered homeless populations to receiving waters through Permittee MS4s. In addition, Permittees would be required to collectively develop a BMP report that identifies effective practices to manage those discharges. Permittees would also be required to report on the control measures being implemented and the approximate portion and locations of unsheltered homeless populations being served by those measures, as well as the unmet need: the approximate portion and location of the unsheltered homeless population not fully served by those measures. Having this information would enable Permittees to evaluate the effectiveness of their implemented BMPs and identify potential areas within their management practices that need additional improvement.

Some Permittees expressed concern that the mapping requirements in C.17 could contribute to the criminalization of homelessness and increase disruptive sweeps. We retained the mapping requirement and clarified that the provision provides substantial flexibility around mapping while still being supportive of the privacy of those experiencing unsheltered homelessness. In addition, we clarified that the intent behind the mapping requirement is for Permittees to generally identify locations within their jurisdiction where homeless populations exist in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface waters. While homeless populations can be transient, locations tend to be occupied and reoccupied over time, and this information will help Permittees focus their water quality protection efforts.

Permittees also expressed concerns that it would be challenging for municipal stormwater programs to coordinate with other agencies and questioned whether this requirement should be in included as part of a stormwater program. We have retained the coordination expectation, which is similar to other kinds of coordination and communication the stormwater programs complete—both internal and external—such as internal coordination with city departments to implement trash controls or LID controls in city

projects, or coordination with industry groups to establish BMPs. In our communications with the Permittees and NGO representatives, we heard that this coordination between City staff and other agencies is necessary. It is reflected in inter-departmental and inter-agency task force efforts being completed now by Permittees, including the cities of Oakland and San Jose. We have also noted that long-term solutions to the water quality concerns associated with discharges from homeless encampments include providing housing, jobs, and supportive services. As such, having some understanding of those efforts is necessary to understand the trajectory of efforts to control non-stormwater discharges associated with unsheltered homelessness.

In conclusion, the Revised Tentative Order implements federal Clean Water Act requirements by prescribing consistent and accountable actions to effectively prohibit non-stormwater discharges, reduce pollutants to the maximum extent practicable, implement TMDLs, and meet RWLs. Implementation of these actions will satisfy the Permittees' responsibility to make measurable progress towards the attainment of water quality standards in the Bay and its watersheds. We recognize that new requirements will demand new resources, so the Revised Tentative Order reduces some requirements compared to the previous permit and phases in new requirements over the 5-year permit term. Also, regarding new resources, an unprecedented and significant amount of federal and state funding will soon be available for Permittees, such as $24 million this year in the San Francisco Bay Improvement Fund administered by U.S. EPA, new federal funding from the Bipartisan Infrastructure Law, new State funding for infrastructure projects, and ongoing opportunities to partner with Caltrans on cooperative projects to control PCBs in old industrial areas and to control trash. Finally, to the extent that a permit requirement causes unintended consequences, or the intent of a requirement is not attainable, the Revised Tentative Order contains a re-opener provision that would allow the permit to be modified in the future in response to changed conditions and new information.

APPENDICES

A. Revised Tentative Order
B. Errata Sheet #1 and Errata Sheet #2
C. Responses to Comments Received
D. Comment Letters Received during the Written Comment Period

Appendix A

Revised Tentative Order

The Revised Tentative Order is available online at:
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/

To download a copy of the Revised Tentative Order, please click on the “Municipal Regional Permit Reissuance” tab, and then click the bulleted link with the text, “Municipal Regional Stormwater NPDES Permit Revised Tentative Order – April 11, 2022.”

It may be downloaded directly by clicking on the following link:

https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/mrp5-22/MRP_3_Revised_Tentative_Order.pdf

Appendix B

Errata Sheets #1 and #2

Appendix C

Responses to Comments Received

The Response to Comments Received is available online at:
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/

To download a copy of the Response to Comments Received, please click on the “Municipal Regional Permit Reissuance” tab, and then click the bulleted link with the text, “Response to Comments Received.”

It may be downloaded directly by clicking on the following link:

https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/mrp5-22/MRP_3_Response_Comments.pdf

Appendix D

Comment Letters Received during the Written Comment Period

Tagged comment letters received during the written comment period have been uploaded to the Water Board's FTP site**. Instructions for how to login to the FTP site are provided below:**

1. Visit the website: https://ftp.waterboards.ca.gov
2. Log in with the following credentials:
    a. Username: rb2-ftp
    b. Password: SanF@rb2
3. Navigate to: RB2/MRP/MRP 3.0 Revised Tentative Order/Comment Letters Received

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Response to Comments
on September 10, 2021, Tentative Order

The responses to comments to the Tentative Order comprise master responses to comments on overarching issues and select comments that were raised by multiple parties, followed by responses in table form. The master responses to comments are organized by the provision numbers (e.g., C.1, C.3) in the Tentative Order and general comments not associated with a specific provision are at the end. Comments are italicized and summarized and paraphrased for brevity. Please refer to the comment letters for the full comments, context, and tone. Responses in the table refer to the master responses by the Master Response Identifier. To request copies of the comment letters, please contact Derek Beauduy at RB2-MRP@waterboards.ca.gov or (510) 325-8082.

C.1 (Compliance with Discharge Prohibitions and Receiving Water Limitations)

Master Response Identifier: C.1 – 1

Comment Identifier: Baykeeper - 2

Provision No.: C.1

Comment*: Because Draft MRP 3 includes Safe Harbors and adds an additional Safe Harbor for bacteria pollution, it must comply with the requirements of the State Board WQ Orders 2015-0075 and 2020-0038. The Safe Harbor language effectively eliminates the requirements for permittees to be in compliance with the narrative and numeric receiving water standards for pollutants covered by C.9, C.10, C.11, C.12, C.14, C.18, and C.19.c-f. When discussing the State Board precedential orders, the Fact Sheet at A-98 to A-99 only has a brief summary of the additional principles in State Board Order WQ 2020-0038. Neither the Fact Sheet nor the Permit itself contains the minimum scheduling requirements for alternative compliance plans, milestones for achieving compliance, a schedule for compliance, and a final compliance deadline, to be achieved as soon as possible. There are no deadlines for compliance with water quality objectives for any pollutant in Draft MRP 3; Draft MRP 3 is unlawful as proposed, significant modification to the C. provisions is necessary. The Fact Sheet at A-104 states that Draft MRP 3 meets the transparency requirement by including explicit requirements in lieu of the WMP/EWMP approach. A "transparent process" also requires a feedback loop to confirm assumptions and allow for adaptive management. Draft MRP 3 has no methods or means for evaluating compliance and lacks monitoring that would allow such analysis.*

Response: Provision C.1 does not relieve permittees from meeting receiving water limitations—they must ultimately achieve compliance and the Permit puts them on a directed path to compliance, as allowed by State Water Board WQ Orders 2015-0075, as amended by 2021-0052-EXEC, and 2020-0038. In the former order, the State Water Board was sympathetic to municipal storm water dischargers being in noncompliance with receiving water limitations for many years while undertaking significant efforts to

achieve compliance. Accordingly, it held that it is appropriate for municipal storm water permits to incorporate a well-defined, transparent, and finite alternative path to permit compliance that allows MS4 dischargers that are willing to pursue significant undertakings beyond the iterative process (of reporting a violation and proposing BMP improvements to better meet water quality standards) to be deemed in compliance with the receiving water limitations. The alternative path has to be ambitious, rigorous, and transparent. Importantly and pertinent here, the State Water Board held that for water body-pollutant combinations with TMDLs, full compliance with the requirements of the TMDL constitutes compliance with the receiving water limitations for that water body-pollutant combination.

Here, the requirements in C.9 to C.12, C.14, C.18, and C.19.c-f provide an alternate path to compliance with applicable receiving water limitations (for pesticides, trash, mercury, PCBs, bacteria, and sediment) consistent with the State Water Board orders. As required by Order WQ 2015-0075, as amended by 2021-0052-EXEC, the requirements are based on a thorough analyses of water quality problems posed by the pollutants in question and the solutions to address them, specifically through TMDLs and the Trash Amendments. The requirements also reflect the latest knowledge and expertise gained by the Water Board over many years trying to resolve the impairments caused by the subject pollutants. The requirements are consistent with the requirements and deadlines of TMDLs and the Trash Amendments, except for Provision C.14.a, which is based on the analyses and requirements from other bacteria TMDLs. As stated above, the State Water Board has held that full compliance with the requirements of a TMDL constitutes compliance with receiving water limitations.

The requirements in the subject provisions include ambitious and rigorous requirements, which are fundamental under the State Board Orders to be deemed in compliance with receiving water limitations. For example, for mercury and PCBs, Permittees are required to undertake numerous difficult but doable actions like finding and controlling sources of these pollutants, which are widely dispersed throughout the region, and implementing controls in old industrial areas totaling thousands of acres, among many other ambitious and rigorous requirements. Indeed, the Water Board is at the forefront of requiring ambitious PCB requirements like controlling runoff of the pollutant from building demolition materials and bridge roadway expansion joints. Similarly, the Water Board has been at the forefront of requiring difficult but doable trash controls. The trash requirements are ambitious and rigorous because they require 100% trash load reduction by 2025. The Tentative Order's bacteria requirements are likewise ambitious and rigorous. For an explanation, please see Master Response Identifier C.14.a-1 below, which responds the comment Baykeeper – 4.

The comment refers to State Water Board Order WQ 2020-0038's "minimum scheduling requirements," but the State Water Board was referring to the Los Angeles Water Board's minimum scheduling requirements. In any case, we recognize that the State Water Board Orders require finite alternative paths to compliance. For pollutants with TMDLs, the final compliance deadlines are the same as the TMDL deadlines. The only provision without a TMDL other than trash (which is based on the Trash Amendments

and whose final compliance deadline is June 30, 2025) is Provision C.14.a pertaining to the cities of Sunnyvale's and Mountain View's bacteria discharges in certain South Bay waters. In response to comments, this provision has been revised to be clearer that the covered permittees are expected to achieve compliance with the receiving water limitations related to bacteria by the end of the Permit term on June 30, 2027. This expectation is based on the rigor, completeness, and thoroughness of what is required to find and control bacteria sources. If despite diligent efforts that does not occur, the permittees are required to submit a comprehensive assessment to achieve compliance as soon as possible (i.e., phase two actions). As explained in the revised Fact Sheet for Provision C.14.a, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges and known and unknown uncertainties associated with identifying and controlling possible sources, it is impossible to assert with certainty at the onset of the Permit term that source identification and control actions will result in compliance by the end of the Permit term. For this reason, the expectation to comply with receiving water limitations by June 30, 2027, is not expressed in the Permit as an enforceable final deadline. The State Water Board Orders allow deviation from the principles therein where a regional water board shows a principle is inappropriate for region- or permit-specific reasons. The unique characteristics, challenges, uncertainties, and unknowns related to bacteria here, as explained in the revised Fact Sheet, support not using the June 30, 2027, as an enforceable final deadline, but allowing for the possibility of phase two actions. This phased approach is also consistent with the requirements of numerous bacteria TMDLs in the region on which Provision C.14.a is based.

The provisions include milestones to assure progress in meeting the final compliance deadlines and reporting requirements. For example, to meet the mercury and PCBs deadlines, the Permit requires actions that are expected to reduce mercury and PCB loads by approximately 10 kg/yr and 1.47 kg/yr, respectively. However, although those estimates are well founded, their approximate nature does not warrant using them as enforceable milestones. Rather, Permittees must substantiate loads reduced through an accounting system and there will be a combination of monitoring and modeling to determine progress in meeting the load reductions (as well as to update prior assumptions and analyses and inform adaptive implementation). The trash provision includes a milestone of 90% trash reduction by 2023. The cities of Sunnyvale and Mountain View are expected to comply with receiving water limitations related to bacteria by implementing specified source identification and control actions by the end of the Permit term. However, as stated above, due to impossibilities or limitations of modeling or conducting quantitative analysis for bacteria MS4 discharges, at the onset of the Permit term, it is impossible to assert with certainty that specific water quality improvement milestones can be achieved during the Permit term. The Permit does, however, call for a mid-Permit term report to adapt efforts based on initial successes and challenges, and an end of Permit term report to either document compliance with bacteria receiving water limitations or if necessary, a plan and schedule of new or enhanced controls to attain compliance as soon as possible in the next permit term.

Order WQ 2020-0038 includes additional requirements related to data usage for alternative compliance paths and the use of limiting pollutants, which are not directly

applicable to the Permit since the Water Board is neither relying on permittee-conceived watershed management plans for compliance with receiving water limitations nor using limiting pollutants. The order reiterates the requirement in WQ Order 2015-0075, as amended, for clear and concrete milestones and deadlines, with which this Order complies, consistent with the applicable TMDLs. WQ Order 2021-0038 also articulated the need for permittees to demonstrate actual compliance with milestones and deadlines not generated through reliance on the relevant permit's required analytical process. Here, water quality monitoring is required in the Permit to determine if milestones and deadlines are or will be met. In other words, there will be accountability based on what is being achieved in waters and not merely through reliance on the Permit's analytical methods.

Similarly, the Permit is consistent with the transparency requirements of the State Water Board Orders. Contrary to the comment, the Permit does include feedback loops in the form of monitoring to inform progress and adaptive implementation, thus assuring transparency. See Master Response Identifier C.8-1 below, which responds to comment Baykeeper – 11.

C.3 (New Development and Redevelopment)

Master Response Identifier: C.3-1

Comment Identifier: Parts 1) and 3) of SCVURPPP-3a,28, SMCWPPP-66, Santa Clara-3, ACCWP-5,8,9,10, San Jose-9, SMCWPPP-7, Orinda-2, Oakland-2, San Mateo County-4, Cupertino-1

Provision No.: C.3.b.ii.(2)-(4) – Other Development Projects, Other Redevelopment Projects, and New or Widening Road Projects. By way of background, the threshold for these Regulated Project categories has been lowered to 5,000 from 10,000 square feet of impervious surface as compared to the previous permit.

Comment: *Changes to C.3.b.ii.(2)-(4) impose new costs to Permittees (increased burden to conduct plan/design review, inspections, tracking) without commensurate/significant water quality benefits.*

Response: As the Fact Sheet explains, the Permittees submitted a report in 2015 that the benefit provided by additionally capturing Regulated Projects in the 5,000-10,000 square foot range would likely provide similar benefit (with respect to acres of impervious surface treated) and similar cost (with respect to the burden on Permittees to review project applications and conduct inspections as well as other administrative burdens) as compared to Regulated Projects already captured, such as the 10,000-15,000 square foot range and the 15,000-20,000 square foot range.

Consistent with many other permits, such as those referenced in the Fact Sheet, these projects constitute a significant investment and replacement of impervious surface, and therefore warrant the inclusion of clean water controls.

Comment: *Municipalities will have a hard time finding acceptable in-lieu alternatives for small projects not suitable for green infrastructure, e.g., those on steep slopes and those without the drainage infrastructure to allow GSI retrofits.*

Response: For smaller/constrained sites at which it is challenging to implement LID, Permittees may use C.3.e.ii Alternative Compliance; one of the major purposes of the Permittees' Green Infrastructure Plans was to identify such alternative sites. Permittees also have the option of having such Regulated Projects contribute to a joint stormwater treatment facility.

Master Response Identifier: C.3-2

Comment Identifier: Part 1) of ACCWP-a1i,a1ii,5,7,12, Oakland-2,7, San Mateo County-4,14, Hillsborough-3, Oakland & San Jose-2a, SMCWPPP-8, Woodside-8,11, CCCWP-18,20, San Pablo-2, CCTA-1,3, Walnut Creek-6, Santa Clara-3, Dublin-4, Concord-1,2,3,6,7, Cupertino-2, Orinda-1, SCVURPPP-3b,29

Provision No.: C.3.b.ii.(5) – Road Reconstruction Projects.

Comment: *It is technically challenging to fit stormwater treatment into Road Reconstruction Projects, for example because of limited right of way and utility conflicts. It is cheaper and easier to include stormwater treatment on parcels than in the public right of way because there are fewer constraints.*

Response: Comment noted. Recognizing that it can be technically challenging to fit stormwater treatment into certain Road Reconstruction Projects, C.3.b.ii.(5)(c) provides flexibility for such constrained sites by allowing the use of the conditionally-approved alternative sizing criteria.

For Road Reconstruction Projects (or any other Regulated Project), Permittees are not required to provide treatment measures onsite. Permittees may install treatment measures on adjacent parcels. And C.3.e.i provides additional flexibility by allowing the offsite treatment measures to treat a separate drainage area, in lieu of treating the drainage area disturbed by the Road Reconstruction Project.

Master Response Identifier: C.3-3

Comment Identifier: Part 4) of ACCWP-a1i,a1ii,5,7,12, Oakland-2,7, San Mateo County-4,14, Hillsborough-3, Oakland & San Jose-2a, SMCWPPP-8, Woodside-8,11, CCCWP-18,20, San Pablo-2, CCTA-1,3, Walnut Creek-6, Santa Clara-3, Dublin-4, Concord-1,2,3,6,7, Cupertino-2, Orinda-1, SCVURPPP-3b,29

Provision No.: C.3.b.ii.(5) – Road Reconstruction Projects

Comment: *C.3.b.ii.(5) will regulate routine pavement maintenance.*

Response: We disagree. C.3.b.ii.(5) specifically regulates significant reconstruction, not routine maintenance. C.3.b.ii.(1)(b) clarifies that distinction. As explained in the Fact Sheet, the Road Reconstruction Regulated Projects category – in addition to the Numeric Implementation retrofit requirements in C.3.j.ii.(2) – is intended to address the significant pollutant loading and hydrologic impact to receiving waters from Permittees' existing public roads and to clarify the amount of road reconstruction that is redevelopment justifying an investment of resources to retrofit the road with clean water controls.

Master Response Identifier: C.3-4

Comment Identifier: Part 2) of ACCWP-a1i,a1ii,5,7,12, Oakland-2,7, San Mateo County-4,14, Hillsborough-3, Oakland & San Jose-2a, SMCWPPP-8, Woodside-8,11, CCCWP-18,20, San Pablo-2, CCTA-1,3, Walnut Creek-6, Santa Clara-3, Dublin-4, Concord-1,2,3,6,7, Cupertino-2, Orinda-1, SCVURPPP-3b,29; Part 1) of CCCWP-18

Provision No.: C.3.b.ii.(5**)** – Road Reconstruction Projects

Comment: *C.3.b.ii.(5) will impede strategic implementation of green infrastructure.*

The proposed change to apply Regulated Project requirements to work in existing rights of way would upend or nullify the municipalities' Green Infrastructure planning and prevent some green infrastructure projects, currently in the process of design or negotiation, from going forward.

Response: We disagree. C.3.b.ii.(5) will facilitate Permittees' strategic implementation of green infrastructure, as they will gain experience, and become more efficient at, implementing green infrastructure.

As well, in MRP 2, the stated purpose of the Green Infrastructure Plans was to incorporate LID into storm drain infrastructure on public and private lands, including streets, roads, storm drains, and other storm drain infrastructure elements. With the Green Infrastructure Plans completed, the Permittees have a head start on implementing exactly the kinds of projects that will be regulated as Road Reconstruction Projects in MRP 3.

Comment: *The proposed change to apply Regulated Project requirements to work in existing rights of way would upend or nullify the municipalities' Green Infrastructure planning and prevent some green infrastructure projects, currently in the process of design or negotiation, from going forward.*

Response: We disagree. The inclusion of Road Reconstruction Projects is consistent with the planning work completed in the Green Infrastructure Plans. The Green

Infrastructure Plans considered Permittees' capital improvement project lists as part of identifying and prioritizing green street retrofit projects, among other project types, and thus it is likely that at least some of the Permittees' road reconstruction projects under C.3.b.ii.(5) were identified in the Permittees' Green Infrastructure Plans. In addition, Permittees may use the prioritized list of projects identified in their Green Infrastructure Plans as a source of alternative compliance projects in lieu of completing clean water controls at a road reconstruction project that otherwise was not identified in their Green Infrastructure Plan.

Please also see the response to Cupertino-1, and to the following combined comment, in the Response to Comments table:

San Mateo County-4
ACCWP-a2i
CCCWP-21

Master Response Identifier: C.3-5

Comment Identifier: Part 5) of ACCWP-a1i,a1ii,5,7,12, Oakland-2,7, San Mateo County-4,14, Hillsborough-3, Oakland & San Jose-2a, SMCWPPP-8, Woodside-8,11, CCCWP-18,20, San Pablo-2, CCTA-1,3, Walnut Creek-6, Santa Clara-3, Dublin-4, Concord-1,2,3,6,7, Cupertino-2, Orinda-1, SCVURPPP-3b,29

Provision No.: C.3.b.ii.(5) – Road Reconstruction Projects

Comment: *Allow the Permittees to implement road reconstruction projects at their own self-determined pace via their Green Infrastructure Plans, and C.3.j.iii, No Missed Opportunities. It is unclear why municipalities were required to complete a GI Plan in the last MRP only to mandate GI in the next MRP.*

Response: We disagree, and this issue is discussed in the Fact Sheet. The Permittees' limited commitments for green infrastructure implementation in their GI Plans are insufficient to address the urban runoff water quality impacts associated with existing impervious surfaces. With few exceptions, the GI Plans do not commit to accelerate the existing rate of green infrastructure implementation, or to retrofit existing impervious surfaces (particularly, in the public right of way), with clean water controls to address urban runoff discharges, beyond what the MRP 2 already required for Regulated Projects using an LID approach. Consequently, the GI Plans are limited in the extent to which they would reduce the adverse water quality impacts of urban runoff on receiving waters over time.

These outcomes represent a missed opportunity, in that MRP 2's green infrastructure planning requirement was included as an alternative to expanding the Regulated Project definitions to include all new and redevelopment projects that create or replace 5,000 square feet of impervious surface, and road projects that just replace existing

impervious surface area. That is, in MRP 2, green infrastructure planning was included in part to provide municipalities the opportunity to evaluate and account for smaller area regulated projects and road replacement projects as part of their GI Plans, and develop commitments to implementation that would be more efficient and effective for them than a Permit requirement to include all such projects.

Because the GI Plans did not include those commitments, the Tentative Order includes a modest green infrastructure implementation requirement, as well as a new Regulated Project category, Road Reconstruction Projects.

Master Response Identifier: C.3-6

Comment Identifier: Part 6) of ACCWP-a1i,a1ii,5,7,12, Oakland-2,7, San Mateo County-4,14, Hillsborough-3, Oakland & San Jose-2a, SMCWPPP-8, Woodside-8,11, CCCWP-18,20, San Pablo-2, CCTA-1,3, Walnut Creek-6, Santa Clara-3, Dublin-4, Concord-1,2,3,6,7, Cupertino-2, Orinda-1, SCVURPPP-3b,29

Provision No.: C.3.b.ii.(5) – Road Reconstruction Projects

Comment: *Permittees are already challenged with maintaining their roadways. Adding additional immediate and long-term costs (capital construction, and O&M) will worsen roadway conditions because improvements will be further delayed, and will negatively impact public safety. Permittees will be burdened with additional treatment systems that need to be inspected, maintained, and tracked, which pose additional costs. Proposition 218 severely restricts cities' ability to raise ongoing stormwater funding that would be needed to cover the additional costs. Existing funding sources for these roadway projects, such as grants, do not include the cost of stormwater treatment and maintenance, and can have restrictions including not combining with other roadway grants that focus on safety.*

Response: We believe that this comment exaggerates the impact that this will have on Permittees' CIP Programs. Funding for C.3 implementation is available from many sources, including grants, collection of in lieu fees, adoption of new ordinances leveraging private redevelopment (e.g., City of San Mateo), and adoption of new - or revision of existing - stormwater utility fees. Please see the discussion in the Economic Analysis, including regarding LA's Measure W and SB 1 gas tax funding, which includes green infrastructure as a fundable cost.

Regarding stormwater utility fees, the Fact Sheet explains that Proposition 218 is not an impediment to the Permittees' fee authority.[1] The Constitution has an exception to the voter approval requirements of Proposition 218, "for fees or charges for sewer, water, and refuse collection services" (Cal. Const. Article XIII D, section 6, subd. (c).). The Fact

[1] Such authority is also undiminished by Proposition 26, which specifically excludes assessments and property-related fees imposed in accordance with Proposition 218 from the definition of taxes (Cal. Const., art. XIII C, § 1, subd. (e)(7).).

Sheet goes on to discuss two recently-enacted pieces of legislation that confirm fee authority without the need for voter approval, including a discussion of SB 231. It continues regarding Permittees' authority to levy stormwater utility fees.

The City of Oakland's GI Plan includes a useful summary letter (App. F, Oakland 100RC Stormwater Program Financing Memo) that describes a range of available funding opportunities, as does BASMAA's Roadmap of Funding Solutions for Sustainable Streets.[2]

Master Response Identifier: C.3-7

Comment Identifier: Part 1) of CCCWP-20, ACCWP-7

Provision No.: C.3.b.ii.(5) – Road Reconstruction Projects

Comment: *No other NPDES MS4 permits in California have analogous requirements for public road projects. Most CA stormwater permits provide a very flexible roadway treatment requirement that is essentially equivalent to a "no missed opportunity" requirement.*

Response: The Fact Sheet lists many examples of municipal MS4 NPDES permits which include analogous treatment requirements for Road Reconstruction Projects, including the City of Portland's NPDES MS4 Permit (effective January 31, 2011) and U.S. EPA's NPDES MS4 Permit for Washington, D.C. (effective June 22, 2018).

Master Response Identifier: C.3-8

Comment Identifier: CCTA-4

Provision No.: C.3.b.ii.(5) – Road Reconstruction Projects

Comment: *Providing stormwater treatment for all urban impervious surfaces is a long-term goal. Therefore, additional exemptions should be included in C.3.b.ii.(5) for said types of projects.*

Response: We agree that retrofit of existing urban impervious surfaces to address their contributions of urban runoff pollutants is a long-term goal. C.3.b. and C.3.j are an incremental, evolutionary step towards reducing those impacts. C.3.j.ii.(4) creates a workgroup to evaluate issues including the necessary rate of future progress, which may result in changes to C.3.b and C.3.j in future permit terms.

[2] https://basmaa.org/wp-content/uploads/2021/01/roadmap_funding_solutions_sustainable_streets_final.pdf

Master Response Identifier: C.3-9

Comment Identifier: Part 6) of ACCWP-a1i, a2ii/8/13, CCCWP-23, SCVURPPP-30, SMCWPPP-7,68, Hillsborough-2, Oakland-8, Cupertino-3, San Jose-16, Woodside-7,11

Provision No.: C.3.b.ii.(6) – Large Detached Single-Family Home Projects. By way of background, in certain Permittees' jurisdictions, a significant portion of development and redevelopment projects consists of large detached single-family home projects because a significant portion of those Permittees' land use is large lot single-family residential. Therefore, this new category has been added to control the pollutant discharges associated with this category of development and redevelopment.

Comment: *Little to no environmental benefit associated with capturing Large Detached Single-Family Home Projects, while annual municipal administration costs are asserted to be significant. Such projects should therefore be allowed to implement onsite design measures such as diverting runoff to onsite vegetated areas in lieu of complying with C.3.c-d.*

Response: The following is provided in the Fact Sheet:

I. The BASMAA study referenced repeatedly in Permittee comments demonstrates that the benefit provided by capturing Regulated Projects in the 5,000-10,000 square foot range would likely provide similar benefit (with respect to acres of impervious surface treated) and cost (with respect to the burden on Permittees to review project applications and conduct inspections as well as other administrative burdens) as compared to Regulated Projects in the preceding ranges, such as 10,000-15,000 square feet and 15,000-20,000 square feet.

II. Large Detached Single-Family Home Projects can cause the same urban runoff pollutant and hydromodification impacts that projects of similar sizes in any of the other Regulated Projects categories can produce, because of the created/replaced impervious surface, because those surfaces are similar in nature to other pollutant-generating surfaces in the urban environment, and because aerially deposited urban pollutants are deposited and discharged from those projects to the MS4. Additionally, when flows from these projects flow onland (e.g., along public streets, ditches and gutters) prior to entering the MS4 system and discharging to receiving waters, they can mobilize stormwater pollutants from those surfaces, eventually transporting them to receiving waters.

III. Permittees are able to recoup all or a significant portion of the cost of accommodating this new category of Regulated Projects, for example, by charging project application review and inspection fees.

IV. There are many other MS4 Permits that consider it MEP to include analogous treatment requirements for Large Detached Single-Family Home Projects, because of the water quality and hydrologic benefits of capturing those projects. Examples are given in the Fact Sheet.

V. U.S. EPA Region 9 supports the expansion of these Regulated Project categories, as it is well understood that untreated stormwater contributes to the degradation of the San Francisco Bay and local creeks and streams, and dense urbanization, infrastructure and impervious surfaces ring San Francisco Bay and contribute to an increase of contaminants that degrade receiving waters.

Noting the above, we believe it would be appropriate to delay the start date of implementation of C.3.b.ii.(6) (and of C.3.b.ii.(5), and of the changes to the thresholds of the existing Regulated Project categories, C.3.b.ii.(2)-(4)) by one year, to give Permittees extra time to adjust their development review processes – see the response to San Jose-11.

Master Response Identifier: C.3-10

Comment Identifier: Part 2) of ACCWP-a1i, a2ii/8/13, CCCWP-23, SCVURPPP-30, SMCWPPP-7,68, Hillsborough-2, Oakland-8, Cupertino-3, San Jose-16, Woodside-7,11

Provision No.: C.3.b.ii.(6) – Large Detached Single-Family Home Projects

Comment: *Including Large Detached Single-Family Home Projects as Regulated Projects if they create and/or replace at least 10,000 square feet of impervious surface, conflicts with state and local governments' concerted efforts to improve housing affordability.*

Response: It is unlikely that Large Detached Single-Family Home Projects, as defined in C.3.b.ii.(6) are significantly contributing to housing affordability because they are almost certainly unaffordable to Extremely Low, Very Low, Low, and even Moderate income households. In one commenter's jurisdiction, the median home price over the past year was $5.1 million (see https://www.redfin.com/city/8642/CA/Hillsborough/housing-market). While some homes available for that price may have triggered this requirement if it had been in place, others would not have had sufficient impervious surface to trigger it. In the City of Oakland, a relatively more affordable city, the median single-family housing price in February 2022 was about $1 million, and even prices well above that median price were for smaller homes and lots that would not have triggered the requirement (https://www.redfin.com/city/13654/CA/Oakland/housing-market). For example, 1 Dulwich Road, Oakland, sold for $1.725 million, but had a lot size of only 3,569 sq. ft. (https://www.redfin.com/CA/Oakland/1-Dulwich-Rd-94618/home/609434), and 6239 Elderberry, Oakland, sold for $1.85 million, but had a lot size of only 7,498 sq. ft. (https://www.redfin.com/CA/Oakland/6239-Elderberry-Dr-94611/home/610738). Even if fully paved, those lots could not have met the 10,000 sq. ft. threshold for impervious surface.

Master Response Identifier: C.3-11

Comment Identifier: Part 3) of ACCWP-a1i, a2ii/8/13, CCCWP-23, SCVURPPP-30, SMCWPPP-7,68, Hillsborough-2, Oakland-8, Cupertino-3, San Jose-16, Woodside-7,11:

Provision No.: C.3.b.ii.(6) – Large Detached Single-Family Home Projects

Comment: *LID controls required for Large Detached Single-Family Home Projects pursuant to C.3.b.ii.(6) are not "readily inspected," or "inaccessible to municipal inspectors," and enforcement is also difficult.*

Response: Permittees are required to establish the legal authority (e.g., via ordinance) to inspect all Regulated Projects, including residential development and redevelopment projects, and to conduct such an inspection at least once every 5 years (C.3.h.ii(6)). Other MS4 Permittees have established this authority. For example, Eugene, Oregon's 2014 Stormwater Manual, Section 4.2.4, Enforcement, states: "…the City has the right and responsibility to inspect private facilities to assure they are being operated and maintained in accordance with the approved design, the O & M Plan, the Eugene Code and this Manual." Manual Section 1.5 states "…Generally, all development and redevelopment land use applications and building permits that propose 1,000 sq. ft. or more of new or replaced impervious surface must treat the stormwater runoff from that area onsite before discharging to the public stormwater system."

Master Response Identifier: C.3-12

Comment Identifier: San Mateo County-12

Provision No.: C.3.b.ii.(6) – Large Detached Single-Family Home Projects

Comment: *Regulation of residential subdivisions as Regulated Projects at 5,000 square feet will include projects that are "now possible under SB 9," and is financially and administratively burdensome. For a two-lot subdivision, the combined impervious surface for both lots may be far less than the 10,000 sq. ft. threshold of impervious surface for single-family homes, yet still be subject to the same requirements.*

Inclusion of single-family subdivisions now possible under SB 9 is in direct conflict with the spirit of the legislation, which is to provide denser, more affordable housing throughout the State. The lowered threshold for subdivisions adds additional development cost at a time when housing is scarce, places a significant maintenance burden on the future homeowners of these parcels, and results in a significant ongoing inspection burden on the County to inspect the small separate systems that would result from this change.

Exempt detached single-family home subdivisions that are just 2 parcels.

Response: Two-lot residential subdivisions are Regulated Projects under MRP 2 when they meet the applicable impervious surface threshold (i.e., 10,000 sq. ft.), and the Fact Sheet includes an analysis supporting the reduction of the threshold to 5,000 sq. ft. in MRP 3. It is not evident from the comment why the reduction of that threshold to 5,000 sq. ft. from 10,000 sq. ft. poses particular impediments for 2-parcel subdivisions, as compared to subdivision projects consisting of 3 or more parcels. We would expect Permittees to continue to apply their existing plan review, inspection, and alternative compliance processes for such projects.

However, recognizing that SB 9 also allows for the construction of an accessory dwelling unit (ADU) on a lot with an existing single-family home, without subdividing the lot, we have modified C.3.b.ii.(6) to clarify that such an action would fall under the large single-family home threshold of 10,000 sq. ft. of impervious surface.

The comment states that the Tentative Order's regulation of residential subdivisions consisting of 2 parcels at a 5,000 square foot impervious surface threshold would impede goals to provide denser and more affordable housing because it would increase development, operation, maintenance, and inspection costs.

Regarding increased development costs, detached single-family subdivisions of 2 parcels are only considered Regulated Projects if they create and/or replace 5,000 square feet of impervious surface. Such projects constitute a significant investment and replacement of impervious surface, and therefore warrant the inclusion of clean water controls.

If treatment systems for such projects are burdensome to operate, maintain, and inspect, Permittees have the option of implementing C.3.e.i Alternative Compliance, for example, by including stormwater treatment in the public right of way that captures runoff from several tributary small subdivisions and other tributary projects, or otherwise constructing district-scale (i.e., up to tens of acres of tributary area) or regional-scale (i.e., hundreds of acres or more of tributary area) treatment systems, which may be more efficient to operate, maintain, and inspect.

There is significant precedent for the regulation of these types of projects. The Fact Sheet includes numerous examples of other municipal stormwater NPDES permits that require analogous treatment measures for 2-parcel subdivision projects that create and or replace greater than or equal to 5,000 square feet of impervious surface, such as: the City of Portland's NPDES MS4 Permit (effective January 31, 2011), and U.S. EPA's NPDES MS4 Permit for Washington, D.C. (effective June 22, 2018). The Fact Sheet provides several additional justifications, including noting the construction of appropriately sized treatment controls for dense projects.

Master Response Identifier: C.3-13

Comment Identifier: San Jose-11

Provision No.: C.3.b.iii – Implementation Level.

Comment: *The changes to C.3 may impact certain projects that are currently in the planning phase. Delay the implementation of new/changed C.3 requirements by several years into the MRP 3 term.*

Response: We agree that to facilitate implementation of updated expectations for the Regulated Project categories (to allow Permittees to arrange all relevant planning authorities and municipal processes, train their staff, etc.), as well as impervious surface threshold reductions to 5,000 square feet from 10,000 square feet, it is appropriate to delay the start date for implementation of the new Regulated Project categories (C.3.b.ii.(5)-(6)), and of changes to the thresholds for the existing Regulated Project categories (C.3.b.ii.(2)-(4)), by one year, until July 1, 2023, as follows:

Provision C.3.b.iii Implementation Level has been revised, to direct Permittees to implement Provisions C.3.b.i, and C.3.b.ii.(1)-(4), immediately. It also directs Permittees to implement Provisions C.3.b.ii.(5)-(6) beginning July 1, 2023. Prior to July 1, 2023, projects under Provision C.3.b.ii.(5) shall instead comply with Provision C.3.j.iii (No Missed Opportunities). Prior to July 1, 2023, projects under Provision C.3.b.ii.(6) shall comply with Provision C.3.i.

Beginning July 1, 2023, all references to 10,000 square feet in Provisions C.3.b.ii.(2)-(4) change to 5,000 square feet. The lower 5,000 square foot impervious surface threshold does not apply to private Regulated Projects which have received final discretionary approval (by June 30, 2023) and to public Regulated Projects which have been fully funded and have had construction scheduled (both by June 30, 2023)

Master Response Identifier: C.3-14

Comment Identifier: BIA Bay Area-1, Contech-2,3, KS&E-1, Oldcastle-1, ACCWP-a1i,a2i

Provision No.: C.3.c.i.(2)(c)(ii)(a) – Alternative Treatment Systems.

Comment: *Suggests additions to C.3.c.i.(2)(ii) to allow the use of alternative treatment systems, so long as they've received certain certifications (i.e., from Washington State Department of Ecology TAPE program) and comply with the C.3.d criteria. The current prescriptive design standard limits innovation. Such treatment systems are allowed in other NPDES MS4 Permits in California. If allowed, they would reduce developers' reliance on Special Projects, since they have a smaller footprint than conventional bioretention. They'd also significantly reduce maintenance costs. Their media is always the same, compared to conventional bioretention with a sand/compost mix which can*

vary and provide significantly less treatment than historical testing would indicate. A petition signed by over 140 engineers, contractors, developers, and municipal staff supports the commenters' request to allow the use of these systems.

Other bioretention systems that do not conform to the sizing and soil media specifications contained in this permit section are prohibited, regardless of their comparative effectiveness in reducing the discharge of pollutants and their technical and financial feasibility.

Prohibiting the use of innovative bioretention systems that are feasible, accepted by similar stormwater programs as appropriate, and have been proven to be equally or more effective in reducing effluent pollutant loads as compared to conventional bioretention, violates the requirement in CWA Section 402(p)(3)(B)(iii) "reduce the discharge of pollutants to the maximum extent practicable." Therefore, the only way that this provision can stand as written is if the conventional bioretention system sizing and media composition described in C.3.c is definitively the most effective bioretention specification available for pollutants of concern in the SF Bay region, which it is not.

Response: The Permit's bioretention performance criteria and related requirements were developed in coordination with the Permittees, U.S. EPA, and others after significant consideration of existing standards and knowledge.

While the Water Board does not currently have resources available to implement a new technology verification program equivalent or substantially similar to Washington State's, designs implemented under the Permit have been, and will continue to be, informed by lessons learned from programs like Washington State's, as well as ongoing research in the Bay Area, California, and elsewhere. We recognize that Washington State's TAPE program, as described at https://fortress.wa.gov/ecy/publications/documents/1110010.pdf, and which includes dissolved copper and dissolved zinc in addition to other pollutants, is relatively more robust than assessment programs limited to a TSS standard. At the same time, by itself, it does not consider issues unique to the Bay Area, including performance related to mercury and PCBs, as well as performance over time and hydrologic performance that affects the discharge of pollutants.

Low impact development runoff treatment practices, including bioretention, remove urban runoff pollutants through a variety of mechanisms, including mechanisms that prevent runoff from discharging directly downstream to a surface water, such as: infiltration of flows into the ground; evapotranspiration; and capture and reuse. These mechanisms can play a significant role in reducing pollutant loads in runoff (see, for example, bioretention performance studies at the International Stormwater BMP Database, www.bmpdatabase.,org). Studies in the Bay Area and elsewhere have found that bioretention designs, even in clay soils expected to have fairly low infiltration rates, could infiltrate a significant portion of runoff (e.g., Contra Costa County Clean Water Program, September 15, 2013. IMP Monitoring Report). Ongoing improvements to

bioretention designs, such as inverted elbows for underdrains, which maximize the time available for runoff to evapotranspire and infiltrate into the ground, are likely to continue to improve volume reduction performance.

In addition, effective implementation of LID practices, including bioretention, involves successfully implementing a series of practices: developing appropriate control designs, including soil specifications, ensuring those designs are built and specifications can be achieved in the field, and that there is sufficient information for them to be appropriately inspected, operated, and maintained. Examples of challenges include ensuring suppliers can consistently deliver appropriate media to construction sites; the need to better understand control hydrologic performance to ensure that alternate approaches are reasonably comparable and reasonably as effective, and ensuring that municipal inspectors have the information needed to ensure controls' effective function—information that may be limited, for example, if a proprietary media mix is used. Those are examples of reasons that the Permit specifies aspects of bioretention cell design and media performance. It is not clear that those issues have been worked out in the Bay Area for novel bioretention systems or media advocated by the commenters. In addition, as stated above, reliance on testing programs from other states for those systems and media has some limitations, since, for example, they do not consider the hydrologic performance that the Permittees must meet under the Permit, which includes unique drivers like reducing PCBs and mercury.

We recognize that the MEP standard evolves in light of programmatic improvements, new source control initiatives, and technological advances that serve to improve the overall effectiveness of stormwater management programs in reducing the discharge of pollutants. At this time, it is premature to allow the novel bioretention systems and media desired by the commenters until their effectiveness and ability to be successfully implemented in a measurable way that is comparable to the Permit's existing standard are better understood.

It is worthwhile to explore whether certain alternative treatment systems may be capable of providing some of the same water quality and hydrologic benefits that are provided by LID, and therefore we have added C.3.c.i.(2)(ii)(a), which prompts the formation of a workgroup to discuss that. The outcomes of the workgroup may result in proposals for changes in the subsequent Permit term.

A substantial portion of the MRP's success is due to the cooperative relationships that have been built and maintained over time amongst Permittees and between Permittees, the Water Board, and other interested parties. Past Permittee work has been significantly informed by research and third-party work both in the Bay Area and outside the Permittees' jurisdictions. The Permittees meet regularly in meetings open to the public (e.g., under BASMAA's aegis), and we urge the commenter to coordinate with the Permittees' ongoing efforts, such as through this new workgroup.

We have also edited the Fact Sheet to remove ambiguity about how such alternative treatment systems are credited, prior to an amendment of an existing Permit or an update in a future Permit.

Master Response Identifier: C.3-15

Comment Identifier: Contech-3

Provision No.: C.3.c.i.(2)(c)(ii)

Comment: *Comment summarizes a report attached to the comment letter, regarding the comparative performance and feasibility of innovative and conventional bioretention systems. Conventional bioretention systems are not effective in removing nutrients, mercury or dissolved copper. At current development rates the exclusive use of conventional bioretention will result in the release of approximately 5,500 lbs of elemental phosphorus from Regulated Projects during MRP 3. Conventional bioretention systems are likely to attenuate TSS and PCBs, but net export of both has been observed at some field testing sites in the San Francisco Bay Area. Other media mixes provide better and more consistent removal of TSS, mercury, PCBs, phosphorus, and dissolved copper. These systems require a smaller footprint and are cheaper than conventional bioretention systems.*

"Conventional bioretention is likely to provide significantly more runoff reduction than innovative biofiltration due to its relatively large footprint. However, to provide similar load reductions for most pollutants, as would be provided by non-infiltrating innovative bioretention systems, between 50 and 70% runoff reduction is required to compensate for poorer concentration reduction. This is not likely on most sites in the San Francisco Bay regional where clay soils predominate. Innovative bioretention systems can also be designed to infiltrate stormwater runoff to further improve their pollutant load reduction."

Response: We agree that bioretention system performance depends in part on site-specific characteristics and control design, and there is an opportunity to better understand and consider those issues as part of the workgroup that could be established under C.3.c.i.(2)(ii)(a). The workgroup could also identify additional research needs for control hydrologic performance in lower-permeability (e.g., clayey) soils, as some research has found relatively beneficial (e.g., infiltrative) performance

even in such soils; thus, additional information is needed to inform an understanding of comparable performance.[3,4,5,6]

We disagree with the assertion that conventional bioretention systems do not attenuate mercury. Although monitoring has not widely demonstrated that, there's plenty of evidence of effective sediment settling which promotes reduction of mercury loads as normally there's a strong correlation between TSS concentration and mercury concentration in stormwater runoff.[7,8,9,10,11]

Regarding nutrients, the Bay is understood to be nitrogen-limited, with the largest nitrogen contributions coming from Bay wastewater treatment plants. Thus, the focus on nutrient control is on nitrogen and is on the wastewater treatment plant discharges. While stormwater treatment controls could be redesigned to remove nitrogen, that has the potential to increase mercury methylation and discharge, which could adversely affect the Bay's mercury impairment.

Please also see the response to the following combined comment, in the Response to Comments table:

BIA Bay Area-1
Contech-2,3
KS&E-1
Oldcastle-1
ACCWP-a1i,a2i

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[3] Winston, Ryan, 2004. Ph.D. dissertation, Resilience of Green Infrastructure Under Extreme Conditions. Univ. of North Carolina. https://repository.lib.ncsu.edu/bitstream/handle/1840.16/10890/etd.pdf?sequence=2

[4] Traver, 2004. Infiltration strategies for LID. World Wat. and Env. Resources Congress, EWRI of ASCE. https://doi.org/10.1061/40737(2004)83

[5] Traver and Ebrahimian, July 19, 2017. Dynamic design of green stormwater infrastructure. Frontiers of Env. Sci. & Engineering 11(15). https://link.springer.com/article/10.1007/s11783-017-0973-z

[6] Winston et al., May 2016. Quantifying volume reduction and peak flow mitigation for three bioretention cells in clay soils in northeast Ohio. Science of the Total Environment 553(15). https://doi.org/10.1016/j.scitotenv.2016.02.081.

[7] Gilbreath, McKee, et al., 2019. Multi-year water quality performance and mass accumulation of PCBs, mercury, methylmercury, copper and microplastics in a bioretention rain garden. Journal of Sustainable Water in the Built Environment 5 (4). https://www.sfei.org/documents/multi-year-water-quality-performance-and-mass-accumulation-pcbs-mercury-methylmercury

[8] Li and Davis, Aug. 2009. Water quality improvement through reduction of pollutant loads using bioretention. Jn. Env. Eng. 135(8), ASCE. https://doi.org/10.1061/(ASCE)EE.1943-7870.0000026

[9] BASMAA, Feb. 8, 2019. Pollutant removal from stormwater with biochar amended bioretention soil media (BSM). https://www.flowstobay.org/wp-content/uploads/2020/07/11-BASMAA_C.11_C.12_POC-BSM-Project-Report_2019-02-08_Final_UCMR-WY-2018.pdf

[10] Gilbreath, A.; Pearce, S.; Shimabuku, I.; McKee, L. 2018. Bay Area Green Infrastructure Water Quality Synthesis. SFEI Contribution No. 922. San Francisco Estuary Institute: Richmond, CA. https://www.sfei.org/documents/bay-area-green-infrastructure-water-quality-synthesis

[11] Monson, Bruce, May 2007. Effectiveness of stormwater ponds/constructed wetlands in the collection of total mercury and production of methylmercury. MN Pollutant Control Agency: St. Paul, MN. https://www.pca.state.mn.us/sites/default/files/tdr-g1-05.pdf

Master Response Identifier: C.3-16

Comment Identifier: BIA Bay Area-2,3, ACCWP-a3,18, CCCWP-25, SMCWPPP-72, SCVURPPP-33, Walnut Creek-1,2,3,4, Oakland-9, EBALDC-1,4,5,6,7,8,10, Oldcastle-5

Provision No.: C.3.e.ii.(5) – Special Projects, Category C.

Comment: *An analysis submitted by the Permittees in February 2015 showed that as of that time, 3.6% of Regulated Project impervious area was associated with Special Projects, and 1.3% of that same impervious area was treated by non-LID, and based on that analysis, the Water Board retained Provision C.3.e.ii in MRP 2.*

Response: As noted in the Fact Sheet, Permittees' implementation of C.3.e.ii.(5) Category C Special Projects during MRP 2 (to-date) has resulted in the treatment of approximately 324 acres of impervious surface by non-LID measures region-wide, most of which is attributable to projects for which the Permittees' reporting did not clearly make the required demonstration that it was infeasible to incorporate onsite LID or contribute to offsite LID, as allowed by C.3.e.i. Therefore, Category C has been revised to target affordable housing development and redevelopment projects, as C.3.e.i already provides sufficient flexibility for other non-affordable housing development and redevelopments that would have qualified as Category C Special Projects in the Previous Permit.

Master Response Identifier: C.3-17

Comment Identifier: Part 3) of BIA Bay Area-2,3, ACCWP-a3,18, CCCWP-25, SMCWPPP-72, SCVURPPP-33, Walnut Creek-1,2,3,4, Oakland-9, EBALDC-1,4,5,6,7,8,10, Oldcastle-5

Provision No.: C.3.e.ii.(5) – Special Projects, Category C.

Comment: *Transit-oriented development projects align with various other agencies' priorities and provides water quality benefit and should continue to be included as Category C Special Projects.*

Response: TOD projects may still qualify as Special Projects, if they satisfy the Special Projects criteria.

The rationale for the removal of the TOD criteria from Category C is provided in the Fact Sheet: Category C of the Previous Permit primarily credited transit-oriented development (via Location Credits) and resulted in the treatment of approximately 324 acres of impervious surface by non-LID measures region-wide, most of which is attributable to projects for which the Permittees' reporting did not clearly demonstrate that it would have been infeasible to incorporate onsite LID or contribute to offsite LID, as allowed by C.3.e.i. Therefore, Category C has been revised to solely target affordable housing development and redevelopment projects, as C.3.e.i in this Permit

already provides sufficient flexibility for other non-affordable housing development and redevelopments that would have qualified as Category C Special Projects in the Previous Permit.

The Fact Sheet goes on to explain that Category C now focuses on affordable housing criteria (instead of TOD) for determining the total LID Treatment Reduction Credit available for Category C Special Projects. Affordable housing criteria are included in Category C for two primary reasons.

First, affordable housing projects typically have high DUs/acre (as further incentivized by the Density Credits) and are typically located near public transportation (as further incentivized by the Location Credits), and thus they likely produce less automobile traffic (resulting in, for example, less pollutant loading to the MS4) compared to other development and redevelopment projects that do not have those characteristics.

Second, affordable housing credited by this Provision will help reduce unsheltered homelessness, which is expected to reduce pollutant discharges (e.g., of trash and sewage) from homeless encampments and other sources (e.g., RVs) into MS4s. [12] The Water Board recognizes that whether to allow for affordable housing is entirely within the Permittee's land use and zoning authority and discretion. Since such development can reduce the discharge of pollutants from MS4s, the Affordable Housing Credits are provided in the Permit. It will benefit the unhoused population, as follows: The affordable housing criteria are structured in such a way that significant portions of the allowable rent/mortgage rates are capped for Extremely Low income households (0-30% of AMI), Very Low income households (31-50% of AMI), and Low income households (51-80% of AMI), rather than allowing all affordable housing units to qualify even if they only are affordable for Moderate income households (81-120% of AMI).

The link to water quality improvement is expected to decline as rent/mortgage rates increase, as rent/mortgage rates as high as the Moderate level are likely to reduce unsheltered homelessness and its associated impacts at a much lower rate; Moderate rent/mortgage rates (rent rates in particular) are effectively market rate because they can be as high as 120% of AMI. For example, in the East Bay, the current average monthly rent cost ($2,440) is within the lowest Moderate income level, that being (30 percent of) the Moderate income level for a 1-person household ($2,637.50).[13]

[12] Batko, Oneto, and Shroyer, Dec. 2020. Unsheltered Homelessness: Trends, Characteristics, and Homeless Histories. Urban Institute, pp. 12-13.
[13] https://www.rentcafe.com/average-rent-market-trends/us/ca/east-bay/

Master Response Identifier: C.3-18

Comment Identifier: Part 4) of BIA Bay Area-2,3, ACCWP-a3,18, CCCWP-25, SMCWPPP-72, SCVURPPP-33, Walnut Creek-1,2,3,4, Oakland-9, EBALDC-1,4,5,6,7,8,10, Oldcastle-5

Provision No.: C.3.e.ii.(5) – Special Projects, Category C.

Comment: *Category C Special Projects criteria are too prescriptive, conflict with state/regional/local criteria (e.g., CA Density Bonus Law), and should be revised so that any amount of affordable housing qualifies a project for 100% non-LID treatment.*

Response: Water Board staff reviewed the California Density Bonus Law[14] and two Metropolitan Transportation Commission grant/loan programs, the Transit-Oriented Affordable Housing Fund (TOAH)[15] and the Bay Area Preservation Pilot Program (BAPP).[16] The proposed Category C criteria do not conflict with the California Density Bonus Law, TOAH, or BAPP. Compliance with the Category C criteria does not preclude compliance with those other programs, and vice versa. Moreover, the fact that an affordable housing project may potentially qualify for density bonuses, incentives or concessions, and waivers or reductions in development standards under the Density Bonus Law does not also mean that the project is exempt from controlling stormwater pollutant discharges to the MS4 under the federal Clean Water Act. Local jurisdictions may deny requested incentives, concessions, or waivers for various reasons, including if the incentive, concession, or waiver would have specific adverse impacts on the physical environment or would be contrary to state or federal law. (Gov. Code, § 65915, subds. (d)(1) and (e)(1).)

Furthermore, Permittees already review these criteria (i.e., percent affordable housing DUs) as part of their ongoing assessment of proposed projects' compliance with the referenced programs (e.g., criteria for the California Density Bonus Law), so review of the Category C criteria for prospective affordable housing projects during MRP 3 will not constitute a significantly new or additional task.

The main difference we identified is that the California Density Bonus Law provides a density bonus at lower percentages of affordable housing DUs as compared to the Category C criteria proposed in the TO – a density bonus is provided at as low as 5% of DUs limited to the Very Low income category and as low as 10% of DUs limited to the Low income category. We agree that the Category C criteria as well should provide a credit at lower percentages of affordable housing DUs.

Therefore, we added a third credit, a 25% non-LID credit, for: 50% of DUs limited to the Moderate income category, 25% of DUs limited to the Low income category, 15% of

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[14] https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=65915&lawCode=GOV

[15] http://www.bayareatod.com/wp-content/uploads/2018/08/TOAH-II-Acq-Loan-Term-Sheet-short-Aug-2018_FINAL.pdf

[16] https://mtc.ca.gov/sites/default/files/11a%20-%2021-0032%20-%20Reso-4454%20-%20BAPP%20Program%20Revisions.pdf

DUs limited to the Very Low income category, and 5% of DUs limited to the Extremely Low income category.

We also revised the second credit, the 35% credit, by increasing it to a 50% credit, but we have also revised the required minimum number of DUs in the Extremely Low income category from 0% of DUs to 15% of DUs, recognizing that for the increased credit, to achieve the intended water quality nexus, it is critical to support housing for households in the Extremely Low income category.

We added the words "at least" before each criterion, to make it clearer that affordable housing projects are not penalized by including more affordable housing DUs than what is required. We also added a table to more clearly communicate these criteria.

The affordable housing criteria are structured in such a way that significant portions of the allowable rent/mortgage rates are capped for Extremely Low income households (0-30% of AMI), Very Low income households (31-50% of AMI), and Low income households (51-80% of AMI), rather than allowing all affordable housing units to qualify even if they only are affordable for Moderate income households (81-120% of AMI). The link to water quality improvement is expected to decline as rent/mortgage rates increase, because rent/mortgage rates as high as the Moderate level are likely to reduce unsheltered homelessness and its associated impacts at a much lower rate; Moderate rents/mortgages (rents in particular) are effectively market rate because they can be as high as 120% of AMI. For example, in the East Bay, the current average rent cost ($2,440) is well-within the lowest Moderate income level, that being the Moderate income level for a 1-person household ($2,637.50).[17]

To afford Moderate (market-rate) housing, households in the Low/Very Low/Extremely Low income levels have to pay significantly more than 30% of their household.[18] That is to say, such households require dedicated affordable housing that is proportionate to their income level, and that is exactly what the criteria in the Tentative Order provide, which is necessary to justify the water quality nexus that is discussed in the Fact Sheet.

Prior to the pandemic, about half of California renters were rent burdened, which means that more than 30% of their income went towards rent, and nearly one third of California renters were severely rent-burdened, which means that more than half of their income went towards rent. The numbers are worse for families of color; in 2019, black renter households were about twice as likely as white renter households to be severely cost burdened.[19]

Nationally, 75% of households that qualify for the Department of Housing and Urban Development's Housing Choice Voucher (HCV) program (including Section 8, HUD-VASH and other tenant-based vouchers that are all included in the Appropriations

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[17] https://www.rentcafe.com/average-rent-market-trends/us/ca/east-bay/

[18] https://ebho.org/wp-content/uploads/2020/05/EB-1400_Guidebook2020-21_WEB.pdf

[19] https://www.cbs8.com/article/news/local/california/calmatters/why-is-housing-so-expensive-in-california/509-e463dd3f-4041-43b9-8983-4226caee88e2

Committee's Tenant-Based Rental Assistance, or TBRA, account) are in the Extremely Low Household income level.[20]

If the Permit allowed non-LID credit for development projects that provide only Moderate level DUs, or even only Low level DUs, there would be a very limited water quality nexus. And if we modify the criteria to make them easier for developers to achieve, there will be significantly less of a water quality nexus, which likely would not justify the corresponding non-LID credit and reduced water quality benefit of the associated controls.

Master Response Identifier: C.3-19

Comment Identifier: Part 5) of BIA Bay Area-2,3, ACCWP-a3,18, CCCWP-25, SMCWPPP-72, SCVURPPP-33, Walnut Creek-1,2,3,4, Oakland-9, EBALDC-1,4,5,6,7,8,10, Oldcastle-5

Provision No.: C.3.e.ii.(5) – Special Projects, Category C

Comment: *Permittees implemented Category C Special Projects appropriately and in good faith during MRP 2, and in some cases negotiated with developers to include more LID than was absolutely required by the criteria.*

Response: Our review of Permittees' implementation of C.3.e.ii.(5) Category C Special Projects during MRP 2 found that, with few exceptions, Permittees used the amount of non-LID credit that was allowed according to the criteria (rather than only as much as was technically necessary), and that Permittees allowed developers to implement C.3.e.ii.(5) even when reporting (i.e., narrative summaries of infeasibility) did not satisfactorily demonstrate that it was infeasible to incorporate LID treatment either onsite or offsite, which demonstration is required by C.3.e.ii.(5). In some project-specific reviews completed by the Water Board for discretionary 401 Water Quality Certifications, we found that some projects had appropriately considered infeasibility. However, we determined that for others, including a 20+ acre residential project in Alameda, an LID design was feasible and the project proponent revised the project's design to incorporate those measures. In part to address these issues, we revised the criteria in MRP 3.

[20] https://endhomelessness.org/ending-homelessness/policy/affordable-housing/

Master Response Identifier: C.3-20

Comment Identifier: EBALDC-13,14,15,16, ACCWP-a3

Provision No.: C.3.e.ii.(5) – Special Projects, Category C.

Comment: *More than 60% of Oakland's 25 Category C Special Projects over two years [two-year period not identified] included some amount of affordable housing. Extent and type of affordable housing units not identified. All but three of those would have been ineligible under the criteria in the Tentative Order, and those three would only receive up to 20% LID reduction credit according to C.3.e.ii. The other 22 projects would not have qualified, and consequently there was the potential for those affordable projects not to have been constructed.*

Response: Comment noted. While we recognize the challenges associated with building housing, including affordable housing, in the Bay Area, we disagree that an inability to complete all or a portion of required water quality treatment on-site using other than LID measures, or off-site using the Permit's Alternative Compliance provision, *prima facie* renders affordable housing projects infeasible. We also recognize that one strategy is to subsidize a portion of units (i.e., one or more) within a larger for-profit housing project. One comment requested that the entirety of such a project (i.e., with as little as 1 affordable unit) be allowed to implement other than LID measures. The unintended adverse effect of doing so would be to allow increased water quality impacts from market-rate residential projects as a means of subsidizing the production of as little as one unit of affordable housing. However, the Permit has sufficient flexibility, both within the LID design approach and within the Alternative Compliance subprovision, to support meeting water quality requirements while also producing housing. And, as noted elsewhere in this response, Permittees have flexibility to modify other project requirements, including parking, allowing increased densities, or pursuing other development models, as a means of supporting affordable housing production.

Master Response Identifier: C.3-21

Comment Identifier: San Mateo County-4, ACCWP-a2i, CCCWP-21

Provision No.: C.3.j.ii.(2) – Green Infrastructure, Numeric Implementation.

Comment: *C.3.j.ii.(2) abandons the programmatic approach that the Water Board adopted in MRP 2 and that the Permittees incorporated into their Green Infrastructure Plans, constrains flexibility and discourages multi-jurisdictional cooperation, and will reduce the Permittees' ability to implement green infrastructure projects with co-benefits, because they will be forced to build the cheapest/easiest green infrastructure to comply with the mandate.*

Response: We disagree. C.3.j.ii.(2) continues the programmatic approach set forth in MRP 2. The green infrastructure planning approach in MRP 2 was intended, in part, to

establish a framework for future GI implementation by identifying excellent project opportunities and targets for the amount of implementation over the coming decades. C.3.j.ii.(2) is intended to support implementation, including ongoing institutional capacity building. The implementation is likely to be at a greater pace because Permittees' Green Infrastructure Plans are insufficient to reduce the discharge of stormwater pollutants to the maximum extent practicable. Because C.3.j.ii.(2)(b) allows the retrofit requirements to be met at the countywide level, multi-jurisdictional cooperation is explicitly encouraged, rather than discouraged.

First, C.3.j.ii.(2) does not preclude Permittees' implementation of their Green Infrastructure Plans. The opposite would appear to be true.

Second, C.3.j in MRP 2 was a planning requirement, included in lieu of expanding the definition of Regulated Projects in C.3.b.ii to include all new and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface and road projects that just replace existing impervious surface, at that time (MRP 2). The MRP 2 Fact Sheet clearly stated, however, that "subsequent Permits may include different impervious surface thresholds or other criteria for Regulated Projects."

In our consideration of changes to propose for MRP 3, Water Board staff reviewed the Permittees' commitments to green infrastructure implementation in their Green Infrastructure Plans, and found them to be insufficient to address the problem associated with impervious surfaces. With few exceptions, the Green Infrastructure Plans do not commit to accelerate the existing rate of green infrastructure implementation, or to retrofit existing impervious surfaces (particularly, in the public right of way), with clean water controls to address urban runoff discharges, beyond what the MRP 2 already required for Regulated Projects using an LID approach. Consequently, the Green Infrastructure Plans are limited in the extent to which they would reduce the discharge of urban runoff pollutants into receiving waters over time.

These outcomes represent a missed opportunity, in that (as stated above) MRP 2's green infrastructure planning requirement was included as an alternative to expanding the Regulated Project definitions to include all new and redevelopment projects that create or replace 5,000 square feet of impervious surface, and road projects that just replace existing impervious surface. That is, in MRP 2, green infrastructure planning was included in part to provide municipalities the opportunity to evaluate and account for smaller area regulated projects and road replacement projects as part of their Green Infrastructure Plans, and develop commitments to implementation that would be more efficient and effective for them than a Permit requirement to include all such projects.

Because the Green Infrastructure Plans did not include those commitments, the Tentative Order includes a modest green infrastructure implementation requirement, and modifications to the Regulated Project categories consistent with other MS4 permits (including those cited in the Fact Sheet).

Master Response Identifier: C.3-22

Comment Identifier: Oakland-7,10, Los Altos-4, San Mateo County-15, SCVURPPP-37, Palo Alto-4, CCCWP-22

Provision No.: C.3.j.ii.(2) – Green Infrastructure, Numeric Implementation.

Comment: *It will be challenging for Permittees to achieve the C.3.j.ii.(2) Numeric Implementation retrofit requirements (as laid out in Table H-1 in Attachment H) because they do not or may not have adequate funding to build and maintain the projects, or because they have other higher priorities for those funds, or otherwise because the projects are expensive. Construction costs combined with a condensed schedule for planning, budgeting, design, and implementation will make projects more expensive to implement than the opportunity-based approach described in Permittees' Green Infrastructure Plans.*

A key purpose of the Green Infrastructure Plans is to ensure Permittees advance implementable multi-benefit projects that have local public support and are eligible for state and Federal funding when those funds (generally competitive grants) become available.

As an example, the City of Union City estimated that their H Street retrofit project cost approximately $660,000 per acre treated. At that rate, treating 10 acres would cost $6.6 million. The Water Board should conduct a cost benefit analysis to determine if that level of expenditure is appropriate for the minimal water quality benefits that would be achieved.

Response: Implementation costs may be offset to a certain extent by grant funds, collaboration with other Permittees, and incorporation of green infrastructure features into budgeted and future infrastructure project. The total number of – and geographical extent of – green infrastructure projects implemented over time includes both private and public green infrastructure projects, so the burden for the total cost of implementation does not rest solely on municipalities.

In developing the requirements in the Tentative Order, Water Board staff considered cost information from California grant-funded projects, as well as from grant-funded projects in other areas, including, but not limited to, Portland, Oregon. The significant shift to, for example, green streets design, from designs that do not substantively address their water quality impacts, will result in a concomitant shift over time in the MEP standard for street design.

Additionally, Water Board staff recognizes that much of the region's existing road infrastructure was constructed without full consideration of its environmental impacts. One result of the Clean Water Act is that we work to gradually address such impacts, within the regulatory structure set up by the Act, including MS4 NPDES permits. This may have the effect of incorporating – into roadway costs – those external costs not originally addressed, and, allowing the public to more clearly recognize those costs and

determine how they will be funded. The green infrastructure planning completed during the Previous Permit may allow reductions in total costs and significant non-water quality benefits—for example, through incorporating measures that more inexpensively address not only water quality, but also downstream flooding (as compared to alternatives like engineered flood control channels), or which reduce pedestrian and related deaths and injuries by calming traffic, or which raise property values by developing a streetscape more desired by residents.

The choice faced under the MEP standard and requirement to achieve wasteload allocations for impairing pollutants is not a choice between the status quo (i.e., maintaining, possibly in perpetuity, the existing road infrastructure without addressing its water quality impacts) and green infrastructure planning. Rather, it is a choice between, or among, different solutions that address the ongoing contributions of runoff from urbanized area, including roads, to receiving waters. Green infrastructure represents a solution that is likely significantly more cost effective, more flexible, and which gives Permittees a greater degree of control than other options, such as end-of-pipe treatment. Additionally, we anticipate that, similar to the incorporation of complete street requirements into transportation grant funding, green street requirements will also be added, thus making such projects competitive for future transportation grant funds. An example is SB 1's funding of green infrastructure elements.

Various references identify the significant water quality benefits, but also additional benefits, such as high quality placemaking, pedestrian/multi-modal safety, reductions in the urban heat island effect, and other benefits (e.g., water quality benefits are discussed in detail in references available at the International Stormwater BMP Database, www.bmpdatabase.org, and references on costs and benefits are available at Green Infrastructure Cost-Benefit Resources | US EPA.) The significant incorporation of green infrastructure as a part of the solution to urban runoff problems by cities including, but not limited to, Chicago, Milwaukee, Detroit, Kansas City, Philadelphia, New York, Portland and Eugene, Oregon, Seattle, Los Angeles, Minneapolis, San Diego, and Auckland, New Zealand, in China's "sponge city" approach, and elsewhere, as well as the concomitant support for those kinds of solutions by organizations like NRDC, TreePeople, and others, indicates the positive role green infrastructure can play in the urban environment.

We agree that there is a cost to green infrastructure and that Permittees may have other priorities (e.g., maintaining pavement condition). That was part of the impetus behind the green infrastructure planning subprovision—for permittees to self-determine a rate of impervious surface retrofit by recognizing that as a priority and committing to a minimum rate of implementation. The cost is likely not as significant as the one Union City project noted by the commenter, because that grant-funded project involved extensive pervious pavement and concrete curb work that were substantially more expensive than other LID-based treatment options. In the absence of a grant-funded pilot project, it is likely that a Permittee would choose less-expensive measures. In its

comment letter, SCVURPPP estimated a per-acre treatment cost of $213,000, approximately 1/3 of the Union City example.

That said, recognizing the cost of GI implementation and that the proposed requirement is intended to effect retrofit in the current permit term while building for the future, we have reduced the cap to 5 from 10 acres, which will accordingly reduce the required retrofit regionwide, from 274 acres down to 217 acres, a reduction of 20 percent.

Please also see the response to the following combined comment, in the Response to Comments table. C.8.d.iv Please also see the response to the following combined comment, in the Response to Comments table:

ACCWP-a1i,a2i,22
Oakland & San Jose-2b

Master Response Identifier: C.3-23

Comment Identifier: Oakland-7

Provision No.: C.3.j.ii.(2) & C.3.b.ii.(5)

Comment: *Incorporating GSI into Road Reconstruction Projects should only be required where it is technically feasible. Technical infeasibility should not mandate alternative compliance for which a suitable location/project may not be possible to identify.*

Response: Green infrastructure employs LID, which is recognized as a cost-effective, beneficial, and holistic integrated stormwater management strategy that provides a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, and promotes infiltration. The Tentative Order does not require Permittees to implement GSI where it is infeasible.

The comment implies a false choice—the idea that there is a choice between either addressing the existing water quality impacts of built infrastructure and urban areas (e.g., via LID retrofit), or simply not implementing LID and leaving the water quality impacts in place indefinitely because of technical constraints.

The option is not whether, but rather how to address them (in a feasible manner), and the green infrastructure approach initiated in MRP 1 and continued through MRP 2 and MRP 3 is a flexible approach that maximizes the Permittees' ability to best plan and implement green infrastructure within their jurisdictions. To the extent a particular green infrastructure approach is challenging to incorporate at a particular site, C.3.j.ii.(2) allows Permittees the flexibility to pursue implementation at a different site or sites within their jurisdictions, as well as the opportunity to coordinate with neighboring jurisdictions.

One of the key components of the Green Infrastructure Plans was the identification of means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, thus allowing Permittees to self-determine the right balance for their communities and where LID facilities could and/or should be constructed. Because of that planning effort, each Permittee now possesses a prioritized list of technically feasible green infrastructure projects.

C.3.j.ii.(2) can be summarized as follows: Permittees will be required to implement some of the projects on those lists – as little as one project for less-populous Permittees, and likely several projects for more-populous Permittees. It does not require Permittees to implement non-identified or non-prioritized projects, to the contrary, the expressed intent is to prompt the Permittees to implement already-identified and already-prioritized projects.

Recognizing the technical challenges associated with green streets projects in particular, C.3.j.ii.(3) provides the following additional flexibility. With cause (e.g., significantly constrained area for a BMP, substantially increased costs for that sizing relative to the C.3.j.i.(2)(g) approach outlined in the Previous Permit, significant amounts of run-on from adjacent areas, or other substantial constraints identified by Permittees) and with reporting in their Annual Reports, Permittees may use the Guidance for Sizing Green Infrastructure Facilities in Streets Projects with companion analysis Green Infrastructure Facility Sizing for Non-Regulated Street Projects submitted in June 2019 (and the conditional approval of that submittal), to size Non-Regulated green streets projects.

Master Response Identifier: C.3-24

Comment Identifier: Part 1) of Orinda-3, CCCWP-13,22, Oakland-10, Walnut Creek-5, Concord-1

Provision No.: C.3.j.ii.(2) – Numeric Implementation

Comment: *Permittees are challenged to comply with all of the different retrofit requirements in C.3.j and in the rest of C.3. With the threshold for Regulated Projects changing from 10,000 to 5,000 square feet (sf), there will be fewer "voluntary" projects that will count towards achieving this target.*

Response: Regarding the comment that the changes to C.3.b will result in fewer voluntary projects that can be counted towards the Numeric Implementation retrofit requirements, the former does not preclude compliance with the latter. In any case, there will still be many non-Regulated projects that can be counted. Regarding the comment that C.3.j.ii.(2) will be challenging to implement, please see the many subprovisions in C.3.j.ii.(2) aimed at facilitating Permittees' compliance and implementation, which were crafted in large part based on Permittee input:

- C.3.j.ii.(2)(b) allows Permittees to meet the numeric retrofit requirements listed in Table H-1 of Attachment H on a countywide basis.
- C.3.j.ii.(2)(d) allows Non-Regulated Projects and green infrastructure beyond the minimum required by C.3.d for a Regulated Project to be counted towards the Numeric Implementation retrofit requirements.
- C.3.j.ii.(2)(e) allows projects completed after January 1, 2021, to be counted towards the C.3.j.ii.(2) Numeric Implementation retrofit requirements.
- C.3.j.ii.(2)(f) allows projects completed by June 30, 2027, to be counted towards the C.3.j.ii.(2) Numeric Implementation retrofit requirements. However, if a project is not completed by June 30, 2027, it may still count towards the C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it is approved and fully funded.
- C.3.j.ii.(2)(g) allows treatment measures implemented to satisfy Provision C.3 requirements, including the numeric retrofit requirements specified in C.3.j.ii.(2), to be used to satisfy C.11 Mercury Controls requirements, and C.12 PCBs Controls requirements, as long as they satisfy the other aspects of those requirements, such as location (i.e., for PCBs, controls that are implemented in areas of old industrial land use or otherwise in areas with identified relatively high concentrations of PCBs).
- C.3.j.ii.(2)(h) allows Permittees to credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects, specified in C.3.b.ii.(5), towards the Numeric Implementation retrofit requirements specified in C.3.j.ii.(2).
- C.3.j.ii.(2)(i) allows Permittees with small rural jurisdictions (e.g., whose stormwater conveyance systems are dominated by roadside ditches) to collectively submit a proposal, subject to the Executive Officer's approval, for pilot projects investigating the use of alternative green infrastructure techniques to comply with the C.3.j.ii.(2) Numeric Implementation retrofit requirements, with construction by June 30, 2027.
- Finally, C.3.j.ii.(2)(j) allows Permittees with existing ordinances (or that adopt new ordinances by June 30, 2023) that require Regulated Projects to treat significantly more impervious surface than the minimum required by C.3.c-d, to offset their Numeric Implementation retrofit requirements specified in C.3.j.ii.(2) by a one-time credit of up to 25 percent, and by no greater than one acre.

<u>Please also see the response to the following combined comment, in the Response to Comments table:</u>

ACCWP-a1i,a2i,22
Oakland & San Jose-2b

C.8 (Water Quality Monitoring)

Master Response Identifier: C.8 -1

Comment Identifier: Baykeeper-11

Provision No.: C.8
Comment: Adequacy of Monitoring Program to Determine Compliance

Comment*: Provision C.8's Monitoring Program Fails to Monitor Whether Stormwater Discharges Comply with MRP Conditions, in Violation of the Clean Water Act's Minimum Monitoring Requirements. It is well-established that every NPDES permit must include discharge monitoring sufficient to determine compliance with all permit limits—in this case, Draft MRP 3's requirement to comply with all applicable receiving water limitations. The monitoring program in Provision C.8 fails to comply with this core requirement. Neither the Regional Board, nor the Permittees, nor the public can use the monitoring in Provision C.8 to determine whether a Permittee is in compliance with the permit terms or the Clean Water Act.*

Response: The Tentative Order requires sufficient compliance monitoring, including the type, interval and frequency sufficient to yield data which are representative of the monitored activity, namely stormwater discharges. For context, it is important first to note that U.S. EPA has long recognized the difficulties inherent in monitoring stormwater because stormwater dischargers are highly variable and unpredictable in terms of flow and pollutant concentrations and the relationship between discharges and water quality can be complex. (61 Fed. Reg. 57425, 57426 (November 6, 1996).) Accordingly, U.S. EPA has early on encouraged permitting authorities to evaluate monitoring needs and stormwater objectives so as to select useful and cost-effective monitoring approaches. (*Id*. at 57428.) For most dischargers, U.S. EPA said monitoring can be conducted for two reasons: "1) to identify if problems are present, either in the receiving water or in the discharge, and characterize the cause(s) of such problems and 2) to assess the effectiveness of stormwater controls in reducing contaminants and making improvements in water quality." (*Id*.)

For MS4 permittees, U.S. EPA stated that stormwater permits may use a variety of stormwater monitoring tools including "receiving water chemistry; receiving water biological assessments (benthic invertebrate surveys, fish surveys, habitat assessments, etc.); effluent monitoring; chemical, whole effluent and visual examinations; illicit connection screenings; and combinations thereof, or other methods," recognizing that end-of-pipe monitoring is more appropriate for an industrial facility than for a municipal facility. (*Id*.)

U.S. EPA has stated that the standard end-of-pipe monitoring that has taken place as the Phase I storm water program has matured "has produced data of limited usefulness because of a variety of shortcomings" identified in the National Research Council's (NRC) 2009 report "Urban Stormwater Management in the United States." (See U.S.

EPA's District of Columbia MS4 Permit No. DC0000221 Fact Sheet, 2011.) U.S. EPA endorsed the NRC's strong recommendations that MS4 programs modify their evaluation metrics and methods to include (1) biological and physical monitoring; (2) better evaluations of the performance/effectiveness of controls and overall programs; and (3) an increased emphasis on watershed scale analyses to ascertain what is actually going on in receiving waters. (*Id.*)

Monitoring of discrete outfalls and receiving water locations throughout the Permittees jurisdictions is not feasible or practicable. There are literally thousands of MS4 outfalls, many of them and associated receiving water locations are not accessible or pose a significant safety risk during storm events. Also, due to the episodic nature and randomness of storm events, which often occur in non-daylight hours, storm even sampling is logistically challenging even at accessible locations, and sampling of many sites during a storm event is very challenging. Furthermore, presence of pollutants of concern in MS4 discharges and receiving waters is associated with land use and activities that are not associated with or constrained by political boundaries. Monitoring at representative locations regardless of jurisdiction is more rigorous, more valid, and more cost-effective than recurrent monitoring at specified locations in each Permittee's jurisdiction, which may or may not be representative of pollutant sources and controls. Representative monitoring coupled with accounting and tracking of Permittees' control actions yields the best individual Permittee compliance data.

The Tentative Order's monitoring requirements recognize the limitations of stormwater monitoring and require sufficient strategic monitoring[21] to ensure compliance with the permit and to yield data which are representative of the monitored activity. It requires a combination of monitoring provisions designed to monitor urban creeks as well as the ultimate receiving water, the Bay. In this fashion, Permittees will develop information concerning the quality of receiving waters, as well as information that will assist in locating pollutant sources in watersheds and assessing effectiveness of source control measures. The monitoring program also requires data collection to yield information essential for crafting improved control measure implementation requirements in future permits. The monitoring for these two purposes (receiving water monitoring and finding sources/control measure effectiveness) is summarized in the following.

<u>Receiving Water Monitoring:</u>

The Tentative Order has been revised to include additional receiving water monitoring in response to the commenter's comments. Provision C.8.f and C.8.h.iv require pollutants of concern (POC) receiving water monitoring in the waterbodies directly receiving the discharges from MS4 during wet and dry seasons. The waterbodies monitored through this provision are generally creeks that flow to San Francisco Bay. The POC receiving

[21] A monitoring program that balances monitoring frequency and locations with the utility of the data is important. In addition, endless monitoring, which may or may not be representative of the monitored activity, should not be substituted for control actions to reduce pollutants discharges from MS4s.

water monitoring is limited to copper, zinc, fecal indicator bacteria, and those pollutants in urban runoff that may result in levels in receiving waters approaching or exceeding water quality objectives. Sampling locations and waterbodies are required to be spatially and temporally representative of the sampled waterbody and waterbody type. This monitoring is important, but the Water Board recognizes it is not without challenges. For example, there are many possible locations to monitor so choosing locations representative of a single waterbody is a challenge. Moreover, it is not possible to monitor every waterbody so a subset of waterbodies (and locations within those waterbodies) must be selected in an attempt to obtain data that are generally representative of conditions in waterbodies receiving discharges from MS4s. Even more challenging is the variable and episodic nature of stormwater itself. There are many challenges associated with mobilizing field crews to collect data during storm events or even during the wet season at exactly the right time. These challenges have been described in the Fact Sheet and elsewhere in this document.

In general, water (and pollutants) flow through MS4 to a large number of storm drains and then to local tributaries and then, finally, to San Francisco Bay or Estuary. In this respect the San Francisco Estuary is the ultimate receiving water for all discharges from the MS4s. The Tentative Order explicitly requires (Provision C.8.c) monitoring of the San Francisco Estuary and also includes specific management questions that such monitoring should address to assess the condition of this receiving water. Permittees fulfill these monitoring requirements by contributing resources to the award-winning[22] Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) and by actively participating in its governance.

The monitoring conducted through the RMP is another important component of receiving water limitations (RWLs) monitoring required by the Tentative Order. The RMP has a yearly monitoring budget of over $4 million for status and trends and special studies. This monitoring includes both wet season and dry season data collection in water, sediment, fish, shellfish, and birds. The analytes monitored in these media provide a comprehensive assessment of water quality in the estuary. With the recently completed redesign of the status and trends component of the RMP, there is an increasing emphasis on monitoring shallow areas of the Bay where tributaries that are influenced by urban runoff enter the Bay. The contaminant concentrations in Bay water, sediment and biota represent an integration of all the sources of contaminants (e.g., urban runoff, atmospheric deposition, wastewater treatment). Comparison of RMP data to water quality objectives allows water quality managers to determine if RWLs are achieved in the ultimate receiving water, San Francisco Bay. The RMP also conducts studies to associate observed presence of POCs in the Bay with presence and loading from sources and pathways, including MS4 discharges. In this way, the comprehensive

22 https://bacwa.org/wp-content/uploads/2021/07/RMP-NACWA-Award-Information-2021.pdf

monitoring conducted through the RMP is a powerful complement to the tributary-focused RWL monitoring specified in Provision C.8.h.iv.[23]

In addition, a portion of the trash monitoring required by Provision C.8.e is intended to determine if trash "discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters." Provision C.8.g requires wet and dry weather monitoring of pesticides and toxicity in urban creeks. Provision C.8.f compels Permittees to conduct monitoring to address relevant management information needs associated with a variety of pollutants. The required monitoring will include assessing status of receiving waters for contaminants of emerging concern, copper, PCBs and mercury. Additionally, two of these management information needs concern POC loading to the Bay and the trend in this loading. We explained at length in the Fact Sheet why the complex transport mechanisms and wide spatial distribution of pollutant-bound pollutants like PCBs and mercury require a hybrid modeling and monitoring approach for loads assessment and, hence, compliance determination (with RWLs) as described in the following paragraphs.

Monitoring for compliance with mercury and PCBs load reduction requirements is two-pronged. First, the permit requires Permittees to use a load reduction accounting system (see Provisions C.11.a and C.12.a) to estimate mercury and PCBs load reductions for each type of programmatic control measure consistent with an expected level of control measure implementation intensity. Permittees are required to track and report on their level of implementation through enforceable control measure-specific performance metrics that are associated with the estimated load reductions. In subsequent permit terms, control measures will be implemented based on what is learned in this term from control measure implementation and monitoring, resulting in even more refined, improved, and effective controls. The reason why the MRP assesses control measure implementation compliance through these performance metrics is because assessing load reductions through monitoring alone is not possible. The challenges (described in Fact Sheet section C.8.f) of measuring (through monitoring) PCBs and mercury loads and load reductions include how these pollutants are distributed in watersheds and transported during storm events and the variability of the Bay Area's climate. The scale of the load reductions resulting from control measure implementation in any single year is small with respect to the variability in monitoring data and loading because of climate variability and other factors.

To overcome the challenges of using monitoring data alone to assess loads and compliance with RWLs, the Fact Sheet explains how watershed models, calibrated and

[23] The commenter points out that a Water Board staff person stated in a deposition that RMP monitoring is not designed to determine compliance with RWLs. However, that staff person is only partially familiar with the RMP. The RMP conducts monitoring to determine whether water quality objectives for POCs are achieved in the Bay, which serves as RWLs monitoring for Bay receiving waters. The RMP conducts some monitoring of urban streams tributary to the Bay for the purpose of determining sources and loadings of POCs in the Bay, but that RMP monitoring is not designed to determine compliance with RWLs in these streams.

validated with monitoring data, are used to estimate loads and load reductions for PCBs and mercury. This is hybrid approach is the second component of compliance monitoring for mercury and PCBs load reductions. At the aggregated level of multiple watersheds or the entire Bay Area, the aggregated load estimate from the model at the regional scale is usually more precise than the estimate for any single watershed. The problems associated with climate variability impacting load variability cannot be entirely avoided by using models, but the models can be used to simulate loading over multiple years to generate an average load over several years where rainfall amounts (and hence loads) may have varied. In this way, the models can smooth out climate variability and generate a reasonably accurate average loading over the modeled period. These multi-year average estimates are generally more accurate than modeled estimates for any single year.

The models ultimately rely on monitoring data for their calibration and validation, however. If actual loading changes have not manifested in monitoring data, then the models will not show loading changes either. If the Bay Area experiences very little rainfall, then loading can decrease just by virtue of less flow and less suspended sediment even if no control measures were implemented. Conversely, if the Bay Area experiences several very wet years, loading can actually increase because the increase flow and suspended sediment could overwhelm the reductions from source control implementation. Such is the challenge of climate variability in assessing loading reductions. Because control measures for PCBs and mercury, even if effective, result in relatively small loading changes during any particular year (e.g., about 1.47 kg/yr estimated PCBs load reduction during this permit term), the monitoring data on which the models rely are unlikely to detect the impact of these load reduction changes in measured concentrations. Therefore, modeled loading estimates are not likely to be sensitive enough to confirm this level of change. The models will be more useful with longer time scales such that enough land use change and concentration change has occurred such that model can detect the change. In other words, the model works best at large spatial and temporal scales. Nevertheless, the monitoring required in the MRP, used in conjunction with the watershed loading models, should eventually be able to assess progress in loading reduction achieved during this and subsequent permit terms and, thus, progress toward compliance with the RWLs. How rapidly this determination can be made depends on the size of the load reduction signal compared to the magnitude of the “noise” of the variability (climate, storm characteristics, source release characteristics, etc.). As more and more data are collected that can be used to calibrate and validate the models, which are being continuously improved and updated with all new data, this signal should emerge. Indeed, the whole point of the monitoring is to generate loading estimates to detect the load reductions so as to determine compliance with TMDLs (and, hence, receiving water limitations).

<u>Finding Sources and Assessing Effectiveness</u>**:** The Tentative Order requires substantial monitoring effort devoted to finding pollutant sources in the program area as well as assessing the effectiveness of required control measures. Consistent with U.S. EPA

guidance, the Water Board views this as a key component of stormwater monitoring so that the problem of pollutants from MS4 discharges can be identified and effectively controlled. For example, Provision C.8.d requires LID monitoring to measure compliance and effectiveness of LID controls by assessing the pollutant removal and hydrologic benefits of different types and designs of LID facilities as well as determining the minimum levels of operation and maintenance necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic performance. In addition to the receiving water trash assessment mentioned previously, Provision C.8.e also requires a robust monitoring program to determine if Permittees' trash management efforts have effectively prevented trash from their jurisdictions from discharging to receiving waters. Finally, the monitoring requirements of C.8.f are designed to compel Permittees to address relevant POC management questions rather than conducting monitoring for the sake of monitoring. These management information needs include finding sources and contaminated portions of watersheds, evaluating control measure effectiveness of and providing support for future management actions, assessing loads relative to TMDL wasteload allocations, and evaluating trends. We explained at length in the Fact Sheet how the widespread spatial distribution and complex transport characteristics require a hybrid modeling and monitoring approach to estimate loads for sediment bound contaminants like PCBs and mercury. Finding PCBs source areas and contaminated watersheds is crucial to the success of an effective PCBs control program because PCBs are difficult to manage once they have been distributed throughout watersheds. Accordingly, monitoring effort directed specifically toward finding highly contaminated source areas and the moderately contaminated catchments in the vicinity of these source areas will yield better information for this purpose than outfall monitoring can. Accordingly, a large portion of the required monitoring effort in MRP2 and continuing in MRP3 is devoted to this information need, and this monitoring supports source area identification requirements in Provision C.11/12.b.

Comment*: Provision C.8 does not mandate wet weather monitoring – Permittees can select dry weather monitoring instead. Thus, the permit regulating urban runoff does not require stormwater runoff sampling. An MS4 permit must assess whether stormwater discharges meet permit terms, and it defies logic that Draft MRP 3 continues to fail to require outfall monitoring for all parameters.*

Provision C.8 does not require outfall sampling from the Permittees' MS4 systems. The Fact Sheet provides a series of rationales for the failure to include outfall monitoring, but does not explain how regional monitoring (or any other monitoring included in Draft MRP 3) can be used to evaluate compliance by any Permittee. In fact, both Regional Board Staff and Permittees have confirmed that current monitoring—continued in Provision C.8—is inadequate to evaluate compliance.

The State Board has confirmed the necessity of end-of-pipe sampling in MS4 permits—particularly where, as here, safe harbors are utilized. As noted by the State Board in

Orders WQ 2015-0075 and WQ 2020-0038, outfall monitoring is an appropriate way to determine compliance with water quality standards in MS4 permits in conjunction with receiving water monitoring.

Response: Please see the responses to the preceding and next comments on wet weather monitoring and the response to the next comment regarding outfall monitoring. We also note that Provision C.8.e explicitly requires outfall sampling for trash. Outfall monitoring may be a component of monitoring POCs like PCBs and mercury, but the usefulness of these outfall data is limited in assessing loading. We have explained this at length in the C.8.f portion of the Fact Sheet and in the next response. The Tentative Order requires a combination of outfall monitoring, receiving water monitoring, and data collected in watersheds themselves as part of a comprehensive monitoring program designed 1) to identify if problems are present, either in the receiving water or in the discharge, and characterize the cause(s) of such problems; 2) determine compliance; and 3) to assess the effectiveness of storm water controls in reducing contaminants and making improvements in water quality.

Nowhere in State Board WQ Orders 2015-0075 (as amended by 2021-0052-EXEC) or 2020-0038 is there a mandate for wet weather end-of-pipe sampling where an alternative path to compliance with RWLs is provided.

Comment*: Region 2 is the only urban coastal region in the state that does not currently require wet weather outfall discharge monitoring by Phase 1 municipal stormwater permittees. Other regions, including Regions 9 (San Diego), 8 (Santa Ana), and 4 (Los Angeles) require such monitoring from Phase 1 municipal stormwater permittees to facilitate assessment of municipal runoff management programs in effectively prohibiting non-storm water discharges into the MS4 and reducing pollutants in stormwater discharges from their MS4s. Bay Area Permittees have avoided the level of scrutiny and oversight afforded other municipalities in the state and Baykeeper continues to be disappointed that Draft MRP 3 does not meet this minimal level of consistency with other Phase 1 MS4 permits.*

Response: The Tentative Order does require, where appropriate, wet weather outfall monitoring, but this type of monitoring is generally not appropriate for POC loading assessment. We have learned a lot over twenty years of assessing POC loads through the RMP, and that is why we use a hybrid approach of using monitoring data to calibrate watershed loading models (explained at length in section C.8.f of the Fact Sheet). This allows us to overcome the insoluble problem of not being able to be in the right place at the right time to sample when loading is occurring. Grab samples can be useful if the goal is to ascertain snapshots of pollutant concentrations, but this is not what we need with respect to pollutants like PCBs and mercury, for which pollutant loading is the primary concern. Other regional boards do not have PCBs TMDLs that require assessment of watershed loading. Reliance on outfall monitoring to ascertain concentration “snapshots” may be more appropriate for the pollutants of concern in Southern California, but this style of monitoring is generally not useful for PCBs or

mercury. Because pollutant loading is the relevant metric for mercury and PCBs, POC outfall monitoring will neither yield useful information to assess compliance with existing control measures nor useful information for guiding future implementation. As explained in section C.8.f of the Fact Sheet and in the response to Baykeeper's comment 15d below, outfall sampling represents snapshots in time (of pollutant concentrations) that are not useful for understanding pollutant loading patterns. Provision C.8.e requires wet weather outfall monitoring for trash because these data are useful and relevant for assessing compliance with trash control implementation measures.

Outfall, or end-of-pipe, monitoring is not as straightforward as implied by the commenter and has limited benefits versus multiple challenges. Outfall monitoring provides an answer to the question, "are pollutants present in the stormwater flowing from the outfall?" The answer to this question is usually "yes," but that generally does not tell you what the impacts from the outfall are on receiving waters or whether the sample is representative of either water quality in receiving waters or of all of the many outfalls that were not sampled. There are perhaps up to 500 outfalls discharging directly to the Bay and thousands discharging into creeks. A stormwater monitoring program focused primarily on outfall monitoring suffers from several significant drawbacks and is not a sound strategy for assessing compliance with RWLs.

The first drawback stems from the fact that Permittee monitoring capacity is finite and Permittee field crews cannot be everywhere at all times. Therefore, choices must be made as to which of the thousands of stormwater outfalls can be feasibly monitored and when. There are also logistical challenges of mobilizing field crews during storm events so that the personnel are present at the right place and time to sample the discharge. For sediment-bound pollutants, particularly in small watersheds, it is not trivial to make sure that monitoring takes place when the highest pollutant loading is taking place.

The second drawback is that the value of data obtained will be uncertain. Allowing, for sake of argument, that the above-referenced logistical challenges can be overcome, the data one will obtain will necessarily be from a subset of all possible outfalls. Because of the spatial and temporal variability of pollutants in stormwater, one will not be certain that these data are spatially and temporally representative of all outfalls, and one will not be certain that the sampling was conducted at the right time to capture the peak concentrations.

A third drawback is that the data collected will tell you what is already understood. Again, allowing for the sake of argument that enough care is taken in the sampling design to obtain a reasonably representative sample, the value of the obtained information will be modest. As noted above, the results are likely to show that the stormwater flowing out of the outfalls contains pollutants like pesticides, PCBs, mercury, CECs, trash and other urban contaminants. We know this already. In the end, with quite a lot of effort and expense, one will demonstrate what is already generally understood. And it will generally not tell you the impacts of the discharge on receiving waters (water quality objectives and RWLs apply in receiving waters, not at the outfall)..

Finally, there is a more significant drawback. These outfall data are only going to be marginally useful in finding sources of pollutants in watersheds, and they will be almost useless in assessing the performance of control measures (like LID). They are not useful for finding source areas for three reasons. First, the outfall data only provide information on the sampled watersheds, and this is an inefficient way to approach source area identification. Second, the water flowing from the outfall will be a combination of water from the contaminated and *uncontaminated* portions of the catchment, and the dilution from the "cleaner" water will likely obscure the signature of the source area. Last, the complex source release characteristics of sediment-bound contaminants make it very easy to miss the pulse from the contaminated portion of the catchment, which may only be released during periods of intense precipitation. These outfall data are likewise not useful for assessing the performance of LID control measures because the outfalls are often too far downstream from the control measures to provide reliable information on the impact of the LID facility (again, dilution by other water not flowing through the LID facility). In short, an outfall-centric approach will provide an affirmative answer to the question of whether there are pollutants in outfalls, but it will not yield useful data for assessing performance of control measures or designing or evaluating strategies to take action to control these pollutants.

The Tentative Order's monitoring program does not suffer from these significant drawbacks and provides better oversight than a program focused primarily on outfall monitoring. To this end, the Tentative Order requires a suite of representative monitoring in both the receiving water, stormwater outfalls, in watersheds, and for assessing control measure facility performance. There are receiving water monitoring in the Bay (through RMP) and in creeks (for pesticides, POCs, toxicity). The Tentative Order also requires monitoring specifically to assess the performance of LID facilities and requires targeted monitoring at outfalls and upstream in order to assess the efficacy of trash control measures. The Tentative Order's representative monitoring program will provide more information than could be obtained through an outfall-centric approach because it is designed to address information needs associated with managing pollutants in urban runoff rather than just collecting monitoring at outfalls in the hope that these outfall data can fulfill the existing information needs.

Comment*: During the term of MRP 2, Baykeeper collected stormwater samples at MS4 outfalls and receiving waters in San Jose, Sunnyvale, and Mountain View. Between February 2014 and March 2014, Baykeeper collected end of pipe stormwater samples and receiving water samples at two locations (one at Coyote Creek and one at the Guadalupe River), on two sampling dates. This sampling program took 53 staff hours (split between two staff) and approximately $4,000 in hard costs for laboratory supplies, laboratory analyses (total coliform, fecal coliform, and enterococci), and travel expenses. Between November 2017 and February 2019, Baykeeper collected end of pipe stormwater samples at six locations and receiving water samples at nine locations (five at Stevens Creek, one at Calabazas Creek, and three at Sunnyvale East Channel), on nine sampling dates over two reporting years. This sampling program took 350 staff*

hours (split between two staff) and approximately $40,600 in hard costs for laboratory supplies, laboratory analyses, and travel expenses. End-of-pipe sampling by Permittees will have significant economies over Baykeeper's program, and represents a small percentage of overall compliance costs. Again, representative sampling is cost effective and feasible.

Response: The two types of sampling cited in the comment (end-of-pipe and receiving water samples) can be useful components of a stormwater monitoring program. However, the costs incurred for this sampling dramatically understate the cost of this sampling because of the limited analyte list. More importantly, the information value of this type of sampling is quite limited.

The only laboratory analyses performed in the work described in the comment were for total coliforms, fecal coliforms, and *enterococci*. Adding just two additional POC analytes, low level mercury in water and PCBs congeners would add nearly $500 to the cost per sample according to the rates paid in the Water Board's laboratory contract. Additionally, the sampling procedures for mercury and PCBs are more labor intensive than for bacteria, and much more time on site is required when sampling for additional analytes. Baykeeper performed a very simplified sampling protocol that is far different that that performed by Permittees. Next, consider the magnitude of the sampling space. There are, according to personal communication with SFEI staff, roughly 300-500 stormwater outfalls that discharge directly into the Bay and the number that discharge into creeks easily reaches into the thousands. Thus, several millions of dollars would be required to sample even a subset of these outfalls on multiple occasions.

Grab samples, which represent a concentration at a point in time, may be useful for some constituents in some circumstances. However, grab samples collected at outfalls or in receiving waters have limited usefulness relative to stormwater management.[24] Especially for PCBs and mercury, a single grab sample at one time or even multiple grab samples on different dates at the same location provides limited information that can be used to assess pollutant load, which is the relevant parameter for these two pollutants.

Permittees do spend considerable resources on monitoring, but this effort is distributed across several broad monitoring categories described in Provision C.8. The style of monitoring cited in the comment has limited usefulness in achieving the objectives for these other categories of monitoring. For example, these data will not help locate areas of contamination in the watersheds contributing to the sampling location. They will have limited use in assessing creek status, identifying stressors to water quality, evaluating control measures, or providing data to support watershed loading models. The style of data collection suggested in the comment is expensive and offers a generally poor

[24] National Research Council (NRC) 2009. "Urban Stormwater Management in the United States." USEPA (2011). District of Columbia MS4 Permit No. DC0000221 Fact Sheet.

return on investment in terms of the information it provides relative to compliance and management information needs, as explained in the preceding response.

C.8.d – LID Monitoring. By way of background, LID Monitoring is intended to measure compliance and effectiveness of LID implementation. It will improve the understanding of the following two management questions (which are repeated in Finding C.8-6 above) related to the implementation of LID controls:

> What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time?
>
> What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance?

The purpose of the first management question is to confirm that Permittees' LID controls are functioning as expected over time. Perhaps some design variations provide greater performance than others. The purpose is not only to compare relative performance between different types of MRP Permittee controls but also to compare their performance against the publicly-available databases of LID performance data, such as those of the International Stormwater BMP Database and SCCWRP's California BMP Effectiveness Calculator.

The purpose of the second management question is straightforward: to assess whether LID controls that receive relatively insufficient O&M perform relatively poorly compared to LID controls that receive relatively sufficient O&M, which will directly inform management actions (such as, what O&M activities to perform, and how much of it to perform how frequently).

Master Response Identifier: C.8.d-1

Comment Identifier: Part 1) of ACCWP-a9,41, SCVURPPP-89,90,92,93,94,95, SMCWPPP-143,144,146,147,148,149,212, Solano-5

Provision No.: C.8.d.i.(1)(d)

Comment: *Remove the requirement to conduct a power analysis for the LID Monitoring Plan, as there is not enough known information (e.g., the normality of the distribution, the parameters of the distribution, and acceptable error rate) available to conduct the power analysis. While this information may be known for certain parameters in datasets outside of the Bay Area, it is not clear whether those data can be extrapolated to the Bay Area. With worsening drought conditions, the number of storm events per year that produce runoff may be less than the number of samples needed to meet the desired*

confidence and power. The coefficient of variation and acceptable error rate are extremely sensitive parameters that can impact the required number of samples by orders of magnitude. For influent and effluent sampling, it is much more difficult to detect small changes in concentration, therefore, LID sites/constituents with low removals or low influent concentrations will inherently require a larger number of samples than sites/constituents with high influent concentrations and high removals. Also remove this requirement from the Fact Sheet.

Response: To reduce the burden on the Permittees to perform the power analysis, and to comply with their request to remove it from the LID Monitoring Plans, we have removed the requirement for the Permittees to conduct a power analysis for the LID Monitoring Plans, conducted the power analysis ourselves, and modified the TO in response.

It is not true that currently there is insufficient information available with which to perform the power analysis. In the case of LID Monitoring, all that is needed is a sufficiently large dataset containing performance data (the ratio of effluent and influent) for a parameter(s) of interest, which has a normal distribution (or a distribution that is reasonably normal once transformed) if running a parametric test, but if running a nonparametric test, a normal distribution is not needed. We have access to two databases with exactly the data needed to perform power analyses to inform a monitoring schedule for LID Monitoring, which satisfy the aforementioned criteria: SCCWRP's California BMP Effectiveness Calculator (https://sccwrp.shinyapps.io/bmp_eval/) and the International Stormwater BMP Database (https://bmpdatabase.org/get-data).

Power analysis involves repeatedly performing student t-tests to compare the mean from a known distribution to the mean from some future data distribution. We then evaluate if we can tell the statistical difference between the known and future means at a given sample size, significance level and statistical power. Significance level is typically set at 5% and power at 80%. Significance level means the chance that differences as large as those observed could occur by chance. Since our null hypothesis is that the future data are from the same population as the existing data, this can also be understood as the probability that we would incorrectly reject the null hypothesis. The quantity 100% minus the power (100% - 80% = 20%) is the probability that we would incorrectly accept the null hypothesis. In other words, if we see differences between the existing data and the future data of a certain magnitude, those differences either indicate a real difference between the data means (i.e., they are from different populations), or the differences are due to bad luck from a non-representative sample – just by chance. Statistical significance is about being wrong about saying the means (and, hence, the distributions) are different. Power is about being wrong about saying the means are not different.

We utilized a method from Helsel (2020)[25] to compute the power of a nonparametric test of differences between geometric means of two distributions. We adapted an R script (power.WMW from Chapter 13) provided on a website[26] providing supporting material for Helsel 2020. For more information on the method, please see Chapter 13 of Helsel 2020. The existing data were for total copper (combined data from SCCWRP California BMP Effectiveness Tracker and the International Stormwater BMP Database), TSS (International Stormwater BMP Database), TSS (SCCWRP California BMP Effectiveness Calculator) and Dissolved Zinc (SCCWRP California BMP Effectiveness Calculator). No data filtering was performed on these data (which possibly include outliers and instances where input:output is < 1). No transformations of the data were required because the nonparametric method does not require the data to be normally distributed.

The results of the power analysis support a reduction in the number of sample events in Table 8.d.2, from approximately 30-35 sample events per County stormwater program (over the course of the 5-year Permit term) (excluding the Solano Permittees) to approximately 25-30 sample events per County stormwater program.

The specific changes to the total Permit term sample events are as follows. For Alameda Permittees, the total has been reduced from 36 to 25; for Contra Costa Permittees, the total has been reduced from 30 to 25; for San Mateo Permittees, the total has been reduced from 28 to 25, for Santa Clara Permittees, the total has been reduced from 36 to 25. For Solano Permittees, the total has not been reduced from 12, because such a reduction is not supported by the power analysis, though the Solano Permittees' number of sample events is still less than half that of each of the others'. However, as we explain starting in the next paragraph, we have additionally reduced the annual minimum sample events for the Solano Permittees from 2 to 1, to allow for additional flexibility, efficiencies and cost savings.

Correspondingly, the annual minimum sample events in Table 8.d.2 have also been reduced. In the original Tentative Order, the annual minimum sample events were the quotient of the total Permit term minimum sample events divided by the length of the Permit term. Therefore, upon reducing the total Permit term minimum sample events, we also reduced the annual minimum sample events. We further reduced the annual minimum sample events, to provide greater flexibility, efficiencies and cost savings, as well as logistical changes should some water years have more storm events to sample than others.

The annual minimum sample events have been reduced as follows. For Alameda (7 annual minimum sample events), Contra Costa (6), San Mateo (5), and Santa Clara Permittees (7), they were first proportionally reduced to 5 (because of the change to the total number of permit term sample events), then reduced by an additional 2 (from 5 to

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[25] Helsel, D.R., Hirsch, R.M., Ryberg, K.R., Archfield, S.A., and Gilroy, E.J., 2020, Statistical methods in water resources: U.S. Geological Survey Techniques and Methods, book 4, chap. A3, 458 p., https://doi.org/10.3133/tm4a3.

[26] https://www.sciencebase.gov/catalog/item/5bf30260e4b045bfcae0c205

3) to provide greater flexibility as discussed above. Finally, as indicated above, even though the total Permit term minimum number of sample events for the Solano Permittees has not changed, we have reduced the annual minimum sample events from 2 to 1, once again, to provide additional flexibility as discussed above.

And briefly, we note that we have added language allowing Permittees to make up sample events in the subsequent water year, if there aren't enough storms to sample in a given water year.

Here is an explanation of the nonparametric power analyses and the derived changes to Table 8.d.2. First, we briefly explain the nonparametric power analysis, and apply it to this specific use case. The goal is essentially to run a series of t-tests to estimate how many sample events of the Permittees' LID BMPs during MRP 3 would need to be collected to determine whether such BMPs – and to the extent that those BMPs are a representative sample of the population of LID BMPs in the region, then this may be extrapolated to that regional population – belong (statistically) to the data population represented by the existing data in the databases of the International Stormwater BMP Database and the SCCWRP California BMP Effectiveness calculator.

The null hypothesis is that the geomean of the Permittees' sample data is the same as the geomean of the population of the databases, and the alternative hypothesis is the converse. A significance level and power level are specified, which are recommended as 5% and 80%, respectively, by the International Stormwater BMP Database's 2009 monitoring guidance document.[27] The significance level is the probability (5%) of incorrectly rejecting the null hypothesis, and 100% minus the power level of 80% is the probability that a significant change will be overlooked (i.e., 20% chance that the null hypothesis will not be rejected when it should have been).

Then, we explore how many sample events are needed to reject the null hypothesis for a given magnitude of difference in the geomeans, for a given power level. We try out different combinations of a sample event size and the difference to detect.

For each dataset that is tested, we calculate the geomean of the performance ratios (input:output) of each sample event, which consists of a flow-weighted (or time-weighted) composite event mean concentration (EMC) taken simultaneously at an inlet and outlet of a particular bioretention cell, for a particular storm event.

Flow- or time-weighted composite EMCs involve the collection of a sample aliquot at a certain increment of flow passing through the monitored orifice, or at a certain increment of time, which is then added to a storage container to form a single composite sample. These are explained in greater detail, including different types of flow-weighted composite EMC methodologies (e.g., volume proportional to flow rate, volume proportional to flow volume increment, and time proportional to flow volume increment), in the International Stormwater BMP Database's 2009 monitoring guidance document.[27]

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[27] https://static1.squarespace.com/static/5f8dbde10268ab224c895ad7/t/604926dae8a36b0ee128f8ac/1615406817379/2009MonitoringManualSingleFile.pdf

These are the sample collection methodologies used for the data in the two aforementioned databases, and they are as well what the Permittees will use in MRP 3.

Once we have the distribution (principally, the geomean) of the performance ratios of each sample event in a dataset, we test for the differences between that ratio of the geometric mean of the database data to the geometric mean of the future to-be-collected data, where each such geometric mean is the geometric mean of the ratios of input:output ratios for each sample event.

For each number of total sample events to be collected over the five-year permit term (e.g., 10, 15, 20, 25…), this produces a range at 80% power, which if the geomean of future sample events falls within that range, would confirm the null hypothesis. The upper and lower bounds of the range are the ratios of the future geomean (of input:output ratios) to the database geomean (of input:output ratios); geomeans closer to the upper bound represent overperformance relative to the distribution of the database, while geomeans closer to the lower bound represent underperformance relative to the distribution of the database. In the center of the range, where the ratio of future geomean to database geomean = 1, their performance is identical. Each range represents a given number of sample events, and the range constricts incrementally as the number of sample events increases. <u>What that translates to is that, as we increase the number of sample events, we are less likely to incorrectly affirm the null hypothesis, though there are diminishing returns, which we'll discuss now.</u>

It is possible to transform the upper and lower bounds of the geomeans to a percent removal using the formula (in:ratio -1)/in:out ratio. However, those percent removals would be approximations, while the geomean range is obtained directly from the power analysis.

The next step in power analysis involves assessing diminishing returns in the constriction of the geomean ranges with increasing numbers of sample events. For example, whereas an increase in sample events from N=10 to N=100 would correspond with a very large constriction in the lower and upper bounds of the geomean ratio (performance) range, an increase in sample events from N=100 to N=110 would correspond with a dramatically lesser constriction.

For the TSS, Copper and Zinc data we tested, the sweet spot for the number of water quality sample events to be collected during the upcoming Permit term is N=30. However, N=25 has a significant but relatively acceptable consequence with respect to the size of the geomean range (particularly for the TSS data from the International Stormwater BMP Database) relative to N=30, and therefore we have used it as a modest reduction in effort for the ACCWP, CCCWP, SCVURPPP, and SMCWPPP Permittees. Above N=30, successive constrictions in the geomean range suffer increasingly dramatic diminishing returns. Below N=25, the opposite is true because the geomean range becomes much larger, and therefore the efficacy and utility of the monitoring program drops off dramatically.

The tabular data and visualizations of the data, which led to these conclusions, are provided in the Fact Sheet. Diminishing returns can be visualized as the point at which the slope of the rate of change in geomean range (x-axis = number of sample events; y-

axis = change in geomean range), starts to flatten out as it approaches a horizontal asymptote.

Master Response Identifier: C.8.d-2

Comment Identifier: Part 2) of ACCWP-a9,41, SCVURPPP-89,90,92,93,94,95, SMCWPPP-143,144,146,147,148,149,212, Solano-5

Provision No.: C.8.d.i.(1)(d)

Comment: *Power analysis can be a useful tool to estimate sample sizes needed for detecting trends over time in long-term monitoring programs of many years (10 or 20 years). However, the LID Monitoring studies conducted during MRP 3.0 are likely too short (less than five years) to detect trends, especially considering that precipitation conditions during the permit term may not represent long-term conditions. Therefore, power analysis is not likely to help the Programs develop useful LID Monitoring Plans.*

Response: It is incorrect that not enough data can be collected in a 5-year permit term to reject/confirm the hypothesis that the Permittees' LID BMPs (assuming they are generally well-represented by the sites that Permittees choose) belong to the same distribution as the population of LID BMPs used in the power analysis (i.e., those that contributed data to the SCCWRP database and the International Stormwater BMP Database. By definition, the exercise of conducting a power analysis will inform how many samples need to be collected to reject/confirm the hypothesis, and then that number of samples can be scheduled to occur during the 5-year permit term. Particularly given that we can now perform non-parametric power analysis, meaning it is not mandatory to have a dataset with a Normal distribution.[28,29] And in our best professional judgement, the number of sample events suggested by the power analysis (see above) is reasonable and doable during the upcoming Permit term.

Master Response Identifier: C.8.d-3

Comment Identifier: Part 4) of ACCWP-a9,41, SCVURPPP-89,90,92,93,94,95, SMCWPPP-143,144,146,147,148,149,212, Solano-5

Provision No.: C.8.d.i.(1)(d)

Comment: *Running a power analysis requires technical expertise and existing data on the spatial and temporal variance in the system. Because the LID facilities likely to be monitored by the Programs are recently built, it is extremely unlikely that we know any of the input values needed to run a power analysis. The many assumptions required will compromise the power analysis results.*

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[28] https://www.sciencebase.gov/catalog/item/5bf30260e4b045bfcae0c205

[29] https://pubs.er.usgs.gov/publication/tm4A3

Response: This is contrary to our understanding. We (and we believe the Permittees as well) have the technical expertise necessary to perform power analysis. And as we describe above, we have all of the inputs that are necessary. The fact that the LID facilities likely to be monitored by the Permittees will be relatively new is completely irrelevant; the data that is used in the power analyses is from the LID BMPs in the aforementioned databases. The comment that the many assumptions required will compromise the power analysis results, is incorrect. As we've explained above, we do not need existing data on the spatial and temporal variance of performance for the LID BMPs that the Permittees will monitor during MRP 3, we need that only for the LID BMPs whose data in the aforementioned databases we are using - we do have all of the information that is necessary for the data in those databases.

Furthermore, the ability to perform nonparametric power analysis makes it even more convenient, because the data do not need to have a normal distribution; see the two references cited in Master Response Identifier: C.8.d-2.

Master Response Identifier: C.8.d-4

Comment Identifier: Part 1) of ACCWP-a6,a7, CCCWP-38,41, SCVURPPP-5,97, SMCWPPP-18,151, Solano-5

Provision No.: C.8

Comment: *The monitoring requirements in the Tentative Order, collectively, will be significantly more expensive to implement than the monitoring requirements in MRP 2. The pandemic's fiscal impacts on Permittees remain. Therefore, revise the Tentative Order, as described in more detail below and in Attachment 2, to allow for more cost saving measures and to reduce the number of required sampling events so that the annual monitoring costs under MRP 3 are similar to annual monitoring costs in MRP 2 and can reasonably and safely be completed. The Permittees thought the Water Board's goal was to keep MRP 3 monitoring cost-neutral compared to MRP 2.*

Response: We have considered costs throughout the Permit development process, strove to maintain costs that are roughly commensurate with those in MRP 2, and have incorporated cost saving measures into the Tentative Order.

To the extent there are cost increases in the aggregate, the monitoring programs (and changes to the monitoring programs) associated with those cost increases are justified as being necessary to demonstrate compliance with Permit requirements, as informing decisions that have greater costs than the monitoring, and/or otherwise as corresponding to a minimum level of effort which is necessary to answer the specified Management Questions.

However, as expressed above, we have made many adjustments to the Tentative Order to accommodate concerns about cost and level of effort. For example, we have removed the requirement to perform a power analysis from both LID monitoring and trash monitoring. We've also eliminated the use of indirect methods from trash

monitoring, which according to the Permittees' own estimation will greatly reduce the cost to implement Trash Monitoring. While we've added LID monitoring, the addition of that new cost and level of effort we believe is commensurate with the removal of Creek Status Monitoring and SSID Projects.

Furthermore, based on power analysis that Water Board staff performed using data from the International Stormwater BMP Database and from the SCCWRP California BMP Effectiveness Calculator, we have reduced the number of sample events in the LID Monitoring table, though that itself is offset by the increase in level of effort associated with each digit/integer in that table by clarifying that those are sample events not individual grab samples, and clarifying that sampling of the inlet and outlet cannot be counted as separate samples; that is because the datapoint is the composited EMC of both inlet and outlet, which gives performance (percent removal).

Please also see the response to the following combined comment in the Response to Comments table, regarding changes to the number of LID Monitoring sample events resulting from that power analysis:

ACCWP-a9,41
SCVURPPP-89,90,92,93,94,95
SMCWPPP-143,144,146,147,148,149,212
Solano-5

We have made additional reductions in the trash monitoring level of effort, by delaying outfall monitoring by a year, delaying in-stream monitoring by 2 years, dislocating those two components (which increases flexibility and may reduce costs further), and reducing the number of in-stream monitoring events down by 1, among other changes.

Please also see the response to the following combined comment in the Response to Comments table, regarding these changes to Trash Monitoring:

ACCWP-a8
SMCWPPP-14,15,165,167,171
San Jose-27
SCVURPPP-108,110

Please also see the response and proposed revisions to the following comment in the Response to Comments table, regarding changes to Trash Monitoring: SMCWPPP-168.

Master Response Identifier: C.8.d-5

Comment Identifier: Part 6) of ACCWP-a9,41, SCVURPPP-89,90,92,93,94,95, SMCWPPP-143,144,146,147,148,149,212, Solano-5

Provision No.: C.8.d.i.(1)(d)

Comment: *Use this permit term to develop the basis for monitoring and understand the variance of the monitoring results. Rather than basing the number of samples solely on*

a power analysis, the Regional Board should consider defining qualifying storm event criteria for sampling and then allow the permittees to consider the number of qualifying storm events that have occurred based on the rainfall record.

Response: This Permit term *will* be used to develop the basis for monitoring and understand the variance of the monitoring results, and adjustments may be made in subsequent Permit terms as the LID Monitoring program is carried forward. However, we can base the number of sample events in Table 8.d.2 on the power analysis that is described above.

We disagree with the suggestion to, rather than basing the number of samples on a power analysis, defining qualifying storm event criteria for sampling and then allowing the Permittees to consider the number of qualifying storm events that have occurred based on the rainfall record.

The power analysis provides a scientific and statistical basis for the number of sample events. It tells us how many samples need to be collected in order to be able to determine whether or not the distribution of the LID BMPs which the Permittees will monitor in MRP 3 (which in theory are a representative subset of the population of LID BMPs in the Permittees' jurisdictions) have a performance distribution that it is reasonable to conclude belongs to the same performance distribution as the dataset populations of the International Stormwater BMP Database and the SCCWRP California BMP Effectiveness Calculator.

This is the standard/defensible/accepted practice for establishing the number of sample events in a monitoring program.

Master Response Identifier: C.8.d-6

Comment Identifier: ACCWP-a9, SCVURPPP-7,101, SMCWPPP-15,16,155,211

Provision No.: C.8.d.iv & C.8.e.iii

Comment: *It is impractical to include annual minimums, because in any particular year there may not be enough storm events to sample. Remove that requirement and allow the Permittees to collect the total required number of samples over the course of the Permit term, and also reduce the number of samples that Permittees are required to collect "as long as the overall level-of-effort in the final Monitoring Plan is equivalent to the level-of-effort included in this Provision." Also remove this from the Fact Sheet.*

Response: We do not agree with the request to completely remove the requirement for annual minimum sample collection, for several reasons. First, a requirement for annual minimum sample events ensures that Permittees make progress towards completing the monitoring requirements during every year of the Permit term. Second, in the event that the 5-year Permit term is administratively extended, no monitoring would be required during those subsequent years. Third, we want to avoid Permittees grouping sample events in time (rather than spreading them out evenly over the course of the

Permit term) to such an extent that the quality of data produced by such a LID Monitoring program would be significantly lower.

However, we do agree that climate may hinder Permittees' ability to perform all required sample events in any particular water year. Therefore, we have revised the language for both C.8.d and C.8.e so that if there are not enough storm events to sample in a given water year, Permittees may certify that that is the case in their UCMR, and then collect the missed samples in the subsequent water year.

And as discussed in the response to the following combined comment in the Response to Comments table, we have also reduced the required minimum number of annual sample events, to provide additional flexibility and potential cost savings:

ACCWP-a9,41
SCVURPPP-89,90,92,93,94,95
SMCWPPP-143,144,146,147,148,149,212
Solano-5

The annual minimum sample events specified in Table 8.d.2 has been adjusted, based on all of these factors.

Master Response Identifier: C.8.d-7

Comment Identifier: ACCWP-a7,40, CCCWP-43, San Jose-25, SCVURPPP-7,98,105, SMCWPPP-14,19,152,160,213

Provision No.: C.8.d.ii & C.8.d.vi

Comment: *Not enough time is allowed for the development of the LID Monitoring Plans. Delay the submittal of the draft LID Monitoring Plans to the TAG, and of the final LID Monitoring Plans to the Water Board, each by 4 months. SMCWPPP-213 requests that any changes to these deadlines be reflected in the Fact Sheet.*

Response: We agree with comments requesting to delay the submittal dates for the draft and final LID Monitoring Plans. However, the requested delays would allow Water Board staff only 3 months, between July 1, 2023, and September 30, 2023, to review the 5 final LID Monitoring Plans, and then approve or conditionally approve each of them. If any of the final LID Monitoring Plans are conditionally approved, such that they require significant changes before they are implemented, the Permittees would have very limited time to revise the Plans and accordingly adjust their planned implementation of the Plans. Since Permittees will be required to start monitoring on October 1, 2023 (the start of the 2024 water year), they might have as little as a few weeks to revise and adjust before they must start monitoring, depending on how quickly Water Board staff are able to review and approve/conditionally-approve the final LID Monitoring Plans.

Therefore, we have delayed the submittal of the draft LID Monitoring Plans to the TAG, and of the final LID Monitoring Plans to the Water Board, each by 2 months. That is, the submittal date of the draft LID Monitoring Plans to the TAG will be delayed from January

1, 2023, to March 1, 2023, and the submittal date of the final LID Monitoring Plans to the Water Board will be delayed from March 1, 2023, to May 1, 2023. This is a reasonable compromise that will afford Permittees sufficient extra time to develop their draft and final LID Monitoring Plans, while ensuring that Water Board staff have sufficient time to review and approve/conditionally-approve those final LID Monitoring Plans, and finally, ensuring Permittees have sufficient time to incorporate any changes required in the conditional approvals (if any) of final LID Monitoring Plans.

Master Response Identifier: C.8.d-8

Comment Identifier: Part 1) of ACCWP-a7,43, CCCWP-44, Contech-4, SCVURPPP-7,102,103, SMCWPPP-17,156,157,210, Solano-6

Provision No.: C.8.d.iv

Comment: *The list of parameters in Table 8.d.2 will make each sample expensive to analyze, some parameters may not be appropriate for answering certain management/monitoring questions, and some parameters don't have standard laboratory and field methods (e.g., PFAS, microplastics, 6PPD-quinone). Analysis of PCBs may be best suited for studies evaluating GSI facilities located in old industrial areas, but not in areas with little to no PCBs in runoff. Analysis of PFAS may be appropriate for studies evaluating infiltration of treated stormwater to the underlying aquifer, but not in studies focusing on the long-term effect of variable operation and maintenance frequencies. Revise the list so that only solids (e.g., TSS or SSC) are a required parameter, and all other parameters are optional and should be sampled depending on which management question is being investigated at a particular monitoring site. TSS could be used as a cost-efficient proxy for other pollutants.*

Response: We agree generally that not all of the parameters in Table 8.d.2 should be required for each site. We have revised the table, into required and optional parameters. Required parameters may no longer be excluded from the LID Monitoring Plans, but Permittees do not have to justify the exclusion of optional parameters. Required parameters are: Total Hg, Total PCBs, TSS, PFAS, TPH, Total and Dissolved Copper, Flow, Total Hardness, and pH. Optional parameters are: Other emerging contaminants (e.g., microplastics) and other ancillary parameters (e.g., nutrients).

PCBs are present in all stormwater runoff, and although their levels are highest in old industrial areas, wherein focused source and possible treatment controls are required, control of PCBs in other drainage areas is also expected and required through implementation of green stormwater infrastructure (GSI) facilities including LID controls over time. Permittees have already claimed reductions of PCBs loads through use of GSI and LID to meet MRP 2 PCBs load reduction requirements. There is ample cause for evaluating and verifying effectiveness of GSI and LID to control PCBs.

There are growing concerns with potential adverse impacts of PFAS. These concerns include adverse impacts to aquatic life and humans due to their presence in surface waters in addition to concerns with their presence in aquifers that may be sources of drinking water. Field and laboratory methods are currently available and used for PFAS

compounds of most concern, e.g., PFOA/PFOS. Given the likely widespread presence of PFAS in runoff, there is also ample cause for evaluating and verifying effectiveness of GSI and LID to control PFAS.

There are also ample concerns with the presence of mercury (Hg), hydrocarbons (TPH), and heavy metals (copper) in runoff and ample cause for evaluating and verifying effectiveness of GSI and LID to control them and pH and hardness level may affect treatability of pollutants.

While TSS could be a proxy for other pollutants in some settings, the relationship between TSS and other pollutants that bind to particles is variable and there will likely be dissolved forms of those pollutants. Also, the revised list of required parameters represents a suite of key pollutants of concern in runoff that will inform and justify the representativeness of studied LID systems and extrapolation of the studies' results to other similar systems in similar and possibly other settings.

Master Response Identifier: C.8.d-9

Comment Identifier: Part 3) of ACCWP-a7,43, CCCWP-44, Contech-4, SCVURPPP-7,102,103, SMCWPPP-17,156,157,210, Solano-6

Provision No.: C.8.d.iv

Comment: *Not all monitoring designs will require sampling of flowing water. For example, studies that assess O&M as well as performance through pollutant accumulation in media do not require flow monitoring. Flow should be removed from the list of parameters and the following footnote should be added to address flow and flow modeling: "All studies shall include the collection of discrete and/or continuous flow and/or volume measurements to adequately address the applicable Management Question(s) identified in the Monitoring Plan(s). A combination of modeling and monitoring may be used to assess the hydrology of GSI facilities."*

Response: We disagree with the suggestion to allow flow modeling in lieu of collecting flow data. LID BMPs serve two primary purposes (among other purposes such as mitigation of urban heat island effect), attenuating stormwater pollutants and reducing flows. Flow must be sampled rather than modeled because the assumptions made when modeling hydrology (and the hydraulics of a LID BMP) are precisely what we are interested in investigating by sampling flow data.

Assumptions include those about preferential paths and the infiltration of water through the media, the infiltration rate of the media and of the underlying native soil, the design and construction of the system, the operation and maintenance of the system, and so on.

Of course, Permittees are encouraged to perform whatever flow modeling they deem necessary to help them choose sites and to evaluate collected data, but flow modeling cannot replace the utility of flow sampling or otherwise offset required flow sampling.

Since the required sample methodology is flow-weighted (or time-weighted) composite EMC via automated sampler, that monitoring system incorporates the measurement and recording of flow data. So, flow data will be collected through the use of the prescribed methodology.

C.8.e – Trash Monitoring. By way of background, trash monitoring at MS4 outfalls or adjacent receiving waters provides a viable method to determine whether control actions implemented by Permittees (full trash capture systems or the implementation of other management actions equivalent to full trash capture) have been effective in preventing trash from discharging to receiving waters. Additionally, trash monitoring can be used to determine whether additional actions may be necessary and associated with sources within a Permittee's jurisdiction. Trash monitoring can also inform whether direct (non-MS4) discharges of trash are causing and/or contributing to adverse trash impacts in the receiving water(s).

The purpose of this trash monitoring is to answer the following management questions and monitoring questions:

Management Questions

- Have Permittees' trash control actions effectively prevented trash within Permittees' jurisdiction from discharging into receiving waters?
- Are discharges of trash from areas within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters?

Monitoring Questions

- What is the trash condition and approximate level of trash (volume, type, and size) within and discharging into receiving waters in areas that receive MS4 runoff controlled to a low trash generation via the installation of full trash capture devices, or the implementation of other trash management actions equivalent to full trash capture systems?
- Does the level of trash in the receiving water correlate strongly with the conditions of the tributary drainage area of the MS4?

Master Response Identifier: C.8.e-1

Comment Identifier: CCCWP-39,45, Oakland-18, SCVURPPP-6,7,106, SMCWPPP-14,15,161,174, ACCWP-a8

Provision No.: C.8.e – Trash Monitoring.

Comment: *The estimated cost associated with implementation of the indirect methods are unreasonable, are significantly greater than those associated with the MRP 2 trash*

monitoring pilot project, and would effectively make Trash Monitoring the highest monitoring priority for MRP 3, which does not align with the Permittees' desires. For example, ACCWP-a8 would like POCs Monitoring to be the highest monitoring priority, followed by LID Monitoring, followed by Trash Monitoring. SCVURPPP-7 asks that: the trash monitoring requirements be reconsidered and significantly reduced to a scale of cost similar to the current permit or lower.

Some comments also say that "there is no reduction in monitoring costs elsewhere in C.8 to offset the increase [to trash monitoring]."

Response: As explained in our response to the comments on C.8.e.iii.(2), the 12:1 ratio specified in that Provision was based on Water Board staff's best professional judgment (and the data available to us) about the cost (or, level of effort) associated the MRP 2 trash monitoring pilot project. The Permittees' high estimated implementation cost for C.8.e is based on the assumed use of the indirect methods relative to the MRP 2 trash monitoring pilot project, rather than the direct methods.

As we are removing the potential use of the indirect methods in part in response to the Permittees' concerns that the use of the indirect methods at the 12:1 ratio would be too costly, and as both Water Board Staff and the Permittees estimate that the use of the direct methods in MRP 3 will be roughly commensurate with the MRP 2 pilot project, the concern raised by this comment is no longer relevant. As the Permittees have attested in their comments, implementation of the direct trash monitoring methods will result in significantly reduced costs and overall level of effort.

Regarding monitoring priorities, as we approach the final compliance benchmark (100% Low trash generation and no adverse impact to receiving waters), it is imperative that we establish a program to evaluate the effectiveness of Full Trash Capture Devices and Full Trash Capture Equivalent Actions, in terms of loading from MS4s (where those controls are implemented) to receiving waters as well as the conditions in receiving waters as a result of that loading, and this is what the program described in C.8.e will investigate.

We disagree that certain subprovisions in C.8 should be considered to be a greater priority than others, however, C.8.e Trash Monitoring is certainly a high monitoring priority.

Regarding the comment that there is no reduction in monitoring costs elsewhere to offset the increase to trash monitoring, again, the exclusive use of direct trash monitoring methods will result in trash monitoring costs roughly commensurate to the MRP 2 trash monitoring pilot project. Furthermore, we estimate that the removal of Creek Status Monitoring and SSID Projects is roughly balanced by the addition of LID Monitoring and the changes to Trash Monitoring.

Please also see the response to the following combined comment in the Response to Comments table, regarding general concerns about C.8 implementation costs:

ACCWP-a6,a7
CCCWP-38,41
SCVURPPP-5,97

SMCWPPP-18,151
Solano-5

Master Response Identifier: C.8.e-2

Comment Identifier: ACCWP-a8,44, CCCWP-38,39,40,41,45, Oakland-18, SCVURPPP-5,6,7,109, SMCWPPP-14,15,16,166,168,173,174,175,176,177, San Jose-27, Solano-7

Provision No.: C.8.e.iii.(2)

Comment: *Eliminate (or revise) Provision C.8.e.iii.(2), so that if Permittees use indirect trash monitoring methods, they have the same numbers of sites and monitoring events as if they were to use direct methods. Permittees will likely mostly use indirect methods because it will be challenging to find outfalls at which they can use direct methods, because many outfalls will be unsafe and inaccessible to monitor directly, and because the Permittees won't have enough time to procure the necessary permits for direct methods (some comments such as CCCWP-45 and SCVURPPP-109 posit that it may not even be possible, regardless of timeline, to get permits for certain end-of-pipe or in-stream devices). Another reason for eliminating Provision C.8.e.iii.(2) is that, if Permittees mostly use indirect methods, implementation costs will be much higher because of the 12:1 site ratio, and so eliminating Provision C.8.e.iii.(2) will make the implementation of indirect methods roughly equivalent to the implementation of direct methods, and will overall reduce the MRP 3 monitoring costs to a level closer to the MRP 2 monitoring costs. There may not be enough municipal and/or contracted staff available to sample all of the sites and storm events required by Provision C.8.e.iii.(2), if indirect methods are used. There may not be enough qualifying sites at which to use the indirect methods, if Provision C.8.e.iii.(2) is maintained as-is. The Fact Sheet does not provide sufficient justification for the 12:1 site ratio. SCVURPPP-109 and SMCWPPP-166 request the inclusion of language that acknowledges the need for permits to install in-stream monitoring devices and/or to retrofit outfalls for the installation of netting devices, and should allow for delays in monitoring implementation as a result.*

Response: As explained in the Fact Sheet, the indirect sampling methods produce data which is less reliable and informative compared to data produced by the direct sampling methods. This is because they sample on-land rather than within the receiving water. Though some undetermined but significant portion of the trash loading will be caught by vegetation and along stream banks (etc.), that portion is likely to be in the minority compared to the portion of trash loading that is not caught (i.e., that is transported by the current downstream). Therefore, such methods are necessarily an approximation of trash loading in the receiving water, and produce data of lower quality than methods that directly sample the receiving water and/or the MS4, if those on-land methods are relied on for indirect sampling of the receiving water.

The 12:1 ratio of indirectly-monitored sites to directly-monitored sites was based on Water Board staff's best judgment of equivalent effort relative to the MRP 2 trash monitoring pilot project, which level of effort the Permittees themselves determined was

reasonable and desirable to answer certain management and monitoring questions at the time. Water Board staff had to make certain assumptions in the development of the 12:1 ratio, because we did not have all the necessary data from the Permittees on the costs associated with that pilot project. In response to this expressed concern that the implementation of the indirect methods would essentially be prohibitively expensive, we have removed them from C.8.e as a substitute for direct sampling of MS4 outfalls and receiving waters (in-stream). Along with that, we have removed C.8.e.iii.(2) from the Tentative Order, which required the 12:1 ratio for indirect monitoring methods, as discussed above. However, as explained in response to SCVURPPP-107 SMCWPPP-164, we are keeping the on-land methods, not as a required component and not as an indirect replacement for the direct monitoring of MS4 outfalls and receiving waters, but to provide a synoptic view of MS4 outfall and in-stream sites, by assessing nearby on-land conditions. See Provision C.8.e.ii.(3).

In our best professional judgment, the direct methods will – the on-land methods very like would not, to the extent they are used as indirect proxies for the direct methods – reliably answer the Management Questions and Monitoring Questions. Because the indirect methods are so imprecise (and represent such an approximation), their use might falsely confirm the null hypothesis that trash loading in receiving waters below outfalls is equivalent to trash loading in receiving waters above outfalls, for such outfalls receiving stormwater runoff from MS4 service areas controlled to the Low trash generation level. Please see the response to the following combined comment for more information on why we think the direct methods will answer the Management and Monitoring Questions:

ACCWP-a8
SMCWPPP-14,15,165,167,171
San Jose-27
SCVURPPP-108,110

By providing the Permittees an additional year to develop the Trash Monitoring Plan, and delaying the inception of trash monitoring by that same additional year, the Permittees will have the time necessary to find outfall sites at which they can implement the direct methods and secure all necessary permits. In fact, among the population of existing trash control devices that are in-stream, at the ends of MS4 outfall pipes, and in-line (see examples provided in Fact Sheet), it may be that some can be used as-is for Provision C.8.e trash monitoring, while others may require modifications. Regardless, with an additional year (a total of 15 months between the effective date of MRP 3, July 1, 2022, and the revised start date of Trash Monitoring, October 1, 2023), the Santa Clara and Alameda Permittees will be able to each locate 3 sites at which they can safely implement direct trash monitoring methods; the San Mateo and Contra Costa Permittees will be able to each locate 2 sites at which they can safely implement direct trash monitoring methods; and the Solano Permittees will be able to locate 1 site at which they can safely implement direct trash monitoring methods. This is a reasonable and doable assignment. Also regarding safety, natural channels are likely to have lesser flow rates as compared to hardened channels experiencing the same runoff conditions, and so Permittees may prefer sampling natural channels, though it may be more

challenging to permit in-stream devices for natural channels than for hardened channels.

As noted previously, for in-stream monitoring we are allowing the Permittees to implement the methods piloted by 5 Gyres and summarized in their final report,[30] which do not screen the full depth/width of the channel, which means Permittees will need to extrapolate the loading in the sample to the rest of the channel cross section.

Extrapolation may be more appropriate or accurate for channels experiencing supercritical flow (which are likely to have good mixing of trash because of the higher turbulence), which is more likely for a hardened channel. Conversely, the opposite is likely the case for natural channels. Natural channels are more likely to have subcritical flows (less turbulence) which means there will be less mixing of trash, more concentration of trash in the thalweg, and samples will be less easily extrapolated to the rest of the cross section.

Regarding the challenges associated with securing permits, this likely won't be an issue for existing devices that may be used for trash monitoring as-is or that may need minor or moderate modifications. New end-of-pipe and in-stream monitoring devices/sites can be easier to permit under certain conditions (e.g., those with less beneficial uses and concerns about fish passage). In-line devices are not likely to require any permits at all.

Regardless, the Permittees will have 15 months to secure permits for MS4 outfall sites, and an additional 12 months (27 months total) to secure permits for in-stream sites. Sites can be chosen that have relatively less permitting concerns, and methods can be chosen that are relatively easier to permit (e.g., temporary devices as opposed to permanent devices). Water Board staff will help the Permittees with securing these permits. And, as requested by SCVURPPP-109, we have included language in the Fact sheet acknowledging the need for these permits, for example, to install in-stream monitoring devices and/or to retrofit outfalls for the installation of netting devices. As well, we have added permitting as a required discussion component for the TAG.

Concerns about not having enough staff for streambank sites, not having enough qualifying streambank sites, and about costs being too high for the 12:1 ratio, are no longer relevant because we have removed the potential use of indirect methods.

Please also see the response to the following combined comment in the Response to Comments table:

ACCWP-a8
SMCWPPP-14,15,165,167,171
San Jose-27
SCVURPPP-108,110

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30 https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/58dd932f414fb5663b5a4f79/1490916184178/TCT+Creek+Monitoring+Report_FINAL.pdf

Master Response Identifier: C.8.e-3

Comment Identifier: ACCWP-a8, SMCWPPP-14,15,165,167,171, San Jose-27, SCVURPPP-108,110

Provision No.: C.8.e.ii

Comment: *The direct methods described in Provision C.8.e are either untested by the Permittees and/or have not been assessed as to whether they can answer the Management/Monitoring Questions, and/or are unsafe. The Water Board should therefore describe (e.g., in the Fact Sheet) the referenced direct methods, and should include examples of their implementation.*

Response: We disagree that the direct trash monitoring methods are untested, that they may not answer the Management and Monitoring Questions, and that they are unsafe.

Regarding whether the methods will reliably answer the Management and Monitoring Questions, in our best professional judgment, the direct methods will – the on-land methods very like would not, to the extent they are used as indirect proxies for the direct methods – reliably answer the Management Questions and Monitoring Questions. Because the indirect methods are so imprecise (and represent such an approximation), their use might falsely confirm the null hypothesis that trash loading in receiving waters below outfalls is equivalent to trash loading in receiving waters above outfalls, for such outfalls receiving stormwater runoff from MS4 service areas controlled to the Low trash generation level.

Other than general consensus from the Permittees and from impartial third part scientific experts that we have consulted with, we believe that implementation of the direct methods will reliably answer the Monitoring Questions because they are straightforward, and when implemented according to the criteria specified in C.8.e.ii they will control for confounding variables, though perhaps less so for in-stream trash monitoring sites depending on the sites that are ultimately selected (e.g., Permittees are asked but not required to select in-stream sites that are not downstream of direct discharge sites). All possible outcomes are accounted for, so long as Permittees adhere to the required site selection criteria, and what's more, the workgroup will guide the development of the Trash Monitoring Plan (e.g., site selection) as well as its ongoing implementation.

For example, C.8.e.ii.(1) directs Permittees to sample only MS4 outfalls that drain areas controlled to the Low level. Any inputs to the MS4 systems that discharge to the sampled outfalls therefore can only represent intended bypass of full trash capture devices (and equivalent actions) such as during storm events greater than the design storm, or failure of those controls (e.g., due to poor design). In the latter case, Permittees are then directed to investigate those failures, and take remedial action as appropriate.

Similarly, for in-stream monitoring, C.8.e.ii.(2) directs Permittees to sample only sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the Low level. Since in-stream sites should not be

downstream of direct discharge sites, similar extrapolations can be made as for MS4 outfall sites, but there may also be inputs of trash loading from upstream outfalls; to the extent that in-stream sites are able to be paired (in space) with MS4 outfall sites, that will allow Permittees to characterize trash loading in the receiving water, with versus without the input of trash loading from the MS4 outfall. Otherwise, in-stream sites which are not paired with MS4 outfalls but which at least satisfy the other criteria in C.8.e.ii.(2) (namely, regarding all upstream MS4 outfalls draining only MS4 areas controlled to the Low level) will still provide a characterization of trash loading in receiving waters for such areas, and in the intermediate-to-long term will advance our region's understanding of the effects of our trash control efforts from the direct perspective of the receiving water.

Regarding the safety of these sites and methods, generally, we have revised C.8.e such that the Permittees have a substantial amount of time to find sites at which they can safely monitor trash. For MS4 outfall sites, Permittees have 12 months prior to the submittal of the Trash Monitoring Plan, and an additional 2 months (14 months total) before monitoring of MS4 outfall sites begins, to find the following: 3 sites each for Santa Clara and Alameda County, 2 sites each for San Mateo and Contra Costa County, and 1 site for Solano County. For in-stream sites, Permittees have 12 months prior to the submittal of the Trash Monitoring Plan, and an additional 14 months (26 months total) before monitoring of in-stream sites begins, to find the following: 2 sites each for Santa Clara and Alameda County, 1 site each for San Mateo and Contra Costa County, and no sites for Solano County. This is more than enough time and flexibility to establish a safe and successful Trash Monitoring program.

And, as noted previously, there are several examples of current implementation of the direct methods that we have provided in the Tentative Order's Fact Sheet.

Master Response Identifier: C.8.e-4

Comment Identifier: San Jose-27, SMCWPPP-174

Provision No.: C.8.e.ii

Comment: *Collection of data on material type is resource intensive, and may itself be unsafe (in particular, during storm events).*

Response: Collection of data on material type is a critical component of Trash Monitoring. As explained by SFEI and SCCWRP's California Trash Monitoring Methods project (https://www.sfei.org/projects/california-trash-monitoring-methods-project, https://sites.google.com/sfei.org/trash/), organizing trash items into categories based on their composition (i.e., material type) allows for the identification of categories making up the majority of the volume and provides information on those that should be targeted for potential source control.

Additionally, this can inform the effectiveness of upstream trash capture devices (e.g., Full Trash Capture Devices) and Other Actions (in addition to source control) with

respect to different types of trash. That the effort of this data collection is ambiguously resource intensive is not, on its own, sufficient justification to remove it.

Regarding safety, it does not follow logically why collection of data on material type is particularly unsafe, as compared to collection of data on trash loading absent consideration of material type. Also, this has been a standard component of several recent trash monitoring efforts.

For general concerns regarding safety, please refer to Master Response Identifier: C.8.e-3.

Master Response Identifier: C.8.e-5

Comment Identifier: SCVURPPP-110, SMCWPPP-167

Provision No.: C.8.e.ii.(3)

Comment: *The use of trash booms with a skirt that extends to the bottom of the water column, seines, or other equivalent in-stream devices should not be used during storm events because they could cause flooding in adjacent upland areas. In practice, trash booms are generally removed during the wet season or when storm events are forecast.*

Remove this monitoring method or revise to remove language about using these methods during storm events. The MRP should not encourage monitoring methods that pose a potential threat to lives and property in the vicinity of the monitoring station.

Response: We have revised C.8.e.ii so that, for the in-stream monitoring, Permittees are not required to screen the entire width and depth of the receiving water. However, they should capture as much of the width and depth of the cross section as is feasible and safe.

Trash booms are not an acceptable in-stream trash monitoring method because they only capture a limited section of the receiving water cross section, and they are typically removed during wet season storm events anyway.

As explained above, the Permittees will have substantial time to find MS4 outfall and in-stream monitoring sites, at which there are minimal concerns about flooding, personal safety, and property damage. In general, Permittees may opt to select MS4 outfalls which drain moderately- or small-sized tributary MS4 service areas, which have less of those risks.

Please also refer to Master Response Identifier: C.8.e-3.

Master Response Identifier: C.8.e-6

Comment Identifier: ACCWP-a8,44, CCCWP-45, Oakland-18, SMCWPPP-14,15,16, 172,178

Provision No.: C.8.e.iii

Comment: *Because there may not be enough qualifying storm events to sample in a given year (e.g., due to drought), make the following change: eliminate annual minimums, and instead prescribe only the total number of samples that must be collected by the end of the 5-year Permit term, and also generally reduce the required number of (wet weather) sample events because of concerns about cost and staffing and qualifying storm events.*

SMCWPPP specifically requests, for each site, that the minimum required number of monitoring events be reduced from 15 over the 5-year permit term (i.e., 3/year for 5 years) to 9 (equivalent to 3/year for 3 years).

Response: There are several problems with this proposal. First, a requirement for annual minimum sample events ensures that Permittees make progress towards completing the monitoring requirements during every year of the Permit term. Second, in the event that the 5-year Permit term is administratively extended, no monitoring would be required during those subsequent years. Third, Permittees might group sample events in time rather than spreading them out evenly over the course of the Permit term, and the quality of data produced by such a trash monitoring program would be significantly lower.

Instead, we have included language in the Permit allowing the Permittees to certify in their Annual Progress Report that there were not enough qualifying storm events to sample in the preceding water year, in which case the Permittees would be required to make up those samples in the subsequent (upcoming) water year.

Effectively, the minimum required number of monitoring events for each MS4 outfall site by the end of the 5-year Permit term will be reduced from 15 (3/year for 5 years) to 12 (3/year for 4 years) over the course of a 5-year Permit term, because the start date will be pushed back from October 1, 2022, to October 1, 2023 (see response to comment C.8.e.iii & C.8.e.v). Likewise, the minimum required number of monitoring events for each in-stream site has been reduced from 15 to 9.

Master Response Identifier: C.8.e-7

Comment Identifier: CCCWP-45,46,108, Oakland-18,19, ACCWP-a8,45, SCVURPPP-7,109, SMCWPPP-14,19,166,171,182,183,214, Solano-7, MRP 3 Testimony Hearing Transcript, October 12, 2021, Mitch Avalon, CCCWP – Page 74 (Line 16-25), 75 (Line 1-5)

Provision No.: C.8.e.iii & C.8.e.v

Comment: *Delay submittal of the Trash Monitoring Plan from September 30, 2022, to July 1, 2023 (or to September 30, 2023). Delay the start date for Trash Monitoring from*

October 1, 2022, to October 1, 2023. Otherwise, Permittees will not have enough time to find sites, set up logistics, develop the Trash Monitoring Plan and solicit/incorporate feedback from the TAG, and secure all necessary permits. Permittees can't start working on these items prior to adoption of the final Permit, because prior to adoption those items are subject to change. SMCWPPP-182 suggests that, in the alternative to pushing back the submittal date of the Trash Monitoring Plan, it could just be eliminated, given how prescriptive it is. SMCWPPP-183 requests that the requirement to solicit input from the TAG and others be removed if the submittal of the Trash Monitoring Plan is not delayed. SMCWPPP-214 requests that, if any of the dates in Provision C.8.e are changed, the Fact Sheet is revised accordingly.

Response: We agree with the request to push back the submittal of the Trash Monitoring Plan, and the start date of trash monitoring, by an additional year. With this extra time, the Permittees will have sufficient time to find sites, set up logistics, fully develop the Trash Monitoring Plan and solicit and incorporate feedback from the TAG, and secure all necessary permits.

As noted in other responses, we are providing an additional year before in-stream monitoring must commence, relative to MS4 outfall monitoring. So, MS4 outfall monitoring has been delayed by one year (to October 1, 2023), and in-stream monitoring will be delayed by a total of two years (to October 1, 2024). This means Permittees can prioritize working on outfall monitoring and refine those methods before they must begin implementing in-stream monitoring. However, we are keeping both components in the Trash Monitoring Plan (rather than breaking up the plan into two separate submittals) because we want both components to be considered together (to the extent possible).

We do not agree with the request by SMCWPPP-182 to remove the Trash Monitoring Plan altogether. The Permittees will implement the Trash Monitoring Plan, and as such the Plan will serve as the guiding document for their implementation. The Permittees' development of the Plan will also facilitate the receipt of input from the TAG members.

Master Response Identifier: C.8.e-8

Comment Identifier: ACCWP-46, Oakland-20, CCCWP-20, SMCWPPP-184, Solano-8

Provision No.: C.8.e.v.(e)

Comment: *Permittees would be challenged to perform power analysis for the Trash Monitoring Plan because there is not enough available trash data of the appropriate kind or consistency in methods used for the data, because trash data in general may not have normal or lognormal distributions, etc. Confusion was expressed by some commenters about which monitoring schedule the Permittees would comply with, whether the schedule in Table 8.e.2 or the schedule suggested by the power analysis.*

Response: These comments overstate what is needed to conduct a power analysis. They are also incorrect that trash monitoring data inherently does not lend itself to power analysis. The data that will be collected for C.8.e can indeed be used for power

analysis. All power analysis does is compare two distributions, or predict how many samples are needed to confirm whether two distributions are distinct, and the data do not even need to be normally-distributed because nonparametric methods of power analysis are now available.

That said, we agree that there likely is not enough existing data that is of the appropriate type for the Permittees to do power analysis for trash at this time. As data is collected, the Water Board may conduct a power analysis towards the end of MRP 3, to inform changes (if any) to the monitoring schedule prescribed in C.8.e.iii.(1), for MRP 4.

Regarding which monitoring schedule to comply with, this is no longer an issue because we have eliminated the requirement to perform the power analysis.

Master Response Identifier: C.8 – 2

Comment Identifier: Baykeeper-15d

Provision No.: C.8.f (Pollutants of Concern Monitoring)

Comment: *Stormwater Sampling and Role of Sediment Sampling*

Table 8.1, POC Monitoring Methods, in Provision C.8.f.ii requires various monitoring methods for five management questions. There are several monitoring methods listed for each management question, but none are mandatory – Permittees will be able to pick and choose their monitoring methods, which is problematic to Baykeeper. Monitoring methods to answer management question 1 allows Permittees to collect samples of urban stormwater runoff or bedded sediments – it does not require both. Sediment samples can be collected year-round, and need not reflect wet weather conditions.

Response: It is appropriate to allow a choice of monitoring methods for addressing the management question 1, which is about finding source locations. If Permittees were constrained to using only wet weather samples in stormwater to find source areas and contaminated portions of watersheds, finding these areas would be much less effective, much more costly, and much less efficient. In fact, bed sediment data collected at all times of the year offers a valuable and efficient means of locating source areas and characterizing contamination in watersheds. During storm events of sufficient intensity, the pollutants attached to sediment are mobilized and transported from source areas, but some of this contaminated sediment is often deposited near the source area so there is a “fingerprint” of the source that can be detected through sampling this bed sediment. If the permit required Permittees to find source areas through stormwater sampling alone, it would require the Permittees to mobilize field crews at just the right time during a sufficiently intense rain event to ensure that they could catch the transport while it is happening. This strategy will sometimes work, but it is not an intelligent strategy or wise use of limited resources. It will very likely result in lots of monitoring

effort that sometimes misses the transport. Stormwater monitoring for POCs is a part of the overall strategy and is important to generate data for modeling, but it is not a wise strategy (by itself) for finding sources and contaminated areas. A better strategy is to use a combination of stormwater and bed sediment sampling, which is what Permittees tend to do. We will add a passage to the Fact Sheet to more clearly explain the value of bedded sediment data for source identification or identifying contaminated portions of watersheds.

Comment*: There also appear to be two options for collecting urban stormwater runoff samples: 1) through MS4s or receiving waters; and 2) at outfall locations. Draft MRP 3 is a stormwater permit, thus monitoring requirements must indicate whether Permittees are complying with Draft MRP 3's discharge prohibitions and receiving water limitations, which presumably requires sampling stormwater. As discussed above, in order to assess permit compliance, receiving water monitoring must be accompanied by outfall monitoring to determine whether discharges are causing or contributing to exceedances of applicable water quality standards. Thus, the Regional Board must revise Table 8.1 to mandate Permittees collect stormwater samples from MS4 outfalls.*

Response: First, we note that receiving water monitoring provides a direct means of monitoring for receiving water limitations. Sampling stormwater discharges from an outfall is a less direct means of monitoring for receiving water limitations because the water quality in an outfall is generally not representative of the water quality of the receiving water into which it flows. A more direct means of determining the quality of receiving waters is to measure the quality of receiving waters directly. Receiving water monitoring is required for the Bay (via the RMP) and for creeks and stormwater conveyances (trash, pesticides, toxicity, pollutants of concern). We further note that we addressed this topic thoroughly in the C.8.f section of the Fact Sheet. There we explained the special challenges of assessing loads of PCBs and mercury because of the wide distribution and the unique features of how these pollutants move through watersheds attached to sediment particles.

Outfall monitoring is a component of the overall POC monitoring strategy, but it is just one tool in the monitoring toolbox, and it is not the best tool for every information need. We very carefully explained in the Fact Sheet why outfall monitoring is *not* a feasible or effective approach for assessing loads of contaminants like PCBs and mercury.

Consider the following. PCBs and mercury are typically transported from watersheds to receiving waters attached to sediment particles during rain events. However, not every rain event will mobilize these sediment particles. The mobilization depends on the intensity of the rainfall event, antecedent conditions, the slope of the land use, the nature of the land use and source area, and a range of other factors. Also consider that there are several hundred (perhaps greater than 1000) outfall locations where loads could be assessed. If Permittees could successfully mobilize monitoring crews during the time of the right rainfall event (when transport is taking place), they would perhaps be able to collect monitoring data during that single event. From these data, one could

compute the load for that event. We would then have a finite number of these events that could be accomplished for the hundreds of outfalls in the region. The load assessed for the individual storms is not guaranteed to be representative of a storm for that watershed. It is merely a load from a single storm. And, it is very difficult to mobilize field crews successfully to capture the right portion of the hydrograph during a storm event. The peak of transport may be missed, and with it the majority of the loading. It is not valid simply to consider this storm load as representative of even that one monitoring location. Different storm sizes yield different loads due to the features mentioned above. This is just a small subset of the difficulties in using the outfall monitoring approach for loads assessment (which is the relevant metric for POCs like mercury and PCBs) that the comment seems to recommend. The data obtained via collecting a limited number of grab samples of PCBs and mercury at all outfalls during storm events would have even less value since there would be no way to use these data to generate loading estimates. We have learned about all of this through work conducted over the last two decades through the RMP and MRP monitoring. The monitoring requirements in the MRP are informed by these two decades of experience.

We provided a more detailed explanation for the monitoring strategy in the C.8.f section of the Fact Sheet. We explained the method for assessing loads using watershed loading models calibrated with data collected strategically from representative watersheds. We explained that the best quality monitoring data is collected through an intensive procedure using fixed station sensors to measure turbidity, which is calibrated to suspended sediment concentrations. We also described how these suspended sediment concentrations are combined with grab samples of pollutants collected during storms to generate loading information that can be extrapolated to places and times not directly sampled. The intensive effort to collect these fixed station and POC grab sample data simply cannot be done everywhere because of logistical and budget constraints. There are several hundreds of possible monitoring locations, and it is not feasible to do this type of monitoring except in a limited number of strategic and representative locations. Instead, data from a number of fixed stations are combined with other sorts of monitoring data and used to calibrate and validate watershed loading models.

Comment*: Further, it is unclear to Baykeeper how sediment sampling can be used to show compliance with water quality standards and raises the following questions: 1) what standards will sediment samples be evaluated against; 2) will sediment samples be compared to sediment quality objectives that have yet to be enacted; and 3) will sediment samples be evaluated to determine whether discharges are causing or contributing to an exceedance of an applicable water quality standard? While Table 8.3, POC analytes and analytical methods, includes laboratory analytical methods for sediment samples, this is not the same as standards to compare the data to. Data collection only for sake of collection is not a reasonable use of limited resources. If sediment sampling remains in Provision C.8.f, then the Regional Board must revise*

these requirements to clarify how sediment sampling will be used to determine compliance with Draft MRP 3.

Response: The purpose of the sediment sampling to *measure contaminant concentrations in sediment* and use this information to locate pollutant source areas or portions of contaminated watersheds. We explained above how these data are used to locate source areas. These sediment data are not themselves compared to a standard but rather to locate sources. This type of monitoring provides valuable information is not "data collection for the sake of collection." They are powerful because they help overcome the stormwater monitoring problem of not being able to sample everywhere at all times. Deposited sediment containing contaminants constitutes a "fingerprint" that can be detected that provides information to locate source areas and assess control measure performance. This type of monitoring is one option among many, but it is useful for addressing a critical information need related to source identification.

Comment*: Again, Baykeeper objects to Provision C.8.f.iii which allows for POC monitoring to be conducted countywide. As discussed above, monitoring must be capable of assessing an individual Permittee's compliance with the permit, and Draft MRP 3 must be revised accordingly.*

Response: As explained in Master Response Identifier C.8-1, representative monitoring coupled with accounting and tracking of Permittees' control actions yields the best individual Permittee compliance data. It is highly impractical to require every permittee to show compliance with receiving water limitations and POCs by monitoring all receiving waters in their jurisdictions. That will be an extraordinary amount of monitoring that is unnecessary when representative monitoring can be employed, as it is in the Permit. Representative monitoring will not only find problems, it will inform compliance. For example, if a representative monitoring sample shows a problem with one or more pollutants in a receiving water, the Water Board would likely not interpret the result to mean that the problem is confined only to that one waterbody or only those Permittees contributing to that waterbody. Rather, the Water Board would consider that evidence of a more widespread problem and use the information, along with the accounting and tracking of Permittees' control actions, for individual Permittee compliance determinations. For mercury and PCBs, please also see the above responses on how monitoring is used in conjunction with models to generate loading estimates. Please also see the more extensive discussion of this topic in the Fact Sheet section on C.8.f.

C.10 (Trash Load Reduction)

Extension of deadlines for 90% and 100% trash reduction requirements

Master Response Identifier: C.10.a -1

Comment Identifiers: San Mateo County – 16, SCVURPPP – 9, Dublin – 1, ACCWP – 54, SCVURPPP – 113, 114, 123, SMCWPPP – 21, 219, 220, 240, Caltrans – 1,2, San Jose – 3, 28, CCCWP – 53, 54, Oakland – 22

Provision No.: C.10.a.i

Comment: Permittees have commented that the COVID-19 pandemic has significantly impacted their operations, budgets, and staffing and, impacts are likely to continue over at least the next few years. As a result, it is unrealistic to expect co-permittees to maintain and accelerate progress towards the benchmarks at the same pace as prior to the pandemic. Permittees are therefore requesting that deadlines to achieve 90% and 100% trash reductions should be extended by at least two years each to July 1, 2025 and July 1, 2027, respectively. In addition, Permittees have requested that the 90% trash reduction requirement should be a performance guideline (similar to the 60% goal in MRP 2.0). Permittees have stated that adopting these recommendations will make the overall program more feasible and better support the planning for long-term trash reduction solutions and collaborative projects with Caltrans.

Response: We acknowledge the economic challenges faced by Permittees related to the COVID-19 pandemic, as well as challenges with implementing trash controls in the remaining uncontrolled trash generation areas, many of which are moderate trash generating and within which it is not as cost-effective to implement trash controls. To accommodate these challenges and allow more time for Permittees to work with Caltrans on implementing cooperative projects, the Tentative Order extended the 100 percent compliance date to June 30, 2025, three years beyond the previous target date of July 1, 2022, in MRP 2. Furthermore, Permittees that may still be challenged in meeting the 100 percent reduction benchmark by June 30, 2025, can be granted an additional year (until June 30, 2026) though the implementation of an approved Direct Discharge Control Plan.

In addition, we decline to make the 90 percent trash reduction requirement a performance guideline. The 90 percent trash reduction requirement is a critical milestone towards the end goal of achieving 100 percent reduction or no adverse impacts to receiving waters. If it is turned into an unenforceable performance guideline, Permittees may not treat it with the same urgency, which will forestall efforts towards achieving the 100 percent milestone.

Requirements for Private Land Drainage Areas:

Master Response Identifier: C.10.a - 2

Comment Identifiers: SCVURPPP – 11, 116, SMCWPPP – 223, Dublin – 2, Oakland & San Jose – 5, 30, SMCWPPP -23,52, ACCWP – 56, Oakland – 24, San Mateo County – 18, CCCWP – 60

Provision No.: C.10.a.ii.(b)

Comment*: Permittees have requested that the requirement in C.10.a.ii. for municipalities to manage trash on all private properties (regardless of size) down to a level of low trash generation be removed. The argument made is that this requirement is an expansion of the requirement in MRP 2.0 (i.e., focused on areas >10,000 sq. ft.) and is impracticable to achieve, especially in the timeframe required*

Response: The language in C.10.a.ii.b on trash control requirements for private land drainage areas is not new, nor an expansion of the requirements in MRP 2. Starting with MRP 1, issued in October 2009, Permittees have been required to control trash discharges from their MS4s regardless of the source, with the exception that they could rely on permits issued by the Board to other dischargers, such as Caltrans, that discharge to a Permittee's MS4. MRP 1 specifically required Permittees to implement and maintain a mandatory minimum number of full trash capture devices by July 1, 2014, to treat runoff from an area equivalent to 30% of Retail/Wholesale Land that drains to MS4s within their jurisdictions. The basis of this requirement was a recognition that many or at least some commercial land use areas are likely very high, high, or moderate trash generation.

In MRP 2, Permittees were required to ensure private land areas, irrespective of size, that were plumbed directly to the Permittees' storm drain system in very high, high, and moderate trash generation areas were controlled with full trash capture systems or with control measures with demonstrated equivalence to or better than full trash capture systems. MRP 2 required Permittees to submit a map July 1, 2018 (or otherwise record the location) of all private land areas greater than 10,000 ft^2 within very high, high, and moderate trash generation areas that are plumbed directly into the Permittees storm drain system as a demonstration of effort and progress towards identifying and ensuring control of trash from those areas. However, Permittees are responsible for all such areas regardless of size. The 10,000 ft^2 threshold in MRP 2 was a mapping criterion and not a criterion to limit Permittee.

Furthermore, since the onset of the NPDES stormwater permit program with the establishment of federal regulations in 1990 and the ensuing MS4 permits, Permittees have had the responsibility and requirement to certify they have adequate legal authority to control discharges to their MS4s from private land areas. The requirements derive from federal NPDES permit application requirements (40 CFR § 122.26) for

municipal separate storm sewer discharges. These regulations required MS4 permittees to provide documentation that they have or otherwise to establish legal authority to control discharges to their MS4s. This included: control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity; prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than stormwater; and require compliance with conditions in ordinances, permits, contracts or orders. The regulations also required MS4 permittees to have a program to monitor and control pollutants in stormwater discharges to their municipal systems from industrial facilities that the municipality determines are contributing a substantial pollutant loading to the municipal storm sewer system. To implement these regulations, the Board has included legal authority requirements in MS4 permits. MRP 1 and MRP 2 included the following [Provision C.4.a.ii.(1)]:

> *Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial to address pollutant sources associated with outdoor process and manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, outdoor drainage from indoor areas, rooftop equipment, and contaminated and erodible surface areas, and other sources determined by the Permittees or Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.*

Similarly, both MRP 1 and MRP 2 required Permittees to have adequate legal authority to prohibit and control illicit discharges the discharge of spills, dumping, or disposal of materials other than storm water to their storm drain systems.

Also noteworthy, to comply with the Cease-and-Desist Orders that the Board issued to the Cities of Hercules and Pinole in 2018 for violation of the 70% trash reduction requirement, both cities adopted ordinances requiring installation of trash capture devices on private properties that are plumbed to the municipal storm drain system.

MRP Permittees have thus had since October 2009, the date MRP 1 was adopted, to develop a plan collaboratively with private land business owners in order to demonstrate that trash generated on their properties is appropriately controlled. The goal for 100 percent trash capture/no adverse impacts to receiving waters cannot be achieved if private proper owners are not held accountable and required to control trash generated on their property and discharged through the Permittees' MS4 system to receiving waters.

Thus, the Tentative Order adds more specificity to the underlying requirement to ensure that private areas directly plumbed to the MS4 achieve full trash capture or its equivalent. Language within the Tentative Order maintains that if there is a full trash capture device downstream of these private land areas that is designed, operated, and maintained to control trash discharges from private land areas, then additional controls are not necessary.

Trash reduction credit for source controls

Master Response Identifier: C.10.b - 1

Comment Identifiers: Santa Clara – 2, Oakland – 21,25, SMCWPPP – 22, 50, 235, 239, 250 CCCWP – 63, Palo Alto – 5, Los Altos – 3, San Jose – 31, SCVURPPP – 119, 128, San Mateo County – 17, Solano – 16, ACCWP – 59, SCVWD – 4

Provision No.: C.10.b.v

Comment*: Permittees have requested that the C.10.b.v source control credits should continue to allow up to 10% reduction for existing and new jurisdiction-wide source controls implemented through the upcoming permit term and beyond. Permittees have stated that through their adoption and enforcement of source control bans for persistent trash items such as foam foodware and single-use plastic bags, they have prevented low trash generating areas from morphing into moderate trash generating areas, reduced the likelihood of these types of trash entering receiving waters from wind or litter, and prevented the plugging of trash capture devices installed in storm drain inlets. Elimination of these credits would discourage the meaningful and effective implementation and enforcement of these ordinances.*

Response: Regional Board staff agrees that source control measures can be an effective tool in controlling and preventing discharges of trash to receiving waters. Source control ordinances can reduce the amount of trash on the landscape by preventing a certain type of trash (such as plastic bags and polystyrene food ware) from being deposited on the landscape when it is not disposed of properly. This reduces trash accumulation and generation, which subsequently should be reflected in a Permittees' trash generation maps. Approximately 75% of Permittees claimed credit for implementing source control measures under MRP 2.0 for plastic bags and/or polystyrene foodware bans, and Permittees will continue to benefit from the decrease in trash volume of these items within their trash management areas. Permittees have stated that through the assistance of these source controls, they may have reduced a trash reduction rate in some areas from moderate to low. However, they have provided little or no quantitative evidence of reduced trash generation rates in specific areas. Regardless, it is in the Permittees' interest to continue implementing and enforcing

existing source control ordinances to prevent areas controlled to a low level due to source controls from "morphing" back into moderate or high trash generation areas.

Continuing to allow a 10% credit for source control measures in addition to documentation that trash generation areas have been converted from very high, high, or moderate to low trash generation results in double counting. Permittees would get the source control percentage credit in addition to the reduced trash loads that should be reflected in their trash generation maps due to implementation and verification of trash controls. For example, if a Permittee claims 90% trash load reduction through conversion of very high, high, or moderate trash generation areas to low trash generation area through implementation full trash capture systems and/or implementation of controls equivalent to full trash capture, such as a source control, then there is no need for adding an additional source control credit to those managed trash generation areas. If source controls address 10% of a community's trash generation, then that 10% credit should only apply to the remaining unmanaged areas. In this case, the credit would apply to the 10% unmanaged area (10% of 10%) for an overall 1% credit not a 10% credit. Providing a Permittee a full 10% credit would be the equivalent of allowing the Permittee to continue to discharge trash from 9% of its trash generation areas. That does not comply with the Trash Amendments' prohibition on the discharge of trash to surface waters of the State or the deposition of trash where it may be discharged into surface waters of the State.

The Permit provides a compromise. Sub-provision C.10.b.v. allows Permittees to claim up to 10% credit for the implementation of new jurisdiction-wide source control actions that reduce trash at the source, until June 30, 2026. Permittees must provide substantial and credible evidence that the new source control actions are being implemented jurisdiction-wide reduce trash by the claimed value. This will allow the Permittees to claim the credit while they are in the process of achieving the 100% trash load reduction requirement. However, the 10% credit must and will sunset for a Permittee to ultimately comply with the Trash Amendments' requirement to meet the trash discharge prohibition through full trash capture or full trash capture equivalency.

After this time, source control measures will still have utility. Thus, source controls may, in combination with other controls, help the permittees in achieving full trash capture equivalency, provided the controls being implemented within a trash generation area are documented, assessed, and verified in accordance with Provision C.10.b.iii. In some circumstances, Permittees may even be able to claim that source control measures on their own achieved trash capture equivalency in specific trash generation areas.

<u>Offsets for creek and shoreline cleanups</u>

Master Response Identifier: C.10.f – 1

Comment Identifiers: AClaesgens -1, Friends of 5 creeks – 1, FoSC – 1, Pdonald – 1 Grass Roots Ecology – 1, Watershed Project – 2, Oakland – 27, ACCWP – 62, Solano – 17, CCCWP – 67, San Jose – 34, Caltrans – 3.

Provision No.: C.10.f.i

Comment: Creek and shoreline cleanups have proven to be beneficial in community engagement. Permittees and environmental groups have stated that the proposed sunsetting of these credits at the end of the Permit term is likely to decrease positive community-based creek and shoreline improvement events. This is due to the likelihood that local governments will reduce the amount budgeted and spent to organize and support volunteer hands-on cleanups. Permittees have stated that they have invested significant resources into building and supporting a large network of volunteers that clean up trash and foster environmental stewardship among youth and citizens. Without receiving ongoing trash reduction credit for these efforts, they state that it will be difficult to justify expending resources towards volunteer efforts. With the loss of these credits, municipalities will not have the necessary incentives, and thus the resources, to organize these cleanups. This responsibility will then be left to community groups and non-governmental organizations, who themselves will not have the authority or the resources to conduct and coordinate them. Furthermore, relegating creek and shoreline cleanups to Provision C.7, Public Outreach and Information, in lieu of credits will eliminate the nexus between trash reduction outreach and corresponding cleanup actions to reduce trash levels, and will void the essential partnership between the public and Permittees.

During the October 12, 2021, testimony hearing, Board Chair Jim McGrath and board members Andy Gunter and Bill Kissinger expressed their support for maintaining offsets available from creek and shoreline cleanup events and recognize its importance in community engagement.

Response: We agree that creek and shoreline cleanups provide a valuable opportunity for education and public engagement. Community-based cleanup programs are a relatively low-cost way for Permittees to benefit from not only trash reduction in their creeks and receiving waters, but they also foster stewardship within their community. However, the Trash Amendments' prohibition and the MRP require trash to be controlled before it is discharged from a Permittees' MS4 to receiving waters so continuing to allow offsets for creek and shoreline cleanups to continue after June 30, 2025, would mean a Permittee that claims 100% trash load reduction that includes a percentage offset due to creek and shoreline cleanups would still have trash discharges, equivalent to the claimed offset, from moderate, high and/or very high trash generating areas. The 100% compliance would be "on paper" because the corresponding percentage of trash load would still be discharging from the MS4 to

receiving waters because trash discharges from those unmanaged areas will continue to remain uncontrolled and discharge trash. Trash enters the waterways continuously, so sporadic, ad hoc cleanups by volunteer groups are a poor substitute for well-managed and institutionalized controls, such as full-trash capture devices or demonstrated equivalent actions like regular trash pickup or increased street sweeping in trash generation.

Permittees assert that the intangible benefits generated from the organization and implementation of creek and shoreline cleanup efforts are significant. As such, it's in the Permittees' interest to continue to support creek and shoreline cleanups irrespective of the expiration of these credits by June 30, 2025. In addition, we encourage Permittees to use creek and shoreline cleanups as part of an effective education and outreach program recognized under Provision C.7.

Curb inlet screens:

Master Response Identifier: C.10.b – 2

Comment Identifiers: CCCWP – 64, San Jose – 32, SCVURPPP – 120, SMCWPPP – 236, Oakland – 26, ACCWP – 60

Provision No.: C.10.b.vi

Comment: *Some Permittees have stated that results submitted to the Water Board in May 2020 should be sufficient to show curb inlet screens effectiveness in controlling trash from moderate trash generation areas. As a result of this study, a minimum 100 percent reduction should be "provisionally" allowed during MRP 3 as information gaps are addressed. Permittees have requested that Water Board staff should consider removing or minimizing the requirement for additional study and analysis that is currently required to address the highest priority information gaps.*

Response: During MRP 2, Permittees assessed the benefit of curb inlet screens, in combination with street sweeping, in reducing the amount of trash discharged through the MS4. A study to this effect was submitted to the Water Board on May 25, 2020 by consultants (EOA Inc.) on behalf of Permittees that provided some evidence showing that curb inlet screens, when paired with street sweeping, can be effective in preventing larger trash items (such as bottles or plastic bags) from discharging through Permittees MS4 system. However, the effectiveness of curb inlet screens in preventing larger trash items for discharging through the MS4 was dependent on the presence of horizontal surface grates installed near the device. In the absence of horizontal surface grates, the study concluded that the likely increase in hydraulic pressure from stormwater flows could potentially force open the retractable screens and thus allow more trash and/or debris to enter the curb inlet at a greater rate and therefore negate the benefit of the installed device. In addition, the study did not evaluate the use of a 5mm screen, within the horizontal surface grate, to prevent trash items greater than 5 mm in diameter from

discharging into the MS4. As a result, smaller persistent trash items (cigarette butts, straws, fragmented plastic and polystyrene food ware etc.) could readily enter the MS4 through the unscreened horizontal surface grate despite the installation of a curb inlet screen. These smaller trash items are more effectively removed from storm drain inlets that have a full trash capture device (due to the 5 mm minimum screen threshold requirement).

In addition, the effectiveness of curb inlet screens in preventing discharges of trash to receiving waters is contingent upon the proper implementation of a street sweeping program that can effectively collect trash items (screened via the curb inlet screen) that may have accumulated along the curb and in the public right of way. A street sweeping program that is too low (infrequent) relative to the baseline trash accumulation rates can lead to trash accumulation against the screen and reducing screen performance. As a result, a crucial component of this study that should have been included was an evaluation of the effects of street sweeping on curb inlet screen performance (i.e., how does a low trash sweeping frequency compared to a high trash sweeping frequency effect curb inlet screen performance). Water Board staff have identified these critical knowledge gaps within the study and have provided Permittees with a list of recommended actions that need to be demonstrated, within C.10.b.v, in-order for Permittees to be granted partial trash reduction benefits through the installation of curb inlet screen-based devices.

C.11/12 (Mercury Controls and Polychlorinated Biphenyls [PCBs] Controls)

Recurrent themes emerged in Permittee comments on C.11/12.c requirements, including the lack of flexibility provided in complying with C.11/12.c requirements, the difficulty in complying with the magnitude of the performance metric, and disagreement on the amount of remaining old industrial land use. Each of these major themes has additional elements discussed in the following responses.

Master Response Identifier: C.11/12 – 1

Comment Identifiers: SMCWPPP comments 27 and 271, San Jose comments 6 and 39, ACCWP comments a5 and 68, CCCWP comments 75, 77, and 78, and comment 6 jointly submitted by Oakland and San Jose

Provision No.: C.11.c and C.12.c

Comment: *Lack of flexibility in complying with C.11/12.c requirements*

The comments on C.11/12.c suggest that there is a need to emphasize the flexibility allowed by the permit in complying with this subprovision. Within the broad theme of compliance flexibility, Permittee comments touch on three sub-themes. First Permittees claim that provision C.11/12.c requires control measure implementation in portions of old industrial area that may not be contaminated. Second, the Permittees claim that

there are limited opportunities to address PCBs in the public rights-of-way; doing so would be expensive, and this is inefficient and because the majority of PCBs originated from private properties can only be remedied through redevelopment or source property referral. Third, Permittee comments suggest that Provision C.11/12.c necessarily requires implementation of treatment controls, and Permittees present very high compliance cost estimates based on this assumption.

Flexibility Theme 1 – Requiring control measure implementation on areas that may not be contaminated

Response: Several Permittee comment letters state that Provision C.11/12.c requires the implementation of treatment or other controls on areas that do not have elevated levels of PCBs and that (old industrial) areas should be confirmed to have an elevated level of PCBs prior to planning treatment for the area. There are two issues here: First, many comments (e.g., CCCWP-75) contain the erroneous claim that Provisions C.11/12.c requires ***treatment controls*** in old industrial land use. On the contrary, these Provisions clearly indicate that a range of control measures can be implemented to comply, including treatment controls, diversion to wastewater treatment plants, redevelopment, enhanced operation and maintenance[31] controls, or other controls. Clearly, treatment control measure implementation is not required. Permittees should use their judgment in choosing from the range of options. We respond in greater to this claim under "Flexibility Theme 3" below.

The second part of the claim - that control measures (of any type) are being required on areas that may not have elevated levels of PCBs requires an explanation of the performance metric. Provisions C.11/12.c require control measure implementation to address 2,580 acres (reduced from 3,300 acres in Tentative Order) of old industrial land use, whether this land use exists on private property or in the public right-of-way. This is not the footprint of the control measure facilities, but rather the acres treated or addressed by the control measure. For example, the runoff from some area of land use may be treated by a control measure much smaller than the drainage area being treated.

Based on data submitted by the Permittees, it is highly likely that more than 2,580 acres of old industrial land use are considered at least moderately contaminated (0.2 mg PCBs/kg). Specifically, there have been over 1,200 samples analyzed for PCBs in old industrial areas in Alameda, Contra Costa, San Mateo, Santa Clara, and Solano counties between 1999 and 2019. The 75th percentile concentration of these data is 0.21 mg PCBs/kg (SCLRA 2021). This means that more than 25 percent of the samples had a concentration above 0.2 mg PCBs/kg. One can reasonably assume that these

[31] This was mistakenly termed "enhanced operation and treatment" in the Tentative Order.

samples are also spatially representative of old industrial area. In other words, if one takes a sample somewhere in an old industrial area, there is about a 25 percent probability that the concentration will exceed 0.21 mg PCBs/kg. There are, according to information submitted by Permittees, about 33,100 acres of old industrial land use in the MRP area. Applying this logic suggests that over 8,200 acres of old industrial land use would be considered moderately contaminated. Permittees have subsequently submitted information in comment letters suggesting that the amount of old industrial land use subject to control measure implementation is far less than 33,100, and we address those claims in the responses below. However, based on PCBs concentration data submitted by Permittees along with previously reported land use amounts, there is a surplus of moderately contaminated areas to which control measures can be applied. Provisions C.11/12.c call for control measure implementation address a substantial fraction of these moderately contaminated areas, but the Tentative Order leaves it up to the Permittees to choose where and how to effectuate this implementation. It is incumbent upon Permittees to implement control measures wisely and based on information suggesting that they are choosing appropriate locations where PCBs will be addressed.

<u>Flexibility Theme 2 – PCBs on private property vs. public rights-of-way</u>

Comment: *Permittee comments concerning PCBs on private property emphasize that the Tentative Order does not recognize that most of the PCBs originate from private parcels which then are transported through public rights-of-way including the municipal storm drain system. Permittee comments also incorrectly suggest that the PCBs on private property can only be addressed through referring the property to the Water Board for cleanup or through the reductions realized as these private parcels are redeveloped. Permittees are therefore limited to implementing control measures to address PCBs in the public rights of way where there are limited opportunities such that it is not economically feasible to implement enough control measures to achieve the performance metric. Further, these control measures implemented in the public rights-of-way are expensive and do not address the underlying problem of the ongoing load from private properties and would be ineffective for properties with inlets plumbed directly to the municipal storm drain system via underground piping.*

Response: The SF Bay PCBs TMDL wasteload allocations for urban runoff discharges applies to PCBs entering San Francisco Bay from municipal stormwater conveyances. The distinction between PCBs that originated from private parcels vs. public rights-of-way is not relevant. The important point is that the PCBs are transported through public rights-of-way and the municipal storm drain system to receiving water and Permittees are responsible for these discharges from their storm drain systems. Therefore, consistent with the wasteload allocations, permit requirements to achieve load reductions do not make an accommodation for the origin of the PCBs, and Permittees are responsible for the PCBs that are discharged to receiving waters from municipal storm water conveyances, regardless of origin. Provisions C.11/12.c do not specify *how*

Permittees should accomplish achieving the load reductions from old industrial areas, but rather establishes a performance metric expressed either as an acreage of land use addressed or a corresponding load reduction accomplished. Permittees are responsible for devising the approach and choosing the control measures appropriate for the circumstances.

Permittees are not fully acknowledging, based on submitted comments, their direct authority to compel private property owners to prevent pollutant discharges from private parcels to the municipal storm sewer system. Permittee comments suggest that referral for cleanup and redevelopment are the primary, and perhaps only means by which PCBs on private parcels may be addressed. However, Permittees are required to have authority to prevent or control these discharges into their storm sewers.

The requirements derive from federal NPDES permit application requirements (40 CFR § 122.26) for municipal separate storm sewer discharges. These require (NPDES permit) applicants "to have or establish legal authorities to control discharges to their MS4s." Permit applicants must make a "demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity."

Permittees are ultimately responsible for the PCBs discharged to their MS4s, and the permit provides flexibility to select the right tool for the set of circumstances. In certain circumstances, the appropriate tool will be to exercise legal authority to compel actions to prevent PCBs discharged from private parcels from entering their MS4s. If Permittees can demonstrate that control measures have been implemented on private parcels to reduce PCBs loading to the MS4s, the acres treated or addressed by such control measures can count toward fulfillment of the C.11/12.c performance metrics. In order to make it clear that such exercise of authority to compel action by private landowners is a recognized part of achieving the performance metric, the language of C.11/12.c.ii has been edited as follows.

> *Permittees shall, within the permit term, implement <u>or cause to be implemented</u> control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and ~~treatment~~ <u>maintenance</u> controls, or other controls) to comply with the performance*

<u>Flexibility Theme 3 – C.11/12 requires implementation of treatment or GI controls or unsuitable control measures</u>

Comment: *Permittee comments contain cost estimates to comply with C.11/12.c that run into the hundreds of millions of dollars for a single Countywide program. These cost estimates are based on the contention meeting the requirements of C.11/12.c would largely be accomplished through the construction and installation of treatment controls or green stormwater infrastructure (GSI) in the public rights-of-way of old industrial*

areas. Such installation of GSI, Permittees content, would circumvent the developed green infrastructure plans by requiring substantial investment in old industrial areas, thus potentially redirecting resources from areas that would benefit from green stormwater infrastructure enhancing their community (e.g., disadvantaged and underserved neighborhoods) to areas that may or may not provide a beneficial reduction of PCBs from moderate and high loading areas. Permittee comments also suggest that diversion to wastewater treatment facilities is not under the control of the Permittee: In many areas of the county the local municipality does not operate the wastewater treatment plant and does not have the authority to require the wastewater treatment facility to accept stormwater runoff. Some Permittee comments suggest that the Permit should "stipulate that Permittees prioritize the installation of trash capture devices in old industrial areas with moderate levels of PCBs, and that contaminated sediment in storm drains and channels should be prioritized for removal and disposal."

Response: The PCBs TMDL establishes a wasteload allocation for municipal stormwater Permittees, and the requirements of C.12.c form a necessary and important component of achieving the load reductions consistent with the TMDL wasteload allocation. Permittees have long been aware, through two decades of monitoring data, that PCBs are concentrated in old industrial areas. Despite this knowledge, Permittees have been reluctant to take the necessary steps and exercise their authorities to address the loading from these areas. Accordingly, Provisions C.11/12.c require Permittees to attend to these areas to reduce the PCBs loading from them.

Provisions C.11/12.c contain a performance metric expressed in acres of old industrial land use addressed or a corresponding load reduction but do not specify a means of compliance. Permittee comments contain cost estimates running to the hundreds of millions of dollars by assuming that compliance with C.11/12.c will largely be accomplished through installation of treatment controls in public rights-of-way. Implementation of treatment controls and possibly GSI will be a part of the solution to reducing PCBs loads from old industrial areas, but there are many more (less expensive) options available that may be, in aggregate, just as effective. We encourage Permittees to work rapidly toward developing the appropriate suite of control measures to implement themselves along with exercising their legal authority to compel action by owners of private properties discharging PCBs to the municipal storm drain system. We note that control measure implementation on private property compelled through the legal authority of Permittees would not be a cost borne by Permittees, but rather the owner of the private property where the PCBs are managed. Permittees claim that a large portion of the PCBs are coming from private properties so compelling private property owners to address this contamination will greatly reduce the costs borne by the Permittees themselves. For example, Permittees can require permits for discharges from private properties and can recoup costs associated with permits because these are not subject to Proposition 218 constraints on the collection of such fees.

The Permit provides flexibility for Permittees to choose the right solution to fit the circumstances. In fact, in developing the Permit requirements, Permittees have sought

such flexibility. In this light, it is somewhat surprising that some comments urge the Water Board to stipulate that "Permittees prioritize installation of trash capture devices in old industrial areas or that contaminated sediment in storm drains and channels should be prioritized for removal and disposal." Permittees are free to implement these measures as a priority if they so choose, and those measures will be credited according to their load reduction benefit. It is not necessary for the Permit to stipulate that they are a priority. Likewise, the observation that diversion to wastewater treatment facilities are not under the authority of stormwater permittees is not relevant. If Permittees can arrange for a wastewater treatment facility to accept the stormwater, then the load reduction or acreage credit will be realized. The Permit merely signals that load reductions through such an arrangement will be recognized but does not require that such diversion is established or even sought.

Requiring compliance with C.11/12.c does not constitute a requirement to circumvent the green infrastructure plans developed by Permittees. The Tentative Order contains a number of requirements throughout many provisions, and Permittees must comply with them all. In this respect, it is not appropriate or helpful to portray permit compliance as a "zero sum game" in which resources allocated for control measure implementation in old industrial areas to achieve C.11/12.c compliance must necessarily come at the expense of GSI implementation elsewhere. We also reject the contention that disadvantaged or underserved communities are better served through GSI installation in their neighborhoods rather than taking steps to reduce the PCBs discharged to the Bay that result in ongoing contamination of fish consumed by these same communities. Both GSI implementation and reducing PCBs concentrations in the fish they consume will benefit these communities. Permittees have obligations and permit requirements related to these and many other objectives, and Permittees need to attend to them all rather than present the false choice that attending to one prevents action on the other.

Master Response Identifier: C.11/12 – 2

Comment Identifiers: SMCWPPP comments 28, 29, and 271; San Jose comments 6, 7, 39, and 40 ACCWP comments a5 and 70; CCCWP comments 78 and 80, comment 6 jointly submitted by Oakland and San Jose, and City of Oakland comment 38

Provision No.: C.11.c and C.12.c

Comment: *Performance Metrics for C.11/12.c*

> *Permittee comments on C.11/12.c performance metrics include two major themes: First, Permittees object to the required submittal of an implementation plan for C.11/12.c in the 2023 Annual Report, which they feel leaves them not enough time to plan for these actions. Accordingly, Permittees request the requirements to be phased in over more time, so they are not required to begin implementation until they do more thorough planning and data collection. Second, Permittees request that the performance metric (acres of old industrial land use addressed) should be substantially reduced.*

<u>Performance Metric Theme 1 – Allow More Time to Plan/Phase in Requirements</u>

Comment: *The specific comments on this theme include the following:*

- *The submittal date for implementation plans three months after the effective date of the permit is too soon.*
- *Preparing the plans will require significant staff time and resources to develop such a detailed report or plan and schedule that includes maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.*
- *The permit should only require an annual submittal of a treatment plan for the acres of old industrial area shown to have elevated levels of PCBs by the monitoring conducted in the previous Water Year. The first plan would be submitted by March 31, 2023, for all areas found to be moderate from the date of permit adoption.*
- *The requirements should be phased-in over additional years and permit terms to allow enough time for permittees to:*
    - *Develop a long-term plan for old industrial areas that identifies (as feasible) the specific geographic areas projected to redevelop, considers realistic time horizons for redevelopment, the added potential benefit of progressive policies to address roadway frontages as part of redevelopment, efforts to control trash discharges, and enhanced efforts to further characterize drainages and identify source properties.*
    - *Gather additional monitoring data in old industrial areas to better delineate hot, moderate, and cold areas relative to PCBs concentrations and mass loadings.*
    - *Focus resources on working with property owners to attempt to identify all PCBs source properties in high and moderate areas and "turn off the tap" by referring or cleaning up these sources.*
    - *Pilot test new techniques such as PCBs detection dogs to help screen suspect locations and potentially enhance the success of source property identification efforts, as part of integrated PCBs source identification efforts that would include working with city inspectors to attempt to gain access to private properties as need]ed and other techniques in the PCBs toolbox.*
    - *Characterize PCBs concentrations in additional composite stormwater runoff samples collected from the bottom of selected urban catchments of interest, based on the potential to contain sources of PCBs.*

Response: We recommend making a modification to Provisions C.11/12.c.iii(1) for reporting the plans and schedules for implementing control measures in old industrial areas. We have revised the deadline for this reporting to March 31, 2023. This modification provides additional time to prepare these plans. We expect Permittees to use this additional time to prepare substantive plans containing the information required in these provisions. Allowing any more time than the modified deadline would further

delay addressing the moderately contaminated old industrial areas as required by Provisions C.11/12.c. Additionally, Permittees should have established a foundation on which to build these plans based on work completed during MRP2. Water Board staff have been urging Permittees to address PCBs contamination in old industrial areas (the objective of Provisions C.12.c) since 2014, prior to the adoption of MRP2. Prior to MRP2, Permittees expressed a preference for programmatic approach for C.11/12 provisions in MRP2. This would have required Permittees to use the information already available at that time concerning the distribution of PCBs in the urban environment (solid evidence of moderate to high concentrations in old industrial areas) to develop robust implementation plans across the region to address these contaminated areas. Unfortunately, despite the prompt from Water Board staff, Permittees failed to develop ***any*** implementation plans for PCBs-contaminated portions of the MRP area during MRP2 development. Consequently, requirements were included in MRP2 for Permittees to develop these plans and identify areas of concern in every municipality. In addition, this lack of proactive implementation plan development led directly to the need to include specific PCBs load reduction requirements in MRP2.

Because Permittees did not proactively develop proposals for implementation plans for known areas of PCBs contamination during the development of MRP2, MRP2 contained the following requirements for identification of contaminated areas and planning for implementation:

> *The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit along with the specific control measures that are currently being implemented and those that will be implemented in these watersheds and management areas and an implementation schedule for these control measures. In addition to the list of watersheds and management areas, this report shall include:*
>
> *a. The number, type, and locations and/or frequency (if applicable) of control measures;*
>
> *b. A cumulative listing of all potentially PCB-contaminated sites Permittees have discovered and referred to the Water Board to date, with a brief summary description of each site and where to obtain further information;*
>
> *c. The description, scope, and start date, of PCBs control measures;*
>
> *d. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement; and*
>
> *e. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.12.a.ii(2).*

In MRP2, this provision used the term “watershed management area” or WMA. However, it is clear from the information submitted by Permittees that watershed management areas were mainly in old industrial areas. In fact, the areas designated as

"high interest" in the SCVURPPP (2016) reporting were defined as "*parcels, broader land areas, or stormwater catchments associated with old industrial land uses that have a relatively high likelihood of having elevated concentrations of PCBs (≥ 0.5 mg/kg) or mercury (>1.0 mg/kg) in street dirt, sediment from the MS4, or in stormwater runoff*." Similar definitions were included in the 2016 reports from the other countywide programs. Further, the SCVURPPP report identifies 139 stormwater catchments of interest across multiple municipalities in Santa Clara County. The other countywide programs used different terminology but also identified WMAs and prepared maps of those WMAs in all the municipalities, and those WMAs are almost all in old industrial land use. Notice here that the concentration threshold was higher (0.5 mg/kg compared to 0.2 mg/kg) to identify WMAs in contrast to the threshold for old industrial implementation in MRP3. However, these WMA areas identified in 2016 should be candidates for immediate action since they have already been identified. The important point here is that Permittees already have a lot of information about the highest priority old industrial areas, and they have had this information since 2016, but have declined to pursue more aggressive action.

The figure below is just one of the dozens of similar maps prepared by the Permittees in March 2016. This is a map of a portion of Oakland showing mapped areas of high interest old industrial area, the concentrations of samples, and contaminated properties.

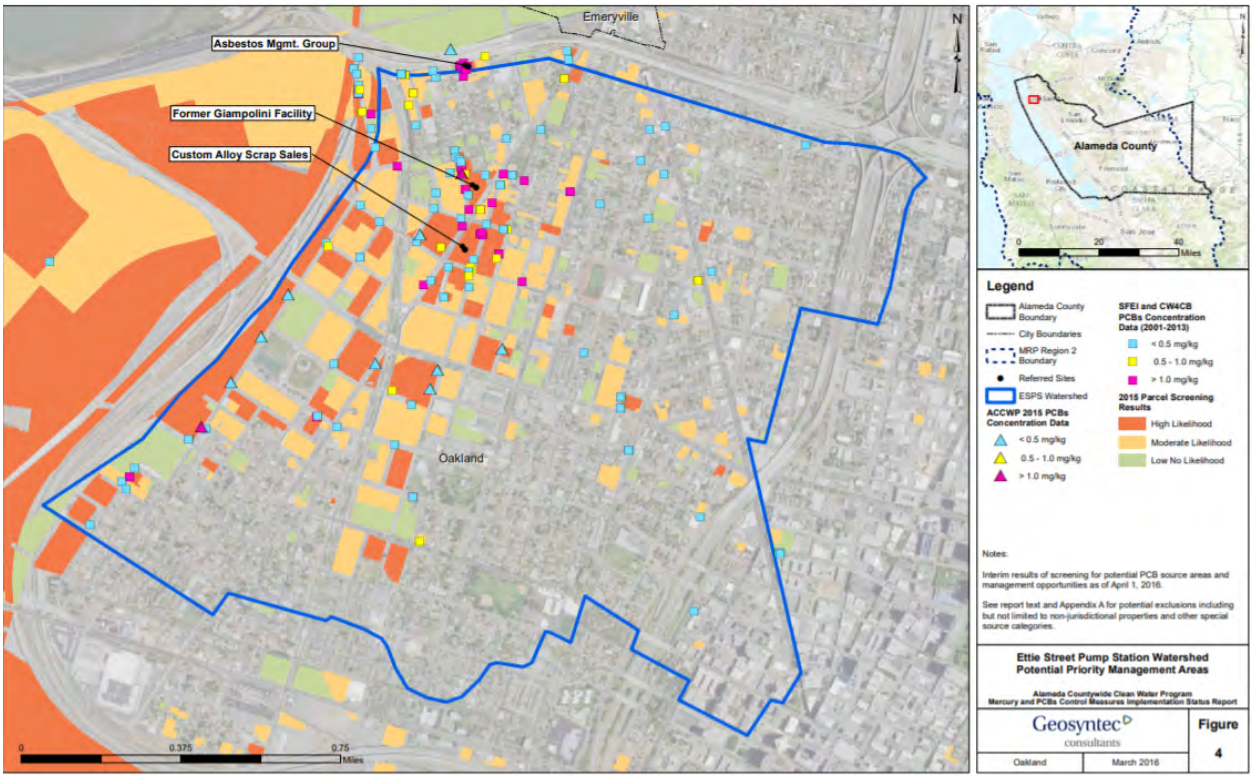

Notice how much information was known about the locations of "high likelihood" parcels. This map and dozens of other similar maps produced by Permittees in 2016 demonstrate that Permittees are not "starting from scratch" in planning for implementation in old industrial areas. On the contrary, there is a strong starting point from their earlier work. In 2016, Permittees made maps of the old industrial areas and

had identified priority catchments and parcels likely to be contaminated, and they had information mapped about monitoring results in relation to these areas. Because of intensive sampling in old industrial areas starting in the early 2000s, MRP Permittees have known well before the adoption of MRP 2 that nearly all moderate and high PCBs contamination is found in old industrial land use. In fact, by March of 2016, Permittees had developed maps of watershed management areas (mainly old industrial areas) and had identified specific catchments as priorities for implementation.

By Fall of 2016, Permittees had submitted implementation plans for these priority catchments (SCVURPPP 2016, SMCWPPP 2016, ACCWP 2016, and CCCWP 2016). However, these plans were not comprehensive as they relied almost exclusively on: identification and referral of source properties, load reductions from the building demolition program (a requirement to which Permittees objected during the permit adoption process), incidental load reductions from green stormwater infrastructure implementation unrelated to PCBs, and small, incidental PCBs load reductions resulting from implementation of trash control devices (also not targeting PCBs). There is also ongoing street sweeping and some other operation and maintenance activities like inlet cleaning.

Despite the extensive knowledge of the old industrial watersheds, their degree of contamination, and the location of parcels likely contributing to this contamination, there has been little effort, if any, to address these parcels directly using municipal authority or to target these areas for other control measure implementation. We additionally note that in the green infrastructure component of Permittees implementation plans, there are very few, if any, green stormwater infrastructure projects that were selected in order to address contaminated parcels. Rather, the small PCBs load reductions from this activity is the result of redevelopment or implementation required by C.3 that was going to happen anyway. Permittees have made very little, if any, attempt to direct treatment control measures to the moderately contaminated old industrial areas. Up to now, their PCBs implementation approach has been passive in that it relies on load reductions achieved through actions by other entities (source property remediation, demolition sites, redevelopment, etc.). Permittees have claimed in comments that the majority of PCBs are coming from private parcels, and they may have convincing evidence of this from monitoring data collected over the last 20 years. However, Permittees have been unwilling to use their direct authority to compel private property owners to manage PCBs on-site to prevent transport to MS4s.

Permittee comments on the MRP 3 TO incorrectly assert or imply that proposed requirements for old industrial areas are so new and unexpected that Permittees will need several more years to plan in order to find these old industrial areas and make maps and collect more data and plan for implementation. Permittees already have information to support control measure implementation immediately, *at the very least* in the priority catchments identified in 2016.

The last part of the history that is relevant to this issue concerns the discussions that took place in early 2020 between Permittees and the Water Board in planning for MRP 3 requirements. At that time, Permittees expressed a preference for a “programmatic approach” to control measure implementation rather than the approach used in MRP 2 where a specific PCBs load reduction performance metric was used. A programmatic

approach prescribes a level of effort performance metric for a particular control measure implementation program, in lieu of a load reduction performance metric. Water Board staff and management agreed to consider this approach as long as it included a control measure implementation program for old industrial areas. Unfortunately, and despite repeated reminders, Permittees failed to produce a program plan with performance metrics targeting these areas in draft proposals for the elements of a programmatic approach for MRP 3. Consequently, the Water Board was compelled to include the requirements for this element as C.11/12.c.

One of the Permittee comments on this theme illustrates the lack of proactivity and the unwillingness to use existing information to build implementation strategies.

> *The permit should **only require an annual submittal** of a treatment plan for the acres of old industrial area shown to have elevated levels of PCBs **by the monitoring conducted in the previous Water Year**. The first plan would be submitted by March 31, 2023 for all areas found to be moderate from the date of permit adoption.*

Despite 20 years of data collection in old industrial areas and the compilation of information available in 2016 submittals, this comment suggests that none of that information exists and suggests that the Water Board should only be requiring implementation plans developed year by year based on monitoring results conducted *in this permit term* and only if they *happen to locate* elevated levels of PCBs. If this approach were adopted and if no monitoring were conducted or no moderately contaminated areas were located in a given year, then no implementation planning would be required for the subsequent year. Given the possibility of this perverse outcome, this is not an acceptable approach. Nor does it make use of the data collected and compiled in the past.

In order for a flexible (rather than “command and control”) regulatory approach to be effective, the regulated parties must use available information and proactively implement control measures without being forced to do so. In view of the history of PCBs implementation by MRP Permittees in old industrial areas, one must conclude that Permittees have approached PCBs implementation reluctantly, rather than proactively. Permittees knew about the high PCBs concentrations of building materials in demolition sites as early as 2011, but they did not initiate any efforts to address this source and vigorously objected to inclusion of requirements in MRP 2 to implement such a program. This program currently accounts for a large proportion of the credited PCBs load reductions.

Permittees have known for at least a decade, based on extensive monitoring data, that old industrial land use was contaminated with PCBs, and, by 2016, they had mapped the most likely parcels requiring attention in these areas (see the map above as just one of dozens of examples). In 2014 during discussions to plan the development of MRP 2, Permittees were encouraged to design, on their own initiative, a program of implementation to address priority watershed management areas (old industrial areas) for inclusion in MRP 2. Permittees declined to do so. Accordingly, the Water Board required these WMA plans as part of MRP 2 and also required specific load reduction performance metric as a direct result of this failure on the part of Permittees to take the

initiative in planning implementation. Similarly, in early 2020, during early discussions between Permittees and Water Board staff to plan for MRP 3, Water Board staff urged Permittees to design a more targeted program of implementation (building off WMA efforts in MRP 2) to target the moderately contaminated portions of old industrial areas. Water Board staff clearly emphasized that inclusion of a program for old industrial areas was an explicit condition of considering a programmatic approach for C.12 implementation. Once again, Permittees declined to offer any implementation program for old industrial areas. Now that these requirements appear in the TO, Permittees request more time to "*gather additional monitoring data in old industrial areas to better delineate hot, moderate, and cold areas relative to PCBs concentrations and mass loadings and work with owners of private properties to turn off the tap and to pilot test new PCBs detection techniques and do more planning for implementation of control measures.*"

Allowing more time sweeps aside this history of delay and rewards inaction on PCBs implementation efforts in general and for old industrial areas in particular. Implementation planning for old industrial areas should have been an ongoing and continuous process since the beginning of MRP 2. That this has not happened and does not entitle Permittees to delay even further by allowing the planning to occur in the early phase of MRP 3. There is a significant amount of time between now and the scheduled due date for the reporting in the 2023 Annual Report. Permittees should use this significant amount time augment their 2016 WMA implementation plans with more recent information and meet the reporting requirements for Provision C.11.12/c in the TO.

Permittee comments on C.11/12.c indicate an understanding of what needs to be accomplished to develop implementation plans for old industrial areas. However, for the reasons stated above, it is inappropriate to allow yet more time to plan for implementation. Many Permittee commenters claim that most of the PCBs entering the MS4s are coming from private parcels. Permittees use this claim to argue against imposing requirements for control measure implementation in the public-right-of-way (see Flexibility Theme 2 – PCBs on private property vs. public rights-of-way). Permittees also suggest that PCBs on private parcels should be addressed either by referring these properties to the Water Board (when highly contaminated) or through ongoing redevelopment. However, Permittees have other options to accelerate the process to prevent these PCBs from entering the MS4. They can immediately exercise their authority to compel private landowners to take action. Doing so should not require the years long process claimed by Permittees to select a location to implement a control measure, designing, sizing and constructing the device. It simply requires Permittees to exercise their authority to regulate discharges into its stormwater system. If what Permittees claim regarding the importance of private parcels and PCBs is true, then many moderately contaminated private parcels can be addressed immediately in this fashion. C.11/12.c recognizes such enforcement as counting toward achievement of the performance metric.

Performance Metric Theme 2 – Adjust Performance Metrics Downward

This theme can be accurately represented by the following comment.

Comment:

> *"Adjust performance metrics downwards to achievable, practicable level. The actions required over the MRP 3 permit term should focus on addressing a realistic portion of the amount of old industrial land use areas currently identified via monitoring (and not redeveloped or treated by green infrastructure) to have moderate levels of PCBs. MRP 3 should require that a plan be developed early in the permit term to describe the process and actions that permittees can implement or cause to be implemented to address PCBs on these properties over the permit term."*

Response: The portion of the comment requesting "that a plan should be developed early in the permit term" was addressed in the previous comment response section. The request by Permittees "to adjust the performance metrics downward to achievable, practicable levels, and to be focused on addressing a realistic portion of the amount of old industrial land use areas currently identified via monitoring to have moderate levels of PCBs" is related to claims about the amount of old industrial land use addressed below. In other words, Permittees have submitted arguments concerning what they have determined is the amount of old industrial land use with moderate levels of contamination. Permittees then request that they should only be required to address some portion of that area. See below for a response to that issue. We focus here on achievability and practicability. We address the claims about the amount of land use below.

Motivated, in part, by this comment we recommend reducing the C.11/12.c performance metrics for Alameda and Contra Costa Counties. Originally, the Tentative Order required Alamada County Permittees to implement control measures on 937 acres of old industrial landuse and required Contra Costa Permittees to implement control measures on 1,119 acres of old industrial land use. The revised Tentative Order requires implementation on 664 acres of old industrial land use use for both these Countywide programs. This amount of acreage is the greater of the performance metrics from the other two large Countywide programs (Santa Clara and San Mateo). The revised acreage eliminates the large disparity in level of effort among the Countywide stormwater management programs, yet still results in a substantial amount of control measure implementation (addressing 2,580 acres) as well as substantial estimated PCBs load reduction (467 grams/year). More information about the modification is provided in the Fact Sheet discussion for Provision C.12.c.

The expected scale of control measure implementation (2,580 acres throughout the region) required by Provisions C.11/12.c is very similar to the anticipated level of effort for Caltrans in the SF Bay Region, in which Caltrans will implement best management practices, including ***treatment controls,*** on approximately 11 percent of their 27,000 acres of right-of-way for a total of more than 2,900 acres (draft Caltrans permit). The scale of the C.11/12.c performance metric was selected, in part, based on the level of

effort expected of Caltrans and also to make meaningful progress in achieving the mercury and PCBs TMDLs by addressing old industrial land use to reduce loads of mercury and PCBs. As noted in a previous response above, 25 percent of the more than 1,200 samples collected in old industrial areas have exceeded 0.21 mg PCBs/kg. This implies that roughly 25% (8200 acres) of the 33,100 acres of old industrial land use would be considered moderately contaminated. We are calling for control measure implementation on a substantial portion, but not all, of this area.

Compliance with the C.11/12.c performance metric will likely not require Permittees themselves to construct treatment facilities to treat 2,580 acres of old industrial land use. According to the arguments submitted by Permittees, the majority of PCBs-generating areas are on private parcels. Assuming this is true, this implies that the need for Permittees to construct treatment facilities or other control measures will be reduced in direct proportion to the degree to private property is the source of PCBs to MS4s. This is true because the pathway to achieving compliance with the performance metric will involve Permittees exercising their legal authority to compel private property owners to address the discharges coming from these properties. Permittees have several options in this regard. First, as explained previously, control measures implemented on private parcels to prevent PCBs from entering MS4s from those parcels can be counted toward achievement of the performance metric if this implementation is documented. Second, municipalities could establish permit conditions for private landowners (discharging to public ROW) requiring them to contribute to treatment controls in municipal ROWs that receive the discharges. Control measures implemented on private property and the control measures implemented in the public ROW would both be recognized as counting toward fulfillment of the MRP (C.11/12.c) performance requirements. Therefore, according to arguments submitted by Permittees concerning the distribution of PCBs-generating areas, the implementation burden could be reduced on Permittees and be distributed throughout the region to the private parcels which are contributing PCBs to the MS4. We emphasize again that Permittees are responsible for exercising their authority to compel private landowners to address these PCBs.

We have reduced the performance metric from 3,300 acres to 2,580 acres, combined for all Permittees. However, we conclude that it is not necessary to further reduce the performance metric as requested. Achievement of the 2,580-acre performance metric is not likely going to be achieved by Permittees constructing treatment facilities in the public rights-of-way. It will be achieved through a combination of treatment facilities and other control measures implemented by Permittees in the public rights-of-way as well as treatment facilities and other control measures implemented on private properties. The Permittees have a responsibility to compel control measure implementation on private property because they are responsible for the PCBs that enter the MS4s from private property.

Amount of Remaining Old Industrial Land Use Theme

Master Response Identifier: C.11/12 – 3

Comment Identifiers: SCVURPPP-142, CCCWP-74,75, 78, ACCWP-67, and SMCWPPP-28

Provision No.: C.11.c and C.12.c

The four countywide urban runoff control programs have submitted comments citing their own analyses of the amount of remaining old industrial land use, the disposition of this land use in terms of private and public ownership, and the magnitude of PCBs contamination. These claims have been used as part of a general argument that the performance metric of C.12.c should be lowered. Because the nature of the claims and support for the claims are specific to the commenting entity, we will respond separately for the four countywide programs.

Santa Clara Urban Runoff Pollution Prevention Program (Comment SCVURPPP-142)**Comment**: *The TO currently requires SCVURPPP co-permittees to address 664 acres of old industrial/moderate areas during the permit term with 70% treatment efficiency. This level of effort is not feasible within the five-year permit term based on the high cost of treatment controls and the time it takes to plan and implement controls.*

Response: The claim about the level of effort not being feasible seems largely predicated upon the assumption that the performance metric must be met exclusively through treatment controls constructed and installed by the Permittee themselves. Provision C.12.c does not require the 664 acres to be accomplished exclusively through installation of treatment controls, which is clear from the language of the provision. Moreover, as has been previously discussed, a significant portion of the acreage (according to commenting Permittees) is on private lands. These acres may be credited as addressed if Permittees exercise their authority to compel action by private landowners. This will reduce the implementation burden on municipalities substantially if the claims about the role of private parcels is correct.

The comment presents the results of a screening study of old industrial land use to argue that the level of effort represented by the performance metric (664 acres) exceeds the amount of moderately-contaminated old industrial land use remaining in Santa Clara County. The comment then provides the results of a screening procedure of Santa Clara County old industrial land use that concludes that of the 5,676 acres of old industrial land use not redeveloped or treated with GSI since 2002, only an estimated 230 acres were confirmed as moderately contaminated and an additional 140 acres as possibly moderately contaminated. The information submitted in the comment related to the screening procedure is not sufficient to support the conclusions stated in the comment that only up to 370 acres of old industrial land use in Santa Clara County could be considered moderately contaminated.

First, according to the analysis, the 72 catchment-scale stormwater samples were each associated with about 22 acres of land use. This means that the contamination status of over 1,500 acres of land use was screened based on these 72 stormwater samples. The comment does not provide sufficient details to explain how stormwater data were used to establish that the catchment area represented by the stormwater sample was above or below the 0.2 mg/kg threshold associated with moderate contamination. The comment refers to a screening procedure, but there is no explanation as to how these 1,500 acres were evaluated. Moreover, drawing conclusions about all of the parcels contributing to a stormwater monitoring location for a single storm event is not a sound procedure based on what has been learned about the variability of contaminant loading and concentrations in different storms. Thus, results from one storm cannot be considered definitive. Depending on the source release characteristics and the size of the storm event, it is not possible to rule out the presence of moderate contamination in these catchments. For example, the storm sampled may not have resulted in mobilization of PCBs from the source area in the catchment because of the storm intensity, antecedent conditions, or the time of year. And, stormwater from cleaner portions of the catchment could have diluted the influence of moderately contaminated portions of the catchment. There is no information provided in the comment that allows for an evaluation of the soundness of the way the data were used or how the data variability was addressed. Without this information, the soundness of the screening procedure methods cannot be ascertained, and the conclusions drawn from the procedure cannot be fully evaluated. Accordingly, the information submitted in the comment relative to the screening procedure is not sufficient to support the conclusions stated in the comment.

Similarly, the same lack of transparency in the screening approach using the 372 sediment samples prevents the evaluation of the robustness of the conclusions drawn from these data. The information submitted in the comment is not sufficient to support the conclusion of the screening procedure applied to the sediment samples. These 372 sediment samples represented about 1,100 acres of old industrial land use. The comment states that the screening procedure associated each sediment sample with parcels adjacent to the public ROW sampling location or immediately upstream of the sampling location. However, the comment does not contain any information as to how the acres were determined to be low, moderate or high PCBs-generating areas. Rather, the comment simply states that a screening procedure was used along with conclusions concerning the results. The information submitted in the comment relative to the screening procedure is not sufficient to evaluate the soundness of the procedure, and the submitted information does not adequately support the conclusions stated in the comment.

Third, based on the screening procedures, the comment states that only 9% of the old industrial area screened “appears to generate moderate to high levels of PCBs.” The comment then applies this 9% ratio to the 2,004 acres not yet screened after subtracting out 600 acres for which trash treatment controls are in place. Applying this ratio, the

comment reports an estimated additional 140 acres of moderate to high PCBs-generating old industrial land use.

The screening procedures described in the comment have likely underestimated the moderately contaminated old industrial land use area in Santa Clara County. First, the information submitted in the comment relative to the screening procedure is not sufficient to evaluate the soundness of the procedure, and the submitted information does not support the conclusions stated in the comment. For example, there is no justification supplied in the comment for applying to unscreened areas the 9% ratio for moderate contamination. Due to the lack of transparency in the explanation of screening methods, it is not possible to evaluate the soundness of the 9% ratio obtained for the screened areas. The results reported in the comment are notably inconsistent with the distribution of PCBs concentration in old industrial land use throughout the Bay Area. The comment reports on the results of a screening analysis suggesting that only 9% of Santa Clara County old industrial land use can be characterized as moderate to high PCBs-generating, but 25% of the 1,200 samples collected in old industrial land use throughout the region have a concentration above 0.21 mg/kg. Based on the concerns about methodology described above, Water Board concludes that a more realistic and supportable value for the proportion of moderately contaminated old industrial land use is 25%. Applying this ratio to the 4,723 acres of old industrial land use claimed to be remaining yields a value of 1,180 acres, which is a better estimate of the old industrial landuse in Santa Clara County likely to be moderately contaminated (> 0.2 mg PCBs/kg). Because of the comment did not provide adequate support for the claimed amount of old industrial landuse, we will not make the modifications to C.12.c requested in the comment. The performance metric for Santa Clara County to implement or cause to be implemented control measures to address 664 acres of old industrial land use is appropriate. Additionally, we note that areas with PCBs concentrations less than 0.2 mg PCBs/kg still represent PCBs concentrations greater than those found in the Bay margin. Thus, these areas contribute to ongoing contamination and merit control.

<u>Alameda Countywide Clean Water Program (Comment ACCWP - 67, 68)</u>

Comment*: Comments 67 and 68 have been condensed as follows. ACCWP performed a desktop analysis of stormwater treatment opportunities in old industrial areas and concludes that the estimated amount of old industrial land use in Alameda County subject to control measure implementation is 4,869. The comment requests that the permit should be revised to incorporate a "reasonable level of effort" as the performance metric for C.12.c. The comment states that the "reasonable level of effort" is to limit implementation only to areas that have been identified as moderately contaminated according to screening procedures used by Alameda County. The comment states that only 124 acres have been currently identified as moderately contaminated old industrial land use in the county. The comment suggests that additional moderate areas would be addressed as they are identified through the C.12.b monitoring process. The comment also claims that sediment data collected in old industrial areas throughout the MRP area*

show that approximately 15% of samples are in the moderate range, and that this suggests that an additional 393 acres (15% of the 2,620 acres to be screened as required by Provision C.12.b) may be found to be moderate through ongoing monitoring.

ACCWP comments also state that treatment control measures should not be required to be implemented on areas that do not have elevated levels of PCBs, and that building stormwater treatment facilities on public parcels or ROW with no or low PCBs will not meet this objective. Areas should be found to have an elevated level of PCBs and to drain into the ROW prior to planning treatment for the area.

Response: In response to the last portion of the comment, we have already explained how C.12.c does not "require treatment control measures" and that the provision provides flexibility in achieving the performance metric (see response to Comment SCVURPPP-142). The figure shown above for Oakland (submitted in 2016) by ACCWP shows several high priority parcels already identified for that one portion of a single city. Permittees have already established a solid foundation for taking immediate implementation action, including exercising direct use of municipal authority on previously identified high priority parcels.

The comment cites an estimate for the total amount of old industrial land use in Alameda County as 12,760 but then presents a series of claims seeking to reduce the amount subject to any implementation requirements. There are several problems with the analysis presented in the comment and the conclusions drawn thereon. We will go through each in turn.

First, the comment suggests that 2,400 acres should be subtracted from this total because these areas have been monitored and shown to have low PCBs. The comment does not include any substantiating information of this figure in comments on the tentative order, but did include the following table as part of comments on the administrative draft. There was no information presented describing how the analysis was conducted, however.

Table 1. Old Industrial Area Monitored and Found to be Low PCBs (<0.2 mg/kg)

Permittee	Old Industrial Parcel Area Adjacent to Samples with Low PCBs (acres)	Old Industrial Area in a Watershed with Maximum Result of <0.2 mg/kg PCBs (acres)
Alameda	-	-
Alameda County	-	14
Albany	0	3
Berkeley	32	141
Dublin	-	-
Emeryville	8	-
Fremont	202	648
Hayward	117	148
Livermore	-	-
Newark	-	110
Oakland	115	215
Pleasanton	-	-
San Leandro	60	472
Union City	-	116
Alameda County Total	**534**	**1,866**

Old Industrial Area Monitored and Found to be Low PCBs (acres)	**2,400**

However, the comment did not provide any description of the methods by which these numbers were calculated. One must, therefore, draw inferences from the information presented in the table. First, the table suggests that 534 acres of old industrial land use should be considered low PCBs because this is the sum of the parcel areas adjacent to a sediment sampling location containing low PCBs. However, there is no information provided to confirm that this is a sound assumption. For example, if a parcel drains to the west, and the sediment sample taken adjacent to that parcel was taken on the east side of the parcel, then the low concentration in this sediment sample provides no definitive information as to the concentration on the parcel. Similarly, some parcels may contribute PCBs to the MS4 through direct connections to the storm drain network, and this would not be ascertained through a surface sample. The table also asserts that 1866 acres of old industrial land use should be considered as having low PCBs because this is the watershed area in which the maximum result is less than 0.2 mg/kg. This cannot be relied upon as definitive without much more information. For example, in the city of Fremont alone, 648 acres of old industrial land use were excluded using this approach. One does not know if this claim is based on one sample, two samples, or many more. The legitimacy of the claim is wholly dependent on how well the available data represents the area in question and the quality of the spatial coverage. There is no information in the comment letter to support the claim that 2,400 acres has been reliably determined to be “low PCBs areas.” Rather, the comment simply *states* that a screening procedure was used along with conclusions concerning the results. The information submitted in the comment relative to the screening procedure is not sufficient to

evaluate the soundness of the procedure, and the submitted information does not adequately support the conclusions stated in the comment.

The comment also asserts that 1,823 acres should be removed from the tally of Alameda County old industrial land use because it is deemed "non-jurisdictional," The properties in this category are Lawrence Berkeley National Lab (LLNL), Coast Guard Island, Alameda Naval Air Station, and Caltrans ROW.[32] The comment also claims that an additional 769 acres of "railroad parcels" should be excluded from the tally. It is not possible based on information provided to confirm if these "non-jurisdictional" or railroad parcels do not drain to MS4s. Therefore, from the information provided, the Water Board cannot accept the assertion that the amount of Alameda County old industrial land use should exclude all or any of these so-called "non-jurisdictional" or railroad parcel areas. The Permittees are responsible for PCBs in their MS4s regardless of sources. The type of sources may affect the appropriate control action (e.g., source control or treatment control). Therefore, it is not appropriate to exclude these areas from the total amount of old industrial land use in Alameda County.

The comment requests that the performance metric for Alameda County should be limited to the 124 acres of area "currently identified (through Alameda County's screening procedures) as moderately contaminated." The comment also suggests that the permit should require implementation on additional moderately contaminated areas only as they are discovered through monitoring associated with Provision C.12.b. The comment estimates this amount as 15% of the amount of old industrial land use required to be investigated by Provision C.12.b. First, the comment erroneously cited 15% as the proportion of old industrial land use considered moderately contaminated according to data collection. The value cited in the SCLRA (2021, Appendix B Table B-1) report states that the 25th percentile of data collected in ***old industrial land use*** is 0.21 mg PCB/kg. This implies that greater than 25% of this land use will have concentrations greater than 0.2 mg PCBs/kg. We also note that the comment asserts that 2,577 acres of old industrial land use have been addressed through treatment. Assuming the time period over which this treatment was installed is approximately 15 years, this suggests that approximately 860 acres have been addressed through treatment during each of the three five-year periods during this time. This comment suggests that the appropriate level of effort for MRP3 is roughly 1/7th the pace of treatment implementation over the previous 15 or so years. The performance metric for Alameda County for Provision C.12.c stated in the revised Tentative Order (664 acres) is somewhat less than the average pace of treatment control implementation over the last 15 years. Moreover, as previously explained, the performance metric can be met through means other than treatment control installed by Permittees in the public rights-

[32] We note that federal facilities "engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants . . . shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity. . . ." 33 U.S.C. § 1313.

of-way. Therefore, we will not modify the performance metric to what Alameda County claims is the amount of currently identified moderately contaminated land use area (124 acres). The conclusions drawn from the screening study leading to this amount of land use are not supported by evidence. This amount of land use is very small in comparison to and inconsistent with the expected proportion (25%) of moderately contaminated old industrial land use. The small scale of implementation resulting from addressing just 124 acres is much smaller than the pace of implementation over the previous 15 years and is insufficient to make meaningful progress to attain the PCBs TMDL wasteload allocations.

Finally, the comment's proposal to link future control measure implementation in old industrial areas to the outcome of sampling to locate source properties is not sound from a permitting perspective. Because Permittees are not specifically required to conduct sampling on the 2,620 acres to be investigated for compliance with C.12.b, linking implementation requirements to the outcomes of this sampling creates a perverse incentive to locate source properties in such a fashion that does not rely on sampling. This is inappropriate. It may be the case that Permittees could comply with the requirements of C.12.b in such a fashion as to conduct very little monitoring. There is no specific amount of monitoring required, and the style of monitoring to locate or confirm source properties may not be effective to locate moderately contaminated areas. Further, the pace of accomplishing the source property investigations is up to the Permittee as long as the performance metric is met by the end of the Permit term. Therefore, Permittees could comply with the requirements of C.12.b in such a fashion as to conduct very little sampling and, thus, not discover any additional moderately contaminated old industrial areas subject to control measure implementation per Provision C.12.c.

<u>San Mateo Countywide Water Pollution Prevention Program (SMCWPPP-28)</u>

Comment: *The performance metrics in the Tentative Order should be adjusted downwards to achievable, practicable levels. We request that the actions required over the MRP 3 permit term focus on addressing a realistic portion of the about 300 acres of old industrial land use areas currently identified via monitoring (and not redeveloped or treated by green infrastructure) to have moderate levels of PCBs. MRP 3 should require that a plan be developed early in the permit term to describe the process and actions that permittees can implement or cause to be implemented to address PCBs on these properties over the permit term.*

Response: Planning for control measure implementation should be completed or well underway as part of development of the old industrial area program. The contamination in old industrial areas has been recognized for over a decade. Allowing yet more time to plan and delay action is not appropriate. We also respond to this suggestion more substantially in the response to *Comment C.11/12.c Performance Metric Theme 1 – Allow More Time to Plan/Phase in Requirements*. The comment does not contain information to substantiate the claim that only 300 acres of old industrial land use has

been identified as having moderate levels of PCBs (> 0.2 mg PCB/kg). Based on the regionwide data collection, one would expect that about 1,100 acres would have moderate levels of PCBs (25% of the 4,450 acres of San Mateo County's old industrial land use). Moreover, information previously submitted by SMCWPPP demonstrates that, even as early as 2016, the spatial scale of moderate to high PCBs contamination in San Mateo County was understood to be much greater than 300 acres.

SMCWPPP submitted, as part of its 2016 Annual Report, information about identified watershed management areas (WMAs) in the county (SMCWPPP 2016). In this report, SMCWPPP identified high interest parcels[33] and catchments of interest, which are catchments with a high density of high interest parcels. The number of high interest parcels reported was 1,579 and 4,004 were deemed potential high interest parcels. The report also included a map of all 1,579 high interest parcels. However, the screening concentration used (0.5 mg PCBs/kg) is much higher than the definition of moderate contamination used for Provision C.12.c so the high interest parcels and catchments of interest reported in 2016 are an underestimate of the extent of moderate contamination in San Mateo County. Nevertheless, the report notes that "110 catchments with high densities of high interest parcels, designated catchments of interest" were identified. The report explains that "a confirmed WMA is a catchment with two or more elevated sediment samples (≥ 0.5 mg PCBs/kg) and a catchment with a single sediment sample elevated for PCBs is designated a potential WMA. The remaining catchments (n = 100) are designated remaining catchments of interest." The measured PCBs concentrations in the 10 confirmed or potential WMAs ranged from 0.57 mg PCBs/kg to 192 mg PCBs/kg. Further, the total watershed area for these 10 catchments was over 3,600 acres, and the total area of the high interest parcels contained within just these catchments totaled 511 acres. The Provision C.12.c performance metric for San Mateo County is 445 acres, which is very close to the total area of the high interest parcels contained in these 10 catchments of interest reported in 2016. We emphasize again that these 10 catchments were identified in 2016 as having PCBs concentrations ≥ 0.5 mg PCBs/kg. The number of catchments with concentrations ≥ 0.2 mg PCBs/kg would necessarily be greater. Additional monitoring data in San Mateo County have likely been collected since 2016 to determine if any of the other 100 catchments of interest have moderate PCBs concentrations. However, even if no additional information is available, SMCWPPP has a strong basis to begin addressing the high interest parcels already identified. SMCWPPP can immediately repeat their screening procedures on their database of monitoring data (updated with more recent sampling) using the 0.2 mg PCBs/kg concentration and identify catchments of interest as well as the high interest parcels contained within them. This is not a time-consuming process and could be done immediately.

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[33] Parcels, broader land areas, or stormwater catchments associated with land uses (most commonly old industrial, electrical, recycling, railroad, and military) that have a relatively higher likelihood of having elevated concentrations of PCBs (≥ 0.5 mg/kg) in street dirt, sediment from the MS4, or in stormwater runoff (particle concentration). These areas generally have not been redeveloped and do not contain stormwater treatment facilities.

Contra Costa County Clean Water Program (CCCWP-74,75, 78)

Comment*: The portions of comments 74, 75, 78 on this issue have been condensed as follows. CCCWP performed a desktop analysis of stormwater treatment opportunities in old industrial areas and concludes that the estimated amount of old industrial land use in Contra Costa County subject to control measure implementation is 2,661 acres (instead of the 11,200 acres cited in the Fact Sheet and Tentative Order based on information submitted by this same Permittee in Fall 2021). This conclusion is based on a calculation in which the 14,139 acres of old industrial land use was reduced by subtracting areas treated (934 acres), referred source properties (78), properties discharging directly to the Bay (1838), old industrial area monitored and determined low PCBs (3,516), Non-jurisdictional areas (4,792), and apparent railroad parcels (320). Permittees are responsible for discharges from their MS4s regardless of the source.*

The comment also claims that sediment data collected in old industrial areas throughout the MRP area show that approximately 15% of samples are in the moderate range such that approximately 399 acres of the remaining 2,661 acres may be found to be moderate through the ongoing C.12.b monitoring. The comment then requests to reduce the remaining old industrial area value for Contra Costa County in Provision C.12.c.i to 2,661 acres. The comment also suggests that a reasonable treatment area to begin with in Contra Costa County would be the old industrial area that has been identified with moderate levels of PCBs to date (77 acres). At the beginning of the permit term, Permittees will start the project development process to treat the 77 acres (10 sites) known to have moderate to high levels of PCBs concentrations.

The comment also states: "as directed by the Regional Water Board during the Tentative Order workshop, please revise the permit to incorporate a reasonable level of effort for MRP 3.0, given the cost of compliance, the limited staff resources available (both Permittee and RWQCB staff), and the ongoing economic impacts due to COVID."

Response: First, we have reviewed the Board member comments in the transcript to search for comments matching the description cited in the comment, but we do not find any such direction, from the Board as a whole, related to the permit in general and certainly not related to Provision C.12.c in particular.

The analysis cited by CCCWP to recalculate the amount of old industrial land use is identical to that performed by ACCWP. See the response to Alameda Countywide Clean Water Program Comments 67 and 68 above explaining in detail why the analysis cited in the CCCWP comment is not factually supported and inconsistent with available information. In fact, there was no explanation of how 3,516 acres in Contra Costa County were determined to have low PCBs levels. The comment simply asserts this as a fact without evidence. The comment appears to rely on a methodology similar to that used for the corresponding Alameda County claim about low PCBs areas. The Contra Costa comment, like the Alameda comment, simply *states* that a screening procedure was used along with conclusions concerning the results. The information submitted in

the comment relative to the screening procedure is not sufficient to evaluate the soundness of the procedure, and the submitted information does not adequately support the conclusions stated in the comment. Accordingly, it is not appropriate to make the adjustment in the remaining acres of old industrial land use in Contra Costa County. We also note that CCCWP, like ACCWP, cites an incorrect value for the proportion of old industrial land use samples in the moderate PCBs concentration range according to the existing data set of over 1,200 samples in this land use type. The correct number is 25%, not the 15% cited in the comment (SCLRA 2021, Table B-1).

There is a high probability that the amount of moderately contaminated old industrial land use in Contra Costa County is far greater than the 476 acres (77 known plus 399 presumed to be identified in the future[34]) cited in the comment. The total amount of old industrial land use in Contra Costa County is at least 11,000 acres. If the proportion of the 1,200 PCBs samples collected in Bay Area old industrial land use exceeding 0.2 mg PCBs/kg (25%) is applied to this amount of Contra Costa County old industrial land use area, then one expects that approximately 2,700 acres of this area will be moderately contaminated (≥ 0.2 mg PCBs/kg). We are not aware of any evidence that the overall regional old industrial land use PCBs concentration distribution (see SCLRA 2021) would be dramatically different than the PCBs concentration distribution in Contra Costa County. As previously indicated, both the total amount of old industrial land use and the presumed moderately contaminated amount of this area have been dramatically underestimated in the analysis cited in the comment. These underestimates result from the unwarranted reduction of the amount of old industrial land use through a logically flawed methodology as well as the application of an incorrect fraction of moderately contaminated land use expected in this type of land use. We emphasize again that if this moderate level of contamination occurs on railroad properties, non-jurisdictional areas or other types of private parcels and if these private parcels contribute PCBs to the MS4 in Contra Costa County, the Permittees are responsible for addressing these areas. Therefore, it is not appropriate to exclude these areas from the total amount of old industrial land use in Contra Costa County as these are potentially areas subject to control measure implementation.

References

ACCWP 2016. ***Mercury and PCBs Watershed/Management Areas and Control Measures***. Prepared by the Alameda Countywide Clean Water Program. September 28, 2016.

CCCWP 2016. ***Mercury and PCBs Watershed/Management Areas and Control Measures***. Prepared by the Contra Costa County Clean Water Program. September 26, 2016.

[34] The comment claims that an additional 399 acres may be found in the remaining 2661 acres of old industrial land use.

SCLRA 2021. ***Source Control Load Reduction Accounting for Reasonable Assurance Analysis***. Prepared for Bay Area Stormwater Management Agencies Association. October 28, 2021.

SMCWPPP 2016. ***Identifying Management Areas and Controls for Mercury and PCBs in San Mateo County Stormwater Runoff***. Prepared by the San Mateo Countywide Pollution Prevention Program. September 30, 2016

SCVURPPP 2016. ***PCBs and Mercury Control Measures Plan for the Santa Clara Valley***. Prepared by the Santa Clara Valley Urban Runoff Pollution Prevention Program. September 30, 2016.

Master Response Identifier: C.11/12 – 4

Comment Identifiers: Baykeeper-8

Provision No.: C.11 and C.12

Comment: *C11/12 Provisions in Relation to TMDL Implementation Requirements*

According to Provision C.11, during MRP 2, Permittees were able to meet the San Francisco Bay Mercury TMDL implementation plan's interim loading milestone by February 2018 of 120 kg/yr. The next deadline is attainment of the regionwide, urban runoff wasteload allocation of 82 kg/yr by February 2028. Unlike for mercury, Provision C.12 does not include an assessment of wasteload reductions made during MRP 2. If this information exists, the Regional Board should add it to Provision C.12.

Response: The comment is incorrect, neither Provision C.11 nor C.12 includes an assessment of wasteload reductions made during *MRP 2*. Rather, the preamble paragraph before C.11.a provides an estimate of the magnitude of expected mercury load reductions during *MRP 3* (approximately 10 kg/yr). Additionally, this paragraph notes that, according to work conducted by SFEI in 2015, the interim loading milestone from the mercury TMDL (120 kg/yr) has been achieved. More information about this can be found in the Permit Fact Sheet section for C.11. The preamble paragraph preceding C.12.a also includes an estimate of the magnitude of expected PCBs load reductions during MR3 (revised to approximately 1.47 kg/yr). In contrast to the mercury TMDL, the PCBs TMDL does not contain an interim loading milestone, and that is why this discussion is not included in this paragraph. However, Finding C.12-5 cites the same 2015 SFEI report from which the mercury loading estimate was obtained. The 2015 loading estimate for PCBs was on the order of 19 kg/yr, and the estimated PCBs load reductions realized during MRP 2 was about 3 kg/yr.

Comment*: Under the San Francisco Bay PCBs TMDL implementation plan, Permittees are allotted 1.6 kg/yr waste load allocation and 14.4 kg/yr of the regionwide total by 2030. During MRP 3 when implementation of control measures for mercury and PCBs will determine whether or not the mercury and PCBs TMDLs' urban runoff wasteload*

allocations are ultimately achieved, it is critical that Provisions C.11 and C.12 not be included in Provision C.1's Safe Harbor. Inclusion in the Safe Harbor disincentivizes Permittees to commit substantial resources to addressing mercury and PCBs, since they will be deemed in compliance by following Provisions C.11 and C.12's requirements regardless of actual compliance with receiving water limitations.

Response: Consistent with State Board Orders 2015-0075, as amended by 2021-0052-EXEC, and 2020-0038, the proposed permit allows Permittees to be deemed in compliance with the receiving water limitations for mercury and PCBs while implementing the rigorous, accountable, and transparent requirements of C.11 (mercury controls) and C.12 (PCBs). Experience implementing PCBs and mercury control measures in the first two terms of the MRP, monitoring data, and the rigorous studies, evaluations, modeling, and mathematical analyses inform the design of the programmatic approach used in MRP 3. Permittees use a load reduction accounting system (see Provisions C.11.a and C.12.a) to estimate mercury and PCBs load reductions for each type of programmatic control measure consistent with an expected level of control measure implementation intensity. Permittees are required to track and report on their level of implementation through enforceable control measure specific performance metrics that are associated with the estimated load reductions.

The requirements expressed in Provisions C.11 (mercury) and C.12 (PCBs) are consistent with the mercury and PCBs TMDLs. The PCBs TMDL directs Permittees "to implement technically feasible, effective and cost-efficient control measures to attain allocations." There is also a possible pathway for the Water Board "to review and revise the allocations and these implementation requirements as part of adaptive implementation" if the allocations cannot be achieved despite implementation of technically feasible, effective, and cost-efficient control measure implementation.

Development and implementation of controls for certain pollutants, such as mercury and PCBs, is challenging. The Fact Sheet section for C.8.f explains how PCBs and mercury are distributed in watersheds and transported during storm events and the variability of the Bay Area's climate. Monitoring data collected over the past two decades allows us to better understand the relationship between control measure implementation and load reductions and thereby establish a solid technical foundation for the control measures required in Provisions C.11 and C.12. The available monitoring data provide a clear picture about how PCBs and mercury are distributed in Bay Area watersheds and what type of watersheds contribute more or less pollutant load. We understand that the highest PCBs-yielding watersheds (mass loading of PCBs per unit area) are concentrated largely along the shore of San Francisco Bay. These high yielding watersheds are generally old industrial areas. These yields were estimated through models calibrated and validated with the monitoring information from those dots on the map along with information about hydrology and sediment transport. The knowledge gained through monitoring and modeling is the foundation for the programmatic control measure approach employed in this permit term to reduce PCBs and mercury loads.

Because we now know that old bayside industrial lands are generally where we find higher PCBs concentrations, this helps to refine the control measures in the permit. Thus, we have required Permittees to search for contaminated source properties (see Provisions C.11/12.b) in old industrial areas and to focus implementation of control measures in the moderately contaminated portions of old industrial land use (see Provisions C.11/12.c). Finding contaminated properties and addressing ongoing moderate contamination in these formerly old industrial bayside areas is an important element in reducing PCBs loads to the Bay. Contrary to the comment's assertion, complying with Provisions C.11 and C.12 will require Permittees to commit substantial resources and significant actions, not less.

Comment*: Currently, 2030 is the deadline for achieving the PCBs wasteload allocation, and it is entirely inappropriate for the Regional Board to condone PCB control measures that will not achieve this deadline and unacceptable for the PCB control measures to be included in Provision C.1's Safe Harbor. The Regional Board should be pushing Permittees to meet waste allocation deadlines, and should not effectively eliminate the deadline for PCBs reductions during the term of MRP 3.*

Response: When the mercury and PCBs TMDLs were adopted, the Board recognized the difficulty of attaining the wasteload allocations in 20 years given the uncertainty with the availability and effectiveness of control measures. That is why the TMDL implementation plans included adaptive implementation components wherein the Board would review the TMDLs and consider extending the compliance timeline and/or revising the wasteload allocations upon a demonstration that Permittees were implementing all technically and economically feasible and cost-effective control measures. Unfortunately, there is no "magic bullet" control measure that Permittees can employ to rapidly achieve large PCBs or mercury load reductions. Finding source areas and implementing effective controls is hard work and takes time. The load reductions that result from these activities, while important to Bay water quality, are modest. However, the requirements in Provision C.12 are consistent with the TMDLs' requirement for updated assessments of control measures and put the Permittees on a path to compliance We explained in our response to the previous comment (about the appropriateness of including Provision C.12 in the C.1 Alternative Compliance section) just some of the information on which this updated assessment was performed. There is a fuller explanation in the Fact Sheet, particularly the section on C.12. Because the twenty-year TMDL implementation schedules for wasteload allocation will arrive in 2028 (mercury) and 2030 (PCBs), the Water Board will soon be reviewing the wasteload allocations and implementation requirements as part of adaptive implementation. Such a review includes looking at any demonstration that the allocations cannot be achieved despite implementation of technically feasible, effective, and cost-efficient control measure implementation. The Water Board is not now condoning any extension of the TMDL deadlines, but merely recognizing that it is a possibility recognized under the TMDL if sufficient demonstration is made supporting an extension. Permittee performance during MRP3 in accomplishing the Provision C.11 and C.12 will be a

significant factor in determining if the allocations should be modified or if more time should be allowed for their achievement.

Comment*: More specifically, as written, Provision C.11.f and C.12.h's monitoring requirements fail to comply with State Board Order WQ 2020-0038's minimum monitoring requirements, which require adaptive management. The Regional Board must revise Provision C.11.f and C.12.h to require low impact development ("LID") monitoring results collected under Provision C.3.d be used to recalibrate the Permittees' reasonable assurance analyses ("RAAs") produced under MRP 2 to validate estimated load reduction benefits for mercury and PCBs.*

Response: The monitoring requirements for pollutants of concern and other constituents are contained in Provision C.8, and not C.11/C,12. Provisions C.11.f and C.12.h concern preparing implementation plans for mercury and PCBs, respectively. The expected load reductions achieved through LID, i.e., green stormwater infrastructure (GSI), implementation for the entire region by 2025 total 0.1 kg/yr (see Fact Sheet discussion under C.11.e) of mercury out of an expected load reduction of 10 kg/yr. This constitutes about 1% of the total expected load reductions. For PCBs, the expected GSI load reductions to be achieved by the end of MRP 3 are about 0.2 kg/yr.

The RAA modeling applications used to estimate these expected load reductions rely on a number of inputs, all of which have uncertainty associated with them. It is highly unlikely that the RAA estimates can be meaningfully improved by re-running the analyses with LID monitoring data required through MRP 3. The comment suggests using mercury and PCBs performance data collected under Provision C.3.d to recalibrate RAA models. However, Provision C.3.d is not requiring new mercury or PCBs performance data. More importantly, the LID performance data used for RAA modeling already provide a sound representation of LID pollutant removal behavior. Given the scale of modest expected GSI load reductions in relation to the magnitude of load reduction, the uncertainties in the modeling outputs with respect to these modest load reductions, and the lack of new PCBs or mercury LID data, requiring recalibration of these RAA models for LID performance is not a sound use of Permittee efforts in MRP 3.

Using implementation experience, monitoring data, and special studies to adapt control measure implementation approaches for PCBs and mercury is an explicit element of the POC strategy for the MRP. Starting with the first MRP, the POC strategy was explicitly based on a phased, adaptive approach whereby control measures were tested and information gathered to allow for adaptation. Monitoring data is a key component of this adaptive, phased implementation. Most of the PCBs provisions in MRP 3 are the result of adaptive implementation informed directly from monitoring information, pilot control measures, or special studies accomplished through earlier MRP efforts.

PCBs and mercury data in bedded sediment (i.e., in storm drains or street sediment) and flowing stormwater have been collected through the RMP and also by the

stormwater programs over the last two decades. Through the RMP and Permittee sampling, over 100 Bay Area watersheds have been sampled. In these watersheds, over 1,500 sediment samples have been taken, and samples have been taken at over 140 locations for flowing stormwater. These monitoring data provide a clear picture about how PCBs and mercury are distributed in Bay Area watersheds and what type of watersheds contribute more or less pollutant load. The highest PCBs-yielding watersheds (mass loading of PCBs per unit area) are concentrated largely along the shore of San Francisco Bay. These high yielding watersheds are generally old industrial areas. These yields were estimated through models calibrated and validated with the monitoring information from those dots on the map along with information about hydrology and sediment transport.

Because the monitoring information has revealed that old bayside industrial lands are generally where we find higher PCBs concentrations, this helps to refine the control measures in the permit. Thus, we have required Permittees to search for contaminated source properties (see Provisions C.11/12.b) in old industrial areas and to focus implementation of control measures in the moderately contaminated portions of old industrial land use (see Provisions C.11/12.c). Finding contaminated properties and addressing ongoing moderate contamination in these formerly old industrial bayside areas is an important element in reducing PCBs loads to the Bay.

Adaptive management is also in evidence for most other elements of the PCBs control program. For example, monitoring studies required in MRP 2 to investigate the presence of PCBs-containing caulk in roadways and bridges led directly to the requirements of Provision C.12.d to properly manage this material during roadway rehabilitation and repair. A stressor/source identification project from MRP 2 also led to the requirements (C.12.e) to control PCBs in oil-filled electrical equipment. Finally, monitoring and special studies investigating the presence of PCBs in caulk used in many older buildings led directly to the MRP requirements (C.12.g) for a control program for this material.

Monitoring data have been used not only for adaptive management of PCBs control programs but also to support modeling efforts to track load reduction progress of these control measures. The monitoring data collected through the MRP are used to calibrate and validate a variety of watershed loading models to generate estimates of the PCBs and mercury load reductions through time from all control measures. This will allow Permittees to track the progress toward achieving TMDL wasteload allocations through implementation of the control measures.

Comment*: Additionally, Provisions C.11 and C.12 allow Permittees to "comply with any requirement of this Provision through a collaborative effort and are encouraged to do so," making it unlikely individual Permittees will report their progress and eliminating the Water Board's, Permittees' and the public's ability to assess individual Permittee compliance. Moreover, to be deemed in compliance, Permittees cannot rely indefinitely*

on initial modeling estimates. Data must be collected to recalibrate these models to confirm and validate modeling assumptions.

Response: Collaborative efforts, where appropriate, are vital to ensure consistency in approaches, encourage efficient dissemination of knowledge and data, and help conserve limited resources. We also note that C.11 and C.12 are about implementation to achieve load reductions. It is crucial that Permittees work collaboratively to make these activities as successful and efficient as possible. There has and will continue to be fruitful collaborative efforts to design and implement control measures. For example, Permittees have worked together to develop procedures for identifying PCBs source properties (C.12.b). They have worked together to collect data for assessing the loading from PCBs contained in bridge and overpass roadway caulk and for designing implementation strategies this source (C.12.d). Permittees worked collaboratively to design programs for controlling PCBs in demolition debris (C.12.g). None of these efforts would have been as effective or efficient if the Permittees were working individually, and this is just a small sample of the activities that have been improved through the Permittees working together. Permittees are required to report on each of the tasks required in C.11 and C.12, which reports are publicly available. Permittees also have individual monitoring responsibilities, and those are in Provision C.8. In the Provision C.8.f discussion of the Fact Sheet, we provided a detailed and thorough explanation about how monitoring and modeling are used to assess PCBs and mercury loads and load reductions. Moreover, one of the main management information needs motivating Provision C.8.f monitoring requirements is to collect monitoring data that will be used in combination with models to update loading estimates. As we explained in the Fact Sheet, the only feasible way to determine PCBs and mercury loads and load reductions is through models informed by monitoring data. Provision C.8.f requires Permittees to collect a minimum of 16 samples each for PCBs and mercury to support generating loading estimates for these pollutants. Likely many more samples than this will be collected that can be used to calibrate and validate watershed models used to generate the loading estimates.

C.14 (Bacteria Controls for Impaired Water Bodies)

Master Response Identifier: C.14.a-1

Comment Identifier: Baykeeper - 4

Provision No.: C.14.a (Enhanced Bacteria Controls for the Cities of Sunnyvale and Mountain View)

Comment: *C.14.a lacks milestones and final deadlines required by State Board Orders. The monitoring program in C.14.a.viii is undefined, there is no deadline for submission of a monitoring plan and the Permit does not require the monitoring plan first be submitted to the Water Board for review and approval. The public will not have the*

opportunity to evaluate and comment on the rigor and accountability of the monitoring program, because the Cities will develop the monitoring program during MRP 3. It is unclear whether the monitoring tasks of using desktop and field evaluation methods, receiving water monitoring, and GIS analysis must be completed simultaneously. As written, Cities could postpone receiving water monitoring until the end of MRP 3's term. C.14.a.iii.(2) excludes outfall monitoring, limiting the Cities' ability to identify the efficacy of certain control actions, and making the monitoring program less effective. C.14.a.iii.(3) does not require monitoring, it only requires reporting on monitoring that has occurred; there is not enough accountability in this requirement. C.14.a does not include any modeling exercise to project when the Cities will cease causing or contributing to bacteria water quality objectives and there is no provision to implement adaptive management if initial projections are incorrect. C.14.a. includes "Planning for Phase Two Actions," indicating that the Water Board does not believe the actions in Draft MRP 3 will be adequate to achieve receiving water limitations. Phase 2 actions are left undefined; new actions are not required, and Cities can simply increase the level of existing control measures. There is no hard deadline for Cities to achieve bacteria Water Quality Objectives – the Cities may be allowed to continue to propose additional actions indefinitely in future MRP iterations. C.14.a contains no milestones based on measurable criteria or indicators to be achieved in the receiving waters and/or MS4 discharges. There is no final date for achieving the receiving water limitations as soon as possible. It is unclear what sort of progress at limiting bacteria the Water Board expects to make each year. The Water Board must exclude C.14.a from the Safe Harbor language in C.1.

Response: In response to the comment, C.14.a.viii's monitoring requirements (and Fact Sheet) have been revised to set forth the required types, intervals, and frequencies of monitoring that must be conducted, including outfall monitoring, bacteria characterization monitoring, and receiving water monitoring. The revised monitoring program must identify bacteria sources to receiving waters, help focus source control efforts, evaluate effectiveness of controls, and ultimately demonstrate attainment of the bacteria water quality objectives. The requirements include specific questions the monitoring program must answer, including the important question of whether bacteria water quality objectives are being met in the receiving waters. There is also a new mid-permit interpretive reporting obligation on the data collected, progress made in answering the specified monitoring questions, and the new, modified, or enhanced control that will be evaluated or implemented, among other requirements. This will enable the course correction referred to in the comment. This report also requires a description of the monitoring, subject to approval by the Water Board through a Permit amendment, to be conducted after the first phase of monitoring and surveillance under the Permit. This is because it is likely that the monitoring will have to be adapted to respond to the results of the required surveillance and monitoring. For example, the results could show that the bacteria exceedances in the receiving waters have been resolved or are worse and more extensive than is currently understood. In either case, different monitoring will be needed to respond to the new information. The Permit

requires the new monitoring to be as comprehensive, systematic, and robust as what is currently required while being commensurate with the need to address and resolve bacteria exceedances in the receiving waters.

With respect to modeling, it is infeasible to predictively model when the cities will cease causing or contributing to bacteria water quality objectives. Please see revisions to the Fact Sheet for Provision C.14 on the uncertainties and unique characteristics of bacteria here that make modeling infeasible.

The requirements of C.14.a, as revised, are ambitious, rigorous, and transparent for several reasons. First, control of all known controllable sources of bacteria is required. Second, the requirements compel the cities of Sunnyvale and Mountain View to comprehensively evaluate their existing bacteria controls, systematically conduct surveillance and monitoring to identify sources, implement existing or enhanced controls, and monitor for effectiveness. The source identification and source control requirements are practical and robust and represent a logical first phase that could or should result in elimination of bacteria sources that result in MS4 discharges that cause or may cause or contribute to exceedances of bacteria water quality objectives in receiving waters. Given the completeness and thoroughness of the requirements to find and control all controllable sources of bacteria, the Water Board expects compliance with bacteria receiving water limitations by the end of the Permit term, and have revised Provision C.14.a.ix to clarify this in response to the comment for clearer deadlines. However, due to impossibilities or limitations of modeling or conducting a quantitative analysis for bacteria MS4 discharges and source uncertainties, it is impossible to assert with certainty at the onset of the Permit term that source identification and control actions will result in compliance by the end of the Permit term on June 30, 2027. For this reason, the expectation to comply with receiving water limitations by June 30, 2027, is not expressed in the Permit as an enforceable final deadline. The State Water Board Orders pertaining to alternative compliance allow deviation from the principles therein where a regional water board shows a principle is inappropriate for region- or permit-specific reasons. The unique characteristics, challenges, and unknowns posed by bacteria here, as explained in the revised Fact Sheet for this provision, support not using the June 30, 2027, as an enforceable final deadline. This phased approach is also consistent with the numerous bacteria TMDLs in the region. This does not mean the cities are not accountable—they must undertake all of the required actions in the Permit and we have no reason to believe that the cities will not perform what is required of them. Moreover, phase two actions and deadlines, if necessary in the next permit, will naturally be informed by the cities' performance during this Permit term, which should incentivize the cities' efforts during this Permit term.

The third reason Provision C.14.a's requirements are rigorous, ambitious, and transparent is because they are based on the rigorously studied and publicly vetted phased source control strategies of the many bacteria TMDLs adopted in the San Francisco Bay region. The requirements reflect the Water Board's determination in these TMDLs on the most effective way to resolve bacteria impairments in the region. TMDLs have resulted in successful outcomes in, for example, Richardson Bay and

Tamales Bay.[35] The requirements are more than the iterative process of improved BMPs over an indefinite period to prevent or reduce exceedances of receiving water limitations; rather, they are rigorous, comprehensive, and systematic requirements to control all controllable bacteria sources.

Phase two actions are necessary only if compliance is not achieved by the end of the Permit term. While the Water Board expects compliance to be achieved by the end of the Permit term, as explained above and in the Fact Sheet, it is impossible to assert with certainty that compliance can be achieved by the end of the Permit; therefore, allowing for the possibility of phase two actions is necessary. Phase two actions, if necessary, will depend on the actions taken during the permit term, and, therefore, cannot yet be specified. The State Water Board supports this kind of adaptive management where compliance is not achieved. (WQ Order 2021-0052-EXEC, p. 65-66.)

C.15 (Exempted and Conditionally Exempted Discharges)

C.15.b.iii – Emergency Discharges of Firefighting Water and Foam. By way of background, this subprovision addresses discharges of firefighting water and foam associated with emergency firefighting activities. Discharges of firefighting water and foam associated with non-emergency firefighting activities such as training are neither exempted nor conditionally exempted by this Provision; they are prohibited pursuant to Discharge Prohibition A.1. If there are discharges to storm drain systems or watercourses of firefighting water and/or foam (or other non-stormwater) associated with non-emergency (e.g., training) firefighting activities, which would violate Discharge Prohibition A.1, then Permittees must comply with the reporting specified in Provision C.23.c.

This Provision acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs only when they do not interfere with immediate emergency response operations or impact public health and safety.

The requirements in Provision C.15.b.iii ensure that Permittees reduce or eliminate the significant pollution from firefighting foam and water discharged during firefighting emergencies, without compromising the ability of firefighting personnel to protect lives and property. Through the convention of a workgroup, Permittees are required to evaluate and improve the efficacy of their BMPs and SOPs for the containment and

35 https://www.waterboards.ca.gov/about_us/performance_report_1718/plan_assess/docs/fy1718/2018_richardson_bay_tmdl.pdf
https://www.waterboards.ca.gov/about_us/performance_report_1718/plan_assess/tmdl_outcomes/r2_tomales_bay_pathogens.pdf

cleanup of firefighting water and foam discharged during firefighting emergencies. Permittees will implement the workgroup's recommendations, upon submittal of a report midway through the Permit term.

Master Response Identifier: C.15-1

Comment Identifier: Part 1) of ACCWP-77,79,80, CFCA-1, CCCEFC-1, CCCWP-90, Oakland-46, SCVURPPP-14d, SMCWPPP-287

Provision No.: C.15.b.iii

Comment: *Recommend replacing specific requirements with language that would encourage participation in a stakeholder group to discuss options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges.*

Response: Removing the "specific requirements" would eliminate many requirements that were present in MRP 2, not only requirements that have been added or changed in the Tentative Order. The comment does not elaborate on which specific requirements should be removed, but it is assumed to mean everything other than C.15.b.iii.(2), Regional Coordination. The requested change - language encouraging participation in a stakeholder group to discuss options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges - is exactly what is provided in C.15.b.iii.(2).

That said, we have made several responsive changes to the language in the Tentative Order. We have reduced the reporting burden to a single Firefighting Discharges Report in 2025, from a preliminary report in 2024 and a final report in 2026, and reduced the required frequency of the Working Group's meetings. In addition, in coordination with the MRP Firefighting Discharges workgroup, we modified language to clarify the substantial flexibility around expectations for the Working Group and the required report.

We have clarified in several places that BMPs and SOPs are not limited to containment and cleanup of firefighting water and foam. We have also further clarified that the BMPs and SOPs that were previously listed as examples to consider in C.15.b.iii.(4) are recommended (not required), and have moved them into the Fact Sheet to preclude confusion about that.

Master Response Identifier: C.15-2

Comment Identifier: Part 2) of ACCWP-77,79,80, CFCA-1, CCCEFC-1, CCCWP-90, Oakland-46, SCVURPPP-14d, SMCWPPP-287)

Provision No.: C.15.b.iii

Comment: *This working group needs to be free to develop the most effective and achievable recommendations. The permit, as written, sets unreasonable and ineffective targets and will ultimately lead to failure. MRP 3 should establish the group and set an overarching goal and not specific provisions.*

Response: C.15.b.iii.(2)(a) does set an overarching goal for the Firefighting Discharges Working Group: "...to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activity." The Firefighting

Discharges Working Group is free to develop guidance for the most effective and achievable BMPs and SOPs, and in coordination with the MRP 3 Firefighting Discharges workgroup, we modified permit language to clarify that intent. The language includes specific prompts for issues to consider, which are information for the Working Group to use as it develops the required report, but which are not required BMPs.

These specific prompts do not limit the Working Group as it considers development of guidance, but they are linked to observed adverse impacts to water quality and beneficial uses of emergency firefighting discharges (e.g., from discharges of chloraminated potable water to creeks), and they recognize the range of municipal departments that may contribute to emergency response, including fire department, public works, and environmental services. As such, it is reasonable to consider them and the extent to which measures could be implemented to reduce the discharges' adverse effects. Further, the tasks in C.15.b.iii.(2)(a) were assigned to individual municipalities in the Administrative Draft, and per the Permittees' request, they were reorganized as a regional task in the Tentative Order, which represents a substantial reduction in level of effort and specificity.

We also note that the Working Group may go beyond the prompts in the Tentative Order, for example, by optionally discussing BMPs for non-emergency discharges of firefighting water and foam (which are prohibited rather than conditionally exempted). We have added language in the Fact Sheet that recognizes this.

Master Response Identifier: C.15-3

Comment Identifier: ACCWP-78

Provision No.: C.15.b.iii

Comment: *We support the idea of the Working Group. There are a significant number of new requirements identified in C.15.b.iii with little knowledge, background, or research to support them. In some Permittee jurisdictions, the responding fire agency may be a special district or Cal Fire, a state agency, over which the Permittee may not have direct oversight. Also, there are no private firefighting crews in the Bay Area.*

Response: We disagree. The commenter did not specifically identify any new requirements that are of concern. However, the Provision sets forth a model that has been used effectively in the past, and which the commenter supports, to develop and implement BMPs and SOPs. C.15.b.iii sets the expectation that Permittee staff, such as firefighters and stormwater program staff, work together to develop a Firefighting Discharges Report that identifies BMPs and SOPs to reduce the potential adverse effects to water quality and beneficial uses from emergency firefighting discharges. It then sets the expectation that the Report's recommendations will be implemented. That model was proposed by the Permittees with Water Board staff support and is similar to

approaches taken in past permits to develop similar guidance and implementation documents.

We concur that in some cases firefighting agencies may not be under a Permittee's direct oversight, and have added language to the Fact Sheet to make more explicit that this is an issue the Working Group should consider in preparing the Firefighting Discharges Report.

Master Response Identifier: C.15-4

Comment Identifier: Part 3) of ACCWP-78, SCVURPPP-150, SMCWPPP-287

Provision No.: C.15.b.iii

Comment: *The significant amount of new requirements and level of effort needed for implementation far outweighs the potential water quality impacts that could be addressed after life and property are addressed.*

Response: We disagree. Justifications for the revisions to C.15.b.iii are outlined at length in the Fact Sheet and include the potential for emergency firefighting discharges to cause fish kills and other adverse impacts to water quality and beneficial uses. One role of the Working Group is to identify those situations where actions could reduce these significant adverse impacts, including consideration of constraints that may limit implementation.

Please also see Master Response Identifier: C.15-8.

Master Response Identifier: C.15-5

Comment Identifier: Part 1) of ACCWP-77,79,80, CFCA-1, CCCEFC-1, CCCWP-90, Oakland-46, SCVURPPP-14d, SMCWPPP-287

Provision No.: C.15.b.iii.(5)

Comment: *Remove changes to reporting between MRP 2 and the Tentative Order for MRP 3, because of the burden of additional reporting requirements.*

Response: We agree and have made the requested change. We have removed all of the reporting that was added in the Tentative Order on top of the existing reporting requirements in MRP 2. Instead, the subprovision now tasks the Working Group with developing reporting recommendations, detailing those in the Firefighting Discharges Report, and finally, implementing those reporting recommendations once the Firefighting Discharges Report is submitted.

Master Response Identifier: C.15-6

Comment Identifier: Part 2) of San Jose-44

Provision No.: C.15.b.iii

Comment: *Implementing BMPs may not be feasible given staffing for the Fire Department as well as any contractors that would be needed. This doesn't give consideration to the fire season, during which San Jose firefighters are deployed to assist with wildfire efforts. Also, keeping resources on-scene of an extinguished fire to plug and dyke water/foam runoff for prolonged periods of time will take first responders out of the system, thus increasing emergency response times and impacting service delivery.*

Response: This concern is addressed by C.15.b.iii.(4)(b): "During emergency firefighting situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). Permittee staff, contractors, or firefighting personnel shall control the pollution threat from their activities during emergency firefighting situations to the extent that time and resources allow."

Master Response Identifier: C.15-7

Comment Identifier: Part 5) of San Jose-44

Provision No.: C.15.b.iii.(4)(a)

Comment: *More consideration is needed for the potential consequences. For example, plugging storm drains could result in flooding. Most importantly, the impact to firefighter's health and safety needs to be considered. Implementing BMPs and using fire suppressants that take longer to extinguish fires required crews to stay longer which increases their exposure to immediate and long-term risk (e.g. health impacts from smoke and fumes).*

Response: This concern is addressed by C.15.b.iii.(4)(a): "The Permittees shall implement and/or require firefighting personnel acting within their jurisdictions to implement BMPs and SOPs for emergency discharges – in order to reduce potential and actual water quality impacts – to the extent that the implementation of such BMPs does not interfere with immediate emergency response operations or impact public health and safety." In other words, if plugging the storm drain for a particular fire would cause flooding, that BMP does not have to be implemented for that fire. Likewise, if the implementation of a BMP such as the use of a fire suppressant that takes longer to extinguish fires would increase the health risks of firefighting personnel, then that BMP does not have to be implemented. Permittees are able to self-determine this.

We have also moved the recommended BMP and SOP examples from the Provision into the Fact Sheet, so it is clearer that they are recommendations to be considered by

the workgroup, rather than required BMPs and SOPs to be implemented by the Permittees on the effective date of MRP 3.

Master Response Identifier: C.15-8

Comment Identifier: CCCWP-87, Oakland-44, SCVURPPP-171

Provision No.: C.15.b.iii & C.15.b.iii Fact Sheet

Comment: *Federal regulations only require municipal stormwater programs to address firefighting activities "where such discharges or flows are identified as significant sources of pollutants to waters of the United States" (40 CFR § 122.26). No such finding has been made for Contra Costa County or for Oakland. The finding made in the Fact Sheet refers to a fish kill study in Berkeley, however, this does not provide substantial evidence of similar occurrences in Contra Costa County or Oakland, as the Berkeley fish kill study is not representative of conditions in Contra Costa County or Oakland.*

Regulating this category with the large number of specific requirements is based on one noted fish kill during the permit term. We recognize the water quality impact from this discharge, but the current permit regulations allowed Water Board staff and the Berkeley Fire Department to adequately address the specific incident and implement corrective actions. Since MRP 2 did not cite any issues we may assume that this significant level of regulation is to address one incident from firefighting discharges in at least 10 years. Revise the Fact Sheet to reflect no incidents of water quality impacts from individual fires were identified in the previous MRP.

Response: Comment noted. There is substantial evidence of the adverse water quality impacts of emergency firefighting discharges, which include discharges of both chloraminated potable water and foams in addition to any materials discharged from the area of the fire. The Fact Sheet section for C.15.b.iii explains the following:

"According to 40 CFR §122.26, MS4 Permits may address discharges or flows from firefighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States. Discharges from firefighting activities are excluded from the definition of illicit discharges, but may be regulated where they are significant contributors to water pollution. This is consistent with U.S. EPA's treatment of firefighting discharges to small MS4s. U.S. EPA envisions that significance is determined with reference to the category of discharges, not individual fires.

At the same time, water quality impacts from individual fires illustrate the significance of the category of discharges. For instance, in April 2019, the discharge of firefighting foam through the storm drain to Codornices Creek in Berkeley caused a fish kill of at least 60 fish, including steelhead.

Potable water is also used to fight fires. In the Bay Area, chloramines are typically used to control pathogens in potable water, and they are toxic to aquatic life. Discharges of

chloraminated potable water to Bay Area receiving waters have caused fish kills. As a result, discharges of chloraminated potable water used for firefighting have the potential to impact aquatic life, including by causing fish kills.

The Water Board observes the following: fish kills from potable water discharges almost every year; small volumes of potable water discharges (between 4,000 and 10,000 gallons) kill fish; and many species of fish (steelhead, rainbow trout, three-spine stickleback, Sacramento suckers, hitch, California roach, mosquitofish, green sunfish, bluegill, fathead minnows, sculpin, golden shiners) and crayfish have been killed by potable water discharges.

There are several recent examples of potable water discharges that resulted in fish kills (and fines) in the Bay Area, listed below. It is important to note that this list is inexhaustive. It includes all fines since 2007, but not all fish kills since 2007. That is because it excludes potable water discharges (resulting in fish kills) between 2018 and 2022 which normally would have resulted in fines, because the Water Board chose not to enforce; review of the Water Board's Enforcement Policy resulted in coordination with water purveyors to improve their asset management programs in lieu of penalties.

(1) Cal Water Service Company, $200,000 ACL, 137,640 gallon discharge to Polhemus Creek in September 2007, killed 21 steelhead + 2 stickleback (R2-2009-0006);

(2) EBMUD, $72,000 ACL, 4,200 gallon discharge to Sausal Creek in August 2010 killed 25+ rainbow trout and 23,400 gallon discharge to Reliez Valley Creek in January 2010 with unknown impact. (R2-2012-0008);

(3) CalTrans, $31,250 ACL, 8,250 gallon discharge to Bear Gulch Creek in May 2011, resulted in fish kill (R2-2012-0009);

(4) SFPUC, $608,310 ACL for 4 violations, including a 37,500 gallon discharge to San Mateo Creek in Jan 2011 killing 5 rainbow trout and 16,500 gallon discharge to San Mateo Creek in October 2012 killing 64 fish including 28 steelhead. (R2-2014-1003);

(5) CA Water Service Company, $1,020,000 ACL for 8,207,560-gallon discharge to Polhemus Creek and San Mateo Creek in October 2013 killing 231 fish including rainbow trout and 1 crayfish (R2-2016-1012);

(6) Town Hillsborough, $221,030 ACL for 153,000-gallon discharge to San Mateo Creek in September 2015 killing 505 fish including threatened species under the Endangered Species Act (R2-2017-1028);

(7) EBMUD, $893,190 ACL for 3 discharges: (1) a 72,000-gallon discharge to San Ramon Creek in October 2015 killing 104 fish including mosquitofish, Sacramento suckers, hitch, and California roach; (2) 2,200,000-gallon discharge to Las Trampas Creek in November 2015 killing 17 California roach and 2 Sacramento suckers; and (3) 191,400-gallon discharge to San Ramon Creek killing 140 California roach, 100 three-

spined stickleback, 75 mosquitofish, 6 green sunfish, 4 bluegill, and 2 fathead minnows (R2-2017-1031);

(8) Marin Municipal Water District, $129,250 ACL for 105,000-gallon discharge to San Anselmo Creek in July 2016 killing an unquantified number of fish that included sculpin, California roach, and rainbow trout or steelhead (R2-2018-1004);

(9) Dublin-San Ramon Services District, $129,250 ACL for 61,000-gallon discharge to Alamo Creek in September 2017 killing 130 golden shiners and 1 bluegill (R2-2018-1006);

(10)San Jose Water Company, $75,000 ACL for 111,250-gallon discharge to Babb Creek in September 2017 killing 565 fish (R2-2018-1011); and

(11)City of San Mateo, $73,700 ACL for 7,720-gallon discharge to San Mateo Creek in May 2021 killing 44 steelhead, 26 prickly sulpin, 19 Sacramento suckers, 8 threespine stickleback, and 1 crayfish (R2-2022-1001).

The Berkeley incident and the use of chloraminated potable water for firefighting demonstrate that flows from firefighting activities can contribute substantial amounts of pollutants to receiving waters if not managed. As a result, the Water Board has determined that firefighting discharges can contribute significant pollution to receiving waters and require management by Permittees."

To the extent non-population-based Permittees (i.e., flood control districts) would have a different role in firefighting, that issue should be addressed by the Working Group and in the produced Firefighting Discharges Report.

Master Response Identifier: C.15-9

Comment Identifier: ACCWP-77,78,81,82, CFCA-2, CCCEFC-2, CCCWP-87,90, SCVURPPP-14b,14c,150,154,159,165,166,167,168,172, SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,307

Provision No.: C.15.b.iii, C.15.b.iii.(4)(a)(v)

Comment: *C.15.b.iii requires Permittees to influence and oversee emergency firefighting activities, which is outside of Permittees' jurisdiction and may interfere with the ability of firefighters to combat emergencies. C.15.b.iii would have municipal stormwater staff directing fire departments on the types of firefighting foams to use, types of fires on which to use foam, amount of foam to use, and locations not to use foams. Stormwater Programs should not be responsible for dictating what tools are used to fight fires and do not have jurisdiction over many fire agencies. Local stormwater programs should not be making decisions that have life and safety consequences - these decisions should only be made by properly trained and knowledgeable fire departments. Permittees should not be held responsible for the*

conduct of fire fighters who are focused on putting out fires, rather than implementing BMPs.

There are also significant new reporting and training requirements that will be difficult for Co-permittees to impose on fire departments.

Permittees don't have jurisdiction over fire agencies that are special districts, and therefore Permittees do not have the authority to require fire agencies to implement BMPs. For example, the Menlo Park Fire District services Menlo Park, East Palo Alto, Atherton, and portions of Unincorporated San Mateo County - the Cities served by that district do not have direct oversight.

Fire agencies are their own special districts in all but three Contra Costa County cities and should therefore be regulated separately and not in MRP 3. Permittees would have little to no legal authority to require these special fire protection districts to implement the required practices identified in the Tentative Order.

Permittees overseeing and regulating fire agencies is problematic and poses legal questions regarding the authority Permittees and/or the Water Board would have in regulating fire agencies. This unresolved legal question has the potential to derail efforts to collaborate on achievable solutions as we argue over authority and jurisdiction. It also sets Permittees up for failure as they have no way to enforce provisions of MRP 3, which they have no legal authority to implement.

Response: The Permit covers discharges to the Permittees' MS4s. Many of the Permittees (e.g., Oakland, Berkeley, San Jose) include municipal fire departments. While Permittees have often established stormwater program staff within their municipality, the stormwater programs themselves are not Permittees. The municipalities - of which stormwater programs and fire departments are often both part - are the NPDES Permittees. Although a stormwater program may lead and coordinate its municipality's compliance with the MRP, the entire municipality is subject to the MRP's requirements as the Permittee, and therefore the MRP neither directly nor indirectly requires stormwater programs to internally regulate fire departments.

For municipalities that do not have their own fire departments, but which rely on countywide fire departments that are part of special districts, please see the response to the following comment in the Response to Comments table: ACCWP-78.

Master Response Identifier: C.15-10

Comment Identifier: Part 2) of ACCWP-79,80, SCVURPPP-152,153, SMCWPPP-288,289

Provision No.: C.15.b.iii.(2)(a)(ii)-(iii)

Comment: *Cleanup BMPs/SOPs should only be for fires that occur in municipal/public property or right of way. Fires that occur on private property are the responsibility of the property owner for cleanup.*

Response: We disagree. While individual property owners may be responsible for cleanup on their properties, to the extent that cleanup has the potential to discharge to the MS4, Permittees have certified they have the authority to address those discharges. As a result, Permittees may hold private property owners responsible for containment and cleanup on their properties, and could do so via means such as providing educational materials to property owners or contractors involved in such cleanups and considering other opportunities to set expectations regarding cleanups, such as during business licensing or via a separate municipal authorization. Under the MRP, Permittees are responsible for non-stormwater discharges to their MS4s and receiving waters, regardless of whether the discharges originate from public or private land.

Master Response Identifier: C.15-11

Comment Identifier: Part 1) of CFCA-3, CCCEFC-3, CCCWP-89, Oakland-45,46, San Jose-8, SCVURPPP-150,159,163,164,167,168, SMCWPPP-285,295,299,300,303,304

Provision No.: C.15.b

Comment: *Over-regulation of firefighting activities during emergency situations. There is no way to detain and collect firefighting runoff (and dispose of the runoff according to jurisdictional requirements), to determine the impact of every foam application to every receiving water, or to remove chloramine from runoff. Including provisions in the MRP 3 that cannot and will not succeed sets up permittees for failure and reduces the opportunities for real environmental quality improvements. Blocking storm drains, collecting firefighting runoff and treating runoff is cost prohibitive, infeasible to store and treat due to the large quantities, and could result in life and safety hazards and property damage due to localized flooding. These prescriptive BMPs should be removed, and fire agencies should continue implementing current voluntary water quality protection BMPs until September 30, 2024, when C.15.b.iii.(2) requires new BMPs developed by a regionwide Firefighting Discharges Working Group (Working Group), to go into effect.*

Response: The Tentative Order appropriately recognizes the commenters' stated priority of life/public health, property, and the environment, in that order. C.15.b.iii.(4) states that permittees must implement BMPs and SOPs " "to the extent that the

implementation of such BMPs does not interfere with immediate emergency response operations or impact public health and safety."

We do not agree with the request to remove C.15.b.iii.(4), which requires implementation of measures to mitigate the adverse water quality and hydrologic impacts associated with emergency firefighting discharges, which are conditionally-exempted non-stormwater discharges. As noted above, although recommendations for BMPs and SOPs to be considered are provided in the Fact Sheet, C.15.b.iii.(4) does not dictate which BMPs Permittees must use, or in which situations they must be used –. Rather, this is addressed via the Working Group and its collaborative preparation of a report, which will include consideration of the range of situations and control measures available.

Please see the response to the following combined comment in the Response to Comments table, regarding the Working Group's role in the consideration of BMPs and SOPs:

ACCWP-77,79,80
CFCA-1
CCCEFC-1
CCCWP-90
Oakland-46
SCVURPPP-14d
SMCWPPP-287The Permit emphasizes the flexibility and choice that fire departments (and Permittees, generally) have in BMP selection, and simply has provided examples in the Fact Sheet. For instance, the non-prescriptive language in the footnote, "Examples of BMPs to be considered...," indicates that the BMPs listed in C.15.b.iii.(4) are not required, but recommended. The Working Group may determine that it is appropriate to consider a broader scope.

We recognize that in some instances, it may be impracticable or dangerous to retain, collect, or treat all firefighting discharges. Nevertheless, within the established life – property – environment hierarchy, there are ways to reduce discharges of foam and potable water. For instance, using less environmentally harmful foams, or limiting the quantity of foam used, may lessen impacts on receiving waters without the need to block off storm drains. Similarly, collection and treatment of firefighting water may be feasible for certain types of fires; this may reduce firefighting discharges and their associated adverse impacts to water quality significantly for those kinds of fires.

Furthermore, we recognize that a range of municipal staff and departments may respond to a fire – that could include fire departments, public works, environmental services, and others. We anticipate that the Working Group will discuss that collective response and consider issues such as the responding staff, their roles, opportunities for communication and coordination, and so on. For example, public works staff may be able to assist with non-emergency tasks, such as blocking off storm drains, if they can

do so from a far enough distance away such that they do not interfere with emergency firefighting activities, to reduce the burden on firefighting personnel to implement clean water controls. If it is not possible for municipal staff, including firefighting staff, to implement a particular control, that control does not have to be implemented. Therefore it will be important for the Working Group to convene and think about which actions are possible and doable in which situations.

Similarly, the Water Board is confident that the Permittees can determine the impact of foam applications to receiving waters. Permittees should have maps of their MS4 systems that show discharge points to receiving waters (If a Permittee does not have this information, C.5.f requires Permittees to: "...identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition.”). Permittees also have records of fires that required use of firefighting foams. With knowledge of discharge points to surface waters and the location of fires where foams were used, the Permittees will be able to inspect nearby surface waters to determine impacts.

The Water Board also disagrees that chloramine cannot be removed from any runoff. If the runoff is contained within the MS4, it can be dechlorinated in place; if the runoff cannot be contained within the MS4, dechlorination measures, such as mats or dechlorination chemical in solution may be used before the water enters the MS4 or as it moves through the MS4, prior to it entering the receiving water. That said, this is challenging for very high flow rate discharges. C.15.b.iii looks to the Working Group to make these kinds of assessments, about what is possible in different situations.

As explained above (see Master Response Identifier: C.15-8), chloraminated discharges have significant adverse impacts on aquatic life, so this is an important issue for the Working Group to consider.

C.17 (Discharges Associated with Unsheltered Homeless Populations)

Master Response Identifier: C.17-1
Comment Identifiers: CCCWP – 93, SCVURPPP – 183, Oakland & San Jose – 7, SMCWPPP – 32, 318, Pleasanton - 1

Provision No.: C.17

Comment: *C.17 language such as "ensuring implementation of control measures" assumes an authority over homeless populations and authority over the various agencies that assist homeless populations that stormwater programs do not have. The Tentative Order is placing responsibilities on stormwater programs in an area that is currently the responsibility of social services, and mental and public health professionals. Stormwater programs could assist these other agencies in addressing homeless problems specific to the expertise of stormwater programs and advocate for*

homeless services that include mitigating impacts to water quality, but stormwater programs cannot determine which control measures are "appropriate" nor "ensure" they will be implemented.

Response: We disagree that the language in C.17 assumes Permittees have an authority over homeless populations and authority over other agencies that provice assistance to homeless populations. Discharges associated with unsheltered homelessness are, like other unauthorized non-stormwater discharges, prohibited by the Clean Water Act. The requirements in C.17 are specific to control measures that Permittees should implement in-order to address discharges from homeless encampments to receiving waters. These actions to control discharges associated with unsheltered homelessness are necessary to prevent or minimize impacts to water quality and public health. Requiring Permittees to implement control measures to address these discharges does not amount to asking stormwater programs to “assume authority” over homeless people or the agencies that assist them. Rather, the requirements in C.17 are intended to ensure Permittees are collecting basic information that is crucial towards understanding the scope of the problem; sharing knowledge and lessons learned with other agencies, and building on efforts already underway throughout the Region to address these impacts to receiving waters.

As an example, C.17.a.iii.(1) requires that Permittees collectively develop and submit a BMP report that identifies effective practices to address discharges associated with unsheltered homelessness that impact water quality. This is intended to improve the overall knowledge of effective practices, in part by recognizing practices permittees are already implementing. This kind of approach is similar to work Permittees have completed in the past, such as C.3 Technical Reports to inform municipal and developer implementation of clean water requirements for new and redevelopment projects.

Master Response Identifier: C.17-2

Comment Identifiers: CCCWP – 95, SCVURPPP – 179, 184, San Mateo County – 22, SMCWPPP – 21, 314, 319, Pleasanton – 3, Oakland – 50, ACCWP – 87, Solano – 10

Provision No.: C.17

Comment: *Provision C.17.a.ii.1 requires each Permittee to submit a map locating homeless residents in relation to the MS4 system and other water bodies. Tracking and locating homeless residents on maps to the level necessary to identify drainage pathways into the MS4 system would be a dehumanizing effort. The "point in time" census information on homelessness is displayed in a heat map format as a sign of consideration for the plight that homeless residents find themselves in. Permittees should not be asked to track and locate homeless residents. The term "point in time" is used to underscore that homeless*

populations are highly nomadic in nature and the census data is simply valid for a small window of time. With this understanding, the value of a mapping requirement seems questionable. Furthermore, the maps and data being requested will only provide a "point in time" look based on the homeless population and encampments at the time of reporting. This data request does not further the overall goal.

Response: This requirement has been revised to clarify that Permittees have flexibility to prepare the maps and to support the privacy for those experiencing unsheltered homelessness. Permittees are still required to submit a map identifying, within its jurisdiction, the approximate location(s) of homeless encampments, and other areas where unsheltered homeless people live. The intent is not for Permittees to “track and locate” individual homeless residents, but to identify locations within their jurisdiction where homeless populations exist in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface waters. Having this information, represented as a heat map, or other similarly effective formats, will enable Permittees to track their existing homeless encampments, identify areas with persistent discharges from homeless encampments to receiving waters, and be able to identify specific locations to focus on while conducing outreach and the implementation of actions to protect water quality. Maps developed by Permittees will provide information on the overall size of the homeless population and its distribution at the time of reporting. Regional Board staff acknowledges that homeless encampments may be transient to some degree, however, particular locations may be used or reused over time. Having reasonably current information about encampment locations and size will enable Permittees to understand risks to receiving waters, and track progress achieved through the BMP implementation. We have retained the requirement that Permittees update their maps once during the permit term, in 2025, to enable Permittees to gauge effectiveness and trends, and to inform the next permit reissuance.

Master Response Identifier: C.17-3

Comment Identifiers: SCVURPPP – 173, San Mateo County – 7, SMCWPPP – 33, 308
Provision No.: C.17

Comment: *Requirements in C.17.a.i.(1) that Permittees use results from biennial point-in-time census surveys and related information, such as municipal reports, databases, complaint logs, and other efforts, to gain a better understanding of unsheltered homeless population numbers within their jurisdictions, the locations of unsheltered homeless residents, discharges and water quality-related impacts associated with homelessness, and associated sanitation-related needs would require additional resources to gain an understanding of homeless populations; this entire provision should be incorporated as a subprovision into provision C.5 - Illicit Discharge Detection and Elimination, with recognition that traditional illicit discharge enforcement procedures are not appropriate for these types of discharges.*

In addition, an exemption for all requirements should be allowed if a Permittee has no known permanent homeless encampments or if populations in the Permittees' jurisdictions are truly transient.

Response: We disagree that the requirement for Permittees to use readily available results from the biennial point-in-time census surveys, and related information, to gain a better understanding of unsheltered homeless population numbers within their jurisdictions, the locations of unsheltered homeless residents, discharges and water quality-related impacts associated with homelessness, and associated sanitation-related needs would require additional resources to implement. Permittees should already be collecting and/or should have access to this information and, more importantly, should be using this information towards understanding the size, location, and needs of their unsheltered homeless residents. Requirements in C.17 have been separated from the Illicit Discharge Detection and Elimination program in C.5 in recognition of the many factors that contribute to unsheltered homelessness, and, by extension its associated discharges. By distinguishing discharges associated with unsheltered homelessness from other unauthorized discharges, the Water Board seeks to reduce the potential incentive that Permittees would otherwise have to implement practices, such as exclusionary zoning or prohibitions on overnight street parking, that might temporarily exclude homeless residents from a particular jurisdiction, but do not contribute to long-term solutions and can exacerbate challenges elsewhere. (e.g., Devers and West, Feb. 2014. Exclusionary Zoning and Its Effect on Housing Opportunities for the Homeless, Notre Dame Jn of Law, Ethics & Public Policy 4(2), https://scholarship.law.nd.edu/cgi/viewcontent.cgi?article=1542&context=ndjlepp).

We decline to include an exemption for permittees that have no homeless residents or wholly transient populations for the same reasons. Including such an exemption would encourage Permittees to implement exclusionary policies or policies that chased

homeless populations to another jurisdiction but did not contribute to long-term solutions, or towards overall reductions in non-stormwater discharges associated with homelessness.

Due to the reasons outlined above, we believe that all Permittees have an important role to play in supporting the BMP report. Additionally, the available biennial point-in-time surveys are not sufficiently granular in location or frequency to determine whether homeless populations are absent from Permittee jurisdictions. It is therefore in the Permittees' best interest to collaborate with other agencies and Permittees in the development of a BMP implementation report, and to develop an effective framework for addressing discharges associated with homeless encampments that impact water quality and public health.

Master Response Identifier: C.17-4

Comment Identifiers: SCVURPPP -177, SMCWPPP – 312, Oakland – 49, ACCWP – 86, Solano – 9,

Provision No.: C.17

Comment: *Provision C.17.a.i.(2).(c) requires that Permittees consider the practicability of actions taken during the COVID-19 pandemic to reduce the spread of the virus in homeless populations (such as temporarily housing homeless people in hotels, etc.) and that contributed to reducing discharges from homeless encampments to receiving waters for longer-term implementation. This requirement should be removed as it does not directly relate to water quality concerns.*

Response: Water Board staff disagrees that this requirement should be removed. The intent is for Permittees to evaluate and consider whether proactive measures implemented to protect the unsheltered homeless during the COVID-19 pandemic could still be a useful means towards addressing discharges from homeless encampments to receiving waters. Examples of such actions include the provision of temporary housing and sanitation services. Permittees, including the cities of San Jose and Oakland, for instance, have had some success in reducing discharges from homeless encampments to receiving waters by both reducing the number of people living on the street, and by providing alternatives to dumping or direct discharges, e.g., trash or sanitation services, thus providing a direct water quality benefit.

General Comments

Master Response Identifier: General – 1

Comment Identifier: Baykeeper - 10

Provision No.: Antidegradation Finding

Comment: *Draft MRP 3 does not comply with federal and state antidegradation requirements. The addition of Provision C.14.a to the Safe Harbor authorizes the lowering of water quality under MRP 3. The Safe Harbor in Provision C.1 authorizes discharges causing degradation of impaired and high-quality receiving waters while programmatic elements are developed and implemented for an indefinite period. Inclusion of Provision C.14.a in the Safe Harbor is not equivalent to the Safe Harbor in the LA County MS4 Permit, as it is not based on an impairment finding or TMDL.*

The anti-degradation analysis is deficient because it fails to address whether the addition of Provision C.14.a to the Safe Harbor in C.1 will result in degradation.

The antidegradation analysis for high quality waters does not examine whether the enforcement insulation provided by the permit's Safe Harbor is offset by the maximum benefit to the people of the state.

There are no interim or final compliance deadlines for Sunnyvale and Mountain View to meet bacteria standards in Draft MRP 3. The anti-degradation analysis references "compliance schedules," but there is no schedule. The Safe Harbor deems Sunnyvale and Mountain View in compliance with bacteria standards for merely implementing their existing MS4 program through MRP 3's term, if not forever. In order to satisfy antidegradation requirements, a valid Safe Harbor must include deadlines for when the degradation will end and receiving water limitations will be achieved. Provision C.14.a does not meet this requirement.

Unlike in the Los Angeles Board's municipal stormwater permit, the Regional Board's antidegradation analysis failed to evaluate an alternative that includes no Safe Harbor, thus extending the Safe Harbor to waterbodies without TMDLs.

In the economic analyses of each alternative the only evidence cited to support the proposition that Permittees face technical and financial constraints are the letters from Permittees requesting the trash load reduction deadlines be extended under C.10, which is not specific to Alternative 3, Option B. The economic analysis for Alternative 3, Option B is conclusory, unsupported, and clearly insufficient to satisfy antidegradation requirements.

The Water Board must conduct complete, waterbody-specific anti-degradation analyses for all waterbodies that will be degraded under C.14.a. Baykeeper believes that once a full analysis is conducted it will become clear that Provision C.1's Safe Harbor is not necessary, nor is C.14.a's inclusion in the Safe Harbor.

Response: The proposed permit does not authorize lowering water quality as compared to the level of discharge authorized in the previous permit (the baseline water quality) such that no antidegradation analysis is required. It continues and strengthens the required controls to reduce the discharge of pollutants to the maximum extent practicable and meet receiving water limitations. The “deemed in compliance” with receiving water limitations language in Provision C.1 (which the commenter refers to as the “Safe Harbor”) by itself will not degrade water quality. The focus of antidegradation is water quality, not what is stated on paper as to how the Regional Water Board will determine compliance. Compared to the previous permit, Provision C.14.a requires the applicable Permittees to comprehensively evaluate their existing bacteria control actions, systematically conduct surveillance and monitoring to identify sources, implement existing or appropriate new or enhanced controls where necessary to control *all* controllable sources of bacteria, and monitor effectiveness of those controls to comply with bacteria receiving water limitations. Collectively, they are not expected to lower water quality related to bacteria in the subject waters as compared to the previous permit—rather, the opposite will occur. The robust and systematic actions will improve conditions in the affected water bodies and the permit has been modified to be clearer that compliance is expected by the end of the permit term. Moreover, bacteria are not a persistent pollutant that degrades receiving waters over time, as bacteria die off relatively quickly. In addition, water quality will not be lowered during the ”deemed in compliance” period because are no actions or controls that the Permittees would or can stop or delay because of the deemed in compliance language, resulting in worse water quality. There are no known specific sources of bacteria that the Permittees can ignore; as in the previous permit, Provision C.5 requires Permittees to eliminate any known or discovered illicit connections and illegal discharges to their storm drain systems.

Even though no antidegradation analysis is required, to be conservative, one has nevertheless been conducted consistent with state and federal antidegradation policies. The analysis assumes without deciding that the baseline water quality for comparison purposes is the best water quality since 1968. It demonstrates how under the permit existing uses and the water quality necessary to protect those uses will be protected in water bodies that are not high quality. For assumed high quality waters, the analysis makes the necessary findings that any degradation under the permit (i.e., Alternative 3 Option B in the antidegradation analysis) is consistent with the maximum benefit of the people of the state, among other findings. The analysis encompasses the inclusion of Provision C.14.a in Provision C.1’s deemed in compliance language. Thus, assuming the waters to which Sunnyvale and Mountain View discharge are high quality and assuming degradation could occur, the necessary analysis and findings have been made.

To the extent the commenter seeks to use the antidegradation policies to say findings are necessary before allowing degradation of already impaired waters, that is not the correct use of the policies. The policies only concern the degradation of high quality waters. The policies do not allow for a maximum benefit (or its federal equivalent)

finding that supports further degradation of a water body that is already at or below the water quality objectives—the objectives are the floor. (See 40 CFR § 131.12 subds. (a)(1) and (b); Resolution 68-16 [degradation of high quality waters shall not result in water quality less than that prescribed in the policies].)

Where there are water bodies in which pollutants exceed water quality objectives (e.g., waters receiving Mountain View and Sunnyvale discharges), the mechanism for ensuring that discharges contributing to these exceedances are controlled is not the antidegradation policies. Such exceedances are addressed through the Water Code's requirement to implement the Water Board's Basin Plan, including consideration of "the beneficial uses to be protected, [and] the water quality objectives reasonably required for that purpose" (Wat. Code §13263(a)) and the allowance of a time schedule for achieving those objectives (Wat. Code §13263(c).) Federal law likewise provides for a mechanism by allowing compliance schedules in NPDES permits. (40 CFR § 122.47.)

The antidegradation policies are particularly challenging to apply in situations where water quality is currently below the objectives, but was, or assumed to be, of better quality than the objectives at some point since 1968 (i.e., the waters are considered "high quality waters" for purposes of the antidegradation policy, but are currently below objectives). Since the antidegradation policies set the water quality objectives as a floor for degradation, such water bodies have already been degraded to a level that a maximum benefit finding under the antidegradation policies cannot accommodate. In those scenarios, the appropriate antidegradation framework considers whether the degradation of the best quality of water since 1968 to the objectives—not beyond the objectives—is justified, and the question as to whether further degradation beyond the water quality objectives is permissible is outside the scope of the antidegradation framework.

The commenter is incorrect that the Los Angeles County MS4 permit's deemed in compliance provision pertained only to parameters with TMDLs. (See, e.g., Los Angeles Water Board Order R4-2021-0105, p. 94.) Staff has confirmed this with the Los Angeles Water Board.

The commenter states the antidegradation analysis for high quality waters does not examine whether insulating Permittees from enforcement (through Provision C.1) for causing degradation is offset by the maximum benefit to the people of the state. We disagree with the premise of the question that the deemed in compliance language by itself will lead to degradation, as explained above. In any case, the commenter is advocating for administrative and judicial (e.g., citizen suits) enforcement of violations of requirements with which Permittees cannot immediately comply. We do not, however, believe it is in the maximum benefit of the people for the Water Board to impose and allow enforcement of permit requirements with which Permittees cannot immediately comply. In fact, it is bad government and bad policy as it leads to failure. Effective regulatory outcomes occur when requirements account for the feasibility of compliance and provide, as necessary, a path to compliance. Here, the assumed high quality

waters are in fact currently impaired by various pollutants and have TMDLs allowing Permittees a time schedule to come into compliance. The proposed Permit, like the previous permit, is consistent with time allotted in these TMDLs to come into compliance with water quality standards. For bacteria in the waters to which Sunnyvale and Mountain View discharge, immediate compliance is unrealistic even if required due to technical constraints. There are no known specific sources of bacteria that can be controlled immediately. There are categorical sources that the permittees must investigate and control once specific sources are found after systematic surveillance and monitoring. There are also no viable means to control bacteria in discharges by treating discharges. Some stormwater treatment or retention systems may reduce levels of bacteria in discharges, but they cannot be implemented immediately, and there are constraints that affect locating them where they would intercept discharges from bacteria sources, e.g., land availability and underground utilities. Also, most importantly, even though they may have viability due to other benefits, such as control of other pollutants and water supply augmentation using captured stormwater, none are able to reduce levels of bacteria equivalent to water quality objectives. Even municipal wastewater treatment systems cannot reduce bacteria to such low levels of bacteria without disinfection of the treated wastewater through chlorination/dichlorination, ozone disinfection, or ultra-violet light disinfection, which are not feasible for episodic stormwater discharges. The Fact Sheet on this point has been revised to explain the technical challenges of immediate compliance, which revisions are also shown below.

With respect to a schedule for Provision C.14.a., we have modified the permit to be clearer that compliance is expected by the end of the permit.

The commenter states that missing from the antidegradation analysis is an alternative that excludes the deemed in compliance language. Such an alternative is not consistent with adopted TMDLs, with which the Water Board must comply. The permit, like the previous permit, implements TMDLs which by their nature provide a time schedule to comply with receiving waters. In addition, State Board WQ Order 2015-0075, as amended by Order 2021-0052-EXEC, states compliance with TMDL requirements constitutes compliance with receiving water limitations.

The commenter states the economic analysis for Alternative 3, Option B is conclusory, unsupported, and insufficient. It also takes issue with citing to letters specific to trash. The citation is merely an example of the Permittees' financial constraints. We have nevertheless deleted the reference and made revisions to Alternative 3, Option B as follows:

> Alternative 3 Option A, as compared to Option B, could potentially avoid some of the costs discussed above~~, because~~ <u>if</u> some Permittees ~~may~~ <u>are able to</u> correct some exceedances earlier if required to comply immediately with receiving water limitations for all waterbody-pollutant combinations with no applicable TMDL. From a practical perspective, however, the Water Board finds that

> immediate compliance, particularly for those water that may have been high quality historically but are not high quality currently, is unrealistic even if required, given the technical and financial constraints faced by Permittees. There are no known specific sources of bacteria that can be controlled immediately. There are also no viable means to control bacteria in discharges by treating discharges. Some stormwater treatment or retention systems may reduce levels of bacteria in discharges, but they cannot be implemented immediately and there are constraints that affect locating them where they would intercept discharges from bacteria sources, e.g., land availability and underground utilities. Most importantly, even though they may have viability due to other benefits, such as control of other pollutants and water supply augmentation using captured stormwater, none are able to reduce levels of bacteria equivalent to water quality objectives.[36] They also have hydraulic capacity constraints that result in bypassing of untreated runoff during large storm events. Even municipal wastewater treatment systems cannot reduce bacteria to such low levels of bacteria without disinfection of the treated wastewater through chlorination/dichlorination, ozone disinfection, or ultra-violet light disinfection, which are not feasible for episodic stormwater discharges. Since it is unrealistic for Permittees ~~will not be able to afford~~ to comply immediately, any costs avoided would be non-existent to minimal. Further, the Permit limits application of Option B to the receiving water limitations for bacteria in water bodies (specifically, Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough) receiving discharges from Mountain View and Sunnyvale and monitoring demonstrates that these water bodies are not currently high quality for bacteria.

Commenter states a waterbody-specific complete antidegradation analyses for waters affected by Provision C.14.a and determine whether the deemed in compliance language is to the maximum benefit of the people. Please see the Fact Sheet's antidegradation analysis on why the Water Board is not required to conduct a waterbody-by-waterbody and pollutant-by-pollutant antidegradation analysis.

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[36] Clary et al., 2020. International Stormwater BMP Database: 2020 Summary Statistics. Water Research Foundation, pp. 21-33. Accessed at: https://www.waterrf.org/system/files/resource/2020-11/DRPT-4968_0.pdf
Clary, Pitt, and Steets, August 2014. Pathogens in Urban Stormwater Systems. ASCE. Accessed at: https://collaborate.ewrinstitute.org/ewri/ourlibrary/viewdocument?DocumentKey=fffe8a76-18b2-4f85-9b54-b0eac23f12a0

Response to Comments Table

The comments in the following Response to Comments Table are summarized and paraphrased for brevity. For the full content and context of the comments, please refer to the comment letters, which have been annotated with comment numbers that are used in the table. To request copies of the annotated letters, please contact Derek Beauduy at (510) 325-8082 or RB2-MRP@waterboards.ca.gov.

Response to Comments on September 10, 2021, Tentative Order
General Comments

Comment No.	Provision	Comment	Response	Proposed Revision
CCCWP - 1	General	To preserve previous comments raised, CCCWP and Contra Costa Permittees reassert every comment submitted on the Administrative Draft and every comment in their comment letter on the Tentative Order as set forth in full.	Comment noted. The comments submitted on the February 2021 administrative draft were considered and addressed via edits resulting in the issuance of the public draft Tentative Order. As a result, they are not addressed separately here. The Water Board is required to respond to comments on the Tentative Order that was circulated for public comment, not comments on prior iterations of the draft order that were circulated as a courtesy to Permittees and that have been significantly modified since the Tentative Order was circulated for public comment.	None.
CCCWP - 3, CCCWP - 4	General	The permit includes many new work products that are required to be submitted to the Water Board. Analyze each required work product to determine if it is redundant or necessary, and if it ensures improvements are made to water quality and adds value to the existing reports and work products, and make sure Water Board staff are available so reports can be reviewed, comments returned, and new plans implemented in a timely manner.	Comment noted. Water Board staff considered as part of the Tentative Order, and again in making revisions in response to comments resulting in the Revised Tentative Order, the items noted in the comment. Staff also coordinated with Permittees in considering adjustments to and prioritization of work products. See also provision-specific responses, and responses to: CCCWP-5; Palo Alto-6; SCVURPPP-2; SCVURPPP-2c; SCVURPPP-2d; and Combined comment:	See responses to the Commenter's subsequent Provision-specific comments on work products and reporting, as noted in Response, at left.

Comment No.	Provision	Comment	Response	Proposed Revision
			Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1.	
CCCWP – 5	General	The permit includes several required tasks that Permittees must undertake for which Permittees have no expertise in nor legal or regulatory authority to do. Having Permittees perform these tasks will result in outcomes that will have little benefit and, worse yet, may be infeasible for permittees to accomplish. For example, modifying emergency firefighting procedures to include water quality best management practices would best be handled directly between the Water Board and the Bay Area fire districts. Most Permittees have neither authority over fire districts nor expertise in emergency firefighting procedures. The homeless provision is another example where permittees do not have the expertise to implement permit requirements.	We disagree. The cited requirements use methods that have been used effectively for more than thirty years in the stormwater program, and with which the Permittees thus have substantial experience: organization of work groups to communicate and coordinate around effective measures to protect water quality, the production of guidance or other expectations reflecting the outcome of that coordination, and subsequent training or other education to support implementation of the guidance and expectations. Where a Permittee's stormwater program staff may not have all of the expertise necessary to consider appropriate measures to protect water quality, it is reasonable to communicate and coordinate with other Permittee staff (e.g., fire department staff or staff working on other issues around unsheltered homelessness). For unsheltered homelessness, this is the response that Permittees including the cities of Oakland and San Jose are taking—internal coordination, which also facilitates coordination with external parties.	See cited responses.

Comment No.	Provision	Comment	Response	Proposed Revision
			Additionally, the comment makes an implicit, but incorrect, distinction, between the stormwater program that many Permittees have established to implement the Permit, and the Permittees as a whole, which are the entities permitted under the Permit, and which are responsible for discharges to their MS4s, even when those discharges come from parties other than a Permittee's stormwater program. Please see also responses to: For emergency firefighting discharges: Combined comment ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 For discharges to the MS4 associated with unsheltered homelessness: CCCWP – 91 CCCWP – 94 and combined comment:	

Comment No.	Provision	Comment	Response	Proposed Revision
			CCCWP – 93, SCVURPPP – 183, Oakland & San Jose – 7, SMCWPPP – 32, 318, Pleasanton - 1	
San Pablo - 1	General	San Pablo has significant concerns about language in the Tentative Order that could have the unintended consequence of terminating current projects and preventing future projects. Many of these concerns and others are addressed in the regional letter sent by the CCCWP on behalf of Contra Costa County Permittees.	Comment noted. Please see responses to specific comments in the CCCWP comment letter, and see response to combined comment: CCCWP - 3 CCCWP - 4	See responses to specific comments in the CCCWP letter and as noted in Response, at left.
Concord - 1	General	The Tentative Order is an improvement over the Administrative Draft released in February. However, it still recommends provisions which will not only prove detrimental to the residents of Concord, but actually work contrary to the stated clean water objective. At the request of the Water Board Chair, we are providing the specificity as to how Concord is already, and proposes to continue to, better achieving water quality objectives through our current approved 2019 Green	Comment noted. The Tentative Order appropriately sets forth expectations to achieve clean water goals consistent with the Clean Water Act and implementing regulations and policy. Specific comments/requests included in Concord's subsequent comments are addressed separately. For example, see responses in C.3 to combined comments: San Pablo-2 CCCWP-20 Concord-1, 2, 3	See responses herein to specific subsequent comments in Concord's letter and as noted in Response, at left.

Comment No.	Provision	Comment	Response	Proposed Revision
		Infrastructure Plan and project opportunities.	Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1 and Concord-1, 5.	
Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1	General	The Permittees are concerned that the Tentative Order does not fully consider the unprecedented situation that municipal agencies are currently facing as a result of the COVID 19 pandemic and related fiscal impacts, and does not provide cost-effective, flexible, and practical approaches focused on high-priority stormwater quality issues.	The Tentative Order takes into account disruptions associated with the pandemic, such as changes to municipal revenues, the availability of and increases to, or anticipated increases to, federal grant funding, funding from Caltrans for cooperative trash control projects, and increases in unsheltered homelessness. These have been considered in context with prioritized water quality drivers and Permittees' ongoing efforts to control urban runoff pollutants, including pollutants like trash, mercury, and PCBs, and reasonable expectations for how those efforts should evolve over time. Those expectations include recognition of the need for Permittees to obtain resources for future actions. As a result, the Tentative Order includes changes such as: C.10 would delay mandatory trash control reductions by three years as compared to the schedule identified in MRP 2; C.3, while introducing two new regulated project categories and adjusting thresholds to reflect the MEP standard, would delay those new categories and the	This is a general comment. Edits have been made in response to more-specific points made by the commenters. See responses to specific comments in the cited Provisions.

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			changes to existing thresholds by one year after the Permit's effective date; rather than incorporating modest additional expectations for reporting and program review, C.2, C.4, C.5, and C.6 have been largely maintained as-is. In some cases, reporting under those provisions has been reduced; and new provision C.17,discharges associated with unsheltered homelessness, has been added to recognize the growing challenge associated with those discharges and to provide both focus and flexibility as compared to C.5's more-rigid framework. In addition, to further focus efforts on the highest-priority water quality needs, the Revised Tentative Order incorporates delays in proposed reporting and reductions in or consolidation of reporting. Certain efforts, while desirable, are also optional (e.g., the opportunity in C.3.d.iv to expand the toolbox of available LID measures), giving Permittees the option to further focus on higher-priority efforts. Fact Sheet section C.10-11 notes Covid's impact on trash discharges.	
Palo Alto – 1 Los Altos – 1 SCVWD – 1 San Jose – 1 Cupertino – 1 WVCWPA - 1	General	The Permittees support the comments on the Tentative Order submitted by SCVURPPP on behalf of its member agencies as well as the comments submitted by SCVURPPP's legal counsel,	Comment noted.	None.

Comment No.	Provision	Comment	Response	Proposed Revision
		Robert Falk, on behalf of SCVURPPP member agencies.		
Palo Alto - 6	General	Palo Alto is concerned about the Tentative Order's substantial new requirements in C.3, C.10, C.11/C.12, C.15, C.17, C.21, and C.22, all of which are designated as high priority by Water Board staff. Since the proposed MRP 3 effective date has been extended to July 1, 2022, requirements that were initially planned to be phased in have been made "effective immediately" or have shortened timelines based on the incorrect assumption that work on certain provisions will begin prior to the effective date of MRP 3. This assumption is inappropriate and unachievable, as Co-permittees have neither the resources nor the legal responsibility to begin work on provisions prior to the effective date of the reissued permit. The schedules for completing requirements during the term of the reissued permit should be adjusted to provide adequate time to allow Co-permittees to successfully achieve the goals of the requirements and not	In response to comments received, we have adjusted some reporting requirements for the referenced provisions, including reducing and simplifying reporting and delaying required reports. See the responses to comments on individual provisions for more-detailed information regarding specific changes. See also response above to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1	This is a general comment. Edits have been made in response to more-specific points made by the commenter. See responses to specific comments in the cited Provisions and as noted at left.

Comment No.	Provision	Comment	Response	Proposed Revision
		presuppose that Co-permittees will begin addressing the requirements prior to the MRP 3 effective date. The Tentative Order also increases tracking and reporting requirements for almost all provisions, including for current programs, with no reason or justification that they have been ineffective in the past. Additionally, justification has not been provided to show how increased reporting and tracking would provide an enhanced benefit to water quality. The City asks that the Water Board consider the requests to adjust timelines and reduce reporting requirements included in the SCVURPPP letter and respective Attachments.		
San Jose – 1	General	The City writes to highlight the provisions that will uniquely impact San José and to provide fact-based analysis for the Water Board's consideration. This letter highlights the City's most crucial concerns (Issues 1 - 8), which are: inaccurate references to the Baykeeper Consent Decree, C.3, (New and Redevelopment), C.10 (Trash Load Reduction), C.12 (PCBs	Comment noted. The City's specific comments are addressed separately in this Response, including proposed responsive revisions.	None.

Comment No.	Provision	Comment	Response	Proposed Revision
		Controls), and C.15 (Exempted and Conditionally Exempted Discharges). In addition, please refer to Att. A: Detailed Comments , for specifics on each of these issues and other challenges in each provision.		
SCVURPPP Legal - 1	General	Nothing is legally deficient about the alternative compliance pathway in the Tentative Order being structured differently than the LA County permit's alternative compliance path. The applicable State Water Board precedent concerning conveying "deemed compliance" status does not constrain the Water Board's proposed approach, dictate a specific type or form of analytical exercise in justifying the selected approach, or require more substance than the Tentative Order and Fact Sheet already provides.	We agree that State Water Board precedent does not constrain the Regional Water Board to developing a permit that mirrors LA's permit. As stated in the Fact Sheet, the State Water Board recognizes that the regions' stormwater permits may not all look alike (See, e.g. State Water Board Order WQ2021-0052-EXEC, p. 64 ("[W]e acknowledge that regional differences may dictate a variation on the [watershed management program] approach."); State Water Board Order WQ 2020-0038, p. 164 ("This order is not intended to curtail the flexibility of the regional water boards. . . to adopt and develop alternative compliance plans that best fit their particular regions, and does not require modification of programs adopted by other regional water boards."). Nevertheless, the Regional Water Board has updated some provisions of the Tentative Order to hew more closely to the principles outlined in State Water Board Orders WQ2021-0052-EXEC and WQ-2020-0038.	Provisions updated as described in the response.

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			For instance, we have augmented receiving water limitations monitoring in C.8.f and updated the monitoring requirements and milestones for C.14.a in response to Baykeeper's comments.	
SCVURPPP Legal-2	General	"See below."	None.	None.
SCVURPPP Legal - 2	General	No legitimately claimed legal impediment exists to the staff revising the proposed permit to extend the offset and credit programs throughout the full term of the new permit. The Water Board has the authority to direct the staff to revise C.10.b.iv and C.10.f to maintain the credit and offset programs for the renewed permit's full five-year term. SCVURPPP again requests that this change be made.	The Water Board disagrees that Permittees can use credits and offsets to achieve the discharge prohibition established by the Trash Amendments. The Trash Amendments require municipal stormwater permittees to achieve zero trash loading by installing full trash capture devices or implementing controls that, in combination, reduce trash discharges to full trash capture equivalency. While credits and offsets may reduce the amount of trash generated, they allow discharges to continue, and so are not compatible with the full-trash capture equivalency standard. However, the underlying source control actions and direct discharge programs may continue to be used as elements of the suite of controls that will achieve full-trash capture, even if they are no longer eligible for a specific credit.	None.
SCVURPPP Legal - 2	General	Fact Sheet Section V.C purports to set forth the legal reasoning supporting the staff's position that new requirements and provisions in the Tentative Order are not	We disagree with the commenter's characterization of the two cited cases and with the implication that the requirements of the Tentative Order are unfunded state mandates. The decisions were narrower than	None.

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		unfunded state mandates, but does not adequately address the California Supreme Court's decision in Department of Finance v. Commission on State Mandates (2016) 1 Cal.5th 749 or acknowledge the import of the California Court of Appeal's more recent decision in Department of Finance v. Commission on State Mandates (2021) 59 Cal.App.5th 546. In the former case, the California Supreme Court held that the Commission on State Mandates, and not the State or Regional Water Boards, have jurisdiction to determine whether requirements imposed through municipal stormwater permits exceed those imposed by the federal government even if they are nevertheless directed to the worthy goal of improving water quality. The Commission has previously determined under relevant case law that municipal stormwater requirements not set forth in the federal regulations or more specific and prescriptive than those in federal regulations, constitute state rather than federal mandates. In the more recent	the commenter suggests and they do not affect the Water Board's conclusion that the Tentative Order does not impose any unfunded state mandates. In the referenced California Supreme Court decision, the court found that two requirements of Los Angeles's stormwater permit, a requirement to inspect industrial and commercial sites and a requirement to install trash cans at transit stops, were not required by the federal mandate to reduce pollutants in stormwater to the maximum extent practicable. *Dept. of Finance v. Comm. on State Mandates* (2016) 1 Cal.5th 749, 770-772. However, the court did not evaluate whether the requirements could potentially have been required under the federal mandate to effectively prohibit the discharge of non-stormwater, or by a Total Maximum Daily Load, and did not definitively conclude that they were unfunded state mandates. In the referenced Court of Appeal decision, the court concluded that while the Los Angeles stormwater permittees had authority to impose fees for inspections of industrial and commercial facilities, they did not have authority to impose fees for the installation of trash receptacles at transit stops on adjacent	

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		case, the Appeal's Court addressed the "unfunded" part of the equation and held that certain of the state mandates at issue were subject to subvention (i.e., effectively suspended until such time as the State provides funding for them) because the local agencies did not have the authority to levy fees sufficient to pay for them under Government Code section 17556(d).	property owners. *Dept. of Finance v. Comm. on State Mandates* (2021) 59 Cal.App.5th 546, 564-565, 569-570. This ruling reflected the specifics of the trash receptacle requirement, namely that the receptacles had to be placed at transit stops, which are publicly owned, meaning that a fee on nearby property owners to install trash cans there would not necessarily fund a service from which those property owners would benefit. *Id.*, 59 Cal. App. 5th at 567-569. However, the ruling was not akin to a determination that *no* stormwater permit requirements could be fee-funded. Neither decision evaluated the effect of the passage of Senate Bill 231, which affirmed that stormwater-related fees are not required to pass by a two-thirds majority (Gov. Code, §§ 53750, 53751). A subsequent decision has determined that the existence of the majority protest process outlined in Govt. Code § 53753 does not negate local agencies' fee authority. *Paradise Irrigation Dist. v. Comm. on State Mandates* (2019) 33 Cal.App.5th 174, 193-194. That decision concluded that "[s]tatutory authorization to levy fees—rather than practical considerations—conclusively determines" whether a local	

Comment No.	Provision	Comment	Response	Proposed Revision
			agency has fee authority. *Id.*, 33 Cal.App.5th at 195. The commenter has not explained why, if the Tentative Order's requirements were determined to be state mandates, the Permittees here would not have fee authority to implement them. After all, multiple Permittees have already passed stormwater fees, as noted in the Fact Sheet. The commenter has not alleged that any of the Tentative Order requirements are akin to the trash receptacle requirement that the Court of Appeal determined could not be funded by a property-based fee.	
SCVURPPP Legal – 3 ACCWP Legal -6	General	Several new and updated provisions in the Tentative Order are unfunded state mandates and should be dropped or made conditional until the State actually provides funds for them. As an example, C.17 newly requires implementation of control measures to address discharges associated with unsheltered homeless populations, a regional problem not even mentioned in the Clean Water Act or federal regulations. C.20 (cost reporting) and C.21 (asset management) are also wholly new, costly,	We disagree that any provisions in the Tentative Order are unfunded mandates. We note that whether or not these provisions could be found to be new programs, the Permittees have fee authority to cover the costs of implementation, as explained in the Fact Sheet (e.g., sections IV.E, Economic Considerations; V.C, State Mandates; and C.3.b). C.17. We disagree that C.17 is an unfunded mandate because it is "wholly new" and "not even mentioned in the Clean Water Act or federal regulations." First, C.17, which	None.

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		burdensome relative to stretching existing municipal staff resources even thinner, and not mandated in their proposed onerous form by the existing federal regulations. In addition, while not altogether new, the Water Board received extensive testimony in Oct. 2021 concerning the expanded requirements and associated increased cost burdens associated with the proposed monitoring (C.8), and green infrastructure and LID requirements proposed in C.3. Similarly, as discussed above, Receiving Water LimitationB.2. is not required by federal law and the Provisions and requirements tied to it reflect the State's discretionary decision to require municipal stormwater to meet water quality standards. All of these should be modified, deleted, curtailed or, at a minimum, conditioned on the receipt of state funding.	incorporates requirements for controlling discharges associated with unsheltered homelessness, is not new. As noted in the Fact Sheet, C.17 implements the longstanding Basin Plan prohibitions on the discharge of trash and raw sewage (Table 4-1, Discharge Prohibitions 7 and 15), as well as the statewide prohibition on trash discharges of trash in the Trash Amendments. Discharges from homeless encampments were previously required to be controlled under MRP 2 Provisions C.5, which covered dumping and illicit discharges, and C.10, which covered trash discharges. Because the control of discharges from homeless encampments has humanitarian dimensions, in MRP 3, the Water Board distinguishes discharges associated with unsheltered homelessness from other types of illicit discharges or trash discharges. C.17 encourages coordination of water quality-driven actions with other agencies' actions to improve the living conditions of homeless people. However, this change in focus does not make the regulation of discharges associated with unsheltered homelessness a new program. Furthermore, the Water Board's hope is that by examining the ancillary water quality benefits of programs that prioritize improvements to homeless people's quality of life, the Permittees may discover efficiencies that enable them to	

Comment No.	Provision	Comment	Response	Proposed Revision
			save money on stormwater controls at the same time that they address the pressing health and safety concerns of people living on the street. In addition C.17 is required by federal law. In addition, C.17 is required by federal law. Municipal stormwater permits have, since the addition of the stormwater amendments in 1987, been required to "effectively prohibit non-stormwater discharges," which would include discharges of sewage and trash from homeless encampments. 33 USC 1342(p)(3)(B)(ii). CWA regulations require MS4 permits to prevent illicit discharges, which would also include discharges associated with unsheltered homelessness. 40 CFR 122.26(d)(1)(v)(B), (d)(2)(iv)(B). We disagree that trash fees or other fees or funding could not be used to cover the cost of implementing additional trash controls at homeless encampments. For instance, San Jose has expanded a program in which the homeless are hired to pick up trash around the city using federal funds and allocations from the city's budget. See "San Jose mayor expands trash-picking program for homeless," *San Jose Spotlight* (Sept. 17, 2021). Oakland similarly allocated $750,000 of its budget to the Downtown Streets	

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			program, which trains homeless individuals to clean up trash. “Cities see trash cleanup programs as a way to combat homelessness,” Pew – Stateline (Oct. 13, 2021). The City of San Francisco spends several million dollars per year on providing portable toilets to homeless encampments. “Bay Area Homelessness: 97 Answers to Your Questions,” San Francisco Chronicle (July 11, 2020); see also “San Francisco Public Toilets Help Homeless, Cost $200,000,” NBC Bay Area (August 2, 2019). C.3 As noted in the Fact Sheet, the requirements of C.3 are also not new programs because they do not discharge a governmental function or apply only to local governments. Private entities under other permits, such as the Construction Stormwater Permit (Order 2009-0009-DWQ) or the Vineyard WDRs (Order No. R2-2017-0033), are routinely required to implement stormwater controls when developing more than a threshold area of impervious surface or to manage stormwater runoff from roads. C.8.	

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			The commenter does not explain which parts of C.8 it believes are new programs. Monitoring generally, however, is not new. MRP 1 and MRP 2 both required monitoring, which is required by the Clean Water Act and its regulations to be included in municipal stormwater permits. See, e.g.,40 CFR §§ 122.26(d)(2)(i)(F), 122.41(h), (j), (l), 122.42(c), 122.44(i), and 122.48; see also 40 CFR 122.26(d)(2)(iii)(A)-(D). All stormwater dischargers, as well as other NPDES dischargers and nonpoint source dischargers, are required to conduct monitoring. Accordingly, monitoring requirements do not implement a uniquely governmental function and are not uniquely applicable to local governments. C.20 The Water Board proposes to include Cost Reporting under C.20 in MRP 3 in response both to Permittee concerns about the costs of Permit implementation and to a March 2018 California State Auditor's report concluding that the Water Boards were not adequately tracking these costs. By requesting this information from the Permittees, the Water Board hopes to "promote greater efficiency, consistency, and transparency related to the [State Water	

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			Board] and [regional water boards'] regulation of a significant source of pollution." State Water Board Order 2020-0038-WQ, p. 28. In requiring cost reporting, the Water Board is requesting information that the Permittees presumably already have and is not requiring Permittees to implement a new program. C.21 Similarly, the asset management requirements do not amount to a new program. Instead, the Water Board would like the Permittees to use the information and data they already have about their own maintenance needs and the condition of their hard stormwater assets to prioritize maintenance and repairs. The intent of this requirement is to ensure that Permittees use their limited resources as efficiently as possible and that improvements or repairs are planned in areas where they are needed most or will have the biggest effect. Moreover, 40 CFR § 122.41(e) requires a permittee to properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with its permit.	

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			Receiving Water Limitation B.2 Receiving Water Limitation B.2 is not a new provision; it was included in MRP 2 and MRP 1 (Order No. R2-2015-0049, p. 5; Order No. R2-2009-0074, p. 8). Moreover, compliance with this receiving water limitation does not require the Permittees to carry out functions "peculiar to government." The requirement that discharges not cause or contribute to water quality standards violations applies not only to local agencies, but to public and private dischargers across the region and the state. For instance, this receiving water limitation can be found in the wastewater permits for private industrial facilities in the San Francisco Bay Region (e.g., Order No. R2-2016-0047, p. 6; Order No. R2-2021-0029, p. 10), as well as in the statewide Industrial Stormwater and Construction Stormwater General Permits (Order 2014-0057-DWQ, p. 21; Order 2009-0009-DWQ, p. 31). While the Water Board acknowledges that stormwater permit compliance costs money, we disagree that the municipalities lack fee authority to raise it. Moreover, the passage of Senate Bill 231 confirms that voter approval is not needed to approve stormwater fees. See Govt. Code §§ 53750, 53751; *Paradise*	

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			Irrigation Dist. v. Comm. on State Mandates (2020) 33 Cal.App.5th 174, 197.The Water Board further disagrees that the funds to pay for stormwater compliance must be the budget of the stormwater program specifically. Monies that Permittees spend on, for instance, trash collection, park maintenance, homeless services and fire prevention may also help comply with the MRP. For instance, as noted above and in the Fact Sheet, the Water Board developed C.17 to prevent Permittees' efforts to achieve trash load reductions from conflicting with their efforts to reduce the number of people living on the street. The Water Board hopes that, with coordination, Permittees will be able to improve the living conditions of their unsheltered homeless residents in ways that also reduce non-stormwater discharges of human waste and trash; and that such coordinated responses will reduce Permittees' combined expenditures on stormwater control and social services.	
ACCWP Legal - 6	General	In addition to the new or updated conditions in the Tentative Order, many of the provisions in the Tentative Order are the subject of two existing test claims currently before the Commission (Test Claim No. 16-TC-03 amended August 14, 2017) and Consolidated Test Claims Nos. 10-	Comment noted. The Water Board acknowledges that Permittees challenged MRP 1 and MRP 2 on mandates grounds and that the Commission on State Mandates has yet to rule on these challenges. As explained above, the Water Board disagrees that the Court of Appeal's decision in *Dept. of Finance v. Comm. on State Mandates* (2021) 59 Cal.App.5th 546 is directly relevant	None.

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		TC-01, 10-TC-02, 10-TC-03 and 10-TC-05. Test Claim No. 16-TC-03 seeks subvention for, among other things, trash-related programs adopted under the 2015 stormwater permit (NPDES Permit No. CAS612008), for which the Court of Appeal's in Dept. of Finance is directly relevant. The Commission has scheduled tentative hearing for these test claims for May 27, 2022.	because MRP 3 does not require the installation of trash receptacles at transit stops.	
Sunnyvale & Mountain View - 1	General	The cities support and incorporate by reference those comments submitted by SCVURPPP. Due to ongoing litigation, the Cities have a sincere interest in ensuring the clarity of the permit's language and requirements. The Cities focus their comments on the provisions related to fecal indicator bacteria, or FIB. In response to the possibility of a problem with FIB the cities have filed a C.1 report and plan and requested a permit amendment as set forth in C.1.	Comment noted.	See responses to comments on Provision C.14.a.
Sunnyvale & Mountain View - 7	General	The Cities urge the Water Board to make the requested modifications to increase the clarity of the MRP provisions discussed in their comment letter and have provided	Comment noted. See responses to the commenters' subsequent specific requested modifications.	See responses, including responsive edits, to commenters' comments with

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		language revisions as an attachment to this letter.		specific requests.
SCVURPPP - 1	General	The comments and recommended revisions to the Tentative Order included in Att. A and B are based on the lessons learned during the implementation of the current MRP (MRP 2) and previous permit terms. Our comments and recommended revisions are consistent with the following permit reissuance goals expressed by Co-permittees during recent and ongoing discussions with Water Board staff: • When developing and adopting the reissued MRP, fully consider the unprecedented situation that Co-permittees are currently facing as a result of the COVID-19 pandemic and associated fiscal impacts; • Recognize and build upon the significant investments made in development of programs, processes, management practices, and standard operating procedures to date in ways that continue to improve and protect water quality; • Provide a clear, data driven, water quality basis for adding or enhancing requirements and	Please see response above to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1	See responses, including responsive edits, to commenter's comments with specific requests.

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		consider the priorities and relationships among various provisions; and • Provide more flexibility with options for compliance rather than prescriptive requirements in the MRP. SCVURPPP Co-permittees are concerned that the Tentative Order does not consider the practical input provided by Co-permittees or sufficiently embrace the collaborative approach that we worked to build.		
SCVURPPP - 2	General	The Tentative Order contains substantial new requirements in a number of provisions, most notably C.3, C.10, C.11/C.12, C.15, C.17, C.21, and C.22, all of which have been described as high priority by Water Board staff. As in past permits, these provisions were again developed in “silos” without regard to the combined fiscal and staffing impacts to Co-permittees and the interaction and inconsistency among provisions.	The permit builds upon the last permit and considers feedback provided during both provision-specific workgroup discussions and meetings of the plenary MRP Steering Committee, which included discussion of the combined burden of the Permit’s proposed expectations. The requirements set forth are also considerate to the fiscal and staffing impacts faced by permittees.	None.

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SCVURPPP – 2a	General	The TO does not allow credit for any of co-permittees' good faith efforts, including the planning efforts that would result in construction of new facilities during MRP 3.0, unless projects were completed after January 1, 2021. Additionally, since 2012 (10 years) SCVURPPP has collected over 370 sediment samples and 70 stormwater samples at a cost of over $2M to identify PCBs source properties, leading to the identification of 41 parcels (182 acres) and the referral of parcels to the Water Board for abatement. These resource intensive and time-consuming investigations led by SCVURPPP have been conducted at a far greater pace than many other stormwater programs. However, the Tentative Order does not acknowledge or consider this level of early implementation and, instead, hastens the pace that investigations would need to occur over the next permit term. This penalizes SCVURPPP Co-permittees, as they have been early (and diligent) implementers	Regarding Provision C.3, see the response below to combined comment: SCVURPPP-2a,4,37 Los Altos-4 San Pablo-5 SMCWPPP-75 CCCWP-21,22 Palo Alto-3. The comment suggests that the Water Board does not sufficiently recognize SCVURPPP efforts conducting source property investigations and even penalizes SCVURPPP co-permittees by hastening the pace of investigations in the next permit term. The efforts being undertaken to control loads of PCBs by SCVURPPP co-permittees are not voluntary efforts that necessarily merit praise or commendation when they are undertaken or performed expeditiously. Rather, these are requirements to implement TMDLs that have been in place for more than 10 years. The Water Board does not make a practice of giving special credit to Permittees simply for complying with permit requirements to prevent pollutants from entering receiving waters. The PCBs TMDL was adopted nearly 12 years ago, so one	See responses, including responsive edits, to commenter's comments with specific requests, and cited response noted in Response, at left.

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		of pivotal stormwater control measures.	would expect that all or nearly all source properties would have been identified by now. SCVURPPP, while having conducted more screening than other programs, has still not completed the task of identifying source properties. The Tentative Order does recognize SCVURPPP's faster pace of source property investigations. Because SCUVRPPP has investigated a larger proportion of its old industrial area, SCVURPPP permittees have a smaller performance metric than other Permittees. MRP 3 calls for SCVURPPP to investigate 913 acres of old industrial land use while the performance metrics for San Mateo (1,411 acres), Alameda (2,620 acres), and Contra Costa (1,700 acres) are much larger. It is not true that the Tentative Order requires SCURPPP to conduct investigations at a faster pace than it has been. SCVURPPP has investigated 4,214 acres of old industrial land use over roughly 10 years, or about 2,107 acres during a 5-year period. MRP3 requires SCVURPPP to investigate only the remaining 913 acres. This requirement represents a pace that is less than half of the pace SCVURPPP has been conducting these investigations.	

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SCVURPPP – 2b	General	Since the proposed MRP 3 effective date has been extended to July 1, 2022, requirements that were initially planned to be phased in have been made "effective immediately" or have shortened timelines based on the incorrect assumption that work on certain provisions will begin prior to the effective date of MRP 3. This assumption is inappropriate and unacceptable, as Co-permittees have neither the resources nor the legal responsibility to begin work on draft/ potential provisions prior to the effective date of the reissued permit. Additionally, significantly shortened timelines ignore the original intention of the extension to the permit reissuance, which was to acknowledge that the COVID-19 pandemic has affected Co-Permittee resources and will	Comment noted. The Permit appropriately considers implementation timelines, including with respect to the Permit's effective date and other factors, such as the time needed to complete monitoring or reporting, and the impacts of the Covid-19 pandemic. Many requirements are ongoing requirements where continued or modestly modified implementation should be straightforward; for new or more-substantially modified expectations, dates were a significant part of workgroup and Steering Committee discussions. In response to comments staff has proposed changes including reductions in reporting and modifications to implementation dates. For example, changes to C.2, C.4, C.5, and C.6 have been reduced to largely conform those to MRP 2; in C.3.b, the implementation of new regulated project categories and updates to thresholds of existing regulated project categories has been delayed by a year; in C.3.j, reporting on Green Infrastructure Plan implementation	See responses, including responsive edits, to commenter's comments with specific requests, and response noted in Response, at left. Changes made as noted herein.

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		affect the feasibility of implementing new requirements for the next few years. The schedules for completing requirements during the term of the reissued permit should be adjusted, as described in Att. A and B, to provide adequate time to allow Co-permittees to successfully achieve the goals of the requirements.	has been reduced to twice during the permit term from annual; in C.15, the Firefighting Discharges Work Group reporting expectation has been reduced to a single final report from two (a draft and a final); and in other provisions, including C.8 and C.20, reporting dates have been delayed. See also response above to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1	
SCVURPPP – 2c	General	A key goal of MRP 3 discussed with Water Board staff was to continue to achieve consistent implementation across the SF Bay Area with respect to "core" municipal stormwater management program elements (e.g., C.2, C.4-C.7). This goal included reducing costly changes to Co-permittee programs that can be avoided. Instead, in C.2, C.4, C.5 and C.6, there were revisions made in every sub-provision, which include additional tracking and reporting	In response to commenters' concerns about additional reporting, we have proposed reducing or eliminating proposed reporting in the following places: C.2.a.iii C.2.b.ii C.2.c.iii C.2.h.iii C.4.d.iii C.5.e.iii C.6.f.iii	See responses, including responsive edits, to commenter's subsequent comments with specific requests. Changes made as noted herein.

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		requirements. Many of these revisions do not reflect an understanding of the successful development and implementation of these programs over the past 20 years and ignore previous beneficial collaborations and agreements reached among Co-permittees and Water Board staff on the scope of these effective and model programs.	C.15.b.iii Although the additional reporting requirements would allow the Water Board to more specifically evaluate what sites have repeated, escalated, or unresolved enforcement actions, as well the appropriateness of specific BMPs used in municipal operations, for the coming Permit term we will only require that the information and supporting documentation be made available during inspections or upon request by Water Board staff. If we determine through inspections or audits that there are specific concerns with inappropriate or inadequate BMPs, or sites that are not appropriately being addressed to resolve violations or referred to the Water Board for escalated enforcement, we will consider updating reporting requirements to address this in a future permit reissuance.	
SCVURPPP – 2d	General	The Tentative Order increases tracking and reporting requirements for core municipal stormwater program elements as well as other existing provisions with no reason or justification that current programs are not effective, nor that increased reporting and tracking would provide an	As noted above in response to comment SCVURPPP – 2c, we have reduced tracking and reporting requirements in response to commenters' concerns. Where we have not reduced reporting, we have provided explanations of the utility of the information.	See responses to commenter's comments with specific requests. Changes made as noted herein.

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		enhanced benefit to water quality. This increase in tracking and reporting requirements for core programs is in addition to the new tracking and reporting requirements associated with new provisions included in the Tentative Order and is counter to Water Board staff's originally stated goal to reduce reporting requirements throughout the permit.		
Oakland & San Jose - 1	General	We request the next MRP contain feasible and achievable mandates to enable our cities to make meaningful progress toward bettering our environment. The Tentative Order contains provisions which impede, rather than facilitate, our cities' progress toward a better environment. If the Tentative Order is adopted as it is currently written the cities of San José and Oakland, in addition to other cities, will encounter significant obstacles.	It is unclear to which provisions or significant obstacles the commenter is referring. We believe the Tentative Order's requirements are both feasible and achievable to control the discharge of pollutants from MS4s.	None.
San Mateo County - 1	General	The County has identified several areas of concern in the Tentative Order and supporting documents that could hamper our ability to effectively improve water quality in	As noted above, in response to comment SCVURPPP – 2c, we have reduced reporting requirements in places where they are not necessary. We have also changed wording	See responses to commenter's comments with specific requests.

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		San Mateo County. In particular, some of the provisions add administrative reporting burdens, significantly increase capital costs of infrastructure improvements, set potentially unachievable targets, and decrease flexibility for adaptive implementation of stormwater requirements.	in places to add flexibility. These provisions include: C.2.f.ii C.8.d.iv C.8.e.iii C.15.b.iii C.17 We disagree that the targets set by the permit are unachievable. These targets are either dictated by state and federal law, or by previously adopted TMDLs; Permittees have, through successive permit terms, made substantial progress toward achieving these targets. For instance, despite vociferous objections that 80% trash reductions could not be achieved in the previous permit term, all but a handful of Permittees were able to achieve this milestone by the deadline in MRP 2, and the Permittees who did not have all since done so.	Changes made as noted herein.
San Mateo County - 2	General	The County supports the intentions of MRP 3 to improve water quality in local creeks, the Bay, and the Pacific Ocean and to meet water quality standards pursuant to the Clean Water Act. Stormwater management is increasingly an important factor in ensuring our	Comment noted. We appreciate San Mateo County's efforts.	None.

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		community remains resilient and our natural resources are protected. The County is committed to improving stormwater management practices and has been collaboratively working with the Water Board, municipalities, local agencies, and the community even before the adoption of the first MRP in 2009.		
San Mateo County – 3,8	General	Increased reporting requirements will require additional staff time for data collection, analysis and reporting. In many instances, the compounding requirements seem overly prescriptive and burdensome without any direct water quality benefits or documented need for enhanced reporting measures. Given the number of permittees subject to MRP 3 and the significant number of reporting requirements, the County is also concerned that many of these submittals will go unread by regulators without increased staff capacity. Remove or reduce extraneous reporting requirements with unclear connections to water quality benefits	See responses to comment SCVURPPP 2c and San Mateo County 1 for provisions we have simplified either to reduce reporting or to increase flexibility. See also response to combined comment CCCWP-3, CCCWP-4.	See responses, including responsive edits, to commenter's comments with specific requests. See also response noted in Response, at left. Changes made as noted herein.

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Woodside – 1-6, 9-10, and 12	General	The Town is a member of the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) that has separately submitted comments. While the Town has significant concerns with many of the provisions of the Tentative Order that are detailed in SMCWPPP's letter, the Town is particularly concerned with two of the changes in C.3: Overall, there appear to be very few provisions in the draft MRP 3 that sufficiently recognize the unique characteristics of Woodside and other similar rural communities, nor is there any provision to exempt or lessen in any way the requirements of C.3.b, in particular, on these communities. The Town is supportive of water quality health and has protections for water resources already embedded in its General Plan, Municipal Code, and development review policies. Town staff feels the changes in MRP 3 in general, as detailed in the SMCWPPP letter, represent a major new unfunded regulatory burden with some provisions	Comment noted. We recognize the work Woodside has done and continues to do to protect the environment. The Tentative Order has been modified in response to comments. To the extent the commenter is saying any changes have to be re-noticed, the commenter is incorrect. A final permit does not be identical to the draft permit; if it did, it would be antithetical to the whole concept of notice and comment. A final permit that departs from a draft must be a logical outgrowth of the noticed proposal and the comments received. The changes here are a logical outgrowth and as such, do not need to be re-noticed. The public will have an opportunity to orally comment on the changes during the Board hearing changes. Please see also responses to comments: For C.3.b, in C.3, below: Hillsborough-5 and Woodside-8. For prioritization and water quality benefit: Fact Sheet sections for all provisions, and particularly C.3, C.10, and C.17. For unfunded mandates:	See responses to specific SMCWPPP comments, Hillsborough – 5, and Woodside - 8.

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		having no or very little commensurate environmental or water quality benefit. The Town requests that the recommendations in the SMCWPPP letter be followed and that a revised draft MRP be issued for public comment.	SCVURPPP Legal – 2 and Combined comment SCVURPPP Legal – 3 ACCWP Legal - 6	
Hillsborough - 1,4	General	The Town is a rural, sparsely populated, densely forested community of about 10,900 residents within 6.25 square miles. As in many rural communities, the Town does not have a traditional storm drain system. Many of our roads drain directly to pervious shoulders and naturally vegetated areas. The Town has 162 lane miles of roadway, but only 35 miles of storm drains. While the Town shares the Water Board's overall objective of protecting water resources, unfortunately Town staff finds that the proposed regulations in MRP 3 impose very onerous and costly new stormwater design, construction, reporting, and inspection requirements on the Town and its residents, with little environmental or water quality benefit. In conclusion, the changes in MRP 3	Please see response, above, to: Woodside – 1-6, 9-10, and 12	See response to Woodside – 1-6, 9-10, and 12.

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		in general, as detailed in the SMCWPPP letter, represent a significant new unfunded regulatory burden without fully understanding how they would actually apply to municipalities with our unique residential characteristics and large lots.		
SMCWPPP - 1	General	Att. 1 provides larger picture context regarding existing and planned stormwater runoff management approaches, accomplishments, and commitments, and context on old industrial areas in San Mateo County. • Att. 2 provides sub-provision specific comments and specific requested revisions, with higher priority sub-provisions highlighted. • Att. 3 provides specific recommendations for language changes (in redline/strikeout) to selected parts of C.3 (and associated Fact Sheet and Glossary language), C.4, C.5, C.8, C.10, and C.15. The recommended language changes are consistent with the comments provided elsewhere in this letter and its other attachments but are provided separately to elucidate	Comment noted. This comment describes how the commenter's comment letter is organized.	None.

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		specific issues of concern for San Mateo County Permittees. To reiterate, these are requested provision-specific track-change modifications for select portions of the permit. For the comprehensive program comments across all provisions of the Tentative Order, refer to Att. 2.		
SMCWPPP - 2	General	San Mateo Permittees have been leaders in adopting progressive stormwater policies, developing comprehensive, integrated plans, and implementing GSI and trash capture. The prescriptive approach of the proposed MRP 3 requirements will stifle innovation, slow progress, and pose challenges that will make it even more difficult to achieve our shared water quality improvement goals. We respectfully request a reissued MRP with flexible and adaptable mandates that would allow us to continue leading on innovative stormwater management both in an efficient and cost-effective manner. Your staff is challenged to craft regulatory requirements for 79 Permittees that provide room to move for the innovators and hold accountable those that are	Comment noted. We recognize SMCWPPP's progressive work and progressive efforts by San Mateo permittees, which have resulted in effective projects and set the stage for additional implementation. Comment SMCWPPP-2 does not identify specific parts of the Tentative Order that are problematic. However, subsequent SMCWPPP comments identify particular concerns and those are responded to separately. Overall, the Revised Tentative Order appropriately incorporates strong, yet flexible requirements that consider and build on past work while recognizing the need to timely address ongoing water quality problems, including impairments. For example, C.3 and C.10 retain the flexibility to address water quality problems at different scales (e.g., by implementing GSI or full trash capture devices at parcel, green street, district, or regional scales), and C.11 and C.12, while	See responses, including responsive edits, to subsequent SMCWPPP comments.

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		challenged to keep up with baseline efforts. We are committed to working with your staff to develop a regulatory framework that incentivizes progressive action, provides accountability for all, and gives flexibility to recognize the highly variable nature of those 79 Permittees. MRP 3 needs to be visionary, building in regulatory flexibility that drives implementation yet works for all.	requiring progress in achieving reductions in mercury and PCBs, retain flexibility for how to achieve that progress. While they recognize the need to complete work on source control evaluations, control of mercury or PCBs discharges from Old Industrial or Old Urban land uses, for example, may be accomplished via a variety of measures, including GSI and diversion to the sanitary sewer. Similarly, while C.3 has been updated as compared to MRP 2 to reflect the current status of MEP with respect to Regulated Project impervious surface thresholds, and to support Permittee GI planning efforts by requiring modest GI retrofit, it has incorporated measures to recognize recently-implemented progress, support and account for retrofit at a variety of scales (including for significant street reconstruction Regulated Projects, and a reduction in retrofit requirements to recognize Permittee implementation of ordinances to support fully accounting for private project impacts to street frontage), and allow flexibility via its existing alternative compliance subprovision, as well as the development of new approaches that could be incorporated into the permit in a future reissuance.	
SMCWPPP - 3	General	Water Board staff have proposed unachievable objectives in the Tentative Order and removed	Comment noted. Please see response to SMCWPPP-2 and to specific subsequent SMCWPPP comments. In addition, please	See responses to subsequent SMCWPPP

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		flexibility that fosters innovation while meeting the overall objective of improving water quality. In response, we submit that the "status quo" of strong yet flexible drivers in MRP 2 has provided the right balance of flexibility and prescriptiveness to support permittees in developing cost-effective, efficient and creative strategies towards meeting the overall water quality endpoints detailed in the permit. While we recognize the need to advance additional water quality goals and meet current regulatory timelines, we also urge the Water Board to carefully consider priority goals for the next permit term and to maintain the existing framework characterized by incentives to collaborate, promote multi-benefit project implementation, and allow permittees to meet compliance targets in the way that works best at the regional, countywide, or local level.	see also response, above, to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1	comments and as noted herein.
SMCWPPP – 4,5	General	The progressive efforts of C/CAG and San Mateo County permittees towards meeting and exceeding existing requirements in the MRP,	Comment noted. Please see response to SMCWPPP – 2 and 3.	See responses to subsequent SMCWPPP comments and as noted herein.

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		have been driven or supported by three key components: 1. Strong, but flexible drivers in the MRP, such as the MRP 2 goal to reduce PCB loads to the Bay by specific amounts via GI by 2040 (and beyond) that allow each Permittee to determine the stormwater management approach that makes the most sense for their community. 2. An influx of outside financial or technical resources, including over $30 million in partnership funding from Caltrans for regional stormwater capture and trash capture projects, nearly $1 million in grant funding from Caltrans for the Sustainable Streets Master Plan, $3 million from the State budget and $500,000 from U.S. EPA to advance regional stormwater capture. Without a combination of these components (flexible drivers, funding, planning), it becomes much more challenging to continue advancing progressive stormwater	We agree that funding is a key component of implementation. Please see Fact Sheet sections IV.E, Economic Considerations, and V.C, State Mandates, for a funding discussion. C.3 retains the flexibility for progressive approaches. Also, through recognizing revised impervious surface thresholds for Regulated Projects, it provides both additional expectations for project-specific implementation and additional opportunities for Permittees, via their GI Plans and the C.3 alternative compliance provision, to implement prioritized GI projects, including those that may result in a range of co-benefits, and district- or regional-scale projects that may have lower unit costs as compared to smaller-scale parcel- or green street-scale projects. As such, C.3 reinforces the Permittees' work on GI Plans, and CCAG's work on the guidance including the Sustainable Streets Master Plan, by setting expectations that the GI envisioned in the plans be implemented over time. That is similarly reinforced by C.11 and C.12, which recognize the pollutant reduction benefit of GI measures with respect to reductions in mercury and PCBs. Flexibility has been retained, in part, through C.3.j's modest expectations for GI retrofit in the coming permit term, combined with C.3.j.ii.(4), developed in coordination with the Permittees, and which gives Permittees an	

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		management, and as a countywide program, we become limited in the ways we can support the San Mateo County Permittees to achieve compliance with the MRP and work creatively to innovate towards greater sustainable infrastructure and water resiliency outcomes. The Tentative Order takes away the first driver by establishing an extremely prescriptive set of requirements that apply equally to all Permittees. That prescriptiveness, especially in C.3, disincentivizes innovation and effectively makes Green Infrastructure Plans, which Permittees expended significant efforts in developing, irrelevant by specifying exactly when and where GI must be implemented. While C/CAG and its member agencies can continue pursuing external sources of financial and technical resources, there are limits to how much can be achieved within a five-year permit and practical limitations such as requirements for matching funds or voter approval requirements for new or increased stormwater fees.	option to propose a long-term implementation approach for future permit terms, and C.3.j.ii.(2)(i), which gives more-rural Permittees an option to propose alternative green infrastructure techniques, beyond the flexibility inherent in the Permit's existing LID approach, for future permit terms.	

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		Additionally, an overly prescriptive permit will reduce the countywide program's ability to continue advancing the types of projects that are competitive under many relevant grant programs, i.e., focus on multi-benefit, integrated planning and infrastructure projects with a strong emphasis on additional co-benefits, including climate adaptation and community resiliency projects, pro-bono support from American Rivers, Corona Environmental, and WaterNow Alliance to explore innovative and market-based funding and financing strategies, and nearly $100,000 in grant funding from the Bay Area Council to advance schoolyard greening in the San Carlos School District. 3. Progressive planning efforts for integrated, multi-benefit stormwater management such as the Stormwater Resource Plan, Sustainable Streets Master Plan, Green Infrastructure Plans, and current efforts related to collaboration on countywide-scale stormwater management.		

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SMCWPPP - 41	General	Given the challenges of digesting the totality of the Tentative Order and coordinating comments from 22 Permittees in a 60-day window, C/CAG and its member agencies are open to continued discussions with Water Board staff over the coming weeks of meaningful approaches to achieving water quality improvement prior to adoption of the permit.	Comment noted. Water Board staff has continued to meet and communicate with Permittees since the Tentative Order's release, including in workgroup and smaller meetings on C.3, C.8, C.11, C.12, and C.14, the plenary MRP Steering Committee, and a two-day Board meeting at which Permittees and other stakeholders gave testimony on the Tentative Order.	None.
F5C - 1	General	Language in the draft MRP, with respect to homelessness, appears to give local governments a five-year free pass with no practical threat of sanctions for pollution from encampments. From experience, we believe that this seems unlikely to contribute to a solution. It could make things worse for both the homeless and our waters.	Comment noted; see response to Friends of 5 Creeks – 2 in C.17	None.
F5C - 4	General	These are not theoretical considerations for our volunteers. Our small, donation-supported organization pays almost $500 a month for a portable toilet on Codornices Creek, installed early in the COVID crisis after we photographed more than a dozen piles of feces on a short reach. None of Albany, Berkeley, or UC	The Water Board readily acknowledges the magnitude and complexity of the problem of homelessness. As the commenter points out, the trash and human waste that accumulate around encampments threaten not just water quality, but the health and safety of the unhoused. Nevertheless, the Water Board is not in a position to provide broad solutions to these problems. The Water Board has no control over municipalities' use of their	None.

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		Berkeley has been willing to help, despite a $500,000 maintenance fund for the creek that we rediscovered after they all forgot its existence. We tried for years to get permission to install a closed cigarette urn, so that homeless smokers would not rummage through butts and dump them at the edge of Codornices Creek (Finally, we just put it in). Pre-COVID, we got a collective yawn when we suggested hiring homeless people from the shelter next to the creek to help pick up trash. We pay for the trash bags that we try to distribute to campers who might use them. Currently, one reach of Codornices Creek is posted as "biohazard – do not enter" due to needles. We cannot go to another reach, where our volunteers for close to 20 years provided nearly all maintenance -- tents and a solid paving of trash block the trail and cover much of the bank, and the smell of feces and urine is obvious. It is not humane to allow people to live in this way.	maintenance funds, for instance, or direct ability to manage or improve the sanitary conditions at homeless encampments. C.17 is designed to prompt regionwide and inter-agency collaboration to reduce discharges associated with unsheltered homelessness and to encourage the Permittees to consider the water quality benefits of non-MRP-driven programs, such as temporary housing programs, that address homelessness. As noted in responses SCVURPPP Legal and ACCWP Legal comments, the Water Board asserts that the Permittees have authority to impose fees or use other funds to pay for trash or sanitation services at homeless encampments. Many Permittees do, in fact, fund such services. In addition, many Permittees, such as Oakland, San Jose, and Palo Alto, do have programs in which homeless people are paid to pick up trash.	
Save the Bay - 1	General	As you deliberate the third iteration of this order, we urge the inclusion	Comment noted. The Water Board agrees that climate change is exacerbating threats	This is a general comment. See

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		of specific and measurable requirements and an ambitious compliance timeline to ensure the Bay and its beneficial uses are protected from trash and other stormwater pollution with a great sense of urgency. Climate change is exacerbating water quality threats to the Bay, and stormwater will be the pathway for most of these threats. Accordingly, now is the time to demand adaptive management and accountability for required outcomes from permittees, not to loosen restrictions. The pandemic has presented numerous challenges to local government, but the state simultaneously experienced a budget windfall that will make hundreds of millions in new funding available for climate resilience projects, including those focused on stormwater management and green infrastructure. With that in mind, we offer specific recommendations to ensure that by the end of the next permit term, the Bay is more – not less – protected from water quality and climate threats.	to water quality in the Bay. C.21 specifically requires Permittees to take climate change into account when developing an asset management strategy. We disagree that MRP 3 proposes to loosen restrictions. MRP 2 requirements would be retained or modestly revised to be more protective in MRP 3 for provisions including C.2, C.4, C.5, C.6, C.7, C.9, and C.13. In addition, the Tentative Order would require Permittees to comply with a 100 percent trash load reduction by June 30, 2025, to achieve significant milestones in PCBs and mercury reduction, and to implement significantly more LID and green infrastructure than required under the previous permit. Those requirements build on actions completed under MRP 1 and MRP 2, including previous PCBs and mercury control actions, Green Infrastructure Plan development, planning for multi-benefit green infrastructure project implementation (for example, coordinated with complete streets projects), and trash control implementation. The Permit also would provide additional focus on discharges of trash and human waste associated with unsheltered homelessness.	Response to Comments sections for cited provisions for specific changes.

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Dublin – 7	General	Please revise the reporting requirements as described in Table 1 in the ACCWP comment letter on the Draft Tentative Order dated November 16, 2021.	Comment noted. In response to this and other comments, we have proposed changes to reporting, including reductions in the number of reports and frequency of report submittals, and in some cases delays to the due date of reports. These are addressed in the response to provision-specific comments on those issues. Please see also responses, above, to SCVURPP-2c, San Mateo County-1, Dublin-7, to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1 and to combined comment: CCCWP-3, CCCWP-4.	Please see the responses to provision-specific comments on reporting, and as noted herein.
ACCWP – a.10	General	There is a significant increased level of general reporting being proposed throughout the tentative order with a schedule of deliverables with challenging timelines due to the number of deliverables required to be submitted at or near the same	Please see responses, above, to SCVURPP-2c, San Mateo County-1, Dublin-7, to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2	See response to referenced comments.

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		timeframe. Reporting should be re-evaluated in terms of priority, applicability, and the perceived benefit to water quality.	SCVWD – 2 Cupertino -1 WVCWPA – 1 and to combined comment: CCCWP-3, CCCWP-4.	
ACCWP_Legal 3	General	Some Provisions would require Permittee commencement of activities in order to achieve compliance with the new MRP prior to MRP adoption and prior to its effective date. Examples include: C.8 monitoring- C.8.d.ii. - Draft LID monitoring Plan to TAG; C.8.d.vi. - Final LID Monitoring Plan; C.8.e.v. - Initial Trash Monitoring Plan; C.8.e.iii. - Begin Trash Monitoring -C.12.b-i. PCB related provisions. Most obviously, C.12.c. would require Permittees to submit a treatment plan by Sept. 30, 2022 (with the annual report).	Please see responses, above, to SCVURPP-2c, San Mateo County-1, Dublin-7, and to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1	See response to referenced comments.
ACCWP_Legal 5	General	We object to having the reissued MRP incorporate the Fact Sheet by Reference (Finding 1) rather than to refer to the Fact Sheet's availability and existence. Incorporation of the Fact Sheet is legally inappropriate – under the NPDES regulations, a fact sheet is	The Fact Sheet contains the basis for the draft permit's conditions, or findings, as required by the NPDES regulations (40 CFR §§ 124.6, subd. (e); 124.8). The Board has incorporated the Fact Sheet into the draft permit, just as it incorporates fact sheets into all the NPDES permits it issues, in order to make the findings required by law to support	

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		only supposed to "accompany" a draft permit and set forth facts and describe questions considered in preparing it; it is not supposed to piecemeal the permit and contain what amounts to additional findings or requirements themselves. See 40 CFR §§ 124.6, 124.8. We request that the language referring to the Fact Sheet being "hereby incorporated by reference" be changed to reference the fact sheet as setting forth facts and describing questions considered in preparing the permit.	its action (See Topanga Assn for a Scenic Community v. County of Los Angeles (1974) 11 Cal. 3d 506, 513-514). The federal regulations' requirement that fact sheets "accompany" NPDES permits does not prohibit the fact sheets' incorporation by reference into those permits. Here, incorporation of the Fact Sheet into the permit enables the Board to avoid repeating the Fact Sheet's contents in the permit, which would make the already lengthy permit unnecessarily repetitive and unwieldy.	
Solano - 1	General	The entities listed (City of Fairfield, Suisun City, Vallejo, & Vallejo Flood & Wastewater District - aka Solano Permittees) have drafted a Memorandum of Agreement (MOA) to formalize our structure to jointly collaborate to achieve MRP3 objectives (Att. A). We anticipate finalizing the MOA prior to the issuance of MRP 3 and request section 6 and 7 be combined to reflect our consolidated efforts as the Solano Permittees Stormwater Program. The signed MOA will be shared	Comment noted. We look forward to seeing the finalized MOA and have updated references to the Solano Permittees' Stormwater Program. We have also corrected references to the Vallejo Flood & Sanitation District.	Updated and/or corrected references to the Solano Permittees' Stormwater Program and the Vallejo Flood & Sanitation District throughout the Tentative Order.

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		with the Water Board as soon as it is finalized. Also, the Vallejo Flood & Wastewater District is incorrectly named as Vallejo Sanitation and Flood Control District and Vallejo Sanitary District in various locations in the Tentative Order.		
Caltrans - 4	General	The MRP has many permittee-level education and outreach requirements, translating to compartmentalized efforts. A state- or region-wide campaign in partnership between other MRP permittees, stakeholders, and Caltrans may have an impactful long-term benefit. The MRP should incentivize regional approaches by allowing trash load reduction credits for public education about stormwater management and impacts to receiving waters to enable change in behavior.	The Water Board agrees that partnerships among MRP permittees, Caltrans, and other stakeholders can have long-term benefits. Several provisions of the MRP do incentivize regional approaches to trash load reduction, such as C.10.e.iii and C.17.a.i.2.c. The Water Board disagrees, however, that trash reduction credits should be allowed for regional public education programs about stormwater management. The effects of public education on behavior are, at best, indirect and difficult to quantify. Moreover, public education about stormwater management, specifically, has been commonplace for several decades now and it has had no discernible impact on the amount of trash in waterways. The Water Board sees no reason to provide credits for an ongoing activity that has not historically correlated to reductions in trash generated or discharged.	None.

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MRP 3 Testimony Hearing Transcript, October 12, 2021, Mitch Avalon, CCCWP – Page 71, Line 4-9	General	There has also been an increase in reporting, tracking and monitoring going into MRP 3. We looked at the amount of new reports and submittals and there's 127 new reports and submittals in MRP 3, above and beyond MRP 2, which is significant.	Please see responses, above, to SCVURPP-2c, San Mateo County-1, Dublin-7, to combined comment: Santa Clara – 1 Palo Alto – 2 Los Altos – 2 SCVWD – 2 Cupertino -1 WVCWPA – 1 and to combined comment: CCCWP-3, CCCWP-4.	See responses to cited comments.
MRP 3 Testimony Hearing Transcript, October 12, 2021, Kelly Abreu – Page 97 (Line 10-25), 98 (Line 1-25), 99 (Line 1-1)	General	The Water Board needs local agencies to cooperate in obtaining voluntary compliance with NPDES requirements. Numerous regulations are already in place. And the Permittees would like to loosen them. They'd like to tout agricultural open space zoning, the Williamson Act contracts, grading permits, water course protections. In spite of this, we have seen structural noncompliance by local land use authorities. Alameda County and its dependent water agencies in Zone 7 are flouting stormwater reporting. Impervious surfaces are constructed without	Comment noted. The Water Board expects compliance with all stormwater permits and investigates specific complaints of non-compliance.	None.

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		permits. Aerial images show grading, graveling and paving at large rural parcels. The aerials reveal unpermitted construction of industrial stockyards, roads, RV lots, and landfills of construction debris. Large projects have been constructed without any inspections. These images show, in fact, several new storm drains were reconstructed recently without any permits in a remote canyon near Castro Valley and Palomares Creek. It was very specific. Your staff has been provided those aerial images. Those storm drains are unmapped. The permittees fly under the radar. They're incapable of independent implementation. So, let's stop relying on pretty maps that show half the county is protected by agricultural zoning, and conservation easements. The aerial images are a good starting point for cost effective verification that starts from the ground up. Tweaking MRP 3 is only the first step. Clean water goals require an enhanced oversight of local land use authorities through judicial		

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		actions and leadership restructuring. True collaboration will require more than open minds. It requires accountability. Regulators need to open their eyes to drill down into the aerial images and uncover the ground truth.		
MRP 3 Testimony Hearing Transcript, October 13, 2021, Kelly Abreu – Page 4 (Line 21-25), 5 (Line 1-25), 6 (Line 1-1)	General	Yesterday's focus was on stricter stormwater regulation of urban construction projects was the assumption. Street maintenance, we saw pictures in dense cities, sponsored by public agencies on public streets. There was concern raised by the permittees about cost impacts, red tape. The Board echoed those concerns. Looking for more efficient ways to obtain the regulatory outcomes. The current regulatory framework overlooks construction of new private roads, industrial stockyards, landfills, and large scale grading, graveling and paving projects in rural areas. These are overseen by the same Permittees we heard from yesterday, county agencies. The lack of voluntary compliance in the rural countryside is easily	The purpose of the Tentative Order is to regulate the discharge of pollutants from municipal separate storm sewers. The comment is unclear as to which regulations are not being complied with in rural areas. Grading permits for private ranch roads are beyond the scope of the order.	None.

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		observed in aerial images because the scale of these projects is huge. One example, old, narrow, dirt ranch roads are widened, regraded, paved. They have stormwater drains and pipes installed, and then they call that, you know, a little road maintenance and it doesn't need a grading permit. This kind of compliance out there in the rural countryside needs to be -- the existing regulatory framework is not being adhered to. And pretending like we're tightening when, in fact, the holes in the Swiss cheese are everywhere. It does not conform with reality.		
MRP 3 Testimony Hearing Transcript, October 13, 2021, Jovan Grogan, San Bruno – Page 32 (Line 21-25), 33 (Line 1-25), 34 (Line	General	I want to talk about San Bruno's recent effort to increase funding to our stormwater enterprise, to highlight the practical challenges of funding stormwater utilities. San Bruno operates five utilities. Garbage, a cable and internet franchise. Potable water system, a sewer system, and stormwater. Stormwater is the only utility where	Comment noted. The Water Board has considered funding authority and capacity among the many issues considered in the permit reissuance. Please see Fact Sheet sections IV.E, Economic Considerations, and V.C, State Mandates. In addition, please see: In C.3: Save the Bay – 2	See responses to cited comments.

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1-25), 35 (Line 1-25), 36 (Line 1-25)		we have to ask the customers, property owners to pay for the system. That's an important consideration when we talk about the impact that funding stormwater has on local municipalities. It's the only utility where we have to ask customers if they want to pay for it. They all benefit from it, but they get to elect whether they pay for it. A little bit about San Bruno's stormwater system. Our fee has not changed since 1994. We know we have $30 million of capacity improvements from a study that was done several years ago. We have stormwater condition improvements that we know are needed, of over $22 million. The new permit requirements will add significant additional costs. And we're currently calculating what that means to our system. San Bruno's not unique in that our system is aging. Much of it dates back to the early 1900s. Right now, the utility does not recover	CCCWP – 12 Oakland – 7 SCVURPPP-3b, 29 Hillsborough-3, Woodside-8 In C.20: Baykeeper-24.	

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		enough money to cover ongoing maintenance, nor capital costs. We're really in a tough situation in how do we fund just capacity improvements because we are a growing area, as well as how do we fund all of the requirements of stormwater, repairing broken pipes, and the new permit requirements. So, here in our city we have a real flooding challenge, and we were able to frankly make the case to the community that flooding here happens not just in our lower lying areas, but everywhere. And so, we recently undertook a Prop. 218 effort, and we have really good evidence. We had evidence of major floods, from a major storm in 2014 that flooded a significant part of our downtown, areas along El Camino Real were impassable. And it's due to our system not being able to handle storm surges and the need for those capacity improvements. And we thought these images would		

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		catalyze our citizenry to realize that this is a real issue. We also nearly lost a roadway because a stormwater pipe eroded part of a hillside and we had to spend over a million dollars immediately to repair that. We did robust public outreach. This was an all out effort to educate our community about stormwater. And we lost resoundingly, 64 percent of the community of our property owners said no, we don't want to pay the additional cost for this utility. The increase that we were asking for was $9 a month, approximately $150 a year for your median, single-family home in our community. Key takeaways are the MRP requirements can create not an unfunded mandate, almost an unfundable mandate to public agencies. And stormwater funding really presents a unique challenge.		

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		And public agencies, while we agree we have the statutory authority to levy stormwater fees, but unlike all other utilities we don't have the unique ability to impose those fees. And so, we have to ask property owners if they would like to pay for the utility, or you could do a partial tax or bond where you're shifting the electorate from property owners to registered voters, but you still have to ask to pay for the utility. And this is, said sort of bluntly, in the draft Tentative Order and I include a quote from there: Fee authority is a matter governed by statute, rather than the factual considerations of practicality. I want to encourage the Board to consider that practical reality of these permits and partner with public agencies. While we agree that protecting water quality to the Bay and green infrastructure are worthy goals, we really need partnership and support to fund these. And because of the unique		

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		challenges with stormwater, where it's that utility where we will be forced to pull funds from public safety, library, safety net programs because this is a mandate. This is a utility. This is something that we all know that we have to do. But the regulatory structure is a challenge to fund them and the MRP requirements only make that worse.		

Response to Comments on September 10, 2021, Tentative Order
Provision A. – Discharge Prohibitions

Comment No.	Provision	Comment	Response	Proposed Revision
Sunnyvale & Mountain View – 2	A.1	The Cities desire a clearer compliance pathway for A.1. The permit does not define "effectively prohibit" or specify how to comply with this term. A direct connection between A.1 and the Permit's illicit connection and illicit discharge elimination program should be provided. The Cities have provided suggested wording changes for the provision and Fact Sheet taken from the State's Phase II Small MS4 General Permit and the Central Valley Region's Phase I MS4 permit.	CWA section 402(p)(3)(B) states permit for municipal storm water discharges "shall include a requirement to effectively prohibit non-stormwater discharges into storm sewers." Thus, the "effectively prohibit" language is from the statute and has been required in previous permits. The requested changes to implement Prohibition A.1 through Provision C.5 (Exempted and Conditionally Exempted Discharges) have not been made. C.5 allows certain types of non-stormwater discharges unless they are a source of pollutants to receiving waters. It implements the minimum non-stormwater discharge requirements (i.e., the illicit discharge program) in the federal regulations. U.S. EPA published those regulations on November 16, 1990, to implement the 1987 amendments to the CWA (55 Fed. Reg. 47990 et seq. (Nov. 16, 1990)). In that rulemaking, U.S. EPA explained that the illicit discharge program requirement was intended to begin to implement the Clean Water Act's provision requiring permits to "effectively prohibit non-stormwater discharges," indicating that the illicit discharge detection and elimination program requirement did not constitute the full manifestation of this provision (55 Fed.Reg. 47990, 47995; see also 40 CFR § 122.26(d)(2)(i).). C.5 is thus not the exclusive	None.

			method to effectively prohibit non-storm water discharges.	
Sunnyvale & Mountain View – 8	A.1	Sunnyvale and Mountain View comments 8-24 contain specific, suggested changes to Provisions and Fact Sheet Language. Please refer to the annotated comment letter to see the exact changes requested.	The suggested change has not been made for the reason specified in the response to Sunnyvale & Mountain View – 2.	None.
Sunnyvale & Mountain View – 3	A.2	A.2 should use nouns over non-specific pronouns. Changes suggested in Att. A.	The suggested change is not necessary and has not been made.	None.
Sunnyvale & Mountain View – 9	A.2	Sunnyvale and Mountain View comments 8-24 contain specific, suggested changes to Provisions and Fact Sheet Language. Please refer to the annotated comment letter to see the exact changes requested.	The suggested change is not necessary and has not been made.	None.
Sunnyvale & Mountain View – 23	A.1 Fact Sheet	Sunnyvale and Mountain View comments 8-24 contain specific, suggested changes to Provisions and Fact Sheet Language. Please refer to the annotated comment letter to see the exact changes requested.	The requested change has not been made. See response to Sunnyvale & Mountain View - 2.	None.

Response to Comments on September 10, 2021, Tentative Order
Provision B. – Receiving Water Limitations

Comment No.	Provision	Comment	Response	Proposed Revision
Sunnyvale & Mountain View – 4	B.2	The basis for including RWL provisions in MS4 permits is flawed because it rested in large part on U.S. EPA's interpretation that CWA Section 301(b)(1)(C) applied to discharges from MS4s. In Defenders of Wildlife, et al v. Browner, the Court disagreed with EPA's interpretation of the relationship between CWA sections 301 and 402(p). The Court reasoned that MS4s are not compelled by section 301(b)(1)(C) to meet all State water quality standards. Guidance exists related to these provisions, however, that should be adjustable if needed to properly address issues that arise. The language should be updated to require that a discharge not "substantially contribute," or more preferably "concentrations that will impact beneficial uses." "Generic Prohibitions" that require a permittee to not cause or contribute to water quality exceedances violate the CWA, which requires either Water Quality-Based Effluent Limitations or prescribed Best Management Practices. These Generic Prohibitions skip the step to	The basis of the receiving water limitations (RWLs) is set forth in the Fact Sheet. We disagree that the RWLs need to be revised to include the word "substantially" (or similar language) and violate the Clean Water Act because they are over broad. RWLs are distinguishable from water quality based effluent limitations (WQBELs). Provisions like the RWLs prohibiting discharges from violating water quality standards are frequently included in NPDES permits, and federal courts have recognized the authority of permit issuers to include similar narrative prohibitions against violations of water quality standards. See, e.g., *Ohio Valley Envtl. Coal. v. Fola Coal Co.*, 845 F.3d 133, 136, 141-142 & n.5 (4th Cir. 2017); *City of Lowell*, 18 E.A.D. 115, 176-177 (EAB 2020) (citing *Nw. Envtl. Advocates v. City. Of Portland*, 56 F.3d 979, 989-90 (9th Cir. 1995); *PUD No. 1 of Jefferson Cty. v. Wash. Dep't of Ecology*, 511 U.S. 700, 716-18 (1994); *Nat. Res. Def. Council, Inc. v. Cty. Of Los Angeles*, 725 F.3d 1194, 1199, 1201, 1205 (9th Cir. 2013). Moreover, the Water Board is not implementing 40 C.F.R. section 122.44(d)(1)(iii). Rather, the RWLs here are imposed under CWA section 402(p)(3)(B) rather than under section 301(b)(1)(C). The RWLs thus do not stand in for WQBELs under 40 C.F.R. section 122.44(d)(1)(iii). MS4 discharges must meet a technology-	None.

		determine if a discharge has "Reasonable Potential" and provides inadequate notice of how compliance is to be achieved. The MRP should be viewed as prescribing BMPs in lieu of WQBELs, which are presumed to comply with applicable standards in most cases. A similar general requirement was cause for the Second Circuit Court of Appeals to invalidate part of the 2013 Vessel General Permit. The remainder of the MRP provides detailed requirements that are presumed will be adequate to meet all discharge prohibitions and receiving water limitations. Strict compliance with water quality standards is discretionary in MS4 permits (Defenders of Wildlife v. Browner). The State has chosen to include such provisions. However, the State Board has also provided the ability for regional boards to also include alternative compliance paths that allow permittees time to come into compliance without being held in violation. The Receiving Water Limitations should be tempered with compliance schedules, either explicitly for particular pollutants,	based standard of effectively prohibiting non-storm water discharges and reducing pollutants in the discharge to the maximum extent practicable (MEP), but requiring strict compliance with water quality standards (by imposing WQBELs) is at the discretion of the permitting agency under *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, as the commenter correctly notes. The Water Board has provided alternative compliance paths and schedules for certain pollutants in the MRP.	

		or generally with clarifications to C.1.		
Sunnyvale & Mountain View – 10, 24	B.2	Sunnyvale and Mountain View comments 8-24 contain specific, suggested changes to Provisions and Fact Sheet Language. Please refer to the annotated comment letter to see the exact changes requested.	See response to Sunnyvale & Mountain View - 4. The unclear sentence in the Fact Sheet pertaining to the legal authority for receiving water limitation B.2 will be corrected. The other requested changes are not necessary to add to the Fact Sheet as they merely expand upon already cited authority and references. The cited references and authority speak for themselves and do not need to be quoted.	See Fact Sheet clarification referenced in the response.

Response to Comments on September 10, 2021, Tentative Order
Provision C.1. – Compliance with Discharge Prohibitions and Receiving Water Limitations

Comment No.	Provision	Comment	Response	Proposed Revision
Sunnyvale & Mountain View – 5	C.1	MS4 permits should incorporate a well-defined, transparent, and finite alternative path to permit compliance for those MS4 dischargers willingly engaged in significant undertakings to be deemed in compliance with receiving water limitations. State Board held that permittees may be deemed in compliance with receiving water limitations if they meet certain conditions during development of a declared WMP/EWMP plan. The C.1. Plans serve a similar initial purpose to confirm the RWL exceedance for the pollutants at issue, determine the sources, and create an implementation plan to achieve RWLs that must be approved by the Regional Board and inserted into the MRP. State Board stated that enforcement protection can be provided during planning phases, so that permittees are not in violation while working to solve the problem. The Water Board should include planning coverage in C.1. to provide limited protection for pollutant(s) at issue from the time the C.1 report and Plan is submitted and during the schedule	The requested change is not appropriate because C.1.a is based on the language in the State Water Board's precedential Order WQ 1999-05, which language is often referred to as the iterative process of identifying a discharge problem and preventing or reducing the problem through additional BMP implementation. The State Water Board's Order WQ 2015-0075, as amended by Order WQ 2021-0052-EXEC, provides that good faith engagement in the iterative process does not constitute compliance with receiving water limitations. The State Water Board did hold that enforcement protection can be provided during the planning phase of an ambitious and rigorous alternative path to compliance; however, it did not extend that to the planning phase under the iterative process. For the same reason, the timeframe during which a permit is modified to incorporate changes from the iterative process is not subject to enforcement protection.	None.

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		approved by the Regional Board, this protection should apply until the necessary permit modification is in place. The C.1 Report and Planning process resembles a permittee specific WMP for a specific pollutant. Coverage would be for the pollutant for which the C.1 Plan is approved, not for B.2 generally, which limits the scope. For incorporation into the MRP Permittees must show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions. The Cities have provided proposed edits to C.1 and the Fact Sheet, and request that the Water Board consider the changes proposed to strengthen and clarify the MRP provisions related to Discharge Prohibitions and RWLs.		
Sunnyvale & Mountain View – 11	C.1	Sunnyvale and Mountain View comments 8-25 contain specific, suggested changes to Provisions and Fact Sheet Language. Please refer to the annotated comment letter to see the exact changes requested.	The requested change to C.1.a and C.1.b has not been made. See response to Sunnyvale & Mountain View – 5. Requested editorial changes have not been made to reduce the number of non-essential edits. The request to add “Discharge Prohibition A.1” is not made because the provisions referenced in C.1 are not the exclusive means by which Permittees must comply	None.

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			with the prohibition to effectively discharge non-stormwater.	
Sunnyvale & Mountain View – 25	C.1 Fact Sheet	Sunnyvale and Mountain View comments 8-25 contain specific, suggested changes to Provisions and Fact Sheet Language. Please refer to the annotated comment letter to see the exact changes requested.	The requested editorial additions to the legal authority section of the Fact Sheet for C.1 are unnecessary and have not been made. Water Code section 13263 speaks for itself and the *Defenders of Wildlife* court decision is referred to elsewhere in the Fact Sheet and need not be repeated here. Reference to 40 CFR section 122.41(d)(1)(i) is retained to support the TMDL requirements. Reasonable potential can be demonstrated in several ways, including through the TMDL development process. Reference to 40 CFR section 122.44(d)(1)(vii) appropriately paraphrases the regulation and the suggested edit has not been made. The reference to Order WQ 2015-00075 has been corrected. The addition to the end of the Fact Sheet paragraph starting "In State Water Board Order WQ 2020-0038, the State Water Board applied and further explained . . ." has not been made. See response to Sunnyvale & Mountain View – 5. The commenter requests changes to the Fact Sheet's Alternative Path to Compliance with Receiving Water Limitations for Certain Pollutants and Consistency with State Water Board Precedent section. The change referencing	The mistaken reference to Order WQ 2016-0075 has been corrected to 2015-0075. In addition, to reflect the amendment to this order, all references to it in the MRP have been revised to include Order WQ 2021-0052-EXEC, which amended Order WQ 2016-0075.

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			a "C.1 Plan" has not been. See response to commenter's comment 5. The reference to the water bodies has been corrected. The editorial changes have not been made to reduce the number of non-essential edits. The requested paragraph explaining the change to allow permittees to be "deemed in compliance" while it takes on C.1 reporting and planning efforts has not been made because the change was not made. See response to commenter's comment 5. The requested new sentences referring to how water quality standards can be reviewed and modified and may evolve to become more nuanced or sophisticated over time has not been made, since they do not purely pertain to compliance with Order WQ 2015-0075, as amended.	
Baykeeper – 1	C.1	The two precedential orders defining acceptable parameters for Safe Harbor provisions in Phase I MS4 Permits apply to MRP 3. Inclusion of Safe Harbor provisions in C.1 requires Draft MRP 3 to comply with the minimum requirements set by State Board. Safe Harbor provisions must be well-defined, transparent, and finite. The State Board has expressly instructed Regional	This comment summarizes State Board WQ Orders 2015-0075, as amended by 2021-0052-EXEC, and 2020-0038 and no response is required. We note, however, that the commenter quotes the minimum scheduling requirements from the Los Angeles Regional Board's permit, not the State Board's requirements when it refers to pages 76-77 of WQ Order 2020-0038. The quoted requirements, therefore, do not apply here. The Water Board does not disagree that these orders are precedential; however,	None.

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		Boards to consider the Los Angeles County MS4 Permit's Safe Harbor approach and provided 7 principles to guide their considerations. The seventh principle is most important here: The alternative compliance should have rigor and accountability. Permittees should be required, through a transparent process, to show that they have analyzed the water quality issues in the watershed, prioritized those issues, and proposed appropriate solutions. Permittees should be further required, again through a transparent process, to monitor the results and return to their analysis to verify assumptions and update the solutions. Permittees should be required to conduct this type of adaptive management on their own initiative without waiting for direction from the regional water board. The Regional Board can make a specific showing that application of a given principle is not appropriate for region-specific or permit-specific reasons. In 2020 the State Board reviewed the adequacy of the alternative compliance plans developed in Los	with respect to WQ Order 2020-0038, the State Board acknowledged that the order's sections other than conditional approvals, review of Executive Officer actions, and separation of functions are "likely to be less directly applicable to other regional boards' programs," but its principles for alternative compliance approaches "will have precedential value . . . in some circumstances." (Order WQ 2020-0038, p. 163.) In other words, the order was very specific to the Los Angeles Water Board's MS4 permit and thus not every pronouncement of the order can be applied to other regions. The State Board also stated that it does not intend to restrain the evolution of other regional boards' approaches to alternative compliance. Regional boards may make a specific showing that the application of a given principle is not appropriate for region-specific or permit-specific reasons.	

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		Angeles County. The State Board found the WMPs and EWMPs reviewed to be inadequate, and set out additional requirements to meet the rigor, accountability, and transparency mandated in its prior precedential order. Permittees have to explain how data was used and justify limiting-pollutant approaches if used. The requirements are summarized on page 75 of Order 2020-0038. Further, the State Board required alternative compliance plans to include "regular, clearly presented, enforceable, non-contingent milestones and deadlines". Per State Board Orders WQ-2015-0075 and WQ 2020-0038, all other Regional Boards must incorporate the lessons learned from the Los Angeles County MS4 Permit into future MS4 permits.		
Baykeeper – 2	C.1	Because Draft MRP 3 includes Safe Harbors, both those carried over from MRP 2, and an additional Safe Harbor for bacteria pollution, it must comply with the requirements of the State Board Orders. The Safe Harbor language effectively eliminates the requirements for permittees to be	See Master Response Identifier C.1 – 1.	See referenced response and revisions to C.14.a.ix and Fact Sheet for the same provision.

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		in compliance with the narrative and numeric receiving water standards for pollutants covered by C.9, C.10, C.11, C.12, C.14, C.18, and C.19.c-f. When discussing the State Board precedential orders, the Fact Sheet at A-98 to A-99 only has a brief summary of the additional principles in State Board Order WQ 2020-0038. Neither the Fact Sheet, nor the Permit itself contains the minimum scheduling requirements for alternative compliance plans, milestones for achieving compliance, a schedule for compliance, and a final compliance deadline, to be achieved as soon as possible. There are no deadlines for compliance with water quality objectives for any pollutant in Draft MRP 3; Draft MRP 3 is unlawful as proposed, significant modification to the C. provisions is necessary. The Fact Sheet at A-104 states that Draft MRP 3 meets the transparency requirement by including explicit requirements in lieu of the WMP/EWMP approach. A “transparent process” also requires a feedback loop to confirm assumptions and allow for		

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		adaptive management. Draft MRP 3 has no methods or means for evaluating compliance and lacks monitoring that would allow such analysis.		
Baykeeper – 9	C.1	Because the Safe Harbor provisions of Draft MRP 3 authorize continued degradation of Bay Area waters, the Regional Board must conduct an anti-degradation analysis in a manner consistent with the following cited codes and policies. This comment cites 40 CFR sections 131.12(a)(1) and 131.12(a)(2)(ii), Water Code section 13372(a), and State Board Resolution No. 68-16 in reference to anti-degradation policy. This comment cites the 1990 Administrative Procedures Update (90-004). This comment cites State Board Order WQ 2015-0075. This comment cites Natural Res. Def. Council, et al. v. State Water Res. Control Bd., et al. Combined, the Federal and State anti-degradation requirements mandate that high water-quality be maintained, unless degradation is justified based on specific findings. And in	See Master Response Identifier General – 1.	See Master Response Identifier General – 1.

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		no case may impaired waters be further degraded.		

Response to Comments on September 10, 2021, Tentative Order
Provision C.2. – Municipal Operations

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-25 SMCWPPP-63	C.2 Fact Sheet	Fact Sheet Finding C.2-1 states: Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges. Typically maintenance personnel do not educate the public regarding illicit discharges unless they also happen to perform illicit discharge inspections. An illicit discharge inspector may contact municipal maintenance staff to assist with illicit discharge cleanup, but the inspector is generally responsible for interacting with the general public and not the municipal maintenance staff involved in the clean- up activities.	We concur that maintenance personnel do not necessarily have a role in educating the public, but it is important that they report and clean up illicit discharges that occur during the course of their municipal operation activities. Fact Sheet Finding C.2-1 has been revised to clarify that their role is in identifying and responding to spills or discharges that occur during the course of their regular work activities, and reporting to other agencies or Permittee staff as appropriate.	Fact Sheet Finding C.2-1 has been updated accordingly.
SCVURPPP-26 SMCWPPP-64	C.2.h Fact Sheet (staff training)	While Permittees previously conducted training for municipal maintenance staff this text implies the Provision was in the previous permit. However, this is a new provision with specific training topics and reporting which are new requirements. This wording should be revised to indicate it is a new Provision and provide the basis for	The C.2-h Fact Sheet language has been updated to reflect the training need and more specific training language. We recognize that under previous permits, the Permittees trained municipal staff to ensure they were properly implementing measures to protect water quality in Permittee operations. Water Board staff has participated in those trainings, some of which	Fact Sheet updated accordingly.

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		including additional requirements and reporting. Revise: This provision continues to require Permittees to conduct annual trainings for municipal staff for specific topics and includes specific reporting requirements. This new Provision was added because….	were specified in the permit (e.g., MRP 2 Provision C.2.c.ii(3) for bridge and structure maintenance and graffiti removal waste disposal, which is also listed in the TO). This subprovision reflects that training is necessary to keep staff current on implementation and updated BMPs to control stormwater discharges from municipal operations, and describes the range of topics for which training is needed and the frequency of training.	
SCVURPPP-17 SCVURPPP-18 SMCWPPP-55 ACCWP-1 City of Oakland-1 CCCWP-6	C.2.a.iii, C.2.b.ii, and C.2.c.iii	These provisions add a requirement to the 2024 Annual Report that Permittees make available to the Water Board applicable supporting BMP documents by providing links to online documents or submitting documents as part of the Annual Report. These provisions require the preparation of new, narrative descriptions for the annual report that do not directly benefit the successful implementation of BMPs to protect stormwater, and add administrative burden on Permittees' staffing and resources that may be better served by implementing other Permit	We have modified the language to reduce the potential administrative burden during the coming permit term and to require that rather than submitting information, it be made available during inspections or upon request by Water Board staff. While the requirements to provide narrative descriptions and copies or links to supporting BMP documents related to municipal operations do not require Permittees to develop or prepare new BMP guidance, but only to identify and provide the documents they are currently implementing, during this Permit term we can assess the appropriateness of BMP documentation during Water Board inspections and audits. Permittees may use CASQA BMP Handbooks, but they may also have individual or modified BMPs specific to their own municipal operations. If, as a result of Water Board inspections or audits, we identify concerns with inappropriate or	Removed additional reporting requirements, and only require BMP documents to be made available during inspections and audits, or otherwise upon request.

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		requirements. Moreover, with respect to C.2.a.iii specifically, the provision already identifies the CASQA Stormwater BMP Handbook and Construction Stormwater BMP Handbook as the relevant BMP documents, thus rendering further reporting on the matter redundant and unnecessary. General concern with overall increase in reporting requirements for all subprovisions. Staff should review the requirements to ensure that required reporting is a high priority and provides information useful for determining compliance with requirements. The narrative description reporting could be moved to the one-time reporting requirement in subprovision <suggested subprovision not listed>.	inadequate BMP guidance and implementation, we will consider updating reporting requirements to address this in a future permit reissuance.	
SCVURPPP-19 SMCWPPP-56	C.2.b.i.	Added requirement: BMPs for washing down outside areas of human habitation shall include sanitizing procedures.”	Comment noted. We disagree that edits are needed.	None.

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		This topic is already included in C.17.a.ii.(3): “Examples of actions that may be implemented include, but are not limited to…establishing and updating sidewalk/ street/plaza cleaning standards for the cleanup and appropriate disposal of human waste.” In addition, sanitizing municipal-owned and -operated areas only needs to be performed in times of elevated risk to public health. This requirement should be removed or include text such as "as needed" or "as appropriate."	Although "establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste" is included as one example of an implementation activity under C.17, that is a more general example than the sanitization procedures required in this provision. To ensure that practices appropriately protect water quality, this provision specifically requires including sanitizing BMPs for washing down areas of human habitation, whereas Permittees may choose to develop additional standards more broadly under C.17. Sanitizing BMPs are required to control potential stormwater pollutants from areas of human habitation to protect the environment. This includes discharges such as human waste, potable water, and sanitizing chemicals. BMP implementation would be expected where there are threatened discharges; implementation is not limited to times of elevated risk to public health, which the commenter has not defined. This subprovision notes BMP examples such as BASMAA’s mobile surface cleaner program, which has been in place for more than twenty years, so there is an existing foundation of work.	
ACCWP-2	C.2.e.ii(2)	Revised language seems to imply that the listed activities must be	We disagree. The subprovision states that the requirements apply "in the course of rural road and public works maintenance and	None.

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		completed even if no such work is being performed.	construction activities." The same requirements applied in the previous permit.	
SCVURPPP-20 SMCWPPP-57	C.2.f.ii	Corporation yard wash areas may not have a sanitary sewer drain, but there may be another approved sanitary sewer connection that could be used for discharge of wash waters (e.g., areas where vactor trucks deposit contents to drain). The option should be provided to collect and discharge wash water to an approved sanitary sewer connection rather than hauling directly to the wastewater treatment plant.	We agree and have updated C.2.f.ii to reflect the requested flexibility.	Updated language to allow discharge to an approved sanitary sewer connection.
CCCWP-7 SMCWPPP-58	C.2.f.iii	This provision should allow the submittal of existing SWPPPs prepared in accordance with the CASQA Municipal BMP Handbook and SWPPP Template. Allowing the submittal of existing SWPPPs would make an efficient use of Permittee staff resources while continuing to protect stormwater. This is an increase in reporting requirements. Overall, reporting requirements for C.2 have increased, although WB staff and permittees had agreed on a goal to	Comment noted. The provision allows the submittal of existing SWPPPs, as requested, and states: “In the 2023 Annual Report, Permittees shall make their corporation yard SWPPPs available to the Water Board by providing links to online documents or submitting the documents as part of the Annual Report.” It does not require Permittees to develop new corporation yard SWPPPs. Permittees may use CASQA resources in the development of their SWPPPs. This is a one-time submittal requirement, reflecting a desire to minimize reporting	None.

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		reduce reporting throughout the permit. There is general concern with the overall increase in reporting requirements.	requirements while ensuring necessary information is submitted to demonstrate that Permittees are appropriately protecting water quality.	
SCVURPPP-21 SMCWPPP-59 ACCWP-3	C.2.g	This provision was moved from MRP 2 Provision C.7.a, Public Information and Participation. This Provision covers both municipally maintained storm drain inlets and newly approved, privately maintained streets. We recommend the requirements related to municipally maintained storm drain inlets remain in C.2 and the private street development requirements be moved to C.3. Note C.3.c.i.(1)(f) already requires storm drain system stenciling or signage. Delete private street requirements from this provision.	We disagree. Storm drain inlet marking is required for newly approved, privately maintained streets regardless of whether they are considered regulated projects under C.3. Keeping this requirement in C.2 avoids potential confusion that the requirement may not apply to projects that are not regulated projects under C.3.	None.
SCVURPPP-22 SMCWPPP-60	C.2.h.ii.	This is a new subprovision that requires training at least once within the permit term on specific topics. The subprovision's task	Comment noted. While the provision's "task description" is general, the provision's "implementation level" specifies the training topics that must be included, "as relevant to municipal staff responsible for maintenance activities." This allows Permittees the	None.

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		description, "Appropriate BMPs for maintenance and cleanup activities," is general and duplicative. Maintenance and cleanup activities are general and not related to any specific maintenance activities and facilities identified within this Provision (e.g., street and road repair and maintenance, bridge and structure maintenance). This is duplicative of the stormwater pollution prevention general topic included in the list.	flexibility to focus on appropriate BMPs for the specific maintenance and cleanup activities their staff are responsible for conducting.	
SCVURPPP-23 SMCWPPP-61	C.2.h.ii.	The topic "Spill and discharge response and notification procedures and contacts" is duplicative and inconsistent with other provision requirements. If maintenance staff are responsible for illicit discharge investigation, notification, or contacts, the training would be covered under C.4.e.ii.(5), Illicit Discharge Detection and Elimination. In addition, C.5.c.ii.(3) requires that "[e]ach Permittee shall require the municipal staff conducting routine maintenance and inspection activities to report illicit discharges	Comment noted. We disagree that the requirement to provide training on this topic is duplicative. It is not for inspectors conducting spill and discharge investigations, and applies only to municipal staff who observe or identify spills or discharges during the course of their municipal maintenance activities. As the commenter notes, it is consistent with the expectation set in C.5.c.ii.(3), and is intended to ensure staff know how to respond and report to those spills and discharges.	None.

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		found during their activities to the central contact point so that illicit discharge staff can investigate and track." Therefore, including this requirement in C.2 is repetitive and inconsistent with other sections of the Permit. Delete this training requirement.		
SMCWPPP-62 SCVURPPP-24	C.2.h.iii	The requirement to report the "[t]otal number of corporation yard staff performing corporation yard inspections for the Permittee" is duplicative of other reporting requirements. It is unclear why this number must be reported separately from "(3) total number of maintenance staff and (4) number and percentage of staff implementing activity who attended training." If the training topic "corporation yard SWPPPs" is covered, then the number and percentage of maintenance staff implementing corporation yard BMPs will be reported. Staff who perform the annual corporation yard inspections typically do not require any additional training other than being knowledgeable of the SWPPP and annual inspection form. Typically there is one staffer who conducts the annual	We agree that annually reporting the number and percentage of staff implementing municipal maintenance activities who attend training is sufficient to assess the implementation of the staff training program. The implementation reporting and SWPPPs provided by Permittees according to C.2.f.iii will allow further evaluation of the corporation yard inspection program.	Deleted reporting requirements beyond the overall number and percentage of staff attending training.

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		inspection. It is not clear the benefit of reporting this single number in each Annual Report. Delete this requirement.		

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SMCWPPP-6	C.3	Water Board staff recognized at the start of the MRP reissuance discussions that transforming an urban landscape developed over many decades to include more sustainable stormwater management infrastructure will similarly require multiple decades. MRP requirements should be drafted accordingly, establishing a strong long-term goal but providing flexibility for permittees on how to get there most cost-effectively, in a manner that contextually fits their jurisdictions, with an emphasis on meaningful planning that will advance implementation. Short-term prescriptive requirements in MRP 3 will effectively derail the long-term vision and approach.	See the responses to the following comments, below: CCTA-4; Oakland-10 SMCWPPP-9 CCCWP-22; SCVURPPP-2a,4; CCCWP-22; and SCVURPPP-2a,4,37 Los Altos-4 San Pablo-5 SMCWPPP-75 CCCWP-21,22 Palo Alto-3. The changes to C.3 are incremental (e.g., the changes to the thresholds for Regulated Projects starting in the second year of the Permit term, and modest expectations for green infrastructure retrofit based in part on the GI Plans), flexible (e.g., changes to C.3.e.i alternative compliance, and recognition of GI Plans as guiding documents that also consider, for example, multi-benefit needs and opportunities), and responsive to past actions (e.g., please the response to Cupertino-1).	See the revisions proposed for the other cited comments.

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Contech-1	C.3	During the next permit term an estimated 6,000 acres of impervious area will be permitted for new development and redevelopment in the region. It will be a colossal missed opportunity to continue to require the use of sand and compost based bioretention systems when there are much more effective controls for important pollutants in the region like sediment, mercury, PCBs, and nutrients. These innovative controls include non-proprietary media specifications that substitute more stable materials for compost, and proprietary modular bioretention systems that can provide greater and more consistent water quality benefits in a smaller footprint. I hear regularly from engineers and others working on land development projects that they need more flexibility to use innovative bioretention solutions that are readily available in other regions, but prohibited in the SF Bay region unless they are working on a "special project." We created a petition and gathered over 130 signatures of people working in the	See the response to the following combined comment, below: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i	See the revision proposed for the following combined comment, below: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i

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		SF Bay region to improve stormwater runoff quality by designing, building, and maintaining stormwater control measures. A copy of the petition language and the names, titles and affiliations of the signatories is included with this comment letter as Att. B. These are many of the people who will be designing and implementing stormwater management solutions during the next permit term.		
ACCWP-4	C.3	As a result of requirements being added over the years, the provision is ambiguous, contains overlapping requirements, and requirements that are challenging to interpret. Streamline the text. Remove redundant requirements. Add a flow chart to the fact sheet.	C.3 addresses the range of potential water quality impacts from new and significant redevelopment projects. That necessarily involves a degree of complexity regarding the range of expected design approaches and water quality controls, and their application to the broad range of land uses in the Permittees' jurisdictions. See below for responses to comments on specific areas of potential confusion, including responsive edits to the Tentative Order. Comment does not explain where text needs to be streamlined, which requirements are redundant, and what kind of and why a flow chart needs to be added to the Fact Sheet.	None.
BIA Bay Area-0	C.3	California is in a housing crisis, and C.3 undermines the State's goal of increasing housing	Comment noted. C.3 has been designed to appropriately address the water quality impacts of new and redevelopment projects while supporting those projects' completion.	None.

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		production and improved affordability.	We disagree that C.3 will undermine increased housing production and affordability. We considered California's current housing situation in considering revisions to C.3 from the previous permit, the need to appropriately control pollutants in discharges associated with housing, and approaches taken in other municipalities, such as Eugene, Oregon, that are also responding to housing challenges. The proposed Order takes an incremental, evolutionary approach to addressing discharges that impact water quality that is consistent with NPDES MS4 permits elsewhere in the U.S., even though, as described in the Fact Sheet, some other permits have gone beyond the expectations proposed in the order. Thoughtful and timely incorporation of clean water controls into project designs, as practiced in communities like Portland, Oregon, and Seattle, Washington, and in the Bay Area, minimizes incremental costs while improving livability and, in some cases, reducing costs to residents (e.g., by reducing urban heat island effects, or from reductions in parking costs associated with elimination of mandatory minimum parking requirements to reduce project impervious surfaces[1]). Significant cost drivers for housing are outside the Permit's	

[1] https://www.housingfinance.com/policy-legislation/boston-ends-parking-minimums-for-affordable-housing_o

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			scope: for example, zoning requirements for minimum lot sizes or maximum densities, minimum parking requirements, lack of densities sufficient to support public transportation alternatives to automobile ownership, and the lack of land banks or similar non-profit or not-for-profit alternatives to for-profit development.	
CCCWP-8	C.3	Retrofit requirements in C.3.b.ii.(1) & (5), C.3.j.ii.(2), and C.12.c & f, are confusing/ overlapping.	The comment does not identify how or why the referenced requirements are confusing or overlapping. However, as described below, we have modified wording in C.3.b.ii.(1) for clarity – see the response to the following combined comment: SCVWD-3 Solano-14,15 CCCWP-18 PG&E-1 SCVURPPP-27,28 SMCWPPP-65,66 San Mateo County-11 San Jose-14 Please also see the response to CCCWP-10, regarding overlap between crediting in C.3.j and C.12.	See the revision proposed for the following combined comment: SCVWD-3 Solano-14,15 CCCWP-18 PG&E-1 SCVURPPP-27,28 SMCWPPP-65,66 San Mateo County-11 San Jose-14

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Save the Bay-2	C.3	Supports the C.3 requirements, as they mitigate the adverse effects associated with climate change. Supports the new Regulated Project category specified in C.3.b.ii.(5), as those road retrofit projects were previously exempted from clean water controls. Notes that over $750 million in new State funding will soon be available for C.3 LID/GSI projects, through the Transformative Climate Communities Program (Strategic Growth Council), the Urban Greening Grant Program (Natural Resources Agency), and the Integrated Climate and Adaptation Resiliency Program (Office of Planning and Research), among other sources. Urges the Board to adopt the proposed changes to C.3.	Comment noted. We agree that the addition of funding sources will facilitate future implementation of green infrastructure, including on road reconstruction projects.	None.
SMCWPPP-42	C.3	Comment describes the 2017 San Mateo County Stormwater Resources Plan.	Comment noted.	None.
Cupertino-1	C.3	The unintended consequences of the new requirements will negatively impact our ability to execute pavement maintenance and Safe Routes to Schools projects that make our bicycle and pedestrian network safer.	The commenter does not quantify or otherwise describe the expected impact. However, we considered potential effects on road projects overall as part of considering expectations for Permittees to address the water quality impacts of roads. The Fact Sheet describes the work to develop clean	None.

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			water expectations for roads over past permit cycles, including road retrofit pilot projects (MRP 1) and the opportunity for permittees to determine and commit to measures to address road impacts as part of their green infrastructure plans (MRP 2). With the absence of a significant commitment, the Tentative Order includes expectations to implement clean water controls for significant road reconstruction projects, which can also count towards the Order's modest expectations for green infrastructure retrofit. The potential for these expectations to delay other road projects, while minor, is reasonable when considered against the ongoing and otherwise significantly unaddressed discharge of pollutants from roads. As other responses explain, C.3.b.ii.(5) and C.3.j.ii.(2) also provide substantial flexibility and accommodation.	
CCCWP-12	C.3 & C.12	It may be more efficient for Permittees to comply with the numeric retrofit requirements in C.3.j.ii.(2) at the County level instead of at the individual municipal level. However, that would be difficult because it is difficult for Permittees to exchange monies with other Permittees.	The Permit would allow Permittees to comply with the C.3.j.ii.(2) retrofit requirements via coordinated implementation of larger projects, and some San Mateo County permittees have already indicated an intention to do so. Permittees already pool money at the county level via their countywide stormwater programs; for Contra Costa County Permittees, that is the Contra Costa Clean Water Program, the commenter.	None.

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			In addition, Permittee green infrastructure plans are frameworks for implementation over time and could facilitate exchanges of funding by allowing permittees to recognize the benefit of collaborative action to achieve lower-unit-cost projects that achieve shared goals, such as PCB or mercury load reductions. In 2020 the City of San Pablo initiated a U.S. EPA San Francisco Bay Water Quality Improvement Fund grant-funded effort to investigate a formalized trading program for Contra Costa County, although the Permit allows pooling of funds in the absence of such a program. As early as MRP 1 (and continuing into MRP 2), C.3.e.i has allowed Permittees to implement LID treatment at an offsite location within the same watershed as the Regulated Project. The Tentative Order would provide even greater flexibility by allowing 100 percent of the required LID treatment to be located offsite. And, C.3.e.i(3) gives substantial implementation flexibility by allowing up to 5 years for completion of the offsite LID treatment. The Permittees have had time and flexibility to develop and implement alternative compliance programs that facilitate exchanges between jurisdictions. Where	

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			such programs have not yet been developed, Permittees can still do alternative compliance within their own jurisdictions, for example by using private redevelopment to fund implementation of projects identified in their Green Infrastructure Plans.	
SMCWPPP-43	C.3, C.11 & C.12	Comment discusses the details, purpose and outcome of the San Mateo County Permittees' Reasonable Assurance Analyses.	Comment noted.	None.
SMCWPPP-44	C.3, C.11 & C.12	Comment lists several regional stormwater runoff capture projects that are currently in the planning or construction phase, and agrees with the Fact Sheet regarding the efficiency of larger scale and regional projects in meeting the C.3.j.ii.(2) numeric implementation retrofit requirements.	Comment noted. We recognize the substantial planning work completed by SMCWPPP and the potential value of lower-unit-cost district- or regional-scale projects that can achieve other laudable goals, such as climate change and water supply resilience.	None.
SMCWPPP-46	C.3, C.11 & C.12	Certain SMCWPPP Permittees are implementing voluntary clean water controls; comment provides several examples. C/CAG is investigating a countywide alternative compliance program. Refers to the county's green infrastructure design guidance.	Comment noted. We support the substantial work SMCWPPP and C/CAG have completed, including their design guidance, and are working with C/CAG as it considers a countywide alternative compliance program.	None.

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SMCWPPP-47	C.3, C.11 & C.12	Certain SMCWPPP Permittees are implementing green streets projects and requiring private developers to implement frontage improvements, including green infrastructure, including such measures that may help the SMCWPPP Permittees achieve their C.12 obligations. Stresses the importance of flexibility in the Permit. Refers to the San Mateo Countywide Sustainable Streets Master Plan, Safe Routes to School, and presents some project cost data (~$300,000/acre treated with GI). Notes that ~30 acres of impervious surface were treated by non-Regulated Projects during the MRP 2 permit term.	Comment noted. The requirements in the Tentative Order incentivize and reward the projects referred to in the comment.	None.
SCVWD-3 Solano-14,15 CCCWP-18 PG&E-1 SCVURPPP-27,28 SMCWPPP-65,66 San Mateo County-11 San Jose-14	C.3.b	In MRP 2, C.3.c.ii.(1) required the Permittees to submit specifications for pervious pavement systems, which included specifications for gravel pavements. Gravel pavements, constructed to these specifications, are pervious surfaces and cannot be regulated under C.3.b.ii., which defines Regulated Projects to be those that create or replace impervious surface.	We agree that pervious pavement systems constructed pursuant to specifications sufficient to ensure compliance with the Permit's LID standard are not Regulated Projects; rather, they are an example of a practice that would address runoff from a Regulated Project. The proposed language does not discourage the use of gravel for erosion control or energy dissipation; it requires Permittees to install flow and treatment measures if a gravel overlay (that is not part of a pervious	We have revised the definition of pervious pavement systems in the Glossary to more clearly distinguish them from gravel overlays, and added information to the Fact Sheet

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		Gravel is used for erosion control, and discouraging its use may result in even less-desired erosion control measures. Gravel roads generate less pollutant loading than concrete/asphalt roads. The Fact Sheet does not support the claim that gravel is impervious and generates pollution. Confusion with regulation of gravel roads vs pervious pavement systems and the definition of impervious surface in the glossary. C.3.b.ii.(1)(b)(iv)(b)-(c) imply that gravel is pervious because they state that upgrading from gravel to pavement is a new impervious surface. Current language disincentivizes gravel surfacing and may cause development project proponents to instead use impervious conventional concrete or asphalt. Gravel should be considered pervious (one commenter requested that gravel be considered pervious within	pavement system) triggers a Regulated Project threshold in C.3.b, to mitigate the adverse water quality and hydrologic impacts associated with a created and/or replaced impervious surface. A gravel overlay, which will compact over time and eventually behave as an impervious surface with respect to runoff, is distinct from gravel that is included as part of a pervious pavement system. U.S. EPA has defined as impervious surfaces "…areas such as gravel roads…that will be compacted through design or use to reduce their impermeability."[2] It further has defined impervious surfaces as "[a]ny surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil."[3] The Ohio EPA includes gravel roads in its required calculations for impervious surfaces.[4] Municipalities including Asheville and	regarding gravel overlays. We have also clarified that layering gravel over an existing gravel road, without expanding the area of coverage, is an exempted practice, in C.3.b.ii.(1)(b)(ii).j.

[2] U.S. EPA, July 2016. Summary of State Post Construction Stormwater Standards, p.13.
[3] Ibid., p.19
[4] Ohio EPA, Oct. 2018. Post-Construction Storm Water Questions and Answers, p.1. "What surfaces should be considered impervious? (…) rooftops, paved or gravel roads…."
and Ohio EPA, Oct. 2019. Guidance on Post-Construction Storm Water Controls for Solar Panel Arrays, p.1, "Paved or gravel roads…must also include post-construction storm water management."

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		certain ranges of compaction, others requested that it be considered pervious in all cases), and C.3.b.ii.(1)(b) should be revised accordingly. Upgrading from dirt to gravel should not be considered a new impervious surface.	Durham, North Carolina, and Avon, Ohio, consider gravel driveways impervious for the purpose of calculating those cities' stormwater utility fees, because compaction results in increased runoff from those surfaces.[5] Guidance on the components and details of a pervious pavement system is readily available; for example, robust guidance is included in the current version of SCVURPPP's "C.3 Stormwater Handbook," in Section 6.10, and its Glossary defines pervious pavement systems as: "…permeable interlocking concrete pavement (PICP), pervious or permeable concrete pavers, pervious grid pavements, pervious concrete, porous asphalt, turf block, grasscrete, and bricks and stones, set on a gravel base with gravel joints. Pervious paving or pavement systems are designed to store and infiltrate rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or store and infiltrate the rainfall runoff volume described in…C.3.d…." Clearly, pervious pavement systems are distinct from simple gravel overlays over dirt or natural soils. In contrast to gravel	

[5] https://www.ashevillenc.gov/department/public-works/stormwater-services-utility/stormwater-fees/ https://www.durhamnc.gov/864/Impervious-Surface. Durham specifically references compacted gravel. https://www.cityofavon.com/DocumentCenter/View/4298/Exhibit-A---Ordinance-No-105-17-Chapter-1056-FINAL?bidId=. "Impervious surfaces include…compacted gravel surface[s]" (p.2).

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			overlays, SCVURPPP's handbook explains how pervious pavement systems effectively prevent compaction (though a required component of ongoing maintenance is periodic surface vacuuming to remove accumulated debris and sediment), and act as self-treating areas. Pursuant to C.3.b.ii.(4)(d), gravel trails greater than or equal to 10 feet wide may be excluded if they direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area. As such, we expect the vast majority of gravel trails to be excluded, as long as they satisfy the criteria therein. We have also clarified that layering gravel over an existing gravel road, without expanding the area of coverage, is an exempted practice, in C.3.b.ii.(1)(b)(ii).j.	

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Oakland-7	C.3.b, C.3.j	Include incentives in the permit to encourage municipalities to work with developers to add GSI to the ROW, where feasible, and to provide incentives to developers to do so.	C.3.j.ii.(2)(j) provides the requested incentive by reducing Permittee retrofit requirements when Permittees adopt an ordinance that would achieve the commenter's stated goal. In addition, developers are incentivized to add GSI to the ROW because of its co-benefits and for the opportunity to obtain alternative compliance funding for the retrofit from other project proponents, including Permittees. Additionally, Permittees are already incentivized to work with developers to add GSI to the public ROW, because doing so would help Permittees achieve their retrofit requirements, even without the credit granted by C.3.j.ii.(2)(j). Lastly, several Permittees have already adopted ordinances which leverage private development and redevelopment, such as the cities of San Mateo and Redwood City. For example, San Mateo's GI Plan explains that "…some private new and redevelopment projects will be required to construct GI measures along the frontages of their property boundaries in the public right of way to treat runoff from roadways, sidewalks and other impervious surfaces" (Section 6.2.3).	None.

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CCCWP-22	C.3.b, C.3.j, C.11, C.12	Permittees recommend the Water Board dispense with the unwieldly and unnecessary accounting for these redundant provisions, eliminate the numeric requirements for all three, and let the Permittees implement their Green Infrastructure Plans. If the Water Board maintains the proposed accounting, then make the following changes: In keeping with the spirit of our emphasis on Green Infrastructure, clarify that all projects that retrofit existing impervious areas with stormwater treatment can be counted toward goals or allocations throughout the permit (C.3, C.10, and C.11/12) simultaneously. C.3.j.ii.(2)(h) allows crediting of Green Infrastructure retrofits built in connection with Road Reconstruction projects under C.3.b.ii.(5). The Permit should also explicitly allow the reciprocal case, that is, Green Infrastructure projects built pursuant to C.3.j.i, C.3.j.ii, or C.12.c should be creditable, under the Alternative Compliance scheme allowed under	We disagree that accounting for required load reductions for mercury and PCBs, for control of trash discharges, or for implementation of green infrastructure retrofit is unnecessary. In fact, it is needed to demonstrate reasonable progress towards achieving the associated TMDL wasteload allocations, or, for trash, reductions in discharge. The Permit reflects our efforts to make the accounting and associated reporting straightforward; much of the reporting is the same as or similar to that in previous permits. Where runoff treatment measures reduce particular pollutants (i.e., mercury, PCBs, or trash), those reductions may all be counted under the Permit. Similarly, to the extent that those measures meet C.3 requirements, they may also be counted towards those requirements. We agree that C.3.j.ii.(2)(h) allows crediting of C3.b.ii.(5) road reconstruction project stormwater treatment controls towards the required green infrastructure retrofit. Specifically, C.3.b.ii.(5)(d) allows Permittees to "…credit the acreage of impervious surface created or replaced for Road Reconstruction Projects towards the Numeric Implementation retrofit requirements specified in Provision C.3.j.ii.(2)." We do not agree that green infrastructure projects built pursuant to C.3.j or C.12.c should be	None.

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		C.3.e.i, toward any compliance obligation incurred for road maintenance projects now designated Regulated Projects under C.3.b.ii.(5).	creditable as alternative compliance for C.3.b.ii.(5) Road Reconstruction Projects. As described in the Fact Sheet, that would work against the MEP standard-based expectation that significant road reconstruction projects incorporate stormwater controls.	
San Jose-11	C.3.b.i.(1)	The changes to C.3 may impact certain projects that are currently in the planning phase. Delay the implementation of new/changed C.3 requirements by several years into the MRP 3 term.	Please see Master Response Identifier C.3-13.	Delayed implementation of new Regulated Project categories (C.3.b.ii.(5)-(6)), and of changes to thresholds for existing Regulated Project categories (C.3.b.ii.(2)-(4)) by one year.
BIA Bay Area-4	C.3.b.i.(1)	Grandfather under MRP 2 all residential projects that have filed preliminary development	We disagree. As the commenter notes, residential projects that were regulated projects under MRP 2 are not subject to	None.

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		applications defined under SB 330 and SB 8 by the effective date of MRP 3, even if those applications have not been approved and the projects are not entitled. We recognize that regulated projects meeting MRP 2's stormwater treatment requirements, along with projects that have approved vesting tentative maps, are exempt from the updated permit language.	updated permit language—and, in any case, the requirements on those projects are the same, so there is no effect on those projects. The regulated project definition has been revised to include multi-unit residential projects with more than 5,000 square feet of impervious surface, and Large Detached Single Family Home Projects with more than 10,000 square feet of impervious surface. The latter were already expected to consider implementation of stormwater controls under MRP 2, and maintaining the MRP 2 expectation regarding which projects will be grandfathered would maintain consistent expectations on that issue. The Fact Sheet includes a discussion of why the changed impervious surface threshold is reasonable and required under MEP, and why projects should be able to meet the revised expectation.	
ACCWP-6 Oakland-3	C.3.b.i.(2)	Some public projects, which may be constructed during MRP 3, were approved without stormwater treatment controls required by C.3.d in the current/previous MRP, and would therefore trigger C.3.b.i.(2). The language allows an exemption for projects with previously approved vesting tentative maps, and new language should be added for public	Please see response to San Jose-11 regarding delayed implementation of updated expectations for public and private projects. In addition, in MRP 2, C.3.j.iii, "no missed opportunities," required Permittees to review CIP project designs and incorporate treatment controls. MRP 1 and MRP 2 already required public projects that were regulated projects to incorporate treatment controls, and MRP 2 included green	See response to San Jose-11.

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		projects, such as allowing an exemption for "the date their governing body or designee approves initiation of the project design," so that the exemption is more easily triggered.	infrastructure planning expectations that included municipal review of projects to determine opportunities to commit to implementation. Thus, the expectation to incorporate controls, or to consider their incorporation, has been present at "initiation of project design" for all public CIP projects since 2015, and for regulated public projects for more than a decade. Earlier MS4 permits also included treatment control expectations. However, to the extent a public project was approved, but not constructed, more than a decade ago, it is reasonable that the design would be brought up to current expectations as part of a permittee's review and budgeting process. The commenters did not identify any public projects where this issue may come up. However, the public projects to which this issue could apply appear limited to those that might fall into the 5,000 – 10,000 square foot threshold, or the 1 acre-plus threshold for significant roadway reconstruction projects. The permit allows flexibility through C.3.e, Alternative Compliance, and C.3.j, Green Infrastructure Planning and Implementation, sufficient to allow those projects to proceed while ensuring their urban runoff impacts are appropriately addressed.	

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San Jose-13	C.3.b.ii	1) Smaller development projects may be defined as Regulated Projects if they are required to additionally treat the portion of the public right of way that is created/replaced as part of the private project. 2) In such cases, runoff from the private parcel and the public right of way may comingle, which can open up Permittees to liability issues. 3) Providing treatment in the public right of way will be difficult and expensive due to space and utility conflicts.	1) To the extent that impervious surface work is part of a project and exceeds specified thresholds, the treatment expectation is the intended outcome. 2) We expect Permittees will address these issues as they come up; they are already being considered by some San Mateo Permittees as they implement treatment control expectations that include ROW runoff. 3) As noted in the Fact Sheet and in our discussions in the C.3 workgroup, urban and suburban environments have constraints that must be addressed as part of treatment control design. The permit has substantial flexibility regarding treatment location: treatment is not required to be in the public right of way. C.3.e.i, alternative compliance, allows offsite treatment when onsite treatment is not possible. Additionally, green infrastructure and Road Reconstruction projects can use the conditionally-approved alternative sizing criteria.	None.
Hillsborough-5	C.3.b.ii	Exempt Hillsborough from "the proposed C.3 New/Redevelopment and C.3 Road Projects provisions."	We disagree. These projects have the potential for significant impacts to water quality and, as such, must be addressed within the Permit's MEP framework. However, the Permit offers substantial flexibility to achieve clean water outcomes, including via C.3.e, Alternative Compliance,	None.

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			and C.3.j, Green Infrastructure Planning and Implementation, sufficient to allow those projects to proceed while ensuring their urban runoff impacts are appropriately addressed. For example, both C.3.b.ii.(5)(c) and C.3.j.ii.(3)(b) allow Permittees to use the conditionally-approved alternative sizing criteria for green streets projects that are categorized as Road Reconstruction Projects. See also response to San Jose-11, noting a 1-year delayed implementation date for new Regulated Project categories (C.3.b.ii.(5)-(6))and for changes to thresholds of existing Regulated Project categories (C.3.b.ii.(2)-(4)), to give Hillsborough and other Permittees more time to implement the updated expectations.	

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SCVURPPP-27 SMCWPPP-66	C.3.b.ii	Absence of "contiguous" in non-excluded public ROW projects will cause more projects to be regulated. For example, piecemeal projects such as gap closures, sidewalk section replacement, utility trenching, ADA curb ramps, LID, etc. that are not “contiguous” and add up to 5,000 sq. ft. or more in total would become regulated. (Based on discussion with Water Board staff on 10/27/21, "piecemeal" projects were not intended to be regulated and it was agreed that language needs to be clarified.)	Projects that qualify as Road Reconstruction Projects are only included if they satisfy all the criteria therein, including criteria regarding contiguousness. We revised C.3.b.ii.(1)(b)(iv) to clarify this. We agree that these types of piecemeal public ROW projects – including sidewalk gap closures, sidewalk section replacement, and ADA curb ramps – that would otherwise qualify as Other Redevelopment Projects, should be excluded unless they create and/or replace 5,000 contiguous square feet of impervious surface, and have clarified that in the Permit. We have revised C.3.b.ii.(5) to clarify that utility trenching projects belong in the Road Reconstruction Projects category, and therefore are only Regulated Projects if they create and/or replace 1 acre or more of contiguous impervious surface.	We have revised C.3.b.ii.(1)(b)(iv) and C.3.b.ii.(3) as indicated. We have also revised the Fact Sheet to explain these changes. Categorized utility trenching projects in C.3.b.ii.(5).
San Jose-12	C.3.b.ii.(1)(a)	Remove C.3.b.ii.(1)(a) as those Regulated Projects fall under the other Regulated Project categories.	This subprovision is retained to be explicit that the permit regulates these categories of development and redevelopment, consistent with precedential State Water Board WQ Order 2000-0011.	None.

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Sandis-2	C.3.b.ii.(1)(a)-(c) and C.3.j	Changes to C.3.b will result in: "fragmented systems… a fragmented approach to treatment of public right[s] of way" and maintenance responsibility. In some cases it may not be feasible to comply with C.3.d. There may be a need to provide treatment on private property if there is insufficient space in the public right of way, which is undesirable and may increase flooding risk. These concerns will be alleviated if Permittees: "...establish consistent implementation details for BMPs within the public right of way..." and "...establish a consistent framework for maintenance of BMPs constructed within the public right of way..." and "identify opportunities for in-lieu projects within the primary watersheds of the MS4 system. Once an applicant has demonstrated the MEP criteria [are] met allow the implementation of partial funding of an identified in-lieu project by the applicant.	We disagree. The Permit does not require implementation of fragmented systems, but rather allows flexibility, via C.3.e, Alternative Compliance, C.3.j, Green Infrastructure Planning and Implementation, and C.3.b.ii.(5)(c), for Permittees to implement systems at other scales, as long as they provide equivalent benefit. C.3.b.ii.(5)(c) allows public road projects to use the conditionally-approved alternative sizing criteria, recognizing the logistical constraints associated with such projects, thus providing modest flexibility on control design that can reduce control size. The concern raised in the comment is not substantiated; it is not clear why appropriately designed, operated, and maintained treatment on private property as opposed to on public property would inherently increase flooding risks. We support the development and implementation of consistent design and operation and maintenance approaches. MRP 2 encouraged Permittees to develop standard specifications and details for public right-of-way BMPs, and permittees and Board staff worked together during MRP 2 as part of the Sustainable Streets project to, in part, identify such consistent approaches.	None.

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			C.3.f, Alternative Compliance, would maintain opportunities for in-lieu projects that could be implemented via developer contributions, and many Permittee Green Infrastructure plans note such opportunities.	

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SCVURPPP-3b	C.3.b.ii.(1)(b)	Estimates that 164 CIP projects "could" require stormwater treatment (this figure may erroneously include projects which are exempted as Routine Maintenance), over 5 years, at an estimated total cost of $300 million countywide.	Based on discussion with SCVURPPP staff (and as noted in footnote 2 in the SCVURPPP comment letter), it is our understanding that a significant portion of these 164 CIP projects will be exempted from the Tentative Order's requirements for Regulated Projects. For example, included in this metric of 164 CIP projects are "piecemeal" non-contiguous public works projects which would be exempted, such as sidewalk section replacement, sidewalk gap closures, and ADA curb ramps. Therefore, this comment significantly overstates the cost of implementing the referenced changes to C.3.b during the MRP 3 term. See response to the following combined comment: SCVURPPP-27 SMCWPPP-66.	We revised C.3.b.ii.(1)(b)(iv), C.3.b.ii.(3), and the Fact Sheet, to clarify which types of projects are excluded.

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SCVURPPP-27,29 SMCWPPP-65,67 San Mateo County-10	C.3.b.ii.(1)(b)	1) Language on regulation of pavement maintenance activities is confusing and should be clarified. 2) If pavement maintenance is not excluded, at a minimum change "base course" to "sub-base course" or "subgrade," and clarify that base course does not mean aggregate base. This is because milling and grinding for resurfacing can disturb the base layer. 3) Clarify whether "square cut patching" includes trench pavement restoration and dig-outs, and whether upgrade from a chip seal to overlay is excluded if wedge grinding is part of overlay. 4) Add exclusion for utility trenching for projects up to 1 acre (per CGP). 5) Allow extension of pavement edge for bike lanes, sidewalks, and public safety projects. 6) Many pavement maintenance projects require repair of the pavement base to ensure effective, long-lasting repairs. Excluding	1) Comment is not sufficiently specific, so it is unclear what changes may make the language less confusing. Please see the following responses that address more-specific comments on this issue: SCVURPPP-27 SMCWPPP-66; San Mateo County-9; ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29; and Part 8) of this response, below.	1) Refer to the proposed revisions for the cited responses. Revised C.3.b.ii.(1)(b)(ii). g. as indicated. 2) Defined base course in Glossary. 3) Added footnote and Glossary definition for wedge grinding. 4) Categorized utility trenching projects as Road Reconstruction Projects. 5) None. 6) None. 7) None. 8) We have made several

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		projects that repair the pavement base in preparation for surface treatment effectively nullifies a significant number of pavement maintenance projects. 7) Remove following text: "...or repairing the pavement base (including repair of the pavement base in preparation for bituminous surface treatment, such as chip seal)." 8) Consider moving sub-provisions C.3.b.ii(1)(b) (ii-iv) out of the Special Land Use Categories sub-provision and into a new "Other Projects in the Public Right-of-Way" sub-provision.	We have also revised C.3.b.ii.(1)(b)(ii).g. for clarity. 2) We disagree. If milling and grinding disturbs the base course layer, we would consider that to be significant reconstruction rather than routine maintenance. For clarity, we have added a definition of base course (which consists of aggregate base) to the glossary. 3) Square cut patching does not include dig-out projects that trigger the thresholds in any of the Regulated Project Categories. Square cut patching includes filling potholes or repairing small and localized areas of raveling. Repair of large and broad areas of raveling (indicative of general hot mix asphalt (HMA) failure), involving the replacement of large sections of pavement, is not exempted if it meets the C.3.b.ii.(5) triggers. Square cut patching does not include (utility) trench pavement restoration; that is not pavement repair, it's filling in sections of pavement that were deliberately removed as part of a utility project. As noted elsewhere, utility trenching projects have been defined as Road Reconstruction Projects and thus would be included when they create or	clarifying edits throughout C.3.b.ii.

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			replace 1 acre or more of impervious surface. Upgrading from a chip seal to an overlay is excluded per C.3.b.ii.(1)(b)(ii).g, even if it includes wedge grinding, so long as the area of coverage is not expanded. We have added a footnote clarifying this as well as a definition to the Glossary. 4) We have made this change. We revised C.3.b.ii to clarify that utility trenching projects are in the Road Reconstruction Projects category, and therefore are Regulated Projects if they create and/or replace 1 acre or more of contiguous impervious surface. See response to Sandis-1, CCWD-1. 5) We do not agree that the referenced pavement creation/replacement activities should be excluded, because they are impervious surfaces that can collect, concentrate, and discharge urban runoff pollutants and contribute to hydromodification. See also response to Cupertino-1. 6) The Tentative Order distinguishes between routine maintenance and significant road reconstruction projects; the Permit	

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			would determine that projects which excavate the base layer fall into the latter category. And, when they replace 1 acre or more of impervious surface, such projects constitute a significant investment and replacement of impervious surface, and therefore warrant the inclusion of clean water controls. 7) A justification has not been provided for the requested change and, therefore, it has not been made. 8) Recognizing that there may be potential for confusion, we have made several responsive clarifying edits throughout C.3.b.ii. To the extent language in C.3.b.ii.(1) is referred to in C.3.b.ii.(2)-(6), it is now referred to (and caveated and/or expanded on) appropriately. Because we have made those clarifying edits, we do not agree that it is necessary to make the change suggested in this comment.	

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CCCWP-18	C.3.b.ii.(1)(b) & C.3.b.ii.(5)	1) The specific criteria are not adapted to Bay Area conditions and existing road infrastructure, and the application of these criteria will have unintended consequences. 2) Many older residential neighborhoods were constructed with thin asphalt sections which do not allow for conventional "grind and overlay" techniques without exposing the base course.	1) We disagree. The criteria appropriately take into account typical Bay Area road cross sections, construction materials, drainage designs, pollutant contributions, and rainfall patterns. These materials, designs, and pollutant contributions are broadly similar to those in other parts the United States where clean water controls have been implemented, including both MS4s and combined sewer systems, and the designs, operation, and maintenance of controls used by the Permittees, such as bioretention cells, are informed by past implementation and studies in the Bay Area, nationally, and internationally. While road projects can be subject to constraints—for example, associated with limited right of way or underground utilities—those constraints are appropriately considered as part of project design and prioritization. 2) Bay Area roads, including those in "older" residential neighborhoods, contribute pollutants and contribute to hydromodification. The intent and effect of this Provision is to, over time, address the impacts associated with these contributions by retrofitting these surfaces with clean water controls when associated projects are completed.	None.

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San Pablo-2 CCCWP-20 Concord-1, 2, 3	C.3.b.ii.(1)(b) & C.3.b.ii.(5)	This proposed language change will disproportionately impact disadvantaged communities (DACs) because DACs are at greater risk of having sidewalk gaps, sidewalks that are not ADA compliant, and few existing bicycle lanes.	Please see the response to the following combined comment, regarding sidewalk gap closures, sidewalk section repair, and contiguousness: SCVURPPP-27 SMCWPPP-66 Exempting DACs from these requirements would result in poorer environmental conditions for DACs. Regarding Road Reconstruction, and general concerns about impacts to DACs, please see the discussion in the Fact Sheet regarding the nexus between water quality and environmental justice, for example, in section IV.E.6.a.[6]	See the proposed revision for the following combined comment: SCVURPPP-27 SMCWPPP-66

[6] Schwarz et al., 2015. *Trees grow on money: Urban tree canopy cover and environmental justice.* PLoS ONE 10(4): e0122051. https://doi.org/10.1371/journal.pone.0122051

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CCCWP - 0	C.3 & C.12	The outsized impact on disadvantaged communities (DAC) is primarily from the road maintenance requirements in provision C.3 (DACs tend to have older pavement with inadequate structural sections requiring more reconstruction work) and PCBs load reduction requirements in provision C.12 (many of the properties in old industrial areas are located in or near DACs).	See response to San Pablo-2, CCCWP-20, and Concord-2,3.	See proposed revision for San Pablo-2, CCCWP-20, Concord-2,3 above.

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San Mateo County-9	C.3.b.ii.(1)(b)(iii)	Revise C.3.b.ii.(1)(b)(iii) so that it is more clear that it only applies to projects that create/replace contiguous impervious surface.	Comment noted. C.3.b.ii.(1)(b)(iii) addresses the scenario in which a project consists of a combination of exempted pavement maintenance practices (pursuant to C.3.b.ii.(1)(b)(ii), non-exempted pavement maintenance practices (pursuant to C.3.b.ii.(1)(b)(iv), and/or other practices that fall under the Regulated Project categories). We have revised the language for clarity.	We have revised C.3.b.ii.(1)(b)(iii) for clarity, and also exchanged its place with C.3.b.ii.(1)(b)(iv) , which is a more logical ordering. We have explained and justified this in the Fact Sheet.
Sandis-1 CCWD-1	C.3.b.ii.(1)(b)(iv)	It may not be practicable to treat stormwater runoff from utility trenching projects, because it's not easy to isolate, route, and treat stormwater runoff from only that surface area. Utility trenching should be exempted.	We disagree that utility trenching that meets the appropriate threshold in C.3.b should be exempted. While we agree that it may be challenging to isolate runoff from certain utility trenching projects because of their tendency to be located with a larger paved right of way, the Permit does not require that project runoff be isolated. Rather, project proponents may use alternative compliance pursuant to C.3.e.i, and, in coordination with permittees, may take advantage of projects identified as part of Permittee Green Infrastructure Plans.	Categorized utility trenching projects as Road Reconstruction Projects to eliminate ambiguity about how they are regulated.

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			As to which utility trenching projects are included, we have clarified that utility trenching projects belong in the Road Reconstruction Projects category, and therefore are only Regulated if they create and/or replace 1 acre or more of contiguous impervious surface.	
Oakland-4	C.3.b.ii.(2)	It is inefficient to include stormwater treatment measures in Other Development Projects between 5k sq. ft. and 10k sq. ft. impervious surface created/replaced.	We disagree. Please see the Fact Sheet discussion for this subprovision, which describes the precedent for and practicability of this requirement. In addition, the Permit provides flexibility if smaller systems are infeasible to implement: Permittees may implement larger systems via C.3.e.i, Alternative Compliance.	None.
Baykeeper-12a	C.3.b.ii.(2)-(3)	Comment supports the new thresholds in C.3.b.ii.(2)-(3), explaining that it is feasible to incorporate green infrastructure/LID in those project types, as it was in MRP 2 for project types in C.3.b.ii.(1)(a), and has been implemented (considered feasible) in San Francisco since 2010 by ordinance. The comment also supports the Large Detached Single-Family Home Projects category in C.3.b.ii.(6).	Comment noted.	None.

Comment No.	Provision	Comment	Response	Proposed Revision
San Mateo County-12	C.3.b.ii.(2)-(3)	Regulation of residential subdivisions as Regulated Projects at 5,000 square feet will include projects that are "now possible under SB 9," and is financially and administratively burdensome. For a two-lot subdivision, the combined impervious surface for both lots may be far less than the 10,000 sq. ft. threshold of impervious surface for single-family homes, yet still be subject to the same requirements. Inclusion of single-family subdivisions now possible under SB 9 is in direct conflict with the spirit of the legislation, which is to provide denser, more affordable housing throughout the State. The lowered threshold for subdivisions adds additional development cost at a time when housing is scarce, places a significant maintenance burden on the future homeowners of these parcels, and results in a significant ongoing inspection burden on the County to inspect the small separate systems that would result from this change.	See Master Response Identifier C.3-12.	Clarified in C.3.b.ii.(6) that the addition of an accessory dwelling unit (ADU) on an existing lot with a single-family home, without a subdivision, falls under the single-family home impervious surface threshold of 10,000 sq. ft.

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		Exempt detached single-family home subdivisions that are just 2 parcels.		

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-3a,28 SMCWPPP-66 Santa Clara-3 ACCWP-5,8,9,10 San Jose-9 SMCWPPP-7 Orinda-2 Oakland-2 San Mateo County-4 Cupertino-1	C.3.b.ii.(2)-(4)	1) Changes to C.3.b.ii.(2)-(4) impose new costs to Permittees (increased burden to conduct plan/design review, inspections, tracking) without commensurate/significant water quality benefits. 2) Permittees do not recoup all administrative costs. 3) Maintain exemption for bike lanes and sidewalks along existing roads to support active transportation and ped/bike safety improvements - the narrower wheels of bicycles and wheelchairs are more sensitive to cracks in the pavement, so it is even more important to keep these surfaces in good repair. 4) New or Widening Road Projects will no longer eligible to be used as in-lieu projects. 5) Oppose the changes, but if the changes are adopted, they should be phased (e.g., by July 1, 2024) in instead of being effective	1) See Master Response Identifier C.3-1 2) It is our understanding that Permittees can increase their fees to recoup their costs. See, e.g., Fact Sheet sections IV.E, Economic Considerations, and V.C.b, State Mandates. 3) We disagree that the creation or replacement of bike lanes and sidewalks along existing roads should be excluded. These impervious surfaces generate urban stormwater pollutants in the form of aerially-deposited particulates as well as pollutants deposited by bicyclists (e.g., bicycle tire wear particles, and petroleum products) and pedestrians (e.g., PAH loading from adjacent roadways, and trash), they are a source of thermal pollution of runoff (which may contribute to adverse impacts threatening cold water wildlife habitat), and they contribute to hydromodification of receiving waters.[7] 4) Comment noted. 5) Please see the response to San Jose-11. 6) See Master Response Identifier C.3-1.	1) None. 2) None. 3) None. 4) None. 5) Please see the proposed revision for San Jose-11. 6) None.

[7] https://doi.org/10.1016/j.scitotenv.2019.136125

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		immediately. 6) Municipalities will have a hard time finding acceptable in-lieu alternatives for small projects not suitable for green infrastructure, e.g., those on steep slopes and those without the drainage infrastructure to allow GSI retrofits.		

Comment No.	Provision	Comment	Response	Proposed Revision
Oakland-5	C.3.b.ii.(3)	Threshold change from 10,000 sq. ft. to 5,000 sq. ft. conflicts with certain plans that involve dense development.	We disagree. Please see the response to CCCWP-12 regarding alternative compliance for Regulated Projects. Please see the examples provided in the Fact Sheet of other Permits that include analogous requirements, in even denser urban settings.	None.
Baykeeper-12b	C.3.b.ii.(4)	Comment supports the Road Reconstruction Projects category in C.3.b.ii.(5), as they are the most efficient way to construct LID projects in an already developed urban environment since deteriorated road materials frequently have to be broken up and removed prior to repaving. The comment also notes that green streets projects were identified as having the greatest opportunity for LID implementation in the Permittees' Green Infrastructure Plans, as compared to other project types (e.g., parcel-based LID).	Comment noted.	None.

Comment No.	Provision	Comment	Response	Proposed Revision
CCTA-2	C.3.b.ii.(4) and C.3.b.ii.(5)	The most appropriate time to incorporate stormwater treatment measures for public ROW projects is not during roadway maintenance projects when availability of ROW is likely insufficient, but during new CIP projects.	Routine maintenance is exempted from requirements for C.3.b.ii.(5) Road Reconstruction Projects, pursuant to C.3.b.ii.(1)(b)(ii). Permittees can include stormwater treatment measures for Road Reconstruction Projects, whether or not they are CIP projects, by doing what the commenter suggests: ensuring adequate time and a thoughtful process with consideration of costs, schedule, required ROW, and utility relocations. Furthermore, in recognition of constraints including utility conflicts, C.3.b.ii.(5)(c) allows the use of conditionally-approved alternative sizing criteria.	None.
San Mateo County-13	C.3.b.ii.(4)(b)(ii)	Because it is very common for Widening Road Projects, driving significant cost increases, remove the following text from C.3.b.ii.(4)(b)(ii): "However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road."	The referenced Provision was included in both MRP 1 and MRP 2, and we do not agree that it should be removed. The subprovision has been included to avoid problematic undersizing of clean water controls that could impact function and operation and maintenance. In addition, the permit provides flexibility by allowing permittees to use alternative compliance in such situations.	None.

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SCVWD-3 Solano-15 San Jose-15 ACCWP-9,11 Oakland-6 SCVURPPP-28	C.3.b.ii.(4)(c)-(d)	C.3.b.ii.(4)(c) in MRP 2 only applied to impervious trails greater than 10 feet wide; in the Tentative Order, it now also applies to impervious trails that are equal to 10 feet wide. Remove C.3.b.ii.(4)(c) altogether and require site design for trails (instead of C.3.c-d stormwater treatment) because no evidence is cited to support the implication that stormwater runoff from impervious trails represents a water quality and/or hydromodification problem. Trails are typically used in areas not served by curbs, gutters, or the municipal separate storm sewer system, and do not support levels of traffic or activity that generate significant amounts of polluted runoff or pose other risks to water quality, and provide various benefits (e.g., accessible transportation networks, reduced reliance on vehicular travel, increased awareness and engagement with the natural environment). If C.3.b.ii.(4)(c) is not removed altogether, revert it back to what it was in MRP 2. Or, exclude all off-road bike and/or pedestrian facilities such as Class	We do not agree that the construction of impervious trails should be removed altogether, for the following reasons: Trails paved with impervious materials can be trafficked by motorized vehicles, including, but not limited to, those near levees. Impervious trails can generate significant amounts of pollutant runoff and pose other risks to water quality. Even absent traffic from motorized vehicles, impervious trails still generate significant levels of urban stormwater pollutants in the form of aerially-deposited particulates as well as pollutants deposited by bicyclists (e.g., bicycle tire wear particles, and petroleum products) and pedestrians (e.g., trash and other non-stormwater discharges), they are a source of thermal pollution of runoff (which may contribute to adverse impacts threatening cold water wildlife habitat), and via their impervious surfaces and associated drainage infrastructure, they contribute to hydromodification of receiving waters. We have revised Fact Sheet section C.3.b to clarify this. Pursuant to C.3.b.ii.(4)(d)(iii)-(iv), new impervious trails are categorically excluded if	Revised Fact Sheet section C.3.b to clarify the impacts of discharges from impervious trails, and revised C.3.b.ii.(3) to clarify that it refers to private trails.

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		1 designated and/or signed multi-use paths, of any width. C.3.b.ii.(4)(d)(iii) should be reverted to the language in MRP 2, which did not specify the amount of adjacent permeable area that exempted impervious trails should be routed to. Public trail projects already require "innovative engineering and programming" due to onsite constraints and conflicts, such as grading issues, trees, and existing land use. Requiring additional land to treat trail surfaces is infeasible for many public trail projects that aim to connect corridors and provide multi-modal transportation options. Trails were also added to Other Redevelopment Projects in C.3.b.ii.(3); trail redevelopment projects should be excluded as well.	they either 1) are constructed as pervious pavement systems, or 2) direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area. The Permit defines new and reconstructed private trails (pursuant to C.3.b.ii.(3)) and public trails that are new (pursuant to C.3.b.ii.(4)) as Regulated Projects. Though reconstructed public trails are not necessarily Regulated Projects, expectations for those projects are prescribed in C.3.a.i.(6)-(7). If they meet the respective thresholds in C.3.b.ii.(4), qualifying trail projects constitute a significant investment and replacement of impervious surface, and therefore warrant the inclusion of clean water controls. The commenter states trails are typically located in areas not served by curbs, gutters, or the municipal separate storm sewer system. While many trails may lack a traditional curb and gutter system, trails typically have associated drainage infrastructure and are part of or connected to the Permittees' MS4s. Those systems can be	

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			designed to direct runoff to treatment measures pursuant to Permit requirements. And as noted above, we would expect the majority of impervious trails to satisfy the criteria in C.3.b.ii.(4)(d)(iii) and to drain runoff to an appropriately-sized vegetated area. The commenter states that trails were added to C.3.b.ii.(3) as an "Other Redevelopment Project" category and should be removed. To the extent they were not previously excluded under MRP 2, impervious trails were already included as "…any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface on a site on which some past development has occurred" (MRP 2, C.3.b.ii.(3)). As such, the language in the Tentative Order clarifies an existing requirement. However, we have revised C.3.b.ii.(3) to clarify that the addition refers to private trails. C.3.b.ii.(4)(c) would include as a new or widening road projects "construction of impervious trails that are greater than or equal to 10 feet wide or are creek-side (within 50 feet of the top of bank." As noted above regarding the potential for such trails to generate urban runoff pollutants, given	

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			their use and urban setting, we disagree that certain types of trails should be excluded. However, C.3.b.ii.(4)(d)(iii) allows an exclusion from C.3.b.ii.(4)(a)(c) for impervious trails that route runoff to a sufficiently-sized vegetated or pervious area. While we agree that trails can be constructed at sites where there are constraints affecting the trail's design, the discharges of pollutants, including hydromodification, need to be addressed, and the subprovision lists acceptable approaches that are likely to be feasible for many trails. C.3.b.ii.(4)(d)(iii)'s specification of the amount of permeable area that runoff from impervious trails should be directed to in order to be exempted from C.3.b.ii.(4) reflects existing practice in most Permittee counties. The specified criteria are consistent with the guidance in Table K-2 in Appendix K of the SCVURPPP C.3 Stormwater Handbook, in Table L-2 of Appendix L of the SMCWPPP C.3 Regulated Projects Guide, and in Table L-2 of Appendix L of the ACCWP C.3 Stormwater Technical Guidance.	

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ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29	C.3.b.ii.(5)	1) It is technically challenging to fit stormwater treatment into Road Reconstruction Projects, for example, because of limited right of way and utility conflicts. It is cheaper and easier to include stormwater treatment on parcels than in the public right of way because there are less constraints. 2) C.3.b.ii.(5) will impede strategic implementation of green infrastructure. 3) Road Reconstruction Projects will no longer be eligible as alternative compliance for other Regulated Projects. 4) C.3.b.ii.(5) will regulate routine pavement maintenance. 5) Allow the Permittees to implement road reconstruction projects at their own self-determined pace via their Green Infrastructure Plans, and C.3.j.iii, No Missed Opportunities. It is unclear why municipalities were required to complete a GI Plan in the last MRP only to mandate GI in the next MRP.	1) See Master Response Identifier C.3-2. 2) See Master Response Identifier C.3-4. 3) Comment noted. We agree. However, such projects may count towards a permittee's C.3.j.ii.(2) retrofit requirement. 4) See Master Response Identifier C.3-3. 5) See Master Response Identifier C.3-5. 6) See Master Response Identifier C.3-6. 7) We disagree. Routine maintenance practices are excluded pursuant to C.3.b.ii.(1)(b)(ii), and significant road reconstruction projects are only regulated if they satisfy all the criteria in C.3.b.ii.(5), in particular, criteria regarding contiguousness and created/replaced impervious surface. To clarify this, we have made edits intended to make clear that "piecemeal" public right of way projects (e.g., pothole filling) are excluded. Please see the response to Cupertino-1 regarding impacts to road projects. 8) We agree that not all funding sources for road projects may include green stormwater	We have made several edits to this Provision to clarify that piecemeal public right of way projects (e.g., pothole filling) are excluded.

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		6) Permittees are already challenged with maintaining their roadways. Adding additional immediate and long-term costs (capital construction, and O&M) will worsen roadway conditions because improvements will be further delayed, and will negatively impact public safety. Permittees will be burdened with additional treatment systems that need to be inspected, maintained, and tracked, which pose additional costs. Proposition 218 severely restricts cities' ability to raise ongoing stormwater funding that would be needed to cover the additional costs. Existing funding sources for these roadway projects, such as grants, do not include the cost of stormwater treatment and maintenance, and can have restrictions including not combining with other roadway grants that focus on safety. 7) CCCWP-18: C.3.b.ii.(5) would have the unintended consequence of skewing municipalities' choices as they optimize annual expenditures for pavement	infrastructure as a fundable project element. However, this is not true across the board. For example, SB 1 includes GSI. 9) We disagree. Please see the discussion in the Fact Sheet, for example, in Economic Considerations, regarding co-benefits (i.e., section IV.E.6.c.). 10) We disagree. Please see responses above. However, as previously mentioned, we have delayed implementation of new Regulated Project categories (C.3.b.ii.(5)-(6)), and of changes to thresholds for existing Regulated Project categories (C.3.b.ii.(2)-(4)), by one year. See the response to San Jose-11.	

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		maintenance and would conflict with good pavement management practices. 8) Grants for roadway improvements often do not cover GSI costs and do not cover the long-term O&M of GSI facilities. 9) C.3.b.ii.(5) hinders Permittees' ability to address other important concerns such as the ongoing housing crisis, business retention and development, urban sprawl reduction and growth patterns, and the wishes of residents and businesses. 10) C.3.b.ii.(5) should be removed.		
Woodside-8	C.3.b.ii.(5)	Over 90% of Town roads already drain to pervious surfaces with no hardscape collection system, so there would be no or very little environmental or water quality benefit to regulating road projects in Woodside because the Town's roads predominantly drain naturally to pervious, forested areas.	Please refer to C.3.j.ii.(2)(i), which allows Permittees with small rural jurisdictions (e.g., whose stormwater conveyance systems are dominated by roadside ditches) to collectively submit a proposal, subject to the Executive Officer's approval, for pilot projects investigating the use of alternative green infrastructure techniques to comply with the C.3.j.ii.(2) Numeric Implementation retrofit requirements.	None.
ACCWP-a1i	C.3.b.ii.(5)	1) The benefit of implementing green stormwater infrastructure in conjunction with the development/	1) Comment noted. C.3.b.ii.(5)(c) provides flexibility for Road Reconstruction Projects by allowing them to use (with cause) the	None.

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		redevelopment of parcels is that it is much less expensive than constructing these in the public right-of-way (i.e., roadways and sidewalks) due to the significant logistical constraints associated with those areas, such as conflicts with utilities and limited right-of-way. 2) In Alameda County, about 88% of the land within the urban boundary in Alameda County is within parcels rather than public right-of-way. Thus, the transformation of the urban landscape from “grey” to “green” infrastructure will by necessity take place primarily through the redevelopment of parcels.	conditionally approved alternative sizing criteria for constrained sites. 2) Comment noted. While a significant land area is within private ownership, discharges from existing public roads represent a significant source of urban stormwater pollutants, as discussed in Fact Sheet section C.3.b. See also response (item 5) to combined comment: ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29	
Hillsborough-3 Woodside-8	C.3.b.ii.(5)	Any GI in the public right of way should be done via incentives that include funding such as the many grant programs for green	Comment Noted. See the response to the following combined comment, above:	

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		infrastructure that are already in place and are regularly being awarded to agencies throughout the Bay Area.	ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29	
CCCWP-18	C.3.b.ii.(5)	1) The proposed change to apply Regulated Project requirements to work in existing rights of way would upend or nullify the municipalities' Green Infrastructure planning and prevent some Green Infrastructure projects, currently in the process of design or negotiation, from going forward. 2) The grant-funded Regional Alternative Compliance Program would no longer be viable and would therefore be abandoned.	1) See Master Response Identifier C.3-4. 2) This is contrary to our understanding, based on our discussions with San Pablo staff. We have continued to meet with San Pablo staff and project partners to advance the proposed Regional Alternative Compliance Program.	None.

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CCCWP-18	C.3.b.ii.(5)	We assume C.3.b.ii.(1) itself does not apply to public roads projects because that provision only applies to certain special land use categories, including auto uses and restaurants.	This comment misinterprets the language in the Tentative Order. C.3.b.ii.(1) defines Special Land Use Categories, while C.3.b.ii.(5) defines Road Reconstruction Projects. However, C.3.b.ii.(1) additionally defines certain exemptions, which apply to both C.3.b.ii.(1) and to C.3.b.ii.(5). As explained in C.3.b.ii.(5): "the specific exclusions that apply to this category are listed in Provision C.3.b.ii.(1)(b)(ii)-(iv). Pavement maintenance practices that are not excluded (as detailed in C.3.b.ii.(1)(b)(iv)) are considered Road Reconstruction Projects if they meet the other definitions therein."	None.
CCCWP-18	C.3.b.ii.(5)	C.3.b.ii.(5) would make it unaffordable for municipalities to maintain their roads, effectively setting back their pavement management programs to a state worse than before SB 1 was passed in 2017. In fact, the changes would wipe out the financing advances for road maintenance provided by SB 1, a politically hard-fought effort that spanned many years.	We disagree. As specified in C.3.b.ii.(1)(b)(ii), routine maintenance practices are exempted. Please refer to the various other responses on this topic, for example, the response to part 6) of the following combined comment: ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8	None.

Comment No.	Provision	Comment	Response	Proposed Revision
			Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29	

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San Pablo-3	C.3.b.ii.(5)	Comment gives an example of a green street project that can't comply with the C.3.d requirement because of technical constraints, lack of local storm drain infrastructure, and class D soils with low infiltration rates, and says that happens often for green street projects. The comment states that the example project (Sutter Avenue Green Streets Project) may be completed through if it is not exempted from the C.3 requirements.	Both C.3.b.ii.(5)(c) and C.3.j.ii.(3) allow the use of the conditionally-approved alternative sizing criteria for green streets projects, where it is technically infeasible to provide the full C.3.d treatment. If a treatment system cannot infiltrate because of poor infiltration rates in the native soil, that is acceptable. Regarding lack of local storm drain infrastructure, streets can function as a Permittee's storm drain (e.g., via curb and gutter drainage and valley gutters), and the Tentative Order provides flexibility for accomplishing the required treatment. The treatment can be provided at a downstream or alternative location where storm drain infrastructure is present. For the particular project given as an example in this comment, if treatment in compliance with C.3 cannot be provided onsite, it can be provided downstream of the site or elsewhere in the watershed, pursuant to C.3.e.i.	None.

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CCCWP-20 ACCWP-7	C.3.b.ii.(5)	1) No other NPDES MS4 permits in California have analogous requirements for public road projects. Most CA stormwater permits provide a very flexible roadway treatment requirement that is essentially equivalent to a "no missed opportunity" requirement. 2) For example, for public roads projects the State Water Resources Control Board's Phase II permit for small municipalities requires LID, "except that treatment of runoff from the 85th percentile that cannot be infiltrated onsite shall follow U.S. EPA guidance regarding green infrastructure to the extent feasible." The Los Angeles Region's recently reissued municipal MS4 Permit specifically exempts streets and roads construction from performance requirements and instead references U.S. EPA guidance to be followed to the maximum extent practicable.	1) See Master Response Identifier C.3-7. 2) C.3.b.ii.(5) is similar to the cited requirement in the State Board's General Permit for Small MS4s; pursuant to C.3.b.ii.(5)(c), Permittees may use the conditionally approved alternative sizing criteria for constrained sites. If site conditions (e.g., D soils) preclude infiltration, it is acceptable to exclude infiltration from the design of the treatment measures – this was allowed in MRP 2 and is retained in the Tentative Order. Likewise, the criteria in the Tentative Order are analogous to the MEP criteria in the Los Angeles Region's recently reissued regional MS4 permit, and similarly provide substantial flexibility, for new road projects, including what is cited in the preceding paragraph. Regarding significant road reconstruction projects which maintain original line and grade, though it is true that they are exempted in the Los Angeles Region's regional MS4 Permit, the Fact Sheet includes numerous other examples of NPDES MS4 permits which do not exempt such projects.	None.

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CCTA-4	C.3.b.ii.(4) and (5)	1) Consider additional exemptions for roadway maintenance and rehabilitation projects, particularly for smaller projects and communities, and disadvantaged communities, because they are disproportionately affected by these requirements. Those projects/communities should be exempted "until these costs have been quantified." 2) Certain other projects "that advance local, regional, and statewide goals of reducing [vehicle miles traveled]...and provide clean transportation alternatives such as bicycle and pedestrian improvements [should] also be exempted."	1) Exempting DACs from C.3.b.ii.(4) and (5) would result in a greater disparity in environmental condition – and would exacerbate environmental justice concerns – for DACs as compared to those better-off communities that would not be exempted, because it would retain or exacerbate existing disparities in pollution discharges. Public and private parties, including Permittees, Caltrans, and developers, and numerous municipalities in California and other parts of the country, have been implementing clean water controls analogous to those in the Permit for more than twenty years. As such, sufficient cost information is available, and was considered as described in the Fact Sheet (e.g., Economic Analysis section) in developing the revised requirements. There is not a need to delay the requirements to further quantify potential costs. 2) We disagree that the creation or replacement of bike lanes and sidewalks along existing roads should be excluded. These impervious surfaces generate urban stormwater pollutants in the form of particulates (e.g., bicycle tire wear particles, petroleum products and PAH loading from adjacent roadways, and trash). They also	None.

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			contribute to hydromodification of receiving waters.[7]	
CCTA-4	C.3.b.ii.(5)	Providing stormwater treatment for all urban impervious surfaces is a long-term goal. Therefore, additional exemptions should be included in C.3.b.ii.(5) for said types of projects.	See Master Response Identifier C.3-8.	None.
Concord-4	C.3.b.ii.(5)	Requests that C.3.b.ii.(5) be removed from the Tentative Order. Notes Board Members' sympathy for impacts of changes to C.3.b on Concord. In response to Board Chair's request, provides examples of potential CIP Projects that could include green infrastructure/LID, and if they do, would achieve the C.3.j.ii.(2) Numeric Implementation retrofit targets, and also satisfyC.3.b.ii.(5) requirements.	The commenter's submittal of information with this comment demonstrates how Concord can and will comply with C.3.b.ii.(5) and C.3.j.ii.(2). If the projects in this list are implemented, Concord will achieve the C.3.j.ii.(2) Numeric Implementation retrofit requirements. According to the descriptions, most of the projects would also be considered Road Reconstruction Projects under C.3.b.ii.(5), and could satisfy the requirements for those projects as well. See also the response to San Jose-11, regarding how we have delayed implementation of new Regulated Project categories (C.3.b.ii.(5)-(6)), and of changes to thresholds for existing Regulated Project categories (C.3.b.ii.(2)-(4)), by one year.	None.

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Concord-7	C.3.b.ii.(5)	If C.3.b.ii.(5) is removed, the City of Concord is willing and able to greatly exceed GI implementation minimums, if afforded the opportunity to plan efficiently and collaboratively to maximize the use of limited storm water funds to achieve the clean water objectives jointly shared by both Concord and the Water Board.	Comment noted. While we would support an increased rate of GI implementation beyond Regulated Projects, the current Regulated Project categories and retrofit expectation constitute a level of effort that is reasonable, consistent with MEP. While this issue came up during C.3 work group discussions, Permittees did not propose what is implied here, that they would substantially increase their retrofit commitment in lieu of implementing clean water controls on road retrofit projects. As a result, Board staff reviewed other MS4 permits and in consideration of the MEP standard developed the revisions to C.3 Permit language.	None.
San Mateo County-14	C.3.b.ii.(5)	Initial cost estimates from a recent GI feasibility study in the North Fair Oaks area estimates that incorporating GI into regular reconstruction projects more than doubles the total project cost on average.	Comment noted. The commenter did not submit the feasibility study or a summary with the comment, so it is not specifically evaluated here. The Fact Sheet (see Economic Analysis section) recognizes that there are costs associated with implementing GI. One approach to managing those costs is prioritizing projects that are relatively easier to implement or less constrained, and Permittees' GI Plans include prioritized lists of potential projects that, in part, consider that issue in their prioritization criteria. In addition, we believe that as Permittees and contractors gain experience in planning, designing, and implementing GI as part of	None.

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			their road reconstruction projects, costs are likely to fall. See also responses to CCCWP-18 and San Pablo-3.	
San Mateo County-14	C.3.b.ii.(5)	C.3.b.ii.(5) undermines the significant staff time, effort, and funding put towards previous GI planning and prioritization efforts such as the Reasonable Assurance Analysis, C/CAG Sustainable Streets Master Plan, and the San Mateo County Green Infrastructure Plan.	We disagree. These efforts are mutually enforcing, and the Permittees' Green Infrastructure Plans lacked significant commitments to implementation. Please see part 1) of the response to CCCWP-18, above. Please also see part 5) of the response to the following combined comment, above: ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2	See the proposed revisions for part 1) of the response to CCCWP-18, and for part 5) of the response to the following combined comment: ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3

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			Orinda-1 SCVURPPP-3b,29	Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29
Concord-1,5	C.3.b.ii.(5) & C.3.j.ii.(2)	Recent bond measure can only be used for road maintenance and repair, but not for stormwater treatment. Concord plans to spend $140M over 5 years using funds from the bond measure to repave 66 miles of Concord's 310 miles of road; an estimated additional $100M would need to be spent on stormwater treatment. Consequently, Concord would only maintain/ rehabilitate 7.76 acres of roads instead of X acres [comment doesn't specify X], the minimum required by C.3.j.ii.(2). Disadvantaged areas of Concord will be most affected.	Comment noted. It is not clear why Concord would only maintain or rehabilitate 7.76 acres of roads over 5 years, and the basis is unclear for the estimate of a needed $100 million to implement stormwater treatment. In their comments, SCVURPPP cited an estimated $213,000 per acre treatment cost. Using that estimate, the cost of treating 7.76 acres of road would be about $1.7 million. The cited project has a significant scope (repaving approximately 20 percent of the City's roads over 5 years), and a significant cost—$140 million, or about $2.1 million per mile. The commenter suggests that clean water controls would be required at a cost that may be more than double SCVURPPP's estimate. That assumes that all of the project's 66 miles of pavement would be treated with clean water controls. However, it is likely that much or all of the project would not be subject to requirements to implement clean water controls, because as repaving it would be considered routine maintenance under C.3.b.ii.(1)(b)(ii)-(iv). In addition, to the	None.

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			extent clean water controls may be required for a portion, unit costs for those controls could be reduced by implementing it as larger district- or regional-scale treatment facilities. Thus, the comment may be confusing potential costs associated with routine maintenance with those associated with significant road reconstruction. Please see other responses that have clarified and distinguished these two practices, including the response to the following combined comment, above: SCVURPPP-27,29 SMCWPPP-65,67 San Mateo County-10 Regarding potential impacts to DACs, please refer to our response to CCTA-4.	
Woodside-11	C.3.b.ii.(5)-(6)	If C.3.b.ii.(5)-(6) are not removed, then exempt Woodside from them.	Comment noted. Please see the Fact Sheet section for C.3.b regarding the need and justification for these subprovisions, and see also the response to San Jose-11 regarding how we have delayed implementation of new Regulated Project categories (C.3.b.ii.(5)-(6)), and of changes to thresholds for existing Regulated Project categories (C.3.b.ii.(2)-(4)), by one year.	None.

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ACCWP-a1i, a2ii/8/13 CCCWP-23 SCVURPPP-30 SMCWPPP-7,68 Hillsborough-2 Oakland-8 Cupertino-3 San Jose-16 Woodside-7,11	C.3.b.ii.(6)	1) It is not clear how large detached single-family home projects between 5,000 and 10,000 square feet are regulated. 2) Including Large Detached Single-Family Home Projects as Regulated Projects if they create and/or replace at least 10,000 square feet of impervious surface, conflicts with state and local governments' concerted efforts to improve housing affordability. 3) LID controls required for Large Detached Single-Family Home Projects pursuant to C.3.b.ii.(6) are not "readily inspected," or "inaccessible to municipal inspectors," and enforcement is also difficult. 4) No exemptions or accommodations are included to make it easier for Permittees to comply with C.3.b.ii.(6). 5) Development review and inspection fees do not cover the additional costs incurred. 6) Little to no environmental	1) Such projects are regulated according to C.3.i. 2) See Master Response Identifier C.3-10. 3) See Master Response Identifier C.3-11. 4) The Permit has flexibility to make it easier for Permittees to comply with C.3.b.ii.(6). As an alternative to the implementation of onsite LID for Regulated Projects (including Large Detached Single-Family Homes), C.3.e.i allows Permittees to implement offsite LID. 5) Permittees could increase the fees they charge, so that those fees do fully recoup the additional administrative costs incurred. The Fact Sheet explains this: “The ability of the Permittees to levy fees, assessments, or service charges to pay for compliance with the requirements of the Order cannot be disputed. In addition to the general authority above, some of the Permittees have specific authority to levy funds to pay for permit compliance through many means, including inspection fees, stormwater fees, development impact fees, trash fees, parks fees, and business improvement districts…” (Fact Sheet section V.C, State Mandates, subsection 2.b). 6) See Master Response Identifier C.3-9.	Delayed implementation of new Regulated Project categories (C.3.b.ii.(5)-(6)), and of changes to thresholds for existing Regulated Project categories (C.3.b.ii.(2)-(4)), by one year. See the proposed revision for San Jose-11.

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		benefit associated with capturing Large Detached Single-Family Home Projects, while annual municipal administration costs are asserted to be significant. Such projects should therefore be allowed to implement onsite design measures such as diverting runoff to onsite vegetated areas in lieu of complying with C.3.c-d.		

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ACCWP-14	C.3.b.iii	Allow Permittees 2 years before they have to implement MRP 3 criteria for C.3.b.i-ii, so they have time to incorporate the new criteria into their planning and approval processes.	Please see the response to San Jose-11.	See the proposed revision for San Jose-11.
CCCWP-19	C.3.b.iii	C.3.b.iii requires that C.3.b.i-ii be implemented immediately, which will result in the cancellation of projects that are already planned, designed, funded, and bid.	See response to San Jose-11.	See the proposed revision for San Jose-11.
ACCWP-15	C.3.b.iv	Change C.3.b.iv so that Permittees do not have to include any of the information in their Annual Reports; revise language so that Permittees make the information available to Water Board staff (and to the public) on request.	We disagree that this change is appropriate. The Permittees have been reporting the information for two permit terms, so they already have a lot of practice with it and have incorporated it into their municipal apparatus. Continuing to require the reporting avoids the need for internal changes to tracking systems. In addition,submitting the information in the Permittees' annual reports facilitates Water Board staff's and the public's review of the Permittees' implementation of C.3.	None.
SCVURPPP-31	C.3.b.v.(2)	Requests that reporting on Regulated Projects be revised so that Permittees still track, but no longer have to report on approved	Water Board staff and the Permittees considered this issue during C.3 work group meetings; unfortunately there was no consensus on how to characterize the cutoff,	Revised C.3.b.iv.(2)(g) and C.3.h.v.(2) to include

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		Regulated Projects; only require that they are reported once they are completed.	at which point Regulated Projects would trigger reporting, as it varied significantly for different Permittees. While Water Board staff was open to the Permittees submitting a proposal, one was not submitted. We would welcome the opportunity to revisit this in a subsequent permit term as Permittees further develop their O&M tracking and asset management efforts. However, we agree that it is important for Permittees to report on completed Regulated Projects, both for the Water Board and public's tracking of those projects, and to facilitate the Water Board's inspection of those projects. We have added responsive edits to C.3.b.iv.(2)(g) and to C.3.h.v.(2).	reporting on completed Regulated Projects.
BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i	C.3.c.i.(2)(c)&(d)	Suggests additions to C.3.c.i.(2)(ii) to allow the use of alternative treatment systems, so long as they've received certain certifications (i.e., from Washington State Department of Ecology TAPE program) and comply with the C.3.d criteria. The current prescriptive design standard limits innovation. Such treatment systems are allowed in other NPDES MS4 Permits in California. If allowed, they would reduce developers' reliance on Special Projects, since they have a	See Master Response Identifier C.3-14.	Added C.3.c.i.(2)(ii)(a), which prompts the formation of a workgroup to discuss alternative treatment systems. Revised Fact Sheet as indicated.

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		smaller footprint than conventional bioretention. They'd also significantly reduce maintenance costs. Their media is always the same, compared to conventional bioretention with a sand/compost mix which can vary and provide significantly less treatment than historical testing would indicate. A petition signed by over 140 engineers, contractors, developers, and municipal staff supports the commenters' request to allow the use of these systems. Other bioretention systems that do not conform to the sizing and soil media specifications contained in this permit section are prohibited, regardless of their comparative effectiveness in reducing the discharge of pollutants and their technical and financial feasibility. Prohibiting the use of innovative bioretention systems that are feasible, accepted by similar stormwater programs as appropriate, and have been proven to be equally or more effective in reducing effluent pollutant loads as compared to conventional		

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		bioretention, violates the requirement in CWA Section 402(p)(3)(B)(iii) "reduce the discharge of pollutants to the maximum extent practicable." Therefore, the only way that this provision can stand as written is if the conventional bioretention system sizing and media composition described in C.3.c is definitively the most effective bioretention specification available for pollutants of concern in the SF Bay region, which it is not.		
Contech-3	C.3.c.i.(2)(c)(ii)	Comment summarizes a report attached to the comment letter, regarding the comparative performance and feasibility of innovative and conventional bioretention systems. Conventional bioretention systems are not effective in removing nutrients, mercury or dissolved copper. At current development rates the exclusive use of conventional bioretention will result in the release of approximately 5,500 lbs of elemental phosphorus from Regulated Projects during MRP 3. Conventional bioretention systems are likely to attenuate TSS and PCBs, but net export of both has	See Master Response Identifier C.3-15.	Please refer to the proposed revision for the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i

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		been observed at some field testing sites in the San Francisco Bay Area. Other media mixes provide better and more consistent removal of TSS, mercury, PCBs, phosphorus, and dissolved copper. These systems require a smaller footprint and are cheaper than conventional bioretention systems. "Conventional bioretention is likely to provide significantly more runoff reduction than innovative biofiltration due to its relatively large footprint. However, to provide similar load reductions for most pollutants, as would be provided by non-infiltrating innovative bioretention systems, between 50 and 70% runoff reduction is required to compensate for poorer concentration reduction. This is not likely on most sites in the San Francisco Bay regional where clay soils predominate. Innovative bioretention systems can also be designed to infiltrate stormwater runoff to further improve their pollutant load reduction."		

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Baykeeper-12c	C.3.c.i.(2)(c)(ii)	Certain studies show that sand/compost media in bioretention provide good treatment of some pollutants such as sediment, zinc, and hydrocarbons, but are likely to export (more than they remove) other pollutants such as mercury and nutrients. Export of mercury is particularly concerning because the mercury TMDL implementation requirements specified in C.11.e rely on the use of these systems. Recommends that the Tentative Order be revised to allow for "innovative bioretention systems" that do not export mercury.	See responses to: Combined comment BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i and Contech-3.	None.
SMCWPPP-70	C.3.d.iv	Comment notes there have been changes to C.3.d.iv as compared to MRP 2, but does not make any requests or recommendations.	Comment noted.	None.
Oldcastle-2	C.3.d.iv.(1)	Comment requests that the proposal in C.3.d.iv be implementable by Permittees upon approval by the Executive Officer, rather than requiring a Permit amendment or incorporation into future Permit. And, that the proposal can be made by non-Permittee third parties.	We are unable to make the requested change. As the proposal submitted pursuant to C.3.d.iv is likely to significantly deviate from the MRP's existing LID expectations, and that significant difference cannot yet be framed because there is yet to be a proposed change, it must receive appropriate public review, and its implementation (or conditional implementation) will require a Permit amendment or incorporation into a subsequent Permit.	Please refer to the proposed revision for the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1

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			We continue to urge third parties to work with the Permittees and Water Board staff on an acceptable proposal. Please refer to the response to combined comment: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i	Oldcastle-1 ACCWP-a1i,a2i

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ACCWP-16	C.3.d.iv.(2)	Delete the language in C.3.d.iv.(2), and allow Permittees to use Tree Interceptor Credits in the current undefined form (no criteria have been approved by the Board) until the Permit is amended/revised to allow criteria in such a proposal as discussed in C.3.d.iv.(1).	As explained in the Fact Sheet, Interceptor Tree Credits are not allowed because the Permittees' 2011 Feasibility/Infeasibility Criteria Report did not sufficiently justify them, because they have not yet been sufficiently studied, and ultimately because the Water Board has not previously adopted any Order allowing their use to offset the treatment required by C.3. However, recognizing the benefit that tree-based stormwater treatment systems may provide, C.3.d.iv is optional and allows the Permittees to collectively submit a proposal which evaluates the benefit of runoff reduction associated with trees and treatment control sizing of tree-based stormwater treatment in combination with structural soils and suspended pavement systems (or other methods which provide tree rooting volume), which will be considered for incorporation into a subsequent Permit. This proposal is intended to learn from the findings of the ongoing Health Watersheds, Resilient Baylands project (https://www.sfei.org/projects/healthy-watersheds-resilient-baylands), a San Francisco Estuary Partnership-led U.S. EPA Water Quality Improvement Fund (WQIF) project that is investigating similar criteria, and which has a technical action committee (TAC) that Water Board staff and Permittee	None.

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			representatives are participating in, to support the Permittees' submittal, and to ensure it has regional application. The purpose of this subprovision is to characterize the stormwater treatment and hydrologic benefit that new tree-based treatment systems provide when designed and maintained to a defined standard, not to credit existing trees that provide little water quality and hydrologic benefit because of the capacity and manner of treatment provided. Until the adoption of such criteria by the Board, they are not allowed to be used, for the reasons described above. The language in C.3.d.iv has been included to avoid any misunderstanding, and to facilitate the Board's future consideration of the criteria.	

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Dublin-6 SCVURPPP-32 SMCWPPP-71 San Pablo-6,8 ACCWP-17	C.3.e.i	Remove requirement that C.3.e.i alternative compliance projects implement onsite LID treatment to the MEP standard; allow 100% of treatment to be offsite without justification. And/or, define/redefine MEP in the Permit or in the Fact Sheet. An example is given by ACCWP-17 to illustrate how C.3.e.i criteria may not result in the greatest possible water quality benefit, and why the MEP standard should be revised.	We agree it is reasonable to provide flexibility while still ensuring that appropriate on-site treatment is completed, and that off-site treatment not be unreasonably distant from the area of impact. C.3.e.i requires that runoff treatment should be within a project's "drainage area," and that off-site treatment should be within a project's "watershed," which provide substantial flexibility while still supporting an appropriate nexus between the project and the off-site alternative compliance location. The additional edits in the Tentative Order were intended to clarify uncertainty in MRP 2 as to whether the portion of runoff treated could be zero, with cause. We have deleted the MEP wording while retaining the expectation for on-site treatment, flexible project drainage area, watershed language, and the note that the portion of runoff treated could be zero. This is consistent with the language in MRP 2. For the example given by ACCWP, the subdivision is the project, not the individual parcels within the larger planned project. A single treatment system (or series of such systems) could provide treatment for the subdivision project as a whole. If it is not to the MEP to provide onsite treatment due to concerns about increased inspection/administrative burden for staff, 100% of treatment may be provided offsite.	Revised as indicated.

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San Pablo-6,7 CCCWP-24 SMCWPPP-71 SCVURPPP-32	C.3.e.i	C.3.e.i.(4) in the Administrative Draft allowed Permittees to propose a more-detailed alternative compliance program, subject to the Executive Officer's approval, for exchanges of impervious surface treatment credits at the regional, county, and/or municipal level. In the Tentative Order, this has been moved to the Fact Sheet. Concern that implementation of the Contra Costa County System, as described in the System Summary Report, when submitted in late 2022 or early 2023, will be delayed by the need to amend the Permit; and, "in a [worst] case scenario, the program would never be implemented if the permit is not amended to clearly authorize the program." Pilot projects that do not strictly comply with C.3.e.i - because they will allow 100% of treatment to be implemented offsite, even though it may be feasible/practicable to implement some onsite treatment - will occur during 2022/2023 as part of the development of the System.	The referenced submittal is still allowed. This Provision was moved to the Fact Sheet in the Tentative Order because the Contra Costa County System is not yet finalized. Once that system is finalized, it will be necessary to allow public input with a Permit amendment, rather than allowing Executive Officer approval. A Permit amendment will follow all required procedures, and is necessary because the Contra Costa County System deviates significantly from the existing proposed C.3.e.i because it would allow 1) treatment in different watersheds, 2) a credit trading program, and 3) 100% offsite LID treatment even if it is feasible to include some LID treatment onsite. Staff will expedite bringing the Permit amendment before the Board for consideration. It is not necessary to include an exception or exemption for the pilot projects, because C.3.e.i in the Tentative Order has sufficient flexibility to allow the pilot projects. It is not necessary to recognize the likely submittal date because there is no associated Permit requirement, and it is also not appropriate because that date is not set in stone. While the Fact Sheet recommends certain components that should be included	None.

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		Include an exemption for these pilot projects. Edit the Fact Sheet to recognize that the Contra Costa County Permittees will submit the Contra Costa County System Summary Report by 2022/2023 and include more details about the System, as this will assist the Permit amendment by providing additional public notice in advance.	in the System, it cannot additionally include any details about the System because those details are not yet finalized.	

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CCCWP-9	C.3.e.i & C.3.b.ii.(5)	Offsite projects are difficult to build for alternative compliance without triggering the Regulated Project thresholds in C.3.b. C.3.b.ii.(5), Road Reconstruction Projects, should be removed so those projects can qualify as alternative compliance projects for other Regulated Projects.	Treatment measures may be implemented without necessarily reconstructing adjacent/tributary roadway sections. Treatment measures located in the public right of way (whether public roads or elsewhere) can be designed to receive runoff from a much greater tributary drainage area than immediately adjacent areas, thereby providing opportunities for alternative compliance credits. That C.3.b.ii.(5) may preclude the use of some number of Road Reconstruction Projects as Alternative Compliance projects is not sufficient justification for its removal. As the Fact Sheet explains, C.3.b.ii.(5) is intended to address the significant pollutant loading and hydrologic impact to receiving waters from Permittees' existing public roads and to clarify the amount of road reconstruction that is redevelopment justifying an investment of resources to retrofit the road with clean water controls. In MRP 2, green infrastructure planning was included in part to provide municipalities the opportunity to evaluate and account for smaller area regulated projects and road replacement projects as part of their Green Infrastructure Plans, and develop commitments to implementation that would	Please refer to the revisions proposed for San Jose-13 (part 3)) and Sandis-2, and for the following combined comment, above: ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1

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			be more efficient and effective for them than a Permit requirement to include all such projects. Because the Green Infrastructure Plans did not include those commitments, the Tentative Order includes a modest green infrastructure implementation requirement, as well as a new Regulated Project category, Road Reconstruction Projects. Please see the responses to San Jose-13 (part 3)) and Sandis-2, and to the following combined comment, above: ACCWP-a1i,a1ii,5,7,12 Oakland-2,7 San Mateo County-4,14 Hillsborough-3 Oakland & San Jose-2a SMCWPPP-8 Woodside-8,11 CCCWP-18,20 San Pablo-2 CCTA-1,3 Walnut Creek-6 Santa Clara-3 Dublin-4 Concord-1,2,3,6,7 Cupertino-2 Orinda-1 SCVURPPP-3b,29	SCVURPPP-3b,29.

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SMCWPPP-10,11,12,13,45,71,75 SCVURPPP-32	C.3.e.i, C.3.j	C.3.e.i/C.3.j do not support regional project implementation and innovative credit trading programs as well as it could. C.3.e.i should be modified to allow multi-benefit Regional Projects to be used as alternative compliance for Regulated Projects even if they use non-LID treatment and divert from a stream (and therefore, by definition do not comply with C.3.c-d). Likewise for C.3.j.	The Board established LID treatment requirements in the MRP for all Regulated Projects in recognition of LID as a superior, cost-effective, beneficial, holistic, integrated stormwater management strategy. The documented benefits of LID establish it as a preferable approach to treating and reducing stormwater runoff because it is cost effective, sustainable, and environmentally sound. LID treatment measures are effective because they can remove a broader range of pollutants in a more robust and redundant fashion, and can achieve multiple environmental and economic benefits in addition to reducing downstream water quality impacts, such as enhanced water supplies, cleaner air, reduced urban temperature, increased energy efficiency and other community benefits. Thus, there is a water quality benefit to implementing LID as opposed to other controls, and it is appropriate to require justification for situations when LID is not implemented. That said, the Permit includes a framework for consideration of alternative treatment measures. Please see the response to the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1	Please see the proposed revision for the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i

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			Oldcastle-1 ACCWP-a1i,a2i	
Oldcastle-3	C.3.e.i.(2)	Onsite treatment with (non-conventional) alternative treatment systems should be prioritized over allowing Permittees to use in-lieu fees as allowed in C.3.e.i.(2), because such fees do not guarantee treatment, are often misappropriated, redirected, or delayed, and may not result in treatment in the same watershed which would allow pollutants of concern to discharge to receiving waters. Comment suggests revision to C.3.e.i.(2) to require any onsite treatment to be with "technologies certified... under the Washington State Department of Ecology's TAPE Program..."	We are aware of no evidence that in-lieu fee programs do not guarantee treatment, are misappropriated, redirected, or delayed. Both C.3.e.i.(1) Option 1 and C.3.e.i.(2) Option 2 require the Offsite Project or Regional Project to be located within the same watershed as the Regulated Project. We do not follow the logic of the change suggested for C.3.e.i.(2). The portion of stormwater runoff to be treated onsite will, by deduction, be treated by bioretention. Any treatment measures for C.3.e.i projects (i.e. Regulated Projects) must comply with C.3.c-d. Therefore, changes would need to be made to C.3.c-d rather than C.3.e.i. See the response to the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i	See the proposed revision for the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i

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Oldcastle-4	C.3.e.i.(3)	Allow only one year for completion of Offsite/Regional Projects, instead of three years. If three years is allowed, temporary onsite treatment (via alternative treatment measures) should be provided in the interim.	We disagree that this is an appropriate revision, as given their potential complexity and Permittees' relatively recent implementation of offsite and regional projects, it is reasonable for this permit term to allow flexibility in construction timing. That said, we have set up a framework for consideration of alternative treatment measures. Please see the response to the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i	Please see the proposed revisions for the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i
Oldcastle-5	C.3.e.ii	For the stormwater treatment systems allowed to be used for C.3.e.ii Special Projects, require that they are certified under Washington State Department of Ecology's TAPE Program as "Basic Treatment," or equivalent certification program.	See the response to the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i	See the proposed revision to the following combined comment, above: BIA Bay Area-1 Contech-2,3 KS&E-1 Oldcastle-1 ACCWP-a1i,a2i

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BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5	C.3.e.ii.(5)	1) An analysis submitted by the Permittees in February 2015 showed that as of that time, 3.6% of Regulated Project impervious area was associated with Special Projects, and 1.3% of that same impervious area was treated by non-LID, and based on that analysis, the Water Board retained Provision C.3.e.ii in MRP 2. 2) The Permittees proposed that they perform a similar analysis prior to the MRP 3 reissuance, and Water Board staff did not respond to that proposal. 3) Transit-oriented development projects align with various other agencies' priorities and provides water quality benefit, and should continue to be included as Category C Special Projects. 4) Category C Special Projects criteria are too prescriptive, conflict with state/regional/local criteria (e.g., CA Density Bonus Law), and should be revised so that any amount of affordable housing qualifies a project for 100% non-LID treatment.	1) See Master Response Identifier C.3-16. 2) We considered the Permittees' proposal and noted that while a new analysis would be unlikely to provide any new information, the Permittees were free to perform and submit any analysis that they wished. 3) See Master Response Identifier C.3-17. 4) Master Response Identifier: C.3-18. 5) Master Response Identifier: C.3-19. 6) This is explained in the Fact Sheet: "The other Category C credits (location, density, and parking criteria) are maintained from the Previous Permit, but reduced so that Affordable Housing Credits are the dominant credit for Category C projects while still recognizing the benefits provided by location, density, and parking criteria, and so that the total possible credit available for Category C Special Projects remains 100 percent." Regarding the implication that non-LID treatment measures are equivalent to LID treatment measures, the Board has established LID treatment requirements in the MRP for all Regulated Projects in recognition of LID as a superior, cost-	Revised the Category C Affordable Housing criteria, as indicated.

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		5) Permittees implemented Category C Special Projects appropriately and in good faith during MRP 2, and in some cases negotiated with developers to include more LID than was absolutely required by the criteria. 6) The proposed changes to Category C reduce the LID reduction credit from 50% to 5% for projects within a ¼ mile of transit, and from 25% to 10% for PDAs. What is the justification for this change given that mechanical treatment provides pollutant removal? 7) Oakland proposes to reduce the Category C thresholds and eliminate the ½-mile of existing/planned transit hub and the ≤ 10% at-grade surface parking for projects without any affordable housing. 8) Allow changes to C.3.e.ii.(5) to take effect in the middle of MRP rather than immediately. 9) Several comments propose to	effective, beneficial, holistic, integrated stormwater management strategy. The documented benefits of LID establish it as a preferable approach to treating and reducing stormwater runoff because it is cost effective, sustainable, and environmentally sound. LID treatment measures are effective because they can remove a broader range of pollutants in a more robust and redundant fashion, and can achieve multiple environmental and economic benefits in addition to reducing downstream water quality impacts, such as enhanced water supplies, cleaner air, reduced urban temperature, increased energy efficiency and other community benefits. Thus, there is a water quality benefit to implementing LID as opposed to other controls, and it is appropriate to require justification for situations when LID is not implemented. 7) Comment noted. These criteria have been removed from Category C as part of focusing it on affordable housing. Please see also item 1 in this response, above. As explained in the Fact Sheet, the other Category C credits (location, density, and parking criteria) are maintained from the Previous Permit, but reduced so that Affordable Housing Credits are the dominant credit for Category C projects while still	

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		maintain the C.3.e.ii.(5) criteria as they were in MRP 2, but eliminate the 1/2 mile of existing/planned transit hub and ≤ 10% at-grade surface parking.	recognizing the benefits provided by location, density, and parking criteria, and so that the total possible credit available for Category C Special Projects remains 100 percent. 8) We disagree that this is appropriate or necessary. As stated above in response to (4), Permittees already review these criteria (i.e., percent affordable housing DUs) as part of their ongoing assessment of proposed projects' compliance with the referenced criteria (e.g., criteria for the California Density Bonus Law), so review of the Category C criteria for prospective affordable housing projects during MRP 3 will not constitute a significantly new or additional task. Therefore, it is reasonable to expect Permittees to be able to implement these new criteria immediately. 9) See response to (7) above.	

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ACCWP-a3	C.3.e.ii.(5)	Comment provides a "Project Based Analysis of the Effect of this Proposal," to illustrate how the proposed changes to C.3.e.ii.(5) could negatively impact an example affordable housing project.	The "Project Based Analysis of the Effect of this Proposal" gives a misleading interpretation of the Category C criteria in the Tentative Order. In the example given, the project has a sufficient number of Moderate, Low, and Very Low DUs to qualify for a 25 percent credit; only an additional 5 percent of the DUs would need to be made affordable for Extremely Low income households. In fact, the project also has a sufficient number of Moderate, Low and Very Low DUs to qualify for a 50 percent credit; only an additional 15 percent of the DUs would need to be made affordable for Extremely Low income households. The example demonstrates that the proposed C.3.e.ii.(5) criteria likely will have limited impact on affordable housing production because as explained above, only a single DU (5 percent of 20 DUs = 1 DU), would need to be made available for Extremely Low income households for the project to qualify for a 25 percent non-LID reduction credit, and only 3 DUs (15 percent of 20 DUs = 3 DUs), would need to be made available for Extremely Low income households for the project to qualify for a 25 percent non-LID reduction credit. As the project has an excess of Moderate, Low, and	None.

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			Very Low DUs with respect to what is required for both the 25 and 50 percent non-LID reduction credits, such a change in project scope is doable and reasonable (considering the significant financial boon provided by the non-LID reduction credits). As described in the Fact Sheet, there is a nexus between the Category C criteria that this project could easily qualify for (if the aforementioned changes were made) and anticipated water quality outcomes to offset the implementation of non-LID instead of LID. Please see the response to the following combined comment, above, which discusses that in greater detail: . BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5 In the example given, it appears that there is required parking (albeit within the structure); please note other opportunities for cost reduction, such as unbundling parking from rents, removing the parking requirement,	

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			and/or pursuing shared parking requirements at another site rather than requiring them to be implemented on-site.[1] The Permit also includes flexibility to complete LID treatment offsite as an alternative compliance project pursuant to C.3.e.i.	
ACCWP-18 Oakland-9	C.3.e.ii.(5)	Incorporate the ABAG Regional Housing Needs Allocation (RHNA 2013) plan and revise the provision to incentivize affordable housing subsidized by private development. Partnerships with private developers are crucial since public funding sources are insufficient to meet affordable housing needs and goals.	The Permit includes substantial flexibility (e.g., alternative compliance and Special Projects Category C) to support the production of housing while also ensuring such production, where it constitutes a significant development or redevelopment project, appropriately addresses its potential water quality impacts consistent with federal standards. The comment does not explain how the RHNA 2013[8] should be incorporated into the MRP, such as by suggesting specific modifications to the Category C criteria. It generally requests that this be done, because generally, it would "incentivize affordable housing subsidized by private	Please refer to the proposed revision for the following combined comment, above: BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-

[8] Abag.ca.gov/sites/default/files/2015-23_rhna_plan.pdf

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			development." But it does not suggest specific changes. The Permit addresses the potential water quality impacts of significant new and redevelopment projects, including housing. The Permittees, through their local land use authority, may be better situated to address specific aspects of the RHNA, for example by modifying their zoning or associated code requirements (e.g., for parking, street widths, lot setbacks, in-lieu fees) to allow construction of additional units. The comment also refers to the draft RHNA 2021 plan, saying it "requires the City to build slightly more low and moderate units, when considered together, than very low-income units." The Category C criteria address this: when considered together, at each credit (70%, 50%, and 25%), the sum of the percentage of DUs in the Moderate and Low categories is greater than the percentage of DUs in the Very Low category. That is consistent with the emphasis noted by the commenter. By providing flexibility with respect to clean water control design, the Category C criteria support implementation of affordable housing projects. Broadly speaking, RHNA 2013 identifies housing needs, and presses municipalities to	1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5

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			meet those housing needs. Special Projects Category C helps support expectations set forth in the RHNA. Please refer to the response to the following combined comment, regarding how the Category C criteria do not preclude achievement of the California Density Bonus Law; BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5	
EBALDC-2	C.3.e.ii.(5)	Category C Special Project criteria are too restrictive; expand the allowable income levels to include Low and Moderate income levels.	Low and Moderate household income levels are already included in the Tentative Order. Please see C.3.e.ii.(5).	None.
EBALDC-3 ACCWP-18	C.3.e.ii.(5)	Expand the provision's interpretation of Affordable Housing to include "lower" and "moderate" income households and to be inclusive of seniors, transitional foster youth, disabled veterans, and homeless people.	These groups are not explicitly or implicitly excluded from the criteria; the current criteria are supportive of housing for these groups because they are likely to fall under the provision's income-based criteria. Low income and Moderate income households are explicitly included in the criteria. Please see C.3.e.ii.(5)(c).	None.

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EBALDC-9	C.3.e.ii.(5)	The density requirements have increased, but the [associated] credit [has been] reduced. This is contrary to the purpose of Special Projects. An increase in density should result in increased incentive, not the other way around. This disincentivizes infill development.	The density needed for a Category C project to quality for density credits is 40 DU/ac, a density that supports dense infill development. Under C.3.e.ii.(5)(e), Density Credits, as the comment recommends, increased density qualifies for increased credit.	None.

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EBALDC-10	C.3.e.ii.(5)	Private developers increase the cost of market rate units to offset the cost of including affordable units in projects. Allowing 100% LID reduction credits to private projects subject to the CA Density Bonus Law will support affordable housing by reducing the complexity and cost of building each affordable unit and will help keep housing costs lower.	By definition, affordable housing projects that are compliant with C.3.e.ii.(5) Category C Special Projects will have housing prices that are affordable. It does not follow logically why revising the Category C Special Projects criteria so they are cheaper for private developers to comply with will support affordable housing more than the Category C criteria will. Besides, private developers are not the only providers of affordable housing; municipalities and NGOs may implement affordable housing projects, and because for those projects there will be little/no profit motive, there will be less/no profit lost when complying with the Category C criteria. However, we have made changes to the Tentative Order to make the C.3.e.ii.(5) Category C Special Projects criteria more in line with state/regional affordable housing criteria – see the response to the following combined comment, above: BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5	See proposed revision for the following combined comment, above: BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5

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EBALDC-11	C.3.e.ii.(5)	The state and region are experiencing a homelessness crisis. There is a water quality nexus between "access" to affordable housing and water quality.	The Fact Sheet explains the nexus between the provision of truly affordable housing (not just housing that is affordable to households with incomes up to 120% of AMI) and water quality.	None.
EBALDC-12	C.3.e.ii.(5)	Oakland has not met ABAG's mandates to provide affordable housing. Affordable housing is expensive to construct/subsidize. Oakland is pursuing increasing the provision of affordable housing.	Comment noted. The Tentative Order is intended to facilitate the construction of affordable housing that addresses its water quality impacts consistent with federal standards.	None.

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EBALDC-13,14,15,16 ACCWP-a3	C.3.e.ii.(5)	1. More than 60% of Oakland's 25 Category C Special Projects over two years [two-year period not identified] included some amount of affordable housing. Extent and type of affordable housing units not identified. All but three of those would have been ineligible under the criteria in the Tentative Order, and those three would only receive up to 20% LID reduction credit according to C.3.e.ii. The other 22 projects would not have qualified, and consequently there was the potential for those affordable projects not to have been constructed. 2. Category C Special Project criteria are too complicated and costly to comply with.	1) See Master Response Identifier C.3-20. 2) We reviewed the criteria and modified them to be more consistent with other laws and guidance. Please see the response to the following combined comment: BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5	Refer to the proposed revision for the following combined comment, above: BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5

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SCVURPPP-33	C.3.e.ii.(5)	Projects that qualify under Category C in MRP 2 should be exempted from needing to re-qualify under those criteria in MRP 3.	Pursuant to C.3.b.i.(1), any Regulated Project that has been approved with stormwater treatment measures in compliance with C.3.d (and C.3.e) under a previous MS4 permit is exempt from the requirements of C.3.c.	None.
BIA Bay Area-2	C.3.e.ii.(5)	Water Board staff have said that developers who relied on Category C in the current Permit will be able to use C.3.e.i instead, which will allow for up to 100 percent offsite treatment or payment of an in-lieu fee, but no regional offsite treatment or related in-lieu fee programs exist today and will not likely be in place for several years. CCCWP, in partnership with several cities, has received a U.S. EPA WQIF grant and is preparing to start the initial phase of a five-year pilot regional alternative compliance project in early 2022. San Mateo County and its cities are working on a regional multi-benefit stormwater capture project, but the plan is in the concept and site selection stage, according to the C/CAG of San Mateo County Stormwater Committee agenda of Oct. 21, 2021. The remaining jurisdictions in Santa Clara, Alameda, and Solano counties	The Permit provides substantial flexibility to meet runoff treatment requirements both on-site and through the implementation of off-site alternative compliance projects. These alternative compliance options have been in place since MRP 1, yet Permittees have (with few exceptions) chosen to not take advantage of them for Category C projects, principally relying on Category C easement instead. Off-site treatment and the payment of in-lieu fee programs can and should be developed. As the comment notes, countywide alternative compliance programs are under development in San Mateo and Contra Costa counties. However, Permittees and developers do not need to wait for a regional alternative compliance exchange system to be set up before they can make use of the alternative compliance Provision. Importantly, individual Permittees can still implement alternative compliance in their jurisdictions/watersheds, as allowed/encouraged by C.3.e.i. The potential offsite LID projects listed in each Permittee's	None.

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		have no regional alternative compliance options as provided in the proposed Tentative Order. Additionally, while we understand that each jurisdiction has a green infrastructure plan, the process by which a developer could participate in each plan in fulfillment of an offsite treatment compliance option has yet to be established in most communities. We ask the Water Board to retain Special Projects Category C for TOD as it exists under the current permit until viable alternative regional offsite stormwater treatment and related in-lieu fee programs have been formally adopted and established broadly throughout the permit coverage area.	GI Plan present an excellent opportunity for Permittees to receive alternative compliance dollars from developers to fund offsite CIP and other public right of way projects. In addition, developers may coordinate to independently implement alternative compliance projects, or may coordinate with Permittees to implement such projects, and request that Permittees take notice of them under C.3.e.i. See also Fact Sheet section C.3.b regarding the flexibility of LID design and feasibility of incorporating it into even smaller or denser projects, particularly when the design approach is considered early in the project design process. Regarding the use of Category C during MRP 2, please see the response to the following combined comment: BIA Bay Area-2,3 ACCWP-a3,18 CCCWP-25 SMCWPPP-72 SCVURPPP-33 Walnut Creek-1,2,3,4 Oakland-9 EBALDC-1,4,5,6,7,8,10 Oldcastle-5	

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Walnut Creek-1	C.3.e.ii.(5)	Under MRP 2, the NOMA project qualified for a 100% credit but under Category B instead of C, and the 699 YVR project, a 100% affordable housing project, qualified as a Category C project. However, Walnut Creek did not require a feasibility memo because our engineers talked them through the potential downsides of non-LID. The use of non-LID/vaults may save space, but does not save on costs. It actually costs more for maintenance due to the need to hire specialty contractors to maintain and inspect annually (~ $2,000-5,000/yr.). Since those projects had the available space, they chose to implement LID on site. There are other examples of projects that qualified for, but did not use non-LID. Therefore, Walnut Creek suggests that Category C Affordable Housing projects should be given credits to waive or reduce required treatment areas altogether to reduce costs in design, construction and on-going maintenance, rather than getting credits to use non-LID (vaults, instead of bioretention basins).	Comment noted. The Special Projects section under MRP 2, as it would under MRP 3, requires a feasibility analysis to determine whether a project may utilize the Special Projects easement. The commenter correctly notes that because LID was feasible for the referenced projects, they were required to incorporate LID pursuant to the relevant sections of C.3. In these cases, the required LID design also saved costs as compared to vault-based systems. The comment suggests that the Permit should grant reductions in area from which runoff is required to be treated by LID, in lieu of allowing the use of non-LID systems. Fact Sheet section C.3 recognizes the diffuse nature of urban runoff pollution and Provision C.3 sets forth expectations regarding appropriate levels of treatment—for example, the LID approach and the treatment of an optimized volume that avoids treating the few largest storms every year, which would require substantial increase in treatment control size, but with diminishing benefits. That analysis incorporates a consideration of the maximum extent practicable standard, including a consideration of economic factors. The comment's proposal, by simply not treating areas of impervious surface, would result in the uncontrolled discharge of pollutants from	None.

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			those areas, and would be based on a differing economic analysis—a differing consideration of project-specific feasibility. The Permit recognizes that there are variations in factors related to a project, such as site constraints, and incorporates both the flexible LID design approach and an alternative compliance subprovision to allow for these variations to be addressed. The option proposed would be weaker than current Permit requirements and there is sufficient flexibility now to accommodate the identified issues.	
Walnut Creek-4	C.3.e.ii.(5)	Adjust the affordable housing income limits based on household size. An example is given from the City of Walnut Creek's municipal code.	We agree that this is an appropriate edit. We have revised C.3.e.ii.(5) so that it directly refers to the California Department of Housing and Urban Development's website, which posts the Official State Income Limits, which are adjusted based on household size. Accordingly, Table H-2 has been deleted from Attachment H. Permittees are required to use the most current Official State Income Limits; the most current limits are dated December 31, 2021.[9,10]	Revised as indicated.
San Jose-17 SCVURPPP-34	C.3.e.v.(2)	In the Tentative Order, Permittees are required to report on potential Special Projects; Permittees should only be required to report on Special Projects once they	Reporting on potential Special Projects is useful to Water Board staff. Water Board staff routinely evaluate the use and misuse of Special Projects by looking at approved as well as potential Special Projects. In each	None.

[9] https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml
[10] https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf

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		receive final discretionary approval. Potential Special Projects are not useful to Water Board staff and can be provided on request.	Annual Report, reporting on potential Special Projects provides a reasonably accurate and critical prediction of Special Projects (and non-LID stormwater treatment) that will be implemented in the near future. This reporting provides full transparency to the Water Board and to the public about the substantial existing and future use of non-LID stormwater treatment. The reporting requirements provide Water Board Staff with early notice of the Special Projects that are being considered by Permittees prior to the Permittees granting final planning approval. This allows Water Board staff to validate a Permittee's analysis of each Special Project and its assignment of appropriate LID Treatment Reduction Credits. In a Previous Permit, this data enabled Water Board staff to work with Permittees on several projects to obtain more-robust LID implementation than had originally been proposed. This reporting is consistent with the Previous Permit. As such, the Permittees have existing procedures in place to collect and provide the information. Given the water quality (and other environmental) benefits of LID over other forms of treatment, there is appropriate cause to require this reporting.	

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			Permittees not wishing to provide this option to project proponents also do not have to incur the tracking and reporting costs.	
CCCWP-14	C.3.g.i.(2)	Include "existing managed engineered earthen channels that are not susceptible to erosion" in the definition of "hardened channels" in C.3.g.i.(2); the comment claims that this was the case for hydromodification applicability maps that were previously approved and adopted.	We disagree that certain existing managed engineered earthen channels may not be susceptible to erosion; earthen channels may not be defined as hardened channels. The Water Board did not allow existing managed engineered earthen channels to be defined as hardened channels in previously approved hydromodification applicability maps. Additionally, the Permit addresses the potential adverse impacts of hydromodification from the creation of impervious surface and associated changes in erosive work in channels to which those projects are tributary. In a context of ongoing and anticipated future climate change, in which storms are expected to, in part, increase in intensity and duration, and thus increase potential erosive work in channels, it becomes more important to appropriately address potential impacts associated with new impervious surface.	None.
CCCWP-15	C.3.g.ii and C.3.g.iii	1) Revise C.3.g language so that it is clearer that CCCWP Permittees may use the HM Standard in either	1) We agree and have made a responsive clarifying edit to C.3.g.v.(2).	Revised as indicated.

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		C.3.g.ii or C.3.g.iii. Comment suggests changes to reflect this. 2) Comment also suggests a change to the Permittees' implementation of C.3.g.iii subsequent to approval/ conditional-approval of the Permittees' submittal pursuant to C.3.g.vi.(2), removing the ability of Water Board staff to conditionally approve the submittal.	2) The relevant sections of C.3.g and associated information, including cited reports, memos, and the Fact Sheet section, set forth the framework for review and acceptance of CCCWP Permittees' hydromodification management plan submittal, and are subject to public review as part of the current Permit adoption process. Additionally, Board staff will consider providing additional public process, such as an opportunity for public review and comment, on matters that have significant public interest. Such consideration typically will be undertaken in conversation with relevant stakeholders, including the CCCWP Permittees. At the same time, conditional approvals are a useful tool to accept submittals that, as conditioned, comply with Permit requirements, without having to delay or otherwise burden those submittals with substantial additional public process. Conditional approval and additional public review are available options that can benefit water quality, allow for more-efficient review processes, and help ensure permit compliance. We decline to limit the Board's ability to review and approve the CCCWP Permittee's hydromodification management plan submittals.	

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CCCWP-16	C.3.g.vi.(2)(a) and C.3.g.vi.(2)(b)	Delete C.3.g.vi.(2)(a)-(b). The required base case (6.5 percent) in C.3.g.vi.(2)(a) is arbitrary and not supported by the CCCWP Permittees' September 29, 2017, technical submittal or otherwise, is more restrictive than what is required for other county stormwater programs, and will preclude housing projects at hydromodification-applicable sites in the County. The Water Board's March 19, 2021, memo referenced in C.3.g.vi.(2)(a) has not been made available for public review.	The cited provisions are intended to set clear expectations for the CCCWP Permittee's hydromodification plan submittal, and reflect technical reviews and discussions completed during MRP 2, including the Water Board's July 10, 2020, memo commenting on CCCWP's submittal and subsequent March 19, 2021, memo responding to a November 2020 CCCWP memo.[11] The base case sizing factor of 6.5 percent is not arbitrary; it is supported by the CCCWP Permittees' September 29, 2017, technical submittal. The Fact Sheet explains that it is conservative, based on sites with project-scale built-out imperviousness in the upper watershed for the Lower Control Threshold of 0.1Q2, for soil percolation rates of 0.024 inches per hour, as presented in Table 5-7 on page 58 of that submittal. In developing the complete suite of sizing factors, the CCCWP Permittees are required to justify any deviations from the base case as conditions of exception that could allow alternative sizing while still being protective (adhering to the hydromodification standard of maintaining erosion potential less than or equal to 1.0), for different soil types and different applicable geographic	None.

[11] July 10, 2020, Memo from Keith Lichten to Karin Graves, CCCWP, "Memo to CCCWP regarding their hydromodification technical report and hydromodification applicability map, submitted Sept. 29, 2017." SF Bay Regional Water Board.
March 19, 2021, Memo from Keith Lichten to Karin Graves, CCCWP, "Response to CCCWP's hydromodification management memo of November 4, 2020, and next steps."

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			characteristics. C.3.g, which references the Water Board's March 19, 2021, memo referenced in C.3.b.vi.(2)(a), has been made available for public review as it was included in the Tentative Order, and as it has been included in the Board Package for the adoption hearing. The memo itself is public and available on request, and it was provided to the CCCWP (the commenter) when it was produced in 2021. The language in the Tentative Order is consistent with that memo and with discussions during MRP 2 between Water Board staff and CCCWP representatives. The specified base case is not more restrictive than what is required for other county stormwater programs, because, as explained earlier in this response, the CCCWP Permittees may deviate from that base case with appropriate justification. In addition, the approach is based on requirements to control erosive work over a specified range of storms, which is the same range. The base case is based on the CCCWP Permittees' submittal. The approaches between countywide programs are not directly comparable, as other programs' approaches rely in part on outlet control, and the CCCWP approach relies	

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			significantly on the expected hydrologic performance of bioretention cells in the absence of outlet control. To ensure they achieve the hydromodification control requirements set forth in the Permit, designs using the CCCWP approach must take into account potential uncertainty regarding performance, which uncertainty is reduced, for example, when outlet controls are used.	

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CCCWP-17	C.3.g.vi.(2)(a) and C.3.g.vi.(2)(b)	Delete C.3.g.vi.(2)(a)-(b) because they are unclear and ambiguous. Gives an example of language in C.3.g.vi.(2)(b) that may be unclear.	We do not agree that these subprovisions should be deleted or that they are ambiguous. They distinguish, in part, between the requirement for projects to manage hydromodification prior to discharge to receiving waters (e.g., on-site or off-site prior to discharge), and CCCWP's proposal to consider off-site mitigation measures that could provide benefit further downstream (e.g., offsite), but not at the impacting project's point of discharge to receiving waters, and potentially a significant distance below the project's point of discharge to receiving waters. In addition, the exclusions in the cited example list potential controls that are outside the control of a particular project proponent and thus have speculative benefit when considered over the life of the impacting project; may not address the project's hydromodification impacts at the point of discharge; and may not be implemented, so may not provide any hydromodification control benefit. However, we have revised Fact Sheet section C.3.g to clarify this understanding. (A) "The additional mitigation measures shall not include: reliance on… the presence of existing or future HM and LID controls located elsewhere within the catchment," is distinct from:	We have added clarifying edits to the Fact Sheet, to more clearly distinguish the two cited paragraphs.

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			(B) "The Technical Report may additionally propose alternative or supplemental methods of compliance with Provision C.3.g.iii. HM Standard, including any combination of: ...additional new HM controls located offsite within the same catchment as the receiving stream..." (A) refers to hydromodification management controls that are outside the control of a project proponent and may be speculative or below the point of discharge to a receiving water body (e.g., a creek). (B) refers to controls constructed concurrently and in combination with other controls specified in C.3.g.vi.(2)(b), as an alternative or supplemental method of compliance with the C.3.g.ii. HM Standard: "undersized onsite HM controls... and in-stream controls... which when implemented together achieve the C.3.g.iii HM Standard."	

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ACCWP-19 SCVURPPP-35 SMCWPPP-73	C.3.i	Adjust C.3.i accordingly, if the respective categories in C.3.b are changed or reverted.	We agree that if any changes should be made to C.3.b in the Tentative Order, C.3.i would be adjusted accordingly. However, since no changes are proposed to the thresholds in C.3.b in the Tentative Order, no changes are proposed for C.3.i.	None.
Baykeeper-12d	C.3.j	Allowing the Permittees to meet their numeric retrofit requirements at the county level pursuant to C.3.j.ii.(2)(b) will not result in adequate wasteload reductions for PCBs and mercury, because C.3.j.ii.(2) does not target known sources and is too low to accomplish the required wasteload reductions. The numeric retrofit requirements should target (e.g., PCBs hotspots) specific pollutants, which will make it hard for the public to track achievement of that WLA. The green infrastructure that San Jose will implement pursuant to its consent decree is orders of magnitude greater than even the total combined numeric retrofit requirement of all MRP Permittees. Permittees will not implement green infrastructure; only if there is a mandate. Since the Santa Clara Permittees other than San Jose will have to do very little because of how the Tentative Order allows	The requirements in C.3.j are separate from the requirements in C.11 and C.12. C.3.j is purposefully flexible, in part to help Permittees implement green infrastructure that achieves multiple goals, and to facilitate gaining of Permittee experience with GI implementation in anticipation of ongoing implementation in future permit terms. However, C.3.j requirements do not remove the requirement for Permittees to achieve wasteload reductions under C.11 and C.12. We expect Permittees will consider, and tend to prioritize, C.3.j implementation that also achieves wasteload reductions. This is borne out by San Pablo's ongoing work to develop a countywide trading program, which is expected to include both C.3.j and C.11/12 as its primary drivers. In C.11 and C.12, the estimated reductions for PCBs and mercury resulting from GI implementation were calculated based on the expected pace of GI implementation as well as the expected land use where GI will likely be implemented. For the purpose of these calculations, GI was not assumed to be	None.

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		their numeric retrofit requirements to be met collectively at the county level; C.3.j.ii.(2) should be revised so that numeric retrofit requirements may be met at the watershed scale, but not at the county scale.	broadly implemented in areas heavily contaminated with PCBs and mercury because there are other priority drivers for such implementation. Therefore, the expected scale of PCBs and mercury load reductions from GI expressed in C.11 and C.12 is a realistic assessment of what will be achieved. Permittees may implement a range of approaches to achieve Hg and PCBs WLAs. While those approaches include GI, GI is not expected to be the most important means of control because of the types of land uses (generally not heavily contaminated with PCBs and mercury) where GI implementation will be realized. C.3.j does not preclude recognizing the load reduction benefit from GI implemented pursuant to C.3.j, and those reductions will be recognized. However, the calculations in C.11 and C.12 suggest that the benefit will be limited because of the type of land use where GI will likely be implemented. Because there are numerous drivers for GI implementation (besides presence of PCBs and mercury) and a range of constraints, the flexibility in C.3.j is warranted. Further, allowing the load reductions to be achieved at the county level allows the	

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			Permittees to choose the best locations for GI implementation, including regional projects. Permittees should not be forced to implement GI where it does not make sense merely to achieve a PCBs or mercury load reduction, when other measures may achieve those required reductions more effectively.	
San Jose-2,10 SCVURPPP-4	C.3.j Fact Sheet	The Tentative Order mischaracterizes the Consent Decree issued by the U.S. District Court in San Francisco Baykeeper v. City of San Jose (Case No. 15-CV-00642-BLF, (Consent Decree). It cites the Consent Decree and theorizes that the City of San Jose "will retrofit (or cause to be retrofitted) roughly 3,750 acres of impervious surface between 2020 and 2030, and roughly 10,000 acres of impervious surface between 2030 and 2040 …" (Note 3.) This is factually inaccurate. The Consent Decree does not contain an acreage requirement. Instead, it requires the City to appropriate	Comment noted. We have revised the Fact Sheet to reflect the expenditure. The scope of the expenditure is such that it is expected to result in substantial retrofit of urban impervious surface with GI during the coming Permit term; that retrofit, to the extent it is not completed for Regulated Projects, may be considered to contribute to the C.3.j GI retrofit requirement. As such, it is appropriate to recognize the Consent Decree and its anticipated effects.	Revised the Fact Sheet to reflect that San Jose is required to spend $100 million over ten years to implement its Green Infrastructure Plan, which San Jose estimates will result in the retrofit acreages it lists in its Green Infrastructure Plan.

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		one hundred million dollars over the next ten years to implement the projects in its Green Stormwater Infrastructure Plan [Consent Decree, ¶ 53(g).] If the City is unable to obtain funding [Consent Decree, ¶ 54] a dispute resolution process with a federal judge can be followed. Delete references to the Baykeeper Consent Decree throughout the permit, including the fact sheet (C.3.j.(1), (3), and (7); Att. A – 146, 147, 149) and footnotes (Att. A - 147) Therefore, SCVURPPP Co-permittees must plan for the prospect of individual compliance with the proposed provisions.		
SCVURPPP-36	C.3.j.ii.(1)	GSI Plans may not need updating in all of these areas. For example, municipalities are just starting to implement their GSI Plans - it may be too early to revise implementation mechanisms. These updates should be incorporated once enough time has elapsed for cities to propose changes based on experience. The permit should instead clearly	We agree that GI Plans may not need to be updated or supplemented in all the areas listed in C.3.j.ii.(1). The subprovision already states that permittees shall “update and/or supplement their Green Infrastructure Plans,” indicating that Permittees may do either, or both. We have revised C.3.j.ii.(1) to clarify that updates and/or supplements shall be done "as needed."	Revised C.3.j.ii.(1) as indicated.

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		state that permittees have the option to provide supplemental information for the GSI Plans in the Annual Reports without having to update the plans.		
SMCWPPP-74	C.3.j.ii.(1)	Comment reiterates C.3.j.ii.(1) requirements, but does not make any requests or recommendations.	Comment noted.	None.
ACCWP-a1i,a2i,22 Oakland & San Jose-2b	C.3.j.ii.(2)	Revise the C.3.j. green infrastructure retrofit target down to 1 acre/50,000 in population, from 3 acres/50,000 in population, with a cap of 5 acres.	We have revised the cap to 5 acres from 10 acres, recognizing Permittee comments that there is a cost to green infrastructure retrofit, and timing required for projects to go through the capital improvement planning and implementation process. In addition, the Permit anticipates a continuing and likely accelerating rate of retrofit in subsequent permit terms, which will be based in part on the long-term implementation report under C.3.j.ii.(4). Retaining a 5-acre cap will appropriately require more-substantial implementation by larger Permittees, including the development of Permittee capacity for additional subsequent GI implementation. We disagree that with the suggestion to revise the green infrastructure allocation to 1 acre/50,000 population from 3 acres/50,000 population, because this is an appropriate	Revised the cap to 5 acres from 10 acres. Updated the Fact Sheet and Attachment H.

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			amount of retrofit that will result in a meaningful reduction in untreated impervious surfaces for Permittees individually and regionally, is fair because it requires more-substantial implementation by larger Permittees, whose jurisdictions are also contributing a larger amount of pollutants, including hydromodification impacts, and because it helps ensure the development of Permittee capacity for additional subsequent GI implementation. See also response to combined comment: Oakland-10 CCCWP-21,22	
SCVURPPP-4,37	C.3.j.ii.(2)	Revise the C.3.j. green infrastructure retrofit target down from 3 acres/50,000 in population to 1 acre/50,000 in population with no cap - the retrofit allocations are not equitable since the largest cities' allocations are capped.	See response above to: ACCWP-a1i,a2i,22 Oakland & San Jose-2b	See proposed revision above for: ACCWP-a1i,a2i,22 Oakland & San Jose-2b

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Oakland-10 SMCWPPP-9 CCCWP-22	C.3.j.ii.(2)	Any targets for implementing green infrastructure in non-Regulated Projects should be part of a long-term plan that considers green infrastructure projects implemented in the public right of way from 2009 through 2030 and 2040.	We agree. The purpose of C.3.j.ii.(4) is to do what the comment requests, that is, recommend revisions to C.3.j.ii.(2) in future Permit terms, to make significant incremental steps towards long-term regional green infrastructure goals. For MRP 3, this cannot be done yet, as the long-term goal that will be investigated via the implementation of C.3.j.ii.(4) will not yet have begun, let alone been completed; instead, C.3.j.ii.(2) has been set as a reasonable, doable incremental step towards a long-term regional green infrastructure goal that will be identified during the coming Permit term.	None.
San Mateo County-4 ACCWP-a2i CCCWP-21	C.3.j.ii.(2)	C.3.j.ii.(2) abandons the programmatic approach that the Water Board adopted in MRP 2 and that the Permittees incorporated into their Green Infrastructure Plans, constrains flexibility and discourages multi-jurisdictional cooperation, and will reduce the Permittees' ability to implement green infrastructure projects with co-benefits, because they will be forced to build the cheapest/easiest green infrastructure to comply with the mandate.	See Master Response Identifier C.3-21.	None.

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Oakland-7,10 Los Altos-4 San Mateo County-15 SCVURPPP-37 Palo Alto-4 CCCWP-22	C.3.j.ii.(2)	It will be challenging for Permittees to achieve the C.3.j.ii.(2) Numeric Implementation retrofit requirements (as laid out in Table H-1 in Attachment H) because they do not or may not have adequate funding to build and maintain the projects, or because they have other higher priorities for those funds, or otherwise because the projects are expensive. Construction costs combined with a condensed schedule for planning, budgeting, design, and implementation will make projects more expensive to implement than the opportunity-based approach described in Permittees' Green Infrastructure Plans. A key purpose of the Green Infrastructure Plans is to ensure Permittees advance implementable multi-benefit projects that have local public support and are eligible for state and Federal funding when those funds (generally competitive grants) become available. As an example, the City of Union City estimated that their H Street	See Master Response Identifier C.3-22.	See proposed revision for: ACCWP-a1i,a2i,22 Oakland & San Jose-2b

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		retrofit project cost approximately $660,000 per acre treated. At that rate, treating 10 acres would cost $6.6 million. The Water Board should conduct a cost benefit analysis to determine if that level of expenditure is appropriate for the minimal water quality benefits that would be achieved.		
Oakland-7	C.3.j.ii.(2)	Incorporating GSI into Road Reconstruction Projects should only be required where it is technically feasible. Technical infeasibility should not mandate alternative compliance for which a suitable location/project may not be possible to identify.	See Master Response Identifier C.3-23.	None.
Oakland & San Jose-2b ACCWP-22 Oakland-10	C.3.j.ii.(2)	Oakland would need to treat 10 acres of runoff through non-regulated GSI projects where currently there is no mandate for projects that do not meet the triggers to be considered regulated. Based on the acreage of non-regulated GSI that Oakland has been able to install to date, and the number of projects that have been built to treat that acreage, Oakland would have to	This comment seems to suggest that the City of Oakland would need to start from scratch in planning for the implementation of green infrastructure projects in the public right of way. However, through the development of its Green Infrastructure Plan in MRP 2, and through the implementation of C.3.j.ii Early Implementation of Green Infrastructure Projects in MRP 2, Oakland should already have begun planning for, and arranging funding for, such projects. Oakland's 2019 Green Infrastructure Plan shows that	See proposed revision for: ACCWP-a1i,a2i,22 Oakland & San Jose-2b

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		identify, plan for, fund, and build between 20-32 new non-Regulated capital projects below 5,000 square feet in the five-year permit that are not technically prohibited from incorporating GSI.	Oakland is already planning to complete several green infrastructure projects during the MRP 3 term. For example, the first page of Appendix C of Oakland's Green Infrastructure Plan lists the "Tassafaronga Village" project at 84th Ave. and F St., as a non-Regulated project that is planned for implementation during MRP 3. Another example on that page is the "Fruitvale Alive Gap Closure" project at Fruitvale Bridge and International Ave., which is also a non-Regulated project, and which is also planned for implementation during MRP 3. More (non-Regulated) planned and potential green infrastructure projects are listed in Appendix C of Oakland's Green Infrastructure Plan. Furthermore, C.3.j.ii.(2) does not specify the size of qualifying green infrastructure projects. Oakland could, in theory, implement significantly fewer than 20-32 green infrastructure projects while still meeting the 10-acre retrofit requirement. Green infrastructure retrofits are not limited to projects involving the creation and/or replacement of significant amounts of impervious surface that would trigger the C.3.b Regulated Project thresholds; Permittees may find situations in which they only need to create/replace the surface area of the treatment measures themselves, and	

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			minimal surrounding areas, thereby avoiding trigging the Regulated Project requirements. While C.3.j.ii.(2) tasks Oakland with retrofitting 10 acres of impervious surface, only 0.2 of those 10 acres need to be implemented within Oakland's jurisdiction. The remainder can be implemented anywhere else in Alameda County. Oakland may pool resources with other Permittees on regional projects that serve multiple jurisdictions. Pursuant to C.3.j.ii.(2)(b), the Numeric Implementation retrofit requirements may be met at the county level, meaning that only 0.2 of the 10 acres assigned to Oakland actually need to be funded by Oakland, provided that the remainder is funded collectively by other ACCWP Permittees (which may or may not including contributions from Oakland). This is indicative of the level of flexibility in the Tentative Order, while still supporting green infrastructure implementation regionally and at the county level, and while still facilitating Permittees' further incorporation of green infrastructure implementation into their planning and budget processes. Additionally, pursuant to C.3.j.ii.(2)(h), Oakland could credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects,	

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			specified in C.3.b.ii.(5), towards the Numeric Implementation retrofit requirements specified in C.3.j.ii.(2). C.3.j.ii.(2)(j) provides Oakland additional incentive to coordinate with private development projects, by offsetting Oakland's assigned 10 acres of green infrastructure retrofit, by up to 1 acre, leaving a remainder of 9 acres. The ordinance that Oakland would be required to adopt – in order to receive that offset – would, in part or in whole, fund Oakland's implementation of those remaining 9 acres of green infrastructure retrofit. C.3.j.ii.(2)(f) provides additional flexibility on GI project construction timing. Pursuant to C.3.j.ii.(2)(f), if a project is not completed by June 30, 2027 (the end of the MRP 3 permit term), Oakland could still count that project towards the C.3.j.ii.(2) Numeric Implementation retrofit requirements, if it were approved and fully funded. All of that said, we have reduced the cap to 5 acres from 10 acres, which would halve Oakland's Numeric Implementation retrofit requirement. Were Oakland to utilize C.3.j.ii.(2)(j), the required retrofit would be 4 acres. See the response above to:	

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			ACCWP-a1i,a2i,22 Oakland & San Jose-2b	
Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1	C.3.j.ii.(2)	1) Permittees are challenged to comply with all of the different retrofit requirements in C.3.j and in the rest of C.3. With the threshold for Regulated Projects changing from 10,000 to 5,000 square feet (sf), there will be fewer "voluntary" projects that will count towards achieving this target. 2) Remove/delay the numeric retrofit requirements, and instead, allow Permittees to implement their Green Infrastructure Plans at their own self-determined pace via C.3.j.iii No Missed Opportunities, with appropriate indicators (such as policies adopted, projects under design, grant applications submitted, projects started) to provide accountability.	1) See Master Response Identifier C.3-24. 2) We do not agree with the request to replace C.3.j.ii.(2) with various programmatic accountability metrics or indicators, for the following reasons. As explained in the Fact Sheet, the retrofit expectation is far below the ultimate need for retrofit in the Permittees' jurisdictions, considering drivers such as the need to accomplish TMDL wasteload allocations and to reduce the discharge generally of urban runoff pollutants through the MS4. However, the retrofit requirement ensures each Permittee builds capacity by completing or meaningfully participating in at least one project. The retrofit assignments, when summed regionally for the Permittees, will result in about 270 acres of non-Regulated Project impervious surface retrofitted by the expiration date of the Permit, which will make a significant incremental step towards addressing the otherwise unaddressed adverse stormwater quality impacts caused by Permittee's rights of way, particularly	See the response to: ACCWP-a1i,a2i,22 Oakland & San Jose-2b

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			those smaller public streets projects that are not otherwise subject to the same clean water controls as C.3.b. Regulated Projects. The retrofit acreages are required to address pollutants discharges from MS4s because the Permittees have substantial areas of impervious surface—comprised in large part of their existing public roads and parking areas—that discharge urban runoff pollutants to the MS4, but on which projects are not being completed that fall into Regulated Project categories. As such, they are unlikely to be retrofitted with clean water controls and will continue to discharge urban runoff pollutants in the absence of a retrofit requirement. Regulated Projects addressed in C.3.b are only a fraction of the thousands of acres of impervious surfaces in the area covered by this Order. All impervious surfaces contribute pollutants to stormwater runoff, with those in higher density land uses contributing more pollutants. Accordingly, in order to reduce the discharge of storm water pollutants from MS4s to the maximum extent practicable and help attain TMDL wasteload allocations, additional impervious surface areas must be addressed beyond the Regulated Projects. As explained in the Fact Sheet, other jurisdictions in the State of California and elsewhere in the United States have MS4 NPDES Permits with similar non-	

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			Regulated Project numeric retrofits requirements that supplement their retrofit requirements for Regulated Projects. The requirements included in C.3.j.ii.(2) are intended to increase the pace at which Permittees address the pollutant loading and hydromodification impacts from their impervious surfaces. The Permittees' existing commitments for green infrastructure implementation in Green Infrastructure Plans are insufficient to address the problem associated with impervious surfaces. With few exceptions, the Green infrastructure Plans do not commit to accelerate the existing rate of green infrastructure implementation, or to retrofit existing impervious surfaces (particularly, in the public right of way), with clean water controls to address urban runoff discharges, beyond what MRP 2 already required for Regulated Projects using an LID approach. Consequently, the Green Infrastructure Plans are limited in the extent to which they would reduce the adverse water quality impacts of urban runoff on receiving waters over time. For example, one Permittee's Capital Improvement Plan indicates consideration of numerous projects with potential for green infrastructure implementation, including miles	

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			of street projects, but its GI Plan sets a retrofit target of only 0.8 acres of public impervious surface by 2040, for both Regulated and non-Regulated public projects. Another Permittee's GI Plan sets a retrofit target of only one acre of public impervious surface by 2040. These outcomes represent a missed opportunity, in that the Previous Permit's green infrastructure planning requirement was included as an alternative to expanding the Regulated Project definitions to include all new and redevelopment projects that create or replace 5,000 square feet of impervious surface, and road projects that just replace existing impervious surface area. That is, in the Previous Permit, green infrastructure planning was included in part to provide municipalities the opportunity to evaluate and account for smaller area regulated projects and road replacement projects as part of their GI Plans, and develop commitments to implementation that would be more efficient and effective for them than a Permit requirement to include all such projects. The retrofit projected by Permittees in their Green Infrastructure Plans, as provided in Table A-4 of the Fact Sheet, shows that despite the opportunity given to flexibly	

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			capture smaller projects in Green Infrastructure Plans in lieu of a numeric permit requirement in MRP 2, the Permittees have not committed to accelerating the existing rate of green stormwater infrastructure implementation, or to retrofit existing impervious surfaces with clean water controls to address urban runoff pollutant discharges from existing impervious surfaces, beyond what MRP 2 already required for Regulated Projects. For these reasons, we do not agree with the commenters' request to remove/delay the numeric retrofit requirements, and instead, allow Permittees to implement their Green Infrastructure Plans at their own self-determined pace via C.3.j.iii No Missed Opportunities, with appropriate indicators to provide accountability. See also the response above to: ACCWP-a1i,a2i,22 Oakland & San Jose-2b	
SCVURPPP-2a,4	C.3.j.ii.(2)	The Water Board should recognize the significant water quality benefits that have occurred as a result of GSI/LID implemented to date to address stormwater runoff from parcel-based development (as opposed to within the public	Comment noted. These efforts will be considered pursuant to C.3.j.ii.(4).	None.

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		ROW). SCVURPPP Co-permittees have required the construction of GSI/LID on over 1,200 projects since new/redevelopment requirements went into effect in 2003. As a result, more GSI/LID treatment measures are now in place in Santa Clara County than in any other county in the SF Bay Area.		
CCCWP-13	C.3.j.ii.(2)	Revise C.3.j.ii.(2) to incentivize moving projects within our Green Infrastructure Plans closer to "shovel-ready" status so that our communities are in the best position to receive state and Federal infrastructure funding when it becomes available.	Comment noted. We disagree that edits are needed, as Permittees are incentivized to move GI Plan projects closer to shovel-ready status by: (1) the potential availability of grant funds; (2) the proposed retrofit implementation requirements during the coming permit term, and the opportunity to contribute to wasteload reductions for pollutants including mercury and PCBs; and (3) likely ongoing future retrofit requirements in subsequent permit terms. These expectations are intended, in part, to support Permittee efforts to complete funding initiatives that may be necessary to continue to expand implementation of GI retrofit measures.	None.

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Oakland-10 CCCWP-21,22	C.3.j.ii.(2)	1) Regarding the C.3.j.ii.(2) Numeric Implementation retrofit requirements, the total amount and division between Permittees does not seem logical or fair, and no rationale was provided. The overall amount of Green Infrastructure mandated regionwide is not tied to any specific water quality improvement goal, and the allocations to individual municipalities are arbitrary. 2) Assigning three acres of non-Regulated Project impervious surface area per 50,000 in Permittee population does not address the differences in opportunities to incorporate Green Infrastructure, nor does it take into account the different financial or technical capabilities within each jurisdiction.	1) As explained in the Fact Sheet regarding Table H-1 of Attachment H, Permittees were assigned three acres of non-Regulated Project impervious surface retrofit per 50,000 population using the 2019 U.S. Census Bureau Population Estimate, prorated, with a minimum requirement of 0.2 acres and a maximum requirement of five acres. Rationale for the numeric retrofit expectation, to be accomplished during the Permit term as described in C.3.j.ii.(2), is provided in the Fact Sheet. It reflects a very modest goal and is far below the ultimate need for retrofit in the Permittees' jurisdictions, considering the vast amount of impervious surfaces and drivers such as the need to reduce the discharge of urban runoff pollutants through the MS4 and make progress attaining TMDLs. The retrofit requirement ensures each Permittee builds capacity by completing or meaningfully participating in at least one project. Permittees are expected to use their GI Plans to help inform the selection of retrofit projects. In addition, the retrofit requirement uses population as a rough proxy for Permittee capacity to complete retrofit work. In combination with the acreage maximum of five acres (and minimum retrofit of 0.2 acres), the retrofit requirement is intended to be a flexible and doable goal during this Permit term.	See the proposed revision for: ACCWP-a1i, a2i, 22 Oakland & San Jose-2b

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			These retrofit assignments, when summed regionally for the Permittees, will result in about 217 acres of non-Regulated Project impervious surface retrofitted by the expiration date of the Permit, which will make a significant incremental step towards addressing the otherwise unaddressed adverse stormwater quality impacts of Permittee's rights of way, particularly those smaller public streets projects that are not otherwise subject to the same clean water controls as C.3.b. Regulated Projects. Please additionally refer to the response to the following combined comment: Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1 See the response above to: ACCWP-a1i,a2i,22 Oakland & San Jose-2b 2) To the contrary, differences in opportunity to implement green infrastructure, and financial differences, are accommodated (among other relevant Subprovisions) by C.3.j.ii.(2)(b), which would allow Permittees	

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			to meet the numeric retrofit requirements listed in Table H-1 of Attachment H on a countywide basis. Only if Permittees within a given county were to fail to collectively achieve their numeric retrofit requirements, would each Permittee within that county be separately responsible for achieving its individual retrofit requirement. Regarding financial concerns, please additionally refer to the response to the following combined comment: Oakland-7,10 Los Altos-4 San Mateo County-15 SCVURPPP-37 Palo Alto-4 CCCWP-22 We do not understand the comment that C.3.j.ii.(2) does not take into account the different technical capabilities within each jurisdiction. Technical capabilities among planning staff in different jurisdictions will always differ, but we do not believe that is cause enough to have differing requirements, especially for requirements that can be implemented. Please refer to the response to Oakland-7.	

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Oakland-10	C.3.j.ii.(2)	Delete C.3.b.ii.(5) (Other Road Projects) so that there are non-regulated projects in the public ROW where green infrastructure could be implemented, via C.3.j.iii No Missed Opportunities.	Under C.3.j.ii.(2)(h), Permittees may credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects, specified in C.3.b.ii.(5), towards the Numeric Implementation retrofit requirements specified in C.3.j.ii.(2). See response to the following combined comment: Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1	None.
San Pablo-5	C.3.j.ii.(2)	C.3.j.ii.(2) does not take into account cities like San Pablo, that have small land area (2.6 square miles) but dense population (32,000). Based on staff analysis, the City only owns approximately three (3) acres of public parcels with impervious area that has not already been treated.	The Provision considers small jurisdictions like San Pablo. Permittees can meet their C.3.j.ii.(2) obligations at the county level, aside from the minimum 0.2 acres, but even that minimum obligation can be implemented in another jurisdiction via financial contribution. Also, pursuant to C.3.j.ii.(2)(h), Permittees may credit the acreage of impervious surface created or replaced for Regulated Road Reconstruction Projects towards the Numeric Implementation retrofit requirements. In addition to the 3 acres of public parcels with impervious area that has not already been treated, San Pablo, like other cities, has substantial areas of public roads that do not	None.

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			have water quality treatment controls. These represent potential opportunities for retrofit, including as part of significant road reconstruction projects.	
SCVURPPP-37 SMCWPPP-75	C.3.j.ii.(2)	"Final discretionary approval" does not really apply to public projects, so it's hard to define.	We have made a responsive edit, to clarify that Permittees can count private GI projects which have received final discretionary approval, and public GI projects which have been fully funded and have had construction scheduled.	Revised as indicated.
SCVURPPP-37	C.3.j.ii.(2)	Note that the population listed in Table H-1 for unincorporated Santa Clara County is incorrect - it should only apply to the portion of the County within the SF Bay watershed. The correct population of the portion of unincorporated Santa Clara County that drains to Region 2 is 98,110.	The requested change has been made.	Revised Table H-1 in Attachment H, as recommended.
SCVURPPP-37 SMCWPPP-75	C.3.j.ii.(2)	Allow permittees more flexibility for GSI implementation, such as requiring GSI retrofits in ROW along frontage, in lieu of other requirements like lowering thresholds and regulating public works projects.	This crediting is explicitly allowed in C.3.j.ii.(2)(j), to help Permittees leverage private development and redevelopment to achieve their C.3.j.ii.(2) Numeric Implementation retrofit requirements. It does not follow logically why, additionally, this crediting should be included in lieu of the changes to C.3.b.	None.

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CCCWP-21	C.3.j.ii.(2)	The replacement of existing incentives and credits with prescriptive, acre-based mandates would serve to effectively override Green Infrastructure goals and targets established by municipalities in their Green Infrastructure Plans, and thereby make it more difficult for Permittees to meet those goals and targets. Up to now, Permittees have relied on Water Board staff to work with municipalities in a collaborative manner to facilitate accomplishment of Green Infrastructure projects. Replacing this incentive-based approach with numerical mandates will have the unintended consequence of reducing Permittees' capacity to further their Green Infrastructure programs.	Please see response to combined comment: Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1 and to comment CCCWP-13.	None.
CCCWP-22	C.3.j.ii.(2)	The Numeric Implementation retrofit requirements should be identified in a more appropriate context of long-term infrastructure renewal (non- Regulated Projects) combined with ongoing redevelopment on private and public parcels (Regulated Projects)	We agree. This is the purpose of C.3.j.ii.(4).	None.
SMCWPPP-75	C.3.j.ii.(2)(c)	More clarity needed as to how regional projects count toward the	Comment noted. Substantial contribution is appropriately flexible while setting	None.

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		GI targets and what represents a "substantial contribution."	expectations that the contribution be meaningful. Discussions with the San Mateo Permittees during MRP 2 have suggested that substantial contributions could be associated with a prorated combined planning, construction, operation, and maintenance cost for a project (prorated relative to the contributing Permittee's obligation), could consist of a similar amount of in-kind contribution of engineering design or related services, or other similar quantifiable contributions. Those approaches are all likely to be acceptable under C.3.j.ii.(2)(c). Given the range of potential projects and situations, it is preferable to allow for flexible language. To the extent there is concern for particular instances, this issue may be addressed during the permit term by conversations with Board staff.	
City of Dublin-5 ACCWP-23	C.3.j.ii.(2)(d)	Clarify language in C.3.j.ii.(2)(d).	The suggested changes are appropriate because they will clarify the Provision. We have made the changes, though not word-for-word.	Revised C.3.j.ii.(2)(d) as suggested.

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SCVURPPP-2a,4,37 Los Altos-4 San Pablo-5 SMCWPPP-75 CCCWP-21,22 Palo Alto-3	C.3.j.ii.(2)(e)	Requiring GSI implementation in MRP 3 based on population does not consider the significant level of GSI implementation that has occurred to-date, and therefore penalizes Permittees for early implementation of GSI. Allow Permittees to receive credit toward GSI target goal for all GSI projects constructed during MRP 2, or at a minimum, change applicable date from Jan. 1, 2021 to Jan. 1, 2019. Others (e.g., CCCWP-22) request that the date be pushed back to 2009. SCVURPPP: 20 voluntary GSI projects since FY 2009-10, treating approximately 40 impervious acres and expending over $10 million. San Pablo: San Pablo has already installed GSI at City Hall, the San Pablo Community Center, the Women Infants and Children (WIC) facility, Rumrill Sports Park, and on various roads. Palo Alto: The City's 2.3 mile Charleston-Arastradero Transit corridor project cost approximately $19.5 million dollars, took 20 years	We recognize the substantial efforts Permittees have made to implement GSI. Permittees are not penalized for their voluntary efforts or for required "no-missed-opportunities" implementation under C.3.j.iii. We expect that any such projects that are not counted towards C.3.j.ii.(2) in MRP 3 will count towards the long-term green infrastructure target that will be developed during MRP 3 pursuant to C.3.j.ii.(4), and which will inform changes to C.3.j.ii.(2) Numeric Implementation retrofit requirements in future Permit terms. The purpose of C.3.j.ii.(2), as explained in the Fact Sheet, is to make a significant incremental step towards addressing the otherwise unaddressed adverse stormwater quality impacts of Permittee's rights of way, including those smaller public streets projects that are not otherwise subject to the same clean water controls as C.3.b. Regulated Projects. C.3.j.ii.(2)(e) is intended to recognize projects being completed over the relatively short-term period around the MRP 3 permit term, while still supporting modest, but significant retrofit during the MRP 3 permit term and development of Permittee capacity to complete GSI retrofit. We expect that projects completed earlier than the C.3.j.ii.(2)(e) date will be considered towards	See the proposed revision for the following combined comment: ACCWP-a1i,a2i,22 Oakland & San Jose-2b

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		to plan and four years to construct due to many stakeholders, various project needs, and a significant scope. The City was proactive and insisted that the project include GSI due to C.3.j.iii., which required public and private projects to include GSI to the maximum extent practicable. This sub-provision was intended to prevent "missed opportunities," which the City adhered to, allocating funding for approximately nine acres of voluntary GSI treatment in the City's right-of-way through this project. Palo Alto requests that all non-regulated GSI projects carried out since 2009 count towards the Tentative Order GSI retrofit treatment requirement. The City has continued in the direction of "no missed opportunities," resulting in three additional funded projects to be completed during the next permit term which will provide 1.6 acres of stormwater treatment. The City received a $1.2 million-dollar U.S. EPA grant to conduct a project with partners to retrofit two parking lots, one in Palo Alto and the other in the Santa Clara. While this grant is appreciated and	the long-term GSI goal. How that is done will be considered under C.3.j.ii.(4) which is to revise the C.3.j.ii.(2) Numeric Implementation retrofit requirement for future Permit terms. See also the response above to the following combined comment: ACCWP-a1i,a2i,22 Oakland & San Jose-2b	

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		offsets City funding, it will take significant staffing resources to successfully carry out the grant scope over four years. Moreover, despite a yearly allocation of $385,000 for GSI construction from the City's Stormwater Fund, construction costs are continuously increasing, and supplementing with the City's general fund budget will be difficult due to Covid impacts and numerous community needs.		

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San Mateo County-4,15 SCVURPPP-4,37 ACCWP-22 Oakland-10 San Pablo-4,5 CCCWP-21,22 Palo Alto-4	C.3.j.ii.(2)(f).	Even if the resources needed to construct such projects are available, it's not possible for Permittees to achieve the C.3.j.ii.(2) Numeric Implementation retrofit requirements (as laid out in Table H-1 in Attachment H) in the five-year MRP 3 term, as green infrastructure projects take longer than five years to identify/plan/design/fund/bid/construct. Extend the deadline in C.3.j.ii.(2)(f). This is especially true of larger, more cost-effective projects. CCCWP-22 further requests: Because of the uncertainty involved in successfully implementing any specific Green Infrastructure project during a 5-year permit term, we urge that any numeric goals apply regionwide or countywide rather than Permittee-by-Permittee.	Much of the referenced processes have already been completed, because Permittees underwent identification/planning (and some design as well) for their Green Infrastructure Plans, in 2019. And under MRP 2's No Missed Opportunities requirement, Permittees have already begun further design/funding/ bidding/construction of the projects in their Green Infrastructure Plans. Regarding the comment that it will be challenging to meet those requirements in the 5-year MRP 3 term, especially for larger, more cost-effective projects, C.3.j.ii.(2)(f) allows Permittees to count projects even if they haven't yet been completed, as long as they are approved and funded. Regarding comment CCCWP-22 that Permittees should be able to meet the Numeric Implementation retrofit requirements at the countywide level, we agree;C.3.j.ii.(2)(b) already allows that. We disagree with the suggestion in CCCWP-22 that Permittees be able to meet the Numeric Implementation retrofit requirements at the regional level, and the comment provides no justification for that request, other than "uncertainty involved in successfully implementing any specific Green Infrastructure project during a 5-year	See the proposed revision for the following combined comment: ACCWP-a1i,a2i,22 Oakland & San Jose-2b

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			permit term." Allowing the requirement to be met on a countywide basis provides sufficient flexibility while still supporting several of the goals of C.3.j.ii.(2) that are expressed in the Fact Sheet, including 1) addressing the otherwise unaddressed public rights of way across the entire region (which will also achieve geographically broader water quality benefits) as opposed to focusing the work in just one or a few jurisdictions, and 2) getting Permittees to build the institutional capacity necessary to implement green infrastructure projects within their jurisdictions. Please see also the response above to the following combined comment: ACCWP-a1i,a2i,22 Oakland & San Jose-2b and see response to Baykeeper-12d	
CCCWP-10	C.3.j.ii.(2)(g)	C.3.j.ii.(2)(g) is confusing.	As stated in the Provision, controls implemented that satisfy all criteria in both C.3.j.ii.(2)-(3) and C.12.c, may be counted towards the metrics in both of those Provisions.	None.
CCCWP-11	C.3.j.ii.(2)(h)	C.3.j.ii.(2)(h) does not allow Permittees to additionally credit the acreage of certain C.3.b.ii.(1)(a) Regulated Projects towards the C.3.j.ii.(2) Numeric Implementation retrofit requirements, and this is	Permittee may get credit for GSI implementation under C.3.b.ii.(5), Significant Road Reconstruction, for the C.3.j.ii.(2) Numeric Implementation retrofit requirements.	None.

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		confusing because either C.3.j.ii.(2) or C.3.b.ii.(5) could determine the total amount of retrofit conducted during the Permit term.		
ACCWP-24	C.3.j.ii.(3)	If the alternative treatment systems are "approved" during the Permit term, allow use of those systems for C.3.j green infrastructure projects.	No alternative treatment systems will be "approved" during the Permit term. The use of such systems for Regulated Projects would require a Permit amendment, and if that were to happen, C.3.j.ii.(3) would change accordingly, since it references (rather than reiterates) the requirements of C.3.c-d. Any additional necessary corrections would be made during the Permit amendment.	None.
SCVURPPP-37,38 SMCWPPP-75,76	C.3.j.ii.(4)	Support the opportunity to work with Water Board staff in the Technical Working Group and request that this process be used to create a more equitable and achievable set of longer term GSI targets that allow recognition of GSI projects completed in Permittees' jurisdictions to-date, including projects that are both public and private, and regulated and non-regulated.	Comment noted.	None.

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SCVURPPP-37,39 SMCWPPP-75 San Jose-18	C.3.j.iii	The "no missed opportunities" requirement is redundant considering the GSI numeric implementation targets. Unclear if this is in addition to the GSI implementation requirements, or a process that can be used to identify potential GSI retrofits. Projects reported under the No Missed Opportunities provision are captured under the GSI numeric implementation targets provision, resulting in duplicative reporting effort with no benefit to the City or Water Board.	We have retained C.3.j.iii because there may be projects that are feasible for Permittees to implement beyond the mandatory minimums specified in C.3.j.ii.(2). Additionally, one of the C.3.j goals is to maintain and grow Permittee capacity to implement GSI, and C.3.j.iii supports that by supporting Permittee review of capital improvement projects to evaluate potential GSI implementation and retrofit opportunities. To delete C.3.j.iii would be to accept that the Permittees cannot do any more than the minimum that the Permit would specify in C.3.j.ii.(2), but we have not received information to support that conclusion. The reporting as described does not appear to be duplicative. The No Missed Opportunities reporting established under MRP 2 would be continued under MRP 3, and consists of reporting Permittees' potentially eligible capital improvement projects and the outcomes of No Missed Opportunity reviews. By contrast, numeric implementation targets may be satisfied by one or more projects or participation in or contribution to a joint or regional project or projects. For some Permittees—particularly those with limited capital improvement project lists—the numeric implementation reporting may be similar to the No Missed Opportunities reporting, but for many it is	None.

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			likely to be much smaller in scope. To the extent there are similarities, preparation of one list is likely to simplify the preparation of the other.	
ACCWP-20,21	C.3.j.v & C.3.j.ii.(1)(b)	The numerous proposed additional tracking and reporting requirements add up and, as a whole, require substantial resources.	Please see the responses to San Jose-20 and the following combined comment: CCCWP-3, CCCWP-4.	See the proposed revision for San Jose-20.
San Jose-19 SCVURPPP-40 SMCWPPP-78	C.3.j.v.(1)	1) Remove the requirement in C.3.j.v.(1): "The tracking and mapping tools shall be used by Permittees to inform issues relevant to program management, such as life cycle costs, asset management, operation and maintenance frequency, and beneficial design changes," because the tracking tool isn't easily used for those purposes.	1) We disagree. The tracking and mapping tools are intended, in part, to inform issues relevant to program management. To the extent the tools do not already do that, they must be modified/updated accordingly. 2) We disagree. This subprovision would require the Permittees to continue to use the tools they developed under MRP 2. To facilitate inter/intra-comparability and general utility, including identification of trends and challenges that can lead to program improvement, the tracking and mapping tools	None.

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		2) Permittees should be allowed to use other tracking/mapping tools instead of the countywide tracking/mapping tools developed during MRP 2.	must be at least consistent at the county level, if not also consistent at the regional level. Additionally, Permittees' use of individually developed tools, would complicate achieving those benefits, may complicate longer-term tracking of GSI implementation, and would complicate access to and use of the information by other parties, including the Water Board and the public.	
ACCWP-25	C.3.j.v.(1)(b)	1) There may be issues with making some of this GI tracking/mapping information public; and 2) it is burdensome.	1) Comment noted. The subprovision allows flexibility with respect to the information that must be made available to the public, and notes that additional information may not be made available to the public. This flexibility is sufficient to accommodate the stated concern. The comment does not identify elements Permittees would not want to make available to the public, why that would be, or recommend specific changes. 2) We recognize there is effort involved in making information available electronically using existing tools. In some cases, Permittees are already providing that information, so there is little to no additional effort needed. The subprovision has been crafted to allow flexibility and minimize the effort involved to achieve the required outcome. That effort is balanced by the benefit of recognizing GSI implementation, educating the public, and allowing for public	None.

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			review and support of ongoing stormwater program efforts. Making the information available provides transparency and accountability regarding the Permittees' progress on their implementation of the green infrastructure requirements in C.3.j.	
Oakland-11	C.3.j.v.(1)(b)	The requirement to provide a description of design, location, land use type, and area treated, is excessive. If detailed information is needed, it can be provided upon request. This level of reporting has no water quality nexus and is an excessive administrative exercise. This takes Permittees' focus away from implementing measures to protect and improve water quality.	This comment misinterprets the language in the Tentative Order; C.3.j.v.(1)(b) is not a reporting requirement, it is a tracking requirement, which must be kept updated and made available to the Water Board. The Permittees do not have to compile the information in the tools and then "report" that information; rather, they may provide a link to the online tools (and update the link, should it change). It is our understanding that the information that C.3.j.v.(1)(b) specifies should be included in the tools is already tracked by the Permittees, as that information is generated and used during Permittees' implementation processes. The main task, therefore, is entering that information into the tools, for each new green infrastructure project.	None.

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			Regarding the nexus between this tracking and water quality, please see response to ACCWP-25.	

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San Jose-20	C.3.j.v.(2)	Do not require Permittees to report on updates to their Green Infrastructure Plans because they may not need to make any updates in any particular year. Instead require them to report on supplemental information, if/when Permittees determine that such supplemental information is necessary. Delete "update and/or" from C.3.j.ii.(1). Require reporting on such updates/ supplementals every 2-3 years instead of annually.	C.3.j.ii allows Permittees to self-determine the need for updates and/or supplemental information for their Green Infrastructure Plans. For some Permittees, it may be necessary to update their Green Infrastructure Plans, and therefore we do not agree with the requested change to C.3.j.ii.(1). However, as the comment requests, C.3.j.ii.(1) allows Permittees to submit supplemental information instead of updated Green Infrastructure Plans, as appropriate. If in a given reporting year, there is no update or supplemental information to report on, Permittees can state that in their Annual Report. However, we agree that it is acceptable to reduce the frequency of reporting on Permittees' implementation of C.3.j.ii.(1) Programmatic Implementation. Therefore, we have reduced that reporting to 2024 and 2026, instead of every year. See also response to SCVURPPP-36.	Reduce the frequency of reporting on programmatic implementation, as indicated.
SCVURPPP-41	C.3.j.v.(2)-(3)	Requests that C.3.j reporting be reduced, for example, by requiring reporting on programmatic implementation every 2-3 years instead of annually.	See response to San Jose-20.	See proposed revision for San Jose-20.

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SMCWPPP-79	C.3.j.v.(2)-(6)	Comment states that C.3.j.v.(2)-(6) constitutes a "major reporting requirement… although WB staff and Permittees had agreed on a goal to reduce reporting throughout the Permit."	See response to San Jose-20.	See proposed revision for San Jose-20.
ACCWP-26	C.3.j.v.(3)	Additional tracking/reporting that requires substantial resources when considered with other tracking/reporting requirements.	This one-time requirement to report on lessons learned, including attainment of the C.3.j numeric retrofit requirements, is important to inform understanding of this work and expectations in subsequent permit terms regarding retrofit. In turn, this should allow improvements in the quality and efficiency of implementation.	None.
MRP 3 Testimony Hearing Transcript, October 12, 2021, Josh Bradt – Page 189 (Line 24-25), 190 (Line 1-25), 191 (Line 1-25), 192 (Line 1-25), 193 (Line 1-20)	C.3	My name is Joshua Bradt. I'm an Environmental Planner and Project Manager at the San Francisco Estuary Partnership and I'm here to speak on green infrastructure as a planner and practitioner. Our organization's both a program of the U.S. EPA's National Estuary Program, and a program of the Association of Bay Area Governments. We facilitate collaborative, innovative projects with all types of partners, and help restore and protect water quality	Comment noted.	None.

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		and habitats in and around the estuary. The Water Board has long been a key partner, with representation on our Implementation Committee. The MRP process has done an excellent job of establishing realistic expectations regarding the implementation of green stormwater infrastructure in the public realm. The initial ten regional green infrastructure demonstration projects from the first MRP was too little, but simply calling for more would be too big. MRP 2's mandate for each permittee to develop actionable green infrastructure master plans was an important step in ensuring that green infrastructure would break out of the stormwater manager silo, and be understood and supported by other municipal divisions, departments, and management level decision makers. The Estuary Partnership stands ready to support the Water Board and the permittees in meeting the		

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		latest requirements of the MRP, as the Region moves from LID planning to implementation and monitoring. We recognize the multiple benefits that come with green infrastructure, beyond water quality improvements, such as reducing hydraulic loading of typically under-sized stormwater drainage networks, greening the public right of way, and reducing heat islands in urban areas. It's likely that the community benefits and visible approach to stormwater management that comes with green infrastructure will lead to public support for developing local funding streams. We're also very familiar with the challenges and costs of retrofitting the existing streetscape of these interventions. We're just completing the San Pablo Avenue green stormwater spine, which treats over 6 acres of impervious surface runoff at four sites, in four cities. And this project really drove home the cost of accommodating		

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		utilities, which do not want green infrastructure facilities over their assets. These conflicts may recede as more projects come online, and tributary areas to green infrastructure facilities eventually decrease the sizing requirements, and allow for smaller projects within these already programmed spaces. The Estuary Partnership also partnered with the San Francisco Estuary Institute in several cities to develop and enhance the Green Plan IT Tool, also called Green Plan IT, where watershed-based green infrastructure master planning. This online module is available for free to any municipality, but most have joined with their countywide Clean Water Programs, using private consultant software to develop their green infrastructure plans. But the Green Plan IT Tool is compatible with most of these proprietary tools, so it could be a prime candidate to be a regional		

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		dataset for implementation progress, and treatment tracking and recording. We also have a GI Resources webpage, at the Estuary Partnership website, that provides design and policy guidance, case studies, and water quality monitoring reports. And finally, the costs of retrofitting are very steep. Always, my recommendation is for GI facilities to be planned as part of a larger street improvement project. We've completed a fact sheet that's approved by the Metropolitan Transportation Commission, that specifies how green infrastructure can be an eligible cost in its One Bay Area Grant, or OBAG funding program. And we have a draft version of a similar fact sheet for eligibility of green infrastructure activities using SB 1 funds. That's awaiting approving from the California Transportation Commission.		

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		So, consider the Partnership as a resource, and potential partner in GI planning, implementation, and grant seeking.		
MRP 3 Testimony Hearing Transcript, October 12, 2021, Will Provost, El Cerrito – Page 155 (Line 20-25), 156 (Line 1-25), 157 (Line 1-25), 158 (Line 1-16)	C.3.j	El Cerrito is implementing its Green Infrastructure Plan now, and the numeric requirement in C.3.j would undermine those efforts. The City has used federal stimulus funds to build rain gardens as part of streetscape improvements projects on San Pablo Ave. The City used State and Urban Greening Grant to build a park-like bioretention facility that treats runoff from 7 acres, that's shown on the slide. Last year, the City added bioretention facilities on San Pablo Ave. as part of SFEI's Green Stormwater Spine Project [which was substantially funded by Caltrans]. Successful GI projects are closely coordinated with multi-mobile transportation improvements and with urban revitalization. A successful project serves multiple purposes, is funded by	Please see the responses to other similar comments regarding C.3.j, including the responses to the following combined comments: San Mateo County-4,15 SCVURPPP-4,37 ACCWP-22 Oakland-10 San Pablo-4,5 CCCWP-21,22 Palo Alto-4 And: San Mateo County-4 ACCWP-a2i CCCWP-21 And: Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1 And:	Please see the proposed revisions for other similar comments regarding C.3.j, including the proposed revisions for the following combined comments: San Mateo County-4,15 SCVURPPP-4,37 ACCWP-22 Oakland-10 San Pablo-4,5 CCCWP-21,22 Palo Alto-4 And: San Mateo County-4

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		multiple sources, and has community support. Flexible timing is everything. We brought these lessons in our GI Plan and there are two examples. A hotel redevelopment project; runoff treatment will include bioretention near the corner of Cutting Blvd. and San Pablo Ave., which will capture runoff in the southbound lanes of San Pablo Ave. And here we're leveraging the private development project to actually capture some public water from the public ROW. BART is building, is proposing to build, a 6-acre parcel at our El Cerrito Plaza BART station. Runoff from the roofs and walkways will be treated and we'll also work with them to treat some runoff from adjacent streets. We have many projects in our plan, but we can't guarantee completion in the 5 years the Tentative Order would require. Like other cities, we have to redirect resources to less valuable, less well-integrated projects to	CCCWP-13	ACCWP-a2i CCCWP-21 And: Orinda-3 CCCWP-13,22 Oakland-10 Walnut Creek-5 Concord-1 And: CCCWP-13

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		meet at minimum numeric requirement. An arbitrary numeric requirement would undermine the plan we have already in progress. And our biggest need is for help from your staff and from you all in finding funding. We ask that you direct staff to work with us. Let us focus on getting projects shovel ready, so we can qualify for federal stimulus or infrastructure funds. Let us implement the plan we submitted to you only two years ago. With this direction, I think we can come to agreement with your staff and El Cerrito could support this requirement in the final Order		

Response to Comments on September 10, 2021, Tentative Order
Provision C.4. – Industrial and Commercial Site Controls

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SCVURPPP-48 to 55 SMCWPPP-86 to 93 CCCWP-30 to 32 ACCWP-29 to 31 City of Oakland-13 and 14	C.4 Fact Sheet	There is no rationale provided in the Fact Sheet for the increase in reporting requirements related to reporting individual potential/ actual discharges resolved, sites at each enforcement action level, number of sites with enforcement actions unresolved in a timely manner, and highest level of enforcement implemented, including business names/ addresses. There is an increase in reporting requirements from MRP 2 to MRP 3 with no rationale provided for the need for this information. Provide rationale for increased reporting requirements.	Although the additional reporting requirements would allow the Water Board to more specifically evaluate which industrial and commercial sites have repeated, escalated, or unresolved enforcement actions, and coordinate with Permittees to help prioritize their oversight of facilities of greater concern, during this Permit term we will only require the Permittees to make the inspection tracking system available upon request, consistent with MRP 2 and the requirements for construction sites in C.6. If we determine through audits, inspections, or tracking system review during this Permit term that there are sites of particular concern that are not appropriately being addressed to resolve violations or referred to the Water Board for escalated enforcement, we will consider the need for more specific reporting requirements during a future permit reissuance.	Removed additional reporting requirements.
Baykeeper-13	C.4.b	Revise C.4.b.ii.(2).(b) to require a minimum number of inspections per year. We recognize that each Permittee's jurisdiction varies in size, and therefore no single number could fairly apply to all Permittees, but instead recommend a revision to include a set percentage (i.e., 10%) of industrial and commercial sites	The Tentative Order has not been updated to require Permittees to inspect a minimum percentage of facilities. As the commenter points out, the number of facilities in each municipality varies greatly. For larger Permittees, even a small percentage of facilities would translate to a high number, and the range of potential water quality issues among facilities, and more broadly within a permittee's jurisdiction, gives benefit	None.

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		with potential to discharge stormwater pollutants be inspected annually.	to permittees having the flexibility to use resources for relatively more-urgent water quality issues. In addition, the Permittees' resources and capacity vary widely. The Water Board has only general information about the Permittees' finances, and no control over the allocation of resources to stormwater management, and is mindful of setting targets with which Permittees are incapable of complying. That said, C.4.b requires the Permittees to establish a prioritized inspection plan that includes a stated inspection frequency, and C.4.d requires permittees to prepare and implement an enforcement response plan that includes escalating enforcement to resolve water quality issues. These tools are sufficient to ensure Permittees are appropriately attending to facilities.	
SCVURPPP-42 SMCWPPP-80	C.4.b.ii	The Provision should not specifically state how a Permittee must meet the requirement to identify new businesses. This language should be placed in the Fact Sheet. In addition, the current language implies using all sources.	Comment noted. Permittees are expected to be aware of the commercial and industrial businesses operating in their jurisdictions and the provision describes factors to consider when permittees are prioritizing inspections of those businesses. However, the provision does not specify how permittees must identify new businesses. Separately, we disagree that the Permit implies a Permittee must use all listed sources of information to develop and update their inspection prioritization. The language	None.

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			states that "Permittees may use a variety of sources, including, but not limited to business license applications, tax records, and inspectors' observations." As such, those are examples for Permittees to consider—although the listed sources are typically used by Permittees.	
SCVURPPP-43 SMCWPPP-81 ACCWP-27 City of Oakland-12	C.4.b.ii	The addition of fueling areas will lead to additional businesses being added to Business Inspection Plans. This is an increase in requirements and new addition to the Permit with no rationale provided in the Fact Sheet for the need to include this category.	We have added information regarding fueling areas to the Fact Sheet section for C.4. Fueling areas were included because they are reasonably likely to contribute to stormwater runoff pollution and are a common focus area of stormwater program inspections, including other MS4 permits, as discussed in the Fact Sheet.	Added discussion of fueling areas to Fact Sheet.
SCVURPPP-44 SMCWPPP-82 ACCWP-28	C.4.b.ii.(b)(vii)	Most (if not all) Permittees have restaurants identified in their Business Inspection Plans. One of the reasons restaurants are included is because of the grease handling and storage (i.e., waste storage function). However, "other food service businesses" is too general and could lead to the incorporation of a significant number of other businesses that do not have a reasonable likelihood to be sources of pollutants, such as an ice cream shops, coffee shops that do not	This provision identifies facilities that are likely sources of pollutants to the storm drain. The inclusion of "other food service businesses" reflects the potential for discharges of pollutants associated with their activities, including waste storage and trash generation from disposable food packaging and utensils in areas where food is consumed by customers of the businesses on the premises. The language has been updated to note that only food service businesses that either prepare food or have onsite eating or drinking areas for customers are required to be included.	Added discussion of food service businesses and supermarkets to Fact Sheet.

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		serve any food, places that only serve prepackaged food, etc. This would be overly burdensome to municipal inspection programs with no likely additional water quality benefit. It is unclear why supermarkets or large grocery stores with outdoor waste storage or cardboard compacting areas were added to the list. There is no supporting reason provided in the Fact Sheet for these additional business categories. Note that outdoor waste storage, handling, and disposal areas are already included in the type of functions that Permittees evaluate for including businesses in the Business Inspection Plans.	Waste from supermarkets and food service businesses is reasonably likely to contribute stormwater runoff pollution, and is a common focus area of stormwater program inspections, including other MS4 permits, as discussed in the Fact Sheet. This language was discussed with the Permittees, including the commenters, as it was developed. In those discussions, with permittees as the language was developed, we considered including a broader range of stores selling groceries (e.g., corner stores and bodegas), but limited the category to supermarkets and large grocery stores to reflect the elevated pollutant threat posed by those businesses, including potential discharges of trash, fluid milk products, and other wastes.	
CCCWP-26	C.4.b.ii.(2)(f)	Permittees maintain the list of commercial/ industrial facilities to be inspected, receive reports from the inspector, and verify that the inspector has had the appropriate training, which is reported on thoroughly in the annual reports. Therefore, creating a list of entities and their responsibilities as well as how they are managed is unnecessary reporting and adds	This information is necessary to ensure effective coordination when multiple entities are responsible for completing inspections and follow-up. This provision requires that, where a Permittee relies on multiple entities to perform business and commercial inspections, the Permittee submit a list of those entities, their responsibilities, and describe how the work is coordinated. Past Water Board inspections have found a lack of effective coordination when multiple	None.

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		an additional administrative reporting burden.	entities are involved with business inspections.	
CCCWP-27	C.4.b.ii.(3)(b)	The recordkeeping required is excessive and will require a significant increase in resources to comply. It is unclear as to the meaning and intent of adding "mobile businesses for outdoor fueling." Recordkeeping for these types of mobile businesses has separate challenges from stationary locations, as mobile businesses may operate out of residential addresses outside the purview of an individual jurisdiction, and should not be included in the provision.	We disagree. The required recordkeeping in this subprovision is the same as C.4.b.ii.(3)(b) in MRP 2, except for the addition of "…use of mobile businesses for outdoor fueling, washing, etc." Permittees are using their existing tracking and reporting systems to meet this recordkeeping requirement. While mobile businesses that conduct fueling and washing would need to be added, that would be an incremental change. It is necessary because those businesses can be significant sources of pollutants (e.g., discharged fuel, potable water, and surfactants), and would be done consistent with the rest of the provision's requirements (e.g., business license review). It may be assisted by coordination between permittees as part of the mobile cleaner outreach program that has been in place for more than 20 years.	None.
San Jose-21	C.4.b.ii.(3)(b)	Not every agency uses SIC codes to classify their industries, and some have transitioned away from the older 4-digit SIC code system and towards using the newer and more specific 6-digit NAICS codes. Both code systems allow permittees to identify businesses that can cause or contribute to	We agree and have updated the provision language as requested.	Allow submission of SIC or NAICS codes.

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		pollution of stormwater runoff. While SIC Codes are still used by many industries and permittees, the SIC Code system has not been updated since 1987. NAICS was designed to and eventually will fully replace SIC. Allow permittees to use the standardized classification system that works best for them.		
CCCWP-28 SCVURPPP-45 SMCWPPP-83	C.4.b.iii	Reporting information on a Permittee's internal procedures for issuing business licenses is outside the scope of stormwater management, as the information and the operations are often in a separate department than stormwater. This would be an unnecessary burden for stormwater programs and the purpose of this reporting activity is not clearly linked to the protection of stormwater. Additionally, not all Permittees issue business licenses.	We disagree. This provision imposes a one-time requirement for Permittees to report on which Permittee entities are responsible for reviewing and approving business licenses, or to provide a link to the Permittee's website for business license applications. This should be straightforward, as Permittees' stormwater program staff have been coordinating with those entities for many years as a source of information to determine sites to prioritize for inspection. Under SB 205, and separate from the Permit, Permittees with business license programs are required to have businesses confirm their SIC code and enrollment status under the Statewide Industrial Stormwater NPDES General Permit. The Water Board will use the information submitted under this provision to coordinate with Permittees and help prioritize its oversight of potentially	None.

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			polluting facilities, including conducting additional outreach in jurisdictions without business license programs or where businesses are required to renew their business license less frequently.	
SCVURPPP-46 SMCWPPP-84	C.4.c.ii	Emergency Response Plans are regulatory reports required for businesses by other regulations (e.g., hazardous materials regulations, state emergency preparedness, etc.). Stormwater inspectors inspect businesses for compliance with local stormwater ordinances, which require appropriate BMPs, but do not require emergency response plans. These plans should be reviewed by the appropriate agencies requiring their completion (e.g., fire departments, CUPA) to avoid inconsistent and duplicative requirements. Delete lack of emergency response plans from list of examples.	We disagree with the proposed deletion. C.4.c.ii.(2) includes “lack of emergency response plans” as an example of a scenario that could lead to a discharge of pollutants. Permittees are not required to review emergency response plans, although for a number of permittees, the inspector doing a stormwater inspection may also be a CUPA or fire department inspector who is qualified to do the review. Stormwater inspectors may determine during an inspection that there is a potential for discharges from a scenario such as an uncontrolled spills, in part because the business does not have an emergency response plan to manage the spill. Under this provision, the Permittees' stormwater inspectors have the flexibility to determine when the lack of an emergency response plan could contribute to a potential discharge.	None.
SCVURPPP-47 SMCWPPP-85	C.4.c.ii.(3)	Revise this to be consistent with the MRP 2 text: "Corrective actions can be temporary and more time can be allowed for permanent corrective actions." By breaking up	We concur with the intent and have revised the language to reflect this.	C.4.c.ii.(3) is revised, in part, to read: "Corrective actions can be

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		this sentence it implies any corrective action can be temporary. While the intent is to allow a facility to implement a temporary corrective action while a permanent corrective action is being implemented over a longer time schedule.		temporary when appropriate, in which case more time can be allowed for permanent corrective actions."
CCCWP-29	C.4.d.ii.(1)(b)	Mobile businesses are already part of Provision C.5, and looking for discharges is already part of the inspection process. The observations for evidence of these discharges is already an established part of the Inspection Plan and this additional specificity is not necessary.	See response to CCCWP-27. Mobile businesses can be a significant source of pollutants, and due to the inherent difficulties in inspecting mobile businesses, observations should be conducted when they are operating as part of the activities of a facility already included in the Inspection Plan. As the commenter notes, making observations for such discharges is already included as part of their Inspection Plan, hence no additional effort would be required.	None.
ACCWP-29 CCCWP-31 SCVURPPP-52 SMCWPPP-90 City of Oakland-13	C.4.d.iii.(1)(h)	The information required for the list of facilities that may need coverage under the Industrial General Permit, but have not filed for coverage, has increased. Reporting the date the facility was first identified may be difficult since this information was not required to be tracked in pervious Permits. It could be a significant amount of resources to review past inspection reports of the previous	Due to this information now only being made available upon Water Board request rather than in each Annual Report, the intent of this requirement is to help the Water Board prioritize its oversight of new facilities identified by Permittees. However, we have clarified that the intent is for this information only to be recorded for new facilities added to the inventory during this Permit term, and have renumbered the subprovision as requested.	Revised language to clarify requirement to collect information for new facilities and renumbered subprovision.

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		10 years to identify when a facility was first reported to the Water Board. Water Board staff should have the dates facilities were previously reported since they have all of the previous Annual Reports from Permittees. In addition, since this list is available upon request it should not be included under the Annual Report requirements. This should be identified as item C.4.d.iii.(2).		

Response to Comments on September 10, 2021, Tentative Order
Provision C.5. – Illicit Discharge Detection and Elimination

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F5C - 2-2	C.5	The first paragraph of C.5 appears to exempt discharges associated with homeless populations from C.5's provisions for detecting and controlling illicit discharges, because those discharges are in some sense "otherwise controlled" by new C.17. However, C.17 requires no actual control – only various maps and reports, some due in 2023 or 2025. Why not reevaluate requirements after a year or two? Under this draft, it appears that the Board could not threaten action where camps pave shorelines with trash and feces, draw rats, and wash soap, gasoline, and other pollutants into streams.	Comment noted. This paragraph indicates that the provision applies when illicit discharges are “not otherwise controlled” under other provisions. It does not exempt illicit discharges related to those provisions. Furthermore, C.17 does not only require reports. C.17.a.ii.(3) requires the implementation of best management practices to control discharges associated with unsheltered homelessness, and C.17.a.ii.(4) requires the Permittees to update their implementation practices with lessons learned over the permit term.	None.
ACCWP-32	C.5	“Discharges Associated with Unsheltered Homeless Populations” could be interpreted as criminalizing unsheltered persons. All text pertaining to C.17 should be removed from this provision.	This cited language in the first paragraph of C.5, and associated references to C.4 and C.6, have been included to recognize other parts of the Permit that are significantly related to C.5 and to facilitate coordinated implementation. As noted elsewhere in this Response to Comments, non-stormwater discharges associated with unsheltered homelessness, such as trash and sewage, are illicit non-stormwater discharges. However, the inclusion of C.17 is intended to give permittees an approach to address such	None.

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			discharges that is more flexible than that framed in C.5, particularly by focusing on managing those issues while permittees seek longer-term solutions to homelessness that are beyond the Permit's scope. The intent of C.17 is to ensure that C.5 does not result in the *de facto* criminalization of unsheltered homelessness, while still protecting water quality.	
ACCWP-34 CCCWP-36 SMCWPPP-107 and 118 SMCWPPP-106 SCVURPPP-68 and 69 City of Oakland-16 San Jose-24	C.5 Fact Sheet and C.5.e.ii	C.5.e includes new text: "This Permit shifts the enforcement approach focus from developing an inventory of mobile businesses and direct observation of mobile business activities to reiterating that the entity hiring the mobile business and the mobile business themselves are responsible for any polluted discharge from the business or property." This statement is not consistent with the increase in requirements related to updating mobile business inventories and inspections. Remove additional requirements related to the inventory and inspections to be consistent with	As stated in the Fact Sheet, the Water Board is aware of inherent difficulties in inspecting mobile businesses. Therefore, a key component of Permittees' approach to regulating them will be to require minimum BMPs for operation of those businesses where these are not already in place. To establish these BMPs, Permittees must have accurate inventories. Similarly, inspections will provide information on which BMPs are needed for particular mobile business types, and where more outreach is necessary.	None.

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		this statement of the Board's intent.		
SCVURPPP-56 SMCWPPP-94 CCCWP-33	C.5.a.ii.(4)	Generally, Permittees want discretion to issue enforcement actions to any or all parties involved with mobile business activities. However, Permittees must discuss with legal counsel. There may be limitations on authority to consider. Suggest revising wording to provide more flexibility by replacing "and" with "or." A timeline for Permittees to amend ordinances, as needed, should be incorporated into the permit implementation.	This subprovision requires Permittees to have adequate legal authority to hold all parties associated with discharges from mobile businesses responsible for stormwater pollution associated with their operations. The Permittees retain the discretion to complete appropriate progressive enforcement. This authority is necessary to ensure permittees can successfully control illicit discharges and implement appropriate enforcement actions depending on the specific scenario. The commenters did not identify a suggested timeline for ordinance amendments or note Permittees who do not currently have adequate legal authority to implement this subprovision. Permittees have certified for more than 20 years that they have adequate legal authority to control non-stormwater discharges in their jurisdictions, and regularly complete enforcement actions against businesses and property owners. As such, Permittees currently should have sufficient authority to implement this subprovision.	None.
SCVURPPP-57 SMCWPPP-95	C.5.b.ii	Emergency response plans are regulatory reports required for businesses by other regulations (e.g., hazardous materials regulations, state emergency	See response to SCVURPPP-46.	None.

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		preparedness). Stormwater inspectors inspect businesses for compliance with local stormwater ordinances, which require appropriate BMPs, but do not require emergency response plans. These plans should be reviewed by the appropriate agencies requiring their completion (e.g., fire departments, CUPA) to avoid inconsistent and duplicative requirements. Delete lack of emergency response plans from list of examples.		
SMCWPPP-96 SCVURPPP-58	C.5.b.ii	Keep MRP 2 text: "Corrective actions can be temporary, and more time can be allowed for permanent corrective actions." By breaking up this sentence it implies any corrective action can be temporary. While the intent is to allow a facility to implement a temporary corrective action while a permanent corrective action is being implemented over a longer time schedule.	We concur with the intent and have changed the language to reflect this.	C.5.b.ii.(3) is revised, in part, to read: "Corrective actions can be temporary when appropriate, in which case more time can be allowed for permanent corrective actions."
SCVURPPP-59	C.5.c.ii	The revisions [from MRP 2] make the Permittee's website the only	We agree that information may be provided via a range of means. At a minimum,	The language "publicized to

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SMCWPPP-97		place the central contact phone number needs to be publicized. Permittees may also publicize the phone number on outreach material and Countywide Program websites. Note the reporting requirements in C.5.c.iii.(3) still contain language asking for a discussion of how the central contact point is being "publicized to the Permittees' staff and the public" even though this wording was deleted from this implementation section. Revise as follows (revisions in italics): Each Permittee shall publicize the phone number on its website, and, if used, a web reporting address or link to a web-based reporting application*, to internal Permittee's staff* *and the public. The Permittee's website shall be one of the places the central contact point is publicized.* The contact information on the permittee's website shall be kept up-to-date, and updated*, as needed,* at least annually. This central contact point	Permittees must publicize the phone number or other contact information on its website, so that the public can easily find where to report complaints. Permittees are free to publicize their phone number or other contact information through other outreach materials or websites as well, but it is unnecessary and duplicative to include language that "[t]he Permittee's website shall be one of the places the central contact point is publicized." We returned the MRP 2 language "publicized to the Permittees' staff and the public" to the C.5.c.ii Implementation Level and noted that the contact information on Permittees' websites only needs to be updated annually when changed.	the Permittees' staff and the public" has been added back to the C.5.c.ii Implementation Level, and annual updates to the contact information on the Permittees' websites are only required when that information changes.

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		shall be readily searchable and accessible on the Permittee's website.		
SCVURPPP-60 SMCWPPP-98 CCCWP-34	C.5.c.ii.(6)	As compared to MRP 2, MRP 3 adds a time frame for illicit discharges to be investigated within 3 business days from the date the complaint was received by the Permittee. There may be instances when it is reasonable for the start of an investigation to take longer than 3 business days. In these few cases there should be an option to document a rationale.	We agree and have updated the language to allow more time with a documented rationale. This requirement was added to reflect the Implementation Level from the statewide Small MS4 NPDES General Permit, which also allows for an explanation to be provided when additional time is needed.	C.5.c.ii.(6) language updated to state: "If additional time is required, the Permittee shall document the rationale for the delay."
SCVURPPP-61 SMCWPPP-99	C.5.d.ii.(2)(a)	The implementation level specifies the records are for tracking "water quality spills, dumping, and complaints that might discharge into the MS4." Therefore, this clarification of "Date and time investigation of spill or discharge started" is not needed in the tracking system information.	We disagree that the information is not needed. It is needed to demonstrate that Permittees timely responded to spills, dumping, and complaints, and the cited language has been included to clearly explain what information is required.	None.
SMCWPPP-100 SCVURPPP-62 ACCWP-33	C.5.d.ii	The stated purpose of this provision is to control illicit discharges. Illegal dumping is not necessarily an illicit discharge. For example, illegal dumping of mattresses, furniture, etc. would	We agree with the commenters that not all instances of dumping may lead to a discharge to the MS4. However, this does not require a change to the provision language. The provision does not require that such instances be tracked. As noted by	None.

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City of Oakland-15		not lead to a discharge to receiving water. This type of illegal dumping is typically handled and tracked by other programs and departments and should not be tracked in the illicit discharge tracking system. This is duplicative of requirements in C.10 related to trash hot spot cleanups. If illegal dumping is required to be tracked in the illicit discharge tracking system it would be a significant amount of work for Permittees to coordinate with other departments and update their electronic tracking system. The implementation level specifies the records are for tracking "water quality spills, dumping, and complaints that might discharge into the MS4". Therefore, this additional tracking requirement is outside of the scope of this Provision. Delete added language.	the commenters, the tracking requirement applies to "water quality spills, dumping, and complaints that might discharge into the MS4." Instances of dumping that do not have the potential to discharge to the MS4 are not required to be tracked.	
San Jose-22	C.5.d.ii.(2)(b)	'Illicit discharge' and 'illegal dumping' are two distinct and non-interchangeable terms. Water Board staff updated C.5 language to reflect this, but missed one instance.	We agree that the terms are different, although they refer to categories that may overlap. Please see response, above, to: SMCWPPP-100 SCVURPPP-62 ACCWP-33	None.

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		Update language as follows: "Date and time response to spill or discharge complaint started."	City of Oakland-15	
SCVURPPP-63 SMCWPPP-101	C.5.d.ii.(2)	The requirement should be to only track other agencies if they oversee the resolution. Revise as follows: (c) Agency, department, or other entities responding to the complaint or discharge if Permittee does not otherwise track resolution of discharge in their jurisdiction;	We disagree that an edit is needed. The cited requirement is to indicate which agency(ies) or outside entity(ies) has(have) been directed to respond. This information will help track effective coordination between multiple agencies or entities in responding to a complaint or discharge.	None.
SCVURPPP-64 SMCWPPP-102	C.5.d.ii.(2)(e)	It would require a significant amount of effort to revise electronic data tracking systems to identify the specific storm drain or specific receiving water instead of a yes/no response if it entered a storm drain or receiving water. Revise to only require a yes/no response.	We have updated the language to address the concern about level of effort. In general, Permittees should be aware of to where discharges in their jurisdictions may discharge. Providing location information for spills and discharges helps to maintain a record of historical spills and track where additional cleanup activities may be required. We have updated the language to allow reporting of only the location of the storm drain using addresses or streets, if they do not have a means of readily identifying the storm drain and receiving water.	Updated language accordingly.
SCVURPPP-65	C.5.d.ii.(3)	This Provision addresses “illicit discharges not otherwise controlled under C.4, C.6, and	This subprovision gives Permittees flexibility to address illicit discharges associated with unsheltered homeless populations by noting	None.

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SMCWPPP-103 CCCWP-35		C.17 – Discharges Associated with Unsheltered Homeless Populations." Therefore, tracking discharges associated with unsheltered populations should not be included in C.5. Furthermore, illicit discharges from unsheltered homeless populations are of multiple types, and mitigating discharges associated with unsheltered homeless populations is fundamentally a health and human services issue. It is inappropriate and burdensome to consider illicit discharges from unsheltered homeless populations as subject to municipal controls in the same manner as other categories of illicit discharges identified in C.5.a. In addition, Permittees are already working with taskforces and other agencies to address the root causes of homelessness that goes beyond the scope of C.5.d, making the permit language redundant and unnecessary. Recommendation: Remove the requirements and address these	that responses to those discharges shall be coordinated with the Permittees' efforts under C.10 and C.17. Permittees are not required to separately record such discharges in their tracking system that are being addressed through broader implementation of C.17 requirements, but they may choose to do so.	

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		matters per the comments on C.17.		
SCVURPPP-66 SMCWPPP-104	c.5.d.iii	The new requirement to provide copies of phone trees and contact lists in the 2026 Annual Report is listed under the Annual Report. To avoid confusion, renumber this section to separate the Annual Reporting requirements from the 2026 reporting.	We agree and have moved the reporting requirement to the 2026 Annual Report in C.5.c.iii.(4).	Moved requirement to C.5.c.iii.(4).
SMCWPPP-105 SCVURPPP-67	C.5.e.ii	Graffiti removal mobile businesses that utilize power washing are already included in the power washing category. Delete graffiti removal from list of mobile business categories.	We disagree that an edit is needed. While we agree that graffiti removal can be conducted via power washing, which is already a listed category, removal may also be conducted using other methods, which could still contribute pollutants to stormwater or result in non-stormwater discharges to the MS4.	None.
SCVURPPP-70 and 71 SMCWPPP-108 and 109	C.5.e.iii	The inspection reporting requirements for the 2026 Annual Report are duplicative of new Annual Reporting requirements to report number of inspections and summary of enforcement actions taken. These requirements should be deleted from the 2026 Annual Report or the Annual Report requirements in C.5.e.iii.(2) should be deleted.	We agree that the annual inspection reporting requirements are sufficient, and the 2026 Annual Report does not need to summarize the cumulative inspection and enforcement actions taken during the Permit term.	Deleted cumulative reporting requirements in C.5.e.iii.(1).(c) and (d).
SCVURPPP-74	C.5.f	The added text of making the MS4 map available to the public "upon request" is in conflict with the	The Permit differentiates between current MS4 maps that are to be made publicly available and future updates to MS4 Maps	Revised to clarify that current MS4

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SCVURPPP-78 SMCWPPP-110 SMCWPPP-112 SMCWPPP-116		requirements in C.5.f.ii.(1) to make MS4 maps publicly available and reporting requirement C.5.f.iii.(1) to discuss how Permittees make MS4 maps available to the public and how they publicize the availability of the MS4 maps. Separate the requirement to "make MS4 maps available to the general public and publicize availability" from the requirement to "update storm drain system maps with more detailed information."	for which Permittees must determine missing information and develop a plan and schedule to update. These are already described separately in C.5.f.ii.(1) Current MS4 Maps and C.5.f.ii.(2) Updates to MS4 maps. The referenced text from C.5.f.i Task Description has been revised to clarify that only current MS4 maps are to be made available to the public.	maps are to be made available to the public.
ACCWP-35 SCVURPPP-74 to 76 SMCWPPP-111 SMCWPPP-114 SMCWPPP-116 to 117 City of Oakland-17	C.5.f	It is unclear in this Provision, given the new requirements, if there are different MS4 maps required for different purposes. The level of detail needed for an MS4 map is different depending on the target audience. Not all Permittees use the Oakland Museum maps as part of their mapping system. There should be a distinction between the types of maps that must be made publicly available and the maps with more component information that are now being required. The general public does not need to know (nor most likely would be interested in) the specification, materials of construction, and condition. From	The requirement to update MS4 maps is distinct from the requirement to make current MS4 maps available to the public, as discussed in response to SCVURPPP-74. Permittees are not required to use the Oakland Museum maps, but they are included as one of multiple resources that Permittees may consider in developing a plan to update their MS4 maps. The Permit does not require Permittees to collect new information on each characteristic and condition of their storm sewer system, but only to consider potential opportunities to identify those characteristics when developing their plan to update MS4 maps. The Permittees also have the opportunity to discuss in their plan what updated information will be made available to the public and how it will be provided. The	Revised C.5.f.ii.(2) for consistency with C.5.f.i.

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		a safety and security perspective, there may be a concern with municipalities making their infrastructure details available to the general public.	language in C.5.f.ii.(2) has been updated to reflect this and remain consistent with the C.5.f.i. Task Description.	
ACCWP-36 to 37 CCCWP-37 SCVURPPP-73 SCVURPPP-77 SCVURPPP-79 SMCWPPP-113 SMCWPPP-115 San Jose-23	C.5.f.ii.(2)	The requirement to have a map/database of storm sewer system "component" locations, size, specifications, materials and condition is beyond what is required by 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5). Requiring condition assessments would place considerable strain on already limited budgets to implement a new program which would be unreasonably resource intensive and would not result in any demonstrable water quality improvements. If Water Board staff are interested in confirming MS4s have up to date maps or databases of their systems for internal use the requirement can be revised to submit a description of MS4 components mapped and/or available in information systems, or by submitting annual revisions or verifying that no modifications to the system occurred. The descriptions may	See response to ACCWP-35. Permittees are given the flexibility to develop a plan and schedule to update their MS4 maps and evaluate the potential information that can be included. The requirement to update MS4 maps to ensure the information provided is accurate is consistent with other MS4 permits as discussed in the Fact Sheet.	None.

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		include what size and types of components are mapped and what information is available. Reduce the update requirements to eliminate the inclusion of materials of construction and condition, or remove this provision so that Permittees can prioritize resources for efforts that will result in improvements to water quality with the necessary green stormwater infrastructure planning and implementation which represent greater improvements to the storm sewer system than map updates.		

Response to Comments on September 10, 2021, Tentative Order
Provision C.6. – Construction Site Control

Comment No.	Provision	Comment	Response	Proposed Revision
SMCWPPP-124 SCVURPPP-85	C.6 Fact Sheet	Keep original text: "This section requires all Permittees to require all construction sites to have year-round seasonally appropriate effective BMPs in the following six categories." It is misleading to add "now" to this Provision since the requirements were in previous permits. Also recommend not adding "or" since the intent is sites use BMPs all year long. Different BMPs may be used throughout the year (i.e., seasonally appropriate).	We agree and have updated the Fact Sheet language as requested.	Updated Fact Sheet language.
SMCWPPP-125 SCVURPPP-86	C.6 Fact Sheet	Combine two sentences to correct punctuation: "Because sites' terrain, soil type, soil disturbance, and proximity to waterbodies differ, it would be unduly prescriptive and inappropriate to require all sites to implement a specific set of BMPs."	We agree and have updated the Fact Sheet language as requested.	Updated Fact Sheet language.
SCVURPPP-81 SMCWPPP-120	C.6.b.ii	Keep original text: "Corrective actions can be temporary, and more time can be allowed for permanent corrective actions." By breaking up this sentence it implies any corrective action can be temporary. While the intent is to allow a facility to implement a temporary corrective action while a permanent corrective action is	We agree and have revised the language to reflect the intent of the requested change.	Updated language to “Corrective actions can be temporary, in which case more time can be allowed for permanent corrective actions”

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		being implemented over a longer time schedule.		
SMCWPPP-119 SCVURPPP-80	C.6.b.ii	Emergency response plans are regulatory reports required for businesses by other regulations (e.g., hazardous materials regulations, state emergency preparedness). Stormwater inspectors inspect businesses for compliance with local stormwater ordinances, which require appropriate BMPs, but do not require emergency response plans. These plans should be reviewed by the appropriate agencies requiring their completion (e.g., fire departments, CUPA) to avoid inconsistent and duplicative requirements. Delete lack of emergency response plans from list of examples.	See response to SCVURPPP-46.	None.
SCVURPPP-82 SMCWPPP-121	C.6.e.ii	There is a new electronic data tracking requirement to record the department, agency, or other entity performing the inspection. This is an increase in reporting requirements.	When Permittees implement inspections between multiple entities, it is important to ensure effective coordination. These reporting requirements allow the Water Board staff and interested public to understand how the inspections are being conducted and what entities are responsible for any enforcement follow-up.	None.

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Provision C.6. – Construction Site Control

Comment No.	Provision	Comment	Response	Proposed Revision
ACCWP-38	C.6.e.iii.(4)	The reporting required for inspections, active sites, enforcement actions, and illicit discharges is onerous. This information should be kept by Permittees and available on request by Water Board staff. The reporting requirements should be deleted.	We disagree that the requirement to report summary/"roll-up" numbers is onerous, and note the Permittees are reporting this information under the previous Permit. The requirement to summarize each year information like the number of sites requiring inspection, total number of inspections conducted, and number of enforcement actions taken is necessary to allow the Water Board and the interested public to evaluate how Permittees are implementing the Permit requirements to control discharges from construction sites, and are consistent with the previous permit. The commenter has not suggested alternatives for the Water Board to determine compliance with this provision.	None.
SCVURPPP-83 SMCWPPP-122	C.6.e.iii	"Evidence of illicit discharges" is a clearer statement of why it is suspected that there was an illicit discharge than "suspected" illicit discharges. An inspector may suspect a discharge occurred, but without evidence inspectors will not issue enforcement. Recommend not changing wording.	In response, we revised the language to refer to "actual and potential" for consistency with the rest of the Permit. The Permit uses the term "potential discharges," as defined in the Glossary and developed in coordination with the Permittees, to describe the types of suspected discharges to evaluate during inspections and implementation of the Enforcement Response Plan. Potential discharges include those supported by evidence (e.g., observed, determined through review of documentation, or through discussion with facility staff).	Updated language accordingly.

Response to Comments on September 10, 2021, Tentative Order
Provision C.6. – Construction Site Control

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-84 SMCWPPP-123	C.6.f.iii	There is an increase in [Staff Training] reporting requirements to report the number of municipal and non-municipal inspectors separately. Consultants that perform these inspections do so on behalf of the municipality. It is unclear why there needs to be a distinction.	We agree that it is not necessary to report municipal and non-municipal inspectors separately, but we want to ensure Permittees report the total number of inspectors involved with C.6 implementation, including both municipal and non-municipal staff. We have updated the language to reflect this.	Updated language accordingly.

Response to Comments on September 10, 2021, Tentative Order
Provision C.7. – Public Information and Outreach

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-87 SMCWPPP-126 SMCWPPP-127 SMCWPPP-128 SMCWPPP-129 SMCWPPP-130 SMCWPPP-131	C.7.a to C.7.g	Reporting requirements consolidated in new Tracking and Reporting subprovision.	Comment noted.	None.
ACCWP-39 SMCWPPP-132 SMCWPPP-133 SMCWPPP-134	C.7.g	There is an increase in onerous reporting requirements. Summarizing program activities should only be required once during the Permit term with the 2027 Annual Report	We disagree. As compared to the previous permit, public information and outreach reporting has been simplified and modestly reduced. Permittees are no longer required to prepare or submit a comprehensive analysis of outreach activities; while they have to maintain a list of outreach activities and associated information under C.7.g.i that is otherwise roughly equivalent to the previous permit, that information no longer has to be reported annually (instead, it must be made available upon request, as noted in C.7.g.ii). The list includes an effectiveness evaluation under C.7.g.iii.(3), as did the previous permit. However, the effectiveness evaluation is now required only once during the Permit term, in 2027, rather than	None.

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			annually, as under the previous permit. And, the Annual Report now only requires a summary table of the types of activities implemented with a brief description, as noted in C.7.g.iii.(1).	
Baykeeper-14	C.7	C.7 should be revised to more clearly incentivize creek/shore cleanups so Permittees will continue to fund cleanups, even in the absence of trash load reduction credits in C.10.f.i. Baykeeper recognizes the value of creek and shoreline cleanups to connect the public with the natural environment and we support Permittees continuing their creek and shoreline cleanup efforts. C.7.c requirements for public outreach and citizen involvement events already includes cleanups as a type of public outreach event. Additionally, C.7.d requirements for watershed stewardship collaboration requires Permittees to collaborate with other organizations to encourage and support community watershed stewardship activities, which can also include creek/shore cleanups. The Water Board should revise C.7 to more explicitly incentivize creek/shore cleanups to ensure	We agree that creek and shoreline cleanups can help foster stewardship and connect the public to the natural environment. The Permit supports their continuation. As noted by the commenter, creek and shoreline cleanups are options to meet the Permittees' public outreach requirements under C.7.c and C.7.d. The absence of an explicit requirement for all Permittees to complete such cleanups allows flexibility based on local priorities and resources.	None.

Comment No.	Provision	Comment	Response	Proposed Revision
		these activities will continue in the absence of the trash load reduction credit in C.10.f.i.		

Response to Comments on September 10, 2021, Tentative Order
Provision C.8. – Water Quality Monitoring

Comment No.	Provision	Comment	Response	Proposed Revision
Baykeeper-11	C.8	1) C.8's Monitoring Program Fails to Monitor Whether Stormwater Discharges Comply with MRP Conditions, in Violation of the CWA's Minimum Monitoring Requirements. It is well-established that every NPDES permit must include discharge monitoring sufficient to determine compliance with all permit limits—in this case, Draft MRP 3's requirement to comply with all applicable receiving water limitations. As recently explained by the Ninth Circuit Court of Appeals: [T]he [CWA] requires every NPDES permittee to monitor its discharges into the navigable waters of the United States in a manner sufficient to determine whether it is in compliance with the relevant NPDES permit. 33 USC § 1342(a)(2); 40 CFR § 122.44(i)(1) ("[E]ach NPDES permit shall include conditions meeting the following . . . monitoring requirements . . . to	Please see Master Response Identifier C.8-1.	Please see Master Response Identifier C.8-1.

Comment No.	Provision	Comment	Response	Proposed Revision
		assure compliance with permit limitations.”). That is, an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance. Natural Res. Def. Council v. Cnty of L.A., 725 F.3d 1194, 1207 (9th Cir. 2013). The monitoring program in C.8 fails to comply with this core requirement. Neither the Water Board, the Permittees, nor the public, can use the monitoring in C.8 to determine whether a Permittee is in compliance with the permit terms or the CWA. First, C.8 does not mandate wet weather monitoring – Permittees can select dry weather monitoring instead. Thus, the permit regulating urban runoff does not require stormwater runoff sampling. This failure is analogous to the COVID testing policy under the Trump Administration: it’s not there if we don’t test for it. An MS4 permit must assess whether stormwater discharges meet permit terms, and it defies logic that Draft MRP 3 continues to fail		

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		to require outfall monitoring for all parameters. Second, C.8 does not require outfall sampling from the Permittees' MS4 systems. The Fact Sheet provides a series of rationales for the failure to include outfall monitoring, but does not explain how regional monitoring (or any other monitoring included in Draft MRP 3) can be used to evaluate compliance by any Permittee. In fact, both Water Board staff and Permittees have confirmed that current monitoring—continued in C.8—is inadequate to evaluate compliance. The State Board has confirmed the necessity of end-of-pipe sampling in MS4 permits—particularly where, as here, safe harbors are utilized. As noted by the State Board in Orders WQ 2015-0075 and WQ 2020-0038, outfall monitoring is an appropriate way to determine compliance with water quality standards in MS4 permits in conjunction with		

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		receiving water monitoring: The State Water Board said outfall monitoring is an appropriate way to determine compliance: "Wet weather receiving water monitoring is fundamental to assessing the effects of storm water discharges on water quality and determining the trends in water quality as Permittees implement control measures. Compliance may be determined at the outfall – for example, where a permittee determines that the discharge does not exceed an applicable WQBEL or receiving water limitation – but outfall monitoring alone cannot provide broader data related to trends in storm water discharge impacts on the receiving water. Further, because Permittees are responsible for impacts to the receiving waters resulting from their MS4 discharges, Permittees may be required to participate in monitoring not only in receiving waters within their jurisdiction, but in monitoring all receiving waters that their discharges impact." State Board Order WQ 2015-0075 at 65-		

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		66. 2) Wet Weather Outfall Monitoring is Feasible and Appropriate Region 2 is the only urban coastal region in the state that does not currently require wet weather outfall discharge monitoring by Phase 1 municipal stormwater permittees. Other regions, including Regions 9 (San Diego), 8 (Santa Ana), and 4 (Los Angeles) require such monitoring from Phase 1 municipal stormwater permittees to facilitate assessment of municipal runoff management programs in effectively prohibiting non-storm water discharges into the MS4 and reducing pollutants in stormwater discharges from their MS4s. Bay Area Permittees have avoided the level of scrutiny and oversight afforded other municipalities in the state and Baykeeper continues to be disappointed that Draft MRP 3 does not meet this minimal level of consistency with other Phase 1 MS4 permits.		

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		For example, Region 4 (Los Angeles), requires stormwater monitoring from at least one major outfall per HUC 12 subwatershed. The Region 9 (San Diego) permit requires dry and wet weather sampling from outfalls and permittees must sample from at least five wet weather MS4 outfalls within designated watershed management areas. Since at least 2010, Region 8's (Santa Ana) Riverside County Phase 1 MS4 Permit has required monitoring of flow and a range of pollutants to enable estimation of pollutant loading from "mass emissions" stations throughout Riverside County. The recent LA County MS4 Permit requires representative end-of-pipe sampling from each municipal permittee, as well as receiving water and downstream mass emissions sampling. Clearly sampling sufficient to monitoring permittee compliance (as required by the CWA) is feasible. 3) Baykeeper's Monitoring During MRP 2 Proves Robust Monitoring is Affordable		

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		During MRP 2, Baykeeper collected stormwater samples at MS4 outfalls and receiving waters in San Jose, Sunnyvale, and Mountain View. Between February and March 2014, Baykeeper collected end of pipe stormwater samples and receiving water samples at two locations (one at Coyote Creek and one at the Guadalupe River), on two sampling dates. Laboratory analyses for total coliform, fecal coliform, and enterococci revealed exceedances for most parameters on both days at least one order of magnitude greater than the Bacteria Water Quality Objectives in Basin Plan Table 3-1. This sampling program took 53 staff hours (split between two staff) and approximately $4,000 in hard costs for laboratory supplies, laboratory analyses, and travel expenses. Between November 2017 and February 2019, Baykeeper collected end of pipe stormwater samples at six locations and receiving water samples at nine locations (five at Stevens		

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		Creek, one at Calabazas Creek, and three at Sunnyvale East Channel), on nine sampling dates over two reporting years. Laboratory analyses for total coliform, fecal coliform, enterococci, and E. Coli also revealed exceedances for most parameters at least one order of magnitude greater than the Bacteria Water Quality Objectives in Basin Plan Table 3-1 and the Bacteria Objectives in the State Board's Bacteria Provisions. This sampling program took 350 staff hours (split between two staff) and approximately $40,600 in hard costs for laboratory supplies, laboratory analyses, and travel expenses. End-of-pipe sampling by Permittees will have significant economies over Baykeeper's program and represents a small percentage of overall compliance costs. Again, representative sampling is cost effective and feasible.		

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Baykeeper-15a	C.8	Draft MRP 3 Must Be Revised to Include Creek Status Monitoring and Bacteria Monitoring in C.8's Monitoring Requirements Baykeeper objects to the removal of creek status monitoring and bacteria monitoring, which were components of MRP 2's monitoring requirements. The Fact Sheet at A-181 states "this Permit has replaced the Creek Status Monitoring […] with LID Monitoring which has been identified as a more useful program at this point in time, and the Water Board will consider changes to LID Monitoring in the subsequent permit to further increase its utility." While Baykeeper approves of the addition of LID monitoring in Draft MRP 3, those monitoring requirements do not take the place of creek or bacteria monitoring. Although the creek status monitoring and bacteria monitoring in MRP 2 had its own flaws (i.e., limiting monitoring to dry weather), Baykeeper expected the Water Board would improve these monitoring programs in Draft MRP 3 rather than remove them all	Creek Status Monitoring was removed because it appears from the Permittees' data and reporting that it is no longer generating additional useful information (i.e., monitoring results were remaining relatively constant), such that continuation of Creek Status Monitoring would have limited utility with respect to the generation of new information that could inform management actions to improve water quality. On the other hand, we identified (with the support of the Permittees) that LID Monitoring presently represents a greater information need and can more effectively inform management actions to improve water quality, and so we replaced Creek Status Monitoring with LID Monitoring. We also added requirements for bacteria and receiving water monitoring. Please see Master Response Identifiers C.8 - 1 and C.14.a – 1.	See Master Response Identifiers C.8 -1 and C.14.a – 1.

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		together. The only meaningful bacteria data collected during MRP 2 were collected by Baykeeper, and consistently showed exceedances of bacteria water quality standards in South Bay creeks. Based on these data, which have been shared with the Water Board, Baykeeper expected more robust monitoring in Bay Area creeks for bacteria. The limited number of creeks monitored by Baykeeper during MRP 2 should not be read to indicate there are no bacteria exceedances in other creeks not monitored. Rather, it is simply a reflection of Baykeeper's limited resources. Instead of requiring robust monitoring, MRP 3 eliminates the monitoring provisions for bacteria and creeks altogether. Baykeeper recommends adding to Draft MRP 3 the creek status monitoring and bacteria monitoring from C.8 in MRP 2, and revising these requirements to include wet weather monitoring.		

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SMCWPPP-15	C.8	We do not believe that all of the requirements in C.8 will significantly improve the data and decision making for improving water quality.	We disagree. Each monitoring requirement has been carefully designed to collect needed data to determine compliance, assess progress and effectiveness of stormwater controls, and inform decision-making. Each subprovision has specified management questions, that in our best professional judgment, will be answered by the requirements included in those subprovisions (for example, see the response to the following combined comment, regarding how the Trash Monitoring Management/Monitoring Questions will be answered: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110).subprovisions. The Water Board believes in and is requiring strategic monitoring to obtain useful and representative data and has made a concerted effort to dispense with any unnecessary monitoring that is not required under the Clean Water Act.	None.

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ACCWP-a6,a7 CCCWP-38,41 SCVURPPP-5,97 SMCWPPP-18,151 Solano-5	C.8	1) The monitoring requirements in the Tentative Order, collectively, will be significantly more expensive to implement than the monitoring requirements in MRP 2. The pandemic's fiscal impacts on Permittees remain. Therefore, revise the Tentative Order, as described in more detail below and in Attachment 2, to allow for more cost saving measures and to reduce the number of required sampling events so that the annual monitoring costs under MRP 3 are similar to annual monitoring costs in MRP 2 and can reasonably and safely be completed. The Permittees thought the Water Board's goal was to keep MRP 3 monitoring cost-neutral compared to MRP 2. 2) The Fact Sheet ignores cost increases between MRP 2 and the MRP 3 Tentative Order, stating that many of the new provisions are "already required or already being completed." The Fact Sheet does not discuss the economic impacts of the Tentative Order's new monitoring requirements. This renders the economic analysis	1) For the full response, please see Master Response Identifier C.8.d-4. We have considered costs throughout the Permit development process, strove to maintain costs that are roughly commensurate with those in MRP 2, and have incorporated cost saving measures into the Tentative Order. Regarding changes to the number of LID Monitoring sample events resulting from that power analysis, please see Master Response Identifier C.8.d-1. We have made additional reductions in the trash monitoring level of effort, by delaying outfall monitoring by a year, delaying in-stream monitoring by 2 years, dislocating those two components (which increases flexibility and may reduce costs further), and reducing the number of in-stream monitoring events down by 1, among other changes. Please see the response to the following combined comment, regarding these changes to Trash Monitoring: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110	1) See proposed revisions discussed in other specific comments. 2) The Fact Sheet has been revised regarding monitoring costs. 3) This requirement is removed.

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		conducted pursuant to Water Code Section 13241 flawed and underestimated, and also violates the requirements of Water Code Sections 13225(c) and 13267(b) because there is no discussion of the relative benefits and burdens of these enhanced monitoring requirements. 3) C.8.d.i.(1)(g) requires that the cost of LID monitoring be commensurate with the cost of the Creek Status Monitoring and Stressor/Source Identification Projects required in the MRP 2.	2) The Fact Sheet has been revised to regarding monitoring costs. As explained in the Fact Sheet, Water Code section 13241 does not apply when the Water Board is implementing federal requirements, as is the case here. The required monitoring here is pursuant to the federal Clean Water Act, which requires monitoring to determine compliance with permit conditions, among other requirements. See, e.g., 40 CFR §§122.26(d)(2)(i)(F), 122.44(i) and 122.48. That said, costs are considered in the Fact Sheet. Water Code sections 13225(c) and 13267 do not apply here since the permit is a Clean Water Act permit and issued pursuant to Water Code, Chapter 5.5, pertaining to compliance with the Clean Water Act. Neither section 13225 nor 13267 is cited as a basis for any of the monitoring requirements. Water Code section 13383 is pertinent for monitoring requirements under the Clean Water Act, not sections 13225 or 13267. Therefore, there is no requirement that the burdens of monitoring, including costs, bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. That said, the burdens bear a reasonable relationship to the benefits to be obtained, namely determining compliance, assess the effectiveness of stormwater	

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			controls, and inform decision-making and adaptive management. We recognize the cost burden of monitoring and have attempted to require only monitoring that is necessary and required. 3) We have removed this requirement. Instead, we have conducted power analysis ourselves to determine the sufficient monitoring schedule for addressing the management questions in C.8.d LID Monitoring. Refer to the response to the following combined comment, below, regarding power analyses: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5	
CCCWP-40 Solano-5	C.8	The Tentative Order requires monitoring a significant number of events (i.e., seven samples per year for LID monitoring, three to four events per year for trash monitoring, and two events per year for pesticides and toxicity monitoring; multiple locations during essentially every storm), which will lead to personnel and safety issues for sampling teams.	Though we have added LID Monitoring and made changes to Trash Monitoring (both with heavy input from Permittees), we have also eliminated Creek Status Monitoring and SSID Projects, and we have worked continuously with the Permittees to address concerns about level of effort, cost, safety, and logistics. For example, regarding logistics, we have added language which states that Permittees	Revised as indicated.

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		Local monitoring firms would need to add many more specialized staff to their teams, which is not feasible for these small local firms. In addition, it puts sampling crews at safety risks for working long hours, multiple days (potentially over a week) in a row, and in hazardous conditions to achieve all of the various monitoring stipulated in the Tentative Order. For reference, consider how many samples and locations that the RMP program plans to sample each year and how many they are able to actually achieve.	will not be penalized if there aren't enough storms to sample in a given year for Trash Monitoring (C.8.e.iii.(7)) they can make up those samples in a subsequent year, and we have also reduced the annual minimum sample events that must be collected for LID Monitoring (and for in-stream trash monitoring). Please see the following combined response, regarding the changes to the number of sample events for LID Monitoring: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5 Please see the response to the following combined comment, above, regarding monitoring costs: ACCWP-a6,a7 CCCWP-38,41 SCVURPPP-5,97 SMCWPPP-18,151 Solano-5 Regarding Trash Monitoring, the Permittees already implemented what essentially amounted to a pilot Trash Monitoring in MRP 2, and the Trash Monitoring included in the	

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			Tentative Order would require a similar implementation cost and level of effort. Regarding safety, C.8.e.iii.(6) says: "Permittees are exempt from outfall and receiving water sampling during dangerous and unsafe weather conditions." Additionally, regarding safety, please see the response to the following combined comment: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110	

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SCVURPPP-5,7 SMCWPPP-20	C.8	1) Under Water Board staff direction, C.8 represents a significant departure from the monitoring programs developed and implemented under MRP 1 and MRP 2. Regional Probabilistic Creek Status Monitoring and Stressor Source Identification (SSID) projects, which have provided invaluable information on the health of our local creeks and helped identify high priority water quality concerns, have been replaced with new requirements for Low Impact Development (LID) effectiveness and Contaminant of Emerging Concern (CEC) monitoring. Trash receiving water monitoring has been moved from C.10 into C.8, with significant increases in the required level-of-effort and the proposed requirements are a shift from the monitoring goals outlined in MRP 2. 2) The most concerning aspects of the proposed requirements in C.8, in addition to a significant change in the approach developed and implemented over the past two permit cycles without substantive	1) Some aspects of monitoring in MRP 3 are changed significantly from MRP 2, but other aspects are unchanged, such as pesticides and toxicity monitoring, and others are changed slightly. We removed creek status monitoring because additional creek status monitoring would not result in any new understanding at this time, as the results seemed to be constant, and would not inform additional management actions to improve water quality. We removed SSID Projects because there will be few new triggers without creek status monitoring. We have transformed trash monitoring into a compliance monitoring program, to inform the effectiveness of actions taken, which is critical as we approach the final compliance benchmark for Trash Load Reduction. The inclusion of LID Monitoring is explained in the Fact Sheet, as follows: LID Monitoring is intended to measure compliance and effectiveness of LID implementation. It will improve the	See specific revisions proposed in response to other comments, including comments cited herein, at left.

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		co-permittee support for the change, are described below and include: 1) substantial increases in costs; 2) lack of adequate time for planning; 3) lack of established technical feasibility; 4) lack of reliable methodologies; and 5) lack of prioritization. Regarding prioritization: Estimated costs to implement the various monitoring elements show that the Tentative Order prioritizes 1) Trash Monitoring, 2) LID Monitoring, and 3) POCs Monitoring. Reorder these priorities as follows: 1) POCs Monitoring, 2) LID Monitoring; and 3) Trash Monitoring. As such, the extensive trash monitoring requirements described in the Tentative Order should be reconsidered and significantly reduced to a scale of cost similar to the current permit or lower.	understanding of the following two management questions (which are repeated in Finding C.8-6 above) related to the implementation of LID controls: What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time? What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance? The purpose of the first management question is to confirm that Permittees' LID controls are functioning as expected over time. Perhaps some design variations provide greater performance than others. The purpose is not only to compare relative performance between different types of MRP Permittee controls but also to compare their performance against the publicly-available databases of LID performance data, such as those of the International Stormwater BMP	

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			Database and SCCWRP's California BMP Effectiveness Calculator. The purpose of the second management question is straightforward: to assess whether LID controls that receive relatively insufficient O&M perform relatively poorly compared to LID controls that receive relatively sufficient O&M, which will directly inform management actions (such as, what O&M activities to perform, and how much of it to perform how frequently). 2) We disagree that there have been significant changes in the monitoring approaches without substantive Permittee support for the changes. Though there have been disagreements about certain issues such as level of effort and details such as annual minimum samples (both of which we have reduced in response to Permittee input), the Permittees have been largely supportive of many of the changes to C.8. Regarding cost, please see the response to the following combined comment, above:	

Comment No.	Provision	Comment	Response	Proposed Revision
			ACCWP-a6,a7 CCCWP-38,41 SCVURPPP-5,97 SMCWPPP-18,151 Solano-5 To provide additional time for planning, we have revised the schedule to provide several additional months the before LID Monitoring Plans must be submitted, and have pushed back the start of MS4 outfall trash monitoring by one year and of in-stream receiving water trash monitoring by two years (and delayed the submittal of the Trash Monitoring Plan by one year). Regarding the comment on the lack of established technical feasibility and lack of reliable methodologies, we assume the comment is referring to the trash monitoring methods, but the in-stream trash monitoring methods have been piloted by 5 Gyres,[12] and the MS4 outfall trash monitoring has as well been tested and implemented in other places. Additionally, we have delayed the start date of MS4 outfall trash monitoring by 1 year and in-stream trash monitoring by 2	

[12] https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/58dd932f414fb5663b5a4f79/1490916184178/TCT+Creek+Monitoring+Report_FINAL.pdf

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			years (and the report submittal by 1 year), meaning the Permittees will have a substantial amount of time to test and further pilot methods before they must be implemented. See the response to the following combined comment: ACCWP-a6,a7 CCCWP-38,41 SCVURPPP-5,97 SMCWPPP-18,151 Solano-5 To provide additional time for planning, we have revised the schedule to provide several additional months the before LID Monitoring Plans must be submitted, and have pushed back the start of MS4 outfall trash monitoring by one year and of in-stream receiving water trash monitoring by two years (and delayed the submittal of the Trash Monitoring Plan by one year). Regarding POCs Monitoring, please see responses to (and proposed revisions for) specific comments on that subprovision. Regarding the comment on the lack of	

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			established technical feasibility and lack of reliable methodologies, we assume the comment is referring to the trash monitoring methods, but the in-stream trash monitoring methods have been piloted by 5 Gyres,[13] and the MS4 outfall trash monitoring has as well been tested and implemented in other places, such as those referenced in the Fact Sheet: "…the vendor Stormwater Systems cites uses of such trash capture (monitoring) systems in Carrolton, Texas at Josey Ranch Lake, St. Louis, Missouri, and the Anacostia River Watershed in Maryland.[14] There are many other examples of implementation of end-of-pipe and in-line systems, such as The Sock in the City of Kwinana, south of Perth, Australia,[15] the TrashTrap in Oxnard, CA, and in Narragansett Bay, RI,[16] Los Angeles	

[13] https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/58dd932f414fb5663b5a4f79/1490916184178/TCT+Creek+Monitoring+Report_FINAL.pdf
[14] https://stormwatersystems.com/stormx-netting-trash-trap/
[15] https://www.abc.net.au/news/2019-06-09/drain-sock-kwinana-pollution-solution-takes-world-by-storm/11190266?nw=0&r=HtmlFragment
[16] https://stormtrap.com/products/trashtrap/#trashtrap-Projects

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			County,[17] a large device controlling flows from a pump station prior to discharge into San Francisquito Creek and the Bay in the City of East Palo Alto,[18] HDS units in the Cities of Livermore and Vallejo, and others. The San Francisco Estuary Partnership implemented, tested, and monitored 42 high-capacity trash control devices (both end-of-pipe and in-line) in more than 60 Bay Area municipalities, in a project that concluded in November 2013, many of which could be adapted as trash monitoring systems if they satisfy the other criteria included in Provision C.8.e.[19] Here is a presentation that includes lessons learned for implementation in Philadelphia, PA (knowing the stormwater outfalls was an important consideration): https://delawareestuary.s3.amazonaws.com/pdf/Summit15/BallA/W-O'DayDel_Summit_Monit_Stormwater_Trash.pdf. Regarding in-stream monitoring, as discussed below, methods have been successfully piloted by 5 Gyres.[20] Caltrans installed trash capture devices at four trash	

[17] https://www.pw.lacounty.gov/wmd/irwmp/docs/Prop%2084%20Round%202%20Implementation%20Grant%20Application/Attachment%207%20Technical%20Justification%202%20of%2015.pdf#page=97
[18] https://www.waterboards.ca.gov/sanfranciscobay/board_info/agendas/2019/February/7b_ssr.pdf
[19] https://www.sfestuary.org/trashcapture/
[20] https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/58dd932f414fb5663b5a4f79/1490916184178/TCT+Creek+Monitoring+Report_FINAL.pdf

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			capture pilot site locations in 2018,[21] which are examples of devices that could readily be modified and used as monitoring devices for Provision C.8.e Trash Monitoring." Additionally, we have delayed the start date of MS4 outfall trash monitoring by 1 year and in-stream trash monitoring by 2 years (and the report submittal by 1 year), meaning the Permittees will have a substantial amount of time to test and further pilot methods before they must be implemented. Please see the response to the following combined comment below, for more on this: CCCWP-45,46,108 Oakland-18,19 ACCWP-a8,45 SCVURPPP-7,109 SMCWPPP-14,19,166,171,182,183,214 Solano-7 MRP 3 Testimony Hearing Transcript, October 12, 2021, Mitch Avalon, CCCWP – Page 74 (Line 16-25), 75 (Line 1-5)	

[21] Caltrans Site Identification Number: 4-430, Post Mile: 04-Ala-880-PM 23.73, Interchange: Davis Street, Device Type: StormTrap (FreshCreek), Construction Completion Date: 07/05/2018; Caltrans Site Identification Number: 4-431, Post Mile: 04-Ala-880-PM 16.58, Interchange: Highway 880/State Route 92, Device Type: Old Castle (KriStar), Construction Completion Date: 07/05/2018; Caltrans Site Identification Number: 4-432, Post Mile: 04-Ala-880-PM 7.37, Interchange: Mowry Avenue, Device Type: Modified Old Castle (KriStar), Construction Completion Date: 12/20/2018; Caltrans Site Identification Number: 4-433, Post Mile: 04-Ala-880-PM 6.29, Interchange: Stevenson Boulevard, Device Type: StormTrap (FreshCreek), Construction Completion Date: 12/04/2018.

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			Regarding the comment on the lack of prioritization, the proposed monitoring program prioritizes needed work while deprioritizing work (e.g., creek status monitoring) that is not expected to result in substantial new information during the permit term. The level of effort reflects the regulatory requirements and need for monitoring, along with the expected benefit to be gained. All monitoring programs in the Tentative Order are important, and the level of effort assigned to each has been justified individually for each based on the ability of the information generated to address specified management questions. This justification has incorporated significant engagement with the Permittees regarding concerns about cost, level of effort, feasibility, and safety, among others.	
MRP 3 Testimony Hearing Transcript, October 13,	C.8	I'm commenting on the monitoring portion of the proposed permit. And again, to remind everybody, I've been very engaged in the process with the L.A. County MS4	Please see Master Response Identifiers C.8-1 and C.8-2.	Please see referenced response.

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2021, Daniel Cooper, Baykeeper – Page 109 (Line 21-25), 110 (Line 1-25), 111 (Line 1-25), 112 (Line 1-25), 113 (Line 1-25), 114 (Line 1-25), 115 (Line 1-18)		Permit, and so I'm very familiar with the terms of the monitoring program there. And I think the place to start is that I think everyone can agree all NPDES Permits must have monitoring sufficient to evaluate compliance by the permittees. The CWA and its implementing regulations require that, and I think we'd all agree that's the primary purpose of the monitoring program is to evaluate permit compliance. I'm focused on B.2, the receiving water limitations. That's the requirement that -- and this is required in all NPDES permits in Region 9. The discharge shall not cause or contribute to a violation of any applicable water quality standard for the receiving waters. The monitoring program must be sufficient to evaluate whether the discharges are causing and contributing to exceedances in receiving water limitations. In the MS4 Permit is that there must be monitoring sufficient to		

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		evaluate whether a city, or other municipal entity that's a permittee, and is discharging from its MS4 is complying with receiving water limitations or whether it's causing and contributing to exceedances. The monitoring program is not designed to do that and does not accomplish that. And it's not what the old permit required or did and it's not what the new one requires. There are essentially five questions being answered or five elements in the monitoring program. One is estuary monitoring, which is consistent with the old permit. One is LID monitoring, about effectiveness of LID programs, or program elements, various kinds of LID. Trash monitoring. Some pollutants of concern monitoring. And pesticides and toxicity. Only trash requires end-of-pipe monitoring. Everything else allows for end-of-pipe monitoring, but also provides for other alternatives, including sediment monitoring, sort		

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		of in the area where the MS4 might be discharging. The permit describes the purposes of this as evaluating trends, evaluating adequacy of certain types of BMPs, regional trends overall, and a regional contribution to impairment in the Bay. Monitoring does not evaluate permit compliance by permittees. It's not designed to evaluate whether discharges from the MS4 cause or contribute to water quality standard exceedances. And again, except for trash, end-of-pipe monitoring is not required. Looking at the way the monitoring is set out now, and the way that it was under the old permit, Baykeeper would have a very hard time, and I would challenge staff to tell you how to determine whether any individual city is complying with the permit requirements and whether they're causing or contributing to exceedances of water quality standards. Because there's no sampling in any one of the cities. It skips around the Bay to different areas, different regions,		

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		and it's not -- there's no repetitive sampling at any particular city, in fact any city really, to evaluate that city's implementation of the program and whether it's causing or contributing to exceedances. The permit does not require bacteria sampling. Baykeeper has obtained extensive bacteria sampling from the City of San Jose from its MS4, and we've also sampled ourselves in Sunnyvale and Mountain View. Every sample we've taken shows orders of magnitude concentration above water quality standards for bacteria, both in the receiving water and in the outfall. And we've also done molecular source tracking that that is -- there is human waste that is causing those bacteria exceedances. And we all know that human waste is the most risky in terms of human health, pathogens, and so on. It's a very big concern to have that stuff going down our creeks and into the Bay.		

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		I think staff would agree that urban stormwater exceeds water quality standards consistently during wet weather. I mean, every major rain event. Yet, no bacteria monitoring is proposed. And I don't know how staff would evaluate how bacteria water quality standards are being complied with from MS4 discharges without monitoring. And this is a critical element. In C.8.h, in the proposed monitoring program, where exceedances of water quality standards are determined or found from the monitoring, then that's when actions have to be undertaken to try and correct the problem. There's a trigger. But there's no explanation of how water quality standard exceedances are determined based on that monitoring. And given that there's no sampling for bacteria, certainly that parameter would not be triggered under the monitoring scheme proposed.		

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		I'll contrast this monitoring program with that in the Los Angeles permit. And under purpose and scope in the LA permit, assess compliance with receiving water limitations and water quality-based effluent limitations. Then it explains that it has stormwater outfall-based monitoring that shall be performed at outfall monitoring locations that are representative of the land uses within the permittee's jurisdiction. The objectives of the stormwater outfall-based monitoring program shall include, determine whether a permittee's discharge causes or contributes to an exceedance of receiving water limitations that apply in-stream. So, the LA permit has in-stream sampling, as well as end-of-pipe sampling, representative for each municipal permittee. And they get to pick which one they call representative, but then that's the compliance point for whether they're causing and contributing. That allows for a feedback loop. Is		

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		the program actually working? Is water quality getting any better? Is stormwater getting any better? That's not called for in this permit and we would urge several corrections. One would be end-of-pipe monitoring to make San Francisco equivalent to MS4 permitting in every major urban area in California, other than San Francisco. And that includes San Diego, Orange County, and LA. That would provide a feedback loop to ensure that the programs are actually working. And if we don't -- we're not making progress on water quality, everybody will know that and we can make course corrections as needed.		
SMCWPPP-209	C.8 Fact Sheet	Several sections of the Fact Sheet, including C.8-5, were not updated from MRP 2 and don't make sense given the significant change in monitoring requirements between MRP 2 and MRP 3. For example, the Fact Sheet discusses the importance of biological and physical monitoring on a watershed scale, as recommended by the National Research Council.	The cited section of the Fact Sheet has been updated. We agree and have updated the Fact Sheet to reflect the shift in monitoring to LID and more-specific receiving water monitoring from creek status monitoring. We recognize the importance and value of biological and physical monitoring. However, after more than ten years, there is minimal benefit to continuing the eliminated Creek Status	Modified Fact Sheet, section C.8, as described.

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		This type of monitoring shows what is actually going on in receiving water. However, the TO does not include this type of monitoring.	Monitoring (including biological and physical monitoring). Baseline monitoring of all creeks has been completed and there is no near-term expectation for change. Consideration of additional or updated biological and physical monitoring will be relevant in future permit terms to evaluate long-term management actions that would cause a measurable change in creek conditions. The Stressor Source Identification monitoring tied to Creek Status Monitoring has been replaced with LID systems and trash control effectiveness monitoring, which are high priorities due to the high benefit costs of those actions.	
SMCWPPP-135	C.8.a.i	Permittees are encouraged to assign tasks to the RMC, particularly reporting duties. However, with dissolution of BASMAA, it is challenging to develop regional projects.	BASMAA has been replaced by the Bay Area Municipal Stormwater Collaborative (BAMSC), the purpose of which is to "continue the information sharing and Permittee advocacy functions of BASMAA in an informal manner after BASMAA's dissolution," according to the BASMAA website. In this Provision and in many other Provisions in the MRP, there remains a need for Permittees to coordinate regionally, which the Permittees may facilitate with any means, be it BASMAA, BAMSC, or some other option.	None.
SMCWPPP-136	C.8.a.ii	Comment notes that there are no changes to this Provision.	Comment noted.	None.
SMCWPPP-137	C.8.a.iii	Comment notes that there are no changes to this Provision.	Comment noted.	None.

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SMCWPPP-138	C.8.b	Comment notes that there are no changes to this Provision.	Comment noted.	None.
SMCWPPP-139	C.8.c	Comment notes that there are no changes to this Provision	Comment noted.	None.
Baykeeper-15b	C.8.d	C.8.d does not provide useful information as written. It is likely that many Permittees will not conduct any LID monitoring within their jurisdictions; C.8.d should be revised so that there are specific monitoring requirements for each individual Permittee. C.8.d does not include a requirement that data generated will be used to recalibrate and validate models used to estimate pollutant removal and inform LID sizing requirements. C.8.d currently informs whether LID systems are functioning as intended rather than evaluation of compliance; it should be revised to require that the data be used for adaptive management purposes as required by State Board Orders WQ 2015-0075 and 2020-0038 (and to evaluate compliance).	We disagree. The LID Monitoring requirements apply to all Permittees, while providing a logical allowance to conduct studies at representative locations that are expected to be representative of similar LID systems in similar settings in all Permittees jurisdictions. Information gained from these studies will be relevant and applicable to all Permittees. The LID monitoring will thus inform Permittee compliance in addition to the effectiveness of LID controls. For example, it will provide information to verify or improve estimates of the total PCBs load reduced as a result of LID implementation. The monitoring results will inform Permittee compliance with respect to the types of controls instituted in similarly situated circumstances. LID effectiveness data cannot be used to calibrate or validate models. That can only be done with data representative of current watershed and receiving water conditions. Pollutant load reductions expected from LID systems can only be estimated using available effectiveness data. That said, the results produced by the LID monitoring studies will be used to improve those	None.

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			estimates, and to inform the next permit requirements, including reliance on and expectations for pollutant load reductions from LID systems. Also, please see Master Response Identifier C.11/12 – 4.	
SMCWPPP-140	C.8.d	Comment notes that this is a new requirement.	Comment noted.	None.
SMCWPPP-15	C.8.d	It is unlikely that the value of the chemical data gathered through LID Monitoring justifies the great expense of sample collection and analysis, particularly when many of the constituents can be modeled or approximated based on less expensive parameters.	We disagree. A purpose of LID Monitoring is to evaluate the efficacy of a representative subset of Permittees' LID controls. We have limited the number of analytes that must be collected, recognizing that certain constituents (e.g., metals) may be modeled based on the performance of a single analyzed parameter. While modeling can, for example, inform design and construction, it cannot alone assess whether the constructed control is operating as intended, in part because it makes idealized assumptions about efficacy, and in part because it can predict, but not assess. Permittees are free to use modeling to supplement LID Monitoring, for example by using modeling to inform site selection, and compare real data collected to assumptions about performance based on modeling, but modeling cannot be used in lieu of data collection, whether chemical or flow data.	None.

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Contech-4	C.8.d & C.8.f	Add the following parameters to Table 8.d.2: Total Phosphorus, Orthophosphate, Nitrate, Nitrite, and TKN. Add the following parameters to Table 8.3: Total Phosphorus, Orthophosphate, Nitrate, Nitrite, and TKN. Justification: urban stormwater is likely a significant source of nutrient pollution, but nutrient management permits have not focused on characterizing or controlling nutrient loads from urban stormwater. N and P species are inexpensive to analyze (less than $200/sample), and additional volume requirements will be no more than 300 mL).	Nutrients were included in MRP 2 C.8.f requirements, but have been eliminated for MRP 3. The Water Board is actively involved in efforts to understand the role of nutrients and their impact on San Francisco Bay. For the past decade, scientists at the San Francisco Bay Estuary Institute have been conducting modeling and monitoring studies to understand the role of nutrients on the trophic status of the Bay. These studies have determined that wastewater is, by far, the dominant source of nutrients to the Bay and the most important in determining nutrient-related impacts. Moreover, the nutrients delivered in stormwater often enter the Bay at a time of the year where there is not a high risk of algae growth because of lower (winter) temperatures. There is already an adequate understanding of nutrient loads from stormwater based on past modeling. Because there are not immediate information gaps associated with nutrients in stormwater, including nutrient monitoring requirements in C.8.f is not necessary during MRP 3.	None.
SMCWPPP-141	C.8.d.i	Comment notes that this is a new requirement.	Comment noted.	None.
SCVURPPP-88 SMCWPPP-142	C.8.d.i.(1)(a)	LID Monitoring Plans may address only one (not both) of the management questions, and the language should be revised to explicitly allow this.	Insufficient justification is provided for this request. Each LID Monitoring Plan should address both management questions, and the Fact Sheet explains why they are important.	None.

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SCVURPP-91 SMCWPPP-145	C.8.d.i.(1)(d)	The minimum sample requirements specified in Table 8.d.2 may conflict with the LID Monitoring Plan requirement to set a monitoring schedule which may be greater than the numbers in Table 8.d.2. Which do Permittees comply with?	This comment likely refers to language regarding performance of power analysis which has been removed, therefore the concerns raised in this comment is likely no longer relevant. This comment likely refers to language regarding performance of power analysis which has been removed (we performed the power analysis ourselves, and subsequently updated Table 8.d.2), therefore the concerns raised in this comment have been indirectly addressed. Regardless, in the LID Monitoring Plan(s) the Permittees will have the discretion to include a greater number of sample events than the minimum required in Table 8.d.2. Please see the response to the following combined comment, about how the power analysis was used to modify Table 8.d.2: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5	Please see the response to the following combined comment, about how the power analysis was used to modify Table 8.d.2: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5None.
SCVURPPP-96 SMCWPPP-150	C.8.d.i.(1)(f)	The TO requires development of "study-specific QAPrPs" that are equivalent to the SWAMP QAPrP. This appears to be a typo. The SWAMP Quality Assurance Program Plan (QAPrP) differs from a study-specific Quality Assurance	We agree and have revised C.8.d.i.(1)(f) to state: “Include study-specific Quality Assurance Project Plans (QAPPs), which at a minimum are SWAMP-comparable.”	Revised C.8.d.i.(1)(f) as noted.

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		Project Plan (QAPP). Because these are different types of documents, it would be inappropriate for the study-specific QAPP to be equivalent to the SWAMP QAPrP. Revise to: "Include study-specific Quality Assurance Project Plans (QAPPs), which at a minimum are comparable to the SWAMP QAPrP."	We agree and made the requested revision.	
SCVURPPP-97 SMCWPPP-151	C.8.d.i.(1)(g)	Remove the requirement to provide annual cost estimates.	This comment was largely regarding concerns about the requirement to perform power analysis, and then to produce a monitoring schedule which might result in a greater number of sample events than the required minimums. However, since the requirement to do power analysis and propose a monitoring schedule which may be more intense than the required minimums, and since we have removed the requirement that the Permittees' cost of implementation of C.8.d in the Tentative Order is commensurate with the cost of implementation of C.8.d from MRP 2, the concern raised in this comment is largely addressed. That aside, it is important for Permittees to submit annual C.8.d implementation cost estimates in their LID Monitoring Plans, to	See other comments and responses regarding power analysis, including the following combined comment: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5 Removed cost estimates

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			help them and Water Board staff anticipate the level of effort and resources that this new monitoring program will require, to allow preemptive comparison to other monitoring provisions in the upcoming Permit term and in Previous Permit terms. See other comments and responses regarding removal of power analysis, including the following combined comment: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5	requirement in C.8.d.
ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5	C.8.d.i.(1)(d)	1) Remove the requirement to conduct a power analysis for the LID Monitoring Plan, as there is not enough known information (e.g., the normality of the distribution, the parameters of the distribution, and acceptable error rate) available to conduct the power analysis. While this information may be known for certain parameters in datasets outside of the Bay Area, it is not clear whether those data can be extrapolated to the Bay Area. With worsening drought conditions, the number of storm events per year that produce runoff may be less	1) It is not true that currently there is insufficient information available with which to perform the power analysis. In the case of LID Monitoring, all that is needed is a sufficiently large dataset containing performance data (the ratio of effluent and influent) for a parameter(s) of interest, which has a normal distribution (or a distribution that is reasonably normal once transformed) if running a parametric test, but if running a nonparametric test, a normal distribution is not needed. We have access to two databases with exactly the data needed to perform power analyses to inform a monitoring schedule for LID Monitoring, which satisfies the aforementioned criteria: SCCWRP's California BMP Effectiveness	Removed the requirement to perform power analysis. Reduced the number of total and annual sample events in Table 8.d.2 but clarified that those are sample events not individual samples.

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		than the number of samples needed to meet the desired confidence and power. The coefficient of variation and acceptable error rate are extremely sensitive parameters that can impact the required number of samples by orders of magnitude. For influent and effluent sampling, it is much more difficult to detect small changes in concentration, therefore, LID sites/constituents with low removals or low influent concentrations will inherently require a larger number of samples than sites/constituents with high influent concentrations and high removals. Also remove this requirement from the Fact Sheet. 2) SCVURPPP-92 and SMCWPPP-146 say: Power analysis can be a useful tool to estimate sample sizes needed for detecting trends over time in long-term monitoring programs of many years (10 or 20 years). However, the LID Monitoring studies conducted during MRP 3 are likely too short (less than five years) to detect trends, especially considering that precipitation	Calculator (https://sccwrp.shinyapps.io/bmp_eval/) and the International Stormwater BMP Database (https://bmpdatabase.org/get-data). Power analysis involves repeatedly performing student t-tests to compare the mean from a known distribution to the mean from some future data distribution. We then evaluate if we can tell the statistical difference between the known and future means at a given sample size, significance level and statistical power. Significance level is typically set at 5% and power at 80%. Significance level means the chance that differences as large as those observed could occur by chance. Since our null hypothesis is that the future data are from the same population as the existing data, this can also be understood as the probability that we would incorrectly reject the null hypothesis. The quantity 100% – Power is the probability that we would incorrectly accept the null hypothesis. In other words, if we see differences between the existing data and the future data of a certain magnitude, those differences either indicate a real difference between the data means (i.e., they are from different populations), or the differences are due to bad luck from a non-representative sample – just by chance. Statistical significance is about being wrong about	Sample events may be completed in a subsequent water year if there are not enough storms to sample in a given water year.

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		conditions during the permit term may not represent long-term conditions. Therefore, power analysis is not likely to help the Programs develop useful LID Monitoring Plans. 3) SCVURPPP-93 and SMCWPPP-147 say: Detecting pollutant removal by a LID facility is not the standard type of trend that a power analysis informs. Power analysis is more suited to inform trends in large populations over long periods of time when a large number of samples can be collected. 4) SCVURPPP-94 and SMCWPPP-148 say: Running a power analysis requires technical expertise and existing data on the spatial and temporal variance in the system. Because the LID facilities likely to be monitored by the Programs are recently built, it is extremely unlikely that we know any of the input values needed to run a power analysis. The many assumptions required will compromise the power analysis results.	saying the means (and, hence, the distributions) are different. Power is about being wrong about saying the means are not different. However, to reduce the burden on the Permittees to perform the power analysis, and to comply with their request to remove it from the LID Monitoring Plans, we have removed the requirement for the Permittees to conduct a power analysis for the LID Monitoring Plans, conducted the power analysis ourselves, and modified the TO in response . For the full response, please see Master Response Identifier C.8.d-1. 2) See Master Response Identifier C.8.d-2. 3) The comment from SCVURPPP-93 and SMCWPPP-147 is contrary to our understanding. Power analysis can and has served exactly the purpose that we have described here. See our responses above in this same combined comment, which detail how we have used power analysis. 4) See Master Response Identifier C.8.d-3.	

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		5) SCVURPPP-95 and SMCWPPP-149: If natural variability is high, as is likely in most water quality monitoring studies due to climate conditions and pollutant fate and transport mechanisms, it simply may not be possible to achieve the power level required in the TO. 6) Use this permit term to develop the basis for monitoring and understand the variance of the monitoring results. Rather than basing the number of samples solely on a power analysis, the Regional Board should consider defining qualifying storm event criteria for sampling and then allow the permittees to consider the number of qualifying storm events that have occurred based on the rainfall record. 7a) A power analysis should use a single representative constituent that is frequently detected, such as TSS, to inform the analysis. Otherwise, the parameter with the highest variability or lowest removal will drive the number	5) This comment largely is concerned about the requirement for the Permittees to perform power analysis, but as described above, we have removed that requirement, as we have performed the power analysis ourselves. Also, as described (and referenced) above, it is now possible to perform non-parametric power analysis, so the consequences of the variability that is cited in the comment is no longer as concerning. But regardless, we have already done the power analysis, so the Permittees do not need to worry about this. 6) This Permit term *will* be used to develop the basis for monitoring and understand the variance of the monitoring results, and adjustments may be made in subsequent Permit terms as the LID Monitoring program is carried forward. For the full response, please see Master Response Identifier C.8.d-5. 7a) We disagree. There is no basis for the claim that power analysis should – or can only – use one parameter to inform a monitoring schedule. We performed power analysis on three representative (indicator) parameters, TSS, Copper and Zinc, and together, the power analysis on these three	

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		samples required, which may be impractical (see additional comment below) and counter-productive to the goals of the monitoring program. 7b) Also, it may not be possible to adequately characterize infrequently detected constituents with parametric statistics. 7c) The practicality of collecting sufficient stormwater sampling data should be considered as well. With worsening drought conditions, the number of storm events per year that produce runoff may be less than the number of samples needed to meet the desired confidence and power. The frequency of sampling is also a matter of practicality. Ideally, a monitoring program should have samples distributed across different seasons, storm sizes, durations, and inter-event times. However, the occurrence of runoff events and ability of sampling teams to mobilize to collect samples often drives the frequency of sampling.	parameters suggests the reductions in sample events that are discussed above. 7b) We disagree that power analysis should not be used simply if it is anticipated that the data are nonparametric, because as described above, we can now use nonparametric power analysis. 7c) We agree that practical and logistical concerns should also be considered, and we have done so. As described above, we have made additional reductions to the annual minimum number of sample events, to accommodate those concerns.	

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San Jose-26	C.8.d.ii	Provision C.8.d.ii implies that there is a single regional LID Monitoring Plan, and/or that each Permittee must submit its own individual LID Monitoring Plan (comment is unclear). It should be revised to clarify that countywide/regional Plans are acceptable.	The requested flexibility is already allowed, pursuant to Provision C.8.d.i.(1): "The Permittees shall, at the regional or countywide level, develop LID Monitoring Plans to implement the requirements in Provision C.8.d.iii-iv…"	None.
ACCWP-a7,40 CCCWP-43 San Jose-25 SCVURPPP-7,98,105 SMCWPPP-14,19,152,160,213	C.8.d.ii & C.8.d.vi	Not enough time is allowed for the development of the LID Monitoring Plans. Delay the submittal of the draft LID Monitoring Plans to the TAG, and of the final LID Monitoring Plans to the Water Board, each by 4 months. SMCWPPP-213 requests that any changes to these deadlines be reflected in the Fact Sheet.	For the full response, please see Master Response Identifier C.8.d-7. The requested delays would allow Water Board staff 3 months, between July 1, 2023, and September 30, 2023, to review the 5 final LID Monitoring Plans, and then approve or conditionally each of them. If any of the final LID Monitoring Plans are conditionally approved, such that they require significant changes before they are implemented, the Permittees would have very limited time to revise the Plans and accordingly adjust their planned implementation of the Plans. Since Permittees will be required to start monitoring on October 1, 2023 (the start of the 2024 water year), they might have as little as a few weeks to revise and adjust before they must start monitoring, depending on how quickly Water Board staff are able to review and approve/conditionally-approve the final LID Monitoring Plans. Therefore, we have delayed the submittal of	Delayed the submittal of the draft LID Monitoring Plans to the TAG from January 1, 2023, to March 1, 2023, and the submittal of the final LID Monitoring Plans to the Water Board from March 1, 2023, to May 1, 2023. Updated the Fact Sheet accordingly.

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			the draft LID Monitoring Plans to the TAG, and of the final LID Monitoring Plans to the Water Board, each by 2 months. That is, the submittal date of the draft LID Monitoring Plans to the TAG will be delayed from January 1, 2023, to March 1, 2023, and the submittal date of the final LID Monitoring Plans to the Water Board will be delayed from March 1, 2023, to May 1, 2023. This is a reasonable compromise that will afford Permittees sufficient extra time to develop their draft and final LID Monitoring Plans, while ensuring that Water Board staff have sufficient time to review and approve/conditionally-approve those final LID Monitoring Plans, and finally, ensuring Permittees have sufficient time to incorporate any changes required in the conditional approvals (if any) of final LID Monitoring Plans.	
SCVURPPP-99 SMCWPPP-153	C.8.d.iii	Not all hydrologic performance monitoring methods are appropriate for all LID facilities. Therefore, these methods should have the word "or" placed after them in the list. Add the word "or" after each hydrologic monitoring method in the list.	As we have specified that automated samplers are required for flow-weighed (or time-weighted) composite EMCs at the inlet and outlet, it is appropriate to collect (record) the flow data at the inlet and outlet via the automated samplers. Therefore, we have clarified that such data collection is mandatory. Regarding the other hydrologic methods, they are optional, and we have clarified the language accordingly. The requested change	Revised C.8.d.iii as indicated.

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			to this list of optional hydrologic methods is not necessary because the word "or" is already included prior to the last item in the list. Grammatically, that "or" applies to each preceding item in the list.	
SCVURPPP-100 SMCWPPP-154	C.8.d.iii	1) Management Question #2 could be addressed exclusively through analysis of existing data or maintenance records. This would allow investigations to look back in time. This method should be added. 2) The use of the word "and" after each hydrologic method in the list in Table 8.d.1 limits flexibility in monitoring designs and appears to force use of all methods in the design. The list should have "or" after each method rather than "and."	1) While analysis of existing data and maintenance records can and should inform Permittees' investigation of this management question in MRP 3, it cannot replace the information provided by monitoring influent and effluent during storm events. For example, if two sampled LID BMPs have similar designs, construction, and pollutant loading, but monitoring conducted for the LID Monitoring program reveals that they have different performance data, Permittees might consult maintenance records to see if, for example, the relatively underperforming LID BMP is in need of O&M while the well-performing LID BMP has receiving an adequate level of O&M. 2) Please see the response to the following combined comment, above: SCVURPPP-99 SMCWPPP-153	1) None. 2) Please see the proposed revision for the following combined comment, above: SCVURPPP-99 SMCWPPP-153
ACCWP-42	C.8.d.iv	Edit the text in the box for Alameda in Table 8.d.2., by adding the following text at the end of the sentence: "…bioretention, and/or other LID measures."	The requested change is appropriate and clarifies the original intent of the language.	Revised C.8.d.iv as requested.

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ACCWP-a7,43 CCCWP-44 Contech-4 SCVURPPP-7,102,103 SMCWPPP-17,156,157,210 Solano-6	C.8.d.iv	1) The list of parameters in Table 8.d.2 will make each sample expensive to analyze, some parameters may not be appropriate for answering certain management/monitoring questions, and some parameters don't have standard laboratory and field methods (e.g., PFAS, microplastics, 6PPD-quinone). Analysis of PCBs may be best suited for studies evaluating GSI facilities located in old industrial areas, but not in areas with little to no PCBs in runoff. Analysis of PFAS may be appropriate for studies evaluating infiltration of treated stormwater to the underlying aquifer, but not in studies focusing on the long-term effect of variable operation and maintenance frequencies. Revise the list so that only solids (e.g., TSS or SSC) are a required parameter, and all other parameters are optional and should be sampled depending on which management question is being investigated at a particular monitoring site. TSS could be used as a cost-efficient proxy for other pollutants.	1) For the full response, please see Master Response Identifier C.8.d-8. We agree generally that not all of the parameters we put in that table should be required for each site. We have revised the table, into required and optional parameters. Required parameters may no longer be excluded from the LID Monitoring Plans, but Permittees do not have to justify the exclusion of optional parameters. 2) For the full response, please see Master Response Identifier C.8.d-8. The required CECs has been reduced to PFAS and there are available field and laboratory methods for the most critical PFAS compounds. 3) For the full response, please see Master Response Identifier C.8.d-9. We disagree. Of course, Permittees are encouraged to perform whatever flow modeling they deem necessary to help them choose sites and to evaluate collected data, but flow modeling cannot replace the utility of flow sampling or otherwise offset required flow sampling. Since the required sample methodology is	1) Revised as indicated. We have included required and optional parameters; LID Monitoring Plans may not exclude required parameters, but they do not have to justify exclusion of optional parameters. 2) None. Flow data will be collected for every sample event. 3) None. 4) We have revised Table 8.d.2 and the accompanying footnote to clarify that sediment sample

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		2) Monitoring for new CECs without fully developed methods and protocols is better suited to the Regional Monitoring Program, which the Permittees pay into. 3) Not all monitoring designs will require sampling of flowing water. For example, studies that assess O&M as well as performance through pollutant accumulation in media do not require flow monitoring. Flow should be removed from the list of parameters and the following footnote should be added to address flow and flow modeling: "All studies shall include the collection of discrete and/or continuous flow and/or volume measurements to adequately address the applicable Management Question(s) identified in the Monitoring Plan(s). A combination of modeling and monitoring may be used to assess the hydrology of GSI facilities." 4) Some parameters may be appropriate for analyzing in sediment samples, and others may	flow-weighted (or time-weighted) composite EMC via automated sampler, that monitoring system incorporates the measurement and recording of flow data. So, we flow data will be collected through the use of that sample methodology. 4) We disagree. To allow that would erode the justification for the minimum numbers of water quality (and flow) sample events in Table 8.d.2 provided by the power analysis. Therefore, although the Permittees are encouraged (but not required) to additionally collect sediment samples (and analyze those samples for total PCBs, total mercury, etc.), such sediment sampling may not be credited towards the required water samples specified in Table 8.d.2. Please see the response to the following combined comment above, regarding the power analysis: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5 5) We agree with this request. Certain parameters are required and are optional. See the response and proposed revision earlier in this combined comment.	collection cannot be credited towards the sample events in Table 8.d.2, which are water quality samples at both the inlet and outlet taken during storm events. 5) Revised as requested. 6) See the proposed revision for Contech-4, above.

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		be appropriate for analyzing in water samples. Distinguish which parameters are required for which types of samples. 5) Remove the requirement to provide justification to eliminate parameters. 6) Contech-4 requests that Total Phosphorus, Orthophosphate, Nitrate + Nitrite, TKN be added to the list of parameters in Provision C.8.d, with the following justification: Urban stormwater is likely a significant source of nutrient pollution, but nutrient management permits have not focused on characterizing or controlling nutrient loads from urban stormwater. N and P species are inexpensive to analyze (less than $200/sample), and additional volume requirements will be no more than 300 mL). Adding nutrients to the list of monitoring parameters in sections C.8.d would help to characterize the load coming from stormwater runoff. <u>The same is requested for Provision C.8.f, but that is addressed separately.</u>	6) See the response to Contech-4.	

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SCVURPPP-104 SMCWPPP-158	C.8.d.iv	The Permit should include commercially available analytical methodologies for required parameters to ensure regionwide consistency in analytical data. Add a table showing commercially available analytical methodologies for the required parameters in Table 8.d.2.	We agree that regionwide consistency is imperative; therefore, we have included that consideration as a required component of the LID Monitoring Plan(s), and as a required point of discussion for the TAG. We have added the following language to Provision C.8.d.iv: Monitoring must be conducted according to test procedures in 40 CFR part 136 for analyses of pollutants unless another method is required under 40 CFR chapter 1, subchapter N. For PFAS, if there are no standard methods in 40 CFR part 136, Permittees may use other methods, such as those recommended by U.S. EPA for non-potable water and other environmental media.	Revised C.8.d.iv as indicated.
ACCWP-a9 SCVURPPP-7,101 SMCWPPP-15,16,155,211	C.8.d.iv & C.8.e.iii	It is impractical to include annual minimums, because in any particular year there may not be enough storm events to sample. Remove that requirement and allow the Permittees to collect the total required number of samples over the course of the Permit term, and also reduce the number of samples that Permittees are required to collect "as long as the overall level-of-effort in the final Monitoring Plan is equivalent to the	See Master Response Identifier C.8.d-6.	Revised as indicated in Master Response Identifier C.8.d-6.

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		level-of-effort included in this Provision." Also remove this from the Fact Sheet.		
SMCWPPP-159	C.8.d.v	Comment notes that this is a new requirement.	Comment noted.	None.
Solano-4	C.8.d.vi	Reduce by half the 'Total Minimum Number of Water/Sediment Quality Samples Collected During the Permit Term (Annual Minimum)' in column 3 from 12 (2) to 6 (1). Solano Permittees represent 4% of the total population overseen by MRP3, and request that the required sampling scale and magnitude be consistent with our relative size. A requirement of 12 (2) would result in the Solano Permittees providing 8% of the total samples required across all the programs for C.8.d. Low Impact Development (LID) Monitoring. Reducing the requirement to six (6) samples during the permit term, with a minimum of one (1) annual sample would result in a total of 136 samples during the permit term and 26 annually across all MRP 3 jurisdictions. This is compared to the proposed reduction to 142 total and 27 annual samples, where	We disagree with this requested change. Reducing the total number of sample events for the Solano Permittees is demonstrably not supported by the power analysis, and they are already greater than half the total number of sample events required for any of the other county stormwater programs; the level of effort is equitable and appropriate. Though we do not support reducing the total number of sample events, we have reduced the annual sample event minimum for the Solano Permittees from 2 to 1. Additionally, we note that we have added language allowing Permittees to make up sample events in the subsequent water year, if there aren't enough storms to sample in a given water year. Please see the response to the following combined response, above: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95	See the revision proposed for the following combined comment, above: ACCWP-a9,41 SCVURPPP-89,90,92,93,94,95 SMCWPPP-143,144,146,147,148,149,212 Solano-5

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		Solano Permittees would contribute 4% of the total sampling effort versus 8%. This reduction would be consistent with the objective to create equity between programs.	SMCWPPP-143,144,146,147,148,149,212 Solano-5	

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Baykeeper-15c	C.8.e	1) The monitoring frequency requirements in C.8.e.ii and C.8.e.iii are confusing because indirect monitoring seems to require 4 sample events per year while direct monitoring seems to require 3 sample events per year. Revise the table under C.8.e.iii.(1) to include monitoring requirements for both direct and indirect monitoring, to reduce confusion. 2) One to 3 sites per county is not enough to assess individual Permittee's compliance. 3) Monitoring for full trash capture devices is required at the Permittee level; other trash controls should also be monitored by each individual Permittee. 4) Revise Provision C.8.e.iii to include more specific requirements like those required for permittees in Region 4, including, but not limited to: 4a) requiring alternative monitoring locations in addition to primary monitoring locations, 4b) requiring at least one monitoring station per reach and tributary, 4c) requiring sampling be repeated at	1) We have revised C.8.e such that this comment is no longer relevant. Regarding on-land trash monitoring, because it is optional, it would not be appropriate to include minimums in a table. 2) In accordance with the Trash Amendments, an individual Permittee's compliance is demonstrated by documentation of full trash capture systems implementation and monitoring to demonstrate full trash capture equivalency of other actions through visual trash assessments in drainage areas. By design, the purpose of this trash monitoring is to demonstrate at representative locations that full trash capture systems or equivalent actions are achieving expected outcomes. The results are applicable to all Permittees implementing trash controls equivalent to those implemented in the representative trash monitoring sites. The amount of monitoring takes into consideration that the required trash monitoring methods are relatively novel and are thus new to the Permittees. It is reasonable that in a future permit the Water Board may consider increasing the number of Trash Monitoring sites, and we have revised the Fact Sheet to make this clearer.	1) None. 2) Revised the Fact Sheet as indicated. 3) Revised as indicated. 4a) None. 4b) Revised as indicated. 4c) Revised as indicated. 4d) None. 4e) None. 5) None. 6) None.

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		the same monitoring stations over time and under different seasonal conditions, and 4d) requiring sampling assessments be repeated at the same site where trash was collected during the previous assessment(s) unless an alternate location is approved. 4e) Monitoring locations should also be selected at outfall representative of distinct land uses and catchment sizes. 5) Comment is supportive of the language in C.8.e.ii.(3) that "The riverine qualitative visual assessment method and the unoccupied aerial system (UAS) method may be merited but require additional study, refinement, and calibration, and their use is subject to the Executive Officer's approval." 6) Remove "...or other equivalent methods," from C.8.e.ii.(3), as the monitoring methodologies under Tiers 3 and 4 have already been evaluated and approved as technically sound and there is no reason to allow for alternative	3) Comment misinterprets the Provision. Permittees are not required to monitor full trash capture devices only, but also tributary drainage areas that achieve Low trash loading via the implementation of full trash capture equivalent actions. However, we agree that the Provision should more clearly state this. C.8.e.iii has been revised accordingly, with the addition of C.8.e.iii.(5). 4a) This request is not clear. However, the revisions to C.8.e are such that there *are* essentially primary monitoring sites (MS4 outfall sites), secondary monitoring sites (in-stream sites), both of which are mandatory, and tertiary monitoring sites (on-land sites), which are optional. 4b) We have not increased the number of sampling events because we recognize the challenges associated with cost and site selection, particularly as the Permittees are relatively new to the required methods for MS4 outfall monitoring and in-stream monitoring. Please refer to the response to SMCWPPP-168, and to the following combined comment, regarding the use of these relatively novel methods, and how they	

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		monitoring methodologies which have not been studied.	essentially constitute a pilot project (and that the Water Board may therefore consider increasing the number of sites/events in a future Permit term): ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110 We have also added language to the Fact Sheet, clarifying this: "…the Trash Monitoring program to be implemented by the Permittees during this Permit term essentially constitutes a pilot project, and the Water Board may consider expanding the scope of the program in a future Permit term by increasing the number of sites and/or events." 4c) Sampling *is* required to be repeated over time - Each site is to be sampled repeatedly during each year, for each year during the Permit term. However, we agree that Permittees should, to the extent possible, try to keep the monitoring sites constant during the Permit term; we have made a responsive revision – see C.8.e.iii.(4).	

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			We do not agree that there should also be mandatory sample events during the dry season, because trash is not likely to be mobilized; it is therefore not likely to be a good use of scarce resources. 4d) We disagree. The management and monitoring questions have changed, and therefore the sample locations may also need to change if the program is to address those questions. At their discretion, Permittees may choose sample sites that are coincident with (or close to) the sites sampled on-land during MRP 2, so long as they satisfy the criteria in C.8.e in MRP 3. 4e) What the comment requests is already incorporated into the Provision. 5) Comment noted. 6) We disagree. While it is likely that established methods will be used, the inclusion of language allowing equivalent methods would encourage innovation and implementation of improved methods to collect the identified data.	

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Save the Bay-3	C.8.e	1) C.8.e should be revised so that Permittees monitor outfalls draining not only areas controlled by (a) full trash capture devices, but also areas controlled by (b) full trash capture equivalent actions. Make explicit that some monitoring sites should be include a mix of (a) and (b), rather than simply allowing either (a) or (b). 2) The Water Board should require additional outfall monitoring sites in each county.	1) We agree that it is appropriate to select monitoring sites of both types and have made a responsive edit. See the response to Baykeeper-15c (part 3), above. 2) See the response to Baykeeper-15c (part 2)), above.	1) Revised as indicated. See the proposed revision for Baykeeper-15c (part 3), above. 2) See the proposed revision for Baykeeper-15c (part 2)), above.
CCCWP-39,45 Oakland-18 SCVURPPP-6,7,106 SMCWPPP-14,15,161,174 ACCWP-a8	C.8.e	The estimated cost associated with implementation of the indirect methods are unreasonable, are significantly greater than those associated with the MRP 2 trash monitoring pilot project, and would effectively make Trash Monitoring the highest monitoring priority for MRP 3, which does not align with the Permittees' desires. For example, ACCWP-a8 would like POCs Monitoring to be the highest monitoring priority, followed by LID Monitoring, followed by Trash Monitoring. SCVURPPP-7 asks that: the trash monitoring requirements be reconsidered and significantly reduced to a scale of	See Master Response Identifier C.8.e-1.	The use of indirect methods, and C.3.e.iii.(2), have been removed, thereby significantly reducing the cost associated with the Permittees' implementation of C.8.e.

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		cost similar to the current permit or lower. Some comments also say that "there is no reduction in monitoring costs elsewhere in C.8 to offset the increase [to trash monitoring]."		
SMCWPPP-162	C.8.e.i	Comment notes that this is a new requirement.	Comment noted.	None.
SMCWPPP-163	C.8.e.ii	Comment notes that this is a new requirement.	Comment noted.	None.
ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110	C.8.e.ii	The direct methods described in Provision C.8.e are either untested by the Permittees and/or have not been assessed as to whether they can answer the Management/Monitoring Questions, and/or are unsafe. The Water Board should therefore describe (e.g., in the Fact Sheet) the referenced direct methods, and should include examples of their implementation.	See Master Response Identifier C.8.e-3.	Revised as indicated. As requested, we have include examples of implementation of the direct trash monitoring methods in the Fact Sheet.

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SCVURPPP-107 SMCWPPP-164	C.8.e.ii	The TO requires that indirect assessment methods are conducted for a 300-foot distance. This length may not be appropriate for many sites, particularly those with tributaries that discharge within the 300-foot reach, or contain steep banks and dense vegetation which make physical access to assessment reach challenging. Change language to: "……..sample the shoreline and/or stream bank (on-land), within 300 feet downstream of the outfall."	The 300-foot metric came directly from the Permittees' own work in MRP 2, and from SFEI and SCCWRP's California Trash Monitoring Methods project (https://www.sfei.org/projects/california-trash-monitoring-methods-project, https://sites.google.com/sfei.org/trash/), and the method therein required sampling along the entire 300-foot assessment length, rather than simply "within" the 300-foot assessment length. Those methods do not allow self-determination of assessment length; a standard assessment length is repeated for all sites to ensure high quality data, as the methods explain and justify in detail. However, since the indirect methods have been removed from C.8.e, this is no longer of major concern. On-land trash monitoring is recommended but no longer required, and as such, though the Permittees are advised to use a 300-ft assessment length (if/when they implement on-land trash assessments), they are explicitly allowed to self-determine the assessment length.	None.

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San Jose-27 SMCWPPP-174	C.8.e.ii	Collection of data on material type is resource intensive, and may itself be unsafe (in particular, during storm events).	See Master Response Identifier C.8.e-4. For concerns regarding general safety, please see the response to the following combined comment, above: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110	None.
San Jose-27	C.8.e.ii	There are likely to be other influences of trash (homeless encampments, illegal dumping, etc.) within a 300ft stretch of the outfall.	Please see the response to the following combined comment above, regarding the time allotted to Permittees to find qualifying sites that are not (to the extent possible) complicated by non-MS4 sources: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110	None.
Solano-7	C.8.e.ii	This comment goes beyond the requests made by SCVURPPP-109 and SMCWPPP-166 (to include language acknowledging the need for permits for the implementation of the direct trash monitoring methods), and requests that language be included to prompt the convening of an additional workgroup to expedite permitting for end-of-pipe or in-stream devices used for trash	We agree with this suggestion, but we believe it would be most efficient to include permitting discussions in the Technical Advisory Group (TAG) rather than recommending/requiring a second workgroup. If Permittees wish to meet separately from the TAG to spend more time on permitting discussions, with or without participation by Water Board staff, with or without participation by other permitting agencies	We have added the topic of permitting as one of the tasks for the Technical Advisory Group.

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		monitoring. It explains that this could significantly reduce the time needed to obtain permits (and may even slightly reduce the cost associated with those permits). It provides some estimates of the timeframe for receiving permits from different agencies.	(e.g., CDFW, Corps), then of course they are free and in fact encouraged to do so. Water Board staff will make ourselves fully available to participate in any permitting discussion/meeting/coordination/etc.	
SMCWPPP-169	C.8.e.ii.(3)	The TO has a footnote reference (32) after "riverine quantitative tally method" but there is no footnote text to go with the reference. Remove footnote reference or add footnote text.	That footnote is included earlier in the Tentative Order. The Tentative Order uses the same footnote numbers for recurring footnotes, which are also known as “cross-references” or “cross-referenced footnotes.”	None.

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SCVURPPP-110 SMCWPPP-167	C.8.e.ii.(3)	The use of trash booms with a skirt that extends to the bottom of the water column, seines, or other equivalent in-stream devices should not be used during storm events because they could cause flooding in adjacent upland areas. In practice, trash booms are generally removed during the wet season or when storm events are forecast. Remove this monitoring method or revise to remove language about using these methods during storm events. The MRP should not encourage monitoring methods that pose a potential threat to lives and property in the vicinity of the monitoring station.	See Master Response Identifier C.8.e-5.	Revised as indicated in Master Response Identifier C.8.e-5.

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SMCWPPP-168	C.8.e.ii.(3)	It is uncertain whether the direct trash boom method and the indirect monitoring methods (i.e., RWTA) to be applied upstream and downstream of individual outfalls will answer the Management/Monitoring Questions. The indirect RWTA was not designed to measure the amount of trash coming from the MS4 at individual outfalls. Nor have trash booms been used for this purpose. Therefore, the TO is prescribing an extensive and expensive monitoring program which may not achieve the desired goals. These methods should be beta tested for the intended Management/Monitoring Questions prior to full-scale implementation. Significantly reduce the trash monitoring level-of-effort so that the methods can be pilot tested for their ability to address the Management/Monitoring Questions.	The Provision includes monitoring questions that will generate data that will answer the management questions. It is true that certain methods (direct and in-stream) are likely to do a better job of answering the management questions than other methods (indirect). However, since we are removing the possible use of indirect on-land methods in lieu of direct monitoring of MS4 outfalls and receiving waters (in-stream), this comment is largely no longer relevant. The on-land methods are still allowed (in fact, encouraged), but not as a replacement for the direct monitoring required at MS4 outfalls and in receiving waters, instead, as a supplement to those efforts, in order to provide a synoptic perspective of trash loading. If, during the Permittees' implementation of C.8.e during MRP 3, they develop recommendations for revisions to C.8.e to improve the efficacy of the Trash Monitoring program, to better address the specified Management Questions, those revisions can be considered for a subsequent Permit term (e.g., MRP 4).	The level of effort has been reduced, because of the elimination of the potential use of the indirect trash monitoring methods. In-stream monitoring has been dislocated from MS4 outfall monitoring, and will be a pilot project rather than a full fledged monitoring program; the Permittees will have 2 years before they have to start in-stream monitoring, and will have less in-stream sites to monitor at.

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				Please see the proposed revision for the following combined comment, above: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110
SMCWPPP-170	C.8.e.iii	Comment notes that this is a new requirement.	Noted.	None.
ACCWP-a8,44 CCCWP-45 Oakland-18 SMCWPPP-14,15,16, 172,178	C.8.e.iii	Because there may not be enough qualifying storm events to sample in a given year (e.g., due to drought), make the following change: eliminate annual minimums, and instead prescribe only the total number of samples that must be collected by the end of the 5-year Permit term, and also generally reduce the required number of (wet weather) sample events because of concerns about cost and staffing and qualifying storm events.	See Master Response Identifier C.8.e-6.	Included language allowing the Permittees to certify (under penalty of perjury) in their Annual Progress Report that there were not enough qualifying storm events to sample in the preceding water

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		SMCWPPP specifically requests, for each site, that the minimum required number of monitoring events be reduced from 15 over the 5-year permit term (i.e., 3/year for 5 years) to 9 (equivalent to 3/year for 3 years).		year, in which case the Permittees would be required to make up those samples in the subsequent (upcoming) water year.
CCCWP-45,46,108 Oakland-18,19 ACCWP-a8,45 SCVURPPP-7,109 SMCWPPP-14,19,166,171,182,183,214 Solano-7 MRP 3 Testimony Hearing Transcript, October 12, 2021, Mitch Avalon, CCCWP – Page 74 (Line 16-25), 75 (Line 1-5)	C.8.e.iii & C.8.e.v	Delay submittal of the Trash Monitoring Plan from September 30, 2022, to July 1, 2023 (or to September 30, 2023). Delay the start date for Trash Monitoring from October 1, 2022, to October 1, 2023. Otherwise, Permittees will not have enough time to find sites, set up logistics, develop the Trash Monitoring Plan and solicit/incorporate feedback from the TAG, and secure all necessary permits. Permittees can't start working on these items prior to adoption of the final Permit, because prior to adoption those items are subject to change. SMCWPPP-182 suggests that, in the alternative to pushing back the submittal date of the Trash Monitoring Plan, it could just be eliminated, given how prescriptive	See Master Response Identifier C.8.e-7.	Change the submittal date of the Trash Monitoring Plan to July 31, 2023, the start date for MS4 outfall monitoring to October 1, 2023, and the start date for in-stream monitoring to October 1, 2024.

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		it is. SMCWPPP-183 requests that the requirement to solicit input from the TAG and others be removed if the submittal of the Trash Monitoring Plan is not delayed. SMCWPPP-214 requests that, if any of the dates in Provision C.8.e are changed, the Fact Sheet is revised accordingly.		

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ACCWP-a8,44 CCCWP-38,39,40,41,45 Oakland-18 SCVURPPP-5,6,7,109 SMCWPPP-14,15,16,166,168,173,174,175,176,177 San Jose-27 Solano-7	C.8.e.iii.(2)	Eliminate (or revise) C.8.e.iii.(2), so that if Permittees use indirect trash monitoring methods, they have the same numbers of sites and monitoring events as if they were to use direct methods. Permittees will likely mostly use indirect methods because it will be challenging to find outfalls at which they can use direct methods, because many outfalls will be unsafe and inaccessible to monitor directly, and because the Permittees won't have enough time to procure the necessary permits for direct methods (some comments such as CCCWP-45 and SCVURPPP-109 posit that it may not even be possible, regardless of timeline, to get permits for certain end-of-pipe or in-stream devices). Another reason for eliminating C.8.e.iii.(2) is that, if Permittees mostly use indirect methods, implementation costs will be much higher because of the 12:1 site ratio, and so eliminating C.8.e.iii.(2) will make the implementation of indirect methods roughly equivalent to the implementation of direct methods, and will overall reduce the MRP 3	See Master Response Identifier C.8.e-2.	Removed C.8.e.iii.(2). In the Fact Sheet, acknowledged that Permittees will need to secure permits for MS4-outfall and in-stream monitoring sites. Otherwise, revised C.8.e as indicated. See the proposed revision for the following combined comment, above: ACCWP-a8 SMCWPPP-14,15,165,167,171 San Jose-27 SCVURPPP-108,110

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		monitoring costs to a level closer to the MRP 2 monitoring costs. There may not be enough municipal and/or contracted staff available to sample all of the sites and storm events required by C.8.e.iii.(2), if indirect methods are used. There may not be enough qualifying sites at which to use the indirect methods, if C.8.e.iii.(2) is maintained as-is. The Fact Sheet does not provide sufficient justification for the 12:1 site ratio. SCVURPPP-109 and SMCWPPP-166 request the inclusion of language that acknowledges the need for permits to install in-stream monitoring devices and/or to retrofit outfalls for the installation of netting devices, and should allow for delays in monitoring implementation as a result.		

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SMCWPPP-179	C.8.e.iii.(3)	There is a requirement to conduct annual monitoring of a storm event that is forecast to be greater than the one-year, one-hour event (i.e., full capture design standard). By definition, a "greater than the one-year, one-hour event" is unlikely to occur each year. Change the requirement so that the one-year, one-hour event is monitored just once during the permit term. This is a more achievable goal.	The language uses the word "should." If such a storm does not occur, Permittees cannot be considered to have violated C.3.e.iii.(3). The purpose of this language is to ascertain, to the extent possible (weather/climate permitting), the relative performance of trash controls during storm events greater than the design storm, which are likely to be bypassed by full trash capture devices, in particular.	None.
Baykeeper – 17	C.8.e.ii	With respect to trash monitoring, Baykeeper recommends the Regional Board require monitoring under Tier 2. Those Permittees who may have difficulty implementing monitoring methodologies under Tier 2 should be allowed to request an exemption from drone monitoring requirements and be permitted to continue trash monitoring using Tier 1 methodologies. Alternatively, if the Regional Board does not want to require Tier 2 methodologies, it should alter the Tier 1 monitoring approach to include adaptive management.	Much of this comment has been addressed through changes in C.8.e, which have been explained in responses to earlier comments (see above). In particular, there is no longer a tier of allowed methods for each trash monitoring component. For MS4 outfall monitoring, data collection must be direct; indirect monitoring of adjacent on-land areas cannot replace that direct monitoring. Likewise, for in-stream monitoring, only direct methods are allowed. Regarding the suggestion to compel on-land monitoring, please see the response to SMCWPPP-168. Regarding the recommendation to require monitoring at designated trash hot spots and	Please refer to the response to the following combined comment, above, regarding changes made to Trash Monitoring: ACCWP-a8,44 CCCWP-38,39,40,41,45 Oakland-18 SCVURPPP-5,6,7,109 SMCWPPP-

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		Additionally, the Regional Board should consider adding to Draft MRP 3 a trigger for monitoring under Tiers 2, 3, and 4 for persistent trash hot spots. Persistent trash hot spots deserve increased scrutiny to inform the sources and pathways of the trash, and identify appropriate management responses (e.g., product bans or increased cleanups of known dumping grounds). If Permittees are still unable to control trash from their hot spots after 10 years of trash control requirements, then the Regional Board should require them to implement more rigorous trash monitoring so Permittees will collect useful data to inform successful management of their trash.	compel additional management actions if the monitoring reveals that concurrent management actions are insufficient, that is built into the framework of the direct discharge control program described in C.10.f.ii. Additionally, the priority of this Permit term is not to confirm known trash hot spots, but rather to assess the efficacy of the approved trash control methods/devices and of the trash accounting framework in C.10. Please refer to the response to the following combined comment, above, regarding changes made to Trash Monitoring: ACCWP-a8,44 CCCWP-38,39,40,41,45 Oakland-18 SCVURPPP-5,6,7,109 SMCWPPP-14,15,16,166,168,173,174,175,176,177 San Jose-27 Solano-7	14,15,16,166,168,173,174,175,176,177 San Jose-27 Solano-7
SMCWPPP-180	C.8.e.iv	Comment notes that this is a new requirement.	Comment noted.	None.
SMCWPPP-181	C.8.e.v	The reporting requirements for Trash Monitoring should be included with Provision C.8.h Reporting, which is where all the other C.8 reporting requirements are contained.	We agree and will make this change. Trash Monitoring reporting was purposefully included within C.8.e in the Tentative Order to facilitate the Permittees'/public's review, and our intention was always to move it to C.8.h for the revised Tentative Order.	Moved C.8.e.v into C.8.h.

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SMCWPPP-185,186	C.8.e.v.(2)	The TO requires that Permittees collectively submit Annual Progress Reports on Trash Monitoring, and a comprehensive Trash Monitoring Report with the Integrated Monitoring Report. With the dissolution of BASMAA, regional reporting will be challenging. Remove the language about collective reporting.	This is a regional Trash Monitoring Program with regional representativeness, and as such, the reporting must be collective reporting. Though BASMAA is dissolved, the Permittees can work together on this reporting via the TAG, BAMSC, and/or other means.	None.
CCCWP-108	C.8.e.v.(2)	Move back initial submittal date of trash monitoring annual progress reports to 3/31/2024, to align with requested delay of beginning trash monitoring to 10/1/2023.	We agree that it does not make sense for the Permittees to submit an Annual Progress Report in the March 2023 UCMR, because Trash Monitoring will not start until later that year. Predictions about monitoring during the upcoming water year won't be possible, because the Trash Monitoring Plan won't yet be completed.	Clarified that the first Annual Trash Monitoring Progress Report will be submitted with the 2024 UCMR.

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ACCWP-46 Oakland-20 CCCWP-20 SMCWPPP-184 Solano-8	C.8.e.v.(e)	Permittees would be challenged to perform power analysis for the Trash Monitoring Plan because there is not enough available trash data of the appropriate kind or consistency in methods used for the data, because trash data in general may not have normal or lognormal distributions, etc. Confusion was expressed by some commenters about which monitoring schedule the Permittees would comply with, whether the schedule in Table 8.e.2 or the schedule suggested by the power analysis.	See Master Response Identifier C.8.e-8.	Removed from C.8.e.v.(1)(e) the requirement that Permittees perform a power analysis. Towards the end of the Permit term, Water Board staff may perform power analysis on trash monitoring data collected to-date, to inform changes (if any) to the monitoring schedule in MRP 4.
MRP 3 Testimony Hearing Transcript, October 12, 2021, Chris Sommers, SCVURPPP – Page 266 (Line 2-10)	C.8.e.ii	The last option is to basically do the methodology we did in MRP 2.0, and to do it upstream and downstream of the outfall. The biggest challenge here is whether or not we can actually detect. We have -- is there too much noise in the data to be able to detect a change? The idea is to compare that control site to the test site, the	Because we are no longer allowing the use of the on-land assessment methods to indirectly characterize in-stream conditions, this comment is no longer relevant. Please refer to other responses, above.	Please refer to other proposed revisions, above.

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		difference between the two would be attributable to the outfall.		
MRP 3 Testimony Hearing Transcript, October 12, 2021, Ian Wren, Baykeeper – Page 293 (Line 18-25)	C.8.e	We recognize the monitoring challenges discussed by Mr. Sommers, but the current evaluation simply is not working for anyone. A scalable and cost effective program, measured at designated hot spots is possible and resources can be focused on implementing control measures, and direct discharge controls where watershed-based approaches are inappropriate.	Comment noted.	None.
Baykeeper-15d	C.8.f	4. Provision C.8.f Must Be Revised to Require Stormwater Sampling and Clarify the Role of Sediment Sampling for Pollutants of Concern ("POC") Table 8.1, POC Monitoring Methods, in Provision C.8.f.ii requires various monitoring methods for five management questions. There are several monitoring methods listed for each management question, but none are mandatory – Permittees will be able to pick and choose their monitoring methods, which is problematic to Baykeeper. Monitoring methods to answer management question 1 allows	Please see Master Response Identifier C.8 - 2.	None.

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		Permittees to collect samples of urban stormwater runoff or bedded sediments – it does not require both. Sediment samples can be collected year-round, and need not reflect wet weather conditions. There also appear to be two options for collecting urban stormwater runoff samples: 1) through MS4s or receiving waters; and 2) at outfall locations. Draft MRP 3 is a stormwater permit, thus monitoring requirements must indicate whether Permittees are complying with Draft MRP 3's discharge prohibitions and receiving water limitations, which presumably requires sampling stormwater. As discussed above, in order to assess permit compliance, receiving water monitoring must be accompanied by outfall monitoring to determine whether discharges are causing or contributing to exceedances of applicable water quality standards. Thus, the Regional Board must revise Table 8.1 to mandate Permittees collect stormwater samples from MS4 outfalls. Further, it is unclear to Baykeeper how sediment sampling can be		

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		used to show compliance with water quality standards and raises the following questions: 1) what standards will sediment samples be evaluated against; 2) will sediment samples be compared to sediment quality objectives that have yet to be enacted; and 3) will sediment samples be evaluated to determine whether discharges are causing or contributing to an exceedance of an applicable water quality standard? While Table 8.3, POC analytes and analytical methods, includes laboratory analytical methods for sediment samples, this is not the same as standards to compare the data to. Data collection only for sake of collection is not a reasonable use of limited resources. If sediment sampling remains in Provision C.8.f, then the Regional Board must revise these requirements to clarify how sediment sampling will be used to determine compliance with Draft MRP 3. Again, Baykeeper objects to Provision C.8.f.iii which allows for POC monitoring to be conducted countywide. As discussed above, monitoring must be capable of		

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		assessing an individual Permittee's compliance with the permit, and Draft MRP 3 must be revised accordingly.		
ACCWP-47	C.8.f.iii	To increase flexibility, allow monitoring for copper and emerging contaminants to address information needs associated with Monitoring Types 3 (provide support for future or existing management actions) and Monitoring Type 4.	Making this change is not necessary. The primary management question for which we need copper and emerging contaminant data is related to loads, concentrations, and presence or absence. If Permittees design data collection in such a fashion that the collected data provide information relative to other management questions (for which data are not explicitly required), this is welcome. However, it is not necessary to broaden the list of applicable management questions in order for the Permittees to design their sampling program to accomplish this.	None.
ACCWP-48	C.8.f.iii	The TO puts a limit of 25% of samples for any pollutant that can be used to satisfy requirements for multiple monitoring categories for that pollutant. This limit does not recognize that the majority of samples indeed address multiple information needs. It limits flexibility in monitoring programs and increases costs. Remove the limit on how many information needs an individual sample can address.	Please see the response to comment SMCWPPP-192.	See response to comment SMCWPPP-192.
ACCWP-49	C.8.f.iii	Table 8.2, footnote d, requires that Total Organic Content (TOC) be	TOC is listed in a row qualified as "as required." As such, there is no requirement to	None.

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		collected concurrently with PCBs data that should be normalized to TOC. Permittees have not normalized to PCBs to TOC for many years as, previously, it was not found to improve analyses or understanding. Remove this requirement.	collect TOC if a Permittee does not find it useful.	
ACCWP-50	C.8.f.iii	Update Table 8.3 to include analytical methods for all pollutants for which monitoring is required.	We have updated the table to include the analytical methods as appropriate.	We have updated the table to include the analytical methods as appropriate.
SMCWPPP-191	C.8.f.iii	Although C.12 (PCBs) increases the level of effort for source property identification, C.8.f allows fewer PCBs samples to count towards this information need by increasing the effort devoted to information needs loads and trends. Change the minimum number of samples for each monitoring type for PCBs to 8 per type (similar to MRP 2).	The increased effort for monitoring types 4 and 5 is intentional and appropriate given the needs to support modeling and trends assessment. The required minimum samples for monitoring types 1-5 total 56 of the 65 or 75 required PCBs samples. The programs are free to allocate the remaining samples to source identification if that is what they choose. Additionally, there may be some samples that can provide information on both source identification and other monitoring needs. Last, the monitoring efforts required for source identification under C.12 are independent from monitoring requirements under C.8 and neither should be thought of as constraining the other. In other words, the fact that “credit” is not provided for a	None.

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			sampling effort associated with finding source properties does not obviate the requirement to find source properties.	
SMCWPPP-192	C.8.f.iii	The TO puts a limit of 25% of samples for any pollutant that can be used to satisfy requirements for multiple monitoring categories for that pollutant. This limit does not recognize that the majority of samples indeed address multiple information needs. It limits flexibility in monitoring programs and increases costs. Remove the limit on how many information needs an individual sample can address.	The intent of this language is to encourage programs to fine tune their monitoring toward answering a monitoring question and not just collecting a sample and claiming that it satisfies different information needs. This monitoring program for pollutants of concern is already very flexible, but its integrity and defensibility depend on the programs collecting data that truly address the unique management questions. We further point out that the required minimums constitute only 56 of the required 65 or 75 total samples for PCBs. The type of sampling required to identify source areas not always guaranteed to yield the best information for calculating loads or trends. These are distinct information needs that should be thought about independently. The permit allows for some possibility of overlap (25%), but going beyond this or even eliminating the limitation is likely to degrade the quality of information because monitoring will not be tuned to an information need.	None.
SMCWPPP-193	C.8.f.iii	Reduce monitoring requirements elsewhere in C.8 to mitigate for the increased costs associated with C.8.d CEC monitoring.	The monitoring requirements, relative to MRP 2, have been reduced for the number of samples collected by the San Mateo program for PCBs, mercury, and copper. Nutrient monitoring requirements have also been removed. The Water Board is mindful of cost	See revisions to C.8.f.

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			concerns, but it is required to impose monitoring requirements and is not required to cap total monitoring costs to those of MRP 2. The total number of samples for PCBs and copper (in Table 8.2) have been reduced by five samples to offset the addition of monitoring to assess compliance with receiving water limits (RWL) in response to Baykeeper - 11. Five samples will be collected by each program for the RWL compliance determination. The purpose of the RWL monitoring is described in C.8.f (Table 8.1 and 8.2), and the reporting requirements are stated in C.8.h.iv(2).	
CCCWP-47	C.8.f.iii.	To increase flexibility, allow monitoring for copper and emerging contaminants to address information needs associated with Monitoring Types 3 (provide support for future or existing management actions) and Monitoring Type 4.	Please see the response to comment ACCWP-47.	See response to comment ACCWP-47.
CCCWP-48	C.8.f.iii.	The TO puts a limit of 25% of samples for any pollutant that can be used to satisfy requirements for multiple monitoring categories for that pollutant. This limit does not recognize that the majority of samples indeed address multiple information needs. It limits	Please see the response to comment SMCWPPP-192.	See response to comment SMCWPPP-192.

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		flexibility in monitoring programs and increases costs. Remove the limit on how many information needs an individual sample can address.		
CCCWP-49	C.8.f.iii.	Table 8.2, footnote d, requires that Total Organic Content (TOC) be collected concurrently with PCBs data that should be normalized to TOC. Permittees have not normalized to PCBs to TOC for many years as, previously, it was not found to improve analyses or understanding. Remove this requirement.	TOC is listed in a row qualified as "as required." As such there is no requirement to collect TOC if a Permittee does not find it useful.	None.
CCCWP-50	C.8.f.iii.	Update Table 8.3 to include analytical methods for all pollutants for which monitoring is required.	Table 8.3 has been updated with additional analytical methods.	Updated Table 8.3.
SMCWPPP-194	C.8.f.iv	Update Table 8.3 to include analytical methods for all pollutants for which monitoring is required.	Table 8.3 has been updated with additional analytical methods.	Updated Table 8.3.
SMCWPPP-195	C.8.g	Comment notes that an option was added to collaborate with CA Dept of Pesticide Regulation for data collection and analysis.	Comment noted.	None.

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SMCWPPP-196	C.8.g.i	1) Comment notes that in MRP 2, Provision C.8.g.i required the Fairfield Permittees to complete their samples by the end of the 5-year Permit period, while in the Tentative Order for MRP 3 they are required to complete their samples by the end of the 2023-2024 water year. 2) C.8.g.i.(2) directs Permittees to sample at locations where toxicity could be likely, to coincide with bioassessment sites, to coincide with creek restoration sites, or to resample a location where toxicity has been found in the past. However, there no longer is bioassessment in C.8.d that this monitoring could be coincident with.	1) Comment noted. 2) We agree that that clause should be removed from the sentence, because although Permittees may use old bioassessment data to inform site selection for toxicity monitoring, the existence of bioassessment data alone should not drive site selection for toxicity monitoring.	1) None. 2) Removed "…to coincide with bioassessment sites" from C.8.g.i.(2).
Solano-2	C.8.g.i	Requires both Fairfield-Suisun AND Vallejo to conduct sampling while the other Permittee programs are considered as single units. By coming together under the MOA, we request that only ONE of these samples needs to be collected for the Solano Permittees for consistency/equity with the other programs. Edit requested on top of pg. C.8-19.	We agree with the requested change.	Revised the samples required of Solano County Permittees in the table in C.8.g.i.(3) from 2 to 1.

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SMCWPPP-197	C.8.g.ii	1) Comment notes that in MRP 2, C.8.g.ii required the Fairfield Permittees to complete their samples by the end of the 5-year Permit period, while in the Tentative Order for MRP 3 they are required to complete their samples by the end of the 2023-2024 water year. 2) C.8.g.ii.(2) directs Permittees to sample at locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past. However, there no longer is bioassessment in C.8.d that this monitoring could be coincident with.	1) Comment noted. 2) That clause will be removed from the sentence.	1) None. 2) Remove "…to coincide with bioassessment sites" from C.8.g.ii.(2).
Solano-3	C.8.g.ii	Requires both Fairfield-Suisun AND Vallejo to conduct sampling while the other Permittee programs are considered as single units. By coming together under the MOA, we request that only ONE of these samples needs to be collected for the Solano Permittees for consistency/equity with the other programs. Edit requested on middle of pg. C.8-21: 1	We agree with the requested change.	Revised the samples required of Solano County Permittees in the table in C.8.g.ii.(4) from 2 to 1.

Comment No.	Provision	Comment	Response	Proposed Revision
SMCWPPP-198	C.8.g.iii	The required reporting level for imidacloprid is changed from 0.05 ppb to 0.01 ppb. Indoxacarb is removed from list of pesticides.	Comment noted.	None.
SMCWPPP-199	C.8.g.iv	Comment states “No change.”	Comment noted.	None.
SMCWPPP-200	C.8.h	Comment states “See below.”	Comment noted.	None.
SMCWPPP-201	C.8.h.i	Comment notes that minor changes were made to reflect changes made in other subprovisions of C.8.	Comment noted.	None.
SMCWPPP-202	C.8.h.ii.(1)	The Regional Data Centers which upload the data to CEDEN prefer that the data is submitted in CEDEN format. Change the required data submittal format from SWAMP to CEDEN.	We disagree. The SWAMP format includes important information that the CEDEN format does not include. There are also tools available that perform the data format conversion automatically, so this does not need to be done by hand.	None.
SMCWPPP-203	C.8.h.iii	The requirements for this report were changed to reflect the changes to C.8. The requirement to include a statement of LID monitoring data quality is listed twice (1)(d) and (1)(g). Remove either (1)(d) and (1)(g) so that the requirement to include a	We have made the requested correction and edit.	Made the requested edit.

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		statement of LID monitoring data quality is listed just once.		
SMCWPPP-204	C.8.h.iv	Comment notes a minor change to this Provision.	Comment noted.	None.
SMCWPPP-205	C.8.h.v	MRP 3 requires the IMR submittal on March 31, 2026. This submittal date would include three years of data collection (WY 2023, WY 2024, WY 2025). MRP 2 required the IMR on March 31, 2020, which included four years of data collection (WYs 2016, 2017, 2018, 2019). The TO incorrectly states in C.8.h.v.(1)and C.8.h.v.(2) that the March 31, 2026, IMR submittal date would include four years of monitoring data. There are only three water years preceding March 2026 (WYs 2023, 2024, 2025). Furthermore, for LID monitoring, which does not begin until October 1, 2023 (i.e., WY 2024), the IMR would represent just two years of monitoring data. Change the IMR submittal date to	We have revised C.8.h.v.(1) to correctly state that the IMR will include data from the prior water year, which is the third water year of the Permit term. C.8.h.v.(2) has been removed from the Tentative Order (it has been combined with C.8.h.v.(1)), so there is no accompanying edit to make there. The comment incorrectly states that the IMR only analyzes data collected up until that point in the Permit term. The IMR analyzes all data collected since the previous IMR. Of course, Permittees will only report (in the IMR) on LID Monitoring and Trash Monitoring conducted during MRP 3, because those subprovisions were not included in MRP 2, however they must still analyze data from MRP 2 for Creek Status Monitoring and SSID Projects since the IMR submitted during MRP 2. We do not agree with the request to delay the IMR by an additional year. If we did that, the information in the IMR would be received	Revised C.8.h.v.(1) as indicated.

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		March 31, 2027, so that more data can be evaluated.	too late in the Permit term to inform changes to C.8 in MRP 4.	
SMCWPPP-206	C.8.h.v.(3)	The TO requires that the IMR present a comprehensive analysis of all data collected since the previous IMR; however, monitoring requirements in the TO are dramatically different from those in MRP 2. The MRP 3 IMR should simply require comprehensive analysis of all data collected since the start of MRP 3. Inclusion of data types that are no longer collected under MRP 3 (Creek Status, SSID) represents a moderate level-of-effort with uncertain value. Change this subprovision to require comprehensive analysis of data collected pursuant to C.8 in MRP 3.	We do not agree that this would be appropriate for all subprovisions in C.8. However, it is reasonable to not require Permittees to report on Creek Status Monitoring conducted subsequent to the submittal of the MRP 2 IMR, and have made a responsive edit.	Revised as indicated.

Comment No.	Provision	Comment	Response	Proposed Revision
SMCWPPP-208	C.8.h.v.ii	Comment notes minor changes to this Provision.	Comment noted.	None.
CCCWP-109	C.8.h.vi	Remove requirement to submit Comprehensive Bioassessment Final Report.	We have not made the change as no justification is provided for the request. Please see the response to SMCWPPP-207, below.	Please see the proposed revision for SMCWPPP-207, below.
SMCWPPP-207	C.8.h.vi	This is a requirement for a regional report which is difficult to fund and organize without BASMAA. BASMAA already conducted a regional analysis of the first five years of bioassessment data (2012-2016) and prepared a report and Factsheet on the findings. SMCWPPP already conducted a countywide analysis of the first eight years of bioassessment data (2012- 2019) in the MRP 2 IMR and reached similar conclusions as the regional study. It is unlikely that adding data to the prior regional or countywide bioassessment reports will result in new findings. Furthermore, with the dissolution of BASMAA, there is no longer a regional fiscal agent to facilitate shared report development. Remove this requirement.	Though BASMAA is dissolved, the Permittees can work together on this reporting via the TAG, and/or via BAMSC, and/or via other means. It is appropriate to include an analysis of all of the bioassessment data, to confirm that the results and conclusions generated by those data are the same as the results and conclusions that were included in the prior regional analysis. Otherwise, bioassessment monitoring between 2017 and 2021 will not be sufficiently evaluated (contrary to the comment, these water years were not included in the MRP 2 IMR), together with the other bioassessment data. Permittees spent multiple years to develop a statistically robust sampling design for bioassessment data that allowed for a defensible region-wide and county-specific analysis. All data collected according to that design per the permit requirements should be analyzed in that manner to take advantage of that effort and continued site tracking and cross county coordination. With double the samples as	Delayed the submittal date by one year.

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			compared to the number analyzed in the BASMAA fact sheet, trends may change, and error bars from the past analysis will be reduced. In the past, some county programs had too few non-urban data points which may change with these additional sample sizes. All of that said, we agree it is reasonable to delay the submittal of this report. We have delayed it by one year, from March 31, 2023, to March 31, 2024. We do not want to delay it further than that, past the stop date of the bioassessment monitoring, and think this is a reasonable compromise.	

Response to Comments on September 10, 2021, Tentative Order
Provision C.9. – Pesticides Toxicity Control

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-111 SMCWPPP-215	C.9	Addition of neonicotinoids to the list of pesticides of concern to water quality increases the Permittees' reporting burden.	Comment noted. Neonicotinoids are a class of urban-use pesticide of significant concern to receiving water quality due to toxicity ("New-generation pesticides are prevalent in California's Central Coast streams," February 2022, https://doi.org/10.1016/j.scitotenv.2021.150683). Their inclusion in the MRP's list of urban-use pesticides of concern to water quality is therefore both merited and necessary, and is worth the cost of an incremental increase in the Permittees' reporting burden.	None.
ACCWP-51	C.9	Remove diazinon and chlorpyrifos from the list of urban-use pesticides of concern to water quality because they are no longer approved for urban use.	We disagree. First, even though diazinon and chlorpyrifos are no longer approved for urban use, they are still being found in receiving waters, and there may still be some loading to receiving waters from ongoing use, and we anticipate that there will be some loading to receiving waters (from legacy and/or ongoing use) in the near term.[22] Second, the retention of diazinon and chlorpyrifos in the list of urban-use pesticides of concern to water quality does not create additional burden for the Permittees because there aren't corresponding monitoring requirements for diazinon and chlorpyrifos.	None.

[22] https://www.waterboards.ca.gov/water_issues/programs/swamp/spot/docs/spot_10_year_report.pdf

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			Third, the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL references both diazinon and chlorpyrifos as being urban-use pesticides of concern to Bay Area water quality.	
SMCWPPP-216	C.9.a	Reiterates requirement.	Comment noted.	None.
ACCWP-52	C.9.a.i	Revert to language in MRP 2 by changing "…toxicity…" to "…pesticide-caused toxicity…"	The Tentative Order already reflects an appropriate edit. This comment refers to text in the Administrative Draft. The text in the Tentative Order was changed to: "…to ensure their use of pesticides does not cause or contribute to **pesticide-related** toxicity in receiving waters." "Pesticide-related toxicity" is the phrasing used in the Diazinon and Pesticide-Related Toxicity in Urban Creeks TMDL.	None.
CCCWP-51	C.9.a.iii.(3)	Don't require submittal of links to IPM policies and ordinances in the 2023 Annual Reports. Instead, require them to only be provided to the Water Board on request.	We disagree. The one-time submittal of online links to IPM policies and ordinances in the 2023 Annual Reports facilitates Water Board staff's review, helping to ensure effective programs are in place and being implemented. It also increases Permittees' transparency both to the Water Board and the public. Finally, it is a fairly easy task, with subsequent reporting required only if the web links change.	None.
CCCWP-52 ACCWP-53	C.9.c.i	Do not require Permittees to verify that contractors hired to perform IPM are acting in accordance with Permittees' IPM policies and/or	We disagree. C.9.c.i would require Permittees to "periodically monitor" contractors they contract with to work on municipal properties, to ensure those contractors are practicing IPM. In their	None.

Comment No.	Provision	Comment	Response	Proposed Revision
		ordinances, as it is an undue burden.	annual reports, Permittees must then describe how they verified contractor compliance and any corrective actions taken. This is a flexible and reasonable burden to ensure that Permittee contractors are implementing IPM. To the extent Permittees rely on contractor or other third party actions to comply with the MRP, the Permittees are responsible for those actions and must monitor and verify them.	
SCVURPPP-112 SMCWPPP-217	C.9.e.iii	Remove the requirement in C.9.e.iii that Permittees shall submit an evaluation of the "effectiveness of outreach efforts required by…C.9.e" in their 2026 Annual Reports. That evaluation is already required in C.9.g.iii.	We agree that this reporting is potentially redundant and have made the requested change as described below. C.9.g focuses on pesticide source control actions, and C.9.e explicitly focuses on public outreach. We have removed the potentially duplicative reporting from C.9.e. While public outreach is implicitly included in pesticide source control actions, to ensure it is clear the C.9.g.iii evaluation includes it, we have revised C.9.g.iii so that it is clear that it includes what is being removed from C.9.e.iii, which is: an assessment of the effectiveness of outreach efforts required by C.9.e.	Revised as indicated.
SMCWPPP-218	C.9.g.iii	Notes that the subprovision exists and does not request any changes.	Comment noted.	None.

Response to Comments on September 10, 2021, Tentative Order
Provision C.10. – Trash Control

Comment No.	Provision	Comment	Response	Proposed Revision
Santa Clara – 2 Oakland – 21,25 SMCWPPP – 22, 50, 235 CCCWP – 63 Palo Alto – 5 Los Altos – 3 San Jose – 31 SCVURPPP – 119 San Mateo County -17 Solano – 16 ACCWP – 59 SCVWD – 4	C.10.b.v	Continue to allow up to 10% reduction value for existing and new jurisdiction-wide source controls through the term of the permit and beyond. Through the adoption and enforcement of source control bans, Permittees have prevented low trash generating areas from morphing into moderate trash generating areas, reduced the likelihood of trash entering receiving waters from wind or litter, and prevented the plugging of trash capture devices installed in storm drain inlets. Continue using the same accounting methods and credits used in MRP 2 in MRP 3.	See Master Response Identifier C.10.b – 1	None.
San Jose – 4, SCVURPPP – 10 Watershed Project – 3	C.10.b.v C.10	Revise C.10.b.v, C.10.f, and C.10.f.i to retain maximum reduction value for direct discharge programs to at least 15% through and beyond the new permit term. Also, allow Additional Creek and Shoreline	For response to retention of source control credits and offsets for creek and shoreline cleanups, see Master Response Identifiers C.10.b – 1 and C.10.f – 1. For Direct Discharge Programs: We acknowledge the benefits of a robust	None.

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		Cleanups offsets to continue to count as 10% towards the 100% trash reduction goal and beyond the new permit term.	Direct Discharge Control Program (DDCP) as an interim tool to addressing the discharges of trash to receiving waters. As such, C.10.f.ii allows Permittees with an approved DDCP to continue to offset up to 15% of their trash load reduction until June 30, 2025, provided they control trash after it has already impacted receiving waters, and by taking steps to permanently reduce direct discharges of trash through implementation of long-term programs to reduce the unsheltered homeless population. Working towards meeting the need for housing and associated services for those experiencing unsheltered homelessness may contribute to a decrease in the number of people experiencing homelessness, and as such, a consequent decrease in the presence of homeless encampments along creeks and riparian areas where direct discharges may be occurring. However, as stated in the MRP 2 Fact Sheet (attachment A-99), offsets available through implementation of the DDCP are interim and were forecast to be removed during the next permit term (MRP 3). Currently, only five Permittees have an approved DDCP and are claiming the 15 percent offset. Allowing offsets to continue beyond June 30, 2025, would mean allowing a corresponding percentage of a Permittee's moderate	

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			and/or high trash generating area to continue to remain uncontrolled. The goal of C.10 is for Permittees to achieve compliance with the trash discharge prohibition through meaningful and quantifiable trash reduction via engineering controls such as the installation and operation of full trash capture devices, or the implementation of other measures equivalent to full trash capture (and verified via OVTAs). This ultimate goal cannot be achieved if offset credits through the Direct Discharge Control Program continue to be an acceptable means of achieving compliance.	
Dublin - 3	C.10.a	Extend the current offsets and credits in MRP 3 through the dates of the 90% and 100% reduction targets. However, reducing the total allowable offsets and credits from the current 35% to a maximum of 25% towards meeting the 90% and 100% reduction targets would be an acceptable compromise	See Master Response Identifiers C.10.b – 1 and C.10.f – 1. See response to San Jose - 4 above for additional discussion on DDCP offsets. We do not agree that extending the credits through the 90% and 100% trash load reduction targets, or allowing Permittees to continue claiming at least 25% of their load reductions in credits, would be an acceptable compromise. Offsets and credits are interim measures designed to help Permittees comply with trash reduction benchmarks by controlling trash	None.

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			at the source and from direct discharges. As noted in the Master Responses, continuing to allow these credits and offsets gives Permittees an opportunity to double count and to continue to avoid reducing discharges from some moderate and high trash generating areas. In addition, we have already provided extensions. These offsets and credits were forecasted in the MRP 2 Fact Sheet to end when MRP 2 was reissued. However, these Source Control credits and offsets are still available until June 30, 2025, for new source control measures, creek and shoreline cleanups, and for the implementation of an approved direct discharge control program. As a result, Permittees can continue to receive credit as they work toward achieving compliance with the 100 percent reduction requirement. This is already an adequate compromise, in the Water Board's view.	
San Mateo County -16, SCVURPP P- 9, Dublin – 1, ACCWP – 54,	C.10.a.i	The COVID-19 pandemic has significantly impacted operations, budgets, and staffing (and impacts will continue over at least the next few years), it	See Master Response Identifier C.10.a -1	None.

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SCVURPPP – 113, 114, 123, SMCWPPP – 21, 219, 220, 240, Caltrans – 1,2, San Jose – 3, 28, CCCWP – 53, 54, Oakland - 22		is unrealistic to expect Permittees to maintain and accelerate progress towards the benchmarks at the same pace as prior to the pandemic. Extend the deadlines to achieve 90% and 100% trash reductions by at least two years each to July 1, 2025, and July 1, 2027, respectively. In addition, make the 90% trash reduction requirement a performance guideline (i.e., not mandatory), similar to the 60% goal in MRP 2. Adopting these recommendations will make the overall program more feasible and better support the planning for long-term trash reduction solutions and collaborative projects with Caltrans. In addition, extend additional time to achieve 100% to July 1, 2030, if Direct Discharge Control Plan is submitted.		
SCVURPPP – 11, 116 SMCWPPP – 223, Dublin – 2,	C.10.a.ii. (b)	Request that the requirement for municipalities to manage trash on all private properties (regardless of size) down to a level of low trash generation be	See Master Response Identifier C.10.a - 2	None.

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Oakland & San Jose – 5, 30 SMCWPPP -23,52, ACCWP – 56, Oakland – 24, San Mateo County – 18, CCCWP - 60		removed. This provision is an expansion of the requirement in MRP 2 (i.e., focused on areas >10,000 sq. ft.) and is impracticable to achieve, especially in the timeframe required.		
SMCWPPP – 24	C.10.c	The following language in C.10.c is new to MRP 3, and not directly related to discharges from the municipal storm drain system, and should be removed: *"Flood management agencies must also implement trash control measures such as trash pickups and installation of trash receptacles, to control Moderate, High, and Very High trash generation areas within their jurisdiction including, but not limited to, parking lots, trailhead areas, and along recreational*	We disagree. C.10.c, requiring flood management agencies to implement trash control measures (such as trash pickups and the installation of trash receptacles) to control Moderate, High, and Very High trash generation areas within their jurisdiction (including demonstrating the effectiveness of these trash control measures through on-land visual trash assessments) is consistent with previous requirements and aligns with the overall objectives of the C.10 to prevent discharges of trash to receiving waters. These measures are appropriately required of flood management agencies, as they are	The word "full" has been removed from the following sentence in C.10.c: *"Flood management agencies must continue to implement requirements for*

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		paths and trails and demonstrate effectiveness of these trash control measures as specified in Provision C.10.b.ii." In addition, request that the word "trash full capture systems" in the first sentence of C.10.c be removed since the devices mentioned in this sub-provision aren't certified as full trash capture equivalent.	of any Permittee, when trash has the potential to discharge to the MS4 from an area with more than a low trash generation rate. The language gives examples of situations where that condition could be present and of controls that could help address those discharges. The request to remove the word "full" from the sentence *"Flood management agencies must continue to implement requirements for full trash capture systems, as specified in Table 10-1, below"* is reasonable and the edit has been made.	*trash ~~full~~ capture systems, as specified in Table 10-1, below"*
Watershed Project - 5	C.10	Proposed amendments to the permit should be consistent with the statewide trash amendments that are currently being written.	Although there may be slight differences in these requirements since the MRP contains specific provisions relevant to the San Francisco Bay region, the tentative order and the statewide trash amendments are consistent.	None.
Save the Bay - 6	C.10	Save The Bay opposes the draft permit's approach to inlets on private land draining to permittees' storm drain systems. Not requiring trash control if there is a full trash capture device downstream of these areas would put streams and channels adjacent to private inlets at greater risk of direct discharge due to poor on-land trash maintenance. The order should	We disagree. Consistent with the Trash Amendments, the MRP provides two approaches to meeting the prohibition on the discharge of trash: installation of full-trash capture devices or implementation of a combination of controls that achieve full trash capture equivalency. Given the limited resources of Permittees, it is not appropriate to require them to do both.	None.

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		maintain trash control requirements for private land, regardless of capture device locations and should require incorporation of trash control on private land into direct discharge plans.	Nevertheless, trash controls may exist or be independently required on private land. For instance, there may be trash receptacles and prohibitions on littering or dumping that apply in private parking lots or other areas plumbed to the MS4.	
Save the Bay - 7	C.10	The Permit should identify the combination of non-structural BMPs that are proven effective at achieving full trash capture equivalency.	Comment noted. There is no set combination of non-structural BMPs that has been proven effective at achieving full trash capture equivalency. The combination of BMPs that proves effective for a particular Permittee in a particular location will depend on site-specific factors, such as the population density of the area, the presence or absence of trash-generating businesses like fast food restaurants, and the social and behavioral norms of the people who live in or visit the area. C.10.c identifies proven non-structural BMPs such as trash pickups and the installation of trash receptacles to control Moderate, High, and Very High trash generation areas. Street sweeping is also listed as a non-structural BMP in C.10.iii.(b).(iii)	None.
Save the Bay - 8	C.10	The current permit's provision for monitoring on-land trash conditions (OVTAs) to determine the effectiveness of trash control measures lacks a standard for ensuring data reliability, leaving	We disagree that the monitoring for on-land trash conditions lacks a standard for ensuring data reliability. C.10.b.iii.(b) provides a set of criteria that Permittee are required to meet when conducting on-land visual assessments. Item (iv) requires that	None.

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		monitoring frequency to the discretion of permittees. The tentative order fails to address the issue of variability in assessment data. The permit should require all data to meet an established statistical confidence level to validate any re-categorizing of High trash generation areas to Medium or Low.	Permittees put forth substantive and credible evidence that their management actions (or sets of management actions) when performed to a specified performance standard, yield a certain trash reduction outcome reliably. Permittees are required to submit such evidence to the Executive Officer separate from any other submittals or reports. If the evidence submitted is accepted by the Executive Officer, Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these management actions at the specified performance standard.	
Baykeeper - 7	C.10	C.10's Trash Load Reduction Credits and Offsets Do Not Comply with the State Board's Trash Amendments To date, Permittees have failed to collect data to support the finding that C.10's credits and offsets results in trash reductions that achieve "full capture system equivalency," consistent with the "Track 2" compliance option. Additionally, the Fact Sheet at A-228 and A-229 admits: "[t]he State Trash Amendments do not allow	We agree that offsets and credits must be phased out in order for Permittees to meet the Trash Amendments' discharge prohibition through full trash capture or full trash capture equivalency. Offsets for creek and shoreline cleanups, offsets for implementation of Direct Discharge Control Plans, and credits for new source control actions will no longer be applicable after June 30, 2025. At that time compliance with the 100 percent trash load reduction requirement is required through implementation of full trash capture systems or equivalent controls.	Changes as described in the comment response have been made to C.10.e in the Permit and Fact Sheet.

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		offset credit for [creek or shoreline cleanups or direct discharge controls] in lieu of implementing MS4 controls to meet the Trash Discharge Prohibition." These admissions require the Water Board to remove C.10 from C.1's safe harbor, as C.10 does not comply with the Trash Amendments it claims to be implementing. Likewise, C.10.e effectively creates a safe harbor within a safe harbor, allowing Permittees to submit a report describing why it is impracticable to control trash via full trash capture devices or equivalent actions.	These offsets and credits are, however, of value in the interim until full trash capture, or equivalency, is implemented. The interim use of them is not proscribed by the Trash Amendments. Permittees that have taken advantage of these offsets and credits have provided information that they have resulted in significant on-the-ground reductions in trash discharges. Moreover, the Water Board expects that source control actions like those that will no longer receive credit after June 30, 2025, will continue to be an element of the suite of controls that Permittees use to achieve full-trash capture equivalency. With respect to the trash reduction impracticability report in C.10.e, it was borne out of trash workgroup meetings with the Permittees where the impracticability of installing full trash capture devices was discussed. C.10.e. was meant to cover that issue and was erroneously written to suggest that the requirement to reduce trash loads does not need to be met, as that was never the case in discussions with the Permittees. We thank the commenter for pointing out this error and have corrected C.10.e to apply to full capture devices. The impracticability report remains optional and can be helpful to focus Permittees' efforts on planning for other actions or a combination of actions that can help them achieve the trash reduction	

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			requirements. The Fact Sheet has likewise been amended.	
CCCWP – 59,68	C.10.f	It is inappropriate to specify in C.10.f.ii.b that the Direct Discharge Control Plan must address unsheltered homeless populations. Recommendation. Remove the language pertaining to services provided to unsheltered homeless populations from the requirements of developing a Direct Discharge Control Plan.	Direct trash discharges within waterways and riparian areas are closely tied to the presence of homeless encampments near creek and riparian areas. Efforts to remove encampments from these areas without the provision of alternative housing or services do not permanently (or even temporarily, in many cases) reduce direct trash discharges, but simply shift them to other areas. As a result, it is crucial that Direct Discharge Control Plans address the needs of unsheltered homeless populations such as the provision of housing and social/sanitation services. When Permittees work collaboratively with homeless advocacy groups, local agencies or departments, and other organizations, they are better able to provide assistance with meeting the housing and sanitation needs of people experiencing unsheltered homelessness. This could result in a potential reduction in the number of people experiencing homelessness, a potential reduction in the presence of homeless encampments within riparian areas, or, at the very least, a reduction in the trash discharges from encampments. Therefore, a key best management practice for mitigating the adverse water quality impacts associated with homelessness is for Permittees to work collaboratively to facilitate	C.10.f. has been revised as follows regarding provision of services: *"… and the following services: trash and sanitary services, and other services which are necessary to ~~meet the needs of people experiencing~~ reduce discharges associated with unsheltered homelessness, such as RV safe parking areas and pump out services, and social services ~~such as health~~*

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			the provision of housing and other services for those experiencing unsheltered homelessness.	~~*care, a means to provide food, and job training*~~ *that can help the unsheltered homeless transition to housing*.
Baykeeper – 6	C.10 C.11 C.12	The Water Board must revise Draft MRP 3 to apply the State Board Orders to the safe harbors in C.10, C.11 and C.12. Proper application will likely require the Water Board to go beyond the requirements in the underlying Trash Amendments and TMDLs in order to achieve rigor, accountability and transparency to comply with the State Board's principles for safe harbors. If the Water Board does not want to go through the exercise of revising these provisions to comply with the State Board Orders, then it must remove C.10, C.11, and C.12 from Provision C.1's Safe Harbor.	C.10, C.11, and C.12 include rigorous, accountable, and transparent requirements for trash, mercury, and PCBs to achieve compliance with receiving water limitations and the mercury and PCBs TMDLs. The requirements are the product of years of Water Board experience and knowledge gained through monitoring, as well as studies, evaluations, modeling, and mathematical analyses that the Water Board has overseen, developed, or participated in to ensure that the final compliance deadlines of 2025 (trash), 2028 (mercury), and 2030 (PCBs) will be met. They are based on a thorough and complete identification and prioritization of the issues regarding these pollutants in and around San Francisco Bay. C.10-C.12 include clear and concrete milestones and deadlines. Trash must be reduced by 90% by 2023 prior to the final deadline in 2025. Permittees are expected to reduce mercury by approximately 10 kg/yr, making substantial progress toward achieving TMDL load allocations. Indeed,	None.

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			Permittees have already met the Bay mercury TMDL's interim loading milestone of 120 kg/yr by 2018. Permittees are expected to reduce an estimated 1.47 kg/yr of PCBs, making substantial progress achieving the regionwide urban runoff wasteload allocation of 2 kg/yr. Representative monitoring is also required to ensure compliance and progress toward achieving standards. In the case of mercury and PCBs, a technically sound quantification of loads reduced through control measures is also required. All of these pollutants are required to be monitored to inform progress and adaptive implementation. In the case of mercury and PCBs, monitoring will be combined with modeling due to the infeasibility of monitoring loading of these pollutants. The data collected will be used to validate assumptions and inform actions. We, therefore, disagree that C.10-C.12 do not comply with the State Water Board orders. Where the Permittees will undertake the kind of ambitious and significant actions required by these Provisions (for example, targeting thousands of acres in total of old industrial areas for mercury and PCBs control alone will be a significant undertaking), the Water Board believes it is appropriate to deem them in compliance with receiving water limitations for these pollutants, consistent	

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			with what the State Water Board has allowed.	
Save the Bay - 4	C.10	The results of Permittees' annual trash monitoring should not only inform updates to their monitoring plan, but should also inform changes to trash management activities throughout their jurisdiction. The tentative order should require updates to trash management activities in TMAs where outfall monitoring indicates that a low trash generation rate has not been achieved. These updates should also be extrapolated to other TMAs being treated similarly. Without an adaptive management requirement, there is no guarantee that these monitoring efforts will lead to actual changes in trash management and improved outcomes for the receiving waters.	We agree; in response to this and similar comments, language has been added in C.8.e.iii.(8) and C.8.e.v.(6) on how trash monitoring results will inform and/or trigger additional management actions by Permittees. We also note that the inspection and monitoring provisions in C.10.b.iii are designed to provide feedback on the effectiveness of trash control measures. For example, data from on-land visual trash assessments are intended to provide information on the effectiveness of non-structural controls. In other words, an on-land visual assessment in an area not served by a full-trash capture device showing more than Low trash generation would generally indicate that the trash control measures require updating.	Please see revisions to Provision C.8.e.iii.(8) and C.8.e.v.(6) and the corresponding Fact Sheet section.
CCCWP - 57	C.10.a.i	The requirement for a schedule of implementation of additional trash load reduction control actions is already a part of the Trash Load Reduction Plan and should not be a separate requirement.	The requirement for a trash load reduction plan in C.10.a.i for Permittees that do not attain the 90 percent compliance benchmark by June 30, 2023, isn't separate from the requirement in C.10.d.ii. C.10.d.ii requires that Permittees calculate their trash load reduction, relative to 2009 baseline conditions, without the trash load	Language in C.10.d.ii has been revised to provide additional clarity.

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			reduction offsets by June 30, 2023. If that reduction is less than 90 percent, then Permittees are required to develop and implement an updated Trash Load Reduction Plan. The updated Trash Load Reduction Plan must include a schedule of additional trash load reduction implementation actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and actions and a schedule to attain the 100 percent reduction achieved through implementation of full trash capture, or other equivalent actions by June 30, 2025.	
Baykeeper - 16	C.10.a.i	C.10.a.i should not push back the 90% and 100% trash load reduction deadlines. We object to C.10.a.i's revisions to the trash load reduction milestones in MRP 2, which required 100% trash load reduction by July 1, 2022, to require 90% trash load reduction by June 30, 2023 and 100% trash load reduction by June 30, 2025. At a minimum, the Water Board must revise C.10.a.i, C.10.d.ii, and C.10.d.iii to clarify the 90% and 100% trash load reductions are enforceable deadlines in 2023 and 2025.	We disagree that revisions are needed. With respect to extending the deadlines for 90 percent and 100 percent compliance, see Master Response Identifier C.10.a – 1. Separately, the requirements to achieve 90 percent reduction by 2023 and 100 percent trash load reduction by 2025 are mandatory, enforceable deadlines, as stated in the order ("Permittees <u>shall reduce</u> trash discharges from 2009 levels…to receiving waters in accordance with the following schedule….") (emphasis added).	None.

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SCVURPPP – 115, SMCPPP – 221, Oakland – 23, ACCWP – 55	C.10.a.ii	Language requiring mapping of "other control measures" could pose an extensive level of effort expended by Permittees and is not likely helpful in illustrating implementation (e.g., street sweeping and source control actions). Revise language to focus on mapping of full capture systems and make mapping of "other control measures" optional.	The mapping requirements in C.10.a.ii are an extension of requirements in MRP 2. In 2014, Permittees mapped trash management areas within their jurisdiction and relative to the 2009 baseline trash conditions. The 2014 maps delineated trash generation areas in the Permittees' jurisdictions into the categories of Low, Moderate, High, and Very High, and showed trash management areas where full trash capture devices, or other controls, were being implemented. The 2024 mapping requirement is needed to gain a better understanding of Permittees' trash management areas, including areas where full trash capture devices or other controls are being implemented. Identifying the areas where other controls are being implemented to achieve full trash capture equivalency is crucial for compliance verification purposes. Permittees may provide access to ultilayered GIS maps that account for other trash control action details and locations on a separate layer than full-trash capture device coverage.	None.
San Jose - 29	C.10.a.ii.(a)	Screening of the overflows may result in clogging. Current bioretention specifications meet the State trash BMP minimum specifications. Remove "and receiving waters and discharge points from the facility, including	We disagree that the change is needed, as the current language provides sufficient flexibility ("screened or otherwise configured") to include designs that will meet the flow standards and perform acceptably for the range of bioretention controls that might be implemented.	None.

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		overflows, are appropriately screened or otherwise configured.”		
PG&E - 2	C.10.a.ii.(b)	The requirement to install Full Trash Capture Devices (FTCDs) on private property in certain areas: • Does not make any exception for properties that are not sources of trash (example: would require installation of FTCDs at sites that are unmanned and fenced to prevent public access). • Imposes unnecessary capital expense and maintenance burdens on properties that do not contribute trash to receiving waters. • Results in risk of property being flooded (i.e., if FTCDs at an unmanned electric substation were to be clogged with leaves), which may create public health and safety risks. Requested modifications: Add an exception for properties that do not contribute trash to the MS4 (i.e., are not accessible to the public and/or on which no trash-generating activities occur).	We disagree that an exception is needed, because C.10.a.ii.(b) has sufficient flexibility to recognize situations where private lands are not sources of trash to the MS4. To avoid confusion, we have revised that subprovision to clarify the situations when a private land would be required to implement FTCDs or equivalent measures. Specifically, those private lands that are either moderate, high, or very high trash generating and that are plumbed to the Permittees’ MS4 system must implement the required measures. We agree that well-maintained fencing has the potential to reduce a parcel’s trash generation rate. However, by itself, fencing is insufficient to allow a determination that a parcel is not significant trash generating. The parcel’s location, including certain PG&E facilities, in an area that has Moderate, High, or Very High trash generation rates due to unauthorized dumping, unsheltered homeless populations, or other trash generating activities, may result in the private parcel generating trash that requires control. Anecdotally, we have observed such situations in Permittee neighborhoods like West Oakland. The revised language clarifies that in such situations, trash control is still required.	Language in C.10.a.ii.(b) and Fact Sheet has been revised to provide additional clarification as described in the response.

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			The design of FTCDs takes into account issues like flooding, for example, by providing high-flow bypasses or similar design solutions	
SCVURPPP – 117 SMCWPPP – 226 ACCWP – 57	C.10.b.i	The following language that is in MRP 2 was removed: "If this frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year." Reduces the flexibility of Permittees to reduce inspection and maintenance frequencies at sites where there is no evidence of maintenance issues. Additionally, this language is specific to catch basin inserts, not high flow capacity devices. Additionally, change the following language to read: "<u>For catch basin inserts</u>, if any such device is found to have a plugged or blinded	Full trash capture systems must be appropriately maintained to be effective. If a full trash capture system enters the wet season clogged with leaves and/or trash/debris, trash can bypass the device, preventing it from functioning effectively. During device inspections over the course of the previous permit term, Water Board staff observed that roughly 20 percent of the inspected full trash capture devices within moderate, high, and very high trash generating areas required cleaning and/or repair or replacement. The Tentative Order maintains the MRP 2 requirement for Permittees to inspect and maintain their full trash capture devices at a minimum frequency of once per year, but within High and Very High trash generation areas, Permittees must now inspect (and maintain if necessary) their full trash capture devices at a minimum frequency of twice per year, with the inspections spaced at least three months apart. Justification for the higher maintenance frequency within High and Very	The Provision has been revised as follows: "<u>For catch basin inserts</u>, if any such device is found to have a plugged or blinded screen, or is 50 percent full or greater..... <u>For high flow capacity devices, if any such device is found to have a plugged or blinded screen, or exhibits conditions that exceed the manufacturer's guidelines</u>

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		screen, or is 50 percent full or greater..... For high flow capacity devices, if any such device is found to have a plugged or blinded screen, or in any way exhibits a condition that meets or exceeds the manufacturer's guidelines for requiring maintenance..."	High trash generation areas is due to the speed with which full trash capture devices in those areas are expected to get plugged with trash and/or debris if not maintained. We agree that the suggested language for catch basin inserts and for high flow capacity devices is appropriate and have made the requested change.	otherwise requires maintenance beyond the manufacturer's specifications..."
SCVURPPP – 118, 127 SMCWPPP – 230, 248 CCWP – 62, ACCWP – 58,	C.10.b.ii	Remove requirement for permittees to submit a program-wide operation and maintenance summary report that identifies the frequency and approach used by Permittees for the inspection and maintenance of full trash capture devices if benefit can't be stated and/or if the report is identified as a low priority, compared to many other new/enhanced actions included throughout the TO	Comment noted. While information on device type, date of installation, location, drainage area, date(s) of inspection and maintenance, etc. is relevant and important information, this requirement has been removed from the tentative order in-order to reduce the reporting burden.	The requirement in C.10.b.ii.(b) for Permittees to submit a program-wide operation and maintenance summary report has been removed.
ACCWP – 58	C.10.b.ii	It is not necessary, useful, or feasible to define the exact drainage area for each individual inlet. Reduce reporting burden: Clarify that defining one drainage area that defines the drainage area of multiple contiguous inlet-based devices is sufficient.	We disagree. The requirement in C.10.b.ii for Permittees to retain device-specific maintenance records including the drainage area for a given full trash capture device is important and useful information that Permittees should already have available.	None.
Baykeeper – 18	C.10.b.v	C.10.b.v should be removed and no credits for source control should	See Master Response Identifier C.10.b – 1. We partially agree. Some Permittees are	None.

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		be given. Permittee jurisdiction-wide actions to reduce trash at the source via ordinances has not resulted in load reduction percentages claimed by Permittees during MRP 2. Some Permittees may temporarily fall out of compliance with C.10 without this credit, but it is the threat of non-compliance that will cause Permittees to invest in their trash management programs. If the Water Board decides to keep C.10.b.v in MRP 3, it must phase out this credit no later than 2025 and revise the language to clarify that credits claimed under MRP 2 for single use plastic bags, polystyrene food service ware, straws cannot be claimed under MRP 3.	building upon the success of existing source control actions and expanding their ordinances to address other types of disposable items such as plastic food service ware ordinances that address additional types of litter-prone items (e.g., straws, cups, takeout foodware). Nevertheless, we are phasing out source control credits, along with all other offsets for creek and shoreline cleanups and implementation of Direct Discharge Control Plans, because they result in double counting and are inconsistent with the Trash Amendments' requirement that the discharge prohibition be attained by full trash capture or full trash capture equivalency. Source control actions can be a part of the strategy that Permittees use to meet full trash capture equivalency with non-structural controls, but continued percentage credit toward the 100% benchmark after June 30, 2025, will not be applicable.	
Caltrans - 3	C.10	Sunsetting of Source Control, Creek Cleanup, and Direct Discharge Control Credits: Caltrans understands these efforts to be both a significant reducer of trash in receiving waters and a valuable source of compliance credit for permittees. Ending the availability of these credits after June 30, 2025, will likely	See Master Response Identifiers C.10.b – 1 and C.10.f – 1. See also response to San Jose – 4 regarding the request to retain credits from implementation of a Direct Discharge Control Program. We acknowledge Caltrans' support for collaborative source control efforts. As mentioned in the response to San Mateo	

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		disincentivize permittees from continuing and/or expanding these efforts, Rather than disincentivize these efforts, Caltrans encourages the Water Board to not only preserve these credits, but to also consider expanding upon them for increased permittee actions. Caltrans is also interested in exploring partnership opportunities associated with these activities, with the goal of supporting their expansion. While implementing structural and non-structural trash controls clearly plays a vital role in preventing trash discharges through MS4 permits, these alternative methods of trash control also demonstrably contribute to achieving trash-free receiving waters.	County – 16, source control actions can continue to be used to meet full trash capture equivalency in concert with other non-structural controls.	
CCCWP – 64, San Jose – 32, SCVURPPP – 120, SMCWPPP – 236, Oakland – 26, ACCWP – 60	C.10.b.vi	For C.10.b.v, Partial Trash Reduction - Curb Inlet Screens, results of existing studies should be sufficient to acquire 100%reduction credit for moderate trash generating area. At a minimum, 100% reduction should be "provisionally" allowed during MRP 3 as information gaps are addressed during MRP 3. Remove language/requirement for	See Master Response Identifier C.10.b -3	None

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		additional study or minimize to allow for reduced level of analysis needed to address highest priority information gaps.		
San Jose - 33	C.10.d.ii	New language requires permittees to submit an updated Trash Load Reduction Plan with their 2023 Annual Report, if they are unable to meet the June 30, 2023, 90% benchmark without offsets. This contradicts language regarding the offsets that says, "Offsets for creek and shoreline cleanups/direct discharge controls will no longer be applicable after June 30, 2025."	We disagree that the C.10.d.ii Trash Load Reduction Plan update contradicts the phase out of offsets. Permittees are not allowed to consider the use of offsets in updating their Trash Load Reduction Plans. The updated Trash Load Reduction Plan should include a schedule of additional trash load reduction implementation actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and detailed implementation actions and a schedule to attain the 100 percent reduction requirement achieved through implementation of full trash capture, or other equivalent actions by June 30, 2025. The requirement ensures that Permittees that do not meet the 90% reduction benchmark have a roadmap for getting to 90 percent and 100 percent reduction without the use of credits and/or offsets.	None
SCVURPPP – 128 SMCWPPP – 239, 250	C.10.b.v	Source control credits should be allowed towards the 100% reduction; they should not be eliminated from consideration.	See Master Response Identifiers C.10.a – 1 and C.10.b – 1	None

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		The timeframes for achieving the compliance benchmarks are impracticable. Modify language to allow source controls to be used to demonstrate the 100% compliance benchmark. Extend the deadlines to achieve the 90 and 100% benchmarks by two years to July 1, 2025, and July 1, 2027, respectively.		
CCCWP - 66	C.10.e	While the Impracticability Report in C.10.e is recognized as an important tool in planning for trash reduction, it is important to keep the expectations for this report realistic so that limited resources are available to implement programs in addition to writing several plans/ reports. This report has a lot of overlap with the Trash Load Reduction Plan and they should be combined. Recommendation. Combine the Impracticability Report and Trash Load Reduction Plan into one submittal due in 2024.	The Impracticability Report in C.10.e is specific to circumstances under which it may be impracticable to control trash via the installation of full trash capture devices. The Trash Load Reduction Plan in C.10.d, by contrast, should include a schedule of additional trash load reduction implementation actions that will be sufficient for the Permittee to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent reduction requirement from 2009 levels, achieved through implementation of full trash capture, or other equivalent actions, by June 30, 2025 Therefore, these two reports are separate in their overall objectives.	None
Save the Bay – 9	C.10.e	While Save The Bay recognizes that some areas have engineering	See response to Baykeeper – 7.	None

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		constraints and highly persistent trash sources, C.10.e wrongly allows permittees to avoid essential trash reduction and undermines the permit's effectiveness.		
AClaesgens -1, Friends of 5 creeks – 1, FoSC – 1, Pdonald – 1 Grass Roots Ecology – 1	C.10.f.i	Ending incentives for local agencies to organize cleanups is likely to decrease positive community-based improvements. Effects are likely to go beyond what is measurable. Removing the current MRP's incentive for residents' efforts seems likely to reduce what local governments spend to organize and support volunteer hands-on cleanups. Volunteer cleanups are likely to increase interest in and motivation for both a trash-free outdoors and more complex aspects of the environment. Please don't end incentives as this would likely decrease community-based improvements in areas in far reaching ways unknown today.	See Master Response Identifier C.10.f – 1.	None.
Watershed Project – 2	C.10.f	Removing the current offset credit for volunteer cleanups after June 30, 2025 as described in C.10.f is	For request to retain credits for creek and shoreline cleanup efforts see Master Response Identifier C.10.f – 1.	None.

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		likely to reduce the number of volunteer cleanups, since permittees will be less likely to be able to allocate resources to these efforts. Similarly, the current 10% offset provided for source control measures such as product bans is also scheduled to sunset on June 30, 2025. With no incentive for permittees to propose source control measures, it is much less likely that they will commit resources to pursue these measures, which will result in more waste being discharged into surface waters. If the goal is to reduce trash in surface waters, shouldn't incentives for investing effort i trash reduction and removal efforts be maintained?	For request to retain source control credits see Master Response Identifier C.10.b – 1.	
SCVURPPP – 125, SMCWPPP – 242	C.10.f.i	Language should be changed to allow offsets to continue towards 100% trash reduction goal. Extending compliance benchmark to 2027 will allow the Water Board and SCVURPPP to work with State Water Board staff to develop and adopt an updated policy that allows for offsets to occur.	Allowing offsets to exist, in perpetuity, after June 30, 2025, would mean allowing a Permittee's moderate and/or high trash generating area to continue to remain uncontrolled (via the installation of a Full Trash Capture Device, or implementing other measures equivalent to full trash capture) and thus continue to discharge trash to receiving waters unabated. The goal of C.10, however, is for Permittees to achieve meaningful and quantifiable trash reduction via engineering controls such as the	None.

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			installation and operation of Full Trash Capture Devices, or the implementation of other measures equivalent to full trash capture (and verified via OVTAs) to ultimately achieve the goal of no adverse impacts to receiving waters from Permittees trash generation areas. This goal cannot be achieved if offset credits through the Direct Discharge Control Program continue to be an acceptable means of achieving compliance.	
Oakland – 27, ACCWP – 62, Solano – 17, CCCWP – 67, San Jose – 34	C.10.f	Allow credits for additional creek and shoreline cleanups to continue towards the 100% trash reduction requirement and beyond.	See Master Response Identifier C.10.f – 1.	None.
Baykeeper – 19	C.10.f.i	No offset for creek cleanups should be given. Creek cleanups do not reduce trash loading in MS4 discharges to receiving waters. If the Water Board decides to continue to include an offset for cleanups in C.10.f.i of Draft MRP 3, at a minimum, Baykeeper recommends this offset be phased out no later than 2025 and in the interim we recommend the Water Board revise the formula for this offset to require more trash removal per offset credit.	See Master Response Identifier C.10.f – 1.	None.

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San Pablo - 9	C.10.f.ii	San Pablo submitted a Direct Discharge Plan which was approved by Water Board staff on September 30, 2020. The Tentative Order requires the updated plans to "include a commitment to, and a plan for, increasing the provision of emergency, transitional, and/or permanent housing…" as well as other services such as trash and sanitary services. Small cities like San Pablo have no emergency, transitional or permanent housing in their jurisdiction, and receive no funding for these services because funding for unsheltered individuals is handled by Contra Costa County. This language does not provide small cities with the required flexibility to meet the new requirement. In addition, to resubmit amended plans 60 days after the new permit's effective date is an unreasonable timeline as it takes time to update documents and to follow the necessary approval processes in the City.	We disagree that the Direct Discharge Control Plans provide insufficient flexibility for small cities like San Pablo to control their direct discharges. As an initial matter, discharges associated with unsheltered homelessness are not the only type of direct discharge. DDCPs must also address illegal dumping, which it is within San Pablo's authority to control. Furthermore, C.10.f.ii does not require San Pablo to build or provide transitional or other housing itself. Instead the provision requires the prioritization of long-term solutions to homelessness, like social services and housing, over temporary solutions, like encampment sweeps. San Pablo may work collaboratively with the County, or with other organizations or agencies, to ensure that broader efforts to improve the living conditions of the unhoused also reduce direct discharges. See responses to CCCWP – 59,68 for additional discussion.	None.

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		Recommendations: Remove the language to require increasing housing stock for unsheltered individuals, allow an amendment in lieu of an updated plan for Permittees that submitted plans during MRP 2, and extend the deadline for submittal by one (1) year.		
SCVURPPP – 126, SMCWPPP – 243, Oakland – 28, ACCWP – 63, SCVURPPP – 130, SMCWPPP - 254	C.10.f.ii	It is in unnecessary for Permittees with an approved DDCP under MRP 2 to resubmit their DDCP for reapproval when this information is readily available in each MRP annual report.	We disagree that it is unnecessary for Permittees to update their DDCPs. C.10.f builds upon previous requirements by requiring that Permittees with an approved DDCP implement measures to prioritize the provision of housing and social/sanitation services in controlling direct discharges associated with unsheltered homelessness. This information was not previously required, so previously approved plans need to be updated with this information.	None.
Baykeeper – 20, Baykeeper & Law Foundation – 1	C.10.f.ii	The Fact Sheet at A-228 describes Direct Discharge Plans as encouraging Permittees to "take steps to permanently reduce direct discharges of trash through the provision of housing and services to the unsheltered populations." Commenters agree with this approach. C.10.f.ii.(b)(i) properly specifies Direct Discharge Plans addressing discharges from	We thank the commenters for their support. The requirements for the submittal and approval of a DDCP in the Tentative Order have been updated to ensure that Permittees claiming these trash reduction offsets are taking appropriate measures to control direct discharges by both 1) removing trash after it has already impacted receiving waters, and 2) by taking appropriate steps to permanently reduce direct discharges of trash through the provision of housing and	None.

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		unsheltered populations must focus on facilitating housing and providing services, such as trash and sanitary services, RV safe parking areas and pump out services, and social services. This provision allows for trash removal methodologies that do not traumatize unsheltered populations and also facilitates transition to housing and services. However, the Water Board must specify that these services be provided on a regular and frequent basis (i.e., weekly) as a parameter for Direct Discharge Plans. While it appears to the Commenters that the Water Board has revised the Direct Discharge Plans to prioritize compassion, this may not be apparent to Permittees. The Direct Discharge Plan requirements in MRP 2 were silent as to encampment sweeps, and Permittees' prioritized encampment sweeps in each of their Plans. Thus, we recommend the Water Board revise C.10.f.ii.(b)(i) to explicitly reject encampment sweeps as a component of a Direct Discharge	services to unsheltered homeless populations (particularly those located near receiving waters); and (3) by abating and implementing controls at illegal dumping sites and near receiving waters. These measures should be on a continuous and on-going basis. We specifically drafted the provision to encourage trash removal methodologies that do not traumatize unsheltered populations. We agree that encampment sweeps are an ineffective strategy in addressing discharges from homeless encampments to receiving waters. See response to Save the Bay – 10 in C.17 for additional discussion.	

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		Plan. Permittees must do all that they can to facilitate ongoing compassion toward unsheltered people in order to successfully transition the most vulnerable in our communities to long-term housing. Permittees should pursue these actions without the incentive of a trash load reduction offset, and these actions will continue on without an offset. Thus, the offset for Direct Discharge Plans should be terminated no later than 2025.		
Oakland – 29	C.10.f.ii.b.i	Please revise language in subprovision C.10.f.ii.b.i to say…The DDCP shall make efforts to prioritize providing housing and services to people experiencing unsheltered homelessness who are living near receiving waters.	We decline to make the change. The existing language provides sufficient flexibility for Permittees to consider competing goals.	None.
Oakland – 30	C.10.f.ii.b.ii	Please revise language in subprovision C.10.f.ii.b.i to say… The DDCP shall make efforts to prioritize control of illegal dumping that occurs near receiving waters.	See response to Oakland-29.	None.
SCVURPPP – 131, SMCWPPP - 255	C.10.g	Remove Fact Sheet language stating that the State Amendments do not allow for offset credit for direct discharge controls.	We disagree. The Trash Amendmentsprohibit “the discharge of Trash to surface waters of the State or the deposition of Trash where it may be discharged into surface waters of the State,”and provide two “tracks,” or alternative	

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		The Fact Sheet states that "The State Trash Amendments do not allow offset credit for direct discharge controls in lieu of implementing MS4 controls to meet the Trash Discharge Prohibition." This statement is not true and should be removed. The State Trash Amendments exclude the SF Bay Area from the explicit requirements in the amendments, and the amendments state that the Region 2 MRP approach (which includes Creek Cleanup and Direct Discharge offsets) is a Track 2 approach that is consistent and acceptable under the Amendments.	pathways, for achieving compliance with this prohibition. Permittees in Track 1 must install, operate, and maintain full capture systems for all storm drains that captures runoff from the priority land uses in their jurisdictions.”Permittees in Track 2 must install, operate, and maintain any combination of full capture systems, multi-benefit projects, other treatment controls, and/or institutional controls that achieve full capture system equivalency. As a result, offsets and credits for direct discharge controls are only acceptable under the Trash Amendments if Permittees can demonstrate that the implementation of these measures achieves full trash capture equivalency. This has not been the case for the MRP Permittees. While source control measures may be an element of the controls used to achieve full-trash capture equivalency, they generally cannot be used in place of on-the-ground controls that directly reduce trash discharges. The Trash Amendments do not exclude the SF Bay Area from its requirements; the only exclusion relates to the time schedule for permittees to elect how it wants to comply with the Trash Amendments (i.e., via either Track 1 [full trash capture systems] or Track 2 [combination of controls achieving full trash equivalency]).	

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SCVURPPP – 124, 129 SMCWPPP – 241, 251	C.10.g.viii	Timeframe for submittal of non-compliance is impractical given that on-land assessments will not be complete until the end of June 2025, time date that the submittal is due. Once data collection efforts are complete, time is needed to apply quality assurance and data validation procedures, and to calculate load reductions associated with data collected. Extend timeframe for submittal of non-compliance to September 30, 2025, with the 2025 annual report.	We decline to make the requested change. It is Water Board staff's understanding that Permittees will be conducting on-land trash assessments and evaluating the results of their data on an ongoing and continuous basis. Furthermore, most Permittees should be able to predict, with some level of certainty, whether they will be able to meet the trash load reduction requirement prior to the deadline due date. Therefore, it is not appropriate to change the deadline to submit the notice of non-compliance from June 30, 2025, to September 30, 2025.	None.
ACCWP_Legal – 4	C.10.g.vi and viii	Request that the "notice of noncompliance" language in Provisions C.10.g.vi. and viii. be deleted and replaced by a filing of an Extension Request that demonstrates that unexpected barriers were encountered that were not reasonably anticipated in the course of achieving the 90% and 100% benchmarks, thereby extending the compliance period through the end of the permit term.	The Water Board declines to make this change. Permittees unable to achieve the 90 percent or 100 percent mandatory trash reduction requirements will be deemed out of compliance with the permit requirements and hence need to submit a notice of noncompliance as required in Provision C.10.g.vii and C.10.g.ix respectively. Within the notice of noncompliance, Permittees should provide a clear explanation of why they were unable to achieve the mandatory trash reduction requirement by the deadline including unexpected barriers that may have been encountered and that were not reasonably anticipated.	None.

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Oakland - 31	C.10.f.xi.1	The City relies on the Alameda County Homeless Census and Survey Comprehensive Reports to provide an estimate of the number of people experiencing unsheltered homelessness. These reports do not geolocate census surveys; therefore, there is no way for the City of Oakland to estimate the number of people experiencing unsheltered homelessness living within 500 feet of receiving waters. Suggest removing the underlined language below… For Permittees whose DDCPs address significant discharges from unsheltered homeless populations, the following information for the current year, and for each prior year of the Permit term: The estimated number of people experiencing unsheltered homelessness in their jurisdiction*; the estimated number of people experiencing unsheltered homelessness living within 500 feet of receiving waters*	The Water Board disagrees that there is no way for the City of Oakland to estimate the number of people experiencing unsheltered homelessness within approximately 500 feet of a receiving water, and the Regional Water Board is not requiring Permittees to "geolocate" homeless people. The Water Board disagrees that there is no way for the City of Oakland to estimate the number of people experiencing unsheltered homelessness within approximately 500 feet of a receiving water, and the Water Board is not requiring Permittees to "geolocate" homeless people. Instead, the Water Board requires Permittees to estimate the number of unsheltered homeless people living in proximity to water, and the estimated number of illegal dumping sites near water, as a way of getting a handle on the magnitude of the direct discharge problem. In addition, the Water Board requires the Permittees to coordinate with other agencies and organizations in sharing information and lessons learned about unsheltered homelessness. We note further that the commenter maintains a service call database including electronic maps that can identify the locations of service calls relative to receiving waters like creeks. Such a system could be used to estimate the populations living in proximity to receiving waters. We revised the language to clarify that it is	We revised language to clarify that the estimate should be within "approximately" 500 feet of receiving waters.

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			"approximately" 500 feet, to give flexibility to use available information.	

Response to Comments on September 10, 2021, Tentative Order
Provisions C.11. – Mercury Controls and C.12. – Polychlorinated Biphenyls (PCBs) Controls

Comment No.	Provision	Comment	Response	Proposed Revision
San Jose-37	C.11	Reporting requirements for C.11.a.iii.(2), C.11.e.iii.(1), C.11.f.iii should be moved to the end of the permit term to allow projects to count if completed by end of permit term.	See response to City of San Jose - 38.	See response to City of San Jose – 38.
SCVURPPP-132	C.11	Mercury TMDL wasteload allocations assigned to MRP Permittees have been achieved so requirements in C.11 are not needed to achieve regulatory targets for stormwater. This should be acknowledged and should be non-enforceable.	The claim by Permittees that the mercury wasteload allocation has been achieved is not based on one of the three methods recognized by the TMDL. The claim is based on a modeling exercise that purports to partition the watershed load into a portion that is the responsibility of the Permittees and another portion which is not. This modeling exercise is not consistent with the assumptions and requirements of the TMDL so its outcome cannot be recognized as a demonstration of wasteload achievement. While this modeling exercise may be useful for planning implementation activities, it is not a recognized method of demonstrating achievement of the wasteload allocation. As such, the Water Board will not make the changes requested by the commenter. The control measure implementation for mercury is largely driven by actions targeting PCBs in any case.	None.
Oakland & San Jose-6	C.11 & C.12	Tentative Order does not consider that PCBs largely reside on private property and not public right of way. Implementing and enforcing	Please see master responses C 11/12 -1 (flexibility of complying with C.11/12.c) and C 11/12 - 2 (C.11/12.c performance metrics).	None.

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		programs to address PCBs of old industrial rights of way will be challenging and expensive. The time to develop the implementation plan to address old industrial areas is too short. We ask for more time for our cities and Water Board staff to jointly collaborate and to identify effective and efficient ways to hone limited resources on the most critical sites that impact waterways while minimizing the impact to all businesses.		
SMCWPPP-54	C.11 & C.12	The total industrial acreage and average industrial parcel size are much lower in San Mateo County relative to other counties. It will be challenging for San Mateo County permittees to achieve PCBs load reductions via source property referrals relative to other counties.	The analysis performed by the commenter is interesting, and it is unfortunate that San Mateo County is faced with the challenge of small industrial parcel size with respect to load reduction credit. On the other hand, the same analysis shows that the amount of old industrial land use in San Mateo County is not as large. Therefore, the county has less work to do than other counties to confirm the presence of source properties and locate areas of moderate contamination. So, while parcel size is smaller, the size of the task to deal with San Mateo County old industrial areas is also smaller. Moreover, this is just one of many possible dimensions to assess implementation challenges for the countywide programs. For example, some	None.

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			counties may have more or fewer opportunities for reducing PCBs through piggybacking PCBs control onto trash control efforts. The counties may differ as well in the degree to which redevelopment will help reduce PCBs loads. Therefore, while we appreciate the information provided in the comment, we are not inclined to adjust the performance metric for San Mateo County for this provision since a move in this direction (to account for county-by-county idiosyncrasies) would result in a needlessly complicated accountability system.	
Baykeeper-8	C.11&C.12	Do not include C.11 and C.12 in C.1's Safe Harbor Provisions.	Please see Master Response Identifier C 11/12 – 4 (C11/12 Provisions in Relation to TMDL Implementation Requirements).	None.
SCVURPPP-133	C.11.a	Reference the revised accounting methodology in the Fact Sheet. Delete statements in C.12.a.iii(2) stating that any refinements to methodologies shall be subject to public review.	See response to SCVURPPP-140.	
SCVURPPP-134	C.11.a	Extend due date for reporting on mercury loads reduced from each control measure so that reporting happens with Report of Waste Discharge, six months prior to permit termination date.	See response to City of San Jose-38.	
SMCWPPP-256	C.11.a	Reference the revised accounting methodology in the Fact Sheet.	See response to SCVURPPP-140.	

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		Delete statements in C.12.a.iii(2) stating that any refinements to methodologies shall be subject to public review.		
SMCWPPP-257	C.11.a	The Tentative Order language for C.12.a does not specify how Permittees would demonstrate that past control measures are being implemented appropriately.	Please see the response to SMCWPPP-268.	
SMCWPPP-258	C.11.a	Extend due date for reporting on mercury loads reduced from each control measure so that reporting happens with Report of Waste Discharge, six months prior to permit termination date.	See response to City of San Jose-38.	
SMCWPPP-259	C.11.b	Allow credit for source property investigation work completed since January 2021. Replace the reference for the Source Control Accounting report in the Fact Sheet.	Please see response to SCVURPPP-141.	
SMCWPPP-260	C.11.c	C.11.c requirements are too aggressive and should be phased over additional years to allow time for gathering data and planning control strategies. Adjust the performance metrics downward.	Please see master responses C 11/12 - 1 (flexibility of complying with C.11/12.c) and C 11/12 - 2 (C.11/12.c performance metrics).	
SMCWPPP-261	C.11.c	Clarify load reduction calculation and crediting procedures.	Please see the response to SCVURPPP-143.	

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City of Oakland-32	C.11.d.iii	Data collected by mercury recycling program is insufficient to estimate mass of mercury contained in recycled material. Delete requirement to report on mass and only include requirements to report on efforts to promote recycling along with total volume or weight of material.	Section 7 of the source control loads reduction accounting report prepared by Permittees and submitted in October 2021 contains reasonable methods to estimate the mass from amounts of collected materials. It is important to provide an estimate of the mass since this is the relevant quantity to assess progress toward load reductions required by the TMDL. This can be done with the information collected through the county program along with the methods in the load reduction accounting report.	
ACCWP-65	C.11.d.iii	Data collected by mercury recycling program are insufficient to estimate mass of mercury contained in recycled material. Delete requirement to report on mass and only include requirements to report on efforts to promote recycling along with total volume or weight of material.	Please see the response to City of Oakland-32.	
CCCWP-69	C.11.d.iii.	Do not require reporting on mass of mercury contained in recycled material.	Please see the response to City of Oakland-32.	
SCVURPPP-139	C.11.f	Extend due date for reporting on C.11.f (implementation plan and schedule) so that reporting happens with Report of Waste Discharge, six months prior to permit termination date.	Please see the response to SMCWPPP-146.	

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SMCWPPP-264	C.11.f	Extend due date for reporting on C.11.f (implementation plan and schedule) so that reporting happens with Report of Waste Discharge, six months prior to permit termination date.	Please see the response to SMCWPPP-146.	
SCVURPPP-12a	C.11/C.12	Permit should recognize that the only practical and cost-effective approach for reducing PCBs discharges from old industrial areas is abating source areas, large full trash capture and redevelopment. Replace provision C.11.c and C.12.c with a requirement to develop a long-term plan during the permit term that includes a detailed strategy for verifying and addressing PCBs and mercury contributions from these properties	Please see the response to SMCWPPP-26 as well as the master response C 11/12 -2 (performance metrics for C.11/12.c).	
SCVURPPP-12b	C.11/c.12	Mercury TMDL wasteload allocations assigned to MRP Permittees have been achieved so requirements in C.11 are not needed to achieve regulatory targets for stormwater. This should be acknowledged and should be non-enforceable.	The claim by Permittees that the mercury wasteload allocation has been achieved is not based on one of the three methods recognized by the TMDL. The claim is based on a modeling exercise that purports to partition the watershed load into a portion that is the responsibility of the Permittees and another portion which is not. This modeling exercise is not consistent with the assumptions and requirements of the TMDL	

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			so its outcome cannot be recognized as a demonstration of wasteload achievement. While this modeling exercise may be useful for planning implementation activities, it is not a recognized method of demonstrating achievement of the wasteload allocation. As such, the Water Board will not make the changes requested by the commenter. The control measure implementation for mercury is largely driven by actions targeting PCBs in any case.	
City of Oakland-33	C.11/C.12.b.ii	Allow credit for source property investigation work completed at end of MRP 2.	Please see the response to SCVURPPP-141.	
City of Oakland-34	C.11/C.12.b.iii	Change reporting for C.11.b and C.12.b to begin the first year after monitoring has occurred. The reporting requirement is unreasonable three months after effective date of the permit.	Please see the response to CCCWP-73.	
City of Oakland-35	C.11/C.12.c.i	The Water Board relies on an inaccurate amount of Alameda County old industrial acres possibly subject to control measures. The Permittee has submitted an analysis of remaining old industrial areas that was not included in the Tentative Order. Change the C.11.c/C.12.c requirements for Alameda County to address only 124 acres of	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c requirements) and C 11/12 - 3 (amount of old industrial landuse).	

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		identified moderately contaminated old industrial areas.		
ACCWP-66	C.11/C.12.b.i	Change reporting for C.11.b and C.12.b to begin the first year after monitoring has occurred. The reporting requirement is unreasonable three months after effective date of the permit.	Please see the response to CCCWP-73.	
ACCWP-67	C.11/C.12.c.i	Revise the estimate for Alameda county of old industrial areas subject to control measure implementation according to submitted analysis. Revise level of effort for MRP3 for Alameda County to incorporate a reasonable level of effort - to address just 124 acres of old industrial area during the permit term in Alameda County.	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c requirements) and C 11/12 -3 (amount of old industrial land use).	
ACCWP-68	C.11/C.12.c.i	Tentative Order requires treatment of urban runoff at concentrations that the state allows to remain on cleanup sites. Treatment controls should not be required on areas that do not have elevated levels of PCBs.	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c requirements) and C 11/12 -3 (amount of old industrial land use).	
City of Oakland-37	C.11/C.12.c.ii	Eliminate sizing requirement for treatment control systems used to comply with C.11.c. Sizing should be allowed as needed in	We cannot allow Permittees to size facilities as needed, but we can allow use of conditionally-approved sizing criteria as cited in C.3.j.ii(3)(b). However, use of the conditionally-approved sizing criteria will	C.11/12.c revised to allow use of conditionally-approved sizing

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		constrained situations or projects may not go forward in these areas.	require Permittees to submit an analysis, acceptable to the Executive Officer, to determine how the effectiveness of the alternatively-sized facility compares with the same facility designed according to the sizing criteria for Regulated Projects in the Permittees' C.3 Technical Guidance Documents and in C.3.d sizing criteria. The ratio of the effectiveness will be applied to the acres addressed by the control measure or the loads reduced, whichever accounting mode is being used by the Permittee.	criteria cited in C.3.j(3)(b) for treatment control systems provided an analysis is performed, acceptable to the Executive Officer, to determine the reduced effectiveness of the facility sized according to these alternative criteria.
ACCWP-69	C.11/C.12.c.iii	Eliminate sizing requirement for treatment control systems used to comply with C.11.c. Sizing should be allowed as needed in constrained situations or projects may not go forward in these areas.	See response to City of Oakland-37.	
City of Oakland-38	C.11/C.12.c.iii(1)	There is not adequate time to develop the implementation plan for old industrial areas. Revise permit to require annual submittal of treatment plan for acres of old industrial landuse with March 31 Monitoring Report, with first plan submitted March 31, 2023.	Please see master response C 11/12 - 2 (performance metrics for C.11/12.c).	

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ACCWP-70	C.11/C.12.c.iii.(1)	Move back reporting for C.11.c.iii(1) by one year.	Please see master response C 11/12 - 2 (performance metrics for C.11/12.c).	
San Jose-38	C.12	Reporting requirements for C.12.a.iii(2), C.12.c.iii(3), C.12.d.iii (3), and C.12.f.iii should be moved to the end of the permit term to allow projects to count if completed by end of permit term.	All control measures implemented during the permit term, but after the 2026 Annual Report, still count toward the implementation requirements. This is clearly stated in C.12.a(iii)(2). It is not acceptable for the Water Board to learn if Permittees fulfilled their obligations under the permit until the very end of the permit term. The Water Board and the public has an interest in receiving information on whether or not Permittees are meeting the performance metrics before the permit is at an end. This will provide an opportunity for some adjustment to implementation intensity while there is still time to implement.	
SMCWPPP-25	C.12	It may not be feasible to meet performance metrics for C.12.c by the end of the permit term.	All Permittees throughout the MRP area have identified high priority watershed management areas, mainly old industrial areas, in 2016, as part of reporting on requirements for MRP 2. Permittees, collectively, have collected over 1000 samples in old industrial areas. Water Board staff has urged Permittees to develop an effective and comprehensive program of implementation in old industrial areas going back to 2014. There is no reason to further delay addressing these areas long known to Permittees as locations of PCBs contamination. See also master response C	

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			11/12 - 1 (flexibility for complying with C.11/12.c) and C 11/12 - 2 (performance metrics for C.11/12.c).	
SMCWPPP-26	C.12	Permit should recognize that the only practical and cost-effective approach for reducing PCBs discharges from old industrial areas is abating source areas, large full trash capture and redevelopment.	We disagree. Making the claim that the only cost-effective and practical approaches are those mentioned in the comment is an overbroad statement without substantiation. Certainly, the approaches mentioned by the commenter are worthy of implementing, but this is not an exhaustive list of approaches that may be appropriate in all circumstances.	
SMCWPPP-27	C.12	Intercepting PCBs originating from private parcels in the public right-of-way is a short-term fix that is costly and inefficient and will not be effective for properties plumbed directly to the municipal storm drain system.	Please see master response C 11/12 -1 (flexibility of complying with C11/12.c).	
SMCWPPP-28	C.12	Performance metrics in Tentative Order should be adjusted downwards to achievable, practical levels. Actions required over the MRP 3.0 permit term focus on addressing a realistic portion of old industrial landuse. MRP 3.0 should require a plan early in the permit term to describe process and actions permittees can implement or cause to be implemented over the permit term.	Please see master responses C 11/12 - 2 (performance metrics for C.11/12.c) and C 11/12 - 3 (amount of old industrial land use).	

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SMCWPPP-29	C.12	PCBs requirements should be phased in over time to allow Permittees time to gather information and data and develop long-term plans for old industrial areas that takes into consideration time horizons for redevelopment, efforts to control trash discharges and enhanced efforts to further characterize drainages and source properties.	Please see master response C 11/12 - 2 (performance metrics for C.11/12.c).	
SCVURPPP-140	C.12.a	Provide approval of the revised accounting methodology and cite this version in the Fact Sheet. Delete statements in C.12.a.iii(2) stating that any refinements to methodologies shall be subject to public review.	We are working toward providing Executive Officer Approval of the accounting methodology submitted as part of reporting for MRP 2, and we have replaced, as appropriate, the references to the final version of this report in the Fact Sheet. Finding 17 of the Tentative Order states that "the Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order	Replace, as necessary, citations to the most recently submitted loads accounting methodology. Clarify details of public review for refinements to the methodology submitted as part of C.12.a.iii(2) reporting.

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			conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures."	
SMCWPPP-267	C.12.a	Provide approval of the revised accounting methodology and cite this version in the Fact Sheet. Delete statements in C.12.a.iii(2) stating that any refinements to methodologies shall be subject to public review.	See response to SCVURPPP-140.	
SMCWPPP-268	C.12.a	The Tentative Order language for C.12.a does not specify how Permittees would demonstrate that past control measures are being implemented appropriately.	The Fact Sheet supporting information for C.12.a contains the following paragraph providing examples of information that could be used for this demonstration. "Examples of this include the enhanced operation and maintenance activities associated with source property referrals, GSI implementation, trash collection devices with mercury and PCBs reduction benefit, and other control measures. Appropriate documentation may include dated photographic evidence, maintenance records, and other types of relevant records showing that the control measures continue to be implemented in a manner consistent with the load reduction credit established when they were initiated."	None.
SMCWPPP-269	C.12.a	Extend due date for reporting on PCBs loads reduced from each	See response to City of San Jose-38.	

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		control measure so that reporting happens with Report of Waste Discharge, six months prior to permit termination date.		
CCCWP-70	C.12.a.ii. and C.11.a	Revise overall load reduction estimate based on realistic estimate for C.12 implementation.	Please see master responses C 11/12 -1 (flexibility in complying with C.11/12.c), C 11/12 -2 (performance metrics for C.11/12.c) and C 11/12 -3 (amount of old industrial land use). The performance metric for C.12.c has not been revised so there is no need to modify the estimated load reduction benefit as suggested in the comment.	None.
SCVURPPP-141	C.12.b	Allow credit for Old Industrial areas investigated in FY 2021/22 since these areas are not being credited under MRP 2. The Fact Sheet should reference the appropriate versions of the Accounting Report.	The Fact Sheet has been updated as appropriate to reference the recently submitted loads accounting report. The proposed performance metric for source property investigation was calculated based on evaluation of the pace of these investigations over a 5-year period. Therefore, crediting actions for a longer time window undercuts the integrity of this metric and is not consistent with the basis of its derivation. Source property investigations and referrals completed during the previous permit term are "credited" in the sense that these efforts reduce the amount of acres requiring investigations.	Fact Sheet updated as noted.

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SMCWPPP-270	C.12.b	Allow credit for Old Industrial areas investigated in FY 2021/22 since these areas are not being credited under MRP 2. The Fact Sheet should reference the appropriate versions of the Accounting Report.	Please see the response to SCVURPPP-141.	
CCCWP-71	C.12.b and C.11.b	Allow credit for Old Industrial areas investigated in FY 2021/22 since these areas are not being credited under MRP 2.	Please see the response to SCVURPPP-141.	
CCCWP-72	C.12.b.ii and C.11.b	There is no need to use language "credited during the permit term" for C.12.b because the programmatic approach does not require achieving a required load reduction during the permit term.	C.11.a.iii(2) and C.12.a.iii(2) require reporting of "total mercury and PCBs loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term." Therefore, the language of C.12.b.ii concerning loads reduced with respect to proper enhanced O&M is relevant. Also this language about crediting contingent on O&M implementation is consistent with the language appearing in the source control accounting report submitted by Permittees for Executive Officer approval (see p, 5 of that report).	None.
CCCWP-73	C.12.b.iii and C.11.b	Change reporting for C.11.b and C.12.b to begin the first year after	It is the Water Board's understanding that the identification of source properties is an	

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		monitoring has occurred. The reporting requirement is unreasonable three months after effective date of the permit.	ongoing activity and not one that will be initiated anew with this permit. Therefore, it is reasonable for Permittees to report on these activities as early as the 2022 Annual Report. Moreover, part of the requirement is to report on the status of ongoing enhanced O&M activities associated with all past contaminated property referrals. The Water Board has a legitimate interest to receive this information yearly and as part of the 2022 Annual Report.	
San Jose-6	C.12.c	Complying with performance requirement of C.12.c will be very costly. Adjust performance metrics down to an achievable, practical level. This permit term should be focused on a practical portion of these acres and require that a plan be developed to describe the process and actions that co-permittees will take to address PCBs on these properties via any set of actions that co-permittees can implement or cause to be implemented during the 5-year MPR 3.0 permit term.	Please see master responses C 11/12 -1 (flexibility in complying with C.11/12.c) and C 11/12 -2 (performance metrics for C.11/12.c).	
San Jose-39	C.12.c	C.12.c requirements are too aggressive and should be phased over additional years to allow time for gathering data and planning	Please see master responses C 11/12 -1 (flexibility in complying with C.11/12.c) and C 11/12 -2 (performance metrics for C.11/12.c).	

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		control strategies. Adjust the performance metrics downward.		
SCVURPPP-142	C.12.c	Required level of effort for C.12.c is not feasible within the five year permit term based on the high cost of treatment controls and the time it takes to plan and implement controls. Level of effort not consistent with Permittee understanding of the amount of moderate old industrial areas in the Santa Clara Valley as determined by an extensive monitoring program conducted by SCVURPPP. The Permittee claims only 370 acres of old industrial landuse in Santa Clara County is moderately contaminated and remains for consideration for control measure implementation. Remove the prescribed acreage and load reduction performance metric for addressing moderate to high PCB-generating old industrial areas. Require that Permittees develop and submit a plan to the Regional Water Board during the permit term that includes a detailed strategy for verifying and addressing PCBs contributions from old industrial properties.	Please see master response C 11/12 - 3 (amount of old industrial land use).	

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		Adjust performance metric significantly downwards for SCVURPPP Permittees to an achievable, practicable level that is based on monitoring data and data analyses conducted to date. PCBs generated on these private properties are not the responsibility of Permittees.		
SCVURPPP-143	C.12.c	Clarify load reduction calculation and crediting procedures.	C.11/12.a already state that the load reduction accounting methodology will be used for these calculations. See C.12.a.i Task Description statements. It is not appropriate to credit enhanced O&M efforts associated with referred source properties as part of C.11/12.c reporting since the purpose of those O&M efforts is to address loads from the source properties and is recognized through the provision of "early credit" for the referral. Crediting these efforts as part of C.11/12.c would be double counting the benefit of these efforts. We do need to clarify that load reductions should not be credited under multiple sub-provisions. For example, green streets projects should generally be credited under C.12.f unless they are predominantly in an old industrial area.	None.

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SMCWPPP-271	C.12.c	C.12.c requirements are too aggressive and should be phased over additional years to allow time for gathering data and planning control strategies. Adjust the performance metrics downward.	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c) and C 11/12 - 2 (performance metrics for C.11/12.c).	
SMCWPPP-272	C.12.c	Clarify load reduction calculation and crediting procedures.	Please see the response to SCVURPPP-143.	
ACCWP-a5	C.12.c	Scale back the performance metric for C.12.c for Alameda County to address 124 acres of old industrial landuse with additional areas addressed as identified through monitoring process. Many Diversion to wastewater treatment facilities is not cost-effective and redevelopment is not under the control of the Permittee. It is expensive to install treatment and GI as a means of compliance. Permittee recommends focusing on identifying source properties as primary means of addressing PCBs.	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c) and C 11/12 - 2 (performance metrics forC.11/12.c).	
CCCWP-74	C.12.c.i and C.11.c	The Permittee has submitted an analysis of remaining old industrial areas that was not included in the Tentative Order.	Please see master response C 11/12 - 3 (amount of old industrial landuse).	
CCCWP-75	C.12.c.i and C.11.c	Treatment control measures should not be required to be implemented on areas that do not	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c), C 11/12 - 2 (performance metrics for C.11/12.c)	

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		have elevated levels of PCBs, as the objective is to reduce loads of PCBs. Building stormwater treatment facilities on land with no or low PCBs will not meet this objective. Areas should be confirmed to have an elevated level of PCBs prior to planning treatment for the area. The requirement to apply treatment control measures to stormwater discharged from 1,119 acres of old industrial lands is based on the assumption that 1,119 acres of old industrial land within Contra Costa County have moderate to high PCBs soil concentrations and that this area is treatable using stormwater infrastructure with a 70% efficiency factor constructed in the public right-of-way, on public parcels, or through private redevelopment.	and C 11/12 - 3 (amount of old industrial land use).	
CCCWP-76	C.12.c.i and C.11.c	Data from a Contra Costa County study suggests that the cost for treatment or diversion is an unreasonable economic burden to place on Permittees for small load reductions.	There is no requirement to use diversion of stormwater for treatment if a Permittee does not wish to do so. This type of control measure is listed in the provision as an option to consider. There are other pollutant reduction benefits and the cost is much less than stormwater treatment.	None.

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CCCWP-77	C.12.c.i and C.11.c	The Tentative Order does not consider that the presence of PCBs in Old Industrial areas largely resides on private properties. Of the 2,661 applicable old industrial acres, approximately 350 acres are in the public right-of-way, 510 acres occur on public parcels, and 1,801 (68%) are private parcels.	Please see master responses C 11/12 -1 (flexibility in complying with C.11/12.c), and C 11/12 - 2 (performance metrics for C.11/12.c).	
CCCWP-78	C.12.c.i and C.11.c	Revise the remaining old industrial area value for Contra Costa County to 2661 acres and revise the performance metric for the county to 77 acres. Permittee also recommends focusing on source properties as an alternative to the requirements stated in C.12.c.	Please see master responses C 11/12 - 1 (flexibility in complying with C.11/12.c), C 11/12 - 2 (performance metrics for C.11/12.c) and C 11/12 - 3 (amount of old industrial land use).	
CCCWP-79	C.12.c.ii and C.11.c	For projects associated with compliance with C.11.c and C.12.c, eliminate this sizing requirement for projects that are not subject to C.3.b	See response to City of Oakland-37.	
San Jose-7	C.12.c.iii	Phase C.12.c requirements over additional years and permit terms to allow enough time to gather additional data, work with private properties, and plan cost-effective control strategies.	Please see master response C 11/12 - 2 (performance metrics for C.11/12.c).	
San Jose-40	C.12.c.iii	Requirements should be phased over additional years and permit	Please see master response C 11/12 - 2 (performance metrics for C.11/12.c).	

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		terms to allow enough time to: - Gather additional monitoring data to better delineate hot vs. warm vs. cold areas. -Work with private property owners to turn off tap. - Plan cost-effective control strategies, including accounting for redevelopment occurring over time. The requirement to submit a plan and schedule 3 months after the permit effective date is impractical and infeasible.		
CCCWP-80	C.12.c.iii.(1) and C.11.c	Requirements should be phased over additional years and permit terms to allow enough time to: - Gather additional monitoring data to better delineate hot vs. warm vs. cold areas. -Work with private property owners to turn off tap. - Plan cost-effective control strategies, including accounting for redevelopment occurring over time. The requirement to submit a plan and schedule 3 months after the permit effective date is impractical and infeasible.	Please see master response C 11/12 - 2 (performance metrics for C.11/12.c).	
CCCWP-110	C.12.c.iii.(2)	Delay C.11.c.iii(2) and C.12.c.iii(2) reporting by one year.	The reporting due date for C.11.c.iii(1) and C.12.c.iii(1) has been slightly delayed, but there is no need to modify the reporting due date for C.11/12.c(2).	None.

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San Jose-41	C.12.d	Exempt projects with committed funding and construction scheduled to begin by July 2023 from C.12.d requirements.	The Permittees have not submitted any evidence of the "indefinite delays" that would be caused by implementing the material management requirements. Nor have the Permittees submitted a specific list of projects for which they would seek an exemption. This creates a circumstance where Permittees could simply claim, for several years, that bridge and overpass replacement projects have been scheduled and that it is impossible to implement the requirements. This would, in turn, delay realizing the PCBs load reductions associated with implementation of the requirements. This is not acceptable. Based on the experience of Caltrans, who implemented a similar procedure prior to deconstruction of the Bay Bridge, removing and managing this material is not difficult or time-consuming. We further note that Caltrans implemented these procedures well into the project without significant disruption.	None.
SMCWPPP-273	C.12.d	The accountability metric of C.12.d is not clearly stated and it should be stated as "implementation of the control program as specified in the provision."	The statement of the accountability metric in the provision is more clearer than that suggested by the Permittees. The suggestion that the accountability metric should be stated as "implementation of the control program as specified in the provision" provides very little information as to what is expected. The requirement of the provision is to implement a Caltrans specification for	None

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			managing PCBs containing material. Therefore, the reporting requirement of the provision that Permittees must submit documentation confirming use of the specification is an appropriate and clearly stated accountability metric.	
CCCWP-111	C.12.d.iii.(2)	Move back submission of inventory of bridges to 9/30/2023.	We agree. We will move submission of the bridge inventory to the 9/30/2023 Annual Report.	Change the reporting due date for C.12.d.iii(2) to the 2023 Annual Report.
SMCWPPP-275	C.12.e	C.12.e provision includes Permittee vs. Water Board staff roles are unclear for the requirement to "collaborate with Water Board". Permittees have limited ability to require PG&E to provide information and are reliant on Water Board staff to use their regulatory authority to compel PG&E to cooperate with any information requests.	The roles are clear. This Provision reflects the mutual commitments and understanding between the Water Board and BASMAA. BASMAA proposed the concept of the Provision as a Stressor/Source Identification (SSID) in March 2019. The Water Board and BASMAA have discussed this SSID numerous times since then. This SSID was modified in March 2020 to only include municipally-owned electrical utilities in the Bay Area and not PG&E because of PG&E's bankruptcy proceedings. BASMAA wrote the draft of the letter that the Water Board will send to PG&E. Because of PG&E's bankruptcy proceedings, the Water Board staff said it will move forward with the SSID in MRP 3.0.	None.
SMCWPPP-276	C.12.e	C.12.e requirement includes actions that are beyond the control	The provision reflects the mutual commitments and understanding between	None.

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		of Permittees. Requirements depend upon PG&E information to be fulfilled. Provision should be revised to only include requirements specific to MRP Permittees.	the Water Board and BASMAA, which represents the Permittees.	
City of Oakland-39	C.12.e.ii.(6)	Remove reporting requirement C.12.e.iii(6).	See response to SMCWPPP-276.	None.
ACCWP-71	C.12.e.iii.(4)	Revise the submittal date for reporting for C.12.e.iii(4) to begin with 2023 Annual Report.	We agree.	Changed to begin Annual Reporting in 2023
CCCWP-81	C.12.e.iii.(4) and C.11.e	Revise the submittal date for reporting for C.12.e.iii(4) to begin with 2023 Annual Report.	We agree.	Changed to begin Annual Reporting in 2023
CCCWP-82	C.12.e.iii.(5) and C.11.e	Remove requirement to submit report associated with C.12.e.iii(5).	The Permittees receive a load reduction of 2 kg PCBs/yr for implementation of the protocol. It is unclear if enough is being done to keep the PCBs from demolished buildings from migrating into the MS4 to receive the 2 kg PCBs/yr. The evaluation provides the opportunity to determine whether controls for this Provision are adequately keeping PCBs from demolished buildings from migrating into the MS4 and allows the opportunity to refine the Provision for next permit term.	None.
ACCWP-72	C.12.e.iii.(6)	Remove reporting requirement C.12.e.iii(6).	See response to SMCWPPP-276.	None.

Comment No.	Provision	Comment	Response	Proposed Revision
San Jose-42	c.12.g	New requirements for C.12.g require new actions by municipalities that will take time to implement. Remove requirement for PCB testing verification and extend implementation date by one year after permit effective date.	We revised language to match task description in MRP 2. We extended the implementation date to begin on July 1, 2023.	We clarified this issue in the revised Tentative Order.
San Jose-43	C.12.g	New requirements for C.12.g require new actions by municipalities that will take time to implement. Remove requirement for PCB testing verification and extend implementation date by one year after the permit effective date.	See response to San Jose-42.	None.
SCVURPPP-145	C.12.g	Additional requirements in C.12.g increase burden on municipal staff. Permittees do not have authority or responsibility to oversee disposal of materials from demolition projects. Permittees are not in a position to determine what is compliant with state and federal regulations. Documentation/confirmation of appropriate disposal of PCBs-containing material should be addressed by agencies under those authorities. Requirements should be clarified to ensure that any required inspections would only apply to projects with	All building materials with PCBs concentrations of 50 ppm or greater requires a Hazardous Waste Manifest for disposal. The Permittees receive a load reduction of 2 kg PCBs/yr for implementation of the protocol. Yet, we do not have a firm enough handle on the demolition of applicable buildings to say enough has been done so there is proper disposal and controls of PCBs from demolished building such that PCBs do not migrate into the MS4. The scope for inspections has been clarified.	We clarified the scope of inspections in C.12.g.

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		applicable structures that are found to have PCBs > 50 ppm.		
SMCWPPP-278	C.12.g	MRP 2 requirements for C.12.g should be retained rather than placing additional burdens on permittees because the increase burden does not demonstrably lead to water quality improvements.	The Permittees receive a load reduction of 2 kg PCBs/yr for implementation of the protocol. Yet, we do not have a firm enough handle on the demolition of applicable buildings to say enough has been done so there is proper disposal and controls of PCBs from demolished building such that PCBs do not migrate into the MS4 and that 2 kg PCBs/yr is being prevented from entering the MS4. We don't know if the building materials contaminated with PCBs are disposed appropriately or recycled such that the PCBs are introduced again to the MS4; we don't know if adequate controls are implemented during demolition such that the PCBs do not enter the MS4 during and/or after demolition through vehicle track-out, airborne releases, soil erosion, or stormwater runoff. As such, the additional tasks in this permit will demonstrably minimize migration of PCBs from contaminated building materials.	We added the exemption to C,12,g.
City of Oakland-40	C.12.g.ii.(1)	C.12.g should provide exemption for emergency demolitions.	We added an exemption for emergency demolitions but also added a reporting requirement so we can get a handle on how many applicable buildings undergo emergency demolition.	We added the exemption to C.12.g.ii.(1).
ACCWP-73	C.12.g.ii.(1)	C.12.g should provide exemption for emergency demolitions.	See response to City of Oakland-40.	

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City of Oakland-41	C.12.g.ii.(3)	C.12.g should only require inspections if elevated PCBs are reported for the site.	We agree.	We clarified this requirement in C.12.g.ii.(3).
CCCWP-83	C.12.g.ii.(3) and C.11.g	C.12.g should only require inspections if elevated PCBs are reported for the site.	We agree.	We clarified this requirement in C.12.g.ii.(3) and C.11.g.
City of Oakland-42	C.12.g.ii.(4)	C.12.g should only require enhanced construction site control programs to minimize migration of PCBs from demolition activities if elevated PCBs are reported for the site.	We agree.	We clarified this requirement in C.12.g.ii.(4).
ACCWP-75	C.12.g.ii.(4)	C.12.g should only require enhanced construction site control programs to minimize migration of PCBs from demolition activities if elevated PCBs are reported for the site.	We agree.	We clarified this requirement in C.12.g.ii.(4).
CCCWP-84	C.12.g.ii.(4) and C.11.g	C.12.g should only require enhanced construction site control programs to minimize migration of PCBs from demolition activities if elevated PCBs are reported for the site.	We agree.	We clarified this requirement in C.12.g.ii.(4) and C.11.g.
SCVURPPP-146	C.12.h	Extend due date for reporting on C.12.h (implementation plan and schedule) so that reporting happens with Report of Waste	Please see the response to SMCWPPP-146.	

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		Discharge, six months prior to permit termination date.		
SMCWPPP-279	C.12.h	Extend due date for reporting on C.12.h (implementation plan and schedule) so that reporting happens with Report of Waste Discharge, six months prior to permit termination date.	The proposed early submittal of this information is intentional. The Fact Sheet explains that one of the main motivations of this provision is to require Permittees to "submit information to inform PCBs-related requirements in the subsequent permit term." The Water Board needs this information submitted well before the end of the permit so that it can timely develop PCBs and mercury provisions for the next MRP. The lack of this information was an impediment for developing such provisions for MRP 3.	
City of Oakland-43	C.12.i.iii	Remove reporting requirement for C.12.i.	The studies required by this provision are motivated by information needs associated with urban runoff. As such, their implementation is the responsibility of Permittees. As the commenter notes, the studies are largely conducted by the SF Bay Regional Monitoring Program, but these efforts will be successful to the degree that Permittees are actively engaged. One way Permittees can demonstrate this engagement is by being knowledgeable about and preparing informative reporting on these efforts.	None.
ACCWP-76	C.12.i.iii	Remove reporting requirement for C.12.i.	See response to City of Oakland-43.	
CCCWP-85	C.12.i.iii and C.11.i	Remove reporting requirement for C.12.i.	See response to City of Oakland-43.	

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ACCWP-74	C.12.g.ii.(3)	C.12.g should only require inspections if elevated PCBs are reported for the site.	See response to comment CCCWP-83.	

Response to Comments on September 10, 2021, Tentative Order
Provision C.13. – Copper Controls

Comment No.	Provision	Comment	Response	Proposed Revision
CCCWP-86	C.13.a.iii and C.13.b.iii	It does not seem appropriate for MRP 3 to require reporting on something in September 2022, as that annual report covers the period of July 1, 2021 – June 30, 2022, before MRP 3.0 is effective. Recommendation. Move these requirements to the 2023 Annual Report, which covers July 1, 2022 – June 30, 2023.	The required reporting under C.13.a and C.13.b is a continuing requirement from MRP 2, and, as a result, reflects work the Permittees are already completing (and required to complete). These requirements involve certifying (presumably existing) legal authority and providing a narrative concerning the mechanism of compliance with C.13.a and C.13.b. Permittees were required to report similar information once during MRP 2, and reporting it once during MRP 3 will help ensure continued implementation. Requiring this continuing modest level of reporting for ongoing implementation in the 2021-22 Annual Report is reasonable.	None.
SCVURPPP-147, 148 SMCWPPP-282, 283	C.13.a, b	The commenters recommend only having every Permittee certify the legal authority, even if they previously certified. The commenters worry that the Water Board could receive some Annual Reports with no certification and that could mean they already certified or the Permittee can't certify.	There is no need to make the requested change. The requirement in the permit clearly states that only Permittees that have not certified their legal authority must do so. There is no exception for Permittees that cannot certify legal authority. The permit is implementing a Basin Plan requirement that all Permittees must certify this legal authority.	None.
Baykeeper-21	C.13.c	The commenter recommends having Permittees' industrial inspectors verify industrial facilities' eligibility for No Exposure Certification (NEC) under the	Permittees are already required to identify facilities likely to use copper or to have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.	None.

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		Industrial General Permit, and force industrial facilities with roof vents that have the potential to discharge elevated levels of copper in stormwater to obtain full coverage under the Industrial General Permit.	Permittees' industrial inspectors are also required to ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site. Permittees do not have authority to enforce components of the Industrial General Permit, including ineligibility for NEC and requirements to obtain full coverage under the Industrial General Permit.	

Response to Comments on September 10, 2021, Tentative Order Provision C.14. – Bacteria Control for Impaired Water Bodies

Comment No.	Provision	Comment	Response	Proposed Revision
Sunnyvale & Mountainview – 12	C.14	Sunnyvale and Mountain View comments 8-24 contai specific, suggested changes to Provisions and Fact Sheet Language.	See response to Sunnyvale and Mountainview – 2, 6, 14-22, and 26-35.	See referenced responses.
ACCWP_Legal – 2	C.14	Testimony was presented at the Board's workshop / hearing by Daniel Cooper and representatives of the San Francisco Baykeeper that the Tentative Order alternative compliance measures (inappropriately called "safe harbors") fail to comply with the precedent and direction provided in State Water Board Orders WQ 2015-0075 and 2020-0038 and Los Angeles Superior Court decisions. We disagree with the conclusions of that testimony and request that no further action be taken to modify the language of the Permit provided in the Tentative Order relating to alternative compliance measures. We support the conclusions reached by the Water Board staff and the rationale described in the Fact Sheet.	Comment noted. We have made some changes in response to the referenced comments, including Provision C.14.a related to the cities of Sunnyvale and Mountain View's bacteria dischaseeProvision 8 related to rceiving water limitations. Please see Responses to Baykeeper - 2, 4, and 11.	See referenced responses and Provisions C.14.a. and C.8.
San Mateo County – 6	C.14	Bacteria Control for Impaired Water Bodies. Recommended actions to address bacteria	We disagree. Commenter has not provided any evidence or argument that would conclude "recommended actions to address	None.

		impairments in TMDL watersheds are likely insufficient to meet water quality standards due to natural background sources and a high reliance on public behavior change. Only minor clarifications to C.14 are noted in Attachment A, but County staff will continue to work directly with Water Board staff to implement TMDL requirements, review water quality data, and evaluate TMDL compliance feasibility and progress.	bacteria impairments in TMDL watersheds are likely insufficient to meet water quality standards due to natural background sources and a high reliance on public behavior change." Until all anthropogenic sources of bacteria discharges are controlled, it is not possible to determine whether the natural background sources would result in exceedances of bacteria water quality standards or not. In the absence of doing so, or any specific evidence that would back up the commenter's assertion, the permittees continue o be requied to implement TMDL-actions prescribed in the Permits.	
Sunnyvale & Mountainview – 6	C.14.a	The language should explicitly include all waterways at issue, Stevens Creek and Calabazas Creek. Sunnyvale East Channel is part of the MS4 channel system owned and operated by the Santa Clara Valley Water District and is not properly considered a Water of the United States. The Tributary Policy would not presume uses and objectives apply therein; however, the MRP should include "Sunnyvale East Channel/Guadalupe Slough, to the extent recreational uses and FIB objectives are applicable." Provision should refer to Fecal Indicator Bacteria instead of	We agree that the language should include all waterways at issue, i.e., Stevens Creek, Calabazas Creek, and Sunnyvale East Channel/Guadalupe Slough. See response to Sunnyvale & Mountain View – 26 – 35, and specifically comment 27, regarding why the Sunnyvale East Channel is a water of the United States. A footnote has been added that references to bacteria pertains to fecal indicator bacteria. We agree that BMPs should not be implemented where a source does not exist, or where a potential source is investigated and found to have no reasonable pathway or contribution to water quality impacts and made that clarifying change.	The changes described in the response have been made to C.14.a.

		bacteria generally. Clarifying language to specify the following is suggested: 1) the first step is to determine if the source being investigated has the potential to transport significant amounts of FIB to receiving waters. 2) the step to implement BMPs would only apply if such sources had observed or demonstrated potential. In other words, BMPs should not be implemented where there is no contributing source.		
Sunnyvale & Mountainview – 13	C.14.a	This comment contains specific suggested language changes to C.14.a, including a correction to the table cited in the Basin Plan. (Footnote 41 should reference Table 3-1)	See response to Sunnyvale & Mountain View - 6. The clarifying edits have been made. Baykeeper's monitoring data indicates that the cities have caused or contributed to exceedances of receiving water limitations during the time Baykeeper took samples, so we did not change make the requested change that the cities "may" be causing this problem.	See referenced response. The Basin Plan reference has been corrected.
Baykeeper – 3	C.14.a	C.14.a creates a new alternative compliance pathway for Mountain View and Sunnyvale (the "Cities") and is included in C.1's Safe Harbor. As discussed below, C.14.a does not comply with the State Board Orders because it does not implement a TMDL or statewide policy and does not require control measures that	A TMDL is not required to provide an alternative path to compliance with receiving water limitations. See State Water Board WQ Orders 2015-0075, as amended by 2021-0052-EXEC, and 2020-0038. We disagree that C.1 .a control measures are not rigorous, transparent, and accountable. Please see response to Baykeeper – 4.	See response to Baykeeper-4.

		demonstrate rigor, transparency, and accountability.		
Baykeeper – 4	C.14.a	C.14.a lacks milestones and final deadlines required by State Board Orders. The monitoring program in C.14.a.viii is undefined, there is no deadline for submission of a monitoring plan and the Permit does not require the monitoring plan first be submitted to the Water Board for review and approval. The public will not have the opportunity to evaluate and comment on the rigor and accountability of the monitoring program, because the Cities will develop the monitoring program during MRP 3. It is unclear whether the monitoring tasks of using desktop and field evaluation methods, receiving water monitoring, and GIS analysis must be completed simultaneously. As written, Cities could postpone receiving water monitoring until the end of MRP 3's term. C.14.a.iii.(2) excludes outfall monitoring, limiting the Cities' ability to identify the efficacy of certain control actions, and making the monitoring program less effective. C.14.a.iii.(3) does not require monitoring, it only requires reporting on monitoring that has	See Master Response Identifier C.14.a-1.	See revisions to C.14.a.viii and ix and the Fact Sheet for Provision C.14.a.

		occurred; there is not enough accountability in this requirement. C.14.a does not include any modeling exercise to project when the Cities will cease causing or contributing to bacteria water quality objectives and there is no provision to implement adaptive management if initial projections are incorrect. C.14.a. includes "Planning for Phase Two Actions," indicating that the Water Board does not believe the actions in Draft MRP 3 will be adequate to achieve receiving water limitations. Phase 2 actions are left undefined; new actions are not required, and Cities can simply increase the level of existing control measures. There is no hard deadline for Cities to achieve bacteria Water Quality Objectives – the Cities may be allowed to continue to propose additional actions indefinitely in future MRP iterations. C.14.a contains no milestones based on measurable criteria or indicators to be achieved in the receiving waters and/or MS4 discharges. There is no final date for achieving the receiving water limitations as soon as possible. It is unclear what sort of progress at limiting bacteria the Water Board expects to make		

		each year. The Water Board must exclude C.14.a from the Safe Harbor language in C.1		
Baykeeper – 5	C.14.a	C.14.a only applies to Stevens Creek and Sunnyvale East Channel, there is no explanation for the Water Board's omission of Calabazas Creek in Draft MRP 3 or the Fact Sheet. C.14.a cites the wrong bacteria water quality objective in Footnote 41. In February 2021, the Board amended the Basin Plan to update bacteria objectives, adopting the State's Board Bacteria Provision. The Board must cite the State Board Bacteria Provisions as the applicable bacteria water quality objectives.	We regret the errors and ha-d them. See change and response to Sunnyvale & Mountain View comment 6.	Errors have been corrected—see revised Provision C.14.a.
Baykeeper – 10	General, C.1, C.14.a	Draft MRP 3 does not comply with Federal and State Anti-Degradation requirements. The addition of C.14.a to the Safe Harbor authorizes the lowering of water quality under MRP 3. The Safe Harbor in C.1 authorizes discharges causing degradation of receiving waters while programmatic elements are developed and implemented for an indefinite period. C.14.a is not based on an impairment finding or TMDL, and inclusion of C.14.a in the Safe Harbor is not equivalent	See Master Response Identifier General – 1.	See referenced response.

		to the Safe Harbor in the LA County MS4 Permit. The anti-degradation analysis is deficient because it fails to address whether the addition of C.14.a to the Safe Harbor in C.1 will result in degradation. The anti-degradation analysis for high quality waters does not examine whether the enforcement insulation provided by the permit's Safe Harbor is offset by the maximum benefit to the people of the state. There are no interim or final compliance deadlines for Sunnyvale and Mountain View to meet bacteria standards in Draft MRP 3. The Safe Harbor deems Sunnyvale and Mountain View in compliance with bacteria standards for implementing their existing MS4 programs through MRP 3's term. C.14.a. does not include deadlines for when the degradation will end and receiving water limitations will be achieved. The Board revised Region 4's anti-degradation analysis to include "Alternative 3, Option B" in the "practicable alternatives" in the Fact Sheet and exclude Region 4's alternative compliance option 'without allowing permittees to be deemed in compliance with receiving water		

		limitations for any high-quality waters.' In the economic analyses of each alternative the only evidence cited to support the proposition that Permittees face technical and financial constraints are the letters from Permittees requesting the trash load reduction deadlines be extended under C.10, which is not specific to Alternative 3, Option B. The Board must conduct complete, waterbody-specific anti-degradation analyses for all waterbodies that will be degraded under C.14.a. Baykeeper believes that once a full analysis in conducted it will become clear that C.1's Safe Harbor is not necessaryIdentifier General – 1. iSee Master Response Identifier General – 1.bor.		
F5C – 2 – 3	C.14.a.iii	The requirements to evaluate potential bacterial sources coming from Unsheltered Homeless populations seem vague and unrelated to the other sections' requirements of a census, map, and report. Why not provide specific incentives, such as a credit if permittees pay for toilets, handwashing stations, access to clean water, trash pickup? Require upstream and downstream tests	We expect that some of the information gathered and effort performed to satisfy requirements for C.17 would also be useful to satisfy requirements for C.14.a.iii and vice-versa. However, the purpose of provision C.14.a.iii is to specifically direct and require permittees to implement controls to reduce fecal indicator bacteria discharged to the specified waterbodies. An incentive is unnecessary for this provision since it is a requirement.	None.

		for human fecal wastes at established camps?		
Sunnyvale & Mountainview – 14 – 22	C.14.a	Sunnyvale and Mountain View comments 14-22 contain specific, suggested changes to Provisions and Fact Sheet Language. The suggested changes accompany their earlier comments. Please refer to the annotated comment letter to see the exact changes requested.	14. See response to comment Sunnyvale & Mountainview - 6. The other editorial changes are unnecessary and have not been made. 15. Requested editorial changes are unnecessary and have not been made. See also response to comment Sunnyvale & Mountainview – 6. 16. Adding “identified potential FIB” is not needed to clarify expectations, since “Where such potential is determined to exist” has been added. The list of actions to minimize bacteria are examples and the Board declines to make the editorial changes that are unnecessary. 17. See response to Sunnyvale & Mountain View – 6. The task has been clarified consistent with the intent of the requirement. The other editorial changes are unnecessary and have not been made. 18. See response to Sunnyvale & Mountain View – 6. Other editorial changes have not been made. 19. The word “private laterals” does not need to be added as it is understood that sanitary and stormwater systems (and their adjacent infrastructure) covered by the MRP are separately operated and maintained. 20. See response to Sunnyvale & Mountain View – 6.	See revised Provision C.14.a for the various changes.

			21 and 22. The water quality monitoring and phase two sections have been revised in response to comments. See response to Baykeeper – 2 and 4.	
Sunnyvale & Mountain View – 26 – 35	C.14 Fact Sheet	Sunnyvale and Mountain View comments 26-35 contain specific suggested changes to Provisions and Fact Sheet Language. The suggested changes accompany their earlier comments. Please refer to the annotated comment letter to see the exact changes requested.	26. The editorial change is unnecessary and has not been made. 27. The references to the waters has been corrected. Sunnyvale East Channel is a water of the U.S. as identified in the jurisdictional delineation completed by H.T. Harvey and Associates[23] and in the current U.S. Army Corps of Engineers Clean Water Act section 404 permit for the Santa Clara Valley Water District's Stream Maintenance Program. It has a defined bed and banks, is hydrologically connected to San Francisco Bay, and is a navigable tributary to the Bay, among other characteristics. Beneficial use designations in the Basin Plan are not complete and are not determinative of whether a waterbody is a water of the U.S. The C.1.a report is submitted pursuant to the iterative process. To be deemed in compliance with receiving water limitations, one must do more than implement the iterative process. Therefore, the change to add future permittees to C.14.a has not been made. The other editorial changes are unnecessary and have not been made.	See the revised Fact Sheet for Provision C.14.a regarding the various changes.

[23] H.T. Harvey and Associates, Sept. 2013. Figures 6g – 6o, "Wetlands and Other Waters of the U.S., Sunnyvale East and West Channels Flood Protection Project – Wetland Delineation."

			28. The corrections have been made. 29. The editorial changes are unnecessary and have not been made. 30. The change has not been made. The permit is clear on this point. 31. The editorial changes are unnecessary and have not been made. 32. The editorial changes are unnecessary and have not been made. 33. The comment does not show that a change is requested. 34. The editorial changes are unnecessary and have not been made. 35. The comment does not show that a change is requested.	
San Mateo County – 19	C.14.b.i.(2)(2e)	Specifies that the Half Moon Bay Airport (KHAF) Meteorological Station is used to assess rainfall depths. Precipitation data from this station has significant gaps and has been unavailable in recent years. Text should state "(as measured at Half Moon Bay Airport (KHAF)	Staff agrees with this request.	Revise C.14.b.i.(2)(e) as follows: The City shall continue to implement a visual inspection and cleanup plan for high dog waste

		Meteorological Station or comparable site)."		accumulation areas along the Creek and its tributaries. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteoro logical Station, or comparable site), and at a frequency of no

				less than once a month.
San Mateo County – 20	C.14.b.ii.(2)(a)	Specifies sampling location for water quality monitoring to assess attainment of wasteload allocations. The Pacifica State Beach Monitoring station described as "the original Linda Mar #5 station" has been reinstated at the location specified and is now identified as Linda Mar #7. Clarify that data from Linda Mar #7 shall be used to assess compliance at Pacifica State Beach. Recommended text: (approximately 300 feet north of the Creek Mouth, at shin depth. Originally referred to as Linda Mar #5 in the TMDL Staff Report, but now referred to as Linda Mar #7).	We agree with this request for clarification and have revised the Tentative Order in response.	Revise C.14.b.ii.(2)(a) as follows: Sample Locations – Two stations shall be monitored: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (the original Linda Mar #5 station, as of the TMDL's adoption date of November 2012, which was located approximately 300 feet north of the Creek mouth, and at shin depth, originally referred to as Linda Mar #5 in the TMDL Staff Report but currently refe

				rred to as Linda Mar #7). The ocations of these stations are shown in the TMDL Staff Report.

Response to Comments on September 10, 2021, Tentative Order
Provision C.15. – Exempted and Conditionally Exempted Discharges

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SMCWPPP-284 SCVURPPP-149	C.15.b.i.(2)	Total Residual Chlorine is not an appropriate sampling parameter for groundwater and should be removed from the table. Remove total residual chlorine from the list of sampling parameters.	It is uncommon, but not completely out of the ordinary, to find total residual chlorine in groundwater. For example, it has been detected in construction projects enrolled in the VOC and Fuel General Permit (NDPES Permit No. CAG912002), which we believe was likely due to leaks from potable water distribution systems. Furthermore, C.15.b.i.(2) applies not only apply to groundwater, but also to discharges from foundation drains, crawl space pumps, and footing drains, which have the potential to receive water from potable sources (e.g., broken lines, wash-down water). Because chlorine can harm aquatic life, it is appropriate to test for it in the listed discharges.	None.

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ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	C.15.b.iii	1) Recommend replacing specific requirements with language that would encourage participation in a stakeholder group to discuss options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges. The following language is all that should be required in MRP 3: iii. Discharge Type –Discharges of Fire Department Generated Water and Foam (1) Discharges resulting from firefighting activities. (a) Permittees shall: (i) Participate on a regionwide Fire Department Discharges Working Group (FDDWG) with at least one stormwater program representative and one Fire Department representative from each Countywide program. The working group shall coordinate to identify SOPs and BMPs to reduce water quality impacts from Fire Department activities. Each Countywide program shall decide which Permittees and Fire Departments from their county shall be represented on the working	1) See Master Response Identifiers C.15-1 & C.15-5. 2) See Master Response Identifier C.15-2. 3a) We disagree. C.15.b.iii has been carefully crafted so that it does not conflict with the primary responsibilities of firefighting personnel. Please refer to the response to the following combined comment, below: CFCA-3 CCCEFC-3 CCCWP-89 Oakland-45,46 San Jose-8 SCVURPPP-150,159,163,164,167,168 SMCWPPP-285,295,299,300,303,304 3b) We agree with the Working Group approach described by the commenters, which is what has been incorporated into C.15.b.iii.(2). We expect the Working Group will produce a document that reflects the group's consensus about doable measures. It is not necessary to wait	Consolidated the two reports (preliminary and final) submitted by the Working Group in 2024 and 2026 into a single report submitted in 2025, and indicated in the Fact Sheet that an update of the report may be called for in a subsequent Permit term. We have reduced the minimum required frequency at which the Working Group convenes subsequent to the submittal of the report from two times per year to once per year. Removed specific reporting requirements, and instead tasked the Working Group with

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		group. (ii) The working group shall identify BMPs and SOPs to prevent and/or improve the quality of non-stormwater discharges from non-emergency activities and from Firefighting Foam. (b) Reporting – The Permittees shall collectively submit a Report by September 30, 2026, that describes progress on the implementation of C.15.b.iii.(2)(a)(i)-(vi) and includes recommendations regarding the implementation of the items listed in C.15.b.iii.(2)(a)(i)-(iv). 2) This working group needs to be free to develop the most effective and achievable recommendations. The permit, as written, sets unreasonable and ineffective targets and will ultimately lead to failure. MRP 3 should establish the group and set an overarching goal and not specific provisions. 3a) SCVURPPP-14d & SMCWPPP-37: Municipal fire department representatives have expressed many times to Water Board staff that the specific requirements now included in the Tentative Order are	for a future Permit term before implementing identified BMPs and SOPs. That would unnecessarily delay the expected water quality benefits associated with such implementation. However, the Working Group's report may frame expectations around the time needed for effective implementation of some controls. 3c) The proposed changes to C.15.b.iii between MRP 2 and MRP 3 are reasonable and appropriate. Specific requests in other comments are addressed separately. The Provision's specific requirements include convening a working group to develop and/or update BMPs and SOPs, then implementing the developed guidance and educating appropriate municipal and private parties about it. That approach is the one proposed by fire department representatives to the Permit working group on this Provision, and it is consistent with the purpose requested in the comment: to encourage participation in a stakeholder group that would discuss options for Permittees to address water quality	developing (then implementing) the reporting requirements.

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		not needed, safe, or appropriate. The significantly expanded requirements constrain the abilities of fire departments to protect community health and properties during emergency situations. 3b) SCVURPPP-14d & SMCWPPP-37: Both fire department representatives and copermittee/Program staff believe that the appropriate way to address potential water quality concerns associated with firefighting is for them and Water Board staff to participate in a stakeholder group that would outline and identify feasible and safe options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges. The recommended consensus-based options could then be incorporated into the permit when it is next renewed or amended. Through this process, fire department, municipal stormwater, and Water Board staff can work together and in parallel track efforts by industry groups and via state and national forums (e.g., SB 1044) to effectively protect water quality,	concerns related to firefighting discharges. 4) The tasks listed in C.15.b.iii.(2)(a)(ii)-(v) are necessary to guide the Firefighting Discharges Working Group. We have modified the language in the provision and associated Fact Sheet section to clarify the Working Group's broad portfolio and flexibility. Please see the response to 3c) above.	

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		while also addressing public safety and multiple regulatory drivers. 3c) SCVURPPP-14d: We request that the only addition to the requirements included in MRP 2 is a requirement to participate in a regional work group and report on participation. 4) SCVURPPP-150 & SMCWPPP-287: Retain Working Group, but remove specific requirements in C.15.b.iii.(2)(a)(ii)-(v).		

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ACCWP-78	C.15.b.iii	We support the idea of the Working Group. There are a significant number of new requirements identified in C.15.b.iii with little knowledge, background, or research to support them. In some Permittee jurisdictions, the responding fire agency may be a special district or Cal Fire, a state agency, over which the Permittee may not have direct oversight. Also, there are no private firefighting crews in the Bay Area.	See Master Response Identifier C.15-3.	

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ACCWP-78 SCVURPPP-150 SMCWPPP-287	C.15.b.iii	1) This permit cycle should be used to learn more about the resources that are available to assist stormwater programs and fire departments meet water quality goals without jeopardizing the protection of life or property, during emergencies. 2) MRP 2 includes requirements for management while allowing the flexibility needed to address these complex discharges associated with life and property safety in emergency situations. 3) The significant amount of new requirements and level of effort needed for implementation far outweighs the potential water quality impacts that could be addressed after life and property are addressed.	1) We agree. C.15.b.iii supports and is consistent with this goal, via its establishment of a Working Group to understand and frame appropriate clean water practices associated with firefighting, consistent with the prioritization of life and property. Please see the response to parts 3b) and 3c) of the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 2) We agree, and the Tentative Order continues to allow this same flexibility. It tasks the Permittees with – on an ongoing basis –identifying and evaluating opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activity, and then taking action based on those identified opportunities. We made responsive edits to clarify the Working Group's role and to place potential BMPs and SOPs for the Working Group to consider in the C.15 Fact Sheet section.	Edits to clarify the role of the Working Group, including moving identified potential BMPs and SOPs to the C.15 Fact Sheet section and continuing to note that they are provided as examples for the Working Group to consider.

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			3) See Master Response Identifier C.15-4.	
Baykeeper-22	C.15.b.iii	G. C.15.b.iii's requirements for firefighting foam containment BMPs must remain in draft MRP 3. During MRP 2's permit term, there were at least three incidents involving discharges of firefighting foam in the Bay Area. In November 2016, a fire-suppression system at the San Jose International Airport malfunctioned, releasing firefighting foam into the surrounding environment. Luckily, a contractor was quickly deployed to clean up the firefighting foam, blocking off storm drains and suctioning up the residual foam, and no impacts to the Guadalupe River were reported. In April 2019, the Berkeley Fire Department used firefighting foam to put out a garbage truck fire in Berkeley. Storm drains were not blocked off, and the firefighting foam reached Codornices Creek, resulting in a fish kill. In October 2019, there was a fire at the NuStar tank farm which was put out with firefighting foam. Initially, it was thought that the firefighting foam was contained	Comment noted. We agree that the provision will not compromise fire response and public safety. In addition, the C.15 Fact Sheet section notes the potential for adverse effects from firefighting discharges, including those that include firefighting foam, and cites specific discharges, including the discharge to Codornices Creek. This provision will establish a Working Group to identify recommended BMPs and standard operating procedures, including for discharges of foam. While the Water Board established a MRP reissuance workgroup to help draft this provision, we are not aware of a working group under MRP 2 like the one that would be required under MRP 3, which performed the tasks specified in C.15.b.iii.(2) of the Tentative Order. Regarding Report timing and implementation, please see responses to the comment: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46	None.

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		via secondary containment, but this was later disproved in the incident's investigation report. The Board must require Permittees to implement BMPs and ensure infrastructure is maintained in order to protect water quality from these discharges. It is Baykeeper's understanding that Permittees convened a working group during MRP 2, similar to the working group required in C.15.b.iii.(2), so it is unclear what additional information the Board expects will be gathered during MRP 3 that has not already been gathered. Despite Baykeeper's requests to be included, we were repeatedly denied the opportunity to participate in the MRP 2 working group, so we can only speculate as to content of these meetings. These past efforts do not justify Permittees needing an additional two years to compile their findings in a Preliminary Report and certainly do not justify delayed BMP implementation under C.15.b.iii.(3). Moreover, this reporting requirement and delayed	SCVURPPP-14d SMCWPPP-287	

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		implementation conflicts with C.15.b.iii.(4), required BMPs, which appears to contain the BMPs already identified by the MRP 2 working group. The Board must revise C.15.b.iii to clarify that BMPs must be implemented during the entire permit term. Contrary to Permittees' claims, C.15.b.iii does not compromise fire response and public safety. C.15.b.iii.(4).(b) provides "[d]uring emergency firefighting situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). Permittee staff, contractors, or firefighting personnel shall control the pollution threat from their activities during emergency firefighting situations to the extent that time and resources allow." Advanced planning will minimize any burdens on time and resources during a fire response in order to allow for the protection of people and the environment.		
CCCWP-88 SCVURPPP-14b	C.15.b.iii	CCCWP-88: The Legislature has already taken significant action (SB 1044) to remove PFAS containing firefighting foam from	Fact Sheet Section C.15 explains the following: "Discharges of Class A firefighting foams	None.

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SMCWPPP-35		use and, where it remains, it is most likely a required form of fire suppression. The Permittees recognize that firefighting foam is a significant source of PFAS into groundwater; however, the Legislature has already addressed this issue. Further requirements to inspect and provide notice of the use of firefighting foam are no longer necessary in light of this legislative action. SCVURPPP-14b: New legislation, SB 1044, approved by the California legislature and signed into law by the Governor in September 2020, addresses the concern of PFAS chemicals in firefighting equipment and foam statewide, which is a more appropriate scale. This legislation prohibits manufacturing, selling, or discharging Class B firefighting foam containing PFAS.	contribute pollution to water quality in receiving waters, because they contain constituents that are acutely toxic to aquatic species. In April 2019, a vehicle fire in the City of Berkeley resulted in the discharge of 4,500-12,000 gallons of potable water and 20 gallons of a Class A firefighting foam (for which the primary/active ingredient is a hydrocarbon surfactant; 96-hr LC50 Rainbow Trout = 16.8 mg/L) into the City's MS4, which discharged to Codornices Creek and resulted in the deaths of at least 63 Central Coast California Steelhead Trout and 1 sculpin. Similar discharges of other Class A foams with comparable acute aquatic toxicity are likely to cause similar impacts. Class B firefighting foams are generally divided into two types, fluorinated and fluorine-free. Discharges of both types of Class B firefighting foams contribute pollution to water quality in receiving waters, because they contain constituents that are toxic to aquatic species. Fluorine-free Class B foams do not contain PFAS but are still acutely toxic to aquatic species because their primary active ingredient is typically a hydrocarbon surfactant. Fluorinated Class B foams typically contain perfluoroalkyl and polyfluoroalkyl substances (PFAS), which are environmentally persistent and toxic to both human health and aquatic species.	

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			California Senate Bill 1044, approved by the Governor on September 29, 2020, and effective January 1, 2022, prohibits the sale and use of Class B firefighting foams that contain intentionally added PFAS chemicals, with phaseouts for certain continued applications of such foams. This Provision requires the Permittees to recommend reporting requirements (for example, reporting if any of the exemptions in Senate Bill 1044 are invoked by parties acting within Permittees' jurisdictions, such that firefighting foams containing PFAS chemicals are used during firefighting emergencies) then implement those recommendations. Reporting on discharges of PFAS and other foams is necessary to ensure transparency about continued PFAS use within the Permit region, and transparency about discharges of other firefighting foams which also have adverse environmental impacts." In summary: 1) All firefighting water and foam have the potential to cause adverse environmental impacts. 2) The Working Group is tasked with discussing, then recommending, reporting	

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			requirements, including the content of the reporting and what will trigger the reporting. 3) PFAS-containing firefighting foams may still be used within Permittees' jurisdictions because of certain exemptions included in SB 1044, and therefore the Working Group will consider reporting on the use and discharge of PFAS-containing firefighting foams. The benefit provided by this reporting(even to the extent it is duplicative of SB 1044's reporting requirements) is reasonable and important, given the adverse water quality impacts caused by PFAS-containing firefighting foams. This can take any number of forms. For example, Permittees could copy the Water Board on communications to the State Warning Center, or forward those communications to the Water Board. And/or, the Permittees could compile certain information from those communications and summarize that information in the Annual Report. For this Permit term, these decisions will be left up to the Working Group, however, the Water Board may consider including more-prescriptive requirements in a subsequent Permit term.	

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			3) SB 1044 does not completely prohibit all discharges of PFAS-containing firefighting foams. SB 1044 contains phaseouts and exemptions that will allow certain discharges to continue during all or a portion of the MRP 3 permit term.	
CUSP-1	C.15.b.iii	The California Urban Streams Partnership (CUSP) is submitting this comment letter to the Board for its consideration in adopting C.15.b.iii addressing Emergency Discharges of Fire Fighting Water and Foam. The CUSP is a statewide non-profit organization whose members have been active in San Francisco Bay Area stream restoration projects since 1982. It is sending this comment letter to emphasize the need for the proposed new provision and urge Board members to adopt the provision. This letter describes a particularly painful environmental impact from the use of firefighting foam on Codornices Creek in Berkeley-Albany (Codornices Creek fish kill described in detail in comment letter).	Comment noted.	None.
CUSP-2	C.15.b.iii	The context for this fish kill is important for the Water Board to appreciate. A collaborative effort to restore Codornices Creek dating	Comment noted.	None.

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		back to 1995 involves the cities of Berkeley and Albany, University of California, California Department of Water Resources, California Natural Resources Agency, California Coastal Conservancy, Caltrans, the Water Board, National Fish and Wildlife Foundation, Codornices Creek Watershed Council, and several citizen non-profits. State of California and local monetary contributions add up to $9 million dollars, accompanied with citizen monitoring and volunteer contributions. With the recent completion of a restoration reach upstream of San Pablo Ave., about 3,000 feet of restored channel has been accomplished in the lower watershed. A focal objective of these collaborations over a period of 25 years has been to enhance and protect the threatened Central Coast Trout-Steelhead population. To have this kind of effort shadowed or eclipsed by a one-time discharge of firefighting toxics into the creek is truly heartbreaking.		

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CUSP-3	C.15.b.iii	After this tragic event a representative of the CUSP and SF Baykeeper met with the Chief of the Watershed Division and implored the Water Board to add emergency discharges for firefighting into the MRP. CUSP is therefore pleased to see this effort to set up a regional Working Group to better identify BMPs and Standard Operating Procedures for integrating into fire department practices.	Comment noted.	None.
CUSP-4	C.15.b.iii	After the April 2019 fish kill, CUSP worked with the Berkeley and Albany City Council representatives from the Codornices Creek watershed to hold a community meeting with the Berkeley Fire Department. These points summarize the recommendations produced by this meeting for a regional working group and best management practices to be considered by this group: • Develop a Bay Area working group to address best management practices that includes fire safety departments, regulatory agencies, and representatives of citizen public	The BMPs and SOPs suggested in this comment will be considered by the Firefighting Discharges Working Group.	None.

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		organizations with a stake in protecting aquatic resources and environmental restoration • Require that fire departments post watershed maps in their stations which identify locations of sensitive habitat and culvert systems connected to them • Hold regularly scheduled trainings for fire personnel on the use of chloramine discharge mats for storm drains • Develop and adopt the use of booms for use at firefighting locations that can capture foam and other discharges before they can enter storm drains or channels • Fire departments must provide assurances that the firefighting response trucks be stocked with the appropriate discharge collection and blocking equipment • Designate firefighting staff with the responsibility to respond to environment protection measures at emergency firefighting locations.		

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Oakland & San Jose-8	C.15.b.iii	Discharge Type – Emergency Discharges of Firefighting Water and Foam Fire departments in both San José and Oakland respond to several thousand fires throughout the year (SJFD = 3,700 fires in FY19-20, OFD = 429 fires in the month of September 2021 alone) and provide mutual aid response throughout the state of California for large scale disasters. Both agencies commit considerable resources and personnel to support the State's efforts in combating wildland fires that have been increasing in size and frequency because of climate change. In both San José and Oakland, fires can occur simultaneously and late into the night, drawing down resources and potentially impacting emergency response times. The vacancy rate at San José is 3.7%. There are significant budget impacts to these departments and expanding resources to address stormwater runoff at fire incidents will not be feasible nor practical. The primary mission for both these	Comment noted. The number of fires responded to in the Bay Area, including the examples given, is indicative of both the need to implement measures to reduce the adverse water quality impacts of emergency firefighting discharges and the challenge of doing so. We recognize that a range of municipal departments may respond to a fire (e.g., fire, public works, environmental services). The Working Group established in this Provision will consider the roles of the various responders, and the actions they could take before, during, and after firefighting response.	None.

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		departments is to protect life, property, then the environment. To protect life, the San José Fire Department response time goal to a priority emergency is 7:59 minutes. More consideration is needed for the potential consequences of these new requirements. Most importantly, the impact to firefighters' health and safety needs to be considered. Implementing discharge controls and limiting foam use during emergency fire suppression activities forces firefighters to remain in toxic environments longer which exposes them to increased levels of known carcinogens. The Fire Department recommends the opportunity to collaborate with the Water Board. In addition, both agencies will help educate its members to the appropriate uses of PFOS/PFAS and recommends collecting more data to better understand the different types of PFOS/PFAS and how they are best used in a safe and effective manner.		
San Jose-44	C.15.b.iii	1) The Fact Sheet describes U.S. EPA's intent to explore these requirements as part of a category	1) Please see the response to the following combined comment, below:	See the proposed revisions for the

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		of discharges and not for individual fires. However, the Fact Sheet references only one fire-related issue to support the extensive new requirements laid out in the provision. While it may be reasonable to prospectively address flows from firefighting activities, this permit immediately requires BMPs to be implemented without consideration of feasibility or the potential consequences. 2) Implementing BMPs may not be feasible given staffing for the Fire Department as well as any contractors that would be needed. This doesn't give consideration to the fire season, during which San Jose firefighters are deployed to assist with wildfire efforts. Also, keeping resources on-scene of an extinguished fire to plug and dyke water/foam runoff for prolonged periods of time will take first responders out of the system, thus increasing emergency response times and impacting service delivery. 3) Firefighting activities at the Airport are regulated by the	CCCWP-87 Oakland-44 SCVURPPP-171 Please also see the response to the following combined comment, above: ACCWP-78 SCVURPPP-150 SMCWPPP-287 2) See Master Response Identifier C.15-6. 3) The comment raises no conflict. If an airport is required by the FAA to use a certain firefighting foam, then C.15.b.iii does not contradict that external requirement. It simply requests that Permittees use the least environmentally harmful firefighting foams, to the extent possible. 4) Please see the response to the following combined comment, which notes the range of municipal departments that may respond to fires in different capacities and the expectation for the Working Group to consider roles and constraints as part of the Firefighting Discharges Working Group (in particular, parts 2) and 3b) of that response): ACCWP-77,79,80 CFCA-1	other combined comments referred to in this response.

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		Federal Aviation Administration (FAA), which determines the type(s) of Aqueous Film-Forming Foam (AFFF) that are approved for use at the Airport, thus restricting the options for alternative firefighting foams. 4) Even if staffing was available, costs for standby pay would be extremely high. Contracting cleanup and pickup services with for-profit hazardous materials disposal contractors is very costly. 5) More consideration is needed for the potential consequences. For example, plugging storm drains could result in flooding. Most importantly, the impact to firefighter's health and safety needs to be considered. Implementing BMPs and using fire suppressants that take longer to extinguish fires required crews to stay longer which increases their exposure to immediate and long-term risk (e.g. health impacts from smoke and fumes). 6) Remove the requirements for	CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 5) See Master Response Identifier C.15-7. 6) Please see the response to the following combined comment regarding the workgroup approach, and regarding clarification about the BMPs and SOPs being recommended not required (and moving them into the Fact Sheet): ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	

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		the immediate implementation for required BMPs and SOPs.		
SCVURPPP-14a SMCWPPP-34	C.15.b.iii	1) The requirements for emergency discharges of firefighting activities have increased substantially in the Tentative Order compared to MRP 2 and, for the reasons set forth below, need to be revised. 2) Co-Permittees and firefighting personnel already control the pollution threat from firefighting activities to the extent that time, safety, and resources allow, given that putting out the fire is their primary objective. 3) However, there are now significant new requirements that are simply untenable.	1) Specific requests are addressed separately. 2) Though some Permittees may implement some water quality and hydrologic controls to mitigate the adverse impacts associated with discharges of firefighting foam and water resulting from emergencies, and caveating that putting out the fire is the primary objective, it is our understanding that Permittees generally do not implement water quality and hydrologic controls to the maximum extent that time, safety and resources allow. Therefore, C.15.b.iii has been modestly revised. 3) Specific concerns are addressed separately within the responses to this Provision.	None.
SCVURPPP-172 SMCWPPP-307	C.15.b.iii	When private property owners contract for cleanup services it is after the emergency is over, i.e. the fire is out. There is generally no need for containment because the water and foam used to extinguish the fire are no longer being used. Cleanup activities should be conducted using proper BMPs. These cleanup activities	The Working Group may discuss this and include recommendations, as appropriate, in the Firefighting Discharges Report. We are not aware of BMPs and SOPs specific to firefighting emergencies that Permittees have included in their IDDE programs, but to the extent they already have and there is no or little need to modify those existing BMPs and SOPs, that would facilitate completion of the Report.	None.

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		would be addressed through existing Illicit Discharge Detection and Elimination programs without the need for additional requirements.		
CCCWP-87 Oakland-44 SCVURPPP-171	C.15.b.iii & C.15.b.iii Fact Sheet	CCCWP-87: Federal regulations only require municipal stormwater programs to address firefighting activities "where such discharges or flows are identified as significant sources of pollutants to waters of the United States" (40 CFR § 122.26). No such finding has been made here for Contra Costa County. The finding made in the Fact Sheet refers to a fish kill study in Berkeley, however, this does not provide substantial evidence of similar occurrences in Contra Costa County, as the Berkeley fish kill study is not representative of conditions in Contra Costa County. Oakland-44: The federal regulations require that non-stormwater discharges be controlled if they are a significant source of pollutants, and the permitting authority is expected to include permit conditions to prohibit or control specified categories of non-stormwater	See Master Response Identifier C.15-8.	Revised Fact Sheet to include list of potable water spills resulting in fish kills.

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		discharges if they are determined to be a source of pollutants to waters of the United States (40 CFR § 122.26(d)(2)(iv)(B)(1).). The Oakland Fire Department (OFD) disagrees with the Water Board's assertion that emergency firefighting activities contribute a significant source of pollutants to waterways. OFD maintains that these activities should remain exempt from the state's stormwater regulations. Federal Stormwater Regulation 40 CFR § 122.26 only requires regulation of discharges from firefighting where such discharges are significant pollutant sources to waterways. Before constraining emergency firefighting activities with prescriptive permit language, and to reduce regulatory confusion, an evidence-based approach should be used to define "significant source of pollutants." Exempt firefighting activities from the state's stormwater regulations. Review language and revise to recognize the differences between population-based permittees and		

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		non-population-based permittees role in implementation. SCVURPPP-171: Regulating this category with the large number of specific requirements is based on one noted fish kill during the permit term. We recognize the water quality impact from this discharge, but the current permit regulations allowed Water Board staff and the Berkeley Fire Department to adequately address the specific incident and implement corrective actions. Since MRP 2 did not cite any issues we may assume that this significant level of regulation is to address one incident from firefighting discharges in at least 10 years. Revise the Fact Sheet to reflect no incidents of water quality impacts from individual fires were identified in the previous MRP.		
ACCWP-78 SCVURPPP-150,172 SMCWPPP-287,307	C.15.b.iii Fact Sheet	There are statements in the Fact Sheet that demonstrate a lack of understanding of fire departments, emergency fire response, and post-fire clean-up. Without this basic understanding it is premature to include these new requirements. For example, the Fact Sheet states: “The Permittees estimate	We have clarified the Fact Sheet language to focus on contractors responding to fires, for example to complete containment or cleanup: “The Permittees estimate that a portion of fires are ~~fought~~ responded to (for containment and clean up) not with municipal resources, but by private ~~firefighting~~	Clarified the language in the Fact Sheet as indicated.

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		that a portion of fires are fought not with municipal resources, but by private firefighting crews." This is not accurate. There are no "private" firefighting crews we are aware of in the Bay Area. SCVURPPP-172: This lack of understanding supports the request to replace the specific implementation requirements with the single requirement to hold regional collective workgroup meetings. RWB staff attending these meetings could also gain a better understanding of emergency firefighting operations and cleanup activities before writing specific regulations for this category.	~~crews~~contractors. Provision C.15.b.iii.(2) additionally requires the Permittees to collectively (e.g., through the Working Group): 1) develop (and revise on an ongoing basis, as-needed) outreach materials regarding BMPs and SOPs for the containment and cleanup of discharges of firefighting water and foam, for private contractors hired by either Permittees or by private parties to conduct ~~firefighting,~~ containment and cleanup within Permittees' jurisdictions, because a significant portion of fires on private properties are responded to (for containment and cleanup) by private contractors hired by the owners of those private properties." This is reflected in C.15.b.iii.(2)(a)(v): "…contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam." That said, as noted in the Fact Sheet, it is our understanding that there are some private firefighting crews in the Bay Area, such as at large industrial sites like the Chevron refinery in Richmond. The Working Group is encouraged to discuss coordination with these private firefighting crews, as needed (for example, if it is likely that emergency discharges from such sites have	

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			the potential enter Permittees' MS4s). Water Board staff established a workgroup to consider this provision and met with Permittee representatives (including firefighting personnel) as part of the workgroup and separately during the reissuance process. C.15.b.iii in the Administrative Draft was in large part a product of this collaboration. The changes to C.15.b.iii in the Tentative Order are a product of further collaboration. C.15.b.iii.(2) calls for convening the kind of regional collective workgroup that the comment suggests (likely, this would be a continuation of the workgroup that was initiated during the reissuance process). <u>Please see the response to the following combined comment, above:</u> ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	
ACCWP-77,78,81,82 CFCA-2 CCCEFC-2 CCCWP-	C.15.b.iii, C.15.b.iii.(4)(a)(v)	1) C.15.b.iii requires Permittees to influence and oversee emergency firefighting activities, which is outside of Permittees' jurisdiction and may interfere with the ability of	See Master Response Identifier C.15-9.	

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87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,307		firefighters to combat emergencies. C.15.b.iii would have municipal stormwater staff directing fire departments on the types of firefighting foams to use, types of fires on which to use foam, amount of foam to use, and locations not to use foams. Stormwater Programs should not be responsible for dictating what tools are used to fight fires and do not have jurisdiction over many fire agencies. Local stormwater programs should not be making decisions that have life and safety consequences - these decisions should only be made by properly trained and knowledgeable fire departments. Permittees should not be held responsible for the conduct of fire fighters who are focused on putting out fires, rather than implementing BMPs. 2) There are also significant new reporting and training requirements that will be difficult for Co-permittees to impose on fire departments. 3) Permittees don't have jurisdiction over fire agencies that		

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		are special districts, and therefore Permittees do not have the authority to require fire agencies to implement BMPs. For example, the Menlo Park Fire District services Menlo Park, East Palo Alto, Atherton, and portions of Unincorporated San Mateo County - the Cities served by that district do not have direct oversight. Fire agencies are their own special districts in all but three Contra Costa County cities and should therefore be regulated separately and not in MRP 3. Permittees would have little to no legal authority to require these special fire protection districts to implement the required practices identified in the Tentative Order. Permittees overseeing and regulating fire agencies is problematic and poses legal questions regarding the authority Permittees and/or the Water Board would have in regulating fire agencies. This unresolved legal question has the potential to derail efforts to collaborate on achievable solutions as we argue over		

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		authority and jurisdiction. It also sets Permittees up for failure as they have no way to enforce provisions of MRP 3, which they have no legal authority to implement.		
SMCWPPP-286 SCVURPPP-151	C.15.b.iii.(1)	This is repetitive of subprovision title. Delete and reformat numbering.	C.15.b.iii.(1) is not repetitive of the subprovision title. It defines Emergency Discharges.	None.
ACCWP-78	C.15.b.iii.(2)	Due to the lack of jurisdiction that Permittees have over state agencies and special districts, the Water Board should be responsible for convening the Working Group. Permittees commit to participating in and supporting the Working Group.	It is the Permittees' responsibility to convene the Working Group and implement Provision C.15.b.iii.(2); Water Board staff will participate and assist. Regarding special districts, please see the response above to ACCWP-78.	None.

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ACCWP-79,80 SCVURPPP-152,153 SMCWPPP-288,289	C.15.b.iii.(2)(a)(ii)-(iii)	1) These tasks should not be included under Regional Coordination. Permittees should not collectively review individual agency SOPs/BMP/maps/etc. The Work Group should be a place to share ideas, experiences, and information. The information from the Work Group would be brought back to countywide and/or local agencies and used, as appropriate and applicable. 2) Cleanup BMPs/SOPs should only be for fires that occur in municipal/public property or right of way. Fires that occur on private property are the responsibility of the property owner for cleanup. 3) Provide flexibility to implement at the individual Permittee, countywide or regional level. 4) Municipal fire department representatives do not believe these specific requirements are needed or appropriate. Recommend replacing the specific requirements with language that would encourage participation in a stakeholder group that would	1) The comment misinterprets the referenced Provision. The language in the Administrative Draft called for this work at the individual municipal level, and in response to the Permittees' comments on the Administrative Draft, we removed the individual requirement and made it a collective regional task for the Firefighting Discharges Working Group in the Tentative Order. In the Tentative Order, the Provision does not require the Firefighting Discharges Working Group to necessarily review all or any particular SOP/BMP/map; the Firefighting Discharges Working Group might, for example, review a representative sample of SOPs/BMPs/maps. We revised the Provision and associated Fact Sheet language to clarify the intent. 2) See Master Response Identifier C.15-10. 3) We disagree with this request. In the original Tentative Order, C.15.b.iii was structured such that it would be implemented primarily by individual Permittees, and then based on feedback from the Permittees, the Provision in the current (revised) Tentative Order sets regional requirements to be implemented by the Permittees collectively. Given the structure of the C.15.b.iii and the tasks assigned to the Working Group, it	Clarified in C.15.b.iii.(2)(a)(ii) that the Working Group may review a representative sample(s) of (rather than each and every) SOPs/BMPs/resources.

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		discuss options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges.	would not be appropriate to allow Permittees to implement those tasks individually. However, in a future Permit term, the Water Board may consider revising C.15.b.iii such that Permittees may implement it either at the individual, county, or regional scale. 4) Please see the response to part 3c) of the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	
ACCWP-81 SCVURPPP-154,164 SMCWPPP-290,300	C.15.b.iii.(2)(a)(iv) & C.15.b.iii.(4)(a)(iv)	Permittees have limited ability to identify environmentally harmful foams and influence firefighting. Local stormwater programs should not be responsible for dictating what tools are used to fight fires and as previously noted do not have jurisdiction over many fire agencies. These activities are better suited to be conducted at a state or national level and not have decisions made at a local level. For example, recent State legislation regarding the use of PFAS in firefighting foam. Remove	This comment misinterprets the cited Provision. Though Permittees may individually have limited ability to identify environmentally harmful foams, C.15.b.iii.(2)(a)(vi) specifically calls for information sharing with agencies and organizations which may aid in this effort. Furthermore,C.15.b.iii.(2)(a)(vi) prompts the Permittees to invite representatives from those agencies and organizations to participate in the Firefighting Discharges Working Group, to aid in this and other listed tasks.	None.

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		this specific requirement but identify it as a topic for discussion at the Work Group.	Please see the response to the following combined comment, above: ACCWP-77,78,81,82 CFCA-2 CCCEFC-2 CCCWP-87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,307 Please also see the response to ACCWP-78, above.	
SCVURPPP-155 SMCWPPP-291	C.15.b.iii.(2)(a)(v)	1) This task should not be included under Regional Coordination. Permittees should have an option to develop their own outreach materials individually, countywide, or regionally. Delete or revise to provide flexibility to implement at the regional, countywide or individual Permittee level: "Develop outreach materials on cleanup BMPs and SOPs for contractors hired by private parties to participate in the cleanup of discharges of firefighting water and foam associated with firefighting activities. Outreach materials may be developed on a Permittee,	1) Please see the response to the following combined comment, above: ACCWP-79,80 SCVURPPP-152,153 SMCWPPP-288,2892) Refer to the response to the following combined comment, below: SCVURPPP-156 SMCWPPP-292 2) The Permit identifies an approach, which is for this issue to be considered in the Working Group. In addition, the stormwater programs regularly collaborate on projects of regional scale, such as preparation of	None.

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		Countywide or Regional basis. Report on outreach development and distribution in 2024 Annual Report." 2) There is currently no mechanism for regional outreach to be developed. 3) The deadline should be for the development of outreach materials and not specifically distribution by a certain date. Outreach materials may be posted on websites to reach target audiences but would not be defined as distributing. In addition, having a specific due date for distribution implies a single action, i.e. mailout. This type of outreach material is more likely to be distributed on an as-needed, on-going basis, potentially by illicit discharge inspectors. 4) Requirements for outreach do not need to explicitly state that if outreach materials are identified as needing to be revised or updated they shall be and then redistributed. This is unnecessary. It benefits Permittees to have current outreach materials. In	outreach materials, and that approach could be implemented here. 3) It does not follow logically why the outreach materials should not be distributed by a specific date, other than to give Permittees more time for the task, and to make the task less regulatorily binding. Regarding the outreach materials being distributed on an as-needed, on-going basis, the Permittees may do that, as well. But the primary task outlined in C.15.b.iii.(2)(a)(v) is to distribute outreach materials to contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities within their jurisdictions. It should be straightforward for Permittees to identify these contractors, given that municipalities require businesses operating with their jurisdictions to apply for and receive business licenses. In addition to physically distributing these outreach materials, Permittees are encouraged to distribute the outreach materials electronically, including by posting them to their websites. 4) Comment noted. The flexible expectation set in the Permit, that outreach materials be appropriately updated as information	

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		every area of implementation, if outreach material is identified as out of date there is an effort to update as needed.	changes, is consistent with the approach noted by the commenters.	
SCVURPPP-156 SMCWPPP-292	C.15.b.iii.(2)(b)	There is currently no mechanism to have all Permittees work collectively to submit a single report. This subprovision should be rewritten to provide an option for Permittees to work individually, countywide or regionwide. In addition, the report should focus on Permittees reporting participation in the Work Group since this should be a time for learning, sharing information, etc. Revise to report on participation in stakeholder groups individually, countywide or regionwide.	We disagree - this is a regional Firefighting Discharges Working Group with regional representation. As such, it is appropriate for the reporting to be done collectively. That is also more efficient than expecting Permittees to complete and report the same or very similar work individually. Though BASMAA has been replaced by the Bay Area Municipal Stormwater Collaborative (BAMSC), the Permittees can work together on this reporting via the TAG, BAMSC, or other means. We do not understand the request to revise the Provision so that reporting focuses on "Permittee participation" in the Firefighting Discharges Working Group. C.15.b.iii.(2)(a) details requirements for the Firefighting Discharges Working Group, and C.15.b.iii.(2)(b) requires reporting on progress on the implementation of C.15.b.iii.(2)(a) as well as recommendations based on that progress. Permittee participation is implicit, but the provision provides flexibility regarding the exact nature	None.

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			of the participation (e.g., it may be appropriate and more efficient to have a selection of key Permittee representatives participate, rather than each Permittee—similar to other coordinated efforts under the Permit). This reporting may influence changes to the MRP in a future Permit term. Reporting only on Permittee participation in the Working Group will not satisfactorily assess Permittees' compliance with this Provision, because it will not ensure the production of information (e.g., BMPs and SOPs) sufficient to guide water quality protection. We agree that the Working Group will help provide an opportunity to share information.	
SCVURPPP-157 SMCWPPP-293	C.15.b.iii.(3)(a)	1) All Permittees may not be able to implement all recommendations in a regional or Countywide report. This requirement is too restrictive. In addition, it may not be possible to begin implementation of recommendations upon submittal of a report. 2) It is counterproductive to begin implementation of Preliminary Report recommendations to only then, two years later, implement different requirements in the Final Report. Delete requirement.	1) The cited requirement is appropriately flexible. The required Report is a regional submittal, not a county or individual Permittee submittal. We expect that part of the work to be completed by the Working Group will be to identify doable actions with consideration of how they may be implemented across the range of potential situations likely to be encountered, and also how implementation may improve over time as practices are put into place. The comment does not justify why this is too restrictive. The Permittees will write the report themselves. We expect part of that work will be to consider how to frame expected and/or	1) None. 2) Refer to the proposed revision in part 1) of the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1

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			required actions, including with respect to practicability. We disagree that is necessary to defer implementation of the Report's recommendations until some time after the Report has been completed and submitted. There will be plenty of time during their development of the report for the Permittees to ready themselves for implementation, and it is likely that the Report will reflect, in part, BMPs and SOPs that Permittees are already implementing. 2) Please refer to part 1) of the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287
SCVURPPP-158 SMCWPPP-294	C.15.b.iii.(3)(b)	It should be specified this applies to containment and cleanup activities that do not interfere with immediate emergency response operations or impact public health and safety and for cleanup in Permittee right-of-way.	The provision appropriately reflects, at various locations, the stated hierarchy of emergency response operations (i.e., life/public health, property, and the environment) (e.g., C.15.b.iii.2.(a)(iv), C.15.b.iii.4.(a) and (d)). We additionally expect that this issue will be considered by the Working Group to be convened under	None.

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		Revise: "Permittees shall ensure proper BMPs and SOPs are included in contracts for nonmunicipal (contracted) staff hired by Permittees to assist with cleanup activities, that do not interfere with immediate emergency response operations or impact public health and safety, in the public right-of-way or on municipal owned property."	this provision and included, as appropriate, in the BMPs and SOPs developed by the group. As a result, there is a not a need to include an additional statement of the hierarchy.	
SCVURPPP-14c,159 SMCWPPP-36,295 ACCWP-78 Solano-11	C.15.b.iii.(3)(c)	1) It is unclear what oversight authority Permittees have over certain fire agencies (e.g., CalFire) when those agencies respond to emergencies within Permittees' jurisdictions. 2) Stormwater program staff within a Permittee should not take on a role of determining the fire response preparedness of industrial facilities that they inspect. Stormwater Programs should not be reviewing or requiring actions related to firefighting. Fire departments already work with large industrial sites through the HMBP program. This should be covered instead within individual Industrial General Permits (or other individual	1) We recognize that Permittees have been challenged to communicate and coordinate with external agencies such as CalFire. As noted in the response to ACCWP-78, we have clarified that this is an expected topic of discussion for the Working Group, with the idea that, over time, improved communication and coordination will reduce potential non-stormwater discharges and their associated impacts to water quality. 2) As explained above (see the response to the following combined comment: ACCWP-77,78,81,82 CFCA-2 CCCEFC-2 CCCWP-87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,	None.

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		permits) and is not the responsibility of municipal stormwater programs.	307), an individual stormwater program is not a Permittee, rather, the municipality of which the stormwater program is a part, is the Permittee. Therefore, we disagree with the comment's premise that C.15.b.iii would task stormwater programs with regulating fire departments and the like – both are a part of the permitted entity, and it is up to the collective Permittee to comply. Regarding discharges from large industrial sites, Permittees are legally responsible for all discharges to and from their MS4s, regardless of where those discharges originate, and regardless of whether those discharges originate from areas that are covered under separate NPDES permits. Under the Permit, Permittees may self-determine how they coordinate internally to address the Permit's requirements. For example, many Permittees have or contract with inspectors with the requisite expertise, even if those inspectors are not under the Permittees' stormwater program. That said, Permittees already review industrial facilities to ensure they're appropriately meeting clean water expectations and operating in a clean way, and we would expect that Permittee inspectors would determine as part of their reviews whether particular fire-specific	

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			consideration is warranted (informed by the outcomes of the Working Group). This is something that could be further developed by the Working Group.	
SCVURPPP-159 SMCWPPP-295	C.15.b.iii.(3)(c)	Is there any demonstration that this is an issue? What is the definition of a “large” industrial site? Just because an IGP facility is large it doesn't mean it has any elevated fire danger or issues. The gas/chemical facilities identified generally have other regulatory programs (e.g., Spill Prevention, Control, and Countermeasure (SPCC) Plan, etc.) and Hazardous Materials Business Plan program that address emergency response plans. Stormwater programs should not be reviewing or requiring actions related to firefighting (i.e., actions for stormwater protection may be counter to firefighting measures). Fire departments already work with these facilities through the HMBP program. Delete this section.	Please see the response to the following combined comment, above: SCVURPPP-14c,159 SMCWPPP-36,295 ACCWP-78 Solano-11	

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		Stormwater municipal staff should not take on a role of determining fire response preparedness. Regulation of these sites should be done through the IGP or individual stormwater permits. Delete requirement.		
SCVURPPP-160 SMCWPPP-296	C.15.b.iii.(3)(d)	1) This training requirement is too restrictive because it states all municipal staff and contracted staff must receive training. Municipalities do not have control over specific personnel sent to job sites from contracted companies. This issue of contracted staff is address by the requirement to include BMPs/SOPs in contracts. 2) Urban fire cleanup is not expected to be a potential source. Foam and/or water from firefighting activities has already been discharged. The cleanup is removal of debris and vacuuming/ cleaning storm drain systems.	1) Municipalities can require contracted staff to participate in the training, as a condition in the contract. It's not enough to just include BMPs/SOPs in the contracts. The training is critical because it will teach them how to implement those BMPs/SOPs in a satisfactory manner, and may also provide background justifying the BMPs/SOPs. This is a reasonable task, and it is required only once during the Permit term. The task is also flexible, in that it could be completed as a standalone training or combined with training taking place for other purposes, in part as noted by the commenters. 2) Cleanup of urban fires is a potential and actual source of pollutants to the MS4 and	Revised as indicated.

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		Procedures are no different than any other illicit discharge cleanup (e.g., don't wash down, block storm drains for cleanup as needed). Therefore, training of municipal staff is duplicative of C.2 requirements. 3) Having a due date for all municipal staff trained may lead to Permittees being out of compliance for situations out of their control. Typically, training is required under implementation and training progress is reported in Annual Reports. By having a requirement that all municipal staff are trained by a date essentially requires training occurs on that due date. Otherwise staff hired after training for the year occurs could be out of compliance. Or staff scheduled for training may be called into the field for an emergency and would then need to reschedule training before the due date. While we are requesting this training requirement be deleted, at the very least, it needs to be reworded to remove the date in the implementation section, remove the word "all" and have	receiving waters. Please see the response to the following combined comment, above: CCCWP-88 SCVURPPP-14b SMCWPPP-35 Please also see the response to the following combined comment, above: CCCWP-87 Oakland-44 SCVURPPP-171 Containment and cleanup BMPs may be similar to other illicit discharge BMPs, but the scenario (a firefighting emergency) is distinct from the types of trainings required by C.2.h, as well that C.2.h only applies to municipal staff. Of course, these trainings may be combined for convenience, provided both Provisions are satisfied (e.g., C.15.b.iii.(3)(d) additionally requires training of contracted staff). 3) We do not agree that the training should not be required for all municipal and contracted staff, by a specified date. To account for the identified situations, we have delayed the specified date by which training must be completed to June 30, 2027. This will also allow 21 months after completion of	

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		Permittees report on training progress in Annual Reports (i.e. number of municipal staff trained). 4) Delete training requirement.	the Firefighting Discharges Report, rather than 9 months. We have delayed the reporting date on training to the 2027 Annual Report from the 2026 Annual Report. 4) We disagree, for the reasons stated above. The training requirement is reasonable and appropriate.	
Solano-12	C.15.b.iii.(3)(e)	This is an unnecessary reporting requirement, because prior to and including 2026, the activities will be reported under C.15.b.iii.(2)(b).	This comment misinterprets the cited provision. The information that will be reported pursuant to C.15.b.iii.(3)(e) is distinct from the information that will be reported pursuant to C.15.b.iii.(2)(b). Specifically, (2)(b) addresses submittal of a Firefighting Discharges Report, and (3)(e) addresses reporting on implementation practices and training.	None.
SCVURPPP-161 SMCWPPP-297	C.15.b.iii.(3)(e)(i)	1) Increase in reporting requirements. Overall, reporting requirements have increased, although Water Board staff and permittees had agreed on a goal to reduce reporting throughout the permit. 2) Limit reporting requirement to reporting on progress of including proper BMPs and SOPs in contracts for non-municipal (contracted) staff hired by Permittees to assist with cleanup activities, that do not interfere with	1) Comment noted. The reporting requirements are reasonable and necessary to ensure and track implementation. However, we have reduced the overall reporting burden by consolidating the Preliminary and Final Reports into a single Firefighting Discharges Report. Please see the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46	1) See the proposed revision for the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-

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		immediate emergency response operations or impact public health and safety, in the public right-of-way or on municipal owned property.	SCVURPPP-14d SMCWPPP-287 Regarding the specific reporting requirements in C.15.b.iii.(3)(e)(i), the reporting on C.15.b.iii.(3)(a) will not begin until the submittal of the Firefighting Discharges Report on September 30, 2025, so there will only be two years of reporting on that subprovision. The reporting on C.15.b.iii.(3)(b)-(c) will also be a light lift prior to the submittal of the Firefighting Discharges Report, as Permittees are expected to begin implementation of those two subprovisions prior to the submittal of the Firefighting Discharges Report, but the BMPs and SOPs will likely not yet be finalized. However, C.15.b.iii.(3)(e)(i) allows flexibility with respect to the content and the associated level of detail of the reporting; the Permittees may self-determine that it is appropriate to simply include a brief narrative summary for each component (e.g., a few sentences each), and update those summaries as needed in subsequent Annual Reports. 2) Since the Permittees will have a significant role in determining the training elements, and since C.15.b.iii explains that containment and cleanup BMPs/SOPs should only be implemented to the extent that they do not interfere with efforts to protect public health	14d SMCWPPP-287 2) None.

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			and safety, it is not necessary to repeat that as well in the language in C.15.b.iii.(3)(e)(i).	
SCVURPPP-162 SMCWPPP-298	C.15.b.iii.(3)(e)(ii)	Increase in reporting requirements. Overall, reporting requirements have increased, although WB staff and permittees had agreed on a goal to reduce reporting throughout the permit. Delete reporting requirement.	We do not agree that this reporting requirement should be removed altogether. It requires reporting once during the Permit term, and it is critical because it will confirm and describe Permittees' compliance with C.15.b.iii.(3)(d). See also response to SCVURPPP-161 and SMCWPPP-297.	None.

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CFCA-3 CCCEFC-3 CCCWP-89 Oakland-45,46 San Jose-8 SCVURPPP-150,159,163,164,167,168 SMCWPPP-285,295,299,300,303,304	C.15.b.iii.(4)	1) Over-regulation of firefighting activities during emergency situations. There is no way to detain and collect firefighting runoff (and dispose of the runoff according to jurisdictional requirements), to determine the impact of every foam application to every receiving water, or to remove chloramine from runoff. Including provisions in the MRP 3 that cannot and will not succeed sets up permittees for failure and reduces the opportunities for real environmental quality improvements. These prescriptive BMPs should be removed, and fire agencies should continue implementing current voluntary water quality protection BMPs until September 30, 2024, when C.15.b.iii.(2) requires new BMPs developed by a regionwide Firefighting Discharges Working Group (Working Group), to go into effect. CCCWP-89: The stormwater permit sets containment and treatment of discharges as a potential requirement. Local fire agencies have informed us that the	1) See Master Response Identifier C.15-11. As explained above (see the response to the following combined comment: CCCWP-87 Oakland-44 SCVURPPP-171), chloraminated discharges have significant adverse impacts on aquatic life, so this is an important issue for the Working Group to consider. 2) San Jose-8: C.15.b.iii.(4) is largely unchanged from MRP 2; a few additional recommended BMPs have been added to the list, though they have actually been moved to the Fact Sheet, whereas they were in the Provision in MRP 2. Therefore, it does not follow that C.15.b.iii.(4) will cause the dramatic negative impact suggested by the comment. As explained above (see responses to part 2) and 5) of San Jose-44, and to the following combined comment: CFCA-3 CCCEFC-3 CCCWP-89 Oakland-45,46 San Jose-8 SCVURPPP-150,159,163,164,167,168 SMCWPPP-285,295,299,300,303,304), and as the Tentative Order reinforces, BMPs should only be implemented to the extent that they do not cause the negative impacts suggested by the comment.	None.

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		amount of water used to fight fires is significant (150-5,000 gallons of water per minute entering the landscape). Blocking storm drains, collecting firefighting runoff and treating runoff is cost prohibitive, infeasible to store and treat due to the large quantities, and could result in life and safety hazards and property damage due to localized flooding. Oakland-45: Plugging storm drains for temporary storage to allow dechlorination prior to discharging emergency firefighting water to storm drains, provided that immediate emergency response operations and/or public health and safety are not impacted, will cause discharge flows to flood streets and could flood adjacent properties and flow into downstream inlets. This is because a typical fire will have multiple lines flowing at 150-1,000 gallons per minute for a range of 10 minutes to hours. These flow rates produce tens of thousands of gallons of water within a few minutes. Trying to contain this water would interfere with emergency response	3) SCVURPPP-159 & SMCWPPP-295: Please see the response to the following combined comment, above: CFCA-3 CCCEFC-3 CCCWP-89 Oakland-45,46 San Jose-8 SCVURPPP-150,159,163,164,167,168 SMCWPPP-285,295,299,300,303,304 4) SCVURPPP-163 & SMCWPPP-299: We disagree. Please see the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-2875) SCVURPPP-167,168 & SMCWPPP-303,304: We do not agree that all recommended BMPs should be removed. BMPs should only be implemented to the extent that they do not impede fire personnel's ability to protect life and property. Please see the response to the following combined comment, above: ACCWP-77,78,81,82 CFCA-2	

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		operations and would strain task-saturated firefighting personnel. Delete this requirement to prevent this unintended consequence. 2) San Jose-8: The Tentative Order's immediate requirement that permittees require firefighting personnel to implement BMPs and SOPs for emergency discharges disregards the feasibility of implementation and potential consequences to emergency response. Implementing the BMPs may not be feasible given staffing for the fire department and will be costly for already strapped city budgets to hire contractors that would be needed for emergency response efforts. Additionally, keeping resources on-scene of an extinguished fire to plug and dyke water/foam runoff for prolonged periods of time will take first responders out of the system, thus increasing emergency response times and impacting service delivery. 3) SCVURPPP-159 & SMCWPPP-295: Actions for stormwater protection may be counter to	CCCEFC-2 CCCWP-87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,307. The requirements in C.15.b.iiido not apply only to municipal stormwater program staff; the entire municipality and all of its departments are the Permittee (see the response to the following combined comment, above: ACCWP-77,78,81,82 CFCA-2 CCCEFC-2 CCCWP-87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,307), and one of the tasks assigned to the Working Group is to identify opportunities to improve coordination within municipalities (as well as between municipalities and other entities, as appropriate).	

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		firefighting measures. 4) SCVURPPP-163 & SMCWPPP-299: Municipal fire department representatives do not believe these specific requirements are needed or appropriate. Recommend replacing the specific requirements with language that would encourage participation in a stakeholder group that would discuss options for Fire Departments and/or Permittees to address water quality concerns related to firefighting discharges. 5) SCVURPPP-167,168 & SMCWPPP-303,304: C.15.b.iii.(4)(vi) & C.15.b.iii.(4)(viii) should be removed. These should not be stormwater BMPs. How much firefighting foam is used, and which fires are treated with firefighting foam should only be determined by fire department staff, based on their knowledge of the type of fire only and not water quality impacts.		

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San Jose-45	C.15.b.iii.(4)(a)(iii)	This is an onerous process for the City. Jurisdictional requirements for disposal will have to be developed for proper disposal of water and foam. This provision exceeds the current resource capacity of the City and will be a high financial burden if the fire department or any City department is required to dispose of water/foam run-off from every vehicle fire/fire in the City. There is also the extra burden to consider regarding billing and cost-recovery. This would result in an extra billing cost for owners/insurance carriers for privately owned property or vehicles. The City will have to absorb the cost when the fire involves uninsured property or unhoused property negatively impacting the City budget. Remove this requirement and replace with a requirement to participate in a stakeholder group that would discuss options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges.	The referenced recommended BMP is not new to the Tentative Order – it was in MRP 2. It is unclear why its retention in the Tentative Order would create new problems in MRP 3, when its inclusion in MRP 2 did not cause those problems. Regardless, these BMPs are recommended, not required. And in the revised Tentative Order, we have moved them into the Fact Sheet and revised the Provision to reference them in the Fact Sheet. The expectation set by C.15.b.iii is that the Working Group will consider the recommended BMPs, make its own recommendations in the Firefighting Discharges Report about which BMPs (and SOPs) are appropriate in which situations, then the Permittees will begin implementing those recommendations upon submittal of the Firefighting Discharges Report. Please refer to the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	Please refer to the proposed revisions for the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287

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			The Water Board disagrees that this provision will exceed the resource capacity of the City or other Permittees. As noted above, fire departments are not required under C.15 to dispose of water or foam runoff from "every vehicle fire" or every fire. Rather, the Permittees are instructed to develop BMPs that can be implemented to reduce firefighting discharges without impeding the firefighting itself. The Water Board is aware that the Permittees may not be able to prevent discharges from every fire. In addition, BMP implementation may not necessarily impose additional costs. BMPs like using less foam may lead to cost savings.	
ACCWP-77 Oakland-47	C.15.b.iii.(5)	1) Greatly increases reporting and administrative requirements. The tracking and reporting requirements in this provision are excessive, 2) contain errors, and 3a) some are infeasible such as the requirement to track and report the quantity and rate of water and foam concentrate discharged to storm drains/ waterways and 3b) the point of discharge. 4) Reporting requirements should instead be developed by the Working Group.	1) Please see the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 2) The comment says that the tracking and reporting requirements contain errors, but does not give any examples of errors. We are not aware of any.	Please see the revision proposed for the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-

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			3a) We disagree that it is infeasible to track and report the quantity of water and foam concentrate discharged to storm drains/waterways and the point of discharge. We have received such reporting for numerous discharges of a similar nature.Where precise volumes cannot be measured, reasonable and reliable estimates may nonetheless be possible. We disagree that reporting on the point of discharge is infeasible. –In fact,a primary responsibility of the Permittees is to be able to track non-stormwater into and from their MS4s, and the Permittees have claimed that they have sufficient knowledge of their MS4 systems to facilitate this type of tracking. Please see the response to the following combined comment, above, regarding C.5.f which tasks the Permittees with assessing whether their MS4 maps need to be updated: CFCA-3 CCCEFC-3 CCCWP-89 Oakland-45,46 San Jose-8 SCVURPPP-150,159,163,164,167,168 SMCWPPP-285,295,299,300,303,304	14d SMCWPPP-287 Please also see the proposed revision for the following combined comment, above: CFCA-3 CCCEFC-3 CCCWP-89 Oakland-45,46 San Jose-8 SCVURPPP-150,159,163,164,167,168 SMCWPPP-285,295,299,300,303,304 Please also see the proposed revision for the following combined comment, above:

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			However, as we intend to engage in conversation with Permittees and other relevant parties about what reporting is feasible, the specific reporting requirements have been removed from the Tentative Order, and deferred to the Firefighting Discharges Report that will be developed by the Working Group. Please see the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 Please also see the response to the following combined comment, above: CCCWP-88 SCVURPPP-14b SMCWPPP-35 4) We agree and have made this change.	CCCWP-88 SCVURPPP-14b SMCWPPP-35
Solano-13	C.15.b.iii.(5)(a)	Edit to read: Beginning in 2026, whenever 5 gallons or more of firefighting foam concentrate – or the reportable quantity … Reasoning: By 2026 we would anticipate the BMPs, SOPs, and	Specific reporting requirements have been removed and deferred to the Working Group. Please refer to the response to the following combined comment, above:	See the revision proposed for the following combined comment:

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		trainings will be in place and emergency response networks familiar with appropriate response protocol. Prior to that, we would be trying to measure and manage an issue without all the appropriate information and collaboration in-place.	ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287
SCVURPPP-169 SMCWPPP-305	C.15.b.iii.(5)(a)	1) This is a significant effort of data collection for an emergency response situation. 2) In addition, if discharge is reported to State Warning Center (i.e., Cal OES) these reports are provided to the Water Board. Therefore, this is duplicative reporting requirements. 3) Given the jurisdictional issues previously discussed, it is unclear how Permittees would require fire departments to submit this information for their Annual Reporting requirements. 4a) Municipal fire department representatives do not believe these specific requirements are needed or appropriate.	1) We disagree. However, we have removed the specific reporting requirements. Please refer to the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 2) For this Permit term, we will leave this up to the consideration of the Working Group. Please refer to the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46	1) Refer to the proposed revision for the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 2) Refer to the proposed revision for the following combined

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		4b) Recommend replacing the specific requirements with language that would encourage participation in a stakeholder group that would discuss options for fire departments and/or Permittees to address water quality concerns related to firefighting discharges.	SCVURPPP-14d SMCWPPP-287 3) Regarding the comment that stormwater program staff cannot dictate requirements to fire departments within the same municipality, please refer to the response to the following combined comment, above: ACCWP-77,78,81,82 CFCA-2 CCCEFC-2 CCCWP-87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,287,290,295,301,302,303,304,307 Regarding the comment about jurisdictional issues, please refer to the response to the following comment, above: ACCWP-78. 4a) We have removed all specific reporting requirements. Please refer to the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46	comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 3) Refer to the proposed revision for the following combined comment, above: ACCWP-77,78,81,82 CFCA-2 CCCEFC-2 CCCWP-87,90 SCVURPPP-14b,14c,150,154,159,165,166,167,168,172 SMCWPPP-35,36,37,285,28

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			SCVURPPP-14d SMCWPPP-287 4b) Please refer to the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287	7,290,295,301,302,303,304,307 Please also refer to the proposed revision for ACCWP-78. 4a) Please refer to the proposed revision for the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 4b) Please refer to the proposed revision for the following combined

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				comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287
SCVURPPP-170 SMCWPPP-306	C.15.b.iii.(5)(b)	1) This reporting is duplicative of the reporting to the State Fire Marshal under SB 1044. This requirement should be removed from the MRP and Water Board staff can obtain the required information from the State Fire Marshal. At a minimum the reporting requirements should match the SB 1044 reporting requirements to reduce the administrative burden of collecting slightly different information for two regulatory agencies. 2) In addition, this section should specify "use of foam by municipal Fire Department." 3) Delete reporting requirement.	1) For this Permit term, we will leave this to the consideration of the Working Group. Please refer to the response to the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287 2) We disagree with the requested specificity, because Permittees are responsible for all non-stormwater that enters and discharges from their MS4s. However, this reporting requirement has been removed – see part 1) of this response, above.	Please refer to the proposed revision for the following combined comment, above: ACCWP-77,79,80 CFCA-1 CCCEFC-1 CCCWP-90 Oakland-46 SCVURPPP-14d SMCWPPP-287

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			3) See part 1) of this response, above.	

Response to Comments on September 10, 2021, Tentative Order
Provision C.16. – Discharges to Areas of Special Biological Significance

Comment No.	Provision	Comment	Response	Proposed Revision

No comments were received on Provision C.16.

Response to Comments on September 10, 2021, Tentative Order
Provision C.17. – Discharges Associated with Unsheltered Homeless Populations

Comment No.	Provision	Comment	Response	Proposed Revision
CCCWP-91	C.17	The Tentative Order would place responsibilities on stormwater programs that are rightfully placed on social services and mental and public health professionals. Permittees do not have the expertise to address homeless populations on their property. Some of the provisions require Permittees to perform activities that would dehumanize homeless residents, and even criminalize the sad fact that they have no home. Permittees should not be placed in the difficult position of choosing permit compliance over the legal and societal constraints associated with addressing the needs of their homeless populations. The provision should be written about the discharge[s], not about homeless populations.	We disagree. C.17 would require Permittees to take actions to protect water quality that are flexible, appropriately consider the challenging nature of unsheltered homelessness and the range of actors involved, and appropriately expect and encourage the Permittees to coordinate internally and amongst themselves. Non-stormwater discharges associated with unsheltered homelessness, including human waste and trash, are a significant water quality concern because they adversely impact water quality and public health. While C.17 is intended to ensure that Permittees implement appropriate control measures for such discharges, it is not meant to criminalize homelessness or to spur Permittees to conduct sweeps, for instance, in the name of water quality. Instead, C.17 would provide flexibility to the Permittees to consider the challenging nature of unsheltered homelessness when taking actions to protect water quality and to coordinate internally and with one another in developing and implementing BMPs or programmatic solutions. For instance, C.17.a.i.2.c encourages Permittees to evaluate whether long-term, non-water quality driven measures, such as the provision of housing and supportive	None.

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			services, correlate to reduced non-stormwater discharges associated with unsheltered homelessness over time. Similarly, C.17.a.i.2.a and (b) require Permittees to coordinate and evaluate water quality controls and strategies that are already in place and working within the region, building on the substantial work already being completed by permittees such as Oakland, East Palo Alto, Fremont, and San Jose, and by associated NGOs and public health agencies. Implementation focuses on understanding the scope of the discharges, and developing, sharing, and implementing best management practices to address them. C.17 also reflects the reality that effectively addressing these discharges involves coordination with unsheltered homeless populations, service providers, and others who are involved. For example, in the absence of coordination with unsheltered homeless populations, efforts to collect trash or provide sanitary services may be significantly less effective. In the absence of C.17's more-flexible language, and its emphasis on coordination and long-term solutions, Permittees would be subject to enforcement for violation of the MRP's prohibition on non-stormwater	

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			discharges. The Fact Sheet recognizes that such enforcement could have the unintended consequence of diverting limited resources currently being used to assist unsheltered homeless populations or encouraging temporary actions that could simply shift the location of non-stormwater discharges. Thus, C.17 is designed to avoid putting Permittees in the "difficult position of choosing permit compliance over the legal and societal constraints associated with addressing the needs of their homeless populations." The commenter's distinction between "stormwater programs" and, implicitly, the municipalities that are the Permittees is concerning. The Permittees are responsible for discharges to and through their MS4s. Many have established stormwater programs within their municipality, which programs have significant, although usually not sole, responsibility for Permit implementation. C.17 supports both internal and external coordination of the type that the Permittees regularly have engaged in since the start of the NPDES stormwater program thirty years ago as a part of addressing discharges to their MS4s. As examples, Permittee stormwater programs regularly coordinate with public works on capital improvement projects, with their planning departments on new and redevelopment projects, and with	

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			external entities, like industry groups or businesses, on source controls and trash controls. While unsheltered homelessness is challenging, and involves in some cases somewhat different players, categorically this coordination is the same kind of work Permittees have done in the past to address problematic discharges. In addition, permittees (e.g., Oakland and San Jose) are already coordinating internally and with NGOs.	
CCCWP-92	C.17	The Tentative Order has homeless[ness]-related requirements dispersed in several other provisions, such as C.5, C.8, and C.10. If the Water Board decides that decentralizing homeless requirements throughout the permit is the best approach, then eliminate provision C.17, and eliminate aspects of the decentralized permit provisions that do not pertain to stormwater but pertain more to social, mental, and public health services.	We do not agree that changes are needed. The Tentative Order's requirements for discharges associated with unsheltered homelessness are centralized in C.17, and appropriately coordinated with language in other provisions. We recognize that Permittee actions to respond to requirements in other provisions, such as actions to control trash pursuant to C.10, may provide a benefit with respect to certain non-stormwater discharges associated with unsheltered homelessness in some locations. However, they are not sufficient to address the range of non-stormwater discharges and locations considered in C.17. As discussed above, coordination within and among Permittees is critical to ensuring that limited resources to address unsheltered homelessness are used efficiently. C.17	None.

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			encourages Permittees to consider non-water quality related programs' effects on water quality as a way of conserving resources and avoiding the unintended consequences of prioritizing water quality over other humanitarian concerns. See also response to CCCWP-91 and, for example, SCVURPPP-19 in C.2, F5C-2-2 in C.5, and ACCWP-32 in C.5.	
CCCWP – 93, SCVURPPP – 183, Oakland & San Jose – 7, SMCWPPP – 32, 318, Pleasanton - 1	C.17	C.17 language such as "ensuring implementation of control measures" assumes an authority over homeless populations and authority over the various agencies that assist homeless populations that stormwater programs do not have. The Tentative Order is placing responsibilities on stormwater programs in an area that is currently the responsibility of social services, and mental and public health professionals. Stormwater programs could assist these other agencies in addressing homeless problems specific to the expertise of stormwater programs and advocate for homeless services that include mitigating impacts to water quality, but stormwater programs cannot	See Master Response Identifier C.17-1. See also response to CCCWP-91.	None.

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		determine which control measures are "appropriate" nor "ensure" they will be implemented.		
CCCWP - 94	C.17.a.i.2	Addressing homelessness is a complex multi-agency effort, led by social services, public, and mental health departments in the county. Asking a stormwater program to develop recommendations and a report on how these agencies should improve their work effort, while ensuring the protection of public health, does not make sense or result in an efficient use of limited resources. Stormwater programs do not have the expertise to determine an overall timeframe for reducing homeless impacts nor identify the milestones to be completed within the timeframe. Nor do the Permittees believe that addressing discharges from homeless populations is necessarily capable of being achieved within a specific timeframe.	We agree that addressing homelessness is a complex multi-agency effort and that stormwater programs have an important role within this effort. However, C.17 does not "ask…a stormwater program to develop recommendations on how [social services, public and mental health departments] should improve their effort." The focus of C.17 is squarely on the water quality impacts of discharges associated with unsheltered homelessness. As discussed above, C.17 requires the Permittees to coordinate on developing BMPs and other control strategies, so as not to duplicate efforts, and to consider the water quality impacts of long-term strategies to reduce homelessness. MRP Permittees, such as the cities of Oakland and Mountain View, are already acting to address problematic discharges from homeless encampments, for example through the establishment of formalized RV encampments or RV safe parking areas where RV waste can be appropriately collected and disposed using mobile services. Oakland, Fremont, and San Jose have had some success in establishing formalized encampments and are also	None.

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			directing resources into affordable housing. Similarly, a few permittees have a dedicated outreach team that can offer emergency shelter, meals, showers, and other basic needs while working to match individuals experiencing homelessness with an appropriate housing program. Oakland and San Jose have established coordinated cross-departmental efforts to respond to the challenges of homelessness. These are just a few examples of measures being implemented by MRP Permittees to address discharges from homeless encampments to receiving waters, and that involve coordination between different departments and agencies. There will be a continuing need to address these non-stormwater discharges given the size of Bay Area populations experiencing unsheltered homelessness and associated challenges, such as the cost of housing and limited availability of jobs and social services. For example, according to a recent article in the East Bay Times, recent data suggest Santa Clara County's efforts to get people off the street, and prevent them from ending up there in the first place have been working. In 2019, the county counted 4,771 unhoused people who reached out for services for the first time. Last year (2021), that number	

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			dropped to 3,172 — a 33% reduction. The county is also making progress in building permanent, affordable housing, with 830 new homes in 9 developments funded by a housing bond. While these seem to be helping, additional expansion in affordable housing options are still needed to make a noticeable dent in the county's population experiencing unsheltered homelessness, indicating the ongoing need for measures to protect water quality (Marisa Kendall, "It's getting better: New Santa Clara County homeless numbers show improvement," East Bay Times, Feb. 17, 2022, accessed at: https://www.eastbaytimes.com/2022/02/17/its-getting-better-new-santa-clara-county-homelessness-numbers-show-improvement/). Please see also responses to CCCWP – 91 and 93.	
CCCWP – 95, SCVURPPP – 179, 184, San Mateo County – 22, SMCWPPP – 21, 314, 319,	C.17.a.ii.(1)	C.17.a.ii.(1) requires each Permittee to submit a map locating homeless residents in relation to the MS4 system and other water bodies. Tracking and locating homeless residents on maps to the level necessary to identify drainage pathways into the MS4 system would be a dehumanizing	See Master Response; Response Identifier C.17-2.	Requirements in C.17.a.ii.(1) have been revised.

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Pleasanton – 3, Oakland – 50, ACCWP – 87, Solano - 10		effort. The "point in time" census information on homelessness is displayed in a heat map format as a sign of consideration for the plight that homeless residents find themselves in. Permittees should not be asked to track and locate homeless residents. The term "point in time" is used to underscore that homeless populations are highly nomadic in nature and the census data is simply valid for a small window of time. With this understanding, the value of a mapping requirement seems questionable. Furthermore, the maps and data being requested will only provide a "point in time" look based on the homeless population and encampments at the time of reporting. This data request does not further the overall goal of ensuring implementation of appropriate control measures.		
CCCWP – 36, SCVURPPP – 181, 185, SMCWPPP – 316, 320,	C.17.a.ii	Remove references from the permit that relate to clean drinking water or sanitation services, include a reference "to the extent practicable" when requiring	Comment noted; language in C.17.a.(ii).(3) relating to the provision of clean drinking water has been removed. The provision of sanitation services, however, is tied to a means of addressing discharges from	Edits made to language in C.17.a.ii.(3)

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Oakland - 48		Permittees to identify and implement management practices that are performed by other agencies, and remove the requirement to evaluate and assess the effectiveness of the management practices.	homeless encampments to the MS4 and therefore has not been removed. In addition, language requiring that Permittees evaluate and assess the effectiveness of their implemented best management practices is crucial to understanding the effectiveness and success rate of implemented measures.	
San Jose – 46, SCVURPPP – 13, SMCWPPP - 30	C.17	This provision should be removed from the permit, since it puts an unnecessary burden on staff focused on providing shelter to unhoused individuals. The requirements proposed are primarily intended to inform Water Board staff which can be achieved separately from the permit and in a way that does not redirect limited resources away from housing people, which this requirement would do.	See response to CCCWP-91 and 93.	None.
SCVURPPP – 173, San Mateo County – 7, SMCWPPP – 33, 308	C.17	Requirements in C.17.a.i.(1) would require additional resources to gain an understanding of homeless populations; this entire provision should be incorporated as a subprovision into provision C.5 - Illicit Discharge Detection and Elimination, with recognition that traditional illicit discharge enforcement procedures are not	See Master Response Identifier C.17 -3.	None.

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		appropriate for these types of discharges. An exemption for all requirements should be allowed if a Permittee has no known permanent homeless encampments or if populations in the Permittees' jurisdictions are truly transient.		
SCVURPPP - 174, SMCWPPP – 303	C.17.a.i	Requirements in C.17.a.i.(2) would require additional resources; Remove this subprovision and incorporate a requirement into C.5, as appropriate, that would require that Permittees communicate successful BMP implementation among MRP permittees by conducting a workshop at the countywide or regional scale.	The BMP report required in C.17.a.i.(2) is intended to foster (and prioritize) regional collaboration between Permittees. Permittees may conduct workshops as one method of performing outreach, but are still expected to develop and submit a BMP report as described in C.17.a.i.(2) Also see responses to ACCWP - 32 in C.5, and CCCWP – 93 and SCVURPPP – 173	None.
SCVURPPP – 175, San Mateo County – 21, SMCWPPP – 310 SCVURPPP – 176,	C.17	C.17.a.i.(2)(a) and C.17.a.i.(2)(b) would require additional resources to produce report. Remove sub-provision and incorporate a requirement into C.5, as appropriate, that would require that Permittees report in summary format on actions that are currently	C.17.a.i(2)(a) and (b) are intended to encourage Permittees to share useful information and avoid duplicating efforts, as described in response to CCCWP-91 -92, and -93, above. See also response to SCVURPPP – 173 for why C.17 was not included in C.5.	None.

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SCVURPPP – 180, SMCWPPP – 311, 315, ACCWP - 85		being implemented to address water quality concerns associated with homeless encampments.		
SCVURPPP - 177, SMCWPPP – 312, Oakland – 49, ACCWP – 86, Solano – 9,	C.17.a.i	C.17.a.i.(2)(c) would require additional resources to produce report. Remove requirement. Not directly related to water quality concerns.	See Master Response Identifier C.17- 4.	None.
SCVURPPP – 178, SMCWPPP 313	C.17	C.17.a.i.(2).(c) requires additional resources to produce report. Remove subprovision and incorporate a requirement into C.5, as appropriate, that would require that Permittees report in summary format on existing and planned collaborative actions to address water quality concerns associated with homeless encampments.	See response to SCVURPPP – 173.	None.
SCVURPPP – 182, SMCWPPP – 317	C.17	Requirements in C.17.a.ii.(4) will require additional resources to produce.	Comment noted. We disagree that C.17.a.ii.(4) will require additional resources. C.17.a.ii.(4) requires that Permittees use information generated through biennial point-in-time census surveys and related	None.

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			information to review and update their BMP implementation practices. This important and reasonable requirement is intended to ensure that Permittees' implemented BMP practices are appropriately tailored to the population and needs of their unsheltered homeless residents. It is also cost efficient relative to other alternative approaches because it helps to ensure that Permittees do not waste time implementing BMPs in areas where they are not needed.	
Friends of 5 creeks – 2	C.17	In fairness, local agencies are dealing more humanely and effectively with the homeless today than years ago. However, this may be due to pressure and possible costly consequences. Please take a positive and cooperative role in addressing our problem of homelessness – but don't promise local governments what amounts to a five-year license to dally.	Comment noted. See response to CCCWP-91.	None.
Save the Bay – 10 Baykeeper and Law Foundation - 3	C.17	Rather than directing permittees to lead this effort (the development of a BMP implementation report), we urge the Board to develop this set of best practices with Permittee participation and feedback. The permit also must explicitly discourage encampment sweeps as a preferred method of trash	The Water Board is not dictating how the Permittees work with their unsheltered homeless populations. As noted in our response to CCCWP-91, we developed C.17 as a way of encouraging Permittees to think holistically about addressing homelessness and to disincentivize short-term solutions, like encampment sweeps, that do not address the root causes of homelessness	Language has been added to the Fact Sheet discouraging the practice of encampment sweeps.

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		control. Providing trash receptacles and collection to encampments while allowing social services adequate time to assist unhoused individuals will help to ensure that water quality improvements are achieved while minimizing trauma.	and therefore do not reduce discharges in a meaningful or lasting way. We agree that encampment sweeps are an ineffective means of reducing discharges from homeless encampments over the long term because, in addition to being traumatizing, such practices often simply push the displaced to a new location, where water quality impacts continue. In some cases, relocating encampment residents can benefit water quality and achieve other municipality goals. For example, the City of Oakland worked to re-house homeless residents at Lake Merritt in nearby community cabins and other housing, reducing discharges to the MS4, direct disharges to the Lake, and conflicts between residents walking around the Lake and homeless residents camped nearby. In another example, encampments along certain South Bay creeks are causing significant damage to the creeks by destroying riparian vegetation, destabilizing banks, and discharging trash and hazardous materials including human waste to the creeks. Those residents can also be at significant risk, as shown by the rescues of homeless residents during Coyote Creek flooding in 2017. Working with encampment residents to relocate them to safer and less-environmentally-impacting locations (and	

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			then managing those locations to reduce discharges, as appropriate), including supportive housing, is an action that a permittee could take under C.17. While the Water Board cannot prohibit the practice of encampment sweeps, C.17.a.ii.(3) describes other options available to Permittees to address problematic discharges to receiving waters. Given the current scope of the problem and the challenges associated with achieving long-term solutions (such as long-term housing, jobs, and supportive services, etc.) the Water Board's expectation is that in some cases appropriate shorter-term solutions include managing discharges in place, and by providing formalized locations, such as Oakland's cabin communities and RV parking areas, where such services can more easily be provided, for example by sanitary and trash collection services. We agree that providing trash receptacles and collection services is a good idea to reduce trash discharges to receiving waters. However, these measures, on their own, aren't sufficient. C.17 encourages the type of interagency coordination that the commenter supports.	
Pleasanton – 2	C.17	While development of best practices are important and the	The BMP implementation report described in C.17.a.i.(2) may be developed at the regional or countywide level under the respective	None.

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		intent to encourage regional, countywide, and municipal collaboration to accomplish is commendable, there is no designation of a lead agency or discussion as to how the development of this report will be funded. Without this, it is difficult to determine how this task will be accomplished.	countywide stormwater program. Permittees may fund this collaborative effort through their stormwater programs, as appropriate.	
Pleasanton – 4	C.17	C.17.a. ii (3) requires each Permittee to evaluate and assess the effectiveness of the best management practices, specifically by reporting on the control measures being implemented, the approximate portion of the Permittee's unsheltered homeless population and locations being served by those control measures, and the portion and locations of the Permittee's unsheltered homeless population not reached, or not fully reached, by those control measures. The value of quantitative data is important in assessing effectiveness, however the metrics requested will be difficult to calculate because the number of homeless in a jurisdiction changes daily. It would be better to have a Permittee	Comment noted. Please refer to Response to SCVURPPP – 179 for a discussion of the utility of mapping areas where encampments and similar areas are located, despite the risk that these areas could change. The Water Board does want Permittees to report on the effectiveness of the best management practices employed and control measures used. However, a description of effectiveness without context makes it more difficult for other Permittees to understand or replicate this success, and for the Water Board to evaluate compliance and determine whether modifications to this provision may be desirable in a subsequent permit term. For these reasons, we require additional information in the report.	None.

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		report on the best management practices employed and describe the control measures used and evaluate their effectiveness.		
ACCWP – 84	C.17	The language in this provision focuses on the social resources and practices undertaken by population-based permittees. Non-population-based permittees, flood control districts, typically partner with surrounding local agencies who provide the social resources while flood control districts focus on clean-up of encampments that impair flood protection services. The last paragraph of the task description (pp. C.17-1-17-2) identifies that flood control districts are potential collaborators with "Permittees," implying that C.17 applies to population-based permittees and the non-population-based permittees provide support. Review language and revise to recognize the differences between population-based permittees' and non-population-based permittees' implementation roles.	Comment noted; language has been revised to recognize that Permittees include flood control districts. The ongoing collaborative work between the City of San Jose and Valley Water is a good example of such efforts.	Language in C.17.a.i.(2).(c) has been revised.
ACCWP – 88	C.17	With the 2023 and 2025 Annual Reports, each Permittee shall report on the implementation of	C.17.a.iii.(1) requires that Permittees' submit their collective BMP implementation report,	None.

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		management practices and other control measures. The provision essentially requires the submittal of the same report required in item iii.(1). The two reports should be combined.	as described in Provision C.17.a.i by September 30, 2023. C.17.a.iii.(3), on the other hand, requires that Permittees report on their individual identified and implemented BMP measures, as described in C.17.a.ii.(3), to address discharges associated with homelessness that impact water quality and public health including evaluating and assessing the effectiveness of those measures.	
Baykeeper & Law Foundation – 3	C.17	The Board must revise C.17 to explicitly center the needs of unsheltered populations and prioritize the human right to water for all.	This comment is general and vague. We disagree that a revision is needed. C.17 is an entirely new provision that recognizes the needs of the homeless population while still requiring protection of water quality. Since this is a stormwater permit, it is inappropriate to prioritize the human right to water.	
Baykeeper & Law Foundation – 5	C.17	From a practical standpoint, this mapping exercise is inappropriate, as it does not reflect the mobile nature of encampments. Resources spent on this mapping exercise would likely be better spent on providing social services themselves. Additionally, the mapping exercise in C.17.a.ii.(1) may have unintended consequences harmful to unsheltered populations. For example, these maps could be used to prioritize encampment	We disagree. See responses to SCVURPPP – 179 and CCCWP – 95.	None.

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		sweeps, causing unsheltered people to move further away from services, to less accessible locations, to avoid sweeps.		

Response to Comments on September 10, 2021, Tentative Order
Provision C.18. – Control of Sediment Discharges from Coastal San Mateo County Roads

Comment No.	Provision	Comment	Response	Proposed Revision
San Mateo County-23	C.18.a.i	Requires Road Erosion Inventory to "reduce road-related erosion from hydrologically connected County roads." There is still uncertainty around the distinction between natural erosion and road-related erosion. Provide description or definition for Road-Related Erosion. Define the natural baseline.	Additional clarifying text to define road-related erosion has been added to the first paragraph of C.18. We also direct the County to the discussion of road-related erosion provided in the Handbook for Forest, Ranch and Rural Roads which is referenced in C.18.	Revised first paragraph of C.18 to include additional description of road-related erosion.
San Mateo County-24	C.18.b.i	Requires a prioritized list and schedule of actions to reduce road-related erosion. A specific schedule cannot be provided since projects are largely dependent on permits issued by other agencies. Change "schedule of actions" to "actions."	Schedules are required and should be based on a best estimate of time required for permit approval by other agencies. Schedules may include flexible timelines to account for project tasks outside the County's control, such as the time required for permit approval.	None.
San Mateo County-25	C.18.c.ii.(3)	New roads constructed on hillsides exceeding 5% shall be constructed as storm-proofed roads. There is no specific start date for this requirement and no clarity on how to treat projects that are currently in the design, permitting,	Our definition of "storm-proofed road" is lengthy and specific, and described in C.18.c.ii.(3). Consequently, a definition is not provided in the glossary. We added text to C.18.c.ii(3) to clarify that new County-maintained roads under construction within one year of the start of	Text added to C.18.c.ii.(3), and the word 'permit' is capitalized in C.18.b.ii.(2) for consistency.

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		or construction phases. Add “storm-proofed road” to definitions in permit and add a start date to the requirement, including adding a clarification that road plans prior to the start date should be exempt.	this Permit term are exempt from the “storm-proofed road” requirement.	
San Mateo County-26	C.18.c.ii.(3)	Storm-proofed roads is defined by Weaver et al. (2015 Chapter 6) Note that Weaver design criteria are more suitable for Parks Department road setting (e.g., gravel, base rock) rather than the paved condition of Public Works Department roads. No specific changes requested.	Comment noted.	None.
San Mateo County-27	C.18.c.ii.(3)(k)	For new roads constructed on hillsides exceeding 5%, ensure that road surfaces and ditches are hydrologically disconnected from stream and stream crossing culverts Note that this is typically not feasible due to constraints of right-of-way and roads being along streams, which is the natural low point of the system.	We partially agree. While it is true that it may not be feasible to hydrologically disconnect some road segments along streams, improvements can be made in many cases. To this end, we added “to the maximum extent feasible” after the word “culvert” in C.18.c.ii(3)(k). Methods and potential solutions to address road-related sediment erosion are discussed in the references provided in C.18. Hydrologic connectivity is defined in	Text added to C.18.c.ii.(3).(k)

Response to Comments on September 10, 2021, Tentative Order
Provision C.18. – Control of Sediment Discharges from Coastal San Mateo County Roads

Comment No.	Provision	Comment	Response	Proposed Revision
		Please define "hydrologically disconnected" and potential solutions if the stream is the receiving water for discharge of these ditches.	C.18.a.i,which includes an explanation of the distinction between hydrologically connected versus hydrologically disconnected roads.	

Response to Comments on September 10, 2021, Tentative Order
Provision C.19. – Cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District

Comment No.	Provision	Comment	Response	Proposed Revision
CCCWP – 97	C.19.d.ii.(1)	Recommend moving submittal date of Control Measure Plan to November 1, 2022, from August 1, 2022.	We have revised the submittal date as requested. It is reasonable to provide more time in this situation to ensure that an adequate plan will be submitted. Moreover, Water Board Region 5 concurs.	Date revised.
CCCWP – 98	C.19.iii.(1)	Recommend first submittal of Annual Mercury Monitoring Plan be due on Oct 1, 2022, and submitted with the Urban Creeks Monitoring Report (March 31) thereafter.	See response to CCCWP – 97.	Schedule revised.

Response to Comments on September 10, 2021, Tentative Order
Provision C.20. – Cost Reporting

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-186 SMCWPPP-321 San Mateo County-28	C.20.a	Cost reporting required via the State Auditor. Will require additional resources above MRP 2. Work Group worked with Water Board staff to craft language. Should be clear that the purpose of cost reported is for regulators to understand cost of compliance and not to compare Permittees' costs.	The guidance for obtaining MS4 Permit implementation costs from Permittees has been developed by the State Water Board's Office of Research, Planning, and Performance. The objectives of the guidance are for the Water Board and the public to obtain adequate, consistent, and comparable information on the storm water management costs local jurisdictions incur, and for the Water Board to base decisions on that information. Although the guidance allows flexibility in selecting the specific reporting categories and information that will be included in the Permittees' cost reporting framework, comparing compliance costs and identifying trends over time is still an essential component of the guidance.	None.
SCVURPPP-187 SMCWPPP-322	C.20.b.i	Work Group worked with Water Board staff to craft language to allow development of acceptable framework rather than conforming to unacceptable State Water Board format. Provide minor modifications to Admin Language to fix incorrect subprovision reference and delete "allow for comparability between Permittees."	The subprovision reference correctly includes both components of the fiscal analysis requirements under 40 CFR 122.26(d)(1)(vi) and 40 CFR 122.26(d)(2)(vi). Please also see response to SCVURPPP-186.	None.
SCVURPPP-188	C.20.b.ii	Exclude requirement to identify source of funds and reporting of	We disagree. For each year of the permit, a fiscal analysis that includes the source of	None.

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SMCWPPP-323 ACCWP-89		estimated future year costs, as these are not required by federal regulations or to address requirements of the State Auditor.	funds is required by 40 CFR 122.26(d)(2)(vi), as discussed in the Fact Sheet. As such, they must be included.	
SCVURPPP-15 SMCWPPP-38 CCCWP-100 SCVURPPP-189 SMCWPPP-325 ACCWP-91 San Jose-47	C.20.c.i	Extend the deadline for the development of the framework to June 30, 2023. The proposed development of this framework within six months of the permit's effective date is not feasible given the recent experience of other stormwater programs in developing cost reporting frameworks. Timeframe does not allow for adequate time for development and vetting of framework. Extending the deadline also allows Permittees to incorporate best practices and guidance from the planned State Water Board STORMS Project 4c: Identify Municipal Storm Water Permit Compliance Cost.	We have revised the deadlines as requested. It is reasonable to extend the deadlines to provide more time to ensure that a reasonable framework will be developed and allow for effective collaboration between Permittees.	Deadline has been extended as requested.
SCVURPPP-15 SMCWPPP-38 ACCWP-91 CCCWP-101	C.20.c.ii	Timeframe does not allow for adequate time Permittees to implement change to their financial accounting systems, begin implementation of framework, and develop and implement tracking and reporting tools.	Please see response to SCVURPPP-15.	Deadline has been extended as requested.

Response to Comments on September 10, 2021, Tentative Order
Provision C.20. – Cost Reporting

Comment No.	Provision	Comment	Response	Proposed Revision
SCVURPPP-190 SMCWPPP-326 San Jose-47		Timeframe to complete and implement framework is inadequate. Modify timeframe to begin reporting with September third (2025) Annual Report under MRP 3, not 2nd Annual Report.		
Baykeeper - 24	C.20	C.20's cost reporting should be used to inform the development of stormwater funding strategies. Municipalities have the legal authority to collect stormwater fees under SB 231, which was signed in 2017. Yet municipalities have yet to develop stormwater fees. Fear of litigation should not drive municipalities' decision.	Comment noted.	None.

Response to Comments on September 10, 2021, Tentative Order
Provision C.21. – Asset Management

Comment No.	Provision	Comment	Response	Proposed Revision
ACCWP-94 CCCWP-102 Oakland-54 SCVURPPP-16,191,192,193,194,196,199 SMCWPPP-39,40,327,328,329,330,331,332,334 San Mateo County-29	C.21	1) This Provision will require substantial cost and effort to implement. 2) Oakland-54: To adequately meet this requirement would require an expenditure of effort that could easily cost millions of dollars. 3) SCVURPPP-191, SMCWPPP-327: If this provision is a priority then other requirements in the permit should be de-prioritized and removed to accommodate for the additional costs and resources permittees will incur to develop this plan. 4) SCVURPPP-191, SMCWPPP-327: This new provision is a significant and costly new effort that would require some coordination among departments, which use different systems for management of other assets. 5) SCVURPPP-16,192, SMCWPPP-39,40: Given the required cost and effort, delay the submittal of the Asset Management Plan from June 30,	1) While the Provision will require some cost and effort to implement, the costs are reasonable and required by federal regulations (see Fact Sheet section for C.21). We considered the potential costs of asset management systems in the Fact Sheet (Section IV.E.4.d, Economic Considerations – Program Costs – New provisions), and found that Permittees were collecting a substantial portion of the required information with existing systems, which could be used or modified to implement C.21. We also worked with the Permittees to consider how to assess asset performance, and agreed that it could be based on the asset condition as observed during regular inspections, which the Permittees were already completing, or requiring to be completed, and tracking. The Fact Sheet notes that San Diego developed and implemented a much more extensive asset management system that tracks “soft” and “hard” stormwater assets, as well as San Diego’s flood management infrastructure—a total of approximately $3 billion in infrastructure. That system was estimated to cost $2 million over 5 years to develop, and an additional $2 million over the subsequent approximately 8 years to update (e.g., by expanding the asset inventory). Additionally, it has a larger scope because San Diego is larger than any MRP Permittee. The City of	None.

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		2025, preferably by 2 years, if not, by 1 year. Delay the start date of implementation, and the start date for reporting on implementation, by the same amount of time.	San Diego has a population of about 1.4 million and an area of about 372 square miles. By comparison, the City of San Jose has a population of about 1 million and an area of about 181 square miles, and the City of Oakland has a population of about 425,000 and an area of about 78 square miles, about one-third of which is water. The remaining MRP Permittees have smaller populations and/or land areas. Because the Permittees are smaller than San Diego and have existing systems to track hard water quality assets, because the categories and number of assets to be tracked are much more limited than San Diego's system, and because the Permittees are already completing substantial portions of the work involved (e.g., pursuant to C.3.h and C.10.b in MRP 2), it is reasonable to conclude that the costs of complying with C.21 will be substantially less than San Diego's system. As noted above, the Provision has been crafted to focus on hard assets (e.g., bioretention cells, full trash capture devices, trash receptacles, and pet waste stations), and asset management plans developed under C.21 are expected to incorporate, as appropriate, Permittees' existing systems for ensuring the effective installation, operation, and maintenance of hard assets (e.g., those required pursuant to C.2, C.3, C.10, C.11,	

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			C.12, C.14, C.17, C.18, and C.19). The Water Board considered a broader asset management plan approach, such as something similar to the one currently being implemented by the City of San Diego, which includes both hard and "soft" or "programmatic" assets (e.g., public education and information materials, new and redevelopment guidelines, an inspection program for commercial, industrial, and construction sites).[24] We found that the system required in C.21 is an appropriately-focused system intended to achieve prioritized water quality outcomes (i.e., via its focus on hard assets), and that for the coming permit term, it is acceptable to manage "soft" assets via their respective provisions and reporting. These steps appropriately minimize the cost of asset management program development and implementation. Additionally, successful asset management programs are expected to reduce overall program costs (e.g., by allowing for planning to complete less-expensive preventive maintenance as opposed to more-expensive rehabilitative or reconstructive maintenance).[25] Effective asset management systems should also reduce Permittee staff costs to prepare	

[24] City of San Diego, Transportation and Stormwater Dept., Stormwater Div., January 2021. Watershed Asset Management Plan, Version 2.0.
[25] U.S. EPA, March 6, 2017. Asset Management Programs for Stormwater and Wastewater Systems: Overcoming Barriers to Development and Implementation.

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			Annual Reports, because the relevant information will be available as a system report. These should reduce the programs' overall cost. 2) We disagree that the provision requires any individual permittee to expend millions of dollars to comply. While C.21.b sets goals that asset management plans must address, the Provision allows substantial flexibility with respect to how Permittees achieve those goals. For example, Permittees may incorporate, coordinate, and/or adapt existing tracking and/or asset management systems and to implement an asset management system that is appropriately scaled to their size and level of complexity. See also response to item (1) immediately above. 3) The Tentative Order, and the revisions resulting in the Revised Tentative Order, reflect a prioritized approach that balances required actions, water quality needs, and the recognition that those require resources. As part of the revisions, Water Board staff revised reporting requirements, in some cases removing required reports or delaying their due dates, and reduced information collection (e.g., in C.2. C.4, C.5, C.6, C.10, and C.15).	

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			4) We agree that for some Permittees, different hard assets will be implemented by different Permittee departments, and that this will require coordination, which may be similar in nature to how Permittees already coordinate to ensure such assets are appropriately designed, operated, and maintained. See also responses to items (1) and (2), above. 5) We disagree. The Tentative Order already allows three years for the development of the Asset Management Plans, and before Permittees have to start implementing them, which we believe is a sufficient amount of time. That also means that there will be approximately only two years of implementation of the Asset Management Plans; those two years are important because they will get Permittees started on asset management, which –as explained in the Fact Sheet – is critical to the performance of their hard assets, and because those two years of implementation are likely to infny) to C.21 for the subsequent Permit term.	

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SCVURPPP-191 SMCWPPP-327 San Mateo County-29	C.21	The permit already has requirements in place to ensure hard assets related to water quality are in satisfactory condition. Requirements in this provision should be consistent with, and not duplicate, requirements in C.10.b, C.10.g, C.3.h, and C.3.j.v. San Mateo County-29: MRP 2 already includes requirements for tracking and reporting of operations and maintenance activities and structural control condition. This effort is largely duplicative. Recommend removal of this provision due to redundant reporting requirements in C.2, C.3, C.10, C.11, C.12, C.13, C.14, and C.18. At a minimum, reporting requirements should be reduced per comments submitted in the C/CAG MRP 3 Tentative Order comment letter.	We disagree. Requirements in C.21 are flexible, consistent with the referenced Provisions, and also go beyond them in their programmatic nature and ability to provide benefits including facilitating oversight—leading to more-effective performance over time—and simplifying periodic reporting. To the extent that there are other databases or tracking systems required in other Provisions (e.g., the database or equivalent tabular format tracking system that is described in C.3.h.ii.(4)-(5)) that contain some of the information required by C.21, Permittees may consider adapting those systems to include the information required by C.21. Likewise, other operation and maintenance plans (e.g., the plan described C.3.h.ii.(4)-(5)) may be adapted/modified. Or, in the alternative, existing information could be incorporated into asset management systems developed under C.21, simplifying information organization and reporting. Other specific comments by C/CAG regarding C.21 are addressed separately. See also response to combined comment, above: ACCWP-94 CCCWP-102	None.

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			Oakland-54 SCVURPPP-16,191,192,193,194,196,199 SMCWPPP- 39,40,327,328,329,330,331,332,334 San Mateo County-29	

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Baykeeper-25	C.21	C.21 must be revised to include MS4 pipes in asset management requirements. Baykeeper generally appreciates the addition of C.21, requiring Permittees to develop and implement asset management plans to "ensure the satisfactory condition of all hard assets constructed during this and previous permit terms." Footnote 54 defines "hard assets" as "structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash receptacles, and pet waste stations." While Baykeeper agrees that these structural controls should be monitored and maintained, (1) C.21 should also include the MS4 infrastructure itself. Much of the MS4s in Region 2 rely on aging clay pipes and many municipalities maintain limited or incomplete records of the age, date, location, and quality of their MS4 infrastructure. Given the seismic activity in the region and clay soils, the possibility of cracking in both the sanitary sewer and storm sewer systems is high. Thus, many	(1) We disagree. The commenter's proposed request regarding the condition of MS4 pipes is addressed in C.5.f, which requires Permittees to "…identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction, and condition." This information must be submitted with the 2026 Annual Report, and is expected to result in requirements for implementation in the subsequent permit term. While sanitary sewer collection systems are not permitted under the MRP, separate efforts are underway to appropriately maintain collection systems (e.g., systems discharging to EBMUD's wastewater treatment plant in the East Bay, and to the City of Pacifica's in Pacifica) which will minimize the potential for sanitary sewer collection system exfiltration to the MS4. (2) What this comment is asking for is already provided by C.21.b.i.(3)(a): Permittees are required to include, in their Asset Management Plans, "A process for prioritizing and scheduling operation and maintenance activities." It is not necessary to specify minimum inspection frequencies in	None.

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		Permittees maintain a high risk of sewage exfiltration from the sanitary sewer system and infiltration to the storm sewer system. But Permittees lack sufficient information about the condition of their MS4 systems and lack condition assessment data. Collecting geographic information system ("GIS") mapping and closed-circuit television ("CCTV") data is best practice for any type of underground pipe system, MS4s included. The Board should (2) revise C.21.b.i.(3).(a) to dictate an annual schedule for inspecting all stormwater treatment and flow control BMPs and facilities that are owned, operated, or regulated by the Permittees and should require Permittees to implement appropriate maintenance actions where any damage or defects are discovered as part of the requirements for the Operation, Maintenance, Rehabilitation, and Replacement Plan. The Board should also (3) revise C.21.b.i.(3).(b).(i) to incorporate a storm sewer system condition	C.21.b.i.(3)(a), because a minimum annual inspection frequency of 15-20% of all C.3 controls is already required in C.3.h.ii.(6)(b) (which would lead to inspection of approximately 100% of C.3 controls in each Permit term), and a minimum annual inspection frequency of 100% of all C.10 controls is already required in C.10.b.i.(a) (a greater frequency is required for C.10 controls in High and Very High trash generation areas). (3) Please see response to (1) above. (4) Comment noted. Please see response to (1) above. (5) Please see response to (1) above.	

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		assessment program, given that most Permittees have little data to inform the condition and effectiveness of their storm sewer system. (4) A recent report from San Diego State University documented the linkage between the sanitary sewer and the presence of human pathogens in stormwater. The study evaluated the relative inputs of human sewage from direct sources (e.g., homelessness and RV dumping) compared to wet weather sources originating from sanitary sewer infrastructure. They found direct sources represent a small proportion of the fecal indicator bacteria. Untreated wastewater originating from the sanitary sewer system "are likely responsible for the majority of elevated microbial pollutants detected in the San Diego River and its tributaries during storm events." Researchers found the "efforts to address contamination of the San Diego River and its tributaries and meet wet weather pollution targets should prioritize replacement of cracked or failing		

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		sewer infrastructure or containment of sanitary sewer overflows." Additionally, (5) the Climate Change Adaptation Report required by C.21.b.v will be inadequate to accurately assess potential climate change-related threats to assets if Permittees' MS4 pipes are not included in the analyses. Full trash capture devices will not function properly if they are constantly inundated by Bay waters. Recent studies regarding rising groundwater in the Bay Area due to climate change also extends the amount of the Bay Area that will be impacted beyond areas immediately adjacent to rivers, creeks, and the shoreline.		

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SMCWPPP-40,335	C.21 & C.21.b.i.(4)	SMCWPPP-40: Allow Permittees to comply with this Provision via the use of existing tracking systems required by other Provisions. SMCWPPP-335: Seems to allow use of existing cloud-based tracking systems (such as the SCVURPPP Stormwater Treatment Measure Data Portal) for (b). Additional resources will be needed to add trash full capture systems and other hard assets to this tool/database.	Comment noted. The Provision does not specify the use of a particular system or systems. There is flexibility for the Permittees to adapt existing tracking systems to meet the C.21 requirements. We agree that the system will need to incorporate or otherwise account for Permittees' hard water quality assets.	None.
ACCWP-92 CCCWP-102,103,105 Oakland-52 SCVURPPP-16,191 SMCWPPP-39,40,327	C.21.b.i.(2)	The proposed language significantly expands the scope of the asset management program beyond the boundaries identified in early discussions. Permittees thought that the asset management requirements would solely include those Permittee owned stormwater treatment systems constructed to meet C.3 regulated projects, C.3 green infrastructure (and related C.11/C.12 green infrastructure provisions), and C.10 full trash capture devices. Redefine hard assets as only including those	C.21.b.i.(2) says: "An inventory… of Permittees' existing hard assets built pursuant to the Provisions cited in Provision C.21.a…" The Provision is already limited to public hard assets. Regarding which hard assets should be included in the Asset Management Plan's inventory as described in C.21.b.i.(2), footnote 54 in the Tentative Order (at the bottom of page C.21-1) give examples of applicable hard assets and is sufficiently descriptive to inform the completion of an asset management system. We do not agree that it should exclude anything other than the three types of controls mentioned in the comment, such as trash receptacles and pet	None.

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		treatment systems. Because the cited Provisions regulate both public and private entities, the Provision should explicitly state that it applies solely to public assets. Clearly define hard assets and remove the examples. Hard assets should be features of permanent infrastructure and should not include trash receptacles or pet waste stations. These small devices, designed to be mobile, will take a significant effort to track and do not require the same level of maintenance or rehabilitation as features such as full trash capture systems or bioretention facilities.	waste stations, as Permittees also rely on these structural controls for their compliance with the Permit, even though some may not be permanent structural controls. Also, it is not uncommon for these types of controls to be poorly maintained and/or serviced, so it is critical that Permittees track their condition in the same way as other hard assets.	
SMCWPPP-331,332	C.21.b.i.(3)(b)	We appreciate the changes made to this provision to focus on assessment of condition rather than performance.	Comment noted.	None.
ACCWP-93 Oakland-53	C.21.b.i.(3)(b)(i)	The performance should be based on the design specification and not the stormwater volume and pollutant load reduction. Reduce Reporting Burden: Delete “minimum performance level(s), including an assessment of stormwater volume and pollutant	The language referenced in this comment is from the Administrative Draft. The language is significantly different in the Tentative Order.	None.

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		load reduction, necessary to comply with the provisions, including applicable water quality based effluent limitations and receiving water limitations” Replace with “performance level of asset functioning as designed”		
CCCWP-106 San Jose-48	C.21.b.i.(3)(b)(ii)	CCCWP-106: Revise condition assessment language to assess the condition of the assets relative to the design standards. Design standards for the hard assets (listed in the previous comment) are described in the Order and the C.3 Technical Manual. The condition assessment of the assets required by this provision should evaluate whether the system is in place and functioning as per the design standards. San Jose-48: This section is very problematic because facilities are built to design requirements and volume and pollutant load reduction are not measured for specific devices. Revise language in this section to refer to a "condition assessment" that compares a "desired" condition (in which the facility meets design	These comments may be referring to language in the Administrative Draft. The language in the Tentative Order already requires an assessment of "...current performance level and effectiveness, as indicated by condition… Permittees shall base the effectiveness evaluation on, at a minimum, factors such as design, capacity, and condition and function relative to the asset’s design, intended operating conditions, and intended function."	None.

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		requirements and construction installation requirements and is well maintained) to the "current" condition. Remove the language "including applicable water quality-based effluent limitations and receiving water limitations".		
SCVURPPP-195 San Jose-49 SMCWPPP-333	C.21.b.i.(3)(b)(iii)	This Provision is unnecessary, as it is part of the risk-based condition assessment described in C.23.b.i.(3)(b)(ii) above. Delete it.	We disagree. The consequence and likelihood of failure are implicitly, but not explicitly, included in the risk-based condition assessment described in C.23.b.i.(3)(b)(ii). This clarifies that they must be considered in the risk-based condition assessment.	None.
SMCWPPP-336	C.21.b.ii-iv	Comment notes that the start date for implementation of these Provisions is the day after the Asset Management Plan is submitted.	The comment is correct.	None.

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ACCWP-94 CCCWP-104,107 Oakland-54 SCVURPPP-197,200 SMCWPPP-337	C.21.b.v	1) This is a significant unnecessary new requirement that adds additional cost to the Permit. 2) Permittees are already dealing with climate change and do not need the Water Board to insert a duplicative requirement in their NPDES permit. 3) The requirement to develop a Climate Change Adaptation Report is written broadly and appears to be beyond the scope of the MRP 3 term and beyond the purview of stormwater programs. Adaptation of stormwater treatment systems (green infrastructure, trash capture devices) for climate change is inherently connected to the larger infrastructure system. There is no agreement in the predictive models regarding potential changes to storm intensity and frequency that would impact the design of bioretention and hydromodification controls. It is premature to consider adapting stormwater treatment systems whose life cycle is shorter than the suggested 50-year planning window for climate adaption.	1) We disagree. As explained in the Fact Sheet, the purpose of the Climate Change Adaptation Report is to ensure that in the long term, as climate change impacts increase, Permittees are able to make necessary adjustments to the design, operation, and maintenance of their hard assets to ensure their satisfactory condition and performance, in response to impacts to those assets associated with climate change. U.S. EPA Region 9's 2014 guidance for incorporating asset management planning requirements into NPDES permits includes a requirement for the assessment of climate change impacts. 2) We are aware of some efforts being completed by Permittees to consider the reasonably foreseeable impacts of climate change on urban runoff and their stormwater programs. These include work by SMCWPPP modeling the performance of GSI with respect to controlling flooding associated with modeled increases in precipitation event intensity, duration, and frequency. However, to our knowledge these generally have not extended to other issues around water quality controls, such as consideration of controls' design, operation, and maintenance, and how those should be modified to respond to identified climate change trends. The comment does not	Shifted Climate Change Adaptation Report due date to 2026 Annual Report.

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		4) Any modification of design standards should be a statewide effort. Allow flexibility for development of report at the State level or coordination with statewide efforts (e.g., through CASQA.). 5) Keep report focused on the impacts of climate change on water quality assets. 6) Remove this Provision or make it optional.	support the claim that the Permittees are already dealing with climate change, nor does it explain what exactly is meant by that. Though Permittees may already be generally investigating climate change impacts, that does not necessarily equate with adequately accounting for existing/future/potential impacts to the hard assets that they rely on for Permit compliance. However, to the extent the Permittees are already sufficiently accounting for such impacts, that would inform the report's preparation and they can include that in their C.21 reporting generally and in the Climate Change Adaptation Report in particular. 3) Climate change is likely to increase the number of extreme/outlier weather events.[26,27] In particular, more intense storms and more prolonged droughts. Identifying climate change related threats to hard assets is integral to proper asset management. The Permittees do not need to start from scratch on this effort, in fact they are encouraged to start by reviewing the literature. Nor does C.21.b.v task the Permittees with perfectly predicting future impacts and immediately implementing changes to their management	

[26] https://nca2018.globalchange.gov/
[27] https://www.ipcc.ch/site/assets/uploads/2018/03/SREX-Chap3_FINAL-1.pdf

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			approaches; the purpose of the Report is to identify approaches that the Permittees may implement to address climate change threats to hard assets. We disagree that it is premature to begin considering and addressing the potential impacts of climate change on hard assets, as change is happening now and is expected to increasingly have the potential to affect those assets. We agree that the effects of climate change are likely to persist beyond the coming permit term, and that it will be important to consider the Report's findings in a future permit reissuance. With that in mind, we have revised the Report's due date to the 2026 Annual Report to allow it to be appropriately considered in the next reissuance. 4) The Provision would allow Permittees to coordinate with CASQA or other organizations to develop the required report, as long as the report meets the requirements of C.21.b.v (e.g., by having a San Francisco Bay-specific regional or countywide scale, which is important in part given California's substantial geographic scope and broad climatic range, and the need to focus information on Permittee hard assets). While we cannot rely on a theorized statewide	

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			effort that may or may not come to pass, should such a statewide effort begin prior to the submittal of the Report, we would encourage the Permittees to participate, share information, and ultimately incorporate findings from that effort into the Report. 5) We agree. The Provision is focused on the impacts of climate change on hard water quality assets, as reflected in its text (e.g., "[t]he report shall assess existing, new, and increasing threats from climate change to the condition of Permittees' inventoried hard assets…."). In addition, the Provision has sufficient flexibility. For example, the report could explain, in part, how certain controls (on which Permittees rely for Permit compliance) will not be affected by climate change. 6) We disagree, for the reasons stated above.	
SMCWPPP-338	C.21.c.i	Comment reiterates the Provision.	Comment noted.	None.
SMCWPPP-339	C.21.c.ii.(1)	Comment reiterates the Provision.	Comment noted.	None.
SMCWPPP - 340	C.21.c.ii.(2)	Comment reiterates the Provision.	Comment noted.	None.
SCVURPPP-199	C.21.c.ii.(2)	This is a significant new reporting requirement which would likely carry over into MRP 4. This is a large amount of information to	Comment noted. A substantial portion of the information required here is currently being prepared for different provisions, and while some effort would be involved in coordinating	SCVURPPP-199

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		report annually and much of the data would not change. Request that report frequency be modified to once during the permit term.	the already-collected information within an asset management system, that is likely to simplify reporting and make the information more actionable.	

Response to Comments on September 10, 2021, Tentative Order
Provision C.22. – Annual Reports

Comment No.	Provision	Comment	Response	Proposed Revision
ACCWP-95 City of Oakland-55	C.22.a	The additional report submittal due on October 15 of each year is unnecessary. To reduce the reporting burden, delete the additional report submittal requirement.	We agree the requirement is duplicative and have removed the October 15 report submission.	Removed additional October 15 report.

No comments were received on Provisions C.23 – 27.

Staff initiated changes: In addition to the changes made to the Tentative Order in response to comments received, minor staff-initiated changes were also made, for example to fix errors and provide further clarity.

California Regional Water Quality Control Board
San Francisco Bay Region

Order No. R2-2023-0019

Amendment of Order No. R2-2022-0018
(NPDES Permit No. CAS612008)
For Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Permittees

WHEREAS the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds the following:

1. The California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), adopted Order No. R2-2022-0018 to reissue the San Francisco Bay Municipal Regional Stormwater Permit (MRP or Permit) at a public hearing on May 11, 2022. The Permit regulates municipal stormwater discharges by the following jurisdictions and entities, hereafter collectively referred to as the Permittees:

   The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees);

   The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees);

   The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees);

   The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees); and

   The cities of Fairfield, Suisun City, and Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance (Solano Permittees).

2. At the May 11, 2022, hearing, the Water Board directed Water Board staff to report back to the Board on certain Permit topics such as including alternative treatment or low impact development (LID) measures in Regulated Projects (as that term is defined in the Permit) and the impacts, if any, on the Permit's Category C Special Project (Affordable Housing) LID credits on housing costs.
3. Since the Permit's adoption, Water Board staff convened numerous stakeholder meetings and workgroups related to the Permit, including on alternative treatment systems and Category C Special Projects. Based on new information, this Order amends the Permit. Specifically, this Order adds Provision C.3.c.i.(2)(c)(iii) to the Permit to allow for the implementation of alternative treatment systems upon a demonstration of technical infeasibility of LID treatment systems and a demonstration of commensurate benefit, among other requirements. This Order also amends the Category C Special Projects Provision of the Permit so that it better aligns with affordable housing projects built in the San Francisco Bay Region by modifying Provision C.3.e.ii.(5)'s method for calculating LID Affordable Housing Credits and making related changes. Further, the Order modifies Section C.3.e.ii.(5) of Permit Attachment A (Fact Sheet) to be consistent with the changes to the Category C Special Projects Provision.
4. The Fact Sheet for this Order (Attachment 1) contains background information and the rationale and basis for this Order's requirements. It is hereby incorporated into this Order by reference and constitutes findings for this Order.
5. This Order is exempt from the provisions of the California Environmental Quality Act pursuant to Water Code section 13389. This Order does not cover new sources as defined by the federal Clean Water Act (CWA) (i.e., sources constructed after new source performance standards were published).
6. Pursuant to Water Code section 13149.2, the Water Board has considered readily available information concerning potential water quality impacts in disadvantaged communities and tribal communities that may result from the adoption of this Order. As described in Finding 3, this Order makes modifications to the Permit. The authorization of alternative treatment systems and the modification to the Permit's Category C Special Projects will not result in water quality impacts. The modifications take into account potential water quality impacts and incorporate measures to protect water quality or otherwise provide offsetting water quality benefits (see Attachment 1, pp. A-18 to A-19, Antidegradation).

   There were no environmental justice concerns raised pertaining to water quality impacts within the Water Board's authority. However, interested persons raised other environmental justice concerns regarding potential adverse impacts that the MRP's road reconstruction requirements could have on road safety in disadvantaged communities. The Water Board considered these concerns and determined that the concerns are not supported and changes to the requirements of the Order are not warranted. The requested changes to the MRP's road reconstruction requirements would result in adverse water quality impacts in disadvantaged communities and are not authorized under the NPDES regulations (40 C.F.R. § 122.62).

7. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments. The Water Board also notified potentially affected disadvantaged communities and tribal communities of this Order and provided them with an opportunity to engage prior to the public comment period.
8. The Water Board, in a public meeting on October 11, 2023, heard and considered all comments pertaining to this Order. The Fact Sheet for this Order provides details regarding the public hearing.

IT IS HEREBY ORDERED, pursuant to the provisions of California Water Code Division 7 (commencing with §13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, that the Permittees shall comply with the Permit as amended by this Order. Additions are displayed as underline type and deletions are displayed as ~~strikethrough~~ format.

1. Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems is added to Order No. R2-2022-0018, as follows:

   (iii) Alternative Treatment Systems

   Permittees may allow a Regulated Project to comply with the Provision C.3.d design volume and/or flow requirement for the approved portion (Approved Portion)[a] using an alternative treatment system (i.e., onsite non-LID treatment systems (e.g., media filters) in combination with systems providing flow control benefit), as follows:

   a. Alternative treatment systems may be implemented in the following two geographic areas, as identified in a Countywide Hydromodification Applicability Map accepted by the Executive Officer:

      1. Areas draining to channels that are hardened continuously from the point of discharge into the channel to San Francisco Bay or to the Pacific Ocean; and

      2. Areas draining directly into the Bay, the Ocean, or channels that are tidally influenced at the point of discharge into the channel.

   Before a Permittee may implement alternative treatment systems, the Permittee shall, among other requirements in this Provision C.3.c.i.(2)(c)(iii), re-submit the applicable portions of its respective Countywide Hydromodification Applicability Map to accurately identify the two geographic areas described above and the resubmitted applicable

[a] The Approved Portion is the portion of the Provision C.3.d design volume/flow that may be treated using non-LID treatment measures, as substantiated in the Demonstration of Technical Infeasibility and Demonstration of Commensurate Benefit that have been approved by the Executive Officer.

portions of the map must be accepted by the Executive Officer as accurate.

b. Alternative treatment systems in the two geographic areas listed in Provision C.3.c.i.(2)(c)(iii)a must have an active General Use Level Designation certification for Enhanced Treatment from the Washington State Department of Ecology's Technology Assessment Protocol – Ecology (TAPE) Program.[b]

c. Implementation of alternative treatment systems requires a Demonstration of Technical Infeasibility[c] that has been submitted by the Permittee to the Water Board and approved by the Executive Officer for each Regulated Project where an alternative treatment system is proposed. Permittees shall include the following documentation in the Demonstration of Technical Infeasibility:

1. The technical constraints (spatial, utility, or other) to treating 100 percent of the Provision C.3.d design volume and/or flow onsite and offsite using LID and that the Regulated Project maximizes LID treatment within those constraints. This must include an assessment of the technical feasibility of incorporating all potential types and configurations of LID, including, but not limited to, the following: runoff capture and use, suspended pavement systems with the approved biotreatment soil media (e.g., Silva cells), bioretention, green roofs, pervious pavement systems, and infiltration galleries.

   For onsite technical infeasibility, a demonstration that the Regulated Project will implement LID in or on all potential or actual onsite landscaping opportunities[d] and that there are no potential or actual onsite landscaping opportunities in or on which LID will not be implemented.

   For offsite technical infeasibility, demonstration that there are no opportunities to implement[e] an equivalent amount of LID in the adjacent or nearby public right of way (ROW) for the Regulated

[b] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

[c] Examples for the Demonstrations of Technical Infeasibility and Commensurate Benefit are provided in the Fact Sheet.

[d] Landscaping opportunities include, but are not limited to: roofs, terraces, patios, courtyards, plazas, quadrangles, athletics areas, outdoor pool areas, playgrounds, parks, bike-separation strips, and adjacent public sidewalks, roads, and rights of way (ROWs).

[e] "Implement" in this paragraph is defined to include not only direct implementation by the project proponent, but also indirect implementation via contribution of funding and/or resources to another entity which will construct and/or maintain an equivalent amount of LID.

Project; elsewhere in the Permittee's jurisdiction (including opportunities identified in the Permittee's GI Plan); and elsewhere in the same county (including opportunities identified in the GI Plans of other Permittees in the county).

2. How LID was considered by both the project proponent and by the Permittee from the early stages of the project's planning and entitlement processes and how that resulted in the project's final design.

d. Implementation of alternative treatment systems requires a Demonstration of Commensurate Benefit[c] that has been submitted by the Permittee to the Water Board and approved by the Executive Officer for each Regulated Project where an alternative treatment system is proposed. Permittees shall include the following documentation in the Demonstration of Commensurate Benefit:

1. That the alternative treatment system includes TAPE-certified (pursuant to Provision C.3.c.i.(2)(c)(iii)(b)) treatment controls sized to accommodate the Provision C.3.d design volume and/or flow.

2. That the alternative treatment system includes flow controls that, based on monitoring and/or field studies, provide flow control benefit commensurate to the flow control benefit of LID measures had they been implemented for the project.

   At a minimum, this shall include consideration of vertical infiltration into soils (including soils with low infiltration rates), horizontal infiltration, evapotranspiration, and the effect of inter-event periods on antecedent soil conditions. In places where infiltration is not allowed because of permanent high groundwater (i.e., less than 10 feet below the surface) or documented existing significant soil and groundwater contamination, flow control benefits may be compared to those from lined bioretention cells.

e. Implementation – Permittees may implement Provision C.3.c.i.(2)(c)(iii) after they have collectively submitted a Regional Guidance Document to facilitate Permittees' compliance with the Demonstration of Technical Infeasibility and with the Demonstration of Commensurate Benefit and the Executive Officer has approved the Regional Guidance Document.

   At a minimum, the Permittees shall include the following in the Regional Guidance Document:

1. Regional guidance to ensure that Permittees and projects seeking to use alternative treatment systems comply with the requirements for

the Demonstrations of Technical Infeasibility and Commensurate Benefit set forth in Provisions C.3.c.i.(2)(c)(iii)c-d;

2. Review of data from monitoring and/or field studies, and guidance on the use of that data sufficient to demonstrate commensurate benefit;

3. Guidance on how the Demonstrations of Technical Infeasibility and Commensurate Benefit apply to different types of projects; and

4. How Permittees will incorporate assessment of technical infeasibility and commensurate benefit into the early stages of their municipal planning processes.

If the Permittees choose to submit a Regional Guidance Document, they must do so on or before the deadline set forth in Provision C.3.c.i.(2)(c)(iii)f.2. The Regional Guidance Document is subject to the approval of the Executive Officer. If the Executive Officer determines that the Regional Guidance Document is sufficiently detailed to enable Permittee review of Demonstrations of Technical Infeasibility and Commensurate Benefits for Regulated Projects on a consistent, objective, and rigorous basis, the Executive Officer may, in the approval of the Regional Guidance Document, allow Permittee[f] approval of the Demonstration of Technical Infeasibility and of the Demonstration of Commensurate Benefit for Regulated Projects in lieu of the requirement for Executive Officer approval of both demonstrations, contingent on Permittees implementing the approved Regional Guidance Document for those Regulated Projects.

f. Reporting

1. In each Annual Report, Permittees shall provide the following information for each Regulated Project that is implementing Provision C.3.c.i.(2)(c)(iii): the final percentage of LID treatment and non-LID treatment and all other information reported for Regulated Projects pursuant to Provision C.3.b.iv.

2. If the Permittees choose to submit the Regional Guidance Document—which is a prerequisite to their implementation of Provision C.3.c.i.(2)(c)(iii)—it shall be submitted no later than with the 2025 Annual Reports.

2. Provision C.3.e.ii.(5) Category C Special Project Criteria (Affordable Housing) of Order No. R2-2022-0018 is amended, as follows:

(5) Category C Special Project Criteria (Affordable Housing)

[f] The Permittee in whose jurisdiction the project is located.

(a) For the purposes of attributing Affordable Housing Credits, affordable housing is defined as preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the ~~total household income, and which meets the following income levels specified in maximum~~ area median household income (AMI) limits adjusted for household size based on the maximum percentage of AMI for each income category, which are defined by the Federal Department of Housing and Urban Development~~'s~~ (HUD'~~s)~~ ~~definition of~~ for affordable housing in metropolitan areas as follows: ~~For metropolitan areas, HUD defines~~ Acutely Low household incomes as 0-15 percent of AMI, Extremely Low household incomes as ~~0~~16-30 percent of ~~area median household income (~~AMI~~)~~, Very Low household incomes as 31-50 percent of AMI, Low household incomes as 51-80 percent of AMI, and Moderate household incomes as 81-120 percent of AMI.[g]

To be considered a Category C Special Project, a Regulated Project must additionally meet both of the following criteria:

(i) Be primarily a residential development project,[h] and

(ii) Achieve at least a gross density of 40 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of four different types of credits that the Category C Special Project may qualify for, namely: Affordable Housing, Location, Density, and Minimized Surface Parking Credits. The total maximum LID Treatment Reduction Credit for any Category C Special Project may not exceed 100 percent.

(c) Affordable Housing Credits: A Category C Special Project may qualify for Affordable Housing Credits, according to the following criteria. The income limits that shall be used for these criteria are the most current Official State Income Limits (adjusted for household size, and specific to each county), which are defined on the California Department of

[g] Emergency homeless shelters constructed pursuant to and consistent with Government Code § 8698.4, including the definition of "homeless shelter" in subdivision (c), and that are temporary are not Regulated Projects under Provision C.3.b. As such, they are not subject to Provisions C.3.c (Low Impact Development) and C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) and shall instead comply with Provision C.3.i (Site Design Measures for Small Projects) and implement relevant best management practices developed under Provision C.17 (Discharges Associated with Unsheltered Homeless Populations). Should the homeless shelter become permanent and the impervious surfaces it created or replaced meet the thresholds for a Regulated Project, or if there is a new Regulated Project and/or Special Project at the site, the project shall comply with Provision C.3, including Provisions C.3.c and C.3.d.

[h] At least two-thirds of the square footage of the project must be designated for residential use.

Housing and Community Development's website.[i,j] All qualifying affordable housing DUs must be preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income.

In each Category C Special Project, up to three DUs that are used as building manager's DUs may be exempted from the deed restriction requirement and may be excluded from the calculations described below in Provision C.3.e.ii.(5)(c)(i)-(ii).

The following two steps shall be used to calculate Affordable Housing Credits:

(i) First, the percentage of the project's DUs in each affordability category are multiplied by the respective credit multipliers, according to the table below, and rounded to the nearest whole number.

AMI	Credit Multiplier
Moderate (≤120% of AMI)	0.20
Low (≤ 80% of AMI)	1.00
Very Low (≤ 50% of AMI)	2.00
Extremely Low (≤30% of AMI)	3.00
Acutely Low (≤15% of AMI)[k]	4.00

(ii) Second, the credits generated from the table above in the first step in Provision C.3.e.ii.(5)(c)(i) are summed together to produce a weighted sum and rounded to the nearest whole number. Then Affordable Housing Credit is granted according to which weighted sum range (in the table below) that whole number (X) falls into.

Weighted Sum (whole number)	Affordable Housing Credit
X ≤ 9%	0%

[i] ~~https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml~~https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits

[j] As of ~~December 31, 2021~~June 6, 2023, they are: ~~https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf~~ https://www.hcd.ca.gov/sites/default/files/docs/grants-and-funding/income-limits-2023.pdf

[k] DUs that are free to tenants, i.e., that do not charge tenants any rent/mortgage, are included in this category.

10% ≤ X ≤ 20%	20%
21% ≤ X ≤ 30%	30%
31% ≤ X ≤ 40%	40%
41% ≤ X ≤ 50%	50%
51% ≤ X ≤ 60%	60%
61% ≤ X ≤ 70%	70%
71% ≤ X ≤ 80%	80%
81% ≤ X ≤ 90%	90%
91% ≤ X	100%

~~To qualify for 70 percent Affordable Housing Credit:~~

~~100 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 75 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 25 percent of the project's DU's must have monthly rent/mortgage rates[k] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).~~

~~To qualify for 50 percent Affordable Housing Credit:~~

~~At least 75 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 15 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).~~

~~To qualify for 25 percent Affordable Housing Credit:~~

~~At least 50 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Moderate~~

~~household income level (≤ 120 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 15 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 5 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).~~

~~AMI~~	~~Minimum Percentage of DUs~~		
	~~70% credit~~	~~50% credit~~	~~25% credit~~
~~Moderate (≤120% of AMI)~~	~~100~~	~~75~~	~~50~~
~~Low (≤80% of AMI)~~	~~75~~	~~50~~	~~25~~
~~Very Low (≤50% of AMI)~~	~~50~~	~~25~~	~~15~~
~~Extremely Low (≤30% of AMI)~~	~~25~~	~~15~~	~~5~~

3. Provision C.3.e.v.(3)(f) Reporting on Special Projects of Order No. R2-2022-0018 is amended, as follows:

   (f) Category C Projects: Number of DUs in each AMI Category and Number of Manager's DUs: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, ~~and~~ Extremely Low, and Acutely Low area median household income levels specified in Provision C.3.e.ii.(5)(c), and the number of Manager's DUs (up to 3).

4. Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects of Order No. R2-2022-0018 is amended, as follows:

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Total Impervious Surface Created/ Replaced	Gross Density DU/Ac	Category C Projects: Number of DUs in each AMI Category & Number of Manager's DUs	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No.: Number of the Special Project as it appears in Table 3.1.

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Total Acreage: Total site area in acres.

Total Impervious Surface Created/Replaced: The total impervious surfaced in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

Gross Density in DU/Ac: Number of dwelling units per acre.

Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, ~~and~~ Extremely Low, and Acutely Low area median household income levels specified in Provision C.3.e.ii.(5)(c) , and the number of Manager's DUs (up to 3).

FAR: Floor Area Ratio.

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

5. Section C.3.e.ii.(5) of Attachment A (Fact Sheet) of Order No. R2-2022-0018 is amended, as follows:

   Provision C.3.e.ii. (Special Projects) . . .

   Category C additionally includes affordable housing criteria for determining the total LID Treatment Reduction Credit available for Category C Special Projects. Affordable housing criteria are included in Category C, for two primary reasons. First, affordable housing projects typically have high DUs/acre (as further incentivized by the Density Credits) and are typically located near public transportation (as further incentivized by the Location Credits), and thus they likely produce less automobile traffic (i.e., less pollutant loading to the MS4) compared to other development and redevelopment projects that do not have those characteristics. Second, affordable housing credited by this Provision will help reduce unsheltered homelessness, which will reduce pollutant discharges (e.g., of trash and sewage) from homeless encampments and other sources (e.g., RVs) into MS4s.[l] The Water Board recognizes that whether to allow for affordable housing is entirely within the Permittees' land use and zoning authority and discretion. The Water Board is not a land use agency and has not established an inclusionary housing policy in the Permit; instead, the Permit recognizes the indirect water quality benefit provided by housing development based on the level of affordability of their DUs, and accordingly provides an amount of non-LID credit proportional to that affordability. Since such development can reduce pollutants from MS4 systems, the Affordable Housing Credits are provided in the Permit~~. It will benefit the unhoused population,~~ as follows: ~~The affordable housing criteria are structured in such a way that~~ greater flexibility is granted to ~~DUs~~projects with greater levels of affordability.~~significant portions of the allowable~~ DUs with rent/mortgage rates ~~are~~capped for Acutely Low income households (0-15% AMI) receive the greatest amount of credit, followed by Extremely Low income households (16-30% of AMI), Very Low income households (31-50% of AMI), ~~and~~ Low income households (51-80% of AMI), and Moderate income households (81-120% of AMI).~~,~~ The Permit takes this approach rather than, for example, granting 100 percent credit to housing projects that have only a small number of DUs affordable to ~~allowing all affordable housing units to qualify even if they only are affordable for~~ Moderate income households, ~~(81-120% of AMI)~~ which limit affordability to a significant portion of the population. The link to water quality improvement is expected to decline as

[l] Batko, Oneto, and Shroyer, Dec. 2020. Unsheltered Homelessness: Trends, Characteristics, and Homeless Histories. Urban Institute, pp. 12-13.

Kushel, Moore, et al., June 2023. Toward a new understanding: The California statewide study of people experiencing homelessness. UCSF. Incl. pp. 83-84.

See also Fact Sheet Sections C.10-5(4) (Attachment A – 234), C.10.f.ii (Attachment A, p. A-247), and C.17 (Attachment A, p. A-326) for discussion of the adverse water quality impacts of unsheltered homelessness.

rent/mortgage rates increase, as rent/mortgage rates as high as the Moderate level are likely to reduce unsheltered homelessness and its associated impacts at a much lower rate.

The other Category C credits (location, density, and parking criteria) are maintained from the Previous Permit but reduced. This is so that Affordable Housing Credits are the dominant credit for Category C projects, while still recognizing the benefits provided by location, density, and parking criteria, and so that the total possible credit available for Category C Special Projects remains 100 percent. Category C of the Previous Permit primarily credited transit-oriented development (via Location Credits) and resulted in the treatment of ~~approximately~~ 414~~324~~ acres of impervious surface by non-LID measures region-wide, most of which is attributable to projects for which the Permittees' reporting did not clearly demonstrate that it would have been infeasible to incorporate onsite LID or contribute to offsite LID. ~~as allowed by Provision C.3.e.i.~~

Provision C.3.e.ii.(5) excludes from compliance with Provisions C.3.c (Low Impact Development) and C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) emergency housing projects for people experiencing unsheltered homelessness, when those projects are constructed pursuant to and consistent with Government Code § 8698.4, including the definition of "homeless shelter" in subdivision (c), and that are temporary.[m] It requires those projects instead to comply with Provision C.3.i (Site Design Measures for Small Projects) and to implement relevant best management practices developed under Provision C.17 (Discharges Associated with Unsheltered Homeless Populations), such as provision of appropriate trash collection and sanitary sewage services.[n] This recognizes the projects' water quality benefits from reducing the number of people experiencing unsheltered homelessness, and the discharges associated with unsheltered homelessness, as described elsewhere in this section. As described in the Fact Sheet section for Provision C.17, it further recognizes the urgent need for such projects and the limited resources available to address unsheltered homelessness relative to the identified need. The flexibility is justified by the water quality benefit from reducing unsheltered homelessness and because it is temporary. If the project becomes permanent and if its created or replaced impervious surfaces meet the thresholds for a Regulated Project, or if a new Regulated Project or Special Project

[m] Examples of temporary emergency housing projects are: formal "community cabin" or tent communities; RV safe parking areas; and homeless "navigation centers" with housing, that are temporary and provide housing for people experiencing unsheltered homelessness.

[n] Examples of additional best management practices that could be considered include, but are not limited to, those described in the Bay Area Municipal Stormwater Collaborative report, dated September 30, 2023. "Regional Best Management Practices Report for Addressing Non-Stormwater Discharges Associated with Unsheltered Homeless Populations." At the time of Permit amendment, the Report had been recently submitted and was under review by the Water Board.

is constructed, then it must comply with Provision C.3, including Provisions C.3.c and C.3.d.

Water Board staff convened a Category C Special Projects / Affordable Housing Workgroup, which met seven times between September 2022 and April 2023, to discuss the Provision C.3.e.ii.(5) Category C Special Project Criteria (Affordable Housing). The Workgroup was co-led by Permittee staff and Water Board staff. Workgroup participants included non-profit/affordable housing advocates, for-profit housing advocates, municipal housing authorities, Permittees, MTC/ABAG, engineering consultants, and others. Presentations were given by various Workgroup participants on the following topics: 1) Definitions of affordable housing; 2) The kinds of projects implemented in the region that include affordable housing; 3) Concerns about how those affordable housing projects may be affected by the existing Category C Special Project Criteria; and 4) Recommended changes to Category C Special Projects. The Workgroup and Water Board work identified new information and Water Board review of that information led to modifications of the crediting criteria first adopted by the Water Board to better align the criteria with the range of affordable housing projects being built in the Bay Area and their associated water quality benefits. The projects range from fully affordable projects, typically constructed by public agencies or non-profit entities, to projects with lesser amounts of affordability, typically constructed by for-profit developers. The revised criteria continue to grant the maximum amount of flexibility to fully affordable projects and "sliding scale" flexibility to other projects, with more flexibility granted to projects that are more affordable. This recognizes that more affordable projects have greater water quality benefit and can also be more challenging to construct because of the amount of money required to support the more affordable units. Managers' units, which are usually not income restricted, have been excluded from the calculation to avoid unintended adverse consequences of limiting flexibility for otherwise affordable projects. The definition for "primarily residential projects" in Provision C.3.e.ii.(5)(a)(i) is intended to facilitate implementation of that subprovision and requires at least two-thirds of the square footage to be residential, which aligns with and is the definition of housing developments in California Government Code section 65589.5, subdivision (h)(2)(B).

Therefore, Category C ~~has been revised to~~ solely target~~s~~ affordable housing development and redevelopment projects, as Provision C.3.e.i in this Permit already provides sufficient flexibility for other non-affordable housing development and redevelopments that would have qualified as Category C Special Projects in the Previous Permit.

To be considered a Category C Special Project, the Regulated Project must be primarily a residential development project, achieve at least a gross density of 40 DU/acre, and the project's DUs must comply with the criteria outlined in Provision C.3.e.ii.(5)(c), which ~~are~~ includes two steps. In the first step, the percentage of the

project's DUs in each affordability category are multiplied by the respective credit multipliers (0.20 for Moderate, 1.00 for Low, 2.00 for Very Low, 3.00 for Extremely Low, and 4.00 for Acutely Low) and rounded to the nearest whole number. In the second step, the credits generated by the multiplication in the first step are summed together to produce a weighted sum, and then Affordable Housing Credits are granted according to which range that weighted sum falls into. For example, if the weighted sum is 45 percent, that would fall into the 41-50 percent Affordable Housing Credit Tier range, and therefore the maximum allowable Affordable Housing Credit that the project could qualify for would be 50 percent. The credit multipliers are structured to recognize the increasing benefit provided by increasing levels of affordability. The result is that significantly affordable projects have maximum flexibility. However, less affordable projects are given "sliding scale" flexibility that recognizes their contribution to reductions in polluted discharges associated with unsheltered homelessness. Therefore, the credit multiplier for DUs in the Extremely Low income affordability category is greater than the credit multiplier for DUs in the Very Low income affordability category, and the credit multiplier for DUs in the Acutely Low income affordability category is greater than the credit multiplier for DUs in the Extremely Low income affordability category. The Affordable Housing Credit Tier ranges provide additional flexibility and simplicity by allowing projects to claim additional non-LID credit according to the range that the weighted sum falls into; for example, a project with a weighted sum as low as 21 percent could claim an Affordable Housing Non-LID Credit as high as 30 percent. ~~for 70 percent Affordable Housing Credit, 100 percent of the DUs within a Category C Special Project must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 75 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 50 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 25 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). Likewise, for 50 percent Affordable Housing Credit, 75 percent of the affordable housing DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 50 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). These criteria, when implemented for Category C Special Projects, will reduce pollutant discharges from unhoused peoples into MS4s when they are housed by the newly-provided affordable housing. Finally, for 25 percent Affordable Housing Credit, 50 percent of the affordable housing DUs must have rent/mortgage~~

~~rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 5 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI).~~

Examples for Provision C.3.e.ii.(5) Category C Special Project Criteria (Affordable Housing)

Example #1: A private project consisting of 100 DUs on 1 acre of land, with preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income, with the following affordability for those DUs:

2 market-rate Managers' DUs,

13 market-rate non-Managers' DUs,

40 Moderate DUs (40/98 = 41%),

15 Low DUs (15/98 = 15%),

20 Very Low DUs (20/98 = 20%),

10 Extremely Low DUs (10/98 = 10%), and

0 Acutely Low DUs (0/98 = 0%).

The percentages of DUs in each income category would be multiplied by the respective credit multipliers, and summed together as follows: (0.20)*41% + (1.00)*15% + (2.00)*20% + (3.00)*10% + (4.00)*0% = 93%. That weighted sum of 93% would fall into the following Affordable Housing Credit Tier: 90% < 93% ≤ 100%. Therefore, this project could qualify for an Affordable Housing Credit of up to 100 percent.

Example #2: A private project consisting of 100 DUs on 1 acre of land, with preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income, with the following affordability for those DUs:

3 market-rate Managers' DUs,

22 market-rate non-Managers' DUs,

40 Moderate DUs (40/97 = 41%),

20 Low DUs (20/97 = 21%),

10 Very Low DUs (10/97 = 10%),

5 Extremely Low DUs (5/97 = 5%), and

0 Acutely Low DUs (0/97 = 0%).

The percentages of DUs in each income category would be multiplied by the respective credit multipliers, and summed together as follows: (0.20)*41% + (1.00)*20% + (2.00)*10% + (3.00)*5% + (4.00)*0% = 64%. That weighted sum of 64% would fall into the following Affordable Housing Credit Tier: 61% < 64% ≤ 70%. Therefore, this Category C Special Project could qualify for an Affordable Housing credit of up to 70 percent.

If combined with up to 10% Location Credit, 15% Density Credit, and 5% Minimized Surface Parking Credit, this Category C Special Project could qualify for up to 100% non-LID Treatment Reduction Credit (70% + 10% + 15% + 5% = 100%).

6. Order No. R2-2022-0018 is hereby amended as shown in this Order.
7. This Order shall become effective on November 1, 2023.

I, Eileen White, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 11, 2023.

Recoverable Signature

X Eileen M. White

Eileen White
Executive Officer
Signed by: Eileen White

Attachment I – Fact Sheet

ATTACHMENT I – FACT SHEET

This Fact Sheet describes the additional rationale and basis for this Order's requirements beyond those set forth in the Fact Sheet for the San Francisco Bay Municipal Regional Stormwater Permit (MRP or Permit) (Order No. R2-2022-0018, NPDES Permit No. CAS612008).

Background

The Water Board adopted the Permit at a public hearing on May 11, 2022. The Permit regulates municipal stormwater discharges from those dischargers (Permittees) listed on page one of this Order and encompasses Alameda, Contra Costa, San Mateo, Santa Clara, and Solano counties in the San Francisco Bay region. In adopting the Permit, the Water Board asked staff to report back on certain Permit topics, such as the inclusion of low impact development (LID) or alternative treatment measures in Regulated Projects, as that term is defined in the Permit, and a review of Provision C.3.e.ii.(5) Category C Special Project (Affordable Housing) criteria and its potential impacts on housing costs. In response, the Water Board staff convened several workgroups on these and other topics. Through these workgroups, the Water Board received and reviewed new information related to alternative treatment systems and Category C Special Projects that gave cause to modify the Permit.

Specifically, this Order amends the Permit by adding Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems to the Permit to allow certain Regulated Projects to treat runoff using an alternative treatment system. Those Regulated Projects for which it is technically infeasible to treat a portion of the Provision C.3.d design volume and/or flow via LID may use alternative treatment systems for that portion, as long as those systems meet the alternative treatment system requirements of Provision C.3.c.i.(2)(c)(iii). Among other requirements, this includes providing a demonstration of technical infeasibility of LID treatment systems and a demonstration of commensurate benefit. Commensurate benefit includes combining alternative treatment controls with flow controls so that the alternative treatment system's water quality benefits (i.e., improvements to runoff quality and hydrologic benefits that benefit downstream water quality) are consistent with those provided by the Permit's LID standard. To ensure this is the case, the area where alternative treatment systems are allowed is limited to areas where LID's broader water quality benefits are relatively more limited, and the benefits provided by alternative treatment systems are comparable to LID.

This Order also modifies Permit Provision C.3.e.ii.(5) Special Projects: Category C to better align it with how affordable housing projects are planned and built in the region, and to exempt from Provision C.3.c and C.3.d temporary emergency homeless shelters for people experiencing unsheltered homelessness, instead requiring those projects to comply with Provision C.3.i and to implement relevant best management practices developed under Provision C.17. The modification better facilitates the construction of affordable housing, and temporary transitional shelters, that reduce~~s~~ water quality impacts associated with unsheltered homelessness.

Authority to Amend the Permit

The Water Board may amend the Permit with good cause pursuant to 40 C.F.R. §122.62(a)(2), if it receives new information that was not available at the time of the Permit's issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance. After the Permit's May 2022 issuance, the Water Board obtained new information, as described below, that would have justified revised Permit conditions if the information was available at the time of the Permit's issuance. The Water Board developed the amendments to the Permit consistent with the new information and the Permit's existing structure.

New Information Regarding the Equivalency of Alternate Treatment Systems Justifying the Addition of Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems

In August 2022, following the Permit's reissuance in May 2022, Water Board staff convened an Alternative Treatment Systems Workgroup, which met seven times through April 2023. Presentations and discussions in this workgroup produced new information which led to this Order's addition of Provision C.3.c.i.(2)(c)(iii) related to alternative treatment systems. This new information, which we elaborate on below, included the following: (1) analysis of the equivalency of water quality benefits (including flow control) and urban greening benefits provided by LID systems and by alternative treatment systems; (2) identification of geographic areas in which flow control benefits are relatively less significant than in other geographic areas, thereby warranting in those areas allowance of alternative treatment systems in combination with systems providing flow control benefit; and (3) analogous requirements in other relevant MS4 NPDES permits, in particular the Washington State Department of Ecology's (Ecology's) series of MS4 NPDES permits and their use of Ecology's Technology Assessment Protocol – Ecology (TAPE) program,[1] which informed the Order's use of the TAPE certification and, in part, the Order's commensurate benefit approach. This new information resulted in a framework for where and how alternative treatment systems could be considered to provide commensurate water quality benefit as LID. The new information would have justified allowing alternative treatment systems in the manner allowed under this Order when the Permit was issued.

New information showed that alternative treatment systems, in combination with flow controls, have the potential to provide a commensurate water quality benefit as compared to LID systems. For example, the recent analysis of the 2018 San Francisco Estuary Institute (SFEI) study,[2] which looked at performance both by LID systems and

[1] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

[2] Gilbreath, A.; Pearce, S.; Shimabuku, I.; McKee, L. 2018. Bay Area Green Infrastructure Water Quality Synthesis. SFEI Contribution No. 922. San Francisco Estuary Institute: Richmond, CA. https://www.sfei.org/documents/bay-area-green-infrastructure-water-quality-synthesis

by non-LID media filters, supports this.[3] In addition, new information showed that the flow control benefits of LID systems are relatively less significant in certain geographic areas in the region, namely areas draining stormwater to channels that are hardened continuously from the point of discharge to San Francisco Bay or the Pacific Ocean or that drain stormwater directly into San Francisco Bay, the Pacific Ocean, or other tidal waters.[4] Accordingly, the Permit amendment limits alternative treatment systems to these areas.

New information on the analogous requirements in other relevant MS4 NPDES permits included the Western Washington Phase II MS4 Permit (and the Washington State Phase I MS4 Permit),[5] which incorporates the TAPE program, under which Ecology reviews and certifies the performance (with respect to reductions in concentration) of alternative treatment systems. The Water Board received new information that the TAPE program ensures certified systems meet a minimum level of performance that is comparable to the Permit's bioretention media performance in terms of pollutant concentration reductions at specified influent concentration ranges. New information on analogous requirements of other relevant MS4 NPDES permits includes the following: the North Coast Regional Water Quality Control Board's Phase I MS4 Permit, which includes an onsite LID retention requirement and only allows onsite alternative treatment systems when onsite LID is determined to be technically infeasible and requires Executive Officer approval for implementation of offsite treatment measures; the Central Coast Regional Water Quality Control Board's Phase I MS4 Permit, which includes an onsite LID retention requirement for nine out of ten watershed management zones; and the Los Angeles Regional Water Quality Control Board's Phase I MS4 Permit, which includes an onsite LID retention requirement and only allows onsite alternative treatment systems when onsite LID is determined to be technically infeasible, subject to Executive Officer approval. Water Board staff also met with San Diego Regional Water Quality Control Board staff regarding their Phase I municipal regional stormwater permit,[6] including that permit's onsite retention requirement and its

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[3] Water Board review of 2018 SFEI study "Bay Area Green Infrastructure Water Quality Synthesis," May 2023. The Water Board analysis of the 2018 SFEI study indicates that it is not clear that media filters have significantly greater performance than LID systems, given the small sample size of media filters (2) compared to LID facilities (8) in the study, the range of influent concentrations for each monitored system, and the study's self-identified limitations.

[4] While not new information, the Water Board also considered general information regarding potential increases to near-Bay groundwater elevations associated with rising tides, because higher groundwater levels can reduce infiltration from a treatment control into the surrounding ground when they are close to the bottom of the control.

[5] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits The Phase II MS4 Permit thresholds that trigger the requirement to include onsite treatment control measures are significantly lower than the MRP's thresholds, and a baseline expectation that post-construction discharge rates match the pre-development condition (i.e., "make it better"). This contrasts with the MRP's baseline less-stringent expectation that post-construction discharge rates only match the pre-construction condition (i.e., "don't make it worse").

[6] https://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/

allowance of implementation of onsite non-LID only if the project provides offsite mitigation with equivalent retention.

Finally, the Water Board considered other jurisdictions' requirements for onsite retention of a certain quantity of stormwater since onsite retention prevents pollutants in the retained runoff from being discharged to receiving waters and mitigates its hydromodification effects. While some of this information was available at the time of Permit issuance, other information (e.g., Pennsylvania's work to update its stormwater manual) was received after the issuance. All the information was newly contextualized with consideration of the role that alternative treatment systems could play:

1. Anacostia, Washington, D.C.: Retain onsite the first one inch of rainfall and provide water quality treatment for rainfall up to the two-year storm volume; offsite mitigation is allowed when onsite retention is infeasible, but only at a ratio of either 1:1.5 (for physical offsets) or 1:2 (for in-lieu fee payments);[7]
2. Central Coast, California (Regional Water Board, Phase II): Limit effective impervious area (EIA) at development projects to no more than 5 percent of total project area (interim criteria); establish an EIA limitation between 3 and 10 percent in local stormwater management plans (permanent criteria);[8]
3. Federal Buildings over 5,000 square feet (under U.S. EPA's draft guidance for implementation of the Energy Independence and Security Act of 2007): Manage onsite (i.e., prevent the offsite discharge of) the 95th percentile storm through infiltration, harvesting, and/or evapotranspiration;
4. Pennsylvania: Capture at least the first two inches of rainfall from all impervious surfaces and retain onsite at least the first one inch of runoff (through reuse, evaporation, transpiration, and/or infiltration); at least 0.5 inch must be infiltrated;[9]

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[7] Anacostia Waterfront Corporation (June 1, 2007) Final Environmental Standards, p. 16; *See also*, State Water Resources Control Board (December 2007) A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption, at 20-21.

[8] Central Coast Regional Water Quality Control Board, Letter from Roger Briggs re: Notification to Traditional, Small MS4s on Process for Enrolling under the State's General NPDES Permit for Storm Water Discharges (Feb. 15, 2008).

[9] Pennsylvania Department of Environmental Protection (December 30, 2006) *Pennsylvania Stormwater Best Management Practices Manual*, Chapter 3, p.7. Additionally, Pennsylvania is currently completing an update to the Manual (in draft as of Dec. 2022) that continues to focus on management of volume as a key component of water quality and recognizes the increased importance of that aspect as the result of climate-change-driven changes in precipitation intensity, depth, and frequency. Furjanic, Traver, Bowen, and Hess, Nov. 2022. PA DEP Stormwater Manual Updates (slide presentation).

5. Philadelphia, Pennsylvania: Infiltrate the first one inch of rainfall from all impervious surfaces; if onsite infiltration is infeasible, the same performance must be achieved offsite;[10] and

6. West Virginia: Retain onsite the first one inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation.[11]

Rationale and Basis for the Addition of Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems

The modifications in the Order allow certain Regulated Projects to treat runoff using an alternative treatment system that has a commensurate benefit with LID treatment measures if LID treatment is infeasible and other requirements are met. This is consistent with the requirement in CWA section 402(p)(3)(B)(ii) to reduce the discharge of pollutants to the maximum extent practicable. Among other requirements, alternative treatment systems must be combined with flow controls so that their water quality benefits—improvements to runoff quality and hydrologic benefits that benefit downstream water quality—are consistent with those provided by the Permit's LID standard. To ensure this is the case, the areas where alternative treatment systems are allowed are limited to areas where LID's broader water quality benefits are relatively limited and the benefits provided by alternative treatment systems are relatively comparable to LID.

The modifications provide additional flexibility to ensure that in the rare situation when it is infeasible for a project to fully implement LID, the Regulated Project may provide water quality benefits consistent with the LID standard by completing a combination of other measures.

Provision C.3.c.i.(2)(c)(iii) requires projects to establish the need to implement alternative treatment systems and ensures consistent water quality benefits by requiring the submittal of a Demonstration of Infeasibility and a Demonstration of Comparable Benefit, respectively. In addition, as a prerequisite to the implementation of this provision, Permittees are required to submit a Regional Guidance Document that guides preparation of the demonstrations and facilitates project compliance with the alternative treatment system requirements.

Alternative treatment systems allowed under this provision are non-LID systems, such as high flow rate media filters, that have obtained an active General Use Level Designation certification for Enhanced Treatment from Ecology's TAPE Program. This certification is intended to ensure a level of performance with respect to pollutant-

[10] City of Philadelphia, Philadelphia Stormwater Regulations § 600.5; City of Philadelphia (2006) *Philadelphia Stormwater Management Guidance Manual: Version 2.0*, Section 1-1, Appendix F.4.1.

[11] State of West Virginia (December 11, 2008) Department of Environmental Protection, Division of Water and Waste Management, Draft General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025, pp. 13-14.

concentration reduction, which when combined with flow control commensurate with that which is provided by LID, provides total water quality benefit that is comparable to the Permit's LID standard. It was chosen in part because of the relative robustness of the TAPE Program, the TAPE Program's applicability to urban runoff and controls in California, where removal mechanisms and conditions are similar, and California has not established its own similarly robust certification program and is unlikely to do so in the foreseeable future.

Alternative treatment systems are similar to the Permit's LID standard in that they contain media similar to the bioretention media allowed pursuant to Provision C.3.c.i.(2)(c)(ii) that has similar unit processes for pollutant removal, including filtration, adsorption, and degradation over time of certain pollutants. However, there are differences between the alternative treatment systems and the Permit's LID approach. Alternative treatment system media is typically contained within an impervious or largely impervious vault and is designed to have substantially higher flow rates of water through the media. As compared to bioretention cells, typically the most used water quality control within the LID framework, alternative treatment systems have limited to negligible flow control benefits due to limited storage within the device and minimal time and space for water to be detained prior to infiltration. This reduces pollutant load losses associated with the control because runoff that would infiltrate into the soil, be retained within the control, or evapotranspire in LID systems is, in an alternative treatment system, instead discharged through the media and back into the MS4 or to a receiving water. An additional result is reduced effectiveness of hydromodification management. To provide comparable benefit, alternative treatment systems must be supplemented with systems that provide flow control benefits at least equivalent to those provided by LID systems.

LID systems provide hydromodification management and associated water quality benefits via measures that include retention (e.g., via infiltration, evapotranspiration, and retention in an LID control's media) and detention. Determining a comparable benefit between LID systems and alternative treatment systems is complicated because alternative treatment systems typically have negligible retention. In addition, while the flow control benefits of LID systems have been documented, the range of those benefits—including from infiltration into less infiltrative soils and horizontal infiltration—is not yet well quantified from monitoring data and field studies.[12] Studies have, however,

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[12] Geosyntec and Wright Water Engineers, January 2011. International Stormwater BMP Database Technical Summary: Volume Reduction (www.bmpdatabase.org).

Geosyntec and Wright Water Engineers, May 2012. International Stormwater BMP Database Addendum 1 to Volume Reduction Technical Summary (January 2011). Expanded Analysis of Volume Reduction in Bioretention BMPs (www.bmpdatabase.org).

Braswell, et al., Oct. 2018. Hydrologic and water quality performance of permeable pavement with internal water storage over a clay soil in Durham, North Carolina. J. Environmental Mgmt. 224:277-287.

found greater benefit than would be expected from textbook infiltration values.[13] Currently, approaches to quantify the flow control benefits are primarily hydrologic models that are imprecise and can be biased by the use of potentially non-conservative or inaccurate assumptions.

To address the potential consequences of that imprecision, the Permit limits the application of non-LID systems to two geographic areas in which LID systems have relatively less flow control benefit; that is, to areas where there is likely to be relatively less difference in flow control between LID systems and alternative treatment systems. If, in the future, the flow control benefits of LID systems are sufficiently studied and quantified in monitoring and field studies, such that their hydrologic benefits can be more reliably translated into flow control requirements including onsite retention and detention, the Water Board may consider incorporating the results of those studies into a future Permit. This would be done by specifying the required flow control benefits, including retention, that must be provided by flow control systems that are paired with media filters for alternative treatment systems. This could allow consideration of implementing those paired systems in a broader set of geographic areas. Work being done to advance the understanding of the flow control benefits of LID systems includes Provision C.8.d Low Impact Development Monitoring as well as studies elsewhere in the U.S.

The recognition that urban runoff water quality impacts are comprised of both pollutants directly in runoff and hydromodification that results in pollutant discharges and associated impacts is a significant issue and has informed the Permit's design, which uses a three-part approach to address polluted runoff from new and redevelopment projects. The Permit requires: (1) design measures that provide source control of pollutants and reduce impervious surfaces and associated discharges of pollutants and hydromodification, which is the change in flows that can result in pollutant discharges; (2) controls that treat or remove pollutants and that also protect water quality by reducing hydromodification; and (3) specific hydromodification management controls for projects that create or replace an acre or more of impervious surface. Thus, hydromodification management is in two parts: the general benefit from LID systems, which applies to all Regulated Projects, and the controls required in Provision C.3.g, Hydromodification Management, which apply to Regulated Projects that create or replace an acre or more of impervious surface and increase the amount of impervious surface at the project site. This three-part approach was developed in part due to input into past permits from stakeholders, including U.S. EPA, the Natural Resources

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Contra Costa Clean Water Program, September 15, 2013. IMP Monitoring Report, chapters 6-7.

Winston, et al., May 2016. Quantifying volume reduction and peak flow mitigation for three bioretention cells in clay soils in northeast Ohio. Science of the Total Environment 553:83-95.

[13] Ibid.

Defense Council (NRDC), and Baykeeper, who supported the Permit's LID system approach and expressed concern that allowing alternative systems would result in less-effective water quality benefits with respect to direct pollutant reduction and flow control. NRDC and Baykeeper noted, for example:

> …there is substantial history, precedent, and justification for requiring LID as the MEP control for the treatment of stormwater runoff from new and redevelopment projects; deviations from this standard must be carefully scrutinized to ensure the avoidance of unintended adverse impacts. These comments also emphasize the importance of flow control via discharge to vegetated areas, which is provided by LID systems.[14]

Both have noted that where there was a deviation from the LID systems approach, it should be based on the technical infeasibility of both on- and off-site LID systems.

Similarly, U.S. EPA stated:

> EPA is today emphasizing LID (also called "green infrastructure") as a preferable approach to treating and reducing stormwater flow to MS4s[15] and its inclusion in provisions of MS4 permits. EPA believes that LID is an approach to storm water management that is cost-effective, sustainable, and environmentally-sound. The effectiveness of landscape-based treatment for stormwater is generally superior to the "conventional" treatment addressed in section C.3.d of the proposed permit because landscape-based treatment can remove a broader range of pollutants in a more robust and redundant fashion, and can achieve multiple environmental and economic benefits in addition to reducing downstream water quality impacts, such as enhanced water supplies, cleaner air, reduced urban temperatures, increased energy efficiency and other community benefits such as aesthetics, recreation, and wildlife areas.[16]

Additionally, LID measures are likely to be more resilient to failure over time than alternative treatment systems. All urban runoff water quality treatment controls are subject to potential failure due to causes such as improper design, installation, or operation and maintenance. Because alternative treatment systems with high-flow-rate media expose media to higher amounts of flow per unit area and volume, and because some vault-based systems may not be visible without removing a maintenance cover, potential failures (e.g., clogging of media by trash or sediment, breakthrough of pollutants) may be more significant and less likely to be timely addressed. The Permit addresses this by requiring Permittees to ensure appropriate design, installation, and

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[14] NRDC and Baykeeper comment letter on the Revised Tentative Order for MRP 1, April 3, 2009.

[15] EPA et al., Green Infrastructure Statement of Intent, April 19, 2007, available at http://www.msdgc.org/downloads/wetweather/greenreport/Files/Green_Report_Exhibit_A.pdf

[16] U.S. EPA Region 9, comment letter on the Revised Tentative Order for MRP 1, April 3, 2009.

operation and maintenance of all systems. However, this also supports the Permit's continued prioritization of LID systems to provide water quality benefits.

To ensure alternative treatment systems are appropriately comparable to the Permit's LID standard, the implementation of alternative treatment systems is contingent on Permittee submittal of two demonstrations to the Water Board: a Demonstration of Technical Infeasibility and a Demonstration of Commensurate Benefit. The requirements for these demonstrations are in Provisions C.3.c.i.(2)(c)(iii)c and C.3.c.i.(2)(c)(iii)d, respectively. Examples are included at the end of this section in Attachment A. Permittees must also re-submit the applicable portions of their Countywide Hydromodification Applicability Map to accurately identify the two geographic areas in which alternative treatment systems are allowed under the Permit.

Provision C.3.c.i.(2)(c)(iii)c.1. requires Permittees to submit a Demonstration of Technical Infeasibility to evaluate opportunities for implementation of offsite LID. If a Permittee's municipal code precludes implementation of offsite LID elsewhere within its jurisdiction, or outside of its jurisdiction, or both, then that Permittee is encouraged to review its municipal code and consider changes to allow or more-flexibly allow implementation of offsite LID of the given kind(s).

Because guidance for these demonstrations has not yet been prepared, Permittees may implement this Provision only upon Executive Officer acceptance of a Regional Guidance Document submitted collectively by the Permittees to the Water Board. This document will also facilitate Permittee and project compliance with the Demonstration of Technical Infeasibility and the Demonstration of Commensurate Benefit. If the Executive Officer determines that the Regional Guidance Document is sufficiently detailed to enable Permittee review of demonstrations of technical infeasibility and commensurate benefits for Regulated Projects in a consistent, objective, and rigorous manner, the Executive Officer may allow Permittees[17] to approve the Demonstration of Technical Infeasibility and the Demonstration of Commensurate Benefit for those Regulated Projects, in lieu of the requirement to receive Executive Officer approval of both demonstrations, contingent on Permittees implementing the approved Regional Guidance Document for those Regulated Projects. In future Permits, the Water Board may consider increasing flexibility for the implementation of alternative treatment systems depending on the Permittees' success in implementing this Provision and the state of knowledge about the equivalency of alternative treatment systems relative to LID systems.

The level of documentation submitted for each demonstration should reflect the significance and complexity of the proposed project. The Water Board does not anticipate the same level of evaluation will be necessary for each demonstration for all

[17] The Permittee in whose jurisdiction the project is located.

projects, since there is likely a correlation between the scope of the evaluation, demonstrated equivalency, and the potential extent of adverse impacts.

Provision C.3.c.i.(2)(c)(iii)c.2. requires Permittees to show – in the Demonstration of Technical Infeasibility – how LID was considered by both the project proponent and by the Permittee from the early stages of the project's planning and entitlement processes and how that resulted in the project's final design. For example, Permittees could submit the following information: 1) when in the planning and entitlement process LID was considered, 2) the scope and results of that consideration, including the alternatives that were considered and why they were not implemented, and 3) the identification, conclusions, and recommendations of the Permittee's responsible engineer and of the project proponent's responsible engineer.

Reporting requirements have been added in the Order on the use of alternative treatment systems and are required pursuant to Clean Water Act section 308(a) and Water Code section 13383.

Examples of Technical Infeasibility

The following are examples of technical infeasibility which may aid Permittees' preparation of the Demonstration of Technical Infeasibility required by Provision C.3.c.i.(2)(c)(iii).

- Examples of on-site technical infeasibility which are potentially acceptable:
  - The project is a "zero lot line" development with no landscaping at ground level or at any other level; the project includes no open space that could incorporate LID measures; the roof slope is so great (e.g., 50 percent) that it precludes implementation of a green roof; the roof must be covered in solar panels and therefore cannot be designed as a green roof; stormwater runoff can be harvested from the site, but there is no feasible use for the harvested stormwater.
- Examples of on-site technical infeasibility which are likely not acceptable:
  - *It is technically infeasible to treat 100 percent of the C.3.d volume/flow with on-site LID measures; therefore, no on-site LID will be included.* On-site LID must be maximized; it is not a binary option where there is either 100 percent LID treatment or no LID treatment.
  - *The site is too flat to route stormwater runoff to LID treatment measures.* Different areas of the site could be graded as needed to direct stormwater runoff to LID treatment measures. If graded overland/sheet flow cannot provide sufficient hydraulic head, bubblers can be used. If neither graded overland/sheet flow nor bubblers can provide sufficient head, pumping should be considered.
  - *Long lengths of plumbing from the podium/courtyard level within the retail spaces to the frontage are impracticable.* This does not provide enough detail to explain why this is infeasible.

  - *Due to the dynamic nature of retail spaces and limited frontage space, placing ground-level planters in front of retail spaces imposes a heavy constraint on retail door locations.* To the extent that retail door locations may change over time, the constraint of being limited to existing door locations is commensurate with the water quality benefit provided by the LID treatment measures. LID measure locations may also be modified as door locations and their associated entry paths are moved.
  - *This landscaping strip is too narrow to be designed as bioretention.* Because there are many examples of bioretention designed in narrow strips, this does not provide enough detail to explain why this is infeasible, and additional justification is required.

- Examples of off-site technical infeasibility which are potentially acceptable:
  - There are no opportunities in the adjacent public right-of-way (ROW) to implement LID measures that would treat the Provision C.3.d volume/flow from the project; there are no opportunities in the adjacent/nearby public ROW to implement (or contribute to the implementation of) LID measures that would treat the Provision C.3.d volume/flow from the project and potentially also from other projects and portions of the public ROW; there are no opportunities elsewhere within the city or county, including other municipalities within the county, to implement LID systems that would treat an amount of stormwater runoff (from an equally-polluting tributary drainage area) that is no less than the Provision C.3.d volume/flow for the project; there are no opportunities to contribute commensurate funding/resources to a project identified in a city's or county's Green Stormwater Infrastructure Plan.

- Examples of off-site technical infeasibility which are likely not acceptable:
  - *The project proponent does not own or otherwise control land within the same watershed of the project that can accommodate off-site bioretention facilities adequately sized to treat the required Provision C.3.d volume/flow.* The project proponent could contribute to a planned/potential project on land owned or controlled by another party (e.g., the city, county, or other municipalities within the county).
  - *There is no county/regional LID stormwater mitigation program available to the project for in-lieu Provision C.3 compliance.* The project proponent could come to agreement with the city, county, or other municipalities within the county, on a "one-off" project (e.g., in the adjacent/nearby public ROW) as a condition of project approval.
  - *The City does not want to be responsible for a Regulated Project's Provision C.3 compliance on its public ROW, because it restricts what the City can do with that section of ROW*. Municipalities routinely require extensive reconstruction of the adjacent public ROW as a

condition of approval on private redevelopment projects; if such a project did include LID measure(s) in the reconstruction public ROW, it is unlikely that the municipality would want to change the ROW in such a way that would require removal of the LID measure(s) located in that ROW. Regardless, this provision is optional, and municipalities may choose to require project proponents to implement on-site LID treatment in lieu of off-site LID treatment.

Examples of Commensurate Benefit:

The following are examples of types of BMPs and projects that could be used to achieve commensurate flow control benefit (i.e., an equivalent amount of flow control benefit as would have been provided by the project if the project were to implement LID), which may aid Permittees' preparation of the Demonstration of Commensurate Benefit required by Provision C.3.c.i.(2)(c)(iii).

- Examples of flow control systems that could be used to achieve commensurate flow control benefit, that are potentially acceptable:
    - Harvesting and use; systems that provide sufficient retention; systems that provide sufficient infiltration.
- Examples of flow control systems that could be used to achieve commensurate flow control benefit that are likely not acceptable:
    - Systems that inappropriately assume highly infiltrative native soils.

New Information Justifying, and Rationale and Basis for, Amendments to Provision C.3.e.ii.(5) Category C Special Projects

As stated earlier, when the Water Board adopted the Permit, it asked staff to review Provision C.3.e.ii.(5) Category C Special Project (Affordable Housing) criteria and potential impacts on housing costs. Additionally, the Board received comments expressing concern that the criteria were too prescriptive, or otherwise did not mesh well with the range of affordable projects being built and had the potential to conflict with incentive programs that had been established to support affordable housing production. In response, the Water Board staff convened a workgroup to consider those issues and received and reviewed new information to better inform the Water Board's understanding of how the criteria work with the range of affordable housing projects being built. Specifically, in September 2022, Water Board staff convened a Category C Special Projects/Affordable Housing Workgroup, which met seven times between September 2022 and April 2023, to discuss Category C Special Project criteria. The Workgroup was co-led by Permittees' staff and Water Board staff. Workgroup participants included non-profit/affordable housing advocates, for-profit housing advocates, municipal housing authorities, Permittees, Metropolitan Transportation Commission (MTC)/Association of Bay Area Governments (ABAG), engineering consultants, business groups, and others. Workgroup participants gave presentations on the following topics: 1) Definitions of affordable housing; 2) The kinds of projects implemented in the region that include affordable housing; 3) Concerns about how those affordable housing projects may be affected by the Permit's Category C Special Project Criteria; and 4) Recommended changes to Category C Special Projects. The Workgroup additionally considered potential effects of Provision C.3.e.ii.(5) on housing generally, including infill housing.

The new information presented at the Workgroup and reviewed by Water Board staff did not identify a cost impact from the Permit's LID standard that was different from the cost of alternative treatment systems. Additionally, Workgroup discussions and the Water Board's review of incentive programs and related information determined that there was not a conflict with the incentive programs. However, the information demonstrated that the Category C criteria in the Permit, as issued, would in practice apply primarily to fully affordable projects constructed by public or non-profit entities. The criteria had the effect of excluding from potential flexibility certain projects (primarily for-profit projects) that provided affordable housing but were not fully affordable. That was not the intent and, thus, there was an opportunity to better align the Category C criteria with the full range of affordable projects being built in the region and their associated water quality benefits, while still focusing on maximizing flexibility (through credits) for the most affordable housing. The result is that the criteria were modified to provide maximum flexibility for the fully affordable projects being built by public and non-profit entities, and to give sliding-scale flexibility for projects with lesser amounts of affordable housing—more typically projects built by for-profit developers. "Sliding-scale flexibility" means that the more a project that is affordable and the more a project's affordable units are

targeted to residents in lower-income categories, the greater flexibility is provided. This is appropriate because of how costs are apportioned across projects (projects that are more affordable are generally harder to build) and because projects targeted to residents in lower-income categories are more likely to provide a water quality benefit by shifting residents into housing from being unsheltered.

Water Board staff reviewed additional information, including state, regional, and local laws, policies, and programs regarding affordable housing. These included MTC's Housing-Oriented Transit Fund, Housing Incentive Pool, One Bay Area Grant Program, Bay Area Preservation Pilot Fund, and the Regional Housing Needs Allocation (RHNA). They also included Senate Bill 35, which allows developers' applications for housing projects to receive streamlined ministerial review and approval, bypassing the local municipality's requirements for discretionary approval, provided that the local municipality has not achieved its RHNA; Assembly Bill 2011, which allows developers to build residential projects in areas zoned commercial, and allows California Environmental Quality Act exemptions for projects that are 100 percent affordable; Senate Bill 9, which allows homeowners to subdivide single-family residential lots into up to four units; and the California Density Bonus Law, which provides housing developers with a density bonus and additional incentives and concessions based on the amount of affordable dwelling units (DUs) included in housing projects. This review informed how the Permit structures the flexibility criteria to better address the range of affordable projects being built and confirmed that the Order's flexibility criteria, which are consistent with the approach in the California Density Bonus Law, were not in conflict with existing affordable housing laws, policies, or programs.

The Workgroup discussed local-level implementation of affordable housing plans, policies, and guidance. At the local level, many municipalities have established their own definitions of affordable housing and their own ordinances, policies, and programs to incentivize affordable housing. For example, the City of Oakland's Construction Innovation and Expanded Housing Options Ordinance[18] allows residential occupancy of recreational vehicles (RVs) and tiny homes on wheels ("Vehicular Residential Facilities") on private property and allows mobile homes and manufactured homes in all zoning districts where residential uses are permitted.[19] This new information reinforced that public and non-profit entities typically are those who are building fully affordable projects, while private investors typically are building projects for which only a portion of the project's dwelling units are affordable. The new information supported both the need for revised criteria that apply to the range of affordable projects being built in the region and the decision to provide more flexibility to projects that are relatively more affordable.

In addition, staff reviewed the California Tax Credit Allocation Committee's (CTCAC's) database of qualifying projects that have received tax credits through the federal and

[18] https://www.oaklandca.gov/news/2021/oakland-construction-innovation-and-expanded-housing-options-ordinance
[19] https://www.treasurer.ca.gov/ctcac/projects.asp

state Low-Income Housing Tax Credit Programs, which were created to promote private investment in affordable rental housing for low-income Californians. Using the database, data were summarized for qualifying affordable housing projects in Alameda, Contra Costa, San Mateo, Santa Clara, and Solano counties between 1990 and 2022, and the results indicate that nearly 100 percent of those projects that received State or Federal affordable housing tax credits would qualify for the maximum non-LID Affordable Housing Credit in the proposed amendment to Category C. These data are summarized in the figure below; "below-moderate DUs" refers to dwelling units that are restricted to households with incomes less than or equal to 80% of area median household income (AMI). In other words, fully affordable housing projects and nearly-fully affordable housing projects will receive the full flexibility of Category C.

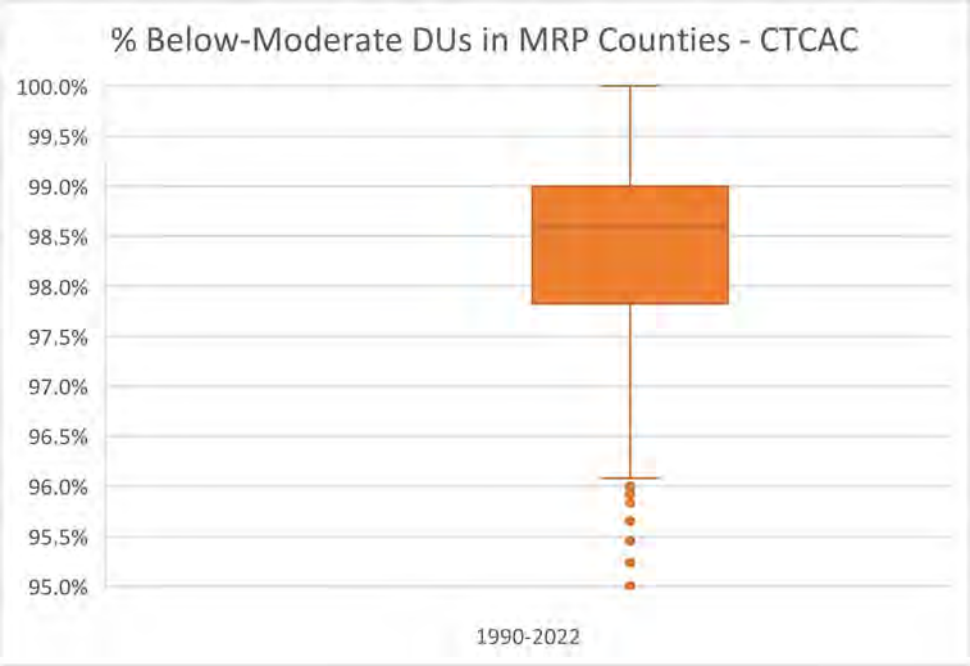

This review of more than thirty years of subsidized projects supports the Order's focus in providing the maximum flexibility to those projects that are most affordable and confirms that the surveyed projects would qualify for that flexibility.

The Workgroup discussed comments on a draft of the Permit that expressed general concern that the approach could conflict with affordable housing expectations in state law or could be perceived as intended to drive state policies on affordable housing. Through the Workgroup, the Water Board received new information about the range of programs on affordable housing, the limited coordination of those programs, and the perception of Sacramento policymakers that a regional stormwater permit provision providing flexibility on clean water requirements relative to a project's affordability could instead be viewed as a driver of housing policy statewide. As a result, revised criteria were developed as described herein, to better align with the range of affordable housing

projects being built in the region. In addition, a statement is added to the Permit's existing Fact Sheet clarifying that the Water Board is not a local land use agency, and that Permit flexibility is intended to be applied to projects as they appear, not to drive housing policy.

Finally, Water Board staff reviewed reports of housing production in Permittee jurisdictions and how it was meeting the Regional Housing Needs Allocation (RHNA) goals, along with information provided by the building industry on average profits for for-profit single-family housing projects during the Great Recession. This was done in part to consider whether Category C should be expanded to include "market-rate" projects that did not have any affordable units.

According to the California Department of Housing and Community Development's Housing Element Implementation and Annual Progress Report Dashboard,[20] for the fifth RHNA cycle (2015-2022), statewide, Bay Area, and countywide RHNA attainment numbers are as shown in the table below. Taken together, these data suggest that MRP Permittees are producing market-rate units significantly in excess of their identified RHNA targets. However, it indicates that there is a shortage of affordable units, with a worse shortage for the lower income brackets, which are the income brackets more likely to experience homelessness.

RHNA 5th Cycle (2015-2022)				
	RHNA Attainment			
County	Above-Moderate Units	Moderate Units	Low Units	Very Low units
Alameda	227%	22%	38%	40%
Contra Costa	218%	68%	58%	23%
San Mateo	194%	48%	85%	44%
Santa Clara	186%	69%	30%	25%
Solano	245%	132%	66%	18%
5-County Total[21]	208%	55%	44%	31%
9-County Total[22]	202%	57%	52%	37%
California Total	143%	55%	30%	20%

[20] https://www.hcd.ca.gov/planning-and-community-development/housing-open-data-tools/housing-element-implementation-and-apr-dashboard
[21] Alameda, Contra Costa, San Mateo, Santa Clara, and Solano Counties.
[22] Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

Permit Provision C.3.e.ii.(5) allows certain Regulated Projects that provide affordable housing to treat runoff using an alternative treatment system consisting of either a high flow rate tree well filter or a high flow rate media filter. This Order's modifications retain that structure, which continues to allow additional flexibility for a project's density, location near transit, and minimized surface parking. However, the modifications:

(1) align the calculation of affordable housing alternative treatment system flexibility relative to the amount of affordable housing in a project, so that the provision better achieves its intended goal of providing flexibility for the range of affordable housing projects being constructed while still protecting water quality;

(2) maximize the alternative treatment system benefits for projects that are fully affordable to lower-income residents, thus providing the most flexibility to those projects that provide the greatest potential water quality benefit. This is facilitated in part by adding the "acutely low" income category to the criteria and flexibility calculation, which recognizes those projects for which all or a component are targeted to that income category;

(3) recognize that managers' dwelling units typically are not targeted as affordable, but are present in otherwise affordable projects, and so excludes them from deed restriction requirements and for the purposes of considering a project's affordability and the flexibility provided under this provision;

(4) define what a "primarily residential" project is for the purposes of determining whether it qualifies for the affordable housing flexibility in a manner that is consistent with the definition of housing development in Government Code section 65589.5(h);

(5) state that the "…total maximum LID Treatment Reduction Credit for any Category C Special Project may not exceed 100 percent." This is not a substantive change, but rather a clarification made to avoid potential confusion. Since a project must treat 100 percent of the amount of runoff required to be treated under the Permit, the maximum flexibility necessarily is also 100 percent. To have a greater amount would be meaningless; and

(6) correct, pursuant to 40 CFR section 122.62(a)(15), the Fact Sheet with information available after the Permit was reissued regarding the total acreage of projects that used Category C under the previous Permit, changing it to 414 acres from "approximately 324 acres."

The Order also modifies reporting requirements in line with the changes to the Category C Special Projects provision and are required pursuant to CWA section 308(a) and Water Code section 13383.

Provision C.3.e.ii.5.(c) revises the Permit's Affordable Housing Credit calculation to provide greater benefit to projects that are relatively more affordable and are made up

of a relatively greater percentage of affordable housing. It provides the most flexibility to projects that are fully affordable. The modifications continue to be justified based on the water quality benefit provided by housing residents who are unsheltered, and thus reducing the substantial discharges of pollutants, including trash and sewage, from unsheltered residents. The result is that significantly affordable projects, and essentially all public and non-profit projects, have maximum flexibility. However, relatively less-affordable projects are still given flexibility that recognizes their contribution to reductions in polluted discharges associated with unsheltered homelessness. These revisions were made in consultation with Workgroup participants, including Permittees and non-profits providing affordable housing, to better reflect the range of projects constructed in the region and to recognize that the most affordable projects (which provide the greatest potential water quality benefit) may also have the greatest barriers to being built. In addition, the Water Board consulted with Association of Bay Area Governments (ABAG)/Metropolitan Transportation Commission (MTC) staff on Plan Bay Area and the Regional Housing Needs Analysis and considered the California Tax Credit Allocation Committee's (CTCAC's) database of qualifying projects that have received tax credits through the federal and state Low-Income Housing Tax Credit Programs, which were created to promote private investment in affordable rental housing for low-income Californians.[23] The results indicate that for the five Bay Area MRP counties, nearly 100 percent of the projects that received state or federal affordable housing tax credits would qualify for the maximum non-LID Affordable Housing Credit in the amendment. That indicates the revisions are appropriately targeting the maximum flexibility to those projects that provide the maximum potential water quality benefit. Additionally, the Water Board reviewed housing laws including the California Density Bonus Law and retained the provision's sliding scale of benefits for projects that are relatively more affordable, although the scale was simplified to facilitate its use and give flexibility to projects (typically for-profit projects) that have a more modest amount of affordable units, but are still expected to provide water quality benefit. The information regarding affordability needed to use this provision (e.g., number of units, relative affordability, deed restrictions) is already typically used as a part of laws including the Density Bonus Law. As such, it should be readily available to use to calculate the Affordable Housing Credit.

Provision C.3.e.ii.5.(c) allows for up to three managers' dwelling units to be excluded from deed restriction requirements. This is to recognize that while managers' dwelling units are necessary to support larger affordable housing projects, they are typically not deed-restricted affordable units, which is information the Water Board did not have at the time of Permit issuance. It is reasonable to exclude them because they are necessary to the operation of certain affordable housing projects and excluding them supports the measure's intended goal of supporting affordable housing by providing flexibility relative to a project's overall affordability.

[23] https://www.treasurer.ca.gov/ctcac/projects.asp

Provision C.3.e.ii.5.(a)(i) has been revised to clarify the definition of primarily residential projects, based on new information provided during the Workgroup participants that affordable housing projects are facilitated through allowing mixed uses. The modification allows projects that provide affordable housing, and thus associated water quality benefits, to benefit from allowed flexibility, even if up to one-third of their square footage is dedicated to other uses (e.g., commercial). It appropriately recognizes that affordable housing projects are not exclusively single-use (i.e., residential), and sets a reasonable threshold for mixed use to retain the provision's affordable housing focus and ensure water quality remains appropriately protected.

Provision C.3.e.ii.5 has been revised to exempt from Provision C.3.c and C.3.d temporary emergency homeless shelters for people experiencing unsheltered homelessness, instead requiring those projects to comply with Provision C.3.i and to implement relevant best management practices developed under Provision C.17. Should the use become permanent, or if there is a new Regulated Project and/or Special Project at the site, the project shall comply with Provision C.3, including Provisions C.3.c and C.3.d. The revision facilitates the construction of temporary emergency housing for people experiencing unsheltered homelessness, which reduces discharges of trash and sewage associated with unsheltered homelessness. It is limited because the exemption is removed if the use becomes other than temporary, or if a new Regulated Project or Special Project is constructed at the site. It is further limited because it applies only to temporary emergency housing projects that would have otherwise been Regulated Projects. Many temporary emergency housing projects are not Regulated Projects because they do not create or replace impervious surface (e.g., RV safe parking areas and cabin communities constructed on existing paved areas). It has been included because of the ongoing significant populations of residents experiencing unsheltered homelessness within MRP Permittee jurisdictions, because of the increasing recognition of the benefits of temporary transitional housing by Permittees including Oakland and San Jose,[24] and Permittee recognition of temporary transitional housing as a practice that can address unsheltered homelessness and the non-stormwater discharges associated with it.[25] The revision recognizes new information that justifies excluding temporary emergency homeless shelters from

[24] For example: Guy Marzorati, June 14, 2023. "San Jose City Council Approves Modest Shift Toward Temporary Homeless Housing." KQED. https://www.kqed.org/news/11952913/san-jose-council-approves-modest-shift-toward-temporary-homeless-housing.
McKinsey & Company, March 23, 2023. The ongoing crisis of homelessness in the Bay Area: What's working, what's not. https://www.mckinsey.com/industries/public-sector/our-insights/the-ongoing-crisis-of-homelessness-in-the-bay-area-whats-working-whats-not#/
National Alliance to End Homelessness, February 24, 2023. Taking an Equitable Approach to Unsheltered Homelessness. https://endhomelessness.org/blog/taking-an-equitable-approach-to-unsheltered-homelessness/

[25] See the Bay Area Municipal Stormwater Collaborative report, dated September 30, 2023. "Regional Best Management Practices Report for Addressing Non-Stormwater Discharges Associated with Unsheltered Homeless Populations." At the time of this Permit amendment, the Report had been recently submitted and was under review by the Water Board.

compliance with Provisions C.3.c-d. This information includes the Bay Area Municipal Stormwater Collaborative report, dated September 30, 2023, "Regional Best Management Practices Report for Addressing Non-Stormwater Discharges Associated with Unsheltered Homeless Populations." At the time of Permit amendment, the Report had been recently submitted and was under review by the Water Board. The report recognizes temporary emergency homeless shelters, such as managed RV safe parking areas and managed encampment sites like "cabin communities," as tools in transitioning to shelter Bay Area residents experiencing unsheltered homelessness, and thus reducing associated non-stormwater discharges. Similarly, there is new information on the shifts in effort by MRP Permittees, including the cities of Oakland and San Jose, to increase focus on temporary emergency housing as one tool in the toolbox of reducing unsheltered homelessness. This includes the City of San Jose's five-year municipal budget projection (e.g., Expenditure Forecast: "In addition, the City has committed the remaining $56.6 million of federal funding from the American Rescue Plan Act to augment and continue critical pandemic response and recovery programs in 2022-2023, including Emergency Interim Housing Construction and Operation, child and youth services investments, contractual services for Beautify San José Consolidated Model, SOAR Expansion, and Digital Equity, which will also be re-evaluated for continuation in 2023-2024 in consideration of ongoing community needs." p.54 of 184, https://www.sanjoseca.gov/home/showpublisheddocument/95049/638134342380800000). And the Water Board considered newly published references indicating that temporary emergency housing is part of the set of tools needed to address unsheltered homelessness.

Antidegradation

Federal and state antidegradation policies at 40 CFR section 131.12 (federal antidegradation policy) and State Water Board Resolution No. 68-16 (state antidegradation policy) require that high quality waters be maintained unless degradation is justified based on specific findings. The federal antidegradation policy also requires existing instream uses and the level of water quality necessary to protect those uses be maintained and protected. Here, the baseline water quality against which any potential degradation resulting from this Order is measured is the level authorized in the Permit.[26] The modifications in this Order do not authorize any lowering water quality as compared to the Permit such that no antidegradation analysis is required. The Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), provides that no antidegradation analysis is required where the regional water board has no expectation that water quality will be reduced by the permitting action. That is the case here. This Order's modification to allow alternative treatment systems will not result in lower water quality because their use is

[26] See Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004, p. 4 (baseline water quality is the best quality of the receiving water since 1969 considering the state antidegradation policy or 1975 considering the federal antidegradation policy, unless subsequent lowering was authorized consistent with these policies).

limited to situations where LID measures are infeasible and backstopped by a requirement to demonstrate commensurate benefit to LID measures. In addition, their use is limited geographically to stormwater discharges that drain into continuously hardened channels or that drain directly into San Francisco Bay, the Pacific Ocean, or other tidal waters, and includes flow controls commensurate with those provided by LID systems, so that stormwater flows will not cause downstream erosion and mobilize sediments and pollutants. The non-LID component of the alternative treatment system also must be TAPE-certified, which ensures a minimum level of performance that is comparable to the Permit's LID performance in terms of pollutant concentration reductions. Collectively, these requirements prevent lowering of water quality.

This Order's modification to the Permit's Category C Special Projects will similarly not result in lower water quality in receiving waters. Category C Special Projects employing alternative treatment systems will account for a very small footprint, because the systems can only be used after establishing the infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) for the Regulated Project's drainage area with LID treatment measures onsite, offsite, through paying in-lieu fees, or a combination thereof. LID treatment measures are highly achievable and cost-effective such that they can be employed in most instances. The Order changes the method for calculating affordable housing credits from fixed credits to a sliding scale of credits, with the maximum credits granted to affordable housing projects with dwelling units for acutely low household incomes. This revised method will slightly increase allowed drainage area that may be treated with non-LID measures as compared to the area allowed by the original method. However, the allowed non-LID treatment systems are alternative treatment systems, which new information shows are as effective as LID measures in reducing pollutant concentrations. Any potential water quality impacts from the slight increase in the drainage area treated with alternative treatment systems would be minor and offset by the benefits of implementing Category C Special Projects. First, as determined by the Water Board in each of the regional municipal stormwater permits issued to date, when considered on a watershed scale, certain smart growth or high-density projects—like Category C Special Projects—can reduce existing impervious surfaces or create less accessory impervious areas and car-related pollutant impacts, all of which reduce the discharge of stormwater pollutants into waters. Because of this, the Water Board established incentive LID treatment reduction credits for certain special projects like Category C Special Projects. Second, the projects that qualify for Category C credits will provide housing that will reduce unsheltered homelessness and its associated non-stormwater discharges into receiving waters within Permittee jurisdictions, thereby improving water quality. Significant impacts to water quality can occur and has occurred from unsheltered homelessness in the region (e.g., from trash and raw sewage).

Antibacksliding

This Order complies with the anti-backsliding provisions of CWA, which generally requires new effluent limitations to be as stringent as those in the previous order. CWA section 402(o) prohibits revising an existing effluent limitation that was established on a case-by-case basis using best professional judgment under CWA section 402(a)(1)(B) to an effluent limitation that reflects subsequently promulgated, less stringent effluent guidelines. It also prohibits relaxing an existing effluent limitation established pursuant to CWA sections 301(b)(1)(C) or 303(d) or (e). CWA section 402(o) does not apply here because the changes to the Permit in this Order are not based on either revised effluent limitation guidelines or CWA section 301(b)(1)(C) or section 303(d) or (e); rather, they are based on CWA section 402(p)(3)(B).

It is unclear if the regulatory anti-backsliding prohibition at 40 CFR section 122.44(l) applies to municipal stormwater permits. This is unnecessary to resolve because assuming for the sake of argument that it applies, even though this Order's changes are not necessarily less stringent, the changes qualify for an exception to backsliding. Both the CWA and federal regulations contain exceptions to the anti-backsliding requirements where new information is available to the permitting authority that was not available at the time of the issuance of the prior permit and that would have justified the imposition of less stringent effluent limitations at that time. See 33 USC § 1342(o)(2)(B)(i); 40 CFR § 122.44(l)(1) anti-backsliding does not apply if the circumstances on which the previous permit was based have materially and substantially changed and would constitute cause for permit modification under 40 CFR section 122.62 [e.g., where new information that was not available at the time the previous permit was issued and would have justified the different requirements]; see also 40 CFR §122.44(l)(2)(i)(B)(1). As explained elsewhere in this Fact Sheet, there is new information that was not available at the time of the Permit's adoption that would have justified the application of different requirements at that time.

Public Participation

A. **Notification of Interested Parties**. The Water Board notified the Permittees and interested agencies and persons of its intent to amend the Permit with this Order and provided an opportunity to submit written comments. The public had access to the agenda and any changes in dates and locations through the Water Board's website at http://www.waterboards.ca.gov/sanfranciscobay. The Water Board also notified potentially affected disadvantaged communities and tribal communities of this Order and provided them with an opportunity to engage prior to the public comment period.

B. **Written Comments**. Interested persons were invited to submit written comments concerning the draft Order as explained through the notification process. Comments were to be submitted to RB2-MRP@waterboards.ca.gov or to the Water Board at 1515 Clay Street, Suite 1400, Oakland, California, to the attention of Derek Beauduy. For Water Board consideration, the written comments were due via email or at the Water Board office by 5:00 p.m. on August 21, 2023.

C. **Public Hearing**. The Water Board held a public hearing on the Order during its regular meeting at the following date, time, and location:

Date:	October 11, 2023
Time:	9:00 a.m.
Location:	Elihu Harris State Office Building 1515 Clay Street, 1st Floor Auditorium Oakland, CA 94612
Contact:	Derek Beauduy, (510) 622-2348 derek.beauduy@waterboards.ca.gov

Interested persons were invited to attend. At the public hearing, the Water Board heard testimony pertinent to the Order.

The Water Board web address is http://www.waterboards.ca.gov/sanfranciscobay, where one could access the current agenda for changes in dates and locations.

D. **Reconsideration of Amendment**. Any aggrieved person may petition the State Water Board to review the Water Board decision regarding this Order.

For instructions on how to file a petition review, see www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

E. **Information and Copying**. Supporting documents and comments received are on file and may be inspected at the address above between 9:00 a.m. and 5:00 p.m., Monday through Friday. Copying of documents may be arranged by calling (510) 622-2300.

G. **Additional Information**. Requests for additional information or questions regarding this Order should be directed to Derek Beauduy at (510) 622-2348 or derek.beauduy@waterboards.ca.gov.

Protecting Alameda County Creeks, Wetlands & the Bay

cleanwater PROGRAM

399 Elmhurst St.
Hayward, CA
94544
p. 510-670-5543

MEMBER AGENCIES:
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Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

September 28, 2020

Mr. Michael Montgomery
Executive Officer
Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland CA 94612

Dear Mr. Montgomery:

SUBJECT: **SUBMITTAL OF FY 2019-20 ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM ANNUAL REPORT PURSUANT TO MRP PROVISION C.17**

As you know, various submission and reporting provisions of the Municipal Regional Stormwater Permit (MRP) authorize Permittee implementation and compliance through coordination of the countywide stormwater program or in a regional collaborative effort. The member agency Permittees of the Alameda Countywide Clean Water Program (Clean Water Program) through their Management Committee, and in conformance with the Memorandum of Agreement signed by their governing bodies, have authorized and directed me to prepare and submit certain reports as part of their compliance with submission of their Annual Reports pursuant to Provision C.17. Therefore with this letter, I am submitting this Clean Water Program Annual Report on behalf of and for the benefit of the Clean Water Program member agency Permittees.

By signing this letter on behalf of the Clean Water Program, I certify under penalty of law that these documents and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine imprisonment of knowing violations. [40 CFR 122.22(d)].

Sincerely,

James Scanlin
Program Manager

Attachment: Alameda Countywide Clean Water Program FY 2018-19 Annual Report

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM FISCAL YEAR 2019/20 ANNUAL REPORT TO THE SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD

MEMBER AGENCIES:

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Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

September 28, 2020

Protecting Alameda County Creeks, Wetlands & the Bay

02987
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List of Acronyms and Abbreviations

ACCWP	Alameda Countywide Clean Water Program
AGOL	ARC GIS Online
BASMAA	Bay Area Stormwater Management Agencies Association
CWA	Clean Water Act
GI	Green Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MRP 1	Municipal Regional Permit adopted in 2009
MRP 2	Municipal Regional Permit reissued in 2015
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PCBs	Polychlorinated Biphenyls
PMT	Project Management Team
PMU	Priority Margin Unit
POC	Pollutants of Concern
POTW	Publicly Owned Treatment Works
RAA	Reasonable Assurance Analysis
RMC	Regional Monitoring Coalition
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SRP	Stormwater Resources Plan
TMDL	Total Maximum Daily Load
UCMR	Urban Creeks Monitoring Report
WY	Water Year

Preface

Provision C.17. of the San Francisco Bay Regional Water Quality Control Board's (Water Board's) Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049, NPDES No. CAS612008) requires the Permittees covered by the MRP to submit Annual Reports by September 30 of each year that document the implementation of MRP requirements during the previous fiscal year (July 1 through June 30). The MRP recognizes that the County of Alameda, the 14 cities within the County, the Alameda County Flood Control and Water Conservation District (District), and the Zone 7 Water Agency (Alameda Permittees) have joined together to form the Alameda Countywide Clean Water Program (ACCWP or Program). Each Alameda Permittee is submitting a separate Annual Report using the format entitled "*Annual Report Template"* approved by the Executive Officer of the Water Board. Those Alameda Permittee reports describe the activities conducted by each of the Permittees during the previous fiscal year. This report describes the activities that were conducted by the Clean Water Program, the Bay Area Stormwater Management Agencies Association (BASMAA), and the California Stormwater Quality Association (CASQA) on behalf of the Alameda Permittees during the previous fiscal year. This report is referenced in the Alameda Permittees' Annual Reports and is incorporated by reference into the Alameda Permittee Annual Reports.

Introduction

Background

The Alameda Countywide Clean Water Program (ACCWP or Program) is a consortium comprising the cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City; the County of Alameda; the Alameda County Flood Control and Water Conservation District (District); and, the Zone 7 Water Agency (Member Agencies). The Program was established in 1991 through a Memorandum of Agreement in response to the San Francisco Bay Regional Water Quality Control Board's (Water Board's) issuance of a National Pollutant Discharge Elimination System (NPDES) stormwater discharge permit (Permit) to the Member Agencies. The Program allows the Member Agencies to work together to more efficiently comply with many of the requirements of the Permit. The Program also works collaboratively with other jurisdictions in the Bay Area through the Bay Area Stormwater Management Agencies Association (BASMAA), and throughout the State through the California Stormwater Quality Association (CASQA).

For the first several permit cycles, the Water Board issued permits on a county by county basis. In 2009, the Water Board decided to issue one permit to all of the jurisdictions within the more urbanized counties in the Bay Area (Alameda, Contra Costa, San Mateo, and Santa Clara) as well as to the cities of Fairfield and Vallejo. This permit was referred to as the Municipal Regional Stormwater Permit or MRP 1. On November 19, 2015, the Water Board reissued the MRP. This reissued permit is referred to as MRP 2.

Compared with MRP 1, MRP 2 contains many requirements that are new programs or require a higher level of service. Some of these programs include significant new or expanded requirements in the development of a green infrastructure plan, a protocol to manage PCBs in building demolition projects, reducing the discharge of trash by 70% by July 2017 and 80% by July 1, 2019, and additional monitoring requirements. Program Permittees have filed Test Claims with the Commission on State Mandates for subvention of state mandated costs attributable to the requirements in MRP 2 that constitute new programs or require a higher level of service. The main test claim being pursued by the City of Union City is currently pending before the Commission.

In addition, most Program Permittees have filed petitions for review of MRP 2 with the State Water Resources Control Board (State Board). The State Board had 270 days from March 15, 2016, the date the petitions were deemed complete, to respond to and act on the petitions for review. Since the State Board did not take action on the petitions within the 270 period, on December 6, 2016 the Board adopted an Order to review the issues raised in the petitions on their own motion thereby extending the 270-day review requirement. The State Board has not taken any further action on the petitions and the petitions for review are still pending before the State Board.

On March 29, 2020 the Program sent to the Board a letter in response to the State Board directive of March 20, 2020 regarding compliance with Water Board Requirements during the Coronavirus (COVID 19) Emergency. On April 3, 2020 the Program sent the Regional Board a follow-up letter that provided more specifics in the Alameda County area on this health emergency and attached a detailed

Notification List of the MPR Activities of Program Permittees Impacted by COVID 19 Shelter in Place Directives. Specific Permit Provisions were referenced in this Notification List. The Regional Board by email sent the MRP program managers a letter dated August 18, 2020 that confirmed receipt of the Notification letters received from the MRP programs and was supportive of the efforts of the MRP permittees. More specific discussion on a provision by provision basis is included in the sections below that follow this Introduction. These three letters are included in Appendix A.

Organization of the Report

The report is organized by major MRP provisions:

C.1. Discharge Prohibitions and Receiving Waters Limitations: Nothing to report this reporting period

C.2. Municipal Operations

C.3. New Development and Redevelopment

C.4. Industrial and Commercial Discharge Control

C.5. Illicit Discharge Detection and Elimination

C.6. Construction Site Control

C.7. Public Information and Outreach

C.8. Water Quality Monitoring

C.9. Pesticide Toxicity Control

C.10. Trash Load Reduction

C.11. Mercury Control

C.12 PCB Control

C.13. Copper Control: Relevant actions reporting in individual Permittee reports

C.14 Bacteria Control: Nothing reported, only applies to the City of Pacifica and County of San Mateo

C.15 Exempted and Conditionally Exempted Discharges

C.16 Discharges to Areas of Special Biological Significance: Only applies to San Mateo County

Within each section, the requirements being reported on are provided along with a description of Program, BASMAA, or CASQA activities conducted to comply with the Permit requirement.

Highlights of Significant FY 2019/20 Accomplishments

Community Stewardship Grants

The Program funded the following six projects through its Community Stewardship Grants program. Descriptions of the funded projects are included in Appendix H.

1. Earth Team - $5,000
2. Regional Parks Foundation - $4,000
3. Friends of Sausal Creek - $5,000
4. Tri-Valley Conservancy - $3,436
5. Mary Spicer (I Heart Oakland & Alameda Estuary) - $5,000
6. Friends of San Leandro Creek - $520

One of the funded project was an on-the-water estuary litter cleanup conducted by ***I Heart Oakland & Alameda Estuary*** in conjunction with Coastal Cleanup Day in September 2019. The grantee engaged cleanup volunteers not only on land but also in dragon boats, canoes, kayaks, and other types of watercraft allowing them to access remote locations of the estuary that cannot be reached on foot. They collected well over 2,000 pounds of debris—double their goal—including litter washed into the estuary through storm drains, but also illegally dumped large items, garbage from homeless encampments and people living on abandoned boats, sharps, chemicals and more.

Our Water Our World

HELPING CONSUMERS FIND LESS-TOXIC PRODUCTS FOR USE IN THEIR HOMES AND GARDENS

Our Water Our World (OWOW) is a very successful point-of-purchase outreach campaign promoting the use of less-toxic pest control methods. In FY 2019/20, OWOW was operating in 26 stores in Alameda County including all

Home Depots. The OWOW program includes “shelf-talkers” that identify less-toxic products, training of store staff, and in-store outreach events. OWOW has also successfully encouraged participating stores to purchase and promote more environmentally friendly products.

OWOW at the Central Garden Trade Show, Las Vegas NV and the Nor Cal Trade Show, San Mateo CA

Fish Advisory Campaign

The program ran a digital campaign in June -October 2019 to promote awareness of fish consumption health advisories. A new web page, Fishing and Health, was added. The ads targeted men and included Facebook, display, search and an e-blast. The web page was viewed 1,300 times, with an average of 2:28 minutes time on site. In addition to digital advertising, a print ad and paid article in Fish Sniffer Magazine reached 26,000 readers interested in fishing. Our ad delivered an important health message to these recreationalists, and no other ad or article covered this topic.

C.3 Technical Guidance Manual Update

The Program completed an update of the Program’s C.3 Technical Guidance manual, which provides comprehensive guidance to project applicants and designers of municipal capital projects regarding the implementation of low-impact development, source control, site design, stormwater treatment, and hydro-modification management measures. Version 7 of the C.3 Technical Guidance was approved on September 19, 2019, and is available on the Program’s website. The revisions of the manual include adding the Program’s Green Infrastructure Example Typical Details, and an update to the plant list

focused on including plants that have been shown to tolerate biotreatment soil based on local experience.

PCBs and Mercury

The Program completed the PCBS and Mercury TMDL Control Measures Plan and Reasonable Assurance Analysis (Appendix O), the Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction Update – 2020 (Appendix M), the *PCBS in Building Materials Management Program – Regional Data Summary, September 18, 2020 (Appendix P), and the* Managing PCBs in Building Demolition –Regional Collaboration for a Data Collection and Assessment Program, August 20, 2020 (Appendix Q).

Trash in Receiving Waters

As required by Provision C.10.b.iv. the Program, in conjunction with other BASMAA member agencies, submitted to the Regional Water Board on July 1, 2020, the San Francisco Bay Area Receiving Water Trash Monitoring Final Report. The Final Report provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020.

Integrated Monitoring Report

In March 2020, the Program submitted its Integrated Monitoring Report (IMR). The IMR included the following Reports: 1) Creek Status Monitoring Report, Water Years 2014 – 2019; 2) Creek Status Bioassessment Monitoring: 2012 – 2019; 3) Stressor/Source Identification Project: Exploring CSCI Results and the Outcomes of Restoration Activities along Sausal Creek, Final Report; 4) Stressor/Source Identification Project: Nutrient/Eutrophication Biological Indicators in the Arroyo Las Positas Watershed, Progress Report; 5) Stressor/Source Identification Project: Castro Valley Creek Sediment Quality, Final Report; 6) Regional SSID Project - Electrical Utilities as a Potential PCBs Source to Stormwater in the San Francisco Bay Area – BASMAA Progress Report; 7) Pollutants of Concern Monitoring Water Years 2014 – 2019; 8) Pollutants of Concern Monitoring Report 2019; 9) Pesticide and Toxicity Monitoring Water Years 2014-2019; and 10) Review of Quality Assurance and Quality Control Results.

Above photos: Creek Status Monitoring

Regional Monitoring Program staff collecting stormwater samples for Pollutants of Concern analysis: Photo: Don Yee.

Provision C.2 Municipal Operations

Requirement: Provision C.2.e requires Permittees to implement BMPs to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities from municipal facilities and infrastructure.

Program Activities:

Municipal Maintenance Subcommittee Meetings: The Program held two Municipal Maintenance Subcommittee meetings during the fiscal year. Steve Aguiar, City of Livermore, was the chair of the Subcommittee. An average of 12 agency staff attended the meetings and shared information on MRP compliance and Program activities. Topics included updates to using the trash Collector App in the field, coordinating storm drain marking, update on integrated pest management (IPM) practices and coordination with the Alameda County Mosquito Abatement District (District), and identifying issues associated with maintaining stormwater treatment systems. The Subcommittee continues to provide a forum for member agencies to share information, benefit from other municipal staff field experiences, and receive information on products and trainings related to municipal maintenance activities.

Pesticide Toxicity Control (C.9): The MRP requires municipal employees follow IPM policies and standard operating procedures in municipal operations and on municipal property. The subcommittee worked with the District to identify mosquito abatement issues associated with storm drain cleaning. Mosquito treatment controls deployed in storm drain inlets by the District may inadvertently be removed during routine storm drain maintenance. The subcommittee developed an agency contact list and summary of the Alameda Countywide Clean Water Program to facilitate coordination with District. The District will use the contact list to coordinate with agency maintenance staff to reduce the loss of mosquito treatment measures during routine drain inlet cleaning.

Operations and Maintenance Verification Program: The MRP requires each Permittee to implement an Operations and Maintenance Verification Program. The Subcommittee identified tasks to improve tracking and maintenance of stormwater treatment devices. In fiscal year 2020/21 the Subcommittee will continue to develop the process for tracking and maintenance of stormwater treatment devices.

Provision C.3: New Development and Redevelopment

Provision C.3: New Development and Redevelopment

Requirement: Provision C.3 requires Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects.

Program Activities: To assist member agencies in complying with this provision, the Program held four meetings of the New Development Subcommittee (NDS), which is currently chaired by Daniel Matlock of the City of Fremont. The NDS provides a valuable venue for member agency staff members to share information, benefit from lessons learned by others, and receive training on permit requirements and products developed by the Program related to Provision C.3, as well as Provision C.6, Construction Site Control, and Provision C.13.a, Manage Waste Generated from Cleaning and Treating of Copper Architectural Features. Additionally, Program staff continued to provide on-call support to member agency requests for assistance regarding Provision C.3 compliance.

Provision C.3.a.i.(4): Provision C.3 Training

Requirement: Provision C.3.a.i.(4) requires Permittees to provide training adequate to implement the requirements of Provision C.3 for staff including interdepartmental training.

Program Activities: To assist member agencies in complying with this provision, the Program incorporated a field tour of green stormwater infrastructure facilities into its training workshop on stormwater compliance construction site inspections, which was held on February 27, 2020 and focused on Provision C.6 compliance. The training workshop was held at Alameda County's Turner Court maintenance and operations facility, which is the location of Alameda County's Turner Court Green Infrastructure (GI) Demonstration Project. The field tour featured presentations at four green stormwater infrastructure facilities, with NDS members guiding discussions regarding protection of green stormwater infrastructure facilities during the construction process – a training topic that pertains to the proper implementation of stormwater treatment requirements for C.3.b Regulated Projects, as well as Provision C.6 construction site control. Sixty-six agency staff attended the workshop. Because the workshop focused primarily on Provision C.6 compliance, the post-workshop report is included in Appendix G, regarding Provision C.6.

Additionally, NDS meetings included presentations to provide training to support member agency staffs in implementing the requirements of Provision C.3. This included a presentation at the January 2020 NDS meeting regarding the San Francisco Public Utilities Commission's approach to developing its alternative compliance program, and a presentation at the April 2020 meeting on improvements to the Arc GIS Online (AGOL) tool described below, under the heading Provision C.3.b: Regulated Projects. The Program also coordinated with ReScape to have a representative of the NDS attend the green

stormwater infrastructure component of ReScape's January 2020 training in Oakland, and provide input for potential collaboration on future ReScape trainings offered in Alameda County.

Provision C.3.b.: Regulated Projects

Requirement: Under Provision C.3.b, the Permittees must require all projects fitting the category descriptions provided in Provision C.3.b.ii (i.e. "Regulated Projects") to implement low impact development (LID) source control, site design, and stormwater treatment, as required in Provisions C.3.c and C.3.d. Provision C.3.b.iv.(2) lists detailed information that must routinely be included in Annual Reports for Regulated Projects that are approved during the reporting period.

Program Activities: To assist member agencies in compiling the information on C.3 Regulated Projects that they are required to routinely report in accordance with Provision C.3.b.iv.(2), the Program continued to maintain the Alameda County/Contra Costa Project Tracking and Load Reduction Accounting Tool ArcGIS Online web application (AGOL Tool). This software tool includes a feature to support the reporting of C.3 Regulated Projects by the Program's member agencies in the annual reports they prepare in compliance with the MRP. The Program is currently updating the AGOL Tool, including improvements to the C.3 App, such as providing a new short-form for data entry, which is anticipated to help member agencies enhance efficiency in entering mandatory and commonly entered data.

Provision C.3.c.: Low Impact Development (LID)

Requirement: Provision C.3.c requires Permittees to implement LID source control, site design, and stormwater treatment requirements in all Regulated Projects.

Program Activities: To further assist member agencies in complying with the requirements in this provision, the Program completed an update of the Program's C.3 Technical Guidance manual, which provides comprehensive guidance to project applicants and designers of municipal capital projects regarding the implementation of LID source control, site design, stormwater treatment, and HM measures. Version 7 of the C.3 Technical Guidance was approved on September 19, 2019. The revisions of the manual include adding the Program's GI Example Typical Details, and an update to the plant list focused on including plants that have been shown to tolerate biotreatment soil based on local experience. The cover page and table of contents of the C.3 Technical Guidance, Version 7 are included in Appendix B.

Provision C.3.e.i.(2): In-Lieu Fee Compliance with Provision C.3.b

Requirement: Under Provision C.3.e.i.(2), Permittees may allow a Regulated Project to treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility and pay equivalent in-lieu fees to treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at a Regional Project.

Program Activities: To assist member agencies in providing an in-lieu fee option for projects in which such an option would achieve a net environmental benefit, the Program continued to coordinate with the Bay Area Stormwater Management Agencies Association (BASMAA) regarding how other agencies

are planning to develop in-lieu fee programs, including an ongoing grant-funded study by City of San Pablo, which will address Contra Costa County and could be a model for Alameda County. This topic was discussed at the January 2020 NDS meeting.

Provision C.3.h.: Operation and Maintenance of Stormwater Treatment Systems

Requirement: Provision C.3.h requires each Permittee to implement an Operation and Maintenance (O&M) Verification Program in accordance with the requirements specified in Provision C.3.h.

Program Activities: The Program is currently updating its AGOL Tool, described above under the heading Provision C.3.b: Regulated Projects, to provide various improvements, including a new Collector App for collecting data during O&M verification inspections required by Provision C.3.h. Program staff gave a presentation on the update of the AGOL Tool at the April 2020 NDS meeting, to describe the proposed features and request input, including specific needs for O&M inspections. Member agency staff will be invited to participate in beta testing of the AGOL Tool update, which is anticipated in FY 2020/21. The Program also developed two new flyers regarding the maintenance of green stormwater infrastructure facilities, to support member agency outreach to property owners regarding property owner responsibilities for facility maintenance, as part of their agencies' O&M verification programs. The new flyers are included in Appendix C. Additionally, the update of the C.3 Technical Guidance described above, under the heading Provision C.3.c: Low Impact Development, includes an update of the Program's maintenance plan templates for various types of stormwater treatment and hydromodification (HM) measures, in response to the Alameda County Mosquito Abatement District's updated guidance for stormwater facilities to drain within 72 hours.

Provision C.3.j: Green Infrastructure Planning and Implementation

Requirement: Provision C.3.j of MRP 2 introduced requirements for each Permittee to complete and implement a Green Infrastructure Plan for the inclusion of LID storm drain infrastructure on public and private lands. The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL waste load allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

Program Activities: To assist member agencies in complying with this provision, the Program conducted various activities, some of which are described here, while others address specific sub-provisions of C.3.j and are described below. To help member agencies with the preparation of bid documents for GI capital projects, the Program compiled examples of municipal GI bid specifications. The memorandum transmitting the compiled bid specifications is included in Appendix D. The Program also addressed topics related to GI at meetings of the NDS, including information sharing on the Member Agencies' activities to implement their GI Plans, reviewing examples of GI-related tools and guidance prepared by individual municipalities, and sharing information on efforts to obtain grant funding for local GI projects.

Provision C.3.j.i.(4): Green Infrastructure Plan Outreach and Education

Requirement: Provision C.3.j.i.(4) requires Permittees to conduct outreach and education on the requirements of Provision C.3.j and methods of implementation, including public outreach (both general outreach and targeted outreach to professionals involved in infrastructure planning and design); staff training (including planning, engineering, public works maintenance, finance, fire/life safety, and management staff); and education of appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, and district board members).

Program Activities: To assist member agencies in complying with this provision, the Program incorporated a field tour of green stormwater infrastructure facilities into its training workshop on stormwater compliance construction site inspections, which was held on February 27, 2020. As described above, under the heading Provision C.3.a.i.(4): Provision C.3 Training, the workshop addressed the topic of protecting green stormwater infrastructure facilities during the construction process, which pertains to the implementing C.3.j requirements for GI, as well as stormwater treatment requirements for C.3.b Regulated Projects and Provision C.6 construction site control. The Post-Workshop report is included in Appendix G, regarding Provision C.6. Additionally, the two new flyers regarding the maintenance of green stormwater infrastructure facilities, described above, under the heading Provision C.3.h: Operation and Maintenance, support the Program's member agencies in complying with the GI outreach and education requirements of Provision C.3.j.i.(4), as well as the Provision C.3.h requirements for the O&M of stormwater treatment facilities.

Provision C.3.j.iii: Participate in Processes to Promote Green Infrastructure

Requirement: Provision C.3.j.iii requires Permittees to, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.

Program Activities: To support the member agencies in complying with this provision, the Program participated through BASMAA in the Urban Greening Bay Area Project's activities to implement the 2018 Roadmap of Funding Solutions for Sustainable Streets, which identifies specific actions to improve the funding of projects that include both complete streets improvements and GI. The work during the reporting period included continuing coordination with transportation agencies – including the Metropolitan Transportation Commission (MTC), Caltrans, the California Transportation Commission (CTC), and the Federal Highway Administration (FHWA) – to clarify GI eligibility in federal, regional, and state transportation grant programs. BASMAA transmitted a memorandum to the above-listed regional and state agencies, documenting the eligibility of GI in applicable regional, state and federal transportation funding programs and requesting the agencies' participation in developing fact sheets that clarify eligibility for sustainable streets in two federal transportation funding programs – the Surface Transportation Block Grant Program (STP) and the Congestion Mitigation and Air Quality

Improvement Program (CMAQ) – as well as the California Senate Bill 1 (SB 1) Road Maintenance and Rehabilitation Program.

The NDS reviewed a draft fact sheet prepared by BASMAA, in cooperation with MTC and Caltrans District 4, regarding the eligibility of GI in projects funded by the STP and CMAQ through the One Bay Area Grant (OBAG) program administered by MTC. The OBAG fact sheet is scheduled to be finalized in September 2020. BASMAA is coordinating with CTC staff to develop a statewide fact sheet that focuses on the eligibility of GI in projects funded by SB 1. BASMAA is also coordinating with the U.S. Environmental Protection Agency and FHWA regarding BASMAA's November 2019 research memorandum, described above. To address questions from CTC and FHWA representatives regarding the level of interest in this topic beyond the San Francisco Bay Area and California, BASMAA is preparing to conduct an online survey for national distribution through the Green Infrastructure Leadership Exchange. The SB 1 fact sheet is scheduled to be finalized by December 2020. BASMAA representatives also participated in various other processes to promote GI.

Additionally, meetings of the NDS included information sharing regarding alternative compliance in-lieu fee programs, potential future development of criteria for land development and redevelopment projects over a certain size to include GI facilities along the frontage of adjacent streets, and other processes to promote GI, including the sharing of information provided through BASMAA. Please see BASMAA's Regional Supplemental Training and Outreach Report (Appendix J) for additional information on regional participation in processes to promote GI, along with a regional plan and schedule for new and ongoing efforts to participate in processes to promote GI.

Provision C.3.j.iv: Tracking and Reporting Progress

Requirement: Provision C.3.j.iv requires Permittees to, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of GI measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that waste load allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and trash, are being met.

Program Activities: To assist member agencies in complying with this provision, the Program continued to support the Alameda Countywide GI Mechanism ("GI Mechanism"), for its member agencies to use in prioritizing and mapping areas for planned and potential GI projects. The mechanism consists of the Alameda Countywide Multi-Benefit Metrics Prioritization Protocol ("prioritization protocol") interface, in conjunction with the AGOL Tool described above, under the heading Provision C.3.b: Regulated Projects. The member agencies continued to use the AGOL Tool to track and map information on GI measures implemented on public and private parcels. The Program is also preparing to develop a public interface of the AGOL Tool, which will make information on implemented GI projects publicly available.

Provision C.4: Industrial and Commercial Site Controls

Provision C.4.d.: Inspections

Requirement: Provision C.4.d requires Permittees to conduct inspections according to their Business Inspection Plan and Enforcement Response Plan to prevent stormwater pollution.

Program Activities: To assist member agencies comply with this provision, the Program produced the following outreach pieces: 1) finalized Tip Sheet for Towing and Vehicle Storage facilities, and 2) developed Tip Sheet for Property Owners. See Appendix E for the finalized Tip Sheets described above.

Provision C.4.e.: Staff Training

Requirement: Provision C.4.e requires Permittees to provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee specific.

Program Activities: To comply with this provision, the Clean Water Program's Industrial and Illicit Discharge Subcommittee (IIDC) sponsored a business inspectors training workshop on November 6, 2019. The workshop was hosted by the City of Hayward at Hayward City Hall. The workshop focused on sharing successful strategies. The workshop included the following presentations.

- Inspecting Restaurants: The Basics – Overview of conducting a stormwater restaurant inspection;
- Strategies for Enforcement – Panel discussion for sharing ideas and experiences regarding enforcement;
- Health of Alameda County Creeks – A look at the biological state of our waterways;
- Strategies for Overcoming Language Barriers – Presentation of ideas and experiences on how to overcome language barriers during inspections; and
- Residential RVs and Stormwater – Strategies and protocols for preventing illicit discharges from residential RVs.

Presentation materials from the workshop are available to Clean Water Program Member Agencies for use as in-house training. Pre- and post-workshop surveys provided insights into the knowledge of the participants before and after the workshop. The pre-workshop survey had an overall correct response rating of 72% that improved to 87% in the post-workshop survey. See Appendix F for the workshop report that includes the agenda, sign-in sheet, and evaluations.

Additional Activities

The Program held three Industrial and Illicit Discharge Control (IIDC) Subcommittee meetings during the fiscal year. Jose Soto, Union Sanitary District, was the chair of the Subcommittee. On average 14 people attended the meetings and shared information on MRP compliance and activities. The IIDC provides a valuable venue for member agency staff to share information, benefit from lessons learned by others, and receive information on permit requirements and products developed by the Program related to Provision C.4, as well as Provision C.5 Illicit Discharge Detection and Elimination, Provision C.13.b. Manage Discharges from Pools, Spas and Fountains that Contain Copper-Based Chemicals, Provision

C.13.c Copper Source Control for Industrial Sources, and C.15. Exempt and Conditionally Exempt Discharges.

Provision C.5: Illicit Discharge Detection and Elimination

Provision C.5.c.: Spill, Dumping and Complaint Response Program

Requirement: Provision C.5.c requires Permittees to implement a program to respond to spills, dumping and complaints.

Program Activities: To assist member agencies comply with this provision, the Program maintains a list of member agencies and a point of contact for reporting spills on the Clean Water Program website. The list is periodically updated. The list was recently updated in May 2020.

Provision C.5.e.: Control of Mobile Sources

Requirement: Provision C.5.e requires Permittees to implement a program to reduce the discharge of pollutants from mobile businesses. The program must include standard BMPs, an enforcement strategy, inventory, outreach strategy and inspections, as needed.

Program Activities: The categories of mobile businesses currently addressed by the Program include automobile washing, power washing, steam cleaning, carpet cleaners and pet care providers. These mobile business categories have minimum standards and BMPs identified in a series of five Tip Sheets developed by the Program: Fundraising Car Washes, Tips for Carpet Cleaners, Tips for Pet Care Providers, Tips for Power Washers and Tips for Mobile Businesses. All of the Tip Sheets are available on the Clean Water Program website.

Outreach to Mobile Businesses: The Program developed a countywide mobile business inventory from individual agencies, internet searches, the BASMAA surface cleaners list, and the Santa Clara and Contra Costa stormwater programs' inventory in FY16-17. A transmittal letter and the appropriate Tip Sheet was sent to the businesses on the countywide inventory in FY16-17. The countywide inventory is updated periodically with businesses identified by municipal inspectors. The inventory is available on the IIDC Subcommittee's member only webpage.

Mobile Business Enforcement Strategy: In FY17-18, the IIDC Subcommittee worked with the Alameda County District Attorney's (DA) office to develop an enforcement strategy for mobile businesses. When City and County IIDC inspectors issue an enforcement action to a mobile business they will also complete a Referral Form for the DA. The DA's office will keep a list of mobile businesses that receive enforcement actions from all jurisdictions in Alameda County. If an individual business receives more than one enforcement action, even if they are from different jurisdictions, the DA's office may choose to take action. The DA Referral Form is periodically emailed to the Subcommittee for reference and use.

See the BASMAA Regional Supplemental Training and Outreach Report (Appendix J) for details on related BASMAA efforts.

Additional Activities

Illicit Discharge Detection and Elimination Program activities are also discussed at the IIDC Subcommittee meetings. As mentioned in Section 4, there were three meetings held this fiscal year.

Provision C.6: Construction Site Control

Provision C.6: Construction Site Control

Requirement: Provision C.6.b requires each Permittee to implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective enforcement response plan (ERP), to prevent construction site discharges of pollutants into storm drains.

Program Activities: To assist member agencies in complying with this provision, the Program included discussions of Provision C.6 requirements at meetings of the New Development Subcommittee (NDS), in which member agency staff could share information, learn from the experience of other agencies, and receive guidance and training from the Program. Examples of C.6-related topics addressed at NDS meetings include reviewing the report on a workshop held during the previous year and offering suggestions for future C.6 training at the July 2019 NDS meeting, discussing preparations for the wet season and forming a work group to plan a C.6 workshop at the October 2019 NDS meeting, reviewing draft materials for the 2020 Construction Site Compliance Training Workshop (described below under Provision C.6.f Staff Training) at the January 2020 NDS meeting, and a debrief on the Construction Site Compliance Training Workshop at the April 2020 NDS meeting. Additionally, Program staff continued to provide on-call support to member agency requests for assistance regarding Provision C.6 compliance.

Provision C.6.e.ii.(1): Wet Season Notification

Requirement: Provision C.6.e.ii.(1) requires Permittees to, by September 1 of each year, remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season.

Program Activities: To assist member agencies in complying with this provision, an email notification was sent to members of the NDS on July 11, 2019, regarding the requirement for member agencies to provide pre-wet season notifications by September 1, 2019, to all site developers or owners of hillside sites, high priority sites, and sites disturbing one acre or more of soil, in order to prepare for the upcoming wet season.

Provision C.6.f: Staff Training

Requirement: Provision C.6.f requires Permittees to provide training at least <u>every other year</u> to municipal staff responsible for conducting construction site stormwater inspections.

Program Activities: To assist member agencies in complying with this provision, the Program conducted a countywide training workshop on stormwater compliance construction site inspections on February 27, 2020. This workshop included an review of C.6 requirements, construction BMP tips for inspectors, case studies of construction site inspections, and field tour of green stormwater infrastructure facilities. The workshop was held at Alameda County's Turner Court maintenance and operations facility, which is the location of Alameda County's Turner Court Green Infrastructure Demonstration Project. The field tour featured presentations at four green stormwater infrastructure facilities, with NDS members

guiding discussions regarding protection of green stormwater infrastructure facilities during the construction process. Sixty-six agency staff attended the workshop. The Post-Workshop Report is included in Appendix G.

Provision C.7: Public Information and Outreach

Provision C.7.b.: Outreach Campaigns

Requirement: Provision C.7.b requires Permittees to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences.

Program Activities: To comply with this provision, the Program conducted the following activities.

In general, the program has used a strategy of conducting smaller, more frequent digital promotions, in order to better reach different audience segments with targeted messaging relating to litter, home maintenance, and gardening/pest control. Here are summaries of the larger efforts.

1. Soapy, Grimy Water Hurts and Litter Hurts: Leveraging Existing Assets to Expand Reach and Reconfirm Messages

This year, the Program promoted two videos developed in past years', featuring the "Fred & Izzy" Program mascots, clicked through to related website content. Each video was promoted with a media buy and supported with social media and digital ads.

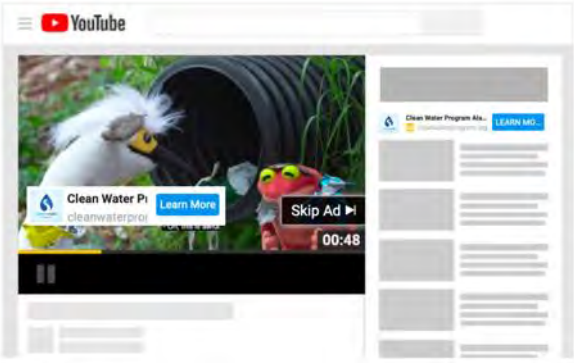

The social media promotions also provided us with informative feedback from residents, highlighting questions and comments that have helped inform future outreach.

The Program's You Tube Channel now has 112 subscribers. The Fred and Izzy videos have been viewed on YouTube over 691,479 times combined. To view the videos, visit the Clean Water YouTube Channel: https://www.youtube.com/channel/UCOFw3gvnzyhHCgUMEaYz-tA

Sweep Don't Hose Results

The program promoted the "Pollution Hurts—Sweep Don't Hose" Mascot Video through Google ads on Google Video, Display and Search Ads.

June 4-18, 2020

YouTube Video	806,713 impressions	263,407 views
Google Display Ads	291,000 impressions	782 clicks
Search Ads	7,990 impressions	34 clicks

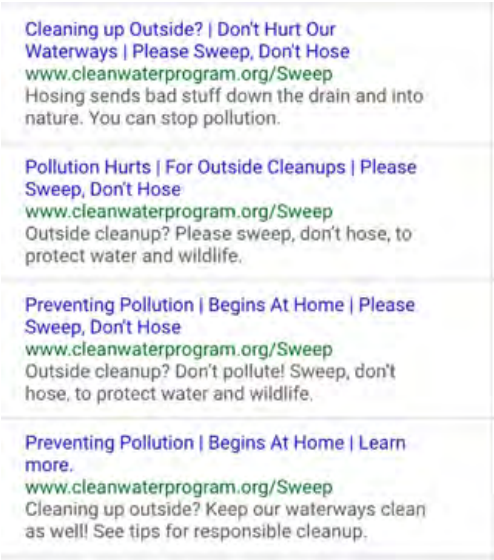

The campaign also included:

- a website landing page entitled "Home Maintenance" where traffic from the ads was directed. During the campaign period that page received 3,321 unique pageviews with 1:15 min on average spent on the page.

Litter Hurts Results

Fred and Izzy are very favorably viewed on Instagram, where a key youth demographic can be reached.

The promotion was timed to coincide with Coastal Cleanup Month.

Sep 14-23, 2020

YouTube Video	75,900 impressions	27,004 views
Facebook Video Ad	66,368 impressions	11,170 views

2. Earth Day at Home Campaign, Spring 2020

Due to COVID-19 restrictions, the 2020 in-person Earth Day activities had to be canceled. To provide alternative options for engagement, Gigantic Idea Studio created a set of downloadable activities for both youth and adults, based on existing resources that were customized as "Earth Day at Home" activities and accessible via this landing page on the Program website: www.cleanwaterprogram.org/get-involved/earth-day-2020.html

The page was launched on April 20, 2020 and remains live. On May 6, the page name was changed to "Things to Do at Home" to expand the content's longevity beyond Earth Month.

Page Promotion

Traffic was sent to the Earth Day at Home page using various tactics:

- E-blast on April 22, 2020 to our e-news subscriber list of over 1,100 contacts. The blast included multiple links to click through to the landing page. Open rate was 18%, click rate was 12%.

- News item on the Program's homepage: www.cleanwaterprogram.org/about-us/news.html
- Cross promotion with outreach partners via social media and newsletters, e.g. City of Oakland Earth Day campaign
- Social media content on the Program's Facebook, Twitter and Instagram accounts
- Facebook posts & ads:
  Posts featured images of specific activities, but all clicked through to the landing page
  - April 17-27: Activity books (promoted)
  - April 17-30: Frog kit (promoted)
  - April 19 Bee Kit
  - April 24-29: Activity books (promoted)
  - May 1-6: IPM activities (promoted)
  - May 7-17: Activity books

Facebook/ Instagram Ad	Reach	Likes	Clicks	Shares	Comments
Activity Books-1	22,223	4	2603	3	0
Frog	22248	117	645	107	8
IPM Card	15700	43	392	17	2
Activity Books-2	28,408	0	567	31	5

Facebook Ad Results

Ads received good shares, engagements, with the Frog post the most successful. See screenshots for samples. The Frog packet received 117 likes and 107 shares—the most shares of any of our promotions—ever. Comments are also positive and helpful. Note the wish for the activities to be in Spanish, something our team recommends in general for next fiscal year.

Website Traffic Earth Day at Home Promotion:

- Total of **2,443 users from CA**, equaling 86% of total of 2,855 users.
  Note: For campaign evaluation, only CA users are counted.
- The vast majority, 88%, were new users.
- Approx. 75% were from Alameda County.
- On average, users spent 52 seconds on the site and viewed 1.27 pages.

Activity downloads

- During Apr 20-May 6, there were **455 downloads** of activities (PDF format) from the landing page.
  Note: these are unique downloads with duplicates (same day, same user) removed.
- With 2,303 views of the Earth Day page in the same time frame, this means that on average, **20% of all Earth Day page views resulted in a download.**

Earth Day / Things to Do at Home Activity Downloads	
Apr 20 - May 31, 2020	
	Downloads
Kid activities	
2020-EarthDay-Bee-At-Home-Fun.pdf	**33**
Activity-book-Grade-4-6-Clean-Water-2019.pdf	**52**
Activity-book-Grade-K-3-Water-Wildlife-2019.pdf	**134**
Fred-Izzy-ColorPage.pdf	**24**
FrogPacket.pdf	**68**
Adult activities	
OWOW-pocket-guide	**29**
Pesticide-Recipe-Card	**115**
ALL DOWNLOADS	**455**

3. Integrated Pest Management Video

This year, the program planned to create a fourth Fred & Izzy video to add an Integrated Pest Management message to the video campaign portfolio. Unfortunately, COVID shelter in place restrictions prevented the actual production. A script, location and pre-production plans are ready to go for Spring 2021.

4. Fishing Advisory Campaign

The program ran a digital campaign in June - October 2019 to promote awareness of fish consumption health advisories. A new web page, Fishing and Health, was added. The ads targeted men and included Facebook, display, search and an e-blast. The web page was viewed 1,300 times, with an average of 2:28 minutes time on site.

In addition to digital advertising, a print ad and paid article in Fish Sniffer Magazine reached 26,000 readers interested in fishing. Our ad delivered an important health message to these recreationalists, and no other ad or article covered this topic.

Facebook /Instagram	Reach	Shares	Clicks	Comments	Likes
Slideshow Ad	8,874	1	642	1	2

Google Display Ads	134,800 impressions	286 clicks
Search Ads	24,135 impressions	392 clicks

Web Page	1,300 page views	2:28 average time spent on page
E-blast	975 reach	136 clicks

A comment on our Facebook promotion showed that our ad made caught the eye of Mr. Wiggles, an avid fisherman who makes his own fishing music videos!

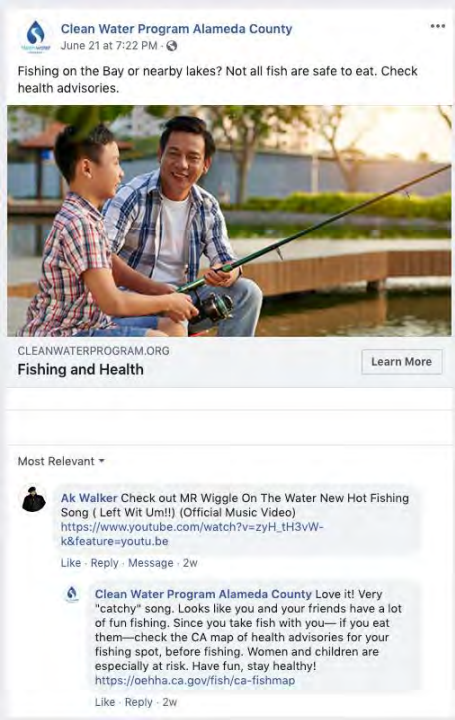

5. Exhibit at the Alameda County Fair

For years, the Clean Water Program has had a booth in the "invitational exhibit" area at the annual Alameda County Fair in June/July. The Program participated in the 2019 Fair that ran through the beginning of July. The 2020 County Fair was canceled due to COVID.

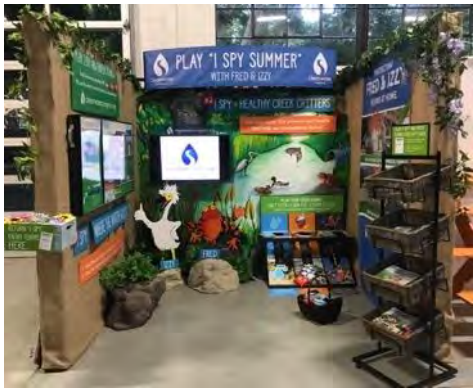

Provision C.7.c.: Stormwater Pollution Prevention Education

Requirement: Provision C.7.c: Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information.

Program Activities: To comply with this provision, the Program conducted the following activities.

Website & Website Promotions

The Program's website can be found at www.cleanwaterprogram.org. Besides comprehensive content on commercial stormwater pollution prevention issues, compliance guidelines and resources, the website offers a section on the local watersheds and pollutants monitoring, the program's community stewardship grants and school outreach, as well as content tailored to residents, promoting everyday practices to help prevent stormwater pollution. Focus areas include toxics reduction and runoff prevention in home and garden, less toxic pest control at home, car care, litter prevention, healthy fish

consumption and local volunteer opportunities. Users can connect with the Program through email or phone, listed in the “Contact Us” section.

In FY 2019/20, the website received 25,167 visits ("sessions”)—27% more than in the previous fiscal year. During those visits a total of 47,020 pageviews occurred. That means an average of just under 2 pages (1.88) were viewed during each visit. The graphs below show sessions per week over the reporting period.

Website traffic July 1, 2019 through April 20, 2020:

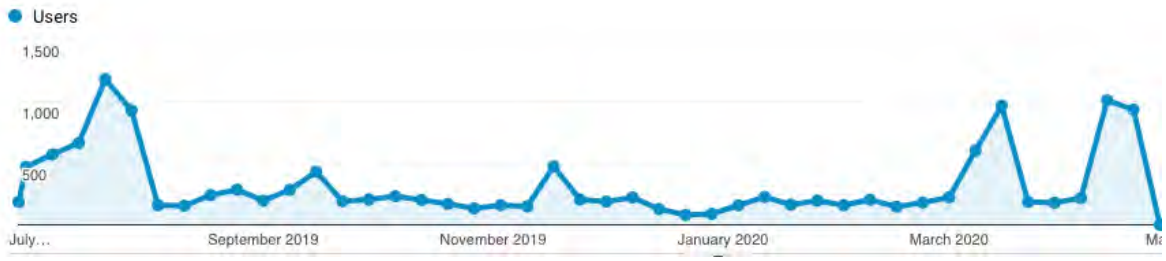

Website traffic April 20 through June 30, 2020:

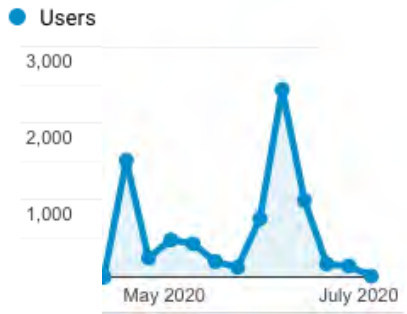

The site receives steady “baseline” traffic to pages tailored to the commercial audience, due to compliance requirements. “Peaks” in traffic are typically due to residential traffic that ebbs and flows with seasonal and topic-specific promotions. Throughout the reporting period, the Program launched several outreach efforts to drive traffic to specific portions (pages) of the residential website content.

Typically, efforts included a press release, one or more e-blasts to the Program’s e-news subscribers and social media posts. The campaigns described in section C.7.b. also used online advertising (YouTube video ads, Google display ads, search ads, text ads and/or Facebook ads), resulting in periods of particularly high website traffic in July 2019, March 2020, April 2020 and June 2020.

See table below for details on the main promo activities during the reporting period and resulting website and eblast performance stats.

Promo period	Topic and landing page URL	Promo activities	Website pageviews during promo period & Eblast stats
July-Oct 2019	***Fishing in the Bay*** Promote awareness of fish consumption health advisories. *Content landing page:* https://www.cleanwaterprogram.org/residents/fishing-and-health.html *Eblast:* https://t.e2ma.net/webview/6hajyb/5628dd5ae8bda04f82773ef86ee6200e	E-blast, Google display ads, search ads, Facebook/ Instagram ads.	1,243 pageviews with avg. 2:32 min on site. E-blast: 975 recipients 19% open rate 14% click rate
Aug/Sep 2019	***Coastal Cleanup Day 2019*** Volunteer event listings, encourage participation. *News Release page:* https://www.cleanwaterprogram.org/about-us/news/134-celebrate-coastal-cleanup-day-on-september-17.html *Event listing page:* https://www.cleanwaterprogram.org/get-involved/volunteer-in-your-community.html *Eblast:* https://t.e2ma.net/webview/26226b/7be4c0257872e11f11a5f426d4646673	News release, E-blast, Facebook posts, Tweets	543 unique pageviews with avg. 2:59 min on site. E-blast: 1,099 recipients 21% open rate 23% click rate

Promo period	Topic and landing page URL	Promo activities	Website pageviews during promo period & Eblast stats
Mar 2020	***Community Stewardship Grants 2020*** Announce 2020 grant cycle, encourage applications, past examples. *News Release page:* https://www.cleanwaterprogram.org/about-us/news/136-clean-water-program-now-accepting-grant-applications-2.html *Grants page:* https://www.cleanwaterprogram.org/programs/grants.html *Eblast:* https://t.e2ma.net/webview/qtgroc/a9fc6198acd89af9b7c3baa3d59aec88	News release, E-blast, Facebook posts, Tweets	1,711 unique pageviews with avg. 2:06 min on site. E-blast: 1,095 recipients 25% open rate 12% click rate
Apr 2020	***Earth Day at Home 2020*** Protect our waterways from home—activity downloads for adults and kids. *Activities download page:* https://www.cleanwaterprogram.org/get-involved/earth-day-2020.html Eblast: https://t.e2ma.net/webview/uwhhtc/a3c5af253fc446b1e32285eb14fc34f7	E-blast, Facebook posts, Tweets	2,220 unique pageviews with avg. 2:09 min on site. E-blast: 1,127 recipients 18% open rate 12% click rate
June 2020	***Sweep, Don't Hose*** Fred & Izzy driveway video: Water pollution resulting from hosing driveways and sidewalks *Content landing page:* https://www.cleanwaterprogram.org/residents/home-maintenance.html	Video ads, Google display ads, search ads.	3,321 unique pageviews with avg. 1:15 min on site.

Promo period	Topic and landing page URL	Promo activities	Website pageviews during promo period & Eblast stats
June 2020	***Organic Gardening Webinars 6/18 & 6/25*** Gardening techniques that prevent pests and diseases, product information for less-toxic pest control alternatives. *Eblast (clicking to registration page):* https://t.e2ma.net/webview/my5azc/d4b939fac7fa2edf25aa6ebf1cabe11a	E-blast, Facebook posts, Tweets	E-blast: 1,128 recipients 19% open rate 10% click rate

About the e-blasts: The Program maintains an email database of currently 1,140 active contacts. Residents can opt into receiving e-blasts via a signup form on the website or at outreach/tabling events.

Besides sending e-blasts to the Program's email list the content was pitched directly to selected local media outlets to promote coverage, as well as to other contacts such as neighborhood and creek groups, local chambers of commerce and member cities that can help increase the Program's reach by including an announcement like the grants in their own e-blast, newsletter or website listing, share a social media post, etc.

June 2020: Organic Gardening Webinar promotion

On June 18, 2020, IPM Advocate and OWOW contractor Suzanne Bontempo held a free webinar about organic gardening practices with a focus on less-toxic pest control. The webinar offered an alternative to in-person, in-store outreach to home gardeners about the downsides of pesticides, available alternatives and practices to prevent pest and disease problems.

The Clean Water Program promoted the webinar with a series of ***e-blasts*** as well as ***Facebook ads***, in addition to un-promoted social media content. All clicked through to the webinar registration page. The response was so positive that a second webinar was scheduled a week later which also filled up. Both webinars had a high retention rate (# of registrants actually logging on to the webinar), compared to similar webinars held in the past.

Webinar date/time	Registrants	Attendees
Thu, June 18, 4-5PM	130	54
Thu, June 25, 4-5PM	130	52

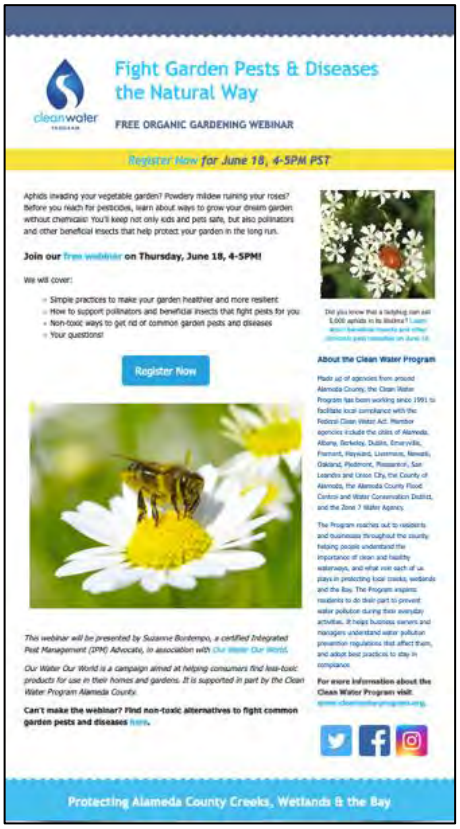

E-blasts and Facebook ads were instrumental in driving registrations for the free Organic Gardening Webinar.

Social Media

The Program has a presence on Facebook, Twitter and Instagram, with the Facebook page content managed on a continuous basis. The posting strategy includes promoting Clean Water Program projects, events and issues through original content, and sharing popular memes and media articles in a timely manner.

Facebook - www.facebook.com/CleanWaterProgram

The Program's Facebook page currently has 1,223 followers.

The Program posts once or twice per week on average. During the one-year reporting period, 72 posts were created. Organic reach per post (not promoted) ranged between 34 and 1,646 followers, with more likes and shares leading to higher reach. Below are two examples of organic reach. Publicizing relevant events can generate good reach through shares while positive, solutions-oriented topics like green infrastructure also get attention.

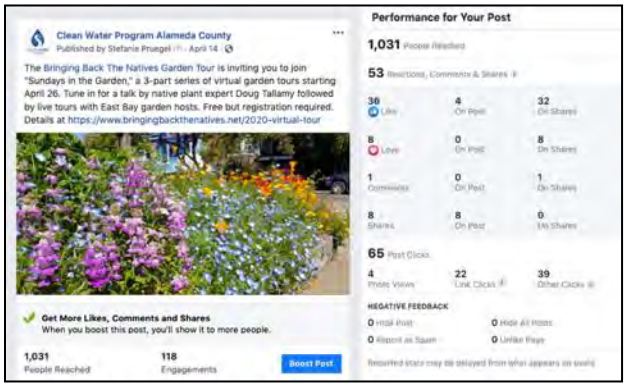

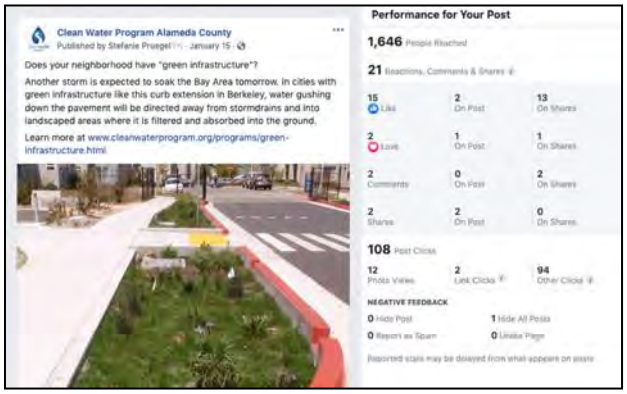

Promoted Facebook Posts

In addition to the Facebook ads run as part of the campaigns (see section C.7.b.: Outreach Campaigns), eight posts were promoted ("boosted"). They included the community stewardship grant program announcement and Coastal Cleanup Day event promotions, among other topics. A small budget goes a long way to amplify reach of these posts. Promoted posts and ads also run on Instagram.

Date of promotion	Topic	People Reached	Engagements
Aug 27, 2019	Coastal Cleanup Day 2019	6,576	114 link clicks
Sep 13, 2019	Litter Hurts Video	65,000 estimated	104 post engagements, 16,041 10-sec video views

Oct 24, 2019	Native plants (pesticide reduction)	945	23 link clicks
Nov 6, 2019	Lawn conversion / sheet mulching	1,522	52 link clicks
Dec 5, 2019	Video: How does rain cause water pollution?	17,000 estimated	3,211 10-sec video views
Mar 13, 2020	Community Stewardship Grants	11,220	1,450 link clicks
June 15, 2020	Organic gardening webinar	5,992	137 link clicks

Sample promoted post: Community Stewardship Grants

Twitter – https://twitter.com/CleanWaterProg

The Program has 72 followers on Twitter. During 2019/20, the Program increased the number of tweets to 22, up from only 8 in the previous year. In addition, several relevant tweets were retweeted. Original tweets promoted Earth Day and Coastal Cleanup Day, announced the Program's grants, featured the work of past grantees and school education activities and promoted less

toxic pest control methods and related gardening practices. Among the tweets that gained more traction, the organic gardening webinar announcement reached 304 people, got 31 engagements and prompted member agencies to replicate the tweet with their own images.

Provision C.7.e.: Watershed Stewardship Collaborative Efforts

Requirement: Provision C.7.e. requires permittees to encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. To fulfill this requirement, the program continued its Community Stewardship Grants with a FY 2019/20 grant cycle announced in March 2019 and grantees selected in July 2019. A total of $22,956 in small grants was awarded as follows:

1. Earth Team - $5,000
2. Regional Parks Foundation - $4,000
3. Friends of Sausal Creek - $5,000
4. Tri-Valley Conservancy - $3,436
5. Mary Spicer (I Heart Oakland & Alameda Estuary) - $5,000
6. Friends of San Leandro Creek - $520

Among the noteworthy activities prior to the shelter in place orders was an on-the-water estuary litter cleanup conducted by ***I Heart Oakland & Alameda Estuary*** in conjunction with Coastal Cleanup Day in September 2019. The grantee engaged cleanup volunteers not only on land but also in dragon boats, canoes, kayaks, and other types of watercraft allowing them to access remote locations of the estuary that cannot be reached on foot. They collected well over 2,000 pounds of debris—double their goal—including litter washed into the estuary through storm drains, but also illegally dumped large items, garbage, sharps, chemicals and more from homeless encampments and people living on abandoned boats.

In addition to the Community Stewardship Grants, the Program also continued to promote volunteer opportunities and provided social media support to watershed stewardship groups.

Provision C.7.f.: School-Age Children Outreach

Provision C.7.f. requires Permittees to implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12). During FY 2019/20, school outreach was performed by three excellent environmental education organizations contracted by the Program: Caterpillar Puppets, Kids for the Bay, and Livermore Area Park and Recreation District.

The in-person school education programs had to be put on hold due to COVID-19 in March 2020, however, one of the groups, KIDS for the BAY, has “retooled” to deliver their programs through Distance Learning in partnership with teachers, including online resources, lesson plans and video demonstrations, see http://kidsforthebay.org/at-home-activities. Caterpillar Puppets is also pursuing options for distance learning alternatives. See summary in Appendix H.

Provision C.8: Water Quality Monitoring

All water quality monitoring activities required by Provision C.8 are coordinated regionally through the Regional Monitoring Coalition (RMC), a collaborative effort of MRP Permittees under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA).

Provision C.8.a.: Compliance Options

Requirement: Provision C.8.a outlines mechanisms that Permittees may choose to meet the monitoring requirements in Provision C.8.

Program Activities: As reported during the previous permit term, all Alameda Permittees notified the Water Board in 2010 that they would participate in the RMC and that monitoring would be coordinated through the Program. This agreement has been confirmed through authorization of the Program's annual work plans. Program staff and consultants participated in seasonal meetings of the RMC Work Group to coordinate planning and activities.

Provision C.8.b.: Monitoring Protocols and Data Quality

Requirement: Provision C.8.b requires that, where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable.

Program Activities: To comply with this provision, the Program continued to ensure that monitoring activities follow the RMC Quality Assurance Project Plan and Standard Operating Procedures, as updated by the RMC in FY 2015/16 to incorporate changes in the MRP requirements and SWAMP standards. The Program conducted quality control review of the monitoring reports prepared by its consultants.

Provision C.8.c.: San Francisco Estuary Receiving Water Monitoring

Requirement: Provision C.8.c requires that Permittees participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program (RMP) by contributing their fair-share financially on an annual basis.

Program Activities: To comply with this provision, the Program made its fair-share annual contributions to the RMP during the reporting period. The Program participated in stakeholder oversight of the RMP through BASMAA representation on the Steering and Technical Review Committees; Sources, Pathways and Loadings Workgroup; and additional Strategy Teams for PCBs, Mercury, Small Tributaries, Sport Fish and Nutrients. Program staff actively participated as a BASMAA representative to the following RMP work groups or teams:

- Sources, Pathways and Loadings Work Group;
- Small Tributaries Loading Strategy Team; and
- Emerging Contaminants Work Group.

Participation included attending meetings or conference calls, reviewing technical reports and work products, reviewing articles included in the RMP's annual update, and providing general program direction to RMP staff.

Provision C.8.d.: Creek Status Monitoring

Requirement: Provision C.8.d requires Permittees to conduct Creek Status monitoring to answer the following questions:

- Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers and tributaries?
- Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

Program Activities: To comply with this provision, the Program implemented all Creek Status Monitoring for Water Year (WY, the 12-month period ending September 30) 2020 in coordination with other RMC programs and according to the seasonal requirements in the previous and current permits. Results will be reported in the Urban Creeks Monitoring Report (UCMR) to be submitted by March 31, 2021 as required by Provision C.8.h.

Due to the Covid-19, the continuous temperature monitoring start time was delayed from April to May.

Provision C.8.e.: Stressor/Source Identification (SSID) Projects

Requirement: Provision C.8.e requires Permittees to initiate SSID projects as follow up when monitoring results exceed certain values or criteria listed for parameters in C.8.d and C.8.g. This provision describes a process for selecting and conducting SSID projects, oriented toward taking action(s) to alleviate stressors and reduce sources of pollutants to receiving waters. Permittees are required to:

- Review results of monitoring (C.8.d and C.8.g) annually and maintain a list of all results exceeding thresholds described therein. Pollutant of Concern Monitoring (C.8.f) results may be included on the list as appropriate.
- Select follow up SSID projects from the list developed in C.8.e.i. based on criteria such as magnitude of threshold exceedance; parameter (or a variety of parameters); likelihood that stormwater management action(s) could address the exceedance; and similar priorities. Permittees who conduct and report SSID projects through a regional collaborative (e.g. the RMC) shall collectively initiate a minimum of eight new SSID projects (minimum of one for toxicity) during the Permit term.
- Conduct site specific SSID project(s) (or non-site specific if the problem is widespread) in a stepwise process described in C.8.e.iii. A minimum of half the required number of SSID projects must be started (i.e. at a minimum have a workplan) by the third year of the permit term, with the goal of completing the technical SSID investigation step 2 for at least half of the projects by the end of the permit term.
- Submit an SSID status report in each UCMR which summarizes the actions taken in regard to C.8.e.i-iii.

Program Activities: To comply with this provision, the Program provided a final report for two SSID projects and a status report for one active SSID project, as described below:

- Castro Valley Creek Sediment Quality - This SSID project was initiated in the previous permit term based on a combination of triggers including a “very poor” IBI score and elevated sediment chemistry concentrations at Site 204R00047. However, the WY 2017 progress report confirmed that the pollutant concentrations in Castro Valley Creek sediments are typical of

urbanized areas in California. Additional monitoring was conducted in WY 2018, and the project was closed in October 2018. The Final Report for this SSID project was included in the March, 2020 IMR.

- Exploring CSCI Results and the Outcomes of Restoration Activities Along Sausal Creek – This recently initiated SSID project investigated low California Stream Condition Index (CSCI) scores and the impacts of restoration activities along Sausal Creek, which has a watershed encompassing nearly 2,700 acres in Oakland. The SSID study evaluated whether benthic macroinvertebrate (BMI) metrics improved from pre-project conditions in reaches with restoration projects and assess whether biological conditions associated with previously measured sub-optimal CSCI scores are a function of recovery/maturation stage or are due to previously unidentified stressors. Data collection and sampling began in Spring 2018, and the first SSID annual progress report was issued in the WY 2018 UCMR in March 2019. Data collection and sampling continued in WY 2019 and did not reveal a stressor/source. The Final Report for this SSID project was included in the March, 2020 IMR.
- Investigating Contributors to Nutrient / Eutrophication Biological Indicators in the Arroyo Las Positas Watershed – This recently initiated SSID project is investigating factors contributing to ongoing impairment in the Arroyo Las Positas Watershed, which covers roughly 80 square miles in and around Livermore. This project was triggered by historic sampling results showing high nitrate concentrations, high pH measurements, and both supersaturated and low dissolved oxygen concentrations. Additionally, benthic macroinvertebrate assemblage metrics were well outside the range of scores for minimally disturbed reference sites. BMI and nutrient sampling started in summer 2019 and continued in 2020. Results will be combined with data from the Water Board's TMDL-related monitoring efforts in the watershed to get an enhanced picture of the causes of impairment in the watershed.

Additionally, BASMAA completed a regional SSID project on behalf of all RMC members in FY 2019/20, which investigated sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The final SSID project report is provided in Appendix I.

Due to the Covid-19 Shelter in Place Order, planned year-2 monitoring in Arroyo las Positas watershed was scaled back due to delay in permitting and being able to initiate monitoring activities. The original plan called for water quality collections to be initiated in March and continue throughout the algae growth and die-off cycle. Lacking the early season information, the monitoring plan was revised to include just continuous monitoring and dry season monitoring collections.

Provision C.8.f.: Pollutants of Concern Monitoring

Requirement: Provision C.8.f requires that Permittees conduct Pollutants of Concern (POC) Monitoring to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving waste load allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants. In particular, monitoring required by this

provision must be directed toward addressing up to five priority POC management information needs (described in MRP Table 8.1, POC Monitoring Methods) for each of the priority POCs listed in MRP Table 8.2, POC Monitoring Parameters, Effort and Type – which identifies the minimum effort and type of samples to be collected for each POC.

Program Activities: To comply with this provision, the Program continued water quality sampling in WY 2020 for copper and nutrients to address information on Monitoring Type #4 (Loads and Presence/Absence) and trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time (Monitoring Type #5). The Program conducted WY 2020 urban sediment / soil sampling to identify potential sources of PCBs to address Monitoring Types #1 and #2 (Source Identification and Contributions to Bay Impairment) in December 2019 and August 2020. In January 2020, the Program also conducted precipitation-based water quality monitoring to characterize PCB and Hg concentrations in runoff from a site characterized previously for POC concentrations in urban sediment / soil (Monitoring Type #1).

Results for WY 2020 POC monitoring will be reported in the March 2021 Urban Creeks Monitoring Report. As required by Provision C.8.h.iv, WY 2020 POC monitoring accomplishments will be summarized in the next ACCWP POC Monitoring Report (if required by the revised MRP), which will also describe allocations of POC monitoring efforts planned for WY 2021 and be submitted by October 15, 2021.

Through the Regional Monitoring Program's Sources Pathways and Loading Work Group (SPLWG) and Emerging Contaminants Work Group (ECWG), Program staff initiated a project in 2018 to ensure that the RMP's Chemicals of Emerging Concern (CECs) Strategy addresses the requirement in MRP Table 8.2 that Permittees conduct or cause to be conducted a special study that addresses relevant management information needs for emerging contaminants[1] by the end of the current permit term. Pilot sampling began in 2019 in close coordination with the Small Tributaries Loading Strategy (STLS) work group. Year-two of this three-year study was approved in 2019, with the inclusion of additional CECs, including organophosphate esters (OPEs) and bisphenol A and S. Based on recommendations from the ECWG in April 2020, the RMP has approved year three and an additional fourth year of monitoring to supplement the initial monitoring and provide more robust data across a better representation of watersheds, given insufficient monitoring in the first two years of the study. The final reports and manuscripts for this study are anticipated in fall 2022. The RMP has also approved a special study for 2020 that will focus on developing toxicity thresholds for new or "possible concern" CECs, per the updated CEC Strategy, which will support further improvements in the tiered risk-based framework for evaluating CECs in the Bay. Lastly, the RMP continues to develop a multi-pollutant modeling effort that will be linked to a CECs

[1] The special study must account for relevant CECs in stormwater and would address at least perfluorooctane sulfonates (PFOS), perfluoroalkyl sulfonates (PFAS), and alternative flame retardants being used to replace polybrominated diphenyl ethers (PBDEs). The RMP has completed work on PFAS and PFOA The RMP developed and funded a special study in 2018 to review available data and previously developed conceptual models for PBDEs to support a stormwater-related alternative flame retardants conceptual model.

stormwater monitoring strategy and will be designed to incorporate stormwater runoff related impacts to the Bay.

Provision C.8.g.: Pesticides and Toxicity Monitoring

Requirement: Provision C.8.g requires Permittees to conduct wet weather and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides-related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Executive Officer modify, reduce or eliminate this monitoring requirement.

Program Activities: To comply with this provision, the Program conducted dry weather toxicity and pesticide monitoring in water and sediment during July. Results for WY 2019 were reported in the March 2020 IMR as required by Provision C.8.h. In WY 2018, in coordination with other RMC members, the Program conducted wet weather toxicity and pesticide monitoring collaboratively through the RMC. There was no monitoring conducted in WY 2019 for wet season pesticides and toxicity. All MRP2 monitoring requirements were satisfied through the WY 2018 RMC collaboration. Analyses of results from pesticide and toxicity monitoring conducted by the Program in Water Year 2019, as well as monitoring conducted in Water Years 2014 through 2018, are presented along with other regionally designed Creek Status Monitoring parameters in the March 2020 IMR.

Provision C.8.h.: Reporting

Requirement: Provision C.8.h requires Permittees to submit the following by March 31 of each year, concerning data collected during the previous October 1–September 30 period (Water Year):

- Electronic data to the California Environmental Data Exchange Network (CEDEN), including results from monitoring conducted pursuant to Provisions C.8.d, C.8.e, C.8.f and C.8.g. Data that CEDEN cannot accept are exempt from this requirement.
- A comprehensive Urban Creeks Monitoring Report (UCMR) on these results.
- An Integrated Monitoring Report, in lieu of the UCMR and which reports on all of the data collected since the previous Integrated Monitoring Report, in 2020.

By October 15 of each year of the permit (beginning in 2016), the Permittees shall submit a Pollutants of Concern (POC) Monitoring Report describing the allocation of sampling effort for POC monitoring (required by Provision C.8.f) for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year.

Program Activities: To comply with this provision, the Program submitted its POC Monitoring Report in October 2019 and its IMR and electronic data in March 2020.

Provision C.9: Pesticide Toxicity Control

Provision C.9.d.: Interface with County Agricultural Commissioners

Requirement: Provision C.9.d. requires that Permittees maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire.

Program Activities: To assist member agencies comply with this provision, the Program contacted the County Agricultural Department to discuss any issues with the implementation of the new structural pest control regulations. The Deputy Director overseeing their integrated pest management program stated that the biggest issue they have been dealing with is from used/discarded pesticides at illegal marijuana grow operations.

Provision C.9.e.ii (1): Public Outreach: Point of Purchase

Requirement: Provision C.9.e.ii(1) requires Permittees to:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally-equivalent pesticide use reduction outreach program.

Program Activities: To comply with this provision, the Program provided funding to the regional Our Water Our World (OWOW) efforts through BASMAA (see the BASMAA Regional Supplemental Training and Outreach Report in Appendix J for details on the regional efforts). The Program also contracted with Suzanne Bontempo to implement the OWOW program in 26 stores in Alameda County including all nine Home Depot stores. Twelve training events were conducted and 115 employees received training. The report on the ACCWP FY 2019/20 Our Water Our World (OWOW) activities and its effectiveness are included in Appendix K. The Program also provides targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control through its website.

Provision C.9.e.ii (2): Pest Control Contracting Outreach

The Permit requires that the Permittees conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring

structural pest control operators and landscape professionals such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

Program Activities: The Program explains the links between pesticide usage and water quality in numerous outreach efforts including this video that was previously shown in movie theaters and is now posted on the Program's website. To promote pest control companies that use integrated pest management (IPM), the Program added a larger section on the website, and created a digital ad promotion linking to the site's resources, which include the fact sheet from OWOW entitled *Finding a Pest Control Company* fact sheet as well as to the EcoWise, Green Shield and Green pro list of certified IPM contractors. The Program had planned to create a new IPM video with the mascots Fred and Izzy, but that was pushed off to next year due to the Covid-19 Shelter in Place Order.

Provision C.9.e.ii (3): Outreach to Pest Control Professionals

Permit Requirement: The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by EcoWise Certified or a functionally-equivalent certification program.

Program Activities: In FY 2017/18 the Program sent a letter to all pest control companies registered in Alameda County that encouraged them to provide and promote IPM services to their customers. In FY 2018/19, the Program created a digital ad promoting EcoWise Certified and other IPM services providers, as having customers reach out to pest control professionals and request IPM services seems like a more productive approach. The Program plans to run this ad again in fiscal year 2020/21.

Provision C.9.f.: Track and Participate in the Regulatory Processes

The Permittees shall conduct the following activities, which may be done at a county, regional, or state wide level: (1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act (CWA) and to accommodate water quality concerns within its pesticide registration process; (2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process; (3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and (4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

Program Activities: The Program fulfilled this requirement through participation in and financial support of the CASQA Pesticide Subcommittee activities. See CASQA's *Pesticide Subcommittee Annual Report and Effectiveness Assessment 2019/20* in Appendix L. Program staff also participated in the State's development of a statewide pesticide toxicity monitoring program.

Provision C.10: Trash Load Reduction

Provision C.10.a. Trash Reduction Requirements

Requirement: Provision C.10.a requires Permittees to reduce their trash load by 70% by July 1, 2017, and 80% by July 1, 2019.

Program Activities: To assist member agencies to comply with this provision, the Program provided technical assistance with the mapping of generation rates, full trash capture devices, full trash capture device treatment areas, private lands drainage areas, and trash management areas. The Program has also established a Trash Subcommittee that met five times in FY 2020 with an average attendance of 12 people per meeting. The Subcommittee has been chaired by Elisa Wilfong, City of Hayward, throughout the fiscal year. The Subcommittee has provided a forum for disseminating technical information, providing training on ArcGIS Online applications, and sharing information among member agencies.

Provision C.10.b.i. Full Trash Capture Systems

Requirement: Provision C.10.b.i. Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system.

Program Activities: To assist member agencies comply with this provision, the Program has developed an ARC GIS Online tool that allows member agencies to document and track the maintenance of each of their full trash capture devices including the mapped location, drainage area, and maintenance history.

Provision C.10.b.ii.b. Visual Assessment of Outcomes

Requirement: Provision C.10.b.ii.b. requires Permittees to conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see C.10.b.ii.b.(iv.)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions.

Program Activities: To assist member agencies comply with this provision, the Program has developed an ARC GIS Online tool that allows member agencies to document and track their visual assessment results.

Provision C.10.b.iv. Source Control

Provision C.10.b.ii.b.iv. allows Permittees to claim a reduction credit of up to 10% of their baseline load for source control actions such as single-use bag bans and polystyrene bans.

Single-Use Bag Ban

An expanded Countywide Single-Use Bag Ban (Ban) was adopted by Alameda County Waste Management Authority (Stopwaste) on October 26, 2016. The original Ban went into effect in January 2013, and required that grocery stores and other stores in Alameda County that sell alcohol or four

items, milk, bread, packaged food and soda, no longer provide single-use plastic carryout bags, nor distribute paper bags or reusable bags for free at checkout. The original Ban covered approximately 1,300 stores in the County. The expanded ban includes two phases. The first phase went into effect on May 1, 2017 and expands the ban to include all retail stores except retail food establishments. This phase of the Ban expands the number of stores covered from approximately 1,300 to approximately 9,000 stores. This is a nearly seven-fold increase in the number of stores covered. The second phase of the Ban went into effect in November 2017 and expanded the Ban to include all public eating establishments. Approximately 5,000 public eating establishments are now also covered by the Single-Use Bag Ban. The Program funded the expansion of the Bag Ban through an $180,000 contribution to the Alameda County Waste Management Authority.

Assessment: The following methods were used to assess the effectiveness of the original Ban: (1) Inspection and Enforcement; (2) Parking lot survey; (3) Voluntary data reporting; and, (4) Characterization of single-use bags in storm drains. Stopwaste has implemented an inspection and enforcement program. Nearly every store covered by the ban has been inspected. Compliance rates were very high. Approximately 85% of the stores were fully compliant, and less than 10% of the stores were distributing single-use plastic bags. Enforcement actions were initiated against stores that were not fully compliant. These enforcement actions should increase the effectiveness of the ordinance over time. Stopwaste also conducted a pre and post-ordinance survey of bag usage in the parking lots of 17 stores covered by the ordinance. Results of the survey indicated that there was a 95% reduction in the use of plastic bags at those stores following the implementation of the ordinance. Sixty-nine stores covered by the ordinance participated in a voluntary data reporting exercise. Participating stores provided data on the number of single-use plastic bags purchased before and after the start of the ban. Based on these results, Stopwaste estimated that there was an 85% reduction in plastic bags purchased by the stores covered by the ban. This equates to approximately 150 million fewer bags purchased. The Program worked with Stopwaste during FY 2013/14 to conduct a study to assess the reduction in the number of plastic bags found in storm drains after the implementation of the ordinance compared to what was found during the BASMAA baseline loading study conducted during FY 2011/12. The BASMAA study found that 8% of the trash found in storm drains was single-use plastic bags. The Alameda Countywide Storm Drain Trash Monitoring and Characterization Project (Characterization Project) found significantly fewer single-use bags in the storm drain inlets throughout the County as compared to the BASMAA study. Initial results indicated an estimated 44% reduction. Based on the results of these assessment efforts and the previous characterization conducted by BASMAA, Program staff recommended that, in the absence of additional jurisdiction specific information, Permittees should estimate that the single-use bag ban reduced the discharge of single-use bags by 50% which equates to an estimated 4% reduction in trash discharged to the their storm drain system. Now that the Ban has been expanded from approximately 1,300 to 14,000 stores, Program staff recommends that Permittees estimate that the trash discharged is reduced by 6%.

Towards the end of the fiscal year, the State banned the use of reusable grocery bags due to concerns regarding the Covid-19 pandemic. It is not clear how much of an affect that may have had. That ban has now been lifted.

Expanded Polystyrene Food Ware Bans

The following eleven cities within the County have adopted expanded polystyrene (EPS) food ware bans: Alameda, Albany, Berkeley, Emeryville, Fremont, Hayward, Livermore, Oakland, Pleasanton, San Leandro, and Union City. The County of Alameda has also adopted a polystyrene ban that applies to the unincorporated area of the County.

Assessment: One of the goals of the Characterization Project was to develop an estimate of the effectiveness of EPS food ware bans at reducing the amount of EPS food ware discharged to the storm drain system. As the City of San Leandro ban went into effect after the completion of the BASMAA baseline study and prior to the implementation of the Project, and twenty-five of the 47 Alameda County sites included in the BASMAA Baseline Study were located in San Leandro, the assessment of the effectiveness of EPS food ware bans focused on San Leandro. Initial results of the Project suggest an estimated 62% reduction in the amount of EPS food ware discharged to the storm drain system following the implementation of the ban. Based on the results of the Project and the previous characterization conducted by BASMAA, Program staff recommend that, in the absence of additional jurisdiction specific information, Permittees should estimate that an EPS food ware ban equates to an estimated 4% reduction in trash discharged to the their storm drain system.

Provision C.10.b.v.b. Receiving Water Monitoring

Provision C.10.b.v.b. requires Permittees to submit a Final Report on implementation of the Receiving Water Trash Monitoring Program Plan to the Executive Officer of the Water Board by July 1, 2020. The Final Report was developed as a regional project through BASMAA who submitted it to Water Board on behalf of Permittees.

Program Activities: The draft Final Report was reviewed and commented upon by the Program's Trash Committee and Management Committee and revisions were made accordingly. The report, entitled *Final Report of the San Francisco Bay Area Receiving Water Trash Monitoring, Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols*, was approved by the Management Committee at its June 24 meeting and submitted to BASMAA for final review and approval. BASMAA submitted the Final Report to Executive Officer via email on July 1, 2020.

Provision C.10.e.i. Optional Trash Load Reduction Offset Opportunities/Additional Creek and Shoreline Cleanup

Program Activities: To assist member agencies comply with this provision, the Program has developed an ARC GIS Online tool that allows member agencies to document and track their creek and shoreline cleanup efforts.

Additional Activities

The Program also conducted anti-litter public outreach efforts. See Provision C.7 reporting for details.

In addition, the Program participates in regional activities on trash-related issues. Starting in January 2020, ACCWP staff member Beth Baldwin began serving as Chair of the BASMAA Trash Committee which meets bimonthly. The Committee is composed of Permittees, Water Board staff, Caltrans representatives, NGOs, and Stormwater Program Managers and staff. It provides a forum for members to discuss compliance-related matters under MRP 2.0, receive updates from Water Board staff and Caltrans, and hear from guest speakers on various trash topics.

Provision C.11: Mercury Controls

Provisions in C.11 reflect the implementation plan incorporated in the Basin Plan through the TMDL for mercury in San Francisco Bay. The MRP Fact Sheet describes a General Strategy for Sediment-Bound Pollutants that progresses from pilot testing of controls in a few specific locations, through focused implementation in areas where benefits are likely to accrue, to full-scale implementation throughout the region where warranted by understanding the effectiveness of each control measure or activity. As noted in the MRP 2 Fact Sheet, the current permit emphasizes focused implementation and in some cases movement towards full-scale implementation.

Most of the MRP provisions for mercury are similar to provisions in C.12 for controlling PCBs; in this permit term management decisions may be driven predominantly by considerations for reducing PCBs loads but are expected to also result in mercury load reductions that will be accounted for. Permittees may comply with any requirement of this provision through a collaborative effort.

Provision C.11.a.: Implement Control Measures to Achieve Mercury Load Reductions

Requirement: Provision C.11.a requires Permittees to:

- Identify the watersheds or portions of watersheds (management areas) in which mercury control measures are currently being implemented and those in which new control measures will be implemented during the term of MRP 2;
- Identify the control measures that are currently being implemented and those that will be implemented in these watersheds or management areas;
- Submit a schedule of control measure implementation; and
- Implement mercury source and treatment control measures and pollution prevention strategies and quantify mercury load reductions achieved by using the accounting methods established according to provision C.11.b.

Program Activities: To comply with the requirements of this provision, Program staff and consultants have been assisting and coordinating Permittees' review of potential High Priority areas and source properties for mercury and PCBs load reduction that were identified through a source area screening process initiated with the Integrated Monitoring Report[2] in 2014. Pursuant to Provision C.11.a.iii(2), the Program has prepared a report documenting the list of the watersheds or management areas within Alameda County and the specific control measures being implemented or to be implemented during the permit term. See Appendix M for the *Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020* report which is submitted on behalf of all ACCWP Permittees to comply with Provision C.11.a.iii (3). The Information in this report has been updated to account for additional control measures implemented during FY 2019/20.

Provision C.11.b.: Assess Mercury Load Reductions from Stormwater

Requirement: Provision C.11.b requires Permittees to develop and implement an assessment methodology and data collection program to quantify, in a technically sound manner, mercury loads

[2] ACCWP Integrated Monitoring Report Part C: PCBs and Mercury Load Reduction Planning. March 14, 2014.

reduced through implementation of pollution prevention, source control, and treatment control measures to demonstrate progress toward achieving the interim load reductions required in this permit term.

Program Activities: To comply with this provision, the Program participated in a regional project on behalf of all Permittees, conducted through the Bay Area Stormwater Management Agencies Association (BASMAA). Program staff worked with BASMAA's contractors and Water Board staff to document, update and refine the load reduction accounting system described in the MRP Fact Sheet. The regional *Interim Accounting Methodology for TMDL Loads Reduced* report was approved by the Executive Officer in May 2017. The *Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020* report (Appendix M) implements the Interim Accounting Methodology to estimate the mercury and PCBs loads reduced by the Permittees to date.

Provisions C.11.b requires the Permittees to submit, in 2018 and subsequent Annual Reports, refinements to the Interim Accounting Methodology to assess load reductions in the next permit term. The Program and Permittees participated in a BASMAA Regional Project to refine the source control measure load reduction accounting methods for the next permit term. The *BASMAA Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report is provided in Appendix N.

Provision C.11.c.: Plan and Implement Green Infrastructure to Reduce Mercury Loads

Requirement: Provision C.11.c requires Permittees to implement GI projects and demonstrate achievement of load reductions specified in the MRP by using the accounting methods documented and approved under provision C.11.b. Provision C.11.c.iii.(3) required the submittal of the quantitative relationship between GI and mercury load reductions in 2018. Provision C.11.c.iii.(4) requires the Permittees to report an estimate of the amount of mercury load reductions resulting from GI implementation during the current term of the MRP, including a description of all data used and a full description of models and model inputs relied on to generate this estimate. Reporting requirements for 2020 include documentation of interim load reductions, an estimate of land area to be treated through GI implementation and an RAA to demonstrate quantitatively that mercury load reductions of at least 10 kg/year will be realized by 2040 through implementation of GI projects across the region by all MRP Permittees.

Program Activities: To assist member agencies in complying with this provision, the Program facilitated Work Groups for GI and GIS with activities described above for Provision C.3. The Program completed the Green Infrastructure RAA in FY 2019/20, which was initiated in FY 2017/18. A *Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* report was prepared by the Program in cooperation with the Contra Costa Clean Water Program in FY 2017/18. This report fulfilled the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(3), C.12.b.iii.(3), and C.12.c.iii.(1) for submitting the quantitative relationship between GI implementation and mercury and PCBs load reductions that was used for the RAA required by MRP Provisions C.11.c.ii.(2), C.11.d.ii, C.12.c.ii.(2), and C.12.d.ii.

The Green Infrastructure RAA (i.e., an estimate of the land area that will be treated through GI implementation by 2020, 2030, and 2040; the estimated PCBs and mercury loads reduced; and a description of models and model inputs relied on to generate this estimate) is provided in the *Alameda County PCBs and Mercury Control Measure Plan and Reasonable Assurance Analysis Report* (Appendix O). This report fulfills the requirements of MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.b.iii.(2), and C.12.d.iii for providing a mercury and PCBs control measure implementation plan and corresponding RAA.

In FY 2019/20, the Program continued to participate in a BASMAA RAA Work Group, whose objective is to provide a forum for collaborative and collegial input from BASMAA member agencies in an effort to create transparent and consistent assumptions and approaches to the development of the countywide RAAs. The workgroup focused on conducting a peer review process for the RAA methodologies in FY 2019/20.

Provision C.11.d.: Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

Requirement: Provision C.11.d requires Permittees to submit with their FY 2019/20 Annual Reports a mercury control measures implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028.

Program Activities: To comply with this provision, the Program prepared the required Implementation Plan and schedule. The *Alameda County PCBs and Mercury Control Measure Plan and Reasonable Assurance Analysis Report* is provided in Appendix O.

Provision C.11.e.: Implement a Risk Reduction Program

Requirement: Provision C.11.h requires Permittees to conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to annually reach 3,000 individuals throughout the region who are likely consumers of San Francisco Bay-caught fish. The Permittees shall report on the status of the risk reduction program in each of their Annual Reports and report the findings of the effectiveness evaluation of their risk reduction program in their FY 2019/20 Annual Report.

Program Activities: Two significant efforts have been conducted to meet this requirement: 1) Fish Consumption Advisory Signage; and 2) a Fishing Advisory Campaign.

Fish Consumption Advisory Signage: The Alameda County Environmental Health (ACEH) Department maintains fish consumption advisory signs posted at popular fishing locations and boat ramps along the Bay shoreline. Many of these sites are included in the California Recreational Fisheries Survey (CRFS) which estimates total marine recreational fin fish catch and effort for California. While CRFS surveys are

designed to aggregate data statewide across multiple types of sites and fishing modes, available results obtained from the Recreational Fisheries Information Network suggest that there were at least 2000 angler visits to the posted Alameda County sites in 2015. While some individual fishers make repeated visits during the year, there are no data to indicate how many people this represents. A survey by San Francisco Bay Fish Project also found that a significant number of fishers who have seen the signs would share the information with other fishers and consumers. Program staff will continue working with ACEH to try to secure additional sites for posting and explore extending outreach to local bait and tackle stores or other outlets. The Program also developed and promoted an online advertisement to promote awareness of proper consumption.

Fishing Advisory Campaign

The program ran a digital campaign in June -October 2019 to promote awareness of fish consumption health advisories. A new web page, Fishing and Health, was added. The ads targeted men and included Facebook, display, search and an e-blast. The web page was viewed 1,300 times, with an average of 2:28 minutes time on site.

In addition to digital advertising, a print ad and paid article in Fish Sniffer Magazine reached 26,000 readers interested in fishing. Our ad delivered an important health message to these recreationalists, and no other ad or article covered this topic.

Facebook /Instagram	Reach	Shares	Clicks	Comments	Likes
Slideshow Ad	8,874	1	642	1	2

Google Display Ads	134,800 impressions	286 clicks
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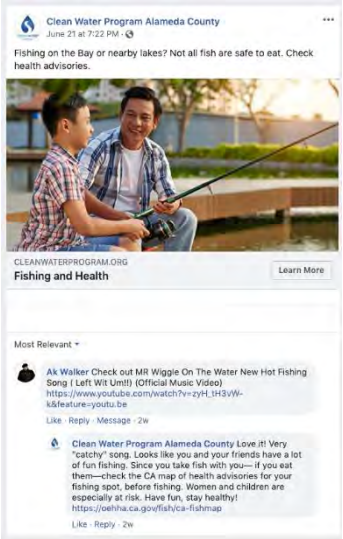

Evaluation

The campaign garnered 195,000 impressions, which is well over the target reach of 3,000. (This is in addition to the estimated 2,000 annual visitors to the posted sites described above.) The campaign documented 1,459 engagements, where viewers took an action to learn more information or check the advisory map. The first step to behavior change is to promote awareness, communicating the risks and benefits to following health advisories. For local impact, signage and direct outreach is the best approach to site-specific prevention of consuming the catch, and that is covered elsewhere in this report. Advertising is a valuable tool for broad reach and increasing knowledge and inspiring action. Since many Alameda County residents travel to other locations outside the county to fish; a regional or statewide advertising strategy directing traffic to the CA Fishing Advisory Map would be helpful to all Clean Water agencies, as there is significant travel between jurisdictions by the target audience. https://oehha.ca.gov/fish/ca-fishmap.

A comment on our Facebook promotion showed that our ad made caught the eye of Mr. Wiggles, an avid fisherman who makes his own fishing music videos!

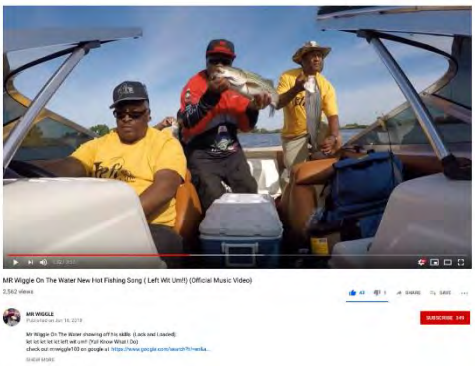

Provision C.12: Polychlorinated Biphenyls (PCBs) Controls

Provisions in C.12 reflect the implementation plan incorporated in the Basin Plan through the Total Maximum Daily Load for PCBs in San Francisco Bay. The MRP 2 Fact Sheet describes a General Strategy for Sediment-Bound Pollutants that progresses from pilot testing of controls in a few specific locations, through focused implementation in areas where benefits are likely to accrue, to full-scale implementation throughout the region where warranted by understanding the effectiveness of each control measure or activity. As noted in the MRP 2 Fact Sheet, the current permit emphasizes focused implementation and in some cases movement towards full-scale implementation. Permittees may comply with any requirement of this provision through a collaborative effort.

Provision C.12.a.: Implement Control Measures to Achieve PCBs Load Reductions

Requirement: Provision C.12.a requires Permittees to:

- Identify the watersheds or portions of watersheds (management areas) in which PCBs control measures are currently being implemented and those in which new control measures will be implemented during the term of this permit;
- Identify the control measures that are currently being implemented and those that will be implemented in these watersheds or management areas;
- Submit a schedule of control measure implementation; and
- Implement sufficient control measures to achieve the permit-area-wide reduction or the county-specific load reduction performance criteria shown in Table 12.1 of the MRP. Beginning with the FY 2016/17 Annual Report, Permittees shall demonstrate achievement of these load reductions as required in provision C.12.b.

Program Activities: To comply with the requirements of this provision, Program staff and consultants have been assisting and coordinating Permittees' review of potential High Priority areas and source properties for mercury and PCBs load reduction that were identified through a source area screening process initiated with the Integrated Monitoring Report[3] in 2014. Pursuant to Provision C.12.a.iii(2), the Program has prepared a report documenting the list of the watersheds or management areas within Alameda County and the specific control measures being implemented or to be implemented during the permit term. See Appendix M for the *Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020* report which is submitted on behalf of all ACCWP Permittees to comply with Provision C.12.a.iii(3). The Information in this report has been updated to account for additional control measures implemented during FY 2019/20.

The Program continued sediment monitoring and data review to assist in identification of potential source properties as described for Provision C.8.f above.

[3] ACCWP Integrated Monitoring Report Part C: PCBs and Mercury Load Reduction Planning. March 14, 2014.

Provision C.12.b.: Assess PCBs Load Reductions from Stormwater

Requirement: Provision C.12.b requires Permittees to develop, document, and implement an assessment methodology and data collection program to quantify, in a technically sound manner, PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, to demonstrate progress toward achieving the interim load reductions required in this permit term.

Program Activities: To comply with this provision, the Program participated in a regional project on behalf of all Permittees, conducted through BASMAA. Program staff worked with BASMAA's contractors and Water Board staff to document, update and refine the load reduction accounting system described in the MRP 2 Fact Sheet. The regional *Interim Accounting Methodology for TMDL Loads Reduced* report was approved by the Executive Officer in May 2017. The *Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020* report (Appendix M) implements the Interim Accounting Methodology to estimate the mercury and PCBs loads reduced by the Permittees to date.

Provisions C.12.b requires the Permittees to submit, in 2018 and subsequent Annual Reports, refinements to the Interim Accounting Methodology to assess load reductions in the next permit term. The Program and Permittees participated in a BASMAA Regional Project to refine the source control measure load reduction accounting methods for the next permit term. The *BASMAA Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report is provided in Appendix N.

Provision C.12.c.: Plan and Implement Green Infrastructure to Reduce PCBs loads

Requirement: Provision C.12.c requires Permittees to implement GI projects and demonstrate achievement of load reductions specified in the MRP by using the accounting methods documented and approved under provision C.12.b. Provision C.12.c.iii.(3) required the submittal of the quantitative relationship between GI and mercury load reductions in 2018. Provision C.12.c.iii.(4) requires the Permittees to report an estimate of the amount of PCBs load reductions resulting from GI implementation during the current term of the MRP, including a description of all data used and a full description of models and model inputs relied on to generate this estimate. Future reporting requirements for 2020 include documentation of interim load reductions, an estimate of land area to be treated through GI implementation and a reasonable assurance analysis (RAA) to demonstrate quantitatively that PCBs load reductions of at least 3 kg/year will be realized by 2040 through implementation of GI projects across the region by all MRP Permittees.

Program Activities: To assist member agencies in complying with this provision, the Program facilitated Work Groups for GI and GIS with activities described above for Provision C.3. The Program completed the Green Infrastructure RAA in FY 2019/20, which was initiated in FY 2017/18. A *Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* report was prepared by the Program in cooperation with the Contra Costa Clean Water Program in FY 2017/18. This report fulfilled the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(3), C.12.b.iii.(3), and C.12.c.iii.(1) for submitting the quantitative relationship between GI implementation and mercury and

PCBs load reductions that will be used for the RAA required by MRP Provisions C.11.c.ii.(2), C.11.d.ii, C.12.c.ii.(2), and C.12.d.ii.

The Green Infrastructure RAA (i.e., an estimate of the land area that will be treated through GI implementation by 2020, 2030, and 2040; the estimated PCBs and mercury loads reduced; and a description of models and model inputs relied on to generate this estimate) is provided in the *Alameda County PCBs and Mercury Control Measure Plan and Reasonable Assurance Analysis Report* (Appendix O). This report fulfills the requirements of MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.b.iii.(2), and C.12.d.iii for providing a mercury and PCBs control measure implementation plan and corresponding RAA.

In FY 2019/20, the Program continued to participate in a BASMAA RAA Work Group, whose objective is to provide a forum for collaborative and collegial input from BASMAA member agencies in an effort to create transparent and consistent assumptions and approaches to the development of the countywide RAAs. The workgroup focused on conducting a peer review process for the RAA methodologies in FY 2019/20.

Provision C.12.d.: Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

Requirement: Provision C.12.d requires Permittees to submit with the 2020 Annual Report a PCBs control measures implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030.

Program Activities: To comply with this provision, the Program prepared the required Implementation Plan and schedule. The *Alameda County PCBs and Mercury Control Measure Plan and Reasonable Assurance Analysis Report* is provided in Appendix O.

Provision C.12.e.: Evaluate PCBs Presence in Caulks/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way

Requirement: Provision C.12.e requires Permittees to collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. Permittees shall report on the results of this investigation no later than the 2018 Annual Report.

Program Activities: The Program participated in the BASMAA Regional Project to evaluate PCBs presence in caulks/sealants used in storm drains and roadway infrastructure, and to quantify the potential PCBs load reduction benefits that may result from public infrastructure improvements. The final project report was provided in the FY 2017/18 Annual Report.

Provision C.12.f.: Manage PCBs-Containing Materials and Wastes during Building Demolition Activities

Requirement: MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable buildings at the time such buildings undergo demolition, so that PCBs do not enter municipal storm drain systems. Applicable buildings include, at a minimum, non-residential buildings constructed or remodeled between the years 1950 and 1980 with building materials such as masonry and concrete with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame buildings are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its FY 2016/17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable buildings at the time such buildings undergo demolition;
2. A method for identifying applicable buildings prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable buildings.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable buildings via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable buildings.

Program Activities: On behalf of MRP Permittees, BASMAA conducted a multi-year regional project to assist MRP Permittees to address Provision C.12.f. The BASMAA project, which began in FY 2016/17 and was completed in March 2019, assisted Permittees in developing local programs to manage PCBs-containing materials during building demolition. It developed guidance materials, tools and training materials and conducted outreach. Permittees began implementing the program on or before July 1, 2019.

During FY 2018/19 and FY 2019/20, MRP Permittees worked together through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) to develop a framework to comply with data collection/evaluation and reporting requirements under Provision C.12.f. As mentioned previously, these requirements include developing an assessment methodology and data collection program to

quantify PCBs loads reduced through implementation of the new program. The regional process developed includes the following steps:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.[4]
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Two documents were prepared collaboratively by the MRP Permittees in compliance with MRP reporting requirements in Provision C.12.f. (3) – (5):

1. Documentation of (a) the number of applicable structures that applied for a demolition permit during the reporting year, and (b) a running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used (*PCBS in Building Materials Management Program – Regional Data Summary, September 18, 2020*) (Appendix P).
2. An assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition (*Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program, August 20, 2020*) (Appendix Q).

Provision C.12.g.: Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

Requirement: Provision C.12.g requires Permittees to conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San

[4] Municipalities should require that applicants fill out and certify a Screening Form for every demolition. For non-Applicable Structures, applicants simply check the boxes, certify, and submit to municipality. Then the municipality can authorize the demolition (e.g., issue a demolition permit). In general, municipalities should have a completed and certified Screening Form before authorizing a demolition, unless they are a small community that is exempt or has some other arrangement with Regional Water Board staff. Municipalities do not need to track non-Applicable Structures otherwise.

Francisco Bay margin areas. Permittees submitted in their FY 2016/17 Annual Reports a workplan describing how these information needs will be accomplished, including the studies to be performed and a preliminary schedule. Permittees were required to report on status of the studies in their FY 2017/18 Annual Report. The Permittees were required to report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles in the March 15, 2020 Integrated Monitoring Report.

Program Activities: Provision C.12.g is being addressed through a multi-year project by the San Francisco Bay Regional Monitoring Program (RMP) to develop a series of conceptual models of PCBs in Priority Margin Units (PMUs). The project is:

- Identifying margin units that are high priority for management and monitoring,
- Developing conceptual models and mass budgets for margin units downstream of watersheds where management actions will occur, and
- Conducting monitoring in these units as a performance measure.

This work will inform the review and possible revision of the PCBs TMDL and the reissuance of the MRP, both of which are tentatively scheduled to occur in 2021. During FY 2019/20, BASMAA representatives to the RMP continued to participate in the RMP PCBs Workgroup, which is providing ongoing oversight of the project. A general description and multi-year budget for this project is in the "PCBs" section of the RMP Multi-Year Plan, 2019 Annual Update (dated May 2019).[5]

Four urban embayments along the Bay shoreline with management actions to address PCBs planned or ongoing in the upstream watersheds were initially selected as PMU for conceptual modeling:

- Emeryville Crescent (Alameda County),
- San Leandro Bay (Alameda County),
- Steinberger Slough/Redwood Creek (San Mateo County), and
- Richmond Harbor (Contra Costa County).

The conceptual models are intended to provide a foundation for future monitoring to track responses to load reductions and may eventually help guide planning of management actions. Three of the selected embayments (all except San Leandro Bay) receive drainage from pilot watersheds that were included in BASMAA's Clean Watersheds for a Clean Bay project.

During FY 2019/20 and future years, BASMAA representatives to the RMP will continue to participate in the RMP PCBs Workgroup to help provide ongoing oversight of PMU conceptual model development and the related RMP Special Studies.

[5] This report is available at: https://www.sfei.org/documents/2019-bay-rmp-multi-year-plan.

Provision C.12.h.: Implement a Risk Reduction Program

Requirement: Provision C.12.h requires Permittees to conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to annually reach 3,000 individuals throughout the region who are likely consumers of San Francisco Bay-caught fish. The Permittees shall report on the status of the risk reduction program in each of their Annual Reports and report the findings of the effectiveness evaluation of their risk reduction program in their FY 2019/20 Annual Report.

Program Activities: Two significant efforts have been conducted to meet this requirement: 1) Fish Consumption Advisory Signage; and 2) a Fishing Advisory Campaign.

12 Fish Sniffer Sept 27 - Oct 11, 2019 Rio Vista Bass Derby VOL.38 • ISS. 21

Fishing in California? Check Health Advisories Before You Eat Your Catch

By the Clean Water Program, Alameda County, California

Fishing is a great way to enjoy life. All across California, and in Alameda County—where our program monitors local waterways for pollutants of concern,—you'll find many excellent places to cast a line, from lakes and reservoirs to piers and shoreline spots.

Fish is also an important part of a healthy diet, providing a lean source of protein, vitamins and omega-3 fatty acids—known to lower the risk of heart disease. However, not all fish are safe to eat, as some contain elevated levels of contaminants such as mercury and polychlorinated biphenyls (PCBs). For example, in San Francisco Bay, it not recommended for anyone to eat surf-perches. Women under 46 and children should not eat Striped Bass, while men can consume up to two servings per week. California Halibut is limited to 1 serving per week for women and children, and two servings per week for men. The chemicals found in the fish can harm the brain and nervous system, especially in unborn babies, infants and children. The specific recommendations vary by fishing location.

If you're planning to eat your catch, be sure to check the fish advisories issued regularly by California's Office of Environmental Health Hazard Assessment (OEHHA). They are in effect in many parts of the state. Protect yourself, your family and friends and limit your fish consumption to the recommended types and amounts of fish. Visit the website and search the map for your location: https://oehha.ca.gov/fish/ca-fishmap

Learn more about how you can help protect our waterways from additional pollution at www.cleanwaterprogram.org.

Smacking Delta Stripers On The Troll With Yo-Zuris by Cal Kellogg

Stripers might hit a variety of different trolled lures, yet you can limit your lure selection to two different models without hurting your success rate. For shallow work in water that is 6 to 9 feet deep, a shallow running minnow plug like a 5.25 inch Yo-Zuri Crystal Minnow work great. At times when it is necessary to work deeper water, say from 12 to 16 feet deep a deep diving Yo-Zuri Crystal minnow is the choice of most anglers.

Yo-Zuris run true and come with strong high quality hooks. In terms of color you'll want plugs in red head/white body, rainbow trout and chartreuse initially. You can add more colors as you gain more experience, but in reality these tried and true colors will catch fish 90% of the time.

A unique aspect of Delta trolling is the addition of a 6 inch plastic worm to the back of your minnow plugs. The worm most often used is a white Trick Worm, but other brands and colors of worms will work. The worm adds vibration, action and size to your plug.

So how do you use these lures and tackle to troll up a mess of stripers?

Stripers are aggressive hunters that actively patrol shoreline structure in search of prey. When you begin a day of trolling you want to start out working shallow water tight to weed beds, tules, rip rap, snags and irrigations pipes. Ideally you want to seek out water that is about 8 feet deep.

For this shallow water work your trolling speed and the distance you put the plug behind the boat is critical. You want to be moving between 3.5 and 5 miles per hour and you want the lure 140 feet behind the boat.

If you fail to hook up in shallow water or are marking fish in deeper water, it is time to switch over to a deep running Yo-Zuri. For this work you'll want to shorten your line to about 100 feet and slow your speed to about 3 miles per hour. Stripers will still hit a fast moving plug in deep water, but the large lip and action of deep divers doesn't allow them to run well at higher speeds.

As a final bit of advice, I believe every Delta troller should have a good lip gripper and a needle nose pliers aboard. Minnow plugs have lots of hooks and stripers like to thrash. I know a lot of guys that have been hooked in the hand or arm, but hooked stripers…Ouch!

GONE FISHING Continued from page 1

in the water, the first rod went off. Ocean salmon trolling is a lot like kokanee fishing: hoochies, flashers, downriggers, and missed opportunities. Yes, missed opportunities as I failed to land my first two hookups. Meanwhile, Anthony, Ian and Chris were having a more successful start to the day and each put a nice keeper salmon in the box. Mind you we were getting bit as fast as Captain Jeff could help us get our gear in the water.

It was Matt's turn next and when his rod went off, I could tell that this was a fish clearly a grade above the ones we had in the box The big salmon made a strong initial run and when it slowed, Matt kept cranking on it. After a spirited battle, he brought the fish within range of the net and Captain Jeff scooped it up without incident. The beautiful salmon ended up being the largest of the day, some 20 plus pounds.

My luck was about to change and soon I was hooked up again. I was careful to maintain constant pressure on the fish and when it made a b-line for the boat, I reeled furiously to keep tension on the line. One more run and the fish was spent. A scoop of the net and the fish was on board. The bite raged on and soon we had secured our limits.

The ride back to the harbor was a happy one for all. We tied up at the dock early and Captain Jeff quickly and skillfully filleted our catch. What a great day, beautiful weather, good people, and early limits. If you would like to get in on the action, you can contact Fish On Charters at 707-490-4067.

This big king hit the deck of the Pacific Dream after an epic battle on light mooching gear!
Photo by CAL KELLOGG, Fish Sniffer Staff.

Fish Consumption Advisory Signage: Through the Alameda County Environmental Health (ACEH) Department maintained fish consumption advisory signs posted at popular fishing locations and boat ramps along the Bay shoreline. Many of these sites are included in the California Recreational Fisheries Survey (CRFS) which estimates total marine recreational fin fish catch and effort for California. While CRFS surveys are designed to aggregate data statewide across multiple types of sites and fishing modes, available results obtained from the Recreational Fisheries Information Network suggest that there were at least 2000 angler visits to the posted Alameda County sites in 2015. While some individual fishers make repeated visits during the year, there are no data to indicate how many people this represents. A survey by San Francisco Bay Fish Project also found that a significant number of fishers who have seen the signs would share the information with other fishers and consumers. Program staff will continue working with ACEH to try to secure additional sites for posting.

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Provision C.15: Exempted and Conditionally Exempted Discharges

Provision C.15.b.iv: Individual Residential Car Washing

Requirement: Provision C.15.b.iv requires the Permittee to discourage through outreach efforts individual residential car washing that discharges into the storm drain system. It also requires Permittees to encourage individuals to direct car wash water to landscape, use as little detergent as necessary or wash cars at commercial car wash facilities.

Program Activities: To assist member agencies comply with this provision, the Program has developed outreach materials and posted information on proper car washing for residents on the Clean Water Program website (http://www.cleanwaterprogram.org/residents/car-care.html). This year the Program developed two videos using the Program's mascots Fred and Izzy, one video discourages residential car washing, and the other discourages hosing off driveways and other impervious surfaces. To view the videos, visit https://www.cleanwaterprogram.org/index.php/residents/care-care.html and https://www.cleanwaterprogram.org/index.php/residents/around-your-home.html

Provision C.15.b.v.: Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

Requirement: Provision C.15.b.v requires Permittees to prohibit polluted discharges from pools, hot tubs, spas and fountains, provide public outreach, allow discharges to the storm drain system only if there are no other alternatives and proper BMPs are implemented, require new facilities to have a connection to the sanitary sewer and implement illicit discharge program Enforcement Response Plans to address polluted discharges from these facilities.

Program Activities: To assist member agencies comply with this provision, the Program maintains the Proper Disposal of Wastewater Don't Drain Pools, Spas and Fountains to Storm Drains Tip Sheet on the Clean Water Program website.

Provision C.15.b.vi.: Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

Requirement: Provision C.15.b.vi. requires Permittees to promote measures that minimize runoff and pollutant loading from excess irrigation via the following.

Program Activities: To assist member agencies comply with this provision, the Program implements several countywide outreach efforts through the New and Re-Development program (C.3), Public Information and Outreach program (C.7) and Pesticide Toxicity Control program (C.9). These efforts are discussed in those sections of the Program Annual Report.

Additional Activities

Compliance with the conditionally exempt discharge categories, specifically pumped groundwater, foundation drains, water from crawl space pumps and footing drains, are also discussed at the IIDC Subcommittee meetings. As mentioned in Section C.4, there were three meetings held this fiscal year and the focus of the meetings is to share information on MRP compliance and activities including conditionally exempt discharges stormwater inspectors may encounter. As mentioned above, the PIP Subcommittee developed outreach material for several of the conditionally exempt discharge categories.

APPENDIX A

Correspondence Regarding Covid-19

cleanwater PROGRAM

Protecting Alameda County Creeks, Wetlands & the Bay

399 Elmhurst St.
Hayward, CA
94544
p. 510-670-5543

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County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

March 29, 2020

Submitted via EMAIL to: r2stormwater@waterboards.com; RB2-SFBayExecSupport@Waterboards.ca.gov

Michael Montgomery, Executive Officer
Attn: r2stormwater@waterboards.com; RB2-SFBayExecSupport@Waterboards.ca.gov
1515 Clay St. Suite 1400
Oakland, CA 94612

Dear Mr. Montgomery,

This letter is in response to the State Water Board directive of March 20, 2020 regarding Compliance with Water Board Requirements during the Coronavirus (COVID 19) Emergency.

The Alameda Countywide Clean Water Program (Alameda Countywide Program) is submitting this letter on behalf of the 17 member agency Permittees that are part of the Alameda Countywide Program - the Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City; Alameda County; Alameda County Flood Control and Water Conservation District; and Alameda County Flood Control and Water Conservation District, Zone 7.

On March 16, 2020, the Alameda County Health Officer Dr. Erica Pan, in addition to six other Bay Area public health jurisdictions, issued an order for all Alameda County residents to shelter in place to slow the spread of novel coronavirus (COVID-19) and preserve critical health care capacity across the region. Some cities within Alameda County, including the City of Berkeley, have issued similar orders. Governor Newsom has issued statewide shelter-in-place orders. We believe that the COVID-19 pandemic is a Force Majeure event that permits our Permittees to temporarily halt or delay some of its work within our jurisdiction.

Given ongoing testing shortages throughout the U.S., there is no way of knowing whether any Permittee personnel, subcontractors, consultants or other involved parties, including members of the general public, are currently affected by COVID 19 and whether certain work may therefore spread it between people and properties. It is essential that the health and safety of all these persons are protected to the maximum extent reasonably possible.

Consequently, there are certain requirements and provisions of the Municipal Regional Stormwater Permit (MRP), Order No. R2-2015-0049, that cannot or may not be timely met in the next 30 days. A list and schedule of these specific MRP requirements and the reasons relating to potential delays as specified in the State Board March 20 Compliance message are currently being prepared by the Alameda Countywide Program and Permittees. We will submit this information to you as a follow-up letter as soon as reasonably possible for your consideration.

Sincerely,

James Scanlin, Program Manager

Copy via email: ACCWP Management Committee and Gary Grimm

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County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

April 3, 2020

Submitted via EMAIL to: r2stormwater@waterboards.com; RB2-SFBayExecSupport@waterboards.ca.gov

Michael Montgomery, Executive Officer
Attn: r2stormwater@waterboards.com
RB2-SFBayExecSupport@waterboards.ca.gov
1515 Clay St., Suite 1400
Oakland, CA 94612

Dear Mr. Montgomery:

This letter is in follow-up to our letter to the Water Board dated March 29, 2020 and is in response to the State Water Board directive of March 20, 2020 regarding Compliance with Water Board Requirements during the Coronavirus (COVID -19) Emergency.

The Alameda Countywide Clean Water Program (Alameda Countywide Program) has been appropriately authorized to submit this letter on behalf of the 17 member agency Permittees that are part of the Alameda Countywide Program - the Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City; Alameda County; Alameda County Flood Control and Water Conservation District; and Alameda County Flood Control and Water Conservation District, Zone 7.

It is the intention of this letter and notification to provide the Water Board with the specifics of the requirements and provisions of the Municipal Regional Stormwater Permit (MRP), Order No. R2-2015-0049, that may not be timely met by the named Permittees or the Alameda Countywide Program in their behalf. A list and schedule of these specific MRP requirements and the reasons relating to potential delays as required and specified in the State Board March 20 Compliance message are enumerated in the detailed Notification List attached to this letter and is part of this notification.

In our March 29 letter, we described the relevant local and state emergency and shelter-in-place orders that apply to the conduct of Permittees and their contractors in performance of their activities and responsibilities in compliance with the MRP. Since our previous letter, this public health emergency has become more serious and widespread. In addition, due to ongoing testing shortages throughout the bay area and California, there is no way of knowing whether any Permittee staff,

contractors, consultants or other involved parties, including members of the general public, are currently affected by COVID -19 and whether certain work may therefore spread it between people and properties. It is essential that the health and safety of all these persons be protected to the maximum extent reasonably possible.

In accordance with the state and local orders and guidelines as set forth in Governor Newsom's Emergency Orders and the March 16 Order of the Health Officer of Alameda County, which was extended by the Health Officer on March 31 through May 3, all individuals must shelter-in-place except for the appropriate performance of certain Essential Governmental Functions and in the performance of any work necessary to the operations and maintenance of certain Essential Infrastructure. Any performance of those activities must be carried out in compliance with Social Distancing Requirements and is complicated by reassignments of some municipal staff to meet other emergency needs. Some of the activities described in the Notification List may be impacted so as to prevent full and timely compliance with the MRP.

Permittee staff, contractors and consultants performing permit compliance activities will make all reasonable efforts to provide performance as required by the MRP provisions while at the same time taking the necessary precautions to minimize exposure to themselves and the general public. These efforts relating to the tasks provided in the Notification List will be more specifically determined and directed in each individual situation in accordance with all relevant circumstances. It is not reasonably possible to provide a specific description that would apply to all situations. For some of the requirements enumerated in the Notification List, certain compliance reporting, mitigation measures, and the health emergency impacts may be included in the Annual Reports.

Finally, as a result of the above orders, activities of many private contractors that support the Alameda Countywide Program and Permittees on program compliance activities have already been disrupted and will continue to be affected on a daily basis in the coming weeks.

You can be assured that the Alameda Countywide Program and Permittees will communicate promptly and openly with the Water Board as new impacts emerge over the coming weeks and months. We are committed to compliance with the requirements of the MRP to the extent reasonably possible while at the same time making all necessary efforts to be protect the public health and safety, and comply with the shelter in place orders. We will keep you updated on these developments. We look forward to your response to this this notification and request.

Sincerely,

James Scanlin

James Scanlin, Program Manager
Copy via email: ACCWP Management Committee and Gary Grimm

Notification List of MRP Activities Impacted by COVID-19 Shelter in Place directives

MRP 2 Provision	Impacted Requirement	Specific Effects/Restraints of Shelter-in-Place Order	Mitigation Measure(s), or in lieu Actions
C.3.h. Operation and Maintenance of Stormwater Treatment Systems	C.3.h.ii.6.(b). Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal year) of Regulated Projects, offsite projects, or Regional Projects.	These inspections are usually done in conjunction with the facility operator. The Order states, "All businesses with a facility in the County, except Essential Businesses… are required to cease all activities at facilities located within the County…," as such, facility managers will generally not be available to participate in the inspections. This is in addition to the other constraints imposed by the order.	The facilities scheduled for inspection this fiscal year (i.e., July 1, 2019 through June 30, 2020) that cannot be inspected due to impacts of Covid-19, will be added to the list of facilities to be inspected next fiscal year so that by the end of next fiscal year (i.e., June 30, 2021), no less than 30% of the subject Projects will have been inspected within the last two fiscal years, and all of the subject Projects will have been inspected within the required five years.
C.4. Industrial and Commercial Site Controls	C.4.b.ii.2.(e). List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual update.	These inspections have always been done in conjunction with the facility operator. The Order states, "All businesses with a facility in the County, except Essential Businesses… are required to cease all activities at facilities located within the County…," as such, facility managers will generally not be available to participate in the inspections. This is in addition to the other constraints imposed by the Order.	The facilities scheduled for inspection this fiscal year (i.e., July 1, 2019 through June 30, 2020) that cannot be inspected due to impacts of Covid-19, will be included in the list of facilities to be inspected next fiscal year so that by the end of next fiscal year (i.e., June 30, 2021), those facilities (assuming they are still in operation) will have been inspected. Another option some Permittees may pursue is to conduct inspections independently of the facility operator being present (for those sites

			where the exterior is assessable). This would be followed by remotely reviewing the inspection with the facility operator and an email/signed acknowledgment from the facility operator of the inspection results/necessary corrective actions (if there are any).
C.7.d. Public Outreach and Citizen Involvement Events	C.7.d.ii. Implementation Level – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events. (The number of events for each Permittee ranges from 2 to 10 depending on population.)	Participation in Earth Day events is a primary component of Permittees' plans to meet this outreach requirement. As all municipally sponsored Earth Day events have been cancelled, this will not be possible this year, and there will not be comparable events held prior to the end of the fiscal year. Permittees also conduct creek and shoreline cleanup events with volunteers in fulfillment of this requirement. These events have been put on hold and may be cancelled. These events also assist meeting Provision C.10.c.i. Hot Spot Cleanups (described below).	The Program and the Permittees are examining options for increasing the online presence of stormwater related messages.
C.7.f. School-age Children Outreach	C.7.f.i. Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age	The Permittees meet this requirement through their participation in the Countywide Program. The Program contracts with environmental education organizations to conduct stormwater related outreach and education in schools throughout the County.	To the extent feasible, the Program will used unspent funds from this fiscal year to increase the outreach efforts next year.

	children (K through 12).	Permittees also conduct outreach to school-age children activities independently through contracting with environmental outreach organizations or having agency staff conduct these activities. Due to the school closures, not all of the activities planned for this year have been completed, and with schools closed for the rest of the school year, these activities may not be completed this year	
C.8. Water Quality Monitoring	C.8.d.i. Biological Assessment including Nutrients and General Water Quality Parameters**.** Sampling shall occur once per year during the appropriate index period (April 15-June 30) with consideration of antecedent rainfall.	The Permittees meet their C.8 monitoring requirements through their participation in the Countywide Program. Most monitoring requirements should be able to be completed and may not be affected by the Order. However, this monitoring – which cannot begin until April 15 with additional constraints of not sampling within one to two weeks of a ½ inch or greater rain event, and the possibility of creeks drying out towards the end of June, may be affected by the delay associated with the Order. The social-distancing requirement of the Order precludes the sampling teams from conducting this monitoring during the term of the Order. Depending on how long the shelter-in-place lasts, this may impact	It may be possible to conduct bioassessment monitoring this year, but potentially not complete all 20 target sites. If the shelter-in-place requirements are extended, and completion becomes infeasible, we will notify the Water Board immediately.

		the ability to conduct this monitoring.	
C.8.d. Water Quality Monitoring	C.8.d.iii. Continuous Temperature Monitoring. Loggers shall be installed so that water temperatures are recorded at 60-minute intervals from April through September at eight locations; C.8.d.iiii. Continuous Monitoring of Dissolved Oxygen, Temperature, and pH. The Permittees shall install sondes so that parameters are recorded at 15-minute intervals over 1-2 weeks in the spring concurrent with bioassessment sampling and 1-2 weeks in summer at the same sites.	Continuous monitoring components may be delayed, or may not be able to be initiated at some or all target locations while the Order is in place. Identification and placement of monitoring equipment requires permission / permitting assistance of property owners at target locations, and it is unknown how the review and approval process might be affected at this time.	It should be possible to conduct both continuous monitoring components from a practical perspective (incorporating social distancing), but permitting process may be problematic. If the shelter-in-place requirements are extended, and completion becomes infeasible, we will notify the Water Board immediately.
C.10. Trash Controls	C.10.a. Trash Reduction Requirements: The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges,.. through the timely implementation of control measures and other actions to reduce trash	Street sweeping is a trash reduction measure Permittees use meet this requirement. Many Permittees have reduced or suspended their routine street sweeping programs and have reduced or suspended their no-parking requirements. This will impact the level of trash along public rights-of-way, and temporarily may reduce	Routine street sweeping and parking restrictions will resume once the Shelter in Place Order has been lifted.

	loads from municipal separate storm sewer systems in accordance with the requirements of this provision.	the amount of trash reduction that is achieved.	
C.10.Trash Controls	C.10.b.i. Full Trash Capture Systems.	Many Permittees have reduced or suspended their routine maintenance activities, including storm drain inlet/full trash (FTC) capture device maintenance, to comply with the shelter in place and social distancing requirments. This may temporarily impact meeting their FTC maintenance requirements.	Maintenance activities will resume once the Shelter in Place Order has been lifted. All of the devices should be maintained prior to the next rainy season, but all planned maintenance may not occur prior to the end of the fiscal year.
C.10. Trash Controls	C.10.b.ii.b. Visual Assessments of Oucomes.	Permittees may need to suspend scheduled on land visual assessments (OVTAs). This may impact their ability to meet the required number of OVTAs. Also, OVTAs are scheduled in relation to street sweeping schedules. If street sweeping has been suspended, OVTAs that might be conducted may not be valid.	Street sweeping and OVTAs will resume once the Shelter in Place Order has been lifed. However, it may not be possible to conduct all planned OVTAs prior to the end of the fiscal year.
C.10. Trash Controls	C,10.c.i. Trash Hot Spot Cleanup– The Permittees shall clean selected Trash Hot Spots to a level of "no visual impact" at least one time per year	Annual cleanups of trash hot spots are conducted using some combination of municipal staff, contractors, and/or volunteers. Events scheduled for the next two to three months have been cancelled or postponed. It may not be possible to reschedule these events for this year due to municipal and contractor staffing/resource constraints. In addition, due to the Shelter in Place order	It may be possible to reschedule these events once the Shelter in Place Order has been lifted, but these events may not occur this fiscal year.

		as a result of COVID-19 pandemic, they may not be possible due to the social distancing requirements. Also, if a municipality was planning to use volunteers, this may impact the number of community outreach events conducted this year (C.7.d).	
C.10. Trash Controls	C,10.e.i. Additional Creek and Shoreline Cleanup: A Permittee may offset part of its provision C.10.a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot cleanups required by C.10.c if the additional cleanup efforts are conducted at a frequency of at least twice per year and sufficient to demonstrate sustained improvement of the creek or shoreline area.	These cleanups are conducted using some combination of municipal staff, contractors, and/or volunteers. Events scheduled for the next two to three months have been cancelled or postponed. It may not be possible to reschedule these events for this year due to municipal and contractor staffing/resource constraints. In addition, due to the Shelter in Place order as a result of COVID-19 pandemic, they may not be possible due to the social distancing requirements. Also, if a municipality was planning to use volunteers, this may impact the number of community outreach events conducted this year (C.7.d).	It may be possible to reschedule these events once the Shelter in Place Order has been lifted, but these events may not occur this fiscal year.

Sent via email; no hard copy to follow

To: Jim Scanlin, Alameda County Clean Water Program, jims@acpwa.org
Karin Graves, Contra Costa Clean Water Program, karin.graves@pw.cccounty.us
Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program, kcullen@fssd.com
Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program, awo@eoa.inc
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Jennifer Harrington, Vallejo Flood & Wastewater District, jharrington@vallejowastewater.org
Geoff Brosseau, Bay Area Stormwater Management Agencies Association, geoff@brosseau.us

Date: August 18, 2020

Subject: **Letters from Municipal Regional Stormwater NPDES Permit (MRP) Permittees in response to the State Water Board's March 20, 2020, directive regarding compliance with Water Board requirements during the COVID-19 emergency**

Dear MRP Program Managers:

On March 20, 2020, the State Water Resources Control Board (State Water Board) issued a directive establishing that timely compliance by the regulated community with all Water Board orders, and other requirements including regulations, permits, contractual obligations, primacy delegations, and funding conditions, would be considered to be within the essential activities, essential government functions, or comparable expectations in shelter-in-place directives provided by local public health officials.

The State Water Board directive further required that if there is a specific Water Board order or requirement that could not be timely met because it would be inconsistent with current governmental directives or guidelines related to COVID-19, the entity responsible for compliance notify the applicable Water Board immediately.

This memo confirms that the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) has received requests for regulatory relief related to compliance

requirements under the MRP (Order No. R2-2015-0049, as amended), per the State Water Board directive, from the following:

- Alameda Countywide Clean Water Program (ACCWP) letters of March 29 and April 3;
- Contra Costa Clean Water Program (CCCWP) letters of April 7 and 28;
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) letters of April 17 and May 1;
- Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) letter of April 1;
- Fairfield-Suisun Urban Runoff Management Program (FSURMP) letter of May 29; and
- The City of Vallejo and Vallejo Flood Control and Irrigation District letter of May 27.

We support the efforts permittees have outlined in the above-referenced letters, subject to additional follow-up actions identified below. In general, the letters received have focused appropriately on the known short-term impacts of the public health protection orders, primarily around limiting gatherings and ensuring municipal employee work can be completed safely in public and at private businesses. For example, they expressed, appropriately, concern about bringing together large groups of people for creek and shoreline cleanup projects, for staff trainings, and for certain inspections. In the letters and in subsequent discussions with permittees, adaptation measures have been identified, including completing online outreach to the public and encouraging individual or distanced cleanup work; completing staff trainings online; and prioritizing and incorporating appropriate protective measures into inspection work.

The letters included in some cases potential safety-related delays in capital improvement project construction, and in some cases general expressions of compliance challenges relating to potential staff shortages due to diversions to address the pandemic. We understand that infrastructure construction projects are continuing with the implementation of appropriate safety measures, and we welcome getting additional information regarding the potential diversion of municipal staff to COVID-19 emergency response activities.

We received an additional letter, dated July 27, 2020, from the CCCWP. Following our discussions with Karin Graves on August 6, we understand CCCWP will obtain additional information to clarify aspects of the submitted letter.

We look forward to working with permittees as they continue to adjust to the evolving challenges associated with the pandemic, and, as appropriate, adjust to ensure continued compliance with the MRP.

Sincerely,

Keith H. Lichten, Chief
Watershed Management Division

Appendix B

Updated C.3 Technical Guidance Manual Cover and Table of Contents

C.3 Stormwater Technical Guidance

2nd Revised Draft
September 11, 2019

A handbook for developers, builders and project applicants

Version 7

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C.3.h. Operation and Maintenance Verification Program flyers

How to Maintain Your Green Stormwater Facility

Did you know that your property includes a landscaped area designed to help reduce flooding and protect the water quality of local creeks and the San Francisco Bay? This flyer explains how to properly maintain your green stormwater facility. Maintaining your facility helps protect your local creeks and the Bay!

Why is this green stormwater facility on my property?

Water flowing into storm drains travels directly to local creeks and then to San Francisco Bay, with no treatment to remove pollutants. The green stormwater treatment facility on your property is designed to remove pollutants such as motor oil, pesticides, and sediment from stormwater runoff collected from your roof, driveway, and other impervious areas.

What is a green stormwater facility and how does it work?

Your green stormwater facility uses plants, "biotreatment" soil (a fast-draining special soil mix composed of compost and sand), and an underdrain to slow down, filter, and absorb stormwater runoff on your property after it rains. Your green stormwater facility may be a "bioretention area" or a "flow-through planter."

In bioretention areas (see the top photos at right), the underdrain is positioned within the rock layer below the biotreatment soil to allow some of the collected water to infiltrate to the underlying soil. On the other hand, flow-through planters (lower photo at right) are lined with concrete or heavy, durable plastic, so runoff that is not absorbed by plants and soil within the planter flows through the underdrain to the storm drain system.

Can I remove it?

No, any green stormwater facilities that were installed on your property or in the street right-of-way adjacent to your property cannot be removed. These structures are required to meet stormwater permit mandates and play a critical role in local and regional flood prevention and water quality protection efforts. Contact your local jurisdiction if you would like to discuss options for modifying your facility.

What a facility looks like

The above photo is a bioretention area in Albany, which is designed to treat stormwater run-off. The illustration below shows how stormwater infiltrates through the fast-draining soil mix in a bioretention area.

Is it a Bioretention Area or Flow-Through Planter?

Flow-through planters and bioretention areas both include biotreatment soil that is placed above a rock layer and underdrain. However, a flow-through planter is lined with concrete to keep stormwater from infiltrating into the native soil, as shown below.

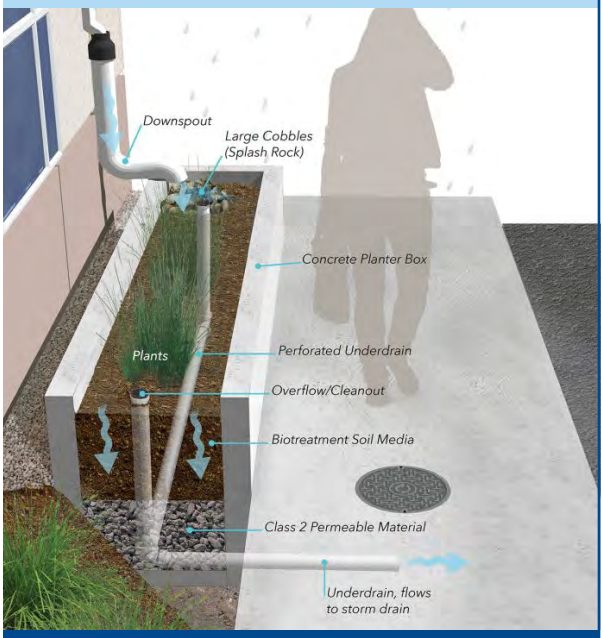

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How do I maintain my stormwater facility?

These facilities require simple maintenance similar to other landscaped areas, which includes: weeding, pruning, mulching, and removal of trash and debris. For maintaining your stormwater facility, see the "Top Tips: Do's and Don'ts" at right.

Troubleshooting common issues

Standing water – The facility's biotreatment soil could be clogged, or the underdrain could be blocked. If sediment has accumulated on the surface, try removing it and replenishing the facility with new mulch and biotreatment soil, as recommended in the guidance below.

Erosion or bare soil – Stormwater may be flowing too fast through the facility, or vegetation may have died. Plant new vegetation to help stabilize the soil. Gravel or cobble stones can be used at the entrance to the facility to slow down the stormwater flow.

Dead or dying plants – Plants may not be suitable for your site's specific conditions. Re-plant vegetation as recommended in the Plant List and Planting Guidance at the link provided below.

No mulch or not enough mulch - Mulch will decompose over time and can be washed or blown away during large storms. Replenish mulch approximately once a year following the instructions provided below.

Plant, soil, and irrigation guidance

Stormwater facilities require a combination of special plants, mulch, and fast-draining biotreatment soil to achieve water quality benefits and to reduce maintenance. Ideal plant selection can be influenced by local microclimates and conditions such as sun exposure, proximity to saltwater, and rainfall patterns. When replacing or adding plants, use native and/or drought tolerant plants and avoid invasive species. Irrigation is generally required; drip emitters should be used instead of spray irrigation. For more information, please visit: www.cleanwaterprogram.org/businesses/development.html:

- For plant selection, click on "C.3 Technical Guidance" and scroll to "Appendix B, Plant List and Planting Guidance"
- Click on "Popular Development Related Documents" for:
  - List of soil providers (scroll to "Biotreatment Soils")
  - Irrigation information (scroll to "Irrigation Resources")

Mulch selection and guidance

Mulch is a critical component of a green stormwater facility, and selecting the correct type of mulch can help minimize maintenance, maximize water quality benefits, and keep the facility functioning well. Cover bare soil with a 3-inch layer of arbor, aged or composted mulch between plantings and maintain this level throughout the year. Washed and clean pea gravel, rock, cobble, or other mulches may also be used, however, they can heat the soil and increase soil water evaporation rates during the hot summer months. Bark and "gorilla hair" mulches are not recommended. Only non-dyed mulch should be used in your stormwater facility.

Top Tips: Do's and Don'ts

Do...

Monthly

- Regularly inspect the facility. If you see signs of clogging, erosion, or unhealthy vegetation, refer to "Troubleshooting common issues" (at left).
- Remove weeds and invasive plants.
- Remove any trash that has washed in.
- Check the facility a few days after a rain storm to make sure that there is no standing water.

As-Needed

- Cut back dead stems on plants in March and remove from the facility.
- Water new plants during initial establishment of plant growth (first 18 months) and as needed. See irrigation guidance at left.
- Check the irrigation timing. See irrigation guidance at left for more information.
- Replenish and redistribute mulch to a total depth of 3 inches, keeping the facility concave to allow temporary ponding. Repair any signs of erosion.
- In the Fall, remove fallen leaves from the entrances to the facility. Leaves may block the flow of stormwater.

Don't...

- Store leaves or grass clippings on top of the bioretention area.
- Use pesticides or quick-release fertilizers.
- Add topsoil (per soil guidance at left).

Additional Resources

To learn more about caring for your green stormwater facility, contact:

Clean Water Program

510-670-6548

www.cleanwaterprogram.org/businesses/development.html

For contact info for local agencies, go to the link listed above, click on "Popular Development Related Documents," then "Local Agency Stormwater Contacts."

November 2019

YOUR POROUS PAVEMENT

How to Maintain Your Pavement

Did you know that your property includes a specially paved area designed to help reduce flooding and protect the water quality of local creeks and San Francisco Bay? This flyer explains how to properly maintain your porous pavement. Maintaining your pavement helps protect your local creeks and the Bay!

Why do I have porous pavement?

Water running off roads and parking areas typically flows unimpeded into storm drains and travels directly to local creeks and then to San Francisco Bay, with no treatment to remove pollutants. The porous pavement on your property is designed to reduce flooding and help remove pollutants such as motor oil, pesticides, and sediment from stormwater runoff collected from your driveway and/or other hard surfaces. The stormwater runoff filters through your porous pavement into gravel, sand, soil, and other materials that remove pollutants, slow runoff flows, and boost groundwater infiltration.

How does it work?

Porous pavements, like those shown to the right, help slow down, filter, and absorb stormwater runoff on your property after it rains. Instead of being non-porous like typical concrete or asphalt, porous pavement allows water to percolate through it. Your property may have porous concrete, permeable pavers, or grid pavements. Instead of running off these surfaces, stormwater drains through them into specially selected materials below the surface and then into the soil and groundwater below.

Can I remove the porous pavement?

No, you cannot remove any porous pavement that was installed on your property or in the street right-of-way adjacent to your property. These structures are required to meet stormwater permit mandates and play a critical role in local and regional flood prevention and water quality protection efforts. Contact the local jurisdiction if you would like to discuss options for modifying your facility.

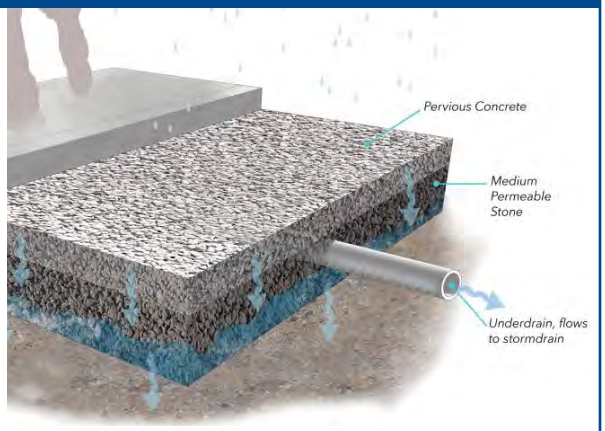

What does it look like?

The above image shows how water flows through porous concrete. The illustration below shows an area of permeable interlocking pavers that allow water to flow through joints between pavers.

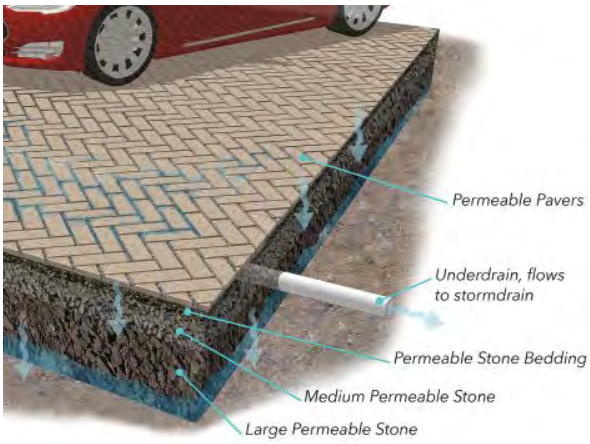

What are grid pavements?

Grid pavements are concrete or plastic tiles that allow stormwater to infiltrate into the ground below. They may be filled with sand or fine gravel, or, as shown below, can be planted with topsoil and turf grass. Grid pavements are typically used in lower traffic areas like overflow parking lots.

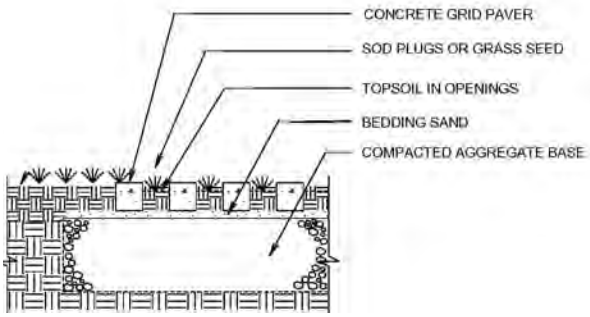

Grid paver detail, Interlocking Concrete Pavement Institute

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Why maintain porous pavement?

Unmaintained porous pavement can become clogged and not allow stormwater to filter through it. Lack of maintenance may require the pavement to be replaced, which can be costly and disruptive.

How do I maintain it?

Porous pavement has simple maintenance requirements, including: leaf and debris removal, sweeping, pressure washing, and vacuuming pavement that does not include sand or fine gravel fill. Damaged pavers or plastic cells in grid pavements may need to be replaced periodically. Grass cells may need to be watered during long dry periods. See the maintenance Top-Ten Do's and Don'ts to the right.

Troubleshooting common issues

Water ponding on or flowing off pavement – Leaf debris or sediment could be clogging pavement or, if present, the underdrain could be blocked. Sweep or vacuum the pavement. Check the subdrain outlet to determine if water is free-flowing. Make sure nearby landscape areas or other potential sources of sediment, like bare soil, are managed such that sediment is not being discharged to the porous pavement. If the surface doesn't drain following these steps, try pressure washing or contact your local jurisdiction using the information at the bottom of this page.

Plants growing in porous concrete or between pavers – This may indicate it has been too long since the last maintenance. Remove unwanted vegetation and sweep or vacuum to remove sediment.

Recommended timeframes for maintenance

Timeframe	Maintenance Activity
After rains	Inspect pavement for ponding, sediment and debris buildup, or other issues
Every 6 months	Sweep, vacuum or pressure wash as needed
Yearly	If present, inspect subdrain outlets for blockages
As needed	Remove weeds from pavement and replace missing sand/gravel

Did you know?

Porous pavement is also frequently referred to as "pervious" or "permeable". If searching for more information online, you may see those terms used as well.

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Top 10 Do's and Don'ts

Do...

As needed

- Inspect your porous pavement after storms to make sure that stormwater properly drains through the material.
- Pressure wash as needed to alleviate clogs in the pavement. Be sure to remove any washed-out sediment. Do not allow the wash water to flow to the storm drain system.
- Inform contractors working on your property of the location of porous pavement to prevent damage or contamination. Consider adding a sign that identifies the surface as porous.
- For permeable interlocking pavers, replenish the top layer of stone between joints with new clean stone after sweeping, vacuuming, or power washing.
- Stabilize any adjacent soil areas (e.g. by using mulch on exposed soil) to keep dirt from washing onto pavement.
- Remove weeds, leaves, and debris from surfaces. Avoid using leaf blowers (which can lead to clogged pavement) or herbicides (which can harm creeks).

Don't...

- Stockpile mulch, sand, salt, soil, or yard waste on porous pavement.
- Replace vehicle fluids or wash your car over porous pavement.
- Apply sealants over porous pavement or repave the area with materials that do not let water pass through.
- Let very large vehicles regularly drive on or turnaround on porous surfaces.

Additional Resources

To learn more about caring for your porous pavement, contact the Clean Water Program:

510-670-6548

www.cleanwaterprogram.org/businesses/development.html

For contact info for new development representatives at local agencies, go to the link listed above, click on "Popular Development Related Documents," then "Local Agency Stormwater Contacts"

November 2019

Appendix D

Green Infrastructure Bid Specifications transmittal memo

Compiled Specifications for Green Infrastructure Projects

The Program has compiled green infrastructure (GI) specifications from five jurisdictions, to support member agencies in developing bid specifications for local GI projects. Example specifications from the five jurisdictions are included as **Attachments A through E**. The example specifications range from project-specific to general citywide GI specifications. While each example document is specific to a particular jurisdiction, member agencies may adapt information from these examples to supplement or enhance their existing specifications to address GI.

The five jurisdictions that prepared the example specifications are listed in **Table 1**, along with the type of document for each jurisdiction, and the specific excerpts included in each attachment. The **References** section, on page 2, provides weblinks to the full documents.

Attachment A consists of the entire City of Alameda document that may be downloaded at the link provided on page 2. Attachments B through E consist of excerpts from larger documents that can be downloaded at the links on page 2. Therefore, Attachments B through E each include a table of contents for the respective source document, identifying the specific section included in the attachment in a yellow highlighted box. In order to provide context, some additional information has been added to Attachments A through E, using **green bolded text**.

Table 1: Compiled Bid Specifications included as Attachments A through E

Attachment	Jurisdiction	Document Type	Topics in Excerpts Included in Attachments A-E
A	City of Alameda, CA	Porous Concrete Specifications for an athletic field renovation	Porous Concrete Specifications, including: • Installer Qualifications • Infiltration Capacity Design • Products • Execution
B	City of Albany, CA	General Bid Provisions and Supplemental Technical Provisions for a green street project	Bioretention Landscape Specifications, including: • Plants • Herbicides • Installation • Protecting Existing Plants • Maintenance
C	City of Seattle, WA	Standard Specifications for Road, Bridge, and Municipal Construction	Specifications for installation of bioretention soil in bioretention cells intended to receive surface water runoff for infiltration, including: • Excavation • Subgrade • Placement of Bioretention Soil • Mulching and Planting

Attachment	Jurisdiction	Document Type	Topics in Excerpts Included in Attachments A-E
D	District of Columbia	GI Standards: Supplement to Standard Specifications for Highways and Structures	Specifications for Bioretention, Plant Bed, Lawn and Sand Based Structural Soils, including: • Delivery, Storage and Handling • Pre-Installation Preparation • Subgrade Preparation • Placement of Drainage Materials & Soil • Protection
E	Flood Control and Water Conservation District, Alameda County	Specifications for GI demonstration project in parking lot	Specifications for City of Fremont Tree Well Filter, including • Materials • Subgrade preparation • Installation

References

1. City of Alameda - Estuary Park Project Athletic Field Complex Renovation Specifications for Porous Concrete: www.cleanwaterprogram.org/committees/new-development-committee/gi-bid-specifications-city-of-alameda-estuary-park-project-porous-concrete-specifications/download.html
2. City of Albany - Brighton Avenue Pilot Green Street Project: www.cleanwaterprogram.org/committees/new-development-committee/gi-bid-specifications-city-of-albany-brighton-ave-green-street-special-provisions/download.html
3. City of Seattle - Standard Specifications for Road, Bridge, and Municipal Construction, 2017 Edition: www.seattle.gov/Documents/Departments/SPU/Engineering/2017StandardSpecifications.pdf
4. District of Columbia Department of Transportation - Green Infrastructure Standards: https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/2014-0421-DDOT%20Green%20Infrastructure%20Standards.pdf
5. Flood Control and Water Conservation District, Alameda County - Turner Court Green Infrastructure Demonstration Project: www.cleanwaterprogram.org/committees/new-development-committee/gi-bid-specifications-county-of-alameda-turner-court-green-infrastructure-demonstration-project-special-provisions-various-plan-sheets/download.html

Appendix E

New Commercial/Industrial BMP Tip Sheets

RESPONSIBILITIES FOR STORMWATER

Tips for Property Owners and Operators

Property owners and operators are responsible for any activities on their property that lead to nonstormwater discharges to the street, gutter or stormdrain. The Clean Water Program's friendly and knowledgeable staff support property owners and managers like you in preventing water pollution and complying with stormwater regulations. The fact that you're reading this fact sheet means you have already decided to take steps to do the right thing when maintaining your property. Thank you for keeping our water safe and healthy.

General Practices

- Know possible pollution sources that you must manage, such as:
  - ✓ Business tenants that generate grease, trash, wastewater, scrap metal and other types of waste.
  - ✓ Mobile businesses that generate wash and wastewater.
  - ✓ Contractor activities that involve equipment containing liquids (e.g. gas, oil), dust/debris, chemicals, or power washing (i.e. for landscaping, construction, cleaning pavement, cleaning restaurant hood and roof equipment, cleaning spills).
  - ✓ On-site equipment such as hose water (contains chlorine) and irrigation equipment.
- Inspect your property at least monthly to make sure all outdoor activities meet local stormwater requirements.
- Keep property clean. Ensure cleaning activities never cause hose water, wastes, or wastewater to enter streets or storm drains.
- Have a spill prevention and control plan so that nothing enters storm drains and pollutes streams and San Francisco Bay.

Communicate with Businesses and Contractors

- Make sure contractors, mobile businesses, tenants, and staff are aware of stormwater regulations. Allowing any material (liquid or solid) to be dumped or hosed off into streets or storm drains, or placed where it could be carried to streets or storm drains by rainwater, is an illegal discharge.
- Provide tenant/staff training on best management practices and spill control response procedures.
- Post signs to notify tenants/staff to keep all dumpster and waste container lids closed, and outdoor areas clean.
- Post signs to notify tenants/employees of spill response plans and location of spill control equipment.

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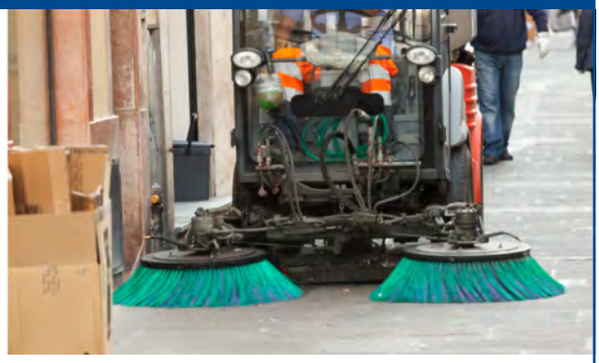

Keep wash waters, waste waters, trash, and debris OUT of the storm drains. Keep oils, grease, and hazardous chemicals OUT of storm drains and sanitary sewers.

Draining wash water from cleaning activities into the street or storm drains damages sensitive habitats and can kill wildlife. Water flowing into storm drains travels directly to local creeks and then to **San Francisco Bay.** It does not go to a wastewater treatment plant.

Learn more about preventing water pollution and the Clean Water Program at **www.cleanwaterprogram.org**.

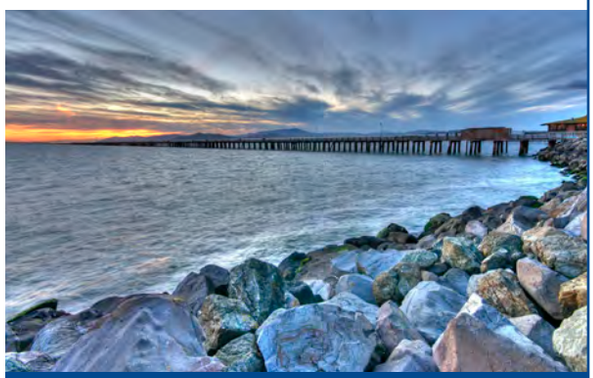

Landscaping and Pest Control

- Look for Bay-Friendly Qualified Professionals (BFQPs). BFQPs complete training on how to create landscapes that conserve water and soil, reduce waste, and prevent pollution. For info, visit rescapeca.org/directory.
- Consider hiring landscapers who use Integrated Pest Management (IPM). IPM focuses on long term pest prevention while minimizing risks to people and nature.

Outdoor Storage and Waste Areas

- Make sure businesses, contractors and staff on your property cover and contain any outdoor materials when not in-use.
- Businesses should have the right size, type, and number of waste containers/dumpsters/bins for their business activities.
- The lids to dumpsters, recycling bins, and other waste containers must always be closed when not in use. Ensure that they are not leaking or over-filled.

Cleaning and Emergency Spill Control

- For greasy drips or spills, absorbents like rags or cat litter may be used, then swept up and properly disposed of.
- If wet cleaning methods are used, then block storm drains, protect storm drains as needed, use minimal water, and collect all wash water for proper disposal.
- It is important that wash water on your property is collected and disposed of at an approved location – never into the street, parking lot, or storm drain.
- Consider hiring or becoming a Bay Area Stormwater Management Agencies Association Recognized Mobile Cleaner. To learn more visit www.basmaa.org/training.

KEY DEFINITIONS

The ***Storm Drain System*** was built to collect and transport rain to prevent flooding in urban areas. Anything that flows or is discharged into the storm drain system goes directly into local creeks or San Francisco Bay without any treatment.

The ***Sanitary Sewer System*** collects and transports sanitary wastes from interior building plumbing systems to the wastewater treatment plant where the wastewater is treated.

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Simple changes to your operations and maintenance can help you comply with local regulations. The Clean Water Program makes it easy.

Learn more about preventing water pollution and the Clean Water Program at **www.cleanwaterprogram.org.**

Local Stormwater Agencies

For advice on avoiding disposal to the storm drain system, contact:

Alameda	(510) 747-7930
Albany	(510) 528-5770
Berkeley	(510) 981-6442
Dublin	(925) 833-6630
Emeryville	(510) 596-3728
Fremont	(510) 494-4570
Hayward	(510) 881-7900
Livermore	(925) 960-8100
Newark	(510) 578-4286
Oakland	(510) 238-6600
Piedmont	(510) 420-3050
Pleasanton	(925) 931-5500
San Leandro	(510) 577-3401
Unincorp. Alameda County	(510) 567-6700
Union City	(510) 675-5308
Clean Water Program	(510) 670-6548

For More Help

For advice and approval on wastewater disposal to the sanitary sewer system, contact:

Cities of Alameda, Albany, Berkeley, Emeryville, Oakland or Piedmont
East Bay Municipal Utility District (EBMUD) ..... (510) 287-1651

Castro Valley
Castro Valley Sanitary District ..(510) 537-0757

City of Dublin
Dublin-San Ramon Services District ..... (925) 828-0515

Cities of Fremont, Newark or Union City
Union Sanitary District ..... (510) 477-7500

City of Hayward
City of Hayward ..... (510) 881-7900

City of Livermore
City of Livermore ..... (925) 960-8100

City of Pleasanton
City of Pleasanton ..... (925) 931-5500

Cities of San Lorenzo, unincorporated portions of San Leandro and Hayward
Oro Loma Sanitary District ..... (510) 481-6971

City of San Leandro
City of San Leandro ..... (510) 577-3401

May 2020

PROPER OUTDOOR STORAGE

Tips For Towing & Automobile Storage

The Clean Water Program's friendly and knowledgeable staff support companies like yours in preventing water pollution. The fact that you're reading this fact sheet means you have already decided to take steps to do the right thing when cleaning your business. Thank you for keeping our water safe and healthy.

Towing and Automobile Storage Facilities

- Facilities accepting or storing cars on the property must have adequate drip pans available.
- Facilities must have adequate supplies of tarps to cover vehicles that come in with missing hoods or have the engine area exposed. Rain water must be prevented from entering the engine compartment while the vehicle is stored outside.
- Facilities storing or accepting vehicles onsite are ultimately responsible for compliance with all storm water regulations.
- Do not rinse or wash vehicles onsite unless the facility has a permitted wash pad structure from the local waste water agency and city. Keep vehicle rinse and wash water out of the storm drain.

Inspect Vehicles

- Inform employees about the need to inspect vehicles being dropped off. Any hazardous materials found in the vehicles must be disposed of properly. Contact your local Certified Unified Program Agency (CUPA).
- Drivers of the tow truck service must inform the accepting facility of possible leaks observed.
- Drain fluids from leaking or wrecked vehicles immediately.
- Employees at the repair shop or automobile storage yard must perform frequent inspections and ensure that vehicles are not leaking onto the pavement. Place drip pans under leaking vehicles.
- Any spills must be cleaned up immediately using dry methods and dispose of properly.

Keep all wash water, fluids and oils OUT of the storm drains. Keep paved surfaces clean at your auto storage area to prevent polluting storm water runoff.

Draining wash water from cleaning activities into the gutters or storm drains will damage sensitive habitats and kill wildlife. Water flowing into storm drains travels directly to local creeks and then to **San Francisco Bay.** It does not go to a wastewater treatment plant.

Learn more about preventing water pollution and the Clean Water Program at **www.cleanwaterprogram.org.**

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Best Management Practices

- Label/stencil each storm drain inlet on your storage facility to remind workers and customers that no dumping is allowed.
- Keep surfaces clean. Do not allow fluids to accumulate or run across surfaces.
- Clean up spills immediately with rags, absorbents, or wet/dry vacuum. Never allow vehicle fluids to flow into a storm drain inlet or the sanitary sewer. Properly dispose of spent absorbent.
- Store parts and equipment inside or in enclosed areas.
- Cover or enclose exposed materials with tarps or PVC enclosures when indoor storage or more permanent containers and coverings are impractical.
- Store vehicle fluids inside. If vehicle fluids must be stored outside then:
  - ✓ Keep a roof and walls around your vehicle fluids to protect them from rain.
  - ✓ Keep containers elevated to protect them from water run-off.
  - ✓ Place primary containers inside double containment.
- Vehicle fluids must be properly managed and cannot be disposed in the garbage, sanitary sewer, or storm drain.
- See ACCWP How Your Vehicle Service Facility Can Prevent Stormwater Pollution booklet for more best management practices on:
  - ✓ Waste disposal and recycling
  - ✓ Vehicle washing
  - ✓ Maintenance work

KEY DEFINITIONS

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City of Pleasanton
City of Livermore ..... (925) 931-5500

Cities of San Lorenzo, unincorporated portions of San Leandro and Hayward
Oro Loma Sanitary District ..... (510) 481-6971

City of San Leandro
City of San Leandro..... (510) 577-3401

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Albany ..... (510) 528-5770
Berkeley..... (510) 981-6442
Dublin ..... (925) 833-6630
Emeryville ..... (510) 596-3728
Fremont ..... (510) 494-4570
Hayward ..... (510) 881-7900
Livermore ..... (925) 960-8100
Newark ..... (510) 578-4286
Oakland ..... (510) 238-6544
Piedmont..... (510) 420-3050
Pleasanton ..... (925) 931-5500
San Leandro ..... (510) 577-3401
Unincorporated Alameda County..... (510) 567-6700
Union City..... (510) 675-5308
Clean Water Program..... (510) 670-6548

June 2019

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Appendix F

Commercial/Industrial Inspector Training Report

Post-Workshop Report: Business Inspectors Training Fiscal Year 2019-2020

The Clean Water Program's Industrial and Illicit Discharge Subcommittee (IIDC) sponsored a business inspectors training workshop titled *Stormwater Business Inspectors Workshop: Sharing Successful Strategies* on November 6, 2019. The workshop was held in the City Council Chambers at Hayward City Hall. The 2019-2020 Training Workgroup responsible for planning the workshop are identified below.

Jose Soto	Union Sanitary District
Alejandro Perez	City of Hayward
Jim Scanlin	Clean Water Program
Beth Baldwin	Clean Water Program
Kristin Kerr	EOA
Kristine Corneillie	LWA

This workshop included presentations that provided tips for inspection strategies, the health of Alameda County Creeks, and methods for handling residential RV waste, as well as a panel discussion of enforcement strategies. The workshop contained the following presentations:

- Inspecting Restaurants: The Basics
- Strategies for Enforcement (panel discussion)
- Health of Alameda County Creeks
- Strategies for Overcoming Language Barriers
- Residential RVs and Stormwater

Fifty-two (52) people attended the 4 hour workshop. Presentation materials from the workshop are available to Clean Water Program member agencies on the Program's website.

Effectiveness Assessment

Pre- and post-workshop surveys provided insights into the knowledge of the participants before and after the workshop. The pre-workshop survey had an overall correct response rating of 72% that improved to 87% in the post-workshop survey.

	Question	Correct Answer	Pre-workshop % Correct	Post-workshop % Correct	Difference
Q1	What should inspector look for during a restaurant stormwater inspection? a. Check for proper refrigeration b. Check for hairnets c. Check whether area smells like burned food d. Check for staining around back door	**D**	**100%**	**100%**	**0%**
Q2	Restaurant wash water should be discharged to sanitary sewer. True or False	**True**	**94.4%**	**96.8%**	**+2.3%**
Q3	What should inspector look for during a restaurant rooftop inspection? a. Safe ladder access or stairs to climb onto the roof. b. Grease collection box. c. Water connections like water spigots. d. All of the above.	**D**	**80.6%**	**90.3%**	**+9.8%**
Q4	What language have the BMP booklets/postcards been translated into? a. Spanish b. Chinese c. Vietnamese d. All of the above	**D**	**100%**	**96.8%**	**-3.2%**
Q5	What translation applications are available? a. WhatDidYouSay b. TranslateMe c. Google Translation d. All of the above	**C**	**36.1%**	**71.0%**	**34.9%**
Q6	What subject matter is presented on ACCWP postcards? a. Landscape Maintenance b. RV waste control c. Fire-fighting foam BMPs d. All of the above	**A**	**36.1%**	**54.8%**	**18.7%**
Q7	Which of the following is a violation of Mountain View's City Code? a. Parking in excess of 24 hours b. Discharge of wastewater to the gutter c. Owning an RV built prior to 1980	**B**	**88.9%**	**100%**	**11.1%**
Q8	The most common vehicle inhabited by homeless is: a. Cars b. RVs c. Box Trucks	**B**	**36.1%**	**77.8%**	**41.7%**
Totals					
	Respondent Percentage Correct		**71.5%**	**87.1%**	**+15.6%**
	Number of 50% or above		**33**	**31**	
	Number of 49% or below		**0**	**0**	
	Number of Surveys Completed		**36**	**31**	

Workshop Evaluation

A total of 30 out of 52 participants (57.7%) completed evaluations. The overall average rating of the workshop was 3.72, out of a maximum of 4.00. Attendees commented that the variety of the agenda was useful. A few participants suggested moving the panel discussion to the end of the workshop in case other questions arose after seeing the presentations. Some also requested more hands on training and real-world examples.

Evaluation Item	**Average Rating (out of 4)[1]**
The presentations were clear and easy to follow.	3.90
Overall, the order/progression of the presentations was appropriate.	3.62
Overall, the workshop materials and handouts were informative and useful.	3.61
I will use the skills learned in the workshop today on the job.	3.45
The presenter(s) were knowledgeable in the subject matter.	3.83
The presenter(s) encouraged questions.	3.90
Overall Rating	**3.72**

Note: 1 = Strongly Disagree, 4 = Strongly Agree

Ideas for future topics identified by the respondents included:

- Trash compliance solutions, tracking, common issues.
- More on stormwater issues from homelessness and what city's/county's are doing.
- How to handle pollution from homeless encampment into creeks.
- Comparison or examples of violations, differences and class or severity. There is a lot of inconsistency in this.
- More biology on creeks to show a positive influence on our stormwater work.
- Sample of a stormwater inspector report.
- Standardizing processes across Permittees rather than different responses to same violations.
- Conducting inspection (all facilities) and hands on exercises.
- Break into groups and learn from peers.
- More training on how to evaluate the violators/potential violators to resolve/abate issues.
- How to involve non-stormwater inspectors (building inspectors, public works inspectors).
- Presentation on cultural competency.
- More real-world examples or case studies.
- More tools/resources to help with inspections. Introduction to new methods/approaches.
- Success stories on protecting waterways C.3 inspection.
- Present enforcement cases starting with discovery photos, step through each phase.
- Multi-business facilities.
- Compare and contrast photos of discharge conditions, with participants ranking.
- Active spill response and abatement enforcement.
- Issues outside of Alameda County and how they resolve them.
- MRP and agency's methods of compliance; keeping focus on MRP.
- Studies/data on how effective BMP outreach is and which kinds of outreach are most effective.

Attachments:
Workshop Agenda
Sign-in Sheet
Evaluation Results

Stormwater Business Inspectors Workshop: Sharing Successful Strategies

November 6, 2019

Registration & Refreshments at 7:30, Workshop Starts at 8:00

Hayward City Hall, Council Chambers, Second Floor
777 B St, Hayward, CA 94541

	Topic	Speaker	Time
1	Check in / Knowledge Survey	All	7:30 – 7:50
2	Welcome	Jose Soto, Union Sanitary District	8:00 – 8:15
3	Inspecting Restaurants: The basics *Restaurant inspection overview.*	Jose Soto, Union Sanitary District	8:15 – 8:45 (10 min Qs)
4	Strategies for Enforcement *Panel discussion for sharing ideas and experiences regarding enforcement.*	Panel: 1. Sheryl Skillern, OFD 2. Jose Soto, USD 3. Jennifer Stern, Oakland	8:45 – 9:45
	BREAK		9:45 – 10:00
5	Health of Alameda County Creeks *Biological look at the state of our waterways*	Tim Pine, UC Berkeley	10:00 – 10:45 (10 min Qs)
6	Strategies for Overcoming Language Barriers *Ideas and experiences on how to overcome language barriers during inspections.*	Beth Baldwin, ACCWP	10:45 – 11:15 (10 min Qs)
7	Fire and Environmental Protection Division Residential RVs and Stormwater. *Strategies and protocols for residential RVs*	Carrie Sandahl, City of Mtn. View	11:15 – 11:45 (10 min Qs)
8	Wrap up Questions & Answers *Complete knowledge surveys, evaluations, pick up certificates*	All	11:45 – 12:00

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Illicit Discharge Detection & Elimination Workshop
November 6, 2019

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Illicit Discharge Detection & Elimination Workshop
November 6, 2019

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Illicit Discharge Detection & Elimination Workshop
November 6, 2019

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Padilla, Victor	victorp@unionsanitary.ca.gov	Union Sanitary District	VP

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Illicit Discharge Detection & Elimination Workshop
November 6, 2019

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Marchant, Steve	steve.marchant@woodplc.com	Wood PLC	[illegible]
Shannan Young		City of Dublin	[illegible]

Summary of Stormwater Business Inspectors Workshop: Sharing Successful Strategies - November 6, 2019

What is your primary job function?	The presentations were clear and easy to follow.	Overvall the order/progression of the presentations was appropriate.	Overall, the workshop materials and handouts were informative and useful.	I will use the skills learned in the workshop today on the job.	The presenter(s) were knowledgeable in the subject matter	The presenter(s) encouraged questions.	Total number of surveys	Overall Rating
Rating Scale 1-4	3.90	3.62	3.61	3.45	3.83	3.90	30	3.72

Q1	Q2	Q3	Q4	Q5	Q6	Q7	What was most valuable about today's training?	What was least valuable about today's training?	Do you have any suggestions for improvements that could be made to the training?	What subjects would you like to see addressed in future workshops?
Stormwater Program Staff Manager	4	4	4	4	3	4	Mtn View response to RV dwelling issues.		Unclear on the woman's name/org, but she said she gave a presentation at CASQA on Cultural Competence + Inspections and I thing that + translation would have been great.	Trash compliance solutions + tracking + common issues.
Stormwater Program Staff Manager	4	3	N/A	3	4	4	RVs and Restaurants	banirs	Warmer room	?
Inspector	4	4	4	4	4	4	Experience Sharing!			
Inspector	4	4	3	3	4	4	RV Presentation		Break into groups and learn from peers.	More on Stormwater issues from Homelessness and what cities are doing. Other Bay Area counties too.
Supervisor	4	4	3	3	4	4	RV. Presentation was great and put a real problem into perspective.	All were great and very usefull.	1st Presentation - Experiences were based on Fremont's regulations which seem to be much more strict than others, therefore not always applicable.	Comparison or examples of violations, differences(?) and class or severity. There is a lot of inconsistancy in this.
Inspector	4	4	4	4	4	4	New to the stormwater program. Learning what to look at during an inspection and example of stormwater violations.			Sample of a stormwater inspector report.
Inspector	4	4	4	3	3	4				
Inspector	4	4	4	4	4	4				
Inspector	4	4	4	4	4	4	Q&A			
Inspector	4	4	4	4	4	4				
Inspector	3	3	2	2	3	3	Illegal discharges associated with restart inspections.			
Inspector	3	2	3	3	3	3	Learning about translation apps.	Not getting hands on experience.	There should be more hands on training.	Inspection conditions (all facilities) and hands on exercises.
Inspector	4	2	4	4	4	4	RV/Creek/Restaurant presentations.	Q&A Session	Recommend question panal afterwars (after all briefs)	How to handle pollution from homeless encampment into creeks.
Inspector	4	3	4	4	4	3	Restaurant inspections, enforcement panel, communication presentation, Strawberry Creek presentation. - Tim Pine was very interesting. All presentations very good.		Better coffee	
Inspector	4	4	3	3	4	4	Health of Alameda County Creeks & Residential RVs.	Enforcement section because everyone does something different.	N/A	N/A
Inspector	4	4	3	3	4	4	The shared stories of enforcement from different jurisdictions.	None	More training on how to evaluate the violaters/potential violaters to resolve/abate issues.	More tools/resources to help inspections. Intro/exposure to new methods or approaches.
Stormwater Program Staff Manager	4	4	4	4	4	4	I enjoyed the health of the creeks presentation the most.	Restaurant presentation (I just know it already) but the presenation was well done.	More biology on creeks to show a positive influence on our stormwater work.	Success stories on protecting waterways C.3 inspection.
Inspector	4	4	4	3	4	4	Panel Discussion brought up issues that I never thought of before.	Health of Bay infor nice to know about fish but hard to adapt to my job.	Look to standardize processes across ACWCWP. Inspectors should not have different responses to same violations.	Present one or a few enforcement cases starting with discovery phot and step through each phase of enforcement.
Inspector	4	4	4	4	4	4	Resedential RV issues was very eye opening, also that most homeless individuals are living in them. View points from another county was also helpful.			Issues that other cities outside of Alameda County are dealing with and hose they resolve them.
Inspector	4	4	4	4	4	4	Photos in presentation from Jose's talk. Tim's inspirational talk.			Multibusiness facilities.
Inspector	4	3	3	3	4	4				
Inspector	4	3	4	3	4	4	Really enjoyed Tim Pine's presentation - great to tie in to why we do what we do. Jose Soto's inspection photos were useful. Thanks for coffee and snacks.	Panel on enforcement went a little long and could have been more structured.	Open Boardroom earlier to allow speakers more time to set up.	MRP and methods member agencies complex; but keep focus on MRP - the source of our regulations.
Inspector	4	4	4	4	4	4	Good variety btw practical, on-stie skills (language barriers) and larger context presentations (Alameda County Creek Health)	All useful.	Silence attendees who talk during presentations.	Studies/Data on how effective BMP outreach is and which kinds of outreach are most effective at businesses.
Inspector	4	4	4	4	4	4	Overcoming language barriers		More case studies.	

Summary of Stormwater Business Inspectors Workshop: Sharing Successful Strategies - November 6, 2019

What is your primary job function?	The presentations were clear and easy to follow.	Overvall the order/progression of the presentations was appropriate.	Overall, the workshop materials and handouts were informative and useful.	I will use the skills learned in the workshop today on the job.	The presenter(s) were knowledgeable in the subject matter	The presenter(s) encouraged questions.	Total number of surveys	Overall Rating
Rating Scale 1-4	3.90	3.62	3.61	3.45	3.83	3.90	30	3.72

Q1	Q2	Q3	Q4	Q5	Q6	Q7	What was most valuable about today's training?	What was least valuable about today's training?	Do you have any suggestions for improvements that could be made to the training?	What subjects would you like to see addressed in future workshops?
Inspector	3	3	2	1	3	4	Translation Apps.	Strategies for enforcement - thought it would be a presentation, not a question and answer session. A case study would have been good.	More the non-presentations to the end of the training since it was mostly general questions being asked.	
							Restaurant inspection presentation.	Language barriers.	More info, maybe, on how to involve non-SW inspectors in the business - i.e. how to utilize building inspectors, PW inspectors, others in SW mitigation.	Compare and contrast photos of discharge conditions, with all participants ranking to BMP, potential, actual, etc.
Stormwater Program Staff Manager	4	3	3	3	4	4	The Q&A with Jose Soto on inspection barriers. Also the discussion on fires and enforcement.	Everything was valuable. :-)	More real world examples/case studies.	Active spill response and abatement enforcement.
Inspector	4	4	4	4	4	4				
Inspector	4	4	4	4	4	4	Creek presention, language barrier presentation.	Nothing.		
Stormwater Program Staff Manager	4	4	4	4	4	4	RV discussio, Creek presentation. Share tips for enforcement.	N/A	Include PPT on Cultural Competency.	

Appendix G

Construction Inspection Training Material Report

Post-Workshop Report: Stormwater Compliance Construction Site Inspections Fiscal Year 2019-2020

The Clean Water Program's New Development Subcommittee (NDS) sponsored a training workshop on construction site inspections (MRP Provision C.6) on February 27, 2020. The workshop was hosted at the Alameda County Public Works Agency's Turner Court Offices. Sixty-six agency staff attended the workshop. The workgroup members responsible for planning the workshop were:

Daniel Matlock	City of Fremont, Subcommittee Chair
Christine Chou	City of Newark
Shannan Young	City of Dublin
Jim Scanlin	Clean Water Program
Laura Prickett	Horizon Water and Environment
Sandy Mathews	Larry Walker Associates

The workshop focused on inspecting best management practices (BMPs)and case studies of field situations. Sessions included:

- Construction Stormwater Program: C.6 Review (Diana Cangco, City of Newark)
- BMP Tips for Inspectors (Sandy Mathews, Larry Walker Associates)
- Inspection Case Studies (Christine Chou, City of Newark)
- Turner Court Green Stormwater Infrastructure: C-6 Considerations Introduction (Jim Barse, City of Alameda)
    - The field tour of four green stormwater infrastructure (GSI) stations were led by Daniel Matlock, City of Fremont, Jim Barse, City of Alameda, Christine Chou, City of Newark, and Sandy Mathews, Larry Walker Associates, who guided discussions regarding protection of GSI facilities during the construction process.

Presentation materials from the workshop were made available to Clean Water Program member agencies for their future use and reference.

Effectiveness Assessment

Pre- and post-workshop surveys provided insights into the knowledge of the participants before and after the workshop. The pre-workshop survey had an overall correct response rating of 67% that improved to 81% in the post-workshop survey (**Table 1**).

Workshop Evaluation

Forty-three of the 66 attendees (65%) completed evaluations. The overall average rating of the workshop was 3.66, out of a maximum of 4.0 (**Table 2**). Attendees generally valued the information about BMPs and the field situations including ideas on follow-up to potential violations. Several comments noted that the photos of actual BMPs installations were valuable.

Future training needs identified by attendees included: information on BMPs and specific situations, e.g., small sites, construction near creeks, contaminated soil; more examples and case studies of enforcement and escalation; and BMP demonstrations or site visits.

Table 1. Workshop Effectiveness Assessment Summary

Stormwater Compliance Construction Site Inspections Workshop February 27, 2020	Pre-workshop % Correct	Post-workshop % Correct	Difference
Which of the following is not a requirement of MRP Provision C.6?	**41%**	**69%**	**28%**
How frequently must active high priority sites be inspected by the local agency?	**64%**	**90%**	**26%**
Which document or method should an inspector use to determine appropriate enforcement actions?	**73%**	**90%**	**17%**
What is the primary purpose of erosion control BMPs?	**70%**	**75%**	**5%**
Silt fences remove sediment from runoff by what primary mechanism?	**59%**	**76%**	**17%**
Which of the following would be the best way to store paint at a construction site?	**93%**	**85%**	**-8%**
The basic principles of stormwater protection at construction sites include which of the following?	**71%**	**81%**	**10%**
Totals			
Respondent Percentage Correct	**67%**	**81%**	**14%**
Number of 50% or above	**41**	**53**	**12**
Number of 49% or below	**15**	**6**	**-9**
Total attendees = 66			
Number of Surveys Completed	**56**	**59**	

Table 2. Workshop Evaluation Summary

Evaluation Item	Average Rating (out of 4)[1]
The presentations were clear and easy to follow.	3.63
I will use the skills learned in the workshop today on the job.	3.63
The presenter(s) were knowledgeable in the subject matter.	3.71
The presenter(s) encouraged questions.	3.70
Overall Rating	**3.66**

[1] Ratings: 1 = Strongly Disagree, 4 = Strongly Agree

Attachments: Workshop Agenda, Sign-in Sheet

New Development Subcommittee Training Workshop
Stormwater Compliance Construction Site Inspections
Agenda

February 27, 2020
Check-in starts at 8:00 a.m.
8:30-Noon
951 Turner Court, Hayward CA

Topic/Activity	Speaker	Time
Check-in and Refreshments *Complete knowledge survey*		8:00-8:30
Welcome	Daniel Matlock, City of Fremont	8:30-8:40
Construction Stormwater Program: C.6 Review	Diana Cangco, City of Newark	8:40-9:00
BMP Tips for Inspectors	Sandy Mathews, Larry Walker Associates	9:00-9:45
Break		9:45-10:00
Inspection Case Studies	Christine Chou, City of Newark	10:00-10:40
Questions for Speakers *Complete workshop knowledge survey and evaluation and turn in before field portion*		10:40-10:50
Turner Court Green Stormwater Infrastructure: C-6 Considerations Introduction	Jim Barse, City of Alameda	10:50-11:00
Tour of GI Sites	Group Leaders: Christine, Sandy, Jim, Daniel	11:00-11:50
Pick up certificates of completion		11:50-Noon

Protecting Alameda County Creeks, Wetlands & the Bay

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New Development Subcommittee Training Workshop
February 27, 2020

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New Development Subcommittee Training Workshop
February 27, 2020

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New Development Subcommittee Training Workshop
February 27, 2020

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Appendix H

Public Outreach Materials

the watershed project

Highlights from the Alameda County Community Stewardship Grants Projects, 2019-2020

Despite a challenging year, this Alameda County's waters and residents benefited greatly from the work done by the grantees. Here are brief synopses of each project. Locations are bolded.

The Friends of Sausal Creek received a grant of $5,000 to undertake the Watershed-Wide Restoration project on **Sausal Creek in Oakland**. Despite an increase in homeless encampments and COVID-19, with modified programming they surpassed their overall goal and coordinated 535 volunteers: 277 students/chaperones and 258 adult community volunteers (original goal: 155 students and 150 adult volunteers). They supported and/or led nine volunteer-led group days, supported 12 volunteer site leaders, and engaged students and youth in 16 field trips or service projects at these restoration sites. In addition to removing trash, volunteers and youth removed invasive, nonnative plants and planted and watered watershed native plants grown at our native plant nursery. Through these activities, FOSC and its volunteer members are continuing to restore riparian habitat and increase biodiversity, thus greatly reducing the amount of litter that ends up in the creek and the bay.

Earth Team received a grant of $5000 to work with high school interns from **Skyline High School in Oakland** on 5 tasks: 1) Receive training on watershed restoration and research methods; 2) Collect samples and test for pet waste from target locations; 3) Analyze the bacteria data working with Aemtek Labs; 4) Create a report and informative brochures and signs to educate community members; and 5) Host a Litter Cleanup Day at Sausal Creek and Surveying. Students completed tasks 1-4 before the COVID-19 pandemic. Task 5 had to be modified since all field trips were cancelled. Instead students did neighborhood based cleanups using the data collecting tools and methods they were trained in on task 1.

I Heart Oakland-Alameda Estuary, a fiscally sponsored project by The Watershed Project, received a grant of $5,000 to conduct cleanups on the **Oakland-Alameda estuary**. Their 2019 Coastal Cleanup Day event was a huge success. 2,077 pounds of trash were removed from the estuary by 150 volunteers. In addition, through this event the I Heart Oakland-Alameda Estuary group built partnerships with local businesses, public agencies and schools to improve awareness of the litter problem and scale up solutions. Although the Earth Day event could not be completed due to COVID-19, they devoted many hours to publicizing the event and were able to greatly streamline their sign-up process with California Canoe and Kayak, which will be a plus for future events.

The Tri-Valley Conservancy received $3,436 to help pay for materials and transportation costs for the Discovery: Youth-In-Nature Program. This interactive, hands-on educational program is offered to fourth graders in the Tri-Valley and is fully-funded by grants and donations ensuring no student, or classroom, is left out due to a financial hardship. Tthis program includes three

engaging, active-learning sessions for a total of five hours of instruction and topics introduced include concepts of ecology, watershed, geography, agriculture, and conservation. During the 2019/2020 school year, over 900 fourth-grade students experienced this outdoor education program.

The **Regional Park Foundation** received $4,000 for the Fish Friends Program, for students in 5 Alameda County schools in the cities of **Oakland, San Leandro, Hayward, and Castro Valley**. This program is designed to promote awareness of the serious impacts of marine debris from litter thereby disrupting the cycle of littering and prevent trash from ever entering waterways. The program utilizes two different approaches to reach kids in grades 3-6 – one that is presented at the schools, and the second is conducted at one of the East Bay Regional Park District's shoreline parks. The fall programs were well received but due to the COVID-19 pandemic, no field trips could be conducted. Instead, the funds will be used to pay for family memberships to the East Bay Regional Parks for low-income families from participating schools. Membership benefits include free parking at all the parks, and free camping at selected parks. The new budget for the grant was reduced to $3,000. The grantee also requested an extension in order to complete the modified scope of work.

The Friends of San Leandro Creek received $520 to conduct restoration on **San Leandro Creek**. Due to the COVID-19 pandemic, all volunteer workdays have been suspended. Instead, the public will be invited to a virtual screening of The Story of Public to better understand the cycle of plastic pollution and to develop strategies for reducing the source of plastic in our environment. The grantee requested an extension in order to complete the modified scope of work.

Appendix I

Electrical Utilities SSID Final Report

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

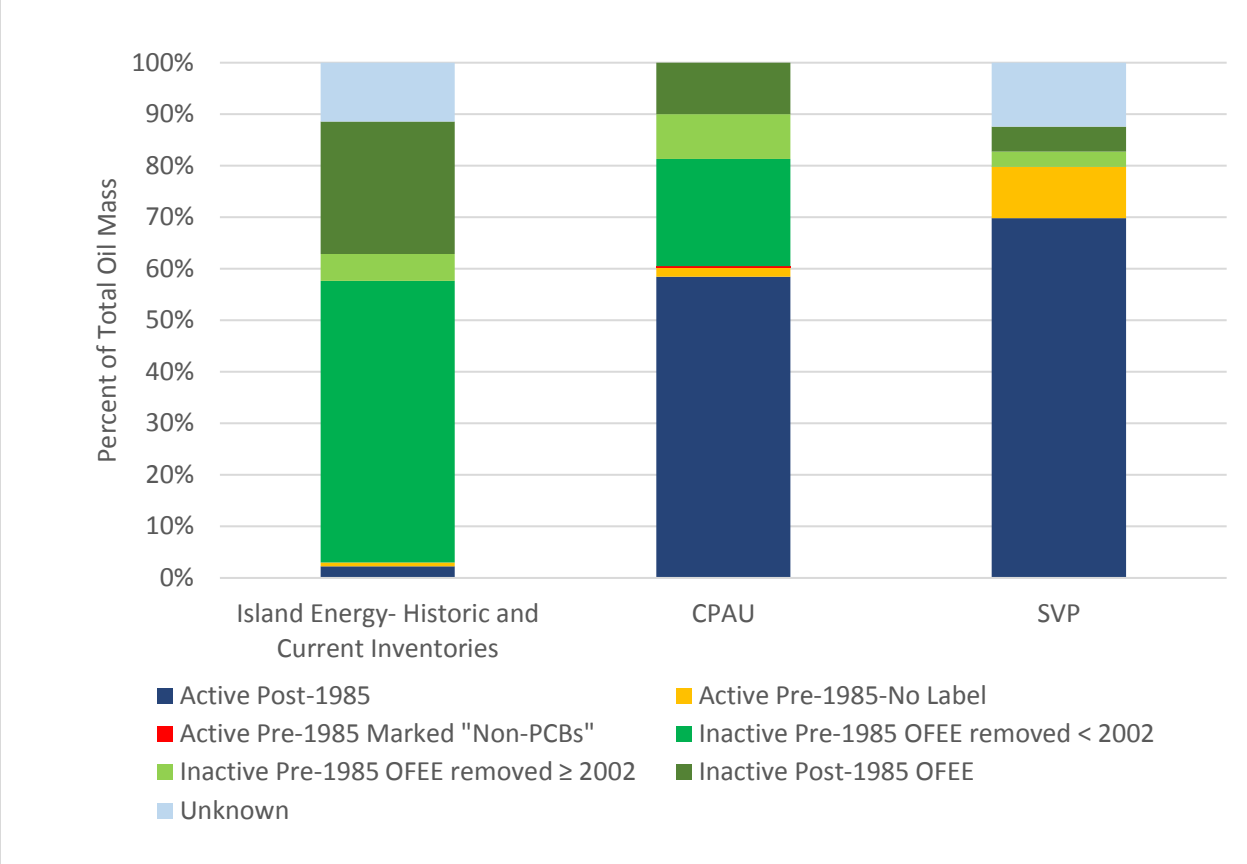

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

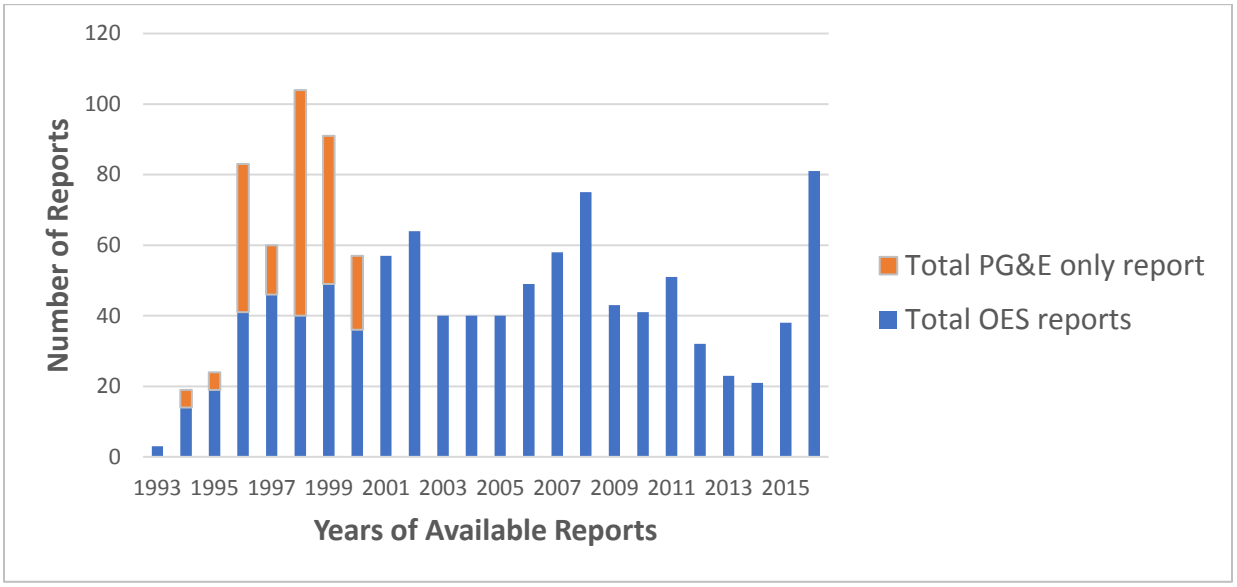

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

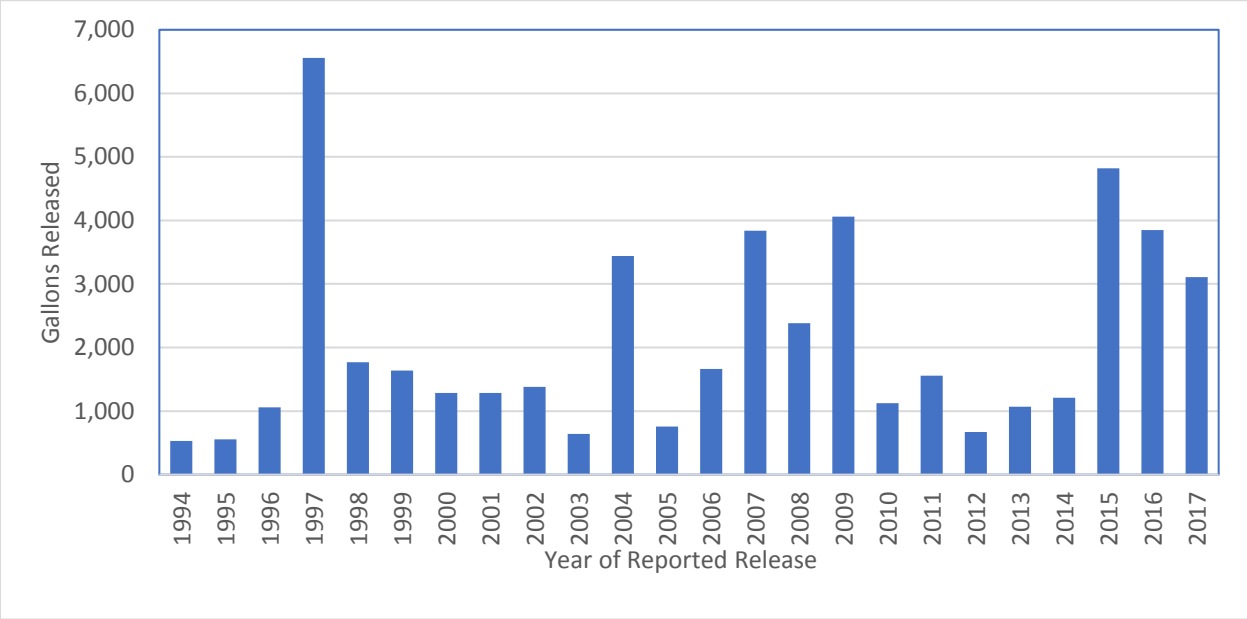

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

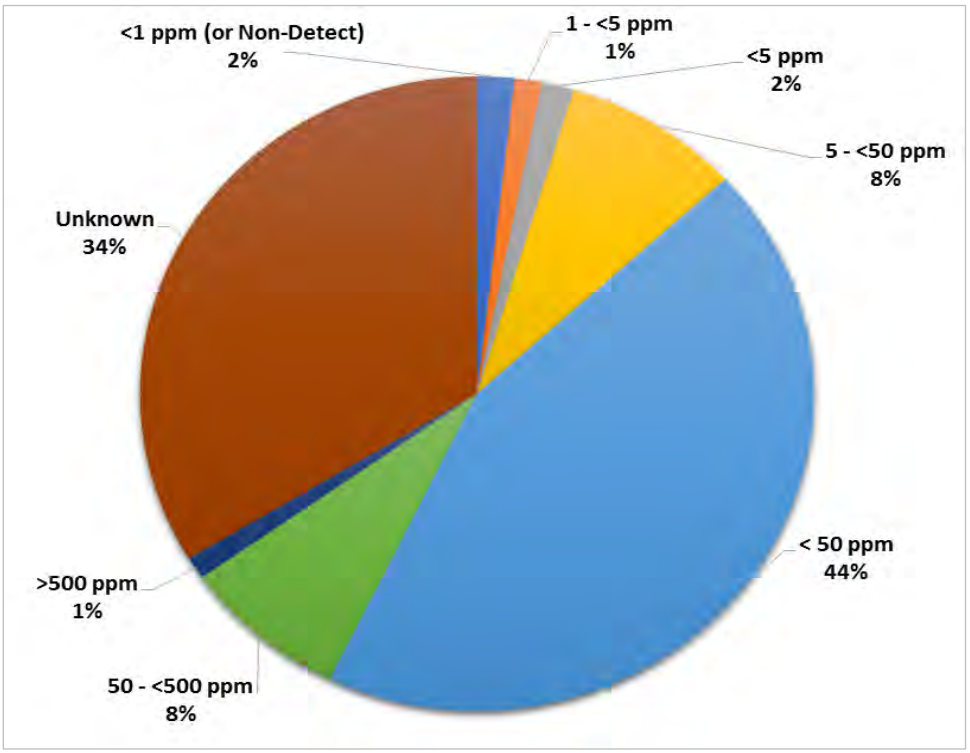

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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Appendix J

BASMAA Regional Supplemental Training and Outreach Report

Annual Reporting for FY 2019-2020

Regional Supplement for New Development and Redevelopment

San Francisco Bay Area Municipal Regional Stormwater Permit

B A S M A A

Bay Area Stormwater Management Agencies Association

September 2020

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Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

To Whom It May Concern:

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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INTRODUCTION

This Regional Supplement has been prepared to report on regionally implemented activities complying with portions of the Municipal Regional Stormwater Permit (MRP), issued to 76 municipalities and special districts (Permittees) by the San Francisco Bay Regional Water Quality Control Board (Water Board). The Regional Supplement covers new development and redevelopment activities related to the following MRP provision:

- C.3.j.iii. Participate in Processes to Promote Green Infrastructure.

These regionally implemented activities are conducted under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA), a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Most of the 2019-20 annual reporting requirements of the specific MRP Provisions covered in this Supplement are completely met by BASMAA Regional Project activities, except where otherwise noted herein or by Permittees in their reports. Scopes, budgets and contracting or in-kind project implementation mechanisms for BASMAA Regional Projects follow BASMAA's Operational Policies and Procedures as approved by the BASMAA Board of Directors. MRP Permittees, through their program representatives on the Board of Directors and its committees, collaboratively authorize and participate in BASMAA Regional Projects or Regional Tasks. Depending on the Regional Project or Task, either all BASMAA members or Phase I programs that are subject to the MRP share regional costs.

GREEN INFRASTRUCTURE PLANNING AND IMPLEMENTATION

C.3.j.iii. Participation in Processes to Promote Green Infrastructure

This provision requires:

> *(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.*

The BASMAA activities described in this section provide compliance for MRP Permittees with this provision. This section describes: 1) activities and accomplishments during FY 19-20; and 2) a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure (GI).

Activities and Accomplishments during FY 19-20

Grant – Urban Greening Bay Area

Urban Greening Bay Area is a large-scale, grant-funded effort to re-envision Bay Area urban landscapes to develop stormwater-friendly dense, green urban infrastructure that addresses challenges associated with climate change, infiltrates or captures stormwater and pollutants near their sources, and in turn, promotes improved water quality in San Francisco Bay. *Urban Greening Bay Area* is funded by an EPA Water Quality Improvement Fund grant awarded to the Association of Bay Area Governments (ABAG), a joint powers agency acting on behalf of the San Francisco Estuary Partnership (SFEP), a program of ABAG. The term of the *Urban Greening Bay Area* grant project was July 1, 2015 to June 30, 2018, but the term was extended to December 31, 2020 and additional funding provided to support follow-up implementation.

BASMAA is one of the subrecipients of the grant and took the lead on two of the grant project tasks – a Regional Green Infrastructure Roundtable process and a Design Charrette, both of which were implemented between May 2016 and May 2018.

The Regional Roundtable was a two-year process, with work groups as needed, to identify and develop a list of recommendations for integrating GI and stormwater management funding and investments with future climate change and transportation investments within the region. The Roundtable included convening meetings with local, regional, and state stakeholders, agencies, elected officials, and staff to produce draft and final task reports that identified and recommended possible legislative fixes, agency agreements, consolidated funding mechanisms, and other means and actions as appropriate. The Roundtable used innovative participatory processes that included key experts, regulators, decision-makers, and other stakeholders to share information, solicit and discuss ideas and solutions, and to identify next steps (i.e., develop a "roadmap"). The Final Roadmap of Funding Solutions for Sustainable Streets was completed in April 2018. Following completion of the Roadmap, BASMAA and SFEP formed a Roadmap Committee to guide future implementation of the Roadmap.

The Design Charrette task involved coordinating with the cities of San Mateo and Sunnyvale to conduct a Bay Area design charrette to develop cost-effective and innovative "typical" designs for integrating GI with bicycle and pedestrian improvements at roadway intersections. The overall goal of developing standardized, transferable designs was to make progress in addressing the high cost of design, implementation, operations, and maintenance that inhibits the widespread use of GI and LID features.

Work products of the Urban Greening Bay Area grant are posted at: http://www.sfestuary.org/urban-greening-bay-area/#planning . The Planning section includes documents related to the Regional Roundtable and the Implementation section includes documents related to the Design Charrette.

During FY 19-20, BASMAA's participation in activities to implement the Roadmap of Funding Solutions for Sustainable Streets included:

- Continued coordination with transportation agencies – including the Metropolitan Transportation Commission (MTC), the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Federal Highway Administration (FHWA) – to clarify GI eligibility in federal, regional, and state transportation grant programs (Roadmap Specific Actions 1-1, 1-2, and 1-3).

- In November 2019, BASMAA transmitted a memorandum to the above-listed regional and state agencies, documenting the eligibility of GI in applicable regional, state and federal transportation funding programs and requesting the agencies' participation in developing fact sheets that clarify eligibility for sustainable streets in two federal transportation funding programs – the Surface Transportation Block Grant Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) – as well as the California Senate Bill 1 (SB 1) Road Maintenance and Rehabilitation Program.

- On February 4, 2020, BASMAA representatives met with staff from MTC and Caltrans District 4 (the Caltrans District for the nine-county Bay Area), to develop an approach for a regional fact sheet that focuses on the eligibility of GI in projects funded by the STP and CMAQ through the One Bay Area Grant (OBAG) program administered by MTC. The draft regional fact sheet was reviewed by MTC staff and is scheduled to be finalized by September 2020.

- On February 10, 2020, BASMAA held a conference call with CTC staff to develop an approach for a statewide fact sheet that focuses on the eligibility of GI in projects funded by Senate Bill 1. CTC staff provided comments on the draft statewide fact sheet but deferred further action pending documentation that there is interest in this topic beyond the San Francisco Bay Area. To address that information need, BASMAA drafted an online survey initially intended for distribution to stormwater programs within California. However, before it was distributed, BASMAA worked with the U.S. Environmental Protection Agency (USEPA) staff liaison to the Federal Highway Administration (FHWA) to have FHWA staff review BASMAA's November 2019 research memorandum. Similar to the CTC, FHWA questioned whether this issue is of interest beyond the San Francisco Bay Area and California. Accordingly, BASMAA is updating the draft online survey for national distribution through the Green Infrastructure Leadership Exchange. The SB 1 fact sheet is scheduled to be finalized by December 2020.

Other Participation and Comments

In addition to the *Urban Greening Bay Area* grant efforts described above, Countywide Program representatives participated in the following forums related to GI promotion:

- Matthew Fabry (C/CAG, representing SMCWPPP and BASMAA) continued to attend a series of meetings with RWQCB, BAFPAA, SFEP, and MTC to discuss ways to integrate stormwater issues into MTC efforts, including Plan Bay Area. To-date, five meetings have been conducted (March 19, 2019; June 12, 2019; July 16, 2019; October 15, 2019; and January 21, 2020). A meeting scheduled for early April 2020 was postponed due to the COVID-19 pandemic.

- Matthew Fabry (C/CAG, representing SMCWPPP) participated in the ReNUWIt "Stormwater for Water Supply" workshop on July 25-26, 2019, and presented information on efforts to manage stormwater via GI, including larger regional facilities that can help recharge groundwater. This workshop was part of a larger effort by ReNUWIt to create a "Bay Area One Water Network." He also participated as a panelist during a follow-on one-hour webinar on July 6, 2020. Relevant information can be found at www.bayareawater.org.

- Matthew Fabry (C/CAG, representing SMCWPPP) and Jill Bicknell (EOA, representing SCVURPPP) participated in ongoing meetings of the organization Transportation Choices for Sustainable Communities, a research and policy institute whose mission is to "advance understanding and support for sustainable transportation as an essential component of livable communities and cities," to plan a "Green Streets for Sustainable Communities" symposium. The event was originally scheduled for March 2020, and has now been rescheduled as a three-day virtual series of seminars on September and October 2020. The symposium will focus on multi-benefit approaches to rethinking streets, including Complete Streets, Green Streets, creating eco-corridors, and as people habitat for public gathering and interaction. Details can be found at http://transportchoice.org/events/.

- Matthew Fabry (C/CAG, representing SMCWPPP) participated in USEPA's Environmental Finance Advisory Board (EFAB) Stormwater Finance Workgroup to respond to a request from Congress in accordance with Section 4101 of the America's Water Infrastructure Act (AWIA) for a report looking at funding sources for stormwater and the adequacy of those sources to support the needs of stormwater management programs. The workgroup met twice – in April and October 2019 and held two public teleconferences in December 2019. On March 30, 2020, EFAB submitted its report, "Evaluating Stormwater Infrastructure Funding and Financing", to USEPA, which accepted the report on July 16, 2020 as satisfying the requirements of Section 4101 of AWIA.

Plan for New and Ongoing Efforts

The plan provided below shows how BASMAA will support its member agencies to collectively and regionally implement the requirements of MRP Provision C.3.j.iii during FY 20-21 and through the remainder of the current permit term. The requirements of Provision C.3.j.iii may change in the reissued MRP and may affect the planning and scheduling of participation in the promotion of GI during the next permit term.

Continue Ongoing Efforts to Participate in Processes to Promote GI

During FY 20-21 and through the end of the permit term for the current MRP (December 31, 2020 or later if extended), BASMAA will continue ongoing efforts to participate in processes to promote GI as described below.

Urban Greening Bay Area. BASMAA will continue to participate in the Urban Greening Bay Area Project's ongoing activities with regard to the implementation of prioritized specific actions in the 2018 Roadmap of Funding Solutions for Sustainable Streets (Roadmap). The Roadmap identifies specific actions to improve the funding of projects that include both complete streets improvements and GI, and is intended to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects. Various specific actions included in the Roadmap address coordinating the timing of funding from different sources, GI designs and design criteria, potential modifications of processes to evaluate projects for funding, and coordination regarding the potential development of cooperative in-lieu programs. The following ongoing activities are anticipated to continue during the period of July 2019 through December 2020:

O-1. Complete the ongoing coordination with the Metropolitan Transportation Commission (MTC) and Caltrans to clarify GI eligibility in federal transportation grants (Roadmap Specific Action 1-1).

O-2. Complete the preparation of a Roadmap fact sheet (Roadmap Specific Action 3-7). The fact sheet is anticipated to advise municipalities on how GI may be included in One Bay Area Grants (OBAG)-funded projects

O-5. Continue to participate in ongoing meetings with RWQCB, BAFPAA, SFEP, and MTC to discuss ways to integrate stormwater issues into MTC efforts, including Plan Bay Area.

O-X. Complete the ongoing coordination with the California Transportation Commission (CTC) to clarify GI eligibility in the Senate Bill 1 Local Streets and Roads Program (Roadmap Specific Action 1-3).

O-X Conduct an online survey for national distribution through the Green Infrastructure Leadership Exchange and continue coordinating with the FHWA liaison to EPA regarding the eligibility of GI in federal surface transportation programs (Roadmap Specific Action 1-1)

New Efforts to Participate in Processes to Promote GI

Between July and December 31, 2020, BASMAA may initiate the following new activities to further implement the Roadmap and participate in other ways to promote GI:

N-X: Coordinate with MTC to develop an approach for including information about the eligibility of GI in federally funded in guidance materials that MTC will

provide to counties for OBAG's third round of funding (Roadmap Specific Action 1-2).

N-X: Coordinate with MTC to include a discussion of GI and green streets implementation in the anticipated update of Plan Bay Area (Roadmap Specific Action 3-8, Incorporate Roadmap specific actions in funding agencies' planning documents).

N-X: Coordinate with MTC regarding opportunities to present information about Sustainable Streets at statewide meetings of officials from Metropolitan Planning Organizations throughout California, in support of the ongoing coordination with MTC to clarify GI eligibility in federal transportation grants (Roadmap Specific Action 1-1), and ongoing coordination with the CTC to clarify GI eligibility in the SB 1 Local Streets and Roads Program (Roadmap Specific Action 1-3).

Annual Reporting for FY 2019-2020

Regional Supplement for Training and Outreach

San Francisco Bay Area Municipal Regional Stormwater Permit

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Bay Area Stormwater Management Agencies Association

September 2020

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Alameda Countywide
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Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

To Whom It May Concern:

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Our Water, Our World Consultant's Summary Report

INTRODUCTION

This Regional Supplement has been prepared to report on regionally implemented activities complying with portions of the Municipal Regional Stormwater Permit (MRP), issued to 76 municipalities and special districts (Permittees) by the San Francisco Bay Regional Water Quality Control Board (Water Board). The Regional Supplement covers training and outreach activities related to the following MRP provisions:

- Provision C.5.e., Control of Mobile Sources,
- Provision C.7.c.ii.(1), Stormwater Point of Contact, and
- Provision C.9.e.ii.(1), Point of Purchase Outreach.

These regionally implemented activities are conducted under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA), a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Most of the 2019-2020 annual reporting requirements of the specific MRP Provisions covered in this Supplement are completely met by BASMAA Regional Project activities, except where otherwise noted herein or by Permittees in their reports. Scopes, budgets, and contracting or in-kind project implementation mechanisms for BASMAA Regional Projects follow BASMAA's operational Policies and Procedures as approved by the BASMAA Board of Directors. MRP Permittees, through their program representatives on the Board of Directors and its committees, collaboratively authorize and participate in BASMAA Regional Projects or Regional Tasks. Depending on the Regional Project or Task, either all BASMAA members or Phase I programs that are subject to the MRP share regional costs.

Training

C.5.e. Control of Mobile Sources

This provision requires:

Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.

(b) Implementation of an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.

(c) Regularly updating mobile business inventories.

(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.

(e) Inspection of mobile businesses, as needed.

(2) Permittees may cooperate county-wide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

BASMAA's long-standing Surface Cleaner Training and Recognition Program addresses

the BMP and training aspects of the provision by focusing on the most common type of outdoor cleaning – cleaning of flat surfaces like sidewalks, plazas, parking areas, and buildings. Individual Permittees address the inspection and enforcement aspects of the provision.

Cleaners that take the web-based training and a self-quiz are designated by BASMAA as Recognized Surface Cleaners. BASMAA also created and provides marketing materials for use by Recognized Surface Cleaners. Cleaners can use the website to get trained and recognized for the first time or renew their training and recognition, as required annually. Recognized cleaners can also download marketing materials from the website. Potential customers, including Permittees can use the site to verify the recognition status of any cleaner, as can municipal inspectors.

In July 2014, the State Water Board adopted a temporary Emergency Regulation for Statewide Urban Water Conservation that directly affected some of the surface cleaning activities and best management practices of the Surface Cleaner Training and Recognition Program. Among other actions, the emergency regulations "prohibited, except where necessary to address an immediate health and safety need:...

2) The use of a hose that dispenses potable water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use;

3) The application of potable water to driveways and sidewalks;"

The regulation was to remain in effect for 270 days, unless extended by the State Water Board due to ongoing drought conditions.

Of particular concern was item 3), which prohibited many of the activities conducted by surface cleaners if an immediate health and safety need could not be demonstrated and would require significant changes in the Surface Cleaner Training and Recognition Program. However, both the term and content of the emergency regulations were temporary, and the State Water Board might need to change either with minimal notice. Given the uncertain long-term future of the emergency regulations, BASMAA adopted a two-part strategy:

1) track the status of the emergency regulations with a plan to make the necessary changes to the Surface Cleaner Training and Recognition Program if the regulations became permanent, and

2) alert the cleaners that are in the Surface Cleaner Training and Recognition Program to the emergency regulations.

To effect part 2), in August 2014, BASMAA sent a notice to all the Recognized Cleaners alerting them to the emergency regulations. Part 1) progressed along the following chronology of events:

- May 2015, the State Water Board amended and readopted the emergency regulation extending its effectiveness to February 2016.
- February 2016, the State Water Board extended the emergency regulation through October 2016 (into FY 16-17).
- May 2016, the State Water Board replaced the emergency regulation adopted in

February 2016 and extended the regulation through February 2017.

- February 2017, the State Water Board extended the emergency regulation for 270 days until November 25, 2017.
- April 2017, the Governor issued Executive Order B-40-17, which builds on actions taken in Executive Order B-37-16, including the State Water Board maintaining prohibitions on wasteful practices such as hosing off sidewalks. And as directed by the Governor in Executive Order B-37-16, the State Water Board is to separately take action to make wasteful water practices permanent.
- February 2018, the State Water Board attempted to make wasteful water practices permanent but after receiving significant opposition from water agencies before the adoption meeting, postponed adoption to allow more time to address comments.

In discussions with BASMAA, State Water Board staff have indicated that the regulations would regulate water use and not the discharge, and the regulations would regulate the use of potable water. BASMAA continues to track any developments and will work with the State Water Board as they develop and adopt a permanent regulation to try to ensure that necessary outdoor surface cleaning activities can be conducted in accordance with both stormwater regulations and urban water conservation regulations.

Public Information and Outreach

C.7.c.ii.(1) Stormwater Point of Contact

This provision requires:

> *Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively and Permittees may combine this function with the spill and dumping complaint central contact point required in C.5.*

BASMAA assists with this provision by using the regional website: BayWise.org to list or link to member programs' lists of points of contact and contact information for the stormwater agencies in the Bay Area (https://baywise.org/about/).

Pesticides Toxicity Control

C.9.e.ii.(1) Point of Purchase Outreach

This provision requires Permittees to:

- *Conduct outreach to consumers at the point of purchase;*
- *Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and*
- *Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.*

The Annual Reporting provision requires:

> *Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted…, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f. [Ed. C.9.g]).*

Below is a report of activities and accomplishments of the *Our Water, Our World* program for FY 2019-2020. For a detailed report of activities, see the attached Consultant's Final Report.

- Coordinated program implementation with major chains Home Depot and Ace Hardware National.
    - Home Depot Corporate (Atlanta) directed support of the program with their stores (see letter attached).
- Completed the development and creation of two new fact sheets for Bed Bugs (in English and Spanish) and Moles, Voles, and Gophers. There are now 22 fact sheets – 18 in English and 4 in Spanish.
- Maintained an inventory of the following: fact sheets, shelf tags, literature rack display signage, *10 Most Wanted* brochures, *Pest or Pal Activity Guide for Kids*, custom-designed product guide dispensers, and two versions of product guides (Home Depot and generic), from which participating agencies could purchase materials.
- Recruited for, developed, planned, and conducted an IPM Advocates training course to qualify 5 new Advocates, almost doubling the IPM Advocates corps to 12 individuals.
- Conducted monthly seasonal pests meetings with IPM Advocates for month / season ahead.
- Updated less-toxic Product List by-manufacturer.
- Coordinated employee trainings and tabling events at *Our Water, Our World* stores.
- Maintained *Our Water, Our World* website.
- Provided Ask-the-Expert service—in which the Bio-Integral Resource Center (BIRC) provides 24-hour turnaround on answers to pest management questions. BIRC researched and provided answers to about 28 questions in FY 19-20.
- Provided and staffed exhibitor booths and made presentations to attendees:

- Central Trade Show, Las Vegas (August 2019)
- L&L Dealer Show, Reno (October 2019)
- NorCal trade show, San Mateo (February 2020)

- Participated in UCIPM Continuing Education for IPM Advocates.

Below are some outputs and outcomes for FY 19-20:

- 36 *Our Water, Our World* Store Trainings[1]
- 301 employees trained at *Our Water, Our World* stores[2]
- 54 outreach events at *Our Water, Our World* stores[3]
- 3,146 customers contacted by Advocates at tabling events at stores and virtual events[4]
- 28 questions researched and answered by technical expert
- Over 30% increase in sales of eco-pesticide categories and an overall 8% increase in sales of eco-products over the previous year (Home Depot Corporate)
- Doubling of Sluggo sales over the previous year
- Over 29% growth in sales of Ortho Ground Clear, a newer eco-herbicide (Scotts Miracle-Gro)
- Over 22% growth in sales of Ortho 3-in-1, pyrethrin and sulfur combination

[1,2,3,4] Funded by permittees at local level.

Attachments

Point of Purchase Outreach

Home Depot Letter of Support

Interoffice
MEMORANDUM

DATE: **January 1, 2020**

TO: **California Store Managers, D28 ASMs and Department Heads**

FROM: **Ron Jarvis**

CC: **Steve Knott, Scott Jacobson**

SUBJECT: **Our Water Our World training**

OUR WATER, OUR WORLD is a coalition of organizations whose purpose is to encourage consumers to use less toxic pest controls in and around their homes. They specialize in retail friendly education. Their goal is not to alienate consumers by telling them what they can't use, but instead their information focuses on less toxic pest management and ties into products currently on our shelves.

An Our Water, Our World (OWOW) representative will be in your store to help train employees and label less-toxic products with shelf-talkers. The representative may also schedule a tabling event to educate consumers. This ties in well with "How-to" weekend events. The representative will display a sampling of excellent less toxic and Eco Options products off our shelves. They will provide free informational literature and a wealth of knowledge and experience. Please enjoy this additional help in your store.

A representative will contact you before the training or demonstration date to arrange details. Please contact Suzanne Bontempo at (415) 317-0475 if you have any questions.

Thank you

Ron Jarvis

from the desk of.....
Ron Jarvis
Merchandising Vice President – Sustainability
THE HOME DEPOT USA, INC.
2455 Paces Ferry Road
Atlanta, GA 30339
(770) 384-4835
Fax (770) 384-4411

Attachments

Point of Purchase Outreach

Our Water, Our World Consultant's Summary Report

OUR WATER - OUR WORLD

BASMAA

Our Water Our World Retail Partners Summary Report
July 2019 – June 2020

prepared by Suzanne Bontempo, Plant Harmony - July 2020

Program Annual Overview:

The fiscal year started off by attending the Central Trade Show in August, then the L&L show in October, where we saw some changes among the vendors. Safer Brand is rebranding many of their products, transitioning both the Concern and some Havahart branding to Safer branding. I saw that Ferti-lome has OMRI certification for its eco-pesticide line. Miracle-Gro has expanded the Performance Organics fertilizer line and the EcoSmart line has new labeling and branding image.

The focus during August – December was preparing for the IPM Advocate training I conducted in January. This involved many hours of collaboration with Debi Tidd and Karey Windbiel-Rojas. I gave my full attention to recruiting, following up with these new recruits, preparing the curriculum, finding a location for the training, scheduling the dates and times of our classes to meet.

As October came, PG&E began exercising the power shut offs, that impacted many residences as well as the retailers throughout the Bay Area. Then the Kincade Fire ignited on October 23rd, halting OWOW services throughout the North Bay Area for the weeks that followed. As soon as the fire was behind us, the retail holiday season was in full swing, which meant OWOW services didn't resume until mid-December.

In January the new IPM Advocates attended and completed their training. This was a wonderful accomplishment. The new Advocates bring wonderful support to the OWOW program and are open to moving the program forward where possible. They come with insightful ideas and dynamic energy.

In February I began working with the new Advocates, having them shadow me with each store visit and OWOW task. I also joined the NorCal Trade Show with the help of IPM Advocate Lisa Ratusz. The NorCal show invited me to give a presentation on IPM to the garden industry professionals. The Department of Pesticide Regulations qualified my class for one continuing education unit for the garden industry professionals. The new IPM Advocates were invited to come experience the show which Charlotte Caner, Sherri Sunahara, and Emily Holly were each available to do.

Then March arrived and life as we knew it went sideways. I cannot express enough how challenging this spring season became because of the Covid-19 pandemic. The retailers were

stressed beyond measure. I, and all of the IPM Advocates servicing the OWOW program did our best to provide OWOW services while sheltering in place. Many of the retailers, including the Home Depot Corporate, requested that we pause our services during that time, which we did. I certainly did what I could to provide the retailers relevant pest problem solving support remotely.

Though these challenges have been significant, this has been a year of transitions. With more IPM Advocates retiring last year, I am happy to include our new, recently training IPM Advocates to the group this year. Next I am finding ways to offer public education to the public remotely. I have been able to transition OWOW public education and outreach to virtual platforms through Zoom.[1] And I am happy to say that I have been able to navigate this new approach to public outreach with success. Two incredible triumphs for the 2019-2020 contract year.

Moving forward, I am currently working with Debi Tidd to develop virtual OWOW trainings that are best suited for the retailers and OWOW. I am also supporting the IPM Advocates with OWOW Pest of the Month social media posts, IPM educational videos, and written articles that expand the OWOW message to a broader reach[2]. I am extremely inspired looking forward to what is possible for delivering the OWOW message to the public in new ways.

We, the IPM Advocates have continued our focus on problem pesticide reduction by educating and mentoring the associates and consumers about alternative approaches to pest problem solving.

- Throughout the year, we continue to provide educational support and resources for the Asian Citrus Psyllid. We share the message of "Inspect, detect and then report'" to the CDFA or local agricultural department.
- The public's concerns around Roundup and glyphosate continues, however with the influence of the IPM Advocates, every retailer has at least one eco-herbicide alternative for sale.
- Rats and mice continue to be the most prevalent pest problem that people are battling. Working with exclusion and trapping is the message for success the we encourage.
- Then with the recent Sheltering in Place gardening trend, we have heard from most retailers that the sales of eco-pesticides and "organics" is up. This is wonderful to see during such a challenging time.
- Other pests that have been in the focus this year are; yellowjackets, spiders and fleas. We have provided additional education and support with eco-management solutions.

Educational retail trainings and public outreach[3]:

- **Total number of OWOW retailer trainings in the 2019-2020 fiscal year = 36**
  - Out of this total, 16 were at the Home Depot Stores
- **Total number of associates trained at these OWOW trainings = 301**
  - Out of this total, 148 were Home Depot associates
- **Total number of OWOW public outreach events in the 2019-2020 fy = 54**
  - Out of this total, 9 were at the Home Depot Stores

[1, 2, 3] Funded by permittees at local level.

- **Total number of people reaches at both in-people + virtual OWOW events = 3,146**
  - Out of this total, 351 were reached at the Home Depot store
  - Out of this total, 943 were reached through virtual classes

These numbers reflect a 220% decrease in trainings conducted over the previous year and a 192% decrease in the number of public outreach events.

Most of the OWOW events are scheduled during the spring retail season, per the request of the retailer and to capture the larger crowds that the spring retail season brings. Unfortunately, the pandemic paused these services with all trainings and in-person outreach events during this time subsequently canceled. I can also add that I didn't receive the Sacramento OWOW contract NTP until January 1st, which was 3 months of opportunities lost.

The encouraging piece we are seeing is with the virtual education webinars. The OWOW IPM educational webinar events were created in lieu of in-person public outreach. Due to the health measures related to Covid, lower staffing levels left customers unsupported in the aisle at the point of purchase. These webinars are intended to introduce the OWOW program, the OWOW & UCIPM websites, and how to use these websites as a tool to properly identify pest problems with less toxic solutions.

Each webinar shares the common goal of introducing IPM Practices and over all healthy garden practices, to pre-educate consumers for their instore purchase decisions. Each participating agency assisted by promoting these events. The attendance rate for these no fee webinars averages 50%, which are encouraging numbers since 20% is the average for no fee webinars. Moving forward I plan to expand this remote outreach education.

Retailer support and sales overview:

- Home Depot Corporate provided a letter of 'Thanks' and "Support" for the OWOW program partnership in October, which Geoff sent to the agencies
- Home Depot Corporate provided a letter to BASMAA for the IPM Advocates outlining this program partnership and participation
- Home Depot Corporate, the sales of the eco-pesticide categories have increased over 30% with an overall increase of 8% of eco-products over the previous year.
- Sluggo sales is reported to have doubled over the previous year. This is a reflection of the recent gardening trend due to the pandemic, working from home and sheltering in place and the efforts of the IPM Advocates
- Ortho Ground Clear, a newer eco-herbicide Scotts Miracle-Gro was showcasing for 2020, has seen a growth of over 29%
- Ortho 3-in-1, pyrethrin and sulfur combination, has seen a growth in sales of over 22%

Throughout the 2020 year, Scott's Miracle Gro's newest organic fertilizer under the name of 'Performance Organics' continues to sell at an amazing rate.

Final comments:

As I mentioned in my review of the 2019-2020 fiscal year, this may have been the most challenging year we will ever see. With the fires and power shutoffs in the fall, the hardware and home improvement stores were faced with many retail stresses. Then, as March arrived, I cannot express enough how challenging this season became because of the pandemic. The

immediate challenge I was then faced with was how to reach the public when we were restricted to Sheltering in Place. How do I transition a public outreach program virtually? With the wonderful support and encouragement of a few agencies, I dove into the virtual training world through Zoom. Moving forward I see the value of providing OWOW education to the public through Webinar style classes. Also, to develop a virtual training platform that is best suited for the retailers and OWOW, this will only broaden our reach with OWOW education. Though it is very disappointing to me to end the year on this note, I am inspired looking forward to what is possible for delivering the OWOW message to the public in a new way.

The other encouraging discovery we witnessed once we began again to provide in-person OWOW services to the retailers is that many of the retailer's shelves were emptied of product from sell through, primarily the eco-products. This was from the supplier's inability to keep up with the consumer's demand. Retail teams also reported that their customers were asking for organic alternatives over the traditional products. A remarkable transition for the marketplace.

In addition, I am encouraged to hear that upgrading OWOW website is currently being discussed. This seems to be more relevant than ever before given the current state of affairs. As I have shared before, the OWOW website has the potential to be a valuable vital tool for the IPM Advocates, the retailers, and the public.

Appendix K

Our Water Our World Summary Report

OUR WATER — OUR WORLD

Alameda Countywide Clean Water Program

Our Water Our World

Integrated Pest Management Retail Store Partnership Program

Final Report for contract fiscal year 2019-2020

Prepared by Suzanne Bontempo, July 2020

Program Overview

We currently have 26 retailers in the OWOW Store Partnership Program. Suzanne Bontempo was the lead for the OWOW program with the assistance of IPM Advocate Lisa Ratusz, Lorenzo Levinger and Charlotte Canner.

Here is the current list of retailers in the OWOW partnership:

Encinal Nursery	2057 Encinal Ave	Alameda
Encinal Hardware	2801 Encinal Ave	Alameda
Flowerland Nursery	1330 Solano Ave.	Albany
Ace Hardware	2145 University Ave.	Berkeley
Berkeley Horticultural Nursery	1310 McGee Ave.	Berkeley
East Bay Nursery	2332 San Pablo Ave.	Berkeley
Westbrae Nursery Garden Supply	1272 Gilman Ave.	Berkeley
Pete's Ace Hardware	2569 Castro Valley Blvd.	Castro Valley
Home Depot	3838 Hollis St.	Emeryville
Dale Hardware	37100 Post	Fremont
Home Depot	43900 Ice House Tr.	Fremont
Regan Nursery	4268 Decoto Rd.	Fremont
Home Depot	21787 Hesperian Blvd.	Hayward
Home Depot	2500 Las Positas Rd.	Livermore
Alden Lane Nursery	981 Alden Ln.	Livermore
Ace Garden Center	4001 Grand Ave.	Oakland
Broadway Terrace Nursery	4340 Clarewood Dr.	Oakland
Cole Hardware	5533 College Ave.	Oakland
Home Depot	4000 Alameda Ave.	Oakland
Laurel Ace Hardware	4024 MacArthur Blvd.	Oakland
Montclair Village Hardware	5048 Woodminister Ln.	Oakland
Thornhill Nursery	6250 Thornhill Dr.	Oakland
Home Depot	6000 Johnson Dr.	Pleasanton
Western Garden Nursery	2756 Vineyard Ave.	Pleasanton
Evergreen Nursery and Garden Supply	350 San Leandro Blvd.	San Leandro
Home Depot	1933 Davis St.	San Leandro

<u>OWOW IPM Retailer Trainings</u>

Alameda County Store Trainings:

- A total of 12 trainings were conducted, with 115 associates trained.

OWOW Retailer training topics covered in each class:

Training topics included:

- OWOW Store Partnership Program overview
- Pesticides that are water pollutants of concern
- Where to dispose of HHW with the Stop Waste handout
- How less toxic products work
- IPM techniques
- Beneficial Insect Identification
- Water Conservation
- Benefits of Mulch
- Water-wise plants choices for our area
- Pests highlights: Rats & mice, aphids, ants, bed bugs, fleas, gophers, citrus leaf miner, snails and slugs, spider mites, whitefly, peach leaf curl and other fungal diseases, and how improving the overall health of the garden with compost and organic fertilizers/reduce over fertilizing with synthetic fertilizers as they increase pest problems.
- Invasive pest awareness: Asian Citrus Psyllid, Spotted Winged Drosophila, and Ligurian Leaf Hooper
- OWOW website and the 'Ask the Expert' feature, the UCIPM website and the BIRC website
- UCIPM YouTube informational channel

Resources provided to teach OWOW training attendee includes:

- The Mac's Field Guide Good Bugs Bad Bugs of California
- The CA DPR's 'How to read a pesticide label' handout
- How less toxic products work
- Home Depot less toxic product list for the Home Depot trainings
- Insect damage of sucking and chewing insects
- Monthly pest calendar
- List of additional resources; websites, books and catalogs for additional support
- Educational handout on managing: spider mites, whiteflies, citrus leaf miner, codling moth, lawn grub management, Asian citrus Psyllid, keeping rats & mice out
- CA-DPR's bed bugs management handout
- How to apply beneficial nematodes
- Sheet mulching instructions
- Alameda Co Household Hazardous Waste locations by StopWaste
- Alameda Co Mosquito Abatement District and Alameda county Vector Control Program brochures and offerings
- The 'Ten Most Wanted' beneficial bug brochure
- OWOW pocket guides to less toxic pesticides

Additional materials focused on this year by OWOW:

- A one sheet handout that includes services offered by the Alameda county Mosquito Abatement District and the Alameda County Vector Control Program
- A one sheet informational handout on 'Keeping Rats & Mice out'

- A one sheet informational handout on ‘Rats in the Garden’
- Asian Citrus Psyllid Campaign fliers in the nursery, displayed in the aisle and stocked in the OWOW literature rack
- UCIPM DIY bed bug management
- Eco-herbicide recommendations
- Retail Nursery & Garden Center IPM News

Extra educational materials:

I provided many of the OWOW retail partners additional educational materials to assist with pest identification, as this is what many were requesting since access to online research during business hours is limited to many associates.

Educational materials were:

- The UCIPM –ANR Pest Identifier and the Weed Identifier wheels
- UCIPM Pests of Landscape Trees and Shrubs
- UCIPM Pests of Gardens and Small Farms
- UCIPM Wildlife Pest Control around Gardens and Homes

An OWOW training for the associates at the Laurel Ace

List of OWOW Trainings provided:

Here is a detail of the 12 trainings we provided this year with 115 associates trained

Date	Store	Number Trained	Instructor
10/18/19	Home Depot Emeryville	6	Suzanne
10/22/2019	Home Depot Hayward	9	Lisa
10/25/2019	Home Depot San Leandro	15	Suzanne
11/1/2019	Home Depot Oakland	11	Suzanne
11/5/2019	Home Depot Fremont	6	Lisa
2/11/2020	Pete's Ace Hardware	10	Lisa
2/14/2020	Laurel Ace Hardware	10	Lisa
2/21/2020	Home Depot Hayward	12	Lisa
2/25/2020	Dale Ace Hardware	12	Lisa
3/4/2020	Grand Lake Ace Hardware	8	Suzanne
3/4/2020	Westbrae Nursery	7	Suzanne
6/26/2020	Home Depot Fremont	9	Lisa

Compilation of training feedback 2019/2020:

The trainings are well received by the associates, as they see the value and appreciate the up to date education, we provide to them. This year specifically, with the increase of rodent problems, we have been collectively been able to education the associates on how to guide their customers through exclusion for prevention and then how to trap for success. With the abundance of snail and slug activity over the winter months, we have been able to provide education around pest identification, then education around taking advantage of the dormant season to manage aphids and diseases such as peach leaf curl. The public's concerns with Round Up is still relevant. Each retailer continues to ask for education on alternatives to Round Up, which we were able to provide a list of recommended eco-herbicides and IPM techniques for weed management.

Examples of the additional educational materials provided to retail associates throughout the year

Summary of Store Training
Pre-Training Surveys

A total of 12 trainings were conducted, 115 associates were trained,
115 pre-training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	Don't Know
When water enters a storm drain, does it go to a treatment plant before it reaches a creek?	15%	60%	25%
When water enters a sanitary sewer from a house drain, like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or bay?	27%	43%	30%
Is it more effective to treat an ant infestation with a bait station rather than a spray?	68%	6%	26%
Where is your local household hazardous waste collection facility located?	24% knew the location	14% answered incorrectly	62% did not know or left it blank

Which sentence best describes Integrated Pest Management (IPM)

a. IPM only uses pesticides: 3%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only when needed): 77%
c. IPM does not rely on identifying pests/disease before treating: 5%
> Left blank or did not know: 15%

Which of these is the most effective IPM method for managing aphids?

a. Apply fast acting fertilizers: 7%
b. Spray insecticidal soap and/or prevent ants from vegetation with tanglefoot or bait station: 66%
c. Use products with pyrethroids: 13%
> Left blank or did not know: 14%

Summary of Store Training
Post-Training Surveys

A total of 12 trainings were conducted, 115 associates were trained,
115 pre-training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	Don't Know
When water enters a storm drain, does it go to a treatment plant before it reaches a creek?	0%	100%	0%
When water enters a sanitary sewer from a house drain, like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or bay?	4%	96%	0%
Is it more effective to treat an ant infestation with a bait station rather than a spray?	100%	0%	0%
Where is your local household hazardous waste collection facility located?	99% knew the location	1% answered incorrectly	0% did not know or left it blank

Which sentence best describes Integrated Pest Management (IPM)

a. IPM only uses pesticides: 0%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only when needed): 99%
c. IPM does not rely on identifying pests/disease before treating: 1%

> Left blank or did not know: 0%

Which of these is the most effective IPM method for managing aphids?

a. Apply fast acting fertilizers: 0%
b. Spray insecticidal soap and/or prevent ants from vegetation with tanglefoot or bait station: 99%
c. Use products with pyrethroids: 1%

> Left blank or did not know: 0%

Summary of End of Training Evaluation Form

	Disagree	Neutral	Agree .
I learned at least one eco-friendly pest management method today		3%	97%
The training will help me recommend and/or sell eco-friendly products		4%	96%
I can comfortably share what I learned with customers and/or co-workers		10%	90%
I can easily use the Our Water – Our World shelf tags and fact sheets to inform customers about less-toxic pest management		11%	89%
Printed resource materials from this training were…	Too much 0%	Just Right 100%	Not enough 0%
What part of the training was most helpful? All was helpful: 50% Pest problem solving: 16% Product information: 30% The folders and other OWOW resources provided: 4%			
What part of the training could be improved? Nothing/everything was good: 88% More time for the training: 7% Samples of pests/pest damage: 1% An in-aisle training would be helpful: 1% Less time, shorter: 2% Video to watch: 1%			

Additional comments:

"The training information provided was great!"
"The instructor is amazing; this class was an A+"
"I appreciate how Lisa explained things & answered questions"

Summary of outreach events 2019-2020

The following is the detailed list of 4 outreach events conducted, reaching 286 people

Date	Store	IPM Advocate	Number reached
9/22/2019	Dale Hardware	Patrice	125
2/27/2020	City of Piedmont Event	Suzanne	80
3/14/2020	Home Depot San Leandro	Suzanne	38
3/14/2020	Home Depot Emeryville	Suzanne	43

During these outreach tabling events, we the IPM Advocates are actively helping customers in the aisle, answering their pest questions, and guiding each to a less toxic solution. We are making changes in the store. By educating the consumer, we are able to guide each towards less toxic pesticides and products. The customers are asking for alternatives in may cases, knowing that they have a choice that is less toxic and effective.
When possible, we display plant material that will attract beneficial insects, so that people can learn how to reduce pesticides with natural enemies. We display water-wise gardening tips & techniques, OWOW & UCIPM website information, as well as seasonal pest issues.

Unfortunately, most of the retailers requested spring tabling events. Due to the Sheltering in Place restrictions, these events were postponed and subsequently canceled. Thankfully, with the promotional assistance provided from Gigantic Idea Studio, I successfully provided 2 OWOW IPM educational webinars for the public, titled "Organic Gardening, A less toxic approach to pest management for Alameda County". Each program reached its registration limit of 130, with 52 attending the first webinar and with 50 joining the second. A post survey was sent to the attendees, which showed favorable feedback and an overall rating of 9 stars for the instructor and content delivered.

Tabling for the public at City of Piedmont's event and a screen shot of the OWOW IPM webinar

Retail store Mentoring and Maintenance Visits:

We provided no less than 4 program store mentoring and maintenance visits to each retailer for the year.

Store Mentoring and Maintenance Activity:

- Stocking fact sheets
- Updating and replacing shelf talkers
- Ask associates what the frequently asked pests issues are
- Ask associates if there are any new or unusual pest issues
- Focus on the pest of the month calendar
- Highlight regional invasive pests
- Distribute the quarterly UCIPM Retailer Newsletter
- Bring timely articles on seasonal pests from UCIPM blog and from BIRC publications
- Remind associates how to access the 'Ask the Expert' feature on the OWOW website
- Provide recourses for pest identification, such as the publications from UCIPM & ANR
- Show associates how to use the UCIPM website
- Guide customers to less toxic pest solutions
- Talk with buyers about new eco-friendly products on the retail market
- Talk with associates about the current pest issues and IPM methods for the pest
- Explain to associates how the less toxic products work and how to use them
- Make employees aware of additional pest identification support services, such as the Alameda County Agricultural Department
- Follow up with the pest questions associates have by emails & phone call
- Provide information on the beneficial insects, where to buy them, how to use them, how to invite them to the gardens
- Schedule trainings and events with managers

Pesticide reduction and increase in self-space and sales of eco-friendly products:

This has been a dynamic year with the awareness and growth of eco-friendly pesticides. Each retail partner has seen an increase in sales and can report that their customers are asking for less toxic products more than before. Some sales data has been shared:

- Grand Lake Ace Hardware has seen a 10-15% increase in sale of eco-friendly pesticides
- Westbrae Nursery has seen a significant increase in less toxic pesticides
- Evergreen Nursery has seen organic pesticide sales stabilize, selling over the problem pesticides
- Broadway Terrace Nursery now only sells eco-friendly products
- Thornhill Nursery reports they are discontinuing the toxic pesticides and promoting IPM and less toxic pest problem solving

The Home Depot Corporate reports that the sale of eco-friendly/alternative category has increased over 30% with an overall increase of 8% of eco-products vear the previous year with the efforts of the IPM Advocates offering mentorship, guidance, education and support.

- Marciello, the department supervisor at the Home Depot, Oakland reports that the sees that the customers are requesting organic products, that they prefer organic pest solutions over traditional.

The associates value the OWOW partnership and support to assist them with the new products, how they work, and what product they should bring in as an alternative to the problem pesticides. In addition to mentoring retail associates, each store appreciates the assistance when helping their customers in the aisle. This support of guiding the customers to choose a product that is less-toxic, also includes other IPM tools that the retailer may sell when a pesticide isn't necessarily the best solution, such as using ¼" hardware cloth behind dryer vents and foundation vents to keep rodents out of the home, the importance of adding compost and organic fertilizer to your soil to increase plant health, choosing water-wise plants for longer term success, and the importance of mulch for water retention and optimum soil health.

- Eric, the manager of the Grand Lake Ace Nursery shares, "Suzanne is very helpful, she updates the shelf talkers often and keeps me informed about current pest problems and best eco-solutions"
- Barbara, the manager of the Evergreen Nursery says, "It's (OWOW) is a great program"
- Jeff, owner of Westbrae Nursery says, "Suzanne and the new IPM Advocate (that offer the OWOW services) are very helpful"

OWOW racks at the Dale Ace Hardware and the Home Depot San Leandro

Additional OWOW support services:

Industry Trade Shows:

I attended the Central Garden Trade Show in August of 2019 and the L&L Distributor Trade Show in October of 2019. The industry trade shows are important as we do meet with the retail buyers within the OWOW partnership, for instance MJ, one of the buyers for Dale Ace Hardware. At these shows I have the chance to educate the buyers, show them new eco-friendly products, and explain how each works. I respond to their

inquiries, make suggestions and guide them to the eco-alternatives. Our Water Our World is an extremely valuable resource for those who attend these shows.
I also attended the NorCal Landscape & Garden trade show in February 2020 where I was invited to present an IPM educational class to the audience of garden industry, city workers and landscape professionals. My presentation qualified those who attended 1 CU (continuing education unit) from the Department of Pesticide Regulations.

OWOW at the Central Garden Trade Show, Las Vegas NV and the Nor Cal Trade Show, San Mateo CA

Overall challenge for the year:

As March arrived, I cannot express enough how challenging this season became because of the pandemic. The retailers were stressed beyond measure. I, and all of the IPM Advocates servicing the OWOW program in other counties, did our best to provide OWOW services while sheltering in place. I certainly did what I could to provide the retailers relevant pest problem solving support remotely. Moving forward I see the value of providing OWOW education to the public through Webinar style classes. I am also currently working with Debi Tidd to develop virtual training platform that is best suited for the retailers and OWOW. Though it is very disappointing to me to end the year on this note, I am inspired looking forward to what is possible for delivering the OWOW message to the public in a new way.

Program Recommendations for 2020/2021:

I do see the need for more resource materials to be provided to the retailers. The new UCIPM Vegetable Pest ID Cards for the retail partners would be a terrific resource to provide. These cards would help associates to answer pest questions, pests that we see on backyard food crops. The cost is $20 each pack.

I would like to continue to work with the IPM Advocates; Lisa Ratusz, Charlotte Canner, Sherri Sunahara and Lorenzo Levinger. Over this year, working with Lisa, and new Advocate Charlotte has been tremendous in providing the level of service we IPM Advocates bring to the OWOW program. It has been a dynamic year indeed.

Thank you so much for allowing me to lead the contract. I appreciate the opportunity to work with these Alameda County retailers.

Suzanne Bontempo

Appendix L

CASQA's Pesticide Subcommittee Annual Report and Effectiveness Assessment 2019/20

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

B A S M A A

September 30, 2020

Michael Montgomery, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: FY 2019-20 Annual Report: MRP Provision C.9.f - Track and Participate in Relevant Regulatory Processes

Dear Mr. Montgomery:

This letter and attachments are submitted on behalf of all 76 municipalities subject to the requirements of the Municipal Regional Stormwater NPDES Permit (MRP).

The essential requirements of provision C.9.f (text attached) are to track U.S. Environmental Protection Agency (USEPA) and California Department of Pesticide Regulation (DPR) actions related to urban-uses of pesticides and actively participate in the shaping of regulatory efforts currently underway. This provision allows for cooperation among Permittees through the California Stormwater Quality Association (CASQA), BASMAA, and/or the Urban Pesticide Pollution Prevention Project (UP3 Project) – an approach the Permittees have engaged in for a number of years. Recognizing this approach is the most likely to result in meaningful changes in the regulatory environment, Permittees elected to continue on this course in FY 2019-20 to achieve compliance with this provision. Oversight of this provision is the purview of the BASMAA Board of Directors.

The actual work of tracking and participating in the ongoing regulatory efforts related to pesticides was accomplished through CASQA. CASQA conducted its activities on behalf of members and coordinated funding contributions and activities through its Pesticides Subcommittee, a group of stormwater quality agencies affected by pesticides or pesticides-related toxicity listings, TMDLs, or permit requirements, as well as others knowledgeable about pesticide-related stormwater issues. FY 2019-20 was another productive year for the Subcommittee. The CASQA Pesticides Subcommittee's annual report for FY 2019-20 (attached) provides a comprehensive and detailed accounting of efforts to track and participate in relevant regulatory processes as well as accomplishments related to pesticides and stormwater quality.

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Bay Area
Stormwater Management
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Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

Attachments

MRP Provision C.9.f

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020; California Stormwater Quality Association; August 2020

MRP Provision C.9.f states:

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description –** The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

   (1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

   (2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

   (3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

   (4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting –** In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020

California Stormwater Quality Association

Final Report

August 2020

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Pesticides Subcommittee Annual Report and Effectiveness Assessment

2019-2020

California Stormwater Quality Association

August 2020

Preface

The California Stormwater Quality Association (CASQA) is comprised of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout California. CASQA's membership provides stormwater quality management services to more than 22 million people in California. This report provides CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. It is a component of CASQA's Source Control Initiative, which seeks to address stormwater and urban runoff pollutants at their sources. This report was funded by CASQA, BASMAA, the Sacramento Stormwater Quality Partnership, and Alameda Countywide Clean Water Program.

This report was prepared by Stephanie Hughes under the direction of the CASQA Pesticides Subcommittee Co-Chair Dave Tamayo, with input from Dr. Kelly Moran and Tammy Qualls of Qualls Environmental Consulting.

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Abbreviations Used in this Report

BACWA – Bay Area Clean Water Agencies

BE – Biological Evaluation

CASQA – California Stormwater Quality Association

CEQA – California Environmental Quality Act

CCRWQCB – Central Coast Regional Water Quality Control Board

CVRWQCB – Central Valley Regional Water Quality Control Board

CWA – Clean Water Act

DPR – California Department of Pesticide Regulation

EPA – United States Environmental Protection Agency

ESA – Endangered Species Act

FWS – U.S. Fish and Wildlife Service

FY – Fiscal Year (July 1 through June 30)

IPM – Integrated Pest Management

MAA – Management Agency Agreement between DPR and the Water Boards

MS4 – Municipal Separate Storm Sewer System

NACWA – National Association of Clean Water Agencies

NPDES – National Pollutant Discharge Elimination System

OPP – U.S. EPA Office of Pesticide Programs

OW – U.S. EPA Office of Water

PAH – Polycyclic aromatic hydrocarbon

PEAIP – Program Effectiveness Assessment and Improvement Plan

PMAC – Pest Management Advisory Committee

PPI – Pests, Pesticides, and Integrated Pest Management DPR initiative

PMP – Pesticides-specific Management Practice

PSC – CASQA Pesticides Subcommittee

SPCB – Structural Pest Control Board

SFBRWQCB – San Francisco Bay Regional Water Quality Control Board

STORMS – Strategy to Optimize Resource Management of Storm Water (a program of the State Water Board)

SWAMP – California Water Boards Surface Water Ambient Monitoring Program

SWRCB – State Water Resources Control Board or State Water Board

TMDL – Total Maximum Daily Load (regulatory plan for solving a water pollution problem)

UP3 – Urban Pesticides Pollution Prevention Partnership

UPA – Urban Pesticide Amendments

UPCMP – Urban Pesticides Coordinated Monitoring Program

USGS – U.S. Geological Survey

Water Boards – California State Water Resources Control Board together with the California Regional Water Quality Control Boards

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Executive Summary

This report by the Pesticides Subcommittee (PSC) of the California Stormwater Quality Association (CASQA) describes CASQA's activities related to the goal of preventing pesticide pollution in urban waterways from July 2019 through June 2020.

To address the problems caused by pesticides in California's urban waterways, CASQA collaborates with the California State Water Resources Control Board and the California Regional Water Quality Control Boards (Water Boards). By working with the Water Boards and other water quality organizations, we address the impacts of pesticides efficiently and proactively through the statutory authority of the California Department of Pesticide Regulation (DPR) and EPA's Office of Pesticide Programs (OPP). More than 17 years of collaboration with Urban Pesticides Pollution Prevention (UP3) Partnership, as well as EPA and DPR staff, has resulted in significant changes in pesticide regulation. CASQA's activities and outcomes are described in Section 2. This year's highlights include continued progress on the State Water Board's Urban Pesticides Amendments (UPA) project as well the pesticide regulator actions described below.

Near term/Current problems – Are actions being taken by State and Federal pesticides regulators and stakeholders expected to end pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

- In Fall 2019, DPR finalized regulations to restrict carbaryl use and end sale of carbaryl consumer products. This action makes all carbaryl products in California restricted materials, except for baits labeled only for agricultural use. This regulation was filed with the Secretary of State this spring and will become effective on August 1st.
- CASQA identified a product registration application containing novaluron and successfully requested this product be routed by DPR for surface water review. The subsequent evaluation did not support registration. DPR subsequently issued a Notice of Proposed Decision to Deny the product.
- CASQA shared its urban runoff expertise with pesticide regulators by preparing comment letters to EPA for seven pesticide reviews, providing the Water Boards and other Partners with information that triggered additional letters on two more pesticide reviews, and participating in meetings and conference calls focused on priority pesticides and long-term regulatory structure improvements. *(See Tables 3, 4 and 5 and the Appendix.)*
- CASQA provided feedback to EPA regarding their Framework for Pesticides Risk Assessments Incorporating Endangered Species Act Biological Evaluations (and eventually all pesticides risk evaluations for conventional pesticides) requesting that outdoor impervious surfaces be included in the list of areas that receive pesticide treatment.
- In response to continued requests from CASQA and Partners, EPA has begun following a precedent for improved label language for pool, spa, and fountain chemicals that was established by the decisions for lithium hypochlorite and copper.
- CASQA/UP3 reviewed scientific literature in order to update and prioritize the Pesticide Watch List, which it shared with pesticides regulators and with government agency and university scientists to stimulate generation of surface water monitoring and aquatic toxicity data for the highest priority pesticides. *(See Table 2.)*

Long term/Prevent future problems – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

- DPR continues to demonstrate its commitment to addressing pesticide impacts on receiving waters through timely mitigation and implementation of improved evaluation procedures.
- The State Water Board continued to work toward adoption of the UPA. These amendments would institutionalize the State's strategy of utilizing pesticide regulations as the primary mechanism for addressing pesticide water quality problems associated with urban runoff, serving as a TMDL

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alternative. Implementation will be supported by a new statewide urban runoff pesticides monitoring program intended to coordinate with existing Water Board and DPR urban pesticides and toxicity monitoring programs.

- In concert with the development of UPA, the Urban Pesticides Coordinated Monitoring Program (UPCMP) continued progress to establish the initial framework of the monitoring program via the Steering Committee and Technical Committee.
- CASQA continued to be an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. CASQA organized a meeting of DPR, Water Board, and CASQA representatives for July 24th for DPR to provide details to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.
- A paper was published that was co-authored by Dr. Kelly Moran, and staff from DPR, the State Water Board, and UC Davis, describing many of the key elements of the coordination between DPR and the State Water Board.
- Although many improvements have been made by OPP since the early 2000s, improvement in scientific evaluations supporting OPP's regulatory efforts and better understanding of urban runoff management systems are still necessary to adequately protect urban surface waters from pesticide impairments. In recent years, the regulatory climate has changed, limiting support of progress by OPP in addressing these concerns.

In FY 2020-2021, CASQA plans to continue to address near-term pesticide concerns and seek long-term regulatory change. Future near-term and long-term tasks are identified in Section 3, Tables 5 and 6. Key topics include:

- Continued support of the eventual completion and adoption of the UPA by the State Water Board
- Continued development of the UPCMP in partnership with the Water Boards, DPR, and EPA Region 9
- Registration review-related activities at EPA for pyrethroids and fipronil (the only such opportunity for the next 15 years)
- DPR registration applications and proposed decisions for new products

Section 1. Introduction

1.1 IMPORTANCE OF CASQA'S EFFORTS TO IMPROVE PESTICIDE REGULATION

For decades now, the uses of certain pesticides in urban areas – even when applied in compliance with pesticide regulations – have adversely impacted urban water bodies. Currently used pesticides are the primary cause of toxicity in California surface waters, including urban water bodies.[1] Under the Clean Water Act (CWA), when pesticides impact water bodies, local agencies may be held responsible for costly monitoring and mitigation efforts. To date, some California municipalities[2] have incurred substantial costs to comply with pesticides-related Total Maximum Daily Loads (TMDLs) and additional permit requirements. In some cases (e.g., diazinon, chlorpyrifos), municipal compliance costs have continued more than a decade after termination of virtually all urban use. In the future, more municipalities throughout the state could be subject to similar requirements, as additional TMDLs and Basin Plan amendments are adopted (Table 1). Meanwhile local agencies have no authority to restrict or regulate when or how pesticides are used[3] in order to proactively prevent pesticide pollution and avoid these costs.

Under federal and state statutes, EPA and DPR have the authority and responsibility to regulate pesticides and protect water bodies from adverse effects (including impacts from pesticides in urban runoff). Unfortunately, until the relatively recent past these agencies did not recognize the need, nor did they possess the institutional capacity to exercise their authority to protect urban water quality. As a result, past registration actions have allowed a number of pesticides (such as pyrethroids and fipronil) to be used legally in ways that have resulted in widespread pollution in urban water bodies. This situation is depicted in Figure 1.

To change this situation CASQA is actively engaged with state and federal regulators in an effort to develop an effective pesticide regulatory system, based primarily on existing statutes, that includes timely identification and mitigation of urban water quality impacts, and proactively prevents additional problems through the registration and registration review processes (Figure 2).

Table 1. California TMDLs, Statewide Water Quality Control Plans, and Basin Plan Amendments Addressing Currently Registered Pesticides and/or Toxicity in Urban Watersheds[4]

Water Board Region	Water Body	Pesticide	Status
Statewide	All MS4s/All Urban Waterways: Statewide Water Quality Control Plan amendments for urban pesticides reduction ["Urban Pesticides Amendments"] (Inland Surface Waters, Enclosed Bays & Estuaries, and Ocean)	All Pesticides/All pesticide-related toxicity	In preparation
	Sediment Quality Objectives (Enclosed Bays & Estuaries)	Sediment Toxicity [5]	Approved
	Toxicity Provisions (Inland Surface Waters and Enclosed Bays & Estuaries)	Toxicity [5]	In preparation

[1] See reports from the California Surface Water Ambient Monitoring Program Sediment Pollution Trends Program including Anderson, B.S., Hunt, J.W., Markewicz, D., Larsen, K., 2011. Toxicity in California Waters, Surface Water Ambient Monitoring Program. California Water Resources Control Board. Sacramento, CA.
[2] For example, Sacramento-area municipalities spent more than $75,000 in the 2008-2013 permit term on pyrethroid pesticide monitoring alone; Riverside-area municipalities spent $617,000 from 2007 to 2013 on pyrethroid pesticide chemical and toxicity monitoring.
[3] Local agencies in California have authority over their own use of pesticides but are pre-empted by state law from regulating pesticide use by consumers and businesses.
[4] Excludes pesticides that are not currently registered in California, such as organochlorine pesticides.
[5] These TMDLs/Plan provisions can trigger toxicity testing stressor source identification studies, and additional follow up, even when toxicity is linked to current pesticides.

Water Board Region	Water Body	Pesticide	Status
San Francisco Bay (2)	All Bay Area Urban Creeks	All Pesticide-Related Toxicity	Approved
Central Coast (3)	Santa Maria River Watershed	Pyrethroids, Toxicity	Approved
	Lower Salinas River Watershed	Pyrethroids, Toxicity	Approved
		Malathion, Chlorpyrifos, Diazinon [6]	In development
	San Lorenzo River Watershed (Santa Cruz)	Chlorpyrifos [6]	Approved
Los Angeles (4)	Marina del Rey Harbor	Copper (Marine antifouling paint) [7]	Approved
	Oxnard Drain 3 (Ventura County)	Bifenthrin, Toxicity	EPA-Adopted Technical TMDL
	Calleguas Creek, its Tributaries and Mugu Lagoon	Water & Sediment Toxicity [5]	Approved
	McGrath Lake (Ventura County)	Diazinon & Chlorpyrifos [6]	Approved
	Colorado Lagoon (Long Beach)	Sediment Toxicity [5]	Approved
	Dominguez Channel and Greater Los Angeles and Long Beach Harbors Waters	Sediment Toxicity [5]	Approved
	Ballona Creek Estuary	Sediment Toxicity [5]	Approved
Central Valley (5)	Sacramento River and San Joaquin River Basins	Pyrethroids	Approved
	Sacramento-San Joaquin River Delta Waterways	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento & Feather Rivers	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento County Urban Creeks	Diazinon & Chlorpyrifos [6]	Approved
	Lower San Joaquin River	Diazinon & Chlorpyrifos [6]	Approved
Lahontan (6)	Pesticide Discharge Prohibition	All Pesticides	Approved
Santa Ana (8)	Newport Bay	Copper (Marine antifouling paint) [7]	In preparation
	San Diego Creek, and Upper and Lower Newport Bay	Toxicity (Diazinon & Chlorpyrifos) [6]	EPA-Adopted Technical TMDL
San Diego (9)	Shelter Island Yacht Basin (San Diego Bay)	Copper (Marine antifouling paint) [7]	Approved
	Chollas Creek	Diazinon [6]	Approved

[6] Use prohibited in urban areas (diazinon) or no meaningful use due to use limitations (chlorpyrifos).
[7] Primarily addresses pesticides that are directly discharged and should not ordinarily appear in stormwater (marine antifouling paint).

Figure 1. Current Pesticide Regulatory System.[8]

[8] Photos in Figures 1 and 2 of spraying pesticide along a garage was taken by Les Greenberg, UC Riverside

Figure 2. Proactive Use of the Pesticide Regulatory Structure to Restrict Pesticide Uses that have the Potential to Cause Urban Water Quality Problems.

1.2 CASQA'S GOALS AND APPLICATION TO PROGRAM EFFECTIVENESS ASSESSMENT

CASQA's Vision for Stormwater, first approved by the Board of Directors in 2015, is periodically updated to reflect developments in stormwater management. In August 2019, CASQA released an interim update to support the development of priorities for 2020.[9] CASQA's Vision, Action 1.3, is to "provide effective and efficient solutions through true source control." Among the three objectives described within Action 1.3 is "control toxicity in receiving waters from pesticide application." In support of this objective, the Vision identifies the following scope:

Anticipated Scope:

- Develop a regulatory system implemented by EPA OPP and California DPR to identify whether use of a pesticide poses a threat to water quality, and then restrict or disallow those uses proactively so that water quality impacts are avoided.
- Respond to the immediate need to participate in EPA pyrethroids, fipronil, and imidacloprid reviews (the only such opportunity for the next 15 years) and to support and encourage DPR steps toward expanded pyrethroids and new fipronil mitigation measures.
- Seek EPA risk mitigation for malathion and carbaryl in urban runoff and the continuation of traditional water quality risk assessments in tandem with Endangered Species Act (ESA) evaluations.
- Continue to leverage successes at the state level as a key stakeholder in the development of statewide Water Quality Control Plan Amendments for urban pesticides reduction.

The effectiveness of CASQA's efforts toward this scope can be expressed in relation to management questions established as part of Municipal Separate Storm Sewer Systems' (MS4s') program effectiveness assessments that are required in some MS4 permits. With respect to addressing urban pesticide impacts on water quality, the following two management questions, derived from the proposed scope for CASQA Vision Action 1.3, are suggested for inclusion in MS4s' program effectiveness assessment:

Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Question 2: (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

This report is organized to answer these management questions and is intended to serve as an annual compliance submittal for both Phase I and Phase II MS4s. It describes the year's status and progress, provides detail on stakeholder actions (by CASQA and others), and provides a roadmap/timeline showing the context of prior actions as well as anticipated end goal of these activities. This report may also be used as an element of future effectiveness assessment annual reporting.

[9] https://www.casqa.org/about/strategic-plan-vision

Section 2. Results of CASQA 2019-2020 Efforts

At any given time, there are dozens of pesticides with current or pending actions from the EPA or DPR. Addressing near term regulatory concerns is important because some pesticides may pose immediate threat to water quality that can lead to compliance liability for MS4s, and because some of the regulatory decisions made by EPA and DPR will last many years. For example, pesticide registration decisions are intended to be revisited on a fifteen-year cycle. To inform its engagement on near-term regulatory concerns, CASQA uses the pesticide "Watch List" created by the PSC and the UP3 Partnership. The Watch List aids CASQA and the UP3 Partnership in their prioritization of near-term efforts (Section 2.1).

Meanwhile, CASQA and the UP3 Partnership are also working on a parallel effort to effect long-term systemic changes in the regulatory process itself. By identifying inadequacies and inefficiencies in the pesticide regulatory process, and persistently working with EPA and DPR to improve the overall system of regulating pesticides, CASQA and the UP3 are gradually achieving results (Section 2.2).

2.1 NEAR-TERM REGULATORY CONCERNS

CASQA seeks to ensure that the Water Boards and EPA's Office of Water (OW) work with DPR and the EPA's OPP to manage problem pesticides that are creating near-term water quality impairments. These efforts address CASQA Vision Action 1.3 as well as Phase II MS4 Program Effectiveness Assessment and Improvement Plan (PEAIP) Management Question 1 regarding observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff.

Assessment Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Answer: As detailed below, at the State level, significant progress has been made by DPR in addressing near-term and current problems with pesticides in surface waters receiving urban runoff. DPR continues to implement improved registration processes and responses to observed water quality problems. DPR also continues to implement and evaluate mitigation measures for observed problems with pyrethroids and fipronil.

At the Federal level, less progress has been made at addressing near term problems. Some early actions were taken to address pyrethroid and fipronil problems at the urging of CASQA and DPR However, EPA does not show a clear understanding of key urban uses in its analyses, and it is still unclear if its upcoming risk management decisions for pyrethroids, fipronil, and imidacloprid and other neonicotinoids will provide any additional protection of urban water bodies.

2.1.1 Updated Pesticide Watch List

A key tool for identifying near-term regulatory concerns is our pesticide "Watch List." CASQA, working through the UP3 Partnership, reviews scientific literature, government reports, and monitoring studies as they are published. This information is used to prioritize pesticides based on the most up-to-date understanding of urban uses, pesticide characteristics, monitoring, and surface water quality toxicity (for pesticides and their degradates). The PSC uses these insights to update the Watch List each year (Table 2), which serves as a management tool to help us focus our efforts on the most important pesticides from the perspective of MS4 agencies.[10] Comparing the current Watch List to the version published in the 2018/19 PSC Annual Report, we see that the insecticides fipronil, imidacloprid, malathion, and pyrethroids remain as the Priority 1.

[10] The first Watch List was published by the UP3 in 2005.

Table 2. Current Pesticide Watch List (June 2020)

Priority	Basis for Priority Assignment	Pesticides		
1	Monitoring data exceeding benchmarks; linked to toxicity in surface waters; urban 303(d) listings	Pyrethroids (20 chemicals[11])	Fipronil	Imidacloprid (neonic) Malathion
2	Monitoring data approaching benchmarks; modeling predicts benchmark exceedances; very high toxicity and broadcast application on impervious surfaces; urban 303(d) listing for pesticide, degradate, or contaminant that also has non-pesticide sources	Carbendazim (Thiophanate methyl)[12] Chlorantraniliprole Copper pesticides	Creosote (PAHs) Indoxacarb Neonics (other than Imidacloprid)[13] Pendimethalin	Pesticides with dioxins impurity[14] Polyhexamethylenebiguanide Zinc pesticides (including Ziram)
3	Pesticide contains a Clean Water Act Priority Pollutant; 303(d) listing for pesticide, degradate, or contaminant in watershed that is not exclusively urban	Arsenic pesticides Chromium pesticides	Diuron Naphthenates	Simazine Silver pesticides Trifluralin
4	High or unknown toxicity (parent or degradate) and urban use pattern associated with water pollution; synergist for higher tier pesticide; on DPR priority list	Abamectin ADBAC pesticides[15] Azoxystrobin Bacillus sphaericus Bacillus thuringiensis (Bti) Bromacil N-Bromosulfamates Busan-77 Carbaryl Chlorinated isocyanurates Chlorine Chlorine dioxide Chlorfenapyr Chlorsulfuron DCOIT DDAC	Dichlobenil Dichlorvos (DDVP) Dithiopyr Halohydantoins Hydramethylnon Hypochlorites Imazapyr Isoxaben Mancozeb Methomyl Methoprene Methyl anthranilate Mineral bases, weak Mineral oil (aliphatic) MGK-264 Novaluron Oryzalin Oxadiazon Oxyfluorfen PCNB	Peroxyacetic acid Phenoxy herbicides[16] Piperonyl butoxide (PBO) Prodiamine Propiconazole Pyrethrins Pyriproxyfen Sodium bromide Sodium chlorite Sodium percarbonate Sodium tetraborate Spinosad/ Spinetoram Sulfometuron-methyl Tebuconazole Terbuthylazine Triclopyr Triclosan Trimethoxysilyl quats

[11] Allethrins, Bifenthrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Cyphenothrin, Deltamethrin, Esfenvalerate, Etofenprox, Flumethrin, Imiprothrin, Metofluthrin, Momfluothrin, Permethrin, Prallethrin, Resmethrin, Sumethrin [d-Phenothrin], Tau-Fluvalinate, Tetramethrin, Tralomethrin.
[12] Carbendazim is a registered pesticide, and also a degradate of thiophanate-methyl
[13] Acetamiprid, Clothianidin, Dinotefuran, Thiamethoxam (degrades into Clothianidin)
[14] 2,4,-D, Chlorothalonil, Dacthal, Pentachlorophenol
[15] Alkyl Dimethyl Benzyl Ammonium Chlorides (ADBAC) includes a family of 21 different quaternary ammonium pesticides.
[16] MCPA and salts, 2,4-D, 2,4-DP, MCPP, dicamba

Priority	Basis for Priority Assignment	Pesticides		
5	Frequent questions from UP3 Partners	Chlorpyrifos (near zero urban use)	Diazinon (no urban use) Glyphosate	Metaldehyde
New	Priority determined on the basis of proposed urban use, aquatic toxicity, and other information in registration application.	Not known but may include the following:	Cyantraniliprole Cyclaniliprole Flupyradifurone	Nitenpyram (Neonic) Nithiazine (Neonic) Sulfoxaflor (Neonic)
None	Based on review of available data, no approved urban use or no tracking trigger as yet identified.	Most of the >1,000 existing pesticides		
Unknown	Lack of information. No systematic screening has been completed by UP3 for the complete suite of urban pesticides.	Unknown		

2.1.2 Description of Near-Term Regulatory Processes

Immediate pesticide concerns may arise from regulatory processes undertaken at DPR or EPA's OPP. For example, when EPA receives an application to register a new pesticide, there may be two opportunities for public comment that are noticed in the Federal Register, as depicted in green in Figure 3. EPA's process usually takes less than a year while DPR typically evaluates new pesticides or major new uses of active ingredients within 120 days. Now that DPR implements relatively robust surface water quality review procedures for new pesticide registrations, there is reduced need for CASQA to provide input to EPA on new pesticides.

Figure 3. EPA's Registration Process for New Pesticides

Another regulatory process, "Registration Review," depicted in Figure 4, is meant to evaluate currently registered pesticides about every 15 years, to account for new data available since initial registration. In general, it takes EPA five to eight years to complete the entire process. In addition to this process, pesticides are typically evaluated based on Endangered Species Act criteria. EPA regularly updates its schedule for approximately 50 pesticides that will begin the review process in a given year.[17]

Figure 4. EPA's Registration Review – Process to Review Registered Pesticides at a Minimum of Every 15 Years.

[17] See https://www.epa.gov/pesticide-reevaluation/registration-review-schedules for schedule information.

DPR also has an ongoing, but informal review process (called continuous evaluation) that can address pesticides water pollution. If it needs to obtain data from manufacturers, DPR can initiate a formal action, called "Reevaluation." These evaluations, mitigation measure development, and mitigation effectiveness evaluation have involved ongoing communication with CASQA and the UP3 Partnership.

While EPA must consider water quality in all of its pesticide registration decisions, at DPR this step is not yet fully established as standard (most outdoor urban pesticide registration applications are routinely routed by DPR for surface water review, but a few – notably antimicrobial products used in storm drains – do not automatically receive this review). CASQA monitors registration applications, to identify those relevant to urban runoff, based on the pesticide watch list in Table 2 and use pattern/toxicity analysis for pesticides that have not previously been reviewed.

2.1.3 Key Near-Term Regulatory Activities and Progress in 2019-20

Table 3 presents a summary of recent UP3 activities to address near-term regulatory concerns and their 2019-2020 results; for additional insight regarding on-going pesticide registrations, see the Appendix. The positive outcomes in Table 3 reflect the success of CASQA's teamwork in the UP3 Partnership. Some of this work occurs during formal public comment periods. To accomplish this, CASQA monitors the Federal Register and DPR's website for notices of regulatory actions related to new pesticide registrations and registration reviews. Since the Watch List is not based on a comprehensive review of all pesticides, CASQA watches for additional pesticides that appear to have any of the following characteristics: proposed urban, outdoor uses with direct pathways for discharge to storm drains, high aquatic toxicity, or containing a priority pollutant. Participating in these regulatory processes can take many years to complete.

In addition, the EPA OPP strives to update their Aquatic Life Benchmarks table on an annual basis.[18] Their 2019 update included two pesticides of interest to urban surface water (see inset at right).

EPA Aquatic Life Benchmarks – 2019 Update

In September 2019, US EPA's Office of Pesticide Programs, Environmental Fate and Effects Division updated its pesticides Aquatic Life Benchmarks table.[18] From the urban surface water quality perspective, this update included two minor changes for pesticides on the Watch List:

- The category "Copper compounds" was added to clarify the applicability of EPA's Office of Water (OW) copper water quality criteria (developed independent from OPP) to all copper-containing pesticides
- The OPP benchmarks for pendimethalin were updated based on the updated toxicity data used to support its 2018 Registration Review decision

Pesticides still awaiting benchmark updates include the many pyrethroids (other than new transfluthrin, which is not yet registered in California) and fipronil and its degradates. These are currently in EPA's Registration Review process.

[18] https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk

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Table 3. Latest Results of Efforts Communicating Near-Term Regulatory Concerns[19]

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
DPR					
New product registration application for a rubber product containing zinc, thiabendazole and 2-pyridinethiol-1-oxide (potential tire use)				Sacramento County	*Pending.* In response to a letter from Sacramento County, DPR stated that the product would not be allowed in rubber, correcting an error in the public notice. This correction was, unfortunately, not reflected in subsequent paperwork. DPR is requesting that the manufacturer correct the label to indicate that it may not be used in rubber in California.
New product registration for an indoxacarb product (Doxem Precise)	✓				*Pending.* CASQA requested that DPR perform an evaluation of this product. Results pending.
New product registration for a novaluron product (TEKKO 0.2G)	✓				*Success!* CASQA requested that DPR perform an evaluation of this product. The subsequent DPR evaluation (including modeling) did not support registration. DPR subsequently issued a Notice of Proposed Decision to deny registration.
EPA					
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals [Request for Extension of Comment Period]	✓			BACWA CCWQCB SFBRWQCB CVWQCB NACWA Cities of Cotati, Elk Grove, San Diego, Sacramento, Santa Barbara. County of Los Angeles, Marin County Stormwater PPP, Napa County FCWCD, Alameda	*Success.* CASQA and Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing, and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.

[19] Color coding in this table is meant to reflect the "Watch List" prioritization color coding in Table 2.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
				Countywide Clean Water Program, County of Orange, County of Sacramento, County of Santa Barbara, SCVURPPP	
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals	✓		✓	BACWA SFBRWQCB NACWA City of Salinas	*Limited Success.* Following significant efforts by CASQA and Partners in prior fiscal years, including meeting with new EPA pyrethroid chemical managers, and substantial feedback on the Preliminary Risk Assessment, EPA released the Risk Mitigation Proposal. EPA used CASQA comments to counter arguments by others suggesting that there is not a significant ecological risk. EPA acknowledged the existence of monitoring data that appears to conflict with modeled runoff exposure results. EPA virtually omitted urban runoff from its CWA compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications nor did it distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts. EPA did not concur with CASQA regarding the need for urban runoff mitigation. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. No resolution in CASQA's request for California-specific labels.
Bifenthrin Proposed Interim Decision	✓			SFBRWQCB BACWA NACWA	*Pending.* CASQA concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. CASQA continues to request that EPA terminate urban outdoor use of bifenthrin. Letter prepared this FY for 2020-2021 submittal.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pyrethroid Pesticides Cyfluthrin, Deltamethrin, Esfenvalerate, Permenthrin, Phenothrin, Prallethrin, and Tau-fluvalinate - Proposed Interim Decision	✓			BACWA NACWA SFBRWQCB	*Pending.* Prior to the release of this Proposed Interim Decision, CASQA commented on the EPA's Ecological Risk Mitigation Proposal (above). CASQA continues to request that EPA's risk / benefit finding be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals. CASQA also requests that EPA's benefits assessment include urban runoff-related costs to municipalities. Letter prepared this FY for 2020-2021 submittal.
Fipronil Risk Assessment	✓			BACWA SFBRWQCB (anticipated) SWQCB (anticipated) NACWA (anticipated)	*Pending.* Letter prepared this FY for 2020-2021 submittal. CASQA requested that EPA included updated California monitoring data and improvements to the urban risk assessment modeling methods. Also recommended additional mitigation to prevent urban surface water quality degradation.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision [Request for Extension of Comment Period]				BACWA, SFBWQCB City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County FCWCD, SCVURPPP	*Success.* Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposed decision and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision	✓			BACWA SFBRWQCB SWRCB	*Pending.* In the Proposed Interim Decision released this year, EPA proposed label improvements but did not include significant label language requests. EPA also did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff and expand modeling to include runoff from all outdoor uses including impervious surfaces. CASQA followed up to address unresolved issues.
Endangered Species Risk Assessment Process for Biological Evaluations of	✓			BACWA SFBRWQCB NACWA	*Partial Success.* EPA acknowledged CASQA's comments and incorporated a significant request by CASQA- that they address pesticides that are applied on outdoor impervious surfaces in Biological Evaluations (BE). EPA also acknowledged CASQA's comment that Bes

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pesticides - Draft Revised Method					must include invertebrate toxicity data. EPA partially incorporated other comments from CASQA and ignored one of the comments.
Zinc registration review Final Interim Decision	✓			SFBRWQCB BACWA NACWA	*Success!* CASQA and its Partners sought that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Further, for all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, CASQA and Partners recommended that the "Environmental Hazards" label statements be applied on the basis of product use (end-use products vs technical grade and manufacturing use) rather than product size to avoid potential conflicting language on product labels. EPA fully incorporated both comments.
Methoprene Registration Review Work Plan				SFBRWQCB BACWA Sacramento County NACWA	***Pending.*** Due to uses for mosquito control that are made directly to neglected swimming pools, catch basins, and other elements of stormwater drainage systems, CASQA Partners called for the collection of data to inform reasonable mitigation measures that would minimize environmental impacts while maintaining the public health benefits of methoprene applications. Asked EPA to consider label language for mitigation measures, including label language for uses with abandoned pools that is consistent with language across pool, spa, and hot tub chemicals that would indicate minimum post-application holding times or other objective criteria that local and state authorities could use in their approval process for discharges to their systems. Further, Partners asked EPA to re-evaluate the aquatic ecological risk associated with discharges of methoprene to aquatic environments by utilizing data for aquatic Dipteran insect species that are more sensitive than the species used for the aquatic risk evaluations in the Preliminary Work Plan.
Chlorine gas/swimming pools Draft Risk Assessment	✓			SFBRWQCB BACWA NACWA	*Pending.* The Proposed Interim Decision correctly identified potential impacts associated with emptying treated pools into storm drains and acknowledged that a requirement to contact local governments for direction prior to discharge would mitigate this risk (this reflects success of prior CASQA educational efforts related to other pool chemicals). Letters prepared this FY for 2020/2021 submittal supporting EPA's

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
					acknowledgement and recommending that the Registration Review decision follows the precedent for improved labels for pool, spa, hot tub, and fountain products that was established by the decisions for similar end use chemicals.
Halohydantoins/pools, fountains, spas – Draft Risk Assessment	✓			BACWA SFBRWQCB NACWA	*Pending.* The Draft Risk Assessment did not examine risks associated with discharges of swimming pool, spa, hot tub, and fountain water treated with halohydantoins. Letter prepared this FY for 2020-2021 submittal to request that the halohydantoins decision follow the precedent for improved labels for swimming pool, spa, hot tub, and fountain products that was established by the decisions for other antimicrobials with these uses.
Terbuthylazine/fountains Draft Risk Assessment	✓			Sacramento County SFBRWQCB	*Success.* In January, CASQA Partners formally requested that language to address pool, spa, and fountain emptying be required to be placed on all such product labels. EPA acknowledged the importance of such communication and will be revising future label language on these products, which will require that the sewer/storm agency be notified prior to any discharge of terbuthylazine. Follow-up letter prepared by CASQA this FY for 2020-2021 submittal.
Inorganic Halides (Sodium Bromide) Draft Risk Assessment				BACWA Sacramento County	*Pending.* Partners requested that the Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Such label language mitigates possible aquatic impacts from discharge of treated water while also providing consistency for label language across pool, spa, hot tub, and fountain chemicals.

2.2 LONG-TERM CHANGE IN THE PESTICIDES REGULATORY STRUCTURE

Since the mid-1990s, CASQA (and its predecessor organization the Storm Water Quality Task Force), have worked toward a future in which the pesticide regulatory structure at the state and federal level proactively restricts pesticide uses that have the potential to cause urban water quality problems. These efforts directly relate to Phase II MS4 PEAIP Management Question 2.

Assessment Question 2. (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

Answer: Improvements in processes at EPA and especially at DPR have moved us closer to that future. Many of these improvements are linked to the persistent work of CASQA and the UP3 Partnership to educate regulators on how previous process deficiencies did not adequately address urban pesticide problems.

As detailed below, at the State level, significant progress has been made by DPR and the Water Boards in establishing a comprehensive statewide approach to utilizing pesticide regulatory authorities to prevent pesticide toxicity in urban water bodies. Overall, DPR has a system in place that is reasonably effective at addressing pesticide toxicity in urban water bodies, although improvement is needed to better coordinate this with the requirements of the Clean Water Act and NPDES MS4 permits. DPR and the Water Board, along with CASQA and other stakeholders, are working diligently to strengthen this system and to institutionalize it. This is primarily embodied in the State's effort to establish the UPA and the Management Agency Agreement (MAA) between DPR and the State Water Board.

At the Federal level, OPP has implemented some improvements in how it evaluates and responds to water quality problems associated with pesticides, but it does not do this reliably and does not have a system in place to ensure that this will happen consistently and adequately. Meanwhile, scientific studies are being conducted by USGS and the EPA's Office of Research and Development to better understand the complexities of pollution in urban stormwater (see inset at right).

National Urban Stormwater Study Included Many Priority 1 and 2 Pesticides

In 2019, USGS and EPA scientists published a major scientific paper examining pollutants in urban runoff, entitled "*Urban Stormwater: An Overlooked Pathway of Extensive Mixed Contaminants to Surface and Groundwaters in the United States*." The authors indicate that this study "provides the most comprehensive representative snapshot of the urban stormwater-contaminant profile derived from randomly sampled sites and sampling days from across the U.S. to date." The study involved low-detection limit measurements of multiple pollutant classes (e.g., pesticides, pharmaceuticals, inorganics, PAHs, PCBs and other organochlorines) in undiluted urban runoff. Pesticides were the most frequently detected pollutant type. Further, organic chemical concentrations and loads were positively correlated with impervious surfaces and highly developed urban catchments.

The study involved 50 storm event urban runoff samples from 21 locations in 17 states, including 2 unnamed locations in California (the 2 largest watersheds sampled). Samples were collected primarily from highly urbanized watersheds, primarily from base-of-watershed discharge pipes and concrete-lined channels.

For current-use pesticides, these nationwide results were generally consistent with other scientific work published in the last decade (much of which is from California), indicating that current use pesticides like pyrethroids, fipronil (and its degradates), imidacloprid, and the fungicide carbendazim are common in urban runoff often at concentrations greater than aquatic life reference values. Multi-pesticide and multi-pollutant mixtures were the norm, raising questions about potential aquatic life effects from cumulative exposures.

While the study measured many Priority 1 and 2 pesticides on the Watch List, most other pesticides on the Watch List were omitted (due, in part, to the absence of standard or convenient low-detection limit analytical methods). For some current-use pesticides (like some pyrethroids and some fipronil degradates), reporting limits were higher than the lowest aquatic life reference values. Most pesticides samples were filtered, which affects reported concentrations of hydrophobic pesticides like pyrethroids that tend to be removed with the suspended solids filtered out of the sample; sediment was not analyzed.

Environ. Sci. Technol. 2019, 53, 17, 10070–10081. Publication Date: August 21, 2019. https://pubs.acs.org/doi/10.1021/acs.est.9b02867

Although more effective regulation of pesticides by EPA is still an important goal for CASQA,[20] due to the current regulatory climate at federal agencies, CASQA does not expect OPP to be very responsive to requests for additional improvements. Specific examples include the current administration's orders for a blanket reduction in regulations, chronic under-staffing at OPP, and lack of accessibility to OPP staff to share scientific information and stormwater expertise.

As a result, CASQA has decided for the time being to limit its efforts to affect long-term systemic change by EPA and other federal agencies. Instead, CASQA has focused more on solidifying advances made at the state level, which will leverage the considerable authority held by the State of California for regulating the use of pesticides.

2.2.1 Focus on MAA Between DPR and State Water Board

In 1997, just as pesticides were first discovered to be an important pollutant in urban waterways, DPR and the State Water Board adopted their first formal agreement to collaborate to address pesticides water pollution. That agreement focused on agricultural areas; the processes it envisioned did not work well in the urban context. CASQA (and its predecessor organization the Storm Water Quality Task Force) worked with DPR and the Water Boards for the next 20 years toward establishing pesticides water quality protection systems that would work in the urban context. During this time, DPR substantially updated its science-based pesticide registration procedures to include a "surface water protection program" review process, it initiated an urban watershed monitoring program, and it developed approaches to implementing mitigation measures addressing urban water pollution, as evidenced by its actions on pyrethroids and fipronil. The Water Boards engaged with DPR, providing scientific and regulatory information, receiving and using information from DPR to inform design of its regulatory programs (particularly TMDLs), and cooperating in monitoring programs. In mid-2019, DPR and the State Water Board received approval to sign a major update to their formal MAA that memorializes their existing systems and growing cooperation and lays out the steps they are taking toward a "unified and cooperative program to protect water quality related to the use of pesticides." The two agencies agree "to work cooperatively to address the discharge of pesticides that may cause or contribute to surface water or groundwater pollution, including surface water toxicity."

For example, DPR will evaluate surface water quality risks and consider these risks when making registration decisions; promote environmentally sound pest management; and respond to water quality concerns that pose significant adverse effects to aquatic organisms. Meanwhile, Water Boards will confer with DPR when developing regulatory programs related to pesticides; ensure waters are monitored (in coordination with DPR's monitoring and including permittee and State Water Board's own monitoring participation); and require and support use of best management practices relating to pesticides (structural management practices are not intended to be required in urban areas).

The Implementation Plan that accompanies the MAA describes opportunities for coordination and mutual enrichment (including cross-training), expectations for both staff and executive level communication (including an annual management-level meeting between the agencies), and current agency organization and interactions. Excerpts from the Implementation Plan:

> *"In the urban environment, pesticides are transported by the municipal wastewater collection system and the municipal separate storm sewer system (MS4). PMPs [pesticides-specific management practices] focus primarily on prevention through responsible use according to the pesticide label and DPR regulations and as a part of a holistic IPM [Integrated Pest Management] strategy. DPR conducts education and outreach efforts to ensure professional applicators are up to date on regulatory actions and label changes. Wastewater treatment plants and multi-benefit storm water treatment practices such as low impact development, runoff infiltration, constructed wetlands, and restoration of riparian buffers around waterways can provide some reductions. However, they are not designed for, nor implemented to address, complex mixtures of pesticides and the effectiveness of these practices to remove various pesticides from these systems is not well understood.*

[20] Long-term regulatory goals at the state and federal level are described in detail in Section 1.2.

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DPR will work with the Water Boards to inform pesticide users on urban PMPs. The Water Boards, through their storm water permits, will continue to require PMPs from storm water permittees. Permittees must also include, as appropriate, education and outreach to inform residential and commercial pesticide users on responsible pesticide use and encourage municipal storm water permittees to provide local expertise into DPR's pesticide regulatory process.

The Water Boards and DPR will collaborate to assess the impacts of pesticides in the urban environment through collective and comprehensive monitoring efforts, which optimize the use of monitoring resources of Water Boards, dischargers, and DPR."

2.2.2 Focus on California's UPA

At the urging of CASQA, in 2014 the State Water Board made a strategically important decision to institutionalize its commitment to work closely with DPR and EPA to utilize pesticide regulatory authority as the primary mechanism for preventing and responding to impairments of receiving waters linked to current use pesticides in urban runoff. To accomplish this, it established an urban pesticides reduction project (now titled the Urban Pesticides Amendments or UPA) as a top priority project under the comprehensive stormwater strategy it adopted in December 2015, known as "Strategy to Optimize Resource Management of Storm Water" or STORMS.[21] In 2018/19, the State Water Board continued working towards developing the Urban Pesticides Amendments which will be changes to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries, and the Water Quality Control Plan for Ocean Waters of California. It is important to note that a critical factor in the State Water Board's decision to move in this direction was DPR's demonstrated commitment and significant progress in addressing urban water quality issues caused by pesticides.[22] A 2020 paper co-authored by Dr. Kelly Moran and staff of DPR, State Water Board, and UC Davis, describes many of the key elements of this progress.[23] The abstract for that paper is presented on the following page.

CASQA representatives have been participating actively in the development of the Urban Pesticide Amendments since their inception, as members of the projects Core Team and various work groups, to ensure that they are consistent with CASQA's vision for pesticide control.[24] The key elements that we anticipate being in the amendments are listed below.

- Element 1: Establishment of a framework for the Water Boards to work with DPR and U.S. EPA to utilize pesticide regulatory authority as the primary means for addressing pesticides in urban runoff.
- Element 2: Adopt a program of implementation addressing urban pesticides water pollution that serves as a TMDL alternative and integrates a feasible compliance pathway for MS4s.

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[21] STORMS' overall mission is to "lead the evolution of storm water management in California by advancing the perspective that storm water is a valuable resource, supporting policies for collaborative watershed-level storm water management and pollution prevention, removing obstacles to funding, developing resources, and integrating regulatory and non-regulatory interests." (http://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/)

[22] As reported in previous CASQA Pesticide Subcommittee Annual Reports, DPR's accomplishments include improved modeling, active ingredient screening for urban water quality issues, monitoring, and regulatory mitigation of pyrethroids and fipronil.

[23] Moran, et al., 2020. Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA. Environmental Toxicology and Chemistry—Volume 39, Number 5—pp. 953–966, 2020

[24] These goals have been adapted from the CASQA document, "End Goals for Pesticide Regulatory Activities," 2014. Goal 3, above, is directly tied to Goals 2, 4, and 5 of that document.

Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA

Kelly Moran, Brian Anderson, Bryn Phillips, Yuzhou Luo, Nan Singhasemanon, Richard Breuer, Dawit Tadesse, *Environ Toxicol Chem* 2020;39:953–966.
https://setac.onlinelibrary.wiley.com/doi/abs/10.1002/etc.4699.

This paper published in 2020 describes key elements of the current State water quality effort.

Abstract

The management of pesticides to protect water quality remains a significant global challenge. Historically, despite regulatory frameworks intended to prevent, minimize, and manage off-site movement of pesticides, multiple generations of pesticide active ingredients have created a seemingly unending cycle of pesticide water pollution in both agricultural and urban watersheds. In California, the most populous and most agricultural US state, pesticide and water quality regulators realized in the 1990s that working independently of each other was not an effective approach to address pesticide water pollution. Over the years, these California agencies have developed a joint vision and have continued to develop a unified approach that has the potential to minimize pesticide risks to aquatic life through a combination of prevention, monitoring, and management actions, while maintaining pesticide availability for effective pest control. Key elements of the current California pesticide/water quality effort include: 1) pesticide and toxicity monitoring, coupled with watershed modeling, to maximize information obtained from monitoring; 2) predictive fate and exposure modeling to identify potential risks to aquatic life for new pesticide products when used as allowed by the label or to identify effective mitigation measures; and 3) management approaches tailored to the different pesticide uses, discharge sources, physical environments, and regulatory environments that exist for agricultural runoff, urban runoff, and municipal wastewater. Lessons from this effort may inform pesticide management elsewhere in the world as well as other chemical regulatory programs, such as the recently reformed US Toxic Substances Control Act and California's Safer Consumer Products regulatory program. © 2020 SETAC

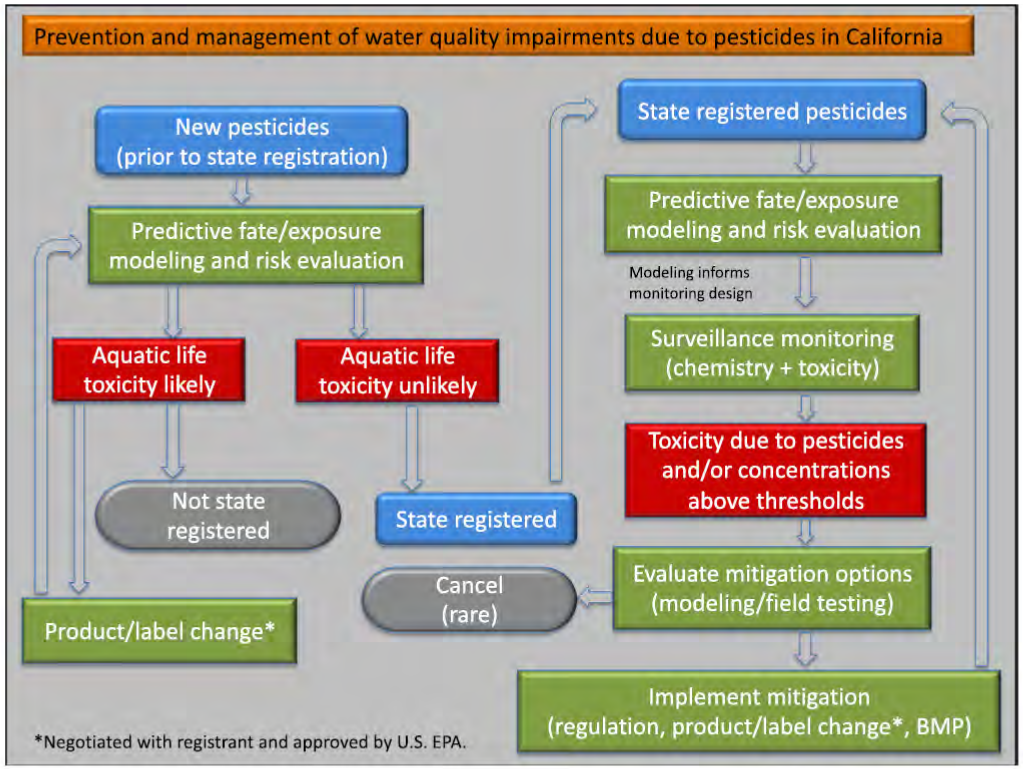

- Element 3: MS4 Monitoring program designed to coordinate with existing DPR and State Water Board pesticides and toxicity monitoring to support effective implementation of Elements 1 and 2.
- Element 4: Requirements for MS4s to support Elements 1 and 3 by contributing expertise on how pollutants present in urban environments enter and behave in urban runoff and water bodies.
- Element 5: Other actions that can reasonably be implemented by MS4s, such as IPM outreach, in support of pesticides reductions.

CASQA supports the State Water Board's stated goal of implementing the UPA "as an alternative to TMDL development to address pesticide and pesticide-related toxicity impairments in individual water bodies." Achievement of this goal would provide substantial savings of state and MS4 agency resources as compared to establishment of multiple TMDLs throughout the state.

Elements 1-4 are consistent with CASQA Vision Action 1.3. Water Board staff have indicated their intent that the Urban Pesticides Amendments, as shown in Element 5 should also establish a consistent set of "*minimum pesticides source control measures for MS4 dischargers.*"

CASQA representatives have worked with the Water Boards to ensure that such requirements are reasonable and consistent with similar measures already in place in some regions. At this time, the list of potential minimum measures includes use of IPM, education of and outreach to residents and professional pesticide applicators, providing urban runoff scientific and management expertise to support pesticide regulatory processes, non-stormwater discharge prohibitions, and pesticide and toxicity monitoring.

CASQA supports the stated goal to "create a comprehensive, coordinated statewide monitoring framework for pesticides and toxicity in urban runoff and receiving water that improves resource efficiency, usefulness of data, and coordination of data collection to support management decisions."[25] A well-designed and managed monitoring framework that is properly representative of urban areas can simultaneously provide more useful information and improve the utilization of resources by eliminating unnecessary MS4 monitoring requirements that do not contribute to effective management of pesticides and pesticide-caused toxicity.

Monitoring. In the previous FY, agreement was reached regarding decision-making channels and membership for the UPCMP. CASQA is an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. These committees have been convened by the Aquatic Science Center using grant funding from the State Water Board. The Steering Committee and Technical Committee are tasked with establishing the initial framework of the monitoring program, including a work plan for its first year of operation. It is intended to have the work plan in place upon adoption of the UPA. However, progress in this direction has been slowed this year by changes in staffing at the State Water Board, and by complications caused by COVID-19. One subsequent meeting of the Technical Group was held in June.

Key joint activities for the UPCMP this FY included:

- Initial meeting of UPCMP Steering committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[26].
- Initial meeting of UPCMP Technical Committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[27].

[25] Informational Document, CEQA Public Scoping Meeting, State Water Resources Control Board, January 25, 2017
[26] MS4 representatives on the Steering Committee are from the Alameda Countywide Clean Water Program, Orange County, and Sacramento County.
[27] MS4 representatives on the Technical Group are from the Santa Clara Valley Urban Runoff Pollution Prevention Program, Orange County, and Sacramento County (jointly funded by the Sacramento Stormwater Quality Partnership).

Technical Support. CASQA continues to provide technical support to the Water Boards on numerous crucial and highly detailed items related to the UPA, Staff Report, CEQA Document, monitoring program, model permit language, and the relationship of these to the MAA. During June, CASQA organized a meeting of DPR, Water Board, and CASQA representatives on July 24th for DPR to provide detailed information to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.

MS4 Input. CASQA Pesticides Subcommittee continued briefings for the MS4 community to explain, gather input, and obtain support for the Urban Pesticide Amendments in advance of their public release for comment. Briefings were provided to representatives of the following MS4 groups:

- Los Angeles County Permittee Group
- Central Valley MS4 Coordinating Committee
- Sacramento Stormwater Quality Partnership
- CASQA Watershed Management and Impaired Waterbodies Subcommittee
- CASQA Policy and Permitting Subcommittee
- CASQA Science and Monitoring Subcommittee
- Sonoma County MS4 Permittee Group

2.2.3 CASQA Participation in Other State Efforts

As presented in Table 4, CASQA has been actively involved with various State agencies and advisory groups that affect pesticide use and pest management in urban areas.

Table 4. Participation in Other State Efforts to Support CASQA's Goals

Agency or Conference	Latest Outcomes
DPR's Pest Management Advisory Committee (PMAC)	Participation on the PMAC has resulted in expanded focus by DPR on urban pest management and water quality issues and generated funding for urban IPM programs. This year the PMAC recommended funding for two IPM research projects that would address pesticides in urban runoff, and one project that would address copper antifouling pesticide impacts of water bodies that are receiving waters of interest to many MS4 agencies. The amount of funding recommended was approximately $570,000. The projects are listed below. • IPM for local Sacramento farmers. [addresses commercial urban farms with high pesticide uses] • Training for pest management professionals. [upgraded facilities and mass media channels for statewide structural pest control licensees] • Training for hull cleaners and boaters. [addresses copper pollution in marinas]
California Structural Pest Control Board (SPCB)	A PSC member is an appointed member of the SPCB. The SPCB recognizes the potential for excessive pesticide application to impact water quality. The SPCB is in the process of adopting regulations to increase continuing education hours required in the IPM category. Finalization of these regulations has been slowed due to the need for California to reconcile its structural licensing requirements with newly adopted Federal regulations for this industry. Five proposals were selected and collectively awarded $1.02 million to be funded by the SPCB Research Fund. Progress reports were provided at the February 2020 board meeting for five research projects funded in the previous FY by the SPCB The research topics are listed below, and detailed project updates are available online at https://www.pestboard.ca.gov/about/agenda/20200312_materials.pdf • "Diet and Colony Structure of Two Emerging Invasive Pest Ants" • "Investigation of Rodenticide Pathways in an Urban System Through the Use of Isotopically Labelled Bait" • "Evaluation of bait station system efficacy for reduced-risk subterranean termite management in California" • "Development and Evaluation of Baiting Strategies for Control of Pest Yellowjackets in California" • "Improving Urban Pest Ants Management by Low-Impact IPM Strategies" The SPCB is in the process of allocating funding for the 2021 FY.

Section 3. CASQA's Approach Looking Ahead

At any given time, EPA and DPR may be in the process of evaluating and registering various pesticides for urban use. CASQA will continue to track and engage in EPA and DPR activities, with a focus on top priority active ingredients (as identified in the annual Pesticide Watch List) and sharing relevant urban runoff information and CASQA's water-quality specific expertise with pesticides regulators. Key documents to be reviewed will include risk assessments and risk management proposals with an eye toward ensuring that pesticide regulators have and consider accurate information on relevant factors in urban areas such as pesticide use patterns, urban pollutant transport mechanisms, and receiving water conditions. CASQA strives to ensure that pesticide regulators have access to relevant information such as monitoring data, water quality regulatory requirements, and urban runoff agency compliance liabilities and cost information. As necessary, CASQA will continue to recommend changes in an individual pesticide's allowable uses or use instructions, request consideration of impacts on water bodies receiving urban runoff, or ask that regulators fill critical data gaps by obtaining more data from manufacturers. As resources allow and circumstances warrant, CASQA will collaborate with wastewater organizations (such as BACWA), other water quality stakeholders, and the Water Boards in commenting on EPA and DPR actions.

In the coming year, CASQA will continue to address near-term pesticide concerns and seek long-term regulatory change. Although changes at the federal level are important for fully achieving CASQA's goal of protecting water quality through the effective use of pesticide regulations, until there is a more favorable situation at that level, we will continue to focus our efforts on solidifying progress at the state level. In FY 2020-2021, we will continue engagement on specific regulatory actions for priority pesticides at the federal level, while continuing our strategic focus on supporting State adoption of the UPA. CASQA's current priority activities are as follows:

(1) Continue collaboration with DPR to address near-term regulatory concerns, while seeking OPP and OW actions to reduce inconsistencies:

- Ensure DPR action on fipronil water pollution is completed, including effective professional user education about restrictions on its outdoor urban use.
- Ensure DPR enforces mitigation measures for pyrethroids and fipronil, and adopts additional measures as necessary.
- Ensure the state continues to conduct surveillance monitoring to evaluate pyrethroids and fipronil mitigation effectiveness and to evaluate occurrence of new threats like imidacloprid and other neonicotinoid insecticides.
- Continue to encourage EPA to complete scientific groundwork and to identify and implement pyrethroids, fipronil, malathion, and imidacloprid mitigation measures, recognizing that it is likely that necessary mitigation cannot readily be implemented entirely by DPR.

(2) Seek long-term changes in the pesticide regulatory structure:

- Leverage our success at the state level and continue to be a key stakeholder in the STORMS project to adopt the statewide UPA. Through this process, CASQA will work with other stakeholders to implement the planned restructuring of California's urban surface water pesticides monitoring to increase its effectiveness and improve coordination.
- Seek procedure changes such that DPR continues to refine its registration procedures to address remaining gaps in water quality protection.
- Seek increased transparency of DPR regulatory activities, including timely access to scientific evaluation reports that are the basis of registration decisions.

CASQA will continue to seek opportunities to coordinate on high priority regulatory actions, with the Water Boards and other water quality stakeholders such as POTWs and non-profits, to take advantage of efficiencies, increase effectiveness, and ensure that the water quality community has a consistent message. Table 5 presents CASQA's activities and level of engagement anticipated for FY 2020-2021; CASQA will conduct these activities as priorities indicate and resources allow. Table 6 summarizes upcoming regulatory action items that are likely to proceed and may require CASQA attention in FY 2020-2021.

Table 5. CASQA Pesticide Subcommittee Activities

Activity		Purpose
Regulatory Tracking	Track Federal Register notices	Identify regulatory actions for high priority active ingredients that may require review.
	Track DPR notices of registration applications and decisions	Identify pesticides meriting surface water review that are not within DPR's automatic routing procedures, identify gaps or potential urban runoff-related problems with current DPR evaluation or registration plans other regulations, procedures & policies.
	Track activities at the Water Boards	Identify opportunities for improvements in TMDLs, Basin Plan Amendments, and permits.
	Review regulatory actions, guidance documents, and work plans	Identify potential urban runoff-related problems with current EPA evaluation or registration plans, other regulations, procedures, and policies.
Regulatory Communications	Briefing phone calls, informal in-person meetings, teleconference meetings, and emails with EPA and DPR	Information sharing about immediate issues or ongoing efforts; educate EPA and DPR about issues confronting water quality community. Provide early communication on upcoming proceedings that help reduce the need for time-intensive letters.
	Convene formal meetings, write letters and track responses to letters	Ensure current pesticide evaluation or registration process accurately addresses urban runoff and urban pesticide use and management contexts and take advantage of opportunities to formally provide information suggest more robust approaches to that could be used in future regulatory process. Request and maintain communication on mitigation actions addressing highest priority pesticides.
Advisory	Serve on EPA, DPR, and Water Board policy and scientific advisory committees	Provide information and identify data needs and collaboration opportunities toward development of constructive approaches for managing pesticides.
Educational	Presentations to and informal discussions with EPA, DPR, Water Board, CASQA members,	Educate EPA, DPR, Water Board, and CASQA members about the urban runoff-related shortcomings of existing pesticide regulatory process, educational efforts to support process improvements, and report on achievements. Encourage research and monitoring programs to address urban runoff data needs and priorities. Stimulate academic, government, or private development of analytical and toxicity identification methods to address anticipated urban runoff monitoring needs. Inform development of new pesticides by manufacturers and selection of pesticides by professional users.
	Developing and delivering public testimony	Educate Water Board members about the problems with existing pesticide regulatory process, encourage change, and report on achievements.

Activity		Purpose
Monitoring and Science	Update Pesticide Watch List based on new scientific and regulatory information	The Pesticide Watch List (Table 2) serves as a management tool to prioritize and track pesticides used outdoors in urban areas.
	Data analysis of DPR/SWAMP/USGS/MS4 monitoring, pesticide use data, and information from scientific literature	Summarize data to educate CASQA members and water quality community, Water Boards, DPR, and EPA.
Reporting	Prepare Monthly Action Plans	Coordinate CASQA's regulatory actions with Partners
	Prepare PSC Annual Report to describe the year's status and progress, provide detail on stakeholder actions, and the context of prior actions as well as anticipated end goal of these activities.	Provide CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. The document serves annual compliance submittal for both Phase I and Phase II MS4s. It may also be used as an element of PEAIPs and future effectiveness assessment annual reporting.

Table 6. Anticipated Opportunities for Pesticides Regulatory Engagement in 2020-2021

EPA Pesticide Registration Review (15-year cycle)
Environmental Risk Assessments • Priority 2-4 pesticides: Busan 77, Chlorothalonil, Irgarol, Diuron, Dichlorvos (DDVP), Isothiazolinones (DCOIT, BIT, BBIT, MIT, OIT). o-Phenyl phenol, Peroxy Compounds (includes Peroxyoctanoic Acid; Sodium Percarbonate), Propiconazole, Tebuconazole, Ziram; others (schedule unknown)
Proposed Interim Decisions • Priority 1 pesticides: Fipronil, Pyrethroids: Cyhalothrins, Cypermethrins, Allethrin, Etofenprox, Metofluthrin • Priority 2-4 pesticides: Carbaryl, Chromated Arsenicals, Creosote, Dichromic acid, DBNPA, Dithiopyr, (phenoxy herbicide), MCPA, MGK-264 (synergist), Methomyl Novaluron, Oxyfluorfen, Pentachlorophenol (Pentachlorophenol, Dioxins), Piperonyl butoxide (PBO) (pyrethroids synergist), Pyrethrins, Simazine, Sodium bromide, Thiophanate methyl, Triclopyr; others (schedule unknown)
Other EPA-related Items
• U.S. EPA "Increasing Consistency and Transparency in Considering Costs and Benefits in the Rulemaking Process" affects how the U.S. EPA uses cost and benefit analysis in setting pollution standards. Rule proposal was expected in 5/19. • Proposed rule to eliminate some OPP Federal Register Notices (was anticipated September 2018 according to U.S. EPA semi-annual regulatory agenda) • U.S. EPA Update to Guidelines for Deriving Aquatic Life Water Quality Criteria. Draft scoping document external peer review is next step. Seeking OPP engagement.
DPR New Pesticide Registration Decisions
• Proposed new urban pyrethroids (momfluorothrin, alpha-cypermethrin, phenothrin and transfluthrin products) • Proposed expansion of bifenthrin use in non-residential urban locations • Proposed new fipronil products: fipronil-bifenthrin landscaping product, termite product, product for yellow jackets • Proposed new aerated indoxacarb powder • Proposed ant and termite product containing the proposed new pesticide broflanilide. • Others (schedule unknown)
Other DPR-related Items
• Registration Application Surface Water Reviews – continue to follow up on communications requesting review of all storm drain products and outdoor antimicrobials
Water Boards
• State Water Board Provisions for Toxicity Assessment and Control, which include statewide numeric water quality objectives and implementation program • STORMS Urban Pesticides Amendments • Pesticides 303(d) listings • Pesticide TMDL implementation requirements for permittees

Appendix

Regulatory Participation Outcomes and Effectiveness Assessment Summary Tables

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Abemectin (September 2019)

Endangered Species Act Outcomes Evaluation (June 2020)

Imidacloprid (April 2020)

Neonics Extension (April 2020)

Pyrethroids (January 2020)

Pyrethroids Extension (April 2020)

Pyrethroids Update (June 2020)

Terbuthylazine (May 2020)

Zinc and Salts (September 2019 and April 2020)

Pesticide:	Abamectin; Docket: EPA–HQ–OPP–2013–0360
Use:	Insecticide used for ants, mites, and spiders (among other uses).
Why we care:	Highly toxic to aquatic invertebrates. Outdoor uses in urban environments have high potential impact MS4 and surface waters.
Actions taken:	CASQA has been tracking this pesticide since 2013.
Status:	EPA released the Final Interim Registration Review Decision in August 2019.

Next steps:	ESA Consultation is required but unlikely to begin before 2022.
Recommendation:	No action is needed at this time. Keep on tracking list.

From EPA's Final Interim Decision:	Response from CASQA's Perspective:
EPA is adding a standard Runoff Prevention Advisory Statement to the label: *"RUNOFF PREVENTION* *To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems."*	The standard runoff prevention language that EPA has proposed could be further strengthened. For example, CASQA typically recommends not allowing pesticide use if rain is predicted in the next 48 hours (instead of 24 hours as is proposed by EPA). We should consider impact of "rinsing application over the treated area" which would be highly problematic on impervious surfaces hydraulically connected to MS4 and surface waters.
From EPA's response to comments in the "Abamectin. Response to Comments Regarding HED's [EPA OPP Health Effects Division] Human Health Risk Assessment in Support of Registration Review, it appears that new crack and crevice usages are being evaluated through a different process: HED notes that the human health draft risk assessment also included a separate new use action for a proposed use on crack and crevice and spot treatment for abamectin. Mitigation measures associated with the proposed new use are separate from the registration review action and are being addressed by the registrant petitioning for that particular use pattern.	To better assess the risks from a pesticide, EPA should evaluate pesticide uses in a comprehensive manner that includes the use patterns and mitigation measures proposed and/or approved after the initiation of Registration Review.

Action:	Method for National Level Endangered Species Risk Assessment Process for Biological Evaluations of Pesticides; Docket: EPA–HQ–OPP–2019–0185
Use:	Defines procedures for assessing pesticides risks to endangered species
Why we care:	EPA intends to use these procedures to replace its current ecological risk assessment procedures
Actions taken:	CASQA submitted a comment letter in 2019. CASQA's comments were echoed by UP3 partners including BACWA, NACWA, the SF Bay Water Board, Xerces Society, Northwest Center for Alternatives to Pesticides (and 8 other groups) and Center for Biological Diversity. DPR made comments similar to CASQA's.
Status:	EPA released its revised method in March 2020
Next steps:	EPA will be using the revised procedures to conduct ecological risk assessments for pesticides in its ESA pilot program.
Recommendation:	Review ecological risk assessments for ESA pilot pesticides and comment on procedural shortcomings as warranted.

CASQA 08/15/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticides Are Applied on Outdoor Impervious Surfaces and Must Be Addressed in BEs	"EPA has corrected its discussion of applications to impervious surfaces in the Revised Method. The discussion was not meant to indicate that EPA would not evaluate applications to impervious surfaces. Rather, it was intended to generate a footprint for developed areas that was more realistic. In the Revised Method, for applications that are not intended to be made directly to impervious surfaces (e.g., to lawns), EPA will make a treated area assumption for the developed land cover class based on the percent of a typical lot that is not represented by impervious surfaces (e.g., footprints of houses, driveways are assumed to not be treated). In these cases, EPA acknowledges that overspray to impervious surfaces can occur, and, as such, the treated area will include a small percent of the impervious surface. For applications designed for impervious surfaces, EPA will model the application using the impervious PWC scenario, along with appropriate adjustments to account for the area treated." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 41.	Yes.
Clean Water Act Compliance Assessment Must Be an Integral Part of BEs and the Pesticide Endangered Species Act Consultation Process	"Office of Pesticide Programs and Office of Water work together on water issues to address issues under each of their statutes." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	No.
BEs must evaluate all uses of a pesticide that EPA is approving – not just uses that have occurred historically. When EPA reviews a pesticide, it licenses each individual use of that pesticide as described on	"EPA will consider all uses allowed on product labels for the assessed pesticide that are registered under Sections 3, 24(c), and 18 of the Federal Insecticide Fungicide Rodenticide Act (FIFRA) when developing BEs. As stated above, the proposed Revised Method included usage data in the derivation of the Action Area. EPA has changed the	Partially. EPA will consider all legal uses in its first phase, but the actual risk assessment

product labels. If EPA restricts its analysis only to uses that have occurred historically, or to select geographic areas, EPA is effectively licensing uses that it is not evaluating, which is inconsistent with the ESA. This would be the effect of the usage data methodology proposal.	Revised Method so that usage data are no longer incorporated into Step 1. Therefore, all registered uses, even those without demonstrated usage are included in Step 1, definition of the Action Area. EPA incorporates usage data into Step 2 of the Revised Method. When usage data (i.e., PCT [Percent Crop Treated], average rate, application timings, etc...) are incorporated into the risk assessment, the best available, scientifically valid data are used. EPA believes that data on pesticide usage represent critical information for determining whether an individual of a listed species is likely to be exposed and adversely impacted, which is the goal of Step 2." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 14.	will leave out any allowed pesticide uses for which there are no usage data.
BEs must use chronic invertebrate toxicity data. The proposal to use only lethal toxicity (LC50) data for aquatic invertebrates deviates from the CWA regulation of aquatic ecosystems to protect food supplies for endangered species.	"EPA will consider effects to mortality, growth or reproduction and other sublethal endpoints linked to survival or reproduction of taxa relevant to a listed species' prey, pollination, habitat and/or dispersal." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	Yes.
Urban pesticide use estimates could be greatly improved with use of reported urban use and sales data collected annually by California Department of Pesticide Regulation (CDPR). Each year, CDPR mandates reporting of pesticide product-specific sales and all professional pesticide use (including urban use). These data provide the quantity of active ingredients. The sales data are collected for every product brand-label combination. Reported use and total annual sales data are freely available and readily accessed from CDPR's online database at https://www.cdpr.ca.gov/dprdatabase.htm While CDPR considers its product-specific sales data as confidential, these data can be obtained upon request by EPA and consolidated (e.g., by use category) before publishing in risk assessments.	"EPA considers California Pesticide Use Reporting data in assessments, as appropriate. EPA agrees with CBD [Center for Biological Diversity] that pesticide sales data, including those available from California Department of Pesticide Regulation, are of limited use in characterizing the timing and location of pesticide usage. Pesticide sales data can provide some information regarding the scale of usage for a pesticide. For example, historical sales for an established pesticide may be useful in ground truthing the reasonableness of estimated usage that rely on multiple conservative assumptions. One example could be comparing sales data to usage modeled for a year and finding that the single year modelled exceeds the 20-year sales total for the AI. Such an outcome suggests that the model is highly conservative overall. Of course, at a local level, the model may be less conservative than indicated by the disparity between the sales and modelled usage estimates." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 11.	Partially.

Pesticide:	Imidacloprid; Docket: EPA–HQ–OPP–2008–0844
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California. Sales data show that use is increasing.
Actions taken:	CASQA submitted a comment letter in 2017 on the Preliminary Aquatic Risk Assessment.
Status:	EPA released the Proposed Interim Registration Review Decision (PID) per Fed. Reg. notice Feb. 3, 2020. Comments are due May 4, 2020.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Proposed Interim Decision to address unresolved issues and concerns.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
CASQA Concurs with EPA's Finding of Significant Risk.	As in the Preliminary Aquatic Risk Assessment. The EPA found significant risk to aquatic life in the Proposed Interim Decision.	Yes.
CASQA Requests EPA Identify Major Sources of Imidacloprid in Urban Runoff. CASQA noted that EPA's PARA model omits most outdoor urban imidacloprid uses. CASQA Suggested Refinements to Imidacloprid Preliminary Risk Assessment: • Include modeling of runoff from impervious surfaces for both residential and commercial models. • Evaluate and then model the runoff from all permitted outdoor uses of imidacloprid • Include leaching of impregnated materials in the model. • Perform an urban-specific analysis, including analysis of monitoring results specific to urban areas.	"EFED's risk assessment indicated, using modeling and monitoring data, that neonicotinoids can potentially enter surface water and groundwater and affect aquatic invertebrates. Although EFED did not explicitly model urban runoff sources, EFED believes the concentrations would not exceed those modeled via agricultural sources. While field and monitoring data provide supporting evidence that neonicotinoids are present in surface waters, supporting metadata for the sampling (i.e., sampling frequency, vicinity of applications to monitoring sites, timing of sample collection relative to timing of applications, etc.) are not available, precluding the quantitative use of monitoring data. While monitoring data from habitats not designed to harbor aquatic organisms may not be directly relevant for ecological risk assessment, they may be indicative of sources that may discharge into aquatic organism habitats. Likewise, while monitoring data from other countries may not be indicative of uses or	No. Although EPA acknowledged that there is a pathway to the storm drain, they did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff or improve modeling of sources.

	products in the United States, they provide a line of evidence that neonicotinoids can contaminate water sources." (PID p.14)	
CASQA Recommends Further Evaluation of Product Labels and Use Restrictions. (see specific requests below)	Although EPA made some small improvements to imidacloprid labels, they did not incorporate the majority of CASQA's label requests.	Partially.
1) Pre-construction termiticide label improvements: "…we request that EPA add a requirement that after a pre-construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured, and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would bridge a gap between the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits."	EPA did not respond to this comment.	No.
2) Require that no applications be made when rainfall is forecast within 48 hours.	EPA partially incorporated CASQA's suggested idea, but only for 24 hours of forecasted rainfall and only for spray (not granular) products.	Partially.
3) Reduce size of perimeter treatment bands around structures for treating for termites and other structural pests to the smallest treated area that will achieve target pest control. Prohibit application on impervious surfaces.	EPA reduced the perimeter treatment area to up to seven feet (on permeable surfaces), up to two feet up a structure, and up to one inch on pervious surfaces.	Partially. A reduced treatment band is an improvement, but the suggested treatment bands do not appear to be based on scientific study. Use on impervious surfaces is still allowed.
4) Prohibit application of granular products to any impervious (non-soil or unvegetated) surface and prohibit application to any area where the product may contact any surface water, storm drain, or urban runoff conveyance system (e.g., gutter).	EPA did not respond to this comment.	No.
5) Reduce target area for granular fly bait, instead of allowing the quantity to be spread over "1,000 square feet".	EPA did not respond to this comment.	No.
6) Disallow all outdoor "paint-on" applications of imidacloprid, especially if painted surface is above impervious area that drains to storm drain system or surface	EPA did not respond to this comment.	No.

water body. If any outdoor uses continue to be allowed, consider reducing application frequency (currently every 4-6 weeks), setting a maximum allowable outdoor treated area, and establishing a total annual application rate.		
7) Disallow product application in cracks and crevices along surfaces that drain into the storm drain system. If allowed, request that EPA and registrants utilize efficacy data to determine the smallest treated area that will achieve target pest control. This will enable labels to limit the spot treatments and crack and crevice treatments – to only the amount necessary – instead of the current 2' x 2' dimensions for spot treatment, and unspecified dimensions for crack and crevice treatments.	EPA updated label requirements to not limit to a 2' x 1' areas as well as limit application to 10% of the treatment area.	Partially.
8) Disallow all usage inside sanitary sewers, storm drains, or inside or around manholes.	Although manholes are not mentioned, it appears that EPA is prohibiting use in sanitary sewers, manholes etc. as they are not in the list of permitted areas.	Yes, but label would be clearer if it explicitly prohibited these uses.
9) Impregnated Materials: (1) Require end use product labels for all products bearing pesticide claims consistent with the recently adopted California guidance for labeling pesticide-impregnated materials (California Notice 2017-08). (2) Consider limiting concentration and/or use locations for materials that show high washoff potential.	EPA did not respond to this comment.	No.

Pesticide:	Neonicotinoid insecticides; Dockets EPA–HQ–OPP–2012–0329, EPA–HQ–OPP–2011–0865, EPA–HQ–OPP–2011–0920, EPA–HQ–OPP–2008–0844, EPA–HQ–OPP–2011–0581
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California
Actions taken:	In March 2020, the County of Sacramento sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: BACWA, City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County Flood Control and Water Conservation District, SCVURPPP, and the SF Bay Water Board.
Status:	EPA released Proposed Interim Decisions for Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Imidacloprid Proposed Interim Decision to address unresolved issues and concerns.

County of Sacramento Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the County of Sacramento Department of Water Resources, I request that EPA extend the comment period for the Proposed Interim Registration Decisions (PIDs) for the subject neonicotinoids for one additional month, to May 4, 2020. This will provide adequate time for review in light of the complexity of the proposed interim decisions, the number of chemicals under consideration, and the occurrence of this comment period during our winter rainy season, when staff from our agency and the organizations we collaborate with take on substantial extra duties in association with monitoring of rainfall/runoff events.	EPA extended the review period from April 3, 2020 to May 4, 2020.	Yes.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	CASQA commented on the Preliminary Ecological Risk Assessment for Pyrethroids in 2017.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

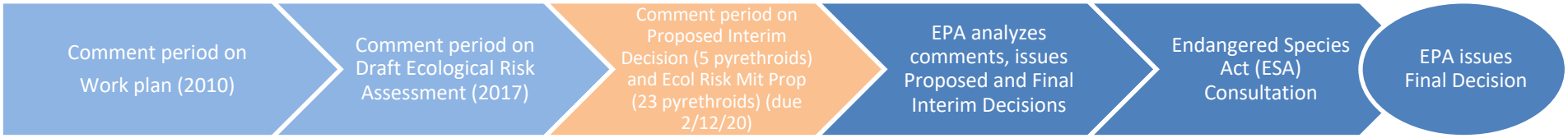

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 7/7/2017 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticide Discharges to storm drains can be costly and disruptive. Currently, EPA has listed 622 California water bodies as impaired by pesticides under Section 303(d) of the Clean Water Act; of those, 16 are listed for pyrethroids.	EPA discussed impacts, including Clean Water Act compliance challenges and costs for indoor discharges, but did not even mention these for stormwater, except a passing reference to TMDL compliance. Based primarily on market share, EPA asserted that the benefits of pyrethroids use are high.	No. It virtually omitted urban runoff from its Clean Water Act compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications (including underground It did not correctly identify alternatives for outdoor structural pest control.). It relied on an industry-supplied report on lawns/landscaping treatments as the data source for its outdoor urban benefits analysis. EPA also does not distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts.

CASQA Concurs with EPA's Finding of Significant Ecological Risk and Need for Mitigation	None. EPA used CASQAs comments to counter arguments by others suggesting that there is not a significant ecological risk.	Yes.
Mitigation addressing urban runoff is needed. To minimize ecological impacts and reduce the number of watersheds impacted by pyrethroid TMDLs and subsequent costs to state and local government agencies, we request that EPA implement mitigation measures as requested above. If these mitigation approaches are not deemed appropriate nationwide, please consider providing clear mechanisms for California-specific labels and sales restrictions.	"Outdoor urban uses of pyrethroids and pyrethrins are expected to result in potential risks of concern, primarily to aquatic invertebrates and fish. This potential risk is often a result of urban runoff, but may also be a result of spray drift or improper disposal of pyrethroid products. The potential for this risk to occur in the environment is supported by pyrethroid monitoring data from urban settings at levels that would be expected to result in potential risk to aquatic invertebrates. There has been a substantial concern from municipalities and states, particularly California, that urban pyrethroid usage adversely impacts water quality and, in the case of California, contributes to TMDL exceedances. As a result, the EPA is proposing measures to reduce to the urban footprint of the pyrethroid group while still allowing flexibility for the user community and retaining the benefits of efficacious pest control." "The potential ecological risks, which are expected to be reduced with the proposed mitigation, are outweighed by the high benefits associated with the use of pyrethroids for the control of pests with public health significance." EPA Proposed mitigation: (1) Indoor and Outdoor Use Site Clarification (2) Reduction in distance from building foundations that can be treated with pyrethroids from 10 feet to 7 feet. [California regulations prohibit applications >3 feet from building foundations] (3) Reduction in height above ground level of building treatments from 3 feet to 2 feet [this would make EPA labels consistent with this element of California regulations] (4) Prohibition on applications during rain. [California regulations already prohibit] (5) Unenforceable advisory statement to avoid applications if rain is forecast within 24 hours. [new] (6) Definition of spot treatment (2 sq. ft.)	No. Proposed mitigations are nice and might reduce slug discharges, but for California, they have no expected benefits for ongoing discharges. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. Text includes two useful mitigations are proposed for indoor products that are <u>not</u> proposed for outdoor products in the enforceable part of the proposal (the "label table in the appendix"): (a) Pictogram and new enforceable label statement: "Do not pour down the drain or sewer. Call your local solid waste agency for local disposal options." (b) New advisory label statements (English & <u>Spanish</u>): "Do not allow to enter indoor or outdoor drains" and "Follow proper disposal procedures on this label" EPA's proposal allows some impervious surface applications prohibited by California regulations: (a) Within 25 feet of an aquatic habitat located down gradient from an application site (b) Preconstruction termite site within 10 feet of a storm drain located down gradient (c) aquatic habitat protection excludes intermittent streams (which are included in California regulations) EPA mitigations cover all users (not just professional applicators) and include etofenprox, which is currently not covered by California regulations.

	(7) New requirement: "Do not allow the product to enter any drain during or after application." [No methods are specified as to how to prevent post-application washoff into storm drains] (8)Various other label clarifications.	
EPA's runoff modeling seems to underestimate some exposures as shown by the risk quotients (RQs) calculated from monitored concentrations that are generally higher than the RQs calculated from modeled concentrations (PRA, Part II, pp. 165-167).	EPA acknowledged the monitoring data and noted that it "did not agree with the PWG that it is inappropriate to compare modeled and monitored concentrations". EPA acknowledged the concerns from commenters from California concerning what is required under the Clean Water Act.	Yes.
CASQA agrees with EPA's use of all available aquatic toxicity data including those for sensitive organisms like Hyalella azteca and Americamysis bahia. The San Francisco Bay Regional Water Quality Control Board also commented on this in their 7/6/17 Letter to EPA, "It should be noted that H. azteca are not uniquely sensitive to pyrethroids. Of the few aquatic invertebrate species that have been tested for pyrethroids toxicity, several are similar to the sensitivity to H. azteca."	EPA considered arguments from both CASQA/SF Water Board and the registrant's lobbying group (Pyrethroid Working Group [PWG]) and ultimately agreed with the comments from CASQA/Water Board on this issue. EPA relied not only on these comments, but also on scientific papers submitted with the comments	Yes.
CASQA Recommends Additional Use Restrictions and Product Label Enhancements.		No, except for improvements to label readability.
1. Reducing overuse of active ingredient. We request that the EPA and registrants review such studies of application sites, applicator methods, and associated residual pesticides in runoff and coordinate with CDPR to develop additional mitigations and associated label restrictions to reduce over-application from creating regulatory and consequent financial burdens that must be borne by state and local governments.	"The EPA has worked extensively with registrants…to develop proposed mitigation to reflect what is practical while also maintaining the efficacy of these uses. The proposed mitigation is designed to reduce the pathway for these chemicals to get into surface waters and storm drainage systems. The language also informs consumers on how to prevent pyrethroids products from ending up in wastewater facilities."	No. EPA's proposal would not meaningfully expand the current California mitigations, which are proving insufficient to resolve pyrethroids water impairments.
2. Adding a minor label requirement for pre-construction (under foundation) termiticide treatments to bridge the gap between FIFRA and	"In following up on the labeling recommendations from CASQA, the EPA consulted with construction experts with specific experience with termiticide applications, regarding	No. EPA did not implement any changes to bridge the gap between FIFRA and the Clean Water act on termiticide treatments.

Clean Water Act regulatory programs. CASQA requests that EPA refine labels for pre-construction termiticide applications with the overall goal of preventing the discharge to water bodies of any water that contacts pesticide treated soil. Specifically, we request that EPA add a requirement that after a pre- construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would address a gap between FIFRA and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits. CASQA would appreciate the opportunity to discuss the specifics of this recommendation with EPA and registrants and professional applicators as appropriate. We perceive this as a relatively minor change that would address an existing gap between FIFRA and Clean Water Act construction site regulatory programs.	the suggestion that a signage requirement on pyrethroid labels could reduce the amount of pesticides running off into the drainage system. The EPA also met with Dave Tamayo, an environmental specialist from CASQA, on February 25, 2019, to discuss these comments and recommendations. The EPA officials also attended the 2019 Termite Tour, organized by the Association of Structural Pest Control Regulatory Officials, which included discussions on pre- and post-construction termite application practices. There wasn't consensus on the potential effectiveness additional posting and covering of these pre-construction termite applications could be in reducing pesticides in surface water. Therefore, the EPA is not proposing these changes in the ecological risk mitigation proposal. However, the EPA welcomes additional comments on this topic during the public comment period."	
3. Enhancing overall readability and enforceability of label language. CASQA requests that EPA seek to eliminate all conflicting and unclear language by coordinating with CDPR and registrants in the development of label language that more clearly provide instructions that result in protection of water quality. If EPA does not concur that label enhancement is necessary on a nationwide basis, CASQA requests that EPA provide clear mechanisms for establishing California-specific label instructions. CDPR is unable to take this action on its own because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA.	"The EPA has made a significant effort to propose changes to pyrethroid labels to improve consistency and help users find adequate directions."	Partially. Proposed label language includes a few useful clarifications but maintains some language that is confusing and includes many statements that are unenforceable. No changes were made to bifenthrin labels, which have additional mitigation that has confusing wording.

4. **California-Specific Labels.** If EPA does not find it appropriate to make these changes on a nationwide basis, we request that EPA provide CDPR the ability to work with registrants to establish California specific instructions on product labels. Since EPA controls product labels – the most effective means of controlling product usage – EPA's explicit approval of state-specific label language is essential.	"The EPA has worked closely with CDPR in the past on adding state-specific labeling restrictions to many pesticide products, including products containing pyrethroids. The EPA will continue to discuss implementation options with states and stakeholders when geographic-specific restrictions may be needed."	**No resolution.** EPA's proposal differs significantly from California regulations, in ways that will further confuse applicators who tend to focus on product labels (in their hands) instead of regulations (not in their hands). EPA does not explicitly state whether it will allow or support California-specific labels.
CASQA Requests EPA Terminate Urban ("Residential") Use of Bifenthrin Due to Its Persistence in Aquatic Ecosystems. CASQA has concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. • Bifenthrin Exceeds EPA Aquatic Life Benchmarks More Often Than Any Other Pyrethroid • Bifenthrin Is Substantially More Persistent in Aquatic Environments Than Other Pyrethroids • Bifenthrin is among the most highly toxic pyrethroids • Bifenthrin is One of Multiple Insecticides Commonly Used in Urban Environments • Due to Bifenthrin's Unique Persistence, It Is Too Hazardous to Use in Urban Settings CASQA further requests that if EPA does not concur that this measure is appropriate on a nationwide basis, that EPA implement such a measure for California by adding California-specific statements to all residential bifenthrin product labels (e.g., "not for use in California"). CDPR is unable to take this action because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA. While the discussion above focuses on bifenthrin, CASQA requests that EPA provide similar controls to ensure that	"With regard to aquatic risk, bifenthrin is not so unique when compared to other pyrethroids that it warrants additional bifenthrin-specific mitigation… bifenthrin does not consistently have the highest RQ exceedances for aquatic invertebrates. The agency disagrees with CASQA that bifenthrin is more toxic to aquatic invertebrates than other pyrethroids. All pyrethroids are very highly toxic to aquatic invertebrates." "The EPA is not proposing ecological mitigation for bifenthrin beyond what is outlined for all pyrethroids in the Pyrethroids and Pyrethrins: Ecological Risk Mitigation Proposal For 23 Chemicals due to the benefits of its use (USEPA 2016), and the agency's expectation that greater detection frequencies and concentrations of alternative insecticides (including other pyrethroids and fipronil) would occur if bifenthrin were removed from the market, because these alternative insecticides would likely take its place in the market."	**No.** EPA is using a scientifically questionable basis for its assertion that bifenthrin is no more problematic than other pyrethroids. The datasets EPA is using and EPA's modeling have scientific errors that have been enumerated in other studies. Bifenthrin may not be the most toxic pyrethroid, but based on monitoring data it appears to be the most persistent pyrethroid in urban watersheds. The combination of toxicity and persistence is the issue (it does not need to be the "top ranked" in either category to merit removal from the market). EPA's RQs are admittedly scientifically incorrect, so they should not be cited as the basis of any decision. Other data sources – particularly DPR's environmental monitoring data - lead to the conclusion that bifenthrin is the main contributor to ecological risks from pyrethroids and that this contribution is high relative to its usage. This indicates that substitution by another pyrethroid would improve water quality. Interestingly, despite the assertion that there should be no difference in risk mitigation among the pyrethroids, EPA notes "Bifenthrin, cypermethrin, deltamethrin, and esfenvalerate had particularly high chronic RQs."

there is adequate mitigation for any other pyrethroid that has similar or greater persistence in aquatic environments.		
Pyrethroids Have Been Identified as a Contributor to the Decline of Important Delta Fish Because of their presence and toxic effects, both directly and through food-web impacts, pyrethroids have been identified as potentially playing a significant role in the decline of important fish species in the Sacramento-San Joaquin Delta Estuary (Delta)…As a result of concerns about pyrethroid impacts in the Delta, establishing control programs for the pyrethroid discharges to the Delta was prioritized in the Delta Stewardship Council's Delta Plan and the Central Valley Regional Water Quality Control Board's Delta Strategic Workplan (CRWCB-CVR 2014). (San Francisco Bay Regional Water Quality Control Board's 7/6/17 Letter to EPA)	EPA acknowledged the SF Water Board's concerns and noted that "pyrethroids are expected to result in risks to aquatic biota in many situations. EPA has considered water quality issues in developing its ecological risk mitigation proposal for the pyrethroids/pyrethrins."	Partially. Although EPA acknowledged the SF Water Board's concerns, the mitigations proposed by EPA are not enough to address the risk. EPA stated that it will address endangered species in individual risk management decisions. This seems to conflict with the concept of the single ecological risk management decision to cover all 23 chemicals, but what it will likely be is a description of next steps for Endangered Species Act Compliance, not a set of mitigation measures for aquatic endangered species.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In November 2019, CASQA sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: NACWA, BACWA, SF Bay Water Board, Central Coast Water Board, Central Valley Water Board, SCVURPPP, Sacramento County, Santa Barbara County, City of Santa Barbara, Alameda County, Napa County Flood & Water Conservation District, Orange County, City of Cotati, City of Sacramento, City of San Diego, LA County Public Works, Marin County Stormwater PPP, and City of Elk Grove.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

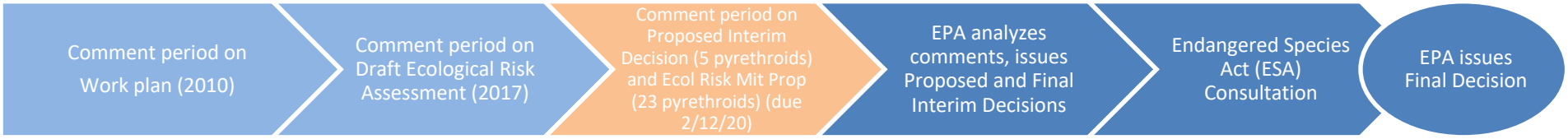

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 11/25/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the California Stormwater Quality Association (CASQA1), we request that the comment period for the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal be extended to February 28, 2020 to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing of the review period, and its timing during the winter rainy season, when staff from our member agencies and the organizations we collaborate with take on substantial extra duties in association with rain events.	EPA extended the review period from January 13, 2020 to February 12, 2020.	Yes.

Pesticide:	Several pyrethroids; Dockets: EPA-HQ-OPP-2008-0331. Docket includes: bifenthrin (EPA–HQ–OPP–2010–0384), cyfluthrin (EPA–HQ–OPP–2010–0684), deltamethrin (EPA–HQ–OPP–2009-0637), esfenvalerate (EPA–HQ–OPP–2009–0301), permenthrin (EPA–HQ–OPP–2011–0039), phenothrin (EPA–HQ–OPP–2011–0539), prallethrin (EPA–HQ–OPP–2011–1009), and tau-fluvalinate (EPA–HQ–OPP–2010–0915).
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In February 2020, CASQA sent a comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal.
Status:	EPA released Proposed Interim Decisions for bifenthrin, cyfluthrin, deltamethrin, esfenvalerate, permenthrin, phenothrin, prallethrin, and tau-fluvalinate.

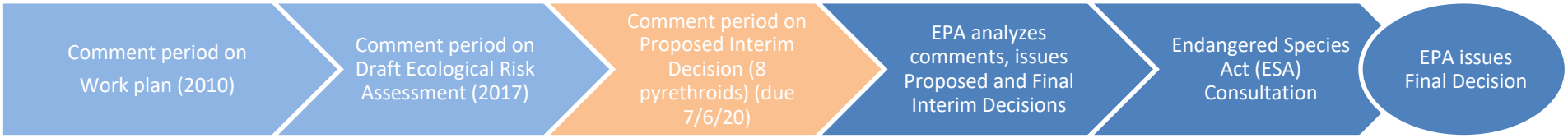

Next steps:	EPA will analyze comments and issue Final Interim Decision on these eight pyrethroids.
Recommendation:	Send comment letter to EPA on these eight Proposed Interim Decisions.

CASQA 2/12/2020 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
EPA's benefits assessment should include urban runoff-related costs to municipalities	No response. In the March 2020 PIDs EPA noted that they "had addressed" comments in a Joint Response issued on 11/12/2019, months before CASQA submitted its 2/12/20 comment letter.	No.
EPA's risk / benefit finding should be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals	EPA issued a single risk mitigation proposal with only one set of measures covering all 23 pyrethroids and pyrethrins, despite finding large differences in aquatic risks among the pyrethroids and pyrethrins.	No.
EPA should end outdoor urban use of bifenthrin	No response.	No.
EPA should provide California-specific labels for outdoor structural pest control products that are consistent with California regulations	No response.	No.
CASQA supports EPA-proposed label changes, with modifications	EPA kept the anti- dumping product label improvements but did not consider CASQA's suggested refinements from the February 2020 comment letter.	Partially.

Prepared by Tammy Qualls 6/14/20

Pesticide:	Terbuthylazine; Docket: EPA-HQ-OPP-2010-0453
Use:	Fountain algaecide / microbiocide / microbiostat.
Why we care:	Highly toxic to aquatic invertebrates.
Actions taken:	County of Sacramento (a CASQA member) sent EPA comments on the Draft Risk Assessment in January 2020, respectively.
Status:	EPA released the Proposed Interim Decision in May 2020.

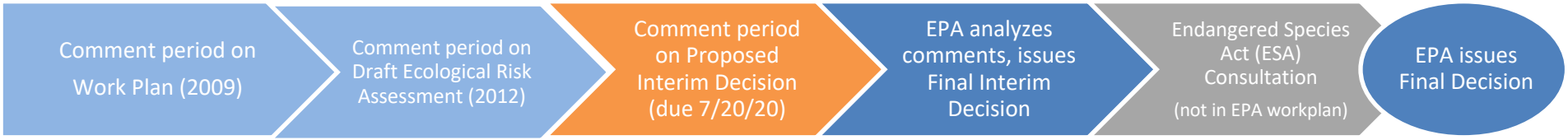

Next steps:	EPA will review comments on the Proposed Interim Decision and issue a Final Interim Decision
Recommendation:	Write a response letter, supporting the Sacramento County comments that EPA included in the Proposed Interim Decision.

Sacramento County comments to EPA (Jan. 2020):	EPA Response:	Did EPA incorporate member comments?
Our primary concern with the subject pesticides is that the Draft Risk Assessment neglected to consider storm drain discharges of terbuthylazine-containing fountain water and the ensuing risk to aquatic life. The Draft Risk Assessment assumed that there would be "*no significant exposure to aquatic organisms…from the decorative/ornamental fountain uses given that the label prohibits discharge of this product into lakes, streams, ponds, estuaries, oceans, or other waters, unless in accordance with the National Pollutant Discharge Eliminations Systems (NPDES) permit.*"	EPA made label changes (see below) that will help reduce the amount of terbuthylazine that is discharged into the storm drain by requiring notification to local sanitary sewer/ storm drain authorities.	Yes.
Sacramento County requests that the current language be changed to match the copper label, which would also provide consistency for label language across pool, spa, hot tub, and fountain chemicals, which follows: "Before draining a treated pool, spa, hot tub, or fountain, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool, spa, hot tub, or fountain water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."	"The agency agrees with the requested label changes and is proposing additional label changes to address the potential ecological risks by reducing exposure and clarifying the appropriate use methods, as described in Appendix B."	Yes.

Sacramento County also notes that the following language exists on several terbuthylazine labels: "*Experience will demonstrate the level of (product) is required."* We are concerned that this vague label language could lead to overuse these products. We are also concerned that label language states that users should maintain a concentration of product, cited in ppm, to get adequate algae control, but does not specify a practical, low-cost method for determining terbuthalyazine concentrations in treated fountain water. We respectfully request that EPA provide a dosing table, based on the size range (in volume of water) for fountains, to guide consumers in the application amount and frequency of application of the product.	EPA did not address this comment.	No.
For all fountain products, including those containing terbuthylazine, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size. This would mimic EPA's decision for lithium hypochlorite products. As explained in our attached lithium hypochlorite comments, this approach avoids potential conflicting language on product labels.	EPA did not address this comment.	No.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively.
Status:	EPA released the Proposed Interim Registration Review Decision in July 2019. Comments are due September 30, 2019.

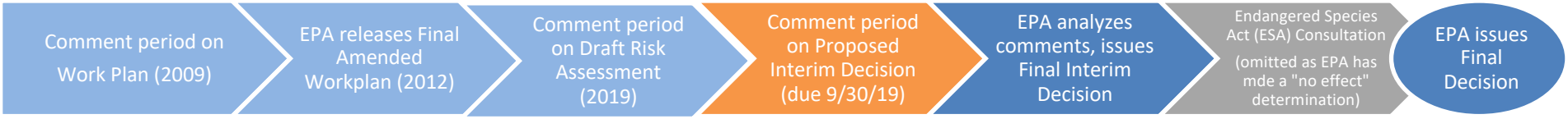

Next steps:	EPA will analyze comments and issue a Proposed Interim Decision. No ESA consultation is planned as EPA made a "no effect" determination.
Recommendation:	Send comments to EPA to declare support of the improved product label language.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
We are writing to request that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. In those Registration Review decisions, EPA worked carefully through the various issues to develop practical label language that mitigates possible aquatic impacts from discharge of treated pool, spa, and hot tub water, while preventing excess flows into sewer collection systems. Sacramento County requests that the current language be changed to match the lithium hypochlorite label, which would also provide consistency for label language across pool, spa, and hot tub chemicals, which follows: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	"Due to the scenarios outlined in these public comments, the requested label language has been added as a proposed requirement." (p. 6)	Yes.
For all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size… this approach avoids potential conflicting language on product labels.	"The requested changes to the uses triggering NPDES permit language have been considered by the Agency and are included as a proposed requirement. Both of the proposed changes are addressed in Appendix A of this document. The Agency thanks the submitters for their comments."	Yes.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively. CASQA commented on the Proposed Interim Decision in September 2019.
Status:	EPA released the Interim Decision in February 2020.

Next steps:	No ESA consultation is planned. EPA will likely proceed to issuing a Final Decision.
Recommendation:	No action is needed at this time.

CASQA Members comments to EPA (September 2019):	EPA Response:	Did EPA incorporate member comments?
CASQA supports the following proposed label language for swimming pool, spa, and hot tub products: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	The language in the Interim Decision exactly matches what was proposed in the Proposed Interim Decision. (p. 12)	Yes.
CASQA also supports EPA's clarification that Office of Pesticide Programs' standard NPDES permit label language is only for manufacturing-use products and is not suitable for end use products.	-For end-use products: NPDES permit language for pool, spa, or hot tub use is not required and must be removed if currently on the label associated with these uses. -For technical grade and manufacturing use products, the following NPDES statement must be included: "Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA." (p. 12)	Yes.

Appendix M

Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

MERCURY AND PCBS WATERSHED/MANAGEMENT AREAS, CONTROL MEASURES, AND LOAD REDUCTION – UPDATE 2020

MEMBER AGENCIES:

Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

Report prepared by:

Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, California 94544

Submitted to:

California Regional Water Quality Control Board, San Francisco Bay Region

September 11,2020

Protecting Alameda County Creeks, Wetlands & the Bay

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Geosyntec Consultants contributed substantially to the writing and preparation of this report.

Preface

This *Mercury and PCBs Watershed/Management Areas and Control Measures Implementation Report* was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP; NPDES Permit No. CAS612008; Order No. R2-2015-0049) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board. This report fulfills the requirements of MRP Provisions C.11.a.iii.(3), C.11.b.iii(2), C.12.a.iii.(3), and C.12.b.iii.(2) for updating the list of control measures reported in 2017 as necessary to account for new control measures and to report loads reduced by these control measures.

This report is submitted by ACCWP on behalf of the following Permittees:

- The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City;
- Alameda County;
- Alameda County Flood Control and Water Conservation District; and
- Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7 Water Agency).

List of Acronyms

Acronym	Definition
ACCWP	Alameda Countywide Clean Water Program (also Program)
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practice
DTSC	Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
ESPS	Ettie Street Pump Station
FY	Fiscal Year
GI	Green Infrastructure
GIS	Geographic Information System
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
POC	Pollutants of Concern
POTW	Publicly Owned Treatment Works
ROW	Right-of-Way
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board (also Regional Water Board)
SFEI	San Francisco Estuary Institute
TMDL	Total Maximum Daily Load
W/MA	Watershed / Management Area

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1 Introduction

1.1 Purpose and Report Organization

This *Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2019* report was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Stormwater Permit (MRP) issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.a.iii.(3), C.11.b.iii(2), C.12.a.iii.(3), and C.12.b.iii.(2) for updating the list of control measures reported in 2018 as necessary to account for new control measures and to report loads reduced by these control measures using the approved Interim Accounting Methodology (BASMAA, 2017).

The following MRP reporting requirements are addressed within this report:

- The list of Watershed/Management Areas (W/MAs) where control measures are currently being implemented:
- The number, type, and locations and/or frequency (if applicable) of control measures;
- A cumulative listing of all potentially PCBs-contaminated sites Permittees has referred to the SFBRWQCB to date, with a brief summary description of each site and where to obtain further information;
- The description, scope, and start date of polychlorinated biphenyls (PCBs) control measures;
- For each structural control and non-structural best management practice (BMP), interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement;
- Clear statements of the roles and responsibilities of each participating Permittee for implementation of identified control measures;
- Mercury and PCBs loads reduced using the approved assessment methodology to demonstrate cumulative mercury and PCBs load reduced from each control measure implemented since the beginning of the Permit term, including supporting data and information necessary to substantiate the load reduction estimates; and

- An estimate of the amount of mercury and PCBs load reductions resulting from green infrastructure implementation during the current term of the MRP, including a description of all data used and a full description of models and model inputs relied on to generate this estimate.

This report is organized into the following sections:

1. **Introduction and Background** – This section describes requirements for managing mercury and PCBs per the Total Maximum Daily Loads (TMDLs) and the MRP, followed by the management approach that has been implemented by ACCWP Permittees. This approach includes delineation of W/MAs based on screening of priority parcels in Old Industrial land classification for likelihood of ongoing PCBs discharge and implementation of control measures. Roles and responsibilities are also described in this section.

2. **Control Measures Overview** – This section provides a general description of the types of control measures that are currently being implemented to control PCBs and mercury.

3. **Watersheds/Management Areas, Control Measures, and Schedule for each Permittee** – These sections describe the Permittee-specific W/MAs and control measures identified by the Permittee that are currently being implemented in each W/MA during this permit term. At least one figure is provided for each Permittee. These figures show W/MA boundaries that contain priority land uses for PCBs management (Old Industrial and Old Urban, as well as "Categorical" overlays described in Section 1.3.2); classification of Old Industrial parcels in these W/MAs resulting from partial screening through 2015 (i.e., High, Moderate or Low/No Likelihood of ongoing PCBs discharge); other land use areas (e.g., New Urban/Other and Open Space); and locations of trash capture devices as examples of treatment controls or sites for enhanced sediment removal.

4. **Loads Reduced** – This section presents the estimates of mercury and PCBs loads reduced by the control measures that are currently being implemented.

1.2 Background

1.2.1 Mercury and PCBs Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay (Bay) has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish

caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to mercury and PCBs. In response, the SFBRWQCB developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDLs. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as best management practices (BMPs), are the tools that Permittees can use to assist in restoring water quality in the Bay.

1.2.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay Area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and reissued in revised form in 2015. Consistent with the TMDLs, Provisions C.11.a. and C.12.a. of the MRP require the implementation of source and treatment control measures and pollution prevention strategies to reduce mercury and PCBs in urban stormwater runoff to achieve specified load reductions throughout the permit area. Although many of the control measures may be selected primarily for the purpose of achieving PCBs load reductions during this MRP permit term, substantial mercury load reductions may result as a tangential benefit and will be accounted for in tracking mercury load reductions. Specifically, the MRP requires the Permittees to:

- Identify the watersheds or portions of watersheds (management areas) in which PCBs control measures are currently being implemented and those in which new control measures will be implemented during the term of this permit;

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[1] See: http://www.swrcb.ca.gov/rwqcb2/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml and http://www.swrcb.ca.gov/rwqcb2/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml.

[2] The MRP replaced previous permits issued to permittees grouped by county, but recognizes that many compliance activities are conducted or facilitated by ACCWP and other countywide stormwater consortia. ACCWP and other Bay Area stormwater programs collaborate regionally through membership in the Bay Area Stormwater Management Agencies Association (BASMAA).

- Identify the control measures that are currently being implemented and those that will be implemented in each watershed/management area;
- Submit a schedule of control measure implementation; and
- Implement sufficient control measures to achieve the mercury and PCBs load reductions stated in the permit.

Provisions C.11.b. and C.12.b. of the MRP require the Permittees to estimate loads reduced by the control measures that have been implemented since the beginning of the Permit term. The MRP allows for load reductions from control measures implemented prior to the effective date of the Permit to be counted toward the required reductions of this permit term if these control measures were established or implemented during the previous permit term, but load reductions from the activity were not realized or credited during the previous permit term (e.g., they were implemented after the 2014 Integrated Monitoring Report was submitted). Therefore, control measures implemented in Fiscal Year (FY) 2013/14, FY 2014/15, FY 2015/16, FY 2016/17, FY 2017/18, FY 2018/19, and FY 2019/20 (i.e., controls measures implemented between July 1, 2013 and June 30, 2020) may be reported herein. In addition, control measures that will be implemented prior to December 31, 2020, are included herein as needed to attain the PCBs load reduction requirement in MRP Provision C.12.a.

1.3 Approach

1.3.1 Control Measures

The urban stormwater runoff wasteload allocation for PCBs represents a 90 percent reduction from the estimated existing load. The TMDL implementation plans set roughly 20-year timelines for achieving the reductions but also incorporate an adaptive implementation planning approach. The adaptive approach consists of the development of a plan that includes early implementation actions based on existing knowledge that have a reasonable probability of success and an overview of options for future actions. For PCBs and mercury in the Bay, the immediate or early implementation actions are not expected to completely eliminate the Bay impairment. Therefore, future actions must be evaluated based on continued monitoring and response to the early implementation actions, as well as based on well-designed studies used for model refinement.

[3] Table 12.1 of the MRP lists interim PCBs load reduction performance criteria that Permittees should achieve during the current permit term. Provision C.11 does not list interim mercury load reduction performance criteria, except for green infrastructure implementation.

The MRP Fact Sheet notes that the initial focus of Provisions C.11/12 is on measures designed to reduce PCBs, while also evaluating opportunities for mercury reduction. Implementation actions may fall into four categories depending on the available knowledge and confidence in a control measure's effectiveness (listed in decreasing order of confidence):

1. Full-scale implementation throughout the region.
2. Focused implementation in areas where benefits are most likely to occur.
3. Pilot-testing in a few specific locations.
4. Other: This may refer to experimental control measures, research and development, desktop analysis, laboratory studies, and/or literature review.

During the previous MRP term, Permittee effort was largely focused on gathering necessary information about control measure effectiveness through pilot projects and some focused implementation of the most effective control measures. In this term of the MRP, the emphasis has shifted towards focused and some full-scale implementation of the most effective control measures. Progress is measured through accounting for specific load reductions as described in the regionally produced report: *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017).

After impacts to the Bay were identified, the Permittees, countywide stormwater programs, Bay Area Stormwater Management Agencies Association (BASMAA), and the SFBRWQCB began gathering data and developing an understanding of the sources and pathways for mercury and PCBs runoff to the Bay (e.g., AMS et al., 2001; AMS, 2002; EOA, 2002; Kleinfelder, 2006). These same parties developed a framework to address these pollutants throughout the following decade, as described in the MRP Fact Sheet. The remainder of this section summarizes key regional initiatives to evaluate mercury and PCBs control measures and ACCWP efforts to identify priority areas within Permittee jurisdictions for implementing control measures.

The Regional Stormwater Monitoring and Urban BMP Evaluation: A Stakeholder-Driven Partnership to Reduce Contaminant Loadings (Proposition 13) project funded by a State of California Proposition 13 grant to the San Francisco Estuary Institute (SFEI) defined conceptual models of sources and pathways of mercury and PCBs in Bay Area urban watersheds (McKee et al., 2006). The Proposition 13 project compiled PCBs and mercury chemical analysis results from sites predominantly in older industrial areas developed prior to the 1979 ban on PCBs production and open uses. The combined dataset contained about 600 sediment samples collected at over 360 locations throughout the Bay Area from roadways and stormwater drainage infrastructure

[4] General Strategy for Sediment-Bound Pollutants (Mercury and PCBs), MRP Attachment A-82.

(e.g., storm drain inlets, pump house wet wells, piping beneath manholes, and open channels) (Yee and McKee, 2010). These data supported the general hypothesis that concentrations of PCBs and mercury are elevated in specific parts of the urban landscape and showed that:

- Pollutant concentrations are highly patchy, even at moderate to small spatial (sub-kilometer) and temporal (approximately annual) scales. This patchiness reflects the episodic nature of many release and transport events and processes.
- Concentrations at sites within three kilometers of one another showed similarities in concentration, which may be due to similarities in land use, activities, or transport of shared pollutant sources.
- Individual sites and areas most contaminated with PCBs are often not those with high mercury, which is a logical finding given the different use histories and original pollutant sources.

Another outcome of the Proposition 13 project was a desktop evaluation of control measures for potential region-wide PCBs and mercury load reductions (Mangarella et al., 2010).

Building upon the efforts of the Proposition 13 project, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted an EPA grant-funded project called Clean Watersheds for a Clean Bay (CW4CB). The CW4CB project, which began in May 2010 and was completed in May 2017, was a collaboration among the MRP Permittees designed to evaluate the effectiveness of stormwater controls for PCBs and mercury. The CW4CB Project implemented a number of pilot projects for various control measures called for by the Bay PCBs and mercury TMDLs and the first term MRP. The CW4CB work products[5] included:

- Selecting five subwatersheds with relatively high levels of PCBs indicated by Proposition 13 project samples and other data sources for pilot investigations;
- Identifying PCBs and mercury source areas within the project subwatersheds and referring these sites to regulatory agencies for cleanup and abatement;
- Developing methods to enhance removal of sediment with PCBs and other pollutants during Permittee sediment management activities;
- Retrofitting 8 to 10 urban sites with different types of stormwater treatment facilities;

[5] The CW4CB work products can be found on the BASMAA webpage at: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project

- Facilitating development and implementation of a regional risk communication and exposure reduction program that focuses on educating the public about the health risks of consuming certain species of Bay fish that contain high levels of PCBs and mercury; and
- Creating public education outreach materials, a project web portal, guidance manual, and technical workshops.

The Permittees used the information gathered and lessons learned through the CW4CB project and the earlier projects as the basis to identify the W/MAs and control measures listed in this report.

In FY 2015/16, ACCWP began a countywide Geographic Information System (GIS) project focused on maintaining, analyzing, interpreting, displaying, and reporting relevant municipal stormwater program data and information to address requirements in the following MRP Provisions:

1. C.3.j Green Infrastructure (GI) Planning and Implementation,
2. C.10 Trash Load Reduction,
3. C.11 Mercury Controls, and
4. C.12 PCBs Controls.

This project is critical to the Permittees' ongoing work to identify watersheds and management areas where multiple-benefit control measure implementation opportunities have been identified and prioritized for implementation during this permit term and over the coming decades. Additionally, this GIS database is being used to track and map existing and future C.3 new and redevelopment projects, allow ease of ongoing review of opportunities for incorporating GI into existing and planned Capital Improvement Projects (CIPs), and assist in the development of GI plans.

The Program's stormwater GIS platform features web maps and applications created using ESRI's ArcGIS Online for Organizations environment. This platform can access GIS data, custom web services, and reports that are hosted within an Amazon cloud service running ESRI's ArcGIS Server technology. The stormwater GIS platform is an important tool for maintaining relevant stormwater data; reviewing, analyzing and displaying data geography; accounting for and assessing compliance with load reduction performance goals; and reporting.

1.3.2 Watershed /Management Area Delineation

Each municipal Permittee has created a list of W/MAs and control measures (i.e., a control measure plan that describes what, where, and when control measures are being implemented)

for PCBs and mercury, provided in Sections 3 through 19 below.[6] The ultimate goal for the listed control measures is to achieve the Alameda countywide PCBs load reductions listed in MRP Tables 12.1 and Table 12.2 during this MRP term:

- 160 g/yr PCBs by 6/30/18,
- 940 g/yr PCBs by 6/30/2020, and
- 37 g/yr PCBs and 15 g/yr mercury using green infrastructure by 6/30/2020.

A W/MA is an area where load reduction credit is being sought for PCBs or mercury control measures. The W/MAs identified in this report are based on ACCWP's ongoing source area identification screening program described in the Mercury and PCBs Control Measures Implementation Status Report (ACCWP, 2016).The W/MAs cover all Old Industrial and Old Urban areas but may also include some New Urban areas where appropriate. W/MAs were delineated through review by Program and Permittee staff of updated maps showing:

1. The results of 2015 PCBs source property screening categorizing Old Industrial parcels as high, moderate, or low/no likelihood of ongoing PCBs discharge;
2. Known past or ongoing PCBs source properties from the CW4CB Task 3 referrals and state environmental databases: Department of Toxic Substances Control EnviroStor, and the State Water Resources Control Board (State Water Board) Geotracker; and
3. Land use classifications (i.e., Old Industrial, Old Urban, New Urban, and Open Space) originally defined and mapped for the Integrated Monitoring Report (ACCWP, 2014) and updated in ACCWP (2016).

These factors were used to create approximate delineations based on the geography within each Permittee's jurisdiction using best professional judgement and Permittee input. If applicable, W/MA boundaries were aligned with existing delineations in a city's General Plan, Specific Plans, and/or Redevelopment Plans. Categorical W/MAs were also created for the non-municipally owned electrical utility (i.e., PG&E) and railroad properties (note, the categorical W/MAs can exist within or create "holes" in the other geographically based WM/As).

Details of the W/MAs and identified control measures will evolve over time as the Permittees learn more about these areas through implementation of the control measures.

[6] Because Alameda County watersheds generally comprise widely varying land uses with differing potentials for load reductions, W/MAs for ACCWP Permittees are generally based on land use groupings or existing planning zones relevant to implementation and tracking of control measures, rather than hydrological boundaries.

The two flood control Permittees (ACFCWCD and Zone 7 Water Agency) own and manage specific storm drainage conveyances and related facilities, which may include creeks, channels, levees, pump stations, dams and reservoirs. Report Sections 18 and 19 show the general locations of key facilities for each of these Permittees, with descriptions of potential opportunities for load reductions that may occur in conjunction with capital projects or maintenance activities. Any documented load reductions from such control measures would be credited to the municipal permittee(s) having jurisdiction over the associated drainage area.

1.3.3 Roles and Responsibilities for Implementation of Control Measures

Table 1-1 below summarizes, for each control measure, the roles and responsibilities of the Permittees, ACCWP, and BASMAA. In a general sense, screening/sampling will primarily be conducted by ACCWP, establishment of regional frameworks is conducted by BASMAA, and adoption and implementation of control measures is conducted by the Permittees.

Table 1-1: Control Measure Roles and Responsibilities

Control Measure Category	Roles and Responsibility		
	Permittee	**Program**	**BASMAA**
Source Property Identification and Abatement	• Work with Program to design monitoring program. • Prepare referral forms, including identification of enhanced operation and maintenance (O&M). • Implement enhanced O&M for referred properties.	• Design and conduct Pollutants of Concern monitoring. • Compile and submit referrals to SFBRWQCB. • Coordinate with BASMAA on ongoing control measure adaptive management.	• Discuss ongoing control measure implementation and adaptive management at Monitoring / Pollutants of Concern Committee (MPC).
Green Infrastructure / Treatment Control Measures	• Prepare a GI Plan. • Implement GI projects. • Gather data on C.3 projects.	• Support GI planning. • Compile data on C.3 projects.	• Coordinate GI planning at Development Committee. • Discuss control measure implementation and adaptive management at MPC Committee.
Managing PCBs in Building Materials	• Participate in BASMAA Regional Project. • Adopt Framework.	• Assist BASMAA Regional Project.	• Develop Framework through Regional Project.
Managing PCBs in Infrastructure	• Participate in BASMAA Regional Project.	• Assist BASMAA Regional Project. • Conduct monitoring.	• Develop monitoring plan and report monitoring results via Regional Project.
Enhanced O&M	• Implement enhanced O&M where identified.	• Coordinate with BASMAA on ongoing control measure adaptive management.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.

Control Measure Category	Roles and Responsibility		
	Permittee	Program	BASMAA
Diversion to Publicly Owned Treatment Works (POTW)	• Implement diversion where identified.	• Coordinate with BASMAA on ongoing control measure adaptive management.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.
Mercury Load Avoidance and Reduction	• Conduct collection events.	• Compile and track data.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.
Illegal Dumping Cleanup	• Identify illegal dumping sites. • Conduct/coordinate cleanup.	• Compile and track data.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.
Stockpiles, Spills, and Disposal of PCBs	• Identify facilities through routine inspections. • Conduct/coordinate cleanup.	• Compile and track data.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.

In addition, the Permittees are tracking control measure implementation and reporting load reductions using the GIS Project Tracking and Load Reduction Accounting Tool, which incorporates the Interim Accounting Methodology to estimate load reductions. This report compiles and reports the county-wide list of site referrals and overall load reductions as well as the MRP permit area-wide list of site referrals and overall load reductions.

Although each Permittee's administrative structure is unique, Table 1-2 summarizes, in general, the roles and responsibilities of the main city or county departments that may be related to implementation of selected control measures. For some Permittees, additional departments may share responsibilities for some implementation activities.

Table 1-2: Permittee Department Roles and Responsibilities

Department	Typical Role / Responsibility
Public Works	• Creeks, watersheds, and stormwater management • Public facility services and maintenance • Engineering and construction services • Capital improvement projects
Community Development / Planning Department	• Planning/zoning/General Plan development • Development project review & approvals • Construction and building inspections

1.3.4 Load Reduction Methodology

MRP Provisions C.11.a and C.12.a require the Permittees to demonstrate cumulative Bay Area-wide and Program area-specific mercury and PCBs load reductions over the current permit term. MRP Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures. The Permittees developed an *Interim Accounting Methodology Report* (BASMAA, 2017) to document the load reduction accounting assessment methodology that is used to demonstrate progress towards achieving the load reductions required in this permit term. This report was approved by the SFBRWQCB in May 2017. The Interim Accounting System is based on relative mercury and PCBs yields from different land use categories. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures implemented during this permit term. This report implements the Interim Accounting System to estimate the mercury and PCBs loads reduced presented in Section 20.

2 Description of Control Measures

This section provides a general description of the types of control measures that are currently being implemented to control PCBs and mercury. Each Permittee has identified the control measures that are currently being implemented in each watershed/management area in the Permittee-specific sections begin with Section 3.

2.1 Source Property Identification and Abatement

Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and where sediment concentrations have been found at levels significantly above urban background levels. The source property identification and abatement control measure begins with performing investigations of these "High Likelihood" areas to identify PCBs sources to the municipal storm drain system. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the SFBRWQCB for investigation and abatement by the SFBRWQCB or another appropriate regulatory agency with investigation and cleanup authority. Source properties may include sites that were previously remediated or are currently being remediated but have PCBs soils cleanup levels that are elevated above urban background levels or may be newly identified source properties.

The Permittees will validate the existence of significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or stormwater sampling in the storm drain system where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated PCBs concentrations (e.g., a sediment concentration equal to or greater than 1.0 milligram per kilogram (mg/kg) or a concentration greater than 0.5 mg/kg plus other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees will take actions to cause the property to be abated or will refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each confirmed source property, the Permittee will implement or cause to be implemented, where appropriate, one or a combination of interim enhanced operation and maintenance (O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process to remove historically deposited sediment and/or to prevent further contaminated sediment from entering the storm drain. These enhanced O&M measures are described in the source property referral that is sent to the SFBRWQCB. If the Permittee finds that enhanced O&M measures are not feasible to implement, the Permittee must discuss these findings with the SFBRWQCB prior to submitting the source property referral. The

SFBRWQCB will review the source property referral and provide comments to the Permittee within 30 days (if needed).

For those source properties that are self-abated (i.e., by the Permittee or the property owner), the Permittee will provide the Regional Water Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation will include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been completely eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

ACCWP, in collaboration with the Permittees, is conducting ongoing targeted investigation and monitoring for known or suspected source properties. Source identification is one of five priority Pollutants of Concern (POC) management information needs to be addressed by monitoring required under MRP provision C.8.f. The allocation of sampling effort for POC monitoring is described in the ACCWP POC Monitoring Report, due October 15 of each year, as required by MRP provision C.8.h.iv. Additionally, future source property investigations may be conducted by the Program and/or Permittees as a result of new information (e.g., as a result of industrial inspections, spill reporting, or development activities).

The properties that have been referred to the SFBRWQCB or reported as self-abated as of September 2020 are listed in Table 2-1 below. Three new site referrals and three new self-abatement reports, all within the City of Oakland, are included for this fiscal year (see Appendix 1).

Table 2-1: Contaminated Sites Referred to the SFBRWQCB

SITE NAME	LOCATION	PROPERTY SIZE (ACRES)	YEAR REFERRED	REFERRAL OR SELF-ABATEMENT
AMG	3438 Helen Street, Oakland	0.43	FY 2017/18	Referral
Custom Alloy Scrap Sales	2601 Peralta St., Oakland	7.65	FY 2017/18	Referral
Former Giampolini Facility	2838 Hannah St., Oakland	1.93	FY 2017/18	Self-Abatement
General Electric – Oakland (Phase I)	5441 East 14th St., Oakland	10.1	FY 2017/18	Self-Abatement
LBNL Old Town	One Cyclotron Rd., Berkeley	1.0	FY 2017/18	Self-Abatement
OAB Transformer Spill	10th and Maritime St., Oakland	0.02	FY 2017/18	Self-Abatement
Precision Cast Products	1549 32nd Street and 2868 Hannah Street, Oakland	0.79	FY 2017/18	Referral
South SPRR/Novartis	4560 Horton St., Emeryville	0.03	FY 2017/18	Self-Abatement
UPRR – Oakland Coliseum	700 73rd Avenue, Oakland	0.40	FY 2017/18	Referral
Schnitzer Steel	1101 Embarcadero West, Oakland	33.7	FY 2019/20	Referral
General Electric Oakland (Phase 2)	5441 East 14th St., Oakland	13.9	FY 2019/20	Self-Abatement
Kaiser Medical Center	280 West MacArthur Blvd, Oakland	3.6	FY 2019/20	Self-Abatement
OES-21	Wood Street and 15th Street, Oakland	6.2	FY 2019/20	Self-Abatement
Brownfield Auto Auction (former Nor-Cal Rock)	768 46th Avenue, Oakland	1.8	FY 2019/20	Referral
Economy Lumber	750 High Street, Oakland	0.4	FY 2019/20	Referral

2.2 Green Infrastructure / Treatment Control Measures

This control measure includes new development and redevelopment projects on private and public properties regulated by Provision C.3, as well as retrofit of existing infrastructure in public right-of-way (ROW) areas and on public properties not subject to Provision C.3. Retrofit includes the installation of full trash capture devices (i.e., hydrodynamic separators (HDS) units) for the purposes of compliance with MRP Provision C.10, which capture sediment in addition to trash and therefore remove PCBs and mercury.

Permittees have been identifying existing C.3 projects as part of this control measure and, in compliance with the requirement of MRP Provision C.3.b.i.(2), are tracking development projects that are subject to C.3. over this permit term.

In addition, the Permittees have been conducting an ongoing review of opportunities for incorporating GI into existing and planned capital improvement projects over this permit term (a.k.a., no missed opportunities) and developing a GI Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements, in compliance with MRP Provision C.3.j.

MRP Provision C.3.j also required the Permittees to submit a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands with the 2019 Annual Report. These plans summarize the amount of existing impervious surface to be retrofit with GI by 2020, 2030, and 2040; map existing public and private projects that incorporated GI from 2003 – 2019; describe any early implementation projects; and list and map potential public retrofit projects from 2020 – 2040.

2.3 Managing PCBs In Building Materials and Infrastructure

2.3.1 PCBs in Building Materials

During the first three years of the permit term, the Permittees developed, in cooperation with BASMAA, a program and protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, stormwater runoff, or improper waste disposal. For MRP compliance, applicable structures commercial, public, institutional and industrial structures constructed between the years 1950 and 1980 and with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Each of the Permittees began implementing the PCBs management program and protocol on July 1, 2019.

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in building materials. This Regional Project developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition. This Regional Project also developed training materials and conducted trainings for municipal staff and outreach workshops for the industry on implementing the framework/protocols developed via the project. The tools and materials developed as part of the project build upon materials and outputs developed in 2010-2011 by

the PCBs in Caulk Project[7] conducted by the San Francisco Estuary Partnership in partnership with BASMAA, as well as subsequent and parallel activities by BASMAA.

In addition, BASMAA has developed an assessment methodology and data collection program to quantify the PCBs loads reduced through implementation of the protocol developed by the BASMAA Regional Project, summarized below:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Data collection started with implementation of the new program on July 1, 2019. When sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program, and

[7] Initially funded through a State Water Board Proposition 50 grant, and later completed with support from the State Revolving Fund under the American Recovery and Reinvestment Act of 2009.

- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and demolition dates, with their FY 2019/20 Annual Reports.

2.3.2 PCBs in Infrastructure

PCBs may also be found in storm drain or roadway infrastructure in public rights-of-way, from use of materials such as caulk and sealants in storm drains and between concrete curbs and street pavement. The Program and Permittees have conducted a study to investigate whether PCBs are present locally in such materials and in what concentrations. A project report prepared by the BASMAA Regional Project was included in the Alameda Countywide Clean Water Program Fiscal Year 2017/18 Annual Report. The results of these investigations will inform the development and implementation of control measures to address this potential source of PCBs into the storm drain system.

2.4 Enhanced Operation and Maintenance

Routine MS4 O&M activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions during this permit term.

Many of the Permittees have installed inlet-based full trash capture devices in response to the trash control requirements of MRP Provision C.10. These devices enhance the capture of sediments that may be contaminated with PCBs. In addition, these inlets are typically cleaned more frequently as a result of the installation of the full trash capture device. Therefore, these Permittees are conducting an enhanced O&M activity for each of these inlets. The load reduction

achieved by this enhanced O&M implementation effort was estimated in the 2017/18 annual report[8].

The following assumptions were used for calculating the reported loads reduced by enhanced O&M control measures:

- Inlet-Based Trash Devices Cleaning
    - Basket, connector pipe screen (CPS), and inlet filters that are listed in the AGOL system were included. The drainage area listed for each device was used for the load reduction calculation. Only operational devices installed since FY 2013-14 were included.
    - If cleanout was stated to occur three times per year, a 'quarterly' frequency was assumed for the purposes of the calculation, as three times per year is not a viable calculation option per the Interim Accounting Methodology. This assumption is assumed to be equivalent to quarterly cleanouts, as a mid-dry season cleanout occurrence is considered superfluous for the purposes of sediment removal.
    - The default trash device cleanout frequency enhancement is from annual to semi-annual, as this cleanout frequency is required by MRP Provision C.10, unless a more frequent frequency was reported by the Permittee (or no enhancement was reported).
- Desilting

  Permittees have conducted some desilting; however, the data needed to estimate loads reduced are difficult to collect for these projects. Therefore, there was no desilting load reduction included in the estimate.

2.5 Diversion to POTW

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff. A feasibility evaluation was prepared during the previous permit term (BASMAA, 2010) that developed selection criteria and information needs for evaluating potential diversion projects and identified candidate pilot projects in the five counties covered by the MRP. This

[8] The load reduction estimates account only for the change in inlet cleaning frequency, per the Interim Accounting Methodology, and do not estimate loads reduced due to the increase in sediment captured by the inlet-based full trash capture devices.

report also reviewed POTW constraints and concerns regarding diversion projects that were presented in a draft white paper (BACWA, 2009), including:

1. Capacity limits on POTWs and conveyance systems may require restricting diversion flows and limiting attainable load reduction benefits, especially since transport of PCBs loads in the MS4 predominantly occurs during higher flows in wet weather.
2. Potential of stormwater pollutants to disrupt advanced treatment systems or to negatively affect the facility's compliance with NPDES numerical effluent limits or waste discharge requirements to control sanitary sewer overflows.
3. Not all POTWs own the collection and conveyance systems that serve them, which could require additional negotiations with the entity or entities that own the collection system.

The cost scenarios for conceptual examples of diversion projects presented in the feasibility evaluation varied depending on the details of physical diversion and operations. Ongoing costs of diversion may be high in relation to load reduction benefits unless the receiving POTW agrees to waive treatment fees.

The Alameda County Flood Control and Water Conservation District is diverting low flows from the Ettie Street Pump Station to the East Bay Municipal Utility District's main wastewater treatment plant for treatment. See Section 18 for further information.

2.6 Source Controls and Other Control Measures

2.6.1 Mercury Load Avoidance and Reduction

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufacturers have significantly reduced the amount of mercury in fluorescent linear tube lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

- Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
- Private business take-back and recycling programs (e.g., Home Depot); and,
- Private waste management services for small and large businesses.

2.6.2 Illegal Dumping Clean-Up

This source control measure entails clean-up of construction and demolition debris from illegal dumping areas. This control measure will apply to construction and demolition illegal dumping only during this permit term but may be expanded to other types of illegally dumped trash if supported by monitoring data.

2.6.3 Stockpile, Spills, and Disposal of PCBs

This control measure includes the proper clean-up and disposal of stockpiles, spills, and/or improperly disposed quantities of PCBs. The measure would involve, for instance, a concentrated source of PCBs (e.g., a barrel) that is found and cleaned-up or properly disposed and the clean-up of transformer spills by PG&E.

ACCWP and BASMAA representatives have been working with SFBRWQCB staff to ensure thorough documentation and clean-up completion of PG&E PCBs transformer spills. PCBs transformer spill reporting is inconsistent through the California Governor's Office of Emergency Services reporting system and often cases are closed before the municipality or SFBRWQCB staff hear of the spill. This activity could have a significant effect on where PCBs in the public right-of-way are found, as many spills happen in residential areas. Residential areas are not typically considered high likelihood areas for PCBs, so no other control measures have been developed specifically for these areas. SFBRWQCB and BASMAA representatives are working on better defining agency roles and responsibilities in responding to spills, at least for their own agencies, and are working on getting PG&E to cooperate to make a smoother and more transparent process as in order to reduce the loading of PCBs into the San Francisco Bay.

BASMAA has begun the process of conducting a regional Stressor/Source Identification (SSID) project, in compliance with MRP Provision C.8.e, that will develop and implement a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source. In FY 2018-19, the regional SSID project developed the SSID workplan. As

a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

3 City of Alameda

3.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Alameda are shown on Figure 3-1 and are listed in Table 3-1 below. These W/MAs drain to the Lower segment of the Bay.

Table 3-1: City of Alameda PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Alameda Beltline	272.4	18.4%	77.0%	2.0%	2.6%	0.0%
Alameda Old Urban	3,077.5	0.0%	100.0%	0.0%	0.0%	0.0%
Alameda Point	1,706.3	0.0%	9.3%	1.9%	1.5%	87.3%
Categorical Railroad	182.5	11.1%	64.5%	2.9%	5.5%	16.0%
Northern Waterfront – East	529.7	14.6%	80.1%	4.3%	0.9%	0.0%
Northern Waterfront – West	846.5	0.0%	53.3%	1.1%	5.6%	40.0%
Northern Waterfront Planning Area	367.3	30.8%	63.2%	4.1%	1.9%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 3-2 and are described in the sections below. Treatment control projects are also shown on Figure 3-1.

Table 3-2: City of Alameda Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	306.9	9.1%	7.2%	0.7%	63.7%	19.2%
Trash Full Capture Devices[1]	6.3	60.3%	39.7%	0%	0%	0%
Enhanced O&M Measures[2]	877.1	0.8%	93.5%	2.8%	1.6%	1.2%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

3.2 Scope and Schedule of PCBs Control Measures

3.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Alameda have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

3.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs is subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. On-going development and redevelopment activity completed during the current reporting period within the City of Alameda has resulted in the conversion of old industrial and old urban parcels to renewed urban areas with C.3 stormwater treatment measures. See the City of Alameda's Green Infrastructure Plan for further information.

3.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Alameda began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

3.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Alameda include clean out of inlet-based full trash capture devices on a semi-annual basis.

3.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

3.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The City of Alameda actively implements mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The City of Alameda continues to actively identify and cleanup (or direct private property owners to do so) illegal dumping of construction and demolition debris when and where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs. As noted above, there have not been any source property identifications made or, specifically, any PCBs stockpile or spill response actions within the City this reporting period.

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 3,200 6,400 Feet

Watershed/Management Areas and Control Measures
Alameda

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 3-1

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4 City of Albany

4.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Albany are shown on Figure 4-1 and are listed in Table 4-1 below. These W/MAs drain to the Central segment of the Bay.

Table 4-1: City of Albany PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Albany Old Industrial	39.2	100.0%	0.0%	0.0%	0.0%	0.0%
Albany Old Urban	2,998.2	0.0%	100.0%	0.0%	0.0%	0.0%
Categorical PG&E	0.8	6.0%	94.0%	0.0%	0.0%	0.0%
Categorical Railroad	54.6	27.1%	71.1%	0.0%	1.8%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 4-2 and are described in the sections below. Treatment control projects are also shown on Figure 4-1.

Table 4-2: City of Albany Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	8.5	20%	80%	0%	0%	0%
Trash Full Capture Devices[1]	--	--	--	--	--	--
Enhanced O&M Measures	384.3	6.7%	93.1%	2.0%	0%	0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

4.2 Scope and Schedule of PCBs Control Measures

4.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Albany have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

4.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs is subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Albany's Green Infrastructure Plan for further information.

4.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Albany began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

4.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Albany include clean out of inlet-based full trash capture devices on a semi-annual basis.

4.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

4.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

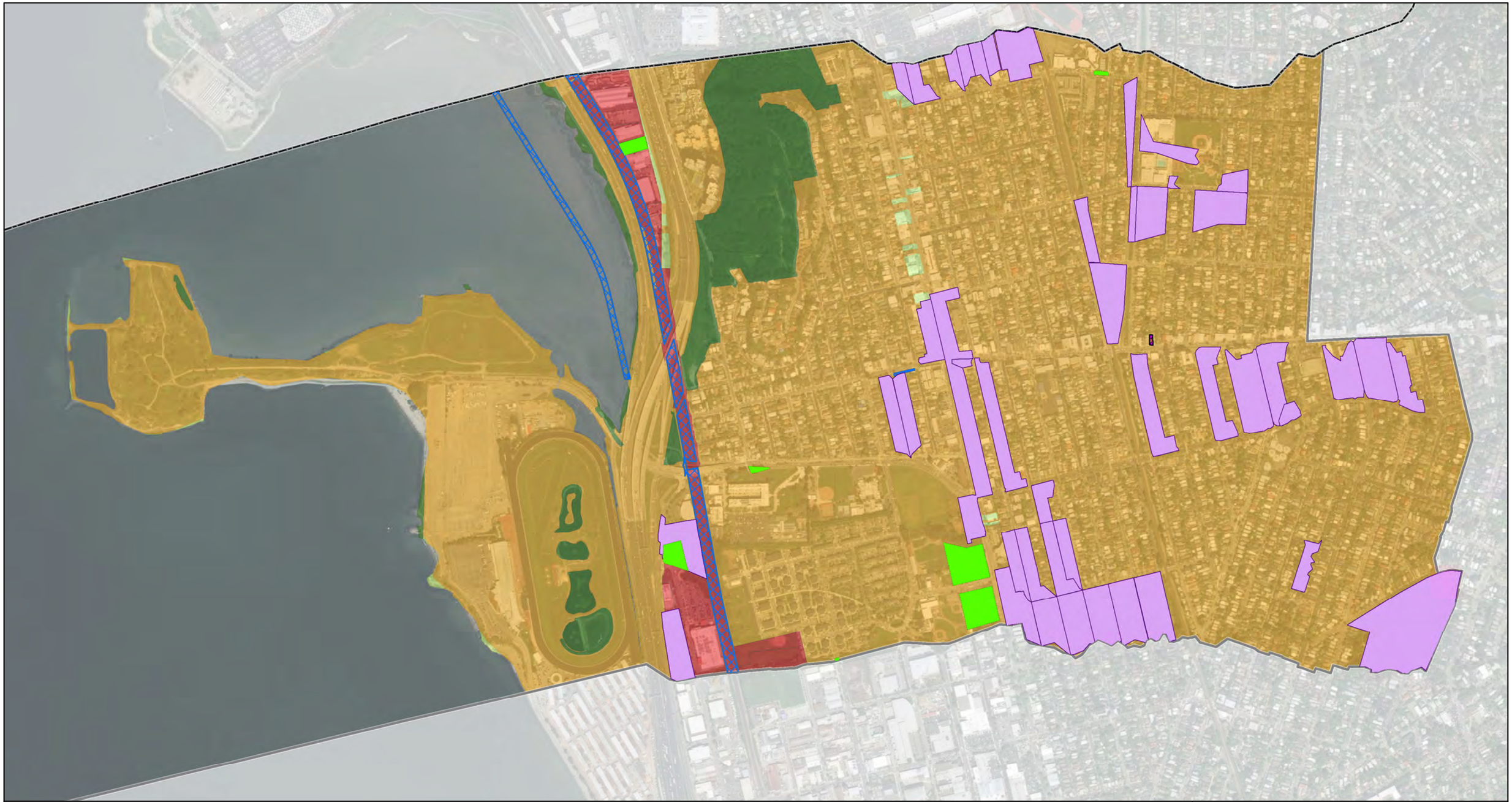

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 790 1,580 Feet

Watershed/Management Areas and Control Measures
Albany

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 4-1

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5 City of Berkeley

5.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Berkeley are shown Figure 5-1 and are listed in Table 5-1 below. These W/MAs drain to the Central segment of the Bay.

Table 5-1: City of Berkeley PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Berkeley Old Urban	7,432.3	0.0%	100.0%	0.0%	0.0%	0.0%
Categorical PG&E	4.4	63.6%	16.4%	0.0%	20.0%	0.0%
Categorical Railroad	71.6	48.2%	50.6%	0.2%	1.0%	0.0%
West Berkeley	1,501.2	26.1%	60.2%	9.4%	4.3%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 5-2 and are described in the sections below. Treatment control projects are also shown on Figure 5-1.

Table 5-2: City of Berkeley Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	1.0	100%	0%	0%	0%	0%
Green Infrastructure and Treatment	22.8	14.9%	80.3%	4.8%	0.0%	0.0%
Trash Full Capture Devices[1]	-	-	-	-	-	-
Enhanced O&M Measures	1,555.4	5.2%	92%	2.7%	0.1%	0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

5.2 Scope and Schedule of PCBs Control Measures

5.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

One property within the City of Berkeley has been referred to the SFBRWQCB as a result of the inspection and monitoring activities conducted by the Program: Lawrence Berkeley National Laboratory (LBNL), Old Town Demolition Phase I (see Table 5-3 below and Attachment A). The location of this property is shown on Figure 5-1.

Table 5-3: Source Property Referral

SITE NAME	LOCATION	AREA (acres)	YEAR ABATED/REFERRED
Lawrence Berkeley National Laboratory	One Cyclotron Road, Berkeley	1.0	2018

LBNL is located above the UC Berkeley campus. LBNL was known as the California Radiation Laboratory when it began operations in 1931 as an accelerator laboratory at the UC Berkeley campus. In 1939, the Laboratory relocated to the area now known as LBNL's Old Town. Extensive scientific research was conducted and among others, research projects involved the Horton Sphere and the 184-inch cyclotron accelerator. Building 6 housed the accelerator and until the 1940s was the center of the Laboratory. Shops and research laboratories were built around and beyond Building 6 between the 1940s and 1950s. The seven buildings within the Old Town Demolition Phase I Project footprint were Buildings 5, 16, 16A, 40, 41, 52, and 52A. The superstructures of these buildings have been demolished and only the foundation slabs remain. Ancillary outdoor facilities within the Site's footprint include an electrical pad for transformers and switching gear (only the pad remains) and a former waste processing yard.

Ongoing Investigations

Ongoing investigations may result in property referrals in the future.

5.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Berkeley's Green Infrastructure Plan for further information.

5.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Berkeley began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

5.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Berkeley include clean out of inlet-based full trash capture devices on a semi-annual basis.

5.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

5.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

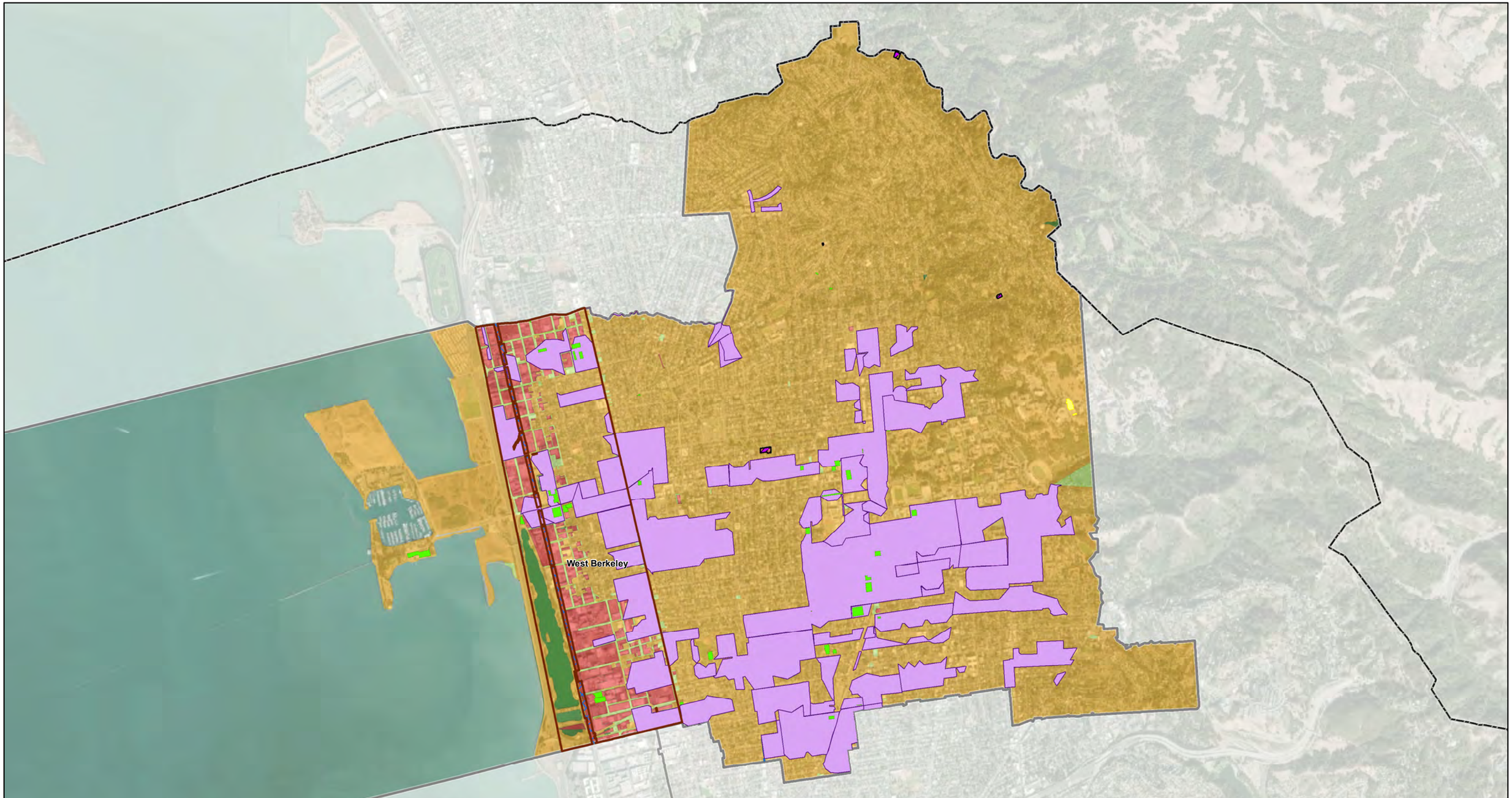

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 2,400 4,800 Feet

Watershed/Management Areas and Control Measures
Berkeley

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 5-1

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6 City of Dublin

6.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Dublin are shown on Figure 6-1 and are listed in Table 6-1 below. These W/MAs drain to the Arroyo de la Laguna branch of the Alameda Creek watershed.

Table 6-1: City of Dublin PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Dublin Old Urban	2,684.3	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 6-2 and are described in the sections below. Treatment control projects are also shown on Figure 6-1.

Table 6-2: City of Dublin Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	1596.2	0.0%	6.6%	16.0%	74.2%	3.0%
Trash Full Capture Devices[1]	305.9	0%	73.8%	18.3%	7.9%	0.0%
Enhanced O&M Measures	1030.1	1.1%	32.8%	41.1%	25%	0%

Note: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

6.2 Scope and Schedule of PCBs Control Measures

6.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Dublin have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

6.2.2 Green Infrastructure / Treatment Control Measures

The City of Dublin will evaluate which GI projects it will implement as part of its GI Work Plan. Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Dublin's Green Infrastructure Plan for further information.

6.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Dublin began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

6.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Dublin include clean out of inlet-based full trash capture devices on a semi-annual basis.

6.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

6.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

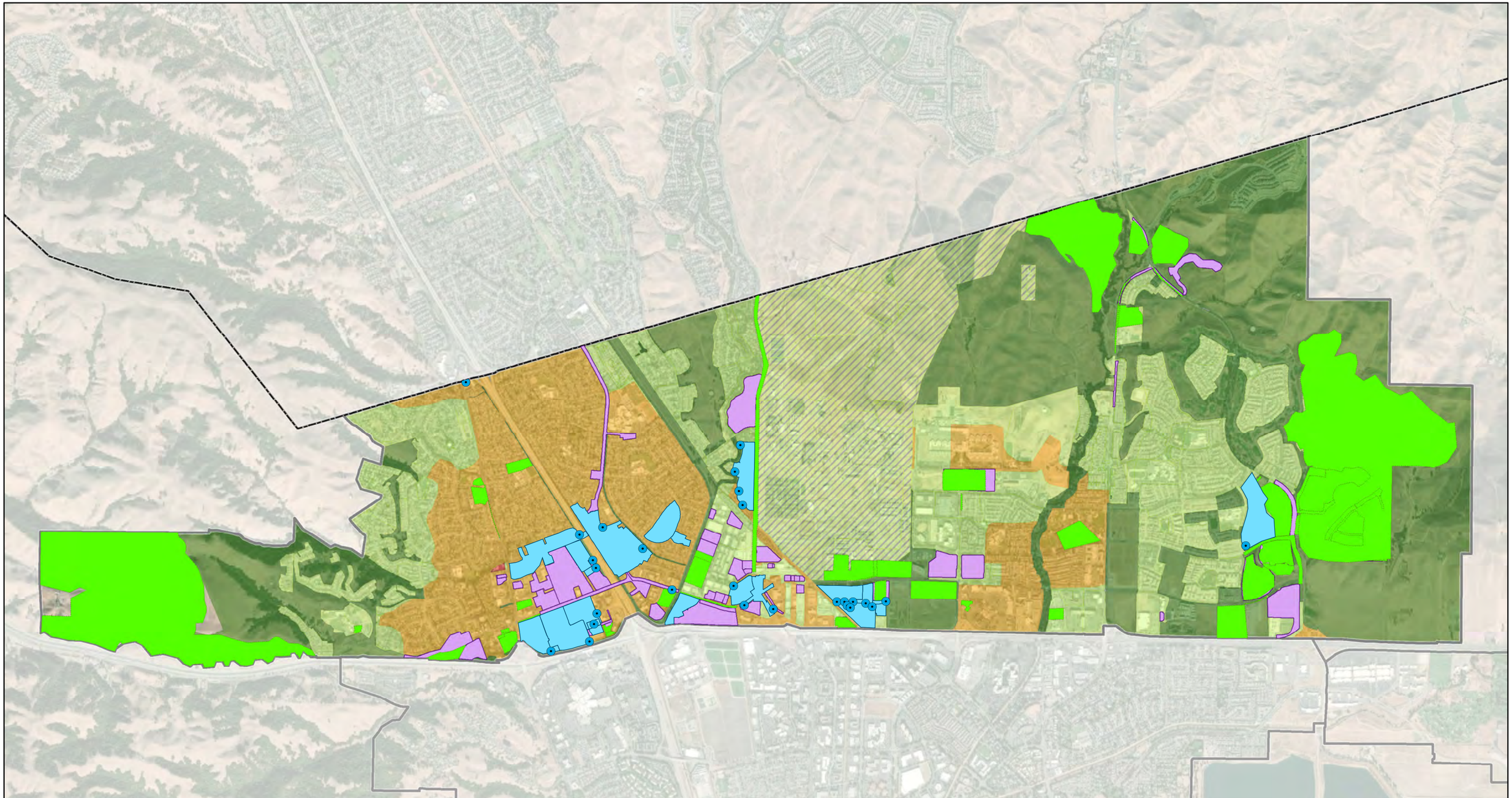

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 2,600 5,200 Feet

Watershed/Management Areas and Control Measures
Dublin

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 6-1

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7 City of Emeryville

7.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Emeryville are shown on Figure 7-1 and are listed in Table 7-1 below. These W/MAs drain to the Central segment of the Bay.

Table 7-1: City of Emeryville PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	13.4	99.4%	0.0%	0.0%	0.6%	0.0%
Categorical Railroad	42.6	95.0%	5.0%	0.0%	0.0%	0.0%
Emeryville Old Industrial	808.7	54.1%	37.0%	8.8%	0.1%	0.0%
Emeryville Old Urban	768.5	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 7-2 and are described in the sections below. Treatment control projects are also shown on Figure 7-1.

Table 7-2: City of Emeryville Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	0.03	100	0%	0%	0%	0%
Green Infrastructure and Treatment	6.9	60.9%	37.7%	1.4%	0%	0%
Trash Full Capture Devices	--	--	--	--	--	--
Enhanced O&M Measures	48.6	64.2%	28.8%	7%	0%	0%

Note: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

7.2 Scope and Schedule of PCBs Control Measures

7.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

One property within the City of Emeryville has been referred to the SFBRWQCB as a result of the inspection and monitoring activities conducted by the Program - the Former South Southern

Pacific Railroad (SPRR) site (see Table 7-3 below). The location of this property is shown on Figure 7-1.

Table 7-3: Source Property Referrals

SITE NAME	LOCATION	AREA (acres)	YEAR ABATED/REFERRED
Former South SPRR/Novartis Site	4560 Horton Street	0.03	2018

The Former South SPRR site is a long narrow strip of land approximately 45 feet wide and 1,100 feet long that is used as a parking lot for office buildings located on the Grifols property immediately west of the Former South SPRR. Grifols purchased the Former South SPRR from Novartis Vaccines & Diagnostics, Inc. (Novartis), formerly Chiron Corporation, in 2014. The PG&E Emeryville Materials Facility is located immediately east of the Former South SPRR. The eastern edge of the Former South SPRR is landscaped, including areas of uncovered soil; this area is approximately 5 feet wide. An SPRR railroad spur once extended south from Stanford Avenue, crossed 53rd Street, and continued south to 45th Street. In 2000, the northern portion of this former SPRR spur and the adjacent former PG&E property, also located north of 53rd Street, were redeveloped into Chiron Way and Novartis Building 4, respectively.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

7.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Emeryville's Green Infrastructure Plan for further information.

7.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Emeryville began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

7.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Emeryville include clean out of inlet-based full trash capture devices on a semi-annual basis.

7.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

7.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

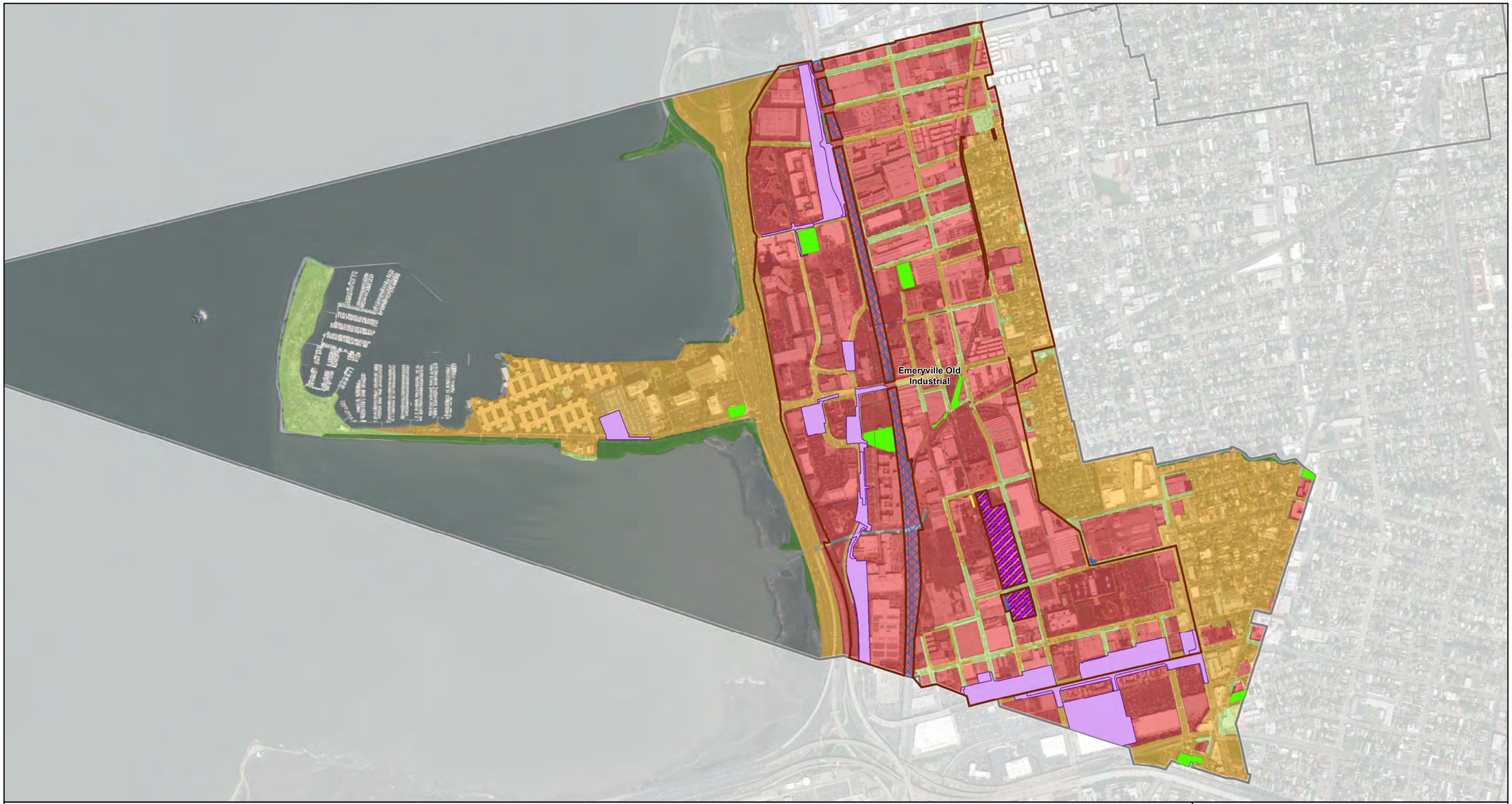

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 925 1,850 Feet

Watershed/Management Areas and Control Measures
Emeryville

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 7-1

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8 City of Fremont

8.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Fremont are shown on Figure 8-1 and are listed in Table 8-1 below. These W/MAs drain to the South Bay and Lower South Bay segments of the Bay.

Table 8-1: City of Fremont PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	4,154.4	2.6%	5.0%	17.8%	74.6%	0.0%
Categorical Railroad	4,465.1	14.2%	19.0%	14.9%	51.9%	0.0%
Fremont Old Industrial	1,066.3	100.0%	0.0%	0.0%	0.0%	0.0%
Fremont Old Urban	12,642.7	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 8-2 and are described in the sections below. Treatment control projects are also shown on Figure 8-1.

Table 8-2: City of Fremont Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	567.3	0.3%	13.7%	37.5%	48.5%	0.0%
Trash Full Capture Devices[1]	177.7	7.5%	19%	73.5%	0%	0%
Enhanced O&M Measures	3,891.8	1.1%	50.1%	41.0%	7.7%	0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

8.2 Scope and Schedule of PCBs Control Measures

8.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Fremont have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

8.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Fremont's Green Infrastructure Plan for further information.

8.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Fremont began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

8.2.4 Enhanced Operation and Maintenance Control Measures

No enhanced operation and maintenance control measures are proposed.

8.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

8.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

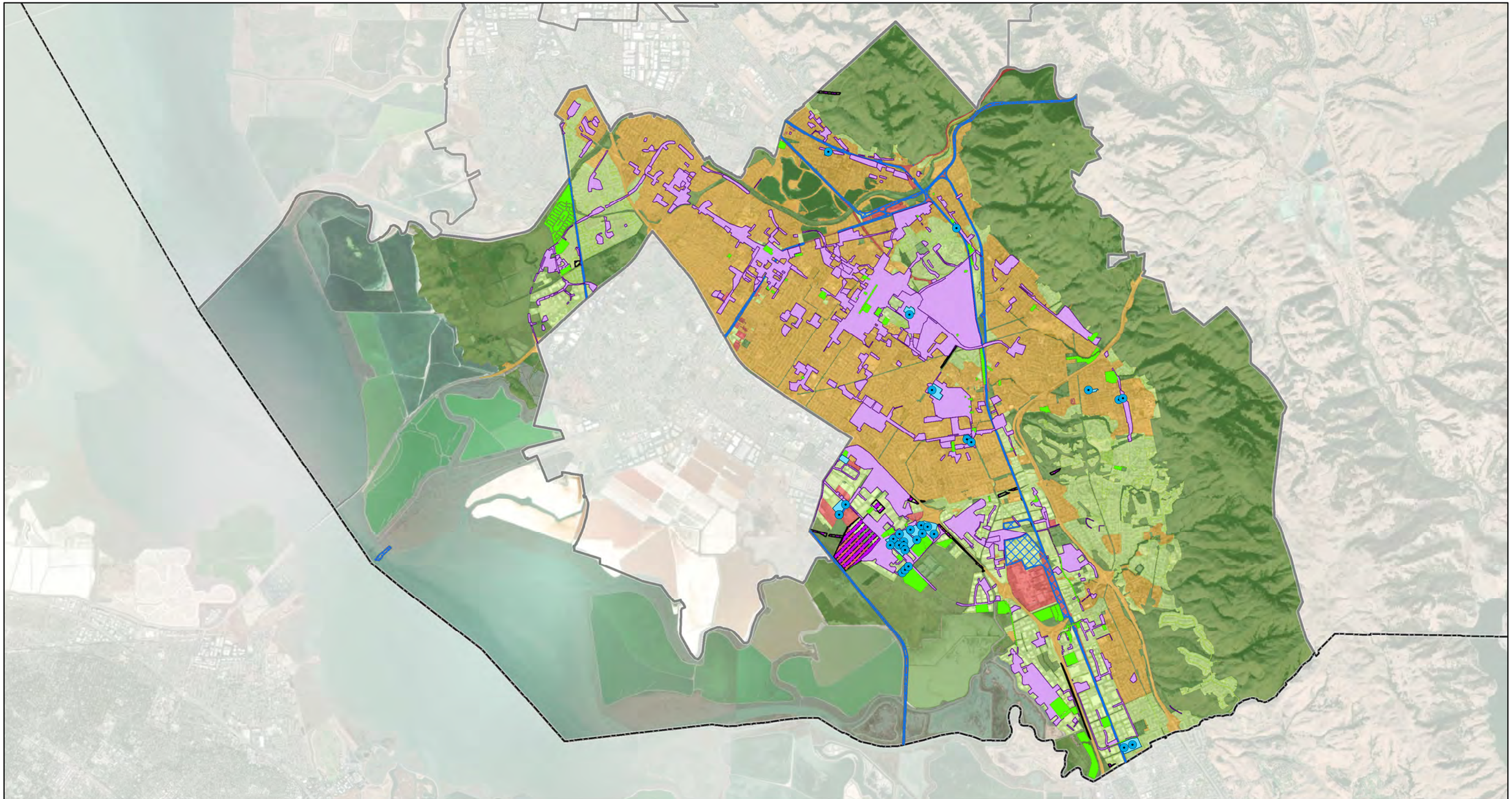

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 6,100 12,200 Feet

Watershed/Management Areas and Control Measures
Fremont

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 8-1

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9 City of Hayward

9.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Hayward are shown on Figure 9-1 and are listed in Table 9-1 below. These W/MAs drain to the Lower segment of the Bay.

Table 9-1: City of Hayward PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	390.0	4.6%	12.9%	42.7%	39.7%	0.0%
Categorical Railroad	908.0	27.5%	2.0%	61.6%	8.9%	0.0%
East Hayward	17,477.5	3.3%	61.0%	9.1%	23.9%	2.6%
West Hayward	10,201.3	15.9%	44.7%	30.9%	4.0%	4.5%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 9-2 and are described in the sections below. Treatment control projects are also shown on Figure 9-1.

Table 9-2: City of Hayward Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	348.4	27.6%	35.6%	27.0%	6.1%	3.6%
Trash Full Capture Devices[1]	1398.1	8.1%	84.1%	1.7%	3.8%	0.0%
Enhanced O&M Measures	993.5	7.3%	85.9%	2.8%	3.3%	0.7%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes Hydrodynamic Separator (HDS) and Gross Solids Removal Device (GSRD) units.

9.2 Scope and Schedule of PCBs Control Measures

9.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Hayward have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

9.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application would be made, such as demolition standards and applicable provisions of section C.3. See the City of Hayward's Green Infrastructure Plan for further information.

9.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Hayward began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

9.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Hayward include clean out of inlet-based full trash capture devices on a semi-annual basis.

9.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

9.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

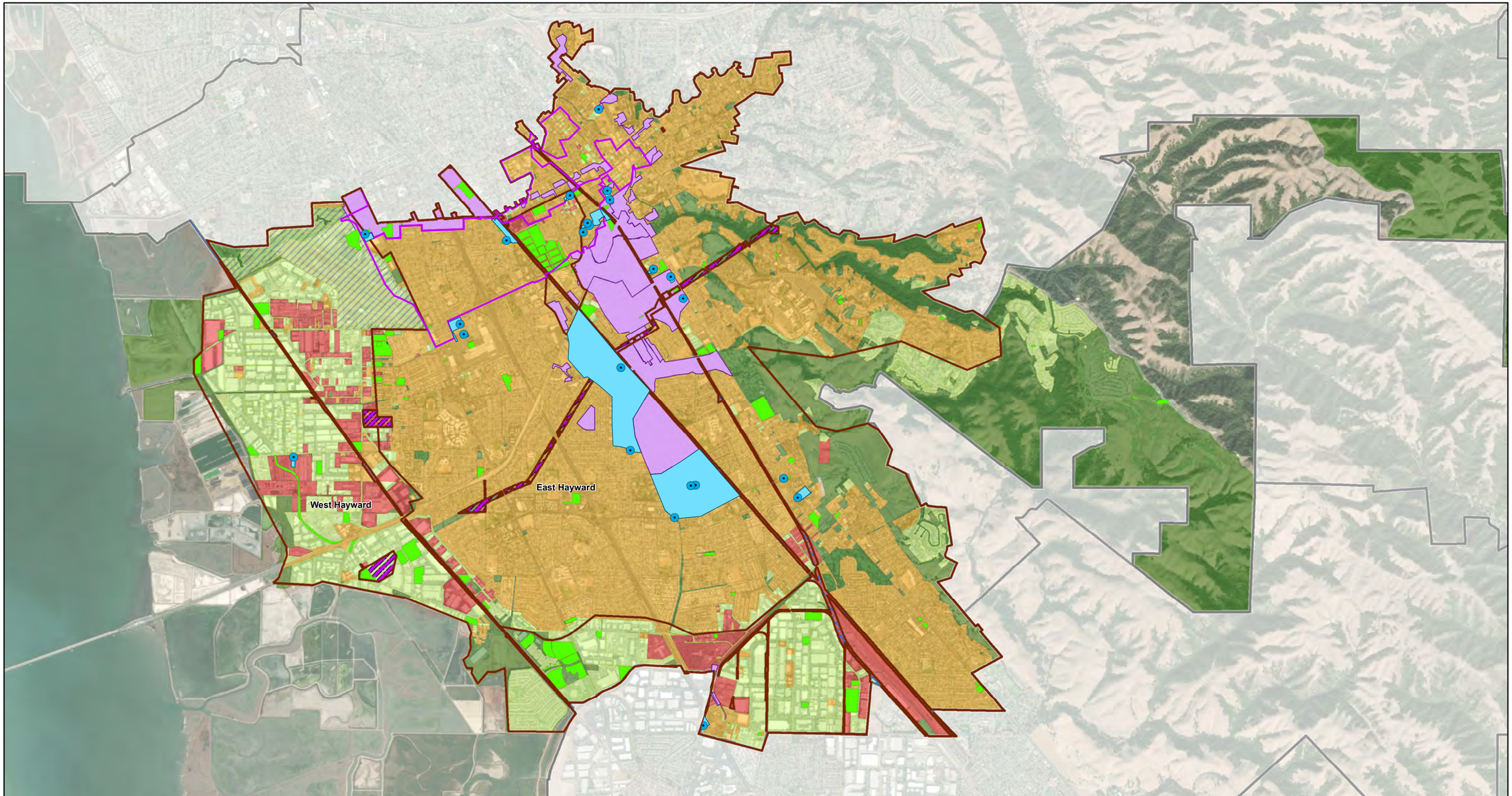

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 3,600 7,200 Feet

Watershed/Management Areas and Control Measures
Hayward

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 9-1

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10 City of Livermore

10.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Livermore are shown on Figure 10-1 and are listed in Table 10-1 below. These W/MAs drain to the Arroyo de la Laguna branch of the Alameda Creek watershed.

Table 10-1: City of Livermore PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	309.9	0.7%	0.0%	98.5%	0.8%	0.0%
Categorical Railroad	470.3	48.8%	0.0%	10.2%	41.0%	0.0%
East Livermore	8,611.9	8.5%	0.1%	1.7%	89.7%	0.0%
Livermore Old Urban	5,594.9	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented are summarized in Table 3-2. These control measures are further described in the sections below. Treatment control projects are also shown on Figure 10-1.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 10-2 and are described in the sections below.

Table 10-2: City of Livermore Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	394.8	3.7%	8.8%	33.1%	54.4%	0.0%
Trash Full Capture Devices[1]	423.2	1.7%	86.5%	8.2.9%	3.7%	0%
Enhanced O&M Measures	1498.4	0.7%	31.3%	49.2%	18.5%	0.4%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

10.2 Scope and Schedule of PCBs Control Measures

10.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Livermore have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

10.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Livermore's Green Infrastructure Plan for further information.

10.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Livermore began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

10.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Livermore include clean out of inlet-based full trash capture devices on a semi-annual basis.

10.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

10.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

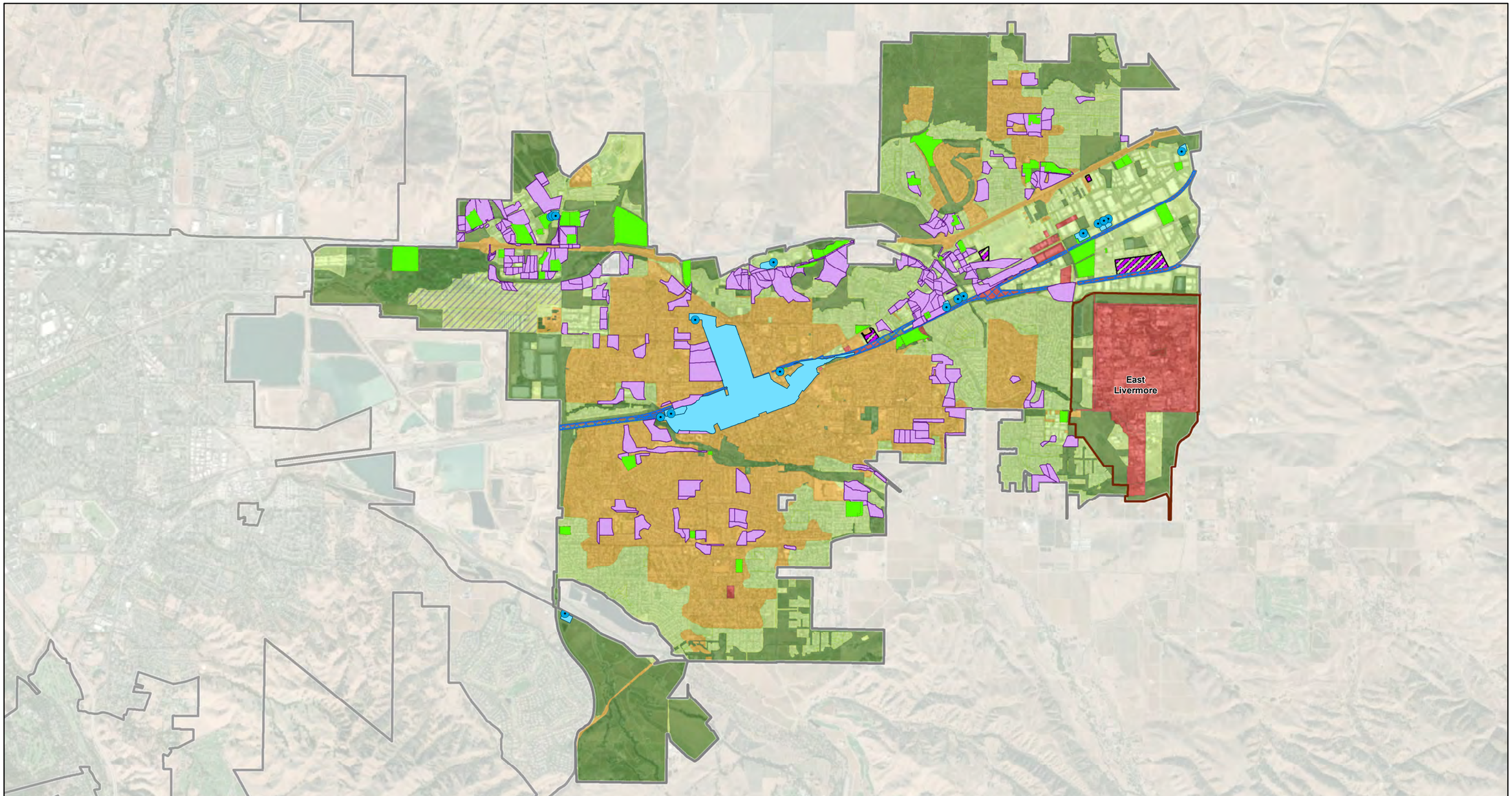

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 4,100 8,200 Feet

Watershed/Management Areas and Control Measures
Livermore

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 10-1

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11 City of Newark

11.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Newark are shown Figure 11-1 and are listed in Table 11-1 below. These W/MAs drain to the Lower and South Bay segments of the Bay.

Table 11-1: City of Newark PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	69.6	100.0%	0.0%	0.0%	0.0%	0.0%
Categorical Railroad	359.8	41.5%	35.9%	15.2%	7.4%	0.0%
Newark Industrial Area	747.0	38.6%	7.2%	52.3%	1.9%	0.0%
Newark Old Urban	2,897.4	0.0%	100.0%	0.0%	0.0%	0.0%

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 11-2 and are described in the sections below. Treatment control projects are also shown on Figure 11-1.

Table 11-2: City of Newark Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	114.3	47.2%	13.5%	25.2%	14.1%	0%
Trash Full Capture Devices	--	--	--	--	--	--
Enhanced O&M Measures	703.7	6.5%	55.8%	30.3%	7.3%	0%

Note: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

11.2 Scope and Schedule of PCBs Control Measures

11.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Newark have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

11.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Newark's Green Infrastructure Plan for further information.

11.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Newark began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

11.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Newark include clean out of inlet-based full trash capture devices on a semi-annual basis.

11.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

11.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

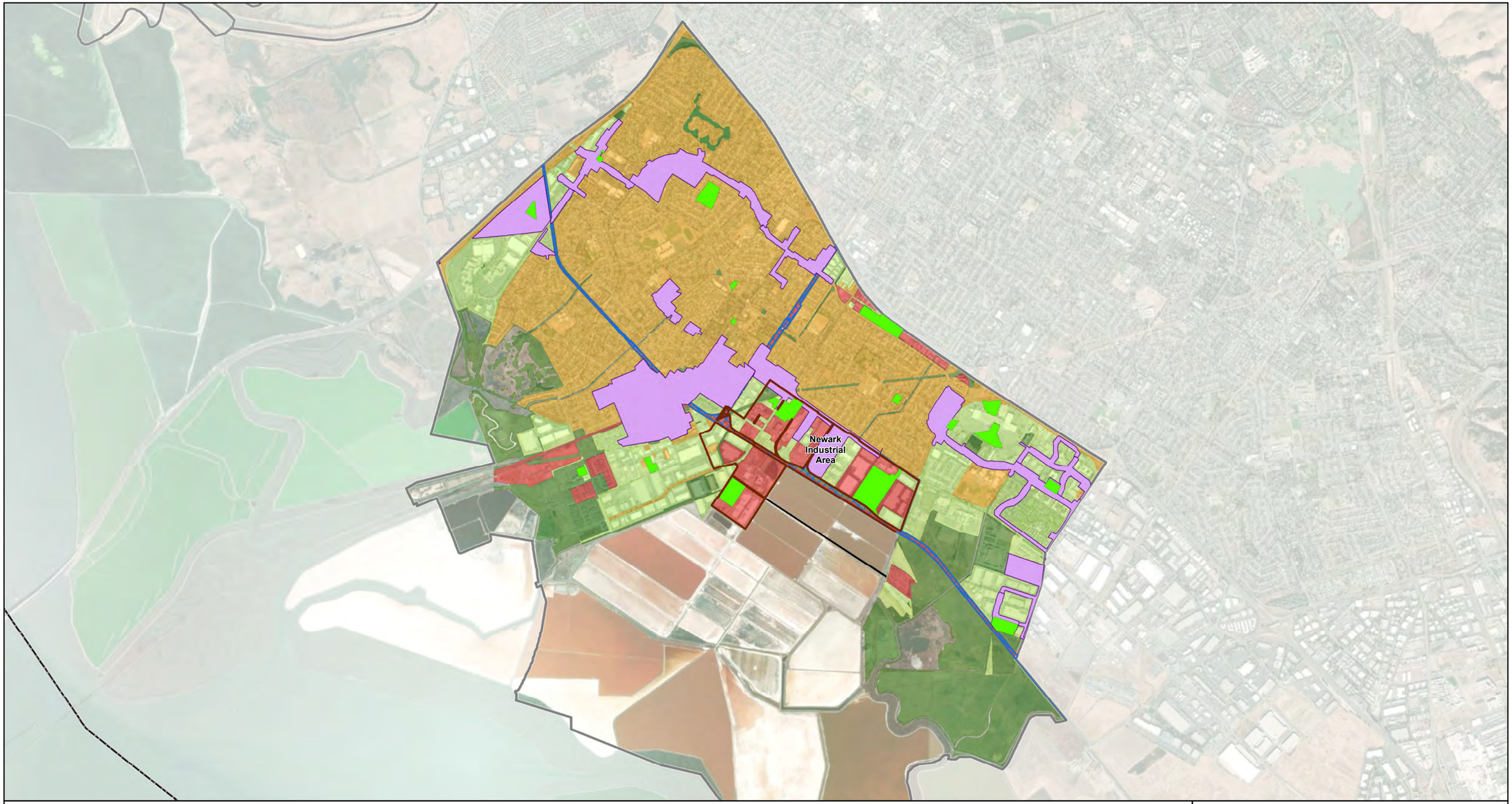

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 2,800 5,600 Feet

Watershed/Management Areas and Control Measures
Newark

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 11-1

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12 City of Oakland

12.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Oakland are shown on Figure 12-1 and are listed in Table 12-1 below. These W/MAs drain to the Central and lower segments of the Bay.

Details for each W/MA are shown in Figure 12-2 through Figure 12-7. The detail maps show land uses (i.e., Old Urban (brown); New Urban and Open (pale green)); non-municipally owned electrical utility parcels (i.e., PG&E, purple crosshatch); railroad parcels (black crosshatch); classification to be confirmed (green crosshatch); and the 2015 PCBs source property screening results (i.e., high (orange), moderate (yellow), and low/no likelihood (green)). The detail map for the West Oakland Management Area (Figure 12-5) also shows known properties referred for PCBs (blue); other PCBs source properties (from the CW4CB Task 3 referrals, Department of Toxic Substances Control (DTSC) EnviroStor, and the State Water Board Geotracker, in red or brown crosshatching); and monitoring data (blue, yellow, and fuchsia triangles).

Table 12-1: City of Oakland PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical Railroad	1,700.0	42.8%	52.3%	2.8%	2.1%	0.0%
Oakland Army Base (Figure 12-4)	994.5	69.0%	29.9%	1.0%	0.1%	0.0%
Oakland Old Industrial (Figure 12-1)	1,766.4	100.0%	0.0%	0.0%	0.0%	0.0%
Oakland Old Urban (Figure 12-1)	22,489.2	0.0%	100.0%	0.0%	0.0%	0.0%
Planned Redevelopment Areas (Figure 12-6, includes Lake Merritt BART Station Area, Brooklyn Basin, International Boulevard TOD Plan, Central Estuary Area Plan, and Coliseum Area Specific Plan)	7,202.2	11.9%	79.2%	6.5%	2.4%	0.0%
Port-Related (Figures 12-2 (Seaport) and 12-3 (Airport))	5,023.3	32.8%	8.1%	5.1%	11.8%	42.2%
West Oakland (Figure 12-5, includes the Ettie Street Pump Station (ESPS) Watershed)	2,113.0	19.7%	69.3%	9.1%	1.8%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 12-2 and are described in the sections below. Treatment control projects are also shown on Figure 12-1 through Figure 12-7.

Table 12-2: City of Oakland Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	79.0	100%	0%	0%	0%	0%
Green Infrastructure and Treatment	254.1	17.1%	30.1%	1.4%	2.1%	49.3%
Trash Full Capture Devices[1]	64.8	0%	96%	4%	0%	0%
Enhanced O&M Measures	255.9	1.0%	94.6%	3.4%	0.9%	0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes Hydrodynamic Separator (HDS) and Gross Solids Removal Device (GSRD) units installed since 2014.

12.2 Scope and Schedule of PCBs Control Measures

12.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

Seven properties within the City of Oakland have been referred to the SFBRWQCB as a result of the inspection and monitoring activities conducted by the Program (see Table 12-3 below). The location of these properties is shown on Figure 12-5.

Table 12-3: Source Property Referrals

SITE NAME	LOCATION	AREA (acres)	YEAR ABATED/REFERRED
AMG	3438 Helen Street	0.43	2018
CASS	2711 Peralta	7.2	2018
Former Giampolini	2847 Peralta Street and 2847 Peralta Street	1.9	2018
GE Oakland	5441 East 14th Street	10.1	2018
OAB Transformer Spill	10th and Maritime Street	0.02	2018
Precision Cast Products	1549 32nd Street and 2868 Hannah Street	0.79	2018
UPRR Oakland Coliseum	700 73rd Avenue	0.40	2018
Schnitzer Steel	1101 Embarcadero West	33.7	2020
General Electric – Oakland Phase 2	5441 East 14th Street	13.9	2020
Kaiser Medical Center	280 West MacArthur Blvd	3.6	2020
OES-21	Wood Street and 15th Street	6.2	2020
768 46th Avenue	768 46th Avenue	1.8	2020
Economy Lumber	750 High Street	0.4	2020

Asbestos Management Group of California, Inc. (AMG) provides general construction services (abatement services) to remove hazardous materials (lead, asbestos, PCBs) from buildings that will be or have been demolished. AMG conducts both interior demolition and exterior demolition. AMG removes caulk and tiles (containing asbestos and PCBs) using hand tools, contains it in plastic, and stores it in an enclosed container onsite.

CASS is a large scrap metal recycling facility operating on four adjacent city blocks. The central facility is the main receiving and sorting area where individuals and small wholesalers deliver metal scrap loads. The eastern facility is where aluminum is taken to be melted down to ingots. The western facility is where large scrap is cut down to manageable sizes and bailed scrap is stored. The northern facility is their parking, machine shop, and community workspace.

The former Giampolini property is an irregularly shaped property bordered by Hannah Street on the west; Peralta Street to the south and Helen Street to the east. Residential and industrial properties border the site to the north. A paint facility was present on the south half of the Site from at least 1939 until the mid-1960s. The paint factory included a varnish kitchen operation. During this time period, the covered storage building on the northwest side of the site was occupied by a reinforcing steel (rebar) bending and storage facility. Foreign Auto Wreckers operated an automobile dismantling business at the Site from the 1980s until 2000.

General Electric Company – Oakland, located in East Oakland, was a transformer manufacturing facility between 1924 and 1975. Between 1975 and the mid-1990s, GE Apparatus Service Department operated an electrical equipment maintenance and repair operation in portions of the site. After that time, the site was used for temporary storage of mobile office trailers. Since 2005, the site has not been in use, but has been undergoing remediation. Phase I of the remediation was performed from August 2013 through March 2015 and was submitted as a self-abatement in FY2017/18. Phase II includes demolition and remediation associated with the eight remaining buildings on the site. After building demolition and remediation, which is planned for completion prior to December 31, 2020, a new industrial building will be constructed with landscaping. This site is being reported as a self-abatement.

A transformer oil spill containing 17 mg/kg of PCBs was cleaned-up at an Oakland Army Base site in October 2014, as described in section 12.2.6.

The Precision Cast Products site (parcels 7-589-1 and 7-589-24) has addresses for 1549 32nd Street and 2868 Hannah Street. From the 1940's to 1983, the site heat-treated metal products, and operated as a steel foundry from 1983 to 2002. A putty and paint factory also operated at the site until 1985. The site is currently a vacant lot. The City of Oakland has approved building permit plans for the proposed "Hannah Street Lofts" redevelopment project contingent upon clearance of environmental conditions at the site.

The Union Pacific Railroad (UPRR) site is located in the vicinity of the Oakland Coliseum Complex. The property is divided into a “northern” and a “southern” portion. The “northern” portion currently serves as a parking lot for the adjacent Oakland Intercity Rail Station. The “southern” portion (defined as the site) is located southeast of 73rd Avenue and is an unpaved vacant lot enclosed by fencing. The site was acquired by Central Pacific Railroad in 1895 and used as a station depot between 1895 and 1933. From 1959 to 1992, the site was leased to two successive tenants and operated as an auto salvage yard. Since 1992, the site has been vacant and unoccupied.

Schnitzer Steel Industries, Inc. is a scrap metal recycling facility located in West Oakland with a long history of soil and groundwater contamination. The SFBRWQCB issued Cleanup and Abatement Orders Nos. 88-023 and R2-2013-1001 to Schnitzer Steel Industries, Inc. in 1988 and 2013 and waste discharge requirements (WDRs; Order No. R2-2016-0045, NPDES Permit CA0030228) for discharges of treated process water, cooling water, dust suppression water, wash water, and stormwater to the facility in 2016. The RWB issued a Water Code Section 13267 Technical Report Requirement order in February 2017. This site is being referred to the SFBRWQCB.

The Kaiser Permanente Oakland Legacy Hospital Tower was a 14-story hospital building with a basement constructed in various phases between the 1940s and 1980s. Sources of PCBs in the facility included caulk, rubber gaskets, and certain metal panels on the building façade that were in contact with PCBs-containing materials. The building was demolished, and the site was landscaped in 2019. This site is being reported as a self-abatement.

OES-21, located at Wood Street and 15th Street, was historically associated with railroad activity. Field sediment sampling performed in the right-of-way adjacent to the property in 2015 measured a PCBs concentration of 2.149 mg/kg. The site has since been redeveloped into a residential housing complex.

Brownfield Auto Auction (former Nor-Cal Rock), located in East Oakland, is currently a storage yard for used automobiles sold for auto auction, was previously operated as a concrete and asphalt recycling business, and prior to that as a scrap metal yard. Seven samples collected from six soil boring locations contained concentrations greater than 1.0 mg/kg. As the site drains directly to an open channel section of Peralta Creek, there is no opportunity for the City of Oakland to implement enhanced O&M measures. Therefore, no load reduction credit has been taken for this source property referral.

The Economy Lumber site is located in East Oakland along the Union Pacific Railroad tracks, extending southeast from High Street to an open channel section of Peralta Creek. The parcel has been used historically for railroad operations, scrap metal operations, and an auto body repair shop. A small portion of the site is unpaved; a work plan for paving has been approved, but as of

June 2020, the paving had not yet been completed. As the site drains directly to an open channel section of Peralta Creek, there is no opportunity for the City of Oakland to implement enhanced O&M measures. Therefore, no load reduction credit has been taken for this source property referral.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

12.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Oakland's Green Infrastructure Plan for further information.

C.3/Redevelopment

A W/MA has been designated for the Oakland Army Base and one W/MA has been designated for the other planned redevelopment areas combined, based on existing Specific Plan and/or Redevelopment Plan boundaries. The planned redevelopment in these W/MAs is described below.

<u>Oakland Army Base</u>

The Oakland Army Base is a 360-acre area bounded by Interstate 80, East Bay Municipal Utility District wastewater treatment plant, Oakland Inner, Middle and Outer Harbor (Port of Oakland), Interstate 880, and 7th Street (see Figure 12-4). The Army Base served as a U.S. Army facility until it closed in 1999. In 2000, the Oakland City Council designated the Base and surrounding properties as a Redevelopment Project Area. The 1,800-acre Army Base Project Area was divided into three major sub-districts: 16th and Wood, Maritime, and Oakland Army Base (OARB). The OARB was further divided into two areas - the Gateway Development Area owned by the Oakland Redevelopment Agency and the Port Development Area owned by the Port of Oakland. Following the dissolution of the Redevelopment Agency in 2012, the Gateway Development Area was transferred to the City by deed and the City assumed all of the environmental obligations attached to the entire former OARB sub-district, and all of the redevelopment obligations for the Gateway Development Area.

On July 3, 2012, the Oakland City Council approved a master plan for the development of a mixed-use project of commercial, maritime, rail, and open space uses on the former Army Base and adjacent Port property (the "Oakland Army Base Project"). Since then, the City has accomplished the following major milestones:

- On October 23, 2012, the City executed a Lease Disposition and Development Agreement (LDDA) with Prologis CCIG Oakland Global to develop the public infrastructure and approximately 120 acres of the former Army Base. The LDDA spells out the financial terms, the scope of development, and other considerations for developing the Army Base. Construction of the public infrastructure, the first phase of the multi-phased project, began November 1, 2013. In this redevelopment phase, the City, with the support of the Port and CCIG, is delivering public improvements, which include:
    - Soil stabilization;
    - Remediation of hazardous substances; and
    - Construction of all new public infrastructure, including roadways, utilities, rail improvements, and environmentally supportive bioswales and landscaping.
- On May 7, 2013, the California Transportation Commission (CTC) executed a grant agreement to provide the City with approximately $176.3 million from the Trade Corridor Improvement Fund (TCIF) for the construction of public improvements.
- On May 7, 2013, and again on April 2, 2014, the City extended the Exclusive Negotiation Agreement (ENA) with California Waste Solutions (CWS) and Custom Alloy Scrap Sales (CASS) for the development of approximately 22 acres in the North Gateway Area of the Army Base. The ENA expired in December 2014.
- On July 30, 2014, the City executed a Lease Disposition and Development Agreement (LDDA) with OMSS, LLC to develop approximately 17 acres of the Army Base for Ancillary Maritime Support (AMS) services. The LDDA spells out the financial terms, scope of development, and other considerations for developing the AMS project. Construction of the project is anticipated to begin in the fourth quarter of 2016.

Lake Merritt BART Station Area

The Lake Merritt Station Area Plan, a Specific Plan for the area around the Lake Merritt BART Station in Downtown Oakland, was adopted in December 2014. The Plan envisions a high-intensity neighborhood around a rejuvenated Lake Merritt BART station. It seeks to reinforce and integrate the cultural and recreational resources that make the area around the transit station unique. The Plan identifies ways in which streets, open spaces, and other infrastructure in the area can be enhanced and establishes regulations for development projects that further the area's vibrancy.

Brooklyn Basin

The Brooklyn Basin (formerly "Oak to Ninth Mixed Use Development") project was approved by the Oakland City Council on July 18, 2006. The project site is approximately 64 acres of waterfront property bounded by Embarcadero Road, Fallon Street, Tenth Avenue and the Estuary. The project includes up to 3,100 residential units including 465 affordable housing units, 200,000 square feet of ground-floor commercial space, a minimum of 3,950 parking spaces, approximately 32 acres of parks and public open space, two renovated marinas (total 170 boat slips), and an existing wetlands restoration area. The existing buildings on the site will be demolished with the exception of the Jack London Aquatic Center, a portion of the Ninth Avenue Terminal shed building, and a portion of the Ninth Avenue Terminal wharf structure. The project does not include approximately six acres of privately held property along the east of Fifth Avenue that contain a mix of commercial and industrial uses, as well as a small community of work/live facilities. The project will be constructed in four phases over a seventeen-year period.

The City of Oakland approved the Phase 1 Streets & Infrastructure Final Development Permit in March 2015 and roadway construction activities got underway. Construction activities included site remediation for hazardous materials. Construction on the first phase of the project, 241 apartments, began in 2017. Additional construction on affordable units for families and seniors began in spring of 2018, with the units available for lease in fall 2019.

International Boulevard Transit Oriented Development Plan

The International Boulevard Transit Oriented Development (TOD) Plan explores opportunities for developing TODs at select locations along International Boulevard. The impetus for the International Boulevard TOD Plan is to leverage a planned Bus Rapid Transit (BRT) system – which would extend across multiple cities and run along the full length of International Boulevard on its route, with multiple stops along the corridor – to improve conditions along the street itself and in surrounding neighborhoods. Construction of the BRT system is expected to bring millions of dollars of new investment in infrastructure to the corridor and result in significant physical improvements to the street. The TOD Plan assesses opportunities for developing TOD projects along International Boulevard, identifies possible strategies for realizing TOD projects in these areas, and develops a menu of options for implementing the strategies. The TOD Plan also supports the City's current land use framework that encourages higher-density developments near transit hubs and along major commercial corridors, promotes high-quality urban design in the city's neighborhoods, and encourages economic development within targeted neighborhoods.

Central Estuary Area Plan

The City of Oakland adopted the Central Estuary Area Plan (CEAP) in 2013 to guide future development in the Central Estuary Area which encompasses 19th Ave. to 54th Ave and I-880 to

the Estuary. The Plan focuses on ten sub-districts where the intensification of commercial/industrial uses is anticipated. The CEAP includes design guidelines and zoning regulations for the various sub-districts. The development contemplated as part of the CEAP would allow for an increase of 390 residential units, 30 live/work units, 370,000 square feet of industrial area, 700,000 square feet of commercial area, and 10 acres of new park space. Additionally, transportation and infrastructure improvements are recommended to address infrastructure deficiencies.

Coliseum Area Specific Plan

The Coliseum Area Specific Plan, which was adopted in March 2015, will guide the future development of the Oakland-Alameda County Coliseum site and the area across I-880 (Oakland Airport Edgewater Business Park). The Plan seeks to transform the underutilized land around the Oakland-Alameda County Coliseum and Arena into a world-class sport, entertainment, and science & technology district that boasts a dynamic and active urban setting with retail, entertainment, arts, culture, live and work uses. The Plan provides both a short-term development plan for the accommodation of up to three new venues for the City's professional sports teams, and a longer term, 25-year planning document providing a roadmap for land use policy, regulatory requirements and public and private investment that coordinates future development in the Coliseum Area. The Plan covers approximately 800 acres, bounded by 66th Avenue to the north, San Leandro Street on the east, Hegenberger Road on the south, and San Leandro Bay and the Oakland International Airport to the west.

Green Street Retrofit Projects

A few of Oakland's implemented or planned green street retrofit projects (not Regulated Projects) are summarized below.

Latham Square

The approximately ¼ acre Latham Square project was completed in July 2016. The project reconstructed the Latham Square Plaza and neighboring roadways and intersections. The Project area is Telegraph Avenue from Broadway to 17th Street, Broadway from 14th Street to 17th Street, and 16th Street from Telegraph to San Pablo Avenue. The improvements include expansion of the Latham Square Plaza, improved intersections, traffic signal upgrades, new roadway surfacing, bulb-outs, restoration of the historic Latham fountain, informational panels, landscaping, and pedestrian and decorative lighting. Green infrastructure components include raingardens along Broadway.

San Pablo Avenue Green Stormwater Spine

The San Pablo Avenue Green Stormwater Spine is a San Francisco Estuary Partnership pilot project and model for Bay Area municipalities implementing green infrastructure projects as part of their stormwater management efforts. The Spine Project will design, build, and monitor an array of low impact development (LID) projects distributed along 12.5 miles of San Pablo Avenue, in partnership with a number of East Bay cities. Within the City of Oakland, the project includes:

- Installation of a rain garden, new bike lane, and wider sidewalk on one acre between 16th and 17th.
- Installation of a rain garden on one acre at West Macarthur. This project is 20% in Oakland and 80% in Emeryville.

Lakeside Green Street Project

The intersection of 20th Street, Lakeside Drive, and Harrison Street adjacent to Snow Park has been reconfigured to calm traffic, create safer pedestrian crossings, add bike lanes, and increase park space. The project includes rain gardens and swales to treat roadway runoff.

Broadway/Keith Avenue to Golden Gate Way Bike/Pedestrian Project

This project incorporated a raingarden (bioretention area) to treat roadway runoff.

7th Street Streetscape

Phase I of this streetscape improvement project, which extends on 7th Street from Peralta to Union, is complete. Phase II, which extends from Wood to Peralta, is currently under construction and includes the installation of widened sidewalks, corner bulb-outs, planted medians, reduced traffic lanes, new lighting, trees, and bicycle lanes. In addition, the project contains several art features, including a gateway element, dancing lights, and sidewalk medallions as part of a Blues Walk of Fame.

Laurel Access to Mills, Maxwell Park & Seminary (LAMMPs) Streetscape Project

LAMMPS is a community-driven, community-based plan designed to improve transportation conditions along MacArthur Boulevard between High Street and Seminary Avenue. This project includes several bioretention facilities and is under construction.

Lake Merritt Improvement Project

This project, located at the entrance to Lakeside Park, Children's Fairyland, and the Garden Center, will improve pedestrian safety, accessibility and pathways. Three bioretention facilities installed at Bellevue and Grand Avenues collect street and sidewalk runoff.

12.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

Oakland implements its Construction and Demolition Debris Waste Reduction and Recycling Ordinance by assigning an access code to each building permit application for online reporting and tracking of debris recycling and disposal via Green Halo Systems (project proponents who opt for paper reporting must pay additional fees). Oakland was the initial adopter of the Green Halo tool and staff use the data to work closely with clients on compliance with the city's ordinance, including advising projects with older buildings that PCBs-containing materials may be present. City and Program staff have explored the feasibility of Green Halo upgrades for reporting on abatement and disposal of such materials that could potentially be contracted via the Alameda County Waste Management.

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Oakland began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

12.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Oakland include clean out of inlet-based full trash capture devices on a semi-annual basis. Enhanced inlet cleaning has been implemented for all inlet-based full trash capture devices (i.e., CPS units) as well as a few inlets in the West Oakland/ESPS Watershed W/MA.

12.2.5 Diversion to POTW

No diversion to POTW control measures are proposed by the City of Oakland, although the Alameda County Flood Control and Water Conservation District is operating an Urban Runoff Diversion Project at the ESPS to direct dry weather discharges from the ESPS watershed to the East Bay Municipal Utility District's main wastewater treatment plant for treatment. See Section 18.1.5 below for further information.

12.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The City of Oakland has an extensive illegal dumping program and devotes significant resources to abating dump sites. In fiscal year 2017/2018, Oakland responded to over 31,000 service requests for illegal dumping and removed over 40,000 cubic yards of debris. Oakland will continue to identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

In October 2014, a pole-mounted transformer that had been removed from a utility pole at the Oakland Army Base tipped over and spilled transformer oil. The concentration of PCBs in the spilled oil was measured to be 17 mg/kg. The impacted asphalt and soils were excavated and removed from the site (Terraphase Engineering, 2014).

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

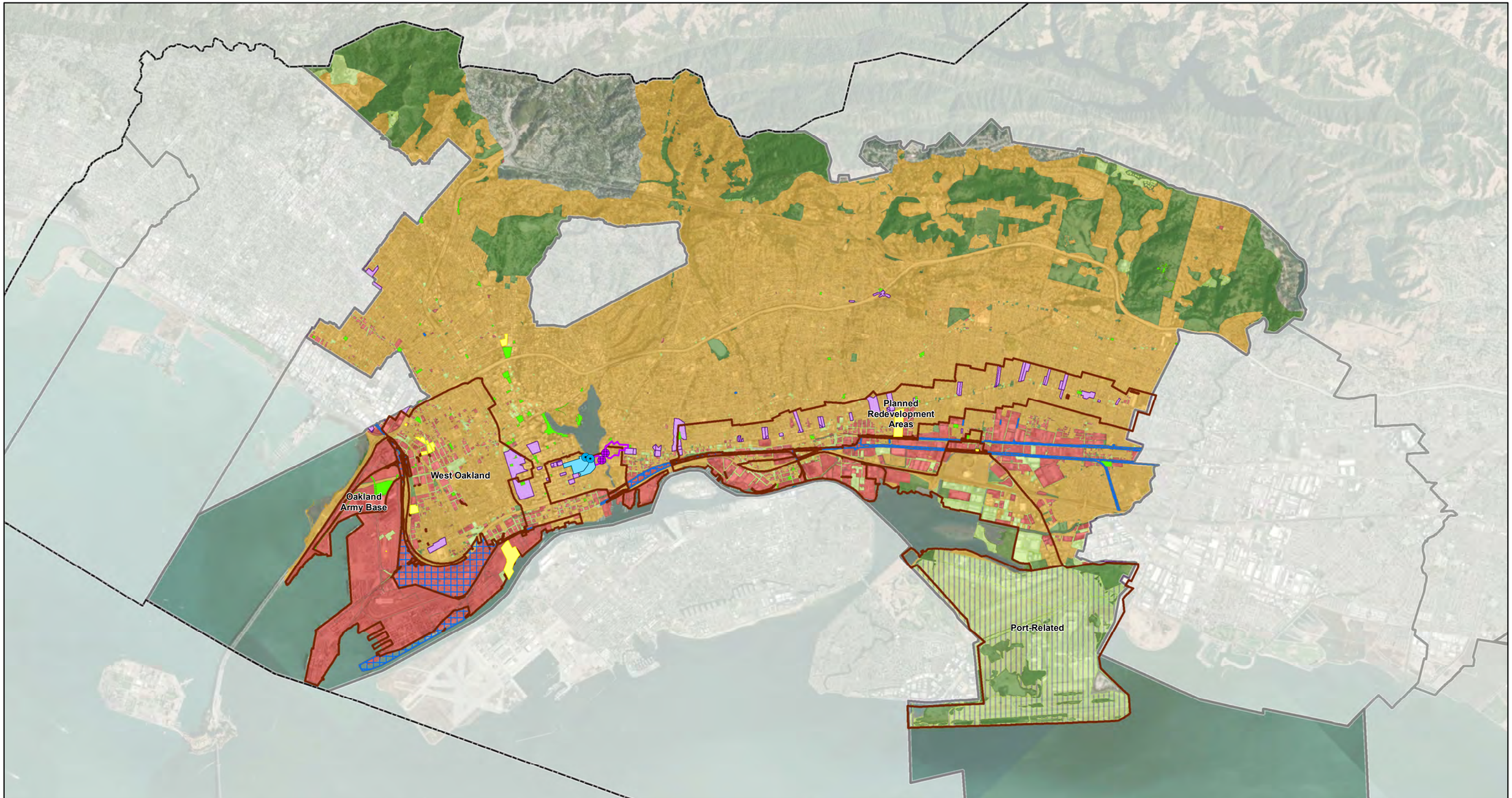

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 5,400 10,800 Feet

Watershed/Management Areas and Control Measures
Oakland

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-1

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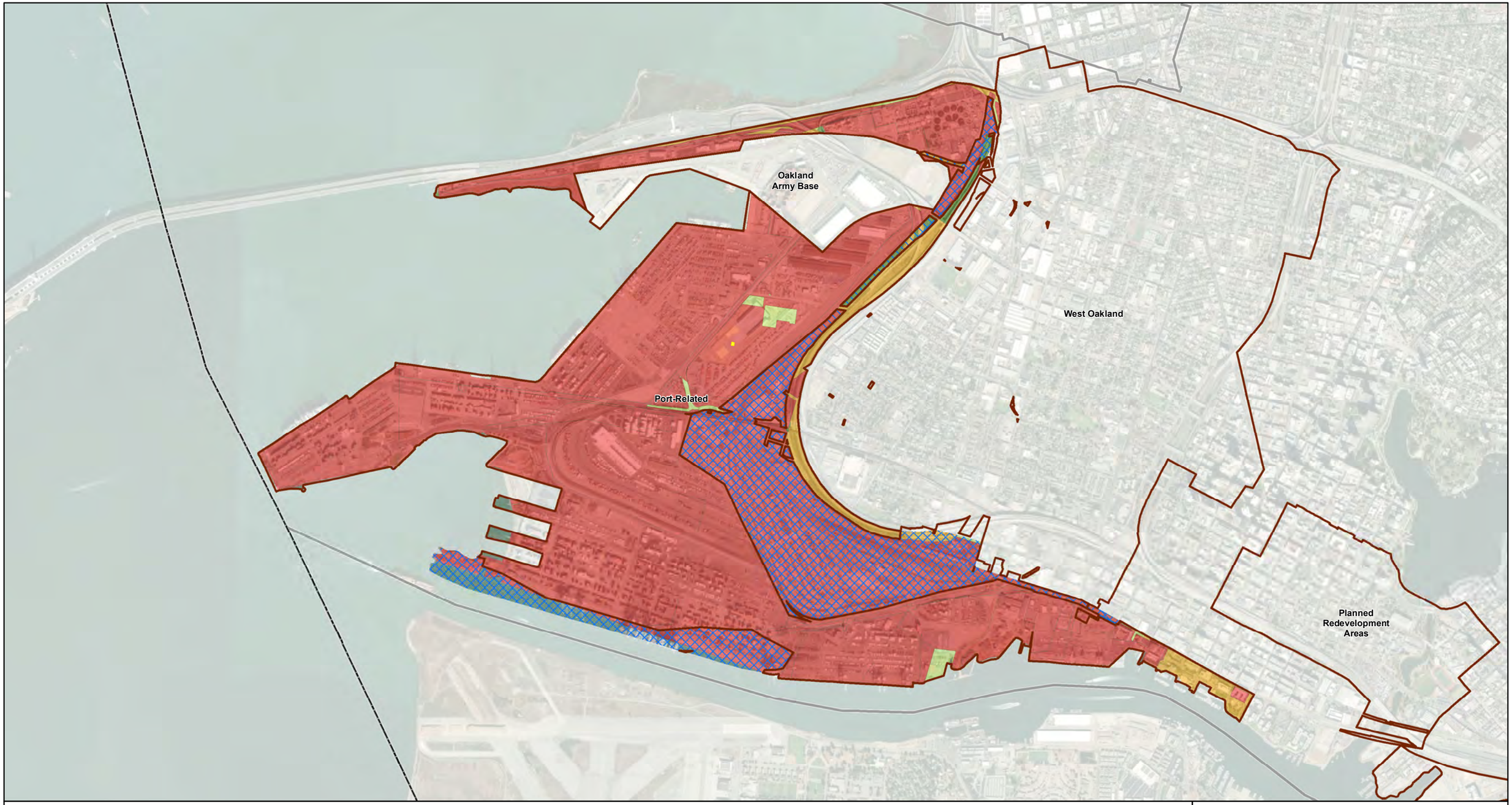

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Baseline Landuse Yield

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 1,700 3,400 Feet

Watershed/Management Areas and Control Measures
Oakland Port-Related Management Area
(Seaport Region)

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-2

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Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Baseline Landuse Yield

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 2,300 4,600 Feet

Watershed/Management Areas and Control Measures
Oakland Port-Related Management Area
(Airport Region)

Alameda Countywide Clean Water Program

Geosyntec consultants

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Figure 12-3

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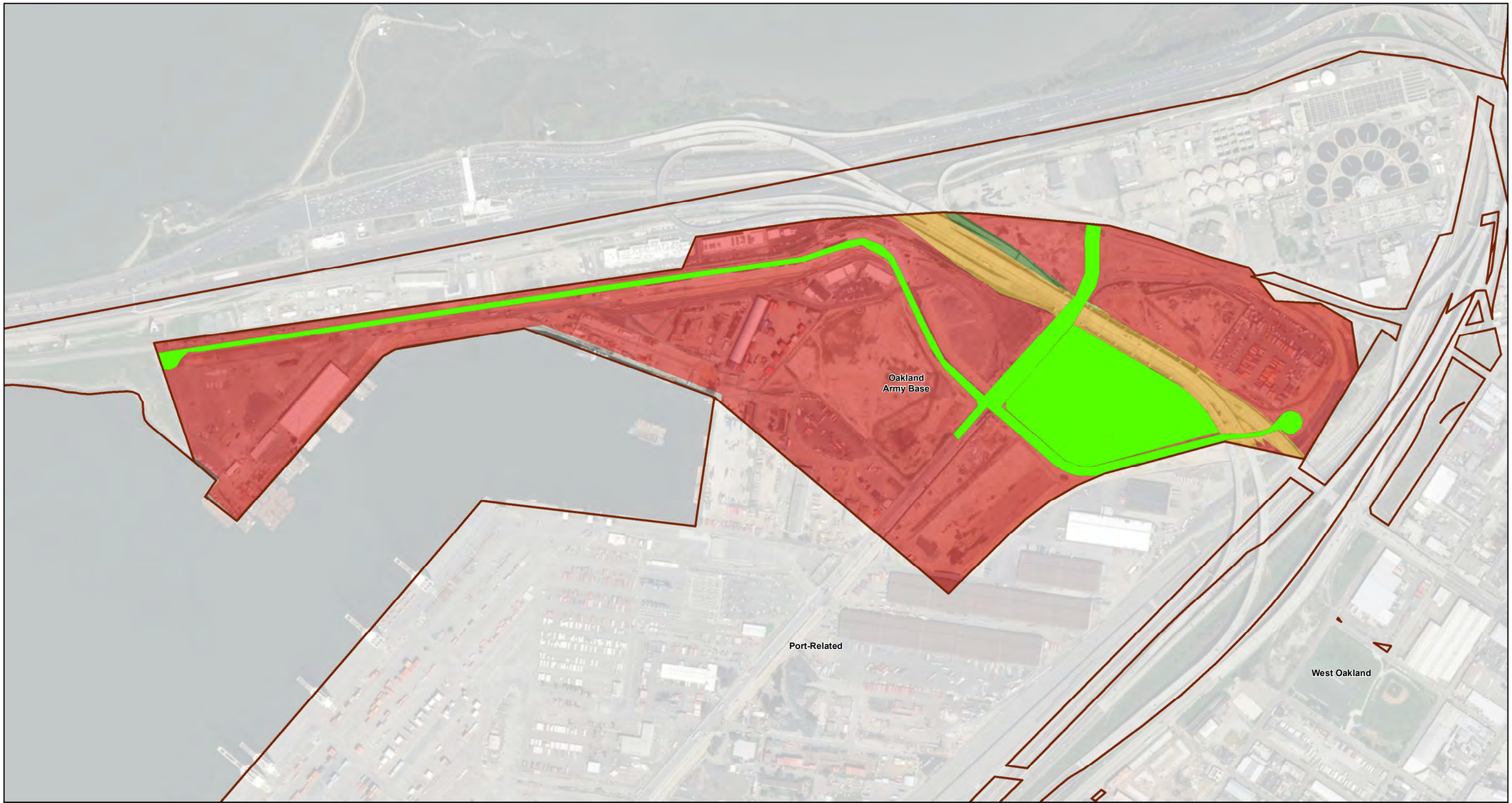

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Baseline Landuse Yield

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 530 1,060 Feet

Watershed/Management Areas and Control Measures
Oakland Army Base Management Area

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-4

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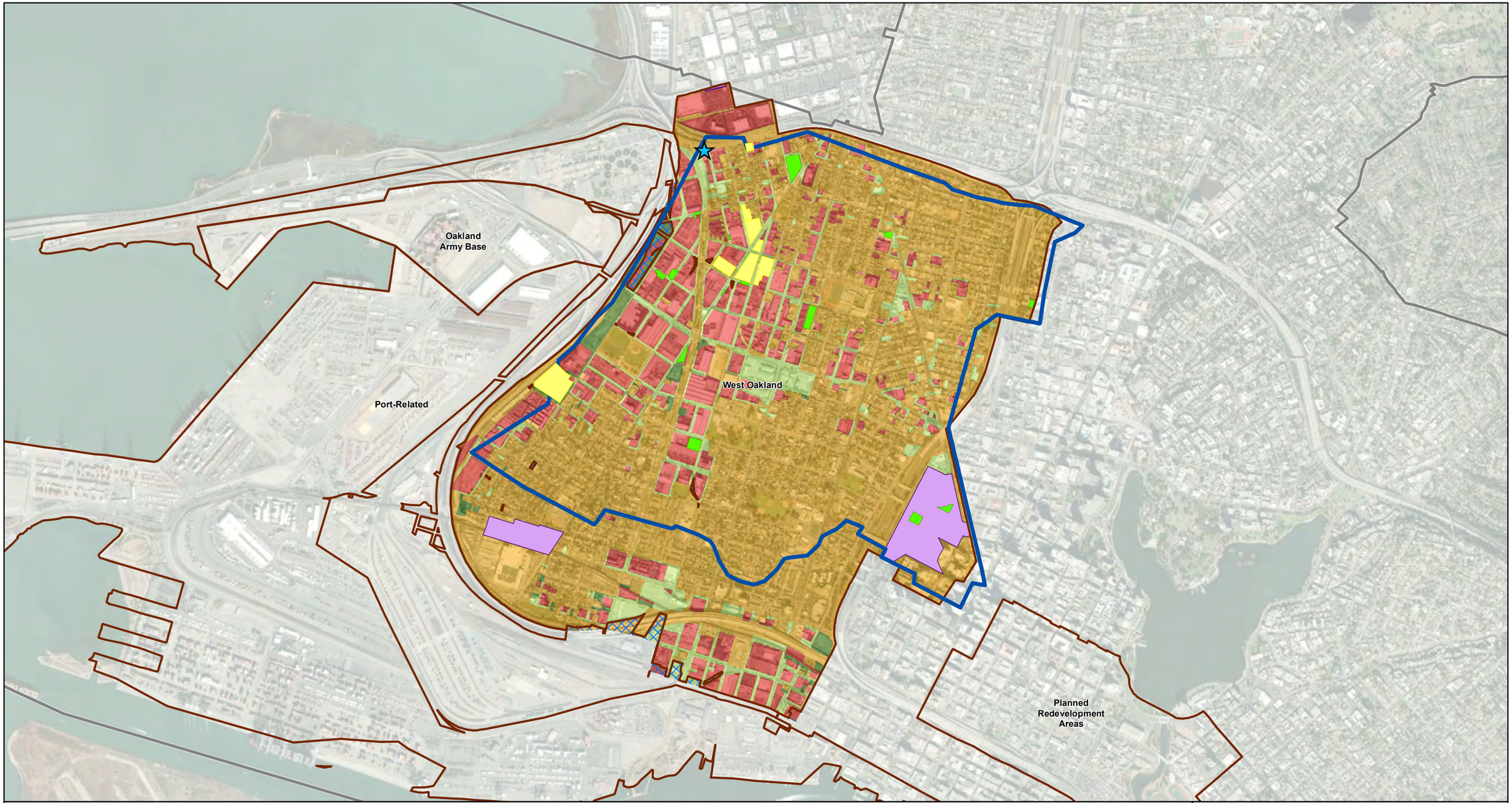

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

Diversion to POTW

- Ettie St. Pump Station Watershed
- Ettie St. Pump Station

N

0 1,500 3,000 Feet

Watershed/Management Areas and Control Measures
West Oakland Management Area

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-5

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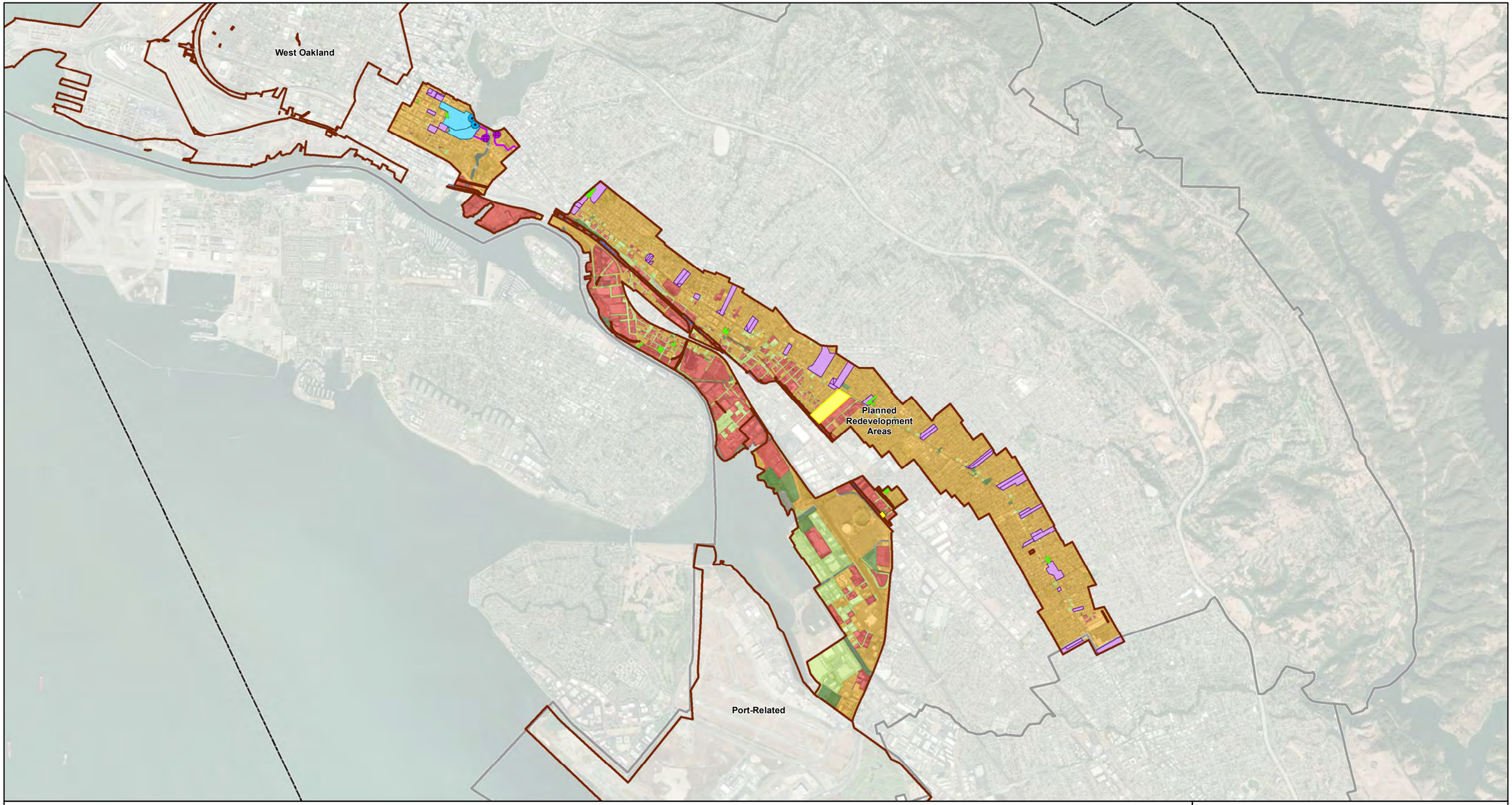

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Baseline Landuse Yield

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 3,750 7,500 Feet

Watershed/Management Areas and Control Measures
Oakland Planned Redevelopment Management Areas

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-6

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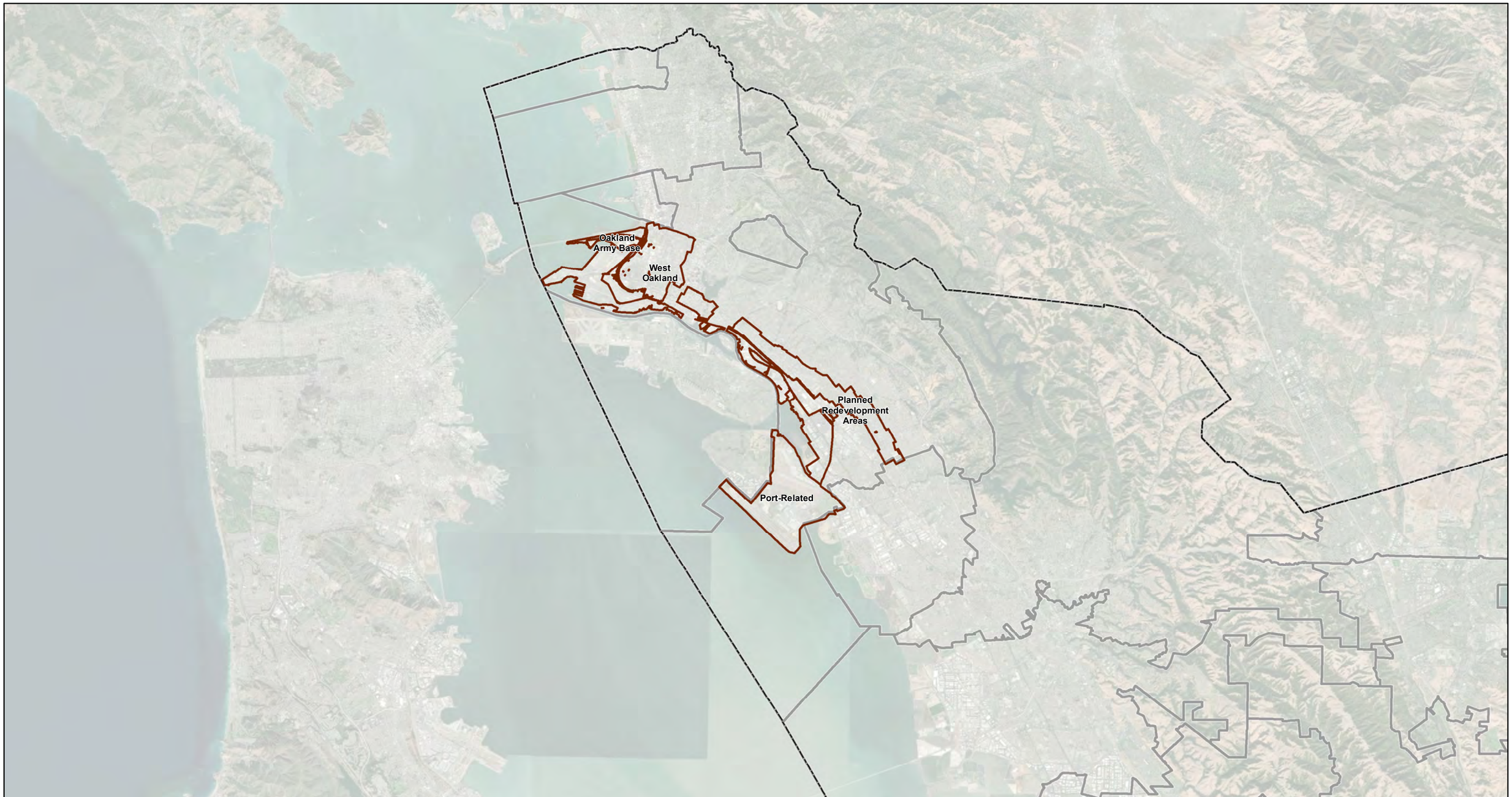

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Baseline Landuse Yield

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 12,000 24,000 Feet

Watershed/Management Areas and Control Measures
Oakland Old Urban and Old Industrial Management Areas

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-7

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13 City of Piedmont

13.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Piedmont are shown on Figure 13-1 and are listed in Table 13-1 below. These W/MAs drain to the Lower segment of the Bay.

Table 13-1: City of Piedmont PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	0.4	0.0%	0.0%	0.0%	100.0%	0.0%
Piedmont Old Urban	2,232.4	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 13-2 and are described in the sections below. Treatment control projects are also shown on Figure 13-1.

Table 13-2: City of Piedmont Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	--	--	--	--	--	--
Trash Full Capture Devices	--	--	--	--	--	--
Enhanced O&M Measures	--	--	--	--	--	--

Note: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

13.2 Scope and Schedule of PCBs Control Measures

13.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Piedmont have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

13.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Piedmont's Green Infrastructure Plan for further information.

13.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Piedmont began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

13.2.4 Enhanced Operation and Maintenance Control Measures

No enhanced operation and maintenance control measures are proposed.

13.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

13.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

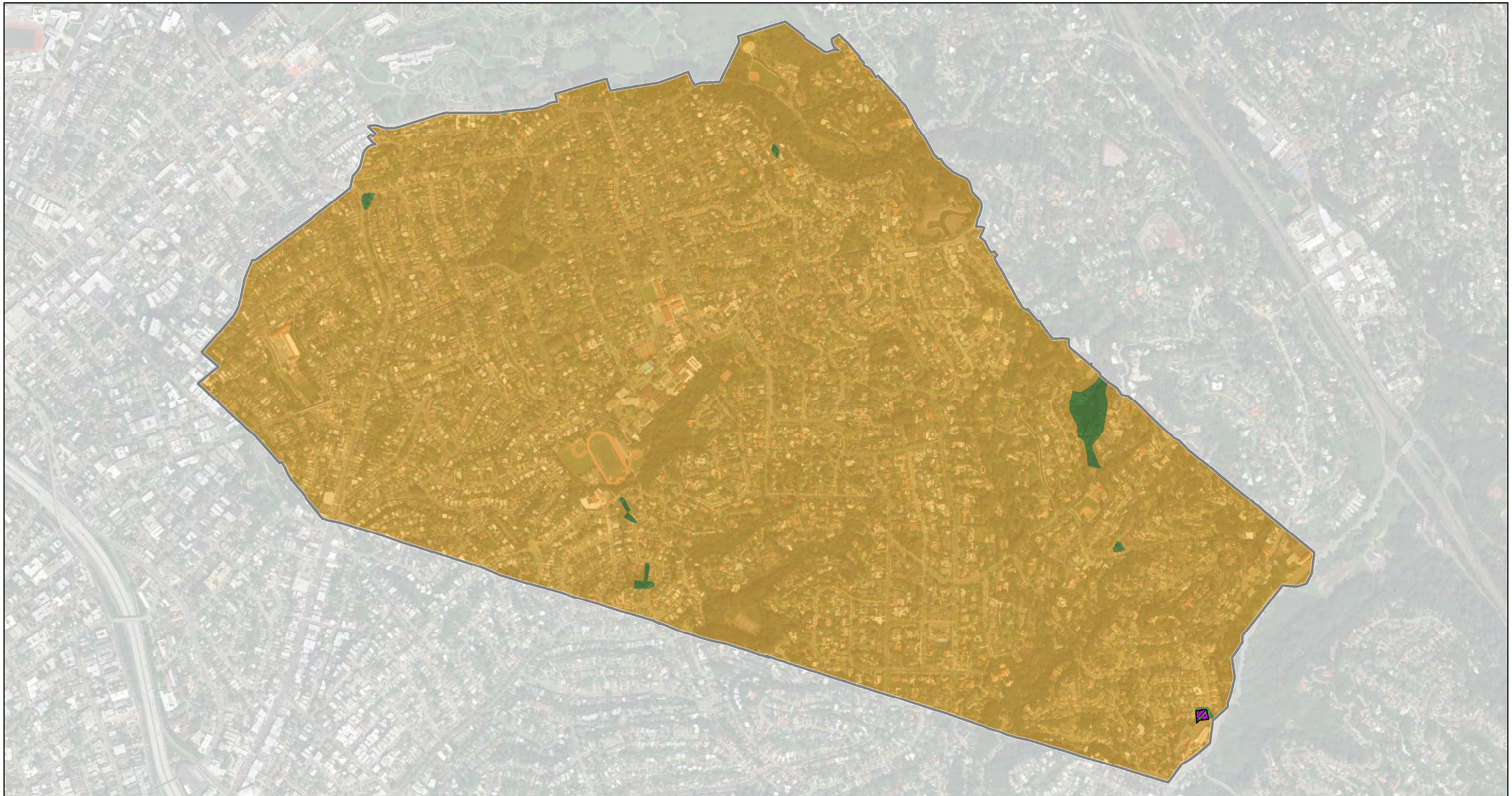

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 840 1,680 Feet

Watershed/Management Areas and Control Measures
Piedmont

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 13-1

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14 City of Pleasanton

14.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Pleasanton are shown on Figure 14-1 and are listed in Table 14-1 below. These W/MAs drain to the Arroyo de la Laguna branch of the Alameda Creek watershed.

Table 14-1: City of Pleasanton PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	204.1	0.0%	0.0%	100.0%	0.0%	0.0%
Categorical Railroad	770.1	6.3%	33.2%	25.0%	35.5%	0.0%
Pleasanton Old Urban	4,317.1	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 14-2 and are described in the sections below. Treatment control projects are also shown on Figure 14-1.

Table 14-2: City of Pleasanton Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	224.1	3.7%	12.8%	79.4%	4%	0%
Trash Full Capture Devices	--	--	--	--	--	--
Enhanced O&M Measures	4.0	0%	5%	95%	0%	0%

Note: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

14.2 Scope and Schedule of PCBs Control Measures

14.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Pleasanton have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

14.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Pleasanton's Green Infrastructure Plan for further information.

14.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Pleasanton began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

14.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Pleasanton include clean out of inlet-based full trash capture devices on a semi-annual basis.

14.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

14.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

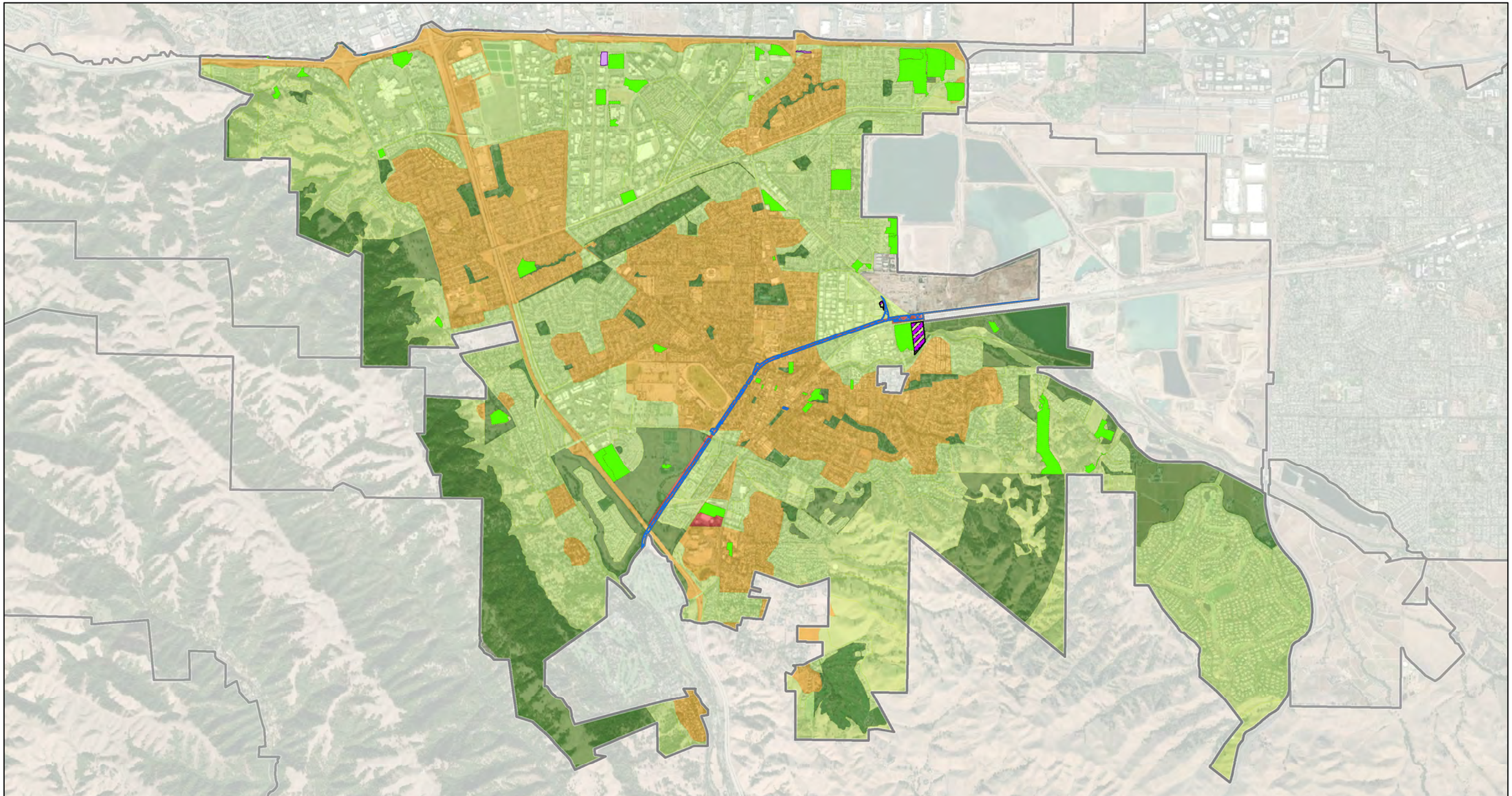

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 3,300 6,600 Feet

Watershed/Management Areas and Control Measures
Pleasanton

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 14-1

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15 City of San Leandro

15.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of San Leandro are shown on Figure 15-1 and are listed in Table 15-1 below. These W/MAs drain to the Lower segment of the Bay.

Table 15-1: City of San Leandro PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	464.8	27.7%	29.1%	33.7%	9.5%	0.0%
Categorical Railroad	897.6	74.2%	2.2%	22.4%	1.3%	0.0%
San Leandro Old Industrial	1,333.6	100.0%	0.0%	0.0%	0.0%	0.0%
San Leandro Old Urban	6,017.7	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 15-2 and are described in the sections below. Treatment control projects are also shown on Figure 15-1.

Table 15-2: City of San Leandro Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	79.5	93%	6.7%	0.4%	0%	0%
Trash Full Capture Devices[1]	968.6	3.4	92.9	1.0	2.6	0%
Enhanced O&M Measures	3,322.1	16.4%	76.4%	6.4%	0.9%	0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes Hydrodynamic Separator (HDS) and Gross Solids Removal Device (GSRD) units.

15.2 Scope and Schedule of PCBs Control Measures

15.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of San Leandro have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

15.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of San Leandro's Green Infrastructure Plan for further information.

15.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of San Leandro began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

15.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of San Leandro include clean out of inlet-based full trash capture devices on a semi-annual basis.

15.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

15.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

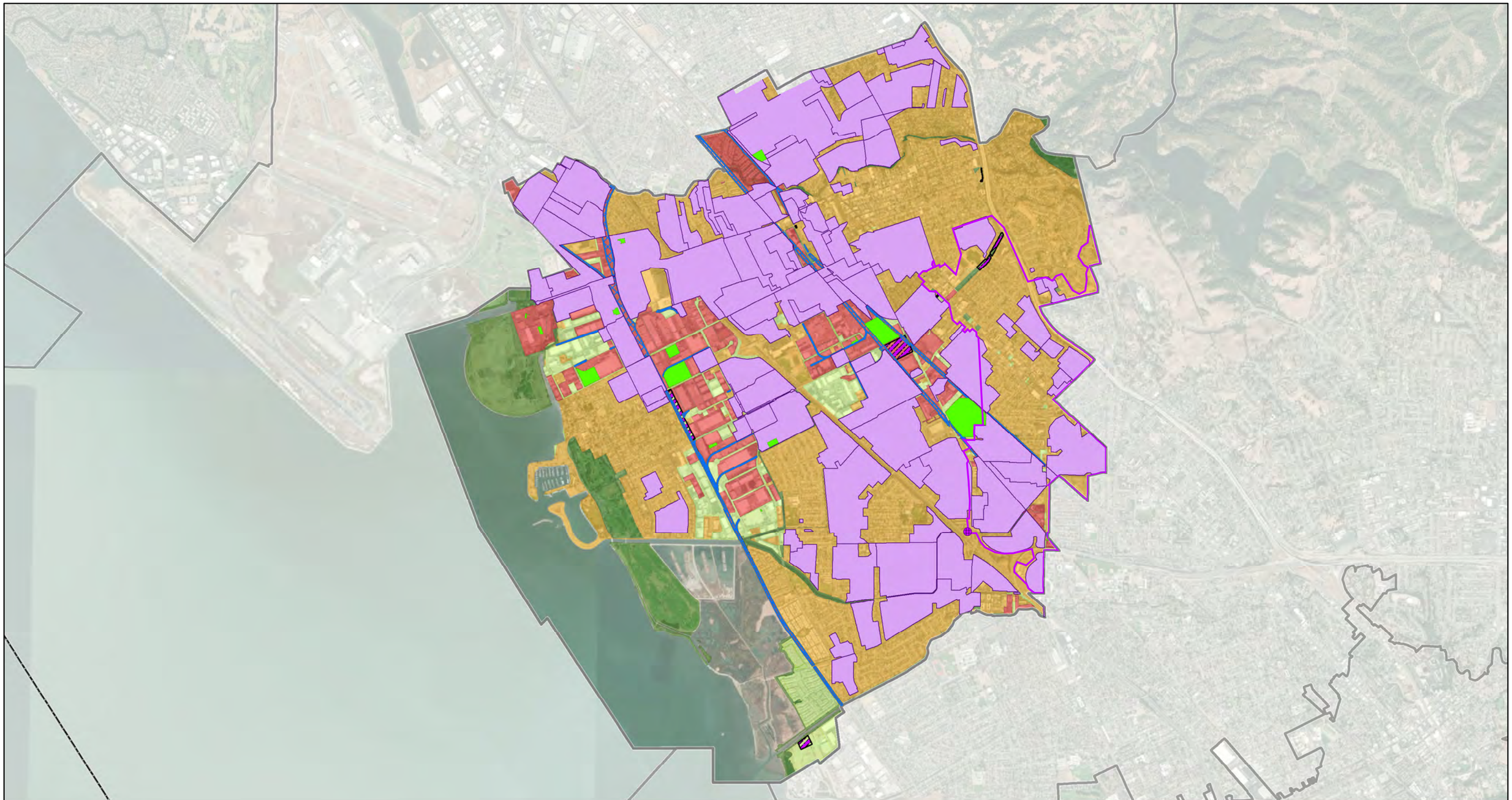

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 3,000 6,000 Feet

Watershed/Management Areas and Control Measures
San Leandro

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 15-1

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16 City of Union City

16.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within the City of Union City are shown on Figure 16-1 and are listed in Table 16-1 below. These W/MAs drain to the Lower segment of the Bay.

Table 16-1: City of Union City PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Alvarado Business Park	2,227.1	6.8%	32.9%	36.9%	23.4%	0.0%
Categorical PG&E	824.9	0.9%	0.0%	0.1%	99.1%	0.0%
Categorical Railroad	740.8	30.8%	0.0%	63.6%	5.6%	0.0%
Central Bay Industrial Park	1,867.1	40.3%	34.3%	23.4%	2.1%	0.0%
Union City Old Urban	4,437.2	0.0%	100.0%	0.0%	0.0%	0.0%
Union City Station District	917.7	14.0%	66.5%	7.0%	12.5%	0.0%
Alvarado Business Park	2,227.1	6.8%	32.9%	36.9%	23.4%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 16-2 and are described in the sections below. Treatment control projects are also shown on Figure 16-1.

Table 16-2: City of Union City Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	213.1	40.9%	36.6%	18.6%	4%	0%
Trash Full Capture Devices[1]	204.3	14.5%	24.6%	24.1%	36.8%	0.0%
Enhanced O&M Measures	1283.4	10.2%	43%	44.4%	2.4%	0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes only Hydrodynamic Separator (HDS) units.

16.2 Scope and Schedule of PCBs Control Measures

16.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Union City have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

16.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Union City's Green Infrastructure Plan for further information.

16.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Union City began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The City of Union City recently conducted an investigation of the caulk in the existing curb and gutter at two locations along H Street as part of their design for the H Street Green Street project and the caulk was found to contain an insignificant amount of PCBs (part per billion). The City of Union City also participated in the BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

16.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the City of Union City include clean out of inlet-based full trash capture devices on a semi-annual basis.

16.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

16.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

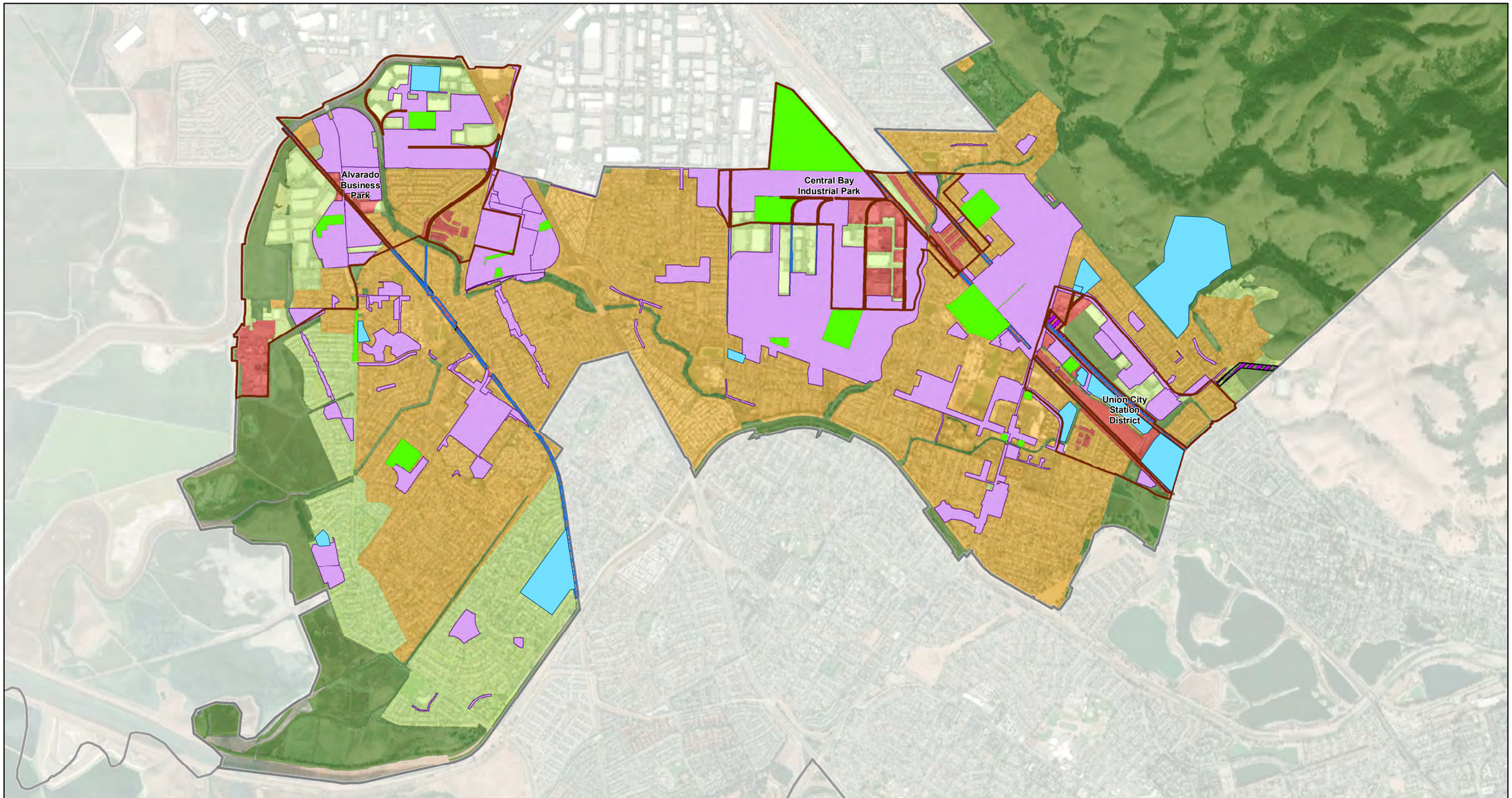

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 2,200 4,400 Feet

Watershed/Management Areas and Control Measures
Union City

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 16-1

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17 Unincorporated Alameda County

17.1 List of Watersheds / Management Areas and Control Measures

The Watersheds / Management Areas (W/MAs) within Unincorporated Alameda County are shown on Figure 17-1 and Figure 17-2 and are listed in Table 17-1 below. These W/MAs drain to the Central and Lower segments of the Bay and to the Arroyo de la Laguna branch of the Alameda Creek watershed.

Table 17-1: Unincorporated Alameda County PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Categorical PG&E	2,504.7	0.2%	4.9%	0.0%	94.9%	0.0%
Categorical Railroad	17,066.4	2.0%	2.0%	0.1%	95.9%	0.0%
Eden Area	5,690.2	4.3%	91.5%	2.1%	2.1%	0.0%
Unincorporated Old Urban	11,028.3	0.0%	100.0%	0.0%	0.0%	0.0%

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 17-2 and are described in the sections below. Treatment control projects are also shown on Figure 17-1 and Figure 17-2.

Table 17-2: City of Unincorporated Alameda County Areas with Load Reductions or Treatment by Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	--	--	--	--	--	--
Green Infrastructure and Treatment	89.1	2.6%	84.7%	0.0%	12.7%	0.0%
Trash Full Capture Devices[1]	2,659.0	3.6%	84.3%	0.9%	10.9%	0.2%
Enhanced O&M Measures	160.6	0.6%	92.0%	1.9%	5.5%	0.0%

Notes: Control measure implementation data are incomplete for FY 13-14 and FY 14-15.

1 Includes Hydrodynamic Separator (HDS) and Gross Solids Removal Device (GSRD) units.

17.2 Scope and Schedule of PCBs Control Measures

17.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within Unincorporated Alameda County have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

17.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the Alameda County Green Infrastructure Plan for further information.

17.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Unincorporated Alameda County began implementing the PCBs management program and protocol on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

17.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced Operation and Maintenance (O&M) control measures that have been implemented by the Unincorporated Alameda County include clean out of inlet-based full trash capture devices on a semi-annual basis.

17.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

17.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

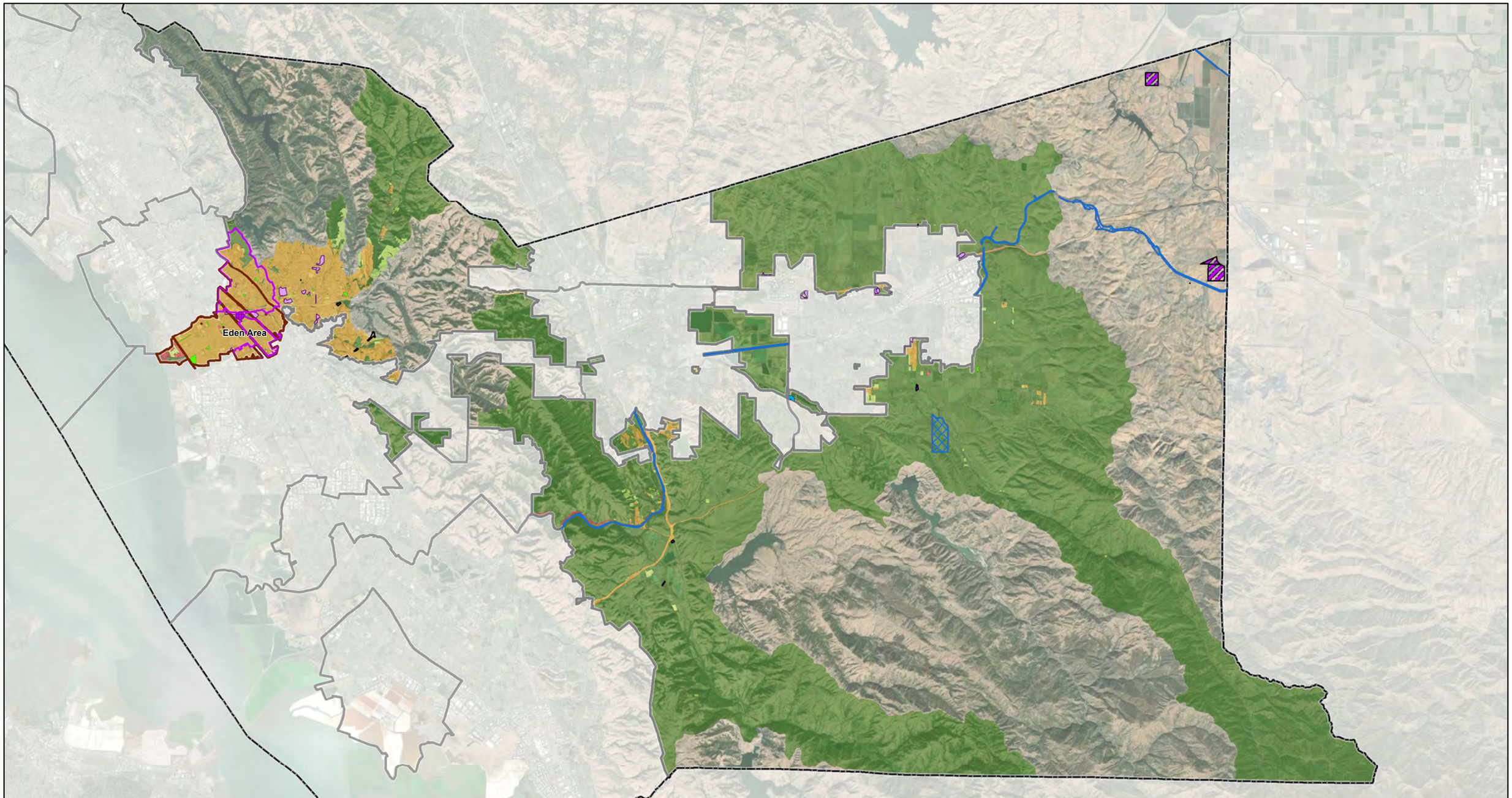

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 13,000 26,000 Feet

Watershed/Management Areas and Control Measures
Unincorporated Alameda County (Full Extent)

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 17-1

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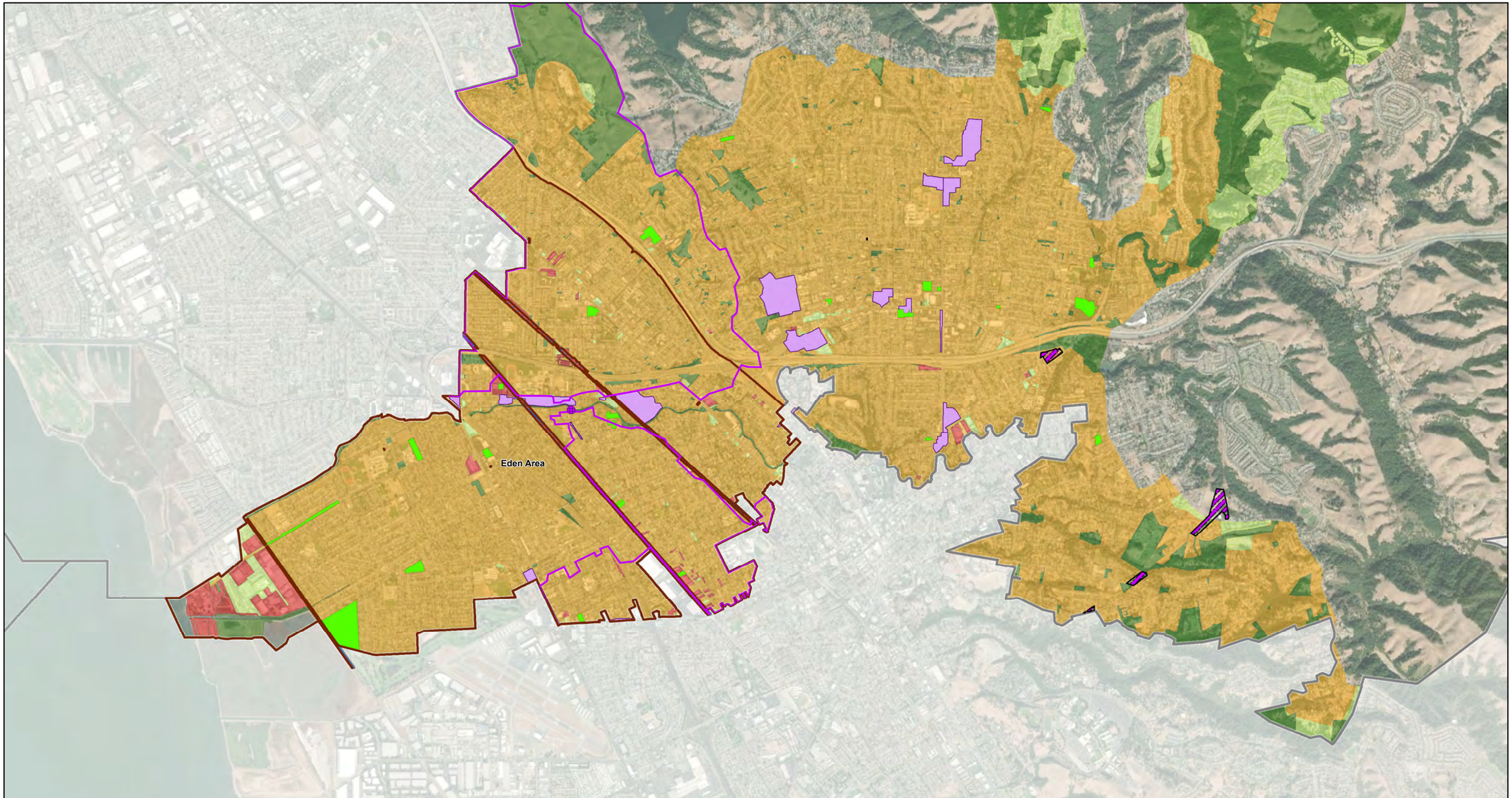

Legend

- City Limits
- County Boundary

Watershed/Management Areas

- Watershed/Management Areas
- Categorical Railroad
- Categorical PG&E

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- C.3.b/Green Streets Projects
- Source Property Referral/Abatement

Large Full Trash Capture

- HDS
- GSRD
- HDS Drainage Area
- GSRD Drainage Area

Enhanced O&M

- Full Trash Capture Device Cleanout

N

0 2,800 5,600 Feet

Watershed/Management Areas and Control Measures
Unincorporated Alameda County (Detail)

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 17-2

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18 Alameda County Flood Control and Water Conservation District

Alameda County Flood Control and Water Conservation District (District) manages flood control infrastructure for flood protection of most of the urbanized portions of Western Alameda County, which include the W/MAs described above for the following Permittees (See Figure 18-1):

- Emeryville
- Fremont
- Hayward
- Newark
- Oakland
- San Leandro
- Union City
- Parts of unincorporated Alameda County

The District is divided into "zones of benefit" which are based on major watershed areas and treated as separate financial entities for the purposes of maintaining and constructing facilities, and for the levying of assessments based on needs within that zone's watershed area. For nine District zones (shaded blue on Figure 18-1), the Alameda County Board of Supervisors is the governing body and the Alameda County Public Works Agency provides engineering, technical, and administrative staff for the District. Zone 7 of the District, located in eastern Alameda County and commonly known as Zone 7 Water Agency, has a separately elected Board of Directors and staffing and is a distinct Permittee under the MRP (see Section 19).

18.1 Scope and Schedule of PCBs Control Measures

Since the District is not a municipal government, a limited range of potential control measures are applicable to its facilities. The scope of control measures that are currently being implemented or may be implemented by the District during the term of the permit is discussed in the sections below.

18.1.1 Source Property Identification and Abatement

While some District-owned facilities lie within areas dominated by Old Industrial land use, none have been identified as source properties during initial screening. Site investigations may be initiated as a result of new information that may result in a property referral in the future.

18.1.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs are subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3.

The District will evaluate its capital projects for potential C.3 compliance and other opportunities to implement treatment.

18.1.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

18.1.4 Enhanced Operation and Maintenance Control Measures

In September 2014, the District conducted enhanced desilting of the ESPS wet wells, which have normally been cleaned on an "as needed" basis. CW4CB-funded monitoring estimated removal of mercury and PCBs through this activity, but listed issues and constraints to quantifying load reduction benefits. There has been large variation in annual sediment deposition and removal since the District acquired the ESPS from the city of Oakland in 1999.

18.1.5 Diversion to POTW

The District has executed an agreement with the East Bay Municipal Utility District (EBMUD) for operation of an Urban Runoff Diversion Project (URDP) at the ESPS to direct dry weather discharge to EBMUD's main wastewater treatment plant for treatment. The URDP is designed to divert up to 0.5 million gallons per day (mgd) of dry-weather flow during the dry season (i.e., approximately April 16th through November 30th). EBMUD completed the installation of its pump and control system and new 6-inch diameter conveyance pipe in 2016 and implementation is in progress. District staff coordinated with and provided assistance to EBMUD staff in FY 2018/19 to ensure proper operation and maintenance of the diversion pump.

EBMUD agreed to make provision in its piping design for possible future connection by the District to the URDP's new force main pipe which allows for a future project wherein stormwater flows could be detained and stored until after the end of peak flows when they could be diverted to the EBMUD plant for treatment. The District does not have available space for such detention

at the ESPS and has no active plans to pursue this concept after initial conversations with state and city representatives about potential access to adjacent street and freeway right-of-way.

Load reductions for PCBs and mercury were computed based on influent and effluent sampling data obtained by EBMUD between 2008 and 2010 (Borisova, Johannesson, and Horenstein, 2012) and flow data from FY 2016/17, FY 2017/18, and FY 2018/19 obtained through email correspondence with EBMUD staff.

18.1.6 Source Controls and Other Control Measures

Illegal Dumping Cleanup

The District will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs on District property.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed if they are identified on District property.

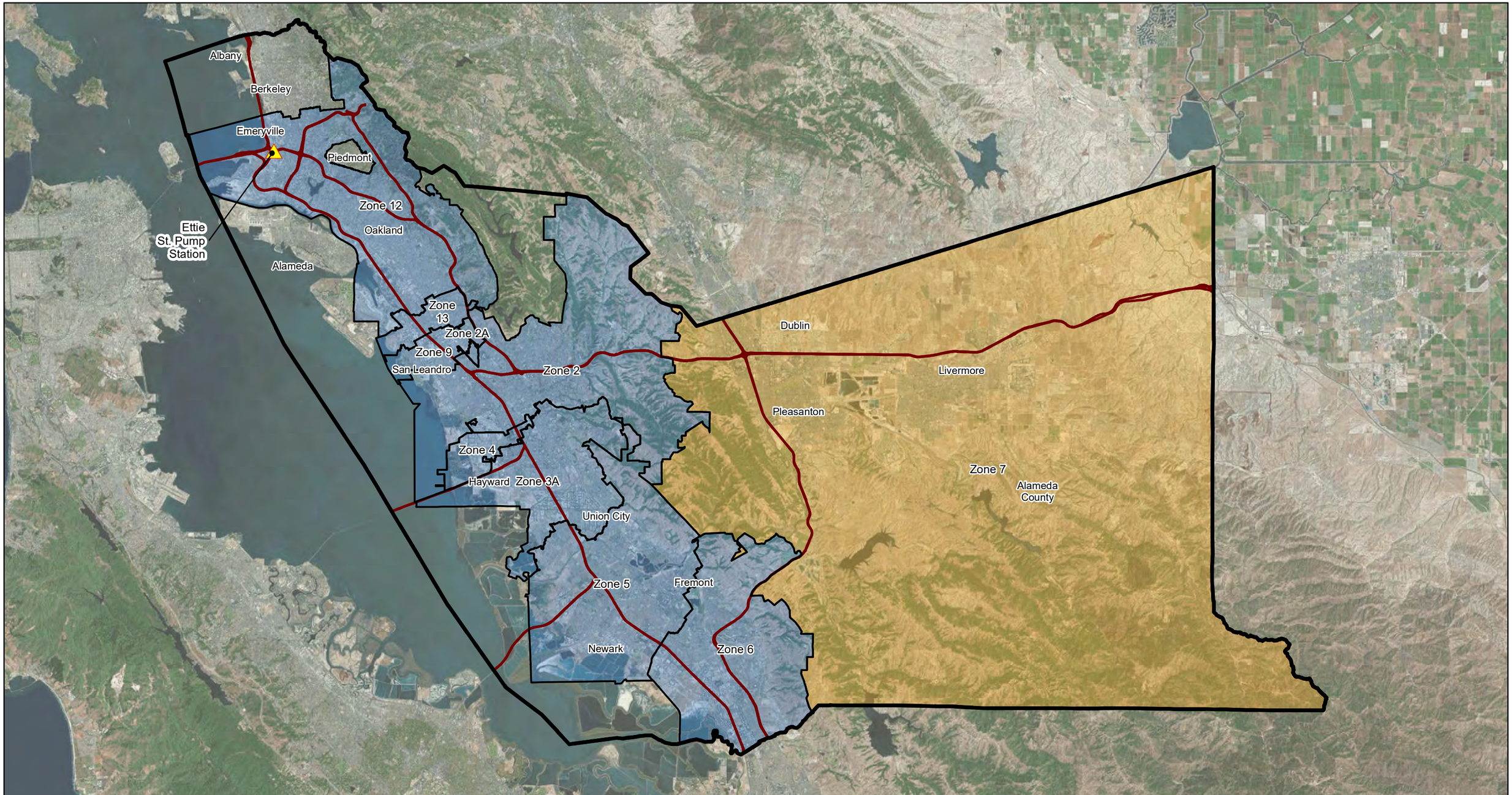

Legend

- Zone 7 (See Figure 19-1)
- West County Zones (managed by ACFCWCD)
- Alameda County Limits
- Highways

N

0 5 10 Miles

ACFCWCD Zones and Representative Facilities and Control Measures

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | August 2020

Figure 18-1

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19 Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7 Water Agency)

Zone 7 Water Agency owns and maintains 37 miles of flood-protection channels located within a 425-square-mile area in eastern Alameda County, which include the W/MAs described above for the following permittees (See Figure 19-1):

- Dublin
- Livermore
- Pleasanton

19.1 Scope and Schedule of PCBs Control Measures

Since the Zone 7 Water Agency is not a municipal government, a limited range of potential control measures are applicable to its facilities. The scope of control measures that are currently being implemented or may be implemented by Zone 7 during the term of the permit is discussed in the sections below.

19.1.1 Source Property Identification and Abatement

Flood control facilities owned by Zone 7 do not occur in significant areas of Old Industrial land use and offer little or no potential to be identified as PCBs source properties.

19.1.2 Green Infrastructure / Treatment Control Measures

The District will evaluate its capital projects for potential C.3 compliance and other opportunities to implement treatment.

19.1.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees are participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

19.1.4 Enhanced Operation and Maintenance Control Measures

No enhanced operation and maintenance control measures are proposed.

19.1.5 Diversion to POTW

No diversion to POTW control measures are proposed.

19.1.6 Source Controls and Other Control Measures

Illegal Dumping Cleanup

The District will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs on District property.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed if they are identified on District property.

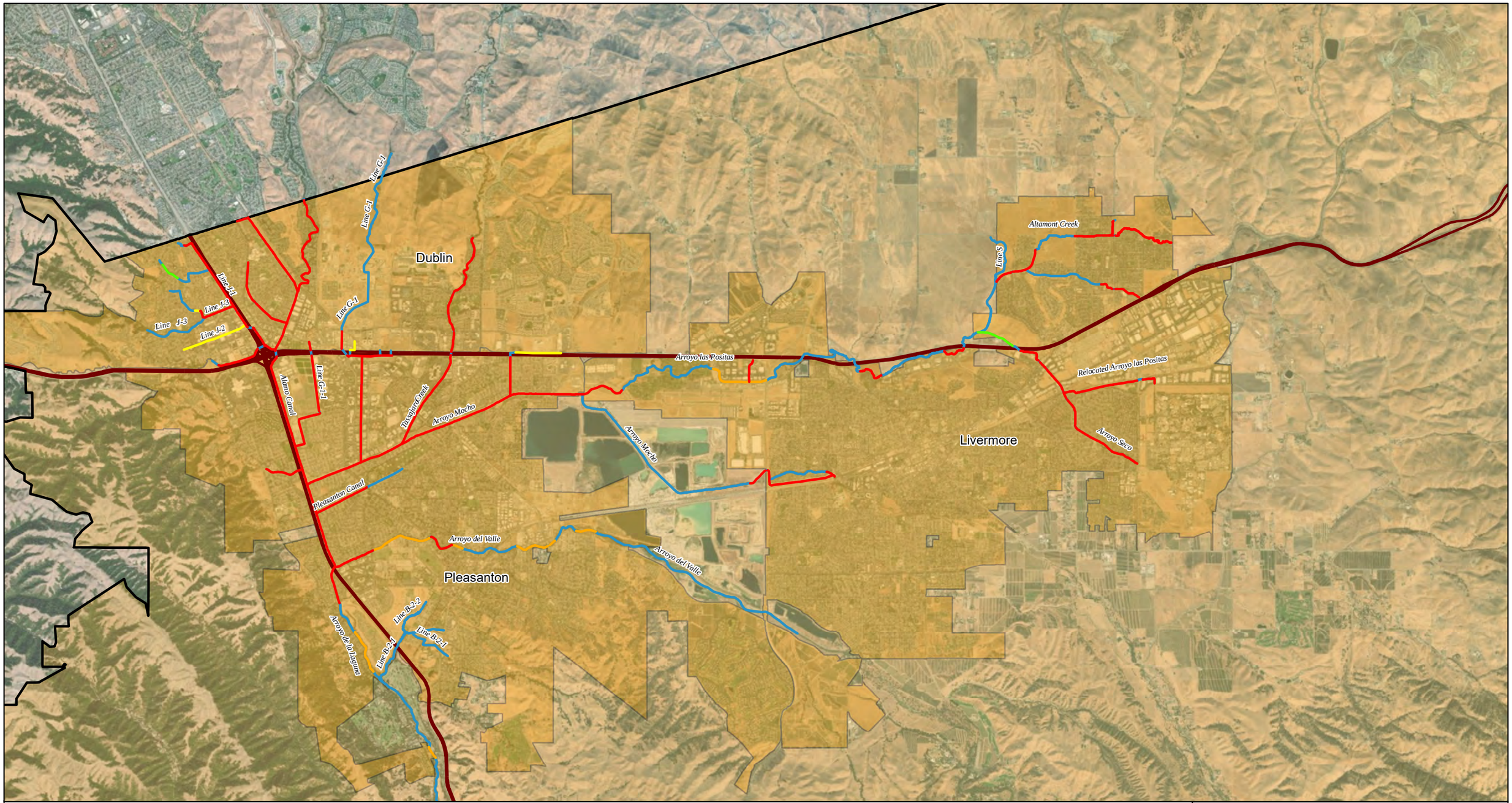

Legend

Zone 7 Channel Status

- Drainage Easement
- Full Ownership
- Partial Ownership
- Stormdrain Easement
- Not Owned/Maintained

- Zone 7 (Incorporated Cities)
- Zone 7 (Unincorporated)
- Highways

N

0 1.5 3 Miles

Channels and Streams Owned by Zone 7 Water Agency

Alameda Countywide Clean Water Program

Geosyntec consultants

Oakland | August 2020

Figure 19-1

P:\GIS\Alameda Countywide Clean Water Program (ACCWP)\POC_2018\Project\POC_Report_Figures\FCD_19-1.mxd 9/19/2017 5:30:13 PM

20 Loads Reduced

This section presents estimates of the loads reduced by the control measures that are reported in the preceding sections of this report (Sections 3 through 19) for each Permittee and county-wide for FY 2013/14 through FY 2019/20. The loads reduced reported in this section reflect previous fiscal years' reporting, although previously reported load reductions may have been revised.

20.1 Loads Reduced – PCBs

Table 20-1 and Table 20-2 report the estimated PCBs loads reduced for each Permittee and county-wide. Note that these tables reflect the load reduction achieved through implementation of the program and protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. This load reduction is equivalent to 626.7 g/yr, which was allocated to each Permittee in FY2018/19 based on their population in the year 2000.

Table 20-1: PCBs Loads Reduced by the Permittees (FY 2013/14 through FY 2019/20)

Permittee	PCBs Loads Reduced (g/yr)							
	FY2013-2014	FY2014-2015	FY2015-2016	FY2016-2017	FY2017-2018	FY2018-2019	FY2019-2020	Cumulative Load Reduced
Alameda	0.01	0.15	0.23	0.66	0.42	33.51	0.24	35.22
Albany	0.19	0	0.03	0.23	0.26	7.16	0	7.87
Berkeley	0.20	0.11	0.71	0.53	4.20	44.75	0	50.50
Dublin	0.61	0.09	1.65	1.50	0.62	13.23	0.32	18.02
Emeryville	0.13	0.11	0.09	0.00	0.14	2.98	0.00	3.45
Fremont	0.34	0.33	2.09	0.37	0.46	88.27	0.73	92.59
Hayward	0.37	7.21	1.70	6.83	1.29	62.46	0	79.86
Livermore	0.23	1.26	0.04	0.23	0.46	34.65	0	36.87
Newark	0.00	2.00	0.33	2.03	0.61	18.69	0	23.66
Oakland	0.54	0.52	0.17	0.29	69.09	175.46	164.35	410.42
Piedmont	0	0	0	0	0	4.77	0	4.77
Pleasanton	0.00	0.75	0.12	0.01	0.28	27.63	0.29	29.08
San Leandro	0.00	1.38	0.42	2.41	0.59	39.02	3.62	47.44
Union City	0.05	0.26	1.62	7.56	0.46	29.34	0	39.29
Unincorporated County	0.34	1.68	0.14	0.88	0.57	68.83	0	72.44
ACFCWCD	0	0	0	0.97	1.98	1.22	0	1.39
TOTAL - All Permittees	**3.01**	**15.85**	**9.34**	**24.50**	**81.43**	**651.96**	**169.55**	**952.86**

Table 20-2: PCBs Loads Reduced Within Alameda County (FY 2013/14 through FY 2019/20)

Control Measure Category	PCBs Loads Reduced (g/yr)								
	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 18/19	Cumulative Load Reduced	Required PCBs Load Reduction by June 30, 2020
Source Property Identification and Abatement[1]	0	0	0	0	71.35	0	163.44	234.80	--
Green Infrastructure and Treatment[2]	2.58	14.24	3.69	13.83	6.67	6.43	6.11	53.54	**37**
Trash Full Capture Devices[3]	0.33	1.53	2.48	6.66	0.13	16.84	0	27.97	--
Enhanced O&M[4]	0.10	0.07	3.18	3.03	1.30	0.81	0	8.49	--
Manage PCBs in Building Materials	0	0	0	0	0	626.67	0	626.67	--
Manage PCBs in Infrastructure[4]	0	0	0	0	0	0.00	0	0	--
Diversion to POTW[4]	0	0	0	0.97	1.98	1.22	0	1.39	--
TOTAL - All Permittees	**3.01**	**15.84**	**9.34**	**24.49**	**81.43**	**651.97**	**169.55**	**952.86**	**940**

Notes:

1. Load Reduced = (Source Property Area (ac)) x (4.065 – 0.0303 (g/ac/yr)). Load reduced is halved for referral rather than self-abatement. Acres associated with this control measure can be found in each Permittee section of this report.
2. For parcel-based projects, Load Reduced = (Project Area (ac)) x (Existing Yield – 0.0035 (g/ac/yr)). For green street or regional retrofit projects, Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/ac/yr)) x 0.70. Acres associated with this control measure can be found in each Permittee section of this report.
3. Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/ac/yr)) x 0.20. Acres associated with this control measure can be found in each Permittee section of this report.
4. See individual Permittee sections for how loads were estimated.

Table 20-2 shows that the required load reduction for GI and the overall PCBs load reduction by 2020 have been achieved.

20.2 Loads Reduced – Mercury

Table 20-3 and Table 20-4 report the estimated mercury loads reduced for each Permittee and county-wide.

Table 20-3: Mercury Loads Reduced by the Permittees (FY 2013/14 through FY 2019/20)

Permittee	Mercury Loads Reduced (g/yr)							
	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	Cumulative Load Reduced
Alameda	0.09	1.03	2.13	9.41	2.49	27.51	1.59	44.25
Albany	2.35	0.00	0.25	1.70	2.28	0	0	6.58
Berkeley	2.16	0.79	6.75	4.48	2.38	0.28	0	16.84
Dublin	4.14	0.60	9.34	10.46	3.25	2.69	2.13	32.61
Emeryville	1.77	1.57	1.08	0	2.06	0.00	0.00	6.48
Fremont	2.56	2.08	17.54	2.05	3.36	0.42	4.72	32.73
Hayward	2.52	92.03	24.82	60.05	17.65	16.60	0	213.67
Livermore	1.51	18.57	0.00	1.08	3.00	21.38	0.01	45.55
Newark	0.00	30.30	2.99	29.76	9.37	1.85	0	74.27
Oakland	5.11	4.28	1.21	2.21	42.83	22.69	55.16	133.49
Piedmont	0	0	0	0	0	0	0	0
Pleasanton	0.00	11.00	0.78	0.06	1.89	0.14	1.97	15.84
San Leandro	0.00	20.82	5.64	27.40	5.75	38.14	55.25	153.00
Union City	0.32	1.80	16.80	105.95	6.57	5.00	0	136.44
Unincorporated County	3.08	16.29	1.42	6.35	3.86	72.90	0	103.90
ACFCWCD	0	0	0	2.30	4.70	2.89	0	9.89
TOTAL - All Permittees	**25.61**	**201.16**	**90.75**	**263.26**	**111.44**	**212.49**	**120.83**	**1,018.95**

Table 20-4: Mercury Loads Reduced Within Alameda County (FY 2013/14 through FY 2019/20)

Control Measure Category	Mercury Loads Reduced (g/yr)							
	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	Cumulative Load Reduced
Source Property Identification and Abatement[1]	0	0	0	0	19.19	0.00	43.95	63.14
Green Infrastructure and Treatment[2]	22.21	185.11	38.97	175.09	75.50	72.60	76.86	646.34
Trash Full Capture Devices[3]	2.35	15.29	24.33	58.03	0.98	130.22	0	231.20
Enhanced O&M Measures[4]	1.05	0.75	27.43	27.85	11.06	6.77	0.01	74.92
Manage PCBs in Building Materials	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manage PCBs in Infrastructure	--	--	--	--	--	--	--	--
Diversion to POTW	0	0	0	2.30	4.70	2.89	0	3.30
Source Controls/ Other	--	--	--	--	--	--	0	--
TOTAL - All Control Measures	**25.61**	**201.15**	**90.73**	**263.27**	**111.43**	**212.48**	**120.82**	**1,018.90**

Notes:

1. Load Reduced = (Source Property Area (ac)) x (1.300 – 0.215 (g/ac/yr)). Load reduction is halved for referral rather than self-abatement. Acres associated with this control measure can be found in each Permittee section of this report.
2. For parcel-based projects, Load Reduced = (Project Area (ac)) x (Existing Yield – 0.033 (g/ac/yr)). For green street or regional retrofit projects, Load Reduced = (Project Drainage Area (ac)) x (area-weighted mercury yield (g/ac/yr)) x 0.70. Acres associated with this control measure can be found in each Permittee section of this report.
3. Load Reduced = (Project Drainage Area (ac)) x (area-weighted mercury yield (g/ac/yr)) x 0.20. Acres associated with this control measure can be found in each Permittee section of this report.
4. See individual Permittee sections for how loads were estimated.

The mercury load performance criterion via green infrastructure implementation for Alameda County is 15 g/yr by June 30, 2020; the results in Table 20-4 indicate that this performance criterion has been exceeded.

20.3 PCBs and Mercury Regional Loads Reduced During MRP 2.0

20.3.1 Introduction

MRP 2.0 requires Permittees to develop and implement control measures to reduce PCBs and mercury in stormwater runoff to the San Francisco Bay throughout the permit area (Table 20-5). For PCBs, Permittees are collectively required to reduce loads by a minimum of 500 grams per

year (g/yr) by June 30, 2018, and 3,000 g/yr by June 30, 2020. At least 120 g/yr of PCBs load reduction must be achieved through implementation of green stormwater infrastructure (GSI) projects on public and private lands. The June 30, 2020 date may be extended to December 31, 2020 if Permittees provide documentation that control measures that will attain the load reduction will be implemented by that date.

For mercury, Permittees are collectively required to reduce stormwater loads by 48 g/yr by June 30, 2020 through implementation of GSI projects on public and private lands.

These load reduction performance criteria may be met regionally. However, if the required load reduction is not achieved regionally, the load reductions should be achieved on a county-wide basis. If neither the permit-area-wide total load reduction criteria nor the county-specific load reduction criterion is achieved, the individual Permittees must achieve load reductions consistent with their share of the county total based on their proportion of the total county population.

Table 20-5: PCBs and Mercury Load Reduction Regional Performance Criteria Required by MRP 2.0 in 2018 and 2020.

PCBs (g/year)			Mercury (g/yr)
July 2018	**July 2020**		**July 2020**
All Control Measures	**All Control Measures**	**Green Stormwater Infrastructure**	**Green Stormwater Infrastructure**
500	3,000	120	48

The PCBs and mercury load reductions that have been achieved to date were calculated using the methodologies presented in the *Interim Accounting Methodology for PCBs and Mercury Loads Reduced Report* (BASMAA 2017), which was developed by BASMAA and approved by the Regional Water Board's Executive Officer in March 2017. The data reported here on regional PCBs and mercury loads reduced by all Permittees were provided by the following countywide stormwater programs and municipal agencies:

- Alameda Countywide Clean Water Program
- Contra Costa Clean Water Program
- Santa Clara Valley Urban Runoff Pollution Prevention Program
- San Mateo Countywide Water Pollution Prevention Program
- Fairfield-Suisun Urban Runoff Management Program
- City of Vallejo and the Vallejo Flood and Wastewater District

The load reductions reported here are based on the best available information at the time this report was written and may not reflect the most up-to-date accounting of all reductions achieved through all control measures that have been implemented in the region.

20.3.2 Regional PCBs Loads Reduced

The cumulative PCBs loads reduced to date by all Permittees during the MRP compliance period (FY 13-14 through FY 19-20) are presented in Table 20-6. A total of 3,017 g/yr of PCBs were reduced across the permit area over that time period, demonstrating that the MRP performance criterion of 3,000 g/yr of PCBs loads reduced by July 2020 has been achieved at the regional level.

Table 20-6: PCBs Loads Reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	PCB Load Reductions (g/yr)
Source Property Identification and Abatement	610
Green Stormwater Infrastructure/Treatment (i.e., Parcel-Based New/Redevelopment or Green Street/Regional Retrofit)	231
Large Full Trash Capture (i.e., HDS or GSRD Units)	157
Enhanced O&M Measures	18
PCBs in Building Materials	2,000
Stormwater Diversion to Sanitary Sewer	1
TOTAL - All Control Measures	**3,017**

1. Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

The PCBs loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 20-1. The PCBs in building materials program achieved the MRP-stipulated 2,000 g/yr (66%) because all Permittees successfully implemented the program by July 1, 2019. This load reduction accounts for 66% of the total PCBs loads reduced during MRP 2.0. The remaining 1,017 g/yr was achieved through implementation of all other control measures. Of these, source property identification and abatement accounts for 20% of the total PCBs load reduction during MRP 2.0. Next to managing PCBs in building materials, source property identification and abatement remains the most effective control measure currently available for reducing PCBs loads to the Bay (BASMAA 2017). Green infrastructure has been the third largest contributor to load reductions, providing 231 g/yr of PCBs loads reduced and accounting for 8% of the total PCBs loads reduced to-date. These data demonstrate the MRP performance criterion of 120 g/yr of PCBs loads reduced through GI has been met across the region. An additional 157 g/yr have been reduced by large full trash capture devices (i.e., HDS and GSRD units), accounting for 5% of the total PCBs loads reduced. The remaining < 1% of the regional PCBs loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

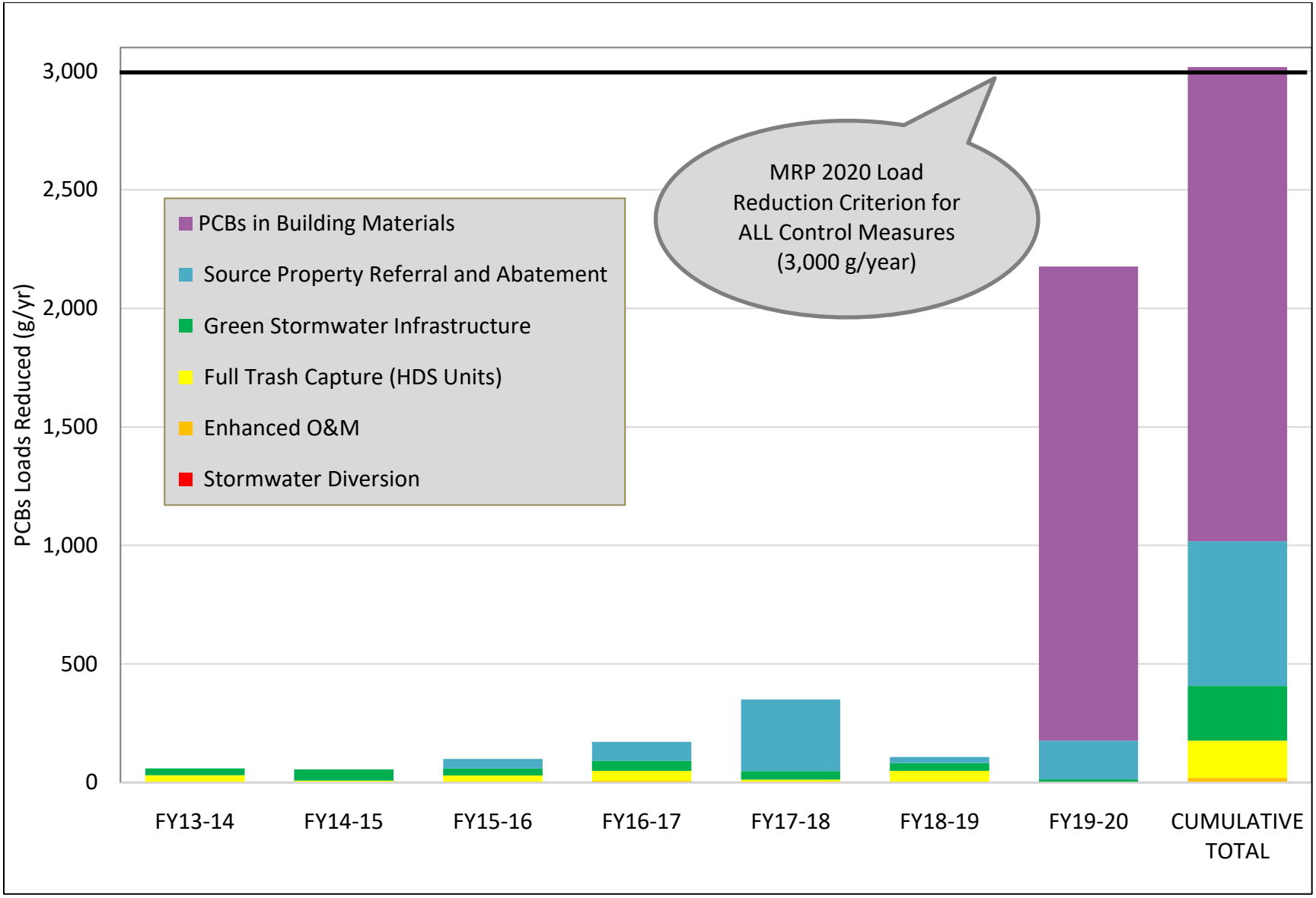

Figure 20-2. PCBs Loads Reduced by MRP Permittees by Fiscal Year and the Cumulative Totals (FY13-14 through FY19-20).

20.3.3 Regional Mercury Loads Reduced

The cumulative mercury loads reduced by MRP Permittees from FY13-14 through FY 19-20 are presented in Table 20-7. An estimated total of 4,394 g/yr of mercury was reduced across the permit area over that time period. The mercury loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 20-2. GI has been the largest contributor to mercury load reductions during the permit term. Total mercury loads have been reduced by 2,759 g/yr through GI, accounting for 63% of the total loads reduced. These data demonstrate the MRP performance criterion of 48 g/yr of mercury loads reduced through GI by 2020 has been met across the region. An additional 1,348 g/yr of mercury have been reduced by large full trash capture devices (i.e., HDS and GSRD units), accounting for 31% of the total loads reduced. Source property identification and abatement has reduced mercury loads by 120 g/yr, accounting for only 4% of the total mercury loads reduced to date. The remaining 4% of the regional mercury loads reduced during the permit have come from enhanced operation and maintenance practices and stormwater diversions.

Table 20-7: Mercury loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	Mercury Load Reductions (g/yr)
Source Property Identification and Abatement	120
Green Stormwater Infrastructure (i.e., Parcel-Based New/Redevelopment or Green Street/Regional Retrofit)	2,759
Large Full Trash Capture (i.e. HDS or GSRD units)	1,348
Enhanced O&M Measures	163
Stormwater Diversion to Sanitary Sewer	3
TOTAL - All Control Measures	**4,394**

1. Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

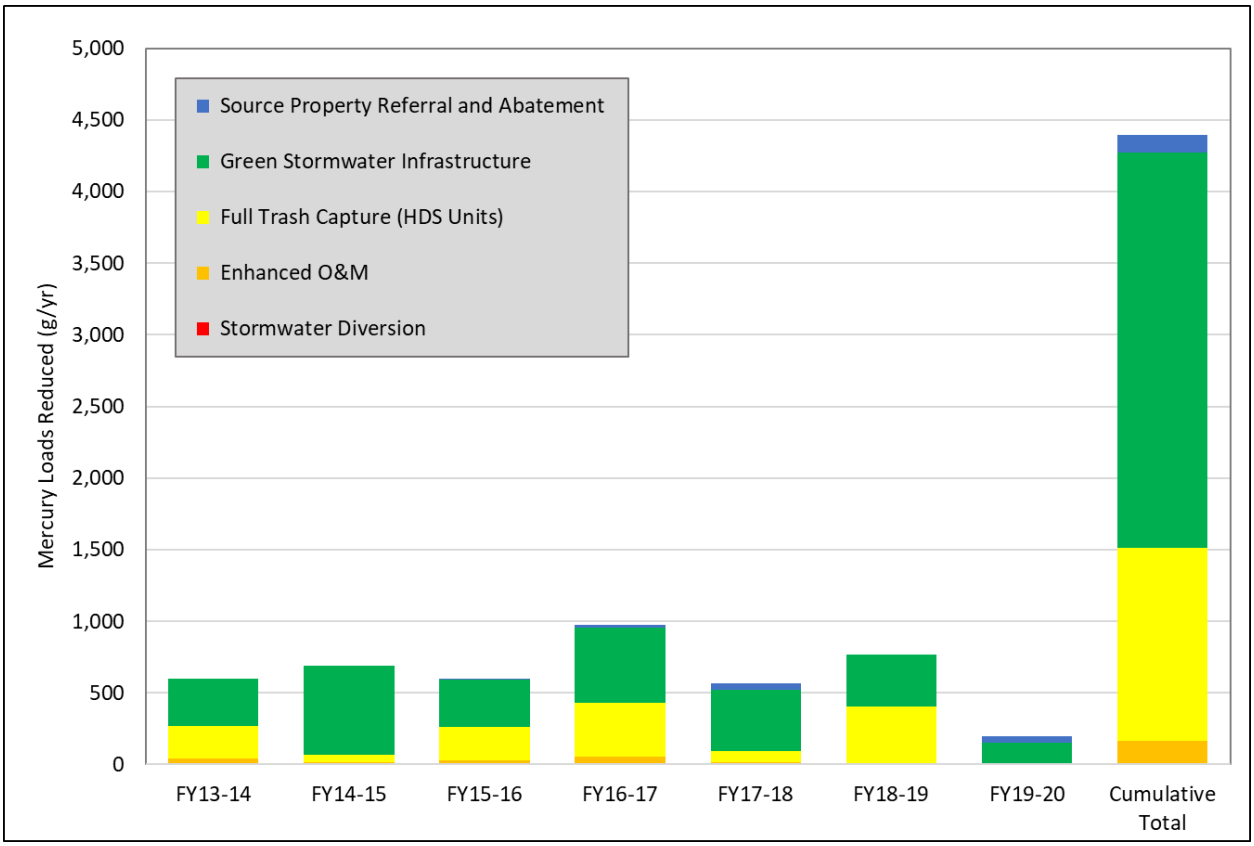

Figure 20-3. Mercury Loads Reduced by MRP Permittees by Fiscal Year and the Cumulative Totals (FY13-14 through FY19-20).

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APPENDIX 1

Source Property Referrals and

Self-Abatement Reports

PCB REFERRAL SITE INFORMATION

The purpose of this form is to provide the Department of Toxic Substances Control and the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions. Please use additional pages, as necessary, to complete your responses.

Referring Agency:	City of Oakland
Staff Contact Name:	Kristin Hathaway
Phone:	510-238-7571
Email Address:	khathaway@oaklandnet.com
Date of Referral:	09/11/2020

1. Name of Site:

Schnitzer Steel Products of California Inc.

2. Address City County ZIP:

1101 Embarcadero West, Oakland CA,
Alameda County, 94607

3. APN(s):

18-395-1

4. Provide a Site Location Map and a Site Diagram showing significant features.

Parcel area: 33.7 acres. See attached Figure 1 and Figure 2.

5. Current Owner

Name:	Schnitzer Steel Products of California Inc
Address, City, County & Zip Code:	1101 Embarcadero West, Oakland, CA 94607
Phone:	(510) 444-3919
E-mail Address:	ajordan@schn.com (Aldo Jordan, Region General Manager) brieser@schn.com (Bruce Rieser, Regional Director)

6. Current Business Operations

Name:	Schnitzer Steel Products of California Inc.
Period of Operation:	1961 – Present
Type:	The facility is a scrap metal recycling plant that stores, shears, torch cuts, and separates non-metal items. The site is also a treatment and transport location for scrap metals.

Schnitzer Steel Industries, Inc. is a scrap metal recycling facility. Approximately one third of the site is covered by buildings or pavement. Typical operations of the facility include the shredding of light iron products, such as automobiles, shearing and torch cutting heavy recyclables steel; sorting and preparing ferrous and non-ferrous metal, recycling feedstock; storage of finished recycled metal and shredded products; and maintenance of equipment.

Material is brought to the site via rail or truck if it is considered raw bulk scrap, and via the Peddler Entrance if material is ferrous or non-ferrous metal. Bulk raw scrap metal is inspected and separated into three material types: (1) heavy melting steel (HMS) for torch cutting into smaller pieces; (2) standard grade HMS for shear cutting into smaller pieces; and (3) shredder feed material that is light iron.

The shredder shreds light iron products to allow the separation of ferrous metals from non-ferrous metals and non-metallic residual. A non-ferrous stream from the shredding process is produced, known as non-ferrous raw (NFR), containing non-ferrous and metallic material is further processed in a Joint Product Plant. The residue from the Joint Product Plant is transported to an off-site landfill for alternative landfill cover. Ferrous material is stockpiled, eventually loaded onto a cargo ship, and moved off site.

Stormwater runoff from the facility is either collected, recycled, or infiltrated. The runoff is collected along the four primary drainage areas. The facility has three concrete berms to prevent runoff to the Oakland Inner Harbor. The berms are located along the upland, west, and north portion of the facility. The collected water is either treated onsite at the stormwater treatment plant or is discharged to the East Bay Municipal Utility Districts sanitary sewer system during heavy storms.

7. Background: Previous Business Operations (if known)

Name:	WA Boole & Sons, Inc
Period of Operation:	1902 - 1909
Type:	Shipyard

Name:	Moore & Scott Iron Works
Period of Operation:	1909 - 1917
Type:	The facility operated as a shipyard. Structures associated with shipyard operations were primarily located within the central and western side of the present-day site boundaries, with the eastern portion of the site being largely undeveloped. The site had one shipway with associated structures to aid in ship repair and ship building. The structures included: a winding engine, machine and iron shops, a boiler shop, water tanks, and a planning mill. Ship building and repair included tankers, ferryboats, and dredges (Terraphase Engineering Inc., 2016).

Name:	Moore Shipbuilding (renamed from Moore & Scott Iron Works)
Period of Operation:	1917 – 1922

Type:	The facility operated as a shipyard. Ship building and ship repairs continued at the site through this time. Operations significantly grew as a result of World War I. Structures included buildings, aboveground storage tanks, an elevated water tank, rail lines for transporting materials around the site, as well as coal piles (Terraphase Engineering Inc., 2016).
Name:	Moore Dry Dock Company (renamed from Moore Shipbuilding)
Period of Operation:	1922 - 1961
Type:	The facility operated as a shipyard. Ship building and ship repairs continued at the site through this time, though operations declined as a result of the Great Depression and expanded during World War II. Dry docks were utilized to repair ships and steel was produced for buildings and bridges. Larger buildings present at the site included a boiler shop, joiner shop, planing shop, machine shop, store rooms along the eastern portion of the site; a fabricating shop and steel storage buildings were located on the northern portion of the site; a plate shop, offices, and woodworking/metal shop were located on the western portion of the site. Smaller structures such as store rooms, pump houses, engine rooms, riggers loft, electric shop, a paint shop, change houses, an oil room, a winching engine room, a hospital, storage of paints and oils, a 500-gallon oil tank were also present at the site (Terraphase Engineering Inc., 2016).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

As listed in the *Modified Sampling and Analysis Plan Schnitzer Steel Facility* (Terraphase Engineering Inc. 2016), the pollutants of concern other than PCBs for the site are listed below and are described in more detail in Table 1:

- Total petroleum hydrocarbons (TPHs);
- Polycyclic aromatic hydrocarbons (PAHs);
- Semi-volatile organic compounds (SVOCs);
- Polybrominated diphenyl ethers (PBDEs); and
- Metals.

These constituents were sampled in soil, groundwater, stormwater and/or process water in 2016.

9. Describe the known and suspected sources of PCBs at the site.

The following information is summarized in the *Investigation Report - Soil and Groundwater Sampling in the Vicinity of Nine Excavation Pits* (Terraphase Engineering Inc., 2015). In 1984, Schnitzer excavated soil in the central part of the site, to the north and west of the shredder operation, in preparation for the construction of a concrete pad. The excavated soil was disposed of at the former Berkeley Landfill. Sampling of the waste soil conducted in 1986 indicated the presence of PCBs at

concentrations exceeding the 50 milligram per kilogram (mg/kg) threshold for hazardous waste. The waste soil was subsequently moved to an approved hazardous waste landfill at Kettleman Hills. In March of 1987, a soil and groundwater investigation was conducted in the vicinity of the original soil excavation, in accordance with an agency-approved sampling plan. Soil and grab-groundwater samples collected from 14 and 11 soil borings, respectively, were analyzed for PCBs and metals. The results of the investigation were reported in a report entitled *Environmental Residuals Beneath the Concrete Pad at Schnitzer Steel Products Site* (ICF Northwest, 1987a). PCBs concentrations in soil were above background (0.26 mg/kg) but generally below 5 mg/kg, except in three soil samples, in which the PCBs concentration ranged from 5.1 to 10 mg/kg.

In June of 1987, Schnitzer performed a follow-up soil and groundwater investigation, which focused on potential impacts to soil and groundwater near the Site shoreline (ICF Northwest 1987b). Six soil pits were excavated approximately every 250 feet along the shoreline down to the first encountered groundwater. Soil samples collected from the top foot of soil and from soil near the groundwater table were analyzed for PCBs, metals, and total hydrocarbons. PCB concentrations in soil ranged from non-detect to 65 mg/kg, with all but two concentrations below 50 mg/kg.

In May 2015, soil samples were collected from 11 boring locations, shown on Figure 3 (Figure 3 of the 2015 Terraphase Engineering report). The shallowest (1.5 feet below ground surface) soil sample collected from each soil boring was analyzed for PCBs by U.S. EPA Method 8082A. The deeper (4.5 and 7.5 feet below ground surface) soil samples from each boring were placed on hold and analyzed if PCBs were detected in the overlying sample from the same soil boring. PCBs were not detected in the shallow soil samples from borings S-1, SB-2, SB-3, or SB-4, and consequently deeper samples from these four borings were not analyzed for PCBs. The results are summarized in Table 4 and on Figure 5, of the 2015 Terraphase Engineering report. Figure 5 of the 2015 Terraphase Engineering report is included as Figure 4 of this referral form.

PCBs (Aroclor-1248, Aroclor-1254, and Aroclor-1260) were detected in the shallow soil samples from borings SB-5 through SB-11, shown on Figure 4 (Figure 5 from the 2015 Terraphase Engineering report). Both the intermediate and deep soil samples from these seven borings were taken off hold and analyzed for PCBs. PCBs were detected in the intermediate interval samples from borings SB-5, SB-6, SB-8, and SB-11. The only PCB detected in the deep interval samples was Aroclor-1254, which was only detected in the deep sample from boring SB-10 at a concentration of 0.016 mg/kg. PCBs were not detected in any other deep soil samples.

The highest PCBs concentrations were measured in soil from borings SB-6 and SB-11, in the northernmost part of the investigations area. PCBs concentrations exceeded the environmental screening level (ESL) in shallow soil from borings SB-6, SB-8, SB-9, and SB-11, and in intermediate soil from borings SB-6, SB-8, and SB-11. PCB concentrations, or reporting limits (RLs), did not exceed ESLs in any of the deep soil samples.

Per the *Modified Sampling and Analysis Plan* prepared by Terraphase Engineering Inc. (2016) the potential known sources of PCBs include:

- The central part of the site, towards the north-west side of the shredder operation is likely a source of PCBs because in 1984 soil sample results indicated a PCB exceedance of 50 milligrams per kilogram threshold.
- The oil-water separators, sumps, and tanks, and conveyance and storage structures.

Regulatory Orders and Permits:

The San Francisco Bay Regional Water Quality Control Board (RWB) issued Cleanup and Abatement Orders Nos. 88-023 and R2-2013-1001 to Schnitzer Steel Industries, Inc. in 1988 and 2013. The RWB issued waste discharge requirements (WDRs; Order No. R2-2016-0045, NPDES Permit CA0030228) for discharges of treated process water, cooling water, dust suppression water, wash water, and stormwater to the facility in 2016. The RWB issued a Water Code Section 13267 Technical Report Requirement order in February 2017. The RWB issued a Conditional Offer to Settle Violations of NPDES Permit CA0030228 in July 2018 for pH and copper effluent limitation exceedances.

References:

Terraphase Engineering Inc. (2017). *Final Soil and Groundwater Management Plan.* Oakland, CA. San Francisco Bay Regional Water Quality Control Board (Region 2).

Terraphase Engineering Inc. (2016). *Modified Sampling and Analysis Plan.* Oakland, CA. San Francisco Bay Regional Water Quality Control Board (Region 2).

Terraphase Engineering Inc. (2015). *Investigation Report Soil and Groundwater Sampling in the Vicinity of Nine Excavation Pits Schnitzer Steel Facility.* Oakland, CA. San Francisco Bay Regional Water Quality Control Board (Region 2).

Terraphase Engineering Inc. (2014). *Work Plan Addendum for Off-Site Cleanup Activities.* Oakland, CA. San Francisco Bay Regional Water Quality Control Board (Region 2).

ICF Northwest. (1987a). *Environmental Residual Beneath the Concrete Pad at Schnitzer Steel Products Site.* Oakland, CA. May 6.

ICF Northwest. (1987b). *Environmental Residual in Soil and Groundwater Near the Shoreline of the Schnitzer Steel Products Site.* Oakland, CA. May 6.

10. Has sampling or other investigation been conducted in the vicinity of the property? Yes ☑ No☐

Samples of street dirt and storm drain inlet sediment were collected by the San Francisco Estuary Institute (SFEI) at the intersection of Market Street and Embarcadero West in September 2008.

Offsite sediment sampling was conducted by the Alameda Countywide Clean Water Program in the vicinity of the property in September 2018 and July 2019. In 2018, sediment was collected along the fence line on Embarcadero West and composited into one sample. In 2019, follow-on sampling collected sediment from four locations within the public right-of-way along Embarcadero West.

The PCBs results are provided in the table below and the site locations are shown on Figure 5.

Site ID	Sample Date	PCBs (mg/kg)	Comments
ROW_18-15	9/18/2018	1.571	Collected soil from dirt bank next to site.
ROW_18-15-A	7/9/2019	1.314	Collected from sediment mounded along fence line.
ROW_18-15-B	7/9/2019	0.516	Dirt parking lot across railroad tracks from facility.
ROW_18-15-C	7/9/2019	1.870	Sampled outside of driveway to non-ferrous area.
ROW_18-15-D	7/9/2019	1.997	Sampled at inlet near intersection of Market St and Embarcadero West.

11. Is the site subject to the general industrial stormwater permit? ☐Yes ☑ No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

Per the RWQCB NOI database, Schnitzer Steel Industries Inc. is listed as "Terminated" since April 3, 2017. The site is covered by individual WDRs (Order No. R2-2016-0045, NPDES Permit CA0030228).

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? ☑ Yes ☐No

Schnitzer Steel Industries, Inc. excavates, and installs trenches and underground utilities to support business; thus, potential for exposure onsite (Terraphase Engineering Inc., 2017).

13. Are any Federal, State or Local regulatory agencies currently involved with the site? ☑Yes ☐ No

If yes, provide as much of the information below as known.

Agency Involvement Contact Name Phone

Agency	Involvement	Contact Name	Email
SFRWQCB	Lead oversight agency	Max Shahbazian	mshahbazian@waterboards.ca.gov
SFRWQCB	Lead oversight agency	Cecil Felix	cecil.felix@waterboards.ca.gov

14. Provide any other pertinent site information not covered above:

None.

15. Describe enhanced control measures that will be implemented at the site.

Schnitzer Steel is in the process of completing grading, paving, and other improvements to the existing onsite stormwater system, including installing an additional stormwater filtration basin, one-million-gallon storage tank, and associated pumping equipment. Schnitzer Steel intends to improve the wheel wash facilities to limit the potential of PCBs in sediment being tracked offsite via truck tires as well as remove legacy sediment along the outside of the outer wall on Embarcadero West. In addition, pavement improvements up to the outer wall on Embarcadero West will be accompanied by enhanced street sweeping along Embarcadero West. Schnitzer Steel will conduct these improvements.

Attach Site Location Map, Site Diagram, and any pertinent sampling & analyses data

Figures

(See attached Figures 1 to 5)

Legend

Parcel Boundary (APN 18-395-1)

Other Project Area

N

0 400 Feet

Schnitzer Steel Products Parcel Boundary Map

1101 Embarcadero West
Oakland, CA

Geosyntec consultants

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Figure 1

P:\GIS\Alameda Countywide Clean Water Program (ACCWP)\AlamedaOldParcels\Projects\Schnitzer Steel facility Parcel Boundary Map.mxd 11/19/2019 5:25:56 PM (Author: YLiu)

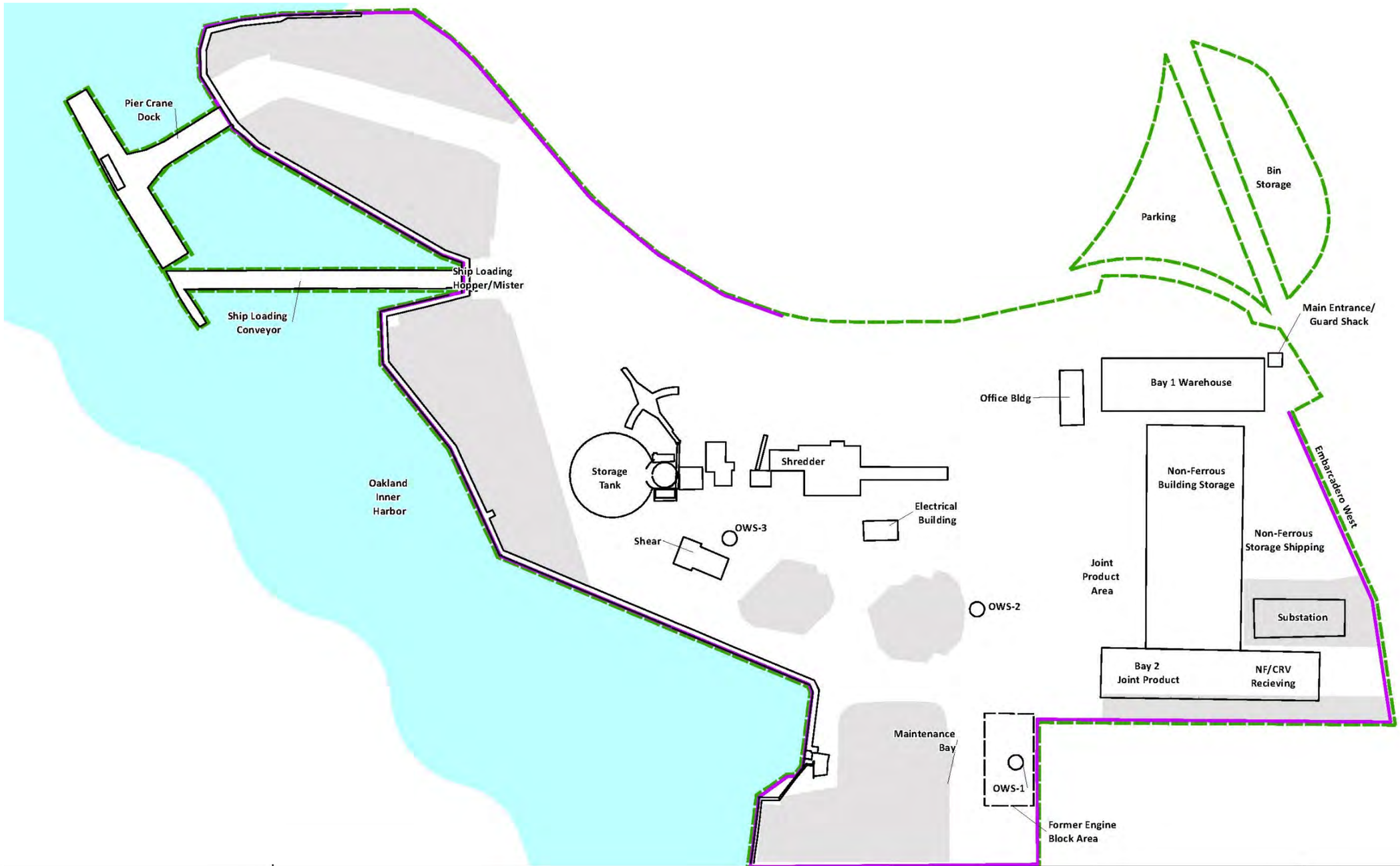

Legend

- Concrete Berm
- Site Boundary
- Unpaved Areas

0 80 160 240 320 Feet

1 inch = 160 feet

N

Figure Credit: Figure 2 of the Final Soil and Groundwater Management Plan (Terraphase Engineering, 2017).

Facility Plan
Schnitzer Steel Products
1101 Embarcadero West
Oakland, CA

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Figure 2

P:\ PRJ2003WRG\Alameda Countywide Clean Water Program (ACCWP)\2015 On Call Technical Services\4. Technical\Source Property Referral\Oakland\Schnitzer Steel\Referral

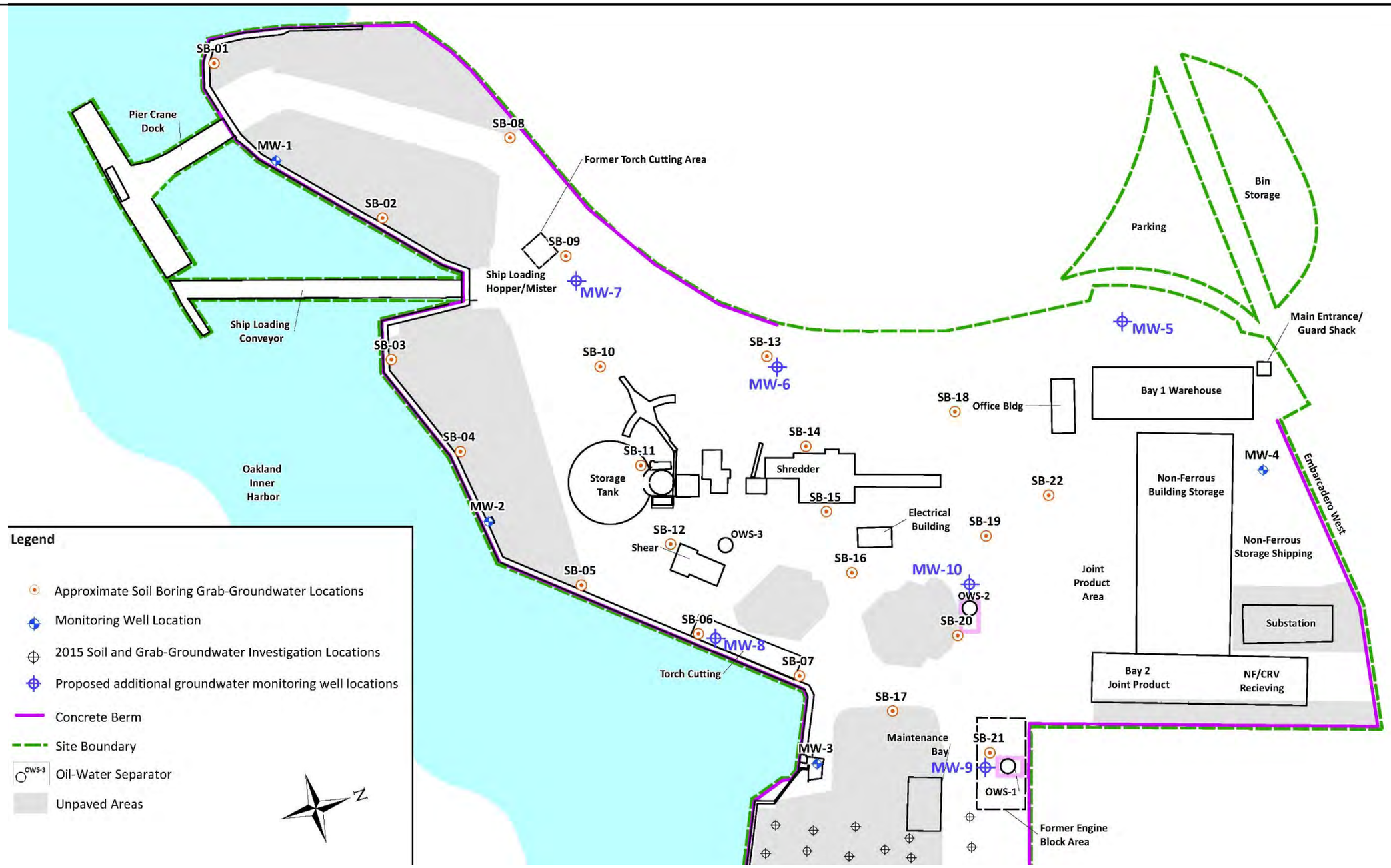

Figure Credit: Figure 3 of the *Investigation Report Soil and Groundwater Sampling in the Vicinity of Nine Excavation Pits Schnitzer Steel Facility* (Terraphase Engineering, 2015).

Soil and Groundwater Sample Locations
Schnitzer Steel Products
1101 Embarcadero West
Oakland, CA

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Figure 3

P:\ PRJ2003WRG\Alameda Countywide Clean Water Program (ACCWP)\2015 On Call Technical Services\4. Technical\Source Property Referral\Oakland\Schnitzer Steel\Referral

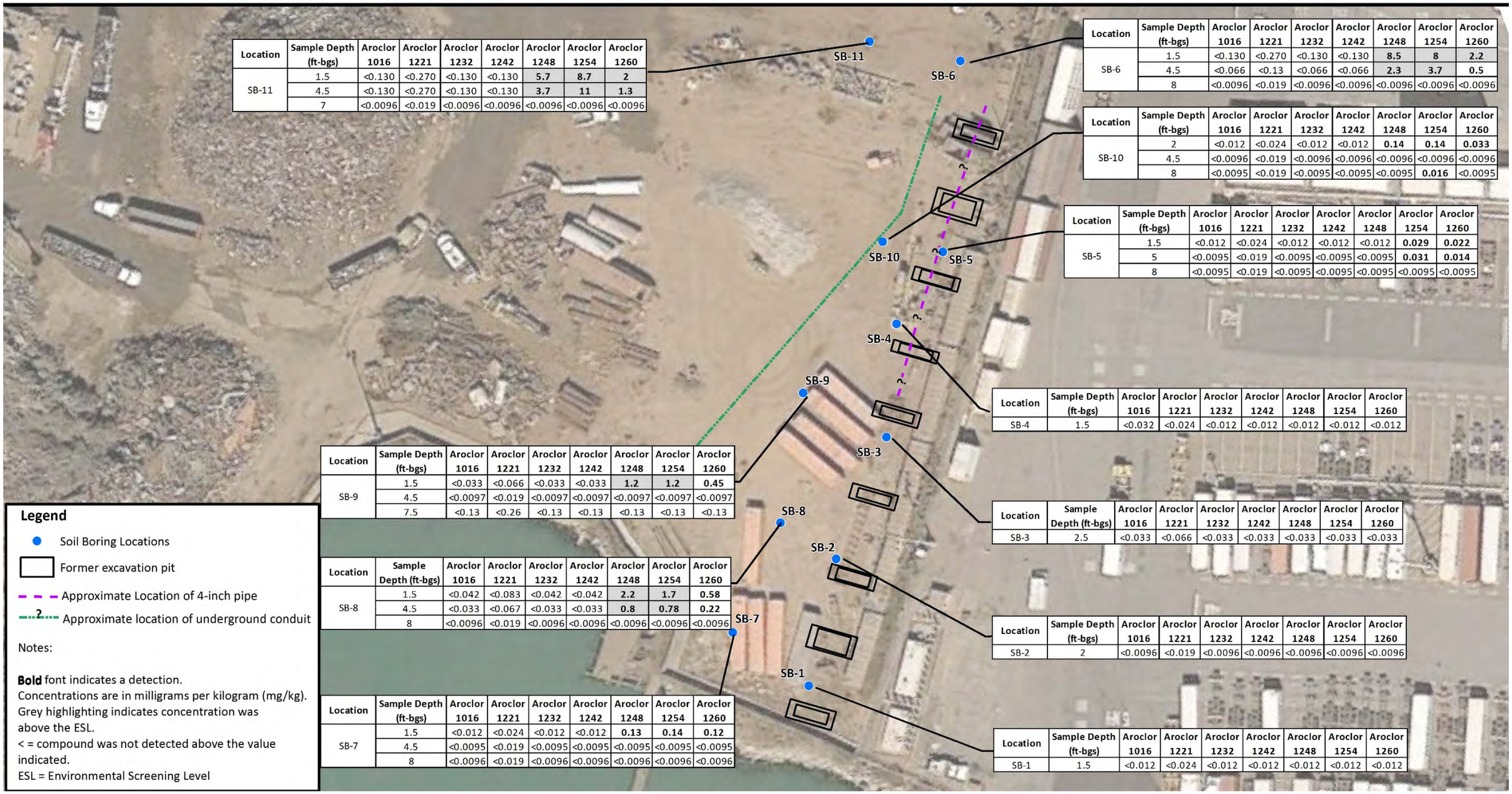

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-11	1.5	<0.130	<0.270	<0.130	<0.130	**5.7**	**8.7**	**2**
	4.5	<0.130	<0.270	<0.130	<0.130	**3.7**	**11**	**1.3**
	7	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-6	1.5	<0.130	<0.270	<0.130	<0.130	**8.5**	**8**	**2.2**
	4.5	<0.066	<0.13	<0.066	<0.066	**2.3**	**3.7**	**0.5**
	8	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-10	2	<0.012	<0.024	<0.012	<0.012	**0.14**	**0.14**	**0.033**
	4.5	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096
	8	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	**0.016**	<0.0095

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-5	1.5	<0.012	<0.024	<0.012	<0.012	<0.012	**0.029**	**0.022**
	5	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	**0.031**	**0.014**
	8	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-4	1.5	<0.032	<0.024	<0.012	<0.012	<0.012	<0.012	<0.012

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-9	1.5	<0.033	<0.066	<0.033	<0.033	**1.2**	**1.2**	**0.45**
	4.5	<0.0097	<0.019	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097
	7.5	<0.13	<0.26	<0.13	<0.13	<0.13	<0.13	<0.13

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-3	2.5	<0.033	<0.066	<0.033	<0.033	<0.033	<0.033	<0.033

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-8	1.5	<0.042	<0.083	<0.042	<0.042	**2.2**	**1.7**	**0.58**
	4.5	<0.033	<0.067	<0.033	<0.033	**0.8**	**0.78**	**0.22**
	8	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-2	2	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-7	1.5	<0.012	<0.024	<0.012	<0.012	**0.13**	**0.14**	**0.12**
	4.5	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095
	8	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096

Location	Sample Depth (ft-bgs)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
SB-1	1.5	<0.012	<0.024	<0.012	<0.012	<0.012	<0.012	<0.012

Legend

- Soil Boring Locations
- Former excavation pit
- Approximate Location of 4-inch pipe
- Approximate location of underground conduit

Notes:

Bold font indicates a detection.
Concentrations are in milligrams per kilogram (mg/kg).
Grey highlighting indicates concentration was above the ESL.
< = compound was not detected above the value indicated.
ESL = Environmental Screening Level

	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
Commercial ESL	0.74	0.74	0.74	0.74	0.74	0.74	0.74

N

0 50 100 150 Feet

1 in = 50 ft

Figure Credit: Figure 5 of the *Investigation Report Soil and Groundwater Sampling in the Vicinity of Nine Excavation Pits Schnitzer Steel Facility* (Terraphase Engineering, 2015).

PCBs Concentration in Soil
Schnitzer Steel Products
1101 Embarcadero West
Oakland, CA

Geosyntec consultants

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Figure 4

P:\ PRJ2003WRG\Alameda Countywide Clean Water Program (ACCWP)\2015 On Call Technical Services\4. Technical\Source Property Referral\Oakland\Schnitzer Steel\Referral

Approximate Site Boundary

Right of Way Sample Locations
Schnitzer Steel Products
1101 Embarcadero West
Oakland, CA

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Figure 5

P:\ PRJ2003WRG\Alameda Countywide Clean Water Program (ACCWP)\2015 On Call Technical Services\4. Technical\Source Property Referral\Oakland\Schnitzer Steel\Referral

SOURCE PROPERTY SELF-ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:	City of Oakland
Staff Contact Name:	Kristin Hathaway
Phone:	(510) 238-7571
Email Address:	khathaway@oaklandnet.com
Date of Report:	09/11/2020

1. Name of Site:
General Electric Company – Oakland (Phase 2)

2. Address City County ZIP:
5441 International Boulevard (Formally known as East 14th Street),
Oakland, CA 94601

3. APN(s):
41-3848-1

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

Total parcel area is approximately 24 acres. The 2018 Phase 1 abatement area was approximately 10.1 acres and remediation of the remaining portion of the site (Phase 2) incorporates 13.9 acres. The location map (Figure 1), site diagrams (Figure 2 and Figure 3-3) and site conceptual plan (Figure 3-5) are provided in Attachment 1.

5. Current Owner

Name:	General Electric Company
Address:	640 Freedom Business Center Drive
City, County & Zip Code:	King of Prussia, Pennsylvania 19406
Contact Person	Lance Hauer
Phone:	610-992-7972
E-mail Address:	Lance.hauer@ge.com

6. Describe Current (Post-Abatement) Site Operations/Land Use:

Between 1924 and 1975, GE operated a transformer manufacturing facility at the site. Between 1975 and the mid-1990s, GE Apparatus Service Department (ASD) operated an electrical equipment maintenance and repair operation in portions of the site. After that time, the site was used for temporary storage of mobile office trailers. Since 2005, the site has not been in use, but has been partially remediated.

Phase I of the remediation was performed from August 2013 through March 2015. The areas shaded in green and yellow on Figure 2 illustrate the 10.1 acres of Phase 1 remediation. Phase II includes remediation associated with the eight remaining buildings on the site (Buildings #1, #2, #4, #8, #17, #18, #20, and #21) as shown on Figure 3-3. These buildings were constructed between 1924 and 1975, with the exception of Building #21, which was constructed in the early 1980s to house monitoring and remediation equipment (Baseline, 2019). Two buildings, Buildings #1 and #2, on the site are historic resources as defined by CEQA and are described further in Question 14.

After building demolition and remediation, an approximately 534,208-square-foot industrial building will be constructed with 93,522 square feet of landscaping (Baseline, 2019).

The site is inspected monthly to assess its condition and determine if maintenance is required. Typical maintenance activities include, but are not limited to fence repairs, street-sweeping semi-annually at a minimum or as required during monthly site inspections and annual asphalt repairs (Baseline, 2019).

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known):

Name:	General Electric Company
Period of Operations:	1924 - 1975
Business Operations:	Transformer Manufacturing Facility
Sources of PCBs & Mercury:	Transformers were manufactured on the property.

Name:	General Electric Company
Period of Operations:	1975 – 1990's
Business Operations:	GE Apparatus Service Department-electrical equipment maintenance and repair operation
Sources of PCBs & Mercury:	Electrical equipment maintenance of turbines, electric motors and switch gear equipment. Used various chemicals including lubricating oils.

Name:	General Electric Company
Period of Operations:	Mid 1990's - 2005
Business Operations:	GE Apparatus Service Department – Temporary storage of mobile office trailers
Sources of PCBs & Mercury:	Historic activities.

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site:

The primary constituents of concern at the site aside from PCBs in soil are chlorinated volatile organic compounds (CVOCs), including trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC), in groundwater and soil (Geosyntec, 2011).

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? ☑ Yes ☐ No

GE – Oakland has undergone extensive soil and groundwater investigations. The investigations include initial on-site monitoring from 1980-1981, VOC investigations from 1996-2000, onsite shallow soil and groundwater investigations in 2000, and groundwater monitoring form 1991-present (Geosyntec Consultants, 2009b). A total of 700 soil samples, at and near the property, were collected from 1980 to 2009, and 428 samples detected PCBs (Geosyntec Consultants, 2009a). The distribution of PCBs in soil in 2009 is shown on Figure 5.

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement? ☑ Yes ☐ No
If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number
Department of Toxic Substances Control	Lead agency	Yongsheng (Johnny) Sun	(510) 540-3872

14. Describe the type and extent of abatement that has occurred:

Prior cleanup efforts included installing and operating a groundwater extraction and treatment system, removing contaminated soil in targeted areas, and covering the portions of the site with caps made of soil, clay or asphalt (DTSC, 2018). In 1981, the facility was capped with asphalt and bentonite-soil, and a soil berm was constructed as the surface runoff control. From 1982 to 1996, the facility used a French drain system to extract oil from the groundwater where waste oil tanks previously were in place. In 1993, the DTSC executed a covenant deed restricted use property dated April 9, 1993 (LSA Associates, Inc., 2017).

Phase I abatement actions included (Geosyntec, 2015b):

- Installed new extraction wells and monitoring wells, and abandoned specified existing monitoring wells;
- Conducted soil sampling and analysis to finalize limits and designs for the targeted excavations;
- Completed targeted soil excavations;
- Completed clearing, grubbing, concrete removal, and grading activities for the asphalt cap;
- Installed groundwater extraction and treatment system trenches, piping, equipment pad, building, fence, and equipment;
- Installed new catch basin upstream of manhole MH24 and fitted with FloGard® filter systems for surface flow filtration into the catch basin. The catch basin structure is located upstream of, and connected to, manhole MH24 and designed to capture sheet flow across the site;
- Installed concrete curb around the perimeter of the site;
- Placed asphalt; and
- Replaced the fence along portions of the southern, northwestern, and eastern property boundaries.

Per the Draft Environmental Impact Report (EIR; Baseline, 2019), Phase II of the project includes demolition of eight contaminated buildings, remediate site, and construct a warehouse on the site. Buildings #1 and #2 on the site, which are among the buildings proposed for demolition, are considered historic resources under CEQA and contribute to the 57th Avenue Industrial District Area of Primary Importance (API). As part of the proposed project, the front "bulkhead" portion of Building #1 (i.e. the façade that contains early-20th century Classical Revival-inspire industrial architecture and a portion of the sides of the building) will be preserved, treated or encapsulated to contain any contaminated materials, and incorporated into the design of the new warehouse. The site will be sufficiently remediated to permit its reuse. The demolition, abatement, remediation and ongoing monitoring activities will be conducted with regulatory agency oversite by the USEPA and DTSC.

After demolition and remediation, which is scheduled to be complete in 2020, an approximately 534,208-square-foot industrial building will be constructed with 93,522 square feet of landscaping. Building construction will include soil vapor barriers, clean utility corridors and other protections for construction workers and employees of the new facility and will be overseen by the USEPA and DTSC. New connections will be made to existing utility systems.

15. Describe how the property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking):

Actions have been implemented to prevent surface runoff from leaving the facility. Fencing along the property has a short concrete wall to prevent flooding onto adjacent properties (LSA, 2017). As part of the remedial work conducted in 2015, stormwater drainage system modifications were also implemented to prevent the transport of stormwater offsite (Geosyntec, 2015b). Stormwater runoff is discharged at only one location, MH24 (see

Figure 2). The stormwater drainage system modifications include the installation of a catch basin upstream of manhole MH24, which is fitted with a FloGard® stormwater treatment system. The concrete channel was filled with engineered fill, and piping around MH23 is permanently plugged. The accumulated stormwater around MH23 is pumped through two in-series bag filtration systems with 10- and 1- micron bags prior to discharging to the catch basin upstream of MH24 (Geosyntec Consultants, 2015b).

PCBs abatement would be considered complete at the end of the remediation phase, which, per the draft EIR, is approximately 6 months after the start of demolition (Baseline, 2019). Building demolition began in March 2020. PCBs in concrete, soil, and building materials will be managed in the following ways:

PCBs in Concrete: Concrete with PCBs less than 50 milligrams per kilogram (mg/kg) will be crushed and then placed on site under the new cap during the construction phase. Concrete with PCBs at or greater than 50 mg/kg will be appropriately disposed of off-site at licensed facilities.

PCBs in Soil: PCBs in soil at four known hotspot locations will be excavated and disposed of off-site based on characterization and profiling of excavated soil. The targeted excavations will address known high concentrations of PCBs in soil. Excavated materials will be stored on-site in covered stockpiles or waste containers pending disposal characterization and off-site transport. Outside of hotspot areas, areas where PCBs have been identified in soil at concentrations 50 mg/kg or greater will be excavated where soil could be disturbed by the redevelopment activities (e.g., generally at depths shallower than 15 feet below current ground surface). This soil will also be disposed of at an appropriately licensed facility based on characterization and profiling.

After the targeted excavation of contaminated soil, the area under the proposed building slab would be filled and compacted. The geotechnical improvement of soil underneath the proposed building pad will entail excavation of up to 5 to 6 feet (on average 3 to 4 feet) of existing fill materials and placement and compaction of engineered fill (e.g., re-used existing fill and crushed concrete from building demolition) beneath the proposed pad grade. In certain areas of the site, ground improvement for geotechnical purposes will be required to depths of up to 18 feet below ground surface. Soil movement will also be needed for site grading and utility installation. On-site exposure to remaining contaminants in soil after hotspot removal and grading will be prevented by:

- Capping – Consistent with the approved 2013 TSCA application and 2011 RAP, a cap will be put in place over the entire site. The existing caps and building foundations will be removed and replaced with new, functionally equivalent capping materials. The new warehouse building slab and concrete pavement will serve as the cap for the site. Landscaped areas will be constructed in raised planters above the concrete cap. The cap will be monitored and maintained after construction.
- Clean Utility Corridors – Clean corridors refer to the installation of subgrade utilities in imported fill material to prevent exposure of maintenance workers to contaminated soil. Aside from remediation-related systems, clean corridors will be used for subgrade utilities that will be active after construction of the warehouse building.
- Stormwater Controls – Stormwater runoff will be collected in a new storm drain system beneath the site. The stormwater runoff from the project site will be treated with measures such as a media treatment basin and/or the various on-site and off-site treatment alternatives, and per City standard requirements. The exact measure or combination of various measures to be used for this project will be further evaluated with the City during the construction design phase and would incorporate USEPA requirements for stormwater and sediment sampling.
- Maintain Land Use Covenant – The current deed restriction for the site prohibits residential and sensitive land uses on the site, listed previously; requires that the cap not be disturbed, and prohibits penetration of the cap except after notification of DTSC. Additionally, the covenant will be updated, in

coordination with DTSC and USEPA, to account for post-remediation site conditions and include requirements for a soil management plan for any post-redevelopment soil handling activities.

PCBs in Building Materials: Disposition of the demolished building materials will be based on the sampling of building materials previously conducted by GE and additional sampling as required by the licensed disposal facility, the City of Oakland, and the USEPA. Except for the concrete slabs that are planned for crushing and placement under the new cap on the site, if PCB concentrations are less than 50 mg/kg, all other building materials generated from the demolition will be appropriately disposed off-site at a permitted facility.

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4:

Stormwater discharge data for PCBs collected in 2015 to 2016 are summarized in the table below. Data collected in 2015-2016 shows PCBs were not detected in the discharge (SMARTS, 2018).

Reporting Period	Parameter	Result (ug/L)	Result Qualifier	Method Detection Limit	Reporting Limit
2015 - 2016	PCB-1248	0.5	<	0.16	0.5
2015 - 2016	PCB-1232	0.5	<	0.14	0.5
2015 - 2016	PCB-1221	1	<	0.32	1
2015 - 2016	PCB-1016	0.5	<	0.16	0.5
2015 - 2016	PCB-1254	0.5	<	0.16	0.5
2015 - 2016	PCB-1242	0.5	<	0.16	0.5
2015 - 2016	PCB-1260	0.5	<	0.13	0.5

REFERENCES

Baseline Environmental Consulting. (2019). *GE Site Remediation and Redevelopment Project (PLN19-076/ER18-013) Draft Environmental Impact Report.* State Clearinghouse No. 201812204. December.

California Department of Toxic Substances Control (DTSC). (2018). Public Notice. Five-Year Review Report, GE Oakland Site. June 2018.

Geosyntec Consultants. (2009a). *Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, California*. June.

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Amec Foster Wheeler Environment & Infrastructure, Inc. (2016). *National Pollutant Discharge Elimination System (NPDES) Industrial General Permit Notice of Termination*. June.

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Amec Foster Wheeler Environment & Infrastructure, Inc. (2017). *Semiannual Monitoring Report April through September 2017*. June.

Stormwater Multiple Application and Report Tracking System (SMARTS). (2018). *Sampling Data Summary General Electric*. Oakland CA.

Attachment 1

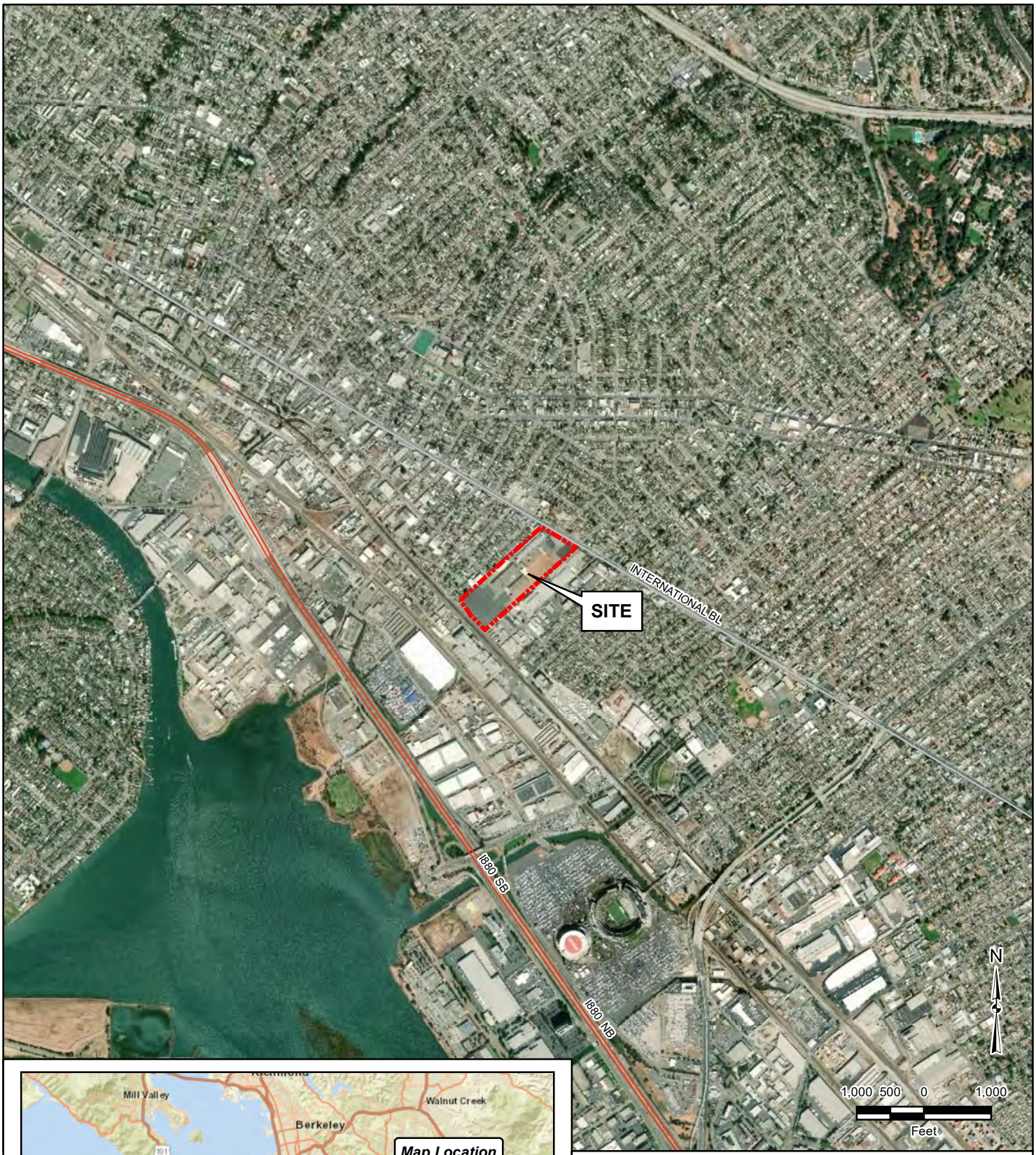

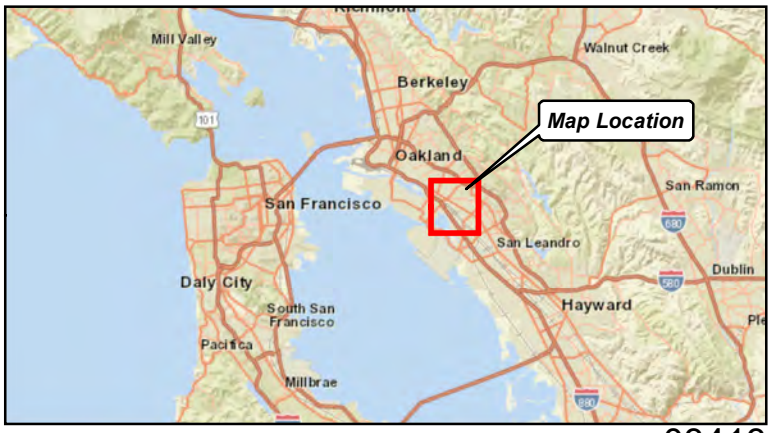

Site Location Map

General Electric Company
5441 International Boulevard
Oakland, California, 94601

Geosyntec consultants

Figure 1

Oakland | May 2015

P:\GIS\GE-Oakland\project\2015_RemedyImplementationReport\Fig01_Site Location.mxd

03413
3454

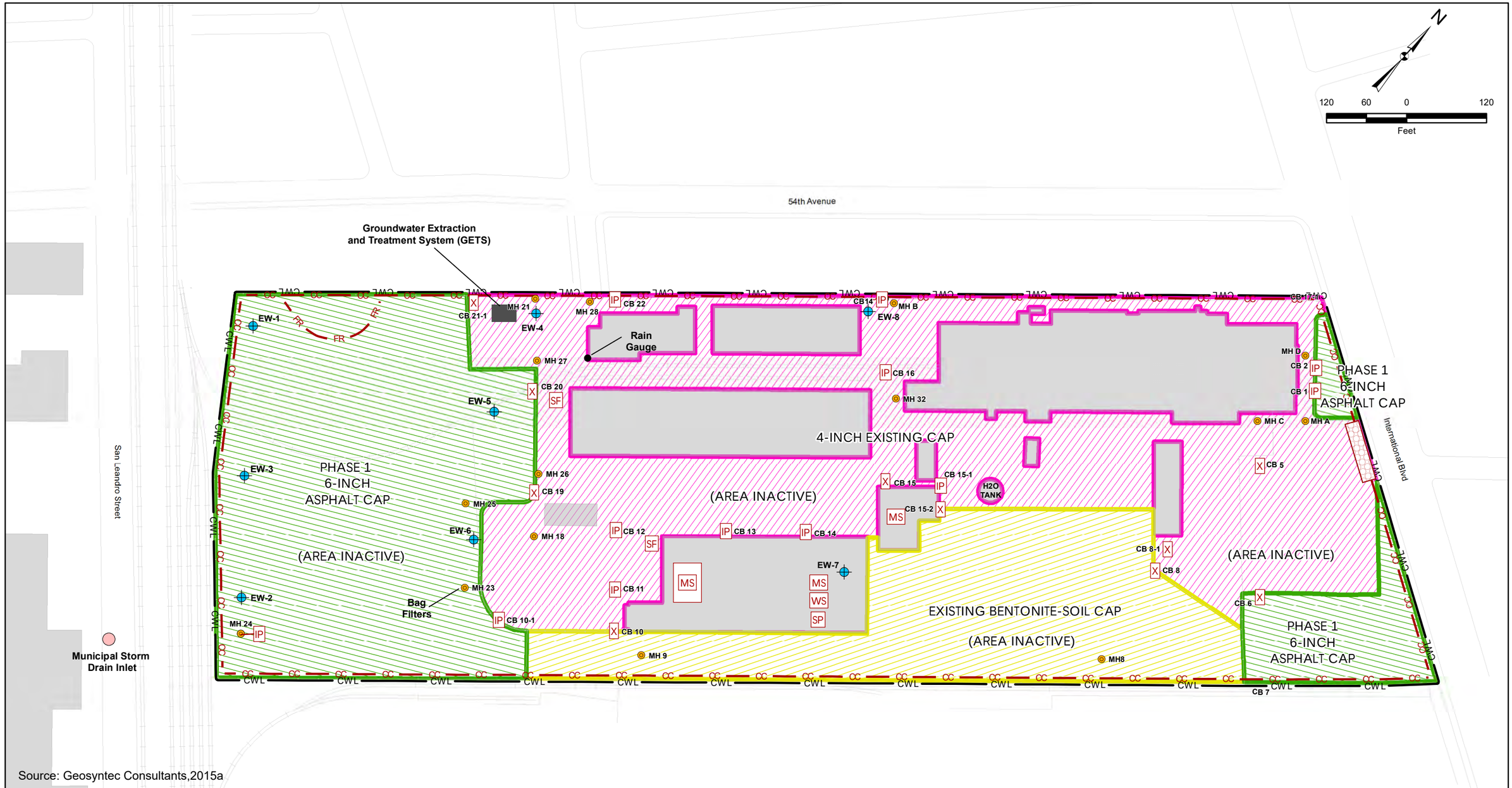

Source: Geosyntec Consultants,2015a

Legend

- Man Hole
- Extraction Well
- CWL — Construction Work Limit
- GB — Gravel Bag Berm (SE-6)
- CC — Concrete Curb
- FR — Fiber Rolls (SE-5)
- Construction Entrance/Exit (Asphalt Berm)
- SP — Stockpile Area (WM-3)
- SF — Sanitation Facilities Area (WM-1)
- MS — Material Storage Area (WM-9)
- X — Closed Catch Basin
- WS — Waste Storage Area (WM-4, WM-5)
- CW — Concrete Waste Management (WM-8)
- VM — Vehicle Fueling and Maintenance Area (NS-9, NS-10)
- H2O — Water Storage for Dust Control (WE-1)
- IP — Open Catch Basin with Inlet Protection (SE-10)

Note:
Phase 1 construction activities were completed as of March 10, 2015. The site is currently Inactive. Phase 2 construction activities are contingent upon approval of a building demolition permit by the City of Oakland. The legend references the CASQA BMP Factsheets for Construction (Jan 2015)

Stormwater Pollution Prevention Plan
5441 International Blvd., Oakland, CA
General Electric Company

Geosyntec consultants

Oakland | June 2018

Figure 2

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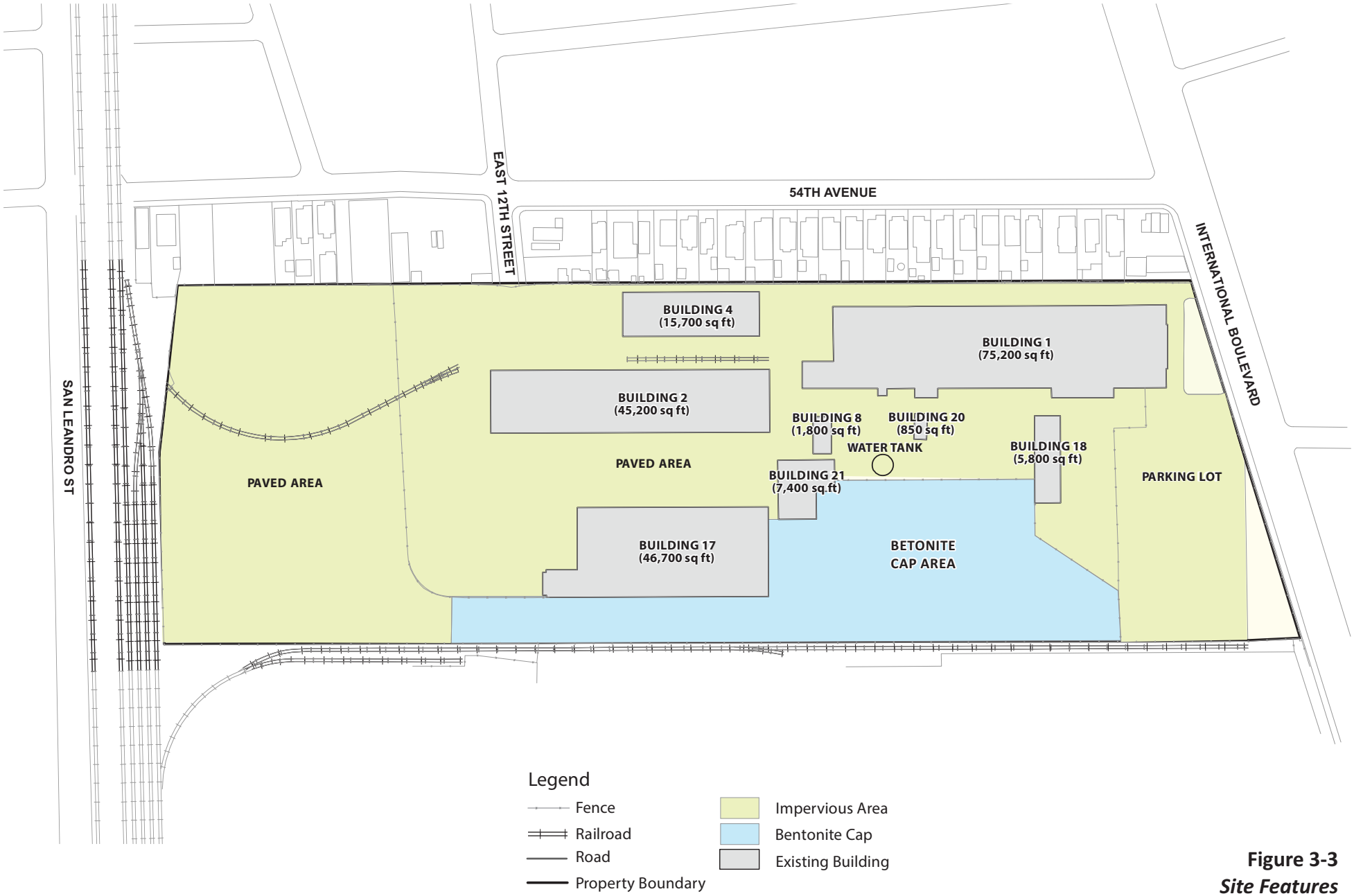

Figure 3-3
Site Features

GE Site Remediation and Redevelopment Project EIR
Source: GEOSYNTEC Consultants, December 2012.

BASELINE ENVIRONMENTAL CONSULTING

P:\Base\18218-00 Bridge GE EIR\Products\Draft EIR\Admin 3\Figures\Figure CDR\Figure 3-3.cdr 10/28/19

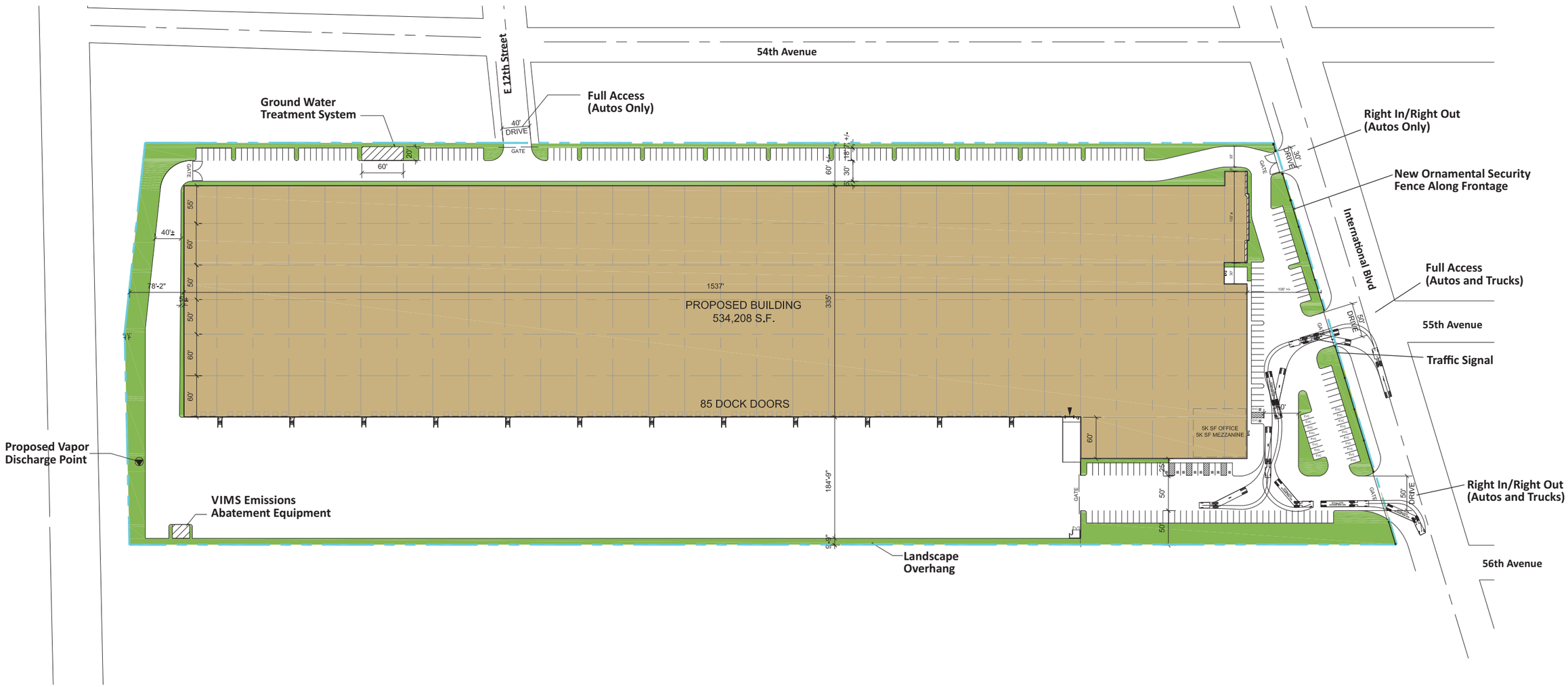

Figure 3-5
Conceptual Site Plan

0 150 Feet

BASELINE ENVIRONMENTAL CONSULTING

GE Site Remediation and Redevelopment Project EIR

Sources: Bridge Development Partners, Herdman Architecture & Design, October 8, 2019.

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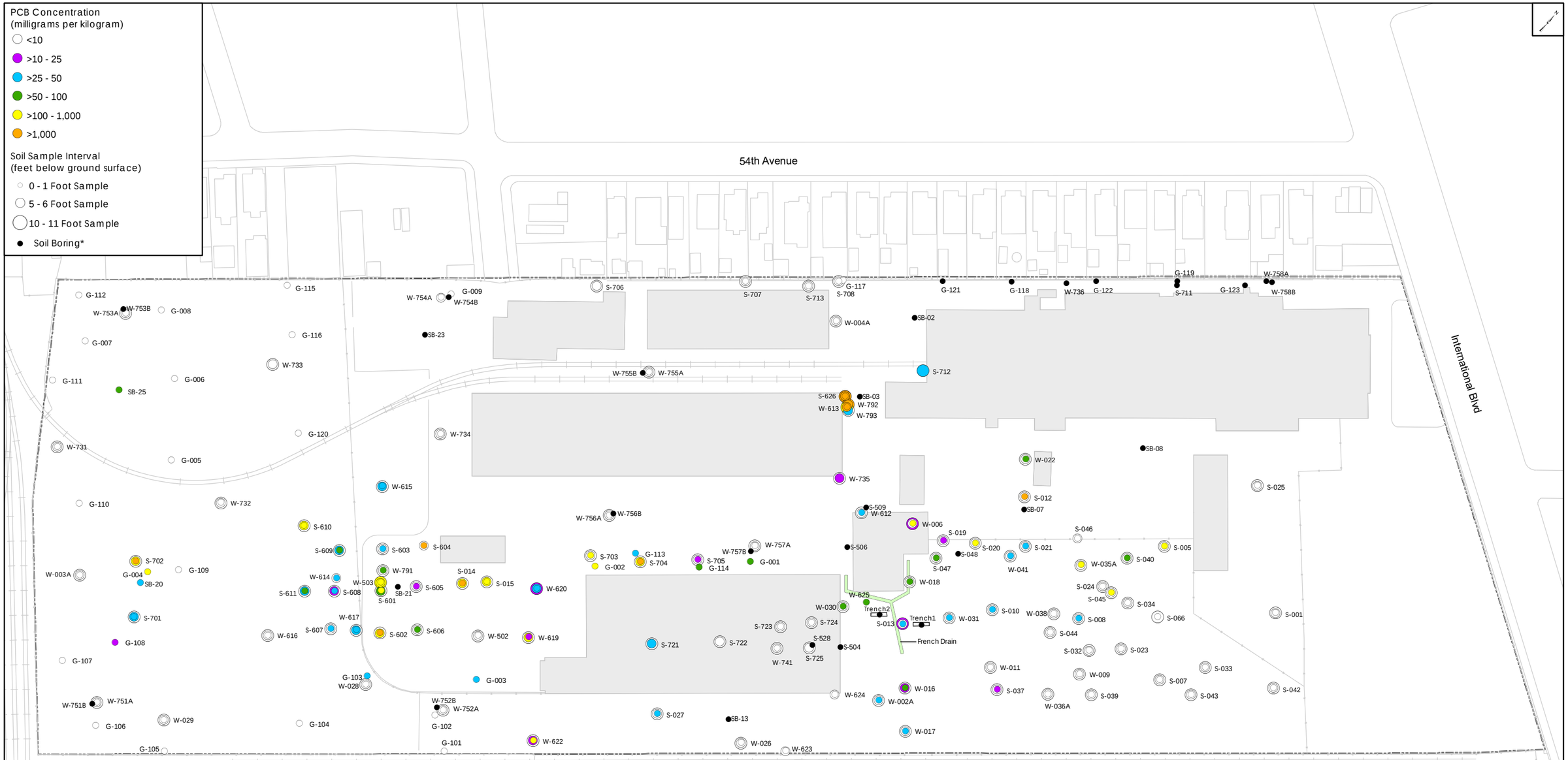

Source : Geosyntec Consultants, 2009a

Notes:
* PCB data from these soil borings is presented in Table 1.
Soil in northeastern portion of the Site was excavated in 2000 and 2004. Data from borings G-118 through W-758 do not represent current PCB concentrations in soil.

120 60 0 120 Feet

PCB Distribution in Soil

General Electric Company, Oakland, CA

Geosyntec consultants

Figure 5

Oakland | July-2020

P:\GE\GE-Oakland\project\2009March\5\PCBs.mxd

SOURCE PROPERTY SELF-ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:	City of Oakland
Staff Contact Name:	Kristin Hathaway
Phone:	(510) 238-7571
Email Address:	khathaway@oaklandnet.com
Date of Report:	09/11/2020

1. Name of Site:
Kaiser Permanente Oakland Legacy Hospital Tower

2. Address City County ZIP:

Address:	280 West MacArthur Boulevard
City, County & Zip Code:	Oakland, CA 94611

3. APN(s):
12-984-15-3

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):
The parcel area is approximately 4.6 acres, although the portion of the parcel that contained the Kaiser Permanente Oakland Legacy Hospital comprises approximately 3.6 acres. The remaining 1 acre consists of the Kaiser Permanent Fabiola Building.

Location maps for the site in the pre- and post-demolition condition are shown in Figures 1 through 4. The parcel map is shown in Figure 5.

5. Current Owner

Parcel:	12-984-15-3
Name:	Kaiser Permanente, NFS – Capital Projects – East Bay Team
Address:	2401 Merced Street, Suite 200
City, County & Zip Code:	San Leandro, CA 94577-4200
Phone:	(510) 752-1000 (main)
Email	Tomas.echeverria@kp.org

6. Describe Current (Post-Abatement) Site Operations/Land Use:

Forensic Analytical Consulting Services (FACS) developed a PCBs Waste Characterization, Segregation, Disposal, and Reuse Plan for Kaiser Permanente prior to demolition, which was conditionally approved by the United States Environmental Protection Agency on March 1st, 2018.

The Kaiser Permanente Oakland Legacy Hospital Tower has been demolished, and as of April 2019 that portion of the site is landscaped. The parcel is shared with another facility, the Kaiser Permanente Fabiola Building, which is another medical facility that is still in operation and was not affected by the demolition.

SOURCE PROPERTY SELF-ABATEMENT REPORT

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known):

The Kaiser Permanente Oakland Legacy Hospital Tower was a 14-story hospital building with a basement constructed in various phases between the 1940s and 1980s. Sources of PCBs in the facility included caulk, rubber gaskets, and certain metal panels on the building façade that were in contact with PCBs-containing materials.

As part of FACS's PCBs plan, exposed soil located along the perimeter of the facility and sediment within nearby stormwater catch basins was sampled for PCBs in 2015 and 2016. Certain areas of exposed soil were found to contain up to 27.2 mg/kg of PCBs, although concentrations varied by location and depth below ground surface.

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site:

On October 7, 2019, the Alameda County Department of Environmental Health reviewed a 2015 Revised Underground Storage Tank Closure Report detailing the results of the removal of two 8,000-gallon double-wall steel underground storage tanks, and noted that "samples collected from immediately beneath the tanks and the soil stockpile had no detectable concentrations of any analyte at or above the method detection limit or reporting limit" (Cook Environmental Services Inc, 2015).

The site is not otherwise referenced in the State Water Resources Control Board GeoTracker system. The site is not referenced in the Department of Toxic Substances Control EnviroStor system.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? ☑ Yes ☐ No

See the *PCB Soil and Sediment Waste Characterization and Disposal Plan*, Appendix A-1.

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement? ☑ Yes ☐ No
If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number
USEPA	PCBs Disposal	Jeff Scott	415-947-8704

14. Describe the type and extent of abatement that has occurred:

The PCB Disposal Plan indicated that soil in various locations around the perimeter of the facility would be removed down to four or five feet deep and disposed of as PCBs remediation waste. Sediment located inside storm drain catch basins and in the first five feet of the attached drain lines would also be removed and disposed of as PCBs remediation waste, and the drain lines would be capped.

The USEPA conditional approval required a "report after completion of all demolition activities that summarizes that actual removal of PCBs from the building before full demolition, off-site disposal of PCB bulk product wastes, PCB remediation wastes, cleanup wastes, decontamination wastes, and recycling of materials associated with the demolition of Kaiser Oakland." This report is pending as of June 2020. Current site conditions indicate that redevelopment as an open vegetated area is completed.

15. Describe how the property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking):

According to the PCB Soil and Sediment Waste Characterization and Disposal Plan, which was approved by EPA, concentrations of PCBs in the soil and sediment at levels greater than or equal to 0.24 mg/kg have been removed and disposed at an appropriate off-site disposal facility in accordance 40 CFR 761.

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4:

No monitoring data are available; the remediation of the site as described above demonstrates the effective elimination of transport of PCBs offsite into the MS4.

REFERENCES

Cook Environmental Services, Inc, 2015. Revised Underground Storage Tank Closure Report, Kaiser Hospital, 280 W. MacArthur Boulevard, Oakland. Cook Environmental Services and Kaiser Foundation Hospital to Robert Weston, Senior Hazardous Materials Specialist, Alameda County Department of Environmental Health. December 11, 2015.

Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan: Kaiser Permanente Medical Center, Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland City, California. Prepared for Carmen Santos, PCB Coordination, USEPA Region 9. Revised April 21, 2017.

USEPA, 2018. PCBCA2017004 – Kaiser Permanente Medical Building, Oakland Legacy Tower Demolition – Disposal Plan for Polychlorinated Biphenyls and Alternative Decontamination of Metal Panels – EPA Approval Under 40 CFR Part 761. USEPA Region 9 to Tomas Echeverria, Architect and NFS Sr. Project Manager, Kaiser Permanente. March 1, 2018.

FIGURES

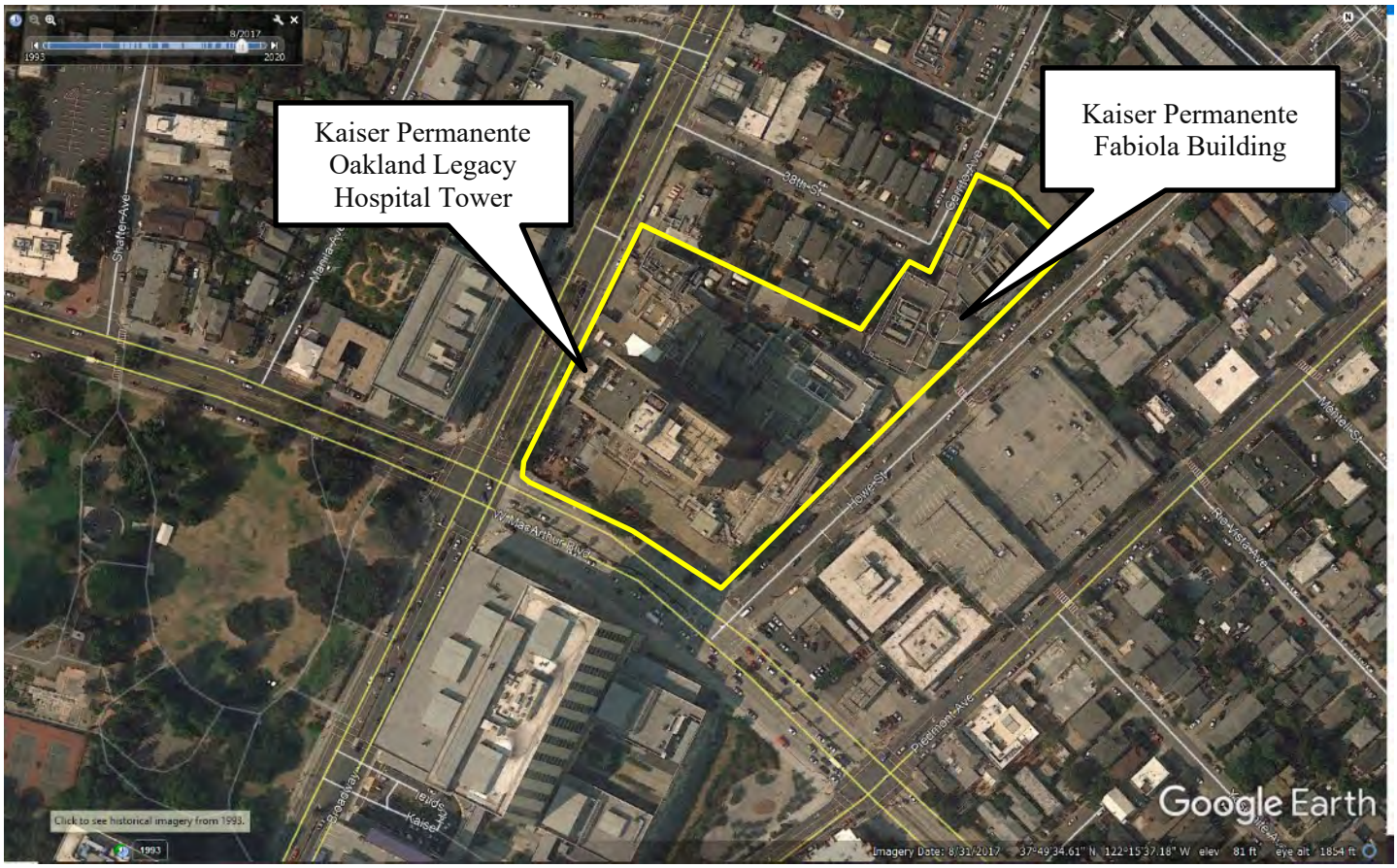

Source: Google Earth, imagery date August 31, 2017

Figure 1: Aerial View of Kaiser Permanente Oakland Legacy Hospital Tower, Prior to Demolition

Source: Google Earth, imagery date October 7, 2017

Figure 2: 3D view of Kaiser Permanente Oakland Legacy Hospital Tower, Prior to Demolition

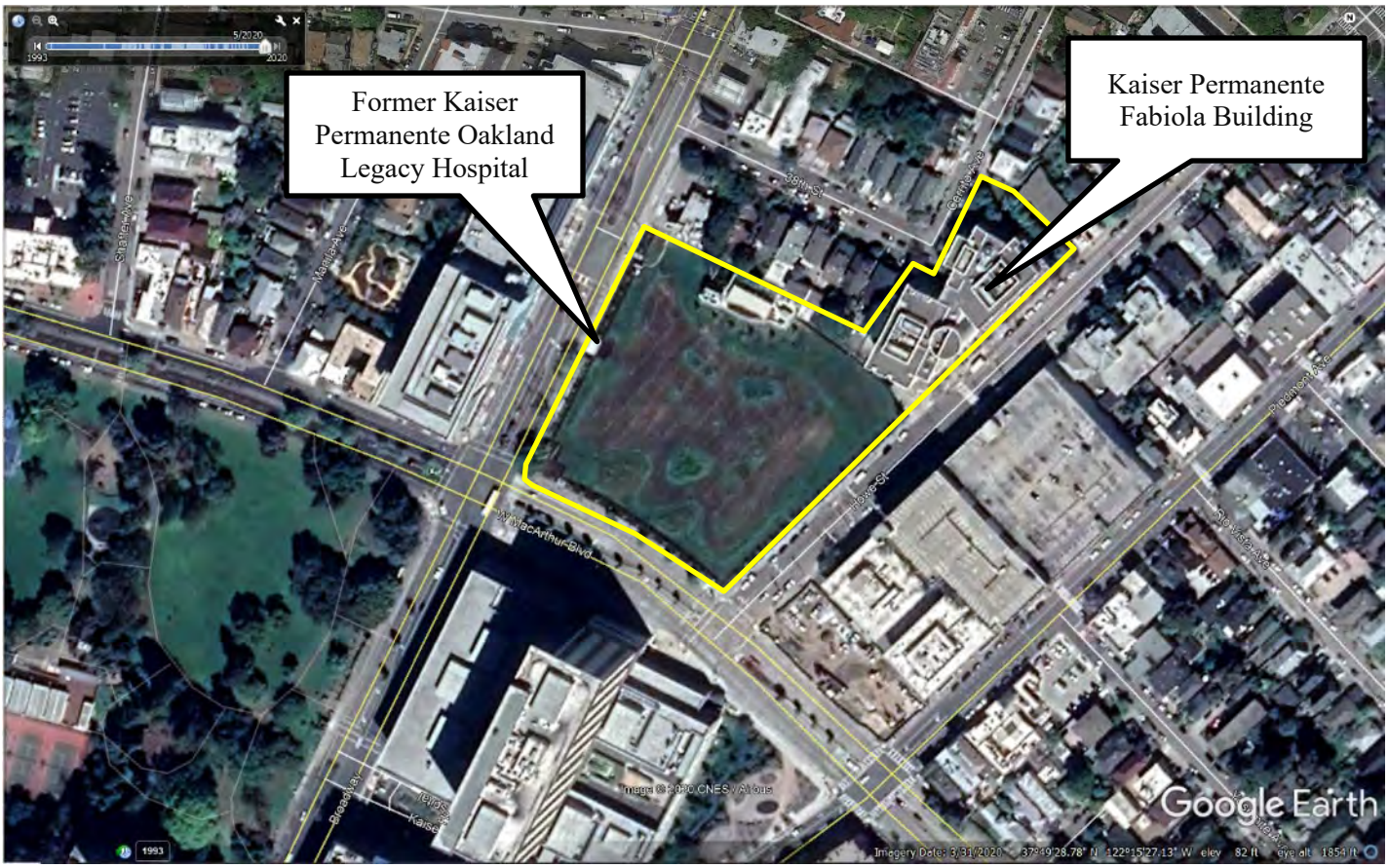

Source: Google Earth, imagery date Marc 31, 2020

Figure 3: Aerial View of Kaiser Permanente Oakland Legacy Hospital Tower, After Demolition

Source: Google Earth, imagery date 2020

Figure 4: 3D view of Kaiser Permanente Oakland Legacy Hospital Tower, During Demolition

Source: Alameda County Assessor's Office

Figure 5: Kaiser Permanente Oakland Legacy Hospital Tower Parcel Map

Figure 6: Photograph of the former Kaiser Permanente Oakland Legacy Hospital, June 2020

SOURCE PROPERTY SELF-ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:	City of Oakland
Staff Contact Name:	Kristin Hathaway
Phone:	(510) 238-7571
Email Address:	khathaway@oaklandnet.com
Date of Report:	0911/2020

1. Name of Site:
OSE-21

2. Address City County ZIP:

Address:	1400 Block Wood Street
City, County & Zip Code:	Oakland, CA 94601

3. APN(s):
18-511-178

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres): 6.2 acres. The site is bounded by Wood Street to the east, 14th Street to the south, 16th Street to the north and the Frontage Road to Interstate-880 to the west. A site location map is provided as Figure 1.

5. Current Owner

Parcel:	18-511-178
Name:	Central Station Village LLC
Address:	6450 Hollis Street
City, County & Zip Code:	Emeryville, CA 94608
Phone:	510-238-1128
E-mail Address:	andyg@hfhltg.com

6. Describe Current (Post-Abatement) Site Operations/Land Use:

The site is currently a residential housing complex (Figure 1).

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known):

"Historical maps indicate that circa 1880, the shoreline of San Francisco Bay passed through the approximate center of the site and ran parallel to Wood Street (City of Oakland, 1880); that is, the site is located in a reclaimed area. Sanborn Fire Insurance maps indicate that the northwestern portion of the site was occupied by railroad tracks from at least 1902 to 1952 with an associated railroad freight depot from at least 1912 to 1952. The southern portion of the site previous was occupied by a door manufacturing facility until at least 1912 and was occupied

by a trucking facility by 1951. The site continued to be used for trucking and warehousing until operations ceased in 2005. The site is currently vacant, and all buildings and other structures have been removed" (AMEC, 2008).

Based on Google Earth historical aerial imagery, construction of the current housing development began in Fall 2015 (see Figure 2).

Based on historic site uses, previous sources of PCBs at the site were likely associated with railroad operations and potentially with historic fill material, although PCBs were not identified as a contaminant of concern (COCs) in environmental investigations performed at the site over approximately the last ten years.

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site:

Environmental site investigations have been conducted at the site since 1998 to characterize soil and groundwater. Except for petroleum impacted soil in the northwest corner of the site, "constituents detected in soil are likely due to the presence of historical fill material and non-point sources associated with previous operations (e.g., trucks)" (AMEC, 2008). Previous site investigations identified four areas of concern, as shown on Figure 3, which required remedial action (SFBRWQCB, 2009):

1) Petroleum affected soil in the northwest portion of the property;
2) Lead affected soil area in the central portion of the property around sample GMX-32;
3) PAH affected soil in the central portion of the property around sample B-1; and
4) Pesticide affected soil on the eastern portion of the property around sample F-5.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? ☑ Yes ☐ No

ACCWP performed sediment field sampling in the right-of-way adjacent to the property on April 14, 2015. The measured PCBs concentrations was 2.149 mg/kg. The location of the sediment sample is shown on Figure 1 (pink triangle). This sediment sample was collected when the site was still unpaved, based on Google Earth aerial imagery from April 2016, which shows that the site was not paved, though construction of building foundations was underway. Aerial imagery from April 2016 is shown on Figure 2.

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement? ☑ Yes ☐ No
If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number
San Francisco Bay RWQCB	Site Clean-Up	Mark Johnson	510-622-2493

14. Describe the type and extent of abatement that has occurred:

On February 27, 2009, the SFBRWQCB issued a No Further Action (NFA) letter stating based on the available information, including the planned use for residential development, no further action related to the pollutant releases was required. Per the NFA letter, "a Final Remediation Plan, [prepared by AMEX Geomatrix and] dated July 2008. The Remediation Plan called for the further assessment and removal of affected soil in each of the four areas where chemical concentrations exceeded the approved soil cleanup standards for unrestricted use. The additional assessment conducted resulted in the removal of approximately 2,500 tons of petroleum impacted and

700 tons of lead impacted soil from the site. Data collected from the PAH and pesticide impacted areas determined that removal in these areas was not necessary."

15. Describe how the property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking):

Contaminated soil has been removed and the site has been paved and redeveloped into a residential housing complex. Based on Google Earth aerial imagery, preparation for the construction of the housing development began in Fall 2015 and appeared to be completed by Spring 2018. The site is almost 100% impervious, comprised of buildings and pavement, with some landscaping. Google Earth Street View image showing current site conditions is provided in Figure 3.

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4: Sediment sampling has not been conducted in the ROW since Spring 2015. Removal of contaminated soil and paving of the site to meet standards for residential use, has effectively eliminated the potential transport of PCBs offsite into the MS4.

REFERENCES

Alameda County Clean Water Program, 2015. AMS Field Sampling Report for ACCWP POCs Monitoring Calendar Year 2015.

AMEX, Geomatrix, Inc. (AMEC), 2008. Remediation Completion Report, Central Station Village, Wood Street District, Oakland, California. November 26.

San Francisco Bay Regional Water Quality Control Board, 2009. No Further Action, Central Station Village, 1401-1599 Wood Street (aka: CSV Parcel), Wood Street Zoning District, Oakland, Alameda County. February 27.

FIGURES

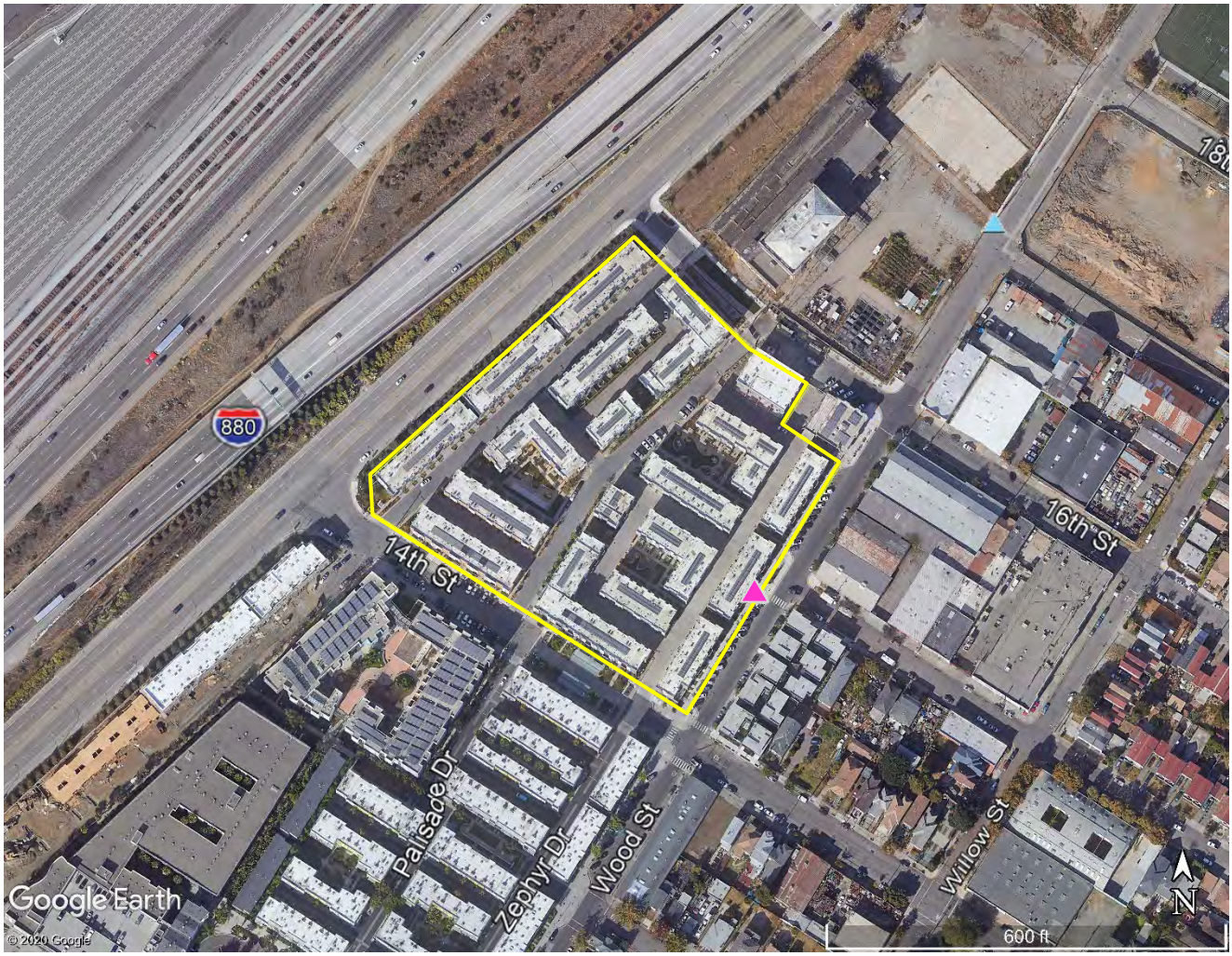

Source: Google Earth (aerial imagery dated October 2018).

Figure 1: Site Location (yellow polygon) and 2015 ROW Sediment Sample Location (pink triangle).

Source: Google Earth (aerial imagery dated April 2016).

Figure 2: Site Location (yellow polygon) with Historical Site Activity.

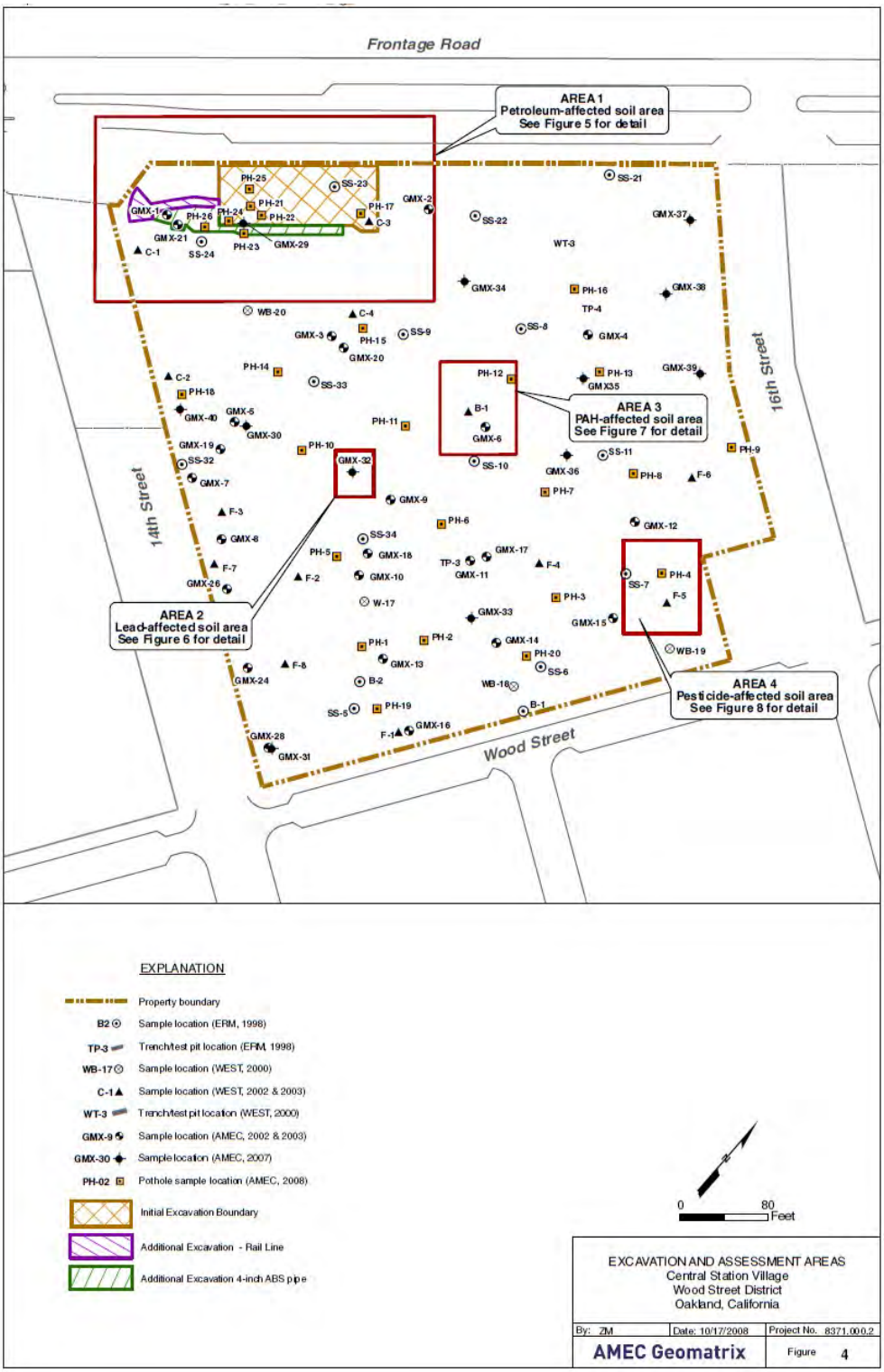

Source: AMEC Geomatrix Figure 4 (2008).

Figure 3: Location of Four Areas of Concern Requiring Remedial Action in 2009.

Figure 4: Google Earth Street View from within the Residential Complex (image from April 2019).

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:	City of Oakland
Staff Contact Name:	Kristin Hathaway
Phone:	510-238-7571
Email Address:	khathaway@oaklandnet.com
Date of Report:	09/11/2020

1. Name of Site:
Brownfield Auto Auction (former Nor-Cal Rock)

2. Address City County ZIP:
768 46th Avenue, Oakland CA, Alameda County, 94601

3. APN(s):
34-2293-2-2 (1.83 acres)

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

Parcel Area: 1.83 acres
See attached Figure 1 for the Site Location Map. Figures 2 and 3 show significant historical features.

5. Current Owner

Name:	Learner Investment Co, c/o Edenwood Realty, LLC and c/o Neu Investment, LLC
Address:	47 Parsippany Road
City, County & Zip Code:	Whippany, NJ 07981-1422
Phone:	973-428-0065
E-mail Address:	Unknown
Contact:	Unknown
Title:	Unknown

6. Background: Current Business Operations

Name:	Brownfield Auto Auction
Period of Operation:	Present
Type:	The facility is a storage yard for used automobiles sold for auto auction.

7. Background: Previous Business Operations (if known)

Name:	NorCal Rock Inc.
Period of Operation:	December 2017 – January 2020
Type:	The facility engaged in activities related to recycling of concrete and asphalt rubble into usable aggregate products including sand, Class II AG and Class I Drain Rock.

NorCal Rock operated as a concrete and asphalt recycling facility. Industrial activities included truck and equipment fueling operations (onsite by a third-party vendor); truck and equipment maintenance activities (onsite by a third-party vendor); truck and equipment storage; loading and unloading operations (raw materials and aggregate products); crushing, screening, and stock piling operations; outdoor storage of materials (stockpiles). Nearly 100% of the site is not paved and vehicle pathways are covered with crushed engineer base rock.

Per the Stormwater Pollution Prevention Plan prepared for the facility in September 2017, there are no storm drain inlets at the facility and stormwater pools and drains onsite or flows northward into a grassy swale (Cal Inc Training, 2017). The swale discharges into an open channel section of Peralta Creek. Peralta Creek drains to East Creek Slough approximately 1,600 feet to the south-southeast, and East Creek Slough drains to San Leandro Bay.

Name:	Learner Investment Co
Period of Operation:	1960s – 1982
Type:	Scrap Metal Yard

The facility operated as a scrap metal yard. The yard received scrap metal such as old appliances, industrial machinery, motors, empty drums and other scrap metal that was light enough to be hydraulically pressed. Between the 1960s and 1971, automobiles were also scrapped onsite. Scrap metal was loaded into a hydraulic bailer via an electric crane, compressed into bails, and resold to steel mills (LFR, 2008).

After operations ceased in 1982, there was no reported site activity until 1988, when Learner began disassembling and removing equipment to redevelop the site into an office and warehouse complex (LFR, 2008). Materials removed included piping containing hydraulic fluid for the bailer. A set of railroad track was also removed. During removal of the bailing equipment and railroad tracks, several large stockpiles (reported 8 to 12 feet high) were situated north and south of the former bailing area. The piles contained a combination of soil, small wood pieces, metal scrap, metal cables, and/or piping (ibid).

Name:	Unknown
Period of Operation:	Pre-1960s
Type:	Asphalt Batch Plant

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

Soil sampling was conducted in July 1998 and April 2008. In 1998, elevated levels of total petroleum hydrocarbons (TPH) were detected from composite samples from soil pile areas (LFR, 2008; ACDEH, 2020). In the 2008 investigation, TPH as diesel oil and motor oil were also detected at elevated concentrations in on-site soil samples throughout the site (ibid).

9. Describe the known and suspected sources of PCBs at the site.

As part of site investigations conducted in July 1988, a composite soil sample was collected from two soil pile areas and analyzed for PCBs (LFR, 2008; ACDEH, 2020). Analytical results from the 1988 investigation are shown in Figure 2. PCBs were detected in both samples at concentrations of 25.2 mg/kg and 19.9 mg/kg.

As part of site investigations conducted in April 2008, soil samples were collected from 12 soil borings at the surface (approximately 2 feet) and at depth (approximately 4 feet) throughout the site (Figure 5 from LFR, 2008). Analytical results from the 2008 investigation are shown in Figure 3. Elevated concentrations of PCBs were detected at multiple locations. Of the 24 soil samples collected, 12 samples, collected from 8 soil borings, contained concentrations of PCBs greater than 0.3 mg/kg. Of these 12 samples, seven samples collected from six

soil boring locations contained concentrations greater than 1.0 mg/kg. Soil samples with the highest PCBs concentrations at the surface and at depth were located near the former scrap metals yard in center of the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

Samples of street dirt were collected by the Alameda Countywide Clean Water Program (ACCWP) on 46th Avenue adjacent to the site entrance in 2015 and 2018. Samples of storm drain inlet sediment were collected by ACCWP at the intersection of 46th Avenue and Coliseum Way in 2019. PCBs concentrations in offsite sediment are shown in the table below and on Figure 5.

Offsite Sediment Sample Results for PCBs

Site ID	Sample Date	PCBs (mg/kg)	Comments
OSL-031	4/15/2015	0.588	Collected adjacent to site entrance
ROW_18-19	9/19/2018	0.846	Collected adjacent to site entrance
ROW_18-19-A	7/9/2019	0.191	Collected at inlet on NW side of intersection of 46th Avenue and Coliseum Way
ROW_18-19-B	7/9/2019	0.046	Collected at inlet on SW side of intersection of 46th Avenue and Coliseum Way

Stormwater runoff from the site was also conducted by ACCWP in the vicinity of the property adjacent to the site entrance in January 2020. The PCBs results for stormwater are provided in the table below and the site locations are shown on Figure 5.

Offsite Runoff Sample Results for PCBs

Site ID	Sample Date	PCBs (ng/L)	TSS (mg/L)	Comments
ROW_18-19-W-01	1/16/2020	383	416	Collected from north side of unpaved driveway to site entrance.
ROW_18-19-W-02	1/16/2020	1511	1630	Collected from south side of unpaved driveway to site entrance.

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regards to potential PCB sources.

As of June 2020, a Notice of Intent (NOI) has not been submitted by Brownfield Auto Action. NorCal Rock Incorporated (WDID 2 01I027510) submitted NO on December 13, 2017 and a Notice of Termination (NOT) on January 21, 2020. Annual industrial stormwater sampling was conducted in January and February 2019 and included the standard IGP-required parameters: pH, oil & grease, and total suspended solids (TSS). PCBs were not identified as a pollutant of concern in the stormwater pollution prevention plan (SWPPP), which was prepared on September 25, 2017 by Cal Inc Training, LLC.

The IGP stormwater samples were collected at the identified discharge point located in the northern portion of the site, downgradient from the vegetated swale. Elevated pH concentrations (i.e. greater than the IGP numeric action level) were reported for the January and February 2019 events. Oil & grease concentrations were not detected above laboratory reporting limits during either event. TSS concentrations were less than 25 mg/L for each event.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

As stated in the ACDEH letter issued on April 28, 2020, "Based on our review of the data contained in the case file compared to the most recent Environmental Screening Levels, subsurface contamination in soil at your site appears to pose a potential threat to human health and the environment."

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number
ACDEH	Local oversight and site cleanup program manager	Paresh C. Khatri	510-567-6700 Paresh.khatri@acgov.org

14. Provide any other pertinent site information not covered above.

None.

15. Describe enhanced control measures that will be implemented at the site.

The site flows through the vegetated area in the northwestern portion of the site to the creek. As the site discharges directly to the receiving water, there is no opportunity to provide enhanced operation and maintenance for this site. No load reduction credit as been assumed for this referral.

References:

Alameda County Department of Environmental Health (2020). *Site Cleanup Program Case RO0002478 and GeoTracker Global ID SLT2O150156, Learner Investment Co, 768 46th Avenue, Oakland, CA 94601 (APNs 34-2293-2-2 and 32-2293-2-5).* Local Oversight Program for Hazards Materials Releases, Letter issued on April 28, 2020.

Cal Inc Training, LLC (2017). *Industrial Activities Stormwater Pollution Prevention Plan for NorCal Rock Incorporated (WDID 2 01I027510).* September 25.

LFR Incorporated (2008). *Summary Report of Soil and Groundwater Investigation, Former Learner Investment Company Property, 768 46th Avenue, Oakland, California (SLIC Case RO0002478; Geotracker Global ID SLT2O150156).* Prepared for Neu Investment Corporation and GVA Kidder Mathews. June 6.

Figures

Figure 1. Site and Parcel Location at 768 46th Ave, Oakland.

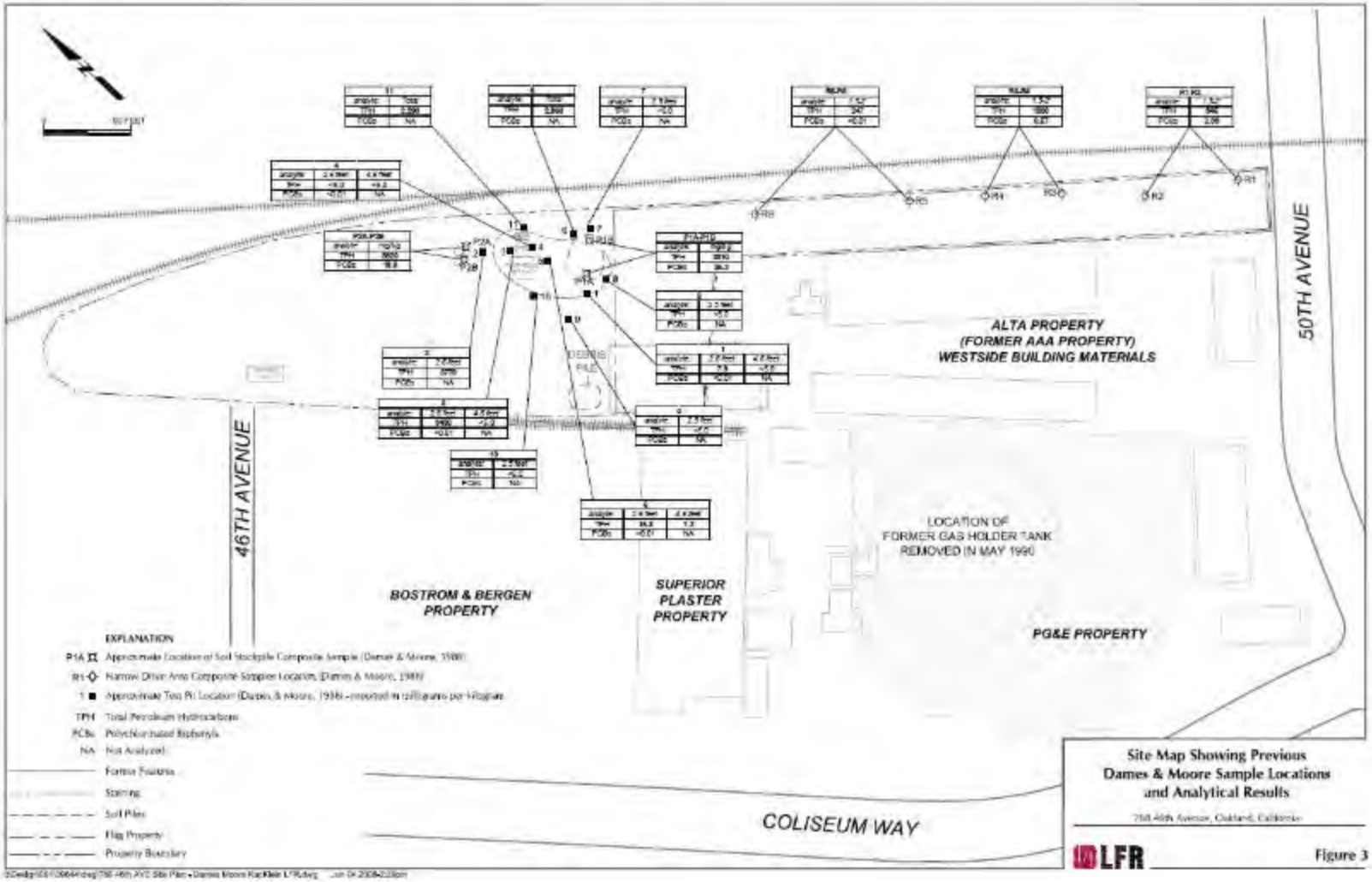

Figure 2. Analytical Results from Soil Samples Collected in the 1988 Site Investigation (Figure 3 from LFR, 2008).

PCBs SOURCE PROPERTY REFERRAL FORM

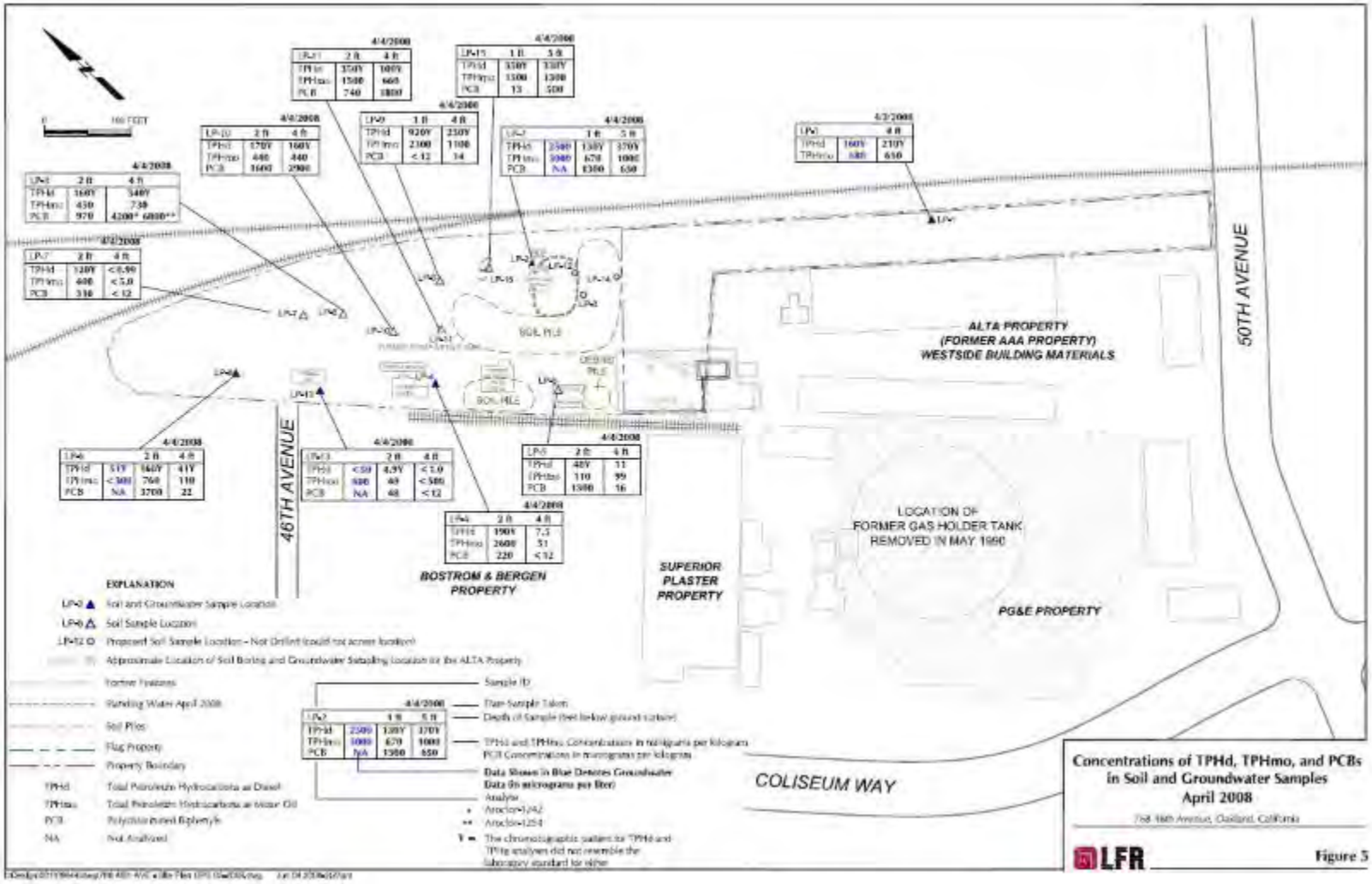

Figure 3. Analytical Results from Soil Samples Collected in the 2008 Site Investigation (Figure 5 from LFR, 2008).

Figure 4. Surface Runoff Flow Direction (Figure 2 from Cal Inc Training, LLC, 2017).

Figure 5. Offsite Sediment and Runoff Sample Locations

Figure 6. Current Site Conditions (June 2020).

Attachment 1

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
COLLEEN CHAWA, Agency Director

DEPARTMENT OF ENVIRONMENTAL HEALTH
LOCAL OVERSIGHT PROGRAM (LOP)
For Hazardous Materials Releases
1131 HARBOR BAY PARKWAY
ALAMEDA, CA 94502
(510) 567-6700
FAX (510) 337-9335

April 28, 2020

Learner Investment Co
c/o Edenwood Realty, LLC
47 Parsippany Road
Whippany, NJ 07981-1422

Learner Investment Co
c/o Neu Investment
47 Parsippany Road
Whippany, NJ 07981-1422

Subject: Site Cleanup Program Case RO0002478 and GeoTracker Global ID SLT2O150156, Learner Investment Co, 768 46th Avenue, Oakland, CA 94601 (APNs 34-2293-2-2 & 34-2293-2-5)

Dear Responsible Parties:

Alameda County Department of Environmental Health (ACDEH) provides regulatory oversight for the subject Site Cleanup Program case located at 768 46th Avenue in Oakland, Assessor's Parcel Numbers 34-2293-2-2 and 34-2293-2-5 (the "Site"). A review of the case file for the Site indicates that the last report submitted to ACDEH was the "Summary Report of Soil and Groundwater Investigation," dated June 6, 2008. Based on our review of the data contained in the case file compared to the most recent Environmental Screening Levels, subsurface contamination in soil at your site appears to pose a potential threat to human health and the environment. Therefore, ACDEH is contacting you as the property owner and Responsible Party for the Site to schedule a meeting with you to discuss the path forward for the investigation and cleanup of the Site.

SITE HISTORY

An asphalt batch plant operated on site prior to Learner acquiring the property in the 1960s. Learner operated a scrap metal yard from the 1960's until 1982. Prior to 1971, automobiles were also scrapped at the site. In 1988, Learner intended to redevelop the site into an office/warehouse complex, and subsequently in June 1988, a 700-gallon diesel underground storage tank (UST) was removed. In July 1988, composite soil samples were collected from three sections of the narrow drive area. The highest total petroleum hydrocarbon (TPH) concentration was detected at 1,830 milligrams per kilogram (mg/kg) at a depth of 18 to 24 inches below the ground surface (bgs). TPH was detected in the other two composite samples at concentrations of 247 mg/kg and 645 mg/kg. A composite soil sample was collected from both soil pile areas and analyzed for TPH and polychlorinated biphenyls (PCBs). TPH was detected at concentrations of 3,610 mg/kg and 3,920 mg/kg in the two composite samples. PCBs were detected in both samples at concentrations of 25.2 mg/kg and 19.9 mg/kg. TPH as diesel (d) and TPH as motor oil (mo) were detected up to 2,500 mg/kg and 3,000 mg/kg, respectively during the 2008 investigation.

ACDEH understands that the long narrow drive that extends onto 50th Avenue is leased to Westside/Alta Building Materials and is used as an access road and storage by Alta (AKA Flag Lot). In June 1989, TPH concentrations from all three samples collected along the paved access drive were greater than 1,000 mg/kg, with concentrations ranging from 3,500 mg/kg to 28,000 mg/kg. Lead concentrations in the three soil samples (B-2 through B-4) collected from the drive ranged from 322 mg/kg in sample B-2 to 5,230 mg/kg in sample B-11.

MEETING REQUEST TO DISCUSS PATH TO CASE CLOSURE

ACDEH would like to discuss the path to closure for this case and is available to meet with you and your environmental consultant for a teleconference call on the following dates and times.

1. Tuesday, May 12, 2020 at 1:00 PM
2. Thursday, May 14, 2020 at 10:00 AM
3. Monday, May 18, 2020 at 10:00 AM

Please select a date and time from above that is convenient for you and notify me by **Friday, May 8, 2020**. If the above dates and times are not convenient, please propose a date and time and we will try to accommodate your request. Failure to respond to our meeting request will result in further enforcement actions and/or referral of your case to the State Regional Water Quality Control Board or Department of Toxic Substances Control Board.

CLOSING

Thank you for your cooperation. Should you have any questions, please contact me at (510) 777-2478 or send me an electronic message at paresh.khatri@acgov.org.

Sincerely,

Paresh C. Khatri
Local Oversight & Site Cleanup Program Manager
Alameda County Department of Environmental Health

ENCLOSURES:
Attachment A Responsible Party(ies) Legal Requirements / Obligations

DISTRIBUTION LIST:
Dilan Roe, ACDEH, (Sent via electronic mail to: dilan.roe@acgov.org)
Paresh Khatri, ACDEH; (Sent via electronic mail to: paresh.khatri@acgov.org)
Electronic File; GeoTracker

Alameda County Environmental Cleanup Oversight Programs (LOP and SCP)	**REVISION DATE:** December 14, 2017
	ISSUE DATE: July 25, 2012
	PREVIOUS REVISIONS: September 17, 2013, May 15, 2014, December 12, 2016
SECTION: ACDEH Procedures	**SUBJECT:** Responsible Party(ies) Legal Requirements / Obligations

REPORT & DELIVERABLE REQUESTS

Alameda County Department of Environmental Health (ACDEH) Cleanup Oversight Programs, Local Oversight Program (LOP) and Site Cleanup Program (SCP) require submission of all reports in electronic form to the State Water Board's (SWB) GeoTracker website in accordance with California Code of Regulations, Chapter 30, Division3, Title 23 and Division 3, Title 27.

Leaking Underground Fuel Tank (LUFT) Cases

Reports and deliverable requests are pursuant to California Health and Safety Code Section 25296.10. 23 CCR Sections 2652 through 2654, and 2721 through 2728 outline the responsibilities of a responsible party (RP) in conjunction with an unauthorized release from a petroleum underground storage tank (UST) system.

Site Cleanup Program (SCP) Cases

For non-petroleum UST cases, reports and deliverables requests are pursuant to California Health and Safety Code Section 101480.

ELECTRONIC SUBMITTAL OF REPORTS

A complete report submittal includes the PDF report and all associated electronic data files, including but not limited to GEO_MAP, GEO_XY, GEO_Z, GEO_BORE, GEO_WELL, and laboratory analytical data in Electronic Deliverable Format™ (EDF). Additional information on these requirements is available on the State Water Board's website (http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/)

- Do not upload draft reports to GeoTracker
- Rotate each page in the PDF document in the direction that will make it easiest to read on a computer monitor.

GEOTRACKER UPLOAD CERTIFICATION

Each report submittal is to include a GeoTracker Upload Summary Table with GeoTracker valid values[1] as illustrated in the example below to facilitate ACDEH review and verify compliance with GeoTracker requirements.

GeoTracker Upload Table Example

Report Title	Sample Period	PDF Report	GEO_MAPS	Sample ID	Matrix	GEO_Z	GEO_XY	GEO_BORE	GEO_WELL	EDF
2016 Subsurface Investigation Report	2016 S1	✓	✓	Effluent	SO	☐	☐	☐	☐	✓
2012 Site Assessment Work Plan	2012	✓	✓			☐	☐	☐	☐	☐
2010 GW Investigation Report	2008 Q4	✓	✓	SB-10	W	✓	☐	☐	☐	✓
				SB-10-6	SO	☐	☐	☐	☐	✓
				MW-1	WG	✓	✓	✓	✓	✓
				SW-1	W	✓	✓	✓	✓	✓

[1] GeoTracker Survey XYZ, Well Data, and Site Map Guidelines & Restrictions, CA State Water Resources Control Board, April 2005

ACKNOWLEDGEMENT STATEMENT

All work plans, technical reports, or technical documents submitted to ACDEH must be accompanied by a cover letter from the responsible party that states, at a minimum, the following: "I have read and acknowledge the content, recommendations and/or conclusions contained in the attached document or report submitted on my behalf to the State Water Board's GeoTracker website." This letter must be signed by the Responsible Party, or legally authorized representative of the Responsible Party.

PROFESSIONAL CERTIFICATION & CONCLUSIONS/RECOMMENDATIONS

The California Business and Professions Code (Sections 6731, 6735, and 7835) requires that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments be performed under the direction of an appropriately licensed or certified professional and include the professional registration stamp, signature, and statement of professional certification. Additional information is available on the Board of Professional Engineers, Land Surveyors, and Geologists website at: http://www.bpelsg.ca.gov/laws/index.shtml.

UNDERGROUND STORAGE TANK CLEANUP FUND

For LUFT cases, RP's non-compliance with these regulations may result in ineligibility to receive grant money from the state's Underground Storage Tank Cleanup Fund (Senate Bill 2004) to reimburse the cost of cleanup. Additional information is available on the internet at: https://www.waterboards.ca.gov/water_issues/programs/ustcf/

AGENCY OVERSIGHT

Significant delays in conducting site assessment/cleanup or report submittals may result in referral of the case to the Regional Water Board or other appropriate agency, including the County District Attorney, for possible enforcement actions. California Health and Safety Code, Section 25299.76 authorizes enforcement including administrative action or monetary penalties of up to $10,000 per day for each day of violation.

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:	City of Oakland
Staff Contact Name:	Kristin Hathaway
Phone:	510-238-7571
Email Address:	khathaway@oaklandnet.com
Date of Report:	09/11/2020

1. Name of Site:
Economy Lumber

2. Address City County ZIP:
750 High Street, Oakland CA, Alameda County, 94601

3. APN(s):
34-2293-6-7 (1.86 acres)

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

Parcel Area: 1.86 acres, area of interest is 0.35 acres.

The location map is provided in Figure 1. The parcel is located south of the Union Pacific Railroad (UPRR) tracks, extending southeast from High Street to an open channel section of Peralta Creek. Peralta Creek drains to East Creek Slough approximately 1,600 feet to the south-southeast, and East Creek Slough drains to San Leandro Bay. Site maps that show historical features (Figure 2-1), storm drains (Figure 2-6), and soil and groundwater sample results for PCBs (Figure 4-1) from CH2M Hill, 2013 are attached.

The site parcel was previously part of a larger Southern Pacific Transportation Company (SPTCo) holding located along the railway corridor before purchase by Economy Lumber in November 1990. Prior to 1990, numerous addresses were associated with businesses operating at the site (758, 770, 772, 774, 774 ½ High Street). Following purchase by Economy Lumber in 1990 the parcel was combined with adjacent Economy Lumber holdings and given the address 750 High Street. The site address used in regulatory correspondence and reporting concerning the site (748 and 755 High Street) appears to have been assigned erroneously.

5. Current Owner

Name:	Economy Lumber Company
Address:	750 High Street
City, County & Zip Code:	Oakland, CA 94601
Phone:	510-261-6100
E-mail Address:	info@economylumberco.com
Contact:	John Bacon, Jr. / Brian Ettlin
Title:	President / General Manager

6. Background: Current Business Operations

Name:	Economy Lumber
Period of Operation:	November 1990 – Present

Type: Economy Lumber operates a building materials supply business and lumber yard at the site.

The property was purchased by John Bacon of Economy Lumber in November 1990, apparently in a simultaneous sale between Hollander and Associates and SPTCo, and Hollander Associates and John Bacon. Most of the property was paved in 1991. After purchase of the property by Economy Lumber, SPTCo was acquired by UPRR in 1996. Economy Lumber currently operates a building materials supply business and lumber yard on its property, which includes the site and two adjacent parcels (APNs 34-2290-7-2 and 34-2290-11) southwest of the site.

7. Background: Previous Business Operations (if known)

According to CH2M Hill (2013), the site was acquired by SPTCo in 1872 from the Contract and Finance Company. As depicted on an 1877 real estate map, the site is located in a triangular block of land bounded by High Street to the west, an east-west rail line to the north, and a southwest-northeast rail line to the south. The 1897 fire insurance map shows no development at the site, with the nearest documented structures belonging to the Western Fuse and Explosives Company, to the southeast. The 1850 limit of tidal marshes in the East Creek Slough area of San Leandro Bay is approximately 1,000 feet south to southeast of the site. Development north of the site, culverting of urban creeks, and infilling of wetlands adjacent to San Leandro Bay are evident on a 1910 USGS topographic map and a 1912 real estate map.

The earliest development at the site is documented on a 1925 fire insurance map. In 1925, the site contained a wood-frame warehouse in the northern half of the property and a vacant, dirt-floored structure with an outbuilding to the west in the central portion of the property. The 1939 aerial photograph shows that the northern portion of the site was redeveloped with a new structure and that a rail spur traversed the northeast corner of the property to a terminus west of High Street. The nature of the onsite activities between 1925 and 1939 is unknown.

During the 1940s and 1950s, an evolving complex of structures was developed on the northern half of the site. A second rail spur terminating in the central portion of the site is first shown on a 1944 SPTCo valuation map. The 1946 aerial photograph shows that the northern portion of the site was redeveloped with a new structure for sheet metal works, dirt roads near the central rail spur, and some materials stored in the center of the site. The 1950 fire insurance map documents that the north-central portion of the site was used for scrap metal storage and salvage and contained one outbuilding. Additionally, this map documents the presence of a storage bunker with unknown contents at the southeast corner of the main building.

In 1956, the Scrap Metal Supply Company (SMS) began leasing the property from SPTCo. In addition to standard scrap, ACEH inspection notes (Appendix A) document that SMS received hazardous wastes, including wet batteries, and stored potentially hazardous wastes in various drums and approximately 200-gallon rinse tanks. The 1957 fire insurance map lists site activities as sheet metal and welding fabrication, and scrap metal warehousing. In the 1958 aerial photograph, abundant materials are visible around the rail spur and peripheries of the central portion of the site, as are several outbuildings and a fence that encloses the northern two-thirds of the site. The southern third of the site, adjacent to Peralta Creek, was undeveloped and possibly unused.

With the exception of a scale office and outbuildings present in the central portion of the site, the 1958 site configuration remained largely unchanged until at least 1989. However, limited site documentation is available for the period between 1969 and 1989; the available aerial photographs are of low quality and fire insurance map coverage ceases. One notable change during this time is the expansion of the fence line to encompass the entire parcel from High Street to Peralta Creek. This expansion opened the previously undeveloped southern portion of the site to onsite activities.

Between at least 1986 and 1989, both SMS and Kayak America Works (an auto body repair shop), occupied portions of the site. SPTCo real estate documents indicate that Hollander and Associates (a real estate and business investment firm) held a ten-year lease on the property beginning in July 1986; in turn, Hollander and Associates subleased the property to SMS. The nature of any contractual arrangements between Kayak America Works, SMS, SPTCo, and/or SPTCo is unknown. An invoice included in SPTCo real estate documents for the cleanup and shuttering of vacant structures on the property from the City of Oakland to SMS indicates that the property had been abandoned sometime before May 1989.

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

Potential pollutants other than PCBs that have been associated with the site include select polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs) and other metals including arsenic, chromium, chromium IV, copper, mercury, nickel, silver, and zinc. These pollutants were generally detected in the upper six feet of soil and shallow groundwater in several areas throughout the site.

9. Describe the known and suspected sources of PCBs at the site.

In August 2013, 169 soil samples were collected from 81 locations throughout the property. Soil samples were collected from the surface to 19 feet below grade. Twenty samples collected at depths from the surface to 11.5 feet below grade had detected concentrations of PCBs above EPA regional screening levels of 0.74 mg/kg for industrial soils for individual Aroclors. The highest concentration of PCBs detected (> 6 mg/kg) were in the southern portion of the site (see Attachments, Figure 4-1 from CH2M Hill, 2013) and tended to be in the uppermost 2 feet of soil. In other areas of the site, PCBs were detected at relatively lower concentrations, although in some cases concentrations exceeded 1.0 mg/kg PCBs in the upper 1 to 2 feet of soil. The areas of greatest soil and groundwater impacts are concentrated near the former scale, office, and outbuildings; south of the main building at the railroad spur terminus and possible former UST location; and along the peripheries of the central and southern portion of the site.

Five samples were also collected from the bottom of remedial excavations from the early 1990s (Figures 2-4 and 4-1 from CH2M Hill, 2013). Three of the five samples exceeded the respective screening levels and therefore a second phase of excavation was conducted in the area.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

One street dirt sample was collected by the Alameda Countywide Clean Water Program (ACCWP) on High Street in the right of way adjacent to the property. The result of 0.087 mg/kg suggests that sediment is not being transported to High Street.

Site ID	Sample Date	PCBs (mg/kg)	Comments
ROW_18-18	9/19/2018	0.087	Samples collected on High Street from fence line and gates off of property at three locations.

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

In August 2015, ACDEH approved a work plan for interim remedial measures presented in a report entitled Addendum to the Revised Surface Improvement Plan Work Plan. Proposed measures included cement surface treatment and asphalt paving in an approximate 0.35-acre unpaved area within the southern (back) portion of the site (see Figure 2 from CH2M Hill, 2015) to limit potential worker exposure to potential pollutants of concern in shallow soil and create a surface to allow for the existing lumber yard related operations to continue at the site. As of June 2020, the paving had not yet been completed.

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number
ACDEH	Site cleanup	Karel Detterman	510-567-6708

14. Provide any other pertinent site information not covered above.

None.

15. Describe enhanced control measures that will be implemented at the site.

Enhanced control measures at the site are not practicable given the current site conditions. The street sediment sample collected in September 2018 yielded a result of <0.1 mg/kg PCBs suggesting that sediment from the site is *not* being transported to High Street. With very low concentrations of PCBs in sediment in the right-of-way, enhanced control measures such as inlet cleaning or street sweeping are not deemed necessary. In addition, the back portion of the site is unpaved and, based on Figure 2-6 from the 2013 CH2M Hill report, there is a storm drain inlet with direct discharge to Peralta Creek. Until the back portion of the site is paved, on-site control measures would include storing materials off the ground surface (e.g. on raised pallets) and to place a straw wattle or filter sock around the drain inlet and a filter fabric within the drain inlet. Monthly sweeping and maintenance, at a minimum, would be conducted at the inlet to minimize the potential for sediment and debris to be discharged into the storm drain system. No PCBs load reduction credit has been assumed for this referral.

References:

https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600101305

CH2M HILL, 2013. Site Conceptual Model Update and Soil and Groundwater Investigation, 744 and 758 High Street, Oakland, California. November 8.

CH2M Hill, 2015. Addendum to the Revised Surface Improvement Work Plan, 744 and 758 High Street, Oakland California. June 22.

Alameda County Clean Water Program (ACCWP). 2018. ACCWP Pollutants of Concern Monitoring Report 2018.

PCBs SOURCE PROPERTY REFERRAL FORM

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

Figures from CH2M Hill (2013):
Figure 2-1: Site and Vicinity Map and Historical Features.
Figure 2-4: Sampling Locations with Approximate Location of 1990 Excavation Area.
Figure 2-6: Results of Subsurface Survey
Figure 4-1: Soil and Groundwater Sample Results for Select PCBs.

Figures from CH2M Hill (2015):
Figure 2: Surface Improvement Map

Source: Google Earth, imagery date October 26, 2018

Figure 1: Site Boundary (yellow polygon) and Urban Sediment Sample Location (blue triangle).

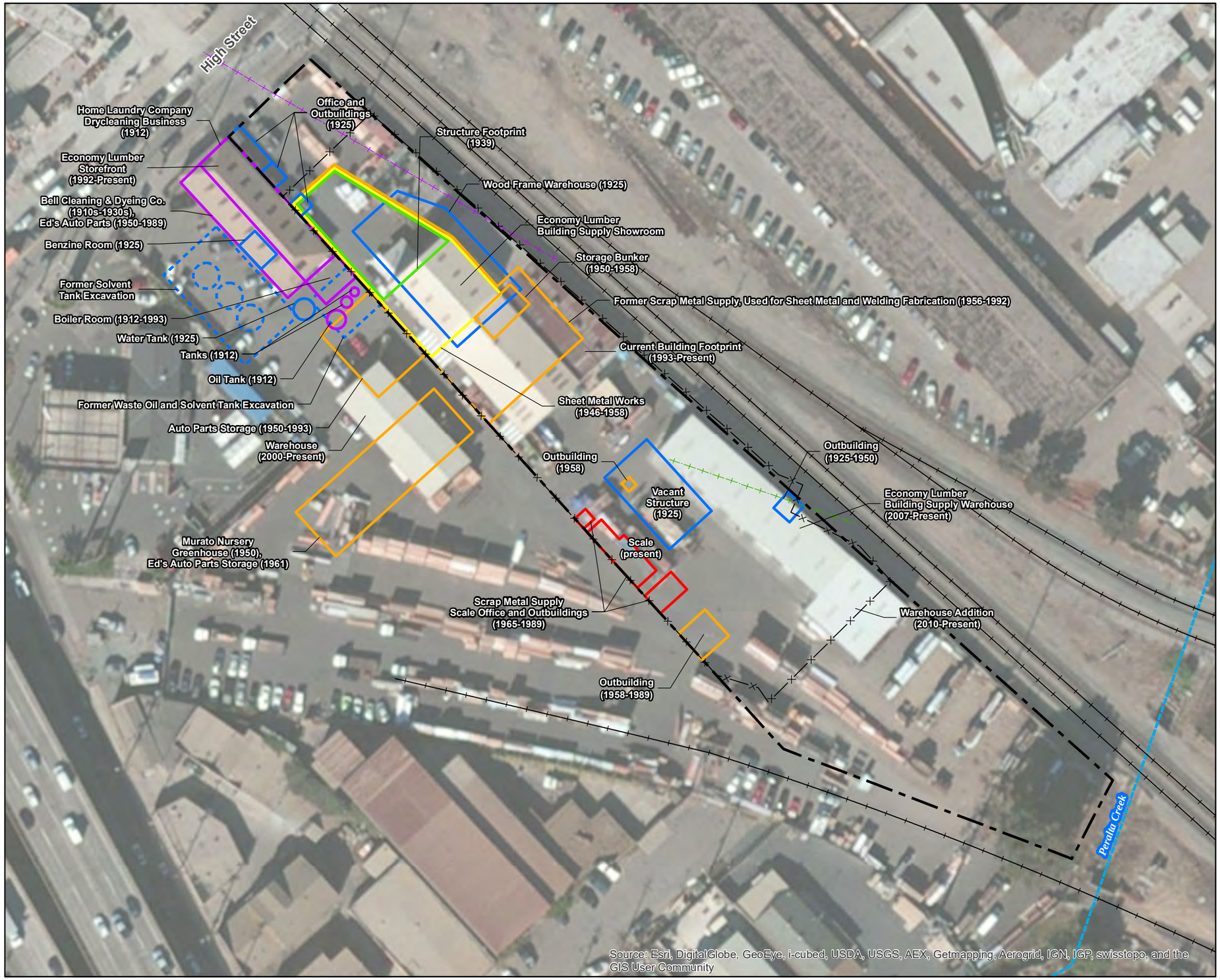

VICINITY MAP

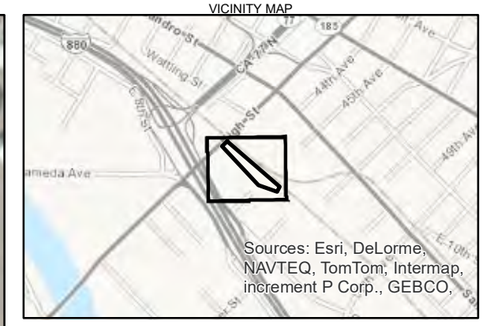

LEGEND

- Active Rail Line
- Former Rail Spur (1939-1958)
- Former Rail Spur (1944-1989)
- Former Fenceline (1948-1965)
- Site Boundary

Decade Feature Was Potentially Built

- 1910s
- 1920s
- 1930s
- 1940s
- 1950s
- 1960s
- Approximate Boundary of 1989 Tank Removal Excavation

Notes:
1. The years cited represent the earliest and latest documented dates for the feature.
2. Aerial photograph was last modified on December 2012 and reflects current site features.

N

0 35 70
Feet

FIGURE 2-1
Site and Vicinity Map and Historical Features
Site Conceptual Model Update and Soil and Groundwater Investigation Report, 744 and 758 High Street, Oakland, California

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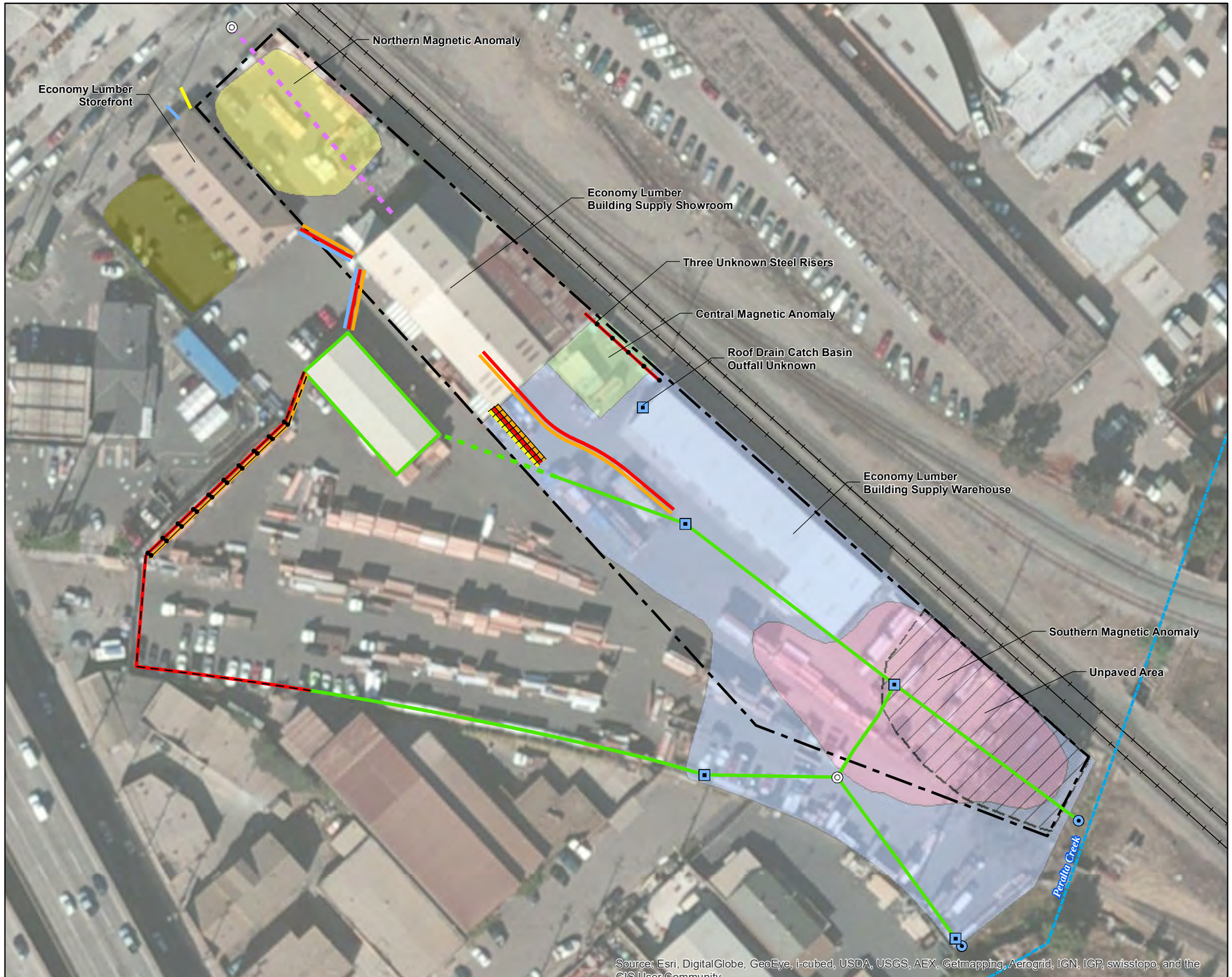

VICINITY MAP

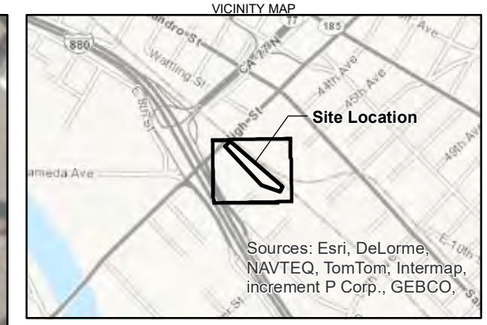

LEGEND

- Manhole
- Storm Drain Catch Basin
- Storm Drain outfall
- Union Pacific Railroad
- Site Boundary

Facility Type (Dashed where Inferred)

- Water
- Storm Sewer
- Communication
- Sanitary Sewer
- Electrical
- Gas
- Abandoned Facility
- Aboveground Facility
- Inferred Facility Location
- Unpaved Area
- Approximate Area of Disturbed Soils
- Approximate Area of Metallic Anomalies and Disturbed Soils
- Widespread Metallic Anomalies, Possible Buried Concrete Slab (less than 1.5 feet)
- Disturbed Soils
- Metal Anomaly, Buried Foundation (less than 1.5 feet)

Notes:
1. All utilities shown are below grade unless otherwise noted.
2. The accuracy of the subsurface features is dependent on site condition and instrument limitations.
3. The features depicted on the figure reflect the interpretation of the findings of a subsurface utility survey using metal detection, radio location, and ground penetrating radar, conducted on January 13, 2013 within and around the Site.

FIGURE 2-6
Results of Subsurface Survey
Site Conceptual Model Update and Soil and Groundwater Investigation Report, 744 and 758 High Street, Oakland, California

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UNK \\ZINFANDEL\PROJ\UNIONPACIFICRAILROAD\468396OAKLAND\6.0_LABORATORY_DATA\GIS\MAPFILES\SCM\FIG2-6_SUBSURFACE.MXD ECLARK1 10/30/2013 3:52:43 PM

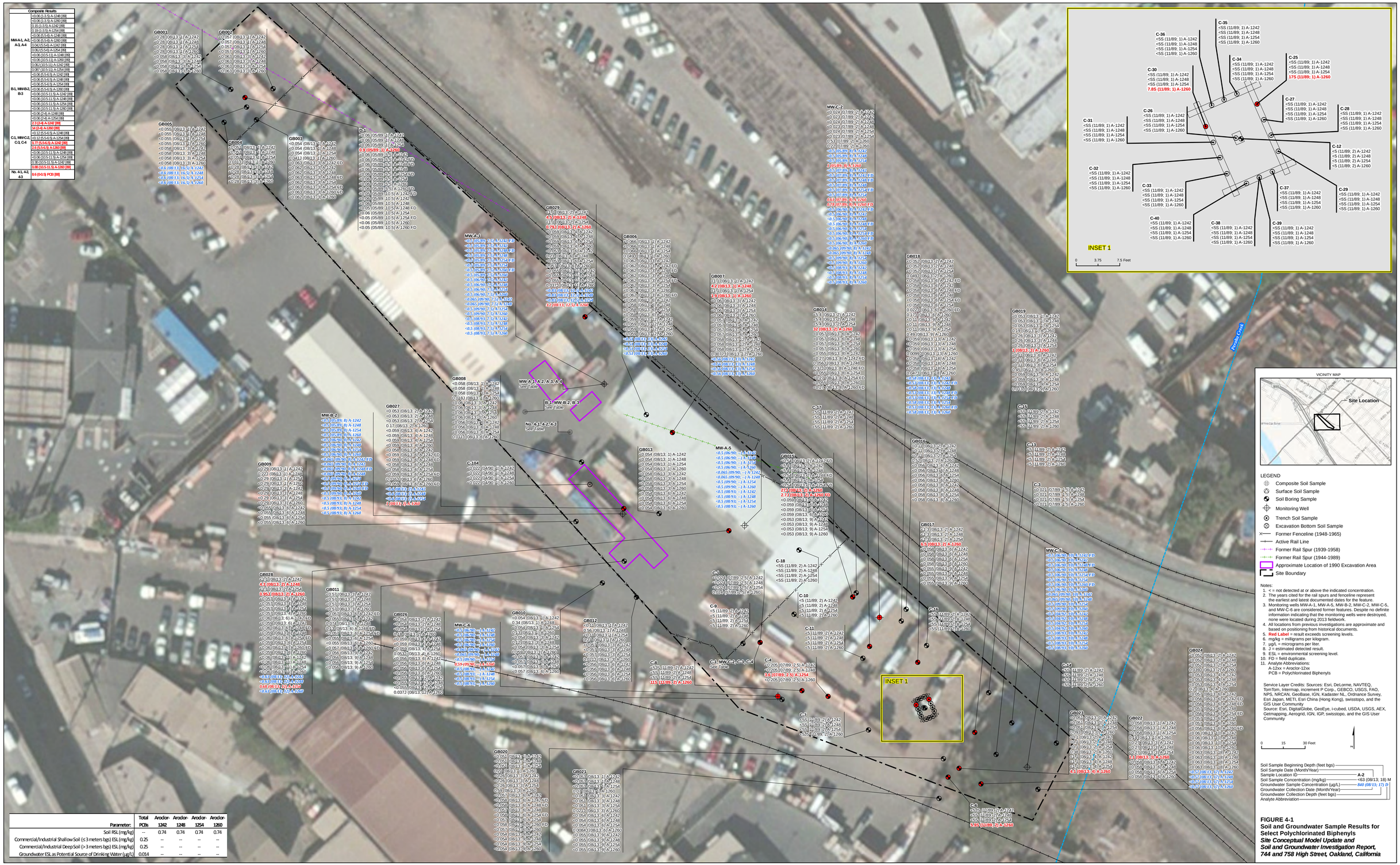

Parameter:	Total PCBs	Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Soil RSL (mg/kg)	--	0.74	0.74	0.74	0.74
Commercial/Industrial Shallow Soil (≤ 3 meters bgs) ESL (mg/kg)	0.25	--	--	--	--
Commercial/Industrial Deep Soil (> 3 meters bgs) ESL (mg/kg)	0.25	--	--	--	--
Groundwater ESL as Potential Source of Drinking Water (µg/L)	0.014	--	--	--	--

FIGURE 4-1
Soil and Groundwater Sample Results for Select Polychlorinated Biphenyls
Site Conceptual Model Update and Soil and Groundwater Investigation Report, 744 and 758 High Street, Oakland, California

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UNK \\ZINFAND\EU\PROJ\UNIONPACIFICRAILROAD\468396OAKLAND\6.0_LABORATORY_DATA\GIS\MAPFILES\SCM\FIG4-1_PCB_D.MXD ECLARK1 10/24/2013 4:28:47 PM

VICINITY MAP

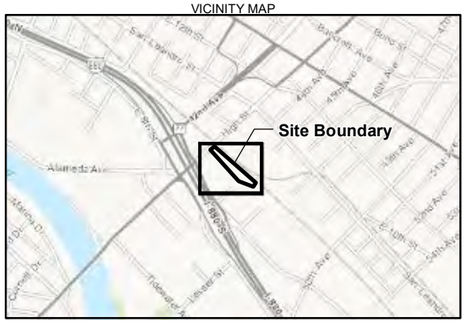

LEGEND

- Active Rail Line
- Site Boundary
- Unpaved Area (0.35 acres)

0 35 70
Feet

N

FIGURE 2
SURFACE IMPROVEMENT MAP
ADDENDUM TO THE
REVISED SURFACE IMPROVEMENT WORK PLAN,
744 AND 758 HIGH STREET, OAKLAND, CALIFORNIA

BAO R:\UPRR\OAKLAND\GIS\MAPFILES\SIWP\FIG2_SURFACEIMPRVEMENT.MXD KMINO 5/27/2015 5:08:52 PM

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Appendix N

BASMAA Source Control Load Reduction Accounting for Reasonable Assurance Analysis

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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Project Number: LA0499

August 31, 2020

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

---

[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

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1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

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3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

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5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

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$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

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9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

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$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

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10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

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APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

A.5 REFERENCES

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APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

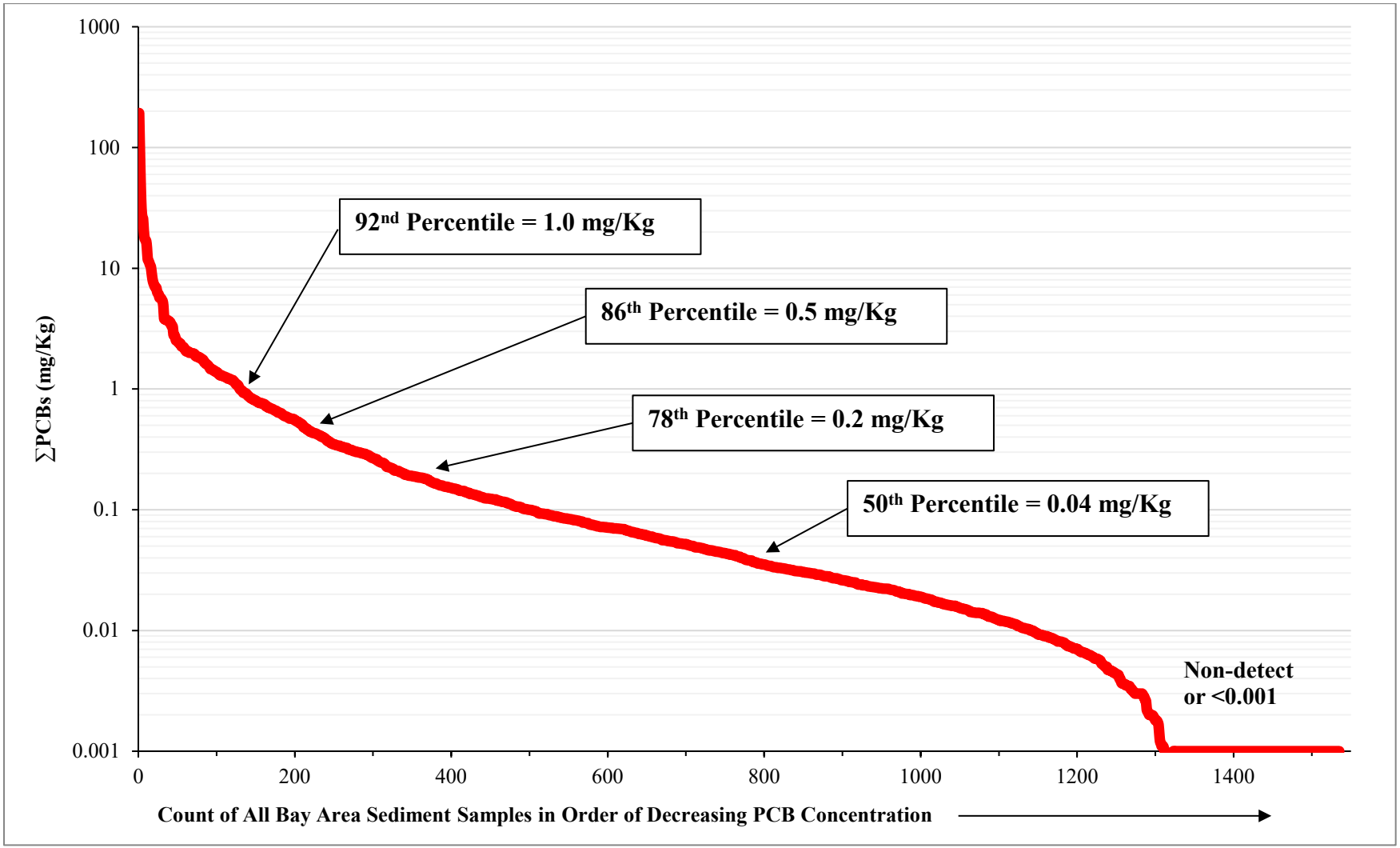

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

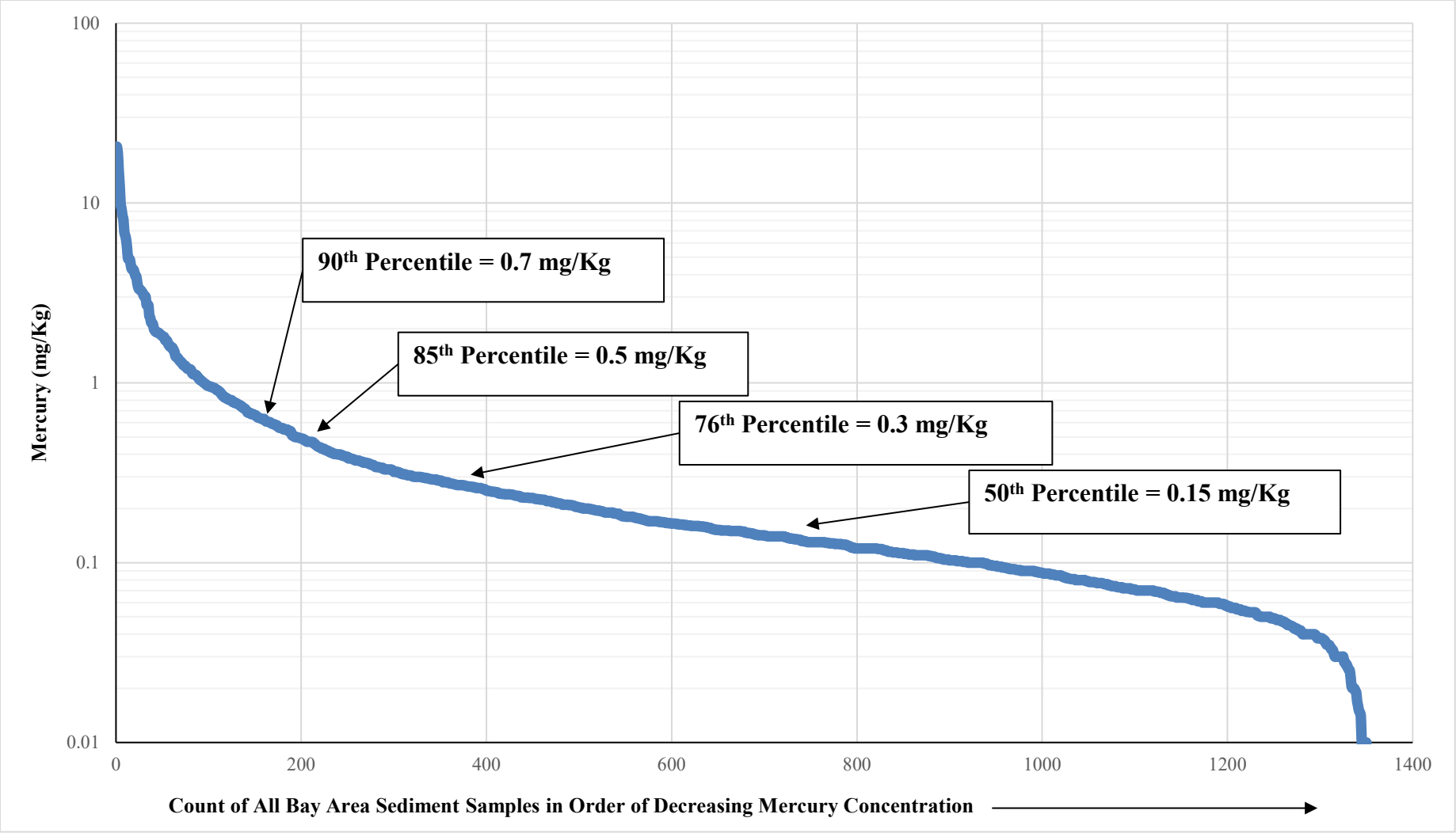

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C
Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

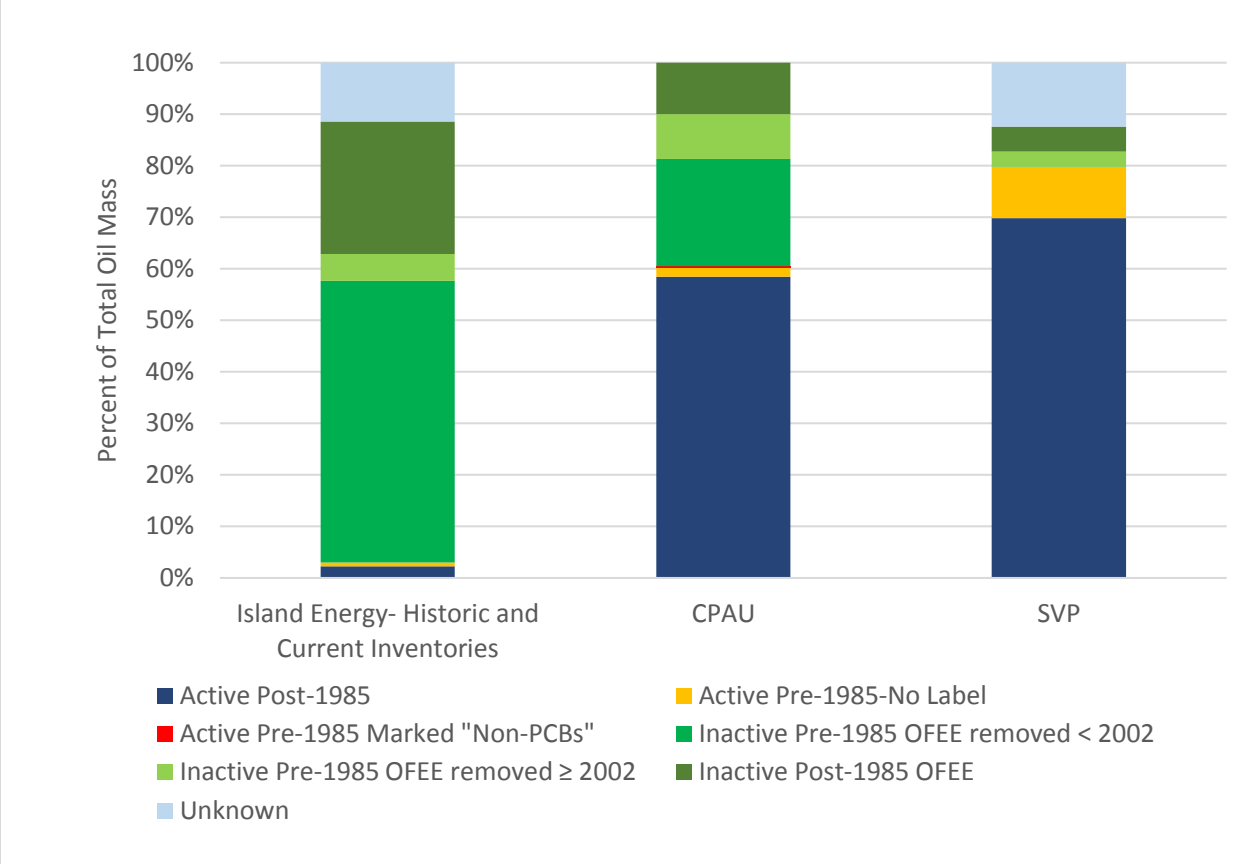

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

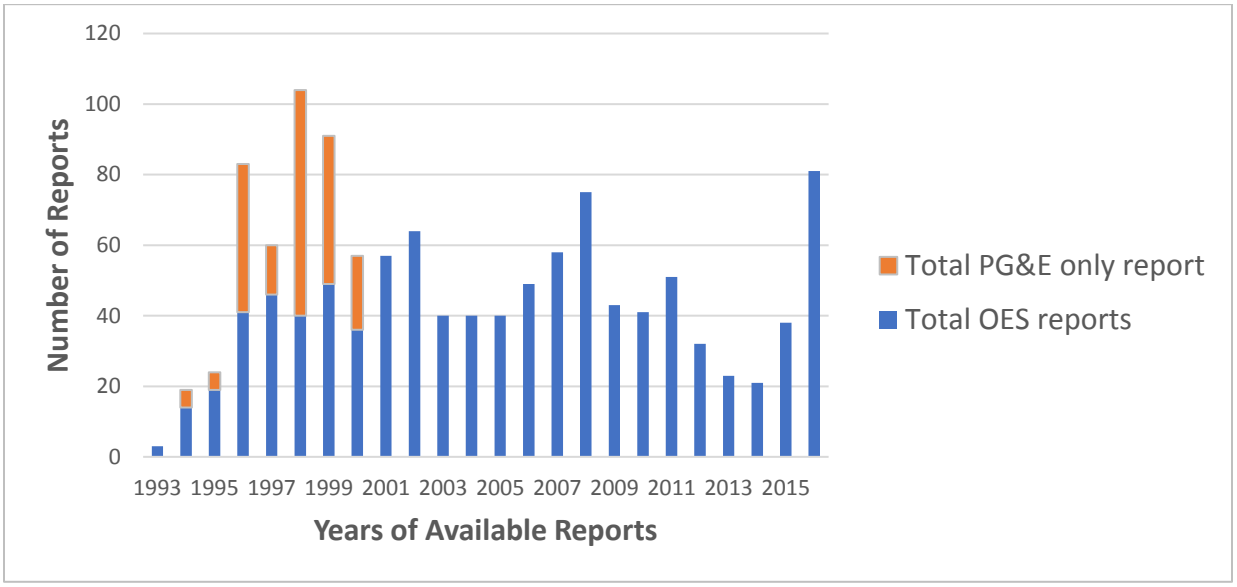

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

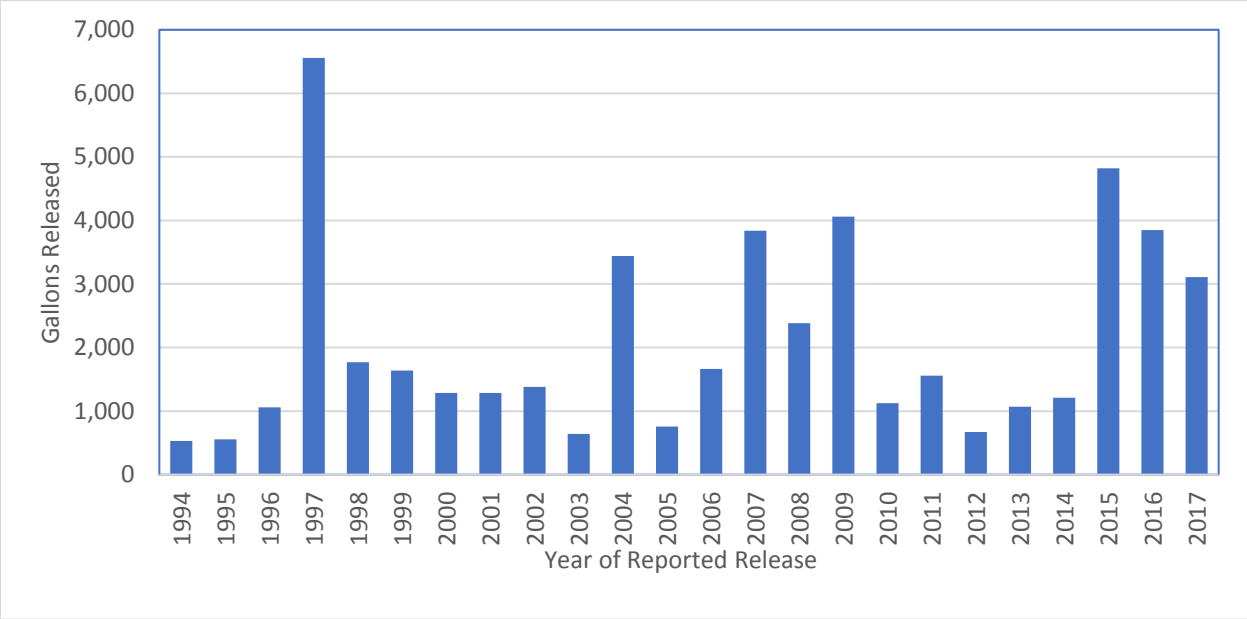

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

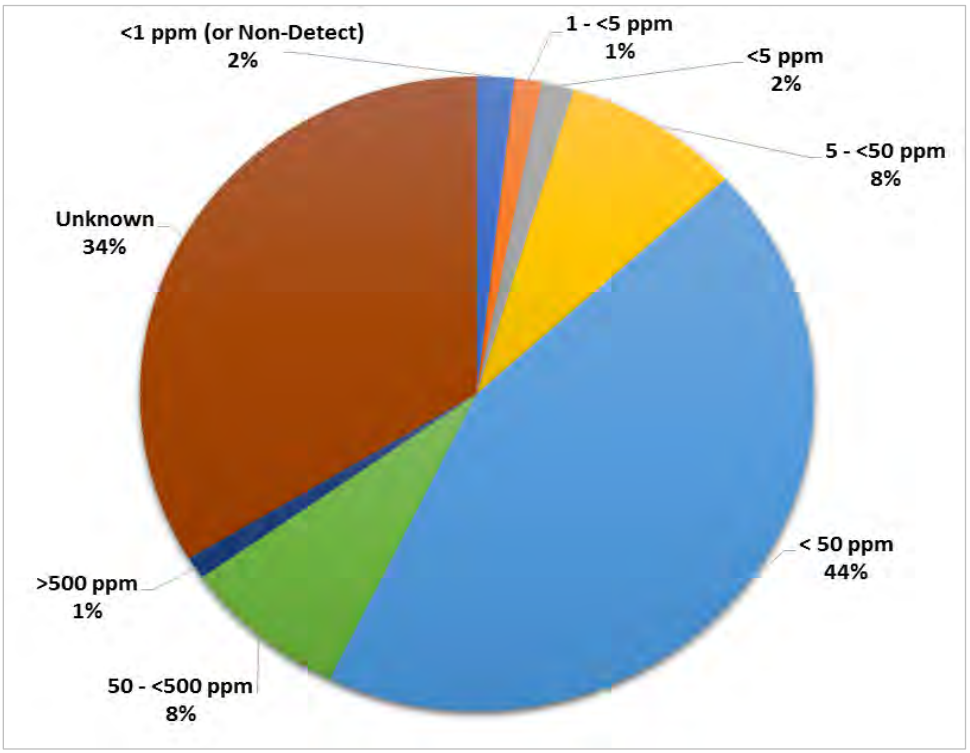

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

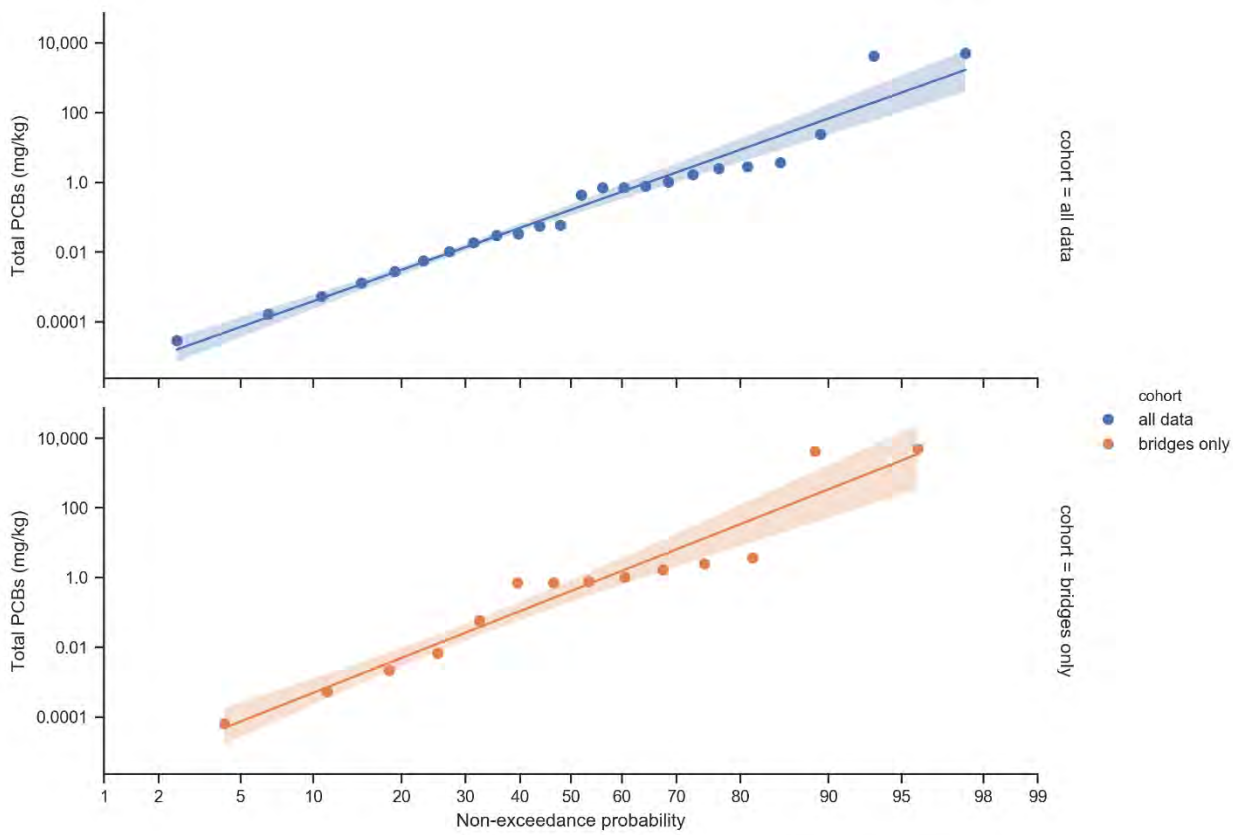

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

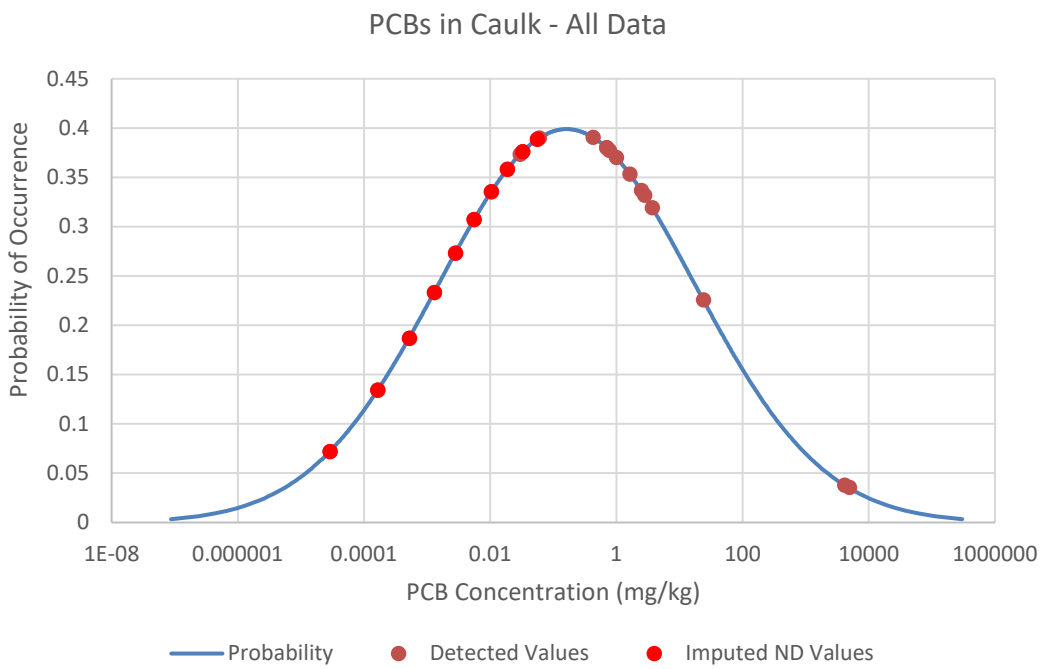

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

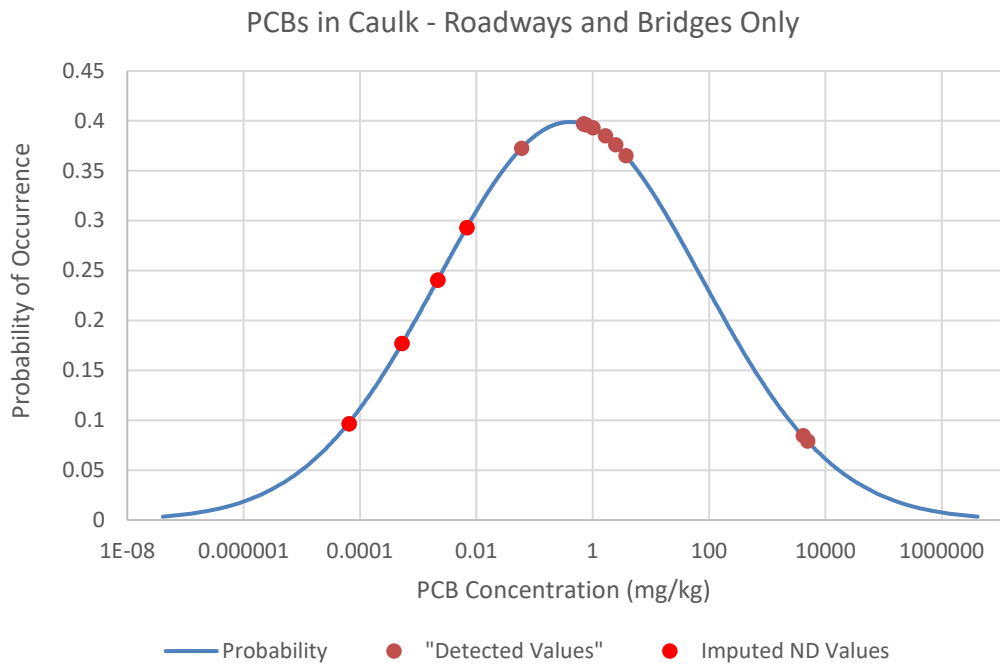

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

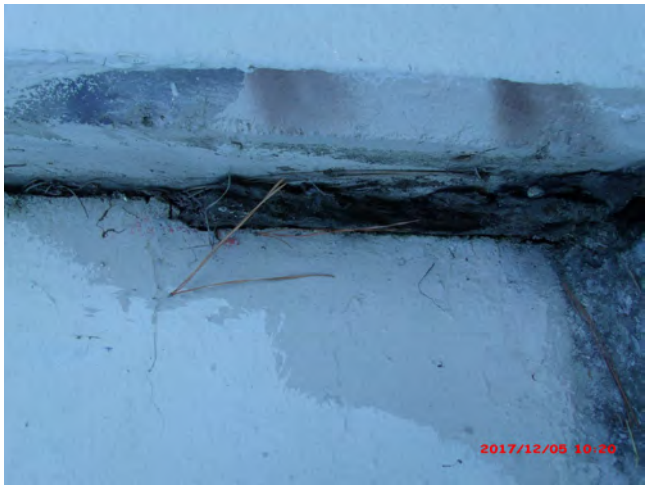

Composite D

Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

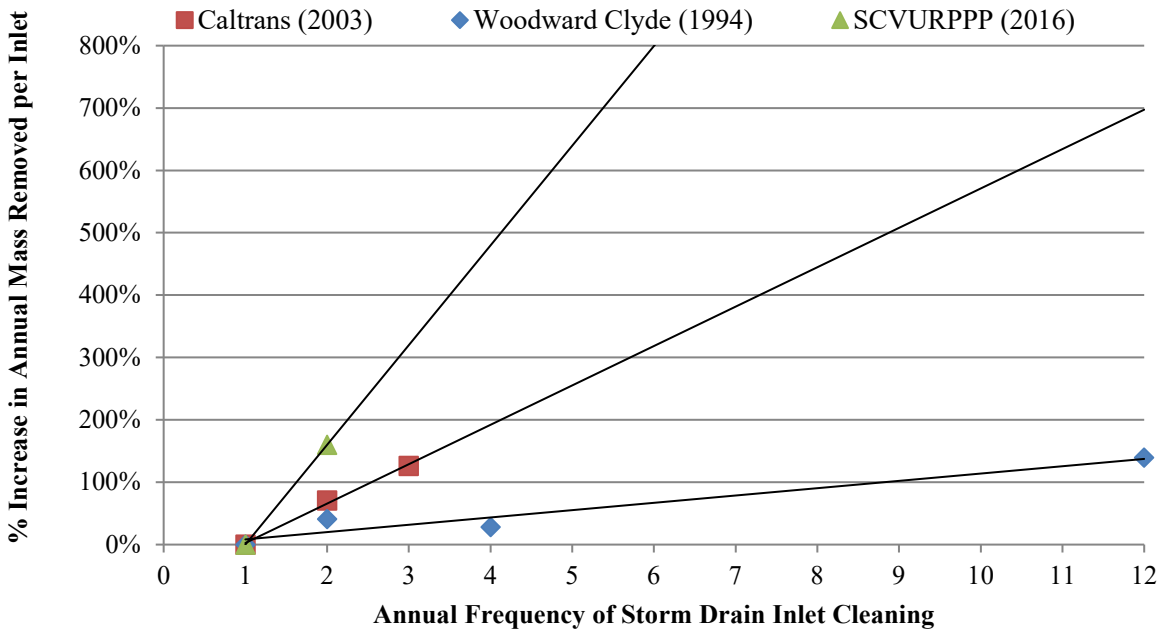

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

BASMAA (2014). San Francisco Bay Area Stormwater Trash Generation Rates - Final Technical Report. Bay Area Stormwater Management Agencies Association. Prepared by EOA, Inc. Oakland. June.

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:

1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:

Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

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APPENDIX O

Alameda County PCBs and Mercury Control Measure Plan and Reasonable Assurance Analysis Report

ALAMEDA COUNTY PCBS AND MERCURY TMDL CONTROL MEASURE PLAN AND REASONABLE ASSURANCE ANALYSIS REPORT

MEMBER AGENCIES:

Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
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California Regional Water Quality Control Board, San Francisco Bay Region

August 2020

Protecting Alameda County Creeks, Wetlands & the Bay

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Preface

This *PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis Report* was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP; NPDES Permit No. CAS612008; Order No. R2-2015-0049) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board. This report fulfills the requirements of MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.b.iii.(2), and C.12.d.iii for providing a mercury and PCBs control measures implementation plan and corresponding reasonable assurance analysis (RAA).

This report is submitted by ACCWP on behalf of the following Permittees:

- The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City;
- Alameda County;
- Alameda County Flood Control and Water Conservation District; and
- Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7 Water Agency).

List of Acronyms

Acronym	Definition
ACCWP	Alameda Countywide Clean Water Program (also Program)
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
EBMUD	East Bay Municipal Utility District
ESPS	Ettie Street Pump Station
g	gram
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
HRU	Hydrologic Response Unit
mg	milligram
mgd	million gallons per day
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
ng	nanogram
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric
POTW	Publicly Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSID	Stressor/Source Identification
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
WLA	Wasteload Allocation
WY	Water Year

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Executive Summary

This report presents the implementation plan for the Alameda Countywide Clean Water Program (ACCWP or Program) Permittees to meet mercury and polychlorinated biphenyls (PCBs) load reductions required by Total Maximum Daily Loads (TMDLs). The plan is required by the San Francisco Bay Regional Water Quality Control Board (Water Board) through the Municipal Regional Stormwater NPDES Permit (MRP). MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.c.iii.(3), and C.12.d.iii specifically require a report providing a mercury and PCBs control measures implementation plan and corresponding reasonable assurance analysis (RAA).

ACCWP Permittees recommend a programmatic approach for reducing PCBs and mercury loads from urban stormwater discharges, whereby compliance is assessed based on implementing and documenting a regionally agreed-on program of control measures, which include:

- Source property identification and abatement,
- Management of PCBs in building materials during demolition,
- Management of PCBs in electrical utility equipment,
- Management of PCBs in bridge structures during replacement,
- Mercury load avoidance and reduction,
- Green stormwater infrastructure (GSI),
- Full trash capture devices, and
- Enhanced operation and maintenance, such as enhanced inlet cleaning.

As part of the process to implement MRP Provisions C.11.d and C.12.d, ACCWP Permittees have worked with peer stormwater programs through the Bay Area Stormwater Management Agency Association (BASMAA) to define the actions and quantifiable benefits of PCBs and mercury control measures. Lessons learned from over 15 years of monitoring, analysis, and reporting informed a series of technical work group meetings beginning in March 2019, with the active participation of Regional Water Board staff in four of those meetings. These workgroup meetings resulted in a programmatic approach agreed on regionally by all stormwater programs. The programmatic approach includes feasible implementation actions that will move the Permittees forward towards the TMDL load reduction goals. Commitment to the programmatic actions provide Permittees with planning certainty needed for compliance while addressing the public interest in measurable progress towards achieving water quality standards.

This TMDL Implementation Report presents an estimate of the load reductions resulting from PCBs and mercury control programs, along with an objective assessment of how inherent uncertainties affect forecast outcomes. It is important to emphasize that the projected pace of control measure implementation and the resultant predicted load reductions are based on current and projected business practices, which are subject to change. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

PCBs Control Measures

Control measures discussed in Section 2 of this report focus on PCBs. Accounting methodologies are presented for both PCBs and mercury control measures in the RAA Report (Section 6) and the supporting BASMAA Source Control Loads Reduction Accounting for RAA Report (Appendix D).

Table ES-1 below summarizes the PCBs program of control measures and the estimated resulting load reductions over time that would result from the proposed control measures.

Table ES-1. Summary of PCBs Control Measures and Estimated Load Reductions

Control Measure	PCBs Load Reduction (kg/yr) by:			
	2020	2030	2040	2090
Source Property Identification and Abatement	0.29	0.49	0.55	0.55
PCBs in Building Materials Management	0.63	0.63	0.63	0.63
PCBs in Electrical Utilities Management	0.12	0.20	0.27	0.34
PCBs in Infrastructure	0	0.01	0.03	0.06
Green Stormwater Infrastructure	0.23	0.38	0.60	1.50
Full Trash Capture Treatment Control Measures	0.14	0.22	0.22	0.22
Enhanced Operations and Maintenance	0.0002	0.0002	0.0002	0.0002
Diversion to POTW	0.001	0.001	0.001	0.001
Total Load Reduced	**1.41**	**1.93**	**2.30**	**3.30**
Load Reduction Goal	**3.30**	**3.30**	**3.30**	**3.30**
Remaining Load to be Reduced	**1.89**	**1.37**	**1.00**	**0**

The analysis shows that, based on current assumptions, the load reduction needed to achieve the PCBs wasteload allocation assigned to Alameda County Permittees would not be achieved

until well after 2030. The RAA estimates that the PCBs TMDL wasteload allocation would be achieved by 2090.

However, Provision C.12.d states that this report should show a path to compliance by 2030. Analysis provided in Appendix G shows that it is technically and economically infeasible to achieve the TMDL wasteload allocation by 2030.

Each of the control measure are described below.

Source Property Identification and Abatement

The Program will continue to assist Permittees with implementing source property investigations and referrals. Twenty-five percent of the remaining old industrial areas that drain to the MS4 will be investigated during the MRP 3 permit term, and the remaining area will be investigated within subsequent permit terms, but prior to 2040. Parcels that drain directly to the Bay may also be investigated if determined to be a high likelihood source property as feasible. If investigation does not identify a specific source for an area with observed elevated concentrations, then the source area may be considered for the application of other types of control measures, such as treatment controls or enhanced O&M.

The rate of discovering new source properties theoretically could be accelerated by increased monitoring effort; however, there is no assurance that new source properties would be discovered. Diminishing returns are expected from this investigation effort going forward, because early efforts targeted high likelihood areas. Therefore, there is low likelihood that progress shown in Table ES-1 above could be accelerated by increased effort on this control measure.

PCBs in Building Materials Management

Permittees will continue implementing adopted ordinances requiring inspection for and removal of PCBs-containing building materials prior to demolition, and reporting outcomes annually. Permittee effort applied to this control measure is expected to remain at its current level of implementation, which began in July 2019. Program costs could be impacted if there are requirements for additional studies, such as effectiveness assessments or refined methods for estimating loads reduced.

There is no way to accelerate the schedule of attaining TMDL goals by changes to this control measure. Future studies may provide information that helps better understand whether the PCBs load reduction achieved is greater or less than the 2 kg/yr allotted to this program in 2019 but would not likely lead to significant changes in the implementation of the program.

PCBs in Electrical Utilities Management

This control measure will improve procedures to document removal and disposal of PCBs in oil-filled electrical equipment (OFEE) as part of ongoing maintenance practices for municipally owned electrical utilities in the MRP area. Alameda Municipal Power is the only municipally owned electrical utility in Alameda County; the remainder of the county is served by East Bay Community Energy[1] and Pacific Gas and Electric Company (PG&E). Alameda Municipal Power will document the removal of PCBs-containing electrical equipment since 2005 and provide data to support calculations of the associated stormwater load reductions due to these efforts.[2]

The limiting factor on implementing this control measure, outside of municipally owned power companies, will likely continue to be the Water Board's ability to direct PG&E to provide the same data and documentation as the municipally owned electrical utilities.

PCBs in Infrastructure

Permittees will inventory bridges in their jurisdictions, including known information about past maintenance, expected maintenance needs, and useful life. The Permittees will then use the inventories to track bridge replacement or rehabilitation projects in their jurisdictions to ensure that contract standard specifications and special provisions addressing PCBs removal from bridge materials are included in any such work. This TMDL Implementation Plan includes the assumption that the responsibility for developing the contract standard specifications and special provisions will be assigned to Caltrans by the State Water Resources Control Board.

Permittees have no way of increasing the benefit from or accelerating the rate of implementing this control measure once it is implemented.

[1] In 2018, the County of Alameda and 11 of its cities formed East Bay Community Energy (EBCE) to provide more renewable energy at competitive rates. EBCE is a not-for-profit public agency that governs the Community Choice Energy service. EBCE supplies electricity to all accounts (residential, business, and municipal) and PG&E delivers it.

[2] BASMAA conducted a regional Stressor/Source Identification (SSID) project that developed and implemented a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source. As a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

Green Stormwater Infrastructure

Permittees will implement their Green Stormwater Infrastructure plans. This will encumber municipal time and attention at current levels, or potentially increased levels, depending on the level of new development and redevelopment activity and ongoing Capital Improvement Project implementation. Permittees will continue tracking GSI implementation in an ArcGIS online (AGOL) database (or a suitable replacement system). The Program will continue to gather data annually to assess PCBs loads reduced. The rate of implementing this control measure is constrained by the rate of private new development, private redevelopment, and municipal capital project implementation.

The projected pace of GSI implementation and the resultant predicted load reductions are based on current and projected business practices, which are subject to change. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and GSI implementation, and/or changes in the ability to provide services that are needed for implementation.

Full Trash Capture Treatment Control Measures

Permittees will continue tracking full trash capture devices in AGOL. The Program would continue to gather AGOL data annually to assess PCBs loads reduced. The opportunities to accelerate this or expand the benefit are limited, as there are a finite number of full trash capture opportunities available to Permittees.

Enhanced Operations and Maintenance (O&M)

Routine MS4 O&M activities conducted by Permittees include street sweeping and drain inlet cleaning. In addition, storm drains, culverts, and channels are maintained as needed (i.e., desilted when needed to remove excessive quantities of accumulated sediment that may be causing localized flooding issues). Infrequent capital improvement projects may also remove accumulated sediment from the MS4, such as storm drain repairs or channel stabilization projects. Each of these O&M activities removes PCBs and mercury that are present in the sediment that is removed. Permittees will continue to perform enhanced O&M at current levels and will consider expanding enhanced O&M in Old Industrial areas and / or near source property areas.

Diversion to POTW

The Alameda County Flood Control and Water Conservation District has an agreement with the East Bay Municipal Utility District (EBMUD) for operation of an urban runoff diversion at the Ettie Street Pump Station that directs dry weather discharge to EBMUD's main wastewater treatment plant for treatment. No other pump station diversion is planned for implementation.

Mercury Control Measures

Mercury control measures for source control (e.g., product collection for recycling) are well-established in the Bay Area. Because of the widespread nature of mercury in the urban environment, further progress on reducing mercury loads will most likely occur in tandem with stormwater management and treatment measures addressing PCBs (i.e., GSI implementation).

Schedule for Implementation

The RAA results predict that the PCBs TMDL wasteload allocation will be achieved in Alameda County by the year 2090. GSI implementation provides multiple benefits, addresses other urban pollutants, and is a requirement for new development and redevelopment projects, so would continue to be implemented as long as that requirement is in place. In addition, the Management of PCBs in Building Materials, Management of PCBs in Electrical Utilities, and Management of PCBs in Infrastructure programs will be implemented until these sources have been abated. As PCBs have been banned in the United States since 1979, it is likely that these programs will no longer be needed by 2080, 100 years later. The Source Property Identification and Abatement Program will be complete by 2040. Full trash capture device implementation is assumed to be complete no later than 2030. The source control measure Mercury Load Avoidance and Reduction, which began during MRP 1.0, is assumed to continue indefinitely.

Evaluation of Costs

The estimate of public agency costs for implementing the PCBs and mercury control measures ranges from $400,000,000 to $1,000,000,000 countywide. The estimated cost for implementing source control programs is negligible in comparison to the estimated costs for implementing GSI measures. An analysis of cost effectiveness demonstrates that source control measures are much more cost efficient than treatment control measures at reducing loads of PCBs in urban runoff.

Public project implementation will depend on funding availability. Funding for implementation of projects included in the Permittees' Green Infrastructure Plans would be obtained by the municipal agency, partnerships of agencies, or other stakeholder project sponsors working to implement the identified projects. Economic or socio-economic impacts and political shifts may

affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

Uncertainty Analysis

Components of uncertainty that cannot be addressed through the methods summarized in this document are pollutant degradation and changes in larger-scale processes that are difficult to predict. Degradation is the process of natural reduction in pollutant concentration, which is anticipated to occur over time as a result of numerous factors present in the watershed. A component of degradation which lends itself to uncertainty is the reduction of PCBs as a source. PCBs are a legacy pollutant in the environment, as they have not been in production for almost 40 years and the allowable uses have been mostly phased out and should be further reduced over time until they are eliminated. Therefore, the load of PCBs that is currently available for transport and conveyance in the MS4 can only be degraded and removed, not added to.

It is anticipated that PCBs as a source will diminish over time as a result of source control activities, as well as natural dispersion and degradation processes, which is not captured by the load reduction estimation methods. Little information is known about these processes, thus insufficient information is available to develop a methodology for accounting for degradation and source reduction in the watershed. Because of this, degradation overtime could account for a considerable amount of uncertainty in the future condition, particularly in the anticipated concentrations in urban runoff and land use-based pollutant load assumptions.

Additional uncertainty is associated with changes in large-scale processes. These include physical phenomena, such as effects of climate change, long-term meteorological patterns, and large seismic events. These can also include economic or socio-economic and political shifts, which may occur as a result of physical phenomena or other factors, such as that experienced in 2020, the COVID-19 pandemic.

Major changes in large-scale processes can impact the actuality of some of the assumptions in the pollutant loading model as well as the future implementation scenarios. These may include changes to total area contributing to loading, for example as a result of sea level rise; changes to annual loading due to increases or decreases in average annual stormwater runoff volume, as a result of precipitation or flooding changes caused by long-term meteorological patterns and/or climate change; or changes to loading and/or redevelopment rates as a result of a seismic event. Economic or socio-economic impacts and political shifts can also affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds

for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

The examples provided represent just a small fraction of the range of possibilities; many of these large-scale phenomena are very challenging to predict. As such, they are even more difficult to model and, in many cases, represent scenarios that may not happen and/or the timeframe for when they happen cannot be estimated.

1 Introduction

1.1 Purpose

This *PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.b.iii.(2), and C.12.d.iii for providing a mercury and PCBs control measures implementation plan and corresponding reasonable assurance analysis (RAA).

The following MRP reporting requirements are addressed within this report:

- An estimate of the amount and characteristics of land area that will be treated through green stormwater infrastructure (GSI) implementation by 2020, 2030, and 2040; the data used; and a full description of models and model inputs relied on to generate this estimate.
- A reasonable assurance analysis to demonstrate quantitatively that Alameda County's population-based portion of PCBs reductions of at least 3 kg/yr and mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of GSI projects; all data used; a full description of models and model inputs relied on to make the demonstration; and documentation of peer review of the reasonable assurance analysis.
- A PCBs and mercury control measure implementation plan and corresponding RAA that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028 and PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan must:
    1. Identify all technically and economically feasible PCBs control measures and mercury control measures (including GSI projects) to be implemented;
    2. Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and
    3. Provide an evaluation and quantification of the PCBs load reduction and mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

This report is organized into the following sections:

1. Introduction and Background – Section 1 describes requirements for managing mercury and PCBs per the TMDLs and the MRP.
2. PCBs Control Measure Plan – Section 2 describes the technically and economically feasible PCBs control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms.
3. Mercury Control Measure Plan – Section 3 describes the technically and economically feasible mercury control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms.
4. Schedule of Implementation – the schedule of implementation for the PCBs and mercury control measures is provided in Section 4.
5. Costs, Efficiency, and Environmental Impacts – Section 5 provides an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from the implementation of the PCBs and mercury control measures.
6. Reasonable Assurance Analysis – This section presents estimates of the PCBs and mercury loads that will be reduced through implementation of the control measures described in the PCBs and Mercury Control Measure Plans presented in Section 2 and Section 3. This section summarizes the data used, describes the model and model inputs, and documents peer review.
7. Conclusion – the final section summarizes the findings of the report.

1.2 Background

1.2.1 PCBs and Mercury Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay (Bay) has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to PCBs, mercury, and other pollutants. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as BMPs, are the tools that Permittees can use to assist in restoring water quality in the Bay.

PCBs TMDL

The PCBs TMDL was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day) (SFBRWQCB, 2008). A food web model was developed by San Francisco Estuary Institute (SFEI) to identify the sediment target concentration that would yield the fish tissue target; this sediment target was found to be 1 microgram (µg) of PCBs per kg of sediment. This is equivalent to reducing the total mass of PCBs in the active layer of the San Francisco Bay to 160 kg. The San Francisco Estuary Institute (Davis, 2003; SFEI, 2007a) developed a mass budget model that identified the total external load of PCBs to the Bay that would attain a long-term (i.e., equilibrated) PCBs mass in the bay of 160 kg within approximately 30 years. The mass budget model estimated that reduction of the external load to 10 kg of PCBs per year would achieve this goal, assuming a starting Bay-wide PCBs concentration in surface sediment of 4.65 micrograms per kilogram (µg/kg)[3] (SFEI, 2007a). Twenty percent of the estimated allowable external load was allocated to urban stormwater runoff.

The wasteload allocation (WLA) for PCBs for urban stormwater is 2 kg/yr by 2030. This load allocation was developed by applying the required sediment concentration (1 µg/kg) to the estimated annual sediment load discharged from local tributaries. The PCBs TMDL staff report (SFBRWQCB, 2008) estimated the annual sediment load originating from stormwater to be 2,000,000 metric tons (i.e., 2,000,000,000 kg/yr) based on a range of then available estimates and differing methods. This WLA was distributed among the counties on population in the year 2000. A summary of the allocations for each county is provided in Table 1-1.

[3] Bay-wide PCBs concentration in surface sediment estimated based on Regional Monitoring Program 2004 – 2006 data (SFEI, 2007a).

Table 1-1: PCBs Wasteload Allocations by County

County	Population (year 2000)	Wasteload Allocations (kg/yr)
Alameda	1,440,000	0.5
Contra Costa	790,000	0.3
Marin	240,000	0.1
Napa	120,000	0.05
San Francisco	630,000	0.2
San Mateo	600,000	0.2
Santa Clara	1,600,000	0.5
Solano	290,000	0.1
Sonoma	110,000	0.05
Total		2

The PCBs TMDL Staff Report estimates a total stormwater load of 20 kg/yr based on studies conducted by SFEI (SFEI, 2006; 2007b). SFEI calculated this baseline load using three different methods to scale monitoring data (grab sample concentration data from Water Year (WY) 2005[4], United States Geologic Survey [USGS] continuous discharge, and suspended sediment data) from Coyote Creek and the Guadalupe River by area and land use. Subtracting the WLA for urban stormwater from this estimate resulted in a required load reduction of 18 kg/yr (i.e., a 90% reduction) by 2030. Note that the MRP area[5] portion of the 2 kg/yr allocation is 1.6 kg/yr.

PCBs TMDL compliance can be demonstrated through two different approaches:

1. Meet the WLA (i.e., monitoring and/or modeling-based compliance demonstration); and
2. Demonstrate the required load reductions can be achieved (i.e., modeling-based compliance demonstration).

Mercury TMDL

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight

[4] Although the PCBs TMDL Staff Report states that PCBs loads estimates for the Guadalupe River were based on data collected between 2003 and 2005; SFEI, 2006 indicates that the baseline load estimate of 20 kg/yr was based on an extrapolation of monitoring data collected in WY 2005.

[5] Marin, Napa, San Francisco, and Sonoma are not within the MRP boundary.

concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.

A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations (SFBRWQCB, 2004).

The urban stormwater runoff load to the San Francisco Bay is estimated to be equivalent to 116 kg/yr, as reported in the San Francisco Bay Regional Monitoring Program for Water Quality's Sources, Pathways, and Loadings Report (McKee et al., 2015), which is less than the Mercury TMDL Staff Report reported load of 160 kg/yr[6] (corresponding to "baseline year" of 2003). The WLA for urban stormwater is 82 kg/yr (SFBRWQCB, 2006). Based on the TMDL reported load of 160 kg/yr, this results in an estimated total required load reduction of 78 kg/yr, required to be achieved by 2028. A summary of the WLA and load reductions required for each urban stormwater entity subject to the TMDL is provided in Table 1-2 (SFBRWQCB, 2006).

[6] This loading assumes an annual sediment load of 410,000,000 kg/yr of sediment with a concentration of 0.38 mg/kg (ppm) (SFBRWQCB, 2006). Although the estimates were based on monitoring data collected in previous years, the TMDL states the baseline year as 2003.

Table 1-2: Mercury Wasteload Allocations by County

Entity	Wasteload Allocation (kg/yr)[1]
Santa Clara Valley Urban Runoff Pollution Prevention Program	23
Alameda Countywide Clean Water Program	20
Contra Costa Clean Water Program	11
San Mateo County Stormwater Pollution Prevention Program	8.4
Vallejo Sanitation and Flood Control District	1.6
Fairfield-Suisun Urban Runoff Management Program	1.6
American Canyon	0.14
Sonoma County area	1.6
Napa County area	1.6
Marin County area	3.3
Solano County area	0.81
San Francisco County area	8.8
Total	82

[1] Listed in Table 4-w of Appendix A in the Mercury TMDL Staff Report (SFBRWQCB, 2006).

Mercury TMDL compliance can be demonstrated through the following three approaches[7]:

1. Show mercury concentrations are below 0.2 milligrams per kilogram (mg/kg) on a countywide level (i.e., monitoring-based compliance demonstration);
2. Meet the WLA (i.e., monitoring and/or modeling-based compliance demonstration);[8] and
3. Demonstrate the required load reductions can be achieved (i.e., modeling-based compliance demonstration).

1.2.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties, and flood control districts in 2009 and revised in 2015.

MRP Provision C.3.j required the Permittees to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. The Green Infrastructure Plans were developed using a mechanism

[7] Detailed documentation requirements for demonstration of these approaches are summarized in the Mercury TMDL Staff Report (SFBRWQCB, 2006).

[8] Modeling-based compliance demonstration requires monitoring-based empirical inputs to conduct the analyses.

to prioritize and map areas for potential and planned green infrastructure projects, both public and private, on a drainage-area-specific basis, for implementation by 2020, 2030, and 2040.

MRP Provisions C.11.c and C.12.c require the Permittees to prepare an RAA for inclusion in the 2020 Annual Report. The RAA required in Provisions C.11.c and C.12.c should do the following:

1. Quantify the relationship between the areal extent of green infrastructure implementation and mercury and PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of green infrastructure strategies likely to be implemented.
2. Estimate the amount and characteristics of land area that will be treated by green infrastructure by 2020, 2030, and 2040.
3. Estimate the amount of mercury and PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.
4. Quantitatively demonstrate that mercury load reductions of at least 10 kg/yr and PCBs load reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects.
5. Ensure that the calculation methods, models, model inputs, and modeling assumptions used have been validated through a peer review process.

Additionally, MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The implementation plans must:

1. Identify all technically and economically feasible mercury or PCBs control measures (including green infrastructure projects, but also other control measures such as source property identification and abatement, managing PCBs in building materials during demolition, enhanced operations and maintenance, and other source controls) to be implemented;
2. Include a schedule according to which technically and economically feasible control measures will be fully implemented; and
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

1.2.3 Bay Area RAA Guidance

From a regulatory perspective, reasonable assurance is defined as the demonstration that the implementation of control measures will, in combination with operation of existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet total maximum daily load (TMDL) wasteload allocations, water quality-based effluent limits (WQBELs), or other water quality targets specified in a municipal separate storm sewer system (MS4) permit (USEPA, 2017). From the perspective of a stakeholder in the watershed who is focused on the improvement of water quality or restoration of a beneficial use of a waterbody, reasonable assurance is the demonstration and a commitment that specific management practices are identified with sufficient detail (and with a schedule for implementation) to establish that necessary improvements in the receiving water quality will occur. From the perspective of an MS4 Permittee, reasonable assurance is a detailed analysis of TMDL WLAs, associated permit limitations, and the extent of stormwater management actions needed to achieve TMDL WLAs and address receiving water limitations. RAAs may also assist in evaluating the financial resources needed to meet pollutant reductions based on schedules identified in the permit, TMDL, or stormwater management plan, and in preparing associated capital improvement plans.

As defined in the *Bay Area RAA Guidance Document* (BASMAA, 2017), an RAA is a demonstration that the control measures proposed in Bay Area City and County Green Infrastructure Plans and PCBs and Mercury Control Measure Implementation Plans, as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury TMDL wasteload allocations for urban stormwater runoff over the defined period of time. Additionally, the RAA should provide a method for evaluating the type, size, number, location, and phasing of green infrastructure measures needed to comply with the green infrastructure load reduction goal (i.e., 10 kilograms per year [kg/yr] mercury load reductions and 3 kg/yr PCBs load reductions by 2040) stated in MRP Provisions C.11/C.12.c. As such, the green infrastructure planning and associated RAAs will require adaptive management. The RAA may also be used to justify extending the TMDL compliance schedules (SFBRWQCB, 2015). [9]

The MRP provides flexibility for Permittees to define what constitutes an acceptable RAA, however the RAAs developed in compliance with the MRP must be peer reviewed and must be approved by the SFBRWQCB. The RAA presented in this report is consistent with the guidance provided in the *Bay Area RAA Guidance Document* (BASMAA, 2017).

[9] See MRP Attachment A: Fact Sheet page Attachment A-122.

2 PCBs Control Measure Plan

This section describes the control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms to control PCBs in urban runoff.

2.1 Source Control Measures

Source control measures include the following programs:

- Source area investigation and abatement,
- PCBs in building materials management,
- PCBs in electrical utilities management,
- PCBs in infrastructure management, and
- Mercury load avoidance and reduction.

Each of these source control programs are described below.

2.1.1 Source Property Identification and Abatement Program

Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels and are being transported to the MS4. The source property identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. A detailed description of the investigation process is provided in Appendix A.

Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the SFBRWQCB for investigation and abatement. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another NPDES permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the ROW or through water sampling where visual inspections and/or other

information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced O&M measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems are described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public ROW and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

The properties that have been referred to the SFBRWQCB or self-abated through FY 2019/20 are listed in Table 2-1 below.

Table 2-1: ACCWP Contaminated Sites Referred to the SFBRWQCB and Self-Abated Properties

SITE NAME	LOCATION	PROPERTY SIZE (ACRES)	YEAR REFERRED	REFERRAL OR SELF-ABATEMENT
AMG	3438 Helen Street, Oakland	0.43	FY 2017/18[1]	Referral
Custom Alloy Scrap Sales	2601 Peralta St., Oakland	7.65	FY 2017/18[1]	Referral
Former Giampolini Facility	2838 Hannah St., Oakland	1.93	FY 2017/18[1]	Self-Abatement
General Electric – Oakland (Phase 1)	5441 East 14th St., Oakland	10.1	FY 2017/18	Self-Abatement
LBNL Old Town	One Cyclotron Rd., Berkeley	1.0	FY 2017/18	Self-Abatement
OAB Transformer Spill	10th and Maritime St., Oakland	0.02	FY 2017/18	Self-Abatement
Precision Cast Products	1549 32nd Street and 2868 Hannah Street, Oakland	0.79	FY 2017/18	Referral
South SPRR/Novartis	4560 Horton St., Emeryville	0.03	FY 2017/18	Self-Abatement
UPRR – Oakland Coliseum	700 73rd Avenue, Oakland	0.40	FY 2017/18	Referral
Schnitzer Steel	Schnitzer Steel, 1101 Embarcadero West, Oakland	33.7	FY2019/20	Referral
General Electric – Oakland (Phase 2)	5441 East 14th St., Oakland	13.9	FY 2019/20	Self-Abatement
Kaiser Medical Center	Kaiser Medical Center, 280 West MacArthur Blvd, Oakland	5.0	FY2019/20	Self-Abatement
OES-021	Wood Street and 15th Street, Oakland	6.2	FY2019/20	Self-Abatement
Brownfield Auto Auction (former Nor-Cal Rock)	768 46th Avenue, Oakland	1.8	FY2019/20	Referral
Economy Lumber	Economy Lumber, 750 High Street, Oakland	4.0	FY2019/20	Referral

The Permittees, with the support of the ACCWP, have estimated the remaining old industrial area to be investigated within Alameda County (Table 2-2). Twenty-five percent of the remaining old industrial areas that drain to the MS4 will be investigated during the MRP 3 permit term, and the remaining area will be investigated within subsequent permit terms, but prior to 2040. Parcels that drain directly to the Bay may also be investigated if determined to be a high likelihood source property as feasible. If investigation does not identify a specific source for an area with observed

elevated concentrations, then the source area may be considered for the application of other types of control measures, such as treatment controls or enhanced O&M.

Table 2-2: Old Industrial Areas to be Investigated within Alameda County

Description		Total Area (acres)
Total urban area below dams and draining to the Bay		337,769
A.	All Old Industrial land use areas (2002)[1]	9,639
B.	Old Industrial land use areas that have redeveloped since 2002 and/or are currently treated by green stormwater infrastructure	821
C.	Old Industrial land use areas that have been previously determined to be low likelihood, investigated[2], referred, or abated.	3,847
D.	Old Industrial land use areas that do not drain to the MS4, rather drain directly to the Bay	337
E.	Old Industrial land use areas that will be investigated (A – (B + C + D))	4,634

Notes:

1. Does not include Old Industrial land use areas within the jurisdiction of the Port of Oakland.
2. Includes the Alameda Naval Air Station, Lawrence Livermore National Laboratory, and Old Industrial parcels associated with low (<0.5 mg/kg) sediment samples

2.1.2 Management of PCBs in Building Materials Program

The Permittees have developed and implemented, in cooperation with the Bay Area Stormwater Management Agencies Association (BASMAA), a protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, stormwater runoff, or improper waste disposal. Applicable structures include, at a minimum, commercial, public, institutional, and industrial structures constructed between the years 1950 and 1980 and with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt.

The ACCWP and Permittees participated in a BASMAA Regional Project to address PCBs in building materials. This Regional Project developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Appendix B. This Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project. The tools and materials developed as part of the project build upon materials and outputs developed in 2010-2011 by the San Francisco Estuary Partnership with State Water Board grant funding, called the “PCBs in Caulk Project”, as well as subsequent and parallel activities by BASMAA.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Data collection started with implementation of the new program on July 1, 2019. When sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program, and
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

2.1.3 Management of PCBs in Electrical Utilities Program

The Management of PCBs in Electrical Utilities Program includes the development and implementation of improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

For this control measure program, municipally owned electrical utilities will document the removal of PCBs-containing electrical equipment since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service and will provide data to

support calculations of the associated stormwater load reductions due to these efforts.[10] Alameda Municipal Power is the only municipally owned electrical utility in Alameda County; the remainder of the county is served by East Bay Community Energy[11] and Pacific Gas and Electric Company (PG&E).

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

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[10] BASMAA conducted a regional Stressor/Source Identification (SSID) project that developed and implemented a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source. As a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

[11] In 2018, the County of Alameda and 11 of its cities formed East Bay Community Energy (EBCE) to provide more renewable energy at competitive rates. EBCE is a not-for-profit public agency that governs the Community Choice Energy service. EBCE supplies electricity to all accounts (residential, business, and municipal) and PG&E delivers it.

2.1.4 Management of PCBs in Infrastructure Program

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the ROW, including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

2.2 Treatment Control Measures

Treatment control measures include green stormwater infrastructure (GSI), full trash capture devices, enhanced operation and maintenance (O&M) practices, and diversion to publicly owned treatment works (POTW). Each of these treatment control measures are described below.

2.2.1 Green Stormwater Infrastructure

Green stormwater infrastructure (GSI) refers to constructing and retrofitting storm drainage systems to mimic natural processes by enabling stormwater to infiltrate into the soil rather than to runoff directly into storm drains. This control measure includes implementation of GSI in new development and redevelopment projects on private and public properties regulated by MRP Provision C.3, as well as retrofit of existing infrastructure in public right-of-way (ROW) areas and on public properties not subject to Provision C.3. GSI is being used to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural treatment control systems to detain and treat runoff before it reaches tributary creeks and, ultimately, San Francisco Bay. GSI treatment control measures include, for example, pervious pavement, infiltration basins, bioretention facilities, green roofs, and rainwater harvesting systems.

MRP Provision C.3 mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay, including PCBs and mercury. GSI has been incorporated into new development and redevelopment projects in the County since the early 2000's. The first edition of the *C.3 Technical Guidance Manual* was published in 2005. The current 7th Edition of the *C.3 Technical Guidance Manual* was published in 2019. Many additional support documents are continually being developed by the ACCWP to assist the Permittees in C.3 implementation. All of these documents are available on the ACCWP website[12].

Permittees track C.3 project implementation in an ArcGIS Online (AGOL) database. ACCWP developed the countywide GIS database to assist with maintaining, analyzing, interpreting, displaying, and reporting relevant municipal stormwater program data and information related to MRP Provision C.3, Provision C.10 (i.e., trash load reduction activities), and Provisions C.11/C.12 (i.e., mercury and PCBs TMDL implementation activities).

[12] See: https://www.cleanwaterprogram.org/businesses/development.html.

MRP Provision C.3.j required each Permittee to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. These Green Infrastructure Plans mapped and prioritized areas for potential and planned public and private GSI projects for implementation by 2020, 2030, and 2040. The RAA provided in Section 4 of this report estimates the PCBs and mercury load reductions that would be achieved through implementation of the Permittees' Green Infrastructure Plans.

The results of the RAA analysis (see Section 4) demonstrate that GSI projects that have the highest potential to reduce PCBs loads are concentrated within a small subset of the Alameda County Permittee area due to the pattern of pre-1980 industrial development within the region. Conversely, many Alameda County Permittees have no or very few opportunities to contribute significantly toward achievement of countywide PCBs loading reductions via implementation of GSI in their communities. Further, if PCBs load reductions are not achieved on a regional or countywide scale, and load reductions are allocated at a local level (by population), these Permittees would not be able to achieve those load reduction allocations due to a lack of opportunity.

Thus, given these findings, the Alameda County Permittees, collectively, believe that a countywide strategy would be the best way to achieve the PCBs load reduction goals in a more efficient and effective manner. For the purposes of creating their local GI Plans, Alameda County Permittees prioritized their GI projects based on achieving other multiple benefits. These other benefits include controlling other stormwater pollutants, preserving and enhancing local stream hydrology, reducing localized flooding, helping communities adapt to climate change by increasing the resiliency of water supply, ancillary benefits that derive from adding landscaped areas within the urbanized environment, and mitigating the urban heat island effect.

Additional actions that the Permittees have taken or will take to promote the implementation of GSI include:

- Incorporate GSI requirements into planning documents such as General Plans, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction;
- Evaluate funding options for GSI projects;
- Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan;

- Conduct public outreach, train Permittee staff, and educate elected officials on the MRP GSI requirements and methods of implementation; and
- Maintain a list of public infrastructure improvement projects that have a potential for incorporating GSI.

It is anticipated that the future iterations of the MRP will incorporate a required level of GSI implementation. The Permittees will continue to implement GSI in compliance with those provisions.

2.2.2 Full Trash Capture Treatment Control Measures

MRP Provision C.10 requires Permittees to implement trash prevention and control actions, including full trash capture systems, to reduce trash generation. Full trash capture systems capture sediment along with trash that may be contaminated with PCBs and mercury. Permittees have installed both large and inlet-based full trash capture devices in response Provision C.10. Large full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes, capture and treat urban runoff from large drainage areas, ranging from 10's to 100' of acres. Inlet-based devices in roadways enhance the capture of sediments that may be contaminated with PCBs and mercury from smaller, localized drainage areas. In addition, these inlets are typically cleaned more frequently as a result of the installation of the full trash capture device. Trash capture device implementation is described in each Permittee's Trash Load Reduction Plan.

2.2.3 Enhanced Operation and Maintenance

Routine MS4 O&M activities conducted by Permittees include street sweeping and drain inlet cleaning. In addition, storm drains, culverts, and channels are maintained as needed (i.e., desilted when needed to remove excessive quantities of accumulated sediment that may be causing localized flooding issues). Infrequent capital improvement projects may also remove accumulated sediment from the MS4, such as storm drain repairs or channel stabilization projects. Each of these O&M activities removes PCBs and mercury that are present in the sediment that is removed. The RAA provided in Section 4 of this report estimates the PCBs and mercury load reductions that are achieved through implementation of increased levels of O&M activities since 2003.

Enhanced O&M control measures are implemented as part of the Source Property Identification and Abatement Program (see Section 2.2.1 below) for referred source properties. Additional enhanced O&M measures may be implemented for Old Industrial source areas with observed elevated concentrations of PCBs if the source area investigation does not identify a specific

source property and the source is suspected to be historically deposited sediment in the public ROW or the storm drain system.

PCBs and mercury load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, will be reported as part of the overall load reductions in future permit terms.

2.2.4 Diversion to POTW

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff. The Alameda County Flood Control and Water Conservation District (District) manages flood control infrastructure for flood protection of most of the urbanized portions of Western Alameda County. The District has an agreement with the East Bay Municipal Utility District (EBMUD) for operation of an urban runoff diversion at the Ettie Street Pump Station (ESPS) that directs dry weather discharge to EBMUD's main wastewater treatment plant for treatment. The project diverts up to 0.5 million gallons per day (mgd) of dry weather flow during the dry season (i.e., approximately April 16th through November 30th). EBMUD completed the installation of its pump and control system and a 6-inch diameter conveyance pipe in 2016 and the stormwater diversion is ongoing. District staff coordinates with and provides assistance to EBMUD staff to ensure proper operation and maintenance of the diversion pump.

No other pump station diversion is planned for implementation.

3 Mercury Control Measure Plan

3.1 Source Control Measures

3.1.1 Mercury Load Avoidance and Reduction

Mercury load avoidance and reduction includes several source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufacturers have significantly reduced the amount of mercury in fluorescent linear tube lamps.

Mercury device recycling programs resulting in mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

- Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
- Private business take-back and recycling programs (e.g., Home Depot); and,
- Private waste management services for small and large businesses.

The Permittees have been implementing these programs since 2005 and will continue to implement them as part of this control measure plan.

3.2 Treatment Control

Treatment control measures that address PCBs in stormwater will also reduce mercury. These treatment control measures, described in Section 2.2 above, include green stormwater infrastructure, full trash capture devices, and enhanced O&M.

Because of the widespread nature of mercury in the urban environment, further progress on reducing mercury loads will most likely occur in tandem with stormwater treatment control measures addressing PCBs (e.g., GSI implementation). The RAA provided in Section 6 of this report estimates the mercury load reductions that would be achieved through implementation of treatment control measures addressing PCBs.

4 Schedule of Implementation

4.1 Overall Schedule of Implementation

Table 4-1 below presents the schedule of implementation for each of the control measures described in the PCBs Control Measure Plan (Section 2) and the Mercury Control Measure Plan (Section 3). The schedule in Table 4-1 shows when implementation of each control measure began and will be complete with respect to TMDL implementation.

The RAA results provided in Section 6 predict that the PCBs TMDL WLA will be achieved in Alameda County by the year 2090, thus this date is listed for GSI and enhanced operations and maintenance (O&M). GSI implementation provides multiple benefits, addresses other urban pollutants, and is a requirement for new development and redevelopment projects, so would continue to be implemented as long as that requirement is in place. In addition, the Management of PCBs in Building Materials, Management of PCBs in Electrical Utilities, and Management of PCBs in Infrastructure programs will be implemented until these sources have been abated. As PCBs have been banned in the United States since 1979, it is likely that these programs will no longer be needed by 2080, 100 years later. The Source Property Identification and Abatement Program will be complete by 2040. Full trash capture device implementation is assumed to be complete no later than 2030. The source control measure Mercury Load Avoidance and Reduction, which began during MRP 1.0, is assumed to continue indefinitely.

Table 4-1: PCBs and Mercury Control Measure Plan Schedule of Implementation

Control Measure	Begin Implementation	Implementation Complete
Source Property Identification and Abatement	2012	2040
Management of PCBs in Building Materials	2019	2080
Management of PCBs in Electrical Utilities	2019	2080
Management of PCBs in Infrastructure	2021	2080
Green Stormwater Infrastructure	2003	2090
Full Trash Capture Treatment Control	2009	2030
Enhanced Operations and Maintenance	2003	2090
Mercury Load Avoidance and Reduction	2005	Ongoing

4.2 Green Stormwater Infrastructure Schedule of Implementation

Table 4-2 below provides an estimate of the area that will be treated through GSI implementation by 2020, 2030, and 2040 countywide. These areas are summarized from the Permittees' Green Infrastructure Plans, which were submitted to the SFBRWQCB in 2019. The data and models used to generate this estimate and schedules for GSI implementation for each Permittee are described

in each Permittee's Green Infrastructure Plan and are summarized below. The RAA results for GSI implementation are based on these area predictions.

The projected pace of control measure implementation and the resultant predicted load reductions are based on current and projected business practices, which are subject to change. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

Table 4-2: Estimate of Area Treated through GSI Implementation by 2020, 2030, and 2040 within Alameda County

Year	GSI Area Treated (acres)
2020	9,111
2030	11,568
2040	14,030

4.2.1 Private Redevelopment Area Projection

The ACCWP Permittees track GSI implemented as part of private development projects subject to MRP Provision C.3.d through the ACCWP's AGOL tracking tool. The combined area treated by GSI implemented for private development from 2003 through 2018 represents a portion of the 2020 total area included in Table 4-2; the remainder was projected private development.

To forecast private development for 2019/2020, 2021 through 2030, and 2031 through 2040, the ACCWP used the UrbanSim model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area Metropolitan Transportation Commission (MTC). MTC forecasts growth in households and jobs and uses the UrbanSim model to predict new development and redevelopment to satisfy future demand. Model inputs include parcel-specific zoning and real estate data; model outputs show increases in households or jobs attributable to specific parcels. The methods and results of the Bay Area UrbanSim model have been approved for use in transportation projections and the regional Plan Bay Area development process.

ACCWP used outputs from the Bay Area UrbanSim model to map parcels predicted to undergo development or redevelopment in each Alameda jurisdiction at each time increment specified in the MRP (2020, 2030, and 2040). The resulting maps were reviewed by local staff for consistency with local knowledge and local planning and economic development initiatives, and the maps were revised as needed. Although the long-term projections based on UrbanSim are robust, there is a lot of uncertainty, much of it due to the unpredictability of future economic conditions.

4.2.2 Public GSI Project Area Projection

Publicly owned parcels and ROWs that could potentially be retrofit to include multi-benefit stormwater capture facilities were identified as part of the Alameda County Stormwater Resource Plan (SWRP) (ACCWP, 2019). These potential project locations were used as the basis for identifying potential public retrofit locations within each Permittee's jurisdiction based on local knowledge and priorities. Note that the public projects listed in the Permittees' GI Plans were based on desktop analysis and have not been field verified. The GI Plans described the process by which Permittees would move forward, when funding is available, to verify the feasibility of stormwater retrofit at the project locations.

5 Evaluation of Costs, Control Measure Efficiency, and Significant Environmental Impacts

5.1 Cost Analysis

5.1.1 Green Stormwater Infrastructure Cost Methodology

GSI project cost data were gathered from several sources within the Bay Area and Southern California to develop relationships between project size (tributary drainage area) and total capital cost (construction and design). Likewise, O&M cost data were gathered from these sources, as well as through literature review. A technical memorandum summarizing this cost analysis is provided in Appendix C. The results of this analysis for project capital costs, in 2018 dollars, are presented in Table 5-1 below. Actual GSI project implementation costs will vary and may be greater than those listed in Table 5-1.

Table 5-1: Statistical Summary of Unit Capital Cost for Green Street, Parcel-Based, and Regional GSI Project Types

Project Category	No. of Projects (n)	Unit Capital Cost ($/ac treated) in 2018 Dollars[1]					
		Minimum	25th-percentile	Median	75th-percentile	Maximum	Mean
Green Street	19	$25,000	$70,000	$137,000	$267,000	$1,290,000	$213,000
Distributed Green Infrastructure	21	$16,000	$90,000	$121,000	$176,000	$416,000	$153,000
Regional Stormwater Control	11	$15,000	$25,000	$61,000	$127,000	$427,000	$101,000

[1] Units have been rounded to the nearest $1,000.

Annual O&M costs are intended to account for activities necessary to maintain the effectiveness of a project that recur on a regular basis, such as routine maintenance on an annual basis or repairs following a large storm event. For this cost analysis, annual O&M costs do not include replacement (of portions) or rehabilitation of GSI facilities, which occurs approximately every 20 to 30 years. For planning purposes, annual O&M costs are often assumed to be a percentage of the capital (design and construction) costs. Annual O&M costs range from approximately 1% to 6% of the capital costs, with an average of 4% of capital cost for the data sources reviewed.

The estimated capital cost, which includes both the design cost and the construction cost, for the estimated public GSI project area listed in Table 4-2 is provided in Table 5-2 below. This cost was estimated by applying the Green Street unit cost to right-of-way area and the Distributed Green Infrastructure unit cost to the parcel area within the total estimated public GSI project area for each year. The low, medium, and high cost estimates were calculated using the 25th percentile,

median, and 75th percentile unit costs. The annual O&M cost was calculated by multiplying the capital cost by an estimated fixed O&M cost factor of 4%. The total project cost includes the capital costs and the annual O&M costs over the design life of the project. For the purposes of this analysis, a 20-year design life and a 3% inflation rate were used to calculate the total present value of the annualized O&M costs. The costs listed in Table 5-2 do not include replacement costs that would be expected to occur at the end of the useful life of the facility.

Table 5-2: Estimated Cost to Treat Public GSI Project Area by 2020, 2030, and 2040 within Alameda County

Year	Total Capital Cost ($1,000)			Annual O&M Cost ($1,000)			Total Project Cost ($1,000)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
2020	$173,000	$249,000	$387,000	$6,920	$9,960	$15,480	$279,000	$402,000	$624,000
2030[1]	$216,000	$321,000	$515,000	$8,640	$12,840	$20,600	$348,000	$518,000	$831,000
2040[1]	$259,000	$392,000	$640,000	$10,360	$15,680	$25,600	$418,000	$632,000	$1,032,000

1. The cost estimates are cumulative from 2020 to 2030 and 2040.

Public project implementation will depend on funding availability. Funding for implementation of projects included in the Permittees' Green Infrastructure Plans would be obtained by the municipal agency, partnerships of agencies, or other stakeholder project sponsors working to implement the identified projects. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

5.1.2 Source Control Measure Cost Analysis

A regionally consistent approach to estimating source control program implementation costs developed through collaboration with the other Bay Area stormwater programs is summarized in Table 5-3 below. These cost values represent average values based on a representative sample of implemented measures.

Table 5-3: Planning Level Cost Estimate Values for Source Control Measures

Control Measure Category	Control Measure	Unit of Implementation	Estimated Unit Costs[1]			
			Initial[2]		Ongoing[3]	
			Cost	Unit	Cost	Unit
Source Area Identification and Referral	Identify and Refer Source Properties	Acres of old industrial land use area investigated	$382	$/acre	NA	NA
Full Trash Capture (FTC)	FTC Implementation - Large Devices	Acres treated	$4,500	$/acre	$6,000	$ per year
	FTC Implementation - Small Devices	Acres treated	$1,000	$/acre	$400	$ per year
Enhanced Municipal Operation and Maintenance (O&M)	Enhanced Street Sweeping - mechanical broom	Acres addressed	$48 / curb-mile swept (lifecycle cost)			
	Enhanced Street Sweeping - Regenerative Air or Vacuum Assisted	Acres addressed	$80 / curb-mile swept (lifecycle cost)			
	Street Flushing	Linear mile of street flushed	$193,139	$ / linear mile of street flushed	NA	NA
	Enhanced Inlet Cleanout	Number of inlet cleaned out	NA	NA	$100	$ per cleanout
	Enhanced Pump Station Cleanout	Additional annual cleanouts	$82,200	$/cleanout	NA	NA
	Storm Drain Piping Cleanout	Annual cleanouts	$146,062	$/cleanout	NA	NA
Managing PCBs-containing Materials during Building Demolition		Annual cost	NA	NA	$400	$ per application
PCBs in Infrastructure Management Program		Annual cost	Minor municipal cost - just tracking and reporting. Some ongoing Program costs but also small.			
Management of PCBs in Electrical Utility Equipment		Annual cost	Minor municipal cost - just tracking and reporting. Some ongoing Program costs but also small.			

1. The unit costs are rough planning level estimates that do not consider net present worth cost adjustments or other complexities. These costs are not a true accounting of costs incurred to-date.
2. Initial costs generally include planning, design, capital, and other initial one-time costs.
3. Ongoing costs include operation & maintenance and other ongoing costs.

These planning level costs have been applied to an estimated level of implementation for each of the planned source control measures in Table 5-4 below.

Table 5-4: Planning Level Cost Estimate for Source Control Implementation – ACCWP

Control Measure	Unit Area Treated (acres) or Units Implemented			Estimated Implementation Cost		
	2020[1]	2030	2040	2020	2030	2040
Management of PCBs in Building Materials	30 applications	300 applications	600 applications	$12,000	$120,000	$240,000
Source Property Identification and Abatement	75 acres	87 acres	99 acres	$29,000	$33,000	$38,000
Full Trash Capture Treatment Control – Large Devices	7,100 acres	7,100 acres	7,100 acres	$1,554,000	$9,546,000	$18,426,000
Full Trash Capture Treatment Control – Inlet-Based Devices	17,660 acres	27,121 acres	27,121 acres	$9,286,000	$47,190,000	$87,936,000

1. The costs are rough planning level estimates that do not consider net present worth cost adjustments or other complexities. These costs are not a true accounting of costs incurred to-date.

As can be seen in Table 5-3 and Table 5-4, the estimated planning level cost for implementing source control programs, aside from full trash capture devices, is negligible in comparison to the estimated costs for implementing GSI measures. Although the estimated initial capital cost of the full trash capture devices is much less than the estimated costs of GSI implementation, the estimated full trash capture device cost is much higher than the programmatic source control program implementation costs, and over time, the ongoing O&M cost for the full trash capture devices contributes to the significant total implementation cost.

5.2 Control Measure Efficiency

In general, as discussed above, source control measures are much more cost efficient to implement than structural treatment control measures.

There are several factors that are considered when selecting control measures to address PCBs and mercury for a specific area. Cost efficiency (i.e., the cost per mass of pollutant reduced), while an important factor, is not sufficient when considering which type of control measure to implement at the management area or site scale. Different types of control measures may be more appropriate in some situations than others. Additionally, the potential load reduction available for each type of control measure varies; some control measures may be more effective but not have as much opportunity for implementation (such as source property identification and abatement), while others may be less effective but have much more opportunity (such as full trash capture devices).

Factors that help identify optimal implementation for a given location are listed below; site- or catchment-specific characteristics may increase or decrease the importance of any of these factors at a given location:

- *Costs*: includes all lifecycle (i.e., including maintenance) costs associated with planning and implementing a given control measure.
- *Load Reduction Potential*: includes the load reduction potential at the site, catchment, or municipal scale.
- *Opportunity*: includes the current and future opportunities and feasibility to implement a given control measure successfully.
- *Safety*: includes consideration of the potential to cause a safety hazard and the need for any additional measures to avoid creating a safety hazard. Safety hazards may include slip, trip, or fall hazards; drowning hazards; visual impairments (i.e., overgrowth into a roadway); vector concerns; chemical hazards; or flooding concerns.
- *Implementation Challenges*: includes consideration of potential implementation challenges due to local ordinances or regulations, resistance from the local community, or ability to obtain adequate funding.

5.2.1 Clean Watersheds for a Clean Bay

The Clean Watersheds for a Clean Bay (CW4CB) project was a collaboration among the BASMAA member agencies funded by a San Francisco Bay Water Quality Improvement Fund grant from the United States Environmental Protection Agency and matching funds from Bay Area countywide stormwater management programs and member agencies. The CW4CB project was designed to evaluate the effectiveness of stormwater controls for PCBs and mercury in response to the PCBs and mercury TMDLs. The CW4CB project pilot-tested methods to control discharges of PCBs and mercury in urban stormwater runoff and developed and implemented a regional risk reduction program that focused on targeted education on the health risks of consuming certain species of Bay fish that contain relatively high levels of mercury and PCBs. The results of the CW4CB project are available on the CW4CB website (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project).

A significant finding from the project was that source control measures, such as source area identification and abatement, are much more cost effective for controlling PCBs and mercury than treatment control measures.

Table 5-5 lists the estimated cost per unit pollutant load reduced by the source property identification and referral and the treatment control retrofit pilot projects. The source property identification and referral cost per unit load reductions represent the cost of pollutant loads reduced per acre of watershed investigated. Costs are in 2016 dollars.

Table 5-5: Estimated Cost Effectiveness for the CW4CB Source Property Identification and Abatement and Treatment Control Retrofit Pilot Projects

Pilot Project Type	Average Cost per PCBs Unit Load Reduced[1] ($/(mg/year))	Estimated Cost per Mercury Unit Load Reduced[1] ($/(mg/year))
Source Area Identification and Abatement[2]	$16	$53
Treatment Control Retrofit		
Tree Well Filter[3]	$4,400	$9,800
Bioretention[4]	$22,000	$372,500
Catch Basin Media Filter[5]	$53,100	$7,800
Vegetated Swale[6]	$47,600	$1,100
HDS Unit[7]	$700	$3,000

1. Assigns the pilot project total design and construction costs to each pollutant independently. Treatment control retrofit project costs are not annualized.
2. Average for all five pilot watersheds of cost of loads reduced per acre of watershed area investigated ($/acre) divided by the unit load reduced ((mg/yr)/acre).
3. Average of cost per acre treated ($/acre) divided by unit load reductions ((mg/yr)/acre) for the West Oakland Industrial Area Tree Wells.
4. Average of cost per acre treated ($/acre) divided by unit load reductions ((mg/yr)/acre) for the El Cerrito Green Streets, Bransten Road, and PGE 1st and Cutting projects.
5. Average of cost per acre treated ($/acre) divided by unit load reductions ((mg/yr)/acre) for the Vallejo PG&E Substation.
6. Average of cost per acre treated ($/acre) divided by unit load reductions ((mg/yr)/acre) for the Broadway and Redwood Swale.
7. Average of cost per acre treated ($/acre) divided by unit load reductions ((mg/yr)/acre) for the Leo Avenue HDS Unit only, pollutant reduction values are not available for the Alameda and High project.

5.2.2 PCBs and Mercury Control Measure Plan Cost Effectiveness

A comparison of the estimated cost for GSI implementation in Section 5.1.1 to the source control measure analysis in Section 5.2.2 demonstrates that the programmatic source control measures (i.e., Source Property Identification and Abatement, Management of PCBs in Building Materials, Management of PCBs in Electrical Utilities, and Management of PCBs in Infrastructure) are much more cost efficient than treatment control measures (GSI and full trash capture devices) at reducing loads of PCBs in urban runoff.

5.3 Significant Environmental Impacts

The California Environmental Quality Act (CEQA) establishes requirements and procedures for state and local agency review of the environmental effects of projects proposed within their jurisdictions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of their decisions. The applicable statutes are contained in California

Public Resources Code, Sections 21000 - 21189, and Title 14 CCR, Division 6, Chapter 3, Sections 15000 – 15387.

CEQA applies to all California public agencies that carry out or approve projects. CEQA compliance is only required if a lead agency is considering approval of a proposed "project." The distinction between the normal and the specific CEQA meaning of "project" is very important, as it can determine whether an action is subject to CEQA compliance or not. Section 15378 of the State CEQA Guidelines provides the following definition of a project:

1. "Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is any of the following:

    a. An activity directly undertaken by a public agency including but not limited to public works construction and related activities clearing or grading of land, improvement to existing public structures, enactment and amendment of zoning ordinances, and the adoption and amendment of local General Plans or elements thereof pursuant to Government Code Sections 65100-65700.

    b. An activity undertaken by a person which is supported in whole or in part through public agency contacts, grants subsidies, or other forms of assistance from one or more public agencies.

    c. An activity involving the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

CEQA requires the preparation of an Initial Study to determine if a project may result in significant effects on the environment. If there is substantial evidence in the record that supports a fair argument that significant effects may occur, an Environmental Impact Report will be prepared. A Negative Declaration or Mitigated Negative Declaration must be prepared if there is no substantial evidence that the project may have a significant effect on the environment, or if revisions to the project would avoid or mitigate the effects that would result in no significant effects.

The CEQA Guidelines stipulate that a public agency shall prepare or have prepared a proposed Negative Declaration or Mitigated Negative Declaration for a project subject to CEQA when:

- The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or

- The initial study identifies potentially significant effects, but:

- Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and

- There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment.

CEQA requires that reasonable alternatives to implement a proposed project should be considered during the planning process and potential environmental effects should be included in the evaluation of the project. CEQA also requires state and local agencies to disclose and consider the environmental impacts of their actions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of the implementation of their action.

This TMDL Control Measure Plan is statutorily exempted under Public Resources Code (California Administrative Code Sec. 15262 et seq.) because it involves feasibility or planning studies for possible future actions that the Permittees have not approved or adopted. Any future projects that are to be constructed as recommended by this Plan will either be determined to be exempt from CEQA or an initial study to determine potential environmental impacts will be prepared. In general, this TMDL Control Measure Plan has been determined to have no potential to generate significant adverse impacts to the environment, but instead will lessen adverse water quality impacts through reducing loads of PCBs and mercury into the Bay.

6 Reasonable Assurance Analysis

This section presents the results of the RAA required by MRP Provisions C.11.c, C.11.d, C.12.c, and C.12.d for the control measures that are described in the preceding sections of this report (Section 2 – the PCBs Control Measure Plan and Section 3 – the Mercury Control Measure Plan). The methodologies for estimating load reductions are introduced herein; additional details on the RAA methodology are provided in Appendix D and Appendix E.

6.1 Methodology

The approach used to estimate the load reductions resulting from implementation of the PCBs Control Measure Plan and the Mercury Control Measure Plan includes several different model components. The methodology is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017). The model components include:

- Baseline Pollutant Loading Model – the baseline pollutant loading model is a continuous simulation[13] hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across Alameda County during the TMDL baseline period (i.e., 2003 – 2005, see BASMAA, 2017). See Section 4.1 for a summary of the baseline model results.
    - Hydrology – this model component produces average annual runoff across Alameda County for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (i.e., imperviousness, underlying soil characteristics, slope, etc.) present within each county for a unit area drainage catchment.
    - Water Quality – the hydrology output is combined with average annual concentrations estimated by the Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM; SFEI, 2018) developed by SFEI to produce average annual PCBs and mercury loading for the period of record.
- GSI Performance Models – GSI performance models were developed to represent load reductions resulting from implementation of GSI.

[13] Continuous simulation models calculate outputs (e.g., runoff) "continuously", i.e., for many time steps over a long-term period of record (e.g., every 10 minutes for 10 years). Long-term "continuous" input data (e.g., hourly rainfall) is required. This is contrasted with design-event simulations which model a single rainfall event, e.g., a 24-hour storm with a 10-year recurrence frequency.

- Source Control Measure Calculations – Calculation methods for estimating load reduction associated with implementation of the source control measures identified in the PCBs Control Measure Plan and the Mercury Control Measure Plan, as established in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020, provided in Appendix D).
- Future Condition (RAA Scenario) Models – the RAA scenario models represent future land use changes and control measure implementation that would result in pollutant load reduction. These include the following (see Section 4.2):
    - Future Land Use – changes to land use as a result of new development and redevelopment and the associated reduction in pollutant loading (i.e., with newer building materials and practices) is represented.
    - Future GSI Performance – the GSI performance model output is applied to areas to be treated by GSI in the future based on the Permittees' Green Infrastructure Plans (see Section 2.1).
    - Source Control Measure Performance – Performance of the source control measures that have been or will be implemented is modeled based on the incidence and location of these control measures.

These components are introduced in the following sections and described in further detail in the Peer Review Package (Appendix E). Third party peer review was undertaken for the baseline model and GSI performance models; documentation of this peer review is provided in Appendix E.

6.1.1 Baseline

The baseline pollutant loading model is a representation of the loading of PCBs and mercury across the County during the TMDL baseline period (i.e., 2003 – 2005, see BASMAA, 2017). The baseline model utilizes an HRU approach to estimate runoff across the County. Generic HRUs, characterized by varying the values of specific identified parameters within a defined representative range, were modeled using USEPA's Stormwater Management Model (SWMM). HRU parameters varied included precipitation and evaporation, slope, underlying soil type (i.e., subsurface infiltration rate) and compaction (i.e., developed versus undeveloped areas), and imperviousness. Continuous simulation HRU models were run on an hourly timestep for the identified baseline period of record (water years [WYs] 2000 – 2009).

An average annual runoff volume per acre was obtained for each HRU through the continuous simulation runs. The average annual runoff volume per acre associated with each specific HRU was multiplied by the area represented by that HRU within the entire area of analysis (i.e., across the county, estimated using geospatial data). Watershed-based drainage routing was accounted for through calibration efforts. Calibration of the generic HRU models was conducted on the average annual discharge volume for WYs 2000-2009, utilizing available stream flow records. The objective of the calibration was to reasonably match the average annual runoff volume for this 10-year period (i.e., within the bounds included in BASMAA (2017). Additional details regarding the calibration efforts are provided in Appendix E.

To obtain pollutant loading, average annual concentrations estimated by the RWSM (SFEI, 2018), for each land use category (i.e., Old Industrial, Old Urban Commercial/Transportation, Old Urban Residential, New Urban, and Open Space) are multiplied by the calibrated average annual runoff volume estimated using the HRU approach. The average annual PCBs and mercury loading for the baseline period of record was validated using available in-stream concentration data, as described in Appendix E.

A flow chart representing the baseline loading model is provided in Figure 6-1 below.

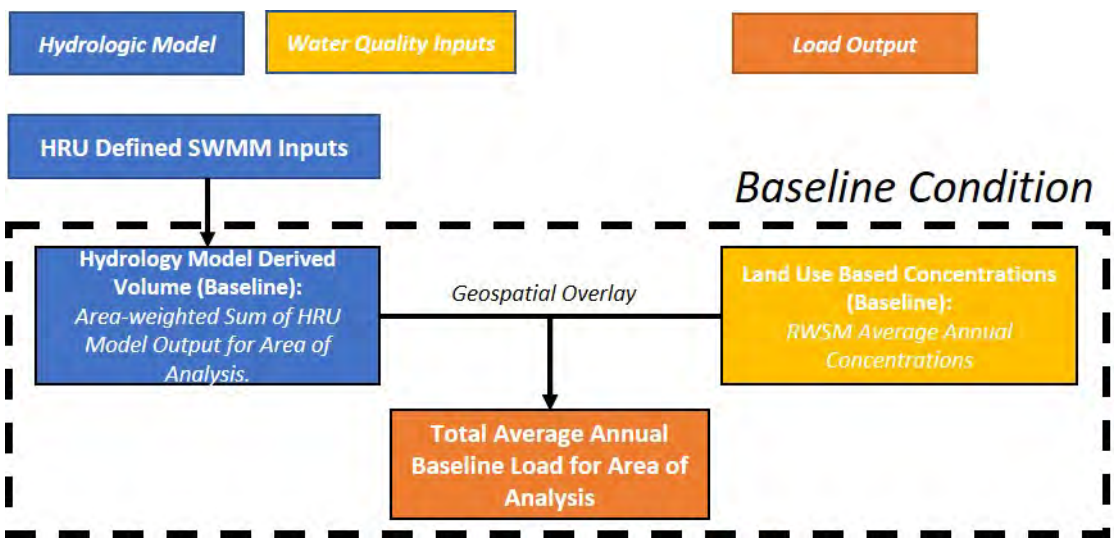

Figure 4-1: Baseline Condition Model Flow Chart

6.1.2 Loads Reduced

Loads reduced from baseline are estimated based on projected land use changes and control measure implementation. To calculate pollutant load reductions associated with land use changes and GSI and source control implementation for future scenarios, the difference between the pollutant loading in the baseline scenario and the total pollutant loading associated with each

future implementation scenario were calculated. Future scenarios included implementation in years 2030, 2040, and beyond 2040. Loads reduced resulting from implementation of control measures are estimated through different methods depending on control measure type. Details relating to load reductions resulting from land use changes versus those from control measures are provided in the following sections.

Load Reduction Resulting from Land Use Changes

Land use-based pollutant loading was based on changes to the land use through new development and redevelopment that has occurred or is projected to occur since the 2003-2005 baseline. To forecast future private development area, ACCWP used the output of UrbanSim,[14] a model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area Metropolitan Transportation Commission (MTC). The UrbanSim modeling system was developed to support the need for analyzing the potential effects of land use policies and infrastructure investments on the development and character of cities and regions. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort.

MTC forecasts growth in households and jobs and uses the UrbanSim model to identify development and redevelopment sites to satisfy future demand. Model inputs include parcel-specific zoning and real estate data; model outputs show increases in households or jobs attributable to specific parcels. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Governments Committees for use in transportation projections and the regional Plan Bay Area development process.

The ACCWP process used outputs from the Bay Area UrbanSim model to map parcels predicted to undergo development or redevelopment in each jurisdiction within Alameda County at the time increments specified in the MRP (2020, 2030, and 2040). The resulting maps were reviewed by Permittee staff for consistency with local knowledge and local planning and economic development initiatives and revised as needed.

If projected new development and redevelopment is assumed to alter the imperviousness of parcels identified for development, the HRU assigned at the parcel scale was revised from the baseline condition to represent the new imperviousness (no other HRU variables would be anticipated to change) in the future condition. Similarly, the overlying RWSM land use category designation was updated from the baseline condition to reflect new land uses from new

[14] http://www.urbansim.com/

development and redevelopment. Updated land use-based pollutant loading was then calculated for the future conditions, using the applicable updated HRU and RWSM land use category assignments.

Load Reductions Resulting from GSI Implementation

Load reduction through implementation of GSI facilities was estimated through the methods described as part of the *Quantitative Relationship between GSI Implementation and PCBs/Mercury Load Reductions Report* (ACCWP, 2018; provided in Appendix E). The POC load reductions through GSI were developed through a combination of hydraulic modeling of GSI facilities combined with empirically derived effluent concentration estimates. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GSI facility and the effluent load. The effluent load is calculated as the proportion of runoff that is treated by the GSI facility multiplied by an effluent concentration. Water quality performance data from selected, representative studies were used to determine a method to predict effluent concentrations in stormwater following treatment through a biofiltration (bioretention or tree well filters) GSI facility. A flow chart representing the GSI load reduction modeling is provided in Appendix E.

GSI implementation levels corresponding to each future implementation scenario were estimated based on GSI Plan projections. The pollutant loading resulting from each of the GSI implementation scenarios was calculated by first applying the updated land use loading. Then, pollutant load reductions resulting from implementation of GSI were applied to identified GSI drainage areas (i.e., both development areas, where land uses are assumed to change, and GSI retrofit areas, where land uses are not assumed to change) to obtain a revised total pollutant loading for those land surfaces. Resulting pollutant loading for areas identified as draining to GSI and areas not draining to GSI were combined geospatially to obtain the pollutant loading associated with each GSI implementation scenario.

Load Reductions Resulting from Implementation of Source Controls

Pollutant load reductions from the source controls described in the implementation plans are incorporated into the RAA scenarios for the TMDL attainment date (i.e., 2030) along with future scenarios for 2040 and beyond 2040. The calculation methods used to estimate load reduction are those described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* (BASMAA, 2020, provided in Appendix D). The resulting load reductions from source controls are combined with the land use and GSI load reduction estimations to get the total estimated load reduction for each future implementation scenario.

6.2 Baseline PCBs and Mercury Loads and Load Reduction Goals

6.2.1 PCBs

Refined PCBs Baseline Load

The results of the RAA baseline modeling for PCBs are presented for Alameda County in Table 6-1 below.

Table 6-1: RAA Model Baseline Loading Estimates – PCBs

RWQCB Region	Above/Below Dam	Permit	Baseline Load Alameda County (kg/yr)
Region 2	Below Dam	**MRP[1]**	**3.74**
		NPDES[2]	0.04
		Phase II[3]	0.45
	TMDL Baseline		***4.23***
	Above Dam	MRP[1]	0.03
		NPDES[2]	0
		Phase II[3]	<0.01
		Total	4.27

[1] Municipal Regional Permit permitted areas, along with IGP facilities and facilities with individual NPDES Stormwater Industrial permits.

[2] Major and Non-Major dischargers with individual NPDES permits. See Appendix F.

[3] Phase II General Permit permittees. See Appendix F.

The countywide baseline load estimated using the RAA model is 4.23 kg/yr. The baseline load estimated for the Permittees after deducting the estimated baseline load for the NPDES dischargers within the County is 3.74 kg/yr. This baseline load is used to establish the PCBs TMDL load reduction goal described below.

TMDL Attainment Load Reduction Goal (2030)

Calculations were conducted to develop the PCBs load reduction goals as described in the *Bay Area RAA Guidance Document* (BASMAA, 2017). The calculation methodology is summarized below.

$$LR_{goal} = \text{Baseline} - \text{WLA (kg/yr)}$$

Where:

LR_{goal} = The load reduction goal (kg/yr)

Baseline = The baseline pollutant loading as calculated through the RAA

WLA = The population-based wasteload allocation for Alameda County

The TMDL population-based wasteload allocation for Alameda County is 0.5 kg/yr. This wasteload allocation must be distributed between the MRP permittees and other permitted stormwater

dischargers (i.e., individual NPDES permittees and Phase II permittees). The wasteload allocations calculated to reflect the relative percentage of the estimated baseline loads are provided in Table 6-2.

Table 6-2: TMDL Wasteload Allocations for Alameda County

Stormwater Discharger within TMDL Baseline Area[1]	Percentage of Baseline Load (%)	PCBs WLA (kg/yr)
MRP Permittees	88%	0.44
NPDES Permittees	1%	0.01
Phase 2 Permittees	11%	0.05
Alameda County	100%	0.5

[1] All SFBRWQCB Region 2, above dams.

Using the calculated Permittee proportion of the WLA and RAA-calculated baseline load, the load reduction goal is estimated to be 3.30 kg/yr (i.e., 3.74 kg/yr – 0.44 kg/yr).

MRP Load Reduction Goal through GI by 2040

The PCBs load reduction required to be achieved through GI by 2040 per MRP Provision C.3.j (i.e., 3 kg/yr MRP area-wide or 0.5 kg/yr for Alameda County) must be adjusted to reflect the RAA-calculated load reduction goal (i.e., 3.30 kg/yr). The MRP load reduction requirement for GI for all Permittees (3 kg/yr) represents 20.8% of the overall load reduction required in the TMDL. Therefore, the adjusted countywide load reduction through GI can be calculated as:

$$LR_{MRP,\ GI,\ 2040} = LR_{goal} * 20.8\%$$

The adjusted countywide MRP PCBs load reduction goal through GSI by 2040 is presented in Table 6-3.

Table 6-3: Adjusted Countywide PCBs Load Reduction Goal through GI by 2040

County	PCBs Load Reduction Goal through GI (kg/yr)
Alameda County	0.69

6.2.2 Mercury

Refined Mercury Baseline Load

The results of the RAA baseline modeling for mercury are presented for Alameda County in Table 6-4 below. The countywide TMDL baseline load estimated with the RAA model is 8.73 kg/yr

Table 6-4: RAA Model Baseline Loading Estimates – Mercury

RWQCB Region	Above/Below Dam	Permit	Baseline Load Alameda County (kg/yr)
Region 2	Below Dam	**MRP[1]**	**8.51**
		NPDES[2]	0.02
		Phase 2[3]	0.20
	TMDL Baseline		***8.73***
	Above Dam	MRP[1]	1.68
		NPDES[2]	0.00
		Phase 2[3]	<0.01
		Total	10.41

[1] Municipal Regional Permit permitted areas, along with IGP facilities and facilities with individual NPDES Stormwater Industrial permits.
[2] Major and Non-Major dischargers with individual NPDES permits. See Appendix F.
[3] Phase II General Permit permittees. See Appendix F.

TMDL Attainment Load Reduction Goal (2028)

The mercury WLA for Alameda County is 20 kg/yr, while the estimated baseline load for the entire county below dams is only 8.73 kg/yr. Thus, the results of the RAA indicate that the TMDL wasteload allocation has been achieved.

MRP Load Reduction Goal through GI by 2040

The mercury load reduction required to be achieved through GSI by 2040 per MRP Provision C.3.j is 10 kg/yr MRP area-wide (3.13 kg/yr for Alameda County). This represents 2.5% of the TMDL baseline load of 127.7 kg/yr for the Alameda County MRP area. Applying this percentage to the adjusted baseline from the RAA model, an adjusted GSI goal would be 0.21 kg/yr for Alameda County (i.e., 8.51 kg/yr x 0.025 = 0.21 kg/yr).

6.3 Estimate of Loads Reduced

6.3.1 Loads Reduced – PCBs

The total estimated annual PCBs loads reduced through implementation of control measures by 2020, 2030, 2040, and beyond 2040 is provided in Table 6-5.

Table 6-5: Summary of PCBs Load Reductions Achieved through Control Measure Implementation

Control Measure	PCBs Load Reduction (kg/yr) by:			
	2020	2030	2040	2090
Source Property Identification and Abatement	0.29	0.49	0.55	0.55
PCBs in Building Materials Management	0.63	0.63	0.63	0.63
PCBs in Electrical Utilities Management	0.12	0.20	0.27	0.34
PCBs in Infrastructure	0	0.01	0.03	0.06
Green Stormwater Infrastructure	0.23	0.38	0.60	1.50
Full Trash Capture Treatment Control Measures	0.14	0.22	0.22	0.22
Enhanced Operations and Maintenance	0.0002	0.0002	0.0002	0.0002
Diversion to POTW	0.001	0.001	0.001	0.001
Total Load Reduced	**1.41**	**1.93**	**2.30**	**3.30**
Load Reduction Goal	**3.30**	**3.30**	**3.30**	**3.30**
Remaining Load to be Reduced	**1.89**	**1.37**	**1.00**	**0**

PCBs TMDL Attainment (2030)

As can be seen in Table 6-5, the required load reduction to achieve the TMDL (3.30 kg/yr) is not met by the TMDL compliance date of 2030. Assuming the annual average load reduction estimated between 2020 and 2040 for GSI is extended past 2040, the PCBs TMDL load reduction goal would be achieved by 2090.

An analysis of scenarios to achieve the TMDL wasteload allocation by 2030 is provided in Appendix G. The results of these analyses show that it is technically and economically infeasible to achieve the TMDL wasteload allocation by 2030.

MRP GSI Load Reduction Goal (2040)

The estimated PCBs load reduced through implementation of GSI by 2040 is 0.60 kg/yr (Table 6-5). As discussed in Section 6.1.3, the RAA-adjusted goal is 0.69 kg/yr, thus there is a predicted 0.09 kg/yr deficit. Extrapolating the average annual increase in load reduction through GSI predicted to occur from 2020 – 2040, the MRP PCBs GSI load reduction goal would be achieved by 2045.

Public GSI retrofit opportunities that have the highest potential to reduce PCBs loads are concentrated within a small subset of Alameda Permittee area due to the pattern of pre-1980 industrial development within the region. Conversely, many Alameda Permittees have no or very few opportunities to contribute significantly toward achievement of countywide PCBs loading reductions via implementation of GSI in their communities. Further, if load reductions are not

achieved on a regional or countywide scale, and load reductions are allocated at a local level (by population), these Permittees would not be able to achieve those load reduction allocations due to a lack of opportunity.

Thus, given these findings, the Alameda Permittees, collectively, believe that a countywide strategy would be the best way to achieve the PCBs load reduction goals in a more efficient and effective manner. For the purposes of creating their local GI Plans, Alameda Permittees have prioritized their GSI projects based on achieving other multiple benefits. These other benefits include controlling other stormwater pollutants, preserving and enhancing local stream hydrology, reducing localized flooding, helping communities adapt to climate change by increasing the resiliency of water supply, ancillary benefits that derive from adding landscaped areas within the urbanized environment, and mitigating the urban heat island effect.

6.3.2 Loads Reduced – Mercury

The total estimated mercury loads reduced through implementation of control measures by 2020, 2030, 2040, and 2080 is provided in Table 6-7. Note that these estimated load reductions do not account for loads reduced by the Mercury Load Avoidance and Reduction source control measure. ACCWP will continue to annually compile and report the number of mercury-containing products collected at household hazardous waste facilities. Translation of that collection information to loads reduced from urban stormwater discharges is challenging and may not be necessary to show attainment of the mercury TMDL.

Table 6-6: Summary of Mercury Load Reductions Achieved through Control Measure Implementation

Control Measure	Hg Load Reduction (kg/yr) by:			
	2020	2030	2040	2080
Green Stormwater Infrastructure	0.18	0.25	0.33	0.41
Full Trash Capture Treatment Control Measures	0.22	0.31	0.31	0.31
Enhanced Operations and Maintenance	0.00	0.00	0.00	0.00
Diversion to POTW	0.003	0.003	0.003	0.003
Total	**0.40**	**0.56**	**0.65**	**0.72**
Load Reduction Goal via GI in MRP 2	**3.13**	**3.13**	**3.13**	**3.13**
Remaining Load to be Reduced via GI	**2.73**	**2.57**	**2.48**	**2.41**

Mercury TMDL Attainment (2028)

As is stated in Section 6.2.2 above, mercury WLA for Alameda County is 20 kg/yr, while the estimated baseline load for the entire county below dams is only 8.73 kg/yr. Thus, the results of the RAA indicate that the TMDL wasteload allocation has been achieved.

MRP Load Reduction Goal through GSI (2040)

The estimated mercury load reduction by 2040 through GSI (0.33 kg/yr) is predicted to achieve the adjusted MRP load reduction goal for GSI by 2040 (0.21 kg/yr).

6.3.3 Uncertainty Analysis

As summarized in the RAA Guidance Document (BASMAA, 2017), according to USEPA's Guidance on the Development, Evaluation, and Application of Environmental Models (USEPA, 2009), model uncertainty describes the lack of knowledge about models, parameters, constants, data, and beliefs. The USEPA Model Guidance identifies two types of uncertainty related to models: model framework uncertainty, related to the scientific soundness of the model, and data uncertainty, arising from measurement errors, analytical imprecision, and limited data sample sizes. The methods and assumptions used for the analysis and described in detail in the appendices were developed with consideration of available data. The methods for developing baseline loading and GSI load reduction estimates went through a rigorous third-party peer review process. The source control load reduction calculations methods presented in Appendix D have been accepted by the SFBRWQCB. Therefore, the methods are reasonably rigorous given the data and resources available, and the primary source of uncertainty for these computational methods is expected to be data uncertainty.

The USEPA Model Guidance (USEPA, 2009) describes the three components that affect data uncertainty:

- Accuracy – the closeness of a measured or computed value to its "true" value.
- Variability – data differences arising from true heterogeneity or diversity in model parameters and their underlying input datasets.
- Precision – the quality of being reproducible in outcome or performance.

Due to natural variability, data limitations affect both accuracy and precision, resulting in higher data uncertainty. Because of this, data limitations will also inform the complexity of the model.

In addition, as indicated in the USEPA RAA Guide (USEPA, 2017), calibration and validation can be used to manage model uncertainty, though data limitations will still cause uncertainty in

model output. Because of this, the USEPA RAA Guide suggests that it is important to update RAA modeling tools over time as additional data become available.

Other components of uncertainty that cannot be addressed through the methods summarized in this document are pollutant degradation and changes in larger-scale processes that are difficult to predict. Degradation is the process of natural reduction in pollutant concentration, which is anticipated to occur over time as a result of numerous factors present in the watershed. A component of degradation which lends itself to uncertainty is the reduction of PCBs as a source. PCBs are a legacy pollutant in the environment, as they have not been in production for almost 40 years and the allowable uses have been mostly phased out and should be further reduced over time until they are eliminated. Therefore, the load of PCBs that is currently available for transport and conveyance in the MS4 can only be degraded and removed, not added to.

It is anticipated that PCBs as a source will diminish over time as a result of source control activities, as well as natural dispersion and degradation processes, which is not captured by the load reduction estimation methods. Little information is known about these processes, thus insufficient information is available to develop a methodology for accounting for degradation and source reduction in the watershed. Because of this, degradation overtime could account for a considerable amount of uncertainty in the future condition, particularly in the anticipated concentrations in urban runoff and land use-based pollutant load assumptions. The Permittees may consider degradation and source reduction in the future as more information becomes available.

Additional uncertainty is associated with changes in large-scale processes. These include physical phenomena, such as effects of climate change, long-term meteorological patterns, and large seismic events. These can also include economic or socio-economic and political shifts, which may occur as a result of physical phenomena or other factors, such as that experienced in 2020, the COVID-19 pandemic.

Major changes in large-scale processes can impact the actuality of some of the assumptions in the pollutant loading model as well as the future implementation scenarios. These may include changes to total area contributing to loading, for example as a result of sea level rise; changes to annual loading due to increases or decreases in average annual stormwater runoff volume, as a result of precipitation or flooding changes caused by long-term meteorological patterns and/or climate change; or changes to loading and/or redevelopment rates as a result of a seismic event. Economic or socio-economic impacts and political shifts can also affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation. The examples provided represent just a small

fraction of the range of possibilities; many of these large-scale phenomena are very challenging to predict. As such, they are even more difficult to model and, in many cases, represent scenarios that may not happen and/or the timeframe for when they happen cannot be estimated. These types of large-scale phenomena can be considered for incorporation into periodic RAA updates when they occur.

7 Conclusions

7.1 PCBs and Mercury Control Measures

ACCWP Permittees recommend a programmatic approach for reducing PCBs and mercury loads from urban stormwater discharges, whereby compliance is assessed based on implementing and documenting a regionally agreed-on program of control measures, which include:

- Source property identification and abatement,
- Management of PCBs in building materials during demolition,
- Management of PCBs in electrical utility equipment,
- Management of PCBs in bridge structures during replacement,
- Mercury load avoidance and reduction,
- Green stormwater infrastructure (GSI),
- Full trash capture devices, and
- Enhanced operation and maintenance, such as enhanced inlet cleaning.

7.2 Implementation Schedule

The RAA results predict that the PCBs TMDL wasteload allocation will be achieved in Alameda County by the year 2090.

7.3 Evaluation of Costs

The estimate of public agency costs for implementing the PCBs and mercury control measures ranges from $400,000,000 to $1,000,000,000 countywide. The estimated cost for implementing source control programs is negligible in comparison to the estimated costs for implementing GSI measures. An analysis of cost effectiveness demonstrates that source control measures are much more cost efficient than treatment control measures at reducing loads of PCBs in urban runoff.

7.4 Reasonable Assurance Analysis

This TMDL Implementation Report presents an estimate of the load reductions resulting from PCBs and mercury control programs, along with an objective assessment of how inherent uncertainties affect forecast outcomes. It is important to emphasize that the projected pace of control measure implementation and the resultant predicted load reductions are based on current and projected business practices, which are subject to change. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing

increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

7.4.1 PCBs

The reasonable assurance analysis shows that, based on current assumptions, the load reduction needed to achieve the PCBs wasteload allocation assigned to Alameda County Permittees would not be achieved until well after 2030. The RAA estimates that the PCBs TMDL wasteload allocation would be achieved by 2090. Analysis provided in Appendix G shows that it is technically and economically infeasible to achieve the TMDL wasteload allocation by 2030.

The reasonable assurance analysis predicts that the MRP PCBs GSI load reduction goal would be achieved by 2045. Public GSI retrofit opportunities that have the highest potential to reduce PCBs loads are concentrated within a small subset of Alameda Permittee area due to the pattern of pre-1980 industrial development within the region. Conversely, many Alameda Permittees have no or very few opportunities to contribute significantly toward achievement of countywide PCBs loading reductions via implementation of GSI in their communities. Further, if load reductions are not achieved on a regional or countywide scale, and load reductions are allocated at a local level (by population), these Permittees would not be able to achieve those load reduction allocations due to a lack of opportunity. Given these findings, the Alameda Permittees, collectively, believe that a countywide strategy would be the best way to achieve the PCBs load reduction goals in a more efficient and effective manner.

7.4.2 Mercury

The results of the RAA indicate that the TMDL wasteload allocation has been achieved and the estimated mercury load reduction by 2040 through GSI is predicted to achieve the adjusted MRP load reduction goal for GSI.

7.4.3 Uncertainty

Uncertainty in the reasonable assurance analysis include factors related to pollutant degradation and changes in larger-scale processes that are difficult to predict. PCBs are a legacy pollutant in the environment, as they have not been in production for almost 40 years and the allowable uses have been mostly phased out and should be further reduced over time until they are eliminated. Therefore, the load of PCBs that is currently available for transport and conveyance in the MS4 can only be degraded and removed, not added to. The load reduction estimation methods do not capture the diminishing of PCBs over time as a result of source control activities, as well as natural dispersion and degradation processes.

Large-scale processes, such as climate change, long-term meteorological patterns, large seismic events, economic or socio-economic and political shifts, which may occur as a result of physical phenomena or other factors, such as that experienced in 2020, the COVID-19 pandemic also introduce uncertainty into the analysis.

The examples provided represent just a small fraction of the range of possibilities; many of these phenomena are very challenging to predict. As such, they are even more difficult to model and, in many cases, represent scenarios that may not happen and/or the timeframe for when they happen cannot be estimated.

8 References

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APPENDIX A

Source Area Investigation Guidance

Source Area Investigation and Abatement Guidance

Process to Conduct Source Area Investigations during MRP 3.0

Background

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

Source Area Investigation Process

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

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D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
    - No evidence of current or historical use of PCBs; and,
    - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
    - There may be evidence of current or historical use of PCBs; and/or
    - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
    - There is evidence of current or historical use of PCBs; and/or
    - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all stormwater samples is less

than 500 ng/g[1], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

    - Electrical equipment associated with PCBs (e.g., transformers and capacitors);
    - Old equipment with hydraulic fluids;
    - Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;

[1] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).
- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).
- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX B

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

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- Ryan Pursley, Chief Building Official, Building Division, City of Concord
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- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

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Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
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PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

Attachment B PCBs in Priority Building Materials Screening Assessment Form B-1

Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

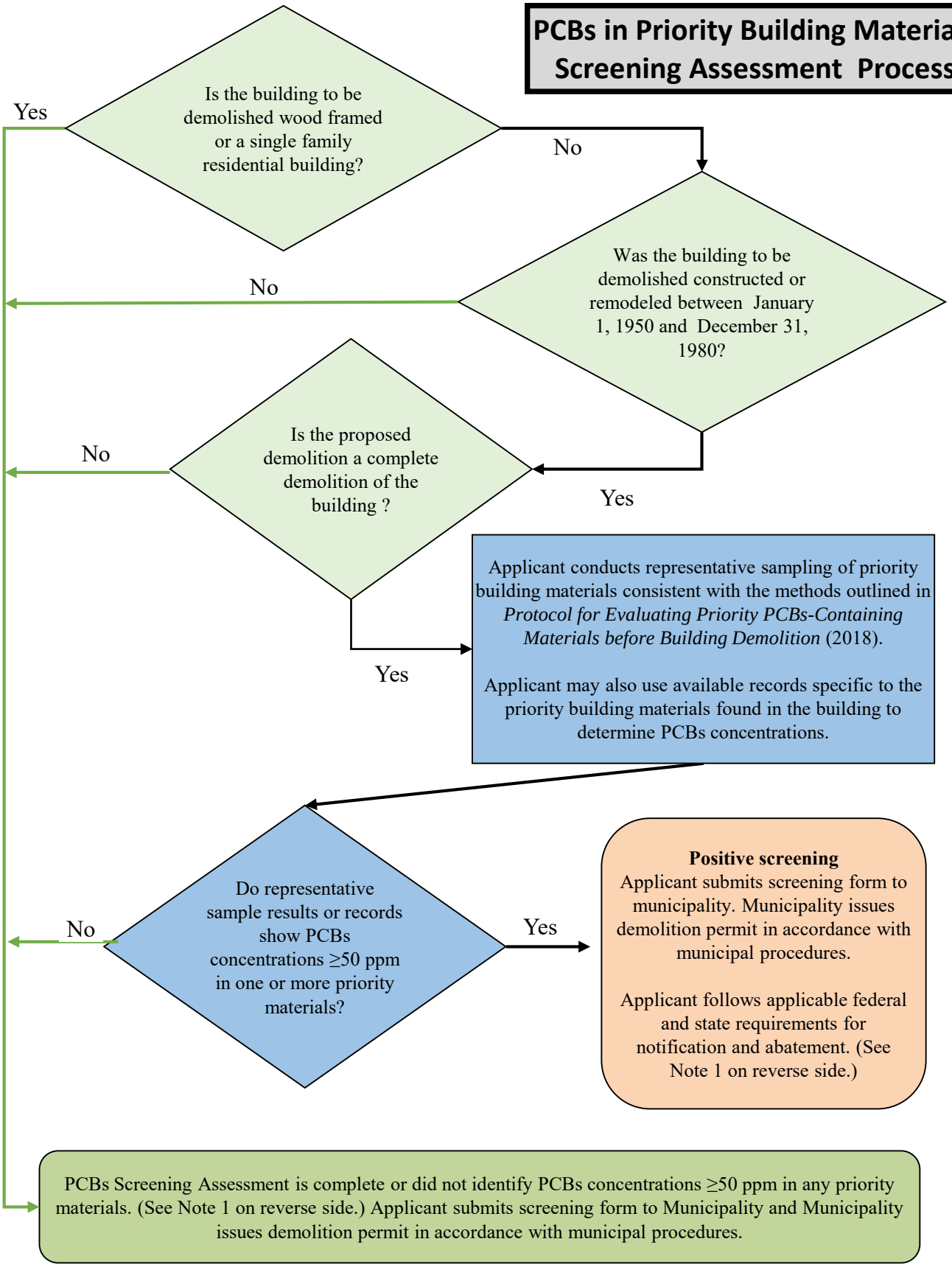

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

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Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

---

[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

---

[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

---

[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	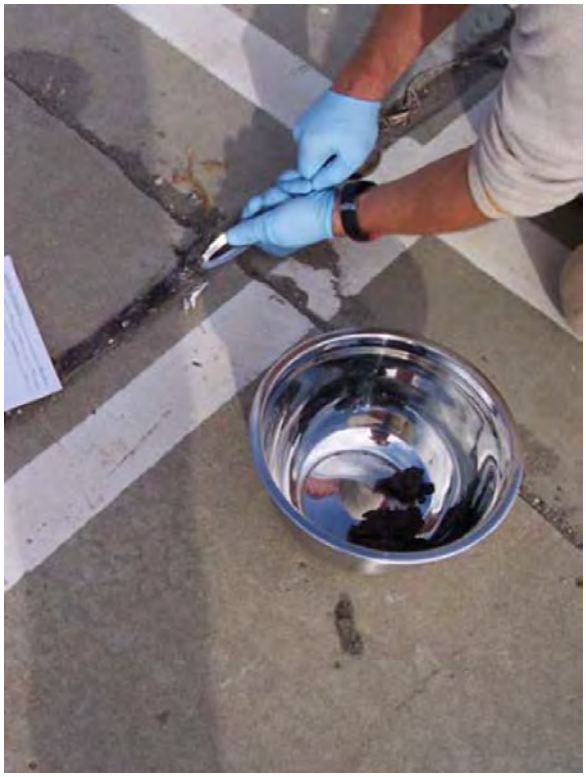
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7

<u>Thermal Insulation</u>:

Damaged felt-style thermal insulation.

Photograph 8

<u>Thermal Insulation</u>:

Exposed/damaged fiberglass insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	

Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

APPENDIX C

ACCWP Green Infrastructure Cost Estimation Methodology Memo

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Memorandum

Date:	December 10, 2018
To:	Jim Scanlin, Alameda Countywide Clean Water Program
Copies to:	Laura Prickett, Horizon
From:	Lisa Austin, Principal; Kelly Havens, Senior Engineer; and Brian Rowley, Senior Engineer
Subject:	Green Infrastructure Cost Estimation Methodology Geosyntec Project Number: WW2127

1. INTRODUCTION

This memorandum provides a simple methodology for estimating green infrastructure capital (design and construction) and operations and maintenance (O&M) costs for use in green infrastructure (GI) planning.

To develop the methodology, GI facility cost data were gathered from several sources within the San Francisco Bay Area and Southern California to develop relationships between project size (tributary shed area) and total capital cost (construction and design). Likewise, O&M cost data were gathered from these sources, as well as through literature review.

2. COST ESTIMATE METHODOLOGY OVERVIEW

2.1 Projects Reviewed

Geosyntec assessed available cost information for 51 constructed projects, as follows:

- Ten projects constructed as part of the Caltrans BMP Retrofit Pilot Program;
- Fifteen projects constructed in the following California jurisdictions:
    - City of Concord,
    - City of El Cerrito,
    - City of La Mesa,
    - City of Los Angeles,
    - City of Oakley,
    - City of Pittsburg,

  - City of San Diego,
  - Union City, and
  - Unincorporated Contra Costa County;
- Six projects constructed as part of the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Project (BASMAA, 2017); and
- Twenty constructed projects from Enhanced Watershed Management Plans (EWMPs) located in Southern California.

2.2 Cost Estimation Project Categories

Construction costs vary by facility type and project location. For example, green street projects often include ancillary construction costs associated with retrofitting the existing right-of-way and therefore are often relatively more expensive than other project types per unit area treated. Regional facilities have greater tributary areas and thus often have reduced costs per acre treated given fixed mobilization costs.

Information on facility type and location was used to group the projects into three cost estimation project categories: Green Street, Distributed Green Infrastructure, and Regional Stormwater Control. The following facility types that were included in each category include:

- Green Street: Projects built within the right-of-way, which include curb cutting and other costs associated with street retrofits. The treatment control measures may include infiltration trenches, bioretention, and infiltration galleries.

- Distributed Green Infrastructure: Biofilters, swales, infiltration strips, and bioretention installed within a parcel to treat runoff generated on that parcel.

- Regional Stormwater Control: Infiltration basins, large storage facilities, and treatment wetlands installed to treat runoff from a larger drainage area.

Projects with significant subsurface components were removed from the analysis for the Green Streets and Distributed Green Infrastructure categories due to large variances in overall trends. Subsurface green infrastructure work often involves shoring, utility relocations, and unforeseen costs associated with unknown subsurface conditions. These cost impacts did not appear to affect trends in the Regional Stormwater Control category, and thus projects with subsurface treatment facilities were included.

2.3 Source of Cost Data

Data sources varied for the projects that are summarized. For instance, for EWMP projects, data was collected from various sources, including the Proposition O monthly progress report from

August 2016 (Bureau of Engineering Prop O Clean Water Division, 2016) and publicly available online information, such as the project fact sheets provided by the City of Los Angeles stormwater program (http://www.lastormwater.org/). For CW4CB and Caltrans, cost data was published as part of Project Reports and "BMP Retrofit Pilot Program", respectively. For municipal projects, information was obtained via communication with relevant city staff.

3. COST ESTIMATE RESULTS

3.1 Design and Construction Cost Estimate

Table 1 below presents unit cost for design and construction, in 2018 dollars, for each project category. When analyzing these cost data, best professional judgment was used to distribute the design and construction costs when the information provided was unclear. If design costs were not available for a project, an estimate for design was inferred from other projects for which such costs were available. From these, the cost of design is approximately 30% of the construction cost.

Table 1: Statistical Summary of Unit Capital Cost for Each Project Category

Project Category	No. of Projects (n)	Unit Capital Cost ($/ac treated) in 2018 Dollars[1]					
		Minimum	25th-percentile	Median	75th-percentile	Maximum	Mean
Green Street	19	$25,000	$70,000	$137,000	$267,000	$1,290,000	$213,000
Distributed Green Infrastructure	21	$16,000	$90,000	$121,000	$176,000	$416,000	$153,000
Regional Stormwater Control	11	$15,000	$25,000	$61,000	$127,000	$427,000	$101,000

[1] Units have been rounded to the nearest $1,000.

3.2 Annual O&M Cost Estimate

Annual O&M costs are intended to account for activities necessary to maintain the effectiveness of a project that recur on a regular basis, such as routine maintenance on an annual basis or repairs following a large storm event. For this cost analysis, annual O&M costs do not include replacement (of portions) or rehabilitation of green infrastructure facilities, which occurs approximately every 20 to 30 years.

Data was compiled from the cost estimation sources listed in Section 2.1., when available, as well as from a literature review of reports and studies. Additionally, interviews were conducted in May and June of 2017 [City of Tacoma, Washington (J. Knickerbocker, personal communication, June 1, 2017, and the City of Portland, Oregon (M. Juon, personal communication, May 30, 2017)]. Sources of O&M data are summarized in Table 2.

For planning purposes, annual O&M costs are often assumed to be a percentage of the capital (design and construction) costs. As shown in Table 2 below, annual O&M costs range from approximately 1% to 6% of the capital costs, with an average of 4% of capital cost for the data sources reviewed.

Table 2: Comparison of O&M Cost Estimates

Source	Cost Estimation Category	O&M Annual Cost Factor (Percent of Capital Costs)
EWMP	Green Street	3.6 %
EWMP	Distributed GI	1.3 %
EWMP	Regional	1.3 %
City of Tacoma, Interview, 2017	Green Street	1.0 % - 4.6 %
City of Tacoma, Interview, 2017	Regional	5 %
City of Portland, Interview, 2017	Regional	1.5 % - 4.7 %
City of Portland, Interview, 2017	Green street	1.0 % - 3.1 %
Los Angeles Alliance for a New Economy (LAANE) Liquid Assets Report, 2018 (LAANE, 2018)	Not Specified	4.3 %
Comparison of Maintenance Cost, Labor Demands, and System Performance for LID and Conventional Stormwater Management, 2013 (Houle et al., 2013)	Not specified	4.1 % - 6.3 %
Caltrans BMP Retrofit Pilot Program Final Report, 2004 (Caltrans, 2004)	Not specified	3.2 %
EPA Green Streets Municipal Handbook, 2008 (EPA, 2008)	Not specified	5.6 %

3.3 Total Project Cost Estimation

The total cost of a project includes the capital costs and the annual O&M costs over the design life of the project.

$$Total\ Cost = Capital\ Cost + Present\ Value\ O\&M\ Cost$$

The capital cost, which includes both the design cost and the construction cost, is estimated for a new project based upon its cost estimation category and treatment area using the equations provided in Table 2. The annual O&M cost is calculated by multiplying the capital cost by the applicable fixed O&M cost factor of 4%, derived from the sources listed in Table 3. For the purposes of this analysis, a 20-year design life and a 3% inflation rate were used to calculate the total present value of the annualized O&M costs.

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APPENDIX D

BASMAA Source Control Loads Reduction Accounting for RAA Report

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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August 31, 2020

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

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[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

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1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

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As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

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2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

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4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

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LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

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5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

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9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

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APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

A.5 REFERENCES

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APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

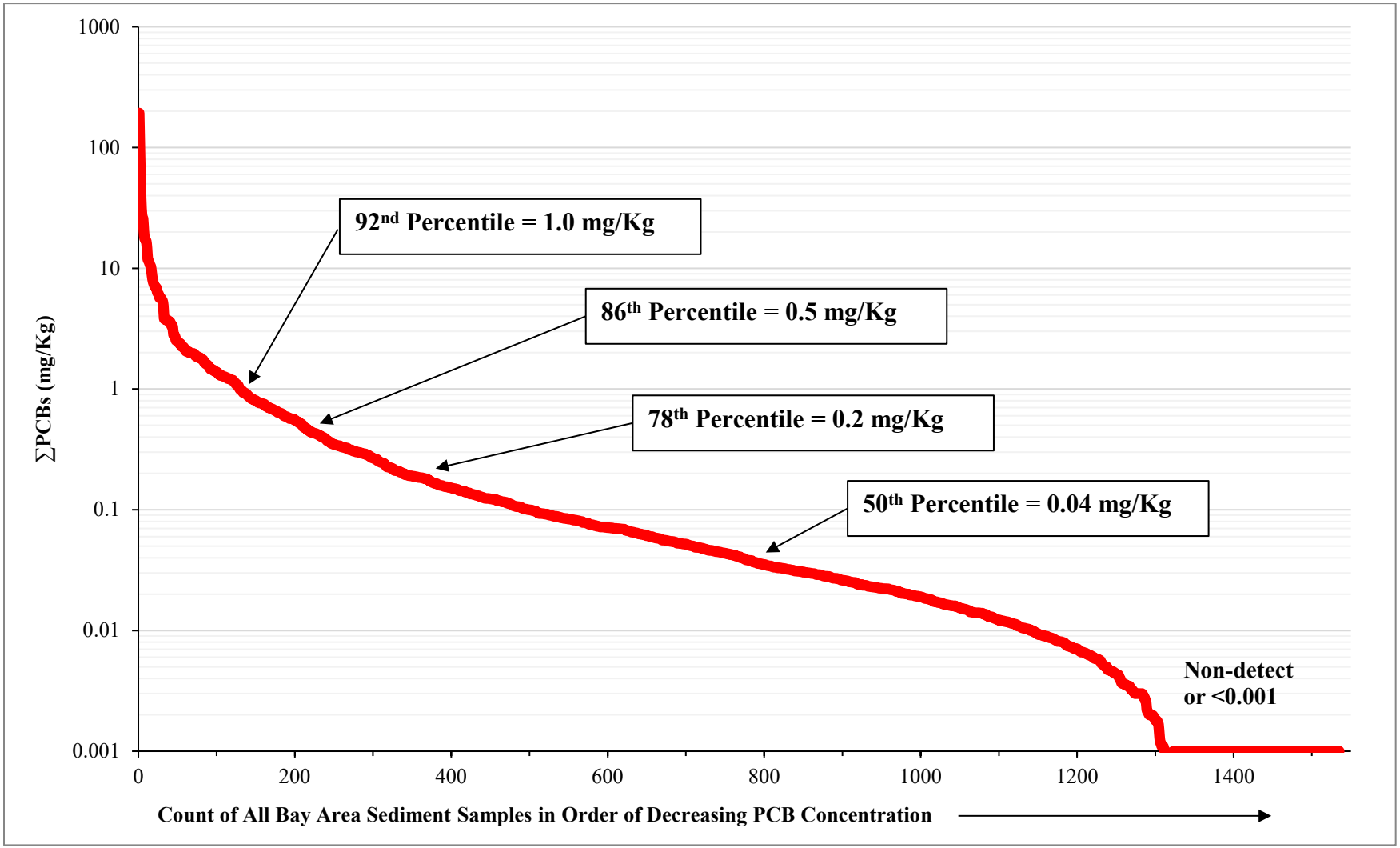

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

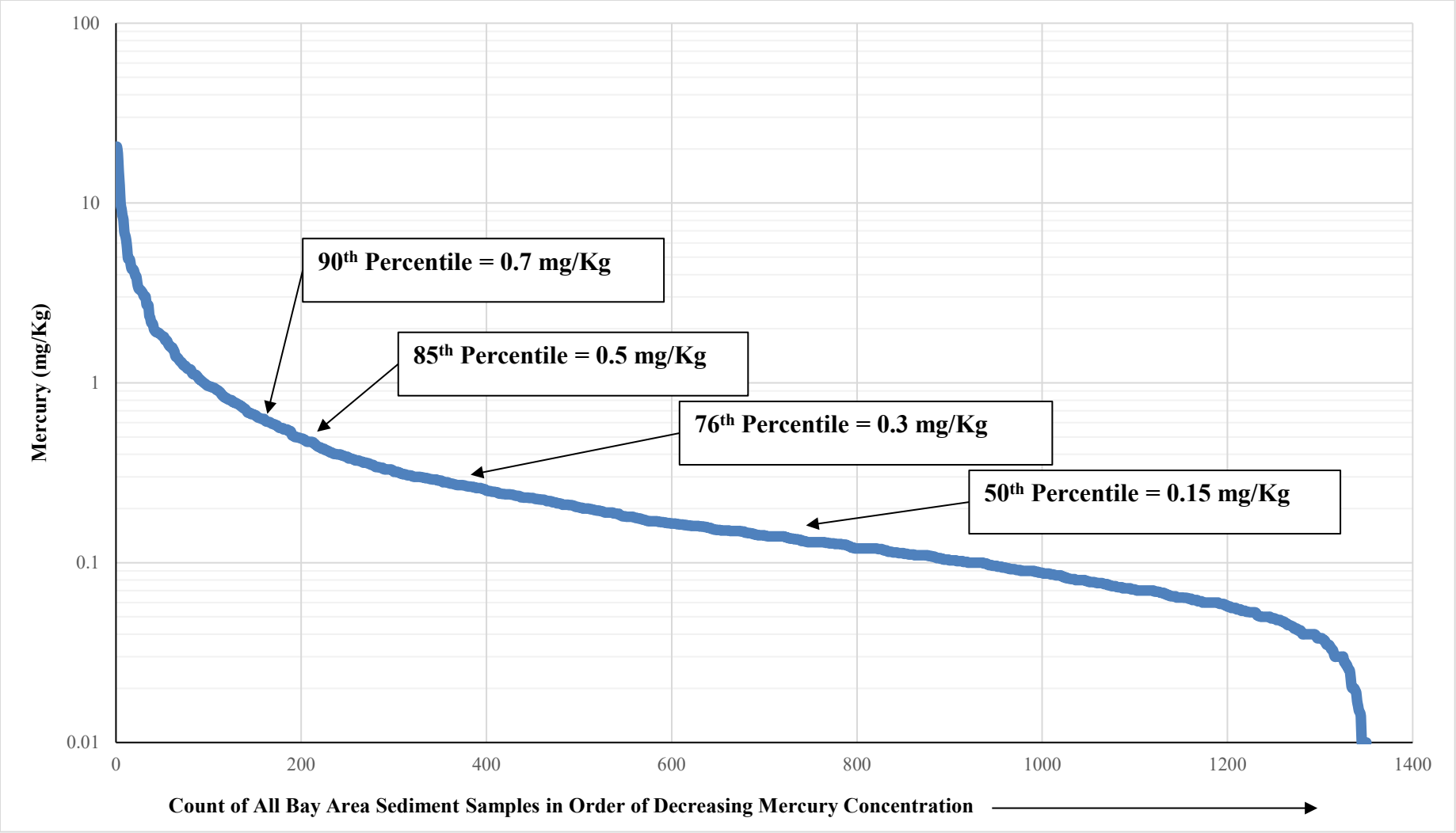

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C
Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

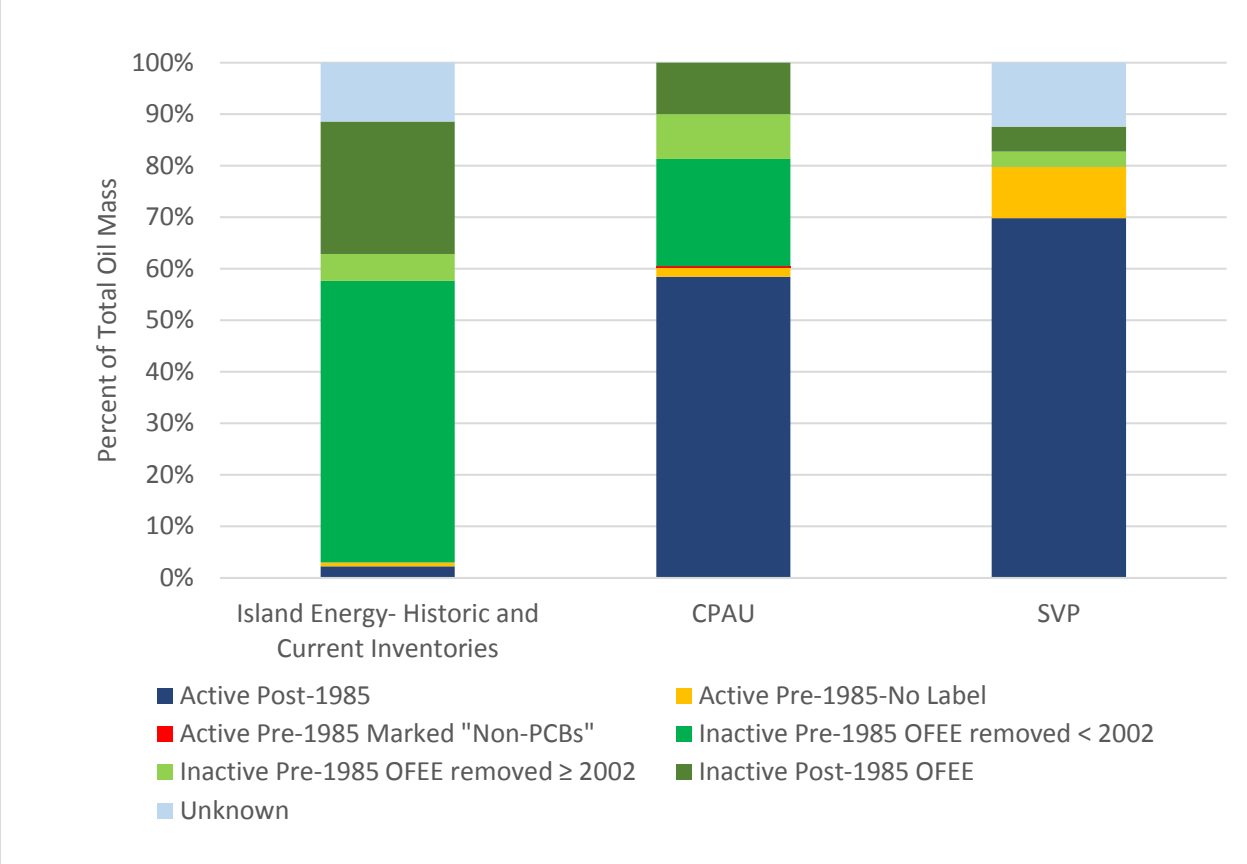

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

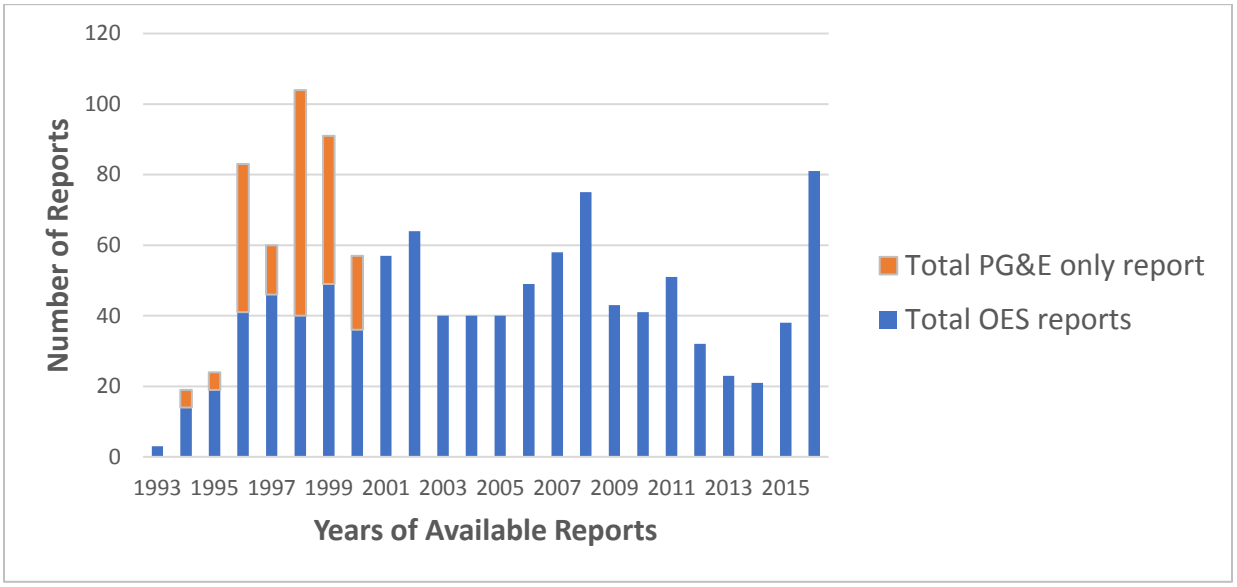

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

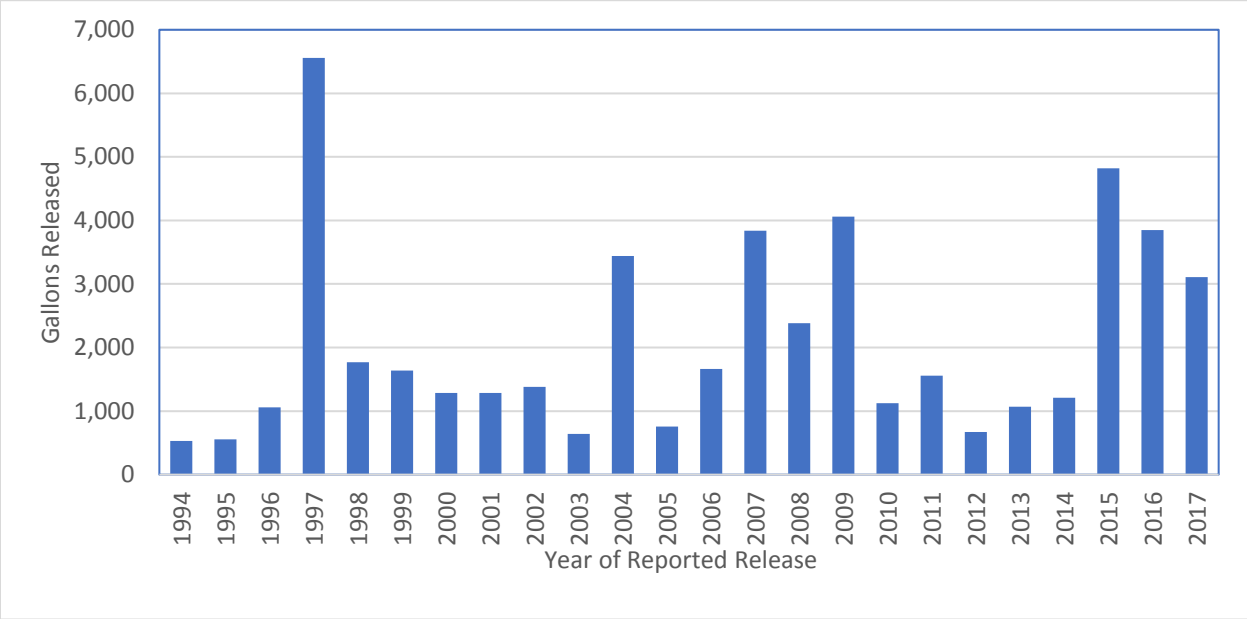

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

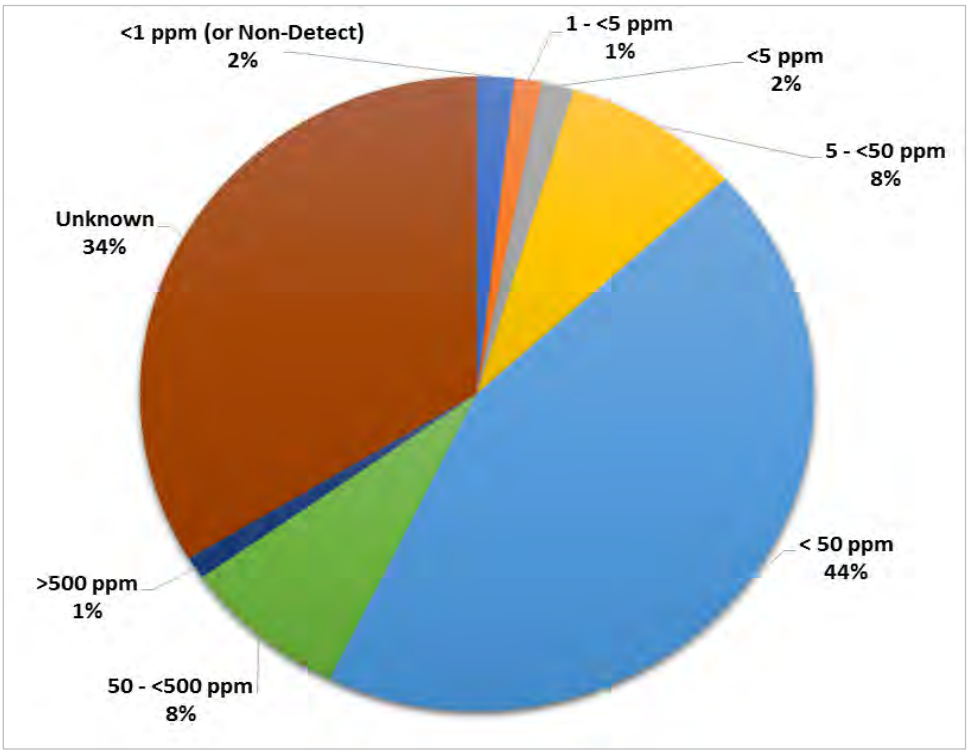

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

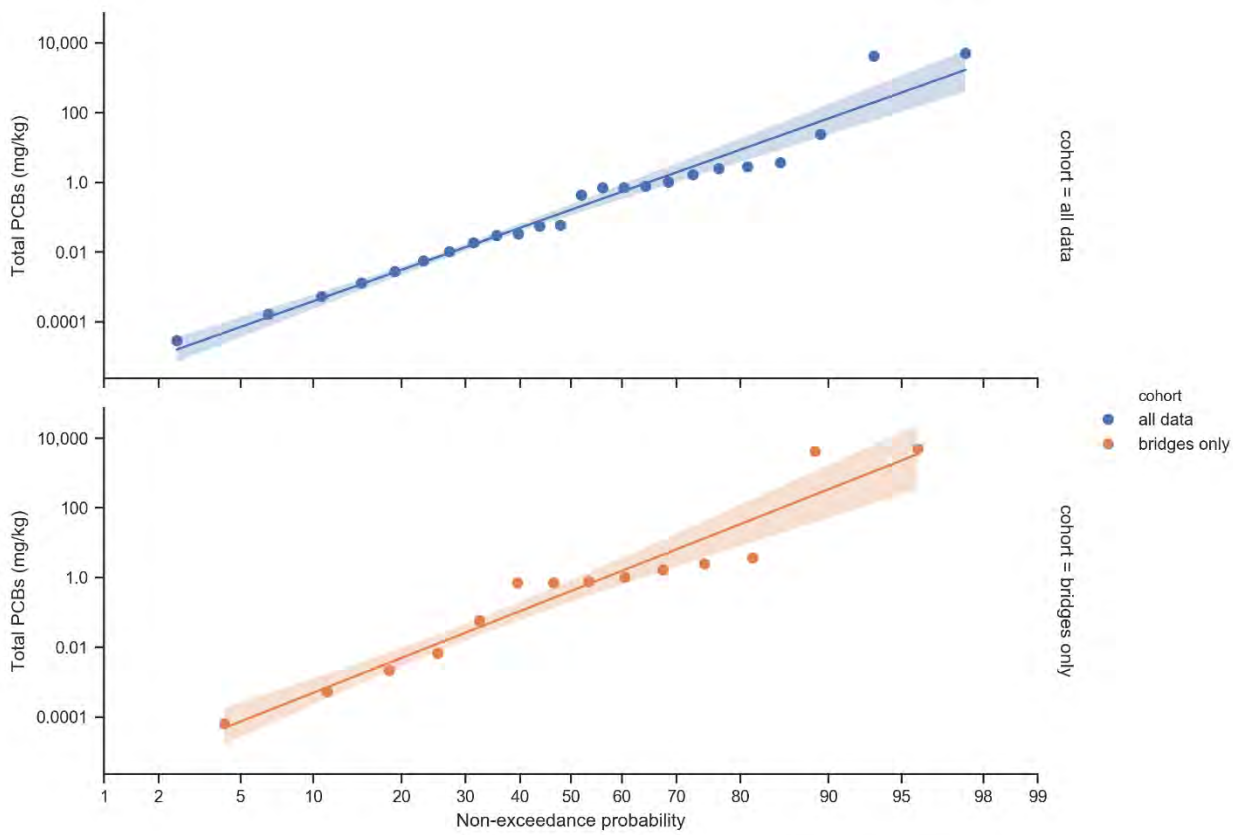

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

03878
3919

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

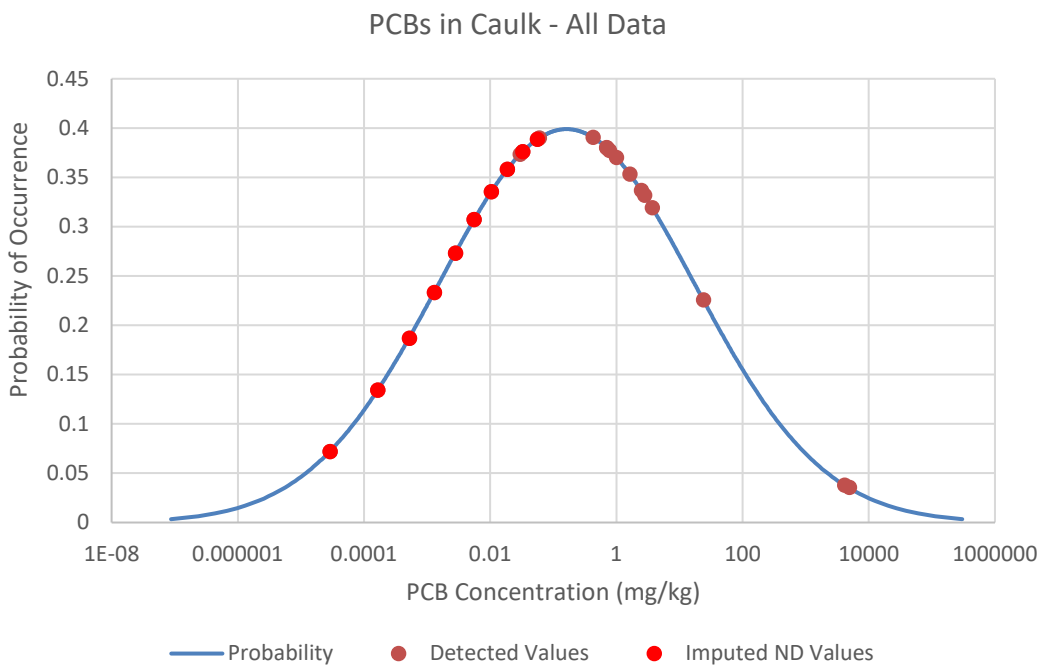

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

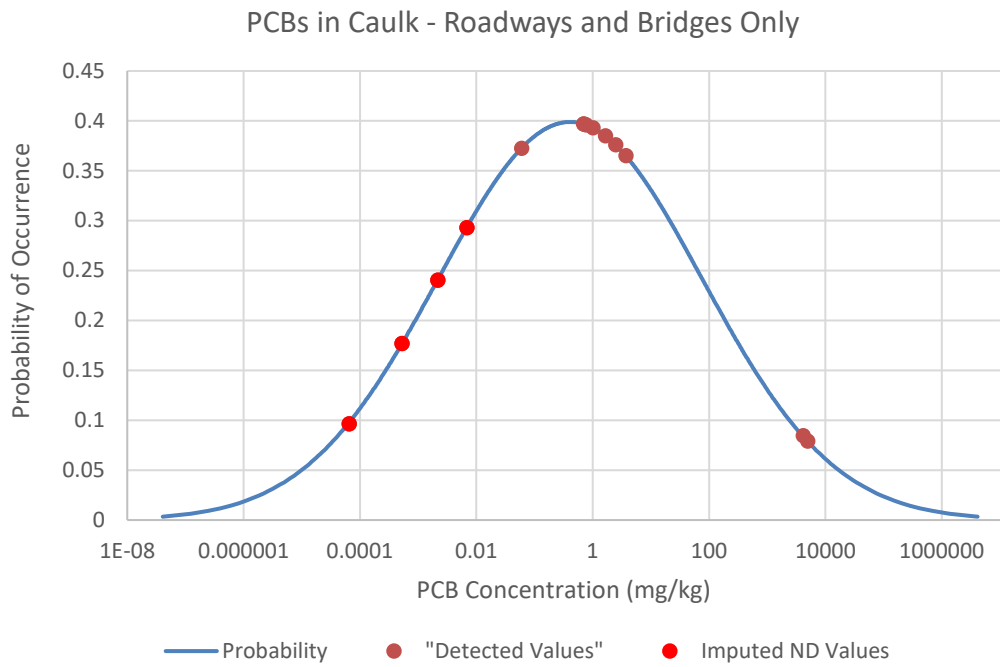

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Takhar, 2013. E-mail titled "RE: 0120T4 SFOBB PCB Survey". Send to Derek Beauduy. 20 November 2013.

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

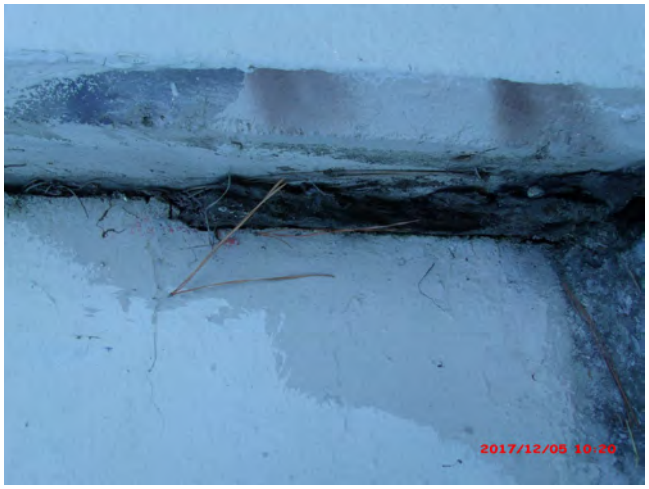

Composite D

Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

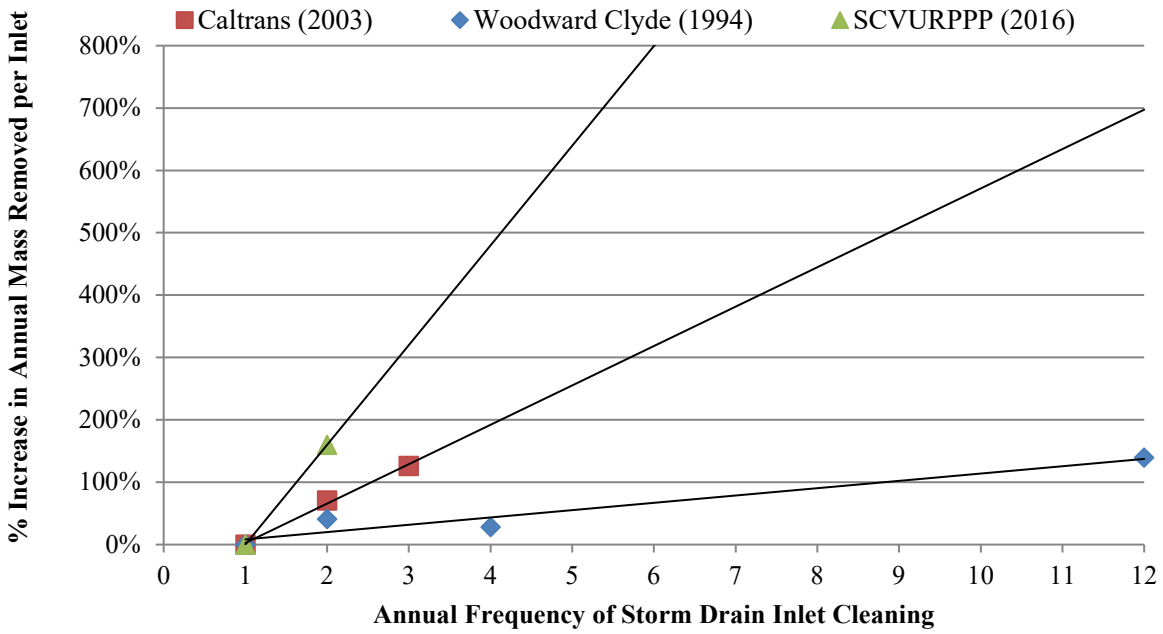

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

BASMAA (2014). San Francisco Bay Area Stormwater Trash Generation Rates - Final Technical Report. Bay Area Stormwater Management Agencies Association. Prepared by EOA, Inc. Oakland. June.

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:

1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:

Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

I.5 References

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APPENDIX E

ACCWP RAA Modeling Report & Peer Review

REASONABLE ASSURANCE ANALYSIS PEER REVIEW PACKAGE

Alameda Countywide Clean Water Program and Contra Costa Clean Water Program

Municipal Regional Stormwater Permit
NPDES Permit No. CAS612008
Order No. R2-2015-0049

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December 11, 2019

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RAA_PeerReviewMatrix_ACCWP_CCCWP_120419_RTC.xlsx

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03909
3950

PR-1: Peer Review Component Descriptions

0. INTRODUCTION

This Peer Review package is intended to provide descriptions and back-up references associated with each model component identified for review in the Peer Review for SF Bay PCBs and Mercury Reasonable Assurance Analyses (RAAs) for Green (Stormwater) Infrastructure Instructions/Guidance to Peer Reviewers (Peer Review Instructions) and "FINAL_RAA_PeerReviewMatrix_Template_8_1_19.xlsx" (Peer Review Matrix), provided by BASMAA (2019). The descriptions herein are repeated or expanded from those included in the Peer Review Matrix, which includes fields that are requested to be populated by the peer reviewer. The descriptions provide summary information regarding the model inputs and/or reference other reports and documentation attached to this Peer Review Package that provide more extensive detail.

The Alameda Countywide Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report (ACCWP, 2018) [PR-2] and the Contra Costa Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report (CCCWP, 2018) [PR-3] (i.e., GI Quantitative Relationship Reports) are frequently referenced throughout this Peer Review package. Note that both GI Quantitative Relationship Reports are very similar, as the same RAA modeling methodology was used for both Counties; often reading one of the two reports will provide the referenced information.

1. BASELINE CONDITION MODELING

1.A Model Selection

Refer to Section 2.1 and 2.2 of the GI Quantitative Relationship Reports [PR-2; PR-3] for an overview of the model selected for the CCCWP and ACCWP RAA baseline condition models.

Rationale: The approach used for modeling hydrology is to use a hydrologic response unit (HRU) approach. An HRU is a unique combination of land surface features (imperviousness, underlying soil characteristics, slope, etc.) which is expected to give a consistent runoff response to rainfall, no matter where that unique combination is found. The HRU approach involves modeling thousands of combinations of land surface features present within the area of analysis, for a generic unit area drainage catchment, and then storing these results in a database. These HRU results can been be scaled geospatially across the entire area of analysis without developing a detailed hydrologic model and this method is appropriate for estimating average annual runoff and pollutant loading. This method is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017).

Spatial/Temporal Resolution: Generic HRUs, characterized by varying the values of specific identified parameters within a defined range, are modeled using USEPA's Stormwater Management Model (SWMM). Continuous simulation HRU models are run on an hourly timestep for the identified baseline period of record (water year [WY] 2000 – 2009). An average annual runoff volume per acre is obtained for each HRU. The average annual runoff volume per acre

associated with a specific HRU can then be multiplied by the area represented by that HRU within the entire area for analysis. The resulting volumes associated with each represented HRU within the area of analysis can then be added together to estimate the total average annual runoff volume.

Alignment with Information/Needs/Data Available: The HRU approach is consistent with the *Bay Area RAA Guidance Document* and the precision of the methods used to develop the TMDLs. As the TMDL WLA and MRP requirements are in terms of annual load reduction, event-specific modeling results are not needed. Additionally, long-term continuous simulation modeling allows for effects such as those relating to antecedent conditions (e.g., soil saturation resulting from back-to-back storms) to be incorporated into the results. Finally, detailed storm drain information is not currently available for all areas within the area of analysis, so it is not possible to develop a detailed routing model at this time.

A flow chart representing the Baseline Loading Model is provided:

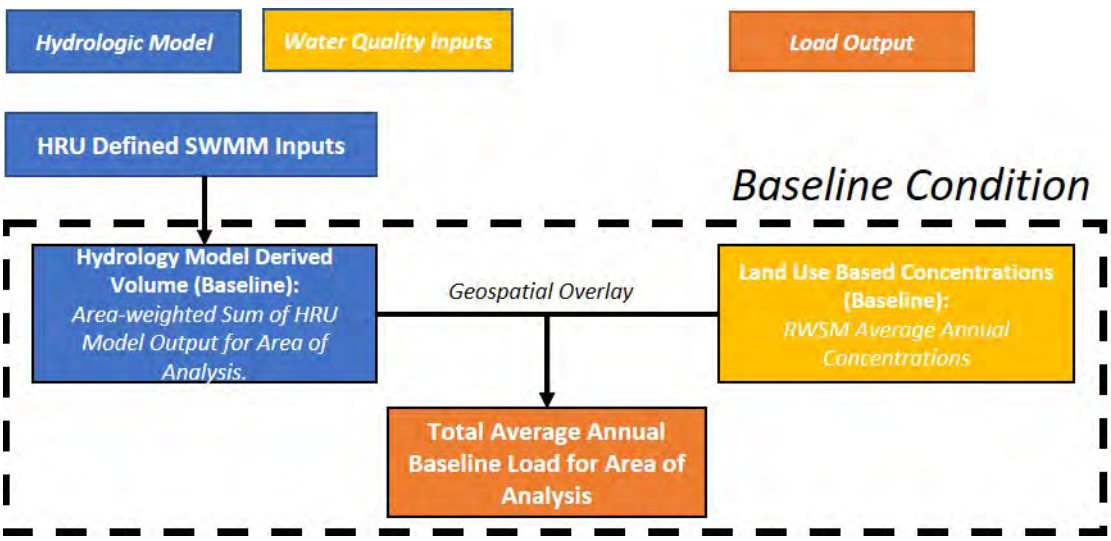

Figure 1-1: Baseline Condition Model Flow Chart

1.B Geographic Area of Analysis

The geographic area of analysis includes the entire area within Contra Costa and Alameda Counties, as shown in Exhibits 1 through 6 of the GI Quantitative Relationship Reports [PR-2; PR-3]. Note that the Counties are not labeled in PR-2 and PR-3; Contra Costa County is north of Alameda County. While the entire area is modeled, baseline results are ultimately subdivided based on regulatory (i.e., MRP covered areas vs. Phase II and Industrial General Permit covered areas) and jurisdictional boundaries. Modeled areas and jurisdictional boundaries are shown in Figure PR-1A and Figure PR-1B for Alameda and Contra Costa Counties, respectively.

1.C Period of Time

Baseline period of record is WY 2000 – 2009 (i.e., October 1, 1999 through September 30, 2009), as documented in the GI Quantitative Relationship Reports [PR-2; PR-3], see section 3.1.1. As included in the RAA Guidance Document (BASMAA, 2017), "For the purposes of RAA analyses, the baseline period for both PCBs and mercury analyses is recommended to be water years 2000

– 2009 (for long-term continuous simulation), or water year 2002 (for representative year simulation). These baseline period options are generally representative of the period during which much of the data were collected for mercury and PCBs." Also see additional detail in item 1.I "Meteorology".

1.D Flows and Pollutant Load Simulation

Section 2.2 of the GI Quantitative Relationship Reports [PR-2; PR-3] describes flow and pollutant load simulation. Refer to Section 2.2.2. of the GI Quantitative Relationship Reports [PR-2; PR-3] specifically for information regarding the water quality model.

1.E Rainfall/Runoff Processes

Rainfall/runoff processes are modeled using USEPA SWMM Version 5.1. A summary of the computational methods employed within SWMM to simulate runoff is provided in Section 3.4 of the USEPA SWMM Manual (USEPA, 2015) [PR-4].

1.F Pollutant Loading Variability

Land use variability is accounted for using SFEI's Regional Watershed Spreadsheet Model (RWSM) output, as described in the "Regional Watershed Spreadsheet Model Version 1.0 Results Summary" memo (Geosyntec, 2019a), provided by BASMAA. The results were developed using Wu et al (2017). Also refer to Section 2.2.2. of the GI Quantitative Relationship Reports [PR-2; PR-3] specifically for information regarding the water quality model.

1.G Watershed Characteristics

See Section 3.1.1 and Table 3 of the GI Quantitative Relationship Reports [PR-2; PR-3] for the watershed characteristics that were varied and the ranges of inputs; also see Table 1.H-1 below, which summarizes SWMM parameter input values.

1.H Watershed Hydrology Parameterization

The output of each uniquely parameterized HRU is matched to those geospatial areas with the unique combination of parameter values, as identified with geospatial data. The geospatial data used to develop the ranges of parameters and match geospatial area to the unique HRUs are shown in Exhibits 1 through 6 of the GI Quantitative Relationship Reports [PR-2; PR-3]. Geospatial data sources associated with each parameter are provided within the text of Section 3.1.1 of the reports (also refer to footnotes). Table 1.H-1 below provides SWMM input values not summarized in Table 3 of the GI Quantitative Relationship Reports [PR-2; PR-3].

Table 1.H-1: SWMM Parameter Input Values

Parameter	Description & Source[1]	Unit	Value
Infiltration Model	Controls how infiltration of rainfall into the upper soil zone of subcatchments is modeled in SWMM.	--	Green Ampt, see parameters in Table 1.H-2
Routing Method	Determines the method used to route flows through the system in SWMM.	--	Kinematic Wave
Reporting Time Step	*Model time step input.*	Minutes	5
Dry Weather Time Step	*Model time step input.*	Minutes	240
Wet Weather Time Step	*Model time step input.*	Minutes	5
Routing Time Step	*Model time step input.*	Seconds	30
Flow Path Length	Overland flow path length assumed for sheet flow runoff. Selected default inputs represent typical overland sheet flow path lengths for undeveloped/open space areas and developed/urban areas, respectively.	Feet	500 (Existing non-developed condition; development footprint)
			250 (Proposed developed condition; development footprint)
N-Imperv	Manning's roughness for impervious or pervious surfaces.	--	0.012 (corresponds to smooth concrete)
N-Perv		--	0.25 (corresponds to dense grass)
Dstore-Imperv	Depth of depression storage (i.e., the maximum surface storage provided by ponding, surface wetting, and interception) for impervious and pervious surfaces.	Inches	0.1, 0.075, and 0.05 for slopes of 3%, 7.5%, and 15%, respectively
Dstore-Perv		Inches	0.2, 0.15, and 0.1 for slopes of 3%, 7.5%, and 15%, respectively
%Zero-Imperv	Percent of the impervious area with no depression storage.	%	25
Groundwater	--	-	Not simulated
Snowmelt	--	-	Not simulated

[1] Source of description and selected model input values obtained from USEPA, 2015 unless otherwise indicated.

Soil parameter model input values are provided in Table 1.H-2.

Table 1.H-2: Green-Ampt Soil Parameters

Hydrologic Soil Group	Prevalent Soil Texture Class	Saturated Soil Conductivity (in/hr)		Suction Head[1] (in)	IMD[1] (in/in)
		Existing Condition[1]	Developed Condition[2]		
A	Sand, Loamy Sand	2.5	1.88	2.61	0.34
B	Sandy Loam	0.3	0.23	6.02	0.22
C	Loam	0.15	0.11	10.4	0.13
D	Clay	0.1	0.08	7.4	0.17

[1] HSG A and B estimated based on texture class from Rawls, et al., (1983); HSG C and D estimated through calibration, see the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation" Memo [PR-5].

[2] Determined based on an assumption of 25% reduction of conductivity due to compaction.

The varied input characteristics resulted in a total of 586 unique pervious HRU models, which are defined by the combinations of rainfall zone, ET zone, HSG, and slope. Additionally, a total of 74 impervious HRU types were modeled, defined by the combinations of rainfall zone, ET zone, and slope. The top 15 most dominant pervious HRU's account for about 50% of the study area. The two most dominant pervious HRU types represent 14% of the total study area, and are both <1% developed (developed includes urbanized and agricultural areas).

1.I Meteorology

Rainfall files used for hydrologic model are documented in Table 1 and Evaporation data inputs are documented in Table 2 of the GI Quantitative Relationship Reports [PR-2; PR-3].

1.J Drainage System Representation

Storm drain system routing was not modeled, as an HRU approach was used, as described above. However, large-scale drainage routing was accounted for when conducting model calibration and validation. Model calibration and validation is further described in the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo" (Geosyntec, 2019b) [PR-5].

1.K Model Calibration

Refer to the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo" (Geosyntec, 2019b) [PR-5].

1.L Model Validation

Refer to the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo" (Geosyntec, 2019b) [PR-5].

2. GREEN INFRASTRUCTURE LOAD REDUCTION MODELING

A flow chart showing the development and components of the future condition model is provided.

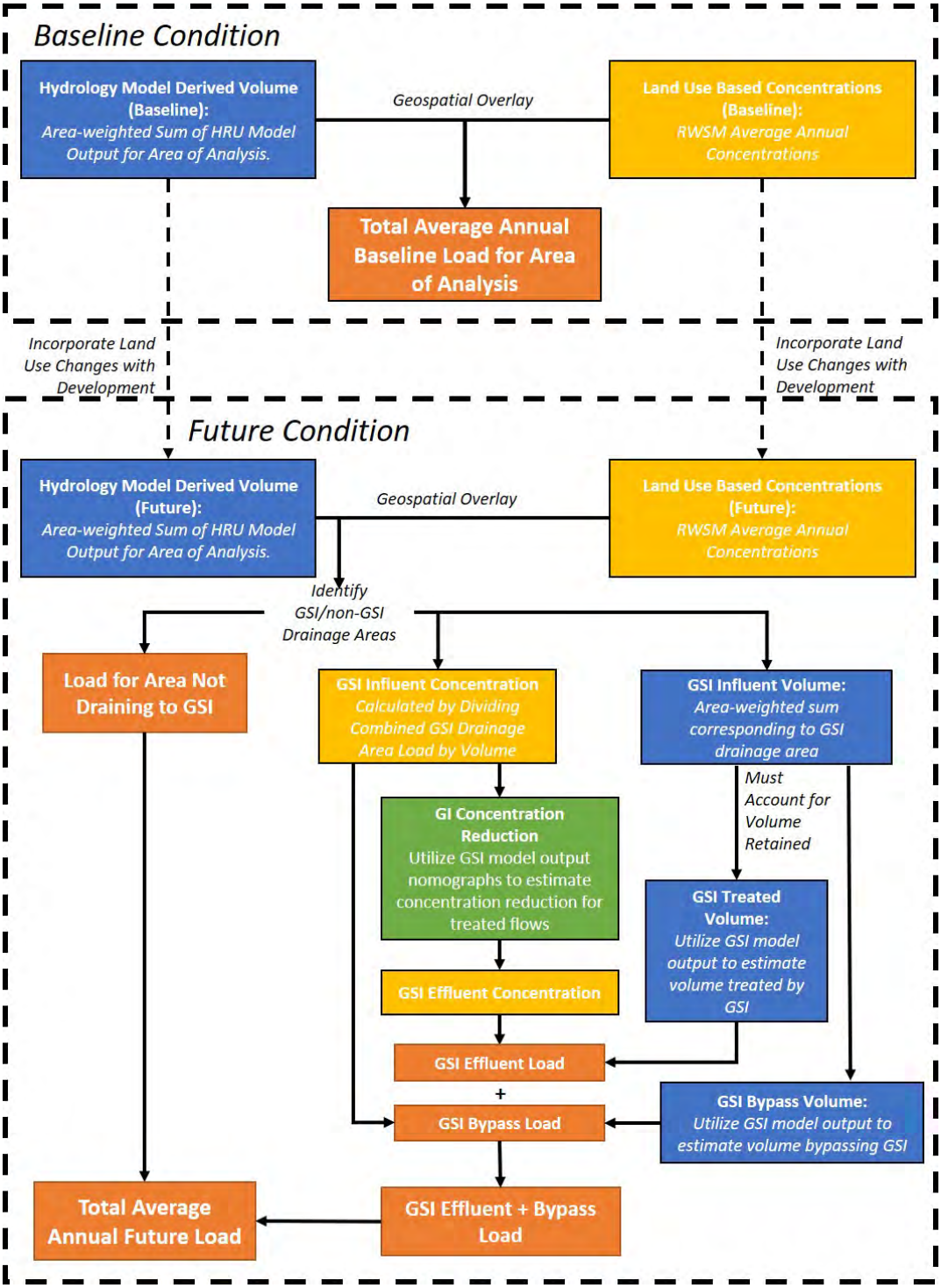

Figure 2-1: Future Condition Model Flow Chart

2.A Load Reduction Goal

The mercury load reduction required to be achieved through GI by 2040 per the MRP is 10 kg/yr MRP area-wide, or 3.1 kg/yr for Alameda County, and 1.7 kg/yr for Contra Costa County.

Calculations were conducted to develop the PCBs load reduction goals as described in the *Bay Area RAA Guidance Document* (BASMAA, 2017). The calculation methodology is summarized below.

2.A.1 TMDL Attainment Load Reduction (2030)

LR_{goal} = Baseline – WLA (kg/yr)

Where:

LR_{goal} = The load reduction goal (kg/yr)

Baseline = The baseline pollutant loading as calculated through the RAA

WLA = The population-based wasteload allocation

The TMDL population-based wasteload allocations for Alameda County and Contra Costa County are provided Table 2.A-1.

Table 2.A-1:TMDL Population-Based Wasteload Allocations for Alameda County and Contra Costa County

Stormwater Improvement Goal	PCBs (kg/yr)
Alameda County	0.5
Contra Costa County	0.3

2.A.2 RAA Calculated Baseline Load - PCBs

The results of the RAA baseline modeling are presented for Alameda County and for Contra Costa County in Table 2.A-2, below. The baseline countywide load used to establish the PCBs load reduction goal for the Permittee area is shown in bold. Refer to the RAA Guidance Document Section 2 and Section 3.5 (BASMAA, 2017) for details on the calculation methodology.

Table 2.A-2: RAA Model Baseline Loading Estimates – PCBs

RWQCB Region	Above/Below Dam	Permit	Baseline Load Alameda County (kg/yr)	Baseline Load Contra Costa County (kg/yr)
Region 2	**Below Dam**	**MRP**	**3.6**	**1.6**
		NPDES	0.2	0.8
		Phase 2	0.5	<0.1
	Above Dam	MRP	<0.1	<0.1
		NPDES	0.0	<0.1
		Phase 2	0.0	0.0
Region 5	Below Dam	MRP	<0.1	0.1
		NPDES	0.0	<0.1
		Phase 2	0.0	<0.1
	Above Dam	MRP	0.0	<0.1
		NPDES	0.0	0.0
		Phase 2	0.0	0.0
		Total	4.3	2.6

Using the preliminary RAA-calculated baseline load[1] of PCBs for each County, the load reduction goal is estimated to be 3.1 kg/yr for Alameda County and 1.3 kg/yr for Contra Costa County.

2.A.3 MRP Load Reduction through GI by 2040

The PCBs load reduction required to be achieved through GI by 2040 (i.e., 3 kg/yr MRP area-wide or 0.9 kg/yr for Alameda County and 0.5 kg/yr for Contra Costa County) must be adjusted to reflect the RAA-calculated baseline load (i.e., 3.6 kg/yr and 1.6 kg/yr for Alameda and Contra Costa Counties, respectively). The MRP load reduction requirement for GI for all permittees (3 kg/yr) represents 20.8% of the overall required TMDL load reduction. Therefore, the adjusted countywide load reduction through GI can be calculated as:

$$LR_{MRP,\ GI,\ 2040} = LR_{goal} * 20.8\%$$

The adjusted countywide PCBs load reduction goal through GI by 2040 are calculated as summarized in Table 2.A-3.

Table 2.A-3: Adjusted Countywide PCBs Load Reduction Goals through GI by 2040

County	PCBs Load Reduction Goal through GI (kg/yr)
Alameda County	0.6
Contra Costa County	0.3

2.B Overall Methodology to Account for GI Load Reductions

Refer to Sections 2.3, 3.2, and 3.3 of the GI Quantitative Relationship Reports [PR-2; PR-3].

[1] As of the May 2019 draft model run; the final baseline load is subject to change per peer review comments

2.C Load Reduction Calculation Method

The load reduction is calculated based on the difference between the baseline PCBs and mercury load and the PCBs and mercury load accounting for GI. The baseline model produces a PCBs and mercury load for each County, along with a "load production" GIS layer that estimates the load corresponding with each parcel and ROW segment within each County (note that individual parcel loadings should be considered representative of the 'average tendency' of loading for similar parcels). This "load production" layer is revised for the future condition based on land use changes, then combined in GIS with planned green infrastructure projects to estimate the resulting parcel load, assuming standard bioretention treatment. The estimated load reduced per acre using this approach is calculated and presented in Sections 4 and 5 of the GI Quantitative Relationship Reports [PR-2; PR-3].

The sum of the revised and treated parcel loads, across each County, provides the load under the future estimated condition. This future estimated load is then subtracted from the baseline estimated load to estimate loads reduced.

3. REFERENCES

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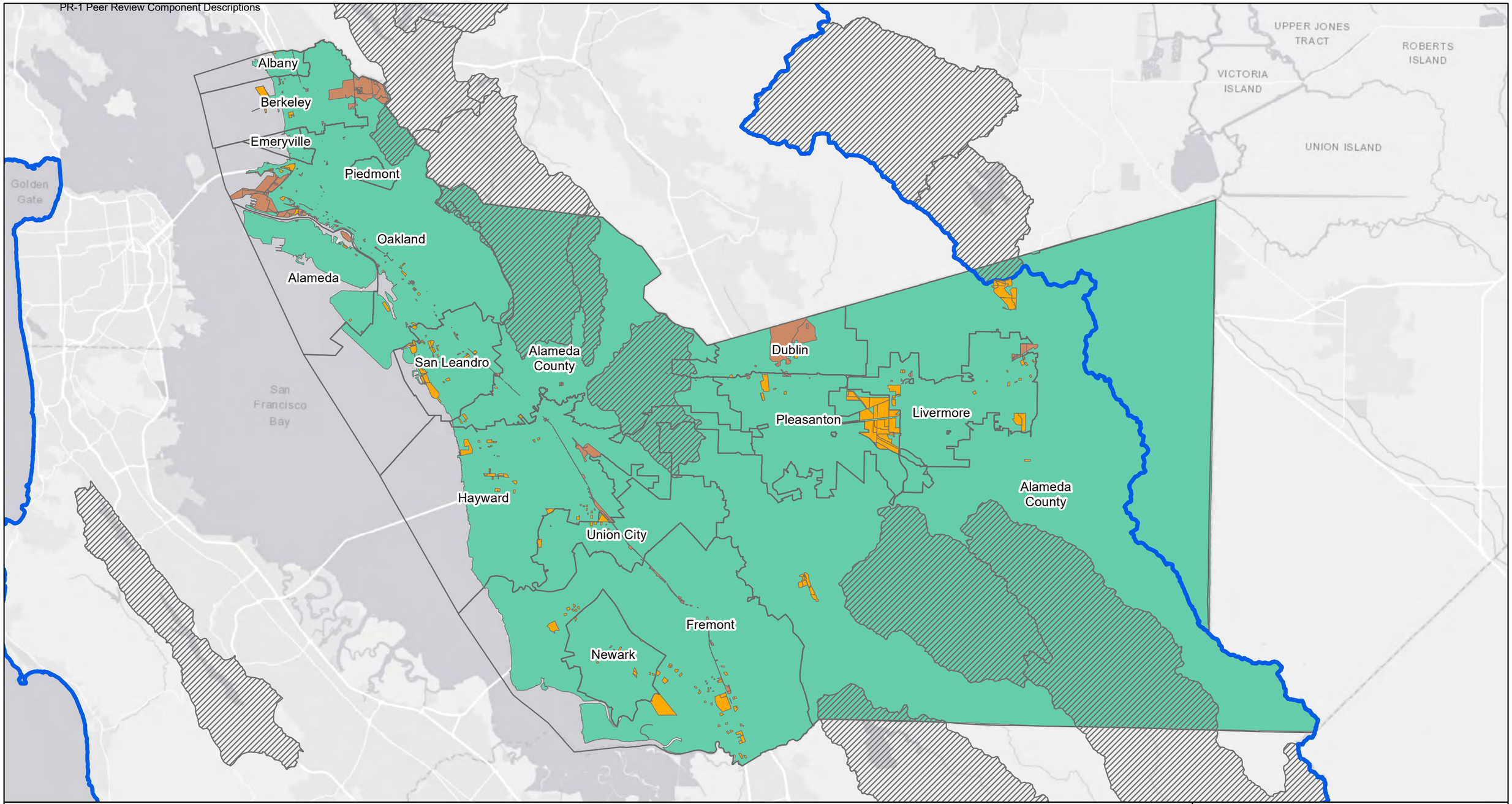

Legend

- Municipalities
- Area Above Dams[1]
- RWQCB Region 2 Boundary
- RWQCB Region 5

Stormwater Permit Coverage

- Individual Stormwater NPDES Permit
- Phase II General Stormwater Permit Water Quality Order 2013-0001-DWQ
- MS4

Notes:
1. Areas above Dams are not included in baseline load estimated for Municipal Regional Stormwater Permittees. Areas covered under different stormwater permits (i.e., individual NPDES permits, Phase II permit) are not included in baseline load estimates for Municipal Regional Stormwater Permittees.

N

0 20,000 Feet

Alameda County RAA
Baseline Loading Analysis Area

Alameda County
California

Geosyntec consultants

Oakland | October 2019

Figure 1A

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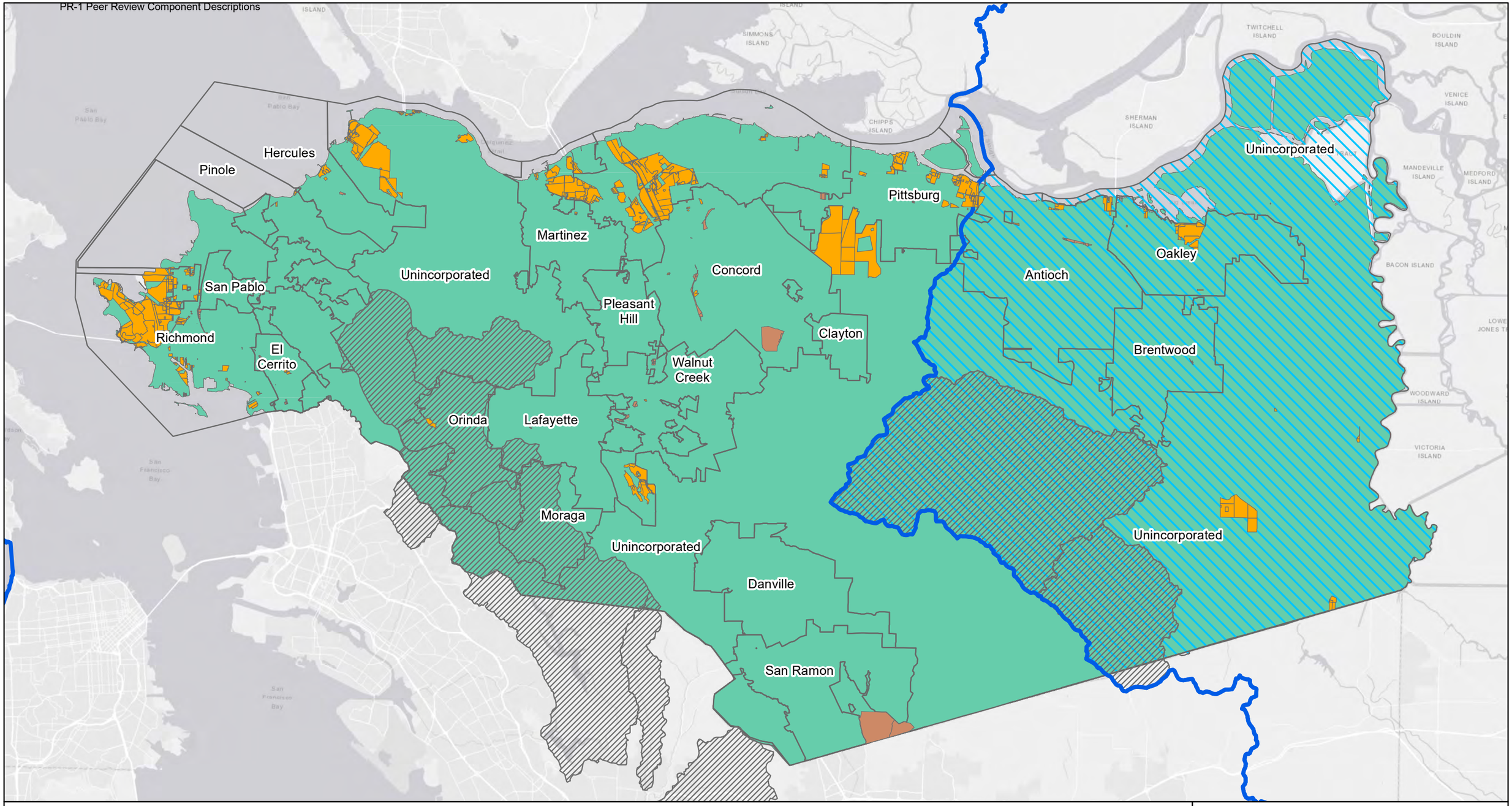

Legend

- Municipalities
- Area Above Dams[1]
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N

0 18,000 Feet

Contra Costa County RAA
Baseline Loading Analysis Area

Contra Costa County
California

Geosyntec consultants

Oakland | October 2019

Figure 1B

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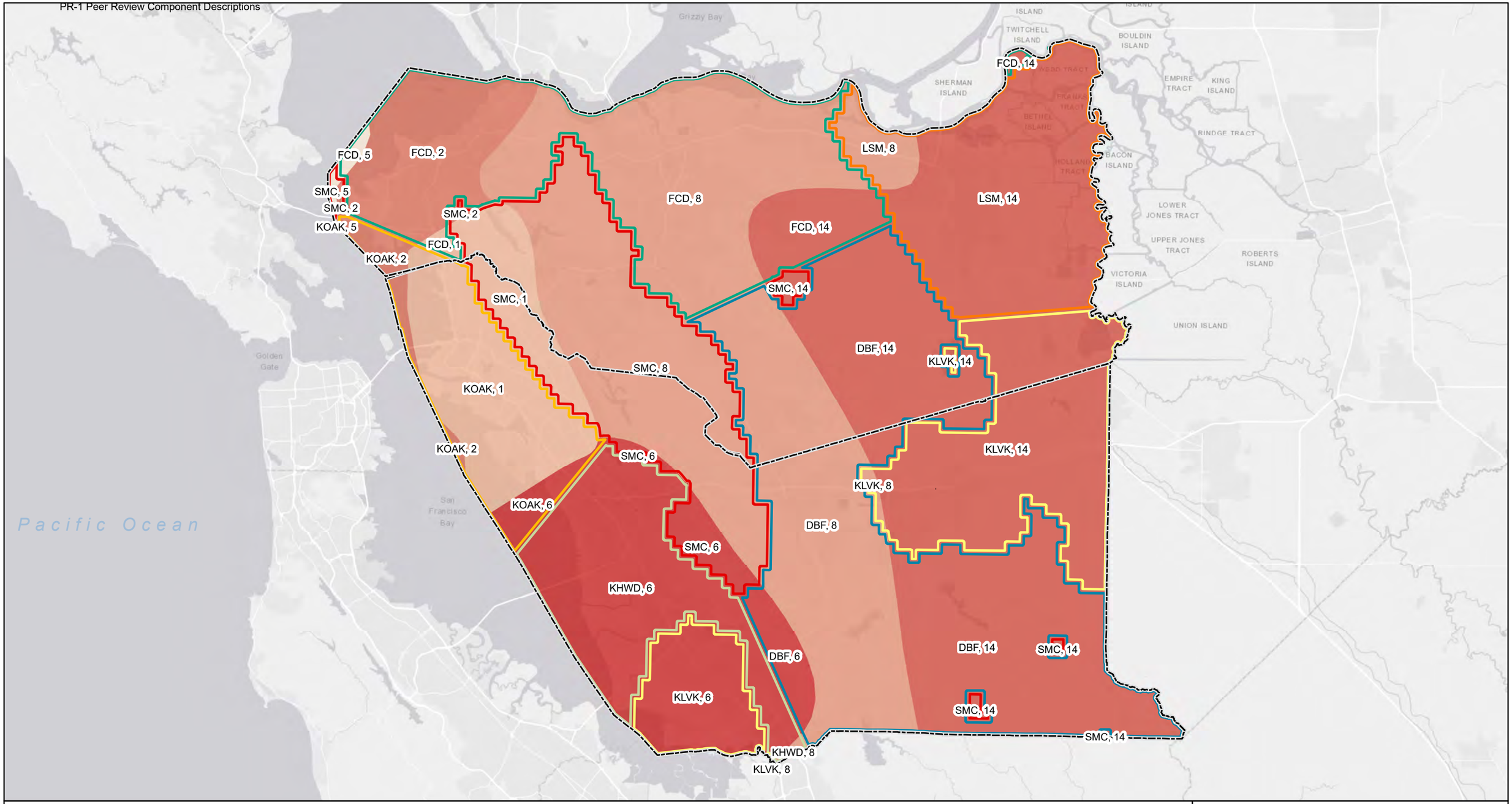

County Boundary

Rain Gauge Zones	CIMIS ET Zone
DBF	1
FCD	2
KHWD	5
KLVK	6
KOAK	8
LSM	14
SMC	

Climate Zones are created by overlapping precipitation zones and ET zones. In Contra Costa County and Alameda County, unique climate zones are labeled as "Gauge ID, ET Zone".

N

0 6 12 Miles

RAA Climate Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

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Figure PR-1C

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PR-2 Alameda Countywide Clean Water Program
GI Quantitative Relationship Report

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

QUANTITATIVE RELATIONSHIP BETWEEN GREEN INFRASTRUCTURE IMPLEMENTATION AND PCBS/MERCURY LOAD REDUCTIONS

MEMBER AGENCIES:

Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

Report prepared by:

Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, California 94544

Submitted to:

California Regional Water Quality Control Board, San Francisco Bay Region

September 28, 2018

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This report was prepared in cooperation with the Contra Costa County Clean Water Program. Geosyntec Consultants contributed substantially to the writing and preparation of this report.

Preface

This *Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP; NPDES Permit No. CAS612008; Order No. R2-2015-0049) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board. This report fulfills the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(1), C.12.b.iii.(3), and C.12.c.iii.(1) to submit refinements to the measurement and estimation methodologies for assessing mercury and PCBs load reductions in the next permit term and the quantitative relationship between green infrastructure implementation and mercury and PCBs load reductions that will be used for the reasonable assurance analyses.

This report is submitted by ACCWP on behalf of the following Permittees:

- The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City;
- Alameda County;
- Alameda County Flood Control and Water Conservation District; and
- Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7 Water Agency).

LIST OF ACRONYMS

ASOS	Automated Surface Observation System
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
CIMIS	California Irrigation Management Information System
GI	Green Infrastructure
GIS	Geographic Information System
HRU	Hydrologic Response Unit
KTRL	Kendall-Theil Robust Line
MAD	Median Absolute Deviation
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
ng/kg	nanogram per kilogram
NPDES	National Pollutant Discharge Elimination System
PCBs	Polychlorinated Biphenyls
RAA	Reasonable Assurance Analysis
RMSE	Root Mean Square Error
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WY	Water Year

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1. INTRODUCTION

1.1 Purpose

This *Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* report was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(1), C.12.b.iii.(3), and C.12.c.iii.(1) for submitting the quantitative relationship between green infrastructure (GI) implementation and PCBs load reductions that will be used for the Reasonable Assurance Analysis (RAA) required by MRP Provisions C.11.c.ii.(2), C.11.d.ii, C.12.c.ii.(2), and C.12.d.ii.

This report was prepared in cooperation with the Contra Costa Clean Water Program. The RAA modeling described herein will be conducted for both countywide programs and will use data inputs from both Alameda County and Contra Costa County.

1.2 Background

1.1.1 PCBs and Mercury Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to PCBs and mercury. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as Best Management Practices (BMPs), are the tools that Permittees can use to assist in restoring water quality in the Bay.

1.1.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and revised in 2015. The MRP includes provisions to reduce loads of mercury and PCBs consistent with the TMDL implementation timeframe (Provisions C.11 and C.12, respectively) through implementation of GI projects (Provisions C.3.j, C.11.c, and C.12.c) and source controls (Provisions C.11.d and C.12.d).

The Permittees are reporting load reductions achieved before and during the current MRP term (2014 – 2020) using the approved Interim Accounting Methodology (BASMAA, 2017). MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3) requires the Permittees to report in the 2018 and subsequent Annual Reports any refinements to the Interim Accounting Methodology to be used in subsequent Permit terms. As part of this reporting requirement, Provision C.11.c.iii.(3) and C.12.c.iii.(1) requires the Permittees to report on the quantitative relationship between GI implementation and PCBs and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

Green Infrastructure Planning and RAA

MRP Provision C.3.j requires the Permittees to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. The Green Infrastructure Plan must be developed using a mechanism to prioritize and map areas for potential and planned GI projects, both public and private, on a drainage-area-specific basis, for implementation by 2020, 2030, and 2040.

MRP Provisions C.11.c and C.12.c require the Permittees to prepare an RAA for inclusion in the 2020 Annual Report that quantitatively demonstrates that specified mercury and PCBs load reductions will be achieved by 2040 through implementation of GI.

This RAA should do the following:

1. Quantify the relationship between the areal extent of GI implementation (e.g., acres treated) and mercury and PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of GI strategies likely to be implemented.
2. Estimate the amount and characteristics of land area that will be treated by GI by 2020, 2030, and 2040.
3. Estimate the amount of mercury and PCBs load reductions that will result from GI implementation by 2020, 2030, and 2040.

4. Ensure that the calculation methods, models, model inputs, and modeling assumptions used have been validated through a peer review process.

Additionally, MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and implementation schedules for mercury and PCBs control measures and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The implementation plans, which will also be included in the 2020 Annual Report, along with the GI-based RAA outlined above, must:

1. Identify all technically and economically feasible mercury or PCBs control measures (including GI projects, but also other control measures such as source property identification and abatement, managing PCBs in building materials during demolition, enhanced operations and maintenance, and other source controls) to be implemented;
2. Include a schedule according to which technically and economically feasible control measures will be fully implemented; and
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

This report presents the quantitative relationship between GI implementation and PCBs and mercury load reductions, including the data used and a full description of models and model inputs relied on to establish this relationship. This relationship will be used to predict loads reduced through GI implementation for the RAAs described above and to report loads reduced through GI implementation in the subsequent Permit term.

2. DESCRIPTION OF RAA MODEL

This section provides an overview of the RAA modeling framework and describes the output of each component.

2.1 RAA Model Overview

The approach used to estimate the load reductions resulting from implementation of GI includes the model components listed below, which are described in further detail in the following sections:

- Baseline Pollutant Loading Model – the baseline pollutant loading model is a continuous simulation[1] hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across the county during the TMDL baseline period (i.e., 2003 – 2005).
    - Hydrology – this model component produces average annual runoff across each county for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (i.e., imperviousness, underlying soil characteristics, slope, etc.) present within each county for a unit area drainage catchment. See Section 2.2.1.
    - Water Quality – the hydrology output is combined with average annual concentrations estimated by the Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM; Wu et al, 2017) developed by the San Francisco Estuary Institute (SFEI) to produce average annual PCBs and mercury loading for the period of record. See Section 2.2.2.
- GI Performance Models – the GI performance models are developed to represent load reductions resulting from implementation of GI. See Section 2.3.
- Future Condition (RAA Scenario) Models – the RAA scenario models are conducted to represent future land use changes and control measure implementation that could result in pollutant load reduction. Both GI and source controls are considered, depending on the time frame of interest. See Section 2.4 for a description of load reduction calculations.

2.2 Baseline Loading Model

2.2.1 Hydrologic Model

As introduced above, the proposed approach for modeling hydrology is to use a hydrologic response unit (HRU) approach. An HRU is a unique combination of land surface features (imperviousness, underlying soil characteristics, slope, etc.) which is expected to give a consistent runoff response to rainfall, no matter where that unique combination is found. The HRU approach involves modeling all possible combinations of land surface features present within each county for a unit area drainage catchment and then storing these results in a database. These HRU results can been be scaled geospatially across the entire county without developing

[1] Continuous simulation models calculate outputs (e.g., runoff) "continuously", i.e., for many time steps over a long-term period of record (e.g., every 10 minutes for 10 years). Long-term "continuous" input data (e.g., hourly rainfall) is required. This is contrasted with design-event simulations which model a single rainfall event, e.g., a 24-hour storm with a 10-year recurrence frequency.

a detailed hydrologic model. This method is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017b).

The generic HRUs are modeled using USEPA's Stormwater Management Model (SWMM) to obtain an average annual runoff volume per acre for the identified baseline period of record (water year [WY] 2000 – 2009) for each HRU. Certain HRU inputs (imperviousness, soil parameters) are adjusted as needed to calibrate the HRUs on an average annual basis to identified flow gauges in the counties.

The average annual runoff volume per acre associated with a specific HRU can then be multiplied by the area represented by that HRU across each county (or a selected smaller planning area, such as a watershed or jurisdictional boundary). The resulting volumes associated with each represented HRU within the specified geospatial area can then be summed for the identified area to obtain the estimated total average annual runoff volume.

2.2.2 Water Quality Model

Identified HRUs across each county are combined with the RWSM land use classifications layer to determine pollutant loading rates. The RWSM provides average annual concentrations of PCBs and mercury that wash off from various land use categories. On an average annual basis, this approach approximates the total load.

Average annual runoff volume associated with the geospatial HRUs is multiplied by the PCBs and mercury average annual concentration (based on the RWSM land use categories for the identified area) to obtain average annual pollutant load using the following equation:

$$Load_{Baseline} = \sum\left(\sum Unit\ Runoff_{HRU} \times Area_{LU,HRU}\right) \times Concentration_{LU} \times 0.00123 \qquad \text{Eqn. 1}$$

Where:

$Load_{Baseline}$ = The total average annual baseline pollutant load for the identified area for calculation [grams/year]

$Unit\ Runoff_{HRU}$ = The average annual runoff per acre for a given HRU within the identified area for calculation [ac-ft/acre/yr]

$Area_{LU,HRU}$ = The total area of the HRU within the RWSM land use category within the identified area for calculation [acres]

$Concentration_{LU}$ = The average annual pollutant concentration associated with the RWSM land use category [ng/L]

0.00123 = Conversion factor [(L/ac-ft)*(g/ng)]

2.3 Green Infrastructure Performance Model

Volume reduction (via retention in the green infrastructure facility) and pollutant load reduction (via filtration through media and discharge through an underdrain) are modeled utilizing a combination of hydraulic modeling in SWMM and currently available empirical GI performance data.

2.3.1 Hydraulic GI Models

GI control measure hydraulic performance is modeled in SWMM with a 100% impervious tributary area for three GI facility types: (1) bioretention[2] with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention. The model is run with varying footprint sizes and varying underlying infiltration rates (i.e., the rate at which treated runoff infiltrates into native soils underlying the BMP facility). Average annual volume retained, volume treated, and volume bypassed by the GI measure are recorded for each GI model run.

Volume-based performance[3] corresponding to the generic 100% impervious tributary area can be applied to the effective area in GI drainage areas made up of identified HRUs. The effective area is also known as the "runoff generating area" and is calculated as the tributary area multiplied by the long-term or average annual runoff coefficient.

2.3.2 Green Infrastructure Pollutant Reduction Calculations

To calculate pollutant load reduction associated with GI implementation, the hydraulic model results are combined with water quality performance data. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load (Eqn. 2). Equations corresponding to the pollutant reduction calculation are provided below and the water balance is illustrated in Figure 1. In summary, influent load is calculated as the pollutant load produced by the 100% impervious tributary area for each RWSM land use category using Eqn. 3. The pollutant load that bypasses the facility is calculated as the proportion of runoff that bypasses the facility per the hydraulic GI model output, multiplied by the influent concentration

[2] The bioretention is assumed to include: 6-inch or 12-inch ponding depth, 1.5 ft of filter media with a 5 in/hr flow through rate, and 1 ft of gravel beneath the media.

[3] Volume-based performance refers to how much runoff volume the GI facility captures and retains or treats and discharges through the underdrain, typically represented as a percentage of the average annual runoff volume.

(Eqn. 4). The effluent load is calculated as the proportion of runoff that is captured by the facility per the hydraulic GI model output, combined with an effluent concentration (Eqn. 5 and Eqn. 6).

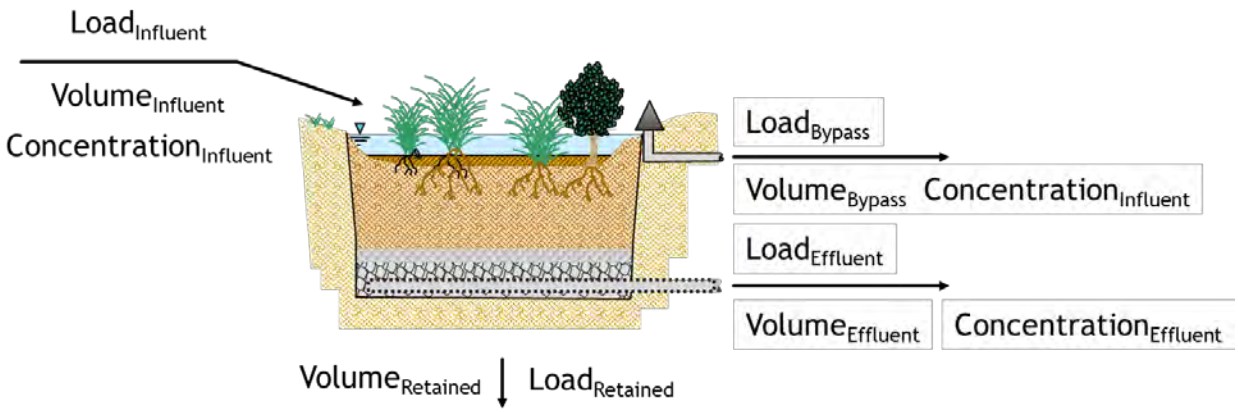

Figure 1: Illustration of GI Facility Pollutant Load Reduction Calculations

$$Load_{Reduced} = Load_{Influent} - Load_{Bypass} - Load_{Effluent} \quad \text{Eqn. 2}$$

$$Load_{Influent} = Volume_{Influent} \times Concentration_{Influent} \times C \quad \text{Eqn. 3}$$

$$Load_{Bypass} = Volume_{Bypass} \times Concentration_{Influent} \times C \quad \text{Eqn. 4}$$

$$Load_{Effluent} = (Volume_{Captured} - Volume_{Retained}) \times Concentration_{Effluent} \times C \quad \text{Eqn. 5}$$

$$Volume_{Captured} = Volume_{Influent} - Volume_{Bypass} \quad \text{Eqn. 6}$$

Where:

$Load_{Reduced}$	=	The total average annual pollutant load reduced by the GI facility [g/year]
$Load_{Influent}$	=	The total average annual pollutant load produced by the facility drainage area [g/year]
$Load_{Bypass}$	=	The pollutant load that bypasses the facility [g/year]
$Load_{Effluent}$	=	The pollutant load discharged from the facility after treatment [g/year]
$Volume_{Influent}$	=	The runoff produced by the drainage area to the GI facility [ac-ft/year]
$Volume_{Bypass}$	=	The proportion of influent runoff that bypasses the facility [ac-ft/year]

$Volume_{Captured}$ = The proportion of influent runoff that is captured by the facility [ac-ft/year]

$Volume_{Retained}$ = The proportion of captured runoff that is retained by the facility through infiltration and/or evapotranspiration [ac-ft/year]

$Concentration_{Influent}$ = The pollutant concentration associated with the GI drainage area [ng/L]

$Concentration_{Effluent}$ = The concentration discharged from the facility after treatment [ng/L]

C = Conversion factor constant = 0.00123 [(L/ac-ft)*(g/ng)]

2.4 RAA Scenario Loading Model

The loading corresponding with RAA future condition scenarios (2020, 2030, 2040) will be developed using the same volume and concentration combination approach used for the baseline condition. HRU outputs developed for the baseline model will scaled across the county corresponding to anticipated land use and development changes for each of the future conditions. Similarly, the RWSM land use classifications layer will be updated corresponding to each future condition scenario.

The outputs of the future hydrology scaling combined with the concentrations corresponding with future RWSM land use classification provides the land use-based loading estimated for each of the future conditions. To obtain the discharged load corresponding to each future GI scenario, load reductions associated with anticipated GI (developed as described above) will be subtracted from the land use-based load.

3. MODEL INPUTS AND DATA USED

This section describes the inputs to each component of the model and the data used.

3.1 Baseline Loading Model

3.1.1 Hydrologic Model

Generic HRU models are developed in SWMM to estimate average annual runoff volume per acre values that can be applied to all land surfaces within each county. The land surface feature inputs that will be varied to model the generic HRUs are described in the sections below and summarized in Table 3.

Climate Inputs

HRU climate inputs provide the total amount of precipitation that falls on the land surface and the amount of precipitation that is lost to the atmosphere via evapotranspiration before running off the land surface. Multiple gauges from across Alameda and Contra Costa counties that had continuous hourly precipitation data were chosen to represent distinct rainfall regions within both counties. For precipitation, these regions are based on 30-year annual rainfall regimes as identified by PRISM[4]. For evapotranspiration rates, the California Irrigation Management Information System (CIMIS) evapotranspiration zones were used within each county. The combination of the identified precipitation regions and evapotranspiration regions were combined to yield "climate zones" used for generic HRU models. Precipitation zones, evapotranspiration zones, and climate zones are shown in Exhibit 1 through Exhibit 3 (see Appendix A). Table 1 provides a summary of precipitation gauges used and average annual rainfall corresponding to the entire period of record and WY 2000 - 2009. Table 2 provides a summary of the CIMIS data used for the daily reference evapotranspiration rate for each evapotranspiration zone.

Table 1: HRU Precipitation Gauges WY2000-2009

Gauge ID	Gauge Name	Average Annual Precipitation (inches) WY 2000 - 2009	Gauge Source
KHWD	Hayward Air Terminal (ASOS)	16.3	ASOS[1]
KLVK	Livermore Municipal Airport (ASOS)	14.6	ASOS
KOAK	Oakland Airport (ASOS)	19.0	ASOS
DBF	Dublin Fire Station, San Ramon	17.3	CCCFCD[2]
FCD	Flood Control District, Martinez	16.2	CCCFCD
LSM	Los Medanos, Pittsburg	11.8	CCCFCD
SMC	Saint Mary's College, Moraga	28.9	CCCFCD

1. Automated Surface Observation System (ASOS) data were used for Alameda County gauge sites for the period of WY2000-2009 since NCDC gauge data was not available for the baseline period. ASOS sites sometimes co-occur with NCDC gauge sites (e.g., airports), but are maintained and delivered by separate government entities.
2. Contra Costa County gauge data is collected by the Flood Control District but was provided to Geosyntec by Dubin Engineering.

[4] Parameter-elevation Relationships on Independent Slopes Model (PRISM), developed and managed by the PRISM Climate Group, Oregon State University http://prism.oregonstate.edu/.

Table 2: CIMIS Reference Evapotranspiration

ET Zone	Monthly Evapotranspiration (in/day)[1]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.03	0.05	0.08	0.11	0.13	0.15	0.15	0.13	0.11	0.08	0.04	0.02
2	0.04	0.06	0.1	0.13	0.15	0.17	0.16	0.15	0.13	0.09	0.06	0.04
3	0.06	0.08	0.12	0.16	0.17	0.19	0.18	0.17	0.14	0.11	0.08	0.06
6	0.06	0.08	0.11	0.16	0.18	0.21	0.21	0.2	0.16	0.12	0.08	0.06
8	0.04	0.06	0.11	0.16	0.2	0.23	0.24	0.21	0.17	0.11	0.06	0.03
14	0.05	0.08	0.12	0.17	0.22	0.26	0.28	0.25	0.19	0.13	0.07	0.05

1. CIMIS reference evapotranspiration, which is based on irrigated turf grass, was scaled by 0.6 to represent the local mix of vegetated cover including urban vegetation, native xeric adapted plants, and unirrigated vegetated open space areas.

Slope

Slope affects how quickly rainfall will run off a modeled land surface and therefore how much is able to be infiltrated into the subsurface. The available digital elevation model (DEM)[5] for the counties was analyzed to obtain percent slope values for each ~30m by ~30m square of land surface. These percent slope values were classified into three distinct slope zones as summarized in Table 3 and shown in Exhibit 4 (see Appendix A).

Underlying Soil Inputs

Physical characteristics of the soil underlying the land surface affect the amount of rainfall that may be infiltrated into the subsurface. Infiltration was simulated in SWMM using the Green-Ampt infiltration model option. The physical soil input parameters for the Green-Ampt infiltration model were varied based on hydrologic soil group (HSG) as identified by the National Resource Conservation Service (NRCS[6]) soil survey and were modified as described below for developed areas. Soil parameters used as model inputs include suction head, hydraulic conductivity, and initial moisture deficit. Developed areas that are assumed to have been compacted and therefore result in less infiltration to the subsurface are modeled using 75 percent of the HSG hydraulic conductivity value. Soil parameters are not reported here, as this input is adjusted as part of baseline model calibration. Details about soil inputs are provided in Table 3. A map of hydrologic soil group is provided as Exhibit 5 (see Appendix A).

[5] U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013

[6] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. link: https://websoilsurvey.sc.egov.usda.gov/

Areas of development were identified based on the land use of the surface. Soils within urban and agricultural use areas were considered to have been compacted by the site preparation and activities.

Imperviousness

Imperviousness (i.e., the percentage of impervious area) affects area on the land surface where rainfall may be infiltrated and therefore the quantity of runoff produced. The runoff from a range of land use imperviousness values is modeled by area-weighting the results of a pervious surface runoff result (i.e., pervious HRU output) with a corresponding impervious surface runoff result (i.e., impervious HRU output) (see Table 3 and Exhibit 6 (see Appendix A)).

The baseline model HRU imperviousness is developed by geospatially combining the land uses identified by the Association of Bay Area Governments (ABAG, 2005) with the National Land Cover Dataset (NLCD, 2006) data. Each feature of the ABAG dataset is assigned a single imperviousness value that is used to determine the average hydrologic response of that land surface. A lookup-table containing NLCD-based imperviousness for each ABAG land use code was used as a starting value for HRU calibration. Imperviousness may be adjusted within an appropriate range as part of baseline model calibration.

3.1.2 Developing HRUs across each County

Each identified combination of land surface features is modeled for a generic unit-acre drainage area in SWMM for the baseline period of record (i.e., WY 2000 – 2009), utilizing a batch-processing method (which allows for inputs to be altered, model files run, and results extracted for many models automatically). The average annual runoff volume per acre is then extracted for each generic HRU modeled.

Table 3: Land Surface Feature Inputs for Generic HRU Hydrologic Models

Variables	Description	Number of Varying Features	Feature Representations	Source
Hourly Annual Precipitation	Rainfall Gauge and Rainfall Zone	7	Contra Costa County Gauges: DBF, FCD, LSM, SMC Alameda County ASOS Gauges: KHWD, KLVK, KOAK	PRISM[1], NCDC/ County-maintained rainfall gauges
Daily Evapotranspiration Rate	Evapotranspiration Zone	5	Zones 1, 2, 3, 6, 8, 14	CIMIS[2]
Slope Zone	Representation of Slope	3	<5%, 5-15%, 15%+	USGS[3]
Developed/ Undeveloped Areas	Representation of Compaction of Underlying Soils (Pervious Areas Only)	2	Undeveloped (Ksat * 1) Developed (Ksat * 0.75)	ABAG Land Use 2005[4]
Hydrologic Soil Group	Representation of Underlying Soil Type (pervious areas only)	6	HSG A, B, C, D[5], Rock, Water	NRCS[6]
Imperviousness	Representation of Imperviousness	2	0% and 100%	NLCD and ABAG 2005

1. PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, 30-year normal mean annual precipitation
2. California Irrigation Management Information System (CIMIS) Reference Evapotranspiration; digitized from http://www.cimis.water.ca.gov/App_Themes/images/etozonemap.jpg
3. U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013
4. ABAG land use features are proposed to be used for identifying developed and undeveloped condition and will have an imperviousness value assigned based on a geospatial analysis of the NLCD Imperviousness layer. The impervious value for each ABAG land use feature will then be carried into the HRU model calibration and adjusted accordingly.
5. "Urban" representation will be re-classified based on the dominant adjacent HSG.
6. U.S. Department of Agriculture, Natural Resources Conservation Service. Soil Survey Geographic (SSURGO) database. 2016

HRUs are determined geospatially based on the climate zone, slope zone, developed/undeveloped areas, and HSG, along with land use-based imperviousness. Exhibits 1 through 5 (see Appendix A) display the data used to develop climate zones, county slope zones, and the HSG distribution across each county. Imperviousness designations will occur based on

land use at the parcel, by combining the geospatial ABAG land use layer[7] with the other hydrologic input regions. This results in a "patchwork" of HRUs across the counties[8].

The resulting patchwork of HRUs can be combined at the scale of choice to provide total runoff volumes for a specific area, such as a watershed or jurisdictional boundary. To estimate the total runoff for the identified area, the total acreage of each designated HRU present within a watershed or jurisdiction will be multiplied by the average annual runoff per acre associated with each HRU and then summed (i.e., area-weighting the average annual runoff volume per acre for all HRUs present).

3.1.3 HRU Input Calibration

Calibration of hydrologic models is required by the *Bay Area RAA Guidance Document*. Calibration of the generic HRU models will be conducted utilizing available stream flow records and based solely upon the annual discharge volume between WY 2000-2009. This annual calibration means that the HRU runoff estimates are representative of the approximate annual runoff volume but will not be used to estimate or compare discharge rates at smaller timesteps, such as the hourly or daily runoff hydrograph.

The list of candidate gauge sites within the counties was developed based on an assessment of the representativeness of the gauged watersheds and the mitigation of confounding factors that interfere with calibration such as missing data and upstream impoundments. For the purposes of calibration, the candidate gauge sites that were selected included stream depth rating curves and at least daily mean records for the historical period of interest. The USGS flow gauges considered for calibration are provided in Table 4 and shown in Exhibit 8 (see Appendix A).

Table 4: Flow Gauge Considered for RAA Model Calibration

Gauge ID	Gauge Name	Location	County	Data Frequency
11337600	Marsh Creek	Brentwood	Contra Costa	Daily
11182500	San Ramon Creek	San Ramon	Contra Costa	Daily
11181390	Wildcat Creek	Richmond / San Pablo	Contra Costa	Daily
11181040	Lan Lorenzo Creek	San Lorenzo	Alameda	Daily
11181008	Castro Valley Creek	Hayward	Alameda	Daily

[7] ABAG land use features will be used to aggregate the imperviousness for the land surface. The relationship between ABAG feature and its imperviousness will be developed based upon other local sources (SMCWPPP, 2017) and analysis of national public data sets such as the National Land Cover Dataset (NLCD).

[8] This will be done once all the HRU input files are finalized, including the imperviousness layers.

Gauge ID	Gauge Name	Location	County	Data Frequency
11181000	San Lorenzo Creek	Hayward	Alameda	Daily
11180700	Alameda Creek Flood Channel	Union City	Alameda	Daily
11179000	Alameda Creek	Fremont	Alameda	Daily
11176900	Arroyo de la Laguna	Verona	Alameda	Daily
11173575	Alameda Creek Below Welch Creek	Sunol	Alameda	Daily
11173510	Alameda Creek Below Calaveras Creek	Sunol	Alameda	Daily

The effective area tributary to each flow gauge is used to calibrate the HRUs to the stream gauge records. Annual flow predicted by area-weighting HRU runoff output for the watersheds draining to the stream gauges was compared to annual flow in the stream records for the identified period of record.

Calibration of land surface runoff hydrology to stream gauge records requires that baseflow be computed and accounted for throughout the period of record. A variety of methods exist for separating baseflow from runoff, including the fixed-interval method and the local-minimum method (Sloto and Crouse, 1996). The most appropriate method for separating baseflow is determined on a gauge by gauge basis depending on the variability in the flow record, and the occurrence of confounding factors that affect baseflow such as dam releases and other dry weather inflows.

The average percent difference between the area-weighted HRU total average annual runoff volume for the watershed and the average annual flow (converted to volume) measured for the WY 2000 – 2009 period will be calculated. The acceptable ranges included in the RAA Guidance document are provided in Table 5 below.

Table 5: Allowable Difference between Simulated and Observed Annual Volumes

Model parameters	Average % difference between simulated annual results and observed data		
	Very Good	Good	Fair (lower bound, upper bound)
Hydrology/Flow	<10	10-15	15-25

If the average percent difference between simulated and measured annual storm flow volumes is greater than 25%, HRU model parameters are adjusted until the percent difference is within the acceptable range. The primary model parameters adjusted include underlying soil hydraulic conductivity and land use imperviousness, but other hydrologic model parameters, such as depression storage, may be adjusted as appropriate.

Once average percent differences in all identified watersheds are within the acceptable range, the HRU model parameters are finalized and the HRU results database will be regenerated. HRUs and resulting average annual baseline volume will be applied across each county to obtain the baseline volume discharged by each county.

3.1.4 Water Quality Model

RWSM values used to develop pollutant loading estimates across each county are:

Table 6: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total mercury (ng/L)
Ag, Open	0.2	80
New Urban	0.2	3
Old Residential	4	63
Old Commercial/ Transportation	40	63
Old Industrial and Source Areas	204	40

Water quality calculations are also used to perform baseline pollutant loading validation. The calculated pollutant load draining to Regional Monitoring Program stations will be validated by calculating the volume-weighted watershed pollutant concentration using the modeling results and comparing it to the observed concentrations in the Regional Monitoring Program data. The equation used to calculate concentration (in ng/L) at an end-of-watershed location is as follows:

$$Concentration_{Baseline} = \frac{\sum Runoff_{HRU} \times Area_{HRU} \times Concentration_{LU,HRU}}{\sum Runoff_{HRU} \times Area_{HRU}} \qquad \text{Eqn. 7}$$

Pollutant concentration and loading data from the Regional Monitoring Program will be compared to the result of Equation 7 for several watersheds for validation purposes.

3.2 Green Infrastructure Performance Model

3.2.1 Long-Term Green Infrastructure Simulations

Long term performance was assessed for each BMP configuration using continuous historical rainfall records. In Contra Costa County historical data was available at the same gauges that were used for the HRU runoff modeling between WY2000-2009, but for Alameda County other gauge sites with longer histories were used for long term BMP performance modeling. The rainfall gauges used to model BMP performance are shown in Table 7.

Table 7: Long Term GI Performance Precipitation Gauges

Gauge ID	Gauge Name	Period of Record	Average Annual Precipitation (inches)	Gauge Source[1]
040693	Berkeley (NCDC)	1948-1990	19.8	NCDC
041060	Brentwood (NCDC)	1950-1985	14.9	NCDC
043863	Hayward (NCDC)	1948-1988	24.3	NCDC
046335	Oakland Airport (NCDC)	1948-1985	16.4	NCDC
047821	San Jose Airport (NCDC)	1948-2010	13.6	NCDC
DBF	Dublin Fire Station, San Ramon	1973-2016	15.0	CCCFCD
FCD	Flood Control District, Martinez	1971-2016	16.5	CCCFCD
LSM	Los Medanos, Pittsburg	1974-2016	10.6	CCCFCD
SMC	Saint Mary's College, Moraga	1972-2016	26.8	CCCFCD

1. NCDC data was used for Alameda County and San Jose gauge sites. Contra Costa County gauge data is collected by the Flood Control District and was provided to Geosyntec by Dubin Engineering.

3.2.2 Hydraulic Green Infrastructure Model

Hydraulic GI models were developed in SWMM to estimate hydraulic performance for a 100% impervious tributary area. Hydraulic model inputs that were varied to model the GI facility performance for the counties are described below and summarized in Table 8.

1. BMP Configuration – three GI facility types were assumed: (1) bioretention with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention with an underdrain.
2. BMP Footprint Size – the BMP footprint size was varied as a percent of impervious area to model different levels of hydraulic capture performance depending on facility sizing.
3. BMP Underlying Infiltration Rate – the infiltration rate of the soils underneath the bioretention facility was varied for the bioretention with a raised underdrain and bioretention with no underdrain configurations (I.e., the unlined facility types).

Table 8: Land Surface Feature Inputs for Generic GI Performance Hydraulic Models

Variables	Description	Number of Varying Features	Feature Representations
Hourly Precipitation	Rainfall Gauge	9	NCDC: 040693 (Berkeley) 046335 (Oakland Airport) 043863 (Hayward) 047821 (San Jose) 041060 (Brentwood) Contra Costa County: DBF, FCD, LSM, SMC
Daily Evapotranspiration Rate	Evapotranspiration Zone	4	CIMIS Zones: 1, 6, 8, 14
BMP Configurations	BMP profiles and underdrain	3	Lined Bioretention with underdrain Unlined Bioretention with elevated underdrain Infiltration Basin without underdrain
BMP Surface Ponding Depth	Depth (feet)	2	0.5, 1
BMP Footprint Sizes	% of Impervious Area	12	0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 3.5, 4, 5, 6
BMP Infiltration Rates	Ksat of underlying soil (in/hr)	7 3	Unlined Bioretention: 0.024, 0.05, 0.1, 0.2, 0.24, 0.3, 0.4, 0.5 Infiltration Basin: 0.5, 1, 2

The BMP cross-sections that were modeled each include:

- 6-inches or 12-inches ponding depth (both were modeled),
- 1.5 ft of filter media with 25% porosity with a 5 in/hr flow through rate, and
- 1 ft of gravel beneath the media with 40% porosity.

Two of the modeled BMP configurations include underdrains. In the lined bioretention facility, the underdrain is located at the bottom of the gravel layer. In the unlined bioretention facility, the underdrain was modeled at the top of the gravel layer. BMP configurations are shown in Exhibits 9 through 11 (see Appendix A).

3.2.3 Green Infrastructure Pollutant Reduction Calculations

As described in Section 2.3.2, pollutant load reduction associated with GI is calculated by combining the hydraulic model results with water quality performance data. The annual estimate

of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load. The effluent load is calculated as the proportion of runoff that is treated by the GI measure multiplied by an effluent concentration.

Water quality performance data from selected, representative studies were used to determine a method to predict effluent concentrations in stormwater following treatment through a biofiltration (bioretention or tree well filters) GI measure. The data used to develop the relationship came from three studies: a) 2011 monitoring study of the El Cerrito Rain Gardens (Gilbreath, Pearce, and McKee, 2012), b) Clean Watersheds for a Clean Bay (CW4CB)[9] (Geosyntec and EOA, 2017), and c) a study at Echo Lake in King County, WA (King County, 2017). A summary of the paired influent-effluent data associated with each study is provided in table:

Table 9: Data used to Develop Effluent Concentrations

Project Name	Project Sponsor	Facility ID	Influent-Effluent Data Pairs (n pairs)	
			PCBs	Mercury
El Cerrito Green Streets – CW4CB	El Cerrito	ELC-B1	3	3
El Cerrito Green Streets – SFEI	SFEI	ELC-B1	4	4
PG&E Substation 1st and Cutting Bioretention Cells – CW4CB	Richmond	LAU-3	8	8
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Bioretention Planter Boxes – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	BPB-1	4	0
		BPB-2	4	0
		BPB-3	4	0
		BPB-4	2	0
West Oakland Industrial Area Tree Wells – CW4CB	Oakland	ETT-TW2	4	4
		ETT-TW6	4	4
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Tree Well – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	FLT-1	4	0
		Total Data Pairs	41	23

[9] The CW4CB study included additional monitoring of the El Cerrito rain gardens.

03947
3988

These data were statistically evaluated to identify an appropriate method for predicting effluent concentrations of PCBs and total mercury. The data analysis first evaluated whether available influent and effluent concentration data were significantly different and, if so, whether a monotonic relationship existed (i.e., effluent generally increased when influent increased).

A Wilcoxon non-parametric hypothesis test was run on the PCBs and total mercury paired influent-effluent data to determine if influent and effluent concentrations were statistically different at a 5% significance level. This difference was found to be significant for PCBs, and significant for total mercury when corresponding influent suspended solids concentration was greater than 20 mg/L.

Spearman's rho and Kendall's tau, which are non-parametric rank correlation coefficients, were used to identify the direction and strength of correlation between influent and effluent concentrations. As shown in Table 10, both correlation coefficients suggest that effluent concentrations are positively correlated with influent concentrations for both PCBs and mercury.

Table 10: Influent/Effluent Correlation Coefficients

Correlation Coefficient	Total PCBs	Total Mercury
Spearman's rho	0.725	0.547
Kendall's tau	0.527	0.396

The Kendall-Theil Robust Line (KTRL) method (Granato, 2006) was used to determine the best fit line between influent and effluent data. This non-parametric method uses the median of all possible pairwise slopes between points, which is more robust to outliers than a simple linear regression. Because stormwater data tend to be lognormal, the analysis was focused on linear and log-linear relationships. After the KTRL was generated, the lower portion of the curve was adjusted to assume that neither PCBs nor total mercury can be exported from biofilters under normal circumstances, i.e., that the maximum effluent concentration of PCBs or total mercury is equal to the influent concentration. The resulting KTRL for PCBs is shown Figure 2. The resulting KTRL for total mercury is shown in Figure 3. Each figure also includes a constant average effluent concentration line with data fit statistics: root mean square error (RMSE) and median absolute deviation (MAD). As indicated, the KTRL provide a better fit of the data. However, the resulting effluent concentrations are not much different between the two lines except when influent PCBs are low (<10 ng/L) and total mercury concentration are high (>50 ng/L). For total mercury, concentration reductions are only predicted to occur when influent concentrations are greater than about 30 ng/L. Due to observed export of total mercury for several events, particularly for the 1st and Cutting bioretention cell (LAU-3), the moderate concentration reductions assumed by the KTRL at higher influent concentrations is reasonably conservative.

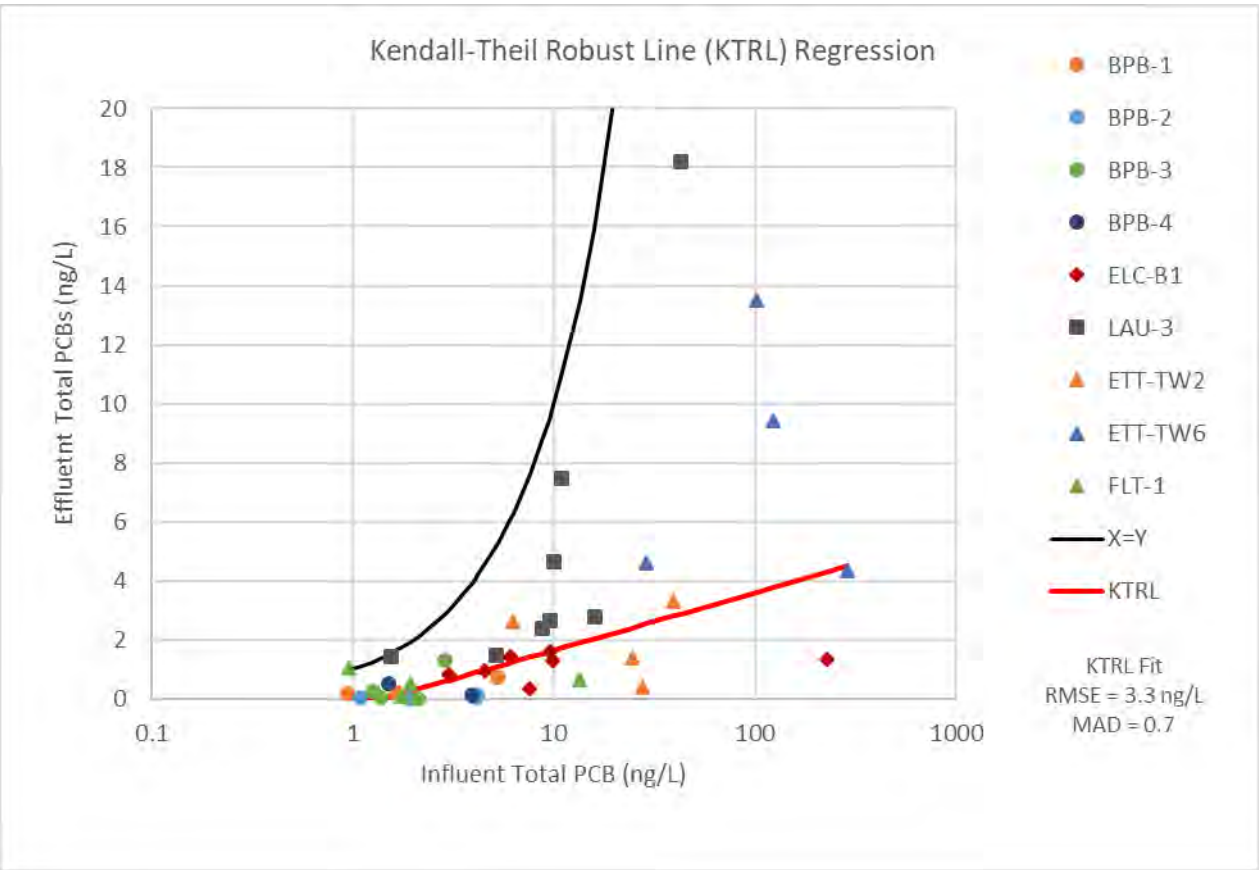

Figure 2: PCBs Influent vs Effluent Concentration Relationship Determined by KTRL Regression

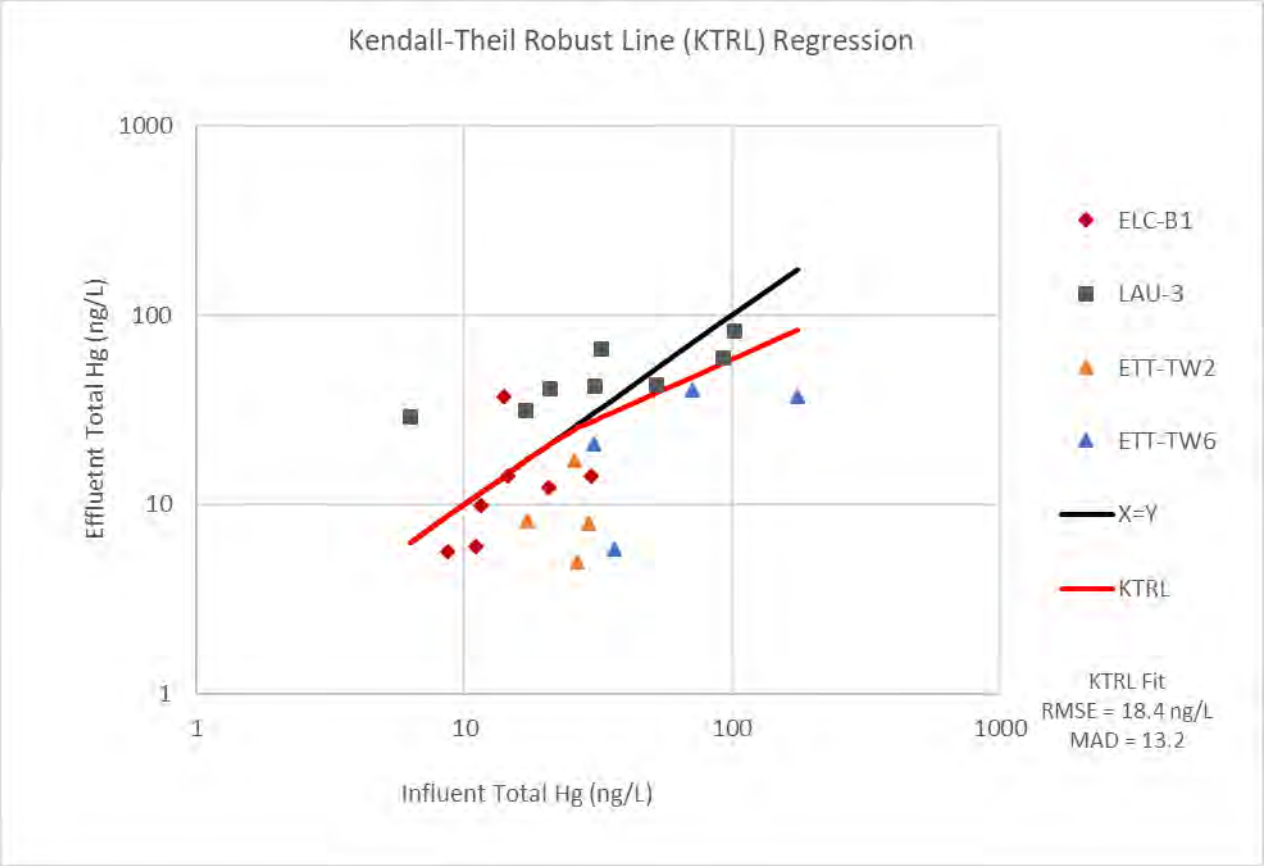

Figure 3: Mercury Influent vs Effluent Concentration Relationship Determined by KTRL Regression

3.3 RAA Scenario Loading Model

To model RAA future scenarios, future condition land use is needed. Future condition land use will be estimated using predictions of private parcel new development and redevelopment in combination with GI implementation on public parcels and rights-of-way.

Load reductions estimated for implementation of GI will be applied to future condition RAA scenario models based on estimated locations of GI and the tributary drainage areas to those GI. Effective area will be used to relate the HRUs, which can have a variety of imperviousness values, to the GI performance which will be based on a unit of effective area with 100% imperviousness. The GI performance curves can thus be applied to many different HRU types and/or combinations of HRUs that make up the tributary drainage areas for future GI measures.

4. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND PCBS LOADS REDUCED

The results of the hydraulic and pollutant reduction modeling of GI measures were used to develop a quantitative relationship between GI implementation and PCBs that can be applied to RAA future scenario models. An example quantitative relationship is provided for GI models run for the Berkeley gauge (040693). Utilizing output from hydraulic modeling, GI measure volumetric percent capture was calculated on an average annual basis. Volumetric model results for runs with GI measures sized to achieve 80%, 85%, 90%, and 95% capture were combined with water quality inputs to obtain pollutant load reduction for varying PCBs influent concentration.

The results of this analysis are shown in nomographs[10] provided in Figure 4, Figure 5, and Figure 6, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 8 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per effective acre[11] displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

[10] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

[11] Effective area is calculated as the area multiplied by the runoff coefficient.

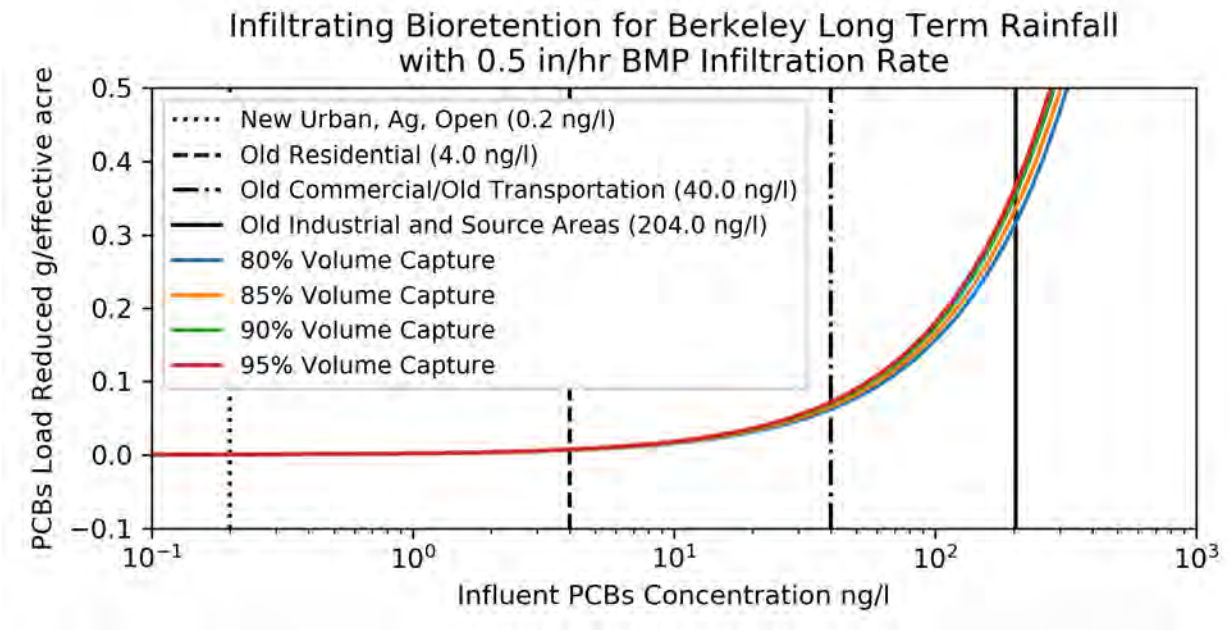

Figure 4: Modeled PCBs Load Removal Performance for Infiltrating Bioretention Basin

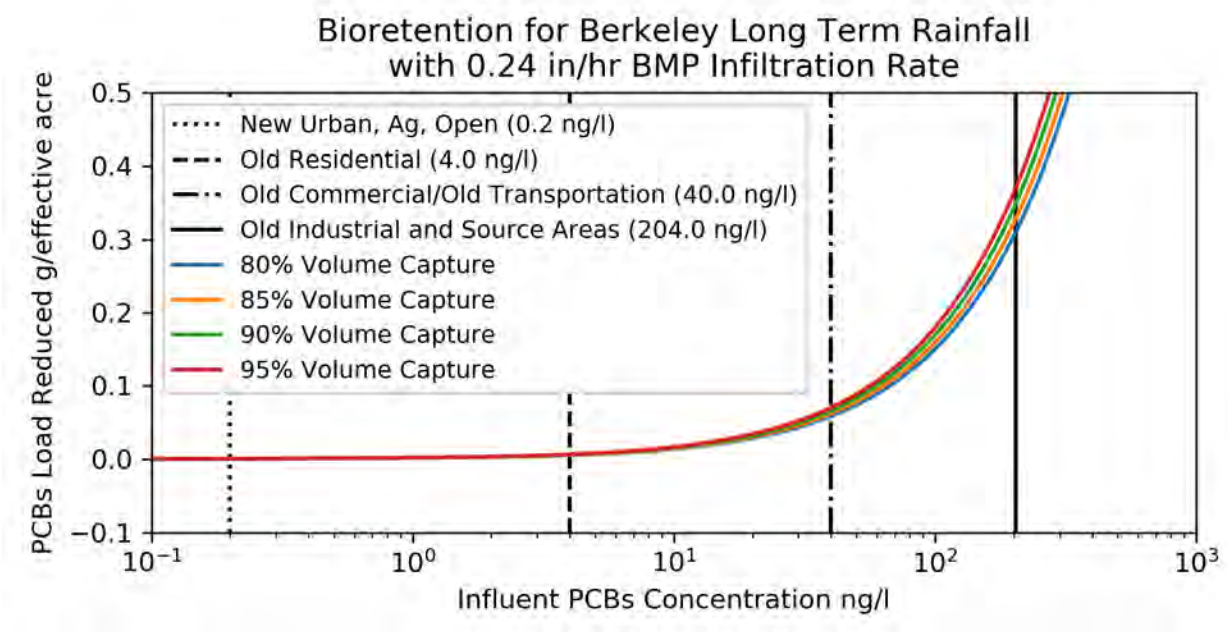

Figure 5: Modeled PCBs Load Removal Performance for Bioretention Basin with Elevated Underdrain

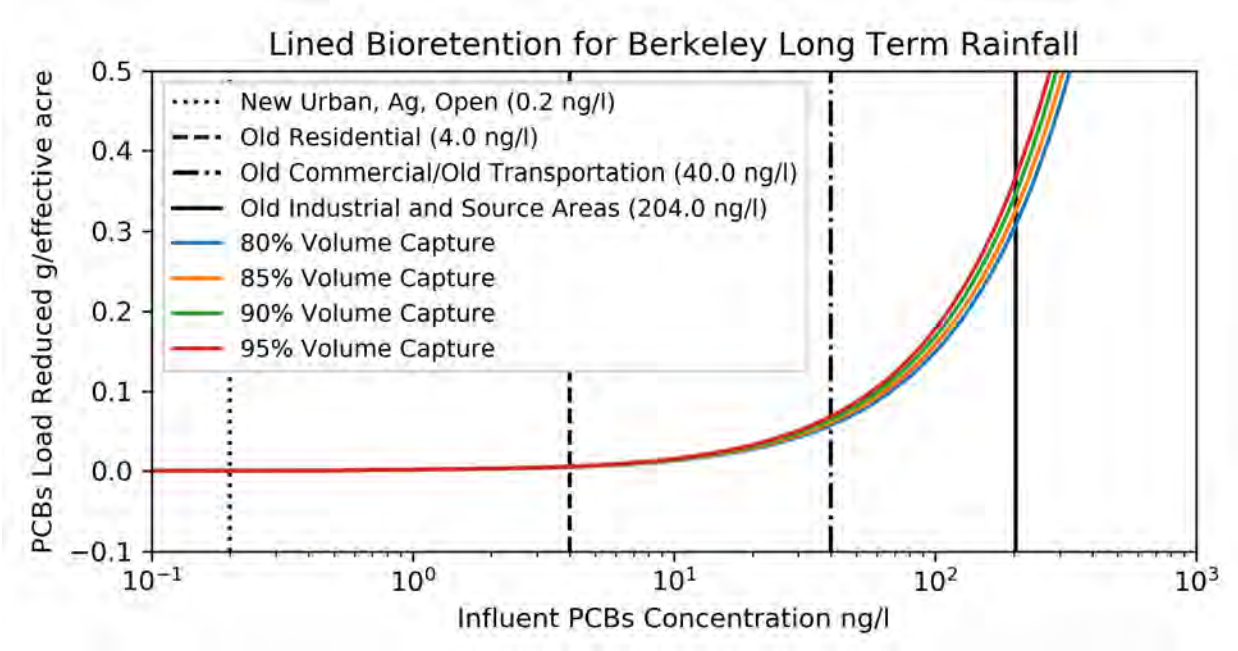

Figure 6: Modeled PCBs Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are listed in Table 11.

Table 11: PCBs Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	PCBs Load Reduced (g/effective ac)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban, Ag, Open	3.12E-04	3.30E-04	3.49E-04	3.61E-04
	Old Residential	0.00623	0.0066	0.00698	0.00722
	Old Commercial / Old Transportation	0.0623	0.066	0.0698	0.0722
	Old Industrial and Source Areas	0.318	0.337	0.356	0.368
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban, Ag, Open	3.08E-04	3.26E-04	3.47E-04	3.67E-04
	Old Residential	0.00518	0.0055	0.00589	0.00633
	Old Commercial / Old Transportation	0.0586	0.0621	0.0661	0.0703
	Old Industrial and Source Areas	0.311	0.329	0.350	0.371
Lined Bioretention	New Urban, Ag, Open	3.08E-04	3.26E-04	3.46E-04	3.67E-04
	Old Residential	0.00484	0.00513	0.00545	0.00577
	Old Commercial / Old Transportation	0.0574	0.0608	0.0647	0.0685
	Old Industrial and Source Areas	0.309	0.327	0.348	0.368

1. Average Annual Facility Volumetric Runoff Capture

5. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND MERCURY LOADS REDUCED

Mercury load reduction results for the Berkeley Gauge are shown in nomographs[12] in Figure 7, Figure 8, and Figure 9, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 9 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per acre displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

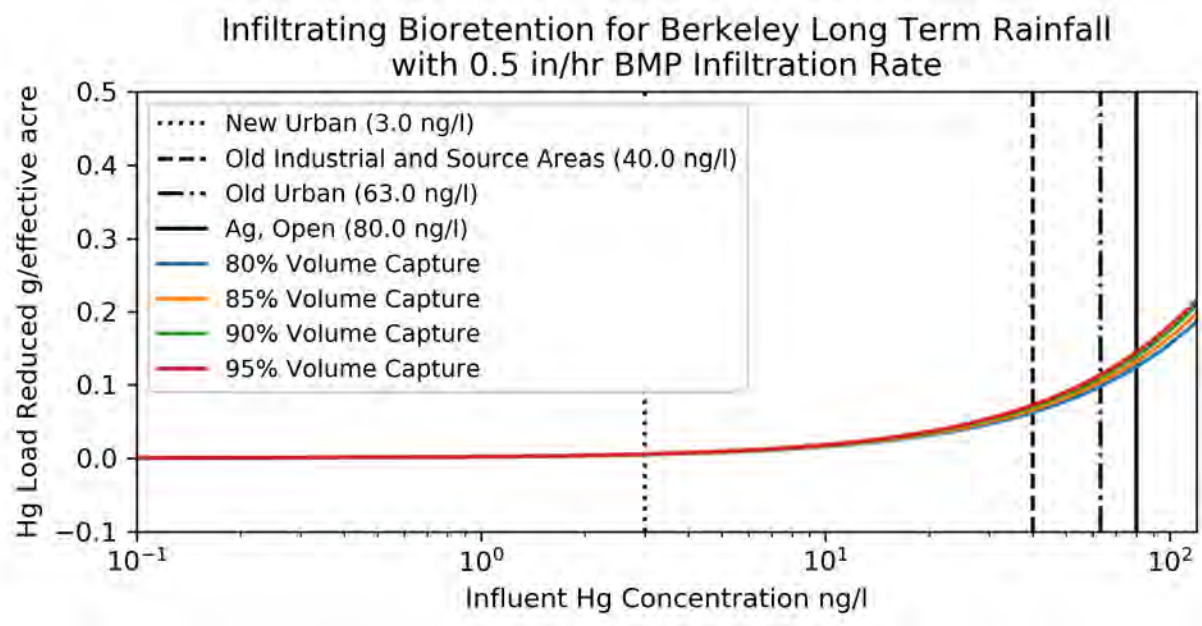

Figure 7: Modeled Mercury Load Removal Performance for Infiltrating Bioretention Basin

[12] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

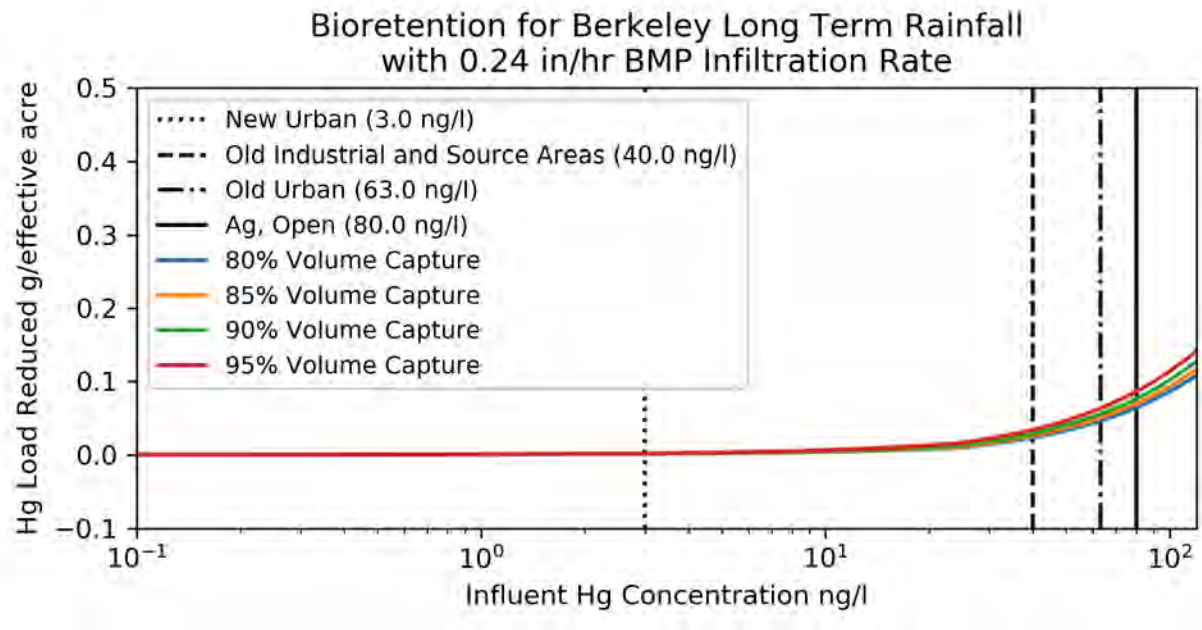

Figure 8: Modeled Mercury Load Removal Performance for Bioretention Basin with Elevated Underdrain

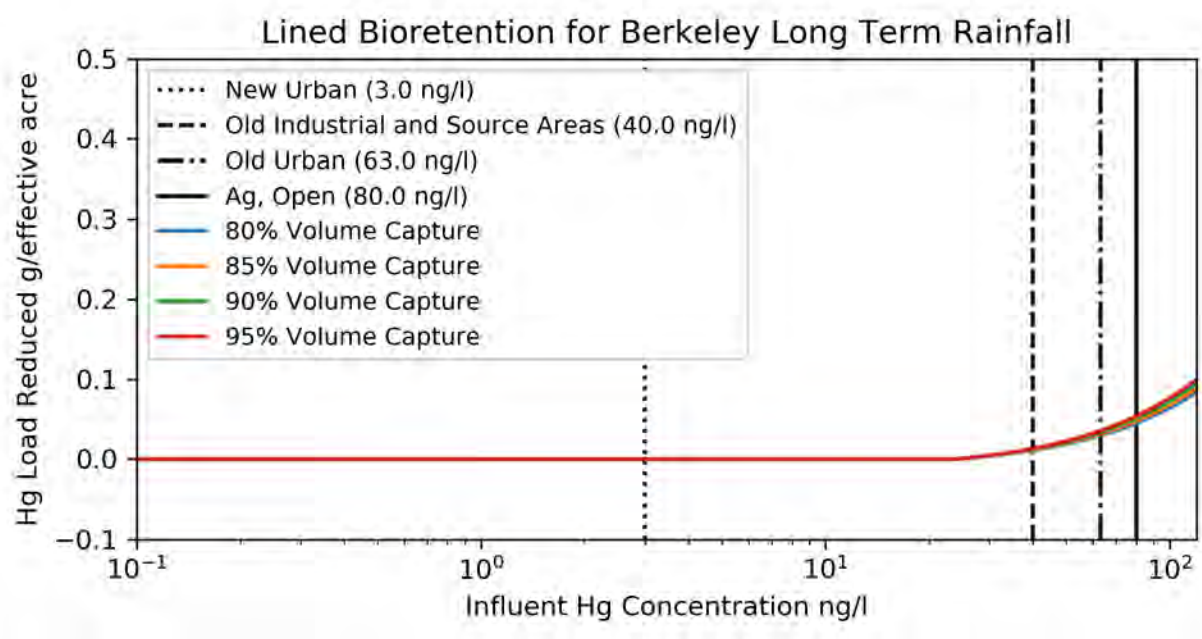

Figure 9: Modeled Mercury Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are summarized in Table 12.

Table 12: Mercury Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	Mercury Load Reduced (g/effective acre)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban	0.00467	0.00495	0.00524	0.00541
	Old Industrial and Source Areas	0.0623	0.066	0.0698	0.0722
	Old Urban	0.0981	0.104	0.110	0.114
	Ag, Open	0.125	0.132	0.140	0.144
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban	0.00113	0.0013	0.00153	0.00192
	Old Industrial and Source Areas	0.0234	0.0258	0.029	0.0341
	Old Urban	0.0462	0.0503	0.0556	0.0634
	Ag, Open	0.0643	0.0696	0.0765	0.0862
Lined Bioretention	New Urban	0	0	0	0
	Old Industrial and Source Areas	0.0108	0.0115	0.0123	0.0130
	Old Urban	0.0296	0.0314	0.0335	0.0353
	Ag, Open	0.0449	0.0476	0.0507	0.0536

[1] Average Annual Facility Volumetric Runoff Capture

6. REFERENCES

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APPENDIX A

Modeling Inputs and Data Exhibits

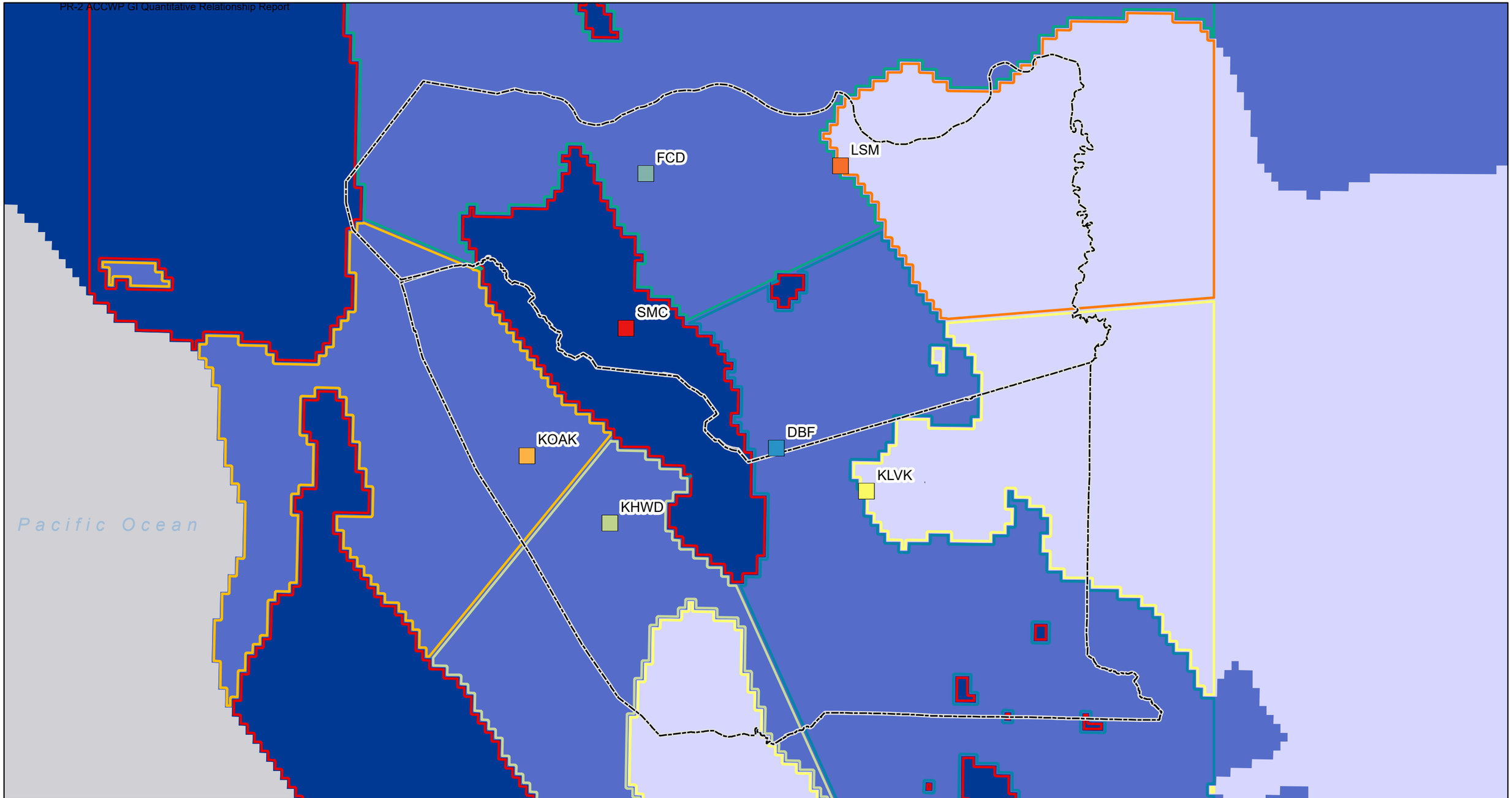

Rain Gauge ID
- Rain Gauge ID
- County Boundary

Mean Annual Precipitation (in)
- < 16
- 16 - 25
- > 25

Rain Gauge Zones
- DBF
- FCD
- KHWD
- KLVK
- KOAK
- LSM
- SMC

N

0 6 12 Miles

Precipitation Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 1

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_1_Precipitation_Zones.mxd 7/5/2018 6:00:09 PM

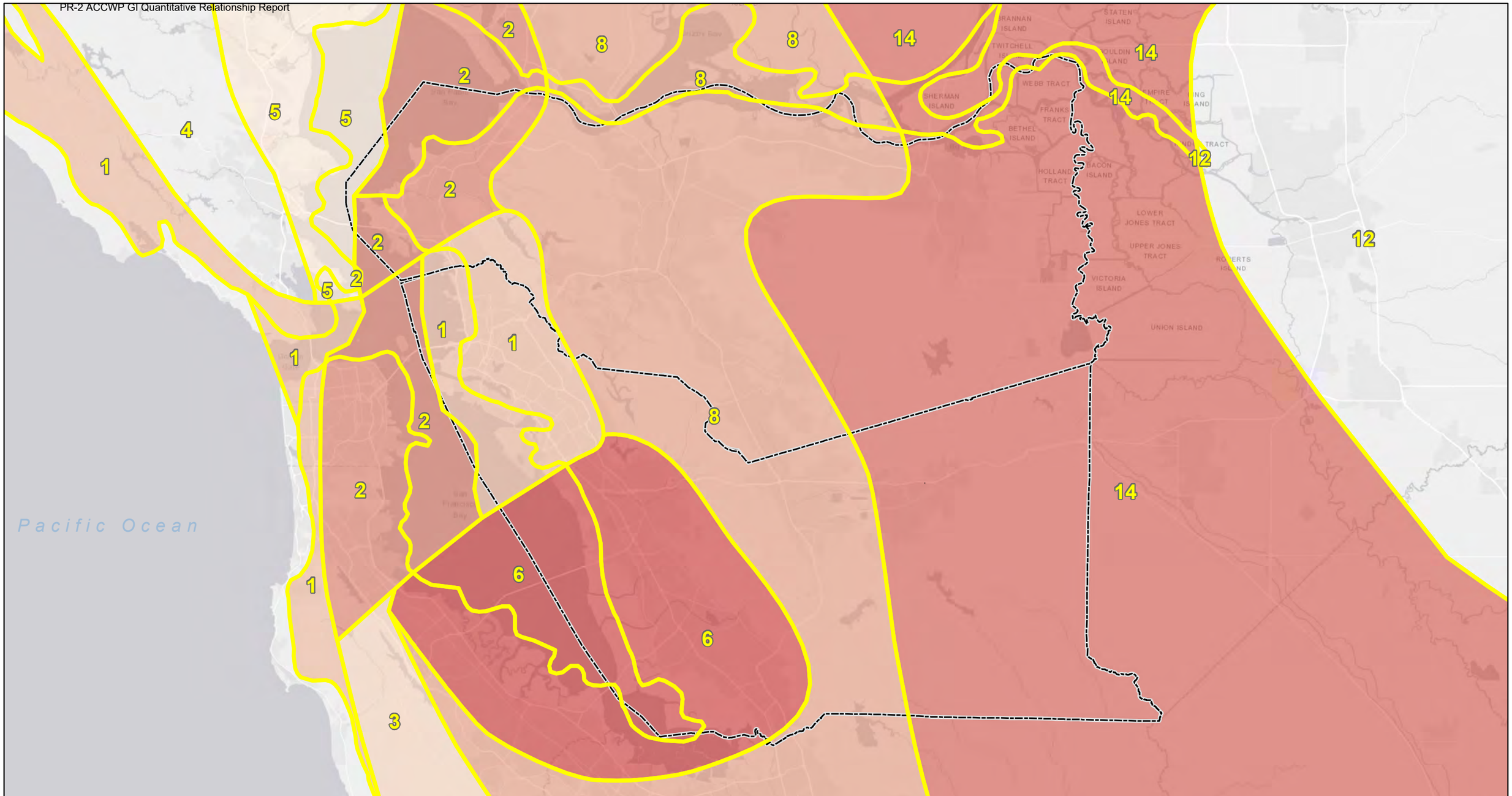

County Boundary

CIMIS ET Zone Boundary

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

N

0 6 12 Miles

CIMIS Evapotranspiration Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

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Exhibit 2

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_3_ET_Zones.mxd 7/5/2018 6:00:18 PM

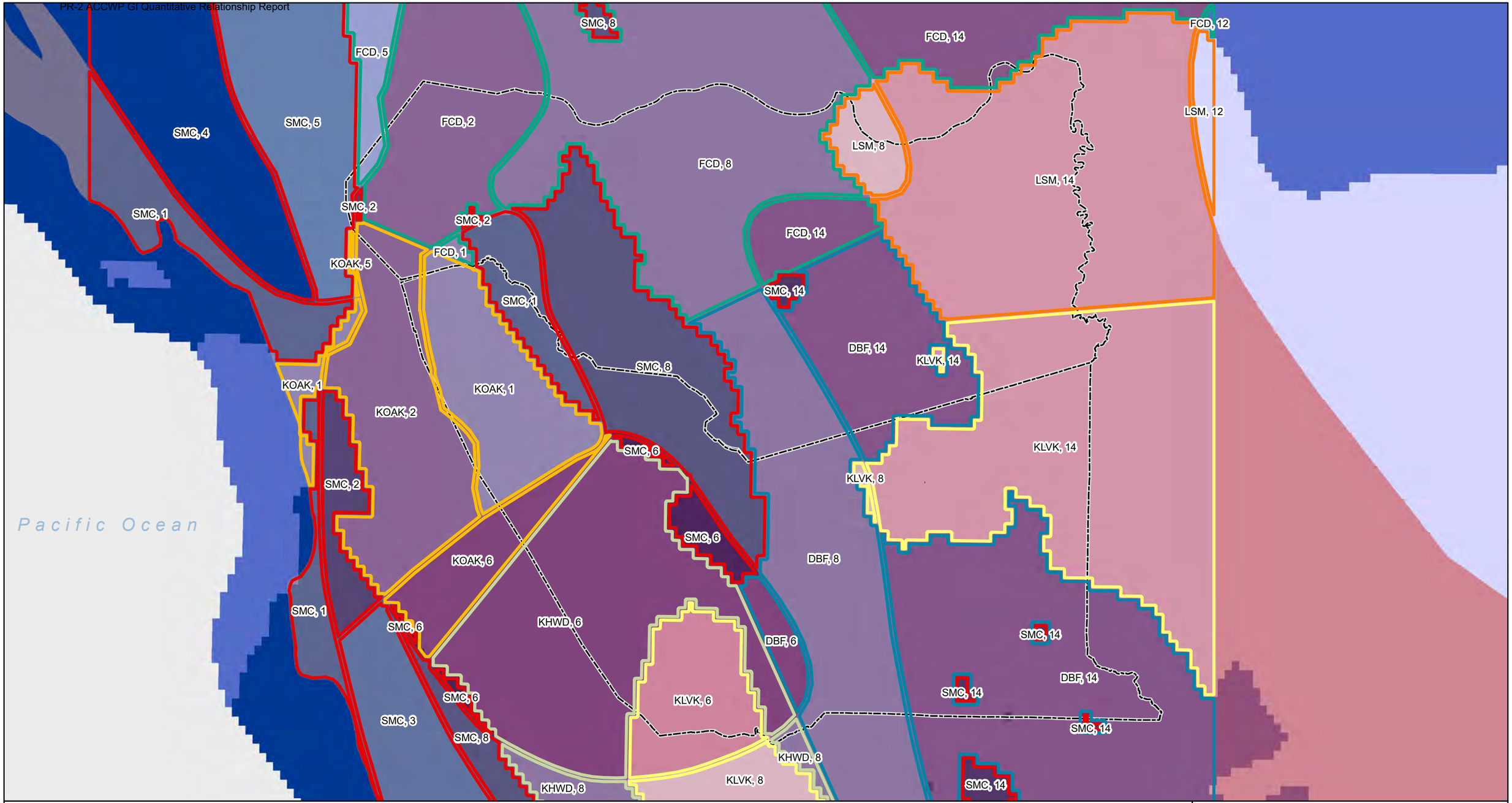

County Boundary

Mean Annual Precipitation (in)

- < 16
- 16 - 25
- > 25

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

Climate Zones are created by overlapping precipitation zones and ET zones.The unique climate zones that occur in Contra Costa and Alameda County are labeled as "Gauge ID, ET Zone".

N

0 6 12 Miles

Climate Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County California

Geosyntec consultants

Oakland | July 2018

Exhibit 3

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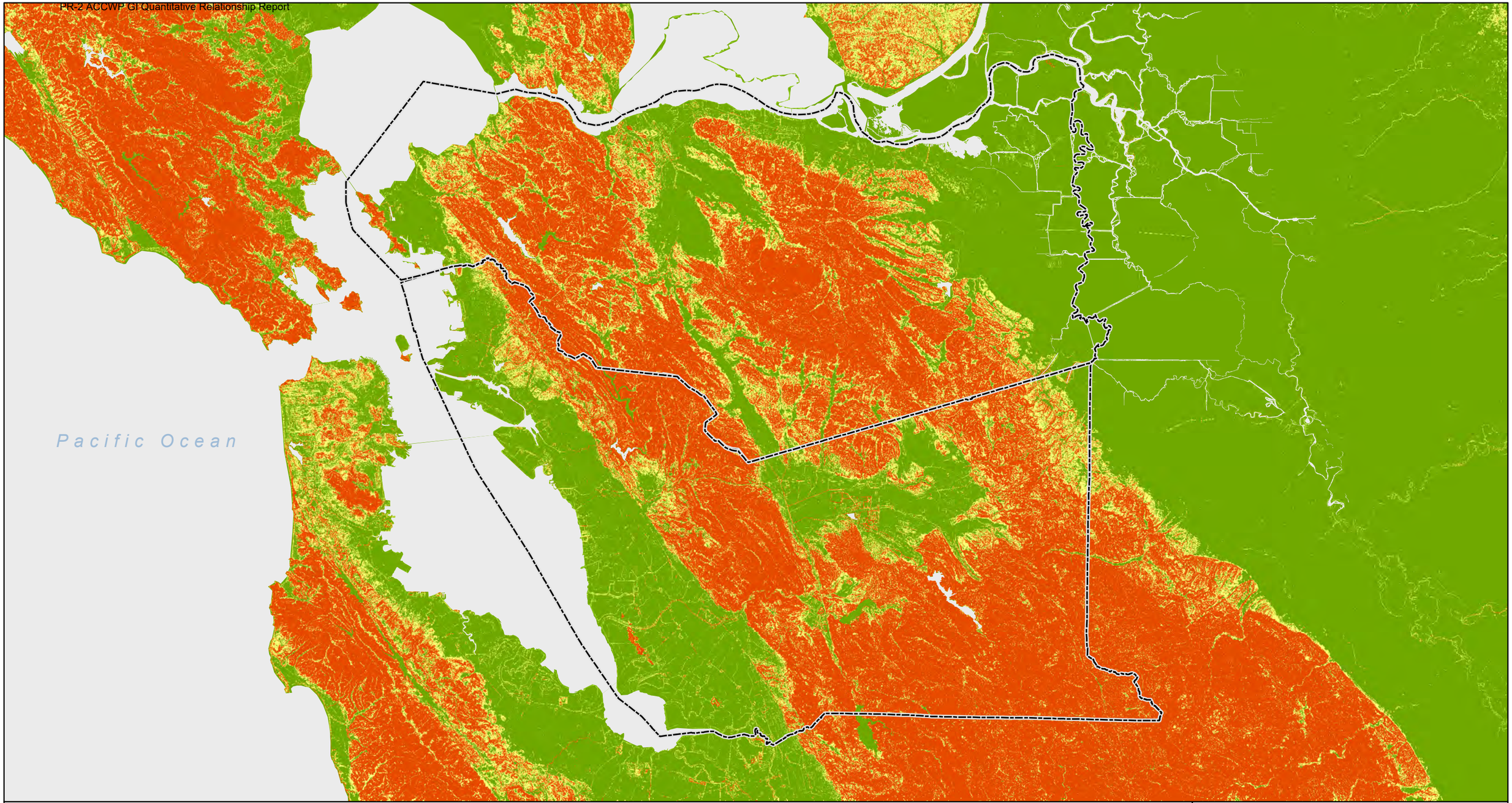

County Boundary

% Slope

- < 5
- 5-15
- > 15

N

0 6 12 Miles

Slope Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

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Exhibit 4

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_5_Slope_Zones.mxd 7/5/2018 6:00:33 PM

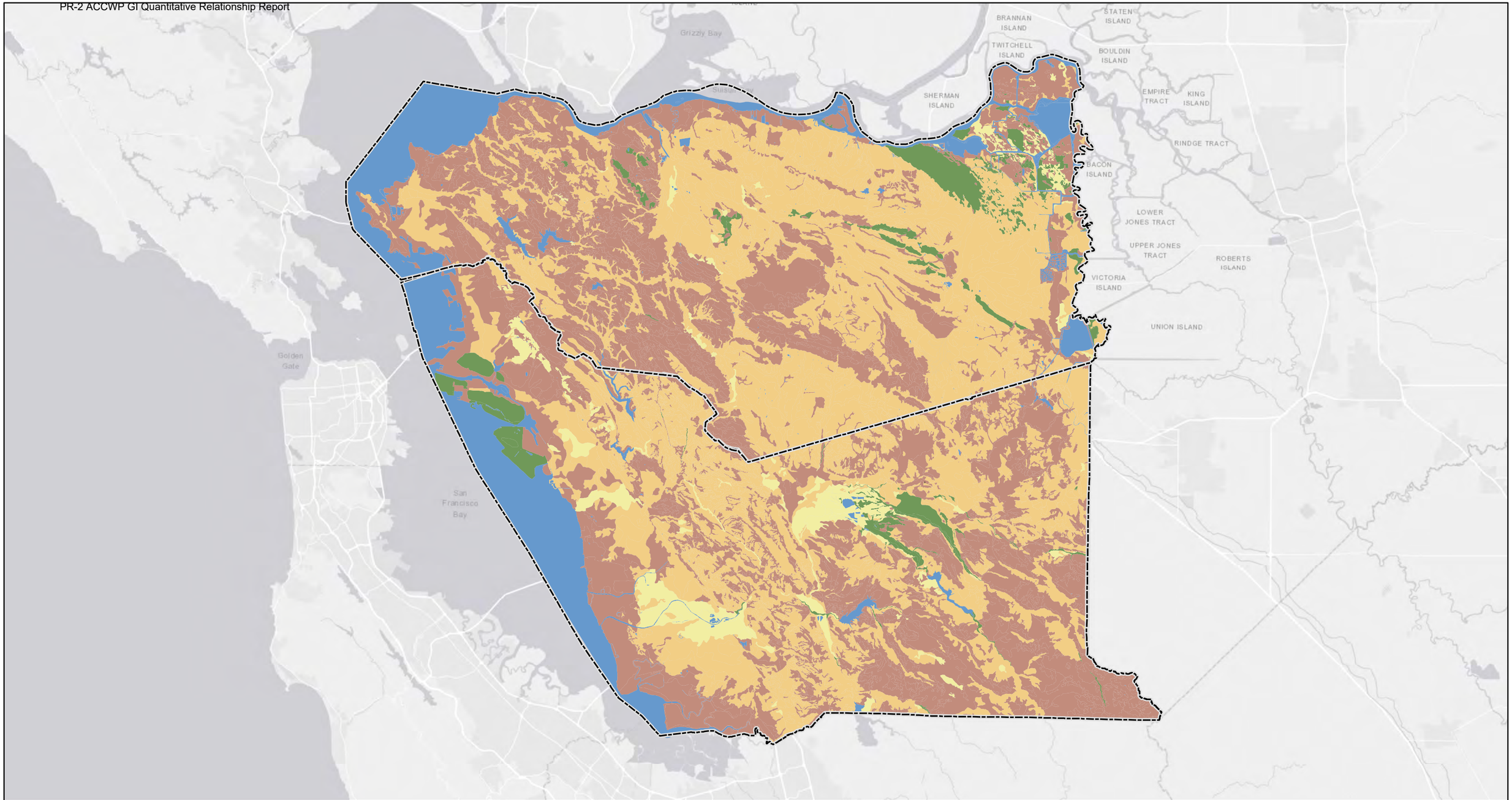

County Boundary

HSG

- A
- B
- C
- D
- W

Note: Area within the county with no HSG assignment was assigned the HSG of the most prominant adjacent soil group.

N

0 6 12 Miles

Hydrologic Soil Group

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 5

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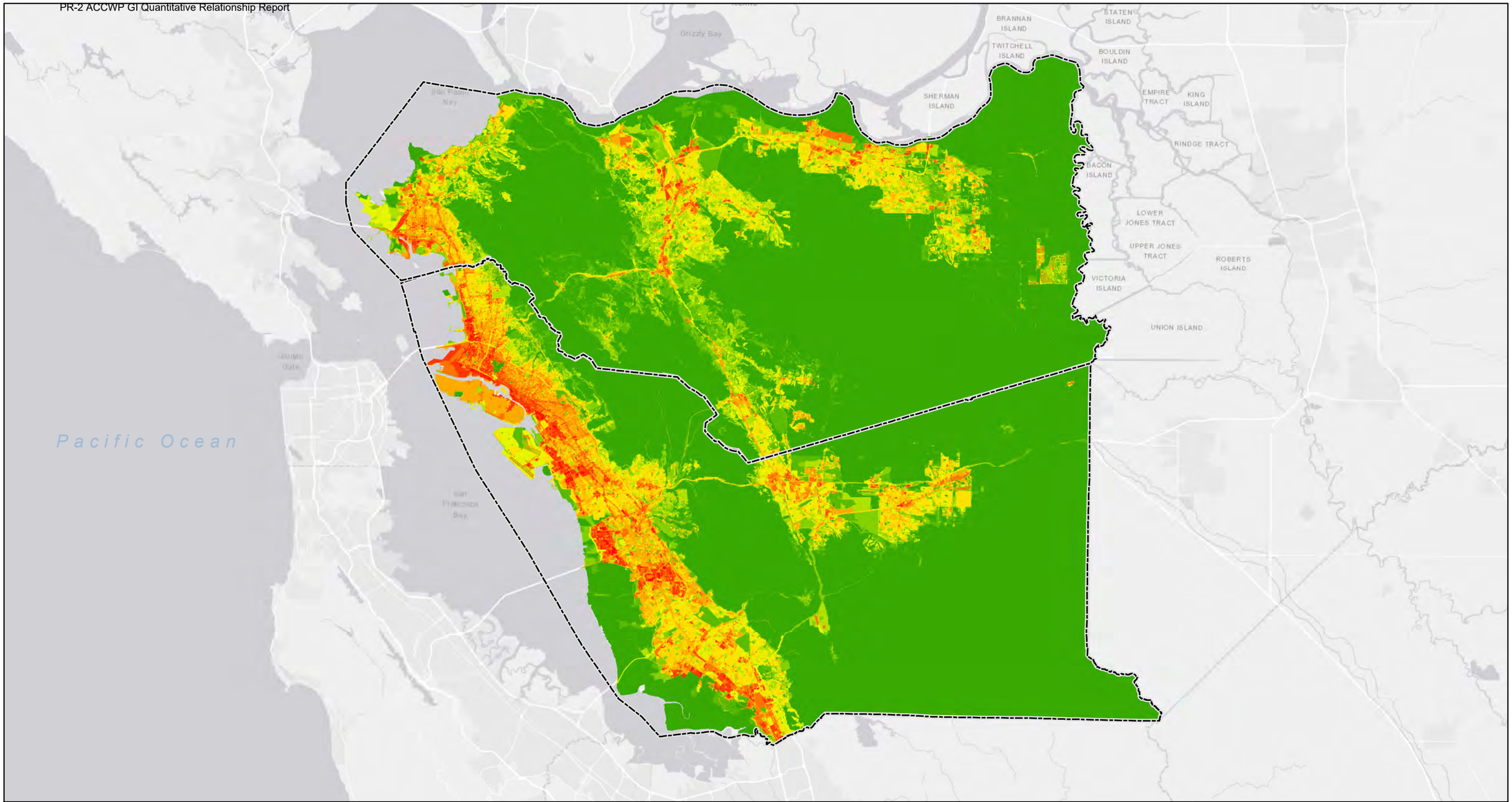

County Boundary

ABAG 2005 Imperviousness

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Note:
Imperviousness is assigned to ABAG 2005 landuse based on the NLCD 2006 Impervious Cover layer. These values may be adjusted during calibration for certain categories of ABAG landuse.

For purposes of calculating runoff from areas with compacted soil, developed areas and agricultural uses were assumed to be compacted to 0.75 times the underlying saturated soil conductivity (ksat). These areas generally have percent imperviousness > 20%.

N

0 6 12 Miles

Regional Imperviousness

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 6

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Exhibit_6_Imperv_dev_undev.mxd 8/1/2018 10:14:41 AM

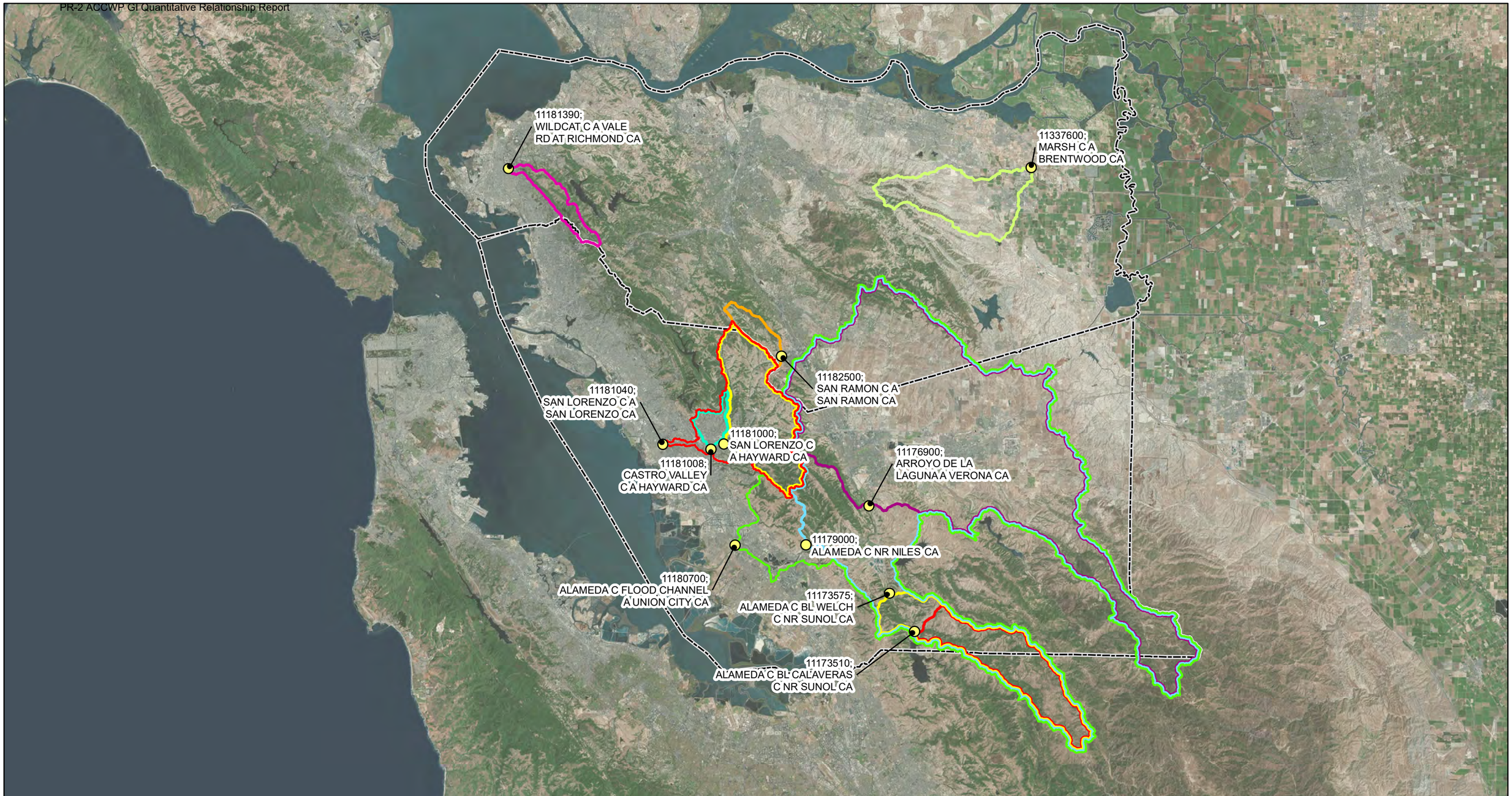

	Group 1	Group 2	Group 3	Group 4	Group 4
County Boundary	11181040	11180700	11182500	11337600	11181390
Gauge Location	11181000	11179000			
	11181008	11173575			
		11176900			
		11173510			

N

0 6 12 Miles

Candidate Calibration Watersheds

Alameda County and Contra Costa County
California

Geosyntec consultants

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Exhibit 7

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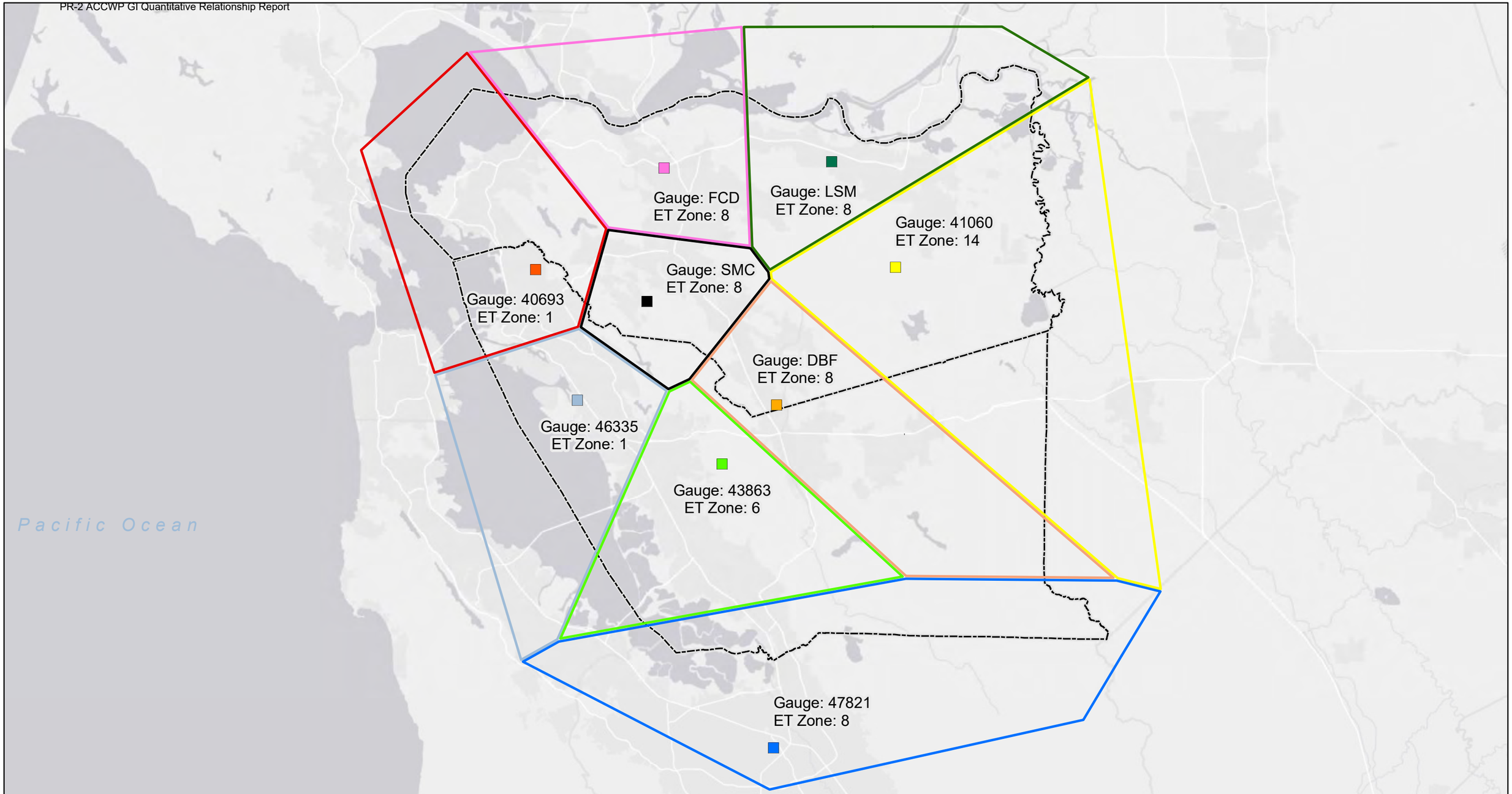

County Boundary

Long-Term Rainfall Gauge Location

- 40693
- 41060
- 43863
- 46335
- 47821
- DBF
- FCD
- LSM
- SMC

N

0 6 12 Miles

Long-Term Rainfall Gauge Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 8

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_8_GI_Long_Term_Rainfall_Precipitation_Zones.mxd 7/5/2018 6:01:01 PM

Plan View

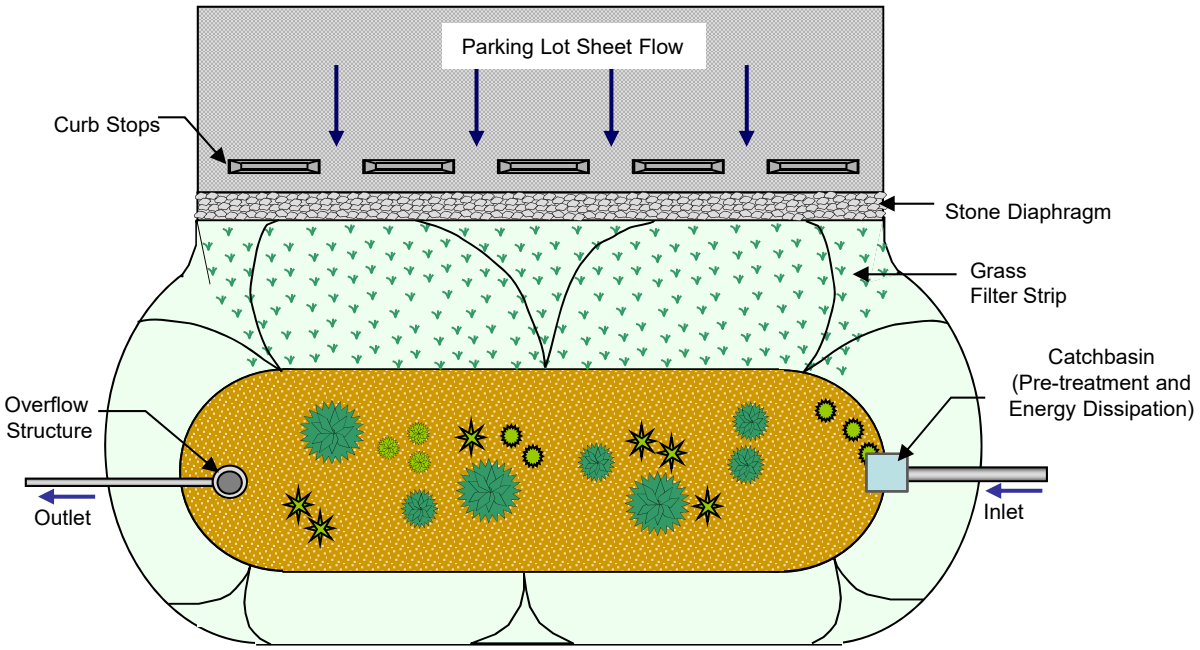

Profile

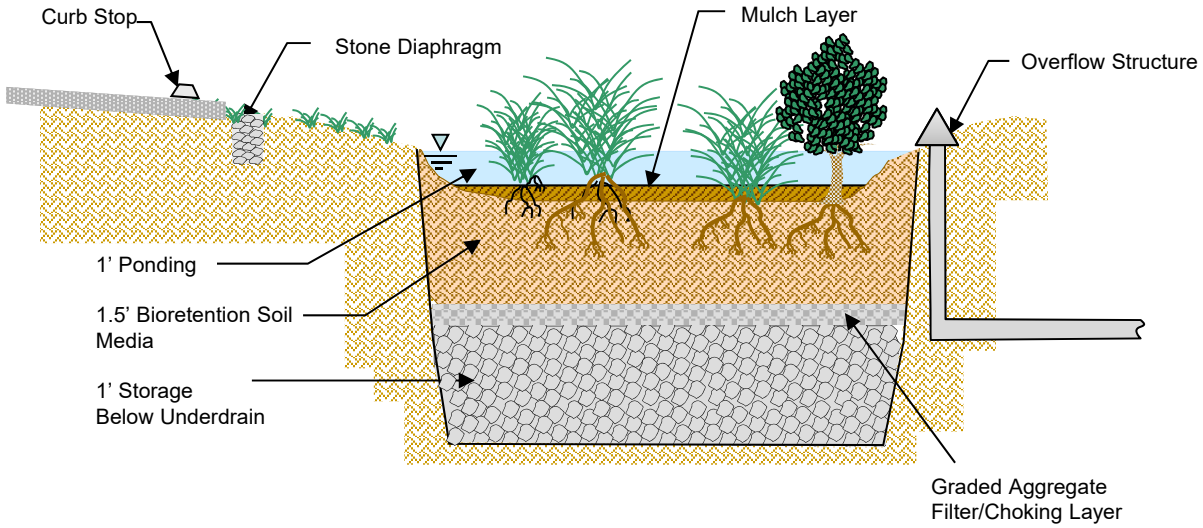

Note: Plan and Profile views are not to scale

Conceptual Illustration of an Infiltration Facility

Geosyntec consultants

Exhibit 9

Oakland | July 2018

Plan View

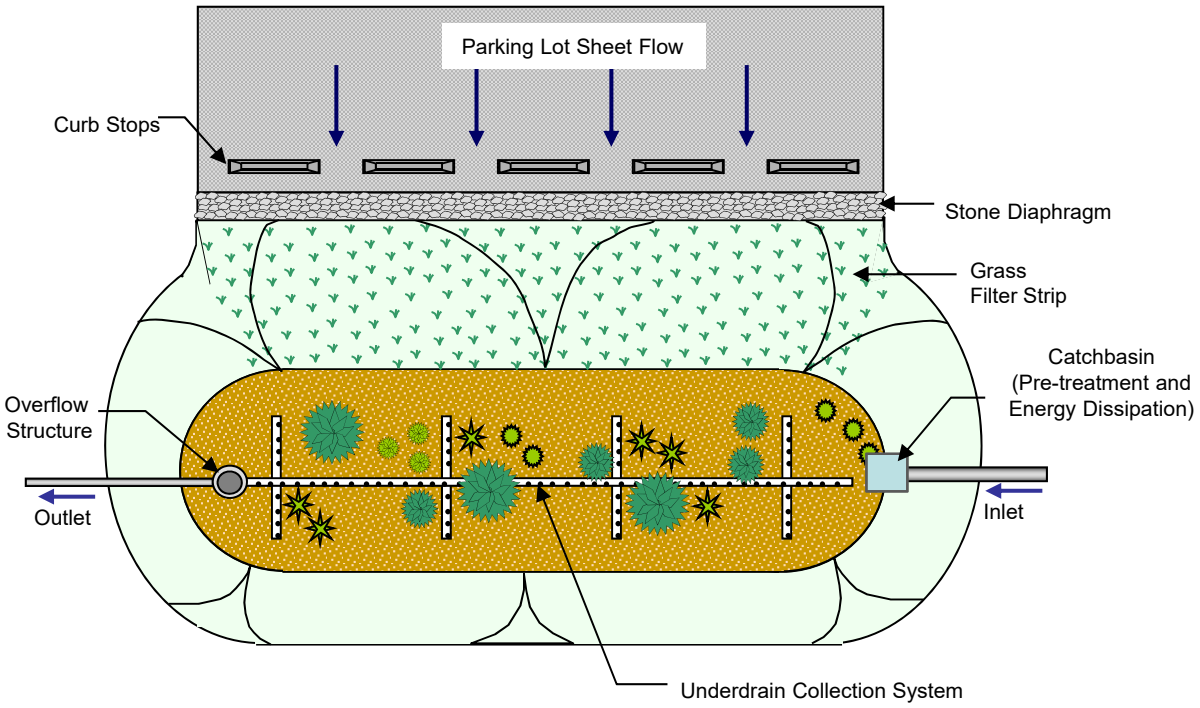

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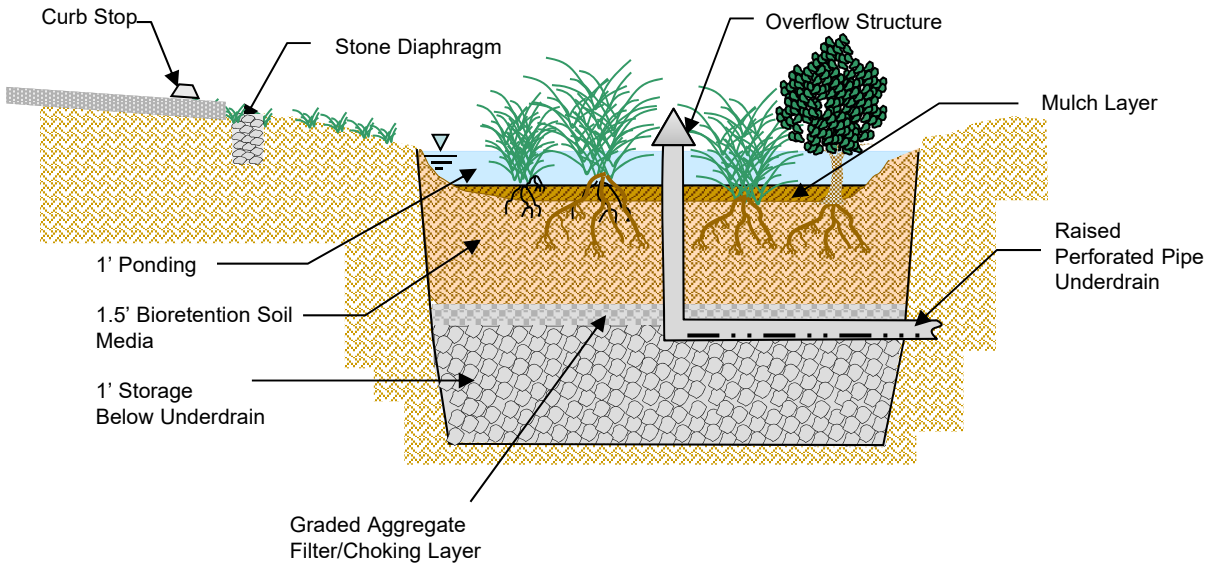

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Bioretention/Bioinfiltration Facility		
Geosyntec consultants		Exhibit 10
Oakland	July 2018	

Plan View

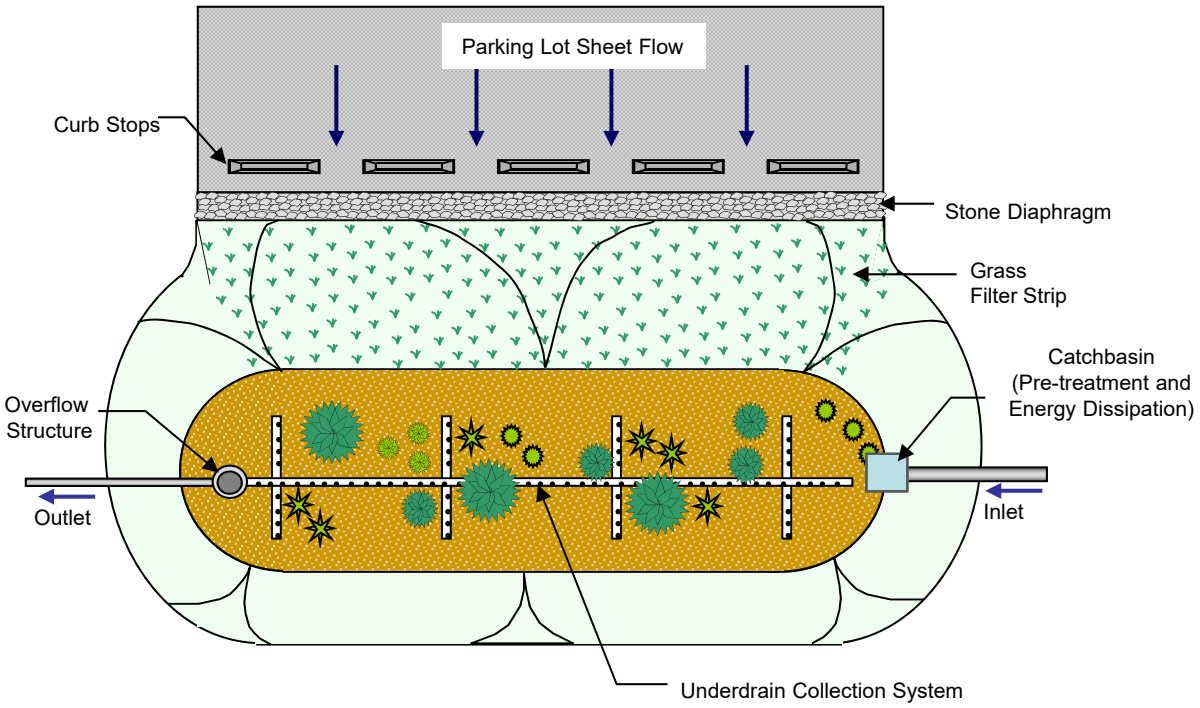

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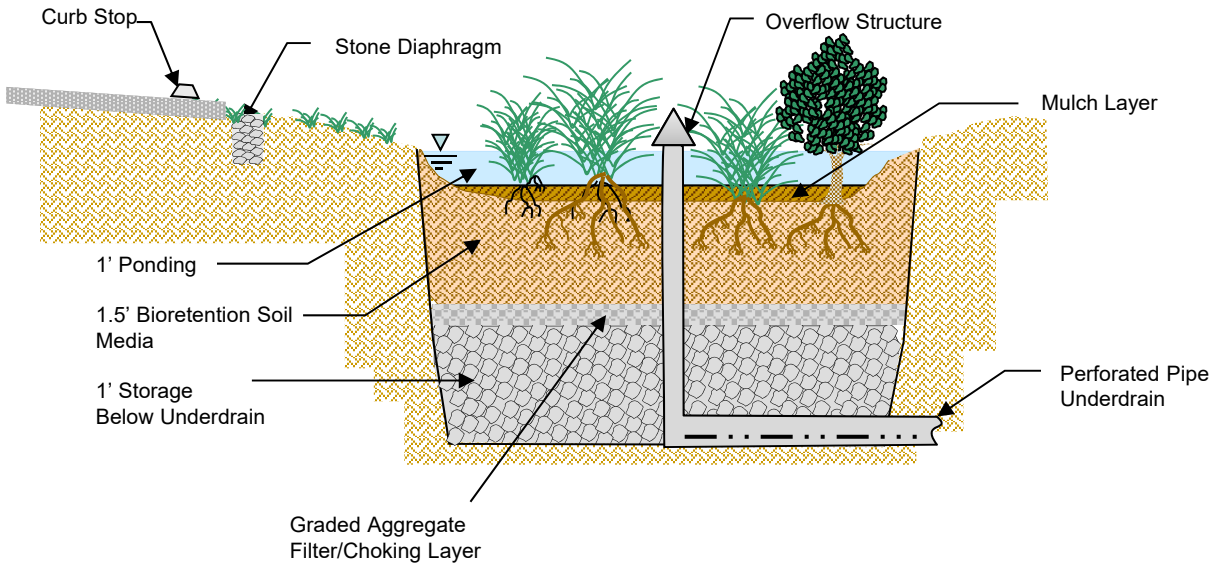

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Biofiltration Facility

Geosyntec consultants

Exhibit 11

Oakland | July 2018

PR-3 Contra Costa Clean Water Program GI Quantitative Relationship Report

CONTRA COSTA CLEAN WATER PROGRAM

QUANTITATIVE RELATIONSHIP BETWEEN GREEN INFRASTRUCTURE IMPLEMENTATION AND PCBs/MERCURY LOAD REDUCTIONS

Submitted in Compliance with Provisions C.11.b.iii.(3), C.11.c.iii.(3), C.12.b.iii.(3), and C.12.c.iii.(1)

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The Contra Costa Clean Water Program – A Municipal Stormwater Program consisting of Contra Costa County, its 19 Incorporated Cities/Towns, and the Contra Costa County Flood Control & Water Conservation District

This report is submitted by the agencies of the

CONTRA COSTA CLEAN WATER PROGRAM

Program Participants:

- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon and Walnut Creek
- Contra Costa County
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LIST OF ACRONYMS

ASOS	Automated Surface Observation System
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
CIMIS	California Irrigation Management Information System
GI	Green Infrastructure
GIS	Geographic Information System
HRU	Hydrologic Response Unit
KTRL	Kendall-Theil Robust Line
MAD	Median Absolute Deviation
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
ng/kg	nanogram per kilogram
NPDES	National Pollutant Discharge Elimination System
PCBs	Polychlorinated Biphenyls
RAA	Reasonable Assurance Analysis
RMSE	Root Mean Square Error
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WY	Water Year

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1. INTRODUCTION

1.1 Purpose

This *Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* report was prepared by the Contra Costa Clean Water Program (CCCWP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(3), C.12.b.iii.(3), and C.12.c.iii.(1) for submitting the quantitative relationship between green infrastructure (GI) implementation and PCBs load reductions that will be used for the Reasonable Assurance Analysis (RAA) required by MRP Provisions C.11.c.ii.(2), C.11.d.ii, C.12.c.ii.(2), and C.12.d.ii.

This report was prepared in cooperation with the Alameda Countywide Clean Water Program. The RAA modeling described herein will be conducted for both countywide programs and will use data inputs from both Contra Costa County and Alameda County.

1.2 Background

1.1.1 PCBs and Mercury Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to PCBs and mercury. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as Best Management Practices (BMPs), are the tools that Permittees can use to assist in restoring water quality in the Bay.

1.1.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and revised in 2015[1]. The MRP includes provisions to reduce loads of mercury and PCBs consistent with the TMDL implementation timeframe (Provisions C.11 and C.12, respectively) through implementation of GI projects (Provisions C.3.j, C.11.c, and C.12.c) and source controls (Provisions C.11.d and C.12.d).

The Permittees are reporting load reductions achieved before and during the current MRP term (2014 – 2020) using the approved Interim Accounting Methodology (BASMAA, 2017). MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3) requires the Permittees to report in the 2018 and subsequent Annual Reports any refinements to the Interim Accounting Methodology to be used in subsequent Permit terms. As part of this reporting requirement, Provision C.11.c.iii.(3) and C.12.c.iii.(1) requires the Permittees to report on the quantitative relationship between GI implementation and PCBs and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

Green Infrastructure Planning and RAA

MRP Provision C.3.j requires the Permittees to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. The Green Infrastructure Plan must be developed using a mechanism

[1] The cities of Antioch, Brentwood, and Oakley, and the eastern portions of unincorporated Contra Costa County and the Contra Costa County Flood Control & Water Conservation District (the East County Permittees) are located within the jurisdiction of the Central Valley Water Board and are covered under a separate Joint Municipal NPDES Permit titled "East Contra Costa County Municipal NPDES Permit" (East County Permit), which was last reissued in September 2010 (NPDES Permit No. CAS083313, Order No. R5-2010-0102). The East County Permit expired on September 1, 2015; however, it remains in force and effect until a new permit is reissued. In October 2016, the East County Permittees requested that the Central Valley Water Board designate the San Francisco Bay Water Board as the permitting authority for MS4 discharges in eastern Contra Costa County. In response to this request, the Central Valley Water Board provided a letter, dated January 6, 2017, that documents written agreement by both Water Boards to designate the San Francisco Bay Water Board to regulate MS4 discharges from the East County Permittees under MRP 2.0 and any successor orders. This East County Permittees are implementing PCBs and mercury control measures and this document reports those implementation efforts and the associated load reductions.

to prioritize and map areas for potential and planned GI projects, both public and private, on a drainage-area-specific basis, for implementation by 2020, 2030, and 2040.

MRP Provisions C.11.c and C.12.c require the Permittees to prepare an RAA for inclusion in the 2020 Annual Report that quantitatively demonstrates that specified mercury and PCBs load reductions will be achieved by 2040 through implementation of GI.

This RAA should do the following:

1. Quantify the relationship between the areal extent of GI implementation (e.g., acres treated) and mercury and PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of GI strategies likely to be implemented.
2. Estimate the amount and characteristics of land area that will be treated by GI by 2020, 2030, and 2040.
3. Estimate the amount of mercury and PCBs load reductions that will result from GI implementation by 2020, 2030, and 2040.
4. Ensure that the calculation methods, models, model inputs, and modeling assumptions used have been validated through a peer review process.

Additionally, MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and implementation schedules for mercury and PCBs control measures and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The implementation plans, which will also be included in the 2020 Annual Report, along with the GI-based RAA outlined above, must:

1. Identify all technically and economically feasible mercury or PCBs control measures (including GI projects, but also other control measures such as source property identification and abatement, managing PCBs in building materials during demolition, enhanced operations and maintenance, and other source controls) to be implemented;
2. Include a schedule according to which technically and economically feasible control measures will be fully implemented; and
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

This report presents the quantitative relationship between GI implementation and PCBs and mercury load reductions, including the data used and a full description of models and model inputs relied on to establish this relationship. This relationship will be used to predict loads reduced through GI implementation for the RAAs described above and to report loads reduced through GI implementation in the subsequent Permit term.

2. DESCRIPTION OF RAA MODEL

This section provides an overview of the RAA modeling framework and describes the output of each component.

2.1 RAA Model Overview

The approach used to estimate the load reductions resulting from implementation of GI includes the model components listed below, which are described in further detail in the following sections:

- Baseline Pollutant Loading Model – the baseline pollutant loading model is a continuous simulation[2] hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across the county during the TMDL baseline period (i.e., 2003 – 2005).
    - Hydrology – this model component produces average annual runoff across each county for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (i.e., imperviousness, underlying soil characteristics, slope, etc.) present within each county for a unit area drainage catchment. See Section 2.2.1.
    - Water Quality – the hydrology output is combined with average annual concentrations estimated by the Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM; Wu et al, 2017) developed by the San Francisco Estuary Institute (SFEI) to produce average annual PCBs and mercury loading for the period of record. See Section 2.2.2.

[2] Continuous simulation models calculate outputs (e.g., runoff) "continuously", i.e., for many time steps over a long-term period of record (e.g., every 10 minutes for 10 years). Long-term "continuous" input data (e.g., hourly rainfall) is required. This is contrasted with design-event simulations which model a single rainfall event, e.g., a 24-hour storm with a 10-year recurrence frequency.

- GI Performance Models – the GI performance models are developed to represent load reductions resulting from implementation of GI. See Section 2.3.
- Future Condition (RAA Scenario) Models – the RAA scenario models are conducted to represent future land use changes and control measure implementation that could result in pollutant load reduction. Both GI and source controls are considered, depending on the time frame of interest. See Section 2.4 for a description of load reduction calculations.

2.2 Baseline Loading Model

2.2.1 Hydrologic Model

As introduced above, the proposed approach for modeling hydrology is to use a hydrologic response unit (HRU) approach. An HRU is a unique combination of land surface features (imperviousness, underlying soil characteristics, slope, etc.) which is expected to give a consistent runoff response to rainfall, no matter where that unique combination is found. The HRU approach involves modeling all possible combinations of land surface features present within each county for a unit area drainage catchment and then storing these results in a database. These HRU results can been be scaled geospatially across the entire county without developing a detailed hydrologic model. This method is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017b).

The generic HRUs are modeled using USEPA's Stormwater Management Model (SWMM) to obtain an average annual runoff volume per acre for the identified baseline period of record (water year [WY] 2000 – 2009) for each HRU. Certain HRU inputs (imperviousness, soil parameters) are adjusted as needed to calibrate the HRUs on an average annual basis to identified flow gauges in the counties.

The average annual runoff volume per acre associated with a specific HRU can then be multiplied by the area represented by that HRU across each county (or a selected smaller planning area, such as a watershed or jurisdictional boundary). The resulting volumes associated with each represented HRU within the specified geospatial area can then be summed for the identified area to obtain the estimated total average annual runoff volume.

2.2.2 Water Quality Model

Identified HRUs across each county are combined with the RWSM land use classifications layer to determine pollutant loading rates. The RWSM provides average annual concentrations of PCBs

and mercury that wash off from various land use categories. On an average annual basis, this approach approximates the total load.

Average annual runoff volume associated with the geospatial HRUs is multiplied by the PCBs and mercury average annual concentration (based on the RWSM land use categories for the identified area) to obtain average annual pollutant load using the following equation:

$$Load_{Baseline} = \sum\left(\sum Unit\ Runoff_{HRU} \times Area_{LU,HRU}\right) \times Concentration_{LU} \times 0.00123 \qquad \text{Eqn. 1}$$

Where:

$Load_{Baseline}$	=	The total average annual baseline pollutant load for the identified area for calculation [grams/year]
Unit $Runoff_{HRU}$	=	The average annual runoff per acre for a given HRU within the identified area for calculation [ac-ft/acre/yr]
$Area_{LU,HRU}$	=	The total area of the HRU within the RWSM land use category within the identified area for calculation [acres]
$Concentration_{LU}$	=	The average annual pollutant concentration associated with the RWSM land use category [ng/L]
0.00123	=	Conversion factor [(L/ac-ft)*(g/ng)]

2.3 Green Infrastructure Performance Model

Volume reduction (via retention in the green infrastructure facility) and pollutant load reduction (via filtration through media and discharge through an underdrain) are modeled utilizing a combination of hydraulic modeling in SWMM and currently available empirical GI performance data.

2.3.1 Hydraulic GI Models

GI control measure hydraulic performance is modeled in SWMM with a 100% impervious tributary area for three GI facility types: (1) bioretention[3] with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention. The model is run with varying footprint sizes and varying underlying infiltration rates (i.e., the rate at which treated runoff infiltrates into native soils underlying the BMP facility). Average annual volume retained, volume treated, and volume bypassed by the GI measure are recorded for each GI model run.

Volume-based performance[4] corresponding to the generic 100% impervious tributary area can be applied to the effective area in GI drainage areas made up of identified HRUs. The effective area is also known as the "runoff generating area" and is calculated as the tributary area multiplied by the long-term or average annual runoff coefficient.

2.3.2 Green Infrastructure Pollutant Reduction Calculations

To calculate pollutant load reduction associated with GI implementation, the hydraulic model results are combined with water quality performance data. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load (Eqn. 2). Equations corresponding to the pollutant reduction calculation are provided below and the water balance is illustrated in Figure 1. In summary, influent load is calculated as the pollutant load produced by the 100% impervious tributary area for each RWSM land use category using Eqn. 3. The pollutant load that bypasses the facility is calculated as the proportion of runoff that bypasses the facility per the hydraulic GI model output, multiplied by the influent concentration (Eqn. 4). The effluent load is calculated as the proportion of runoff that is captured by the facility per the hydraulic GI model output, combined with an effluent concentration (Eqn. 5 and Eqn. 6).

[3] The bioretention is assumed to include: 6-inch or 12-inch ponding depth, 1.5 ft of filter media with a 5 in/hr flow through rate, and 1 ft of gravel beneath the media.

[4] Volume-based performance refers to how much runoff volume the GI facility captures and retains or treats and discharges through the underdrain, typically represented as a percentage of the average annual runoff volume.

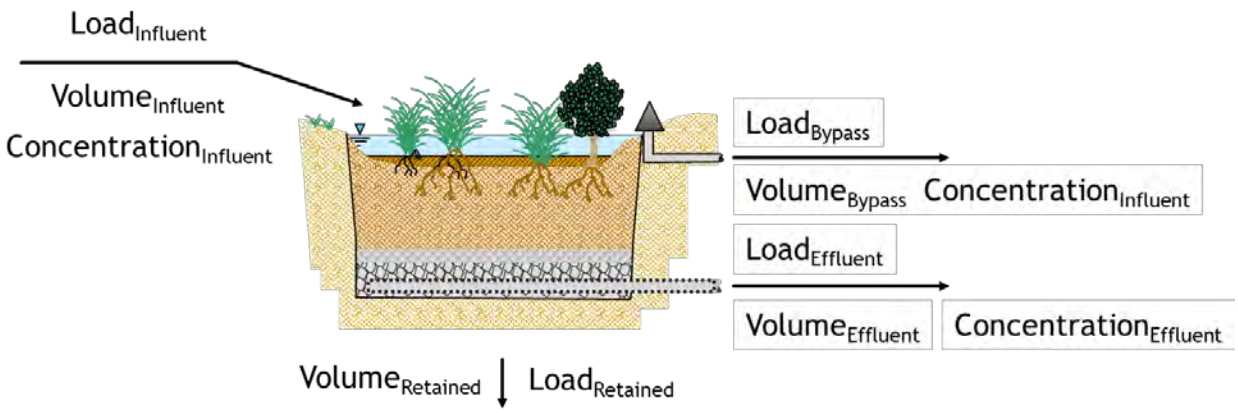

Figure 1: Illustration of GI Facility Pollutant Load Reduction Calculations

$$Load_{Reduced} = Load_{Influent} - Load_{Bypass} - Load_{Effluent} \quad \text{Eqn. 2}$$

$$Load_{Influent} = Volume_{Influent} \times Concentration_{Influent} \times C \quad \text{Eqn. 3}$$

$$Load_{Bypass} = Volume_{Bypass} \times Concentration_{Influent} \times C \quad \text{Eqn. 4}$$

$$Load_{Effluent} = (Volume_{Captured} - Volume_{Retained}) \times Concentration_{Effluent} \times C \quad \text{Eqn. 5}$$

$$Volume_{Captured} = Volume_{Influent} - Volume_{Bypass} \quad \text{Eqn. 6}$$

Where:

$Load_{Reduced}$	=	The total average annual pollutant load reduced by the GI facility [g/year]
$Load_{Influent}$	=	The total average annual pollutant load produced by the facility drainage area [g/year]
$Load_{Bypass}$	=	The pollutant load that bypasses the facility [g/year]
$Load_{Effluent}$	=	The pollutant load discharged from the facility after treatment [g/year]
$Volume_{Influent}$	=	The runoff produced by the drainage area to the GI facility [ac-ft/year]
$Volume_{Bypass}$	=	The proportion of influent runoff that bypasses the facility [ac-ft/year]

$Volume_{Captured}$ = The proportion of influent runoff that is captured by the facility [ac-ft/year]

$Volume_{Retained}$ = The proportion of captured runoff that is retained by the facility through infiltration and/or evapotranspiration [ac-ft/year]

$Concentration_{Influent}$ = The pollutant concentration associated with the GI drainage area [ng/L]

$Concentration_{Effluent}$ = The concentration discharged from the facility after treatment [ng/L]

C = Conversion factor constant = 0.00123 [(L/ac-ft)*(g/ng)]

2.4 RAA Scenario Loading Model

The loading corresponding with RAA future condition scenarios (2020, 2030, 2040) will be developed using the same volume and concentration combination approach used for the baseline condition. HRU outputs developed for the baseline model will scaled across the county corresponding to anticipated land use and development changes for each of the future conditions. Similarly, the RWSM land use classifications layer will be updated corresponding to each future condition scenario.

The outputs of the future hydrology scaling combined with the concentrations corresponding with future RWSM land use classification provides the land use-based loading estimated for each of the future conditions. To obtain the discharged load corresponding to each future GI scenario, load reductions associated with anticipated GI (developed as described above) will be subtracted from the land use-based load.

3. MODEL INPUTS AND DATA USED

This section describes the inputs to each component of the model and the data used.

3.1 Baseline Loading Model

3.1.1 Hydrologic Model

Generic HRU models are developed in SWMM to estimate average annual runoff volume per acre values that can be applied to all land surfaces within each county. The land surface feature inputs that will be varied to model the generic HRUs are described in the sections below and summarized in Table 3.

Climate Inputs

HRU climate inputs provide the total amount of precipitation that falls on the land surface and the amount of precipitation that is lost to the atmosphere via evapotranspiration before running off the land surface. Multiple gauges from across Alameda and Contra Costa counties that had continuous hourly precipitation data were chosen to represent distinct rainfall regions within both counties. For precipitation, these regions are based on 30-year annual rainfall regimes as identified by PRISM[5]. For evapotranspiration rates, the California Irrigation Management Information System (CIMIS) evapotranspiration zones were used within each county. The combination of the identified precipitation regions and evapotranspiration regions were combined to yield "climate zones" used for generic HRU models. Precipitation zones, evapotranspiration zones, and climate zones are shown in Exhibit 1 through Exhibit 3 (see Appendix A). Table 1 provides a summary of precipitation gauges used and average annual rainfall corresponding to the entire period of record and WY 2000 - 2009. Table 2 provides a summary of the CIMIS data used for the daily reference evapotranspiration rate for each evapotranspiration zone.

Table 1: HRU Precipitation Gauges WY2000-2009

Gauge ID	Gauge Name	Average Annual Precipitation (inches) WY 2000 - 2009	Gauge Source
KHWD	Hayward Air Terminal (ASOS)	16.3	ASOS[1]
KLVK	Livermore Municipal Airport (ASOS)	14.6	ASOS
KOAK	Oakland Airport (ASOS)	19.0	ASOS
DBF	Dublin Fire Station, San Ramon	17.3	CCCFCD[2]
FCD	Flood Control District, Martinez	16.2	CCCFCD
LSM	Los Medanos, Pittsburg	11.8	CCCFCD
SMC	Saint Mary's College, Moraga	28.9	CCCFCD

1. Automated Surface Observation System (ASOS) data were used for Alameda County gauge sites for the period of WY2000-2009 since NCDC gauge data was not available for the baseline period. ASOS sites sometimes co-occur with NCDC gauge sites (e.g., airports), but are maintained and delivered by separate government entities.
2. Contra Costa County gauge data is collected by the Flood Control District but was provided to Geosyntec by Dubin Engineering.

[5] Parameter-elevation Relationships on Independent Slopes Model (PRISM), developed and managed by the PRISM Climate Group, Oregon State University http://prism.oregonstate.edu/.

Table 2: CIMIS Reference Evapotranspiration

ET Zone	Monthly Evapotranspiration (in/day)[1]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.03	0.05	0.08	0.11	0.13	0.15	0.15	0.13	0.11	0.08	0.04	0.02
2	0.04	0.06	0.1	0.13	0.15	0.17	0.16	0.15	0.13	0.09	0.06	0.04
3	0.06	0.08	0.12	0.16	0.17	0.19	0.18	0.17	0.14	0.11	0.08	0.06
6	0.06	0.08	0.11	0.16	0.18	0.21	0.21	0.2	0.16	0.12	0.08	0.06
8	0.04	0.06	0.11	0.16	0.2	0.23	0.24	0.21	0.17	0.11	0.06	0.03
14	0.05	0.08	0.12	0.17	0.22	0.26	0.28	0.25	0.19	0.13	0.07	0.05

1. CIMIS reference evapotranspiration, which is based on irrigated turf grass, was scaled by 0.6 to represent the local mix of vegetated cover including urban vegetation, native xeric adapted plants, and unirrigated vegetated open space areas.

Slope

Slope affects how quickly rainfall will run off a modeled land surface and therefore how much is able to be infiltrated into the subsurface. The available digital elevation model (DEM)[6] for the counties was analyzed to obtain percent slope values for each ~30m by ~30m square of land surface. These percent slope values were classified into three distinct slope zones as summarized in Table 3 and shown in Exhibit 4 (see Appendix A).

Underlying Soil Inputs

Physical characteristics of the soil underlying the land surface affect the amount of rainfall that may be infiltrated into the subsurface. Infiltration was simulated in SWMM using the Green-Ampt infiltration model option. The physical soil input parameters for the Green-Ampt infiltration model were varied based on hydrologic soil group (HSG) as identified by the National Resource Conservation Service (NRCS[7]) soil survey and were modified as described below for developed areas. Soil parameters used as model inputs include suction head, hydraulic conductivity, and initial moisture deficit. Developed areas that are assumed to have been compacted and therefore result in less infiltration to the subsurface are modeled using 75 percent of the HSG hydraulic conductivity value. Soil parameters are not reported here, as this input is adjusted as part of

[6] U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013

[7] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. link: https://websoilsurvey.sc.egov.usda.gov/

baseline model calibration. Details about soil inputs are provided in Table 3. A map of hydrologic soil group is provided as Exhibit 5 (see Appendix A).

Areas of development were identified based on the land use of the surface. Soils within urban and agricultural use areas were considered to have been compacted by the site preparation and activities.

Imperviousness

Imperviousness (i.e., the percentage of impervious area) affects area on the land surface where rainfall may be infiltrated and therefore the quantity of runoff produced. The runoff from a range of land use imperviousness values is modeled by area-weighting the results of a pervious surface runoff result (i.e., pervious HRU output) with a corresponding impervious surface runoff result (i.e., impervious HRU output) (see Table 3 and Exhibit 6 (see Appendix A)).

The baseline model HRU imperviousness is developed by geospatially combining the land uses identified by Association of Bay Area Governments (ABAG, 2005) with the National Land Cover Dataset (NLCD, 2006) data. Each feature of the ABAG dataset is assigned a single imperviousness value that is used to determine the average hydrologic response of that land surface. A lookup-table containing NLCD based imperviousness for each ABAG land use code was used as a starting value for HRU calibration. These initial values may be adjusted within an appropriate range as part of baseline model calibration.

3.1.2 Developing HRUs across each County

Each identified combination of land surface features is modeled for a generic unit-acre drainage area in SWMM for the baseline period of record (i.e., WY 2000 – 2009), utilizing a batch-processing method (which allows for inputs to be altered, model files run, and results extracted for many models automatically). The average annual runoff volume per acre is then extracted for each generic HRU modeled.

Table 3: Land Surface Feature Inputs for Generic HRU Hydrologic Models

Variables	Description	Number of Varying Features	Feature Representations	Source
Hourly Annual Precipitation	Rainfall Gauge and Rainfall Zone	7	Contra Costa County Gauges: DBF, FCD, LSM, SMC Alameda County ASOS Gauges: KHWD, KLVK, KOAK	PRISM[1], NCDC/ County-maintained rainfall gauges
Daily Evapotranspiration Rate	Evapotranspiration Zone	5	Zones 1, 2, 3, 6, 8, 14	CIMIS[2]
Slope Zone	Representation of Slope	3	<5%, 5-15%, 15%+	USGS[3]
Developed/ Undeveloped Areas	Representation of Compaction of Underlying Soils (Pervious Areas Only)	2	Undeveloped (Ksat * 1) Developed (Ksat * 0.75)	ABAG Land Use 2005[4]
Hydrologic Soil Group	Representation of Underlying Soil Type (pervious areas only)	6	HSG A, B, C, D[5], Rock, Water	NRCS[6]
Imperviousness	Representation of Imperviousness	2	0% and 100%	NLCD and ABAG 2005

1. PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, 30-year normal mean annual precipitation
2. California Irrigation Management Information System (CIMIS) Reference Evapotranspiration; digitized from http://www.cimis.water.ca.gov/App_Themes/images/etozonemap.jpg
3. U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013
4. ABAG land uses are proposed to be used for identifying developed and undeveloped condition and will have an imperviousness value assigned based on a geospatial analysis of the NLCD Imperviousness layer. The impervious value for each ABAG land use feature will then be carried into the HRU model calibration and adjusted accordingly.
5. "Urban" representation will be re-classified based on the dominant adjacent HSG.
6. U.S. Department of Agriculture, Natural Resources Conservation Service. Soil Survey Geographic (SSURGO) database. 2016

HRUs are determined geospatially based on the climate zone, slope zone, developed/undeveloped areas, and HSG, along with land use-based imperviousness. Exhibits 1 through 5 (see Appendix A) display the data used to develop climate zones, county slope zones, and the HSG distribution across each county. Imperviousness designations will occur based on

land use at the parcel level, by combining the geospatial ABAG land use layer[8] with the other hydrologic input regions. This results in a "patchwork" of HRUs across the counties[9].

The resulting patchwork of HRUs can be combined at the scale of choice to provide total runoff volumes for a specific area, such as a watershed or jurisdictional boundary. To estimate the total runoff for the identified area, the total acreage of each designated HRU present within a watershed or jurisdiction will be multiplied by the average annual runoff per acre associated with each HRU and then summed (i.e., area-weighting the average annual runoff volume per acre for all HRUs present).

3.1.3 HRU Input Calibration

Calibration of hydrologic models is required by the *Bay Area RAA Guidance Document*. Calibration of the generic HRU models will be conducted utilizing available stream flow records and based solely upon the annual discharge volume between WY 2000-2009. This annual calibration means that the HRU runoff estimates are representative of the approximate annual runoff volume but will not be used to estimate or compare discharge rates at smaller timesteps, such as the hourly or daily runoff hydrograph.

The list of candidate gauge sites within the counties was developed based on an assessment of the representativeness of the gauged watersheds and the mitigation of confounding factors that interfere with calibration such as missing data and upstream impoundments. For the purposes of calibration, the candidate gauge sites that were selected included stream depth rating curves and at least daily mean records for the historical period of interest. The USGS flow gauges considered for calibration are provided in Table 4 and shown in Exhibit 8 (see Appendix A).

[8] ABAG land use features will used to aggregate the imperviousness for the land surface. The relationship between AGAB feature and its imperviousness will be developed based upon other local sources (SMCWPPP, 2017) and analysis of national public data sets such as the National Land Cover Dataset (NLCD)

[9] This will be done once all the HRU input files are finalized, including the imperviousness layers.

Table 4: Flow Gauge Considered for RAA Model Calibration

Gauge ID	Gauge Name	Location	County	Data Frequency
11337600	Marsh Creek	Brentwood	Contra Costa	Daily
11182500	San Ramon Creek	San Ramon	Contra Costa	Daily
11181390	Wildcat Creek	Richmond / San Pablo	Contra Costa	Daily
11181040	Lan Lorenzo Creek	San Lorenzo	Alameda	Daily
11181008	Castro Valley Creek	Hayward	Alameda	Daily
11181000	San Lorenzo Creek	Hayward	Alameda	Daily
11180700	Alameda Creek Flood Channel	Union City	Alameda	Daily
11179000	Alameda Creek	Fremont	Alameda	Daily
11176900	Arroyo de la Laguna	Verona	Alameda	Daily
11173575	Alameda Creek Below Welch Creek	Sunol	Alameda	Daily
11173510	Alameda Creek Below Calaveras Creek	Sunol	Alameda	Daily

The effective area tributary to each flow gauge is used to calibrate the HRUs to the stream gauge records. Annual flow predicted by area-weighting HRU runoff output for the watersheds draining to the stream gauges was compared to annual flow in the stream records for the identified period of record.

Calibration of land surface runoff hydrology to stream gauge records requires that baseflow be computed and accounted for throughout the period of record. A variety of methods exist for separating baseflow from runoff, including the fixed-interval method and the local-minimum method (Sloto and Crouse, 1996). The most appropriate method for separating baseflow is determined on a gauge by gauge basis depending on the variability in the flow record, and the occurrence of confounding factors that affect baseflow such as dam releases and other dry weather inflows.

The average percent difference between the area-weighted HRU total average annual runoff volume for the watershed and the average annual flow (converted to volume) measured for the WY 2000 – 2009 period will be calculated. The acceptable ranges included in the RAA Guidance document are provided in Table 5 below.

Table 5: Allowable Difference between Simulated and Observed Annual Volumes

Model parameters	Average % difference between simulated annual results and observed data		
	Very Good	Good	Fair (lower bound, upper bound)
Hydrology/Flow	<10	10-15	15-25

If the average percent difference between simulated and measured annual storm flow volumes is greater than 25%, HRU model parameters are adjusted until the percent difference is within the acceptable range. The primary model parameters adjusted include underlying soil hydraulic conductivity and land use imperviousness, but other hydrologic model parameters, such as depression storage, may be adjusted as appropriate.

Once average percent differences in all identified watersheds are within the acceptable range, the HRU model parameters are finalized and the HRU results database will be regenerated. HRUs and resulting average annual baseline volume will be applied across each county to obtain the baseline volume discharged by each county.

3.1.4 Water Quality Model

RWSM values used to develop pollutant loading estimates across each county are:

Table 6: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total mercury (ng/L)
Ag, Open	0.2	80
New Urban	0.2	3
Old Residential	4	63
Old Commercial/ Transportation	40	63
Old Industrial and Source Areas	204	40

Water quality calculations are also used to perform baseline pollutant loading validation. The calculated pollutant load draining to Regional Monitoring Program stations will be validated by calculating the volume-weighted watershed pollutant concentration using the modeling results and comparing it to the observed concentrations in the Regional Monitoring Program data. The equation used to calculate concentration (in ng/L) at an end-of-watershed location is as follows:

$$Concentration_{Baseline} = \frac{\sum Runoff_{HRU} \times Area_{HRU} \times Concentration_{LU,HRU}}{\sum Runoff_{HRU} \times Area_{HRU}} \quad \text{Eqn. 7}$$

03992
4033

Pollutant concentration and loading data from the Regional Monitoring Program will be compared to the result of Equation 7 for several watersheds for validation purposes.

3.2 Green Infrastructure Performance Model

3.2.1 Long-Term Green Infrastructure Simulations

Long term performance was assessed for each BMP configuration using continuous historical rainfall records. In Contra Costa County historical data was available at the same gauges that were used for the HRU runoff modeling between WY2000-2009, but for Alameda County other gauge sites with longer histories were used for long term BMP performance modeling. The rainfall gauges used to model BMP performance are shown in Table 7.

Table 7: Long Term GI Performance Precipitation Gauges

Gauge ID	Gauge Name	Period of Record	Average Annual Precipitation (inches)	Gauge Source[1]
040693	Berkeley (NCDC)	1948-1990	19.8	NCDC
041060	Brentwood (NCDC)	1950-1985	14.9	NCDC
043863	Hayward (NCDC)	1948-1988	24.3	NCDC
046335	Oakland Airport (NCDC)	1948-1985	16.4	NCDC
047821	San Jose Airport (NCDC)	1948-2010	13.6	NCDC
DBF	Dublin Fire Station, San Ramon	1973-2016	15.0	CCCFCD
FCD	Flood Control District, Martinez	1971-2016	16.5	CCCFCD
LSM	Los Medanos, Pittsburg	1974-2016	10.6	CCCFCD
SMC	Saint Mary's College, Moraga	1972-2016	26.8	CCCFCD

1. NCDC data was used for Alameda County and San Jose gauge sites. Contra Costa County gauge data is collected by the Flood Control District and was provided to Geosyntec by Dubin Engineering.

3.2.2 Hydraulic Green Infrastructure Model

Hydraulic GI models were developed in SWMM to estimate hydraulic performance for a 100% impervious tributary area. Hydraulic model inputs that were varied to model the GI facility performance for the counties are described below and summarized in Table 8.

1. BMP Configuration – three GI facility types were assumed: (1) bioretention with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention with an underdrain.

2. BMP Footprint Size – the BMP footprint size was varied as a percent of impervious area to model different levels of hydraulic capture performance depending on facility sizing.
3. BMP Underlying Infiltration Rate – the infiltration rate of the soils underneath the bioretention facility was varied for the bioretention with a raised underdrain and bioretention with no underdrain configurations (I.e., the unlined facility types).

Table 8: Land Surface Feature Inputs for Generic GI Performance Hydraulic Models

Variables	Description	Number of Varying Features	Feature Representations
Hourly Precipitation	Rainfall Gauge	9	NCDC: 040693 (Berkeley) 046335 (Oakland Airport) 043863 (Hayward) 047821 (San Jose) 041060 (Brentwood) Contra Costa County: DBF, FCD, LSM, SMC
Daily Evapotranspiration Rate	Evapotranspiration Zone	4	CIMIS Zones: 1, 6, 8, 14
BMP Configurations	BMP profiles and underdrain	3	Lined Bioretention with underdrain Unlined Bioretention with elevated underdrain Infiltration Basin without underdrain
BMP Surface Ponding Depth	Depth (feet)	2	0.5, 1
BMP Footprint Sizes	% of Impervious Area	12	0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 3.5, 4, 5, 6
BMP Infiltration Rates	Ksat of underlying soil (in/hr)	7 3	Unlined Bioretention: 0.024, 0.05, 0.1, 0.2, 0.24, 0.3, 0.4, 0.5 Infiltration Basin: 0.5, 1, 2

The BMP cross-sections that were modeled each include:

- 6-inches or 12-inches ponding depth (both were modeled),
- 1.5 ft of filter media with 25% porosity with a 5 in/hr flow through rate, and

- 1 ft of gravel beneath the media with 40% porosity.

Two of the modeled BMP configurations include underdrains. In the lined bioretention facility, the underdrain is located at the bottom of the gravel layer. In the unlined bioretention facility, the underdrain was modeled at the top of the gravel layer. BMP configurations are shown in Exhibits 9 through 11 (see Appendix A).

3.2.3 Green Infrastructure Pollutant Reduction Calculations

As described in Section 2.3.2, pollutant load reduction associated with GI is calculated by combining the hydraulic model results with water quality performance data. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load. The effluent load is calculated as the proportion of runoff that is treated by the GI measure multiplied by an effluent concentration.

Water quality performance data from selected, representative studies were used to determine a method to predict effluent concentrations in stormwater following treatment through a biofiltration (bioretention or tree well filters) GI measure. The data used to develop the relationship came from three studies: a) 2011 monitoring study of the El Cerrito Rain Gardens (Gilbreath, Pearce, and McKee, 2012), b) Clean Watersheds for a Clean Bay (CW4CB)[10] (Geosyntec and EOA, 2017), and c) a study at Echo Lake in King County, WA (King County, 2017). A summary of the paired influent-effluent data associated with each study is provided in table:

Table 9: Data used to Develop Effluent Concentrations

Project Name	Project Sponsor	Facility ID	Influent-Effluent Data Pairs (n pairs)	
			PCBs	Mercury
El Cerrito Green Streets – CW4CB	El Cerrito	ELC-B1	3	3
El Cerrito Green Streets – SFEI	SFEI	ELC-B1	4	4
PG&E Substation 1st and Cutting Bioretention Cells – CW4CB	Richmond	LAU-3	8	8

[10] The CW4CB study included additional monitoring of the El Cerrito rain gardens.

Project Name	Project Sponsor	Facility ID	Influent-Effluent Data Pairs (n pairs)	
			PCBs	Mercury
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Bioretention Planter Boxes – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	BPB-1	4	0
		BPB-2	4	0
		BPB-3	4	0
		BPB-4	2	0
West Oakland Industrial Area Tree Wells – CW4CB	Oakland	ETT-TW2	4	4
		ETT-TW6	4	4
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Tree Well – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	FLT-1	4	0
		Total Data Pairs	41	23

These data were statistically evaluated to identify an appropriate method for predicting effluent concentrations of PCBs and total mercury. The data analysis first evaluated whether available influent and effluent concentration data were significantly different and, if so, whether a monotonic relationship existed (i.e., effluent generally increased when influent increased).

A Wilcoxon non-parametric hypothesis test was run on the PCBs and total mercury paired influent-effluent data to determine if influent and effluent concentrations were statistically different at a 5% significance level. This difference was found to be significant for PCBs, and significant for total mercury when corresponding influent suspended solids concentration was greater than 20 mg/L.

Spearman's rho and Kendall's tau, which are non-parametric rank correlation coefficients, were used to identify the direction and strength of correlation between influent and effluent concentrations. As shown in Table 10, both correlation coefficients suggest that effluent concentrations are positively correlated with influent concentrations for both PCBs and mercury.

Table 10: Influent/Effluent Correlation Coefficients.

Correlation Coefficient	Total PCBs	Total Mercury
Spearman's rho	0.725	0.547
Kendall's tau	0.527	0.396

The Kendall-Theil Robust Line (KTRL) method (Granato, 2006) was used to determine the best fit line between influent and effluent data. This non-parametric method uses the median of all possible pairwise slopes between points, which is more robust to outliers than a simple linear regression. Because stormwater data tend to be lognormal, the analysis was focused on linear and log-linear relationships. After the KTRL was generated, the lower portion of the curve was adjusted to assume that neither PCBs nor total mercury can be exported from biofilters under normal circumstances, i.e., that the maximum effluent concentration of PCBs or total mercury is equal to the influent concentration. The resulting KTRL for PCBs is shown Figure 2. The resulting KTRL for total mercury is shown in Figure 3. Each figure also includes a constant average effluent concentration line with data fit statistics: root mean square error (RMSE) and median absolute deviation (MAD). As indicated, the KTRL provide a better fit of the data. However, the resulting effluent concentrations are not much different between the two lines except when influent PCBs are low (<10 ng/L) and total mercury concentration are high (>50 ng/L). For total mercury, concentration reductions are only predicted to occur when influent concentrations are greater than about 30 ng/L. Due to observed export of total mercury for several events, particularly for the 1st and Cutting bioretention cell (LAU-3), the moderate concentration reductions assumed by the KTRL at higher influent concentrations is reasonably conservative.

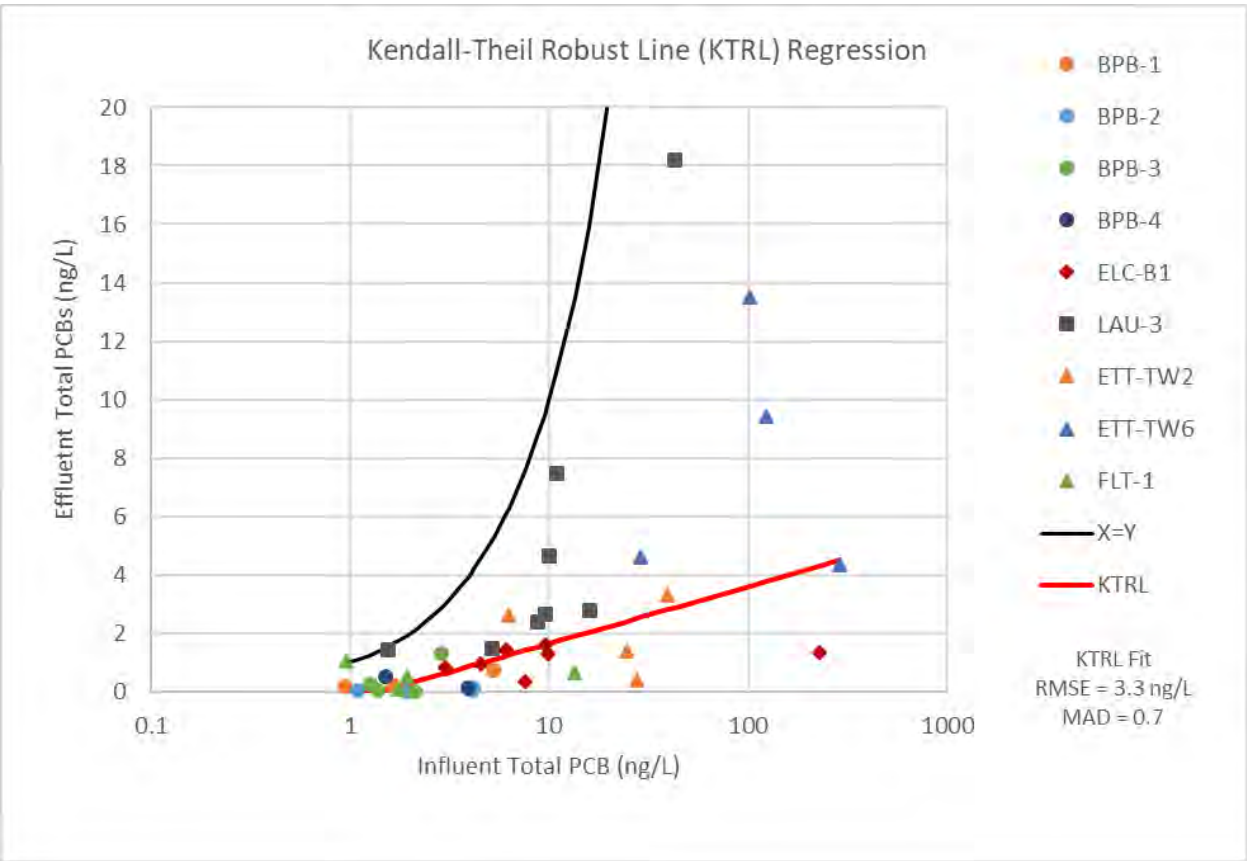

Figure 2: PCBs Influent vs Effluent Concentration Relationship Determined by KTRL Regression

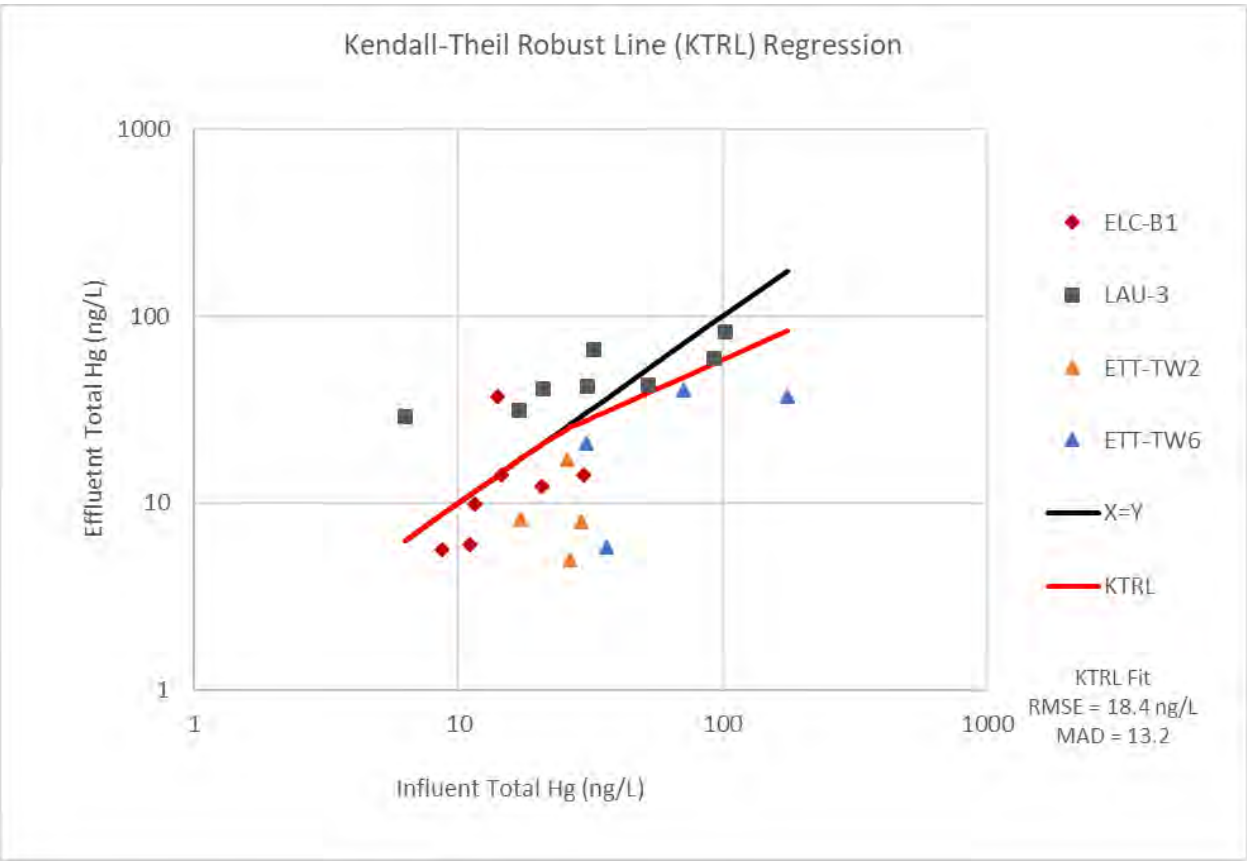

Figure 3: Mercury Influent vs Effluent Concentration Relationship Determined by KTRL Regression

3.3 RAA Scenario Loading Model

To model RAA future scenarios, future condition land use is needed. Future condition land use will be estimated using predictions of private parcel new development and redevelopment in combination with GI implementation on public parcels and rights-of-way.

Load reductions estimated for implementation of GI will be applied to future condition RAA scenario models based on estimated locations of GI and the tributary drainage areas to those GI. Effective area will be used to relate the HRUs, which can have a variety of imperviousness values, to the GI performance which will be based on a unit of effective area with 100% imperviousness. The GI performance curves can thus be applied to many different HRU types and/or combinations of HRUs that make up the tributary drainage areas for future GI measures.

4. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND PCBS LOADS REDUCED

The results of the hydraulic and pollutant reduction modeling of GI measures were used to develop a quantitative relationship between GI implementation and PCBs that can be applied to RAA future scenario models. An example quantitative relationship is provided for GI models run for the Berkeley gauge (040693). Utilizing output from hydraulic modeling, GI measure volumetric percent capture was calculated on an average annual basis. Volumetric model results for runs with GI measures sized to achieve 80%, 85%, 90%, and 95% capture were combined with water quality inputs to obtain pollutant load reduction for varying PCBs influent concentration.

The results of this analysis are shown in nomographs[11] provided in Figure 4, Figure 5, and Figure 6, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 8 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per effective acre[12] displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

[11] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

[12] Effective area is calculated as the area multiplied by the runoff coefficient.

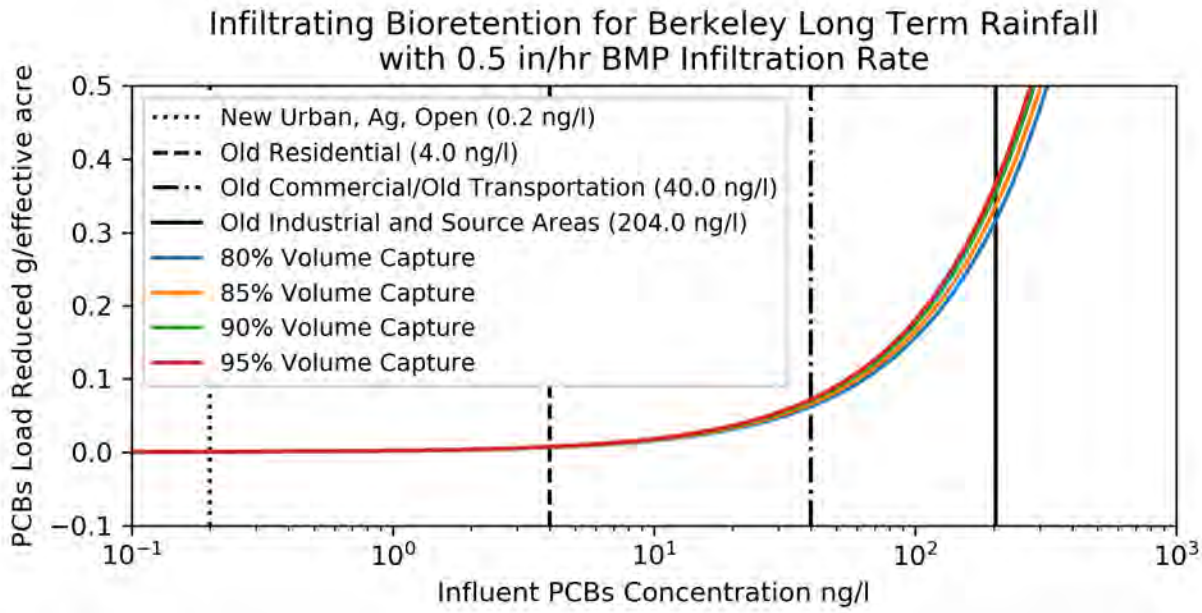

Figure 4: Modeled PCBs Load Removal Performance for Infiltrating Bioretention Basin

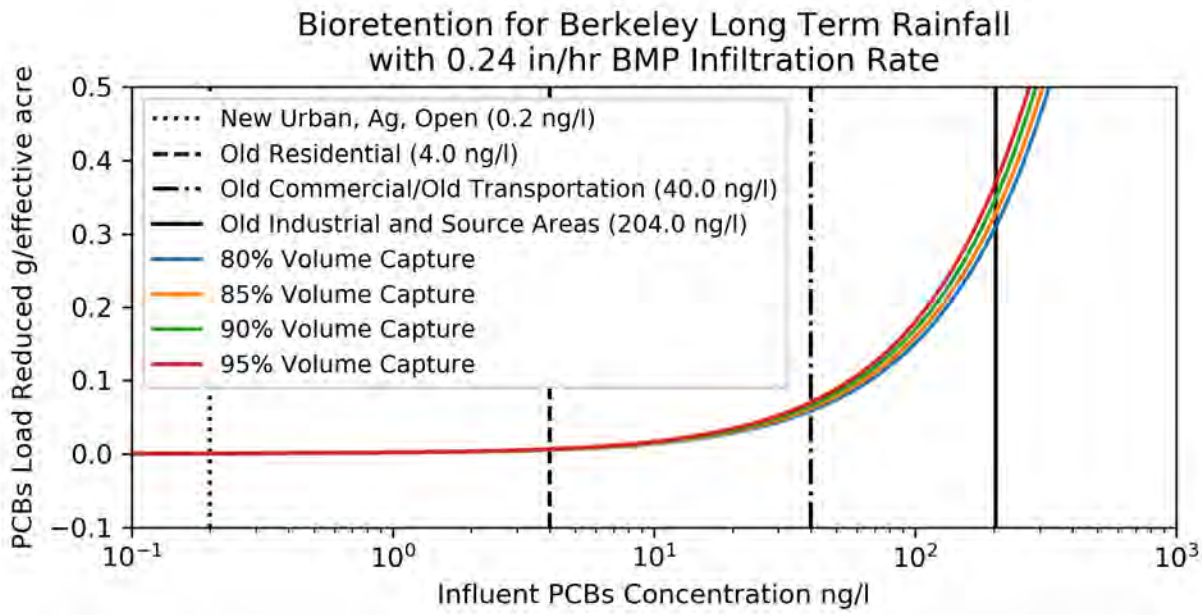

Figure 5: Modeled PCBs Load Removal Performance for Bioretention Basin with Elevated Underdrain

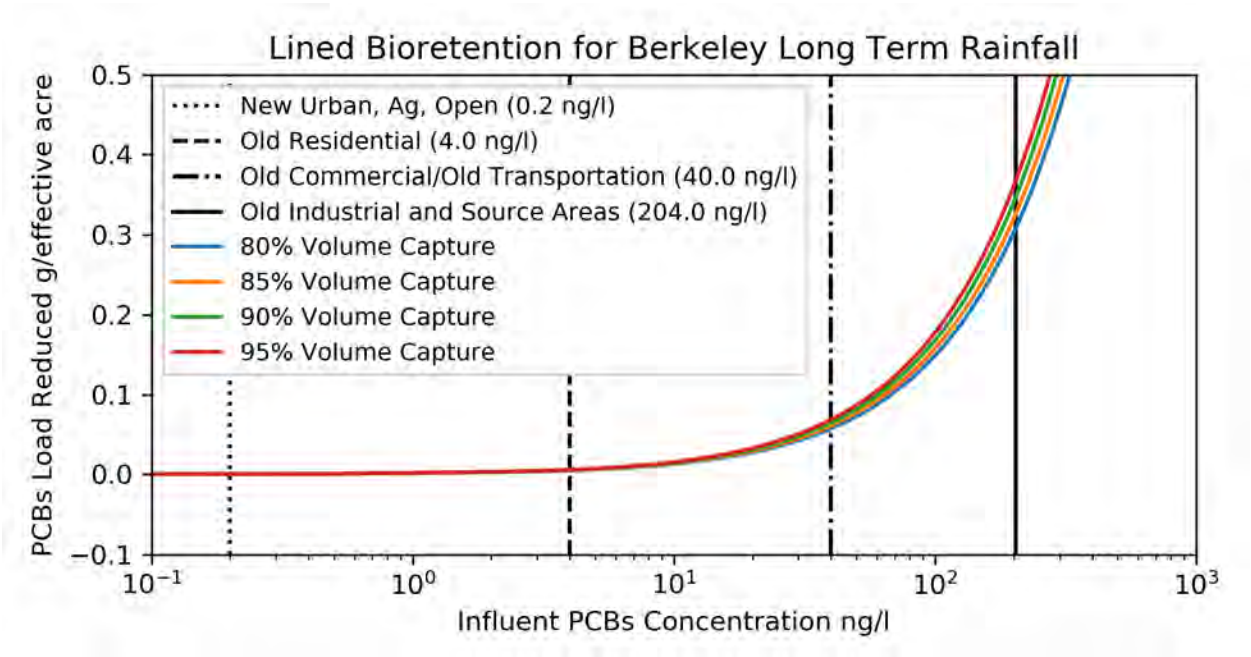

Figure 6: Modeled PCBs Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are listed in Table 11.

Table 11: PCBs Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	PCBs Load Reduced (g/effective ac)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban, Ag, Open	3.12E-04	3.30E-04	3.49E-04	3.61E-04
	Old Residential	0.00623	0.0066	0.00698	0.00722
	Old Commercial / Old Transportation	0.0623	0.066	0.0698	0.0722
	Old Industrial and Source Areas	0.318	0.337	0.356	0.368
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban, Ag, Open	3.08E-04	3.26E-04	3.47E-04	3.67E-04
	Old Residential	0.00518	0.0055	0.00589	0.00633
	Old Commercial / Old Transportation	0.0586	0.0621	0.0661	0.0703
	Old Industrial and Source Areas	0.311	0.329	0.350	0.371

Facility Configuration	Land Use Category	PCBs Load Reduced (g/effective ac)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Lined Bioretention	New Urban, Ag, Open	3.08E-04	3.26E-04	3.46E-04	3.67E-04
	Old Residential	0.00484	0.00513	0.00545	0.00577
	Old Commercial / Old Transportation	0.0574	0.0608	0.0647	0.0685
	Old Industrial and Source Areas	0.309	0.327	0.348	0.368

1. Average Annual Facility Volumetric Runoff Capture

5. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND MERCURY LOADS REDUCED

Mercury load reduction results for the Berkeley Gauge are shown in nomographs[13] in Figure 7, Figure 8, and Figure 9, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 9 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per acre displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

[13] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

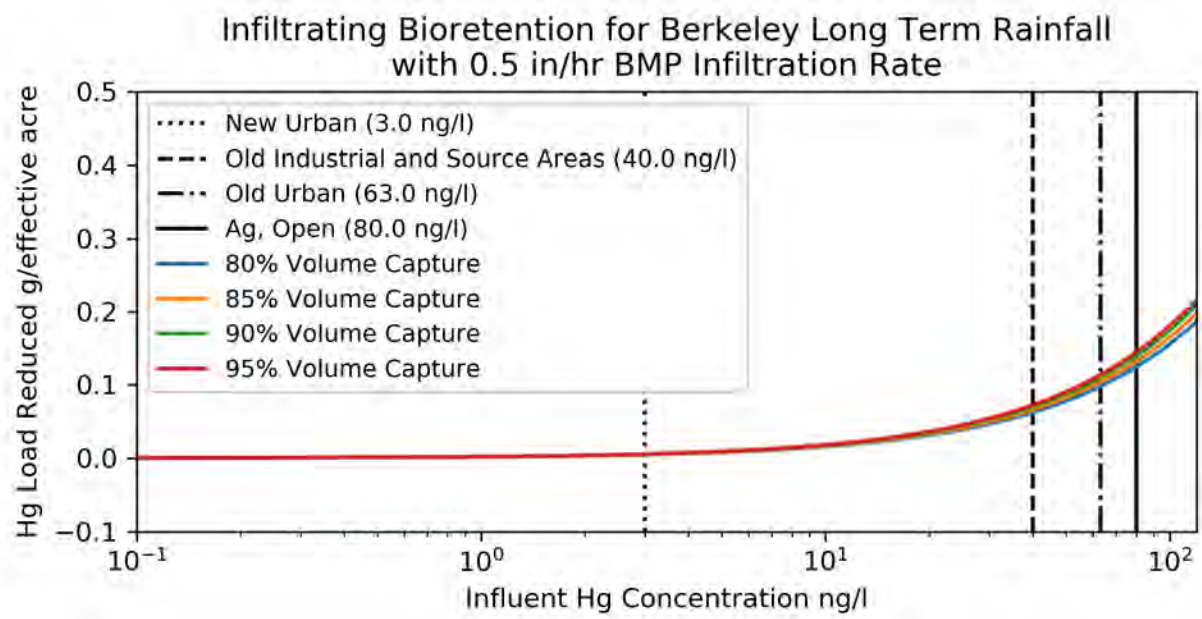

Figure 7: Modeled Mercury Load Removal Performance for Infiltrating Bioretention Basin

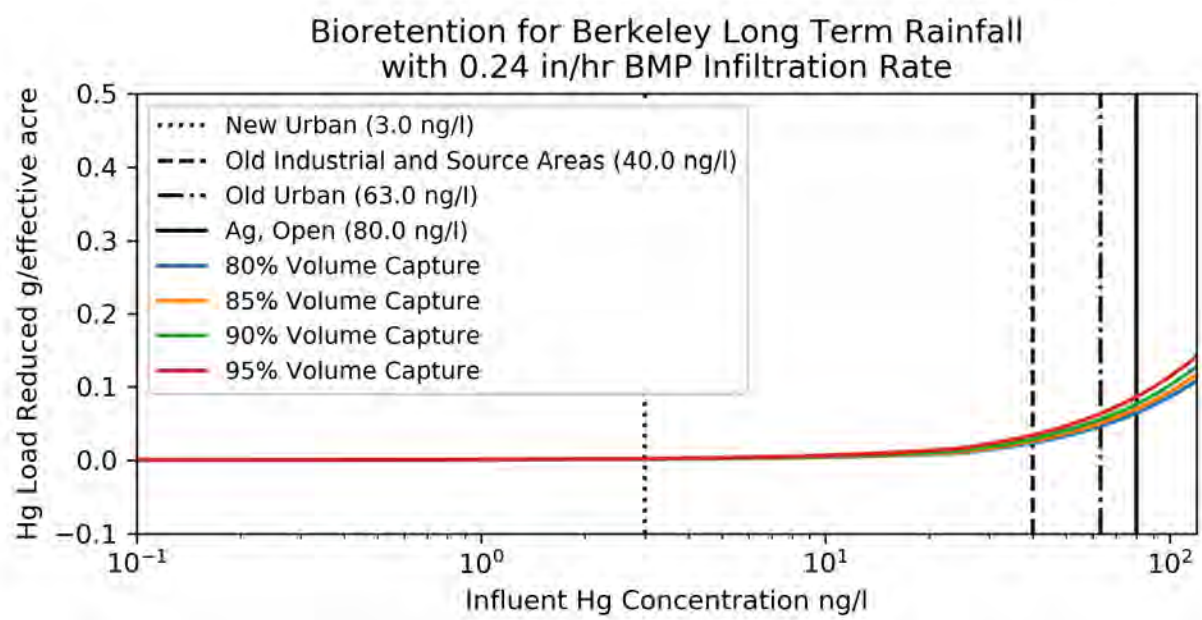

Figure 8: Modeled Mercury Load Removal Performance for Bioretention Basin with Elevated Underdrain

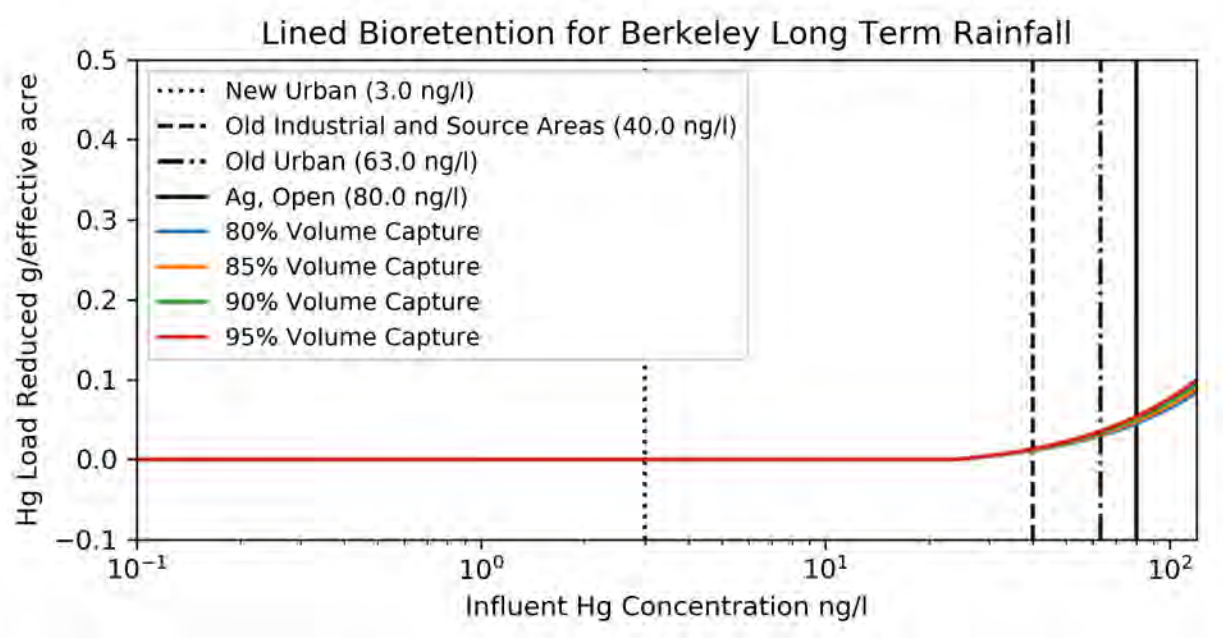

Figure 9: Modeled Mercury Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are summarized in Table 12.

Table 12: Mercury Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	Mercury Load Reduced (g/effective acre)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban	0.00467	0.00495	0.00524	0.00541
	Old Industrial and Source Areas	0.0623	0.066	0.0698	0.0722
	Old Urban	0.0981	0.104	0.110	0.114
	Ag, Open	0.125	0.132	0.140	0.144
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban	0.00113	0.0013	0.00153	0.00192
	Old Industrial and Source Areas	0.0234	0.0258	0.029	0.0341
	Old Urban	0.0462	0.0503	0.0556	0.0634
	Ag, Open	0.0643	0.0696	0.0765	0.0862

Facility Configuration	Land Use Category	Mercury Load Reduced (g/effective acre)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Lined Bioretention	New Urban	0	0	0	0
	Old Industrial and Source Areas	0.0108	0.0115	0.0123	0.0130
	Old Urban	0.0296	0.0314	0.0335	0.0353
	Ag, Open	0.0449	0.0476	0.0507	0.0536

[1] Average Annual Facility Volumetric Runoff Capture

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APPENDIX A

Modeling Inputs and Data Exhibits

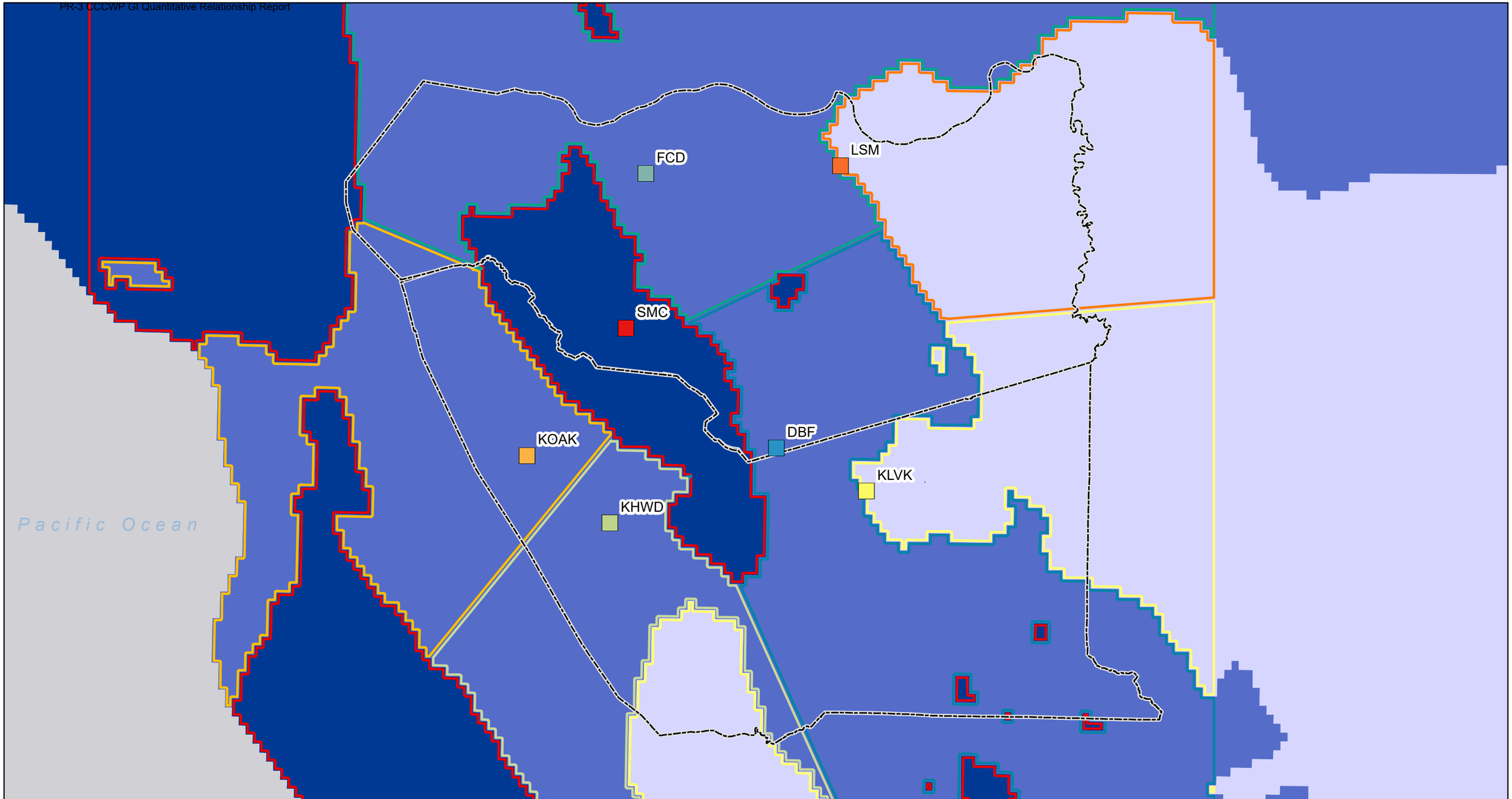

Rain Gauge ID
- Rain Gauge ID
- County Boundary

Mean Annual Precipitation (in)
- < 16
- 16 - 25
- > 25

Rain Gauge Zones
- DBF
- FCD
- KHWD
- KLVK
- KOAK
- LSM
- SMC

N

0 6 12 Miles

Precipitation Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County
California

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Exhibit 1

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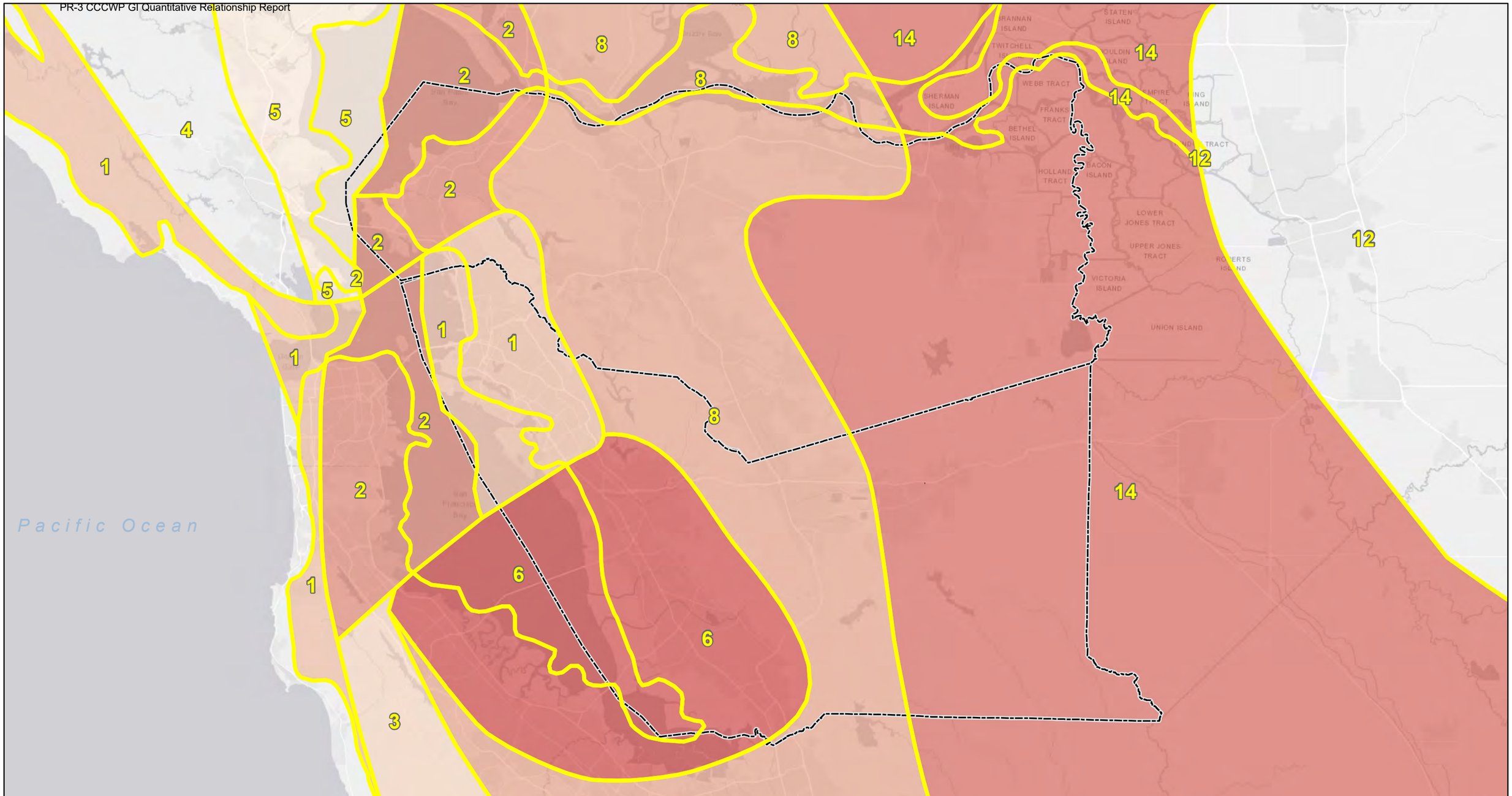

County Boundary

CIMIS ET Zone Boundary

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

N

0 6 12 Miles

CIMIS Evapotranspiration Zones

Alameda County and Contra Costa County
California

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Exhibit 2

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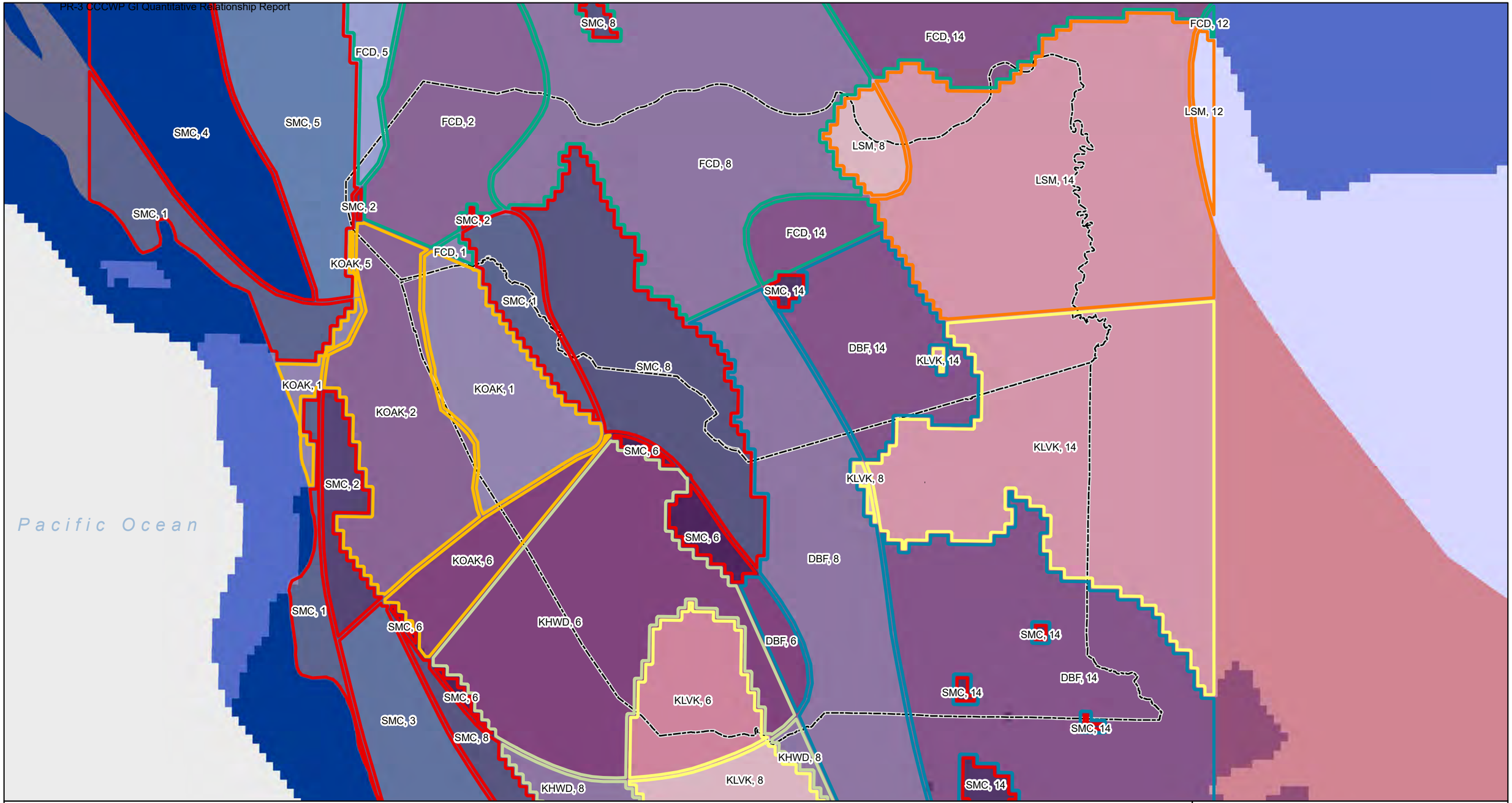

County Boundary

Mean Annual Precipitation (in)

- < 16
- 16 - 25
- > 25

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

Climate Zones are created by overlapping precipitation zones and ET zones.The unique climate zones that occur in Contra Costa and Alameda County are labeled as "Gauge ID, ET Zone".

N

0 6 12 Miles

Climate Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County California

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Exhibit 3

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_4_Climate_Zones.mxd 7/5/2018 6:00:27 PM

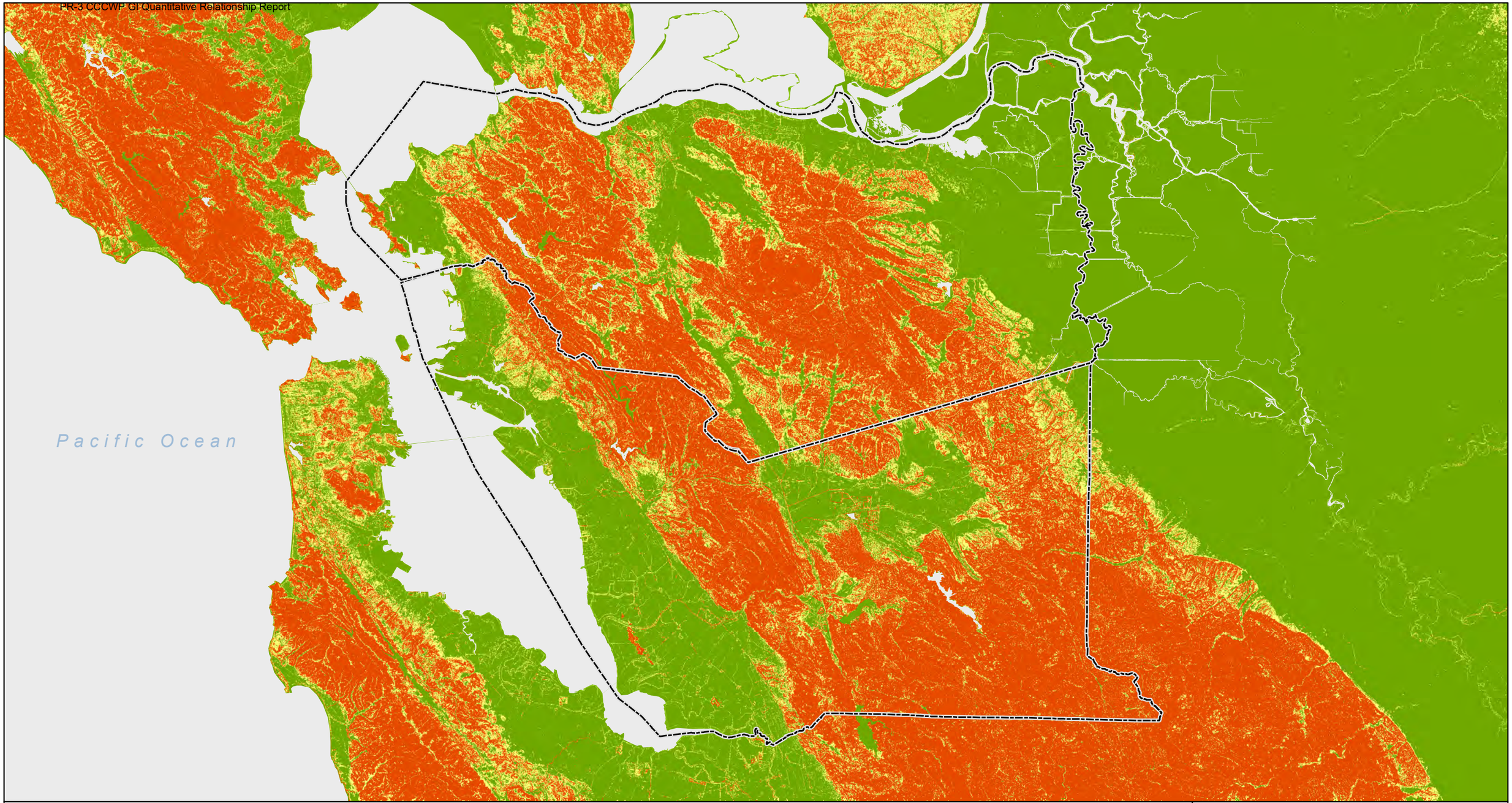

County Boundary

% Slope

- < 5
- 5-15
- > 15

N

0 6 12 Miles

Slope Zones

Alameda County and Contra Costa County
California

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Exhibit 4

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_5_Slope_Zones.mxd 7/5/2018 6:00:33 PM

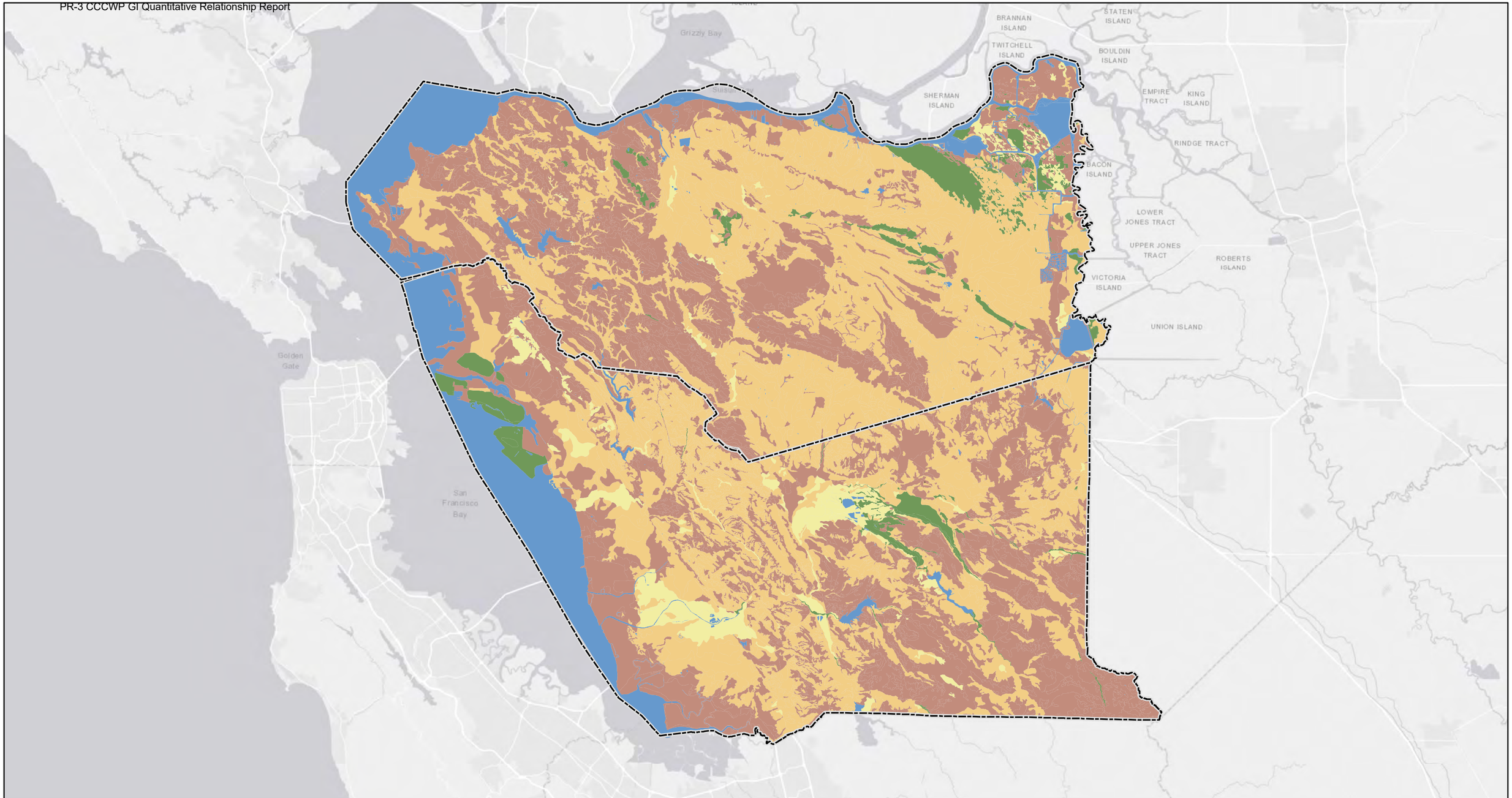

County Boundary

HSG

- A
- B
- C
- D
- W

Note: Area within the county with no HSG assignment was assigned the HSG of the most prominant adjacent soil group.

N

0 6 12 Miles

Hydrologic Soil Group

Alameda County and Contra Costa County
California

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Exhibit 5

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_6_Hydrologic_Soil_Group.mxd 7/5/2018 6:00:38 PM

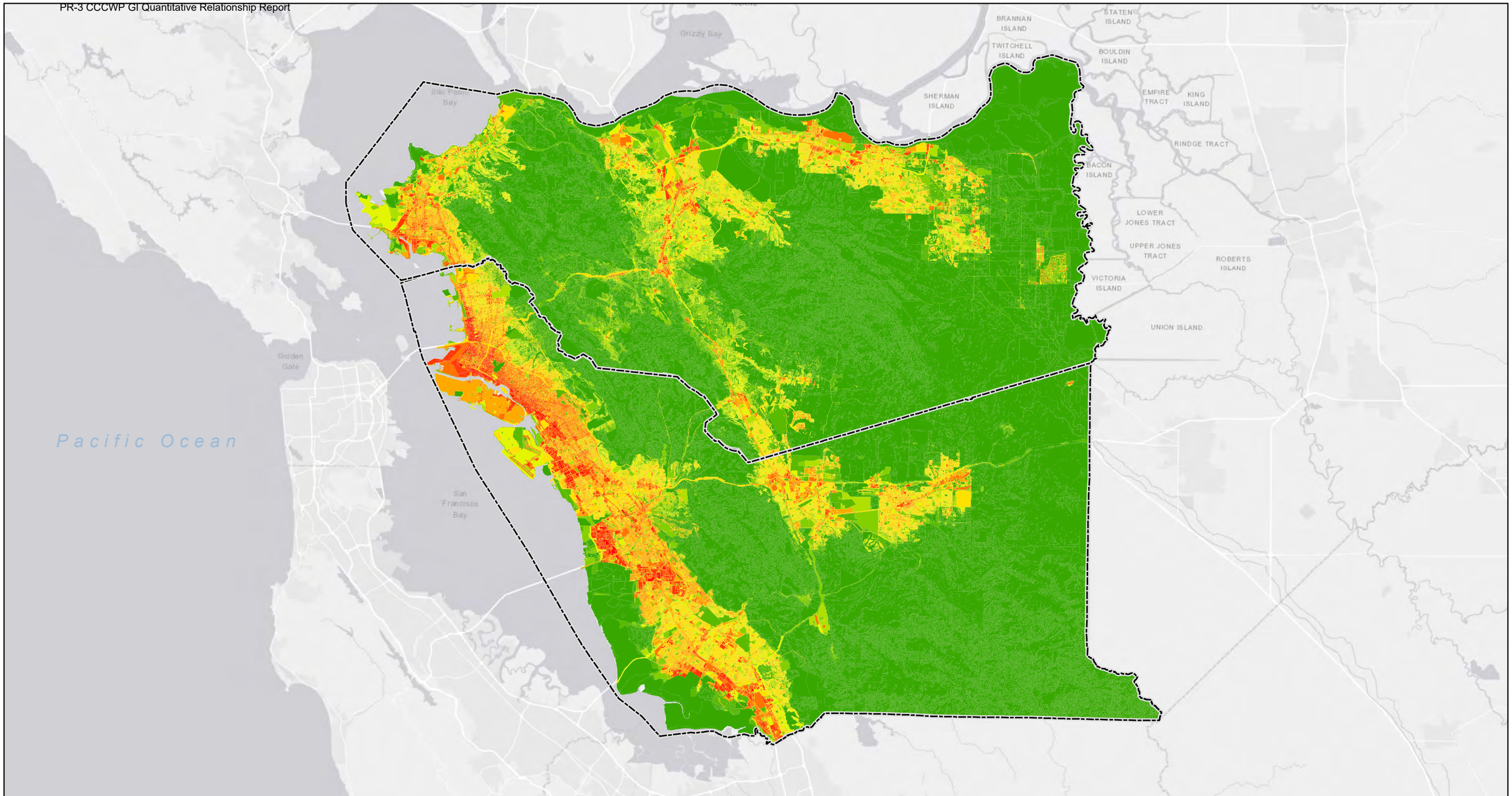

County Boundary

ABAG 2005 Imperviousness

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Note:
Imperviousness is assigned to ABAG 2005 landuse based on the NLCD 2006 Impervious Cover layer. These values may be adjusted during calibration for certain categories of ABAG landuse.

For purposes of calculating runoff from areas with compacted soil, developed areas and agricultural uses were assumed to be compacted to 0.75 times the underlying saturated soil conductivity (ksat). These areas generally have percent imperviousness > 20%.

N

0 6 12 Miles

Regional Imperviousness

Alameda County and Contra Costa County
California

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Exhibit 6

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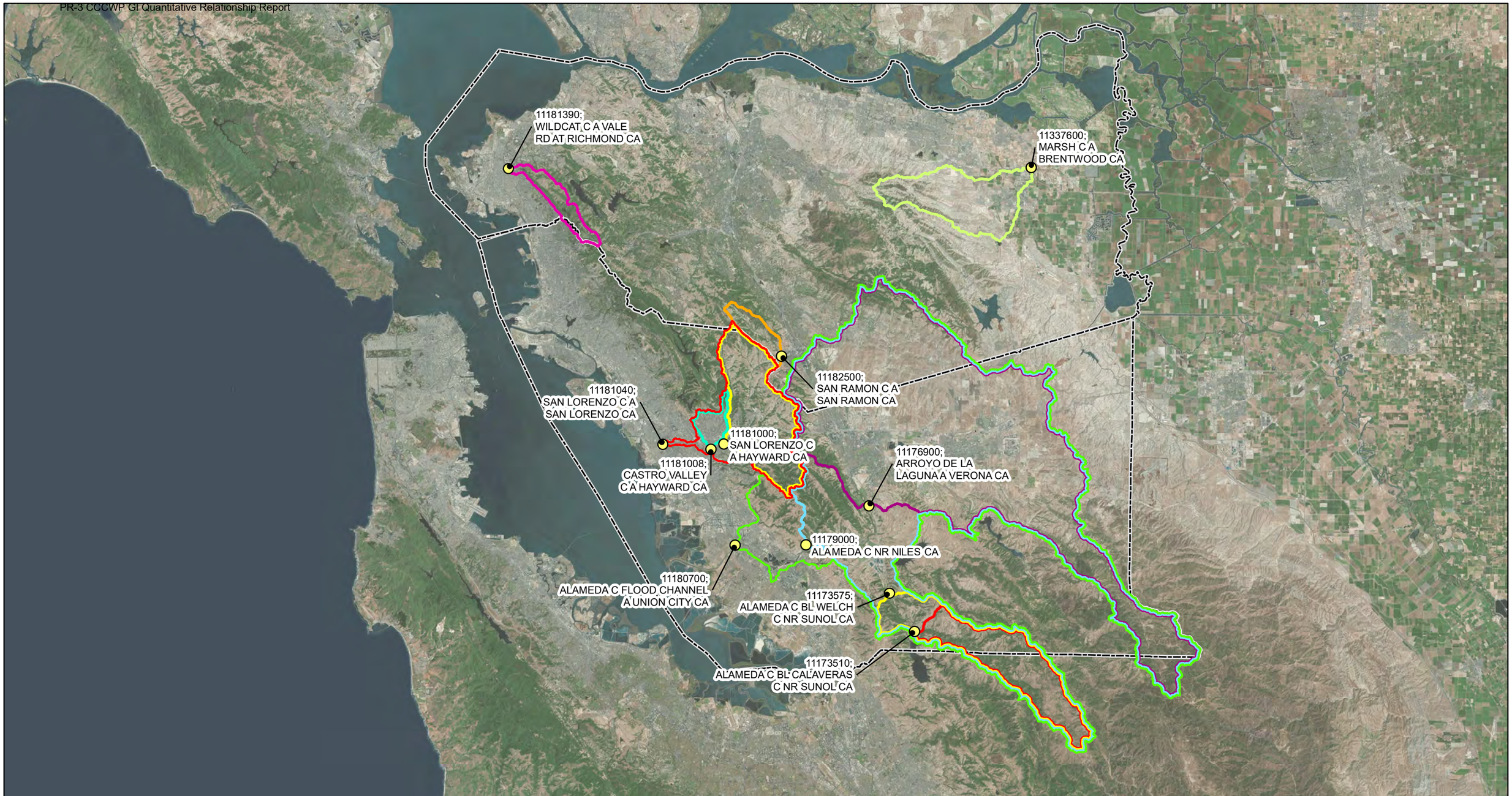

County Boundary
Gauge Location

Group 1	Group 2	Group 3	Group 4	Group 4
11181040	11180700	11182500	11337600	11181390
11181000	11179000			
11181008	11173575			
	11176900			
	11173510			

N

0 6 12 Miles

Candidate Calibration Watersheds

Alameda County and Contra Costa County
California

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Exhibit 7

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_8_Stream_Gauges.mxd 7/5/2018 6:00:55 PM

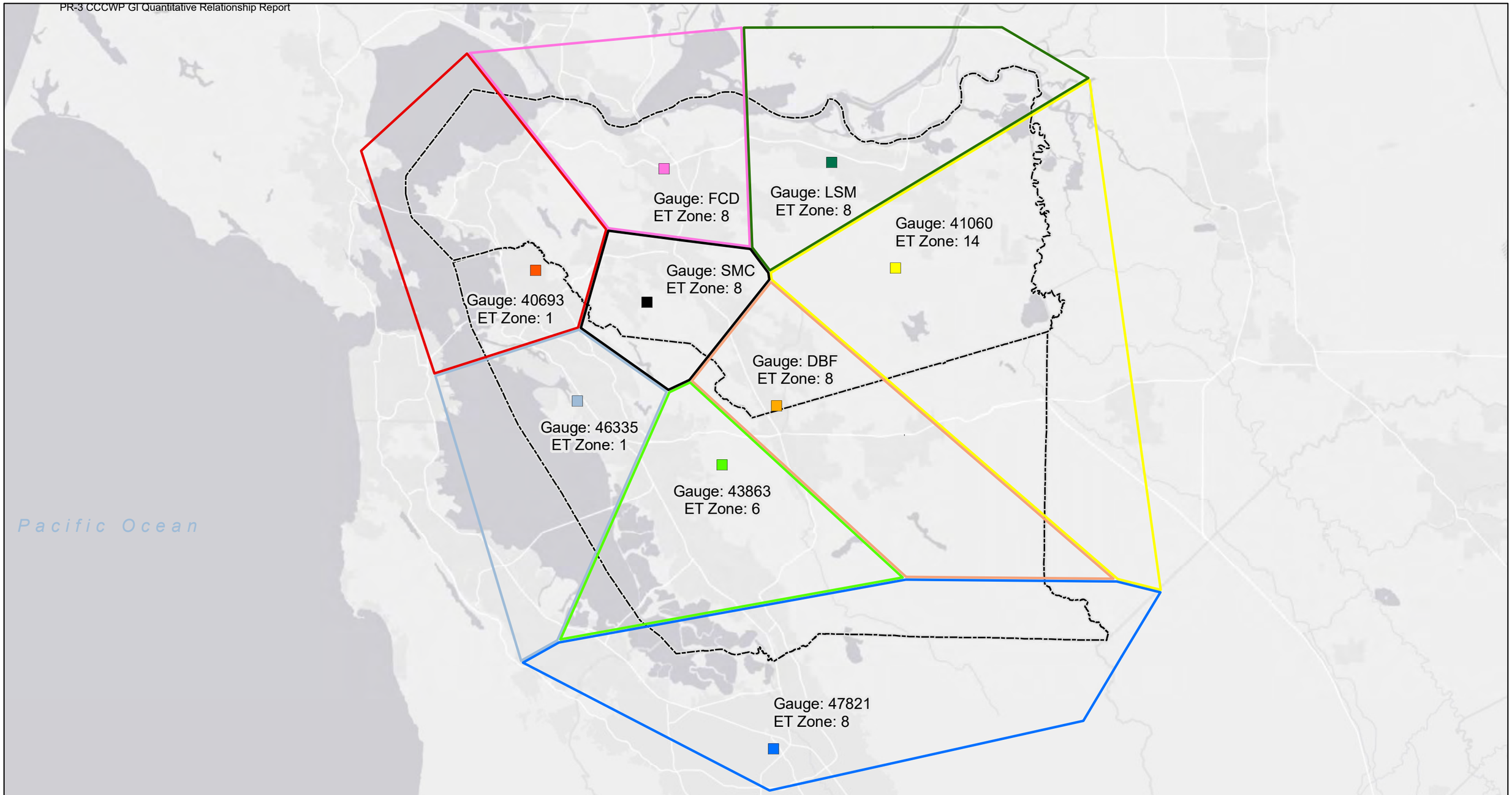

County Boundary

Long-Term Rainfall Gauge Location

- 40693
- 41060
- 43863
- 46335
- 47821
- DBF
- FCD
- LSM
- SMC

N

0 6 12 Miles

Long-Term Rainfall Gauge Zones

Alameda County and Contra Costa County
California

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Exhibit 8

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_8_GI_Long_Term_Rainfall_Precipitation_Zones.mxd 7/5/2018 6:01:01 PM

Plan View

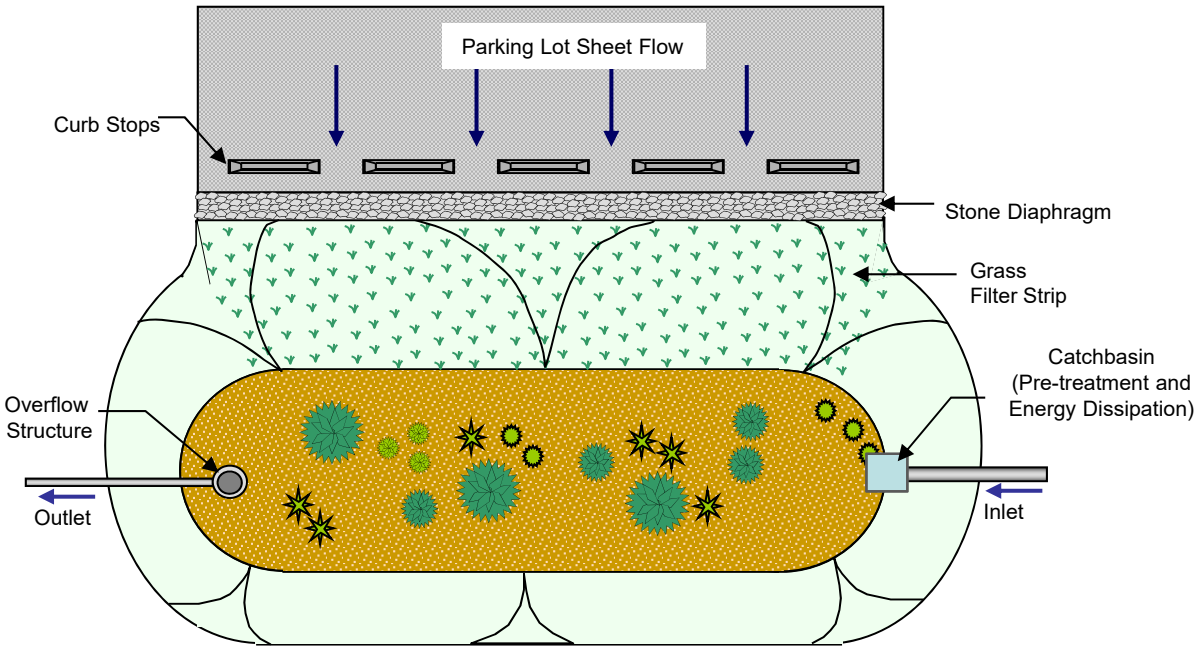

Profile

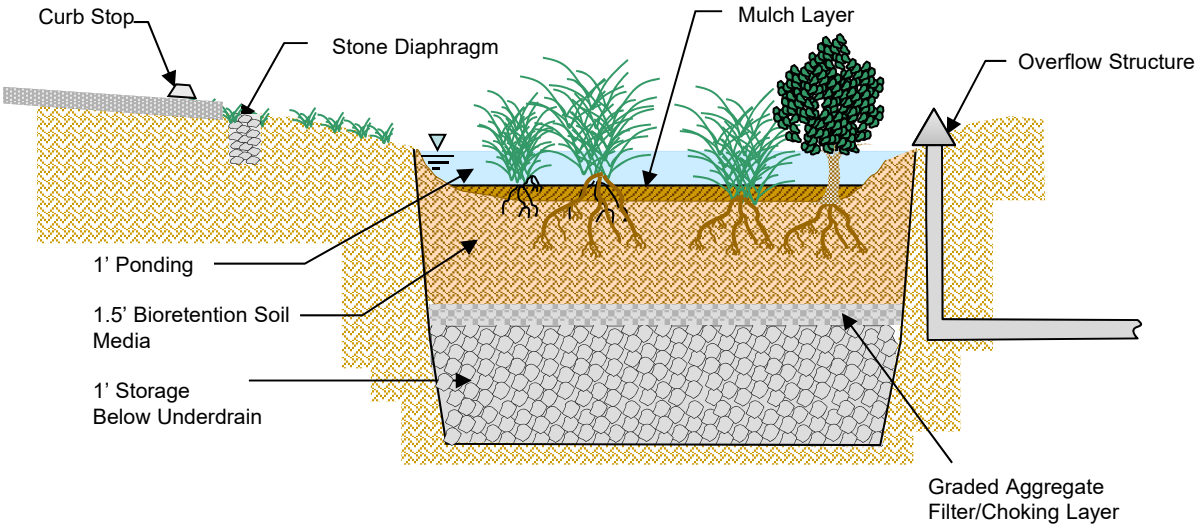

Note: Plan and Profile views are not to scale

Conceptual Illustration of an Infiltration Facility

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Exhibit 9

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Plan View

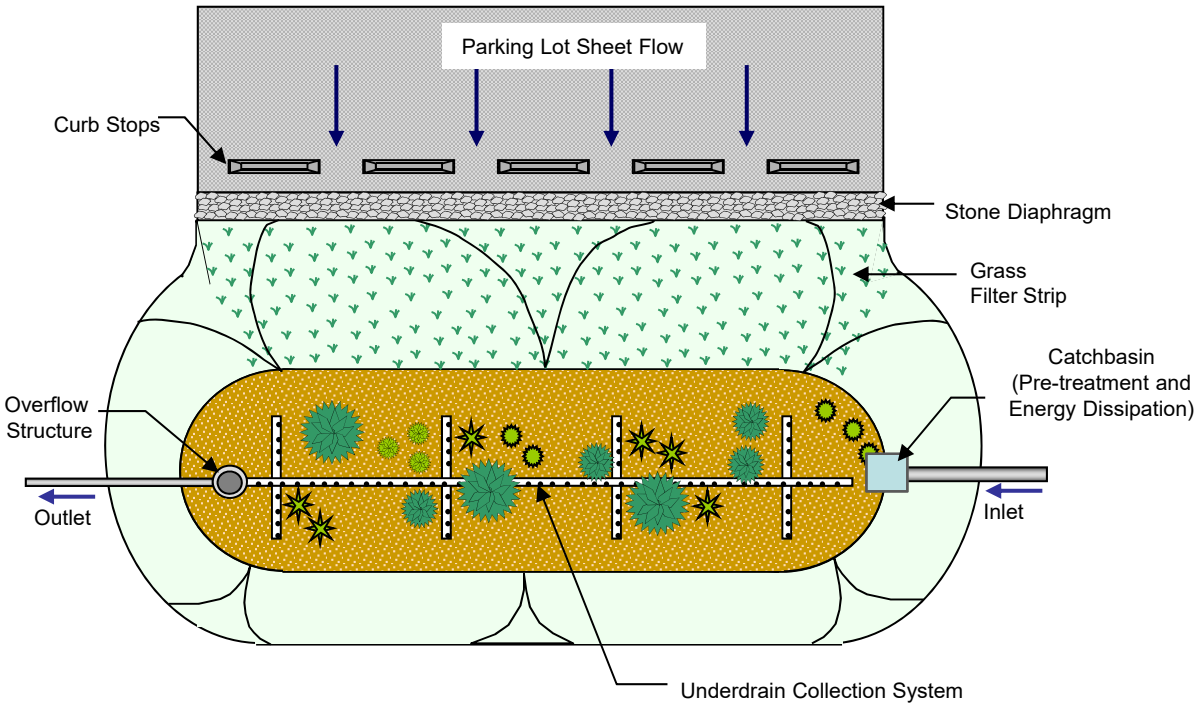

Profile

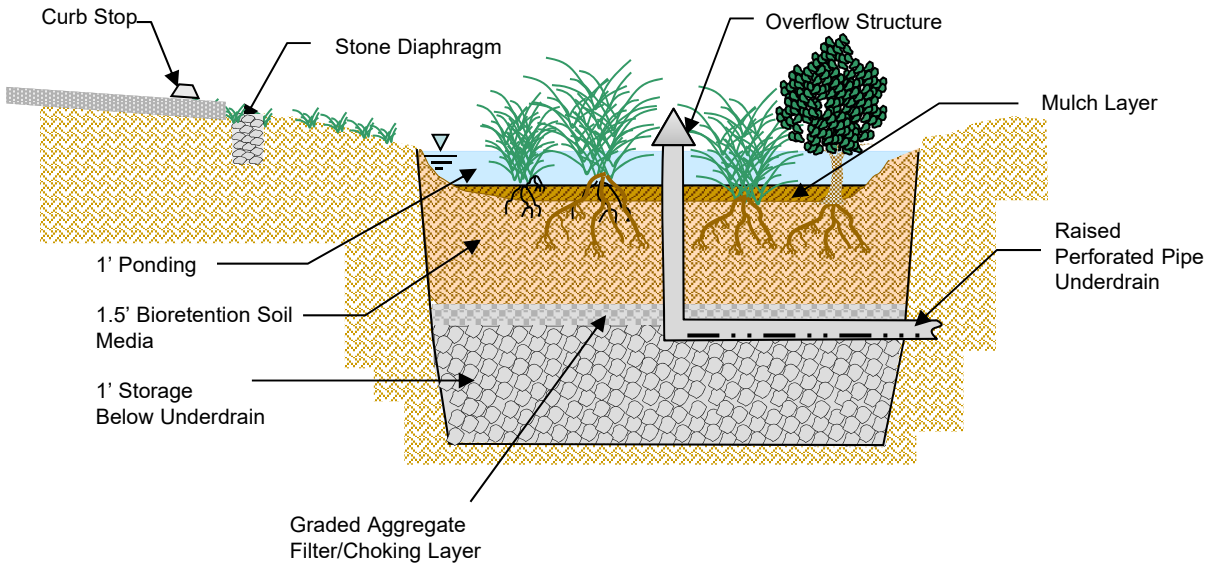

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Bioretention/Bioinfiltration Facility

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Exhibit 10

Oakland | July 2018

Plan View

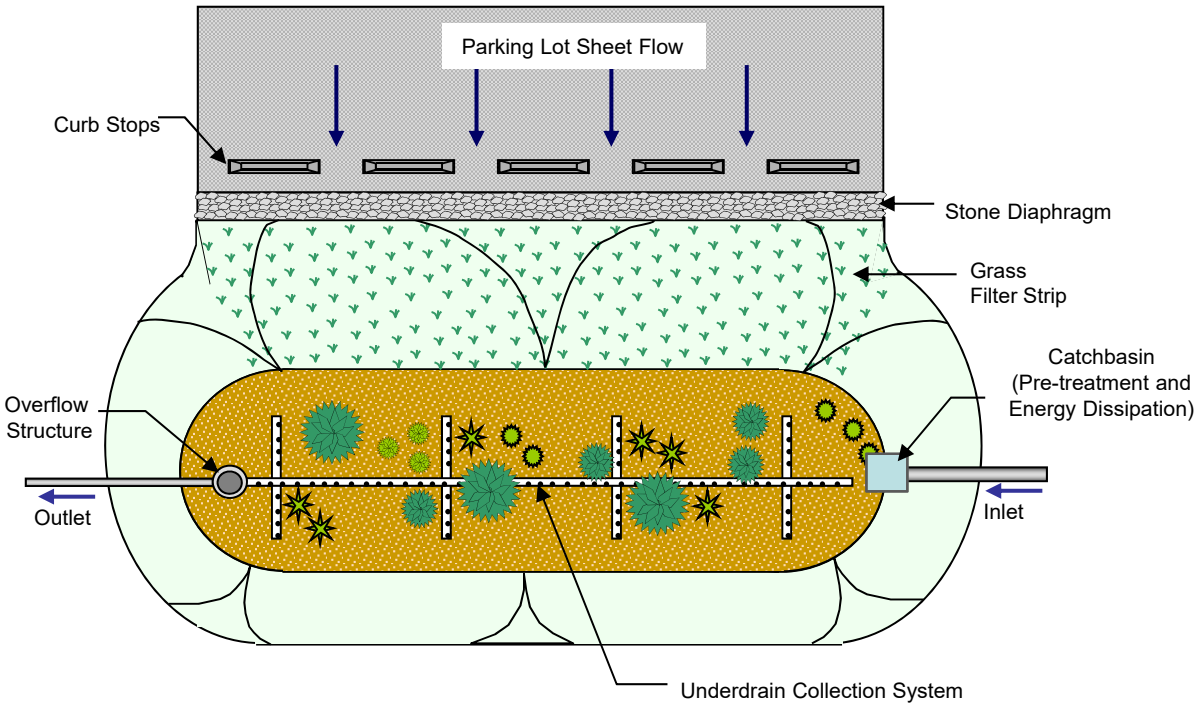

Profile

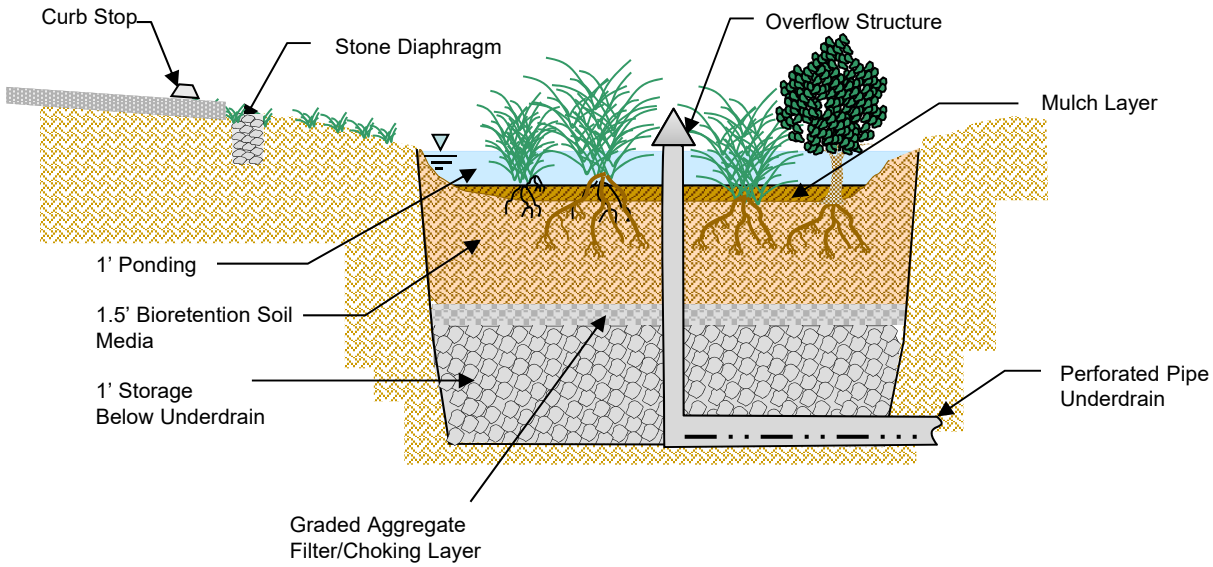

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Biofiltration Facility

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Exhibit 11

Oakland | July 2018

PR-4 USEPA Stormwater Management Model Manual Excerpts

falls directly on them and do not capture runoff from other impervious areas in their subcatchment.

The second approach allows LID controls to be strung along in series and also allows runoff from several different upstream subcatchments to be routed onto the LID subcatchment. If these single-LID subcatchments are carved out of existing subcatchments, then once again some adjustment of the Percent Impervious, Width and also the Area properties of the latter may be necessary. In addition, whenever an LID occupies the entire subcatchment the values assigned to the subcatchment's standard surface properties (such as imperviousness, slope, roughness, etc.) are overridden by those that pertain to the LID unit.

Normally both surface and drain outflows from LID units are routed to the same outlet location assigned to the parent subcatchment. However one can choose to return all LID outflow to the pervious area of the parent subcatchment and/or route the drain outflow to a separate designated outlet. (When both of these options are chosen, only the surface outflow is returned to the pervious sub-area.)

3.4 Computational Methods

SWMM is a physically based, discrete-time simulation model. It employs principles of conservation of mass, energy, and momentum wherever appropriate. This section briefly describes the methods SWMM uses to model stormwater runoff quantity and quality through the following physical processes:

- Surface Runoff
- Groundwater
- Flow Routing
- Water Quality Routing
- Infiltration
- Snowmelt
- Surface Ponding

3.4.1 Surface Runoff

The conceptual view of surface runoff used by SWMM is illustrated in Figure 3-7 below. Each subcatchment surface is treated as a nonlinear reservoir. Inflow comes from precipitation and any designated upstream subcatchments. There are several outflows, including infiltration, evaporation, and surface runoff. The capacity of this "reservoir" is the maximum depression storage, which is the maximum surface storage provided by ponding, surface wetting, and interception. Surface runoff per unit area, Q, occurs only when the depth of water in the "reservoir" exceeds the maximum depression storage, d_s, in which case the outflow is given by Manning's equation. Depth of water over the subcatchment (d) is continuously updated with time by solving numerically a water balance equation over the subcatchment.

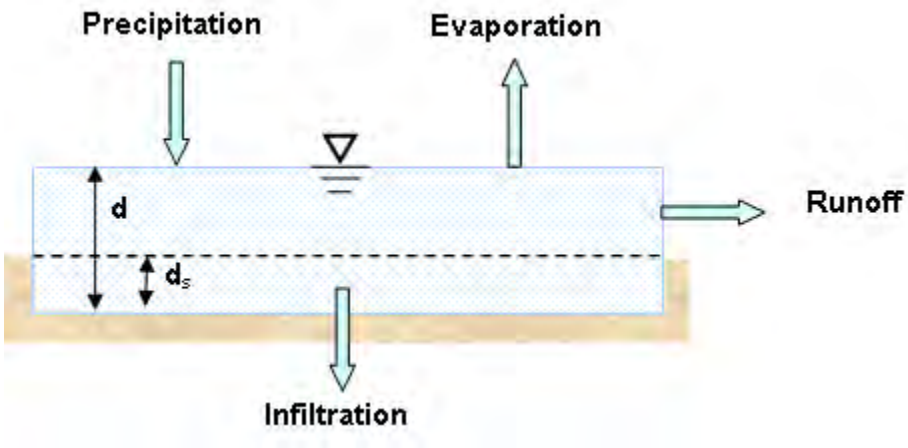

Figure 3-7 Conceptual view of surface runoff

3.4.2 Infiltration

Infiltration is the process of rainfall penetrating the ground surface into the unsaturated soil zone of pervious subcatchments areas. SWMM offers four choices for modeling infiltration:

Horton's Method

This method is based on empirical observations showing that infiltration decreases exponentially from an initial maximum rate to some minimum rate over the course of a long rainfall event. Input parameters required by this method include the maximum and minimum infiltration rates, a decay coefficient that describes how fast the rate decreases over time, and a time it takes a fully saturated soil to completely dry.

Modified Horton Method

This is a modified version of the classical Horton Method that uses the cumulative infiltration in excess of the minimum rate as its state variable (instead of time along the Horton curve), providing a more accurate infiltration estimate when low rainfall intensities occur. It uses the same input parameters as does the traditional Horton Method.

Green-Ampt Method

This method for modeling infiltration assumes that a sharp wetting front exists in the soil column, separating soil with some initial moisture content below from saturated soil above. The input parameters required are the initial moisture deficit of the soil, the soil's hydraulic conductivity, and the suction head at the wetting front. The recovery rate of moisture deficit during dry periods is empirically related to the hydraulic conductivity.

Modified Green-Ampt Method

This method modifies the original Green-Ampt procedure by not depleting moisture deficit in the top surface layer of soil during initial periods of low rainfall as was done in the original method. This change can produce more realistic infiltration behavior for storms with long initial periods where the rainfall intensity is below the soil's saturated hydraulic conductivity.

Curve Number Method

This approach is adopted from the NRCS (SCS) Curve Number method for estimating runoff. It assumes that the total infiltration capacity of a soil can be found from the soil's tabulated Curve Number. During a rain event this capacity is depleted as a function of cumulative rainfall and remaining capacity. The input parameters for this method are the curve number and the time it takes a fully saturated soil to completely dry.

SWMM also allows the infiltration recovery rate to be adjusted by a fixed amount on a monthly basis to account for seasonal variation in such factors as evaporation rates and groundwater levels. This optional monthly soil recovery pattern is specified as part of a project's Evaporation data.

3.4.3 Groundwater

Figure 3-8 is a definitional sketch of the two-zone groundwater model that is used in SWMM. The upper zone is unsaturated with a variable moisture content of θ. The lower zone is fully saturated and therefore its moisture content is fixed at the soil porosity ϕ. The fluxes shown in the figure, expressed as volume per unit area per unit time, consist of the following:

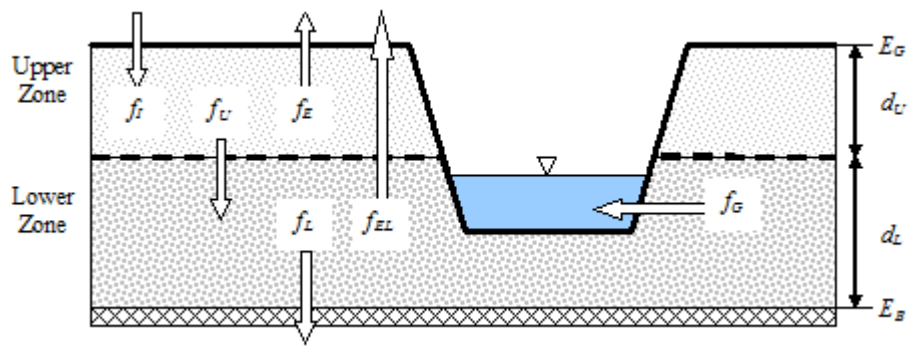

Figure 3-8 Two-zone groundwater model

f_I infiltration from the surface

f_{EU} evapotranspiration from the upper zone which is a fixed fraction of the un-used surface evaporation

f_U percolation from the upper to lower zone which depends on the upper zone moisture content θ and depth **d_U**

f_{EL} evapotranspiration from the lower zone, which is a function of the depth of the upper zone **d_U**

f_L seepage from the lower zone to deep groundwater which depends on the lower zone depth **d_L**

f_G lateral groundwater interflow to the drainage system, which depends on the lower zone depth **d_L** as well as the depth in the receiving channel or node.

where C = IMD . S, ft of water,
t = time, sec, and
1,2 = subscripts for start and end of time interval respectively.

This equation must be solved iteratively for F_2, the cumulative infiltration at the end of the time step. A Newton-Raphson routine is used.

The infiltration volume during time step (t_2 - t_1) is thus (t_2 - t_1) x i if the surface does not saturate and (F_2 - F_1) if saturation has previously occurred and a sufficient water supply is at the surface. If saturation occurs during the time interval, the infiltration volumes over each stage of the process within the time steps are calculated and summed. When rainfall ends (or falls below infiltration capacity) any water ponded on the surface is allowed to infiltrate and added to the cumulative infiltration volume.

Recovery of Infiltration Capacity (Redistribution)

Evaporation, subsurface drainage, and moisture redistribution between rainfall events decrease the soil moisture content in the upper soil zone and increase the infiltration capacity of the soil. The processes involved are complex and depend on many factors. In SWMM a simple empirical routine is used as outlined below; commonly used units are given in the equations to make the description easier to understand.

Infiltration is usually dominated by conditions in the uppermost layer of the soil. The thickness of this layer depends on the soil type; for a sandy soil it could be several inches, for a heavy clay it could be less. The equation used to determine the thickness of the layer is:

$$L = 4 \cdot \sqrt{K_s} \tag{20-73}$$

where L = thickness of layer, in, and
K_s = saturated hydraulic conductivity, in/hr.

Thus for a high K_s of 0.5 in/hr (12.7 mm/hr) the thickness is 2.83 inches (71.8 mm). For a soil with a low hydraulic conductivity, say K_s = 0.1 in/hr (2.5 mm/hr), the computed thickness is 1.26 inches (32.1 mm).

A depletion factor is applied to the soil moisture during all time steps for which there is no infiltration from rainfall or depression storage. This factor is indirectly related again to the saturated hydraulic conductivity of the soil and is calculated by:

$$DF = \frac{L}{300} \tag{20-74}$$

where DF = depletion factor, hr^{-1}, and

L = depth of upper zone, in.

Hence, for K_s = 0.5 in/hr (12.7 mm/hr), DF = 0.9% per hour; for K_s = 0.1 in/hr (2.5 mm/hr) DF = 0.4% per hour. The depletion volume (DV) per time step is then:

$$DV = DF \cdot FU_{max} \cdot \Delta t \tag{20-75}$$

where FU_{max} = L · IMD_{max} = saturated moisture content of the upper zone, in,
IDM_{max} = maximum initial moisture deficit, in/in, and
Δt = time step, hr.

The computations used are:

$$FU = FU - DV \quad for \quad FU \geq 0 \tag{20-76}$$

$$F = F - DV \quad for \quad F \geq 0 \tag{20-77}$$

where FU = current moisture content of upper zone, in, and
F = cumulative infiltration volume for this event, in.

To use the Green-Ampt infiltration model in continuous SWMM, it is necessary to choose a time interval after which further rainfall will be considered as pn independent event. This time is computed as:

$$T = \frac{6}{100 \cdot DF} \tag{20-78}$$

where T = time interval for independent event, hr.

For example, when K_s = 0.5 in/hr (12.7 mm/hr) the time between independent events as given in the last equation is 6.4 hr; when K_s = 0.1 in/hr (2.5 mm/hr) the time is 14.3 hr. After time T has elapsed the variable F is set to zero, ready for the next event. The moisture remaining in the upper zone of the soil is then redistributed (diminished) at each time step by the two previous equations in order to update the current moisture deficit (IMD). The deficit is allowed to increase up to its maximum value (IMD_{max}, an input parameter) over prolonged dry periods. The equation used is

$$IMD = \frac{FU_{max} - FU}{L} \; for \; IMD \leq IMD_{max} \tag{20-79}$$

When light rainfall ($i \leq K_s$) occurs during the redistribution period, the upper zone moisture storage, FU, is increased by the infiltrated rainfall volume and IMD is again updated using the last equation.

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PR-4 SWMM Manual Excerpts

Guidelines for estimating parameter values for the Green-Ampt model are given elsewhere in this manual. As is also the case for the Horton equation, different soil types can be modelled for different subcatchments.

Program Variables

The infiltration computations are performed in subroutines WSHED and GAMP in the RUNOFF Module. Correspondence of program variables to those of this subsection is as follows:

S = SUCT(J)	L = UL(J)
IMD_{max} = SMDMAX (J)	DF = DF(J)
K_s = HYDCON(J)	i = RI
FU_{max} = FUMAX(J)	t = time
FU = FU(J)	Δt = DELT
IMD = SMD(J)	DV = DEP
F = F(J)	F_s = FS

20.5.4 Green-Ampt Infiltration Input Data

Although not as well known as the Horton equation, the Green-Ampt equation (1911) has the advantage of physically based parameters that, in principle, can be predicted a priori. The Mein-Larson (1973) formulation of the Green-Ampt equation is a two-stage model. The first step predicts the volume of water, F_s which will infiltrate before the surface becomes saturated. From this point onward, infiltration capacity, f_p, is predicted directly by the Green-Ampt equation. Thus,

$$For\ F < F_s : f = i\ and\ F_s = \frac{S_u\ IMD}{i / K_s - 1}\ for\ i > K_s; \tag{20-80}$$

No calculation of F_s for $i \leq K_s$.

$$For\ F \geq F_s : f = f_p\ and\ f_p = K_s(1 + \frac{S_u\ IMD}{F}) \tag{20-81}$$

where
- f = infiltration rate, ft/sec,
- f_p = infiltration capacity, ft/sec,
- i = rainfall intensity, ft/sec,
- F = cumulative infiltration volume, this event, ft,
- F_s = cumulative infiltration volume required to cause surface saturation, ft,
- S_u = average capillary suction at the wetting front (SUCT), ft water,
- IMD = initial moisture deficit for this event (SMDMAX), ft/ft, and

PR-5 Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo

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4066

Geosyntec consultants

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Oakland, California 94607
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Memorandum

Date:	November 13, 2019
To:	Jim Scanlin, Alameda Countywide Clean Water Program, and Courtney Riddle, Contra Costa Clean Water Program
Copy:	Karin Graves and Lucile Paquette, Contra Costa Clean Water Program
From:	Kelly Havens, Senior Engineer, Austin Orr, Engineer, Lisa Austin, Principal, and Marc Leisenring, Principal
Subject:	Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Geosyntec Project Numbers: WW2127 and WW2407

1. INTRODUCTION

This memorandum provides an expanded description and summary results for the calibration and validation conducted as for the development of the Alameda Countywide Clean Water Program (ACCWP) and Contra Costa Clean Water Program (CCCWP) Reasonable Assurance Analysis (RAA) model. This memorandum provides additional information to that provided in the Alameda Countywide Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report and the Contra Costa Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report (i.e., "GI Quantitative Relationship Reports"; ACCWP, 2018 [PR-2] and CCCWP, 2018 [PR-3]) for the purpose of peer review. As such, this memorandum references information and sections in those reports.

2. CALIBRATION APPROACH AND PARAMETERS

As described in the GI Quantitative Relationship Reports [PR-2; PR-3], the baseline pollutant loading model utilized for the RAA is based on continuous simulation hydrology model run in EPA's Stormwater Management Model (SWMM) version 5.1, combined with land use-based runoff concentrations to obtain the average annual loading of mercury and PCBs in stormwater runoff from Alameda and Contra Costa counties during the TMDL baseline period (i.e., 2003 – 2005). The hydrologic model utilizes generic hydrologic response units (HRUs), as described in Sections 2.2.1 and 3.1.1 of the GI Quantitative Relationship Reports [PR-2; PR-3]. Calibration of the generic HRU models was conducted on the average annual discharge volume for water years

(WYs) 2000-2009, utilizing available stream flow records. The objective of the calibration was to reasonably match the average annual runoff volume for this 10-year period.

The acceptable percent difference between simulated and observed annual volumes included in the *Bay Area RAA Guidance Document* (BASMAA, 2017) are provided in Table 1 below. These ranges were used to verify model results and evaluate whether parameters have been adequately calibrated.

Table 1: Allowable Difference between Simulated and Observed Annual Volumes

Model parameters	Average % difference between simulated annual results and observed data		
	Very Good	Good	Fair (lower bound, upper bound)
Hydrology/Flow	<10	10-15	15-25

A summary of the observed data and the parameters used to conduct the calibration with the simulated (modeled) results are provided in the following subsections.

2.1 Observed Data

2.1.1 Flow Gauges Used for Calibration

A list of candidate flow gauge sites were identified for potential use in calibration in the GI Quantitative Relationship Reports [PR-2; PR-3]. For the purposes of calibration, the candidate gauge sites that were identified in the GI Quantitative Relationship Reports included stream depth rating curves and daily mean records for the WY 2000 – 2009 period, and all are USGS gauges. The flow gauges used in calibration are summarized in Table 2 and shown in Figure PR-5A (all figures are provided at the end of the memo).

Table 2: Flow Gauges Used for RAA Model Calibration

Gauge ID	Gauge Name	Location	County	Data Frequency
11182500	San Ramon Creek	San Ramon	Contra Costa	Daily
11181390	Wildcat Creek[1]	Richmond / San Pablo	Contra Costa	Daily
11181040	San Lorenzo Creek	San Lorenzo	Alameda	Daily
11181008	Castro Valley Creek	Hayward	Alameda	Daily
11181000	San Lorenzo Creek	Hayward	Alameda	Daily
11180700	Alameda Creek Flood Channel	Union City	Alameda	Daily
11179000	Alameda Creek	Fremont	Alameda	Daily
11176900	Arroyo de la Laguna	Verona	Alameda	Daily

1. The Wildcat Creek gauge record is incomplete and contains data only for the four-year period WY 2006-2009. Geosyntec used the available years of gauge data to inform the calibration effort, but it was not ultimately used to assess the overall fitness of the model at representing the RAA baseline period regional hydrology.

Three other gauges were identified for potential use in calibration in the GI Quantitative Relationship Reports, but were ultimately not used for calibration, as described below. These included:

- Gauge number 11337600, Marsh Creek, which had considerable quantities of dry weather flows recorded with significant variability, such that baseflow removal techniques were not successful in isolating flows associated with rainfall;
- Gauge number 11173575, Alameda Creek Below Welch Creek, which contained significant data gaps in the record, as well as erratic stream flows likely caused by dam influence; and
- Gauge number 11173510, Alameda Creek Below Calaveras Creek, which contained significant data gaps in the record, as well as erratic stream flows likely caused by dam influence.

Given the data availability, calibration was conducted for both Alameda County and Contra Costa County areas simultaneously.

The area tributary to each flow gauge was delineated using the USGS StreamStats online tool (U.S. Geological Survey, 2016). These delineations were intersected with the HRU layer to select generic HRU's from across the two counties for use in the calibration, including multiple different rainfall and climate zones, soil classifications, surface slopes, and land uses. The watershed areas tributary to the gauges used are shown in Figure PR-5A and summarized in Table 3.

Table 3: Calibration Watershed Tributary Area Characteristics

Gauge ID	Gauge Name	Area (acres)	Percent Developed	Percent Impervious
11182500	San Ramon Creek	3,878	21%	2%
11181390	Wildcat Creek	4,999	22%	5%
11181040	San Lorenzo Creek	29,989	38%	12%
11181008	Castro Valley Creek	3,531	93%	44%
11181000	San Lorenzo Creek	24,203	24%	5%
11180700	Alameda Creek Flood Channel	237,946	29%	10%
11179000	Alameda Creek	224,072	28%	9%
11176900	Arroyo de la Laguna	164,679	35%	12%

2.1.2 Baseflow Removal Process

Calibration of land surface runoff hydrology to stream gauge records requires that baseflow be computed and accounted for throughout the period of record, as the RAA model does not include storm flow routing, groundwater inflow/outflow, diversions, or reservoirs. Where baseflow constitutes a large percentage of total flow, baseflow accounting allows for isolation and calibration of just the flow gauge runoff response to a rainfall event, which is dependent on land surface features. A variety of methods exist for separating baseflow from runoff. For those flow gauges requiring baseflow separation, two methods were identified as appropriate for the flow gauges used for Alameda County and Contra Costa County RAA model calibration. The methods and gauge characteristics corresponding to the use of the method include:

1. Base-Flow Index (BFI) modified: BFI modified is a timeseries analysis which locates minimum values in the hydrograph over five-day increments. For each identified minimum, if 90% of its value is less than both adjacent minimums, it is identified as a hydrograph 'turning point'. The baseflow hydrograph is established by connecting the turning points with straight lines (Barlow et., al, 2015). This method was used to remove baseflow from calibration watersheds with appreciable development.

2. PART (short for partitioning): PART is an iterative timeseries analysis that identifies daily streamflow values that are not affected by surface runoff, assigns these values as baseflow, then removes baseflow from all days to compile the baseflow-corrected record used for surface runoff calibration. Daily streamflow values are identified as baseflow if they are preceded by N days of continuous streamflow recession (Barlow et., al, 2015); N is identified through the pattern of recession of streamflow measurements. This method was used to remove baseflow from large calibration watersheds influenced by significant impoundments.

The gauges for which no baseflow separation was conducted were estimated to have very little or no potential for baseflow to influence the calibration to mean annual volume since the streams are largely undeveloped, aren't actively managed with significant impoundments, and typically run dry in the month of September. The most appropriate method for separating baseflow was determined on a gauge-specific basis, depending on the variability in the flow record and the occurrence of confounding factors that affect baseflow such as dam releases and other dry weather inflows.

A summary of the baseflow separation method used for each flow gauge is provided in Table 4.

Table 4: Calibration Flow Gauge Baseflow Removal Methods Used

Gauge ID	Gauge Name	Baseflow Separation and Removal Method	Notes	Total Watershed Area Including Impoundments (acres)	Impounded Area in Watershed (acres)
11182500	San Ramon Creek	No Baseflow Removal	Small, mostly undeveloped, typically dry in August or September	3,878	None
11181390[1]	Wildcat Creek	No Baseflow Removal	Small, mostly undeveloped, typically dry in August or September. Data only available for WY 2006-2009	4,999	None
11181040	San Lorenzo Creek	BFI Modified	Contains significant urban development	29,989	None
11181008	Castro Valley Creek	BFI Modified	Contains significant urban development	3,531	None
11181000	San Lorenzo Creek	No Baseflow Removal	Small, mostly undeveloped, typically dry in August or September	24,203	None
11180700	Alameda Creek Flood Channel	PART	Used only WY 2002, 2003, and 2005 – 2009 due to missing and erroneous data in other WYs. Large watershed with impoundments.	418,788	180,809
11179000	Alameda Creek	PART	Large watershed with impoundments.	404,913	180,809
11176900	Arroyo de la Laguna	BFI Modified	Contains significant urban development	258,121	93,419

1. The USGS does not report discharge for this gauge more recently than 1996. Balance Hydrologics began recording measurements for this gauge in 2005; this record was used for WY2006-2009.

2.2 Modeled Results - Model Calibration Parameters

To conduct the calibration, modeled annual storm flow produced from the delineated watersheds draining to the stream gauges (see Figure PR-5A) was compared to annual flow in the stream gauge records, with baseflow separated as described in Section 2.1.2, for WYs 2000 – 2009. Modeled annual storm flow was predicted by area-weighting the runoff output from generic HRU models in proportion to the areas of those generic HRUs within the watersheds draining to the stream gauges.

HRU calibration parameters were adjusted in three phases. The first phase entailed establishing the general range and sensitivity of the hydrologic model to saturated soil hydraulic conductivity (Ksat) for HSG C and D type soils for the generic HRUs within the three undeveloped watersheds tributary to identified calibration flow gauges (see Tables 2, 3, and 4). The second phase involved exploring sensitivity to changes in soil infiltration recovery time for the identified range of Ksat values. The third phase incorporated soil parameter value combinations identified in the first two phases in models for all eight calibration watersheds. National Land Cover Dataset (NLCD) imperviousness data were initially considered as a calibration parameter but were not ultimately used (see further discussion in Section 2.2.3 below).

Identified model parameters were adjusted for each phase until the average percent difference between modeled and measured average annual storm flow volumes (with baseflow removed as described in Table 4) was less than 25% - the acceptable range as summarized in Table 1. Once the average percent difference for all the calibration watersheds were within the acceptable range, the HRU model parameters were finalized.

2.2.1 Soil Hydraulic Conductivity

Soil Ksat was primarily calibrated in the watersheds draining to flow gauges 11182500 (San Ramon Creek), 11181390 (Wildcat Creek), and 11181000 (San Lorenzo Creek) because these watersheds are primarily undeveloped and thus provide greater isolation of the pervious area runoff and loss response to rainfall. Given the percent total area of hydrologic soil group (HSG) C and D type soils in these watersheds, soil Ksat was adjusted only for HSG types C and D. The Ksat for soil groups A and B were assigned by area-weighting literature values corresponding with the texture classes that are present within Alameda County and Contra Costa County. It was found that adjusting HSG A and B Ksat model input values resulted in minimal changes to average annual volume in the watersheds given that A and B type soils each cover less than 5% of the Alameda County and Contra Costa County areas modeled.

2.2.2 Soil Recovery Pattern

The same three watersheds used for Ksat calibration were also used to calibrate soil recovery time. This parameter is associated with the soil drying effects caused by evapotranspiration and determines how many days it takes for a soil to recover its full infiltrative capacity during the dry period following a rainfall event. In SWMM, this parameter is a function of both the subbasin's Ksat and expected soil recovery time and can be defined on a monthly basis as part of the climatological parameters. See SWMM5 Users Guide 13th Edition pg. 462-463 (James et., al, 2010; provided in PR-4) for information on the Green Ampt Equation and the Recovery of Infiltration Capacity.

2.2.3 Calibration for Developed Watersheds

Imperviousness (associated with specific Association of Bay Area Governments [ABAG] land use types, see Section 3.1.1. of the GI Quantitative Relationship Reports [PR-2; PR-3]) was considered as a parameter for calibration, but NLCD-derived imperviousness was found to produce modeled results within the acceptable range, so no adjustment to imperviousness was applied as part of calibration. Imperviousness values were assigned for each individual polygon in the ABAG 2005 Geospatial Information System (GIS) dataset by area-weighting the NLCD 2006 imperviousness values associated with the polygon. Each parcel and right-of-way (ROW) segment had roughly the same spatial resolution.

Soil parameters calibrated to undeveloped watersheds were adjusted for soil compaction assumed to occur during development (see Section 3.1.1 of the GI Quantitative Relationship Reports [PR-2; PR-3]) and were used to develop area-weighted average annual HRU runoff output for the other more developed and impervious watersheds associated with identified flow gauges. Coupled with the NLCD-derived imperviousness method for identifying representative HRUs for the watersheds, these calibrated soil parameters were found to produce results within the acceptable calibration range for the more developed and impervious watersheds used for calibration.

3. CALIBRATION RESULTS

3.1 Parameter Adjustment

To identify the region of best fit between modeled and measured average annual runoff for the identified calibration parameters, a large range of values were input into the generic HRU models representative of the areas within the calibration watersheds.

3.1.1 Soil Hydraulic Conductivity and Recovery Time

Soil Ksat values between 0.025 – 0.35 inches per hour (in/hr) for HSG C and D soils were examined as part of the first phase of calibration. Varying combinations of Ksat values for the two soil types were tested for the undeveloped calibration watersheds. Each pair of parameters represent hundreds of individual continuous HRU SWMM models. This calibration exercise revealed that the best fit values for HSG C and D type soil in the three undeveloped calibration watersheds likely falls between 0.1 and 0.2 in/hr for HSG C soils, and between 0.05 and 0.125 in/hr for HSG D type soils.

This range of parameters was explored further in the second phase of calibration, in which soil recovery time was adjusted for three different values: 7 days, 14 days, and 18 days. The calibration percent difference results corresponding to the combinations of HSG C and D soil Ksat values and soil recovery times are shown in Figure PR-5B. Darker blue areas indicate a lower percent difference between modeled runoff volume and measured total discharge volume

(with baseflow removed per Table 4) in the three undeveloped calibration watersheds. Over 11,800 continuous simulation HRU model runs were evaluated in order to create the grid of values, shown in Figure PR-5B.

The darkest blue areas of the three plots in Figure PR-5B indicate the least percentage difference between modeled and measured average annual runoff volume for all three undeveloped stream gauge records during the period from WY 2000 - 2009. The percentage difference in total annual average runoff volume is quite sensitive to changes in HSG C and D type soils for the range of Ksat values searched during this exercise, but the model is not very sensitive to soil recovery time as indicated by the small differences in the three plots.

From this calibration phase two investigation, it was identified that the most appropriate soil Ksat values ranged from 0.125 – 0.15 in/hr for HSG C soils, 0.075 – 0.1 in/hr for HSG D soils. A soil recovery pattern equivalent to a 14-day soil recovery time for HSG C soils was also identified to be the most appropriate for the calibration watersheds.

Phase three of the calibration used this tighter range of HSG C and D soil Ksat values to evaluate percent difference between average annual modeled runoff and measured discharge at all of the calibration gauges (as corrected for baseflow removal per Table 4). The best-fit soil Ksat parameters for all eight of the calibration gauges are shown in Table 5 below.

Table 5: Final Soil Ksat Values for the Eight Calibration Gauge Tributary Watersheds

HSG	Undeveloped Soil Ksat (in/hr)	Developed Soil Ksat[1] (in/hr)
A[2]	2.5	1.875
B[2]	0.3	0.225
C	0.15	0.1125
D	0.1	0.075

[1] Ksat is decreased by 25% to account for soil compaction expected to occur during development.

[2] Ksat assigned by area-weighting literature values corresponding with soil texture classes present in the areas modeled.

3.2 Resulting Percent Difference between Modeled and Measured Average Annual Runoff

Utilizing the calibrated parameter values described in Section 3.1 and summarized in Table 5, the percent difference between average annual modeled runoff and average annual measured runoff for the period of record (WY 2000 – 2009) was found to be within the required threshold (Table 1) for most of the watersheds examined, with the exception of the Wildcat Creek gauge (gauge number 11181390). This gauge has an incomplete record and contains data for only four years, from WY 2006-2009. The available data from this gauge was used to inform the calibration parameters, but given the incomplete record, the percent difference between measured and modeled average annual runoff volume was not ultimately used to assess the overall fitness of the RAA hydrologic model for the full baseline time period (WY 2000-2009).

The percent difference between average annual modeled runoff and measured runoff (accounting for baseflow corrections per Table 4) for the RAA baseline period from WY 2000-2009 for each calibration gauge is shown in Figure PR-5C. Since the entire decade was modeled, some individual years within the period of record varied more than the 25% threshold; however, these percent differences are offset between wet years and dry years to provide an acceptable percent difference between average annual modeled and measured values.

4. VALIDATION

Following completion of baseline hydrologic calibration, baseline loads were validated using pollutant monitoring data collected as part of the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP; specifically, the Small Tributary Loading Strategy project) and the Surface Water Ambient Monitoring Program (SWAMP). Pollutant concentration data were obtained from the California Environmental Data Exchange Network (CEDEN). The validation analysis included 206 total PCBs and 291 total mercury results from various monitoring locations in Alameda and Contra Costa Counties with sample dates ranging from 2001 to 2014.

Samples were taken at load monitoring stations, mostly during wet weather. These stations are shown on Figures PR-5D (PCBs) and PR-5E (mercury) along with their respective watershed delineations. Where not provided by SFEI, watershed delineations were developed using the USGS StreamStats delineation tool (USGS, 2016). The land use composition of the validation watersheds is provided in Attachment A to this memo.

The validation exercise conducted combines the calibrated Contra Costa and Alameda County regional hydrology with the Regional Watershed Spreadsheet Model (RWSM) PCBs and mercury values estimated by SFEI (see section 2.1 and 2.2.2 of the GI Quantitative Relationship Reports [PR-2; PR-3] and Regional Watershed Spreadsheet Model Version 1.0 Results Summary Memorandum (Geosyntec, 2019). Because the RWSM concentrations used for the RAA water quality model are not modifiable for the regional RAA Modeling approaches, this validation exercise is purely qualitative, and is not expected to result in changes to the hydrologic or water quality model input parameters.

The validation process includes computing the area-weighted average annual runoff volume for each land use category within the validation watersheds and combining these results with the associated RWSM average annual pollutant concentration. The resulting land use-based pollutant loads are added together over all land uses to obtain the estimated average annual pollutant load for each validation watershed. This average annual pollutant load is divided by the average annual runoff volume for the validation watershed to obtain an average annual pollutant discharge concentration for each validation watershed. The values calculated from the model output were compared to monitoring data collected at the associated validation monitoring

locations. Statistical summaries and the number of samples for PCBs and mercury concentrations measured at each validation monitoring location are shown in box plot format in Figure PR-5F and Figure PR-5G, respectively. The resulting average annual pollutant discharge concentration for each validation watershed is superimposed on the box plots of the measured values for comparison.

The modeled PCBs concentrations are within the expected ranges for the validation watersheds examined (see Figure PR-5F). In some cases, the model slightly overpredicts the PCBs concentration in runoff, notably in the Ettie Street and Zone 5 Line M watersheds, and in other cases, underpredicts, such as in the Santa Fe Channel watershed. This is expected given the highly variable spatial distribution of PCBs contamination and storm-to-storm variability in runoff characteristics. The differences are largely attributable to the use of the regionally-characteristic land use-based RWSM values for modeling PCBs runoff concentrations and comparing average annual concentrations computed from annualized loads and volumes.

The validation exercise for mercury included many more watersheds than for PCBs. In general, the modeled values for mercury concentration are significantly higher than the measured values (see Figure PR-5G). The present RWSM land use-based concentration values for mercury appear to overestimate the observed concentration of mercury in the monitored watersheds within Alameda County and Contra Costa County.

5. REFERENCES

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Attachment

Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo

Attachment A: Land Use Breakdown, Validation Watersheds

November 8, 2019

Validation Watershed	POC	Total Acres by Land Use					Total Acres	Percent Area by Land Use				
		Old Industrial	Old Commercial/ Old Transportation	Old Residential	New Urban	Open Space		Old Industrial	Old Commercial/ Old Transportation	Old Residential	New Urban	Open Space
Ettie Street Pump Station_A	PCBs and Hg	356	187	580	47	13	1,183	30%	16%	49%	4%	1%
Santa Fe Channel-SFeCh	PCBs and Hg	197	240	1,012	43	35	1,527	13%	16%	66%	3%	2%
Zone 5 Line M-Z5LM	PCBs and Hg	162	79	645	100	858	1,843	9%	4%	35%	5%	47%
Hayward Ind Stdrn	PCBs and Hg	82	312	495	118	14	1,021	8%	31%	48%	12%	1%
Meeker Slough	PCBs and Hg	9	74	415	3	5	507	2%	15%	82%	<1%	<1%
San Leandro Creek	PCBs and Hg	49	243	4,750	617	23,052	28,710	<1%	<1%	17%	2%	80%
San Lorenzo Creek	PCBs and Hg	50	842	5,619	2,781	20,694	29,986	<1%	3%	19%	9%	69%
Lower Marsh Creek	PCBs and Hg	125		1,113	6,034	67,837	75,109	<1%	0%	1%	8%	90%
Walnut Creek	PCBs and Hg	88	2,284	18,655	5,558	28,004	54,590	<1%	4%	34%	10%	51%
Glen Echo Creek-GECr	PCBs and Hg		90	400	3	223	716	0%	13%	56%	<1%	31%
Port Chicago Highway	Hg Only	1,650	268	1,801	1,021	14,229	18,968	9%	1%	9%	5%	75%
Codornices at 2nd Street	Hg Only	61	24	893	3	2	983	6%	2%	91%	<1%	<1%
Kirker Creek at Floodway	Hg Only	23		204	99	105	431	5%	0%	47%	23%	24%
El Charro	Hg Only	981	1,027	2,792	4,653	44,201	53,654	2%	2%	5%	9%	82%
Cerrito at Creekside Park	Hg Only	27	119	1,626	17	89	1,879	1%	6%	87%	<1%	5%
Richmond Parkway	Hg Only	36	165	868	47	4,382	5,497	<1%	3%	16%	<1%	80%
3rd St. Bridge	Hg Only	123	339	6,804	911	18,576	26,753	<1%	1%	25%	3%	69%
Baxter at Booker	Hg Only	1	65	541	2	83	692	<1%	9%	78%	<1%	12%
Above Vulcan Bridge Zone 7	Hg Only	28	96	1,078	414	26,592	28,209	<1%	<1%	4%	1%	94%
Arroyo Viejo Rec. Center	Hg Only	2	130	1,841	64	1,400	3,438	<1%	4%	54%	2%	41%
Cesar Chavez Park	Hg Only	0	116	1,287	2	56	1,461	0%	8%	88%	<1%	4%
Strawberry Creek Park	Hg Only		98	822	75	454	1,448	0%	7%	57%	5%	31%
Sausal at E.22nd	Hg Only		140	1,822	6	545	2,513	0%	6%	73%	<1%	22%
Above Lake Temescal	Hg Only		37	817	49	202	1,105	0%	3%	74%	4%	18%
Kirker Creek Apartments	Hg Only		50		10	3,497	3,558	0%	1%	0%	<1%	98%
Mitchell on Oak St	Hg Only			97	0	2,729	2,826	0%	0%	3%	0%	97%

Figures

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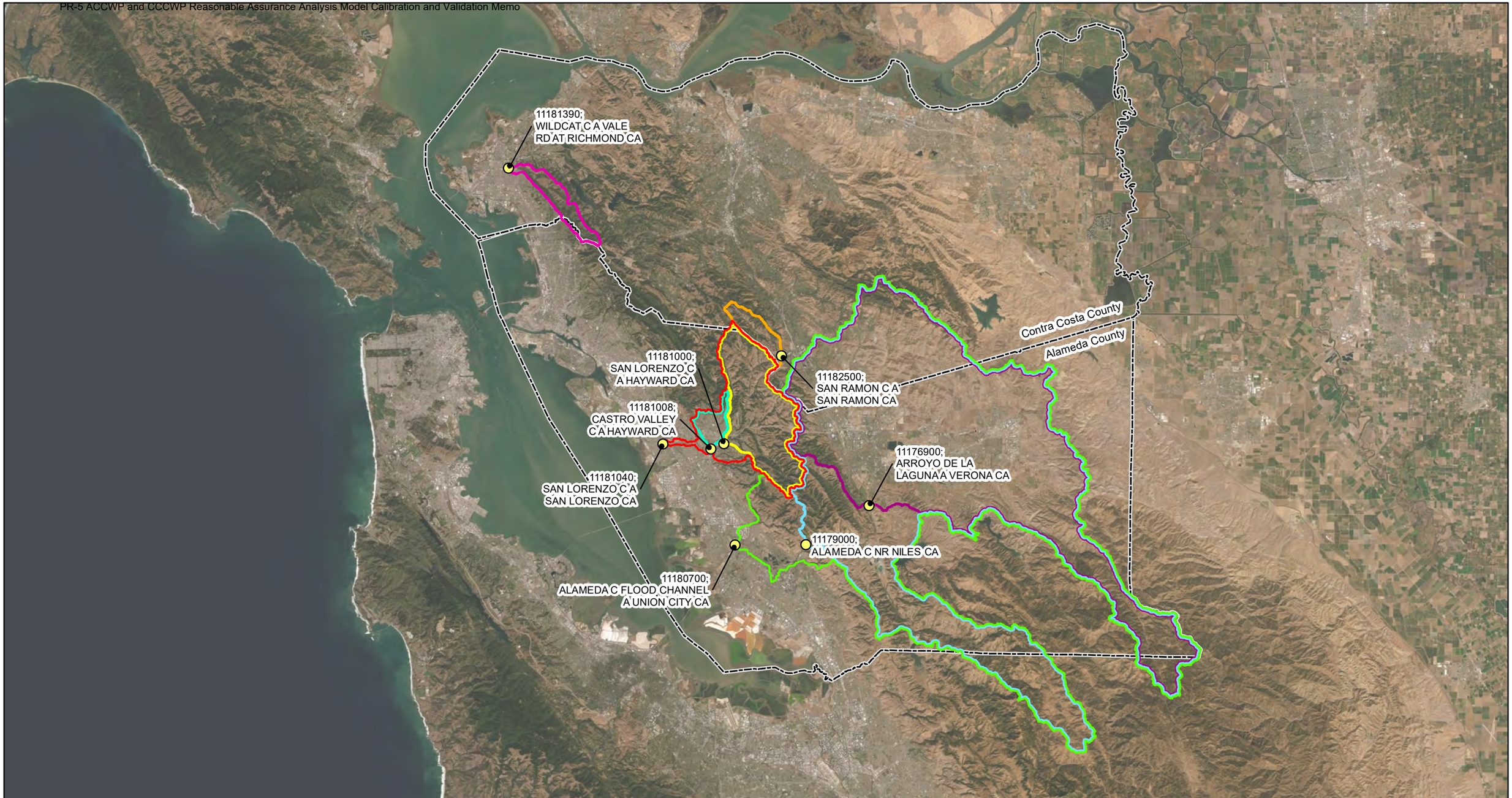

Legend

- County Boundaries
- Flow Gauge Location

San Lorenzo Ck.	Alameda Ck.	San Ramon Ck.	Wildcat Ck.
11181040	11180700	11182500	11181390
11181000	11179000		
11181008	11176900		

N

0 6 12 Miles

RAA Hydrologic Model Calibration

Watersheds Tributary to Flow Gauges Used for Comparison

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | August 2019

Figure PR-5A

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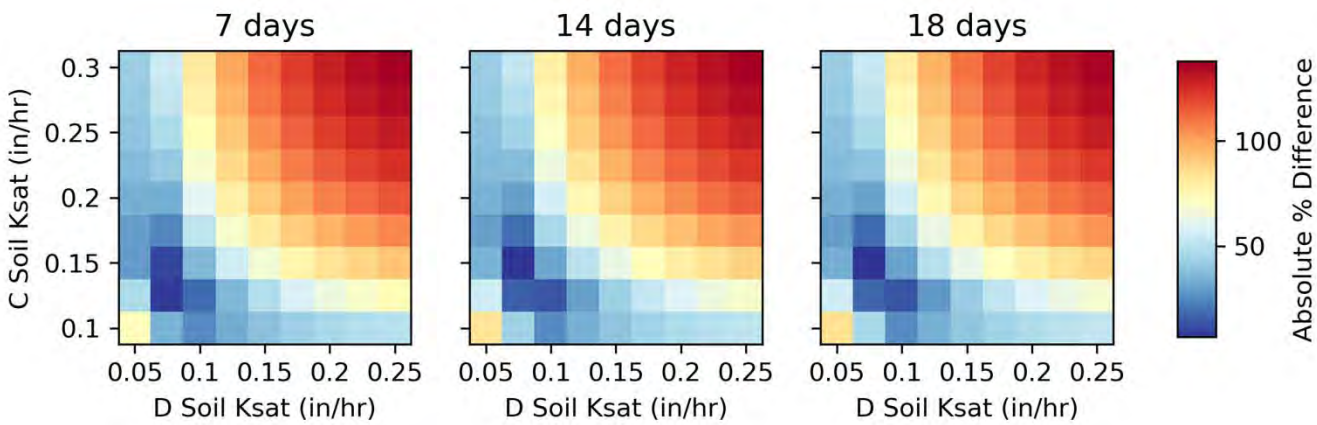

Calibration Matrix for HSG C and D Soils and Soil Recovery Time

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Figure PR-5B

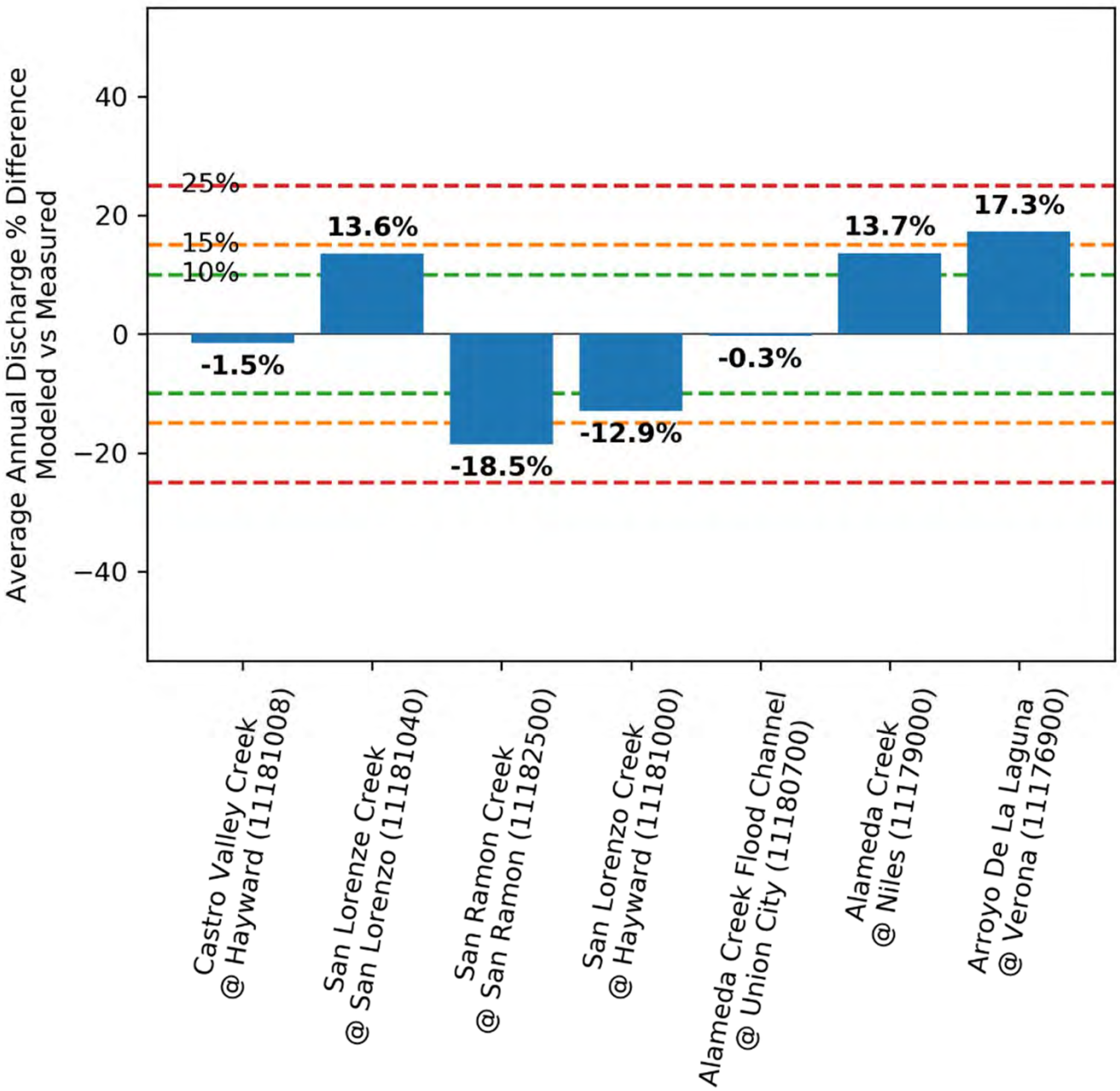

Percent Difference Between Modeled and Measured Average Annual Runoff Volume for Each Calibration Watershed

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Figure PR-5C

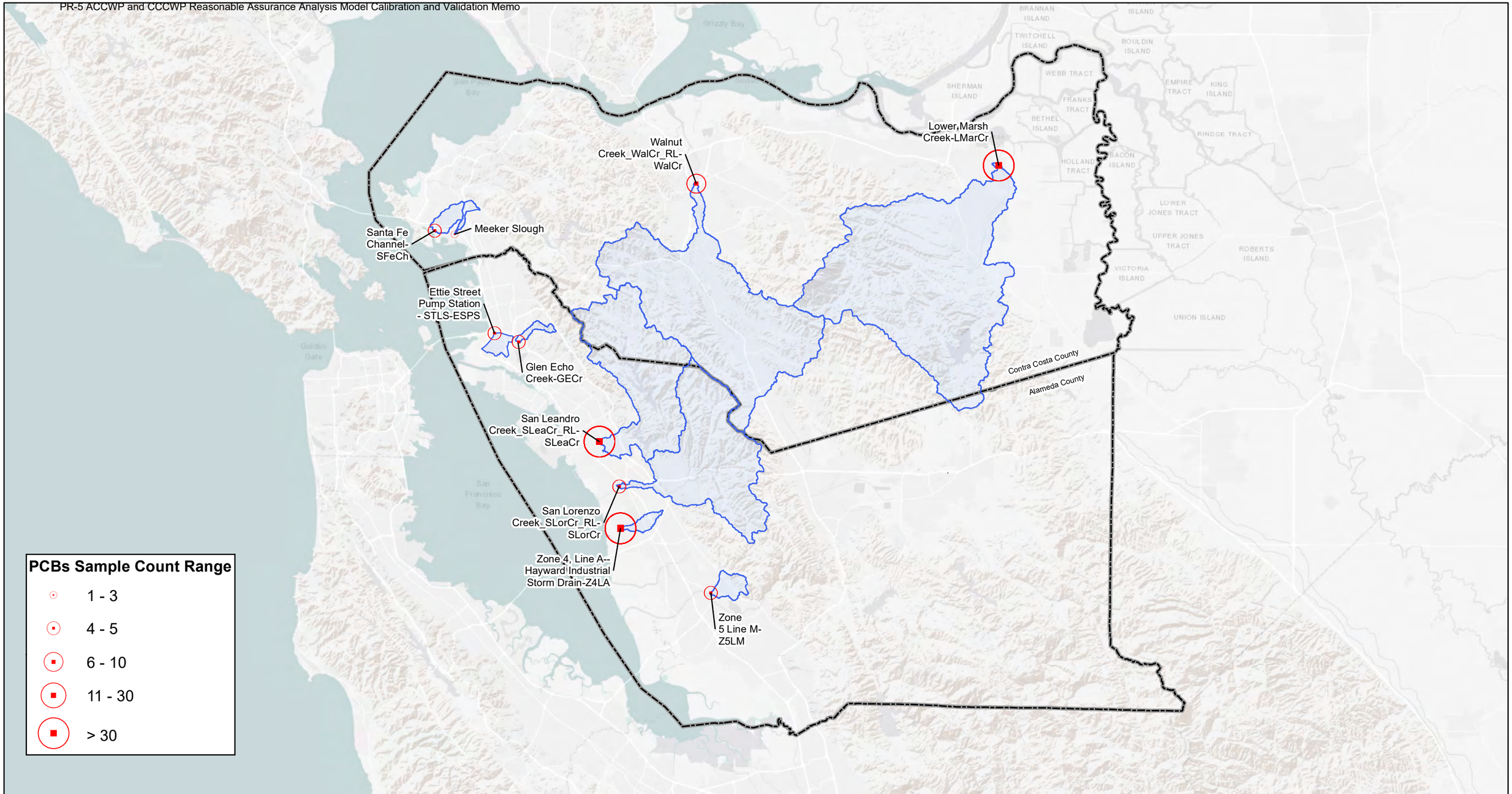

Legend

- County Boundary
- Validation Watershed
- Monitoring Location

N

0 3 6 12 Miles

RAA Water Quality Model Validation

Watersheds Tributary to Polllutant Monitoring Locations used for Comparison of PCBs

Alameda County and Contra Costa County California

Geosyntec consultants

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Figure PR-5D

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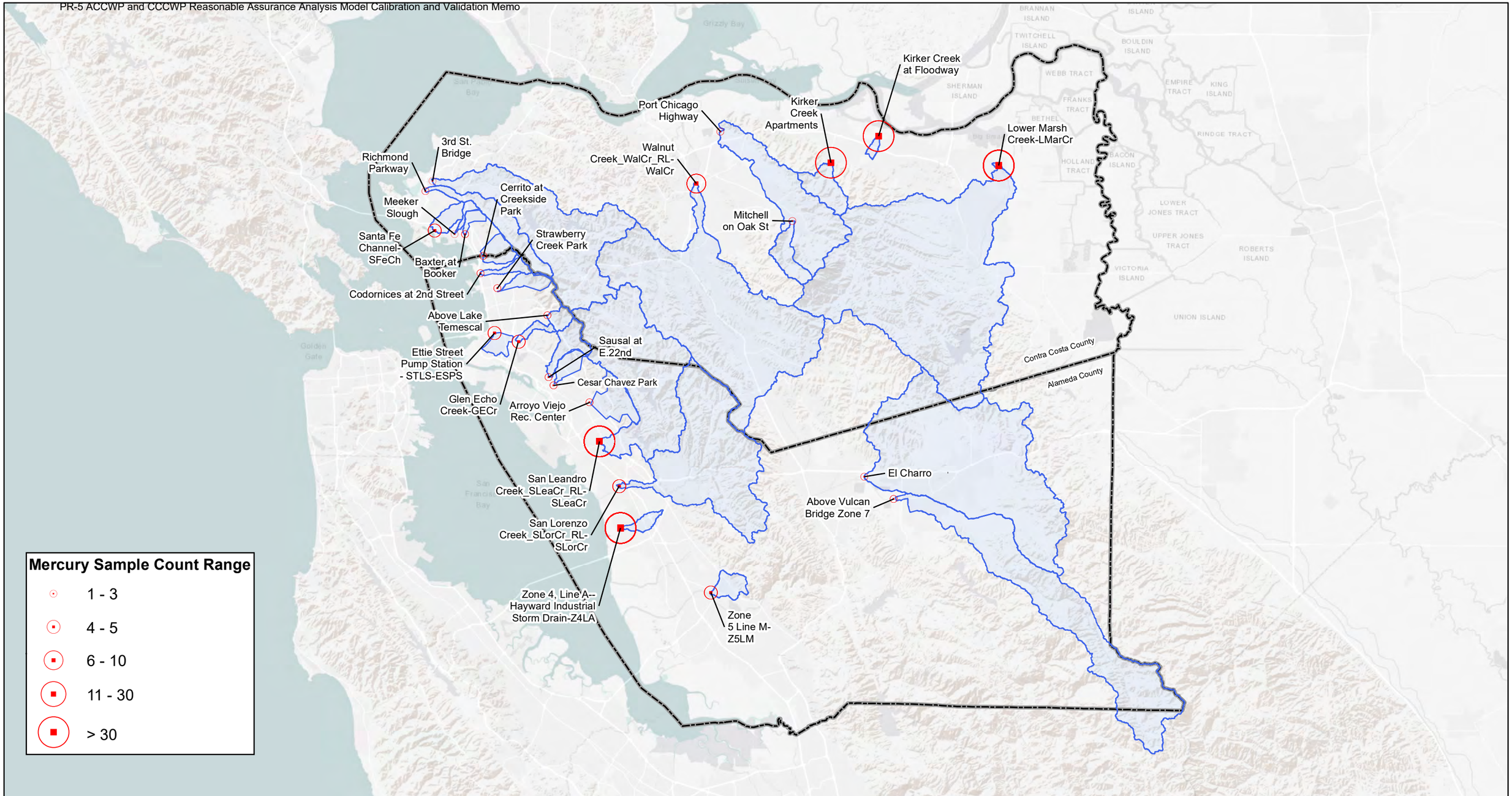

Legend

County Boundary

Validation Watershed

N

0 3 6 12 Miles

RAA Water Quality Model Validation

Watersheds Tributary to Polllutant Monitoring Locations used for Comparison of Mercury

Alameda County and Contra Costa County California

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Figure PR-5E

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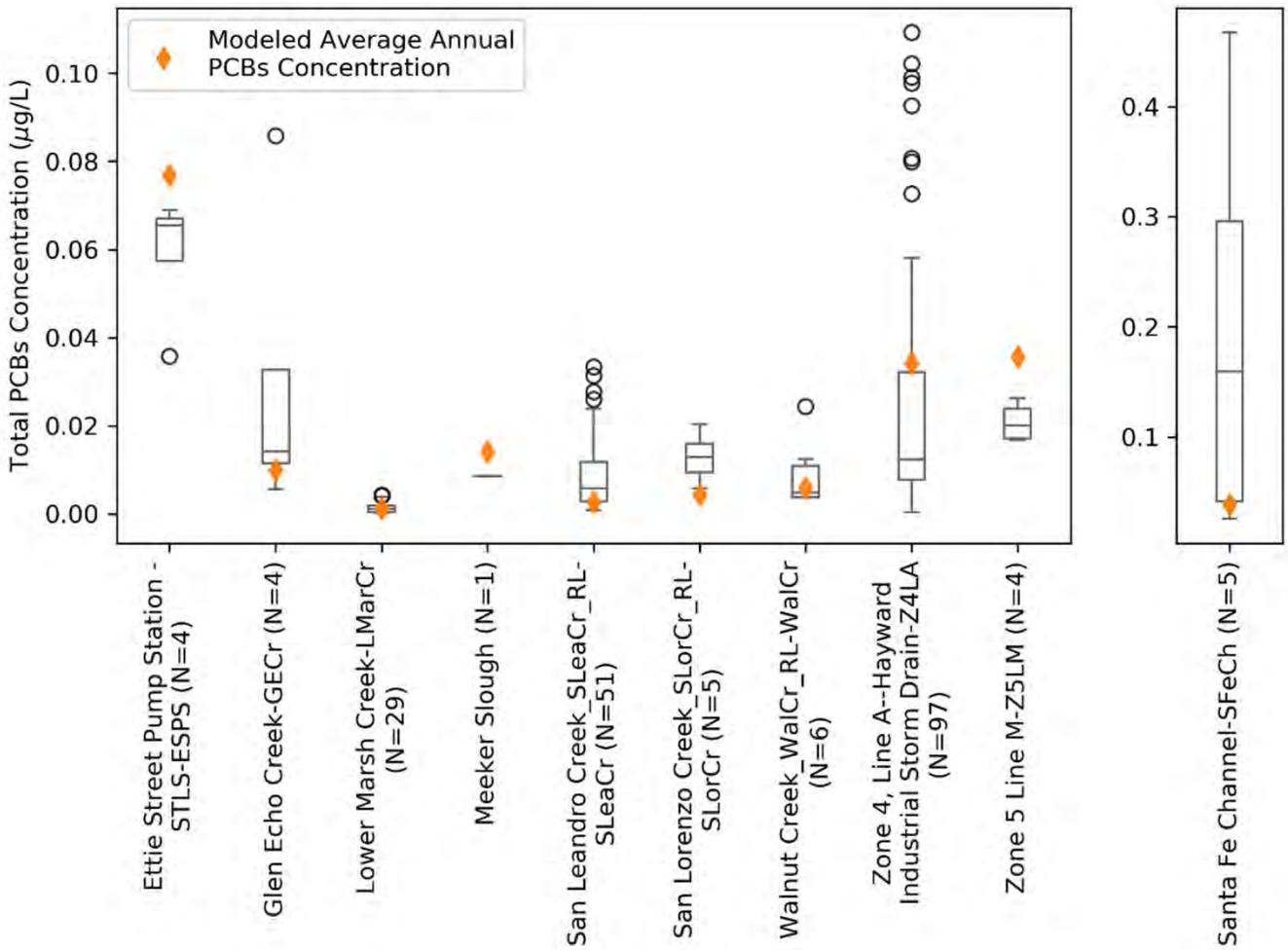

Modeled and Measured PCBs Concentrations for Monitored Watersheds in Alameda County and Contra Costa County

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Figure PR-5F

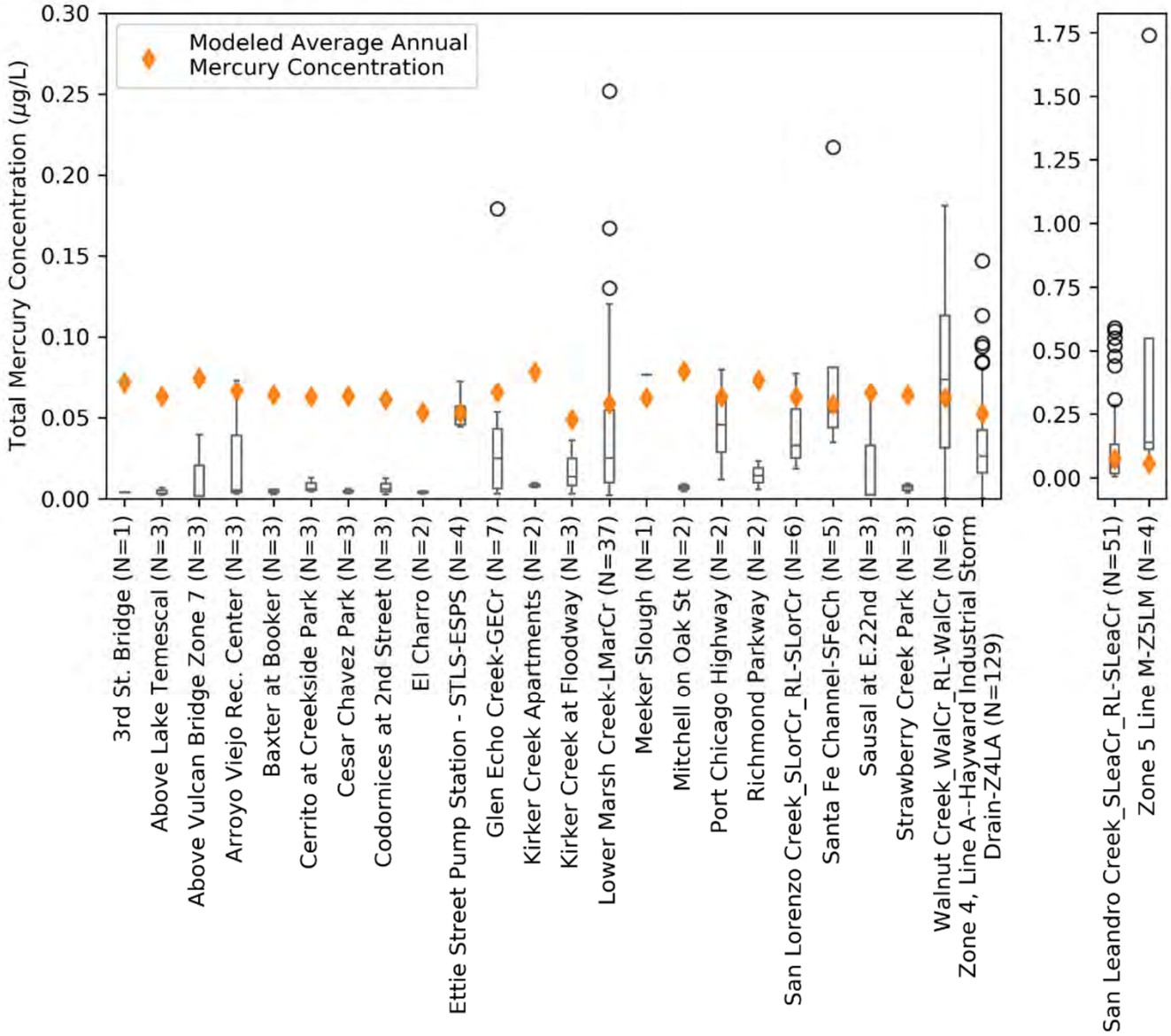

Modeled and Measured Mercury Concentrations for Monitored Watersheds in Alameda County and Contra Costa County

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Figure PR-5G

APPENDIX F

List of NPDES Permittees Removed from Baseline

Table A-1: List of Phase II Permittees, and Facilities with Major or Minor NPDES Permits, in Alameda County

Permit Category	Facility Name	Facility Owner	City
Phase II	Bay Area Rapid Transit (BART)	Bay Area Rapid Transit Ditrict	Various
Phase II	Alameda Coast Guard	United States of America	Alameda
Phase II	Amtrak Oakland Maintenance Facility	National Railroad Passenger Corporation	Oakland
Phase II	Federal Correctional Instituion, Dublin (Camp Parks)	United States of America	Dublin
Phase II	Cal State East Bay Hayward Campus	State of California	Hayward
Phase II	Port of Oakland	City of Oakland	Oakland
Phase II	University of California, Berkeley	Regents of the University of California	Berkeley/Oakland
NPDES Major	City Of Livermore Sewage Treatment Plant	City Of Livermore	Livermore
NPDES Major	East Bay Mud Main WWTP	East Bay Municipal Utility District	Oakland
NPDES Major	Dublin-San Ramon WWTF	Dublin San Ramon Services District	Pleasanton
NPDES Major	EBDA Common Outfall	City Of San Leandro /East Bay Dischargers Authority	San Leandro
NPDES Minor	Alameda Sewer Collection System	City Of Alameda	Alameda
NPDES Minor	Albany Wet Weather Bypass	City Of Albany Public Facilities Financing Authority	Albany
NPDES Minor	City Of Berkeley Transfer Station	City Of Berkeley	Berkeley
NPDES Minor	Former Marchant Building	Lba Riv Co Xii LLC	Berkeley/Emeryville/Oakland
NPDES Minor	Carl Zeiss Meditec	Gpt Tpg 5160 Hacienda LP	Dublin
NPDES Minor	Dublin San Ramon Services District	Dublin San Ramon Services District	Dublin
NPDES Minor	Hexcel Corporation	Hexcel Corporation	Dublin
NPDES Minor	Emeryville Sewer Collection System	City Of Emeryville	Emeryville
NPDES Minor	Hayward Waste Water Treatment	City Of Hayward	Hayward
NPDES Minor	ACWD Newark Desalination Facility Discharges To Outfall E-14	Alameda County Water District	Newark
NPDES Minor	Oakland Sewer Collection System	Housing Authority Of The City Of Oakland	Oakland
NPDES Minor	Schnitzer Steel	Schnitzer Steel Products Of California Inc	Oakland
NPDES Minor	Piedmont Sewer Collection System	City Of Piedmont	Piedmont
NPDES Minor	Coopervision Inc	Black Mountain Properties LLC	Pleasanton
NPDES Minor	Rock Roll Auto Recycling	Guasco Richard L Tr	Pleasanton
NPDES Minor	Thoratec Corporation	Fox Thoratec LLC & 6035 Stoneridge Dr Asscs Etal	Pleasanton

Permit Category	Facility Name	Facility Owner	City
NPDES Minor	San Leandro Wpcp	City Of San Leandro	San Leandro
NPDES Minor	Former Mckesson Facility	Williams Brothers	Union City
NPDES Minor	Union Sanitary District Treatment Plant	Union Sanitary District	Union City

APPENDIX G

ACCWP Memo on Scenarios for Attaining PCBs Loads by 2030

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Memorandum

Date:	August 19, 2020
To:	Jim Scanlin, Alameda Countywide Clean Water Program
From:	Lisa Austin, P.E., Principal; Kelly Havens, P.E., Senior Engineer; and Elai Fresco, P.E., Project Engineer
Subject:	ACCWP Reasonable Assurance Analysis – 2030 Scenario Geosyntec Project Number: LA0597

1. BACKGROUND

This memorandum presents the results of an analysis of scenarios that investigate the level of implementation needed to result in polychlorinated biphenyls (PCBs) load reductions sufficient to attain the PCBs total maximum daily load (TMDL) wasteload allocation for Alameda County by 2030.

Municipal Regional Permit (MRP) (SFBRWQCB; Order No. R2-2015-0049; as amended by Order No. R2-2019-0004) Provisions C.11.d and C.12.d require that a reasonable assurance analysis (RAA) be conducted for the PCBs and mercury control measures described in the countywide PCBs Control Measure Plan and Mercury Control Measure Plan. The RAA methodologies and estimated load reductions for the control measures plans are provided Section 6 of the *Alameda County PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report (ACCWP, 2020). The load reduction results are summarized in Table 1 below.

Table 1: Summary of Estimated PCBs Load Reductions Achieved through Control Measure Implementation

Control Measure	PCBs Load Reduction by 2030 (kg/yr)
Source Property Identification and Abatement	0.49
PCBs in Building Materials Management	0.63
PCBs in Electrical Utilities Management	0.20
PCBs in Infrastructure	0.01
Green Stormwater Infrastructure	0.38
Full Trash Capture Treatment Control Measures	0.22
Enhanced Operations and Maintenance	0.0002
Diversion to POTW	0.001
Total Load Reduced	**1.93**
Load Reduction Goal	**3.30**
Remaining Load to be Reduced	**1.37**

As shown in Table 1, the control measures described in the RAA Report are not estimated to provide the required load reduction (i.e., the load reduction goal of 3.30 kg/yr) to achieve the TMDL wasteload allocation by the TMDL compliance date of 2030 (although it is estimated to be achieved by 2090 in the RAA Report). The RAA estimates a deficit of 1.37 kg/yr of PCBs load reduction by 2030. The discussion below assesses the level of effort or change of assumptions that would result in compliance with the wasteload allocation by 2030.

An analysis of mercury is not included in this memorandum, as the RAA model estimates that the existing baseline mercury load is less than the TMDL wasteload allocation.

2. PCBS LOAD REDUCTION GOAL

The RAA baseline pollutant loading model is a representation of the loading of PCBs across the County during the TMDL baseline period (i.e., 2003 – 2005). The baseline load used to establish the PCBs TMDL load reduction goal for the Alameda MRP Permittees is the load for the MRP area (i.e., within Water Board Region 2) below dams, after deducting the estimated baseline load for the other NPDES-permitted stormwater dischargers within this area (i.e., NPDES major and minor permittees and Phase II permittees). The TMDL population-based wasteload allocation for Alameda County MRP Permittees is calculated based on distributing the total wasteload allocation between the MRP Permittees and other NPDES-permitted stormwater dischargers. Using the calculated MRP Permittee portion of both the wasteload allocation and the RAA-calculated baseline load, the load reduction goal is estimated to be 3.30 kg/yr. (For further detail, see Section 6 of the *Alameda PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report).

If additional non-MRP Permittee areas are accounted for, this load reduction goal would be reduced, as described in the sections below.

2.1 Adjustment for Caltrans Right-of-Way Area

An additional non-jurisdictional area within Alameda County is located in the right-of-way (ROW) area owned and operated by Caltrans, whose urban stormwater discharges are regulated under a separate NPDES permit. An analysis was conducted to estimate the difference in the MRP Permittees' TMDL load reduction goal if the Caltrans area is removed from the MRP Permittee portion of the RAA-calculated baseline load (Table 2).

Table 2: Alameda County Estimated PCBs Baseline Loads without Caltrans ROW

RWQCB Region	Above/Below Dam	Permit	Baseline Load PCBs (kg/yr)
Region 2	Below Dam	**MRP[1]**	**3.54**
		Caltrans	0.21
		NPDES[2]	0.04
		Phase 2[3]	0.45
	TMDL Baseline		2.36

[1] Municipal Regional Permit permitted areas, along with IGP facilities and facilities with individual NPDES Stormwater Industrial permits.
[2] Major and Non-Major dischargers with individual NPDES permits.
[3] Phase II General Permit permittees.

Table 3 below presents the wasteload allocation for the MRP Permittees after adjusting for the Caltrans portion of the baseline.

Table 3: TMDL Wasteload Allocations for Alameda County with Caltrans

Stormwater Discharger within TMDL Baseline Area[1]	Percentage of Baseline Load (%)	PCBs WLA (kg/yr)
MRP Permittees	83%	0.417
Caltrans	5%	0.024
NPDES Permittees	1%	0.005
Phase 2 Permittees	11%	0.053
Alameda County	100%	0.5

[1] All Water Board Region 2, above dams.
WLA – Wasteload Allocation

Using the calculated MRP Permittee portion of the wasteload allocation and RAA-calculated baseline load after removing the Caltrans portion, the adjusted load reduction goal would be 3.12 kg/yr (i.e., 3.54 kg/yr – 0.42 kg/yr), in contrast to 3.30 kg/yr with Caltrans included (a 0.18 kg/yr difference). If Caltrans was removed from the baseline and the wasteload allocation, the 2030 PCBs load reduction deficit would decrease from 1.37 kg/yr (see Table 1) to 1.19 kg/yr.

Including the Caltrans ROW area in the MRP Permittee baseline assumption is conservative (i.e., generates a greater overall load reduction goal), but allows the Permittees to take full credit for the loads reduced by control measures implemented by Caltrans within Alameda County. Leaving Caltrans baseline loads and wasteload allocations as part of the MRP Permittees load reduction goal calculations will also foster collaboration with Caltrans in implementing PCBs control measures going forward.

2.2 Adjustment for Non-Urban Open Space Area

A portion of Alameda County within Region 2 is comprised of open space located outside of the urban boundary as defined by the U.S Census. The estimated RAA baseline load for this area is 0.008 kg/yr. This load constitutes a very small fraction of the overall Permittee baseline load (0.2%). Although no control measures would be applied to this area and thus it could be removed from the Permittee baseline load estimate, it is such a small portion of the baseline load for PCBs that it would not affect the PCBs load reduction goal, so has not been removed.

3. APPLICATION OF ADDITIONAL CONTROL MEASURES BY 2030

3.1 Green Stormwater Infrastructure

The RAA model was used to estimate the total potential PCBs load reduction through application of GSI treatment to areas within the County, within Water Board Region 2, and below dams, that is not already treated or projected to be treated by 2030 (i.e., the public and private GSI Plan project areas projected to be implemented between 2030 and 2040 are still "available" for treatment through GSI). The results of this analysis are provided in Table 4 below. Table 5 lists the approximate area that would be needed for private parcels, public parcels, or right-of-way (ROW) to reduced PCBs loads by an additional 1.36 kg/yr by 2030 using the average load reduction from the RAA model for the projects constructed by 2020 or projected for 2030.

Table 4: PCBs Load Available for GSI Treatment by 2030

	Private Parcels	Public Parcels	Right-of-Way	Total
Available Area[1] (Acres)	240,299	123,757	30,456	394,512
Potential PCBs Load Reduction via GSI Treatment (kg/yr)	1.02	0.44[2]	0.45	2.68

[1] Results are for the areas within Alameda County that are within Water Board Region 2, below dams, and not already treated or projected to be treated by 2030.

[2] Excludes loads for area within the Alameda Naval Air Station, Old Industrial portion of Camp Parks, Lawrence Livermore National Lab, and Port of Oakland.

Table 5: PCBs Load Available for GSI Treatment by 2030

Alameda County Parameter	RAA Model Result
Average Modeled Load Reduction Potential – Available Private Parcels (g/yr/acre)	0.036
Available Private Parcel Area Needed to Reduce 1.37 kg/yr[1] (acres)	38,000
Average Modeled Load Reduction Potential – Available Public Parcels (g/yr/acre)	0.029
Available Public Parcel Area Needed to Reduce 1.37 kg/yr[1] (acres)	47,000
Average Modeled Load Reduction Potential – Available Public ROW (g/yr/acre)	0.026
Available ROW Area Needed to Reduce 1.37 kg/yr[1] (acres)	52,000

[1] Assumes average modeled load reduction for area category (i.e., private parcels, public parcels, or ROW) to calculate area needed to be treated.

[2] ROW = Right-of-Way.

The following conclusions can be drawn from the results provided in Table 4 and Table 5:

- As can be seen in Table 4, much more area and potential load reduction are available in private parcels than public parcels or rights-of-way.
- Sixty-one percent of the available area consists of privately-owned parcels. Approximately 38,000 acres of this area (15%) would need to be treated via GSI by 2030 to achieve an additional PCBs load reduction of 1.37 kg/yr. The RAA analysis currently predicts that 1,900 acres of private parcel area will redevelop between 2020 and 2030, therefore 20 times as much redevelopment would need to occur to achieve the 2030 TMDL WLA solely through private parcels. This much private redevelopment is highly unlikely to occur in the next decade.
- Thirty-one percent of the available area is comprised of public parcels. Approximately 47,000 acres would need to be treated via GSI by 2030 to achieve an additional PCBs load reduction of 1.37 kg/yr. The RAA analysis currently assumes 566 acres of public parcels will be retrofit between 2020 and 2030, therefore 83 times more public parcel area would need to be retrofit than the public parcel area included in the Permittees' Green Infrastructure Plans. Using the cost estimating methodology presented in the *Alameda PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report, which assumes a median capital cost of $121,000 per acre treated with GSI (2018 dollars), retrofitting 47,000 acres of public parcels would cost approximately 5.8 billion dollars. In addition to the large amount of funding that would be needed, installing this much GSI on public parcels in 10 years would be technically infeasible to implement due to the time needed to site projects, conduct preliminary and final engineering design, and go through the municipal procurement process. A typical municipal GSI project would take two to five years to go through this process. Additionally, it is unlikely that the number of contractors needed to construct this much GSI in such a short period of time would be available.

- Eight percent of the available area is public ROW; approximately 52,000 acres of ROW would need to be treated via GSI by 2030 to reduce PCBs load by 1.37 kg/yr. As with the discussion on public parcel area above, this is a highly unlikely scenario. The estimated capital cost for retrofitting 52,000 acres of ROW is seven billion dollars (assuming a median cost of $137,000 per acre treated). The same technical infeasibility constraints as outlined above for retrofitting public parcels applies to retrofitting large areas of public ROW.

3.2 Enhanced Operations and Maintenance

The RAA model was used to assess the potential load reduction that could be achieved by applying enhanced operations and maintenance (O&M) measures in Old Industrial areas that are not planned to be addressed by treatment control measures (i.e., GSI or full trash capture devices) by 2030. Enhanced inlet cleaning was selected as a representative enhanced O&M measure for the purpose of this analysis. The total PCBs load produced by these areas is estimated to be 1.07 kg/yr. Table 6 below presents the potential load reduction if all of this area were addressed through enhanced storm drain inlet cleanout (i.e., increasing the frequency of cleanout from annually to biannually) with and without the use of inlet-based full trash capture devices.

Table 6: Potential Load Reduction through Enhanced Inlet Cleaning in Old Industrial Areas Not Planned for Control Measures by 2030

County/ Region	Enhanced Cleaning Frequency for Inlets with FTC Devices -- No Device to Biannual		Enhanced Cleaning Frequency for Inlets without FTC Devices -- Annual to Biannual	
	Potential Load Reduction (kg/yr)	Potential Load Reduction Rate (g/yr per acre)	Potential Load Reduction (g/yr)	Potential Load Reduction Rate (g/yr per acre)
Efficiency Factor:	**18%**		**5%**	
Alameda Region 2	0.29	0.0466	0.080	0.01295

FTC – Full trash capture.

To achieve the additional required PCBs load reduction of 1.37 kg/yr using enhanced street inlet cleaning without inlet-based full trash capture devices, enhanced cleaning would be needed for approximately 105,000 inlets with an average tributary area of one acre (i.e., a 105,000-acre drainage area). The cost of implementing enhanced inlet cleaning without full trash capture for this scenario would be $10,500,000 per year for one additional cleanout per year (assumes $100/cleanout).

If new inlet-based full trash capture devices were implemented with biannual cleaning, then a total inlet drainage area of 29,172 acres would be required. Assuming an average one-acre tributary area and a capital cost of $1,000 per acre treated, the capital cost of implementing enhanced inlet cleaning with full trash capture for this scenario would be approximately

$29,100,000. The additional ongoing annual cost would be approximately $5,700,000, assuming $200 per year for biannual cleaning.

3.3 Conclusion

The analysis provided in this memorandum leads to a reasonable conclusion that it is technically and economically infeasible to achieve the PCBs TMDL wasteload allocation in Alameda County by 2030.

* * * * *

Appendix P

PCBs in Building Demolition
Regional Data Summary

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Memorandum

Date:	September 18, 2020
To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

*****

Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	May 2020	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

04070

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

Attachment B PCBs in Priority Building Materials Screening Assessment Form B-1

Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

DISCLAIMER

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

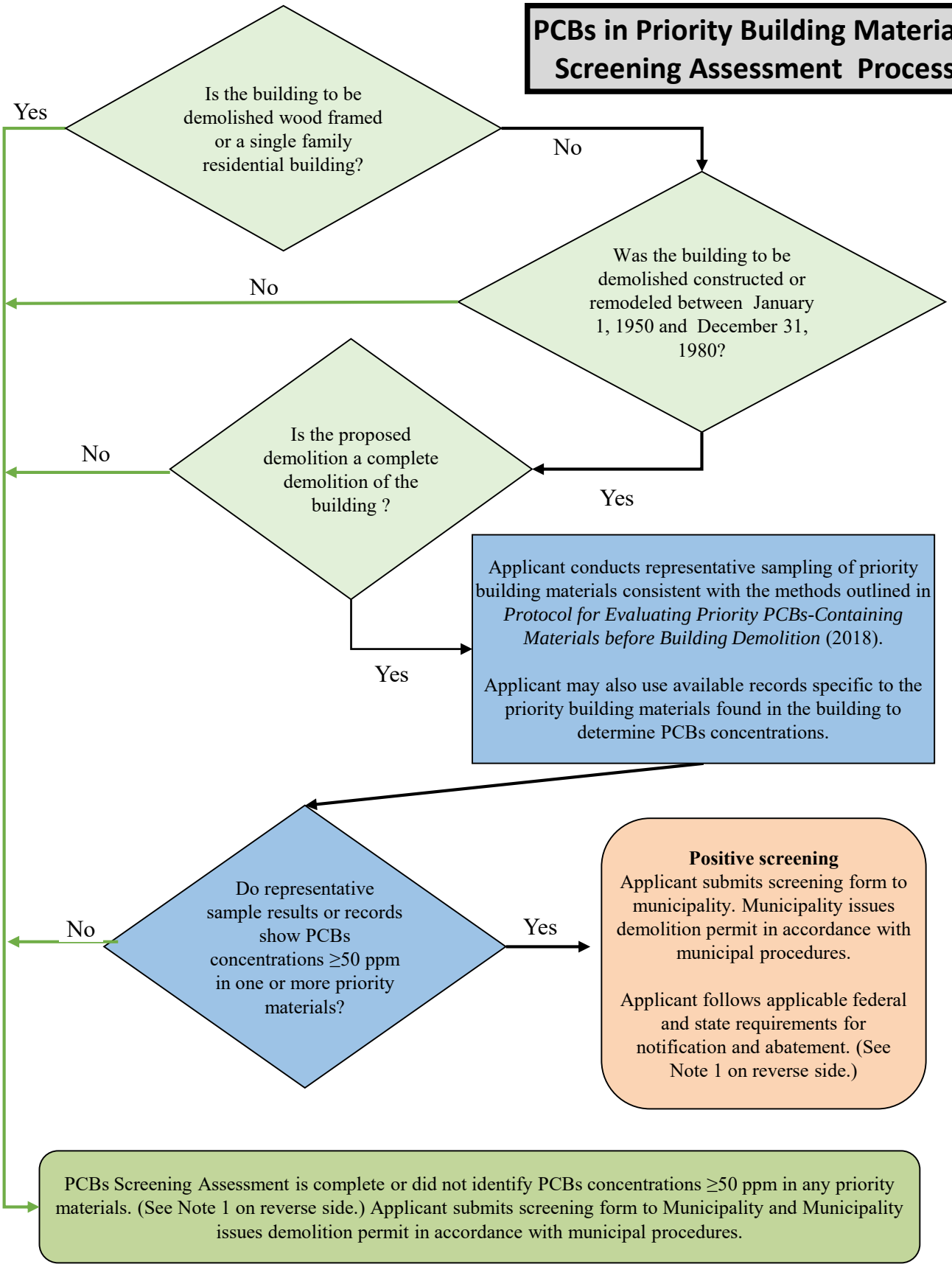

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

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Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

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[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

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[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	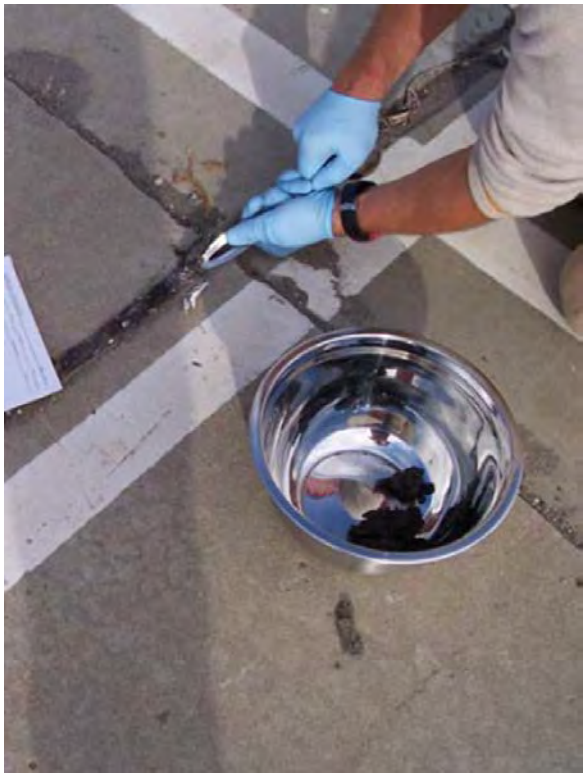
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 7

<u>Thermal Insulation</u>:

Damaged felt-style thermal insulation.

Photograph 8

<u>Thermal Insulation</u>:

Exposed/damaged fiberglass insulation.

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 9	
<u>Thermal Insulation</u>: **Exposed and damaged pipe insulation.**	
Photograph 10	
<u>Thermal Insulation</u>: **Pipe insulation.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	
Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

Appendix Q

PCBs in Building Demolition
Data Collection and Assessment

MEMORANDUM

TO: **BASMAA MPC Committee**

FROM: **Lisa Sabin and Jon Konnan, EOA, Inc.**

DATE: **September 23, 2020**

SUBJECT: **Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program**

1. BACKGROUND

The San Francisco Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. Provision C.12.f.ii(3) requires development of a data collection and assessment methodology program by July 1, 2019 to quantify PCBs loads reduced through implementation of the new program for controlling PCBs during building demolition, which began implementation on that date. Provision C.12.f.iii requires Permittees to submit the data collection and assessment methodology with their Fiscal Year (FY) 2019/20 Annual Reports, and states that this reporting should be at the regional level on behalf of all Permittees.

This technical memorandum provides administrative and technical support at the regional level for ongoing efforts by MRP Permittees to comply with data collection, evaluation, and reporting requirements under MRP Provision C.12.f. by:

- Documenting the regional process to collect data from the new program for controlling PCBs during building demolition;
- Presenting the assessment methodology to calculate PCBs loads reduced via the building demolition program;
- Documenting the results of additional literature searches and data gathering efforts conducted to set the stage for refining and reducing uncertainty in the parameters of the assessment methodology equation;
- Describing how data generated from the new demolition control program will be incorporated into the assessment methodology, including providing conversion factors needed for the load reduction calculations; and
- Addressing the MRP Provision C.12.f.iii requirement to submit the data collection and assessment methodology with their FY 2019/20 Annual Reports.

This technical memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration). The information provided builds upon a previous BASMAA effort that outlined a conceptual approach for the regional data collection process and assessment methodology (BASMAA 2018).

2. REGIONAL DATA COLLECTION PROCESS

This section documents the regional data collection process for the new programs to manage PCBs-containing building materials during demolition that began on July 1, 2019. This process was developed through a collaborative effort by municipalities subject to the MRP, the associated countywide stormwater management programs, and BASMAA. The regional data collection process focuses on collecting, compiling, and evaluating the data generated by the new programs on a regional basis. In addition, when sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program.
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

The regional data collection process involves collection of data from individual permit applicants at the municipal level, followed by compilation of data for applicable structures[1] at the countywide level, and data evaluation and reporting at the regional level. The process is described below.

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality. For non-applicable buildings, applicants simply check the boxes, certify, and submit to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and estimated demolition dates, with their FY 2019/20 Annual Reports.

The regional data management system is an Excel spreadsheet-based tool for storing and managing the data from each Permittee. The tool also calculates the estimated loads avoided throughout the region via implementation of the new management program, using the assessment methodology and data inputs described below.

3. ASSESSMENT METHODOLOGY

This section describes the assessment methodology and refined data inputs for estimating the loads of PCBs to municipal separate storm sewer systems (MS4s) that are avoided due to implementation of new controls to manage PCBs in building materials during demolition activities. To-date, the load of PCBs reduced through management of PCBs during demolition has been calculated using Equation 1:

Equation 1. $$Load\ of\ PCBs\ Reduced = N \bullet M \bullet SW \bullet E_f$$

Where:

N = Number of applicable structures with PCBs concentrations ≥ 50 ppm demolished each year (structures/yr)

M = Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm (kg/structure)

SW = Average fraction of PCBs that enters the MS4 due to demolition without new demolition program controls (dimensionless fraction)

E_f = Average fraction of PCBs prevented by new demolition program controls from entering MS4 (dimensionless fraction)

The MRP 2.0 Factsheet (SFBRWQCB 2015) provides values for each of the four terms in Equation 1 that were used to stipulate the load reduction for implementing the new demolition control program across the MRP area, which was a total of 2 kg/yr. Table 1 presents the values used for each of the four terms in the Factsheet to derive the 2 kg/yr PCBs load reduction credit. The Factsheet notes that each of the terms could be represented by a range of values and the information available to estimate the values of these terms shown in Table 1 was limited.

BASMAA (2018) summarized the above MRP 2.0 Factsheet approach and other previous efforts to estimate PCBs loads from demolition and potential loads reduced by control programs. It also presented a conceptual approach to refining the 2 kg/year PCBs load reduction estimate by describing methods to potentially refine the values of each of the four Equation 1 parameters shown in Table 1. Building upon the approach described in that document, additional literature searches and data gathering efforts were conducted to set the stage for refining and reducing uncertainty in the values of the four terms. For the first two parameters, data will be incorporated as they are generated from the new demolition control programs. The results of these efforts are presented below.

Table 1. Terms in MRP 2.0 Factsheet (SFBRWQCB 2015) equation used to stipulate the loading of PCBs to MS4s avoided by implementing demolition control measures.

Term	Symbol	Term Definition	Value	Units
1	*N*	Number of applicable structures demolished per year with PCBs concentrations ≥ 50 ppm	50	structures/year
2	*M*	Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm	5	kg/structure
3	*SW*	Average fraction of PCBs that enters MS4s due to demolition without controls[1]	0.01	dimensionless fraction
4	E_f	Average fraction of PCBs prevented by controls[1] from entering MS4 (i.e., assumed effectiveness of controls)	0.8	dimensionless fraction

1. The term "controls" refers to the proposed new demolition management program, not existing construction controls.

Term 1: Number of Applicable Structures Demolished Per Year

Current Basis

A study conducted by the San Francisco Estuary Institute (SFEI) reported a medium estimate of 521 building demolitions per year in commercial and industrial land uses in the study area, based on Bay Area Air Quality Management District (BAAQMD) asbestos abatement permitting data.[2] The SFEI study also reported the following medium estimates: 46% of the demolished buildings were built between 1950 and 1980 and 36% had PCBs concentration in caulks/sealants greater than 50 ppm (Klosterhaus et al. 2011). Multiplying (521) x (0.46) x (0.36) results in an estimated 86 commercial and industrial buildings demolished per year that were built between 1950 and 1980 and had PCBs concentration in caulks/sealants greater than 50 ppm.

Based upon information in the SFEI study and considering that the scope of the program to manage PCBs during demolition is limited to exclude wood frame buildings, the MRP Factsheet assumed 50 applicable structures with PCBs concentrations ≥ 50 ppm are demolished per year in the Bay Area (SFBRWQCB 2015).

Basis for Refinement

Data gathered during the new demolition control programs will be used to document the number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year throughout the MRP area. These data will be used to calculate a regional annual average number of applicable

[2] The BAAQMD regulations require that a "J Number" be applied for and obtained before applying for a building permit for demolition of an existing structure or renovations removing greater than 100 square feet of asbestos material within the San Francisco Bay air basin.

structures with PCBs concentrations ≥ 50 ppm that are demolished. This regional annual average value will be used for Term 1 in Equation 1 (see Table 1).

As part of implementing the new demolition controls that began in July 2019, applicants for demolition permits are required to submit a Screening Form to the municipality with jurisdiction for each applicable structure. Permittees will submit these forms to their countywide stormwater programs, which will document the number of applicable structures with PCBs concentrations ≥ 50 ppm within each jurisdiction that are demolished each year. This information will be compiled in the regional database described previously (Section 2) and used to calculate an annual average number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year in the region. Use of these real-world data collected in the MRP area will substantially reduce the uncertainty that is currently associated with the estimated value for Term 1 that was used in the MRP 2.0 Factsheet.

Term 2: Average Mass of PCBs per Applicable Structure

Current Basis

The SFEI study included estimating the mass of PCBs in caulks in Bay Area buildings and releases to stormwater runoff during renovation and demolition (Klosterhaus et al. 2011). Using a blind sampling approach, the SFEI study collected 25 caulk samples from the exterior of ten commercial and industrial buildings constructed in the study area between 1950 and 1980. The study area was the portion of the San Francisco Bay Area covered by the MRP: Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and the cities of Fairfield, Suisun, and Vallejo. The caulk samples were analyzed for PCBs, which were detected in 88% of the samples, with 40% exceeding 50 ppm, the concentration at which caulk falls under U.S. Environmental Protection Agency (USEPA) regulations (Federal Register 2010). Detectable PCBs concentrations ranged over six orders of magnitude, from 1 to 220,000 ppm. These data were consistent with previous studies in other cities (Klosterhaus et al. 2011).

A geographic information system (GIS)–based approach was then used to estimate the number, area, and volume of currently standing buildings in the study area that were built during the era of greatest PCBs use in caulk. The approach used historical imagery and contemporary land use and involved characterization of randomly selected buildings within the study area, with the result scaled up to extrapolate total building counts and areas in the MRP footprint. Various assumptions, including the frequency of anticipated PCBs detection and PCBs concentrations in the caulk, average mass of caulk per unit building volume, and average building volume, were then applied to calculate an estimate of the total PCBs mass in building caulk in the study area. The evaluation resulted in a mid–range estimate of 10,500 kg PCBs in caulk in buildings located in the study area (low and high estimates were 767 and 46,000 kg, respectively), which equated to an average of 4.7 kg PCBs per building (low and high estimates were 0.6 and 16 kg per building, respectively). The estimate included caulk located on both the interior and exterior of buildings (Klosterhaus et al. 2011). Based upon the information in the SFEI study, the MRP Factsheet assumed an average applicable structure with PCBs concentrations ≥ 50 ppm in the Bay Area contains 5 kg of PCBs (SFBRWQCB 2015).

Basis for Refinement

Data gathered as part of the new demolition control programs will be used to document the quantities and associated PCBs concentrations of priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm. These data will be used to calculate a regional average mass of PCBs per

applicable structure with PCBs concentrations ≥ 50 ppm in priority materials. This calculated regional average mass will be used for the value of Term 2 in Equation 1 (see Table 1).

Because of the new program to manage PCBs in building materials during demolition activities, Permittees have the opportunity to gather real-world data to estimate the mass of PCBs in priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm that is demolished in the region. Over time, these data will be compiled into a dataset that can be used to calculate a regional average mass. This calculated average will account for five priority building materials that potentially contain PCBs previously identified for the program (caulk, rubber window gaskets, thermal insulation, fiberglass insulation, and mastic adhesives), while the estimate in the MRP Factsheet (Table 1) is based upon caulk only.

The information provided in the Screening Form includes two types of data that are needed to calculate the mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm: (1) the quantity of each priority material in the structure, and (2) the concentration of PCBs in each priority material in the structure. These data will be used as inputs in Equation 2 to calculate the total mass of PCBs in the five priority materials for each applicable structure with PCBs concentrations ≥ 50 ppm that undergoes demolition beginning July 1, 2019.

Equation 2. $$Mass\ of\ PCBs\ per\ Structure\ (mg) = [\sum_{i=1}^{n}(C_i \bullet Q_i \bullet F_i)]$$

Where:

C_i = Concentration of PCBs in priority material i (mg/kg)

Q_i = Quantity of priority material i (linear feet or square feet)

F_i = Conversion factor – mass of priority material per linear foot of priority material i (kg/ft) or mass of priority material i per square foot of priority material i (kg/ft^2)

Equation 2 only accounts for the PCBs mass associated with the five priority building materials, so may represent an underestimate of the total PCBs mass in a given building. However, the extent of the underestimate would be small if the five priority materials contain most of the PCBs mass in a building.

The PCBs concentrations in each priority material (C_i) that will be used in Equation 2 is provided on the Screening Form for each applicable structure in units of mg of PCBs per kg of priority material (mg/kg).[3]

[3] Please note that this memorandum does not provide guidance on determining a representative PCBs concentration when multiple samples are collected from a single homogeneous area of a building material, per the sampling protocol (e.g., applying average vs. geomean vs. median to determine central tendency when multiple sample results are available). This type of determination should be made once sufficient data are available about PCBs concentration distributions in building material samples (e.g., after two or three years of data have been collected).

The quantity of each priority material (Q_i) that will be used in Equation 2 is provided on the Screening Form in units of linear feet (ft) for caulk and rubber window gaskets, and square feet (ft^2) for thermal or fiberglass insulation and mastic adhesives. Conversion factors (F_i) for each priority material i were developed to provide the mass of priority material per linear foot or per square foot using Equation 3.

Equation 3. $$\boldsymbol{F_i = (D_i \times \rho_i)}$$

Where:

F_i = mass of priority material i per linear foot (of caulk or rubber window gaskets) of i (kg/ft) or mass of priority material i per square foot (of insulation or mastic) of i (kg/ft^2)

D_i = Assumed dimensions of priority material i (ft^2 or ft)

- For caulk and rubber window gaskets, this represents the assumed cross-sectional area of the caulk bead or the gasket in square feet.
- For insulation and mastic, this represents the thickness of the layer of material in feet.

ρ_i = Assumed density of priority material i (kg/ft^3)

Conversion factors that were developed for each priority building material are shown in Table 2. For caulk and rubber window gaskets, the conversion factors estimate the mass of material per linear foot (kg/ft). For thermal or fiberglass insulation and mastic adhesives, the conversion factors estimate the mass of material per square foot (kg/ft^2). Table 2 identifies typical applications for each priority material and the associated conversion factors that were developed for that application. The conversion factors are presented as a range of values and a "Best" value based on the average or mid-range value.

To develop the conversion factors shown in Table 2, data on common priority material dimensions and densities used in typical building construction were gathered through literature review, product technical specifications, building construction guidelines, and other relevant resources (Panke and Cook 1992, Scheffler and Connolly 1996, Jester 1995). The ranges of assumed dimensions and densities that were used to develop the conversion factors are shown in Table 3. Additional information on the assumptions and data used to populate Table 3 and develop the conversion factors shown in Table 2 is presented below.

Product Dimensions

Multiple construction guides were consulted to identify typical dimensions for common applications of priority materials in building construction. For caulk or rubber gaskets, Table 3 provides a range of typical heights and widths of applications around windows and doorframes, and for caulk, also between concrete expansion joints. For fiberglass or thermal insulation, Table 3 provides a range of typical thicknesses for applications used around HVAC systems, heathers, boilers, and pipes, and inside walls or crawl spaces. For mastic adhesives, Table 3 provides typical thicknesses of the material used under or between roofing material and flashing or used on surfaces between carpet and floor tiles. These dimensions apply to newly applied or installed products and may not reflect the dimensions of an aged/weathered product but represent the best information currently readily available.

Table 2. Conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Descriptions of typical application	Material[1,2,3]	Conversion Factors				
			Range			Best (Average or mid-range value)	Units
Caulk	Around windows or window frames; around door frames	polysulfide caulk	0.009	-	0.04	0.02	kg/ft
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.01	-	0.15	0.04	kg/ft
Rubber Window Gaskets	Around windows or window frames	Butyl Rubber	0.02	-	0.06	0.03	kg/ft
Thermal or Fiberglass Insulation	Around HVAC systems/ heaters/boilers	Felt Insulation	0.09	-	2.3	0.82	kg/ft^2
		Unfaced Blanket Fiberglass	0.03	-	0.28	0.16	kg/ft^2
	Around heated transfer piping	Fiberglass Pipe Insulation	0.06	-	0.62	0.26	kg/ft^2
	Inside walls or crawl spaces	Loose Fiberglass Fill/Batting	0.17	-	0.24	0.21	kg/ft^2
		Rigid Fiberglass Foam Board	0.03	-	0.45	0.17	kg/ft^2
Adhesive Mastics	Below carpet and floor tiles	Floor Mastic	0.06	-	0.13	0.10	kg/ft^2
	On, under or between roofing materials and flashing	Roof Mastic	0.30	-	0.74	0.50	kg/ft^2

1. Panke and Cook, 1992.
2. Scheffler, M. and Connolly, J. 1996.
3. Jester, T.C. 1995.

Product Densities

The density information reported in Table 3 was gathered from readily available commercial literature on a range of reported densities for the five priority materials. Where possible, information on products that were used in the 1950s to 1980s time period and that were known to contain PCBs were used. However, because this type of product-specific information was not readily available, much of the information used to estimate typical product densities (and dimensions) was based on commercially available products that are currently in use for similar types of building and construction applications. For example, prior to 1980, polysulfide caulks and sealants were frequently formulated with PCBs and are commonly found in buildings constructed between 1950 and 1980. Although currently available polysulfide sealants do not contain PCBs, the densities of these types of sealants were used in Table 3 as reasonable approximations of the densities of polysulfide sealants used in the past. Similarly, the densities for other priority materials shown in Table 3 are primarily based on current use products that are similar to products used in the past.

In addition to the lack of technical data on products in use during the 1950s – 1980s, there is a lack of data about the impact of age and weathering on priority material densities. Loss of volatile material will reduce product densities over time, while other weathering factors, such as compression or stretching, may increase or decrease densities over time. In an attempt to better account for age and weathering, available literature was reviewed to identify information on the densities of priority materials in construction and demolition debris and wastes. This type of information was not found on the specific priority materials of interest. However, US EPA (2016) provides estimates for the weight to volume ratios (i.e., densities) of a number of construction and demolition (C&D) waste categories. These categories include concrete, asphalt paving, roofing, wood, gypsum board, metal, rock/gravel/dirt and sand, and bulk waste. The bulk waste category is a generic catchall grouping for the remainder of C&D debris that does not fit into one of the other categories. Although the materials that are included in this generic category are not specified, the priority materials would likely all fall into the generic bulk waste category when disposed.

Therefore, in the absence of other data, the density for C&D bulk waste may be somewhat comparable to the densities of aged/weathered priority materials and can be compared to the densities of new products provided in Table 3. The average priority material densities in Table 3 range from about 1 kg/ft^3 to 40 kg/ft^3, with an average of 12 kg/ ft^3 across all priority materials. The C&D bulk waste density of 8 kg/ft^3 fits within the range of the priority material densities reported in Table 3 and is about 30% less than the average density across all priority materials. This comparison is limited because of the unknown composition of C&D bulk waste but suggests the densities in Table 3 are reasonable approximations for aged/weathered materials.

Average Conversion Factors

Use of the conversion factors shown in Table 2 requires information on the application and material type of the priority building material. It is anticipated that in some cases the available data may be incomplete or may not match the categories in Table 2. Conversion factors that are not specific to the priority building material's application or material type were therefore developed by averaging across applications/types (Table 4). When calculating the mass of PCBs removed from a demolition site, conversion factors from Tables 2 and/or 4 should be selected as appropriate given the level of information available about the associated sample(s).

Table 3. Dimensions and densities for typical construction applications of priority materials used to develop conversion factors.

Priority Material Category	Descriptions of typical application	Material	Typical Product Dimensions (Inches)						Typical Product Density (kg/ft^3)		
			Width			Depth/Thickness					
			Low	Mid	High	Low	Mid	High	Low	Mid	High
Caulk[1,2,3,4,5]	Around windows or window frames; around door frames	polysulfide caulk	0.25	0.38	0.50	0.13	0.19	0.25		42	
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.25	0.5	1	0.125	0.25	0.5		42	
Rubber Window Gaskets[5]	Around windows or window frames	butyl rubber	0.30	0.40	0.50	0.20	0.30	0.40		41	
Thermal/Fiberglass Insulation[5]	Around HVAC systems/ heaters/boilers	felt insulation[6]	n/a			1.0	3.0	5.0	1.1	3.3	5.4
		unfaced blanket fiberglass[7]				0.5	2.8	5		0.68	
	Around heated transfer piping	fiberglass pipe insulation[8]				1.0	2.0	3.0	0.68	1.6	2.5
	Inside walls or crawl spaces	loose fiberglass fill/batting[9]					3.5		0.59	0.70	0.82
		rigid fiberglass foam board[10]				1.0	2.5	4.0	0.32	0.84	1.4
Adhesive Mastics[5]	Below carpet and floor tiles	floor mastic[11]	n/a			0.13	0.19	0.25		6.2	
	On, under or between roofing materials and flashing	roof mastic[12]				0.13	0.19	0.25	29	32	36

1 Pfeiffer M.J., Darwin, D., 1987.
2 Panke, J.R. and John P. Cook. 1992.
3 Hammer & Hand. 2016.
4 M. Scheffler, M. and J. Connolly, J. 1996.
5 Jester, T.C. 1995.
6 Owens-Corning Thermafiber Industrial Felt
7 Owens-Corning unfaced fiber glass blanket
8 Owens-Corning fiberglass pipe insulation
9 Owens-Corning Loose fill insulation and NIST Fiberglass Batt (wall and ceiling insulation)
10 Owens-Corning Foamular Products - rigid polyurethane foam (PUR/PIR)
11 Latricrete Premium Mastic
12 Henry Company Pro-Grade Flashing Cement, Pro-Grade Plastic Cement and Pro-Grade Repair Cement

Table 4. Average conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Conversion Factor	Units
Caulk	0.03	kg/ft
Rubber Window Gaskets	0.03	kg/ft
Thermal/Fiberglass Insulation	0.32	kg/ft^2
Adhesive Mastics	0.30	kg/ft^2

Term 3: Average fraction of PCBs that enters MS4 due to demolition without controls

Current Basis

The average fraction of PCBs that enters the MS4 due to demolition without controls has been estimated at 0.01, based upon professional judgment (i.e., 1% of PCBs in building materials enter MS4s due to demolition without additional controls beyond standard construction site controls). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 3 (see Table 1).

The one percent value presumably incorporates losses to the environment both at the site and during disposal and recycling. Conceptually, this approach assumes that without controls, the transport and fate of the PCBs–containing materials that were in the demolished building fall within three general categories:

1. Released during the demolition (e.g., as part of an initially airborne plume of small particles) and settled in a "halo" around the site. Any wash waters used during the demolition (e.g., during cleaning of equipment, onsite or offsite) that are not fully contained and treated or disposed of could also transport PCBs–containing materials to the MS4.
2. Removed from the site and disposed of as part of the general waste stream (e.g., at a landfill), with some fraction potentially released to the environment during the handling, transport, and disposal process (e.g., during transportation of waste materials by truck to a landfill).
3. Removed from the site with recycled materials, with some fraction potentially released to the environment during the handling, transport, and recycling process (e.g., during transportation of waste materials by truck to a transfer station or recycling facility) or returned to the environment with recycled materials.

This methodology assumes that all PCBs–containing materials released into the environment via any of the above three categories eventually enter the MS4. For example, permanent storage in onsite or offsite pervious areas is assumed to be negligible. All three transport and fate categories are presumably

incorporated into the third term of Equation 1, the average fraction of PCBs that enters MS4s due to demolition without controls.

This methodology also assumes that the effectiveness of any existing controls (e.g., proper offsite disposal of PCBs–containing materials, erosion and sediment controls, and other routine construction site controls) is incorporated into the third term of Equation 1.

Basis for Refinement

BASMAA (2018) summarized the readily available information and studies on the release of PCBs to stormwater from building materials during demolition activities. Building upon those efforts, a follow-up literature review was conducted in 2019 to identify any additional information that could be used to refine the assumed fraction of PCBs that enters MS4s due to demolition without controls in Equation 1, Term 3 (see Table 1). This literature review was also conducted to identify new information that could be used to refine Term 4 (i.e., the fraction of PCBs prevented by controls from entering MS4s). This section summarizes the literature review efforts and identifies the outcomes for Term 3. The literature review outcomes for Term 4 are presented in the next section.

Literature Review

The literature review conducted in 2019 built upon the information summarized in BASMAA (2018). The Google search engine as well as specific scientific literature databases and government websites were searched, including:

- Google Scholar
- Google Books
- SpringerLink
- Wiley Online Library
- American Chemical Society
- ScienceDirect.com
- Elsevier
- US EPA Website

Major search terms (and similar variations or combinations of these terms) that were used included the following:

- PCBs transport and fate
- PCBs in soils/stormwater/demolition/building materials/building demolition/building renovation
- PCBs in caulk/rubber window gaskets/thermal insulation/fiberglass insulation/mastic
- PCBs contaminated sites/cleanup sites/remediation sites
- PCBs in school buildings
- Remediation of PCBs in buildings/building materials
- Construction and Demolition Debris/Waste

- Demolition dust and stormwater impacts
- Soil contamination from PCB-containing caulk/materials/buildings
- PCBs in soil after demolition
- PCB contamination from polysulfide sealants
- PCB-contaminated soil/demolition dust
- Mass of PCBs in Building materials
- Fate of PCBs in the environment/urban environment/caulk/building materials
- PCBs Source apportionment
- PCBs Waste characterization
- Accumulation rates of PCBs in soils
- PCB cleanup and disposal programs
- Managing remediation waste from PCB cleanups
- Handling and disposal of PCBs waste
- Improved recycling practices/BMP effectiveness and stormwater impacts
- PCBs sources/emissions/releases from caulk/buildings/schools
- PCBs emissions during demolition/renovation/abatement/replacement/removal of caulk
- Dust from demolition and construction sites

In addition, online searches were performed to identify any new research that had cited one or more of the studies previously described in BASMAA (2018). These citations were reviewed to identify any relevant studies that may have occurred more recently and relied upon these earlier studies.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs entering MS4s due to demolition activity without controls in Equation 1, Term 3 (see Table 1). To date, the vast majority of research on the release of PCBs contained in building materials has focused on human health risks and quantifying human exposures via air, ingestion, and/or dermal pathways. It appears the release of PCBs to stormwater from building materials in general, and specifically during demolition or renovation activities has not been quantitatively studied, outside of the limited studies reported previously in BASMAA (2018). These earlier studies developed conceptual models and thought experiments to estimate the fraction of PCBs released based on the limited measurement data available. Without new measurement data, however, further attempts to improve upon these efforts and reduce uncertainty in the current estimate of Term 3 are not warranted.

BASMAA (2018) recommends exploring whether disposal and/or recycling practices have improved in recent years such that less PCBs would be lost to the environment via these pathways. Evidence was not found during the literature review of improved recycling or disposal practices implemented in the Bay Area in recent years that would result in reduced releases of PCBs to MS4s from demolition materials.

This finding is further supported by anecdotal information about recycling facilities in the South Bay Area. Over the past 5+ years Santa Clara Valley MRP Permittees have been investigating sources of PCBs to public ROWs in industrial areas and have frequently targeted facilities where demolition materials are brought on site for recycling. These investigations have documented poor housekeeping practices, visible scrap material and soils tracking off sites, and general lack of appropriate stormwater BMPs at many of these types of facilities which have resulted in citations during municipal stormwater inspections. Overall, these investigations have found large inconsistencies in materials handling practices across facilities, and even at the same facility over time. Although not a quantitative assessment, this information suggests that it is unlikely consistent improvements in recycling practices across facilities have occurred in recent years.

Term 4: Average fraction of PCBs prevented by new controls from entering MS4

Current Basis

The estimated fraction of PCBs prevented by new controls from entering MS4s has been estimated at 0.8, based mainly upon professional judgment (i.e., 80% of PCBs are prevented from entering MS4s due to the new programs to manage PCBs during building demolition). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 4 (see Table 1).

Basis for Refinement

As described above, a review of readily available literature was conducted in 2019 to identify any new information that could be used to refine the assumed effectiveness of controls to prevent PCBs from entering MS4s (Term 4). The literature review efforts are summarized in the above section on Term 3. This section presents the outcomes of the literature review for Term 4.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs prevented by new controls from entering MS4s. However, BASMAA (2018) identified two earlier studies that estimated 99% capture of PCBs contained in caulk removed from buildings using appropriate abatement measures (high power vacuums and power washing during removal). Based on these data, a reasonable assumption is that the new control programs will be similarly effective at capturing PCBs in priority materials that, prior to demolition, are removed from a building using appropriate abatement methods. Given the new programs are focused on controlling PCBs in priority materials only, the use of a lower (80%) value for the overall effectiveness of the controls at preventing PCBs from entering MS4s (Term 4) appears reasonable.

Using Data from New Program on PCBs Mass in Priority Building Materials

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs presumably removed from the building before demolition. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0

Factsheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Equation 1 and Table 1 may be set to 1 when evaluating the PCBs load avoided using PCBs mass in priority building materials data from the new program, since it may be assumed that the program removes 100% of the priority materials with PCBs ≥ 50 ppm that were identified by the sampling protocol.

4. POTENTIAL FUTURE REFINEMENTS TO THIS METHODOLOGY

It should be noted that the new program for controlling PCBs during building demolition is in its early stages, having begun implementation only recently (i.e., on July 1, 2019). The data generated during the first fiscal year of the program have not yet been compiled and evaluated. As experience is gained in implementing the program and the associated data are collected and evaluated, and/or new information becomes available from any other source, the need may arise to revise the data collection and assessment methodology presented in this memorandum. As needed, staff from the countywide programs in the MRP area will work with MRP Permittee and Regional Water Board staff to make any future refinements to the program and methodology.

5. REFERENCES

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CONTRA COSTA
CLEAN WATER
PROGRAM

September 30, 2020

Michael Montgomery, Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

SUBJECT: Transmittal of Annual Report for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

Dear Mr. Montgomery:

Enclosed please find the Contra Costa Clean Water Program's (CCCWP's) Fiscal Year (FY) 2019/20 Annual Report. This report documents permit compliance activities conducted during the previous fiscal year (July 1, 2019 to June 30, 2020) collectively by Contra Costa Permittees in accordance with National Pollutant Discharge Elimination System (NPDES) Permit No. CAS612008 (R2-2015-0049 [MRP 2.0]), as amended, issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB).

CCCWP has been authorized to submit this Annual Report on behalf of the 21-member agency Permittees that comprise the CCCWP. These include the Cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek; Towns of Danville and Moraga; Contra Costa County and Contra Costa County Flood Control & Water Conservation District.

The Annual Report consists of the following:

- **Volume I - Group Activities Annual Report:** Compliance activities conducted collectively as a group by all 21 CCCWP Permittees
- **Volume II - Individual Permittee Annual Reports:** Compliance activities conducted by each individual Permittee within their jurisdiction
- **BASMAA Regional/CASQA Statewide Supplemental Reports:** BASMAA will submit separately the following regional and statewide supplemental reports directly to the Water Board:
    a. Regional Supplement for New Development and Redevelopment;
    b. Regional Supplement for Training and Outreach; and
    c. CASQA Pesticide Subcommittee Annual Report and Effectiveness Assessment

In accordance with Provision C.16.5, the relevant portions of the FY 2019/20 Annual Report have been submitted to the Central Valley Regional Water Quality Control Board on behalf of the East County Permittees (cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District).

255 Glacier Drive, Martinez, CA 94553-4825 • Tel (925) 313-2360 Fax: 313-2301 • Website: www.cccleanwater.org

This annual report provides the SFBRWQCB with an update on the specifics of the requirements and provisions of MRP 2.0 that were impacted by Contra Costa County Health Orders relating to COVID-19. A discussion of these specific MRP requirements and the reasons relating to potential delays is included in relevant sections of this report. The response efforts relating to MRP provisions were conducted by Permittees differently, in accordance with their jurisdiction's relevant circumstances, and Permittee-specific considerations have been included in their individual reports.

With the approval and direction from each duly authorized representative of each Permittee, I have been authorized to submit and certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Karin Graves

Sr. Watershed Management Planning Specialist
Contra Costa Clean Water Program

Attachments: *Volume I - Group Activities Annual Report*
Volume II - Individual Permittee Annual Reports

cc: Patrick Pulupa, CVRWQCB, Executive Officer
Elizabeth Lee, CVRWQCB, Senior Water Resources Control Engineer
CCCWP Management Committee

CONTRA COSTA
CLEAN WATER
PROGRAM

FISCAL YEAR 2019/20

ANNUAL REPORT

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	1.2	Contra Costa Clean Water Program, Organizational Structure
	1.3	Contra Costa Clean Water Program, BASMAA and SFBRWQCB Committee Participation
	1.4	Contra Costa Clean Water Program, Management Committee and Subcommittee Participation & Attendance
7 – Public Information and Outreach	7.1	Bringing Back the Natives Garden Tour 2020 Summary
	7.2	Contra Costa Clean Water Program, Awareness, Behaviors and Attitudes Study Research Report
8 – Water Quality Monitoring	8.1	Letter to the CVRWQCB Documenting Pyrethroid Pesticide and Toxicity Monitoring
9 – Pesticides Toxicity Controls	9.1	Contra Costa Clean Water Program, Our Water Our World Store Partnership Program Report, 2019-2020
10 – Trash Load Reduction	10.1	Receiving Water Trash Monitoring Program Plan: 2020 Final Report
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	12.2	Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020
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List of Acronyms and Abbreviations

Acronym	Term
ACCWP	Alameda Countywide Clean Water Program
AGOL	ArcGIS Online
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CCC	Contra Costa County
CCCWP	Contra Costa Clean Water Program
CCCFCWCD	Contra Costa County Flood Control and Water Conservation District
CCEAC	Contra Costa Engineering Advisory Committee
CCHS	Contra Costa Health Services
CCWF	Contra Costa Watershed Forum
CCWSWRP	Contra Costa Watersheds Stormwater Resource Plan
CGP	Construction General Permit
ConFire	Contra Costa Fire Protection District
COVID-19	Coronavirus Disease 2019
CPESC	Certified Professional in Erosion and Sediment Control
CTR	Click-through Rate
CVRWQCB	Central Valley Regional Water Quality Control Board
DWQ	Department of Water Quality
EBME	East Bay Municipal Engineers
E_P	Erosion Potential
FY	Fiscal Year
GBP	Green Business Program
GI	Green Infrastructure
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
HHW	Household Hazardous Waste
HM	Hydromodification Management
HMP	Hydrograph Modification Management Plan
HSPF	Hydrological Simulation Program – Fortran

Acronym	Term
IDDE	Illicit Discharge Detection and Elimination
IMP	Integrated Management Practices
IPM	Integrated Pest Management
JPA	Joint Powers Authority
LID	Low Impact Development
MOC	Municipal Operations Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
NPDES	National Pollutant Discharge Elimination System
OPP	Oil Payment Program
OVTA	On-land Visual Trash Assessment
OWOW	Our Water Our World
PAPA	Pesticide Applicators Professional Association
PCBs	Polychlorinated Biphenyls
PCOs	Pest Control Operators
PIP	Public Information and Participation
PMU	Priority Margin Units
POC	Pollutants of Concern
POTW	Publicly Owned Treatment Works
PSA	Public Service Announcement
QSD/P	Qualified SWPPP Developer/Practitioner
RAA	Reasonable Assurance Analysis
RMP	Regional Monitoring Program
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SIC	Standard Industrial Classification
SUA	Stormwater Utility Assessment
SWRP	Stormwater Resource Plan
TMDL	Total Maximum Daily Loads
UC	University of California
UCMR	Urban Creeks Monitoring Report
USEPA	United States Environmental Protection Agency
WQ	Water Quality
WLA	Waste Load Allocation
WMAs	Watershed Management Areas

SECTION 1 – INTRODUCTION

Introduction

The Contra Costa Clean Water Program (CCCWP) comprises Contra Costa County (CCC), its 19 incorporated cities/towns[1], and the Contra Costa County Flood Control & Water Conservation District (District). These 21 public agencies are collectively referred to as "Contra Costa Permittees". The Contra Costa Permittees submit their CCCWP Fiscal Year (FY) 2019/20 Annual Report to the San Francisco Bay and Central Valley Regional Water Quality Control Board (SFBRWQCB) and (CVRWQCB) as required by the Municipal National Pollutant Discharge Elimination System (NPDES) Permit (see "Municipal Stormwater Permit" discussed further on Page 1-2. The Annual Report documents permit compliance activities conducted during the previous fiscal year (July 1, 2019 to June 30, 2020), and consists of the following:

- **Volume I – Group Activities Annual Report**: This Volume I report documents permit compliance activities conducted collectively as a group by all 21 Contra Costa Permittees.
- **Volume II – Individual Municipal Annual Reports**: Volume II is a compilation of the Contra Costa Permittees' individual Municipal Annual Reports, which document compliance activities conducted by each individual Permittee within their jurisdiction.
- **BASMAA Regional/CASQA Statewide Supplemental Reports**: These reports document compliance activities conducted regionally (Bay Area-wide) in coordination with the Bay Area Stormwater Management Agencies Association (BASMAA)[2] and statewide in coordination with the California Stormwater Quality

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[1] Cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, and Towns of Danville and Moraga.

[2] BASMAA is a consortium of municipal stormwater programs representing over 90 agencies, including 79 cities and 6 counties. BASMAA was started by local governments in the Bay Area to share information and combine resources to develop products and programs that would be more cost-effective if done regionally. In FY 2008/09, BASMAA reorganized as a 501(c)(3) non-profit organization. This allows BASMAA to enter into contracts and seek grant funds on behalf of its members. BASMAA is focused on regional challenges and opportunities to improving the quality of stormwater that flows to our local creeks, San Francisco Bay and delta, and the ocean.

Association (CASQA)[3]. On behalf of the Contra Costa Permittees, BASMAA will submit separately the following regional/statewide supplemental reports directly to the SFBRWQCB[4]:

1. *BASMAA Annual Reporting for FY 2019-2020, Regional Supplement for New Development and Redevelopment*;
2. *BASMAA Annual Reporting for FY 2019-2020, Regional Supplement for Training and Outreach; and,*
3. *CASQA, Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020.*

Municipal Stormwater Permit

The SFBRWQCB reissued its *Municipal Regional Stormwater NPDES Permit* to 76 Phase I[5] municipalities within the San Francisco Bay Region on November 19, 2015 (NPDES Permit No. CAS612008, Order No. R2-2015-0049) and this reissued permit, which took effect on January 1, 2016, is hereinafter referred to as "MRP 2.0." The previous permit (NPDES Permit No. CAS612008, Order No. R2-2009-0075), which was superseded by MRP 2.0 on January 1, 2016, is hereinafter referred to as "MRP 1.0". MRP 2.0 is in effect for five years ending on December 31, 2020.

MRP 2.0 was amended on February 13, 2019, to add the cities of Antioch, Brentwood, and Oakley, and the eastern portions of unincorporated Contra Costa County and the Contra Costa County Flood Control & Water Conservation District (the East County Permittees), which are located within the jurisdiction of the Central Valley Regional Water Quality Control Board (CVRWQCB, Region 5) and were previously covered under a

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[3] Formed in 1989, the California Stormwater Quality Task Force was a quasi-governmental organization, which advised the State Water Resources Control Board on matters related to developing stormwater regulations - more specifically, it was intended to help California comply with the municipal and industrial NPDES stormwater mandates of the federal Clean Water Act. The Task Force officially became the California Stormwater Quality Association (CASQA) in September 2002, when its formal 501 (c)(3) non-profit organization status was approved.

[4] CCCWP submitted these reports directly to the CVRWQCB.

[5] Phase I regulations were promulgated in 1990 and require medium and large cities or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges.

separate Joint Municipal NPDES Permit titled "East Contra Costa County Municipal NPDES Permit".

MRP 2.0 Permittees include all Phase I Municipal Stormwater Programs[6] in the San Francisco Bay Region, and the aforementioned East County Permittees. Each Permittee is individually responsible for complying with the permit mandates; however, MRP 2.0 allows and encourages Permittees to collaborate in the design, development, and/or implementation of certain mandates collectively (countywide, region-wide and/or statewide). Activities conducted collectively are referred to as "group activities" and are documented in this Volume I report and in the regional and statewide supplemental reports noted on Page 1-2.

Unless specified otherwise, hereinafter all group activities reported below will reference activities conducted by all Contra Costa Permittees in accordance with MRP 2.0. A copy of the amended MRP 2.0 can be downloaded from a link found on the CCCWP website at: https://www.cccleanwater.org/resources/permit.

CCCWP Overview

Program Agreement

The Contra Costa Permittees operate under a "Program Agreement", which was first entered into in 1991 and was last updated in 2010. The roles and responsibilities of CCCWP staff and the 21 Contra Costa Permittees are outlined within the Program Agreement (2010-2025).

Program Staffing

Staff to the CCCWP is provided by CCC. The CCCWP is staffed by five full-time staff positions and one 40-hour clerical position. The Clerical position was vacant for part of

[6] Phase I Municipal Stormwater Programs include: 17 public agencies comprising the Alameda Countywide Clean Water Program (ACCWP); 21 public agencies comprising the CCCWP; 15 public agencies comprising the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP); 22 public agencies comprising the San Mateo Countywide Water Pollution Prevention Program; the cities of Fairfield and Suisun City comprising the Fairfield-Suisun Urban Runoff Management Program; and, the City of Vallejo and the Vallejo Sanitation and Flood Control District.

the year, the two Watershed Management Planning Specialist positions were staffed by consultants, and the Program Manager has been on extended leave since August 2019. Additional technical and temporary staff support was provided, as needed, by consultants/contractors. See Attachment 1.1 for a listing of staff positions and the time certain positions were vacant, and consultants/contractors retained in FY 2019/20.

Organizational Structure

The Management Committee, which consists of one designated representative from each of the 21 Contra Costa Permittees, is the decision-making body of the CCCWP and provides direction to CCCWP staff and subcommittees. The Management Committee meets monthly and directs and monitors the implementation of all group activities. Six subcommittees: Administrative, Development, Monitoring, Municipal Operations, Public Information and Participation (PIP), and Select Committees review, research, and make recommendations to the Management Committee. CCCWP staff and designated municipal representatives participate on similar BASMAA subcommittees, which are focused on the implementation of tasks and projects conducted regionally. Attachment 1.2 outlines the CCCWP's organizational structure. Attachment 1.3 shows Contra Costa Permittees' participation and attendance on the CCCWP's Management Committee and its subcommittees. In accordance with the Program Agreement, designated Permittee representatives are required to attend at least 80% of the CCCWP's regularly scheduled meetings.

Funding Stormwater Compliance Programs

Most Contra Costa Permittees' stormwater activities are funded by a stormwater utility assessment (SUA). The assessments were authorized in 1993 and range from $25 to $45 a year for a single-family home, depending on the municipality. Assessments for properties are based on estimates of stormwater runoff based on impervious area. The cities of Richmond and Brentwood do not have a SUA. In those two municipalities, stormwater pollution prevention activities are funded by other revenues, including the general fund. In addition, most Contra Costa Permittees that have the assessment for stormwater pollution prevention supplement those revenues from other sources.

Revenues from the SUAs are collected by the CCC Tax Collector with the property tax bill. The District is responsible for the administration and disbursement of the assessment revenues, which in FY 2019/20 totaled approximately $15,838,822. The assessment is restricted revenue that may only be used for NPDES program activities including construction of pollution control improvements and drainage system maintenance. Approximately 20% of these revenues are used to fund permit compliance activities that Contra Costa Permittees choose to conduct collectively (i.e., Group Activities). The remaining 80% of the revenue is "returned-to-source" (i.e., returned to the local jurisdiction from which it originated). The return-to-source revenue pays for permit compliance activities conducted at the municipal level. Each Permittee's cost share of Group Activities is apportioned by population. CCCWP staff, consultants, and contractors assisted Contra Costa Permittees in compliance with MRP 2.0 by providing technical support and guidance, staff training, and implementation of a variety of activities, including public education and outreach and water-quality monitoring. These activities are more effectively and cost-efficiently implemented as Group Activities. The CCCWP's FY 2019/20 budget was $3,624,213 and is available on the CCCWP's website at: https://www.cccleanwater.org/resources/budget.

Within this budget, the CCCWP pays dues on behalf of the Contra Costa Permittees to: BASMAA, the San Francisco Bay Regional Monitoring Program (RMP) for Trace Substances, the Bay Friendly Landscape Coalition, the Green Business Program (GBP), and CASQA. These groups provide water quality monitoring and research activities that are mandated under the NPDES permits, and/or provide representation, guidance and/or staff training at the regional or state levels.

Contra Costa Permittees' authority to raise taxes or assessment fees to pay for governmental activities has been sharply constrained by voter initiatives such as

Proposition 13[7] and Proposition 218[8]. Contra Costa Permittees' SUA rates have a maximum limit, which was established in 1993. All Contra Costa Permittees reached their maximum rate by FY 2009/10, when the SFBRWQCB adopted MRP 1.0. Since then, Contra Costa Permittees have been supplementing their SUA revenues with funding from other sources, including the general fund, to finance the ever-increasing stormwater compliance mandates.

Funding the unfunded federal and state mandated stormwater permit compliance programs continues to be the Contra Costa Permittees' most significant challenge. In the absence of new revenues for stormwater pollution prevention, Contra Costa Permittees have repeatedly advocated for the need to prioritize actions that have proven most beneficial to water quality and have asked that less beneficial permit requirements be eliminated or reduced. However, Contra Costa Permittees ultimately have no authority over permit conditions and cannot guarantee that permit conditions are reasonable or implementable, or that prescribed actions are effective or worthwhile. Contra Costa Permittees continue to explore ways to improve cost recovery and to assign costs for controlling certain pollutant sources that originate on private property. Contra Costa Permittees also continue to seek community partners for trash cleanup and other watershed stewardship activities and aim to align available stormwater grant funding with transportation funding and grant programs for integrated transportation and drainage infrastructure improvements.

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[7] Proposition 13 - In 1978 California voters passed Proposition 13, reducing property tax rates by about 57%. The basis for property tax calculation was rolled back to the 1976 assessed value. Reassessment of property value was allowed only upon change in property ownership and the assessment was limited to 1% of the sales price. Revenue for stormwater management agencies, such as a Flood Control Zone, was reduced significantly and the tax rate was locked in at the 1976 adopted rate. As time went on, stormwater management agencies could not raise revenue to keep up with needed construction, major maintenance, or replacement of failed drainage facilities.

[8] Proposition 218 - After Proposition 13 was passed, many stormwater management agencies turned to assessments and other measures to help fund services. In 1996, California voters passed Proposition 218, expanding the protection against property tax increases established by Proposition 13. Voter approval was now required for all new or increased assessments, charges or fees proposed by a stormwater management agency. Assessment proponents also had to demonstrate the specific benefit to properties before initiating or increasing the assessment. Fees and charges established or increased by agencies providing water or sewer services were expressly exempted from obtaining voter approval.

Highlights of Group Program Activities for FY 2019/20

Public Information and Participation

CCCWP funded multiple transit advertisements in FY 2019/20. The ads ran on three bus lines in Contra Costa County: Tri Delta, West Cat, and County Connection. Due to the stay at home orders put in place during March and April, the bus ads received almost a month of override as added value.

- 10 king size ads were posted on Tri Delta Transit.
- 22 units were posted on West Cat.
- 34 king size ads were posted on County Connection buses.

Receiving Water Trash Monitoring Program Plan (Trash Monitoring Plan)

CCCWP has been involved in implementing the Trash Monitoring Plan. In FY 2019/20, the Testing Phase of the Trash Monitoring Plan was complete and results were summarized in the Final Report for all MRP 2.0 Permittees. The Final Report was submitted to the SFBRWQCB by July 1, 2020. CCCWP's monitoring contractors conducted the qualitative trash assessments at 30 probabilistic sites and quantitative monitoring at 19 targeted sites. CCCWP was also engaged in overseeing development and completion of the *San Francisco Bay Area Receiving Water Trash Monitoring Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols Final Report*, which was submitted to the SFBRWQCB as an attachment to this Annual Report (Attachment 10.1).

Implemented Control Measures to Achieve Mercury and PCB Load Reductions

MRP 2.0 Provisions C.11.a.iii.(2) and C.12.a.iii.(2) require reporting a list of the Watershed Management Areas (WMAs) where mercury and PCBs control measures are currently being implemented and those in which new control measures will be or have the potential to be implemented during the term of this permit, along with the specific control measures and an implementation schedule. Although many of the control measures may be selected primarily for the purpose of achieving PCBs load reductions during this permit term, substantial mercury load reductions may result as a tangential benefit and will be accounted for in tracking mercury load reductions. A *Mercury and PCBs*

Watershed/Management Areas, *Control Measures, and Load Reduction – Update 2020* report (WMA report) was prepared by the CCCWP to fulfill the requirement of MRP Provision C.11.a.iii.(3) and C.12.a.iii.(3) for updating the list of control measures reported annually as necessary to account for new control measures. This WMA report is provided as Attachment 12.2.

Previous studies indicate that old industrial areas are the most likely land use type to contain high PCBs concentrations. CCCWP is continuing the source property identification process until all Old Industrial areas are screened and characterized for the likelihood of pollutant load removal and potential referral to the SFBRWQCB for further action. CCCWP has compiled the past decade of source property investigation data to develop a Conceptual Work Plan for Completing PCB Source Area Investigations. In FY 2019/20, CCCWP continued to use its GIS platform for data management and analysis determining actual and potential load reductions, and as a tracking and reporting tool for Provisions C.11 and C.12 implementation work.

Planned and Implemented Green Infrastructure to Reduce Mercury and PCB Loads

Provisions C.11.c and C.12.c require by 2020 Contra Costa Permittees located in Region 2 to implement GI projects sufficient to achieve a mercury loads reduction performance criteria of 9 g/yr and performance criteria of 120 g per year PCBs reduced by GI for all MRP Permittees collectively. This has been achieved and documented in Attachment 12.2 (the WMA Report). Provision C.11.c further require a demonstration of the amount of mercury that will be reduced by GI by the years 2030 and 2040. That requirement is fulfilled by the Clean Water Program Reasonable Assurance Analysis Report (RAA Report, Appendix A of the Attachment 12.1, the TMDL Implementation Report). Finally, Provision C.12.c requires a demonstration that all MRP Permittees collectively will attain 10 kg per year mercury load reductions via GI by the year 2040. The RAA Report documents the extent and cost of GI that would be required to achieve the proportion of that regional goal that would be applicable to Contra Costa Permittees located in Region 2.

Contra Costa Permittees are tracking private GI projects and implementing early action public GI projects to achieve the PCBs load reductions specified by performance criteria for GI. The regional performance standard of 120g/yr by GI was achieved collectively by all MRP Permittees (Attachment 12.2, Table 20-6). The TMDL Implementation Report includes a RAA of Permittee GI Plans that relates acres treated by green stormwater infrastructure (GSI) to loads reduced over time.

Prepared Implementation Plan and Schedule to Achieve TMDL Allocations

MRP Provisions C.11.d and C.12.d require the Permittees to prepare a plan and schedule for mercury and PCBs control measure implementation and RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL WLAs by 2028 and the PCBs TMDL WLAs by 2030. This requirement is fulfilled by the TMDL Implementation Report (Attachment 12.1) and RAA Report (Appendix A to Attachment 12.1).

Implemented a Risk Reduction Program

The Contra Costa Permittees implemented risk reduction activities to increase awareness of the risks of mercury and PCBs contamination when consuming fish caught in the San Francisco Bay/Delta via kiosks and pier postings and point-of-purchase outreach at fishing supply stores through displaying multi-lingual signage and brochures. A report on the effectiveness of risk reduction activities is provided in Attachment 12.4.

A Summary of Other Group Program Activities for FY 2019/20

In addition to the activities and programs highlighted above, Contra Costa Permittees collectively conducted a broad range of other activities and programs designed to reduce or eliminate the discharge of stormwater pollutants (i.e., anything other than stormwater) into and from municipal storm drain systems. This Volume I report documents the other activities conducted or coordinated collectively as follows:

Table 1-1: Group Program Activities

MRP 2.0 Provisions	Section
C.2 Municipal Operations – Controls to reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.	2
C.3 New Development and Redevelopment – Source controls, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges, and controls to prevent increases in runoff flows from new development and redevelopment projects.	3
C.4 Industrial and Commercial Site Controls – Inspections and enforcement of stormwater pollution prevention measures at businesses to prevent pollutant exposure and discharges into and from municipal storm drain systems.	4
C.5 Illicit Discharge Detection and Elimination (IDDE) – Surveillance, spill and complaint investigations, control of mobile sources, and enforcement and case follow-up.	5
C.6 Construction Site Controls – Inspections and enforcement of construction site stormwater pollution prevention to reduce and eliminate pollutant discharges into and from municipal storm drain systems.	6
C.7 Public Information and Outreach – Information and outreach to increase knowledge and encourage behavior changes of target audiences regarding the impacts of stormwater pollution on receiving water and of pollution prevention solutions to mitigate the problems, respectively.	7
C.8. Water Quality Monitoring – Water quality monitoring activities including: 1) San Francisco Estuary receiving water monitoring; 2) creek status monitoring; 3) stressor source identification investigation; 4) Pollutants of Concern (POC) monitoring; 5) pesticides and toxicity monitoring; and 6) reports submitted annually on March 31.	8

MRP 2.0 Provisions	Section
C.9 Pesticide Toxicity Control – Actions to prevent impairment of urban streams by pesticide-related toxicity including implementation of Integrated Pest Management (IPM); outreach and training to municipal employees, pest control operators (PCOs), and residents; and, outreach to consumers on less-toxic methods of pest prevention and control.	9
C.10 Trash Load Reduction – Implementation of control measures and other actions to reduce trash loads discharged into municipal storm drainage systems and receiving water bodies.	10
C.11 Mercury Controls – Implementation of control measures to reduce total mercury and methylmercury loads in accordance with load reduction allocations established for urban runoff in the San Francisco Bay Mercury and the Sacramento San Joaquin Delta Methylmercury TMDLs.	11
C.12 Polychlorinated Biphenyls Controls – Implementation of control measures to reduce PCBs loads in accordance with load reduction allocations established for urban runoff in the San Francisco Bay PCBs TMDL.	12
C.13 Copper Controls – Implementation of source control BMPs[9] to reduce and eliminate discharges containing copper into and from municipal storm drainage systems.	13
C.15 Exempted and Conditionally Exempted Discharges – Implementation of control measures to eliminate any adverse impacts to receiving waters from exempted unpolluted non-stormwater discharges, such as flows from natural springs; and, conditionally exempted non-stormwater discharges that are potential sources of pollutants, such as swimming pools and spas and irrigation water.	14
C.16.5 Provisions Applicable to East County Permittees – This Provision was added to the MRP in January 2019 to include the Cities of	15

[9] A BMP is defined as any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution.

MRP 2.0 Provisions	Section
Brentwood, Antioch and Oakley, and portions of Unincorporated County and the Flood Control District located in Water Quality Control Board Region 5 (East County Permittees), as dischargers named in the San Francisco Bay MRP. The provisions align the activities of East County Permittees with Permittees located in Region 2 and describe actions by East County Permittees necessary to implement TMDLs applicable in Region 5.	

COVID-19 Impacts

The CCCWP sent letters to the Regional Water Board on April 7, April 28, and July 27, 2020, in response to the State Water Resources Control Board (State Water Board) directive of March 20, 2020 regarding *Compliance with Water Board Requirements During the Coronavirus 2019 (COVID-19) Emergency,* identifying compliance activity impacts due to COVID-19.

This annual report provides the Regional Water Board with an update on the specifics of the requirements and provisions of the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP), Order R2-2015-0049, that were impacted by Contra Costa County Health Orders for COVID-19. A discussion of these specific MRP requirements and the reasons relating to potential delays is included in relevant sections of this report. The response efforts relating to MRP provisions were conducted by Permittees differently, in accordance with their jurisdiction's relevant circumstances, and Permittee-specific considerations have been included in their individual reports.

As described in our letters, Contra Costa County declared a state of emergency on March 10, 2020, and the County Health Officer issued subsequent Health Orders to slow the spread of the COVID-19 virus. The intent was and still is to ensure the maximum number of people socially distance, and it has been and still is deemed essential that the health and safety of all Permittee staff and contractors be protected to the maximum extent reasonably possible. In accordance with State and local orders and guidelines, any

performance of Essential Governmental Functions must be carried out in compliance with Social Distancing Requirements. This continues to hamper and impact the operations of some Permittees.

Though the COVID-19 pandemic has had wide ranging impacts on our society, there are three primary reasons why it has impacted Permittee abilities to comply with some permit requirements.

- **Operational Delay.** When the initial health order went into effect on March 17, 2020, Permittees ceased working and sheltered in place (except for essential workers identified by each jurisdiction). After a while Permittees better understood the intent and limitations of the health order restrictions and were able to determine which operational activities could be resumed with protective measures, which activities would have to wait until certain restrictions were lifted, and which activities could be modified and still meet permit requirements. This initial response to the pandemic health restrictions and subsequent analysis took about two months, creating a two-month period during when Permittee operations and permit compliance were hampered.
- **Staff Reassignments.** Permittees have a role in emergency response efforts, and the pandemic posed a societal emergency requiring many Permittees to open their emergency operations centers. This resulted in reassignment of staff resources to meet the staffing needs of their emergency operations. Although this was a rather short-term effort for most Permittees, except perhaps for the County, it certainly disrupted operations. In addition, Permittees reassigned staff to handle essential worker operations, support operations for essential workers, and accommodate working remotely for essential and nonessential workers that could work at home. Not all jurisdictions were set up to work at home and this transition took additional time and resources.
- **Budget Reductions.** A primary source of general-purpose revenue for most Permittees is from sales tax. At the onset of the pandemic only essential business operations were open, reducing local sales tax revenue dramatically. Subsequent relaxation of certain restrictions allowed some businesses to open but only at

reduced capacity. This has increased some sales tax but nowhere near pre-pandemic levels. This loss of revenue has resulted in significant budget reductions in Permittee stormwater divisions and in departments and divisions that support stormwater operations.

Despite these impediments, Permittee staff and their contractors and consultants continue to make all reasonable efforts to perform required permit activities while at the same time taking the necessary precautions to minimize exposure to themselves and the general public. As noted in the following sections, some of the required work was performed beyond June 30, 2020, the FY 2019/20 timeline. Even though it was completed after the end of the fiscal year, we are reporting these activities in the Annual Report and considering these activities complete for FY 2019/20. Activities remaining to be completed will be fulfilled in FY 2020/21 to the extent feasible. Feasibility, in this context, goes beyond practical constraints to include funding and staffing capacity. It must be noted in these extraordinary times, that some Permittee stormwater programs do not have the resources to perform permit requirements as they typically had in past years. It may be a Permittee's intent, at this time, to perform uncompleted work in FY 2020/21, however, if staff is not reassigned back to their stormwater program or if slashed funding for a consultant or stormwater program position is not reinstated, then there may be no way for that work to be completed. And there are some permit requirements that cannot be made up if missed, such as wet weather inspections. For Permittees who missed some wet weather inspections due to COVID-19, those inspections cannot be performed now – the wet weather window is gone.

Our general approach to completing permit requirements during this difficult year has the following four components:

- The requirement was able to be completed as specified in the permit.
- The requirement was completed but completed later than June 30, 2020.
- The requirement was not completed or completed at a reduced level, but the uncompleted balance will be done in FY 2020/21, to the extent feasible.
- The requirement was not completed and cannot be made up due to circumstances prohibiting its completion now (e.g., wet weather inspections).

Uncompleted FY 2019/20 permit requirements to be “carried over” and completed in FY 2020/21 will be indicated by each permittee in their individual report. Permittees will file an amended report, or other appropriate correspondence, with the Regional Water Board at a later date with the status of their “carried over” FY 2019/20 requirements.

SECTION 2 – PROVISION C.2 MUNICIPAL OPERATIONS

Introduction

CCCWP staff, consultants and municipal staff participate on the Municipal Operations Committee (MOC), which assists in the review and preparation of guidance and training for municipal staff with respect to Provisions C.2 (Municipal Operations), C.4 (Industrial Commercial Site Controls), C.5 (Illicit Discharge Detection and Elimination), C.9 (Pesticide Toxicity Control), C.10 (Trash Load Reduction), C.13 (Copper Controls), and C.15 (Exempted and Conditionally Exempted Discharges) of the MRP. CCCWP staff also participate in the BASMAA MOC, which coordinates related regional activities. This section of the Annual Report will focus on municipal operation activities (Provision C.2). Reporting related to Provisions C.4, C.5, C.9, C.10, C.13, and C.15, are covered in Sections 4, 5, 9, 10, 13 and 14, respectively, in this Volume I Report.

In FY 2019/20, Jolan Longway (City of Pittsburg) and Stephen Prée (City of El Cerrito) served as Chair and Vice Chair, respectively, of the CCCWP MOC. The regular MOC typically meets the third Tuesday of each month. In FY 2019/20, the regular MOC met in all months except August and September.

Amanda Booth and Becky Haworth (City of San Pablo), Michele Mancuso (Unincorporated Contra Costa County), Lucile Paquette (City of Walnut Creek) and Kristine Corneillie (CCCWP augmented staff) represented the CCCWP at the BASMAA Trash Subcommittee. Work undertaken by this committee is discussed in Section C.10. The BASMAA MOC did not meet in FY 2019/20.

A listing of Contra Costa municipal representatives on the CCCWP MOC is included in Attachment 1.3. Summary minutes of these meetings are available in the FY 2019/20 Management Committee agenda packets provided on the CCCWP website at http://www.cccleanwater.org/meetings/.

FY 2019/20 Accomplishments

The monthly MOC meetings provide an opportunity to further train and educate Contra Costa Permittees on subjects that are relevant to municipal operations and permit

compliance. The meetings also serve as a forum to discuss municipal operations such as pest management, trash controls, or illicit discharge response. There are also opportunities to hear from guest speakers, share audit findings of stormwater programs relative to municipal operations, or identify the need for new or updated public outreach material based on findings from stormwater inspections. Below are some of the highlights from MOC activities for FY 2019/20.

Presentations by Guest Speakers

As part of an ongoing effort to build relationships with agencies whose work may potentially intertwine with MOC's activities, guest speakers are invited to give presentations on their respective programs to this committee. In FY 2019/20, presentations were given by the following persons:

- Caltrans staff presented at multiple meetings regarding collaboration with Contra Costa Permittees on trash control device projects.
- Stephen Prée (City of El Cerrito) presented on Integrated Pest Management (IPM) and use of the IPM Guidance Manual.
- Karen Adler presented on Contra Costa County Department of Agriculture activities.

Additionally, specialized workshops provided training for CCCWP staff, including:

- Stormwater Inspector Training Workshop (C.4, see description below) – July 29, 2020

Finally, announcements were regularly sent out to the MOC to notify Contra Costa Permittees of upcoming region-wide workshops and activities of interest to Permittees.

FY 2020/21 Planned Activities

In FY 2020/21, the CCCWP MOC will continue to review and provide assistance to municipal maintenance and operations staff, where necessary, to ensure consistent and effective BMPs are implemented during the operation, inspection, and routine repair and

maintenance activities of municipal facilities and infrastructure. This includes, but is not limited to: graffiti removal, implementation of Corporation Yard Stormwater Pollution Prevention Plans, municipal stormwater pump station inspection, operation, maintenance, and monitoring, implementation of appropriate BMPs during road, parking lot and bridge repair and maintenance work; and, complying with the reporting requirements in Provision C.2 and other relevant provisions to municipal operations.

In particular, the MOC will participate in MRP 3.0 negotiations for those provisions under the purview of the municipal operations and will review proposed permit language and provide comments as well as recommend improvements on reporting.

SECTION 3 – PROVISION C.3 NEW DEVELOPMENT AND REDEVELOPMENT

Introduction

CCCWP staff and consultants assisted Contra Costa Permittees as they completed their Green Infrastructure Plans, which were submitted in September 2019. Under the direction of CCCWP's Development Committee, CCCWP organized a Low Impact Development (LID) technical workshop attended by over 100 land development professionals and municipal staff, and augmented the *Stormwater C.3 Guidebook, 7th Edition* with new sizing criteria for bioretention facilities in high-density projects. CCCWP consultants and municipal staff and consultants also contributed ideas and proposals for Provision C.3 in the to-be-reissued Municipal Regional Permit (MRP 3.0).

Planned updates to hydromodification management design criteria were delayed, pending receipt of Regional Water Board staff's comments on maps and a technical report submitted in September 2017. Some other activities were reduced or delayed due to staff shortages and the pandemic, as discussed further below.

FY 2019/20 Objectives

The Development Committee's FY 2019/20 work was guided by the following objectives:

- Facilitate Permittee compliance with MRP Provision C.3.
- Facilitate planning, design, construction, and maintenance of permanent controls on new developments in Contra Costa Permittees' jurisdictions.
- Facilitate Contra Costa Permittees' planning, design, construction, and maintenance of Green Infrastructure facilities in Permittees' jurisdictions.
- Organize and implement all required C.3 group activities and submittals.
- Negotiate permit requirements and interpretations that protect water quality and are implementable and cost-effective.
- Continuously improve Program outreach, guidance, and training on C.3 requirements.
- Continue CCCWP's regional and statewide role as an exemplar and leader in implementation of new development controls.

FY 2019/20 Accomplishments – Overview

During FY 2018/19 the Development Committee was chaired by Scott Alman (City of Clayton) and Phil Hoffmeister (City of Antioch) served as vice-chair. Chris McCann (Town of Danville) and John Steere (Contra Costa County) served as CCCWP representatives to BASMAA's Development Committee. Staff from Antioch, Brentwood, Clayton, Concord, Contra Costa County, Danville, Hercules, Lafayette, Oakley, Pittsburg, Pleasant Hill, San Ramon, and Walnut Creek were voting members of the Committee.

In addition to supporting implementation of Permit requirements, CCCWP staff and consultants, and Permittee staff, participated in BASMAA's MRP 3.0 C.3/Green Infrastructure (GI) Work Group. The Work Group met most months throughout the fiscal year and made a presentation to the MRP 3.0 Steering Committee in April 2020.

Contra Costa's contributions to BASMAA's MRP 3.0 C.3/GI Work Group included:

- Comments on and contributions to a "Draft Outline of Draft Permit Language Related to GI Drivers and Indicators (C.3.j.)." This document was provided to Water Board staff in September 2019 and was based on a "Conceptual Framework and Potential Indicators for Green Infrastructure Implementation," which CCCWP contributed in March 2019.

- Contributions to a discussion of proposed asset management provisions, and participation in internal subgroup meetings, during October 2019 – March 2020. This included a presentation at the March 5, 2020 C.3/GI Work Group meeting detailing the process Contra Costa permittees use to ensure build quality in LID facilities.

- Suggested language to update Provision C.3.i. (Small Projects and Single-Family-Home Projects), which was presented as an alternative to changing the threshold for Regulated Projects.

- Participation in an internal subgroup to study the implications of changes to Special Projects requirements (Provision C.3.e.ii.).

FY 2019/20 Accomplishments – Regulated Projects (Provisions C.3.a. – C.3.i.)

C.3.g - Preparing Updates to Hydromodification Management (HM) Criteria

Background and Previous Years' Activities

A 2003 permit amendment required CCCWP to prepare a Hydrograph Modification Management Plan (HMP). Similar requirements were added to the Santa Clara permit in 2001. Contra Costa's HMP was developed in 2003-2005 and emphasizes the use of LID to mitigate changes in runoff caused by land development. The SFBRWQCB approved the HMP in mid-2006. The HMP included requirements for monitoring of some bioretention facilities and for calibration and verification of the model used to calculate the bioretention sizing factors. The 3rd Edition of the *Stormwater C.3 Guidebook* (October 2006) incorporated HM requirements, including the sizing factors, into criteria for LID design on projects subject to the HM requirements.

Designs for bioretention facilities were further developed and refined in 2006-2008. The *Guidebook* 4th Edition (2009) included variations on bioretention designed and incorporated sizing factors for all facilities based on limiting flow exiting via facility underdrains to two-tenths of 2-year event (0.2Q2). MRP 1.0 (2009) imposed 0.1Q2, but allowed Contra Costa to continue to use 0.2Q2 for the permit term. MRP 1.0 also renewed the requirement for a model calibration and verification study.

The study proceeded in FY 2011/12 and FY 2012/13. Tony Dubin of Dubin Environmental Consulting conducted the model calibration and verification. CCC Flood Control District staff conducted the monitoring. A report was completed and submitted with the 2013 Annual Report. Monitoring data showed that exfiltration from the bioretention facilities was 0.24 inches per hour, an order of magnitude higher than the rate assumed in the original model. Largely because of this difference, using the calibrated model, sizing factors would not need to increase even if the 0.1Q2 flow limit were to be met.

For MRP 2.0, CCCWP sought to also change criteria in Provision C.3.g. that favor the use of flow duration control basins rather than LID. This effort started with developing potential alternatives to the curve-matching criteria in Provision C.3.g.ii.(2). In

early 2015, following discussions with SFBRWQCB staff, BASMAA retained Judd Goodman of Geosyntec Consultants to develop a memorandum describing how the potential for downstream stream bed and bank erosion (erosion potential, or E_P) could be estimated directly, rather than relying on the matching of flow-duration curves. Mr. Goodman collaborated with Mr. Dubin. The modeling results from the 2013 CCCWP report were used as input for Goodman's calculations of E_P.

Additionally, in MRP 2.0, the Water Board required Contra Costa permittees to submit a technical report, due with the 2017 Annual Report, describing how CCCWP's criteria will be updated. The update was to be implemented by January 3, 2018. At a July 20, 2017 meeting, CCCWP consultants demonstrated how three "sensitive" parameters—lower threshold for sediment movement, facility exfiltration rate to native soils, and projected future increases in watershed imperviousness—interact to affect minimum sizing factors. It was shown how a selected value for sizing factor could be fully protective for a broad variety of reasonable combinations of Qcp, facility exfiltration rate, and assumed future increase in watershed imperviousness. It was proposed to use this approach rather than using the "most conservative" values for all three sensitive parameters.

It was further proposed that this report would recommend an appropriate sizing factor for the "base case" of a bioretention facility in Hydrologic Soil Group "D" soils, which represents most future development in Contra Costa. Representative values for the three sensitive parameters that correspond to this selected sizing factor would then be used to generate the remaining sizing factors (for other facility types and other soil groups).

The Technical Report was submitted as required on September 30, 2017. CCCWP staff e-mailed SFBRWQCB staff on September 7, 2017, reviewing these proposed steps, stating that CCCWP anticipated being able to prepare updated sizing factors by January 3, 2018, if CCCWP received notice of the SFBRWQCB's acceptance of the technical report by October 31, 2017 and also stating CCCWP's understanding that Contra Costa Permittees would not be penalized for continuing to use the current sizing factors until any issues are resolved. SFBRWQCB staff responded the following day that "this sounds acceptable," and CCCWP staff followed up with an e-mail on November 15, 2017 noting

that comments had not been received, that Contra Costa Permittees would be guided to continue implementing HM criteria in the Stormwater C.3 Guidebook beyond that January 3, 2018 date, and suggesting a meeting once SFBRWQCB staff had reviewed and commented on the Technical Report.

FY 2019/20 Activities

Work on updating the HM sizing factors was suspended while awaiting Water Board staff's response to the Technical Report submitted in September 2017.

During FY 2019/20, CCCWP staff emailed SFBRWQCB staff on September 24 to request a response. Another email was sent on February 6.

SFBRWQCB staff responded on March 1, and a meeting was held (via remote conferencing) on April 14. For this meeting, CCCWP compiled and summarized documentation of discussions held, and consensus reached, as the Technical Report was being prepared in 2016 and 2017. CCCWP also researched and provided language from other California Water Boards that supports the direct-simulation-of-erosion-potential approach used in the 2017 report. At the April 14, 2020 meeting, SFBRWQCB staff committed to providing written comments on the September 30, 2017 submittal.

CCCWP staff followed up the April 14 meeting with a May 5 email, requesting a timeline for the written comments. A response, including written comments, was received in July 2020.

<u>HM Applicability Maps</u>

Background and Previous Years' Activities

MRP 2.0 required Contra Costa Permittees to prepare HM applicability maps by September 2017. The maps are to show locations where projects may be exempted because they are in a catchment that drains to pipes or a hardened channel that extend continuously to the Bay, Delta, or a flow-controlled reservoir, or drain to channels that are tidally influenced, or are located in a catchment or subwatershed that is 70% or more impervious. CCCWP's GIS Consultant, PSOMAS used a digital elevation model to

delineate sub-basins (catchments). The sub-basins were overlaid on a national land cover dataset to determine sub-basins with imperviousness equal to or greater than 70%. Channel hardening was determined using ortho-imagery, and the initial determination was reviewed and corrected by Permittee staff. Sub-basins draining to hardened channels all the way to the Bay/Delta were manually coded as exempt. The maps were submitted, along with PSOMAS' Technical Report, on September 30, 2017, as required.

FY 2019/20 Activities

Because MRP Provision C.3.g.vi. requires that the new HM Applicability Maps be "acceptable to the Executive Officer," and no response to the submittal was received, Contra Costa Permittees have been guided to implement existing policies (consistent with Attachment C in the 2009 MRP) in the interim. The April 14 meeting with SFBRWQCB staff included discussion of the maps, and some of the comments received in July 2020 addressed the maps.

<u>C.3.d - Integration of BASMAA Sizing Guidance into Guidance for Development Projects</u>

Background and Previous Years' Activities

MRP Provision C.3.d. states minimum hydraulic design criteria for stormwater treatment systems constructed for Regulated Projects. The criteria were originally developed for sizing extended detention basins (volume hydraulic design basis) and sand filters (flow hydraulic design basis) and were included when the C.3 requirements were added to Contra Costa's stormwater NPDES permit (2003).

Since the first edition (2005), CCCWP's Stormwater C.3 Guidebook has included an adaptation of the Provision C.3.d. flow-based criteria to be used for sizing bioretention facilities. Bioretention facilities must be sized to a minimum of 4% of tributary equivalent impervious area.

Provision C.3.d.i.(3) was included in MRP 1.0 (2009) and carried forward into MRP 2.0 (2015). It allows "treatment systems that use a combination of flow and volume

capacity…" to be sized "to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data."

Sometime during the MRP 1.0 term, Permittees in Alameda, Santa Clara, and San Mateo counties began using an interpretation of the Provision C.3.d.i.(3) criterion to allow bioretention facilities to be sized smaller (typically closer to 3% of tributary equivalent impervious area). This created a slight advantage, in development costs, to land developments in those counties over land developments in Contra Costa. Contra Costa Permittees continued to use the 4% criterion (with a few exceptions) because (1) the regulatory and technical basis of the method used in the southerly counties is questionable and (2) the 4% criterion is feasible on the great majority of development sites and the smaller facilities provide only a slight cost advantage in the context of overall cost of a typical land development.

To meet Stormwater C.3 Guidebook treatment requirements, land development projects must either incorporate bioretention facilities sized to the 4% minimum criterion or, if they qualify as higher-density "Special Projects," may substitute non-LID vault-based media filters or tree-box-type high-rate filters to treat runoff from some or all of the impervious area created or replaced.

Permittee staff has sought alternatives to these two options for higher-density projects because (1) the non-LID options are less desirable for communities and (2) SFBRWQCB staff has declared their intent to eliminate the "Special Projects" option in future permits (possibly in MRP 3.0).

In MRP 2.0 (2015), Provision C.3.j.i.(g) requires Green Infrastructure projects to meet the treatment and hydromodification management sizing requirements in Provision C.3.d. but, for non-Regulated Projects, allows Permittees to collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements.

In early 2016, CCCWP initiated, through the BASMAA Development Committee, a project to evaluate bioretention sizing via Provision C.3.d.i.(3). The purpose was to determine the

relationship between bioretention facility size and percent of total runoff treated over the life of the project. This will facilitate decision-making about when it is appropriate to build bioretention facilities in street locations where space is constrained.

BASMAA selected Dubin Environmental Consulting to implement the bioretention sizing evaluation project. Dubin used long-term hourly rainfall data from Bay Area gauges and a standard continuous-simulation model (HSPF) to simulate runoff flows. Dubin's report was accepted by BASMAA and forwarded to Water Board staff in June 2019.

Dubin found that the Provision C.3.d.i.(g) criterion could be met by bioretention facilities sized smaller than 4%, and that the minimum required sizing could be correlated linearly to Mean Annual Precipitation.

In a June 21, 2019 letter, Water Board staff stated "conditional acceptance" of the BASMAA guidance. The Water Board's letter includes the following paragraph:

> One aspect of the approach is that it has minimized safety factors, which, as noted in the Guidance, is likely to result in the construction of controls that have a greater need for operation and maintenance work over their lifetime, a higher rate of failure, and may be more likely to have reduced effectiveness and a reduced effective life in the absence of that attention. This calls into question whether the approach meets the C.3.d. sizing requirements for Regulated Projects, and whether it should be applied beyond non-Regulated Green Streets retrofit projects. In the absence of additional evaluation of this issue, the reduced sizing approach should not be applied to Regulated Projects.

FY 2019/20 Activities

In October 2019, the Development Committee formed a Work Group to pursue the 2019-2020 workplan task: "Integrate the outcomes of the BASMAA stormwater treatment facility sizing study into guidance for private and public land development projects."

The Work Group met on December 4 and on January 13. Discussion focused on how to limit the use of reduced sizing criteria to where the allowance is really needed (and continue to require the standard 4% sizing factor elsewhere) and how to ensure a reasonable factor of safety is incorporated on smaller facilities. The work group concluded that the best way to provide a factor of safety is to require, for facilities smaller than 4% of tributary equivalent impervious area, that the facilities be as large as feasible given site-specific constraints and to require—to the satisfaction of the municipal reviewer—an appropriate demonstration of those constraints. Use of the reduced sizing criteria is limited to projects where surface parking does not exceed 10 stalls or 10% of total parking stalls (including indoor parking) whichever is fewer. As a further safety factor, additional scrutiny will be applied during review of facility design and construction.

After reaching consensus on these issues, the work group decided to prepare and review language to be incorporated in an addendum to the Stormwater C.3 Guidebook, 7th Edition. A draft redline/strikeout was reviewed by the Development Committee on February 26. After incorporation of changes, the Development Committee approved a final redline/strikeout which was approved by the Management Committee at its May 20, 2019 meeting. The redline/strikeout includes edits to Chapter 4, Design and Construction of Bioretention Facilities and Other Integrated Management Practices. Additional edits, providing background on the technical issues, including consideration of factors of safety, is included in edits to Appendix E. The *Guidebook* update is published at www.cccleanwater.org.

CCCFCWCD Policy on C.3 Facilities and Flood Control

Background

Designs for proposed land developments within Contra Costa County must include facilities to safely collect and convey runoff from the development site. Depending on the site's characteristics and location, flood storage may be required to match peak runoff to pre-development conditions, and/or to limit effects on downstream facilities. The Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) reviews proposed designs on behalf of municipal planning authorities.

An April 2019 CCCFCWCD memo concludes that C.3 facilities should not be relied on to mitigate peak flows. A February 2020 draft update to that memo suggested potential alterations to C.3 facilities that could allow them to be considered to have some mitigating effect.

Local stormwater coordinators are concerned that these design alterations, and proposals to combine flood control and stormwater treatment in a single facility, could result in facilities that have compromised performance, are difficult or impossible to maintain, and which lack the LID aesthetic qualities and ancillary benefits needed for long-term resiliency.

Design of flood control facilities and design of C.3/LID facilities use different hydrologic analysis methodologies and have different objectives for controlling flows.

FY 2019/20 Activities

During FY 2019/20, CCCWP's consultant redrafted the CCCFCWCD memo and distributed the redraft for comment by CCCFCWCD staff and by the Development Committee.

Based on comments received, CCCWP consultant conferred with CCCFCWCD staff and it was agreed to establish a Work Group, comprising CCCFCWCD staff and municipal engineering staff, to study the issue and develop consensus recommendations.

The Work Group will be convened during 2020/21.

<u>Other Updates to the Stormwater C.3 Guidebook</u>

Background and Previous Years' Activities

CCCWP published the first edition of the *Stormwater C.3 Guidebook* in 2005. The current 7th Edition was published during 2016-2017. Ancillary documents, including example projects and updated templates, were posted to the CCCWP website in 2018.

FY 2019/20 Activities

During FY 2019/20, the *Guidebook* was updated with additional sizing factors and criteria for using the factors, as described above.

Anticipated changes for the 8th Edition include updated sizing factors for HM facilities. Calculation of these sizing factors is pending Water Board staff acceptance of the 2017 HM Technical Report. Other changes, including updates to Chapter 5 (Operation and Maintenance), will be incorporated in the 8th Edition when published.

Outreach and Training

Background and Previous Years' Activities

Since 2004, CCCWP has sponsored a workshop on LID planning, design, and construction each fiscal year (excepting 2016-2017). Workshops typically include an overview of C.3 requirements, implementation procedures, and design guidance in accordance with the *Stormwater C.3 Guidebook.* Participants include private-sector land development professionals and municipal staff.

Also, since 2004 CCCWP has maintained pages at www.cccleanwater.org with links to resources for implementing Provision C.3 requirements. These resources include the *Stormwater C.3 Guidebook,* CCCWP's Integrated Management Practices (IMP) Sizing Calculator, templates for Stormwater Control Plans, Stormwater Control Plan examples, miscellaneous memoranda, submittals to the Water Boards, and slides and materials used in trainings.

FY 2019/20 Activities

A workshop, "Planning, Design, Construction, and Maintenance of Low Impact Development Features and Facilities," was held February 11 from 8:00 AM to 12:00 PM at the City of Walnut Creek's Shadelands Civic Arts Auditorium. Use of the auditorium was donated by the City.

Total registrants were 130, accounting for no-shows vs. walk-ins, attendance is estimated to be close to the same number. Based on information given at registration, about 76 attendees worked for design firms and 44 were staff for stormwater NPDES permittees, with the remainder working for developers or other public agencies. Fifty-three registrants said they had previously attended a CCCWP C.3 workshop.

Presentations included a review of the basics of Provision C.3 compliance and Low Impact Development Design, an update on potential changes coming in MRP 3.0, and an overview of Green Infrastructure implementation.

A panel made up of experienced municipal stormwater staff (Amanda Booth, City of San Pablo; Phil Hoffmeister, City of Antioch; Chris McCann, City of Danville; and Frank Kennedy, Kennedy and Associates) led an interactive discussion of six key topics in LID implementation. In addition, Mitch Avalon spoke on issues related to meeting LID requirements and flood management requirements on development sites.

Participants were asked to complete a feedback form and 62 responses were received. Comments were thoroughly positive. Many commenters said they appreciated the panel's contribution and the back-and-forth between panelists and the audience. Ideas for improvement varied (for example, there were requests for more introductory material, and for less). Several commenters regretted that the discussion of two topics, "Getting LID Features and Facilities Built Right" and "Operation, Maintenance, and Inspections" was omitted for lack of time.

The workshop agenda and slides have been posted to the CCCWP website.

Also during FY 2019/20, the C.3 pages at www.cccleanwater.org were updated and refreshed as part of an overall and ongoing website reorganization and update.

Development of Countywide GIS and Database Capabilities

Background and Previous Years' Activities

CCCWP has collaborated with the Alameda Countywide Clean Water Program (ACCWP) since FY 2015/16 to develop GIS capabilities (ArcGIS Online, or AGOL) for facilitating

planning, tracking and reporting of NPDES compliance activities, including activities to reduce discharges of trash and pollutants of concern. During FY 2016/17, CCCWP and ACCWP initiated efforts to incorporate into AGOL features that would allow integrated tracking and reporting of Regulated Projects in accordance with Provisions C.3.b. (Project approvals), C.3.e. (Special Projects), and C.3.h. (Operation and Maintenance).

During that year and into FY 2017/18, a "C.3 module" was created within AGOL to facilitate tracking and reporting of Regulated Projects and Green Infrastructure street and drainage retrofit projects. The primary purpose of the module and the Contra Costa Permittees' data entry into the module was to track and document load reductions achieved as a result of C.3 implementation. The Contra Costa Permittees continued to use their own, separate, tracking systems for C.3.b., C.3.e., and C.3.h. reporting requirements.

FY 2019/20 Activities

Further development of AGOL capabilities to track C.3 implementation is pending Program reorganization, available budget, and potential new requirements in the reissued MRP.

Discussions of C.3 Implementation

Development Committee meeting agendas continued to feature, as a last item in each agenda, "open discussion" for the purpose of allowing Contra Costa Permittees to share questions and experiences regarding C.3 implementation, including implementation of Green Infrastructure Plans.

Design and Engineering Assistance to Municipal Staff and to Applicants for Development Project Approvals

Throughout the fiscal year, CCCWP made the services of the Program's C.3 consultant, Dan Cloak, P.E., available to its member Permittees and to the community of land development professionals for consultation on C.3 compliance and LID design and construction. Typically, two to ten requests were fulfilled each month, and varied from e-

mailed answers to questions, to review of drawings, to participation in local project review meetings.

FY 2019/20 Accomplishments – Green Infrastructure Planning and Outreach

C.3.j - Assistance to Permittees to Prepare Green Infrastructure Plans

Background and Previous Years' Activities

In 2013, CCCWP initiated discussions within BASMAA of Green Infrastructure as a unifying theme for the soon-to-be-reissued MRP 2.0. CCCWP staff and consultants participated in a BASMAA-sponsored Green Infrastructure Work Group that was launched in early 2014. During FY 2014/15, CCCWP staff and consultants helped draft a proposed green infrastructure provision. Following discussions within BASMAA and with Water Board staff, some elements of that draft were incorporated into MRP 2.0 Provision C.3.j.

During FY 2015/16, CCCWP focused on assisting Permittees to implement the early implementation "no missed opportunities" requirements of MRP C.3.j.ii. CCCWP initiated and drafted the BASMAA Development Committee's *Guidance for Identifying Green Infrastructure Potential in Municipal Capital Improvement Projects* and assisted Contra Costa Permittees to implement routine procedures to assess their capital projects.

Over the next three fiscal years (2016-2019) CCCWP staff, and CCCWP's consultant, created resources for Contra Costa Permittees to use in preparing their Green Infrastructure Plans. These resources are available on a Green Infrastructure Planning Resources page on the www.cccleanwater.org and include a template for creating local Green Infrastructure Plans, example policies, links to planning and design manuals and engineering details, and presentation slides.

During FY 2018/19 CCCWP prepared, with local and SWRCB funding, the Contra Costa Watersheds Storm Water Resources Plan (CCWSWRP), which included a database of potential public Green Infrastructure projects. CCCWP prepared, for the Permittees' use, projections and maps of anticipated redevelopment, by using the Metropolitan

Transportation Commission's (MTC's) process for creating transportation demand projections using the UrbanSim model created at UC-Berkeley. These efforts were coordinated with development of the Reasonable Assurance Analysis (RAA), due for submittal with this Annual Report. Technical work products included a *PCBs Load Reduction Attainment Tool,* an optimized PCBs Load Reduction Attainment Scenario, and a *Green Infrastructure Cost Estimation Methodology.*

Importantly, through this process, Contra Costa Permittees concluded that they should plan to implement Green Infrastructure to achieve multiple water-quality and ancillary benefits, rather than prioritize PCB load reduction.

CCCWP staff and consultants' outreach on Green Infrastructure Planning included multiple presentations to Contra Costa County Planning Directors as well as Public Works Directors and municipal engineers through the City/County Engineering Advisory Committee.

2019/20 Activities

During FY 2019/20, in preparation for Permittees' submittal of their Green Infrastructure Plans, CCCWP made final the Contra Costa Watersheds Storm Water Resources Plan and the Countywide Load Reduction Attainment Scenario. CCCWP staff and consultants provided miscellaneous assistance as the Permittees prepared their Green Infrastructure Plans for submittal.

CCCWP assisted two of its Permittees, the City of Richmond, and the City of San Pablo, with grant applications to implement projects listed in the Contra Costa Watersheds Stormwater Resource Plan:

- Richmond: 2nd Street Bikeway Project in the Baxter, Cerrito Creeks & West Richmond Watershed
- San Pablo: Sutter Avenue Green Street in the Wildcat Creek Watershed

CCCWP is participating in the Regional Compliance for a Sustainable Bay project, which is supported by an EPA San Francisco Bay Water Quality Improvement Fund grant to

CCCWP member agencies San Pablo, Walnut Creek, and Richmond, in addition to Contra Costa County. The objective of the Project is to develop a Regional Alternative Compliance System (System) with the ability to efficiently and cost-effectively improve surface water quality, achieve multiple benefits, and reduce compliance pressures on jurisdictions and entities subject to stormwater quality requirements. It is intended that the System developed will help facilitate required green stormwater infrastructure/low impact development (GSI/LID) across the San Francisco Bay Area with the potential for substantial cost savings, all while meeting Municipal Regional Stormwater Permit and Total Maximum Daily Load (TMDL) water quality goals. This Project will develop a System for Contra Costa County permittees, with the intent that the Project deliverables could be easily adapted for other programs and/or entities subject to the same water quality compliance requirements. During FY 2019/20, a stakeholder Advisory Committee and Technical Advisory Committee were formed, and the literature review and analysis initiated.

C.3.j - Green Infrastructure Design Guidance and Standard Specifications and Details

Background and Previous Years' Activities

Contra Costa municipalities' Green Infrastructure Plans include a commitment to participate in a multi-year countywide interagency process, convened by CCCWP, to facilitate excellence and consistency in the design and construction of Green Infrastructure features and facilities. This process will augment the use of design resources such as the National Association of City Transportation Officials *Urban Street Stormwater Guide* and the San Mateo County *Sustainable Green Streets and Parking Lots Design Guidebook* as common primary resources for determining design elements to be included in streetscape improvements and Complete Streets projects, and the use of CCCWP's *Stormwater C.3 Guidebook* as the primary resource for design specifications and details for constructing Green Infrastructure features and facilities.

A survey of Contra Costa municipal public works directors and capital projects engineers indicated strong support for CCCWP's strategy of compiling design and engineering resources and making them readily available. In addition, respondents were unanimous

in supporting countywide interagency collaboration to select and possibly refine details and specifications for use in Contra Costa.

FY 2019/20 Activities

Following the direction of CCCWP's Development Committee, CCCWP staff and consultants initiated the countywide interagency process with a presentation to the City/County Engineering Advisory Committee on January 16.

The next steps are to solicit the participation of City Engineers and capital improvement project managers and to hold a convening meeting. This project is on hold because of staff shortages and the pandemic; it may be restarted during FY 2020/21.

C.3.j.(4) - Green Infrastructure Outreach and Participation in Processes to Promote Green Infrastructure

Background and Previous Years' Activities

MRP Provision C.3.j.(4) requires Permittees to conduct public outreach, train appropriate staff, and educate appropriate Permittee elected officials. Provision C.3.j.iii. requires the Permittees to track processes and provide information to assist regional, state, and Federal agencies to plan, design, and fund incorporation of Green Infrastructure into local infrastructure projects.

At the countywide level, CCCWP's outreach in previous years (2016-2019) included presentations to the Contra Costa City/County Engineering Advisory Committee (CCEAC), the Contra Costa Planning Directors, the East Bay Municipal Engineers (EBME), and CASQA. CCCWP also provided resources, including templates for plans, documents, and presentations, to assist Contra Costa Permittees with their outreach to local elected officials and the public.

At the regional level, CCCWP supported and participated in regional discussions (2013-2015), which included representatives of the Contra Costa Transportation Authority and Water Board staff that informed the requirements of MRP Provision C.3.j. CCCWP staff and consultants, and staff from Contra Costa Permittees, also participated in BASMAA's

grant-funded regional roundtable (2017); that process culminated in preparation of BASMAA's *Roadmap of Funding Solutions for Sustainable Streets* (2018).

FY 2019/20 Activities

During FY 2019/20, CCCWP's Green Infrastructure outreach at the countywide and regional level was hampered by staff shortages and the pandemic. Even had CCCWP staff and consultants been available, many of the target organizations and associations have limited their meetings or limited the addition of items to meeting agendas as they struggle to cope with the difficulty of operating under county and statewide health orders.

C.3 COVID-19 Impacts

Provision C.3.h. requires inspection by the Permittees of an average of 20%, but no less than 15%, of the total number of Regulated Projects, offsite projects, or Regional Projects each fiscal year. However, field work increases risk of person-to-person contact and protocols have had to be modified. Additionally, many facilities that would have been part of the inspections were not open for certain periods of time and facility managers were not present due to work from home mandates and diversion to other essential operations duties. After an initial disruption of work, Permittees have resumed inspections with use of appropriate protective measures, such as social distancing and use of face masks and have reported on inspections completed in FY 2019/20. Some of the missed inspections were complete beyond June 30, 2020, but prior to the submittal of the annual report and therefore being reported. Facility inspections planned for FY 2019/20 that were not completed have been added to the FY 2020/21 inspection lists. Follow-up inspections were performed as soon as reasonable, following Health Order guidance for those requiring enforcement.

Planned FY 2020/21 Activities

- Complete negotiation of any changes to Regulated Projects requirements and Green Infrastructure requirements in the reissued MRP.

- Resolve any outstanding issues related to HM applicability and based on outcomes of interactions with Water Board staff direct CCCWP's consultant Psomas to revise the draft maps. Publish the maps via website links.
- Resolve SFBRWQCB staff comments on the September 2017 HM Technical Report.
- Generate new tables for the *Stormwater C.3 Guidebook* containing updated HM sizing factors.
- Obtain consensus among municipal engineering staff and CCCFCWCD staff regarding the contribution of C.3/LID facilities to flood control requirements for land development projects that have both requirements. Produce a memorandum approved by both agencies and incorporate the consensus recommendations into a draft update for the *Stormwater C.3 Guidebook.*
- Prepare draft updates to *Stormwater C.3 Guidebook* Chapter 4 with instructions for using maps and updated sizing factors.
- Prepare draft updates to *Stormwater C.3 Guidebook* Chapter 5 on planning stormwater facilities operation and maintenance.
- Following attainment of consensus with Water Board staff regarding revisions to HM requirements, update the IMP Sizing Calculator with (a) new sizing factors (b) additional usability and technical updates (c) integration with C.3 data management and GIS.
- Compile new and updated guidance into draft sections of the *Stormwater C.3 Guidebook, 8th Edition.*
- Continue to update pages on the CCCWP website with new resources and publications.
- Compile and distribute additional design resources for stormwater facilities.
- If allowed by health orders, hold a half-day LID workshop for municipal staff and land development professionals.
- Further explore and develop countywide GIS and database capabilities to integrate tracking and reporting of Regulated Projects and Green Infrastructure in accordance with Provisions C.3.b. (project approvals) C.3.e. (Special Projects), C.3.h. (Operation and Maintenance) and C.3.j. (Green Infrastructure).

- Convene and facilitate a countywide interagency process to facilitate excellence and consistency in the design and construction of Green Infrastructure features and facilities
- Continue ongoing countywide and regional outreach and coordination with funding sources for Green Infrastructure. See specific activities and schedule in the BASMAA Regional Supplement (fulfills the specific requirement in MRP Provision C.3.j.iii.(3)).
- Discuss C.3 implementation examples, problems, and issues at Development Committee meetings. Provide consulting on request to assist local staff with review of proposed development projects.
- Create and maintain an online library of photos and other materials related to C.3 implementation. Develop a guide for municipal project design review teams.
- Prepare guidance, consistent with regional reporting requirements, for Permittee preparation of the FY 2020/21 Annual Report.
- Prepare and review FY 2020/21 Annual Report of Program activities.
- Assist Contra Costa Permittees as needed with reporting C.3 implementation.

SECTION 4 – PROVISION C.4 INDUSTRIAL AND COMMERCIAL SITE CONTROLS

Introduction

During FY 2019/20, Contra Costa Permittees implemented their business inspection programs as follows:

- Antioch, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Orinda, Pittsburg, Pleasant Hill, San Pablo, San Ramon, and Walnut Creek contract for business inspection services with local sanitary district inspectors (or POTW inspectors). This institutional arrangement of using local POTW inspectors to conduct municipal stormwater inspections was initiated soon after the CCCWP was issued its first Joint Municipal NPDES Permit in 1993. This arrangement has been praised by SFBRWQCB staff for its effectiveness, and has served as a model for other municipalities throughout California. Business inspections conducted by POTW inspectors are referred to in this Annual Report collectively as the "Group Inspection Program". The CCCWP provides administrative support to the Group Inspection Program. This includes management of the contracts, agreements, invoices and reporting; and, assistance in review and development of annual inspection lists, plans, and goals.
- Brentwood, Oakley, Pinole and CCC currently conduct their own business inspection programs.
- Richmond uses a combination approach for its business inspection program. Stormwater inspections are conducted by municipal staff as well as contracted POTWs inspectors.

FY 2019/20 Accomplishments

During FY 2019/20, CCCWP staff and the CCCWP's MOC assisted Permittees with implementation of Provision C.4 by:

- Administering the CCCWP's Group Inspection Program;
- Hosting an Industrial Commercial Stormwater Inspector Training Workshop;
- Supporting and participating in the Contra Costa Green Business Program; and

- Providing Outreach Resources to Businesses.

The following is a detailed account of each activity listed above:

C.4.b,d - Administering the CCCWP's Group Inspection Program

CCCWP staff administers and manages the various inspection agreements for the Group Inspection Program involving the 16 Contra Costa Permittees and three local POTWs (Central Contra Costa Sanitary District, Delta Diablo, and West County Wastewater District). Administration of the Group Inspection Program includes: 1) coordinating the review of amendments and revisions to the inspection agreements, when necessary; 2) receipt and payment of POTW invoices on behalf of the 16 Contra Costa Permittees; 3) assistance to the Contra Costa Permittees and POTW staff in developing inspection goals, ensuring MRP compliance concerns are integrated into business inspections (e.g., identification and proper management of POC, such as PCBs); 4) training of inspectors to promote consistent inspection services countywide; and, 5) field support to inspectors and municipal staff when needed.

CCCWP staff meets with the participating Contra Costa Permittees and POTW staff annually to: assess the services provided; set inspection goals for the upcoming FY; distribute documentation needed for preparation of municipal annual reports; and, review any special issues or enforcement problems that have occurred.

C.4.e - Stormwater Inspector Training Workshop

The CCCWP hosted one Commercial/Industrial Stormwater Inspection Training Workshop in FY 2019/20. Due to the ongoing coronavirus pandemic, it was challenging to schedule the workshop in the Spring, when it is usually held. To accommodate trainer and staff schedule, and the restrictions on meeting in person, the workshop was held on July 29, 2020 via a Zoom webinar. The workshop topics consisted of:

- A Case Study of PCBs Tracking at a Metal Recycling Facility;
- Residential RVs and Stormwater; and
- Senate Bill 205

Green Business Program (GBP)

The CCCWP is one of the largest contributing partners to the GBP and in FY 2019/20, provided $6,000 to support the GBP to assist with carrying out its program mission. The GBP is designed to publicly recognize private businesses and public agencies that take extra steps, beyond baseline compliance with environmental regulations, to prevent pollution and save resources (e.g., conserve water and energy, reduce waste through reuse and recycling, prevent stormwater pollution through good housekeeping practices). This program encourages and helps business managers and inspectors strengthen and sustain the quality of the environment in the County through a collaborative partnership.

Since its inception in 1998, 634 businesses have been certified as Green Businesses in the County. There are 269 currently certified businesses, including seven new businesses that were certified in FY 2019/20, as well as 34 businesses that were recertified. The types of businesses being certified are diverse and include business offices, solar electric companies, auto repair shops, landscapers, printers, restaurants, small manufacturers, home remodelers and cleaning services, and wastewater treatment facility.

Municipal stormwater and POTW inspectors assist the GBP by encouraging business to become Green Business candidates. Each certified Green Business must complete a checklist section with pollution prevention and stormwater specific measures. CCCWP staff members serve on the GBP's "Partners Committee," and actively engage in development of the Green Business checklist (i.e., the stormwater pollution prevention section that each business needs to complete before becoming certified as a Green Business).

For FY 2020/21, the Green Business Program will be focusing primarily on the certification of 20 businesses or recertification of 40 businesses, or a combination (1 new business certification = 2 recertifications). To accomplish this, the Green Business Program has on staff 1 Hazardous Waste Reduction Manager and 1 Temporary Pollution Prevention Specialist.

Providing Outreach and Resources to Businesses

With CCCWP MOC input and direction, CCCWP staff develops and/or updates a variety of business outreach materials, including BMPs brochures and posters, a website, and a telephone hotline. Stormwater inspectors promote these resources during their inspections.

Throughout FY 2019/20, CCCWP staff responded to businesses and residents requesting copies of such outreach materials. Business owners use the CCCWP website at http://www.cccleanwater.org/business/ to find information on stormwater pollution prevention practices and how they can make their stormwater inspections as easy as possible. Businesses and residents also use the CCCWP's 1-800-No-Dumping hotline to report illegal dumping in their area to help their business communities prosper from a cleaner environment for their customers. A growing awareness of stormwater BMPs has stemmed from use of these resources and this awareness may help to eliminate non-stormwater discharges.

C.4 COVID-19 Impacts

Provision C.4.d. requires industrial & commercial business inspections, and subsequent enforcement, if necessary. However, field work increases risk of person-to-person contact and inspection protocols had to be modified. Additionally, many facilities requiring inspections were not open in the March – June 2020 time period, and facility managers were unavailable due to work from home mandates and diversion to other essential operations duties. After an initial disruption of work, Permittees have resumed inspections with use of appropriate protective measures, such as social distancing and use of face masks and have reported on inspections completed in FY 2019/20. Any facility inspections planned for FY 2019/20 that were not completed have been added to the FY 2020/21 inspection lists. Follow-up inspections were performed as soon as reasonable and followed Health Order guidance for those requiring enforcement. The planned schedule based on our Business Inspection Plan was disrupted, but the Permittees have worked to develop a schedule to complete appropriate number of inspections in FY20/21.

Provision C.4.e. requires that Permittees provide focused training for industrial & commercial business inspectors annually. Due to the risk of person-to-person contact, the training was planned as an online webinar. Many Permittees and trainers had limited availability for the workshop due to requirements to staff essential operations and/or work-stop orders. Therefore, training was delayed and held in July 2020 instead of Spring 2020 and this provision's requirement is completed.

FY 2020/21 Planned Activities

For over 20 years, the CCCWP and local POTWs have consistently maintained a strong Group Inspection Program. Many of the MRP requirements were already part of Contra Costa Permittees' existing business inspection programs. To promote continuous improvement of the municipal inspection programs, the CCCWP MOC established as planned goals for FY 2020/21 the following activities:

- Work to perform inspections and follow-up inspections that had to be delayed due to the coronavirus pandemic;
- Conduct an annual training workshop for industrial and commercial stormwater inspectors;
- Provide training on POC source identification and management;
- Develop other outreach materials as needed; and,
- Continue to participate in, and support, the Green Business Partnership.

SECTION 5 – PROVISION C.5 ILLICIT DISCHARGE DETECTION AND ELIMINATION

Introduction

The majority of MRP requirements related to Illicit Discharge Detection and Elimination (IDDE) are being addressed directly by Contra Costa Permittees. The CCCWP MOC oversees IDDE Group Activities.

FY 2019/20 Accomplishments

In FY 2016/17 CCCWP created a robust inventory, updated outreach material for mobile sources and businesses, and completed a mass mailing of the outreach material and an accompanying cover letter to the list of businesses. In FY 2018/19 Permittees reviewed and updated (as necessary) the minimum standards, BMPs, inspection and enforcement strategies, and outreach materials previously developed. The following IDDE Group Activities were initiated or ongoing during FY 2019/20:

- Mailed new Landscaping Brochures
- Managed the 1-800-No-Dumping Hotline and Hazmat Incident Reports;
- Continued with BASMAA and CCCWP activities related to mobile surface cleaners;
- Continued to respond to notifications of potential IDDE incidents and direct notifications to the respective municipality and provide guidance on response; and
- Continued to promote and offer stormwater pollution prevention car washing kits for charity car washing events.

Provided below is a brief summary of each activity listed above.

<u>Mailed new Landscaping Brochures</u>

The CCCWP contracted with Sagent Marketing in FY 2018/19 to develop an outreach brochure titled “Best Management Practices for Landscaping Companies. The brochure audience is lawn and garden maintenance, mowing services, landscape contractors, landscape installation services, tree and shrub services, and plant maintenance services.

The CCCWP worked with Permittees to develop a list of landscaping companies, based on SIC codes, to whom the brochure could be mailed.

C.5.c - 1-800-No-Dumping Hotline and Hazmat Incident Reports

The CCCWP continues to operate the 1-800-No-Dumping Hotline. The Hotline is used by the public to report illegal dumping and to obtain stormwater information. All Hotline calls are referred to the appropriate municipality for follow-up and, if necessary, enforcement**.** Calls have been logged since FY 2004/05.

The CCCWP received 183 Hotline calls during FY 2019/20. The number of calls this year represents an approximate 12% decrease from FY 2018/19. This decrease may be in response to the public contacting the municipality itself rather the Hotline on the location of dumped materials or illicit discharge. Additionally, RecycleMore (a JPA that serves West County jurisdictions) in partnership with Republic Services, started a free mattress recycling drop off program in February of 2019 that may be helping to alleviate some of the illegal dumping. The West County jurisdictions include El Cerrito, San Pablo, Richmond, Pinole, Hercules, and the unincorporated County (El Sobrante, North Richmond, etc).

The most commonly dumped materials reported in these calls include garbage, mattresses and box springs, and miscellaneous items. Other commonly reported dumped materials included furniture and sofas, appliances, yard and landscaping waste, building/construction debris, tires, and household goods. Each Permittee uses the information from the Hotline to identify problem areas that need to be addressed.

The CCCWP also continues to collaborate with the CCC Hazardous Materials Programs Division (HazMat). HazMat's countywide 24-hour spill response is a vital component of Contra Costa Permittees' IDDE programs. Each month, the CCCWP disseminates the HazMat spill response reports (also known as "Incident Reports") to Contra Costa Permittees. These reports inform each Permittee of HazMat incident responses within their jurisdiction. Contra Costa Permittees use this information to track the type and locations of spills and dumping incidents, and to conduct appropriate follow-up. The Contra Costa Fire Protection District (ConFire) has also established a HazMat response

team in Pittsburg (Station 87). The team responds to hazardous materials calls within their jurisdiction or that is called into their dispatch center. ConFire HazMat coordinates with CCC HazMat both for response assistance and to report questionable activities at a business.

More information on each Permittee's IDDE program is provided in the individual Municipal Annual Reports compiled in Volume II of this Report.

C.5.e - BASMAA and CCCWP Activities Related to Mobile Surface Cleaners

BASMAA's Mobile Surface Cleaner Program is a training and certification program for mobile surface cleaners. BASMAA continues to work on these efforts. For a list of activities and accomplishments and additional details, see BASMAA's *Annual Reporting for FY 2019-2020, Regional Supplement for Training and Outreach.*

To augment BASMAA's efforts to address mobile businesses, the CCCWP continued with its own set of actions. When incidents are reported through HazMat, CCCWP reviews all notices for issues with mobile businesses. This information may then be disseminated to stormwater inspectors and municipal staff throughout the county. The tracking spreadsheet also serves to identify businesses that have received two or more citations and may warrant an escalation in enforcement action.

Charity Car Wash Kits

In FY 2007/08, the CCCWP created and implemented a charity car wash pilot campaign to help charity car wash sponsors avoid illegal discharges of wash water to storm drains. The charity car washing campaign included the creation of a brochure and several car washing kits containing: one submersible pump; one 50 ft. electrical extension cord; one 3 ft. X 4 ft. rubber mat; one 50 ft. garden hose; one metal spray nozzle; three collapsible safety cones, and tape. The brochure instructs charity car wash organizers on how to conduct a car washing event without discharging wash water into the storm drain system. The brochure instructs organizations to: 1) contact the CCCWP; 2) make sure that charity car washes are legal within their municipality; and 3) use the car washing kit in accordance with the instructions provided.

The charity car wash kits were not used in FY 2019/20. The drop in usage of the kit may be in response to previous drought conditions and may indicate that organizations have transitioned to other types of fundraising activities. The CCCWP will continue to promote and track the use of these charity car wash kits in FY 2020/21.

C.5 COVID-19 Impacts

Provision C.5.d. requires illicit discharge tracking and case follow-up and illicit discharge field investigations. However, field work increases the risk of person-to-person contact and investigation protocols had to be modified. Additionally, field staff have had limited availability due to requirements for staffing essential operations. After an initial disruption of work, Permittees have resumed inspections with use of appropriate protective measures, such as social distancing and use of face masks, and have reported on inspections completed in FY 2019/20. Permittees have continued to prioritize incidents and deploy appropriate personnel as needed.

FY 2020/21 Planned Activities

A focus for CCCWP will be assisting Permittees in negotiating MRP 3.0 provisions inline with current practices and efforts. Other planned Program activities for FY 2020/21 include:

- Continuing to staff the 1-800-No-Dumping Hotline;
- Continuing to distribute CCC Hazmat Division's incident response reports to Contra Costa Permittees;
- Promoting the charity car wash kit;
- Revisiting the model IDDE response plan for further review and finalization;
- Assisting Permittee in their responses to illicit discharges and spills; and,
- Providing input and support for BASMAA's expanded mobile surface cleaners program and associated work efforts.

SECTION 6 – PROVISION C.6 CONSTRUCTION SITE CONTROLS

Introduction

The CCCWP's Development Committee facilitates Contra Costa Permittees' implementation of MRP Provision C.6 requirements and provides direction to CCCWP staff and consultants. During FY 2019/20 the Development Committee was chaired by Scott Alman (City of Clayton) and Phil Hoffmeister (City of Antioch) served as vice-chair. Chris McCann (Town of Danville) and John Steere (Contra Costa County) served as CCCWP representatives to BASMAA's Development Committee. Staff from Antioch, Brentwood, Clayton, Concord, Contra Costa County, Danville, Hercules, Lafayette, Oakley, Pittsburg, Pleasant Hill, San Ramon, and Walnut Creek were voting members of the Committee. The Development Committee's FY 2019/20 goals were:

- Facilitate member agencies' compliance with MRP Provision C.6.
- Facilitate member agencies' efforts to reduce erosion and sedimentation, and discharge of pollutants, from construction sites.
- Continuously improve Program outreach and guidance on construction-phase controls.
- Facilitate member agencies' compliance with the Construction General Permit (for agency-sponsored projects)

FY 2019/20 Accomplishments

<u>C.6.f - Construction Inspector Training</u>

To assist Contra Costa Permittees to comply with MRP Provision C.6.f.ii., CCCWP sponsors training for permittee construction inspection staff biennially.

On November 14, 2019, the Contra Costa Clean Water Program (CCCWP) sponsored a workshop for member agency staff responsible for conducting inspections and implementing the Construction Site Control (C.6) requirements of the MRP. The workshop was organized by CCCWP and hosted by the City of Walnut Creek at the Civic Park Community Center. The training was led by Sandy Mathews, CPESC, QSD/P of Larry Walker Associates, and presentations and case studies were provided by Neil Mock, City

of Walnut Creek; David Klapperich, Contra Costa County; and Margaret Monahan, San Francisco Bay Regional Water Board. The workshop was attended by 57 people including member agency staff, program staff, and Regional Water Board staff.

The workshop provided a review of the C.6 requirements, reviewed the principles of construction site stormwater management and BMP resources, and inspection practices. The workshop included the following modules:

- MRP C.6 Refresher
- Stormwater Protection Principles and BMPs for Construction Sites
- Real Stories from the Field
- Inspections and Documentation Best Practices and Tools
- Regional Water Board—Inspections and Issues

Participants' evaluations and an effectiveness assessment (pre- and post-workshop surveys) demonstrated increased knowledge regarding the required frequency of hillside/high-priority inspections, basic stormwater-pollution-prevention principles, and the timeframe for correcting violations.

C. 6.e - Construction Inspection Forms

As stated in the FY 2017/18 Annual Report, the Development Committee aimed to implement the following task during FY 2018/19:

- Investigate and discuss whether to refine inspection forms and reporting procedures on a countywide basis.

This task was not implemented due to the need to focus available resources on supporting the Contra Costa Permittees' Green Infrastructure planning efforts.

C.6 COVID-19 Impacts

Provision C.6.e. requires Permittees to conduct inspections to determine compliance and effectiveness of BMPs during the wet season (October – April). However, field work increases the risk of person-to-person contact and inspection protocols had to be

modified. Additionally, field staff have had limited availability due to requirements for staffing essential operations. Due to a disruption in inspections at the end of the wet season (March and April) drive-by inspections were performed when possible and active sites were still inspected monthly, when possible. Some sites were closed and not accessible for inspection, including drive-by inspections. Permittees have reported on inspections completed in FY 2019/20.

FY 2019/20 Planned Activities

- Assist Contra Costa Permittees to update enforcement response plans as needed. Review and update warning notice forms and guidance for use.
- Investigate the need to update construction inspection reporting forms and update as necessary. Continue providing support as needed for use of forms. Assist Contra Costa Permittees to respond to Water Board requests for submittal of inspection data.
- Assist Contra Costa Permittees with construction general permit (CGP) compliance and reporting requirements as needed. Discuss CGP compliance and reporting requirements at Development Committee meetings.

SECTION 7 – PROVISION C.7 PUBLIC INFORMATION AND OUTREACH

Introduction

The CCCWP Public Information and Participation (PIP) Committee, with assistance from CCCWP staff and consultants, is responsible for overseeing the development of materials and products, information dissemination, marketing and public outreach related to stormwater pollution prevention. In FY 2019/20 the CCCWP Administrative Committee joined the PIP Committee as voting members in order for the PIP Committee to have sufficient voting members. Most of the public information and outreach requirements in the MRP are contained in Provision C.7; however, additional outreach activities are required or encouraged in other MRP provisions as well. The CCCWP PIP Committee works to identify and coordinate these public information and outreach mandates conducted as a group and/or regionally through BASMAA's PIP Committee. Attachments 1.2 and 1.3 provide a list of CCCWP representatives to BASMAA's PIP Committee, and participation and attendance at CCCWP PIP Committee meetings, respectively. In FY 2019/20, Julie Haas-Wajdowicz (City of Antioch) served as Chair and Melinda Harris (CCC Flood Control District) served as Vice-Chair, respectively, of the CCCWP joint PIP/Administrative Committee. The CCCWP's public information and outreach budget was supplemented by CalRecycle Oil Payment Program (OPP) Grant funds.

One of CCCWP's major accomplishments in FY 2019/20 was a paid media campaign utilizing radio, outdoor and digital advertisements to reach a large audience. For further details of the CCCWP's outreach activities implemented regionally, see *BASMAA's Annual Reporting for FY 2019-2020, Regional Supplement for Training and Outreach*.

The remainder of this section documents public education and outreach activities conducted collectively in Contra Costa County.

FY 2019/20 Accomplishments

<u>C.7.b - Outreach Campaigns</u>

- The CCCWP media consultant, Sagent, developed organic content supporting CCCWP program messaging that targeted Contra Costa residents with a special

focus on pollutants of concern for their watershed and ran from April 6, 2020 through June 20, 2020. The campaign's messages focused on litter and pesticides.

- The campaign utilized radio, outdoor, and digital ads. Additionally, this campaign ran Spanish language digital display and audio spots.
- Viamedia Mobile Ad Messenger had a click through rate (CTR[10]) of 1.05%, highest of all digital elements and higher than industry average CTR.
- The outdoor media delivered the most added value to the campaign from additional postings and override. Outdoor media postings all received 5 to 6 weeks of override.
- Radio spots ran on KMVQ-FM both on-air and in-stream.
- Outdoor media was placed as transit ads. The ads ran on three bus lines in Contra Costa County: Tri Delta, West Cat, and County Connection. Due to the stay at home orders put in place during March and April, the bus ads received almost a month of override as added value.
    - 10 king size ads were posted on Tri Delta Transit.
    - 22 units were posted on West Cat.
    - 34 king size ads were posted on County Connection buses.
- The digital media for this campaign was a combination of digital display and video in both English and Spanish. Solid Search/Bonneville's digital had delivery of more than 34 million impressions across display and video.
- English Language digital display ads ran on Entercom's display network. In total, the ads delivered 756,320 impressions and 1,830 clicks for a CTR of 0.24%. Video PreRoll ads also ran on Entercom's display network and delivered 90,381 impressions with 381 clicks for a 0.42% CTR.
- English language digital display ads and mobile ad messenger ran on Viamedia's display network. Viamedia delivered 909,883 impressions between digital display and mobile ad messenger and 5,820 clicks for a CTR of 0.64%.

[10] The number of people who clicked on message's link as measured against the total number of emails.

- Spanish language digital display, streaming audio and an eblast ran with Univision. Overall, the digital display ads combined delivered 566,509 impressions and 879 clicks for a click through rate of 0.16%. The eblast deployed by Univision delivered 86,017 impressions and had 297 clicks for a click through rate of 0.35%. The eblast had an open rate of 6.48%.
- Social media posts were posted on KMVQ's Facebook, Instagram, and Twitter as a part of the radio buy for this campaign. The social posts were posted to the station's page and then boosted. The posts were posted on the following days 4/13, 4/16, 4/22, and 4/29, for a delivered impression of 27,617.

C.7.c - Stormwater Pollution Prevention Education

- Sagent utilized links on banner ads as part of the digital paid media to drive residents to the website. A web tool graphic was created and shared with partners, along with the CCCWP logo, to drive traffic to the CCCWP website. The Bringing Back the Natives Garden Tour website has posted the CCCWP logo/live link to their program website. These tactics have resulted in directing 7,594 users to the website. Sagent provided a Website Review which recommended ways to improve the website. Fixing broken links was one of the suggested ways to improve the site.
- CCCWP staff worked with Sagent to begin improving the CCCWP website in order to make it more user friendly, update older content and better organize the information it includes. Sagent created an audit list of all recommended changes that was shared with Permittees, and has assisted CCCWP to make some initial changes. The "About Us" and "Development and Infrastructure" pages were updated with current information. The banner images were updated and the tabs were updated to make the website work better on mobile devices and easier to search for information. In addition the calendar, the monthly newsletter, and the link to the MRP were moved to the home page making this important information easier to find.
- In addition, the CCCWP provides a 1-800-No-Dumping Hotline where people can call and report illegal dumping, as well as obtain stormwater information. Calls

regarding illegal dumping are forwarded to the appropriate Permittee for follow-up as needed. Further details regarding these calls are provided in Section 5 of this Volume 1 report.

- CCCWP continued IPM engagement through Our Water Our World (OWOW) outreach in retail locations; continued outreach to school-age children with the OPP/ Mr. Funnelhead programs; and utilized the watershed diorama at one community event.

C.7.d - Public Outreach and Citizen Involvement Events

Contra Costa Permittees conducted several public outreach efforts and citizen involvement events as a group in order to reach a broad spectrum of the community with both general and specific stormwater runoff pollution prevention messages. Several efforts were conducted countywide, and are described below:

- **Social Media** – The CCCWP expanded its use of social media to include Instagram in FY 19/20. Sagent continued to use an expanded social media approach to promote involvement at events. Utilizing Facebook and Instagram they shared Permittee and partner recommendations for public outreach and community involvement events.
- **Bringing Back the Natives Garden Tour** – This public outreach and citizen involvement event promotes the idea of water-saving, pesticide-reduced gardening through planting of native species. Due to the pandemic, Contra Costa Permittees sponsored the 16th Annual Bringing Back the Natives Garden Tour as a virtual event. The Tour took place on three Sundays (April 26, May 3, May 10, 2020) and showcased 43 gardens and 5 native plant nurseries located in 19 cities throughout Alameda and Contra Costa counties. There were 3,070 registrants who participated. Best-selling author and renowned speaker Doug Tallamy was keynote speaker on the first day of the program. Twenty-four native plant gardens were visited, live, with the host or designer, 2 native plant nurseries were toured. Two question and answer sessions were held; one with landscape designers and garden tour hosts, and another with Doug Tallamy and Dan Gluesenkamp, Executive Director of the California Native Plant Society. A PowerPoint

presentation on sheet mulching was given and each of the three days of programming ended with a professional pianist playing as a montage of native garden, native plant, and native wildlife photos was shown. For a detailed summary about the Tour, see Attachment 7.1 of this Volume 1 report.

- **OWOW** – As in past years, Contra Costa Permittees partnered with the OWOW Program to help raise awareness of the connection between pesticide use and water quality, and to provide information to consumers (at the point of purchase) about IPM and less-toxic alternatives that reduce or eliminate impacts to water quality. Thirty-three stores participated in this public outreach program, with 68 store staff receiving formal trainings, and over 65 additional staff trained in-aisle during informal, mentoring visits. Ten outreach/tabling events reached over 700 people. Additional outreach/community events reached over 6,109 people. For a detailed report on this year's efforts, see Section 9 and see Attachment 9.1 of this Volume 1 report.
- **CCCWP Community Calendar** – The CCCWP Community Calendar is a tool which facilitates both citizen involvement and public outreach. CCCWP promotes watershed-related community events, activities and volunteer opportunities on the CCCWP Community Calendar webpage at www.cccleanwater.org/community-calendar/. A secondary goal in maintaining the Community Calendar is to increase traffic to, and use of, the CCCWP website and its information resources to increase awareness of stormwater quality and pollution prevention practices.
- **Volunteer Field Monitoring Equipment Maintenance Support** – CCCWP budgets for an annual contribution of $1,000 to maintain field monitoring equipment used by creek groups and volunteer field monitors. This equipment is housed by the CCC Department of Conservation and Development.

C.7.e - Watershed Stewardship Collaborative Efforts

- **Contra Costa Watershed Forum (CCWF)** – CCCWP staff attends and participates in CCWF meetings, an open committee of some 50 organizations, including state and local agencies, local non-profit environmental and education organizations, community volunteer groups, and private citizens. The CCWF

operates on the premise that actions in a watershed are inter-related, and that broad participation and cooperation is needed to effect change. Concerned with urban, suburban, and rural areas in the San Francisco Bay Delta area, the CCWF facilitates local agency and citizen collaboration, fosters innovative strategies for stewardship and protection of watershed resources, and encourages regional capacity building in Contra Costa and neighboring areas. The CCCWP uses the CCWF as a primary venue for regular community updates about the Contra Costa Watersheds SWRP and stakeholder education and engagement throughout the planning process.

- **Green Business Program** – CCCWP continued to provide staff support and financial assistance to the GBP to help with its outreach activities to the business community, including the certification and recertification of Green Businesses. CCCWP continues to be a major contributor to the GBP. Strategic meetings are held quarterly. For more details on the GBP, see Section 4 of this Volume 1 report.
- **CCCWP Community Calendar** - Refer to Section C.7.d for information on this program.

C.7.f - School Age Children

This provision requires Permittees to individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed messages in school-age children. In FY 2019/20, the Contra Costa Permittees, individually and collectively, implemented several youth-oriented outreach programs, which are discussed below:

- **Social Marketing** – CCCWP's youth outreach campaign targeted Contra Costa County youth residents with a special focus on positive behavior change and ran from May 26, 2020 to June 16, 2020. The campaign's messages focused on how the individual's positive actions can help protect nature. The campaign utilized Instagram to reach the target audience. Overall, the Youth Outreach campaign helped increase Instagram followers to 115 and increased our age 13-17 audience. By testing multiple creative assets, Sagent found the youth demographic resonates better with peaceful landscapes compared to pictures with people in them. As

Sagent continues to develop original content, they will provide a mixture of content to adhere to the CCCWP pages' various demographic.

- **OPP Grant & Mr. Funnelhead** – The OPP strives to reach across all age groups, but places particular emphasis on youth for two reasons: (1) teaching positive behaviors to young children early can result in the behavior being a part of their daily lives; and (2) children can influence behavior change in their parents and other adults. Several Contra Costa Permittees provided their allocation of OPP grant funds to the CCCWP for implementation of an ongoing, countywide comprehensive effort in FY 2019/20. There are several components of the OPP: 1) certifying and recertifying used-oil recycling centers throughout the County; 2) providing educational programs targeted to elementary schools throughout the County; 3) providing outreach at community events countywide; 4) providing programming to educate and entertain people about the importance of recycling used motor oil; and, 5) providing outreach through a cable advertising component. A "Mr. Funnelhead" website exists as an additional outreach tool at www.funnelhead.com. A summary of OPP activities are reported below:

  Used Oil Collection Center Certification - There are now a total of 78 certified oil collection sites in CCC. In FY 2019/20 there were 1,140 used filters (up and 4,344 gallons of oil recycled.

  "The Filter Crush" - During FY 2019/20, the CCCWP's Used Oil Recycling Program continued to air Public Service Announcements (PSAs) entitled "The Filter Crush" in English and Spanish on Comcast Spotlight. These pieces were done in cooperation with the West Contra Costa Integrated Waste Management Authority (also known as RecycleMore). They focused on oil filter recycling and featured Ruby Lopez, a bilingual Spanish-speaking professional actress who has worked throughout the Bay Area. In the PSAs, Lopez plays an auto mechanic showing how much oil can be left in an oil filter after draining, followed by a shot of an oil filter being crushed in a clear filter crusher to show the amount of residual oil. These PSAs can be seen at: Spanish - https://youtu.be/6-L0OjJ4u9U; English - https://youtu.be/BulmUlfSvxQ.

Mr. Funnelhead - Matt Bolender is CCCWP's OPP Grant consultant, using the Mr. Funnelhead character to provide educational outreach. Now in its 22nd year, the Mr. Funnelhead School Education Program visited 13 schools educating 3,940 students about the importance of used oil and filter recycling. When in-school programs and outreach events were delayed due to COVID-19, Matt Bolender focused on updating and revising the Mr. Funnelhead website. The premise of this years show involved several actors. Dr. Pickle, a nutty professor type, ends up touching used motor oil and turning into Mr. Slime, a villain of sorts. Mr. Slime then turns the robot into a polluting menace until Mr. Funnelhead and the students save the day by turning the robot back into a recycling robot. With professional actors, lighting and sound the show has been the most talked about and memorable part of the program. This year's performances can be viewed at: https://youtu.be/iYMm3uHULnc and https://youtu.be/IdLubPSpyDY.

Additional Outreach - Another highlight of the program was outreach to children and adults about the recycling of used motor oil and filters with use of a diorama/biosphere. With flowing water and plenty of figurines children were captivated by its unique focus on the recycling of used motor oil and filters. Over the past 9 years OPP has created several stories to intrigue and infuse with information children between the age of 4-80 years of age about the importance of recycling of used motor oil and filters. This year the program educated 1,460 children and adults about this important subject. There was a decrease in persons educated due to COVID-19 and the cancelation of many events.

Annual Art Contest - Mr. Funnelhead also holds an annual art contest where children incorporate Mr. Funnelhead into their own message about recycling used oil. To see this year's contest winners and their artwork, visit http://www.funnelhead.com. Prizes are given to the top three artists.

- **CCCWP Watershed Diorama** - The CCCWP's Watershed Diorama is provided to, and used by, Contra Costa Permittees and stakeholder organizations for youth-education programs and various public outreach events. The Watershed Diorama is a hands-on model which shows how rain becomes stormwater runoff carrying dirt, garbage, and other pollutants found in the urban environment into storm drains, which flow untreated to local creeks, the Delta, and the Bay. In FY 2019/20, the diorama was reserved for three events as follows, however two events were cancelled due to COVID-19:

Table 7-1: Watershed Diorama Use

Use Date	Entity	Event
8/15/19	CCC Flood Control	Outreach
4/5/20	City of Oakley	Cancelled
4/15-20/20	City of Danville	Cancelled

C.7 COVID-19 Impacts

Provision C.7.a. requires a survey of storm drain inlet markers and certification that 80% of inlets are legibly marked with a pollution prevention message. However, field work increases the risk of person-to-person contact and survey protocols had to be modified. Additionally, field staff have had limited availability due to requirements for staffing essential operations. After an initial disruption of work, Permittees have resumed surveys with use of appropriate protective measures, such as social distancing and use of face masks, and have reported on surveys completed in FY 2019/20. Storm drain surveys planned for FY 2019/20 that were not completed have been added to the FY 2020/21 lists.

Provisions C.7.b-g. require in-person outreach events, citizen involvement events, school age children outreach, and paid media campaign bus advertisements via individual or collective outreach events. However, in person outreach increases the risk of person-to-person contact and did not comply with the shelter-in-place order or person protective

protocols. Outreach staff had limited availability in the March – June 2020 timeframe due to requirements to conduct only essential operations and work from home orders. However, Bring Back the Natives Garden Tour was held as a virtual, online tour. The paid media campaign bus advertisements ran on three bus lines in Contra Costa County in May and June. Permittees continued to provide outreach materials on the CCCWP website, radio, and internet, as well as through a variety of City publications. In-person events have resumed as much as possible with the use of appropriate protective measures, such as social distancing and use of face masks. When in-school programs and outreach events were delayed due to COVID-19, Matt Bolender focused on updating and revising the Mr. Funnelhead website (www.funnelhead.com). Additionally, programs have been/are being planned using online platforms for outreach to school age children.

Provisions C.7/C.11.e./C.12.h. require Fish Risk Reduction signs, brochures and poster distribution as an ongoing risk reduction program to address public health impacts of mercury and PCBs in SF Bay/Delta fish. However, in person outreach increases the risk of person-to-person contact and did not comply with the shelter-in-place order. Outreach staff had limited availability in the March – June 2020 timeframe due to requirements to conduct only essential operations and work from home orders. Because of these conditions, the fish risk flyer and sign distribution was delayed from early spring and completed in July 2020, so this MRP provision was still met.

FY 2020/21 Planned Activities

- Increase awareness of and expand partnership with Friend of the Creek organizations and clean-up events with shared calendars, social media posts, e-mail blasts.
- Use expanded social media to promote involvement at events.
- Increase awareness of the Bringing Back the Natives Garden Tour partnership including program ad and recognition.
- Continue to generate awareness and participate in the Mr. Funnelhead Program targeting Oil Recycling messaging.

- Expand partnerships with Kids for the Bay which offers in-school materials that are aligned with Next Generation Science Standards and the Common Core Curriculum, encourage parent participation, and also meets Watershed Requirements.
- Provide less/non-toxic info to use in the home and home garden as well as no-till gardening (which does not require herbicides) distributed through website, e-newsletter, social media, and any approved long-form outreach materials.
- Tag garden societies and nurseries with less/non-toxic information posted to social media about no-till gardening which does not require herbicides) for no-cost message sharing and potential to grow social audience.
- Create a series of recorded Zoom videos, hosting a subject-matter expert partner having conversations about various clean water topics.
- Create organic content focusing on partners and linking to their websites.
- Local virtual panel events for Contra Costa County.
- Create video for youth outreach program and utilize youth focused partners.
- Create multi-functioning :15 & :30 videos to raise awareness of stormwater targeted to school-aged children.
- Classroom speakers through online video platform.
- Social media campaign targeting school-aged children on Instagram, Facebook, and YouTube.
- Virtual workshop/event hosted with partner.
- Social competition for students to showcase their local watershed knowledge.
- Action-based outreach activity to post on social media.

SECTION 8 – PROVISION C.8 WATER QUALITY MONITORING

Introduction

Reporting on implementation of the Provision C.8 Water Quality Monitoring requirements is provided in the *Urban Creeks Monitoring Report, Water Year 2019* (2019 UCMR) submitted to the SFBRWQCB and CVRWQCB on March 31, 2020. The 2019 UCMR is a section of the 5-year Integrated Monitoring Report for Water Years 2014 – 2019. This report is available at https://www.cccleanwater.org/resources/reports.

Provision C.8.h.iv requires a POC Monitoring Report due October 15, 2020. The POC report will describe the planned allocation of sampling effort for POC monitoring for the forthcoming Water Year 2021 beginning October 1, 2020, and what was accomplished for POC monitoring during WY 2020 (October 1, 2019 to September 30, 2020).

Pyrethroid pesticide and toxicity monitoring conducted in compliance with Provision C.8.g fulfills requirements of the Central Valley Water Boards TMDL for Pyrethroid Pesticides, applicable to East County Permittees (the Cities of Antioch, Brentwood, and Oakley, and portions of unincorporated County and the Flood Control District locates within Region 5). In August 2020, CCCWP submitted a letter to the Central Valley Water Board documenting that Pyrethroid pesticide and toxicity monitoring conducted by CCCWP since 2012 fulfills the monitoring requirements Central Valley Water Board has established for municipal stormwater dischargers (Attachment 8.1).

C.8 COVID-19 Impacts

Provisions C.8.d., f., and g. require creek status, pollutant of concern, and pesticides and toxicity monitoring to assess the chemical, physical and biological impacts of urban runoff on receiving waters. However, field work increases the risk of person-to-person contact and work was delayed for a period of time. Additionally, field staff have had limited availability due to requirements for essential operations. For FY 2019/20 the biological assessments were completed. Temperature, dissolved oxygen, and pH instrumentation installations were delayed from originally planned installation times, but were installed during FY 2019/20 and data was available to complete required monitoring reports.

Although delayed, all C.8 MRP requirements for water year 2020 have been met, or are on schedule for completion by the end of the calendar year.

SECTION 9 – PROVISION C.9 PESTICIDES TOXICITY CONTROLS

Introduction

BASMAA and CCCWP staff, consultants and MOC members provided the following assistance to Contra Costa Permittees' efforts to reduce pesticide toxicity in local creeks during FY 2019/20:

- Tracking and participating in pesticide regulatory initiatives;
- Promoting opportunities for training events for municipal employees and contractors on IPM and similar programs;
- Providing outreach to residents and the general public on less-toxic pesticides and proper pesticide use and disposal; and
- Coordinating with, and reporting to, the CCC Agricultural Commissioner on improper pesticide use.

FY 2019/20 Accomplishments

CCCWP's MOC provides a forum for Contra Costa Permittees to share information on common issues and lessons learned related to reducing pesticide toxicity in the County's urban creeks. A summary review of activities conducted as a Group Activity is provided below.

<u>C.9.b - Train Municipal Employees on IPM Practices</u>

CCCWP did not sponsor workshops for municipal staff and their contracted employees during FY 2019/20. However, throughout the FY, CCCWP notified Permittees about IPM trainings being conducted in the Bay Area and recommended that if Contra Costa Permittees have municipal staff that apply or use pesticides and need training, to sign up for these workshops.

C.9.d - Interface with CCC Agricultural Commissioner

During FY 2019/20, at the June MOC meeting, Karen Adler from the Contra Costa County Department of Agriculture presented *Regulating Fipronil in Surface Water Runoff: Case Study of a Pest Control Business Violation*. Ms. Adler discussed the role of the Department of Agriculture, background information on surface water restrictions, review of fipronil concerns, fipronil label changes, and fipronil use in structural pest control.

CCCWP contacted Deputy Larry Yost and Biologist Beth Slate to inquire as to whether there had been any reports of improper pesticide usage that occurred in FY 2019/20. It was reported that there had been one violations of pesticide use affecting stormwater, as discussed in Karen Adler's presentation, described above.

C.9.e - Public Outreach

- Point of Purchase Outreach: The CCCWP funds and participates in the OWOW Program, which provides educational outreach directly to the consumer/user at the point of purchase (i.e., in the store). The OWOW Program is implemented both regionally and locally. Further details regarding regional implementation of the OWOW Program are provided in the BASMAA's *Annual Reporting for FY 2018-2019, Regional Supplement for Training and Outreach,* submitted separately by BASMAA on behalf of Contra Costa Permittees.

  Locally, the CCCWP distributes OWOW educational literature in stores for customers and classes/presentations for the public at community events. CCCWP staff promotes OWOW through its website and direct interactions with citizens, schools, and businesses. In addition, many Contra Costa Permittees provide educational flyers at their city of county offices (public counters). A total of 33 Contra Costa stores participated in the OWOW Program in FY 2019/20. All 33 stores were set up with literature racks, fact sheets, and shelf talkers.

  One of OWOW's primary outreach tools is to set up a table where they can promote eco-friendly products, answer customer questions and work with them in the aisle

on product choices. This is a chance to reach customers at point-of-purchase. They also set up tables at community events to introduce the OWOW program to a broader audience, promote eco-friendly methods and products, and explain how the fact sheets and shelf talkers can help in product selection. This year, Spring events were cancelled with the shelter-in-place order, so OWOW has been working on developing a series of on-line classes to stay in touch with the public and the store customers. OWOW participated in many Trade Shows in FY 2019/20. Additionally, two new fact sheets were completed: *Protect Your Garden from Gophers, Moles and Voles* and *Keep Bed Bugs Out of Your Home*. These new sheets will start going into stores this summer.

- Store Staff Training: Training on the OWOW Program was provided to staff at 8 key stores in FY 2019/20. There were 68 staff trained at formal training events and over 65 staff were trained in-aisle during informal mentoring visits. Trainings included information on:
    - Pesticide pollution and impacts on water quality through storm drains and sewers; pesticides of particular concern; how and where to dispose of pesticide products no longer wanted.
    - How to identify common beneficials and pests; planting to attract beneficials; new/invasive pests/diseases to watch for.
    - Benefits of organic fertilizers, compost and mulch; nutrient run-off; chemical salt buildup from fertilizers; the importance of building up the soil foodweb.
    - Techniques for managing specific pest problems and the eco-friendly products they carry for these pests; active ingredients and how eco-friendly products work.
    - Tips for working with customers on how to choose and use products.
    - How to find and use on-line resources, including the OWOW ‘Ask the Expert’ feature and the UC IPM website.

  Each training participant received a packet of information and resources, including:

    - An Introduction to the OWOW Store Partnership Program

- IPM Basics
- Reading a Pesticide Label
- How Less-Toxic Products Work
- *Ten Tips for Water-Wise Gardening*
- Applying Beneficial Nematodes
- Laminated Good Bug/Bad Bug Identification
- Lose Your Lawn the Bay-Friendly Way (sheet mulching instructions for lawn reduction projects)
- Monthly Pest-At-A-Glance Calendar
- *Pests Bugging You* Pocket Guide
- *10 Most Wanted Bugs in Your Garden* brochure
- Samples of some of the fact sheets
- Additional pest management information sheets on: citrus leaf miner, codling moth, dormant spraying, whitefly, beneficial nematodes, and bed bugs
- OWOW Resources (websites, books, and the location of local Household Hazardous Waste Collection Sites.)

Trainees also receive pre- and post-training surveys to determine effectiveness of training on the connection of pesticides to water quality and proper disposal of pesticides.

- Increased Involvement/Interest: One of the most significant changes in FY 2019/20 was the increase in the number of eco-friendly products on shelves. Given the on-going concerns about glyphosate, this is especially true in the area of herbicides. Almost all stores now carry at least one eco-friendly herbicide. There are several new products for rats, mice and voles which tie in with our new fact sheet. Choices in organic fertilizers have also continued to grow. For additional information on this year's OWOW activities, see Attachment 9.1.

- Pest Control Contracting Outreach: In FY 2019/20, CCCWP continued its pesticide reduction campaigns from previous years and continued to promote the Pesticides Linger website (https://www.cccleanwater.org/pesticideslinger/). The site encourages CCC residents who contract for pest control services to hire eco-certified Pest Control Operators (PCOs) who practice environmentally sound pest management practices.

- Outreach to PCOs: CCCWP performs outreach to PCOs by mailing PCOs a letter and flyer and encouraging them to attend the annual Pesticide Applicators Professional Association (PAPA) seminar held in Contra Costa County. The FY 2019/20 seminar was canceled due to the pandemic and PCOs are being notified of the now-available webinar-based trainings.

C.9.f - Track and Participate in Relevant Regulatory Processes

In recent FYs, the CCCWP, along with other BASMAA members and stormwater programs statewide, invested considerable efforts in tracking and participating in the USEPA and Department of Pesticide Regulation actions related to urban uses of pesticides to reduce the amount of toxic pesticides impacting urban waterways. The most recent efforts in this area may be found in CASQA's *Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020* submitted separately by BASMAA on behalf of Contra Costa Permittees.

C.9 COVID-19 Impacts

Provision C.9.b. requires Permittees to ensure all municipal employees who apply or use pesticides are trained in IPM. Due to the risk of person-to-person contact, the regional training seminars typically attended by pesticide applicators were canceled. Training in IPM has resumed virtually for FY 2020/21.

Provision C.9.e. requires Permittees to conduct outreach to consumers at the point of purchase. Due to Health Order restrictions, many businesses have had limited hours and staffing or have been closed. Outreach staff had limited availability due to requirements for essential operations and work-stop orders. Outreach events have resumed as much

as possible with the use of appropriate protective measures, such as social distancing and use of face masks, and the Program is reporting on outreach that was still able to be conducted earlier in FY 2019/20. Additionally, Permittees have continued to design outreach materials. This provision's requirements were met, at a slightly reduced level due to business closures in the Spring.

FY 2020/21 Planned Activities

Planned activities for FY 2020/21 may include:

- In conjunction with the MOC, determining if training of municipal employees and their contractors on landscape and/or structural IPM should be conducted by CCCWP or left to the individual Contra Costa Permittees;
- Continuing to support BASMAA and CCCWP's OWOW Programs; continuing to track and participate in relevant pesticide-related regulatory processes and initiatives through BASMAA and CASQA;
- Continuing to provide outreach to PCOs by promoting PAPA seminars held in CCC or identifying other meaningful ways to promote IPM to PCOs;
- Continuing to interface with County Agricultural Commissioners; and
- Continuing to evaluate effectiveness of implementation of pesticide source control actions.

SECTION 10 – PROVISION C.10 TRASH LOAD REDUCTION

Introduction

In FY 2019/20, CCCWP directed its efforts to address Provision C.10 requirements in four areas to assist Permittees in meeting their trash load reduction requirements. These efforts included assisting Contra Costa Permittees with implementing and reporting on the Receiving Water Monitoring Program Plan; participating in the regional and statewide efforts on trash-related issues affecting stormwater; continuing to coordinate efforts with Caltrans to identify mutually beneficial projects that reduce trash loads; and communications with Regional Water Board staff regarding MRP 3.0 trash provisions. CCCWP also advised Permittees regarding mapping of drainage from private lands. A link to the countywide maps showing trash generation rates and the full trash capture drainage areas can be found here: http://cccwp.maps.arcgis.com/apps/webappviewer/index.html?id=d1f1446a5d044b938985d70cf3a9b685

FY 2019/20 Accomplishments

C.10.b.v - Implementation of a Receiving Water Monitoring Program Plan for Trash

Provision C.10.b.v of MRP 2.0 required Permittees to develop and test a receiving water trash monitoring program plan. The Bay Area Stormwater Management Agencies Association submitted a Final Trash Monitoring Plan, that addressed all comments received by Regional Water Board staff, in October 2017. Implementation of the Trash Monitoring Plan, initiated in October 2017, represents the “pilot-testing phase” of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were evaluated in the field between October 2017 to July 2020. The specific goals of the Trash Monitoring Plan, developed through the stakeholder engagement process, include:

- Informs management decisions;
- Accounts for different stream and channel types, and considers temporal variability (e.g., to estimate baseline conditions and show change over time) and seasonality;
- Can assess trends over time;

- Helps to assess if the Permittees' trash reduction efforts are resulting in improvement;
- Allows for comparison of trash levels between sites (understand the range of levels of impact);
- Assists in determining relative contributions from different pathways (i.e., wind, illegal dumping, illegal encampments, MS4s);
- Leverages and exhibits consistency with existing monitoring efforts and other water quality monitoring programs, including direct discharge offset provisions (MRP Provision C.10.e); and
- Cost-effective, efficient and feasible (e.g., safe, access to sample locations, can be implemented by volunteer monitoring groups).
- Project goals were used to guide the development of scientific monitoring questions that informed the study design and selection of methodologies used during the pilot-testing phase of the Trash Monitoring Plan.

The Trash Monitoring Plan primarily focused on two types of monitoring designs:

- Probabilistic Assessment Sites – Randomly selected monitoring sites that were previously established for BASMAA's Regional Monitoring Coalition (RMC) Creek Status Monitoring Program. These sites are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area.
- Targeted Monitoring Sites – Selected sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. Includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Regionally, a total of 125 urban creek, channel and riverine probabilistic sites were selected and qualitatively assessed for trash Bay Area-wide. Qualitative visual trash assessments were conducted at a total of 30 probabilistic sites in Contra Costa County.

In addition to conducting qualitative assessments at 30 probabilistic sites, CCCWP worked with its Permittees and its monitoring contractors to conduct quantitative monitoring at 19 targeted sites during the dry season (between May 1 and September 30). Prior to conducting quantitative monitoring, CCCWP had to secure encroachment permits and business licenses from the respective Permittees where necessary.

Key findings from the pilot-testing phase of the Trash Monitoring Plan include:

- Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both regional and countywide scale. The visual assessment tool is recommended as a valid approach to assess trash conditions for most creeks/channel sites.
- Regionwide, approximately 77% of the urban stream lengths in the MRP Area exhibit low to moderate levels of trash.
- Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
- Seasonality appears to have little to moderate effects on trash levels observed/measured at receiving water sites. Storm intensity and frequency does appear to have an influence on trash levels observed during the wet season.
- Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with largest proportion of trash observed.

The *Final Report* was submitted to the SFBRWQCB prior to the July 1, 2020 deadline, and can be found as Attachment 10.1 to this report.

<u>Participating in the BASMAA Trash Subcommittees and Statewide Efforts</u>

CCCWP staff participate in the BASMAA Trash Subcommittee and MRP 3.0 Workgroup. CCCWP staff is participating in the Ocean Protection Council's *Statewide Trash Monitoring Methods Project* being conducted in collaboration with the State Water Board, the San Francisco Estuary Institute, and the Southern California Coastal Water Research

Project. CCCWP is a stakeholder in this endeavor and will be attending future stakeholder meetings as they occur.

Coordinating Trash Reduction Efforts with Caltrans

In FY 2019/20, CCCWP continued to serve as a liaison between Caltrans and Contra Costa Permittees. CCCWP arranged for Caltrans to present at the January, March, and June 2020 Municipal Operation Committee Meetings and assisted Permittees with their communication of candidate projects they had identified that would benefit both Caltrans and their municipalities. CCCWP provided information to Permittees on the criteria that Caltrans required for candidate projects to qualify for assistance and identified factors that would help a project's overall ranking and what minimum information they should include with their project submittal. In FY 2019/20 several Contra Costa Permittees submitted potential collaborative projects with Caltrans, and worked to move forward on agreements.

C.10 COVID-19 Impacts

Provision C.10.a. requires Permittees to demonstrate compliance with trash Discharge Prohibitions through the timely implementation of control measures and other actions to reduce trash loads from their MS4. However, due to worker and public safety, many street sweeping programs were reduced or suspended in the March – June 2020 timeframe, including no-parking restrictions. Permittees normal practices were disrupted, including the state's suspension of bans on plastic bags. This change may increase the number of plastic bags seen on the ground, although with less people out walking and shopping there may not be a net difference in plastic bag litter. Permittees have resumed activities with the use of appropriate protective measures, such as social distancing and use of face masks, and have reported on activities completed in FY 2019/20.

MRP 2.0 requires Permittees to conduct on-land visual trash assessments (OVTAs) of each trash generation area where implementing trash management actions other than full trash capture. However, field work such as this, which includes walking along sidewalks or riding as a team in a vehicle, increases the risk of person-to-person contact and assessment protocols have had to be modified. Additionally, field staff have had

limited availability due to requirements for staffing emergency and essential operations. After an initial disruption in work, Permittees have resumed activities with use of appropriate protective measures, such as social distancing and use of face masks. Assessments during the pandemic may not be an accurate snapshot of average conditions due to modified behaviors and residents sheltering-in-place. Not all scheduled OVTAs were able to be completed during the fiscal year due to restrictions in March – June 2020, but Permittees have reported the results of OVTAs completed in FY 2019/20 and continue to find creative ways to conduct assessments.

MRP 2.0 allows Permittees to offset a percent reduction of their trash load percent reduction by conducting additional cleanup of creeks and shorelines if performed at least twice per year. However, field work increases the risk of person-to-person contact and cleanup protocols have had to be modified. Field staff have had limited availability due to requirements for staffing emergency operations as well as work-stop orders. Additionally, volunteer events after mid-March were canceled. Not all scheduled cleanups were able to be completed during FY 2019/20 but Permittee annual reports contain data on cleanups that were completed.

Trash hot spots in receiving waters are required to be cleaned annually. Similar to creek and shoreline cleanups, field work increases the risk of person-to-person contact and cleanup protocols have had to be modified. Field staff have had limited availability due to requirements for staffing essential operations as well as work-stop orders. Additionally, volunteer events after mid-March were canceled. Most, but not all, scheduled cleanups were able to be completed during FY 2019/20. Permittee annual reports contain data on cleanups that were completed. Additional cleanups may be performed in FY 2020/21 to make up for missed events.

FY 2020/21 Planned Activities

CCCWP staff and consultants will continue to coordinate and support Contra Costa Permittees in refining and implementing their *Long-Term Trash Load Reduction Plans* and meeting MRP 2.0 trash load reduction requirements, while also working to negotiate the terms of MRP 3.0. CCCWP staff will also continue to inquire about trash reduction

credits resulting from product bans, such as straws. Support will include further refinement, development and training of the countywide GIS Platform and associated applications; continued involvement in the BASMAA Trash Committee and stakeholder meetings from the Ocean Protection Council; and exploring project and funding opportunities with Caltrans.

SECTION 11 – PROVISION C.11 MERCURY AND METHYLMERCURY CONTROL PROGRAM

Introduction and Overview of Countywide Implementation of Two TMDLs

Provision C.11 of the MRP Implements the TMDL for Mercury in San Francisco Bay, applicable to Permittees located within Region 2[11]. Provision C.16.5.h implements the TMDL for Mercury and Methylmercury in the Sacramento San Joaquin River Delta, applicable to East County Permittees located within Region 5. CCCWP coordinates mercury monitoring, reporting of control measures, and assessing effectiveness on a Countywide level to be responsive to both applicable TMDLs and associated permit provisions.

MRP Provision C.11 requires that the Permittees implement a mercury control program including source control, treatment control, and pollution prevention actions to make substantial progress toward achieving the urban runoff mercury load allocations established for the TMDL.

The TMDL implementation plan calls for attainment of the urban runoff load reduction goals by February 2028. Mercury TMDL compliance can be demonstrated through three different approaches[12]:

1. Show that mercury concentrations in suspended sediments discharged by urban stormwater are below 0.2 milligrams per kilogram (mg/kg) (i.e., monitoring-based compliance demonstration using grab and / or composite sampling to measure mercury and suspended sediment concentrations).

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[11] Permittees located in Region 2 (the San Francisco Bay Basin) include the Cities of Clayton, Pittsburg, Concord, Martinez, Pleasant Hill, Walnut Creek, San Ramon, Lafayette, Orinda, El Cerrito, Richmond, San Pablo, Pinole, Hercules, the Towns of Danville and Moraga, and portions of unincorporated Contra Costa County and the Flood Control District. The Cities of Brentwood, Antioch, or Oakley, and portions of unincorporated County and the Flood Control District (known as East County permittees) are located in Region 5, (the Central Valley Basin).

[12] See Order No. R2-2015-0049 as amended, Attachment A (Fact Sheet) Page A-105 for definition of three pathways to comply with the San Francisco Bay Mercury TMDL

2. Show attainment of the WLA as a rolling 5-year average (i.e., through monitoring flows and event mean mercury concentrations, combined with numeric modeling applied to unmonitored storms).
3. Demonstrate the required load reductions can be achieved over time by a program of source control and treatment measures, with quantitative evidence of the load reduction benefits of control measures applied.

CCCWP Permittees in Region 2 are pursuing the third pathway for compliance with the San Francisco Bay Mercury TMDL. The Implementation Plan, Schedule, and Reasonable Assurance Analysis for Achieving PCBs and Mercury Total Maximum Daily Load (TMDL) Load Reduction Goals (TMDL Implementation Report) is included with the description of PCB Control Measures as Attachment 12.1 and discussed in more detail in Section C.12.d below. The waste load allocation (WLA) applicable to urban runoff discharges from CCCWP Permittees in Region 2 is 11 kg/yr. The TMDL Implementation Report (Attachment 12.1) parses the 11 kg/yr WLA into a load reduction goal that focuses on MRP areas where Permittees will implement mercury control measures.

East County Permittees completed and submitted a Methylmercury Control Study Report to the Central Valley Water Quality Control Board in FY 2018/19. That report established the requirements of MRP Provision C.16.5.h when Order No. R2-2019-0004 amended the MRP to include East County Permittees. Accomplishments under Provision C.16.5.h are described separately in Section C.16.5 below (Central Valley Provisions Applicable to East County Permittees).

CCCWP Permittees are developing a coordinated Countywide approach to implementing both the Region 2 Mercury TMDL and the Region 5 Methylmercury TMDL. Both TMDLs result in control measures focused on pollution prevention, source control, and long-term implementation of green stormwater infrastructure through development, and redevelopment, with some incremental contribution from public projects as funding and planning constraints allow.

FY2019/20 Accomplishments

C.11.a - Implement Control Measures to Achieve Mercury Load Reductions

MRP 2.0 Provisions C.11.a.iii.(2) and C.12.a.iii.(2) require reporting a list of the Watershed Management Areas where mercury and PCBs control measures are currently being implemented and those in which new control measures will be or have the potential to be implemented during the term of this permit, along with the specific control measures and an implementation schedule. Although many of the control measures may be selected primarily for the purpose of achieving PCBs load reductions during this permit term, substantial mercury load reductions may result as a tangential benefit and will be accounted for in tracking mercury load reductions. A *Mercury and PCBs Watershed/Management Areas*, *Control Measures, and Load Reduction – Update 2020* report (WMA report) was prepared by the CCCWP to fulfill the requirement of MRP Provision C.11.a.iii.(3) and C.12.a.iii.(3) for updating the list of control measures reported annually as necessary to account for new control measures. This WMA report is provided as Attachment 12.2 and summarized in Section 12 below under provision C.12.a.

C.11.b - Assess Mercury Load Reductions from Stormwater

MRP Provision C.11.b and C.12.b require the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures. These provisions also require the Permittees to submit, in 2018 and subsequent Annual Reports, refinements to the mercury and PCBs load reduction assessment methodology to assess load reductions in the next permit term. Those refinements are documented in the BASMAA Source Control Load Reduction Accounting for Reasonable Assurance Analysis Report, Appendix B of Attachment 12.1 (the TMDL Implementation Report). The load reduction methodology applied to data on control measures is used to report mercury load reductions by WMA in Attachment 12.2 (the WMA Report).

C.11.c - Plan and Implement GI to Reduce Mercury Loads

Provision C.11.c requires Contra Costa Permittees located in Region 2 to implement GI projects sufficient to collectively achieve a “mercury loads reduction performance criteria” of 9 g/yr by 2020. This has been achieved and documented in Attachment 12.2 (the WMA Report). Provision C.11.c further require a demonstration of the amount of mercury that will be reduced by GI by the years 2030 and 2040. That requirement is fulfilled by The Clean Water Program Reasonable Assurance Analysis Report (RAA Report, Appendix A of the Attachment 12.1, the TMDL Implementation Report). Finally, Provision C.12.c requires a demonstration that all MRP Permittees collectively will attain 10 kg per year mercury load reductions via GI by the year 2040. The RAA Report documents the extent and cost of GI that would be required to achieve the proportion of that regional goal that would be applicable to Contra Costa Permittees located in Region 2.

C.11.d - Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

MRP Provision C.11.d requires the Permittees to prepare a plan and schedule for mercury control measure implementation and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL WLAs by 2028. The TMDL Implementation Report (Attachment 12.1) and RAA Report (appendix A to Attachment 12.1) fulfills this requirement.

C.11.e - Implement a Risk Reduction Program

Refer to Section C.12.h for information on implementation actions related to this permit requirement.

SECTION 12 – PROVISION C.12 POLYCHLORINATED BIPHENYLS CONTROLS

Introduction

MRP Provision C.12 implements the urban runoff requirements of the San Francisco Bay PCBs TMDL. It requires the Permittees located in Region 2 to implement a control program for PCBs that includes source control, treatment control, and pollution prevention control measures where benefits are most likely to accrue (i.e., focused implementation). East County Permittees are exempt from Provision MRP C.12. The San Francisco Bay PCBs TMDL's urban runoff WLA for CCC is 0.3 kg/yr. The TMDL Implementation Report (Attachment 12.1) parses this WLA into a load reduction goal that focuses on MRP areas where Permittees will implement PCB control measures.

FY 2019/20 Accomplishments

C.12.a - Implement Control Measures to Achieve PCBs Load Reductions

MRP Provision C.12.a., similar to Provision C.11.a., requires the Permittees to report the Watershed Management Areas where PCBs control measures are currently being implemented and where new control measures will be implemented during the term of this permit, the specific control measures, and an implementation schedule. The Permittees are required to update the list of control measures annually as needed.

A *Mercury and PCBs Watershed/Management Areas*, *Control Measures, and Load Reduction – Update 2020* report was prepared by the CCCWP to fulfill the requirement of MRP Provision C.11.a.iii.(3) and C.12.a.iii.(3) for updating the list of control measures reported annually as necessary to account for new control measures. This report is provided as Attachment 12.2.

Previous studies indicate that old industrial areas are the most likely land use type to contain high PCBs concentrations. CCCWP is continuing the source property identification process until all Old Industrial areas are screened and characterized for the likelihood of pollutant load removal and potential referral to the SFBRWQCB for further action. CCCWP has compiled the past decade of source property investigation data to develop a Conceptual Work Plan for Completing PCB Source Area Investigations

(Appendix C of Attachment 12.1). In FY 2019/20, CCCWP continued to use its GIS platform for data management and analysis determining actual and potential load reductions, and as a tracking and reporting tool for Provisions C.11 and C.12 implementation work.

MRP Provision C.12.a. also requires the Permittees to implement sufficient control measures to achieve the PCBs 0.56 kg/yr PCB load reductions by June 30, 2020. This represents the estimated share of the regional 3 kg/yr PCB load reduction performance standard. The regional performance standard of 3 kg/yr was achieved (Attachment 12.2, Table 2-6 and Figure 20-1).

C.12.b - Assess PCBs Load Reductions from Stormwater

MRP Provisions C.11.b and C.12.b. require the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures. Those requirements are fulfilled by the BASMAA Source Control Load Reduction Accounting for Reasonable Assurance Analysis Report, Appendix B of Attachment 12.1 (the TMDL Implementation Report). The load reduction methodology applied to data on control measures is used to report PCB load reductions by WMA in Attachment 12.2 (the WMA Report).

In FY 2015/16, the CCCWP began development of a countywide GIS pilot project focused on maintaining, analyzing, interpreting, displaying, and reporting relevant municipal stormwater program data and information related to Provisions C.10 (i.e., trash load reduction activities) and C.11/C.12 (i.e., mercury and PCBs source property identification and abatement screening activities). In FY 2016/17, the CCCWP worked with the ACCWP and its GIS consultant PSOMAS to expand the countywide GIS platform and create the GIS C.3 Project Tracking and Load Reduction Accounting Tool to support additional compliance activities related to: 1) C.3.b Regulated Projects reporting; 2) the C.3.j GI Planning and Implementation provisions; and, 3) the C.11 Mercury Controls and C.12 PCBs Controls provisions. In FY 2019/20 the CCCWP used the GIS C.3 Project Tracking

data and the Loads Accounting Report (Appendix B of Attachment 12.1) to estimate the loads reduced that are reported in Attachment 12.2 (the WMA Report).

This GIS tool helps Contra Costa Permittees identify WMAs where multiple-benefit control measure implementation opportunities have been identified and prioritized for implementation during this permit term and over the coming decades. Additionally, this GIS database is being used to track and map existing and future C.3 projects, allow ease of ongoing review of opportunities for incorporating GI into existing and planned Capital Improvement Projects, assist in the development of GI plans, and to report mercury and PCBs loads reduced.

C.12.c - Plan and Implement GI to Reduce PCBs Loads

C.12.c requires MRP Permittees to plan and implement GI sufficient to meet a performance criterion of 120g per year PCBs reduced by GI for all MRP Permittees collectively. Contra Costa Permittees are tracking private GI projects and implementing early action public GI projects to achieve the PCBs load reductions specified by performance criteria for GI. The regional performance standard of 120g/yr by GI was achieved collectively by all MRP Permittees (Attachment 12.2, Table 20-6). The TMDL Implementation Report includes a RAA of Permittee GI Plans that relates acres treated by GSI to loads reduced over time.

C.12.d - Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

MRP Provisions C.11.d and C.12.d require the Permittees to prepare a plan and schedule for mercury and PCBs control measure implementation and RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL WLAs by 2028 and the PCBs TMDL WLAs by 2030. This requirement is fulfilled by the TMDL Implementation Report (Attachment 12.1).

C.12.e - Evaluate PCBs Presence in Caulks/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way

The CCCWP participated in a BASMAA Regional Project to evaluate PCBs presence in caulks/sealants used in storm drains and roadway infrastructure, and to quantify the

potential PCB load reduction benefits that may result from public infrastructure improvements. The final project report was submitted with the CCCWP's 2017/18 Annual Report.

C.12.f - Manage PCB-Containing Material and Wastes During Building Demolition Activities so that PCBs do not Enter Municipal Storm Drains

MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 parts per million or greater in applicable structures[13] at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. A Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its FY 2016/17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.[14]

Contra Costa Permittees located in Region 2 were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

- The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition
- A method for identifying applicable structures prior to their demolition
- Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of

[13] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

[14] The City of Clayton provided acceptable evidence and is exempt from this provision.

applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff; and,

- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

BASMAA completed a regional project in March 2019 that assisted developing local programs to manage PCBs-containing materials during building demolition. The assistance included model ordinance language, guidance materials, tools and training materials and conducted outreach. Contra Costa Permittees began implementing the program on July 1, 2019. Building demolition data were gathered from Permittees with applicable structures and are included in the 2020 WMA Report (Attachment 12.2, Appendix B).

C.12.g - Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

MRP Provision C.12.g requires Permittees to conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. Provision C.12.g is being addressed through a multi-year project by the San Francisco Bay RMP to develop a series of conceptual models of PCBs in Priority Margin Units (PMU). The project is:

- Identifying margin units that are high priority for management and monitoring.
- Developing conceptual models and mass budgets for margin units downstream of watersheds where management actions will occur; and,
- Conducting monitoring in these units as a performance measure.

Four urban embayments along the Bay shoreline with management actions planned or ongoing to address PCBs in the upstream watersheds were initially selected as PMU for conceptual modeling:

- Emeryville Crescent (Alameda County)
- San Leandro Bay (Alameda County)
- Steinberger Slough (San Mateo County)
- Richmond Harbor (Contra Costa County)

The conceptual models are intended to provide a foundation for future monitoring to track responses to load reductions and may eventually help guide planning of management actions. The Richmond Harbor in Contra Costa County has not to date had any resources allocated for conceptual model development.

BASMAA representatives to the RMP will participate in the RMP PCBs Workgroup to help provide ongoing oversight of PMU conceptual model development and the related RMP Special Studies. CCCWP will communicate with the RMP PCBs Workgroup to encourage development of a conceptual model for the Richmond Harbor PMU.

C.12.h - Implement a Risk Reduction Program

The Contra Costa Permittees implement risk reduction activities to increase awareness of the risks of mercury and PCBs contamination when consuming fish caught in the San Francisco Bay/Delta:

- Kiosks and Pier Postings **–** The CCCWP works with the East Bay Regional Parks District to post, inspect, and maintain fish consumption warning signs at fishing piers and harbor/marina kiosks around CCC. CCCWP funds the replacement of signs which is necessary when signs are vandalized or when fish consumption information is updated.

- Point-of-purchase outreach at fishing supply stores – In FY 2019/20, the CCCWP continued to work with marinas and local fishing supply stores throughout the county to make fish consumption warning information available to the public through displaying multi-lingual signage and brochures.

- A report on the effectiveness of risk reduction activities is provided in Attachment 12.4.

SECTION 13 – PROVISION C.13 COPPER CONTROLS

Introduction

Under MRP 2.0, Contra Costa Permittees need to report on efforts to control copper discharges from architectural copper; from pools, spas, and fountains that contain copper-based compounds; and from industrial sources. A review of these efforts specific to the CCCWP is provided here. Copper control activities conducted at the local level are reported in the Individual Municipal Annual Reports compiled in Volume II of this Report.

Accomplishments

C.13.a - Architectural Copper

In FY 2015/16, CCCWP finalized and approved a public outreach flyer entitled *Requirements for Copper Roofs and Other Architectural Copper.* Contra Costa Permittees continue to make this flyer available to the public at permit counters. CCCWP also encourages Permittees to include the flyer with applicable building permits and to incorporate the BMPs as conditions of approval for any discretionary projects with architectural copper features.

C.13.b - Pools, Spas and Fountains

Since many of the larger community pools within CCC are included in the inventory of facilities that have the potential to have non-stormwater discharges, these facilities are inspected on a regular basis as required by Provision C.4. During the inspection process, stormwater inspectors convey the requirements for managing discharges from pools relative to stormwater and wastewater regulations. For this reason, CCCWP has not had to devote significant additional resources to address this potential source of copper.

On occasion, as part of the 1-800-No-Dumping Line or other complaint hotlines, municipal staff or their contracted stormwater inspectors have had to counsel residential owners of pools to instruct them on the proper procedure for discharging their pool water or cleaning of their filters. CCCWP has made available to municipal staff and their contracted inspectors a *Draining Pools and Spas* brochure to provide guidance to homeowners on managing their pool discharges.

C.13.c - Industrial Sources

The CCCWP has provided training to stormwater inspectors on industrial sources of copper. This training has been included in past annual C.4 commercial and industrial stormwater inspection workshops. As inspectors have been well-trained in this area, CCCWP has not had to devote significant resources to address these particular sources.

C.13 COVID-19 Impacts

Provision C.13 states that as part of the industrial inspections, inspectors shall ensure that proper BMPs are in place to minimize discharge of copper to storm drains. However, field work increases risk of person-to-person contact and inspection protocols have had to be modified. Additionally, many facilities that would have been part of the inspections were not open for a time period and facility managers were not present due to work from home mandates and other essential operations duties. After an initial disruption of work, Permittees have resumed inspections with use of appropriate protective measures, such as social distancing and use of face masks and have reported on inspections completed in FY 2019/20. Any facility inspections planned for FY 2019/20 that were not completed have been added to the FY 2020/21 inspection lists. Follow-up inspections were performed as soon as reasonable and following Health Order guidance for those requiring enforcement.

FY 2019/20 Planned Activities

CCCWP will continue to assist Permittees with meeting Copper Control requirements, and evaluating appropriate requirements for MRP 3.0. CCCWP will be working with Permittees to ensure they have established a robust procedure within their municipalities' planning and building departments to adequately address new potential sources of copper from architectural features and management of pools, spas, and fountains.

CCCWP is considering providing outreach to homeowners who have personal pools. For this task, CCCWP would work with Permittees to inventory residential pools and once inventoried, send outreach material to the pools owners to ensure they understand

maintenance, filter cleaning, and draining requirements relative to stormwater regulations.

CCCWP will continue to work with stormwater inspectors to address industrial sources of copper identified during inspections and ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains. It is anticipated that the FY 2020/21 stormwater inspector training required under Provision C.4 may include a refresher on how to identify POC including Copper and Mercury at industrial facilities and BMPS for controlling these pollutants and preventing their discharge to stormwater.

SECTION 14 – PROVISION C.15 EXEMPTED AND CONDITIONALLY EXEMPTED DISCHARGES

Introduction

As outlined in Section 2, the CCCWP's MOC is tasked with the review, development and coordination of any countywide and/or regional tasks conducted to assist Contra Costa Permittees with implementation of the mandates in Provision C.15. CCCWP resources on this provision continue to be minimal. One of the primary reasons for limited focus on this provision is that Contra Costa Permittees that are also water purveyors and used to report on their planned and unplanned drinking water discharges in their MRP Annual Reports are now reporting these discharges under their Statewide NPDES Permit for Drinking Water System Discharges (Order WQ 2014-0194-DWQ).

FY 2020/21 Planned Activities

In FY 2020/21, it is anticipated that Group Program activities related to Provision C.15 will continue to be minimal. CCCWP staff may work with Permittees to improve outreach to address potable water discharges to the MS4s arising from large-scale landscape irrigation projects. This outreach may include working more closely with Contra Costa Water District and East Bay Municipal Utility District. Other issues under this provision will be addressed as needed, including negotiations for MRP 3.0.

SECTION 15 – PROVISION C.16.5 PROVISIONS APPLICABLE TO EAST COUNTY PERMITTEES

Introduction

Provision C.16.5 was added to the MRP in January 2019 to include the Cities of Brentwood, Antioch and Oakley, and portions of Unincorporated County and the Flood Control District located in Water Quality Control Board Region 5 (East County Permittees), as dischargers named in the San Francisco Bay MRP. The provisions align the activities of East County Permittees with Permittees located in Region 2 and describes actions by East County Permittees necessary to implement TMDLs applicable in Region 5.

C.16.5.a - Green Infrastructure Planning and Implementation

This provision requires Development and Implementation of GI Plans. East County Permittees are required to have a GI framework approved by their governing bodies by December 31, 2019. Completed GI plans, including documentation of legal mechanisms for implementation, are due by December 31, 2020. East County Permittees self-certify these completion deadlines.

C.16.5.b - Inspections for Construction Site Control at Hillside Projects

This provision requires Inspections for construction site control on hillslope properties. East County Permittees are required to self-certify in their 2020 annual report the criteria it uses to determine hillslope development, including any maps or other written criteria.

C.16.5.c - Trash Load Reductions

This provision requires trash control plans. East County Permittees are required to self-certify 70 percent reductions in trash by December 31, 2019, or a report of non-compliance if unable to attain the 70 percent trash reduction.

C.16.5.d - Mercury Controls

This provision exempts East County Permittees from Provision C.11 (Mercury controls to implement the San Francisco Bay Mercury TMDL).

C.16.5.e - Polychlorinated Biphenyls Controls

This provision exempts East County Permittees from Provision C.12 (PCB controls to implement the San Francisco Bay PCBs TMDL).

C.16.5.f - Diazinon and Chlorpyrifos Controls

This provision requires East County Permittees to maintain WLAs for diazinon and chlorpyrifos. Practically, this means demonstrating the diazinon and chlorpyrifos water quality standards are not exceeded. In 2018 CCCWP transmitted a letter to the CVRWQCB providing monitoring data that documented exceedances of numeric water quality objectives for diazinon and chlorpyrifos have generally ceased since 2009. The letter is included as Attachment 15.1 to this report. CCCWP has ceased directly monitoring diazinon and chlorpyrifos because the products are no longer in general commercial use. CCCWP verifies that WLAs are maintained via toxicity screening using *Cerodaphnia dubia*, a species of water flea known to be sensitive to diazinon and chlorpyrifos.

C.16.5.g - Methylmercury Monitoring

This provision requires methylmercury monitoring with a minimum frequency of eight samples per year. CCCWP reports samples collected and future sample collection plans in the October 15 POC Report. Results are reported in the annual Urban Creeks Monitoring Report.

C.16.5.h - Delta Mercury Control Program

This provision requires actions to implement a Delta Methylmercury Control Program. The Methylmercury Control Program implements WLAs for methylmercury assigned to subareas of the Delta that receive stormwater discharges from East County Permittees: The West Delta Sub Area (receiving waters of East and West Antioch Creeks) is in attainment of it WLA of 3.2 grams per year. The Marsh Creek subarea appears to exceed its WLA of 0.3 grams per year. The CCCWP's Methylmercury Control Study Report provides evidence that attainment of the WLA for the Marsh Creek sub-area is technologically infeasible. In WY 2019/20 CCCWP responded to Central Valley Water

Board questions about the Methylmercury Control Study and revised the final study report in response to clarifications requested by the CVRWQCB. In June 2020 CCCWP submitted a Report of Waste Discharge that recommended specific permit language to implement the methylmercury TMDL. CCCWP anticipates working with the Central Valley Water Board staff to review the Delta Methylmercury TMDL and revise the WLAs and attainment schedule to reflect the results of the CCCWP Methylmercury Control Study.

Provision C.16.5.h includes specific control measures required by East County Permittees to implement the Delta Methylmercury Control Plan:

1) **Mercury collection and recycling.** Mercury Collection and Recycling. During FY 2019/20, the CCCWP continued to coordinate with Contra Costa Permittees and local household hazardous waste (HHW) collection facilities to implement mercury collection and recycling in accordance with MRP 1.0 and MRP 2.0 Provision C.16.5.h.(1). These efforts are only required to be reported for the East County Permittees. Delta Diablo serves East County Permittees. Contra Costa Permittees collect HHW at three regional facilities in the County:
    - Central Contra Costa Sanitary District
    - Delta Diablo
    - West County Wastewater District

    In addition to the above mercury collection activities, many municipally owned and maintained non-decorative streetlights in CCC have been and continue to be converted from mercury and/or high-pressure sodium vapor streetlights to Light Emitting Diode streetlights. The old fixtures included the high-pressure sodium vapor lamps (bulbs) at various wattage sizes. Each streetlamp is reported to have from 1 to 22 mg of mercury, with an average of 16 mg/bulb for a 100-Watt bulb. This streetlight replacement removing substantial amounts of mercury from the environment.

2) **Enhanced Municipal Management Practices to Reduce Sediment Discharges.** East County Permittees are required to list in their annual reports the

municipal maintenance activities used to minimize sediment discharged from urban stormwater.

3) **Public education and risk reduction.** East County Permittees are required to conduct ongoing public education about mercury pollution prevention and health guidance for reducing mercury risk from fish consumption. East County Permittees provide pollution prevention outreach through implementation of Provision C.7. Please see Section 12 describing the Fish Consumption Risk Reduction Effectiveness Assessment Report that fulfills this requirement for East County Permittees.

Attachment 1.1

Contra Costa Clean Water Program,

Staffing and Consultants/Contractors

Contra Costa Clean Water Program (CCCWP) Management Structure

Attachment 1.1

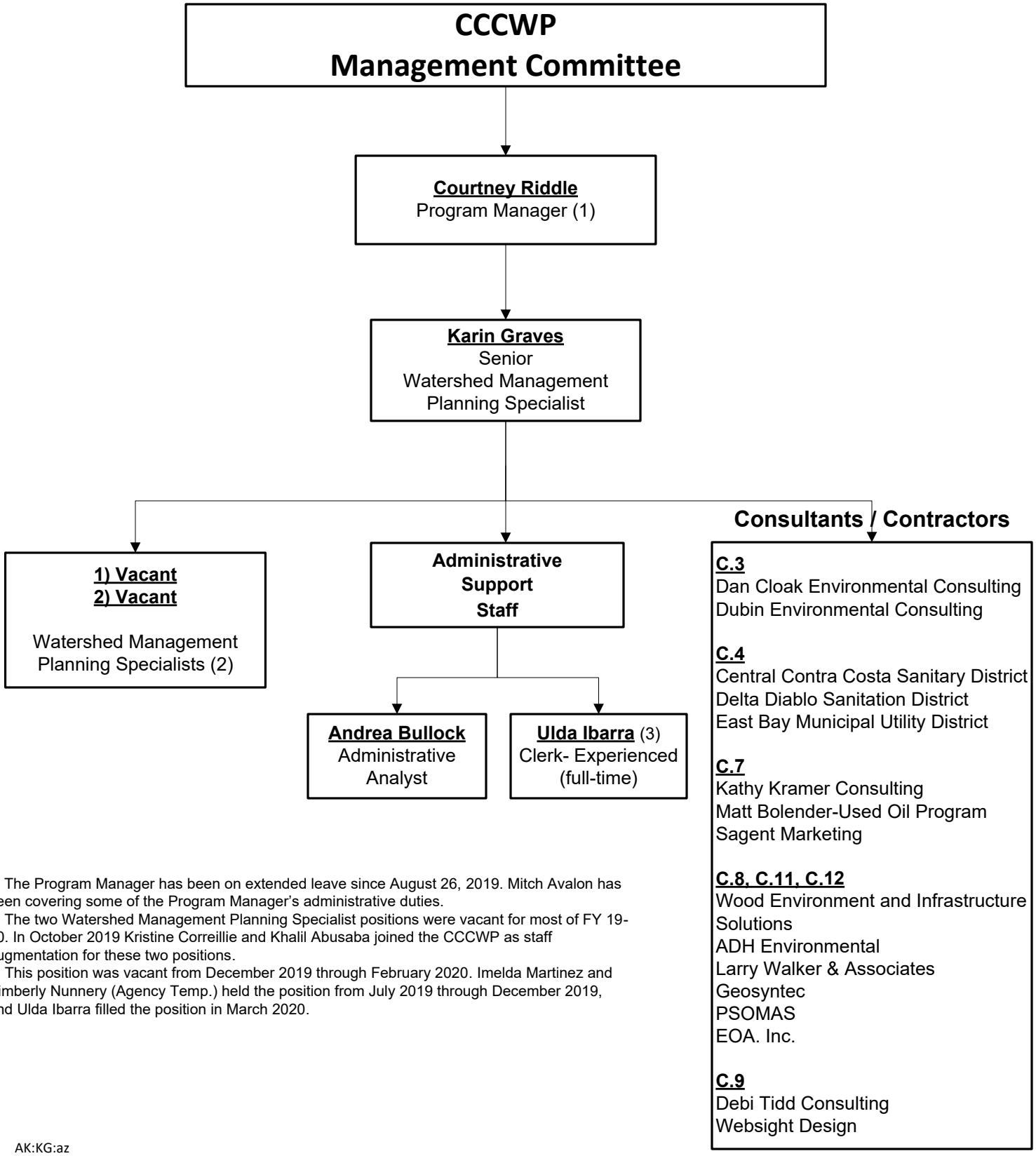

1. The Program Manager has been on extended leave since August 26, 2019. Mitch Avalon has been covering some of the Program Manager's administrative duties.
2. The two Watershed Management Planning Specialist positions were vacant for most of FY 19-20. In October 2019 Kristine Correillie and Khalil Abusaba joined the CCCWP as staff augmentation for these two positions.
3. This position was vacant from December 2019 through February 2020. Imelda Martinez and Kimberly Nunnery (Agency Temp.) held the position from July 2019 through December 2019, and Ulda Ibarra filled the position in March 2020.

AK:KG:az
G://GrpData/NPDES/Org Charts/CCCWP Program Management 19-20
Last Updated: July 28, 2020

Attachment 1.2

Contra Costa Clean Water Program,

Organizational Structure

CONTRA COSTA CLEAN WATER PROGRAM
ORGANIZATIONAL STRUCTURE

Attachment 1.2

Participants -- Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Contra Costa County, and Contra Costa County Flood Control & Water Conservation District

ADMINISTRATIVE COMMITTEE

DUTIES

- Administration
- Strategic Planning
- Personnel
- Budget
- Conflict Resolution

MANAGEMENT COMMITTEE

DUTIES

- Decision Making Body
- Strategic Planning
- Sets Policies / Directives
- Program Manager Evaluation
- Approves / Appropriates Budget

STAFF

Courtney Riddle, Program Manager*
Karin Graves, Senior Watershed Management Planning
Mitch Avalon, Program Consultant
Khalil Abusaba, Program Consultant
Kristine Corneillie, Program Consultant
Dan Cloak, Program Consultant
Vacant, Clerk – Experienced** Level
Andrea Bullock, Administrative Analyst

MONITORING COMMITTEE

DUTIES

- C.8 - Water Quality Monitoring
- C.9 - Pesticides Toxicity Control
- C.11 - Mercury Controls
- C.12 - Polychlorinated Biphenols (PCBs) Controls
- C.13 - Copper Controls
- C.14 - PBDEs, Legacy Pesticides and Selenium
- C.16.5 – East County Coordination

DEVELOPMENT COMMITTEE

DUTIES

- C.3 - New Development and Redevelopment
- C.3 – Green Infrastructure
- C.6 - Construction Site Control

PUBLIC INFORMATION / PARTICIPATION COMMITTEE

DUTIES

- C.7 - Public Information and Outreach
- C.9 Pesticides Toxicity Control

MUNICIPAL OPERATIONS COMMITTEE

DUTIES

- C.2 - Municipal Operations
- C.4 - Industrial and Commercial Site Controls
- C.5 - Illicit Discharge Detention and Elimination
- C.9 - Pesticides Toxicity Control
- C.10 - Trash Load Reduction
- C.15 - Exempted and Conditionally Exempted Discharges

BASMAA MONITORING / POC COMMITTEE

- Michele Mancuso (CCC)
- Amanda Booth (San Pablo)
- Lucile Paquette (Walnut Creek)
- Khalil Abusaba (CCCWP)

BASMAA DEVELOPMENT COMMITTEE

- John Steere (CCC)
- Amanda Booth (San Pablo)
- Phil Hoffmeister (Antioch)
- Frank Kennedy (Pinole)
- Dan Cloak (CCCWP)
- Karin Graves (CCCWP)

BASMAA PUBLIC INFORMATION / PARTICIPATION COMMITTEE

- Karin Graves (CCCWP)

BASMAA TRASH COMMITTEE

- Michele Mancuso (CCC)
- Becky Haworth/Amanda Booth (San Pablo)
- Lucile Paquette (Walnut Creek)
- Stephen Pree (El Cerrito)
- Kristine Corneillie (CCCWP)
- Dan Cloak (CCCWP)

BASMAA Board or Directors

- Karin Graves (CCCWP)

* Courtney Riddle has been on leave since August 2019
** The Clerk position was vacant December 2019 through March 2020

G:\NPDES\OrgCharts\CCCWP Org Structure 19-20

September 2, 2020

Attachment 1.3

Contra Costa Clean Water Program,

BASMAA and SFBRWQCB Committee Participation

CONTRA COSTA CLEAN WATER PROGRAM
MRP 3.0 BASMAA AND SFBRWQCB COMMITTEE PARTICIPATION

Attachment 1.3

Participants -- Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Contra Costa County, and Contra Costa County Flood Control & Water Conservation District

MRP 3.0 STEERING COMMITTEE

- Bruce Davis (Concord)
- Joanne Le (Richmond)
- Lucile Paquette (Walnut Creek)
- Amanda Booth (San Pablo)
- Michele Mancuso (County)
- Chris McCann/Bob Russell (Danville)
- Frank Kennedy (Moraga)
- Scott Alman (Clayton, Martinez)
- Mitra Abkenari (Concord)
- Neil Mock (Walnut Creek)
- Mitch Avalon (CCCWP)
- Dan Cloak (CCCWP)
- Karin Graves (CCCWP)

HOMELESSNESS WORK GROUP

- Amanda Booth (San Pablo)
- Michele Mancuso (County)
- Jose Avila (Contra Costa County Health)
- Mitch Avalon (CCCWP)

REPORTING AND TRACKING WORK GROUP

- Mitch Avalon (CCCWP)

FIREFIGHTING WORK GROUP

- Eric Govan (Richmond Fire Department)
- Dan McClellan (Contra Costa County Fire Protection District)
- Amanda Booth (San Pablo)
- Karin Graves (CCCWP)

MRP 3.0 C.3 WORKGROUP

- John Steere (CCC)
- Chris McCann (Danville)
- Frank Kennedy (Pinole)
- Amanda Booth (San Pablo)
- Dan Cloak (CCCWP)
- Karin Graves (CCCWP)
- Lisa Austin (CCCWP)

MRP 3.0 C.8 WORKGROUP

- Lucile Paquette (Walnut Creek)
- Khalil Abusaba (CCCWP)

MRP 3.0 C.10 WORKGROUP

- Kristine Corneillie (CCCWP)
- Michele Mancuso (CCC)
- Amanda Booth (San Pablo)
- Joanne Le (Richmond)

MRP 3.0 C.11/C.12 WORKGROUP

- Michele Mancuso (CCC)
- Amanda Booth (San Pablo)
- Lucile Paquette (Walnut Creek)
- Khalil Abusaba (CCCWP)
- Karin Graves (CCCWP)
- Joanne Le (Richmond)
- Jolan Longway (Pittsburg)

Attachment 1.4

Contra Costa Clean Water Program,
Management Committee and Subcommittee
Participation & Attendance

Management Committee FY 2019-20

MUNICIPALITY	REPRESENTATIVE	JUL	AUG(3)	SEP	OCT(3)	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	INDIV % ATT	MUNI % ATT
City of Antioch	**Phil Hoffmeister**	1		1		1	1	1	1	1	1	1	1	100%	**100%**
	Lynne Filson													0%	
City of Brentwood	**Meghan Laporta**			1		1		1		1	1	1	1	70%	**90%**
	Jack Dhaliwal						1							10%	
	James Campero	1												10%	
City of Clayton	**Laura Hoffmeister**	1				1		1		1		1		50%	**60%**
	Mindy Gentry													0%	
	Scott Alman												1	10%	
City of Concord	**Kevin Marstall**					1	1						1	30%	**100%**
	Frank Kennedy													0%	
	Bruce Davis	1		1		1		1	1	1	1	1		80%	
Town of Danville	**Chris McCann**	1		1		1	1	1	1	1	1	1		90%	**100%**
	Steven Jones													0%	
	Bob Russell										1	1	1	30%	
	Mark Rusch													0%	
City of El Cerrito	**Will Provost**			1		1	1	1	1	1	1	1	1	90%	**100%**
	Steven Prée	1												10%	
	Yvetteh Ortiz													0%	
	Maria Sanders													0%	
City of Hercules	**Mike Roberts**													0%	**100%**
	Jeff Brown	1												10%	
	Jose Pacheco													0%	
	Frank Kennedy			1										10%	
	Nai Saelee			1		1	1	1	1	1	1	1	1	90%	
City of Lafayette	**Matt Luttropp**	1		1			1	1	1	1	1	1	1	90%	**90%**
	Donna Feehan													0%	
	Tim Clark												1	10%	
City of Martinez	**Khalil Yowakim**			1		1			1			1	1	50%	**50%**
	Bob Cellini													0%	
	Scott Alman												1	10%	
Town of Moraga	**Edric Kwan**													0%	**100%**
	Frank Kennedy	1		1		1	1	1	1	1	1	1	1	100%	
City of Oakley	**Billilee Saengchalern**									1				10%	**100%**
	Andrew Kennedy									1				10%	
	Frank Kennedy	1		1		1	1	1	1		1	1	1	90%	
City of Orinda	**Scott Christie**	1		1		1	1	1	1	1	1	1	1	100%	**100%**
	Kevin Marstall													0%	
	Jason Chen													0%	
City of Pinole	**Tamara Miller**											1	1	20%	**100%**
	Frank Kennedy	1		1		1	1	1	1	1	1			80%	
	Michelle Fitzer													0%	
	Misha Kaur										1			10%	
City of Pittsburg	**Jolan Longway**			1		1	1		1	1	1	1	1	80%	**80%**
	Fritz McKinley													0%	
City of Pleasant Hill	**Frank Kennedy**	1		1		1	1	1	1	1	1	1	1	100%	**100%**
	Mario Moreno													0%	
City of Richmond	**Joanne Le**	1		1		1	1	1	1	1	1	1	1	100%	**100%**
	Ryan Smith													0%	
City of San Pablo	**Amanda Booth** (1)	1				1	1	1	1	1	1	1	1	90%	**90%**
	Karineh Samkian													0%	
	Jill Mercurio													0%	
City of San Ramon	**David Krueger**					1	1	1		1	1	1	1	70%	**70%**
	Maria Sanders													0%	
	Robin Bartlett													0%	
City of Walnut Creek	Steve Waymire													0%	**80%**
	Lucille Paquette					1	1	1	1	1	1	1	1	80%	
	Neil Mock													0%	
Contra Costa County	**Michele Mancuso** (2)	1		1		1	1			1	1	1	1	80%	**100%**
	Tim Jensen			1										10%	
	Allison Knapp			1				1	1					30%	
	Brian Balbas													0%	
Flood Control	**Tim Jensen**			1			1			1	1	1	1	60%	**90%**
	Michele Mancuso	1		1				1	1					40%	
	Allison Knapp			1										10%	
PROGRAM STAFF															
Courtney Riddle		x													
Lucile Paquette		x													
Andrea Bullock		x		x		x	x	x	x	x	x	x	x		
Karin Graves				x		x	x	x	x	x	x	x	x		
Clerk				x		x	x	x	x				x		
Mitch Avalon				x		x	x	x	x	x	x	x	x		
Adêle Ho	Consultant														
Sandy Mathews	Consultant			x											
Kristine Corneillie	Consultant			x		x					x	x	x		
Lisa Austin	Consultant														
Dan Cloak	Consultant			x		x	x				x	x	x		
Khalil Abusaba													x		

(1) Chairperson (2) Vice- Chairperson (3)Meeting Cancelled G:\NPDES\Management Committee\Minutes&Attend\MC Attendance 2019-20

**Both Primary and Alternate attended the same meeting; attendance credit goes to Primary representative.

ADMINISTRATIVE COMMITTEE FY 19-20

MUNICIPALITY	REPRESENTATIVE	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	INDIV % ATT	MUNI % ATT
City of Antioch	Phil Hoffmeister	1	1	1	1	1	1	1	1	1	1	1	1	100%	**100%**
	Ken Warren													0%	
Contra Costa County	Michele Mancuso [2]			1	1	1	1		1	1	1	1	1	75%	**92%**
	Tim Jensen	1	1		1					1			1	42%	
CCC Flood Control	Tim Jensen	1	1		1	1				1	1	1	1	67%	**83%**
	Michele Mancuso			1	1			1		1			1	42%	
City of Orinda	Scott Christie	1				1				1	1		1	42%	**92%**
	Kevin McCourt			1	1		1	1	1			1	1	58%	
City of Pinole	Frank Kennedy	1	1	1	1	1	1	1	1	1	1	1	1	100%	**100%**
	AJ Kennedy												1	8%	
City of San Pablo	Amanda Booth [1]	1	1	1	1	1	1	1	1	1	1	1	1	100%	**100%**
	Karineh Samkian												1	8%	
City of San Ramon	David Krueger	1			1	1		1	1	1	1	1	1	75%	**83%**
	Rod Wui												1	8%	
City of Walnut Creek	Lucille Paquette				1	1	1	1	1	1	1	1	1	75%	**92%**
	Neil Mock	1		1						1			1	33%	
NON-VOTING															
Town of Danville	Chris McCann				x								x		
City of Martinez	Khalil Yowakim	x													
City of Concord	Bruce Davis	x													
City of Richmond	Joanne Le	x		x					x		x				
Contra Costa County	Brian Balbas			x											
PROGRAM STAFF															
Courtney Riddle		x													
Lucile Paquette		x		x											
Allison Knapp				x	x	x	x	x	x	x	x		x		
Andrea Bullock		x			x	x	x	x	x	x	x	x	x		
Karin Graves		x		x	x	x	x	x	x	x	x	x	x		
Mitch Avalon	consultant			x		x	x	x	x	x	x	x	x		
Emily Rogers	Sagent									x					
Shelley Cousineau	Sagent									x					
Casey Camacho	Sagent									x					
Clerk					x	x	x			x			x		

(1) Chairperson (2) Vice-Chairperson (3) Meeting cancelled

G:\NPDES\Admin Committee\Minutes&Attend\AC Attendance 2019-20

DEVELOPMENT COMMITTEE FY 19-20

MUNICIPALITY	REPRESENTATIVE	JUL(3)	AUG	SEP	OCT	NOV(3)	DEC(3)	JAN	FEB	MAR	APR(3)	MAY	JUN(3)	INDIV % ATT	MUNI % ATT
City of Antioch	**Phil Hoffmeister**		1	1				1	1	1		1		86%	**86%**
City of Brentwood	**Aman Grewal**		1	1	1				1	1				71%	**71%**
City of Clayton	**Scott Allman** (1)		1	1	1			1	1			1		86%	**100%**
	Laura Hoffmeister				1					1				29%	
City of Concord	**Mitra Abkeneri**		1	1	1			1		1		1		86%	**100%**
	Bruce Davis		1	1				1	1	1		1		86%	
Contra Costa County	**John Steere**		1	1	1			1		1		1		86%	**100%**
	Michele Mancuso		1	1					1					43%	
Town of Danville	**Chris McCann** (2)			1	1				1	1		1		71%	**71%**
	Mark Rusch													0%	
	Bob Russell											1		14%	
Town of Moraga	**Frank Kennedy**		1	1	1			1	1					71%	**71%**
City Of Hercules	Jeff Brown		1	1	1				1	1		1		86%	**86%**
City of Lafayette	**Matt Luttropp**		1	1	1			1	1	1		1		100%	**100%**
	Tim Clark											1		14%	
	Danielle Sanchez													0%	
City of Oakley	**Billilee Saengchalern**													0%	**100%**
	Frank Kennedy		1	1	1			1	1	1		1		100%	
City of Pittsburg	**Jolan Longway**		1	1	1					1				57%	**86%**
	Joseph Camaddo								1	1		1		43%	
City of Pleasant Hill	**Ananthan Kanagasundaram**													0%	**100%**
	Frank Kennedy		1	1	1			1	1	1		1		100%	
City of San Ramon	**Rod Wui**		1	1				1		1				57%	**57%**
	Theresa Peterson													0%	
City of Walnut Creek	**Lucile Paquette**			1	1			1		1		1		71%	**100%**
	Ryan Cook		1	1	1			1	1	1		1		100%	
Non-Voting Members															
City of San Pablo	Amanda Booth		x						x	x		x			
City of Martinez	Scott Alman				x										
PROGRAM STAFF															
Karin Graves				x				x		x		x			
Dan Cloak	consultant		x	x	x			x	x	x		x			
Lisa Austin	consultant		x												
Mitch Avalon	consultant				x				x	x					

(1) Chairperson, (2) Vice-Chairperson, (3) Meeting Cancelled

G:\NPDES\NDCCC\Minutes&Attend\DC Attendance 2019-20

MONITORING COMMITTEE FY 19-20

MUNICIPALITY	REPRESENTATIVE	JUL(3)	AUG	SEP(3)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	INDIV % ATT	MUNI % ATT
City of Antioch	Phil Hoffmeister [1]		1			1		1	1	1	1	1	1	80%	**80%**
County Flood Control	Michele Mancuso		1				1	1	1	1	1	1	1	80%	**90%**
	Cece Sellgren		1											10%	
City of Pinole	Andrew Kennedy [2]		1		1	1		1	1	1	1	1	1	90%	**90%**
	Tamara Miller													0%	
	Misha Kaur												1	10%	
City of Pittsburg	Jolan Longway				1		1					1		30%	**90%**
	Joseph Cammado		1			1	1	1	1	1			1	70%	
City of Richmond	Joanne Le							1	1	1	1	1	1	60%	**60%**
	Terri Mason													0%	
	Maxwell Potter													0%	
City of San Pablo	Amanda Booth		1		1	1	1	1	1	1	1	1	1	100%	**100%**
	Karineh Samkian													0%	
City of Walnut Creek	Lucile Paquette				1	1	1	1	1	1	1	1	1	90%	**90%**
	Neil Mock													0%	
	Mojgan Rahimi								1					10%	
NON-VOTING															
The Watershed Project	Helen Fitanides		x												
PROGRAM STAFF/CONSULTANTS															
Lucile Paquette			x												
Courtney Riddle															
Karin Graves			x		x		x	x	x			x			
Mitch Avalon	Consultant					x		x	x		x	x	x		
Clerk													x		
Khalil Abusaba	Consultant		x		x	x	x	x	x		x	x	x		
Dan Cloak	Consultant												x		
Lisa Austin	Consultant												x		

(1) Chair (2) Vice Chair (3) Meeting Cancelled

G:\NPDES\Monitoring Committee\Minutes & Attendance 19-20

MUNICIPAL OPERATIONS COMMITTEE FY 19-20

MUNICIPALITY	REPRESENTATIVE	JUL	AUG(3)	SEP(3)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	INDIV % ATT	MUNI % ATT
City of Antioch	Phil Hoffmeister					1	1	1		1				40%	**50%**
	Jeff Cook								1					10%	
City of Brentwood	Melissa Barcelona	1			1	1	1	1	1		1	1	1	90%	**90%**
	Meghan Laporta	1												10%	
City of Concord	Jeff Rogers	1			1	1		1	1		1		1	70%	**70%**
	Jesse Crawford													0%	
	Kevin Marstall							1						10%	
	Bruce Davis					1								10%	
Contra Costa County	Michele Mancuso	1						1	1	1	1	1		60%	**90%**
	John Streere				1	1							1	30%	
	Cece Sellgren	1												10%	
City of El Cerrito	Stephen Prée	1			1		1	1	1	1	1	1	1	90%	**90%**
	Will Provost													0%	
City of Martinez	Bob Cellini	1				1								20%	**20%**
	Khalil Yowakim													0%	
	Zach Seal					1								10%	
City of Pinole	Andrew Kennedy					1								10%	**10%**
City of Pittsburg	Jolan Longway	1			1	1	1	1	1	1		1	1	90%	**100%**
	Joseph Camaddo					1					1	1	1	40%	
City of Richmond	Joanne Le	1				1				1	1	1	1	60%	**60%**
	Terri Mason													0%	
City of Walnut Creek	Lucile Paquette				1		1	1		1	1	1	1	70%	**100%**
	Neil Mock	1				1		1	1					40%	
	Mojgan Rahimi												1	10%	
Non-Voting Members															
City of Oakley	Andrew Kennedy									1					
City of San Pablo	Amanda Booth									1					
Town of Danville	Chris McCann										1				
	Robert Russell										1		1		
City of Lafayette	Francine Kuykendall												1		
PROGRAM STAFF															
Courtney Riddle															
Andrea Bullock															
Karin Graves					1			1							
Mitch Avalon	consultant					1	1	1			1	1	1		
Kristine Cornellie	consultant				1	1	1	1	1	1	1	1	1		
Clerk					1								1		

(1) Chairperson, (2) Vice-Chairperson, (3) Meeting Cancelled

G:\NPDES\MOC\Minutes & Attendance\MOC Attendance 2019-20

PUBLIC INFORMATION/PARTICIPATION COMMITTEE FY 19-20

MUNICIPALITY	REPRESENTATIVE	JUL(3)	AUG(3)	SEP(3)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	INDIV % ATT	MUNI % ATT
City of Antioch	Julie Haas-Wajdowicz				1	1		1	1	1	1	1	1	89%	**100%**
	Phil Hoffmeister				1	1	1							33%	
CCC Flood Control	Melinda Harris				1	1	1	1	1		1		1	78%	**78%**
	John Steere													0%	
City of San Ramon	David Krueger				1			1	1	1	1	1	1	78%	**78%**
	Shane Hsieh													0%	
AC acting a PIP Members	**REPRESENTATIVE**														
City of Walnut Creek	Lucile Paquette				1	1	1	1	1	1	1	1	1	100%	**100%**
City of Antioch	Phil Hoffmeister												1	11%	**11%**
CCC Flood Control	Tim Jensen				1	1				1	1	1		56%	**67%**
	Michele Mancuso											1	1	22%	
City of Orinda	Scott Christie					1				1	1			33%	**89%**
	Kevin McCourt				1		1	1	1				1	56%	
City of Pinole	Frank Kennedy				1	1	1	1		1		1	1	78%	**78%**
City of San Pablo	Amanda Booth				1	1	1	1	1	1	1	1		89%	**100%**
	Karineh Samkian												1	11%	
Contra Costa Co.	Michele Mancuso				1	1	1	1	1	1	1	1	1	100%	**100%**
Town of Danville	Chris McCann				1									11%	**22%**
	Bob Russell											1		11%	
PROGRAM STAFF															
Courtney Riddle															
Andrea Bullock					x		x	x	x	x	x	x	x		
Allison Knapp					x		x			x					
Karin Graves					x		x	x	x	x	x	x	x		
Clerk					x		x	x					x		
Shelley Cousineau	Sagent				x		x			x	x	x	x		
Emily Rogers	Sagent				x	x	x			x	x	x	x		
Matt Bolender													x		
Anna Minard												x	x		
Casey Camacho	Sagent					x									
Mitch Avalon	Consultant							x	x		x	x	x		

(1) Chairperson, (2) Vice-Chairperson, (3) Meeting Cancelled

G:\NPDES\PIP_PEIO\Minutes&Attendance\PIP Attendance 2019-20

SELECT COMMITTEE FY 19-20

MUNICIPALITY	REPRESENTATIVE	15-Jan	12-Feb	26-Feb	31-Mar	29-Apr	13-May	3-Jun	29-Jun	INDIV % ATT	MUNI % ATT
City of Antioch	Phil Hoffmeister	1	1	1	1	1	1	1	1	100%	**100%**
Contra Costa County	Michele Mancuso	1	1	1	1	1	1	1	1	100%	**100%**
City of Richmond	Joanne Le	1	1	1	1	1	1	1	1	100%	**100%**
City of San Pablo	Amanda Booth	1	1	1	1	1	1	1	1	100%	**100%**
City of San Ramon	David Krueger								1	100%	**100%**
City of Walnut Creek	Lucile Paquette(1)	1	1	1	1	1	1		1	88%	**88%**
City of Pleasant Hill	Frank Kennedy(2)	1	1	1	1	1	1	1	1	100%	**100%**
Town of Danville	Chris McCann	1	1	1	1	1	1	1		100%	**100%**
PROGRAM STAFF											
Karin Graves		x	x	x		x			x		
Mitch Avalon	Consultant	x	x	x	x	x	x	x	x		
Dan Cloak	Consultant	x	x	x	x	x	x	x	x		
Kristine Cornellie	Consultant		x	x	x	x	x	x			

(1) Chairperson, (2) Vice-Chairperson, (3) Meeting Cancelled

G:\NPDES\09_Select_Committee\Select Committee\Select Committee Attendance 2019-20

Attachment 7.1

Bringing Back the Natives Garden Tour

2020 Summary

Bringing Back the Natives Garden Tour

C.7.d. ►Public Outreach Events/Citizen Involvement Events

Event Details	Description	Evaluation of Effectiveness

Bringing Back the Natives Garden Tour:
Virtual event took place on three Sundays, April 26, May 3, and May 10, 2020
 	
• 43 gardens in nineteen cities and 5 native plant nurseries located throughout Alameda and Contra Costa counties were showcased on the Tour's website: https://www.bringingbackthenatives.net/
• 3.070 people registered for this event
• When the live Tour was canceled due to the virus, 3 days (fourteen hours) of virtual tour programming took the place of the in-person tour. The schedule for the three days of programming can be found here.
	Summary of the Sixteenth Annual Bringing Back the Natives Garden Tour
	
	• 3.070 people registered for this event
	• 43 gardens in nineteen cities were showcased on the Tour's website
	• When the live Tour was canceled due to the virus, 3 days (fourteen hours) of virtual tour programming took the place of the in-person tour. The schedule for the three days of programming can be found here.
	• In the virtual tour, which took place on April 26, May 3, and May 10:
	  • Best-selling author and renowned speaker Doug Tallamy was keynote speaker on the first day of the program; he also gave a follow-up presentation and participated in a Q & A session on the second day of the event
	  • 24 native plant gardens were visited, live, with the host or designer
	  • 2 native plant nurseries were toured
	  • 2 Q and A sessions were held; one with landscape designers and garden tour hosts, and another with Doug Tallamy and Dan Gluesenkamp, Executive Director of the California Native Plant Society
	  • A PowerPoint presentation on sheet mulching was given
	  • Each of the three days of programming ended with a professional pianist playing as a montage of native garden, native plant, and native wildlife photos was shown
		There was an increase in the number of registrants over the usual in-person tour (3.070 vs about 2,400)
		
		• 1,700 of the registrants were new, and 1,300 were returning. This is a sizeable increase in the ratio of new to returning registrants, when compared to the regular tour.
		• 64% of respondents said they would change their gardening practices because of this year's Bringing Back the Natives Garden Tour.

	o The schedule for the three days of programming can be found here. • The April 26 program had 830 live views, and has had an additional 7,100 views on YouTube. • The May 3 program had 865 live views, and has had an additional 3,100 views on YouTube. • May 10 program had more than 600 live views, and has had an additional 3,200 views on YouTube. The Tour's YouTube channel is here. • Total: 3,000 live views and an additional 13,400 YouTube views to date. • The garden guide was produced as a 115 page PDF, which featured forty three gardens, lists of native plant designers and nurseries, and native plant gardening resources; it contained more than 50 full color photographs. The 2020 garden guide, which was e-mailed to more than 15,000 people, can be viewed here. • The website contains numerous photographs of all of the gardens that have ever been on the tour,extensive garden descriptions, plant lists for each garden, and some garden-specific bird, butterfly, mammal, reptile, and amphibian lists, as well as resource information on how to garden with California natives. The resource information includes contact information for landscaper designers with gardens on the tour, a list of Easy-to-Grow East Bay Natives, lists of nurseries that carry native plants, lists of reference books, “How I got started gardening with native plants” essays by a number of the host gardeners, and more.	

Attachment 7.2

Contra Costa Clean Water Program,
Awareness, Behaviors and Attitudes Study Research Report

Attachment 7.2

sagent

CONTRA COSTA CLEAN WATER PROGRAM

Awareness, Behaviors & Attitudes Study

08.25.2020

Research Report

ConsumerQuest
Marketing Insight Through Research

3231 Ocean Park Blvd., Suite 104
Santa Monica, CA 90405
tele. (310) 207-6605
www.consumerquest.com

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Background & Objectives

- Provision C.7.b of the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP) (SFBRWQCB, 2015) requires Permittees to conduct outreach campaigns with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences. In the Annual Report following the post-campaign effectiveness assessment/evaluation Permittees are required to provide a report of the effectiveness assessment/evaluation completed.
- The Contra Costa Clean Water Program conducted a county-wide effectiveness evaluation to determine awareness, behaviors, and attitudes surrounding its efforts toward stormwater education.
- A total of 402 Contra Costa residents age 18+ were surveyed online from July 7-15, 2020.
- The Effectiveness Evaluation:

1. Measured Contra Costa county residents' awareness and behavior toward stormwater pollution and pollutants of concern.
2. Quantified the general public's compliance with behaviors that help ensure clean stormwater, including the use and disposal patterns for specific products.
3. Determined the needs and concerns of residents relative to their behaviors affecting stormwater pollution. This includes an understanding of the association between awareness and beliefs and actual behaviors and purchase decisions.
4. Analyzed the effectiveness of key components and innovative elements of the Contra Costa Clean Water Program.
5. Examined similarities and differences in the above areas by different demographic groups within the county.

Methodology

- A total of 402 Contra Costa county residents age 18+ were surveyed countywide July 7-15, 2020.
  - The sample was recruited online from large national research panels.
  - Respondents were contacted at random and the purpose of the survey was disguised.
  - Quotas were used to ensure a reasonably representative mix of the local population by gender, age, and income.
  - Results are statistically significant with 95% confidence to within ±4.8%-points or less.
- Residents were surveyed for about 10 minutes online about the following topics:
  - Frequency of engaging in specific positive or negative behaviors that are the focus on the program, including littering.
  - Perceived threat/importance to Contra Costa County of various environmental issues, including polluted waterways and bodies of water.
  - Perception of where storm drains go to and how they work.
  - Perceived contribution to water pollution of various actions or entities.
  - Awareness of advertising and public service messages and awareness of the CCCWP.
  - Media source of awareness.
  - Main message and slogan recall of advertising about keeping storm drains clean.
  - Consumption of particular kinds of fish from the San Francisco Bay and the ocean and knowledge of the greatest number of servings that it is safe to eat those particular fish.

Characteristics of Sample: Gender and Age

GENDER

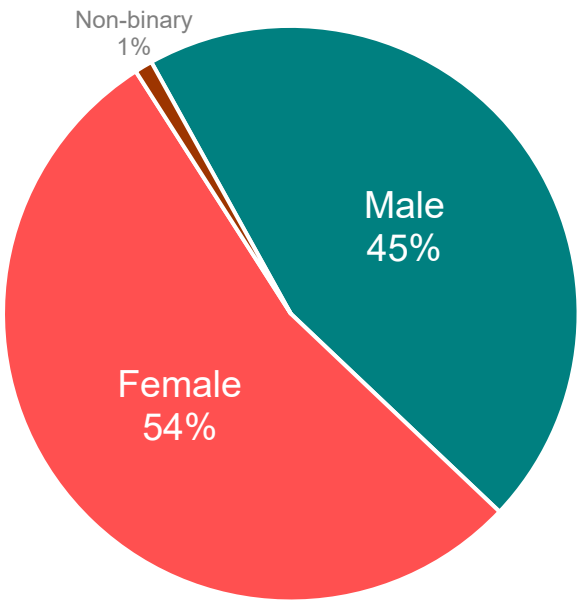

AGE

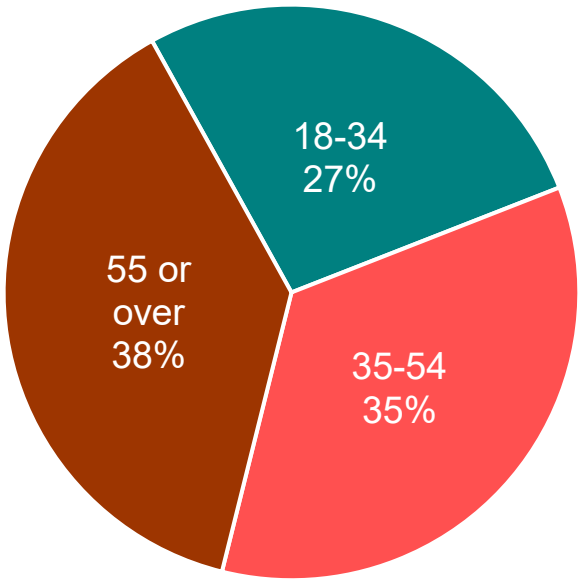

Base: Total sample, N=(402).

04281
4322

Characteristics of Sample: Area of Residence

CONTRA COSTA CLEAN WATER PROGRAM

AREA OF RESIDENCE

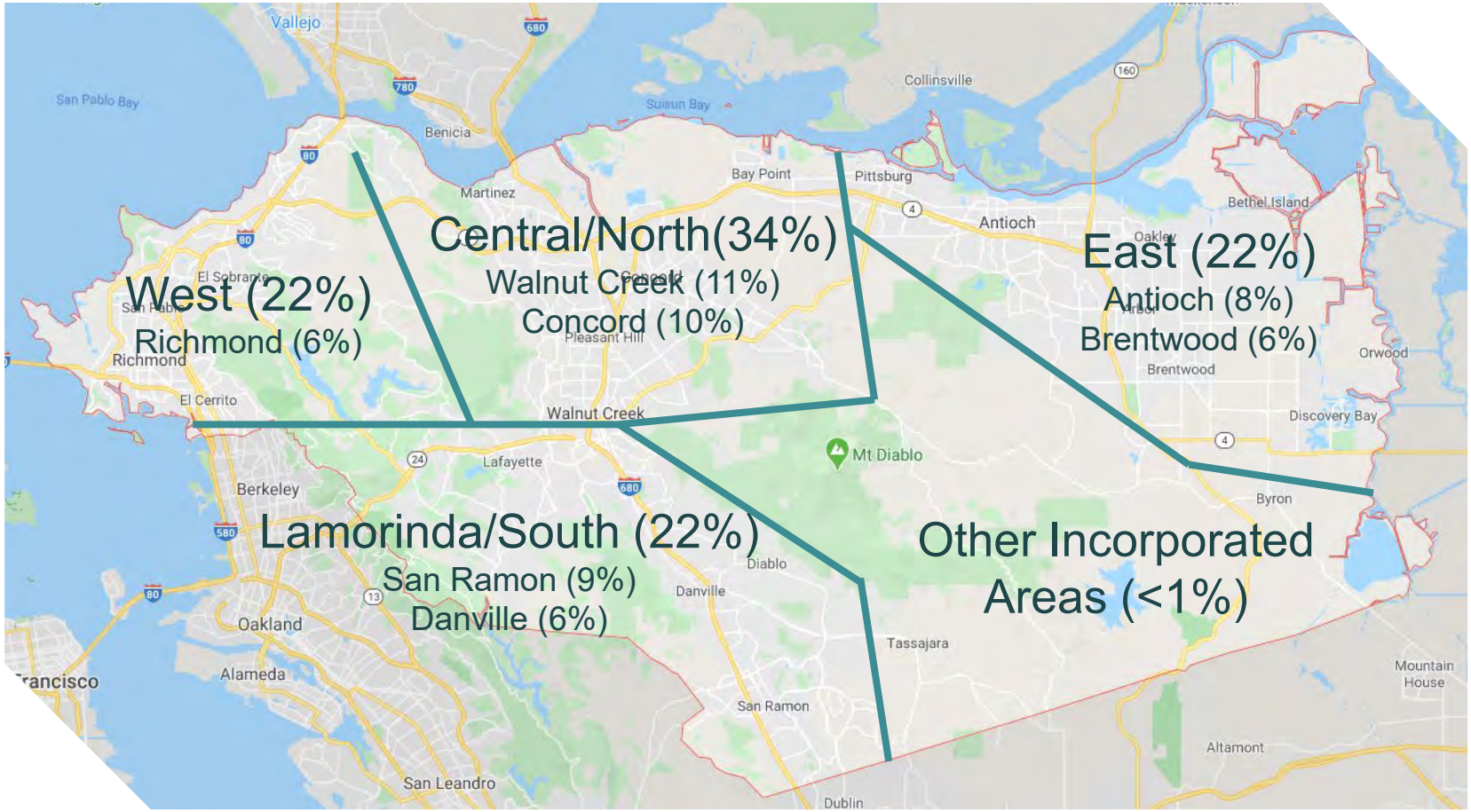

Base: Total sample, N=(402).

04282
4323

Characteristics of Sample: Type of Residence

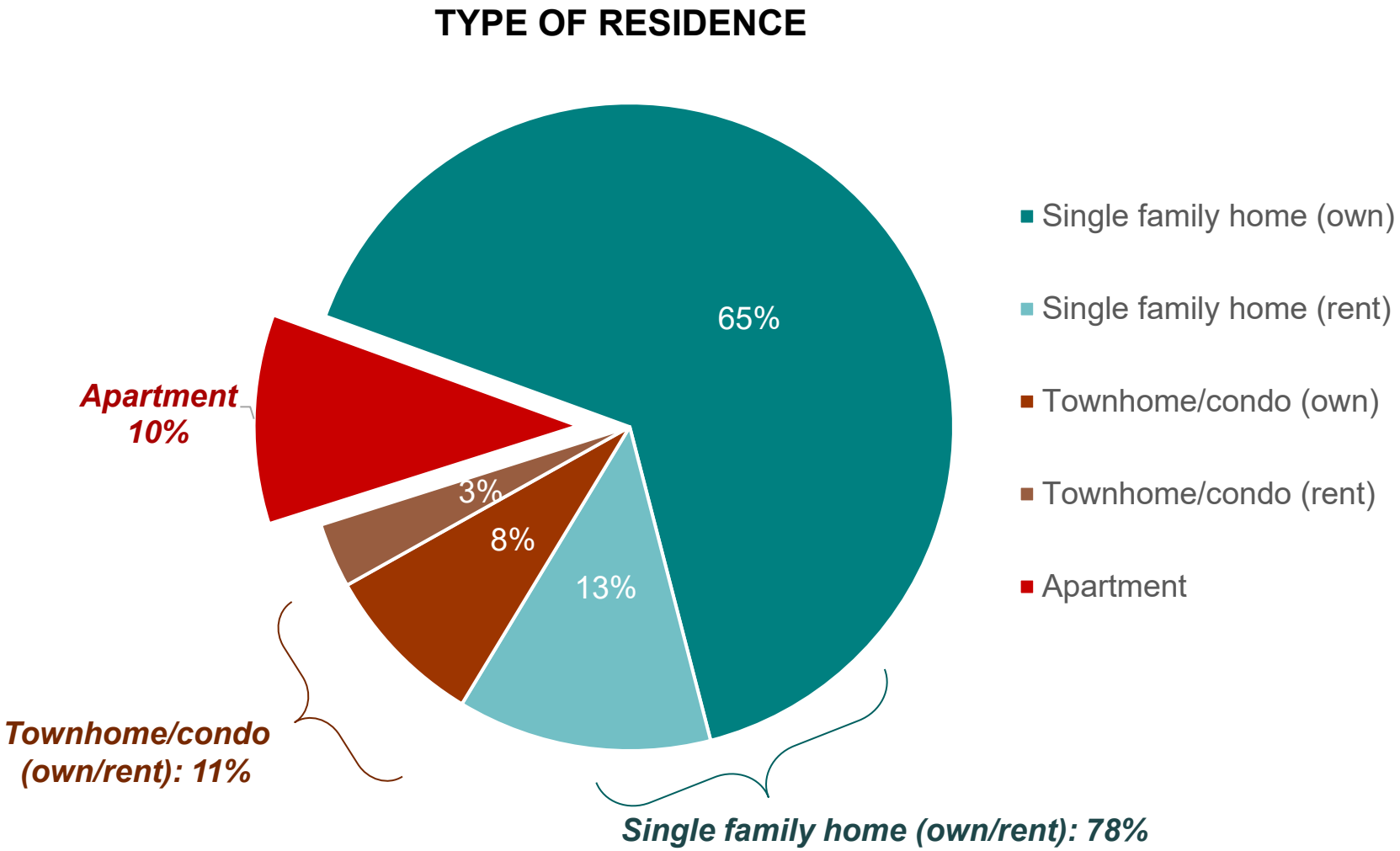

Base: Total sample, N=(402).

04283
4324

Characteristics of Sample: Ethnicity

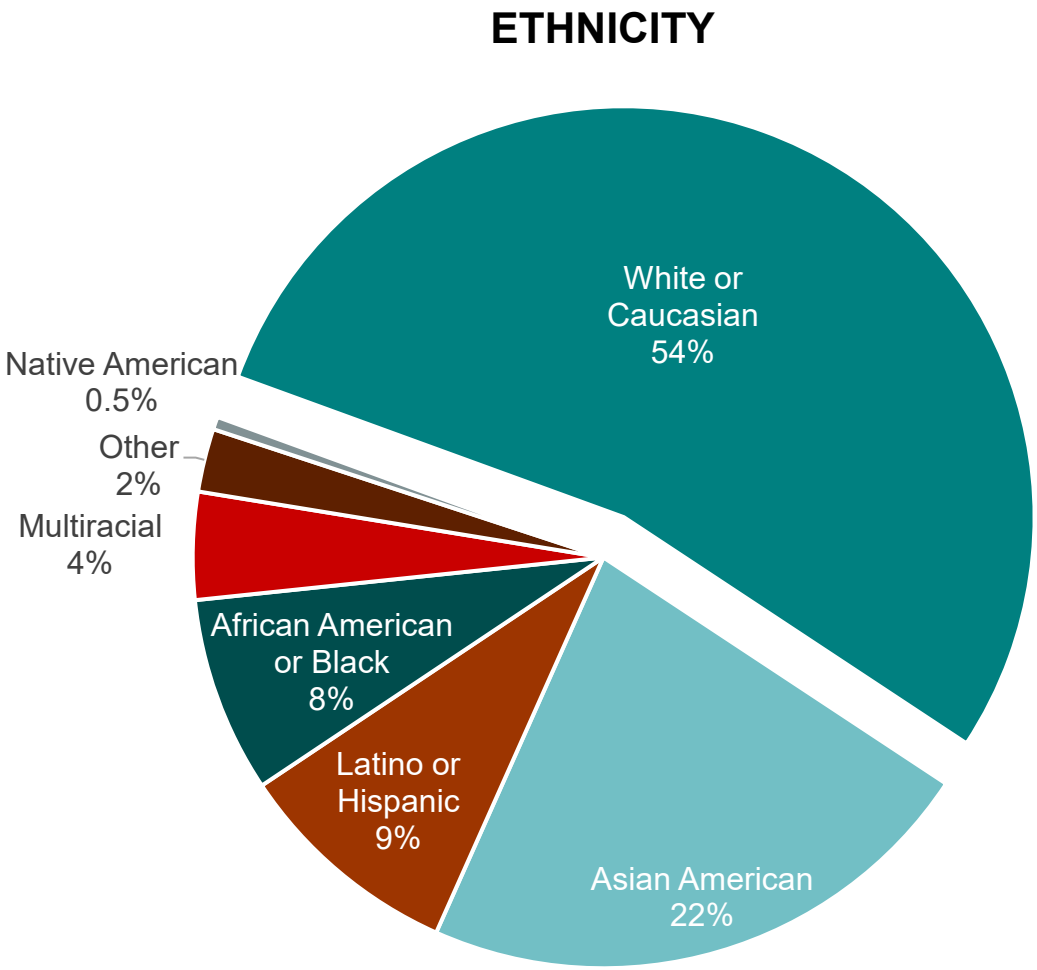

White: 54%

Non-White: 46%

Base: Total sample, N=(402).

04284
4325

Evaluation Results

Behaviors

Attachment 7.2

Use of Organic/Green-Friendly Pesticide/Fertilizer

- Many Contra Costa residents do not consistently engage in positive behaviors to keep the county's storm drains clean and unpolluted.
- Only one in five people (21%) who use pesticides, herbicides, or fertilizers for their yard or garden always choose to use an organic or green-friendly pesticide or fertilizer. Fewer than half (46%) usually or always choose organic/green.

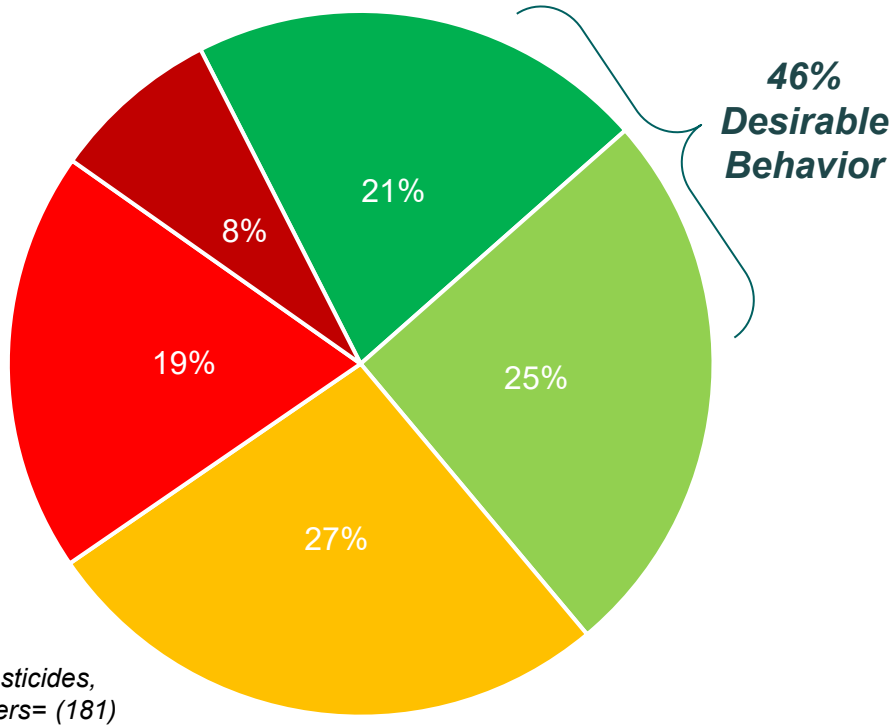

N who ever use pesticides, herbicides, or fertilizers= (181)

Q: Of all the times you need to use pesticides or fertilizer in your yard or garden, how often do you use an organic or green-friendly pesticide or fertilizer in your yard or garden instead?

04286
4327

Disposal of Old or Leftover Pesticide or Fertilizer

- Four in ten (39%) usually dispose of leftover fertilizers or pesticides improperly and residents are as likely to place them in the trash (23%) as they are to take them to recycle center of hazardous waste facility (21%).

Desirable Behavior	(%)
Desirable Behaviors (NET)	***59%***
Would not dispose of them/ Always save them for later	38%
Take to recycle center or hazardous waste disposal site	21%
Give them to friends or neighbors	0%

Undesirable Behavior	(%)
Undesirable Behaviors (NET)	***39%***
Place them in the trash	23%
Put them in recycling or green waste bins	9%
Pour them into the ground	4%
Take them to the garbage dump	2%
Pour them down the drain in the kitchen or bath	1%
Pour them into the street or gutter	0%
N who ever use pesticides, herbicides, or fertilizers=	(181)

Q: If you have old or leftover fertilizers or pesticides, how would you usually dispose of them?

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Where Usually Wash Motor Vehicle

- Nearly half (45%) wash their vehicle in their driveway (40%) or not at all (5%).

Desirable Behavior	(%)
Desirable Behaviors (NET)	***52%***
At a full-service car wash	27%
At a gas station	14%
At a self-service car wash	11%

Undesirable Behavior	(%)
Undesirable Behaviors (NET)	***45%***
In my driveway	40%
I never wash my vehicle	5%
N =	(402)

Q: Where do you usually wash your vehicle?

04288
4329

Attachment 7.2

How Usually Clean Paint Brushes, Rollers & Trays

- While many household paint users clean paint brushes, rollers, and trays in the sink (45%), a large minority rinse them in the ground, yard, street, or gutter (22%).

Desirable Behavior	(%)
Rinse them in the sink	45%

Neutral Behavior	(%)
Neutral Behaviors (NET)	***33%***
Rinse or clean them into another container specifically for that purpose	20%
Do not wash or rinse them out	9%
Don't know / Don't remember	4%

Undesirable Behavior	(%)
Undesirable Behaviors (NET)	***22%***
Rinse or clean on ground/yard	19%
Rinse them into the street or gutter	2%
N who buy household paints =	(244)

Q: When you have completed a paint project, how do you usually clean your paint brushes, rollers and/or trays?

04289
4330

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Bag Dog's Poop & Throw It In Trash

- Three in four of dog owners (74%) say they "always" bag their pet's poop and throw it in the trash.
- However, 18% do this "almost always" and another 8% bag their pet's poop just usually, sometimes, or never.

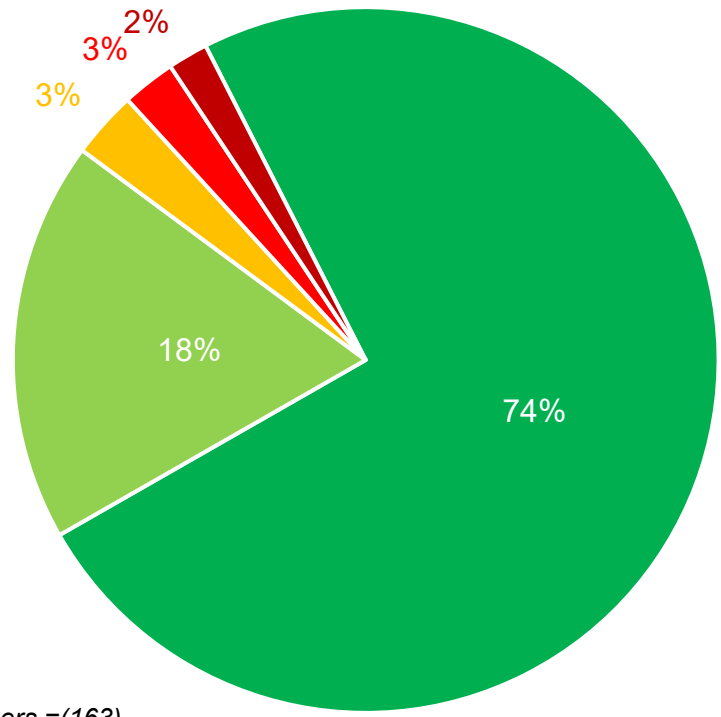

- I absolutely always bag my dog's poop and throw it in the trash
- I almost always bag my dog's poop and throw it in the trash, but once in a while do not
- I usually bag my dog's poop and throw it in the trash, but sometimes I do not
- I usually do not bag my dog's poop and throw it in the trash
- I never bag my dog's poop and throw it in the trash

N of dog owners =(163)

Q: Regardless of where your dog poops, do you bag your dog's poop and throw it in the trash?

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Method of Disposal for Household Items

- One in four households report improper disposal of batteries by usually putting them in the trash (24%).
- While most residents properly dispose of household items like computers (91%), large monitors (88%), small/medium screen computers (89%), proper disposal is not universal.

HOUSEHOLD BATTERIES

Desirable Behavior	(%)
Desirable Behaviors (NET)	***66%***
Take to a household hazardous waste facility	25%
Take them to an e-waste even	15%
Set them out on the curb for special collection	14%
Take them to a retail store	12%
N =	(384)

Undesirable Behavior	(%)
Throw out/Put in the trash	24%
N =	(384)

OLD COMPUTERS

Desirable Behavior	(%)
Desirable Behaviors (NET)	***91%***
Take to a household hazardous waste facility	17%
Take them to a retail store	10%
Take them to an e-waste even	41%
Set them out on the curb for special collection	23%
N =	(328)

Undesirable Behavior	(%)
Throw out/Put in the trash	3%
N =	(328)

LARGE SCREEN TV/ VIDEO MONITORS

Desirable Behavior	(%)
Desirable Behaviors (NET)	***88%***
Take them to an e-waste even	36%
Set them out on the curb for special collection	28%
Take to a household hazardous waste facility	16%
Take them to a retail store	8%
N =	(319)

Undesirable Behavior	(%)
Throw out/Put in the trash	6%
N =	(319)

SMALL & MEDIUM SCREEN COMPUTER MONITORS

Desirable Behavior	(%)
Desirable Behaviors (NET)	***89%***
Take them to an e-waste even	38%
Set them out on the curb for special collection	25%
Take to a household hazardous waste facility	16%
Take them to a retail store	9%
N =	(322)

Undesirable Behavior	(%)
Throw out/Put in the trash	6%
N =	(322)

Q: Here are some different household items that many people eventually dispose of. For each item listed, please tell us how you usually get rid or dispose of that item.
Base: Those who dispose of them, N=(varies).

04291
4332

Evaluation Results

Littering

Littering

Frequency of Littering

- Just over half of residents (54%) say they never, ever litter.
- Nearly two-thirds (62%) say they have not littered in the past 90 days.
- However, and perhaps more telling, when asked to estimate how many times in the past 90 days their average fellow Contra Costan has littered, just 8% say not at all, 25% say once or twice, 26% say three to five times, and 13% guesstimate over 20 times.
  - To the extent littering is a low-involvement socially undesirable activity, some respondents may project this behavior onto their neighbors rather than admit that they do it themselves.

SELF-REPORTED BEHAVIOR

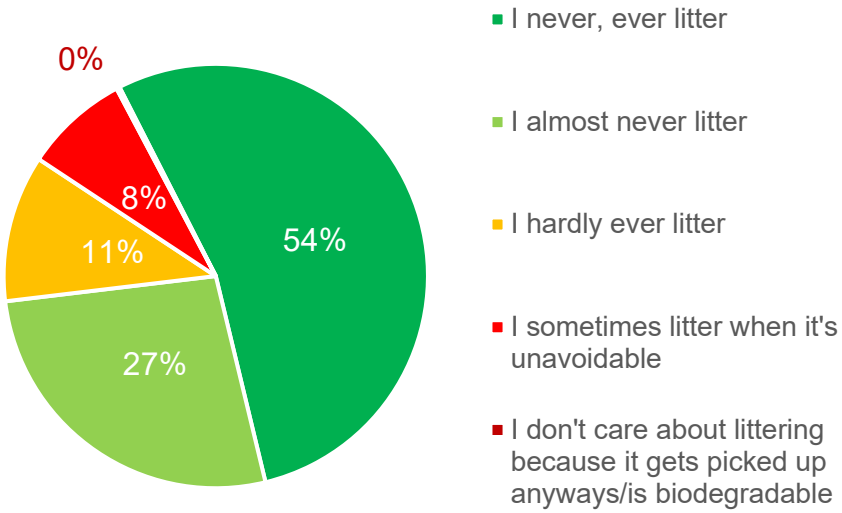

N=(402)

TIMES LITTERED IN PAST 90 DAYS

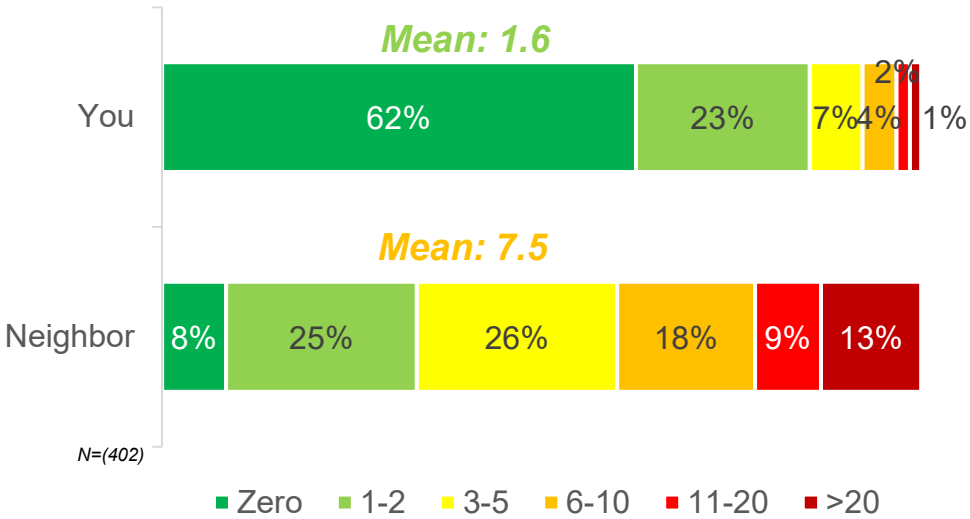

N=(402)

Q: About how often do you litter?

Q: If you had to guess, about how many times in the past 90 days would you guess the average person who lives in Contra Costa County left or tossed litter on the ground, no matter how small it might have been?

Q: If you had to guess, about how many times in the past 90 days would you say that you left or tossed litter on the ground, no matter how small it might have been?

Attachment 7.2

Seriousness of Littering as a Problem

- Litter is considered a major problem by nearly half of Contra Costans (44%).
- Only 8% consider it “not really much of a problem”.

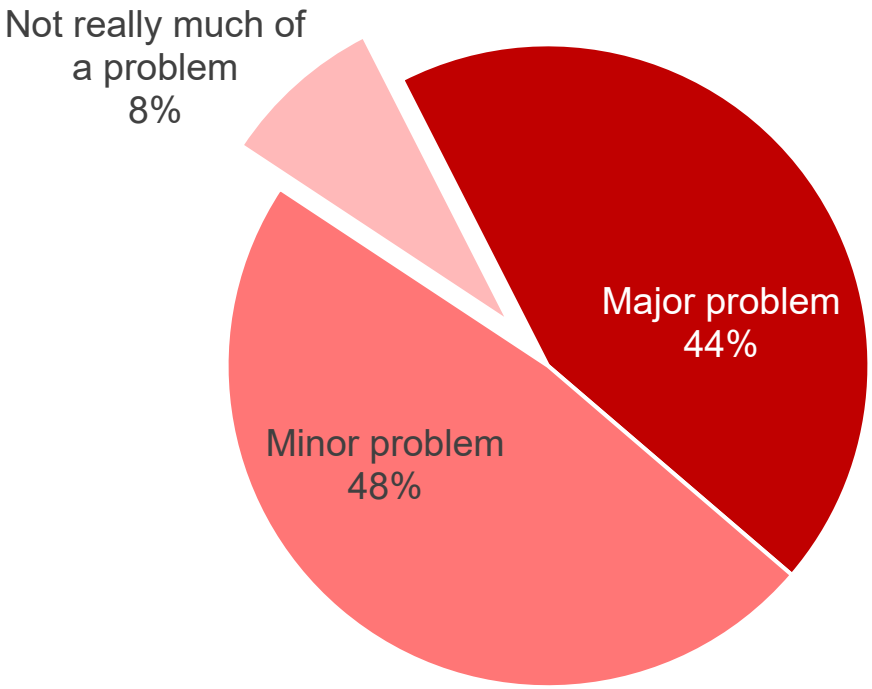

N=(402)

Q: Thinking again about litter, would you say that litter is a major problem, a minor problem, or not really much of a problem in your community?

04294
4335

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Frequency of Unintentional Littering

- Unintentional littering is common.
  - Most Contra Costans (58%) report having something accidentally fall on the ground in the past 90 days and just 43% report always picking it up.
  - About one in four (23%) say they pick up such unintentional litter never, rarely, or only sometimes, with 9% picking it up only rarely or never.

FREQUENCY OF UNITENTIONAL LITTERING (PAST 90 DAYS)

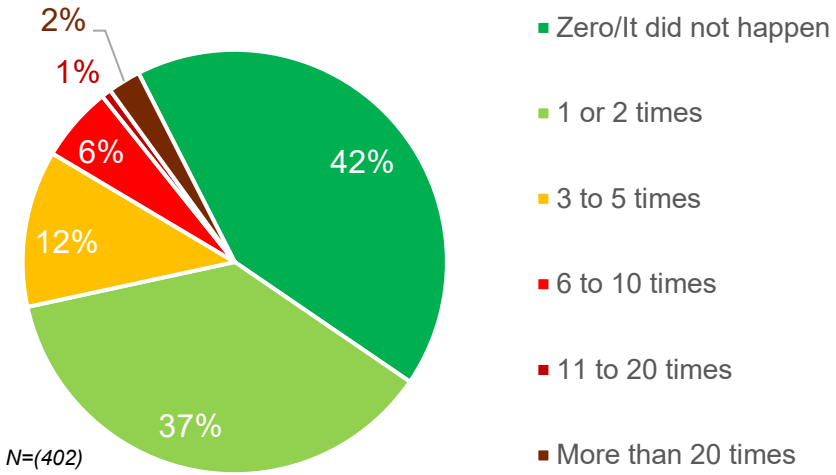

Q: Things sometimes fall on the ground by accident. For example, a wrapper falls out of a trash bin, a small piece of paper or something a person is carrying or holding on to accidentally flies out of their hand, etc. If you had to guess, about how many times in the past 90 days would you say this happened to you?

HOW OFTEN PICK IT UP OR RETRIEVE IT WHEN IT HAPPENS

	(%)
Always	43%
Mostly	34%
Sometimes	14%
Rarely	6%
Hardly ever/Never	3%
N =	(233)

Q: Thinking about those __ times this happened to you, how often did you pick it up or retrieve it?

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Persuasiveness of Deterrents

- Huge fines are considered the most persuasive deterrent (31%), moderate fines are thought to be less effective (7% consider them most persuasive), and one in four residents (24%) say it takes self-discipline.
  - Other deterrents are moderately cited: having more public trash cans (16%), community service (10%), and points on driving record (10%).

	Most Persuasive or Convincing	Top 3 Most Persuasive or Convincing	Top 5 Most Persuasive or Convincing
Huge fines, like a speeding ticket	31%	64%	82%
I would use self-discipline to never litter	24%	37%	53%
If there were more public trash cans around	16%	44%	69%
If you were caught repeatedly, you'd have to do community service and clean up trash somewhere	10%	47%	86%
If it went on your driving record (like points)	10%	43%	74%
Moderate fines, like a parking ticket	7%	49%	86%
If your neighbor ever saw you litter and said something about it to you	2%	16%	50%
N = (402)			

Q: Here are some possible deterrents that might make people litter less. These are not real but try to imagine they are. Please rank them in terms of how much impact they would have on you when it comes to convincing you not to litter?

Evaluation Results

Environmental Issues

Environmental Issues

Attachment 7.2

Perceived Seriousness

- Of seven environmental concerns, Contra Costans rank polluted lakes, rivers, and streams 6th in terms of how critical an issue it is to the area today.
  - Traffic congestion, climate change, and air pollution are considered most pressing. Population growth and toxic waste disposal are considered next most pressing.

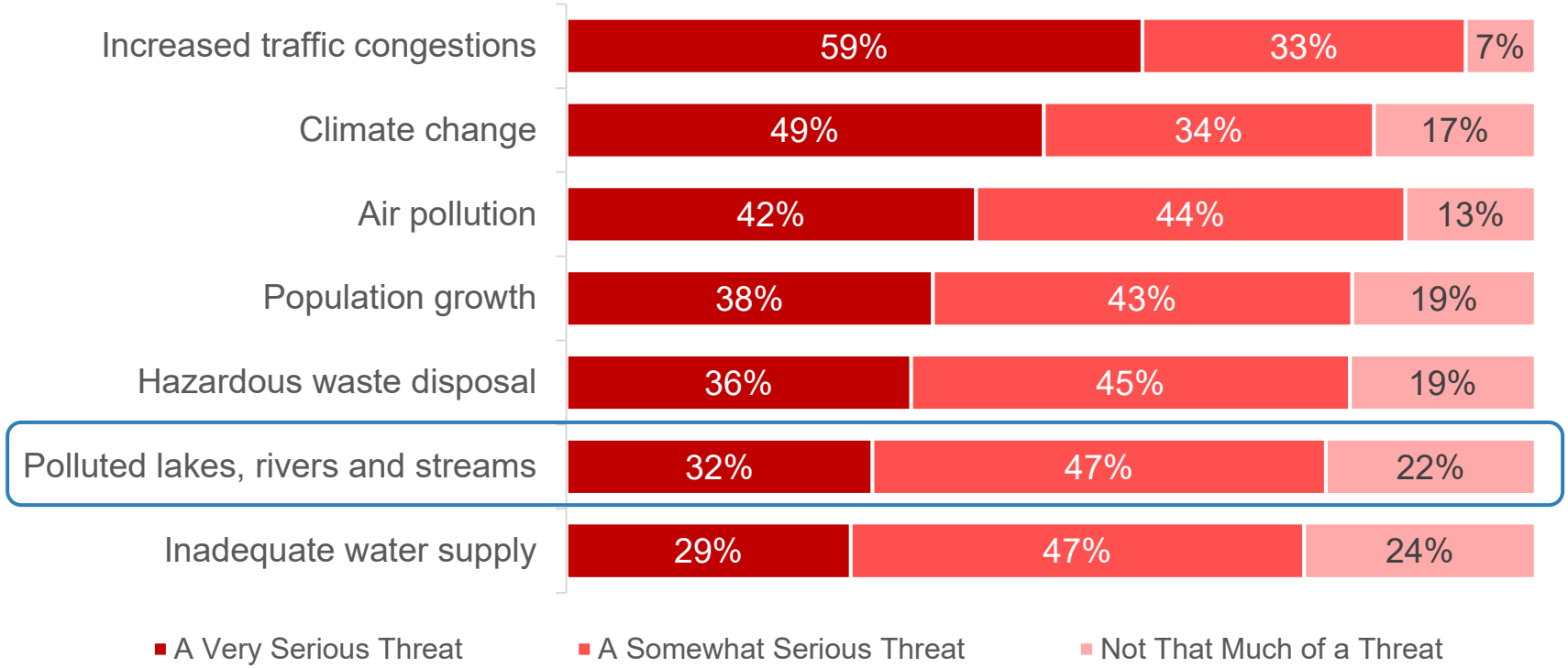

N=(402)

Q: For each issue, tell us if you think it is a very serious threat to the Contra Costa area today, a somewhat serious threat to the Contra Costa area today, or not that much of a threat to the Contra Costa area today.

04298
4339

Environmental Issues

Rank Order of Criticalness

- Of the seven environmental issues, polluted lakes, rivers, and streams is least likely to be cited as one of residents' top three most critical or pressing issues.

	Most Critical or Pressing Issue	Top 3 Most Critical or Pressing Issues
Increased traffic congestions	35%	66%
Climate change	22%	44%
Inadequate water supply	11%	34%
Air pollution	10%	57%
Population growth	10%	47%
Polluted lakes, rivers and streams	7%	24%
Hazardous waste disposal	5%	28%
N = (402)		

Q: Now, please rank these issues in order of how important they are to the people of the Contra Costa area today.

04299
4340

Understanding of Storm Drains & Sewer System

- Over half of residents (58%) believe that Contra Costa's sewer system and storm drain system are largely (almost completely 6%, mainly 14%, or half the time 38%) part of the same system.
- One quarter of residents (28%) have a misperception that rainwater and substances that flow through the county's storm drains are treated, while 40% believe it flows directly to bodies of water, with the balance (32%) believing both are at play.
- Most (62%) believe wastewater flows through to a treatment plant, while just 13% believe it flows directly to bodies of water, with the balance (24%) believing both are at play.

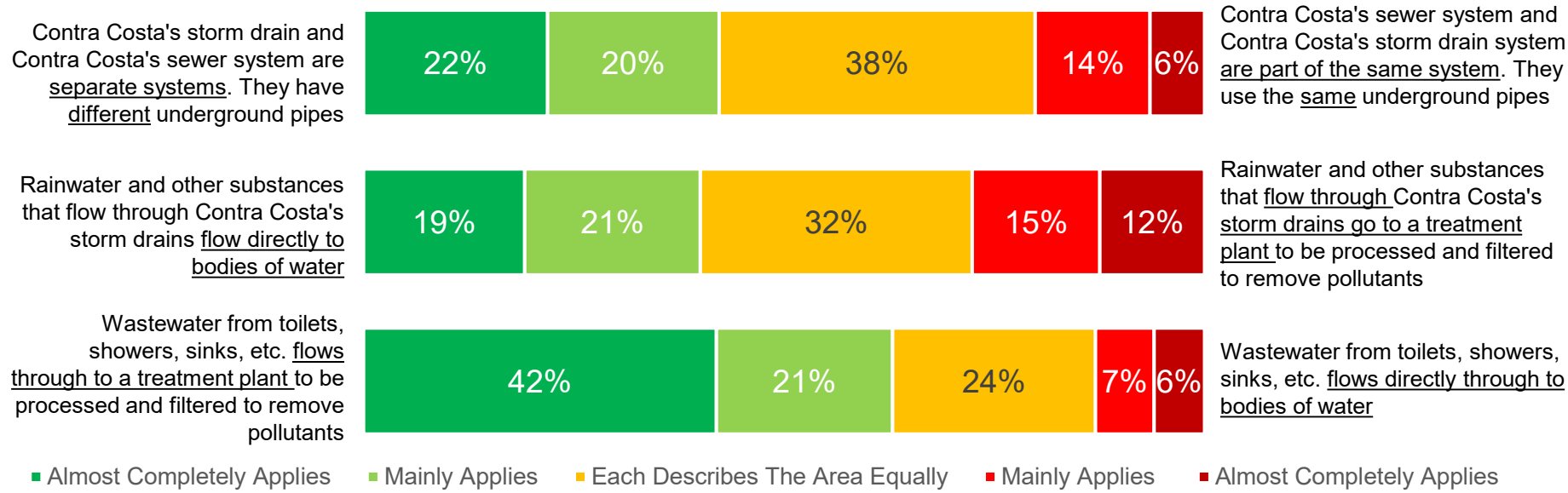

N=(402)

Q: *Three statements are given below, one on the left and one on the right. Please read each statement and then click on the number that best describes what you think.*

04300
4341

Seriousness of Pollution to Contra Costa's Water Bodies as a Problem

- While other environmental concerns surpass pollution to lakes, rivers, and streams in terms of their seriousness, three quarters (75%) of residents believe such pollution has very (21%) or somewhat (54%) serious consequences.
  - Residents are as likely (21%) to say that it is not that serious and has only minor consequences. Another 4% say it is not at all serious, with little consequence.
- Residents most commonly (54%) say that pollution to the water bodies has some consequences.

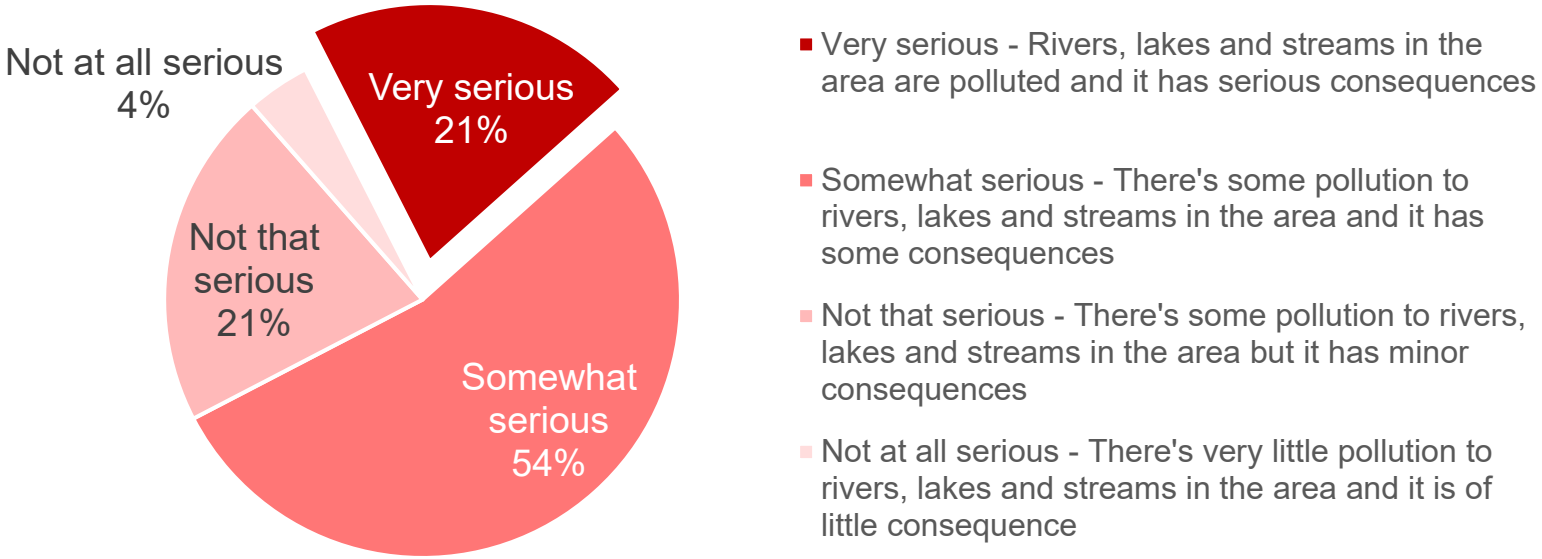

N=(402)

Q: How serious a problem do you think pollution is to Contra Costa's water bodies?

04301
4342

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Perceived Contribution of Pollutants

- A variety of pollutants are believed to contribute, with no dominant culprit.
  - Eleven sources are all cited by 10-35% of residents as contributing "a lot" to water pollution in Contra Costa county.
  - Discharge from industry and illegal dumping are considered the primary causes (24% and 20%, respectively), followed by trash/garbage (16%).

	Contributes A Lot	Primary Cause of Water Pollution in Contra Costa Area	Top 3 Causes of Water Pollution in Contra Costa Area
Discharge from industry/refineries	35%	24%	48%
Illegal dumping	33%	20%	48%
Cigarette butts	29%	6%	26%
Trash/garbage	28%	16%	40%
Pesticides	26%	8%	33%
Motor oil	22%	4%	22%
Sewage	21%	8%	25%
Run-off from construction sites	18%	5%	20%
Pet waste	14%	1%	10%
Dirt	11%	4%	12%
Yard waste	10%	3%	12%
Other	3%	2%	3%
N=	(402)	(386)	(386)

Q: How much do you think each of the following contributes to water pollution in the Contra Costa area?

Q: If you had to guess, what would you say are the three major causes of water pollution in the Contra Costa area?

Evaluation Results

Advertising & Message Awareness

Advertising & Message Awareness

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

2017-2018 Paid Media Results

- The 2017-2018 paid media campaign had a total budget of $48,738, targeting Contra Costa County residents and used IPM and Anti-Litter messages to drive awareness and engagement.
- The campaign utilized geo-fenced digital ads, keyword targeted ads, digital display, native advertising and streaming :30 audio.
- Additionally, through a partnership with Caltrans, the CCCWP logo was included on ***Protect Every Drop*** campaign messages as added value display banners and outdoor billboards.

Total Impressions: 9,396,844
Total Cost: $48,738
Total Value: $67,783

Vendor	Asset	Impressions Ordered	Impressions Delivered	Cost	Total Value
All Over Media	Pump toppers	4,188,150	4,188,150	$21,706	$21,706
Entercom	Digital display	1,140,000	1,626,755	$12,500	$15,000
Contra Costa Times	Native ads and digital display	1,265,000	1,396,790	$8,650	$14,077
Pandora	:30 Streaming radio and digital display	501,255	555,556	$5,882	$6,000
Caltrans Partnership	Protect Every Drop Digital	-	515,042	-	$6,000
Caltrans Partnership	Protect Every Drop Outdoor		1,114,551		$5,000
Total	-	**7,094,405**	**9,396,844**	**$48,738**	**$67,783**

Advertising & Message Awareness

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

2018-2019 Paid Media Results

- The 2018-2019 paid media campaign had a total budget of $52,482, targeting Contra Costa County residents and gardeners and ran from April 1 through May 5. The campaign's message was "Pesticides Linger" and encouraged residents to use pesticides that are eco-friendly.
- The campaign utilized digital, radio, and bus advertising. Digital advertising included Spanish language creative.

Total Impressions: 13,509,064
Total Cost: $ 52,482.35
Added Value: $26,584 (50%)
Total Campaign Value: $79,066

Medium	Planned Impressions	Impressions	Cost	Value
Radio	1,472,740	1,472,740	$6,300	$7,655
Outdoor	6,634,313	9,979,301	$28,682.36	$44,289.35
Digital	2,176,098	2,057,023	$17,500	$27,122
Total	10,283,151	13,509,064	$52,482.35	$79,066

Advertising & Message Awareness

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

2019-2020 Paid Media Results

- The 2019-2020 paid media campaign had a total budget of $52,482, targeting Contra Costa residents with a special focus on litter and pesticides and ran from April 6 – June 20.
- The campaign utilized radio, outdoor, and digital. Additionally, this campaign ran Spanish language digital display and audio spots.

Total Impressions: 9,842,855
Total Cost: $52,482
Added Value: $76,390
Total Campaign Value: $128,872

Medium	Planned Impressions	Delivered Impressions	Cost	Value
Radio	3,066,800	4,989,218	$8,100	$14,970
Outdoor	4,080,972	2,234,666	$19,849	$80,690
Digital	2,401,380	2,591,354	$22,632	$31,312
Paid Social	NA	27,617	$1,900	$1,900
Total	9,549,152	9,842,855	$52,481	$128,872

Advertising & Message Awareness

Recall of Public Service Messages or Ad Campaigns

- One in five (20%) report reading, seeing, or hearing messages about the importance of keeping the water that goes into Contra Costa's storm drains clean and unpolluted.

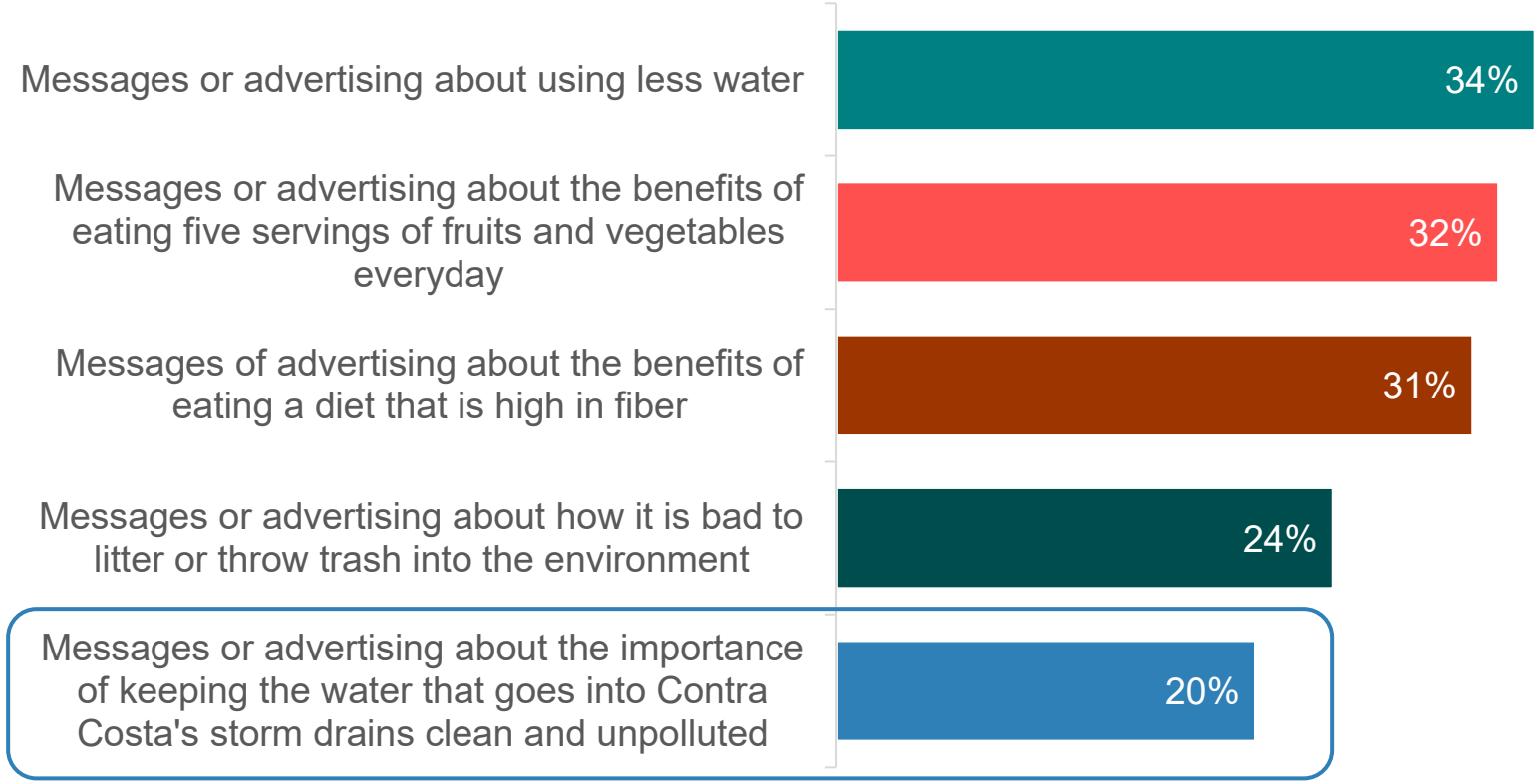

N=(402)

Q: For each message listed, please tell us whether or not you read, saw or heard about it. In the past six months, do you recall reading, seeing or hearing any…

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Source of Messages

- Residents are not certain of the components that sourced such messages. Nine different sources are attributed by one-third to one-half of residents, including sources from prior campaigns in years past. Primary sources of recall are water company bill inserts or flyers and TV commercials (22% each), followed by billboards (12%).
  - TV ads are often misattributed as a source of ad awareness in surveys. Transit shelter ads might be remembered as or assigned to billboards.

	Primary Place	All Places
Bill insert or flyer from water company	22%	49%
TV commercial	22%	44%
Billboard	12%	43%
News Reports/News Reporters	7%	32%
Social media (Facebook, Instagram)	6%	40%
Bus Advertising	5%	32%
Internet/online ad	5%	32%
Radio commercial	4%	35%
Newspaper	2%	32%
Magazine	0%	23%
Other	4%	7%
Don't remember	10%	10%
N who recall such advertising = (81)		

Q: Where did you read, see or hear these messages? Please check the primary place you recall reading, seeing or hearing this message in the last six months in column A and any other places you can recall it from in column B.

Advertising & Message Awareness

Recall & Main Message Recall of Advertising about Keeping Storm Drains Clean & Unpolluted

- Recall of specific messages or elements of such advertising is general, with no dominant theme or playback.
  - For example, among those aware of such advertising, messages related to keeping storm drains clean are played back by only 19% on an unaided basis.
- Nevertheless, several messages from the campaign do break through with a significant minority of residents, suggesting that progress is being made.

What do you remember about the advertising about keeping storm drains clean and unpolluted?

Keep Storm Drains Clean (Net)	*11%*
Water from storm drains goes directly into the rivers/lakes/ocean	*9%*
Proper disposal of toxic waste/chemicals/pollutants	*8%*
Remember a drawing/stencil of a fish	*4%*

What was the one main message that this advertising (about the CCCWP) told you?

Importance of clean environment / being environmentally conscious	*18%*
Don't litter	*15%*
Water conservation	*10%*
Keep our water clean	*9%*
Water from storm drains goes directly into the rivers/lakes/ocean	*8%*
Proper disposal of toxic waste/chemicals/pollutants	*7%*

What was the one main thing the advertising told you?

Keep Storm Drains Clean (Net)	*19%*
Water from storm drains goes directly into the rivers/lakes/ocean	*11%*
Proper disposal of toxic waste/chemicals/pollutants	*6%*
Storm drainage affects/can kill fish/wildlife	*4%*

Q: What do you remember about the advertising about keeping storm drains clean and unpolluted?
Q: What was the one main message that this advertising told you?

Advertising & Message Awareness

Aided Awareness of Program & Slogans

- One in five (20%) have heard of the Contra Costa Clean Water Program.
- About half that number (11%) recall advertising that mentions the slogan “Pesticides Linger”, “Litter Travels”, or “Protect Every Drop”.

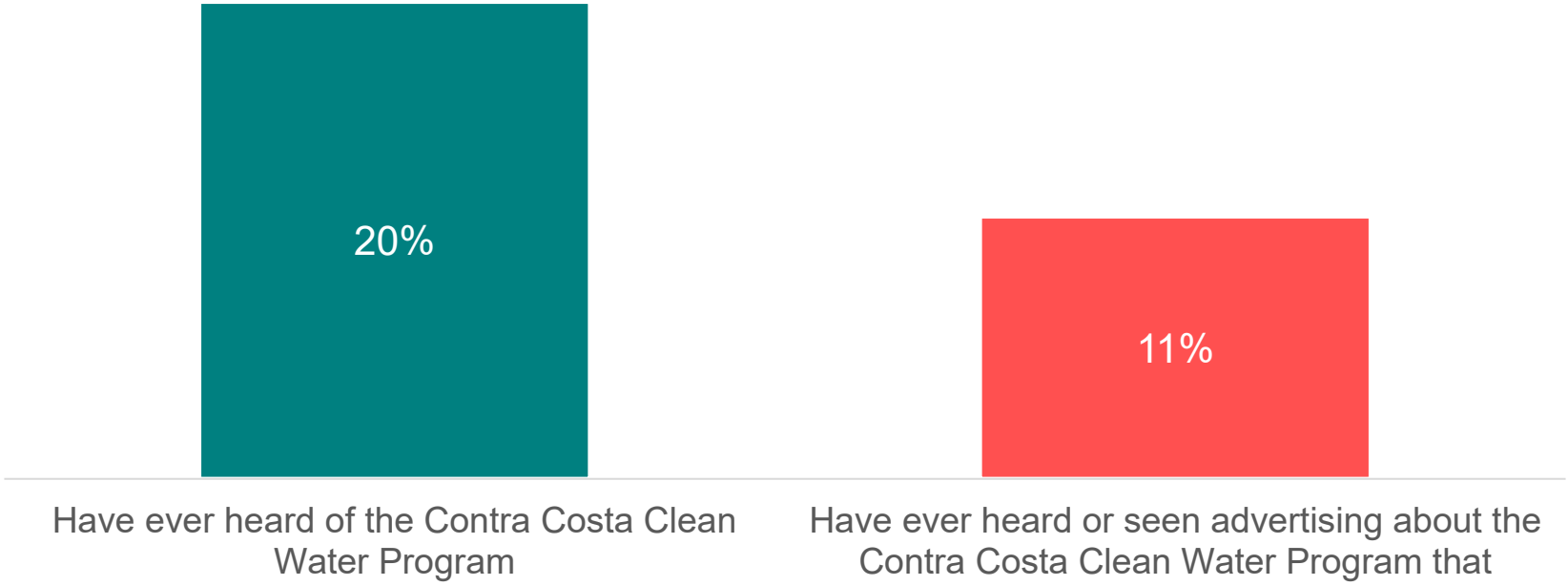

N=(402)

Q: Have you ever heard of the Contra Costa Clean Water Program?
Q: Have you ever heard or seen advertising about the Contra Costa Clean Water Program that mentioned the slogan ”Pesticides Linger”, “Litter Travels”, or “Protect Every Drop”?

Evaluation Results

Fish Consumption & Safety

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Overconsumption by Women

- Female residents eat several kinds of fish more than the guideline safety amount.
- Twenty percent (20%) of women report they eat striped bass, 13% sturgeon, 8% shark, 7% surfperches, and 6% salmon more than the recommended guideline frequency.

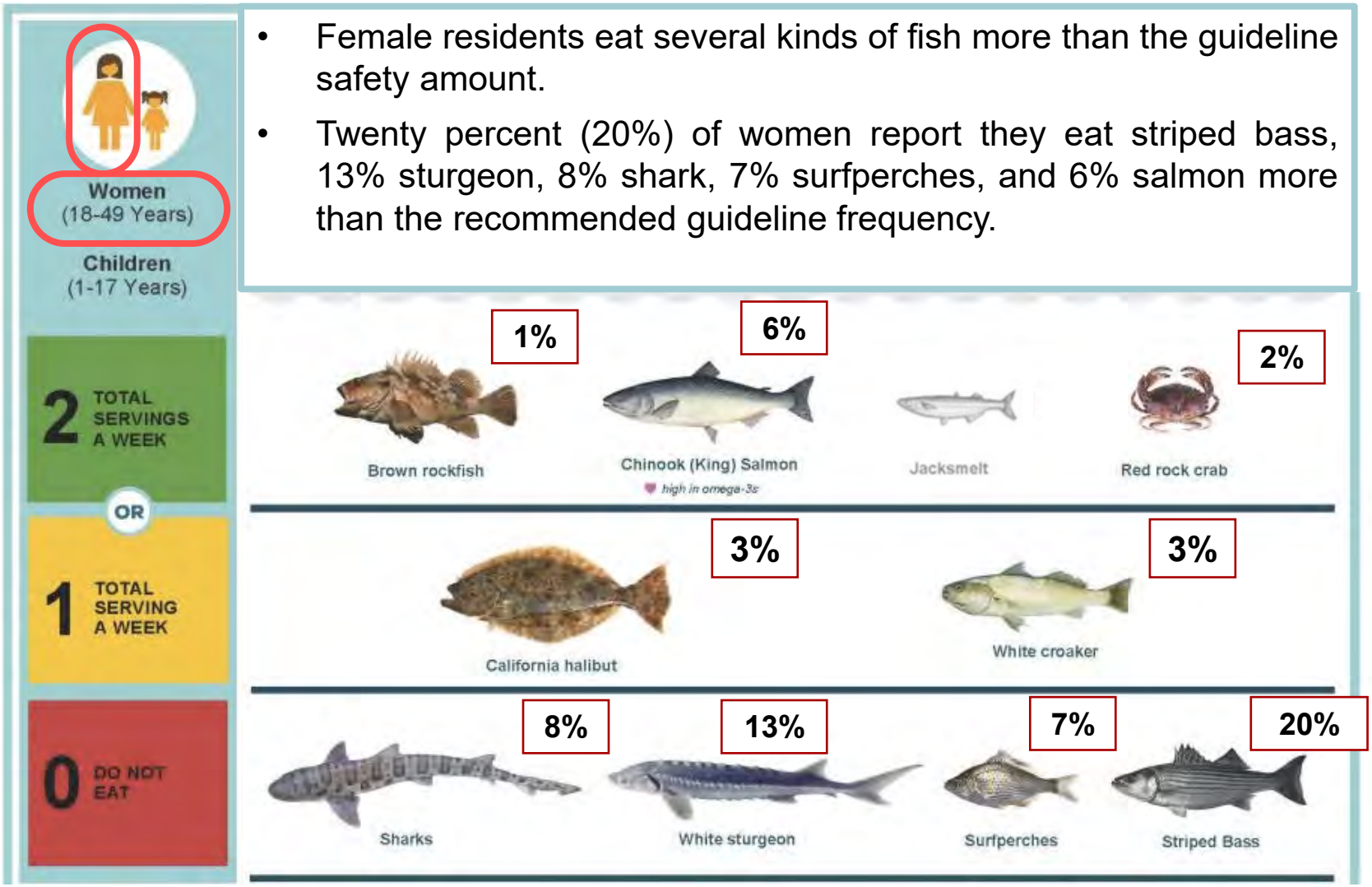

Q: About how often you eat the following kinds of fish?

N of women =(216)

04312
4353

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Perceived Safety In Excess of Threshold for Women

- A large minority of women falsely believe it is safe for themselves to eat three kinds of fish five or more times a week:
  - brown rockfish (22%); red rock crab (21%); white croaker (30%).
- Only 10% know that it is not safe to eat any servings of striped bass. Nearly as few know that it is unsafe to eat any servings of shark, or sturgeon (18% and 20%, respectively).

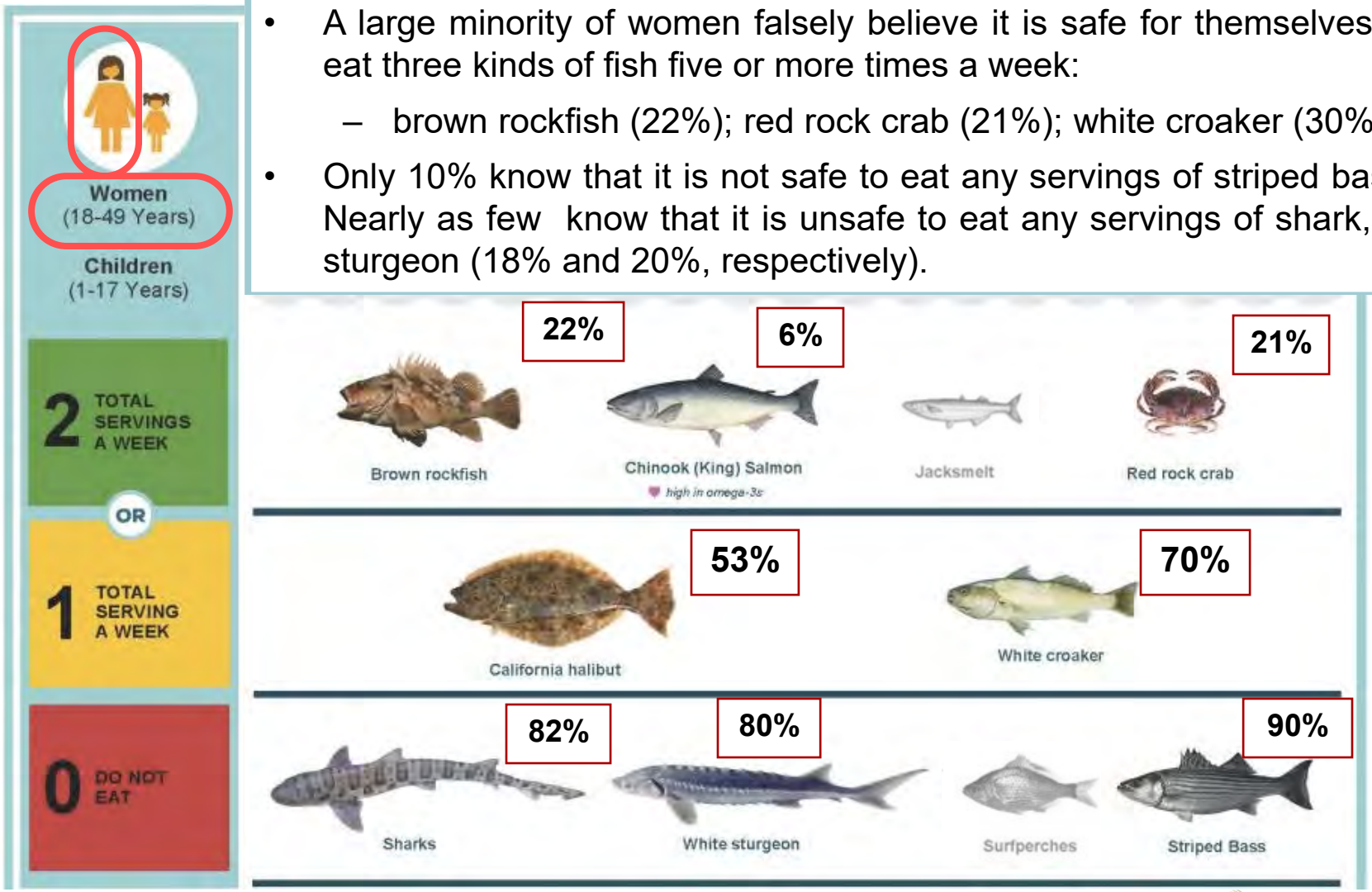

Q: For each kind of fish below, please indicate the greatest number of servings a week it is safe for you to eat that kind of fish.
Base: Those who eat this type of fish at least once a week, N=(varies).

04313
4354

CONSUMERQUEST MARKETING INSIGHT THROUGH RESEARCH

sagent

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Overconsumption by Men

- Men have a higher recommended safety amount for fish than do women.
- Yet even among men, 2-6% consume in excess for several kinds of fish.

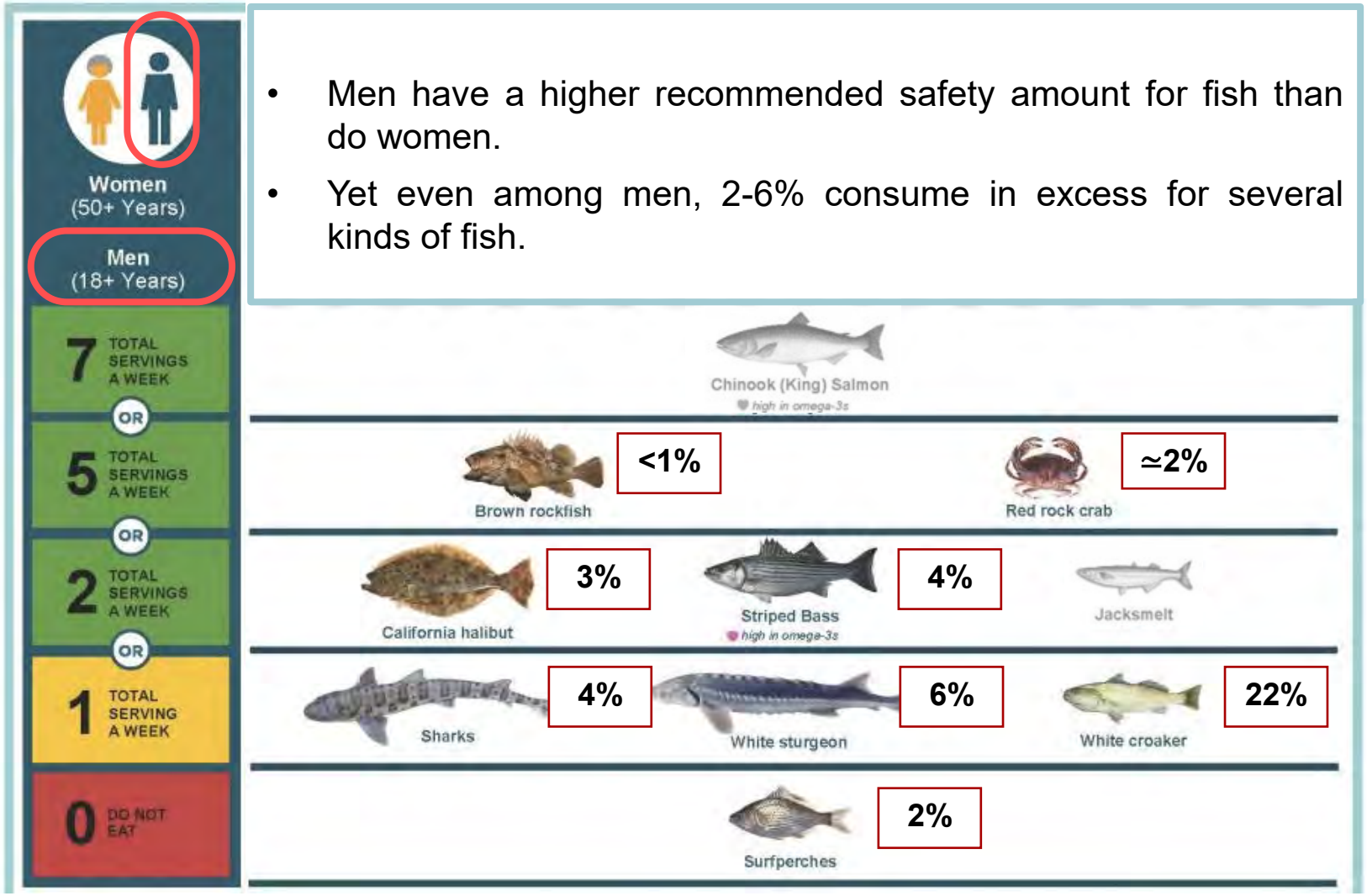

Q: About how often you eat the following kinds of fish?

04314
4355

N of men =(181)

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

Perceived Safety in Excess of Threshold for Men

- A significant minority of men falsely believe it is safe for themselves to eat various kinds of fish more than the recommended amount:
  - California halibut (28%); Striped bass (30%)
- Only 18% know that it is not safe to eat more than one serving of shark per week. One a third know that it is unsafe to eat any servings of white sturgeon or white croaker (33% and 38%, respectively).

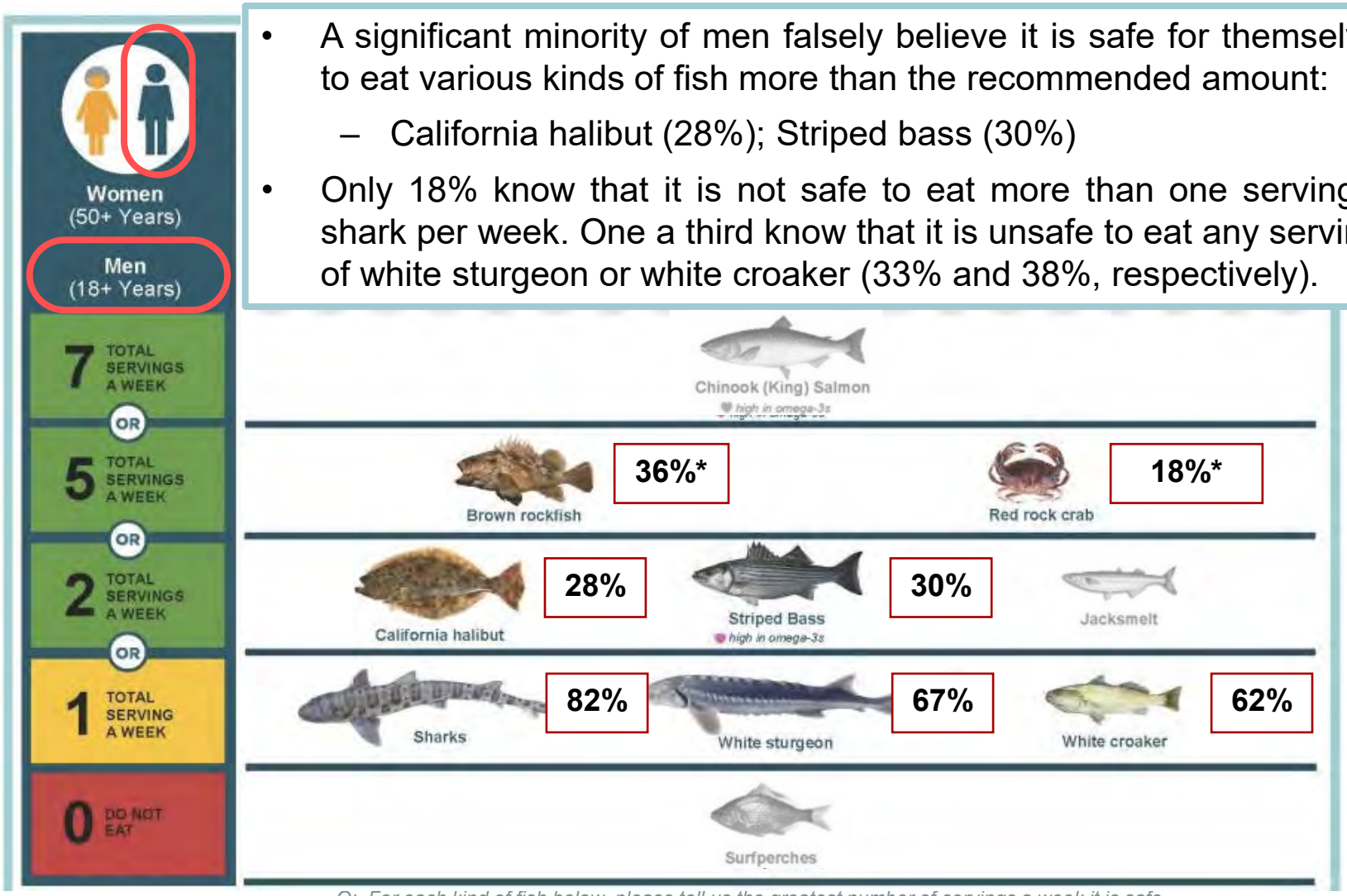

Q: For each kind of fish below, please tell us the greatest number of servings a week it is safe for you to eat that kind of fish.

Base: Those who eat this type of fish at least once a week, N=(varies).

** 5 or more servings*

04315

4356

Evaluation Results

Differences in Subgroups

Differences in Subgroups

Attachment 7.2

CONTRA COSTA CLEAN WATER PROGRAM

By Age

- Older residents age 55 and up are more likely to use pesticides, herbicides, or fertilizers and they are less likely to use organic/ green-friendly ones. On the other hand, these residents are more likely to properly dispose of tech products and electronics and less likely to unintentionally litter.
- Younger residents 18-34 are more likely to improperly dispose pesticides, herbicides or fertilizers, to litter, to unintentionally litter, and to not retrieve unintentional litter. These Millennials express greater relative concern for the area's water bodies.
- Middle-aged residents 35-54 are like their younger neighbors, but to a lesser extent.

	Age 18-34	Age 35-54	Age 55+
Ever use pesticides, herbicides, or fertilizers	33%	41%	58%
Never/Usually do not use organic/green-friendly pesticide or fertilizer	8%	19%	40%
Do not properly dispose of leftover pesticides or fertilizers	67%	47%	22%
Disposes of household batteries in the trash	33%	27%	15%
Disposes of old computers (desktops and laptops) in the trash	6%	4%	0%
Disposes of large screen monitors in the trash	13%	7%	0%
Disposes of medium/small screen computer monitors in the trash	14%	7%	1%
Sometimes litter (or don't care because it's biodegradable)	13%	9%	4%
Littered in Past 90 Days	51%	42%	24%
Mean number of times littered in past 90 days	2.2	2.1	0.8
Unintentionally littered in past 90 days	76%	58%	45%
Never/rarely/only sometimes retrieves unintentional litter	30%	26%	10%
Believe polluted lakes, rivers, streams are a very serious threat to Contra Costa area today	29%	42%	24%
Rank polluted lakes, rivers, streams as top 3 most critical issue in Contra Costa area today	35%	26%	14%
Believe lakes, rivers & streams in the area are polluted and it has very serious consequences	25%	29%	11%
Believe litter is a major problem	52%	49%	33%
N =	(109)	(140)	(153)

Positive attitude or behavior that is significantly greater with 95% confidence

Negative attitude or behavior that is significantly greater with 95% confidence

Differences in Subgroups

Attachment 7.2

By Household Income

CONTRA COSTA CLEAN WATER PROGRAM

- Moderate- and lower-income households in the county are less compliant overall*, particularly when it comes to littering and retrieving unintentional litter. Higher-income households are more likely to use pesticides, herbicides and fertilizers or buy household paints. However, they are more compliant, except when it comes to not bagging their dog's poop.

	Low/Mod. Income: Under $100k	Higher Income: $100k+
Ever use pesticides, herbicides, or fertilizers	37%	55%
Buy household paints	50%	73%
Rinse brushes, rollers, trays in ground/yard/street/gutter	28%	16%
Always/Usually/Sometimes Do Not Bag Dog's Poop	4%	10%
Never litter	65%	46%
Most compliant* (0.3-1.0)	27%	32%
Medium compliant* (1.1-1.5)	29%	41%
Least compliant* (1.6-3.0)	44%	27%
Littered in Past 90 Days	43%	32%
Never/rarely/only sometimes retrieves unintentional litter	30%	13%
N=	(218)	(184)

Positive attitude or behavior that is significantly greater with 95% confidence

Negative attitude or behavior that is significantly greater with 95% confidence

* Compliance rating is the sum across all behavioral questions asked. More points were added for negative actions (i.e., higher scores are undesirable).

Differences in Subgroups

Attachment 7.2

By Region of the County

CONTRA COSTA CLEAN WATER PROGRAM

- Residents of Lamorinda/South are least compliant. They are more likely to believe litter is a major problem but less likely to admit to littering themselves. West residents are also less compliant, especially when it comes to unintentional litter. On the other hand, they are less likely to use pesticides, herbicides or fertilizers. Central/North residents are most compliant.

	Lamorinda/ South	East	Central/ North	West
Ever use pesticides, herbicides, or fertilizers	63%	55%	41%	24%
Wash car in driveway or never wash	49%	51%	37%	50%
Disposes of household batteries in the trash	24%	34%	16%	26%
Most compliant* (0.3-1.0)	23%	23%	38%	28%
Medium compliant* (1.1-1.5)	35%	39%	35%	28%
Least compliant* (1.6-3.0)	42%	38%	27%	44%
Littered in Past 90 Days	27%	45%	39%	38%
Unintentionally littered in past 90 days	49%	53%	61%	68%
Never/rarely/only sometimes retrieves unintentional litter	21%	26%	16%	31%
Believe litter is a major problem	20%	66%	39%	53%
N =	(88)	(87)	(135)	(90)

Positive attitude or behavior that is significantly greater with 95% confidence

Negative attitude or behavior that is significantly greater with 95% confidence

ConsumerQuest Marketing Insight Through Research

* Compliance rating is the sum across all behavioral questions asked. More points were added for negative actions (so higher scores are undesirable).

04319
4360

sagent

Differences in Subgroups

Relationship with Compliance

- The most compliant residents are more likely to believe polluted lakes, rivers & streams are a very serious threat to Contra Costa area today.
- The least compliant residents are less likely to believe lakes, rivers & streams in the area are polluted and that it has very serious consequences.

RELATIONSHIP BETWEEN OVERALL COMPLIANCE* AND OTHER VARIABLES

	Most Compliant	Mid Compliant	Least Compliant
Believe polluted lakes, rivers & streams are a very serious threat to Contra Costa area today	37%	30%	29%
Rank polluted lakes, rivers & streams as top 3 most critical issue in Contra Costa area today	22%	22%	27%
Believe lakes, rivers & streams in the area are polluted and it has very serious consequences	25%	22%	17%
N =	(117)	(138)	(147)

Positive attitude or behavior that is significantly greater with 95% confidence

Negative attitude or behavior that is significantly greater with 95% confidence

* Compliance rating is the sum across all behavioral questions asked. More points were added for negative actions (so, higher scores are undesirable).

Differences in Subgroups

Relationship with Littering

- There is a relationship between littering and unintentional littering. Those who litter are also less careful when it comes to unintentional litter.

RELATIONSHIP BETWEEN LITTERING AND OTHER VARIABLES

	Did Not Litter	Littered At Least Once	Always Picks Up Unintentional Litter	Does Not Always Pick Up Unintentional Litter
Hardly ever /Sometimes litter (or think it's biodegradable)	6%	42%	13%	40%
Littered in Past 90 Days	0%	100%	35%	69%
Mean number of times littered in past 90 days	0.0	4.3	1.2	3.2
Unintentionally littered in past 90 days	42%	84%	100%	100%
Never/rarely/only sometimes retrieves unintentional litter	10%	33%	0%	40%
N =	(251)	(151)	(100)	(133)

Negative behavior that is significantly greater with 95% confidence

Differences in Subgroups

Relationship with Environmental Concern

CONTRA COSTA CLEAN WATER PROGRAM

- People see the detriment in their own littering.
  - The more serious an issue a person thinks is pollution to Contra Costa's water bodies, the more likely they are to litter or believe littering is a problem.

	Believe Issue of Pollution to Contra Costa's Lakes, Rivers & Streams Is		
	Very Serious	Somewhat Serious	Not That Serious
Littered in Past 90 Days	45%	36%	30%
Mean number of times littered in past 90 days	2.4	1.3	1.0
Unintentionally littered in past 90 days	63%	61%	44%
Believe litter is a major problem	62%	40%	25%
N =	(127)	(188)	(87)

Negative attitude or behavior that is significantly greater with 95% confidence

Differences in Subgroups

Attachment 7.2

Ad Recall & Awareness of CCCWP

CONTRA COSTA CLEAN WATER PROGRAM

- Those who recall advertising or messages are more aware of their own littering. They also are more concerned with the area's polluted water bodies and more likely to use organics.
- Those who are aware of the CCCWP consider litter a larger problem, believe storm drains go to a treatment plant, and are more likely to admit to unintentional littering.

	Recall Ads about Keeping Storm Water Clean	Do Not Recall Ads or Not Sure	Heard of CCCWP	Have Not Heard of CCCWP: or Not Sure
Never/Usually Do Not Use Organic or Green-Friendly Pesticide or Fertilizer	15%	30%	18%	30%
Disposes of household batteries in the trash	25%	24%	16%	26%
Hardly ever /Sometimes litter (or think it's biodegradable)	32%	16%	23%	19%
Littered in Past 90 Days	48%	35%	46%	36%
Unintentionally littered in past 90 days	77%	53%	68%	55%
Believe polluted lakes, rivers, streams are a very serious threat to Contra Costa area today	46%	28%	43%	29%
Believe lakes, rivers & streams in the area are polluted and it has very serious consequences	30%	19%	28%	19%
Believe storm drains go to treatment plant	25%	28%	38%	25%
Believe litter is a major problem	47%	43%	57%	41%
N =	(81)	(321)	(79)	(323)

Positive attitude or behavior that is significantly greater with 95% confidence

Negative attitude or behavior that is significantly greater with 95% confidence

Future Outreach Campaigns

Future Outreach Campaigns

- To influence awareness and behavior changes regarding stormwater runoff pollution prevention messages, the CCCWP is pivoting its strategy from past years to adapt to the new times.

- There will be a large focus on a virtual and digital channels, including:
  - Videos focusing stormwater to be shared to all ages.
  - Hosting virtual workshops or events with partners.
  - Multi-channel social media campaign to reach all target markets.
  - Creating a series of recorded Zoom videos, hosting a subject-matter expert partner having conversations about various clean water topics.

Appendix
Questionnaire

Questionnaire

CONTRA COSTA CLEAN WATER PROGRAM AWARENESS & BEHAVIORS STUDY
CONSUMERQUEST # 1703 -- 05/20
3231 Ocean Park Blvd., Ste. 104
Santa Monica, CA 90405
tele (310) 207-6605

QUESTIONNAIRE

(DISABLE BACK BROWSER BUTTON. HALF OF INVITATIONS SHOULD BE SENT TO MALE HEAD OF HOUSEHOLD, HALF TO FEMALE HEAD OF HOUSEHOLD. DESCRIBE THE SUBJECT MATTER OF SURVEY AS: "living in Contra Costa County.")

A1. Do you identify as...

1. Male
2. Female
3. Non-binary / Transgender / Non-conforming

SCREEN AN EQUIVALENT BALANCE OF 1 AND 2.

A2. Which of these groups includes your age?

1. Under 18
2. 18-34
3. 35-54
4. 55 or over

IF "1", TERMINATE. SCREEN ROUGHLY 25%, 35%, 40%, RESPECTIVELY.

A3. Considering the income of all members of your household, which category best describes your total annual household income before taxes in 2019?

1. Less than $50,000
2. $50,000 to $74,999
3. $75,000 to $99,999
4. $100,000 to $149,000
5. $150,000 or more

GET A MIX OF INCOMES.

B1. Do you live in California?

1. Yes
2. No → TERMINATE.

B2. In which of these counties do you currently live? Please click one.

1. Alameda County
2. Contra Costa County
3. Fresno County
4. Kern County
5. Los Angeles County
6. Marin County
7. Merced County
8. Napa County
9. Orange County
10. Riverside County
11. Sacramento County
12. San Bernardino County
13. San Diego County
14. San Francisco County
15. San Joaquin County
16. San Mateo County
17. Sonoma County
18. Santa Clara County
19. Solano County
20. Another county in California

TERMINATE IF ANSWER IS NOT "2".

Click to access PDF

Attachment 7.2

3231 Ocean Park Blvd., Suite 104 ● Santa Monica, CA 90405 ● tele. (310) 207-6605 ● www.consumerquest.com

Attachment 8.1

Letter to the CVRWQCB Documenting
Pyrethroid Pesticide and Toxicity Monitoring

CONTRA COSTA
CLEAN WATER
PROGRAM

Courtney Riddle
Program Manager

August 31, 2020

Patrick Pulupa, Esq., Executive Officer
California Regional Water Quality Control Board, Central Valley Region
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Michael Montgomery, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

SUBJECT: Completion of Baseline Pyrethroid Monitoring and Commitment to Continue Implementing a Pyrethroid Management Plan

Dear Mr. Pulupa and Mr. Montgomery,

The Contra Costa Clean Water Program (CCCWP) has reviewed your July 30, 2019 letter to all municipal separate storm sewer system (MS4) dischargers in the Central Valley requiring baseline pyrethroid pesticide monitoring and implementation of a pyrethroid management plan. Our permittees in the Central Valley region began conducting baseline pyrethroid monitoring in 2012. They have been implementing the functional equivalent of a Pyrethroid Management Plan since 2010 - first through Provision C.9 of an NPDES stormwater permit issued by the Central Valley Water Board, and currently under Provision C.9 of our stormwater permit issued by the San Francisco Bay Water Board. The CCCWP respectfully submits this letter outlining our pyrethroid monitoring program and management plan on behalf of the Cities of Brentwood, Antioch, and Oakley; the Contra Costa County Flood Control and Water Conservation District (District); and unincorporated Contra Costa County (County) (collectively referred to as the East County Permittees).

Background

The Contra Costa Clean Water Program serves all 19 cities and towns in Contra Costa County, plus the District and the County, in the administration of applicable National Pollutant Discharge Elimination System (NPDES) permits regulating the discharge of urban stormwater. East County Permittees are located entirely or partly within the jurisdiction of the Central Valley Regional Water Quality Control Board (Central Valley Water Board). Watershed plans and policies issued by the Central Valley Water Board that affect NPDES stormwater permits are applicable to East County Permittees.

Prior to 2019, East County Permittees enrolled in coverage under a municipal stormwater permit issued by the Central Valley Water Board – the most recent being Order No. R5-2010-0102. As of January 2019, municipal stormwater discharges from East County Permittees are authorized

255 Glacier Drive, Martinez, CA 94553-4825 • Tel: (925) 313-2360 Fax: (925) 313-2301 • Website: www.cccleanwater.org

Program Participants: Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Contra Costa County and Contra Costa County Flood Control & Water Conservation District

under the Municipal Regional Stormwater NPDES Permit (MRP), Order No. R2-2015-0049 as amended in 2019, issued by the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board). This administrative mechanism recognizes and promotes CCCWP's Countywide approach to monitoring and managing pollutants of concern in urban stormwater.

Baseline pyrethroid monitoring commenced in 2012 in compliance with monitoring provision C.8 in the Central Valley Water Board's Order No. R5-2010-0102. The order required wet season monitoring of stormwater for pyrethroid pesticides and toxicity; monitoring dry weather flows for toxicity; and dry weather monitoring of sediments for pyrethroid pesticides and toxicity. Notably, the order in effect at the time did not require monitoring dry weather flows for pyrethroids.

In 2014 the CCCWP conducted a stressor source identification study (SSID) in Dry Creek (544R0025), a tributary to Marsh Creek in the Brentwood area (CCCWP, 2014). The SSID study included toxicity identification evaluations that confirmed the role of pyrethroid pesticides in causing toxicity to *Hyalella azteca*, as initially suggested by prior chemistry results from stormwater monitoring. The SSID study concluded in 2015 with an assessment of legal consumer pesticide sales and agricultural use in Contra Costa County, confirming that replacement of pyrethroids for now restricted diazinon and chlorpyrifos could account for the pesticide-associated toxicity (CCCWP, 2015). In 2018 CCCWP initiated a study of the causes of fish kills in Marsh Creek. That study included three events when dry weather flows were monitored for pyrethroid pesticides. When East County Permittees were added to the San Francisco Bay Water Board's MRP in 2019, the CCCWP commenced monitoring dry weather flows for pyrethroids and continued monitoring toxicity in dry weather flows and sediments, as well as pyrethroids and toxicity in stormwater.

All pyrethroids and toxicity monitoring conducted on behalf of East County Permittees focused on Marsh Creek and its tributaries. Marsh Creek is the second largest watershed in Contra Costa County and the dominant watershed feature in urbanized eastern Contra Costa County. As such, the CCCWP considers Marsh Creek pyrethroids monitoring to represent conditions of urban stormwater for the East County Permittees' jurisdictions.

Provision C.9 of Order No. R5-2010-0102 and Provision C.9 of the San Francisco Bay MRP currently in effect require implementation of a pesticide control program. The elements of Provisions C.9 are consistent with Central Valley Water Board requirements for a pesticide control program. This is expected because CCCWP understands that the Central Valley Water Board requirements for a pesticide control program were modeled on the San Francisco Bay Water Board's MRP provision C.9.

In summary, through compliance with the prior and existing permit, the CCCWP has monitored pyrethroid pesticides and implemented a Pesticide Control program since adoption of Order No. R5-2010-0102 in 2010. Details of monitoring actions are explained below and in Attachment 1 to show that the value of CCCWP monitoring is equivalent to the baseline pyrethroids monitoring program expected by the Central Valley Water Board. The San Francisco Bay MRP Provision C.9 is provided as Attachment 2 to show the functional equivalence of the CCCWP's pesticide control program.

Functional Equivalence of CCCWP's Baseline Pyrethroids Monitoring

The Central Valley Water Board's requirements for pyrethroid monitoring include:

- A Quality Assurance Project Plan (QAPP), in accordance with the quality assurance/quality control (QA/QC) and other protocols established by the Surface Water Ambient Monitoring Program (SWAMP);
- Environmental Laboratory Accreditation Program (ELAP) - accredited laboratories and methods for chemistry and toxicity testing;
- Analysis of the following pyrethroids: bifenthrin; cyfluthrin; cypermethrin; esfenvalerate; Lambda-cyhalothrin; and permethrin;
- Analysis of dissolved and total organic carbon with water samples;
- Toxicity testing using *Hyalella azteca;* and
- Collection of QA/QC samples for least 20 percent of all samples collected.

The CCCWP's pyrethroid and toxicity monitoring meet all of the above requirements with the exception of dissolved organic carbon measurements, which were not required by Order No. R5-2010-0102 and are not required by the San Francisco Bay MRP.

The seasonal timing, sample matrices, tests, and frequencies expected by the Central Valley Water Board in a baseline monitoring program are summarized in Table 1 below, which also compares Central Valley Water Board expectations to the number of samples collected by CCCWP for each season/matrix/test.

Table 1. Comparison of Central Valley Water Board Pyrethroid and Toxicity Baseline Monitoring Frequency to the Numbers of Samples Collected by CCCWP

Season	*Matrix*	*Test*	*Baseline frequency specified by CVRWQCB*	*# Samples Analyzed by CCCWP, 2012 - 2019*
Wet	Water	Pyrethroids	3 / year	12
Wet	Water	Toxicity - *Hyalella azteca*	3 / year	13
Dry	Water	Pyrethroids	1/ year	3
Dry	Water	Toxicity - *Hyalella azteca*	1/ year	3
Dry	Sediments	Pyrethroids	3 / year	8
Dry	Sediments	Toxicity - *Hyalella azteca*	1/ year	9

Table 1 shows that the total number of samples collected by CCCWP for each combination of season/matrix/test is equivalent to at least three years' worth of baseline pyrethroids and toxicity monitoring required by the Central Valley Water Board. The summary shown in Table 1 is for samples collected in Eastern Contra Costa County (i.e., in the Centra Valley Region). The samples were collected as part of a larger regional collaborative that has collected over 70 sediment samples and more than a dozen water samples for pyrethroids since 2012. That sampling program followed SWAMP guidance for QAPP development and QA/QC procedures in effect at the time.

In summary, the pyrethroid and toxicity monitoring provided by CCCWP provides at least equivalent – or better – value compared to Central Valley Water Board's requirements for baseline monitoring. The dissolved organic carbon variance noted above is non-substantive in that it does not affect the finding that pyrethroids exceed water quality standards. The SSID studies added value by (1) providing direct evidence linking *Hyalella azteca* mortality to pyrethroids and (2) demonstrating the potential role of legal pyrethroid use. The CCCWP finds that the data are sufficient to support implementation of a Pyrethroid Management Plan and intends to continue doing so through compliance with provision C.9 of the San Francisco Bay MRP.

Reporting Requirements

We understand Central Valley Water Board requirements include a baseline monitoring report that:

- Summarizes the pyrethroid and toxicity monitoring results;
- Assesses the compliance of the discharge with the conditional prohibition triggers in the Basin Plan established by Resolution R5-2017-0057;
- Summarizes toxicity of water and sediment samples to the test organism *Hyalella azteca*; and
- Summarizes any other pyrethroid monitoring data collected by Discharger during the above period.

That baseline monitoring report is expected by the Central Valley Water Board by September 19, 2022. Although we have previously submitted the above information in our annual Urban Creeks Monitoring Reports, we recognize the convenience of having all pyrethroid and toxicity data compiled in a single location. CCCWP will compile and submit the required information by the September 19, 2022 deadline stipulated for other Central Valley municipal stormwater dischargers.

We hope this information clearly demonstrates compliance with the Central Valley Water Board requirements for municipal stormwater dischargers for monitoring and managing pyrethroids. If you have any questions, please do not hesitate to reach out.

Regards,

Karin Graves, Sr. Watershed Management Planning Specialist
Contra Costa Clean Water Program

cc: Daniel McClure, CVRWQCB
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East County Permittees
Mitch Avalon, CCCWP

Attachments:

1) Details of CCCWP Pyrethroid and Toxicity Monitoring Locations and Timing
2) San Francisco Bay MRP Provision C.9

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Attachment 1: Details of CCCWP Pyrethroid and Toxicity Monitoring Locations and Timing

Season	Sample Matrix	Test	Location	Station Code	Year(s)	# Samples	Data Reference
Dry	Sediment	Pyrethroids	Dry Creek (tributary to Marsh Creek)	544R00025	2012	1	CEDEN
Dry	Sediment	Pyrethroids	Dry Creek (tributary to Marsh Creek)	544MSH065 and 544MSH062	2014	4	CCCWP (2015)
Dry	Sediment	Pyrethroids	Lower Marsh Creek at Along Sand Creek Trail	544MSH045	2019	1	CEDEN
Dry	Sediment	Pyrethroids	Marsh Creek 30m Southwest of Brentwood Blvd	544R00281	2013	1	CEDEN
Dry	Sediment	Pyrethroids	Marsh Creek Just Upstream of Dainty Ave.	544R01737	2018	1	CEDEN
Dry	Sediment	Toxicity -	Dry Creek	544R00025	2012	1	CEDEN
Dry	Sediment	Toxicity -	Dry Creek (tributary to Marsh Creek)	544MSH065 and 544MSH062	2014	4	CCCWP (2015)
Dry	Sediment	Toxicity -	Lower Marsh Creek at Along Sand Creek Trail	544MSH045	2019	2	CEDEN
Dry	Sediment	Toxicity -	Marsh Creek 30m Southwest of Brentwood Blvd	544R00281	2013	1	CEDEN
Dry	Sediment	Toxicity -	Marsh Creek Just Upstream of Dainty Ave	544R01737	2018	1	CEDEN
Dry	Water	Pyrethroids	Lower Marsh Creek	M2	2018-2019	2	CCCWP (2020)
Dry	Water	Pyrethroids	Sand Creek (tributary to Marsh Cr) at flow source	NA	2018	1	CCCWP (2020)
Dry	Water	Toxicity -	Lower Marsh Creek at Along Sand Creek Trail	544MSH045	2019	1	CEDEN
Dry	Water	Toxicity -	Marsh Creek 30m SW of Brentwood Blvd	544R00281	2013	1	CEDEN
Dry	Water	Toxicity -	Marsh Creek Just Upstream of Dainty Ave.	544R01737	2018	1	CEDEN
Wet	Water	Pyrethroids	Dry Creek (tributary to Marsh Creek)	544MSH065 and 544MSH062	2014	4	CCCWP (2015)
Wet	Water	Pyrethroids	Lower Marsh Creek	LMarCr	2012 - 2014	8	CEDEN
Wet	Water	Toxicity -	Dry Creek (tributary to Marsh Creek)	544MSH065 and 544MSH062	2014	4	CCCWP (2015)
Wet	Water	Toxicity -	Lower Marsh Creek at Fish ladder	LMarCr	2012 - 2014	8	CEDEN
Wet	Water	Toxicity -	Marsh Creek 30m SW of Brentwood Blvd	544R00281	2013	1	CEDEN

California Data Exchange Network (CEDEN). Data downloaded by searching on Contra costa County and specified matrix and parameter group. Available at:www.ceden.org, last accessed 7/28/2020.

Contra Costa Clean Water Program, 2014. Report of Stressor / Source Identification Studies for Dry Creek and Grayson Creek, Part A. Appendix A-3 of CCCWP Integrated Monitoring Report for Water Years 2012 – 2013. Available at: http://www.cccleanwater.org/userfiles/kcfinder/files/CCCWP-SSID-Part-A-Report-with-Appendices-FINAL-DRAFT-12-03-14.pdf (last accessed 7/23/2020)

Contra Costa Clean Water Program, 2020. Marsh Creek Stressor and Source Identification Study: Year 2 Report. Appendix 3C of CCCWP Integrated Monitoring Report for Water Years 2014 – 2019. Available on request.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system.

This provision implements requirements of the TMDL for Diazinon and Pesticide-Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur, because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Urban-use pesticides of concern to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin); and carbamates (e.g., carbaryl and aldicarb).

C.9.a. Maintain and Implement an Integrated Pest Management (IPM) Policy or Ordinance and Standard Operating Procedures

All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of IPM[40] and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance.

[40] IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. IPM techniques could include biological controls (e.g., ladybugs and other natural enemies or predators); physical or mechanical controls (e.g., hand labor or mowing, caulking entry points to buildings); cultural controls (e.g., mulching, alternative plant type selection, and enhanced cleaning and containment of food sources in buildings); and reduced risk chemical controls (e.g., soaps or oils).

i. Task Description – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides do not cause or contribute to pesticide-caused toxicity in receiving waters.

ii. Implementation - Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property.

iii. Reporting

(1) In their Annual Reports, the Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of pesticides of concern to water quality as listed in the introduction section of this Provision. Trends and quantities of pesticide active ingredient usage shall be reported beginning with the September 2017 Annual Report.

(2) In their Annual Reports, the Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and examples of integration of several strategies into a cohesive whole, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term.

(3) IPM policies or ordinances and IPM standard operating procedures shall be submitted to the Water Board upon request.

C.9.b. Train Municipal Employees

i. Task Description– The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy or ordinance and standard operating procedures. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided.

ii. Reporting

(1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in their IPM policy or ordinance and IPM standard operating procedures

within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc.

(2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.

C.9.c. Require Contractors to Implement IPM

i. Task Description – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall observe contractor pesticide applications to verify that contractors implement their contract specifications in accordance with the Permittee's IPM policies or ordinance and standard operating procedures. Permittees shall note that contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee an individual employee will always use IPM strategies. Thus, periodic Permittee observation of contractor performance is necessary.

ii. Implementation – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used.

iii. Reporting – In their Annual Reports, the Permittees shall state how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.

C.9.d. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (http://www.cdpr.ca.gov/docs/legbills/rulepkgs/11-004/text_final.pdf).

ii. Reporting – In their Annual Reports, the Permittees shall briefly describe the communications they have had with county agricultural commissioners and report followup actions to correct violations of pesticide regulations.

C.9.e. Public Outreach

i. Task Description – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce their reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.

ii. Implementation – The Permittees shall conduct each of the following:

(1) **Point of Purchase Outreach**: The Permittees shall:

- Conduct outreach to consumers at the point of purchase;
- Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and
- Participate in and provide resources for the "Our Water, Our World" program or a functionally-equivalent pesticide use reduction outreach program.

(2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM).

(3) **Outreach to Pest Control Professionals:** The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by Ecowise Certified or a functionally-equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BASMAA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators.

iii. Reporting – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f.).

C.9.f. Track and Participate in Relevant Regulatory Processes

i. Task Description – The Permittees shall conduct the following activities, which may be done at a county, regional, or state wide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. Reporting – In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or state wide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

C.9.g. Evaluate Implementation of Pesticide Source Control Actions

i. Task Description – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.

ii. Implementation – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule.

iii. Reporting – In their 2019 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-e and g; a discussion of any improvements

made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.

Attachment 9.1

Contra Costa Clean Water Program
Our Water Our World Store Partnership Program Report
2019-2020

OUR WATER — OUR WORLD

Contra Costa Clean Water Program
Our Water Our World Store Partnership Program Report
2019 - 2020

Report prepared by Debi Tidd

"Everything was helpful and the handouts are great."
From training evaluation, Annie's Annuals, Richmond

"So much great info to suggest and absorb, love the handouts."
From training evaluation, Sloat, Martinez

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OUR WATER — OUR WORLD

PROGRAM OVERVIEW

During the 2019 – 2020 fiscal year, thirty-three stores in Contra Costa County participated in the Our Water Our World Store Partnership Program. The contract lead was Debi Tidd, with Patrice Hanlon and Annie Joseph working as sub-contractors at some stores and events.

NUMBERS AT A GLANCE

- 33 stores participating in the partnership.
- 33 store set-ups with shelf talkers, fact sheet racks and supplemental materials.
- 8 store trainings provided
- 68 staff trained at formal staff trainings; 65+ additional staff trained in-aisle during informal, mentoring visits.
- 10 tabling/outreach events (approximately 400 people reached at outreach events plus an additional 300+ customers we worked with in-aisle while mentoring stores).
- Additional outreach/publicity events (6109 people reached; see locations and numbers of additional programs below).

Tasks we completed during this year included:

- Store Set-ups and Re-sets: We set-up and maintained store materials including shelf talkers and fact sheet racks. Many stores re-organize their shelves after receiving new products for the year, and these stores required a re-set of all the shelf talkers.
- Store Trainings: We were able to provide staff trainings for a number of our stores. In some stores we were able to provide formal trainings with dedicated time for staff attendance. Where we were not able to provide a formal training, we provided in-aisle trainings for new staff during our regular mentoring visits.
- Store Mentoring: Each store was visited on a monthly basis to replace/add shelf talkers and fact sheets, to work with staff and customers to identify pest problems and find eco-friendly solutions, to answer staff questions, and to bring in seasonal and new resources and handouts.
- Public Outreach: We provided both tablings for customers in stores, and classes/presentations for the public at community events.
- End cap displays: we worked with store staff and product vendors to make product recommendations and label displays of eco-friendly products.

- Program Assessment: During the year we were able to compile data from pre and post surveys, as well as data on customer interactions/questions, product choices and changes in products stocked by stores.

IMPACTS OF COVID-19 ON THE OWOW PROGRAM IN OUR STORES

The shelter-in-place order that began in mid-March had a substantial impact on our ability to work in the stores. All of the staff trainings and public tablings scheduled for Spring were cancelled. This is normally our busiest time of year in the stores. In addition, some of our stores closed while others had radically reduced hours or they closed indoor portions of the store where products were located. We were able to get back into the stores in June to make sure all of the shelf talkers and fact sheet racks were taken care of, and to answer customer and staff questions.

In response to the shelter-in-place, we made calls to check in with our stores, and we sent out a letter of support reminding stores that we could still answer questions and provide resource materials. A copy of this letter is included at the end of this report.

However, in some ways this challenge also opened up some new opportunities for the program. With concerns about gatherings of people required for trainings and tablings, we have started to look at on-line options. As part of a pilot program, a number of classes were developed on IPM topics and offered as live, on-line programs for the public sponsored by Napa, Alameda and Marin Counties. Registration data shows that a large number of the participants live in Contra Costa County. These classes were hugely successful, often filled to capacity with 100 sign-ups. Based on evaluations, the overall rating for the classes was nine out of ten stars. Topics for classes included organic gardening, attracting beneficials to the garden, and concerns of the summer garden. In all programs, OWOW materials and IPM methods were highlighted.

This opens up a whole new audience of folks who might not be coming into stores, and for folks who have more time to spend learning tips and techniques when at home as opposed to running a quick errand in the store. Because these are live classes, participants can ask and get answers in real time to their pest questions.

We are hoping to offer these classes in Contra Costa during the coming year. In addition, we will be developing a series of trainings for store staff so that we can still get this information out to the stores.

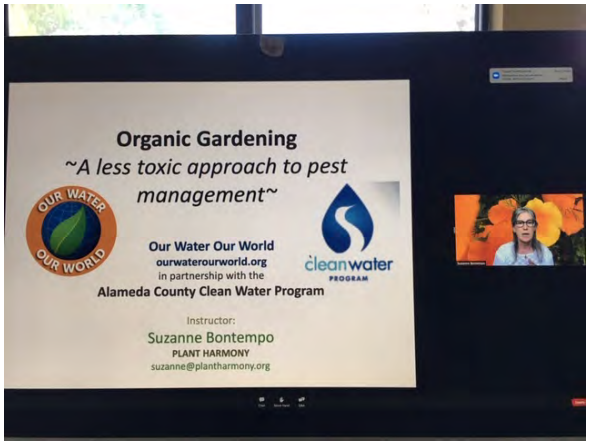

On-line outreach class on organic gardening

NEW IPM ADVOCATE TRAINING

With the demand for our help in the stores continuing to grow, we offered a training program in the Fall of this year to recruit a new group of IPM Advocates to help in our stores. We had six participants in this training, and they began working with us in early Spring.

New IPM Advocates at our Fall training

LIST OF PARTNER STORES

Here is the roster of stores participating in the 2018 – 2019 program:

Alamo

1. Ace Hardware

Antioch

2. Ace Hardware
3. Morgan's Home and Garden Center

Brentwood

4. Ace Hardware
5. Home Depot

Concord

6. Emerald City Garden
7. Bills Ace Hardware
8. Sloat Garden Center
9. Home Depot

Danville

10. Sloat Garden Center (Diablo Road)
11. Sloat Garden Center (Camino Ramon)

El Cerrito

12. Home Depot
13. Ace Hardware

El Sobrante

14. Oliver's Ace Hardware

Hercules

15. Home Depot

Lafayette

16. Orchard Nursery and Florist
17. Ace Hardware

Martinez

18. Bills Ace Hardware
19. Sloat Garden Center
20. Home Depot

Moraga

21. Moraga Garden Center

Oakley

22. Ace Hardware

Orinda

23. McDonnell Nursery

Pittsburg

24. Home Depot
25. Ace Hardware

Pleasant Hill

26. Sloat Garden Center
27. Ace Hardware

Richmond

28. Annie's Annuals

29. Urban Farmer Store

Rodeo

30. True Value Hardware

San Ramon

31. Home Depot

Walnut Creek

32. Ace Hardware (Mt. Diablo)
33. Ace Hardware (Ygnacio Valley Road)

PROGRAM COMPONENTS

PROGRAM ADMINISTRATION AND DEVELOPMENT

Here are some of the administrative tasks completed this year:

- A yearly inventory of all the OWOW materials was completed, and new materials were ordered. These materials were labeled and stored at the Clean Water offices.
- Revisions and updates were made in all of the training packet materials and tabling handouts, and orders were placed for laminated bug guides and pest id cards for stores.
- All of our product lists, guides and pest calendars were revised to reflect changes in products stocked by stores and new pests.
- Training packet materials were copied, collated and made into packets, and training powerpoints were revised for Home Depot and general store trainings.
- We researched and followed up on questions from staff and customers regarding pest management strategies and new pests. We continue to work with store managers to update them on changes in the pesticide aisle.
- A final report on our progress was submitted at the end of the fiscal year.

Several handouts are provided each year to answer questions and concerns from staff and customers and to provide seasonal information. Some handouts are included in the rack, and others are provided at tablings. These additional handouts include:

- Dormant Spray – Customers commonly ask for help with peach leaf curl in Spring when it is too late to treat. We include these handouts in racks in the fall to highlight correct timing for dormant spraying and to make sure customers are not using products when they are not effective.

- Fall and Winter Garden Checklist – This handout includes seasonal information about how to maintain a landscape without the need for pesticides, including reminders about organic fertilizers, mulching, and sanitation to reduce pests.

- Fight the Bite: Services Provided by the Contra Costa Mosquito and Vector Control District: This handout is included in the fact sheet rack and reminds customers about the free services they can receive in managing mosquitoes, rats and ticks from Contra Costa County

- Monthly Pest Calendar: Pest calendars are used as a guide for customers and staff on the timing of common pests and the products they can use to manage these pests. Calendars are revised each year to reflect changes in products. There are two versions, a general version and one specifically designed for Home Depot stores.

Our Water Our World
2020 Monthly Pest-At-A Glance Calendar

Month	Pest/Disease	Notes	Resources	Products to Highlight
January	Weeds	Pull/treat weeds when they are small; some herbicides require warm weather	OWOW Weed Fact Sheet	Bonide Burn Out; Ortho Grandslam; Pulverize; Dr. Earth Weed & Grass; Natru Grass & Weed Control
February	Rose Care	Mulch to prevent fungal diseases & conserve water	OWOW Rose Fact Sheet	Bonide All Seasons Oil; Rose Rx; Neem Oil; Serenade
March	Snail/Slug Codling Moth	Snails: water early to prevent wet foliage at night Use traps to monitor for codling moth	OWOW Snail & Slug Fact Sheet OWOW Codling Moth Handout	Sluggo/Iron phosphate baits Copper Tape Codling Moth Trap/Captain Jack's/Monterey Garden Insect
April	Aphids	Look for ladybugs & other beneficials that eat aphids	OWOW Aphid Fact Sheet	Soaps and oils
May	Grubs	Buy beneficial nematodes on-line to manage grubs	OWOW Lawn Grub Handout	Beneficial Nematodes
June	Mosquitoes	Check for standing water/screen windows	OWOW Mosquito Fact Sheet	Mosquito Dunks, Plunks and Bits
July	Yellowjackets	Set traps at perimeter of yard, not near eating areas	OWOW Yellowjacket Fact Sheet	Yellowjacket traps/lures Zero Wasp, Hornet, Yellowjacket
August	Fleas & Flies	Flies: remove pet waste & fallen fruit Fleas: use nematodes in outside breeding areas	OWOW Flea Fact Sheet	Fly Traps, Fly Tape Nematodes outside Flea Traps
September	Ants Citrus Leafminer	Seal entries with caulk/manage aphids to discourage ants Monitor for citrus leafminer	OWOW Ant Fact Sheet OWOW Citrus Leafminer Handout	Tanglefoot, Rescue & Revenge ant baits/Orange Guard Citrus leafminer traps/Captain Jack's
October	Rats/Mice	Pick up fallen fruit/nuts Seal entries with foam	OWOW Rats and Mice Fact Sheet	Rat/Mouse Traps Rat X & Mouse X
November	Dormant Spray	Use when roses and fruit trees have lost their leaves	OWOW Rose Fact Sheet	Bonide All Seasons Oil Bonide Copper Fungicide Monterey Liquicop
December	Bed Bugs	Use a monitoring tool to detect bed bugs	OWOW Bed Bug Fact Sheet	Bed bug traps Diatomaceous Earth Hot Shot Bed Bug Killer Dust

General Monthly Pest Calendar

OUR WATER – OUR WORLD

Tips for Dormant Spraying

November is the time to start dormant spraying!

Prevention is one of the first steps in managing pests and diseases. Choosing disease resistant plant varieties can help avoid some problems, and dormant spraying can give you an early start managing insects, mites and fungal diseases on woody plants. Dormant spraying can kill insect eggs and fungal spores that over-winter in the plant's cracks and crevices. These preventative measures can be more effective than trying to manage pests in warm weather when they become more active.

What is a dormant spray?
A dormant spray is a pesticide (a oil, fungicide or insecticide) that is applied to a plant after it has dropped its leaves and is not actively growing. It is used as a preventative measure to help manage pests and diseases as part of an overall IPM program.

Why use dormant sprays?
Dormant sprays can help manage a wide variety of over-wintering soft-bodied insects and their eggs, such as aphids, psyllids, thrips, mites, and immature whitefly and scale, as well as fungal diseases such as peach leaf curl, powdery mildew, and rust. Use dormant sprays for roses, fruit trees and deciduous trees and shrubs.

How to use dormant sprays
Timing will vary, depending upon the plant. In general, spray the plant once most of the leaves have fallen, usually around late November. A repeat spraying may be needed in late December, and again when the buds are just opening and starting to elongate, usually in late January or early February.

Make sure to read the instructions on the label. You may need sprayers, tools for mixing up concentrates, and gloves and goggles if required.

General Tips

- Be sure to remove any remaining leaves and fruit and throw them away.
- Select a clear day when there is little or no breeze and no rain in the forecast, and when temperatures are above 35 degrees.
- Mix the product and spray the tree according to the label, until the tree is saturated and dripping.
- Repeat if needed for the specific insect, mite, or disease.
- Remove and dispose of all infected plant materials. This will help prevent future problems.

Dormant spray handout

OWOW STORE SET-UPS

Shelf talkers are one of the most visible aspects of the program in stores. To determine which products to label, we refer to two different master products lists: the "OWOW Less-Toxic Product List by Manufacturer" and the "OWOW Less-Toxic Product List by Pest." Both these lists are available to stores and the public on the OWOW Website. These lists are revised and updated each year, and we have a group of IPM experts that review new products to make sure they should be included in the list. Along with pesticides and fertilizers the lists include pest management products including traps, weed block, mulch, flamers, etc.

Shelf talkers are labeled with the printed name of a specific product to ensure that if the products are moved, it will be clear that the shelf talker is not marking a product that is not eco-friendly. In some cases, shelf talkers have to go behind a store product label, but they

are designed to identify a product as eco-friendly even when only a portion of the shelf talker is exposed.

Many of our stores completely re-organize their shelves when they receive new products in late January/early February. This calls for a complete re-set of their shelf talkers during this time. During these visits we also have the opportunity to introduce the program to new staff, answer staff questions and work with customers to answer their pest management and landscaping questions.

In addition to fact sheets, each of our store racks includes a small display to hold pocket guides which help customers and staff quickly locate which products to use for common pests. There are two versions of these guides, one for Home Depot stores and a general version. We also attach additional resources to the racks, including laminated bug guides and pest id cards.

Shelf talkers, front and back sides

Shelf talkers in Ace, El Cerrito

Shelf talkers behind store labels in Ace, Walnut Creek

Fact sheet rack in Ace, Antioch

Pocket Guides and 10 Most Wanted Bugs brochures in fact sheet rack

NEW FACT SHEETS

This year two new fact sheets were completed: *Protect Your Garden from Gophers, Moles and Voles* and *Keep Bed Bugs Out of Your Home*. These new sheets will start going into stores this summer.

EFFECTIVE ECO-FRIENDLY PEST CONTROL • LESS-TOXIC PRODUCTS

PROTECT YOUR GARDEN FROM MOLES, VOLES, AND GOPHERS

CONTROL MOLES, VOLES, AND GOPHERS, WITH THESE ECO-FRIENDLY PRODUCTS

	MOLES	VOLES	GOPHERS
BARRIERS	Amdro Mole, Vole and Gopher Blocker wire	Amdro Mole, Vole and Gopher Blocker wire • Gonzo Gopher Shield	Amdro Mole, Vole and Gopher Blocker wire • Diggers Root Guard Baskets and Wire • Gonzo Gopher Shield
REPELLENTS	Bonide Mole Max • Bonide Gopher Max • Liquid Fence Mole Repellent • Liquid Fence Mole and Vole Repellent • Messina Wildlife Mole and Vole Stopper • Mole Scram • Ortho Mole B Gone Mole and Vole Repellent • Repellex Mole, Vole, & Gopher Repellent • Sweeneys Mole and Gopher Repellent • Tom Cat Mole and Gopher Repellent	Bonide Mole Max • Bonide Gopher Max • Liquid Fence Mole and Vole Repellent • Messina Wildlife Mole and Vole Stopper • Ortho Mole B Gone Mole and Vole Repellent • Repellex Mole, Vole, & Gopher Repellent • Sweeneys Mole and Gopher Repellent • Tom Cat Mole and Gopher Repellent • Vole Scram	Bonide Mole Max • Bonide Gopher Max • Gopher Scram • Repellex Mole, Vole, & Gopher Repellent • Sweeneys Mole and Gopher Repellent • Tom Cat Mole and Gopher Repellent
TRAPS	Amdro Multi-use Traps • Cinch Trap for Moles • Gonzo Dead End Mole and Gopher Trap • Sweeney's Mole Trap • Tom Cat Mole Trap, Victor Mole Trap	Snap-style mouse traps, such as Victor or Tom Cat	Amdro Multi-use Traps • Black Hole Gopher Trap • Cinch Trap for Gophers • Gophister • Gopher Hawk • Gonzo Dead End Mole and Gopher Trap • Macabee Gopher Trap • Revenge Gopher Trap • Sweeney's Gopher Trap • Victor Black Box • Victor Gopher Trap • Wilco Trap for Gophers

Something is tearing up your garden. Varmints! But what kind?

In most parts of California, the likely culprits are moles, voles, or pocket gophers. All are controllable with non-toxic strategies, combined with accurate pest identification, determination, and perseverance.

MOLE, VOLE, OR GOPHER? HOW DO I KNOW?

- If you see cone-shaped mounds of soil or a network of raised tunnels, and your plants are not getting eaten, you likely have **moles**.
- If you see a network of closed or partly exposed tunnels (runways) and a clean, golf ball-sized entrance hole to a tunnel, you likely have **voles**. Locate the runways by moving aside groundcover.
- If you see a crescent-shaped mound of soil with a plugged opening, you likely have **gophers**. A gopher will plug any opening to its burrow system.

Choose eco-friendly products for your home and garden. Look for this symbol before you buy.

EFFECTIVE ECO-FRIENDLY PEST CONTROL • LESS-TOXIC PRODUCTS

KEEP BED BUGS OUT OF YOUR HOME

CONTROL BED BUGS IN YOUR HOME WITH THESE ECO-FRIENDLY PRODUCTS

Bed bug pitfall traps	ClimbUP Interceptor, Hot Shot Bed Bug Interceptor, SenSci Blackout Bed Bug Detector
Desiccating dusts	Harris Resistant Bed Bug Powder, Safer Brand Diatomaceous Earth
Mattress encasements	Mattress Safe, Protect-a-Bed, SafeRest
Plant-based insecticides	Ecologic Bed Bug Killer, Proof 100% Effective Bed Bug and Dust Mite Killer

Bed bugs are small, flat insects that hide in tight spaces like mattress seams and cracks in furniture. They are similar in color to an apple seed, but a bit smaller. Young bed bugs start off about the size of a poppy seed. They bite us while we are resting or sleeping.

Actual size adult and eggs

Anyone can get bed bugs. Infestations are becoming more common, and once you have them, they can be hard to control. There are some things you can do yourself, but you may need to use a pest control professional to successfully identify and control bed bugs. If you rent and have bed bugs, you will need to work with your landlord to make sure bugs are eliminated.

DID YOU KNOW?

- Bed bugs do not transmit diseases.
- Like mosquitoes, bed bugs feed on human blood. They may occasionally feed on pets and other animals.
- Some people have no reaction to bed bug bites; others can suffer itchy welts.
- Store bought "bug bombs" are ineffective and can push bed bugs into other rooms.
- Don't throw out infested items! Most can be treated.
- Bed bugs move around by hitching rides on furniture, bedding, baggage, clothing, and other personal belongings.

WHAT CAN YOU DO?

Spraying bugs directly with eco-friendly products is effective, but insecticides alone cannot eliminate a bed bug infestation. Over-the-counter "bug bombs" are not effective and may scatter bed bugs into new rooms in your home or into neighbors' apartments.

Bed bugs match from eggs (on left), adult (only intact adult on right)

- **Look for signs of bed bugs and know where they hide.** They aren't just on mattresses. Check bed frames, headboards, along baseboards, under and behind furniture, around electrical sockets, and any other dark hidden areas near beds. Use a bright flashlight.
- **Catch bugs with a lint roller or packing tape.**
- **Vacuum infested areas thoroughly.** This can quickly remove many live bugs. Immediately after vacuuming, **remove the vacuum bag or canister contents**, seal in a plastic bag and dispose of right away. Vacuuming alone will not eliminate an infestation.
- **Use the clothes dryer to kill bed bugs.** You can kill all stages of bed bugs on dry cloth items by tumble drying them for 15 minutes on "high." If items are wet, dry them first, and then continue tumbling on "high" for at least an additional 15 minutes. **Wash and dry your sheets at least every 2 weeks.**

Choose eco-friendly products for your home and garden. Look for this symbol before you buy.

STORE TRAININGS

Training store staff is essential to the program since they are the ones on the front-line answering customer questions on a daily basis. We worked with staff at trainings and during mentoring visits to make sure they were knowledgeable about the eco-friendly products their store stocks, and how to use shelf talkers and fact sheets.

Trainings are sometimes held in a formal setting like a break room, but more often we provide in-aisle trainings where we can identify and focus on specific products. Trainings are often

challenging to schedule because of smaller staff sizes in general, and this year the shelter in place order required us to cancel a number of trainings.

Each staff member that attends a training receives a training packet of resource materials, and we often focus on particular products and pests at the request of store managers.

This year we provided trainings to 8 key stores this year. Trainings include information on:

- Pesticide pollution and impacts on water quality through storm drains and sewers; pesticides of particular concern; how and where to dispose of pesticide products no longer wanted.
- How to identify common beneficials and pests; planting to attract beneficials; new/invasive pests/diseases to watch for.
- Benefits of organic fertilizers, compost and mulch; nutrient run-off; chemical salt build-up from fertilizers; the importance of building up the soil foodweb.
- Techniques for managing specific pest problems and the eco-friendly products they carry for these pests; active ingredients and how eco-friendly products work.
- Tips for working with customers on how to choose and use products.
- How to find and use on-line resources, including the OWOW 'Ask the Expert' feature and the UC IPM website.

Sloat, Martinez training

Home Depot, Brentwood training

STORE TRAINING PACKETS

Here are the contents of the store training packets:

- An Introduction to the OWOW Store Partnership Program
- IPM Basics
- Reading a Pesticide Label
- How Less-Toxic Products Work
- *Ten Tips for Water-Wise Gardening*

- Applying Beneficial Nematodes
- Laminated Good Bug/Bad Bug ID
- Lose Your Lawn the Bay-Friendly Way (sheet mulching instructions for lawn reduction projects)
- Monthly Pest-At-A-Glance Calendar
- *Pests Bugging You Pocket Guide*
- *10 Most Wanted Bugs in Your Garden* brochure
- Samples of some of the fact sheets
- Additional pest management information sheets on: citrus leaf miner, codling moth, dormant spraying, whitefly, beneficial nematodes, and bed bugs.
- OWOW Resources (websites, books, and the location of local Household Hazardous Waste Collection Sites.)

STORE MENTORING AND RETURN VISITS

Visiting stores each month is another essential component of the program. These mentoring visits allow us to keep materials stocked and looking neat and to replace/add shelf talkers. It also allows us to update staff on new products and pests, research staff questions, work with customers in-aisle, and helps keep the program visible and relevant.

STORE DISPLAYS AND END CAPS/PARTNERSHIPS WITH VENDORS

Many stores set up end caps to highlight new and seasonal products. We work with stores to recommend products to include, and vendors will often contact us to let us know about new eco-friendly product displays for us to label.

OUTREACH EVENTS

One of our primary outreach tools is to set up a table where we can promote eco-friendly products, answer customer questions and work with them in the aisle on product choices. This is our chance to reach customers at point-of-purchase. We also set up tables at community events to introduce the OWOW program to a broader audience, promote eco-friendly methods and products, and explain how the fact sheets and shelf talkers can help in product selection. At all of our outreach events we provide a broad range of informational handouts, promote plants that attract beneficials, and provide kid's activity sheets and samples of eco-friendly products.

This year, all of our Spring events were cancelled with the shelter- in-place order, so we have been working on developing a series of on-line classes to stay in touch with the public and the store customers.

Tabling at Sloat, Danville

Tabling at Ace, Oakley

GROWTH OF ECO-FRIENDLY PRODUCTS IN STORES

Again this year, we have seen a growth in the number of eco-friendly products on shelves. Given the on-going concerns about glyphosate, this is especially true in the area of herbicides. Almost all of our stores now carry at least one eco-friendly herbicide giving us a chance to talk with customers about weed management methods and eco-friendly solutions. There are several new products for rats, mice and voles which tie in with our new fact sheet. Choices in organic fertilizers have also continued to grow.

Many of our stores actively promote IPM methods with signage and displays. Stores like Annie's Annuals and Sloat promote planting for beneficial insects. A few of our stores, like Emerald City Garden, keep more toxic products behind the desk and make them available by request only. Some Home Depot stores have added green "natural" labels beneath eco-friendly products. All of these efforts are great tie-ins to our program and messages.

Plant pollinator signage at Sloat, Pleasant Hill

Bee plant signage at Annie's Annuals, Richmond

Green 'natural' labels at Home Depot stores along with OWOW shelf talkers

WORKING ON THE BIG PICTURE – INCREASING PROGRAM AWARENESS AND LESS-TOXIC OPTIONS

We are always looking for ways to connect with store management and corporate offices to make product suggestions and promote the importance of the OWOW program. We often make recommendations for new products to carry, and on more toxic products to phase out.

Here are some of the ways we work with stores behind the scenes:

- Working with Home Depot Corporate – We work closely with Home Depot's Corporate Office of Sustainability and each year they send a memo to all store managers reminding them to support the program. (A copy of this memo is included at the end of the report.) We are able to make recommendations for products, and were able to get eco-friendly products like Sluggo and Captain Jack's back on their shelves. They are grateful for the work we do in the stores, and work with us to determine new in-store projects and promotions. For the coming year, they have given us the go-ahead to develop a training video that staff can access in the store.

- Working with Ace stores – Last year several of the old OSH store locations were purchased by Ace stores and their new stores have started to open for business. We have been working with a manager of this group of stores to introduce the OWOW program, and hope to be able to expand into some of their new stores next year.

- Herbicide Alternatives
  With customers looking for eco-friendly herbicide products, stores have continued to contact us for information on new products to stock. This year we revised our store handout on weed killer recommendations to include the explosion of new products in this area, and supplied the list to all of our stores.

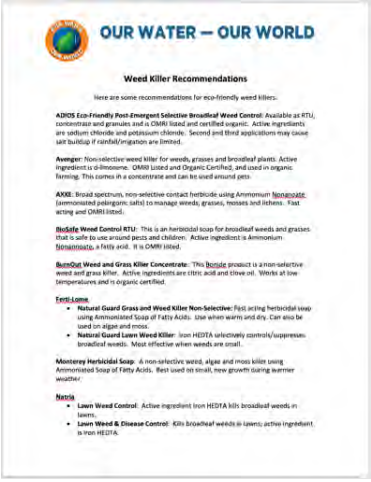

OUR WATER – OUR WORLD

Weed Killer Recommendations

Here are some recommendations for eco-friendly weed killers:

ADIOS Eco-Friendly Post-Emergent Selective Broadleaf Weed Control: Available as RTU, concentrate and granules and is OMRI listed and certified organic. Active ingredients are sodium chloride and potassium chloride. Second and third applications may cause salt buildup if rainfall/irrigation are limited.

Avenger: Non-selective weed killer for weeds, grasses and broadleaf plants. Active ingredient is d-limonene. OMRI Listed and Organic Certified, and used in organic farming. This comes in a concentrate and can be used around pets

AXXE: Broad spectrum, non-selective contact herbicide using Ammonium Nonanoate (ammoniated pelargonic salts) to manage weeds, grasses, mosses and lichens. Fast acting and OMRI listed.

BioSafe Weed Control RTU: This is an herbicidal soap for broadleaf weeds and grasses that is safe to use around pests and children. Active ingredient is Ammonium Nonanoate, a fatty acid. It is OMRI listed.

BurnOut Weed and Grass Killer Concentrate: This herbicide product is a non-selective weed and grass killer. Active ingredients are citric acid and clove oil. Works at low temperatures and is organic certified.

Ferti-Lome

- **Natural Guard Grass and Weed Killer Non-Selective**: Fast acting herbicidal soap using Ammoniated Soap of Fatty Acids. Use when warm and dry. Can also be used on algae and moss.
- **Natural Guard Lawn Weed Killer**: Iron HEDTA selectively controls/suppresses broadleaf weeds. Most effective when weeds are small.

Monterey Herbicidal Soap: A non-selective weed, algae and moss killer using Ammoniated Soap of Fatty Acids. Best used on small, new growth during warmer weather.

Natria

- **Lawn Weed Control**: Active ingredient Iron HEDTA kills broadleaf weeds in lawns.
- **Lawn Weed & Disease Control**: Kills broadleaf weeds in lawns; active ingredient is Iron HEDTA.

Weed Killer Recommendation handout

ADDITIONAL OUTREACH EVENTS

Each year we have the opportunity to work at community outreach events to promote and publicize the OWOW Store Partnership program and eco-friendly pest management strategies. Most of these events are not charged to the contract, but they help us to promote the OWOW program by:

- Introducing the program and our materials to new audiences
- Promoting stores that are in the OWOW partnership for more visibility in the community
- Influencing the product choices store managers and buyers make when placing orders for eco-friendly products for their shelves.
- Providing additional information and training to store managers and staff in aisle
- Networking with stores that would like to become a part of the store partnership program

Here are some of the outreach events that we were able to be part of this year:

- L & L Trade Show (3,000+ participants)
  There are three trade shows each year where many of our stores order their pesticides, herbicides, and fertilizers for the year. The L&L show is one of the largest trade shows on the West Coast, and OWOW is one of the only non-vendors allowed to attend this show. At our OWOW booth we make recommendations about eco-friendly product choices, offer fact sheets, sample shelf talkers, pocket guides, and seasonal handouts, set up displays with photos of staff at our partner stores, highlight new products on the market, and provide general information on eco-friendly products. Each year we are

also invited to make a presentation to attendees on an eco-friendly pest management topic.

- NorCal Trade Show (1000+ participants)
  This is our local trade show, held in San Mateo each year. Our booth provides general pest/product. Our OWOW booth provides information and pesticide product recommendations to our local stores and provides handouts, new eco-friendly product samples, and answers to pest management questions.

- Central Garden Trade Show (1000+ participants)
  The Central show is held in Las Vegas, and because each trade show carries different products, many of our stores attend this show. Our booth highlighted new eco-friendly products and provided handouts and information to store buyers.

- Sloat Garden Center –Vendor Night (60 participants)
  Once a year, Sloat's corporate office puts on a vendor night where staff from all of their stores come to learn about new products, plants and pets. We have five Sloat stores in our program, so this is a perfect way to remind staff about the program, meet new hires, and to introduce new products

OWOW booth at the L&L Trade Show

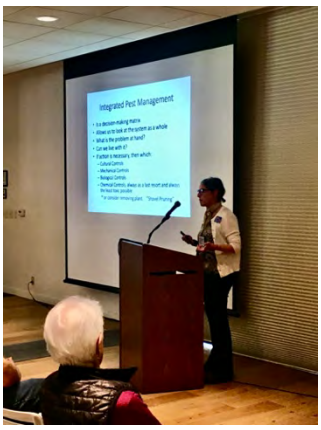

Speaking on IPM at Bay Area pollinator symposium

OWOW booth at Sloat Vendor Night

OWOW booth at NorCal show in San Mateo

- IPM Advocate Continuing Education (9 participants)
  Partnering with the UC Statewide IPM Program, we provide continuing education programs to all of our IPM Advocates each year. These classes are a great opportunity for Advocates to learn about new pests and get answers to staff and customer questions and receive new resource materials. This year our Advocates attended a training in Oakland designed to help work with retail stores.

- Community Events and Classes (40 participants)
  Each year we have the opportunity to speak at or teach classes at different events in the community. This year we were able to teach at the Contra Costa Water District demonstration garden with a focus on teaching eco-friendly management for pests of houseplants and managing landscapes without pesticides through smart plant, fertilizer and mulch choices.

- Workshops and Lectures (1000 participants)
  Several different programs were offered by IPM Advocates in venues throughout the Bay Area during past year. Many of these programs were offered through the Bay Area Water Supply and Conservation District (BAWSCA) and included both live talks and and webinars for the public and city workers. These are great opportunities to get OWOW information and pest management strategies out, and to determine new ways to expand the program.

PROGRAM ASSESSMENT METHODS

Each year we use a variety of strategies to help us assess the overall success of the OWOW program, and to determine ways to strengthen our message, identify which products/pest management strategies we need to promote, and to determine the effectiveness of the program in disseminating information to both store staff and customers. Here are some of the tools we use:

- Pre-Training Surveys:
  Each staff member attending a training is asked to fill out a brief pre-training survey. This survey helps to determine the level of knowledge about water quality issues and eco-friendly products and management techniques in advance so that we can determine how well we are providing the type of information they need. A summary of this year's pre-training surveys is included below.

- Post Training Surveys:
  Once they complete the training, staff members are asked to fill out a post-training survey form. These help us to evaluate the effectiveness of the training, how well the information is understood, and where we can make improvements. The results of these evaluations can be seen below, and were overwhelmingly positive.

- Tracking sales of eco-friendly products:
  Each year we are able to get some numbers on the sales of eco-friendly products from some of our stores and some of the pesticide vendors. Here are some fo the numbers we were able to get from last year:
  - Scotts Miracle-Gro Nature's Care eco-friendly pesticide products increased on average from 12.5% to 30% due to IPM Advocate efforts. Their new organic fertilizer line under the name Performance Organics had better than average sales in the Northern California stores.
  - Sales of Sluggo by Monterey are up approximately 35%, and sales of their Copper Soap Fungicide are up approximately 30% due to IPM Advocate efforts.
  - Home Depot stores continue to increase their eco-friendly products by 8 – 12% over the year.

- Numbers of customers reached by tablings and special events:
  Keeping track of the numbers of people we reach helps to determine how well we are promoting the program. We keep track of how many people we reach through tablings and outreach events. We also track which fact sheets are being taken, and which pests/products customers ask about.

- Changing behavior around product purchases:
  Changing customer buying behaviors is always a concern when working with stores. When working in the aisle, we focus on letting customers know to look for shelf talkers, and are often able to impact their product choice by directing them away from more toxic products toward eco-friendly products. We also focus on making sure staff can quickly identify eco-friendly choices using shelf talkers, and can explain how to use these products to their customers.

- Trends/Sales of less-toxic products:
  Each year we attend trade shows where new products are introduced and stores order products for the year. We are able to get a preview of what the trends are and what eco-friendly products are coming out so that we can influence store purchasing behavior by highlighting the new trends and products.

PROGRAM RECOMMENDATIONS

Here are last year's goal/recommendations, and how we followed up on them:

- Continue to promote the new eco-friendly herbicide products and herbicide handout, and make sure store staff are knowledgeable about these products before weeds appear in the spring.
  Our herbicide recommendation sheet was revised this year to include all of the new products available and was provided to all stores, and we highighted weed management techniques and eco-friendly herbicides in our store trainings.

- Focus on providing more tips for rat, mole, gopher & vole management, and get the new fact sheet into stores.
  The new fact sheet on gophers, moles and voles was completed this year and we will be adding them to fact sheet racks this summer. Management techniques for rats and gophers were highlighted in this year's store trainings.

- Continue to educate store staff about seasonal pest issues, such as the timing for dormant spraying, to ensure they are not promoting pesticide products when they are not effective. Work with customers to highlight products that can reduce the need for pesticides such as insectary plants, organic fertilizers and mulches.
  Handouts on the correct methods/timing of dormant spraying were provided in Fall in fact sheet racks, and were a focus on in-aisle mentoring visits. During outreach and mentoring we highlighted the new organic fertilizer products, and worked with customers out in nursery areas to promote plants that attract beneficial insects.

Here are some tasks we will be working on for the 2019 to 2020 program:

- Develop a series of on-line classes as alternate ways of providing information and outreach given Covid-19 concerns.

- Develop on-line training for store staff with on-line pre and post surveys.

CLOSING

Though the Covid-19 shelter-in-place and store shut-downs had a great impact on the program in March and April, we were able to have a very successful year up to that point. There continues to be an increase in the number of eco-friendly products for us to recommend, and more and more customers are looking for these eco-friendly options. Stores continue to be supportive of the program, and many of them are adding their own signage identifying beneficial insect plants and eco-friendly products

The best part of working with the stores is developing strong relationships with the staff. Given their staff shortages, our stores are always grateful for the time we can spend with customers in-aisle, and the up-to-date information we can provide on pests and new products.

Tabling at Sloat, Pleasant Hill

Thank you for the opportunity to work with our dedicated store partners

Debi Tidd
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925-360-5425

APPENDIX

PRE AND POST SURVEY FORMS

A NOTE ON TRAINING ASSESSMENT FORMS

At each staff training, participants are asked to fill out pre and post survey forms which help us to assess their level of knowledge going into the training, how well we are communicating information, and areas where we can improve our training materials or information.

A review of this year's post survey evaluation forms shows several areas where there was a substantial gain in knowledge over initial question responses. Knowledge about sources of storm drain pollution jumped from 83% correct responses to 98% correct responses. Knowledge about pesticide treatment at the sanitary district went from 45% correct responses to 95% correct responses. Knowledge about the location of local HHW sites jumped from 44% correct responses to 95% correct responses.

We had an overwhelmingly positive response to the trainings with 97% of the attendees responding that they had learned eco-friendly management techniques to share with their customers.

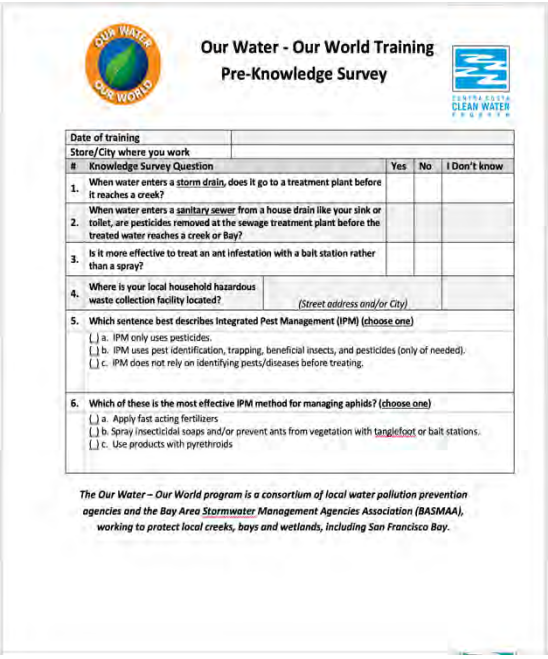

Our Water - Our World Training
Pre-Knowledge Survey

Date of training	
Store/City where you work	

#	Knowledge Survey Question	Yes	No	I Don't know
1.	When water enters a storm drain, does it go to a treatment plant before it reaches a creek?			
2.	When water enters a sanitary sewer from a house drain like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or Bay?			
3.	Is it more effective to treat an ant infestation with a bait station rather than a spray?			
4.	Where is your local household hazardous waste collection facility located? (Street address and/or City)			
5.	Which sentence best describes Integrated Pest Management (IPM) (choose one) ( ) a. IPM only uses pesticides. ( ) b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only of needed). ( ) c. IPM does not rely on identifying pests/diseases before treating.			
6.	Which of these is the most effective IPM method for managing aphids? (choose one) ( ) a. Apply fast acting fertilizers ( ) b. Spray insecticidal soaps and/or prevent ants from vegetation with tanglefoot or bait stations. ( ) c. Use products with pyrethroids			

The Our Water – Our World program is a consortium of local water pollution prevention agencies and the Bay Area Stormwater Management Agencies Association (BASMAA), working to protect local creeks, bays and wetlands, including San Francisco Bay.

Our Water - Our World Training
Post-Knowledge Survey and Evaluation

Date of training	/ /	Store/City where you work	

#	Knowledge Survey Question	Yes	No	I Don't know
1.	When water enters a storm drain, does it go to a treatment plant before it reaches a creek?			
2.	When water enters a sanitary sewer from a house drain like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or Bay?			
3.	Do you think it's more effective to treat an ant infestation with a bait station rather than a spray?			
4.	Where is your local household hazardous waste collection facility located? (Street and/or City)			
5.	Which sentence best describes Integrated Pest Management (IPM) (choose one) ( ) a. IPM only uses pesticides. ( ) b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only if needed). ( ) c. IPM does not rely on identifying pests/diseases before treating.			
6.	Which of these is the most effective IPM method for managing aphids? (choose one) ( ) a. Apply fast acting fertilizers ( ) b. Spray insecticidal soaps and/or prevent ants from vegetation with tanglefoot or bait stations. ( ) c. Use products with pyrethroids.			

Training Evaluation Questions	Disagree	Neutral	Agree
I learned at least one eco-friendly pest management method today			
The training will help me recommend and/or sell eco-friendly products			
I can comfortably share what I learned with customers and/or co-workers			
I can easily use the Our Water - Our World shelf-tags and fact sheets to inform customers about less toxic pest management			

	Too much info	Just right	Not enough info
Printed resource materials from this training were ...			

Please use the back side of this survey and evaluation for additional comments or explanation

What part of the Training was most helpful?	
What part of the training could be improved?	

The Our Water – Our World program is a consortium of local water pollution prevention agencies and the Bay Area Stormwater Management Agencies Association (BASMAA), working to protect local creeks, bays and wetlands, including San Francisco Bay.

THANK YOU FOR YOUR PARTICIPATION!

Summary of Pre-Training Evaluation Forms

A total of 64 Pre-Training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	I Don't Know
When water enters a storm drain, does it go to a treatment plant before it reaches a creek?	3%	83%	14%
When water enters a sanitary sewer from a house drain like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or Bay?	27%	45%	28%
Do you think it's more effective to treat an ant infestation with a bait station rather than a spray?	74%	6%	20%

Where is your local household hazardous waste collection facility located	44% know location (Street address and/or City)	56%

Which sentence best describes Integrated Pest Management (IPM) (choose one)

a. IPM only uses pesticides: 5%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only if needed): 89%
c. IPM does not rely on identifying pests/diseases before treating: 6%

Which of these is the most effective IPM method for managing aphids? (choose one)

a. Apply fast acting fertilizers: 9%
b. Spray insecticidal soaps and/or prevent ants from vegetation with tanglefoot or bait stations: 80%
c. Use products with pyrethroids: 11%

Summary of End of Training Evaluation Forms

A total of 65 Post-Training surveys were returned.
Here are the results of those surveys

Survey Question	Yes	No	I Don't Know
When water enters a storm drain, does it go to a treatment plant before it reaches a creek?	0%	98%	2%
When water enters a sanitary sewer from a house drain like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or Bay?	3%	95%	2%
Do you think it's more effective to treat an ant infestation with a bait station rather than a spray?	97%	3%	0%

Where is your local household hazardous waste collection facility located	95% know location (Street address and/or City)	5%

Which sentence best describes Integrated Pest Management (IPM) (choose one)

a. IPM only uses pesticides: 2%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only if needed): 95%
c. IPM does not rely on identifying pests/diseases before treating: 3%

Which of these is the most effective IPM method for managing aphids? (choose one)

a. Apply fast acting fertilizers: 2%
b. Spray insecticidal soaps and/or prevent ants from vegetation with tanglefoot or bait stations: 92%
c. Use products with pyrethroids: 6%

Training Evaluation Questions	Disagree	Neutral	Agree
I learned at least one less-toxic management method today.	0%	3%	97%
The training will help me recommend and/or sell less-toxic products.	0%	5%	95%
I can comfortably share what I learned with customers and/or co-workers.	0%	10%	90%
I can easily use the Our Water Our World shelf-tags and fact sheets to inform customers about less-toxic pest management.	0%	9%	91%
	Too much info	Just right	Not enough info
Printed resource materials from this training were….	3%	97%	0%

Please use the back side of this survey and evaluation for additional comments or explanation.

What part of the Training was most helpful?

- Everything was helpful: 20%
- Learning about products/eco-friendly pesticides: 35%
- Learning about beneficial insects/pests/bug guide: 9%
- Training packet materials/visuals: 8%
- Pest id sheet/new pests to look for/management tips for specific pests: 8%
- Hands-on aspect of training/practical real-life examples: 5%
- Trainer knowledge/enthusiasm: 5%
- Explanation of active ingredients: 2%

- Mosquito abatement info: 1%
- Scope of information: 1%
- Weed control info: 1%
- Knowing what I was doing was good: 1%

What part of the Training could be improved?

- Everything was good/nothing to improve: 52%
- More time: 5%
- Add videos: 1%
- Go over handouts: 1%
- Bring in diseased plants to see actual problems: 1%
- Add a quiz to help us remember info: 1%
- Go over lawn diseases: 1%
- Hold training away from customers: 1%

COMMENTS:

- It was all well done and informative/it was all excellent. (7)
- I loved it all! All insects have purpose.
- Such a great presentation, thank you.
- It was really good.
- Such a great presenter, thank you. (2)

OUR WATER - OUR WORLD

We are here to support you!

Hello,

How are you doing? Hopefully you and all members of your team are taking good care and staying healthy! The current shelter in place order in response to the COVID19 pandemic has sent people back into their gardens and into essential businesses like yours. Spring is in full bloom and business are operating under less than ideal circumstances with little support. We wanted to reach out and lend a hand any way we can during this time. We are still here to support you and your amazing team as much as we can.

As IPM Advocates, who provide the OWOW services, we are taking a pause from our regular in-person store visits, associate trainings and public outreach events during this crisis. However, please reach out if you have any pest questions, need support with how products work, or if you are looking for any additional pest problem solving resources. Also, as a reminder, please take advantage of the 'Ask the Expert' feature which you will find on the OWOW website. http://ourwaterourworld.org/Ask-Our-Expert

You will find this link on our home page, where you will also see the link to the UCIPM website for additional support.

If your OWOW rack is in need of new fact sheets, if shelf talkers need to be placed, or if you need any materials stocked, please don't hesitate to ask. We can restock in person or mail the materials directly to you.

You can also reference the OWOW fact sheets at the website:
http://ourwaterourworld.org/Fact-Sheets

In the meantime, take good care and stay well!

Debi Tidd
Our Water Our World
dragonfly2010@hotmailcom
925-360-5425

Yearly Memo from Home Depot Corporate Office of Sustainability

Interoffice
MEMORANDUM

DATE: January 1, 2020

TO: California Store Managers, D28 ASMs and Department Heads

FROM: Ron Jarvis

CC: Steve Knott, Scott Jacobson

SUBJECT: Our Water Our World training

OUR WATER, OUR WORLD is a coalition of organizations whose purpose is to encourage consumers to use less toxic pest controls in and around their homes. They specialize in retail friendly education. Their goal is not to alienate consumers by telling them what they can't use, but instead their information focuses on less toxic pest management and ties into products currently on our shelves.

An Our Water, Our World (OWOW) representative will be in your store to help train employees and label less-toxic products with shelf-talkers. The representative may also schedule a tabling event to educate consumers. This ties in well with "How-to" weekend events. The representative will display a sampling of excellent less toxic and Eco Options products off our shelves. They will provide free informational literature and a wealth of knowledge and experience. Please enjoy this additional help in your store.

A representative will contact you before the training or demonstration date to arrange details. Please contact Suzanne Bontempo at (415) 317-0475 if you have any questions.

Thank you

Ron Jarvis

from the desk of.....
Ron Jarvis
Merchandising Vice President – Sustainability
THE HOME DEPOT USA, INC.
2455 Paces Ferry Road
Atlanta, GA 30339
(770) 384-4835
Fax (770) 384-4411

Attachment 10.1

Receiving Water Trash Monitoring Program Plan: 2020 Final Report

Attachment 10.1

San Francisco Bay Area Receiving Water Trash Monitoring

Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols

FINAL REPORT

Prepared for:

Bay Area Stormwater Management Agencies Association

Prepared by:

EOA inc.

APPLIED marine SCIENCES

June 2020

04369
4410

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agency Association
CCCWP	Contra Costa Clean Water Program
CEDEN	California Environmental Data Exchange Network
FSURMP	Fairfield Suisun Urban Runoff Management Program
MRP	Municipal Regional Permit
NPDES	National Pollution Discharge Elimination System
OVTA	On-land Visual Trash Assessments
OPC	California Ocean Protection Council
PMT	Project Management Team
QAPP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QA/QC	Quality Assurance/Quality Control
RTA	Rapid Trash Assessment
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
SCCWRP	Southern California Coastal Water Research Project
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMC	Southern California Monitoring Coalition
SMCWPPP	San Mateo County Water Pollution Prevention Program
SOP	Standard Operating Protocol
WY	Water Year

EXECUTIVE SUMMARY

Provision C.10.b.v of the Municipal Regional Stormwater NPDES Permit (MRP 2.0), issued by the San Francisco Bay Regional Water Quality Control Board to 76 cities, counties and flood control districts in the SF Bay Area, requires public agencies to develop, submit and test a Receiving Water Trash Monitoring Program Plan (Trash Monitoring Plan). Version 1.0 of the Trash Monitoring Plan includes a description of the monitoring design and monitoring/assessment protocols.

In July 2017, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted the first iteration of the Trash Monitoring Plan to SF Bay Water Board staff for review and comment. The Final Trash Monitoring Plan that addressed all comments was submitted to the SF Bay Water Board staff in October 2017 (BASMAA 2017). Implementation of the Trash Monitoring Plan represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were applied during the MRP 2.0-specified timeframe of October 2017 to July 2020.

The MRP requires that the results of the testing phase of the Trash Monitoring Plan be submitted to the SF Bay Regional Water Board as a Final Report by July 1, 2020. The Final Report provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020. Monitoring Plan objectives and scientific monitoring questions outlined in the Trash Monitoring Plan were used to guide the evaluation of trash monitoring and assessment data results presented in this Final Report.

Monitoring Questions

1. Are significantly strong correlations observed between qualitative and quantitative methods?
2. What is the current level of trash deposited in flowing waterbodies in the entire MRP area?
3. What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
4. Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
5. What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
6. Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

The Trash Monitoring Plan primarily focuses on two types of monitoring designs: 1) **probabilistic** (randomly) selected monitoring sites that are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area; and 2) **targeted** sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. The design also includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Two trash assessment tools were developed and applied for the pilot testing phase of the Trash Monitoring Plan. **Qualitative** trash assessments are visual surveys of trash levels (i.e., conditions). Trained personnel assign a trash condition score from 1 to 12 (12 being the most trash) to a site based on the level of trash that is observed both within the water body and along its banks or shoreline within a defined assessment area. **Quantitative** trash monitoring entails removing, sorting and measuring the volume of trash that is found within the assessment area at a targeted site. Both quantitative trash

monitoring methods and the qualitative assessment methods were used at targeted sites to allow for the comparison of qualitative and quantitative approaches.

A total of 125 urban creek, channel and riverine probabilistic sites throughout the MRP Area were qualitatively assessed for trash. A total of 625 qualitative trash assessments were conducted over five sampling events (three during wet season and two during dry season) between October 2017 and March 2020. A total of 100 targeted sites were selected for both qualitative and quantitative trash assessments. A total of 200 trash assessments were conducted over two sampling events at targeted sites. Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara and San Mateo Counties.

Key Findings

1. Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both regional and countywide scale. The visual assessment tool is recommended as a valid approach to assess conditions when using volume of trash as the indicator for trash conditions.
2. Regionwide, approximately 77% of the urban stream lengths in the MRP Area exhibit low to moderate levels of trash.
3. Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
4. Seasonality appears to have no effect on trash levels observed/measured at receiving water sites. Trash levels were highly similar between the dry and wet seasons. Storm intensity and frequency did not appear to have an influence on trash levels observed during the wet season.
5. Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with largest proportion of trash observed.

An evaluation of methods and monitoring design used during the pilot-testing phase of the Trash Monitoring Plan is provided in this report. This evaluation provides guidance for potential revisions to methods that may be used to monitor trash in receiving waters.

1 INTRODUCTION

The San Francisco Bay Regional Water Quality Control Board (Regional Water Board) has determined that trash is a pervasive problem near and in receiving waters, such as local creeks, rivers, and the San Francisco Bay Estuary (SFBRWQCB 2015). Trash can cause major impacts to beneficial uses, including recreation, aquatic life and habitat in those waters. Trash can originate on land or through individuals directly dumping/depositing trash into a receiving water or on its banks/shoreline. Eventually, trash present in local water bodies contributes to the global ocean ecosystem, where it can persist in the environment for hundreds of years, concentrate organic toxins, and be ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared, and can ingest trash that looks like prey, losing the ability to feed properly.

Between 2003 and 2005, trash levels and types deposited in local creeks and rivers were measured by the Regional Water Board using the Surface Water Ambient Monitoring Program's (SWAMP) Rapid Trash Assessment (RTA) Protocol. The Regional Water Board reported that data collected by SWAMP indicated that levels of trash in the waters of the San Francisco Bay region were very high (SFBRWQCB 2007). During 85 surveys conducted at 26 sites throughout the Bay Area, an average of almost three pieces of trash were observed per linear foot of creek. As a result of this new information, the Regional Water Board added 26 waterbodies in the region to the 303(d) list for the pollutant trash and concluded that this set of receiving waters was representative of the trash impacts present in all segments of local receiving waters that flow through urbanized watershed areas, and the shoreline of San Francisco Bay (Bay). Additionally, urban stormwater runoff was identified as an important pathway that transports trash from watersheds to these receiving waters. Identifying stormwater as an important pathway necessitated the inclusion of trash load reduction requirements in the Municipal Regional Stormwater NPDES Permit (MRP 2.0), Order No. R2-2015-0049.

MRP 2.0 was issued by the Regional Water Board on November 19, 2015 to 76 cities/towns, counties and special districts (Permittees). MRP 2.0 includes general stormwater management requirements, as well as those associated with specific pollutants. Provision C.10 of MRP 2.0 (Trash Load Reduction) requires Permittees to reduce trash discharged from their municipal separate storm sewer system (MS4) by demonstrable amounts in specific timeframes, install and maintain trash full capture systems, annually cleanup and assess trash hot spots in receiving waters, and conduct monitoring and assessment activities to address specific management questions regarding trash. Provision C.10.b.v entitled "Receiving Water Monitoring" requires Permittees to develop and test a receiving water trash monitoring program plan (Trash Monitoring Plan).

In July 2017, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted the first iteration of the Trash Monitoring Plan to Regional Water Board staff for review and comment. The Final Trash Monitoring Plan that addressed all comments was submitted to the Regional Water Board staff in October 2017 (BASMAA 2017). Implementation of the Trash Monitoring Plan represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were applied during the MRP 2.0-specified timeframe of October 2017 to July 2020.

The overall goal of the Trash Monitoring Program Plan, as described in the MRP 2.0 Fact Sheet, is to establish:

> *"…the least expensive and simplest to use monitoring methods and protocols that are applicable to the various discharge and receiving water scenarios that accounts for the various receiving waters and watershed, community, and drainage characteristics within*

> *Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s). These and other factors, such as feasibility, location logistics, types of trash, complexity, and costs provide a means to focus and limit the number of monitoring tools and protocols, and determine spatial and temporal representativeness of the tools and protocols, representativeness of scenarios that will be tested." (Emphasis added)*

The Fact Sheet also indicates that Permittees may include assessment methods based on the *Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams* (SFBRWQCB 2007). Additionally, MRP 2.0 specifies that the development of receiving water monitoring tools and protocols and a monitoring program shall be designed, to the extent possible, to answer the following management questions:

1. Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
2. Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
3. Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
4. Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?

Receiving water trash monitoring conducted through the Trash Monitoring Plan is intended to address these management questions by collecting initial information on the levels of trash in applicable receiving waters, the importance of site and watershed characteristics on trash levels observed/measured, and the relative contributions from important trash sources and pathways. Information and data collected during the testing phase of the Trash Monitoring Plan is not intended to address compliance issues associated with trash reduction requirements of the MRP. Compliance is achieved through other aspects of Provision C.10, including evaluations of the extent of certified trash full capture system implementation and the trash reduction effects of other management actions measured via On-land Visual Trash Assessments (OVTA) conducted on streets, sidewalks and other watershed land areas.

Provision C.10.b.v of the MRP requires that the results of the testing phase of the Trash Monitoring Plan be submitted to the Regional Water Board in two separate reports: 1) Preliminary Report by July 1, 2019; and 2) Final Report by July 1, 2020. This report serves as the Final Report for all MRP 2.0 Permittees and provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020. Trash assessment results, as well as the methods and approach used in the Trash Monitoring Plan, were evaluated by the BASMAA Project Management Team (PMT), regional stakeholders, and scientific peer reviewers.

2 BACKGROUND

2.1 TRASH MONITORING PLAN OVERVIEW

2.1.1 Monitoring Plan Development Process

The Trash Monitoring Plan was developed through a collaboration of the BASMAA Project Management Team (PMT), regional stakeholders and scientific peer reviewers. Permittees and SF Bay Regional Water Board staff developed a list of stakeholders who would be potentially interested in providing feedback on the Trash Monitoring Plan. Stakeholders included additional permittee representatives, and staff from environmental non-governmental organizations, USEPA, and Regional and State Water Boards.

BASMAA held three stakeholder meetings at key stages of the project to solicit input and share information. Additionally, stakeholders also had an opportunity to contribute information on existing monitoring tools and protocols. Stakeholders were provided the opportunity to review and provide comments on the Draft Trash Monitoring Plan. In some instances, follow-up discussions were necessary with individual stakeholders (e.g., Regional Water Board staff) to obtain clarification and guidance for moving forward with the project. A table of stakeholder comments received and BASMAA responses is provided as an attachment to the Trash Monitoring Plan (BASMAA 2017).

The development of the Trash Monitoring Plan utilized technical experts to review the monitoring tools, protocols and sample design. These peer reviewers were selected by the PMT based on their experience in designing and implementing trash receiving water monitoring programs and/or other types of water quality monitoring. Peer reviewers provided input on key topic areas, which assisted the PMT in developing an effective receiving water trash monitoring program.

2.1.2 Goals/Objectives of Monitoring Plan

The PMT developed specific goals of the Trash Monitoring Plan through the stakeholder engagement process to cost-effectively answer the MRP 2.0 management questions. These goals include:

- Informs management decisions;
- Accounts for the different stream and channel types, and considers temporal variability (e.g., to estimate baseline conditions and show change over time) and seasonality;
- Can assess trends over time;
- Helps to assess if the Permittees' trash reduction efforts are resulting in improvement;
- Allows for comparison of trash levels between sites (understand the range of levels of impact);
- Assists in determining relative contributions from different pathways (e.g., wind, illegal dumping, illegal encampments, MS4s);
- Leverages and exhibits consistency with existing monitoring efforts and other water quality monitoring programs, including direct discharge offset provisions (MRP Provision C.10.e); and
- Cost-effective, efficient and feasible (e.g., safe, access to sample locations, can be implemented by volunteer monitoring groups).

2.1.3 Trash Scientific Monitoring Questions

Project goals were used to guide the development of scientific monitoring questions that informed the study design and selection of methodologies used during the pilot-testing phase of the Trash Monitoring Plan. These scientific monitoring questions were developed to begin answering the broader

Management Questions listed in Table 2-1.

Table 2-1. Scientific monitoring questions developed to guide the design of the trash monitoring program and the methods used to monitor trash in receiving waters.

Management Question	Scientific Monitoring Question
1. Is trash present in receiving water(s) at levels that may cause adverse water quality impacts?	• What is the current level of trash deposited in flowing waterbodies in each MRP county; the entire MRP area? • Are significantly strong correlations observed between qualitative and quantitative methods? • What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
2. Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s) (*over time*)?	• What is the current level of trash deposited in flowing waterbodies in each MRP county; the entire MRP area? • Are significantly strong correlations observed between qualitative and quantitative methods? • Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?
3. Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?	• What is the current level of trash deposited in flowing waterbodies in each MRP county; the entire MRP area? • Are significantly strong correlations observed between qualitative and quantitative methods? • What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
4. Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?	• What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
5. Is trash (if present) being transported from one receiving water to another, at levels that may cause adverse water quality impacts?	• Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?

2.2 Coordination with State Monitoring Project

In 2015, the State Water Resources Control Board (State Water Board) adopted an Amendment to the Water Quality Control Plan for the Ocean Waters of California (Ocean Plan) to Control Trash and Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries. Together these are referred to as the Trash Amendments. The Trash Amendments prohibit discharge of trash larger than 5 millimeters to state waters from stormwater systems.

The California Ocean Protection Council (OPC) sent a letter to the State Water Board supporting adoption of the Trash Amendments in 2015. The letter expressed the OPC's interest in the use of

scientific measures to track and verify program effectiveness. The OPC recognized that there is no agreed-upon scientific method to monitor for trash in receiving waters and that the lack of methods makes assessing progress on reducing trash in state waters difficult. In close partnership with the State Water Board, the OPC employed the Southern California Coastal Water Research Project (SCCWRP) and San Francisco Estuary Institute (SFEI) to begin evaluating and testing multiple trash monitoring methods with a goal of developing a library of methods with known levels of precision, accuracy, and cross-comparability of results. The methods tested would also be linked to specific management questions. The Trash Monitoring Methods Project sponsored by OPC is intended to provide the research needed to develop scientific measures to monitor macro (>5mm) trash in receiving waters.

The OPC/State Water Board Trash Monitoring Methods Project began subsequent to the finalization of the BASMAA Trash Monitoring Plan. As such, the methods developed via the BASMAA Trash Monitoring Plan were incorporated with other methods being used in Southern California and novel (e.g., aerial photography and machine-learning) methods developed as part of the OPC/State Water Board project. These three methods are currently being tested in coordination with MRP 2.0 permittee efforts described in this report. Additionally, MRP 2.0 Permittee staff participates on the OPC/State Water Board's Technical Advisory Committee (TAC) to provide further coordination on the testing of trash receiving water monitoring methods. This coordination is planned to continue throughout the term of both projects.

3 Data Collection and Analysis Methods

3.1 Study Area

The pilot-testing phase of the Trash Monitoring Plan focuses on initial evaluations of the extent, magnitude and pathways of trash present/deposited on the surface and banks of local creeks, channels, rivers and lakes/lagoons, and the shorelines of San Francisco Bay and the Pacific Ocean. The study area for the Trash Monitoring Program consists of receiving water bodies that are within the MRP Area, which includes portions of the five participating counties (San Mateo, Santa Clara, Alameda, Contra Costa, Solano) that are subject to MRP 2.0 requirements.

3.2 Monitoring Design

The Trash Monitoring Plan primarily focuses on two types of monitoring designs:

1) **Probabilistic Assessment Sites** – Randomly selected monitoring sites that were previously established for BASMAA's Regional Monitoring Coalition (RMC) Creek Status Monitoring Program. These sites are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area.

2) **Targeted Monitoring Sites** – Selected sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. Includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Together, probabilistic and targeted sites are intended to represent the full range of trash conditions present in all water bodies flowing through the urban Bay Area that are subject to MRP 2.0 trash reduction requirements, and San Francisco Bay shorelines that may be impacted by contributions of trash from these flowing waters (e.g., creeks, channels and rivers). Brief descriptions of both types of

monitoring design and the associated sites are provided below, followed by descriptions of the types of monitoring methods deployed at each type of site.

3.2.1 Probabilistic Assessment Sites

Probabilistic trash assessment sites were chosen from the sample frame (i.e., stream network) developed by the RMC in 2012 for the Bay Area Regional Creek Status and Trends Monitoring Program (BASMAA 2012). The RMC sample frame includes all perennial and non-perennial creeks, channels and rivers that run through urban and non-urban areas within the five counties subject to MRP requirements. The sample frame was established using the United State Geological Survey (USGS) National Hydrography Dataset, which covers 3,567 miles of stream length in the five counties.

As part of the RMC's Regional Creek Monitoring Program, a pool of urban and non-urban probabilistic monitoring sites were previously established along the RMC sample frame at an average density of one site per 0.62 mile of stream length (i.e., total of 5,740 sites). Urban and non-urban probabilistic sites were previously selected (randomly) from this pool and monitored for physical, chemical and biological integrity as part of the Regional Creek Monitoring Program (2012-2019). The urban[1] sites previously monitored by the RMC formed the pool of sites for which probabilistic trash assessment sites were selected.[2] Additional details of the RMC sample frame and site selection process are summarized in the *BASMAA Regional Monitoring Coalition Five-Year Bioassessment Report Water Years 2012-2016* (BASMAA 2019).

A total of 125 probabilistic trash assessment sites[3] (approximately 7% of the urban sites in the RMC sample frame) representing urban creek, channel and river segments were initially selected for pilot-testing the Trash Monitoring Plan (Figure 3-1). Consistent with the Trash Monitoring Plan, Alameda, Contra Costa, San Mateo and Santa Clara Counties each selected 30 probabilistic assessment sites, and 5 sites were selected in Solano County. Trash assessments at these probabilistic sites focused on qualitatively observing and documenting trash levels and estimating the contributions of trash from different pathways. Because the vast majority of the trash assessment sites included in the Monitoring Program Plan were previously monitored by Permittees via RMC's Creeks Monitoring Program, these sites generally represent accessible locations where trash assessments could feasibly occur and permission to sample could be obtained. Probabilistic trash assessment sites were selected and evaluated in the order they appeared in the site pool to determine if each site met requirements outlined in the Trash Monitoring Plan and was physically accessible (including during higher flow conditions in the wet season). Evaluations of potential trash assessment sites were conducted following the methods presented in *Standard Operating Procedures for Ambient Creek Status Monitoring Site Evaluation* (BASMAA 2016).

3.2.2 Targeted Monitoring Sites

In addition to the 125 probabilistic sites, 100 targeted trash receiving water monitoring sites were selected and monitored (Figure 3-1). These targeted sites were generally known by MRP Permittees to accumulate trash. The vast majority of the sites were previously designated as "trash hot spots" and

[1] Probabilistic sites classified as urban are located within the boundaries of a city or a populated place.

[2] Non-wadeable and tidally influenced probabilistic sites that were originally removed from the site pool during creek status monitoring due to limitations in implementing standardized monitoring protocols at these sites, were added back into the pool of trash assessment sites due to interest in trash levels at these sites.

[3] During dry season sampling event in 2019, four of the sites were replaced due to issues related to physical access. As a result, a total of 129 probabilistic sites were assessed during the pilot testing phase of the project.

undergo periodic trash removal. These sites include segments of urban creeks, channels and rivers, and shoreline sites along the San Francisco Bay. To the extent possible, targeted trash monitoring sites were selected to represent a wide range of known trash levels in water bodies within a majority of MRP Permittee jurisdictions within each of the five MRP counties. The goal was to establish a pool of sites with a wide range of trash conditions as a basis to evaluate the relationship between qualitative and quantitative trash assessment tools. Consistent with the Trash Monitoring Plan, the following numbers of targeted sites were selected and monitored by Permittees in the following MRP counties: Alameda (29), Contra Costa (19), San Mateo (15), Santa Clara (32) and Solano (5).

It is important to note that each county used different criteria to select their targeted monitoring sites. Some counties selected targeted sites that contained illegal encampments with large quantities of trash. Other counties purposefully avoided selecting sites with illegal encampments for practical concerns and safety issues. Due to the discrepancy in the type of targeted sites and associated levels of trash, the quantitative assessment data collected at targeted sites were not compared between counties.

Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara and San Mateo Counties. Location description, agency/organization conducting maintenance, upstream drainage area and period of operation is presented in Table 3-1 and shown in Figure 3-2. Trash boom locations within the three counties include: (1) three booms along the shoreline of Lake Merritt in the City of Oakland, Alameda County; (2) two booms in the Lower Silver - Thompson Creek (tributary to Coyote Creek) and two booms at the bottom of the Adobe and Matadero Creek watersheds (both in Santa Clara County); and (3) two booms in the 16th Street and 19th Street Channels, located in San Mateo County.

Although trash boom monitoring was not identified as a required component of the Trash Monitoring Plan, MRP 2.0 Permittees agreed to conduct monitoring at these sites to better understand the utility of data from these locations and answer management questions outlined in MRP 2.0.

Table 3-1. Location description, drainage area, agency/organization conducting maintenance and period of operation for trash booms located in Alameda, Santa Clara and San Mateo Counties.

County	Jurisdiction	Maintenance	Location	Latitude	Longitude	Drainage Area (acres)	Period of Operation
Alameda	Oakland	Lake Merritt Institute	22nd and Harrison St (Outfall 56)	37.8102	-122.2623	35[1]	All Year
			Glen Echo Arm	37.8106	-122.2616	1609	
			Trestle Glen Arm	37.8081	-122.2500	1952	
Santa Clara	San José	Valley Water	Lower Silver Creek at King Rd	37.3604	-121.8642	12,056[2]	All Year
			Thompson Creek above Tully Rd	37.3292	-121.8106	14,205	
	Palo Alto	Palo Alto	Adobe Creek below Hwy 101	37.4324	-122.1050	8979	April - December
			Matadero Creek above Hwy 101	37.4397	-122.1142	7997	
San Mateo	City of San Mateo	City of San Mateo	16th Avenue Channel	37.5678	-122.2940	1218.3	All Year
			19th Avenue Channel	37.5526	-122.2901	1987	

[1] Total catchment area for storm drain is 138.4 acres; however full capture device at 22nd and Valley captures majority of trash; untreated drainage area upstream of the boom is 35 acres.

[2] Drainage area does not include area upstream Thompson Creek boom (assuming both booms are deployed at the same time). The total drainage area for Lower Silver Creek without Thompson Creek boom is 26,261 acres.

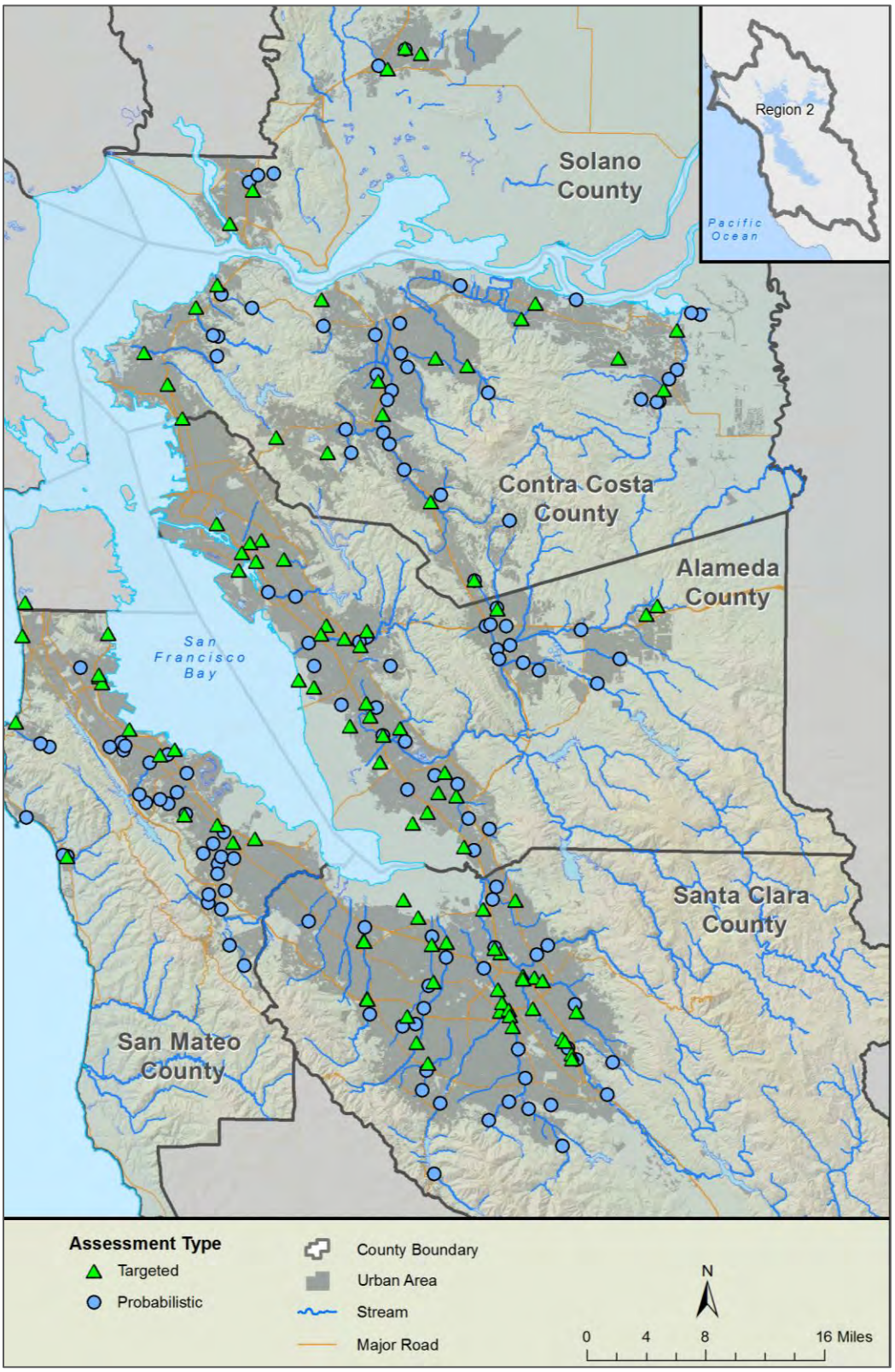

Figure 3-1. Locations of probabilistic and targeted receiving water trash monitoring and assessment sites included in the pilot-testing of the BASMAA Trash Monitoring Plan.

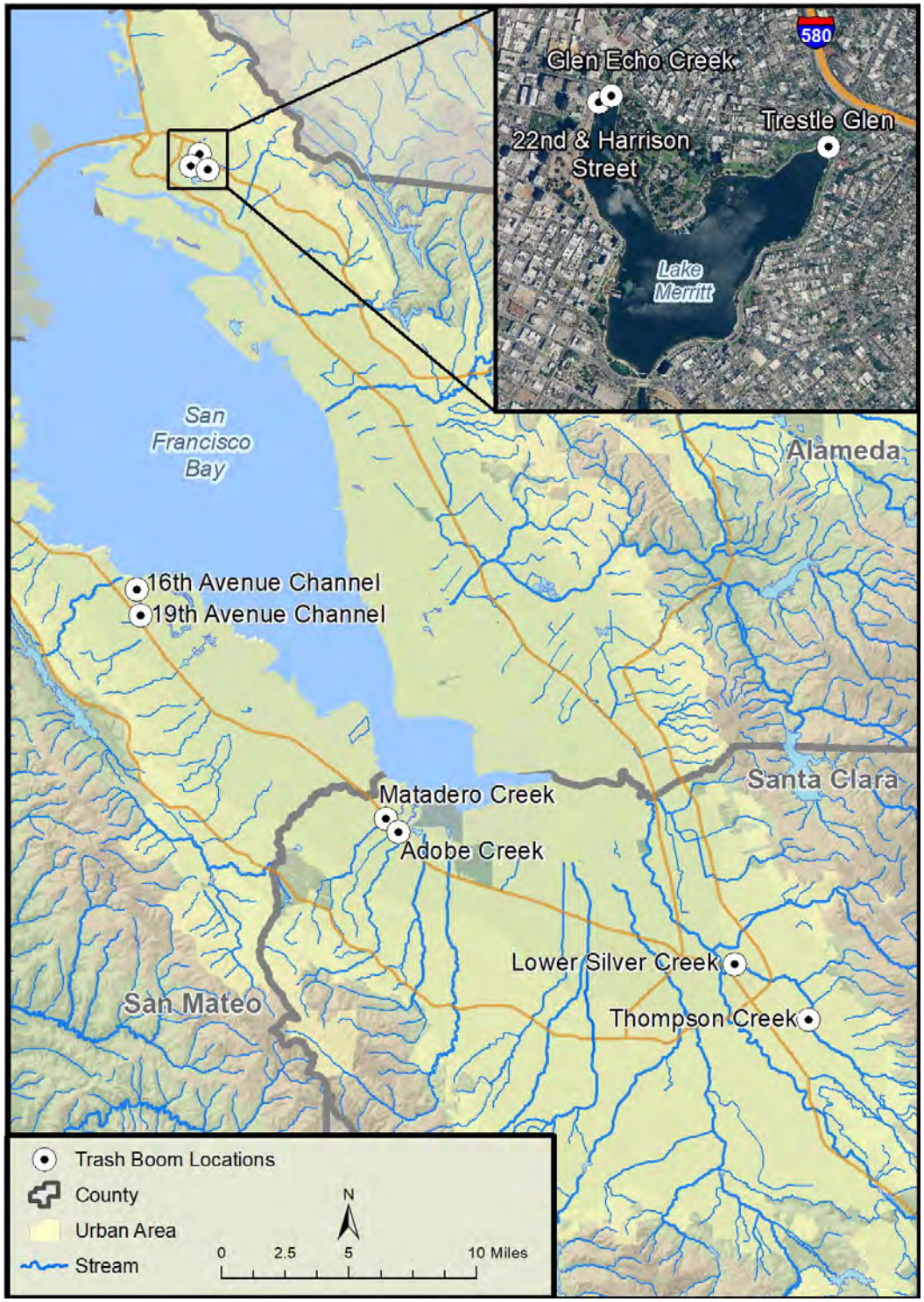

Figure 3-2. Locations of trash boom monitoring in the pilot-testing of the BASMAA Trash Monitoring Plan.

3.3 Monitoring Protocols and Data Collection

Standard Operating Procedures (SOPs) and associated field forms (Version 1.0) for conducting qualitative visual trash assessments and quantitative trash monitoring were developed as part of the Trash Monitoring Plan (BASMAA 2017). The SOPs and field forms were refined (Version 2.0) in July 2018 following recommendations by field staff after pre-monitoring calibration events, the initial assessment event at probabilistic sites, and the trainings conducted for field staff. Revisions of the SOPs primarily consisted of supplementing or modifying specific data fields that are associated with site characteristics. Summaries of qualitative and quantitative assessment methods are provided in Sections 3.3.1 and 3.3.2. Full descriptions of these methods are included in the Trash Monitoring Plan (BASMAA 2017).

3.3.1 Qualitative Visual Assessments

Qualitative trash assessments are visual surveys of trash levels (i.e., conditions) within a defined assessment area of a receiving water body. Trained personnel assign a **trash condition score** from 1 to 12 (12 being the most trash) to a site based on the level of trash that is observed both within the water body and along its banks or shoreline within a defined assessment area. Field personnel assign trash condition scores based on their first impression of the amount of trash that is visually observed within the entire assessment area.

Trash condition scores (1 to 12) are organized into four **trash condition categories** that include narrative descriptions of trash levels associated with the condition scores (Table 3-2). The four trash condition categories and associated condition scores are: Low (1-3), Moderate (4-6), High (7-9) and Very High (10-12). As part of the pilot testing phase of the Trash Monitoring Plan, trash condition scores were compared to trash volume data collected during the quantitative assessment (see Section 3.3.2) at targeted sites to validate the less intensive qualitative assessment method.

Qualitative visual assessments include documentation of site characteristics within the assessment area that may affect the transport and accumulation of trash. Site characteristic information includes predominant channel type (e.g., armored, levee, natural) and the proportion (%) of bank cover (e.g., grasses, shrubs, trees) and creek/channel cover (e.g., woody debris, aquatic vegetation, open/wet, dry) within the assessment area.

In addition to trash condition scoring, field crews estimated the relative contribution of trash associated with four different trash pathways: 1) Litter/Wind; 2) Illegal Encampments; 3) Illegal Dumping and 4) Other (Stormwater/Upstream Sources). The definition and characteristics for each of these four pathways are presented in Table 3-3.

During the testing of the Trash Assessment SOP, field crews determined that trash directly associated with stormwater and MS4s could not be accurately determined in the field. As a result, the “Other” category was created to include any trash that is transported by water to the assessment area from any upstream sources, including stormwater conveyances. Trash items identified as “Other” were typically small, transportable trash observed in the channel that appeared worn due to exposure from water (Table 3-3).

Because stormwater related trash is a component of the “Other” trash pathway, the amount or percentage of trash from stormwater could not be determined. However, the differences between the “Other” pathway and the remaining three trash pathways was investigated to provide information for identifying high priority pathways to inform management programs.

During qualitative assessments, the contribution of trash from each pathway was visually estimated and assigned a percentage between 0 and 100% (increments of 5%) of the total trash observed in the trash assessment area.

Table 3-2. Narrative descriptions of trash condition categories and scoring ranges for qualitative visual assessments in receiving waters.

Condition Category			
Low	Moderate	High	Very High
• Effectively no or very little trash • On first glance, little or no trash is visible • Little or no trash is evident when streambed and stream banks are closely examined for litter and debris • One individual could easily remove all trash observed within 30 minutes	• Predominantly free of trash except for a few littered areas • On first glance, trash is evident in low levels • After close inspection, small levels of trash are evident in stream bank and/or streambed • On average, all trash could be cleaned up by two individuals within 30 minutes to one hour • Approximately 2-3 times more trash than the low condition category	• Predominantly littered except for a few clean areas • Trash is evident upon first glance in moderate levels along streambed and banks • Evidence of site being used by people: scattered cans, bottles, food wrappers, plastic bags, etc. • On average, would take a more organized effort (more than 2 people, but fewer than 5) to remove all trash from the area. Removal of trash would take 30 mins to 2 hours • Approximately 2-6 times more trash than the moderate condition category	• Trash is continuously seen throughout the assessment area • Trash distracts the eye on first glance • Substantial levels of litter and debris in streambed and banks • Evidence of site being used frequently by people (e.g., many cans, bottles, food wrappers, plastic bags, clothing, piles of garbage and debris) • On average, would take a large number of people (more than 5) during an organized effort to remove all trash from the area. Removal of all trash would take more than 2 hours. • Approximately 2 or more times trash than the high condition category
1 2 3	4 5 6	7 8 9	10 11 12

Table 3-3. Characteristics of trash associated with each of the four transport pathways.

Pathway	Characteristics	Potential Location in Assessment Area
Litter/Wind	• Light weight • Distributed evenly, recent/not worn	• Adjacent to or under freeways and road crossings • Near roadways, bike or foot paths adjacent to the water body
Illegal Encampments	• Large items • Dense, multiple piles near current or abandoned camping site • No sign of water damage	• Adjacent to camps or trails • Banks, above and below high-water mark • Under bridges
Illegal Dumping	• Large items • Recent • Large piles, adjacent to roads	• Directly upstream or downstream of bridges • Near roadways
Other (Stormwater/ Upstream Sources)	• Small, persistent, transportable • Old, worn, water damaged • Integrated with vegetation, debris • Well distributed and mixed with debris	• Wetted channel • Banks below high-water line • Directly below outfalls

3.3.2 Quantitative Monitoring

Quantitative trash monitoring entails removing, sorting and measuring the volume of trash that is found within the assessment area at a targeted site. The collected trash is sorted into the four pathway categories (Table 3-2) and the volume of trash attributable to each pathway is quantified by using buckets or trash bags of known size. The quantified volume of trash for each trash pathway is then combined to establish the total volume of trash collected at each monitoring event. Materials that are too large to be placed in buckets or bags are stacked together (by pathway) and the volume of these materials is visually estimated using units of cubic feet or cubic yards. In addition, field crews identify the five most frequently observed types of trash (e.g., single use plastic grocery bags, beverage bottles) that are collected.

Both quantitative trash monitoring methods summarized above and the qualitative assessment methods described in the previous section were used at targeted sites to allow for the comparison of qualitative and quantitative approaches. At targeted sites, qualitative monitoring was conducted directly prior to (i.e., within 1-3 days) each corresponding quantitative monitoring event.

The removal of trash at a site via cleanup events that occur directly before or within a few weeks of assessment/monitoring events can potentially result in lower levels of trash observed at a site, in comparison with sites where recent cleanup events did not occur. Organized or informal cleanup activities that occurred prior to a trash assessment/monitoring event were documented at a small number of the targeted monitoring locations. However, most field crews did not document the last known trash cleanup event on data collection forms and therefore the data were not normalized to elapsed time between cleanup events.

Trash boom monitoring consisted of the removal and estimation of the total volume of trash that accumulated behind the booms during a known period of time. At some booms, trash was sorted and characterized; however, this information is not presented in this report.

3.3.3 Delineation of Assessment Areas

Trash assessments and monitoring was conducted within a defined assessment area within both probabilistic and targeted sites. A standard assessment length of 300-feet was used for sites located in creeks, channels and rivers. This is consistent with the length generally used by the RMC Creek Status and Trends Monitoring Program and for creek/channel trash hot spot cleanups required by MRP 2.0. For sites on creeks, channels and rivers, the width of the assessment area was specific to each site and extended to the upper portions of the banks where a majority of normal discharges and channel-forming activities take place. This creek/channel width is typically referred to as the “bankfull width” of the receiving water. The width of each trash assessment area on a creek or channel included the distance, as measured by the contour of the bank slope, between three equidistant bankfull locations at the middle and each end of each reach.

Trash assessments conducted at targeted sites along bay/ocean shorelines were typically 600 feet in length, which is consistent with the minimum length for trash hot spots, as described in MRP Provision C.10.c.i. For shoreline monitoring locations, the assessment area width was delineated as appropriate, based on a change in substrate material, presence of upland vegetation or the onset of development.

3.3.4 Field Staff Training and Calibration

Trash assessments were conducted by several entities representing MRP 2.0 Permittees (Table 3-4). For this reason, several field calibration events were conducted for field staff representing Permittees in Alameda, Contra Costa, Santa Clara, San Mateo and Solano Permittees to help standardize field data

collection methods. For Santa Clara and San Mateo, additional field training events were conducted to train permittee staff conducting both qualitative and quantitative trash assessments at targeted sites.

Table 3-4. Entities that conducted qualitative and/or quantitative trash assessment/monitoring at probabilistic and targeted receiving water monitoring sites in each county within the MRP Area.

County	Qualitative Assessments at Probabilistic Sites	Qualitative Assessments and Quantitative Monitoring at Targeted Sites
Alameda	Applied Marine Sciences (AMS)	SJ Conservation Corps & Charter School with AMS Supervision
Contra Costa	ADH Environmental	ADH Environmental
Santa Clara	EOA, Inc.	Municipal staff with EOA, Inc. supervision
San Mateo	EOA, Inc.	Municipal staff with EOA, Inc. supervision
Solano	Solano County Resource Conservation District	Solano County Resource Conservation District

3.4 Assessment/Monitoring Frequencies

Regionally, a total of 125 urban creek, channel and riverine probabilistic sites were initially selected and qualitatively assessed for trash. Qualitative visual trash assessments were conducted at a total of 30 probabilistic sites in Alameda, Contra Costa, Santa Clara and San Mateo Counties, and 5 sites in Solano County (Table 3-5). A total of five assessment events were planned at the probabilistic sites during the pilot testing phase of the Trash Monitoring Plan (October 2017 - March 2020). A total of 625 qualitative trash assessments were conducted over the five sampling events (three during wet season and two during dry season). During the 2019 dry season sampling event, four of the sites were replaced due to issues related to physical access. Thus there were 129 probabilistic sites that were assessed over the entire pilot study.

As described in the Trash Monitoring Plan, assessments are planned during three wet season events and two dry season events. Data collected during both seasons is intended to allow comparisons between dry and wet season trash conditions and accumulation rates in receiving waters. Dry season assessments are intended to provide information about non-stormwater sources and pathways, such as wind and illegal dumping. Wet season assessments provide information on the transport and deposition of trash resulting from stormwater runoff and transport from upstream locations.

In addition to the probabilistic sites, a total of 100 targeted sites were selected for qualitative and quantitative trash assessments. The total number of sites was determined based on population for each county: Santa Clara (32), Alameda (29), Contra Costa (19), San Mateo (15) and Solano (5). Targeted sites included 91 sites in urban creeks, channels, rivers and 9 sites along the shorelines of San Francisco Bay. Two quantitative monitoring events were planned at each targeted site during the pilot testing phase of the Trash Monitoring Plan; one during the dry season 2018 and one during dry season 2019. Trash monitoring at targeted sites coincided with Permittee's clean up events at known trash problem areas, which typically occur during the dry season each year. A total of 200 quantitative and qualitative assessments were conducted at 100 targeted sites.

Trash collected from trash booms was removed, bagged and measured (volume) during multiple monitoring events conducted at 9 locations (Table 3-5). The total number of monitoring events and the

period of trash accumulation at each boom were dependent on existing maintenance practices and thus varied among booms. Monitoring data were collected from each municipality/agency and compiled. The number of trash monitoring events ranged from 2 to 8 per boom, and the length of trash accumulation ranged from 6 to 230 days (refer to Table 4-10 for exact dates).

Table 3-5. Total number of sampling sites and events planned during pilot testing phase of Trash Monitoring Plan.

County	Probabilistic Sites (Qualitative Trash Assessments)			Targeted Sites (Qualitative and Quantitative Assessments)			Trash Boom		
	# Sites	Frequency	# Events	# Sites	Frequency	# Events	# Sites	Frequency	# Events
Alameda	30	5x	150	29	2x	58	3	2-4	8
Contra Costa	30	5x	150	19	2x	38	--		
San Mateo	30	5x	150	15	2x	30	2	3-8	11
Santa Clara	30	5x	150	32	2x	64	4	2-3	11
Solano (Vallejo, Suisun City and Fairfield)	5	5x	25	5	2x	10	--		
Total	**125**	**--**	**625**	**100**	**--**	**200**	**9**		**30**

3.5 Data Analysis Methods

All statistical, tabular, and graphical analyses were conducted using RStudio, running R version 3.5.0 (R Core Team 2018). The qualitative trash condition scores (1 to 12) defined in the Trash Monitoring Plan were used to evaluate all trash data collected at probabilistic and targeted sites. Four condition categories were used to distinguish these thresholds: "Low" (trash scores 1-3); "Moderate" (trash scores 4-6); "High" (trash scores 7-9); and "Very High" (trash scores 10-12).

To provide a standardized quantitative estimate of trash levels at targeted sites, trash volumes were converted to density (in units of gallons per square foot of assessment area) for all analyses, by dividing trash volumes (as a total and by pathway) by the site assessment area.

For all analyses of targeted data, multiple sampling events were kept separate when evaluating associations between qualitative and quantitative methods.

3.5.1 Estimating the Extent of Trash Levels in all Urban Streams

Cumulative distribution functions (CDFs) of qualitative trash condition scores were generated for probabilistic sites to estimate overall extent of trash levels within the urban portion of the sampling frame. The estimates were weighted based on total stream length of urban sites, divided by the total stream length in the urban area of the sample frame. Non-urban sites that were part of the original RMC creek status monitoring site selection process were excluded from the analyses of trash levels. Therefore, each urban trash monitoring site contributes an equal proportional amount of stream length to the extent estimates. The adjusted sample weights were used to estimate the proportion of stream length represented by trash condition scores regionwide. Condition estimates and 95% confidence intervals were calculated for all probabilistic results averaged across the five qualitative events, as well as for the trash condition scores generated from each seasonal sampling event individually. All calculations were conducted using the R-package *spsurvey* (Kincaid and Olsen 2016).

3.5.2 Boxplots and Descriptive Statistics

Boxplots and scatterplots were used to summarize the distributional characteristics of the data. In each boxplot, the horizontal line represents the median value, the bounds of the lower and upper box represent the interquartile range (IQR; representing the middle 50% of the data), and the lower and upper whiskers represent the 25th (Q1) and 75th (Q3) percentiles of the data plus 1.5 times the interquartile range (i.e. Q1 – 1.5*IQR or Q3 + 1.5*IQR), respectively. 'Outlier' values outside the whiskers are shown by points. Each set of seasonal assessment results was included (assessments performed at the same sites were not averaged).

Scatterplots are used to evaluate relationships between qualitative (trash condition scores) and quantitative (trash density) results. Linear regression lines were added for perspective only. Similarly, individual assessment results were included as is, and were not averaged.

3.5.3 Statistical Tests

Spearman rank correlation statistics (rho) were used to evaluate relationships between trash condition scores or densities and site characteristics (e.g., channel type, channel width, bank cover, channel cover), and pathways of trash. Each of the multiple trash condition scores collected at each site was used in analyses. For all analyses involving trash densities, only data for targeted sites were used. A p-value of < 0.05 was used to determine significance for all correlation analyses.

To test for statistical significance in trash densities among qualitative trash scores a Kruskal-Wallis rank sum test (a non-parametric analysis-of-variance) was performed, followed by pairwise comparison with adjustment for multiple comparisons. Non-parametric statistical testing was selected due to the non-normal distribution of trash densities that could not be corrected by transformation.

3.6 Data Quality

Field efforts associated with the Trash Monitoring Plan were covered under four Data Quality Objectives (DQOs) and Measurement Quality Objectives (MQOs) established within the Quality Assurance Project Plan (QAPP) to ensure that sound collection of data concerning trash loading was able to occur. Two qualitative DQO/MQOs of representativeness and comparability were put forth for the project, while two quantitative DQO/MQOs of completeness and precision were also established.

The quantification of trash loading is an inherently variable data type with respect to spatial and temporal characteristics, and the significant use of human judgment in associated trash data collection can increase the potential for bias. Given this, it was of importance to ensure effective training and consistent data collection principles so that the data quality goals encompassed within the four DQO/MQOs could be achieved.

A summary of data quality practices used for the project are provided in Appendix A.

4 Results and Discussion

The results and discussion presented in this section considers all data collected during the pilot phase of the Trash Monitoring Plan. The results are organized by the following sections and are intended to answer specific scientific monitoring questions outlined in the Trash Monitoring Plan:

4.1 Comparison of Qualitative Assessment and Quantitative Monitoring Results

- Are significantly strong correlations observed between qualitative and quantitative trash receiving water monitoring/assessment methods?

4.2 Levels of Trash in Urban Water Bodies in the MRP Area

- What is the current level of trash deposited in flowing waterbodies in each MRP county and the entire MRP urban area?
- Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
- Do other site and landscape variables correlate with trash levels in flowing waterbodies?
- What trash levels are observed at sites targeted for cleanup? How do these levels compare to levels in all flowing waterbodies?

4.3 Contributions of Trash from Different Pathways

- What percentages of trash observed in receiving waters are attributable to stormwater conveyance systems, direct dumping, wind, and encampments?

4.4 Levels of Trash Observed in Receiving Waters Compared to Trash Discharged by Stormwater Conveyances

- Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

4.1 Comparison of Qualitative Assessment and Quantitative Monitoring Results

Both qualitative visual assessments and quantitative monitoring of trash volumes and densities were conducted at targeted sites (n=100) to evaluate the correlation between these two receiving water trash monitoring methods. Correlations between qualitative and quantitative results would serve as the basis for validating the qualitative assessment methodology and provide the foundation for its potential use as a surrogate method for quantitative trash monitoring in receiving waters. A strong association between these methodologies would provide a reliable estimate of the trash volumes via qualitative assessment results with a known level of variance, and provide the basis for using the less resource-intensive qualitative assessment tool for future trash receiving water monitoring efforts.

Significant correlations were observed between the qualitative trash condition scores (1-12) and trash density estimates (volumes per surface area) at both regional and countywide scales (Table 4-1). A comparison of trash condition scores and trash densities for the two assessment events conducted at targeted sites is presented in Figure 4-1. During both assessments, trash densities were significantly higher at sites with *High* or *Very High* trash condition scores (i.e. $\geq$ 7 condition score), compared to densities measured at sites with *Low* or *Moderate* scores (i.e. $\leq$ 6 condition score). When pooling both events, the Kruskal-Wallis non-parametric statistical test showed a significant difference in trash densities among the 12 trash condition scores. However, multiple-comparison tests revealed that trash densities were only significantly different with trash conditions scores that were separated by large differences in scores (e.g. 4 vs. 8 and 5 vs. 10; $p < 0.05$), compared to smaller differences in scores (e.g., 5 vs. 6 or 9 vs. 10; $p > 0.05$). These results suggest that reducing the scoring range (e.g., 1-8) may statistically increase the difference between the condition categories.

Table 4-1. Correlations between trash densities (volume per unit surface area) and qualitative trash condition scores (1-12) at targeted urban receiving water monitoring sites in the MRP area. Each of the targeted sites was assessed twice (dry season 2018 and dry season 2019).

Strata[1]	Targeted Sites[2]	Correlation Coefficient (rho)	p-value
Alameda	24	0.42	0.003
Contra Costa	19	0.70	< 0.001
San Mateo	12	0.75	< 0.001
Santa Clara	31	0.72	< 0.001
Solano	**5**	**NR**	**NR**
Regional	**91**	**0.60**	**< 0.001**

NR – Not reported due to the low number of samples

[1] Solano County (n=5 sites; n=10 sampling events) is included in the regional evaluation, but had low statistical power to evaluate correlations at the county scale.

[2] Shoreline sites (n = 9) were excluded due to their poor association between qualitative score and densities. Thus, for some counties, the number of sites shown in the table are lower than what was previously presented in Table 3-5.

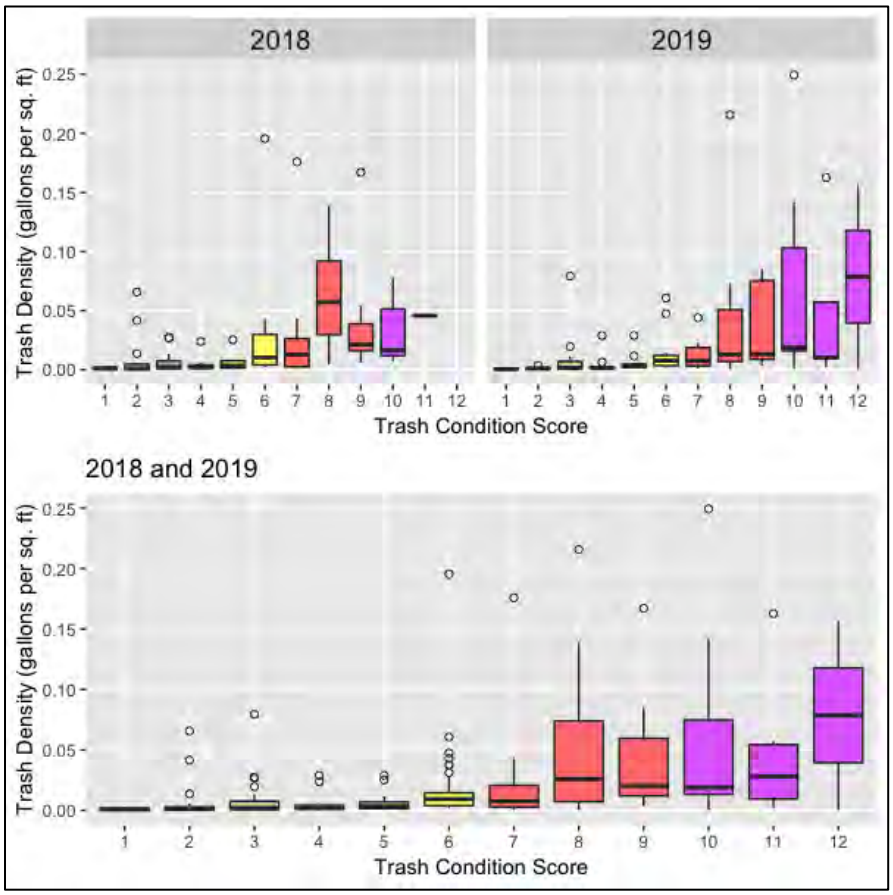

Figure 4-1. Comparison of trash densities (volume per unit surface area) and qualitative trash condition scores (1-12) at targeted receiving water monitoring sites (n=100) in the urban MRP area. Colors designate trash condition scores (Green = Low, Yellow = Moderate, Red = High, and Purple = Very High). Each of the targeted sites was assessed twice (dry season of 2018 and dry season 2019).

Organizing the trash condition scores presented in Figure 4-1 into the four broader trash condition categories shows a clear relationship with trash density (Figure 4-2), which visually confirms the positive correlations outlined in Table 4-1. Kruskal-Wallis non-parametric statistical testing showed that there was a significant difference in trash density among the four trash condition categories. A multiple-comparison test revealed that mean trash densities significantly differed between each of the condition categories, except for the *High* and *Very High* categories ($p = 0.30$). Trash densities between the Low and Moderate condition categories and the Moderate and High condition categories were significantly different ($p < 0.001$).

Based on the significant difference in trash densities between condition categories, descriptive statistics (mean density and quartiles) were calculated for the four condition categories during each of targeted assessments, as well as both targeted datasets pooled together (Table 4-2). During the 2018 assessment, mean trash density ranged from 0.0075 gal/ft^2 at sites corresponding to the *Low* condition category to 0.0439 gal/ft^2 for sites in the *High* condition category (i.e., approximately a factor of six). The mean density of the sites classed in the *Very High* condition category was slightly lower (0.0340 gal. per sq. ft)

than for the sites classed in *High* condition. This deviation is likely associated with the few number of sites (n=7) that represented the *Very High* condition and some sites having variable trash densities.

During the 2019 assessment, trash densities were lower than 2018, in each of the *Low* to *High* condition categories, ranging from 0.0058 to 0.0308 gal/ft^2. However, a significant number of targeted sites were classed in the *Very High* condition in 2019 (n = 18), which resulted in a notably higher mean density of 0.0619 gal/ft^2. Overall, combining the results from both assessments showed that the mean and median trash densities clearly increased with each successive trash condition category.

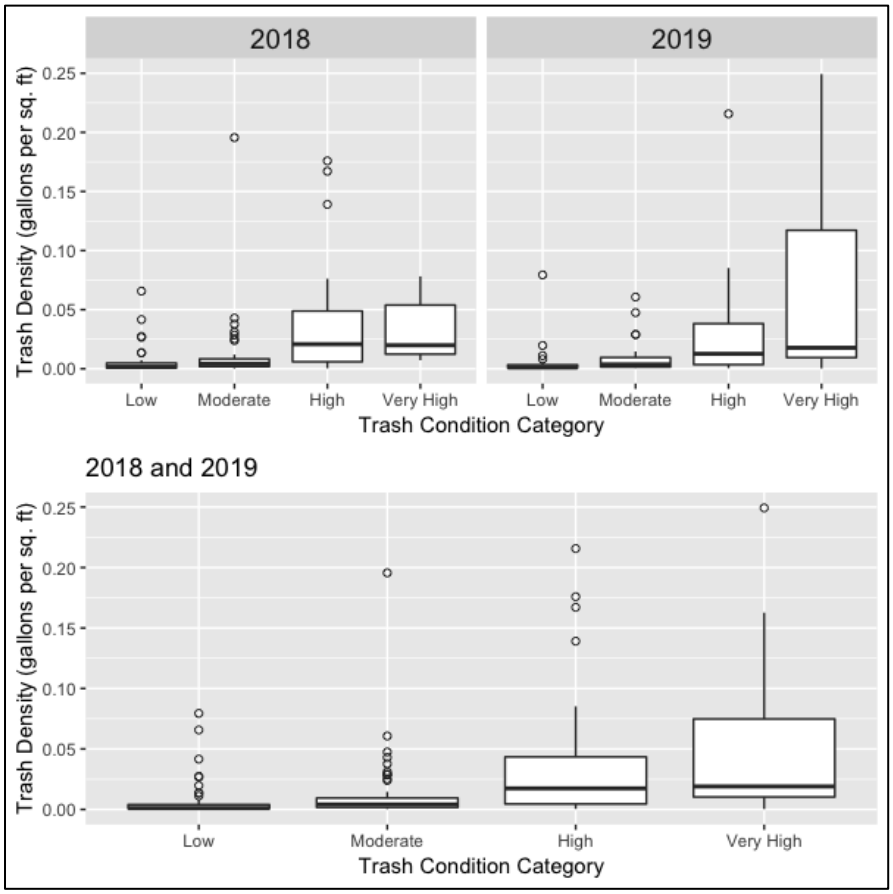

Figure 4-2. Comparison of trash densities (gallons per surface area unit) and qualitative trash condition categories at 100 targeted receiving water monitoring sites. Each of the targeted sites was assessed twice (dry season of 2018 and dry season 2019).

Table 4-2. Summary statistics for trash densities (gal/ft^2) and trash condition categories measured at 100 targeted sites in 2018, 2019, and combined.

Sampling Event	Condition Category	Number of Sites	Mean (gal. per sq. ft)	25th Percentile	50th Percentile	75th Percentile
2018	Low	31	**0.0075**	0.0006	0.0016	0.0048
	Moderate	43	**0.0124**	0.0018	0.0041	0.0083
	High	19	**0.0439**	0.0059	0.0208	0.0488
	Very High	7	**0.0340**	0.0123	0.0199	0.0539
2019	Low	26	**0.0058**	0.0007	0.0010	0.0033
	Moderate	24	**0.0089**	0.0015	0.0037	0.0095
	High	22	**0.0308**	0.0035	0.0126	0.0381
	Very High	18	**0.0619**	0.0095	0.0177	0.1171
2018 and 2019 Combined	Low	57	**0.0067**	0.0007	0.0011	0.0040
	Moderate	77	**0.0109**	0.0017	0.0041	0.0094
	High	41	**0.0368**	0.0045	0.0174	0.0434
	Very High	25	**0.0541**	0.0103	0.0190	0.0748

Outliers[4] shown (as open circles) in Figures 4-1 and 4-2 identify results where the trash density was higher than the 75th percentile + 1.5 times the interquartile range (an indicator of extreme values). There were outlier sites within each of the *Low, Moderate*, and *High* categories, suggesting that trash density can be highly variable among sites assigned a condition category. Closer examination of these outliers provides some insight into issues that may arise when applying both qualitative and quantitative assessment methods. These issues include:

- Trash was not visible in dense vegetation on the banks or under the water surface of the channel and was excluded from the qualitative assessment; however, this trash was removed and measured for the quantitative assessment.
- High volumes of trash occurred in a small proportion of the assessment area (e.g., under bridge), but the remaining area had low levels of trash; as a result, the overall site inappropriately received a low trash condition score during the qualitative assessment.
- High trash levels were observed at the site, but not all trash could be removed and measured due to access issues (e.g., deep water, muddy substrate) or safety issues related to illegal encampments. This example was often the case at shoreline sites, where trash was visible in mudflats which could not be safely accessed, removed and quantitatively measured.

These observations suggest that although correlations between qualitative and quantitative methods appear to be moderately strong, qualitative and quantitative results may not correlate well at every site due to the unique attributes of some sites.

[4] Data from outlier sites were included in the statistical analyses.

4.1.1 Effects of Channel Characteristics on Correlations between Qualitative and Quantitative Methods

Factors that may explain the relationship between qualitative trash condition scores or category and trash density were explored to inform the design of future receiving water trash monitoring. Figure 4-3 illustrates how channel type may affect this relationship. Although data are limited for certain types of sites (e.g., shorelines), trash condition scores correlate well with trash densities in different types of channels. Sites with concrete and natural channels had trash condition scores that spanned between 1 and 12, and exhibited similar relationships to trash density (i.e., slope of regression line ~ 0.008 gal/ft^2). Sites in earthen channels, however, had condition scores that ranged between 1 and 11 and exhibited a different relationship to trash density (i.e., slope of regression line ~0.002 gal/ft^2). Thus, for sites in natural and concrete channels, the trash density was higher for a given trash condition score, compared to earthen channels.

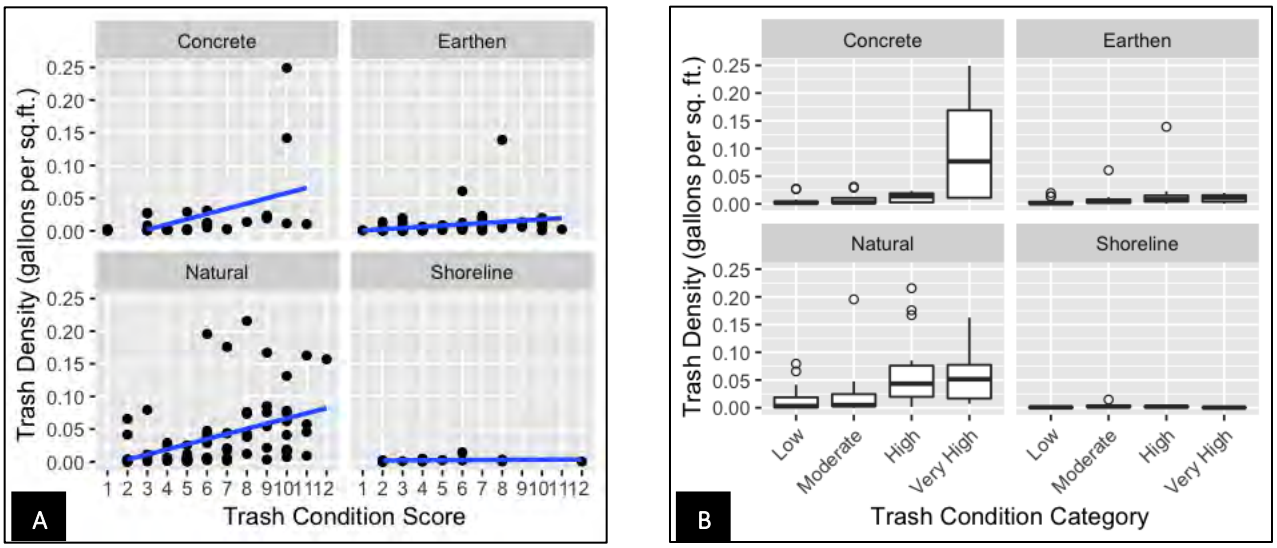

Figure 4-3. Comparison of trash densities and qualitative condition scores (A) and categories (B) observed at 100 targeted receiving water monitoring sites grouped by channel type. Each of the targeted sites was assessed twice (dry season 2018 and dry season 2019).

Although the dataset at shoreline sites is limited (n=18), trash condition scores did not tend to relate as well to trash densities as channels, presumably as a consequence of larger assessment areas where trash dispersion is less constrained that can occur farther away from the site than trash within stream channels. These observations suggest that not all channel types behave similarly in their mode of trash deposition. It should thus be considered in future monitoring that sites be selected or stratified according to different channel types, to ensure a full representation of receiving water conditions are assessed.

Overall, the comparison of qualitative assessments and quantitative monitoring indicates a strong association between the two methodologies. The results indicate potential regional differences in the relationships between the two methods, with Contra Costa, San Mateo, and Santa Clara Counties exhibiting higher correlations than Alameda County. Additionally, it appears that the relationship between qualitative and quantitative methods was weaker at the 1 to 12 scale, compared to categorical scale (i.e., *Low, Moderate, High, Very High*). There were less obvious delineations in trash levels between small incremental changes in condition scores, compared to the four categories. This pattern may suggest that refinements to the qualitative assessment SOP that reduces (or eliminates) the 1 to 12 scale may be

warranted. Alternatively, additional training and calibration of field crews to the current 1 to 12 scale may help improve the relationship to trash densities, along with additional training tools, such as video footage of trash deposition for each of the trash condition categories.

4.2 Levels of Trash in Urban Waterbodies in the MRP Area

4.2.1 Qualitative Visual Assessments at Probabilistic and Targeted Sites

Qualitative trash condition scores for the 129 probabilistic receiving water monitoring sites were used to conduct an evaluation of the extent and magnitude of trash in urban creeks and channels in the MRP area.[5] Table 4-3 illustrates the cumulative distribution results of trash condition scores (averaged over five events) for the regional probabilistic dataset. Condition scores at 40% of the urban probabilistic sites were in the *Low* condition category (i.e., condition score < 4) and 37% were in the *Moderate* category (condition score 4 to 6), indicating that approximately 77% (±13%) of the urban stream lengths in the MRP area exhibit low to moderate levels of trash. In contrast, 22% of the urban stream lengths in the MRP area had trash levels in the two highest condition categories, with only 2% in the *Very High* trash condition category. It is also notable that none of the sites assessed had an average trash condition score of 12.

The cumulative distribution results of the trash condition scores for each of the five monitoring events are shown in Appendix B - Table B1. The variability in trash condition scores for each probabilistic site is shown in Appendix B - Table B2 and for each targeted site in Appendix B – Table B3. Average trash condition scores at probabilistic and targeted stream sites in the region are illustrated in Figures 4-2 and 4-3. Trash condition scores for each site and event in each county are provided in Appendix C.

Table 4-3. Estimates of percent stream length (± 95% Confidence Interval) in the MRP urban area represented by average trash condition scores (1 to 12) and condition categories (Low, Moderate, High and Very High) based on observations at 129 sites within the 5 participating MRP counties.

Trash Condition Score	% of Stream Length (± 95% C.I.)	Trash Condition Category	% of Stream Length (± 95% C.I.)
1	5% (3%)	Low	40% (7%)
2	18% (6%)		
3	17% (6%)		
4	12% (6%)	Moderate	37% (6%)
5	16% (6%)		
6	9% (6%)		
7	12% (4%)	High	20% (2%)
8	6% (3%)		
9	2% (2%)		
10	1% (2%)	Very High	2% (0%)
11	2% (0%)		
12	0% (0%)		

[5] Condition scores from the 100 targeted sites were not used in this evaluation because of the uncertainty in the length of stream represented by these sites, beyond the length of the site. Targeted data were used, however, to compare to condition scores at probabilistic sites to evaluate whether the conditions observed at targeted sites (i.e., trash hot spots) were or were not represented in the probabilistic sample draw.

To estimate the total trash accumulation for urban streams in the MRP area, the trash density statistics from targeted sites was extrapolated to the extent of stream length represented by trash condition scores observed at probabilistic sites. In order to convert volumetric estimates to total accumulation, trash density (gal per sq. ft; Table 4-2) was first converted to linear distance by multiplying by the average assessment width of sites in each condition category. The trash accumulation (gal per ft) was then scaled to the entire MRP area (1,997 urban stream kilometers) by multiplying by the proportion of urban stream length represented by each condition category (Table 4-3). Table 4-4 presents the estimates of total trash accumulation for each condition category. The total accumulation of trash for all urban streams in the MRP area is estimated to be over 4 million gallons, based on trash density estimates from 2018 and 2019 combined. The majority of the trash accumulation is estimated to be derived from channels in the *High* condition category.

Table 4-4. Estimates of total trash accumulation represented by trash condition categories (Low, Moderate, High and Very High) based on observations at 129 probabilistic sites and 100 targeted sites within the 5 participating MRP counties.

Trash Condition Category	Length of Streams in the MRP Urban Area within each Category		Trash Accumulation Level in Streams within each Condition Category	
	km	%	gallons	%
Low	798.8	40%	568,382	14%
Moderate	738.9	37%	879,640	22%
High	399.4	20%	2,242,783	55%
Very High	39.9	2%	373,099	9%

The trash assessment scores from the targeted sites were compared to the results from probabilistic sites to determine if the range of conditions were similar between the two sample designs. The percentage of sites within each condition category was used to compare results. As presented in Table 4-5, 23% fewer targeted sites were in *Low* trash condition category, compared to the probabilistic sites, and more targeted sites were in the *Very High* condition categories than at probabilistic sites. A similar percentage of sites were observed in the *Moderate* and *High* condition categories between the two sampling designs. Targeted sites were selected by MRP Permittees as "trash hot-spots", thus higher trash scores would generally be expected at targeted sites compared to probabilistic sites. However, some of the targeted sites may have lower than expected trash conditions for several reasons, including recent cleanup activities (prior to assessment), exclusion of sites with illegal encampments, and overall low trash levels within some jurisdictional areas.

Table 4-5. Percentage of probabilistic and targeted sites in each trash condition category.

Trash Condition Category	Probabilistic Sites		Targeted Sites	
	% of Sites	# of Sites[1]	% of Sites	# of Sites
Low	40%	52	17%	17
Moderate	37%	48	47%	47
High	20%	26	26%	26
Very High	2%	3	10%	10
Totals		129		100

[1] Although 125 probabilistic sites were assessed during each event, 4 sites assessed during the first event were replaced with new sites before the subsequent monitoring events due to access issues.

Project results suggest that trash hot spot locations identified by MRP Permittees have higher levels of trash compared to the range of trash conditions observed at probabilistic sites. Additionally, these results may suggest that the probabilistic sites assessed via the Trash Monitoring Plan may not fully represent stream lengths with higher trash accumulation (i.e., trash hot spots).

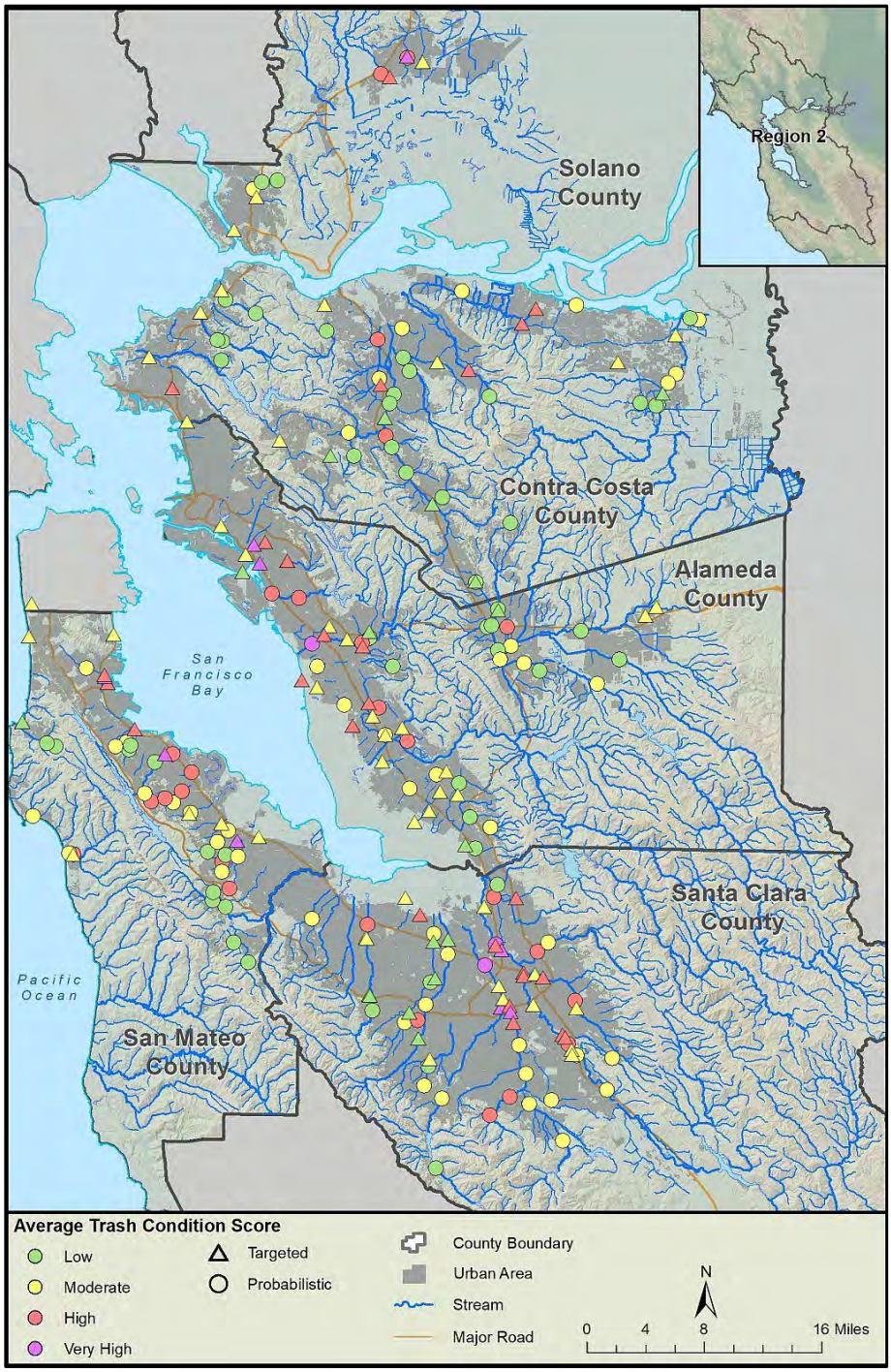

Figure 4-4. Average Trash Condition Scores for 129 probabilistic (average of 5 events) and 100 targeted (median of 2 events) sites in SF Bay Area urban streams and shorelines.

4.2.2 Associations with Site/Landscape Characteristics

To better understand patterns in the extent and magnitude of trash in receiving waters, all site characteristics (e.g., site width, bank cover, channel cover, and channel type) and descriptive site/landscape variables (e.g., range in flow, adjacent land use, number/size of storm drain outfalls, and evidence of public use) were evaluated for their potential association with trash condition scores and trash densities. Spearman correlation analysis, regression analysis, and data visualization were used to evaluate the relationship between site/landscape characteristics and qualitative trash condition scores at probabilistic and trash targeted sites combined, and between site/landscape characteristics and trash densities for targeted sites, where site/landscape characteristic data were available.

Bank and Channel Cover

Spearman correlation results for variables associated with the site width, and types of bank and channel cover are shown in Table 4-6. In general, site characteristic variables were weakly correlated or not correlated at all with qualitative trash condition scores. Higher assessment area widths (rho = 0.18), higher proportions of grasses (rho = 0.14), bushes (rho = 0.19), and trees (rho = 0.12) and lower proportions of armored banks (rho = - 0.21) were all significantly correlated ($p < 0.05$, indicating the correlation was non-zero) with trash condition scores. But there was no correlation with open/exposed banks. Similarly, trash conditions scores were not significantly correlated with the proportion of dry or open/wet channels, or aquatic vegetation/algae cover (i.e., $p > 0.05$). There was a very weak correlation of trash condition scores with woody debris (rho = 0.08, $p = 0.02$). The number of insignificant correlations and generally low correlation coefficients (rho < 0.2) suggests that size of assessment area, bank cover, and channel cover are ineffective groupings for stratification of sites by qualitative trash condition.

Table 4-6. Correlations between bank/channel cover variables and qualitative trash condition scores for all MRP urban sites (probabilistic and targeted). Variables with statistically significant correlations are bolded.

Site Characteristic	Variable	Correlation Coefficient (rho)	p-value
Width	**Contiguous Width**	**0.18**	**< 0.001**
Bank Cover	**% Grasses**	**0.14**	**< 0.001**
	% Bushes/Shrubs	**0.19**	**< 0.001**
	% Trees	**0.12**	**< 0.001**
	% Armored	**-0.16**	**< 0.001**
	% Open/Exposed	-0.01	0.88
Channel Cover	% Open/Wetted Channel	0.05	0.17
	% Woody Debris	0.08	0.02
	% Aquatic Veg/Algae	-0.04	0.30
	% Dry Channel	-0.06	0.06

Landscape Characteristics

Associations between descriptive landscape metrics, such as range in flow, adjacent land use, public use, and number/size of storm drain outfalls and trash condition (scores and densities) were evaluated. The degree of flow at a site was estimated during trash assessments by classification into a range of flow classes that varied from “dry” to “tidal”, as shown in Figure 4-5. There was no general pattern to flow and qualitative trash condition when all sites were combined. However, targeted sites with dry or with only isolated pools had lower trash density than sites in either the 0.1-1 cfs, 1-5 cfs, or 5-20 cfs flow

categories. In contrast, sites with higher runoff or those that were tidally influenced exhibited lower densities of trash that was relatively consistent amongst those sites. Presumably trash at these sites is more widely dispersed, leading to a lack of association with flow and trash density.

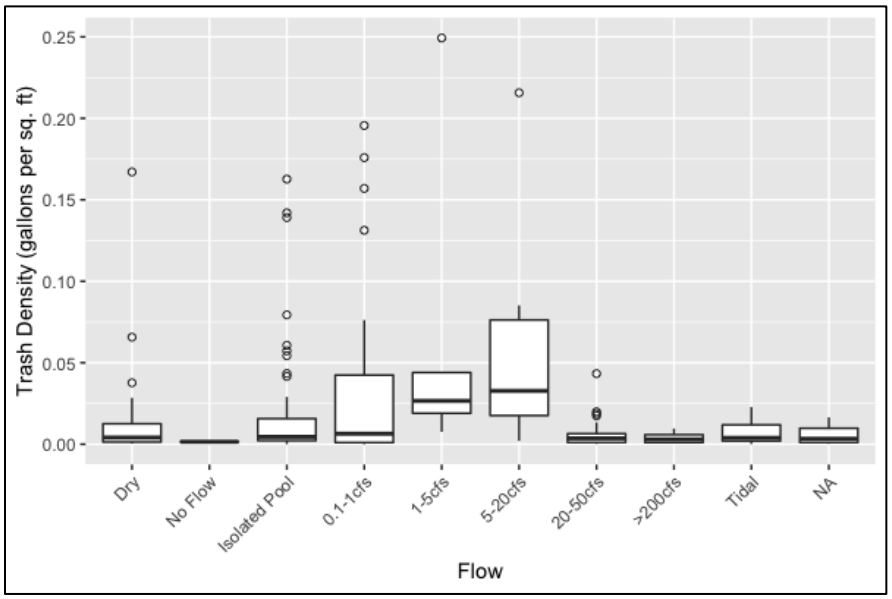

Figure 4-5. Comparison of estimated stream flow and trash density (gal/ft^2) at targeted sites (n=92) sampled during the two dry season assessments (2018 and 2019).

Adjacent land uses were characterized for each assessment site using broad land use categories. Each site was classified into two to four categories, including “residential”, “commercial”, “industrial”, “freeway”, “public”, and/or “open/park.” To assess associations among trash levels and adjacent land uses, the number of sites in each land use category was calculated. Six land use categories were found to be most frequently occurring, irrespective of trash condition category. Sites adjacent to “residential” (including single and multi-family) and “open/park” comprised at least half of all land use designations in the *Low* to *High* trash categories (Figure 4-6). In contrast, sites corresponding to the *High* and *Very High* trash condition were more frequently adjacent to higher proportions of “freeway” and “industrial” land use categories, compared to sites in either *Low* or *Moderate* condition categories. The proportion of commercial land use was relatively consistent between sites with different condition categories, comprising 12% to 22% of the adjacent land uses.

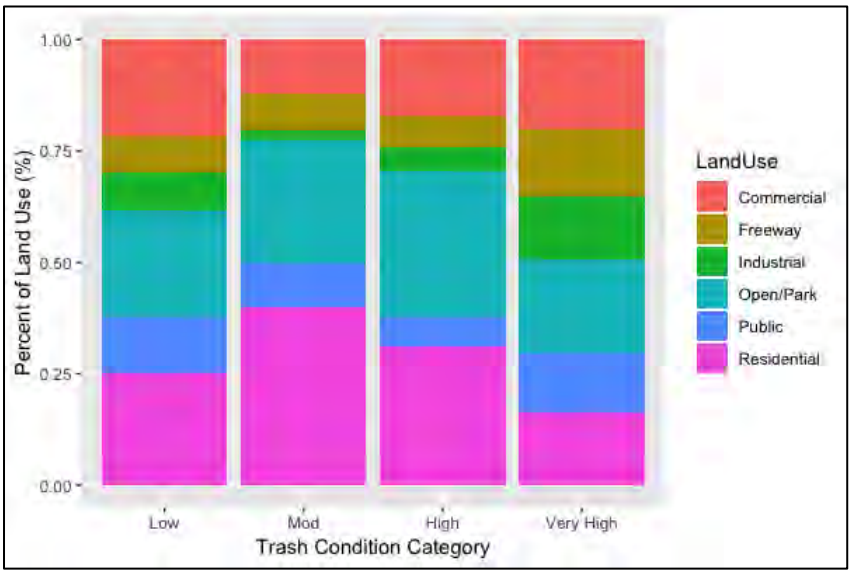

Figure 4-6. Comparison of trash condition categories observed at monitoring sites and the predominate land uses adjacent to these sites.

Evidence of public use was also recorded during surveys based on the categorical assessment scale of "None", "Low", "Moderate" or "High" observed during each assessment (Figure 4-7). As predicted, sites with higher levels of public use generally exhibited higher trash densities. A Kruskal-Wallis statistical test confirmed there was a significant difference in trash density by public use category, where sites classed in the "High" public use category had significantly higher mean trash density than sites in either the "Low" or "Moderate" public use classes.

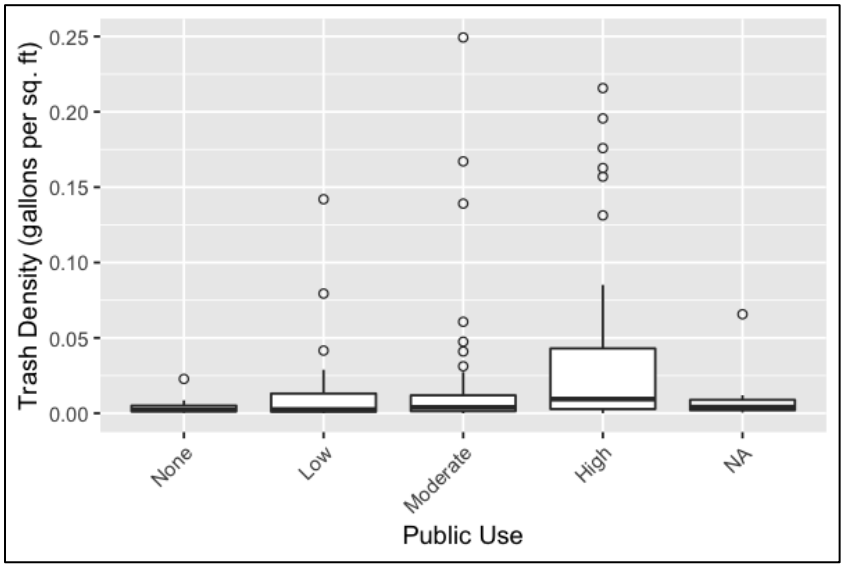

Figure 4-7. Comparison of public use levels and trash density at targeted sites sampled during two dry season assessments (2018 and 2019).

Correlations between the number and size of stormwater outfalls that were observed in the assessment area, and trash condition scores or trash densities were also examined. There was a weak correlation (rho = 0.09 – 0.14, $p < 0.05$) in trash condition scores and the number of outfalls in each of the size classes (18-

24”, 24-36”, 36-48”, > 48”). Similarly, targeted sites showed a modest association between the abundance of stormwater outfalls and total trash density (Figure 4.8).

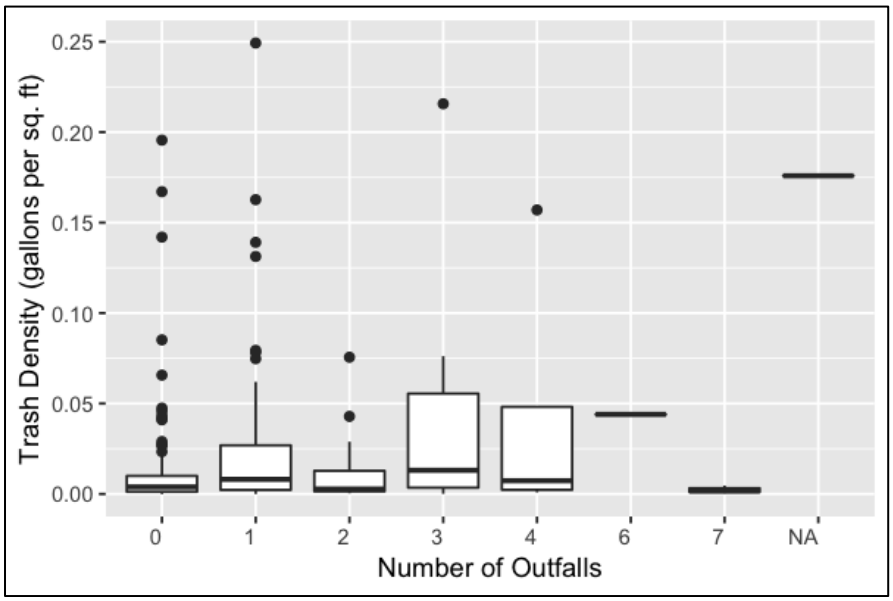

Figure 4-8. Total number of stormwater outfalls compared to the average trash density observed at targeted sites during two dry season assessments (2018 and 2019).

Overall, the comparison of site characteristics to trash densities and condition categories at receiving water monitoring sites suggests that neither bank and channel cover characteristics, magnitude of water flow at the time of the assessment/monitoring event, or the level of public use at the site can be used to fully explain the variations in trash conditions observed at probabilistic and targeted sites. The extent of natural vegetation along banks at a site appears to be somewhat positively correlated to trash condition scores, while the extent of armored banks is negatively correlated to scores. One hypothesis to explain these observations is that natural channels that have riparian vegetation and diverse instream substrate (both woody debris and varying sizes of substrate) “intercept” trash more effectively than channels with fewer obstructions. Similarly, sites with the largest flows observed or high levels of accessibility do not necessarily equate to higher trash densities, though at some sites this may occur. These observations suggest that the largest sources of variations in trash condition scores may be from other factors associated with the wide range of trash sources and pathways, in addition to the site-specific factors evaluated through this pilot project.

4.2.3 Contributions of Trash in Receiving Waters During Different Seasons

Between October 2017 and March 2020, three qualitative trash assessments were conducted during the wet season (October – March) and two assessments were conducted during the dry season (April – September) at the 125 probabilistic sites. Concurrent with the two dry season events, two assessments were conducted at an additional 100 targeted sites. As illustrated in Figure 4-9, the rainfall patterns during each of the three wet seasons differed substantially. During the wet season of 2017-18, storms were infrequent, short and had the highest intensity of the three water years. In 2018-19 wet season, storms were generally more frequent, longer, but less intense. The 2019-20 wet season (through March 2020) had very few storms that were of predominantly lower intensity than most storms occurring in either of the preceding two wet seasons. Despite the differences in rainfall, the distributions of trash

condition scores had minimal differences between wet seasons at probabilistic sites (Figure 4-10). The median of trash condition scores for all probabilistic sites monitored in each wet season (2017-18, 2018-19, 2019-20) was 4 (Moderate) on the 1 to 12 scale. In comparison, the median trash condition score (3) for all probabilistic sites during the 2018 dry season was slightly lower than the median score (4) for the 2019 dry season.

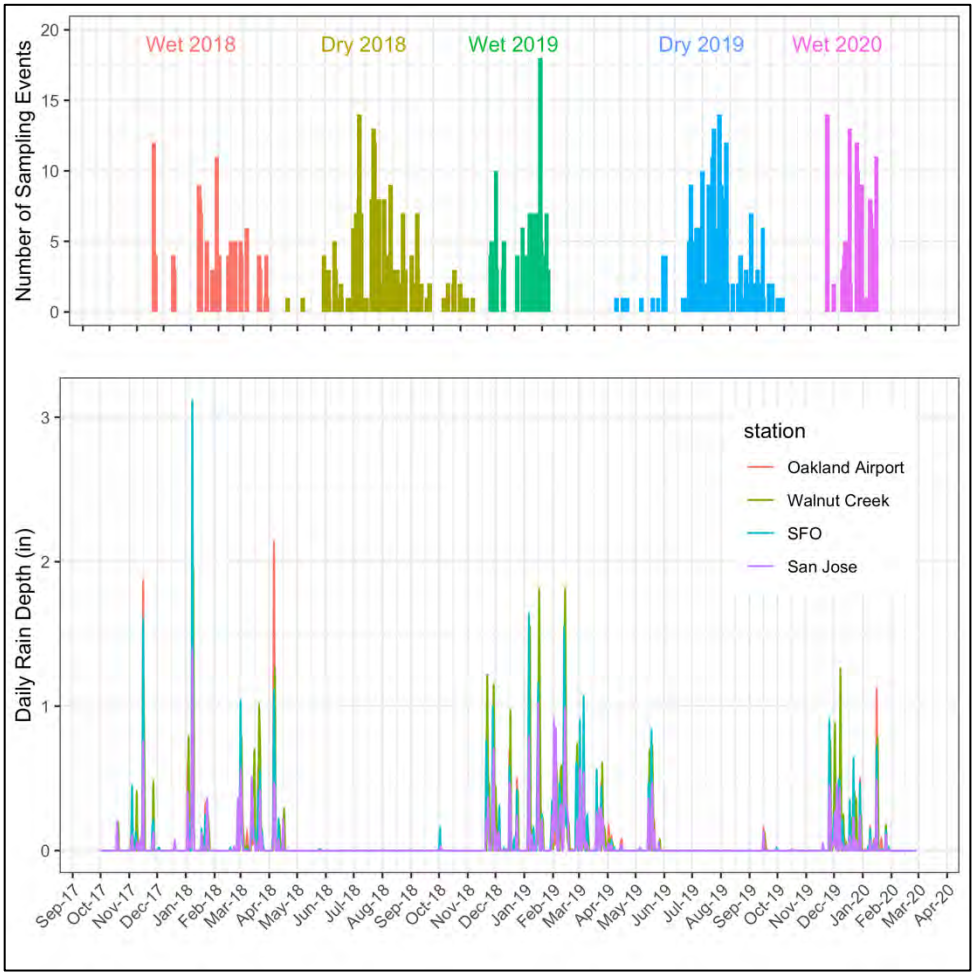

Figure 4-9. Daily precipitation (inches) recorded at four stations across the SF Bay Area from October 2017 through March 2020, and the number of probabilistic and targeted sampling events during that timeframe.

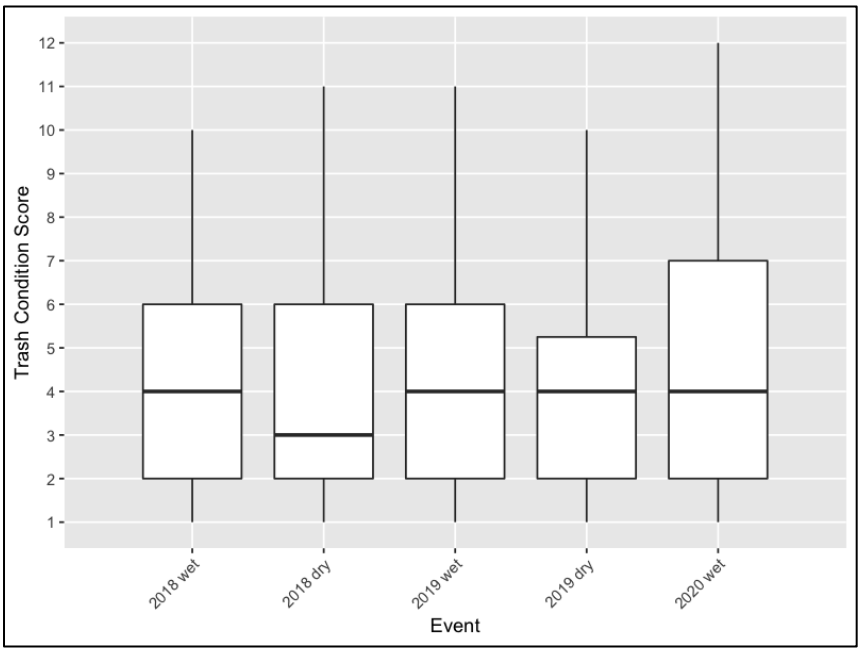

Figure 4-10. Ranges of trash condition scores at probabilistic sites during the 2018, 2019, and 2020 dry and wet season monitoring events.

The trash conditions observed at probabilistic sites indicated that slightly higher trash levels occurred during the wet season events compared to the dry season events. Figure 4-11 illustrates the proportion of probabilistic sites in each of the four trash condition categories for the five events. The proportion of sites in the *High* and *Very High* categories ranged between 22% and 25% for all wet season events, compared to 15% for both dry season events. The proportion of sites in the *Low* category was slightly higher in the dry season (48%-53%) relative to each of the wet season events (42% - 46%). Higher trash conditions during the wet season may be influenced by recent deposition of trash following storm events which mobilized trash to the site from either upstream in-stream sources (e.g., illegal encampments or dumping) or through the stormwater pathway. Additionally, trash is generally more visible during the wet season, when riparian vegetation is less dense, which could affect trash condition scores.

Anecdotal information from field crew experience indicates that dry season is a better time period to physically access the creek and visually observe trash in the channel and along the banks, when stream flows are reduced or creeks/channels are dry. In addition, trash from other pathways (e.g., litter/wind) may be more visible at some locations (e.g., bridges) when flows are lower and the transport of trash downstream is not actively occurring.

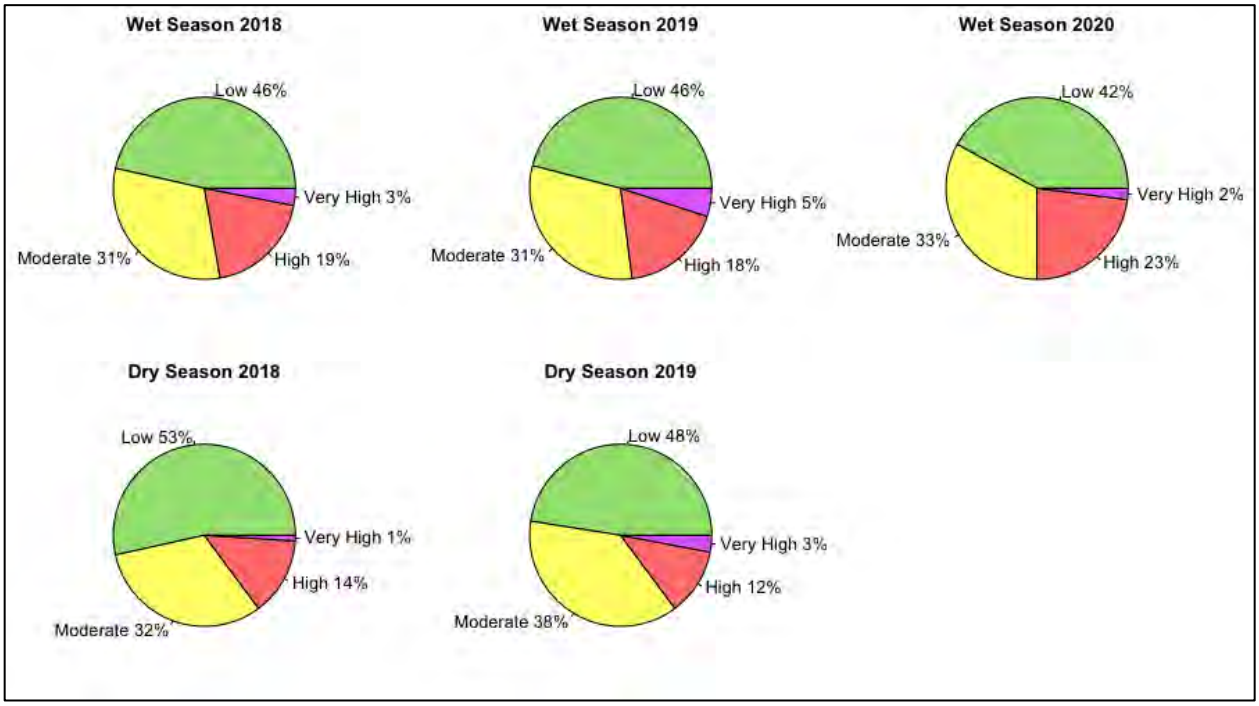

Figure 4-11. Comparison of trash conditions at probabilistic sites for wet and dry season (2018, 2019 & 2020) sampling events.

4.3 Contributions of Trash in Receiving Waters from Different Pathways

The BASMAA trash assessment qualitative and quantitative monitoring protocols include the identification of trash pathways. Field personnel qualitatively identified trash pathways at all sites (both probabilistic and targeted) and estimated the volume of trash from each pathway at targeted sites. Contributions from one or more of the following four pathways were documented: 1) litter/wind; 2) illegal dumping; 3) illegal encampments; and 4) other/stormwater. One of the goals for this project was to determine the relative contribution of trash observed at monitoring sites that is associated with the "Other/Stormwater" pathway.[6] The trash dataset was evaluated to answer the following questions:

- How well do qualitative and quantitative approaches to assessing contributions from different trash pathways compare?
- What are the prevalent pathways of trash observed in receiving waters?
- What are the relationships between trash pathways and trash levels?
- What are key factors that influence trash pathways?

4.3.1 Comparison of Qualitative and Quantitative Approaches

Prior to presenting the information collected on the relative contributions of trash to probabilistic and targeted sites from each of the four pathways, it is important to compare trash pathway contributions

[6] "Other/Stormwater" pathway includes trash that appears to be associated with stormwater and unknown upstream sources (i.e., trash transported by flow and deposited further downstream).

that were determined via two different approaches: 1) qualitative visual assessments and 2) volumetric measurements. Figure 4-12 presents the results of linear regression analyses conducted on data collected at targeted sites (n=100) on the relative (%) contributions by the four pathways using quantitative and qualitative approaches. Based on these analyses, it appears that the qualitative and quantitative approaches were well correlated ($r^2 > 0.7$) for two (i.e., litter/wind and homeless encampments) of the four pathways.

Multiple pathways were identified for the vast majority of the targeted sites using both the qualitative and quantitative approaches. Trash items associated with the litter/wind and other/stormwater pathways are typically light weight and smaller in size (e.g., single-use food ware, plastic bags, cigarettes), and therefore typically contribute smaller proportions of the overall trash volume at sites where the illegal dumping and/or illegal encampment pathways are also present. As a result, the estimates of trash from the litter/wind and other/stormwater pathways have lower regression slopes compared to the illegal encampment pathway, which is associated with larger items.

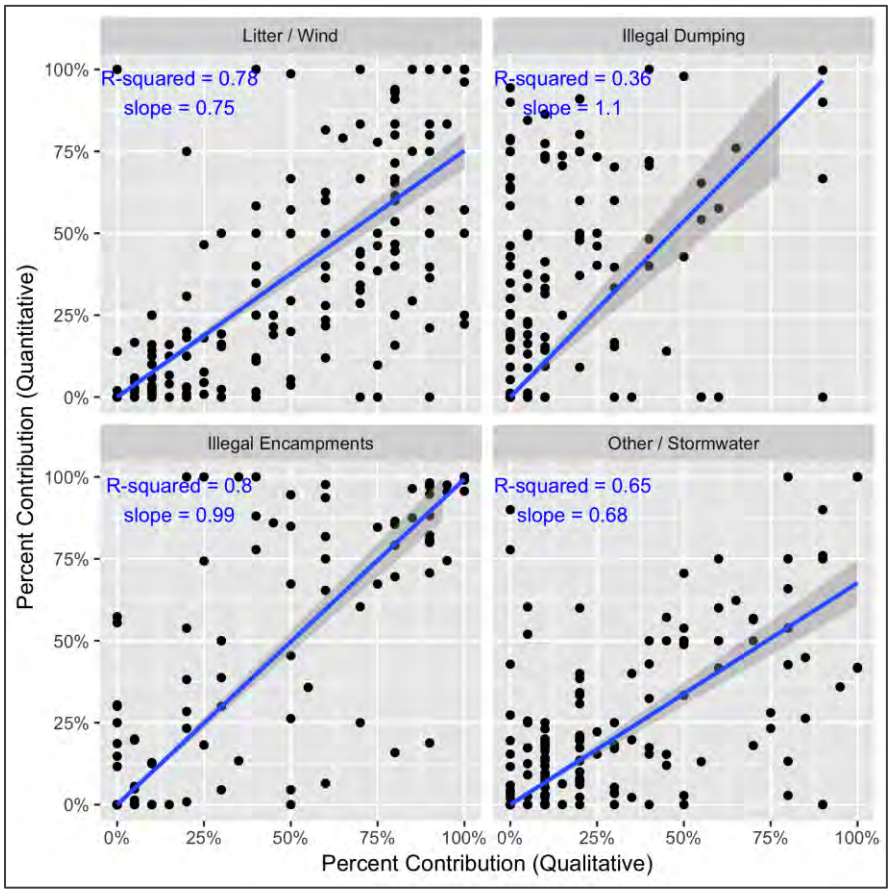

Figure 4-12. Comparisons of quantitative (volume measurements) and qualitative (visual estimate) approaches to relative contributions of trash from four trash pathways at 100 targeted monitoring sites sampled during two monitoring events (n = 200).

4.3.2 Prevalent Trash Pathways

The prevalence of each trash pathway was evaluated by qualitatively assessing whether the pathway was (or was not) identified as a contributor of trash to each site (Table 4-7). The two most common pathways identified as contributors were litter/wind (90% of events) and other/stormwater (78% of events). The

illegal encampment pathway was the least represented pathway (24% of events). These results indicate that trash from the wind/litter and other/stormwater pathways are most prevalent at all sites. Illegal dumping and illegal encampment pathways had higher relative contributions at the targeted sites, compared to the probabilistic sites. This result is expected since these sites were originally selected as trash hot spots, many of which included high trash areas that were associated with illegal encampments.

Table 4-7: Total number and percentage of events at probabilistic and targeted sites when trash from a given pathway was reported as contributing trash to the trash monitoring site.

Type of Site	# of events included in analysis[1]	# of Events where the Pathway was Identified (%)			
		Litter / Wind	Illegal Dumping	Illegal Encampments	Other / Stormwater)
Probabilistic	607	559 (92%)	160 (26%)	117 (19%)	483 (80%)
Targeted	198	166 (84%)	79 (40%)	79 (40%)	141 (71%)
Totals	**805**	**725 (90 %)**	**239 (30 %)**	**196 (24 %)**	**624 (78 %)**

[1] The number of sites included in this analysis are smaller than the total number of monitoring events because of data quality issues with 16 probabilistic sites and 3 targeted sites, as related to pathway determinations.

4.3.3 Relationships Between Trash Pathways and Trash Levels

Although illegal encampments and illegal dumping pathways were less prevalent at targeted and probabilistic sites compared to litter/wind and other/stormwater, these two pathways were associated with the largest volumes of trash observed at sites. During the two targeted monitoring events (dry season of 2018 and 2019), trash volumes were measured for each of the four pathways. In total, about 14,000 gallons of trash in 2018 and 21,000 gallons in 2019 were associated with illegal encampments and illegal dumping, while the litter/wind and other/stormwater pathways combined, accounted for about 3,000 gallons of trash in each event (Figure 4-13).

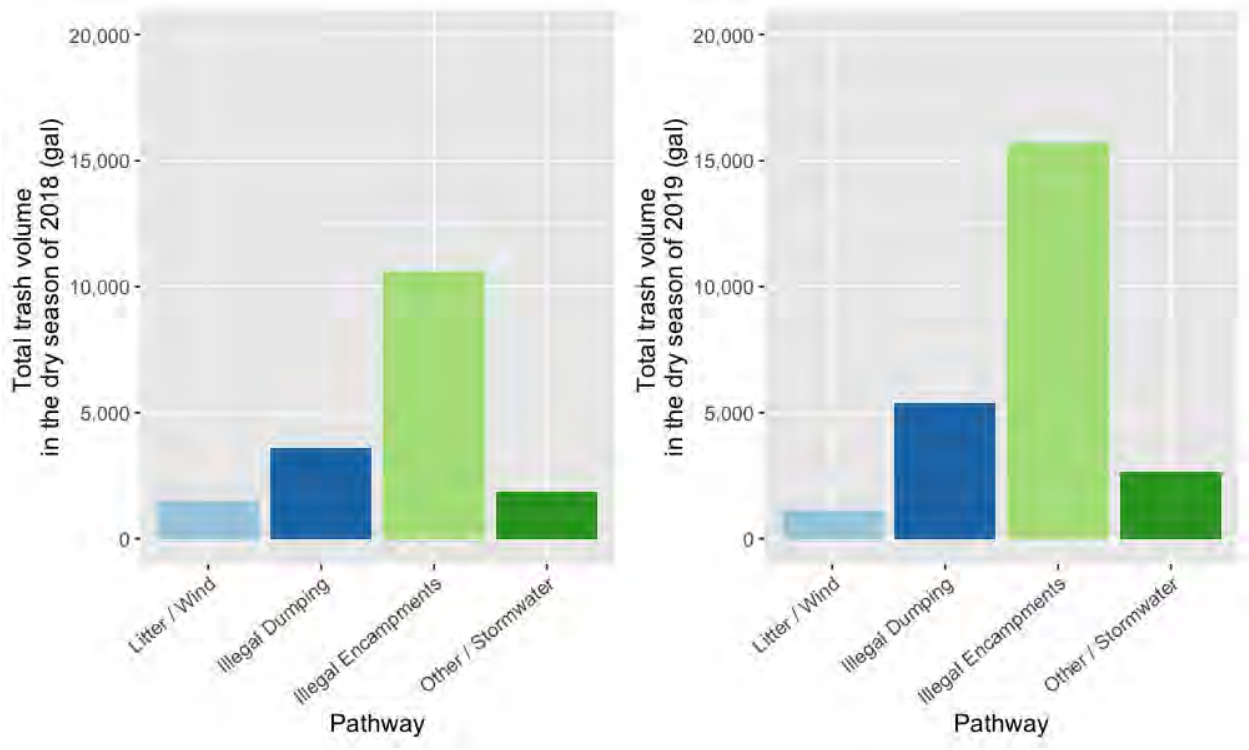

Figure 4-13. Total trash volume for each of the four pathways measured at targeted sites.

The positive association between illegal encampments and illegal dumping pathways, and trash condition scores and volumes, was confirmed using statistical correlation tests. The Spearman correlation analysis presented in Table 4-8 examined correlations between the relative contributions by each trash pathway and the trash condition score observed at the probabilistic and targeted sites. At probabilistic sites, higher trash condition scores were correlated to higher proportions of trash from the illegal encampment and illegal dumping pathways. In contrast, lower condition scores were correlated to proportions of trash from the litter/wind pathway. The contribution of trash from the other/stormwater pathway did not exhibit a correlation to trash condition scores at either targeted or probabilistic sites. That said, it should be noted that contribution estimates are relative percentages and a negative correlation does not indicate that there is less trash from the litter/wind pathway, but merely that this pathway is less dominant, compared to other pathways (i.e., Illegal dumping and Illegal encampments).

Table 4-8. Correlations between qualitative trash condition scores and the qualitative estimation of trash contributed from different pathways at probabilistic (n=129) and targeted (n=100) sites.

	Probabilistic		Targeted	
Pathway	Correlation Coeff. (rho)	p-value	Correlation Coeff. (rho)	p-value
% Litter / Wind	**-0.30**	**< 0.001**	**-0.42**	**< 0.001**
% Illegal Dumping	**0.48**	**< 0.001**	0.12	0.24
% Illegal Encampment	**0.50**	**< 0.001**	**0.53**	**< 0.001**
% Other / Stormwater	0.08	0.37	-0.15	0.15

The association between trash condition category and trash pathway contribution for probabilistic and targeted sites is represented visually in Figure 4-14. Consistent with the statistical analysis results presented in Table 4-7, poor trash conditions are associated with higher proportions of trash from illegal encampments and illegal dumping, and lower proportions of trash from litter/wind. There appears to be little or no change in the relative contribution of trash levels from the other/stormwater pathway.

Figure 4-14. Average contributions of trash observed from each pathway to probabilistic and targeted receiving water monitoring sites during monitoring events. Monitoring events are grouped by trash condition categories.

4.3.4 Factors that Influence Trash Pathways

Seasonal differences in the relative contributions of trash from different pathways were also evaluated. Based on the data collected at probabilistic sites, the relative contributions of the four trash pathways remained relatively consistent across four of the five events (Figure 4-15). Trash associated with the litter/wind pathway was associated with the highest proportion of trash, except during the 2019 wet season, which showed a higher relative contribution from the other/stormwater pathway (i.e., > 50% of the trash) and a lower relative contribution from the litter/wind pathway. As discussed in Section 4.2.1, the 2019 wet season had more frequent storm events, compared to the 2018 and 2020 wet seasons, potentially resulting in more opportunities for trash to be transported and deposited across sites during the 2019 wet season. More frequent storm events may also have resulted in the transport of significantly more trash associated with the other/stormwater pathway, as illustrated in Figure 4-10. Notably, illegal encampments and illegal dumping consistently represented the lowest contribution to trash levels in each of the probabilistic monitoring events. Overall, the comparison of trash levels among seasons suggests that seasonal differences may have an impact on the relative contributions from different trash pathways. In particular, wet seasons with more frequent, runoff-inducing storm events might lead to higher contributions of trash from the other/stormwater pathway.

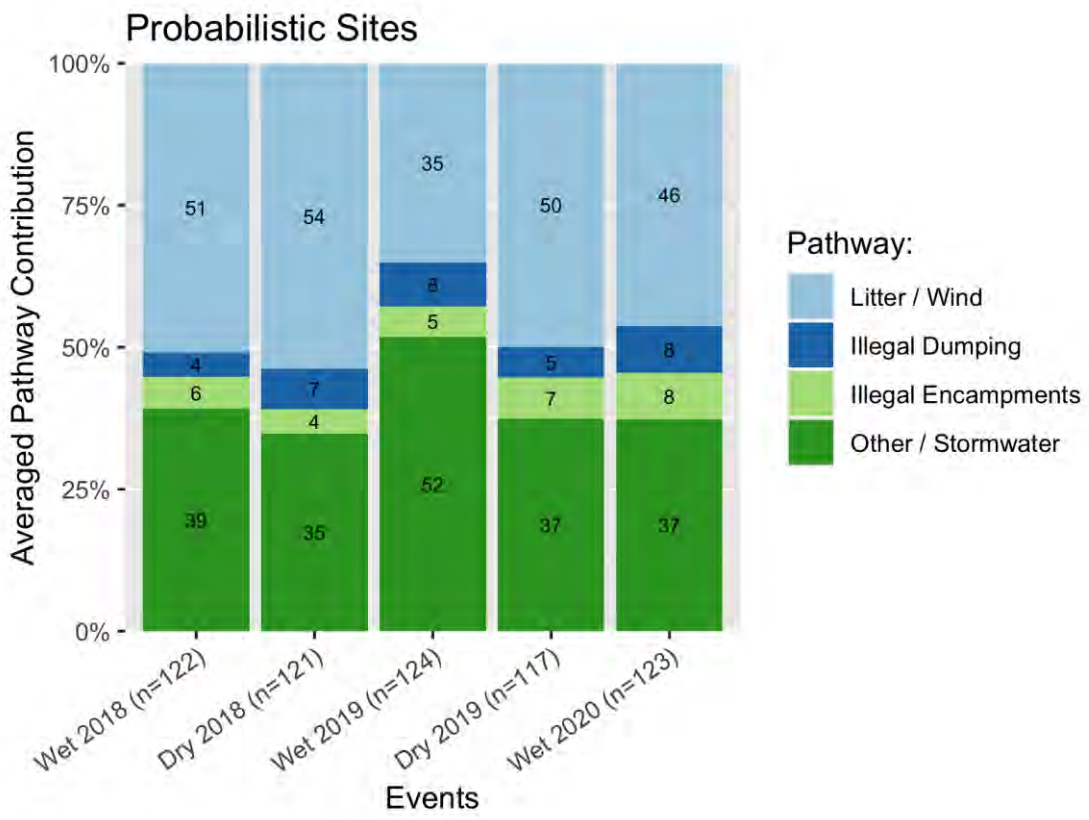

Figure 4-15. Average contributions of trash from each pathway identified during each receiving water trash monitoring event (n=5) at probabilistic sites.

4.4 Levels of Trash Observed in Receiving Waters Compared to Trash Discharged By Stormwater Conveyances

This section compares the amount of trash collected from targeted monitoring sites and trash booms to the amount of trash predicted to currently be generated from the upstream land areas (i.e., catchments) and transported via the stormwater conveyance system to these receiving water monitoring sites. The process used to predict trash generation in these catchments is described below.

Under MRP 2.0, each municipality subject to trash load reduction requirements was required to develop a *Baseline Trash Generation Map* that illustrates the 2009 levels of trash that is deposited on streets, sidewalks, landscaping, and other land areas, and available for transport to local receiving waters via the stormwater conveyance system pathway. These baseline maps serve as the starting point for demonstrating the attainment of stormwater trash load reduction requirements included in the MRP. Maps are color-coded using the color-scheme illustrated in Table 4-9, based on the observed levels of trash on different land areas within their jurisdictional boundaries. Baseline trash generation rates are then assigned to each trash generation category (Table 4-9) to estimate baseline trash generation levels (i.e., annual loads) from land areas, based on their baseline trash levels observed on-land. Annual baseline trash loads do not account for trash control measures that were implemented after 2009, the year the baseline maps depict.

Table 4-9. Average trash generation rates (gallons/acre/year) for each generation category. Rates are used to calculate annual trash loads from land areas within MRP Permittee jurisdictional boundaries.

Trash Generation Category	Low	Moderate	High	Very High
Annual Trash Generation Rate (gallons/acre/year)	0	7.5	30	90

Geographic Information System (GIS) data layers for creek network and stormwater conveyance systems were used to delineate the catchment area upstream of all targeted monitoring sites and trash booms. Annual baseline trash loads for each catchment were calculated by multiplying the rates shown in Table 4-9 by the acreage in each catchment that fall within each trash generation category.

To account for the significant trash control measures implemented by MRP Permittees since 2009, the baseline trash loads for each catchment were adjusted based on the extent of trash full capture systems installed to-date. Generation rates for land areas addressed by full capture systems were adjusted to low/green levels. Baseline loads were not adjusted to account for reductions associated with other types of control measures (e.g., street sweeping or on-land cleanup events) due to the challenges in the accounting methods described in MRP 2.0. The resulting adjusted baseline trash loads are intended to depict "current" trash loading from the stormwater pathway to the targeted monitoring sites and trash booms at the time receiving water trash monitoring was conducted (i.e., 2018-2019).

4.4.1 Comparison of Stormwater Trash Loads to Trash Volumes Removed from Trash Booms

Trash booms collect trash transported in receiving waters during dry and/or wet weather flow events. Data collected at all trash booms monitored during this project depict a combination of trash transported during wet and dry weather events. Annual rates of trash volumes captured by each boom monitored during the project were calculated by dividing total trash volume removed from the boom by the total number of days trash accumulated at the boom. Trash accumulation periods for all monitoring events ranged between 6 and 230 days during 2018 and 2019 (Table 4-10). These data should be interpreted with caution since for some booms, the annual rates were developed by extrapolating 1-2 weeks of trash accumulation for an entire year.[7] Trash accumulation rates were also standardized by area using the upstream catchment area associated with each boom.

Trash volumes collected at the 9 trash booms monitored during the project ranged from 0.1 to 2,020 gallons (Table 4-10). The annual rate of trash accumulation at the booms ranged from 177 to 5,163 gallons. The estimated annual trash volume standardized by area ranged two orders-of-magnitude (0.02 to 2.3 gallons/acre).

[7] For three trash booms in Alameda County, the annual estimate was based on the daily trash rate calculated for wet and dry event applied to number of days with rainfall (n=80) and no rainfall (n=285) during January 2019 through December 2019.

Table 4-10. Trash volumes removed from 9 booms and the estimated trash accumulation rates for each.

Trash Boom Location	Preceding Trash Removal Date	Trash Removal Date	Accumulation Period (days)	Trash Volume Removed (Gallons)	Annual Trash Rate (Gallons/ Year[1])	Annual Trash Rate per Area (Gallons/Acre/Year)
22nd and Harrison (Oakland)	3/27/2018	4/17/2018	21	5	322	2.3
	11/20/2019	11/26/2019	6	0.1		
	2/21/2019	2/28/2019	7	20		
	1/21/2020	1/28/2020	7	30		
Glen Echo (Oakland)	3/27/2018	4/17/2018	21	20.5	1444	0.9
	2/21/2019	2/28/2019	7	102		
Trestle Glen (Oakland)	11/20/2019	11/26/2019	6	30	2796	1.5
	1/21/2020	1/28/2020	7	120		
Lower Silver Creek (San José)	3/5/2019	5/30/2019	86	404	4096	0.34
	10/11/2018	11/20/2018	40	404		
	5/7/2018	8/23/2018	108	1818		
Thompson Creek (San José)	3/14/2019	4/29/2019	46	1010	5163	0.36
	12/18/2018	3/14/2019	86	2020		
	5/7/2018	12/18/2018	225	2020		
Adobe Creek (Palo Alto)	4/15/2019	5/18/2019	33	22	231	0.02
	10/3/2018	12/15/2018	73	45		
Matadero Creek (Palo Alto)	4/15/2019	5/18/2019	33	15	177	0.02
	10/3/2018	12/15/2018	73	60		
	5/19/2018	7/13/2018	55	3		
16th Ave Channel (San Mateo)	12/7/2018	5/28/2019	172	400	1380	1.4
	12/4/2018	12/7/2018	3	150		
	10/31/2018	12/4/2018	34	200		
	10/19/2018	10/31/2018	12	100		
	3/3/2018	10/19/2018	230	400		
	2/11/2018	3/3/2018	20	400		
	2/6/2018	2/11/2018	5	200		
	1/4/2018	2/6/2018	33	75		
19th Ave Channel (San Mateo)	6/6/2018	10/24/2018	140	300	623	0.31
	3/22/2018	6/6/2018	76	75		
	1/4/2018	3/22/2018	77	125		

[1] Annual trash rate was calculated by dividing combined trash volume for all events by total days of accumulation and standardizing to 365 days.

The annual rate of trash accumulation at each boom was compared to the estimated annual stormwater trash load generated from the catchment draining to each boom. As anticipated, the annual stormwater trash load was far greater than the annual volume of trash that accumulated at the booms. The booms accumulated between 4% and 42% of the estimated trash load from the catchment (Table 4-11).

Table 4-11. Estimated portion of the trash volume transported via stormwater from the catchment upstream of the trash boom that is accumulated in the trash boom.

Trash Boom Location	Trash Generation (gallons/year)	Annual Trash Removal (gallons/year)	Portion Accumulated in Trash Boom (%)
22nd and Harrison	2,908	322	11.1
Glen Echo	11,252	1,444	12.8
Trestle Glen	6,730	2,796	41.5
Lower Silver/Thompson (Combined)	65,773	9,259	14
16th Avenue Channel	10,529	1,380	13
19th Avenue Channel	14,340	623	4.3

4.4.2 Comparison of Stormwater Trash Loads to Trash Levels at Targeted Monitoring Sites

Similar to trash booms, stormwater trash loading estimates to each targeted monitoring site were developed and compared to quantitative monitoring results from targeted receiving water monitoring sites. The total estimated volume of trash annually generated in the catchments upstream of the targeted sites ranged from 40 to 162,295 gallons. The average volume of trash associated with the Other/stormwater pathway that was measured during two monitoring events at the non-shoreline targeted sites (n=91) ranged from 0 to 412 gallons. For 90 of the 91 sites, the amount of trash measured was between 0% and 4.5% of the estimated trash loading to the site. For the vast majority (91%) of these sites, the amount of trash measured at the site that was identified as originating from the Other (stormwater/upstream) pathway, was equivalent to less than 1% of the estimated trash load to the site. The volume of trash measured at one site was greater than the estimated trash load to the site.

Overall, the average volume of trash measured at each targeted site associated with the Other (stormwater/upstream) pathway was poorly correlated with the volume of stormwater-generated trash in the watershed (Figure 4-16). The poor association with these data is not surprising for a number of reasons. First, as described in the previous section, there are inherent challenges with accurately distinguishing the portion of trash at creek/channel sites that is associated with the Other (stormwater/upstream) pathway from other trash pathways. Additionally, there is a lack of information to determine what proportion of stormwater-related trash is deposited in assessment area of the channel and banks of a given site, and what portion is deposited upstream of the sites, accumulating at the site but above the assessment area, or is transported downstream of the site. Also, the timing of the trash transport process was not taken into account when making the comparison between trash loading and trash deposited at the site from stormwater. Loading estimates are annual, while the trash deposited in the creeks/channel occurs on a sub-annual basis, consistent with stormwater transport processes (i.e., stormwater flow events) and site-specific factors that were previously discussed as potentially being important for understanding deposition of trash (e.g., channel type and extent/type of vegetation).

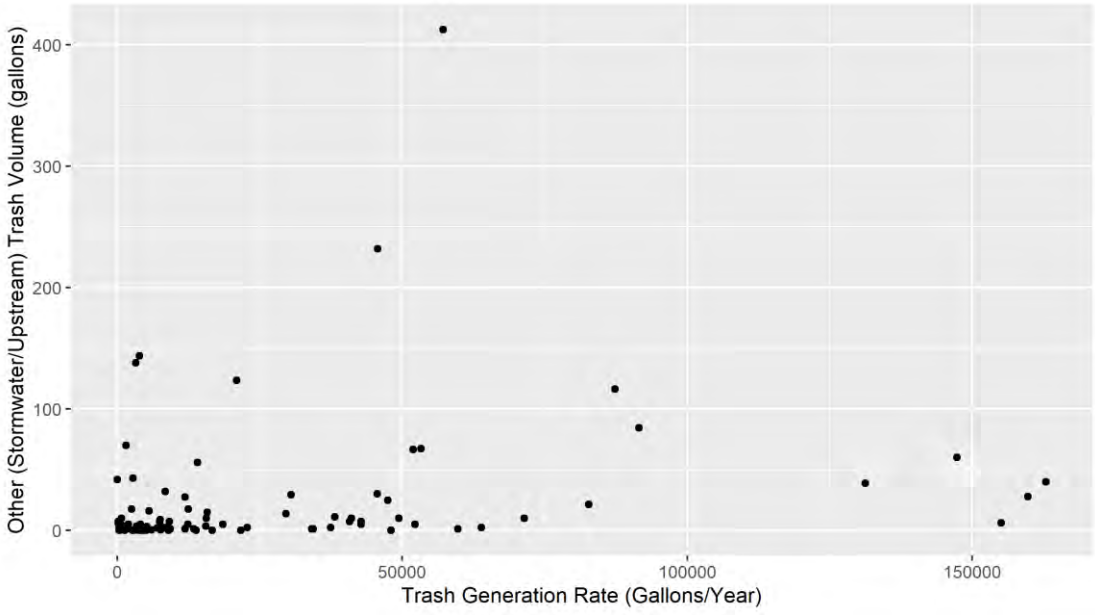

Figure 4-16. Comparison of the average trash volumes (gallons) for the Other (stormwater/upstream) pathway measured at 91 targeted monitoring sites with the predicted annual amount of trash generated in those drainage areas (gallons/year).

5 CONCLUSIONS

The following section presents conclusions for the data analyses presented in the Final Report. The conclusions are organized by specific scientific monitoring questions outlined in the Trash Monitoring Plan.

Comparison of Qualitative Assessment and Quantitative Monitoring Results

- ***Are significantly strong correlations observed between qualitative and quantitative trash receiving water monitoring/assessment methods?*** - Significant correlations are observed between qualitative trash condition scores (1-12) and trash density (volume per unit area) at both regional and countywide scales. Correspondence of qualitative scoring to trash density was better using the categorical scale for trash condition (i.e., Low, Moderate, High, Very High). Low correlation between methods at some sites indicates the assessment tools are less effective under certain types of conditions (e.g., shorelines).

Levels of Trash in Urban Water Bodies in the MRP Area

- ***What is the current level of trash deposited in flowing waterbodies in the entire MRP urban area?***

  Trash levels were evaluated based on the qualitative trash condition scores/categories observed at probabilistic sites. For the probabilistic sites regionwide, 40% are in the Low condition category and 37% are in the Moderate category, indicating that approximately 77% of the urban stream lengths in the MRP area exhibit low to moderate levels of trash. In contrast, only 2% of the stream-lengths have trash levels in the Very High trash condition category. The total estimated amount of trash volume that was present in all urban streams in the MRP area during the study period was just over 4 million gallons. An estimated 64% was of this volume was associated with the 22% of the stream miles that fell into the High or Very High condition categories.

- ***Do other site and landscape variables correlate with trash levels in flowing waterbodies?***

  Site and landscape characteristics for trash receiving water monitoring sites suggests that some bank and channel cover characteristics partially explain the variation in observed trash conditions. The extent of natural vegetation on banks at a site appear to be somewhat positively correlated to trash condition scores, while the extent of armored banks is negatively correlated to condition scores. This is likely because natural channels that have riparian vegetation and diverse instream substrate (both woody debris and varying sizes of substrate) “intercept” trash more effectively than channels with fewer obstructions. Public access was also found to be an important factor for the density of trash observed in streams.

- ***Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?***

  Seasonality appears to have little effect on trash levels observed/measured at receiving water sites. Trash condition categories observed at probabilistic sites indicate slightly greater trash levels during the wet season, compared to the dry season, but not statistically significant. Variations in trash levels between the three wet season events, however, also illustrates the effects that storm frequencies and intensities can have on trash levels observed at the same sites over time during the wet weather season.

- ***What trash levels are observed at sites targeted for cleanup? How do these levels compare to levels in all flowing waterbodies?***

  The trash assessment results from the targeted (hot spot) sites were compared to the results from probabilistic sites to determine if the range of conditions were similar between the two

sample designs. Approximately 23% fewer targeted sites were in Low trash condition category, compared to the probabilistic sites, and more targeted sites were in the Moderate, High, and Very High condition categories than the probabilistic sites. Because targeted sites were selected by MRP Permittees as "trash hot-spots", higher trash scores would be expected at targeted, compared to probabilistic sites.

Contributions of Trash from Different Pathways

- *What percentages of trash observed in receiving waters are attributable to stormwater conveyance systems, direct dumping, wind, and encampments?*

  At targeted sites, illegal encampments and illegal dumping pathways were associated with much larger volumes of trash. In total, at targeted sites we estimate about 14,000 gallons and 21,000 gallons of trash were associated with illegal encampments and illegal dumping in 2018 and 2019, respectively. We also estimated that litter/wind and other/stormwater pathways together accounted for about 3,000 gallons of trash for both years. Based on comparisons between average pathway contribution and trash condition category, poor trash conditions are associated with higher proportions of trash from illegal encampments and illegal dumping. Although little to no association between trash conditions and the other/stormwater pathway have been observed, contributions of trash from this pathway appear to increase during the wet season, compared to the dry season.

Levels of Trash Observed in Receiving Waters Compared to Trash Discharged by Stormwater Conveyances

- *Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?*

  Trash monitoring data collected at 9 trash booms and 91 targeted sites were used to compare the amount of trash accumulation at a site to estimate annual trash loads transported via the stormwater pathway from watershed land areas to boom/targeted sites. A volume of trash equivalent to 4% to 42% of the estimated stormwater trash loads from the upstream catchments is captured by booms. For 90 of the 91 targeted sites, the amount of trash measured was a relatively small percent (between 0% and 4.5%) of the estimated trash loading to the site. For the vast majority (91%) of these sites, the amount of trash measured at the site that was identified as originating from the Other (stormwater/upstream) pathway, was equivalent to less than 1% of the estimated trash load to the site. Overall, the average volume of trash measured at each targeted site associated with the Other (stormwater/upstream) pathway was poorly correlated with the volume of stormwater-generated trash in the watershed. One of the major reasons for this poor correlation is the inherent challenges with accurately distinguishing the portion of trash at creek/channel sites that is associated with the Other (stormwater/upstream) pathway from other trash pathways.

6 Evaluation of Trash Monitoring Program

An evaluation of methods and monitoring design used during the pilot-testing phase of the Trash Monitoring Plan is provided in the section below. This evaluation provides guidance for potential revisions to approach trash monitoring in receiving waters.

6.1 Monitoring Design

6.1.1 Site Selection

The initial trash monitoring design utilized an existing RMC sample frame to select probabilistic sites for evaluating overall trash conditions within the MRP Area. Overall, 30 sites within each county and 125 sites at urban streams within the MRP area were sampled during the pilot study. The total of 125 sites provided a statistically significant number of samples to estimate probabilities of trash conditions (i.e., cumulative distribution frequencies) for all urban streams in the MRP area.

To evaluate monitoring questions related to seasonal differences, the monitoring design emphasized increased sampling effort at the same sites (i.e., five events at 125 sampling locations) over increased density of sampling sites (i.e., 1 event at 625 sampling locations). As a result, although the design provided adequate sampling to evaluate the seasonal variability of trash conditions in streams, trash conditions observed during the pilot study may under-represent trash conditions when the data are used to extrapolate to all creek/channel areas in the MRP area. This appears to be the case for creek segments with relatively high trash levels (i.e., *High* or *Very High* trash condition category). Overall, the probabilistic sites had low percentage of sites with high trash conditions. In contrast, a much higher percentage of the targeted sites of known trash problem areas had sites that scored in the *High* or *Very High* trash condition. The targeted sites with high trash levels appear to be clustered within certain creek segments, representing a small percentage of the urban creeks in the MRP area. There would have had to be a very large number of sites selected from the RMC sample frame for all of the targeted sites with high trash levels to be selected. Thus, sites of known trash problem areas should be targeted during monitoring designs for future receiving water trash monitoring.

Trash assessment results indicate that channel type may be an important factor influencing trash conditions. Much higher levels of trash were observed in natural channels, compared to concrete or earthen channels. Thus, to fully represent trash conditions, the influence of channel type should be considered in site selection or to stratify probabilistic sites for future sampling design.

6.1.2 Monitoring Frequency and Timing

Trash assessments were conducted during both dry and wet seasons (total of five events) at all probabilistic sites during the pilot study. The results suggest a slightly higher proportion of *High*/*Very High* trash conditions at sites sampled during wet season compared to the dry season. However, there was relatively no difference in median trash condition scores across all five sampling events.

It is important to have good physical access to visually observe the trash within the assessment area when conducting trash monitoring. Physical access in the channel is generally better during the dry season, when stream flows are reduced. However, increased vegetation growth in the dry season can create issues for observing trash. Trash pathways may also vary by season, depending on the type of site. For example, trash associated with illegal encampments may be more prevalent during the dry season. Thus, the timing of assessment may need to be determined based on the dominant pathway/sources of trash for any given site, and in consideration of flow and vegetation levels.

The trash monitoring conducted at probabilistic sites did not include removal of trash following the visual assessment, thus, it was not possible to evaluate changes in trash density over time at any of these sites. Although trash was removed at targeted sites, it was not possible to evaluate changes over time with any confidence as additional trash removal events occurred between assessments at many of the sites. As a result, the pilot study results do not provide insight into appropriate monitoring frequency of sites to determine trash conditions over time.

6.2 Assessment Area

The trash assessment protocol requires delineation of the assessment area to allow for comparison of trash conditions over time, as well as comparison of qualitative and quantitative assessment results. The upper edge of the assessment area for creek/channel sites was defined as bankfull width (or the high-water mark during a 1 – 2-year storm event). The goal was to specifically identify all trash that may impact "flowing waterbodies", with focus on the proportion of trash associated with the other/stormwater pathway.

There were several challenges with defining bankfull width. Channel features associated with bankfull (e.g., bank scour, breaks in type and size of vegetation) are not always present at every site (e.g., armored banks). There are also challenges to exclude the trash associated with less frequent storm events (5 - 10-year storm event) that can accumulate on the upper portions of the banks but is outside the bankfull definition. This trash may enter the channel at some point due to wind or stormwater runoff but was not included in the assessment.

Another major challenge in the assessment protocol was encountered for sites that had trash accumulation areas that could not be accessed (e.g. too deep or muddy, or with highly vegetated bank cover). In these cases, trash may be present in the channel, but the channel was not always accessible or visible from shore. This feature may be associated with some of the variation observed between wet and dry season events. Therefore, the scoring system needs to consider the level of effort involved in trash removal and the proportion of channel assessed.

The assessment protocol does not provide adequate guidelines on how to define shoreline sites. Important issues include when to conduct the assessment (i.e., high or low tide) and whether or not to include inaccessible mudflat areas during low tide. Furthermore, shoreline sites (standardized to 600 feet in length) could be extremely large depending on the distance between water edge and high tide line, which made the visual assessment of trash conditions more challenging. Additional guidance is needed for shoreline trash monitoring, should this occur in the future.

6.3 Assessment Method

The visual assessment tool is recommended as a valid approach to assess trash conditions for most creeks/channel sites for future monitoring design. The qualitative assessment method will provide a cost-effective approach to assess trash conditions at higher spatial density and frequency compared to the more resource intensive quantitative assessment method. The qualitative method has been shown to be a repeatable measure of relative trash condition that correlates with higher trash density.

It is critical that all field personnel are adequately trained to conduct the qualitative assessment method. This requires training and calibration activities to ensure that field crews are assigning the correct

category associated with observed trash conditions. This is especially important when municipal/agency staff may be used to evaluate the trash levels within their jurisdiction, which may bias the scoring towards the range of trash conditions in their region. Training should also ensure that practitioners are accurately assessing trash conditions that may be widely dispersed in a large area or clustered in portions of the site. Training materials should include better photo documentation for the low end and high end of each trash condition category.

Field collection of site characteristics data for the qualitative assessment was relatively time consuming and the data generated does not provide significant information to interpret results, compared to the resources expended. One exception is channel type (natural, earthen and concrete/armored), which had some correlation with trash conditions and therefore should be considered in selecting future sites for monitoring. Percent bank and channel cover estimates were very subjective and should be simplified in the future if used to evaluate channel roughness across a numeric scale (rather than percent for different categories). Identifying storm drain outfalls in the field is not recommended as a high priority information need, since this information is typically available in GIS. Other data types associated with site characteristics that do not appear to be useful for describing trash conditions include flow, water clarity, bank angle and sinuosity.

Assessment of trash pathways was the most subjective information collected during the visual assessments. The other/stormwater pathway was the most difficult pathway to discern, since much of the trash that appears to be worn and transported to receiving waters can be from sources other than stormwater conveyances, including illegal encampments or dumping upstream of the site. Additional guidance should be provided on how far upstream to consider illegal encampment and dumping influences, which would be helpful to standardize data collection in the future. Photographs and examples of trash from each pathway illustrated over time of decay (in addition to the guidance already developed for protocol) should be considered.

6.4 Utility of Boom Data

Trash booms are floating barriers placed in receiving water bodies to capture trash and other floating debris. Trash booms are considered partial capture devices since less buoyant trash can still be transported in the water column below the floating barrier, especially during storm events. However, much of the trash comprised of plastic and expanded polystyrene foam that enter receiving waters is primarily floatable material that is likely to get captured by trash booms. Trash data collected across the nine booms indicated that an amount of trash equivalent to 4% to 42% of the stormwater trash load was removed from the booms monitored. Thus, it appears these structures can effectively trap and remove trash that is likely associated with the stormwater pathway.

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APPENDICES

A. Statement of Data Quality
B. Trash Condition Scores for Probabilistic sites over three sampling events (Tables B1-B2) and targeted sites over two sampling events (Table B3)
C. Trash Condition Scores for probabilistic and targeted sites for all counties (Figures C1-C5)
D. Trash densities at targeted sites (Table D1)

APPENDIX A: STATEMENT OF DATA QUALITY

A1 – Alameda County
A2 – Santa Clara and San Mateo Counties
A3 – Contra Costa County
A4 – Solano County (not included due to small number of samples)

A1 – Data Quality for Alameda County

As identified in BASMAA (2017), there are four main data quality objectives (DQOs) developed for the monitoring program to best ensure data quality: (1) representativeness, (2) comparability; (3) completeness; and (4) precision. ACCWP's activities relative to each of these four components are described briefly below:

Representativeness

Representativeness reflects the ability of data collected to represent the true condition of the sample sites. For the qualitative trash assessments, sample sites were identified through a probabilistic draw. AMS team members used site photos and GPS coordinates to return to the same basic reaches for each sampling event. In some cases, starting coordinates were shifted slightly, for example, due to difficulty in obtaining a precise GPS signal, but in each case reaches overlapped for the vast majority for each of the five sampling events. At the conclusion of each sampling day, the Monitoring Project Manager (MPM) reviewed all recorded site coordinates against targets to confirm reaches were appropriately located.

Overall assessments included three wet season events and two dry season events. All wet season sampling events were initiated only after the first significant rainfall of the year (>0.5" measured precipitation in a 24-hr period). All dry season events were targeted by ACCWP for the timeframe of July through September; due to staffing conflicts, the 2019 dry season effort extended into the first week of October 2019, but there was no significant precipitation experienced before conclusion of assessments.

Comparability

Comparability is the degree to which data can be compared both internally over time and externally to other relevant efforts. Sampling personnel assigned to conduct assessments for ACCWP were drawn from a pool of four individuals for all sampling events as a means of incorporating internal consistency across the five efforts.

Prior to conducting any assessments, ACCWP monitoring personnel participated in the BASMAA intercalibration and cross-training exercise in San José as a means of incorporating consistency with external assessors. ACCWP monitoring personnel also conducted an additional internal intercalibration exercise prior to initiation of WY2019 assessment activities.

Completeness

Completeness is defined as the percentage of valid data collected and assessed, compared to the total percentage of data expected to be obtained under normal operating conditions. The quantitative measurement quality objective (MQO) for assessing completeness of the trash monitoring effort was identified as 90%. Overall, completeness was very high, and well above the 90% threshold. The main exceptions to this were photographs inadvertently missed or that were corrupted before transferring from field cameras to long-term storage, and channel widths that were unable to be measured in the field due to non-wadeable conditions.

Precision

Precision assesses the consistency between individual measurements of a given parameter. Per BASMAA (2017), precision is assessed via replicate analyses of individual parameters at 10% of overall sampling sites. The defined MQO for precision is to achieve a relative percent difference (RPD) on individual metrics of ≤ 20%.

For ACCWP, the MPM assigned field duplicate sites prior to each sampling season. At each duplicate site, the members of the two-person field team worked together to assess the measurements and qualitative factors that required both members' participation (e.g., creek width). The two field team members then split apart and independently assessed the following factors:

- Trash condition
- Bank cover categories, by subcategory
- Channel cover categories, by subcategory
- Trash source categories, by subcategory

These FD assessments were performed at a total of 15 sites over the course of the five events. These encompass a total of 207 distinct datapoints for which replicate assessments were possible. Looking strictly at the MQO of 20% RPD, 62 of the pairs (30%) exceeded the MQO for precision. It should be noted that, due to the relatively small values reported as results for various metrics, even a small difference in reported results can generate a relatively large RPD. This suggests that an alternative MQO may be required to realistically assess precision going forward. Assessments of precision are discussed in more detail by category below.

Due to modifications made to data being collected that were put into effect between WY2018 and WY2019, the number of replicate pairs for each datapoint assessed may vary. For example, while replicate trash condition scores were recorded at all fifteen sites, the proportion of the channel containing algae was only assessed at six sites (consistent with the original WY2018 protocol and datasheets), and the proportion of armored bank cover was only assessed at nine sites (consistent with the revised protocol). For purposes of the following discussion, only categories assessed at a minimum of three events, consistent with current protocol, are described.

Trash Condition

Precision for trash condition score was assessed at a total of 15 replicate sites over the five events. Of the 15 replicate sites assessed, precision exceeded the 20% RPD MQO at 10 (67%). At 14 of the 15 sites, replicate trash condition scores represented a zero- or one-point differential, however, which would generally seem to indicate good agreement between the two assessments. In fact, scores at 9 of the 10 sites exceeding the MQO only differed by one point.

Additionally, it should be noted that in some cases a one-point differential achieves the MQO and in others it does not. For example, at ACCWP site 205R00279 visited in wet season 2020, assigned trash condition scores of 9 and 8 generated a 12% RPD, which achieved the MQO. In comparison, at site 204R00068 also assessed in wet season 2020, assigned trash condition scores of 3 and 2 generated a 40% RPD, which exceeded the MQO. With the current MQO, a one-point differential between scores of 5 or lower will automatically fail to meet the given MQO.

At the lone site that did not represent a zero- or one-point differential, 205R00686 assessed wet season 2020, the assessors' scores differed by three points. This difference appears to be a reflection of the differences in interpretation of characteristics descriptive of each trash condition category. At this site, a narrow concrete channel (approximately 6') with steep banks, fairly long stretches were mostly free of trash. However, there was one point within the reach where a hole had been cut in the surrounding chain link fence and illegal dumping had occurred, including a shopping cart and several smaller items (rope, wrappers, cans, etc.). So, the site reflected characteristics of both the moderate (i.e., all trash could be removed by two individuals within 30 minutes to one hour) and high (i.e., evidence of site being used by people) categories. This may suggest that additional thought needs to go into defining the trash condition categories to help navigate situations like this with conflicting evidence. This type of rethought could also be used to help normalize situations where two sites may reflect similar trash densities, but one would require much more cleanup effort due to larger areal extent.

Bank Cover

Assessments of bank cover are incorporated to help identify the trash capturing capability of the banks. Examining all subcategories of bank cover, 12 of 45 replicate analyses (27%) exceeded the MQO for precision (Table 1). Half of these exceedances represented a difference of ≤10% in the two measurements themselves, however.

Some of the difference between replicate assessments can be explained by uncertainty related to classification of dead and dying vegetation. Consistent with definitions used for bioassessment monitoring activities, this vegetation may be classified as exposed habitat. However, since it may serve a trash capturing function even while dead / desiccated, it may more appropriately be considered in the vegetation category. Additional clarification would likely serve to minimize this disagreement.

Table 1. Maximum Range Between Replicate Pairs and Percentage of Replicates Exceeding MQO for Individual Bank Cover Categories.

Metric	Max. Range (%)	%> MQO
Grasses	15	33
Bushes / Shrubs	35	33
Trees / Roots	0	0
Open / Exposed	45	44
Armored	5	22
Total	-	27

Channel Cover

Similar to bank cover, assessments of channel cover are incorporated to help identify the trash capturing capability within the channel itself. Examining all subcategories of bank cover, 10 of 36 replicate analyses (28%) exceeded the MQO for precision (Table 2). Similar to the case for bank cover replicates, eighty percent of these exceedances represented a difference of ≤10% in the two measurements themselves.

Table 2. Maximum Range Between Replicate Pairs and Percentage of Replicates Exceeding MQO for Individual Channel Cover Categories.

Metric	Max. Range (%)	%> MQO
Aquatic Veg	15	55
Dry Channel	15	33
Woody Debris	5	11
Open Wetted Channel	15	11
Total	-	28

Pathway Analysis

For pathway analysis, assessors are tasked with performing a subjective assessment of the trash present to evaluate its possible source based upon four identified categories. For this assessment, 15 of 60 replicate measurements (25%) exceeded the 20% MQO for precision (Table 3).

Table 3. Maximum Range Between Replicate Pairs and Percentage of Replicates Exceeding MQO for Individual Pathway Analysis Categories.

Metric	Max. Range (%)	%> MQO
Litter / Wind	90	53
Illegal Dumping	90	13
Illegal Encampment	25	13
Other / Stormwater	50	20
Total	-	25

The maximum ranges shown in Table 3 do not reflect the generally good agreement between replicate assessments of individual trash subcategories. For 50 of the 60 data pairs, the two replicate measurements fell within 5% of each other; it should be noted that for 6 of these measurements within 5% of each other, the replicate pair did not meet the MQO due to the relatively low percentages being compared. This again suggests a revised MQO may be required to assess precision effectively.

It should be noted that the 90% maximum ranges shown in Table 3 for the categories of Litter / Wind and Illegal Dumping may also be somewhat misleading. These 90% ranges were recorded at site 204R00068 in wet season 2020. At this site, the two assessors were in general agreement on trash condition (scores of 2 and 3) but differed on the source category associated with an accumulation of food-related waste within a short section of the concrete channel that appeared to originate from the adjacent commercial enterprise; one assessor associated this accumulation with litter / wind and the second assessor associated its origin was illegal dumping.

Discussion

Based on data gathered from the five ACCWP seasonal assessments completed to-date, some metrics exhibit good consistency between different observers (e.g., trash condition, encampment and dumping pathways). Other metrics do appear more difficult to assess in a consistent fashion (e.g., bank cover, litter pathway). As discussed previously, better guidance in how to characterize banks with dead or dying

vegetation may assist with removing some of the variability associated with the bank cover categories. Distinguishing between the pathway categories of litter / wind and other / stormwater may be more difficult and at this time with present guidance remains a judgment call as to what defines locally-generated litter.

Consistent among all of the precision analyses described above is that the current MQO based upon RPD between two replicate pairs is not a viable measurement of precision for this type of monitoring effort. An alternative MQO may need to be identified that incorporates ranges for each metric, for example ±1 (or similar) for trash category and ±15% (or similar) for bank cover, channel cover, and pathway.

A2 – Data Quality for Santa Clara and San Mateo Counties

Field efforts associated with the Pilot Receiving Water Trash Monitoring Program were covered under four Data Quality Objectives (DQOs) and Measurement Quality Objectives (MQOs) established within the Quality Assurance Project Plan (QAPP) to ensure that sound collection of data concerning trash loading was able to occur. Two qualitative DQO/MQOs of representativeness and comparability were put forth for the project, while two quantitative DQO/MQOs of completeness and precision were also established. The quantification of trash loading is an inherently variable data type with respect to spatial and temporal characteristics, and the significant use of human judgment in associated trash data collection can increase the potential for bias. Given this, it was of importance to ensure effective training and consistent data collection principles so that the data quality goals encompassed within the four DQO/MQOs could be achieved.

Before monitoring began in November of 2017, trainings were conducted for all staff involved in associated field efforts. This involved staff developing individual familiarity of the monitoring protocol and then rehearsing all components of the protocol in a routine field setting. The purpose of the trainings was to ensure that each member of a given field crew would be able to use the monitoring protocol to successfully collect all necessary data in the same manner as all other field crews and field crew members. The trainings also gave staff the opportunity to clarify any potential discrepancies within their or others' understanding of the protocol.

Throughout the monitoring period from November of 2017 to March of 2020, inter-calibration and field data duplication activities were orchestrated. These events allowed field staff to maintain consistency regarding execution of the protocol, discuss any questions pertaining to the protocol that had developed during previous project monitoring efforts, and generate field data based on each monitoring component to demonstrate achievement of the DQO/MQOs. Each scheduled inter-calibration and data duplication exercise involved two or more field crews that met at a series of receiving water sites to conduct the monitoring on an individual crew basis and compare the results between crews after finishing the monitoring for each site. During inter-calibration and duplication events, the members of each crew were interchanged on a site-by-site basis so that all possible crew member combinations were examined to ascertain bias or difficulty with protocol execution.

The following is a list of the training events that took place over the course of the monitoring period:

Date	Event Type	Agency
10/23/2017	Training	Santa Clara/San Mateo
1/25/2018	Training	Santa Clara/San Mateo
3/13/2018	Training	Santa Clara
3/28/2018	Training	San Mateo

Fifteen field inter-calibration and duplicate events in both Santa Clara and San Mateo County took place during the monitoring period, constituting 10% of the total sites sampled. The following table shows the calculated relative percent differences (RPDs) between the original and duplicate trash scores generated at the duplicate sites:

County	Site	Date	Orig. Num. Grade	Dup. Num. Grade	RPD (%)	Orig. Letter Grade	Dup. Letter Grade	RPD (%)
SC	282	7/23/2019	8	7	13	C	C	0
SC	346	7/23/2019	5	5	0	B	B	0
SC	659	7/23/2019	6	7	15	B	C	40
SC	90	7/23/2019	3	2	40	A	A	0
SC	154	7/23/2019	4	5	22	B	B	0
SC	538	7/30/2019	6	6	0	B	B	0
SC	26	7/30/2019	6	4	40	B	B	0
SC	586	7/30/2019	2	2	0	A	A	0
SC	714	7/30/2019	4	5	22	B	B	0
SC	67	2/13/2020	6	5	18	B	B	0
SC	234	2/13/2020	1	2	67	A	A	0
SC	259	2/13/2020	11	11	0	D	D	0
SC	355	2/13/2020	6	4	40	B	B	0
SC	554	2/13/2020	2	2	0	A	A	0
SC	627	2/13/2020	7	7	0	C	C	0
SM	180	7/25/2019	2	3	40	A	A	0
SM	436	7/25/2019	2	2	0	A	A	0
SM	807	7/25/2019	5	6	18	B	B	0
SM	884	7/25/2019	4	4	0	B	B	0
SM	1460	7/25/2019	1	2	67	A	A	0
SM	2228	7/25/2019	1	2	67	A	A	0
SM	232	8/1/2019	7	6	15	C	B	40
SM	520	8/1/2019	5	6	18	B	B	0
SM	1256	8/1/2019	2	2	0	A	A	0
SM	520	2/6/2020	5	5	0	B	B	0
SM	1288	2/6/2020	5	4	22	B	B	0
SM	1972	2/6/2020	4	4	0	B	B	0
SM	2056	2/6/2020	6	6	0	B	B	0
SM	2248	2/6/2020	8	8	0	C	C	0
SM	2548	2/6/2020	7	5	33	C	B	40

As shown in the table, the RPDs calculated from duplicate samples taken over the course of the monitoring period were generally low, with eight RPDs exceeding the commonly used threshold of 20% when calculated from numeric trash grades and three exceeding 20% when calculated from letter trash grades. The relatively low RPD values indicate that the DQO/MQO involving sample precision was achieved. The implementation of inter-calibration and data duplication activities in addition to the thorough trainings at the beginning of the program allowed for data representativeness, comparability, completeness, and precision to be maximized during the monitoring period as per the requirements of the DQO/MQOs.

A3 – Data Quality for Contra Costa County

Data Quality Objectives (DQOs) were established by the BASMAA Trash Monitoring Program Plan to ensure that data collected is sufficient and of adequate quality for the intended use. DQOs include both quantitative and qualitative assessment of the acceptability of data. The qualitative goals included representativeness and comparability, and the quantitative goals include completeness and precision. Measurement Quality Objectives (MQOs) are the acceptance thresholds or goals for the data (BASMAA, 2017).

Information and data collected on trash are quantified using personnel trained in the characterization and classification of trash data. DQOs have a strong emphasis on training and oversight, with inter-comparisons between performance of individual field team members participating in the various assessment and characterization efforts.

Table 1. CCCWP Training Events

Date	Event Type	Agency
9-13-18	Inter-Agency Training	ACCWP/CCCWP/SCVURPPP/SMCWPPP
1-26-18	Inter-Agency Calibration	ACCWP/CCCWP
7-12-18	Quantitative Training	CCCWP

The following DQOs and MQOs were established by the BASMAA Trash Monitoring Program Plan:

1. The representativeness of data is the ability of the sampling locations and the sampling procedures to adequately represent the true condition of the sample sites. Representativeness of the sampling event is ensured by sampling within the established assessment area and specified timeframe. The MQOs for sampling event representativeness are measured by proximity to the site location.

Trash surveys were conducted only within the defined assessment area as specified in the Program Plan and ensured by the Field Crew Supervisor. Wet and Dry season assessment requirements were met for all 30 Contra Costa County probabilistic/qualitative sites and 19 Dry season targeted qualitative and quantitative assessments.

2. Comparability is the degree to which data can be compared directly to other relevant studies. The MQOs will rely on training and oversight of the Monitoring Program Manager, Field Crew Supervisor, and Field Crew Members to follow field sampling protocols to ensure comparability with other studies that utilize similar protocols.

All field crew members were trained in methods, procedures and field sampling protocols (see Table 1).

3. Completeness is defined as the percentage of valid data collected and analyzed compared to the total expected to be obtained under normal operating conditions. For qualitative visual assessments, the objective is to conduct one assessment in each 300-foot segment in the assessment area for each site. An overall completeness of greater than 90% of the assessment area segments is considered acceptable for the Receiving Water Trash Monitoring Program. The Field Crew Supervisor should check both qualitative and quantitative data collection forms to make sure they are complete and accurately filled out, prior to leaving the site. Additionally, following quantitative monitoring events, the Field Crew Supervisor should

check the site to make sure that the vast majority of the trash present was removed from the assessment area. Photographs of the site after the cleanup has occurred should also be taken.

Field Crew Supervisors checked the completeness of all field logs and photo documented each site prior to departure. Before and after photos were taken at all 19 quantitative assessment sites, and the Field Crew Supervisor walked the length of the 300-foot reach following each assessment in order to determine completeness and remove any additional trash found within the assessment area.

4. For qualitative visual assessments, precision will be evaluated at 10% of the assessment events conducted by a Stormwater Program. The events should be randomly picked by the Monitoring Program Manager. Precision will be measured by comparing the assessment data collected by the Field Crew Supervisor overseeing the event and the data collected (in parallel) during the event by the Monitoring Program Manager or second Field Crew Supervisor.

For quantitative monitoring events, precision will also be evaluated at 10% of quantitative events conducted by each Stormwater Program. The events should be randomly picked by the Monitoring Program Manager. Monitoring data collected by the Field Crew Supervisor overseeing the quantitative event and the data collected (in parallel) during the event by the Monitoring Program Manager or second Field Crew Supervisor will be compared.

A target relative percent difference between qualitative data points or quantitative measurements (measured in parallel by separate individuals) is < 20%. Additionally, the accuracy in the reporting of crew members and Field Crew Supervisors on field data sheets is very important. All individuals present at the site and participating in the qualitative assessment of qualitative monitoring events should be recorded.

Field crews in Contra Costa County conducted 15 duplicate assessments in order to evaluate precision at a 10% frequency during the Trash Monitoring Program. Calculating Relative Percent Difference results in the magnitude of scores being compared; effecting the calculated RPDs. For continuous data, this is appropriate; for ordinal data, it is a different matter. For example, the RPD of 1 and 2 is 67% while that for 10 and 11 is 10%. Here, the example scores both differ by one unit yet one pair's RPD is less than "commonly used threshold of 25." To more accurately represent the level of precision at which blind duplicate scores are being assessed, a Percent Difference in score has been calculated based on the 12-point grading system, that is [(original score) – (duplicate score)/12] x (100).

Table 2. Duplicate Assessment Scores

County	Site	Date	Orig. Num. Grade	Dup. Num. Grade	Percent Difference (%)	Orig. Letter Grade	Dup. Letter Grade	RPD (%)
CC	388	1/23/2019	2	2	0.0	A	A	0
CC	727	1/24/2019	3	3	0.0	A	A	0
CC	919	1/24/2019	3	2	8.3	A	B	40
CC	880	6/19/2019	4	5	8.3	A	B	40
CC	631	7/17/2019	4	5	8.3	B	B	0
CC	281	7/18/2019	4	3	8.3	B	A	0
CC	395	7/31/2019	3	3	0.0	A	A	0
CC	388	8/28/2019	2	3	8.3	A	A	0
CC	891	8/28/2019	2	2	0.0	A	A	0
CC	27	1/14/2020	3	4	8.3	A	B	40
CC	247	1/14/2020	2	2	0.0	A	A	0
CC	503	1/14/2020	4	6	16.7	B	B	0
CC	843	1/22/2020	1	1	0.0	A	A	0
CC	395	1/22/2020	1	2	8.3	A	A	0
CC	567	1/22/2020	5	6	8.3	B	B	0

APPENDIX B: TRASH CONDITION SCORES AT PROBABILISTIC AND TARGETED SITES

Trash Condition Scores at Probabilistic Sites

Table B1 presents the cumulative distribution results of trash condition scores during each of five events for the entire regional dataset. Table B2 presents the trash condition scores observed at each site during each of the sampling events.

Across all five events, streams exhibited trash condition scores of 1 or 2 (27-38%) and 4 or 5 (20-28%). Less than 30% of the stream length had a condition score of 7 or higher during each of the 2018, 2019, or 2020 wet seasons (22%, 24%, 26%, respectively), and only 15% of the stream length had a score of 7 or higher during each of the dry events.

Table B1. Proportion of stream lengths with different average trash condition scores based on the five sets of observations at 125 sites within the five participating MRP counties. Condition categories are represented as follows: Low (green); Moderate (yellow); High (red) and Very High (purple).

Season	WY 2018 Wet Season	WY 2018 Dry Season	WY 2019 Wet Season	WY 2019 Dry Season	WY 2020 Wet Season
Event	1	2	3	4	5
Trash Condition Score	Percent of Stream Length (± 95% C.I.)				
1	18% (6%)	15% (5%)	15% (5%)	10% (5%)	15% (5%)
2	20% (7%)	22% (7%)	17% (7%)	24% (7%)	12% (7%)
3	9% (7%)	16% (7%)	14% (7%)	13% (6%)	14% (7%)
4	14% (7%)	10% (7%)	13% (7%)	11% (6%)	10% (6%)
5	11% (7%)	10% (7%)	11% (7%)	17% (6%)	18% (7%)
6	6% (6%)	11% (5%)	7% (6%)	11% (5%)	6% (6%)
7	10% (5%)	6% (4%)	8% (6%)	5% (4%)	10% (5%)
8	7% (3%)	6% (2%)	6% (5%)	7% (2%)	7% (4%)
9	2% (2%)	2% (1%)	5% (3%)	2% (1%)	6% (2%)
10	3% (0%)	1% (0%)	3% (2%)	1% (0%)	2% (1%)
11	0% (0%)	0% (0%)	2% (0%)	0% (0%)	1% (0%)
12	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)

Table B2. Trash condition scores at probabilistic sites over five sample events. Condition categories are represented as follows: Low (green); Moderate (yellow); High (red) and Very High (purple).

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
202R00284	2	5	4	5	5
202R01308	9	8	4	6	5
202R01356	1	1			
202R01612	1	1	1	1	1
202R02332			7	6	5
204R00020	4	4	2	2	1
204R00047	1	2	2	2	3
204R00068	3	3	2	3	3
204R00084	1	2	4	3	3
204R00100	5	2	3	3	3
204R00180	2	2	3	2	3
204R00191	7	5	3	5	1
204R00200	7	7	9	8	9
204R00232	6	8	5	7	7
204R00244	1	1	1	3	1
204R00292	3	2	2	2	2
204R00303	10	5	8	8	8
204R00327	6	6	6	4	6
204R00334	2	2	4	5	4
204R00340	2	2	4	3	4
204R00356	5	2	7	2	3
204R00367	1	2	2	2	2
204R00383	5	3	4	6	5
204R00388	2	3	2	2	2
204R00391	7	6	7	7	8
204R00436	2	4	3	2	5
204R00447	1	2	2	2	1
204R00473	1	2	2	1	2
204R00520	5	4	4	5	5
204R00575	7	4	5	8	8
204R00583	9	3	9	7	7
204R00596	8	3	9	5	6
204R00639	10	5	11	10	12
204R00680	7	9	9	8	9
204R00711	4	3	6	6	5

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
205R00259	10	11	10	10	11
205R00279	8	7	9	5	9
205R00282	4	3	9	8	7
205R00346	5	6	6	5	7
205R00355	5	5	6	6	6
205R00374	3	4			
205R00387	4	1	3	3	2
205R00419	2	2	2	3	2
205R00430	2	2	2	2	3
205R00451	10	9	11	11	11
205R00474	5	6	5	5	5
205R00535	5	3	3	5	6
205R00538	6	7	7	6	5
205R00547	1	3	1	2	1
205R00554	2	6	3	4	2
205R00586	1	2	2	2	1
205R00602	3	2	7	3	5
205R00622	3	3	2	2	3
205R00627	6	3	7	6	7
205R00659	7	5	7	6	9
205R00686	1	3	2	2	4
205R00707	4	5	4	6	5
205R00714			4	4	7
205R00872	1	1			
205R00878	5	5	4	5	4
205R00984	1	3	1	2	1
205R01704	2	2	3	2	3
205R01816	1	1	1	1	1
205R02408			1	1	1
206R00727			3		1
206R00919	3	1	3	4	3
206R00960	3	2	2	3	5
206R01024	4	2	3	2	2
206R01495	2	2		1	
207R00027	2	2	3	2	3

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
204R00712	8	8	8	7	7
204R00807	4	7	1	5	2
204R00831	7	6	7	5	7
204R00852	1	1	2	2	1
204R00884	6	4	5	4	5
204R01012	4	2	2	4	3
204R01256	6	4	6	2	6
204R01268	2	6	2	4	2
204R01288	4	2	6	5	5
204R01460	3	2	2	1	3
204R01972	4	4	3	5	4
204R02056	6	8	5	8	6
204R02228	1	2	1	1	2
204R02248	6	7	8	7	8
204R02312	8	7	8	6	8
204R02504	5	3	4	5	5
204R02548	7	6	4	6	7
205R00026	4	4	8	6	7
205R00035	5	7	7	8	7
205R00042	4	5	5	5	5
205R00067	5	6	5	5	6
205R00090	4	4	5	3	4
205R00099	4	6	5	3	4
205R00110	2	4	3	5	4
205R00115	7	6	8	8	8
205R00131	8	5	6	7	8
205R00154	7	3	6	4	8
205R00218	5	5	7	6	9
205R00227	2	6	4	4	5
205R00234	2	2	3	1	1
205R00241	2	3	5	4	5

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
207R00247	1	1	1	1	2
207R00395	5	5	4	3	4
207R00428	8	8	10		9
207R00476	8	7	10		5
207R00503	1	1	1	1	4
207R00567	2	3	5	5	5
207R00619	1	1	1	2	3
207R00631	7	5	5	4	7
207R00688	4	2	4		4
207R00823	2	1	1	5	1
207R00843	3	1	1	2	1
207R00880	4	3	5	3	9
207R00891	2	1	2	2	2
207R01163	9	8	10	3	5
207R01227	2	1	1	2	2
207R01271	1	1	1	1	1
207R01291	8	8	5	4	7
207R01447	2	2	3	2	4
207R02480	1	1	1		1
207R03504	2	1	1		1
543R00137	2	2	2	2	3
544R00025	2	3	1	2	3
544R00281	4	4	6	4	5
544R00342	8	6	4	1	3
544R00464	7	6	3	3	3
544R00598	3	1	3	2	1
544R01049	1	3	1	2	2
544R01305	3	4	8	3	8

Trash Condition Scores at Targeted Sites

Comparison of the trash condition scores for targeted sites by monitoring event suggests the majority of streams in the MRP urban area exhibit low to moderate levels of trash, with some sites in High and Very High condition. Table B3 presents the trash condition scores observed at each site during both of the sampling events. Of the 100 sites, 40% scored in the same condition category during both events, trash condition category increased in 40% of the sites between events, and 20% decreased in trash condition category between the two events.

Across both events, streams exhibited trash condition scores of 3 or 4 (24-28%) and 5 or 6 (25-27%). Less than 25% of the sites had a condition score of 9 or higher during each dry season (14% and 23%, respectively).

Table B3. Trash condition scores at targeted sites over two sample events. Condition categories are represented as follows: Low (green); Moderate (yellow); High (red) and Very High (purple).

Site ID	Event 2	Event 4	Site ID	Event 2	Event 4
ACF_5C_1	6	6	ORI_01	4	5
ACF_5D_1	6	4	PAC01	2	2
ACF_CAL_1	2	3	PIN_01	3	4
ACF_WAR_1	7	9	PIT_01	6	7
ACF_WAR_2	3	10	PIT_04	10	8
ALA_CAS_1	2	2	PLH_01	6	8
ALA_CHA_1	6	8	RCY01	9	10
ALA_EST_1	6	3	RCY03	5	3
ALA_SAN_2	3	11	RIC_01	4	11
ALA_SAN_3	3	8	SCC02	5	5
ALA_SEM_2	9	10	SCC03	6	3
ALA_SITE3	2	4	SCF02	9	9
ANT_04	4	6	SCL01	4	2
BEL01	5	4	SCL02	1	1
BRE_02	2	3	SCL03	2	2
BRI02	3	5	SCP02	10	10
BUR01	5	8	SCS01	4	3
CCC_SF_2	8	3	SJC01A	10	10
CLA_01	7	7	SJC02	10	10
CON_01	5	4	SJC10	6	8
CUO01	3	1	SJC15A	4	7
CUO02	1	1	SJC18	8	11
DAN_01	1	3	SJC22A	7	4
DCY02	4	3	SJC23	10	8
DCY04	6	6	SJC25B	9	3
DUB_ALA_1	2	3	SJC29	6	9
ELC_01	3	5	SJC30	5	9
FF01	10	10	SJC31	8	12
FF03	4	6	SMO01	7	6
FF04	6	7	SMO03	9	10
FRE_CRAN_1	2	7	SNV_01	4	4
FRE_LAG_3	6	6	SNV_02	4	9
FRE_LAG_5	6	6	SPB_01	5	6
FRE_TULE_7	4	8	SRM_02	2	2
HAY_ACF_1	5	7	SSF01	7	7

Site ID	Event 2	Event 4
HAY_DEP_3	3	6
HAY_SFB_7	4	12
HMB01	7	5
LIV_ALP_1	3	5
LIV_ALT_1	2	5
LOA_01	2	3
MIP-01	9	3
MIP-05	8	7
MOR_01	4	2
MOV_01	4	5
MOV_02	3	4
MTZ_01	7	5
OAK_01	4	4
OAK_ARR_1	6	10
OAK_COU_1	5	11
OAK_LMC_1	2	6
OAK_PER_1	11	10
OAK_SAU_2	4	6

Site ID	Event 2	Event 4
SWD_06	7	11
SWD_07	6	5
SWD_08B	9	6
SWD_13	2	6
SWD_19	5	10
UNI_DRY_1	3	7
UNI_OAC_2	2	5
VA01	3	6
VA02	5	3
WCR_02	3	3
WVC02	5	2
WVC03	2	2

APPENDIX C: TRASH CONDITION CATEGORY FOR PROBABILISTIC AND TARGETED SITES FOR EACH COUNTY

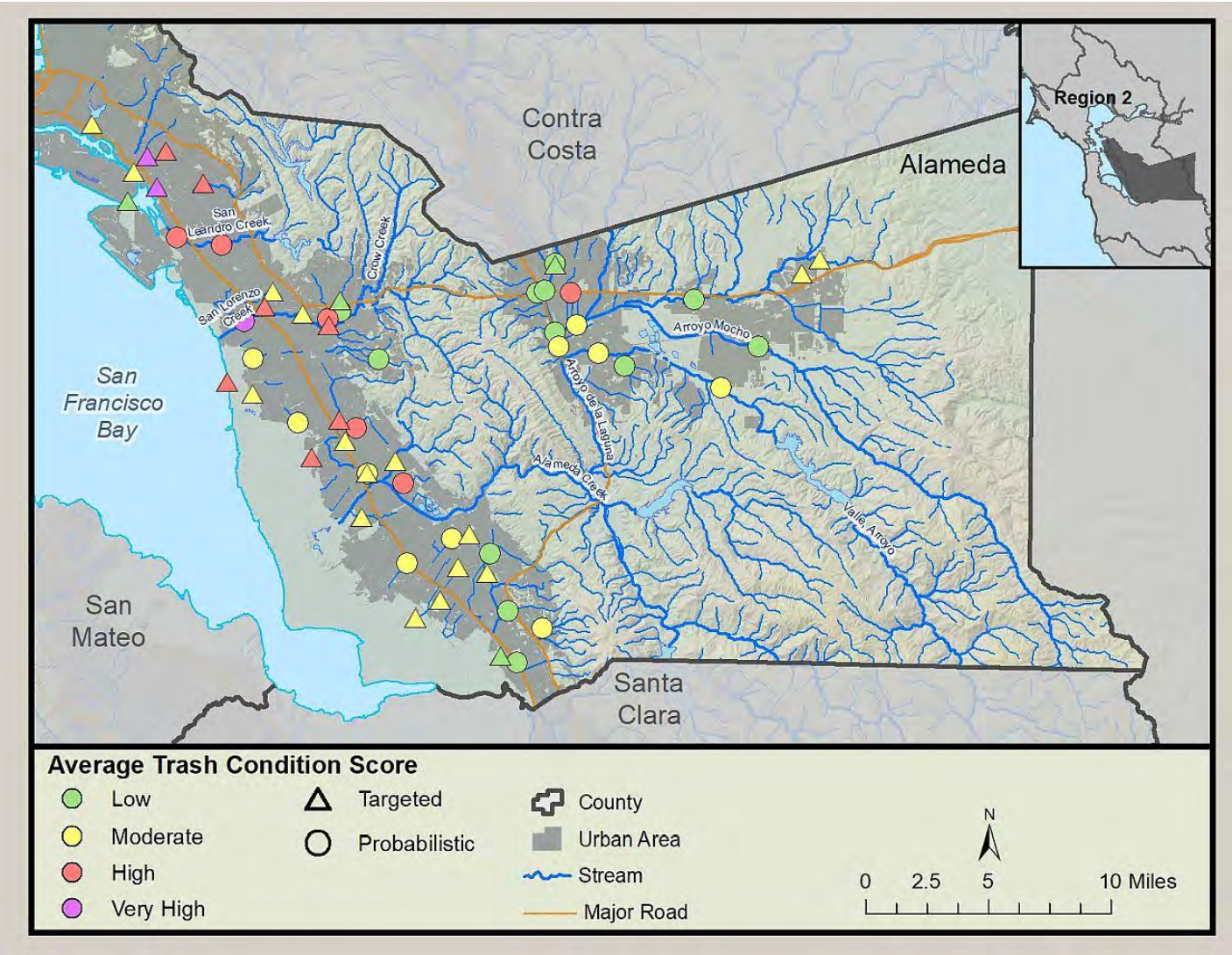
Contra Costa
Alameda
Region 2
San Francisco Bay
San Mateo
Santa Clara
San Leandro Creek
San Lorenzo Creek
Crow Creek
Arroyo Mocho
Arroyo de la Laguna
Alameda Creek
Valle Arroyo
Average Trash Condition Score
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0 2.5 5 10 Miles

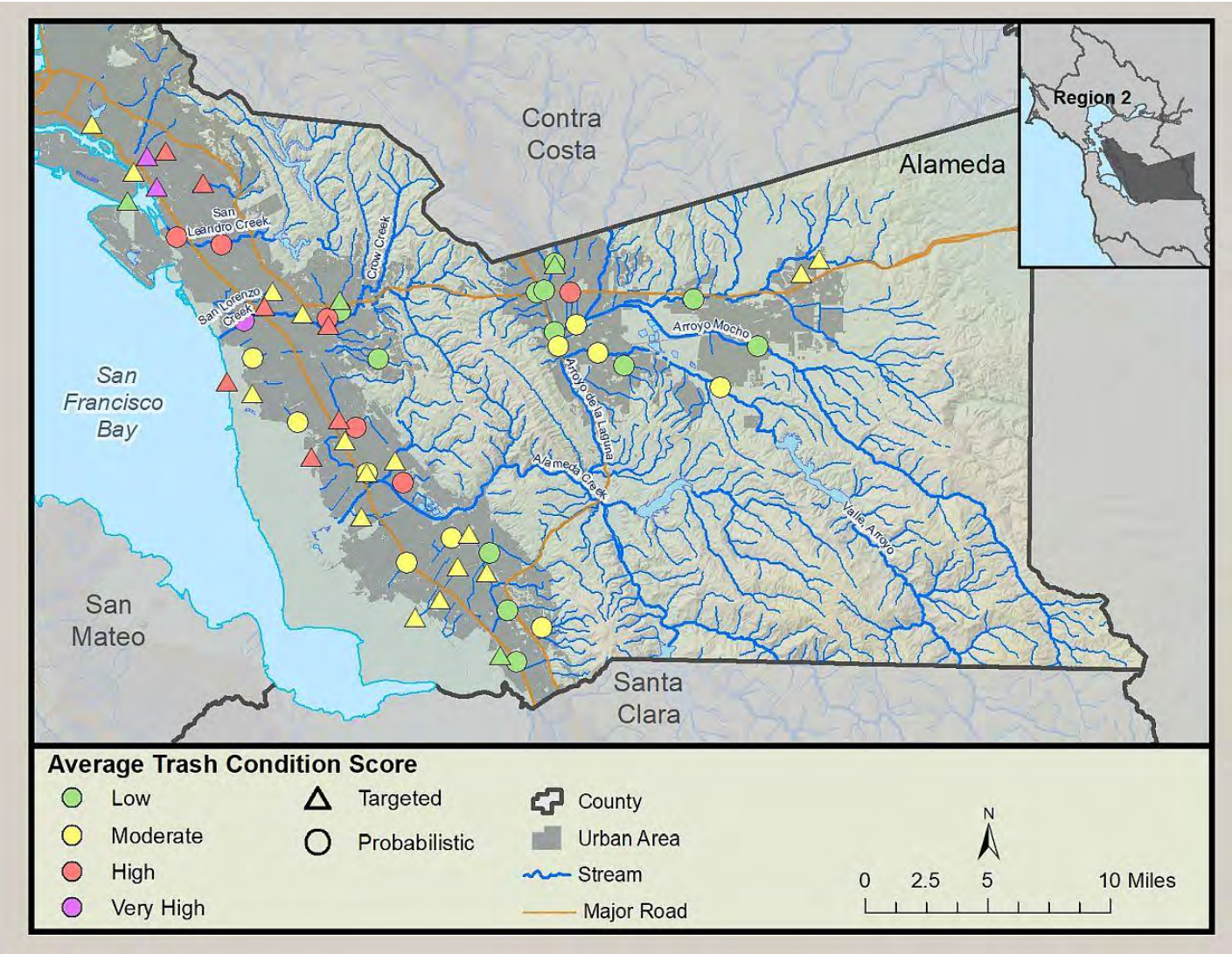

C.1 Average trash condition of probabilistic and targeted sites in Alameda County.

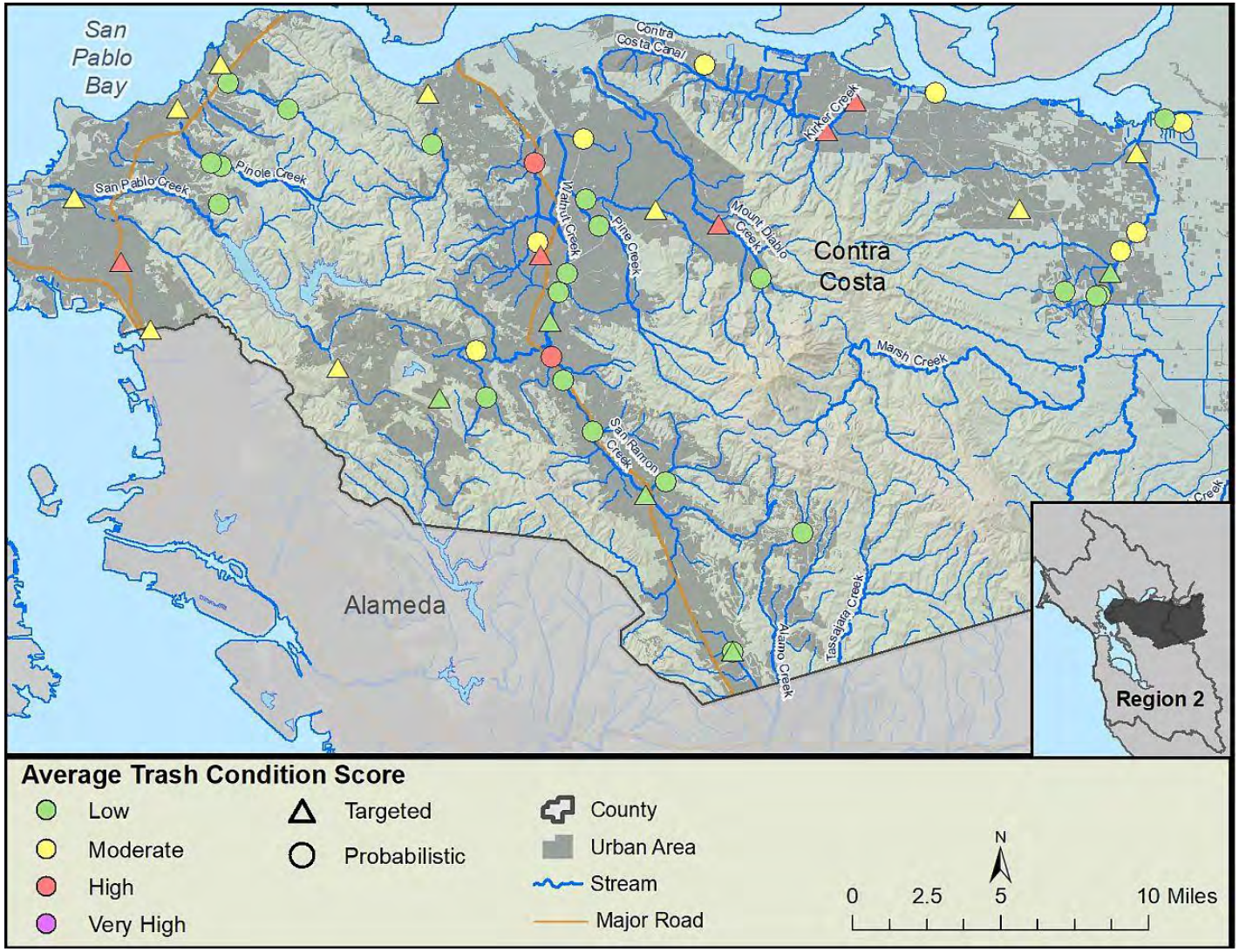
San Pablo Bay
Contra Costa Canal
Kirker Creek
Pinole Creek
San Pablo Creek
Walnut Creek
Pine Creek
Mount Diablo Creek
Contra Costa
Marsh Creek
San Ramon Creek
Alameda
Alamo Creek
Tassajara Creek
Region 2
Average Trash Condition Score
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0
2.5
5
10 Miles

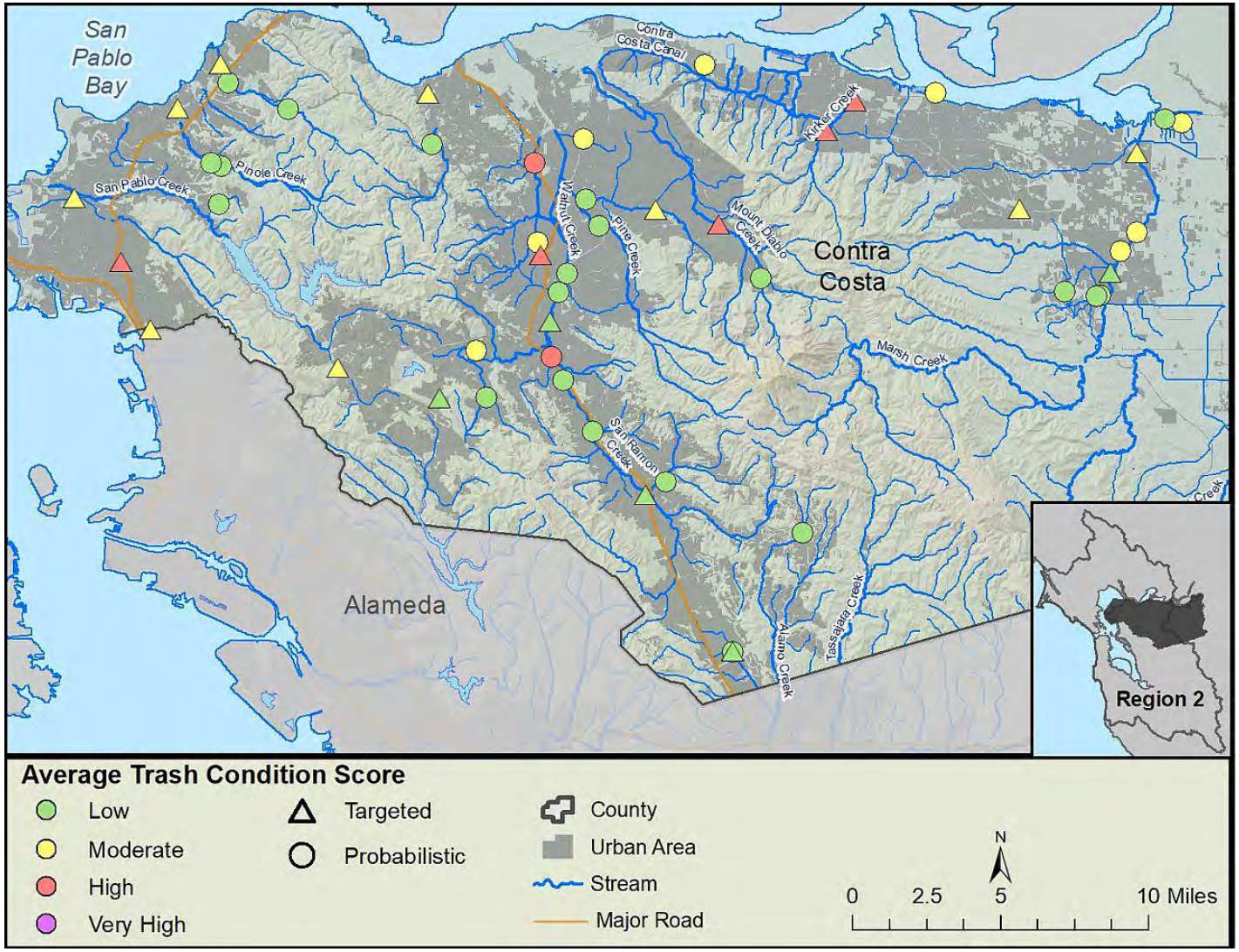

C.2 Average trash condition of probabilistic and targeted sites in Contra Costa County.

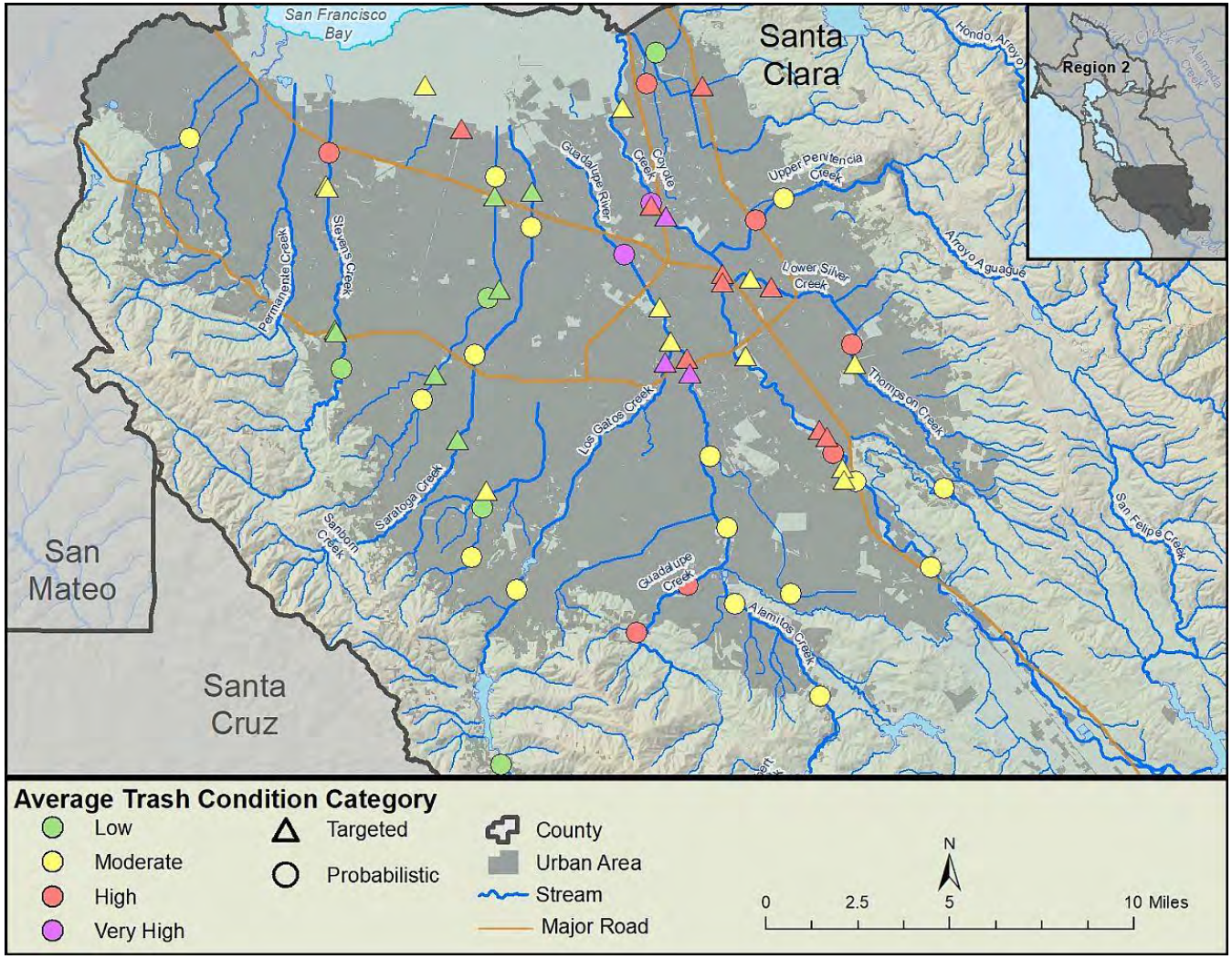
San Francisco Bay
Santa Clara
Region 2
Hondo Arroyo
Alameda Creek
Upper Penitencia Creek
Coyote Creek
Guadalupe River
Arroyo Aguague
Lower Silver Creek
Stevens Creek
Permanente Creek
Thompson Creek
Los Gatos Creek
Saratoga Creek
Sanborn Creek
San Felipe Creek
Guadalupe Creek
Alamitos Creek
San Mateo
Santa Cruz
Average Trash Condition Category
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0
2.5
5
10 Miles

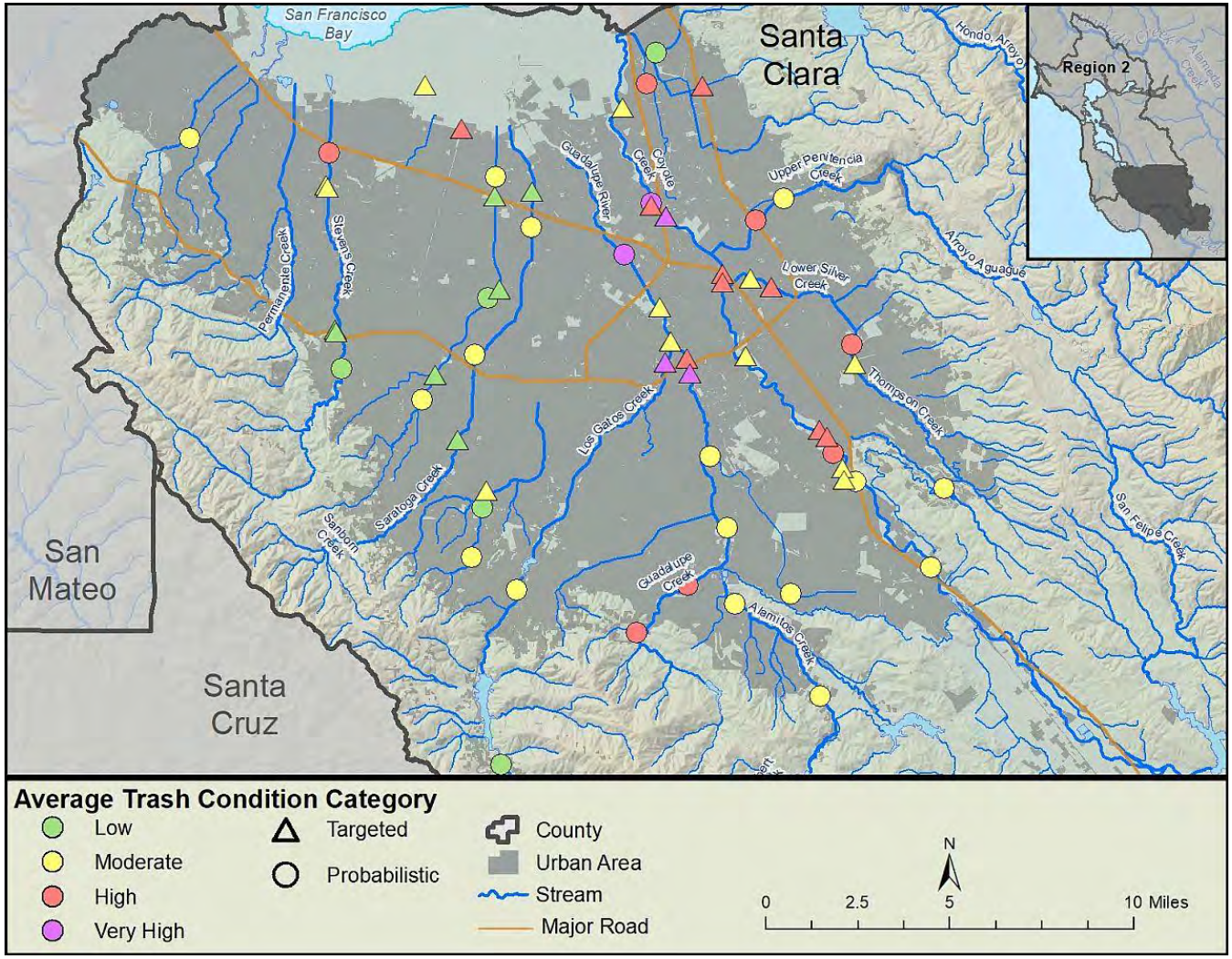

C.3 Average trash condition of probabilistic and targeted sites in Santa Clara County.

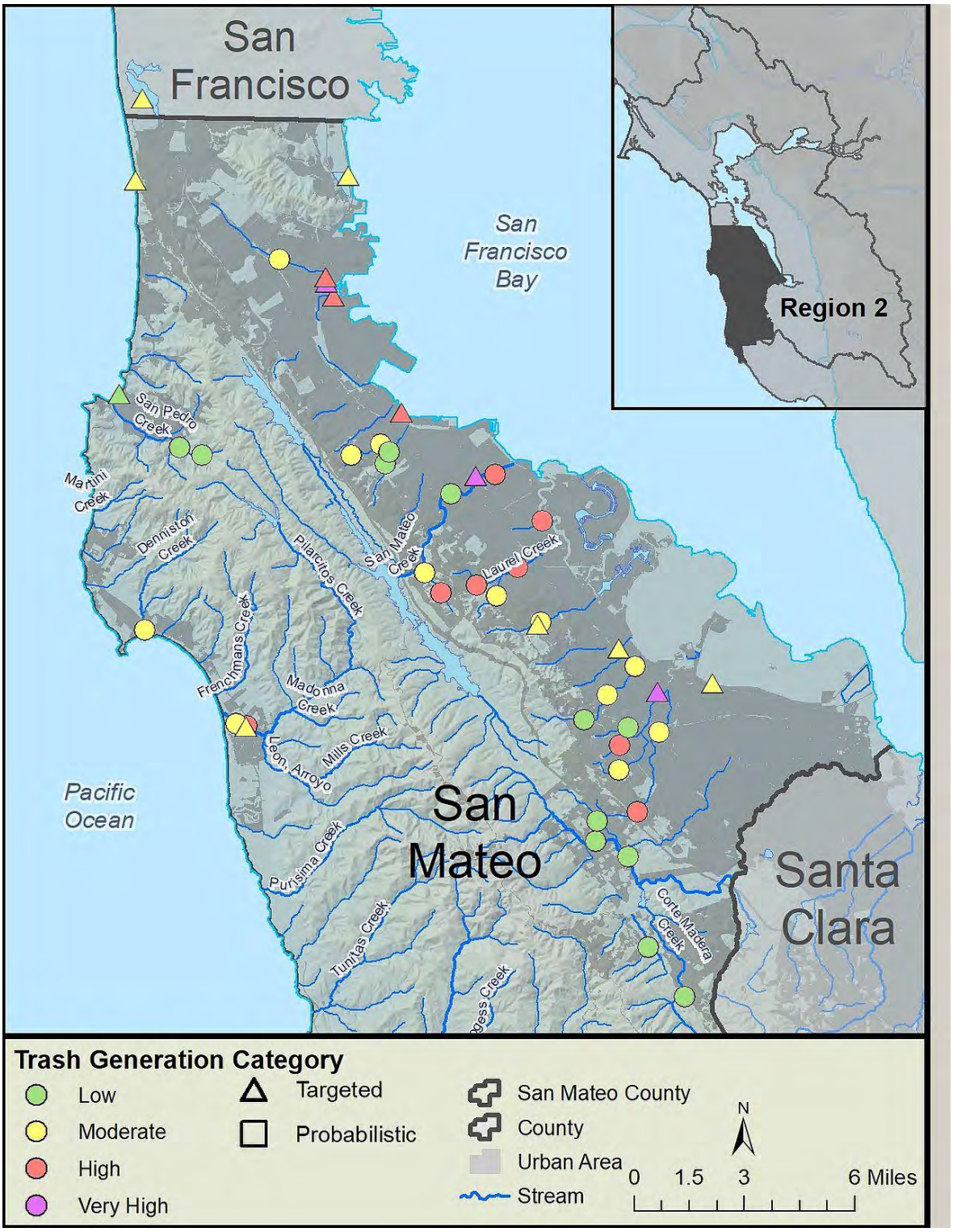
San Francisco
San Francisco Bay
Region 2
San Pedro Creek
Martini Creek
Denniston Creek
Pilarcitos Creek
San Mateo Creek
Laurel Creek
Frenchmans Creek
Madonna Creek
Mills Creek
Leon Arroyo
Pacific Ocean
San Mateo
Purisima Creek
Tunitas Creek
Corte Madera Creek
Santa Clara
Trash Generation Category
Low
Moderate
High
Very High
Targeted
Probabilistic
San Mateo County
County
Urban Area
Stream
N
0 1.5 3 6 Miles

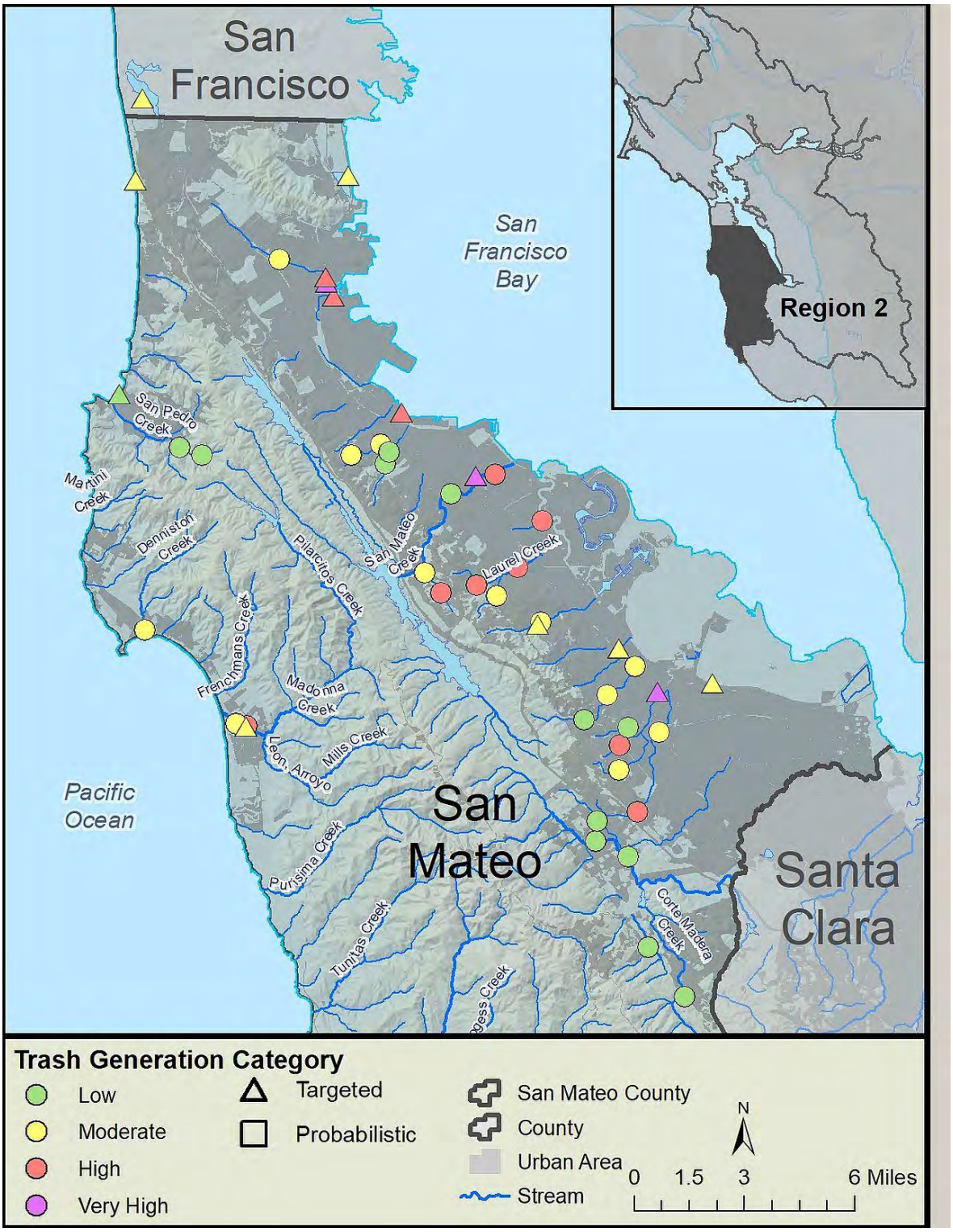

C.4 Average trash condition of probabilistic and targeted sites in San Mateo County.

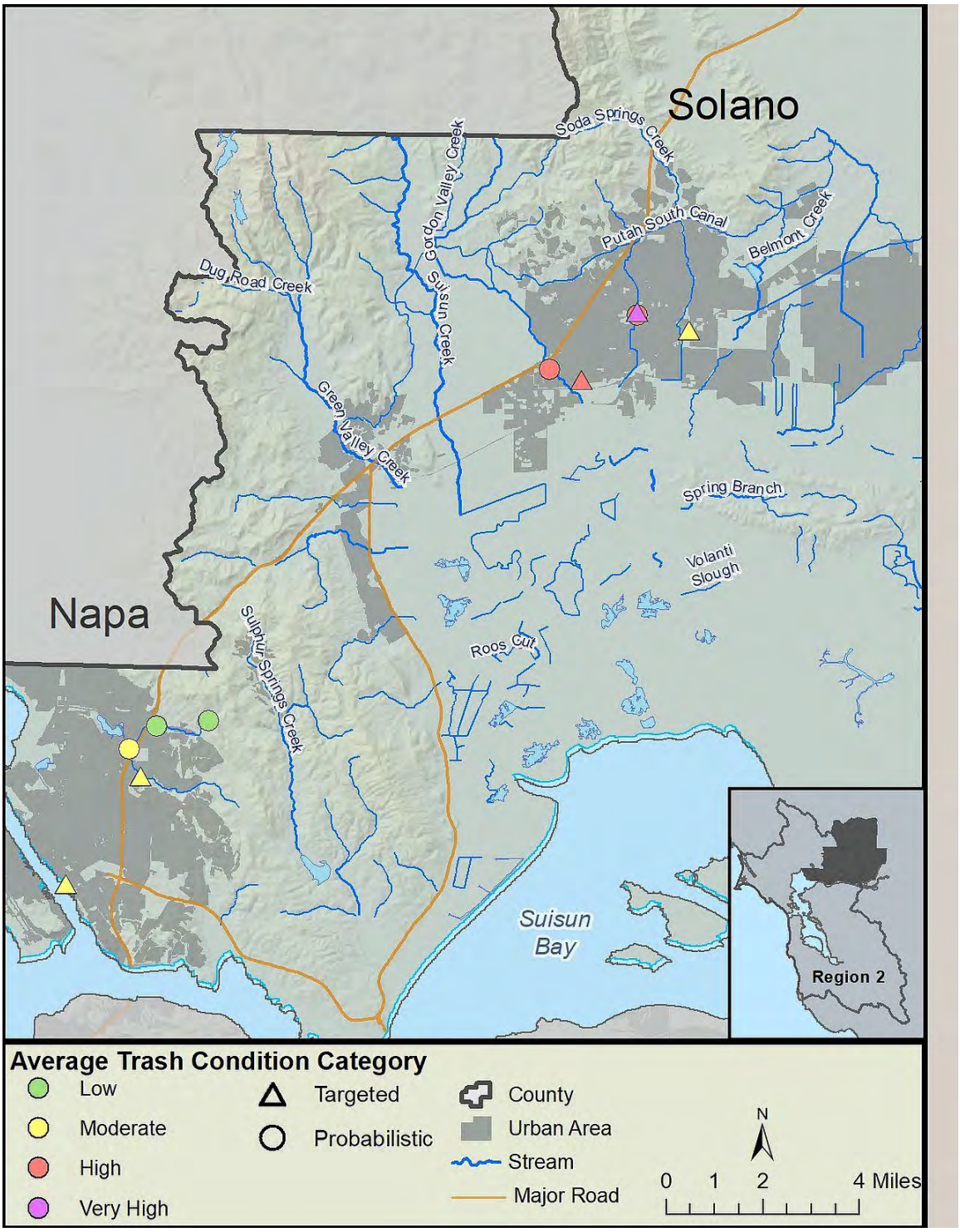
Solano
Napa
Soda Springs Creek
Gordon Valley Creek
Putah South Canal
Belmont Creek
Dug Road Creek
Suisun Creek
Green Valley Creek
Spring Branch
Volanti Slough
Roos Cut
Sulphur Springs Creek
Suisun Bay
Region 2
Average Trash Condition Category
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0 1 2 4 Miles

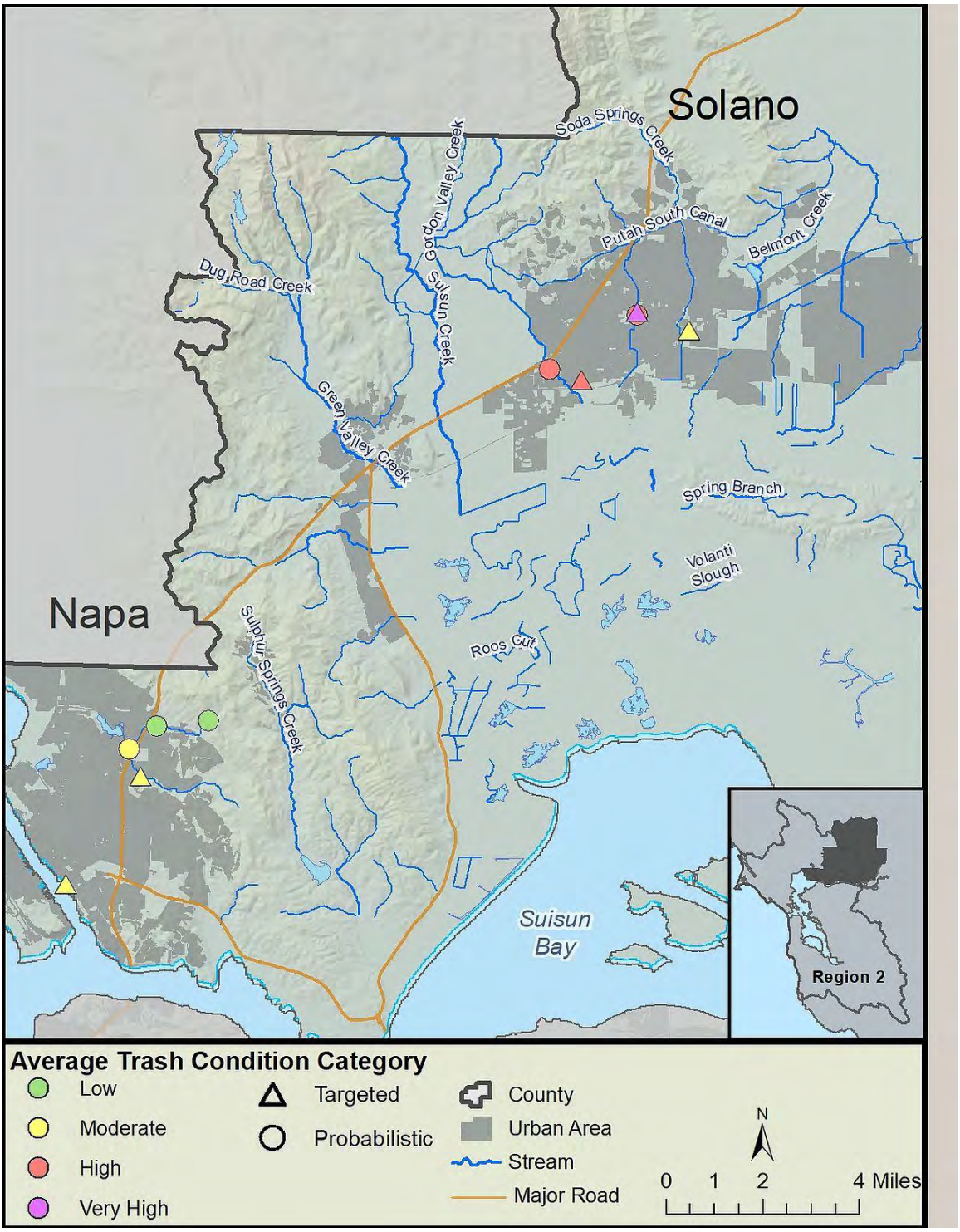

C.5 Average trash condition of probabilistic and targeted sites in Solano County.

APPENDIX D: TRASH VOLUME AT TARGETED SITES

Table D1. Trash volume and density at targeted sites during two sampling events. Qualitative assessment trash condition scores are provided for comparison.

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
ACF_5C_1	20	0.0045	6	54.9	0.0122	6	37.45	0.017
ACF_5D_1	40	0.0035	4	15	0.0010	4	27.5	0.005
ACF_CAL_1	35	0.0056	2	3	0.0055	32.5	19	0.011
ACF_WAR_1	129.8	0.0197	7	62.4	0.0088	9	96.1	0.028
ACF_WAR_2	20	0.0004	3	30	0.0005	10	25	0.001
ALA_CAS_1	99.8	0.0416	2	5	0.0022	2	52.4	0.044
ALA_CHA_1	22.5	0.0044	6	57.5	0.0122	8	40	0.017
ALA_EST_1	119.8	0.0312	6	3.8	0.0009	3	61.8	0.032
ALA_SAN_2	79.8	0.0266	3	115	0.0103	11	97.4	0.037
ALA_SAN_3	82.3	0.0274	3	142.4	0.0137	8	112.35	0.041
ALA_SEM_2	70	0.0059	9	107.4	0.0087	10	88.7	0.015
ALA_SITE3	17.5	0.0011	2	12.5	0.0014	4	15	0.003
ANT_04	42.5	0.0047	4	25.3	0.0028	6	33.9	0.007
BEL01	1	0.0005	5	3	0.0015	4	2	0.002
BRE_02	12.5	0.0011	2	12.5	0.0011	3	12.5	0.002
BRI02	15	0.0008	3	55	0.0029	5	35	0.004
BUR01	75	0.0023	5	143	0.0034	8	109	0.006
CCC_SF_2	75	0.0045	8	15	0.0008	3	45	0.005
CLA_01	107.4	0.0060	7	332	0.0187	7	219.7	0.025
CON_01	40	0.0028	5	35	0.0024	4	37.5	0.005

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
CUO01	6.5	0.0009	3	4	0.0005	1	5.25	0.001
CUO02	0.2	0.0000	1	4.3	0.0005	1	2.25	0.001
DAN_01	11.2	0.0011	1	7.5	0.0007	3	9.35	0.002
DCY02	32	0.0021	4	30.4	0.0020	3	31.2	0.004
DCY04	64	0.0119	6	64	0.0119	6	64	0.024
DUB_ALA_1	10	0.0016	2	5	0.0008	3	7.5	0.002
ELC_01	23.7	0.0025	3	15.5	0.0010	5	19.6	0.003
FF01	139.5	0.0114	10	1314.8	0.1420	10	727.15	0.153
FF03	112.4	0.0040	4	205	0.0094	6	158.7	0.013
FF04	205	0.0120	6	78	0.0228	6	141.5	0.035
FRE_CRAN_1	5	0.0006	2	37.5	0.0076	7	21.25	0.008
FRE_LAG_3	30	0.0104	6	30	0.0060	6	30	0.016
FRE_LAG_5	10	0.0039	6	21.3	0.0053	6	15.65	0.009
FRE_TULE_7	47.4	0.0017	4	17.5	0.0005	8	32.45	0.002
HAY_ACF_1	55	0.0044	5	64.9	0.0037	7	59.95	0.008
HAY_DEP_3	15	0.0010	3	25	0.0016	6	20	0.003
HAY_SFB_7	25	0.0003	4	15	0.0003	12	20	0.001
HMB01	1644.4	0.1759	7	33	0.0035	5	838.7	0.179
LIV_ALP_1	17.5	0.0040	3	10	0.0027	5	13.75	0.007
LIV_ALT_1	12.5	0.0040	2	17.5	0.0048	5	15	0.009
LOA_01	202.5	0.0657	2	71.3	0.0063	3	136.9	0.072
MIP-01	327.5	0.0234	9	122.2	0.0080	3	224.85	0.031
MIP-05	640	0.1391	8	21	0.0033	7	330.5	0.142
MOR_01	7.5	0.0017	4	5	0.0011	2	6.25	0.003
MOV_01	12.5	0.0014	4	10	0.0011	5	11.25	0.002
MOV_02	5	0.0005	3	10	0.0010	4	7.5	0.002

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
MTZ_01	40	0.0027	7	423.9	0.0290	5	231.95	0.032
OAK_01	25	0.0019	4	10	0.0008	4	17.5	0.003
OAK_ARR_1	543.8	0.1956	5	25	0.0157	4	284.4	0.211
OAK_COU_1	5	0.0016	5	30	0.0092	11	17.5	0.011
OAK_LMC_1	7.5	0.0021	2	10	0.0020	6	8.75	0.004
OAK_PER_1	154.7	0.0458	11	74.9	0.0161	10	114.8	0.062
OAK_SAU_2	20	0.0046	4	69.9	0.0146	6	44.95	0.019
ORI_01	15	0.0015	4	15	0.0014	5	15	0.003
PAC01	3	0.0001	2	5	0.0001	2	4	0.000
PIN_01	22.5	0.0027	3	61.2	0.0064	4	41.85	0.009
PIT_01	44.9	0.0036	6	20	0.0016	7	32.45	0.005
PIT_04	319.9	0.0199	10	129.9	0.0081	8	224.9	0.028
PLH_01	68.7	0.0065	6	458.9	0.0433	8	263.8	0.050
RCY01	45	0.0214	9	40	0.0190	10	42.5	0.040
RCY03	46	0.0081	5	0	0.0000	3	23	0.008
RIC_01	52.4	0.0041	4	33.7	0.0023	11	43.05	0.006
SCC02	10	0.0008	5	19.5	0.0047	5	14.75	0.005
SCC03	21.5	0.0024	6	30.5	0.0111	3	26	0.014
SCF02	275	0.0131	9	275	0.0131	9	275	0.026
SCL01	2.5	0.0004	4	6.3	0.0014	2	4.4	0.002
SCL02	7.5	0.0028	1	5	0.0019	1	6.25	0.005
SCL03	10	0.0007	2	15	0.0011	2	12.5	0.002
SCP02	559	0.0133	10	691.9	0.0165	10	625.45	0.030
SCS01	11.7	0.0018	4	10	0.0016	3	10.85	0.003
SJC01A	100	0.0073	10	1030.9	0.0748	10	565.45	0.082
SJC02	760.9	0.0620	10	1609.9	0.1313	10	1185.4	0.193

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
SJC10	517	0.0377	6	2955.8	0.2157	8	1736.4	0.253
SJC15A	247.5	0.0239	4	455.5	0.0440	7	351.5	0.068
SJC18	430	0.0381	8	1835.7	0.1627	11	1132.85	0.201
SJC22A	658	0.0434	7	438	0.0289	4	548	0.072
SJC23	758.9	0.0782	10	710.9	0.0733	8	734.9	0.152
SJC25B	755.9	0.0543	9	1247.9	0.0794	3	1001.9	0.134
SJC29	625	0.0429	6	1100.9	0.0756	9	862.95	0.119
SJC30	273	0.0253	5	921.5	0.0852	9	597.25	0.110
SJC31	980.5	0.0762	8	2020	0.1570	12	1500.25	0.233
SMO01	74.4	0.0025	7	36	0.0050	6	55.2	0.008
SMO03	219.8	0.0190	9	1446.1	0.2493	10	832.95	0.268
SNV_01	69.6	0.0041	4	25	0.0015	4	47.3	0.006
SNV_02	53.7	0.0064	4	28	0.0035	9	40.85	0.010
SPB_01	32.5	0.0062	5	55	0.0096	6	43.75	0.016
SRM_02	5	0.0003	2	7.5	0.0005	2	6.25	0.001
SSF01	20	0.0004	7	50	0.0011	7	35	0.002
SWD_06	277	0.0208	7	252	0.0573	11	264.5	0.078
SWD_07	272.5	0.0285	6	111	0.0116	5	191.75	0.040
SWD_08B	2548.6	0.1671	9	443.9	0.0475	6	1496.25	0.215
SWD_13	419.7	0.0137	2	136	0.0030	6	277.85	0.017
SWD_19	237	0.0076	5	1281.8	0.0410	10	759.4	0.049
UNI_DRY_1	79.8	0.0134	3	84.9	0.0174	7	82.35	0.031
UNI_OAC_2	1.3	0.0003	2	10	0.0039	5	5.65	0.004
VA01	67.4	0.0074	3	351	0.0607	6	209.2	0.068
VA02	115.3	0.0086	5	68.5	0.0197	3	91.9	0.028
WCR_02	20	0.0017	3	8.8	0.0007	3	14.4	0.002

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
WVC02	7	0.0010	5	25	0.0037	2	16	0.005
WVC03	1	0.0002	2	2.5	0.0004	2	1.75	0.001

APPENDIX E: GUIDANCE FOR PEER REVIEWERS, PEER REVIEW COMMENTS, AND RESPONSES TO PEER REVIEWER COMMENTS

SF Bay Area Receiving Water Trash Monitoring Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols

Guidance for Peer Reviewers
May 2020

Background

Provision C.10.b.v of the Municipal Regional Stormwater NPDES Permit (MRP 2.0), issued by the San Francisco Bay Regional Water Quality Control Board (SF Bay Regional Water Board) to 76 cities, counties and flood control districts in the SF Bay Area (collectively referred to as Permittees), requires the development, submittal and testing of a Receiving Water Trash Monitoring Program Plan (Trash Monitoring Plan). Version 1.0 of the Trash Monitoring Plan, which was submitted to the SF Bay Regional Water Board by the Bay Area Stormwater Management Agencies Association (BASMAA) on behalf of all Permittees, includes a description of the monitoring design and monitoring/assessment protocols.

Implementation of the Trash Monitoring Plan between October 2017 and July 2020 represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which pilot protocols and methods will be evaluated in the field. This evaluation is intended to provide cities, counties and flood control agencies subject to requirements in MRP 2.0 the opportunity to evaluate the validity of the pilot monitoring protocols and adapt the methodologies for future iterations of the monitoring program, should they occur, based on the information gained during the pilot-testing phase.

The MRP requires that the results of the pilot-testing phase of the Trash Monitoring Plan be submitted to the SF Bay Regional Water Board as a Final Report by July 1, 2020. The Final Report provides analysis of all information/data collected from trash assessments and monitoring during the pilot-testing phase. Monitoring Plan Objectives and scientific monitoring questions outlined in the Trash Monitoring Plan were used to guide the evaluation of trash monitoring and assessment data results presented in the Final Report. The monitoring objectives are listed below. The monitoring questions are included in the next section, along with the guiding questions that we request the peer reviewers answer during their review.

Monitoring Goals/Objectives

- Informs management decisions;
- Accounts for different stream and channel types, and considers temporal variability (e.g., to estimate baseline conditions and show change over time) and seasonality;
- Can assess trends over time;
- Helps to assess if the Permittees' trash reduction efforts are resulting in improvement;
- Allows for comparison of trash levels between sites (understand the range of levels of impact);
- Assists in determining relative contributions from different pathways (i.e., wind, illegal dumping, illegal encampments, MS4s);
- Leverages and exhibits consistency with existing monitoring efforts and other water quality monitoring programs, including direct discharge offset provisions (MRP Provision C.10.e); and
- Cost-effective, efficient and feasible (e.g., safe, access to sample locations, can be implemented by volunteer monitoring groups).

Scope of Peer Review

The Project Management Team (PMT) would like the Peer Reviewers to review and comment on the results and analyses of trash assessment data described in the Draft Final Report, to determine whether it adequately addresses the monitoring goals/objectives and questions developed by BASMAA. The following questions are provided to focus your review on specific areas on which we would appreciate your comments. Additional comments on other aspects of the Final Report are also welcome, but not required.

Guiding Questions for Peer Reviewers

1. Monitoring Question #1 - Are significantly strong correlations observed between qualitative and quantitative methods?
    - *Peer Review Question 1a - Does the correlation between qualitative and quantitative trash assessment methods described in the Final Report support the conclusion that qualitative (visual) trash assessment method is valid approach to assessing trash conditions of creeks in the MRP urban area?*
    - *Peer Review Question 1b - Could the visual assessment method also be an effective approach to address other potential monitoring objectives (e.g., trends, measure trash reduction efforts)? If not, what refinements in the method do you suggest?*
2. Monitoring Question #2 - What is the current level of trash deposited in flowing waterbodies in the entire MRP area?
    - *Peer Review Question 2a - Did the study adequately estimate the current level of trash deposited in flowing waterbodies in the entire MRP urban area?*
    - *Peer Review Question 2b - Is the protocol that was used to define an assessment area (i.e., where trash monitoring was conducted) clear, practical to implement, and repeatable? If not, what recommendations might you have to improve it.*
    - *Peer Review Question 2c - Would you suggest that other methods (e.g., design, sampling or analysis/interpretation) be employed to help answer Monitoring Question #2, should future trash monitoring occur in the MRP area?*
3. Monitoring Question #3 - What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
    - *Peer Review Question 3a - Were the quantitative methods developed and employed by BASMAA to evaluate trash levels at targeted sites adequate to answer Monitoring Question #3?*
    - *Peer Review Question 3b - Should future trash monitoring occur to evaluate trash conditions in streams, would you recommend that a strictly probabilistic-based approach be used (with the goal that all stream types and trash conditions would be assessed over time) or should an approach that uses targeted sites at known trash problem areas be included?*
4. Monitoring Question #4 - Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
    - *Peer Review Question 4a - Did the study adequately assess if trash conditions are significantly different between wet and dry seasons in receiving waters?*
    - *Peer Review Question 4b - What additional data would you suggest should be collected or evaluated, should monitoring continue into the future, to identify optimal timing for trash assessments?*
5. Monitoring Question #5 - What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
    - *Peer Review Question 5a - Was the method developed and used adequate for estimating the relative contribution of trash from the four trash pathways (wind/litter, illegal dumping, illegal encampments, and other (stormwater/upstream sources))? If not, what refinements in the method are suggested?*
    - *Peer Review Question 5b - Are there suggested refinements to methods that could specifically improve the accuracy of estimating the contribution from the stormwater pathway?*

6. **Monitoring Question #6 -** Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

    - *Peer Review Question 6 - Were the analysis methods employed in the study to compare trash levels observed in streams to trash generation levels depicted on Permittee maps adequate? If not, what improvements to the methods used would you recommend?*

Additional Questions for Peer Reviewers

7. *Peer Review Question 7 - Were the data quality objectives and measurement quality objectives developed for the study achieved? Do you have suggestions on how to improve quality assurance/controls for future data collection efforts, should they occur?*
8. *Peer Review Question 8 - What are your suggestions on how best to standardize qualitative assessment methods across sites that range in the levels of physical access to observe the site at a close distance?*
9. *Peer Review Question 9 - What are your recommendations on refinements to site characterization data (e.g., percent bank/channel cover) collection methods? Are there other factors that may be influencing trash conditions that should be considered if future data collection efforts were to move forward?*
10. *Peer Review Question 10 - What management or monitoring questions can be answered via data collected at trash booms in receiving waters?*

Peer Review Schedule

Please provide all responses to the questions above and any other comments on the Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols Final Report to Chris Sommers (Project Manager) at csommers@eoainc.com **by Friday, May 22, 2020**. Chris can also be reached at 510-393-1549, should you have questions or if you would like to discuss the peer review process or the Study.

Comments from Peer Reviewers Shelly Moore and George Leonard on the Draft Trash Receiving Waters Monitoring Report and Responses from Project Consultants
June 2020

Comment #	Report Section	Peer Reviewer	Comment	Project Consultant's Response to Comments
1	Executive Summary	George Leonard	Why not keep it simple and make it a 1-10 scale?	No edit made. There are four condition categories so the number scale should be divisible by four (e.g., 8 or 12).
2	Executive Summary	George Leonard	Are you dealing with material and product types?	No edit made. We did not characterize the trash items during this study, as this level of detail was not needed to answer the management/monitoring questions.
3	Executive Summary	George Leonard	What was the statistical significance? What is the correlation coefficient?	No edit made (there were several statistical tests performed). Descriptions of these tests are provided in section 4.1
4	Executive Summary Key Findings	Shelly Moore	Re-word to indicate that visual tool is valid approach to assess trash conditions when using trash volume as the indicator for conditions (State Monitoring Project indicate that number of trash items does not show good correlation with trash conditions)	Edits were made to indicate conditions based on trash volume were correlated with visual assessment score.
5	Executive Summary Key Findings	Shelly Moore	Are trash levels higher or lower in a given season? You do not say how season effects trash levels. In Southern California, the storms tend to clean out storm drains; is it the opposite for highly vegetated Bay Area stormdrains (channels)?	Edits were made to clarify that study results did not show seasonality to significantly influence trash levels.
6	Executive Summary Key Findings	George Leonard	Key Finding #4 - This is an important observation and seems to go against the prevailing wisdom.	We agree. No edits necessary.
7	Executive Summary Key Findings	George Leonard	This is the first reference to plastic vs. trash. These categories should be defined early in this document.	No edit made. Specific trash types or materials were not an objective for this study.
8	Introduction	George Leonard	Management Questions - These are good management questions.	No edit necessary.
9	Table 2-1	George Leonard	Good questions but not sure they explicitly get at the question of does the level actually cause adverse water quality impacts (Management Question 1 and 3).	No edit made. Monitoring questions were identified through stakeholder process during development of the Trash Plan. Evaluating specific impacts of trash to water quality in creeks/channels was beyond the scope of this project. Total amount of trash deposition was used to indirectly evaluate the potential for water quality impacts.
10	Table 2-1	George Leonard	Not sure this question directly addresses the issue to the left in the table (Management Question 5).	See response above
11	Section 3.2.1	George Leonard	Regarding the use of the term "probabilistic" - this is really a stratified, random design.	We agree. We used the term probabilistic as a simpler term.
12	Figure 3-1	George Leonard	These are good, even coverage of sites throughout the watershed. This should provide a robust estimate of trash flows in the area of concern.	
13	Section 3.3.1	George Leonard	Are these relative to some number? Low is very subjective. Or are they are all simply relative measures?	These categories are relative. Field crews were trained and provided visual guidance of characteristics of each condition category. One of the goals of the project was to develop correlations between volumes and (visual) conditions, which would help give additional relevance to the condition scores/categories.
14	Section 3.3.1	Shelly Moore	(Regarding utility of Other/stormwater pathway) Not sure I would agree; there would be a lot of error associated with this kind of measurement as the uncertainty of source for many trash items is very high.	We agree with comment that determining pathway contributions is uncertain. Edits were made to clarify that we aimed to differentiate other / stormwater sources from other pathways.
15	Section 3.3.2	George Leonard	Ideally you want the weight of materials as the density of different products/items can vary a lot, making comparisons of volume erroneous. And if you want to quantify material flow, you'd like to keep it based on mass.	While we understand the point and agree that density is an important factor to consider when measure trash volumes, measurements of density are not practical at this scale of a program. We disagree that comparisons of volumes are erroneous in the absence of density. As evaluated and described in many previous documents regarding the measurement of trash, volume is the most practical and consistent measurement to make when assessing levels of trash in waterways. Ideally trash would be compacted, but again there are impracticalities in compacting all trash removed via a monitoring program of this size.
16	Section 3.3.2	George Leonard	Regarding documentation of the previous cleanup event - This is a major issue with all attempts to quantify material on land and in coastal habitats. It is not easily resolved without a level of resolution that is virtually impossible to guarantee.	We agree. No edits necessary.
17	Section 3.3.2	Shelly Moore	Are the booms all the same? Do they all collect trash to the same depth (some booms have skirts)	None of the trash booms monitored use skirts. Only trash on the surface is captured in the booms used for study.
18	Section 3.3.3	George Leonard	So, did you standardize the volume estimates to a density (per area) basis? Or were bankfuls always the same area? I don't quite understand the ultimate units of measurement you are using.	We standardized the lengths (300' or 600') and determined an average (of 3) width measurements for each assessment. This was used to calculate the area of the assessment (sq ft), and thus convert the trash volume to density (vol per square foot). This process is described in the methods section of the report and in the SOP.
19	Section 3.3.3	George Leonard	Why not use the metric system?	Preference. Standard lengths of 300 feet (stream) and 600 feet (shoreline) were already established by Programs at known trash problem areas (targeted sites).
20	Section 3.5.2	George Leonard	Scatter plots are not an "allowed" way to represent categorical data. A linear regression would be deemed invalid as the trash conditions scores are not a continuous variable.	We treated the condition scores as a discrete variable (i.e. numeric, ordered, countable) that was continuous for the purpose of correlation/regression. The discrete scores were separated into four categories (Low to Very High) that were not regressed/correlated.
21	Section 3.5.3	George Leonard	Regarding the statistical test used - Given the constraints, above, the statistical tests below are appropriate and valid.	Comment noted. No edits needed.
22	Section 4.1	George Leonard	What if you pool the data across the subcategories to roll up to the 4 main categories (i.e. low….to very high). Would those 4 categories be considered statistically significant? I would bet there would be little way to resolve differences within those categories given variability in the response variable.	We agree with this comment, this is presented in the Figure 4.2

Comments from Peer Reviewers Shelly Moore and George Leonard on the Draft Trash Receiving Waters Monitoring Report and Responses from Project Consultants
June 2020

Comment #	Report Section	Peer Reviewer	Comment	Project Consultant's Response to Comments
23	Section 4.1	George Leonard	Regarding the results of using the Kruskal-Wallis non-parametric statistical test - Yes, this is what I was asking about and suspected. Glad it worked out.	Comment noted. No edits needed.
24	Section 4.1, Figure 4-1	Shelly Moore	Include a description of box and whiskers	No edit made. Box and whiskers are defined in the methods, section 3.5.2
25	Section 4.1	George Leonard	Given these low absolute values, you could present the data as gal/100 sq feet, which would move the decimal point to the right 2 places. And the area (10 x10 feet) is essentially the area of small bedroom, so it is easy to get your head around.	No edit made. Will consider this unit of measure in the future.
26	Section 4.1	George Leonard	This means trash is patchy at scales SMALLER than your sampling unit. This poses an important challenge going forward.	Agree with comment. No edit necessary.
27	Section 4-1	Shelly Moore	Suggest providing some guidance on when you would recommend quantitative surveys over qualitative	Both have merits depending on goals and MQs of future monitoring. We'll add a statement in the last section to address your suggestion.
28	Section 4.1.1	George Leonard	It is statistically incorrect to use a linear regression unless both the dependent and independent variables are continuous variables. Here the x axis is categorical and thus violates that assumption.	See response to comment #18. Based on our significant experience in applying statistics to environmental data, we believe it is valid to treat a discrete variable as continuous, whereas the categorical variable was the four condition categories.
29	Section 4.1.1	George Leonard	Regarding the suggestion that in future monitoring, sites should be selected or stratified based on channel type - I believe this recommendation is warranted.	
30	Section 4.1.1	George Leonard	I agree that the data suggest that only resolution at the 4 category level is warranted. Actually, given the lack of difference between the high and very high categories, one could make the argument that only 3 categories are warranted.	We generally agree. However, given our extensive experience in conducting similar visual trash assessment approaches on land, it is likely that four categories are needed, but we just don't have enough sites in the very high category to substantiate this claim. Should additional data collection take place in the future, this hypothesis should be tested, and they number of categories adjusted accordingly.
31	Section 4.2.1	George Leonard	Comment on the footnote: it would NOT have been appropriate to analyze the targeted sites as they are non random and thus not representative. Only the probabilistic sites are.	We agree with this comment and was the reason we did not include.
32	Section 4.2.1	George Leonard	What percentage of the total trash is associated with the 22% of the reaches listed as high/very high? In short, from a total trash perspective, it looks like the high sites are where all the action is.	We agree, but did explicitly calculate this statistic. We do discuss that the worst sites (high and very high categories) are more associated with illegal dumping and encampments.
33	Section 4.2.1	George Leonard	I still think figuring out how to convert to mass would be more informative.	Weight of trash was not measured during the study. Estimating mass is not possible without significant assumptions and measurements would have had to occur in the field, which just wasn't practical. Additionally, Water Board staff have repeatedly stated that volume is the unit that they'd like us to measure.
34	Section 4.2.2, Figure 4-8	George Leonard	I don't see an obvious relationship here. Are you saying there is a statistically significant one?	There was a very weak statistically significant correlation between # outfalls and trash density for targeted sites.
35	Section 4.2.2	George Leonard	Could you do a multivariate analysis that would show if a group of characteristics explains a significant amount of the variation?	No edit made. Although not reported, a multi-variate analysis was done and did not reveal any site characteristics that helped explained variation. Therefore, it was not included in the report.
36	Section 4.3.2	George Leonard	What is the total proportion of all trash associated with encampments vs. litter? That seems especially relevant from a policy perspective.	We agree. This is presented in Figure 4.13
37	Section 4.3.3	George Leonard	How do you really know the differences in these categories from looking at the trash itself?	The factors used to categorize trash into different pathways is included in the SOP that was forwarded to the commenter. In summary, best professional judgment was used to categorize based on trash size, condition and location as indicators of trash pathways. Training of field personal was important for the consistent assessment of trash pathways.
38	Section 4.4.1, Table 4-11	George Leonard	Would you consider these values to represent the effectiveness of the trash booms. Or do they not collect all the trash because booms don't cover 100% of the flow?	These values provide a (low/floor) estimate of how much of the trash is generated upstream of the boom and passes to the boom site.
39	Section 4.4.2	George Leonard	Statement is not clear (at least to the reader) "Lack of relationship between annual trash loading associated with the stormwater pathway at a particular site and the amount of trash associated with this pathway that is measured at the same site".	Agree. Deleted the sentence.
40	Section 5 (Conclusions)	George Leonard	Yes, but doesn't this amount to the vast majority of trash? What is the total percent of trash in those high categories?	See Table 4-4. Based on the data collected at the probabilistic sites, we estimated that 64% of the trash in urban Bay Area creeks is located at sites with high or very conditions.
41			By my math, 92% of the trash is associated with encampments and illegal dumping. (= 35/38). This is an important finding with significant public policy ramifications.	Correct. Based on the data collected, we estimate that between 80-95% of the trash observed in urban Bay Area creeks is associated with illegal dumping and encampments when measuring by volume.
42	Section 5 (Conclusions)	George Leonard	My read of the data suggests seasonality has little effect.	Agree, edit made
43	Section 5 (Conclusions)	George Leonard	I'm surprised that any targeted sites were in the lowish categories given they were intentionally chosen to be hot spots. Can you explain that? Are they trashy some times but not others?	The term "hot spot" varies based on the municipality definition of what is "hot" for their community. Therefore, for some communities, sites with moderate levels and possibly even low levels would be considered "hot".
44	Section 5 (Conclusions)	George Leonard	Is there some value in calculating the trash as amount/per person in the watershed, given the EPA calculations trash generation rates on the per capita basis?	This is an interesting concept, but is beyond the scope of this project. Given our experience in conducting on-land visual assessments and trash volume measurements, a number of factors are correlated with trash levels, including population density (not just population) and income.
45	Section 5 (Conclusions)	George Leonard	This suggest we don't need more booms in the watershed. We need to stop illegal dumping and clean up illegal encampments. Is that a correct interpretation?	Agreed. Study results do suggest that management actions that address illegal dumping and illegal encampments would have the greatest reduction in amount of trash observed in waterbodies.

Comments from Peer Reviewers Shelly Moore and George Leonard on the Draft Trash Receiving Waters Monitoring Report and Responses from Project Consultants
June 2020

Comment #	Report Section	Peer Reviewer	Comment	Project Consultant's Response to Comments
46	Section 6.3	Shelly Moore	It would be good to provide some actual estimated costs for visual assessment (to support statement made of cost-effective)	Cost estimates were not developed as part of this project, but we're happy to work with SFEI and SCCWRP to assist in developing cost estimates to include in the California statewide evaluation of trash monitoring methods, which includes the methods used in this study.
47	Section 6.3	George Leonard	I don't remember you calculating the relative efficiency (in time and dollars) of the two methods. That would be worth doing. How MUCH more efficient is it? I suspect a lot.	See response above.
48	Section 6.3	Shelly Moore	Measuring trash pathways using these categories creates too much error and variation and these measurements should be dropped	While we agree that estimating trash pathways was very subjective and has high degree of uncertainty, they are important from a trash management perspective. While we don't believe that the pathway identification methods developed as part of this project were precise, we do believe that refining the methods to create high levels of certainty in the results is an important next step, should monitoring continue in the future.
49	Section 6.3	George Leonard	This is a general concern of mine about these pathways. You have no direct evidence that these materials came from the assumed pathway and it is possible and likely probable that a given material can take multiple pathways. Who gets to decide?	Understand that when the pathways are identified, the field crews started with the obvious trash that originated from a specific pathway (e.g., illegal dumping or encampments). Then any trash that couldn't be reliably assigned to a speck pathway based on its characteristics, was assigned to the other/stormwater pathway. For that reason, one should look at the volumes and percentages of trash originating from the littering, illegal dumping, and encampments categories as likely low estimates, and the volumes and percentages from the other/stormwater pathways as likely high estimates.
50	Section 6.4	George Leonard	I am still confused here. Did the booms cover 100% of the potential pathways, allowing you to draw this conclusion? Or was it that they simply didn't cover ALL pathways and thus it is difficult to estimate their effectiveness?	For the sake of the comparison, we assumed that all trash captured at trash boom was associated with other/stormwater.

Attachment 12.1

Mercury and PCBs TMDL Implementation Report

CONTRA COSTA PCBS AND MERCURY TMDL CONTROL MEASURE PLAN AND REASONABLE ASSURANCE ANALYSIS

Submitted in Compliance with Provision C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.c.iii.(3), and C.12.d.iii

Municipal Regional Stormwater Permit
NPDES Permit No. CAS612008
Order No. R2-2015-0049

September 2020

The Contra Costa Clean Water Program – A Municipal Stormwater Program consisting of Contra Costa County, its 19 Incorporated Cities/Towns, and the Contra Costa County Flood & Water Conservation District

This report is submitted by the agencies of the

Program Participants:

- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon and Walnut Creek
- Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

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Report Prepared By:

Geosyntec Consultants

on behalf of the
Contra Costa Clean Water Program

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LIST OF ACRONYMS

BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
g	gram
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
HRU	Hydrologic Response Unit
mg	milligram
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission
ng	nanogram
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric
POTW	Publicly Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSID	Stressor/Source Identification
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
WLA	Wasteload Allocation
WY	Water Year

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Executive Summary

This report presents the implementation plan for the Contra Costa County Clean Water Program (CCCWP or Program) Permittees within Region 2[1] to meet mercury and polychlorinated biphenyls (PCBs) load reductions required by Total Maximum Daily Loads (TMDLs). The plan is required by the San Francisco Bay Regional Water Quality Control Board (Water Board) through the Municipal Regional Stormwater NPDES Permit (MRP). MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.c.iii.(3), and C.12.d.iii specifically require a report providing a mercury and PCBs control measures implementation plan and corresponding reasonable assurance analysis (RAA).

CCCWP Permittees recommend a programmatic approach for reducing PCBs and mercury loads from urban stormwater discharges, whereby compliance is assessed based on implementing and documenting a regionally agreed-on program of control measures, which include:

- Management of PCBs in building materials during demolition,
- Source property identification and abatement,
- Management of PCBs in electrical utility equipment,
- Management of PCBs in bridge structures during replacement,
- Green stormwater infrastructure (GSI),
- Full trash capture devices, and
- Enhanced operation and maintenance, such as enhanced inlet cleaning.

As part of the process to implement C.11.d and C.12.d, CCCWP Permittees have worked diligently with peer stormwater programs through the Bay Area Stormwater Management Agency Association (BASMAA) to define the actions and quantifiable benefits of PCBs and mercury control measures. Lessons learned from over 15 years of monitoring, analysis, and reporting informed a series of technical work group meetings beginning in March 2019, with the active

[1] Permittees within Region 2 include the Cities of Clayton, Pittsburg, Concord, Martinez, Pleasant Hill, Walnut Creek, San Ramon, Lafayette, Orinda, El Cerrito, Richmond, San Pablo, Pinole, Hercules, the Towns of Danville and Moraga, and portions of unincorporated Contra Costa County and the Flood Control District. This requirement does not apply to the Cities of Brentwood, Antioch, or Oakley as they are not subject to the San Francisco Bay PCBs TMDL. East County Permittees have separate requirements for demonstrating reasonable assurance that Central Valley TMDLs will be achieved.

participation of Regional Water Board staff in four of those meetings. These workgroup meetings have resulted in a programmatic approach agreed on regionally by all stormwater programs. The programmatic approach includes feasible implementation actions that will move the Permittees forward towards the TMDL load reduction goals. Commitment to the programmatic actions provide Permittees with planning certainty needed for compliance while addressing the public interest in measurable progress towards achieving water quality standards.

This TMDL Implementation Report presents an estimate of the load reductions resulting from PCBs and mercury control programs, along with an objective assessment of how inherent uncertainties affect forecast outcomes. It is important to emphasize that projected pace of control measure implementation and the resultant predicted load reductions are based on current and projected business practices, which are subject to change. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

PCBs Control Measures

Control measures discussed in Section 2 of this report focus on PCBs. Accounting methodologies are presented for both PCBs and mercury control measures in the RAA Report (Appendix A) and the supporting BASMAA Source Control Loads Reduction Accounting for RAA Report (Appendix B).

Table ES-1 below summarizes the PCBs program of control measures and the estimated resulting load reductions over time that would result from the proposed control measures.

Table ES-1. Summary of PCBs Control Measures and Estimated Load Reductions

Control Measure	PCBs Load Reduction (kg/yr) by:			
	2020	2030	2040	2050
1. PCBs in Building Materials Management	0.37	0.37	0.37	0.37
2. Source Property Identification and Abatement	0.21	0.54	0.54	0.54
3. PCBs in Electrical Utilities Management	0.07	0.12	0.17	0.21
4. PCBs in Infrastructure	0.00	0.01	0.02	0.02
5. Green Stormwater Infrastructure	0.14	0.18	0.26	0.32
6. Full Trash Capture Treatment Control Measures	0.05	0.05	0.05	0.05
7. Enhanced Operations and Maintenance	0.004	0.004	0.004	0.004
Total Load Reduced	0.84	1.27	1.41	1.51
Load Reduction Goal	1.51	1.51	1.51	1.51
Remaining Load to be Reduced	0.67	0.24	0.10	0

The analysis shows that based on current assumptions the load reduction needed to achieve the PCBs goals assigned to Contra Costa County permittees would not be achieved until after 2040 (i.e., when shaded bottom row in Table ES-1 reaches zero). The RAA estimate of achieving the PCBs TMDL wasteload allocation by 2050 is based on many assumptions, and while the RAA demonstrates that Contra Costa will not achieve the PCBs load reduction goal before 2050, this goal may not be achieved until well after 2050.

However, Provision C.12.d states that this report should describe scenarios showing a path to compliance by 2030. The analysis provided in Appendix G shows that it is technically and economically infeasible to achieve the TMDL wasteload allocation by 2030.

The discussion by control measure below includes the elements of each control measure, ramifications for Permittees, and an assessment of the level of effort or change of assumptions that would result in compliance by 2030.

<u>PCBs in Building Materials Management</u>

Permittees will continue implementing adopted ordinances requiring inspection for and removal of PCBs-containing building materials prior to demolition, and reporting outcomes annually. Now that the ordinances have been adopted, Permittee effort applied to permitting building demolition projects and providing information for annual reports is not expected to increase. Program costs could be impacted if there are requirements for additional studies, such as effectiveness assessments or refined methods for estimating loads reduced. Past Program costs

for participation in TMDL studies have ranged from about $10,000 - $100,000 depending on the scope and complexity. Any such study costs would be factored into the overall Program monitoring plan, including regional collaborations, with the usual goal of containing or reducing overall program monitoring costs.

There is no way to accelerate the schedule of attaining TMDL goals by changes to this control measure. Studies would provide information that helps better understand whether the PCBs load reduction achieved is greater or less than 0.37 kg per year (for Contra Costa County) but would not likely lead to significant changes in the implementation of the program.

Source Property Identification and Abatement

Permittees (e.g., Cities of San Pablo, Richmond, and Pittsburg, unincorporated Contra Costa County) with Old Industrial areas will continue source property investigations and referrals. This would continue to impact time and attention for those Permittees. CCCWP has performed a detailed analysis of Old Industrial land areas and has developed a Conceptual Work Plan for Source Area Investigation, included as Appendix C. Based on the analysis, CCCWP will propose a schedule for screening potential PCBs source areas, with 25 percent of such land areas being screened by the end of MRP 3.0. To that end, Program resources would continue to be applied to the source area investigations at about the level of effort established in MRP 1.0 and MRP 2.0.

The rate of discovering new source properties theoretically could be accelerated by increased monitoring effort; however, there is no assurance that new source properties would be discovered. Diminishing returns are expected from this investigation effort going forward, because early efforts targeted high likelihood areas. Therefore, there is low likelihood that progress shown in Table ES-1 above could be accelerated by increased effort on this control measure.

PCBs in Electrical Utilities Management

This control measure will improve procedures to document removal and disposal of PCBs in oil-filled electrical equipment (OFEE) as part of ongoing maintenance practices for municipally owned electrical utilities in the MRP area. The Pittsburg Power Company is the only municipally owned electrical utility in Contra Costa County; the remainder of the county is served by the Pacific Gas and Electric Company (PG&E). The Pittsburg Power Company will document the

removal of PCBs-containing electrical equipment since 2005 and provide data to support calculations of the associated stormwater load reductions due to these efforts.[2]

The limiting factor on implementing this control measure, outside of municipally owned power companies, will likely continue to be the Water Board's ability to direct PG&E to provide the same data and documentation as the municipally owned electrical utilities.

PCBs in Infrastructure

Permittees will inventory bridges in their jurisdictions, including known information about past maintenance, expected maintenance needs, and useful life. The Permittees will then use the inventories to track bridge replacement or rehabilitation projects in their jurisdictions to ensure that contract standard specifications and special provisions addressing PCBs removal from bridge materials are included in any such work. This TMDL Implementation Plan includes the assumption that the responsibility for developing the contract standard specifications and special provisions will be assigned to Caltrans by the State Water Resources Control Board.

Permittees have no way of increasing the benefit from or accelerating the rate of implementing this control measure once it is implemented.

<u>Green Stormwater Infrastructure</u>

Permittees will implement their Green Stormwater Infrastructure plans. This will encumber municipal time and attention at current levels, or potentially increased levels, depending on the level of development and redevelopment activity. Permittees will continue tracking GSI implementation in an ArcGIS online (AGOL) database (or a suitable replacement system). The Program will continue to gather data annually to assess PCBs loads reduced. The rate of implementing this control measure is constrained by the rate of private development, private redevelopment, and municipal capital project development.

[2] BASMAA conducted a regional Stressor/Source Identification (SSID) project that developed and implemented a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source. As a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

Full Trash Capture Treatment Control Measures

Permittees will continue tracking full trash capture devices in AGOL. The Program would continue to gather AGOL data annually to assess PCBs loads reduced. The opportunities to accelerate this or expand the benefit are limited, as there are a finite number of full trash capture opportunities available to Permittees.

Enhanced Operations and Maintenance (O&M)

Enhanced O&M generally means increasing the frequency that sediment is removed from storm drain catch basin inserts, or increasing street sweeping frequencies. Permittees began enhanced O&M measures in 2017-18, resulting in the 0.004 g / year pf PCBs reduced shown in Table ES-1. Permittees will continue to perform enhanced O&M at current levels and will consider expanding enhanced O&M in Old Industrial areas and / or near source property areas.

Diversion to POTW

A pilot diversion project performed during MRP 1.0 showed limited benefit from diverting wet or dry weather urban runoff to sanitary sewers for treatment. Permittees do not anticipate stormwater diversion to sanitary sewers will be an implementation action in the foreseeable future.

Mercury Control Measures

The RAA confirmed the original TMDL findings that urban stormwater is closer to achieving mercury goals compared to PCB goals. As progress is made towards achieving PCB goals, mercury goals will also be achieved. GSI that reduces stormwater volumes and traps urban sediments will reduce mercury loads in addition to PCBs. Thus, the approach to achieving mercury TMDL wasteload allocations for urban stormwater will be via stormwater management actions that concurrently address PCBs.

Schedule for Implementation

The RAA results predict that the PCBs TMDL wasteload allocation will be achieved in Contra Costa County no sooner than the year 2050, although several of the control measures would continue to be implemented for other reasons after this date. For example, GSI provides multiple benefits, addresses other urban pollutants, and is a requirement for new development and redevelopment projects, so would continue to be implemented as long as that requirement is in place. In addition, the Management of PCBs in Building Materials, Management of PCBs in Electrical

Utilities, and Management of PCBs in Infrastructure programs will be implemented until these sources have been abated. As PCBs have been banned in the United States since 1979, it is likely that these programs will no longer be needed by 2050, 70 years later. The Source Property Identification and Abatement Program will be complete by 2040. Full trash capture device implementation is assumed to be complete no later than 2030. The source control measure Mercury Load Avoidance and Reduction, which began during MRP 1.0, is assumed to continue indefinitely.

Evaluation of Costs

The estimate of public agency costs for implementing the PCBs and mercury control measures ranges from $1,000,000,000 to $2,000,000,000 countywide. The estimated cost for implementing source control programs is negligible in comparison to the estimated costs for implementing GSI measures. An analysis of cost effectiveness demonstrates that source control measures are much more cost efficient than treatment control measures at reducing loads of PCBs in urban runoff.

Public project implementation will depend on funding availability. Funding for implementation of projects included in the Permittees' Green Infrastructure Plans would be obtained by the municipal agency, partnerships of agencies, or other stakeholder project sponsors working to implement the identified projects. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

Uncertainty Analysis

There are two types of uncertainty in this analysis: modeling uncertainty and planning uncertainty. The RAA (Appendix A) discusses modeling uncertainty. The main causes of modeling uncertainty are: 1) the scientific soundness of the model, and 2) the reliability and applicability of the data used in the model. Modeling uncertainties were addressed through a peer review that is documented along with the RAA modeling approach in Appendix H. Modeling uncertainty is not as much of a limiting factor on the ability to forecast change as compared to planning uncertainties that result from input assumptions.

The estimate of achieving the PCBs TMDL wasteload allocation by 2050 is based on several assumptions that introduce planning uncertainties. The RAA result that Contra Costa will not achieve the PCBs load reduction goal <u>before</u> 2050 is reasonably certain (i.e., not likely to change

as a result of changed assumptions). But it is possible, due to planning uncertainties, that this goal may not be achieved until well after 2050. Examples of planning uncertainties that lead to uncertainty in the RAA results include:

- The assumption that the building demolition program achieves a PCBs load reduction benefit equivalent to 0.37 kg/yr (Table ES-1, top row) is an order of magnitude estimate – the true value could be double or half the assumed value.
- The willingness of PG&E to implement a control measures plan for OFEE is not assured.
- The RAA model does not include PCBs degradation, which could theoretically lead to achievement of the TMDL slightly sooner than predicted.
- The load reduction benefit of source property investigations is based on specific assumptions about the expected number of future source property referrals or abatements that may not play out as expected.
- Climate change, long-term meteorological patterns, and large seismic events could each significantly affect watershed transport of polluted sediments.
- Sea level rise could cause Bay Margin sites to become partly or fully submerged, moving those potential source areas from the domain of stormwater control measures to the domain of in-bay remediation.
- Large scale economic or socio-economic and political shifts, which may be either planned (e.g. , Federal Infrastructure Projects that create GSI funding opportunities) or unplanned, (e.g., the 2020 COVID-19 pandemic), can affect the rate of GSI implementation.

1. INTRODUCTION

1.1 Purpose

This *PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report was prepared by the Contra Costa Clean Water Program (CCCWP) as required by the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.c.iii.(2), C.11.c.iii.(3), C.11.d.iii, C.12.c.iii.(2), C.12.c.iii.(3), and C.12.d.iii for providing a mercury and PCBs control measures implementation plan and corresponding reasonable assurance analysis (RAA).

The following MRP reporting requirements are addressed within this report:

- An estimate of the amount and characteristics of land area that will be treated through green stormwater infrastructure (GSI) implementation by 2020, 2030, and 2040; the data used; and a full description of models and model inputs relied on to generate this estimate.
- A reasonable assurance analysis to demonstrate quantitatively that Contra Costa's population-based portion of PCBs reductions of at least 3 kg/yr and mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of GSI projects; all data used; a full description of models and model inputs relied on to make the demonstration; and documentation of peer review of the reasonable assurance analysis.
- A PCBs and mercury control measure implementation plan and corresponding RAA that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028 and PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan must:
    1. Identify all technically and economically feasible PCBs control measures and mercury control measures (including GSI projects) to be implemented;
    2. Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and
    3. Provide an evaluation and quantification of the PCBs load reduction and mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

This report is organized into the following sections:

1. Introduction and Background – Section 1 describes requirements for managing mercury and PCBs per the TMDLs and the MRP.
2. PCBs Control Measure Plan – Section 2 describes the technically and economically feasible PCBs control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms.
3. Mercury Control Measure Plan – Section 3 describes the technically and economically feasible mercury control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms.
4. Schedule of Implementation – the schedule of implementation for the PCBs and mercury control measures is provided in Section 4.
5. Costs, Efficiency, and Environmental Impacts – Section 5 provides an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from the implementation of the PCBs and mercury control measures.
6. Conclusion – the final section summarizes the findings of the report.

The RAA provided in Appendix A presents estimates of the PCBs and mercury loads that will be reduced through implementation of the control measures described in the PCBs and Mercury Control Measure Plans presented in Section 2 and Section 3. This RAA summarizes the data used, describes the model and model inputs, and documents peer review.

1.2 Background

1.2.1 PCBs and Mercury Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay (Bay) has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body and placed on the Clean Water Act "Section 303(d) list" due to PCBs, mercury, and other pollutants. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of

the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, or BMPs, are the tools that Permittees can use to assist in restoring water quality in the Bay.

PCBs TMDL

The PCBs TMDL was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day) (SFBRWQCB, 2008). A food web model was developed by San Francisco Estuary Institute (SFEI) to identify the sediment target concentration that would yield the fish tissue target; this sediment target was found to be 1 microgram (µg) of PCBs per kg of sediment. This is equivalent to reducing the total mass of PCBs in the active layer of the San Francisco Bay to 160 kg. The San Francisco Estuary Institute (Davis, 2003; SFEI, 2007a) developed a mass budget model that identified the total external load of PCBs to the Bay that would attain a long-term (i.e., equilibrated) PCBs mass in the bay of 160 kg within approximately 30 years. The mass budget model estimated that reduction of the external load to 10 kg of PCBs per year would achieve this goal, assuming a starting Bay-wide PCBs concentration in surface sediment of 4.65 micrograms per kilogram (µg/kg)[3] (SFEI, 2007a). Twenty percent of the estimated allowable external load was allocated to urban stormwater runoff.

The wasteload allocation (WLA) for PCBs for urban stormwater is 2 kg/yr by 2030. This load allocation was developed by applying the required sediment concentration (1 µg/kg) to the estimated annual sediment load discharged from local tributaries. The PCBs TMDL staff report (SFBRWQCB, 2008) estimated the annual sediment load originating from stormwater to be 2,000,000 metric tons (i.e., 2,000,000,000 kg/yr) based on a range of then available estimates

[3] Bay-wide PCBs concentration in surface sediment estimated based on Regional Monitoring Program 2004 – 2006 data (SFEI, 2007a).

and differing methods. This WLA was distributed among the counties on population in the year 2000. A summary of the allocations for each county is provided in Table 1-1.

Table 1-1: PCBs Wasteload Allocations by County

County	Population (year 2000)	Wasteload Allocations (kg/yr)
Alameda	1,440,000	0.5
Contra Costa	790,000	0.3
Marin	240,000	0.1
Napa	120,000	0.05
San Francisco	630,000	0.2
San Mateo	600,000	0.2
Santa Clara	1,600,000	0.5
Solano	290,000	0.1
Sonoma	110,000	0.05
Total		2

The PCBs TMDL Staff Report estimates a total stormwater load of 20 kg/yr based on studies conducted by SFEI (SFEI, 2006; 2007b). SFEI calculated this baseline load using three different methods to scale monitoring data (grab sample concentration data from Water Year (WY) 2005[4], United States Geologic Survey [USGS] continuous discharge, and suspended sediment data) from Coyote Creek and the Guadalupe River by area and land use. Subtracting the WLA for urban stormwater from this estimate resulted in a required load reduction of 18 kg/yr (i.e., a 90% reduction) by 2030. Note that the MRP area[5] portion of the 2 kg/yr allocation is 1.6 kg/yr.

PCBs TMDL compliance can be demonstrated through two different approaches:

1. Meet the WLA (i.e., monitoring and/or modeling-based compliance demonstration); and
2. Demonstrate the required load reductions can be achieved (i.e., modeling-based compliance demonstration).

[4] Although the PCBs TMDL Staff Report states that PCBs loads estimates for the Guadalupe River were based on data collected between 2003 and 2005; SFEI, 2006 indicates that the baseline load estimate of 20 kg/yr was based on an extrapolation of monitoring data collected in WY 2005.

[5] Marin, Napa, San Francisco, and Sonoma are not within the MRP boundary.

Mercury TMDL

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.

A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations (SFBRWQCB, 2004).

The urban stormwater runoff load to the San Francisco Bay is estimated to be equivalent to 116 kg/yr, as reported in the San Francisco Bay Regional Monitoring Program for Water Quality's Sources, Pathways, and Loadings Report (McKee et al., 2015), which is less than the Mercury TMDL Staff Report reported load of 160 kg/yr[6] (corresponding to "baseline year" of 2003). The WLA for urban stormwater is 82 kg/yr (SFBRWQCB, 2006). Based on the TMDL reported load of 160 kg/yr, this results in an estimated total required load reduction of 78 kg/yr, required to be achieved by 2028. A summary of the WLA and load reductions required for each urban stormwater entity subject to the TMDL is provided in Table 1-2 (SFBRWQCB, 2006).

[6] This loading assumes an annual sediment load of 410,000,000 kg/yr of sediment with a concentration of 0.38 mg/kg (ppm) (SFBRWQCB, 2006). Although the estimates were based on monitoring data collected in previous years, the TMDL states the baseline year as 2003.

Table 1-2: Mercury Wasteload Allocations by County

Entity	Wasteload Allocation (kg/yr)[1]
Santa Clara Valley Urban Runoff Pollution Prevention Program	23
Alameda Countywide Clean Water Program	20
Contra Costa Clean Water Program	11
San Mateo County Stormwater Pollution Prevention Program	8.4
Vallejo Sanitation and Flood Control District	1.6
Fairfield-Suisun Urban Runoff Management Program	1.6
American Canyon	0.14
Sonoma County area	1.6
Napa County area	1.6
Marin County area	3.3
Solano County area	0.81
San Francisco County area	8.8
Total	82

[1] Listed in Table 4-w of Appendix A in the Mercury TMDL Staff Report (SFBRWQCB, 2006).

Mercury TMDL compliance can be demonstrated through the following three approaches[7]:

1. Show mercury concentrations are below 0.2 milligrams mercury per kilogram of sediment (mg/kg) on a countywide level (i.e., monitoring-based compliance demonstration);
2. Meet the WLA in Table 1-2 (i.e., monitoring and/or modeling-based compliance demonstration);[8] and
3. Demonstrate the required load reductions can be achieved (i.e., modeling-based compliance demonstration).

[7] Detailed documentation requirements for demonstration of these approaches are summarized in the Mercury TMDL Staff Report (SFBRWQCB, 2006).

[8] Modeling-based compliance demonstration requires monitoring-based empirical inputs to conduct the analyses.

1.2.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and revised in 2015.

The MRP was amended on February 13, 2019, to add the cities of Antioch, Brentwood, Oakley, and the eastern portions of unincorporated Contra Costa County and the Contra Costa County Flood Control & Water Conservation District (the East County Permittees), which are located within the jurisdiction of the Central Valley Water Board (Region 5) and were previously covered under a separate Joint Municipal NPDES Permit titled "East Contra Costa County Municipal NPDES Permit". The East County Permittees are not subject to the PCBs and mercury TMDLs, although they have been implementing PCBs and mercury control measures. The amended MRP specifically exempts the East County Permittees from MRP Provisions C.11 and C.12, but does incorporate requirements for the Sacramento-San Joaquin Delta Estuary Methylmercury TMDL. Therefore, this report does not report on planned PCBs and mercury control measure implementation or RAA results for the East County Permittees. For unincorporated Contra Costa County, this report summarizes the control measures implemented and the PCBs and mercury loads reduced within the SFBRWQCB Region 2 boundary.

MRP Provision C.3.j required each Permittee to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. CCCWP developed, and each of the Permittees used, a mechanism to prioritize and map areas for potential and planned green infrastructure projects, both public and private, on a drainage-area-specific basis, for implementation by 2020, 2030, and 2040.

MRP Provisions C.11.c and C.12.c require the Permittees to prepare an RAA for inclusion in the 2020 Annual Report. The RAA required in Provisions C.11.c and C.12.c should do the following:

1. Quantify the relationship between the areal extent of green infrastructure implementation and mercury and PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of green infrastructure strategies likely to be implemented.
2. Estimate the amount and characteristics of land area that will be treated by green infrastructure by 2020, 2030, and 2040.
3. Estimate the amount of mercury and PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.

4. Quantitatively demonstrate that mercury load reductions of at least 10 kg/yr and PCBs load reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects.
5. Ensure that the calculation methods, models, model inputs, and modeling assumptions used have been validated through a peer review process.

Additionally, MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The implementation plans must:

1. Identify all technically and economically feasible mercury or PCBs control measures (including green infrastructure projects, but also other control measures such as source property identification and abatement, managing PCBs in building materials during demolition, enhanced operations and maintenance, and other source controls) to be implemented;
2. Include a schedule according to which technically and economically feasible control measures will be fully implemented; and
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

1.2.3 Bay Area RAA Guidance

From a regulatory perspective, reasonable assurance is defined as the demonstration that the implementation of control measures will, in combination with operation of existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet total maximum daily load (TMDL) wasteload allocations, water quality-based effluent limits (WQBELs), or other water quality targets specified in a municipal separate storm sewer system (MS4) permit (USEPA, 2017). From the perspective of a stakeholder in the watershed who is focused on the improvement of water quality or restoration of a beneficial use of a waterbody, reasonable assurance is the demonstration and a commitment that specific management practices are identified with sufficient detail (and with a schedule for implementation) to establish that necessary improvements in the receiving water quality will occur. From the perspective of a MS4 Permittee, reasonable assurance is a detailed analysis of

TMDL WLAs, associated permit limitations, and the extent of stormwater management actions needed to achieve TMDL WLAs and address receiving water limitations. RAAs may also assist in evaluating the financial resources needed to meet pollutant reductions based on schedules identified in the permit, TMDL, or stormwater management plan, and in preparing associated capital improvement plans.

As defined in the *Bay Area RAA Guidance Document* (BASMAA, 2017), an RAA is a demonstration that the control measures proposed in Bay Area City and County Green Infrastructure Plans and PCBs and Mercury Control Measure Implementation Plans, as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury TMDL wasteload allocations for urban stormwater runoff over the defined period of time. Additionally, the RAA should provide a method for evaluating the type, size, number, location, and phasing of green infrastructure measures needed to comply with the green infrastructure load reduction goal (i.e., 10 kilograms per year [kg/yr] mercury load reductions and 3 kg/yr PCBs load reductions by 2040) stated in MRP Provisions C.11/C.12.c. As such, the green infrastructure planning and associated RAAs will require adaptive management. The RAA may also be used to justify extending the TMDL compliance schedules (SFBRWQCB, 2015). [9]

The MRP provides flexibility for Permittees to define what constitutes an acceptable RAA, however the RAAs developed in compliance with the MRP must be peer reviewed and must be approved by the SFBRWQCB. The RAA presented in this report is consistent with the guidance provided in the *Bay Area RAA Guidance Document* (BASMAA, 2017).

[9] See MRP Attachment A: Fact Sheet page Attachment A-122.

2. PCBS CONTROL MEASURE PLAN

This section describes the control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms to control PCBs in urban runoff.

2.1 Source Control Measures

Source control measures include the following programs:

- PCBs in building materials management,
- Source area investigation and abatement,
- PCBs in electrical utilities management, and
- PCBs in infrastructure management.

Each of these source control programs are described below.

2.1.1 Management of PCBs in Building Materials Program

The Permittees have developed and implemented, in cooperation with the Bay Area Stormwater Management Agencies Association (BASMAA), a protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, stormwater runoff, or improper waste disposal. Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed between the years 1950 and 1980 and with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. A Permittee is exempt from this requirement if the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[10]

[10] Each Permittee seeking exemption from this program must have submitted documentation to the SFBRWQCB, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures. The City of Clayton has been approved for this exemption.

The CCCWP and Permittees participated in a BASMAA Regional Project to address PCBs in building materials. This Regional Project developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Appendix D. This Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project. The tools and materials developed as part of the project build upon materials and outputs developed in 2010-2011 by the San Francisco Estuary Partnership with State Water Board grant funding, called the "PCBs in Caulk Project", as well as subsequent and parallel activities by BASMAA.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Data collection started with implementation of the new program on July 1, 2019. When enough new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program, and

- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

2.1.2 Source Property Identification and Abatement Program

CCCWP provides monitoring to support source property identification that at times (i.e., for one to three percent of land area investigated) leads to referrals and self-abatement of properties. These are typically sites in Old Industrial areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels and are being transported to the MS4. The source property identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. A detailed description of the investigation process is provided in Appendix E. This program is an example of the CCCWP Permittees collectively funding investigations to help abate discharge of PCBs-contaminated sediments.

Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the SFBRWQCB for investigation and abatement. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another NPDES permit.

CCCWP identifies significantly elevated PCBs concentrations through surface soil/sediment sampling in the public ROW or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced O&M measures in the public street or

storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems are described in the source property referral form that is sent to the SFBRWQCB. If implementation of enhanced O&M is not feasible (e.g., for properties that discharge directly to the Bay), the source property may still be referred to the SFBRWQCB, although PCBs load reduction credit would be received after the property is abated or after 10 years, whichever occurs first.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public ROW and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

The properties in Contra Costa that have been referred to the SFBRWQCB or self-abated through FY 2019/20 are listed in Table 2-1 below.

The Permittees, with the support of the CCCWP, have estimated the remaining old industrial area to be investigated within Contra Costa County (Table 2-2). Appendix C provides a conceptual work plan for completing these investigations. Parcels that drain directly to the Bay may also be investigated, as feasible, if determined to be a high-likelihood source property.

Table 2-1: CCCWP Contaminated Sites Referred to the SFBRWQCB and Self-Abated Properties

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR REFERRED	REFERRAL OR SELF-ABATEMENT
Sims Metal Management Richmond Facility	600 South 4th Street, Richmond / 560-240-040, 560-250-027, 560-250-025	19.3	FY 2017/18	Referral
World Corp	1014 Chesley Ave., Richmond	10.44	FY 2017/18	Referral
Port of Richmond	Point Potrero Marine Terminal, Richmond	0.72	FY 2017/18	Self-Abatement
San Diego St. Transformer Spill	R.O.W. San Diego St., Richmond	0.08	FY 2017/18	Self-Abatement
Larkey Pool Renovation Project	2771 Buena Vista Ave., Walnut Creek /171-110-021	<0.01	FY 2017/18	Self-Abatement
Radiant Avenue	Radiant Avenue, North Richmond; 408-082-030	19.5	FY 2016/17	Self-Abatement
Former Molino Enterprises. Inc.	1215 Willow Pass Rd., Pittsburg; 096-091-003-2	6.0	FY 2015/16	Referral
Rumrill Sports Complex (Former BNSF Railyard Site)	1509 Rumrill Blvd, San Pablo / 409-313-009; 409-313-009; 410-012-007; 410-012-008	4.45	FY 2015/16	Self-Abatement
Fass Metals	818 W. Gertrude Avenue, Richmond, CA 94801 / 408-160-011	0.2	FY 2017/18	Referral w/out Enhanced O&M
Zeneca/Former Stauffer Chemical Company	1415 South 47th St, Richmond, CA 94804 / 560-050-022	9.2	FY 2019/20	Referral w/out Enhanced O&M
UC Richmond Field Station	1301 South 46th Street, Richmond, CA 94804 / 560-060-008	14.0	FY 2019/20	Referral w/out Enhanced O&M

Table 2-2: Old Industrial Areas to be Investigated within Contra Costa County

Description		Total Area (acres)
Total urban area below dams, within Region 2, and draining to the Bay		254,365
A.	All Old Industrial land use areas (2002)[1]	21,459
B.	Old Industrial land use areas that have redeveloped since 2002 and/or are currently treated by green stormwater infrastructure	1,135
C.	Old Industrial land use areas that have been previously determined to be low likelihood, investigated[2], referred, or abated.	9,236
D.	Old Industrial land use areas that do not drain to the MS4, rather drain directly to the Bay	6,550
E.	Old Industrial land use areas that will be investigated (A – (B + C + D))	4,539

Notes:

1. Does not include Old Industrial land use areas within Eastern Contra Costa County (Region 5).
2. Includes areas associated with the Concord Naval Weapons Station, parcels identified as being primarily open space, and Old Industrial parcels associated with low (<0.5 mg/kg) sediment samples.

If investigation does not identify a specific source for an Old Industrial area with observed elevated concentrations, then the source area will be considered for the application of other types of control measures, such as treatment controls or enhanced O&M.

2.1.3 Management of PCBs in Electrical Utilities Program

The Management of PCBs in Electrical Utilities Program includes the development and implementation of improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

For this control measure program, municipally owned electrical utilities will document the removal of PCBs-containing electrical equipment since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service and will provide data to support calculations of the associated stormwater load reductions due to these efforts.[11] The

[11] BASMAA conducted a regional Stressor/Source Identification (SSID) project that developed and implemented a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source. As a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

Pittsburg Power Company is the only municipally owned electrical utility in Contra Costa County; the remainder of the county is served by the Pacific Gas and Electric Company (PG&E).

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

2.1.4 Management of PCBs in Infrastructure Program

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the ROW, including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual

samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

2.2 Treatment Control Measures

Treatment control measures include green stormwater infrastructure (GSI), full trash capture devices, enhanced operation and maintenance (O&M) practices, and diversion to publicly-owned treatment works (POTW). Each of these treatment control measures are described below.

2.2.1 Green Stormwater Infrastructure

Green stormwater infrastructure (GSI) refers to constructing and retrofitting storm drainage systems to mimic natural processes by slowing runoff by dispersing it to vegetated areas, harvesting and using runoff, promoting infiltration and evapotranspiration, and using bioretention to filter stormwater runoff. This control measure includes implementation of GSI in new development and redevelopment projects that are under the Permittees' planning and

building authority, as well as retrofit of existing infrastructure in public right-of-way (ROW) areas and on publicly owned parcels.

MRP Provision C.3 mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay, including PCBs and mercury. GSI has been incorporated into new development and redevelopment projects in Contra Costa County since 2005. The first edition of the CCCWP *Stormwater C.3 Guidebook* was published in 2005. The current 7th Edition of the *Stormwater C.3 Guidebook* was published in 2017. Ancillary support documents, such as example projects, design details, and reporting templates, are continually being developed by the CCCWP to assist the Permittees in C.3 implementation. All of these documents are available on the CCCWP website[12].

Permittees track C.3 project implementation in an ArcGIS Online (AGOL) database. CCCWP developed the countywide GIS database to assist with maintaining, analyzing, interpreting, displaying, and reporting relevant municipal stormwater program data and information related to MRP Provision C.3, Provision C.10 (i.e., trash load reduction activities), and Provisions C.11/C.12 (i.e., mercury and PCBs TMDL implementation activities).

MRP Provision C.3.j required each Permittee located within Region 2[13] to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. These Green Infrastructure Plans mapped and prioritized areas for potential and planned public and private GSI projects for implementation by 2020, 2030, and 2040. The RAA provided in Appendix A of this report estimates the PCBs and mercury load reductions that would be achieved through implementation of the Permittees' Green Infrastructure Plans.

The results of the RAA analysis (see Appendix A) demonstrate that GSI projects that have the highest potential to reduce PCBs loads are concentrated within a small subset of the Contra Costa County Permittee area due to the pattern of pre-1980 industrial development within the region. These communities have lower median incomes, higher poverty rates, and score lower on public

[12] See: https://www.cccleanwater.org/development-infrastructure/

[13] East County Permittees were brought into coverage under the MRP by an amendment (Order R2-2019-0004) in January 2019. Provision C.16.5.a requires East County Permittees to submit Green Infrastructure Plans by December 31, 2020.

health indices, correlating with the presence of environmental stressors. The local governments have fewer resources and have difficulty maintaining aging infrastructure while meeting social needs. Conversely, most Contra Costa County Permittees have no or very few opportunities to contribute significantly toward achievement of countywide PCBs loading reductions via implementation of GSI in their communities. Further, if PCBs load reductions are not achieved on a regional or countywide scale, and load reductions are allocated at a local level (by population), these Permittees would not be able to achieve those load reduction allocations due to a lack of opportunity.

Further, the Permittees determined that prioritizing GSI projects based on PCBs load-reduction effectiveness could compromise public support for their Green Infrastructure programs overall. Many of the sites in Old Industrial areas have little pedestrian traffic; placement of an expensive urban amenity in these locations may be perceived as poor planning and poor use of scarce infrastructure funding.

Also, while GSI is an effective multi-decadal strategy for reducing PCB loading if implemented in the context of the multiple benefits that could be obtained from a long-term shift from “grey” to “green” infrastructure—as envisioned in MRP Provision C.3.j.—when considered solely as a pollutant control measure it is not nearly as cost-efficient as source controls. See Section 5.1.

Given these findings, and following discussions with SFBRWQCB staff, Contra Costa County Permittees prioritized their GI projects to achieve multiple benefits, including control of other stormwater pollutants, preserving and enhancing local stream hydrology, reducing localized flooding, helping communities adapt to climate change by increasing the resiliency of water supply, and public health benefits that derive from integrating landscaped areas into the urbanized environment.

Additional actions that the Permittees have taken or will take to promote the implementation of GSI include:

- Incorporate GSI requirements into planning documents such as General Plans, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee’s jurisdiction;

- Evaluate funding options for GSI projects;
- Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of their Green Infrastructure Plans;
- Conduct public outreach, train Permittee staff, and educate elected officials on the MRP GSI requirements and methods of implementation; and
- Maintain a list of public infrastructure improvement projects that have a potential for incorporating GSI.

Permittees will continue to implement GSI projects and will work with the SFBRWQCB staff on setting achievable GSI goals in future iterations of the MRP.

2.2.2 Full Trash Capture Treatment Control Measures

MRP Provision C.10 requires Permittees to implement trash prevention and control actions, including full trash capture systems, to reduce trash generation. Full trash capture systems capture sediment along with trash that may be contaminated with PCBs and mercury. Permittees have installed both large and inlet-based full trash capture devices in response Provision C.10. Large full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes, capture and treat urban runoff from large drainage areas, ranging from 10's to 100's of acres. Inlet-based devices in roadways enhance the capture of sediments that may be contaminated with PCBs and mercury from smaller, localized drainage areas. In addition, these inlets are typically cleaned more frequently as a result of the installation of the full trash capture device. Trash capture device implementation is described in each Permittee's Trash Load Reduction Plan. Permittees track installed trash capture devices in the AGOL database and to use the database to run scenarios to guide future locations for these devices. Permittees did not update the Trash Load Reduction Plan that was developed prior to adopting the visual assessment methodology.

2.2.3 Enhanced Operation and Maintenance

Routine MS4 O&M activities conducted by Permittees include street sweeping and drain inlet cleaning. In addition, storm drains, culverts, and channels are maintained as needed (i.e., desilted when needed to remove excessive quantities of accumulated sediment that may be causing localized flooding issues). Infrequent capital improvement projects may also remove accumulated sediment from the MS4, such as storm drain repairs or channel stabilization

projects. Each of these O&M activities removes PCBs and mercury that are present in the sediment that is removed. The RAA provided in Appendix A of this report estimates the PCBs and mercury load reductions that are achieved through implementation of increased levels of street sweeping and drain inlet cleaning since 2003.

Enhanced O&M control measures are implemented as part of the Source Property Identification and Abatement Program (see Section 2.2.1 below) for referred source properties. Additional Enhanced O&M or other corrective measures will be considered for Old Industrial source areas with observed elevated concentrations of PCBs if the source area investigation does not identify a specific source property and the source is suspected to be historically deposited sediment in the public ROW or the storm drain system.

PCBs and mercury load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, will be reported as part of the overall load reductions in future permit terms.

2.2.4 Diversion to POTW

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff. A pilot diversion project conducted at the North Richmond Pump Station (CCCWP, 2016) showed limited benefit from diverting wet or dry weather urban runoff to sanitary sewers for treatment, thus there is no ongoing diversion. Permittees do not anticipate stormwater diversion to sanitary sewer will be an implementation action in the foreseeable future.

3. MERCURY CONTROL MEASURE PLAN

The Mercury TMDL and subsequent MRP permit provisions implementing the TMDL include the assumption that urban stormwater is closer to achieving TMDL WLAs than PCBs. For this reason, the mercury control plan first names specific, well-defined measures to control the release of mercury from consumer products, and then notes that PCB control measures will also help achieve stormwater mercury WLAs. The RAA Report (Appendix A) explains how control measures translate to mercury loads reduced.

3.1 Source Control Measures

3.1.1 Mercury Load Avoidance and Reduction

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufacturers have significantly reduced the amount of mercury in fluorescent linear tube lamps.

Mercury Device Recycling Programs resulting in mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

- Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
- Private business take-back and recycling programs (e.g., Home Depot); and,
- Private waste management services for small and large businesses.

The CCCWP coordinates with Permittees and local household hazardous waste collection facilities to implement mercury collection and recycling in accordance with MRP Provisions C.11.a.i and C.11.a.ii.

CCCWP Permittees collect household hazardous waste at three regional facilities in the County:

- Central Contra Costa Sanitary District (CCCSD);
- Delta Diablo Sanitation District (DDSD); and,
- West Contra Costa Integrated Waste Management District (WCCIWMA).

CCCSD serves the communities of Concord, Clayton, Martinez, Pleasant Hill, Orinda, Lafayette, Moraga, Walnut Creek, Danville, San Ramon and unincorporated County. DDSD serves Pittsburg, Antioch, Oakley and Bay Point. WCCIWMA serves Richmond, Pinole, El Sobrante, El Cerrito, San Pablo, and unincorporated areas of Contra Costa County.

The types of data collected at each facility are slightly different as is the level of differentiation between types of mercury containing devices and the level of specificity in reporting the data.

3.2 Treatment Control Measures

Treatment control measures that address PCBs in stormwater will also reduce mercury. These treatment control measures, described in Section 2.2 above, include green stormwater infrastructure, full trash capture devices, and enhanced O&M.

Because of the widespread nature of mercury in the urban environment, further progress on reducing mercury loads will most likely occur in tandem with stormwater treatment control measures addressing PCBs (e.g., GSI implementation). The RAA provided in Appendix A of this report estimates the mercury load reductions that would be achieved through implementation of treatment control measures addressing PCBs.

4. SCHEDULE OF IMPLEMENTATION

4.1 Overall Schedule of Implementation

Table 4-1 below presents the schedule of implementation for each of the control measures described in the PCBs Control Measure Plan (Section 2) and the Mercury Control Measure Plan (Section 3). The schedule in Table 4-1 shows when implementation of each control measure began and will be complete with respect to TMDL implementation. The RAA results provided in Appendix A predict that the PCBs TMDL WLA will be achieved in Contra Costa County by the year 2050, thus this date is listed for most of the control measures, although several of the control measures would continue to be implemented for other reasons. For example, GSI as implemented provides multiple benefits, addresses other urban pollutants, and is a requirement for new development and redevelopment projects, so would continue to be implemented as long as that requirement is in place. In addition, the Management of PCBs in Building Materials, Management of PCBs in Electrical Utilities, and Management of PCBs in Infrastructure programs will be implemented until these sources have been abated. As PCBs have been banned in the United States since 1979, it is likely that these programs will no longer be needed by 2050, 70 years later. The Source Property Identification and Abatement Program will be complete by 2040, as described in the conceptual investigation workplan provided in Appendix C. Full trash capture device implementation is assumed to be complete no later than 2030. The source control measure Mercury Load Avoidance and Reduction, which began during MRP 1.0, is assumed to continue indefinitely.

Table 4-1: PCBs and Mercury Control Measure Plan Schedule of Implementation

Control Measure	Begin Implementation	Implementation Complete
Management of PCBs in Building Materials	2019	2050
Source Property Identification and Abatement	2015	2040
Management of PCBs in Electrical Utilities	2019	2050
Management of PCBs in Infrastructure	2021	2050
Green Stormwater Infrastructure	2003	Ongoing
Full Trash Capture Treatment Control	2005	2030
Enhanced Operations and Maintenance	2003	2050
Mercury Load Avoidance and Reduction	2005	Ongoing

4.2 Green Stormwater Infrastructure Schedule of Implementation

Table 4-2 below provides an estimate of the amount of public and private land area that will be treated through GSI implementation by 2020, 2030, and 2040 countywide. These areas are summarized from the Permittees' Green Infrastructure Plans, which were submitted to the SFBRWQCB in 2019. The data and models used to generate this estimate and schedules for GSI implementation for each Permittee are described in each Permittee's Green Infrastructure Plan and are summarized below. The RAA results for GSI implementation are based on these area predictions.

Table 4-2: Estimate of Area Treated through GSI Implementation by 2020, 2030, and 2040 within Contra Costa County

Year	Cumulative Area Treated by GSI (acres)
2020	7,100
2030	9,000
2040	11,900

4.2.1 Private Redevelopment Area Projection

The CCCWP Permittees track GSI implemented as part of private development projects subject to MRP Provision C.3.d through the CCCWP's AGOL tracking tool. The combined area treated by GSI implemented for private development from 2003 through 2018 represents a portion of the 2020 total area included in Table 4-2; the remainder was projected private development.

To forecast private development for 2019/2020, 2021 through 2030, and 2031 through 2040, the CCCWP used the UrbanSim model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area Metropolitan Transportation Commission (MTC). MTC forecasts growth in households and jobs and uses the UrbanSim model to predict new development and redevelopment to satisfy future demand. Model inputs include parcel-specific zoning and real estate data; model outputs show increases in households or jobs attributable to specific parcels. The methods and results of the Bay Area UrbanSim model have been approved for use in transportation projections and the regional Plan Bay Area development process.

CCCWP used outputs from the Bay Area UrbanSim model to map parcels predicted to undergo development or redevelopment in each Contra Costa jurisdiction at each time increment specified in the MRP (2020, 2030, and 2040). The resulting maps were reviewed by local staff for

consistency with local knowledge and local planning and economic development initiatives, and the maps were revised as needed.

Although the UrbanSim methodology is robust, the pace of redevelopment and of resulting pollutant-load reductions depend on future economic conditions.

4.2.2 Public GSI Project Area Projection

Publicly owned parcels and ROWs that could potentially be retrofit to include multi-benefit stormwater capture facilities were identified as part of the Contra Costa Watersheds Stormwater Resource Plan (SWRP) (CCCWP, 2019). These potential project locations were used as the basis for identifying potential public retrofit locations within each Permittee's jurisdiction based on local knowledge and priorities. Each Permittee selected projects, largely from the SWRP list, to be incorporated into their Green Infrastructure Plan. Projects in the Permittees' Green Infrastructure Plans were compiled countywide to develop the projection herein.

Generally, local knowledge and priorities include judgments of potential neighborhood support for a project, potential integration with transportation projects that can be externally funded, [14] and potential integration with storm drainage infrastructure projects, including drainage improvement projects funded by local special assessments and/or state and Federal grants. In addition, some identified public ROW retrofit projects could potentially be implemented as street frontage improvements and funded through development agreements.

For nearly all public projects identified in the Permittees' Green Infrastructure Plans, implementation is dependent on funding or other support that is not within the Permittees' control. It can be expected that the pace of implementation in any given jurisdiction will vary considerably from year to year (with more variability among smaller jurisdictions, because they have fewer projects). Progress will best be assessed as a multi-year average over the region or countywide. The regional or countywide pace of implementation will be affected by economic conditions and by the general availability of state and Federal infrastructure grants.

[14] See the "Roadmap of Funding for Sustainable Streets" prepared by BASMAA for the Urban Greening Bay Area Initiative (2018)

5. EVALUATION OF COSTS, CONTROL MEASURE EFFICIENCY, AND SIGNIFICANT ENVIRONMENTAL IMPACTS

5.1 Cost Analysis

5.1.1 Green Stormwater Infrastructure Cost Methodology

GSI project cost data were gathered from several sources within the Bay Area and Southern California to develop relationships between project size or project area (tributary drainage area) and total capital cost (construction and design). Likewise, O&M cost data were gathered from these sources, as well as through literature review. A technical memorandum summarizing this cost analysis is provided in Appendix F. The results of this analysis for project capital costs, in 2018 dollars, are presented in Table 5-1 below. Actual GSI project implementation costs will vary and may be greater than those listed in Table 5-1.

Table 5-1: Statistical Summary of Unit Capital Cost for Green Street, Parcel-Based, and Regional GSI Project Types

Project Category	No. of Projects (n)	Unit Capital Cost ($/ac treated) in 2018 Dollars[1]					
		Minimum	25th-percentile	Median	75th-percentile	Maximum	Mean
Green Street	19	$25,000	$70,000	$137,000	$267,000	$1,290,000	$213,000
Distributed Green Infrastructure	21	$16,000	$90,000	$121,000	$176,000	$416,000	$153,000
Regional Stormwater Control	11	$15,000	$25,000	$61,000	$127,000	$427,000	$101,000

[1] Units have been rounded to the nearest $1,000.

Annual O&M costs are intended to account for activities necessary to maintain the effectiveness of a project that recur on a regular basis, such as routine maintenance on an annual basis or repairs following a large storm event. For this cost analysis, annual O&M costs do not include replacement (of portions) or rehabilitation of GSI facilities, which occurs approximately every 20 to 30 years. For planning purposes, annual O&M costs are often assumed to be a percentage of the capital (design and construction) costs. Annual O&M costs range from approximately 1% to 6% of the capital costs, with an average of 4% of capital cost for the data sources reviewed.

The estimated capital cost, which includes both the design cost and the construction cost, for the estimated public GSI project area listed in Table 4-2 is provided in Table 5-2 below. This cost was estimated by applying the Green Street unit cost to right-of-way area and the Distributed Green

Infrastructure unit cost to the parcel area within the total estimated public GSI project area for each year. The low, medium, and high cost estimates were calculated using the 25th percentile, median, and 75th percentile unit costs. The annual O&M cost was calculated by multiplying the capital cost by an estimated fixed O&M cost factor of 4%. The total project cost includes the capital costs and the annual O&M costs over the design life of the project. For the purposes of this analysis, a 20-year design life and a 3% inflation rate were used to calculate the total present value of the annualized O&M costs.

Table 5-2: Cost to Treat the Estimated Public GSI Project Area by 2020, 2030, and 2040 within Contra Costa County

Year	Total Capital Cost ($1,000)			Annual O&M Cost ($1,000)			Total Project Cost ($1,000)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
2020	$446,000	$602,000	$881,000	$17,840	$24,080	$35,240	$719,000	$971,000	$1,421,000
2030	$487,000	$667,000	$992,000	$19,480	$26,680	$39,680	$786,000	$1,076,000	$1,600,000
2040	$567,000	$782,000	$1,168,000	$22,680	$31,280	$46,720	$915,000	$1,261,000	$1,884,000

Public project implementation will depend on funding availability. Funding for implementation of projects included in the Permittees' Green Infrastructure Plans would be obtained by the municipal agency, partnerships of agencies, or other stakeholder project sponsors working to implement the identified projects. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

The Cities of San Pablo, Walnut Creek, and Richmond and Contra Costa County have partnered for an EPA San Francisco Bay Water Quality Improvement Fund grant to develop and pilot a Regional Alternative Compliance System in Contra Costa County. The objective of the project is to develop a Regional Alternative Compliance System that will efficiently and cost-effectively improve surface water quality, achieve multiple benefits, and reduce compliance pressures on jurisdictions and entities subject to MRP requirements. It is intended that the system will help facilitate implementation of GSI across Contra Costa County with the potential for substantial cost savings, while meeting MRP and TMDL water quality goals. A draft Regional Alternative Compliance System is expected in August 2021. The draft system will then be pilot tested from September 2021 – January 2022; lessons learned will be documented and used to propose a system by June 2022. Alternative Compliance Systems developed in other regions have taken decades to fully mature from the start of implementation.

5.1.2 Source Control Measure Cost Analysis

A regionally consistent approach to estimating source control program implementation costs developed through collaboration with the other Bay Area stormwater programs is summarized in Table 5-3 below.

Table 5-3: Planning Level Cost Estimate Values for Source Control Measures

Control Measure Category	Control Measure	Unit of Implementation	Estimated Unit Costs[1]			
			Initial[2]		Ongoing[3]	
			Cost	Unit	Cost	Unit
Source Area Identification and Referral	Identify and Refer Source Properties	Acres of old industrial land use area investigated	$382	$/acre	NA	NA
Full Trash Capture (FTC)	FTC Implementation - Large Devices	Acres treated	$4,500	$/acre	$6,000	$ per year
	FTC Implementation - Small Devices	Acres treated	$1,000	$/acre	$400	$ per year
Enhanced Municipal Operation and Maintenance (O&M)	Enhanced Street Sweeping - mechanical broom	Acres addressed	$48 / curb-mile swept (lifecycle cost)			
	Enhanced Street Sweeping - Regenerative Air or Vacuum Assisted	Acres addressed	$80 / curb-mile swept (lifecycle cost)			
	Street Flushing	Linear mile of street flushed	$193,139	$ / linear mile of street flushed	NA	NA
	Enhanced Inlet Cleanout	Number of inlets cleaned out	NA	NA	$100	$ per cleanout
	Enhanced Pump Station Cleanout	Additional annual cleanouts	$82,200	$/cleanout	NA	NA
	Storm Drain Piping Cleanout	Annual cleanouts	$146,062	$/cleanout	NA	NA
Managing PCBs-containing Materials during Building Demolition		Annual cost	NA	NA	$400	$ per application
PCBs in Infrastructure Management Program		Annual cost	Minor municipal cost - just tracking and reporting. Some ongoing Program costs but also small.			
Management of PCBs in Electrical Utility Equipment		Annual cost	Minor municipal cost - just tracking and reporting. Some ongoing Program costs but also small.			

1. The unit costs are rough planning level estimates that do not consider net present worth cost adjustments or other complexities.
2. Initial costs generally include planning, design, capital, and other initial one-time costs.
3. Ongoing costs include operation & maintenance and other ongoing costs.

These planning level costs have been applied to an estimated level of implementation for each of the planned source control measures in Table 5-4 below.

Table 5-4: Planning Level Cost Estimate for Source Control Implementation – CCCWP

Control Measure	Cumulative Unit Area Treated (acres) or Units Implemented			Estimated Implementation Cost		
	2020	2030	2040	2020	2030	2040
Management of PCBs in Building Materials	3 buildings	30 buildings	60 buildings	$1,200	$12,000	$24,000
Source Property Identification and Abatement	84 acres	97 acres	109 acres	$32,088	$36,863	$41,638
Full Trash Capture Treatment Control – Large Devices	4,815 acres	4,815 acres	4,815 acres	$1,354,500	$8,320,500	$16,060,500
Full Trash Capture Treatment Control – Inlet-Based Devices	7,020 acres	10,367 acres	10,367 acres	$4,684,400	$23,173,952	$42,939,891

As can be seen in Table 5-3 and Table 5-4, the estimated planning level cost for implementing source control programs is negligible in comparison to the estimated costs for implementing GSI measures.

5.2 Control Measure Efficiency

In general, as discussed above, source control measures are much more cost efficient to implement than structural treatment control measures.

There are several factors that are considered when selecting control measures to address PCBs and mercury for a specific area. Cost effectiveness (i.e., the cost per mass of pollutant reduced), while an important factor, is not sufficient when considering which type of control measure to implement at the management area or site scale. Different types of control measures may be more appropriate in some situations than others. Additionally, the potential load reduction available for each type of control measure varies; some control measures may be effective but not have much opportunity for implementation (such as source property identification and abatement), while others may be less effective but have much more opportunity (such as full trash capture devices).

Factors that help identify optimal implementation for a given location are listed below; site- or catchment-specific characteristics may increase or decrease the importance of any of these factors at a given location:

- *Costs*: includes all life cycle (i.e., including maintenance) costs associated with planning and implementing a given control measure.
- *Load Reduction Potential*: includes the load reduction potential at the site, catchment, or municipal scale.
- *Opportunity*: includes the current and future opportunities and feasibility to implement a given control measure successfully.
- *Safety*: includes consideration of the potential to cause a safety hazard and the need for any additional measures to avoid creating a safety hazard. Safety hazards may include slip, trip, or fall hazards; drowning hazards; visual impairments (i.e., overgrowth into a roadway); vector concerns; chemical hazards; or flooding concerns.
- *Implementation Challenges*: includes consideration of potential implementation challenges due to local ordinances or regulations, resistance from the local community, major utility conflicts, or ability to obtain adequate funding.

5.2.1 Clean Watersheds for a Clean Bay

The Clean Watersheds for a Clean Bay (CW4CB) project was a collaboration among the BASMAA member agencies funded by a San Francisco Bay Water Quality Improvement Fund grant from the United States Environmental Protection Agency and matching funds from Bay Area countywide stormwater management programs and member agencies. The CW4CB project was designed to evaluate the effectiveness of stormwater controls for PCBs and mercury in response to the PCBs and mercury TMDLs. The CW4CB project pilot-tested methods to control discharges of PCBs and mercury in urban stormwater runoff and developed and implemented a regional risk reduction program that focused on targeted education on the health risks of consuming certain species of Bay fish that contain relatively high levels of mercury and PCBs. The results of the CW4CB project are available on the CW4CB website (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project).

A significant finding from the project was that source control measures, such as source area identification and abatement, are much more cost effective for controlling PCBs and mercury than treatment control measures.

Table 5-5 lists the estimated cost per unit pollutant load reduced by the source property identification and referral and the bioretention treatment control retrofit pilot projects. The

source property identification and referral cost per unit load reductions represent the cost of pollutant loads reduced per acre of watershed investigated. Costs are in 2016 dollars.

Table 5-5: Estimated Cost Effectiveness for the CW4CB Source Property Identification and Abatement and Treatment Control Retrofit Pilot Projects

Pilot Project Type	Average Cost per PCBs Unit Load Reduced[1] ($/(mg/year))	Estimated Cost per Mercury Unit Load Reduced[1] ($/(mg/year))
Source Area Identification and Abatementl[2]	$16	$53
Treatment Control Retrofit – Bioretention[3]	$22,000	$372,500

1. Assigns the pilot project total design and construction costs to each pollutant independently. Treatment control retrofit project costs are not annualized. Costs are in 2016 dollars.
2. Average for all five pilot watersheds of cost of loads reduced per acre of watershed area investigated ($/acre) divided by the unit load reduced ((mg/yr)/acre).
3. Average of cost per acre treated ($/acre) divided by unit load reductions ((mg/yr)/acre) for the El Cerrito Green Streets, Bransten Road, and PGE 1st and Cutting projects.

5.2.2 PCBs and Mercury Control Measure Plan Cost Effectiveness

A comparison of the estimated cost for GSI implementation in Section 5.1.1 to the source control measure analysis in Section 5.2.2 demonstrates that the programmatic source control measures (i.e., Management of PCBs in Building Materials, Source Property Identification and Abatement, Management of PCBs in Electrical Utilities, and Management of PCBs in Infrastructure) are much more cost efficient than treatment control measures (GSI and full trash capture devices) at reducing loads of PCBs in urban runoff.

5.3 Significant Environmental Impacts

The California Environmental Quality Act (CEQA) establishes requirements and procedures for state and local agency review of the environmental effects of projects proposed within their jurisdictions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of their decisions. The applicable statutes are contained in California Public Resources Code, Sections 21000 - 21189, and Title 14 CCR, Division 6, Chapter 3, Sections 15000 – 15387.

CEQA applies to all California public agencies that carry out or approve projects. CEQA compliance is only required if a lead agency is considering approval of a proposed “project.” The distinction between the normal and the specific CEQA meaning of “project” is very important, as it can

determine whether an action is subject to CEQA compliance or not. Section 15378 of the State CEQA Guidelines provides the following definition of a project:

1. "Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is any of the following:

    a. An activity directly undertaken by a public agency including but not limited to public works construction and related activities clearing or grading of land, improvement to existing public structures, enactment and amendment of zoning ordinances, and the adoption and amendment of local General Plans or elements thereof pursuant to Government Code Sections 65100-65700.

    b. An activity undertaken by a person which is supported in whole or in part through public agency contacts, grants subsidies, or other forms of assistance from one or more public agencies.

    c. An activity involving the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

CEQA requires the preparation of an Initial Study to determine if a project may result in significant effects on the environment. If there is substantial evidence in the record that supports a fair argument that significant effects may occur, an Environmental Impact Report will be prepared. A Negative Declaration or Mitigated Negative Declaration must be prepared if there is no substantial evidence that the project may have a significant effect on the environment, or if revisions to the project would avoid or mitigate the effects that would result in no significant effects.

The CEQA Guidelines stipulate that a public agency shall prepare or have prepared a proposed Negative Declaration or Mitigated Negative Declaration for a project subject to CEQA when:

- The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or

- The initial study identifies potentially significant effects, but:

    - Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released

for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and

- There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment.

CEQA requires that reasonable alternatives to implement a proposed project should be considered during the planning process and potential environmental effects should be included in the evaluation of the project. CEQA also requires state and local agencies to disclose and consider the environmental impacts of their actions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of the implementation of their action.

This TMDL Control Measure Plan is statutorily exempted under Public Resources Code (California Administrative Code Sec. 15262 et seq.) because it involves feasibility or planning studies for possible future actions that the Permittees have not approved or adopted. Any future projects that are to be constructed as recommended by this Plan will either be determined to be exempt from CEQA or an initial study to determine potential environmental impacts will be prepared. In general, this TMDL Control Measure Plan has been determined to have no potential to generate significant adverse impacts to the environment, but instead will lessen adverse water quality impacts through reducing loads of PCBs and mercury into the Bay.

6. REASONABLE ASSURANCE ANALYSIS SUMMARY

This section provides a summary of the results of the reasonable assurance analysis. Further detail on the RAA modeling is provided in Appendix A.

6.1 RAA Results

6.1.1 Loads Reduced – PCBs

The total estimated annual PCBs loads reduced through implementation of the control measures outlined in the PCBs Control Measure Plan by 2020, 2030, 2040, and 2050 is provided in Table 6-1 below.

Table 6-1: Summary of PCBs Load Reductions Achieved through Control Measure Implementation

Control Measure	PCBs Load Reduction (kg/yr) by:			
	2020	**2030**	**2040**	**2050**
PCBs in Building Materials Management	0.37	0.37	0.37	0.37
Source Property Identification and Abatement	0.21	0.54	0.54	0.54
PCBs in Electrical Utilities Management	0.07	0.12	0.17	0.21
PCBs in Infrastructure	0.00	0.01	0.02	0.02
Green Stormwater Infrastructure	0.14	0.18	0.26	0.32
Full Trash Capture Treatment Control Measures	0.05	0.05	0.05	0.05
Enhanced Operations and Maintenance	0.004	0.004	0.004	0.004
Total Load Reduced	0.84	1.27	1.41	1.51
Load Reduction Goal	**1.51**	**1.51**	**1.51**	**1.51**
Remaining Load to be Reduced	0.67	0.24	0.10	0

TMDL Wasteload Allocation

As can be seen in Table 6-1, the required load reduction to achieve the TMDL (1.51 kg/yr) is not met by the TMDL compliance date of 2030 but is achieved by 2050. The RAA estimate of achieving the PCBs TMDL wasteload allocation by 2050 is based on many assumptions, and while the RAA demonstrates that Contra Costa will not achieve the PCBs load reduction goal before 2050, this goal may not be achieved until well after 2050.

An analysis of scenarios to achieve the TMDL wasteload allocation by 2030 is provided in Appendix G. The results of these analyses show that it is technically and economically infeasible to achieve the TMDL wasteload allocation by 2030.

MRP GSI Load Reduction Goal

The PCBs load reduction required to be achieved through GSI by 2040 per MRP Provision C.3.j (i.e., 3 kg/yr MRP area-wide or 0.5 kg/yr for Contra Costa County), after adjusting to reflect the RAA model results, is 0.31 kg/yr (see Appendix A for further detail). As shown in Table 6-1, this load reduction goal is not achieved by 2040, but is met by 2050.

Public project implementation will depend on funding availability. Funding for implementation of projects included in the Permittees' Green Infrastructure Plans would be obtained by the municipal agency, partnerships of agencies, or other stakeholder project sponsors working to implement the identified projects. Economic or socio-economic impacts and political shifts may affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds available for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation.

6.1.2 Loads Reduced – Mercury

Mercury loads reduced are estimated by applying the loads accounting methodology for mercury to the treatment control measures of GSI, full trash capture, and enhanced O&M (Table 6-2, and see Appendices A and H for further detail on the RAA modeling for mercury). Table 6-2 shows that the current implementation level provide about 0.29 kg/yr mercury reduction, anticipated to increase to about 0.47 kg/yr by 2050.

Table 6-2: Summary of Mercury Load Reductions Achieved through Control Measure Implementation

Control Measure	Hg Load Reduction (kg/yr) by:			
	2020	2030	2040	2050
Green Stormwater Infrastructure	0.17	0.22	**0.28**	0.33
Full Trash Capture Treatment Control Measures	0.10	0.12	0.12	0.12
Enhanced Operations and Maintenance	0.02	0.02	0.02	0.02
Total	**0.29**	**0.36**	**0.42**	**0.47**
Load Reduction Goal via GI in MRP 2	--	--	**0.48**	--
Remaining Load to be Reduced via GI	--	--	**0.20**	--

TMDL Wasteload Allocation

In contrast to PCBS, the mercury load reduction goal can't be calculated because the RAA seems to indicate that the WLA for mercury in Contra Costa County stormwater has already been achieved. This results from recalculating the baseline load compared to the original mercury TMDL. The mercury WLA for Contra Costa County is 11 kg/yr, while the new recalculated mercury baseline load for the entire county below dams is only 6.25 kg/yr.

The finding that the TMDL allocation has been "achieved" by recalculating the baseline does not lead CCCWP to conclude that mercury control measures are unnecessary. The main factor that drives the change on recalculation is eliminating areas above dams and areas subject to other permits. CCCWP assumes that the recalculated current load would need to be compared to a TMDL allocation developed based on similar assumptions. This recalculation of baseline for mercury is a nuance with no substantive effect on implementation, because of the assumption that achieving PCB WLAs by GSI, full trash capture, and enhanced O&M will lead to achieving mercury WLAs.

MRP GSI Load Reduction Goal

The mercury load reduction required to be achieved through GSI by 2040 per MRP Provision C.3.j is 10 kg/yr MRP area-wide (19% or 1.9 kg/yr for Contra Costa County). This represents 8% of the estimated TMDL baseline load of 127.7 kg/yr for the MRP area. Applying this percentage to the

adjusted baseline from the RAA model[15], an adjusted GSI goal would be 0.48 kg/yr for Contra Costa County (i.e., 6.02 kg/yr x 0.08 = 0.48 kg/yr). The adjusted load reduction goal focuses attention on what can be controlled by Permittees to reduce mercury loads to the Bay.

The predicted mercury load reduction by 2040 through GSI (0.28 kg/yr) would not achieve the adjusted load reduction goal for GSI established in MRP Provision C.11.c.i (Table 6-2). RAA results analyzing the potential for GSI to reduce mercury loads to achieve this goal (Table 6-3) show that a significant portion of the Old Industrial, Old Commercial, Old Transportation, and/or Old Urban Residential land use area would need to be treated to reduce mercury loads by about 0.2 kg per year in Contra Costa County. Assuming the mercury load reduction rate that is predicted by the RAA model would occur every decade through implementation of GSI on public and private land, this MRP load reduction goal would be achieved by 2077.

Table 6-3: Application of GSI to All Land Use Area in Contra Costa County within Region 2 below Dams

Land Use Category	Maximum Potential Mercury Load Reduction through GSI Implementation (kg/yr)
Old Industrial	0.40
Old Commercial	0.14
Old Transportation	0.22
Old Urban Residential	2.07
New Urban	0.02

There appears to be a mismatch between the mercury load reduction by GSI required in Provision C.11.c.i and the actual mercury reductions that are achievable. Provision C.11.c requires 0.006 kg/yr (6 g/yr) of mercury reduced by GI in the year 2020. Going from 0.006 kg/yr in 2020 to 1.9 kg/yr in 2040, nearly a 300-fold increase in GI implementation in 20 years, is not believable, reasonable, nor achievable. This can be rectified in MRP 3 by leaving out numeric targets for mercury (or PCBs) loads reduced by GSI, and instead setting acres treated goals for GSI implementation through Provision C.3.

[15] The adjusted baseline removes loads for areas above dams and other NPDES permittees (NPDES major and minor dischargers and Phase II municipal permittees). For further detail, see Appendix A.

6.2 Uncertainty Analysis

There are two types of uncertainty in this analysis: modeling uncertainty and planning uncertainty. The RAA (Appendix A) discusses modeling uncertainty, whereas planning uncertainties are summarized in this section. The estimate of achieving the PCBs TMDL wasteload allocation by 2050 is based on several assumptions that introduce planning uncertainties. The RAA result that Contra Costa will not achieve the PCBs load reduction goal before 2050 is reasonably certain (i.e., not likely to change as a result of changed assumptions). But it is possible, due to planning uncertainties, that this goal may not be achieved until well after 2050. A discussion of planning uncertainties that lead to uncertainty in the RAA results is provided below.

The RAA assumes that the building demolition program achieves a PCBs load reduction benefit equivalent to 0.37 kg/yr (Table 6-1, top row). An effectiveness assessment of the building demolition program may show a lower PCBs load reduction benefit as a result of either lower PCBs mass per building or lower numbers of applicable buildings being demolished than assumed. If so, the time to achieve the wasteload allocation would extend beyond 2050 unless other control measures could be scaled up.

The RAA model does not include PCBs degradation, which does occur (albeit very slowly). Little information is known about PCBs degradation in upland areas, thus insufficient information is available to develop a methodology to account for source reduction by degradation in the watershed. On its own, not accounting for degradation in the watershed exemplifies a planning uncertainty that could lead to achievement of TMDL WLAs somewhat sooner than 2050. Components of uncertainty that cannot be addressed through the RAA methods summarized in Appendix A include pollutant degradation and changes in larger-scale processes that are difficult to predict.

The load reduction benefit of source property investigations is based on specific assumptions about the expected number of future source property referrals or abatements. Discovering and referring more properties, leading to more source property abatements than assumed, would increase the benefit over the loads reduced presented in Table 6-1. Conversely, identifying fewer properties (or less area) than assumed would lead to lower load reduction benefits. This uncertainty will be resolved as the source property investigation program is implemented over the next two to three permit cycles.

The behavior of parties other than CCCWP Permittees cannot be committed by CCCWP. This introduces substantive planning uncertainties. For example, implementation of a control program for PCBs in electrical equipment can be committed by City of Pittsburg as a Permittee owner of a power company. The commitment of larger utilities, e.g., PG&E, to implement a control program is unknown to CCCWP. Similarly, CCCWP can commit to referring potential PCB source properties to the Water Board as they are identified, but has no control over the prioritization, level of effort or schedule for enforcement by the Water Board.

Changes in large-scale processes can be difficult to predict and can introduce substantial planning uncertainties. Climate change, long-term meteorological patterns, and large seismic events could each significantly affect watershed transport of polluted sediments. These can also include economic or socio-economic and political shifts, which may be either planned (e.g. , Federal Infrastructure Projects that create GSI funding opportunities) or unplanned, (e.g., the 2020 COVID-19 pandemic).

Major changes in large-scale processes can impact the actuality of some of the assumptions in the pollutant loading model as well as the future implementation scenarios. These may include changes to total area contributing to loading, for example as a result of sea level rise; changes to annual loading due to increases or decreases in average annual stormwater runoff volume, as a result of precipitation or flooding changes caused by long-term meteorological patterns and/or climate change; or changes to loading and/or redevelopment rates as a result of a seismic event. Economic or socio-economic impacts and political shifts can also affect future implementation scenarios, causing increases or decreases in the amount of private investment and public funds for development and control measure implementation, and/or changes in the ability to provide services that are needed for implementation. The examples provided represent just a small fraction of the range of possibilities; many of these large-scale phenomena are very challenging to predict. As such, they are even more difficult to model and, in many cases, represent scenarios that may not happen and/or the timeframe for when they happen cannot be estimated.

In general, these large-scale processes primarily drive uncertainty in the actual versus assumed rate of GSI implementation. However, sea level rise also introduces a substantial source property uncertainty. At some point, the Bay Margin sites become partly or fully submerged, moving the source area from the domain of stormwater control measures to the domain of in-bay remediation.

7. CONCLUSIONS

This report answers the question from MRP Provisions C.11.d and C.12.d: "what implementation actions would result in compliance with the mercury TMDL by the year 2028 and the PCBs TMDL by the year 2030?" Achieving TMDL-required PCBs load reductions for urban stormwater in Contra Costa County by those deadlines would require capital and labor resources beyond the means of the Permittees. The foreseeable time frame for achieving PCBs load reductions is no sooner than the year 2050, and possibly much later than 2050. Present day mercury loads from urban stormwater are closer to load reduction goals compared to PCBs; therefore, control measures to achieve PCBs load reductions will result in achieving the required mercury load reductions over time.

Optimistic goals in the Permittees' Green Infrastructure plans lead to the conclusion that PCBs load reduction goals might be achieved by 2050; however, those GI Plan goals are aspirational planning goals and are stated to be as such in the plans. As the GI Plans become the basis for requiring GSI implementation through the MRP, the practicality of implementing GSI projects according to schedules assumed in the Permittees' GI Plans (and this RAA) must be revisited. More realistic assumptions about GSI implementation will lead to predicted attainment of PCBs allocations well after 2050.

Dividing load reduction control measures into categories of "scalable" and "fixed" benefits helps evaluate alternatives for compliance. Control measures with fixed benefits cannot practically be increased in scope to achieve load reductions sooner or in greater measure. After the last building containing PCBs in caulk has been demolished, there will be no further opportunities to intervene and prevent PCBs in construction debris from entering the MS4. Scalable control measures (e.g., GSI or enhanced O&M) increase load reduction in proportion to implementation – more acres treated leads to more loads reduced.

Scaling up the number of GSI projects is practically and economically infeasible. Redevelopment in old industrial areas creates the most likely path to achieving PCBs load reduction goals; however, the schedule for redevelopment is cyclic and cannot be foreseen, leading to planning uncertainty about when PCBs load reduction goals will be achieved. Municipalities lack the funding and opportunity areas to implement GSI in the public right-of-way at a rate that would close the gap on TMDL attainment. The $1 billion to $2 billion in total costs associated with full implementation of the public projects in the Permittees' GSI plans would not be procured for the

single purpose of achieving PCBs TMDL goals, but rather as an outcome of community development for multiple benefits.

Scaling up enhanced operations and maintenance (O&M) in old industrial areas is also impractical. Appendix G shows that closing the gap on TMDL attainment through enhanced O&M in Contra Costa County old industrial areas would practically mean inspecting and maintaining about 18,500 additional drainage inlets per year with no trash capture device, or about 5,000 additional inlets per year equipped with trash capture devices. This translates to implementation scenarios of $1.85 million per year in new labor costs with no full trash capture, or $5 million in new capital costs with a new ongoing labor cost of $1 million per year if full trash capture inlet devices are used. The impacts of enhanced O&M requirements would be focused in economically disadvantaged communities that contain the majority of old industrial area.

Alternative compliance programs could allow opportunities to channel capital resources from development into stormwater improvements where they derive greater benefits, such as old industrial areas. Alternative compliance programs typically take many years to develop and fully implement. A recent Permittee-led grant funded project exploring alternative compliance is in the nascent stages, but it would be premature to rely on alternative compliance for achieving TMDL load reduction goals.

This RAA report introduces the “adjusted baseline” concept to reconcile logical inconsistencies in the PCBs and mercury TMDLs. The load reduction requirements assigned to the category of “urban stormwater” include mercury and PCBs loads from sources that are beyond the control of Contra Costa Permittees, such as individually permitted industrial properties and Phase 2 permittees. The San Francisco Bay TMDLs do not apply to East County jurisdictions. Control measures applied upstream of reservoirs do not affect PCBs or mercury loads to the Bay, because reservoirs act as sediment traps, thus these areas were not included in the TMDL. To address these inconsistencies, baseline loads were adjusted to develop TMDL load reduction goals applicable to the Contra Costa Permittees’ MRP jurisdictions where control measures are expected to reduce pollutant loads to the Bay. The adjusted TMDL goals preserve the intent of urban stormwater load allocations proposed in the original TMDLs (i.e., about 90% PCBs load reductions and about 50% mercury load reductions from the recalculated baseline).

The baseline adjustment focuses effort on areas where Permittees can implement control measures. Caltrans facilities are included in Permittee MRP areas for computing adjusted baseline; Caltrans facilities are interwoven within Permittee jurisdictions. Including Caltrans loads

with the MRP jurisdiction loads creates opportunities for cooperative implementation of control measures where Caltrans and municipal jurisdictions overlap.

In summary, this TMDL Implementation Report presents a programmatic approach to implement known and effective PCBs and mercury control measures. The programmatic approach will lead to achieving TMDL goals for PCBs loads discharged by urban stormwater no sooner than 2050, and possibly not until 2080 or after, depending on the rate of GSI implementation achieved. This quantitative analysis showing the linkage between schedule and feasibility supports an implementation time frame of 2050 - 2080 or later for achieving the PCBs and mercury TMDLs' wasteload allocations assigned to Contra Costa County.

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APPENDIX A

Contra Costa Clean Water Program Reasonable Assurance Analysis Report

CONTRA COSTA CLEAN WATER PROGRAM

CONTRA COSTA CLEAN WATER PROGRAM REASONABLE ASSURANCE ANALYSIS

Submitted in Compliance with Provision C.11.c.iii.(3), C.11.d.iii, C.12.b.iii.(2), and C.12.d.iii

Prepared for

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ACRONYMS AND ABBREVIATIONS

BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
g	gram
GI	Green Infrastructure
GSI	Green Stormwater Infrastructure
HRU	Hydrologic Response Unit
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
WLA	Wasteload Allocation
WY	Water Year

1. INTRODUCTION

This report presents the results of the reasonable assurance analysis (RAA) for Contra Costa County required by the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). MRP Provisions C.11.c, C.11.d, C.12.c, and C.12.d require an RAA for the PCBs and mercury control measures that are described in the PCBs Control Measure Plan and the Mercury Control Measure Plan. The methodologies for estimating load reductions are introduced herein; additional details on the RAA methodology are provided in the Reasonable Assurance Analysis Peer Review Package (Appendix H of the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report).

The following MRP reporting requirements are addressed within this report:

- A reasonable assurance analysis to demonstrate quantitatively that Contra Costa's population-based portion of PCBs reductions of at least 3 kg/yr and mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of GSI projects; all data used; a full description of models and model inputs relied on to make the demonstration; and documentation of peer review of the reasonable assurance analysis.
- A PCBs and mercury control measure implementation plan RAA that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028 and PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030.

2. METHODOLOGY

2.1 Overview

The approach used to estimate the load reductions resulting from implementation of the PCBs Control Measure Plan and the Mercury Control Measure Plan includes a number of different model components. The methodology is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017)

The model components include:

- Baseline Pollutant Loading Model – the baseline pollutant loading model is a continuous simulation[1] hydrology model combined with pollutant loading inputs to obtain the average annual loading of PCBs and mercury across Contra Costa County

[1] Continuous simulation models calculate outputs (e.g., runoff) "continuously", i.e., for many time steps over a long-term period of record (e.g., every 10 minutes for 10 years). Long-term "continuous" input data (e.g., hourly rainfall) is required. This is contrasted with design-event simulations which model a single rainfall event, e.g., a 24-hour storm with a 10-year recurrence frequency.

during the TMDL baseline period (i.e., 2003 – 2005, see BASMAA, 2017). See Section 3 for the baseline model results.

  - Hydrology – this model component produces average annual runoff across Contra Costa County for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (i.e., imperviousness, underlying soil characteristics, slope, etc.) present within Contra Costa County for a unit area drainage catchment.
  - Water Quality – the hydrology output is combined with average annual concentrations estimated by the Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM; SFEI, 2018) developed by SFEI to produce average annual PCBs and mercury loading for the period of record.

- GSI Performance Models – GSI performance models were developed to represent load reductions resulting from implementation of GSI.
- Source Control Measure Calculations – Calculation methods for estimating load reduction associated with implementation of the source control measures identified in the PCBs Control Measure Plan and the Mercury Control Measure Plan, as established in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020, provided in Appendix B of the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report).
- Future Condition Models – the RAA future condition models represent future land use changes and control measure implementation that would result in pollutant load reduction. These include the following:
  - Future Land Use – changes to land use as a result of new development and redevelopment and the associated reduction in pollutant loading (i.e., with newer building materials and practices) is represented.
  - Future GSI Performance – the GSI performance model output is applied to areas to be treated by GSI in the future based on the Permittees' Green Infrastructure Plans.
  - Source Control Measure Performance – Performance of the source control measures that have been or will be implemented is modeled based on the incidence and location of these control measures.

These components are summarized in the following sections and described in further detail in the Peer Review Package (Appendix H).

2.2 Baseline

The baseline pollutant loading model is a representation of the loading of PCBs and mercury across the County during the TMDL baseline period (i.e., 2003 – 2005, see BASMAA, 2017). The baseline model utilizes an HRU approach to estimate runoff across the County. Generic HRUs, characterized by varying the values of specific identified parameters within a defined

representative range, were modeled using USEPA's Stormwater Management Model (SWMM). HRU parameters varied included precipitation and evaporation, slope, underlying soil type (i.e., subsurface infiltration rate) and compaction (i.e., developed versus undeveloped areas), and imperviousness. Continuous simulation HRU models were run on an hourly timestep for the identified baseline period of record (water years [WYs] 2000 – 2009).

An average annual runoff volume per acre was obtained for each HRU through the continuous simulation runs. The average annual runoff volume per acre associated with each specific HRU was multiplied by the area represented by that HRU within the entire area for analysis (i.e., across the county, estimated using geospatial data). Watershed-based drainage routing was accounted for through calibration efforts. Calibration of the generic HRU models was conducted on the average annual discharge volume for WYs 2000-2009, utilizing available stream flow records. The objective of the calibration was to reasonably match the average annual runoff volume for this 10-year period (i.e., within the bounds included in BASMAA (2017).

To obtain pollutant loading, average annual concentrations estimated by the RWSM (SFEI, 2018), for each land use category (i.e., Old Industrial, Old Urban Commercial/Transportation, Old Urban Residential, New Urban, and Open Space) are multiplied by the calibrated average annual runoff volume estimated using the HRU approach. The average annual PCBs and mercury loading for the baseline period of record was validated using available in-stream concentration data.

A flow chart representing the baseline loading model is provided in Figure 2-1 below.

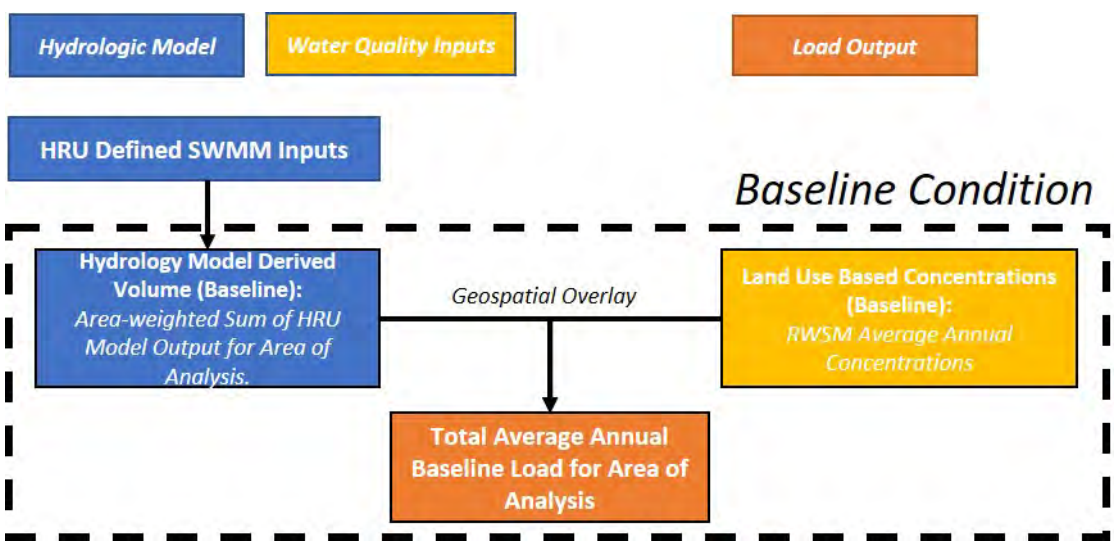

Figure 2-1: Baseline Condition Model Flow Chart

2.3 Loads Reduced

Loads reduced from baseline are estimated based on projected land use changes and control measure implementation. To calculate pollutant load reductions associated with land use changes and GSI and source control implementation for future scenarios, the difference between the pollutant loading in the baseline scenario and the total pollutant loading associated with each

future implementation scenario were calculated. Future scenarios included implementation in years 2030, 2040, and beyond 2040. Loads reduced resulting from implementation of control measures are estimated through different methods depending on control measure type. Details relating to load reductions resulting from land use changes versus those from control measures are provided in the following sections.

2.3.1 Load Reduction Resulting from Land Use Changes

Land use-based pollutant loading was based on changes to the land use through new development and redevelopment that has occurred or is projected to occur since the 2003-2005 baseline. To forecast future private development area, CCCWP used the output of UrbanSim,[2] a model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area Metropolitan Transportation Commission (MTC). The UrbanSim modeling system was developed to support the need for analyzing the potential effects of land use policies and infrastructure investments on the development and character of cities and regions. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort.

MTC forecasts growth in households and jobs and uses the UrbanSim model to identify development and redevelopment sites to satisfy future demand. Model inputs include parcel-specific zoning and real estate data; model outputs show increases in households or jobs attributable to specific parcels. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Governments Committees for use in transportation projections and the regional Plan Bay Area development process.

The CCCWP process used outputs from the Bay Area UrbanSim model to map parcels predicted to undergo development or redevelopment in each Contra Costa jurisdiction at the time increments specified in the MRP (i.e., 2020, 2030, and 2040). The resulting maps were reviewed by Permittee staff for consistency with local knowledge and local planning and economic development initiatives and revised as needed.

If projected new development and redevelopment is assumed to alter the imperviousness of parcels identified for development, the HRU assigned at the parcel scale was revised from the baseline condition to represent the new imperviousness (no other HRU variables would be anticipated to change) in the future condition. Similarly, the overlying RWSM land use category designation was updated from the baseline condition to reflect new land uses from new development and redevelopment. Updated land use-based pollutant loading was then calculated for the future conditions, using the applicable updated HRU and RWSM land use category assignments.

2.3.2 Load Reductions Resulting from GSI Implementation

Load reduction through implementation of GSI facilities was estimated through the methods described as part of the *Quantitative Relationship between GSI Implementation and*

[2] http://www.urbansim.com/

PCBs/Mercury Load Reductions Report (CCCWP, 2018; provided in Appendix H). The POC load reductions through GSI were developed through a combination of hydraulic modeling of GSI facilities combined with empirically derived effluent concentration estimates. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GSI facility and the effluent load. The effluent load is calculated as the proportion of runoff that is treated by the GSI facility multiplied by an effluent concentration. Water quality performance data from selected, representative studies were used to determine a method to predict effluent concentrations in stormwater following treatment through a bioretention GSI facility. A flow chart representing the GSI load reduction modeling is provided in Appendix H.

GSI implementation levels corresponding to each future implementation scenario were estimated based on GI Plan projections. The pollutant loading resulting from each of the GSI implementation scenarios was calculated by first applying the updated land use loading. Then, pollutant load reductions resulting from implementation of GSI were applied to identified GSI drainage areas (i.e., both development areas, where land uses are assumed to change, and GSI retrofit areas, where land uses are not assumed to change) to obtain a revised total pollutant loading for those land surfaces. Resulting pollutant loading for areas identified as draining to GSI and areas not draining to GSI were combined geospatially to obtain the pollutant loading associated with each GSI implementation scenario.

2.3.3 Load Reductions Resulting from Implementation of Source Controls

Pollutant load reductions from the source controls described in the implementation plans are incorporated into the RAA scenarios for the TMDL attainment date (i.e., 2030) along with future scenarios for 2040 and beyond 2040. The calculation methods used to estimate load reduction are those described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* (BASMAA, 2020, provided in Appendix B). The resulting load reductions from source controls implemented are combined with the land use and GSI load reduction estimations to get the total estimated load reduction for each future implementation scenario.

3. ADJUSTED BASELINE LOADS AND LOAD REDUCTION GOALS

3.1 PCBs

3.1.1 Adjusted PCBs Baseline Load

The results of the RAA baseline modeling for PCBs are presented for Contra Costa County in Table 3-1 below.

04533
4574

Table 3-1: RAA Model Baseline Loading Estimates – PCBs

RWQCB Region	Above/Below Dam	Permit	Baseline Load Contra Costa County (kg/yr)
Region 2	**Below Dam**	**MRP[1]**	**1.73**
		NPDES[2]	0.62
		Phase II[3]	0.01
	TMDL Baseline		***2.36***
	Above Dam	MRP[1]	0.04
		NPDES[2]	<0.01
		Phase II[3]	0
Region 5	Below Dam	MRP[1]	0.13
		NPDES[2]	0.01
		Phase II[3]	<0.01
	Above Dam	MRP[1]	<0.01
		NPDES[2]	0
		Phase II[3]	0
County-wide		Total	2.55

[1] Municipal Regional Permit permitted areas, along with IGP facilities and facilities with individual NPDES Stormwater Industrial permits.
[2] Major and Non-Major dischargers with individual NPDES permits. See Appendix A.
[3] Phase II General Permit permittees. See Appendix A.

The countywide baseline load below dams estimated using the RAA model is 2.36 kg/yr. The baseline load estimated for the Permittees after deducting the estimated baseline load for the NPDES dischargers within the County is 1.73 kg/yr. This baseline load is used to establish the PCBs TMDL load reduction goal described below.

3.1.2 TMDL Attainment Load Reduction Goal (2030)

Calculations were conducted to develop the PCBs load reduction goals as described in the *Bay Area RAA Guidance Document* (BASMAA, 2017). The calculation methodology is summarized below.

$$LR_{TMDLgoal} = \text{Baseline} - \text{WLA (kg/yr)}$$

Where:

$LR_{TMDLgoal}$ = The TMDL load reduction goal (kg/yr)

Baseline = The baseline pollutant loading as calculated through the RAA

WLA = The population-based wasteload allocation for Contra Costa County

The TMDL population-based wasteload allocation for Contra Costa County is 0.3 kg/yr. This wasteload allocation must be distributed between the MRP permittees and other permitted stormwater dischargers (i.e., individual NPDES permittees and Phase II permittees). The wasteload allocations calculated to reflect the relative percentage of the estimated baseline loads are provided in Table 3-2.

For example, as shown in Table 3-1, the MRP Permittees baseline load is estimated to be 1.73 kg/yr, which represents 73% of the total baseline load below dams (i.e., 1.73/2.36 x 100 = 73%). Thus, the PCBs wasteload allocation for the MRP Permittees is equal to 73% of 0.3 kg/yr (i.e., 0.73 x 0.3 kg/yr = 0.22 kg/yr)

Table 3-2: TMDL Wasteload Allocations for Contra Costa County

Stormwater Discharger within TMDL Baseline Area[1]	Percentage of Baseline Load (%)	PCBs WLA (kg/yr)
MRP Permittees	73%	0.22
NPDES Permittees	26%	0.08
Phase 2 Permittees	1%	0.002
Contra Costa County	100%	0.3

[1] All SFBRWQCB Region 2, above dams.
WLA – Wasteload Allocation

Using the calculated MRP Permittee proportion of the wasteload allocation and RAA-calculated baseline load, the load reduction goal is estimated to be 1.51 kg/yr (i.e., 1.73 kg/yr – 0.22 kg/yr = 1.51 kg/yr).

3.1.3 MRP Load Reduction Goal through GSI by 2040

The PCBs load reduction required to be achieved through GSI by 2040 per MRP Provision C.3.j (i.e., 3 kg/yr MRP area-wide or 0.56 kg/yr for Contra Costa County) must be adjusted to reflect the RAA-calculated load reduction goal (i.e., 1.51 kg/yr).

The MRP C.3.j load reduction requirement for GSI by 2040 (for all Permittees; 3 kg/yr) represents 20.8% of the overall load reduction required in the TMDL[3] (i.e., [3 kg/yr ÷ 14.4 kg/yr] x 100 = 20.8%). Therefore, the adjusted countywide load reduction through GSI can be calculated as:

$$LR_{MRP,\ GSI,\ 2040} = LR_{TMDLgoal} * 20.8\%$$

The adjusted countywide MRP PCBs load reduction goal through GSI by 2040 is 0.31 kg/yr (i.e., 1.51 kg/yr x 0.208 = 0.31 kg/yr).

[3] The PCBs TMDL estimates a total urban baseline stormwater load of 20 kg/yr and assigns a wasteload allocation to urban stormwater of 2 kg/yr; thereby resulting in a required load reduction of 18 kg/yr (i.e., a 90% reduction) by 2030. Note that the MRP area is a portion of the total TMDL area, as Marin, Napa, San Francisco, and Sonoma are not within the MRP boundary. The MRP portion of the estimated TMDL baseline load is 16 kg/yr and the MRP portion of the 2 kg/yr wasteload allocation is 1.6 kg/yr, thus the TMDL load reduction goal for the MRP area is 14.4 kg/yr.

3.2 Mercury

3.2.1 Adjusted Mercury Baseline Loads

The results of the RAA baseline modeling for mercury are presented for Contra Costa County in Table 3-4 below. The countywide baseline load estimated with the RAA model is 6.25 kg/yr. The baseline load estimated for the Permittees after deducting the estimated baseline load for the NPDES dischargers within the County is 6.02 kg/yr. This baseline load is used to establish the mercury TMDL load reduction goal described below.

Table 3-3: RAA Model Baseline Loading Estimates – Mercury

RWQCB Region	Above/Below Dam	Permit	Baseline Load Contra Costa County (kg/yr)
Region 2	**Below Dam**	**MRP[1]**	**6.02**
		NPDES[2]	0.20
		Phase 2[3]	0.03
	TMDL Baseline		***6.25***
	Above Dam	MRP[1]	1.59
		NPDES[2]	0.002
		Phase 2[3]	0.00
Region 5	Below Dam	MRP[1]	1.02
		NPDES[2]	0.004
		Phase 2[3]	0.001
	Above Dam	MRP[1]	0.35
		NPDES[2]	0.00
		Phase 2[3]	0.00
County-wide		Total	9.23

[1] Municipal Regional Permit permitted areas, along with IGP facilities and facilities with individual NPDES Stormwater Industrial permits.
[2] Major and Non-Major dischargers with individual NPDES permits. See Appendix A.
[3] Phase II General Permit permittees. See Appendix A.

3.2.2 TMDL Attainment Load Reduction Goal (2028)

The mercury WLA for Contra Costa County is 11 kg/yr, while the estimated baseline load for the entire county below dams is only 6.25 kg/yr. Thus, the results of the RAA indicate that the TMDL wasteload allocation has been achieved.

3.2.3 MRP Load Reduction Goal through GSI (2040)

The mercury load reduction required to be achieved through GSI by 2040 per MRP Provision C.3.j is 10 kg/yr MRP area-wide (19% or 1.9 kg/yr for Contra Costa County). This represents 8% of the estimated TMDL baseline load of 127.7 kg/yr for the MRP area. Applying this percentage to the adjusted baseline from the RAA model, an adjusted GSI goal would be 0.48 kg/yr for Contra Costa County (i.e., 6.02 kg/yr x 0.08 = 0.48 kg/yr).

4. ESTIMATE OF LOADS REDUCED

4.1 Loads Reduced – PCBs

The total estimated annual PCBs loads reduced through implementation of control measures by 2020, 2030, 2040, and 2050 is provided in Table 4-1.

Table 4-1: Summary of PCBs Load Reductions Achieved through Control Measure Implementation

Control Measure	PCBs Load Reduction (kg/yr) by:			
	2020	**2030**	**2040**	**2050**
PCBs in Building Materials Management	0.37	0.37	0.37	0.37
Source Property Identification and Abatement	0.21	0.54	0.54	0.54
PCBs in Electrical Utilities Management	0.07	0.12	0.17	0.21
PCBs in Infrastructure	0.00	0.01	0.02	0.02
Green Stormwater Infrastructure	0.14	0.18	0.26	0.32
Full Trash Capture Treatment Control Measures	0.05	0.05	0.05	0.05
Enhanced Operations and Maintenance	0.004	0.004	0.004	0.004
Total Load Reduced	0.84	1.27	1.41	1.51
Load Reduction Goal	**1.51**	**1.51**	**1.51**	**1.51**
Remaining Load to be Reduced	0.67	0.24	0.10	0

4.1.1 PCBs TMDL Attainment (2030)

As can be seen in Table 4-1, the required load reduction to achieve the TMDL wasteload allocation (1.51 kg/yr) is not met by the TMDL compliance date of 2030 but is achieved by 2050. The RAA estimate of achieving the PCBs TMDL wasteload allocation by 2050 is based on many assumptions, and while the RAA demonstrates that Contra Costa will not achieve the PCBs load reduction goal before 2050, this goal may not be achieved until well after 2050. An analysis of scenarios needed to achieve the TMDL wasteload allocation by 2030 is presented in Appendix G of the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report).

4.1.2 MRP GSI Load Reduction Goal (2040)

The estimated PCBs load reduced through implementation of GSI by 2040 is 0.26 kg/yr. As discussed in Section 3.1.3, the RAA-adjusted goal is 0.31 kg/yr, thus there is a predicted 0.05 kg/yr deficit.

Table 4-2 below provides an estimate of the PCBs loads reduced by the public and private land area that will be treated through GSI implementation by 2020, 2030, and 2040. The areas modeled were summarized from the Permittees' Green Infrastructure Plans, which were submitted to the SFBRWQCB in 2019.

Table 4-2: Estimate of PCBs Load Reduced by Area Treated through GSI Implementation by 2020, 2030, and 2040 within Contra Costa County

Year	Estimated PCBs Load Reduced (kg/yr)	
	Private	Public
2020	0.13	0.01
2030	0.16	0.02
2040	0.23	0.03

As can be seen in Table 4-2, public GSI area is a small portion of the total load reduced through GSI (ranging from 8% to 13%) and is also subject to a lot of uncertainty regarding when opportunities will emerge, and funding will be available.

Public GSI retrofit opportunities that have the highest potential to reduce PCBs loads are concentrated within a small subset of Contra Costa Permittee area due to the pattern of pre-1980 industrial development within the region. Conversely, many Contra Costa Permittees have no or very few opportunities to contribute significantly toward achievement of countywide PCBs loading reductions via implementation of GSI in their communities. Further, if load reductions are not achieved on a regional or countywide scale, and load reductions are allocated at a local level (by population), these Permittees would not be able to achieve those load reduction allocations due to a lack of opportunity.

Thus, given these findings, the Contra Costa Permittees, collectively, believe that a countywide strategy would be the best way to achieve the PCBs load reduction goals in a more efficient and effective manner. For the purposes of creating their local GI Plans, Contra Costa Permittees have prioritized their GSI projects based on achieving other multiple benefits. These other benefits include controlling other stormwater pollutants, preserving and enhancing local stream hydrology, reducing localized flooding, helping communities adapt to climate change by increasing the resiliency of water supply, ancillary benefits that derive from adding landscaped areas within the urbanized environment, and mitigating the urban heat island effect.

4.2 Loads Reduced – Mercury

The total estimated mercury loads reduced through implementation of the GSI and the other treatment control measures that are implemented for PCBs by 2020, 2030, 2040, and 2050 is provided in Table 4-3.

Note that these estimated load reductions do not account for loads reduced by the Mercury Load Avoidance and Reduction source control measure. CCCWP will continue to annually compile and report the number of mercury-containing products collected at household hazardous waste facilities. Translation of that collection information to loads reduced from urban stormwater discharges is challenging and may not be necessary to show attainment of the mercury TMDL.

Table 4-3: Summary of Mercury Load Reductions Achieved through Control Measure Implementation

Control Measure	Hg Load Reduction (g/yr) by:			
	2020	2030	2040	2050
Green Stormwater Infrastructure	0.17	0.22	**0.28**	0.33
Full Trash Capture Treatment Control Measures	0.10	0.12	0.12	0.12
Enhanced Operations and Maintenance	0.02	0.02	0.02	0.02
Total	**0.29**	**0.36**	**0.42**	**0.47**
Adjusted Load Reduction Goal via GSI in MRP 2	**--**	**--**	**0.48**	**--**
Remaining Load to be Reduced via GSI			**0.20**	

4.2.1 Mercury TMDL Attainment (2028)

As is stated in Section 3.2.2 above, the mercury WLA for Contra Costa County is 11 kg/yr, while the estimated baseline load for the entire county below dams is only 6.25 kg/yr. Thus, the results of the RAA indicate that the TMDL wasteload allocation has been achieved.

4.2.2 MRP Load Reduction Goal through GSI (2040)

The predicted mercury load reduction by 2040 through GSI (0.28 kg/yr) would not achieve the adjusted load reduction goal for GSI in the MRP (0.48 kg/yr). RAA results analyzing the potential for GSI to reduce mercury loads to achieve this goal are shown in Table 4-4 below. A significant portion of the Old Industrial, Old Commercial, Old Transportation, and/or Old Urban Residential land use area would need to be treated to meet this load reduction goal in Contra Costa County (shaded rows of Table 4-4). Assuming the mercury load reduction rate that is predicted by the RAA model to occur every decade through implementation of GSI on public and private land, this MRP load reduction goal would be achieved by 2077.

Given the RAA results for baseline load in comparison to the TMDL wasteload allocation, the load reduction goal set in the MRP appears to be unnecessary for TMDL compliance.

Table 4-4: Application of GSI to All Land Use Area in Contra Costa County within Region 2 below Dams

Land Use Category	Maximum Potential Mercury Load Reduction through GSI (kg/yr)
Old Industrial	0.40
Old Commercial	0.14
Old Transportation	0.22
Old Urban Residential	2.07
New Urban	0.02

4.3 RAA Modeling Uncertainty

There are two types of uncertainty in the RAA analysis: modeling uncertainty and planning uncertainty. This section discusses modeling uncertainty, whereas planning uncertainties are

discussed in Section 6.2 of the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report.

As summarized in the RAA Guidance Document (BASMAA, 2017), according to USEPA's Guidance on the Development, Evaluation, and Application of Environmental Models (USEPA Model Guidance, 2009), model uncertainty describes the lack of knowledge about models, parameters, constants, data, and beliefs. The USEPA Model Guidance identifies two types of uncertainty related to models: model framework uncertainty, related to the scientific soundness of the model, and data uncertainty, arising from measurement errors, analytical imprecision, and limited data sample sizes. The methods and assumptions used for the analysis and described in detail in the appendices were developed with consideration of available data. The methods for developing baseline loading and GSI load reduction estimates went through a rigorous third-party peer review process. The source control load reduction calculations methods presented in Appendix B have been accepted by the SFBRWQCB. Therefore, the methods are considered to be reasonably rigorous given the data and resources available, and the primary source of uncertainty for these computational methods is expected to be data uncertainty.

The USEPA Model Guidance (USEPA, 2009) describes the three components that affect data uncertainty:

- Accuracy – the closeness of a measured or computed value to its "true" value.
- Variability – data differences arising from true heterogeneity or diversity in model parameters and their underlying input datasets.
- Precision – the quality of being reproducible in outcome or performance.

Due to natural variability, data limitations affect both accuracy and precision, resulting in higher data uncertainty. Because of this, data limitations will also inform the complexity of the model.

In addition, as indicated in the USEPA RAA Guide (USEPA, 2017), calibration and validation can be used to manage model uncertainty, though data limitations will still cause uncertainty in model output. Because of this, the USEPA RAA Guide suggests that it is important to update RAA modeling tools over time as additional data become available.

5. REFERENCES

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USEPA, 2017. Developing Reasonable Assurance: A Guide to Performing Model-Based Analysis to Support Municipal Stormwater Program Planning. Prepared by Paradigm Environmental. February 2017.

APPENDIX A

List of NPDES Permittees Removed from Baseline

Table A-1: List of Phase II Permittees, and Facilities with Major or Minor NPDES Permits, in Contra Costa County

Permit Category	Facility Name	Facility Owner	City
Phase II	Bay Area Rapid Transit (BART)	Bay Area Rapid Transit Ditrict	Various
Phase II	Cal State East Bay Concord Campus	State of California	Concord
Phase II	Federal Correctional Instituion, Dublin (Camp Parks)	United States of America	San Ramon / Unincorporated
NPDES Major	Tesoro Golden Eagle Refinery	Tesoro Refining & Marketing Co	Concord
NPDES Major	C&H Sugar Co Inc	Sugar Acquisition Corp	Crockett (Unincorporated)
NPDES Major	C&H Sugar Co Inc	Sugar Acquisition Inc	Crockett (Unincorporated)
NPDES Major	C&H Sugar Co Inc	C & H Sugar Company Inc	Crockett (Unincorporated)
NPDES Major	Phillips 66 - San Francisco Refinery	Shore Terminals LLC	Crockett (Unincorporated)
NPDES Major	Discovery Bay WWTP	Ccc Sanitation District #19	Discovery Bay (Unincorporated)
NPDES Major	Discovery Bay WWTP	Discovery Bay Town Of	Discovery Bay (Unincorporated)
NPDES Major	Central Contra Costa WWTF	Central Cc Sanitary District	Martinez
NPDES Major	Eco Services Martinez Plant	Eco Services Operations LLC	Martinez
NPDES Major	Mt View Sanitary Dist WWTF	Mt View Sanitary District	Martinez
NPDES Major	Shell Oil Products, Martinez Refinery	Equilon Enterprises LLC	Martinez
NPDES Major	Tesoro Golden Eagle Refinery	Tesoro Refining & Marketing Co	Martinez
NPDES Major	Ironhouse Sd WWTP	Ironhouse Sanitary District	Oakley
NPDES Major	Pinole WWTF	Pinole City Of	Pinole
NPDES Major	Pittsburg Power Plant	Genon California North LLC	Pittsburg
NPDES Major	Pittsburg Power Plant	Pittsburg Power Company	Pittsburg
NPDES Major	Pittsburg Power Plant	Pacific Gas & Electric Co	Pittsburg
NPDES Major	Pittsburg Power Plant	Southern Energy Delta LLC	Pittsburg
NPDES Major	Uss-Posco Industries	Uss Posco Industries	Pittsburg
NPDES Major	Chevron Richmond Refinery	Chevron Usa Inc	Richmond
NPDES Major	Phillips 66 - San Francisco Refinery	Tosco Corporation	Rodeo (Unincorporated)
NPDES Major	Rodeo Sanitary District	Rodeo Sanitary District	Rodeo (Unincorporated)
NPDES Major	Chevron Richmond Refinery	Chevron Usa Inc	San Pablo
NPDES Minor	A1 Auto Dismantler Inc	Nguyen Theresa	Antioch
NPDES Minor	Bridgehead Marine Services	Devries Neil & Mary Tre	Antioch
NPDES Minor	Delta Diablo WWTP	Ccc Sanitation District #7 A	Antioch
NPDES Minor	Eastern Contra Costa Transit Authority	Eastern Contra Costa Transit	Antioch
NPDES Minor	Ftg Construction Materials Inc	Alegre Anthony J Tre	Antioch
NPDES Minor	Gateway Generating Station	Pacific Gas & Electric Co	Antioch
NPDES Minor	Georgia-Pacific Gypsum LLC	Georgia-Pacific Gypsum LLC	Antioch
NPDES Minor	Verco Decking, Inc	Verco Decking Inc	Antioch
NPDES Minor	Criterion Catalysts Company LP	LP Catalyst Holdings Inc	Bay Point (Unincorporated)

Permit Category	Facility Name	Facility Owner	City
NPDES Minor	Insurance Auto Auctions Inc	Borba Scott L Tre	Bay Point (Unincorporated)
NPDES Minor	Diablo Boat Works	Weltin Dan	Bethel Island (Unincorporated)
NPDES Minor	Golden Gate Petroleum	Bay Area Diablo Petroleum	Brentwood
NPDES Minor	Right Away Redy Mix	Bay Cities Blding Mat Co Inc	Byron (Unincorporated)
NPDES Minor	Concord Auto Dismantlers	Countryside Investments LLC	Concord
NPDES Minor	John A Mchugh	Mchugh John A Tre	Concord
NPDES Minor	John A Mchugh	Mchugh Mary Karen	Concord
NPDES Minor	Royal Trucking Company	Buildings 1-4 LLC	Concord
NPDES Minor	Seg Trucking	Candy Properties	Concord
NPDES Minor	Systron Donner	Systron Donner Inertial Inc	Concord
NPDES Minor	Systron Donner	Systron Business Center LLC	Concord
NPDES Minor	Stege Sewer Collection System	Stege Sanitary District	El Cerrito
NPDES Minor	Bio-Rad Laboratories	Bio-Rad Laboratories Inc	Hercules
NPDES Minor	American Stage Tours	Lucas James V & Shari	Martinez
NPDES Minor	American Stage Tours	Lucas James & Shari	Martinez
NPDES Minor	American Stage Tours	Lucas James V & Shari S	Martinez
NPDES Minor	Eagle Marine	Martinez City Of	Martinez
NPDES Minor	Delta Scrap And Salvage	Graunstadt Kenneth P Tre	Oakley
NPDES Minor	Pena Dismantler	Hulsey Tim L Tre	Oakley
NPDES Minor	E B M U D Orinda Water Trtmnt Plant	East Bay Municipal Utility Dis	Orinda
NPDES Minor	Antioch Building Materials Company	Pittsburg Industrial Park LLC	Pittsburg
NPDES Minor	Delta Diablo WWTP	Ccc Sanitation District #7 A	Pittsburg
NPDES Minor	Delta Diablo WWTP	Delta Diablo Sanitation Dist	Pittsburg
NPDES Minor	Hasa Inc	CCIP LP	Pittsburg
NPDES Minor	Koch Carbon LLC	Isle Capital Corporation Tre	Pittsburg
NPDES Minor	Los Medanos Energy Center	Uss Posco Industries	Pittsburg
NPDES Minor	Praxair, Inc	Union Carbide Ind Gases Inc	Pittsburg
NPDES Minor	Bay Cities Refuse Service, Inc.	United Refuse Service Inc	Richmond
NPDES Minor	Bragg Crane Ser	Bragg Investment Company Inc	Richmond
NPDES Minor	Bragg Crane Ser	Bragg Invewtment Co Inc	Richmond
NPDES Minor	Ecology Control Industries	255 Parr Blvd LLC	Richmond
NPDES Minor	First Student Inc 20306	Laidlaw Transit Inc	Richmond
NPDES Minor	Qualawash Holdings LLC	Quality Carriers Inc	Richmond
NPDES Minor	West Co Water Pollutional Control Plant	West County Wastewater Dist	Richmond
NPDES Minor	West Co Water Pollutional Control Plant	West County Wastewater Dist	San Pablo
NPDES Minor	USPS Walnut Creek VMF	Marasco Joseph Tre	Walnut Creek

APPENDIX B

BASMAA Source Control Loads Reduction Accounting for RAA Report

CONTRA COSTA CLEAN WATER PROGRAM

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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August 11, 2020

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

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[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

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- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

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5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

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9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

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$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

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APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

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APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

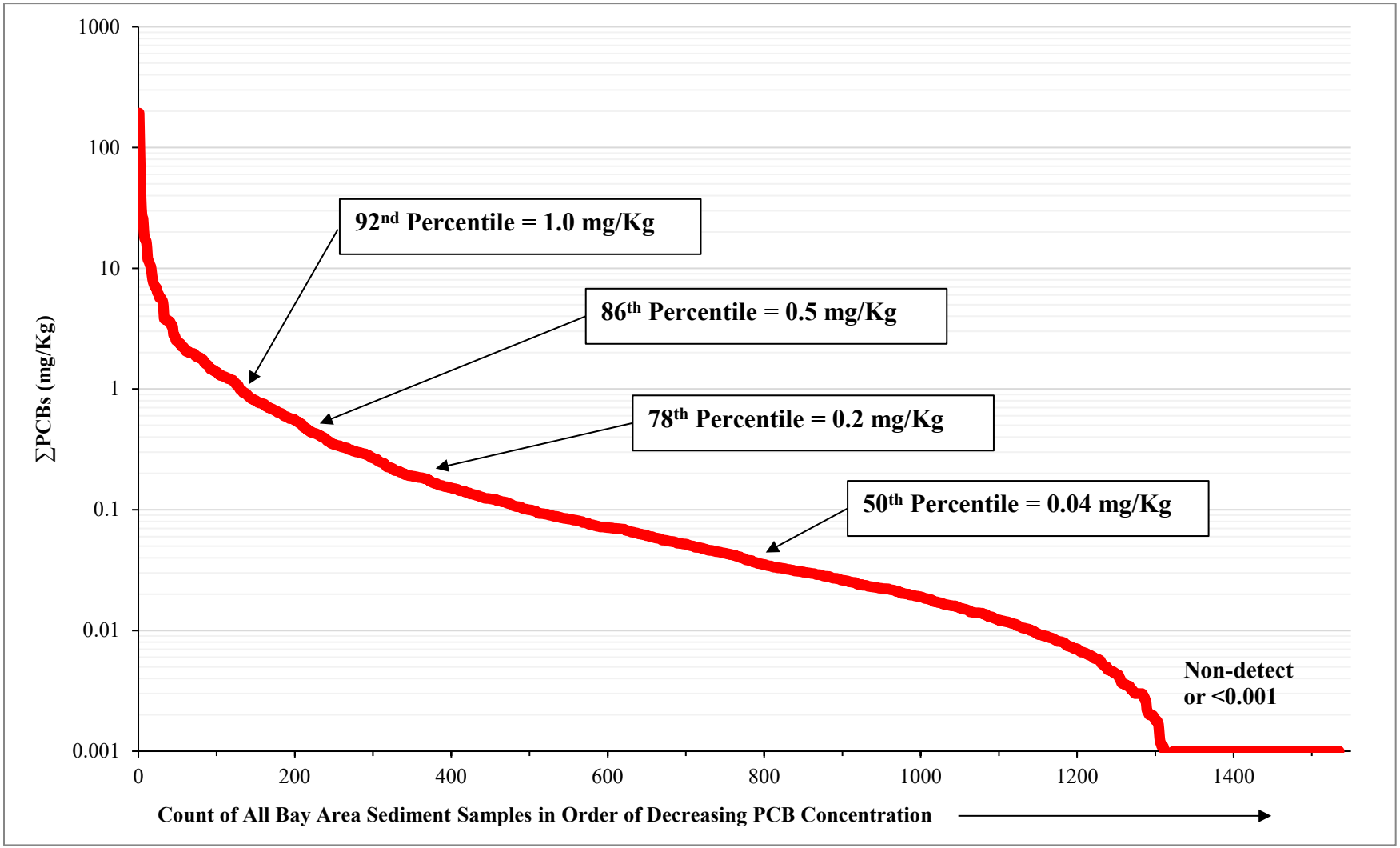

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

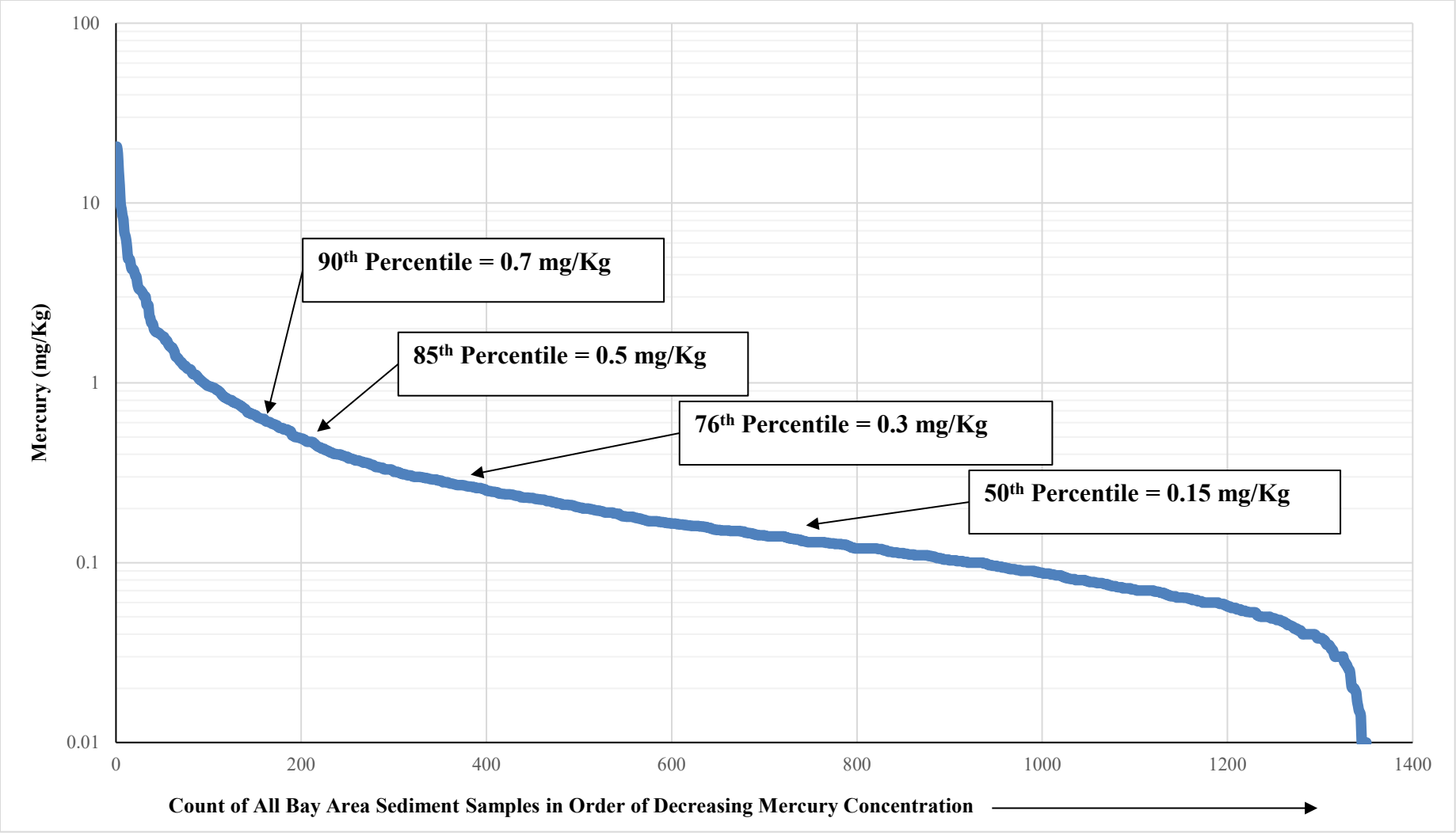

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C
Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

04600
4641

6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

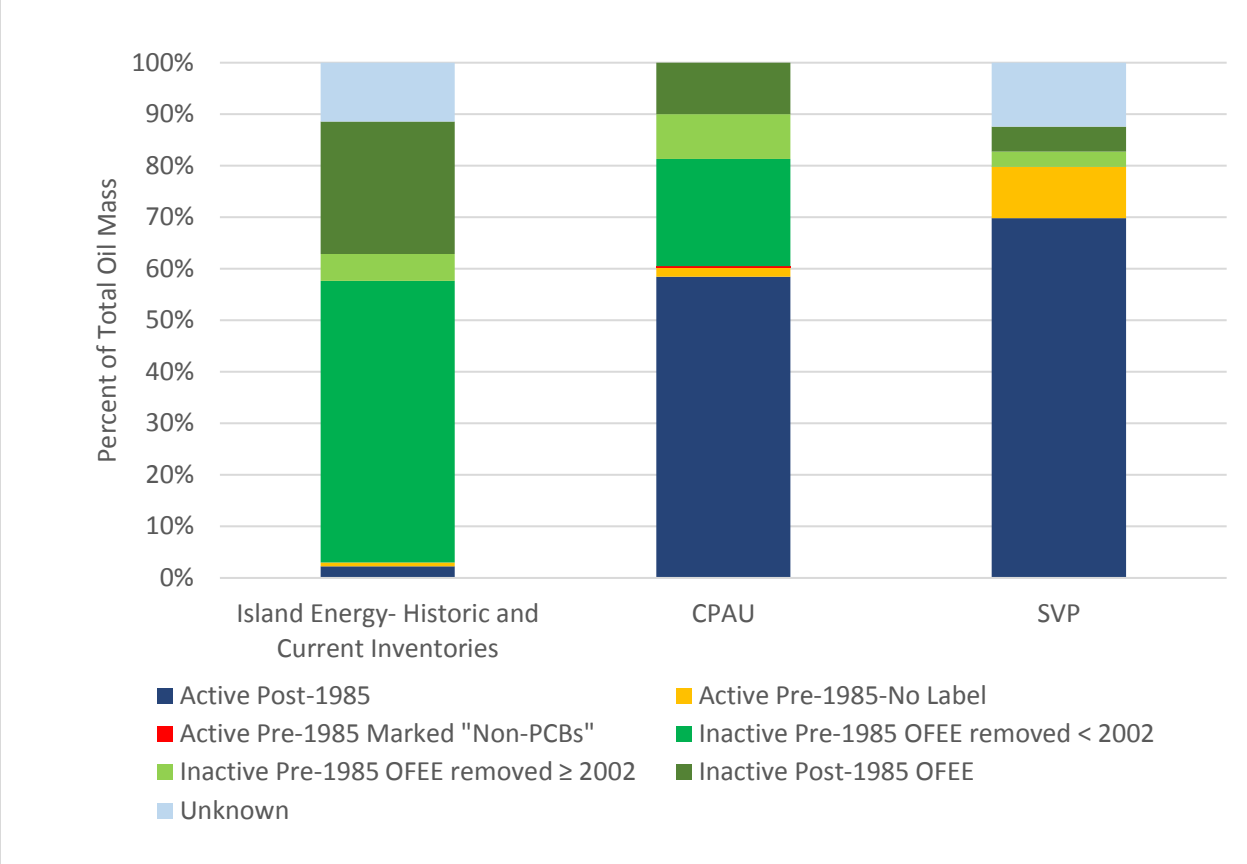

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

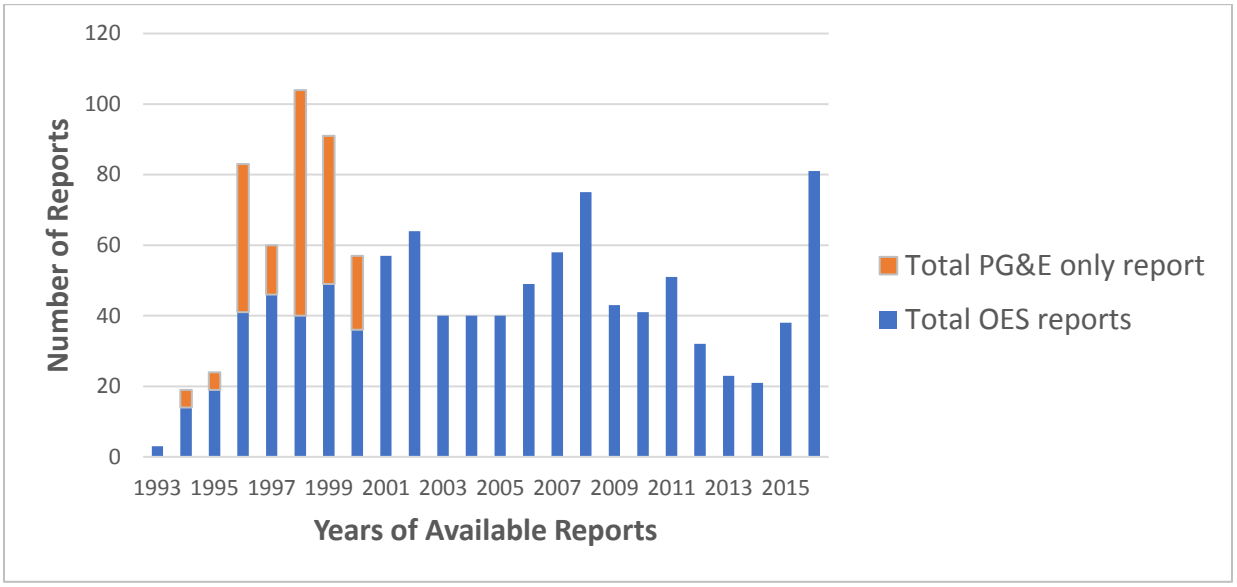

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

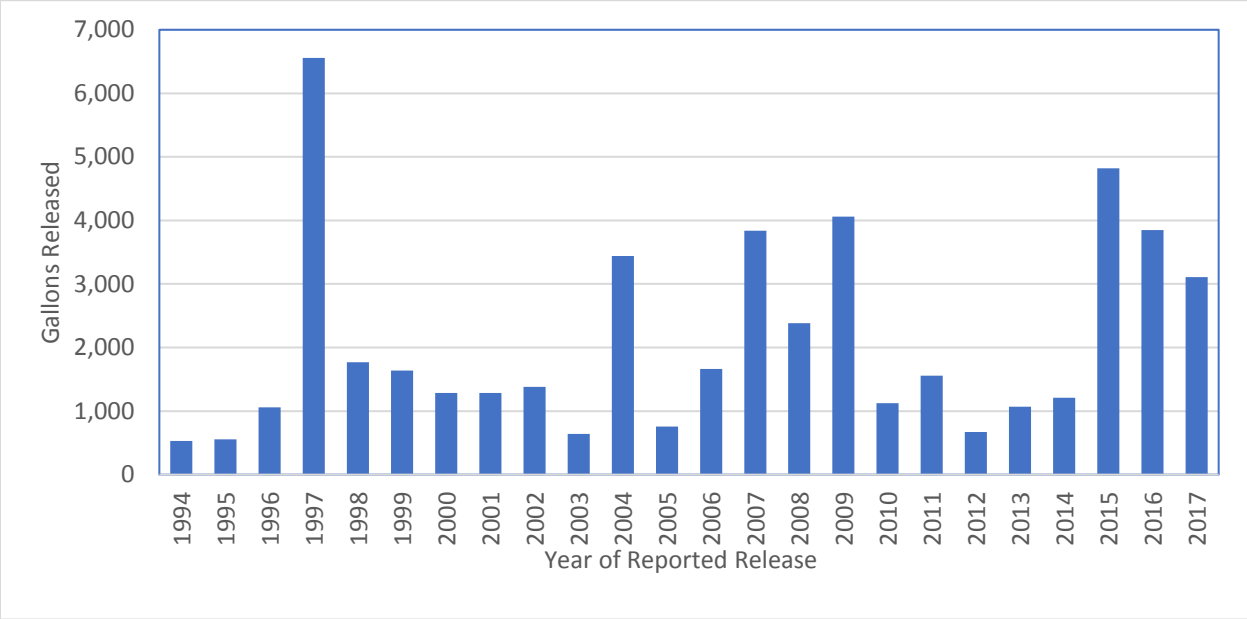

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

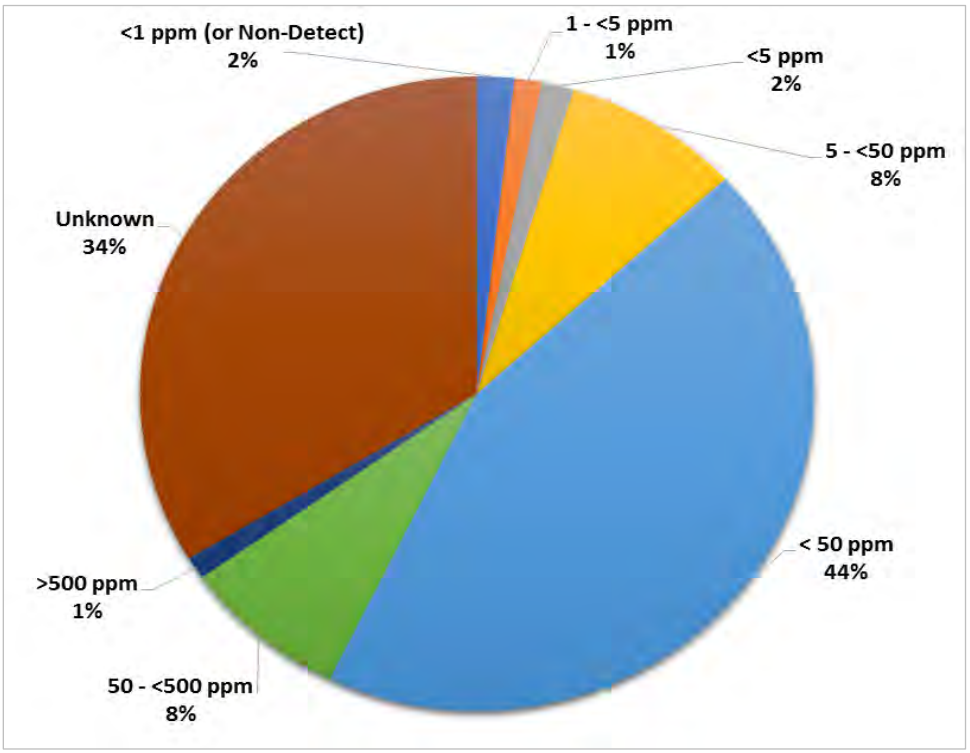

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

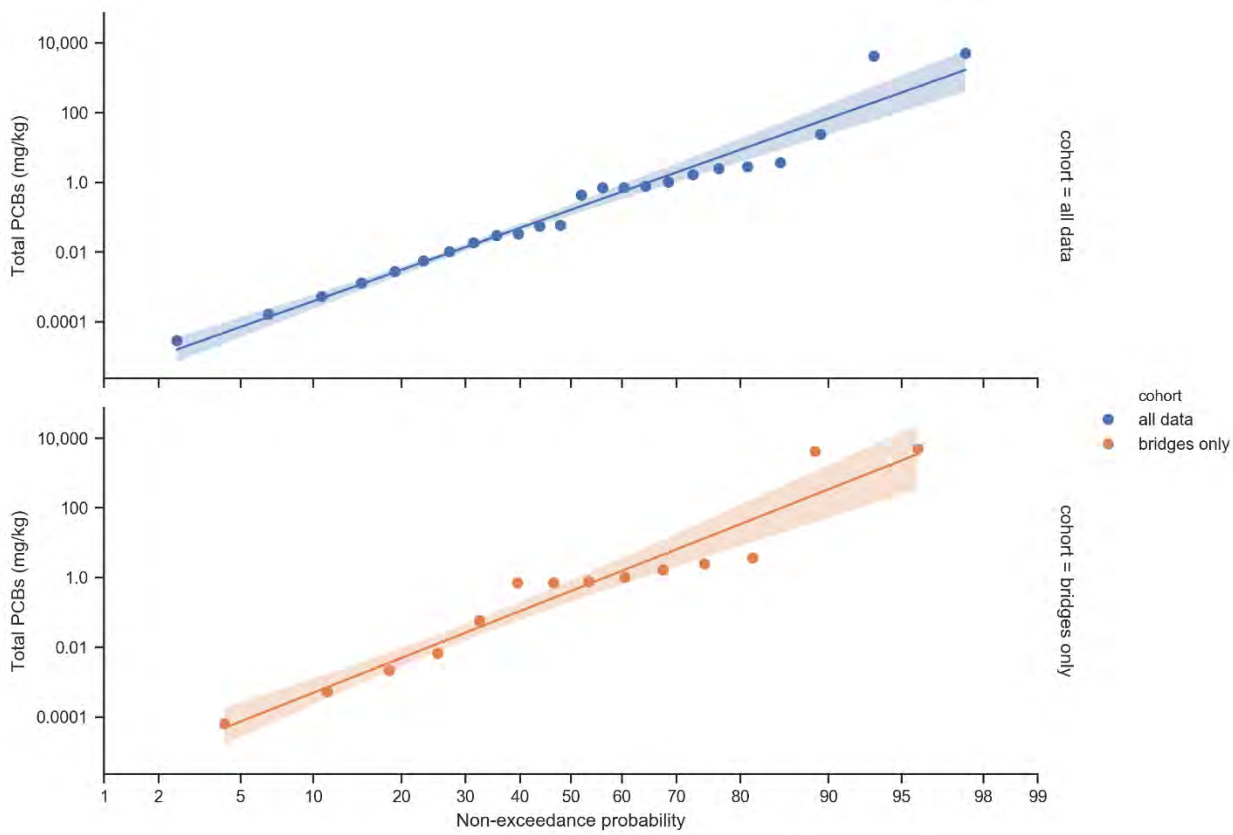

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

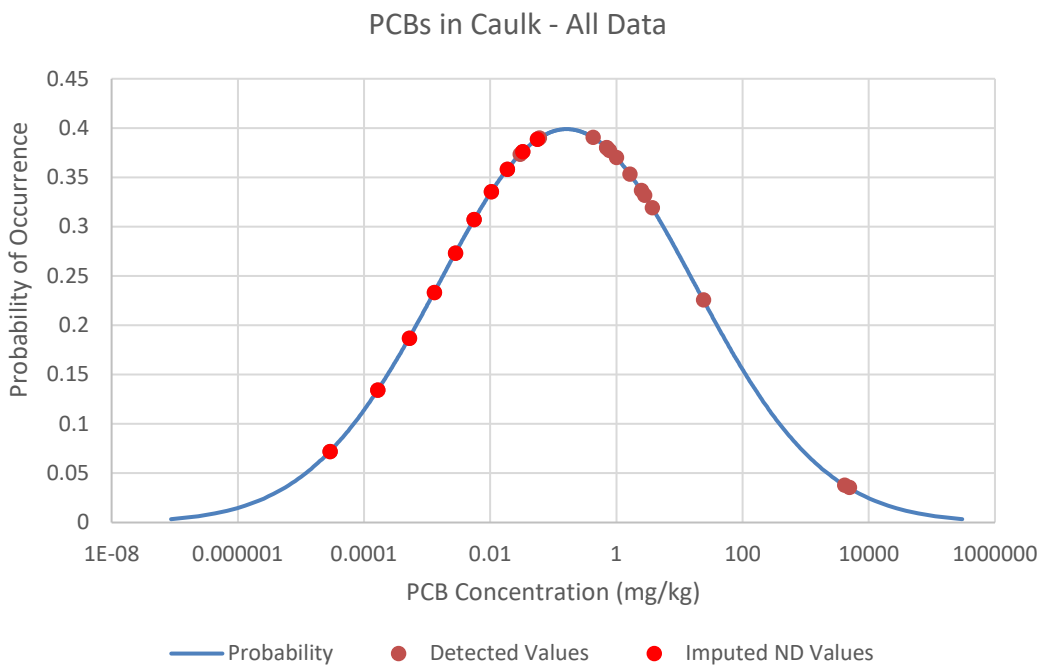

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

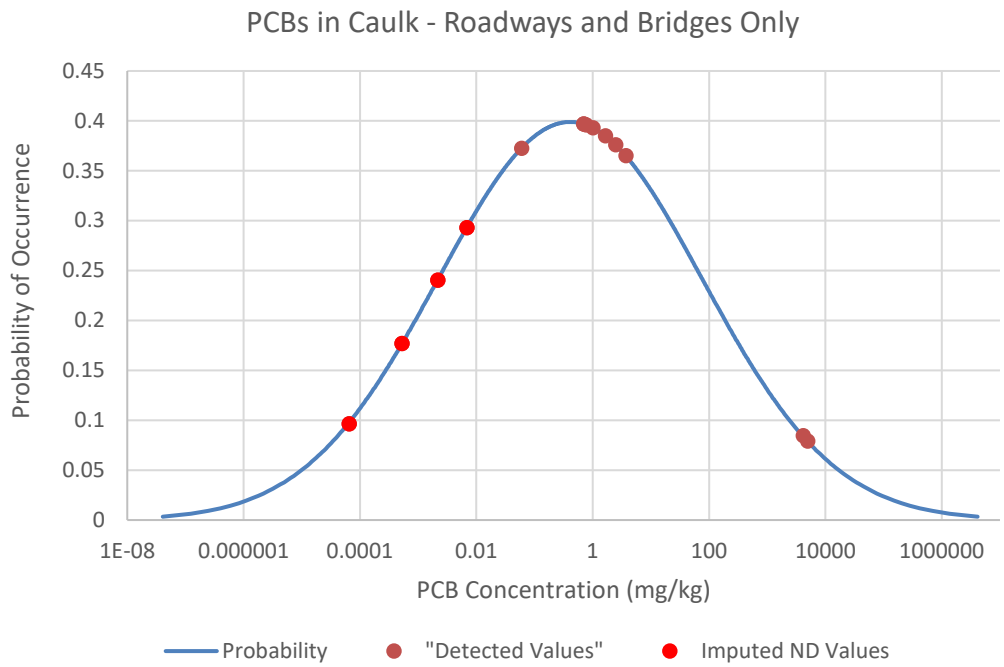

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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NCHRP, 2016. Guidelines for Maintaining Small Movement Bridge Expansion Joints (Part I). Prepared by University of Delaware and P.J. Weykamp. Transportation Research Board, National Research Council. Washington, D.C.

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Takhar, 2013. E-mail titled "RE: 0120T4 SFOBB PCB Survey". Send to Derek Beauduy. 20 November 2013.

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

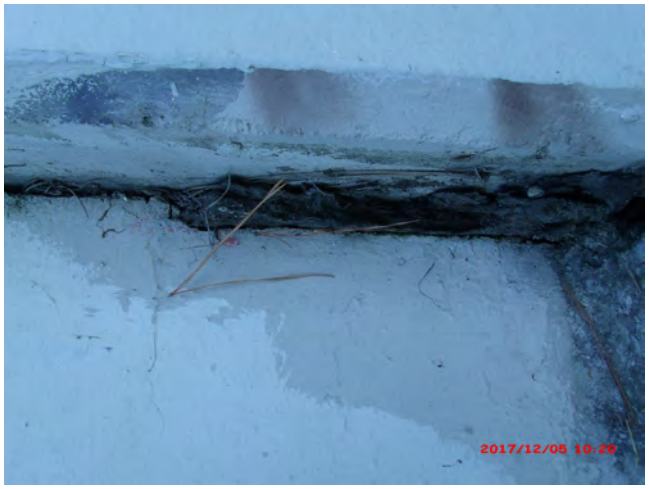

Composite D

Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

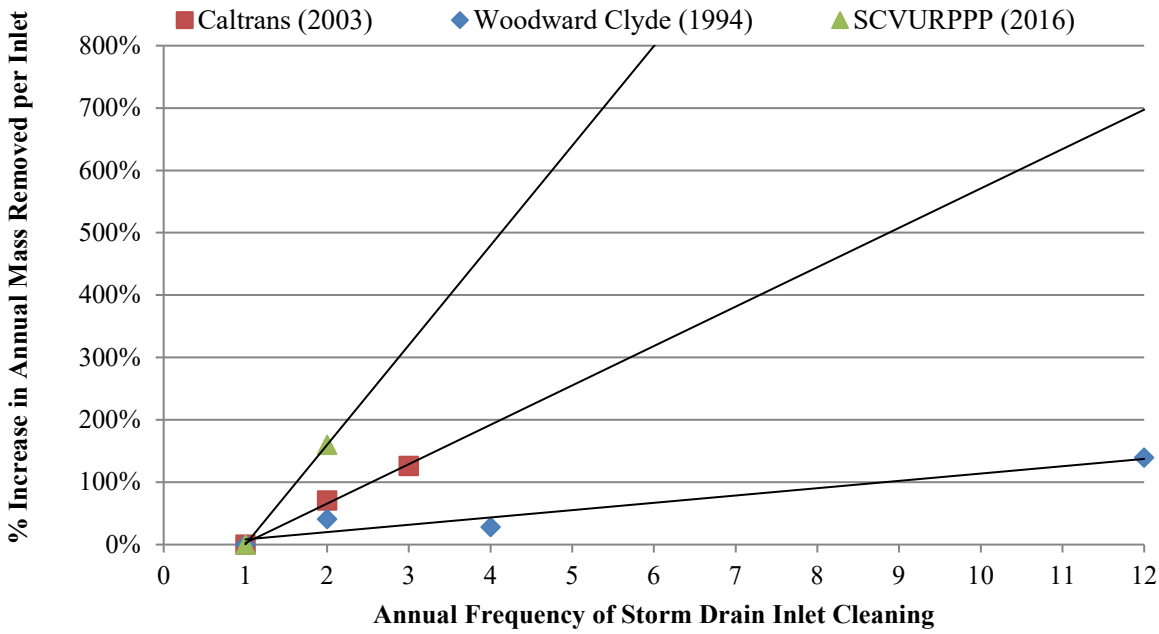

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

BASMAA (2014). San Francisco Bay Area Stormwater Trash Generation Rates - Final Technical Report. Bay Area Stormwater Management Agencies Association. Prepared by EOA, Inc. Oakland. June.

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:

1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:

Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

I.5 References

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APPENDIX C

CCCWP Conceptual Work Plan for PCBs Source Area Assessment

CONTRA COSTA CLEAN WATER PROGRAM

Contra Costa Clean Water Program

Contra Costa Source Area Investigation for PCBs Control

Work Plan

Submitted to

Contra Costa Clean Water Program
255 Glacier Drive
Martinez, California 94553

Submitted by

ADH Environmental
3065 Porter Street, Suite 101
Soquel, California 95073

and

Wood Environment & Infrastructure Solutions, Inc.
180 Grand Avenue, Suite 1100
Oakland, California 94612

September 16, 2020

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Contra Costa Clean Water Program

Contra Costa Source Area Investigation for PCBs Control

Work Plan

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Acronyms and Abbreviations

ADH	ADH Environmental
BART	Bay Area Rapid Transit District
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
DQO	data quality objective
EPA	United States Environmental Protection Agency
MRP	Municipal Regional NPDES Stormwater Permit
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
POC	pollutants of concern
PSD	particle size distribution
QAPP	quality assurance project plan
QA/QC	quality assurance / quality control
RMC	BASMAA Regional Monitoring Coalition
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SOP	standard operating procedure
SSC	suspended sediment concentration
TMDL	total maximum daily load

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1. INTRODUCTION AND BACKGROUND

The Contra Costa Clean Water Program (CCCWP) together with its Bay Area Stormwater Management Agencies Association (BASMAA) colleagues, and in discussions with the San Francisco Bay Regional Water Quality Control Board (SFRWQCB), has developed a monitoring approach for investigating potential PCBs high interest areas during the upcoming five-year term (2021-2025) of the Municipal Regional Stormwater NPDES Permit (MRP) 3.0. This Work Plan addresses CCCWP's commitment to continue the screening of old industrial areas where opportunities may exist for polychlorinated biphenyls (PCBs) control through property referrals to SFRWQCB, or through enhanced operations and maintenance activities conducted by private land holders and/or Permittees.

1.1 Monitoring Goals

CCCWP Permittees prioritize monitoring pollutants of concern with the goal of identifying reasonable and foreseeable means of achieving load reductions of pollutants required by total maximum daily loads (TMDLs). TMDLs are watershed plans to attain water quality goals developed and established by SFRWQCB. The two most prominent TMDLs in driving stormwater monitoring, source control, and treatment projects are the Mercury TMDL and the PCBs TMDL. In the interest of protecting the beneficial uses of surface waters for people and wildlife dependent on San Francisco Bay for food, the overall monitoring goal is intended to reduce concentrations of mercury and PCBs in fish within the Bay.

Mercury and PCBs tend to bind to sediments. The principal means of transport from watersheds is via sediments washed into the Municipal Separate Storm Sewer System (MS4); therefore, an important focus of monitoring is identifying the most significant sources of contaminated sediments to the MS4. The highest pollutants of concern (POC) monitoring priorities for Permittees are answering these two basic TMDL implementation questions: where are the most significant sources of pollutants of concern, and what can be done to control them?

1.2 Environmental Setting

Much of Contra Costa County lies within the San Francisco Bay margin which has a rich history of industrial activity from a time when either little was known about the potential ecological harm from PCBs and mercury, or regulation and controls were not amply effective. Today we know that these pollutants are distributed in a patchy nature throughout old industrial lands, not only along Bay margins but in other old industrial land-use pockets throughout the County.

From some of these former and current-use industrial lands, the legacy pollutants of PCBs and mercury are migrating offsite (from private lands) through varies means to the MS4 (to public lands), and subsequently to the Bay. The implementation goal of this Work Plan is to identify those segments of public lands where legacy pollutants are found in elevated concentration and to further identify the source for abatement and control.

1.3 Regulatory Setting

The SFRWQCB has indicated to BASMAA member agencies that they seek reportable metrics for PCB control progress. These metrics include a specific number of acres of remaining source areas investigated per year, and a completion date for the investigation of all remaining source areas.

In response to SFRWQCB concerns over having specific metrics for PCB control progress, CCCWP is committed to providing annual targets for the screening of remaining potential source areas. This Work Plan identifies those targets within the framework of the upcoming MRP and follow-on permits beyond the term of MRP 3.0.

2. CONCEPTUAL MODEL AND MONITORING APPROACH

Since 2014, CCCWP and Permittee have conducted source area assessments to delineate high interest parcels and areas for consideration of property referrals and focused implementation planning for PCBs and mercury load reductions. Past monitoring efforts were focused in areas that were identified through various means as having high likelihood for PCBs control. To date, there have been five source properties that were self-abated, three properties that were referred to the SFRWQCB for enforcement action, and two properties that are likely to be referred to SFRWQCB in the near future.

The following subsections describe the remaining source areas to be investigated and corresponding monitoring approach and schedule to complete the task.

2.1 Source Areas

A GIS assessment was conducted by CCCWP's C.11/C.12 contractor, Geosyntec Consultants, to identify remaining old industrial properties throughout the county that may not have been thoroughly investigated in the past, and that may have the potential to contribute PCBs to the public right of way and the MS4. In generating the property database, careful consideration was given to the historic land use of each property and to results of previous monitoring efforts. In total, 723 individual properties encompassing 4,539 acres of land were identified for investigation. Table 1 identifies the key statistics of the properties to be investigated. Figures 1 and 2 depict the location of most of these properties as they tend to fall close to Bay margins in the western and northern portions of the County where former and present day industry lies.

Table 1. Remaining Source Areas Categories

Likelihood that PCBs are Present[1]	Number of Properties[1]	Acreage[1]
High	305	2,005
Medium-High	212	510
Medium	48	709
Medium-Low	126	625
Not Categorized	32	690
Total:	*723*	*4,539*

1 Source: Geosyntec Consultants, 2020

Figure 1. Remaining Source Areas (Orange Polygons) – West County

Source: Geosyntec Consultants, 2020

Figure 2. Remaining Source Areas (Orange Polygons) – North County

Source: Geosyntec Consultants, 2020

2.2 Approach – Initial Screening

The GIS source areas assessment provided CCCWP the specific information needed to develop a monitoring approach to investigate the remaining old industrial lands. To maintain consistency with the current level of effort expended during the term of MRP 2.0, CCCWP intends to screen remaining high interest areas for potential source properties, and conduct some focused follow-up sampling, at the rate of 80 samples per permit term. Therefore, during the upcoming term of MRP 3.0, 80 samples will be assigned to source areas investigation. A further goal under MRP 3.0 is to assess at least 25 percent of the remaining source areas acreage. That is, 0.25 x 4,539 acres equals 1,135 acres to be targeted for analysis in the next five years.

Sampling will first focus on properties that have the highest likelihood of contributing PCBs to the MS4 (properties categorized as "High" in Table 1). After the high likelihood properties are screened, the focus will fall on medium-high likelihood properties and so on until all 723 have been assessed. In many cases, a single sample will serve to screen several properties. As such, there is not a one to one correspondence between the number of samples analyzed and the number of properties screened. To estimate the overall number of samples necessary to screen all 723 properties, an desktop reconnaissance effort was conducted to identify sampling locations that maximizes the number of properties (and acreage) per sample. Table 2 provides the key findings of the desktop reconnaissance effort.

Table 2. Desktop Reconnaissance Key Findings

Number of Remaining High Interest Areas [1]	Acreage of Remaining High Interest Areas1	Number of Areas on Non-Jurisdictional Lands[2,3]	Number of Samples Estimated to Conduct Initial Screening[2]
723	4,539	125	200
Distribution of 200 Initial Screening Samples by Category[2]			
High Likelihood	Medium-High Likelihood	Medium Likelihood	Medium-Low Likelihood
67	69	40	24
Distribution of 200 initial Screening Samples by Type[2]			
Street Dirt / Sediment	MS4 Drop Inlet Sediment	Sediment Sample on Property[4]	Stormwater Grab
170	14	11	5

1 Source: Geosyntec Consultants, 2020

2 Estimated number was extrapolated from a representative desktop analysis of 60% of all remaining properties

3 Discharges directly to the Bay without entering the MS4, on private railroad or BART land, or do not offer feasible sampling from the public right of way; these properties are excluded from the initial screening

4 Sediment sample to be collected on property rather than in public right of way adjacent to property; this is usually done on public agency land where encroachment permission is easily granted

2.3 Approach – Follow-Up Sampling

Following initial screening, it will become necessary to conduct some follow-up sampling and analysis to refine the identification of source areas. For example, if a sample result is elevated that characterized

multiple properties, then additional sampling will be necessary to narrow in on the source. In another example, if initial screening results are inconsistent with past monitoring data, then additional sampling may be needed to confirm either elevated concentrations or low concentrations. In many instances, a useful technique for follow-up sampling is to conduct stormwater collection to either confirm or disprove results of previous sediment sampling results. Stormwater sampling is typically not used in the initial screening phase because it is substantially more expensive both in terms of collection level of effort and laboratory analytical costs, but it remains the best method to confirm that pollutants are (or are not) being conveyed through storm drain infrastructure to receiving waters.

The anticipated number of follow-up samples is somewhat difficult to predict and largely depends on the level of proof needed to either: 1) recommend referral to SFRWQCB, or 2) clear of property that may have been known to release PCBs in the past. It is entirely possible that there will be inconclusive cases with confounding results. These uncertainties for follow-up sampling underscore the need for a flexible monitoring approach moving forward, allowing for temporary cessation of initial screening efforts to focus on follow-up monitoring in an area of interest. Conversely, follow-up sampling in a target area may have to be stopped to refocus on another area of interest even when results are inconclusive.

2.4 Schedule and Expected Outcome

Assuming 200 initial screening samples, up to an additional 50 samples for follow-up analysis, and a collection rate of 80 samples per permit term, it may take approximately three permit cycles (15 years) to complete the source areas investigation. Based on the recent history of monitoring suspected/known high-opportunity properties and the number of referrals that resulted from that monitoring (three referrals with two more likely), it is conservatively assumed that one or two additional referrals may result from the investigation of all remaining source areas.

3. FIELD AND LABORATORY METHODS

Field sampling personnel will collect sediment and water samples in the field using methods that minimize contamination, losses, and changes to the chemical form of the analytes of interest. The samples will be collected in the field into pre-cleaned sample containers of a material appropriate to the analysis to be conducted. Pre-cleaned sampling equipment is used for each site, whenever possible and/or when necessary. Appropriate sampling technique and measuring equipment may vary depending on the location, sample type, sampling objective, and weather.

BASMAA standard operating procedures (SOPs) associated with sampling and sample handling which are to be followed are included in Table 3.

Table 3. List of BASMAA RMC SOPs

Standard Operating Procedure	SOP No. (BASMAA 2014)
Manual Collection of Water Samples for Chemical Analysis	RMC FS-2
Collection of Sediment Samples for Chemical Analysis	RMC FS-6
Field Equipment Cleaning Procedures	RMC FS-7
Sample Container, Handling, and Chain of Custody Procedures	RMC FS-9
Completion and Processing of Field Datasheets	RMC FS-10

3.1 Sediment Sampling

Ideally and where a sufficient volume of sediment allows, samples are collected into a composite container, where they are thoroughly homogenized in the field, and then aliquoted into separate jars for each chemical analysis to be conducted. Table x identifies each sediment analytical test name, method number, reporting limit and sample holding time.

The sediment will be scooped from the sample location with the trowel or other pre-cleaned sediment sampling implement and placed into the compositing bucket, or directly into the sample container if no compositing will take place. In cases where sediment samples are taken from street surfaces or other impervious areas, a small nylon or natural fiber pre-cleaned brush may be used in conjunction with the trowel, consistent with methods used during the Proposition 13-funded project conducted by SFEI (McKee and Yee, 2010) and the EPA grant funded study Clean Watersheds for a Clean Bay Task 3

When applicable, when all of the sediment samples from a given site have been collected in the compositing bucket, the sediment will be composited in the field. The composite sample will then be scooped with the trowel into laboratory-provided glass containers. Sample containers will be filled to the top, taking care to prevent sediment from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. All samples will then be sealed, labeled, and placed in a chilled cooler pending delivery under COC to the laboratory.

Table 4. Sediment Screening Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	EPA 8082A	0.5 µg/kg	1 year
Total Mercury	EPA 7471B	5 µg/kg	1 year
Total Organic Carbon	ASTM D4129-05M	0.05%	28 days
Particle Size Distribution[2]	ASTM D422M	0.01%	28 days

1 San Francisco Bay RMP 40 PCB congeners include PCB-8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203.

2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns.

3.2 Stormwater Sampling

Stormwater sample collection techniques and health and safety considerations will adhere to all relevant protocols specified in the RMC's SOP FS-2, *Manual Collection of Water Samples for Chemical Analysis, Bacteriological Analysis, and Toxicity Testing* (BASMAA, 2014). Table x identifies each stormwater analytical test name, method number, reporting limit and sample holding time.

As feasible, monitoring staff will also adhere to RMC guidance in selection of storm events to monitor:

- Track storms that are likely to produce runoff
- Minimum 0.5" Quantity of Precipitation Forecast (QPF) is good rule of thumb
- When appropriate, observe 72 hour antecedent dry period; however for legacy pollutant sampling locations the 72-hour antecedent dry period need not be observed.
- Collect sample on rising limb of hydrograph, near peak flow
- Coordinate sample collection when possible to sample multiple sites during same event
- Coordinate events with labs in advance.

Table 5. Stormwater Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Target Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	EPA 1668C	0.1 µg/kg	1 year
Total Mercury	EPA 1631E	0.5 ng/L	90 days
Suspended Sediment Concentration	ASTM D 3977-97	1.5 mg/L	7 days
Total Organic Carbon	EPA 9060	0.50 mg/L	28 days

1 San Francisco Bay RMP 40 PCB congeners include PCB-8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203.

2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns.

3.3 Field Equipment and Cleaning Procedures

A list of recommended sampling equipment is presented in Table x. Prior to sampling, all sediment collection implements and mixing trays will be thoroughly cleaned according the following procedure:

- Wash in a solution of Alconox®, Liquinox®, or similar phosphate-free detergent and deionized water
- Rinse three times with deionized water
- Wash with a dilute (2%) solution of hydrochloric acid
- Rinse three times with deionized water
- Wash with reagent grade methanol
- Rinse three times with deionized water
- All equipment is then allowed to dry in a clean environment
- The cleaned equipment is then stored in clean polyethylene bags until used in the field

Table 6. Field Sampling Equipment

Description of Equipment	Material (if applicable)
Sampling scoops / trowels / implements	Stainless steel or Kynar® coated
Compositing bucket / tray	Stainless steel or Kynar® coated
Broom, various sizes (for street dirt collection)	Natural fiber or nylon
Sample containers (8 oz.)	Amber glass, certified clean
Methanol, Reagent grade (Teflon™ squeeze bottle with refill)	
Hydrochloric acid, 2%, Reagent grade (Teflon™ squeeze bottle with refill)	
Liquinox detergent (diluted in Teflon™ squeeze bottle with refill)	
Deionized water	
Plastic scrub brushes	
Container for storage of sampling derived waste, dry	
Container for storage of sampling derived waste, wet	
Wet ice	
Coolers, as required	
Aluminum foil (heavy duty recommended)	
Protective packaging materials	Bubble / foam bags
Splash-proof eye protection	
Personal protective equipment for sampling personnel, including traffic control, as required	
Gloves for sample collection, reagent handling	Nitrile, powder-free
Gloves for “clean hands/dirty hands” mercury sampling	Vinyl, provided by laboratory
Field datasheets	
Chain of custody forms	
Shipping materials (as required)	
Global positioning system	

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4. QUALITY ASSURANCE / QUALITY CONTROL

The data quality objective process is implemented through a quality assurance/quality control (QA/QC) program. The elements of the QA/QC program including required levels of precision and accuracy, and tolerable levels of error are presented in detail in the CCCWP QAPP (CCCWP, 2020).

4.1 Field QA/QC and Duplicate Samples

Field personnel will strictly adhere to the project QA guidelines (CCCWP, 2020) to ensure the collection of representative, uncontaminated samples. Sampling methods are designed to be consistent with those employed for the CW4CB and other previous BASMAA investigations, as will be reasonably practicable in order to facilitate comparability with prior results. The most important aspects of field QA/QC associated with sample collection are:

- Field personnel will be thoroughly trained in the proper use of sample collection equipment and will be able to distinguish acceptable versus unacceptable samples in accordance with pre-established criteria presented in this Work Plan and relevant SOPs.
- Field personnel will be thoroughly trained to recognize and avoid potential sources of sample contamination (e.g., dirty hands, vehicle exhaust, contaminated equipment, ice used for cooling).
- Sampling implements that come in direct contact with the sample will be made of non-contaminating materials (e.g., glass, stainless steel, inert chemical coatings) and will be thoroughly cleaned between sampling stations.
- Sample containers will be pre-cleaned and of the type recommended by the analytical laboratory.

It is anticipated that there will be some degree of naturally occurring heterogeneity associated with both sediment and stormwater sample matrices, and therefore variability within analytical results. Field duplicate samples may assist with interpretation of analytical results by providing a measure of this variability.

Field duplicate samples will be collected with a frequency that is approximately five percent of sample locations or sample count. Generally, field duplicate sample collection will be spatially and temporally distributed among sampling sites to best represent variability of field conditions.

Stormwater sample duplicates will be filled sequentially, immediately following collection of their respective parent sample. Sediment sample duplicates will be homogenized with a mixing implement in sample-dedicated compositing buckets or trays where sample volume allows. Homogenized material will then be transferred to the appropriate wide-mouth glass jars for both the regular (parent) and duplicate samples. All jars designated for a particular analysis (e.g., PCBs) will be filled sequentially before jars designated for another analysis are filled (e.g., grain size). Duplicate samples will be

preserved, packaged, and sealed in the same manner as other samples of the same matrix. A separate sample number and station number will be assigned to each field duplicate, and it will be submitted blind to the laboratory.

4.2 Laboratory QA/QC

The end products of laboratory analysis are data reports that should include a number of QA/QC results along with the environmental results. QA/QC sample results reported by the lab must include internal laboratory QA/QC results (method blanks, matrix spikes, laboratory duplicates, and laboratory control samples). These laboratory QA/QC results help assess analytical accuracy, precision and the potential for contamination. There are often differences among laboratories in terms of style and format of reporting. The data reviewer will verify that the laboratory data package as received includes the following items:

- A narrative which outlines any problems, anomalies, conclusions, and corrective actions
- Sample identification numbers
- Sample extraction and analysis dates/times
- Reporting limits and detection limits
- Results of method blanks
- Results of matrix spike and matrix spike duplicate analyses, including calculation of percent recovery and relative percent differences
- Results of laboratory control sample analyses, and calculation of percent recovery
- Results of standard reference material analyses, and calculation of percent recovery
- Surrogate spike analyses results for organic constituents and calculation of percent recovery
- A summary of acceptable QA/QC criteria used by the laboratory

4.3 Analytical Data Verification and Validation

Verification

Chain of custody records will be compared with field logbooks and laboratory data reports to verify the accuracy of all sample identification and to ensure that all samples submitted for analysis have a value reported for each parameter requested. The laboratory reports will be reviewed to identify results that are outside the range of normally observed values. Any type of suspect result or apparent typographical error will be verified with the laboratory. Besides apparent out-of-range values, the indicators of potential laboratory reporting problems include the following:

- Significant lack of agreement between analytical results reported for laboratory duplicates or field duplicates
- Unusual numbers of detected values reported for blank sample analyses
- Inconsistency in sample identification/labeling

If the laboratory confirms a problem with the reported concentration, the corrected or recalculated result will be issued in an amended report, or if necessary, the sample might be re-analyzed. If laboratory results are changed or other corrections are made by the laboratory, a revised laboratory report will be requested to update the project records.

Other steps for the data verification process include the following:

- Ensuring the proper preparation and/or preservation method was applied to all samples
- Ensuring that the correct analytical method was applied to the samples
- Verifying that target reporting limits were achieved
- Assessing that method holding times were met after sample delivery to the laboratory

Validation

The data quality evaluation process (data validation) is structured to provide systematic checks to ensure that the reported data accurately represent the concentrations of constituents to the maximum extent practicable. Data validation can often identify sources of contamination in the sampling and/or analytical processes, as well as detect deficiencies in the laboratory analyses or errors in data reporting. Data validation allows monitoring data to be used in the proper context with the appropriate level of confidence. QA/QC parameters that are reviewed in the validation process fall into the following categories:

- Reporting and method limits
- Holding times
- Contamination check results (method blanks)
- Precision analysis results (laboratory, field, and matrix spike duplicates)
- Accuracy analysis results (matrix spikes, surrogate spikes, laboratory control samples, and external reference standards)

Each of these QA/QC parameters will be compared to data quality acceptability criteria, also known as the project's data quality objectives (DQOs). The key steps that will be adhered to in the analysis of each of these QA/QC parameters are as follows:

- Examine the complete set of the QA/QC results for the parameter being analyzed
- Compare the laboratory QA/QC results to accepted criteria (DQOs)
- Compile any out-of-range values and report them to the laboratory for verification and potential reissue of the results for the parameter

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5. DATA MANAGEMENT AND REPORTING

Record keeping of field measurements data will employ standard record-keeping and tracking practices. All field measurements will be entered in datasheets at the time of collection. Field measurement data that were entered into datasheets will be quality control checked for entry errors. These data as well as all laboratory data deliverables will be maintained on a secure central server which is backed up daily. Additional data management procedures will follow the CCCWP QAPP where specified.

On an annual water-year basis, after field sampling is concluded and all issues related to project data have been finalized, a report documenting methods and results will be prepared. The annual reports may include discussions of sampling results, summary tables, graphical representation of sampling sites and analytical concentrations, statistical analysis and interpretation, recommendations for future monitoring, and an assessment of data quality.

Annual reports will conform to MRP requirements of completeness and content. To track progress toward achieving the monitoring goals set forth in this Work Plan, the annual reports will show how sampling was applied to the prioritized list of remaining source areas and will document percent completion. On a permit-cycle basis, updates on the overall completion time frame will be made.

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6. REFERENCES

CCCWP, 2020. Quality Assurance Project Plan, Pollutants of Concern Monitoring; Pesticides and Toxicity Monitoring MRP 2 Provisions C.8.f, C.8.g. Prepared by ADH Environmental and Applied Marine Sciences. February 14, 2020.

SFBRWQCB, 2016. California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, Order R2-2015-0049 NPDES Permit No. CAS612008. November 19, 2016.

Yee, D., and McKee, L. J., 2010. *Task 3. 5: Concentrations of PCBs and Hg in soils, sediments and water in the urbanized Bay Area: Implications for best management.* A technical report of the Watershed Program. SFEI Contribution 608. San Francisco Estuary Institute, Oakland, CA. March 31, 2010.

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7. APPENDIX A – EXAMPLE FIELD DATASHEETS FOR SEDIMENT STORMWATER QUALITY SAMPLING

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CCCWP POCs Field Data Sheet - SEDIMENT Collection			Contractor:	Pg of Pgs
StationID:	*Date (mm/dd/yyyy):	/ /		
General Location:	ArrivalTime:	DepartureTime:		
ProjectCode:	Personnel:			

Location: Bank Midchannel StormDrain PumpStation Curb&Gutte		*GPS/DGPS	**Lat (dd.ddddd)**	**Long (ddd.ddddd)**	OCCUPATION METHOD: Walk-in Bridge R/V _____ Other
GPS Device:		**Target:**			STARTING BANK (facing downstream): LB / RB / NA
Datum: NAD83	Accuracy (ft / m):	**Actual:**			DISTANCE FROM BANK (m): / STREAM WIDTH (m): / WATER DEPTH (m):

Habitat Observations (CollectionMethod = Habitat_generic)		WADEABILITY: Y / N / Unk	Wind Speed (mph):	HYDROMODIFICATION: None, Bridge, Pipes, ConcreteChannel, GradeControl, Culvert, AerialZipline, Other LOCATION (to sample): US / DS / WI / NA
SITE ODOR:	None,Sulfides,Sewage,Petroleum,Smoke,Other_____			
SKY CODE:	Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy	WIND DIRECTION (from):	N W E S	
OTHERPRESENCE:	Vascular,Nonvascular,OilySheen,Foam,Trash,Other____			**PHOTOS** (RB & LB assigned when facing downstream; RENAME to StationCode_yyyy_mm_dd_uniquecode): 1: (RB / LB / BB / US / DS / ##)
DOMINANTSUBSTRATE:	Bedrock, Concrete, Cobble, Gravel, Sand, Mud, Unk, Other_____			
SEDODOR:	None, Sulfides, Sewage, Petroleum, Mixed, Other_____	PRECIPITATION:	None, Fog, Drizzle, Rain, Snow	2: (RB / LB / BB / US / DS / ##)
SEDCOLOR:	Colorless, Green, Yellow, Brown	PRECIPITATION (last 24 hrs):	Unknown, <1", >1", None	
SEDCOMPOSITION:	Silt/Clay, FineSand, CoarseSand, Gravel, Cobble, Mixed, HardPanClay	EVIDENCE OF FIRES:	No, <1 years, <5 years	3: (RB / LB / BB / US / DS / ##)
OBSERVED FLOW:	NA, Dry Waterbody Bed, No Obs Flow, Isolated Pool, Trickle (<0.1cfs), 0.1-1cfs, 1-5cfs, 5-20cfs, 20-50cfs, 50-200cfs, >200c			

Samples Taken (# of containers filled) - Method=Sed_Grab | **Field Dup YES / NO:** (SampleType = Grab / Integrated; LABEL_ID = FieldQA; create collection record upon data entry

SAMPLE TYPE: Grab / Composite | Equip. Used: Scoop (SS / PC / PE), Core (SS / PC / PE), Grab (Van Veen / Eckman / Petite Ponar) | Depth Collected (cm): _____

Circle all that apply	PCBs	Mercury	Grain Size	TOC	Metals[1]	PAHs	Pesticides[2]	Toxicity[3]					
Sample ID													

1. Metals = arsenic, cadmium, chromium, copper, lead, nickel, zinc
2. Pesticides = pyrethroids (bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lamda-cyhalothrin, permethrin), carbaryl, fipronil and degredates.
3. Toxicity = *P. promelas, C. dubia, S. capricornutum, H. azteca, C. dilutus*

COMMENTS:

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CCCWP POCs Field Data Sheet - WATER collection			Contractor:	Pg of Pgs
StationID:	Date (mm/dd/yyyy): / /			
General Location:	ArrivalTime:	DepartureTime:		
ProjectCode:	Personnel:			

Location: Bank Midchannel StormDrain PumpStation Curb&Gutter		GPS/DGPS	**Latitude**	**Longitude**	OCCUPATION METHOD: Walk-in Bridge R/V _____ Other
GPS Device:		**Target:**			STARTING BANK (facing downstream): LB / RB / NA
Datum: NAD83	Accuracy (ft / m):	**Actual:**			Point of Sample (if Integrated, then -88 in dbase)

Habitat Observations (CollectionMethod = Habitat_generic)		WADEABILITY: Y / N / Unk	Wind Speed (mph):		DISTANCE FROM BANK (m):		STREAM WIDTH (m):
SITE ODOR:	None,Sulfides,Sewage,Petroleum,Smoke,Other_____						WATER DEPTH (m):
SKY CODE:	Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy	WIND DIRECTION (from):	N W E S	HYDROMODIFICATION: None, Bridge, Pipes, ConcreteChannel, GradeControl, Culvert, AerialZipline, Other LOCATION (to sample): US / DS / WI / NA			
OTHER PRESENCE:	Vascular,Nonvascular,OilySheen,Foam,Trash,Other_____			**PHOTOS** (RB & LB assigned when facing downstream; RENAME to StationCode_yyyy_mm_dd_uniquecode):			1: (RB / LB / BB / US / DS / ##)
DOMINANT SUBSTRATE:	Bedrock, Concrete, Cobble, Gravel, Sand, Mud, Unk, Other_____						
WATERCLARITY:	Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis)	PRECIPITATION:	None, Fog, Drizzle, Rain, Snow				2: (RB / LB / BB / US / DS / ##)
WATERODOR:	None, Sulfides, Sewage, Petroleum, Mixed, Other_____	PRECIPITATION (last 24 hrs):	Unknown, <1", >1", None				
WATERCOLOR:	Colorless, Green, Yellow, Brown, Gray	EVIDENCE OF FIRES:	No, <1 year, <5 years				3: (RB / LB / BB / US / DS / ##)
OVERLAND RUNOFF (Last 24 hrs):	none, light, moderate / heavy, unknown						
OBSERVED FLOW:	NA, Dry Waterbody Bed, No Obs Flow, Isolated Pool, Trickle (<0.1cfs), 0.1-1cfs, 1-5cfs, 5-20cfs, 20-50cfs, 50-200cfs, >200cfs						

Field Measurements (SampleType = FieldMeasure; Method = Field) *Record replicate Free and Total Chlorine measurements for any results > 0.08 mg/L*

	DepthCollected (m)	Water Temp (°C)	pH	O_2 (mg/L)	Specific Conductivity (uS/cm)	Salinity (ppt)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Free Chlorine (mg/L)	Total Chlorine (mg/L)			Chlorine Kit Exp. Date
SUBSURF/MID/ BOTTOM													
Instrument:													
Calib. Date:													

Samples Taken (# of containers filled) - Method=Water_Grab													**Field Dup YES / NO:** (SampleType = Grab / Integrated; LABEL_ID = FieldQA; create collection record upon data entry
SAMPLE TYPE: Grab / Integrated			COLLECTION DEVICE:										Indiv bottle (by hand, by pole, by bucket); Teflon tubing; Kemmer; Pole & Beaker; Other _____
Circle all that apply	SSC	PCBs	TOC	Mercury	Methymercury	Total Copper	Dissolved Copper	Hardness	Nutrients[1]	Pesticides[2]	Toxicity[3]		
Sample ID													

1. Nutrients = ammonia, nitrate, nitrite, TKN, orthophosphate, and total phosphorus. Field filter for ammonia, nitrate, nitrite, and orthophosphate.

2. Pesticides = pyrethroids (bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lamda-cyhalothrin, permethrin), imidacloprid, indoxacarb, fipronil and degredates.

3. Toxicity = *P. promelas, C. dubia, S. capricornutum, H. azteca, C. dilutus*

COMMENTS:

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APPENDIX D

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

CONTRA COSTA CLEAN WATER PROGRAM

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

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Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

Attachment B PCBs in Priority Building Materials Screening Assessment Form B-1

Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

The mention of commercial products, their source, or their use in connection with information in BASMAA products is not to be construed as an actual or implied approval, endorsement, recommendation, or warranty of such product or its use in connection with the information provided by BASMAA.

This disclaimer is applicable to all BASMAA products, whether information from the BASMAA products is obtained in hard copy form, electronically, or downloaded from the Internet.

Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

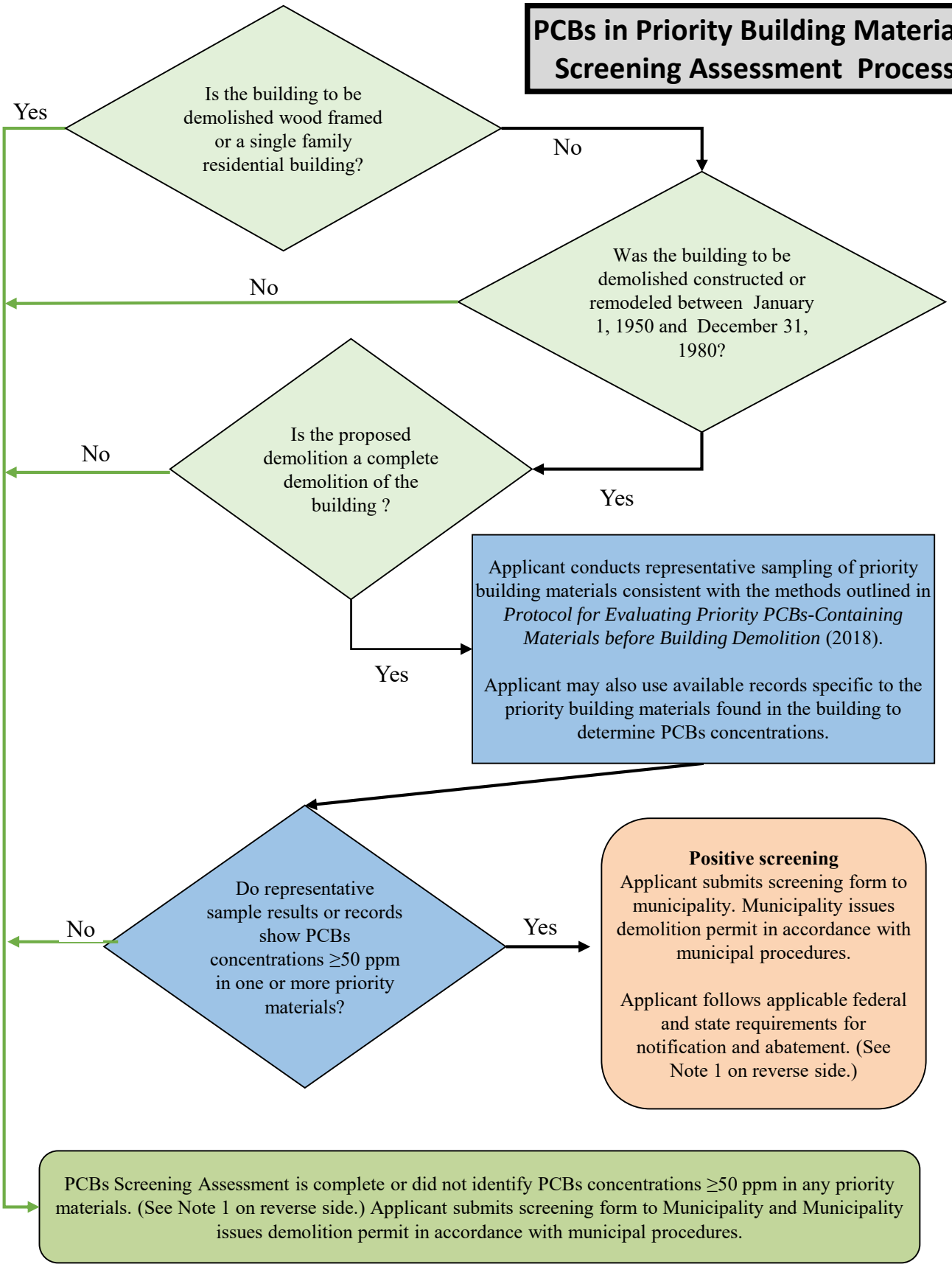

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

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Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

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[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

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[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	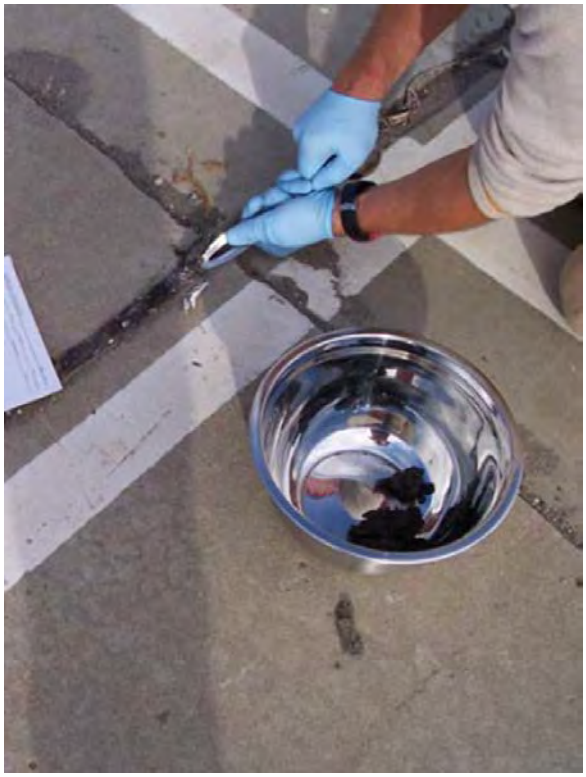
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	
Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7

<u>Thermal Insulation</u>:

Damaged felt-style thermal insulation.

Photograph 8

<u>Thermal Insulation</u>:

Exposed/damaged fiberglass insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	

Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	

Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

APPENDIX E

Source Area Investigation Guidance

CONTRA COSTA CLEAN WATER PROGRAM

Source Area Investigation and Abatement Guidance

Process to Conduct Source Area Investigations during MRP 3.0

Background

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

Source Area Investigation Process

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
    - No evidence of current or historical use of PCBs; and,
    - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
    - There may be evidence of current or historical use of PCBs; and/or
    - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
    - There is evidence of current or historical use of PCBs; and/or
    - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all stormwater samples is less

than 500 ng/g[1], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

    - Electrical equipment associated with PCBs (e.g., transformers and capacitors);
    - Old equipment with hydraulic fluids;
    - Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;

[1] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).
- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).
- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX F

CCCWP Green Infrastructure Cost Estimation Methodology Memo

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Memorandum

Date:	November 28, 2018
To:	Adele Ho and Courtney Riddle, Contra Costa Clean Water Program
Copies to:	Dan Cloak, Dan Cloak Consulting
From:	Lisa Austin, Principal; Kelly Havens, Senior Engineer; and Brian Rowley, Senior Engineer
Subject:	Green Infrastructure Cost Estimation Methodology Geosyntec Project Number: WW2407

1. INTRODUCTION

This memorandum provides a simple methodology for estimating green infrastructure capital (design and construction) and operations and maintenance (O&M) costs for use in green infrastructure (GI) planning.

To develop the methodology, GI facility cost data were gathered from several sources within the San Francisco Bay Area and Southern California to develop relationships between project size (tributary shed area) and total capital cost (construction and design). Likewise, O&M cost data were gathered from these sources, as well as through literature review.

2. COST ESTIMATE METHODOLOGY OVERVIEW

2.1 Projects Reviewed

Geosyntec assessed available cost information for 51 constructed projects, as follows:

- Ten projects constructed as part of the Caltrans BMP Retrofit Pilot Program;
- Fifteen projects constructed in the following California jurisdictions:
    - City of Concord,
    - City of El Cerrito,
    - City of La Mesa,
    - City of Los Angeles,
    - City of Oakley,
    - City of Pittsburg,

  - City of San Diego,
  - Union City, and
  - Unincorporated Contra Costa County;
- Six projects constructed as part of the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Project (BASMAA, 2017); and
- Twenty constructed projects from Enhanced Watershed Management Plans (EWMPs) located in Southern California.

2.2 Cost Estimation Project Categories

Construction costs vary by facility type and project location. For example, green street projects often include ancillary construction costs associated with retrofitting the existing right-of-way and therefore are often relatively more expensive than other project types per unit area treated. Regional facilities have greater tributary areas and thus often have reduced costs per acre treated given fixed mobilization costs.

Information on facility type and location was used to group the projects into three cost estimation project categories: Green Street, Distributed Green Infrastructure, and Regional Stormwater Control. The following facility types that were included in each category include:

- Green Street: Projects built within the right-of-way, which include curb cutting and other costs associated with street retrofits. The treatment control measures may include infiltration trenches, bioretention, and infiltration galleries.

- Distributed Green Infrastructure: Biofilters, swales, infiltration strips, and bioretention installed within a parcel to treat runoff generated on that parcel.

- Regional Stormwater Control: Infiltration basins, large storage facilities, and treatment wetlands installed to treat runoff from a larger drainage area.

Projects with significant subsurface components were removed from the analysis for the Green Streets and Distributed Green Infrastructure categories due to large variances in overall trends. Subsurface green infrastructure work often involves shoring, utility relocations, and unforeseen costs associated with unknown subsurface conditions. These cost impacts did not appear to affect trends in the Regional Stormwater Control category, and thus projects with subsurface treatment facilities were included.

2.3 Source of Cost Data

Data sources varied for the projects that are summarized. For instance, for EWMP projects, data was collected from various sources, including the Proposition O monthly progress report from

August 2016 (Bureau of Engineering Prop O Clean Water Division, 2016) and publicly available online information, such as the project fact sheets provided by the City of Los Angeles stormwater program (http://www.lastormwater.org/). For CW4CB and Caltrans, cost data was published as part of Project Reports and "BMP Retrofit Pilot Program", respectively. For municipal projects, information was obtained via communication with relevant city staff.

3. COST ESTIMATE RESULTS

3.1 Design and Construction Cost Estimate

Table 1 below presents unit cost for design and construction, in 2018 dollars, for each project category. When analyzing these cost data, best professional judgment was used to distribute the design and construction costs when the information provided was unclear. If design costs were not available for a project, an estimate for design was inferred from other projects for which such costs were available. From these, the cost of design is approximately 30% of the construction cost.

Table 1: Statistical Summary of Unit Capital Cost for Each Project Category

Project Category	No. of Projects (n)	Unit Capital Cost ($/ac treated) in 2018 Dollars[1]					
		Minimum	25th-percentile	Median	75th-percentile	Maximum	Mean
Green Street	19	$25,000	$70,000	$137,000	$267,000	$1,290,000	$213,000
Distributed Green Infrastructure	21	$16,000	$90,000	$121,000	$176,000	$416,000	$153,000
Regional Stormwater Control	11	$15,000	$25,000	$61,000	$127,000	$427,000	$101,000

[1] Units have been rounded to the nearest $1,000.

3.2 Annual O&M Cost Estimate

Annual O&M costs are intended to account for activities necessary to maintain the effectiveness of a project that recur on a regular basis, such as routine maintenance on an annual basis or repairs following a large storm event. For this cost analysis, annual O&M costs do not include replacement (of portions) or rehabilitation of green infrastructure facilities, which occurs approximately every 20 to 30 years.

Data was compiled from the cost estimation sources listed in Section 2.1., when available, as well as from a literature review of reports and studies. Additionally, interviews were conducted in May and June of 2017 [City of Tacoma, Washington (J. Knickerbocker, personal communication, June 1, 2017, and the City of Portland, Oregon (M. Juon, personal communication, May 30, 2017)]. Sources of O&M data are summarized in Table 2.

For planning purposes, annual O&M costs are often assumed to be a percentage of the capital (design and construction) costs. As shown in Table 2 below, annual O&M costs range from approximately 1% to 6% of the capital costs, with an average of 4% of capital cost for the data sources reviewed.

Table 2: Comparison of O&M Cost Estimates

Source	Cost Estimation Category	O&M Annual Cost Factor (Percent of Capital Costs)
EWMP	Green Street	3.6 %
EWMP	Distributed GI	1.3 %
EWMP	Regional	1.3 %
City of Tacoma, Interview, 2017	Green Street	1.0 % - 4.6 %
City of Tacoma, Interview, 2017	Regional	5 %
City of Portland, Interview, 2017	Regional	1.5 % - 4.7 %
City of Portland, Interview, 2017	Green street	1.0 % - 3.1 %
Los Angeles Alliance for a New Economy (LAANE) Liquid Assets Report, 2018 (LAANE, 2018)	Not Specified	4.3 %
Comparison of Maintenance Cost, Labor Demands, and System Performance for LID and Conventional Stormwater Management, 2013 (Houle et al., 2013)	Not specified	4.1 % - 6.3 %
Caltrans BMP Retrofit Pilot Program Final Report, 2004 (Caltrans, 2004)	Not specified	3.2 %
EPA Green Streets Municipal Handbook, 2008 (EPA, 2008)	Not specified	5.6 %

3.3 Total Project Cost Estimation

The total cost of a project includes the capital costs and the annual O&M costs over the design life of the project.

$$Total\ Cost = Capital\ Cost + Present\ Value\ O\&M\ Cost$$

The capital cost, which includes both the design cost and the construction cost, is estimated for a new project based upon its cost estimation category and treatment area using the equations provided in Table 2. The annual O&M cost is calculated by multiplying the capital cost by the applicable fixed O&M cost factor of 4%, derived from the sources listed in Table 3. For the purposes of this analysis, a 20-year design life and a 3% inflation rate were used to calculate the total present value of the annualized O&M costs.

4. REFERENCES

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* * * * *

APPENDIX G

CCCWP Memo on Scenarios for Attaining PCBs Loads by GSI

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Memorandum

Date:	August 12, 2020
To:	Karin Graves, Contra Costa Clean Water Program
From:	Lisa Austin, P.E., Principal; Kelly Havens, P.E., Senior Engineer; and Elai Fresco, P.E., Project Engineer
Subject:	CCCWP Reasonable Assurance Analysis – 2030 Scenario Geosyntec Project Number: LA0540

1. BACKGROUND

This memorandum presents the results of an analysis of scenarios that investigate the level of implementation needed to result in polychlorinated biphenyls (PCBs) load reductions sufficient to attain the PCBs total maximum daily load (TMDL) wasteload allocation for Contra Costa County by 2030.

Municipal Regional Permit (MRP) (SFBRWQCB; Order No. R2-2015-0049; as amended by Order No. R2-2019-0004) Provisions C.11.d and C.12.d require that a reasonable assurance analysis (RAA) be conducted for the PCBs and mercury control measures described in the countywide PCBs Control Measure Plan and Mercury Control Measure Plan. The RAA methodologies and estimated load reductions for the control measures plans are provided in the RAA Report (Appendix A of the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report (CCCWP, 2020)). The load reduction results are summarized in Table 1 below.

Table 1: Summary of Estimated PCBs Load Reductions Achieved through Control Measure Implementation

Control Measure	PCBs Load Reduction by 2030 (kg/yr)
PCBs in Building Materials Management	0.37
Source Property Identification and Abatement	0.54
PCBs in Electrical Utilities Management	0.12
PCBs in Infrastructure	0.01
Green Stormwater Infrastructure	0.18
Full Trash Capture Treatment Control Measures	0.05
Enhanced Operations and Maintenance	0.004
Total Load Reduced	**1.27**
Load Reduction Goal	**1.51**
Remaining Load to be Reduced	**0.24**

As shown in Table 1, the control measures described in the RAA Report are not estimated to provide the required load reduction (i.e., the load reduction goal of 1.51 kg/yr) to achieve the TMDL wasteload allocation by the TMDL compliance date of 2030 (although it is estimated to be achieved by 2050 or later in the RAA Report). The RAA estimates a deficit of 0.24 kg/yr of PCBs load reduction by 2030. The discussion below assesses the level of effort or change of assumptions that would result in compliance with the wasteload allocation by 2030.

An analysis of mercury is not included in this memorandum, because the RAA model estimates that the existing baseline mercury load may have achieved the TMDL wasteload allocation already. This is a nuance related to calculating baseline and accounting for lands above reservoirs. The RAA supports the TMDL assumption that certain control measures (i.e., GSI and enhanced operations and maintenance) implemented to achieve PCB reductions will achieve target mercury reductions. Therefore, this scenario analysis focuses on PCBs for simplicity.

2. PCBS LOAD REDUCTION GOAL

The RAA baseline pollutant loading model represents the loading of PCBs across the County during the TMDL baseline period (i.e., 2003 – 2005). The baseline load used to establish the PCBs TMDL load reduction goal for the Contra Costa MRP Permittees is the load for the MRP area (i.e., within Water Board Region 2) below dams, after deducting the estimated baseline load for the other NPDES-permitted stormwater dischargers within this area (i.e., NPDES major and minor permittees and Phase II permittees).

In contrast, the TMDL population-based wasteload allocation for Contra Costa County MRP Permittees was calculated by distributing the countywide urban stormwater wasteload allocation between the MRP Permittees and other NPDES-permitted stormwater dischargers. Using the calculated MRP Permittee portion of both the wasteload allocation and the RAA-calculated baseline load, the load reduction goal is estimated to be 1.51 kg/yr. (For further detail, see the

RAA Report (Appendix A of the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report).

If additional non-MRP Permittee areas are accounted for, this load reduction goal would be reduced, as described in the sections below.

2.1 Adjustment for Caltrans Right-of-Way Area

An additional non-jurisdictional area within Contra Costa County is located in the right-of-way (ROW) area owned and operated by Caltrans, whose urban stormwater discharges are regulated under a separate NPDES permit. An analysis was conducted to estimate the difference in the MRP Permittees' TMDL load reduction goal if the Caltrans area is removed from the MRP Permittee portion of the RAA-calculated baseline load (Table 2).

Table 2: Contra Costa County Estimated PCBs Baseline Loads without Caltrans ROW

RWQCB Region	Above/Below Dam	Permit	Baseline Load PCBs (kg/yr)
Region 2	Below Dam	**MRP[1]**	**1.61**
		NPDES[2]	0.62
		Caltrans	0.12
		Phase 2[3]	0.01
	TMDL Baseline[4]		2.36

[1] Municipal Regional Permit permitted areas, along with IGP facilities and facilities with individual NPDES Stormwater Industrial permits.
[2] Major and Non-Major dischargers with individual NPDES permits.
[3] Phase II General Permit permittees.
[4] See Table 3-1 in the *Contra Costa Clean Water Program Reasonable Assurance Analysis report* (Appendix A to the *Contra Costa Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis report*.)

Table 3 below presents the wasteload allocation for the MRP Permittees after adjusting for the Caltrans portion of the baseline.

Table 3: TMDL Wasteload Allocations for Contra Costa County with Caltrans

Stormwater Discharger within TMDL Baseline Area[1]	Percentage of Baseline Load (%)	PCBs Wasteload Allocation (kg/yr)
MRP Permittees	68%	0.205
NPDES Permittees	26%	0.079
Caltrans	5%	0.015
Phase 2 Permittees	0.6%	0.002
Contra Costa County	100%	0.3

[1] All Water Board Region 2, above dams.

Using the calculated MRP Permittee portion of the wasteload allocation and RAA-calculated baseline load after removing the Caltrans portion, the adjusted load reduction goal would be 1.40 kg/yr (i.e., 1.61 kg/yr – 0.21 kg/yr), in contrast to 1.51 kg/yr with Caltrans included (see Table 1), which is 0.11 kg/yr less. If Caltrans was removed from the baseline and the wasteload allocation, the 2030 PCBs load reduction deficit would be decreased by 46%, from 0.24 kg/yr (see Table 1) to 0.13 kg/yr (i.e., 1.40 kg/yr - 1.27 kg/yr predicted load reduction by 2030 (see Table 1) = 0.13 kg/yr).

Including the Caltrans ROW area in the MRP Permittee baseline assumption is conservative (i.e., generates a greater overall load reduction goal), but allows the Permittees to take full credit for the loads reduced by control measures implemented by Caltrans within Contra Costa County. Leaving Caltrans baseline loads and wasteload allocations as part of the MRP Permittees load reduction goal calculations may also foster collaboration with Caltrans in implementing PCBs control measures going forward.

2.2 Adjustment for Non-Urban Open Space Area

A portion of Contra Costa County within Region 2 is comprised of open space located outside of the urban boundary as defined by the U.S Census. The estimated RAA baseline load for this area is 0.007 kg/yr. This load constitutes a very small fraction of the overall Permittee baseline load (0.4%). Although no control measures would be applied to this area and thus it could be removed from the Permittee baseline load estimate, it is such a small portion of the baseline load for PCBs that it would not affect the PCBs load reduction goal, so has not been removed.

3. APPLICATION OF ADDITIONAL CONTROL MEASURES BY 2030

3.1 Green Stormwater Infrastructure

The RAA model was used to estimate the total potential PCBs load reduction through application of GSI treatment to areas within the County, within Water Board Region 2, and below dams, that is not already treated or projected to be treated by 2030 (i.e., the public and private GSI Plan project areas projected to be implemented between 2030 and 2040 are still "available" for treatment through GSI). The results of this analysis are provided in Table 4 below. Table 5 lists the approximate area that would be needed for private parcels, public parcels, or right-of-way (ROW) to reduced PCBs loads by an additional 0.24 kg/yr by 2030 using the average load reduction from the RAA model for the projects constructed by 2020 or projected for 2030.

Table 4: PCBs Load Available for GSI Treatment by 2030

	Private Parcels	Public Parcels	Right-of-Way	Total
Available Area[1] (Acres)	159,817	99,498	22,465	281,780
Potential PCBs Load Reduction via GSI Treatment (kg/yr)[2]	1.12	0.20	0.21	1.58

[1] Results are for the areas within Contra Costa County that are within Water Board Region 2, below dams, and not already treated or projected to be treated by 2030.

[2] Excludes loads for area within the Concord Naval Weapons Station.

Table 5: PCBs Load Available for GSI Treatment by 2030

Contra Costa County Parameter	RAA Model Result
Average Modeled Load Reduction Potential – Available Private Parcels (g/yr/acre)	0.027
Available Private Parcel Area Needed to Reduce 0.24 kg/yr[1] (acres)	9,042
Average Modeled Load Reduction Potential – Available Public Parcels (g/yr/acre)	0.004
Available Public Parcel Area Needed to Reduce 0.24 kg/yr[1] (acres)	57,483
Average Modeled Load Reduction Potential – Available Public ROW (g/yr/acre)	0.030
Available ROW Area Needed to Reduce 0.24 kg/yr[1] (acres)	8,030

[1] Assumes average modeled load reduction for area category to calculate area needed to be redeveloped and/or treated.

[2] ROW = Right-of-Way.

The following conclusions can be drawn from the results provided in Table 4 and Table 5:

- As can be seen in Table 4, much more area and potential load reduction is available in private parcels than public parcels or rights-of-way.
- Fifty-seven percent of the available area consists of privately-owned parcels. Approximately 9,000 acres of this area (6%) would need to be treated via GSI by 2030 to achieve an additional PCBs load reduction of 0.24 kg/yr. The RAA analysis currently predicts that 1,380 acres of private parcel area will redevelop between 2020 and 2030, therefore six times as much redevelopment would need to occur to achieve the 2030 TMDL WLA solely through private parcels. This much private redevelopment is highly unlikely to occur in the next decade.
- Thirty-five percent of the available area is comprised of public parcels. Approximately 57,500 acres would need to be treated via GSI by 2030 to achieve an additional PCBs load reduction of 0.24 kg/yr. The RAA analysis currently assumes 517 acres of public parcels will be retrofitted between 2020 and 2030, therefore more than 100 times more public parcel area would need to be retrofitted than the public parcel area included in the Permittees' Green Infrastructure Plans. Using the cost estimating methodology presented in the *Contra Costa PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis* report, which assumes a

median capital cost of $121,000 per acre treated with GSI (2018 dollars), retrofitting 57,500 acres of public parcels would cost approximately seven billion dollars. In addition to the large amount of funding that would be needed, installing this much GSI on public parcels in 10 years would be technically infeasible to implement due to the time needed to site projects, conduct preliminary and final engineering design, and go through the municipal procurement process. A typical municipal GSI project would take two to five years to go through this process. Additionally, it is unlikely that the number of contractors needed to construct this much GSI in such a short period of time are available.

- Eight percent of the available area is public ROW; approximately 8,000 acres of ROW would need to be treated via GSI by 2030 to reduce PCBs load by 0.24 kg/yr. As with the discussion on public parcel area above, this is a highly unlikely scenario. The estimated capital cost for retrofitting 8,000 acres of ROW is more than one billion dollars (assuming a median cost of $137,000 per acre treated). The same technical infeasibility constraints as outlined above for retrofitting public parcels applies to retrofitting large areas of public ROW.

3.2 Enhanced Operations and Maintenance

The RAA model was used to assess the potential load reduction that could be achieved by applying enhanced operations and maintenance (O&M) measures in Old Industrial areas that are not planned to be addressed by treatment control measures (i.e., GSI or full trash capture devices) by 2030. Enhanced inlet cleaning was selected as a representative enhanced O&M measure for the purpose of this analysis. The total PCBs load produced by these areas is estimated to be 1.07 kg/yr. Table 6 below presents the potential load reduction if all of this area were addressed through enhanced storm drain inlet cleanout (i.e., increasing the frequency of cleanout from annually to biannually) with and without the use of inlet-based full trash capture devices.

Table 6: Potential Load Reduction through Enhanced Inlet Cleaning in Old Industrial Areas Not Planned for Control Measures by 2030

County/ Region	Enhanced Cleaning Frequency for Inlets with FTC Devices -- Annual to Biannual		Enhanced Cleaning Frequency for Inlets without FTC Devices -- Annual to Biannual	
	Potential Load Reduction (kg/yr)	Potential Load Reduction Rate (g/yr per acre)	Potential Load Reduction (g/yr)	Potential Load Reduction Rate (g/yr per acre)
Efficiency Factor:	**18%**		**5%**	
Contra Costa Region 2	0.33	0.0466	0.092	0.01295

FTC – Full trash capture.

To achieve the additional required PCBs load reduction of 0.24 kg/yr using enhanced street inlet cleaning without inlet-based full trash capture devices, enhanced cleaning would be needed for approximately 18,500 inlets with an average tributary area of one acre (i.e., 18,500-acre drainage area). The cost of implementing enhanced inlet cleaning without full trash capture for this scenario would be $1,850,000 per year for one additional cleanout per year (assumes $100/cleanout).

If new inlet-based full trash capture devices were implemented with biannual cleaning, then a total inlet drainage area of approximately 5,000 acres would be required. Assuming an average one-acre tributary area and a capital cost of $1,000 per acre treated, the capital cost of implementing enhanced inlet cleaning with full trash capture for this scenario would be approximately $5,000,000. The additional ongoing annual cost would be approximately $1,000,000 assuming $200 per year for biannual cleaning.

3.3 Conclusion

The analysis provided in this memorandum leads to a reasonable conclusion that it is technically and economically infeasible to achieve the PCBs TMDL wasteload allocation in Contra Costa County by 2030.

* * * * *

APPENDIX H

CCCWP RAA Modeling Report & Peer Review

CONTRA COSTA CLEAN WATER PROGRAM

REASONABLE ASSURANCE ANALYSIS PEER REVIEW PACKAGE

Alameda Countywide Clean Water Program and Contra Costa Clean Water Program

Municipal Regional Stormwater Permit
NPDES Permit No. CAS612008
Order No. R2-2015-0049

Prepared by

Geosyntec Consultants, Inc.

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Project Numbers: LA0542 and LA0540

December 11, 2019

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RAA_PeerReviewMatrix_ACCWP_CCCWP_120419_RTC.xlsx

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PR-1: Peer Review Component Descriptions

0. INTRODUCTION

This Peer Review package is intended to provide descriptions and back-up references associated with each model component identified for review in the Peer Review for SF Bay PCBs and Mercury Reasonable Assurance Analyses (RAAs) for Green (Stormwater) Infrastructure Instructions/Guidance to Peer Reviewers (Peer Review Instructions) and "FINAL_RAA_PeerReviewMatrix_Template_8_1_19.xlsx" (Peer Review Matrix), provided by BASMAA (2019). The descriptions herein are repeated or expanded from those included in the Peer Review Matrix, which includes fields that are requested to be populated by the peer reviewer. The descriptions provide summary information regarding the model inputs and/or reference other reports and documentation attached to this Peer Review Package that provide more extensive detail.

The Alameda Countywide Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report (ACCWP, 2018) [PR-2] and the Contra Costa Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report (CCCWP, 2018) [PR-3] (i.e., GI Quantitative Relationship Reports) are frequently referenced throughout this Peer Review package. Note that both GI Quantitative Relationship Reports are very similar, as the same RAA modeling methodology was used for both Counties; often reading one of the two reports will provide the referenced information.

1. BASELINE CONDITION MODELING

1.A Model Selection

Refer to Section 2.1 and 2.2 of the GI Quantitative Relationship Reports [PR-2; PR-3] for an overview of the model selected for the CCCWP and ACCWP RAA baseline condition models.

Rationale: The approach used for modeling hydrology is to use a hydrologic response unit (HRU) approach. An HRU is a unique combination of land surface features (imperviousness, underlying soil characteristics, slope, etc.) which is expected to give a consistent runoff response to rainfall, no matter where that unique combination is found. The HRU approach involves modeling thousands of combinations of land surface features present within the area of analysis, for a generic unit area drainage catchment, and then storing these results in a database. These HRU results can been be scaled geospatially across the entire area of analysis without developing a detailed hydrologic model and this method is appropriate for estimating average annual runoff and pollutant loading. This method is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017).

Spatial/Temporal Resolution: Generic HRUs, characterized by varying the values of specific identified parameters within a defined range, are modeled using USEPA's Stormwater Management Model (SWMM). Continuous simulation HRU models are run on an hourly timestep for the identified baseline period of record (water year [WY] 2000 – 2009). An average annual runoff volume per acre is obtained for each HRU. The average annual runoff volume per acre

associated with a specific HRU can then be multiplied by the area represented by that HRU within the entire area for analysis. The resulting volumes associated with each represented HRU within the area of analysis can then be added together to estimate the total average annual runoff volume.

Alignment with Information/Needs/Data Available: The HRU approach is consistent with the *Bay Area RAA Guidance Document* and the precision of the methods used to develop the TMDLs. As the TMDL WLA and MRP requirements are in terms of annual load reduction, event-specific modeling results are not needed. Additionally, long-term continuous simulation modeling allows for effects such as those relating to antecedent conditions (e.g., soil saturation resulting from back-to-back storms) to be incorporated into the results. Finally, detailed storm drain information is not currently available for all areas within the area of analysis, so it is not possible to develop a detailed routing model at this time.

A flow chart representing the Baseline Loading Model is provided:

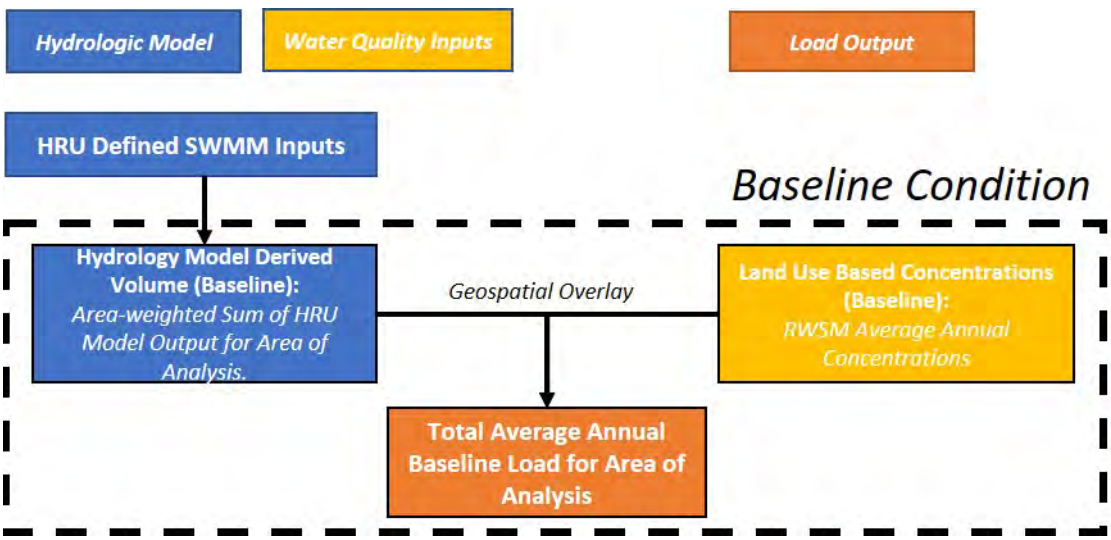

Figure 1-1: Baseline Condition Model Flow Chart

1.B Geographic Area of Analysis

The geographic area of analysis includes the entire area within Contra Costa and Alameda Counties, as shown in Exhibits 1 through 6 of the GI Quantitative Relationship Reports [PR-2; PR-3]. Note that the Counties are not labeled in PR-2 and PR-3; Contra Costa County is north of Alameda County. While the entire area is modeled, baseline results are ultimately subdivided based on regulatory (i.e., MRP covered areas vs. Phase II and Industrial General Permit covered areas) and jurisdictional boundaries. Modeled areas and jurisdictional boundaries are shown in Figure PR-1A and Figure PR-1B for Alameda and Contra Costa Counties, respectively.

1.C Period of Time

Baseline period of record is WY 2000 – 2009 (i.e., October 1, 1999 through September 30, 2009), as documented in the GI Quantitative Relationship Reports [PR-2; PR-3], see section 3.1.1. As included in the RAA Guidance Document (BASMAA, 2017), "For the purposes of RAA analyses, the baseline period for both PCBs and mercury analyses is recommended to be water years 2000

– 2009 (for long-term continuous simulation), or water year 2002 (for representative year simulation). These baseline period options are generally representative of the period during which much of the data were collected for mercury and PCBs." Also see additional detail in item 1.I "Meteorology".

1.D Flows and Pollutant Load Simulation

Section 2.2 of the GI Quantitative Relationship Reports [PR-2; PR-3] describes flow and pollutant load simulation. Refer to Section 2.2.2. of the GI Quantitative Relationship Reports [PR-2; PR-3] specifically for information regarding the water quality model.

1.E Rainfall/Runoff Processes

Rainfall/runoff processes are modeled using USEPA SWMM Version 5.1. A summary of the computational methods employed within SWMM to simulate runoff is provided in Section 3.4 of the USEPA SWMM Manual (USEPA, 2015) [PR-4].

1.F Pollutant Loading Variability

Land use variability is accounted for using SFEI's Regional Watershed Spreadsheet Model (RWSM) output, as described in the "Regional Watershed Spreadsheet Model Version 1.0 Results Summary" memo (Geosyntec, 2019a), provided by BASMAA. The results were developed using Wu et al (2017). Also refer to Section 2.2.2. of the GI Quantitative Relationship Reports [PR-2; PR-3] specifically for information regarding the water quality model.

1.G Watershed Characteristics

See Section 3.1.1 and Table 3 of the GI Quantitative Relationship Reports [PR-2; PR-3] for the watershed characteristics that were varied and the ranges of inputs; also see Table 1.H-1 below, which summarizes SWMM parameter input values.

1.H Watershed Hydrology Parameterization

The output of each uniquely parameterized HRU is matched to those geospatial areas with the unique combination of parameter values, as identified with geospatial data. The geospatial data used to develop the ranges of parameters and match geospatial area to the unique HRUs are shown in Exhibits 1 through 6 of the GI Quantitative Relationship Reports [PR-2; PR-3]. Geospatial data sources associated with each parameter are provided within the text of Section 3.1.1 of the reports (also refer to footnotes). Table 1.H-1 below provides SWMM input values not summarized in Table 3 of the GI Quantitative Relationship Reports [PR-2; PR-3].

Table 1.H-1: SWMM Parameter Input Values

Parameter	Description & Source[1]	Unit	Value
Infiltration Model	Controls how infiltration of rainfall into the upper soil zone of subcatchments is modeled in SWMM.	--	Green Ampt, see parameters in Table 1.H-2
Routing Method	Determines the method used to route flows through the system in SWMM.	--	Kinematic Wave
Reporting Time Step	*Model time step input.*	Minutes	5
Dry Weather Time Step	*Model time step input.*	Minutes	240
Wet Weather Time Step	*Model time step input.*	Minutes	5
Routing Time Step	*Model time step input.*	Seconds	30
Flow Path Length	Overland flow path length assumed for sheet flow runoff. Selected default inputs represent typical overland sheet flow path lengths for undeveloped/open space areas and developed/urban areas, respectively.	Feet	500 (Existing non-developed condition; development footprint)
			250 (Proposed developed condition; development footprint)
N-Imperv	Manning's roughness for impervious or pervious surfaces.	--	0.012 (corresponds to smooth concrete)
N-Perv		--	0.25 (corresponds to dense grass)
Dstore-Imperv	Depth of depression storage (i.e., the maximum surface storage provided by ponding, surface wetting, and interception) for impervious and pervious surfaces.	Inches	0.1, 0.075, and 0.05 for slopes of 3%, 7.5%, and 15%, respectively
Dstore-Perv		Inches	0.2, 0.15, and 0.1 for slopes of 3%, 7.5%, and 15%, respectively
%Zero-Imperv	Percent of the impervious area with no depression storage.	%	25
Groundwater	--	-	Not simulated
Snowmelt	--	-	Not simulated

[1] Source of description and selected model input values obtained from USEPA, 2015 unless otherwise indicated.

Soil parameter model input values are provided in Table 1.H-2.

Table 1.H-2: Green-Ampt Soil Parameters

Hydrologic Soil Group	Prevalent Soil Texture Class	Saturated Soil Conductivity (in/hr)		Suction Head[1] (in)	IMD[1] (in/in)
		Existing Condition[1]	Developed Condition[2]		
A	Sand, Loamy Sand	2.5	1.88	2.61	0.34
B	Sandy Loam	0.3	0.23	6.02	0.22
C	Loam	0.15	0.11	10.4	0.13
D	Clay	0.1	0.08	7.4	0.17

[1] HSG A and B estimated based on texture class from Rawls, et al., (1983); HSG C and D estimated through calibration, see the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation" Memo [PR-5].

[2] Determined based on an assumption of 25% reduction of conductivity due to compaction.

The varied input characteristics resulted in a total of 586 unique pervious HRU models, which are defined by the combinations of rainfall zone, ET zone, HSG, and slope. Additionally, a total of 74 impervious HRU types were modeled, defined by the combinations of rainfall zone, ET zone, and slope. The top 15 most dominant pervious HRU's account for about 50% of the study area. The two most dominant pervious HRU types represent 14% of the total study area, and are both <1% developed (developed includes urbanized and agricultural areas).

1.I Meteorology

Rainfall files used for hydrologic model are documented in Table 1 and Evaporation data inputs are documented in Table 2 of the GI Quantitative Relationship Reports [PR-2; PR-3].

1.J Drainage System Representation

Storm drain system routing was not modeled, as an HRU approach was used, as described above. However, large-scale drainage routing was accounted for when conducting model calibration and validation. Model calibration and validation is further described in the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo" (Geosyntec, 2019b) [PR-5].

1.K Model Calibration

Refer to the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo" (Geosyntec, 2019b) [PR-5].

1.L Model Validation

Refer to the "Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo" (Geosyntec, 2019b) [PR-5].

2. GREEN INFRASTRUCTURE LOAD REDUCTION MODELING

A flow chart showing the development and components of the future condition model is provided.

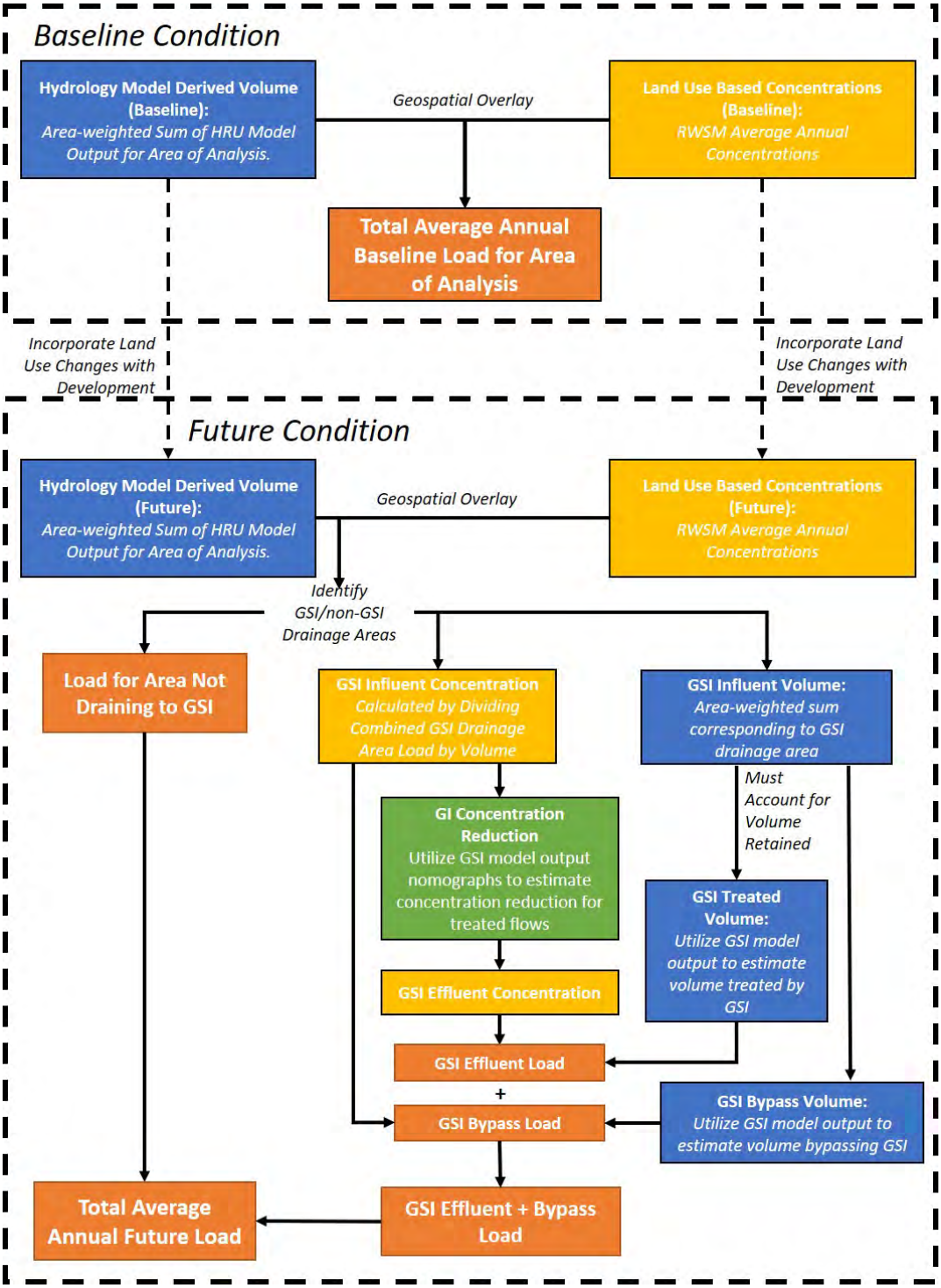

Figure 2-1: Future Condition Model Flow Chart

2.A Load Reduction Goal

The mercury load reduction required to be achieved through GI by 2040 per the MRP is 10 kg/yr MRP area-wide, or 3.1 kg/yr for Alameda County, and 1.7 kg/yr for Contra Costa County.

Calculations were conducted to develop the PCBs load reduction goals as described in the *Bay Area RAA Guidance Document* (BASMAA, 2017). The calculation methodology is summarized below.

2.A.1 TMDL Attainment Load Reduction (2030)

LR_{goal} = Baseline – WLA (kg/yr)

Where:

LR_{goal} = The load reduction goal (kg/yr)

Baseline = The baseline pollutant loading as calculated through the RAA

WLA = The population-based wasteload allocation

The TMDL population-based wasteload allocations for Alameda County and Contra Costa County are provided Table 2.A-1.

Table 2.A-1:TMDL Population-Based Wasteload Allocations for Alameda County and Contra Costa County

Stormwater Improvement Goal	PCBs (kg/yr)
Alameda County	0.5
Contra Costa County	0.3

2.A.2 RAA Calculated Baseline Load - PCBs

The results of the RAA baseline modeling are presented for Alameda County and for Contra Costa County in Table 2.A-2, below. The baseline countywide load used to establish the PCBs load reduction goal for the Permittee area is shown in bold. Refer to the RAA Guidance Document Section 2 and Section 3.5 (BASMAA, 2017) for details on the calculation methodology.

Table 2.A-2: RAA Model Baseline Loading Estimates – PCBs

RWQCB Region	Above/Below Dam	Permit	Baseline Load Alameda County (kg/yr)	Baseline Load Contra Costa County (kg/yr)
Region 2	**Below Dam**	**MRP**	**3.6**	**1.6**
		NPDES	0.2	0.8
		Phase 2	0.5	<0.1
	Above Dam	MRP	<0.1	<0.1
		NPDES	0.0	<0.1
		Phase 2	0.0	0.0
Region 5	Below Dam	MRP	<0.1	0.1
		NPDES	0.0	<0.1
		Phase 2	0.0	<0.1
	Above Dam	MRP	0.0	<0.1
		NPDES	0.0	0.0
		Phase 2	0.0	0.0
		Total	4.3	2.6

Using the preliminary RAA-calculated baseline load[1] of PCBs for each County, the load reduction goal is estimated to be 3.1 kg/yr for Alameda County and 1.3 kg/yr for Contra Costa County.

2.A.3 MRP Load Reduction through GI by 2040

The PCBs load reduction required to be achieved through GI by 2040 (i.e., 3 kg/yr MRP area-wide or 0.9 kg/yr for Alameda County and 0.5 kg/yr for Contra Costa County) must be adjusted to reflect the RAA-calculated baseline load (i.e., 3.6 kg/yr and 1.6 kg/yr for Alameda and Contra Costa Counties, respectively). The MRP load reduction requirement for GI for all permittees (3 kg/yr) represents 20.8% of the overall required TMDL load reduction. Therefore, the adjusted countywide load reduction through GI can be calculated as:

$$LR_{MRP,\ GI,\ 2040} = LR_{goal} * 20.8\%$$

The adjusted countywide PCBs load reduction goal through GI by 2040 are calculated as summarized in Table 2.A-3.

Table 2.A-3: Adjusted Countywide PCBs Load Reduction Goals through GI by 2040

County	PCBs Load Reduction Goal through GI (kg/yr)
Alameda County	0.6
Contra Costa County	0.3

2.B Overall Methodology to Account for GI Load Reductions

Refer to Sections 2.3, 3.2, and 3.3 of the GI Quantitative Relationship Reports [PR-2; PR-3].

[1] As of the May 2019 draft model run; the final baseline load is subject to change per peer review comments

2.C Load Reduction Calculation Method

The load reduction is calculated based on the difference between the baseline PCBs and mercury load and the PCBs and mercury load accounting for GI. The baseline model produces a PCBs and mercury load for each County, along with a "load production" GIS layer that estimates the load corresponding with each parcel and ROW segment within each County (note that individual parcel loadings should be considered representative of the 'average tendency' of loading for similar parcels). This "load production" layer is revised for the future condition based on land use changes, then combined in GIS with planned green infrastructure projects to estimate the resulting parcel load, assuming standard bioretention treatment. The estimated load reduced per acre using this approach is calculated and presented in Sections 4 and 5 of the GI Quantitative Relationship Reports [PR-2; PR-3].

The sum of the revised and treated parcel loads, across each County, provides the load under the future estimated condition. This future estimated load is then subtracted from the baseline estimated load to estimate loads reduced.

3. REFERENCES

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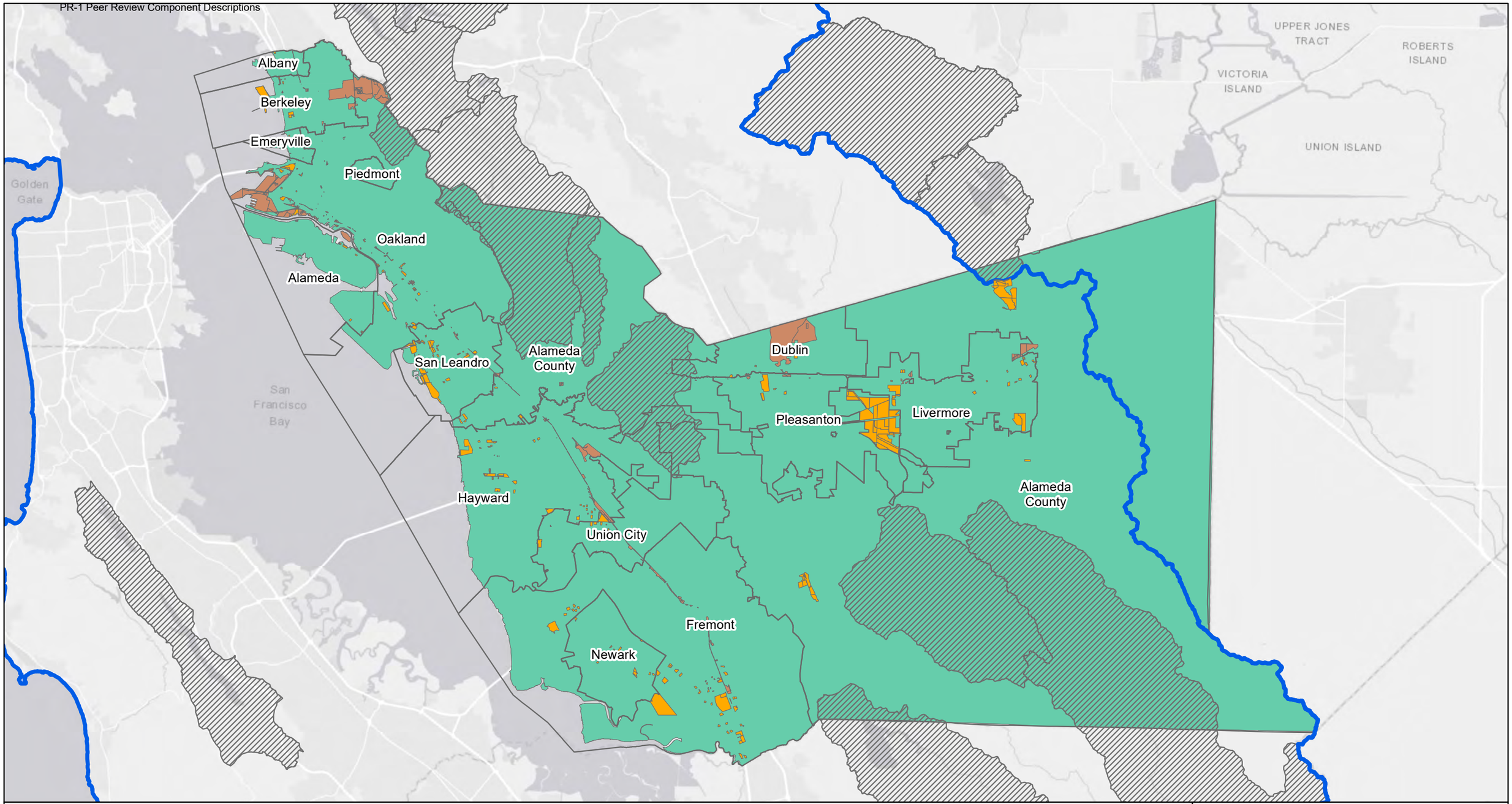

Legend

- Municipalities
- Area Above Dams[1]
- RWQCB Region 2 Boundary
- RWQCB Region 5

Stormwater Permit Coverage

- Individual Stormwater NPDES Permit
- Phase II General Stormwater Permit Water Quality Order 2013-0001-DWQ
- MS4

Notes:
1. Areas above Dams are not included in baseline load estimated for Municipal Regional Stormwater Permittees. Areas covered under different stormwater permits (i.e., individual NPDES permits, Phase II permit) are not included in baseline load estimates for Municipal Regional Stormwater Permittees.

N

0 20,000 Feet

Alameda County RAA
Baseline Loading Analysis Area

Alameda County
California

Geosyntec consultants

Oakland | October 2019

Figure 1A

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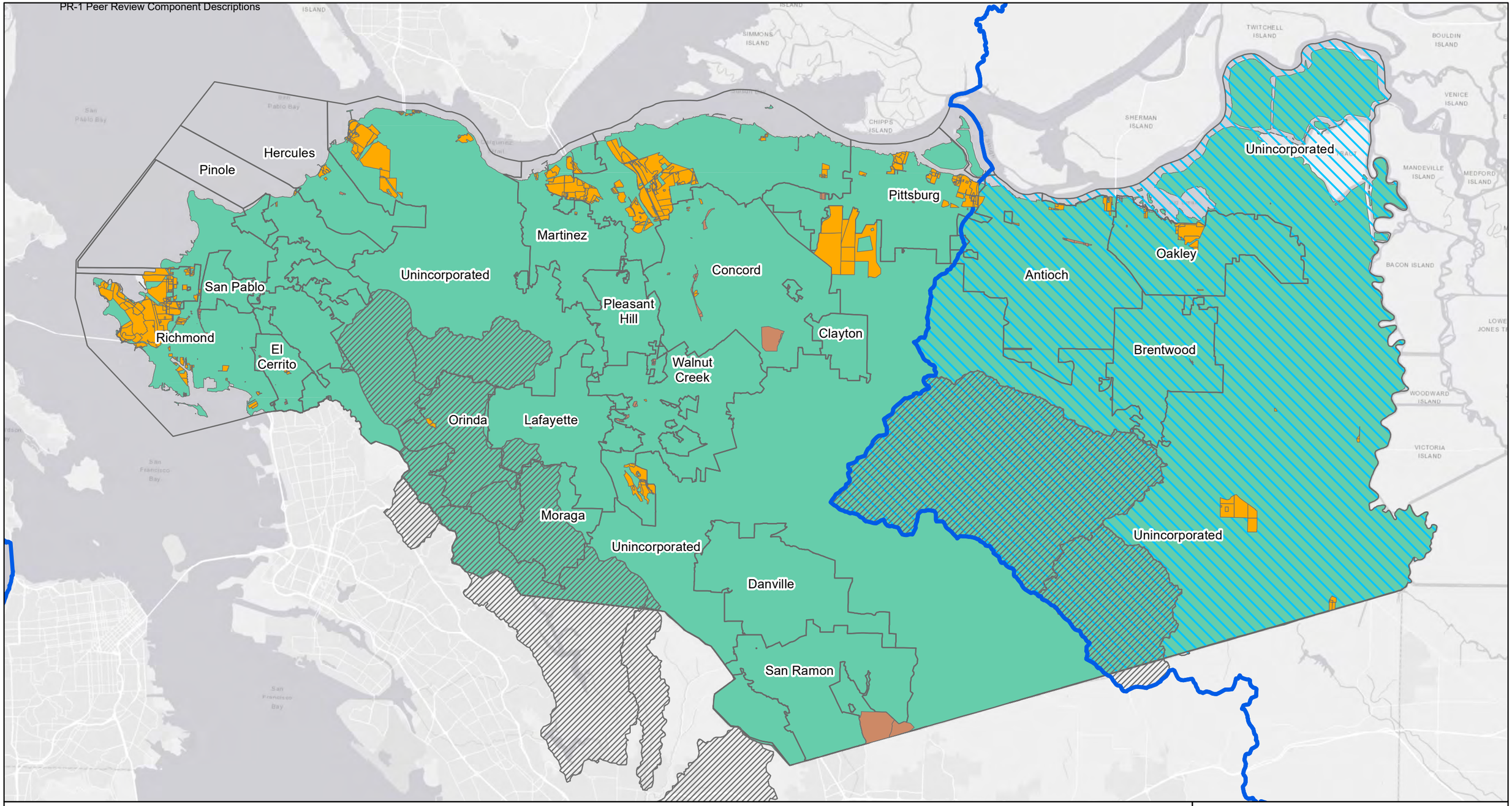

Legend

- Municipalities
- Area Above Dams[1]
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- RWQCB Region 5

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N

0 18,000 Feet

Contra Costa County RAA
Baseline Loading Analysis Area

Contra Costa County
California

Geosyntec consultants

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Figure 1B

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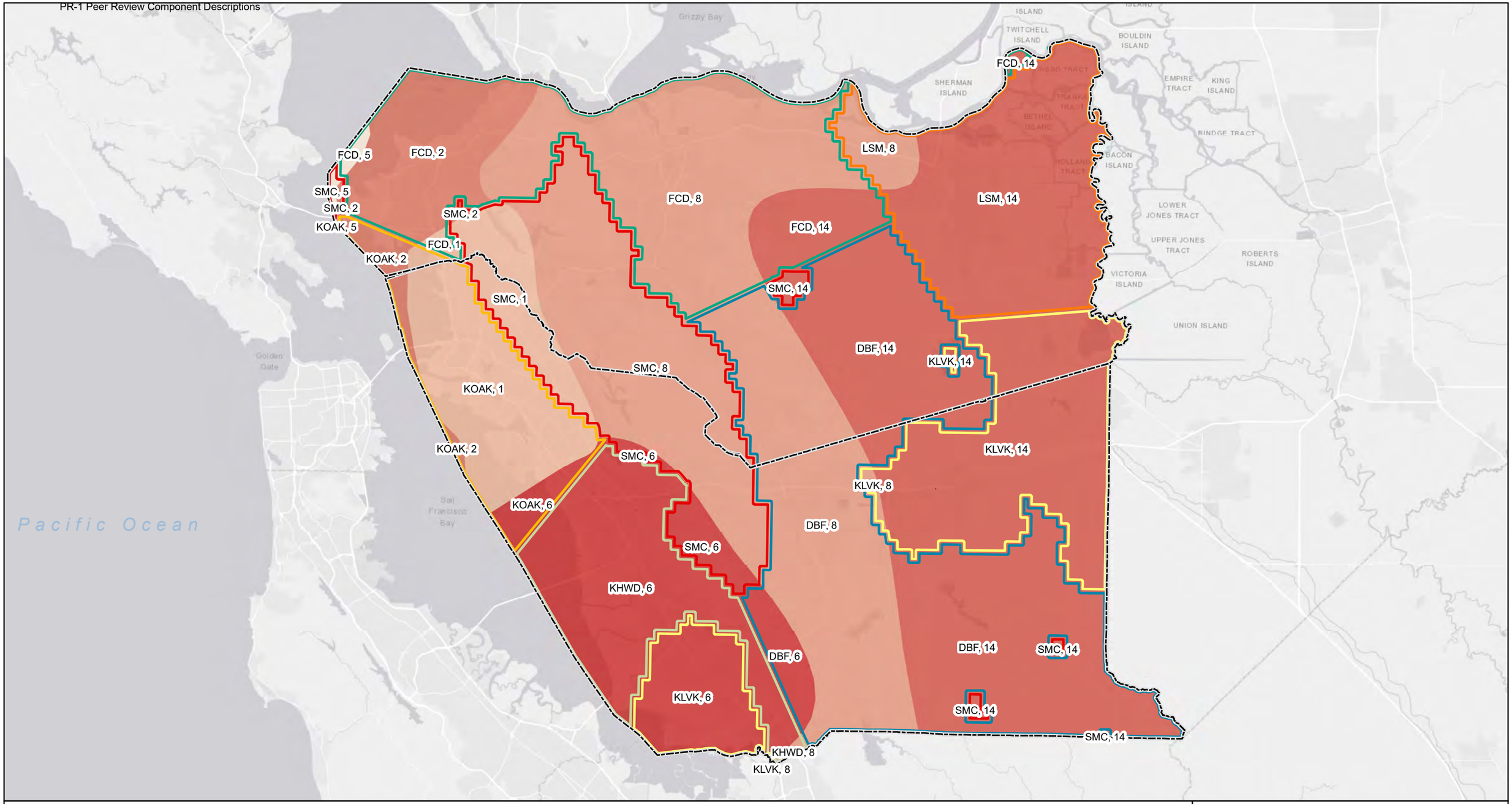

County Boundary

Rain Gauge Zones	CIMIS ET Zone
DBF	1
FCD	2
KHWD	5
KLVK	6
KOAK	8
LSM	14
SMC	

Climate Zones are created by overlapping precipitation zones and ET zones. In Contra Costa County and Alameda County, unique climate zones are labeled as "Gauge ID, ET Zone".

N

0 6 12 Miles

RAA Climate Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | November 2019

Figure PR-1C

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PR-2 Alameda Countywide Clean Water Program
GI Quantitative Relationship Report

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

QUANTITATIVE RELATIONSHIP BETWEEN GREEN INFRASTRUCTURE IMPLEMENTATION AND PCBS/MERCURY LOAD REDUCTIONS

MEMBER AGENCIES:

Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

Report prepared by:

Alameda Countywide Clean Water Program
399 Elmhurst Street
Hayward, California 94544

Submitted to:

California Regional Water Quality Control Board, San Francisco Bay Region

September 28, 2018

Acknowledgements

This report was prepared in cooperation with the Contra Costa County Clean Water Program. Geosyntec Consultants contributed substantially to the writing and preparation of this report.

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Preface

This *Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP; NPDES Permit No. CAS612008; Order No. R2-2015-0049) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board. This report fulfills the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(1), C.12.b.iii.(3), and C.12.c.iii.(1) to submit refinements to the measurement and estimation methodologies for assessing mercury and PCBs load reductions in the next permit term and the quantitative relationship between green infrastructure implementation and mercury and PCBs load reductions that will be used for the reasonable assurance analyses.

This report is submitted by ACCWP on behalf of the following Permittees:

- The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City;
- Alameda County;
- Alameda County Flood Control and Water Conservation District; and
- Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7 Water Agency).

LIST OF ACRONYMS

ASOS	Automated Surface Observation System
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
CIMIS	California Irrigation Management Information System
GI	Green Infrastructure
GIS	Geographic Information System
HRU	Hydrologic Response Unit
KTRL	Kendall-Theil Robust Line
MAD	Median Absolute Deviation
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
ng/kg	nanogram per kilogram
NPDES	National Pollutant Discharge Elimination System
PCBs	Polychlorinated Biphenyls
RAA	Reasonable Assurance Analysis
RMSE	Root Mean Square Error
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WY	Water Year

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1. INTRODUCTION

1.1 Purpose

This *Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* report was prepared by the Alameda Countywide Clean Water Program (ACCWP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(1), C.12.b.iii.(3), and C.12.c.iii.(1) for submitting the quantitative relationship between green infrastructure (GI) implementation and PCBs load reductions that will be used for the Reasonable Assurance Analysis (RAA) required by MRP Provisions C.11.c.ii.(2), C.11.d.ii, C.12.c.ii.(2), and C.12.d.ii.

This report was prepared in cooperation with the Contra Costa Clean Water Program. The RAA modeling described herein will be conducted for both countywide programs and will use data inputs from both Alameda County and Contra Costa County.

1.2 Background

1.1.1 PCBs and Mercury Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to PCBs and mercury. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as Best Management Practices (BMPs), are the tools that Permittees can use to assist in restoring water quality in the Bay.

1.1.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and revised in 2015. The MRP includes provisions to reduce loads of mercury and PCBs consistent with the TMDL implementation timeframe (Provisions C.11 and C.12, respectively) through implementation of GI projects (Provisions C.3.j, C.11.c, and C.12.c) and source controls (Provisions C.11.d and C.12.d).

The Permittees are reporting load reductions achieved before and during the current MRP term (2014 – 2020) using the approved Interim Accounting Methodology (BASMAA, 2017). MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3) requires the Permittees to report in the 2018 and subsequent Annual Reports any refinements to the Interim Accounting Methodology to be used in subsequent Permit terms. As part of this reporting requirement, Provision C.11.c.iii.(3) and C.12.c.iii.(1) requires the Permittees to report on the quantitative relationship between GI implementation and PCBs and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

Green Infrastructure Planning and RAA

MRP Provision C.3.j requires the Permittees to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. The Green Infrastructure Plan must be developed using a mechanism to prioritize and map areas for potential and planned GI projects, both public and private, on a drainage-area-specific basis, for implementation by 2020, 2030, and 2040.

MRP Provisions C.11.c and C.12.c require the Permittees to prepare an RAA for inclusion in the 2020 Annual Report that quantitatively demonstrates that specified mercury and PCBs load reductions will be achieved by 2040 through implementation of GI.

This RAA should do the following:

1. Quantify the relationship between the areal extent of GI implementation (e.g., acres treated) and mercury and PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of GI strategies likely to be implemented.
2. Estimate the amount and characteristics of land area that will be treated by GI by 2020, 2030, and 2040.
3. Estimate the amount of mercury and PCBs load reductions that will result from GI implementation by 2020, 2030, and 2040.

4. Ensure that the calculation methods, models, model inputs, and modeling assumptions used have been validated through a peer review process.

Additionally, MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and implementation schedules for mercury and PCBs control measures and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The implementation plans, which will also be included in the 2020 Annual Report, along with the GI-based RAA outlined above, must:

1. Identify all technically and economically feasible mercury or PCBs control measures (including GI projects, but also other control measures such as source property identification and abatement, managing PCBs in building materials during demolition, enhanced operations and maintenance, and other source controls) to be implemented;
2. Include a schedule according to which technically and economically feasible control measures will be fully implemented; and
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

This report presents the quantitative relationship between GI implementation and PCBs and mercury load reductions, including the data used and a full description of models and model inputs relied on to establish this relationship. This relationship will be used to predict loads reduced through GI implementation for the RAAs described above and to report loads reduced through GI implementation in the subsequent Permit term.

2. DESCRIPTION OF RAA MODEL

This section provides an overview of the RAA modeling framework and describes the output of each component.

2.1 RAA Model Overview

The approach used to estimate the load reductions resulting from implementation of GI includes the model components listed below, which are described in further detail in the following sections:

04839
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- Baseline Pollutant Loading Model – the baseline pollutant loading model is a continuous simulation[1] hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across the county during the TMDL baseline period (i.e., 2003 – 2005).
    - Hydrology – this model component produces average annual runoff across each county for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (i.e., imperviousness, underlying soil characteristics, slope, etc.) present within each county for a unit area drainage catchment. See Section 2.2.1.
    - Water Quality – the hydrology output is combined with average annual concentrations estimated by the Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM; Wu et al, 2017) developed by the San Francisco Estuary Institute (SFEI) to produce average annual PCBs and mercury loading for the period of record. See Section 2.2.2.
- GI Performance Models – the GI performance models are developed to represent load reductions resulting from implementation of GI. See Section 2.3.
- Future Condition (RAA Scenario) Models – the RAA scenario models are conducted to represent future land use changes and control measure implementation that could result in pollutant load reduction. Both GI and source controls are considered, depending on the time frame of interest. See Section 2.4 for a description of load reduction calculations.

2.2 Baseline Loading Model

2.2.1 Hydrologic Model

As introduced above, the proposed approach for modeling hydrology is to use a hydrologic response unit (HRU) approach. An HRU is a unique combination of land surface features (imperviousness, underlying soil characteristics, slope, etc.) which is expected to give a consistent runoff response to rainfall, no matter where that unique combination is found. The HRU approach involves modeling all possible combinations of land surface features present within each county for a unit area drainage catchment and then storing these results in a database. These HRU results can been be scaled geospatially across the entire county without developing

[1] Continuous simulation models calculate outputs (e.g., runoff) "continuously", i.e., for many time steps over a long-term period of record (e.g., every 10 minutes for 10 years). Long-term "continuous" input data (e.g., hourly rainfall) is required. This is contrasted with design-event simulations which model a single rainfall event, e.g., a 24-hour storm with a 10-year recurrence frequency.

a detailed hydrologic model. This method is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017b).

The generic HRUs are modeled using USEPA's Stormwater Management Model (SWMM) to obtain an average annual runoff volume per acre for the identified baseline period of record (water year [WY] 2000 – 2009) for each HRU. Certain HRU inputs (imperviousness, soil parameters) are adjusted as needed to calibrate the HRUs on an average annual basis to identified flow gauges in the counties.

The average annual runoff volume per acre associated with a specific HRU can then be multiplied by the area represented by that HRU across each county (or a selected smaller planning area, such as a watershed or jurisdictional boundary). The resulting volumes associated with each represented HRU within the specified geospatial area can then be summed for the identified area to obtain the estimated total average annual runoff volume.

2.2.2 Water Quality Model

Identified HRUs across each county are combined with the RWSM land use classifications layer to determine pollutant loading rates. The RWSM provides average annual concentrations of PCBs and mercury that wash off from various land use categories. On an average annual basis, this approach approximates the total load.

Average annual runoff volume associated with the geospatial HRUs is multiplied by the PCBs and mercury average annual concentration (based on the RWSM land use categories for the identified area) to obtain average annual pollutant load using the following equation:

$$Load_{Baseline} = \sum\left(\sum Unit\ Runoff_{HRU} \times Area_{LU,HRU}\right) \times Concentration_{LU} \times 0.00123 \qquad \text{Eqn. 1}$$

Where:

$Load_{Baseline}$ = The total average annual baseline pollutant load for the identified area for calculation [grams/year]

$Unit\ Runoff_{HRU}$ = The average annual runoff per acre for a given HRU within the identified area for calculation [ac-ft/acre/yr]

$Area_{LU,HRU}$ = The total area of the HRU within the RWSM land use category within the identified area for calculation [acres]

$Concentration_{LU}$ = The average annual pollutant concentration associated with the RWSM land use category [ng/L]

0.00123 = Conversion factor [(L/ac-ft)*(g/ng)]

2.3 Green Infrastructure Performance Model

Volume reduction (via retention in the green infrastructure facility) and pollutant load reduction (via filtration through media and discharge through an underdrain) are modeled utilizing a combination of hydraulic modeling in SWMM and currently available empirical GI performance data.

2.3.1 Hydraulic GI Models

GI control measure hydraulic performance is modeled in SWMM with a 100% impervious tributary area for three GI facility types: (1) bioretention[2] with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention. The model is run with varying footprint sizes and varying underlying infiltration rates (i.e., the rate at which treated runoff infiltrates into native soils underlying the BMP facility). Average annual volume retained, volume treated, and volume bypassed by the GI measure are recorded for each GI model run.

Volume-based performance[3] corresponding to the generic 100% impervious tributary area can be applied to the effective area in GI drainage areas made up of identified HRUs. The effective area is also known as the "runoff generating area" and is calculated as the tributary area multiplied by the long-term or average annual runoff coefficient.

2.3.2 Green Infrastructure Pollutant Reduction Calculations

To calculate pollutant load reduction associated with GI implementation, the hydraulic model results are combined with water quality performance data. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load (Eqn. 2). Equations corresponding to the pollutant reduction calculation are provided below and the water balance is illustrated in Figure 1. In summary, influent load is calculated as the pollutant load produced by the 100% impervious tributary area for each RWSM land use category using Eqn. 3. The pollutant load that bypasses the facility is calculated as the proportion of runoff that bypasses the facility per the hydraulic GI model output, multiplied by the influent concentration

[2] The bioretention is assumed to include: 6-inch or 12-inch ponding depth, 1.5 ft of filter media with a 5 in/hr flow through rate, and 1 ft of gravel beneath the media.

[3] Volume-based performance refers to how much runoff volume the GI facility captures and retains or treats and discharges through the underdrain, typically represented as a percentage of the average annual runoff volume.

(Eqn. 4). The effluent load is calculated as the proportion of runoff that is captured by the facility per the hydraulic GI model output, combined with an effluent concentration (Eqn. 5 and Eqn. 6).

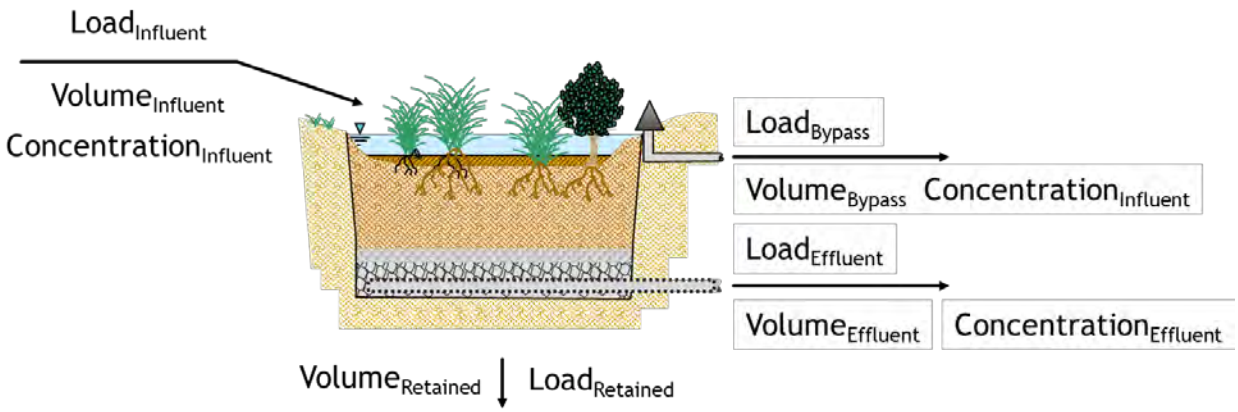

Figure 1: Illustration of GI Facility Pollutant Load Reduction Calculations

$$Load_{Reduced} = Load_{Influent} - Load_{Bypass} - Load_{Effluent} \quad \text{Eqn. 2}$$

$$Load_{Influent} = Volume_{Influent} \times Concentration_{Influent} \times C \quad \text{Eqn. 3}$$

$$Load_{Bypass} = Volume_{Bypass} \times Concentration_{Influent} \times C \quad \text{Eqn. 4}$$

$$Load_{Effluent} = (Volume_{Captured} - Volume_{Retained}) \times Concentration_{Effluent} \times C \quad \text{Eqn. 5}$$

$$Volume_{Captured} = Volume_{Influent} - Volume_{Bypass} \quad \text{Eqn. 6}$$

Where:

$Load_{Reduced}$	=	The total average annual pollutant load reduced by the GI facility [g/year]
$Load_{Influent}$	=	The total average annual pollutant load produced by the facility drainage area [g/year]
$Load_{Bypass}$	=	The pollutant load that bypasses the facility [g/year]
$Load_{Effluent}$	=	The pollutant load discharged from the facility after treatment [g/year]
$Volume_{Influent}$	=	The runoff produced by the drainage area to the GI facility [ac-ft/year]
$Volume_{Bypass}$	=	The proportion of influent runoff that bypasses the facility [ac-ft/year]

$Volume_{Captured}$ = The proportion of influent runoff that is captured by the facility [ac-ft/year]

$Volume_{Retained}$ = The proportion of captured runoff that is retained by the facility through infiltration and/or evapotranspiration [ac-ft/year]

$Concentration_{Influent}$ = The pollutant concentration associated with the GI drainage area [ng/L]

$Concentration_{Effluent}$ = The concentration discharged from the facility after treatment [ng/L]

C = Conversion factor constant = 0.00123 [(L/ac-ft)*(g/ng)]

2.4 RAA Scenario Loading Model

The loading corresponding with RAA future condition scenarios (2020, 2030, 2040) will be developed using the same volume and concentration combination approach used for the baseline condition. HRU outputs developed for the baseline model will scaled across the county corresponding to anticipated land use and development changes for each of the future conditions. Similarly, the RWSM land use classifications layer will be updated corresponding to each future condition scenario.

The outputs of the future hydrology scaling combined with the concentrations corresponding with future RWSM land use classification provides the land use-based loading estimated for each of the future conditions. To obtain the discharged load corresponding to each future GI scenario, load reductions associated with anticipated GI (developed as described above) will be subtracted from the land use-based load.

3. MODEL INPUTS AND DATA USED

This section describes the inputs to each component of the model and the data used.

3.1 Baseline Loading Model

3.1.1 Hydrologic Model

Generic HRU models are developed in SWMM to estimate average annual runoff volume per acre values that can be applied to all land surfaces within each county. The land surface feature inputs that will be varied to model the generic HRUs are described in the sections below and summarized in Table 3.

Climate Inputs

HRU climate inputs provide the total amount of precipitation that falls on the land surface and the amount of precipitation that is lost to the atmosphere via evapotranspiration before running off the land surface. Multiple gauges from across Alameda and Contra Costa counties that had continuous hourly precipitation data were chosen to represent distinct rainfall regions within both counties. For precipitation, these regions are based on 30-year annual rainfall regimes as identified by PRISM[4]. For evapotranspiration rates, the California Irrigation Management Information System (CIMIS) evapotranspiration zones were used within each county. The combination of the identified precipitation regions and evapotranspiration regions were combined to yield "climate zones" used for generic HRU models. Precipitation zones, evapotranspiration zones, and climate zones are shown in Exhibit 1 through Exhibit 3 (see Appendix A). Table 1 provides a summary of precipitation gauges used and average annual rainfall corresponding to the entire period of record and WY 2000 - 2009. Table 2 provides a summary of the CIMIS data used for the daily reference evapotranspiration rate for each evapotranspiration zone.

Table 1: HRU Precipitation Gauges WY2000-2009

Gauge ID	Gauge Name	Average Annual Precipitation (inches) WY 2000 - 2009	Gauge Source
KHWD	Hayward Air Terminal (ASOS)	16.3	ASOS[1]
KLVK	Livermore Municipal Airport (ASOS)	14.6	ASOS
KOAK	Oakland Airport (ASOS)	19.0	ASOS
DBF	Dublin Fire Station, San Ramon	17.3	CCCFCD[2]
FCD	Flood Control District, Martinez	16.2	CCCFCD
LSM	Los Medanos, Pittsburg	11.8	CCCFCD
SMC	Saint Mary's College, Moraga	28.9	CCCFCD

1. Automated Surface Observation System (ASOS) data were used for Alameda County gauge sites for the period of WY2000-2009 since NCDC gauge data was not available for the baseline period. ASOS sites sometimes co-occur with NCDC gauge sites (e.g., airports), but are maintained and delivered by separate government entities.
2. Contra Costa County gauge data is collected by the Flood Control District but was provided to Geosyntec by Dubin Engineering.

[4] Parameter-elevation Relationships on Independent Slopes Model (PRISM), developed and managed by the PRISM Climate Group, Oregon State University http://prism.oregonstate.edu/.

Table 2: CIMIS Reference Evapotranspiration

ET Zone	Monthly Evapotranspiration (in/day)[1]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.03	0.05	0.08	0.11	0.13	0.15	0.15	0.13	0.11	0.08	0.04	0.02
2	0.04	0.06	0.1	0.13	0.15	0.17	0.16	0.15	0.13	0.09	0.06	0.04
3	0.06	0.08	0.12	0.16	0.17	0.19	0.18	0.17	0.14	0.11	0.08	0.06
6	0.06	0.08	0.11	0.16	0.18	0.21	0.21	0.2	0.16	0.12	0.08	0.06
8	0.04	0.06	0.11	0.16	0.2	0.23	0.24	0.21	0.17	0.11	0.06	0.03
14	0.05	0.08	0.12	0.17	0.22	0.26	0.28	0.25	0.19	0.13	0.07	0.05

1. CIMIS reference evapotranspiration, which is based on irrigated turf grass, was scaled by 0.6 to represent the local mix of vegetated cover including urban vegetation, native xeric adapted plants, and unirrigated vegetated open space areas.

Slope

Slope affects how quickly rainfall will run off a modeled land surface and therefore how much is able to be infiltrated into the subsurface. The available digital elevation model (DEM)[5] for the counties was analyzed to obtain percent slope values for each ~30m by ~30m square of land surface. These percent slope values were classified into three distinct slope zones as summarized in Table 3 and shown in Exhibit 4 (see Appendix A).

Underlying Soil Inputs

Physical characteristics of the soil underlying the land surface affect the amount of rainfall that may be infiltrated into the subsurface. Infiltration was simulated in SWMM using the Green-Ampt infiltration model option. The physical soil input parameters for the Green-Ampt infiltration model were varied based on hydrologic soil group (HSG) as identified by the National Resource Conservation Service (NRCS[6]) soil survey and were modified as described below for developed areas. Soil parameters used as model inputs include suction head, hydraulic conductivity, and initial moisture deficit. Developed areas that are assumed to have been compacted and therefore result in less infiltration to the subsurface are modeled using 75 percent of the HSG hydraulic conductivity value. Soil parameters are not reported here, as this input is adjusted as part of baseline model calibration. Details about soil inputs are provided in Table 3. A map of hydrologic soil group is provided as Exhibit 5 (see Appendix A).

[5] U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013

[6] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. link: https://websoilsurvey.sc.egov.usda.gov/

Areas of development were identified based on the land use of the surface. Soils within urban and agricultural use areas were considered to have been compacted by the site preparation and activities.

Imperviousness

Imperviousness (i.e., the percentage of impervious area) affects area on the land surface where rainfall may be infiltrated and therefore the quantity of runoff produced. The runoff from a range of land use imperviousness values is modeled by area-weighting the results of a pervious surface runoff result (i.e., pervious HRU output) with a corresponding impervious surface runoff result (i.e., impervious HRU output) (see Table 3 and Exhibit 6 (see Appendix A)).

The baseline model HRU imperviousness is developed by geospatially combining the land uses identified by the Association of Bay Area Governments (ABAG, 2005) with the National Land Cover Dataset (NLCD, 2006) data. Each feature of the ABAG dataset is assigned a single imperviousness value that is used to determine the average hydrologic response of that land surface. A lookup-table containing NLCD-based imperviousness for each ABAG land use code was used as a starting value for HRU calibration. Imperviousness may be adjusted within an appropriate range as part of baseline model calibration.

3.1.2 Developing HRUs across each County

Each identified combination of land surface features is modeled for a generic unit-acre drainage area in SWMM for the baseline period of record (i.e., WY 2000 – 2009), utilizing a batch-processing method (which allows for inputs to be altered, model files run, and results extracted for many models automatically). The average annual runoff volume per acre is then extracted for each generic HRU modeled.

Table 3: Land Surface Feature Inputs for Generic HRU Hydrologic Models

Variables	Description	Number of Varying Features	Feature Representations	Source
Hourly Annual Precipitation	Rainfall Gauge and Rainfall Zone	7	Contra Costa County Gauges: DBF, FCD, LSM, SMC Alameda County ASOS Gauges: KHWD, KLVK, KOAK	PRISM[1], NCDC/ County-maintained rainfall gauges
Daily Evapotranspiration Rate	Evapotranspiration Zone	5	Zones 1, 2, 3, 6, 8, 14	CIMIS[2]
Slope Zone	Representation of Slope	3	<5%, 5-15%, 15%+	USGS[3]
Developed/ Undeveloped Areas	Representation of Compaction of Underlying Soils (Pervious Areas Only)	2	Undeveloped (Ksat * 1) Developed (Ksat * 0.75)	ABAG Land Use 2005[4]
Hydrologic Soil Group	Representation of Underlying Soil Type (pervious areas only)	6	HSG A, B, C, D[5], Rock, Water	NRCS[6]
Imperviousness	Representation of Imperviousness	2	0% and 100%	NLCD and ABAG 2005

1. PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, 30-year normal mean annual precipitation
2. California Irrigation Management Information System (CIMIS) Reference Evapotranspiration; digitized from http://www.cimis.water.ca.gov/App_Themes/images/etozonemap.jpg
3. U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013
4. ABAG land use features are proposed to be used for identifying developed and undeveloped condition and will have an imperviousness value assigned based on a geospatial analysis of the NLCD Imperviousness layer. The impervious value for each ABAG land use feature will then be carried into the HRU model calibration and adjusted accordingly.
5. "Urban" representation will be re-classified based on the dominant adjacent HSG.
6. U.S. Department of Agriculture, Natural Resources Conservation Service. Soil Survey Geographic (SSURGO) database. 2016

HRUs are determined geospatially based on the climate zone, slope zone, developed/undeveloped areas, and HSG, along with land use-based imperviousness. Exhibits 1 through 5 (see Appendix A) display the data used to develop climate zones, county slope zones, and the HSG distribution across each county. Imperviousness designations will occur based on

land use at the parcel, by combining the geospatial ABAG land use layer[7] with the other hydrologic input regions. This results in a "patchwork" of HRUs across the counties[8].

The resulting patchwork of HRUs can be combined at the scale of choice to provide total runoff volumes for a specific area, such as a watershed or jurisdictional boundary. To estimate the total runoff for the identified area, the total acreage of each designated HRU present within a watershed or jurisdiction will be multiplied by the average annual runoff per acre associated with each HRU and then summed (i.e., area-weighting the average annual runoff volume per acre for all HRUs present).

3.1.3 HRU Input Calibration

Calibration of hydrologic models is required by the *Bay Area RAA Guidance Document*. Calibration of the generic HRU models will be conducted utilizing available stream flow records and based solely upon the annual discharge volume between WY 2000-2009. This annual calibration means that the HRU runoff estimates are representative of the approximate annual runoff volume but will not be used to estimate or compare discharge rates at smaller timesteps, such as the hourly or daily runoff hydrograph.

The list of candidate gauge sites within the counties was developed based on an assessment of the representativeness of the gauged watersheds and the mitigation of confounding factors that interfere with calibration such as missing data and upstream impoundments. For the purposes of calibration, the candidate gauge sites that were selected included stream depth rating curves and at least daily mean records for the historical period of interest. The USGS flow gauges considered for calibration are provided in Table 4 and shown in Exhibit 8 (see Appendix A).

Table 4: Flow Gauge Considered for RAA Model Calibration

Gauge ID	Gauge Name	Location	County	Data Frequency
11337600	Marsh Creek	Brentwood	Contra Costa	Daily
11182500	San Ramon Creek	San Ramon	Contra Costa	Daily
11181390	Wildcat Creek	Richmond / San Pablo	Contra Costa	Daily
11181040	Lan Lorenzo Creek	San Lorenzo	Alameda	Daily
11181008	Castro Valley Creek	Hayward	Alameda	Daily

[7] ABAG land use features will be used to aggregate the imperviousness for the land surface. The relationship between ABAG feature and its imperviousness will be developed based upon other local sources (SMCWPPP, 2017) and analysis of national public data sets such as the National Land Cover Dataset (NLCD).

[8] This will be done once all the HRU input files are finalized, including the imperviousness layers.

Gauge ID	Gauge Name	Location	County	Data Frequency
11181000	San Lorenzo Creek	Hayward	Alameda	Daily
11180700	Alameda Creek Flood Channel	Union City	Alameda	Daily
11179000	Alameda Creek	Fremont	Alameda	Daily
11176900	Arroyo de la Laguna	Verona	Alameda	Daily
11173575	Alameda Creek Below Welch Creek	Sunol	Alameda	Daily
11173510	Alameda Creek Below Calaveras Creek	Sunol	Alameda	Daily

The effective area tributary to each flow gauge is used to calibrate the HRUs to the stream gauge records. Annual flow predicted by area-weighting HRU runoff output for the watersheds draining to the stream gauges was compared to annual flow in the stream records for the identified period of record.

Calibration of land surface runoff hydrology to stream gauge records requires that baseflow be computed and accounted for throughout the period of record. A variety of methods exist for separating baseflow from runoff, including the fixed-interval method and the local-minimum method (Sloto and Crouse, 1996). The most appropriate method for separating baseflow is determined on a gauge by gauge basis depending on the variability in the flow record, and the occurrence of confounding factors that affect baseflow such as dam releases and other dry weather inflows.

The average percent difference between the area-weighted HRU total average annual runoff volume for the watershed and the average annual flow (converted to volume) measured for the WY 2000 – 2009 period will be calculated. The acceptable ranges included in the RAA Guidance document are provided in Table 5 below.

Table 5: Allowable Difference between Simulated and Observed Annual Volumes

Model parameters	Average % difference between simulated annual results and observed data		
	Very Good	Good	Fair (lower bound, upper bound)
Hydrology/Flow	<10	10-15	15-25

If the average percent difference between simulated and measured annual storm flow volumes is greater than 25%, HRU model parameters are adjusted until the percent difference is within the acceptable range. The primary model parameters adjusted include underlying soil hydraulic conductivity and land use imperviousness, but other hydrologic model parameters, such as depression storage, may be adjusted as appropriate.

Once average percent differences in all identified watersheds are within the acceptable range, the HRU model parameters are finalized and the HRU results database will be regenerated. HRUs and resulting average annual baseline volume will be applied across each county to obtain the baseline volume discharged by each county.

3.1.4 Water Quality Model

RWSM values used to develop pollutant loading estimates across each county are:

Table 6: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total mercury (ng/L)
Ag, Open	0.2	80
New Urban	0.2	3
Old Residential	4	63
Old Commercial/ Transportation	40	63
Old Industrial and Source Areas	204	40

Water quality calculations are also used to perform baseline pollutant loading validation. The calculated pollutant load draining to Regional Monitoring Program stations will be validated by calculating the volume-weighted watershed pollutant concentration using the modeling results and comparing it to the observed concentrations in the Regional Monitoring Program data. The equation used to calculate concentration (in ng/L) at an end-of-watershed location is as follows:

$$Concentration_{Baseline} = \frac{\sum Runoff_{HRU} \times Area_{HRU} \times Concentration_{LU,HRU}}{\sum Runoff_{HRU} \times Area_{HRU}} \qquad \text{Eqn. 7}$$

Pollutant concentration and loading data from the Regional Monitoring Program will be compared to the result of Equation 7 for several watersheds for validation purposes.

3.2 Green Infrastructure Performance Model

3.2.1 Long-Term Green Infrastructure Simulations

Long term performance was assessed for each BMP configuration using continuous historical rainfall records. In Contra Costa County historical data was available at the same gauges that were used for the HRU runoff modeling between WY2000-2009, but for Alameda County other gauge sites with longer histories were used for long term BMP performance modeling. The rainfall gauges used to model BMP performance are shown in Table 7.

Table 7: Long Term GI Performance Precipitation Gauges

Gauge ID	Gauge Name	Period of Record	Average Annual Precipitation (inches)	Gauge Source[1]
040693	Berkeley (NCDC)	1948-1990	19.8	NCDC
041060	Brentwood (NCDC)	1950-1985	14.9	NCDC
043863	Hayward (NCDC)	1948-1988	24.3	NCDC
046335	Oakland Airport (NCDC)	1948-1985	16.4	NCDC
047821	San Jose Airport (NCDC)	1948-2010	13.6	NCDC
DBF	Dublin Fire Station, San Ramon	1973-2016	15.0	CCCFCD
FCD	Flood Control District, Martinez	1971-2016	16.5	CCCFCD
LSM	Los Medanos, Pittsburg	1974-2016	10.6	CCCFCD
SMC	Saint Mary's College, Moraga	1972-2016	26.8	CCCFCD

1. NCDC data was used for Alameda County and San Jose gauge sites. Contra Costa County gauge data is collected by the Flood Control District and was provided to Geosyntec by Dubin Engineering.

3.2.2 Hydraulic Green Infrastructure Model

Hydraulic GI models were developed in SWMM to estimate hydraulic performance for a 100% impervious tributary area. Hydraulic model inputs that were varied to model the GI facility performance for the counties are described below and summarized in Table 8.

1. BMP Configuration – three GI facility types were assumed: (1) bioretention with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention with an underdrain.
2. BMP Footprint Size – the BMP footprint size was varied as a percent of impervious area to model different levels of hydraulic capture performance depending on facility sizing.
3. BMP Underlying Infiltration Rate – the infiltration rate of the soils underneath the bioretention facility was varied for the bioretention with a raised underdrain and bioretention with no underdrain configurations (I.e., the unlined facility types).

Table 8: Land Surface Feature Inputs for Generic GI Performance Hydraulic Models

Variables	Description	Number of Varying Features	Feature Representations
Hourly Precipitation	Rainfall Gauge	9	NCDC: 040693 (Berkeley) 046335 (Oakland Airport) 043863 (Hayward) 047821 (San Jose) 041060 (Brentwood) Contra Costa County: DBF, FCD, LSM, SMC
Daily Evapotranspiration Rate	Evapotranspiration Zone	4	CIMIS Zones: 1, 6, 8, 14
BMP Configurations	BMP profiles and underdrain	3	Lined Bioretention with underdrain Unlined Bioretention with elevated underdrain Infiltration Basin without underdrain
BMP Surface Ponding Depth	Depth (feet)	2	0.5, 1
BMP Footprint Sizes	% of Impervious Area	12	0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 3.5, 4, 5, 6
BMP Infiltration Rates	Ksat of underlying soil (in/hr)	7 3	Unlined Bioretention: 0.024, 0.05, 0.1, 0.2, 0.24, 0.3, 0.4, 0.5 Infiltration Basin: 0.5, 1, 2

The BMP cross-sections that were modeled each include:

- 6-inches or 12-inches ponding depth (both were modeled),
- 1.5 ft of filter media with 25% porosity with a 5 in/hr flow through rate, and
- 1 ft of gravel beneath the media with 40% porosity.

Two of the modeled BMP configurations include underdrains. In the lined bioretention facility, the underdrain is located at the bottom of the gravel layer. In the unlined bioretention facility, the underdrain was modeled at the top of the gravel layer. BMP configurations are shown in Exhibits 9 through 11 (see Appendix A).

3.2.3 Green Infrastructure Pollutant Reduction Calculations

As described in Section 2.3.2, pollutant load reduction associated with GI is calculated by combining the hydraulic model results with water quality performance data. The annual estimate

of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load. The effluent load is calculated as the proportion of runoff that is treated by the GI measure multiplied by an effluent concentration.

Water quality performance data from selected, representative studies were used to determine a method to predict effluent concentrations in stormwater following treatment through a biofiltration (bioretention or tree well filters) GI measure. The data used to develop the relationship came from three studies: a) 2011 monitoring study of the El Cerrito Rain Gardens (Gilbreath, Pearce, and McKee, 2012), b) Clean Watersheds for a Clean Bay (CW4CB)[9] (Geosyntec and EOA, 2017), and c) a study at Echo Lake in King County, WA (King County, 2017). A summary of the paired influent-effluent data associated with each study is provided in table:

Table 9: Data used to Develop Effluent Concentrations

Project Name	Project Sponsor	Facility ID	Influent-Effluent Data Pairs (n pairs)	
			PCBs	Mercury
El Cerrito Green Streets – CW4CB	El Cerrito	ELC-B1	3	3
El Cerrito Green Streets – SFEI	SFEI	ELC-B1	4	4
PG&E Substation 1st and Cutting Bioretention Cells – CW4CB	Richmond	LAU-3	8	8
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Bioretention Planter Boxes – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	BPB-1	4	0
		BPB-2	4	0
		BPB-3	4	0
		BPB-4	2	0
West Oakland Industrial Area Tree Wells – CW4CB	Oakland	ETT-TW2	4	4
		ETT-TW6	4	4
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Tree Well – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	FLT-1	4	0
		Total Data Pairs	41	23

[9] The CW4CB study included additional monitoring of the El Cerrito rain gardens.

These data were statistically evaluated to identify an appropriate method for predicting effluent concentrations of PCBs and total mercury. The data analysis first evaluated whether available influent and effluent concentration data were significantly different and, if so, whether a monotonic relationship existed (i.e., effluent generally increased when influent increased).

A Wilcoxon non-parametric hypothesis test was run on the PCBs and total mercury paired influent-effluent data to determine if influent and effluent concentrations were statistically different at a 5% significance level. This difference was found to be significant for PCBs, and significant for total mercury when corresponding influent suspended solids concentration was greater than 20 mg/L.

Spearman's rho and Kendall's tau, which are non-parametric rank correlation coefficients, were used to identify the direction and strength of correlation between influent and effluent concentrations. As shown in Table 10, both correlation coefficients suggest that effluent concentrations are positively correlated with influent concentrations for both PCBs and mercury.

Table 10: Influent/Effluent Correlation Coefficients

Correlation Coefficient	Total PCBs	Total Mercury
Spearman's rho	0.725	0.547
Kendall's tau	0.527	0.396

The Kendall-Theil Robust Line (KTRL) method (Granato, 2006) was used to determine the best fit line between influent and effluent data. This non-parametric method uses the median of all possible pairwise slopes between points, which is more robust to outliers than a simple linear regression. Because stormwater data tend to be lognormal, the analysis was focused on linear and log-linear relationships. After the KTRL was generated, the lower portion of the curve was adjusted to assume that neither PCBs nor total mercury can be exported from biofilters under normal circumstances, i.e., that the maximum effluent concentration of PCBs or total mercury is equal to the influent concentration. The resulting KTRL for PCBs is shown Figure 2. The resulting KTRL for total mercury is shown in Figure 3. Each figure also includes a constant average effluent concentration line with data fit statistics: root mean square error (RMSE) and median absolute deviation (MAD). As indicated, the KTRL provide a better fit of the data. However, the resulting effluent concentrations are not much different between the two lines except when influent PCBs are low (<10 ng/L) and total mercury concentration are high (>50 ng/L). For total mercury, concentration reductions are only predicted to occur when influent concentrations are greater than about 30 ng/L. Due to observed export of total mercury for several events, particularly for the 1st and Cutting bioretention cell (LAU-3), the moderate concentration reductions assumed by the KTRL at higher influent concentrations is reasonably conservative.

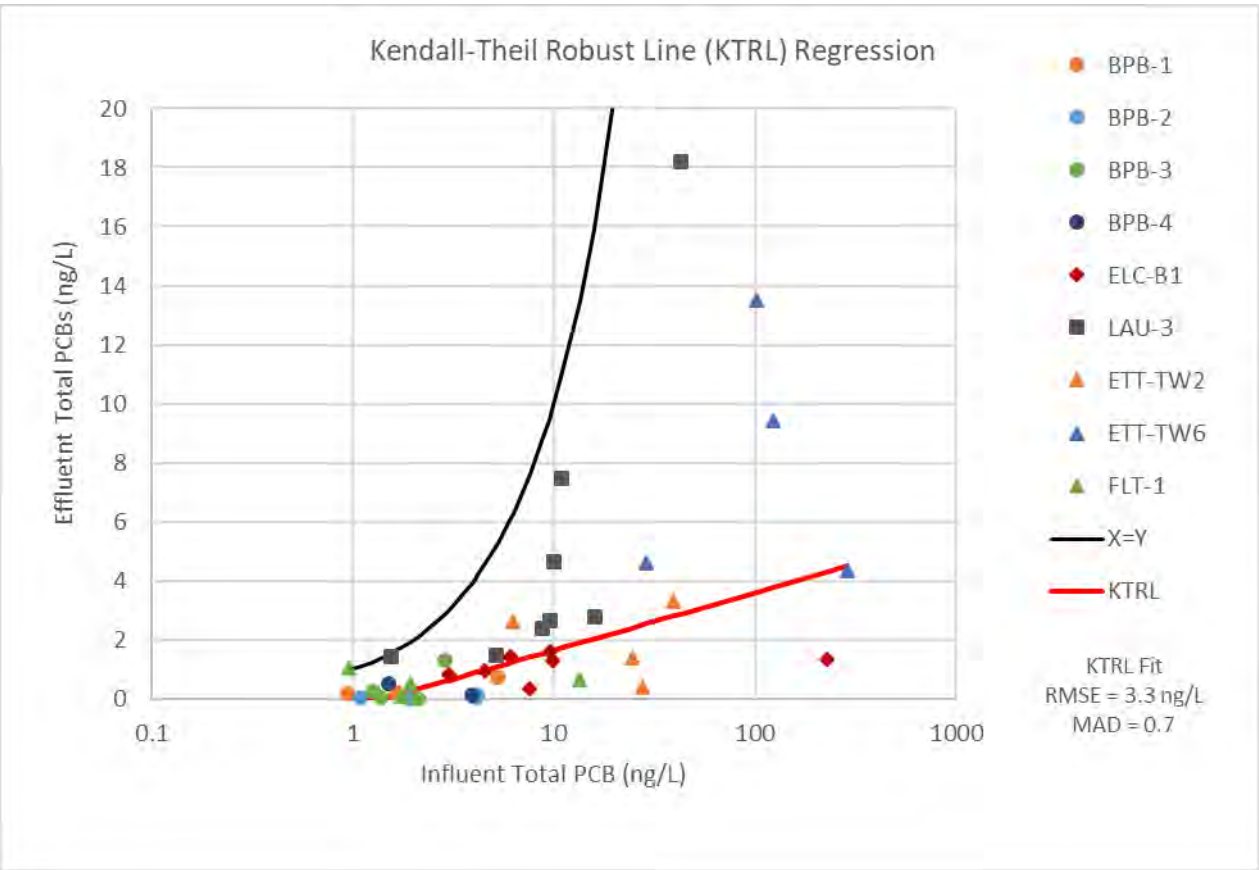

Figure 2: PCBs Influent vs Effluent Concentration Relationship Determined by KTRL Regression

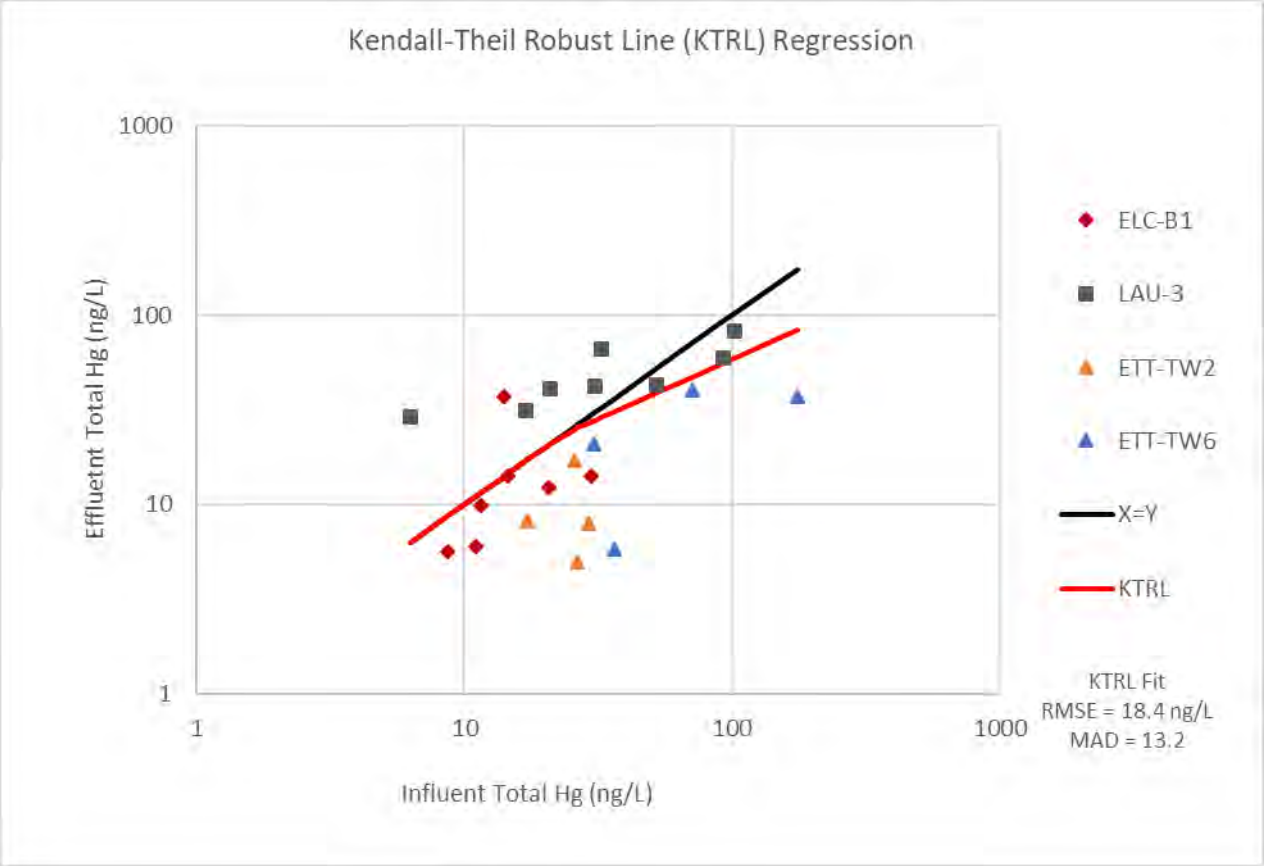

Figure 3: Mercury Influent vs Effluent Concentration Relationship Determined by KTRL Regression

3.3 RAA Scenario Loading Model

To model RAA future scenarios, future condition land use is needed. Future condition land use will be estimated using predictions of private parcel new development and redevelopment in combination with GI implementation on public parcels and rights-of-way.

Load reductions estimated for implementation of GI will be applied to future condition RAA scenario models based on estimated locations of GI and the tributary drainage areas to those GI. Effective area will be used to relate the HRUs, which can have a variety of imperviousness values, to the GI performance which will be based on a unit of effective area with 100% imperviousness. The GI performance curves can thus be applied to many different HRU types and/or combinations of HRUs that make up the tributary drainage areas for future GI measures.

4. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND PCBS LOADS REDUCED

The results of the hydraulic and pollutant reduction modeling of GI measures were used to develop a quantitative relationship between GI implementation and PCBs that can be applied to RAA future scenario models. An example quantitative relationship is provided for GI models run for the Berkeley gauge (040693). Utilizing output from hydraulic modeling, GI measure volumetric percent capture was calculated on an average annual basis. Volumetric model results for runs with GI measures sized to achieve 80%, 85%, 90%, and 95% capture were combined with water quality inputs to obtain pollutant load reduction for varying PCBs influent concentration.

The results of this analysis are shown in nomographs[10] provided in Figure 4, Figure 5, and Figure 6, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 8 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per effective acre[11] displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

[10] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

[11] Effective area is calculated as the area multiplied by the runoff coefficient.

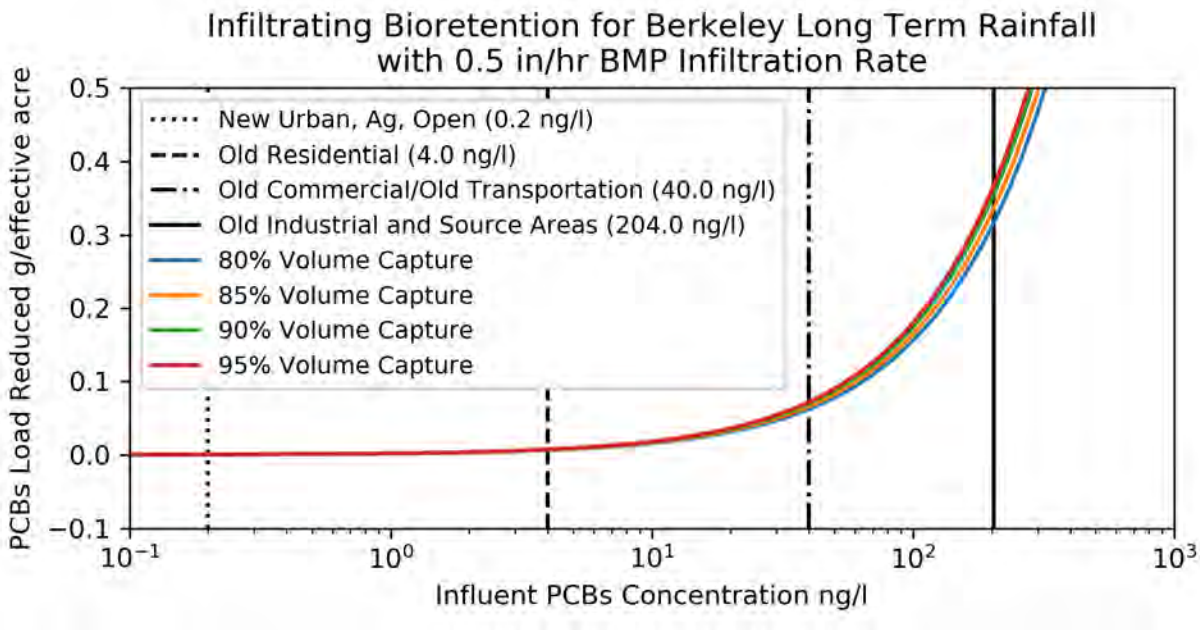

Figure 4: Modeled PCBs Load Removal Performance for Infiltrating Bioretention Basin

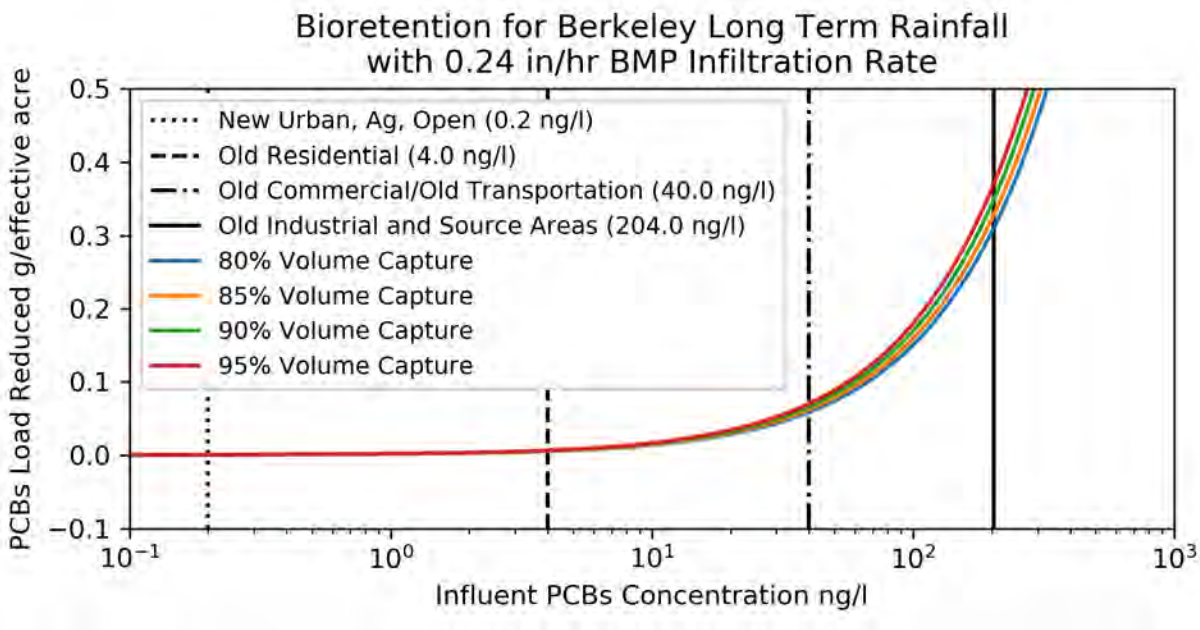

Figure 5: Modeled PCBs Load Removal Performance for Bioretention Basin with Elevated Underdrain

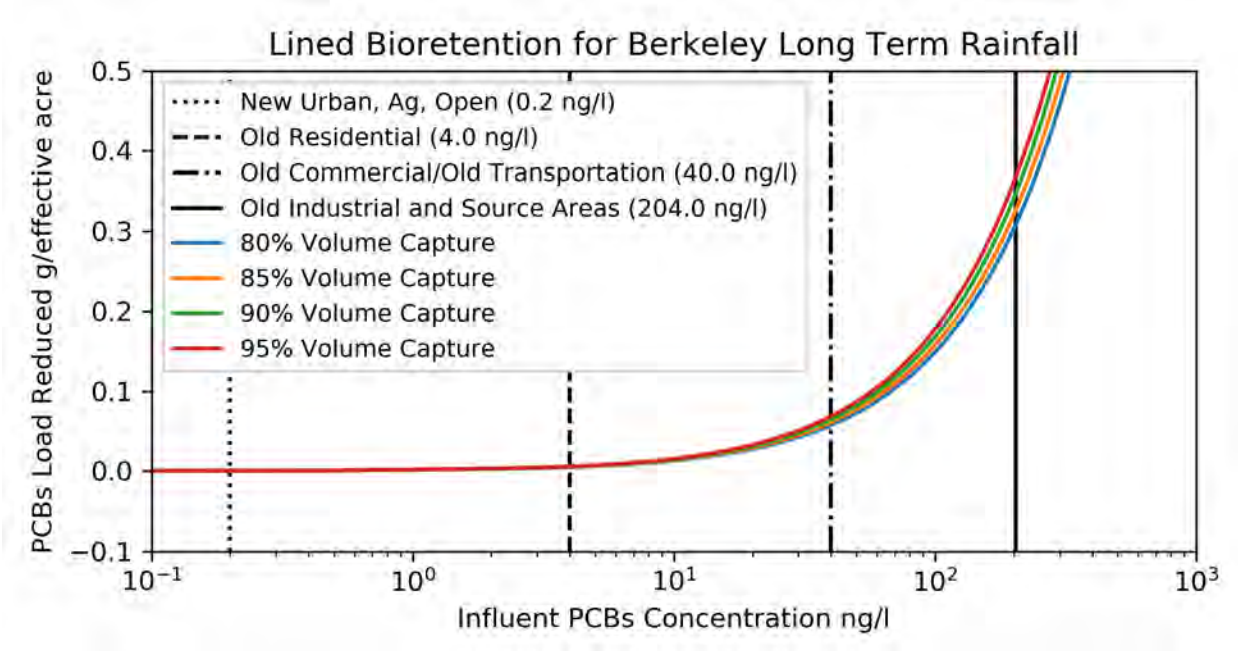

Figure 6: Modeled PCBs Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are listed in Table 11.

Table 11: PCBs Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	PCBs Load Reduced (g/effective ac)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban, Ag, Open	3.12E-04	3.30E-04	3.49E-04	3.61E-04
	Old Residential	0.00623	0.0066	0.00698	0.00722
	Old Commercial / Old Transportation	0.0623	0.066	0.0698	0.0722
	Old Industrial and Source Areas	0.318	0.337	0.356	0.368
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban, Ag, Open	3.08E-04	3.26E-04	3.47E-04	3.67E-04
	Old Residential	0.00518	0.0055	0.00589	0.00633
	Old Commercial / Old Transportation	0.0586	0.0621	0.0661	0.0703
	Old Industrial and Source Areas	0.311	0.329	0.350	0.371
Lined Bioretention	New Urban, Ag, Open	3.08E-04	3.26E-04	3.46E-04	3.67E-04
	Old Residential	0.00484	0.00513	0.00545	0.00577
	Old Commercial / Old Transportation	0.0574	0.0608	0.0647	0.0685
	Old Industrial and Source Areas	0.309	0.327	0.348	0.368

1. Average Annual Facility Volumetric Runoff Capture

5. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND MERCURY LOADS REDUCED

Mercury load reduction results for the Berkeley Gauge are shown in nomographs[12] in Figure 7, Figure 8, and Figure 9, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 9 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per acre displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

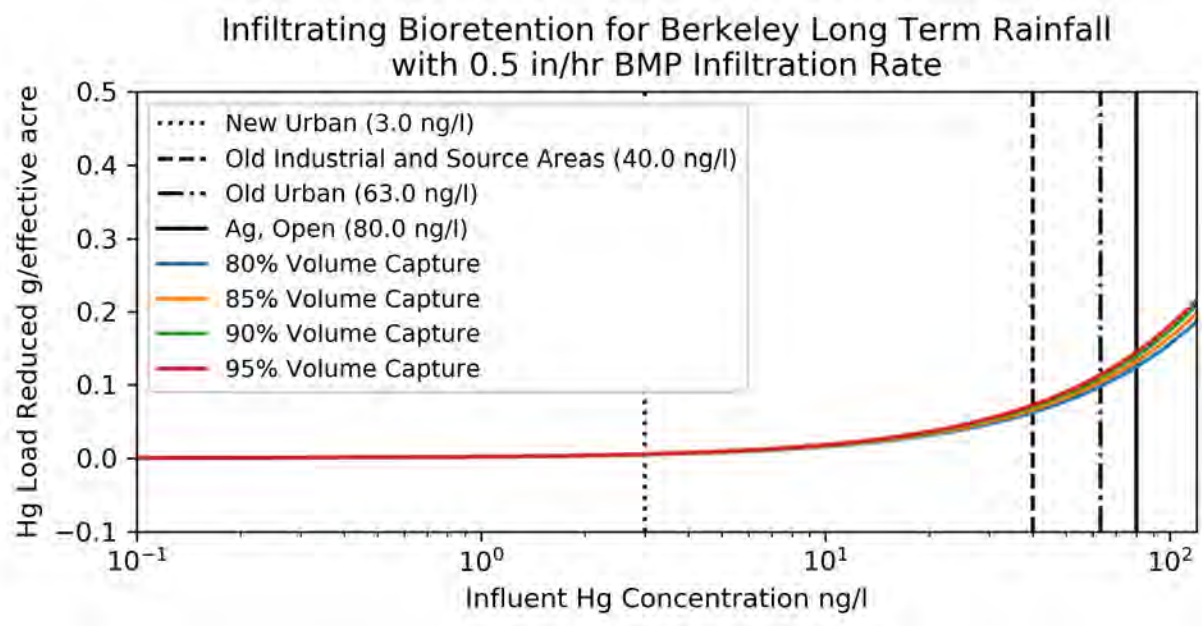

Figure 7: Modeled Mercury Load Removal Performance for Infiltrating Bioretention Basin

[12] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

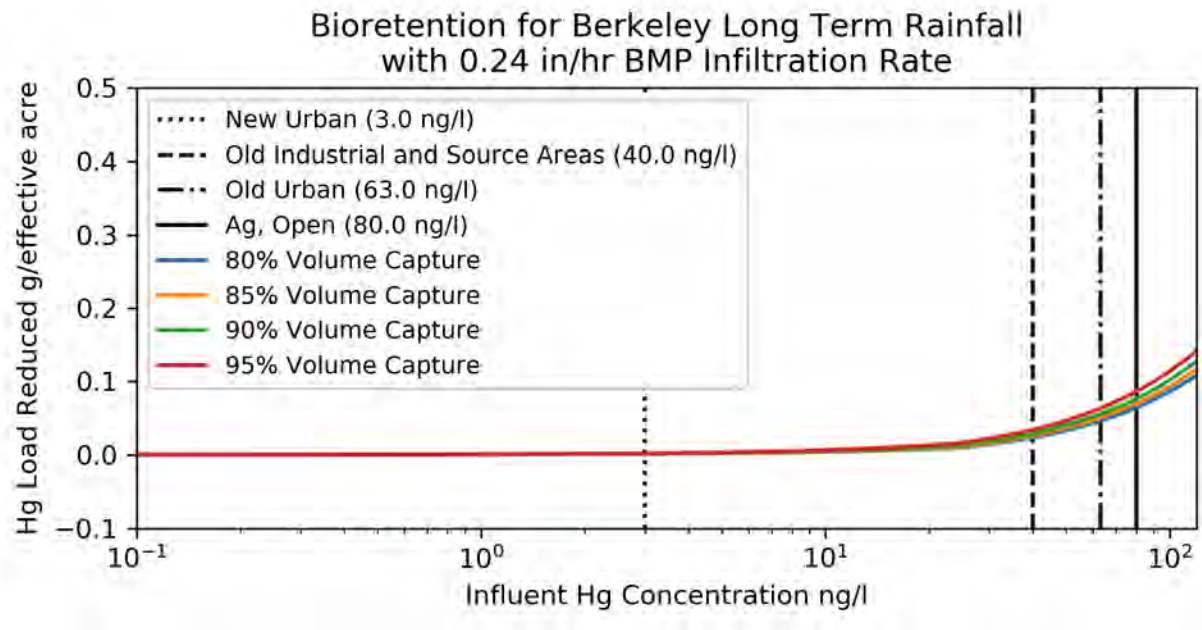

Figure 8: Modeled Mercury Load Removal Performance for Bioretention Basin with Elevated Underdrain

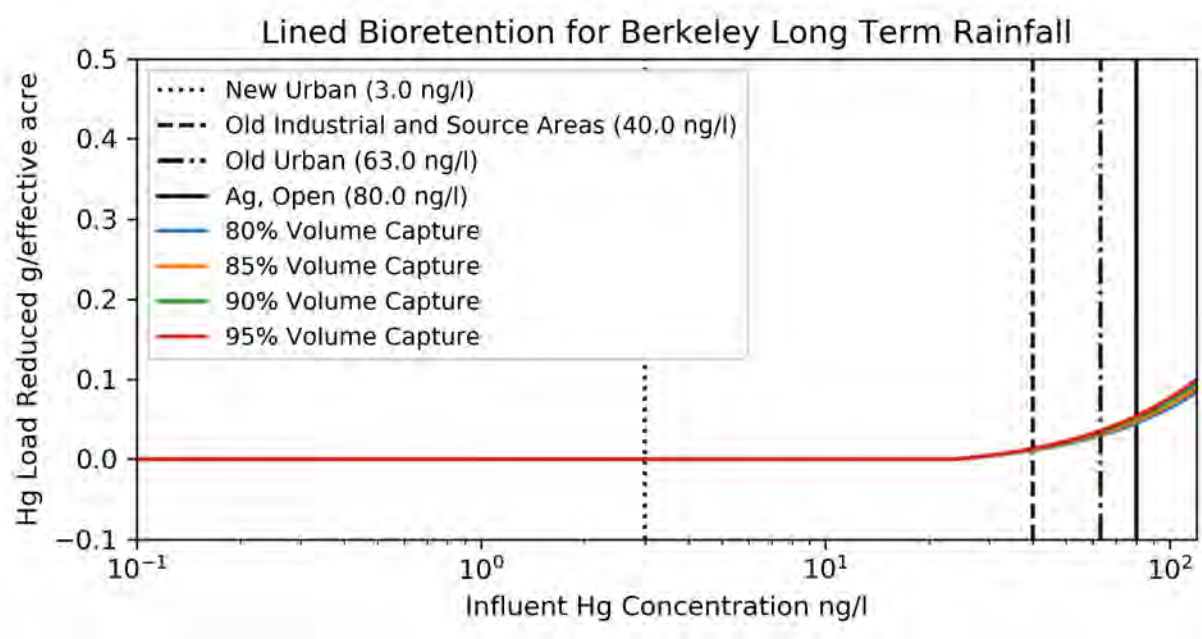

Figure 9: Modeled Mercury Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are summarized in Table 12.

Table 12: Mercury Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	Mercury Load Reduced (g/effective acre)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban	0.00467	0.00495	0.00524	0.00541
	Old Industrial and Source Areas	0.0623	0.066	0.0698	0.0722
	Old Urban	0.0981	0.104	0.110	0.114
	Ag, Open	0.125	0.132	0.140	0.144
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban	0.00113	0.0013	0.00153	0.00192
	Old Industrial and Source Areas	0.0234	0.0258	0.029	0.0341
	Old Urban	0.0462	0.0503	0.0556	0.0634
	Ag, Open	0.0643	0.0696	0.0765	0.0862
Lined Bioretention	New Urban	0	0	0	0
	Old Industrial and Source Areas	0.0108	0.0115	0.0123	0.0130
	Old Urban	0.0296	0.0314	0.0335	0.0353
	Ag, Open	0.0449	0.0476	0.0507	0.0536

[1] Average Annual Facility Volumetric Runoff Capture

6. REFERENCES

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APPENDIX A

Modeling Inputs and Data Exhibits

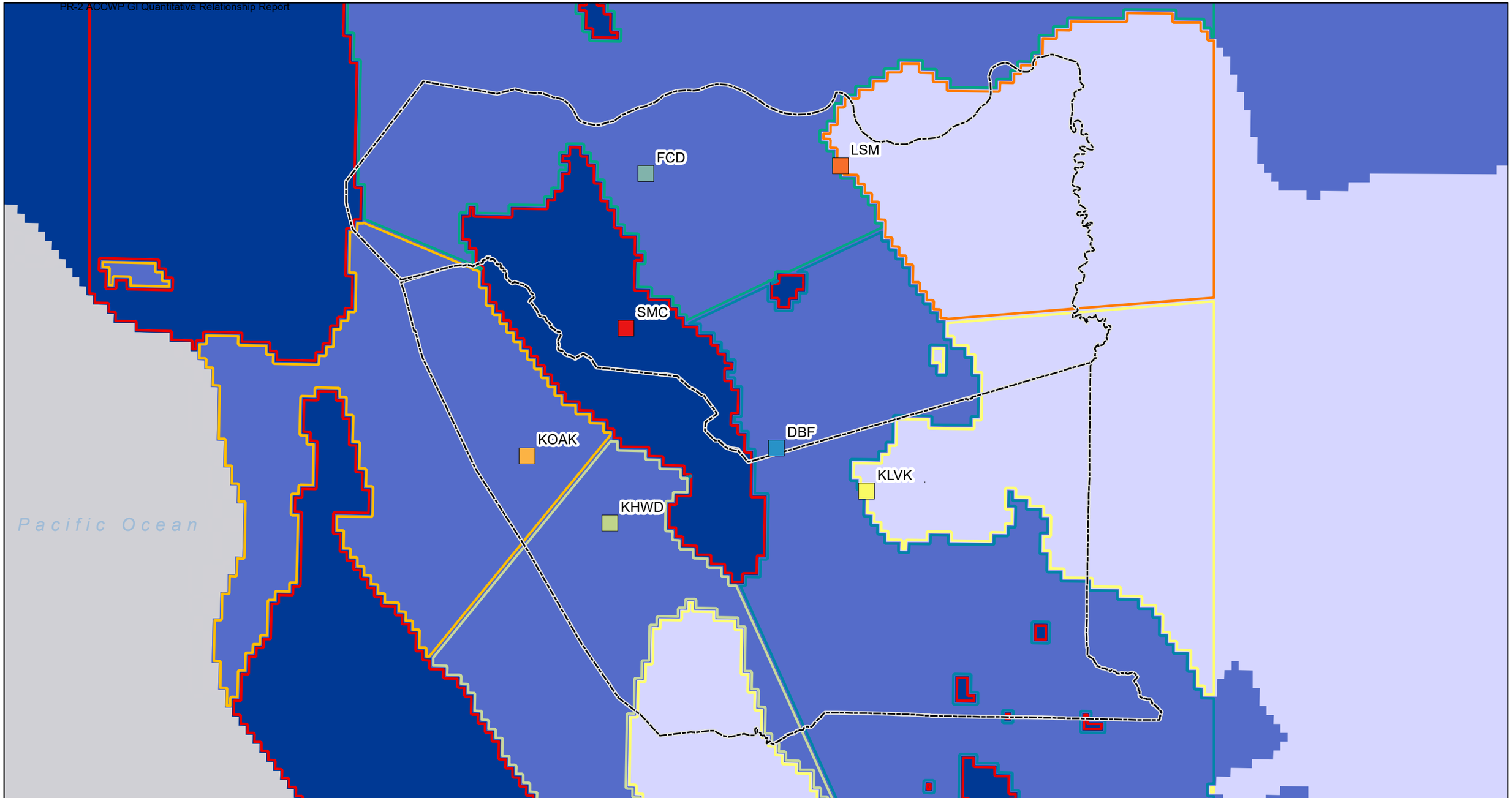

Rain Gauge ID

- Rain Gauge ID
- County Boundary

Mean Annual Precipitation (in)

- < 16
- 16 - 25
- > 25

Rain Gauge Zones

- DBF
- FCD
- KHWD
- KLVK
- KOAK
- LSM
- SMC

N

0 6 12 Miles

Precipitation Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 1

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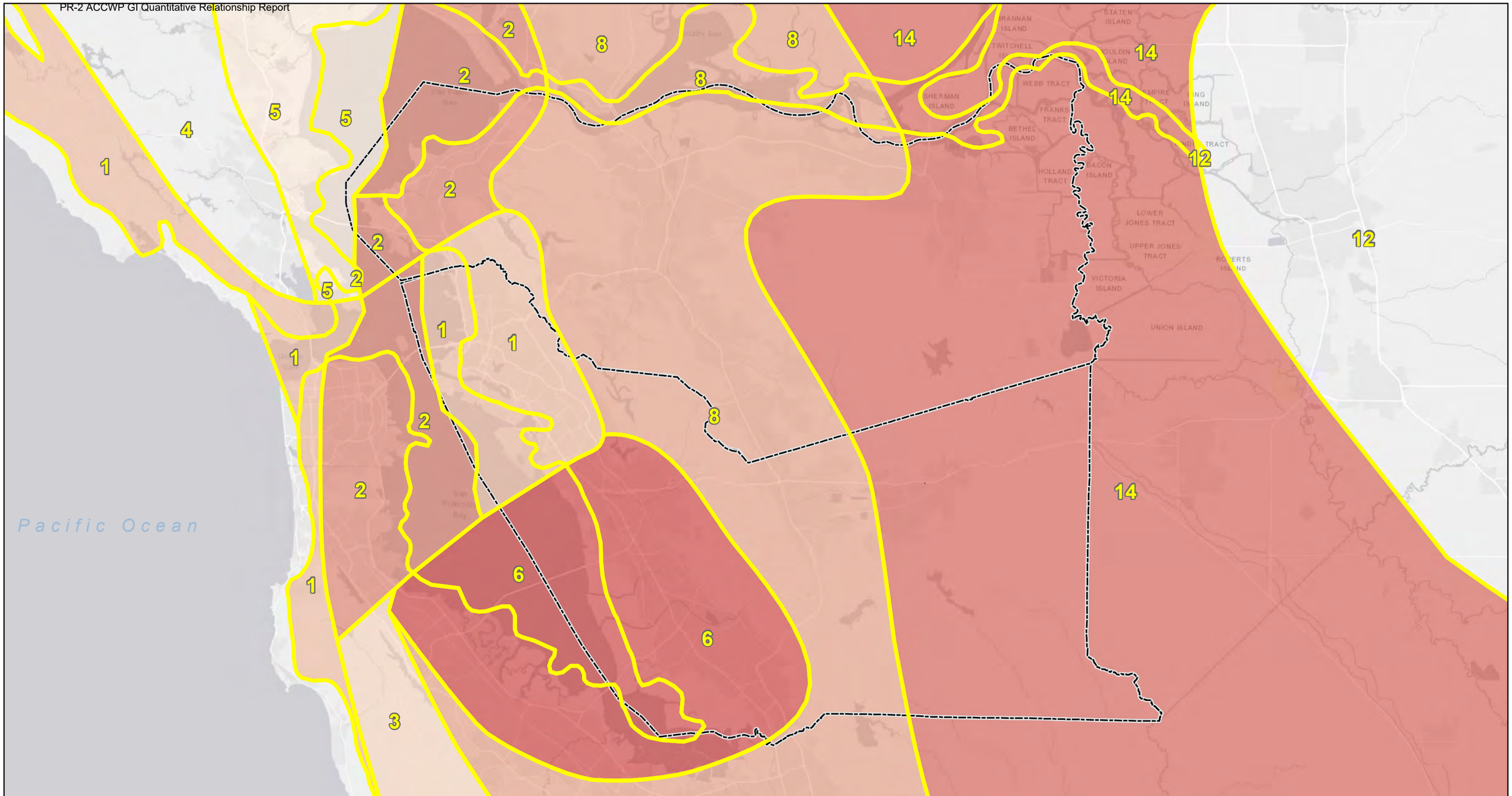

County Boundary

CIMIS ET Zone Boundary

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

N

0 6 12 Miles

CIMIS Evapotranspiration Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 2

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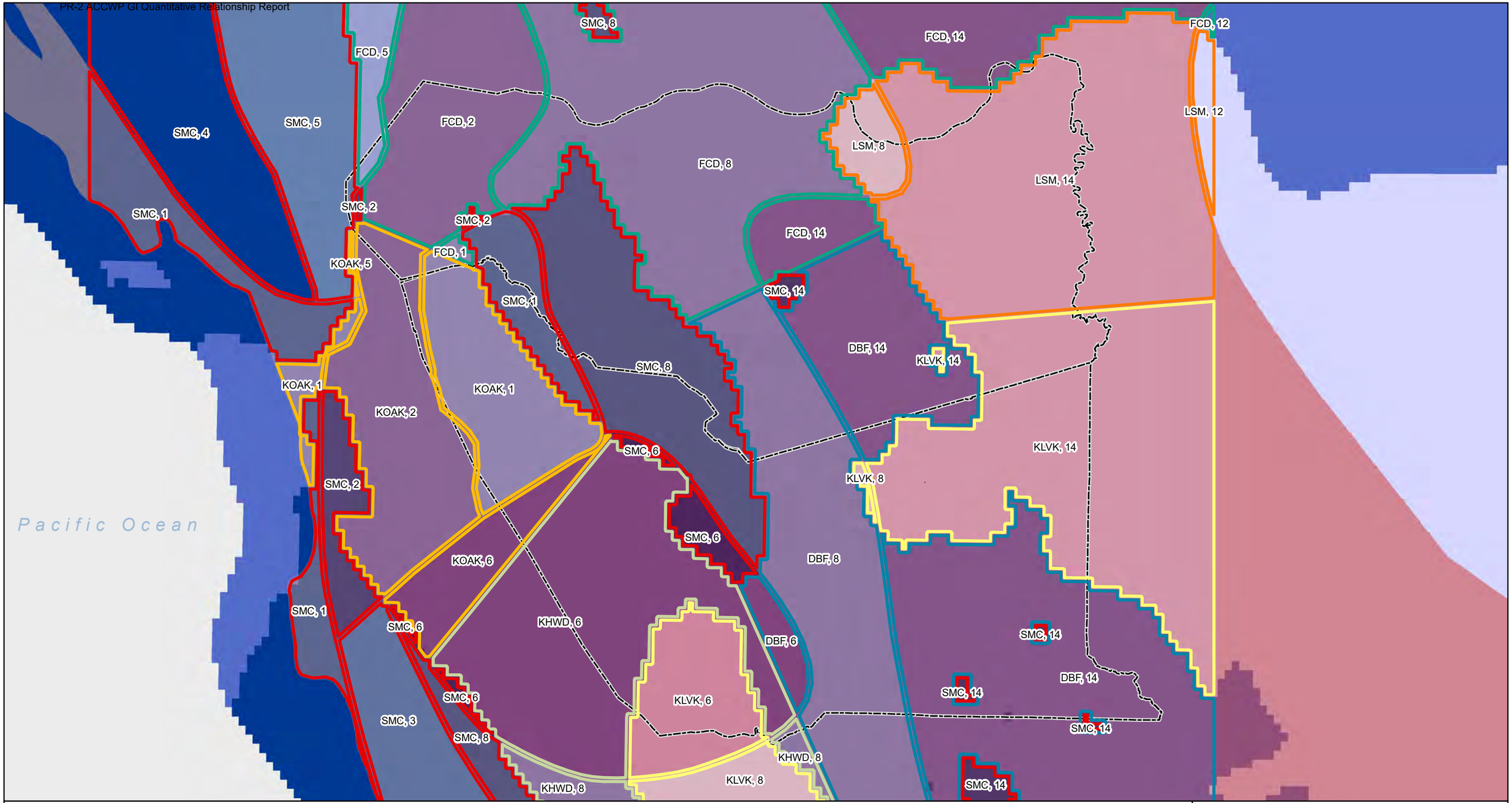

County Boundary

Mean Annual Precipitation (in)

- < 16
- 16 - 25
- > 25

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

Climate Zones are created by overlapping precipitation zones and ET zones.The unique climate zones that occur in Contra Costa and Alameda County are labeled as "Gauge ID, ET Zone".

N

0 6 12 Miles

Climate Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County California

Geosyntec consultants

Oakland | July 2018

Exhibit 3

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_4_Climate_Zones.mxd 7/5/2018 6:00:27 PM

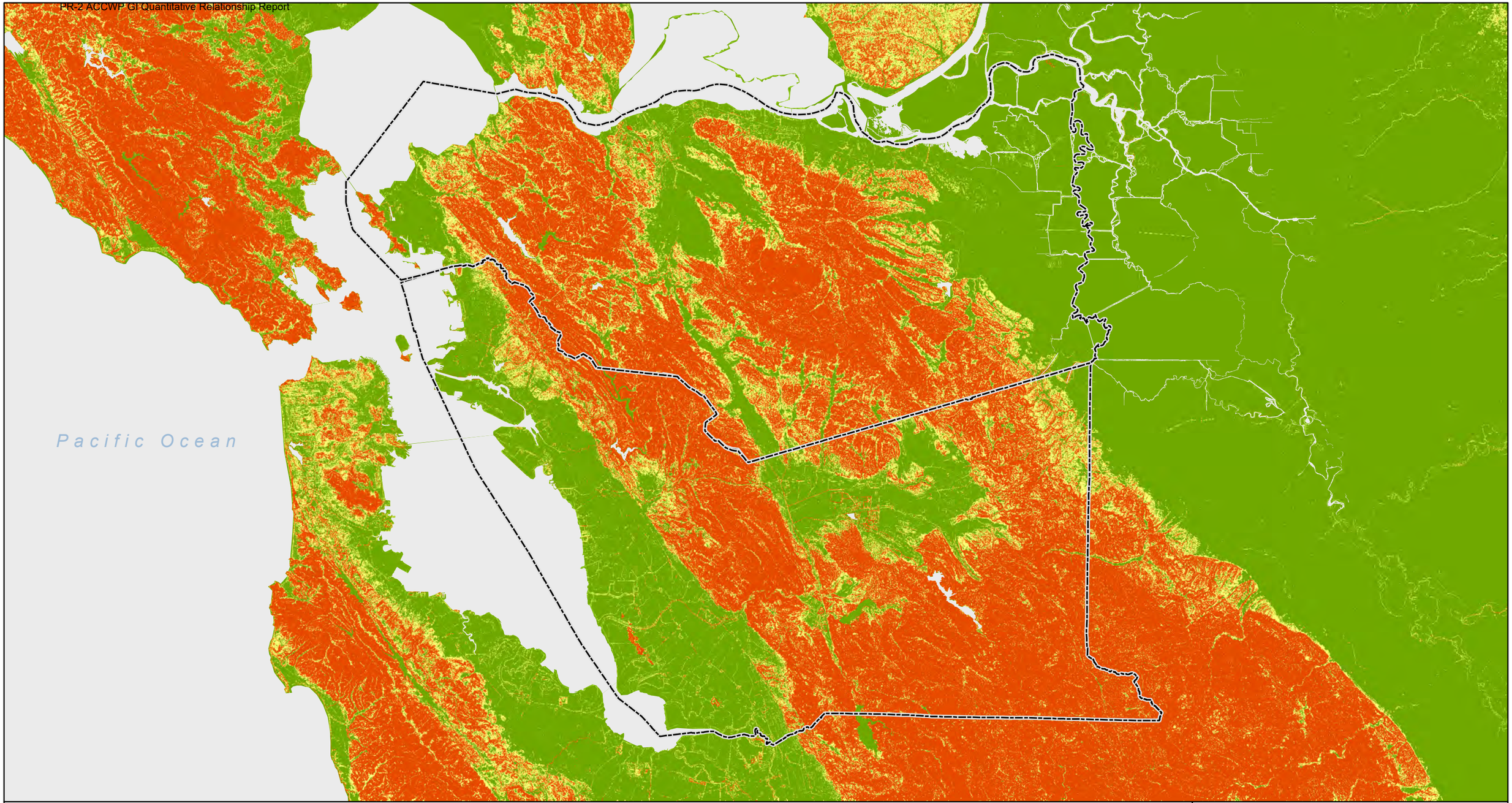

County Boundary

% Slope

- < 5
- 5-15
- > 15

N

0 6 12 Miles

Slope Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

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Exhibit 4

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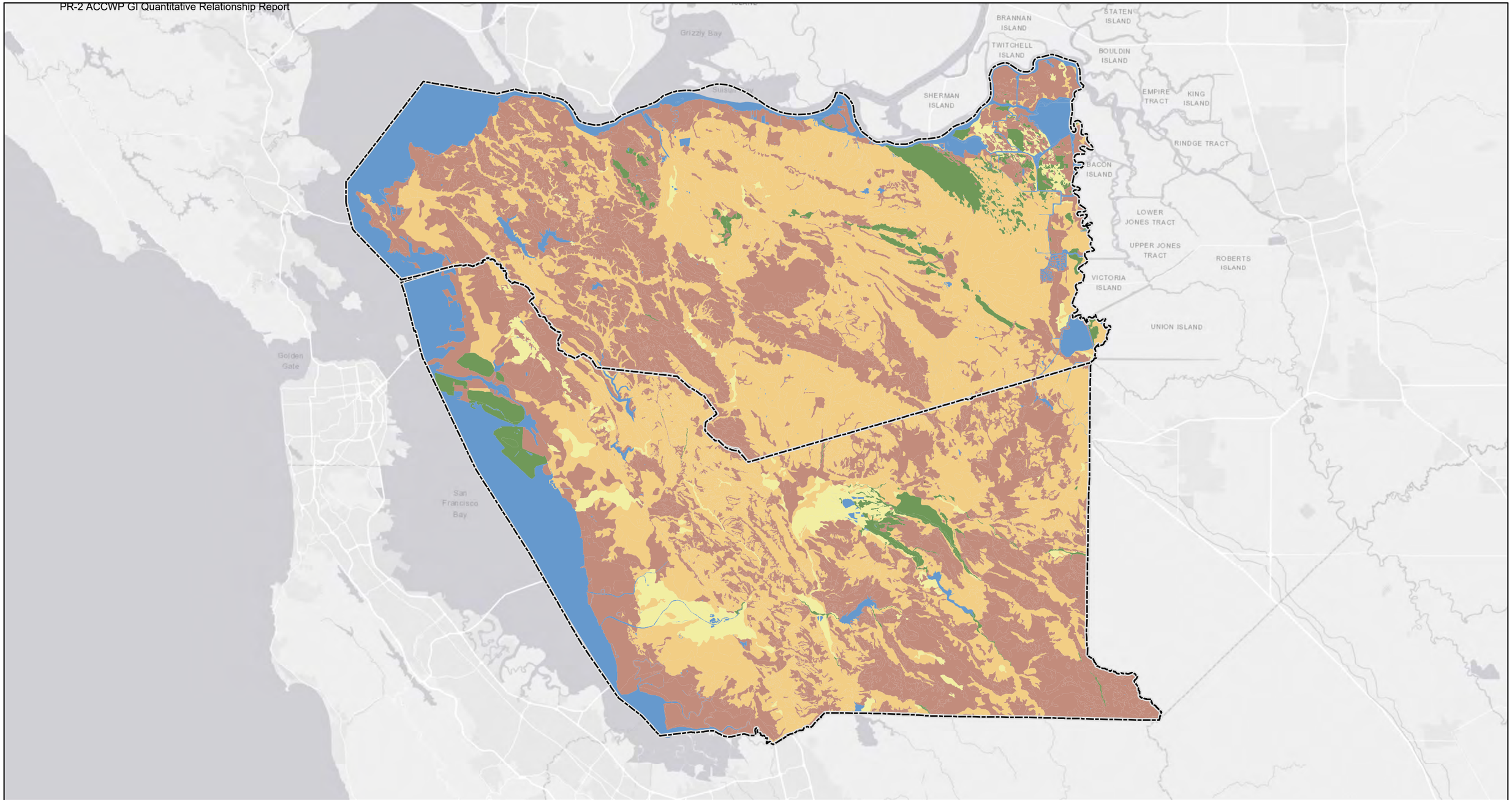

County Boundary

HSG

- A
- B
- C
- D
- W

Note: Area within the county with no HSG assignment was assigned the HSG of the most prominant adjacent soil group.

N

0 6 12 Miles

Hydrologic Soil Group

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 5

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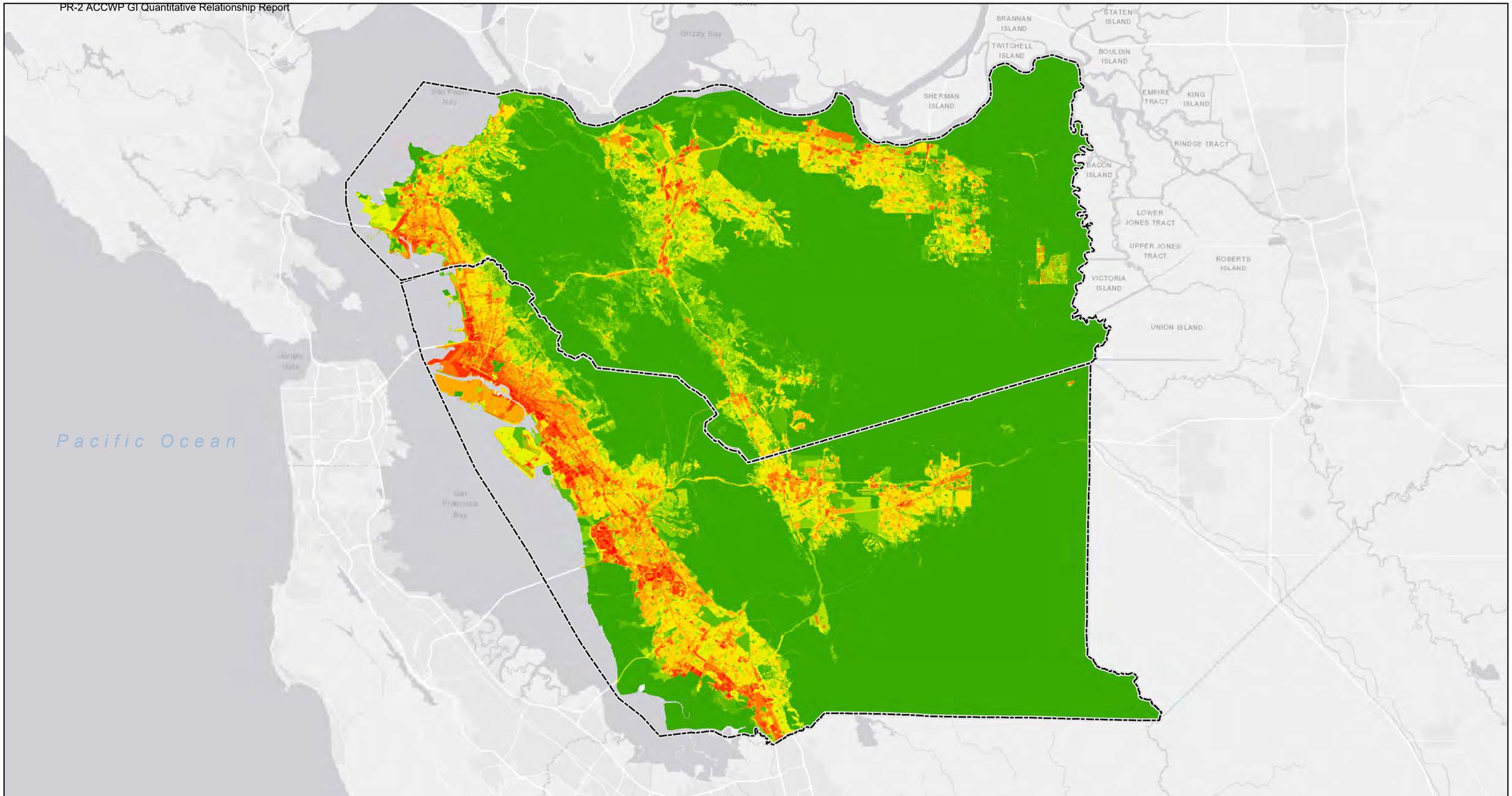

County Boundary

ABAG 2005 Imperviousness

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Note:
Imperviousness is assigned to ABAG 2005 landuse based on the NLCD 2006 Impervious Cover layer. These values may be adjusted during calibration for certain categories of ABAG landuse.

For purposes of calculating runoff from areas with compacted soil, developed areas and agricultural uses were assumed to be compacted to 0.75 times the underlying saturated soil conductivity (ksat). These areas generally have percent imperviousness > 20%.

N

0 6 12 Miles

Regional Imperviousness

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 6

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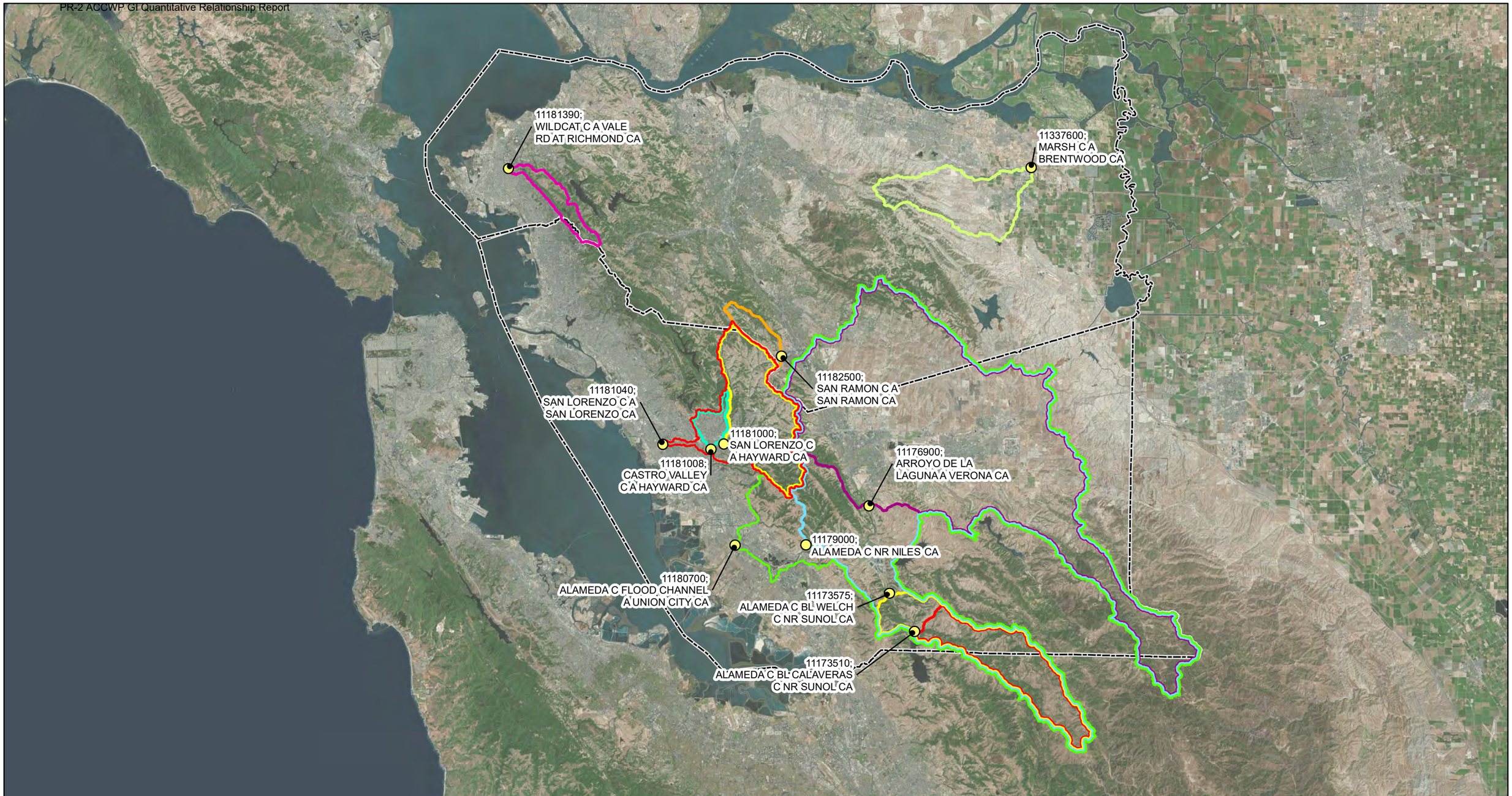

	Group 1	Group 2	Group 3	Group 4	Group 4
County Boundary	11181040	11180700	11182500	11337600	11181390
Gauge Location	11181000	11179000			
	11181008	11173575			
		11176900			
		11173510			

N

0 6 12 Miles

Candidate Calibration Watersheds

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 7

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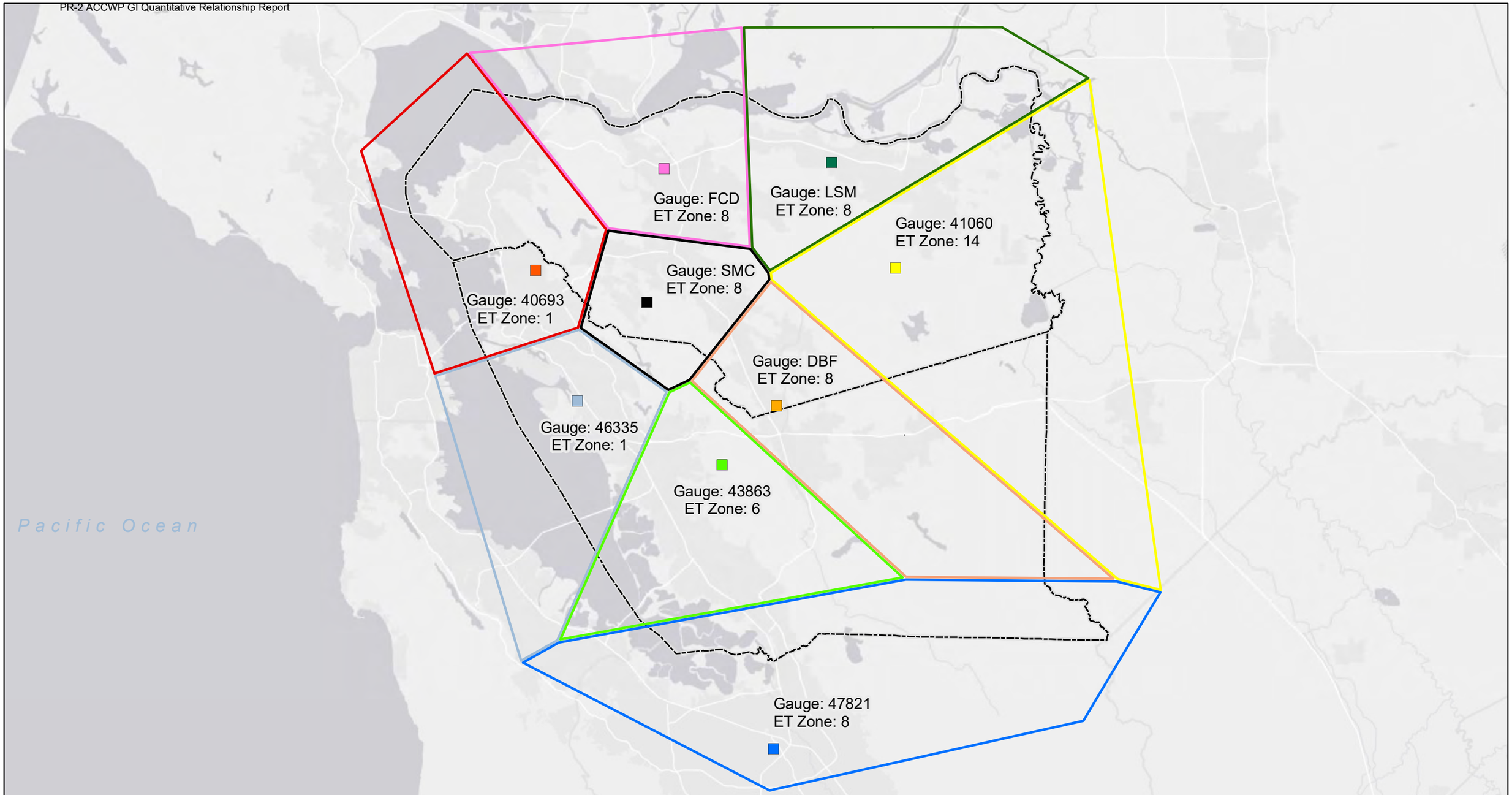

County Boundary

Long-Term Rainfall Gauge Location

- 40693
- 41060
- 43863
- 46335
- 47821
- DBF
- FCD
- LSM
- SMC

N

0 6 12 Miles

Long-Term Rainfall Gauge Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | July 2018

Exhibit 8

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_8_GI_Long_Term_Rainfall_Precipitation_Zones.mxd 7/5/2018 6:01:01 PM

Plan View

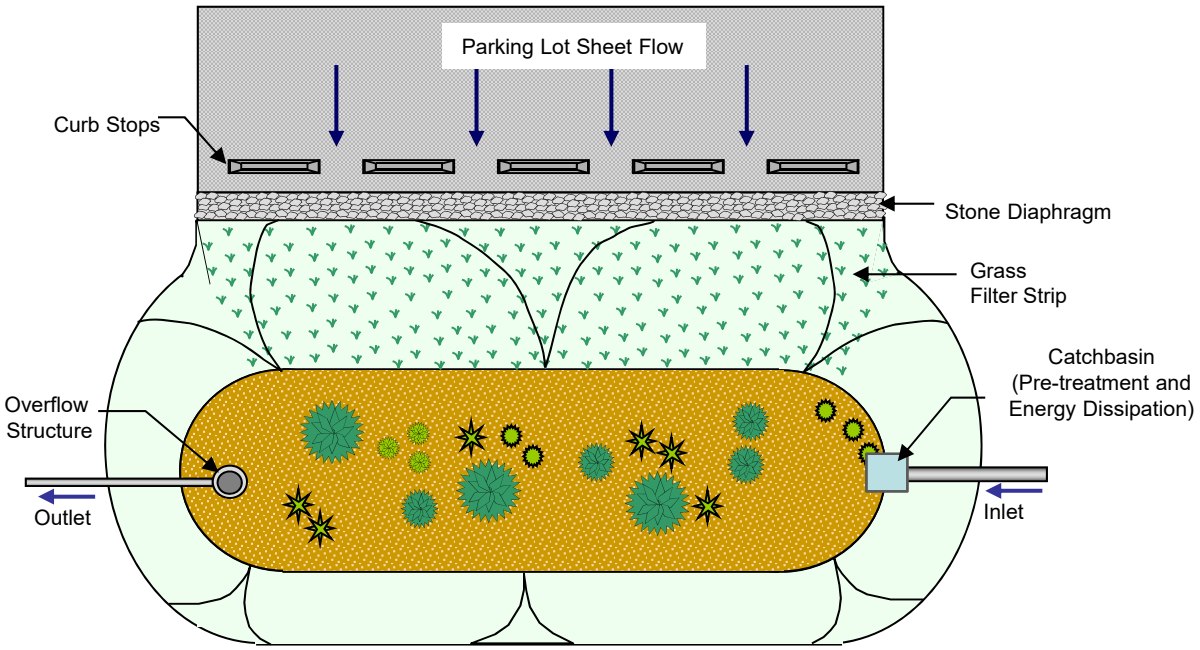

Profile

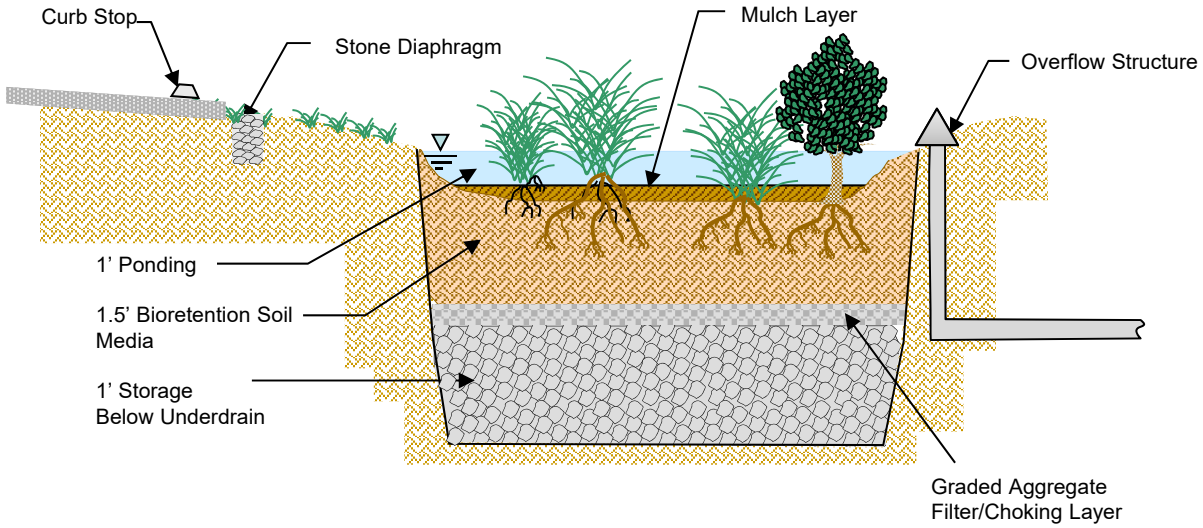

Note: Plan and Profile views are not to scale

Conceptual Illustration of an Infiltration Facility

Geosyntec consultants

Exhibit 9

Oakland | July 2018

Plan View

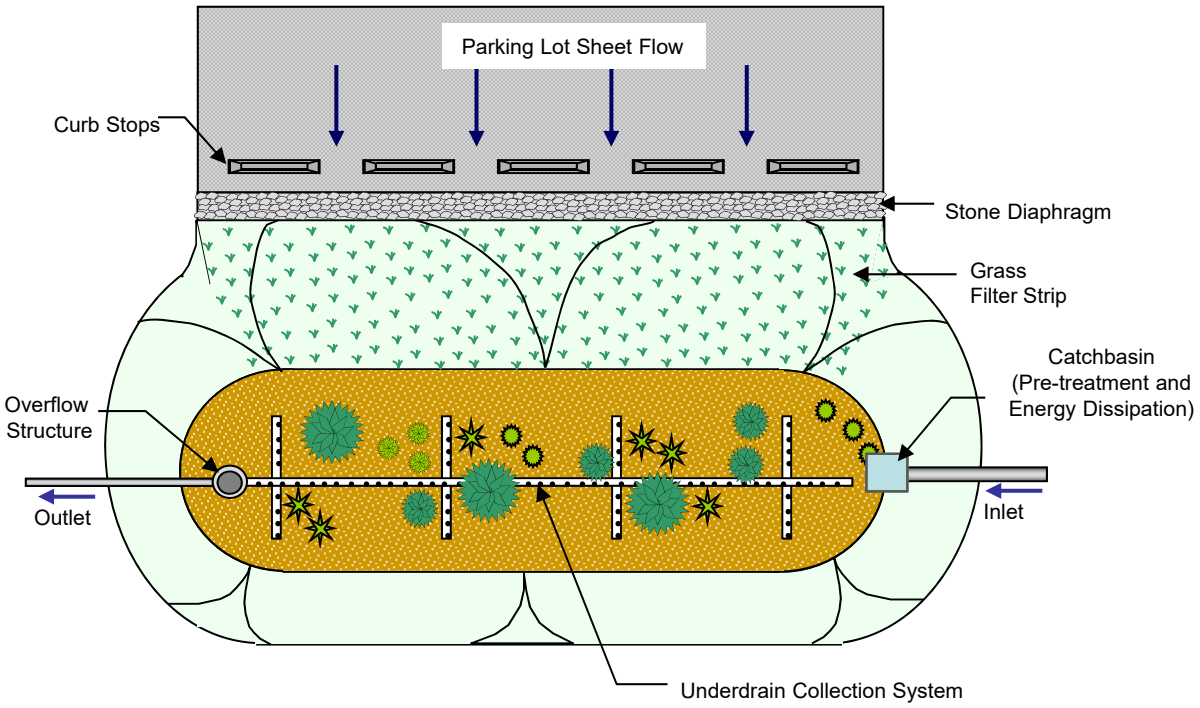

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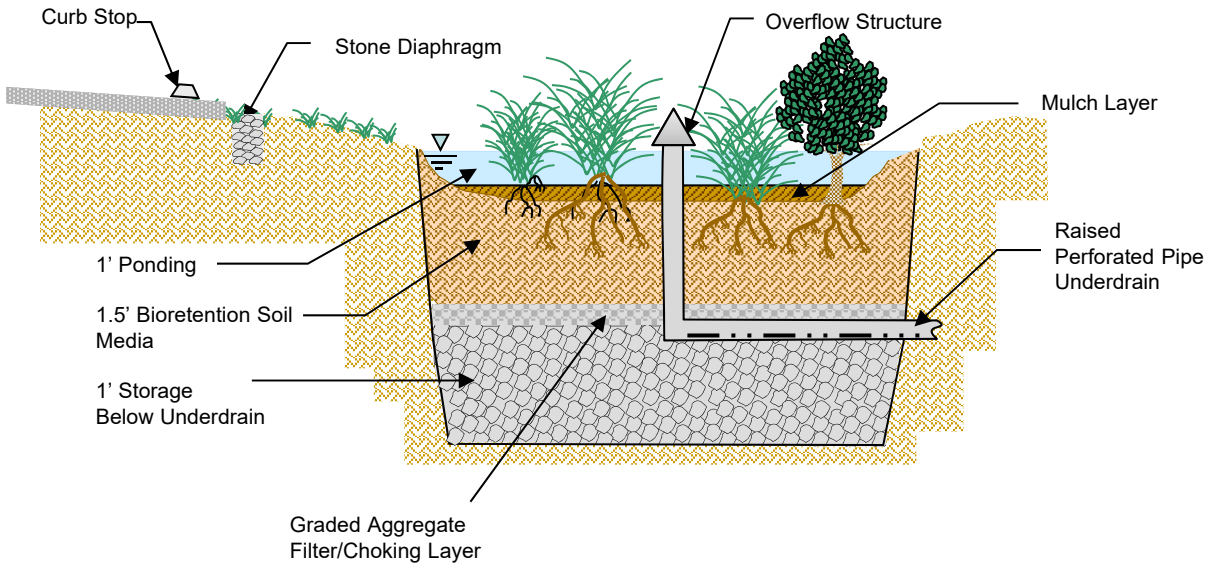

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Bioretention/Bioinfiltration Facility

Geosyntec consultants

Exhibit 10

Oakland | July 2018

Plan View

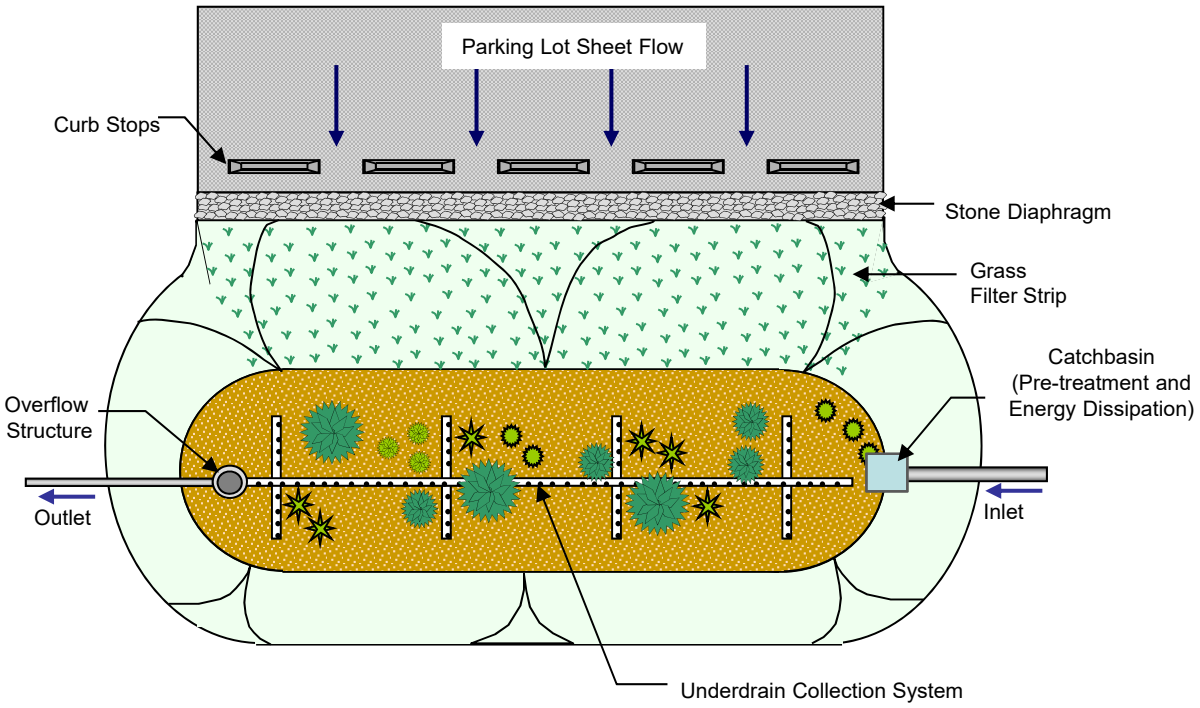

Profile

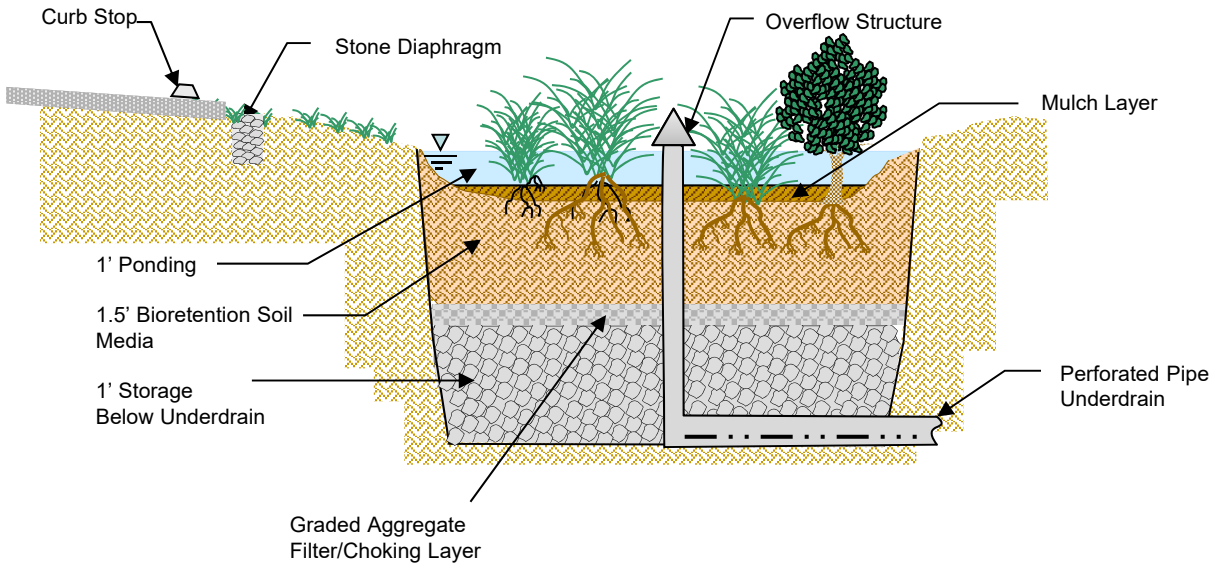

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Biofiltration Facility

Geosyntec consultants

Exhibit 11

Oakland | July 2018

PR-3 Contra Costa Clean Water Program GI Quantitative Relationship Report

CONTRA COSTA CLEAN WATER PROGRAM

QUANTITATIVE RELATIONSHIP BETWEEN GREEN INFRASTRUCTURE IMPLEMENTATION AND PCBs/MERCURY LOAD REDUCTIONS

Submitted in Compliance with Provisions C.11.b.iii.(3), C.11.c.iii.(3), C.12.b.iii.(3), and C.12.c.iii.(1)

Municipal Regional Stormwater Permit
NPDES Permit No. CAS612008
Order No. R2-2015-0049

August 22, 2018

The Contra Costa Clean Water Program – A Municipal Stormwater Program consisting of Contra Costa County, its 19 Incorporated Cities/Towns, and the Contra Costa County Flood Control & Water Conservation District

This report is submitted by the agencies of the

CONTRA COSTA CLEAN WATER PROGRAM

Program Participants:

- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon and Walnut Creek
- Contra Costa County
- Contra Costa County Flood Control & Water Conservation District

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on behalf of the
Contra Costa Clean Water Program

LIST OF ACRONYMS

ASOS	Automated Surface Observation System
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
CIMIS	California Irrigation Management Information System
GI	Green Infrastructure
GIS	Geographic Information System
HRU	Hydrologic Response Unit
KTRL	Kendall-Theil Robust Line
MAD	Median Absolute Deviation
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
ng/kg	nanogram per kilogram
NPDES	National Pollutant Discharge Elimination System
PCBs	Polychlorinated Biphenyls
RAA	Reasonable Assurance Analysis
RMSE	Root Mean Square Error
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SWMM	Stormwater Management Model
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WY	Water Year

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1. INTRODUCTION

1.1 Purpose

This *Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reductions* report was prepared by the Contra Costa Clean Water Program (CCCWP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.b.iii.(3), C.11.c.iii.(3), C.12.b.iii.(3), and C.12.c.iii.(1) for submitting the quantitative relationship between green infrastructure (GI) implementation and PCBs load reductions that will be used for the Reasonable Assurance Analysis (RAA) required by MRP Provisions C.11.c.ii.(2), C.11.d.ii, C.12.c.ii.(2), and C.12.d.ii.

This report was prepared in cooperation with the Alameda Countywide Clean Water Program. The RAA modeling described herein will be conducted for both countywide programs and will use data inputs from both Contra Costa County and Alameda County.

1.2 Background

1.1.1 PCBs and Mercury Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to PCBs and mercury. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as Best Management Practices (BMPs), are the tools that Permittees can use to assist in restoring water quality in the Bay.

1.1.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and revised in 2015[1]. The MRP includes provisions to reduce loads of mercury and PCBs consistent with the TMDL implementation timeframe (Provisions C.11 and C.12, respectively) through implementation of GI projects (Provisions C.3.j, C.11.c, and C.12.c) and source controls (Provisions C.11.d and C.12.d).

The Permittees are reporting load reductions achieved before and during the current MRP term (2014 – 2020) using the approved Interim Accounting Methodology (BASMAA, 2017). MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3) requires the Permittees to report in the 2018 and subsequent Annual Reports any refinements to the Interim Accounting Methodology to be used in subsequent Permit terms. As part of this reporting requirement, Provision C.11.c.iii.(3) and C.12.c.iii.(1) requires the Permittees to report on the quantitative relationship between GI implementation and PCBs and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

Green Infrastructure Planning and RAA

MRP Provision C.3.j requires the Permittees to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. The Green Infrastructure Plan must be developed using a mechanism

[1] The cities of Antioch, Brentwood, and Oakley, and the eastern portions of unincorporated Contra Costa County and the Contra Costa County Flood Control & Water Conservation District (the East County Permittees) are located within the jurisdiction of the Central Valley Water Board and are covered under a separate Joint Municipal NPDES Permit titled "East Contra Costa County Municipal NPDES Permit" (East County Permit), which was last reissued in September 2010 (NPDES Permit No. CAS083313, Order No. R5-2010-0102). The East County Permit expired on September 1, 2015; however, it remains in force and effect until a new permit is reissued. In October 2016, the East County Permittees requested that the Central Valley Water Board designate the San Francisco Bay Water Board as the permitting authority for MS4 discharges in eastern Contra Costa County. In response to this request, the Central Valley Water Board provided a letter, dated January 6, 2017, that documents written agreement by both Water Boards to designate the San Francisco Bay Water Board to regulate MS4 discharges from the East County Permittees under MRP 2.0 and any successor orders. This East County Permittees are implementing PCBs and mercury control measures and this document reports those implementation efforts and the associated load reductions.

to prioritize and map areas for potential and planned GI projects, both public and private, on a drainage-area-specific basis, for implementation by 2020, 2030, and 2040.

MRP Provisions C.11.c and C.12.c require the Permittees to prepare an RAA for inclusion in the 2020 Annual Report that quantitatively demonstrates that specified mercury and PCBs load reductions will be achieved by 2040 through implementation of GI.

This RAA should do the following:

1. Quantify the relationship between the areal extent of GI implementation (e.g., acres treated) and mercury and PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of GI strategies likely to be implemented.
2. Estimate the amount and characteristics of land area that will be treated by GI by 2020, 2030, and 2040.
3. Estimate the amount of mercury and PCBs load reductions that will result from GI implementation by 2020, 2030, and 2040.
4. Ensure that the calculation methods, models, model inputs, and modeling assumptions used have been validated through a peer review process.

Additionally, MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and implementation schedules for mercury and PCBs control measures and an RAA demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The implementation plans, which will also be included in the 2020 Annual Report, along with the GI-based RAA outlined above, must:

1. Identify all technically and economically feasible mercury or PCBs control measures (including GI projects, but also other control measures such as source property identification and abatement, managing PCBs in building materials during demolition, enhanced operations and maintenance, and other source controls) to be implemented;
2. Include a schedule according to which technically and economically feasible control measures will be fully implemented; and
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency, and significant environmental impacts resulting from their implementation.

This report presents the quantitative relationship between GI implementation and PCBs and mercury load reductions, including the data used and a full description of models and model inputs relied on to establish this relationship. This relationship will be used to predict loads reduced through GI implementation for the RAAs described above and to report loads reduced through GI implementation in the subsequent Permit term.

2. DESCRIPTION OF RAA MODEL

This section provides an overview of the RAA modeling framework and describes the output of each component.

2.1 RAA Model Overview

The approach used to estimate the load reductions resulting from implementation of GI includes the model components listed below, which are described in further detail in the following sections:

- Baseline Pollutant Loading Model – the baseline pollutant loading model is a continuous simulation[2] hydrology model combined with pollutant loading inputs to obtain the average annual loading of mercury and PCBs across the county during the TMDL baseline period (i.e., 2003 – 2005).
    - Hydrology – this model component produces average annual runoff across each county for the period of record using a hydrologic response unit (HRU) approach. The HRU approach involves modeling various combinations of land surface features (i.e., imperviousness, underlying soil characteristics, slope, etc.) present within each county for a unit area drainage catchment. See Section 2.2.1.
    - Water Quality – the hydrology output is combined with average annual concentrations estimated by the Regional Monitoring Program's Regional Watershed Spreadsheet Model (RWSM; Wu et al, 2017) developed by the San Francisco Estuary Institute (SFEI) to produce average annual PCBs and mercury loading for the period of record. See Section 2.2.2.

[2] Continuous simulation models calculate outputs (e.g., runoff) "continuously", i.e., for many time steps over a long-term period of record (e.g., every 10 minutes for 10 years). Long-term "continuous" input data (e.g., hourly rainfall) is required. This is contrasted with design-event simulations which model a single rainfall event, e.g., a 24-hour storm with a 10-year recurrence frequency.

- GI Performance Models – the GI performance models are developed to represent load reductions resulting from implementation of GI. See Section 2.3.
- Future Condition (RAA Scenario) Models – the RAA scenario models are conducted to represent future land use changes and control measure implementation that could result in pollutant load reduction. Both GI and source controls are considered, depending on the time frame of interest. See Section 2.4 for a description of load reduction calculations.

2.2 Baseline Loading Model

2.2.1 Hydrologic Model

As introduced above, the proposed approach for modeling hydrology is to use a hydrologic response unit (HRU) approach. An HRU is a unique combination of land surface features (imperviousness, underlying soil characteristics, slope, etc.) which is expected to give a consistent runoff response to rainfall, no matter where that unique combination is found. The HRU approach involves modeling all possible combinations of land surface features present within each county for a unit area drainage catchment and then storing these results in a database. These HRU results can been be scaled geospatially across the entire county without developing a detailed hydrologic model. This method is consistent with the *Bay Area RAA Guidance Document* (BASMAA, 2017b).

The generic HRUs are modeled using USEPA's Stormwater Management Model (SWMM) to obtain an average annual runoff volume per acre for the identified baseline period of record (water year [WY] 2000 – 2009) for each HRU. Certain HRU inputs (imperviousness, soil parameters) are adjusted as needed to calibrate the HRUs on an average annual basis to identified flow gauges in the counties.

The average annual runoff volume per acre associated with a specific HRU can then be multiplied by the area represented by that HRU across each county (or a selected smaller planning area, such as a watershed or jurisdictional boundary). The resulting volumes associated with each represented HRU within the specified geospatial area can then be summed for the identified area to obtain the estimated total average annual runoff volume.

2.2.2 Water Quality Model

Identified HRUs across each county are combined with the RWSM land use classifications layer to determine pollutant loading rates. The RWSM provides average annual concentrations of PCBs

and mercury that wash off from various land use categories. On an average annual basis, this approach approximates the total load.

Average annual runoff volume associated with the geospatial HRUs is multiplied by the PCBs and mercury average annual concentration (based on the RWSM land use categories for the identified area) to obtain average annual pollutant load using the following equation:

$$Load_{Baseline} = \sum\left(\sum Unit\ Runoff_{HRU} \times Area_{LU,HRU}\right) \times Concentration_{LU} \times 0.00123 \qquad \text{Eqn. 1}$$

Where:

$Load_{Baseline}$	=	The total average annual baseline pollutant load for the identified area for calculation [grams/year]
Unit $Runoff_{HRU}$	=	The average annual runoff per acre for a given HRU within the identified area for calculation [ac-ft/acre/yr]
$Area_{LU,HRU}$	=	The total area of the HRU within the RWSM land use category within the identified area for calculation [acres]
$Concentration_{LU}$	=	The average annual pollutant concentration associated with the RWSM land use category [ng/L]
0.00123	=	Conversion factor [(L/ac-ft)*(g/ng)]

2.3 Green Infrastructure Performance Model

Volume reduction (via retention in the green infrastructure facility) and pollutant load reduction (via filtration through media and discharge through an underdrain) are modeled utilizing a combination of hydraulic modeling in SWMM and currently available empirical GI performance data.

2.3.1 Hydraulic GI Models

GI control measure hydraulic performance is modeled in SWMM with a 100% impervious tributary area for three GI facility types: (1) bioretention[3] with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention. The model is run with varying footprint sizes and varying underlying infiltration rates (i.e., the rate at which treated runoff infiltrates into native soils underlying the BMP facility). Average annual volume retained, volume treated, and volume bypassed by the GI measure are recorded for each GI model run.

Volume-based performance[4] corresponding to the generic 100% impervious tributary area can be applied to the effective area in GI drainage areas made up of identified HRUs. The effective area is also known as the "runoff generating area" and is calculated as the tributary area multiplied by the long-term or average annual runoff coefficient.

2.3.2 Green Infrastructure Pollutant Reduction Calculations

To calculate pollutant load reduction associated with GI implementation, the hydraulic model results are combined with water quality performance data. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load (Eqn. 2). Equations corresponding to the pollutant reduction calculation are provided below and the water balance is illustrated in Figure 1. In summary, influent load is calculated as the pollutant load produced by the 100% impervious tributary area for each RWSM land use category using Eqn. 3. The pollutant load that bypasses the facility is calculated as the proportion of runoff that bypasses the facility per the hydraulic GI model output, multiplied by the influent concentration (Eqn. 4). The effluent load is calculated as the proportion of runoff that is captured by the facility per the hydraulic GI model output, combined with an effluent concentration (Eqn. 5 and Eqn. 6).

[3] The bioretention is assumed to include: 6-inch or 12-inch ponding depth, 1.5 ft of filter media with a 5 in/hr flow through rate, and 1 ft of gravel beneath the media.

[4] Volume-based performance refers to how much runoff volume the GI facility captures and retains or treats and discharges through the underdrain, typically represented as a percentage of the average annual runoff volume.

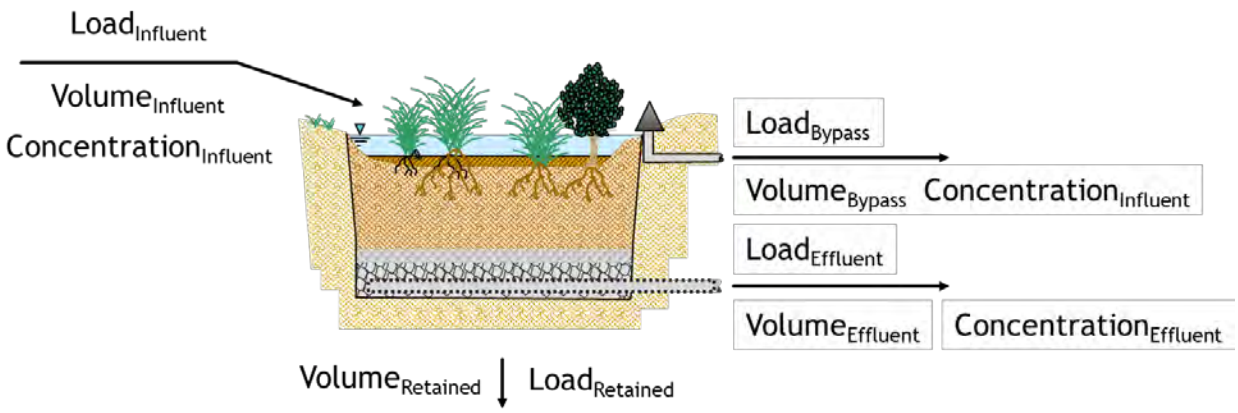

Figure 1: Illustration of GI Facility Pollutant Load Reduction Calculations

$$Load_{Reduced} = Load_{Influent} - Load_{Bypass} - Load_{Effluent} \quad \text{Eqn. 2}$$

$$Load_{Influent} = Volume_{Influent} \times Concentration_{Influent} \times C \quad \text{Eqn. 3}$$

$$Load_{Bypass} = Volume_{Bypass} \times Concentration_{Influent} \times C \quad \text{Eqn. 4}$$

$$Load_{Effluent} = (Volume_{Captured} - Volume_{Retained}) \times Concentration_{Effluent} \times C \quad \text{Eqn. 5}$$

$$Volume_{Captured} = Volume_{Influent} - Volume_{Bypass} \quad \text{Eqn. 6}$$

Where:

$Load_{Reduced}$	=	The total average annual pollutant load reduced by the GI facility [g/year]
$Load_{Influent}$	=	The total average annual pollutant load produced by the facility drainage area [g/year]
$Load_{Bypass}$	=	The pollutant load that bypasses the facility [g/year]
$Load_{Effluent}$	=	The pollutant load discharged from the facility after treatment [g/year]
$Volume_{Influent}$	=	The runoff produced by the drainage area to the GI facility [ac-ft/year]
$Volume_{Bypass}$	=	The proportion of influent runoff that bypasses the facility [ac-ft/year]

$Volume_{Captured}$	=	The proportion of influent runoff that is captured by the facility [ac-ft/year]
$Volume_{Retained}$	=	The proportion of captured runoff that is retained by the facility through infiltration and/or evapotranspiration [ac-ft/year]
$Concentration_{Influent}$	=	The pollutant concentration associated with the GI drainage area [ng/L]
$Concentration_{Effluent}$	=	The concentration discharged from the facility after treatment [ng/L]
C	=	Conversion factor constant = 0.00123 [(L/ac-ft)*(g/ng)]

2.4 RAA Scenario Loading Model

The loading corresponding with RAA future condition scenarios (2020, 2030, 2040) will be developed using the same volume and concentration combination approach used for the baseline condition. HRU outputs developed for the baseline model will scaled across the county corresponding to anticipated land use and development changes for each of the future conditions. Similarly, the RWSM land use classifications layer will be updated corresponding to each future condition scenario.

The outputs of the future hydrology scaling combined with the concentrations corresponding with future RWSM land use classification provides the land use-based loading estimated for each of the future conditions. To obtain the discharged load corresponding to each future GI scenario, load reductions associated with anticipated GI (developed as described above) will be subtracted from the land use-based load.

3. MODEL INPUTS AND DATA USED

This section describes the inputs to each component of the model and the data used.

3.1 Baseline Loading Model

3.1.1 Hydrologic Model

Generic HRU models are developed in SWMM to estimate average annual runoff volume per acre values that can be applied to all land surfaces within each county. The land surface feature inputs that will be varied to model the generic HRUs are described in the sections below and summarized in Table 3.

Climate Inputs

HRU climate inputs provide the total amount of precipitation that falls on the land surface and the amount of precipitation that is lost to the atmosphere via evapotranspiration before running off the land surface. Multiple gauges from across Alameda and Contra Costa counties that had continuous hourly precipitation data were chosen to represent distinct rainfall regions within both counties. For precipitation, these regions are based on 30-year annual rainfall regimes as identified by PRISM[5]. For evapotranspiration rates, the California Irrigation Management Information System (CIMIS) evapotranspiration zones were used within each county. The combination of the identified precipitation regions and evapotranspiration regions were combined to yield "climate zones" used for generic HRU models. Precipitation zones, evapotranspiration zones, and climate zones are shown in Exhibit 1 through Exhibit 3 (see Appendix A). Table 1 provides a summary of precipitation gauges used and average annual rainfall corresponding to the entire period of record and WY 2000 - 2009. Table 2 provides a summary of the CIMIS data used for the daily reference evapotranspiration rate for each evapotranspiration zone.

Table 1: HRU Precipitation Gauges WY2000-2009

Gauge ID	Gauge Name	Average Annual Precipitation (inches) WY 2000 - 2009	Gauge Source
KHWD	Hayward Air Terminal (ASOS)	16.3	ASOS[1]
KLVK	Livermore Municipal Airport (ASOS)	14.6	ASOS
KOAK	Oakland Airport (ASOS)	19.0	ASOS
DBF	Dublin Fire Station, San Ramon	17.3	CCCFCD[2]
FCD	Flood Control District, Martinez	16.2	CCCFCD
LSM	Los Medanos, Pittsburg	11.8	CCCFCD
SMC	Saint Mary's College, Moraga	28.9	CCCFCD

1. Automated Surface Observation System (ASOS) data were used for Alameda County gauge sites for the period of WY2000-2009 since NCDC gauge data was not available for the baseline period. ASOS sites sometimes co-occur with NCDC gauge sites (e.g., airports), but are maintained and delivered by separate government entities.
2. Contra Costa County gauge data is collected by the Flood Control District but was provided to Geosyntec by Dubin Engineering.

[5] Parameter-elevation Relationships on Independent Slopes Model (PRISM), developed and managed by the PRISM Climate Group, Oregon State University http://prism.oregonstate.edu/.

Table 2: CIMIS Reference Evapotranspiration

ET Zone	Monthly Evapotranspiration (in/day)[1]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.03	0.05	0.08	0.11	0.13	0.15	0.15	0.13	0.11	0.08	0.04	0.02
2	0.04	0.06	0.1	0.13	0.15	0.17	0.16	0.15	0.13	0.09	0.06	0.04
3	0.06	0.08	0.12	0.16	0.17	0.19	0.18	0.17	0.14	0.11	0.08	0.06
6	0.06	0.08	0.11	0.16	0.18	0.21	0.21	0.2	0.16	0.12	0.08	0.06
8	0.04	0.06	0.11	0.16	0.2	0.23	0.24	0.21	0.17	0.11	0.06	0.03
14	0.05	0.08	0.12	0.17	0.22	0.26	0.28	0.25	0.19	0.13	0.07	0.05

1. CIMIS reference evapotranspiration, which is based on irrigated turf grass, was scaled by 0.6 to represent the local mix of vegetated cover including urban vegetation, native xeric adapted plants, and unirrigated vegetated open space areas.

Slope

Slope affects how quickly rainfall will run off a modeled land surface and therefore how much is able to be infiltrated into the subsurface. The available digital elevation model (DEM)[6] for the counties was analyzed to obtain percent slope values for each ~30m by ~30m square of land surface. These percent slope values were classified into three distinct slope zones as summarized in Table 3 and shown in Exhibit 4 (see Appendix A).

Underlying Soil Inputs

Physical characteristics of the soil underlying the land surface affect the amount of rainfall that may be infiltrated into the subsurface. Infiltration was simulated in SWMM using the Green-Ampt infiltration model option. The physical soil input parameters for the Green-Ampt infiltration model were varied based on hydrologic soil group (HSG) as identified by the National Resource Conservation Service (NRCS[7]) soil survey and were modified as described below for developed areas. Soil parameters used as model inputs include suction head, hydraulic conductivity, and initial moisture deficit. Developed areas that are assumed to have been compacted and therefore result in less infiltration to the subsurface are modeled using 75 percent of the HSG hydraulic conductivity value. Soil parameters are not reported here, as this input is adjusted as part of

[6] U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013

[7] Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. link: https://websoilsurvey.sc.egov.usda.gov/

baseline model calibration. Details about soil inputs are provided in Table 3. A map of hydrologic soil group is provided as Exhibit 5 (see Appendix A).

Areas of development were identified based on the land use of the surface. Soils within urban and agricultural use areas were considered to have been compacted by the site preparation and activities.

Imperviousness

Imperviousness (i.e., the percentage of impervious area) affects area on the land surface where rainfall may be infiltrated and therefore the quantity of runoff produced. The runoff from a range of land use imperviousness values is modeled by area-weighting the results of a pervious surface runoff result (i.e., pervious HRU output) with a corresponding impervious surface runoff result (i.e., impervious HRU output) (see Table 3 and Exhibit 6 (see Appendix A)).

The baseline model HRU imperviousness is developed by geospatially combining the land uses identified by Association of Bay Area Governments (ABAG, 2005) with the National Land Cover Dataset (NLCD, 2006) data. Each feature of the ABAG dataset is assigned a single imperviousness value that is used to determine the average hydrologic response of that land surface. A lookup-table containing NLCD based imperviousness for each ABAG land use code was used as a starting value for HRU calibration. These initial values may be adjusted within an appropriate range as part of baseline model calibration.

3.1.2 Developing HRUs across each County

Each identified combination of land surface features is modeled for a generic unit-acre drainage area in SWMM for the baseline period of record (i.e., WY 2000 – 2009), utilizing a batch-processing method (which allows for inputs to be altered, model files run, and results extracted for many models automatically). The average annual runoff volume per acre is then extracted for each generic HRU modeled.

Table 3: Land Surface Feature Inputs for Generic HRU Hydrologic Models

Variables	Description	Number of Varying Features	Feature Representations	Source
Hourly Annual Precipitation	Rainfall Gauge and Rainfall Zone	7	Contra Costa County Gauges: DBF, FCD, LSM, SMC Alameda County ASOS Gauges: KHWD, KLVK, KOAK	PRISM[1], NCDC/ County-maintained rainfall gauges
Daily Evapotranspiration Rate	Evapotranspiration Zone	5	Zones 1, 2, 3, 6, 8, 14	CIMIS[2]
Slope Zone	Representation of Slope	3	<5%, 5-15%, 15%+	USGS[3]
Developed/ Undeveloped Areas	Representation of Compaction of Underlying Soils (Pervious Areas Only)	2	Undeveloped (Ksat * 1) Developed (Ksat * 0.75)	ABAG Land Use 2005[4]
Hydrologic Soil Group	Representation of Underlying Soil Type (pervious areas only)	6	HSG A, B, C, D[5], Rock, Water	NRCS[6]
Imperviousness	Representation of Imperviousness	2	0% and 100%	NLCD and ABAG 2005

1. PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, 30-year normal mean annual precipitation
2. California Irrigation Management Information System (CIMIS) Reference Evapotranspiration; digitized from http://www.cimis.water.ca.gov/App_Themes/images/etozonemap.jpg
3. U.S. Geological Survey. National Elevation Dataset (NED) 1/3 arc-second. 2013
4. ABAG land uses are proposed to be used for identifying developed and undeveloped condition and will have an imperviousness value assigned based on a geospatial analysis of the NLCD Imperviousness layer. The impervious value for each ABAG land use feature will then be carried into the HRU model calibration and adjusted accordingly.
5. "Urban" representation will be re-classified based on the dominant adjacent HSG.
6. U.S. Department of Agriculture, Natural Resources Conservation Service. Soil Survey Geographic (SSURGO) database. 2016

HRUs are determined geospatially based on the climate zone, slope zone, developed/undeveloped areas, and HSG, along with land use-based imperviousness. Exhibits 1 through 5 (see Appendix A) display the data used to develop climate zones, county slope zones, and the HSG distribution across each county. Imperviousness designations will occur based on

land use at the parcel level, by combining the geospatial ABAG land use layer[8] with the other hydrologic input regions. This results in a "patchwork" of HRUs across the counties[9].

The resulting patchwork of HRUs can be combined at the scale of choice to provide total runoff volumes for a specific area, such as a watershed or jurisdictional boundary. To estimate the total runoff for the identified area, the total acreage of each designated HRU present within a watershed or jurisdiction will be multiplied by the average annual runoff per acre associated with each HRU and then summed (i.e., area-weighting the average annual runoff volume per acre for all HRUs present).

3.1.3 HRU Input Calibration

Calibration of hydrologic models is required by the *Bay Area RAA Guidance Document*. Calibration of the generic HRU models will be conducted utilizing available stream flow records and based solely upon the annual discharge volume between WY 2000-2009. This annual calibration means that the HRU runoff estimates are representative of the approximate annual runoff volume but will not be used to estimate or compare discharge rates at smaller timesteps, such as the hourly or daily runoff hydrograph.

The list of candidate gauge sites within the counties was developed based on an assessment of the representativeness of the gauged watersheds and the mitigation of confounding factors that interfere with calibration such as missing data and upstream impoundments. For the purposes of calibration, the candidate gauge sites that were selected included stream depth rating curves and at least daily mean records for the historical period of interest. The USGS flow gauges considered for calibration are provided in Table 4 and shown in Exhibit 8 (see Appendix A).

[8] ABAG land use features will used to aggregate the imperviousness for the land surface. The relationship between AGAB feature and its imperviousness will be developed based upon other local sources (SMCWPPP, 2017) and analysis of national public data sets such as the National Land Cover Dataset (NLCD)

[9] This will be done once all the HRU input files are finalized, including the imperviousness layers.

Table 4: Flow Gauge Considered for RAA Model Calibration

Gauge ID	Gauge Name	Location	County	Data Frequency
11337600	Marsh Creek	Brentwood	Contra Costa	Daily
11182500	San Ramon Creek	San Ramon	Contra Costa	Daily
11181390	Wildcat Creek	Richmond / San Pablo	Contra Costa	Daily
11181040	Lan Lorenzo Creek	San Lorenzo	Alameda	Daily
11181008	Castro Valley Creek	Hayward	Alameda	Daily
11181000	San Lorenzo Creek	Hayward	Alameda	Daily
11180700	Alameda Creek Flood Channel	Union City	Alameda	Daily
11179000	Alameda Creek	Fremont	Alameda	Daily
11176900	Arroyo de la Laguna	Verona	Alameda	Daily
11173575	Alameda Creek Below Welch Creek	Sunol	Alameda	Daily
11173510	Alameda Creek Below Calaveras Creek	Sunol	Alameda	Daily

The effective area tributary to each flow gauge is used to calibrate the HRUs to the stream gauge records. Annual flow predicted by area-weighting HRU runoff output for the watersheds draining to the stream gauges was compared to annual flow in the stream records for the identified period of record.

Calibration of land surface runoff hydrology to stream gauge records requires that baseflow be computed and accounted for throughout the period of record. A variety of methods exist for separating baseflow from runoff, including the fixed-interval method and the local-minimum method (Sloto and Crouse, 1996). The most appropriate method for separating baseflow is determined on a gauge by gauge basis depending on the variability in the flow record, and the occurrence of confounding factors that affect baseflow such as dam releases and other dry weather inflows.

The average percent difference between the area-weighted HRU total average annual runoff volume for the watershed and the average annual flow (converted to volume) measured for the WY 2000 – 2009 period will be calculated. The acceptable ranges included in the RAA Guidance document are provided in Table 5 below.

Table 5: Allowable Difference between Simulated and Observed Annual Volumes

Model parameters	Average % difference between simulated annual results and observed data		
	Very Good	Good	Fair (lower bound, upper bound)
Hydrology/Flow	<10	10-15	15-25

If the average percent difference between simulated and measured annual storm flow volumes is greater than 25%, HRU model parameters are adjusted until the percent difference is within the acceptable range. The primary model parameters adjusted include underlying soil hydraulic conductivity and land use imperviousness, but other hydrologic model parameters, such as depression storage, may be adjusted as appropriate.

Once average percent differences in all identified watersheds are within the acceptable range, the HRU model parameters are finalized and the HRU results database will be regenerated. HRUs and resulting average annual baseline volume will be applied across each county to obtain the baseline volume discharged by each county.

3.1.4 Water Quality Model

RWSM values used to develop pollutant loading estimates across each county are:

Table 6: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total mercury (ng/L)
Ag, Open	0.2	80
New Urban	0.2	3
Old Residential	4	63
Old Commercial/ Transportation	40	63
Old Industrial and Source Areas	204	40

Water quality calculations are also used to perform baseline pollutant loading validation. The calculated pollutant load draining to Regional Monitoring Program stations will be validated by calculating the volume-weighted watershed pollutant concentration using the modeling results and comparing it to the observed concentrations in the Regional Monitoring Program data. The equation used to calculate concentration (in ng/L) at an end-of-watershed location is as follows:

$$Concentration_{Baseline} = \frac{\sum Runoff_{HRU} \times Area_{HRU} \times Concentration_{LU,HRU}}{\sum Runoff_{HRU} \times Area_{HRU}} \quad \text{Eqn. 7}$$

04899
4940

Pollutant concentration and loading data from the Regional Monitoring Program will be compared to the result of Equation 7 for several watersheds for validation purposes.

3.2 Green Infrastructure Performance Model

3.2.1 Long-Term Green Infrastructure Simulations

Long term performance was assessed for each BMP configuration using continuous historical rainfall records. In Contra Costa County historical data was available at the same gauges that were used for the HRU runoff modeling between WY2000-2009, but for Alameda County other gauge sites with longer histories were used for long term BMP performance modeling. The rainfall gauges used to model BMP performance are shown in Table 7.

Table 7: Long Term GI Performance Precipitation Gauges

Gauge ID	Gauge Name	Period of Record	Average Annual Precipitation (inches)	Gauge Source[1]
040693	Berkeley (NCDC)	1948-1990	19.8	NCDC
041060	Brentwood (NCDC)	1950-1985	14.9	NCDC
043863	Hayward (NCDC)	1948-1988	24.3	NCDC
046335	Oakland Airport (NCDC)	1948-1985	16.4	NCDC
047821	San Jose Airport (NCDC)	1948-2010	13.6	NCDC
DBF	Dublin Fire Station, San Ramon	1973-2016	15.0	CCCFCD
FCD	Flood Control District, Martinez	1971-2016	16.5	CCCFCD
LSM	Los Medanos, Pittsburg	1974-2016	10.6	CCCFCD
SMC	Saint Mary's College, Moraga	1972-2016	26.8	CCCFCD

1. NCDC data was used for Alameda County and San Jose gauge sites. Contra Costa County gauge data is collected by the Flood Control District and was provided to Geosyntec by Dubin Engineering.

3.2.2 Hydraulic Green Infrastructure Model

Hydraulic GI models were developed in SWMM to estimate hydraulic performance for a 100% impervious tributary area. Hydraulic model inputs that were varied to model the GI facility performance for the counties are described below and summarized in Table 8.

1. BMP Configuration – three GI facility types were assumed: (1) bioretention with a raised underdrain, (2) bioretention with no underdrain, and (3) lined bioretention with an underdrain.

2. BMP Footprint Size – the BMP footprint size was varied as a percent of impervious area to model different levels of hydraulic capture performance depending on facility sizing.
3. BMP Underlying Infiltration Rate – the infiltration rate of the soils underneath the bioretention facility was varied for the bioretention with a raised underdrain and bioretention with no underdrain configurations (I.e., the unlined facility types).

Table 8: Land Surface Feature Inputs for Generic GI Performance Hydraulic Models

Variables	Description	Number of Varying Features	Feature Representations
Hourly Precipitation	Rainfall Gauge	9	NCDC: 040693 (Berkeley) 046335 (Oakland Airport) 043863 (Hayward) 047821 (San Jose) 041060 (Brentwood) Contra Costa County: DBF, FCD, LSM, SMC
Daily Evapotranspiration Rate	Evapotranspiration Zone	4	CIMIS Zones: 1, 6, 8, 14
BMP Configurations	BMP profiles and underdrain	3	Lined Bioretention with underdrain Unlined Bioretention with elevated underdrain Infiltration Basin without underdrain
BMP Surface Ponding Depth	Depth (feet)	2	0.5, 1
BMP Footprint Sizes	% of Impervious Area	12	0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 3.5, 4, 5, 6
BMP Infiltration Rates	Ksat of underlying soil (in/hr)	7 3	Unlined Bioretention: 0.024, 0.05, 0.1, 0.2, 0.24, 0.3, 0.4, 0.5 Infiltration Basin: 0.5, 1, 2

The BMP cross-sections that were modeled each include:

- 6-inches or 12-inches ponding depth (both were modeled),
- 1.5 ft of filter media with 25% porosity with a 5 in/hr flow through rate, and

04901
4942

- 1 ft of gravel beneath the media with 40% porosity.

Two of the modeled BMP configurations include underdrains. In the lined bioretention facility, the underdrain is located at the bottom of the gravel layer. In the unlined bioretention facility, the underdrain was modeled at the top of the gravel layer. BMP configurations are shown in Exhibits 9 through 11 (see Appendix A).

3.2.3 Green Infrastructure Pollutant Reduction Calculations

As described in Section 2.3.2, pollutant load reduction associated with GI is calculated by combining the hydraulic model results with water quality performance data. The annual estimate of pollutant load reduction from the modeled drainage area is equivalent to the difference between the influent load and the sum of the pollutant load that bypasses the GI measure and the effluent load. The effluent load is calculated as the proportion of runoff that is treated by the GI measure multiplied by an effluent concentration.

Water quality performance data from selected, representative studies were used to determine a method to predict effluent concentrations in stormwater following treatment through a biofiltration (bioretention or tree well filters) GI measure. The data used to develop the relationship came from three studies: a) 2011 monitoring study of the El Cerrito Rain Gardens (Gilbreath, Pearce, and McKee, 2012), b) Clean Watersheds for a Clean Bay (CW4CB)[10] (Geosyntec and EOA, 2017), and c) a study at Echo Lake in King County, WA (King County, 2017). A summary of the paired influent-effluent data associated with each study is provided in table:

Table 9: Data used to Develop Effluent Concentrations

Project Name	Project Sponsor	Facility ID	Influent-Effluent Data Pairs (n pairs)	
			PCBs	Mercury
El Cerrito Green Streets – CW4CB	El Cerrito	ELC-B1	3	3
El Cerrito Green Streets – SFEI	SFEI	ELC-B1	4	4
PG&E Substation 1st and Cutting Bioretention Cells – CW4CB	Richmond	LAU-3	8	8

[10] The CW4CB study included additional monitoring of the El Cerrito rain gardens.

Project Name	Project Sponsor	Facility ID	Influent-Effluent Data Pairs (n pairs)	
			PCBs	Mercury
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Bioretention Planter Boxes – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	BPB-1	4	0
		BPB-2	4	0
		BPB-3	4	0
		BPB-4	2	0
West Oakland Industrial Area Tree Wells – CW4CB	Oakland	ETT-TW2	4	4
		ETT-TW6	4	4
Monitoring Stormwater Retrofits in the Echo Lake Drainage Basin Tree Well – SAM Effectiveness Study	King County, Dept. of Natural Resources and Parks	FLT-1	4	0
		Total Data Pairs	41	23

These data were statistically evaluated to identify an appropriate method for predicting effluent concentrations of PCBs and total mercury. The data analysis first evaluated whether available influent and effluent concentration data were significantly different and, if so, whether a monotonic relationship existed (i.e., effluent generally increased when influent increased).

A Wilcoxon non-parametric hypothesis test was run on the PCBs and total mercury paired influent-effluent data to determine if influent and effluent concentrations were statistically different at a 5% significance level. This difference was found to be significant for PCBs, and significant for total mercury when corresponding influent suspended solids concentration was greater than 20 mg/L.

Spearman's rho and Kendall's tau, which are non-parametric rank correlation coefficients, were used to identify the direction and strength of correlation between influent and effluent concentrations. As shown in Table 10, both correlation coefficients suggest that effluent concentrations are positively correlated with influent concentrations for both PCBs and mercury.

Table 10: Influent/Effluent Correlation Coefficients.

Correlation Coefficient	Total PCBs	Total Mercury
Spearman's rho	0.725	0.547
Kendall's tau	0.527	0.396

The Kendall-Theil Robust Line (KTRL) method (Granato, 2006) was used to determine the best fit line between influent and effluent data. This non-parametric method uses the median of all possible pairwise slopes between points, which is more robust to outliers than a simple linear regression. Because stormwater data tend to be lognormal, the analysis was focused on linear and log-linear relationships. After the KTRL was generated, the lower portion of the curve was adjusted to assume that neither PCBs nor total mercury can be exported from biofilters under normal circumstances, i.e., that the maximum effluent concentration of PCBs or total mercury is equal to the influent concentration. The resulting KTRL for PCBs is shown Figure 2. The resulting KTRL for total mercury is shown in Figure 3. Each figure also includes a constant average effluent concentration line with data fit statistics: root mean square error (RMSE) and median absolute deviation (MAD). As indicated, the KTRL provide a better fit of the data. However, the resulting effluent concentrations are not much different between the two lines except when influent PCBs are low (<10 ng/L) and total mercury concentration are high (>50 ng/L). For total mercury, concentration reductions are only predicted to occur when influent concentrations are greater than about 30 ng/L. Due to observed export of total mercury for several events, particularly for the 1st and Cutting bioretention cell (LAU-3), the moderate concentration reductions assumed by the KTRL at higher influent concentrations is reasonably conservative.

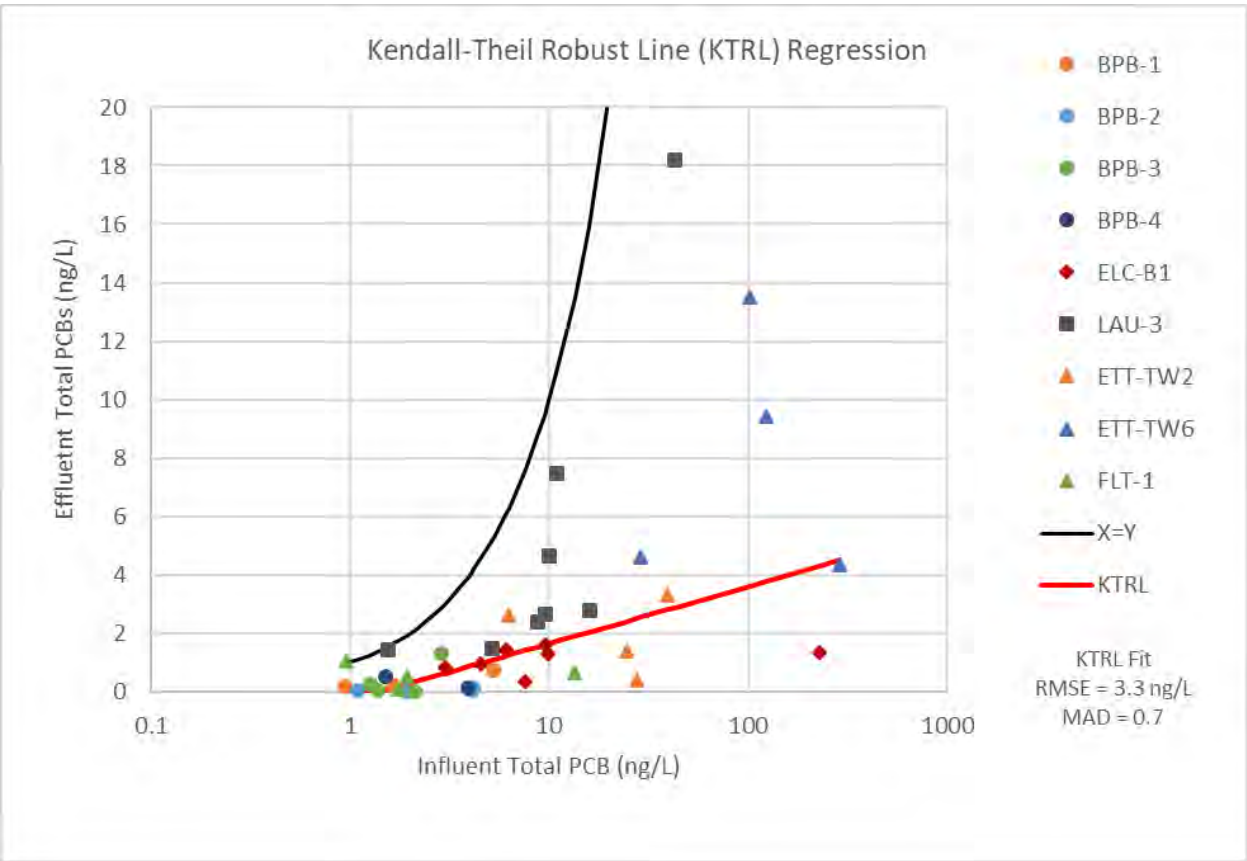

Figure 2: PCBs Influent vs Effluent Concentration Relationship Determined by KTRL Regression

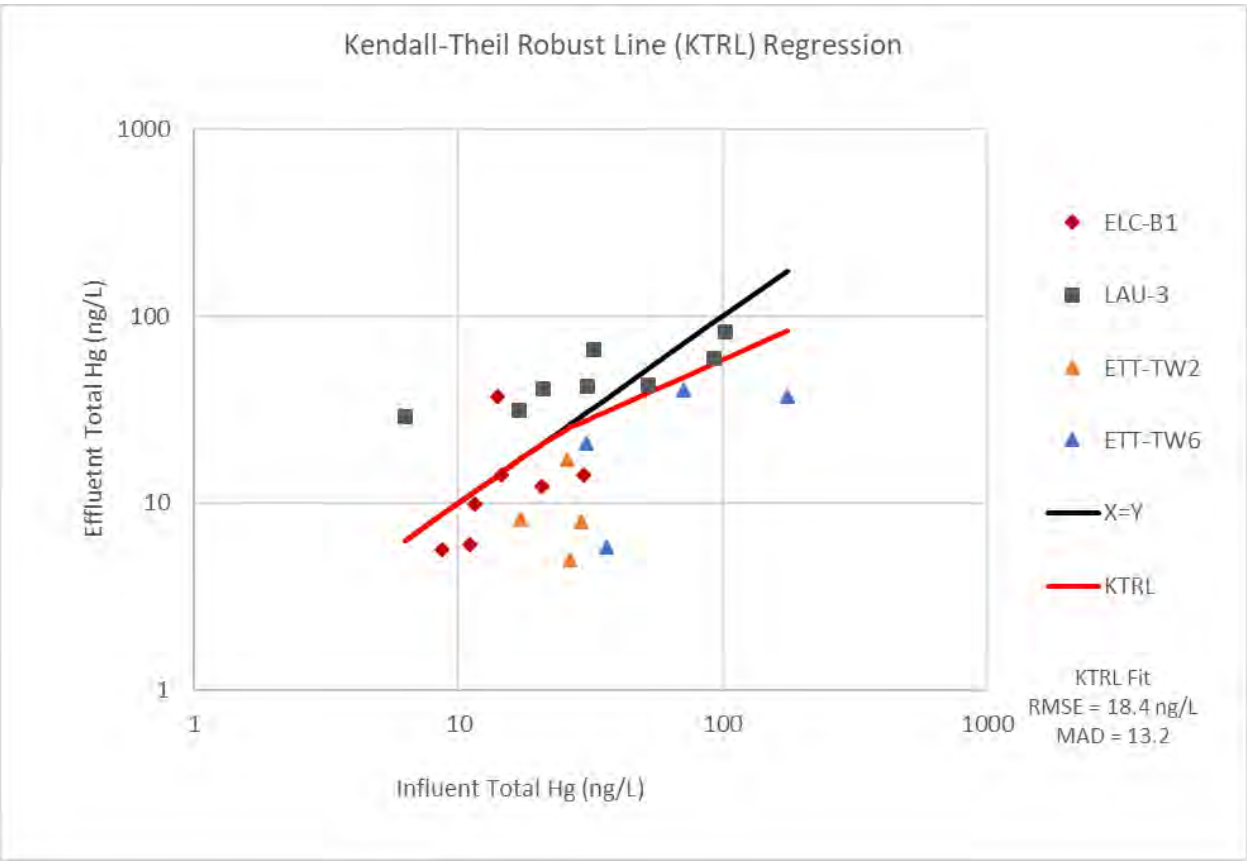

Figure 3: Mercury Influent vs Effluent Concentration Relationship Determined by KTRL Regression

3.3 RAA Scenario Loading Model

To model RAA future scenarios, future condition land use is needed. Future condition land use will be estimated using predictions of private parcel new development and redevelopment in combination with GI implementation on public parcels and rights-of-way.

Load reductions estimated for implementation of GI will be applied to future condition RAA scenario models based on estimated locations of GI and the tributary drainage areas to those GI. Effective area will be used to relate the HRUs, which can have a variety of imperviousness values, to the GI performance which will be based on a unit of effective area with 100% imperviousness. The GI performance curves can thus be applied to many different HRU types and/or combinations of HRUs that make up the tributary drainage areas for future GI measures.

4. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND PCBS LOADS REDUCED

The results of the hydraulic and pollutant reduction modeling of GI measures were used to develop a quantitative relationship between GI implementation and PCBs that can be applied to RAA future scenario models. An example quantitative relationship is provided for GI models run for the Berkeley gauge (040693). Utilizing output from hydraulic modeling, GI measure volumetric percent capture was calculated on an average annual basis. Volumetric model results for runs with GI measures sized to achieve 80%, 85%, 90%, and 95% capture were combined with water quality inputs to obtain pollutant load reduction for varying PCBs influent concentration.

The results of this analysis are shown in nomographs[11] provided in Figure 4, Figure 5, and Figure 6, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 8 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per effective acre[12] displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

[11] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

[12] Effective area is calculated as the area multiplied by the runoff coefficient.

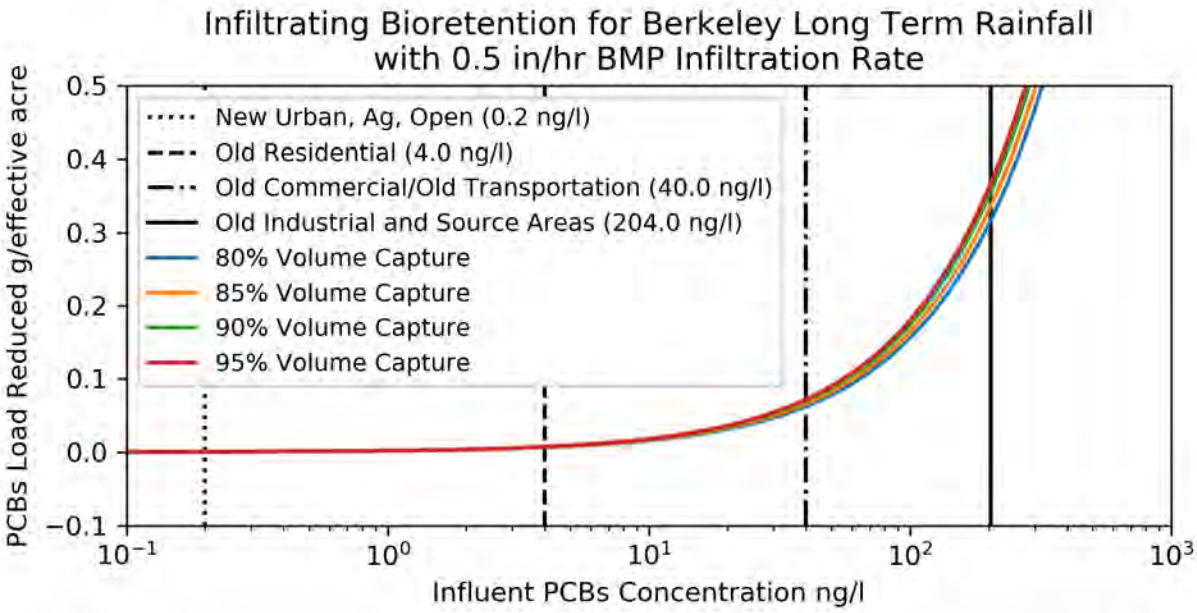

Figure 4: Modeled PCBs Load Removal Performance for Infiltrating Bioretention Basin

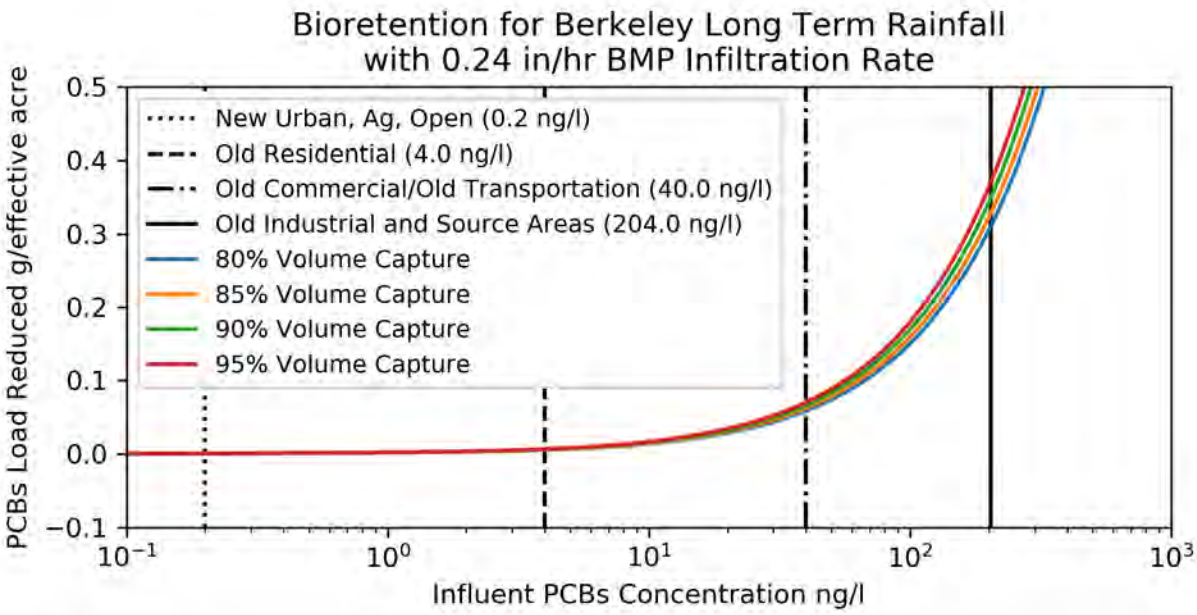

Figure 5: Modeled PCBs Load Removal Performance for Bioretention Basin with Elevated Underdrain

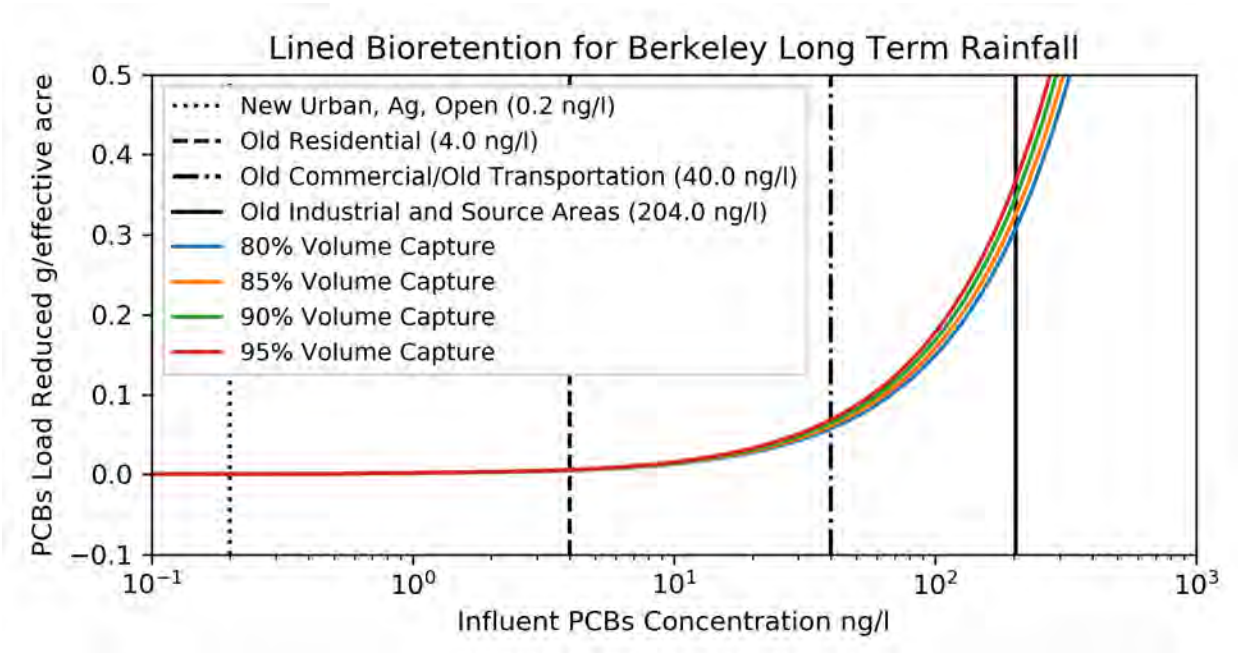

Figure 6: Modeled PCBs Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are listed in Table 11.

Table 11: PCBs Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	PCBs Load Reduced (g/effective ac)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban, Ag, Open	3.12E-04	3.30E-04	3.49E-04	3.61E-04
	Old Residential	0.00623	0.0066	0.00698	0.00722
	Old Commercial / Old Transportation	0.0623	0.066	0.0698	0.0722
	Old Industrial and Source Areas	0.318	0.337	0.356	0.368
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban, Ag, Open	3.08E-04	3.26E-04	3.47E-04	3.67E-04
	Old Residential	0.00518	0.0055	0.00589	0.00633
	Old Commercial / Old Transportation	0.0586	0.0621	0.0661	0.0703
	Old Industrial and Source Areas	0.311	0.329	0.350	0.371

Facility Configuration	Land Use Category	PCBs Load Reduced (g/effective ac)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Lined Bioretention	New Urban, Ag, Open	3.08E-04	3.26E-04	3.46E-04	3.67E-04
	Old Residential	0.00484	0.00513	0.00545	0.00577
	Old Commercial / Old Transportation	0.0574	0.0608	0.0647	0.0685
	Old Industrial and Source Areas	0.309	0.327	0.348	0.368

1. Average Annual Facility Volumetric Runoff Capture

5. QUANTITATIVE RELATIONSHIP BETWEEN GI IMPLEMENTATION AND MERCURY LOADS REDUCED

Mercury load reduction results for the Berkeley Gauge are shown in nomographs[13] in Figure 7, Figure 8, and Figure 9, which correspond to infiltrating bioretention (i.e., with no underdrain), bioretention with a raised underdrain, and lined bioretention, respectively. All facilities shown in the figures below have a 6-inch ponding depth. For bioretention with a raised underdrain, the facility configuration with an underlying infiltration rate of 0.24 in/hr only is shown (see Table 9 for all modeled infiltration rates). Facilities sized to achieve 80%, 85%, 90%, and 95% capture from the 100% impervious tributary catchment are shown in series, with pollutant load reduction in grams per acre displayed as a function of influent concentration. Constant influent lines corresponding with RWSM land use-based influent concentrations are shown.

[13] A nomograph is a graphical relationship between two variables that can be used to quickly estimate one value from another.

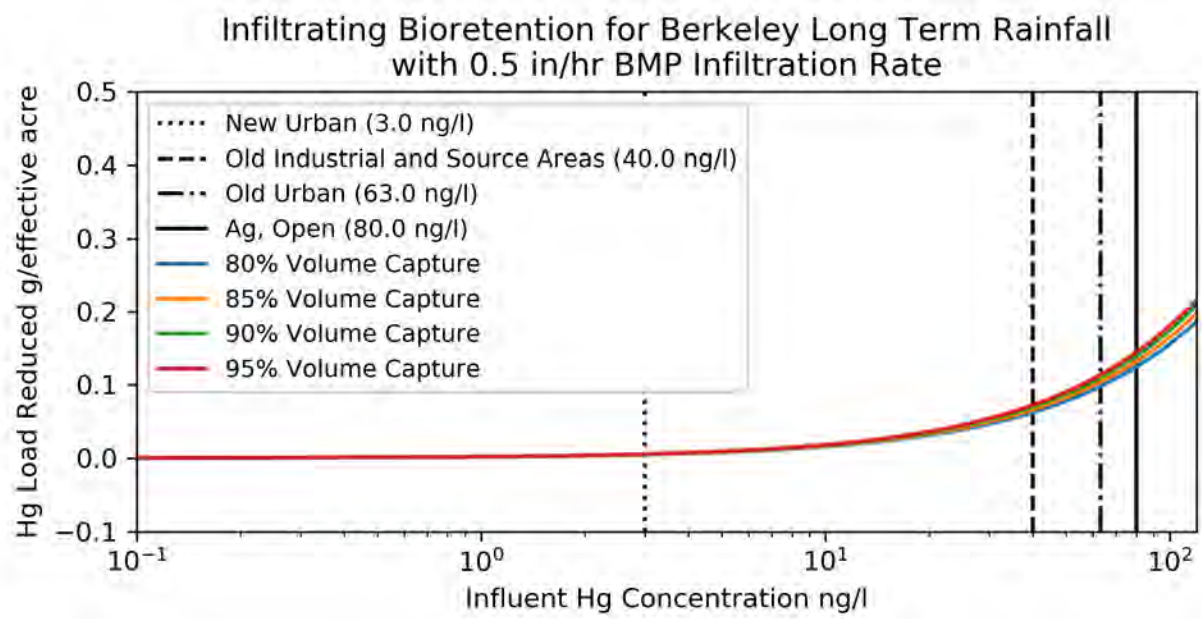

Figure 7: Modeled Mercury Load Removal Performance for Infiltrating Bioretention Basin

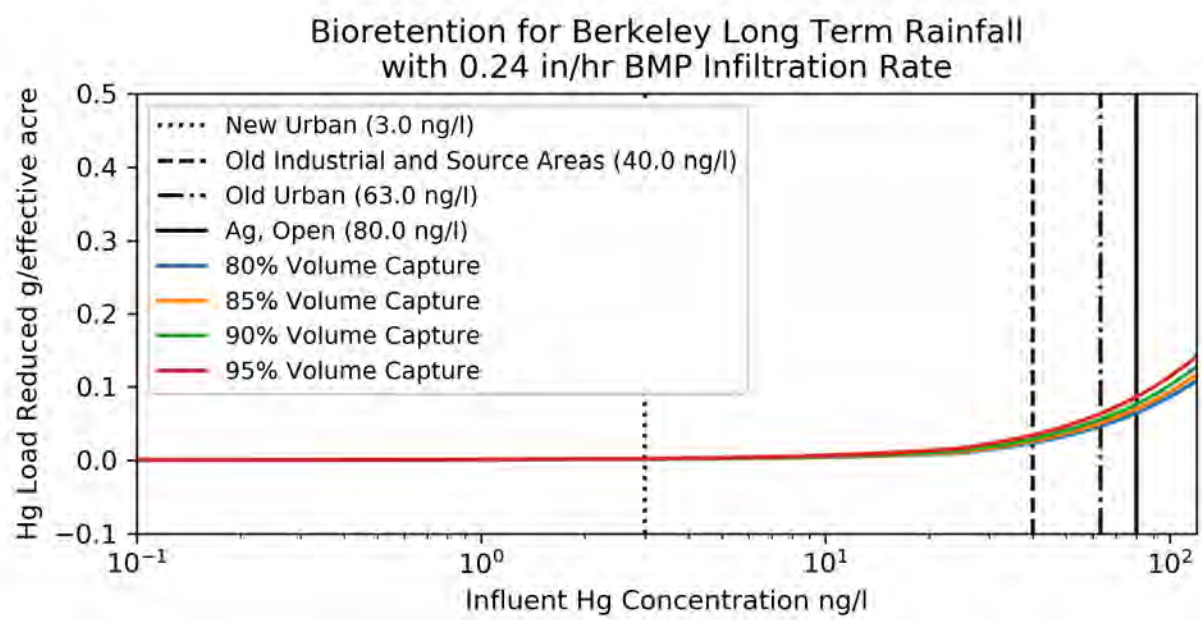

Figure 8: Modeled Mercury Load Removal Performance for Bioretention Basin with Elevated Underdrain

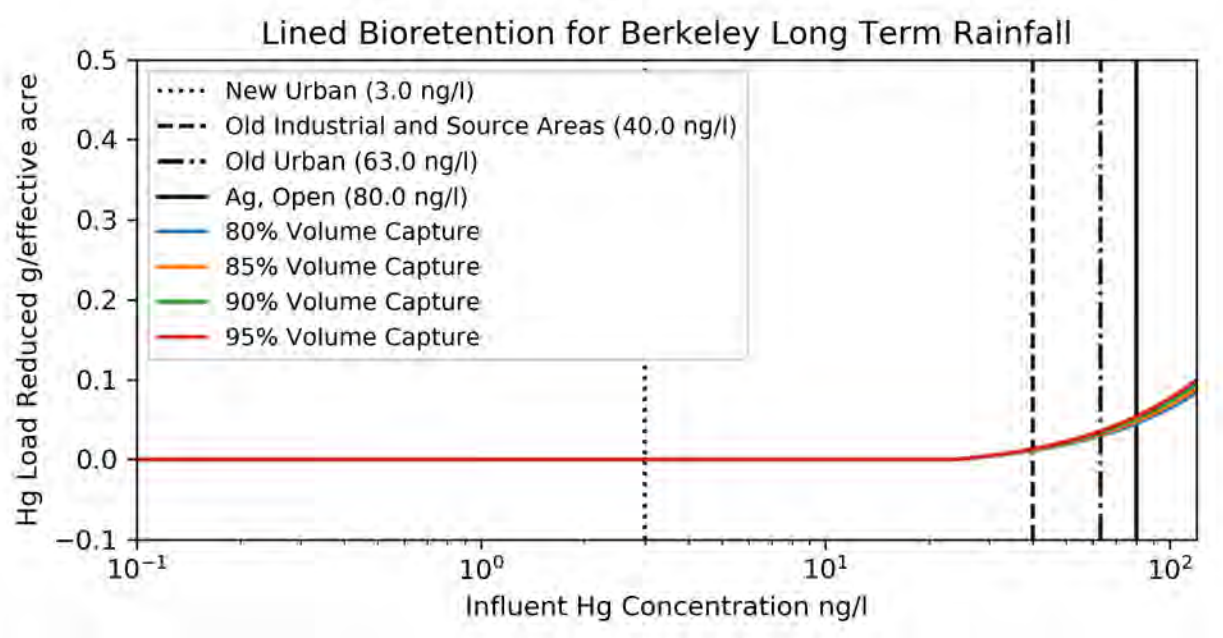

Figure 9: Modeled Mercury Load Removal Performance for Lined Bioretention Basin with Underdrain

The intersection points between the load reduction series and the constant influent lines represent the load reduced in grams per acre for each specific RWSM land use category. These intersection points are summarized in Table 12.

Table 12: Mercury Load Reduction for RWSM Land Use Categories for Berkeley Gauge for Different BMP Percent Capture Values

Facility Configuration	Land Use Category	Mercury Load Reduced (g/effective acre)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Infiltrating Bioretention (0.5 underlying infiltration rate)	New Urban	0.00467	0.00495	0.00524	0.00541
	Old Industrial and Source Areas	0.0623	0.066	0.0698	0.0722
	Old Urban	0.0981	0.104	0.110	0.114
	Ag, Open	0.125	0.132	0.140	0.144
Bioretention with Raised Underdrain (0.24 underlying infiltration rate)	New Urban	0.00113	0.0013	0.00153	0.00192
	Old Industrial and Source Areas	0.0234	0.0258	0.029	0.0341
	Old Urban	0.0462	0.0503	0.0556	0.0634
	Ag, Open	0.0643	0.0696	0.0765	0.0862

Facility Configuration	Land Use Category	Mercury Load Reduced (g/effective acre)			
		80% Capture[1]	85% Capture[1]	90% Capture[1]	95% Capture[1]
Lined Bioretention	New Urban	0	0	0	0
	Old Industrial and Source Areas	0.0108	0.0115	0.0123	0.0130
	Old Urban	0.0296	0.0314	0.0335	0.0353
	Ag, Open	0.0449	0.0476	0.0507	0.0536

[1] Average Annual Facility Volumetric Runoff Capture

6. REFERENCES

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APPENDIX A

Modeling Inputs and Data Exhibits

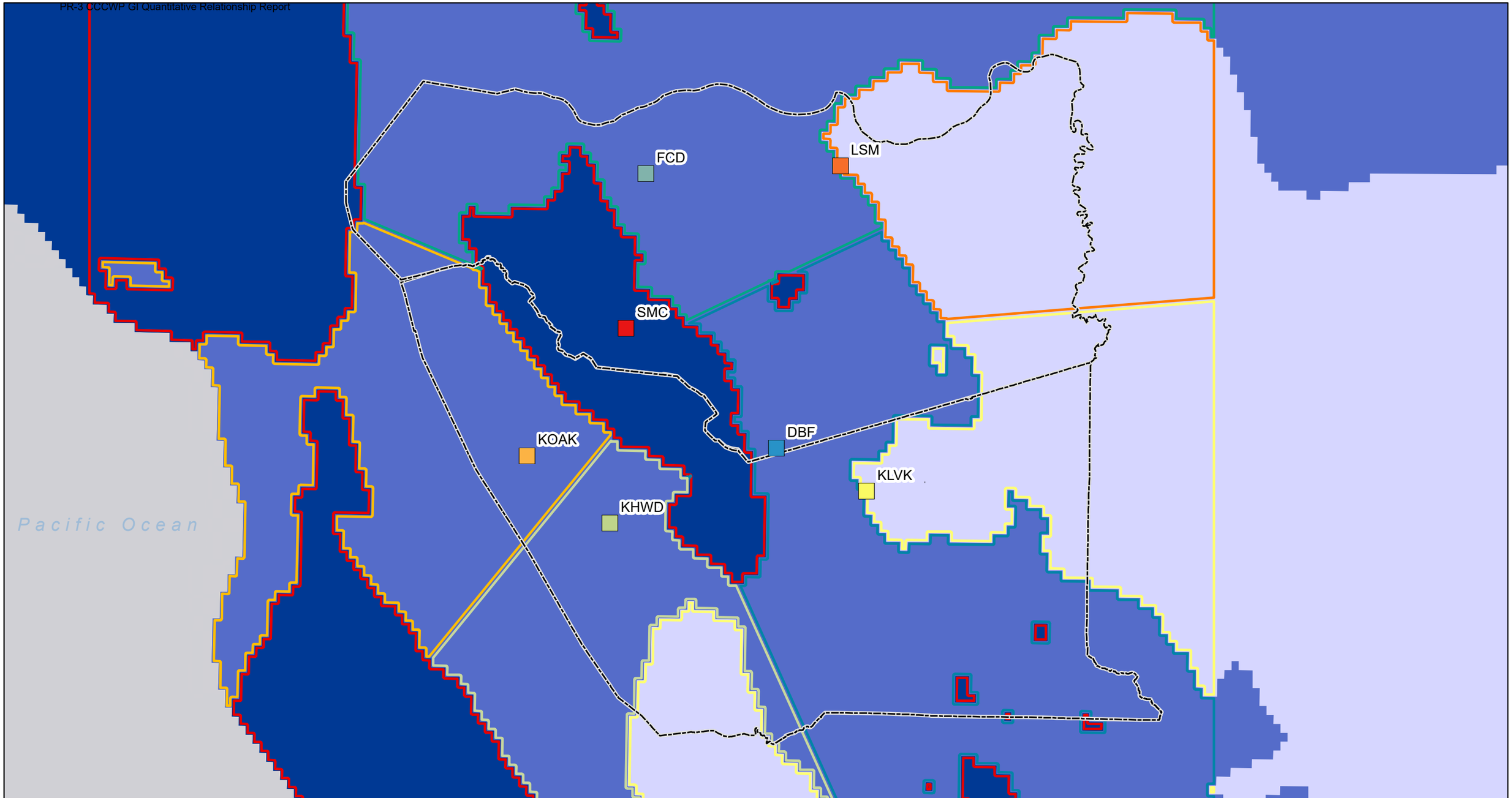

Rain Gauge ID
- Rain Gauge ID
- County Boundary

Mean Annual Precipitation (in)
- < 16
- 16 - 25
- > 25

Rain Gauge Zones
- DBF
- FCD
- KHWD
- KLVK
- KOAK
- LSM
- SMC

N

0 6 12 Miles

Precipitation Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County
California

Geosyntec consultants

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Exhibit 1

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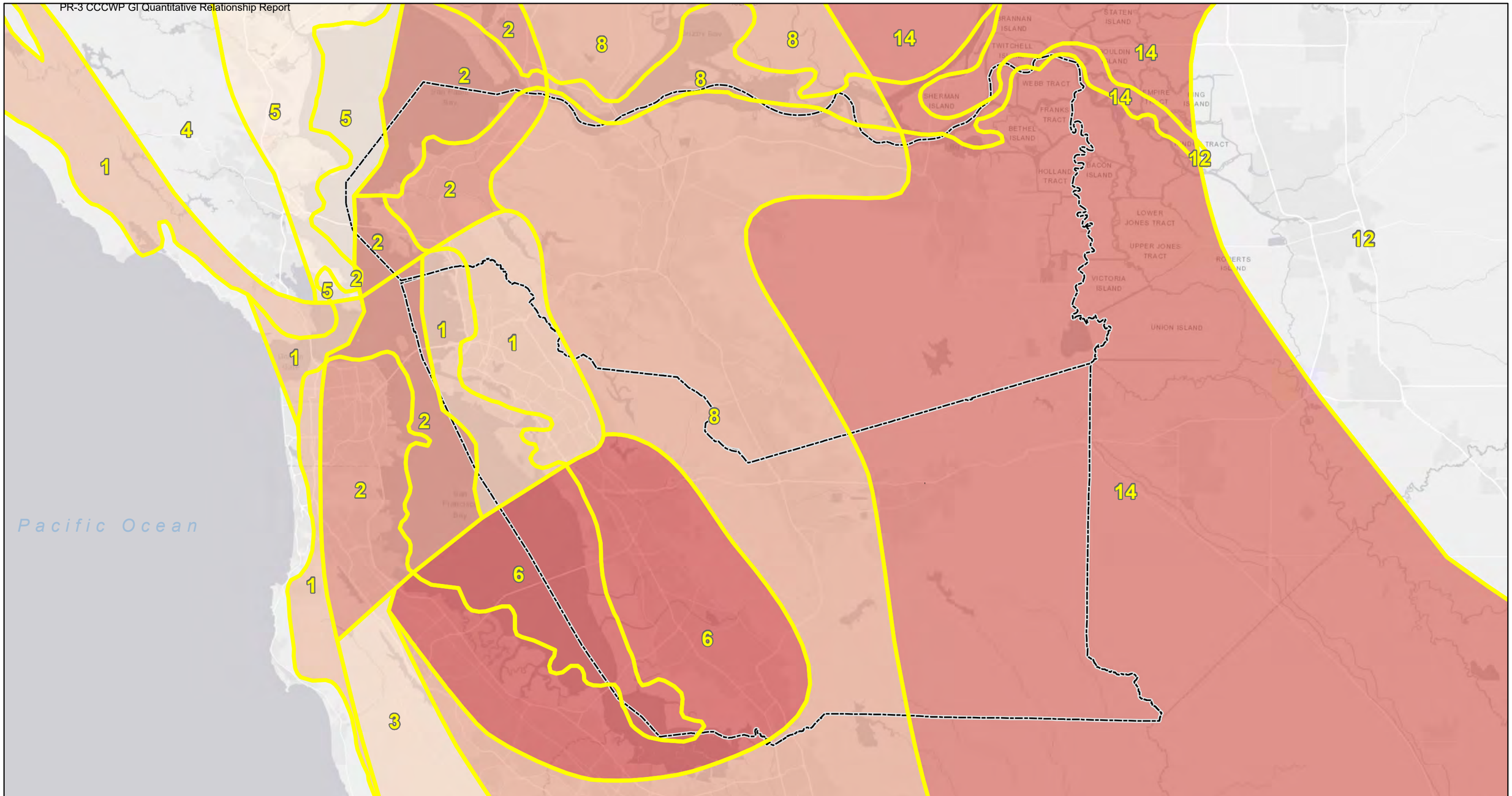

County Boundary

CIMIS ET Zone Boundary

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

N

0 6 12 Miles

CIMIS Evapotranspiration Zones

Alameda County and Contra Costa County
California

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Exhibit 2

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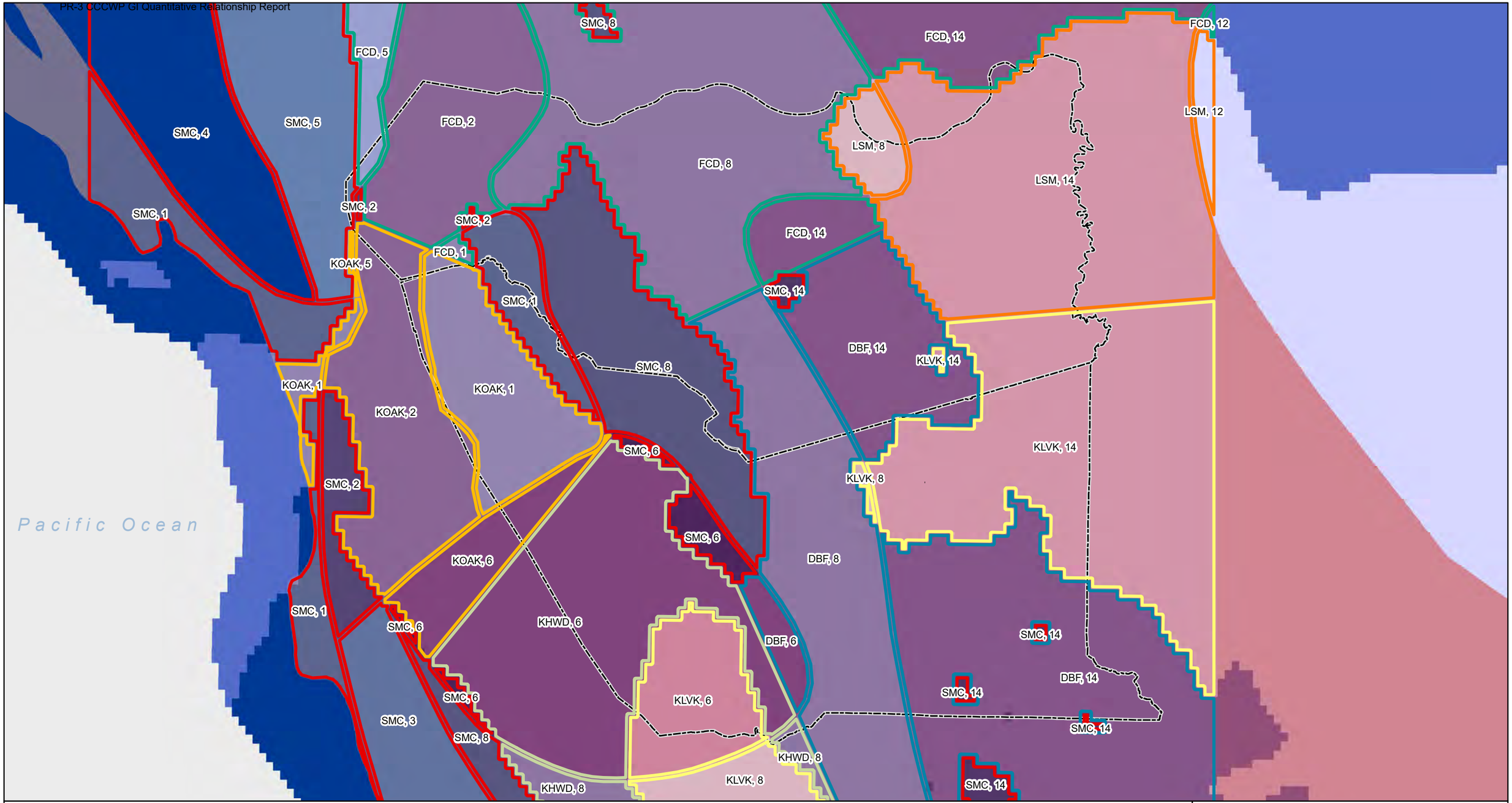

County Boundary

Mean Annual Precipitation (in)

- < 16
- 16 - 25
- > 25

CIMIS ET Zone

- 1
- 2
- 3
- 5
- 6
- 8
- 14

Climate Zones are created by overlapping precipitation zones and ET zones.The unique climate zones that occur in Contra Costa and Alameda County are labeled as "Gauge ID, ET Zone".

N

0 6 12 Miles

Climate Zones for Baseline Runoff Period (WY 2000-2009)

Alameda County and Contra Costa County California

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Exhibit 3

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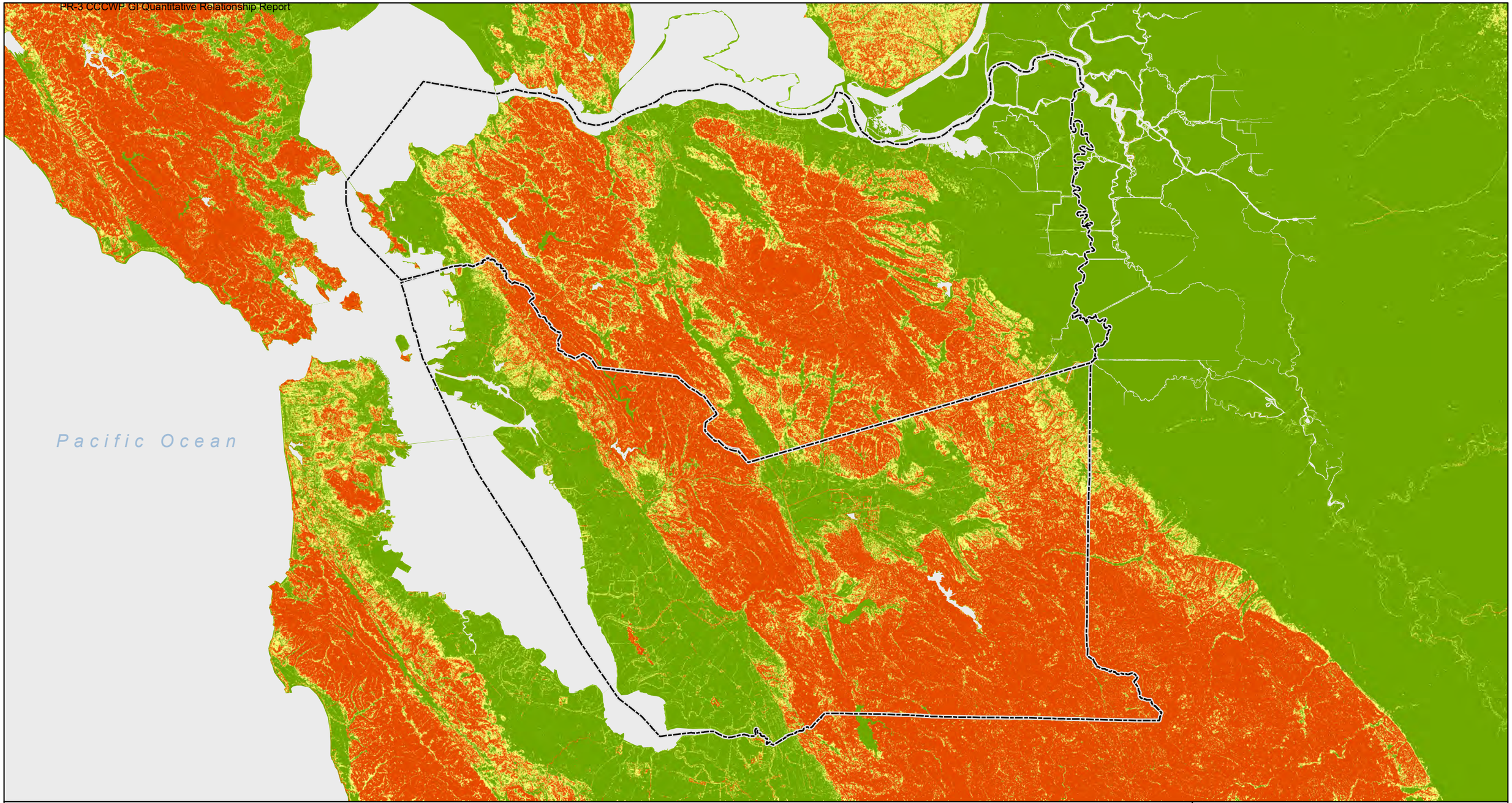

County Boundary

% Slope

- < 5
- 5-15
- > 15

N

0 6 12 Miles

Slope Zones

Alameda County and Contra Costa County
California

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Exhibit 4

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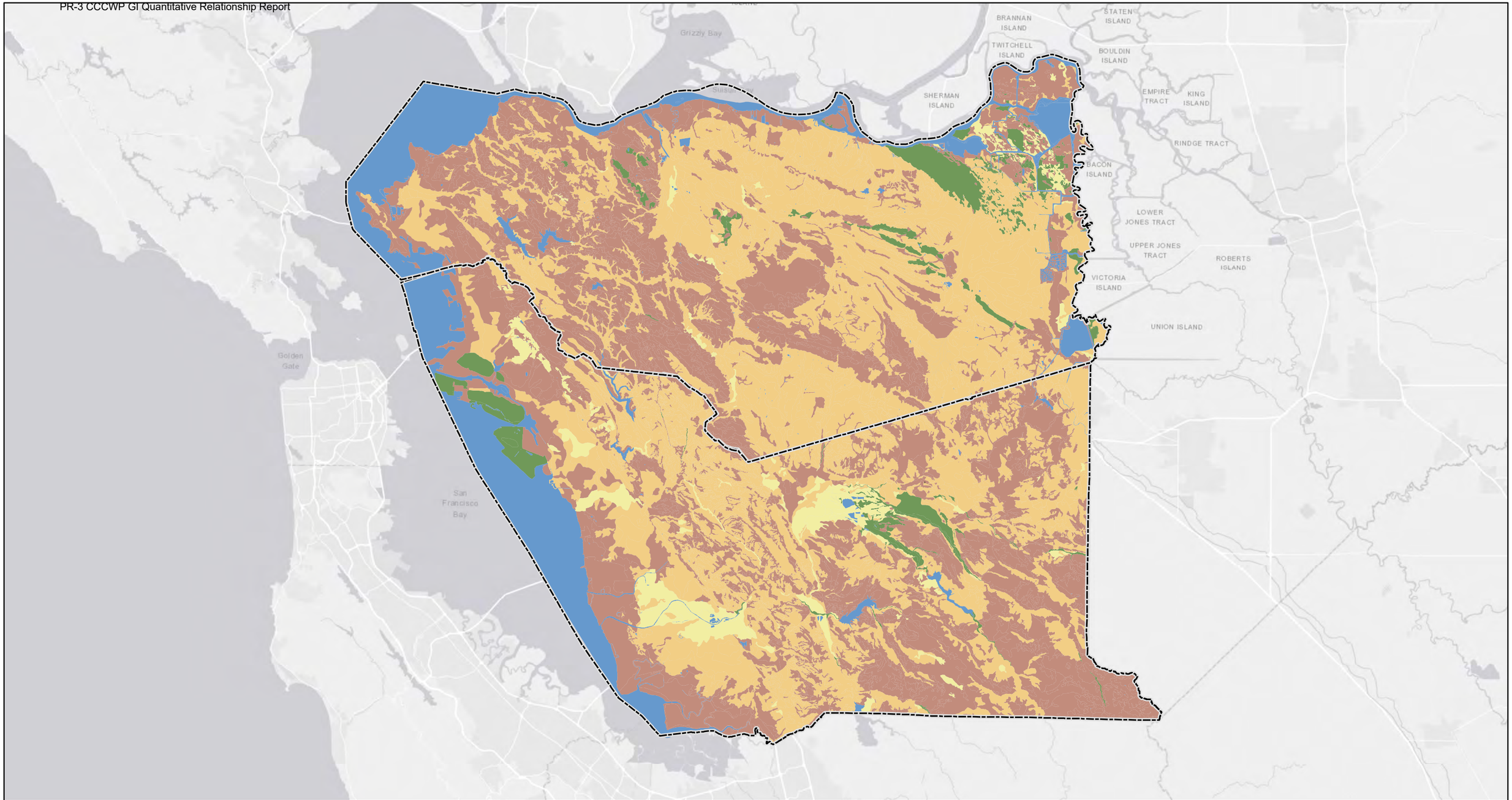

County Boundary

HSG

- A
- B
- C
- D
- W

Note: Area within the county with no HSG assignment was assigned the HSG of the most prominant adjacent soil group.

N

0 6 12 Miles

Hydrologic Soil Group

Alameda County and Contra Costa County
California

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Exhibit 5

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_6_Hydrologic_Soil_Group.mxd 7/5/2018 6:00:38 PM

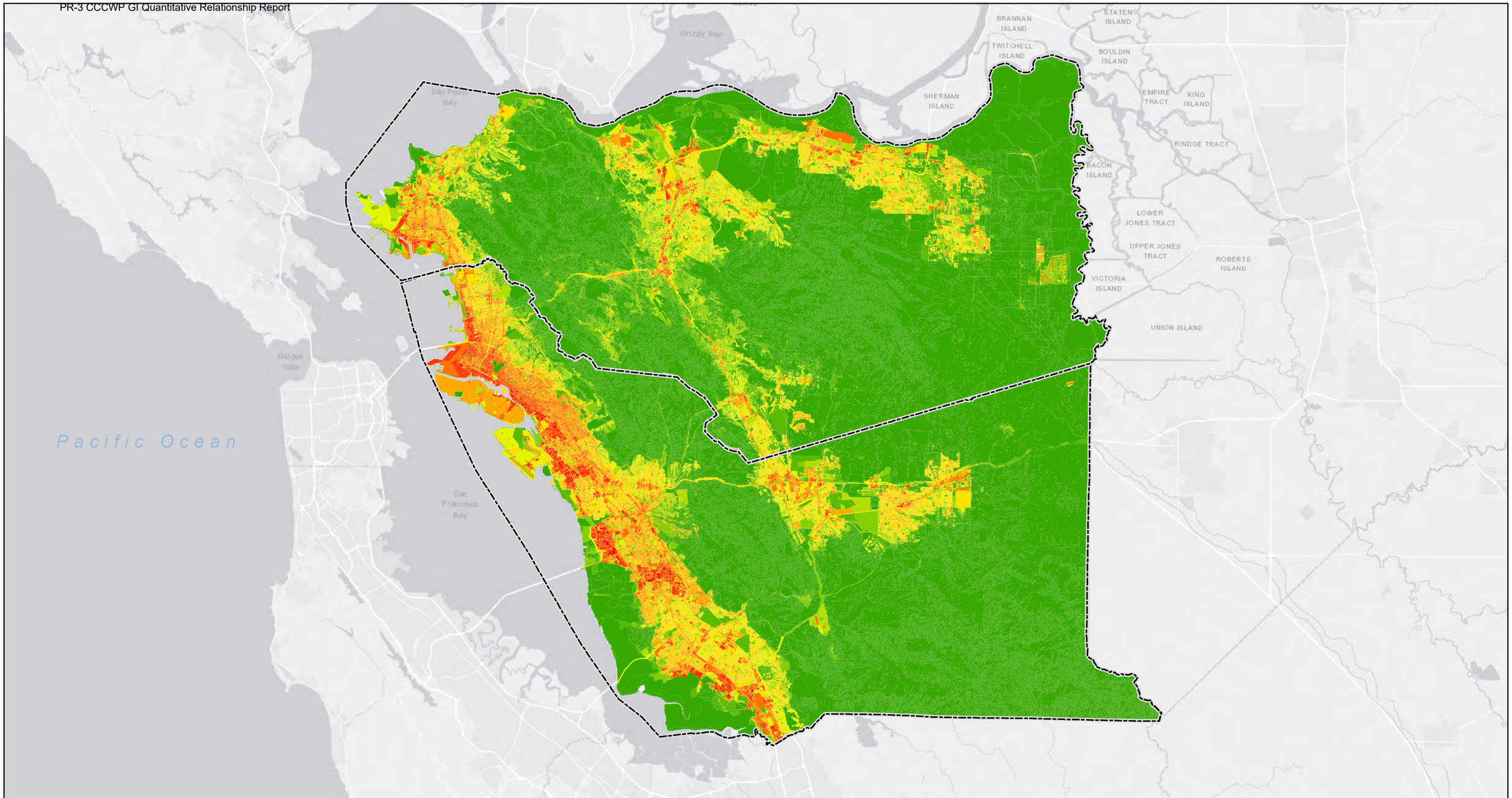

County Boundary

ABAG 2005 Imperviousness

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

Note:
Imperviousness is assigned to ABAG 2005 landuse based on the NLCD 2006 Impervious Cover layer. These values may be adjusted during calibration for certain categories of ABAG landuse.

For purposes of calculating runoff from areas with compacted soil, developed areas and agricultural uses were assumed to be compacted to 0.75 times the underlying saturated soil conductivity (ksat). These areas generally have percent imperviousness > 20%.

N

0 6 12 Miles

Regional Imperviousness

Alameda County and Contra Costa County
California

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Exhibit 6

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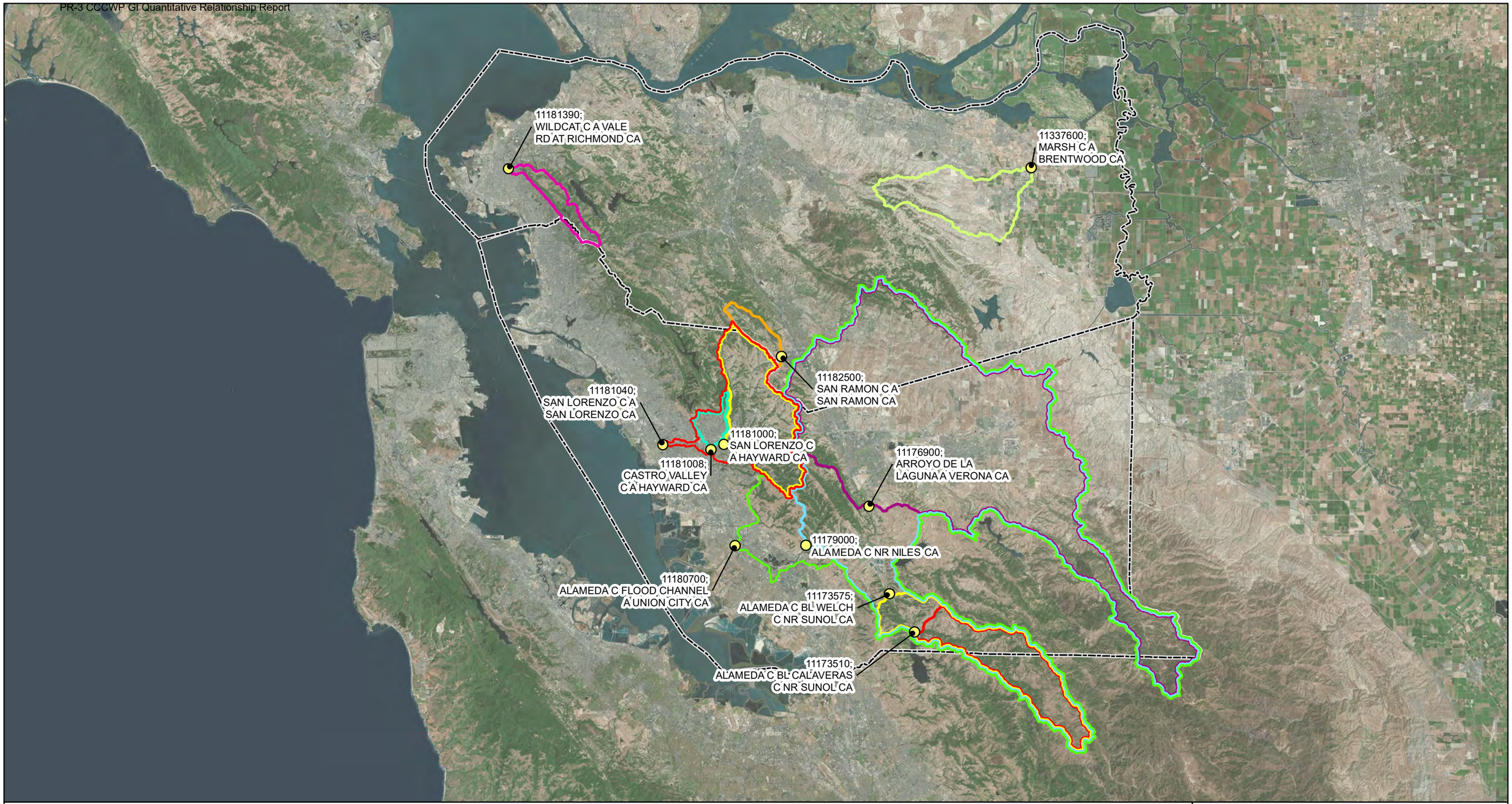

County Boundary
Gauge Location

Group 1	Group 2	Group 3	Group 4	Group 4
11181040	11180700	11182500	11337600	11181390
11181000	11179000			
11181008	11173575			
	11176900			
	11173510			

N

0 6 12 Miles

Candidate Calibration Watersheds

Alameda County and Contra Costa County
California

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Exhibit 7

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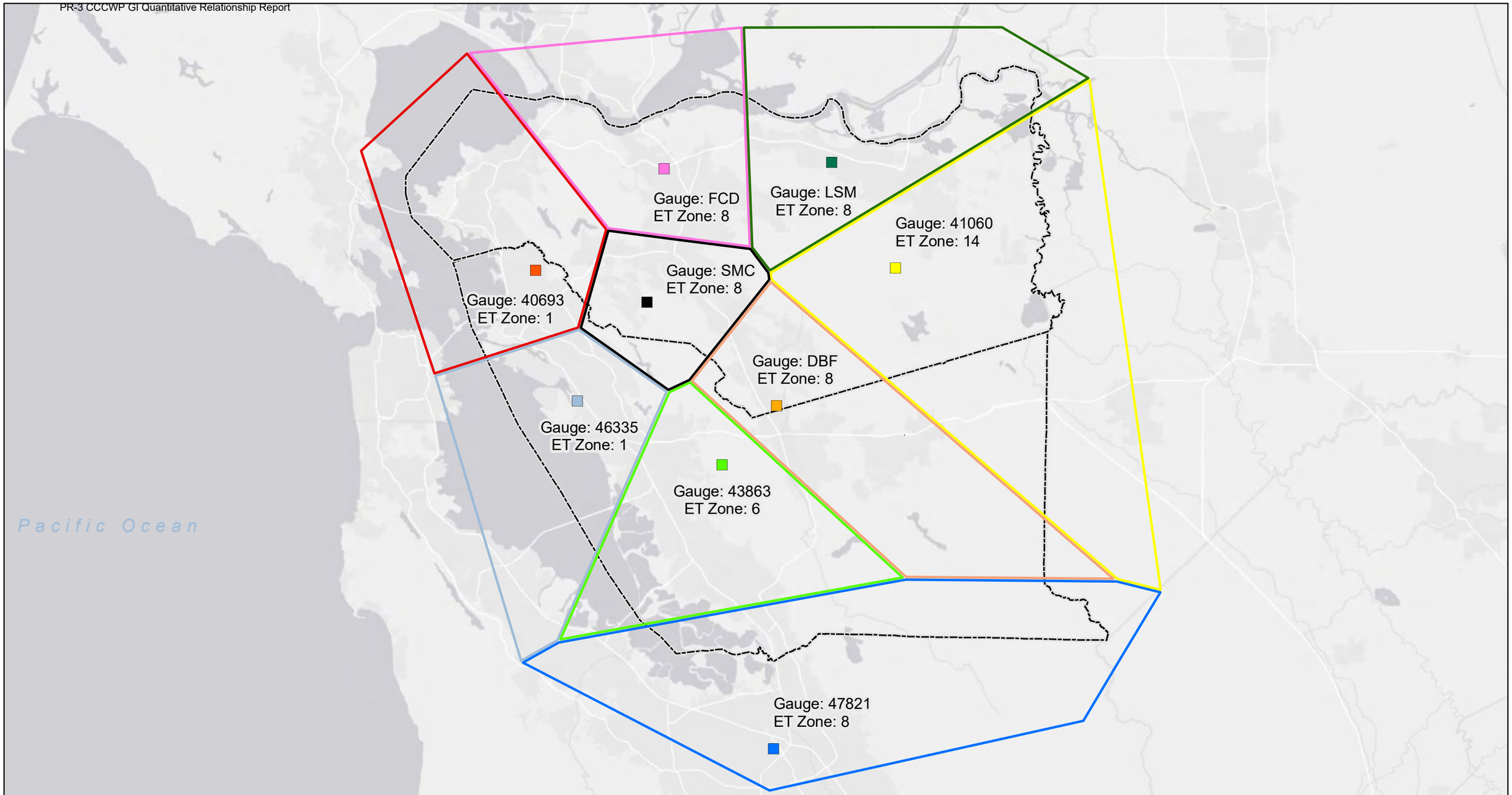

County Boundary

Long-Term Rainfall Gauge Location

- 40693
- 41060
- 43863
- 46335
- 47821
- DBF
- FCD
- LSM
- SMC

N

0 6 12 Miles

Long-Term Rainfall Gauge Zones

Alameda County and Contra Costa County
California

Geosyntec consultants

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Exhibit 8

P:\GIS\Bay_Area_RAA\Project\GI_Load_Reduced_Report_Exhibits\Figure_8_GI_Long_Term_Rainfall_Precipitation_Zones.mxd 7/5/2018 6:01:01 PM

Plan View

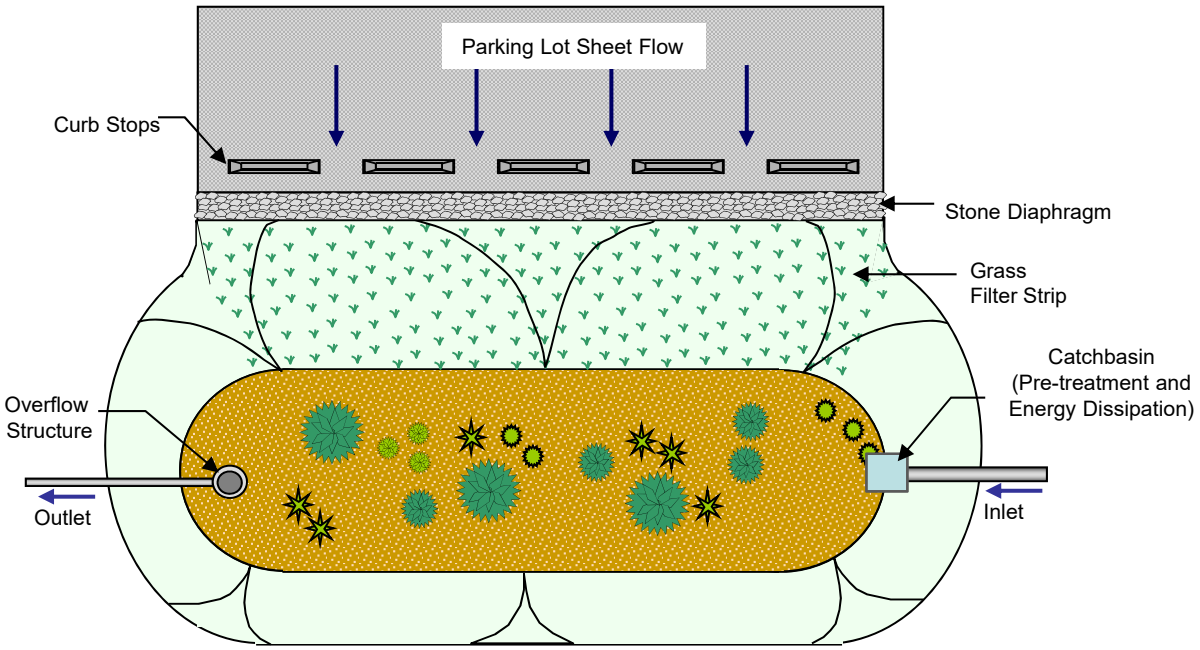

Profile

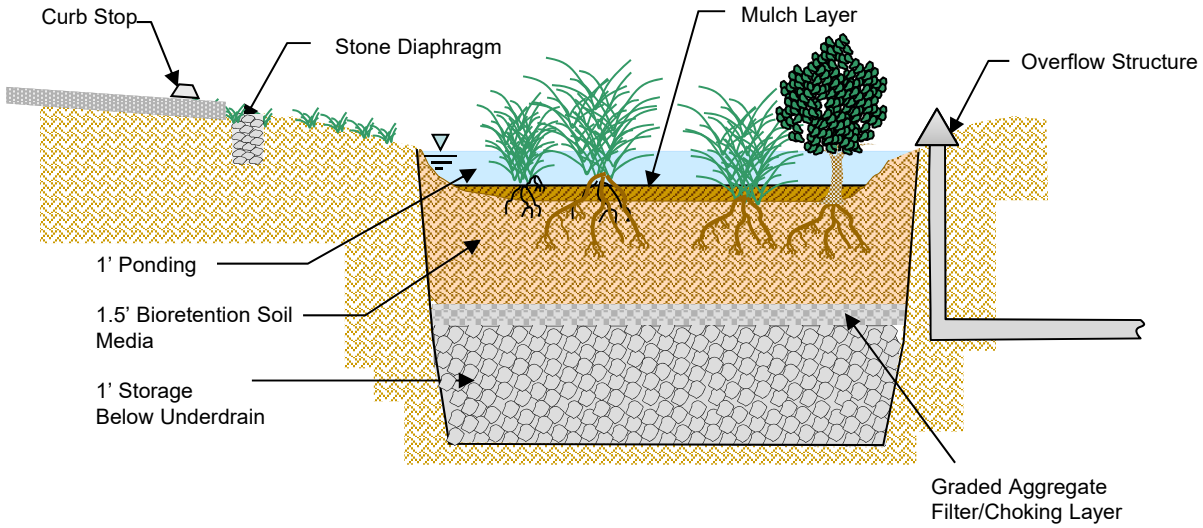

Note: Plan and Profile views are not to scale

Conceptual Illustration of an Infiltration Facility

Geosyntec consultants

Exhibit 9

Oakland | July 2018

Plan View

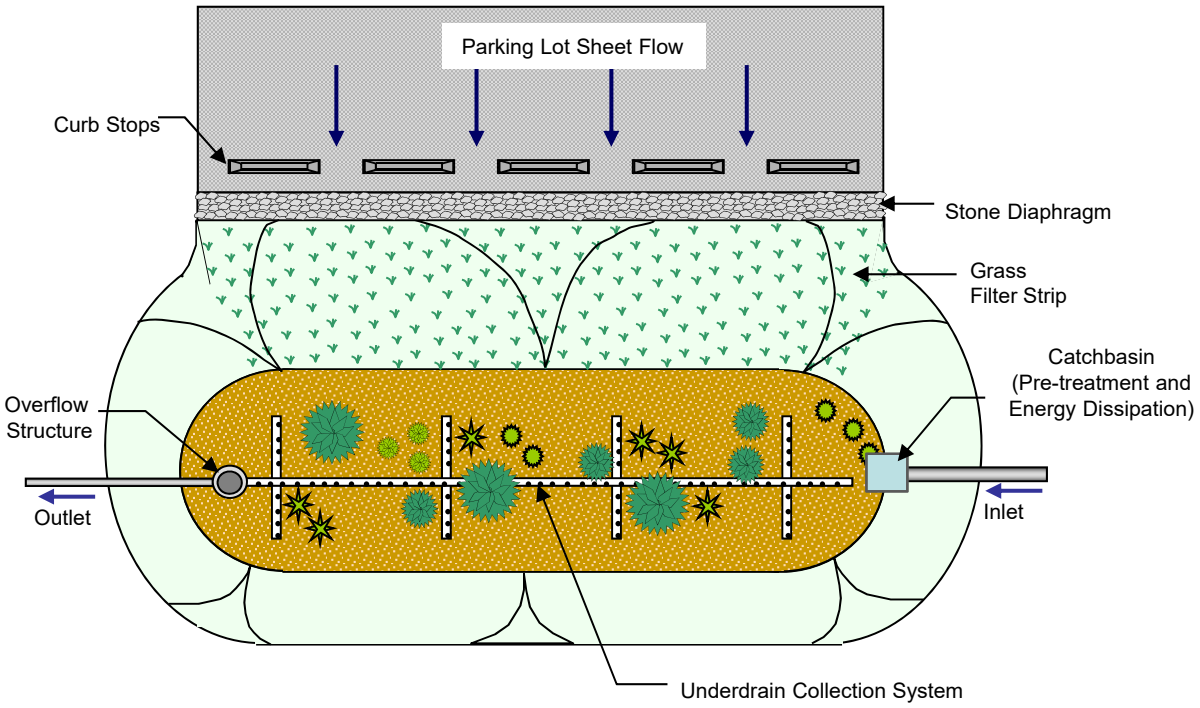

Profile

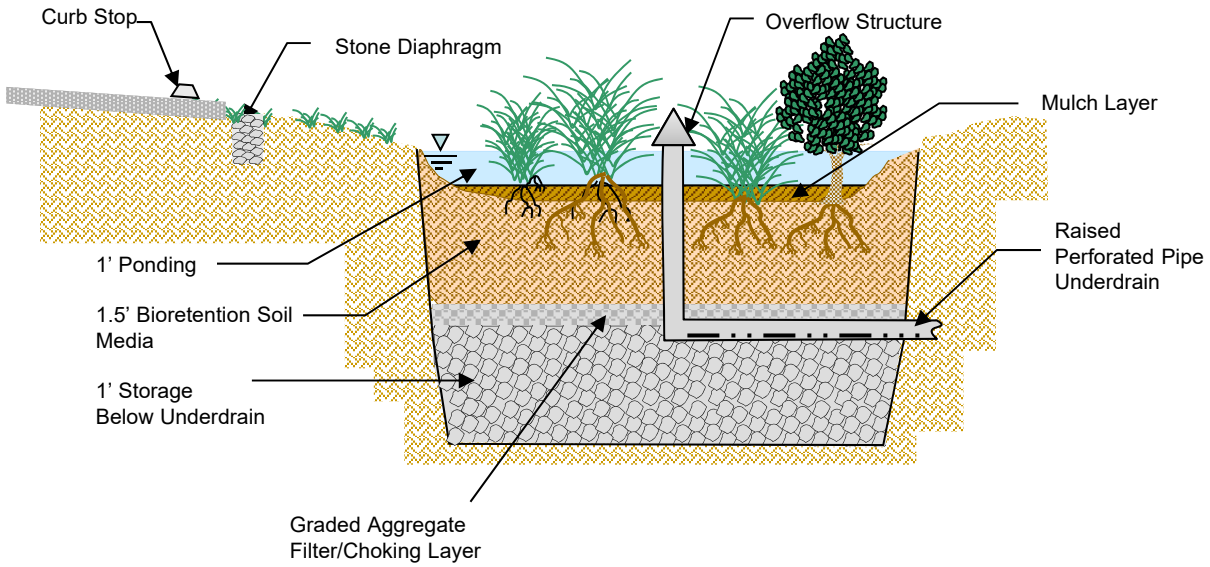

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Bioretention/Bioinfiltration Facility

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Exhibit 10

Oakland | July 2018

Plan View

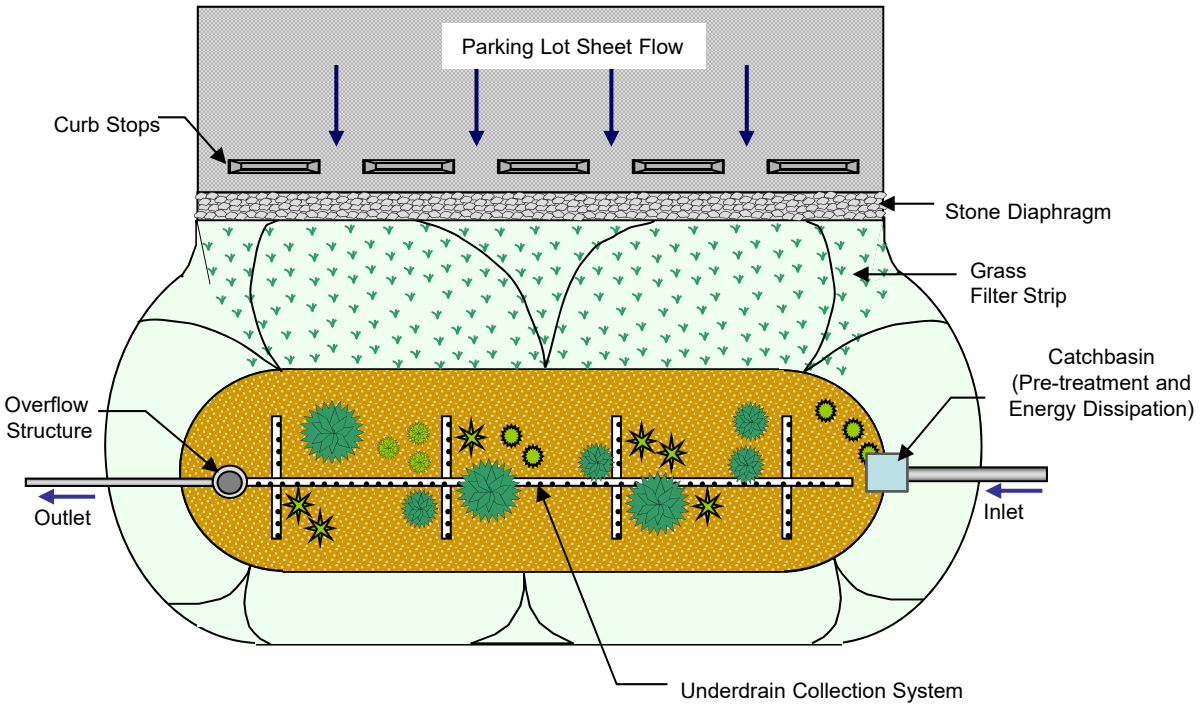

Profile

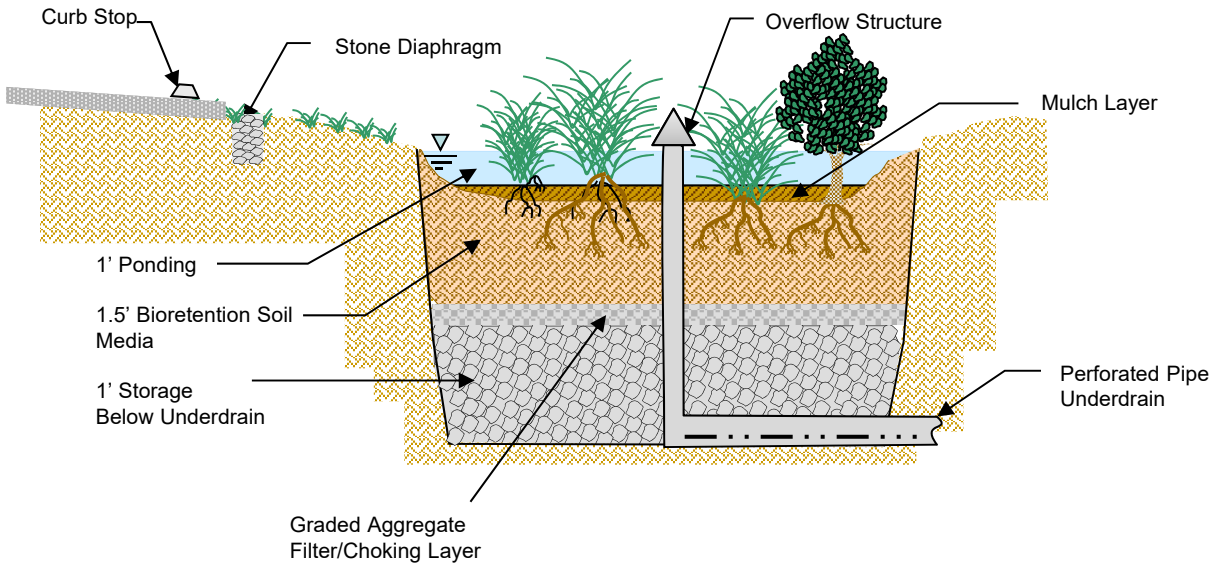

Note: Plan and Profile views are not to scale

Conceptual Illustration of a Biofiltration Facility

Geosyntec consultants

Exhibit 11

Oakland | July 2018

PR-4 USEPA Stormwater Management Model Manual Excerpts

falls directly on them and do not capture runoff from other impervious areas in their subcatchment.

The second approach allows LID controls to be strung along in series and also allows runoff from several different upstream subcatchments to be routed onto the LID subcatchment. If these single-LID subcatchments are carved out of existing subcatchments, then once again some adjustment of the Percent Impervious, Width and also the Area properties of the latter may be necessary. In addition, whenever an LID occupies the entire subcatchment the values assigned to the subcatchment's standard surface properties (such as imperviousness, slope, roughness, etc.) are overridden by those that pertain to the LID unit.

Normally both surface and drain outflows from LID units are routed to the same outlet location assigned to the parent subcatchment. However one can choose to return all LID outflow to the pervious area of the parent subcatchment and/or route the drain outflow to a separate designated outlet. (When both of these options are chosen, only the surface outflow is returned to the pervious sub-area.)

3.4 Computational Methods

SWMM is a physically based, discrete-time simulation model. It employs principles of conservation of mass, energy, and momentum wherever appropriate. This section briefly describes the methods SWMM uses to model stormwater runoff quantity and quality through the following physical processes:

- Surface Runoff
- Groundwater
- Flow Routing
- Water Quality Routing
- Infiltration
- Snowmelt
- Surface Ponding

3.4.1 Surface Runoff

The conceptual view of surface runoff used by SWMM is illustrated in Figure 3-7 below. Each subcatchment surface is treated as a nonlinear reservoir. Inflow comes from precipitation and any designated upstream subcatchments. There are several outflows, including infiltration, evaporation, and surface runoff. The capacity of this "reservoir" is the maximum depression storage, which is the maximum surface storage provided by ponding, surface wetting, and interception. Surface runoff per unit area, Q, occurs only when the depth of water in the "reservoir" exceeds the maximum depression storage, d_s, in which case the outflow is given by Manning's equation. Depth of water over the subcatchment (d) is continuously updated with time by solving numerically a water balance equation over the subcatchment.

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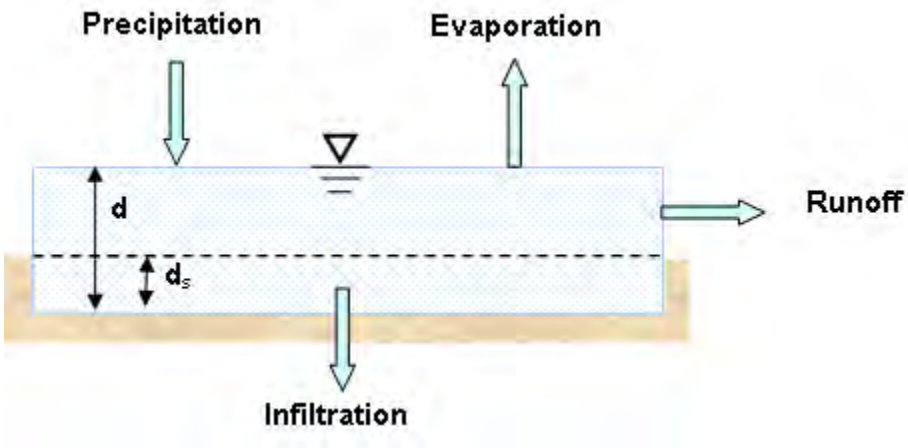

Figure 3-7 Conceptual view of surface runoff

3.4.2 Infiltration

Infiltration is the process of rainfall penetrating the ground surface into the unsaturated soil zone of pervious subcatchments areas. SWMM offers four choices for modeling infiltration:

Horton's Method

This method is based on empirical observations showing that infiltration decreases exponentially from an initial maximum rate to some minimum rate over the course of a long rainfall event. Input parameters required by this method include the maximum and minimum infiltration rates, a decay coefficient that describes how fast the rate decreases over time, and a time it takes a fully saturated soil to completely dry.

Modified Horton Method

This is a modified version of the classical Horton Method that uses the cumulative infiltration in excess of the minimum rate as its state variable (instead of time along the Horton curve), providing a more accurate infiltration estimate when low rainfall intensities occur. It uses the same input parameters as does the traditional Horton Method.

Green-Ampt Method

This method for modeling infiltration assumes that a sharp wetting front exists in the soil column, separating soil with some initial moisture content below from saturated soil above. The input parameters required are the initial moisture deficit of the soil, the soil's hydraulic conductivity, and the suction head at the wetting front. The recovery rate of moisture deficit during dry periods is empirically related to the hydraulic conductivity.

Modified Green-Ampt Method

This method modifies the original Green-Ampt procedure by not depleting moisture deficit in the top surface layer of soil during initial periods of low rainfall as was done in the original method. This change can produce more realistic infiltration behavior for storms with long initial periods where the rainfall intensity is below the soil's saturated hydraulic conductivity.

Curve Number Method

This approach is adopted from the NRCS (SCS) Curve Number method for estimating runoff. It assumes that the total infiltration capacity of a soil can be found from the soil's tabulated Curve Number. During a rain event this capacity is depleted as a function of cumulative rainfall and remaining capacity. The input parameters for this method are the curve number and the time it takes a fully saturated soil to completely dry.

SWMM also allows the infiltration recovery rate to be adjusted by a fixed amount on a monthly basis to account for seasonal variation in such factors as evaporation rates and groundwater levels. This optional monthly soil recovery pattern is specified as part of a project's Evaporation data.

3.4.3 Groundwater

Figure 3-8 is a definitional sketch of the two-zone groundwater model that is used in SWMM. The upper zone is unsaturated with a variable moisture content of θ. The lower zone is fully saturated and therefore its moisture content is fixed at the soil porosity ϕ. The fluxes shown in the figure, expressed as volume per unit area per unit time, consist of the following:

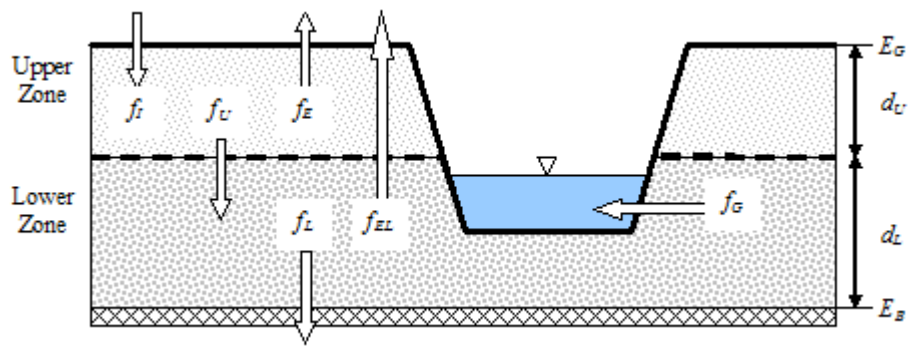

Figure 3-8 Two-zone groundwater model

f_I infiltration from the surface

f_{EU} evapotranspiration from the upper zone which is a fixed fraction of the un-used surface evaporation

f_U percolation from the upper to lower zone which depends on the upper zone moisture content θ and depth **d_U**

f_{EL} evapotranspiration from the lower zone, which is a function of the depth of the upper zone **d_U**

f_L seepage from the lower zone to deep groundwater which depends on the lower zone depth **d_L**

f_G lateral groundwater interflow to the drainage system, which depends on the lower zone depth **d_L** as well as the depth in the receiving channel or node.

where C = IMD . S, ft of water,
t = time, sec, and
1,2 = subscripts for start and end of time interval respectively.

This equation must be solved iteratively for F_2, the cumulative infiltration at the end of the time step. A Newton-Raphson routine is used.

The infiltration volume during time step (t_2 - t_1) is thus (t_2 - t_1) x i if the surface does not saturate and (F_2 - F_1) if saturation has previously occurred and a sufficient water supply is at the surface. If saturation occurs during the time interval, the infiltration volumes over each stage of the process within the time steps are calculated and summed. When rainfall ends (or falls below infiltration capacity) any water ponded on the surface is allowed to infiltrate and added to the cumulative infiltration volume.

Recovery of Infiltration Capacity (Redistribution)

Evaporation, subsurface drainage, and moisture redistribution between rainfall events decrease the soil moisture content in the upper soil zone and increase the infiltration capacity of the soil. The processes involved are complex and depend on many factors. In SWMM a simple empirical routine is used as outlined below; commonly used units are given in the equations to make the description easier to understand.

Infiltration is usually dominated by conditions in the uppermost layer of the soil. The thickness of this layer depends on the soil type; for a sandy soil it could be several inches, for a heavy clay it could be less. The equation used to determine the thickness of the layer is:

$$L = 4 \cdot \sqrt{K_s} \tag{20-73}$$

where L = thickness of layer, in, and
K_s = saturated hydraulic conductivity, in/hr.

Thus for a high K_s of 0.5 in/hr (12.7 mm/hr) the thickness is 2.83 inches (71.8 mm). For a soil with a low hydraulic conductivity, say K_s = 0.1 in/hr (2.5 mm/hr), the computed thickness is 1.26 inches (32.1 mm).

A depletion factor is applied to the soil moisture during all time steps for which there is no infiltration from rainfall or depression storage. This factor is indirectly related again to the saturated hydraulic conductivity of the soil and is calculated by:

$$DF = \frac{L}{300} \tag{20-74}$$

where DF = depletion factor, hr^{-1}, and

L = depth of upper zone, in.

Hence, for K_s = 0.5 in/hr (12.7 mm/hr), DF = 0.9% per hour; for K_s = 0.1 in/hr (2.5 mm/hr) DF = 0.4% per hour. The depletion volume (DV) per time step is then:

$$DV = DF \cdot FU_{max} \cdot \Delta t \tag{20-75}$$

where FU_{max} = L · IMD_{max} = saturated moisture content of the upper zone, in,
IDM_{max} = maximum initial moisture deficit, in/in, and
Δt = time step, hr.

The computations used are:

$$FU = FU - DV \quad for \quad FU \geq 0 \tag{20-76}$$

$$F = F - DV \quad for \quad F \geq 0 \tag{20-77}$$

where FU = current moisture content of upper zone, in, and
F = cumulative infiltration volume for this event, in.

To use the Green-Ampt infiltration model in continuous SWMM, it is necessary to choose a time interval after which further rainfall will be considered as pn independent event. This time is computed as:

$$T = \frac{6}{100 \cdot DF} \tag{20-78}$$

where T = time interval for independent event, hr.

For example, when K_s = 0.5 in/hr (12.7 mm/hr) the time between independent events as given in the last equation is 6.4 hr; when K_s = 0.1 in/hr (2.5 mm/hr) the time is 14.3 hr. After time T has elapsed the variable F is set to zero, ready for the next event. The moisture remaining in the upper zone of the soil is then redistributed (diminished) at each time step by the two previous equations in order to update the current moisture deficit (IMD). The deficit is allowed to increase up to its maximum value (IMD_{max}, an input parameter) over prolonged dry periods. The equation used is

$$IMD = \frac{FU_{max} - FU}{L} \; for \; IMD \leq IMD_{max} \tag{20-79}$$

When light rainfall ($i \leq K_s$) occurs during the redistribution period, the upper zone moisture storage, FU, is increased by the infiltrated rainfall volume and IMD is again updated using the last equation.

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PR-4 SWMM Manual Excerpts

Guidelines for estimating parameter values for the Green-Ampt model are given elsewhere in this manual. As is also the case for the Horton equation, different soil types can be modelled for different subcatchments.

Program Variables

The infiltration computations are performed in subroutines WSHED and GAMP in the RUNOFF Module. Correspondence of program variables to those of this subsection is as follows:

S = SUCT(J)	L = UL(J)
IMD_{max} = SMDMAX (J)	DF = DF(J)
K_s = HYDCON(J)	i = RI
FU_{max} = FUMAX(J)	t = time
FU = FU(J)	Δt = DELT
IMD = SMD(J)	DV = DEP
F = F(J)	F_s = FS

20.5.4 Green-Ampt Infiltration Input Data

Although not as well known as the Horton equation, the Green-Ampt equation (1911) has the advantage of physically based parameters that, in principle, can be predicted a priori. The Mein-Larson (1973) formulation of the Green-Ampt equation is a two-stage model. The first step predicts the volume of water, F_s which will infiltrate before the surface becomes saturated. From this point onward, infiltration capacity, f_p, is predicted directly by the Green-Ampt equation. Thus,

$$For\ F < F_s : f = i\ and\ F_s = \frac{S_u\ IMD}{i / K_s - 1}\ for\ i > K_s; \tag{20-80}$$

No calculation of F_s for $i \leq K_s$.

$$For\ F \geq F_s : f = f_p\ and\ f_p = K_s(1 + \frac{S_u\ IMD}{F}) \tag{20-81}$$

where

f = infiltration rate, ft/sec,
f_p = infiltration capacity, ft/sec,
i = rainfall intensity, ft/sec,
F = cumulative infiltration volume, this event, ft,
F_s = cumulative infiltration volume required to cause surface saturation, ft,
S_u = average capillary suction at the wetting front (SUCT), ft water,
IMD = initial moisture deficit for this event (SMDMAX), ft/ft, and

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PR-5 Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo

Geosyntec consultants

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Oakland, California 94607
PH 510.836.3034
FAX 510.836.3036
www.geosyntec.com

Memorandum

Date:	November 13, 2019
To:	Jim Scanlin, Alameda Countywide Clean Water Program, and Courtney Riddle, Contra Costa Clean Water Program
Copy:	Karin Graves and Lucile Paquette, Contra Costa Clean Water Program
From:	Kelly Havens, Senior Engineer, Austin Orr, Engineer, Lisa Austin, Principal, and Marc Leisenring, Principal
Subject:	Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Geosyntec Project Numbers: WW2127 and WW2407

1. INTRODUCTION

This memorandum provides an expanded description and summary results for the calibration and validation conducted as for the development of the Alameda Countywide Clean Water Program (ACCWP) and Contra Costa Clean Water Program (CCCWP) Reasonable Assurance Analysis (RAA) model. This memorandum provides additional information to that provided in the Alameda Countywide Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report and the Contra Costa Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions Report (i.e., "GI Quantitative Relationship Reports"; ACCWP, 2018 [PR-2] and CCCWP, 2018 [PR-3]) for the purpose of peer review. As such, this memorandum references information and sections in those reports.

2. CALIBRATION APPROACH AND PARAMETERS

As described in the GI Quantitative Relationship Reports [PR-2; PR-3], the baseline pollutant loading model utilized for the RAA is based on continuous simulation hydrology model run in EPA's Stormwater Management Model (SWMM) version 5.1, combined with land use-based runoff concentrations to obtain the average annual loading of mercury and PCBs in stormwater runoff from Alameda and Contra Costa counties during the TMDL baseline period (i.e., 2003 – 2005). The hydrologic model utilizes generic hydrologic response units (HRUs), as described in Sections 2.2.1 and 3.1.1 of the GI Quantitative Relationship Reports [PR-2; PR-3]. Calibration of the generic HRU models was conducted on the average annual discharge volume for water years

(WYs) 2000-2009, utilizing available stream flow records. The objective of the calibration was to reasonably match the average annual runoff volume for this 10-year period.

The acceptable percent difference between simulated and observed annual volumes included in the *Bay Area RAA Guidance Document* (BASMAA, 2017) are provided in Table 1 below. These ranges were used to verify model results and evaluate whether parameters have been adequately calibrated.

Table 1: Allowable Difference between Simulated and Observed Annual Volumes

Model parameters	Average % difference between simulated annual results and observed data		
	Very Good	Good	Fair (lower bound, upper bound)
Hydrology/Flow	<10	10-15	15-25

A summary of the observed data and the parameters used to conduct the calibration with the simulated (modeled) results are provided in the following subsections.

2.1 Observed Data

2.1.1 Flow Gauges Used for Calibration

A list of candidate flow gauge sites were identified for potential use in calibration in the GI Quantitative Relationship Reports [PR-2; PR-3]. For the purposes of calibration, the candidate gauge sites that were identified in the GI Quantitative Relationship Reports included stream depth rating curves and daily mean records for the WY 2000 – 2009 period, and all are USGS gauges. The flow gauges used in calibration are summarized in Table 2 and shown in Figure PR-5A (all figures are provided at the end of the memo).

Table 2: Flow Gauges Used for RAA Model Calibration

Gauge ID	Gauge Name	Location	County	Data Frequency
11182500	San Ramon Creek	San Ramon	Contra Costa	Daily
11181390	Wildcat Creek[1]	Richmond / San Pablo	Contra Costa	Daily
11181040	San Lorenzo Creek	San Lorenzo	Alameda	Daily
11181008	Castro Valley Creek	Hayward	Alameda	Daily
11181000	San Lorenzo Creek	Hayward	Alameda	Daily
11180700	Alameda Creek Flood Channel	Union City	Alameda	Daily
11179000	Alameda Creek	Fremont	Alameda	Daily
11176900	Arroyo de la Laguna	Verona	Alameda	Daily

1. The Wildcat Creek gauge record is incomplete and contains data only for the four-year period WY 2006-2009. Geosyntec used the available years of gauge data to inform the calibration effort, but it was not ultimately used to assess the overall fitness of the model at representing the RAA baseline period regional hydrology.

Three other gauges were identified for potential use in calibration in the GI Quantitative Relationship Reports, but were ultimately not used for calibration, as described below. These included:

- Gauge number 11337600, Marsh Creek, which had considerable quantities of dry weather flows recorded with significant variability, such that baseflow removal techniques were not successful in isolating flows associated with rainfall;
- Gauge number 11173575, Alameda Creek Below Welch Creek, which contained significant data gaps in the record, as well as erratic stream flows likely caused by dam influence; and
- Gauge number 11173510, Alameda Creek Below Calaveras Creek, which contained significant data gaps in the record, as well as erratic stream flows likely caused by dam influence.

Given the data availability, calibration was conducted for both Alameda County and Contra Costa County areas simultaneously.

The area tributary to each flow gauge was delineated using the USGS StreamStats online tool (U.S. Geological Survey, 2016). These delineations were intersected with the HRU layer to select generic HRU's from across the two counties for use in the calibration, including multiple different rainfall and climate zones, soil classifications, surface slopes, and land uses. The watershed areas tributary to the gauges used are shown in Figure PR-5A and summarized in Table 3.

Table 3: Calibration Watershed Tributary Area Characteristics

Gauge ID	Gauge Name	Area (acres)	Percent Developed	Percent Impervious
11182500	San Ramon Creek	3,878	21%	2%
11181390	Wildcat Creek	4,999	22%	5%
11181040	San Lorenzo Creek	29,989	38%	12%
11181008	Castro Valley Creek	3,531	93%	44%
11181000	San Lorenzo Creek	24,203	24%	5%
11180700	Alameda Creek Flood Channel	237,946	29%	10%
11179000	Alameda Creek	224,072	28%	9%
11176900	Arroyo de la Laguna	164,679	35%	12%

2.1.2 Baseflow Removal Process

Calibration of land surface runoff hydrology to stream gauge records requires that baseflow be computed and accounted for throughout the period of record, as the RAA model does not include storm flow routing, groundwater inflow/outflow, diversions, or reservoirs. Where baseflow constitutes a large percentage of total flow, baseflow accounting allows for isolation and calibration of just the flow gauge runoff response to a rainfall event, which is dependent on land surface features. A variety of methods exist for separating baseflow from runoff. For those flow gauges requiring baseflow separation, two methods were identified as appropriate for the flow gauges used for Alameda County and Contra Costa County RAA model calibration. The methods and gauge characteristics corresponding to the use of the method include:

1. Base-Flow Index (BFI) modified: BFI modified is a timeseries analysis which locates minimum values in the hydrograph over five-day increments. For each identified minimum, if 90% of its value is less than both adjacent minimums, it is identified as a hydrograph 'turning point'. The baseflow hydrograph is established by connecting the turning points with straight lines (Barlow et., al, 2015). This method was used to remove baseflow from calibration watersheds with appreciable development.

2. PART (short for partitioning): PART is an iterative timeseries analysis that identifies daily streamflow values that are not affected by surface runoff, assigns these values as baseflow, then removes baseflow from all days to compile the baseflow-corrected record used for surface runoff calibration. Daily streamflow values are identified as baseflow if they are preceded by N days of continuous streamflow recession (Barlow et., al, 2015); N is identified through the pattern of recession of streamflow measurements. This method was used to remove baseflow from large calibration watersheds influenced by significant impoundments.

The gauges for which no baseflow separation was conducted were estimated to have very little or no potential for baseflow to influence the calibration to mean annual volume since the streams are largely undeveloped, aren't actively managed with significant impoundments, and typically run dry in the month of September. The most appropriate method for separating baseflow was determined on a gauge-specific basis, depending on the variability in the flow record and the occurrence of confounding factors that affect baseflow such as dam releases and other dry weather inflows.

A summary of the baseflow separation method used for each flow gauge is provided in Table 4.

Table 4: Calibration Flow Gauge Baseflow Removal Methods Used

Gauge ID	Gauge Name	Baseflow Separation and Removal Method	Notes	Total Watershed Area Including Impoundments (acres)	Impounded Area in Watershed (acres)
11182500	San Ramon Creek	No Baseflow Removal	Small, mostly undeveloped, typically dry in August or September	3,878	None
11181390[1]	Wildcat Creek	No Baseflow Removal	Small, mostly undeveloped, typically dry in August or September. Data only available for WY 2006-2009	4,999	None
11181040	San Lorenzo Creek	BFI Modified	Contains significant urban development	29,989	None
11181008	Castro Valley Creek	BFI Modified	Contains significant urban development	3,531	None
11181000	San Lorenzo Creek	No Baseflow Removal	Small, mostly undeveloped, typically dry in August or September	24,203	None
11180700	Alameda Creek Flood Channel	PART	Used only WY 2002, 2003, and 2005 – 2009 due to missing and erroneous data in other WYs. Large watershed with impoundments.	418,788	180,809
11179000	Alameda Creek	PART	Large watershed with impoundments.	404,913	180,809
11176900	Arroyo de la Laguna	BFI Modified	Contains significant urban development	258,121	93,419

1. The USGS does not report discharge for this gauge more recently than 1996. Balance Hydrologics began recording measurements for this gauge in 2005; this record was used for WY2006-2009.

2.2 Modeled Results - Model Calibration Parameters

To conduct the calibration, modeled annual storm flow produced from the delineated watersheds draining to the stream gauges (see Figure PR-5A) was compared to annual flow in the stream gauge records, with baseflow separated as described in Section 2.1.2, for WYs 2000 – 2009. Modeled annual storm flow was predicted by area-weighting the runoff output from generic HRU models in proportion to the areas of those generic HRUs within the watersheds draining to the stream gauges.

HRU calibration parameters were adjusted in three phases. The first phase entailed establishing the general range and sensitivity of the hydrologic model to saturated soil hydraulic conductivity (Ksat) for HSG C and D type soils for the generic HRUs within the three undeveloped watersheds tributary to identified calibration flow gauges (see Tables 2, 3, and 4). The second phase involved exploring sensitivity to changes in soil infiltration recovery time for the identified range of Ksat values. The third phase incorporated soil parameter value combinations identified in the first two phases in models for all eight calibration watersheds. National Land Cover Dataset (NLCD) imperviousness data were initially considered as a calibration parameter but were not ultimately used (see further discussion in Section 2.2.3 below).

Identified model parameters were adjusted for each phase until the average percent difference between modeled and measured average annual storm flow volumes (with baseflow removed as described in Table 4) was less than 25% - the acceptable range as summarized in Table 1. Once the average percent difference for all the calibration watersheds were within the acceptable range, the HRU model parameters were finalized.

2.2.1 Soil Hydraulic Conductivity

Soil Ksat was primarily calibrated in the watersheds draining to flow gauges 11182500 (San Ramon Creek), 11181390 (Wildcat Creek), and 11181000 (San Lorenzo Creek) because these watersheds are primarily undeveloped and thus provide greater isolation of the pervious area runoff and loss response to rainfall. Given the percent total area of hydrologic soil group (HSG) C and D type soils in these watersheds, soil Ksat was adjusted only for HSG types C and D. The Ksat for soil groups A and B were assigned by area-weighting literature values corresponding with the texture classes that are present within Alameda County and Contra Costa County. It was found that adjusting HSG A and B Ksat model input values resulted in minimal changes to average annual volume in the watersheds given that A and B type soils each cover less than 5% of the Alameda County and Contra Costa County areas modeled.

2.2.2 Soil Recovery Pattern

The same three watersheds used for Ksat calibration were also used to calibrate soil recovery time. This parameter is associated with the soil drying effects caused by evapotranspiration and determines how many days it takes for a soil to recover its full infiltrative capacity during the dry period following a rainfall event. In SWMM, this parameter is a function of both the subbasin's Ksat and expected soil recovery time and can be defined on a monthly basis as part of the climatological parameters. See SWMM5 Users Guide 13th Edition pg. 462-463 (James et., al, 2010; provided in PR-4) for information on the Green Ampt Equation and the Recovery of Infiltration Capacity.

2.2.3 Calibration for Developed Watersheds

Imperviousness (associated with specific Association of Bay Area Governments [ABAG] land use types, see Section 3.1.1. of the GI Quantitative Relationship Reports [PR-2; PR-3]) was considered as a parameter for calibration, but NLCD-derived imperviousness was found to produce modeled results within the acceptable range, so no adjustment to imperviousness was applied as part of calibration. Imperviousness values were assigned for each individual polygon in the ABAG 2005 Geospatial Information System (GIS) dataset by area-weighting the NLCD 2006 imperviousness values associated with the polygon. Each parcel and right-of-way (ROW) segment had roughly the same spatial resolution.

Soil parameters calibrated to undeveloped watersheds were adjusted for soil compaction assumed to occur during development (see Section 3.1.1 of the GI Quantitative Relationship Reports [PR-2; PR-3]) and were used to develop area-weighted average annual HRU runoff output for the other more developed and impervious watersheds associated with identified flow gauges. Coupled with the NLCD-derived imperviousness method for identifying representative HRUs for the watersheds, these calibrated soil parameters were found to produce results within the acceptable calibration range for the more developed and impervious watersheds used for calibration.

3. CALIBRATION RESULTS

3.1 Parameter Adjustment

To identify the region of best fit between modeled and measured average annual runoff for the identified calibration parameters, a large range of values were input into the generic HRU models representative of the areas within the calibration watersheds.

3.1.1 Soil Hydraulic Conductivity and Recovery Time

Soil Ksat values between 0.025 – 0.35 inches per hour (in/hr) for HSG C and D soils were examined as part of the first phase of calibration. Varying combinations of Ksat values for the two soil types were tested for the undeveloped calibration watersheds. Each pair of parameters represent hundreds of individual continuous HRU SWMM models. This calibration exercise revealed that the best fit values for HSG C and D type soil in the three undeveloped calibration watersheds likely falls between 0.1 and 0.2 in/hr for HSG C soils, and between 0.05 and 0.125 in/hr for HSG D type soils.

This range of parameters was explored further in the second phase of calibration, in which soil recovery time was adjusted for three different values: 7 days, 14 days, and 18 days. The calibration percent difference results corresponding to the combinations of HSG C and D soil Ksat values and soil recovery times are shown in Figure PR-5B. Darker blue areas indicate a lower percent difference between modeled runoff volume and measured total discharge volume

(with baseflow removed per Table 4) in the three undeveloped calibration watersheds. Over 11,800 continuous simulation HRU model runs were evaluated in order to create the grid of values, shown in Figure PR-5B.

The darkest blue areas of the three plots in Figure PR-5B indicate the least percentage difference between modeled and measured average annual runoff volume for all three undeveloped stream gauge records during the period from WY 2000 - 2009. The percentage difference in total annual average runoff volume is quite sensitive to changes in HSG C and D type soils for the range of Ksat values searched during this exercise, but the model is not very sensitive to soil recovery time as indicated by the small differences in the three plots.

From this calibration phase two investigation, it was identified that the most appropriate soil Ksat values ranged from 0.125 – 0.15 in/hr for HSG C soils, 0.075 – 0.1 in/hr for HSG D soils. A soil recovery pattern equivalent to a 14-day soil recovery time for HSG C soils was also identified to be the most appropriate for the calibration watersheds.

Phase three of the calibration used this tighter range of HSG C and D soil Ksat values to evaluate percent difference between average annual modeled runoff and measured discharge at all of the calibration gauges (as corrected for baseflow removal per Table 4). The best-fit soil Ksat parameters for all eight of the calibration gauges are shown in Table 5 below.

Table 5: Final Soil Ksat Values for the Eight Calibration Gauge Tributary Watersheds

HSG	Undeveloped Soil Ksat (in/hr)	Developed Soil Ksat[1] (in/hr)
A[2]	2.5	1.875
B[2]	0.3	0.225
C	0.15	0.1125
D	0.1	0.075

[1] Ksat is decreased by 25% to account for soil compaction expected to occur during development.

[2] Ksat assigned by area-weighting literature values corresponding with soil texture classes present in the areas modeled.

3.2 Resulting Percent Difference between Modeled and Measured Average Annual Runoff

Utilizing the calibrated parameter values described in Section 3.1 and summarized in Table 5, the percent difference between average annual modeled runoff and average annual measured runoff for the period of record (WY 2000 – 2009) was found to be within the required threshold (Table 1) for most of the watersheds examined, with the exception of the Wildcat Creek gauge (gauge number 11181390). This gauge has an incomplete record and contains data for only four years, from WY 2006-2009. The available data from this gauge was used to inform the calibration parameters, but given the incomplete record, the percent difference between measured and modeled average annual runoff volume was not ultimately used to assess the overall fitness of the RAA hydrologic model for the full baseline time period (WY 2000-2009).

The percent difference between average annual modeled runoff and measured runoff (accounting for baseflow corrections per Table 4) for the RAA baseline period from WY 2000-2009 for each calibration gauge is shown in Figure PR-5C. Since the entire decade was modeled, some individual years within the period of record varied more than the 25% threshold; however, these percent differences are offset between wet years and dry years to provide an acceptable percent difference between average annual modeled and measured values.

4. VALIDATION

Following completion of baseline hydrologic calibration, baseline loads were validated using pollutant monitoring data collected as part of the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP; specifically, the Small Tributary Loading Strategy project) and the Surface Water Ambient Monitoring Program (SWAMP). Pollutant concentration data were obtained from the California Environmental Data Exchange Network (CEDEN). The validation analysis included 206 total PCBs and 291 total mercury results from various monitoring locations in Alameda and Contra Costa Counties with sample dates ranging from 2001 to 2014.

Samples were taken at load monitoring stations, mostly during wet weather. These stations are shown on Figures PR-5D (PCBs) and PR-5E (mercury) along with their respective watershed delineations. Where not provided by SFEI, watershed delineations were developed using the USGS StreamStats delineation tool (USGS, 2016). The land use composition of the validation watersheds is provided in Attachment A to this memo.

The validation exercise conducted combines the calibrated Contra Costa and Alameda County regional hydrology with the Regional Watershed Spreadsheet Model (RWSM) PCBs and mercury values estimated by SFEI (see section 2.1 and 2.2.2 of the GI Quantitative Relationship Reports [PR-2; PR-3] and Regional Watershed Spreadsheet Model Version 1.0 Results Summary Memorandum (Geosyntec, 2019). Because the RWSM concentrations used for the RAA water quality model are not modifiable for the regional RAA Modeling approaches, this validation exercise is purely qualitative, and is not expected to result in changes to the hydrologic or water quality model input parameters.

The validation process includes computing the area-weighted average annual runoff volume for each land use category within the validation watersheds and combining these results with the associated RWSM average annual pollutant concentration. The resulting land use-based pollutant loads are added together over all land uses to obtain the estimated average annual pollutant load for each validation watershed. This average annual pollutant load is divided by the average annual runoff volume for the validation watershed to obtain an average annual pollutant discharge concentration for each validation watershed. The values calculated from the model output were compared to monitoring data collected at the associated validation monitoring

locations. Statistical summaries and the number of samples for PCBs and mercury concentrations measured at each validation monitoring location are shown in box plot format in Figure PR-5F and Figure PR-5G, respectively. The resulting average annual pollutant discharge concentration for each validation watershed is superimposed on the box plots of the measured values for comparison.

The modeled PCBs concentrations are within the expected ranges for the validation watersheds examined (see Figure PR-5F). In some cases, the model slightly overpredicts the PCBs concentration in runoff, notably in the Ettie Street and Zone 5 Line M watersheds, and in other cases, underpredicts, such as in the Santa Fe Channel watershed. This is expected given the highly variable spatial distribution of PCBs contamination and storm-to-storm variability in runoff characteristics. The differences are largely attributable to the use of the regionally-characteristic land use-based RWSM values for modeling PCBs runoff concentrations and comparing average annual concentrations computed from annualized loads and volumes.

The validation exercise for mercury included many more watersheds than for PCBs. In general, the modeled values for mercury concentration are significantly higher than the measured values (see Figure PR-5G). The present RWSM land use-based concentration values for mercury appear to overestimate the observed concentration of mercury in the monitored watersheds within Alameda County and Contra Costa County.

5. REFERENCES

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Attachment

Alameda Countywide Clean Water Program and Contra Costa Clean Water Program Reasonable Assurance Analysis Model Calibration and Validation Memo

Attachment A: Land Use Breakdown, Validation Watersheds

November 8, 2019

Validation Watershed	POC	Total Acres by Land Use					Total Acres	Percent Area by Land Use				
		Old Industrial	Old Commercial/ Old Transportation	Old Residential	New Urban	Open Space		Old Industrial	Old Commercial/ Old Transportation	Old Residential	New Urban	Open Space
Ettie Street Pump Station_A	PCBs and Hg	356	187	580	47	13	1,183	30%	16%	49%	4%	1%
Santa Fe Channel-SFeCh	PCBs and Hg	197	240	1,012	43	35	1,527	13%	16%	66%	3%	2%
Zone 5 Line M-Z5LM	PCBs and Hg	162	79	645	100	858	1,843	9%	4%	35%	5%	47%
Hayward Ind Stdrn	PCBs and Hg	82	312	495	118	14	1,021	8%	31%	48%	12%	1%
Meeker Slough	PCBs and Hg	9	74	415	3	5	507	2%	15%	82%	<1%	<1%
San Leandro Creek	PCBs and Hg	49	243	4,750	617	23,052	28,710	<1%	<1%	17%	2%	80%
San Lorenzo Creek	PCBs and Hg	50	842	5,619	2,781	20,694	29,986	<1%	3%	19%	9%	69%
Lower Marsh Creek	PCBs and Hg	125		1,113	6,034	67,837	75,109	<1%	0%	1%	8%	90%
Walnut Creek	PCBs and Hg	88	2,284	18,655	5,558	28,004	54,590	<1%	4%	34%	10%	51%
Glen Echo Creek-GECr	PCBs and Hg		90	400	3	223	716	0%	13%	56%	<1%	31%
Port Chicago Highway	Hg Only	1,650	268	1,801	1,021	14,229	18,968	9%	1%	9%	5%	75%
Codornices at 2nd Street	Hg Only	61	24	893	3	2	983	6%	2%	91%	<1%	<1%
Kirker Creek at Floodway	Hg Only	23		204	99	105	431	5%	0%	47%	23%	24%
El Charro	Hg Only	981	1,027	2,792	4,653	44,201	53,654	2%	2%	5%	9%	82%
Cerrito at Creekside Park	Hg Only	27	119	1,626	17	89	1,879	1%	6%	87%	<1%	5%
Richmond Parkway	Hg Only	36	165	868	47	4,382	5,497	<1%	3%	16%	<1%	80%
3rd St. Bridge	Hg Only	123	339	6,804	911	18,576	26,753	<1%	1%	25%	3%	69%
Baxter at Booker	Hg Only	1	65	541	2	83	692	<1%	9%	78%	<1%	12%
Above Vulcan Bridge Zone 7	Hg Only	28	96	1,078	414	26,592	28,209	<1%	<1%	4%	1%	94%
Arroyo Viejo Rec. Center	Hg Only	2	130	1,841	64	1,400	3,438	<1%	4%	54%	2%	41%
Cesar Chavez Park	Hg Only	0	116	1,287	2	56	1,461	0%	8%	88%	<1%	4%
Strawberry Creek Park	Hg Only		98	822	75	454	1,448	0%	7%	57%	5%	31%
Sausal at E.22nd	Hg Only		140	1,822	6	545	2,513	0%	6%	73%	<1%	22%
Above Lake Temescal	Hg Only		37	817	49	202	1,105	0%	3%	74%	4%	18%
Kirker Creek Apartments	Hg Only		50		10	3,497	3,558	0%	1%	0%	<1%	98%
Mitchell on Oak St	Hg Only			97	0	2,729	2,826	0%	0%	3%	0%	97%

Figures

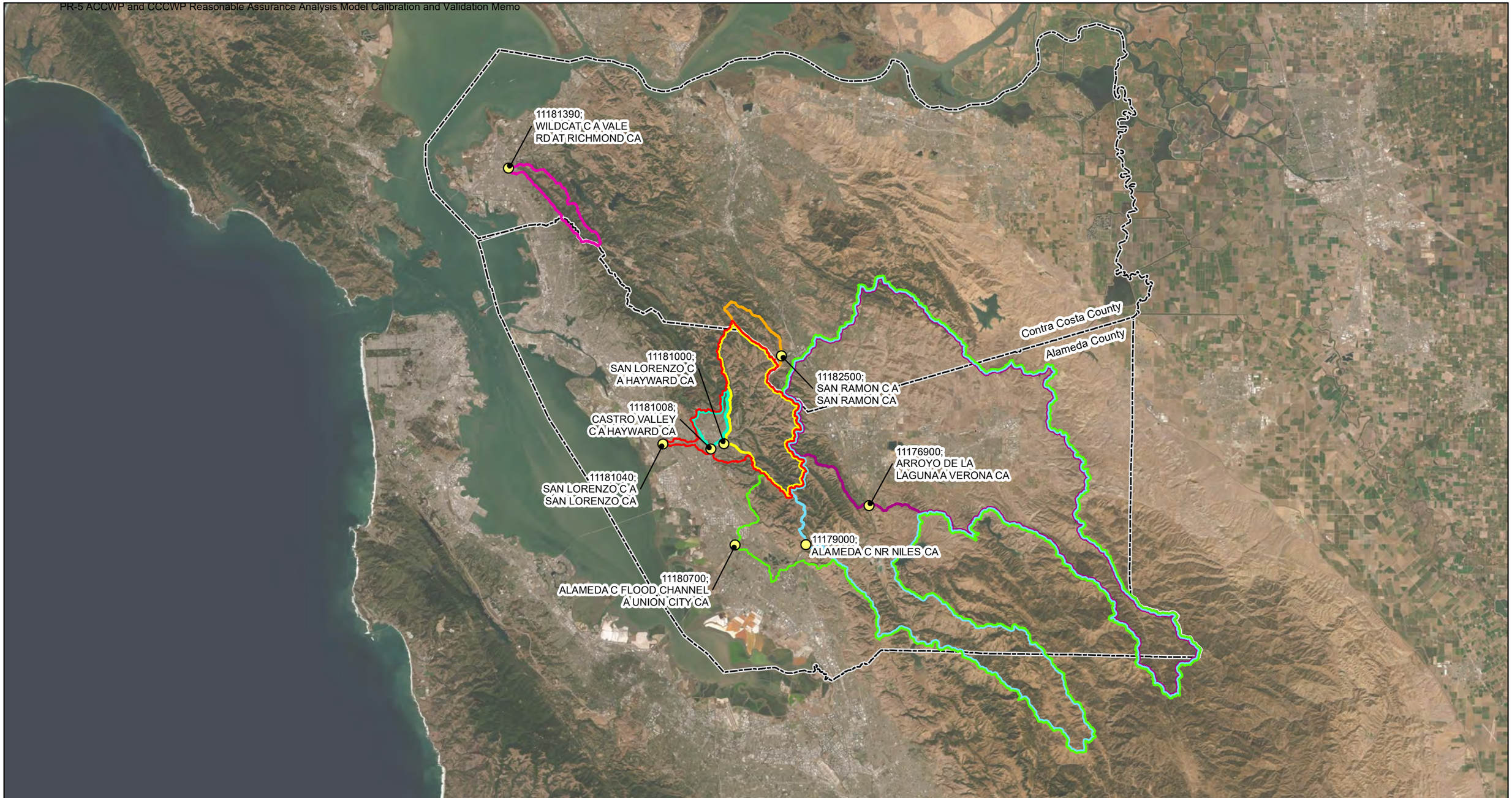

Legend

- County Boundaries
- Flow Gauge Location

San Lorenzo Ck.	Alameda Ck.	San Ramon Ck.	Wildcat Ck.
11181040	11180700	11182500	11181390
11181000	11179000		
11181008	11176900		

N

0 6 12 Miles

RAA Hydrologic Model Calibration

Watersheds Tributary to Flow Gauges Used for Comparison

Alameda County and Contra Costa County
California

Geosyntec consultants

Oakland | August 2019

Figure PR-5A

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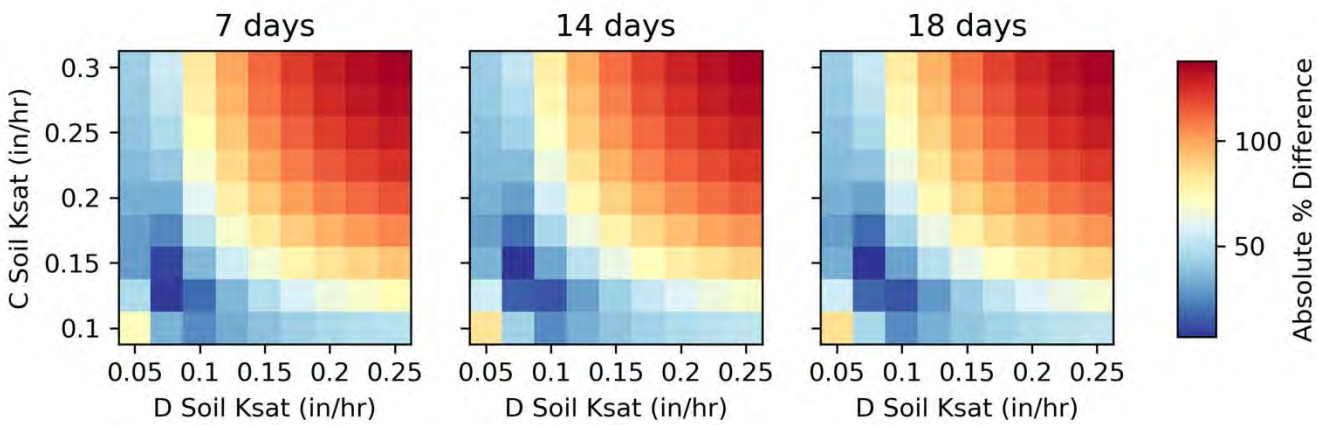

Calibration Matrix for HSG C and D Soils and Soil Recovery Time

Geosyntec consultants

Oakland | August 2019

Figure PR-5B

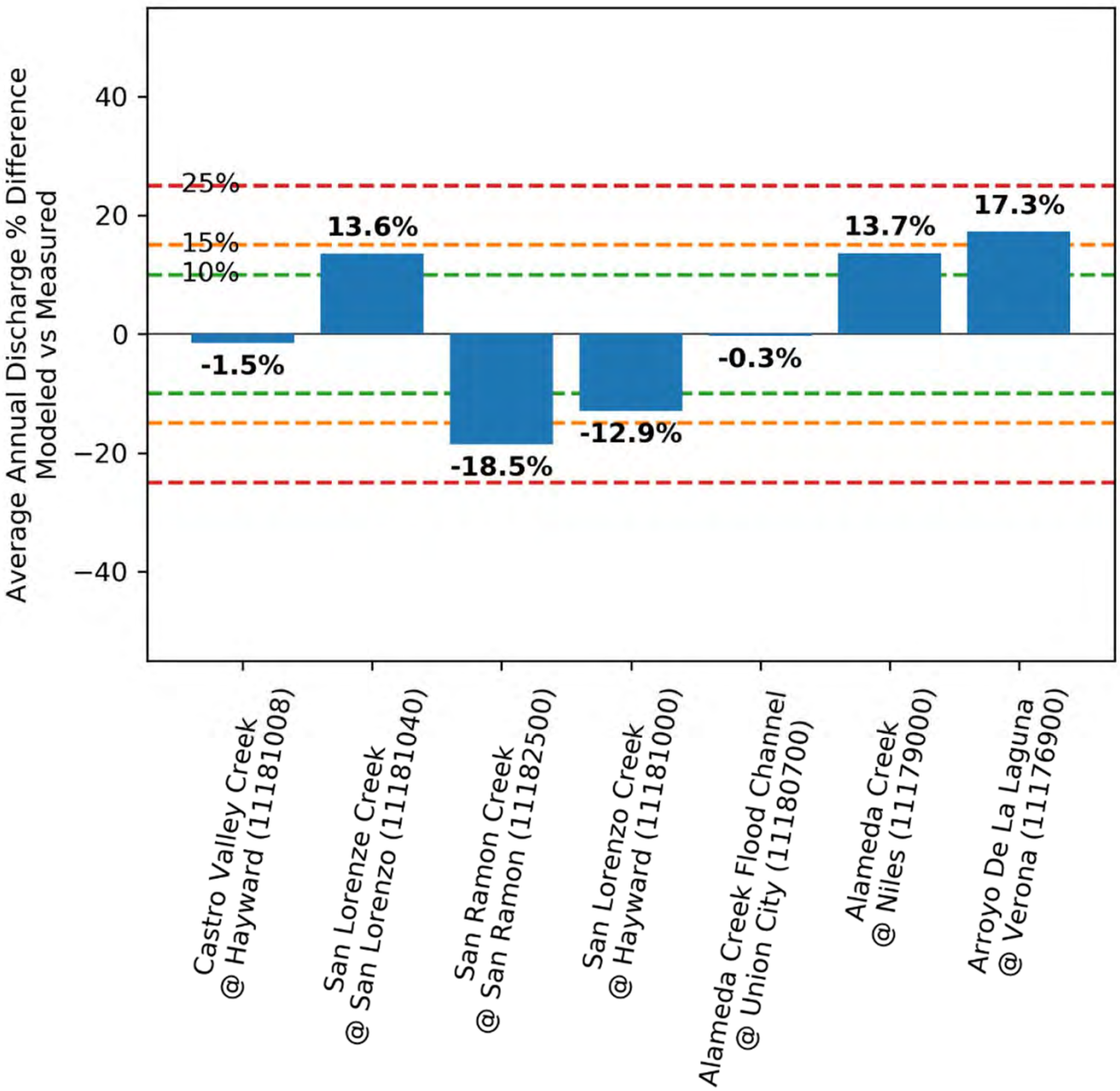

Percent Difference Between Modeled and Measured Average Annual Runoff Volume for Each Calibration Watershed

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Figure PR-5C

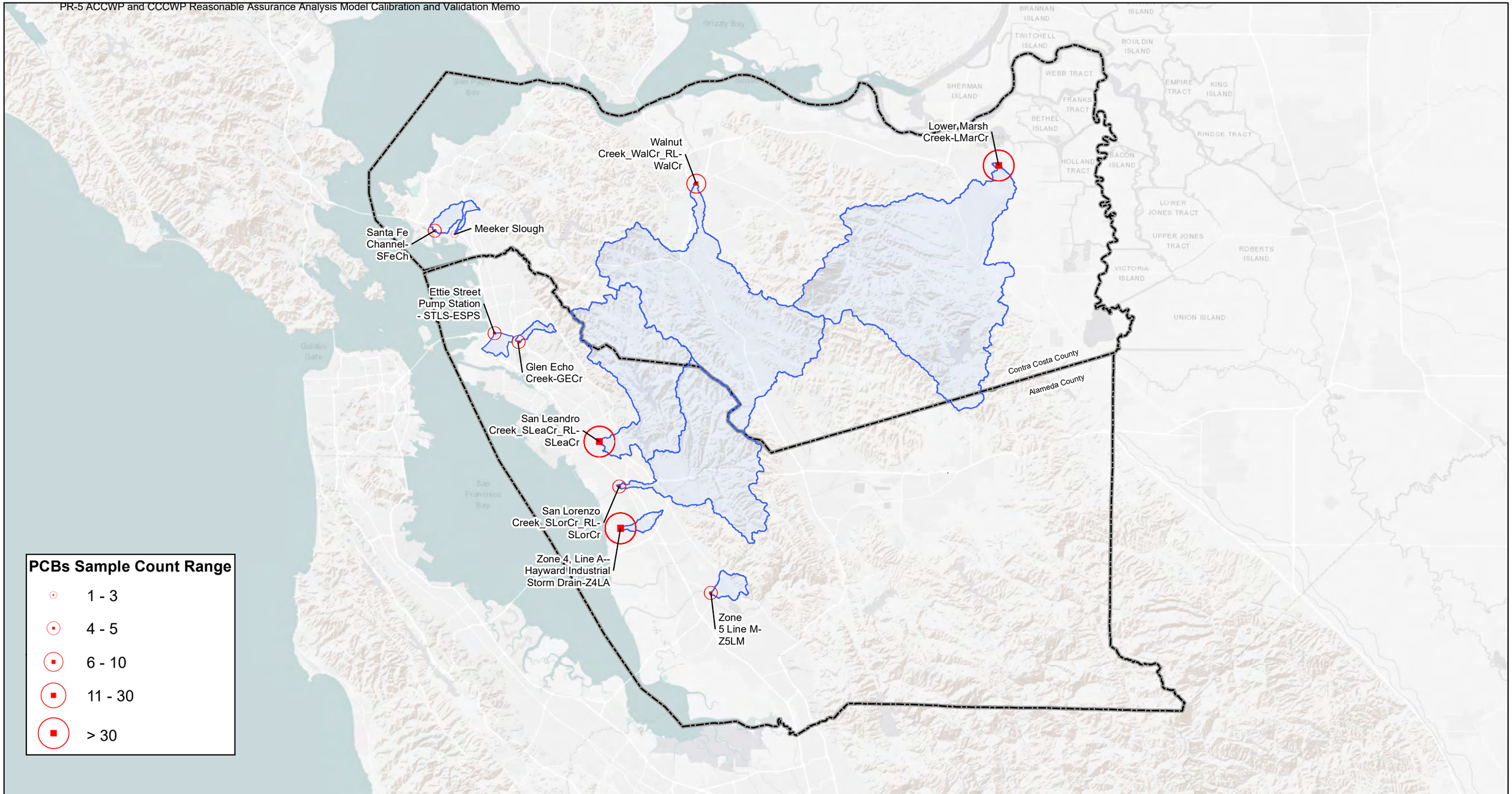

Legend

- County Boundary
- Validation Watershed
- Monitoring Location

N

0 3 6 12 Miles

RAA Water Quality Model Validation

Watersheds Tributary to Polllutant Monitoring Locations used for Comparison of PCBs

Alameda County and Contra Costa County California

Geosyntec consultants

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Figure PR-5D

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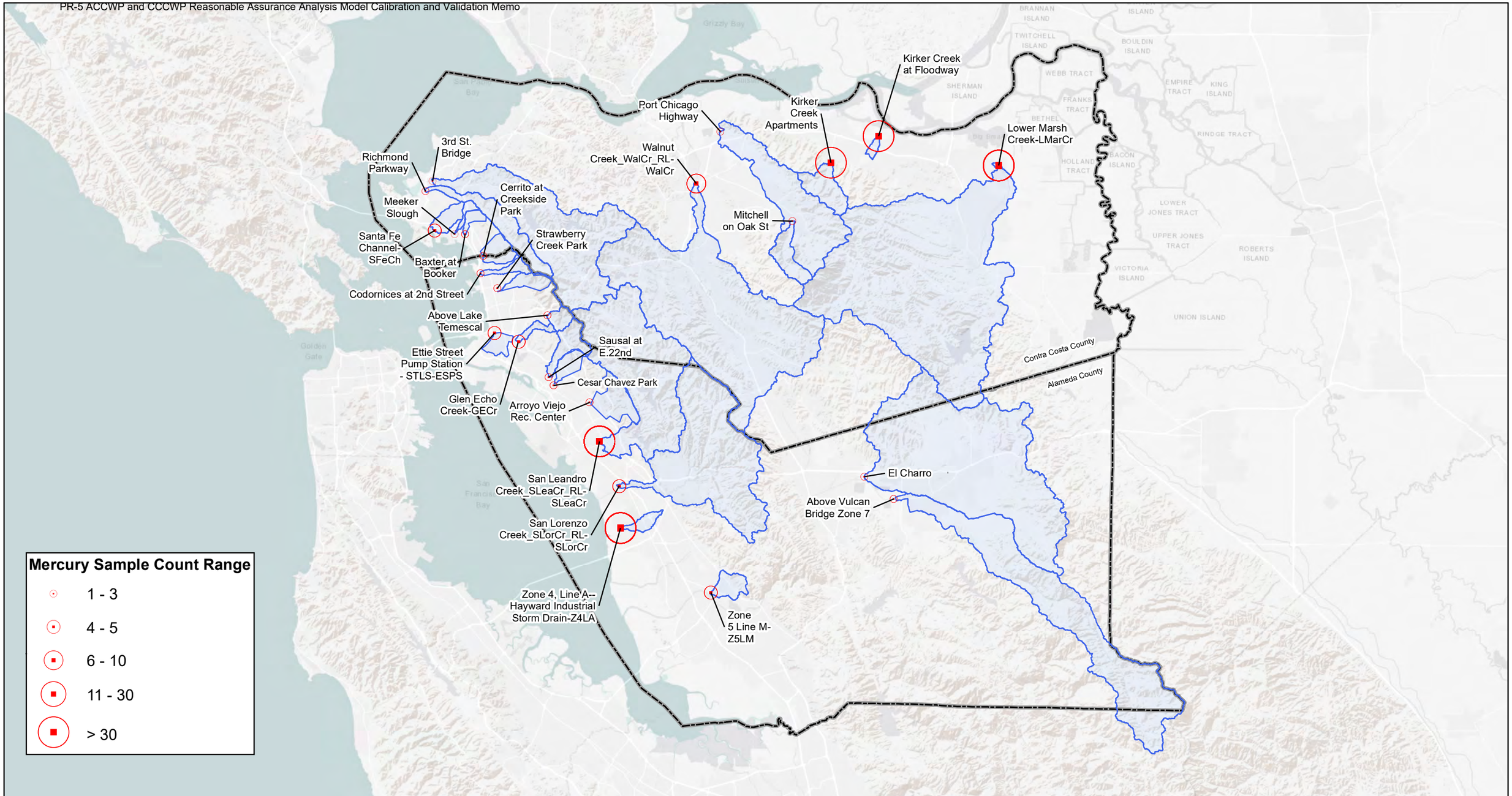

Legend

County Boundary

Validation Watershed

N

0 3 6 12 Miles

RAA Water Quality Model Validation

Watersheds Tributary to Polllutant Monitoring Locations used for Comparison of Mercury

Alameda County and Contra Costa County California

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Figure PR-5E

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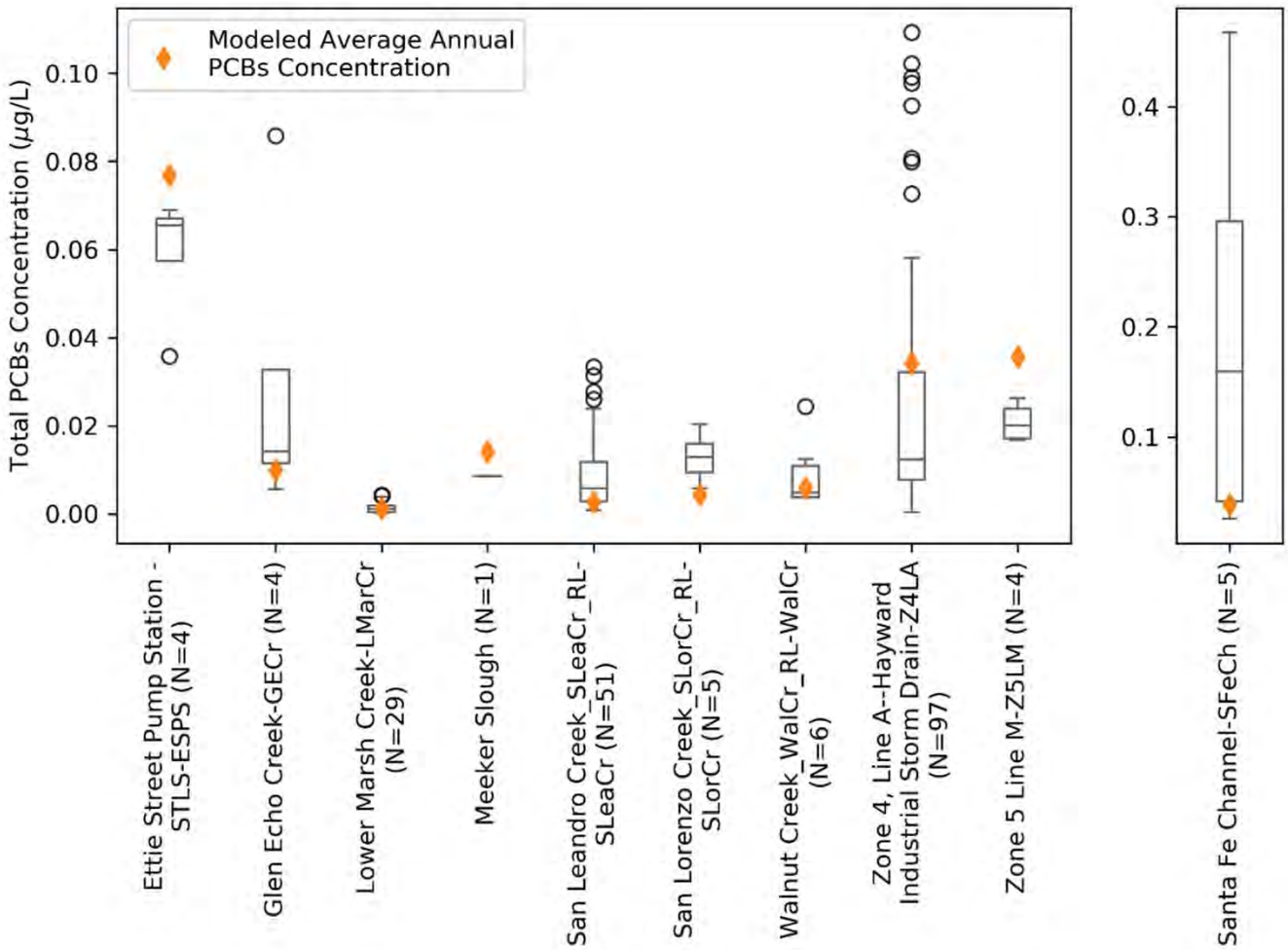

Modeled and Measured PCBs Concentrations for Monitored Watersheds in Alameda County and Contra Costa County

Geosyntec consultants

Oakland | August 2019

Figure PR-5F

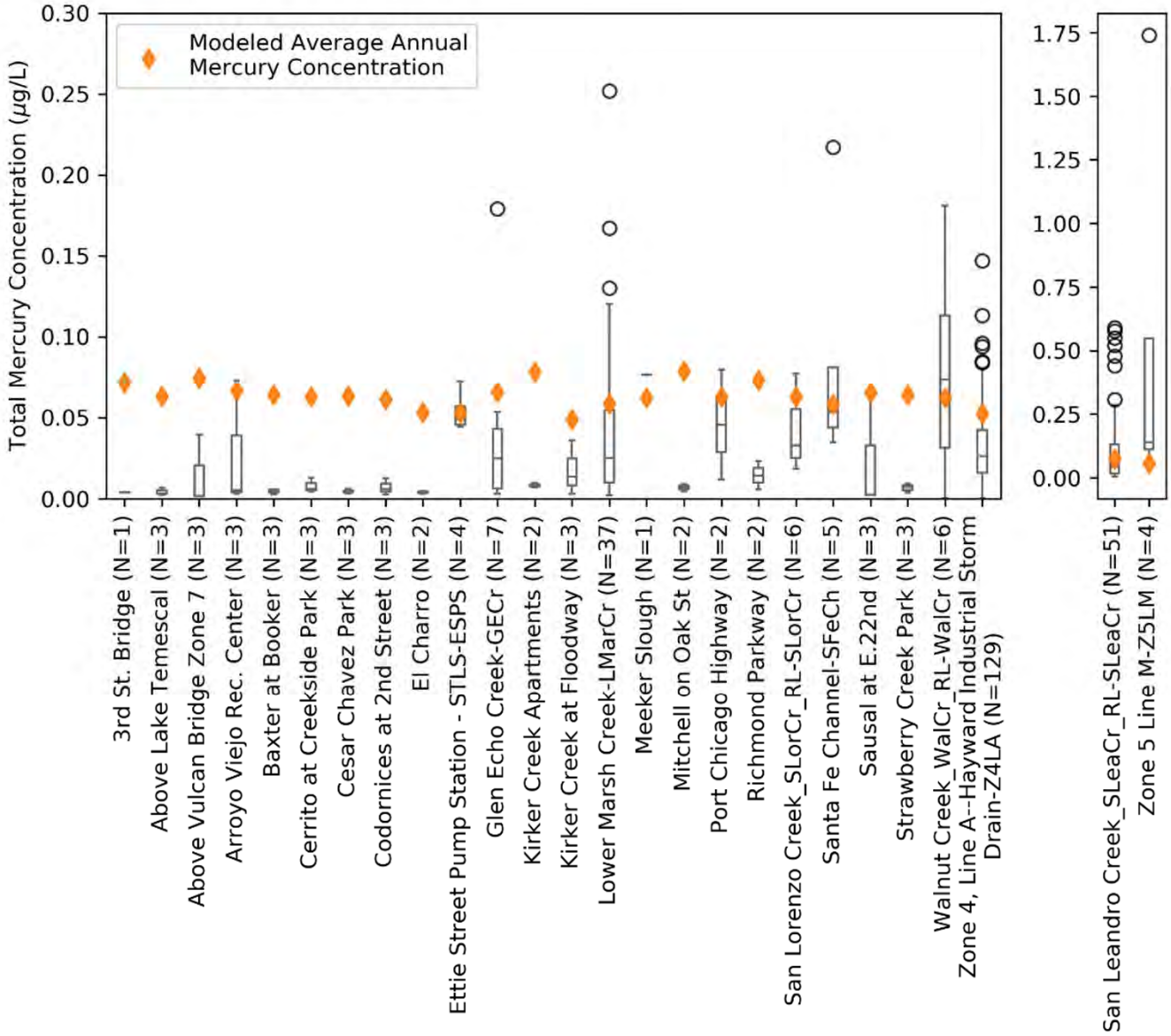

Modeled and Measured Mercury Concentrations for Monitored Watersheds in Alameda County and Contra Costa County

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Figure PR-5G

Attachment 12.2

Mercury and PCBs Watershed/Management Areas, Control Measures, and Load Reduction – Update 2020

MERCURY AND PCBS WATERSHED/MANAGEMENT AREAS, CONTROL MEASURES, AND LOAD REDUCTION – UPDATE 2020

Submitted in Compliance with Provision C.11.a.iii.(3), C.11.b.iii.(2), C.12.a.iii.(3), and C.12.b.iii.(2)

Municipal Regional Stormwater Permit
NPDES Permit No. CAS612008
Order No. R2-2015-0049

September 25, 2020

The Contra Costa Clean Water Program – A Municipal Stormwater Program consisting of Contra Costa County, its 19 Incorporated Cities/Towns, and the Contra Costa County Flood & Water Conservation District

This report is submitted by the agencies of the

Program Participants:

- Cities of: Antioch, Brentwood, Clayton, Concord, Danville (Town), El Cerrito, Hercules, Lafayette, Martinez, Moraga (Town), Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon and Walnut Creek
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LIST OF ACRONYMS

BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practices
CCCWP	Contra Costa Clean Water Program
CIP	Capital Improvement Plan
GI	Green Infrastructure
GIS	Geographic Information System
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
OES	Office of Emergency Services
PCBs	Polychlorinated Biphenyls
POC	Pollutants of Concern
POTW	Publicly Owned Treatment Works
ROW	Right-of-Way
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
W/MA	Watershed / Management Area
WY	Water Year

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Attachment A Source Property Referrals and Self-Abatement Reports

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1 INTRODUCTION

1.1 Purpose

This *Mercury and PCBs Watershed/Management Areas*, *Control Measures, and Load Reduction – Update 2019* report was prepared by the Contra Costa Clean Water Program (CCCWP) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.a.iii.(3), C.11.b.iii(2), C.12.a.iii.(3), and C.12.b.iii.(2) for updating the list of control measures reported in 2018 as necessary to account for new control measures and to report loads reduced by these control measures using the approved Interim Accounting Methodology (BASMAA, 2017).

The following MRP reporting requirements are addressed within this report:

- The list of Watershed/Management Areas (W/MAs) where control measures are currently being implemented or will be implemented during the term of the Permit;
- The number, type, and locations and/or frequency (if applicable) of control measures;
- A cumulative listing of all potentially PCBs-contaminated sites Permittees have referred to the SFBRWQCB to date, with a brief summary description of each site and where to obtain further information;
- The description, scope, and start date of PCBs control measures;
- For each structural control and non-structural best management practice (BMP), interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement;
- Clear statements of the roles and responsibilities of each participating Permittee for implementation of identified control measures;
- Mercury and PCBs loads reduced using the approved assessment methodology to demonstrate cumulative mercury and PCBs load reduced from each control measure implemented since the beginning of the Permit term, including supporting data and information necessary to substantiate the load reduction estimates; and

- An estimate of the amount of mercury and PCBs load reductions resulting from green infrastructure implementation during the current term of the MRP, including a description of all data used and a full description of models and model inputs relied on to generate this estimate.

This report is organized into the following sections:

1. Introduction and Background – This section describes requirements for managing mercury and PCBs per the TMDLs and the MRP, followed by the management approach that will be implemented by the CCCWP Permittees. This approach includes delineation of W/MAs based on screening of priority parcels in Old Industrial land classification for likelihood of ongoing PCBs discharge and implementation of control measures. Roles and responsibilities are also described in this section.
2. Control Measures Overview – This section provides a general description of the types of control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms to control PCBs and mercury, and any specific assumptions used for load reduction accounting.
3. Watersheds/Management Areas, Control Measures, and Schedule for each Permittee – These sections describe the Permittee-specific W/MAs and control measures identified by the Permittee that are currently being implemented in each W/MA during this permit term.
4. Loads Reduced – This section presents the estimates of mercury and PCBs loads reduced by the control measures that are currently being implemented within Contra Costa County and within the MRP region.

1.2 Background

1.2.1 Mercury and PCBs Total Maximum Daily Loads

Fish tissue monitoring in San Francisco Bay (Bay) has revealed bioaccumulation of PCBs, mercury, and other pollutants. The levels found are thought to pose a health risk to people consuming fish caught in the Bay. As a result of these findings, California has issued an interim advisory on the consumption of fish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act "Section 303(d) list" due to PCBs, mercury, and other pollutants. In response, the SFBRWQCB has developed Total Maximum Daily Load (TMDL) water

quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources and restore water quality.

Municipal separate storm sewer systems (MS4s) are one of the PCBs and mercury source/pathways identified in the TMDL plans. Local public agencies (i.e., Permittees) subject to requirements via National Pollutant Discharge Elimination System (NPDES) permits are required to implement control measures in an attempt to reduce PCBs and mercury from entering stormwater runoff and the Bay. These control measures, also referred to as BMPs, are the tools that Permittees can use to assist in restoring water quality in the Bay.

1.2.2 Municipal Regional Permit

NPDES permit requirements associated with Phase I municipal stormwater programs and Permittees in the Bay area are included in the MRP, which was issued to 76 cities, counties and flood control districts in 2009 and revised in 2015.

The MRP was amended on February 13, 2019, to add the cities of Antioch, Brentwood, Oakley, and the eastern portions of unincorporated Contra Costa County and the Contra Costa County Flood Control & Water Conservation District (the East County Permittees), which are located within the jurisdiction of the Central Valley Water Board (Region 5) and were previously covered under a separate Joint Municipal NPDES Permit titled “East Contra Costa County Municipal NPDES Permit”. The East County Permittees have been implementing PCBs and mercury control measures and previous versions of this report summarized those implementation efforts and the associated load reductions. The amended MRP specifically exempts the East County Permittees from MRP Provisions C.11 and C.12, but does incorporate requirements for the Sacramento-San Joaquin Delta Estuary Methylmercury TMDL. Therefore, this report does not summarize PCBs and mercury control measure implementation or load reductions for the East County Permittees. For unincorporated Contra Costa County, this report summarizes the control measures implemented and the PCBs/mercury loads reduced within the SFBRWQCB Region 2 boundary.

Consistent with the TMDL plans, Provisions C.11.a. and C.12.a. of the MRP require the implementation of source and treatment control measures and pollution prevention strategies to reduce mercury and PCBs in urban stormwater runoff to achieve specified load reductions throughout the permit area. Specifically, the MRP requires the Permittees to:

1. Identify the watersheds or portions of watersheds (management areas) in which PCBs control measures are currently being implemented and those in which new control measures will be implemented during the term of this permit;
2. Identify the control measures that are currently being implemented and those that will be implemented in each watershed/management area;
3. Submit a schedule of control measure implementation; and
4. Implement sufficient control measures to achieve the mercury and PCBs load reductions stated in the permit[1].

Provisions C.11.b. and C.12.b. of the MRP require the Permittees to estimate loads reduced by the control measures that have been implemented since the beginning of the Permit term. The MRP allows for load reductions from control measures implemented prior to the effective date of the Permit to be counted toward the required reductions of this permit term if these control measures were established or implemented during the previous permit term, but load reductions from the activity were not realized or credited during the previous permit term (e.g., they were implemented after the 2014 Integrated Monitoring Report was submitted). Therefore, control measures implemented in Fiscal Year (FY) 2013/14, FY 2014/15, FY 2015/16, FY 2016/17, FY 2018/19, FY 2018/19, and FY 2019/20 (i.e., controls measures implemented between July 1, 2013 and June 30, 2020) may be reported herein.

1.3 Approach

1.3.1 Control Measures

The urban stormwater runoff wasteload allocation for PCBs represents a 90 percent reduction from the estimated existing load. The TMDL implementation plans set roughly 20-year timelines for achieving the reductions but also incorporate an adaptive implementation planning approach. The adaptive approach consists of the development of a plan that includes early implementation actions based on existing knowledge that have a reasonable probability of success and an overview of options for future actions. For PCBs and mercury in the Bay, the immediate or early

[1] Table 12.1 of the MRP lists interim PCB load reduction performance criteria that Permittees should achieve during the current permit term. Provision C.11 does not list interim mercury load reduction performance criteria, except for green infrastructure implementation.

implementation actions are not expected to completely eliminate the Bay impairment. Therefore, future actions must be evaluated based on continued monitoring and response to the early implementation actions, as well as based on well-designed studies used for model refinement.

The MRP Fact Sheet notes that the initial focus of provisions C.11/12 is on measures designed to reduce PCBs, while also evaluating opportunities for mercury reduction. Implementation actions may fall into four categories depending on the available knowledge and confidence in a control measure's effectiveness (listed in decreasing order of confidence):

- Full-scale implementation throughout the region.
- Focused implementation in areas where benefits are most likely to occur.
- Pilot-testing in a few specific locations.
- Other: This may refer to experimental control measures, research and development, desktop analysis, laboratory studies, and/or literature review.

During the previous MRP term, Permittee effort was largely focused on gathering necessary information about control measure effectiveness through pilot projects and some focused implementation of the most effective control measures. In this term of the MRP, the emphasis has shifted towards focused and some full-scale implementation of the most effective control measures. Progress will be measured through accounting for specific load reductions as described in the report: *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017).

The Permittees, countywide stormwater programs, Bay Area Stormwater Management Agencies Association (BASMAA), SFBRWQCB, and other interested parties (e.g., the Regional Monitoring Program) began gathering data and developing an understanding of the sources and pathways for mercury and PCBs in the Bay in the late 1990's. These same parties developed a framework to address these pollutants throughout the following decade.

The Regional Stormwater Monitoring and Urban BMP Evaluation: A Stakeholder-Driven Partnership to Reduce Contaminant Loadings project funded by a State of California Proposition 13 grant and conducted by the San Francisco Estuary Institute (SFEI) defined conceptual models of sources and pathways of mercury and PCBs in Bay Area urban watersheds (McKee et al., 2006). The SFEI Proposition 13 project compiled PCBs and mercury chemical analysis results from about

600 sediment samples collected at over 360 locations throughout the Bay Area from roadways and stormwater drainage infrastructure (e.g., storm drain inlets, pump house wet wells, piping beneath manholes, and open channels) (Yee and McKee, 2010). These data supported the general hypothesis that concentrations of PCBs and mercury are elevated in specific parts of the urban landscape and showed that:

- Pollutant concentrations are highly patchy, even at moderate to small spatial (sub-kilometer) and temporal (approximately annual) scales. This patchiness reflects the episodic nature of many release and transport events and processes.
- Concentrations at sites within three kilometers of one another showed similarities in concentration, which may be due to similarities in land use, activities, or transport of shared pollutant sources.
- Individual sites and areas most contaminated with PCBs are often not those with high mercury, which is a logical finding given the different use histories and original pollutant sources.

Another outcome of the SFEI Proposition 13 project was a desktop evaluation of control measures for PCBs and mercury load reductions (Mangarella et al., 2010).

Building upon the efforts of the SFEI Proposition 13 project, BASMAA conducted an EPA grant-funded project called Clean Watersheds for a Clean Bay (CW4CB). The CW4CB project, which began in May 2010 and was completed in May 2017, is a collaboration among the MRP Permittees designed to evaluate the effectiveness of stormwater controls for PCBs and mercury. The CW4CB Project implemented a number of pilot projects for various control measures called for by the Bay PCBs and mercury TMDLs and the first term MRP. The CW4CB work products can be found on the BASMAA webpage, http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project and included the following:

- Selecting five high priority subwatersheds that discharge urban runoff with PCBs and other pollutants to the Bay;
- Identifying PCBs and mercury source areas within the project subwatersheds and referring these sites to regulatory agencies for cleanup and abatement;
- Developing methods to enhance removal of sediment with PCBs and other pollutants during municipal operation and maintenance that remove sediment from streets and storm drain system infrastructure (e.g., street sweeping and storm drain cleaning);

- Treatment control measure retrofits were designed and constructed in the public right-of-way, roadways, and easements;
- Facilitating development and implementation of a regional risk communication and exposure reduction program that focuses on educating the public about the health risks of consuming certain species of Bay fish that contain high levels of PCBs and mercury; and
- Creating public education outreach materials, project web portal, guidance manual, and technical workshops.

Monitoring data were collected for most of the pilot projects conducted as part of this project. The Permittees used the information gathered and lessons learned through the CW4CB project and the earlier projects as the basis to identify the W/MAs and control measures listed in this report.

In FY 2015/16, the CCCWP began development of a countywide Geographic Information System (GIS) pilot project focused on maintaining, analyzing, interpreting, displaying, and reporting relevant municipal stormwater program data and information related to Provisions C.10 (i.e., trash load reduction activities) and C.11/C.12 (i.e., PCBs source property identification and abatement screening activities).

With the adoption of the current MRP, the CCCWP has expanded the countywide GIS C.3 Project Tracking and Load Reduction Accounting Tool to support additional compliance activities related to 1) C.3.b Regulated Projects reporting; 2) the C.3.j Green Infrastructure Planning and Implementation provisions; 3) the C.11 Mercury Controls and C.12 PCBs Controls provisions; and 4) C.10 Trash Load Reductions provision that provide shared benefits. This tool is critical to Permittees' ongoing work to identify watersheds and management areas where multiple-benefit control measure implementation opportunities have been identified and prioritized for implementation during this permit term and over the coming decades. Additionally, this GIS database is being used to track and map existing and future C.3 projects, allow ease of ongoing review of opportunities for incorporating Green Infrastructure (GI) into existing and planned Capital Improvement Plan (CIP) projects, and assist in the development of GI plans.

The CCCWP's stormwater GIS platform features web maps and applications created using Esri's ArcGIS Online for Organizations environment, which access GIS data, custom web services and reports that are hosted within an Amazon cloud service running Esri's ArcGIS Server technology.

The CCCWP anticipates its expanded stormwater GIS platform will be an important tool for maintaining relevant stormwater data; reviewing, analyzing and displaying data geography; accounting for and assessing compliance with load reduction performance goals; and reporting. The data used for this platform originated from many sources over the last decade and is being reviewed and updated as needed to reflect current land uses and implementation of C.3 projects as new and redevelopment occurs.

1.3.2 Watershed /Management Area Delineation

Each Permittee has created a list of W/MAs and control measures (i.e., a control measure plan that describes what, where, and when control measures will be implemented) for PCBs and mercury, provided in the sections below. The ultimate goal for the listed control measures is to achieve the Contra Costa countywide PCBs load reductions listed in MRP Tables 12.1 and Table 12.2 and the mercury load reductions listed in MRP Table 11.1 during this MRP term:

- 90 g/yr PCBs by 6/30/18,
- 560 g/yr PCBs by 6/30/2020,
- 23 g/yr PCBs using green infrastructure by 6/30/2020, and
- 9 g/yr mercury using green infrastructure by 6/30/2020.

A W/MA is an area where load reduction credit will be sought for PCBs or mercury control measures. The W/MAs cover all Old Industrial and Old Urban areas but may include some New Urban areas where appropriate. W/MAs were delineated using the maps showing the 2015 PCBs source property screening results (i.e. high, moderate, and low/no likelihood), known PCBs source properties (from the CW4CB Task 3 referrals, DTSC EnviroStor, and the State Water Board Geotracker), and land use categories (i.e., Old Industrial, Old Urban, New Urban, Open Space, and Other) from the Mercury and PCBs Control Measures Implementation Status Report (CCCWP, 2016). These factors were used to create approximate delineations based on the geography within each Permittee's jurisdiction. If applicable, a city's General Plan, Specific Plans, and/or Redevelopment Plans were used to form a W/MA boundary. Categorical W/MAs were also created for the non-municipally owned electrical utility (i.e., PG&E) and railroad properties (note, the categorical W/MAs can exist within or create "holes" in the other geographically based W/MAs). The categorical W/MAs shown on the figures are preliminary and may change over time.

The W/MAs and identified control measures may also evolve over time as the Permittees learn more about these areas through implementation of the control measures. The Permittees will be developing Green Infrastructure Plans per MRP Provision C.3.j and the delineations of W/MAs in this report may also be revised as part of that planning process. Additionally, the Permittees may adjust preliminary control measure selections as lessons are learned throughout the permit term.

1.3.3 Roles and Responsibilities for Implementation of Control Measures

Table 1-1 below summarizes, for each control measure, the roles and responsibilities of the Permittees, CCCWP, and BASMAA. In a general sense, screening/sampling will primarily be conducted by the CCCWP, establishment of regional frameworks will be conducted by BASMAA, and adoption and implementation of control measures will be conducted by the Permittees.

Table 1-1: Control Measure Roles and Responsibilities

Control Measure Category	Roles and Responsibility		
	Permittee	Program	BASMAA
Source Property Identification and Abatement	• Work with Program to design monitoring program. • Prepare referral forms, including identification of enhanced Operation and Maintenance (O&M). • Implement enhanced O&M for referred properties.	• Design and conduct POCs monitoring. • Compile and submit referrals to SFBRWQCB in Region 2 and the CVRWQCB in Region 5. • Coordinate with BASMAA on ongoing control measure adaptive management.	• Discuss ongoing control measure implementation and adaptive management at Monitoring / Pollutants of Concern (MPC) Committee.
Green Infrastructure / Treatment Control Measures	• Prepare a GI Plan. • Implement GI projects. • Gather data on C.3 projects.	• Support GI planning. • Compile data on C.3 projects.	• Coordinate GI planning at Development Committee. • Discuss control measure implementation and adaptive management at MPC Committee.
Managing PCBs in Building Materials	• Participate in BASMAA Regional Project. • Implement PCB in Demolition Program.	• Assist BASMAA Regional Project.	• Develop Framework through Regional Project.
Managing PCBs in Infrastructure	• Participate in BASMAA Regional Project.	• Assist BASMAA Regional Project. • Conduct monitoring.	• Develop monitoring plan and report monitoring results via Regional Project.
Enhanced O&M	• Implement enhanced O&M where identified.	• Coordinate with BASMAA on ongoing control measure adaptive management.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.
Diversion to POTW	• Implement diversion where identified.	• Coordinate with BASMAA on ongoing control measure adaptive management.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.

Control Measure Category	Roles and Responsibility		
	Permittee	Program	BASMAA
Mercury Load Avoidance and Reduction	• Conduct collection events.	• Compile and track data.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.
Illegal Dumping Cleanup	• Identify illegal dumping sites. • Conduct/coordinate cleanup.	• Compile and track data.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.
Stockpiles, Spills, and Disposal of PCBs	• Identify facilities through routine inspections. • Conduct/coordinate cleanup. • Track OES reports and follow-up on spills with PGE.	• Compile and track data. • Coordinate w/ Permittees, BASMAA partners, SFBRWQCB, and PGE as needed.	• Discuss ongoing control measure implementation and adaptive management at MPC Committee.

In addition, the Permittees are tracking control measure implementation and reporting load reductions using the GIS C.3 Project Tracking and Load Reduction Accounting Tool, which incorporates the Interim Accounting Methodology to estimate load reductions. This report compiles and reports the county-wide list of green infrastructure projects, site referrals, and overall load reductions as well as the MRP permit area-wide overall load reductions.

Although each Permittee's administrative structure is unique, Table 1-2 summarizes, in general, the roles and responsibilities of the various city, town, or county departments that may be related to implementation of selected control measures:

Table 1-2: Permittee Department Roles and Responsibilities

Department	Typical Role / Responsibility
Public Works	• Creeks, watersheds, and stormwater management • Public facility services and maintenance • Engineering and construction services • Capital improvement projects
Community Development / Planning Department	• Planning/zoning/General Plan development • Development project review & approvals • Construction and building inspections

1.3.4 Load Reduction Methodology

MRP Provisions C.11.a and C.12.a require the Permittees to demonstrate cumulative Bay Area-wide and Program area-specific mercury and PCBs load reductions over the current permit term. MRP Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures. The Permittees developed an *Interim Accounting Methodology for TMDLs Loads Reduced* report (BASMAA, 2017) to document the load reduction accounting assessment methodology that will be used to demonstrate progress towards achieving the load reductions required in this permit term. This report was approved by the SFBRWQCB in May 2017. The Interim Accounting *Methodology* is based on relative mercury and PCBs yields from different land use categories. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures implemented during this permit term. This report implements the Interim Accounting System to estimate the mercury and PCBs loads reduced presented in Section 20.

2 DESCRIPTION OF CONTROL MEASURES

This section provides a general description of the types of control measures that are currently being implemented or will be implemented by the Permittees during this and future permit terms to control PCBs and mercury.

2.1 Source Property Identification and Abatement

Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and where sediment concentrations have been found at levels significantly above urban background levels[2]. The source property identification and abatement control measure begins with performing investigations of these "High Likelihood" areas to identify PCBs sources to the municipal storm drain system. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the SFBRWQCB for investigation and abatement by the SFBRWQCB or another appropriate regulatory agency with investigation and cleanup authority. Source properties may include sites that were previously remediated or are currently being remediated but have PCBs soils cleanup levels that are elevated above urban background levels or may be newly identified source properties.

The Permittees will validate the existence of significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or stormwater sampling in the storm drain system where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated PCBs concentrations (e.g., a sediment concentration equal to or greater than 1.0 mg/kg or a concentration greater than 0.5 mg/kg plus other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees will

[2] The *Interim Accounting Methodology for TMDL Loads Reduced* report (BASMAA 2017) presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,204 PCBs samples and 952 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2015.

take actions to cause the property to be abated or will refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each confirmed source property, the Permittee will implement or cause to be implemented, where appropriate, one or a combination of interim enhanced operation and maintenance (O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process to remove historically deposited sediment and/or to prevent further contaminated sediment from entering the storm drain. These enhanced O&M measures will be described in the source property referral that is sent to the SFBRWQCB. If the Permittee finds that enhanced O&M measures are not justified, the Permittee must discuss these findings with the SFBRWQCB prior to submitting the source property referral. The SFBRWQCB will review the source property referral and provide comments to the Permittee within 30 days (if needed).

For those source properties that are self-abated (i.e., by the Permittee or the property owner), the Permittee will provide the Regional Water Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation will include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been completely eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4, if available.

The CCCWP, in collaboration with the Permittees, are conducting ongoing targeted investigations and monitoring for known or suspected source properties. Source identification is one of five priority POC management information needs required by MRP provision C.8.f. The allocation of sampling effort for POC monitoring will be described in the POC Monitoring Report, due October 15 of each year, as required by MRP provision C.8.h.iv.

The properties that have been referred to the SFBRWQCB or self-abated through FY 2019/20 are listed in Table 2-1 below. Two new site referrals are included for this fiscal year (see Appendix 1).

Table 2-1: CCCWP Contaminated Sites Referred to the SFBRWQCB and Self-Abated Properties

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR REFERRED	REFERRAL OR SELF-ABATEMENT
Zeneca/Former Stauffer Chemical Company	1415 South 47th St, Richmond	9.2	FY2019/20	Referral
UC Berkeley Richmond Field Station	1301 South 46th St, Richmond	14	FY2019/20	Referral
Fass Metals	818 West Gertrude Ave, Richmond	0.2	FY2017/18	Referral
Sims Metal Management Richmond Facility	600 South 4th Street, Richmond / 560-240-040, 560-250-027, 560-250-025	19.3	FY 2017/18	Referral
World Corp	1014 Chesley Ave., Richmond	10.44	FY 2017/18	Referral
Port of Richmond	Point Potrero Marine Terminal, Richmond	0.72	FY 2017/18	Self-Abatement
San Diego St. Transformer Spill	R.O.W. San Diego St., Richmond	0.08	FY 2017/18	Self-Abatement
Larkey Pool Renovation Project	2771 Buena Vista Ave., Walnut Creek/171-110-021	<0.01	FY 2017/18	Self-Abatement
Radiant Avenue	Radiant Avenue, North Richmond; 408-082-030	19.5	FY 2016/17	Self-Abatement
Former Molino Enterprises. Inc.	1215 Willow Pass Rd., Pittsburg; 096-091-003-2	6.0	FY 2015/16[1]	Referral
Rumrill Sports Complex (Former BNSF Railyard Site)	1509 Rumrill Blvd, San Pablo / 409-313-009; 409-313-009; 410-012-007; 410-012-008	4.45	FY 2015/16	Self-Abatement

2.2 Green Infrastructure / Treatment Control Measures

This control measure includes new development and redevelopment projects on private and public properties regulated by Provision C.3, as well as retrofit of existing infrastructure in public ROW areas and on public properties not subject to Provision C.3. See Section 3 of the Contra Costa Clean Water Program Fiscal Year 2018/19 Annual Report for further detail on C.3 implementation.

Permittees are accounting for implemented C.3. projects and public retrofit GI projects over this permit term to achieve the PCBs load reductions shown in MRP Table 12.2 and mercury load reductions shown in MRP Table 11.1. Permittees are identifying existing C.3 projects as part of this control measure and, in compliance with the requirement of MRP Provision C.3.b.i.(2), will be tracking development projects that are subject to C.3. over this permit term.

In addition, the Permittees have been conducting an ongoing review of opportunities for incorporating GI into existing and planned capital improvement projects over this permit term (a.k.a., no missed opportunities) and have developed a GI Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements, in compliance with MRP Provision C.3.j.

2.3 Managing PCBs In Building Materials and Infrastructure

2.3.1 PCBs in Building Materials

The Permittees have developed and implemented, in cooperation with BASMAA, a protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, stormwater runoff, or improper waste disposal. Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed between the years 1950 and 1980 and with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. A Permittee is exempt from this requirement if the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures[3].

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in building materials. This Regional Project developed an implementation framework, guidance

[3] Each Permittee seeking exemption from C.12.f requirements must submit in its 2017 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures. The City of Clayton has been approved for this exemption and documentation was included in its 2017 Annual Report.

materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition. This Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project. The tools and materials developed as part of the project build upon materials and outputs developed in 2010-2011 by the San Francisco Estuary Partnership with State Water Board grant funding, called the "PCBs in Caulk Project", as well as subsequent and parallel activities by BASMAA. See Section 12 of the Contra Costa Clean Water Program Fiscal Year 2018/19 Annual Report for further details on compliance with this MRP provision. Specific activities undertaken by the Permittees are discussed in the Permittee-specific sections of this report.

In addition, BASMAA has developed an assessment methodology and data collection program to quantify the PCBs loads reduced through implementation of the protocol developed by the BASMAA Regional Project, summarized below:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs will compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Data collection started with implementation of the new program on July 1, 2019. When sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program, and
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

A summary of the number of applicable structures that applied for a demolition permit during the reporting year and an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol are provided in Attachment B.

2.3.2 PCBs in Infrastructure

PCBs may also be found in storm drain or roadway infrastructure in public rights-of-way such as caulk and sealants used in storm drains and between concrete curbs and street pavement. The Program and Permittees participated in a BASMAA Regional Project to characterize the levels of PCBs in caulks/sealants used in storm drains and roadway infrastructure to quantify the potential PCBs load reduction benefits that may result from public infrastructure improvements. A project report prepared by the BASMAA Regional Project was included in the Contra Costa Clean Water Program Fiscal Year 2017/18 Annual Report. The results of these investigations will inform the development and implementation of control measures to address this potential source of PCBs into the storm drain system.

2.4 Enhanced Operation and Maintenance

Routine MS4 O&M activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions during this permit term.

Many of the Permittees have installed inlet-based full trash capture devices in response to the trash control requirements of MRP Provision C.10. These devices enhance the capture of sediments that may be contaminated with PCBs. In addition, these inlets are typically cleaned more frequently as a result of the installation of the full trash capture device. Therefore, the Permittees are conducting an enhanced O&M activity for each of these inlets. The load reduction

achieved by this enhanced O&M implementation effort[4] was estimated in the 2017/18 annual report. This estimate does not reflect any increases in enhanced O&M efforts in 2018/19, but the estimate will be updated for the FY 2019/20 Annual Report.

The following assumptions were used for calculating the reported loads reduced by enhanced O&M control measures:

- Inlet-Based Trash Devices Cleaning
    - Basket, connector pipe screen (CPS), and inlet filters that are listed in the AGOL system were included. The drainage area listed for each device was used for the load reduction calculation. Only operational devices installed since FY 2013-14 were included.
    - If cleanout was stated to occur three times per year, a 'quarterly' frequency was assumed for the purposes of the calculation, as three times per year is not a viable calculation option per the Interim Accounting Methodology. This assumption was assumed to be equivalent to quarterly cleanouts, as a mid-dry season cleanout occurrence is considered superfluous for the purposes of sediment removal.
    - The default trash device cleanout frequency enhancement was from annual to semi-annual, as this cleanout frequency is required by MRP Provision C.10, unless a more frequent frequency was reported by the Permittee (or no enhancement was reported).
- Street Sweeping Enhanced O&M

  One permittee, Concord, has enhanced their sweeping from None to Annually. However, an annual street sweeping frequency is not an enhancement option in the Interim Accounting Methodology. In order to consider this enhancement, the calculation used the least frequent sweeping option, Monthly, and scaled this load reduction linearly to Annual by dividing the estimated load reduced by 12.6

[4] The load reduction estimates account only for the change in inlet cleaning frequency, per the Interim Accounting Methodology, and do not estimate loads reduced due to the increase in sediment captured by the inlet-based full trash capture devices.

- Desilting

  Permittees have conducted some desilting; however, the data needed to estimate loads reduced are difficult to collect for these projects. Therefore, there was no desilting load reduction included in the estimate.

2.5 Diversion to POTW

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff. A pilot diversion project was conducted at the North Richmond Pump Station, but there is no ongoing diversion.

2.6 Source Controls and Other Control Measures

2.6.1 Mercury Load Avoidance and Reduction

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufacturers have significantly reduced the amount of mercury in fluorescent linear tube lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

- Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;

- Private business take-back and recycling programs (e.g., Home Depot); and,
- Private waste management services for small and large businesses.

The Program conducted a Methylmercury Control Study in response to Provision C.11.i of the East County Permit[5], which states: "Permittees shall conduct methylmercury control studies to monitor and evaluate the effectiveness of existing BMPs on the control of methylmercury and shall develop and evaluate additional BMPs as needed to reduce mercury and methylmercury discharges to the Delta and meet methylmercury waste load allocations…". The Methylmercury Control Study Final Report was submitted to the Central Valley Regional Water Board in October 2018[6].

The Program coordinates with Permittees and local household hazardous waste (HHW) collection facilities to implement mercury collection and recycling in accordance with MRP Provisions C.11.a.i and C.11.a.ii.

CCCWP Permittees collect HHW at three regional facilities in the County:

- Central Contra Costa Sanitary District (CCCSD);
- Delta Diablo Sanitation District (DDSD); and,
- West Contra Costa Integrated Waste Management District (WCCIWMA).

CCCSD serves the communities of Concord, Clayton, Martinez, Pleasant Hill, Orinda, Lafayette, Moraga, Walnut Creek, Danville, San Ramon and Unincorporated County. DDSD serves Pittsburg, Antioch, Oakley and Bay Point. WCCIWMA serves Richmond, Pinole, El Sobrante, El Cerrito, San Pablo, and portions of Unincorporated Contra Costa County.

The types of data collected at each facility are slightly different as is the level of differentiation between types of mercury containing devices and the level of specificity in reporting the data.

[5] East Contra Costa County Municipal NPDES Permit (NPDES Permit No. CAS083313, Order No. R5-2010-0102).

[6] This report can be found on the CCCWP website at: https://www.cccleanwater.org/userfiles/kcfinder/files/Methlymercury_Control_Studies_Progress_Report_FINAL_Oct2015%281%29.pdf.

These efforts are no longer required to be reported but will be tracked for mercury loads reduced through implementation of mercury avoidance and reduction control measures.

In addition, Table 2-2 below lists some mercury spill response efforts in Contra Costa County.

Table 2-2: Mercury Spills in Contra Costa County

SPILL DATE	CITY	LOCATION	INCIDENT TYPE	QUANTITY/ CONCENTRATION	DATE OF FINAL SPILL REPORT
3/13/2017	Antioch	2209 Manzanita Dr	Spill	5-gal(s) Mercury	3/13/2017
3/7/2017	Rossmoor	3324 Tice Creek Dr. Apt. 11	Spill	"a few" ml/g of Mercury spilled	3/10/2017
1/22/2017	Antioch	2206 Mandarin Way	Spill	Small Unk Mercury amount	1/26/2017
12/22/2016	Antioch	2324 Mandarin Way	Spill	1 oz Mercury	12/22/2016

2.6.2 Illegal Dumping Clean-Up

This source control measure entails clean-up of construction and demolition debris from illegal dumping areas that contain PCBs. This control measure will apply to construction and demolition illegal dumping only during this permit term but may be expanded to other types of illegally dumped trash if supported by monitoring data.

2.6.3 Stockpile, Spills, and Disposal of PCBs

This control measure includes the proper clean-up and disposal of stockpiles, spills, and/or improperly disposed quantities of PCBs. The measure would involve, for instance, a concentrated source of PCBs (e.g., a barrel) that is found leaking and cleaned-up or properly disposed and the clean-up of transformer spills by PG&E.

CCCWP and BASMAA representatives have been working with SFBRWQCB staff to ensure thorough documentation and clean-up completion of PG&E PCBs transformer spills. PCBs transformer spill reporting is inconsistent through the OES reporting system and often cases are closed before the municipality or SFBRWQCB staff hear of the spill. This activity could have a significant effect on where PCBs in the public right-of-way are found, as many spills happen in residential areas. Residential areas are not typically considered high likelihood areas for PCBs, so no other control measures have been developed specifically for these areas. SFBRWQCB and BASMAA representatives are working on better defining agency roles and responsibilities in

responding to spills, at least for their own agencies, and are working on getting PG&E to cooperate to make a smoother and more transparent process as we try to reduce the loading of PCBs into the San Francisco Bay, San Joaquin/Sacramento Rivers Delta, and Suisun and San Pablo Bays.

CCCWP staff has been compiling information on PCBs transformer spills that have occurred since 2014 (there are additional data from earlier years). Table 2-3 presents a partial list of the spills that have happened throughout Contra Costa County from November 2014 – June 2020. All information on the spills and clean-ups are not currently available, as the process to get documentation of the completion of a clean-up is difficult. PG&E has many private contractors that are called out at odd hours in all types of weather to do the clean-up. Locating one representative who can confirm PG&E's process or progress on spills has proven impossible. Many spills are less than 49 gallons and less than 50 ppm, but still have significant levels of PCBs concentrations (e.g., 5 gallons of transformer oil with a PCBs concentration of 44 ppm).

BASMAA has begun the process of conducting a regional Stressor/Source Identification (SSID) project, in compliance with MRP Provision C.8.e, that will develop and implement a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source. In FY 2018-19, the regional SSID project developed the SSID workplan. As a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

Table 2-3: PG&E Transformer Pole Spills in Contra Costa County

SPILL DATE	CITY	LOCATION	INCIDENT TYPE	QUANTITY/ CONCENTRATION	DATE OF FINAL SPILL REPORT FROM PGE AND SFBRWQCB
5/3/2019	El Sobrante	711 Alhambra Road	Spill	5-gals PCB Mineral Oil 103 ppm	Not determined
1/31/2018	Richmond	600 South 4th Street	Fire/Explosion		2/12/2018
1/9/2018	Concord	2395 Willow Pass Rd	Spill	50 gal(s) Non-PCB Insulating Oil	1/9/2018

SPILL DATE	CITY	LOCATION	INCIDENT TYPE	QUANTITY/ CONCENTRATION	DATE OF FINAL SPILL REPORT FROM PGE AND SFBRWQCB
Not determined	Richmond	665 S 31st St.	Storm Drain/Creek	120-gal(s) Petroleum Mineral oil (non-PCB)	10/3/2017
6/26/2017	El Cerrito	984 King Ave	Spill	3-gal, unknown concentration PCBs	Not determined
6/26/2017	El Cerrito	984 King Ave	Spill	3-gal(s) Transformer oil 9.5 ppm	6/27/2017
6/23/2017	Richmond	4480 Bell Ave.	Spill	5-gal(s) Petroleum Mineral oil (Unknown PCB)	6/24/2017
6/5/2017	Richmond	4949 Cypress Ave	Spill	1 gal(s) Petroleum Mineral oil (non-PCB)	6/6/2017
6/3/2017	Pittsburg	493 Rich Spring Dr.	Spill	3 gal(s) Non-PCB Mineral Oil	6/6/2017
5/9/2017	Danville	134 Verde Mesa Drive	Spill	20 gal(s) Mineral Oil (Unknown PCB)	5/9/2017
4/9/2017	Pinole	2621 Appian Way	Spill	180 gal(s) Mineral Oil (non-PCB)	4/9/2017
4/6/2017	Richmond	1100 S 27th St.	Spill	1 gal, 25 PPM PCBs	Not determined
4/5/2017	Richmond	209 Parr Blvd	Spill	1 gal(s) Petroleum Mineral oil (25 ppm PCB)	4/6/2017
1/12/2017	Lafayette	3584 Mt. Diablo Blvd	Spill	10-gal(s) Transformer Oil (Unknown PCB)	1/14/2017
11/19/2016	Pleasant Hill	624 Contra Costa Blvd.	Spill	50 gal	Not determined
11/10/2016	Moraga	806 Crossbrook Dr	Spill	5-gal, 280 ppm PCBs	Not determined
10/21/2016	Alamo	Corner of Danville Blvd x Stone Valley Road	Spill	5 gal	Not determined
8/31/2016	Concord	1494 Washington Blvd	Spill	42,658 gal	Not determined
6/12/2016	Discovery Bay	2426 Pinehurst Ct.	Spill	1 gal, unknown PCBs	Not determined
4/5/2016	Orinda	Orinda	Spill	20-gal, undefined conc.	Not determined
3/6/2016	Concord	1354 Babel Ln, Concord	Spill	30-gal, 31 ppm (reported to OES as 1,000 ppm)	Not determined
2/7/2016	Richmond	5610 Bayview, Richmond	Spill	13 gal, <2 ppm	3/2/2016

SPILL DATE	CITY	LOCATION	INCIDENT TYPE	QUANTITY/ CONCENTRATION	DATE OF FINAL SPILL REPORT FROM PGE AND SFBRWQCB
5/4/2015	Richmond	5635 San Diego St, Richmond	Spill	60-gal, 45 ppm	11/16/2015
11/14/2014	Richmond	Port of Richmond	Spill	48,303 kg, 600,000 mg/kg	Early 2016

3 CITY OF CLAYTON

3.1 List of Watersheds / Management Areas and Control Measures

The watersheds / management areas (W/MAs) the City of Clayton are shown on Figure 3-1 and are listed in Table 3-1 below.

Table 3-1: City of Clayton PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
CLA-1: Old Urban	738.1	0.0	100.0	0.0	0.0	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 3-2 and are described in the sections below. Treatment control projects are also shown on Figure 3-1.

Table 3-2: City of Clayton Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	23.5	0.0	55.7	44.3	0.0	0.0
Large Full Trash Capture Devices	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	167.9	0.0	5.3	46.9	47.8	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

3.2 Scope and Schedule of PCBs Control Measures

3.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Clayton have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

No further investigation is warranted in the City of Clayton.

3.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within the W/MA will be subject to the development standards in effect at the time an application is made, such as applicable provisions of MRP section C.3. See the City of Clayton's Green Infrastructure Plan for further information.

3.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The City of Clayton has been approved for exemption pursuant to C.12.f.i and C.12.f iii.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

3.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Clayton include clean out of inlet-based full trash capture devices on a semi-annual basis.

3.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

3.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the San Francisco Bay, San Joaquin/Sacramento Rivers Delta, and Suisun and San Pablo Bays.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

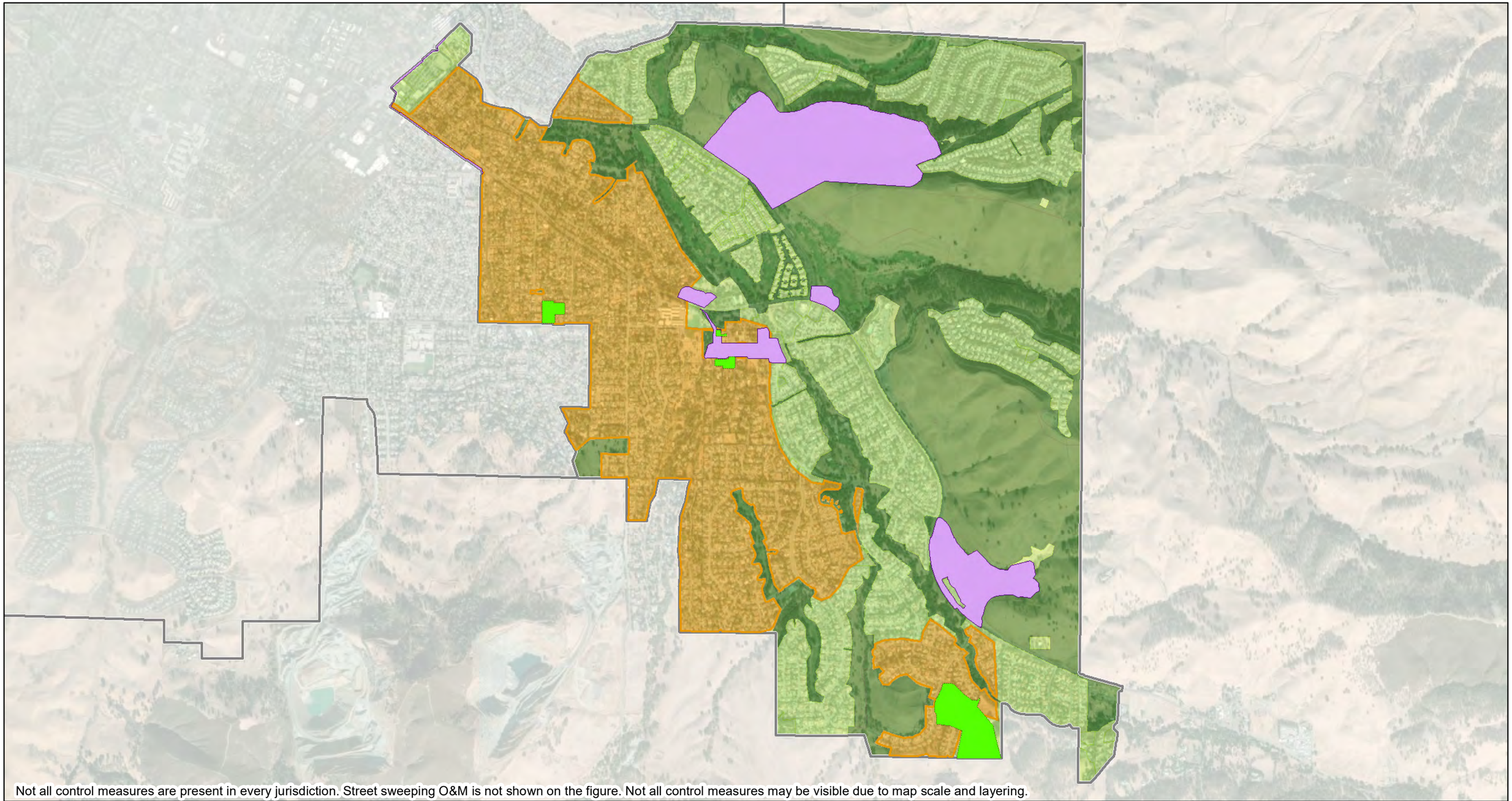

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- CLA-1, Old Urban

N

0 1,400 2,800 Feet

Watershed/Management Areas and Control Measures
City of Clayton

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 3-1

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4 CITY OF CONCORD

4.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Concord are shown on Figure 4-1 and are listed in Table 4-1 below.

Table 4-1: City of Concord PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
CON-1: Old Urban	13,047.7	0.1	76.8	6.6	16.2	0.3
CON-2: Old Industrial	1,073.1	19.2	20.5	47.8	12.4	0.0
CON-3: Military Base	5,344.7	0.0	1.0	0.0	5.1	93.9
CON-PGE: Categorical PG&E	21.9	0.9	92.4	0.3	6.4	0.0
CON-RAIL: Categorical Railroad	49.6	30.6	12.0	1.5	55.9	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented in each of these W/MAs are summarized in Table 4-2 and are described in the sections below. Treatment control projects are also shown on Figure 4-1.

Table 4-2: City of Concord Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	105.5	5.4	77.4	3.4	13.7	0.0
Large Full Trash Capture Devices	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	1,323.8	1.2	91.6	4.6	2.3	0.2

Notes:

1. Includes enhanced street sweeping and inlet-based full trash capture device clean out.

4.2 Scope and Schedule of PCBs Control Measures

4.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Concord have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

4.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of MRP section C.3. See the City of Concord's Green Infrastructure Plan for further information.

4.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

As part of the demolition for the planned Veranda shopping center project, the building materials and surrounding onsite soils for the existing Chevron offices on Diamond Boulevard were tested and materials identified as below the residential numeric detection limits for PCBs (<0.25 ppm), per EPA guidance, were designated for haul away and disposal at an approved site, thereby mitigating a measured volume of PCBs that otherwise had the potential to migrate into downstream receiving waters.

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Concord was actively involved in the region-wide discussions and development of the program to reduce the migration of PCBs during building demolition through participation on the Regional Project Technical Advisory Committee. The City began implementing the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

4.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Concord include clean out of inlet-based full trash capture devices on a semi-annual basis. In addition, the City of Concord Public Works department has implemented an enhanced street sweeping program. Numerous streets that historically had limited access for street sweeping due to parked cars are being posted "no parking" so that they can be swept clean. This enhanced maintenance activity is happening annually. The effort involves extensive public notifications, placing over 150 barricades, trimming trees, re-painting red-curbs, and towing vehicles that remain on the street. The list of locations is provided below.

- Carey Drive; from Monument Boulevard to Victory Lane
- Frisbi Court; from Lacey Lane to the end of the street
- Virginia Lane; from Monument Boulevard to Premier Place
- Oakmead Drive; from Monument Boulevard to Toyon Drive
- Laguna Street; from Amador Drive to Detroit Avenue
- Victory Lane; from Monument Boulevard to Linden Drive
- Robin Lane; from Virginia Lane to Meadow Lane
- Toyon Drive; from Oakmead Drive to Ellis Street
- Riley Court; from Meadow Lane to the end of the street
- Reganti Place; from Reganti Drive to the end of the street
- Lacey Lane; from Monument Boulevard to Tilson Drive
- Ellis Street; from Toyon Drive to Clayton Road
- Sierra Road; from Oak Grove Road to Fox Meadow Way
- Pine Street; from Clayton Road to the end of the Street
- Toyon Oakmead to Oakmead

- San Miguel Cowell to Via Montanas

4.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

4.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the San Francisco Bay, San Joaquin/Sacramento Rivers Delta, and Suisun and San Pablo Bays.

Illegal Dumping Cleanup

The Permittees does identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs are addressed as they are identified through industrial facility inspection and spill notification programs.

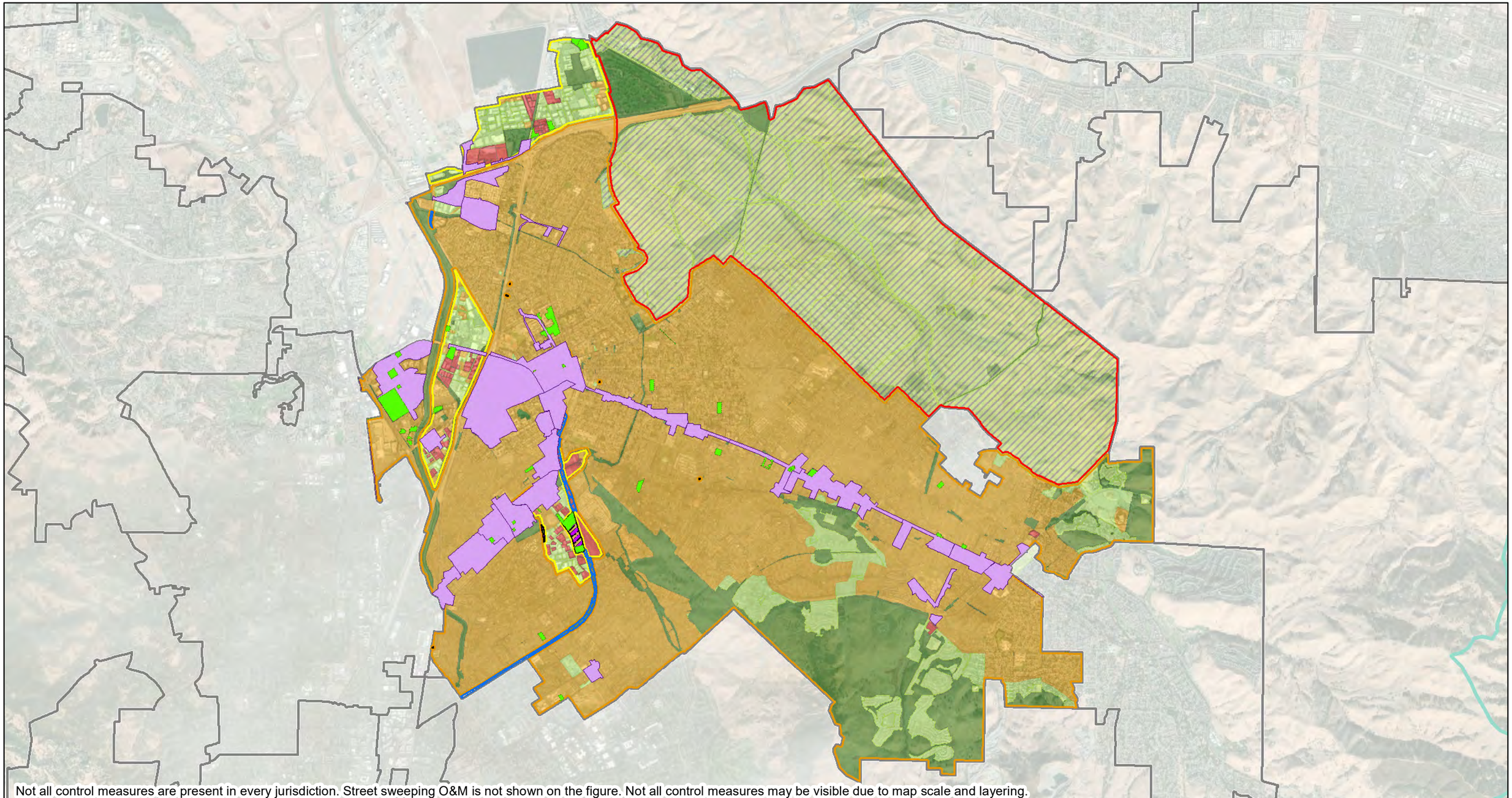

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE
- Region 5 Boundary

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- CON-1, Old Urban
- CON-2, Old Industrial
- CON-3, Military Base

N

0 4,000 8,000 Feet

Watershed/Management Areas and Control Measures
City of Concord

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 4-1

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5 TOWN OF DANVILLE

5.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the Town of Danville are shown on Figure 5-1 and are listed in Table 5-1 below.

Table 5-1: Town of Danville PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
DAN-1: Danville Town Boundary	11,554.2	0.1	38.9	21.5	39.6	0.0
DAN-PGE: Categorical PG&E	14.4	0.0	75.1	24.9	0.0	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The majority of the Town is residential with a lot of preserved open space areas and hillsides. Old Urban commercial uses are concentrated in the old downtown area on Hartz Avenue and along San Ramon Valley Boulevard. A portion of the older residential areas are also identified as old urban.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 5-2 and are described in the sections below. Treatment control projects are also shown on Figure 5-1.

Table 5-2: Town of Danville Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	183.2	0.0	19.7	9.3	71.1	0.0
Large Full Trash Capture Devices	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	112.2	0.0	96.5	2.7	0.8	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

5.2 Scope and Schedule of PCBs Control Measures

5.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

Danville has no known or suspected source properties. No properties within the Town of Danville have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

No further investigation is warranted in the Town of Danville.

5.2.2 Green Infrastructure / Treatment Control Measures

All redevelopment in Danville will be subject to C.3 regulations. See the Town of Danville's Green Infrastructure Plan for further information.

5.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Danville began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

5.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the Town of Danville include clean out of inlet-based full trash capture devices on a semi-annual basis.

5.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

5.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the San Francisco Bay, San Joaquin/Sacramento Rivers Delta, and Suisun and San Pablo Bays.

Illegal Dumping Cleanup

The Town of Danville regularly identifies and cleans up illegal dumping throughout town, including construction and demolition debris.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through the Town's established industrial facility inspection and spill notification programs.

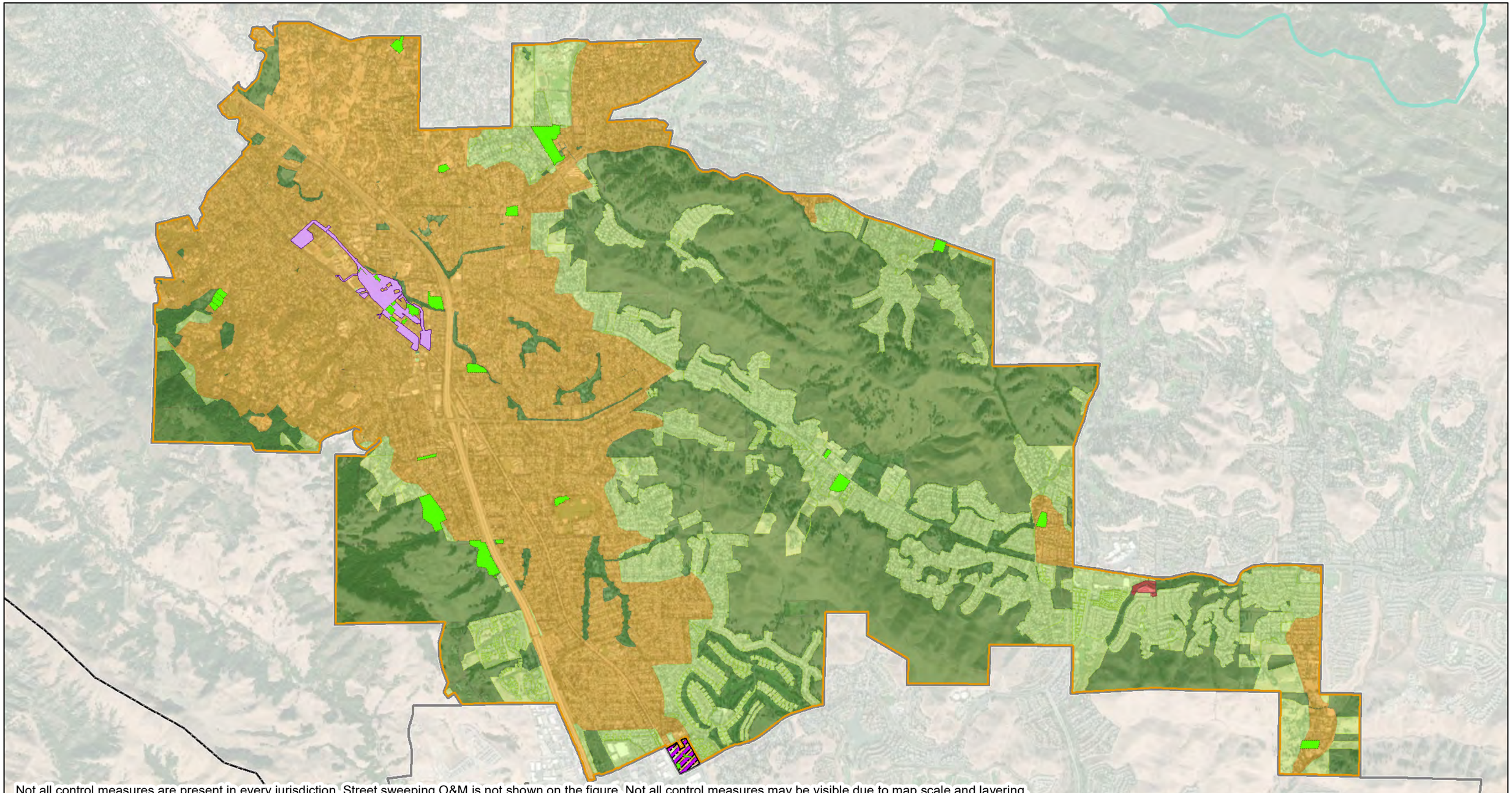

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE
- Region 5 Boundary

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- DAN-01, Danville WMA

N

0 2,600 5,200 Feet

Watershed/Management Areas and Control Measures
Town of Danville

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 5-1

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6 CITY OF EL CERRITO

6.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of El Cerrito are shown on Figure 6-1 and are listed in Table 6-1 below.

Table 6-1: City of El Cerrito PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
ELC-1: Old Urban	2,023.2	0.0	98.0	0.4	1.5	0.0
ELC-2: Old Industrial and High Likelihood	0.7	73.5	2.7	0.0	23.7	0.0
ELC- PGE: Categorical PG&E	29.9	26.4	38.8	0.1	34.7	0.0
ELC- RAIL: Categorical Railroad	9.4	0.0	100.0	0.0	0.0	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 6-2 and are described in the sections below. Treatment control projects are also shown on Figure 6-1.

Table 6-2: City of El Cerrito Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	8.4	1.2	89.3	2.4	7.1	0.0
Large Full Trash Capture Devices	0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	462.2	0.2	96.0	2.7	1.1	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

6.2 Scope and Schedule of PCBs Control Measures

6.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of El Cerrito have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

6.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of Section C.3. See the City of El Cerrito's Green Infrastructure Plan for further information.

6.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The City of El Cerrito participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of El Cerrito began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

6.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of El Cerrito include clean out of inlet-based full trash capture devices on a semi-annual basis.

6.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

6.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The City of El Cerrito has partnered with RecycleMore to offer Household Hazardous Waste (HHW) Collection at an additional site, located at the El Cerrito Recycling Center. This service provides residents in the City of El Cerrito with an even more convenient location for disposing of materials containing HHW, including products that contain mercury. El Cerrito, along with other permittees, is also actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay and Delta.

Illegal Dumping Cleanup

The City of El Cerrito Public Works department actively works to identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs. Public Works Staff respond whenever an illegal dumping complaint is received, in addition to completing weekly inspections and cleanups throughout the community.

Stockpiles, Spills, and Disposal of PCBs

El Cerrito has done significant outreach to educate the public that only rain should enter creeks and storm drains. This has included featuring related articles in the City's "News & Views" newsletter, the City's "Greener El Cerrito" newsletter, and in the City's "Green Happenings" e-newsletter. City staff also provided outreach materials at events such as the City's 4th of July Festival and Earth Day in 2018. Through these outreach methods, the City has actively encouraged residents to report spills and illicit discharges and to properly dispose of Household Hazardous Waste. Stockpiles and spills of PCBs are addressed as they are identified through industrial facility inspection and spill notification programs.

The City of El Cerrito's Public Works staff responds to reports of spills and discharges as soon as possible by containing spills and vacuuming or diverting spills away from the MS4 to a permeable landscape. Staff normally investigates the complaint on the same business day. In cases where the complaint is received after business hours, staff is dispatched as an emergency through the

El Cerrito Police Department, at which time the after-hours crew responds, contains or diverts and investigates.

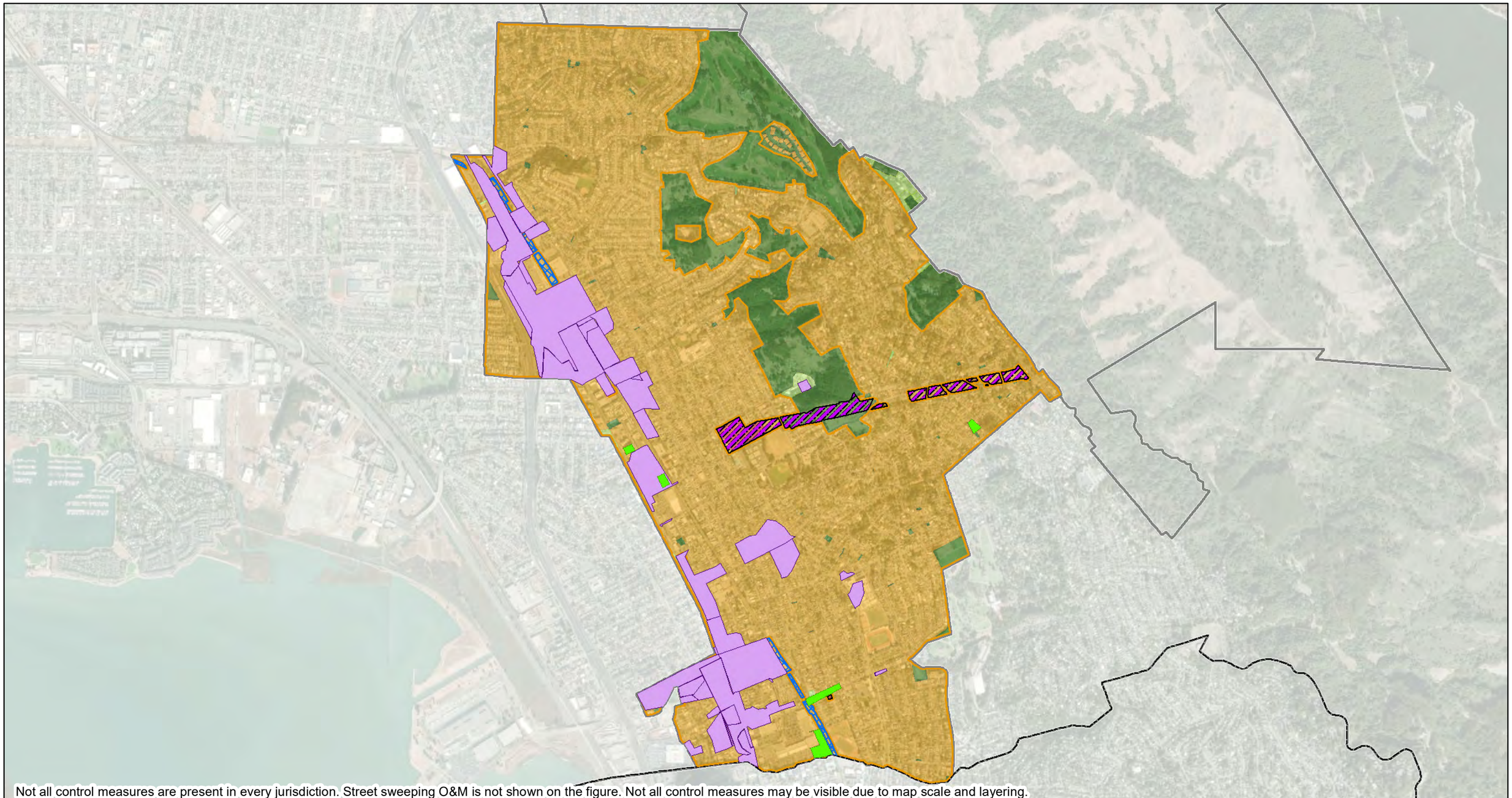

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- ELC-1, Old Urban
- ELC-2, Old Industrial / High Likelihood

N

0 1,600 3,200 Feet

Watershed/Management Areas and Control Measures
City of El Cerrito

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 6-1

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7 CITY OF HERCULES

7.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Hercules are shown on Figure 7-1 and are listed in Table 7-1 below.

Table 7-1: City of Hercules PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
HER-1: Old Urban	479.9	23.9	44.3	20.0	11.7	0.0
HER-2: Old Industrial/ High Likelihood	64.3	51.6	18.7	10.0	19.7	0.0
HER-PGE: Categorical PG&E	2.4	29.0	59.6	11.5	0.0	0.0
HER-RAIL: Categorical Railroad	26.1	88.5	0.5	0.0	10.9	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 7-2 and are described in the sections below. Treatment control projects are also shown on Figure 7-1.

Table 7-2: City of Hercules Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	52.1	21.5	0.0	0.6	77.9	0.0
Large Full Trash Capture Devices[1]	286.0	18.4	21.1	48.1	12.4	0.0
Enhanced O&M Measures[2]	72.4	0.1	0.1	96.1	3.6	0.0

Notes:

1. Includes only Hydrodynamic Separator (HDS) units.
2. Includes inlet-based full trash capture device clean out.

7.2 Scope and Schedule of PCBs Control Measures

7.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Hercules have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

7.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Hercules' Green Infrastructure Plan for further information.

7.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees are actively participating in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Hercules began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

7.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Hercules include clean out of inlet-based full trash capture devices on a semi-annual basis.

7.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

7.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees does identify and clean up illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs are addressed as they are identified through industrial facility inspection and spill notification programs.

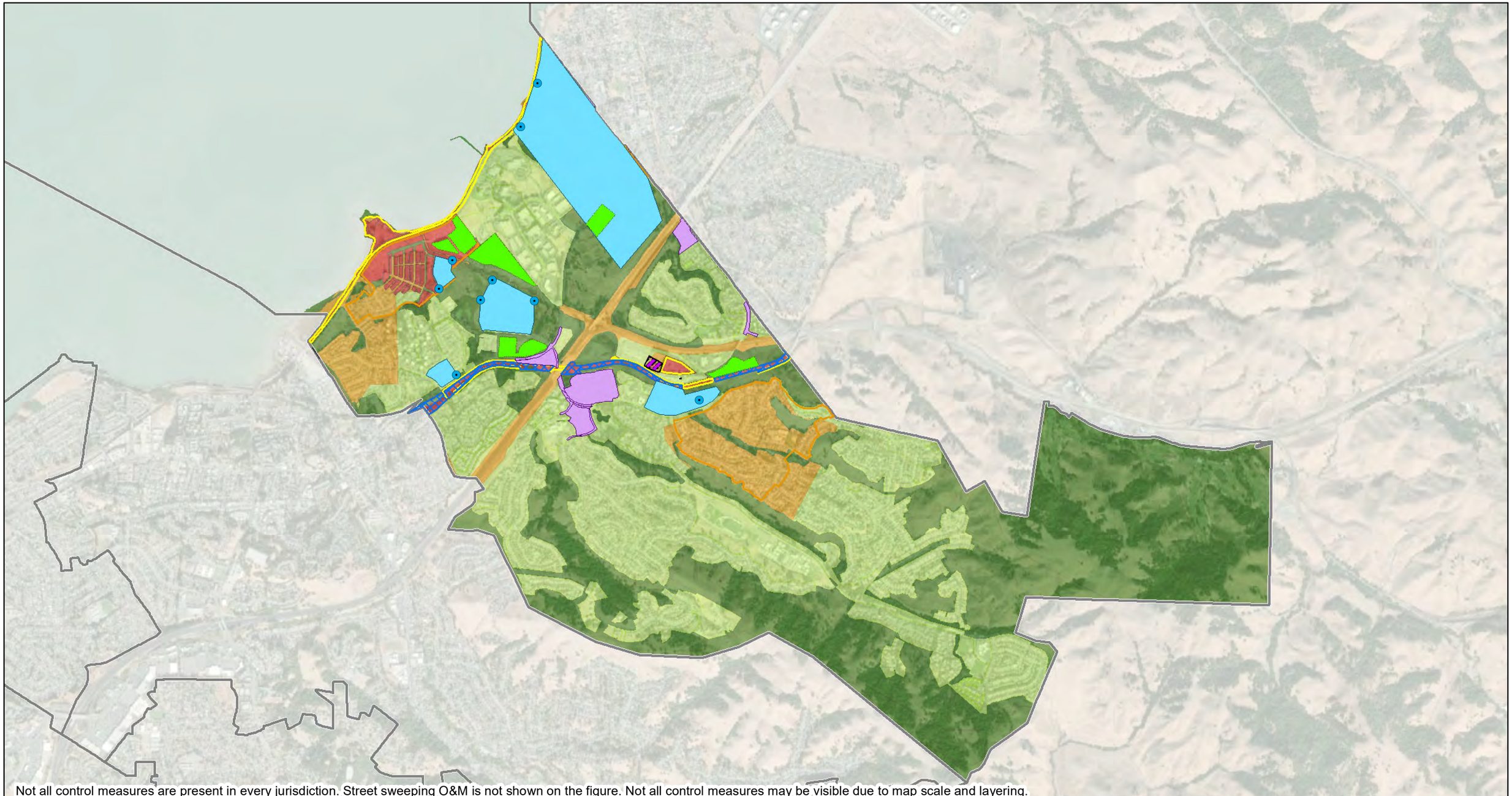

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- HER-1, Old Urban
- HER-2, Old Industrial / High Likelihood

N

0 2,100 4,200 Feet

Watershed/Management Areas and Control Measures
City of Hercules

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 7-1

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8 CITY OF LAFAYETTE

8.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Lafayette are shown on Figure 8-1 and are listed in Table 8-1 below.

Table 8-1: City of Lafayette PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
LAF-1: Old Urban	5,869.8	0.0	100.0	0.0	0.0	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 8-2 and are described in the sections below. Treatment control projects are also shown on Figure 8-1.

Table 8-2: City of Lafayette Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	23.0	0.0	63.9	0.0	36.1	0.0
Large Full Trash Capture Devices[1]	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[2]	31.8	0.0	95.0	5.0	0.0	0.0

Notes:

1. Includes only Hydrodynamic Separator (HDS) units.
2. Includes enhanced street sweeping, enhanced storm drain inlet cleaning, and full trash capture device clean out.

8.2 Scope and Schedule of PCBs Control Measures

8.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

The City of Lafayette has no known or suspected source properties. No properties within the City of Lafayette have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

No further investigations are warranted in the City of Lafayette.

8.2.2 Green Infrastructure / Treatment Control Measures

The City of Lafayette requires all new development, redevelopment, and infrastructure projects within the City to comply with the applicable sections of the MRP Provision C.3 and demolition standards at the time of application. When projects are determined to be unregulated, the City requires the project to implement LID design standards to the fullest extent practicable. Although limited opportunities are available to incorporate green infrastructure into the City's capital improvement program, the City will continue to look for opportunities to incorporate green infrastructure when possible. See the City of Lafayette's Green Infrastructure Plan for further information.

8.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Lafayette began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees also participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

8.2.4 Enhanced Operation and Maintenance Control Measures

The City of Lafayette has been street sweeping since 1969. Though the program has changed throughout the years, the areas swept today include commercial and arterial streets once a week, residential streets once a month, and City owned parking lots once a month. This schedule amounts to approximately 6,400 acres swept a year and was established pre-MRP.

Established before fiscal year 2013/2014, the City of Lafayette has been cleaning drain inlets once a year in preparation of the wet season except for the inlet-based full trash capture units which are currently professionally cleaned three times per year. If any drain inlet is in need of maintenance between cleanings or was missed because of lack of access, the City's maintenance crew performs the cleaning. The City of Lafayette also employs Futures Explored trash pickup patrols to clean up liter in the downtown where a majority of the pedestrian traffic is and hosts an annual creek cleanup day.

Since fiscal year 2013/2014, enhanced O&M control measures that have been implemented by the City of Lafayette are more on-land trash pickups as trash is seen and as needed, and installation of new double recycle/trash cans around the downtown. These activities have resulted in increased trash reduction above what is required by the permit.

8.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

8.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay. As street lighting containing mercury or high-pressure sodium pressure lighting fixtures fail, the City of Lafayette is properly disposing of the old fixture and replacing it with LED lighting.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs. The City of Lafayette also picks up other illegally dumped items within the public right-of-way as they become known.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs. The City of Lafayette has experienced no specific PCBs incidents of dumping that require cleanup to date.

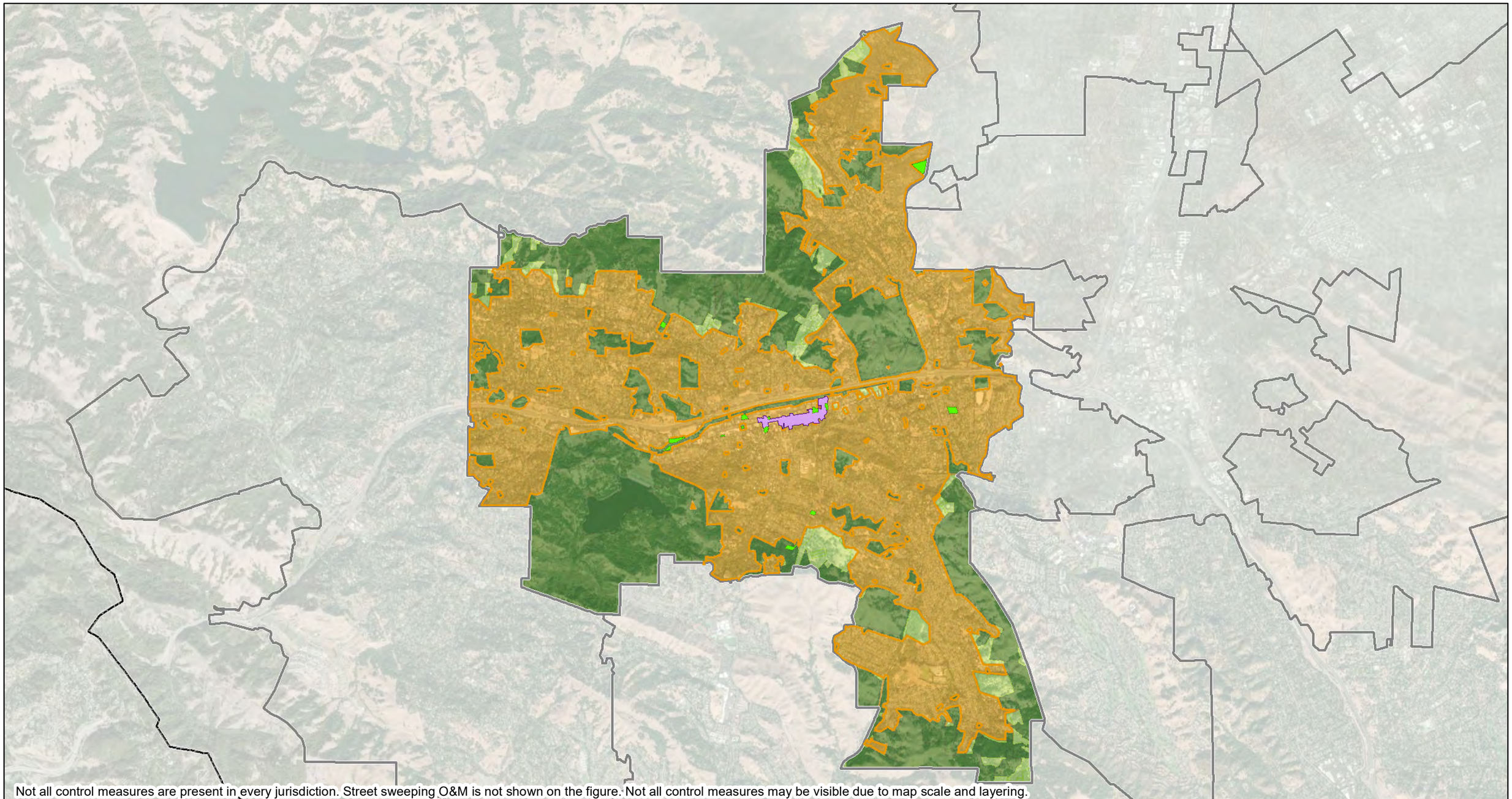

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- LAF-1, Old Urban

N

0 3,600 7,200 Feet

Watershed/Management Areas and Control Measures
City of Lafayette

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 8-1

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9 CITY OF MARTINEZ

9.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Martinez are shown on Figure 9-1 and are listed in Table 9-1 below.

Table 9-1: City of Martinez PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
MTZ-1: Old Urban	2,776.0	0.0	100.0	0.0	0.0	0.0
MTZ-2: Refinery/Industrial	648.2	51.5	7.1	19.0	22.4	0.0
MTZ-3: Downtown/Commercial	177.7	31.1	42.1	24.8	2.1	0.0
MTZ-PGE: Categorical PG&E	16.8	7.8	27.0	0.0	65.3	0.0
MTZ-RAIL: Categorical Railroad	10.8	61.5	9.9	0.0	28.6	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 9-2 and are described in the sections below. Treatment control projects are also shown on Figure 9-1.

Table 9-2: City of Martinez Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	70.2	15.7	34.8	33.6	16.0	0.0
Large Full Trash Capture Devices[1]	4.1	39.0	53.7	7.3	0.0	0.0
Enhanced O&M Measures[2]	403.3	1.9	63.5	14.6	20.0	0.0

Notes:

1. Includes only Hydrodynamic Separator (HDS) units.
2. Includes enhanced street sweeping and inlet-based full trash capture device clean out.

9.2 Scope and Schedule of PCBs Control Measures

9.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Martinez have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

The City of Martinez conducted visual windshield inspection of potential Old Industrial and High Likelihood parcels. Although no investigations are currently underway, future investigations have the potential to result in a property referral.

9.2.2 Green Infrastructure / Treatment Control Measures

As required by the MRP, all regulated development, redevelopment, capital improvement, and infrastructure projects within the W/MA will be subject to the development standards in effect at the time an application is made, and the applicable provisions of Section C.3 of the MRP, including the installation of low impact development drainage design facilities such as bioretention basins. Non-regulated projects are encouraged to install one or more LID elements. See the City of Martinez's Green Infrastructure Plan for further information.

9.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Martinez began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

9.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Martinez include clean out of inlet-based full trash capture devices on a semi-annual basis and enhanced street sweeping.

9.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

9.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

- In 2014, the City replaced 487 streetlights (throughout the City) from high-pressure sodium (HPS) lamps to LED. The replaced lights contain approximately 25 mg /each of mercury.
- In FY 2013-14 & FY 2014-15, the City replaced approximately 3,910 linear feet of florescent lights. The replaced lights contain approximately 2.5 mg mercury/linear foot.
- In FY 2013-14 & FY 2014-15, the City replaced approximately 97 compact lights. The replaced lights contain approximately 5 mg mercury/each.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

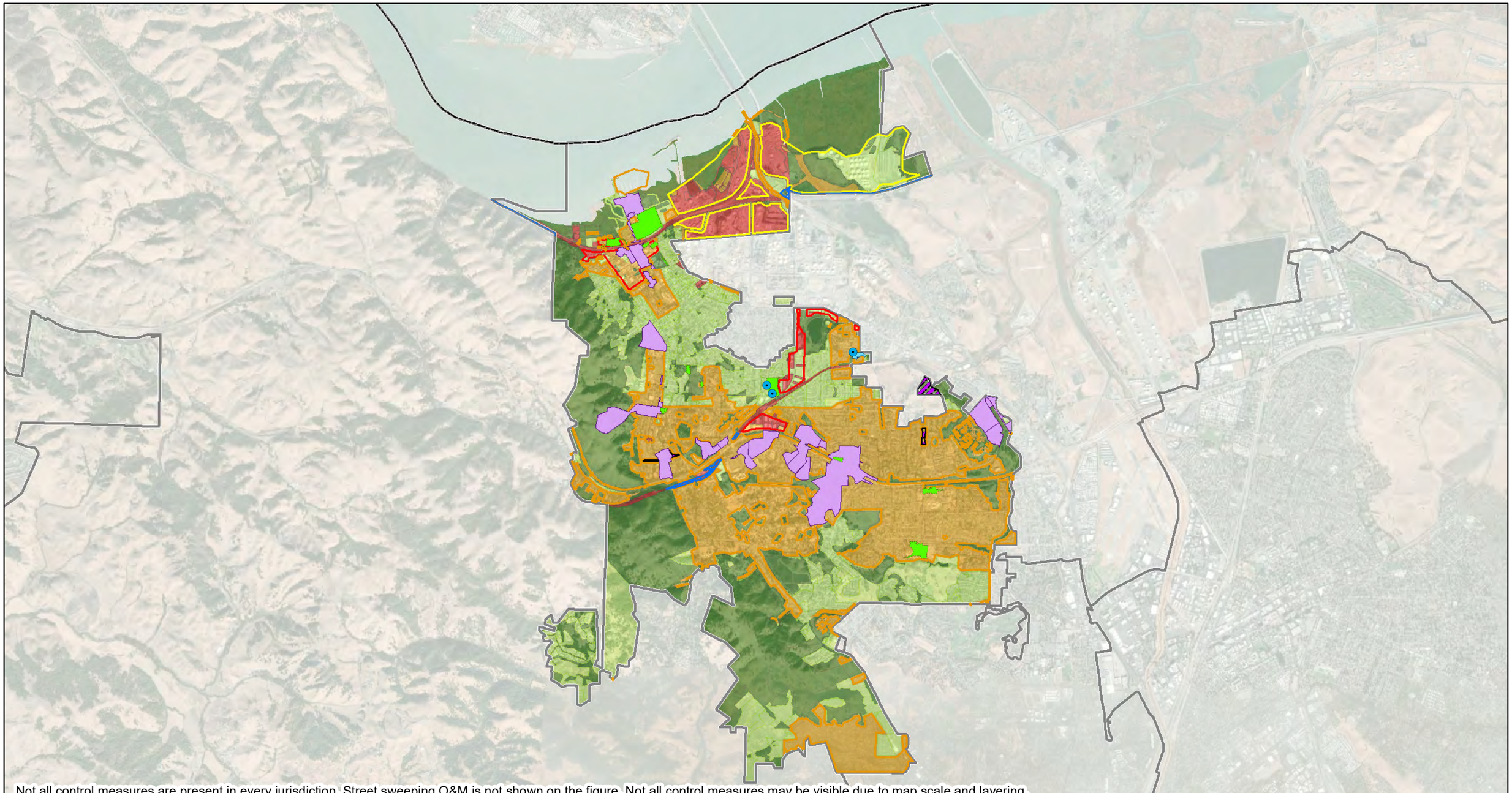

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- MTZ-1, Old Urban
- MTZ-2, Refinery/Industrial
- MTZ-3, Downtown/Commercial

N

0 3,750 7,500 Feet

Watershed/Management Areas and Control Measures
City of Martinez

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 9-1

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10 TOWN OF MORAGA

10.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the Town of Moraga are shown on and are listed in Table 10-1 below.

Table 10-1: Town of Moraga PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
MOR-1: Old Industrial	22.8	100.0	0.0	0.0	0.0	0.0
MOR-2: Old Urban	2,382.4	0.0	99.9	0.0	0.1	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 10-2 and are described in the sections below. Treatment control projects are also shown on Figure 10-1.

Table 10-2: Town of Moraga Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	18.9	0.0	36.0	0.0	64.0	0.0
Large Full Trash Capture Devices	0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	198.3	15.3	76.3	2.9	5.4	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

10.2 Scope and Schedule of PCBs Control Measures

10.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the Town of Moraga have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

No further investigations are warranted in the Town of Moraga.

10.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the Town of Moraga's Green Infrastructure Plan for further information.

10.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Town of Moraga participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Moraga began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

10.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the Town of Moraga include clean out of inlet-based full trash capture devices on a semi-annual basis.

10.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

10.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify, and cleanup illegal dumping of construction and demolition debris as needed.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs are addressed as they are identified through industrial facility inspection and spill notification programs.

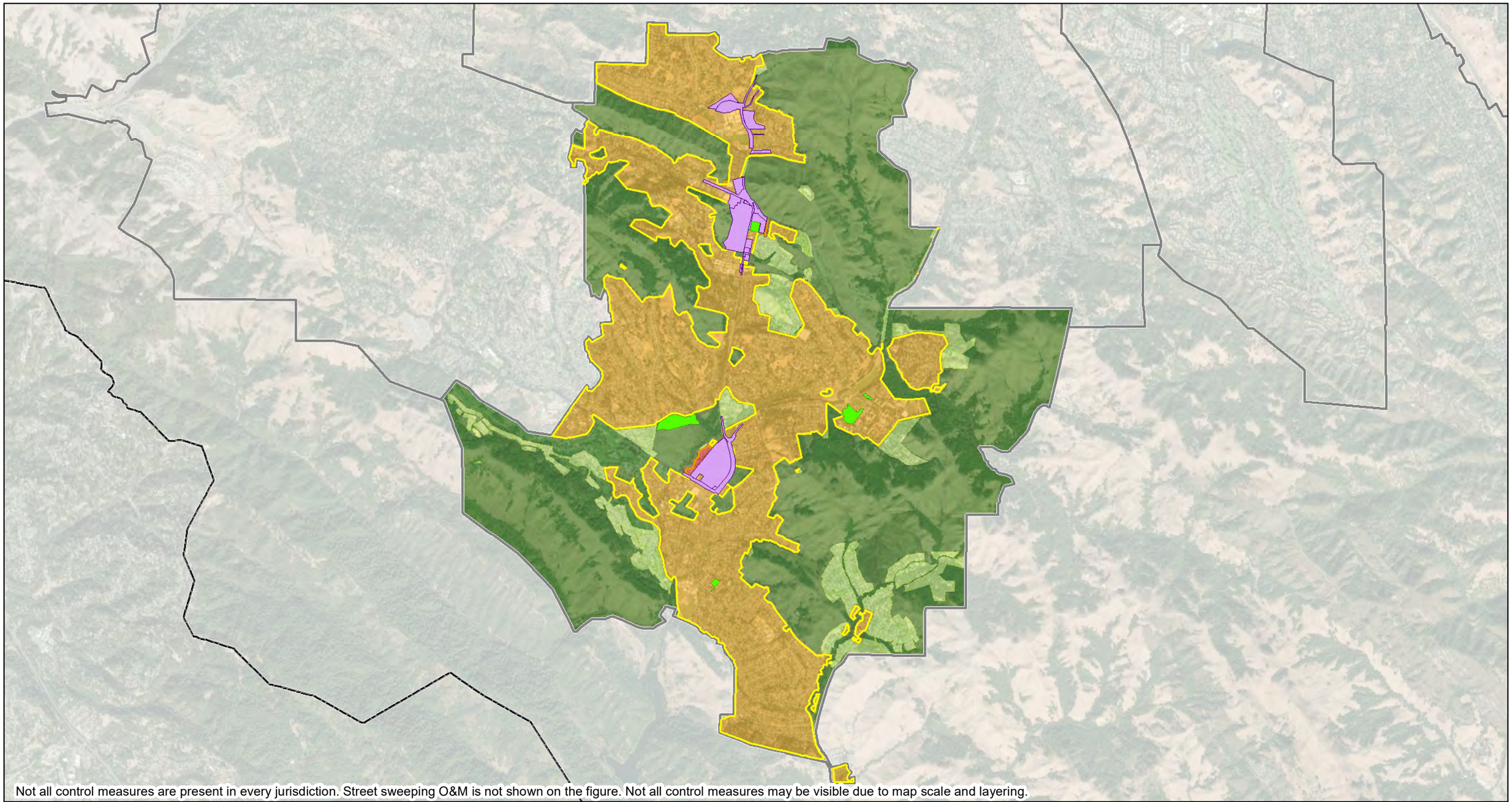

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- MOR-1, Old Industrial
- MOR-2, Old Urban

N

0 2,700 5,400 Feet

Watershed/Management Areas and Control Measures
Town of Moraga

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 10-1

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11 CITY OF ORINDA

11.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Orinda are shown on Figure 11-1 and are listed in Table 11-1 below.

Table 11-1: City of Orinda PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
ORI-1: Old Urban	5,274.1	0.0	93.9	0.0	6.0	0.0
ORI-2: Downtown	44.0	0.0	97.5	0.5	2.0	0.0
ORI-PGE: Categorical PG&E	154.0	22.7	0.1	4.0	73.2	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 11-2 and are described in the sections below. Treatment control projects are also shown on Figure 11-1.

Table 11-2: City of Orinda Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	16.5	0.0	100.0	0.0	0.0	0.0
Large Full Trash Capture Devices	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	33.4	0.0	99.7	0.0	0.3	0.0

Notes:

1. Includes enhanced street sweeping and inlet-based full trash capture device clean out.

11.2 Scope and Schedule of PCBs Control Measures

11.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Orinda have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

The City of Orinda is largely old urban. There are no suspected source properties contained in the City of Orinda's W/MAs. The only old industrial areas are owned and operated by PG&E and included in WMA 4. Therefore, no ongoing inspection or abatement is required.

11.2.2 Green Infrastructure / Treatment Control Measures

The City of Orinda requires developers to follow the Stormwater C.3 Guidebook developed by the Contra Costa Clean Water Program for all new development or redevelopment. See the City of Orinda's Green Infrastructure Plan for further information.

11.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees are actively participating in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2. Orinda began implementation of the program on July 1, 2019.

11.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Orinda include clean out of inlet-based full trash capture devices on a semi-annual basis and enhanced street sweeping.

11.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

11.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

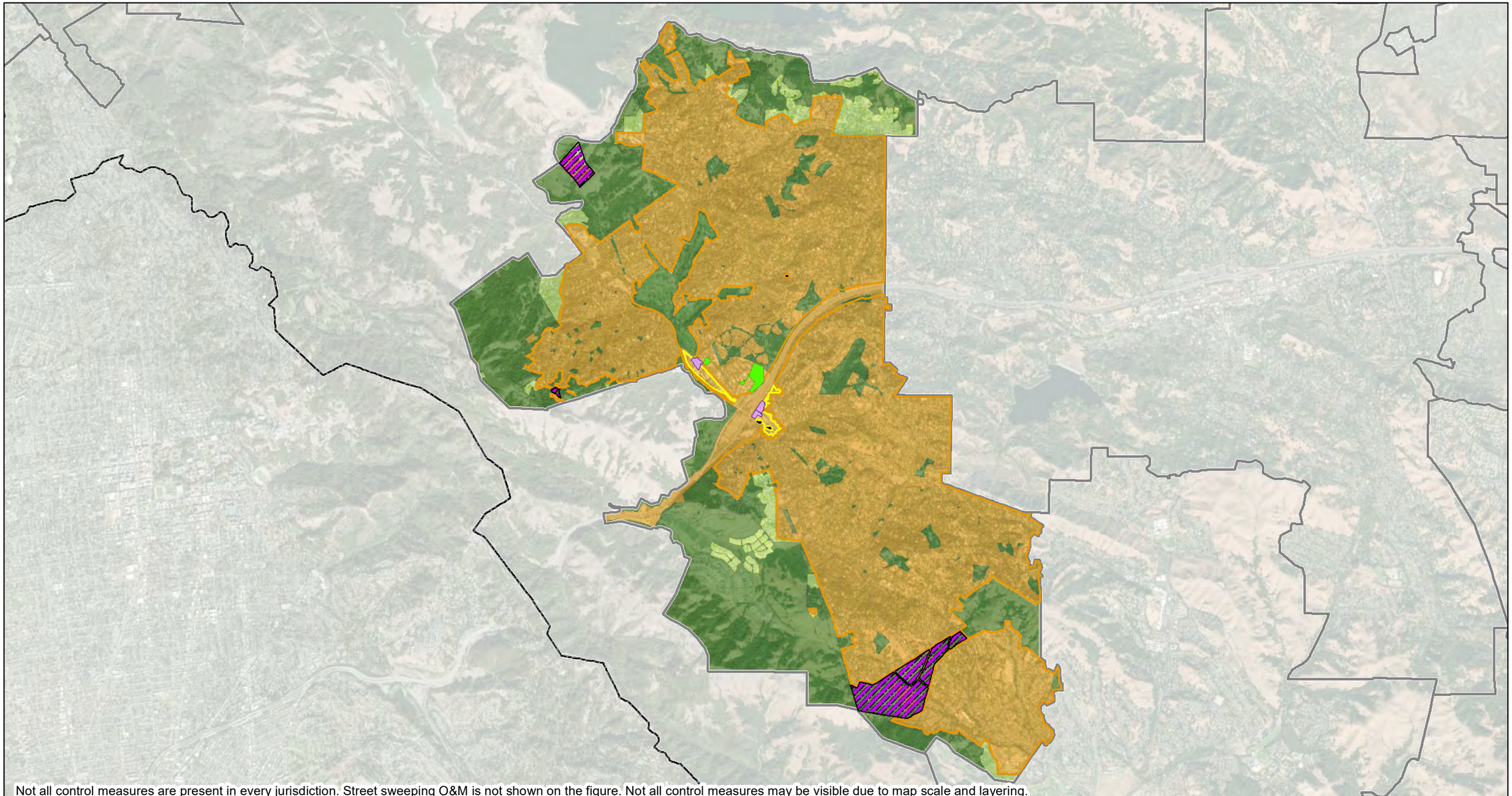

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- ORI-1, Old Urban
- ORI-2, Downtown

N

0 3,300 6,600 Feet

Watershed/Management Areas and Control Measures
City of Orinda

Contra Costa Clean Water Program

Geosyntec consultants

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Figure 11-1

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12 CITY OF PINOLE

12.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Pinole are shown on Figure 12-1 and are listed in Table 12-1 below.

Table 12-1: City of Pinole PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
PIN-1: Old Industrial/ High Likelihood	95.0	64.8	7.0	21.5	6.6	0.0
PIN-2: Old Urban Commercial	367.7	0.0	91.1	0.9	7.9	0.0
PIN-3: Old Urban Residential	1,919.3	0.0	85.5	1.5	13.0	0.0
PIN-PGE: Categorical PG&E	4.6	0.0	0.0	0.	100.0	0.0
PIN-RAIL: Categorical Railroad	3.6	13.6	0.0	0.0	86.4	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 12-2 and are described in the sections below. Treatment control projects are also shown on Figure 12-1.

Table 12-2: City of Pinole Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	22.9	0.0	80.8	0.0	19.2	0.0
Large Full Trash Capture Devices	18.0	70.0	7.8	0.0	22.2	0.0
Enhanced O&M Measures[1]	223.4	10.8	78.7.0	5.7	4.7	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

12.2 Scope and Schedule of PCBs Control Measures

12.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Pinole have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

12.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application would be made, such as demolition standards and applicable provisions of section C.3. See the City of Pinole's Green Infrastructure Plan for further information.

12.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees are actively participating in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Pinole began implementation of the program on July 1, 2019.

A universal waste and suspect hazardous building materials inventory was conducted prior to demolition activities on a 3-story commercial building and associated outbuilding located at 1617 and 1627 Canyon Drive in Pinole in February 2017. This inventory identified 100 gallons of hydraulic fluid in the passenger elevator equipment above ground storage tank that was suspected of containing PCBs that was recommended for proper disposal.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

12.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Pinole include clean out of inlet-based full trash capture devices on a semi-annual basis.

12.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

12.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees does identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs are addressed as they are identified through industrial facility inspection and spill notification programs.

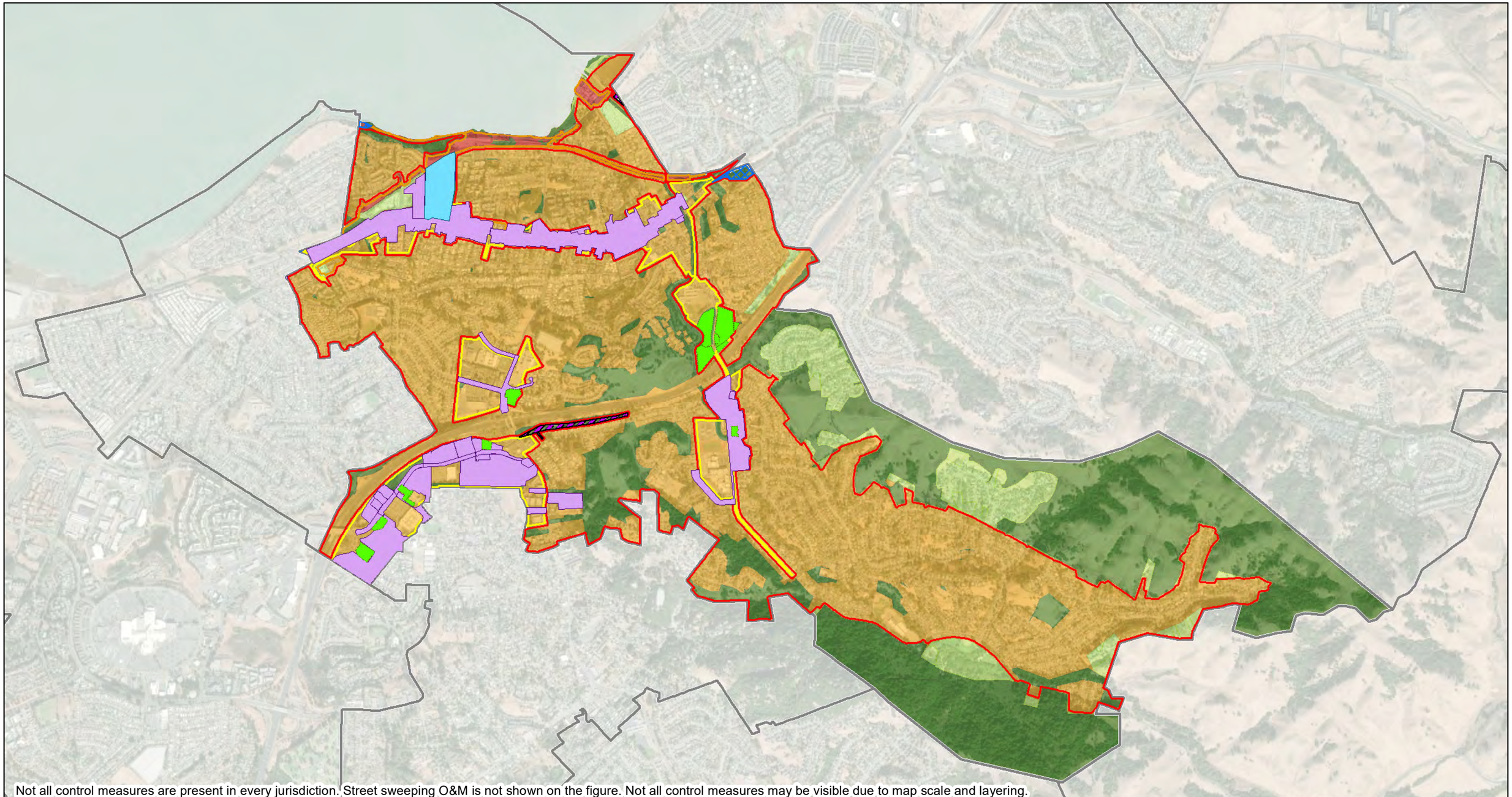

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- PIN-1, Old Industrial / High Likelihood
- PIN-2, Old Urban Commercial
- PIN-3, Old Urban Residential

N

0 1,750 3,500 Feet

Watershed/Management Areas and Control Measures
City of Pinole

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 12-1

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13 CITY OF PITTSBURG

13.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Pittsburg are shown on Figure 13-1 and are listed in Table 13-1 below.

Table 13-1: City of Pittsburg PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
PIT-1: Old Urban	3,042.6	0.0	100.0	0.0	0.0	0.0
PIT-2: Southern Energy Delta/ Genon	859.0	28.4	0.0	0.0	71.6	0.0
PIT-3: USS Posco Industries	442.6	80.1	0.0	19.9	0.0	0.0
PIT-4: Dow Chemical Company	433.5	66.3	1.2	7.9	24.6	0.0
PIT-5: Old Industrial	78.6	56.0	16.4	10.3	17.3	0.0
PIT-6: Camp Stoneman	382.8	84.2	1.4	8.6	5.9	0.0
PIT-7: Waterfront Industrial	84.2	89.6	0.0	9.3	1.0	0.0
PIT-PGE: Categorical PG&E	348.3	12.5	3.1	0.7	83.7	0.0
PIT-RAIL: Categorical Railroad	106.2	93.0	0.0	3.1	3.9	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 13-2 and are described in the sections below. Treatment control projects are also shown on Figure 13-1.

Table 13-2: City of Pittsburg Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	6.0	100.0	0.0	0.0	0.0	0.0
Green Infrastructure and Treatment	159.3	12.2	28.2	29.9	29.7	0.0

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Large Full Trash Capture Devices[1]	436.4	1.8	62.9	33.0	2.3	0.0
Enhanced O&M Measures[2]	157.3	1.5	20.9	47.8	29.8	0.0

Notes:

1. Includes Hydrodynamic Separator (HDS) and Gross Solids Removal Device (GSRD) units.
2. Includes inlet-based full trash capture device clean out.

13.2 Scope and Schedule of PCBs Control Measures

13.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

One property within the City of Pittsburg was referred to the SFBRWQCB in FY 2015-16 as a result of implementation of the Source Property Identification and Abatement control measure to date.

Table 13-3: City of Pittsburg Contaminated Sites Self-Abated or Referred to the SFBRWQCB (FY 2013/14 through FY 2019/20)

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR	Referral/ Self-Abatement
Former Molino Enterprises. Inc.	1215 Willow Pass Rd., Pittsburg; 096-091-003-2	6.0	FY 2015-16	Referral

Ongoing Investigations

Ongoing investigations of other parcels may result in a property referral in the future.

13.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Pittsburg's Green Infrastructure Plan for further information.

13.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The City of Pittsburg participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City began implementation of the program on July 1, 2019. The City received a Community-wide Brownfield Assessment Grant to conduct Phase I and Phase II Environmental Site Assessments on City-owned and private parcels. As part of this effort, five parcels will be sampled for contaminants including PCBs.

Managing PCBs in Infrastructure

The City also participated in the BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

13.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Pittsburg include clean out of inlet-based full trash capture devices on a semi-annual basis. In addition, the City of Pittsburg enhanced the street sweeping schedule for more effective street sweeping and debris removal. Staff will explore the possibility of incorporating other enhancements in conjunction with maintenance of the MS4.

13.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

13.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The City participates in a regional Household Hazardous Wastes program with the Delta Household Hazardous Waste Facility. The City promotes the use of this facility for the collection of mercury containing items for residents and small businesses through brochures and through contact with the general public at year-round publicly hosted events.

The Permittees are actively implementing mercury recycling programs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The City is active at identifying and removing illegally dumped construction and demolition debris. The City has Public Works staff dedicated to addressing illegally dumped material within the Public Right of Ways and City owned property. Debris is typically removed as discovered by staff, or within 24 hours of a notification. PW staff are trained on the proper disposal protocols for hazardous substances.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

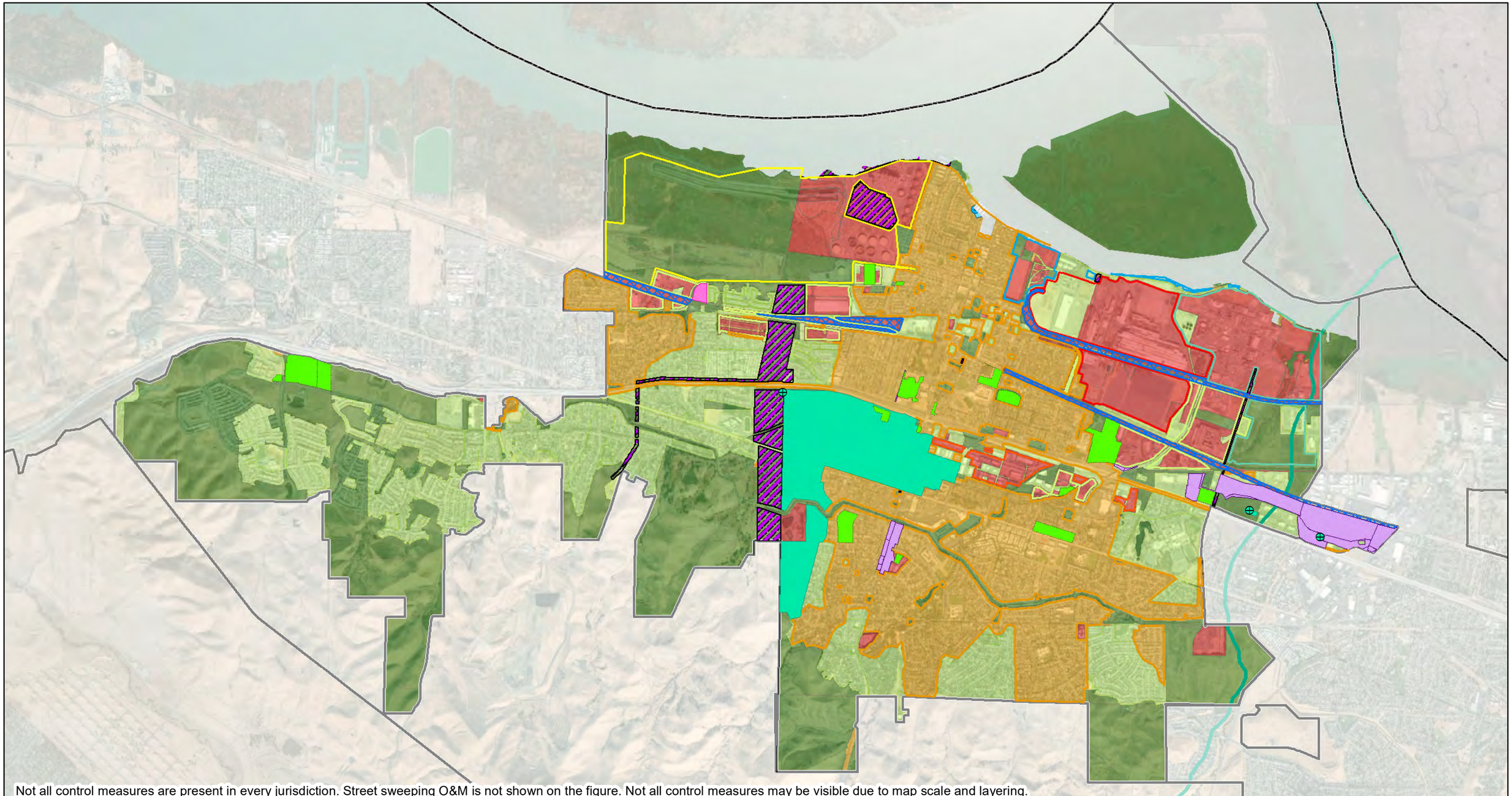

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE
- Region 5 Boundary

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- PIT-1, Old Urban
- PIT-2, Southern Energy Delta/Genon
- PIT-3, USS Posco Industries
- PIT-4, Dow Chemical Company
- PIT-5, Waterfront Industrial
- PIT-6, Old Industrial
- PIT-7, Camp Stoneman

N

0 2,800 5,600 Feet

Watershed/Management Areas and Control Measures
City of Pittsburg

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 13-1

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14 CITY OF PLEASANT HILL

14.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Pleasant Hill are shown on Figure 14-1 and are listed in Table 14-1 below.

Table 14-1: City of Pleasant Hill PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
PLH-1: Old Urban	4,509.0	0.0	80.2	6.3	13.5	0.0
PLH-2: Old Industrial	20.2	100.0	0.0	0.0	0.0	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 14-2 and are described in the sections below. Treatment control projects are also shown on Figure 14-1.

Table 14-2: City of Pleasant Hill Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2018/19)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	72.0	0.0	99.9	0.0	0.1	0.0
Large Full Trash Capture Devices[1]	35.8	0.0	93.6	6.1	0.3	0.0
Enhanced O&M Measures[2]	547.8	0.0	94.5	2.5	3.0	0.0

Notes:

1. Includes only Hydrodynamic Separator (HDS) units.
2. Includes inlet-based full trash capture device clean out.

14.2 Scope and Schedule of PCBs Control Measures

14.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of Pleasant Hill have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

The City of Pleasant Hill has not identified any source properties but will continue its inspection of commercial/industrial facilities required by Provision C.4 which may identify source properties in the future, albeit unlikely given the commercial rather than industrial nature of the facilities inspected. Ongoing investigations may result in a property referral in the future.

14.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of Pleasant Hill's Green Infrastructure Plan for further information.

14.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Pleasant Hill began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

14.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Pleasant Hill include clean out of inlet-based full trash capture devices on a semi-annual basis.

14.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

14.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees does identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs are addressed as they are identified through industrial facility inspection and spill notification programs.

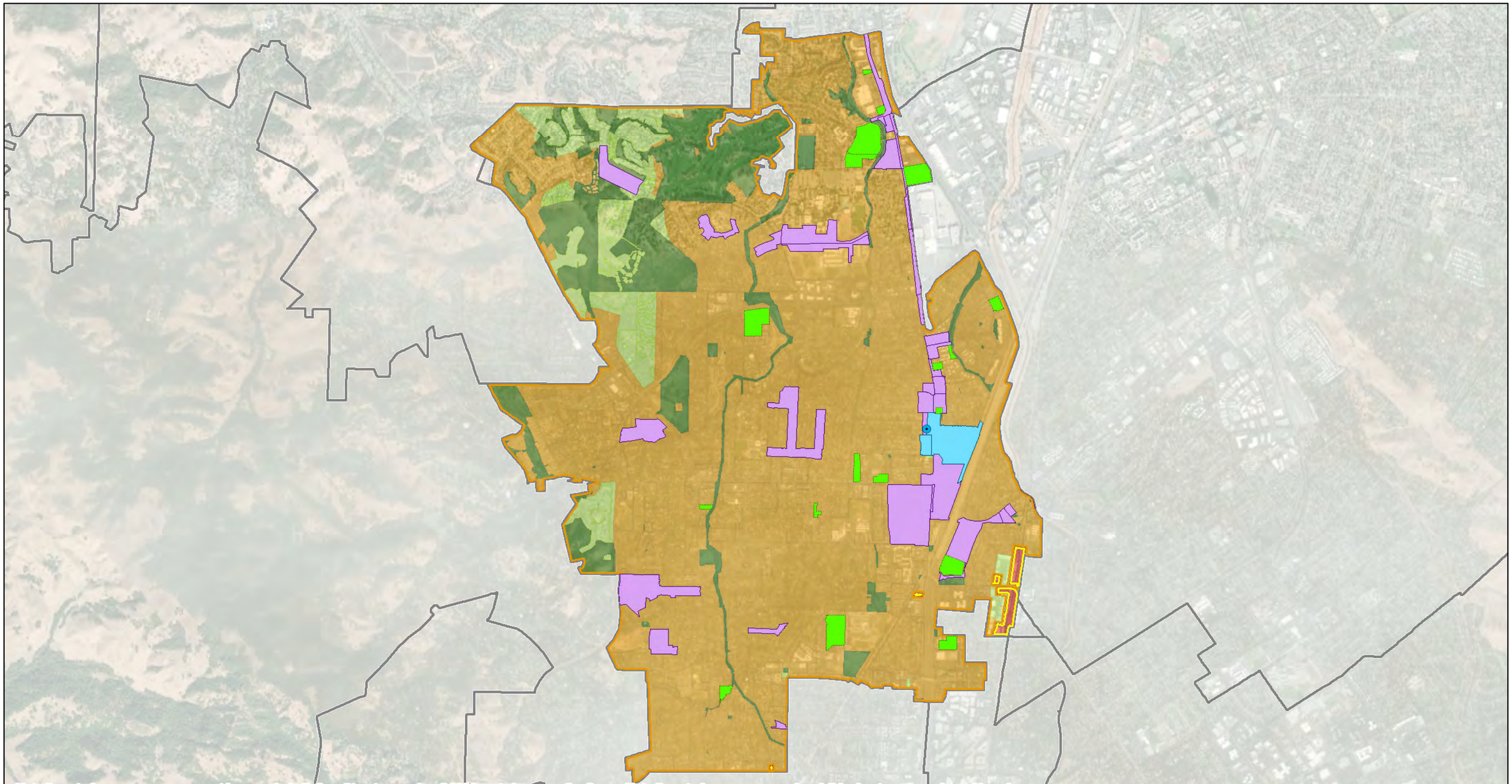

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- PLH-1, Old Urban
- PLH-2, Old Industrial

N

0 2,250 4,500 Feet

Watershed/Management Areas and Control Measures
City of Pleasant Hill

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 14-1

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15 CITY OF RICHMOND

15.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Richmond are shown on Figure 15-1 and are listed in Table 15-1 below.

Table 15-1: City of Richmond PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
RIC-1: Old Urban	5,563.0	6.3	85.1	4.9	3.7	0.0
RIC-2: Point Pinole	329.4	31.6	0.0	31.9	36.5	0.0
RIC-3: Santa Fe Channel	833.6	63.8	7.0	6.5	22.7	0.0
RIC-4: Zeneca Site	63.4	100.0	0.0	0.0	0.0	0.0
RIC-PGE: Categorical PG&E	6.6	42.7	0.0	15.5	41.9	0.0
RIC-Rail: Categorical Rail	467.6	80.9	5.7	1.1	12.3	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 15-2 and are described in the sections below. Treatment control projects are also shown on Figure 15-1.

Table 15-2: City of Richmond Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	36.5	100.0	0.0	0.0	0.0	0.0
Green Infrastructure and Treatment	313.4	47.1	23.7	7.4	21.8	0.0
Large Full Trash Capture Devices[1]	2,662.9	5.4	90.4	2.1	2.1	0.0

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Enhanced O&M Measures[2]	970.7	5.0	89.2	3.7	2.1	0.0

Notes:

1. Includes Hydrodynamic Separator (HDS) and Gross Solids Removal Device (GSRD) units.
2. Includes inlet-based full trash capture device clean out.

15.2 Scope and Schedule of PCBs Control Measures

15.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

Six properties within the City of Richmond have been referred to the SFBRWQCB or have been abated as a result of implementation of the Source Property Identification and Abatement control measure to date (Table 15-3). Two new source properties were identified in FY 2019/20 – Zeneca and the UC Berkeley Richmond Field Station. Both of these properties discharge directly to the Bay, therefore there is no opportunity for the City of Richmond to implement enhanced O&M measures. Thus, no load reduction credit has been taken for these source property referrals.

Table 15-3: City of Richmond Contaminated Sites Self-Abated or Referred to the SFBRWQCB (FY 2013/14 through FY 2019/20)

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR	Referral/ Self-Abatement
Zeneca/Former Stauffer Chemical Company	1415 South 47th St, Richmond	9.2	FY 2019/20	Referral
UC Berkeley Richmond Field Station	1301 South 46th St, Richmond	14	FY 2019/20	Referral
Sims Metal Management Richmond Facility	600 South 4th Street, Richmond / 560-240-040, 560-250-027, 560-250-025	19.3	FY 2017-18	Referral
World Corp	1014 Chesley Ave., Richmond	10.44	FY 2017-18	Referral

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR	Referral/ Self-Abatement
Port of Richmond	Point Potrero Marine Terminal, Richmond	0.72	FY 2017-18	Self-Abatement
San Diego St. Transformer Spill	R.O.W. San Diego St., Richmond	0.08	FY 2017-18	Self-Abatement

Ongoing Investigations

The City of Richmond, through its C.4 business inspection program, continuously inspects and investigates industrial and commercial properties for potential sources of PCBs in the Santa Fe Channel, Zeneca, and North Richmond management areas. Moreover, City staff inspects PG&E maintenance yards, located in its jurisdiction, to warrant that all PCBs containing transformers and equipment are properly contained and disposed. Ongoing investigations may result in a property referral in the future.

Through the plan checking process, any properties that apply for grading permits for the purpose of site remediation under clean up orders by State regulatory agencies (i.e., State Water Resources Control Board and Department of Toxic Substance Control) are required to submit monitoring results for PCBs prior to permit issuance.

Currently, the City does not perform any source identification in residential Old Urban or New Urban management areas.

15.2.2 Green Infrastructure / Treatment Control Measures

Development and redevelopment projects in all management areas are subjected to the Contra Costa County C.3 requirements. See the City of Richmond's Green Infrastructure Plan for further information.

15.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Richmond began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

15.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Richmond include clean out of inlet-based full trash capture devices on a semi-annual basis.

15.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

15.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

The City of Richmond utilizes the 1-800-NO DUMPING hotline for reports of illegal dumping activities. When reports are received by the City abatement crew, illegally dumped materials are abated and sorted according to the type of wastes and disposed of accordingly.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

The City of Richmond staff diligently investigates, enforces, and follows up on the removal, disposal, and remediation of spills from transformers belonging to PG&E as they are reported.

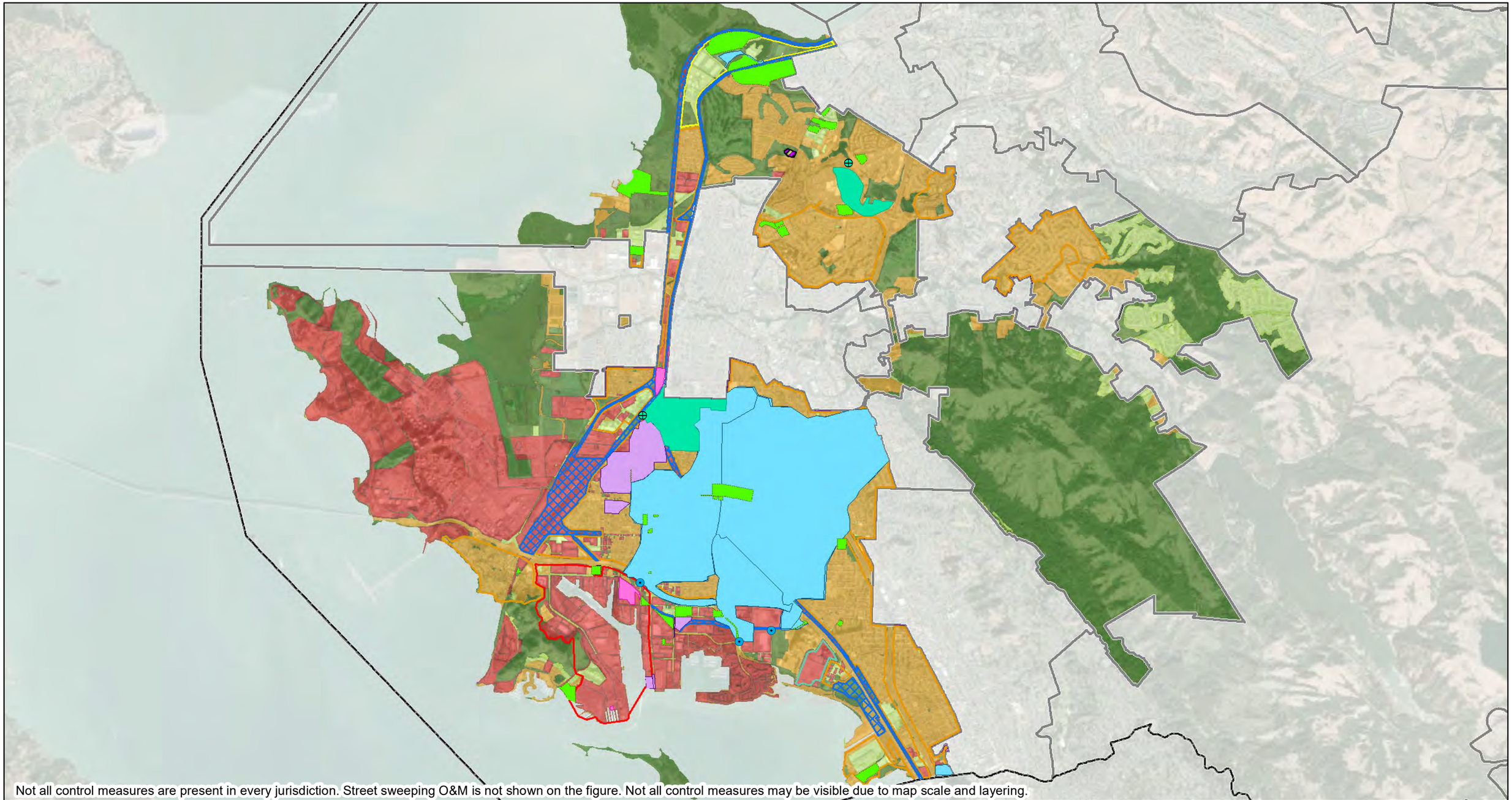

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- RIC-1, Old Urban
- RIC-2, Point Pinole
- RIC-3, Santa Fe Channel
- RIC-4, Zeneca Site

N

0 4,300 8,600 Feet

Watershed/Management Areas and Control Measures
City of Richmond

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 15-1

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16 CITY OF SAN PABLO

16.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of San Pablo are shown on Figure 16-1 and are listed in Table 16-1 below.

Table 16-1: City of San Pablo PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
SPB-1: Rumrill Industrial Area	45.2	22.9	52.7	16.7	7.7	0.0
SPB-2: Giant Highway Industrial Area	22.7	73.9	9.5	16.5	0.0	0.0
SPB-3: Old Urban	1,599.1	0.8	88.4	0.6	10.2	0.0
SPB-RAIL	0.1	89.3	10.7	0.0	0.0	0.0
SPB-PG&E	0.2	0.0	0.0	0.0	100.0	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 16-2 and are described in the sections below. Treatment control projects are also shown on Figure 16-1. The City will be assessing Clean Watersheds for a Clean Bay results, development applications, sampling results, and other pilot projects to gain a clear understanding of the economic and environmental impacts of each project. The City will use this information to make informed decisions in the future about funding programs that provide additional PCBs and mercury reductions.

Table 16-2: City of San Pablo Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	4.5	100.0	0.0	0.0	0.0	0.0
Green Infrastructure and Treatment	21.5	18.6	61.9	1.4	18.1	0.0
Large Full Trash Capture Devices	0	0	0	0	0	0

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Enhanced O&M Measures[1]	660.1	2.6	90.9	2.3	4.2	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

16.2 Scope and Schedule of PCBs Control Measures

16.2.1 Source Property Identification and Abatement

Over the 2014-2015 and 2015-2016 reporting periods the City of San Pablo (in conjunction with the Contra Costa Clean Water Program) screened 132 parcels, revised the high-likelihood parcels to 11 and collected samples at six of the 11 sites. Of the six samples collected, there was one sample in the City of San Pablo that contained PCBs levels above 1.0 mg/kg.

Since the initial sampling, the City of San Pablo performed further research into the neighborhood surrounding the site with the elevated PCBs sample and learned that this area is adjacent to a previously referred (2009) PCBs contaminated site; however, this site is located in a different jurisdiction. In January 2017, the City of San Pablo in conjunction with CCCWP performed additional sampling to eliminate other properties surrounding the area and worked with the Contra Costa Clean Water Program and the City of Richmond to perform sediment sampling around the previously referred PCBs contaminated site at 1014 Chesley Avenue. One additional sampling event occurred in May 2017, which confirmed that the site was still leaking PCBs into the public right-of-way. Over the 2017-2018, reporting year the City of San Pablo transferred this site to the City of Richmond since the property is located in the City of Richmond's jurisdiction. The City of San Pablo will continue to work with the City of Richmond and SFBRWQCB regarding the status of this property, however information regarding this progress can be found in the City of Richmond section.

In addition, the City of San Pablo attended various meetings regarding a potential contaminated site at 1411 Rumrill Avenue in San Pablo. The City attended a meeting in February 2018 to discuss the potential for an abatement process and credit for this abatement. The City is currently working on a "complete streets" project that will address runoff from this parcel. Design for this project is expected to be completed in late 2020, with construction occurring in 2021-2022. Once constriction is complete, the City will submit documentation for abatement of the site.

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of San Pablo have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date. While no properties within the City of San Pablo have been referred to the Regional Water Board by the Contra Costa Clean Water Program, one PCBs-contaminated self-abated property has been reported to the SFBRWQCB.

Table 16-3: City of San Pablo Contaminated Sites Self-Abated or Referred to the SFBRWQCB (FY 2013/14 through FY 2019/20)

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR REFERRED	Referral/ Self-Abatement
Rumrill Sports Complex (Former BNSF Railyard Site)	1509 Rumrill Blvd, San Pablo / 409-313-009; 409-313-009; 410-012-007; 410-012-008	4.45	FY 2015-16	Self-Abatement

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

16.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of San Pablo's Green Infrastructure Plan for further information.

16.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of San Pablo assisted in this project by providing municipality representatives in the Technical Advisory Committee and the Steering Committee. The City began full implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

16.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of San Pablo include clean out of inlet-based full trash capture devices on a semi-annual basis.

In the 2016-17 reporting year, the City of San Pablo desilted 400 linear feet of Wildcat Creek to remove sediment that is blocking storm drains. This desilting project resulted in the removal of 800 cubic yards of sediment from the creek. As the data needed to determine the PCBs and mercury load reductions for this desilting are not available, no load reduction credit has been included in this report for this project.

16.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

16.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

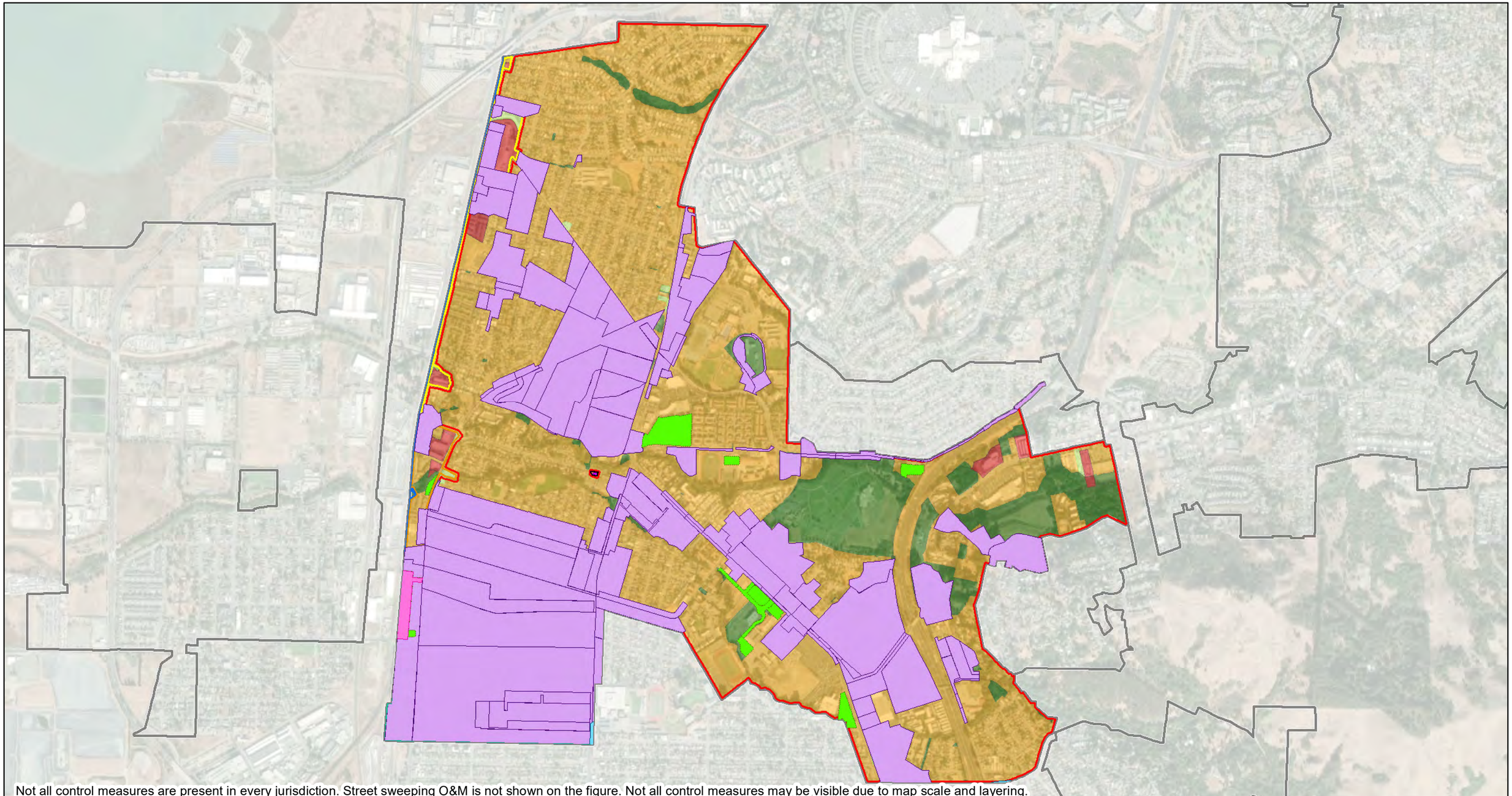

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- SPB-1, Rumrill Industrial Area
- SPB-2, Giant Highway Industrial Area
- SPB-3, Old Urban

N

0 1,300 2,600 Feet

Watershed/Management Areas and Control Measures
City of San Pablo

Contra Costa Clean Water Program

Geosyntec consultants

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Figure 16-1

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17 CITY OF SAN RAMON

17.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of San Ramon are shown on Figure 17-1 and are listed in Table 17-1 below.

Table 17-1: City of San Ramon PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
SRM-1: Old Urban	916.9	0.0	93.9	4.7	1.5	0.0
SRM-PGE: Categorical PG&E	84.5	15.9	13.8	2.6	67.6	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The City of San Ramon has identified one WMA that covers old urban areas within the City. There are no areas within the City's jurisdiction that are categorized as old industrial land use (pre-1974) as defined in the initial Source Property Identification and Abatement study conducted by the Contra Costa Clean Water Program. There are a limited number of commercial buildings within WMA 1 that were constructed pre-1974. Those units are located within the City of San Ramon Northwest Specific Plan and are subject to redevelopment as the residential and commercial markets develop in the area. One PG&E storage facility that may have contained power transformers will be included in a county-wide categorical WMA.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 17-2 and are described in the sections below. Treatment control projects are also shown on Figure 17-1.

Table 17-2: City of San Ramon Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	36.5	0.0	23.6	74.8	1.6	0.0
Large Full Trash Capture Devices	0.0	0.0	0.0	100.0	0.0	0.0

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Enhanced O&M Measures[1]	232.3	0.0	39.3	60.1	0.6	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

17.2 Scope and Schedule of PCBs Control Measures

17.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

No properties within the City of San Ramon have been referred to the SFBRWQCB as a result of implementation of the Source Property Identification and Abatement control measure to date.

Ongoing Investigations

No further investigations are warranted in the City of San Ramon.

17.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application is made, such as demolition standards and applicable provisions of section C.3. See the City of San Ramon's Green Infrastructure Plan for further information.

17.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. San Ramon began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in a BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

17.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of San Ramon include clean out of inlet-based full trash capture devices on a semi-annual basis.

17.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

17.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The City of San Ramon typically removes items from illegal dumping sites within 24 hours of notification or discovery by staff.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

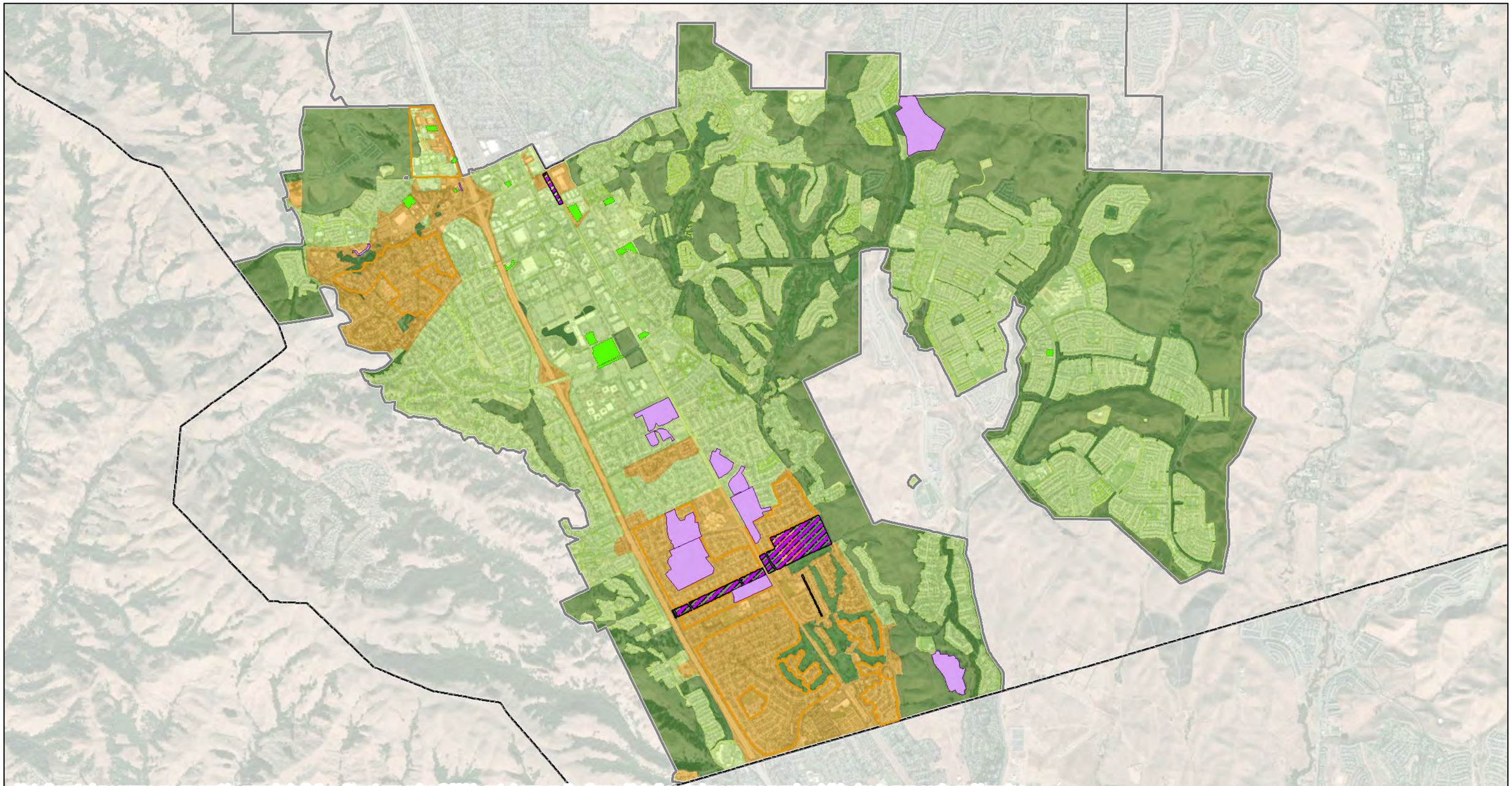

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- SRM-1, Primary WMA

N

0 2,900 5,800 Feet

Watershed/Management Areas and Control Measures
City of San Ramon

Contra Costa Clean Water Program

Geosyntec consultants

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Figure 17-1

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18 CITY OF WALNUT CREEK

18.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within the City of Walnut Creek are shown on Figure 18-1 and are listed in Table 18-1 below.

Table 18-1: City of Walnut Creek PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
WCR-1: Downtown Core	775.7	0.9	96.3	0.4	2.5	0.0
WCR-2: Shadelands	233.7	5.3	86.4	0.0	8.3	0.0

Notes:

1. Land use breakdown as of IMR land use year 2013.

The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 18-2 and are described in the sections below. Treatment control projects are also shown on Figure 18-1.

Table 18-2: City of Walnut Creek Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Green Infrastructure and Treatment	119.4	1.4	85.8	0.0	12.7	0.0
Large Full Trash Capture Devices	20.7	0	99.5	0.0	0.5	0.0
Enhanced O&M Measures[1]	735.3	0.0	89.9	3.8	6.3	0.0

Notes:

1. Includes inlet-based full trash capture device clean out.

18.2 Scope and Schedule of PCBs Control Measures

18.2.1 Source Property Identification and Abatement

PCBs-Contaminated Properties Referred to the Regional Water Board

During renovation of the Larkey Pool swim center, 27 linear feet of PCBs-containing concrete slab expansion joint caulking, approximately 6 inches in width, were removed. The self-abatement form for this project was provided in a previous annual report.

Ongoing Investigations

Ongoing investigations may result in a property referral in the future.

18.2.2 Green Infrastructure / Treatment Control Measures

As required by the Municipal Regional NPDES Permit (MRP, provision C.3.j), the City of Walnut Creek requires the inclusion of low impact development (LID) drainage design into storm drain infrastructure on public and private lands (including streets, storm drains, parking lots, building roofs and others). When a project is not considered as a regulated project under provision C.3 (such as a single-family residence project), it is encouraged to install one or more LID elements. See the City of Walnut Creek's Green Infrastructure Plan for further information.

18.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The City of Walnut Creek participated in the BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. The City of Walnut Creek began implementation of the program on July 1, 2019.

Managing PCBs in Infrastructure

The City of Walnut Creek also participated in the BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

18.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by the City of Walnut Creek include clean out of inlet-based full trash capture devices on a semi-annual basis.

18.2.5 Diversion to POTW

No diversion to POTW control measures are proposed.

18.2.6 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The City of Walnut Creek participates in the regional recycling efforts of mercury-containing thermometer and devices through the Central Contra Costa Sanitary District (CCCSD) household hazardous waste program.

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Illegal Dumping Cleanup

The City has not encountered any incidents involving illegal dumping of PCBs and/or mercury containing materials and related cleanups.

The Permittees will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

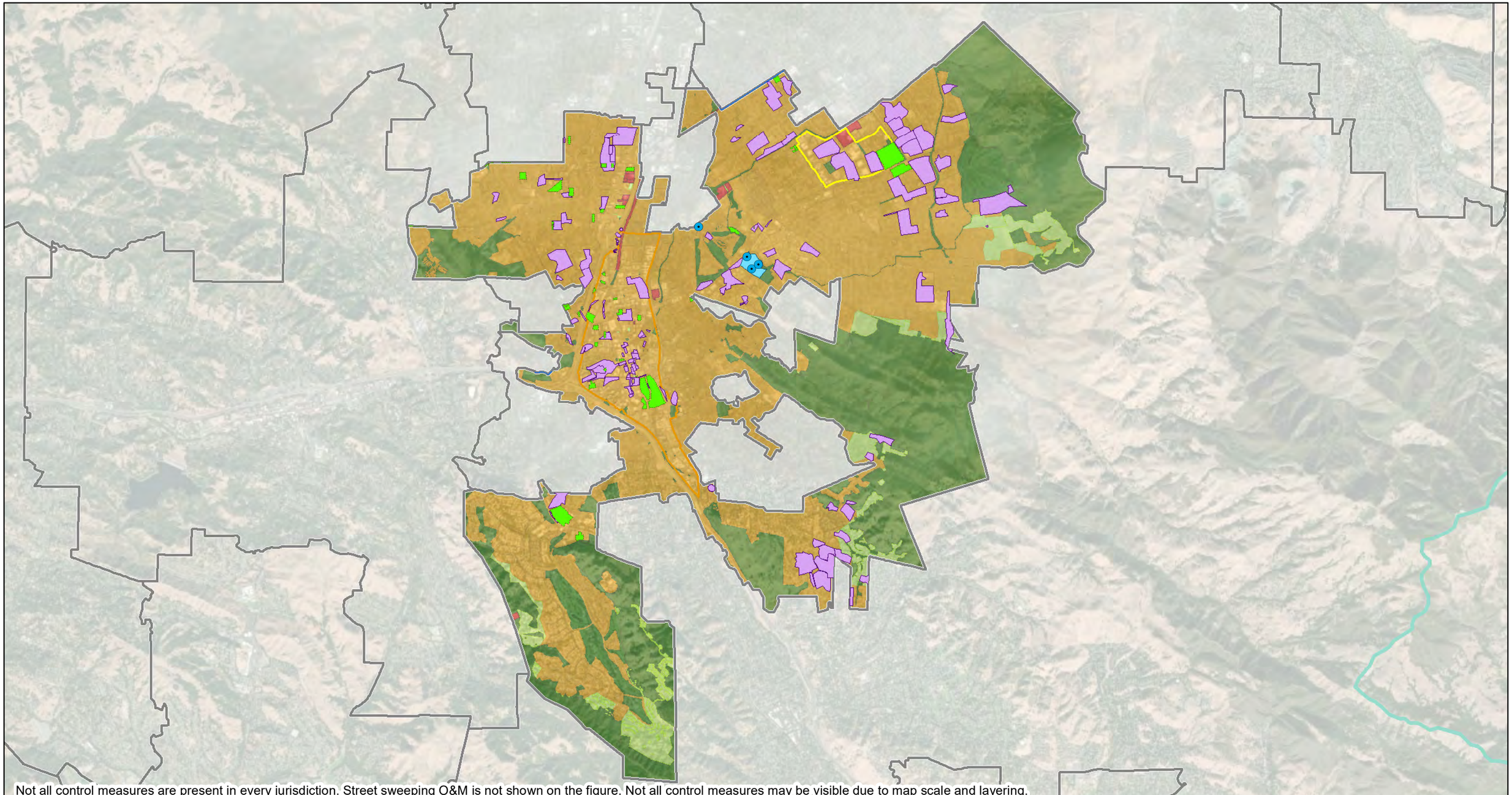

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE
- Region 5 Boundary

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- WCR-1, Downtown Core
- WCR-2, Shadelands

N

0 4,100 8,200 Feet

Watershed/Management Areas and Control Measures
City of Walnut Creek

Contra Costa Clean Water Program

Geosyntec consultants

Oakland | September 2020

Figure 18-1

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19 UNINCORPORATED CONTRA COSTA COUNTY

19.1 List of Watersheds / Management Areas and Control Measures

The W/MAs within Unincorporated Contra Costa County are shown on Figure 19-1 and are listed in Table 19-1 below. Note that although MRP Provisions C.11/C.12 apply only to the portion of Unincorporated Contra Costa County within Region 2, the County has mapped W/MAs countywide (see Figure 19-1).

Table 19-1: Unincorporated Contra Costa County PCBs and Mercury Watershed Management Areas (W/MAs) and Associated Land Uses

W/MA Identifier	Total Area[1] (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
CCC-1: High Likelihood and Source Properties	5,931.2	51.7	9.1	2.8	22.8	13.6
CCC-2: Old Industrial Areas	1,055.0	99.9	0.0	0.0	0.1	0.0
CCC-3: North Richmond Pump Station (NRPS) Drainage Area	182.2	0.1	86.7	3.7	9.6	0.0
CCC-4: Infrastructure Improvement Areas (old industrial and old urban areas with very limited or no storm drain systems adjacent to industrial areas)	560.8	0.0	30.3	42.4	27.3	0.0
CCC-5: Enhanced Operations and Maintenance Areas (old industrial and old urban areas with curb, gutter, and storm drain systems)	1,856.4	0.0	90.9	2.7	6.3	0.0
CCC-PGE: Categorical PG&E	1,775.3	3.7	2.2	0.7	93.4	0.0
CCC-RAIL: Categorical Railroad	639.9	9.8	2.0	15.0	72.4	0.9

Notes:

1. Land use breakdown as of IMR land use year 2013.

These W/MAs are designated based on the types of control measures and actions that may be taken to reduce PCBs flowing or present in the stormwater drainage system. These areas represent priority areas within Contra Costa County. The control measures that are currently being implemented during the term of the permit in each of these W/MAs are summarized in Table 19-2 and are described in the sections below.

Table 19-2: Unincorporated Contra Costa County Area Treated by Area-Based Control Measure Category (FY 2013/14 through FY 2019/20)

Control Measure Category	Total Area Treated (Acres)	% Old Industrial	% Old Urban	% New Urban	% Open Space	% Other
Source Property Identification and Abatement	19.5	100.0	0.0	0.0	0.0	0.0
Green Infrastructure and Treatment	82.8	0.0	61.6	1.8	36.6	0.0
Large Full Trash Capture Devices	0.0	0.0	0.0	0.0	0.0	0.0
Enhanced O&M Measures[1]	1,179.3	1.6	85.0	2.7	10.4	0.3

Notes:

1. Includes enhanced street sweeping and inlet-based full trash capture device clean out.

19.2 Scope and Schedule of PCBs Control Measures

19.2.1 Source Property Identification and Abatement

The Fass Metals site was referred to the SFBRWQCB in FY 2017/18, although no load reduction credit has been taken for this source property due to the inability to implement enhanced O&M. A self-abatement report was submitted for a second site on Radiant Avenue in North Richmond.

Table 19-3: Unincorporated Contra Costa County Contaminated Sites Self-Abated or Referred to the SFBRWQCB (FY 2013/14 through FY 2019/20)

SITE NAME	LOCATION/APN	PROPERTY SIZE (ACRES)	YEAR	Referral/ Self-Abatement
Radiant Avenue	Radiant Avenue, North Richmond; 408-082-030	19.5	FY 2016/17	Self-Abatement
Fass Metals	818 West Gertrude Ave, Richmond	0.2	FY2017/18	Referral

Ongoing Investigations

Properties designated as High Likelihood or old industrial in Contra Costa County will be further investigated to see if they are properties likely to have PCBs. Contra Costa County will work with

County C.4 industrial inspectors under the Commercial and Industrial Inspection Program to investigate the likelihood of PCBs on these High Likelihood Properties. These investigations will be coordinated with industrial facility inspections over the next few years. Ongoing investigations may result in a property referral in the future.

19.2.2 Green Infrastructure / Treatment Control Measures

Any development, redevelopment, and infrastructure projects within each of the W/MAs will be subject to the development standards in effect at the time an application would be made, such as demolition standards and applicable provisions of section C.3. See the Contra Costa County's Green Infrastructure Plan for further information

19.2.3 Managing PCBs in Building Materials and Infrastructure

Managing PCBs in Building Materials

The Program and Permittees actively participated in a BASMAA Regional Project to address PCBs in building materials as described in Section 2.3.1. Contra Costa County's Building Inspector Management participated on the Regional Project Technical Advisory Committee. The County began implementing a PCBs in Building Materials Program on July 1, 2019.

Managing PCBs in Infrastructure

The Program and Permittees participated in the BASMAA Regional Project to address PCBs in infrastructure as described in Section 2.3.2.

19.2.4 Enhanced Operation and Maintenance Control Measures

Enhanced O&M control measures that have been implemented by Contra Costa County include clean out of inlet-based full trash capture devices on a semi-annual basis. Some units were initially installed in 2013, including a total of 139 connector piper screens and top hats. The County installed an additional 147 connector pipe screens in FY 2016/17 in the unincorporated communities of Bay Point, Richmond, and Rodeo. These systems are maintained to reduce not only debris but accumulated sediment from flowing to the Bay. They treat a total of 383.5 acres. Additional systems were installed in sections of North Richmond and Bay Point during FY 2018/19.

In addition, Contra Costa County implements enhanced street sweeping as listed in Table 19-4 below.

Table 19-4: Unincorporated Contra Costa County Enhanced O&M Control Measures (FY 2013/14 through FY 2019/20)

Enhanced O&M Control Measure Type	Fiscal Year	Baseline Frequency	Enhanced Frequency	New Treatment Area (acres)	Location
Street Sweeping	FY2015-2016	Monthly	Biweekly	55.0	Crockett Commercial
Street Sweeping	FY2015-2016	Monthly	Biweekly	27.5	El Sobrante Commercial (excluding San Pablo Dam Road)
Street Sweeping	FY2015-2016	Monthly	Biweekly	13.4	El Sobrante Commercial (only including San Pablo Dam Road)
Street Sweeping	FY2015-2016	Monthly	Biweekly	19.5	Pacheco Commercial
Street Sweeping	FY2015-2016	Monthly	Biweekly	32.7	Richmond Pkwy
Street Sweeping	FY2015-2016	Monthly	Biweekly	83.3	Rodeo Commercial
Street Sweeping	FY2015-2016	Monthly	Biweekly	17.8	San Pablo Ave Commercial

Several areas of the County have roadside ditches and other areas have curb and gutter or curb and gutter interspersed with roadside ditches. As development takes place over time, Contra Costa County will develop curb and gutter and storm drain systems in some areas of the County, particularly in residential areas adjacent or near to old industrial areas. Contra Costa County Public Works Maintenance operates and maintains storm drain infrastructure by cleaning and repairing it to reduce debris and sediment that flows the Bay.

Contra Costa County has street sweeping in most areas that have curb and gutter. In some of the old urban and old industrial areas that have curb and gutter and storm drain infrastructure, Contra Costa County has enhanced the street sweeping frequency from once to twice per month. These areas include approximately 249 acres of commercial and some residential areas in the

unincorporated areas of Crockett, Pacheco, Richmond and Rodeo. These areas include old industrial, old urban, new urban and open space.

Diversion to POTW

Contra Costa County maintains the North Richmond pump station in North Richmond. A temporary diversion was planned under MRP 1.0. The diversion provided an opportunity to coordinate more with West County Wastewater District, test how a diversion could work, and discuss potential future diversions. Contra Costa County is investigating the possibility of building more permanent diversion infrastructure and coordinating with West County Wastewater District to potentially find a way to divert more stormwater drainage discharges.

19.2.5 Source Controls and Other Control Measures

Mercury Load Avoidance and Reduction

The Permittees are actively implementing mercury recycling programs in all W/MAs in order to reduce mercury loading to the Bay.

Household hazardous waste facilities collect materials and devices containing mercury. There may be other opportunities over time to collect mercury or identify additional sources and take measures to reduce discharges to the MS4. Contra Costa County's Landscaping and Lighting District is coordinating with PG&E to replace Mercury (Hg) containing light fixtures with LED fixtures. Contra Costa County has converted many mercury and/or high-pressure sodium vapor street lights to Light Emitting Diode (LED) street lights. In addition, the County Public Works Department converted all the fluorescent bulbs in the main office building to LED last year with over 6,500 feet of fluorescent tubes replaced on one property.

Illegal Dumping Cleanup

Illegal dumps are cleaned from Contra Costa County's road right-of-way regularly and disposed of properly by Contra Costa County's Public Works or where appropriate, Hazardous Materials. Illegal dumping consists of many types of material including furniture, trash, construction material and debris, and potentially hazardous materials or wastes. Where possible, information is used to track down the owner of the material and properly dispose of the material or recover costs of disposing.

The County will identify and cleanup illegal dumping of construction and demolition debris where illegal dumping of construction and demolition debris occurs.

Stockpiles, Spills, and Disposal of PCBs

Stockpiles and spills of PCBs will be addressed as they are identified through industrial facility inspection and spill notification programs.

Spills of PCBs occur due to accidents, weather, worn out transformers, or other reasons. The County may also find or be notified about stockpiles of materials. The County has trained Hazardous Materials and Environmental Health Inspectors on the importance of the identification and correct disposal of PCBs related to stormwater and the Municipal Regional Stormwater Permit (MRP 2.0). The County Watershed Program coordinates with Haz Mat to complete stormwater inspections and has communicated the importance of relaying information relating to PCBs sources to the Watershed Program. The County has also been involved in a Code Enforcement Task Force and has communicated the importance of working with stormwater managers to identify and communicate the potential presence of PCBs when there are spills or stockpiled material. The County works with the Contra Costa County Hazardous Materials staff and the Clean Water Program to inform program staff of spill incidents within unincorporated County. Where these spills involve other agencies or organizations, Contra Costa County will work with the agencies or property owners as appropriate.

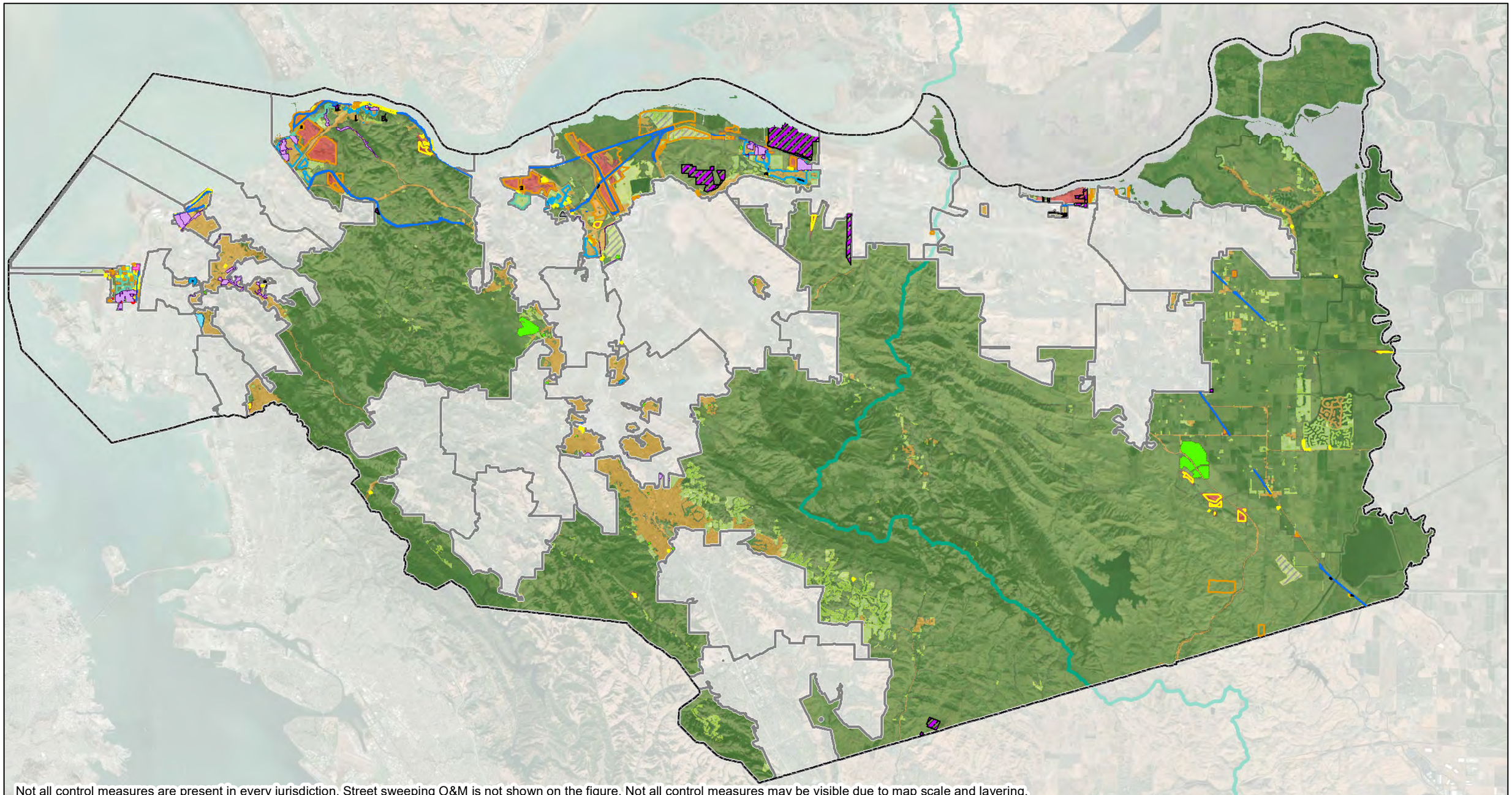

Not all control measures are present in every jurisdiction. Street sweeping O&M is not shown on the figure. Not all control measures may be visible due to map scale and layering.

Legend

- City Limits
- County Boundary
- Categorical Railroad
- Categorical PGE
- Region 5 Boundary

Yield Classification

- Old Industrial
- Old Urban
- New Urban
- Open Space
- Other

Control Measures

- Stormwater Treatment Project
- Source Property Referral/Abatement
- Trash Capture Device Enhanced O&M
- HDS
- GSRD
- HDS Device Drainage Area
- GSRD Device Drainage Area

Watershed/Management Areas

- CCC-1, High Likelihood and Source Properties
- CCC-2, Old Industrial Areas
- CCC-3, North Richmond Pump Station (NRPS) Drainage Area
- CCC-4, Infrastructure Improvement Areas
- CCC-5, Enhanced Operations and Maintenance Areas

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Watershed/Management Areas and Control Measures
Unincorporated Contra Costa County

Contra Costa Clean Water Program

Geosyntec consultants

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Figure 19-1

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20 LOADS REDUCED

This section presents estimates of the loads reduced by the control measures that are reported in the preceding sections of this report (Sections 3 through 22) for each Permittee and county-wide for FY 2013/14 through FY 2018/19. The loads reduced reported in this section reflect previous fiscal years' reporting, although previously reported load reductions may have been revised.

20.1 Loads Reduced – PCBs

Table 20-1 reports the estimated PCBs loads reduced for each Permittee for all control measures. Note that this table reflects the load reduction achieved through implementation of the program and protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. This load reduction is equivalent to 373.3 g/yr, which has been allocated to each Permittee in FY2018/19 based on their population in the year 2000.

Table 20-1: PCBs Loads Reduced by the Permittees (FY 2013/14 through FY 2019/20)

Permittee	PCBs Loads Reduced (g/yr)							
	FY2013-2014	FY2014-2015	FY2015-2016	FY2016-2017	FY2017-2018	FY2018-2019	FY2019-2020	Cumulative Load Reduced
Clayton	0	0.36	0.01	0	0	4.11	0	4.48
Concord	0.03	0.95	0.26	0.46	1.60	56.81	0	60.11
Danville	0.08	0.21	0.26	0.14	0.13	15.20	0.29	16.33
El Cerrito	0	0.18	0.05	0.25	0.05	11.19	0	11.72
Hercules	0	1.40	0	0	0.01	9.45	0	10.86
Lafayette	0.04	0.05	0.04	0.00	0.04	11.99	0	12.16
Martinez	0.00	0.40	0.05	0.96	0.07	14.07	0.14	15.69
Moraga	0.16	0.06	0	0.17	0.02	4.88	0	5.29
Orinda	0.39	0.01	0	0.05	0.03	6.81	0	7.29
Pinole	0.02	0.36	0	0.10	0.11	8.26	0.01	8.86
Pittsburg	0.54	1.34	0.15	0.31	0.22	23.10	0.01	25.67
Pleasant Hill	0.04	0.74	0.87	0.01	0	16.18	0	17.84
Richmond	0.29	7.36	12.95	2.71	70.62	61.49	0.79	156.21
San Pablo	0.00	0.20	18.52	0.08	0.22	14.65	0.01	33.68

Permittee	PCBs Loads Reduced (g/yr)							
	FY2013-2014	FY2014-2015	FY2015-2016	FY2016-2017	FY2017-2018	FY2018-2019	FY2019-2020	Cumulative Load Reduced
San Ramon	0.00	0.17	0	0	0.08	17.30	0	17.55
Walnut Creek	0.23	1.17	0.10	0.48	0.11	29.70	0.52	32.18
Unincorporated County	0.44	0.07	0.48	79.28	0.19	86.59	0.24	167.29
TOTAL - All Permittees	**2.26**	**15.03**	**33.74**	**85.0**	**73.5**	**391.77**	**2.01**	**603.30**

Table 20-2 reports the PCBs loads reduced for all Permittees for each control measure. The results indicate that the load reductions required through Green Infrastructure by June 30, 2020 (23 g/yr) and the overall load reductions required by June 30, 2020 (560 g/yr) by the Contra Costa Permittees have been exceeded.

Table 20-2: PCBs Loads Reduced Within Contra Costa County (FY 2013/14 through FY 2019/20)

Control Measure Category	PCBs Loads Reduced (g/yr)								Required Load Reductions (g/yr)
	FY 2013-2014	FY 2014-2015	FY 2015-2016	FY 2016-2017	FY 2017-2018	FY 2018-2019	FY 2019-2020	Cumulative Load Reduced	2020
Source Property Identification and Abatement[1]	0	0	30.06	78.68	63.35	0	0	172.09	--
Green Infrastructure and Treatment	2.24	8.53	3.4	4.33	3.19	9.13	1.81	32.64	**23.00**
Full Trash Capture Devices	0	4.55	0.03	0	6.53	9.08	0	20.07	--
Enhanced O&M	0	1.95	0.25	1.98	0.43	0.24	0.19	5.03	--

Control Measure Category	PCBs Loads Reduced (g/yr)								Required Load Reductions (g/yr)
	FY 2013-2014	FY 2014-2015	FY 2015-2016	FY 2016-2017	FY 2017-2018	FY 2018-2019	FY 2019-2020	Cumulative Load Reduced	2020
Manage PCBs in Building Materials	0	0	0	0	0	373.33	0	373.33	--
Diversion to POTW	0	0	0	0	0	0	0	0	--
Source Controls/ Other	0	0	0	0	0	0	0	0	--
TOTAL - All Control Measures	**2.24**	**15.03**	**33.74**	**84.99**	**73.51**	**391.78**	**2.00**	**603.30**	**560.00**

Notes:

1. Load Reduced = (Source Property Area (ac)) x (4.065 – 0.0303 (g/ac/yr)). Acres associated with this control measure can be found in each Permittee section of this report.
2. For parcel-based projects, Load Reduced = (Project Area (ac)) x (Existing Yield – 0.0035 (g/ac/yr)). For green street or regional retrofit projects, Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/ac/yr)) x 0.70. Acres associated with this control measure can be found in each Permittee section of this report.
3. Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/ac/yr)) x 0.20. Acres associated with this control measure can be found in each Permittee section of this report.

"--" indicates no required load reduction target or loads reduced.

20.2 Loads Reduced – Mercury

Table 20-3 and Table 20-4 report the estimated mercury loads reduced for each Permittee and county-wide, respectively. The mercury load performance criterion via green infrastructure implementation for Contra Costa County is 9 g/yr by June 30, 2020; the results in Table 20-4 indicate that this performance criterion has been exceeded.

Note that these estimated load reductions do not account for loads reduced by the Mercury Load Avoidance and Reduction source control measure. CCCWP will continue to annually compile and report the number of mercury-containing products collected at household hazardous waste facilities. Translation of that collection information to loads reduced from urban stormwater discharges is challenging and may not be necessary to show attainment of the mercury load reduction goals.

Table 20-3: Mercury Loads Reduced by the Permittees (FY 2013/14 through FY 2019/20)

Permittee	Mercury Loads Reduced (g/yr)							
	FY2013-2014	FY2014-2015	FY2015-2016	FY2016-2017	FY2017-2018	FY2018-2019	FY2019-2020	Cumulative Load Reduced
Clayton	0	2.47	0.06	0	0	0	0	2.53
Concord	0.17	9.17	3.16	3.33	10.95	0.97	0.01	27.76
Danville	0.57	1.46	1.69	0.32	0.89	0.47	1.96	7.36
El Cerrito	0	1.31	0.40	1.80	0.38	0.81	0	4.70
Hercules	0	17.42	0	0	0.05	14.22	0	31.69
Lafayette	0.30	0.35	0.24	0	0.27	1.65	0	2.81
Martinez	0	5.85	0.57	11.25	0.05	1.58	0.90	20.20
Moraga	1.07	0.46	0	1.92	0.11	0.17	0	3.73
Orinda	2.65	0.06	0	0.33	0.03	0	0	3.07
Pinole	0.12	4.52	0	0.63	0.76	1.99	0.09	8.11
Pittsburg	4.45	10.40	2.33	1.96	0.70	23.58	0.05	43.47
Pleasant Hill	0.26	5.24	5.88	0.10	0	6.92	0	18.40
Richmond	2.86	103.12	12.72	25.06	87.93	122.91	11.37	365.97
San Pablo	0	1.55	11.44	0.53	1.67	0.09	0.09	15.37
San Ramon	0	1.19	0	0	0.56	0.36	0	2.11
Walnut Creek	2.74	8.08	0.68	3.20	0.76	5.65	3.51	24.62
Unincorporated County	2.98	0.45	1.78	25.36	1.26	1.22	1.61	34.66
TOTAL - All Control Measures	**18.17**	**173.10**	**40.95**	**75.79**	**106.37**	**182.59**	**19.59**	**616.61**

Table 20-4: Mercury Loads Reduced Within Contra Costa County (FY 2013/14 through FY 2019/20)

Control Measure Category	Mercury Loads Reduced (g/yr)							
	FY2013-2014	FY2014-2015	FY2015-2016	FY2016-2017	FY2017-2018	FY2018-2019	FY2019-2020	Cumulative Load Reduced
Source Property Identification and Abatement[1]	0	0	8.08	21.16	17.03	0	0	46.27

Control Measure Category	Mercury Loads Reduced (g/yr)							
	FY2013-2014	FY2014-2015	FY2015-2016	FY2016-2017	FY2017-2018	FY2018-2019	FY2019-2020	Cumulative Load Reduced
Green Infrastructure and Treatment[2]	18.18	115.45	32.25	38.82	28.31	109.65	18.25	360.91
Large Full Trash Capture Devices[3]	0	43.30	0.43	0.01	58.40	70.96	0	173.10
Enhanced O&M Measures[4]	0	14.35	0.21	15.81	2.62	2.00	1.34	36.33
Diversion to POTW	0	0	0	0	0	0	0	0
Source Controls/ Other[4]	0	0	0	0	0	0	0	0
TOTAL - All Permittees	**18.18**	**173.10**	**40.97**	**75.80**	**106.36**	**182.61**	**19.59**	**616.61**

Notes:

1. Load Reduced = (Source Property Area (ac)) x (4.065 – 0.0303 (g/ac/yr)). Acres associated with this control measure can be found in each Permittee section of this report.
2. For parcel-based projects, Load Reduced = (Project Area (ac)) x (Existing Yield – 0.0035 (g/ac/yr)). For green street or regional retrofit projects, Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/ac/yr)) x 0.70. Acres associated with this control measure can be found in each Permittee section of this report. The Mercury Load Performance Criteria via Green Infrastructure Implementation for Contra Costa County is 9 g/yr by June 30, 2020.
3. Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/ac/yr)) x 0.20. Acres associated with this control measure can be found in each Permittee section of this report.
4. See individual Permittee sections for how loads were estimated.
5. "--" indicates no required load reduction target.

20.3 PCBs and Mercury Regional Loads Reduced During MRP 2.0

20.3.1 Introduction

MRP 2.0 requires Permittees to develop and implement control measures to reduce PCBs and mercury in stormwater runoff to the San Francisco Bay throughout the permit area (Table 20-5). For PCBs, Permittees are collectively required to reduce loads by a minimum of 500 grams per year (g/yr) by June 30, 2018, and 3,000 g/yr by June 30, 2020. At least 120 g/yr of PCBs load reduction must be achieved through implementation of green stormwater infrastructure (GSI) projects on public and private lands. The June 30, 2020 date may be extended to December 31,

2020 if Permittees provide documentation that control measures that will attain the load reduction will be implemented by that date.

For mercury, Permittees are collectively required to reduce stormwater loads by 48 g/yr by June 30, 2020 through implementation of GSI projects on public and private lands.

These load reduction performance criteria may be met regionally. However, if the required load reduction is not achieved regionally, the load reductions should be achieved on a county-wide basis. If neither the permit-area-wide total load reduction criteria nor the county-specific load reduction criterion is achieved, the individual Permittees must achieve load reductions consistent with their share of the county total based on their proportion of the total county population.

Table 20-5: PCBs and Mercury Load Reduction Regional Performance Criteria Required by MRP 2.0 in 2018 and 2020

PCBs (g/year)			Mercury (g/yr)
July 2018	**July 2020**		**July 2020**
All Control Measures	**All Control Measures**	**Green Stormwater Infrastructure**	**Green Stormwater Infrastructure**
500	3,000	120	48

The PCBs and mercury load reductions that have been achieved to date were calculated using the methodologies presented in the *Interim Accounting Methodology for PCBs and Mercury Loads Reduced Report* (BASMAA 2017), which was developed by BASMAA and approved by the Regional Water Board's Executive Officer in March 2017. The data reported here on regional PCBs and mercury loads reduced by all Permittees were provided by the following countywide stormwater programs and municipal agencies:

- Alameda Countywide Clean Water Program
- Contra Costa Clean Water Program
- Santa Clara Valley Urban Runoff Pollution Prevention Program
- San Mateo Countywide Water Pollution Prevention Program
- Fairfield-Suisun Urban Runoff Management Program
- City of Vallejo and the Vallejo Flood and Wastewater District

The load reductions reported here are based on the best available information at the time this report was written and may not reflect the most up-to-date accounting of all reductions achieved through all control measures that have been implemented in the region.

20.3.2 Regional PCBs Loads Reduced

The cumulative PCBs loads reduced to date by all Permittees during the MRP compliance period (FY 13-14 through FY 19-20) are presented in Table 20-6. A total of 3,017 g/yr of PCBs were reduced across the permit area over that time period, demonstrating that the MRP performance criterion of 3,000 g/yr of PCBs loads reduced by July 2020 has been achieved at the regional level.

Table 20-6: PCBs Loads Reduced by MRP Permittees (FY13-14 – FY19-20)

Control Measure Category	PCB Load Reductions[1] (g/yr)
Source Property Identification and Abatement	610
Green Stormwater Infrastructure/Treatment (i.e., Parcel-Based New/Redevelopment or Green Street/Regional Retrofit)	231
Large Full Trash Capture (i.e., HDS or GSRD Units)	157
Enhanced O&M Measures	18
PCBs in Building Materials	2,000
Stormwater Diversion to Sanitary Sewer	1
TOTAL - All Control Measures	**3,017**

1. Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

The PCBs loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 20-1. The PCBs in building materials program achieved the MRP-stipulated 2,000 g/yr (66%) because all Permittees successfully implemented the program by July 1, 2019. This load reduction accounts for 66% of the total PCBs loads reduced during MRP 2.0. The remaining 1,017 g/yr was achieved through implementation of all other control measures. Of these, source property identification and abatement accounts for 20% of the total PCBs load reduction during MRP 2.0. Next to managing PCBs in building materials, source property identification and abatement remains the most effective control measure currently available for reducing PCBs loads to the Bay (BASMAA 2017). Green infrastructure has been the third largest contributor to load reductions, providing 231 g/yr of PCBs loads reduced and accounting for 8% of the total PCBs loads reduced to-date. These data demonstrate the MRP performance criterion of 120 g/yr of PCBs loads reduced through GI has been met across the region. An additional 157 g/yr have been reduced by large full trash capture devices (i.e., HDS

and GSRD units), accounting for 5% of the total PCBs loads reduced. The remaining < 1% of the regional PCBs loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

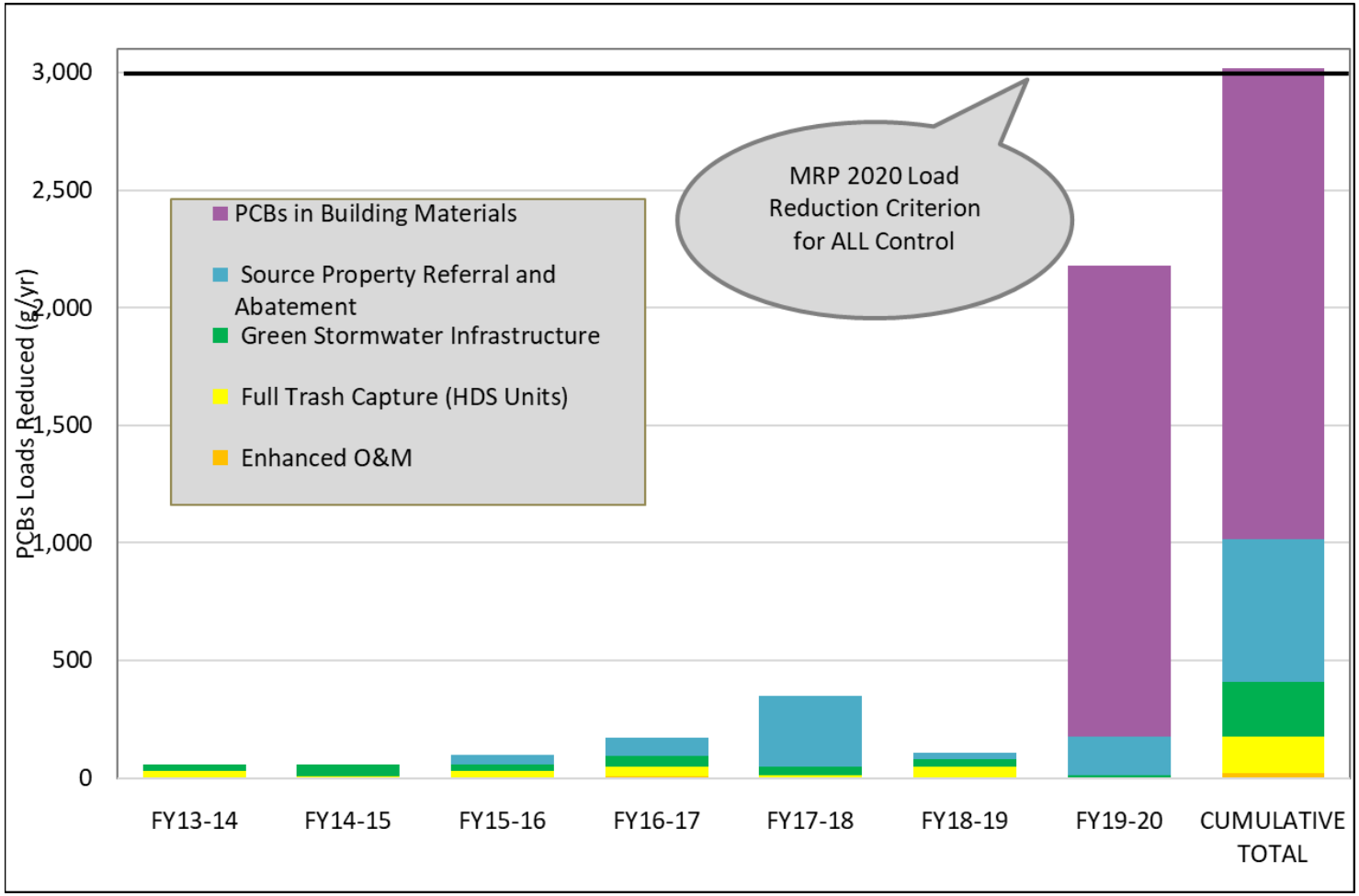

Figure 20-1: PCBs Loads Reduced by MRP Permittees by Fiscal Year and the Cumulative Totals (FY13-14 through FY19-20)

20.3.3 Regional Mercury Loads Reduced

The cumulative mercury loads reduced by MRP Permittees from FY13-14 through FY 19-20 are presented in Table 20-7. An estimated total of 4,414 g/yr of mercury was reduced across the permit area over that time period. The mercury loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 20-2. GI has been the largest contributor to mercury load reductions during the permit term. Total mercury loads have been reduced by 2,752 g/yr through GI, accounting for 62% of the total loads reduced. These data demonstrate the MRP performance criterion of 48 g/yr of mercury loads reduced through GI by 2020 has been met across the region. An additional 1,347 g/yr of mercury have been reduced by large full trash capture devices (i.e., HDS and GSRD units), accounting for 30% of the total loads reduced. Source property identification and abatement has reduced mercury loads by 191 g/yr, accounting for only 4% of the total mercury loads reduced to date. The remaining < 3% of the regional mercury loads reduced during the permit have come from enhanced operation and maintenance practices and stormwater diversions.

Table 20-7: Mercury loads reduced by MRP Permittees (FY13-14 – FY19-20)

Control Measure Category	Mercury Load Reductions[1] (g/yr)
Source Property Identification and Abatement	191
Green Stormwater Infrastructure (i.e., Parcel-Based New/Redevelopment or Green Street/Regional Retrofit)	2,752
Large Full Trash Capture (i.e. HDS or GSRD units)	1,347
Enhanced O&M Measures	120
Stormwater Diversion to Sanitary Sewer	3
TOTAL - All Control Measures	**4,414**

1. Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

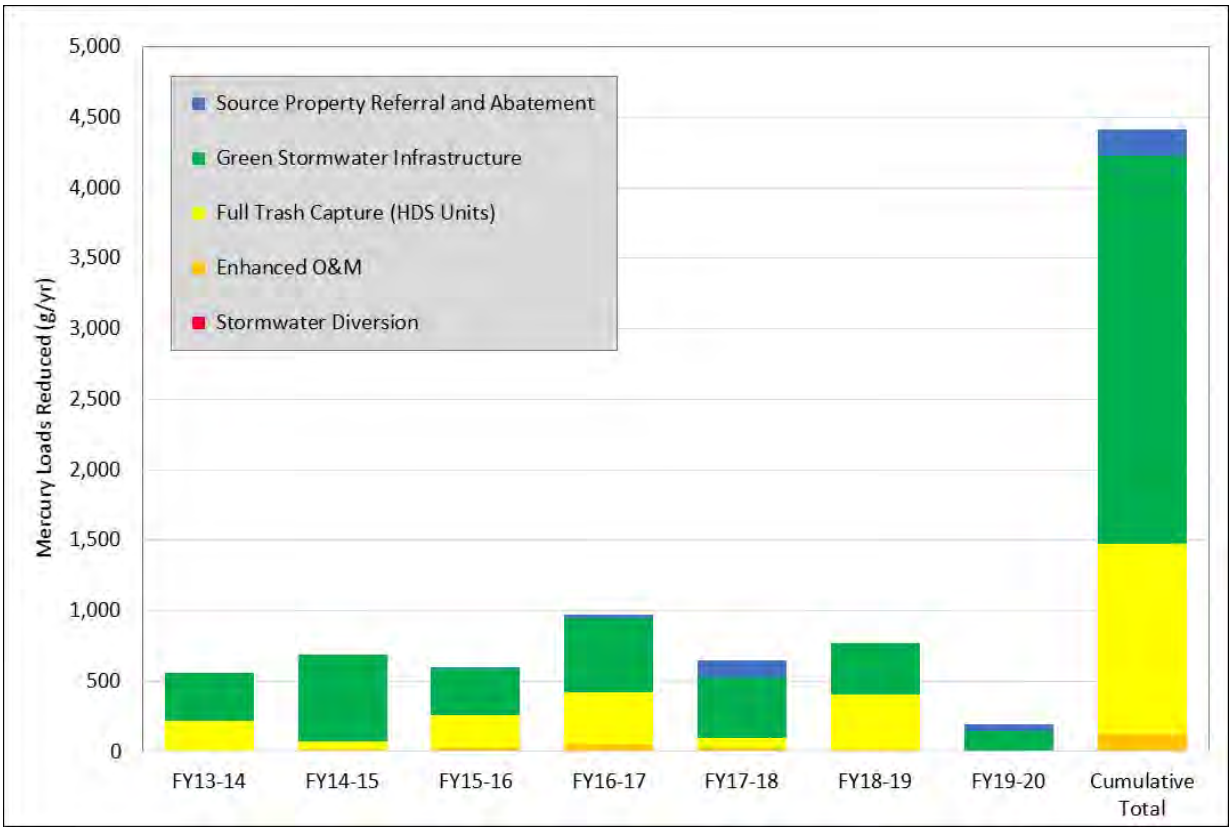

Figure 20-2: Mercury Loads Reduced by MRP Permittees by Fiscal Year and the Cumulative Totals (FY13-14 through FY19-20)

21 REFERENCES

BASMAA, 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared by Geosyntec Consultants and EOA, Inc. for the Bay Area Stormwater Management Agencies Association (BASMAA). March 2017.

Contra Costa Clean Water Program, 2016. Mercury and PCBs Control Measures Implementation Status Report. Submitted in Compliance with Provision C.11.a.iii.(1) and C.12.a.iii.(1) Municipal Regional Stormwater Permit NPDES Permit No. CAS612008 Order No. R2-2015-0049. March 31, 2016.

Mangarella, P., Havens, K., Lewis, W., and McKee, L.J., 2010. Task 3.5.1: Desktop Evaluation of Controls for Polychlorinated Biphenyls and Mercury Load Reduction. A Technical Report of the Regional Watershed Program: SFEI Contribution 613. San Francisco Estuary Institute, Oakland, CA.

McKee, L., Mangarella, P., Williamson, B., Hayworth, J., and Austin, L., 2006. Review of Methods Used to Reduce Urban Stormwater Loads: Task 3.4. A Technical Report of the Regional Watershed Program: SFEI Contribution #429. San Francisco Estuary Institute, Oakland, CA.

Yee, D., McKee, L.J., 2010. Task 3.5: Concentrations of PCBs and Hg in Soils, Sediments, and Water in the Urbanized Bay Area: Implications for Best Management. A Technical Report of the Watershed Program. SFEI Contribution 608. San Francisco Estuary Institute, Oakland, CA 94621.

ATTACHMENT A

Source Property Referrals and

Self-Abatement Reports

PCB REFERRAL SITE INFORMATION

The purpose of this form is to provide the Department of Toxic Substances Control and the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions. Please use additional pages, as necessary, to complete your responses.

Referring Agency: City of Richmond
Staff Contact Name: Joanne Le
Phone: (510) 620-6540
Email Address: joanne_le@ci.richmond.ca.us
Date of Referral: 9/17/2020

1. Name of Site: Zeneca/Former Stauffer Chemical Company

2. Address City County ZIP: 1415 South 47th St, Richmond, CA 94804

3. APN(s): 560-050-022

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):
   Total area is 86 acres. Area of concern is 9.2 acres. See Figure 1 for location.

5. Current Owner
   Name: Cherokee Simeon Venture I LLC
   Address, City, County & Zip Code: 4677 Meade St, Richmond, CA 94804
   Phone: Unknown E-mail Address: unknown

6. Background: Current Business Operations
   Name: Vacant

   Type:
   Period of Operation:

7. Background: Previous Business Operations (if known)
   #1 Name: Zeneca/Stauffer Chemical Company

   Type: Manufacture Sulfuric Acid

   Period of Operation: 1897-1997

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

   The site was first developed in 1897 when Stauffer Chemical Company built a plant to manufacture sulfuric acid. The facility continually expanded, acquiring adjacent parcels and manufacturing of various chemicals, including proprietary pesticides. All manufacturing activities ceased in 1997 and all but three buildings were demolished in 2000 and are currently unoccupied. The site was divided in seven operable units or investigation areas.

   The area of interest is HA-2 which includes the upper and lower lagoons (also known as former chemical evaporation ponds) which total approximately six acres and the adjacent transitional habitat or habitat buffer area (approximately 3.2 acres). The upper and lower lagoons were created

between 1960 and 1971 by the construction of levees or berms in existing upland areas. When the facility was in operation, the lagoons were known as evaporation ponds and were arranged in series to capture site wastewater mixtures from industrial activities, building maintenance, chemical processing and untreated stormwater runoff. The lagoons are currently used for stormwater management.

The US Army Corps of Engineers asserted jurisdiction over the delineated areas waters and wetlands areas via an Authorized Jurisdictional Determination on March 18, 2016. This includes a small drainage ditch, ponded area, and both lagoons. The major chemicals of concern at HA-2 (approximately 9.2 acres) in sediments, soil and/or groundwater includes proprietary pesticides (s-ethyl dipropylthiocarbamate or EPTC, and pebulate), metals (arsenic, lead, copper, mercury and selenium), organochlorine pesticides, and PCBs.

The site is currently under clean-up order from the Department of Toxic Substance Control. Proposed remediation actions are to remove soils and sediments that contain chemicals above screening levels, in situ treatment of moderate concentrations of proprietary pesticides, placement of a sediment cap, groundwater monitoring, habitat restoration, and institutional controls. The schedule of remediation actions are as follows: Remediation Action Plan was submitted to DTSC on November 1, 2019; Operations and Maintenance Plan was submitted to the DTSC December 17, 2019, and Remedial Action Completion Report is due to DTSC in 2022.

9. Describe the known and suspected sources of PCBs at the site.

   The major chemicals of concerns at HA-2 in sediments, soil and/or groundwater includes proprietary pesticides (s-ethyl dipropylthiocarbamate or EPTC, and pebulate), metals (arsenic, lead, copper, mercury and selenium), organochlorine pesticides and PCBs sourced from historic manufacturing activities.

10. Has sampling or other investigation been conducted in the vicinity of the property? (Yes) No
    Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

    Sampling was performed by Stauffer in 1987 and confirmed concentrations of proprietary pesticides (s-ethyl dipropylthiocarbamate or EPTC, and pebulate), metals (arsenic, lead, copper, mercury and selenium), organochlorine pesticides, VOCs, SVOCs and PCBs. PCBs were found throughout the site and, specifically, along the northwestern portion of Lot 1 and the former railroad spurs. Soil within the vicinity of MW-25 contained PCBs and remediation efforts in 2008 removed 2,800 tons of soil containing PCBs and VOCs. Soil in the Lot 1 PCB Area was excavated in 2008 to remove soil where PCBs were detected above 1 mg/kg and VOCs were detected above remedial goals (EKI, 2008). Excavation extents are shown on Figure 4 (EKI, 2008) and Figure 2 (Terraphase Engineering Inc., 2019).

11. Is the site subject to the general industrial stormwater permit? Yes (No)
    If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? (Yes) No Unknown
    If yes, explain:

Current potential for exposure of public health and the environment to contaminants at the site are direct contact of site media by plants and invertebrates, and incidental ingestion of site media, inhalation of burrow or ambient air, and dermal contact by wildlife. Indirect exposures may include ingestion of contaminated food (biota).

13. Are any Federal, State or Local regulatory agencies currently involved with the site?
Yes No
If yes, provide as much of the information below as known.

Agency Involvement Contact Name Phone

Agency	Involvement	Contact Name	Phone Number
DTSC	Project Manager	Lynn Nakashima	(510) 540-3839
EPA	Project Manager	Omer Shalev	(415) 972-3538

14. Provide any other pertinent site information not covered above:

Following the cleanup, the site could be redeveloped for a variety of uses, including residential, retail, commercial, and recreational.

15. Describe enhanced control measures that will be implemented at the site.

Proposed remediation actions are to remove soils and sediments that contain chemicals above screening levels, in situ treatment of moderate concentrations of proprietary pesticides, placement of a sediment cap, groundwater monitoring, habitat restoration, and institutional controls.

As the site discharges to directly San Francisco Bay, there is no opportunity to provide enhanced operation and maintenance for this site. No load reduction credit has been assumed for this referral.

References

Erler & Kalinowski, Inc. (EKI). 2008. Completion Report (Part 1), Lot 1 PCB/VOC Area Removal Action, Campus Bay Site, Richmond, California. Erler & Kalinowski Inc. October 14.

Terraphase Engineering Inc. 2019. Feasibility Study and Remedial Action Plan for Lot 1, Lot 2, and the Uplands Portion of Lot 3 Campus Bay, Richmond, California. Volume I of III. November 1, 2019.

Figures

N

SAFETY FIRST

terraphase engineering

CLIENT:	Zeneca Inc.
PROJECT:	Campus Bay Richmond, CA
PROJECT NUMBER:	0009.002.049

Site Location

FIGURE 1

File: J:\GIS Backup\GIS Data\0009 Zeneca - 002 Campus Bay\023 GWM 2015\SMR\fig_1_Site_Location_0009-002-023.mxd 7/30/2015 Created by: DR Checked by: EM

05083

5124

Legend:

- Property Boundary
- Former Arsenic Excavation Boundary (See Note 3)
- Excavation Boundary
- Boundary of Area Not Over-Excavated due to East Bay Municipal District Water Line
- Sidewall Benching Boundary
- Fence
- Former Building Location
- Abandoned Fire Line
- Abandoned Chemical Drain Line
- Abandoned Sanitary Sewer Line
- Natural Gas Line
- Water Line
- Location of Soil Confirmation Sample Used to Determine Final Excavation Extent (Note 5)
- Location of Soil Confirmation Sample Excavated During Additional Soil Removal Activities (Note 5)
- GN1-5/GN2-10 — Two Samples Collected at Same Location Along Sidewall but at Different Depths
- Abandoned Monitoring Well
- Pre-Remediation Soil Sampling Location
- Ⓖ — Denotes Area Excavated to Specified Depth (Note 6)
- (2 ft) — Excavation Depth
- Concrete Slab
- Approximate Areas of Additional Excavation

Abbreviations:

ft bgs	=	depth in feet below ground surface
*	=	soil associated with sample removed during sidewall sloping and benching activities
**	=	soil associated with sample removed during excavation of B90-1 area

Notes:

1. All locations are approximate.
2. Basemap provided by LFR Inc.
3. Eastern boundary of former arsenic excavation extends at least 14 feet east of borehole B90-4 based on field observations made during EKI's disposal classification evaluation sampling performed in August 2007.
4. Sample AF6-4 was collected and put on hold. Sample was not analyzed due to detections below remediation goals in surrounding samples.
5. Data for soil confirmation samples are presented in Tables 1 and 2.
6. Soil excavation and related activities took place between 16 June and 15 August 2008.
7. Soil above and below concrete slab excavated to approximate boundary shown on figure.

Erler & Kalinowski, Inc.

Pre-Remediation and Confirmation Soil Sample Locations

Campus Bay Site
Richmond, CA

February 2009
EKI A50014.05

Figure 4

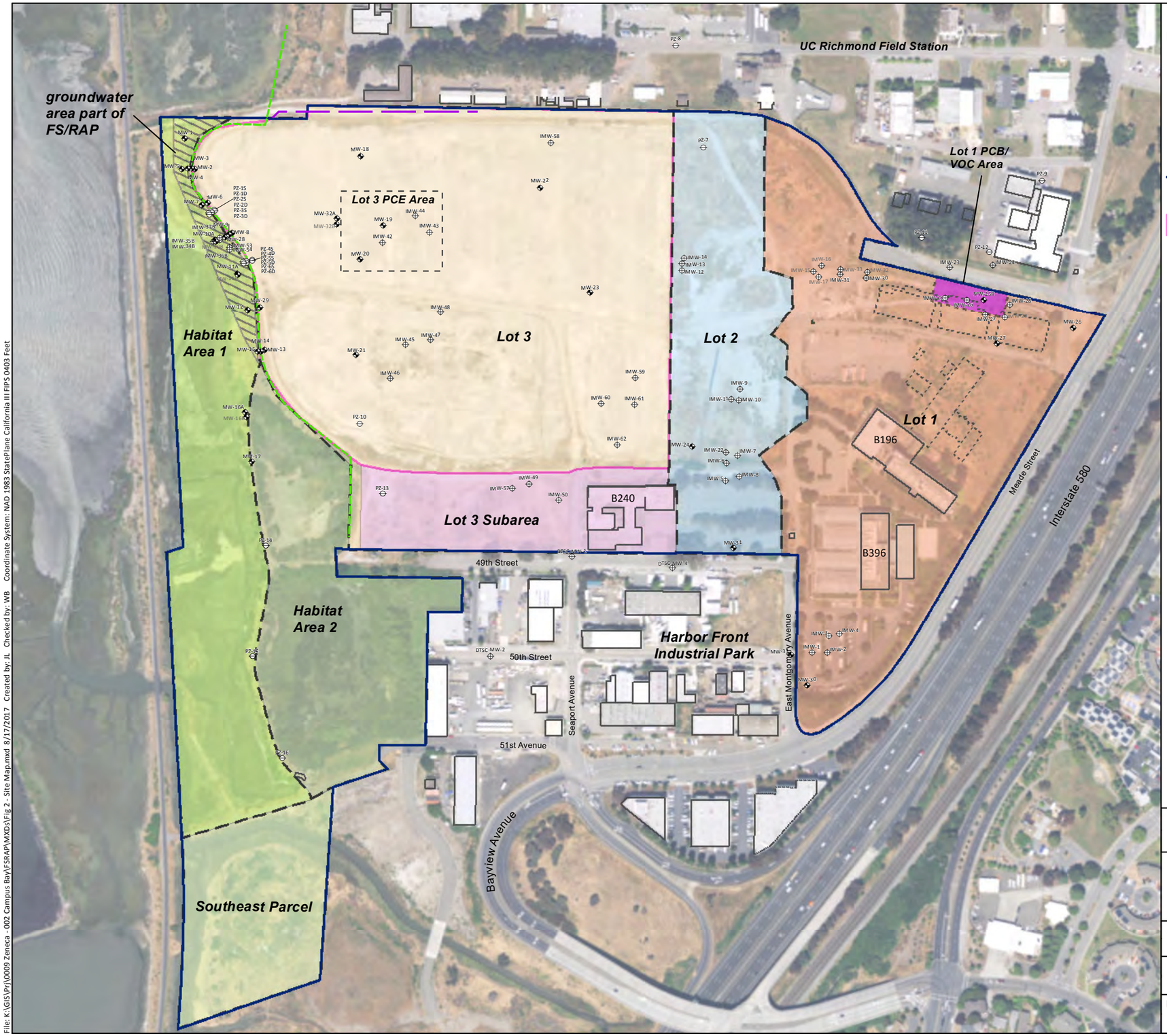

Legend

- Approximate Location of Monitoring Well
- Approximate Location of Temporary Monitoring Well
- Approximate Location of Piezometer
- Approximate Location of Slurry Wall
- Approximate Location of Biologically Active Permeable Barrier (BAPB)
- Approximate Site Boundary
- Lot Boundary
- Lot 3 Treated Cinder Area

Notes:
1. All locations are approximate.
2. Basemap obtained from ARCADIS U.S., Inc.
3. This FS/RAP addresses the portions of Campus Bay identified as Lot 1, Lot 2, Lot 3, and the groundwater beneath the portion of the habitat area between Lot 3 and East Stege Marsh.
4. Groundwater wells include groundwater monitoring well, interim monitoring well and piezometers.
5. Groundwater monitoring wells, interim monitoring wells and piezometers illustrated are included in semi-annual monitoring and/or performance monitoring.

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0 150 300 450 600 Feet

1 inch = 300 feet

CLIENT:	Zeneca Inc.
PROJECT:	Campus Bay Richmond, California
PROJECT NUMBER:	0009.002.049

Site Plan

FIGURE 2

File: K:\GIS\Pr\0009 Zeneca - 002 Campus Bay\FSRAP\MXDs\Fig 2 - Site Map.mxd 8/17/2017 Created by: JL Checked by: WB Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

PCBs REFERRAL SITE INFORMATION

The purpose of this form is to provide the Department of Toxic Substances Control and the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCBs cleanup actions. Please use additional pages, as necessary, to complete your responses.

Referring Agency: City of Richmond
Staff Contact Name: Joanne Le
Phone: (510) 620-6540
Email Address: joanne_le@ci.richmond.ca.us
Date of Referral: 9/17/2020

1. Name of Site: UC Berkeley Richmond Field Station

2. Address City County ZIP: 1301 South 46th St, Richmond, CA 94804

3. APN(s): 56000600007, 560060008, 560270030

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres): The total site area is 162 acres. The location map and site map are provided in Figures 1 and 2, respectively. The contiguous area in the upland region where PCBs in soil are elevated is approximately 14 acres (Figure 3).

5. Current Owner
Name: The Regents of the University of California
Address, City, County & Zip Code: 1111 Franklin Street, 12th Floor, Oakland, California 94607
Phone: **E-mail Address:** regentsoffice@ucop.edu

6. Background: Current Business Operations
Name: Regents of the University of California
Type: Academic teaching and research activities
Period of Operation: 1950-present

The Richmond Field Station (RFS) is an academic teaching and research off-site facility located 6 miles northwest of the UC Berkeley Central Campus on the San Francisco Bay. The RFS has been used primarily for large-scale engineering research since 1950. The 170-acre property consists of 100-acres of uplands with the remainder being marsh or bay lands.

The RFS property currently accommodates a range of research and resource conservation values. With more than 500,000 assignable square feet of research space, the site houses the eleven floor 7.4 million volume storage capacity Northern Regional Library Facility which serves as an archive for lesser used books for four northern UC campuses, one of the world's largest earthquake shaking tables, sophisticated test facilities for advanced transportation research, and a regional laboratory for U.S. Environmental Protection Agency.

The open areas of the Field Station are also prized for their research and habitat value. The site contains one of the largest and best preserved remaining areas of native coastal grasslands that were once prevalent throughout the Bay Area. The adjacent stands of eucalyptus provide a home for wintering monarch butterflies and nesting raptors. The bay marsh and mudflats provide additional habitat for a variety of flora and fauna, including the endangered California Clapper Rail, as well as an opportunity for the Berkeley campus to use these areas for teaching and research.

In addition to UC Berkeley-related operations, the UC Regents have leased space to non-UC Berkeley tenants. Current tenants include the EPA Region 9 Laboratory; Schlumberger, Inc.; The Watershed Project (TWP); and Stratacor, Inc.

Many of the RFS buildings historically housed (and currently house) offices, laboratories, warehouses, and workshops used to support engineering projects. Many of the buildings used by the California Cap Company were torn down when UC Berkeley purchased the RFS property, but some still remain—including two buildings that were formerly homes and several buildings used for a laboratory, offices, and storage. In a few cases, RFS moved buildings to new locations on the property (Tetra Tech Inc, 2008).

7. Background: Previous Business Operations (if known)

#1
Name: California Cap Company
Type: Produced mercury fulminate, blasting caps, and shells
Period of Operation: 1891-1950

Between the 1880s and 1948, the California Cap Company, manufacturer of blasting caps, shells, and explosives, and several other small companies, including the U.S. Briquette Company and the Pacific Cartridge Company, operated explosives manufacturing plants at the RFS. Research has demonstrated that there is very little known information regarding activities at the RFS prior to World War II. The California Cap Company slowed operations following World War II, but no additional information is available. In October 1950, the UC Regents purchased the California Cap Company property with the agreement that the California Cap Company would remove all hazardous materials from the property. (Tetra Tech, Inc., 2008).

#2
Name: Spanish Governor of Alta
Type: Ranch
Period of Operation: 1823-1891

The RFS was part of a land grant from the Spanish Governor of Alta, California to Francisco Maria Castro in 1823 and was part of Castro's Rancho San Pablo. Wheat was grown on the rancho, and a grain storage warehouse was built on the RFS (at the current location of Building 102). The Rancho was subdivided and sold in the 1850s. Richard Stege raised frogs for restaurants in San Francisco and is believed to have constructed the pier on the mudflat known as Stege Landing. In the late 1800s, portions of the property were sold, and chemical and explosives industries moved into the area (Tetra Tech, Inc., 2008).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

Soil on the site is impacted with metals (arsenic, mercury, and lead), polycyclic aromatic hydrocarbons (PAHs), and dioxins. Groundwater within the vicinity of the site is impacted by carbon tetrachloride. Sources of mercury account for approximately 1,500 cubic yards of mercury-impacted soil from the Mercury Fulminate area. Sources of PAHs account for approximately 15 cubic yards of impacted soil from the corporation yard (DTSC, 2011).

9. Describe the known and suspected sources of PCBs at the site.

Data for soil and sediment are discussed separately for three different ecological zones: (1) the RFS Upland Area, (2) the Transition Area (including the Bulb), and (3) the Western Stege Marsh as shown on Figure 2. PCBs data presented below are described in the 2008 Current Conditions Report (Tetra Tech, 2008).

Historic potential source areas from former industrial operations are presented on Figure 4 (Figure 2-1 from the 2014 Removal Action Work (RAW) Plan (Tetra Tech, 2014).

UPLAND AREA

Remediation activities performed at RFS in 2004 removed identified areas of PCBs in the Upland Area. A query of the database of historic analytical results reports that 115 soil samples were collected and analyzed for PCBs in the Upland Area that were not subject to remediation activities and therefore are representative of current site conditions. The concentrations of PCBs for the 0 to 1 feet depth interval in the Upland Area is presented on Figure 5 (Figure 34 in the 2008 Current Conditions Report) and screened against the Tier 1 Edwards Air Force Base ecological screening criterion of 0.1 mg/kg. At one location of the fill along the western foundation of Building 155, the total PCBs concentrations in two samples were 9.99 mg/kg (WPERIMETERB155COMP2) and 12.59 mg/kg (WPERIMETERB155COMP1). PCBs concentrations did not exceed the human health site-specific target level (H-SSTL) developed in 2001 by the Water Board of 10 mg/kg.

Records showed that all PCBs-containing electrical distribution system transformers were either removed for off-site disposal or filled onsite with non-PCBs oils in the late 1980s and early 1990s. During this time period, approximately 40 pieces of electrical equipment (mostly capacitors and some transformers) were temporarily placed on a concrete pad in the northern portion of Building 280B, as part of a campus-wide cleanout of PCBs items. There are no records indicating that spills of PCBs oils ever occurred, and former employees did not recall any leaks or spills associated with the transformers at the RFS.

According to the 2014 Removal Action Work (RAW) Plan, excavation of PCBs-impacted soils is proposed at Building 112 and Building 150 Transformer Areas and three areas within the Corporation Yard with total PCBs exceeding the TSCA high occupancy without further conditions threshold remedial goal (1 mg/kg) as shown on Figure 6 (Figure 4-1 from the RAW).

TRANSITION AREA

The Transition Area was created when upland fill materials were placed on top of the former tidal mudflat. Prior to placement of clean soil on top of the former tidal mudflat, portions of the tidal mudflat were subject to pollutant releases or direct placement of wastes from California Cap Company or filled with the placement of pyrite cinders. Remediation has been completed in the eastern half of the Transition Area and the area was backfilled with clean soils and sediments.

Ten samples were collected for analysis of PCBs in the Transition Area in areas not subject to remediation activities performed between 2002 and 2004. The concentrations of PCBs for the 0 to 1 feet depth interval are presented on Figure 4 (Figure 34 of the 2008 Current Conditions Report) and screened against the Tier 1 Edwards Air Force Base ecological screening criterion of 0.1 mg/kg. PCBs concentrations exceeded the H-SSTL of 10 mg/kg in one surface soil sample collected along the southern edge of the Bulb area of the Transition Area at sample location Old Outfall 2. This

sample was collected at the location of a former suspected sanitary sewer line outfall, but the location of the sanitary sewer line has not been verified.

WESTERN STEGE MARSH

Remediation of the eastern portion of the Western Stege Marsh was performed in two phases in 2002 and 2003. The remediation activities in the marsh included excavation of sediments down to clean, stiff tan clay followed by backfilling with clean bay mud. As a result of the completed remediation activities, an extensive area of pollutant source material and most of the contaminated sediments present in the eastern portion of the Western Stege Marsh were removed.

In portions of the marsh that were not remediated 2002 and 2003, PCBs detected in shallow sediment (0 to 0.5 bgs) exceeded the marsh screening values in the western portion of the marsh, primarily along Meeker Slough and east of the Bulb area in the Transition Area. The highest concentrations of PCBs were detected along the northern portion of Meeker Slough. In addition, areas in the eastern portion of Western Stege Marsh that was remediated in 2002 and 2003 have slightly elevated concentrations of PCBs in the near surface; as compared with ER-L values.

10. Has sampling or other investigation been conducted in the vicinity of the property? Yes (No)

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

The site discharges directly to the Bay, so no ROW sampling has been conducted.

11. Is the site subject to the general industrial stormwater permit? Yes (No)

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCBs sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes (No) Unknown

If yes, explain:

13. Are any Federal, State or Local regulatory agencies currently involved with the site? (Yes) No

If yes, provide as much of the information below as known.

Agency Involvement Contact Name Phone

Agency	Involvement	Contact Name	Phone Number
DTSC	Project Manager	Lynn Nakashima	(510) 540-3839

14. Provide any other pertinent site information not covered above: None

15. Describe enhanced control measures that will be implemented at the site.

As the site discharges to directly San Francisco Bay, there is no opportunity to provide enhanced operation and maintenance for this site. No load reduction credit has been assumed for this referral.

References

Department of Toxic Substances Control (DTSC). 2006. Site Investigation and Remediation Order. Docket No. I/SE-RAO 06/07-004. September 15.

Department of Toxic Substances Control (DTSC). 2011. Filing of Notice of Determination in Compliance with Section 21108 or 21152 of the Public Resources Code. June 23.

Tetra Tech, Inc. 2008. Current Conditions Report. University of California, Berkeley Richmond Field Station, Richmond, California. November 21.

Tetra Tech, Inc. 2014. Removal Action Workplan Richmond Bay Campus, Richmond, California. Research, Education, and Support Area and Groundwater within the Former Richmond Field Station Site. July 18.

Tetra Tech, Inc. 2018. Phase V Sampling Results Technical Memorandum Western Stege Marsh. Richmond Field Station Site Berkeley Global Campus at Richmond Bay University of California, Berkeley. October 15.

FIGURES

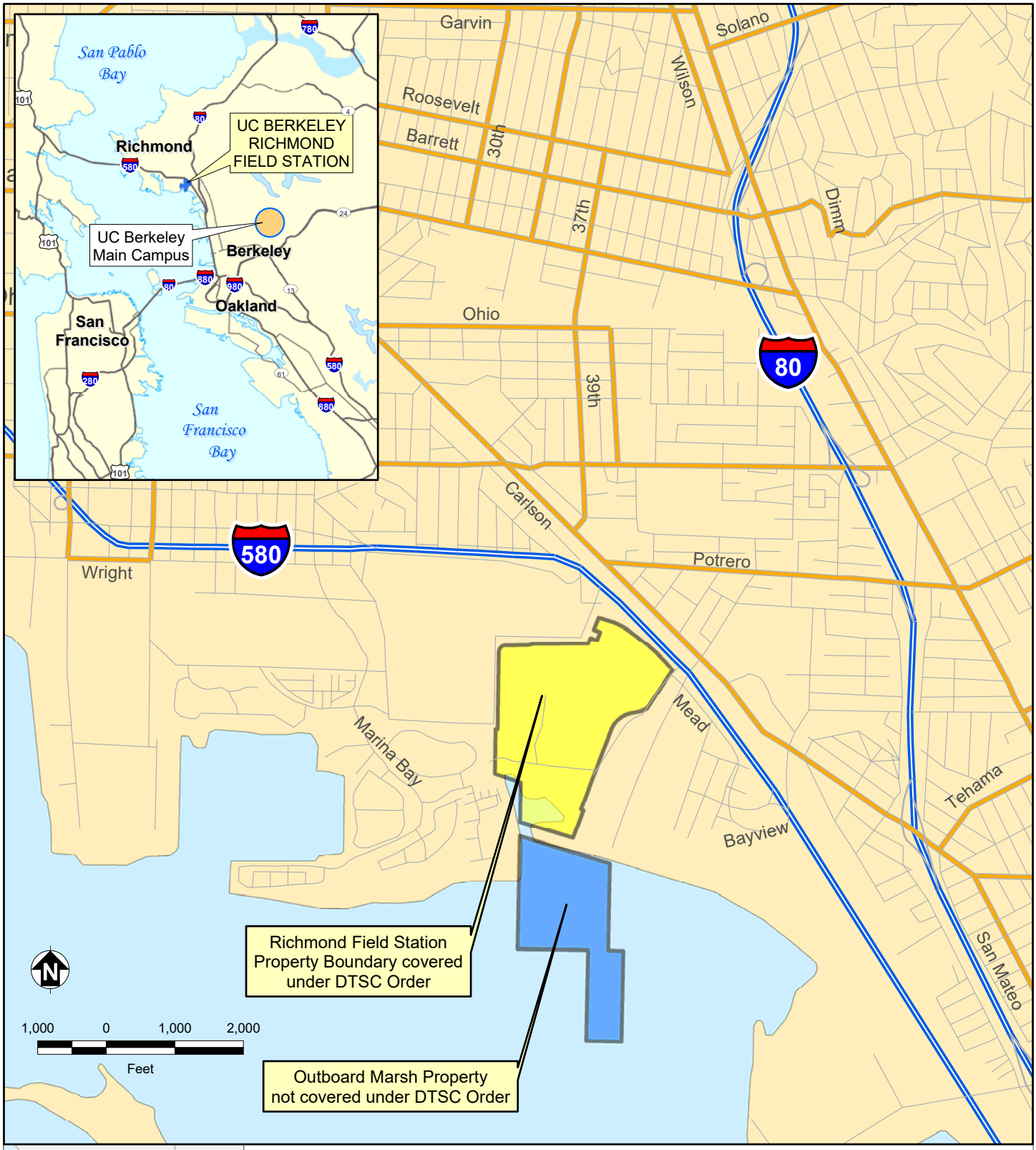

TETRA TECH EM INC.

Richmond Field Station
University of California, Berkeley

FIGURE 1
SITE LOCATION MAP

Current Conditions Report

2008-11-19 v:\misc_gis\richmond_field_station\projects\current_conditions_report\site_location_map_sza.mxd

05092
5133

300 0 300

Feet

Property Boundary

Approximate Property Boundary

Notes:
EBRPD East Bay Regional Parks District
EERC Earthquake Engineering Reseach Center
EPA Environmental Protection Agency
NRLF Northern Regional Library Facility
RFS Richmond Field Station

TETRA TECH EM INC.

Richmond Field Station
University of California, Berkeley

FIGURE 2
SITE MAP

Current Conditions Report

2008-11-19 V:\Misc_GIS\Richmond_Field_Station\Projects\Current_Conditions_Report\Site_Boundaries.mxd

Figure 3. Estimate of a contiguous area in the upland region (yellow polygon), where PCBs results in soil are >1mg/kg. Area is approximately 14 acres.

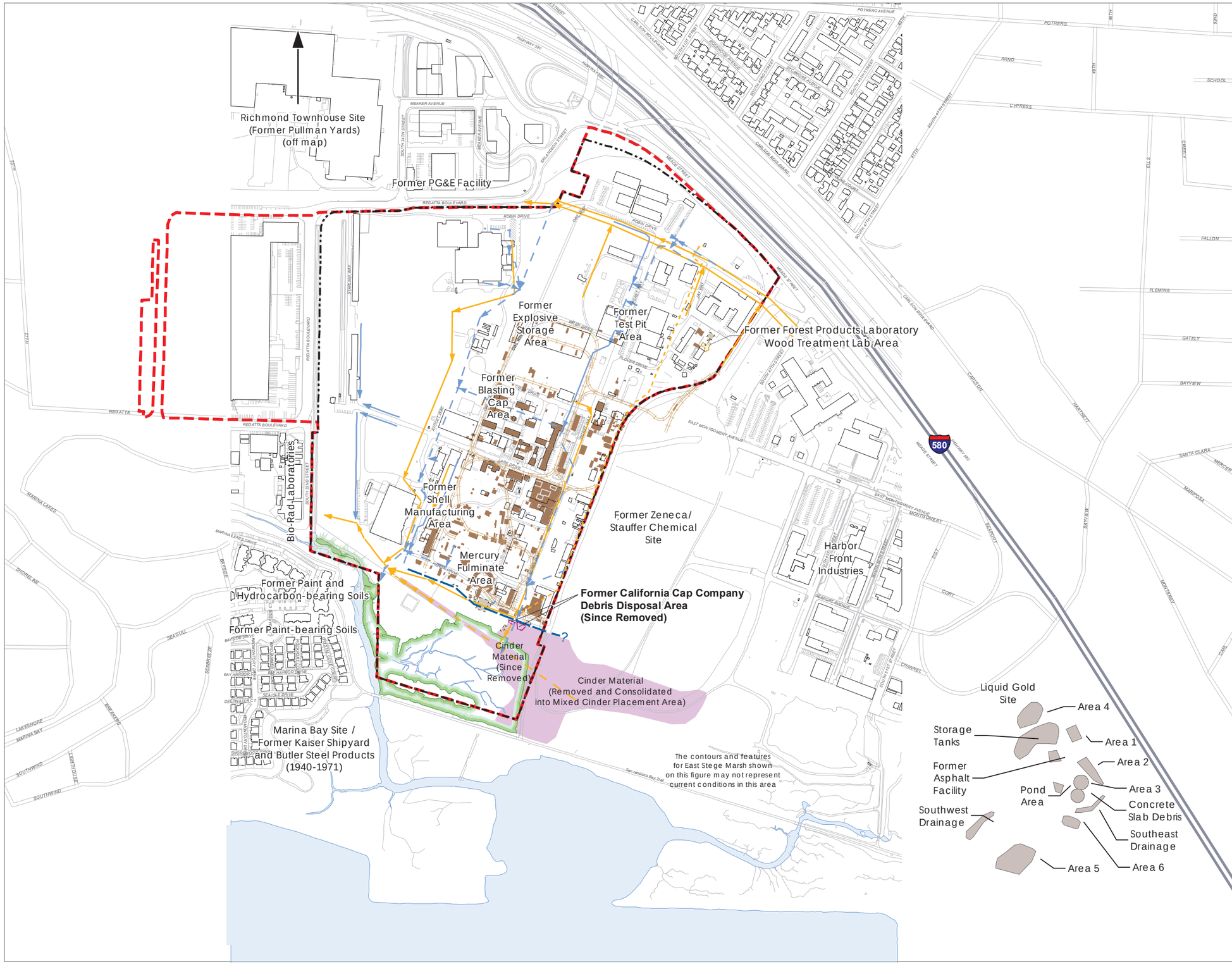

Potential Source Areas (Some Locations are Approximate):

- Former California Cap Company Facilities
- Former Pyrite Cinders (Since Removed)
- Removed or Relocated Building (RFS)
- Former California Cap Company Debris Disposal Area (Since Removed)
- Former California Cap Company Tramway
- Portion of RFS Property Subject to DTSC order, Defined as "Site"
- Richmond Bay Campus
- Existing Building
- Roads and Other Landscape Features
- Marsh Boundary
- Former Seawall (Approximate)
- Surface Water

Sanitary Sewer Lines:

- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Storm Drain Lines:

- Open Swale
- Underground Culvert

Sources:
1. URS. 2000. Field Sampling and Analysis Results, University of California Berkeley,Richmond Field Station/Stege Marsh. December.

2. Former California Cap Company building information is based on Sanborn maps from 1930 and 1941 and an earlier undated map signed by "J. Geo. Smith, C.E., Emeryville."

Notes:
Cinder material removed from UC was consolidated into mixed cinder placement area on former Zeneca site.

DTSC	Department of Toxic Substances Control
PG&E	Pacific Gas and Electric Company
RFS	Richmond Field Station
UC	University of California
URS	URS Corporation

N

500 0 500
Feet

TETRA TECH

Richmond Bay Campus

FIGURE 2-3
HISTORIC POTENTIAL SOURCE AREAS FROM FORMER INDUSTRIAL OPERATIONS (PRE 2002)

Removal Action Workplan

9/24/2013 V:\Misc_GIS\Richmond_Field_Station\Projects\RAW\Layouts\Historic_Potential_Source_Areas.mxd TtEMI-OAK yashekia.evans

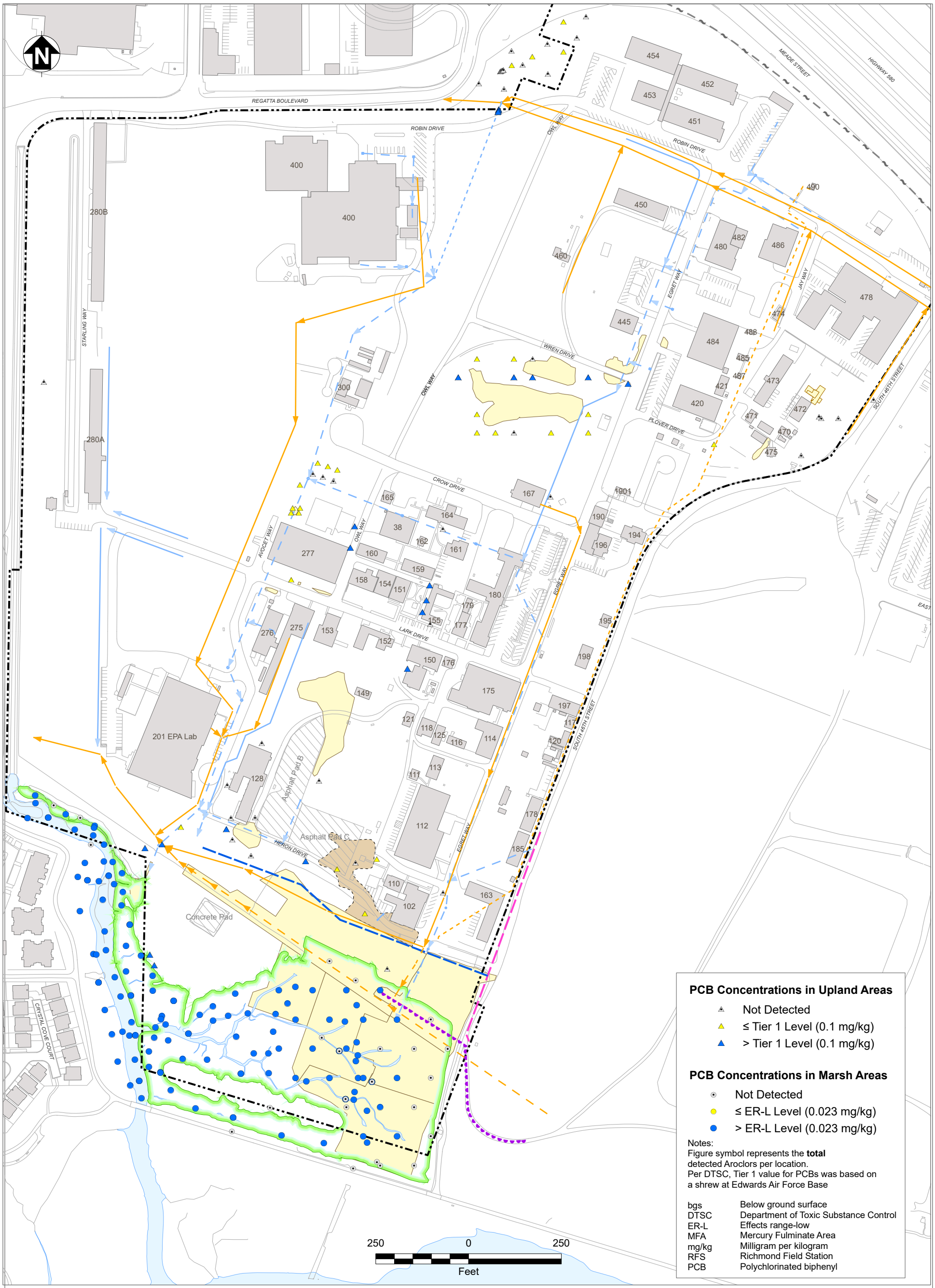

Existing Building
Asphalt/Concrete Pads
MFA
Remediated Areas
Surface Water
Marsh Boundary
Property Boundary
Approximate Property Boundary

Sanitary Sewer Lines:
Existing Sewer Line
Removed Sewer Line
Abandoned Sewer Line
Storm Drain Line:
Open Swale
Underground Culvert
Underground Culvert, Abandoned (Grouted at Manholes)

Biologically Active Permeable Barrier Wall
Former Seawall (Approximate)
Slurry Wall
Road or Other Landscape Feature

TETRA TECH EM INC.

Richmond Field Station
University of California, Berkeley

FIGURE 34
PCB ANALYTICAL RESULTS IN SOIL AND SEDIMENT, 0 TO 1 FEET BGS
Current Conditions Report

2008-11-18 V:\Misc_GIS\Richmond_Field_Station\Projects\Current_Conditions_Report\PCB_soil_sed_0-1ft.mxd TtEMI-SF

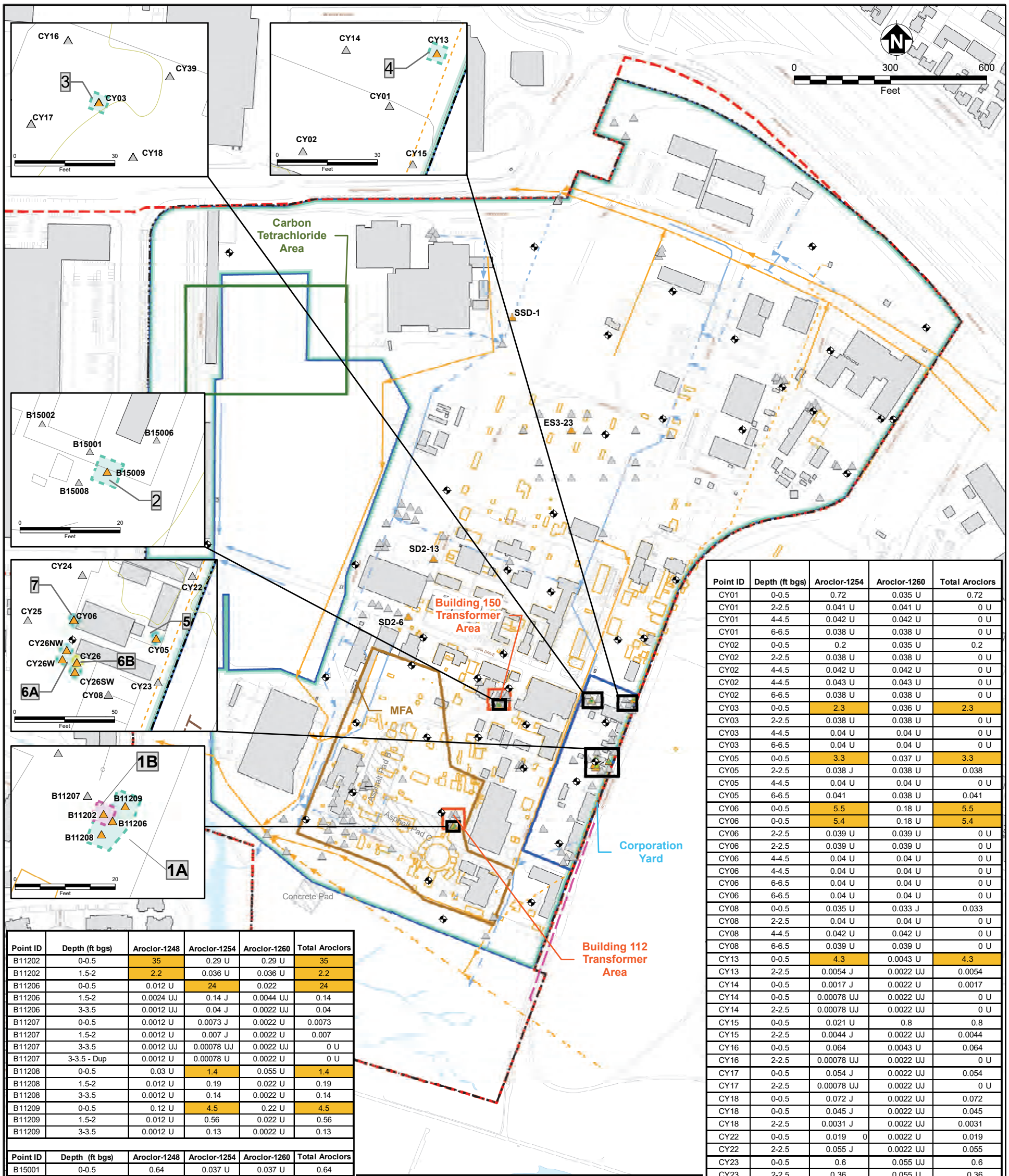

Point ID	Depth (ft bgs)	Aroclor-1248	Aroclor-1254	Aroclor-1260	Total Aroclors
B11202	0-0.5	35	0.29 U	0.29 U	35
B11202	1.5-2	2.2	0.036 U	0.036 U	2.2
B11206	0-0.5	0.012 U	24	0.022	24
B11206	1.5-2	0.0024 UJ	0.14 J	0.0044 UJ	0.14
B11206	3-3.5	0.0012 UJ	0.04 J	0.0022 UJ	0.04
B11207	0-0.5	0.0012 U	0.0073 J	0.0022 U	0.0073
B11207	1.5-2	0.0012 U	0.007 J	0.0022 U	0.007
B11207	3-3.5	0.0012 UJ	0.00078 UJ	0.0022 UJ	0 U
B11207	3-3.5 - Dup	0.0012 U	0.00078 U	0.0022 U	0 U
B11208	0-0.5	0.03 U	1.4	0.055 U	1.4
B11208	1.5-2	0.012 U	0.19	0.022 U	0.19
B11208	3-3.5	0.0012 U	0.14	0.0022 U	0.14
B11209	0-0.5	0.12 U	4.5	0.22 U	4.5
B11209	1.5-2	0.012 U	0.56	0.022 U	0.56
B11209	3-3.5	0.0012 U	0.13	0.0022 U	0.13

Point ID	Depth (ft bgs)	Aroclor-1248	Aroclor-1254	Aroclor-1260	Total Aroclors
B15001	0-0.5	0.64	0.037 U	0.037 U	0.64
B15001	1.5-2	0.039 U	0.039 U	0.039 U	0 U
B15002	0-0.5	0.037 U	0.028 J	0.036 J	0.064
B15002	1.5-2	0.04 U	0.04 U	0.04 U	0 U
B15006	0-0.5	0.035 U	0.028 J	0.034 J	0.062
B15006	1.5-2	0.04 U	0.04 U	0.04 U	0 U
B15008	0-0.5	0.0012 U	0.052	0.0022 U	0.052
B15008	1.5-2	0.0012 U	0.018	0.0022 U	0.018
B15009	0-0.5	0.033 U	0.021 U	1.7	1.7
B15009	1.5-2	0.0012 UJ	0.14 J	0.0022 UJ	0.14
B15010	0-0.5	0.0034 U	0.048	0.0062 U	0.048
B15010	1.5-2	0.0012 U	0.024	0.0022 U	0.024
B15010	1.5-2 - Dup	0.0012 U	0.023	0.0022 U	0.023

Excavation Site	EST. Depth (ft bgs)	EST. Area (ft²)	EST. Volume (cy)
1A	1	58	2.15
1B	2.5	16	1.48
2	1	25	0.93
3	1	25	0.93
4	1	25	0.93
5	1	25	0.93
6A	1	92	3.41
6B	3	25	2.78
7	1	25	0.93
Total		**316**	**14.45**

Point ID	Depth (ft bgs)	Aroclor-1254	Aroclor-1260	Total Aroclors
CY01	0-0.5	0.72	0.035 U	0.72
CY01	2-2.5	0.041 U	0.041 U	0 U
CY01	4-4.5	0.042 U	0.042 U	0 U
CY01	6-6.5	0.038 U	0.038 U	0 U
CY02	0-0.5	0.2	0.035 U	0.2
CY02	2-2.5	0.038 U	0.038 U	0 U
CY02	4-4.5	0.042 U	0.042 U	0 U
CY02	4-4.5	0.043 U	0.043 U	0 U
CY02	6-6.5	0.038 U	0.038 U	0 U
CY03	0-0.5	2.3	0.036 U	2.3
CY03	2-2.5	0.038 U	0.038 U	0 U
CY03	4-4.5	0.04 U	0.04 U	0 U
CY03	6-6.5	0.04 U	0.04 U	0 U
CY05	0-0.5	3.3	0.037 U	3.3
CY05	2-2.5	0.038 J	0.038 U	0.038
CY05	4-4.5	0.04 U	0.04 U	0 U
CY05	6-6.5	0.041	0.038 U	0.041
CY06	0-0.5	5.5	0.18 U	5.5
CY06	0-0.5	5.4	0.18 U	5.4
CY06	2-2.5	0.039 U	0.039 U	0 U
CY06	2-2.5	0.039 U	0.039 U	0 U
CY06	4-4.5	0.04 U	0.04 U	0 U
CY06	4-4.5	0.04 U	0.04 U	0 U
CY06	6-6.5	0.04 U	0.04 U	0 U
CY06	6-6.5	0.04 U	0.04 U	0 U
CY08	0-0.5	0.035 U	0.033 J	0.033
CY08	2-2.5	0.04 U	0.04 U	0 U
CY08	4-4.5	0.042 U	0.042 U	0 U
CY08	6-6.5	0.039 U	0.039 U	0 U
CY13	0-0.5	4.3	0.0043 U	4.3
CY13	2-2.5	0.0054 J	0.0022 UJ	0.0054
CY14	0-0.5	0.0017 J	0.0022 U	0.0017
CY14	0-0.5	0.00078 UJ	0.0022 UJ	0 U
CY14	2-2.5	0.00078 UJ	0.0022 UJ	0 U
CY15	0-0.5	0.021 U	0.8	0.8
CY15	2-2.5	0.0044 J	0.0022 UJ	0.0044
CY16	0-0.5	0.064	0.0043 U	0.064
CY16	2-2.5	0.00078 UJ	0.0022 UJ	0 U
CY17	0-0.5	0.054 J	0.0022 UJ	0.054
CY17	2-2.5	0.00078 UJ	0.0022 UJ	0 U
CY18	0-0.5	0.072 J	0.0022 UJ	0.072
CY18	0-0.5	0.045 J	0.0022 UJ	0.045
CY18	2-2.5	0.0031 J	0.0022 UJ	0.0031
CY22	0-0.5	0.019 0	0.0022 U	0.019
CY22	2-2.5	0.055 J	0.0022 UJ	0.055
CY23	0-0.5	0.6	0.055 UJ	0.6
CY23	2-2.5	0.36	0.055 U	0.36
CY24	0-0.5	0.082	0.0022 U	0.082
CY24	2-2.5	0.014	0.0022 U	0.014
CY25	0-0.5	0.00078 U	0.0022 U	0 U
CY25	2-2.5	0.00078 U	0.0022 U	0 U
CY26	0-0.5	110	2.2 U	110
CY26	2-2.5	7.2	0.22 U	7.2
CY26NW	0-0.5	1.1	0.022 U	1.1
CY26SW	0-0.5	8.3	0.22 U	8.3
CY26W	0-0.5	12	0.22 U	12
CY39	0-0.5	0.062	0.0022 U	0.062
CY39	2-2.5	0.17 J	0.0022 UJ	0.17

PCB Concentrations[1 2]
- PCB Concentrations[1 2] < 1 mg/kg (TSCA High Occupancy, No Conditions)
- PCB Concentrations[1 2] ≥ 1 mg/kg (TSCA High Occupancy, No Conditions)

PCB Excavation Footprint and Depth (ft bgs)
- 1 ft
- 2.5 ft
- 3 ft

Area Boundaries
- Transformer Areas
- Carbon Tetrachloride Area
- Corporation Yard
- MFA
- Research, Education & Support Area within the Site
- Richmond Bay Campus

- Portion of RFS Property Subject to DTSC order, Defined as "Site"
- Buildings
- Former California Cap Company Facilities/Buildings
- Roads other Landscape Features
- Piezometer Groundwater Monitoring Well
- Slurry Wall
- Asphalt/Concrete Pads
- Surface Water

Sanitary Sewer Lines:
- Existing Sewer Line
- Removed Sewer Line
- Abandoned Sewer Line

Storm Drain Lines:
- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted at Manholes)

Notes:
Results in table are presented in mg/kg.

1 Total PCB concentration is the sum of detected concentrations of Aroclors-1248, -1254, and -1260 in each sample. The maximum concentration at each location is represented.

2 Results for locations ES3-23, SD2-6, SD2-13, and SSD-1 are not presented in the tables and are not proposed for cleanup because they are not associated with any transformer area or any transformer maintenance activities.

bgs Below ground surface
cy Cubic yards
DTSC California Department of Toxic Substances Control
Dup Duplicate Sample
EST Estimated
ft Feet
J Estimated
MFA Mercury Fulminate Area
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
RES Research, Education & Support
RFS Richmond Field Station
TSCA Toxic Substances Control Act
U Not Detected

TETRA TECH

Richmond Bay Campus

FIGURE 4-1
PCB EXCAVATION AREAS

Removal Action Workplan

11/22/2013 V:\Misc_GIS\Richmond_Field_Station\Projects\RAW\Layouts\PCB Excavation Area.mxd TtEMI-OAK yashekia.evans

ATTACHMENT B

Managing PCBs in Building Materials Reports

Geosyntec consultants

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Oakland, California 94607
PH 510.836.3034
www.geosyntec.com

Memorandum

Date:	September 18, 2020
To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

*****

Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	Unknown	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

05110

5151

This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

Prepared for:

BASMAA
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Prepared by:

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Larry Walker Associates
Geosyntec Consultants
Stephanie Hughes
David J. Powers & Associates, Inc.

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

The mention of commercial products, their source, or their use in connection with information in BASMAA products is not to be construed as an actual or implied approval, endorsement, recommendation, or warranty of such product or its use in connection with the information provided by BASMAA.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

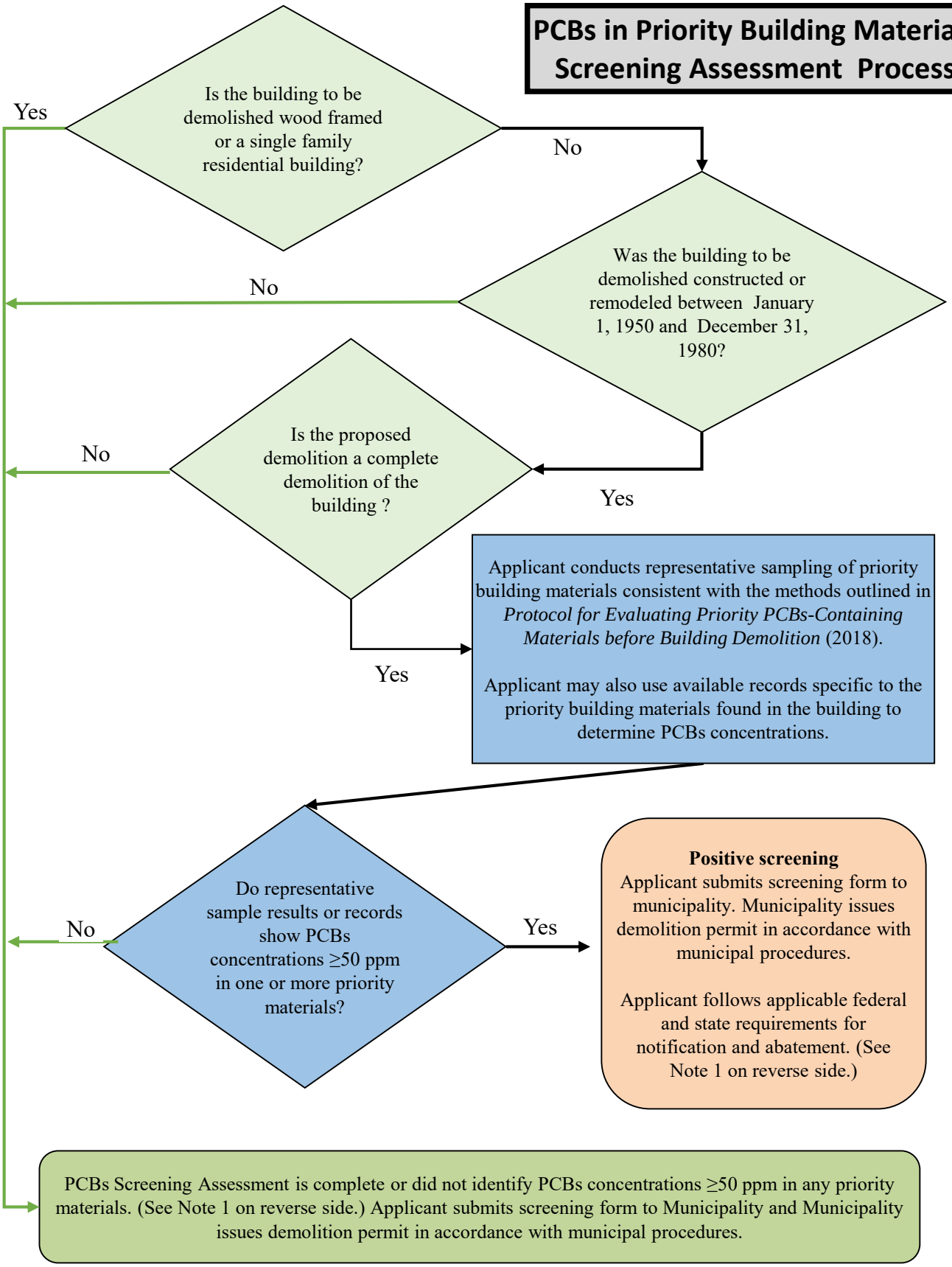

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
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Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
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DISCLAIMER

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

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[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

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[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	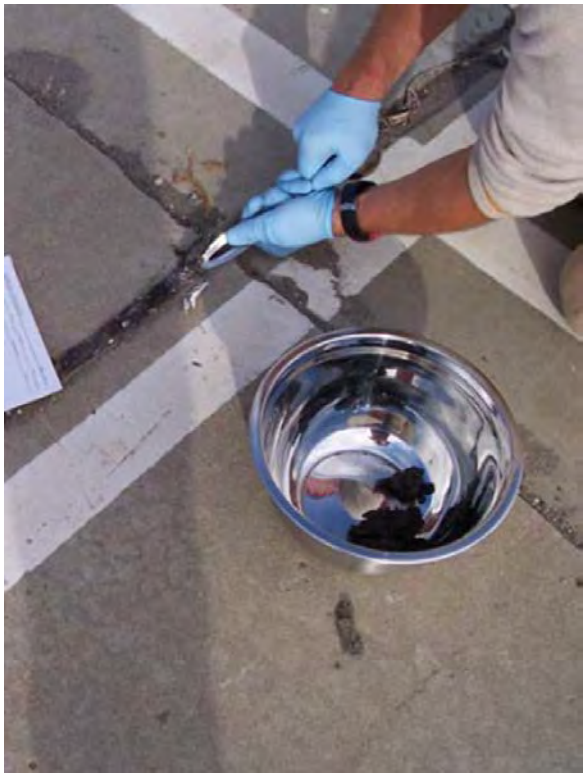
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	
Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7

<u>Thermal Insulation</u>:

Damaged felt-style thermal insulation.

Photograph 8

<u>Thermal Insulation</u>:

Exposed/damaged fiberglass insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 9	
<u>Thermal Insulation</u>: **Exposed and damaged pipe insulation.**	
Photograph 10	
<u>Thermal Insulation</u>: **Pipe insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	
Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

MEMORANDUM

TO: **BASMAA MPC Committee**

FROM: **Lisa Sabin and Jon Konnan, EOA, Inc.**

DATE: **September 23, 2020**

SUBJECT: **Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program**

1. BACKGROUND

The San Francisco Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. Provision C.12.f.ii(3) requires development of a data collection and assessment methodology program by July 1, 2019 to quantify PCBs loads reduced through implementation of the new program for controlling PCBs during building demolition, which began implementation on that date. Provision C.12.f.iii requires Permittees to submit the data collection and assessment methodology with their Fiscal Year (FY) 2019/20 Annual Reports, and states that this reporting should be at the regional level on behalf of all Permittees.

This technical memorandum provides administrative and technical support at the regional level for ongoing efforts by MRP Permittees to comply with data collection, evaluation, and reporting requirements under MRP Provision C.12.f. by:

- Documenting the regional process to collect data from the new program for controlling PCBs during building demolition;
- Presenting the assessment methodology to calculate PCBs loads reduced via the building demolition program;
- Documenting the results of additional literature searches and data gathering efforts conducted to set the stage for refining and reducing uncertainty in the parameters of the assessment methodology equation;
- Describing how data generated from the new demolition control program will be incorporated into the assessment methodology, including providing conversion factors needed for the load reduction calculations; and
- Addressing the MRP Provision C.12.f.iii requirement to submit the data collection and assessment methodology with their FY 2019/20 Annual Reports.

This technical memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration). The information provided builds upon a previous BASMAA effort that outlined a conceptual approach for the regional data collection process and assessment methodology (BASMAA 2018).

2. REGIONAL DATA COLLECTION PROCESS

This section documents the regional data collection process for the new programs to manage PCBs-containing building materials during demolition that began on July 1, 2019. This process was developed through a collaborative effort by municipalities subject to the MRP, the associated countywide stormwater management programs, and BASMAA. The regional data collection process focuses on collecting, compiling, and evaluating the data generated by the new programs on a regional basis. In addition, when sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program.
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

The regional data collection process involves collection of data from individual permit applicants at the municipal level, followed by compilation of data for applicable structures[1] at the countywide level, and data evaluation and reporting at the regional level. The process is described below.

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality. For non-applicable buildings, applicants simply check the boxes, certify, and submit to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and estimated demolition dates, with their FY 2019/20 Annual Reports.

The regional data management system is an Excel spreadsheet-based tool for storing and managing the data from each Permittee. The tool also calculates the estimated loads avoided throughout the region via implementation of the new management program, using the assessment methodology and data inputs described below.

3. ASSESSMENT METHODOLOGY

This section describes the assessment methodology and refined data inputs for estimating the loads of PCBs to municipal separate storm sewer systems (MS4s) that are avoided due to implementation of new controls to manage PCBs in building materials during demolition activities. To-date, the load of PCBs reduced through management of PCBs during demolition has been calculated using Equation 1:

Equation 1. $$Load\ of\ PCBs\ Reduced = N \bullet M \bullet SW \bullet E_f$$

Where:

N = Number of applicable structures with PCBs concentrations ≥ 50 ppm demolished each year (structures/yr)

M = Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm (kg/structure)

SW = Average fraction of PCBs that enters the MS4 due to demolition without new demolition program controls (dimensionless fraction)

E_f = Average fraction of PCBs prevented by new demolition program controls from entering MS4 (dimensionless fraction)

The MRP 2.0 Factsheet (SFBRWQCB 2015) provides values for each of the four terms in Equation 1 that were used to stipulate the load reduction for implementing the new demolition control program across the MRP area, which was a total of 2 kg/yr. Table 1 presents the values used for each of the four terms in the Factsheet to derive the 2 kg/yr PCBs load reduction credit. The Factsheet notes that each of the terms could be represented by a range of values and the information available to estimate the values of these terms shown in Table 1 was limited.

BASMAA (2018) summarized the above MRP 2.0 Factsheet approach and other previous efforts to estimate PCBs loads from demolition and potential loads reduced by control programs. It also presented a conceptual approach to refining the 2 kg/year PCBs load reduction estimate by describing methods to potentially refine the values of each of the four Equation 1 parameters shown in Table 1. Building upon the approach described in that document, additional literature searches and data gathering efforts were conducted to set the stage for refining and reducing uncertainty in the values of the four terms. For the first two parameters, data will be incorporated as they are generated from the new demolition control programs. The results of these efforts are presented below.

Table 1. Terms in MRP 2.0 Factsheet (SFBRWQCB 2015) equation used to stipulate the loading of PCBs to MS4s avoided by implementing demolition control measures.

Term	Symbol	Term Definition	Value	Units
1	*N*	Number of applicable structures demolished per year with PCBs concentrations ≥ 50 ppm	50	structures/year
2	*M*	Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm	5	kg/structure
3	*SW*	Average fraction of PCBs that enters MS4s due to demolition without controls[1]	0.01	dimensionless fraction
4	E_f	Average fraction of PCBs prevented by controls[1] from entering MS4 (i.e., assumed effectiveness of controls)	0.8	dimensionless fraction

1. The term "controls" refers to the proposed new demolition management program, not existing construction controls.

Term 1: Number of Applicable Structures Demolished Per Year

Current Basis

A study conducted by the San Francisco Estuary Institute (SFEI) reported a medium estimate of 521 building demolitions per year in commercial and industrial land uses in the study area, based on Bay Area Air Quality Management District (BAAQMD) asbestos abatement permitting data.[2] The SFEI study also reported the following medium estimates: 46% of the demolished buildings were built between 1950 and 1980 and 36% had PCBs concentration in caulks/sealants greater than 50 ppm (Klosterhaus et al. 2011). Multiplying (521) x (0.46) x (0.36) results in an estimated 86 commercial and industrial buildings demolished per year that were built between 1950 and 1980 and had PCBs concentration in caulks/sealants greater than 50 ppm.

Based upon information in the SFEI study and considering that the scope of the program to manage PCBs during demolition is limited to exclude wood frame buildings, the MRP Factsheet assumed 50 applicable structures with PCBs concentrations ≥ 50 ppm are demolished per year in the Bay Area (SFBRWQCB 2015).

Basis for Refinement

Data gathered during the new demolition control programs will be used to document the number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year throughout the MRP area. These data will be used to calculate a regional annual average number of applicable

[2] The BAAQMD regulations require that a "J Number" be applied for and obtained before applying for a building permit for demolition of an existing structure or renovations removing greater than 100 square feet of asbestos material within the San Francisco Bay air basin.

structures with PCBs concentrations ≥ 50 ppm that are demolished. This regional annual average value will be used for Term 1 in Equation 1 (see Table 1).

As part of implementing the new demolition controls that began in July 2019, applicants for demolition permits are required to submit a Screening Form to the municipality with jurisdiction for each applicable structure. Permittees will submit these forms to their countywide stormwater programs, which will document the number of applicable structures with PCBs concentrations ≥ 50 ppm within each jurisdiction that are demolished each year. This information will be compiled in the regional database described previously (Section 2) and used to calculate an annual average number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year in the region. Use of these real-world data collected in the MRP area will substantially reduce the uncertainty that is currently associated with the estimated value for Term 1 that was used in the MRP 2.0 Factsheet.

Term 2: Average Mass of PCBs per Applicable Structure

Current Basis

The SFEI study included estimating the mass of PCBs in caulks in Bay Area buildings and releases to stormwater runoff during renovation and demolition (Klosterhaus et al. 2011). Using a blind sampling approach, the SFEI study collected 25 caulk samples from the exterior of ten commercial and industrial buildings constructed in the study area between 1950 and 1980. The study area was the portion of the San Francisco Bay Area covered by the MRP: Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and the cities of Fairfield, Suisun, and Vallejo. The caulk samples were analyzed for PCBs, which were detected in 88% of the samples, with 40% exceeding 50 ppm, the concentration at which caulk falls under U.S. Environmental Protection Agency (USEPA) regulations (Federal Register 2010). Detectable PCBs concentrations ranged over six orders of magnitude, from 1 to 220,000 ppm. These data were consistent with previous studies in other cities (Klosterhaus et al. 2011).

A geographic information system (GIS)–based approach was then used to estimate the number, area, and volume of currently standing buildings in the study area that were built during the era of greatest PCBs use in caulk. The approach used historical imagery and contemporary land use and involved characterization of randomly selected buildings within the study area, with the result scaled up to extrapolate total building counts and areas in the MRP footprint. Various assumptions, including the frequency of anticipated PCBs detection and PCBs concentrations in the caulk, average mass of caulk per unit building volume, and average building volume, were then applied to calculate an estimate of the total PCBs mass in building caulk in the study area. The evaluation resulted in a mid–range estimate of 10,500 kg PCBs in caulk in buildings located in the study area (low and high estimates were 767 and 46,000 kg, respectively), which equated to an average of 4.7 kg PCBs per building (low and high estimates were 0.6 and 16 kg per building, respectively). The estimate included caulk located on both the interior and exterior of buildings (Klosterhaus et al. 2011). Based upon the information in the SFEI study, the MRP Factsheet assumed an average applicable structure with PCBs concentrations ≥ 50 ppm in the Bay Area contains 5 kg of PCBs (SFBRWQCB 2015).

Basis for Refinement

Data gathered as part of the new demolition control programs will be used to document the quantities and associated PCBs concentrations of priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm. These data will be used to calculate a regional average mass of PCBs per

applicable structure with PCBs concentrations ≥ 50 ppm in priority materials. This calculated regional average mass will be used for the value of Term 2 in Equation 1 (see Table 1).

Because of the new program to manage PCBs in building materials during demolition activities, Permittees have the opportunity to gather real-world data to estimate the mass of PCBs in priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm that is demolished in the region. Over time, these data will be compiled into a dataset that can be used to calculate a regional average mass. This calculated average will account for five priority building materials that potentially contain PCBs previously identified for the program (caulk, rubber window gaskets, thermal insulation, fiberglass insulation, and mastic adhesives), while the estimate in the MRP Factsheet (Table 1) is based upon caulk only.

The information provided in the Screening Form includes two types of data that are needed to calculate the mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm: (1) the quantity of each priority material in the structure, and (2) the concentration of PCBs in each priority material in the structure. These data will be used as inputs in Equation 2 to calculate the total mass of PCBs in the five priority materials for each applicable structure with PCBs concentrations ≥ 50 ppm that undergoes demolition beginning July 1, 2019.

Equation 2. $$Mass\ of\ PCBs\ per\ Structure\ (mg) = [\sum_{i=1}^{n}(C_i \bullet Q_i \bullet F_i)]$$

Where:

C_i = Concentration of PCBs in priority material i (mg/kg)

Q_i = Quantity of priority material i (linear feet or square feet)

F_i = Conversion factor – mass of priority material per linear foot of priority material i (kg/ft) or mass of priority material i per square foot of priority material i (kg/ft^2)

Equation 2 only accounts for the PCBs mass associated with the five priority building materials, so may represent an underestimate of the total PCBs mass in a given building. However, the extent of the underestimate would be small if the five priority materials contain most of the PCBs mass in a building.

The PCBs concentrations in each priority material (C_i) that will be used in Equation 2 is provided on the Screening Form for each applicable structure in units of mg of PCBs per kg of priority material (mg/kg).[3]

[3] Please note that this memorandum does not provide guidance on determining a representative PCBs concentration when multiple samples are collected from a single homogeneous area of a building material, per the sampling protocol (e.g., applying average vs. geomean vs. median to determine central tendency when multiple sample results are available). This type of determination should be made once sufficient data are available about PCBs concentration distributions in building material samples (e.g., after two or three years of data have been collected).

The quantity of each priority material (Q_i) that will be used in Equation 2 is provided on the Screening Form in units of linear feet (ft) for caulk and rubber window gaskets, and square feet (ft^2) for thermal or fiberglass insulation and mastic adhesives. Conversion factors (F_i) for each priority material i were developed to provide the mass of priority material per linear foot or per square foot using Equation 3.

Equation 3. $$\boldsymbol{F_i = (D_i \times \rho_i)}$$

Where:

F_i = mass of priority material i per linear foot (of caulk or rubber window gaskets) of i (kg/ft) or mass of priority material i per square foot (of insulation or mastic) of i (kg/ft^2)

D_i = Assumed dimensions of priority material i (ft^2 or ft)

- For caulk and rubber window gaskets, this represents the assumed cross-sectional area of the caulk bead or the gasket in square feet.
- For insulation and mastic, this represents the thickness of the layer of material in feet.

ρ_i = Assumed density of priority material i (kg/ft^3)

Conversion factors that were developed for each priority building material are shown in Table 2. For caulk and rubber window gaskets, the conversion factors estimate the mass of material per linear foot (kg/ft). For thermal or fiberglass insulation and mastic adhesives, the conversion factors estimate the mass of material per square foot (kg/ft^2). Table 2 identifies typical applications for each priority material and the associated conversion factors that were developed for that application. The conversion factors are presented as a range of values and a "Best" value based on the average or mid-range value.

To develop the conversion factors shown in Table 2, data on common priority material dimensions and densities used in typical building construction were gathered through literature review, product technical specifications, building construction guidelines, and other relevant resources (Panke and Cook 1992, Scheffler and Connolly 1996, Jester 1995). The ranges of assumed dimensions and densities that were used to develop the conversion factors are shown in Table 3. Additional information on the assumptions and data used to populate Table 3 and develop the conversion factors shown in Table 2 is presented below.

Product Dimensions

Multiple construction guides were consulted to identify typical dimensions for common applications of priority materials in building construction. For caulk or rubber gaskets, Table 3 provides a range of typical heights and widths of applications around windows and doorframes, and for caulk, also between concrete expansion joints. For fiberglass or thermal insulation, Table 3 provides a range of typical thicknesses for applications used around HVAC systems, heathers, boilers, and pipes, and inside walls or crawl spaces. For mastic adhesives, Table 3 provides typical thicknesses of the material used under or between roofing material and flashing or used on surfaces between carpet and floor tiles. These dimensions apply to newly applied or installed products and may not reflect the dimensions of an aged/weathered product but represent the best information currently readily available.

Table 2. Conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Descriptions of typical application	Material[1,2,3]	Conversion Factors				
			Range			Best (Average or mid-range value)	Units
Caulk	Around windows or window frames; around door frames	polysulfide caulk	0.009	-	0.04	0.02	kg/ft
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.01	-	0.15	0.04	kg/ft
Rubber Window Gaskets	Around windows or window frames	Butyl Rubber	0.02	-	0.06	0.03	kg/ft
Thermal or Fiberglass Insulation	Around HVAC systems/ heaters/boilers	Felt Insulation	0.09	-	2.3	0.82	kg/ft^2
		Unfaced Blanket Fiberglass	0.03	-	0.28	0.16	kg/ft^2
	Around heated transfer piping	Fiberglass Pipe Insulation	0.06	-	0.62	0.26	kg/ft^2
	Inside walls or crawl spaces	Loose Fiberglass Fill/Batting	0.17	-	0.24	0.21	kg/ft^2
		Rigid Fiberglass Foam Board	0.03	-	0.45	0.17	kg/ft^2
Adhesive Mastics	Below carpet and floor tiles	Floor Mastic	0.06	-	0.13	0.10	kg/ft^2
	On, under or between roofing materials and flashing	Roof Mastic	0.30	-	0.74	0.50	kg/ft^2

1. Panke and Cook, 1992.
2. Scheffler, M. and Connolly, J. 1996.
3. Jester, T.C. 1995.

Product Densities

The density information reported in Table 3 was gathered from readily available commercial literature on a range of reported densities for the five priority materials. Where possible, information on products that were used in the 1950s to 1980s time period and that were known to contain PCBs were used. However, because this type of product-specific information was not readily available, much of the information used to estimate typical product densities (and dimensions) was based on commercially available products that are currently in use for similar types of building and construction applications. For example, prior to 1980, polysulfide caulks and sealants were frequently formulated with PCBs and are commonly found in buildings constructed between 1950 and 1980. Although currently available polysulfide sealants do not contain PCBs, the densities of these types of sealants were used in Table 3 as reasonable approximations of the densities of polysulfide sealants used in the past. Similarly, the densities for other priority materials shown in Table 3 are primarily based on current use products that are similar to products used in the past.

In addition to the lack of technical data on products in use during the 1950s – 1980s, there is a lack of data about the impact of age and weathering on priority material densities. Loss of volatile material will reduce product densities over time, while other weathering factors, such as compression or stretching, may increase or decrease densities over time. In an attempt to better account for age and weathering, available literature was reviewed to identify information on the densities of priority materials in construction and demolition debris and wastes. This type of information was not found on the specific priority materials of interest. However, US EPA (2016) provides estimates for the weight to volume ratios (i.e., densities) of a number of construction and demolition (C&D) waste categories. These categories include concrete, asphalt paving, roofing, wood, gypsum board, metal, rock/gravel/dirt and sand, and bulk waste. The bulk waste category is a generic catchall grouping for the remainder of C&D debris that does not fit into one of the other categories. Although the materials that are included in this generic category are not specified, the priority materials would likely all fall into the generic bulk waste category when disposed.

Therefore, in the absence of other data, the density for C&D bulk waste may be somewhat comparable to the densities of aged/weathered priority materials and can be compared to the densities of new products provided in Table 3. The average priority material densities in Table 3 range from about 1 kg/ft^3 to 40 kg/ft^3, with an average of 12 kg/ ft^3 across all priority materials. The C&D bulk waste density of 8 kg/ft^3 fits within the range of the priority material densities reported in Table 3 and is about 30% less than the average density across all priority materials. This comparison is limited because of the unknown composition of C&D bulk waste but suggests the densities in Table 3 are reasonable approximations for aged/weathered materials.

Average Conversion Factors

Use of the conversion factors shown in Table 2 requires information on the application and material type of the priority building material. It is anticipated that in some cases the available data may be incomplete or may not match the categories in Table 2. Conversion factors that are not specific to the priority building material's application or material type were therefore developed by averaging across applications/types (Table 4). When calculating the mass of PCBs removed from a demolition site, conversion factors from Tables 2 and/or 4 should be selected as appropriate given the level of information available about the associated sample(s).

Table 3. Dimensions and densities for typical construction applications of priority materials used to develop conversion factors.

Priority Material Category	Descriptions of typical application	Material	Typical Product Dimensions (Inches)						Typical Product Density (kg/ft^3)		
			Width			Depth/Thickness					
			Low	Mid	High	Low	Mid	High	Low	Mid	High
Caulk[1,2,3,4,5]	Around windows or window frames; around door frames	polysulfide caulk	0.25	0.38	0.50	0.13	0.19	0.25		42	
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.25	0.5	1	0.125	0.25	0.5		42	
Rubber Window Gaskets[5]	Around windows or window frames	butyl rubber	0.30	0.40	0.50	0.20	0.30	0.40		41	
Thermal/Fiberglass Insulation[5]	Around HVAC systems/ heaters/boilers	felt insulation[6]	n/a			1.0	3.0	5.0	1.1	3.3	5.4
		unfaced blanket fiberglass[7]				0.5	2.8	5		0.68	
	Around heated transfer piping	fiberglass pipe insulation[8]				1.0	2.0	3.0	0.68	1.6	2.5
	Inside walls or crawl spaces	loose fiberglass fill/batting[9]					3.5		0.59	0.70	0.82
		rigid fiberglass foam board[10]				1.0	2.5	4.0	0.32	0.84	1.4
Adhesive Mastics[5]	Below carpet and floor tiles	floor mastic[11]	n/a			0.13	0.19	0.25		6.2	
	On, under or between roofing materials and flashing	roof mastic[12]				0.13	0.19	0.25	29	32	36

1 Pfeiffer M.J., Darwin, D., 1987.
2 Panke, J.R. and John P. Cook. 1992.
3 Hammer & Hand. 2016.
4 M. Scheffler, M. and J. Connolly, J. 1996.
5 Jester, T.C. 1995.
6 Owens-Corning Thermafiber Industrial Felt
7 Owens-Corning unfaced fiber glass blanket
8 Owens-Corning fiberglass pipe insulation
9 Owens-Corning Loose fill insulation and NIST Fiberglass Batt (wall and ceiling insulation)
10 Owens-Corning Foamular Products - rigid polyurethane foam (PUR/PIR)
11 Latricrete Premium Mastic
12 Henry Company Pro-Grade Flashing Cement, Pro-Grade Plastic Cement and Pro-Grade Repair Cement

Table 4. Average conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Conversion Factor	Units
Caulk	0.03	kg/ft
Rubber Window Gaskets	0.03	kg/ft
Thermal/Fiberglass Insulation	0.32	kg/ft^2
Adhesive Mastics	0.30	kg/ft^2

Term 3: Average fraction of PCBs that enters MS4 due to demolition without controls

Current Basis

The average fraction of PCBs that enters the MS4 due to demolition without controls has been estimated at 0.01, based upon professional judgment (i.e., 1% of PCBs in building materials enter MS4s due to demolition without additional controls beyond standard construction site controls). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 3 (see Table 1).

The one percent value presumably incorporates losses to the environment both at the site and during disposal and recycling. Conceptually, this approach assumes that without controls, the transport and fate of the PCBs–containing materials that were in the demolished building fall within three general categories:

1. Released during the demolition (e.g., as part of an initially airborne plume of small particles) and settled in a "halo" around the site. Any wash waters used during the demolition (e.g., during cleaning of equipment, onsite or offsite) that are not fully contained and treated or disposed of could also transport PCBs–containing materials to the MS4.
2. Removed from the site and disposed of as part of the general waste stream (e.g., at a landfill), with some fraction potentially released to the environment during the handling, transport, and disposal process (e.g., during transportation of waste materials by truck to a landfill).
3. Removed from the site with recycled materials, with some fraction potentially released to the environment during the handling, transport, and recycling process (e.g., during transportation of waste materials by truck to a transfer station or recycling facility) or returned to the environment with recycled materials.

This methodology assumes that all PCBs–containing materials released into the environment via any of the above three categories eventually enter the MS4. For example, permanent storage in onsite or offsite pervious areas is assumed to be negligible. All three transport and fate categories are presumably

incorporated into the third term of Equation 1, the average fraction of PCBs that enters MS4s due to demolition without controls.

This methodology also assumes that the effectiveness of any existing controls (e.g., proper offsite disposal of PCBs–containing materials, erosion and sediment controls, and other routine construction site controls) is incorporated into the third term of Equation 1.

Basis for Refinement

BASMAA (2018) summarized the readily available information and studies on the release of PCBs to stormwater from building materials during demolition activities. Building upon those efforts, a follow-up literature review was conducted in 2019 to identify any additional information that could be used to refine the assumed fraction of PCBs that enters MS4s due to demolition without controls in Equation 1, Term 3 (see Table 1). This literature review was also conducted to identify new information that could be used to refine Term 4 (i.e., the fraction of PCBs prevented by controls from entering MS4s). This section summarizes the literature review efforts and identifies the outcomes for Term 3. The literature review outcomes for Term 4 are presented in the next section.

Literature Review

The literature review conducted in 2019 built upon the information summarized in BASMAA (2018). The Google search engine as well as specific scientific literature databases and government websites were searched, including:

- Google Scholar
- Google Books
- SpringerLink
- Wiley Online Library
- American Chemical Society
- ScienceDirect.com
- Elsevier
- US EPA Website

Major search terms (and similar variations or combinations of these terms) that were used included the following:

- PCBs transport and fate
- PCBs in soils/stormwater/demolition/building materials/building demolition/building renovation
- PCBs in caulk/rubber window gaskets/thermal insulation/fiberglass insulation/mastic
- PCBs contaminated sites/cleanup sites/remediation sites
- PCBs in school buildings
- Remediation of PCBs in buildings/building materials
- Construction and Demolition Debris/Waste

- Demolition dust and stormwater impacts
- Soil contamination from PCB-containing caulk/materials/buildings
- PCBs in soil after demolition
- PCB contamination from polysulfide sealants
- PCB-contaminated soil/demolition dust
- Mass of PCBs in Building materials
- Fate of PCBs in the environment/urban environment/caulk/building materials
- PCBs Source apportionment
- PCBs Waste characterization
- Accumulation rates of PCBs in soils
- PCB cleanup and disposal programs
- Managing remediation waste from PCB cleanups
- Handling and disposal of PCBs waste
- Improved recycling practices/BMP effectiveness and stormwater impacts
- PCBs sources/emissions/releases from caulk/buildings/schools
- PCBs emissions during demolition/renovation/abatement/replacement/removal of caulk
- Dust from demolition and construction sites

In addition, online searches were performed to identify any new research that had cited one or more of the studies previously described in BASMAA (2018). These citations were reviewed to identify any relevant studies that may have occurred more recently and relied upon these earlier studies.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs entering MS4s due to demolition activity without controls in Equation 1, Term 3 (see Table 1). To date, the vast majority of research on the release of PCBs contained in building materials has focused on human health risks and quantifying human exposures via air, ingestion, and/or dermal pathways. It appears the release of PCBs to stormwater from building materials in general, and specifically during demolition or renovation activities has not been quantitatively studied, outside of the limited studies reported previously in BASMAA (2018). These earlier studies developed conceptual models and thought experiments to estimate the fraction of PCBs released based on the limited measurement data available. Without new measurement data, however, further attempts to improve upon these efforts and reduce uncertainty in the current estimate of Term 3 are not warranted.

BASMAA (2018) recommends exploring whether disposal and/or recycling practices have improved in recent years such that less PCBs would be lost to the environment via these pathways. Evidence was not found during the literature review of improved recycling or disposal practices implemented in the Bay Area in recent years that would result in reduced releases of PCBs to MS4s from demolition materials.

This finding is further supported by anecdotal information about recycling facilities in the South Bay Area. Over the past 5+ years Santa Clara Valley MRP Permittees have been investigating sources of PCBs to public ROWs in industrial areas and have frequently targeted facilities where demolition materials are brought on site for recycling. These investigations have documented poor housekeeping practices, visible scrap material and soils tracking off sites, and general lack of appropriate stormwater BMPs at many of these types of facilities which have resulted in citations during municipal stormwater inspections. Overall, these investigations have found large inconsistencies in materials handling practices across facilities, and even at the same facility over time. Although not a quantitative assessment, this information suggests that it is unlikely consistent improvements in recycling practices across facilities have occurred in recent years.

Term 4: Average fraction of PCBs prevented by new controls from entering MS4

Current Basis

The estimated fraction of PCBs prevented by new controls from entering MS4s has been estimated at 0.8, based mainly upon professional judgment (i.e., 80% of PCBs are prevented from entering MS4s due to the new programs to manage PCBs during building demolition). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 4 (see Table 1).

Basis for Refinement

As described above, a review of readily available literature was conducted in 2019 to identify any new information that could be used to refine the assumed effectiveness of controls to prevent PCBs from entering MS4s (Term 4). The literature review efforts are summarized in the above section on Term 3. This section presents the outcomes of the literature review for Term 4.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs prevented by new controls from entering MS4s. However, BASMAA (2018) identified two earlier studies that estimated 99% capture of PCBs contained in caulk removed from buildings using appropriate abatement measures (high power vacuums and power washing during removal). Based on these data, a reasonable assumption is that the new control programs will be similarly effective at capturing PCBs in priority materials that, prior to demolition, are removed from a building using appropriate abatement methods. Given the new programs are focused on controlling PCBs in priority materials only, the use of a lower (80%) value for the overall effectiveness of the controls at preventing PCBs from entering MS4s (Term 4) appears reasonable.

Using Data from New Program on PCBs Mass in Priority Building Materials

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs presumably removed from the building before demolition. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0

Factsheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Equation 1 and Table 1 may be set to 1 when evaluating the PCBs load avoided using PCBs mass in priority building materials data from the new program, since it may be assumed that the program removes 100% of the priority materials with PCBs ≥ 50 ppm that were identified by the sampling protocol.

4. POTENTIAL FUTURE REFINEMENTS TO THIS METHODOLOGY

It should be noted that the new program for controlling PCBs during building demolition is in its early stages, having begun implementation only recently (i.e., on July 1, 2019). The data generated during the first fiscal year of the program have not yet been compiled and evaluated. As experience is gained in implementing the program and the associated data are collected and evaluated, and/or new information becomes available from any other source, the need may arise to revise the data collection and assessment methodology presented in this memorandum. As needed, staff from the countywide programs in the MRP area will work with MRP Permittee and Regional Water Board staff to make any future refinements to the program and methodology.

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Attachment 12.3

Fish Risk Reduction Program for Mercury and PCBs: 2020 Status Report and Effectiveness Evaluation

Contra Costa Clean Water Program

Fish Risk Reduction Program for Mercury and PCBs:

2020 Status Report and Effectiveness Evaluation

Submitted to the San Francisco Bay Regional Water Quality Control Board

In Compliance with NPDES Permit Provision C.11.e & C.12.h Municipal Regional Stormwater Permit (Order No. R2-2015-0049)

August 2020

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Contra Costa Clean Water Program

Fish Risk Reduction Program for Mercury and PCBs: 2020 Status Report and Effectiveness Evaluation

August 2020

Submitted to

San Francisco Bay Regional Water Quality Control Board
In Compliance with NPDES Permit Provision C.11.e & C.12.h
Municipal Regional Stormwater Permit (Order No. R2-2015-0049)

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Acronyms and Abbreviations

Bay Area	San Francisco Bay Area
CCCWP	Contra Costa Clean Water Program
CDFW	California Department of Fish and Wildlife
CVRWQCB	Central Valley Regional Water Quality Control Board
Delta	Sacramento-San Joaquin River Delta
FY	Fiscal Year
MRP	Municipal Regional Stormwater Permit
NPDES	National Pollutant Discharge Elimination System
OEHHA	California Office of Environmental Health Hazard Assessment
PCBs	polychlorinated biphenyls
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board

1 INTRODUCTION

The Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (MRP) (SFBRWQCB, 2015) requires Permittees to conduct an ongoing risk reduction program to address public health impacts of mercury and PCBs in fish within San Francisco Bay and Sacramento-San Joaquin River Delta (Delta). In fiscal year (FY) 2016-2017 (July 1-June 30), Contra Costa Clean Water Program (CCCWP), in conjunction with the California Office of Environmental Health Hazard Assessment (OEHHA), began a public outreach program designed to reach a minimum of 3,000 individuals annually who are likely consumers of San Francisco Bay or Delta-caught fish.

This status report and effectiveness evaluation provides an overview of the Fish Risk Reduction Program and summarizes progress achieved by CCCWP during FY 2019-2020. The report highlights ongoing activities, suggestions for outreach improvements, and considers the program's effectiveness since being implemented under the MRP.

1.1 MRP Provision

Contra Costa County lies within the jurisdictions of both the San Francisco Bay (Region 2) and Central Valley (Region 5) Regional Water Quality Control Boards (SFBRWQCB and CVRWQCB, respectively). Municipal stormwater discharges in Contra Costa County are regulated by the requirements of both the MRP for urban stormwater in Region 2 (Order No. R2-2015-0049), and the East Contra Costa County municipal NPDES permit (Central Valley Permit) in Region 5 (Order No. R5-2010-0102). This submittal fulfills reporting requirements for a risk reduction program specified in provisions C.11.e and C.12.h of the MRP for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049), as amended by Order No. R2-2019-0004, incorporating the eastern portion of Contra Costa County within the requirements of the MRP.

1.2 Task Description

The Fish Risk Reduction Program was designed to address public health impacts of PCBs and mercury in San Francisco Bay and the Central and South Sacramento-San Joaquin River Delta by:

- Taking actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay/Delta-caught fish, such as recreational anglers, subsistence fishers, and their families.
- Working with local health departments, regional parks, and Permittees to leverage resources for the program and appropriately targeting at-risk populations.

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2 APPROACH

The Fish Risk Reduction Program is designed to provide public awareness of the risks involved with consuming fish caught in the San Francisco Bay and Central and South Sacramento-San Joaquin Delta Regions. In order to achieve this goal, CCCWP identified a list of locations where individuals who catch fish are likely to frequent. The locations include local harbors and marinas (Table 1), bait, tackle and fishing supply stores (Table 2), and fishing piers and regional park shoreline locations (Table 3). All outreach locations listed in Tables 1 and 2 are contacted twice annually to confirm and provide each location with the appropriate brochures or posters (Attachment 1) for display at marina informational kiosks and storefront countertops.

The following locations (Tables 1 and 2) were contacted twice during FY 2019-2020, once during the month of August and again the following June. Outreach efforts are typically conducted every August and March, but efforts in the spring of 2020 were postponed until May due to the COVID-19 pandemic and shelter-in-place order.

Table 1. Outreach Locations at Harbors and Marinas

Antioch Marina	1 Marina Plaza, Antioch
New Bridge Marina	6325 Bridgehead Road, Antioch
Piper Point Marina	3861 Willow Road, Bethel Island
Bethel Harbor	3405 Harbor Road, Bethel Island
Bethel Island Marina	6050 Bethel Island Road, Bethel Island
New Anchor Marina	1970 Taylor Road, Bethel Island
Sugar Barge Resort and Marina	1440 Sugar Barge Road, Bethel Island
Russo's Marina	3995 Willow Road, Bethel Island
Emerald Point Marina	4262 Windsweep Road, Bethel Island
Cruiser Haven Yacht Club	7000 Orwood Road, Brentwood
Holland Riverside Marina	7000 Holland Tract Road, Brentwood
New Life Marina	1200 Taylor Road, Bethel Island
Lazy M Marina	5050 Clifton Court Road #C, Discovery Bay
Discovery Bay Yacht Harbor	5901 Marina Road #1, Discovery Bay
Martinez Marina	7 North Court Street, Martinez
Big Break Marina	100 Big Break Road, Oakley
Hennis Marina	3255 Wells Road, Oakley
Pittsburg Marina	51 Marina Boulevard, Pittsburg
Marina Bay Yacht Harbor	1340 Marina Way S, Richmond
Brickyard Cove Marina	1160 Brickyard Cove Road Suite 110, Richmond

Table 2. Outreach Locations at Bait, Tackle, and Fishing Supply Stores	
Gotcha Bait and Tackle	3500 E 18th Street, Antioch
Lost Anchor Bait & Tackle	1001 McAvoy Road, Bay Point
Gateway Gas and Mart	3615 Gateway Road, Bethel Island
Orwood Resort and Bait Shop	4451 Orwood Road, Brentwood
Bay Tackle	5815 Cutting Boulevard, El Cerrito
Gas 'n Save	1541 East Cypress Road, Oakley
Hook, Line & Sinker	3100 Main Street #260, Oakley
Marina Emporium	5993 Bethel Island Road, Oakley
Fisherman's Catch	27 Marina Boulevard, Pittsburg
City Arms East	60 Golf Club Road #B, Pleasant Hill
Creative Sports	1712 Linda Drive, Pleasant Hill
Rodeo Bait & Tackle	205 Pacific Avenue, Rodeo
Rodeo Sport & Liquor	133 Parker Avenue, Rodeo

In addition to outreach locations at harbors, marinas and local fishing supply stores, CCCWP Permittees, in coordination with Contra Costa Health Services and the East Bay Regional Parks District, collectively implement fish risk reduction activities by posting, maintaining and inspecting fish consumption warning signs (Figures 1 through 6) on an annual basis at the fishing piers and regional shoreline locations listed in Table 3. During FY 2019-2020, CCCWP coordinated with OEHHA on receiving updated outreach material for hard signs and brochures/flyers for both the San Francisco Bay and Sacramento-San Joaquin River Delta (Figures 1 through 4; Attachment 1). Once updated material was acquired, CCCWP field staff coordinated with East Bay Regional Parks District shoreline managers to install the updated hard signs at fishing piers throughout the county (Figures 1 through 4).

Currently, new hard signs are either installed or in the process of being installed at six San Francisco Bay (San Pablo Bay) fishing piers and one Delta fishing pier (Table 3). Field staff reconnaissance of Table 3 locations during FY 2019-2020 determined that some locations along regional shorelines and fishing piers contain out-of-date material (Figures 5 and 6), as confirmed by OEHHA in December of 2019 (personal communication between Karin Graves of CCCWP and Tran Pham of OEHHA). To mitigate out-of-date material, CCCWP will replace old signs no longer containing OEHHA's official advisory (Figure 5), or by physically amending out-of-date contact information and age limits to reflect the official OEHHA advisory (Figure 6).

Table 3. Fishing Piers and Regional Shoreline Signs

Sign Location	Sign Address	Sign Status
Antioch/Oakley Regional Shoreline Fishing Pier	Bridgehead Road at Wilbur Avenue, Antioch	New sign complete
Antioch Marina Fishing Pier	1 Marina Plaza, Antioch	Sign amendment
Antioch Fishing Pier	9 I Street, Antioch	Sign replacement
Carquinez Strait Regional Shoreline and Eckley Fishing Pier	5700 Eckley Road, Crockett	New sign in progress
Clifton Court Forebay	5072 Clifton Court Road, Discovery Bay	Sign amendment
San Pablo Reservoir*	7301 San Pablo Dam Road, El Sobrante	Sign amendment
Radke Martinez Regional Shoreline and Martinez Fishing Pier	7 North Court Street, Martinez	New sign in progress
Pittsburg Fishing Pier	22 Cutter Avenue, Pittsburg	Sign amendment
John J. Sheridan Fishing Pier	1499 Harbor Way South, Richmond	Sign replacement
Big Break Regional Shoreline	69 Big Break Road, Oakley	Sign amendment
Point Pinole Regional Shoreline and Fishing Pier	5551 Giant Highway, Richmond	New sign complete
Point Isabel Regional Shoreline	2701 Isabel Street, Richmond	Sign replacement
Point Molate Fishing Pier	1721 Stenmark Drive, Richmond	New sign in progress
Miller/Knox Regional Shoreline and Ferry Point Fishing Pier	1545 Dornan Drive, Richmond	New sign in progress
Lucretia Edwards Shoreline Park and Richmond Launch Ramp	1500 Marina Way South, Richmond	Sign amendment
San Pablo Bay Regional Shoreline at Lone Tree Point	413 San Pablo Avenue, Rodeo	New sign in progress

*Ongoing risk reduction program for fish caught in San Pablo Reservoir (see Attachment 1).

Figure 1. New sign installation at Point Pinole fishing pier (SF Bay)

Figure 2. New sign installation at Point Pinole fishing pier (SF Bay) – closeup

Figure 3. Overview of new sign installation on Antioch/Oakley fishing pier (Delta)

Figure 4. New sign installation at Antioch/Oakley fishing pier (Delta) – closeup

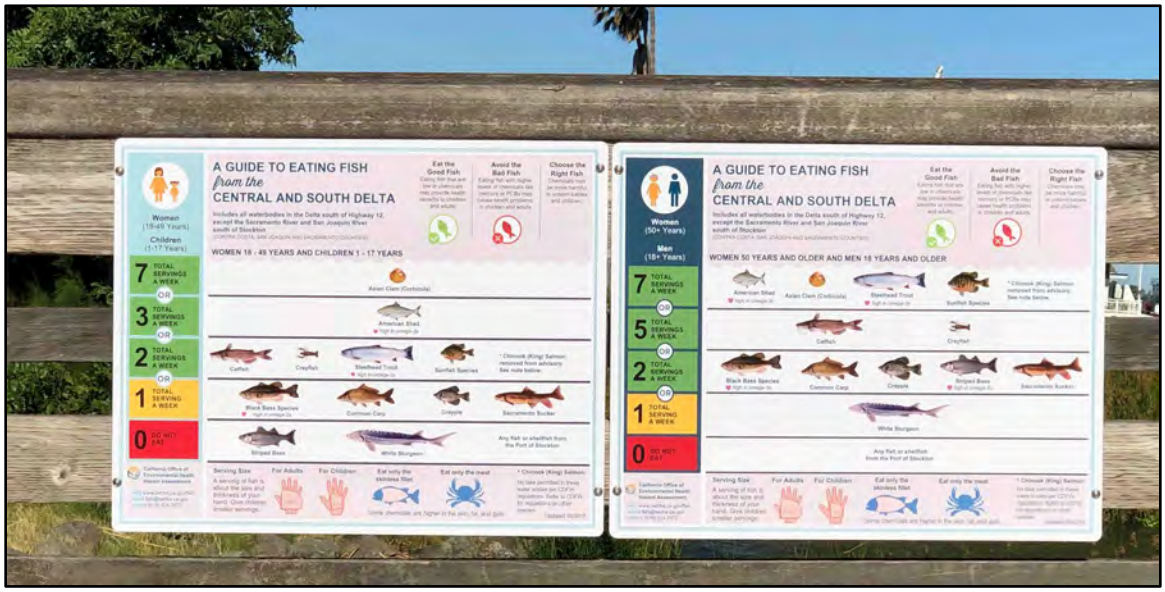

Figure 5. Example of outdated fish advisory sign to be replaced in Contra Costa County

Figure 6. Example of fish advisory sign to be amended with updated contact info and age limits for women

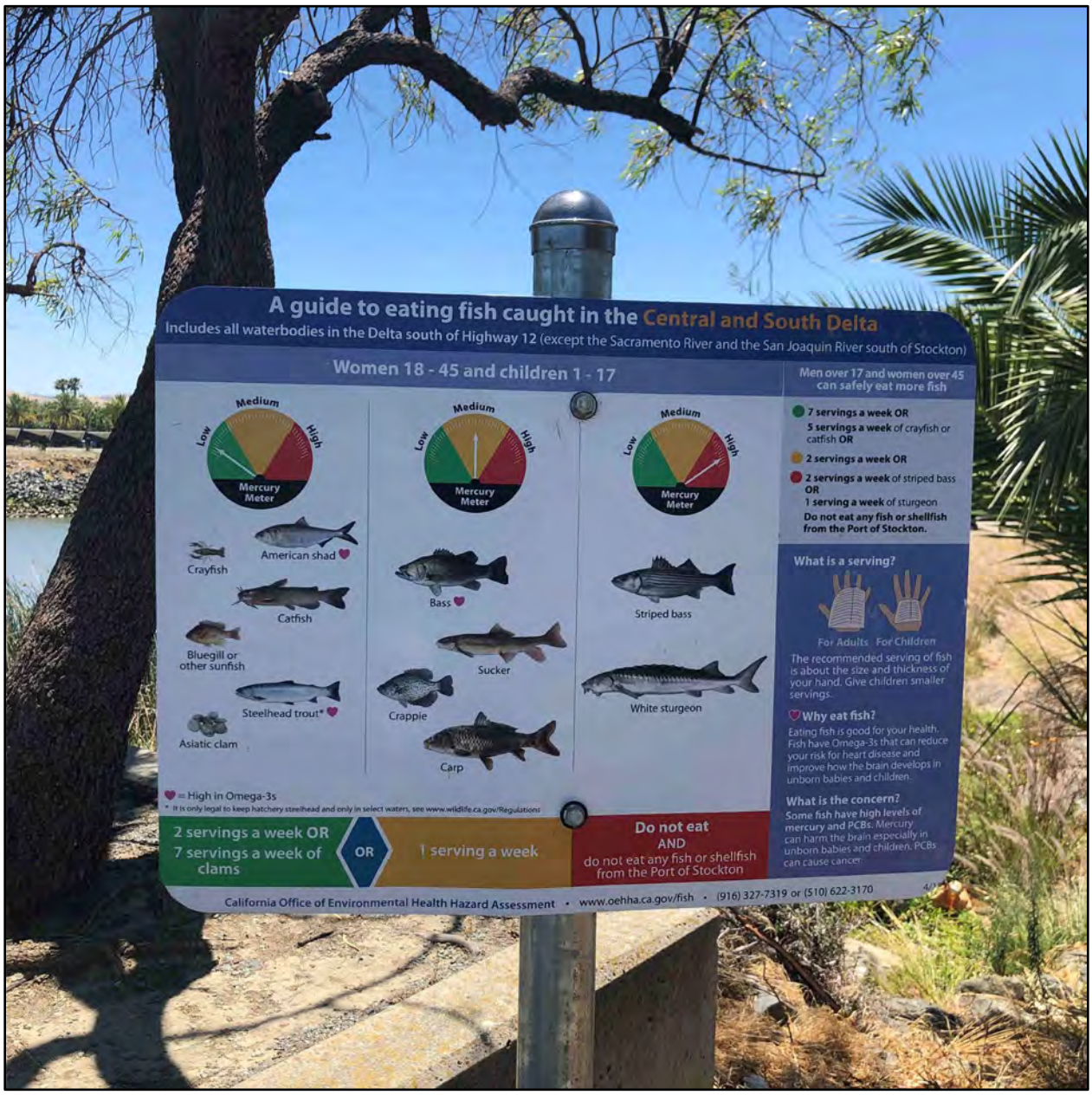

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3 PROGRESS TO DATE

Business operators were individually contacted via telephone to establish the languages which would best reach their specific clientele. Brochures, flyers and posters were subsequently provided to each of the 20 harbors and marinas listed in Table 1, and the 13 bait, tackle and fishing supply stores listed in Table 2. Fishing piers and regional shorelines listed in Table 3 have existing hard signs posted in high visibility areas. Figure 7 is an overview map of the fish risk reduction outreach locations. During FY 2019-2020, two locations were removed from Table 2 as they have since gone out of business.

3.1 Number of People Reached

CCCWP estimates the Fish Risk Reduction Program has the potential to reach well over the program's minimum target of 3,000 individuals annually. In FY 2019-2020, CCCWP delivered 30 to 100 brochures to each of the locations listed in Tables 1 and 2. If each location listed in Tables 1 and 2 (33 total locations) delivers just 30 brochures or flyers annually, this effort can reach about 1,000 individuals throughout the county. In addition to Tables 1 and 2, the estimate to reach over 3,000 individuals annually is defined by the outreach potential on locations listed in Table 3 alone. If just one individual views the fish risk reduction signage per day at each of the 16 fishing piers or shoreline kiosks, multiplied by 200 views per pier annually, it is estimated that 3,200 individuals will view the signage alone. Two hundred views per pier annually is a conservative estimate to account for periods of inclement weather or poor fishing conditions. In FY 2019-2020, CCCWP field staff spoke with shoreline supervisors from the East Bay Regional Parks District, who estimated hard signs each have the potential to receive as many as 100 views on a busy weekend. This supports the program's conservative estimate of 200 views per pier annually, yet still obtains the minimum outreach goal.

3.2 Additional Measures Adopted in 2020

In an effort to effectively reach the maximum number of people likely to consume fish from the San Francisco Bay and Sacramento-San Joaquin Delta, CCCWP compiled a list of all locations approved by the California Department of Fish and Wildlife (CDFW) to sell recreational fishing licenses. Via the CDFW website, CCCWP identified an additional 17 locations that could be contacted to improve the outreach program (Table 4). In FY 2019-2020, CCCWP made efforts to reach out to the locations in Table 4; however, many big box retailers could not confirm participation in the program due to legal obligations or company policies stating material to be displayed on countertops must first be reviewed by corporate offices. Outreach to local big box retailers confirmed store managers were willing to participate, but asked CCCWP staff to confirm with corporate offices for approval. Efforts to coordinate approval for the distribution of fish risk reduction material at big box retailers will resume in FY 2020-2021, as outreach efforts could not be completed in 2020 when corporate offices were either difficult to reach or requested we try again as many were busy reopening while adhering to guidelines pertaining to the COVID-19 pandemic.

Figure 7. Fish Risk Reduction Outreach Locations

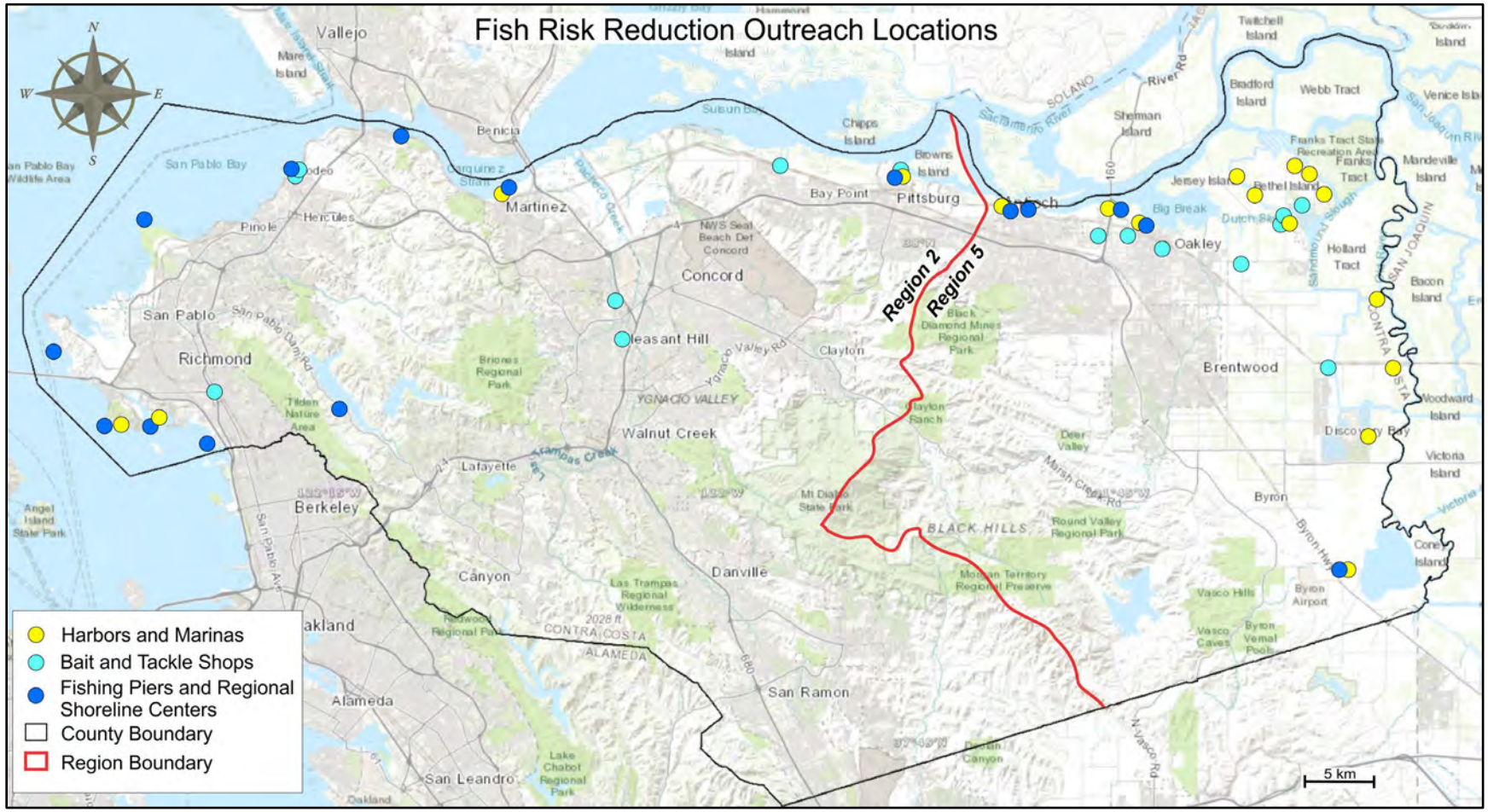

Table 4. Additional Fish License Retailers

Big 5 – Store #303	4859 Lone Tree Way, Antioch
Big 5 – Store #378	2689 Clayton Road, Concord
Big 5 – Store #178	11060 San Pablo Ave, El Cerrito
Big 5 – Store #062	1572 Fitzgerald Drive, Pinole
Big 5 – Store #113	4701 Century Boulevard, Pittsburg
Big 5 – Store #437	510 Contra Costa Blvd, Pleasant Hill
Big 5 – Store #071	3209 Crow Canyon Place, San Ramon
Big 5 – Store #132	1630 Mt Diablo Boulevard, Walnut Creek
CVS – Store #09511	1175 2nd Street, Brentwood
CVS – Store #09565	14830 Highway 4, Discovery Bay
Dick's Sporting Goods	2314 Monument Boulevard, Pleasant Hill
REI	1975 Diamond Blvd Ste B100, Concord
Walmart – Store #2697	4893 Lone Tree Way, Antioch
Walmart – Store #5610	9100 Alcosta Boulevard, San Ramon
Walmart – Store #1615	2203 Loveridge Road, Pittsburg
Walmart – Store #3493	1021 Arnold Drive, Martinez
Walmart – Store #3455	1400 Hilltop Mall Road, San Pablo

3.3 Effectiveness Evaluation

Determining the effectiveness of the risk reduction program was completed mostly on a qualitative basis. Field staff would assess effectiveness by observing fishers at piers and shorelines who stop to read posted hard signs for extended periods of time, with views generally averaging about one minute. Sign locations were often posted in highly visible locations near pier entrances, where both the general public and target demographic would stop to view the information on the sign. Field staff inferred this to mean the graphic was both engaging and effectively conveying the message of the risk reduction program.

In addition to general observations made along fishing piers, field staff discussed the program with bait and tackle shop owners. Over the course of the outreach program, each of the bait and tackle shops listed in Table 2 were contacted twice annually to offer shops an opportunity to restock the brochures and flyers. During general conversations with bait and tackle shop owners or staff, the offer to receive the risk reduction program information was met with positivity and enthusiasm. Every shop contacted in Table 2 needed to be resupplied at least once annually, with shop deliveries averaging about 50 brochures or flyers per delivery.

Along with bait and tackle shops, field staff also delivered brochures to the harbors and marinas listed in Table 1. Harbor masters and marina staff were supportive in supplying material, but had little to add about the effectiveness of the program. As the brochures and flyers at harbors and marinas are typically displayed in an area containing other nautical and boating informational pamphlets, harbor masters and marina staff had less information and interaction with the general public regarding the effectiveness of

the fish risk reduction program, and there was less interaction with the general public to determine how the target demographic reacted to the information.

Following the 2019 status report, CCCWP opted to make social media postings with information about the Fish Risk Reduction Program. A link to guidelines for safely eating fish from the San Francisco Bay and Sacramento-San Joaquin River Delta were also placed on their website. In an effort to determine how effective or how large of an audience a social media post can reach, CCCWP hired a marketing firm to track the number of unique page views on the selected posts. Despite efforts, unique page views on selected posts were fewer than 50, and the marketing firm was not able to confirm if the target demographic (i.e., fishers or likely consumers) were being reached. To increase outreach, CCCWP will look into whether or not bait and tackle shops or marinas would be willing to post this information on their social media accounts. Posting this information to a publicly available and interactive platform has the potential to help better understand the public's sentiments toward the Fish Risk Reduction Program. Comments on posts left by bait and tackle shops, which are more likely to reach the target demographic, will also provide insight into whether there is any confusion, concern, skepticism, or feedback on the program.

As part of the program's efforts to improve the outreach effectiveness, CCCWP staff worked closely with shoreline park regional managers from the East Bay Regional Parks District, and coordinated with the District's head fisheries biologist to install up-to-date signs along fishing piers (see Figure 1). A new sign template was provided by OEHHA. Field staff utilized feedback from park managers on the most effective locations to install signs along the parks and fishing piers, and were proactive to remove out-of-date material from piers and kiosks. Working closely with park managers from the East Bay Regional Parks District, field staff developed the opportunity for an interagency collaboration on future outreach programs and reporting. Park managers offered estimates by quantifying the fishing population on popular fishing days. Through their understanding of the Fish Risk Reduction Program, they also offered to educate persons with questions and/or direct them to the proper contacts.

Evaluating metrics for whether the Fish Risk Reduction Program effectively changes or impacts the diet of the target demographic was not assessed in 2020, and was considered too difficult a metric to approach during the COVID-19 pandemic. For FY 2020-2021, CCCWP is inquiring with OEHHA to determine if the agency can recommend a way to quantifiably assess this metric to better determine the effectiveness of the outreach program.

The primary goal with OEHHA's advisory posters is to ensure the public can easily access the correct serving recommendation. In previous research conducted by California Department of Public Health, they found this was one of the major issues with the older posters. Effectiveness will be measured by the percentage of people surveyed who are able to identify the correct number of servings for their age/gender group.

4 REFERENCES

SFBRWQCB. 2015. California Regional Water Quality Control Board, San Francisco Bay Region. Municipal Regional Stormwater NPDES Permit, Order No. R2-2015-0049, Permit No. CAS612008. November 19, 2015.

oehha.ca.gov. Office of Environmental Health Hazard Assessment. A Guide To Eating Fish Caught from the Central and South Delta. September 21, 2018. https://oehha.ca.gov/media/downloads/advisories/deltacentralsouthposter082418.pdf

oehha.ca.gov. Office of Environmental Health Hazard Assessment. A Guide to Eating Fish from San Francisco Bay. March 12, 2018. https://oehha.ca.gov/media/downloads/advisories/sfbayposter031218.pdf

pierfishing.com. Pier Fishing in California. Ferry Point Pier, Richmond, California. August 23, 2018. https://www.pierfishing.com/ferry-point-pier-richmond/

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ATTACHMENT 1: FISH RISK FLYERS

Images of the fish risk flyers can be found at the following links:

https://oehha.ca.gov/media/downloads/advisories/sfbayposter031218.pdf

https://oehha.ca.gov/media/downloads/advisories/deltacentralsouthposter082418.pdf

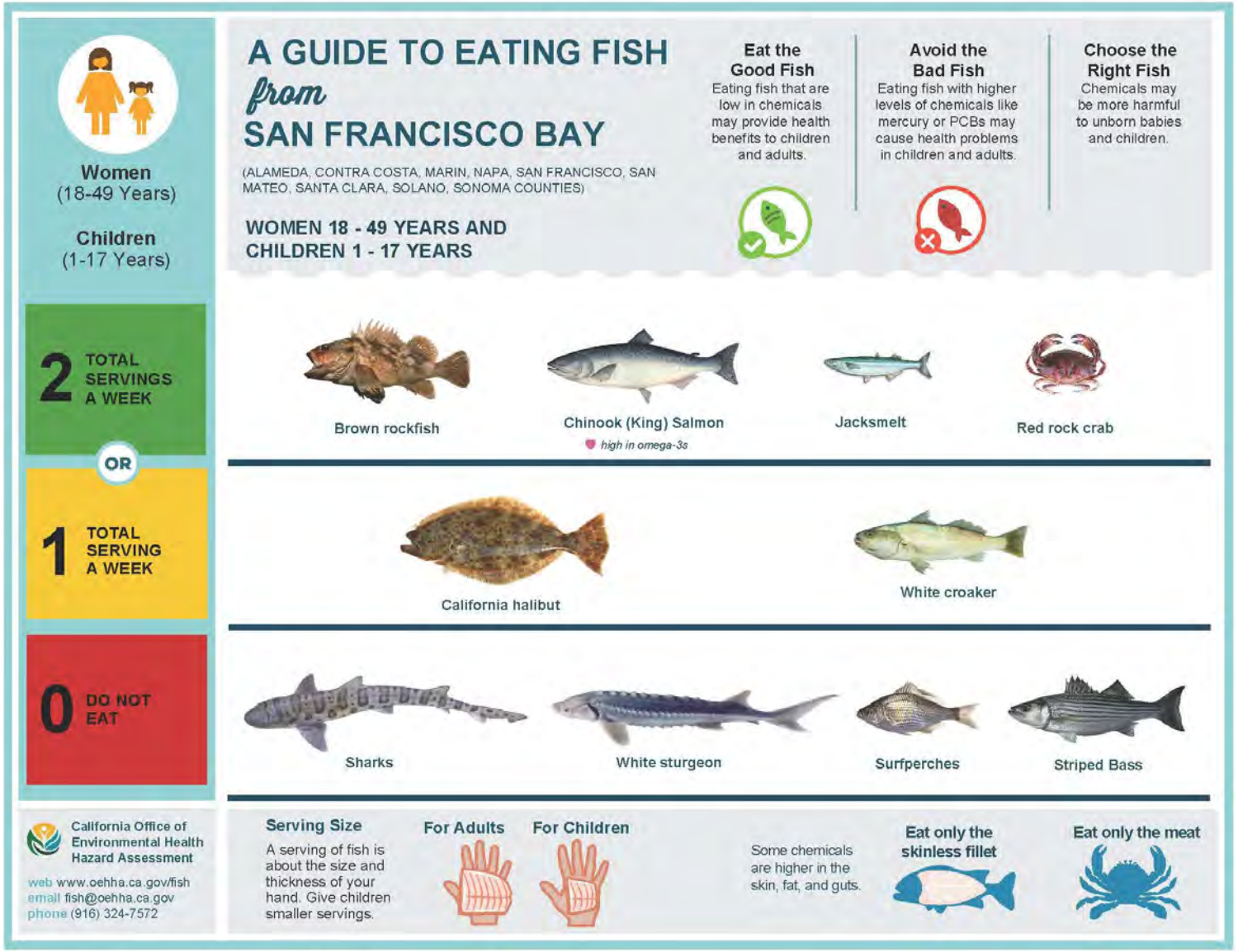
A GUIDE TO EATING FISH
from
SAN FRANCISCO BAY
(ALAMEDA, CONTRA COSTA, MARIN, NAPA, SAN FRANCISCO, SAN MATEO, SANTA CLARA, SOLANO, SONOMA COUNTIES)
WOMEN 18 - 49 YEARS AND CHILDREN 1 - 17 YEARS
Eat the Good Fish
Eating fish that are low in chemicals may provide health benefits to children and adults.
Avoid the Bad Fish
Eating fish with higher levels of chemicals like mercury or PCBs may cause health problems in children and adults.
Choose the Right Fish
Chemicals may be more harmful to unborn babies and children.
Women (18-49 Years)
Children (1-17 Years)
2 TOTAL SERVINGS A WEEK
OR
1 TOTAL SERVING A WEEK
0 DO NOT EAT
Brown rockfish
Chinook (King) Salmon
high in omega-3s
Jacksmelt
Red rock crab
California halibut
White croaker
Sharks
White sturgeon
Surfperches
Striped Bass
California Office of Environmental Health Hazard Assessment
web www.oehha.ca.gov/fish
email fish@oehha.ca.gov
phone (916) 324-7572
Serving Size
A serving of fish is about the size and thickness of your hand. Give children smaller servings.
For Adults
For Children
Some chemicals are higher in the skin, fat, and guts.
Eat only the skinless fillet
Eat only the meat

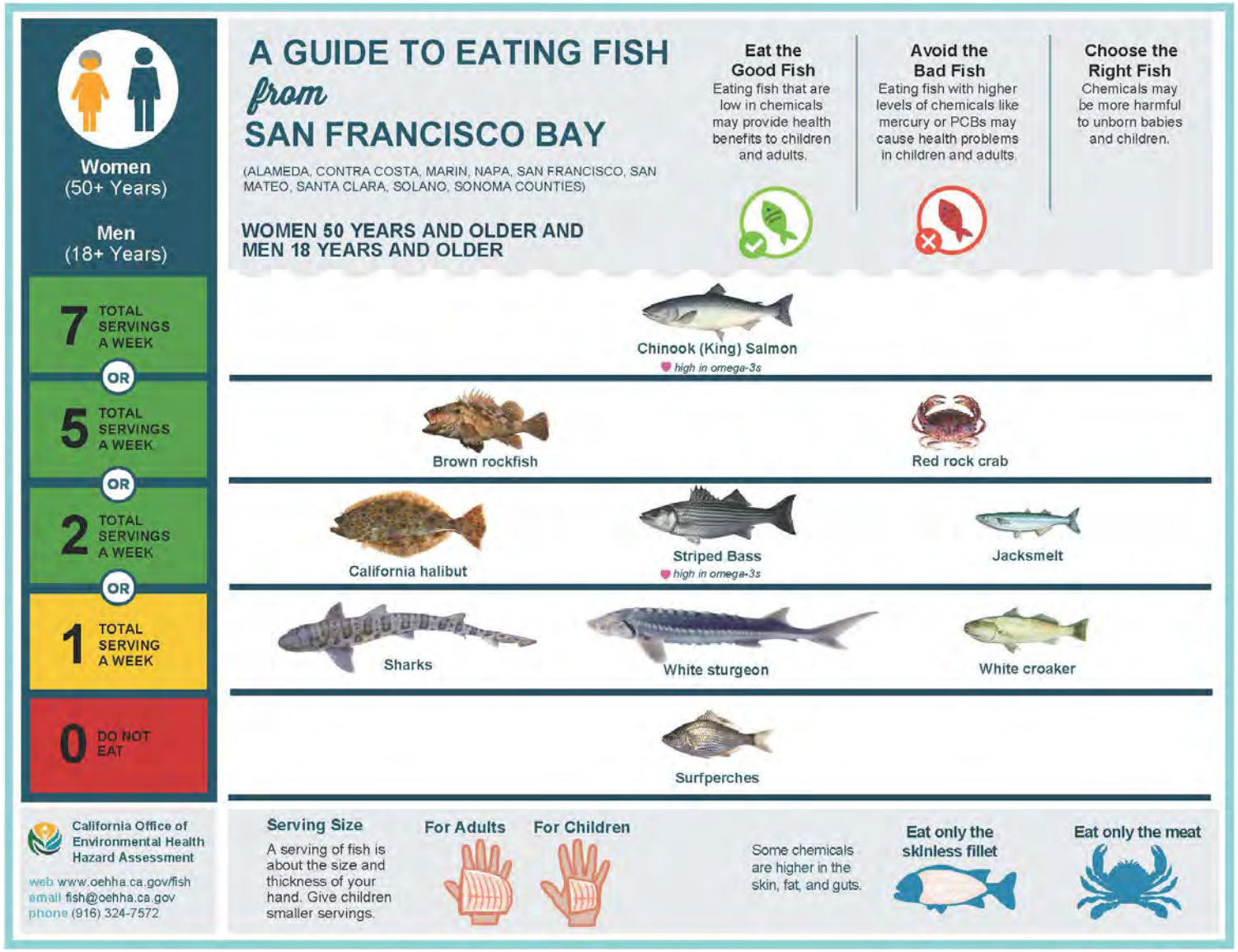
A GUIDE TO EATING FISH
from
SAN FRANCISCO BAY
(ALAMEDA, CONTRA COSTA, MARIN, NAPA, SAN FRANCISCO, SAN MATEO, SANTA CLARA, SOLANO, SONOMA COUNTIES)
WOMEN 50 YEARS AND OLDER AND MEN 18 YEARS AND OLDER
Eat the Good Fish
Eating fish that are low in chemicals may provide health benefits to children and adults.
Avoid the Bad Fish
Eating fish with higher levels of chemicals like mercury or PCBs may cause health problems in children and adults.
Choose the Right Fish
Chemicals may be more harmful to unborn babies and children.
Women (50+ Years)
Men (18+ Years)
7 TOTAL SERVINGS A WEEK
OR
5 TOTAL SERVINGS A WEEK
OR
2 TOTAL SERVINGS A WEEK
OR
1 TOTAL SERVING A WEEK
0 DO NOT EAT
Chinook (King) Salmon
high in omega-3s
Brown rockfish
Red rock crab
California halibut
Striped Bass
high in omega-3s
Jacksmelt
Sharks
White sturgeon
White croaker
Surfperches
California Office of Environmental Health Hazard Assessment
web www.oehha.ca.gov/fish
email fish@oehha.ca.gov
phone (916) 324-7572
Serving Size
A serving of fish is about the size and thickness of your hand. Give children smaller servings.
For Adults
For Children
Some chemicals are higher in the skin, fat, and guts.
Eat only the skinless fillet
Eat only the meat

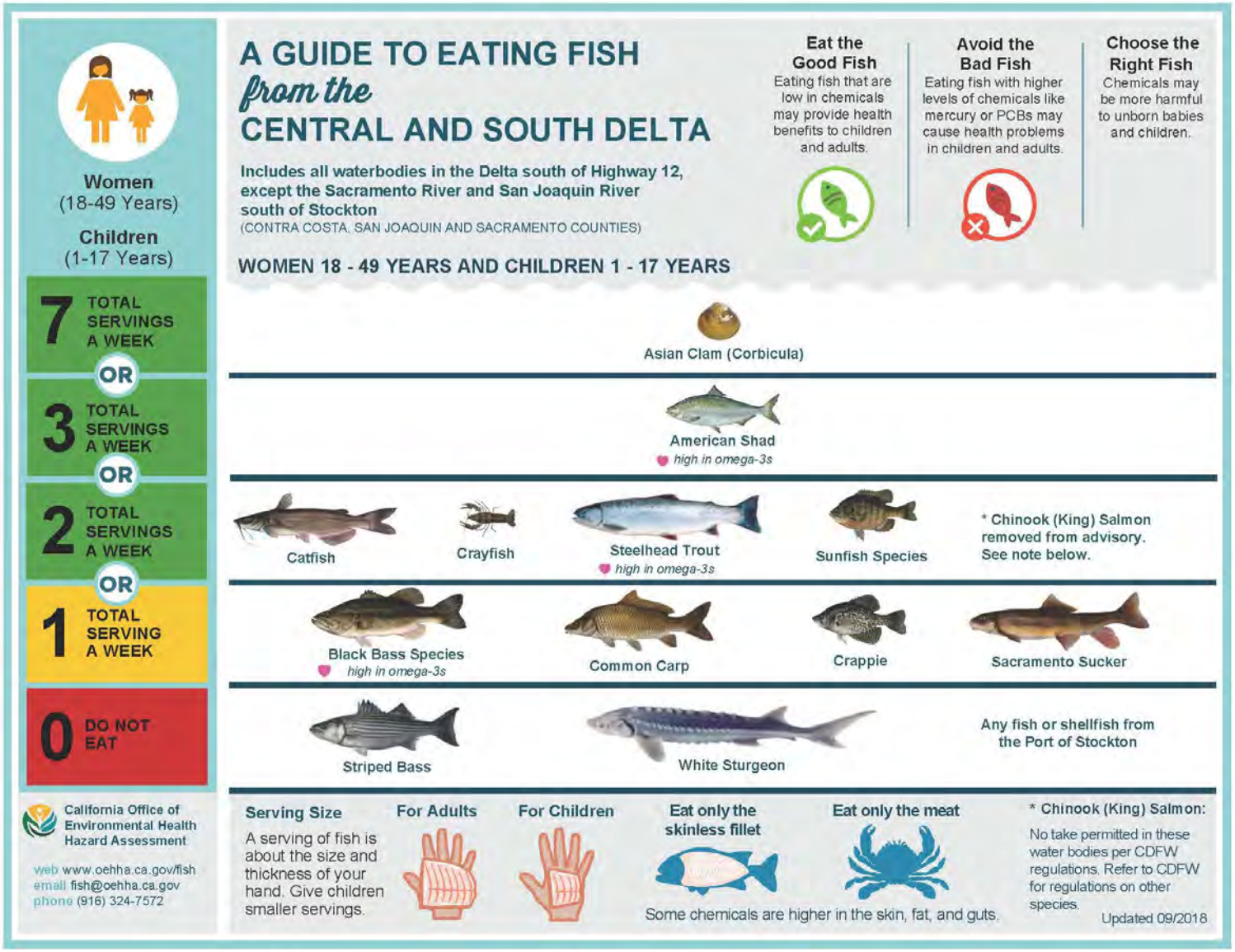
A GUIDE TO EATING FISH
from the
CENTRAL AND SOUTH DELTA
Includes all waterbodies in the Delta south of Highway 12, except the Sacramento River and San Joaquin River south of Stockton
(CONTRA COSTA, SAN JOAQUIN AND SACRAMENTO COUNTIES)
Eat the Good Fish
Eating fish that are low in chemicals may provide health benefits to children and adults.
Avoid the Bad Fish
Eating fish with higher levels of chemicals like mercury or PCBs may cause health problems in children and adults.
Choose the Right Fish
Chemicals may be more harmful to unborn babies and children.
Women (18-49 Years)
Children (1-17 Years)
WOMEN 18 - 49 YEARS AND CHILDREN 1 - 17 YEARS
7 TOTAL SERVINGS A WEEK
OR
3 TOTAL SERVINGS A WEEK
OR
2 TOTAL SERVINGS A WEEK
OR
1 TOTAL SERVING A WEEK
0 DO NOT EAT
Asian Clam (Corbicula)
American Shad
high in omega-3s
Catfish
Crayfish
Steelhead Trout
high in omega-3s
Sunfish Species
* Chinook (King) Salmon removed from advisory. See note below.
Black Bass Species
high in omega-3s
Common Carp
Crappie
Sacramento Sucker
Striped Bass
White Sturgeon
Any fish or shellfish from the Port of Stockton
California Office of Environmental Health Hazard Assessment
web www.oehha.ca.gov/fish
email fish@oehha.ca.gov
phone (916) 324-7572
Serving Size
A serving of fish is about the size and thickness of your hand. Give children smaller servings.
For Adults
For Children
Eat only the skinless fillet
Eat only the meat
Some chemicals are higher in the skin, fat, and guts.
* Chinook (King) Salmon:
No take permitted in these water bodies per CDFW regulations. Refer to CDFW for regulations on other species.
Updated 09/2018

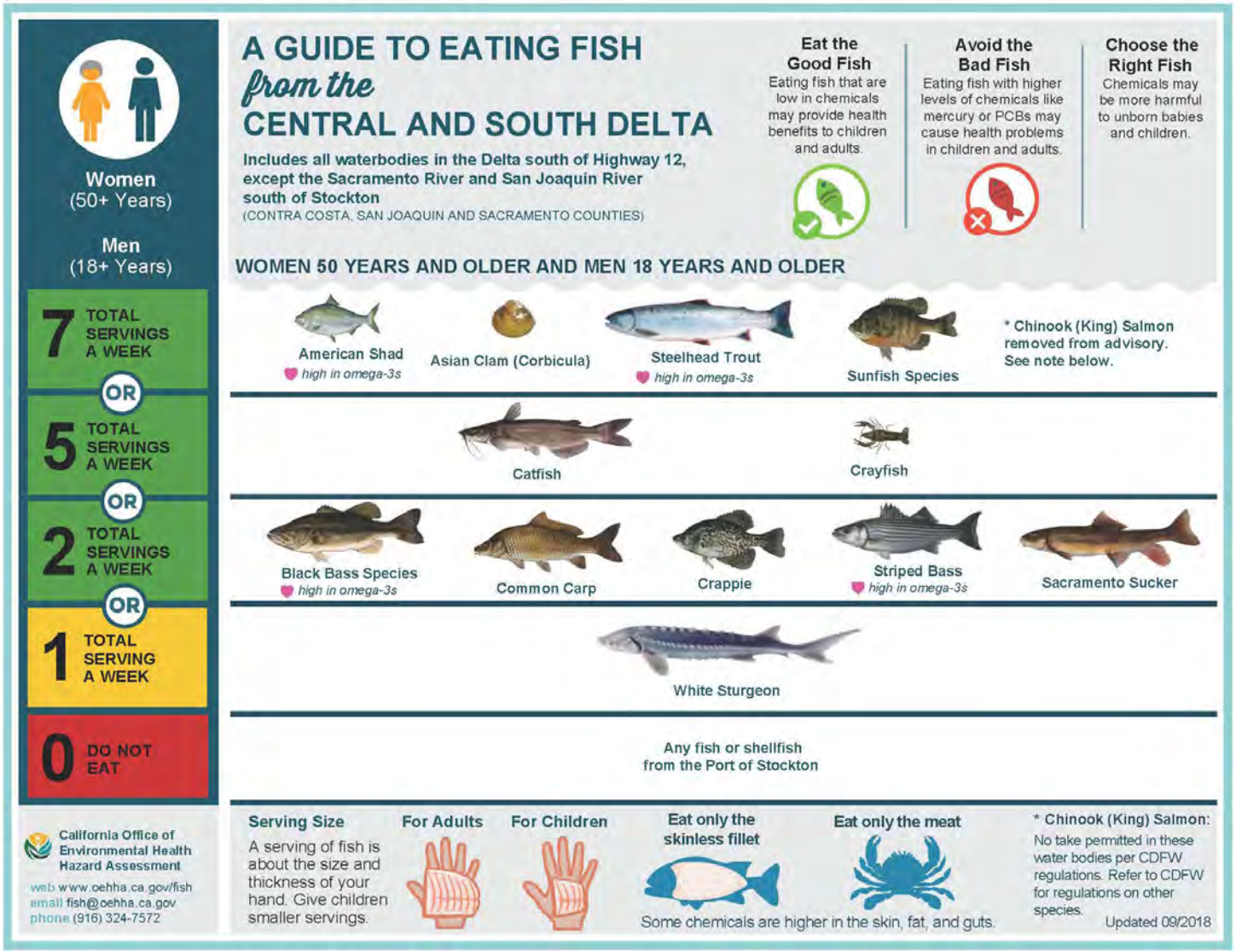
A GUIDE TO EATING FISH
from the
CENTRAL AND SOUTH DELTA
Includes all waterbodies in the Delta south of Highway 12, except the Sacramento River and San Joaquin River south of Stockton
(CONTRA COSTA, SAN JOAQUIN AND SACRAMENTO COUNTIES)
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Women (50+ Years)
Men (18+ Years)
7 TOTAL SERVINGS A WEEK
OR
5 TOTAL SERVINGS A WEEK
OR
2 TOTAL SERVINGS A WEEK
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0 DO NOT EAT
WOMEN 50 YEARS AND OLDER AND MEN 18 YEARS AND OLDER
American Shad
high in omega-3s
Asian Clam (Corbicula)
Steelhead Trout
high in omega-3s
Sunfish Species
* Chinook (King) Salmon removed from advisory. See note below.
Catfish
Crayfish
Black Bass Species
high in omega-3s
Common Carp
Crappie
Striped Bass
high in omega-3s
Sacramento Sucker
White Sturgeon
Any fish or shellfish from the Port of Stockton
Serving Size
A serving of fish is about the size and thickness of your hand. Give children smaller servings.
For Adults
For Children
Eat only the skinless fillet
Eat only the meat
Some chemicals are higher in the skin, fat, and guts.
* Chinook (King) Salmon:
No take permitted in these water bodies per CDFW regulations. Refer to CDFW for regulations on other species.
Updated 09/2018
California Office of Environmental Health Hazard Assessment
web www.oehha.ca.gov/fish
email fish@oehha.ca.gov
phone (916) 324-7572

Attachment 15.1

2018 Letter to CVRWQCB Regarding Diazinon and Chlorpyrifos

CONTRA COSTA
CLEAN WATER
PROGRAM

Courtney Riddle
Program Manager

Sent via email: no hard copy to follow

September 13, 2018

Elizabeth Lee
Daniel McClure
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive #200
Rancho Cordova, CA 95670

Re: Demonstration of Satisfying Diazinon and Chlorpyrifos Wasteload Allocations

Dear Ms. Lee and Mr. McClure:

This letter documents the results of diazinon and chlorpyrifos stormwater monitoring throughout the county from 2001 to 2017, conducted by CCCWP and other parties during storm season, when pollutant concentrations are likely to be highest. The purpose of this letter is to demonstrate to the CVRWQCB and SFBRWQCB staff that the wasteload allocations for these pollutants have been met, in preparation for extending coverage of the SFBRWQCB Municipal Regional Permit to East County Stormwater Permittees and that no further implementation is required.

The water quality objectives to East County permittees as listed in the Water Quality Control Plan for the Sacramento and San Joaquin River Basins are summarized in Table 1 below. This analysis compiles historic monitoring data and compares to the objectives listed below.

Table 1. Water Quality Objectives for Diazinon and Chlorpyrifos

Pesticide	Acute Objective (ng/L) (1-hour average)	Chronic Objective (ng/L) (4-day average)
Diazinon	160	100
Chlorpyrifos	25	15

Five data sources were used to compile monitoring data for diazinon and chlorpyrifos in water:

- CCCWP's Pollutants of Concern Loads Monitoring program at Lower Marsh Creek (CCCWP POC)
    - These data were obtained directly from laboratory reports obtained by CCCWP's monitoring contractor, ADH Environmental (email from Pete Wilde, ADH

255 Glacier Drive, Martinez, CA 94553-4825 • Tel: (925) 313-2360 Fax: (925) 313-2301 • Website: www.cccleanwater.org

Program Participants: Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Contra Costa County and Contra Costa County Flood Control & Water Conservation District

  - Environmental, to Khalil Abusaba, Wood Environment & Infrastructure Solutions, 5/15/2018).
  - This location is directly downstream from one of the largest continuous urbanized areas in East County.
- The State of California's Surface Water Ambient Monitoring Program (SWAMP)
  - These data were downloaded from the California Environmental Data Exchange Network.
  - None of the creeks sampled (Kirker, Mitchel, Baxter, San Pablo and Wildcat) are located in East County.
- The Department of Pesticide Regulation (DPR) Statewide Pesticide Monitoring Program
  - These data were obtained directly from DPR (email from Michael Ensminger, DPR to Lucile Paquette, CCCWP, 6/25/2018).
  - The Creeks sampled (Grayson and Walnut) are not located in East County.
- The San Francisco Estuary Institute's Small Tributaries Loading Strategy (SFEI STLS)
  - These data were downloaded from the California Environmental Data Exchange Network.
  - The single station monitored in Contra Costa County at the North Richmond Pump station is not located in East County.

In summary, the first data source represents East County jurisdictions, whereas the latter three provide countywide context from outside of East County.

Creeks in Contra Costa County, including creeks within East County Permittees' jurisdictions, are well below water quality objectives for diazinon and chlorpyrifos and well below the TMDL wasteload allocations. The chlorpyrifos data summarized in Table 2 and the diazinon data summarized in Table 3 show that detections and exceedances for both pesticides were previously sporadic, and have generally ceased since 2009.

Table 2. Summary of Detections and Exceedances of Water Quality Objectives for Chlorpyrifos in Contra Costa County

Program	Years	# Measured	# Detections	# Exceeding WQOs	Years, Creeks exceeding WQOs
CCCWP POC	2012 - 2014	8	5	0	NA
SWAMP	2001 - 2005	16	0	0	NA
DPR	2008-2009, 2017	13	1	1	2009, Grayson
SFEI / STLS	2013 - 2014	5	5	0	NA

Shaded rows indicate programs within East County Permittees' jurisdictions

Table 3. Summary of Detections and Exceedances of Water Quality Objectives for Diazinon in Contra Costa County

Program	Years	# Measured	# Detections	# Exceeding WQOs	Years and locations exceeding WQOs
CCCWP POC	2012 - 2014	8	1	0	NA
SWAMP	2001 – 2005	16	9	9	2003, Kirker (3x) 2001-2002, San Pablo 2003, Mitchell (2x) 2002, Wildcat (2x)
DPR	2008, 209, 2017	13	1	1	2/15/2009, Grayson
SFEI / STLS	2013 - 2014	5	0	0	NA

Shaded rows indicate programs within East County Permittees' jurisdictions

Detection limits have decreased over the past two decades with the availability of more sensitive analytical techniques. During the 2001 to 2005 time frame covered by the SWAMP program, the chlorpyrifos detection limit was 20 ng/L, higher than the Water Quality Objective (15 ng/L); therefore, some of the non-detects could have included concentrations that did exceed the Water Quality Objective for that data set. However, chlorpyrifos detection limits in CCCWP's POC monitoring program (2 – 10 ng/L) are all below the lowest water quality objective, and therefore the more recent non-detects reported from those programs truly represent attainment of the water quality objective. In contrast to chlorpyrifos, historic diazinon detection limits were generally below water quality objectives. Given the numbers well below objectives, the wasteload allocations based on combined diazinon and chlorpyrifos concentrations are also being attained by a wide margin.

The most recent detected and quantified results from CCCWP's POC monitoring program help make quantitative evaluations of whether diazinon and chlorpyrifos are "well below" water quality objectives (Table 4, Figure 1, Figure 2). The most stringent applicable water quality objective for chlorpyrifos is 15 ng/L; in comparison, the range of recently (2012 – 2014) detected chlorpyrifos concentrations in Marsh Creek is 1 to 7 ng/L, well below the water quality objective. Likewise, the only recently (2012 – 2014) detected concentration of diazinon in Marsh Creek was 1.7 ng/L, well below the water quality objective of 100 ng/L.

The observation that water quality objectives were sporadically exceeded in the past but are consistently attained since 2009 follows statewide and national trends, whereby prevention of diazinon sales for most outdoor, non-agricultural uses leads to a significant decrease in surface water occurrences (Banks et al, 2005).

Table 4. Details of Diazinon and Diazinon Monitoring Results from Marsh Creek, downstream of East County MS4 areas

Date	Diazinon Result (ng/L)	Diazinon Reporting Limit (ng/L)	Chlorpyrifos Result (ng/L)	Chlorpyrifos Reporting Limit (ng/L)	Analytical Method
1/21/2012	ND	20	ND	10	EPA 614
3/17/2012	ND	20	ND	10	EPA 614
3/17/2012	ND	20	ND	10	EPA 614
11/29/2012	ND	1.5	1	0.2	EPA 8270
12/22/2012	1.6*	1.7	6.6	3.4	EPA 8270
4/5/2013	ND	1.5	1.3	2	EPA 8270
2/6/2014	ND	1.5	2.4	2	EPA 8270
2/9/2014	ND	1.5	2.1	2	EPA 8270

All results are below lowest applicable water quality objective.
* Sample reported as below reporting limit, therefore detected but not quantified

Figure 1. Summary of Diazinon Results from Marsh Creek Downstream of East County Permittee's MS4 Areas in Comparison to the Lowest Applicable Water Quality Objective.

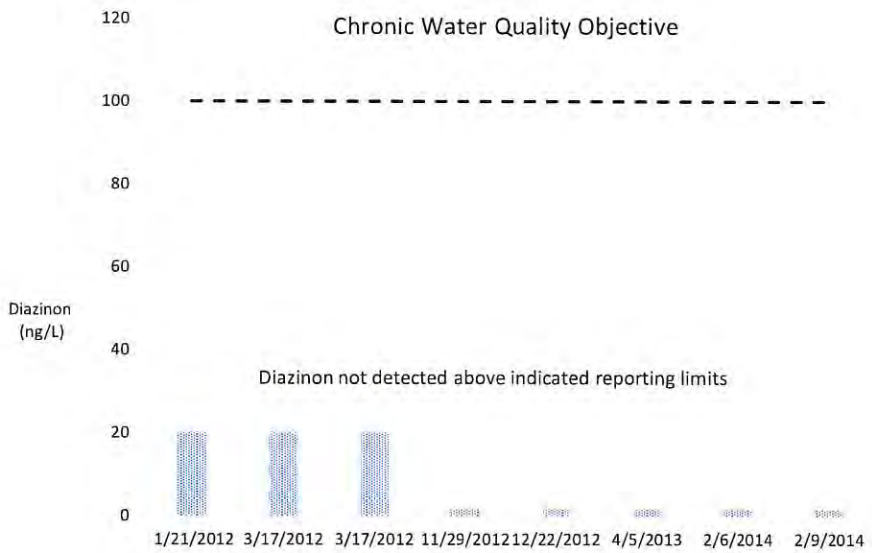

Hatching pattern indicates the reporting limit for samples that were below the reporting limit.

Figure 2. Summary of Chlorpyrifos Results from Marsh Creek Downstream of East County Permittee's MS4 Areas in Comparison to the Lowest Applicable Water Quality Objective.

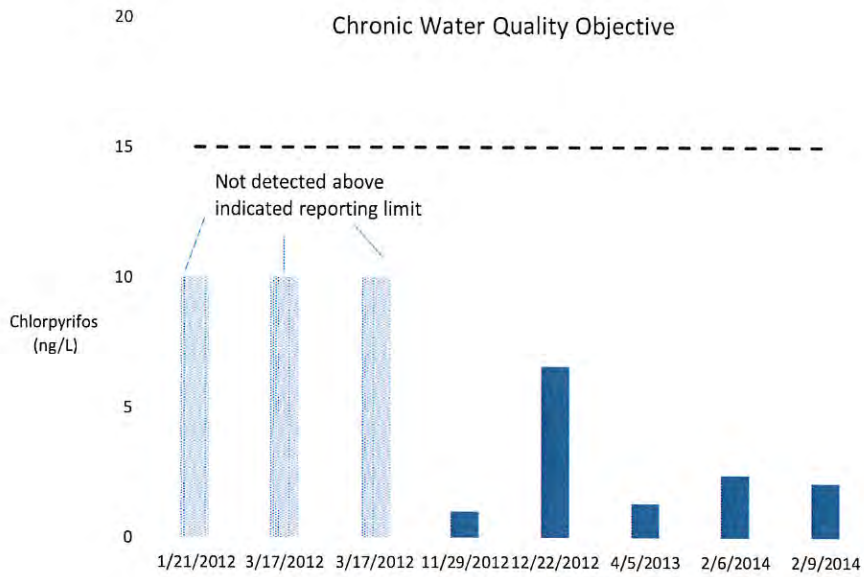

Hatching pattern indicates the reporting limit for samples that were below the reporting limit.

If you have questions, or if you would like to discuss this matter further, please contact me directly at 925-313-2392.

Regards,

Courtney D. Riddle

Courtney Riddle
Program Manager

FAIRFIELD-SUISUN SEWER DISTRICT
1010 CHADBOURNE ROAD • FAIRFIELD, CALIFORNIA 94534 • (707) 429-8930 • WWW.FSSD.COM
GREGORY G. BAATRUP, GENERAL MANAGER

September 30, 2020

Mr. Michael Montgomery, Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Attention: Mr. Zach Rokeach, Water Resources Control Engineer

Reference: Fairfield-Suisun Urban Runoff Management Program - FY 2019-2020 Annual Report

Dear Mr. Montgomery:

The attached FY 2019-2020 Annual Report represents the Fairfield-Suisun Urban Runoff Management Program's responses to the items requested per Provision C.17 of NPDES Permit No. CAS612008 (Permit) as adopted on November 18, 2015 via Order No. R2-2015-0049. This letter also transmits by reference the BASMAA Regional Supplements to the Annual Report for FY 2018-2019.

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Kevin A. Cullen

Kevin A. Cullen, P.E.
Senior Environmental Engineer

Attachment

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Section 1 – Permittee Information

Background Information					
Permittee Name:	Fairfield-Suisun Urban Runoff Management Program				
Population:	143,978 (combined)				
NPDES Permit No.:	CAS612008				
Order Number:	R2-2015-0049				
Reporting Time Period (month/year):	July 2019 through June 2020				
Name of the Responsible Authority:	Fairfield-Suisun Urban Runoff Management Program			Title:	Program Manager
Mailing Address:	1010 Chadbourne Road				
City:		Zip Code:	94534	County:	Solano
Telephone Number:	707-688-8895		Fax Number:		707-429-1280
E-mail Address:	KCullen@fssd.com				
Name of the Designated Stormwater Management Program Contact (if different from above):	Kevin Cullen			Title:	Fairfield Suisun Urban Runoff Program Manager
Department:	Fairfield-Suisun Sewer District				
Mailing Address:	1010 Chadbourne Road				
City:	Fairfield	Zip Code:	94534	County:	Solano
Telephone Number:	707-428-9129		Fax Number:		707-429-1280
E-mail Address:	KCullen@fssd.com				

Section 2 - Provision C.2 Reporting Municipal Operations

Program Highlights and Evaluation
Highlight/summarize activities for reporting year:

Summary:

Program members participated in monthly Program Management meetings which included discussions of municipal maintenance BMPs to protect water quality. Program Manager partook regularly in BASMAA's monthly committee meetings for the BASMAA Board of Directors. The Program Manager, participated in BASMAA's regional Municipal Maintenance meetings when they occurred.

C.2.a. ►Street and Road Repair and Maintenance

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

NA	Control of debris and waste materials during road and parking lot installation, repaving or repair maintenance activities from polluting stormwater
NA	Control of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater from discharging to storm drains from work sites.
NA	Sweeping and/or vacuuming and other dry methods to remove debris, concrete, or sediment residues from work sites upon completion of work.

Comments:

Please see individual city reports, as these activities are implemented at the city level.

C.2.b. ►Sidewalk/Plaza Maintenance and Pavement Washing

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

NA	Control of wash water from pavement washing, mobile cleaning, pressure wash operations at parking lots, garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning activities from polluting stormwater
NA	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs

Comments:
Please see individual city reports, as these activities are implemented at the city level.

C.2.c. ►Bridge and Structure Maintenance and Graffiti Removal

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

NA	Control of discharges from bridge and structural maintenance activities directly over water or into storm drains
NA	Control of discharges from graffiti removal activities
NA	Proper disposal for wastes generated from bridge and structure maintenance and graffiti removal activities
NA	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs for graffiti removal
NA	Employee training on proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.
NA	Contract specifications requiring proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.

Comments:
Please see individual city reports, as these activities are implemented at the city level.

C.2.e. ►Rural Public Works Construction and Maintenance

Does your municipality own/maintain rural[1] roads:		Yes	x	No
If your answer is No then skip to C.2.f.				

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

NA	Control of road-related erosion and sediment transport from road design, construction, maintenance, and repairs in rural areas
NA	Identification and prioritization of rural road maintenance based on soil erosion potential, slope steepness, and stream habitat resources
NA	No impact to creek functions including migratory fish passage during construction of roads and culverts
NA	Inspection of rural roads for structural integrity and prevention of impact on water quality
NA	Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion
NA	Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate
NA	Inclusion of measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology when replacing culverts or design of new culverts or bridge crossings

Comments including listing increased maintenance in priority areas:
This type of maintenance work is handled at the city level. However, neither city in the Program has rural roads within its jurisdiction.

[1]Rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses.

C.2.f. ►Corporation Yard BMP Implementation

Place an X in the boxes below that apply to your corporations yard(s):

x	We do not have a corporation yard
	Our corporation yard is a filed NOI facility and regulated by the California State Industrial Stormwater NPDES General Permit
	We have a **Stormwater Pollution Prevention Plan (SWPPP)** for the Corporation Yard(s)

Place an X in the boxes below next to implemented SWPPP BMPs to indicate that these BMPs were implemented in applicable instances. If not applicable, type NA in the box. If one or more of the BMPs were not adequately implemented during the reporting fiscal year then indicate so and explain in the comments section below:

NA	Control of pollutant discharges to storm drains such as wash waters from cleaning vehicles and equipment
NA	Routine inspection prior to the rainy seasons of corporation yard(s) to ensure non-stormwater discharges have not entered the storm drain system
NA	Containment of all vehicle and equipment wash areas through plumbing to sanitary or another collection method
NA	Use of dry cleanup methods when cleaning debris and spills from corporation yard(s) or collection of all wash water and disposing of wash water to sanitary or other location where it does not impact surface or groundwater when wet cleanup methods are used
NA	Cover and/or berm outdoor storage areas containing waste pollutants

Comments:
Please see individual city reports as these activities are implemented at the city level.

If you have a corporation yard(s) that is not an NOI facility, complete the following table for inspection results for your corporation yard(s) or attach a summary including the following information:

Corporation Yard Name	**Corp Yard Activities w/ site-specific SWPPP BMPs**	**Inspection** Date[2]	**Inspection Findings/Results**	Date and Description of **Follow-up and/or** Corrective Actions
NA	NA	NA	NA	NA

[2] Minimum inspection frequency is once a year during September.

Section 3 - Provision C.3 Reporting New Development and Redevelopment

C.3.b.iv.(2) ►Regulated Projects Reporting

Fill in attached table C.3.b.iv.(2) or attach your own table including the same information.

Please see individual city reports as these activities are implemented at the city level.

C.3.e.iv. ►Alternative or In-Lieu Compliance with Provision C.3.c.

Is your agency choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e.?	x	Yes		No

Comments (optional):
Please see individual city reports as these activities are implemented at the city level.

C.3.e.v ► Special Projects Reporting

1. In FY 2019-20, has your agency received, but not yet granted final discretionary approval of, a development permit application for a project that has been identified as a potential Special Project based on criteria listed in MRP Provision C.3.e.ii(2) for any of the three categories of Special Projects (Categories A, B or C)?		Yes	x	No
2. In FY 2019-20, has your agency granted final discretionary approval to a Special Project? If yes, include the project in both the C.3.b.iv.(2) Table, and the C.3.e.v. Table.		Yes	x	No

If you answered "Yes" to either question,

1) Complete Table C.3.e.v.
2) Attach narrative discussion of 100% LID Feasibility or Infeasibility for each project.

Please see individual city reports as these activities are implemented at the city level.

C.3.h.v.(2) ► Reporting Newly Installed Stormwater Treatment Systems and HM Controls (Optional)

On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting year) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. The list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

Please see individual city reports as these activities are implemented at the city level.

C.3.h.v.(3)(a) **–(c) and (f) ► Installed Stormwater Treatment** Systems Operation and Maintenance Verification Inspection Program Reporting

Please see individual city reports as these activities are implemented at the city level.

Site Inspections Data	Number/Percentage
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the previous fiscal year (FY18-19)	NA
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the reporting period (FY 19-20)	NA
Total number of Regulated Projects (including offsite projects, and Regional Projects) for which O&M verification inspections were conducted during the reporting period (FY 19-20)	NA
Percentage of the total number of Regulated Projects (including offsite projects, and Regional Projects) inspected during the reporting period (FY 19-20)	NA

C.3.h.v.(3)(d)-**(e) ► Installed Stormwater Treatment Systems** Operation and Maintenance Verification Inspection Program Reporting

Provide a discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

Summary:
Please see individual city reports as these activities are implemented at the city level.

Provide a discussion of the effectiveness of the O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness program).

Summary:
Please see individual city reports as these activities are implemented at the city level.

C.3.i. ►Required Site Design Measures for Small Projects and Detached Single Family Home Projects

On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

Summary:
BASMAA prepared standard specifications in four fact sheets regarding the site design measures listed in Provision C.3.i, as a resource for Co-permittees. We have modified local procedures and forms/checklists to require all applicable projects approved after December 1, 2012 to implement at least one of the site design measures listed in Provision C.3.i. The Program cities are using BASMAA's site design fact sheets for compliance with this requirement.

- BASMAA's site design fact sheets

C.3.j.i.(5)**(d) ► Green** Infrastructure Outreach

On an annual basis, provide a summary of your agency's outreach and education efforts pertaining to Green Infrastructure planning and implementation.

Summary:

Green Infrastructure has been a regular topic of conversation at the Program's stormwater management meetings on a monthly basis with program and city staff involved. Program and city staff have collaborated with the Vallejo permittee's to hire a team of consultants to develop a Green Stormwater Infrastructure Plan. Staff is now working with the team of Fall Creek Engineering, 2NDNature, Wateristas, Brown and Caldwell, Dan Cloak Engineering and AMEC-Foster Wheeler to provide the design for Solano County's Green Stormwater Infrastructure Plan.

Both cities have adopted Green infrastructure work plans and have made presentations to city Council staff for the adoption of the work plans. The newly developed Green Stormwater Infrastructure (GSI) Plans have been placed on both cities websites for public review and advertisement. Green Stormwater Infrastructure Plans are posted on each cities' website. In addition, the Program has participated at a regional level for the promotion of Green Stormwater Infrastructure.

The Program's Green Stormwater Infrastructure Plan development process engaged a wide variety of stakeholders, including both government staff and community members who will live, work, and play near future green stormwater infrastructure projects. The cities also intend to engage relevant government staff and community members as projects move forward towards design and implementation.

1.1 Interdepartmental Meetings and Trainings

To get support and commitment to the GSI Plan and this new approach to urban infrastructure, educating department staff, managers, and elected officials about the purposes and goals of green stormwater infrastructure, the required elements of the GSI Plan, and steps needed to develop and implement the GSI Plan was an important step in the development of the GSI Plan. The cities began this process in fiscal year 2015-2016 and to date has completed the following tasks:

- Engineering staff attended a GSI workshop covering GSI design guidelines; implementing GSI projects, the GSI Design Guidebook; and GSI landscape and maintenance considerations.
- In-house training was provided February 4, 2019 to Planning and Engineering Services Department staff on GSI requirements, strategies, and opportunities.
- Interdepartmental meetings with affected department staff and management have been held to discuss GSI requirements and assigned tasks.

C.3.j.ii.(2) ► Early Implementation of Green Infrastructure Projects

On an annual basis, submit a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures. Include the following information:

- A summary of planning or implementation status for each public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. (see C.3.j.ii.(2) Table B - Planned Green Infrastructure Projects).
- A summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement (see C.3.j.ii.(2) Table A - Public Projects Reviewed for Green Infrastructure).

Background Information:

Describe how this provision is being implemented by your agency, including the process used by your agency to identify projects with potential for green infrastructure, if applicable.

The Program has utilized BASMAA's guidance for the review of CIPs for the potential of incorporating Green Infrastructure (see attached) for CIP inside the Program jurisdictional boundaries. Monthly meetings are held with Program Permitees in which GI potential is discussed and developed. The Program has led the development of the GSI Plans.

Summary of Planning or Implementation Status of Identified Projects:

The Program has utilized BASMAA's guidance for the review of CIPs for the potential of incorporating Green Infrastructure (see attached) for CIP inside the Program jurisdictional boundaries. Monthly meetings are held with Program Permitees in which GI potential is discussed and developed. The Program has led the development of the GSI Plans.

C.3.j.iii.(2) and (3) ► Participate in Processes to Promote Green Infrastructure

On an annual basis, report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

The FSURMP's Green Stormwater Infrastructure Plan development process engaged a wide variety of stakeholders, including both government staff and community members who will live, work, and play near future green stormwater infrastructure projects. The City of Fairfield also intends to engage relevant government staff and community members as projects move forward towards design and implementation.

1.2 Interdepartmental Meetings and Trainings

To get support and commitment to the GSI Plan and this new approach to urban infrastructure, educating department staff, managers, and elected officials about the purposes and goals of green stormwater infrastructure, the required elements of the GSI Plan, and steps needed to develop and implement the GSI Plan was an important step in the development of the GSI Plan. The City began this process in fiscal year 2015-2016 and to date has completed the following tasks:

- Engineering staff attended a GSI workshop covering GSI design guidelines; implementing GSI projects, the GSI Design Guidebook; and GSI landscape and maintenance considerations.
- In-house training was provided February 4, 2019 to Planning and Engineering Services Department staff on GSI requirements, strategies, and opportunities.
- Interdepartmental meetings with affected department staff and management have been held to discuss GSI requirements and assigned tasks.
- The MRP requirements to analyze proposed capital projects for opportunities to incorporate GSI were discussed with Planning Department staff.

1.3 Public Outreach and Education

Public and stakeholder support is also essential for the successful implementation of the GSI Plan and future GSI projects. There were several opportunities for public participation in the development of the GSI Plan, including through a GSI website and public outreach events and presentations.

Updates on the development of the GSI Plan were presented at public outreach events and a City webpsites were established to provide information to the public and will be periodically updated. The website will also serve as a home for the Final GSI Plan.

For Elected Officials, the Solano Permittees developed a factsheet and a brief presentation for Cities to use in conducting outreach to elected officials on GSI.

The Cities will continue to conduct education and outreach about GSI as the GSI Plan is implemented.

C.3.j.iv.(2) and (3) ► Tracking and Reporting Progress

On an annual basis, report progress on development and implementation of methods to track and report implementation of green infrastructure measures and provide reasonable assurance that wasteload allocations for TMDLs are being met.

Program and city staff have collaborated with the Vallejo permittee's to hire a team of consultants to develop a Green Stormwater Infrastructure Plan. Staff is now working with the team of Fall Creek Engineering, 2NDNature, Wateristas, Brown and Caldwell, Dan Cloak Engineering and AMEC-Foster Wheeler to provide the design for Solano County's Green Stormwater Infrastructure Plan.

Program staff is currently negotiating with its' consultants on the terms of conditions for the tracking and reporting tool.

5.1.2 GIS Tracking tool

As the Solano Permittees proceed to implement GI control measures, projects will be tracked in a manner that allows ongoing assessment of stormwater mitigation multi-benefits and spatially explicit quantification of runoff and pollutant load reductions. Ongoing project effectiveness and BMP maintenance needs tracking and will be accomplished with an asset management system integrated with a stormwater infrastructure geodatabase. The project tracking system will include field data capture via datasheets or mobile apps, inspection protocols for decentralized and centralized structural BMPs, and a protocol to field verify non-structural BMPs. Overall effectiveness tracking for projects will be based on the estimates of cumulative annual runoff and pollutant load reductions calculated for implemented projects and comparison with the target GI load reduction targets.

GI implementation data will be stored in a geodatabase linked to hydrographic data that describe the urban drainage system that includes urban catchment delineations, stormwater infrastructure, catchment outfalls, and connectivity to receiving waters. This will facilitate quantification of stormwater pollutant load reduction quantification that may require a routing component and/or integration with source controls for tracking progress towards pollutant waste load allocations. The geodatabase will also include data layers required for estimating runoff and pollutant loading to BMPs, such as impervious surface coverage, rainfall, soil types, land use, and slope. GI project implementation data will include a hierarchy of implementation types that includes non-structural parcel LID, decentralized BMPs, and centralized BMPs. When available, individual BMP data will be stored within the geodatabase and linked to both the GI project level data and the catchment spatial data.

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 1) – Projects Approved During the Fiscal Year Reporting Period

Project Name Project No.	Project Location[1], Street Address	Name of Developer	Project Phase No.[2]	Project Type & Description[3]	Project Watershed[4]	Total Site Area (Acres)	Total Area of Land Disturbed (Acres)	Total New Impervious Surface Area (ft^2)[5]	Total Replaced Impervious Surface Area (ft^2)[6]	Total Pre-Project Impervious Surface Area[7](ft^2)	Total Post-Project Impervious Surface Area[8](ft^2)
Private Projects											
Please see individual city reports											
Public Projects											
Please see individual city reports											
Comments:											

[1]Include cross streets
[2]If a project is being constructed in phases, indicate the phase number and use a separate row entry for each phase. If not, enter "NA".
[3]Project Type is the type of development (i.e., new and/or redevelopment). Example descriptions of development are: 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse.
[4]State the watershed(s) in which the Regulated Project is located. Downstream watershed(s) may be included, but this is optional.
[5]All impervious surfaces added to any area of the site that was previously existing pervious surface.
[6]All impervious surfaces added to any area of the site that was previously existing impervious surface.
[7]For redevelopment projects, state the pre-project impervious surface area.
[8]For redevelopment projects, state the post-project impervious surface area.

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (private projects)

Project Name Project No.	Application Deemed Complete Date[9]	Application Final Approval Date[10]	Source Control Measures[11]	Site Design Measures[12]	Treatment Systems Approved[13]	Type of Operation & Maintenance Responsibility Mechanism[14]	Hydraulic Sizing Criteria[15]	Alternative Compliance Measures[16/17]	Alternative Certification[18]	HM Controls[19/20]
Private Projects										
Please see individual city reports										

[9]For private projects, state project application deemed complete date. If the project did not go through discretionary review, report the building permit issuance date.
[10]For private projects, state project application final discretionary approval date. If the project did not go through discretionary review, report the building permit issuance date.
[11]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[12]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[13]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[14]List the legal mechanism(s) (e.g., O&M agreement with private landowner; O&M agreement with homeowners' association; O&M by public entity, etc…) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[15]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[16]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[17]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[18]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[19]If HM control is not required, state why not.
[20]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (public projects)

Project Name Project No.	Approval Date[21]	Date Construction Scheduled to Begin	Source Control Measures[22]	Site Design Measures[23]	Treatment Systems Approved[24]	Operation & Maintenance Responsibility Mechanism[25]	Hydraulic Sizing Criteria[26]	Alternative Compliance Measures[27/28]	Alternative Certification[29]	HM Controls[30/31]
Public Projects										
Please see individual city reports										
Comments:										

[21]For public projects, enter the plans and specifications approval date.
[22]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[23]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[24]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[25]List the legal mechanism(s) (e.g., maintenance plan for O&M by public entity, etc.) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[26]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[27]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[28]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[29]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[30]If HM control is not required, state why not.
[31]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

C.3.h.v.(2). ►Table of Newly Installed[32] Stormwater Treatment Systems and Hydromodification Management (HM) Controls (Optional)

Fill in table below or attach your own table including the same information.

Name of Facility	Address of Facility	Party Responsible[33] For Maintenance	Type of Treatment/HM Control(s)
Please see individual city reports			

[32] "Newly Installed" includes those facilities for which the final installation inspection was performed during this reporting year.
[33] State the responsible operator for installed stormwater treatment systems and HM controls.

C.3.e.v.Special Projects Reporting Table

Reporting Period – July 1 2019 - June 30, 2020

Project Name & No.	Permittee	Address	Application Submittal Date[34]	Status[35]	Description[36]	Site Total Acreage	Gross Density DU/Acre	Density FAR	Special Project Category[37]	LID Treatment Reduction Credit Available[38]	List of LID Stormwater Treatment Systems[39]	List of Non-LID Stormwater Treatment Systems[40]
Please see individual city reports												

[34]Date that a planning application for the Special Project was submitted.
[35] Indicate whether final discretionary approval is still pending or has been granted, and provide the date or version of the project plans upon which reporting is based.
[36]Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.
[37] For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.
[38]For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.
[39]**:** List all LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area.
[40]List all non-LID stormwater treatment systems proposed. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

Special Projects Narrative

C.3.j.ii.(2) ► Table A - Public Projects Reviewed for Green Infrastructure

Project Name and Location[41]	Project Description	Status[42]	GI Included?[43]	Description of GI Measures Considered and/or Proposed or Why GI is Impracticable to Implement[44]
Please see individual city reports				

C.3.j.ii.(2) ► Table B - Planned and/or Completed Green Infrastructure Projects

Project Name and Location[45]	Project Description	Planning or Implementation Status	Green Infrastructure Measures Included
Please see individual city reports			

[41] List each public project that is going through your agency's process for identifying projects with green infrastructure potential.
[42] Indicate status of project, such as: beginning design, under design (or X% design), projected completion date, completed final design date, etc.
[43] Enter "Yes" if project will include GI measures, "No" if GI measures are impracticable to implement, or "TBD" if this has not yet been determined.
[44] Provide a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. If review of the project indicates that implementation of green infrastructure measures is not practicable, provide the reasons why green infrastructure measures are impracticable to implement.
[45] List each planned (and expected to be funded) public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Note that funding for green infrastructure components may be anticipated but is not guaranteed to be available or sufficient.

BASMAA Development Committee

Guidance for Identifying Green Infrastructure Potential in Municipal Capital Improvement Projects (8 April 2016 DRAFT)

Background

In MRP 2.0, Provisions C.11 and C.12 require the Permittees to reduce discharges of Mercury and PCBs, respectively. A portion of these load reductions must be achieved by implementing Green Infrastructure. Permittees, collectively, must implement Green Infrastructure to reduce mercury loading by 48 grams/year and PCB loading by 120 grams/year by 2020, and plan for substantially larger reductions in the following decades. Green Infrastructure on both public and private land can serve to achieve these load reduction requirements. Implementation on private land is achieved by implementing stormwater requirements for new development and redevelopment (Provision C.3.a. through Provision C.3.i.). These requirements were carried forward, largely unchanged, from MRP 1.0.

MRP 2.0 defines Green Infrastructure as:

> Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.

In practical terms, most green infrastructure will take the form of diverting runoff from existing streets, roofs, and parking lots to one of two stormwater management strategies:

1. Dispersal to vegetated areas, where sufficient landscaped area is available and slopes are not too steep.
2. LID (bioretention and infiltration) facilities, built according to criteria similar to those currently required for regulated private development and redevelopment projects under Provision C.3.

In some cases, the use of tree-box-type biofilters may be appropriate[1]. In other cases, where conditions are appropriate, existing impervious pavements may be removed and replaced with pervious pavements.

In MRP 2.0, Provision C.3.j. includes requirements for Green Infrastructure planning and implementation. Provision C.3.j. has two main elements to be implemented by municipalities:

1. Preparation of a Green Infrastructure Plan for the inclusion of LID drainage design into storm drain infrastructure, including streets, roads, storm drains, etc.
2. Early implementation of green infrastructure projects ("no missed opportunities"),

This guidance addresses the second of these requirements. The intent of the "no missed opportunities" requirement is to ensure that no major infrastructure project is built without assessing the opportunity for incorporation of green infrastructure features.

Provision C.3.j.ii. requires that each Permittee prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term, and infrastructure projects planned for implementation during the permit

[1] Standard proprietary tree-box-type biofilters are considered to be non-LID treatment and will only be allowed under certain circumstances. Guidance on use and sizing of these facilities will be provided in a separate document.

term that have potential for green infrastructure measures. The list must be submitted with each Annual Report, including:

> "… a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practical during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description for the project and the reasons green infrastructure measures were impracticable to implement".

This requirement has no specified start date; "during the permit term" means beginning January 1, 2016 and before December 31, 2020. The first Annual Report submittal date will be September 30, 2016.

Note that this guidance primarily addresses the review of proposed or planned public projects for green infrastructure opportunities. The Permittee may also be aware of proposed or planned private projects, not subject to LID treatment requirements, that may have the opportunity to incorporate green infrastructure. These should be addressed in the same way as planned public projects, as described below.

Procedure for Review of Planned Public Projects and Annual Reporting

The municipality's Capital Improvement Program (CIP) project list provides a good starting point for review of proposed public infrastructure projects. Review of other lists of public infrastructure projects, such as those proposed within separately funded special districts (e.g., lighting and landscape districts, maintenance districts, and community facilities districts), may also be appropriate. This section describes a two-part procedure for conducting the review.

Part 1 – Initial Screening

The first step in reviewing a CIP or other public project list is to screen out certain types of projects from further consideration. For example, some projects (e.g., interior remodels, traffic signal replacement) can be readily identified as having no green infrastructure potential. Other projects may appear on the list with only a title, and it may be too early to identify whether green infrastructure could be included. Still others have already progressed past the point where the design can reasonably be changed (this will vary from project to project, depending on available budget and schedule).

Some "projects" listed in a CIP may provide budget for multiple maintenance or minor construction projects throughout the jurisdiction or a portion of the jurisdiction, such as a tree planting program, curb and sidewalk repair/upgrade, or ADA curb/ramp compliance. It is recommended that these types of projects not be included in the review process described herein. The priority for incorporating green infrastructure into these types of projects needs to be assessed as part of the Permittees' development of Green Infrastructure Plans, and standard details and specifications need to be developed and adopted. During this permit term, Permittees will evaluate select projects, project types, and/or groups of projects as case studies and develop an approach as part of Green Infrastructure planning.

The projects removed through the initial screening process do not need to be reported to the Water Board in the Permittee's Annual Report. However, the process should be documented and records kept as to the reason the project was removed from further consideration. Note that projects that were determined to be too early to assess will need to be reassessed during the next fiscal year's review.

The following categories of projects may be screened out of the review process in a given fiscal year:

1. **Projects with No Potential -** The project is identified in initial screening as having no green infrastructure potential based on the type of project. For example, the project does not include any exterior work. Attachment 1 provides a suggested list of such projects that Permittees may use as a model for their own internal process.

2. **Projects Too Early to Assess –** There is not yet enough information to assess the project for green infrastructure potential, or the project is not scheduled to begin design within the permit term (January 2016 – December 2020). If the project is scheduled to begin within the permit term, an assessment will be conducted if and when the project moves forward to conceptual design.
3. **Projects Too Late to Change –** The project is under construction or has moved to a late design phase in which changes cannot be made.
4. **Projects Consisting of Maintenance or Minor Construction Work Orders –** The "project" includes budgets for multiple maintenance or minor construction work orders throughout the jurisdiction or a portion of the jurisdiction. These types of projects will not be individually reviewed for green infrastructure opportunity but will be considered as part of a municipality's Green Infrastructure Plan.

Part 2 – Assessment of Green Infrastructure Potential

After the initial screening, the remaining projects either already include green infrastructure or will need to go through an assessment process to determine whether or not there is potential to incorporate green infrastructure. A recommended process for conducting the assessment is provided later in this guidance. As a result of the assessment, the project will fall into one of the following categories with associated annual reporting requirements:

- **Yes – Project already includes green infrastructure and is funded**.

  Reporting: List the project in "Table B-Planned Green Infrastructure Projects" in the Annual Report, indicate the planning or implementation status, and describe the green infrastructure measures to be included.

- **Yes – Project may have green infrastructure potential** pending further assessment of feasibility, incremental cost, and availability of funding. If the public infrastructure project is subject to stormwater requirements for new developments (Provision C.3), follow current C.3 guidance.

  Reporting: a) If the feasibility assessment is not complete and/or funding has not been identified, list the project in "Table A-Public Projects Reviewed for Green Infrastructure" in the Annual Report. In the "GI Included?" column, state "TBD". In the rightmost column, describe the green infrastructure measures considered and/or proposed, and note the funding and other contingencies for inclusion of Green Infrastructure in the project. b) If funding for the project has been identified, list the project in "Table B-Planned Green Infrastructure Projects" in the Annual Report, indicate the planning or implementation status, and describe the green infrastructure measures to be included.

- **No – A project-specific assessment has been completed, and Green Infrastructure is impracticable**.

  Reporting: In the Annual Report, list the project in "Table A-Public Projects Reviewed for Green Infrastructure". In the "GI Included?" column, state "No." Briefly state the reasons for the determination in the rightmost column. If needed, prepare a more detailed statement of the reasons for the determination and keep in project files.

Process for Assessing Green Infrastructure Potential of a Public Infrastructure Project

Initial Assessment of Green Infrastructure Potential

Consider opportunities that may be associated with:

- Alterations to roof drainage from existing buildings
- New or replaced pavement or drainage structures (including gutters, inlets, or pipes)
- Concrete work
- Landscaping, including tree planting
- Streetscape improvements and intersection improvements (other than signals)

Step 1: Information Collection/Reconnaissance

For projects that include alterations to building drainage, identify the locations of roof leaders and downspouts, and where they discharge or where they are connected to storm drains.

For street and landscape projects:

- Evaluate potential opportunities to substitute pervious pavements for impervious pavements.
- Identify and locate drainage structures, including storm drain inlets or catch basins.
- Identify and locate drainage pathways, including curb and gutter.

Identify landscaped areas and paved areas that are adjacent to, or down gradient from, roofs or pavement. These are potential facility locations. *If there are any such locations, continue to the next step.* Note that the project area boundaries may be, but are not required to be, expanded to include potential green infrastructure facilities.

Step 2: Preliminary Sizing and Drainage Analysis

Beginning with the potential facility locations that seem most feasible, identify possible pathways to direct drainage from roofs and/or pavement to potential facility locations—by sheet flow, valley gutters, trench drains, or (where gradients are steeper) via pipes, based on existing grades and drainage patterns. Where existing grades constrain natural drainage to potential facilities, the use of pumps may be considered (as a less preferable option).

Delineate (roughly) the drainage area tributary to the potential facility location. Typically, this requires site reconnaissance, which may or may not include the use of a level to measure relative elevations.

Calculate a preliminary sizing factor (facility area/tributary area) for the potential facility location. Note the following guidelines (not strict rules, but targets):

- Sizing factor ≥ 0.5 for dispersal to landscape or pervious pavement[2] (i.e., a maximum 2:1 ratio of impervious area to pervious area)
- Sizing factor ≥ 0.04 for bioretention
- Sizing factor ≥ 0.004 (or less) for tree-box-type biofilters

For bioretention facilities requiring underdrains and tree-box-type biofilters, note if there are potential connections from the underdrain to the storm drain system (typically 2.0 feet below soil surface for bioretention facilities, and 3.5 feet below surface for tree-box-type biofilters).

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[2] Note that pervious pavement systems are typically designed to infiltrate only the rain falling on the pervious pavement itself, with the allowance for small quantities of runoff from adjacent impervious areas. If significant runoff from adjacent areas is anticipated, preliminary sizing considerations should include evaluation of the depth of drain rock layer needed based on permeability of site soils.

If, in this step, you have confirmed there may be feasible potential facility locations, *continue to the next step.*

Step 3: Barriers and Conflicts

Note that barriers and conflicts do not necessarily mean implementation is infeasible; however, they need to be identified and taken into account in future decision-making.

Note issues such as:

- Confirmed or potential conflicts with subsurface utilities
- Known or unknown issues with property ownership, or need for acquisition or easements
- Availability of water supply for irrigation, or lack thereof
- Extent to which green infrastructure is an "add on" vs. integrated with the rest of the project

Step 4: Project Budget and Schedule

Note any constraints on the project schedule, such as a regulatory mandate to complete the project by a specific date, grant requirements, etc., that could complicate aligning a separate funding stream for the green infrastructure element. Consider whether cost savings could be achieved by integrating the project with other planned projects, such as pedestrian or bicycle safety improvement projects, street beautification, etc.

Step 5: Assessment—Does the Project Have Green Infrastructure Potential?

Consider the ancillary benefits of green infrastructure, including opportunities for improving the quality of public spaces, providing parks and play areas, providing habitat, urban forestry, mitigating heat island effects, aesthetics, and other valuable enhancements to quality of life.

Based on the information above, would it make sense to include green infrastructure into this project—*if funding were available for the potential incremental costs of including green infrastructure in the project?* Identify any additional conditions that would have to be met for green infrastructure elements to be constructed consequent with the project.

Attachment 1

Examples of Projects with No Potential for Green Infrastructure

- ☐ Projects with no exterior work (e.g., interior remodels)
- ☐ Projects involving exterior building upgrades or equipment (e.g., HVAC, solar panels, window replacement, roof repairs and maintenance)
- ☐ Projects related to development and/or continued funding of municipal programs or related organizations
- ☐ Projects related to technical studies, mapping, aerial photography, surveying, database development/upgrades, monitoring, training, or update of standard specs and details
- ☐ Construction of new streetlights, traffic signals or communication facilities
- ☐ Construction of or upgrades to fueling stations, chemical and waste storage facilities, landfills, recycling and waste transfer stations.
- ☐ Minor bridge and culvert repairs
- ☐ Non-stormwater utility projects (e.g., sewer or water main replacement, utility undergrounding, treatment plant upgrades)
- ☐ Equipment purchase or maintenance (including vehicles, street or park furniture, equipment for sports fields and golf courses, etc.)
- ☐ Irrigation system installation, upgrades or repairs

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa County
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Sanitation
and Flood
Control District

B A S M A A

November 30, 2012

Bruce Wolfe, Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: Standard Specifications for Site Design Measures for Small Projects and Detached Single Family Home Projects (MRP Provision C.3.i.iv)

Dear Mr. Wolfe:

This letter report and attachment are submitted on behalf of all municipalities subject to the requirements of the Municipal Regional Stormwater NPDES Permit (MRP) except those that are part of the Contra Costa Clean Water Program, which is making a separate submittal.

MRP Provision C.3.i.iv requires Permittees to develop standard specifications for lot-scale site design and treatment measures (e.g., for roof runoff and paved areas) as a resource for single-family homes and small development projects. This task may be fulfilled by the Permittees cooperating on a countywide or regional basis. A report containing the standard specifications for lot-scale treatment BMPs measures is to be submitted by December 1, 2012. A related requirement, Provision C.3.i.i., states that permittees shall require small development projects that create and/or replace $\geq$ 2,500 ft^2 to < 10,000 ft^2 of impervious surface, and detached single family home projects that create and/or replace 2,500 ft^2 or more of impervious surface, to install one or more of the following measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.

In FY 11-12, the BASMAA Development Committee initiated a regional project to develop fact sheets describing these lot-scale site design measures, using the fact sheets in the City of Los Angeles stormwater manual as a model, but tailoring the Los Angeles approach to MRP requirements and preparing appropriate design details. The Development Committee reviewed the City of Los Angeles' fact sheets, agreed on desired changes to reflect MRP and Bay Area requirements, and contracted with a consultant to prepare user-friendly design details. The result is a set of four fact sheets on the following measures (see attachments):

Bay Area
Stormwater Management
Agencies Association
P.O. Box 2385
Menlo Park, CA 94026
510.622.2326
info@basmaa.org

- Landscape Dispersion of Runoff
- Pervious Paving
- Rain Barrels
- Rain Gardens

The first three fact sheets fulfill the requirement to develop standard specifications for lot-scale site design and treatment measures as a resource for small development and single-family home projects. They collectively address the six options listed in Provision C.3.i.iv. The fourth fact sheet on rain gardens was developed to offer small project applicants another option for storing and infiltrating runoff, similar to the approach of landscape dispersion but in a smaller footprint.

The fact sheets have been provided to Permittees so that Permittees may use them to comply with Provision C.3.i. Permittees will report on the implementation of Provision C.3.i in their FY 12-13 Annual Reports.

Please contact Jill Bicknell, BASMAA Development Committee Chair and SCVURPPP Assistant Program Manager, at 408-720-8811, ext.1 if you have any questions about the submittal or need additional information.

Attachments:
- Landscape Dispersion Fact Sheet: "Landscape Designs for Stormwater Management"
- Pervious Paving Fact Sheet: "Pervious Pavement"
- Rain Barrels Fact Sheet: "Rain Barrels and Cisterns"
- Rain Gardens Fact Sheet: "Rain Gardens"

cc: Tom Mumley, Regional Water Board
Shin-Roei Lee, Regional Water Board
Dale Bowyer, Regional Water Board
Sue Ma, Regional Water Board
BASMAA Board of Directors

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We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James Scanlin, Alameda Countywide Clean Water Program

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matt Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Lance Barnett, Vallejo Sanitation and Flood Control District

LANDSCAPE DESIGNS FOR STORMWATER MANAGEMENT

Stormwater Control for Small Projects

Bay Area Stormwater Management Agencies Association

Dry creek infiltrates and conveys runoff.

Designing landscaped areas to soak up rainfall runoff from building roofs and paved areas helps protect water quality in local creeks and waterways. These landscape designs reduce polluted runoff and help prevent creek erosion.

As the runoff flows over vegetation and soil in the landscaped area, the water percolates into the ground and pollutants are filtered out or broken down by the soil and plants.

This fact sheet shows how you can design your landscape to absorb runoff from impervious surfaces, such as roofs, patios, driveways, and sidewalks, with landscape designs that can be very attractive.

If you are interested in capturing and storing water for irrigation use, see the Rain Barrel fact sheet in this series.

Can My Project Manage Stormwater in the Landscape?

Directing stormwater runoff to the landscape is suitable for sites with the following conditions:

- Roofs, driveways, parking areas, patios, and walkways that can drain to an existing landscape, or an area that may be converted to landscape.
- Areas of landscape with a slope of 5% or less are preferred; check with the municipality regarding requirements for steeper sites.
- Works best in well-drained soil; soil amendments may be used in areas with poor drainage.
- Landscaped areas that total at least 1/2 the size of the impervious area draining to it.
- Direct runoff away from building foundations.
- Runoff should not create ponding around trees and plants that won't tolerate wet conditions.

How Do I Size My Landscape?

The landscaped area should be 50% of the size of the contributing impervious surface. For example (see below), to manage runoff from a 5,000 square foot roof or paved surface, you should have 2,500 square feet of landscaping.

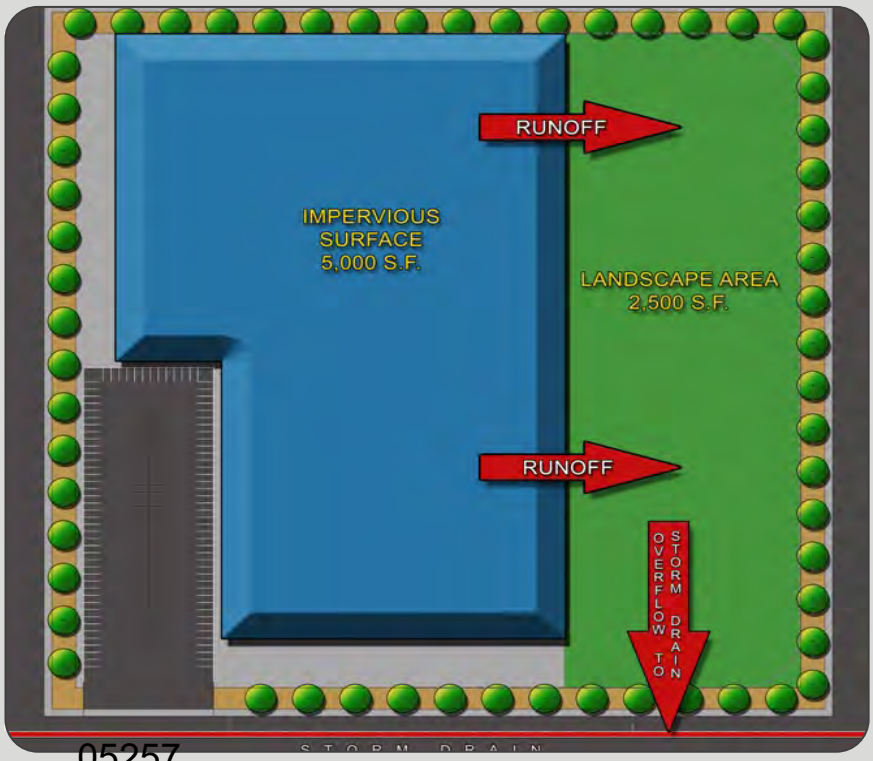

Techniques to Manage Stormwater in Landscaping

Direct Roof Runoff to Landscape

- Use additional piping to connect the downspout to the landscape if needed.
- Direct runoff away from building foundation.
- Prevent erosion by installing:
  - Splash blocks,
  - Rain chains,
  - Gravel area under a gutterless roof,
  - Pop-up drainage emitter connected to a pipe that carries runoff away from the foundation, or
  - Other energy dissipation technique.

Splash block

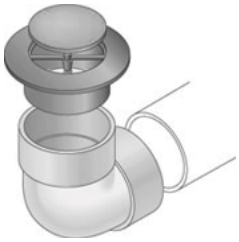

Pop-up emitter

Gravel area under a gutterless roof

Rain chain

Swales or Dry Creeks

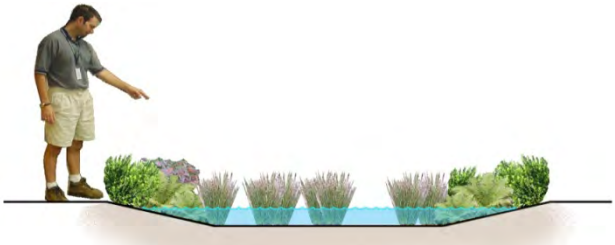

Cross section

Swales and dry creeks are narrow, linear depressions designed to capture and convey water. Swales imitate a natural creek's ability to slow, infiltrate, and filter stormwater. To install a swale follow these steps:

- Excavate a narrow linear depression that slopes down to provide a flow path for runoff. The path length (10 to 15 feet or more) should meander to slow water and prevent erosion.
- Use plants from creek and river ecosystems to help reduce erosion and increase evaporation of runoff.
- The end of the swale requires an outlet for high flows (another landscaped area or a yard drain). Talk to municipal staff to identify an appropriate discharge location.
- Contact municipal staff for a local list of plants suitable for swales.

Techniques to Manage Stormwater in Landscaping

Direct Parking Lot Runoff to Landscape

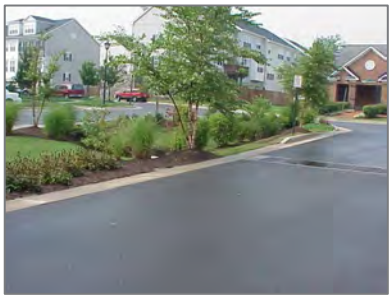

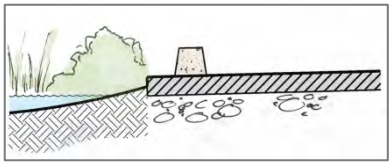

Cross section

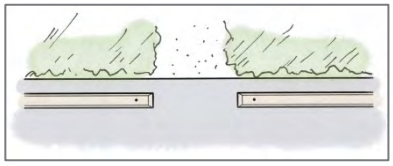

View from above

During storms, parking lots generate large amounts of runoff, which picks up oils, grease, and metals from vehicles. Landscaped areas can be designed to absorb and filter this runoff.

- Landscaped areas must be below the paved elevation. Allow an elevation change of 4 to 6 inches between the pavement and the soil, so that vegetation or mulch build-up does not block the flow.
- Grade the paved area to direct runoff towards the landscaping.
- If possible, provide a long path for runoff to infiltrate (while meeting the landscaped area sizing on page 1).
- Provide multiple access points for runoff to enter the landscape. Install curb cuts or separate wheel stops for the water to flow through. Provide cobbles or other permanent erosion control at points of concentrated flow.

Manage Runoff from Driveways/Small Paved Areas

Driveways, sidewalks, patios, walkways, and other small paved areas can offer creative opportunities to drain runoff to landscaping.

- Install landscape adjacent to the paved surface, and grade the paved area so runoff flows toward the landscaping.
- Landscaped areas must be below the paved elevation. Allow an elevation change of 4 to 6 inches between the pavement and the soil, so that vegetation or mulch build-up does not block the flow.
- Install cobbles or rocks where runoff enters the landscape to avoid erosion.
- Use sizing ratio described on page 1.
- Use drought-tolerant native or climate-adapted plants to reduce irrigation.

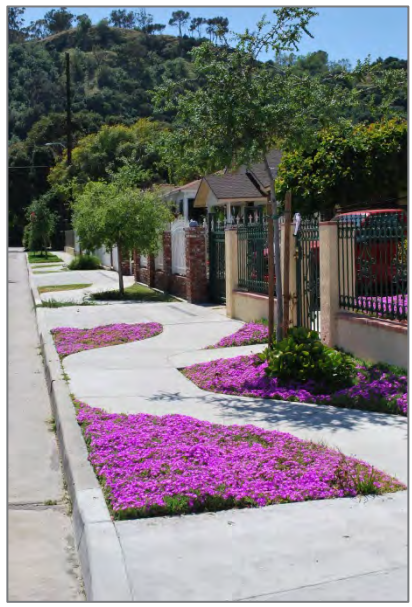

Design Checklist

- ❑ Maximize the use of landscaping and natural areas that already exist. Try to design new landscapes immediately adjacent to impervious surfaces.
- ❑ Water should flow evenly (without concentrating runoff into small streams) from the impervious surface to the landscape; this will maximize the filtration and settling of sediment and pollutants and prevent erosion. The design should avoid allowing straight channels and streams to form.
- ❑ Amend soils to improve drainage, when necessary.
- ❑ If the project is located next to standard asphalt or concrete pavement, and there is concern about water undermining the pavement, include a water barrier in the design.
- ❑ Use curb cuts to create places where water can flow through to the landscape.
- ❑ Disconnect roof downspouts and redirect flow to adjacent landscapes. Disconnected downspout systems should incorporate a splash block to slow the runoff flow rate; a landscape flow path length of 10 to 15 feet is recommended.
- ❑ Use drought-tolerant native or climate-adapted plant species whenever possible. Avoid invasive or pest species. A list of invasive species may be found at the California Invasive Plant Council website (www.cal-ipc.org). Contact municipal staff for a list of plants suitable for stormwater management areas.
- ❑ Design the landscape area so that overflow from large storms discharges to another landscaped area or the storm drain system to prevent flooding.

Maintain Your Landscape

The following practices will help maintain your landscape to keep it attractive and managing stormwater runoff effectively.

- ❑ During dry months, irrigate during the first year to encourage root growth and establish the plants. In subsequent years, irrigate as needed by the plant species to maintain plant health.
- ❑ Repair signs of erosion immediately and prevent further erosion by reinforcing the surrounding area with ground cover or using rocks for energy dissipation.
- ❑ If standing water remains in the landscaped area for more than 4 days, use soil amendments to improve infiltration.
- ❑ Inspect the locations where water flows into a landscaped area from adjacent pavement to ensure that there is positive flow into the landscape, and vegetation or debris does not block the entrance point.

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. The Sonoma Valley Groundwater Management Program, San Mateo Countywide Water Pollution Prevention Program, City of San Jose, Sacramento Stormwater Quality Partnership, and the Purissima Hills Water District are acknowledged for images used in the fact sheet.

PERVIOUS PAVEMENT

Stormwater Control for Small Projects

Bay Area Stormwater Management Agencies Association

Permeable Interlocking Concrete Pavers

Pervious pavement, also referred to as permeable pavement, contains pores or separation joints that allow water to flow through and seep into a base material (typically gravel or drain rock). Types of pervious pavement include porous asphalt and concrete, open joint pavers, interlocking concrete or permeable pavers, and plastic or concrete grid systems with gravel-filled voids.

Pervious pavement systems allow infiltration of stormwater into soils, thereby reducing runoff and the amount of pollutants that enter creeks, San Francisco Bay, the Pacific Ocean, and other water bodies. This improves water quality, helps reduce creek erosion, and can facilitate groundwater recharge. Pervious pavement is available in many different types that offer environmentally-friendly and aesthetically pleasing options for driveways, walkways, parking areas, and patios.

Is Pervious Pavement Feasible for My Project?

Pervious pavement is appropriate in locations with the following characteristics:

- The location is flat or nearly flat (a maximum 2% slope).
- The location is not in a seasonally wet area.
- The location is not close to a building foundation, unless measures are taken to prevent infiltration under the structure. (See Design Checklist.)

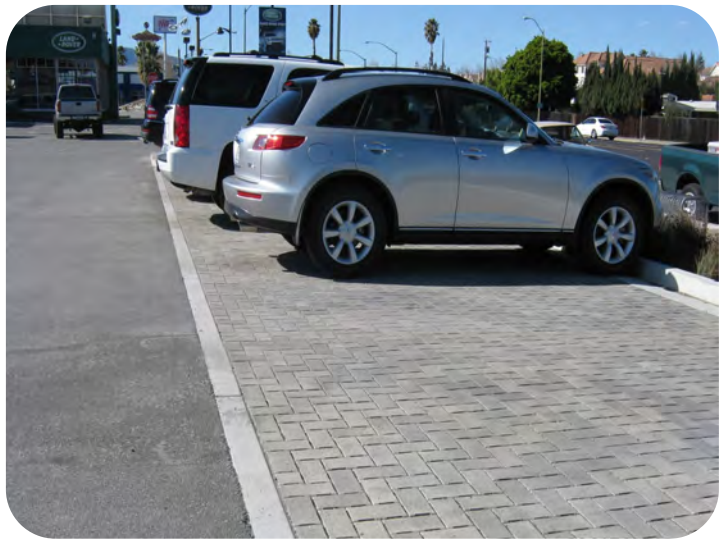

Typical Materials and Example Applications

Pervious Concrete

Turf Block

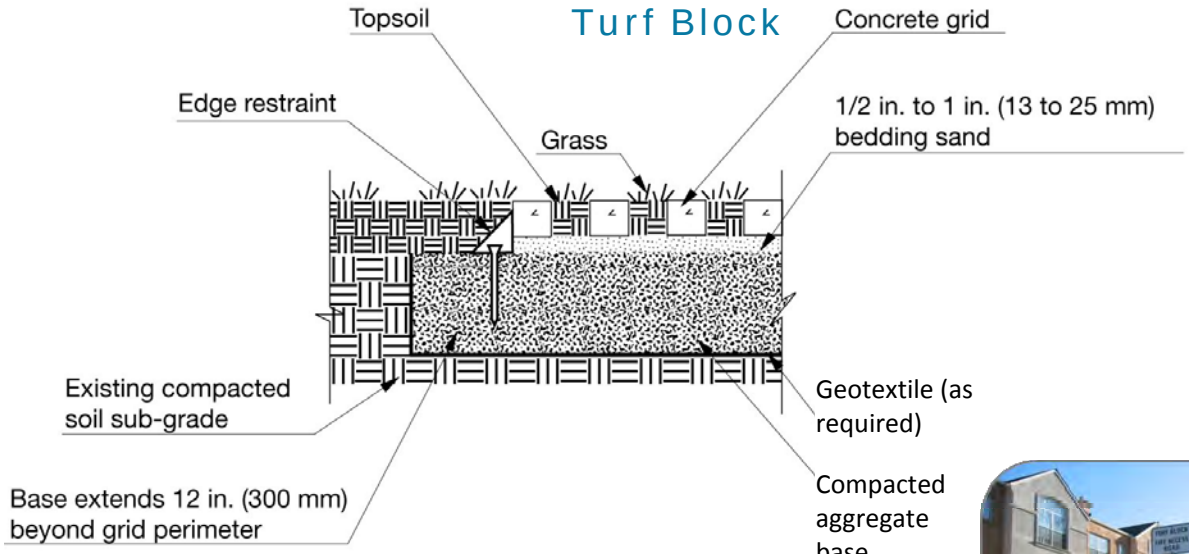

Typical Materials and Example Applications

Permeable Interlocking Concrete Pavers

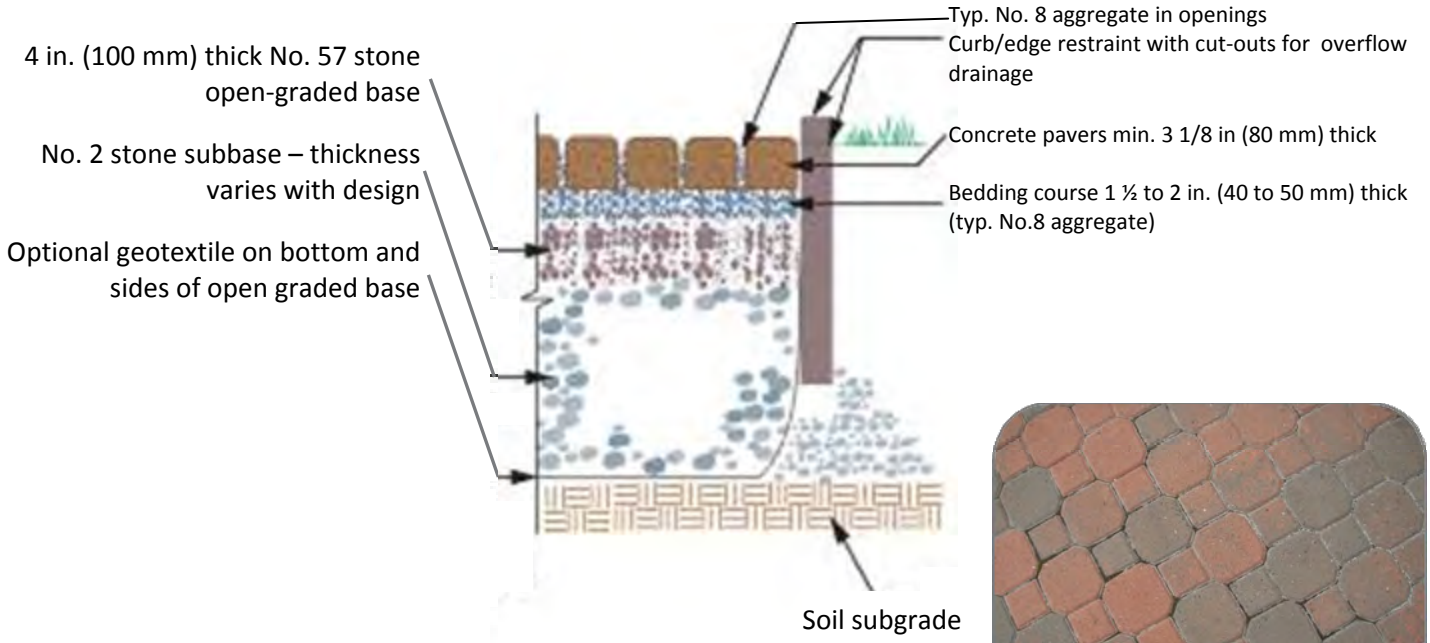

Note: ASTM No. 3 or 4 stone may be substituted for No. 2 stone.
ASTM No. 89 or 9 stone may be used in the paver openings.

Porous Asphalt

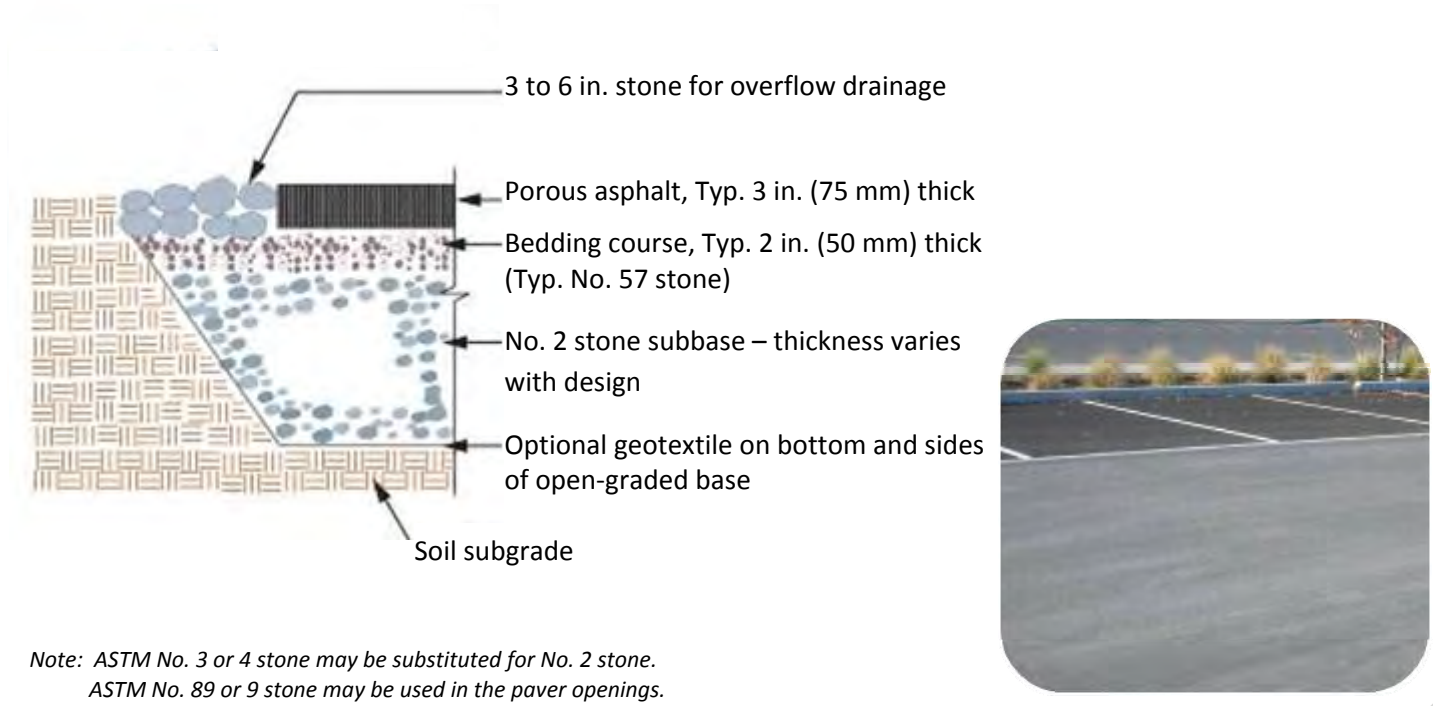

Note: ASTM No. 3 or 4 stone may be substituted for No. 2 stone.
ASTM No. 89 or 9 stone may be used in the paver openings.

Design Checklist

When installing pervious pavement, the following design criteria should be considered.

- ❑ An open-graded base of crushed stone, which has 35 to 45 percent pore space, is installed below the surface pavement. The recommended base thickness is 6 inches for pedestrian use and 10 inches for driveways to provide adequate structural strength.
- ❑ Slope is flat or nearly flat (not greater than 2 percent).
- ❑ Flow directed to pervious pavement is dispersed so as not to be concentrated at a small area of pavement.
- ❑ No erodible areas drain onto the pavement.
- ❑ The subgrade is uniform and compaction is the minimum required for structural stability.
- ❑ If a subdrain is provided, its outlet elevation is a minimum of 3 inches above the bottom of the base course.
- ❑ A rigid edge is provided to retain granular pavements and unit pavers.
- ❑ If paving is close to a building, a barrier or impermeable liner may be required to keep water away from the building foundation.
- ❑ Pavers have a minimum thickness of 80 mm (3 1/8 inches) and are set in sand or gravel with minimum 3/8-inch gaps between pavers.
- ❑ Proprietary products must be installed per the manufacturer's specifications.
- ❑ The project complies with applicable sections of the current municipal code, including disabled access requirements and site drainage requirements, if applicable.

Maintenance Considerations

Once pervious pavement is installed, the following maintenance criteria should be followed:

- ❑ The use of leaf blowers on permeable pavement can force dirt and debris into pavement void spaces. Avoid blowing leaves, grass trimmings and other debris across permeable pavement.
- ❑ Remove weeds from pavement and replace missing sand or gravel between pavers as needed.
- ❑ Inspect subdrain outlets (if applicable) yearly to verify they are not blocked.
- ❑ Inspect pavement after rains for ponding or other visible problems. If there are problems with standing water, vacuum sweeping with specialized equipment may be required. Concrete grid pavers do not require sweeping.

Open Joint Pavers

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. The Interlocking Concrete Pavement Institute is acknowledged for contributing pavement sections, design details and specifications. The San Mateo Countywide Water Pollution Prevention Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, and City of San Jose are acknowledged for images used in the fact sheet.

RAIN BARRELS AND CISTERNS

Stormwater Control for Small Projects

Bay Area Stormwater Management Agencies Association

Daisy chained system of 205-gallon rain barrels
Courtesy of The City of Oakland

Rain barrels and cisterns can be installed to capture stormwater runoff from rooftops and store it for later use. They are low-cost systems that will allow you to supplement your water supply with a sustainable source and help preserve local watersheds by detaining rainfall.

Collected rainwater may be used for landscape irrigation. Subject to permitting requirements, harvested rainwater may be allowed for toilet flushing; contact municipal staff for more information. Capturing even a small amount of your roof runoff will have environmental benefits because it will reduce the quantity and speed of stormwater runoff flowing to local creeks.

Rain barrels typically store between 50 and 200 gallons. They require very little space and can be connected or "daisy chained" to increase total storage capacity.

Cisterns are larger storage containers that can store 200 to over 10,000 gallons. These come in many shapes, sizes, and materials, and can be installed underground to save space.

How Much Storage is Recommended?

The number of rain barrels recommended to capture runoff from a given roof (or other impervious area) is shown in the following table.

Are Rain Barrels or Cisterns Feasible for My Project?

Rain barrels and cisterns are appropriate for sites with the following characteristics:

- Roof areas that drain to downspouts.
- A level, firm surface is needed to support a rain barrel(s) or cistern to prevent shifting or falling over. A full 55-gallon rain barrel will weigh over 400 lbs.
- A landscaped area where the captured water can be used (and where it can be drained by gravity flow) should be located within a reasonable distance from the rain barrel(s).
- A landscaped area or safe path to the storm drain system that can handle overflow.

Roof or Impervious Area (sq. ft.)	Suggested Minimum Number of 55 Gallon Rain Barrels*
Up to 750	1-2
750 – 1,250	2-3
1,250 – 1,750	3-4
1,750 – 2,250**	4-5

* Or equivalent capture using larger rain barrels or a cistern.
** To harvest rainwater from an area greater than 2,250 sq. ft. install 1 additional rain barrel per each additional 500 sq. ft.

Components of a Rainwater Harvesting System

Roofing Materials

Wood shingle roof
Courtesy of Gutter Glove

Technically, any impervious surface can be used for harvesting rainwater; however, the surface materials will affect the quality of captured rainwater, which has implications for the recommended uses.

Although it is technically possible to harvest runoff from parking lots, patios, and walkways, it is more difficult since a subterranean cistern or a pump is usually needed to move the water into an above-ground rain barrel or cistern. Also, there are typically greater levels of debris and contaminants that must be filtered out of the runoff before it enters the storage system. Due to these complexities, it is more common to harvest rainwater from rooftops, which is the focus of this fact sheet.

When designing your system, consider the roofing material on the building.

- If you have asphalt or wooden shingles, use the harvested rainwater only for non-edible landscapes, unless the water is treated first. Petroleum or other chemicals from these roofing materials can leach into the rain water.
- Roofs with cement, clay, or metal surfaces are ideal for harvesting water for a wide variety of uses.

Gutters and Downspouts

Properly sized and maintained gutters and downspouts are essential to a rainwater harvesting system.

- Strategically locate any new downspouts in an area where the rain barrel or cistern will be most useful.
- Consider the height of the rain barrel and the first flush device. Existing downspouts may have to be shortened to make room for the rain barrel and first flush device.
- Install a fine mesh gutter guard on gutters to keep leaves and other debris from entering and clogging the gutters. This will reduce the need for cleaning gutters and the rain barrel or cistern.
- As needed, consult a professional roofer to aid in gutter and downspout installation.

This gutter is covered by a fine mesh gutter guard to keep debris out.
Courtesy of Gutter Glove

Components of a Rainwater Harvesting System

Rain Barrel and Cistern Accessories to Keep Water Clean

First flush and downspout diverter installation
Courtesy of The City of Oakland

Various accessories to rain barrels and cisterns help protect the quality of harvested water and reduce maintenance. These accessories include “first flush” diverters, filters, and screens.

Leaves, twigs, sediment, and animal waste are common in runoff, especially at the beginning of a storm (“first flush”). This debris can result in clogging and encourage bacterial growth. A first flush diverter helps remove debris and contaminants by directing the first few gallons of runoff from the roof to landscaping, away from the rain barrel or cistern.

The following tips will help you keep the water in your system clean.

- Install a first flush diverter directly under your downspout. You may have to cut the downspout to connect the first flush diverter above the rain barrel.
- Use the same diameter pipe for the first flush diverter, the downspout, and the connector to the rain barrel. Avoid changing diameters of pipes in order to keep the system from backing up.
- Design the first flush diverter to discharge the first flush to non-edible landscaping.
- Install mosquito-proof screens under the lid of the rain barrel and inside the overflow outlet.

Foundation and Overflow

Before installing a rain barrel or cistern, prepare the site so that the system will function safely.

- Find or create a level location near the downspout on which to place the rain barrel or cistern.
- A concrete or stone paver foundation may be appropriate for smaller rain barrels. A more substantial foundation will likely be required for large cisterns.
- Secure rain barrels and cisterns to your structure with metal strapping, or anchor to the foundation, to prevent tipping in an earthquake.
- Maintain clear access to the rain barrel outlets and cleaning access points.
- Design an overflow path, so that overflow from the rain barrel(s) will discharge safely to a landscaped area, or storm drain system.
- Where possible, direct overflow to a rain garden, swale, or other landscaped area to maximize retention of rainwater onsite.
- Direct the overflow away from the rain barrel, building foundation, and neighboring properties.
- Consult with the municipality to identify overflow locations.

Large unit installed at a single family residence.
Courtesy of Stephanie Morris

Design Checklist

When installing rain barrels and cisterns, consider the following criteria unless otherwise instructed by the municipality.

- ❑ Do not use flexible piping, to prevent mosquito breeding in water that may pool in flexible pipes. If irrigating edible landscapes, consider pipes that meet FDA food grade standards.
- ❑ When designing the overflow path, remember that in heavy storms rain barrels and cisterns *will* overflow. A 1,000-sq.-ft. roof will produce about 600 gallons of runoff during a storm that has produces a depth of 1 inch of rain.
- ❑ There shall be no direct connection of any rain barrel or cistern and/or rainwater collection piping to any potable water pipe system. Rainwater systems shall be completely separate from potable water piping systems.
- ❑ Place the bottom of the barrel at a higher elevation than the landscape, to use gravity flow.
- ❑ All rain barrels and cisterns should have a screen to ensure mosquitoes cannot enter.
- ❑ Allow overflow to drain to your landscape or a rain garden. Ensure that areas receiving overflow do not have standing water for more than 48-hours.
- ❑ The low water pressure from a small rain barrel will not operate in-ground sprinkler or low-volume devices. Consider using a soaker hose.
- ❑ If using a soaker hose, remove the pressure-reducing washer to increase the water flow.
- ❑ If the water is not needed for irrigation during the rainy season, consider releasing the water to a vegetated area between storms, so the barrels will be empty to catch rain from the next storm. This will help protect your watershed by reducing the quantity and speed of water entering local creeks during storms. Install a spigot and drip tape to allow the rain barrel or cistern to slowly drain between storms. You can store the water captured towards the end of the rainy season to irrigate your garden in the dry season.
- ❑ For more information, ask municipal staff to refer you to countywide stormwater guidance.

Operation and Maintenance

After installing your rain barrel or cistern, follow these tips for long-term safety and functionality.

- ❑ Regularly check the gutters and gutter guards to make sure debris is not entering the rainwater harvesting system.
- ❑ Inspect the screens on the rain barrel or cistern prior to the wet season to make sure debris is not collecting on the surface and that there are not holes allowing mosquitoes to enter the rain barrel. Inspect screens more frequently if there are trees that drop debris on the roof.
- ❑ Clean the inside of the rain barrel once a year (preferably at the end of the dry season when the rain barrel has been fully drained) to prevent buildup of debris. If debris cannot be removed by rinsing, use vinegar or another non-toxic cleaner. Use a large scrub brush on a long stick, and avoid actually entering the rain barrel. Drain washwater to landscaping.
- ❑ Clean out debris from cisterns once a year, preferably at the end of the dry season.

Daisy-chained system
Courtesy of Acterra

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text and formatting used in this fact sheet. The City of Oakland, Acterra, Gutter Glove, and Stephanie Morris are acknowledged for images used in the fact sheet.

RAIN GARDENS

Stormwater Control for Small Projects

Bay Area Stormwater Management Agencies Association

Large Residential Rain Garden

Rain gardens are landscaped areas designed to capture and treat rainwater that runs off roof and paved surfaces. Runoff is directed toward a depression in the ground, which is planted with flood and drought-resistant plants. As the water nourishes the plants, the garden stores, evaporates, and infiltrates rainwater into the soil. The soil absorbs runoff pollutants, which are broken down over time by microorganisms and plant roots.

Rain gardens are a relatively low-cost, effective, and aesthetically pleasing way to reduce the amount of stormwater that runs off your property and washes pollutants into storm drains, local streams, and the San Francisco Bay. While protecting water quality, rain gardens also provide attractive landscaping and habitat for birds, butterflies, and other animals, especially when planted with native plants.

Is a Rain Garden Feasible for My Project?

Rain gardens are appropriate where the following site characteristics are present:

- Rain gardens should be installed at least 10 feet from building foundations. The ground adjacent to the building should slope away at a 2% minimum slope. A downspout extension or "swale" (landscaped channel) can be used to convey rain from a roof directly into a rain garden. Rain gardens can also be located downstream from a rain barrel overflow path.
- Rain gardens should be at least 3 feet from public sidewalks (or have an appropriate impermeable barrier installed), 5 feet from property lines, and in an area where potential overflow will not run onto neighboring properties.
- The site should have well-drained soil and be relatively flat. Soil amendments can improve infiltration in areas with poor drainage. Add about 3 inches of compost to any soil type and till it in to a depth of about 12 inches.
- A front or backyard can work well for a rain garden, especially in areas where the slope naturally takes the stormwater.

How Large Does My Rain Garden Need to Be?

A general recommendation for a garden with a 6-inch ponding depth is to size the rain garden to approximately 4% of the contributing impervious area. Your soil type will affect how the rain garden should be sized because the water infiltration rate depends on the soil type; rain gardens should be larger in areas with slower infiltration. The following table can be used as general guidance.

Contributing Area (sq. ft.)	Rain Garden Area (sq. ft.)
500 – 700	24
701 – 900	32
901 – 1,100	40
1,101 – 1,300	48
1,301 – 1,500	56
1,501 – 2000*	70

*Projects adding roof or other impervious areas in excess of 2,000 sq. ft. should add 20 sq. ft. of rain garden surface area per every 500 sq. ft. of additional area.

How to Plan and Install a Rain Garden

Select a Location and Plan for Overflow

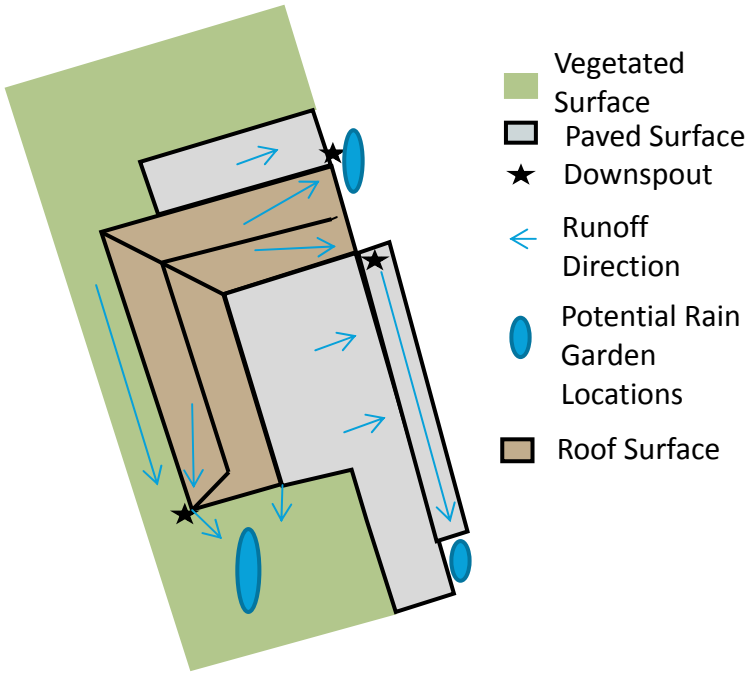

- Before choosing the location of your rain garden, observe how rainwater is distributed across your home and yard. The ideal rain garden location is a flat or gently sloped area and is down slope from a runoff source.
- Site your garden at least 10 feet away from any structures (unless an impermeable barrier is used) and 5 feet from property lines.
- Avoid siting your garden over underground utilities and septic systems, near large trees, or next to a creek, stream or other water body.
- Your rain garden will overflow in large storms. Therefore, all garden designs should include an overflow system. One option is to build the perimeter of the garden so that it is perfectly level and to allow water to gently spill over the top during large storms. Another option is to build in a spillway that connects to another landscaped area, or the storm drain system.

Plan the Size of Your Rain Garden

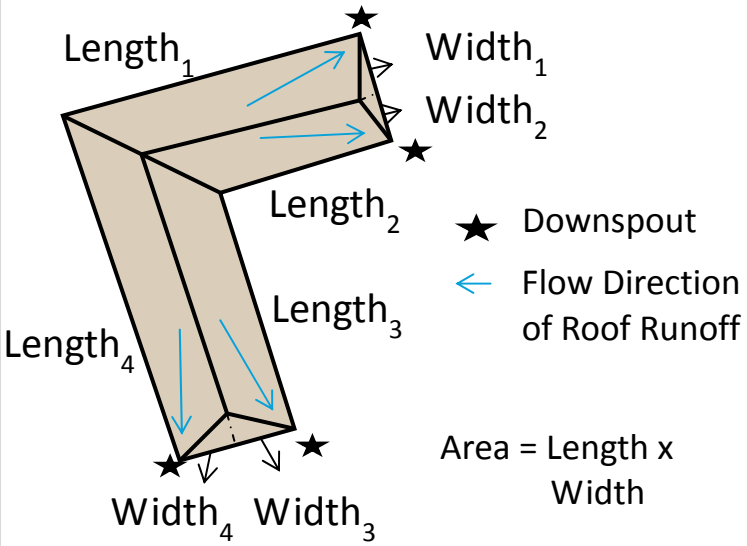

- Once you have determined where your garden will be sited, look at the surrounding area and identify which surfaces will contribute runoff to the garden. Is it all or just a part of the roof, patio, or driveway?
- Estimate the roof area by measuring the length and width of the building foundation and adding a few inches for the overhang. Multiply the length times the width to determine the contributing area. Once you have calculated the area of each contributing surface, add them up to obtain the total contributing area.
- Refer to the chart on page 1 to identify the size of the rain garden you will need to manage runoff from the contributing area.

If you do not have the space, budget, or interest in building a garden of this size, you may consider capturing some of your roof runoff in rain barrels to reduce the amount of runoff, or discharge the overflow to another landscaped area.

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How to Plan and Install a Rain Garden

Install your Rain Garden

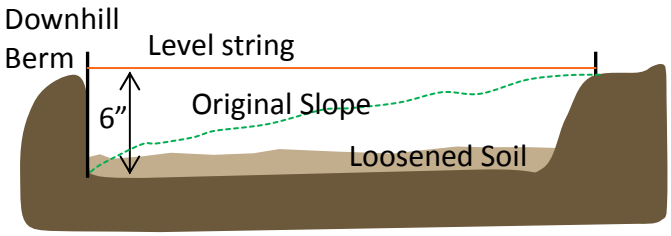

- Once you have selected a site and planned the size of your rain garden, lay out the shape using a string or tape to define the outline of where you will dig.
- If the yard is level, dig to a depth of 6-inches and slope the sides. If the site is sloped, you may need to dig out soil on the uphill side of the area and use the soil to construct a small berm (a compacted wall of soil) along the down slope side of the garden.
- Use a string level to help level the top of the garden and maintain an even 6-inch depth.
- Once the garden is excavated, loosen the soil on the bottom of the area so you have about 12 inches of soft soil for plants to root in. Mix in about 3 inches of compost to help the plants get established and improve the water-holding capacity of the soil.
- If water enters the garden quickly, include a layer of gravel or river rock at the entry points to prevent erosion.

Select Appropriate Plants

You can design your rain garden to be as beautiful as any other type of garden. Select plants that are appropriate for your location and the extremes of living in a rain garden

Site Considerations:

- How much light will your garden receive?
- Is your property near the coast or located in an inland area (this affects sun and temperature)?
- Are there high winds near your home?

Recommended plant characteristics:

- Native plants adapted to local soil and climate,
- Drought tolerant,
- Flood tolerant,
- Not invasive weedy plants,
- Non-aggressive root systems to avoid damaging water pipes,
- Attracts birds and beneficial insects.

*Contact municipal staff to obtain a full list of recommended plants, provided in the countywide stormwater guidance.

Design Checklist

When installing a rain garden, the following design considerations are recommended.

- ❑ Locate the rain garden at least 10 feet from home foundation, 3 feet from public sidewalks, and 5 feet from private property lines. If rain gardens need to be located closer to buildings and infrastructure, use an impermeable barrier.
- ❑ Locate the rain garden to intercept and collect runoff from a roof downspout or adjacent impervious area.
- ❑ Size the rain garden appropriately based on the soil type and drainage area (see Page 1).
- ❑ Do not locate the rain garden over septic systems or shallow utilities. Locate utilities before digging by calling Underground Service Alert at 811 or (800) 227-2600.
- ❑ Locate the rain garden on a relatively flat area, away from steep slopes. If you plan on moving a large quantity of soil, you may need a grading permit. Contact your local municipality for further assistance.
- ❑ Consider installing an underdrain to enhance infiltration in very clayey soils. Contact municipal staff for guidance on how to properly install an underdrain.
- ❑ An overflow should been incorporated in the rain garden to move water that does not infiltrate to another pervious area and away from the home's foundation or neighboring property.
- ❑ Drought and flood resistant native plants are highly recommended and a variety of species should be planted. Avoid invasive plants. Contact municipal staff for a list of plants appropriate for rain gardens from the applicable countywide stormwater guidance. A list of invasive species may be found at the California Invasive Plant Council website (www.cal-ipc.org).

Maintenance Considerations

Once a rain garden is installed, the following steps will help the garden function effectively.

- ❑ Rain gardens should be irrigated periodically (as needed) during dry months, especially while plants are being established. Plants should be inspected for health and weeds should be removed as often as necessary.
- ❑ Apply about 2 inches of mulch and replace as needed. Mulch with a material that will not float away such as compost or a larger sized hardwood mulch (avoid microbark, for example).
- ❑ Areas of erosion should be repaired. Further erosion can be prevented by stabilizing the eroding soil with ground cover or using energy dispersion techniques (e.g., splashblock or cobbles) below downspouts.
- ❑ Avoid using synthetic fertilizers or herbicides in your rain garden because these chemicals are water pollutants.
- ❑ Standing water should not remain in a rain garden for more than 3 days. Extended periods of flooding will not only kill vegetation, but may result in the breeding of mosquitos or other vectors.

The City of Los Angeles and Geosyntec Consultants are acknowledged for providing text, formatting and various images used in this fact sheet. Contra Costa County is acknowledged for an image used in the fact sheet.

Green Stormwater INFRASTRUCTURE

What is LID?

Low Impact Development (LID) is a water quality and stormwater management strategy that maintains or restores the natural ecological and hydrologic functions of a community and/or site to protect and improve water quality, manage stormwater runoff, achieve natural resource protection objectives and fulfill environmental regulatory requirements.

What is GSI?

Green Stormwater Infrastructure (GSI) is a built approach to slow, infiltrate, use, and/or treat stormwater runoff using vegetation, soils, and natural processes to make stormwater runoff cleaner, absorb it back into the ground, and create healthier environments.

Sidewalks, roofs, streets, and parking lots are everywhere in the built environment. Stormwater runoff originating from these surfaces is a significant source of water pollution. The impact of that pollution extends beyond the human sphere.

Wildlife that depend on clean, abundant water resources — including species of recreational and economic value — cannot thrive in contaminated water bodies.

Green stormwater infrastructure offers tools that can manage stormwater runoff, improve water quality for wildlife, restore wildlife habitat to the built environment, and invite beneficial species such as pollinating insects, birds, and fish back to the places we live.

The City is currently developing a Green Stormwater Infrastructure Plan to identify and prioritize green stormwater infrastructure projects that can be built to reach pollution reduction targets for PCBs and mercury by 2020, 2030, and 2040.

SOLANO PERMITEES

GREEN STORMWATER INFRASTRUCTURE PLAN

05274
5315

WHAT IS GSI ?

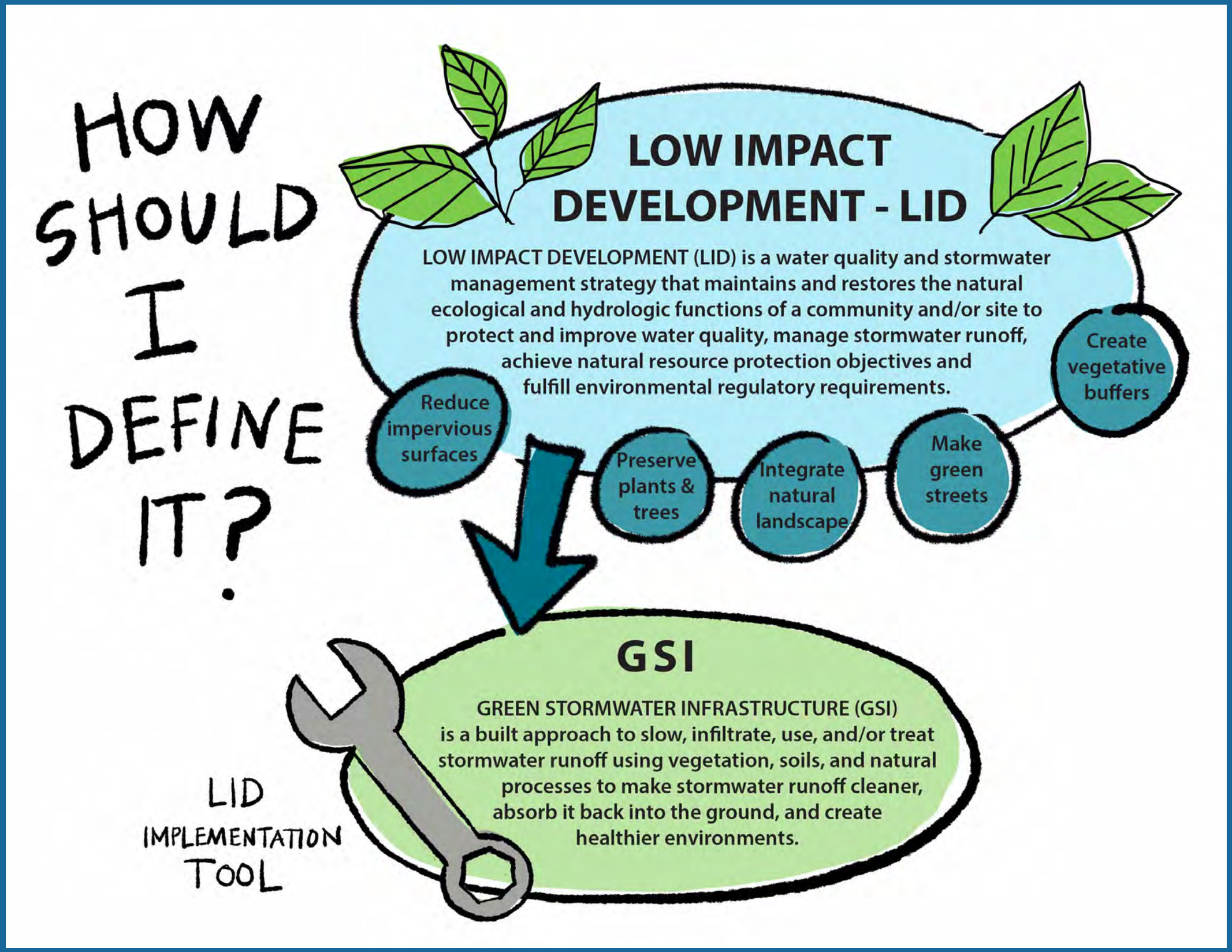
HOW SHOULD I DEFINE IT?
LOW IMPACT DEVELOPMENT - LID
LOW IMPACT DEVELOPMENT (LID) is a water quality and stormwater management strategy that maintains and restores the natural ecological and hydrologic functions of a community and/or site to protect and improve water quality, manage stormwater runoff, achieve natural resource protection objectives and fulfill environmental regulatory requirements.
Reduce impervious surfaces
Preserve plants & trees
Integrate natural landscape
Make green streets
Create vegetative buffers
GSI
GREEN STORMWATER INFRASTRUCTURE (GSI) is a built approach to slow, infiltrate, use, and/or treat stormwater runoff using vegetation, soils, and natural processes to make stormwater runoff cleaner, absorb it back into the ground, and create healthier environments.
LID IMPLEMENTATION TOOL

EXAMPLE GSI PROJECT

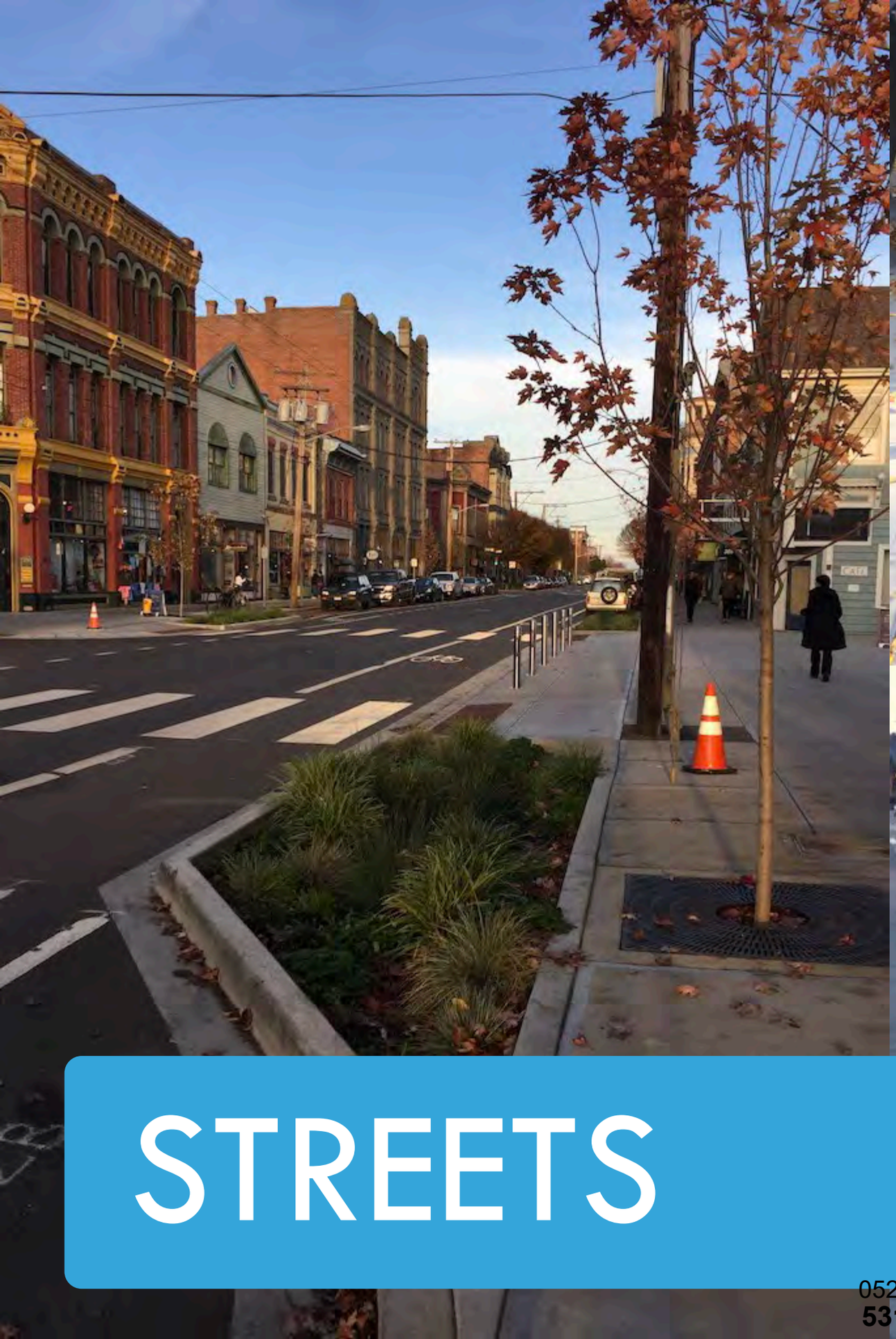

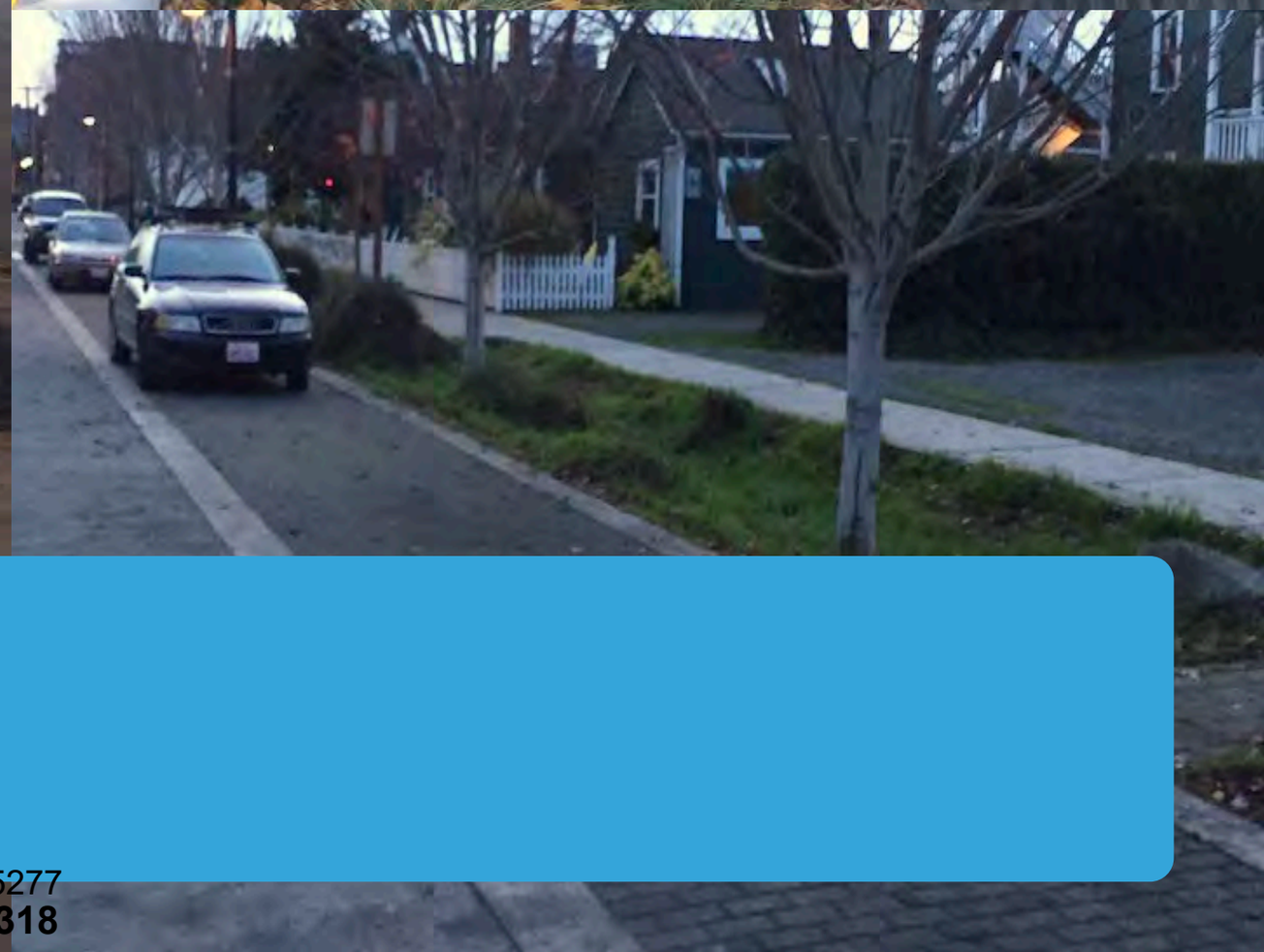

STREETS

EXAMPLE GSI PROJECT

PARKING LOT RETROFITS

EXAMPLE GSI PROJECT

PARKS AND OPENSPACE

05279
5320

WHAT IS THE SOLANO GSI PLAN?

DESCRIBES HOW, OVER THE LONG TERM, THE CITY WILL RETROFIT STORM DRAIN INFRASTUCTURE TO:

- BE MORE RESILIENT
- SLOW RUNOFF BY DISPERSING IT TO VEGETATED AREAS
- PROMOTE INFILTRATION, AND
- CLEAN RUNOFF TO MEET PCB AND MERCURY LOAD REDUCTION TARGETS

WHY DO WE NEED THIS DOCUMENT?

IS REQUIRED BY MUNICIPAL REGIONAL STORMWATER PERMIT

MUST BE SUBMITTED TO THE SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD BY SEPTEMBER 30, 2019.

WHAT DID WE DO IN THE PAST?

EACH CITY HAS A DIFFERENT PROCESS FOR THIS

SOLANO
SUISUN
VALLEJO
TO ADD IN THEIR TEXT HERE

WHAT IS NEW ABOUT THIS PLAN?

REQUIRED GREEN INFRASTRUCTURE PLAN ELEMENTS INCLUDE:

- TARGETS FOR THE AMOUNT OF IMPERVIOUS SURFACE TO BE RETROFITTED BY 2020, 2030, AND 2040
- PRIORITIZED PROJECTS AND AREAS FOR POTENTIAL PROJECTS
- PROCESS FOR TRACKING AND MAPPING COMPLETED PROJECTS

WHAT IS NEW ABOUT THIS PLAN?

REQUIRED GREEN INFRASTRUCTURE PLAN ELEMENTS, CONTINUED:

- UPDATES TO PLANNING DOCUMENTS (GENERAL PLANS, STORM DRAIN MASTER PLANS, COMPLETE STREETS PLANS, ETC.)
- DESIGN GUIDELINES
- STANDARD SPECIFICATIONS AND DETAILS
- EVALUATION OF FUNDING OPTIONS
- POLICIES AND ORDINANCES NEEDED TO IMPLEMENT
- OUTREACH AND EDUCATION

PLANNING DOCUMENT COORDINATION?

GENERAL & SPECIFIC PLAN UPDATES
STANDARD ENGINEERING DETAILS & SPECIFICATIONS

MRP REQUIRES CHANGES TO BE DONE BY END OF PERMIT TERM (11/2020)

CAN THIS COMPLEMENT OUR CIP PROJECTS?

EACH CITY HAS A DIFFERENT LIST OF PROJECTS FOR THIS –

SOLANO
SUISUN
VALLEJO
TO ADD IN THEIR PROJECTS HERE

FUNDING?

QUESTIONS?

05288
5329

Section 4 – Provision C.4 Industrial and Commercial Site Controls

Program Highlights and Evaluation
Highlight/summarize activities for reporting year:

Summary:

The Program contracts with the Solano County Department of Resource Management to conduct stormwater inspections of industrial, commercial and food handling businesses within the Program area. The Program updates the Business Inspection Plan as necessary to keep the document current. Changes are made to facilities lists upon observations of facilities closing or a change in compliance status resulting in a reduction or increase in inspection frequency. Specific information on the number of facilities inspected, types of violations incurred and resolution of violations within reasonable time periods is included in each city's 2019-2020 Annual Report as required by the Water Board.

The Solano County Health Department Inspector training was performed on January 14, 2020 (see attached sing-in sheet. The focus of the training was consistency in enforcement levels, enforcement authority; trash hot spots and outreach; city stormwater ordinances; high-priority facilities needed to be inspected during the fiscal year and enforcement levels associated with illegal discharges.

The Program Management team meets on a monthly basis to discuss important Program issues including commercial, industrial and restaurant inspections. The Program also participates in the Municipal Operations Committee meeting on a regional level, which was originally intended to discuss Industrial and Commercial Site Controls.

C.4.b.iii ► Potential Facilities List (i.e., List of All Facilities Requiring Stormwater Inspections)

List below or attach your list of industrial and commercial facilities in your Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff.

The Potential Facilities List was generated at the Program level and distributed to the cities for submittal in their Annual Report. See individual city reports for this list.

C.4.d.iii.(2)(a) & (c) ►Facility Inspections

Fill out the following table or attach a summary of the following information. Indicate your reporting methodology below.

	x	Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
		Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Total number of inspections conducted (C.4.d.iii.(2)(a))	
Violations, enforcement actions, or discreet number of potential and actual discharges resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner (C.4.d.iii.(2)(c))	

Comments:

The Program industrial-commercial and restaurant inspection forms have been designed so that when a facility is seen as being free of violations and without threat to the environment, all of the inspection form line items are checked “yes” and the “In Compliance With Pollution Control Requirements?” box is also checked “yes”.

Inspection reports where the “no” box is marked in the checklist area and the facility is seen as not being “In Compliance With Pollution Control Requirements?” are incorporated into the “Number of violations” totaled above. The level of enforcement of the offense is delineated in an annual training given to the inspectors and as described in the Program ERP.

2. Violations not resolved within 10 days or otherwise deemed resolved in a longer but still timely manner:

This data is different for each city, see individual city reports for this information.

C.4.d.iii.(2)(b) ►Frequency and Type of Enforcement Conducted

Fill out the following table or attach a summary of the following information.

	Enforcement Action (as listed in ERP)[1]	**Number of Enforcement Actions Taken**
Level 1		
Level 2		
Level 3		
Level 4		
Total	See individual city reports for this information.	

C.4.d.iii.(2)(d) ► Frequency of Potential and Actual Non-stormwater Discharges by Business Category

Fill out the following table or attach a summary of the following information.

Business Category[2]	Number of Actual Discharges	Number of Potential Discharges
See individual city reports for this information.		

C.4.d.iii.(2)(e) ►Non-Filers

List below or attach a list of the facilities required to have coverage under the Industrial General Permit but have not filed for coverage:

See individual city reports for this information.

[1]Agencies to list specific enforcement actions as defined in their ERPs.
[2]List your Program's standard business categories.

C.4.e.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Industrial/ Commercial Site Inspectors in Attendance	Percent of Industrial/ Commercial Site Inspectors in Attendance	No. of IDDE Inspectors in Attendance	Percent of IDDE Inspectors in Attendance
Solano County Annual Refresher Training for Storm and Sewer	1/14/2020	Enforcement authority; city stormwater ordinances; high-priority facilities needed to be inspected this fiscal year; enforcement levels associated with illegal discharges, High Priority Areas for Trash (see attached training sign-in sheet).	14	90	12	~50

Comments:

Solano County Department of Resource Management and Fairfield-Suisun Urban Runoff/Sewer District - Storm and Sewer Training

January 14, 2020

SIGN-IN SHEET

Name	Organization	Phone
Colby LaPlace	Solano County	707-784-3318
Connie Howard	Solano County	707-784-3301
Jessica Miller	Solano County	707-784-3323
Max Clark	Solano County Haz mat	(707) 784-3313
H. GIUGLIANO	SOL. CO. EH	784.6765
Jenifer Miller	Solano Co	784-3307
Josh Steele	Solano Co	707 784-3317
Joyce Benefield	Solano CO	707-784-3324
Jeff Boggs	SOLANO	707-784-3320
Aaron Ramirez	Solano	707-784-3164
Cassandra Brooks	Solano	(707) 784-3327
Misty Kaltreider	Solano	784-3311
Nellie Dimalanta	FSSD	428-9140
KEVIN CULLEN	FSSD / FSURMP	707-688-8895
JAHNIAH McGILL	SOLANO	707.784.6765

Regulatory Inspections – Survey 123 Training

Fairfield-Suisun Sewer District
Urban Runoff Management Program

January 14, 2020

Agenda

- Updates to Facility Data
  - Schedule: S123 DB is generally updated with new facilities on a quarterly basis (June, Sep, Dec, Mar). An email reminder is sent to supervisors for inspectors to update the forms on the devices.
  - If a new facility has an enforcement action or is non-compliant and requires reinspection, the DB shall be updated by Nellie asap so the listing will be available for subsequent re-inspections by City and/or County inspectors.
  - If a business has been renamed, closed, relocated; enter as UNLISTED as the Facility Name. In *<Updates to above Facility Info>* field, add appropriate comments, and under New Facility, proceed to add static data.
  - If business is under new management but same name, select Listed Facility dropdown, and add applicable comments under *<Updates to above Facility Info>* field.

- Reminders:
  - Majority of businesses are not permitted, meaning their business activities do not require a General Industrial permit by the State; i.e. cement companies.
  - In the signatory section of the form, add a space in your name separating the first and last name.
  - When a facility is non-compliant, an email should be sent to Kevin asap. He will in turn notify the City's inspector to reinspect the facility.

- Print Demo
  - Providing a copy of the inspection is optional but highly recommended when a violation is noted in the inspection.

Section 5 – Provision C.5 Illicit Discharge Detection and Elimination

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Provide background information, highlights, trends, etc.

Summary:

The Program Manager participates in BASMAA's Municipal Maintenance and Commercial/ Industrial Controls meetings. Additionally, monthly Stormwater Management meetings are held at the Program level to discuss illicit discharge detection and elimination.

On January 14, 2020, the Program performed training with Health Inspectors for both of the Program cities. The training covered Enforcement authority; city stormwater ordinances; enforcement levels associated with illegal discharges and high priority areas for trash.

In June of 2019, the Program, along with the Vallejo permittees held an outreach campaign promoting BASMAA's surface cleaning program. Please see the attached mailer with a list of all mobile cleaners and mobile businesses to which the flier was mailed.

C.5.c.iii ►Complaint and Spill Response Phone Number

(For the FY 2019-20 Annual Report only) Provide the following information:

List below or attach your complaint and spill response phone number: See each cities Annual Report for this

Provide your complaint and spill response web address, if used; See each cities Annual Report for this

Is a screen shot of your website showing the central contact point attached? [x] Yes [ ] No

If No, explain:

Provide a discussion of how the central contact point (complaint and spill response phone number and, if used, web address) is being publicized to your staff and the public.

The Program promotes the contact point for illegal discharges through the distribution of You Are The Solution To Stormwater Pollution brochures and posters. The brochures are given away at each outreach event attended by Program staff as well as Farmers Markets which are held each Thursday between 3 and 8 pm between April 15 and October 15 held on the green in front of the County building on West Texas Street in Fairfield.

C.5.d.iii.(1), (2), (3) ►Spill and Discharge Complaint Tracking

Spill and Discharge Complaint Tracking (fill out the following table or include an attachment of the following information)	
	Number
Discharges reported (C.5.d.iii.(1))	
Discharges reaching storm drains and/or receiving waters (C.5.d.iii.(2))	
Discharges resolved in a timely manner (C.5.d.iii.(3))	
Comments: See each cities Annual Report for this	

ATTENTION MOBILE WASHING BUSINESS OWNERS / MANAGERS

Preventing water pollution is easy! Simply follow the recommendations in a short online presentation (www.BASMAA.org) and receive your free Pollution Prevention Training Certificate.

The Training Certificate lets your customers know that you are doing your part to keep pollution out of storm drains and the San Francisco Bay. Storm drains are direct pathways for pollution, traveling from streets, gutters, and other paved surfaces to local creeks and lakes, and from there to the Bay, Ocean, or Delta.

Allowing pollution into storm drains is prohibited in California. Both the person who pollutes and the owner of the property where the pollution is generated are liable.

The Bay Area Stormwater Management Agencies Association provides guidance and certification for mobile cleaners to prevent water pollution when cleaning surfaces such as carpets, sidewalks, plazas, building exteriors, parking areas and drive-throughs.

Green business practices attract customers and are good for business. Visit www.BASMAA.org today and sign up for your free certificate!

For more information about your local stormwater program, contact Kevin Cullen at the Fairfield-Suisun Urban Runoff Management Program (707-428-9129), Mark Hall of the Vallejo Flood & Wastewater District (707-644-8949 ext. 1609), or Derek Crutchfield at the City of Vallejo (707-644-5346).

Title	Name of Business	Street	City, State	Zip
Owner/Manager	A1 Restoration & Carpet	1681 Vicksburg Drive	Fairfield, CA	94533
Owner/Manager	A1 Restoration & Carpet	1600 Vandenberg Circle	Suisun City, CA	94585
Owner/Manager	Action Pressure Washing	1509 Rampart Way	Brentwood, CA	94513
Owner/Manager	Adobe Power Washing	12 Birnam Wood Court #B	Petaluma, CA	94954
Owner/Manager	Alamo Lane Hand Car Wash	760 Alamo Lane	Vacaville, CA	95687
Owner/Manager	Albertson's Abbey Carpet	5000 East 2nd Street	Benicia, CA	94510
Owner/Manager	Albertson's Carpet Cleaning	281 Cottonwood Drive	Vallejo, CA	94591
Owner/Manager	All in One Janitorial	5123 Ellsworth Road	Vacaville, CA	94588
Owner/Manager	All Included Carpet Cleaning	5055 Business Center Drive	Fairfield, CA	94534
Owner/Manager	All Size Carpet Cleaning	1021 Mason Street, Suite 2	Vacaville, CA	95688
Owner/Manager	Always Green Clean	6618 Leisure Town Road	Vacaville, CA	95687
Owner/Manager	Ans Carpet Cleaning	504 Rollingwood Dr.	Vallejo, CA	94591
Owner/Manager	Atlas Carpet Care	734 Capricorn Circle	Fairfield, CA	94533
Owner/Manager	Bains Janitorial Service	310 Notre Dame Drive	Vallejo, CA	94589
Owner/Manager	Bartha's Carpet Cleaning	5040 Silverado Drive	Fairfield, CA	94534
Owner/Manager	Bay Area Carpet	4862 East 2nd Street	Benicia, CA	94510
Owner/Manager	Bay Area Cleaning	704 Missouri Street	Fairfield, CA	94533
Owner/Manager	Bay Area Cleaning Solutions	1433 Kentucky Street	Fairfield, CA	94533
Owner/Manager	Bayside Carpet Cleaning	1537 Vervais Avenue	Vallejo, CA	94591
Owner/Manager	Bell's Chem-Dry	807 Davis St., Suite N	Vacaville, CA	95687
Owner/Manager	Benicia Carpet Cleaning	86 Solano Square	Benicia, CA	94510
Owner/Manager	Benicia Carpet Cleaning	1300 Southampton Rd.	Benicia, CA	94510
Owner/Manager	Best Rates Carpet Cleaning	3069 Alamo Drive	Vacaville, CA	95687
Owner/Manager	Big Al's Auto Detailing	340 Industrial Way, Suite F	Dixon, CA	95620
Owner/Manager	Blue Kings Power Washing	925 Civic Center Drive	Rohnert Park, CA	94928
Owner/Manager	Budget Master Carpet Cleaning	5123 Ellsworth Road	Vacaville, CA	95688
Owner/Manager	Cali-Klean	2122 Cox Lane	Fairfield, CA	94533
Owner/Manager	California Carpet Care	940 Ruby Drive	Vacaville, CA	94587
Owner/Manager	The Carpet Cleaner	8501 Kenneth Ridge Court	Fair Oaks, CA	95628
Owner/Manager	Carpet One	47 Union Way #B	Vacaville, CA	95687
Owner/Manager	Carpets & More	2059 E. Monte Vista Ave. #A	Vacaville, CA	95687
Owner/Manager	Chase's Carpet & Blinds Inc.	4720 E. 2nd Street	Benicia, CA	94510
Owner/Manager	Cheap Carpet Cleaning Service	1001 First Street	Benicia, CA	94510
Owner/Manager	Chem-Dry	938 Adams Street	Benicia, CA	94510
Owner/Manager	Chem-Dry Carpet Cleaning	214 Serrano Drive	Fairfield, CA	94533
Owner/Manager	Class Carpet Cleaning	2795 Barbour Drive	Fairfield, CA	94534
Owner/Manager	Class Carpet Cleaning	340 Elizabeth Street	Vacaville, CA	95688
Owner/Manager	Clean America Carpet Cleaning	6130 Elkhorn Ct.	Vallejo, CA	94591
Owner/Manager	Clean America Carpet Cleaning	2546 Huber Drive	Vallejo, CA	94590
Owner/Manager	Clean Sweep Carpet Care	766 Tulare Drive	Vacaville, CA	95687
Owner/Manager	Crystal Clear Pressure Wash	2412 Redwood St.	Vallejo, CA	94590
Owner/Manager	Dab Carpet Cleaner	1368 Leafwood Court	Fairfield, CA	94534
Owner/Manager	The Detail Shop	988 Adams Street	Benicia, CA	94510
Owner/Manager	D-Mos Auto Detail	311 State Street	Fairfield, CA	94533
Owner/Manager	E & R Carpet & Upholstery Cleaning	1287 Alamo Drive	Vacaville, CA	95687
Owner/Manager	Extreme Carpet Cleaning	1195 La Homa Drive	Napa, CA	94558
Owner/Manager	Gillespie's Abbey Carpet	360 Chadbourne Road	Fairfield, CA	94534
Owner/Manager	Heaven's Best Carpet Cleaning	190 Deerglen Circle	Vacaville, CA	95687
Owner/Manager	Heaven's Best Carpet Cleaning	2796 Hillview Drive	Fairfield, CA	94534
Owner/Manager	Heaven's Best Carpet Cleaning	320 Elizabeth Street	Vacaville, CA	95688
Owner/Manager	Heaven's Best Carpet Cleaning	1140 Pitt School Rd., Suite F	Dixon, CA	95620
Owner/Manager	Heaven's Best Carpet Cleaning	164 Robles Way #132	Vallejo, CA	94591
Owner/Manager	Love's Dry Carpet Cleaning	38 Commerce Pl., Suite C	Vacaville, CA	94587
Owner/Manager	MAIDS	136 Spencer Strteet	Vallejo, CA	94589
Owner/Manager	Mike's Carpet Cleaning	1500 Oliver Road	Fairfield, CA	94534

Owner/Manager	Mr. Fresh Carpet Care	4160 Suisun Valley Road, E521	Fairfield, CA	94534
Owner/Manager	National Multi Steam Cleaning	3631 Norfolk Street	Napa, CA	94558
Owner/Manager	New Look Power Wash	5118 Tawny Lake Place	Fairfield, CA	94534
Owner/Manager	New Looks Service & Supply	621 Tuolumne Street	Vallejo, CA	94590
Owner/Manager	Nu Concept Products	122 Lemon Tree Circle	Vacaville, CA	95687
Owner/Manager	O'Connell Jetting Systems	3190 Park Road	Benicia, CA	94510
Owner/Manager	PC Carpet Care	1679 Highland Circle	Fairfield, CA	94534
Owner/Manager	Performance Cleaning Co.	336 Bon Air Center #150	Greenbrae, CA	94904
Owner/Manager	Pet Stain & Odor Removal	1095 Magazine Street	Vallejo, CA	94591
Owner/Manager	Power Steam Carpet Cleaning	P.O. Box 2502	Vacaville, CA	95696
Owner/Manager	Precision Power Washing	464 Richards Blvd.	Sacramento, CA	95811
Owner/Manager	Pressey's Carpet & Upholstery	415 Hillside Circle	Dixon, CA	95620
Owner/Manager	Professional Steam Services	2705 Delta Road	Brentwood, CA	94513
Owner/Manager	Quality Pressure Washing	1953 Cardinal Way	Fairfield, CA	94533
Owner/Manager	Rainbow International	431 Coloma	Sausalito, CA	94965
Owner/Manager	Service Master	499 Watt Drive #B	Fairfield, CA	94534
Owner/Manager	Servpro Industries	5130 Fulton Drive, Suite 1	Fairfield, CA	94534
Owner/Manager	Solano Pressure Washing	1037 Cabernet Court	Vacaville, CA	95688
Owner/Manager	SOS Carpet Cleaning	926 East 3rd Street	Benicia, CA	94510
Owner/Manager	Spotless Carpet Cleaning	800 First Street	Benicia, CA	94510
Owner/Manager	Stanley Steemer	2162 Rivera Drive	Vallejo, CA	94590
Owner/Manager	StarCare Power Wash	4849 Robinson Rd.	Vacaville, CA	95688
Owner/Manager	State of Art Cleaning Svcs.	1091 Cabernet Ct.	Vacaville, CA	95688
Owner/Manager	Steam Bright	606 Pena Dr., Suite 300	Davis, CA	95618
Owner/Manager	Superlative Steam Cleaning	999 S. Novato Blvd.	Novato, CA	94947
Owner/Manager	Surface Technologies	18 Willotta Drive	Fairfield, CA	94534
Owner/Manager	Thee Best Carpet	1889 San Pablo Avenue	Vallejo, CA	94590
Owner/Manager	Top Building Maintenance	206 Catamaran Way	Vacaville, CA	95688
Owner/Manager	Triple J Green Cleaning Svcs.	301 Georgia Street	Vallejo, CA	94590
Owner/Manager	United Carpet & Upholstery	2104 Beaujolais Court	Fairfield, CA	94533
Owner/Manager	Usery's Blue Ribbon Carpet	754 Calico Trail	Vacaville, CA	95687
Owner/Manager	Welcome Building Maintenance	5046 Commercial Circle #D	Concord, CA	94520
Owner/Manager	White's Carpet Cleaning	232 White Sands Drive	Vacaville, CA	95687
Owner/Manager	Windrose Carpet	415 Lemon Street	Vallejo, CA	94590
Owner/Manager	Zen Cleaning Solutions	325 Falcon Drive	Vallejo, CA	94589

FAIRFIELD-SUISUN SEWER DISTRICT

ABOUT US | WORKING WITH US | WHAT WE DO | ACHIEVEMENTS | GET INVOLVED | EDUCATIONAL PROGRAMS | DID YOU KNOW... | CONTACT

WHAT WE DO

STORMWATER MANAGEMENT

Stormwater and urban runoff is collected in a system that is completely separate from the wastewater system that transports sewage.

All of the stormwater that our network of storm drains and pipes collects flows untreated into the Suisun Marsh, an environmentally-sensitive area of enormous proportions.

Stormwater and urban runoff is collected in a system that is complete separate from the wastewater system that transports sewage.

Suisun Marsh is the largest contiguous brackish water marsh remaining on the west coast of North America. More than 10 percent of the remaining natural wetlands in California are within the Suisun Marsh.

The marsh contains habitat for more than 220 bird species, 45 animal species, 16 different reptilian and amphibian species, and more than 40 fish species. The marsh also serves as the resting and feeding ground for thousands of waterfowl traversing the Pacific Flyway.

And yes, the Suisun Marsh does play a role in the drinking water supply as well.

The 230-miles of winding levees within the marsh help to protect the drinking water supplies for 22 million people by preventing salt water intrusion into the Sacramento-San Joaquin Delta.

To maintain this pristine environment, the District assists the cities of Fairfield and Suisun City by participating in the URMP (Urban Runoff Management Program), and by maintaining the cities' stormwater pumpstations.

The URMP is intended to reduce or eliminate pollutants discharged from the urban environment into our storm drains, local creeks and the Suisun Marsh. Water flowing into our gutters and storm drains is not treated before discharge into our creeks, which feed into the expansive Suisun Marsh.

Key components of the URMP include industrial and commercial inspections, education outreach to schools and the general public, monitoring municipal maintenance activities, and ensuring that local residential and commercial construction sites do not contribute to pollution in our local waterways.

All of us at the Fairfield-Suisun Sewer District take our responsibility to protect the Suisun Marsh and our region's other vital environmental attributes very seriously. We hope you do as well. Together, we can protect and preserve these essential natural resources for generations to come.

City Of Fairfield Stormwater | City of Suisun City Stormwater | Solano County Stormwater

Creek and Marsh Watch

The cities of Fairfield, Suisun City and the Fairfield-Suisun Sewer District have joined together to form the Creek and Marsh Watch. These municipalities protect the local creeks and the Suisun Marsh.

The Suisun Marsh, just downstream from the city of Fairfield and Suisun City, is the largest contiguous brackish water marsh remaining on the west coast of North America. This enormous marsh is a critical part of the San Francisco Bay-Delta estuary ecosystem, encompassing 116,000 acres, including 52,000 acres of managed wetlands, 27,700 acres of upland grasses, 6,300 acres of tidal wetlands, and 30,000 acres of bays and sloughs.

Suisun Marsh is a critical nursery for endangered Delta smelt as well as multitudes of other native and introduced species. The Suisun Marsh is also a major stop-over point each year for 1.5 million migratory birds on the Pacific Flyway.

It is the responsibility of all of our citizens to protect our local creeks and the Suisun Marsh.

The Fairfield-Suisun Urban Runoff Management Program gratefully acknowledges the Santa Clara Valley Urban Runoff Pollution Prevention Program for sharing the content and the artwork of this brochure.

TO REPORT ILLEGAL DISCHARGES
and
SPILL RESPONSE

Solano County Resource Management
(707) 784-6765 or www.solanocounty.com

Fairfield Police Department
(707) 428-7300

Suisun City Police Department
(707) 421-7373

Other Useful Contacts
(during normal business hours)

Solano Recycles (oil, latex, paint, etc)
(707) 437-8900 or www.solanorecycles.com

Fairfield-Suisun Sewer District
(707) 429-8930

Fairfield Public Works Department
(707) 428-7485 or www.fairfield.ca.gov

Suisun City Public Works Department
(707) 421-7340 or www.suisun.com

CA Department of Fish & Game
Caltip 888-334-2258 (Poaching or Polluting)
707-944-5500 or www.dfg.ca.gov

San Francisco Bay Regional
Water Quality Control Board
(510) 622-2300 or www.swrcb.ca.gov

Fairfield-Suisun Urban Runoff Management Program

(07/07/13)

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5342

You are the Solution to Water Pollution

Creek and Marsh Watch

Our Creeks.
Our Water.
Ours to Protect.

You live in a Watershed

A watershed is a land area that drains rain and other water into a creek, marsh, lake or bay. Rain and irrigation from lawns and gardens wash pollutants off surfaces like streets, sidewalks, and driveways into our storm drains and creeks and out to the Bay.

You may live miles away from the Bay and still be polluting its waters

Water from your neighborhood enters the storm drain system and flows directly to local creeks, the Marsh, and the Bay *without any treatment*. It often is contaminated by pollutants that can be toxic to fish, wildlife and people.

Residents and small businesses are the leading causes of local stormwater pollution, and have become the primary threats to the Marsh and Bay. Pollutants that get into storm drains because of our daily choices and activities can end up in our local waterways. You may be polluting the Marsh and Bay without realizing it.

Storm drains carry water and pollutants directly to our local creeks and the Suisun Marsh.

Never put anything into the gutter, street or storm drain.

Pollution comes from everyday activities.

Here are a few suggestions how you can help prevent stormwater pollution:

- *Motor oil and auto fluids*. If you change your own oil, recycle it, or take it to a household hazardous waste collection program.
- *Soap and dirt from washing cars in the driveway or street*. Go to a commercial car wash, or wash cars on a lawn or dirt surface and empty your bucket of soapy water into a sink or toilet.
- *Antifreeze, oil, paint or household cleaners*. Rinse latex paint tools in a sink, not outdoors. Also, clean up toxic spills like motor oil, paint and antifreeze with an absorbent material and dispose of soiled absorbent properly.
- *Dirt, leaves and lawn clippings that clog storm drains and choke creeks*. Rake or sweep to clean up outside. Compost leaves and yard clippings, or recycle them.
- *Weed killers, fertilizers and pesticides that are washed off lawns*. Use “green” gardening methods such as conserving water, planting native plants, protecting the soil and reducing the use of toxic pesticides. Adjust your sprinklers or irrigation systems to prevent over watering.
- *Litter and grime that collects on parking lots and sidewalks*. Use a broom, not a hose, to clean up outside. Use “green building” materials and practices, such as pervious paving, for your next project.
- *Pet waste left on lawns, streets, in the gutter or on sidewalks*. Pick it up and put it in a trash can.

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Section 6 – Provision C.6 Construction Site Controls

C.6.e.iii.(3)(a), (b), (c), (d) ►**Site/Inspection Totals**			
Number of active Hillside Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii.3.a)	Number of High Priority Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii. 3.c)	Number of sites **disturbing ≥** 1 acre of soil (C.6.e.iii.3.b)	**Total number of storm water runoff quality** inspections conducted (include only Hillside Sites, High Priority Sites and sites disturbing 1 acre or more) (C.6.e.iii. 3.d)

Comments:

This provision is handled at the city level. Please see individual city reports for this information.

Provide the number of inspections that are conducted at sites not within the above categories as part of your agency's inspection program and a general description of those sites, if available or applicable.

This provision is handled at the city level. Please see individual city reports for this information.

C.6.e.iii.(3)(e) ►**Construction Related Storm Water Enforcement** Actions

This provision is handled at the city level. Please see individual city reports for this information.

	Enforcement Action (as listed in ERP)[1]	**Number Enforcement Actions Issued**
Level 1[2]		
Level 2		
Level 3		
Level 4		
Total	This provision is handled at the city level. Please see individual city reports for this information.	

C.6.e.iii.(3)(f), ►**Illicit Discharges**

This provision is handled at the city level. Please see individual city reports for this information.

	Number

C.6.e.iii.(3)(g) ► Corrective Actions

Indicate your reporting methodology below.

- ☐ Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
- ☐ Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Enforcement actions or discrete potential and actual discharges fully corrected within 10 business days after violations are discovered or otherwise considered corrected in a timely period (C.6.e.iii. .3.g)	

This provision is handled at the city level. Please see individual city reports for this information.

[1]Agencies should list the specific enforcement actions as defined in their ERPs.
[2]For example, Enforcement Level 1 may be Verbal Warning.

C.6.e.iii.(4) ►Evaluation of Inspection Data

Describe your evaluation of the tracking data and data summaries and provide information on the evaluation results (e.g., data trends, typical BMP performance issues, comparisons to previous years, etc.).

Description:

This provision is handled at the city level. Please see individual city reports for this information.

C.6.e.iii.(4) ►Evaluation of Inspection Program Effectiveness

Describe what appear to be your program's strengths and weaknesses, and identify needed improvements, including education and outreach.

Description:

The construction site management is handled at the city level. Please see individual city reports for this information.

C.6.f.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Inspectors in Attendance
Remote Training - Fairfield-Suisun Urban Runoff Management Program – C.6 Construction Site Control	June 2020	General Construction Permit, MRP-2, ERP appropriate enforcement levels for BMP implementation.	5

CONSTRUCTION SITE TRAINING

Stormwater Compliance for Solano County MRP Permittees

Learn about MRP and General Construction Permit Compliance

When: Thursday, June 18, 2020

7:30 am -9am

Where: Fairfield-Suisun Sewer District

1010 Chadbourne Road

Fairfield, CA 94534

Featuring:

Free!!

KAZ ASSOCIATES
ENVIRONMENTAL SERVICES

(he's back and he and his team are better than ever!)

Free Doughnuts and Coffee Provided

RSVP to: tmedrano@fssd.com or call Tania @ 707 429 8100

Mandatory!!

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Construction and Stormwater Pollution

Solano Stormwater Programs

June 2020

05307
5348

MRP vs GCP

- Municipal Regional Permit (MRP 2)
  - Permit given to the City for discharging stormwater
- General Construction Permit (GCP)
  - Permit issued by the State Water Resources Control Board for construction site management

Ordinances

Nothing goes down

the storm drain

Except Clean Stormwater

& other exempt discharges delineated in the MRP

Changes to the MRP in C.6

- Issued in December 2015
  - More specificity in Enforcement Response Plan
  - Inclusion of hillside projects disturbing

    > 5,000 square feet on a 15 % slope for high-priority inspections

Plan Review
Site Inspections

- C.6.d Engineering staff review Stormwater Pollution Prevention Plans including erosion control
- C.6.e.Monthly inspections shall be conducted during the wet season (October – April) on sites disturbing more than one acre and on high priority sites (close to waterways, steeply sloped sites)

What we will look for?

- SWPPP onsite and up-to-date
- Erosion Control Measures
- Sediment Control Measures
- Run-On and Runoff Control
- Good Site Management
- Non-Stormwater Management

CONSTRUCTION SITE INSPECTION REPORT

1. Inspection Date: _____ 1a. Current weather conditions: _____ 1b. Rainfall with runoff since last inspection? ☐ Yes ☐ No

2. Name of Project: _____ 2a. Project No./Permit No. _____

3. Project Location: _____

4. Inspection Type: ☐ Routine ☐ Pre-Rain ☐ During Rain ☐ After Rain ☐ Follow-up ☐ Other

5. Permit Type: ☐ Building Permit ☐ Grading Permit ☐ Site Development ☐ CIP Project

6. Project disturb 1 acre or more?: _____ (yes/no) SWPPP dated ___/___/___ SWPPP on site? _____ (yes/no)
Project covered under Statewide General Construction Permit? WDID # _____ SWPPP log updated? _____ (yes/no)

7. High Priority Site (significant threat to water quality)? _____ (yes/no)
NOTE: Sites disturbing 1 acre or more AND *High Priority Sites require monthly inspections during the wet season.
*High Priority Sites pose significant threats to water quality through soil type, slope, size, and receiving water.

8. Project Type: ☐ Commercial/Industrial ☐ Residential ☐ Street Improvement ☐ Landscaping ☐ Utility (water, sewer, PG&E) ☐ Grading ☐ Demolition ☐ Other

9. Erosion Control Measures

☐ Fiber Blankets / Mulch	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Slopes / Drain Outfalls protected	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Hydroseed/Soil Binder/Compost Blanket	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Unprotected soil areas stablized	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Tree Protection Fencing	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Riparian Area Barrier	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable

10. Sediment Control Measures

☐ Wattles / Fiber Rolls in place	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Silt Fences / Compost Berms	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Sedimentation Basin	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Inlet protection (Bags, sand, gravel)	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Dust Control	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Stabilized construction entrance	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Street Sweeping Onsite	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Public roads free of sediment & debris	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable

11. Run-on and Runoff Control

☐ Sampling conducted, if required	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Non-Visual pollutant sampling	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Flows leaving site free of sediment	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Active Treatment System (if any)	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable

12. Good Site Management

☐ Construction Materials (wood, cement, etc)	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ HazMat (paint, solvents, oil, fuel, etc)	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Solid waste properly managed & covered	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Soil, bark, sand stockpiles cov'd/bermed	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Vehicle Servicing	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable

13. Non-Stormwater Management

☐ Concrete washout available & maintained	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Stucco mixers bermed to prevent runoff	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Dewater performed by an aprv'd method	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Painters have cleanup area	☐ Adequate	☐ Requires Maintenance	☐ Non-Compliant	☐ Not Applicable
☐ Discharge points free of illicit discharges?	☐ Yes	☐ No		

14. Comments:

15. **Enforcement/Follow-Up:** Date problem first indentified: _____ Next follow-up inspection date: _____
Comments:

Enforcement: ☐ None/In Compliance ☐ Verbal Notice ☐ Notice to Comply ☐ Notice of Violation ☐ Stop Work ☐ Administrative Fine

16. Resolution: ☐ Problem Fixed ☐ Need More Time ☐ Escalate Enforcement ☐ Date resolved: _____
Was there rain with runoff after problem identified and before resolution? ☐ Yes ☐ No

17. Inspector's Signature: _____ Date: _____

18. Name of Project Manager (Print) _____ Phone Number _____
Signature of Project Manager _____ Date: _____

C.6 - Construction Site Controls - Enforcement Response Plan

Enforcement Action	Examples of Polluting Activity[3]	Time Schedule to Compliance and Procedure
Level 1- Verbal Notice *For threatened violations due to inadequate housekeeping,*	Lack of an updated erosion control plan; no SWPPP onsite; lack of appropriate BMPs to prevent pollution; threatened non-stormwater discharges.	Before the next rainfall event, but not longer than 10 business days, unless more timely compliance is feasible or other exceptions apply[2]. Verbal Notices are normally corrected onsite immediately after such notice is given. Follow-up is required if corrections not performed immediately (subsequent site visit required).
Level 2- Notice to Comply *For minor violations, or if the response to a Verbal Notice is inadequate.*	Minor amounts of soil entering into street or gutter; inadequate erosion or sediment control, ie.: including placement and anchoring; uncovered stockpiles and/or dumpsters. Lack of vehicle maintenance, stabilized construction site entrance, or concrete washout/maintenance.	Active non-stormwater discharges to cease immediately. Corrective action to be completed before the next rainfall event, but not longer than 10 business days, unless more timely compliance is feasible or other exceptions apply[2]. Follow-up is required if corrections not performed immediately (subsequent site visit required).
Level 3- Notice of Violation *For major violations or if the response to a Notice to Comply is inadequate.*	Actual discharges to the storm drain system; concrete washing into the storm drain system; "chocolate" water discharge.	Active non-stormwater discharges to cease immediately. Corrective actions to be completed before the next rainfall event, but not longer than 10 business days, unless more timely compliance is feasible or other exceptions apply.[2] If more time is needed than provided above, consider issuing a stop work order. Follow-up is required if corrections not performed immediately (subsequent site visit required).
Level 4- Stop Work/ Administrative Fine *Pursue for the most serious violations*	Violations that affect the agency's ability to comply with the MRP's requirements.	The time schedule for compliance will need to be determined based on case-specific information. This information will be documented as required by the MRP.

[2] The MRP states that violations must be corrected in a timely manner with a goal of correction before the next rain event, but not longer than 10 business days after discovery unless agency staff document reasons why a longer period is needed in the agency's database or equivalent.
[3] For each polluting activity, the enforcement action may increase or decrease, depending on the level of severity.

Erosion Control BMP: Hydro-mulch application

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Erosion Control BMP: Geotextiles/Erosion Control Blankets

Erosion Control: Good example of Slope Protection

Erosion Control: Slope Protection?

Sediment Control: Sedimentation Basin

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Sediment Control BMP: Straw Wattles

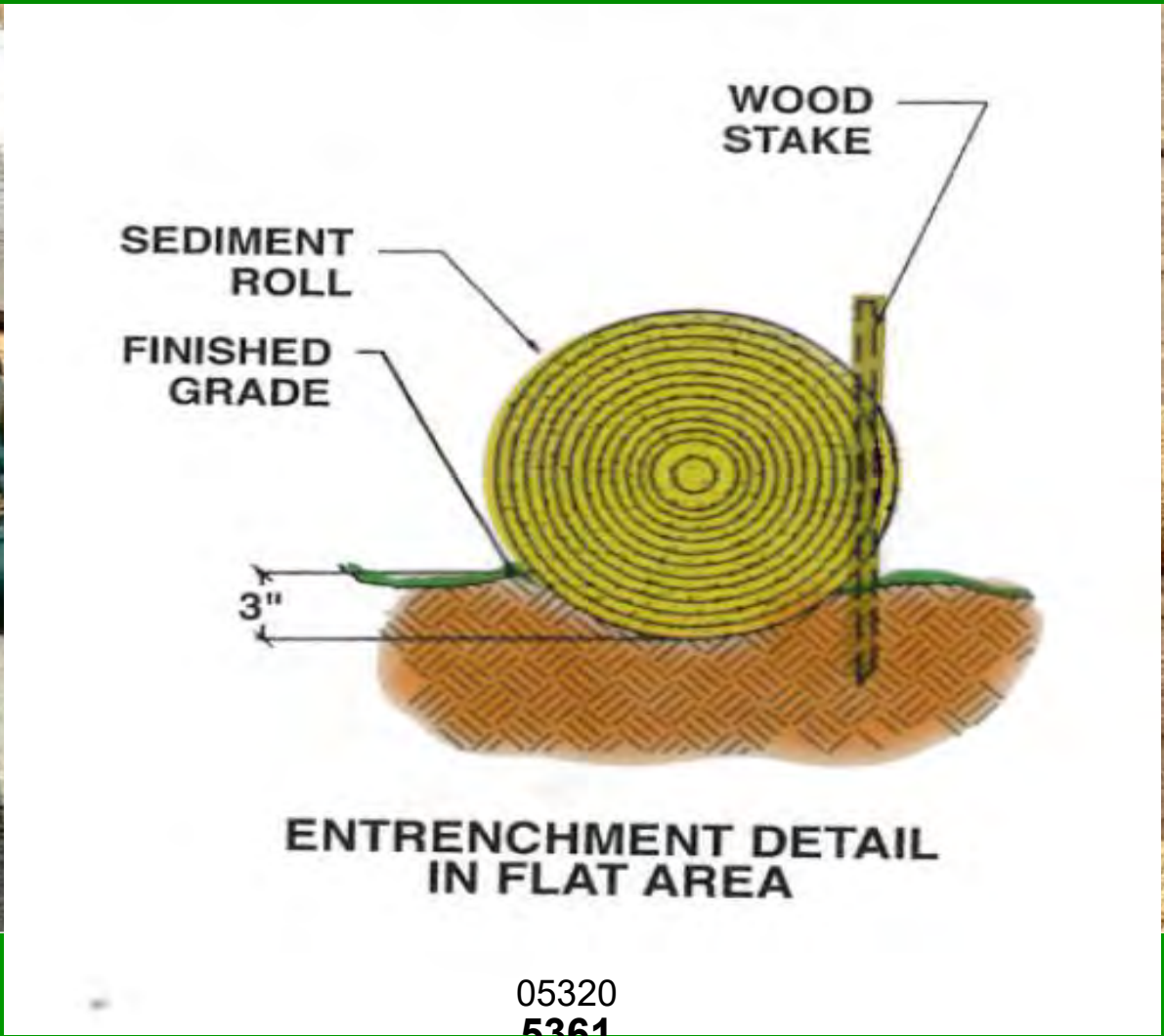

Sediment Control BMP: Silt Fence

Sediment Control BMP: Inlet Protection

Sediment Control BMP: Regular Street Cleaning

Sediment Control BMP: Stabilized Construction Entrance

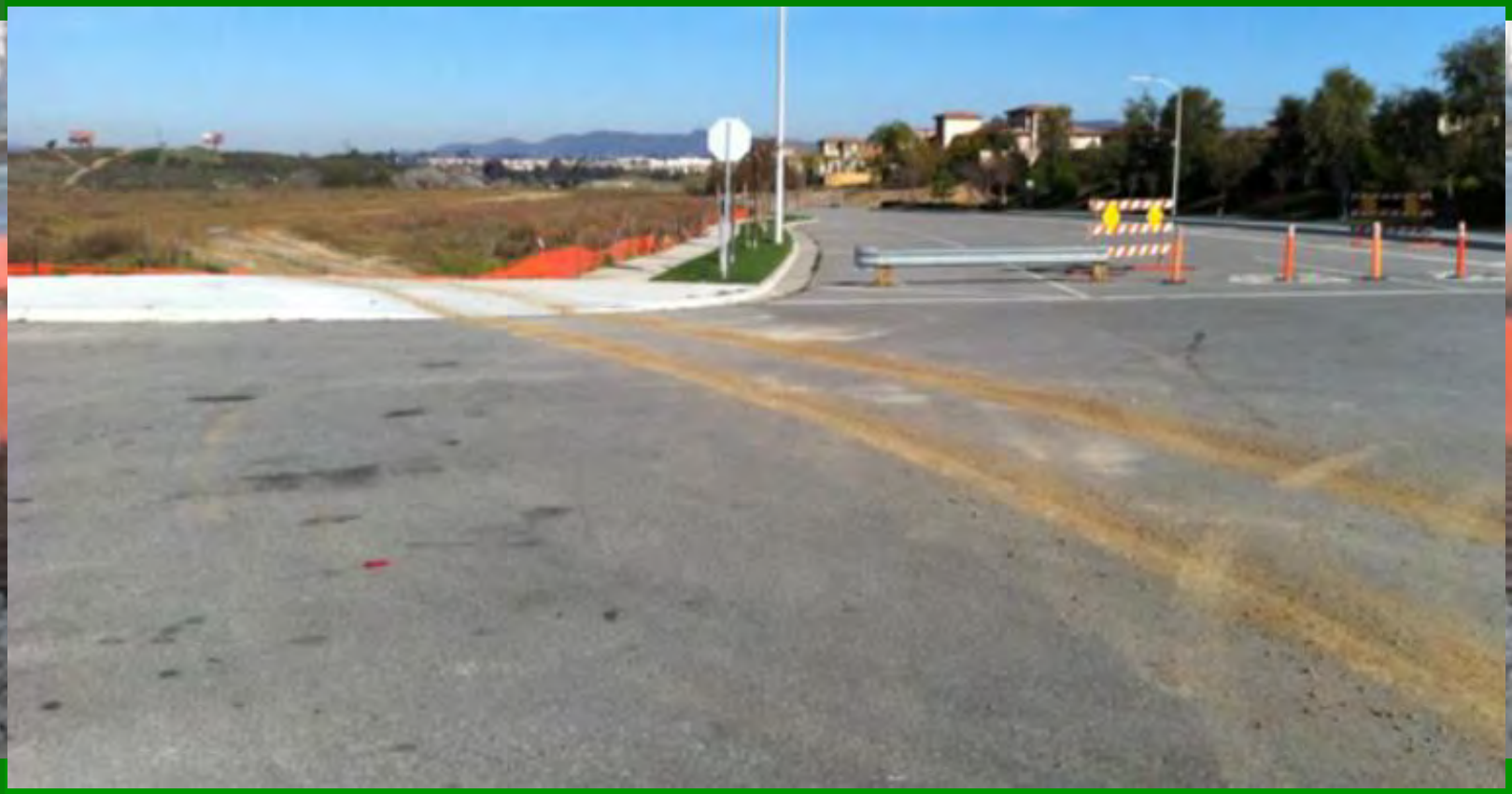

Sediment Control BMPs: Dust Control

Dirty Streets & Tracking

Not This

Run-on and Runoff Controls

- Run-on from off-site shall be directed away from all disturbed areas
- All runoff leaving site shall be free of sediment

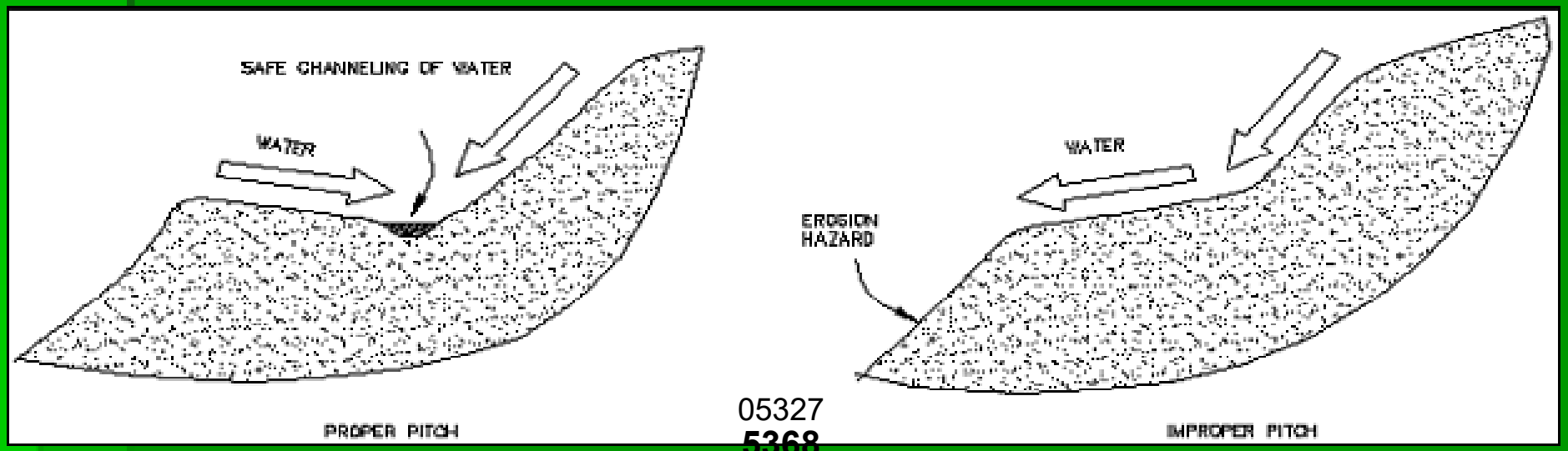

Good Site Management

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5369

Keep Sawdust and Trash Contained in Covered Containers

05329
5370

Store Chemicals Properly

05330
5371

Contain Paint and Other Wastes

Repair Leaking Equipment

05332
5373

Portable Toilets

Non-Stormwater Management: Stucco mixer cleaning

NonStormwater Management: Stucco Pumping

Check for Hose Leaks

Nonstormwater Managment Stucco Mixer

Lay down plastic that will contain spills, not to protect the sidewalk.

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Non Stormwater Management: Provide a Concrete Washout

Non Stormwater Management: Don't Wash Concrete Tools in the street

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5379

Non Stormwater Management: Dewatering Plan

Every Project must have a Dewatering Plan

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Non Stormwater Management: TSS Levels

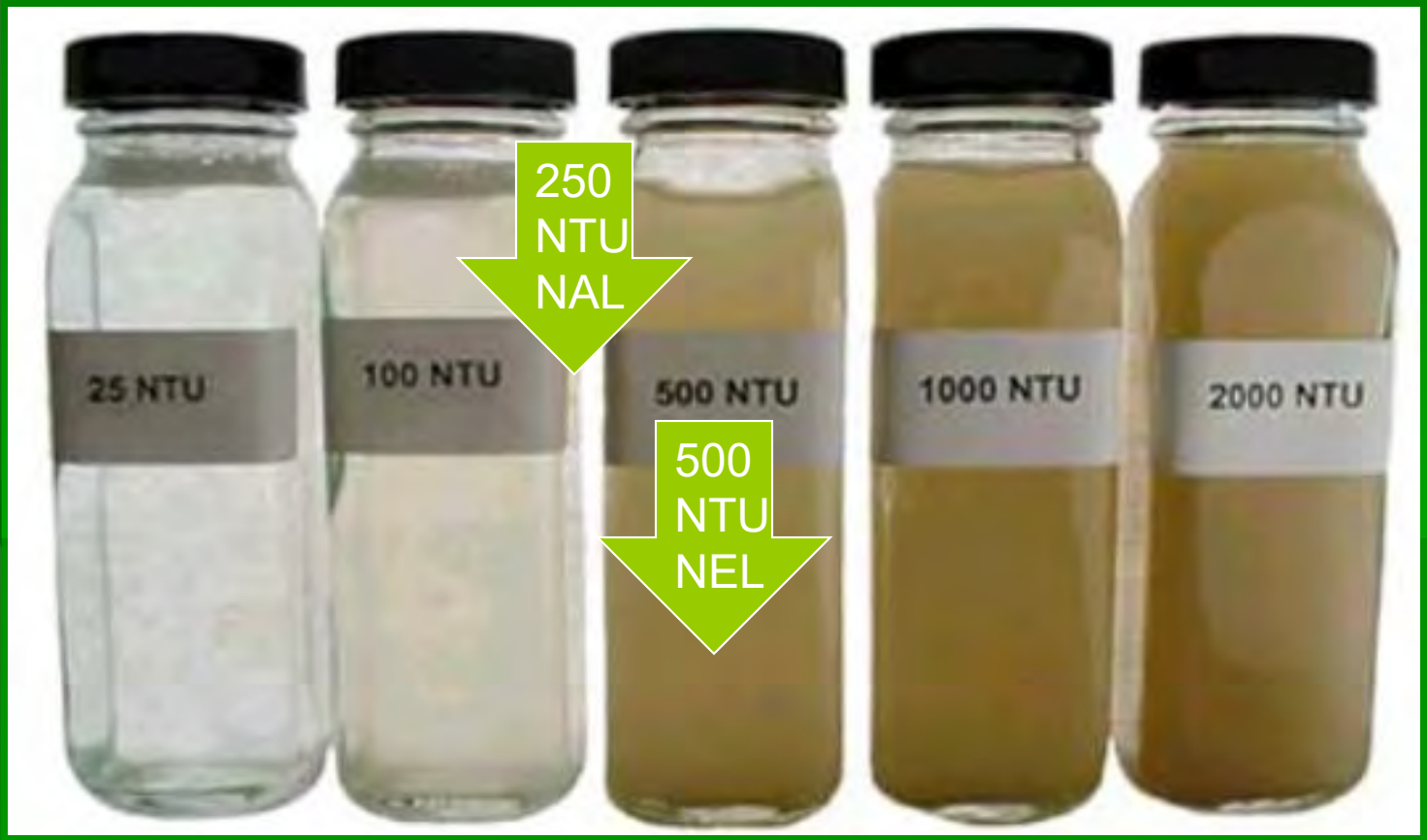

Remember

Good Housekeeping & Documentation

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Documentation

- Keep your log up to date!
- Keep site map updated!

Questions?

Fairfield-Suisun Urban Runoff Management Program - C.6 Construction Site Control Training

June 2020

SIGN-IN SHEET

Name	Organization	Phone
DOUG GILMAN	C.O.F	(707) 428-7044
Roger Dunham	C.O.F.	707-428-7047
Matt Kott	C.O.F.	707-399-5921
AARON GADOW	C.O.F.	707-428-7048
TOM MARTIN	COF	707 425-7478

Section 7 – Provision C.7. Public Information and Outreach

C.7.a.iii ►Storm Drain Inlet Marking

(For the FY 2019-20 Annual Report only) Provide the following information:

These elements of Provision C.7 are handled at the city level. Please see individual city reports for Storm Drain Inlet Marking.

State the number of municipally-maintained storm drain inlets in your jurisdiction				
Are at least 80 percent of municipality-maintained storm drain inlets legibly labeled with an appropriate stormwater pollution prevention message?		Yes		No
Is a picture of a labeled municipality-maintained inlet attached?		Yes		No
Did all newly approved privately-maintained streets have storm drain inlet markings verified prior to acceptance of the project?		Yes		No
Were the storm drain inlet markings on privately-maintained streets required to be maintained through the development maintenance entity?		Yes		No

C.7.b.i.1 ►Outreach Campaign

Summarize outreach campaign. Include details such as messages, creative developed, and outreach media used. The detailed outreach campaign report may be included as an attachment. If outreach campaign is being done by participation in a countywide or regional program, refer to the separate countywide or regional Annual Report.

Summary:

This campaign was conducted at a Program level please see attached outreach campaign report.

C.7.b.iii.2 ►Post-Campaign Effectiveness Assessment/Evaluation

(For the Annual Report following the post-campaign effectiveness assessment/evaluation*)* Submit a report of the effectiveness assessment/evaluation completed, which, at a minimum, should include the following information:

1) A description of the outreach campaign
2) A summary of how the effectiveness assessment/evaluation was implemented
3) An analysis of the effectiveness assessment/evaluation results
4) A discussion of the measurable changes in awareness and behavior achieved
5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages

If campaign implementation and effectiveness assessment were done Countywide or regionally, refer to a Countywide or regional submittal that contains the information described above.

x	See attached effectiveness assessment/evaluation report
	See Countywide or regional submittal (reference document)

C.7.c. Stormwater Pollution Prevention Education

No Change

C.7.d ►Public Outreach and Citizen Involvement Events

Describe general approach to event selection. Provide a list of outreach materials and giveaways distributed.
Use the following table for reporting and evaluating public outreach events

Event Details	Description (messages, audience)	Evaluation of Effectiveness
Provide event name, date, and location. Indicate if event is local, countywide or regional. Indicate if event is public outreach or citizen involvement.	Identify type of event (e.g., school fair, creek clean-up, storm drain stenciling, farmers market etc.), type of audience (school children, gardeners, homeowners etc.) and outreach messages (e.g., Enviroscape presentation, pesticides, stormwater awareness)	Provide general staff feedback on the event (e.g., success at reaching a broad spectrum of the community, well attended, good opportunity to talk to gardeners etc.). Provide other details such as: • Success at reaching a broad spectrum of the community • Number of participants compared to previous years. • Post-event effectiveness assessment/evaluation results • Quantity/volume of materials cleaned up, and comparisons to previous efforts
Coast and Creek Cleanup; September 21, 2019; 21 cleanup sites throughout Fairfield and Suisun City; this is a Program event that is also world-wide	The Program lead volunteer cleanup of local creeks, marsh and open space areas.	599 volunteers picked up 7,472 pounds of trash and recyclables along 36.9 miles of waterway at 21 sites. This was a very successful event. See attached summary attached to the end of this section. Significant jump in attendance is correlated to an increased level of visibility along Highway 80 in Fairfield on the Jumbotron. In addition, further efforts were made in the local high schools with posters and future contracts to increase interest.
OWOW Home Depot Events; Cadenasso Dr. Fairfield, CA and Ace	IPM Consultant and advocate Suzanne Bontempo provided IPM	Discussions were held with Home Depot customers regarding

Hardware in Suisun City; this is a Program event. Store visits were also made by the Program Advocate. Store visits were made in throughout the year and were stopped in April of 2020 due to the pandemic.	training for Home Depot and Ace Hardware customers on safe gardening practices at the local Home Depot store.	alternatives to toxic pesticides. Customers were very engaged. See attached OWOW report.
Fairfield- Suisun Farmers Market; Thursdays from May through October; the event is held in downtown Fairfield at the intersection of W. Texas St. and Jefferson Street; this is a Program event.	Program members contract with Valcore Recycling to attend the weekly farmers market and man the Recycling and Environmental booth. Messages include the connectedness of our streets to our local creeks; less toxic alternatives to pesticides and only clean stormwater should be flowing to our local storm drain system. The booth also features information about reporting illegal discharges and free grease scrapers to avoid sanitary sewer overflows.	Starting in May and ending October an average of 16 visitors per week that stop and engage at the Fairfield Recycles and stormwater booth. Crewmembers also quiz guests and give out prizes. Attendance has dropped due to pandemic.
Earth Day - April 27, 2019; Fairfield Civic Center This is a Program event.	Event cancelled due to pandemic	
Earth Day Cleanup of local creeks- April 20, 2019; Ledgewood Creek at Highway 80 behind Home Depot, Lower Union Avenue Creek, Grizzly Island Trail, Suisun City Waterfront, Mid Laurel Creek and Beldens Landing. This is a Program event.	Event cancelled due to pandemic	
Solano County Master Gardener Training; March 1, 2019; UC	IPM Consultants Teresa Lavell and Suzanne Bontempo, provided IPM	26 new Master Gardeners were in attendance, based on the interaction

Cooperative - Master Gardeners Headquarters, Woodland, CA; this is a Program activity.	training for Solano County Master Gardeners, who in turn instruct the general public on safe gardening practices at local farmers' markets and events throughout the county. Also described was the connectivity of the streets to our local creeks; the difference between stormwater and wastewater; the wastewater treatment process; how pesticides can impact the process.	between the presenters and speakers, the audience was highly engaged. These Master Gardeners will carry this message to their tablings at libraries, and the local Farmers Markets in the area. Many of the Master Gardeners have their own gardening businesses so these messages will go also into the communities they service with their business and as volunteers in the communities. This was a very successful event, again.
Solano Community College Earth Day - April 23, 2019; The Program participated in this event located at Solano Community College. The event included earth friendly vendors. This is a Program event.	Event cancelled due to pandemic	
The Suisun City Boater Outreach Program is an environmental education effort targeting recreational boaters and boat owners visiting the Suisun City Slough. See attached report for Boater Outreach.	Between July 2019 through September 2019, program highlights include: Connected with boaters for four (4) hours each day on eleven (11) separate days at the Suisun City Boat Launch and Suisun City Marina. Of the sixty-nine (69) boaters who were contacted, six (6) declined the survey. Nearly 96% (63) participated in the survey and received a boater kit and oil absorbents.	The Suisun City Boater Outreach Program is an environmental education effort targeting recreational boaters and boat owners visiting the Suisun City Slough. See attached report for Boater Outreach.

	Distributed sixty-three (63) boater kits, thirty-two (32) fishing line containers, and six (6) oil used oil canisters were distributed. A total of ninety-nine (99) people were educated on oil absorbents, and clean and green boating practices.	

C.7.e. ►Watershed Stewardship Collaborative Efforts

Summarize watershed stewardship collaborative efforts and/or refer to a regional report that provides details. Describe the level of effort and support given (e.g., funding only, active participation etc.). State efforts undertaken and the results of these efforts. If this activity is done regionally refer to a regional report.

Evaluate effectiveness by describing the following:

- Efforts undertaken
- Major accomplishments

Summary:

The Program conducts an array of activities which qualify for watershed stewardship collaborative efforts. These efforts are also mentioned in other portions of this Annual Report. Our enhanced efforts directed toward Coast and Creek Cleanup result in watershed stewardship collaboration. Presentations were made to schools and clubs in the Fairfield Suisun Unified School District which resulted in an increased number of participants in our creek cleanup events. Creek Captains meetings are also used to encourage public involvement in watershed volunteer efforts.

C.7.f. ►**School**-Age Children Outreach

Summarize school-age children outreach programs implemented. A detailed report may be included as an attachment.

Use the following table for reporting school-age children outreach efforts.

Program Details	Focus & Short Description	Number of Students/Teachers reached	Evaluation of Effectiveness
Provide the following information: Name Grade or level (elementary/ middle/ high)	Brief description, messages, methods of outreach used	Provide number or participants	Provide agency staff feedback. Report any other evaluation methods used (quiz, teacher feedback etc.). Attach evaluation summary if applicable.
School Water Education Program (SWEP); this Program is available for Kindergarten through 12th grade and is a Program element.	SWEP provides free water education resources to teach water awareness and conservation to students, teachers and parents in our service areas of Dixon, Vacaville, Fairfield, Suisun City and Travis Air Force Base. The in-class education Programs as well as the resource materials and assembly Programs are multi-discipline and aligned to the content standards for California public schools. The Programs encourage students and adults to develop a healthy attitude of personal	6,445 K-12 students were reached throughout Solano County including the Cities of Fairfield and Suisun City.	See attached final report from Program contractor.

	responsibility towards our environment and develop skills needed to contribute meaningfully to decision-making process on issues involving our resources and particularly conserving our most precious resource, water.		
The Watershed Explorers Program; Solano County third-graders. This is a Program element.	This Program is held at Rockville Hills Park, Hanns Park and Lagoon Lake Park. The Program utilizes science and placed base learning to build awareness and understanding of local creeks and watersheds, their unique ecosystems and ways in which we care for them. In the field discussions and activities teach children about the fragile habitats of birds and other wildlife. Students learn the importance of water quality in a watershed and discover that can be negatively impacted by urban runoff and its complements: trash, oil, household chemicals and other human and domestic animal waste and discards. Please go to:	A total of 5 schools, 35 classes with 852 students coming from the Solano County School District Areas.	See attached final report from Program contractor.

	http://www.solanorcd.org/ for videos of the Program.		
Suisun Marsh Watershed and Wetland Education Program; the classes available to middle schools throughout Solano County.	The Program provides place-based environmental education for underserved middle school students in Solano County. The central Program themes include watersheds, wetlands, marsh functions, native and non-native plants, storm runoff, endangered and threatened species, and watershed connections between their residential communities, Suisun marsh, the San Francisco Bay, and the Pacific Ocean.	62 classes of approximately 1954 students from schools throughout Solano County including Fairfield and Suisun City participated in the Program.	See attached Suisun Marsh Watershed and Wetland Education Program 2019 – 20 Fiscal Year Report

C.7.g. ►Outreach to Municipal Officials
(For FY 19-20 Annual Report only) Summarize outreach conducted to increase the overall awareness of stormwater and/or watershed messages among municipal officials.
Summary:

Both cities have adopted Green infrastructure work plans and have made presentations to city Council staff for the adoption of the work plans. The newly developed Green Stormwater Infrastructure (GSI) Plans have been placed on both cities' websites for public review and advertisement. Green Stormwater Infrastructure Plans are posted on each cities' website. In addition, the Program has participated at a regional level for the promotion of Green Stormwater Infrastructure.

The Program's Green Stormwater Infrastructure Plan development process engaged a wide variety of stakeholders, including both government staff and community members who will live, work, and play near future green stormwater infrastructure projects. The cities also intend to engage relevant government staff and community members as projects move forward towards design and implementation.

To get support and commitment to the GSI Plan and this new approach to urban infrastructure, educating department staff, managers, and elected officials about the purposes and goals of green stormwater infrastructure, the required elements of the GSI Plan, and steps needed to develop and implement the GSI Plan was an important step in the development of the GSI Plan. The City began this process in fiscal year 2015-2016 and to date has completed the following tasks:

• Engineering staff attended a GSI workshop covering GSI design guidelines; implementing GSI projects, the GSI Design Guidebook; and GSI landscape and maintenance considerations.

• In-house training was provided February 4, 2019 to Planning and Engineering Services Department staff on GSI requirements, strategies, and opportunities.

• Interdepartmental meetings with affected department staff and management have been held to discuss GSI requirements and assigned tasks.

Fairfield-Suisun Urban Runoff Management Program

C.7.b.iii.2 ►Post-Campaign Effectiveness Assessment/Evaluation

September 30, 2020

Prepared for and by:
Fairfield-Suisun Urban Runoff Program
City of Fairfield
City of Suisun City

This Post-Campaign Effectiveness Assessment/Evaluation Report represents the Fairfield-Suisun Urban Runoff Management Program's (Program) responses to the items requested per Provision C.7.b.iii.2 of NPDES Permit No. CAS612008 (MRP-2) as adopted on November 18, 2015 via Order No. R2-2015-0049 (MRP-2).

Based on previous work in compliance literature[1] (e.g., littering), there has been a strong correlation discovered between environmental social norms from volunteering in environmental organizations and behaviors such as littering. The decrease in incidence of littering with unpaid work in environmental organizations is strongly correlated. Therefore, it is the Programs goal to engage volunteers to a maximum extent in order to build a greater community of environmental stewards.

The Program's Outreach Campaign has focused on trash. The campaign implementation and effectiveness assessment were conducted Program-wide. The Program hosts two principal trash cleanup events with the focus on citizen volunteers throughout the year. The largest event is Coast and Creek Cleanup Day (CCCD) while the other significant cleanup day is held on or near Earth Day. The Program is the lead sponsor and organizer in Suisun City, Fairfield and portions of unincorporated Solano County for both events. Both events have grown significantly and are well recognized throughout both cities and the County.

Section C.7.b.iii.2 of MRP 2 requires Permittees to submit a report of the effectiveness assessment/evaluation completed, which, at a minimum, should include the following information:

(1) A description of the outreach campaign.

(2) A summary of how the effectiveness assessment/evaluation was implemented.

(3) An analysis of the effectiveness assessment/evaluation results.

(4) A discussion of the measurable changes in awareness and behavior achieved.

(5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages.

The following are the Program responses to the requirements of the Permit.

[1] Volunteering, Pro-Environmental Attitudes and Norms by Maria Garcia-Valinas, et al., The Journal of Socio-Economics, August 2012

1) A description of the outreach campaign

- Jumbotron on Auto Mall Parkway -- advertisements for Coast and Creek Cleanup and Earth Day Cleanups
- Enhanced website for Coast and Creek Cleanup at https://www.fssd.com/coast-creek-cleanup-day/
    - including site counters, site videos, site descriptions, waiver forms and site statistics
- enhanced radio outreach on KUIC (FM 95.3)
    - increased number, frequency and content
- enhanced outreach efforts to local coffee shops, high schools, scout clubs and church groups

The Program also works on a regional level with the BASMAA Public Information/Participation committee to provide consistent messaging across the Bay and the State to maximize the effectiveness of our outreach efforts, in both financial and staff time.

Please see Attachment A for examples of the above Program enhancements for this campaign.

2) A summary of how the effectiveness assessment/evaluation was implemented

The Program has evaluated the effectiveness of the campaign by tracking: number of participants; amount of trash and recyclables removed; and miles of creek and shoreline cleaned. Numbers are collected by different methods depending on the type of data being gathered.

The number of persons participating, and the amount of trash and recyclables collected is gathered through and by the site captain at each of the cleanup site locations. The number of participants is assembled through the tallying of liability release forms. The amount of trash and recyclables is calculated through the weighing of bags of trash and recyclables collected and averaging that amount over the total volume collected. In recent years, contaminated recyclables have been placed with the trash due to the market value of imperfect recycle material.

The length of shoreline cleaned is calculated through Google Earth Pro by the Event Coordinator after the Site Captain relays information on landmarks cleaned back to the Coordinator at the end of the event.

Information is then put in an Annual Report summary and sent to the County coordinator for rollup to sum all numbers throughout Solano County. The Solano County coordinator then sends the information to the State Coordinator for a rollup to sum all numbers reported to the State.

3) An analysis of the effectiveness assessment/evaluation results and 4) A discussion of the measurable changes in awareness and behavior achieved.

Upon the accumulation of the data described above, the numbers are place into an Excel file for evaluation. Over the past several years the Program has assembled the files as shown below:

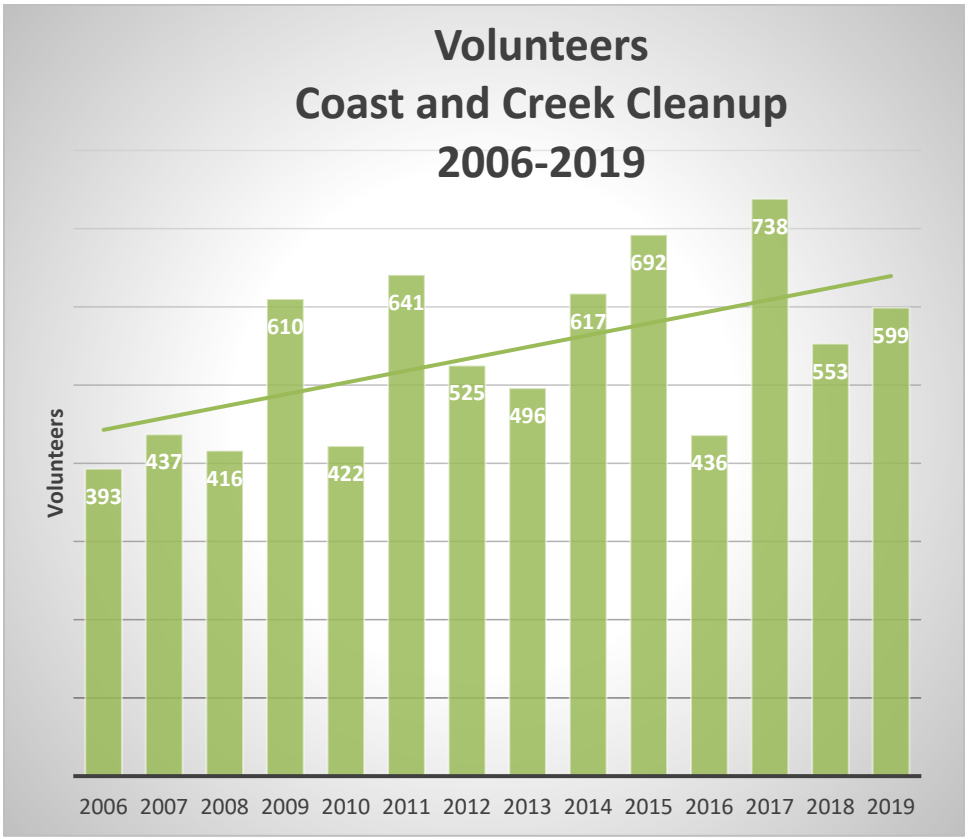

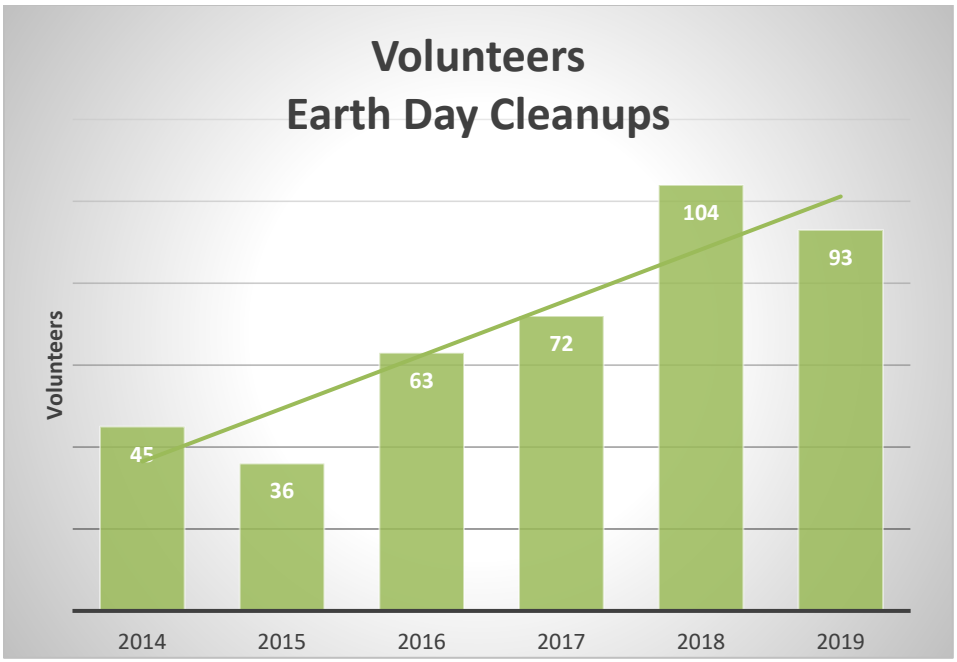

Volunteer Discussion

The Program attempts to not inundate Volunteers with data requests during cleanup events. The California Coastal Commission satisfies that obligation. The Program has found that inundating participants with surveys and data collection is detrimental to the performance, enthusiasm and likelihood of a volunteer to return. The primary indicator of success for any volunteer campaign is the number of volunteers joining an event. In addition, an alternative indicator of success for an event is the percentage of return volunteers.

The Program has used the same 20 plus site captains on an annual basis for the last multiple Coast and Creek Cleanup events. From the 20 volunteers who are site captains, a super-majority continue to return, and the number of volunteers is trending upwards. Coast and Creek cleanup and our efforts to improve and increase the number of participants and consequent environmental stewards is a success and will continue into the future.

The Program generally uses the same 4 plus site captains on an annual basis for the last several years for the Earth Day Cleanups. The number of volunteers is trending upwards. Earth Day cleanups and our efforts to improve and increase the number of participants and consequent environmental stewards is a success which will continue into the future. The Program is nurturing environmental stewards in our jurisdictional boundaries and beyond.

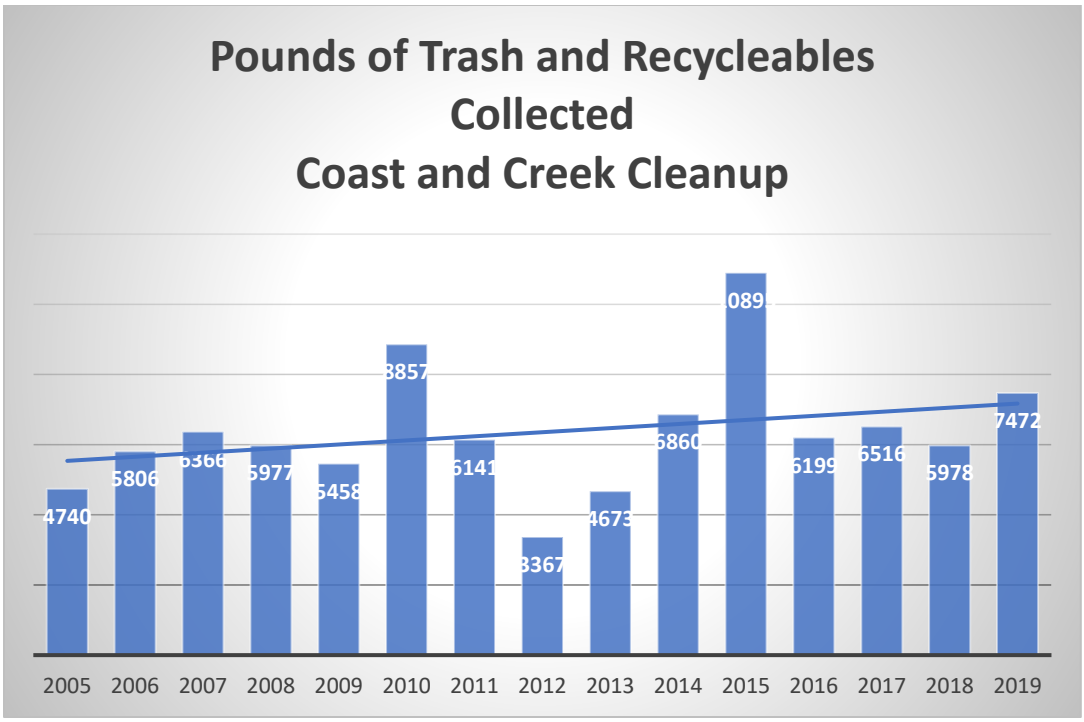
Pounds of Trash and Recycleables Collected
Coast and Creek Cleanup
4740
5806
6366
5977
6458
8857
6141
3367
4673
6860
10891
6199
6516
5978
7472
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

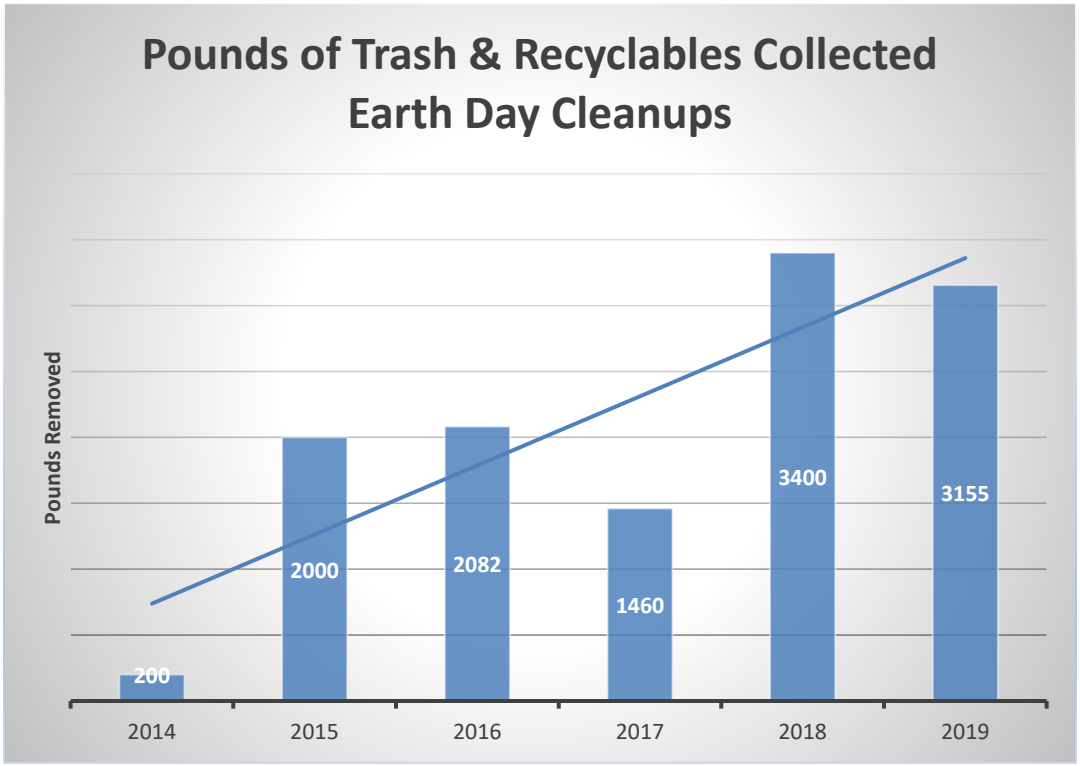
Pounds of Trash & Recyclables Collected
Earth Day Cleanups
Pounds Removed
200
2000
2082
1460
3400
3155
2014
2015
2016
2017
2018
2019

Trash and Recyclables Collected Discussion

The weight of recyclables and trash removed from cleanup sites cannot be correlated to an events success. It is the hope of the Program to continually increase the number of volunteers and miles of creek and shoreline cleaned on an annual basis while seeing the weight of garbage an recyclables pulled from cleanup sites trend downward.

As can be seen from the above graph that the weight of trash and recyclables continues to increase on an annual basis. The primary source of trash and recyclables at the local cleanup sites in Fairfield and Suisun City are homeless encampments.

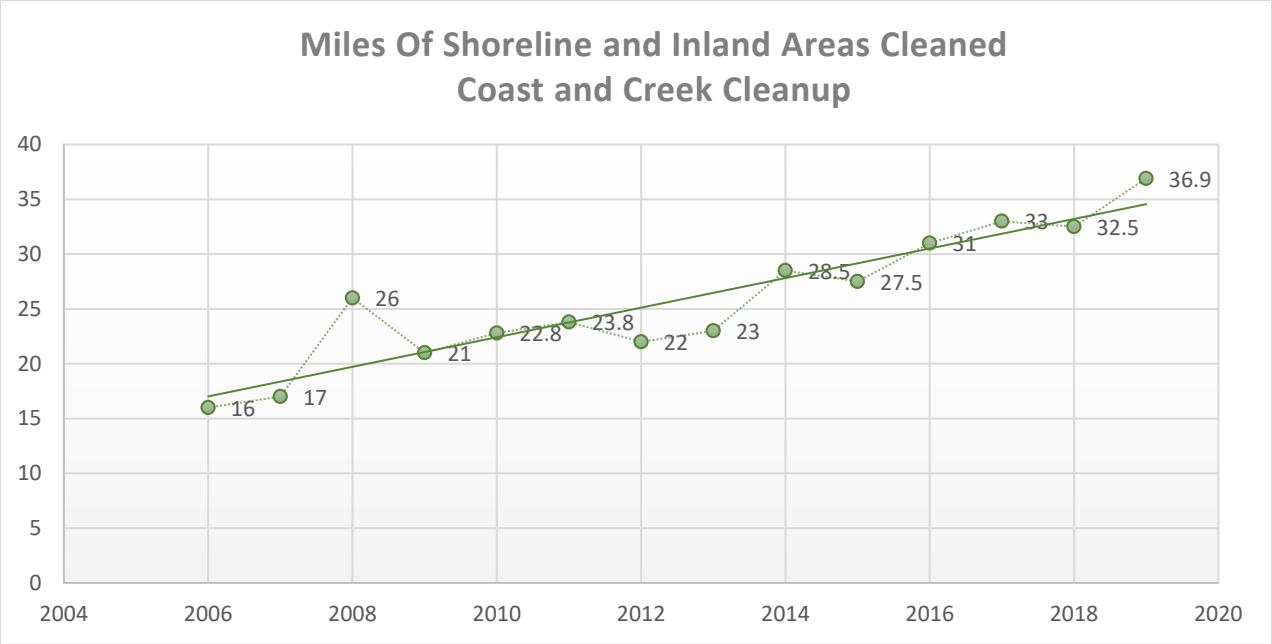
Miles Of Shoreline and Inland Areas Cleaned
Coast and Creek Cleanup
40
35
30
25
20
15
10
5
0
2004
2006
2008
2010
2012
2014
2016
2018
2020
16
17
26
21
22.8
23.8
22
23
28.5
27.5
31
33
32.5
36.9

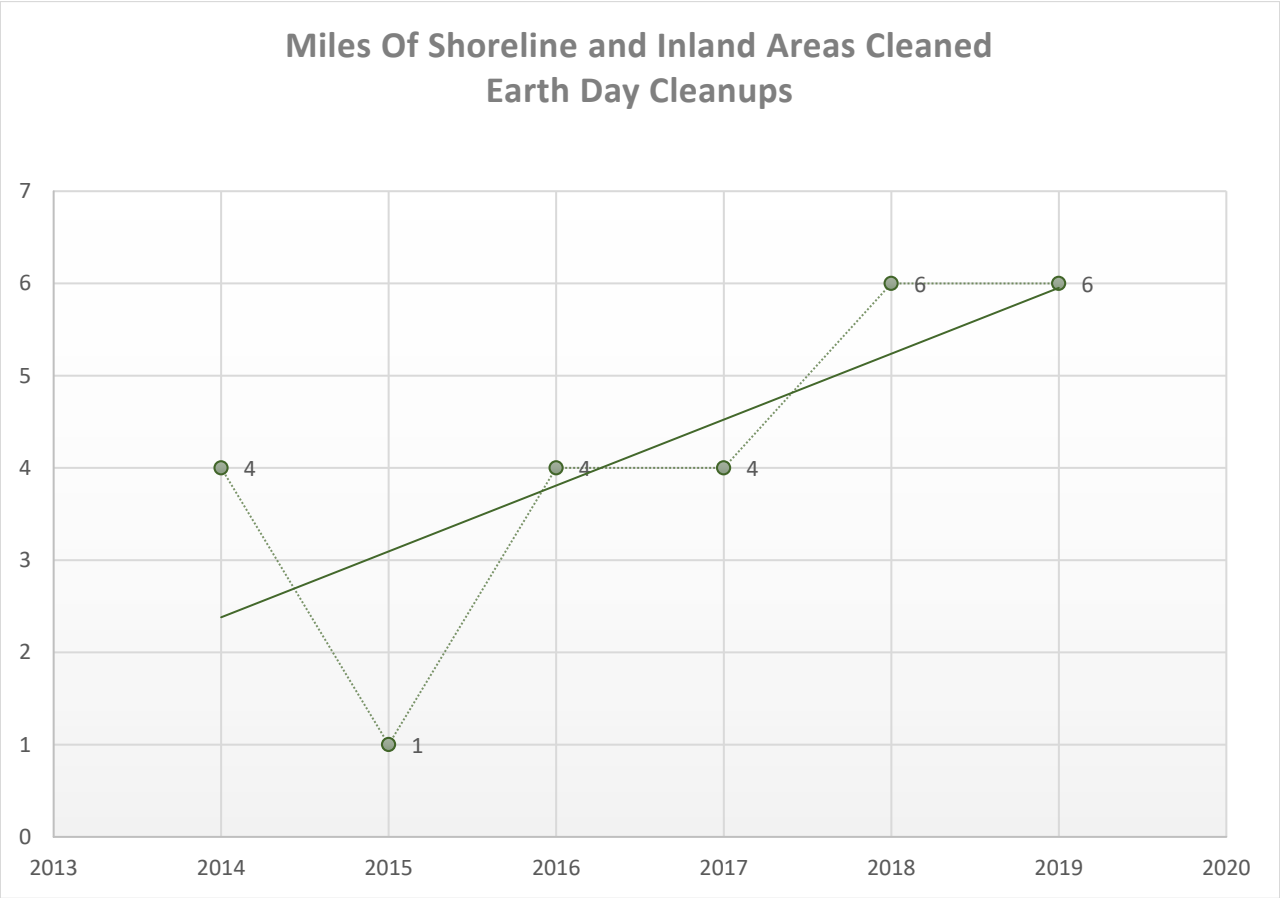
Miles Of Shoreline and Inland Areas Cleaned
Earth Day Cleanups
7
6
5
4
3
2
1
0
2013
2014
2015
2016
2017
2018
2019
2020
4
1
4
4
6
6

Miles of Shoreline and Inland Areas Cleaned Discussion

An increase in the number of miles of shoreline and inland areas cleaned is seen to be a success by the Program. This number will continue to increase until resources are depleted and political will weans. To date, as can be seen by the above graphs, an increase in miles cleaned has occurred from nearly each successive event.

4) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages

It has recently been discussed with the Regional Water quality Control Board, that the Fairfield Suisun Urban Runoff Management Program and the Vallejo Stormwater Program will be joining forces under MRP3 to become the Solano Stormwater Program (SSP). Because these two programs are already coordinating efforts to improve our local waterways, it is anticipated that the campaign for enhancing and improving local cleanup efforts will continue.

Although, at this time, the Program cannot speak to the priorities of SSP in the future the Program can speak to their current goals and priorities as a community. Future outreach will build on current success; we will continue to drive the work of the SSP to engage our community in trash issues.

The Program currently would like to continue the growth of these two clean up campaigns and increase the number of volunteers and environmental stewards in the cities of Fairfield and Suisun. In doing this it would be prudent to put more effort into the inspiration of volunteers. The Program sees the following as strong priorities on which the number of volunteers and stewards can be amplified:

- work more with Travis Air Force Base volunteers
- further enhance outreach in the schools through the School Water Education Program (see Annual Report)

Appendix A

Examples of Enhanced Outreach Implementation Program

VOLUNTEERS NEEDED!

COASTAL CLEANUP DAY

Saturday, September 21, 2019

9 AM to 12 PM

SOLANOVOLUNTEERS.ORG

05365
5406

FSSD.COM

FAIRFIELD-SUISUN SEWER DISTRICT

Solano County

Earth Day Cleanup '19

SATURDAY, APRIL 20
9AM – 11AM

05366
5407

Fairfield-Suisun Sewer District

VOLUNTEERS NEEDED

fssd.com

Fairfield-Suisun
Sewer District

COASTAL CLEANUP DAY

Saturday, Sept. 21, 2019 9am to 12pm

Did you know that most of the debris found on our local waterways and coastal beaches actually start as litter on our streets? That's why Coast and Creek cleanup is a very important event, where children and adults come together to help cleanup our local creeks around Solano County.

Many cleanup sites available around Fairfield and Suisun, visit FSSD.COM for a list cleanup sites available and additional inforamtion!!

Visit FSSD.com to register, print waiver forms, or get more information!

05367
5408

Locally Coordinated by the Fairfield-Suisun Sewer District and Fairfield-Suisun Urban Runoff Management Program

COAST & CREEK CLEANUP

SATURDAY, SEPTEMBER 21, 2019 9:00 AM - NOON

Meet at any of these sites

American Canyon Creek – Fairfield
Oakbrook Dr. & Silverado Dr.

Montezuma Bridge Open Space
Grizzly Island Rd. at 2nd bridge, approx. 6 mi. off Hwy.12

Dan Wilson Creek – Fairfield
Upper Section--Solano Community College Football Stadium Entrance
Lower Section--End of Lookout Hill Rd.off Central Pl. & Pittman Rd.

Freeborn Creek – Fairfield
Cresthaven Ct and Stockbridge Dr

Green Valley Creek – Fairfield
Nelda Mundy Elementary School--Kids Play Area

Grizzly Island Trail – Suisun City
Intersection of Lotz Wy. & Marina Blvd.

Hill Slough / Rush Ranch – Suisun City
Grizzly Island Rd. at 1st bridge, approx. 1.5 mi off Hwy.12

Ledgewood Creek – Fairfield
Upper Section--Springfield Dr. off Astoria Dr.
Lower Section--Home Depot Parking lot off Auto Mall Pkwy.

Laurel Creek – Fairfield
Upper Section--Redwood Dr. & Persimmon Pl. at Laurel Creek
Mid Section--Wood Hollow Ct. at Laurel Creek
Lower Section--Meadowlark Dr.& Falcon Dr. at Laurel Creek

Marina Channel at Suisun Slough – Suisun City
Turn right at the end of Civic Center Blvd.--Solano Yacht Club parking lot.

McCoy Creek Bike Path – Suisun City
Pathway Entrance on Pintail St. near E. Wigeon Way

Serpas Ranch Open Space – Fairfield
Parking lot at Hilborn Rd. & Sanctuary Dr.

Suisun Boat Ramp at the Marina (Peytonia Slough)
In parking lot on Kellogg St. off Main St. near Suisun Wildlife Center in Suisun City

Suisun City Waterfront (kayakers) – Suisun City
Boat ramp off Solano St and Kellogg St, near the promenade

Union Creek – Fairfield
Upper Section--Parking lot behind Masonic Lodge at 412 Travis Blvd.

Union Creek – Suisun City
Lower Section--Dead end of Railroad Ave. near Marina Blvd.

Flyway Center—Fairfield
South end of Ramsey Rd at the dead end

To register go to:

www.fssd.com/coast-creek-cleanup-day

IMPORTANT

Remember to turn in your waiver form on the day of the event to the Site Captain. If you are under the age of 18, the waiver form must be signed by a parent or guardian.
For specific questions, please email Kevin Cullen at kcullen@fssd.com Thank you.

SUPPLIES

The following supplies are provided: Disposable gloves, pic-sticks, trash bags, buckets, water and snack bars. Please feel free to bring your own supplies and/or reusable items.

FAIRFIELD-SUISUN SEWER DISTRICT

CITY OF SUISUN CITY CALIFORNIA

FAIRFIELD

CALIFORNIA COASTAL COMMISSION

REPUBLIC SERVICES

Locally coordinated by the Fairfield-Suisun Sewer District and Fairfield-Suisun Urban Runoff Management Program

FROM SOLANO TO THE SEA...

Coastal Cleanup Day

Saturday, Sept. 21, 2019
9:00am to Noon

VOLUNTEERS NEEDED! cleanupsolano.org

BENICIA
Marc Bautista (707) 746-4337
email: *mbautista@ci.benicia.ca.us*
website: *ci.benicia.ca.us*

DIXON
Pernell Coulter (530) 682-3265
email: *pcoulter@ci.dixon.ca.us*
website: *ci.dixon.ca.us*

FAIRFIELD • SUISUN CITY and TRAVIS AFB
Kevin Cullen (707) 428-9191
email: *kcullen@fssd.com*
website: *fssd.com*

LAKE BERRYESSA
Marianne Butler (567) 674-5611
email: *marianne.butler@solanorcd.org*
website: *solanorcd.org*

RIO VISTA/SANDY BEACH PARK
Marissa Medders (707) 374-2097
email: *MAMedders@solanocounty.com*
website: *solanocounty.com/parks*

SOLANO COUNTY PARKS
website: *solanocounty.com/parks*

Belden's Landing
Diana Samuels (707) 580-0292
email: *dlsamuels@solanocounty.com*

Lake Solano
Sean McDowell (530) 795-2990
email: *scmcdowell@solanocounty.com*

VACAVILLE
Peter Wanberg (707) 469-6421
email: *peter.wanberg@cityofvacaville.com*
website: *cityofvacaville.com/creekcleanup*

VALLEJO
Ken Hawes (707) 645-8258
email: *info@valcorerecycling.org*
website: *valcorerecycling.org*

PUTAH CREEK LOCATIONS
Brian Keeley (530) 795-3006
email: *brian@putahcreekcouncil.org*
website: *putahcreekcouncil.org*

COURTESY OF THE ARTIST: "PALISADES PARK, SANTA MONICA" © TOM KILLION 1997

APRIL
20

VOLUNTEERS NEEDED

Earth DAY

Join us in celebrating Earth Day by cleaning our local creeks!!

Saturday, April 20, 2019

9:00 a.m. – 11:00 a.m.

Meet at any of these sites listed below:

Ledgewood Creek – Fairfield

Home Depot Parking lot off Auto Mall Pkwy.

Suisun City Waterfront (kayakers) – Suisun City

Boat ramp off Solano St and Kellogg St, near the promenade

Union Creek – Suisun City

Dead end of Railroad Ave. near Marina Blvd.

Laurel Creek—Fairfield

Intersection of Isabella Way and Redwood Dr.

To register go to:

www.fssd.com/earthday

IMPORTANT

Remember to turn in your waiver form on the day of the event to the Site Captain. If you are under the age of 18, the waiver form must be signed by a parent or guardian.

For specific questions, please email Kevin Cullen at kcullen@fssd.com Thank you.

SUPPLIES

The following supplies are provided: Disposable gloves, pic-sticks, trash bags, buckets. Please feel free to bring your own supplies and/or reusable items.

Locally Coordinated by the Fairfield-Suisun Sewer District and Fairfield-Suisun Urban Runoff Management Program.

05370
5411

Solano County Earth Day Cleanup 19

APRIL

Be part of the movement, "Keep Solano Clean & Green"

#KeepSolanoClean

"You cannot get through a single day without having an impact on the world around you. What you do makes a difference, and you have to decide what kind of difference you want to make."

– Jane Goodall

BENICIA

Location: Ninth Street Beach
Time: Saturday, April 20 8am-11am
Contact: Carrie Chase
Email: cchase@ci.benicia.ca.us
www.ci.benicia.ca.us

BTF Tree Planting & Trash Cleanup
Location: Rose Drive near Kearny Drive (park along Kearney)
Time: Saturday, April 27 9am-12pm
Contact: Benicia Tree Foundation
Email: info@beniciatrees.orgb
beniciatrees.org

DIXON

Location: Pond B on Doyle Lane
Time: Saturday, April 20 9am-11am
Contact: Pernell Colter
Email: pcolter@ci.dixon.ca.us
http://www.ci.dixon.ca.us

FAIRFIELD

Location: Lower Ledgewood Creek (parking lot behind Home Depot)
Time: Saturday, April 20 9am-11am
Contact: Kevin Cullen
Email: kcullen@fssd.com
fssd.com

RIO VISTA

Location: Sandy Beach Park
Time: Saturday, April 20 10am-12pm
Contact: Marissa Medders
Email: MAMedders@SolanoCounty.com
solanocounty.com

SUISUN CITY

Location: Lower Union Ave Creek (dead end of Railroad Ave near Marina Blvd)
Time: Saturday, April 20 9am-11am
Contact: Kevin Cullen
Email: kcullen@fssd.com
fssd.com

Location: Suisun Waterfront – Kayaking (call 707-341-6141 to reserve a space)
Time: Saturday, April 20 9am-11am
Contact: James Berg
Email: grizzlywaterskayaking@gmail.com
grizzlywaters.com

Location: Grizzly Island Road (meet at Rush Ranch Open Space)
Time: Saturday, April 20 9am-12pm
Contact: Diana Samuels
Email: DLSamuels@SolanoCounty.com
solanolandtrust.org

VACAVILLE

Location: Southside Bikeway behind WinCo (park at WinCo or use trail)
Time: Saturday, April 20 9am-11am
Contact: Peter Wanberg
Email: Peter.Wanberg@cityofvacaville.com
cityofvacaville.com/creekcleanup

Location: Andrews Park
Time: Saturday, April 20 9am-11:30am
Contact: Emma Mendiola
Email: emma.mendiola@gmail.com
cityofvacaville.com/creekcleanup

VALLEJO

Location: Blue Rock Springs Creek Corridor (below Wardlaw Park)
Time: Saturday, April 27 9am-11am
Contact: Doug Darling
Email: ddfish4life@sbcglobal.net
vallejowatershedalliance.org

Location: McGary Road - Adults Only
Time: Sunday, April 21 9am-11:30am
Contact: Diana Samuels
Email: DLSamuels@SolanoCounty.com
solanocounty.com

Please do your part to help save resources by bringing your own gloves, water bottle and collection bucket.

For more information contact 707.678.1655 (ext 114) or visit recycle.solanocounty.com

05371
5412

DAILY REPUBLIC
Solano County's News Source
FAIRFIELD-SUISUN CITY, CALIFORNIA

How to register children for school

SUSAN HILAND
SHILAND@DAILYREPUBLIC.NET

Kindergarten is a time of transition for children and their parents.

The changes may not be easy, but here is a list of suggestions for getting started:

• **Find a school**: A child's school is typically determined by where his or her family lives. Some districts post maps online to help parents locate their school. But if parents have questions, they can call the district to make certain they have selected the proper one.

• **Prove residency**: Parents must prove a child is eligible to attend the school where they are registered. To do this, parents need to provide two of three things: a property tax payment receipt, rent payment receipt or valid property rental contract; a PG&E bill or receipt, deed or closing papers on home purchase; a declaration of residency executed by the student's parent or guardian.

ROBINSON KUNTZ/DAILY REPUBLIC FILE (2015)

Children play with blocks during a pre-kindergarten class at the Joseph A. Nelson Community Center, in Suisun City.

• **Prove age**: A birth certificate showing a child is the minimum age to attend kindergarten is required. The minimum age is a child turning 5 on or before Sept. 1 for the 2019-20 year. However, there are exceptions to this.

• **Get shots**: Parents need to provide an immunization record proving a child is current on vaccinations. Parents should check directly with school district if they wish to opt out based on personal beliefs.

Officials FROM PAGE 27

SCHOOL BOARD

President: Rita DeAnda. Elected in 2013, term expires in 2022. Reach at rdeanda@travisusd.org.

Clerk: Russ Barrington. Elected in 2018, term expires in 2022. Reach at rbarrington@travisusd.org.

Vice President: Ivery Hood. Elected in 2003, term expires 2020. Reach at ihood@travisusd.org.

Member: Janet Jackson Forbes. Elected in 2018, term expires in 2022. Reach at jjacksonforbes@travisusd.org

Member: Adrian Saiz. Elected in 2018, term expires in 2022. Reach at asaiz@travisusd.org.

Vacaville School District

Phone: 453-6117

Website: www.vacavilleusd.org

Superintendent: Jane Shamieh, 453-6100, Jane58@vacavilleusd.org.

SCHOOL BOARD

President: Sherie Mahlberg. Elected in 2015. Term expires in 2020. Reach at SherieMahlberg@vacavilleusd.org.

Vice President: John Jansen. Elected in 2015. Term expires in 2022. Reach at JohnJansen@vacavilleusd.org.

Clerk: Tracee Stacey. Elected in 2016, term expires in 2020. Reach at TraceeStacy@vacavilleusd.org.

Member: Michael Kitzes. Elected in 2016, term expires in 2020. Reach at MichaelKitzes@vacavilleusd.org.

Member: Shelley Daily. Elected in 2013, term expires in 2020. Reach at SDaily@vacavilleusd.org.

Member: Michael Silva. Elected in 2018, term expires in 2022. Reach at MichaelSilva@vacavilleusd.org.

Member: Shawn Windham. Elected in 2014. Term expires in 2020. Reach at ShawnWindham@vacavilleusd.org.

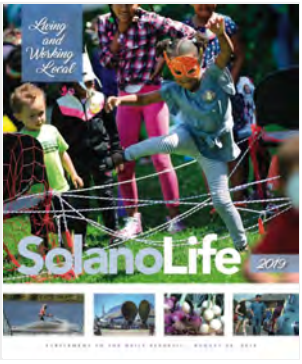

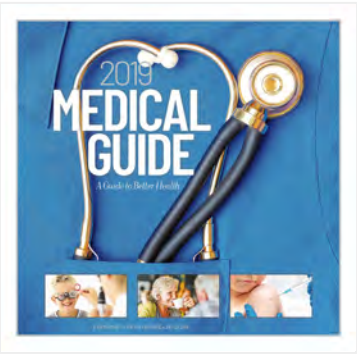

2019 California Coastal Cleanup Day

CCD Coordinator Report Form

People, Pounds & Miles

County: **Solano County** **Organization:** **FSSD**

Cleanup Information

	Site Name	Coastal or Inland	Site Captain	Phone/E-mail Address	# of People	Weight of Trash Collected	Weight of Recyclables Collected	Distance Cleaned	# of Sites	Zero Waste Sites	# of ppl w/ reusables	# of vessels	# of Bags	Unusual Finds
	Fairfield/Suisun City													
1	Upper Ledgewood Creek	Inland			43	60	5	3.00	1	0	3	0	3	tennis shoe
2	SuisunBoat Ramp/Peytonia Preserve	Inland			22	500	0	1.25	1	0	10	0	37	baby stroller
3	Belden's Landing	Coastal			2	20	12	2.25	1	1	3	0	8	glass
4	Upper Laurel Creek	Inland			20	100	5	1.25	1	1	3	0	24	Vodka Bottle
5	Mid Laurel Creek	Inland			41	100	5	2.00	1	1	6	0	38	sink
6	Lower Laurel Creek	Inland			62	500	0	1.25	1	1	7	0	73	bycicle
7	Hill Slough/Rush Ranch	Coastal			21	850	0	1.50	1	1	0	0	45	20 tires
8	American Canyon Creek (Silverado Dr. off Oakwood)	Inland			35	500	0	2.50	1	1	5	0	24	bicycle
9	Dan Wilson Creek	Inland			30	150		2.00	1	1	8	0	16	
10	Serpas	Inland			20	150		1.20	1	1	3	0	15	live rattlesnake
11	Union Avenue	Inland			4	100		1.50	1	1	3	0	17	
12	Lower Union Ave	Inland			3	1000		0.50	1	1	1	0	1	
13	Upper Dan Wilson	Inland			35	130	0	3.00	1	1	5	0	100	electric keyboard
14	Mic Coy Creek	Inland			7	80		2.00	1	1	5	0	28	
15	Grizzly Island Trail	coastal			35	200		1.25	1	1	3	0	12	
16	Lower Ledgewood Creek	Inland			21	1000	0	2.00	1	1	4	0	24	FSSD Pick Stick
17	Green Valley Creek	Inland			100	65	0	2.00	1	1	6	0	10	oil drum
18	Yacht Club	coastal			9	30	15	1.00	1	1	0	0	25	Fishing Pole
19	Freeborn Creek	Inland			55	350	20	2.40	1	1	25	0	50	
20	Suisun Water Front - Kayakers	Coastal			4	225	0	1.00	1	1		10	10	
21	Lower Lower Ledgewood Creek	Coastal			5	700	0	1.00	1	1			55	
22	Flyway Center	Coastal			25	600	0	1.00	1	1	4		40	Flat Screen Tv
20	**TOTALS**				**599**	**7410**	**62**	**36.9**	**22**	**20**	**100**	**10**	**655**	

2019 Earth Day Cleanup

CCD Coordinator Report Form

People, Pounds & Miles

County: **Solano County** Organization: **FSSD**

Cleanup Information

	Site Name	Coastal or Inland	Site Captain	Phone/E-mail Address	# of People	Weight of Trash Collected, lbs	Weight of Recyclables Collected	Volume of Trash, gallons	Distance Cleaned	# of Sites	Zero Waste Sites	# of ppl w/ reusables	# of vessels		Groups and Unusual Finds
	Fairfield/Suisun City														
1	SuisunBoat Ramp/Peytonia Preserve/Suisun Water Front	Coastal			7	200	0	200	1.00	1	1	2	7		
2	Lower Union Ave, Suisun	Inland			3	250	0	250	1.00	1	1	3	0		FSSD
3	Grizzly Island Trail, Suisun	coastal			15	500	0	500	1.00	1	1	15	0		Sac Delta Conservancy
4	Lower Ledgewood Creek, Fair	Inland			33	620	0	620	1.00	1	1	10	0		FSSD
5	Mid Laurel Ck	Inland			20	25	0	26	2.00	1	1	20	0		Matt Garcia Foundation
6	Beldans Landing	Coastal			15	1500	60	1500	2.00	1	1	15	2		County Parks, F and W
	TOTALS				**93**	**3095**	**60**	**3096**	**8.0**	**6**	**6**	**65**	**9**	**0**	

Certificate of Participation

Awarded this 20th day of April, 2019 to:

_____

(Volunteer's name above)

For Outstanding Public Service in Protecting and Enhancing the Beauty and Natural Resources of Fairfield and Suisun City Creeks, Waterways, and the Suisun Marsh for the Benefit of Present and Future Generations Through the

2019 Earth Day Cleanup

We couldn't do it without you!

Thank you for volunteering ____ hour(s) of your time to help keep our waterways clean.

Kevin A. Cullen

Fairfield-Suisun Cleanup Coordinator

Fairfield-Suisun Sewer District—Fairfield-Suisun Urban Runoff Management Program—California Coastal Commission

05375

5416

Advantage
EMBLEM & SCREEN PRINTING

4313 Haines Road, Duluth, MN 55811
800.626.4948 | Fax: 218.626.2916
advantageemblem.com
dawn@advantageemblem.com

Contact: Dawn Johnson Ext. 200

Job Name: CCC **Job #** H01-007387 **Size:** 2.5" x 3.5" = 3"

Colors: 9

Design #1

Design #2

05376
5417

Please Note: Colors on monitors or printers may vary slightly.

Belden’s Landing - Grizzly Island Road across from the parking lot before the second bridge

Hill Slough, Grizzly Island Road before the first bridge

Suisun boat ramp-off of Kellogg Street , near the wildlife Center.

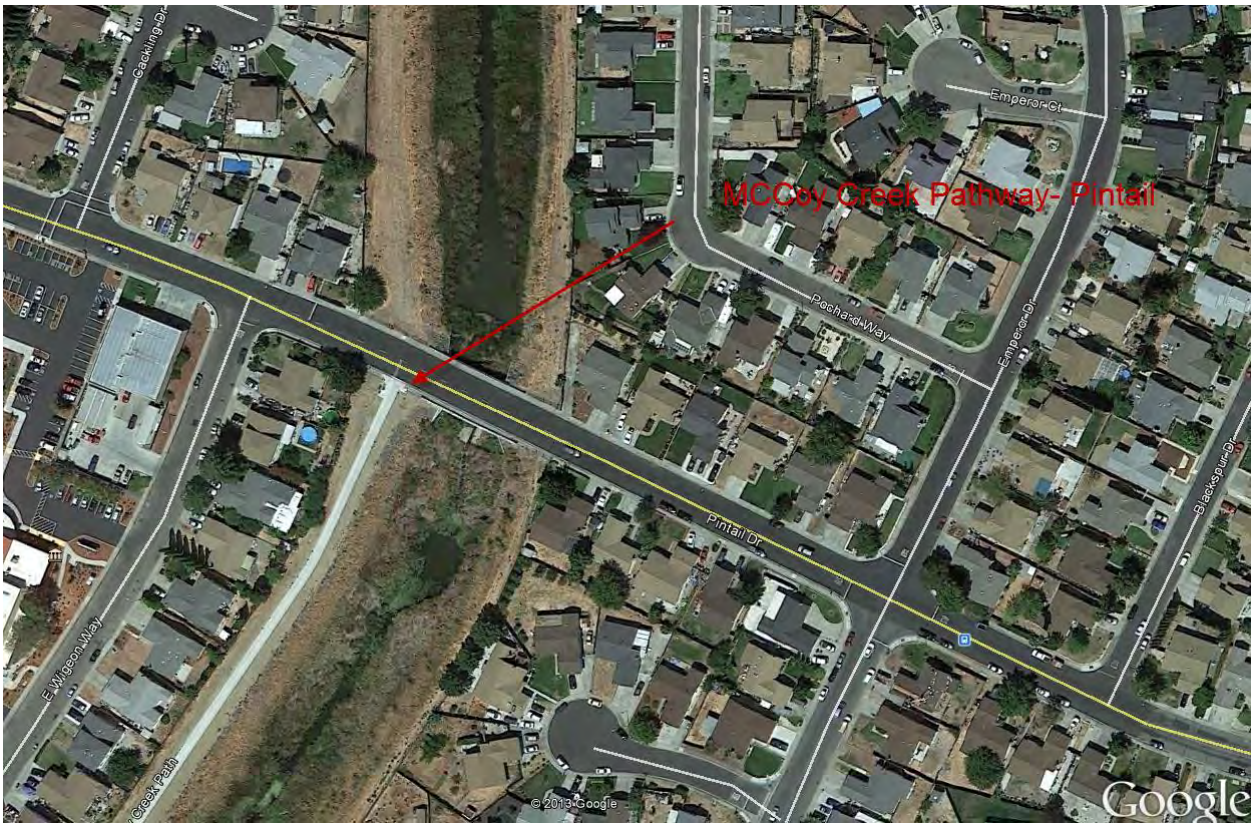

McCoy Creek Bike Path and Pintail Dr., Suisun City

Upper Laurel Creek - Redwood drive at Persimmon place

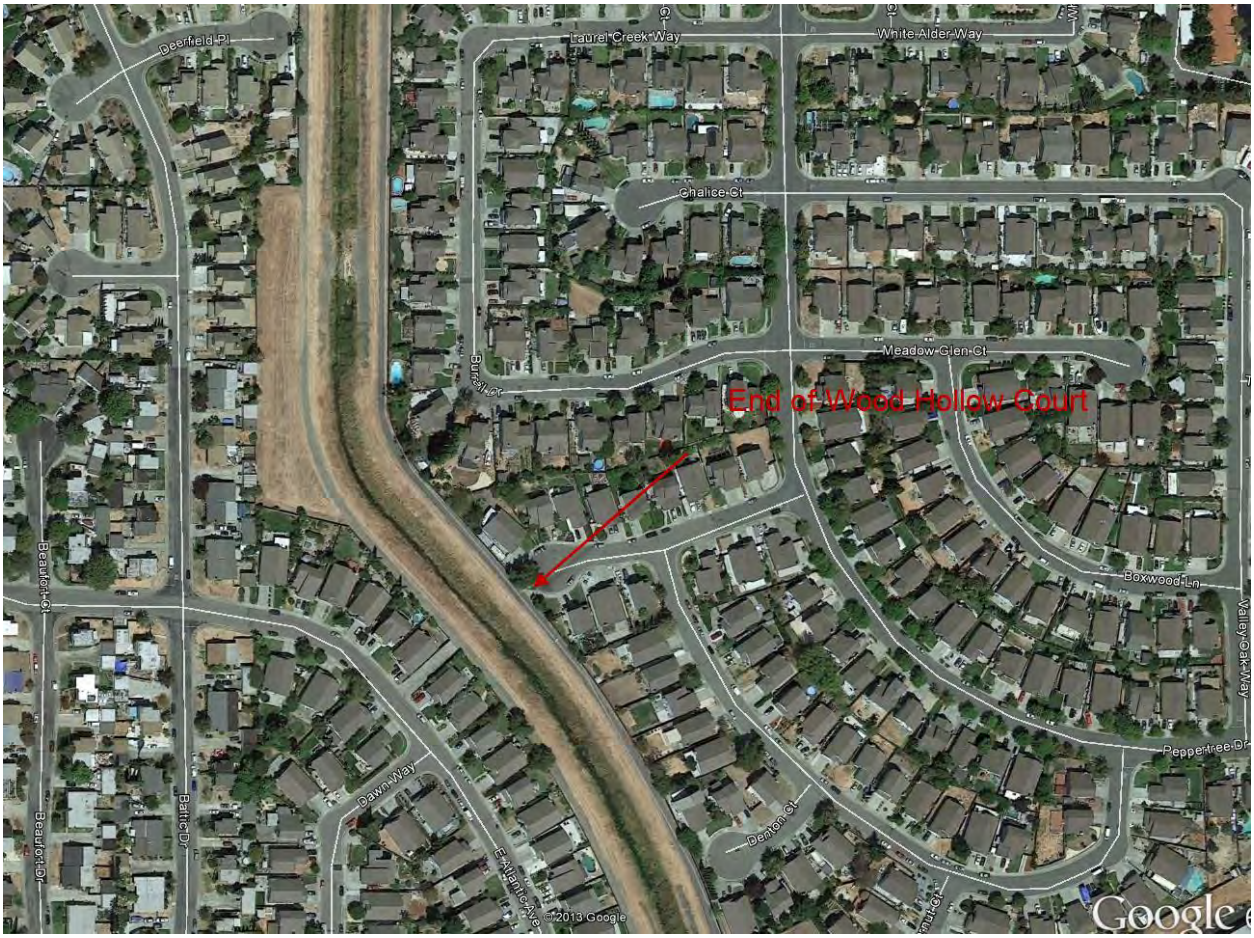

Middle Laurel Creek - and the Wood Hollow Court near the bike path.

Lower Laurel Creek - Meadowlark Dr. near the bike path

Dan Wilson Creek – Dead end of Lookout drive

American Canyon Creek - Park at Oakbrook Dr. and Silverado Drive.

Upper Union Ave., Creek between linear park, and Travis Blvd., including Acacia St.

Lower Union Ave., Creek, Suisun

Upper Ledgewood Creek – Springfield Drive off of Astoria Drive at the creek access

Lower Ledgewood Ck – Behind Home Depot down to Woolner

Upper Dan Wilson Creek - in front of Solano Community College Stadium

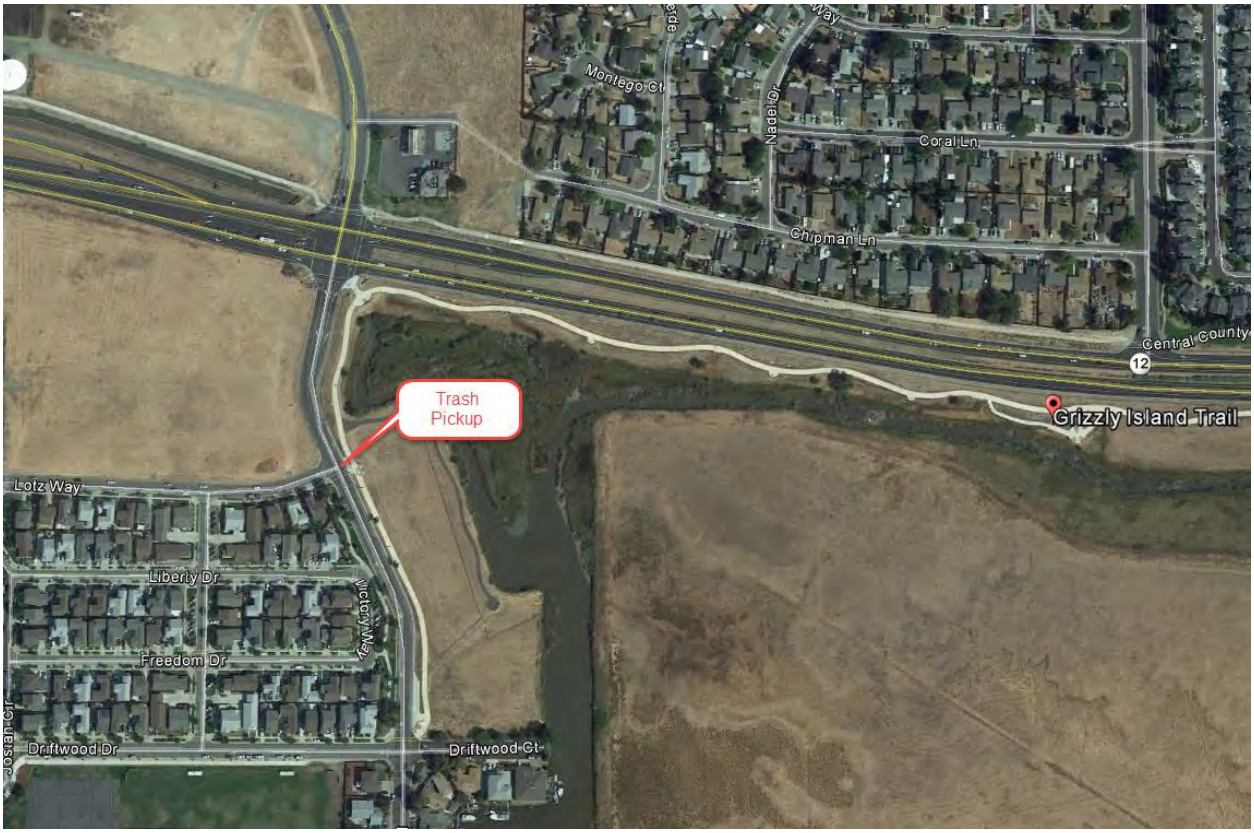

Grizley Island Trail - corner of Lotz Way and Marina Boulevard

Green Valley Creek - Mangels Blvd., at Creek path behind Nelda Mundy's elementary school

Freeborn Creek – End of Cresthaven Court

Solano yacht club - right at the bottom of Civic Center Dr. in the parking lot of yacht club

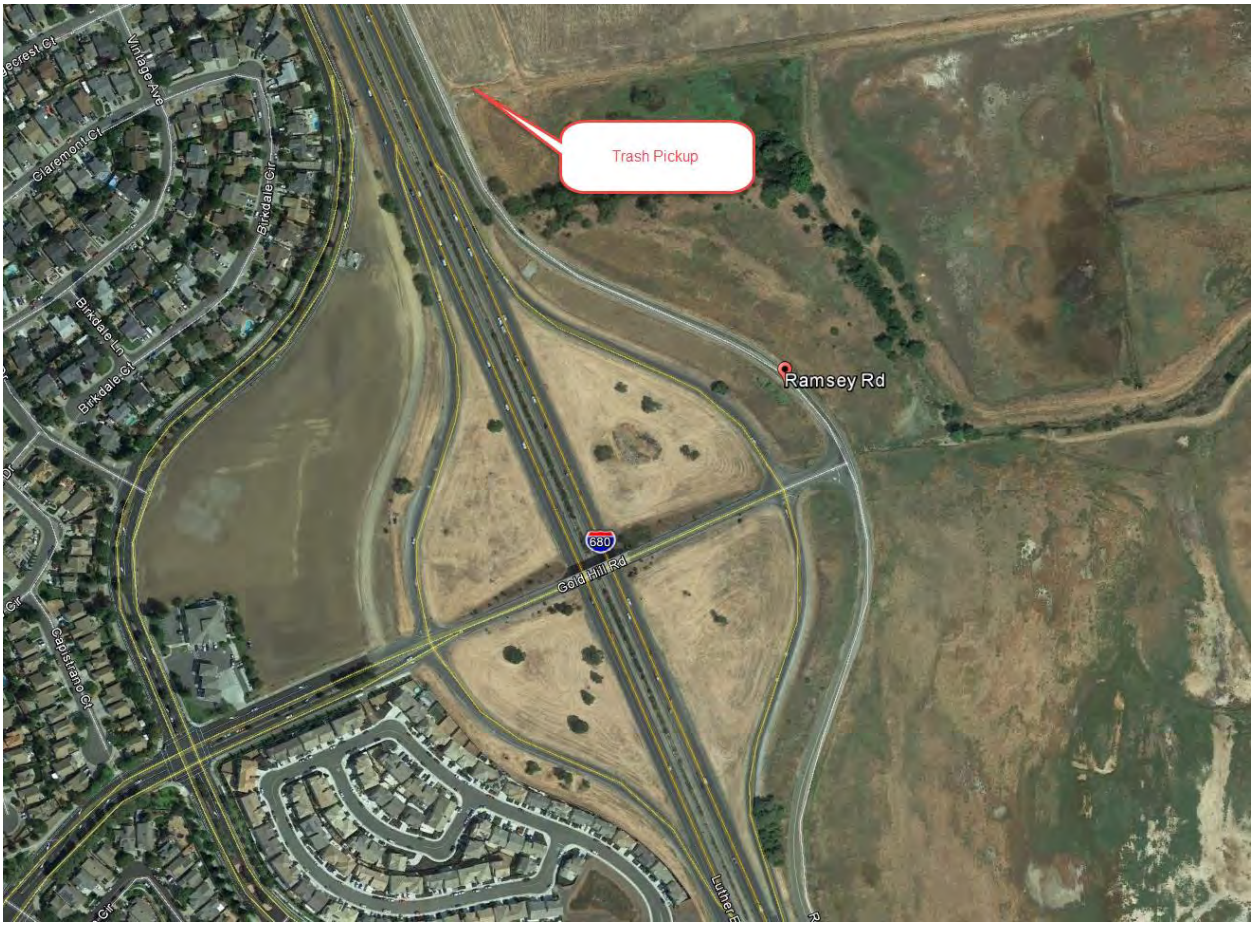

Flyway Center -

THANK YOU!

Coast and Creek Cleanup Day

Fairfield, Suisun City and Suisun Marsh

599 Volunteers

Removed 7,410 lbs. of Trash

FAIRFIELD-SUISUN SEWER DISTRICT

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BGTF

CRYSTAL GEYSER
ORACLE

TRASH

TRASH

EVENT

CA-071
ARMIJO HS

Love
Where
You
Live

TION
RAFFIC
AD

Springfield
MOTOR VEHICL
PROHIBITED
WITHOUT CITY PER

COAST & CREEK CLEANUP

SATURDAY, SEPTEMBER 21, 2019 9:00 AM - NOON

Meet at any of these sites

American Canyon Creek – Fairfield
Oakbrook Dr. & Silverado Dr.

Montezuma Bridge Open Space
Grizzly Island Rd. at 2nd bridge, approx. 6 mi. off Hwy.12

Dan Wilson Creek – Fairfield
Upper Section--Solano Community College Football Stadium Entrance
Lower Section--End of Lookout Hill Rd.off Central Pl. & Pittman Rd.

Freeborn Creek – Fairfield
Cresthaven Ct and Stockbridge Dr

Green Valley Creek – Fairfield
Nelda Mundy Elementary School--Kids Play Area

Grizzly Island Trail – Suisun City
Intersection of Lotz Wy. & Marina Blvd.

Hill Slough / Rush Ranch – Suisun City
Grizzly Island Rd. at 1st bridge, approx. 1.5 mi off Hwy.12

Ledgewood Creek – Fairfield
Upper Section--Springfield Dr. off Astoria Dr.
Lower Section--Home Depot
Parking lot off Auto Mall Pkwy.

Marina Channel at Suisun Slough – Suisun City
Turn right at the end of Civic Center Blvd.--Solano Yacht Club parking lot.

McCoy Creek Bike Path – Suisun City
Pathway Entrance on Pintail St. near E. Wigeon Way

Serpas Ranch Open Space – Fairfield
Parking lot at Hilborn Rd. & Sanctuary Dr.

Suisun Boat Ramp at the Marina (Peytonia Slough)
In parking lot on Kellogg St. off Main St. near Suisun Wildlife Center in Suisun City

Suisun City Waterfront (kayakers) – Suisun City
Boat ramp off Solano St and Kellogg St, near the promenade

Union Creek – Fairfield
Upper Section--Parking lot behind Masonic Lodge at 412 Travis Blvd.

Union Creek – Suisun City
Lower Section--Dead end of Railroad Ave. near Marina Blvd.

Laurel Creek – Fairfield
Upper Section--Redwood Dr. & Persimmon Pl. at Laurel Creek
Mid Section--Wood Hollow Ct. at Laurel Creek
Lower Section--Meadowlark Dr.& Falcon Dr. at Laurel Creek

To register go to:

www.fssd.com/coast-creek-cleanup-day

IMPORTANT

Remember to turn in your waiver form on the day of the event to the Site Captain. If you are under the age of 18, the waiver form must be signed by a parent or guardian.
For specific questions, please email Kevin Cullen at kcullen@fssd.com Thank you.

SUPPLIES

The following supplies are provided: Disposable gloves, pic-sticks, trash bags, buckets, water and snack bars. Please feel free to bring your own supplies and/or reusable items.

Fairfield-Suisun Sewer District · City of Suisun City California · Fairfield · California Coastal Commission · Republic Services

Locally coordinated by the Fairfield-Suisun Sewer District and Fairfield-Suisun Urban Runoff Management Program

05414
5455

Coastal Cleanup Day

Fairfield-Suisun
Sewer District

Saturday, September 21
9am-12pm

Fairfield
Suisun City
Travis AFB

Please Register at FSSD.com

05415
5456

2019 California Coastal Cleanup Day

CCD Coordinator Report Form

People, Pounds & Miles

County: **Solano County** Organization: **FSSD**

Cleanup Information

	Site Name	Coastal or Inland	Site Captain	Phone/E-mail Address	# of People	Weight of Trash Collected	Weight of Recyclables Collected	Distance Cleaned	# of Sites	Zero Waste Sites	# of ppl w/ reusables	# of vessels	# of Bags	Unusual Finds
	Fairfield/Suisun City													
1	Upper Ledgewood Creek	Inland	Sandra Gonzalez	580-4516	43	60	5	3.00	1	0	3	0	3	tennis shoe
2	SuisunBoat Ramp/Peytonia Preserve	Inland	Yany/Nancy	301-3543 / 707-208-7901	22	500	0	1.25	1	0	10	0	37	baby stroller
3	Belden's Landing	Coastal	Gregg Goodman	416-1797	2	20	12	2.25	1	1	3	0	8	glass
4	Upper Laurel Creek	Inland	Michael Occiano/ Patrick Student	592-9728/707-862-0132	20	100	5	1.25	1	1	3	0	24	Vodka Bottle
5	Mid Laurel Creek	Inland	Michael Occiano/ Patrick Student	592-9728/707-862-0132	41	100	5	2.00	1	1	6	0	38	sink
6	Lower Laurel Creek	Inland	Janet Santos/Kehaulani Student	330-0908/384-8022	62	500	0	1.25	1	1	7	0	73	bycicle
7	Hill Slough/Rush Ranch	Coastal	Jordan Kippenburg	315-262-4090	21	850	0	1.50	1	1	0	0	45	20 tires
8	American Canyon Creek (Silverado Dr. off Oakwood)	Inland	Robyn Morris	974-7947	35	500	0	2.50	1	1	5	0	24	bicycle
9	Dan Wilson Creek	Inland	Tania	510-439-6331	30	150		2.00	1	1	8	0	16	
10	Serpas	Inland	Teri Luchini or Truex	(707) 249-3613	20	150		1.20	1	1	3	0	15	live rattlesnake
11	Union Avenue	Inland	Meg Herston/Nicole	925-978-6358 / 759-0398	4	100		1.50	1	1	3	0	17	
12	Lower Union Ave	Inland	Natalie	530-209-1120	3	1000		0.50	1	1	1	0	1	
13	Upper Dan Wilson	Inland	Ruhpreet	803-9001 / 510-206-5053	35	130	0	3.00	1	1	5	0	100	electric keyboard
14	Mic Coy Creek	Inland	Bob Anthony	688-8894	7	80		2.00	1	1	5	0	28	
15	Grizzly Island Trail	coastal	Tara Spinelli	386-3992	35	200		1.25	1	1	3	0	12	
16	Lower Ledgewood Creek	Inland	Scott Maddi	816-0020	21	1000	0	2.00	1	1	4	0	24	FSSD Pick Stick
17	Green Valley Creek	Inland	Wendy	510-926-2639	100	65	0	2.00	1	1	6	0	10	oil drum
18	Yacht Club	coastal	Heather	619-279-4723	9	30	15	1.00	1	1	0	0	25	Fishing Pole
19	Freeborn Creek	Inland	Claude Winfree	951-662-8640	55	350	20	2.40	1	1	25	0	50	
20	Suisun Water Front - Kayakers	Coastal	James Jairo	341-6141	4	225	0	1.00	1	1		10	10	
21	Lower Lower Ledgewood Creek	Coastal	Lexi	910-590-7551	5	700	0	1.00	1	1			55	
22	Flyway Center	Coastal	Veronica	291-0684	25	600	0	1.00	1	1	4		40	Flat Screen Tv
20	**TOTALS**				**599**	**7410**	**62**	**36.9**	**22**	**20**	**100**	**10**	**655**	

THANK YOU!

Coast and Creek Cleanup Day

Fairfield, Suisun City and Suisun Marsh

599 Volunteers

Removed 7,410 lbs. of Trash

FAIRFIELD-SUISUN
SEWER DISTRICT

05417
5458

Solano County

Earth Day Cleanup

'20

SATURDAY, APRIL 18
9AM – 11AM

05418
5459

Fairfield-Suisun Sewer District

VOLUNTEERS NEEDED

fssd.com

OUR WATER - OUR WORLD

Fairfield-Suisun Sewer District

Our Water Our World Retail Partners Final Report

July 2019 – June 2020

prepared by Suzanne Bontempo, Plant Harmony

Program Notes:

The Our Water Our World retail partnership program is currently in 2 retailers:

The Home Depot	Fairfield
Ace Hardware	Suisun City

OWOW IPM Retailer Trainings

Fairfield-Suisun OWOW retailer trainings:

A total of 2 training were conducted, with 19 associates trained.

Topics covered in the training:

- An OWOW partnership program overview
- Pesticides that are water pollutants of concern
- Where to dispose of local HHW
- How less toxic products work
- IPM techniques
- Beneficial Insect Identification
- Water Conservation
- Benefits of Mulch
- Water-wise plant choices for our area
- Pests highlighted: Aphids, ants, bed bugs, citrus leaf miner, fleas, gophers, rats & mice, snails & slugs, spider mites, whitefly, fungal diseases, and many customer habits, such as how over fertilizing can increase pest populations.
- Invasive pests: Ligurian Leaf Hopper, Spotted Winged Drosophila, Asian Citrus Psyllid
- OWOW website and the 'Ask the Expert' feature, UC Davis IPM website, BIRC website
- UCIPM You Tube informational channel

Resources provided to each OWOW training attendee includes:

- The Mac's Field Guide Good Garden Bugs of California
- Monthly Pest Calendar
- How to Apply Beneficial Nematodes
- How Less Toxic Products Work handout
- Home Depot less toxic product list for the Home Depot Store trainings
- List of websites, books, and catalogs on a resource sheet
- Sheet Mulching instructions
- The CA DPR's 'How to read a pesticide label' handout
- Information on pest problem solving for the following pests: spider mites, lifecycle of grubs, whiteflies, spider mites, citrus leaf miner, Asian Citrus Psyllid, DPR's handout on bed bug management, and the UCIPM Quick tips for gopher controls
- 10 Most Wanted Bugs for Your Garden brochure
- OWOW pocket guides
- Solano County Vector Control Program

Additional materials focused on this year by OWOW:

- A one sheet informational handout on 'Keeping Rats & Mice out'
- A one sheet informational handout on 'Rats in the Garden'
- Retail Nursery & Garden Center IPM News
- Asian Citrus Psyllid Campaign fliers in the nursery, displayed in the aisle and stocked in the OWOW literature rack
- UCIPM DIY bed bug management
- Eco-herbicide recommendations for the Ace Hardware

Extra educational materials:

I provided each of the OWOW retail partners additional educational materials to assist with pest identification, as this is what many were requesting since access to online research during business hours is limited to many associates.

Educational materials were:
- UCIPM Meet the Beneficial Poster
- UCIPM Wildlife Pest Control around Gardens and Homes

Trainings conducted:

1. The Home Depot, Fairfield – 10 associates were trained, 10/23/2019
2. Ace Hardware, Suisun City – 9 associates were trained, 2/26 & 3/9/2020

The training session provided were well received by the associates. Many shared how valuable they felt the information covered was, especially the information on the 'Ask the Expert' feature on the OWOW website.

The survey results for this contract year will follow on the next pages

Summary of Store Training
Pre-Training Surveys

A total of 2 training was conducted, 19 associates were trained,
18 pre-training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	Don't Know
When water enters a storm drain, does it go to a treatment plant before it reaches a creek?	0%	50%	50%
When water enters a sanitary sewer from a house drain, like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or bay?	6%	44%	50%
Is it more effective to treat an ant infestation with a bait station rather than a spray?	39%	11%	50%
Where is your local household hazardous waste collection facility located?	28% knew the location	72% did not know the location	

Which sentence best describes Integrated Pest Management (IPM)

a. IPM only uses pesticides: 0%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only when needed): 67%
c. IPM does not rely on identifying pests/disease before treating: 0%

> Left blank or did not know: 33%

Which of these is the most effective IPM method for managing aphids?

a. Apply fast acting fertilizers: 0%
b. Spray insecticidal soap and/or prevent ants from vegetation with tanglefoot or bait station: 56%
c. Use products with pyrethroids: 6%
> Left blank or did not know: 38%

Summary of End of Training Evaluation Form

A total of 2 training was conducted, 19 associates were trained,
18 pre-training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	Don't Know
When water enters a <u>storm drain</u>, does it go to a treatment plant before it reaches a creek?	0%	100%	0%
When water enters a <u>sanitary sewer</u> from a house drain, like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or bay?	0%	100%	0%
Is it more effective to treat an ant infestation with a bait station rather than a spray?	100%	0%	0%
Where is your local household hazardous waste collection facility located?	100% knew the location	0% did not know the location	

Which sentence best describes Integrated Pest Management (IPM)

a. IPM only uses pesticides: 0%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only when needed): 100%
c. IPM does not rely on identifying pests/disease before treating: 0%
> Left blank or did not know: 0%

Which of these is the most effective IPM method for managing aphids?

a. Apply fast acting fertilizers: 6%
b. Spray insecticidal soap and/or prevent ants from vegetation with tanglefoot or bait station: 94%
c. Use products with pyrethroids: 0%
> Left blank or did not know: 0%

	Disagree	Neutral	Agree .
I learned at least one eco-friendly pest management method today		6%	94%
The training will help me recommend and/or sell eco-friendly products		6%	94%
I can comfortably share what I learned with customers and/or co-workers		11%	89%
I can easily use the Our Water – Our World shelf tags and fact sheets to inform customers about less-toxic pest management		17%	83%
Printed resource materials from this training were…	Too much 0%	Just Right 100%	Not enough 0%

What part of the training was most helpful?
All was helpful: 13%
Pest problem solving: 47%
Product information: 33%
Q&A: 7%

What part of the training could be improved?
Nothing/everything was good: 84%
More frequent trainings: 8%
Information about toxicity of eco-pesticides on food crops: 8%

Additional comments by attendees:

"This class was great, a perfect amount of time with lots of great information"

"I thought this was great, I learned a lot"

"Very helpful to learn how the (eco) products work"

Summary of outreach events 2019-2020

Unfortunately, the management teams at both retailers requested OWOW outreach tablings for their consumers for dates for the end of March and April. Due to the Shelter in Place restrictions, public outreach events were cancelled for the remainder of the fiscal year.

1) Integrated Pest Management Training for the Solano-Yolo County Master Gardeners:

An OWOW IPM training was provided to the Solano-Yolo County Master Gardeners – 34 attended this training, 2/28/20

Topics covered in the training:

- An OWOW partnership program overview
- Pesticides that are water pollutants of concern
- Principles of Integrated Pest Management, including;
    - Building healthy soil with compost
    - Benefits of using organic fertilizer
    - Benefits of mulch
    - Right plant, right place
    - Planting for the pollinators
    - Keeping water on site
    - Hydro-zoning
    - How to water effectively and efficiently
    - Water-wise plant choices for our area
    - Importance of sanitation in the landscape
    - Pest Prevention
- How less toxic products work
- Tips for using pesticides
- OWOW website and the 'Ask the Expert' feature, UC Davis IPM website, BIRC website
- UCIPM You Tube informational channel

2) Extra project for Vallejo and Fairfield-Suisun agencies:

IPM Training Video:

An OWOW IPM training program of 30-minute recording for the Fairfield-Suisun Sewer

District for team training purposes.

Retail store Mentoring and Maintenance Visits:

A total number of 16 program store mentoring and maintenance visits for the year.

- The Home Depot, Fairfield: 8 visits
- Ace Hardware, Suisun City: 8 visits

Store mentoring and maintenance activities throughout the year:

- Replenish fact sheets
- Update shelf talkers on new products
- Ask associates if they are hearing of any new or unusual pest problems from their customers
- Focus on the pest of the month calendar
- Bring the quarterly UCIPM Retail Newsletter to each retailer
- Remind associates about the 'Ask Our Expert' resource on the OWOW website
- Demonstrate how to use the UCIPM website for pest problem assistance
- Guide customers to less toxic solutions in the aisle
- Mentor buyer and manager at the Ace about new eco-friendly product on the market
- Mentor associates about the current pest problems and IPM strategies for the pests
- Mentor associates on how less toxic active ingredients work
- Follow up with emails and phone calls on pest questions from associates, as well as customers

These two retailers have witnessed a reduction of sales in the traditional pesticide categories and see an increase in sales with the eco-friendly alternative pesticides. Even throughout a challenging spring season, we see that people are looking for alternative to the toxic pesticides. As we see from the annual sales reports provided from:

- Home Depot Corporate, the sales of the eco-pesticide categories have increased over 30% with an overall increase of 8% of eco-products over the previous year.
- Sluggo sales is reported to have doubled over the previous year. This is a reflection of the recent gardening trend due to the pandemic, working from home and sheltering in place.
- Ortho Ground Clear, a new eco-herbicide for the 2020 year, has seen a growth of over 29%
- Ortho 3-in-1, pyrethrin and sulfur combination, has seen a growth in sales of over 22%

The associates value the OWOW partnership and support, assisting them with the new products, how they work, and what product they should bring in as an alternative to the problem pesticides. In addition to mentoring retail associates, each store appreciates the assistance when helping their customers in the aisle. This support of guiding the customers to choose a product that is less-toxic, also includes other IPM tools that the retailer may sell when a pesticide isn't necessarily the best solution, such as using ¼" hardware cloth behind dryer vents and foundation vents to keep rodents out of the

home, the importance of adding compost and organic fertilizer to your soil to increase plant health, choosing water-wise plants for longer term success, and the importance of mulch for water retention and optimum soil health.

Additional OWOW support services:

Industry Trade Shows:

I attended the Central Garden Trade Show in August of 2019 and the L&L Distributor Trade Show in October of 2019. The industry trade shows are important as we do meet with the retail buyers within the OWOW partnership. At these shows I have the chance to educate the buyers, show them new eco-friendly products, and explain how each works. I respond to their inquiries, make suggestions and guide them to the eco-alternatives. Our Water Our World is an extremely valuable resource for those who attend these shows.
I also attended the NorCal Landscape & Garden trade show in February 2020 where I was invited to present an IPM educational class to the audience of garden industry professionals. My presentation qualified those who attended 1 CU (continuing education unit) from the Department of Pesticide Regulations.

Overall challenge for the year and moving forward:

As March arrived, I cannot express enough how challenging this season became because of the pandemic. The retailers were stressed beyond measure. I, and all of the IPM Advocates servicing the OWOW program in other counties, did our best to provide OWOW services while sheltering in place. I certainly did what I could to provide the retailers relevant pest problem solving support remotely. Moving forward I see the value of providing OWOW education to the public through Webinar style classes. I adapted educational webinars for the public quickly and presented 14 classes for the public with the support from many OWOW sponsoring agencies throughout the greater SF Bay Area. Post webinar surveys were emailed to those attendees with good valuable feedback to report.
I am also currently working with Debi Tidd to develop virtual training platform that is best suited for the retailers and OWOW. Though it is very disappointing to me to end the year in the midst of a pandemic, I am inspired looking forward to what is possible for delivering the OWOW message to the public in a new way.

Plan Before You Start Work

When performing wet cleaning work, preparation up front is the best way to keep harmful pollutants out of waterways. It's always easier to prevent pollution than it is to clean it up after the fact.

Remember the 3 C's:

Control
Control your workspace. Perform as much dry cleaning as possible before you start using water. Remove any harmful chemicals or debris from the immediate area.

Contain
Contain any water that reaches the ground. When you perform washing and steam cleaning, the water picks up contaminants and is no longer clean. Take steps to ensure none of this water leaves your working area.

Capture
Capture the dirty water and dispose of it properly. Water should always be discharged to the sanitary sewer, unless it contains hazardous materials, but NEVER into a septic system.

Non-Emergency Calls:

Solano County Department of Resource Management
(707) 784-6765

Fairfield Police Department
(707) 428-7300

Suisun City Police Department
(707) 421-7373

Vallejo Flood & Wastewater District Stormwater Program:
(707) 644-8949

Emergency Calls ONLY:
Dial 911

Other Useful Numbers:
Fairfield Public Works Department
(707) 428-7485

Suisun City Public Works Department
(707) 421-7340

City of Vallejo Public Works
(707) 648-4315

CA Department of Fish & Game
(707) 944-5512

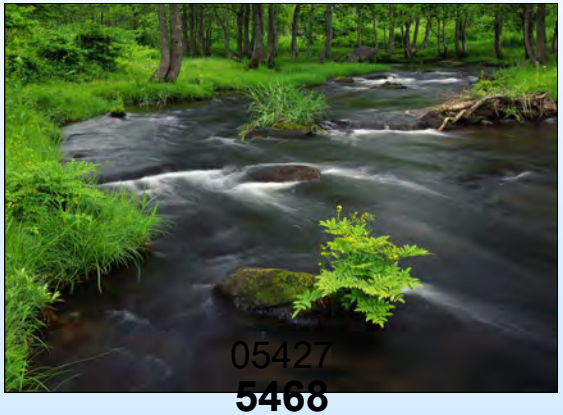

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Stormwater Tips for Mobile Washers

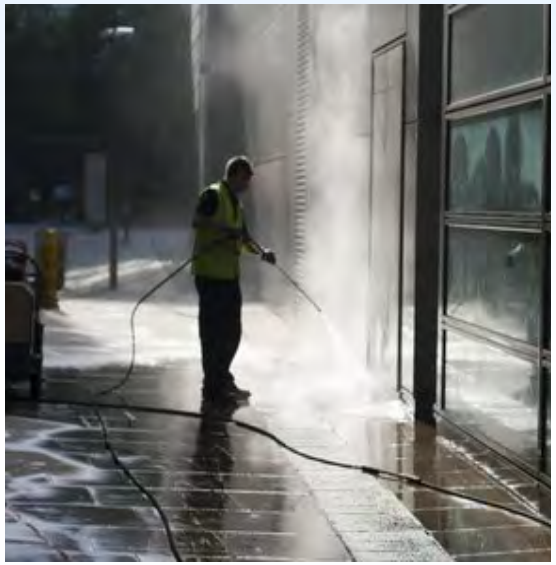

Helpful hints for proper automobile, power, and pressure washing.

Tips for Proper Power Washing

Many people believe that water entering storm drains in streets and parking lots travels through the sewer and gets treated at the wastewater plant. Not true!

This water, called *stormwater*, flows untreated directly into our creeks, rivers and the Bay. Allowing chemicals, oil and other contaminants to flow into these drains not only damages our environment, it is also violates federal, state and local laws.

Follow these Best Management Practices to ensure a clean work area and prevent pollution:

Planning: Examine the area before you begin work. Identify all storm drains and the slope of the ground to determine how water will flow and how to protect those drains. Block off water's access to drains using the best method available (e.g. rubber drain mats, berms, etc.). Obtain permission from the property owner if you plan to discharge to their sanitary sewer system.

Pre-Cleaning: Use dry methods to pre-clean as much of the surface as possible. Clean up any oil or grease with absorbent pads, booms or powder. Sweep or vacuum up dirt, debris and trash. Remove this dry waste from the work area before beginning to use water.

Washing: Use as little water as possible to complete the job. This will minimize the amount you have to collect and dispose of. Avoid using cleaners with harsh chemicals or solvents, and use heat and pressure whenever possible to reduce the need for chemicals.

Capturing: In the Planning step, you should have identified a low spot in your work area to collect the runoff water, or made use of a temporary containment pool or wash bib. As you are working, verify that all water is being captured by your containment measure and none is escaping to the street, gutter or storm drain.

Disposal: This water has picked up contaminants during the cleaning process and should NEVER be poured, pumped or dumped in the street or down a storm drain. Use a portable pump, wet/dry vac or mop and bucket to dispose of the captured water to the sanitary sewer, through a sewer clean-out, sink or toilet. Be sure to first obtain permission from the property owner. Water containing hazardous materials must be removed by a licensed hazardous waste hauler.

- If the wash water contains large amounts of debris or particles (e.g. sediment, paint chips, etc.), a filter should be used on the pump. Once the water is removed, dispose of the debris with dry cleaning measures.
- Water containing grease, cooking oil or other food debris should be discharge so that it flows through a grease trap/vault.
- All discharges to the sanitary sewer must comply with local sewer district standards and requirements.
- Discharge standards for the ***Fairfield and Suisun*** area can be found in the Fairfield-Suisun Sewer District website at www.FSSD.com Ordinance 2008-03, and for the ***Vallejo*** area at the Vallejo Flood & Wastewater website at www.VallejoWastewater.org (section 4.12.080 of the District Code).
- Become a BASMAA-recognized mobile cleaner. For more information about the certification program, please visit: www.basmaa.org

Creek and Marsh Watch

The cities of Fairfield, Suisun City and the Fairfield-Suisun Sewer District have joined together to form the Creek and Marsh Watch. These municipalities protect the local creeks and the Suisun Marsh.

The Suisun Marsh, just downstream from the city of Fairfield and Suisun city, is the largest contiguous brackish water marsh remaining on the west coast of North America. This enormous marsh is a critical part of the San Francisco Bay-Delta estuary ecosystem, encompassing 116,000 acres, including 52,000 acres of managed wetlands, 27,700 acres of upland grasses, 6,300 acres of tidal wetlands, and 30,000 acres of bays and sloughs.

Suisun Marsh is a critical nursery for endangered Delta smelt as well as multitudes of other native and introduced species. The Suisun Marsh is also a major stop-over point each year for 1.5 million migratory birds on the Pacific Flyway.

It is the responsibility of all of our citizens to protect our local creeks and the Suisun Marsh.

The Fairfield-Suisun Urban Runoff Management Program gratefully acknowledges the Santa Clara Valley Urban Runoff Pollution Prevention Program for sharing the content and the artwork of this brochure.

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TO REPORT ILLEGAL DISCHARGES
and
SPILL RESPONSE

Solano County Resource Management
(707) 784-6765 or (707) 429-7090

Fairfield Police Department
(707) 428-7300

Suisun City Police Department
(707) 421-7373

Fairfield-Suisun Sewer District
(707) 429-8930

Other Useful Contacts
(during normal business hours)

Solano Recycles (oil, latex, paint, etc)
(707) 437-8941

Fairfield Public Works Department
(707) 428-7485

Suisun City Public Works Department
(707) 421-7340

CA Department of Fish & Game
(707) 944-5512

San Francisco Bay Regional Water Quality Control Board
(510) 622-2300

Fairfield-Suisun Urban Runoff Management Program
(04/09/10)

You are the Solution to Water Pollution

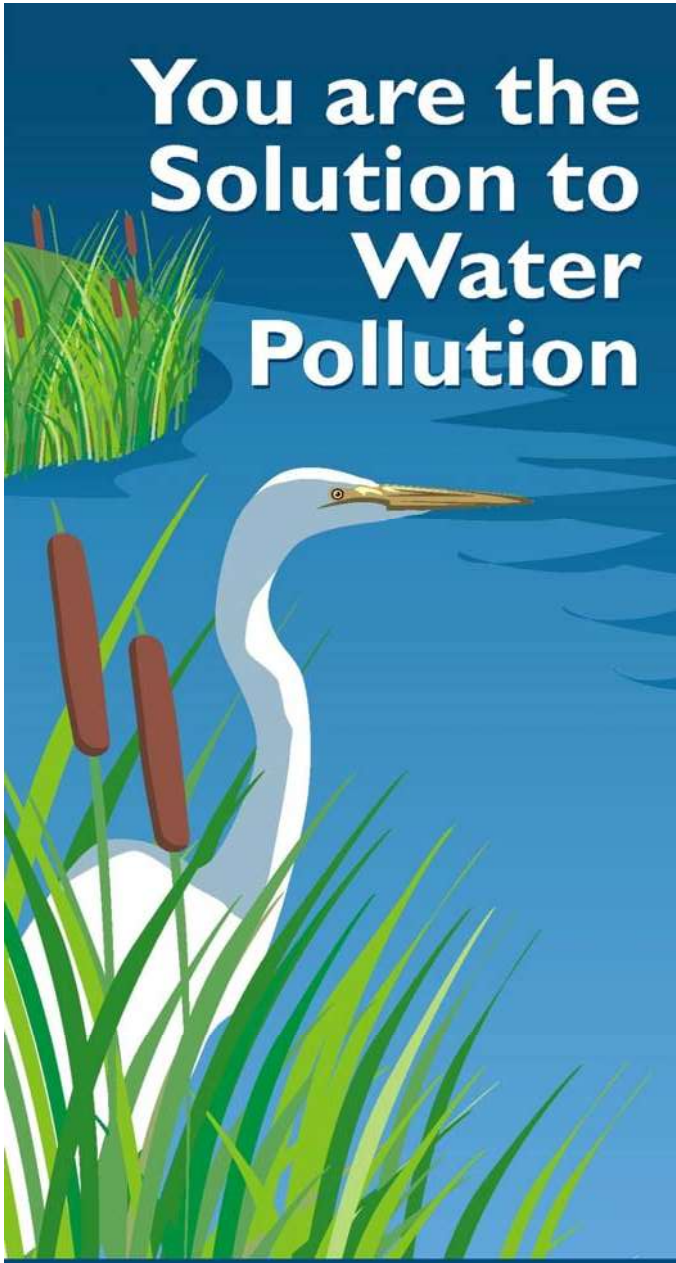

Creek and Marsh Watch

Our Creeks.
Our Water.
Ours to Protect.

You live in a Watershed

A watershed is a land area that drains rain and other water into a creek, marsh, lake or bay. Rain and irrigation from lawns and gardens wash pollutants off surfaces like streets, sidewalks, and driveways into our storm drains and creeks and out to the Bay.

You may live miles away from the Bay and still be polluting its waters

Water from your neighborhood enters the storm drain system and flows directly to local creeks, the Marsh, and the Bay *without any treatment*. It often is contaminated by pollutants that can be toxic to fish, wildlife and people.

Residents and small businesses are the leading causes of local stormwater pollution, and have become the primary threats to the Marsh and Bay. Pollutants that get into storm drains because of our daily choices and activities can end up in our local waterways. You may be polluting the Marsh and Bay without realizing it.

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Storm drains carry water and pollutants directly to our local creeks and the Suisun Marsh.

Never put anything into the gutter, street or storm drain.

Pollution comes from everyday activities.

Here are a few suggestions how you can help prevent stormwater pollution:

- *Motor oil and auto fluids*. If you change your own oil, recycle it, or take it to a household hazardous waste collection program.
- *Soap and dirt from washing cars in the driveway or street*. Go to a commercial car wash, or wash cars on a lawn or dirt surface and empty your bucket of soapy water into a sink or toilet.
- *Antifreeze, oil, paint or household cleaners*. Rinse latex paint tools in a sink, not outdoors. Also, clean up toxic spills like motor oil, paint and antifreeze with an absorbent material and dispose of soiled absorbent properly.
- *Dirt, leaves and lawn clippings that clog storm drains and choke creeks*. Rake or sweep to clean up outside. Compost leaves and yard clippings, or recycle them.
- *Weed killers, fertilizers and pesticides that are washed off lawns*. Use "green" gardening methods such as conserving water, planting native plants, protecting the soil and reducing the use of toxic pesticides. Adjust your sprinklers or irrigation systems to prevent over watering.
- *Litter and grime that collects on parking lots and sidewalks*. Use a broom, not a hose to clean up outside. Use "green building" materials and practices, such as pervious paving, for your next project.
- *Pet waste left on lawns, streets, in the gutter or on sidewalks*. Pick it up and put it in a trash can.

Fairfield Main Street Association
1000 Webster Street, First Floor, Suite A
Fairfield, CA 94533

EXHIBIT "A"
SCOPE OF WORK

Description of Work Performed

The Fairfield Main Street Association will provide special event waste management at the 22 Fairfield Certified Farmers' Market and outreach and education during the 4-hour event. Scope includes setup and breakdown and tracking of diversion from all events.

Set up recycling station consisting of 3-bins and signage during the event in order to collect compost, recycling, and landfill. Staff will monitor recycling stations throughout the event. Once collected, waste will be sorted to ensure a clean stream, then placed into the appropriate dumpster.

Event Details:
Fairfield Certified Farmers' Market – 2020
Every Thursday from 3-7pm

May 2, 2019 - October 3, 2020
April 30, 2020 – October 1, 2020

- Set up and monitor recycling stations at 23 weekly events
- Recycling stations shall have a bins for Trash, Recycling and Organics with proper signage.
- Discuss the connectedness of our streets and creeks
- Discuss allowable discharges to the storm drain system
- Vendors shall reduce plastic and other waste and encourage food donation
- Provide Recycling Stations (bins or bags) vendors
- Provide litter control during event
- Assist Produce Pipeline with green diversion. Track and report food diversion for the 2019 Farmer's Market.
- Provide Recycling Outreach for used oil, household hazardous waste, special events (such as paper shredding), mattress recycling
- Provide a residential battery drop off spot at information booth

Breakdown/Cleanup

- Set up/take down Recycling Stations with signage
- Place waste and recycling in appropriate dumpster (recycling/trash)
- Assist vendors with recycling/trash as necessary

Fairfield Main Street Association
1000 Webster Street, First Floor, Suite A
Fairfield, CA 94533

- Lock dumpsters

Other

- Report total diversion tonnages to City Public Works Department
- Track outreach materials – Replace and/or request from City/Republic
- Engage with visitors – answer general questions regarding recycling
- Promote and encourage recycling throughout the season
- Maintain communication with Republic Services for waste pickups.
- Coordinate with PW staff during the season and provide final reports
- Work with PW staff / Republic to obtain Bins and Signage and outreach materials and trash pickup supplies.
- Deliver messages and pamphlets for Fairfield Suisun Sewer District. Messages include: You Are the Solution to Water Pollution:

- Hi my name is _____, did you know that our streets are directly connected to our creeks and that water flows from our streets directly to our local creeks untreated? Only clean stormwater should be flowing down the storm drain. Here are few suggestions on how to prevent stormwater pollution. Thank you.

- Grease scrapers :
- Hi my name is_____, these scrapers are from the Fairfield Suisun Sewer District and can be used to scrape grease from your pots and pans and dishes into the garbage after the grease has cooled off. Grease in your sewer lines builds up and clogs up over time causing backups in your home and spills on the street which then flow into your local creeks. These scrapers are also great for countertops to avoid using paper towels. Just put them in the dishwasher when they get dirty.

- Control Guides for Using Less Toxic Methods to Prevent Pests in Your Home:
- Hi my name is_____, this an easy reference guide for cheap and less toxic methods to control and prevent pests around your house. These methods may take a little more time than the traditional pesticide application but the methods are less expensive and result in healthier gardens. Thank you.

Cost: $1,500 per season.

EXHIBIT "B"

PAYMENT

Fairfield Main Street Association
1000 Webster Street, First Floor, Suite A
Fairfield, CA 94533

1) The total contract price for services rendered by CONSULTANT under this Agreement shall be as specified below:

2) Payment shall be made to CONSULTANT on a time and materials basis, and CONSULTANT shall submit invoices to the City of Fairfield, Public Works Department, 1000 Webster Street, Fairfield CA 94533 for the same.

APRIL 18

VOLUNTEERS NEEDED

Earth DAY

Join us in celebrating Earth Day by cleaning our local creeks!!

Saturday, April 18, 2020

9:00 a.m. – 11:00 a.m.

Meet at any of these sites listed below:

Ledgewood Creek – Fairfield

Hamilton Dr. off Auto Mall Pkwy.

Laurel Creek – Fairfield

Wood Hollow Ct. off Peppertree Dr.

Suisun Boat Ramp (Kayakers and Walkers) – Suisun City

Maple Street and Kellogg Street

Union Creek – Suisun City

Dead end of Railroad Ave. near Marina Blvd.

To register go to:

www.fssd.com/earthday

IMPORTANT

Remember to turn in your waiver form on the day of the event to the Site Captain.

If you are under the age of 18, the waiver form must be signed by a parent or guardian.

For specific questions, please email Lexi Valenti at Avalenti@fssd.com Thank you.

SUPPLIES

The following supplies are provided: Disposable gloves, pic-sticks, trash bags, buckets. Please feel free to bring your own supplies and/or reusable items.

Fairfield-Suisun Sewer District

Locally Coordinated by the Fairfield-Suisun Sewer District and Fairfield-Suisun Urban Runoff Management Program.

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THINK BEFORE YOU FLUSH!!

Help keep our sewer pipes flowing

ONLY FLUSH THE 3 P'S

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Fairfield-Suisun
Sewer District

PEE

POOP

TOILET PAPER

SUISUN CITY
BOATER OUTREACH PROGRAM
SUMMER 2019
Final Report

Program Funding Provided by

Fairfield-Suisun Sewer District and City of Suisun City

With Support from

Solano County Department of Resource Management

California State Parks Division of Boating and Waterways and California Coastal Commission

Solano RCD
1170 N Lincoln, Suite 110 • Dixon, CA 95620
(707) 678-1655 x 3 • FAX (707) 678-5001
www.solanorcd.org

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Program Overview

The Suisun City Boater Outreach Program is an environmental education effort targeting boaters visiting the Suisun City boat launch and marina. Protecting the Suisun Bay from motor oil and gasoline pollution is a stakeholder priority. In addition to oil and gasoline, the Suisun Harbor and Grizzly Island Slough are at high risk for contamination from motor oil and gasoline pollution as well as from trash, which includes monofilament fishing line, illegally discharged boat sewage, and invasive plant and/or animal species.

The Solano Resource Conservation District facilitates the Boater Outreach Program with funding provided by Fairfield-Suisun Sewer District and the City of Suisun City. Additional key partners include Solano County Department of Resource Managemnt, provides the marina with oil absorbents, and the California State Parks Division of Boating and Waterways (DBW), and the California Coastal Commission. The DBW provides in-kind boater education kits and outreach materials in exchange for the Program's participation in its "Dockwalker" survey program and educational efforts.

Boater kits include a variety of clean and green boating tips, boater law information, fuel bibs, and oil absorbents. The DBW also provides fishing line containers for fishermen to store their used monofilament as well as other educational materials.

Summer 2019 Highlights

- Connected with boaters for four (4) hours each day on eleven (11) separate days at the Suisun City Boat Launch and Suisun City Marina.
- Of the sixty-nine (69) boaters who were contacted, six (6) declined the survey. Nearly 96% (63) participated in the survey and received a boater kit and oil absorbents.
- Distributed sixty-three (63) boater kits, thirty-two (32) fishing line containers, and six (6) oil used oil canisters were distributed.
- A total of ninety-nine (99) people were educated on oil absorbents, and clean and green boating practices.
- Of the sixty-three (63) boaters/boat owners surveyed:
    - Twelve (12) had inboard motor boats & eight (8) had inboard/outboard motor boats
    - Forty-three (43) had outboard motor boats
- Fifteen (15) (75%) had never used a bilge pad before while five (5) (25%) had used a bilge pad at some point in the past.
    - Of those five (5) boaters that used an oil absorbent:
        - Zero (0) (0%) had thrown their bilge pad in the trash
        - Four (4) (80%) disposed of it at a marina
        - One (1) (20%) disposed of in other ways, such as with a boat maintenance service.

- Boaters come to Suisun's three (3) launches from a variety of locations throughout Northern California;
    - Fifty-five (55) (87.3%) of boaters surveyed live within Solano County's seven major cities:
        - Fairfield (45.4% of Solano County residents)
        - Suisun City (25.4%)
        - Vacaville (25.5%)
        - Vallejo (3.6%)
    - Eight (8) (12.7%) of boaters surveyed live outside of Solano County
        - Generally speaking, most non-Solano County residential boaters came from Sacramento, Pittsburg, Antioch, and Stockton/Lodi.

- Peak launch times at the Suisun City Boat Launch are between the hours of 9AM to 1PM

Outreach Materials

- Boater kit – The 2019 boater kit contained a 15% off coupon to West Marine, 2019 tide chart, map of the Delta, oil absorbent pillow, oil absorbent sheet, fuel bib, and "Clean and Green" boating information.
- Boater banner – The banner advertised free boating supplies and was used when educating boaters.
- Fishing line containers – The containers were given to fisherman to dispose of monofilament fishing line.
- Used oil canisters – Canisters were distributed to Solano County boaters who change the oil in their boats.
- Canteens- Water canteens were distributed to Solano County boaters who were willing to take the time to install an oil absorbent pad into their boat.

Successful Methods

- Watching the timing of the tides was helpful in figuring out when boaters were most likely to be launching.
- Communicating with the Marina Harbor Master and staff about the Boater Program and inquiring about any events scheduled during the summer.
- Connecting with other people's interests to keep them engaged (i.e. talking to fisherman about keeping the waterways clean in order to keep fish healthy).

Challenges

- Windy weather made it challenging to set up our equipment.
- Major events such as bike races or dredging of the channel made it challenging due to access to the boat launch.
- There were many Spanish speaking boaters that we could not educate.
- Most boaters who declined the survey were concerned that the program represented a government agency and government infringement on personal rights.

Recommendations

- Circulate a press release in the Suisun City community about the Boater Outreach Program to encourage local residents to receive the boater kit.
- Consider installing both a red canister for the collection of used oil absorbent pads at the next to the blue canister at the Harbor Master's office.
- Consider leaving oil absorbent pads with Marina staff so they can keep the bilge pad container outside of the Harbor Master's office regularly stocked.
- Use a fishing *deluxe* app to improve correlating times with fishermen's fishing patterns.
- Connect with the Yacht Club Commodore to arrange meeting with boater members.
- Revisit survey questions and see if our program partners have any questions to add.
- Since nearly 70% of boat owners can't install an oil absorbent, provide canteens to everyone who takes the survey and receives a boater kit.

Fairfield family with their 2019 boater kit.

Jet skier receives a new oil absorbent pad.

Suisun City boater posing with his 2019 kit.

Coast Guard receiving the 2019 kit.

School Water Education Program (SWEP)

2019-2020 Program Report

July 2020

Program Funding:

Cities of Vacaville, Fairfield, Suisun, Vallejo, Benicia;
Fairfield-Suisun Sewer District; and Solano Irrigation District

1170 N Lincoln, Suite 110 Dixon, CA 95620
Office 707.678.1655
Solanorcd.org

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Program Background

The School Water Education Program Committee contracted the Solano Resource Conservation District (SRCD) to implement the School Water Education Program (SWEP) for the fourth year.

Program curriculum was created by Solano RCD in September 2015. It is revised each year to adaptively manage content to better fit with student style, readiness, and funder objectives. The SWEP program delivers the following resources to Solano County teachers and students:

- Solano County Water Lesson
- Solano County Virtual Lesson (adapted for the COVID-19 pandemic)
- 'Test Your Tap' Lesson and Lab
- Project WET Trainings (Water Education for Teachers)
- Field trips to the Dunnell Nature Center
- Free water related materials offered to all Solano County teachers. Materials include the following:
    - *My Book About Water* Booklet
    - *Water and Me* Booklet
    - *Respecting the Water Cycle* Booklet
    - *Conserve Water* Booklet
    - *California Water Works* Booklet
    - Solano County "Our Water" Poster
    - "California Waterways" Poster
    - "The Delta Ecosystem" Poster
    - "Solano Saves Water" Pencils
    - "Solano Saves Water" Erasers
    - "Solano Saves Water" Rulers
    - "Solano Saves Water" Plastic Bags
    - Project W.E.T. Curriculum and Activity Guide 2.0
    - Water Conservation Playing Cards
    - Five Minute Shower Timers

January-June 2020 Program Summary

Beginning March 16, 2020, Solano County schools began to close due to COVID-19. Due to this circumstance, deliverables were not able to be completely achieved. This report includes two data sets for each category: deliverables achieved prior to March 16 and incomplete deliverables that were scheduled from March 16 through June. SRCD was scheduled to work with 4,559 students this year. Despite the impacts, SWEP lessons and resources were still delivered to 2,259 students, or 49.5% of our scheduled participation.

SWEP Lessons

The ***Solano County Water Lesson*** is available to students K-12. This lesson conveys where student drinking water comes from, stormwater pollution as it pertains to the student's home watershed and water conservation. A water conservation challenge is offered to teachers who participate in the lesson. This form allows students to keep track of how much water they use on a daily basis, highlighting the areas in which students can reduce their water usage. 87 lessons reaching 2,748 students were scheduled to participate in our Solano County Water lesson. Due to COVID-19, 46 lessons took place reaching 1,704 students (Tables 1 and 2).

Test Your Tap is a two-day, in-class lesson geared toward grades 5-12. This lesson focuses on highlighting the water quality of student's city tap water. The second lesson is a water quality lab. Students bring in water from various tap and bottled water sources and conduct a chemical analysis of each sample. The goal of this lesson is to empower students to think critically about their water resources and determine that water from the tap is safe, healthy, and reliable. 44 lessons reaching 1,346 students were scheduled; however, only 10 lessons occurred reaching 302 students (Tables 1 and 2).

Solano County Water Virtual Lessons were offered to Solano County teachers during the COVID-19 pandemic. The Solano County Water lesson was split into two short 25 minute lessons; a lesson on student water resources and water conservation; and a second lesson on watersheds and stormwater pollution. 16 lessons were completed reaching 170 students (Tables 1 and 2).

In summary, 4,264 students were originally scheduled to participate in the SWEP Solano County Water lesson and Test Your Tap lessons (Table 1). Due to COVID-19 related school closures, 2,176 students actually participated.

Table 1 – Summary of Spring 2020 Scheduled Lessons

Lesson	Benicia	Dixon	Fairfield	Rio Vista	Suisun City	Travis AFB	Vacaville	Vallejo	Total
Solano County Water Resources									
No. of Lessons	13	10	16	3	13	3	15	14	**87**
No. of Students	321	550	390	72	600	84	402	329	**2,748**
Test Your Tap									
No. of Lessons	10	--	24	--	--	--	10	--	**44**
No. of Students	302	--	720	--	--	--	324	--	**1,346**
Virtual Solano County Water Resources									
No. of Lessons	--	--	--	--	--	--	4	12	**16**
No. of Students	--	--	--	--	--	--	58	112	**170**
Total No. of Lessons	**23**	**10**	**40**	**3**	**13**	**3**	**29**	**26**	**147**
Total No. of Students	**623**	**550**	**1,110**	**72**	**600**	**84**	**784**	**441**	**4,264**

Table 1. Solano County scheduled student participation by city and lesson during spring 2020. Lessons include *Solano County Water Lesson, Test Your Tap* and our *Virtual Solano County Water Lesson.*

Table 2 – Summary of Spring 2020 Actual Lessons

Lesson	Benicia	Dixon	Fairfield	Rio Vista	Suisun City	Travis AFB	Vacaville	Vallejo	Total
Solano County Water Resources									
No. of Lessons	--	10	16	--	13	3	4	--	46
No. of Students	--	550	390	--	600	84	80	--	1,704
Test Your Tap									
No. of Lessons	10	--	--	--	--	--	--	--	10
No. of Students	302	--	--	--	--	--	--	--	302
Virtual Solano County Water Resources									
No. of Lessons	--	--	--	--	--	--	4	12	16
No. of Students	--	--	--	--	--	--	58	112	170
Total No. of Lessons	**10**	**10**	**16**	**--**	**13**	**3**	**8**	**12**	**72**
Total No. of Students	**302**	**550**	**390**	**--**	**600**	**84**	**138**	**112**	**2,176**

Table 2. Solano County actual student participation by city and lesson during spring 2020. Lessons include *Solano County Water Lesson, Test Your Tap* and our *Virtual Solano County Water Lesson.*

SWEP Teacher Training

Project WET is a teacher training that gives teachers the resources needed to successfully teach water related subjects in their classroom. The theme of this year's training was "Solano to Sea", which focused on how runoff from our streets can end up in our waterways. All activities facilitated at the event focused around this theme. The training was held on February 22, 2020 at the Dunnell Nature Center in Fairfield. 27 teachers signed up for the training and 18 teachers attended. Out of the 18 teachers that attended, 14 of them were from Solano County (Table 3).

Brian Brown, the California *Project WET* Coordinator, co-facilitated the training with Solano RCD staff. Brian's experience with *Project WET* activities and curriculum helped shape the success of this event. Additionally, Alex Rabidoux with the Solano County Water Agency (SCWA) provided a presentation on California and Solano County water resources and issues.

Our next training is scheduled for November 7, 2020. The training will focus on hands-on waters science in an online world. Teachers will participate in a part online and part socially distanced field experience that focuses on engaging students in Project WET hands-on activities.

Table 3 – Summary of Spring 2020 Project WET Participants

	BUSD	DUSD	FSUSD	RDUSD	TUSD	VUSD	VCUSD	Other Districts	Total
Project W.E.T. Training									
No. of Teachers	--	2	6	--	--	4	2	4	18

Table 3. Project WET teacher participation for the spring 2020 training broken down by school district. BUSD = Benicia Unified, DUSD = Dixon Unified, FSUSD = Fairfield-Suisun Unified, RDUSD = River-Delta Unified, TUSD = Travis Unified, VUSD = Vacaville

Dunnell Nature Center Field Trip

The ***Dunnell Nature Center Field Trip*** delivers water related curriculum in an outdoor setting and incorporates a nature hike along Union Avenue Creek. Students are divided into three rotating groups to explore our water sources, stormwater pollution and experience a creek-side nature hike. This spring, 295 students were scheduled to participate in the field trips at the Dunnell Nature Center (Table 4). Due to COVID-19, 83 students actually participated (Table 5).

Table 4 – Summary of Spring 2020 Scheduled Field Trips

	Benicia	Dixon	Fairfield	Rio Vista	Suisun City	Travis AFB	Vacaville	Vallejo	Total
Dunnell Nature Center									
No. of Field Trips	2	1	--	1	--	--	1	1	6
No. of Students	83	60	--	50	--	--	52	50	295
Total No. of Field Trips	**2**	**1**	**--**	**1**	**--**	**--**	**1**	**1**	**6**
Total No. of Students	**83**	**60**	**--**	**50**	**--**	**--**	**52**	**50**	**295**

Table 4. Dunnell Nature Center scheduled participation for spring 2020.

Table 5 – Summary of Spring 2020 Actual Field Trips

	Benicia	Dixon	Fairfield	Rio Vista	Suisun City	Travis AFB	Vacaville	Vallejo	Total
Dunnell Nature Center									
No. of Field Trips	2	--	--	--	--	--	--	--	2
No. of Students	83	--	--	--	--	--	--	--	83
Total No. of Field Trips	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**
Total No. of Students	**83**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**83**

Table 5. Dunnell Nature Center actual participation for spring 2020.

SWEP Events

All community spring events, including Solano County Youth Ag Day, were canceled this year.

2019-2020 Full Year Program Summary

With schools being shut down and a mandatory shelter-at-home order, our yearly classroom goals were not completed for all cities. Although we were not able to fully meet our goals, we did meet a majority of them. We just met our Dixon and Rio Vista

classroom presentation goals, and exceeded our presentation goals for Benicia, Dixon, Suisun City, and Vallejo. We were just one presentation shy from meeting our Vacaville goal. Refer to Chart 1 for a breakdown of our scheduled events and accomplishments for the 2019-2020 school year.

The pandemic also affected Dunnell Nature Center field trips. Field trips were booked for all cities, with 491 students planning to attend. 279 students participated in field trips before the pandemic hit. See table 6 and 7 for more details.

Project WET trainings were not impacted. A total of 38 teachers attended our October 2019 and February 2020 trainings.

Throughout the 2019-2020 school year, we planned on having 6,445 students participate in lessons, labs, and field trips. Due to COVID-19, we worked with 4,145 students across all activities. See table 6 and 7 for more details.

Table 6 – Summary of 2019-2020 Scheduled Participation

City	Dunnell Nature Center	Solano County Water Resources	Test Your Tap	Virtual Solano County Water Resources	Total
Benicia					
No. of Lessons	2	13	10	--	25
No. of Students	83	321	302	--	706
Dixon					
No. of Lessons	1	10	--	--	11
No. of Students	60	550	--	--	610
Fairfield					
No. of Lessons	2	16	24	--	42
No. of Students	96	390	720	--	1,206
Rio Vista					
No. of Lessons	1	3	--	--	4
No. of Students	50	72	--	--	122
Suisun City					
No. of Lessons	2	22	2	--	26
No. of Students	100	873	66	--	1,039
Travis AFB					
No. of Lessons	--	3	--	--	3
No. of Students	--	84	--	--	84
Vacaville					
No. of Lessons	1	23	26	4	54
No. of Students	52	636	792	58	1,538
Vallejo					
No. of Lessons	1	35	2	12	50
No. of Students	50	912	66	112	1,140
Total No. of Lessons	**10**	**125**	**64**	**16**	**215**
Total No. of Students	**491**	**3,838**	**1,946**	**170**	**6,445**

Table 6. Summary of scheduled participation in SWEP programs for the 2019-2020 school year, by city and individual SWEP program.

Table 7– Summary of 2019-2020 Actual Participation					
City	**Dunnell Nature Center**	**Solano County Water Resources**	**Test Your Tap**	**Virtual Solano County Water Resources**	**Total**
Benicia					
No. of Lessons	2	--	10	--	12
No. of Students	83	--	302	--	385
Dixon					
No. of Lessons	--	10	--	--	10
No. of Students	--	550	--	--	550
Fairfield					
No. of Lessons	2	16	--	--	18
No. of Students	96	390	--	--	486
Suisun City					
No. of Lessons	2	22	2	--	26
No. of Students	100	873	66	--	1,039
Travis AFB					
No. of Lessons	--	3	--	--	3
No. of Students	--	84	--	--	84
Vacaville					
No. of Lessons	--	12	16	4	32
No. of Students	--	314	468	58	840
Vallejo					
No. of Lessons	--	21	2	12	35
No. of Students	--	583	66	112	761
Total No. of Lessons	**6**	**84**	**30**	**16**	**136**
Total No. of Students	**279**	**2,794**	**902**	**170**	**4,145**

Table 7. Summary of participation in SWEP programs for the 2019-2020 school year, by city and individual SWEP program.

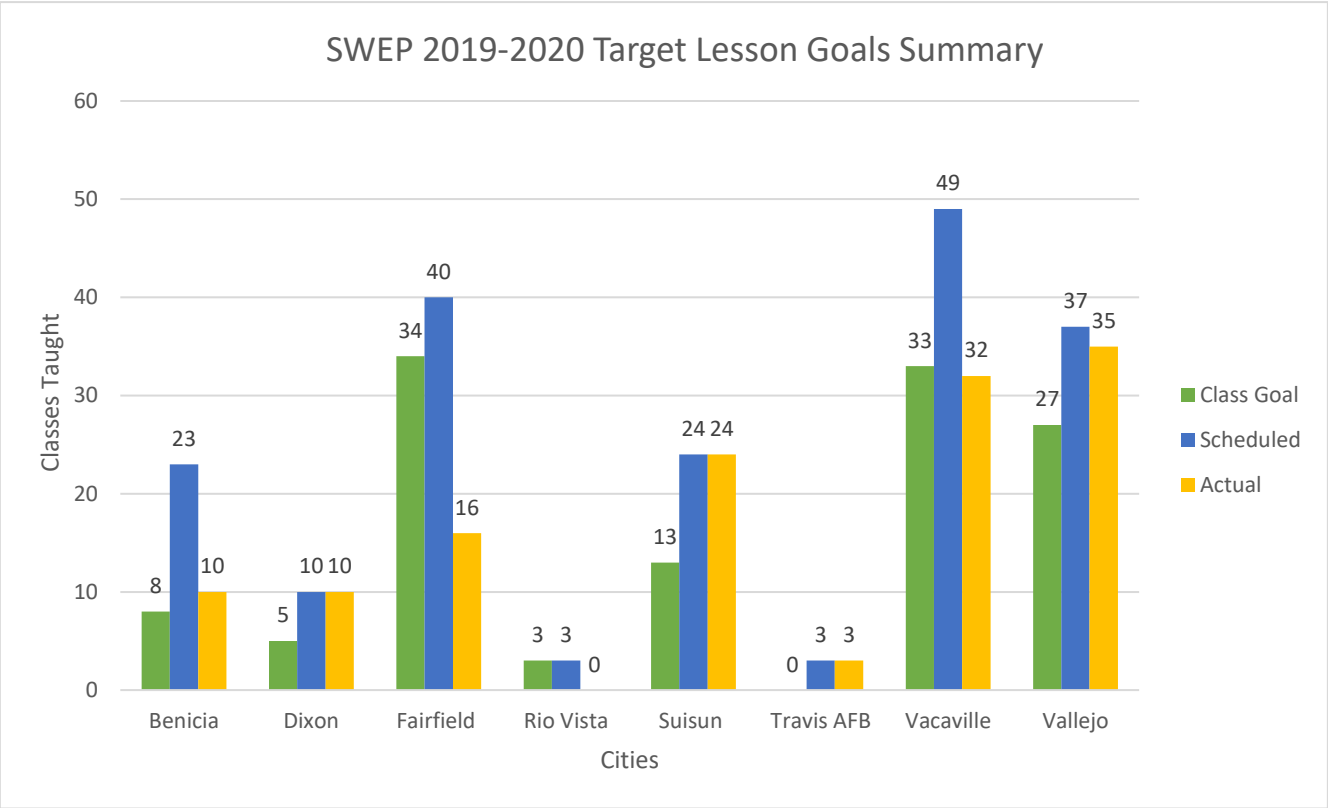

Chart 1. Comparison of the classroom presentation target goals set forth by the SWEP committee, scheduled lessons before the COVID-19 pandemic, and completed presentations.

SWEP 2020-2021 Program Expectations

- In the 2020-2021 school year, we will continue to work towards meeting and/or exceeding our participation goals in water related education activities throughout Solano County. Our program review and refinement will continue to be ongoing.
- If we cannot teach in the classroom, we will offer virtual lessons, labs, field trips, and trainings. We have piloted some virtual lessons in spring 2020, and will continue find more engaging ways to share our targeted messages virtually.
- Our Project WET trainings are set to take place on November 7th, 2020 and February 20th, 2021. Brian Brown, with the Water Education Foundation will co-facilitate with Solano RCD.

Full Year Summary of Water Education Programs Across Solano County

Seven organizations in Solano County deliver water related education programs to K-12 students in the form of classroom presentations, field trips, assemblies, and water related contests. These organizations include: SWEP, Solano RCD, Putah Creek Council's *Water Ways*, Ranger Teri Luchini from Rockville Park in Fairfield, private presenters ZunZun and Rock Steady, and the Solano County Water Agency. All organizations combined were scheduled to connect with 57,374 student (Table 8), but due to school closures, were only able to connect with 44,581 students (Table 9). Please refer to digital Appendix A for a breakdown of program specifics.

Table 8 - 2019-2020 Solano County Scheduled Water Education Totals

Cities	Assemblies	Contests	Field Trips	Lessons	Total
Benicia					
No. of Events	6	--	43	87	136
No. of Students	1,413	--	1,758	2,565	5,736
Dixon					
No. of Events	5	--	12	24	41
No. of Students	764	--	592	963	2,319
Fairfield					
No. of Events	22	1	35	135	193
No. of Students	5,289	5	1,776	4,031	11,101
Rio Vista					
No. of Events	3	--	4	15	22
No. of Students	726	--	262	824	1,812
Suisun City					
No. of Events	9	--	6	34	49
No. of Students	2,156	--	471	1,343	3,970
Travis AFB					
No. of Events	4	--	5	27	36
No. of Students	1,205	--	342	866	2,413
Vacaville					
No. of Events	23	1	39	198	261
No. of Students	6,786	5	2,304	6,124	15,219
Vallejo					
No. of Events	30	1	28	148	207
No. of Students	8,932	23	1,788	4,061	14,804
Total No. of Events	**102**	**3**	**172**	**668**	**945**
Total No. of Students	**27,271**	**33**	**9,293**	**20,777**	**57,374**

Table 9 - 2019-2020 Solano County Actual Water Education Totals					
Cities	**Assemblies**	**Contests**	**Field Trips**	**Lessons**	**Total**
Benicia					
No. of Events	4	--	15	64	83
No. of Students	970	--	703	1,942	3,615
Dixon					
No. of Events	4	--	8	21	33
No. of Students	664	--	393	867	1,924
Fairfield					
No. of Events	18	1	15	80	114
No. of Students	4,150	5	1,027	2,496	7,678
Rio Vista					
No. of Events	3	--	2	12	17
No. of Students	726	--	140	752	1,618
Suisun City					
No. of Events	9	--	6	34	49
No. of Students	2,156	--	471	1,343	3,970
Travis AFB					
No. of Events	4	--	3	21	28
No. of Students	1,205	--	217	681	2,103
Vacaville					
No. of Events	23	1	17	125	166
No. of Students	6,786	5	962	3,934	11,687
Vallejo					
No. of Events	29	1	12	99	141
No. of Students	8,450	23	749	2,764	11,986
Total No. of Events	**94**	**3**	**78**	**456**	**631**
Total No. of Students	**25,107**	**33**	**4,662**	**14,779**	**44,581**

Program Coordinator, Lidia Tropeano, teaching about Solano County Water Resources to Dixon 3rd graders.

Fairfield 3rd graders draw the path that a candy wrapper takes from their school, to their watershed, and out to the ocean at the Dunnell Nature Center.

Program Coordinator, Laura Morgan, pointing out a storm drain to Suisun City second graders at the Dunnell Nature Center.

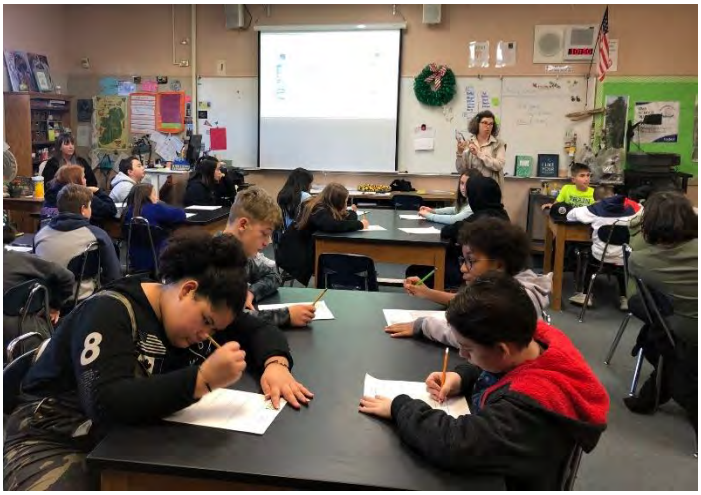

Program Educator, Wendy Low, facilitating the Test Your Tap lesson to Benicia Middle School 6th graders.

Alex Rabidoux, from the Solano County Water Agency, leading a lecture on California water resources at the February Project WET training.

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FOR IMMEDIATE RELEASE

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LOCAL TEACHERS DIVE INTO LEARNING ABOUT SOLANO COUNTY WATER

Solano County educators participate in award-winning Project WET training

Solano County (February 27, 2019): On Saturday, February 22, eighteen teachers took time from their Saturday activities to attend a Solano County Project WET training at Fairfield's Dunnell Nature Park and Education Center. The training, hosted by the Solano Resource Conservation District (Solano RCD) in conjunction with the Water Education Foundation, focused on empowering Solano County teachers to help their students build an awareness of their local and statewide water resource issues.

For participating, teachers received the award-winning Project WET curriculum: a hands-on, multi-disciplinary K-12 water themed science education resource that is fully aligned with California Common Core and Next Generation Science Standards.

"I recommend this training because it provides easily integrated lessons," shared one teacher in a written post-workshop survey. Another teacher also expressed their support for the training, explaining that "it opens up thoughts to different teaching strategies and planning."

The training was facilitated by Project WET California State Coordinator Brian Brown with support from Solano RCD. Featured speaker Alex Rabidoux, Water Resources Engineer for the Solano County Water Agency, provided a state-wide perspective on water resources and discussed water quality, use, and distribution through a local lens.

"I greatly appreciate Mr. Rabidoux for presenting on the intricacies of Solano County water at each of these trainings," said Marianne Butler, Education Director for Solano RCD. "This allows teachers to bring locally relevant information back to their classrooms so that they can confidently teach students why it's important to protect Solano County's water resources."

A second 2020 Project WET training opportunity will occur on Saturday, September 19 at the Dunnell Nature Park and Education Center. Those who are interested in registering can do so at solanorcd.org.

Project WET trainings are offered as part of the Solano RCD School Water Education Program (SWEP), a county-based water education collaborative. SWEP is funded through contributions by the cities of Vacaville, Fairfield, Suisun City, Vallejo, and Benicia; the Fairfield-Suisun Sewer District; and the Solano Irrigation District. SWEP integrates all water education programs in the county into one place, where teachers can work with program staff to find the best fit of lessons and materials for their classrooms.

###

Photo courtesy of the Solano Resource Conservation District unless otherwise stated.

Project WET's California Coordinator Brian Brown explains the Water Education Foundation to K-12 teachers as part of an annual Project WET spring workshop. The workshop was hosted by the Solano Resource Conservation District and the Water Education Foundation, and featured a guest presentation by Alex Rabidoux, Senior Engineer with Solano County Water Agency.

Photo Courtesy of Napa Resource Conservation District

Project WET California Coordinator Brian Brown introduces a Project WET activity "Storm Water," where students investigate how water travels through a community and how it can be managed.

2019-2020 School Water Education Program - *Teacher Feedback*

School: Laurel Creek Teacher Name: Stacie Wagner Date: 2/20/20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

0

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

The were most excited about the hands on model.

What did students seem to enjoy ***least*** about this experience?

My students seemed to enjoy the whole lesson.

What was the Program Educator(s) most effective at? ***Please use educator names.***

The Program Educator was really good at getting & keeping the students attention. Very clear & right speed. Love how she asked a lot of questions & allowed students to work together.

What suggestions for improvement could you offer the Program Educator(s)?

It was all great!

Please provide any additional suggestions or comments:

Great job Ms. Williams! Great with the kids!

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Laurel Creek Teacher Name: Lisa Drake Date: 2/21/20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

Interacting with each other: looking at maps, planning on how to build a lake ← Lynette's note: when discussing reservoirs I ask the students how they would build a lake!

What did students seem to enjoy ***least*** about this experience?

they liked it all.

What was the Program Educator(s) most effective at? ***Please use educator names.***

Lynette was very good at keeping the students' attention. She was very kind and good at explaining and answering questions.

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

This is a valuable program and I hope it will continue year after year. It's important information that the students need to know.

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Laurel Creek Elementary Teacher Name: Hennell 2 Date: 2/21/2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

Using their prior knowledge to build on what they know.

What did students seem to enjoy ***least*** about this experience?

They wanted to talk more about their own experiences.

What was the Program Educator(s) most effective at? ***Please use educator names.***

Lynette was very good at keeping my class engaged in the lesson.

What suggestions for improvement could you offer the Program Educator(s)?

Instead of calling on one student at a time, have them think-Pair-Share. A/B students

Please provide any additional suggestions or comments:

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: K I Jones Teacher Name: Miles Date: 2/24/20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☑	☐	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

model interaction

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

Ms. Morgan

What suggestions for improvement could you offer the Program Educator(s)?

more energy - But great info!

Please provide any additional suggestions or comments:

thank you!

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: KI Jones Teacher Name: Rich Date: 2/24/2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☑	☐	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

The model of the watershed

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

Ms. Morgan getting the students engaged in the lessons

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: K. I. Jones Teacher Name: Shadia Jones Date: 2/24/2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☒	☐	☐
Encourage science discussion between peers?	☐	☐	☒	☐	☐
Support your district or school science curriculum needs?	☐	☐	☒	☐	☐

Additional comments or explanations: weather / climate

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☐	☒	☐
After Lesson	☐	☐	☐	☒
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☐	☒
After Lesson	☐	☐	☐	☒
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☒	☐	☐
After Lesson	☐	☐	☐	☒
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☐	☒
After Lesson	☐	☐	☐	☒
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☐	☒	☐
After Lesson	☐	☐	☐	☒
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☒
After Lesson	☐	☐	☐	☒
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

They always enjoy the watershed model. It was nice to have the Solano County water map for them to look at.

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

She was very clear in her lessons and her instructions (Laura) to the students

What suggestions for improvement could you offer the Program Educator(s)?

* Have the students use their fingers to trace the path of the water that leaves the house vs. water on the street. They are still a little confused about sewer vs. storm drain.

Please provide any additional suggestions or comments:

Thank You!

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Kl Jones Elementary Teacher Name: Mr. Berkson Date: 2/25/20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☑	☐	☐
Encourage science discussion between peers?	☐	☐	☑	☐	☐
Support your district or school science curriculum needs?	☐	☐	☑	☐	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☑	☐	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

The Water model

What did students seem to enjoy ***least*** about this experience?

Ø

What was the Program Educator(s) most effective at? ***Please use educator names.***

Gaining the students attention

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

05465

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

5506

2019-2020 School Water Education Program - *Teacher Feedback*

School: K I Jones Teacher Name: ms.cardoza Date: 2·25·20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☑	☐	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

They LOVED the model! It was amazing!

What did students seem to enjoy ***least*** about this experience?

Nothing :)

What was the Program Educator(s) most effective at? ***Please use educator names.***

Ms. Williams had such a great energy about her. She handled the class well, was very engaging and made the effort to connect with the class!

What suggestions for improvement could you offer the Program Educator(s)?

N/A.

Please provide any additional suggestions or comments:

Thanks so much! :)

05467

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: K.I. Jones Teacher Name: G. Holland Date: 2.25.2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☑	☐	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☑	☐	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

enthusiasm of instructor
water sled demo.

What did students seem to enjoy ***least*** about this experience?

nothing

What was the Program Educator(s) most effective at? ***Please use educator names.***

Lynette Communicating her expectations to st. at the start of the lesson.

What suggestions for improvement could you offer the Program Educator(s)?

great as is

Please provide any additional suggestions or comments:

05469

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

5510

2019-2020 School Water Education Program - *Teacher Feedback*

School: Nelda Mundy Teacher Name: Mary Tarrant Date: 3/4/2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☑	☐	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☑	☐	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy *most* about this experience?

-> They loved the collaborative activities
-> They loved the pictures from Then & now
-> They loved how interactive it was!! The model was awesome

What did students seem to enjoy *least* about this experience?

What was the Program Educator(s) most effective at? *Please use educator names.*

Ms. Williams did a great job taking time to set out her expectations at the beginning of the lesson! Her personality is perfect for the presentation.

What suggestions for improvement could you offer the Program Educator(s)?

generally, they get antsy after about 20-30 minutes... maybe add a break to get their energy out OR split the lesson into two 30 min halves? (I know, that would be extremely hard!) ex: Rotate through classes (30 mins each class) for the 1st half), then rotate again & finish the last half?

Please provide any additional suggestions or comments:

-> embedding the fish video into the presentation would be awesome!

05471

2019-2020 School Water Education Program - *Teacher Feedback*

School: Nelda Mundy Teacher Name: Chase Date: 3-4-20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations: Map was fun for them.

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?	The shorter slide show helped keep their attention. :)			
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?	They loved the model of Fairfield.			
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?	Loved the Lake Pictures of drought.			

05472
5513

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Mundy Teacher Name: Hemphill Date: 3-4-20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☑	☐	☐
Encourage science discussion between peers?	☐	☐	☑	☐	☐
Support your district or school science curriculum needs?	☐	☐	☑	☐	☐

Additional comments or explanations:
Good rapport established between Ms. Williams + students

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?	Map reading			
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☐
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Scandia Teacher Name: Richards Date: 3/3/20

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☑	☐	☐
Support your district or school science curriculum needs?	☐	☐	☑	☐	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Scandia Teacher Name: Slaughter Date: 3/3/2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☐	☑	☐
Encourage science discussion between peers?	☐	☐	☐	☑	☐
Support your district or school science curriculum needs?	☐	☐	☐	☑	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☐	☑
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☑	☐	☐
After Lesson	☐	☐	☑	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☐	☑	☐
After Lesson	☐	☐	☑	☑
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☐	☑
After Lesson	☐	☐	☐	☑
What program activities supported any observed changes?				

The lessons that were taught leading up to the presentation were fun and engaging. The students loved the map and discussions.

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

They really enjoyed finding locations on the map as well as seeing real photographs.

What did students seem to enjoy ***least*** about this experience?

Having to wait to share their ideas.

What was the Program Educator(s) most effective at? ***Please use educator names.***

Keeping the kids engaged and excited. She communicated well and got them to listen.

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 School Water Education Program - *Teacher Feedback*

School: Scandia Elementary Teacher Name: Melissa Yao Date: 03/03/2020

Thank you for your feedback! Please use a checkmark (☑) to indicate your response to the rating questions below, and then respond to the additional questions on the back of this form.
Your feedback is important in improving the quality and impact of this program.

Does the SWEP lesson...	Needs improvement	Okay but room for growth	Yes	Exceptional	Don't know
Excite students about water conservation and resources?	☐	☐	☒	☐	☐
Encourage science discussion between peers?	☐	☐	☐	☒	☐
Support your district or school science curriculum needs?	☐	☐	☒	☐	☐

Additional comments or explanations:

Knowledge Gains	No knowledge	Minimal knowledge	Moderate knowledge	Advanced knowledge
My students' understanding of their drinking water comes from.				
Before Lesson	☒	☒	☐	☐
After Lesson	☐	☒	☒	☐
My own understanding of where my drinking water comes from.				
Before Lesson	☐	☒	☐	☐
After Lesson	☐	☐	☒	☐
What program activities supported any observed changes?				
My students' understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☒	☐	☐
After Lesson	☐	☐	☐	☐
My own understanding of water pollution and stewardship opportunities.				
Before Lesson	☐	☒	☐	☐
After Lesson	☐	☐	☒	☐
What program activities supported any observed changes?				
My students' understanding of the importance of water conservation.				
Before Lesson	☐	☒	☐	☐
After Lesson	☐	☐	☒	☐
My own understanding of the importance of water conservation.				
Before Lesson	☐	☐	☒	☐
After Lesson	☐	☐	☒	☐
What program activities supported any observed changes?				

Additional Feedback

What did students seem to enjoy ***most*** about this experience?

- the maps and model

What did students seem to enjoy ***least*** about this experience?

What was the Program Educator(s) most effective at? ***Please use educator names.***

Ms. Williams had a great way with the students! She spoke clearly and catered to their needs.

What suggestions for improvement could you offer the Program Educator(s)?

Please provide any additional suggestions or comments:

Thank you!

Thank you for taking your time to fill out this evaluation form. Your feedback is very important to us. Please return to educator or scan and send to education@solanorcd.org

2019-2020 Solano County Water Education Totals

Pre-COVID Scheduled Events					
Cities	**Assembly**	**Contest**	**Field Trip**	**Lesson**	**Total**
Benicia					
No. of Events	6	--	43	87	136
No. of Students	1413	--	1758	2565	5736
Dixon					
No. of Events	5	--	12	24	41
No. of Students	764	--	592	963	2319
Fairfield					
No. of Events	22	1	35	135	193
No. of Students	5289	5	1776	4031	11101
Rio Vista					
No. of Events	3	--	4	15	22
No. of Students	726	--	262	824	1812
Suisun					
No. of Events	9	--	6	34	49
No. of Students	2156	--	471	1343	3970
Travis					
No. of Events	4	--	5	27	36
No. of Students	1205	--	342	866	2413
Vacaville					
No. of Events	23	1	39	198	261
No. of Students	6786	5	2304	6124	15219
Vallejo					
No. of Events	30	1	28	148	207
No. of Students	8932	23	1788	4061	14804
Total No. of Events	**102**	**3**	**172**	**668**	**945**
Total No. of Students	**27271**	**33**	**9293**	**20777**	**57374**

Post-COVID Completed Events					
Cities	**Assembly**	**Contest**	**Field Trip**	**Lesson**	**Total**
Benicia					
No. of Events	4	--	15	64	83
No. of Students	970	--	703	1942	3615
Dixon					
No. of Events	4	--	8	21	33
No. of Students	664	--	393	867	1924
Fairfield					
No. of Events	18	1	15	80	114
No. of Students	4150	5	1027	2496	7678
Rio Vista					
No. of Events	3	--	2	12	17
No. of Students	726	--	140	752	1618
Suisun					
No. of Events	9	--	6	34	49
No. of Students	2156	--	471	1343	3970
Travis					
No. of Events	4	--	3	21	28
No. of Students	1205	--	217	681	2103
Vacaville					
No. of Events	23	1	17	125	166
No. of Students	6786	5	962	3934	11687
Vallejo					
No. of Events	29	1	12	99	141
No. of Students	8450	23	749	2764	11986
Total No. of Events	**94**	**3**	**78**	**456**	**631**
Total No. of Students	**25107**	**33**	**4662**	**14779**	**44581**

Suisun Marsh

Watershed Education Program

2019-2020 Program Summary

Solano RCD is grateful to the program funders:

Solano County Water Agency

Solano County Department of Resource Management

Fairfield Suisun Sewer District

Written and Administered by
Solano Resource Conservation District

1170 N Lincoln Suite 110 Dixon, CA 95620
Office 707.678.1655
solanorcd.org

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PROGRAM OVERVIEW

Solano County Water Agency (SCWA) is in the twelfth year contracting the Solano Resource Conservation District (Solano RCD) to implement the Suisun Marsh Watershed Education Program. Additional support is provided by Solano County Department of Resource Management and the Fairfield-Suisun Sewer District.

Sections of the curriculum were adapted from the California Coastal Commission's *Waves, Wetlands and Watersheds* and *Our Wetlands, Our World*. The teaching objectives are directly linked to California's Next Generation Science and Common Core standards. The curriculum was written in August 2008 and has been revised each year. Upon attending the BEETLES Project leadership Institute in August 2019, housed within the Lawrence Hall of Science at UC Berkley, Solano RCD leadership implemented research-based approaches and tools to improve science teaching and learning.

Marianne Butler directs the program, Allison Martin manages in curriculum and teacher relations. Laura Morgan and Lidia Tropeano coordinate in-class lessons and lead the field trips. Wendy Low, Shiree Rezendes and Olivia Wong teach in class lessons in addition to program educators Don Broderson, Carla Murphy, Deborah Bartens, Olivia Wong, and Paula Pashby lead field trip groups.

AUDIENCE

29 field trips occurred with 62 classes of 1954 students from Crystal Middle in Suisun City, Green Valley Middle and Public Safety Academy in Fairfield, Sierra Vista K-8 School, Orchard Elementary, Browns Valley Elementary and Willis Jepson Middle in Vacaville, Franklin Middle and Hogan Middle in Vallejo, Travis Elementary and Scandia Elementary in the Travis Air Force Base, Benicia Middle in Benicia, Dixon Montessori in Dixon and Riverview Middle in Rio Vista.

School	City	Grade	Total Students	Number of Classes
Sierra Vista K-8 School	Vacaville	7th	120	4
Orchard Elementary	Vacaville	6th	68	2
Willis Jepson Middle	Vacaville	7th	162	5
Browns Valley Elementary	Vacaville	6th	105	4
Riverview Middle	Rio Vista	6th	64	2
Crystal Middle	Suisun City	6th	68	2
Travis Elementary	Fairfield	6th	66	2
Scandia Elementary	Fairfield	6th	67	2
Green Valley Middle	Fairfield	6th	272	8
Public Safety Academy	Fairfield	6th	136	4
Benicia Middle	Benicia	6th	365	12
Dixon Montessori	Dixon	6th	47	2
Franklin Middle	Vallejo	6th	170	5
Hogan Middle	Vallejo	6th	240	8
TOTAL			**1954**	**62**

Since 2008, 11,557 students in 365 classes have participated.

GOALS AND OBJECTIVES

The Suisun Marsh Watershed Program takes a macro view of a discreet, special watershed, and builds on the ecology and stewardship lessons from our Watershed Explorers Program, but also stands alone. Participants leave the program:

- Understanding the concept of storm water pollution on their watershed, particularly the impacts of oil, chemicals and human debris in storm water;
- Increasing their awareness and knowledge of reduce, reuse, recycle messaging, and its impact on storm water pollution issues;
- Articulating the threats to Suisun Marsh and demonstrates how they can improve these ongoing issues;
- Articulating how water moves through the watershed and how it ends up in the Delta and ocean;
- Understanding that drought is inevitable in the California landscape and how students can conserve water and lessen their impact on the water system.

METHODOLOGY

Four program sessions take place between August-February. Three classroom lessons are held prior to each field trip and one lesson occurs after the field trip. Each class has the option of participating in a poster session at their school and taking a field trip to the North Bay Regional Water Treatment Plant.

The student field manual is included with this report. The lessons are updated each year and align with the current state science standards. Descriptions of the lessons are as follows:

Lesson One: In this lesson students use a model (Enviroscape) to explore important features of the Suisun Marsh and to understand how storm water affects our creeks, marsh, and ocean. This demonstration involves the addition of "pollutants" (motor oil, animal waste, and trash) to a landscape, adding "rain," and tracking where the water goes. Students are introduced to techniques to hone in their observation skills and ask questions like a scientist.

Lesson Two: Students explore the features and functions of the Suisun Marsh and other Solano County watersheds through mapping activities and modeling. Students are able to explain that pollution can be globally distributed as a result of the interconnectedness of water. Student's use I notice, I wonder to explain the function of a topographic map of the Suisun Marsh watershed and answer a series of questions about where and how water flows through Solano County. Finally, students model the path a piece of litter takes from a student's home, through the storm drains and creeks systems and eventually ending up in the ocean.

Lesson Three: Students investigate, analyze, and compare data to determine the impact of trash in Solano County and beyond. After describing how trash enters the ocean from in-land sources, students conduct a Solano County trash survey by sorting and counting the number of "trash" items collected during a "volunteer cleanup event." From this activity, students can describe that the most common items ending up in Solano County waterways are single use plastic debris. After quantifying the trash, participants create a plan of action to reduce the amount of waste they personally contribute to the environment (such as by practicing the Three R's).

An optional poster session allows participants to examine plants and animals found at Suisun Marsh more closely by researching and creating posters about the organism's habitat, behavior, and population status.

Field Trip to Rush Ranch Center: Students spend 4-5 hours thinking like a scientist as they collect data and engage in three science stations centered on the topics of soil, water, and plants. At the soil station, students use a color chart to identify soil composition and use their hands to experience the different textures of soil in the marsh and grassland. At the water station, students test the water from First Mallard Slough for dissolved oxygen, temperature, phosphates, pH, and turbidity. At the plant station, students set up a plant sampling quadrat and analyze the percent cover of plant species (native or non-native, invasive) within the site using

plant guides created by Suisun RCD. As a small group, they discuss the data from the different experiments and theorize how storm water pollution, development, drought and invasive species may affect the Suisun Marsh.

Following the stations, students enjoy lunch at the picnic tables in a eucalyptus grove. Students also take a moment to assess the environmental impact of their lunch choices and how they can utilize the Three R's to have a waste free lunch.

Next, students explore the Rush Ranch property by taking a nature walk through different habitats. Program educators facilitate an observation activity in which students can practice using all five senses as they explore the Rush Ranch. While on the walk, students look for scat, tracks, plants, and wildlife. Each student is equipped with a pair of binoculars to look for birds and they have the opportunity to view a sleeping barn owl.

Following the interpretive walk, students sit quietly on top of Overlook Hill and write poetry about their experiences and impressions of the wetland. Teachers submit the poems to River of Words. River of Words is a California-based non-profit organization that connects kids to the watersheds they live in through art and poetry. The organization runs an annual Art and Poetry Contest in conjunction with the Library of Congress. All program participants receive a Watershed Explorers Certificate.

Lesson Four: Following the field trip students participate in a Water Conservation Challenge. Students participate in a discussion about the importance of water in their daily lives and reflect on how they would survive with extremely limited water resources. Students complete a prediction of their household's water use for an upcoming day based on their family's usual water use. After they complete their prediction, students take their worksheet home and log their family's water for an entire day. Students also calculate the cost of their day's water use and extrapolate it for a year. The goal of this lesson is to get students to assess if their water use is more or less than they predicted and to implement along with their families water conservation measures.

PROGRAM EVALUATION

Student participants were asked to take a five-question assessment quiz developed by program staff on the last day of the program. The program ended just prior to COVID-19 pandemic was starting to take hold in California. Whether for this reason or not, 6 classes did not return post-program quizzes, so the data discussed here does not provide a full picture of the knowledge participants left with at the end of program. For this reason, this assessment measures student proficiency after a period of instruction and study in correctly providing answers to five questions intended to represent the program's core concepts.

The participant cohort returned 1387 post assessment quizzes. From this response, a straight 30 percent randomized sample was drawn for processing and analysis.

QUIZ RESPONSE OVERVIEW

Student ability to provide correct or partly correct answers to the five questions ranged from 45% to 88%. On average, 72% were able to provide correct or partially correct answers to all questions. Students were most challenged by the question asking them to "draw or write what they thought of when they heard the word watershed." 19% were able to include all the elements quiz designers were looking for, 26% provided some elements for a combined 45% providing a correct or partially correct answer to this question.

Students demonstrated more understanding in answering the question about behaviors and decisions that harm watersheds. 43% provided correct answers, 45% provided a partially correct answer (88% combined). They also did well with the question asking them for ways to protect watersheds: 45% gave a correct answer, 42% gave a partially correct answer (87% combined). When asked to predict how the marsh environment might change over

five years, 22% answered correctly, and 46% gave partially correct answers (68% combined). The cohort had a slightly more difficult time listing three things they learned about water over the program. 28% listed the requested 3 things and 43% listed at least one thing (71% combined). Overall, the cohort scored 72% correct and partially correct answers on the post-program quiz.

This is the second year we have asked students to draw or write an answer to one of our questions. This year, again, students performed slightly better in the narrative version of this question, providing correct or partially correct answers 3% more in the narrative than they did in the drawing. This is a relatively small difference, but it suggests that students are learning the rote facts better than they are integrating the knowledge we are teaching in a way that lets them explain and illustrate the concept to someone else. We continue to use these assessments to look at the areas where students struggle and make program adjustments and adapt our methodology to improve student understanding of our core concepts.

Appendix A – Teacher/Student Feedback

"I really enjoyed the whole experience and the quality of education we received."

– Chad VanHeusen, Scandia Elementary teacher (6th grade, Travis AFB)

"I loved the map activities. It was great to also use Google Maps to show students how to utilize [how] technology can be used in science."

– Mrs. Bracken, Browns Valley Elementary teacher (6th Grade, Vacaville)

Student Exit Tickets

My mind has changed about pollution. I've learned that there's way more trash in the world than I thought there was, and we can do something about it.

– Jasmine Leal, student

I learned outside water and storm drain water doesn't get cleaned and goes straight to waterways, and inside household water gets treated.

– Vanessa Sandoval, student

Today I learned how all the pollution like trash gets pushed down storm drains during storms and then flows into rivers. Also, sink water and wastewater flows to a place where people clean it a lot and then put it into the rivers. This was all demonstrated in a model. I had a lot of fun.

Appendix B – Photo Documentation

Students from Suisun City's Crystal Middle School test the temperature of a water sample from the marsh.

Students from Vacaville's Browns Valley Elementary reflect on their day and share their watershed poems.

Nelda Mundy students participate in a BEETLES (Lawrence Hall of Science) activity called *Making Observations*.

Suisun City's Crystal Middle School students compare soil samples from wetland and grassland habitats.

Benicia Middle students demonstrate how stormwater enters our creeks.

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Appendix C – River of Words Poetry/Drawing

Franklin Middle School student in Vallejo provides an illustration using grass and soil from the marsh to add color to their drawing.

Appendix D – Program Thank You Card

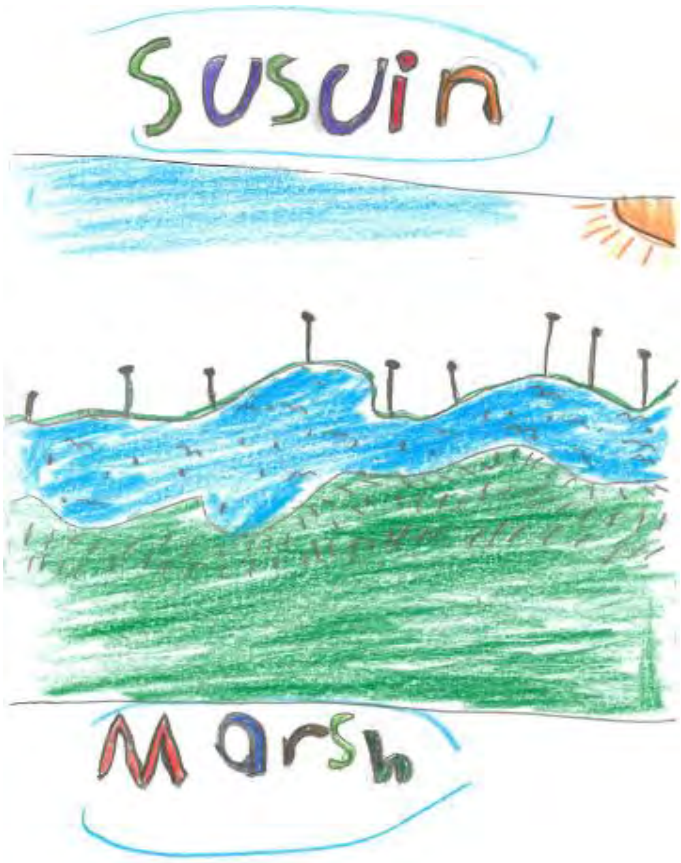

Dear Ms. Rezendez,

Thank you for being my guide on the field trip! You helped me with a lot of ways to conserve water. One of the ways I learned to save water is to put a bucket in the shower while the water is heating. Good use that water for plants. Once again, thank you!

Sincerely,

Macy

Transcribed from above –

Dear Ms. Rezendez,
Thank you for being my guide on the field trip! You helped me with a lot of ways to conserve water. One of the ways I learned to save water is to put bucket in the shower while the water is heating up and use that water for plants. Once again, thank you!
Sincerely, Macy
6th grader from Orchard Elementary School (Vacaville)

Watershed Explorers Program

2019-2020 Program Summary

Solano RCD is grateful to the program funders:

Solano County Water Agency
Solano County and All City Jurisdictions
Beverage Container Recycling City/County Payment Program
CalRecycle Used Oil Recycling Program
Vallejo Water Conservation Program
Vallejo Flood and Wastewater District
Fairfield-Suisun Sewer District
Potrero Hills Landfill

Fall field trip component funded by the Habitat Conservation Fund administered through Greater Vallejo Recreation District

Written and Administered by
Solano Resource Conservation District

1170 N Lincoln Suite 110 Dixon, CA 95620
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solanorcd.org

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PROGRAM OVERVIEW

The Watershed Explorers Program engages third grade students in exploring their local watershed through in-class lessons provided by their classroom teacher, a water lesson facilitated by the Solano RCD through the School Water Education Program, and a field trip to a local park or open space. Concepts are linked to the *Next Generation Science Standards for California Schools.* In both lessons and on the field trip, students are prompted to use exploration routines to develop a mindset of curiosity, support development of scientific language and use of tools, and to directly engage with their peers to build their social and communication skills.

In March 2020, in-person lessons and field trips were cancelled as schools closed in response to COVID-19. Solano RCD created a Watershed Explorers Program distant learning online page with digital activities, videos and additional resources for topic extensions.

GOALS AND OBJECTIVES

The primary program goal of the Watershed Explorers Program is to help students develop an awareness of the outdoor, natural world. Specifically, students obtain, evaluate, and communicate information about how drought and runoff pollution influences living things in a watershed and leave the program able to:

- Describe the path water takes from source to sink;
- Understand the role drought plays and practice ways to conserve water;
- Recognize how stormwater influences our watersheds and the impacts of motor oil and trash;
- Understand how to mitigate the impacts of their own and their family's behaviors on the local watershed by becoming stewards of our county waterways, including how to implement the "Triple R" (reduce, reuse, recycle) messaging.

AUDIENCE

2020 Scheduled Participants

- Benicia – 4 schools comprising 13 classes of 321 students – no spring field trip
- Vallejo – 5 schools comprising 14 classes of 329 students – no spring field trip
- Fairfield – 3 schools comprising 13 classes of 315 students and 76 adults
- Suisun – 2 school comprising 9 classes of 200 students and 39 adults
- Vacaville – 4 schools comprising 10 classes of 252 students – no spring field trip
- Dixon – 3 schools comprising 10 classes of 253 students and 26 adults
- Rio Vista – 1 school comprising 3 classes of 72 students a – no spring field trip
- Travis AFB – 1 school comprising 3 classes of 84 students and 13 adults
- Unincorporated - 1 school comprising 3 classes of 75 students and 10 adults

Registered for the program were 24 schools, 78 classes with 1,901 students. 41% of all Solano County 3rd grade classes enrolled in the program. Due to COVID-19, 11 field trips with 852 students and 164 chaperones from 35 classes actually participated.

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School Name	Classes	Students	Field Trip Site	Spring Trip Date
Dixon				
Anderson Elementary	3	75	Pond C	Tues. January 28th*
Dixon Montessori	4	103	Pond C	Thu. February 6th* Fri. February 7th*
Gretchen Higgins	3	75	Valley Glen Pond A	Thu. April 16th
Fairfield/Unincorporated				
KI Jones	6	126	Rockville Hills	Mon. March 2nd* Tues. March 3rd*
Laurel Creek	3	81	Rockville Hills	Thu. March 5th*
Nelda Mundy Elementary	4	108	Rockville Hills	Tues. March 10th*
Tolenas	3	75	Rockville Hills	Thu. February 20th*
Suisun				
Crescent Elementary	4	100	Rockville Hills	Thu. February 27th*
Suisun Elementary	5	100	Rockville Hills	Fri. March 6th*
Travis				
Scandia Elementary	3	84	Rockville Hills	Mon. March 9th*
Rio Vista				
D.H. White Elementary	3	72	Sandy Beach	Mon. March 30th
Vacaville				
Edwin Markham Elementary	3	72	Lagoon Valley	Fri. April 3rd
Hemlock Elementary	3	74	Lagoon Valley	Thu. March 26th
Kairos Public School Academy	2	50	Lagoon Valley	Thu. April 2nd
Orchard Elementary	2	56	Lagoon Valley	Tues. March 31st
Benicia				
Joe Henderson Elementary	4	96	Glen Cove/Benicia SRA	Tue. April 21st
Mary Farmar Elementary	3	78	Glen Cove/Benicia SRA	Wed. April 22nd
Matthew Turner Elementary	3	72	Glen Cove/Benicia SRA	Thu. April 30th
Robert Semple Elementary	3	75	Glen Cove/Benicia SRA	Thu. April 23rd
Vallejo				
Cooper Elementary	3	66	Glen Cove/Benicia SRA	Tue. May 5th
Highland Elementary	3	75	Glen Cove/Benicia SRA	Fri. May 1st
Patterson Elementary	2	50	Glen Cove/Benicia SRA	Fri. May 8th
Pennycook Elementary	4	90	Glen Cove/Benicia SRA	Mon. April 27th
Wardlaw Elementary	2	48	Glen Cove/Benicia SRA	Fri. April 24th
Planned Classes:	**78**		**Planned Students:**	**1901**
Actual Participating Classes:	**35**		**Actual Participating Students:**	**852**

Table 1. Program participation by school. Actual field trips that occurred are indicated with an asterisk.

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Fall Phenology Component
804 students from 33 classes of the Watershed Explorers Program participated in the fall phenology field trip. Participating students came from across all seven cities in the County, each visiting their respective city's park or open space. These students had the opportunity to compare and contrast environmental variances within the parks from fall to spring as well as document the different phenophases, or stages they observed. The student-collected data is submitted to the USA National Phenology Network (USPN) where it is utilized to better understand how plants, animals, and ecosystems respond to changes in the climate locally, regionally, and nationally.

METHODOLOGY

Teacher-Led Activities
Participants receive a Watershed Explorers Student Journal, which contains activities to complete prior to the RCD-facilitated lesson and field trip. Classroom teachers receive preparatory information in a Watershed Explorers Teachers Guide and are able to use this resource to lead students through completing the following activities.

What Is A Watershed Explorer? Students hypothesize what a watershed explorer looks like and what they might do. They consider what they may bring in their backpack and what they may look for. Students use words and drawings to express their ideas. At the end of the program, students repeat this activity with the hope that they draw themselves and understand that anyone can become a watershed explorer.

What Is Phenology? This activity introduces the concept of phenology by having students make inferences about a deciduous tree that is changing throughout the seasons. Teachers introduce observation tools that are used throughout the program, including *I notice, I wonder, It reminds me of.* These tools are adapted from the Lawrence Hall of Science BEETLES Program.

Fun with Phenology. Students connect their personal experiences to phenological events by playing a bingo-inspired game. Students share, discuss, and record various natural events that happen during specific seasons. The goal of this activity is to have students apply their own experience to the concept of phenology to understand why it is important for scientists to track phenological events.

How Are You Connected To Water? This activity summarizes the water cycle by having students imagine that they are a drop of water traveling from the clouds, into creeks, rivers, and oceans. Drought, storm drains and stormwater pollution are key components of this activity. Students are asked to use words and drawings to show the path that their unique water droplet takes after it hits the ground.

How Much Water Do You Use? Students log their daily water use in gallons, and look for ways that they can conserve water wherever they are. The term drought is introduced and explained to further help students understand why it's important to be water conscientious in California.

How Do Watersheds Work? Students model and observe how a watershed works by using a crumpled piece of paper as their landscape and a spray bottle to represent rain.

What's In My Watershed? Students explore their campus and look for evidence that their school is part of a watershed. Teachers help students connect stormwater pollution and drought impacts on their local watershed.

School Water Education Program – Water Lesson

With support from the Solano RCD's School Water Education Program, a Solano RCD educator provides a 50-minute presentation for each enrolled class featuring where students' drinking water comes from, where stormwater goes, and ways they can conserve water. Students use maps provided by the Solano County Water Agency to discover how Solano County drinking water travels to their home and how they can conserve that water. Students see the movement of water pollution while using a hands-on, three-dimensional non-point source watershed model (EnviroScape). As part of this activity, students learn the key differences between sewer and stormwater pathways.

Field Trip Components

When students arrive on the field trip, they are outfitted with the equipment they'll need to investigate the landscape and divided into small groups. Guided by program educators, students use their journals and participate in these hands-on activities.

Storm Drain Model

Description: Students observe a storm drain model demonstration by creating an "oil spill" and then following the path of the contaminated water. Students discuss the significance of properly disposing used oil, and watch their program leader dump "oil" in a recycling container. ***Desired Outcome:*** Students bring their student journal home and share with their parents where they can discard used motor oil.

Watershed Drawing

Description: Students model the movement of pollution (e.g., oil and litter) through a watershed; from streets, to storm drains, out to creeks, and oceans. The students verbally explain their drawings to the group. ***Desired Outcome:*** Students tie key watershed and stormwater pollution concepts together to deepen their knowledge.

Reduce, Reuse & Recycle (RRR)

Description: Educators talk to students about RRR concepts, using student lunches as tangible examples of reusable items and the importance of recycling. Each student journal includes a color-it-yourself CRV page comic featuring Petrolia the Used Oil Avenger - *Petrolia and the Case of the CRV Refund* to reiterate that many cans and bottles can be exchanged for cash. Classes are invited to participate in the WE! Recycle Challenge by collecting recyclables in their class for a month and turning them in at a CRV Recycling Center. ***Desired Outcome:*** Students understand the significance of the RRR message and begin discarding trash responsibly while also engaging in the California Beverage Container recycling program.

Plant and Animal Phenology

Description: As a group and individually, students observe a plant or animal to help them deepen their observation skills and put what they observe into context with the current season. Students make predictions about how the characteristics of the plant (e.g., number of flower buds) or animal (e.g., nesting behavior) will change over time, and how drought may affect these organisms and their watershed. Students are encouraged to come back with their families to check if their predictions are accurate. ***Desired Outcome:*** Students are able to identify phenological characteristics of plant and animal behaviors, and are able to predict how the impact of drought may affect their watershed.

Discovery Swap

Description: In this two-part activity, students practice making and recording observations through nature journaling, use field guides to identify organisms, and present findings to their peers. At the beginning of the activity, students pair up and collect macroinvertebrates in a local creek, pond, or lake with a net and tray. Students brainstorm how various pollutants and drought can harm macroinvertebrates and other life in the ecosystem they are studying.

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Desired Outcome: Students will directly connect drought and stormwater pollution to the vitality of macroinvertebrates, and all life that relies on them, in their local waterways.

Phenology Observation Quest

Description: Students work in pairs to locate and identify seasonally driven phenomena (e.g., opening leaf buds, pollinator activity, dropping leaves). Once the Observation Quest is complete, the group discusses how understanding phenology is important to organism's dependency on water availability, and how we should all conserve water to support plants and animals during times of drought. ***Desired Outcome:*** Students will directly connect water consumption to preservation of life across all ecosystems.

Distance Learning Resources

In early April 2020, Solano RCD began creating distance learning materials featuring five key components of the Watershed Explorers program: the watershed concept, stormwater pollution, water from source to sink, phenology, and watershed stewardship. Each topic included two or more short videos featuring program staff, several printable pages from the program's Student Journal, and links to additional resources to allow for further exploration. The materials were made available on the Solano RCD website, solanorcd.org, under Distance Learning. The resources were shared directly with teachers and school principals and formatted to be readily incorporated into the teacher's digital classroom.

What is a Watershed?

Description: Students watch four videos of staff describing watersheds using homemade models and/or sharing watershed phenomena they found around their home. Participants complete three activities from the Student Journal, either by printing out the pages or transcribing their work into a notebook. Students also have the option of creating their own watershed models and investigating miniature watersheds around their home. ***Desired Outcome:*** Students understand what a watershed is and can identify their local Solano County watershed.

Storm Drains and Storm Water Pollution

Description: Students watch two videos featuring program staff as they track stormwater flowing into their local storm drains and describe stormwater pollution. Afterwards, participants are encouraged to conduct investigations for how development can impact the flow of stormwater and what may contribute to stormwater pollution. ***Desired Outcome:*** Students tie key watershed and stormwater pollution concepts together to deepen their knowledge and protect stormwater quality.

Solano County Water from Source to Sink

Description: Students watch one of two videos in which program staff use Google Earth and other imagery to describe the sources of tap water for the different cities of Solano. ***Desired Outcome:*** Students can list and describe the source(s) of their tap water and describe why it is important to save water, especially during droughts and for the future since it is uncertain when the next drought will come.

Phenology

Description: Students learn about phenology through four videos, each video teaching a new skill to help students become better scientific observers and to consider the impacts drought and climate change has on ecosystems. ***Desired Outcome:*** Students use observation tools and nature journaling to document their observations and scientific questions to better understand their local watershed.

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Watershed Stewardship

Description: Equipped with a list of achievable stewardship actions, students are inspired to become Watershed Protectors. They watch five videos on the following topics: RRR message, CRV (California Redemption Value) program, recycling used oil, stopping water waste in the garden, and saving water in the home. Participants are given activity pages and resources on used oil recycling as well as the CRV program. They are invited to create a list of how they will accomplish protecting their watershed. ***Desired Outcome:*** Students feel knowledgeable and empowered to take the actions necessary to protect their watershed and can support their families in doing the same.

Watershed Wednesday

Every Wednesday in May, SRCD educators led a live, virtual classroom from 10am-11am via Zoom Webinar. Students, parents, and teachers from Solano County were invited to attend. Each Wednesday covered a different watershed topic.

Making a Watershed – May 6, 2020

Description: Students learned about watersheds by building a watershed model with paper, markers, and a spray bottle. ***Desired Outcome:*** Students understand the term watershed, can name their local watershed, and list ways that they can be a watershed protector.

Solano County Water Report – May 13, 2020

Description: Students received a report from a program educator who dressed up like a reporter and provided an update on California's current water conditions. Students then played the reporter and reported on how they conserve water in their home. ***Desired Outcome:*** Students learn about their local water resources and the importance of water conservation in California.

Making Observations – May 20, 2020

Description: Students are introduced to topics of drought and phenology by making and recording observations of natural phenomenon happening right outside of student's homes. ***Desired Outcome:*** Students sharpen their observations skills and gain insight into how plants and animal react to the changing seasons.

Aquatic Mini-Beasts – May 27, 2020

Description: Students are introduced to the wild array of macroinvertebrates living in Solano County creeks and use their observation skills to record information on the critters they observe. ***Desired Outcome:*** Students understand how abundance and diversity of macroinvertebrates Solano County's local creeks can reveal the quality of our creek water. Students learn how the actions they take around the homes or schools can impact the life living in our waterways.

Teacher Feedback for Watershed Wednesdays

"I really enjoyed your presentation. I especially like when you polled the audience with questions. I was too shy to speak up, so the poll made me feel like I was still participating. I also enjoyed the Nature Guide activity (I am going to bring it up in my Zoom meeting today) and would recommend having another "hands on project" kids love making things! I am going to tell my students to watch next week! Thank you!" –Bessie Bazos, Robert Semple Elementary, Benicia

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PROGRAM EVALUATION

We assess gains in student knowledge about concepts taught in the Watershed Explorers program with a two-part assessment quiz. The first quiz is administered before students participate in the program, this is intended to make a baseline assessment of their prior knowledge. Participants take the second, identical quiz after participating in the in-class curriculum and fieldtrip, to identify changes in knowledge as students leave the program. The 4-question pre and post assessments are designed to measure understanding of the watershed concept, phenology, and water conservation.

Watersheds are a historically difficult concept for students of all ages. We are experimenting with ways to match our question format to students' literacy and ability to respond in writing. We have shortened our quiz instrument to its current format, in addition to introducing the idea of visually providing answers instead of requesting them verbally. Field trip participants vary wildly in reading and comprehension skills, which exacerbates the difficulty of written response-driven assessment. As is always the case, at least half of all samples analyzed required a very fluid understanding of spelling and phonetics to decode, with some responses virtually indecipherable.

Evaluation Questions include:

1. Draw and/or write what you think of when you hear the word "watershed"?
   Desired elements: Hills/mountains, cityscape, storm drains, water flowing into waterways/watershed.
2. List ways nature changes as the seasons change.
   Desired Response: Leaves fall, flowers bloom, the rainy season comes, rain falls, etc.
3. List ways you can protect water.
   Desired Response: Keep storm drains/storm water clear of pollution, RRR, recycle used oil, clean up after your pet, teach your friends and family about storm water pollution, etc.
4. What should we do if we don't get much rain?
   Desired Response: Conserve water by turning the water off when brushing teeth or washing hands, taking shorter showers, water plants in the AM and PM, etc.

<u>Fall Phenology Field Trips</u>
Fall 2019 was the third year of a Habitat Conservation Fund grant-funded five-year program to pilot a fall WE field trip focused on phenology, with a strong citizen science emphasis. 804 students participated in eleven 4-hour field trips, representing 33 classes containing an average of 24 students each.

622 students completed the pre-assessment, which asked them to spend 5 minutes using words and/or drawings to answer the questions. Students struggled with all of these questions, with only 28% able to provide correct or partially correct answers to most questions. Students did best at answering the question about changes in nature, with 45% able to provide correct or partially correct answers. 37% were able to provide correct or partially correct answers about ways to protect water. 16% gave correct or partially correct answers to the question about what to do when it didn't rain very much, and no one was able to describe a watershed in images or in words.

560 students completed the post assessment, which asked the same questions. 52% of respondents were able to answer all questions correctly or partially correctly, an improvement of 28% overall, with improvements on individual questions ranging from 9% to 82%. The greatest improvement was to the "ways to protect water" question, to which 82% of students provided correct or partially correct answers, an increase of 44%. Students also showed marked improvement in their understanding of what happens in a drought, with 60% providing a correct or partially correct answer. As in the pre-assessment, the "what do you think of when you hear 'watershed'" question proved to be the most challenging, with only 9% of students providing correct/partially correct answers. Fall field trip material

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focuses mostly on the aspect of phenology, thus the results are consistent with intended program messaging.

Winter-Spring Field Trips

Increased funding allocation started this year with the expectation that Solano RCD would increase the number of classes it took on field trips in their home watershed. The COVID-19 pandemic interrupted those plans, as well as the ability of the students and teachers who did participate to access the full experience.

The Governors Shelter in Place Order, implemented in late March, reduced the number of schools participating in our spring program from 24 to nine. Of those nine, only three schools (Dixon Montessori, Nelda Mundy, and Suisun Elementary) also participated in the fall program, rendering comparisons between the groups who participated in both field trips with the group who participated in only the spring field trip of little statistical use.

449 students completed the spring pre-assessment quiz. 49% of these students were able to provide correct or partially correct answer to all questions, with 51% providing no answer or incorrect answers. As in the fall program, the “draw or describe a watershed” question was by far the most difficult for participants, but 20% of respondents were able to complete this task correctly or partially correctly. In the fall, no student could do this in the pre-assessment. 36% (16% in fall cohort) of students gave correct or partially correct answers to the water conservation question, 67% (37% in fall cohort) provided correct or partially correct answers to the water protection question, and 76% (55% in fall cohort) were able to correctly or partially correctly list phenological changes across seasons. Students demonstrated better understanding of all concepts, presumably because of the teaching and learning they were exposed to in the interim.

435 students completed the post assessment instrument, with an average of 76% correctly or partially correctly answers given for all questions, an improvement of 26 percentage points from the pre-assessment. Greatest improvement was in the watershed concept question: 66% of students provided correct or partially correct answers on the post assessment, an improvement of 46%. Improvement was lowest for the phenology question, with students moving from 76% correct or partially correct to 86% percent correct or partially or correct, suggesting solid understanding of the concept to begin with, which was improved by more exposure. Students had the most trouble with the water conservation question, with 64% providing correct or partially correct answers, a gain of 28 over the course of the program. Overall student performance moved from an F to a C+, a solid gain in understanding.

PHOTO DOCUMENTATION

Highland students from Vallejo journaling after a hike from Glen Cove to Benicia State Recreation Area.

D.H. White students work on their watershed drawing at Sandy Beach Park in Rio Vista.

Students from Dixon Montessori making and recording observations at Pond C in Dixon.

Vacaville students learn that drought can influence their local waterways at Lagoon Valley Park.

Students give a thumbs up after doing Discovery Swap at Rockville Hills Regional Park.

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February 28th , 2020 IPM training with local Master Gardeners.

* 2020. Feb. 28 * 1PM/Sustainable landscapes

SIGN IN SHEET

Ramona Thomas
Jennifer Neumann
Gary Salcido
Kevin Cullen
Kathy Ramirez
Ron Marshall
Brad Miller
Laura J Spangler
Betty Victor
Kristina Moore
Jean Strauss
LINDA GOEI
Lori Mayoza
Kathleen O'Kelly
Alex Russell
Tim Wells
Jovina Buscagan
JoAnn Brown
Spring Tseng
Patrick Wen
Darrell Schramm
Donna Sesla
Jeanine McAvaney
Stacey Brooker
Angela Davidson
NATALIE PAN
Alan DeLeonardi
Nancy Lower

FAIRFIELD-SUISUN SEWER DISTRICT
1010 CHADBOURNE ROAD • FAIRFIELD, CALIFORNIA 94534 • (707) 429-8930 • WWW.FSSD.COM
GREGORY G. BAATRUP, GENERAL MANAGER

May 29, 2020

Mr. Michael Montgomery, Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Attention: Mr. Keith Lichten, Chief Watershed Management Division

Re: Fairfield-Suisun Urban Runoff Management Program - Compliance with Water Board Requirements during the Coronavirus 2019 (COVID-19) Emergency

Dear Mr. Montgomery:

The cities of Fairfield and Suisun City are responsible for the protection of stormwater quality in their city's jurisdictional boundaries under the Municipal Regional Stormwater Permit, Order No. R2-2015-0049 (MRP). This letter is in response to the State Water Board directive of March 20, 2020 regarding compliance with Water Board requirements during the Coronavirus 2019 (COVID-19) emergency.

The attached summary lists provisions in the MRP that have been impacted by compliance with public health orders and some responsibilities that may not be met within this reporting period. The cities and the Program will provide detailed descriptions in their respective annual reports for 2019-2020, which will be submitted by September 30, 2020.

If you have any questions or concerns please contact me at KCullen@fssd.com or 707-688-8895.

Sincerely,

Kevin A. Cullen

Kevin A. Cullen, P.E.
Fairfiel-Suisun Urban Ronoff Program Manager

Attachment

C: Nick Lozano, Suisun City
Alvin Lei, Fairfield

MRP PROVISIONS THAT MAY BE IMPACTED BY COVID-19 RESPONSE as of May 29 , 2020		
Permit Section	**Potential and Actual Deficiencies Due to COVID-19 Restrictions**	**Potential Mitigation**
C.2	Staff training; no in-person trainings are being held.	Develop remote trainings
C.4	Routine business inspections are not being conducted at a frequency previously conducted. High priority facilties may not all get inspected	Continue prioritized inspections at a safe pace
C.5	Illicit discharge response is more limited; the ability to respond to spills and complaints is periodically impacted by reduced staff presence.	Incidents may have to be prioritized based on availability of limited essential personnel
C.6	Staff training; no in-person trainings are being held. Abilities to respond to complaints may be slowed or more limited due to reduced staff presence.	Develop remote trainings; Incidents may have to be prioritized based on availability of limited essential personnel
C.7	Spring outreach events cancelled. School tours were cancelled; All volunteer creek and shoreline cleanups have been cancelled and will not be rescheduled within the reporting period.	virtual sessions are now available through the Solano Resource Conservation District. Possible outreach to volunteers with encouragement for individual cleanups since regular volunteer activities not possible.
C.9	Planned staff trainings have been cancelled.	Develop remote trainings
C.10	Inspection and maintenance of trash full capture devices may be reduced due to staff and contract staff constraints. All volunteer creek and shoreline cleanups have been cancelled and will not be rescheduled within the reporting period. Trash hot spots may not be cleaned due to availability of contract staff.	Continue prioritized inspections and maintenance at a safe pace Possible outreach to volunteers with encouragement for individual cleanups since regular volunteer activities not possible.
C.11/12	Staff may not be able to follow PCB/Hg plans due to decreases in staffing.	Continue prioritized inspections and investigations at a safe pace

Section 9 – Provision C.9 Pesticides Toxicity Controls

C.9.a. ►Implement IPM Policy or Ordinance

Is your municipality implementing its IPM Policy/Ordinance and Standard Operating Procedures?		Yes	x	No
If no, explain:				

Report implementation of IPM BMPs by showing trends in quantities and types of pesticides used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphates, pyrethroids, carbamates fipronil, indoxacarb, diuron, and diamides. A separate report can be attached as evidence of your implementation.

Trends in Quantities and Types of Pesticide **Active Ingredients** Used[1]

Pesticide Category and Specific Pesticide **Active Ingredient** Used	Amount[2]					
	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Organophosphates	NA	NA	NA	NA	NA	
Active Ingredient Chlorpyrifos	NA	NA	NA	NA	NA	
Active Ingredient Diazinon	NA	NA	NA	NA	NA	
Active Ingredient Malathion	NA	NA	NA	NA	NA	
Pyrethroids (see footnote #57 for list of active ingredients)	NA	NA	NA	NA	NA	
Active Ingredient Type X	NA	NA	NA	NA	NA	
Active Ingredient Type Y	NA	NA	NA	NA	NA	
Carbamates	NA	NA	NA	NA	NA	
Active Ingredient Carbaryl	NA	NA	NA	NA	NA	
Active Ingredient Aldicarb	NA	NA	NA	NA	NA	

[1]Includes all municipal structural and landscape pesticide usage by employees and contractors.
[2]Weight or volume of the active ingredient, using same units for the product each year. Please specify units used. The active ingredients in any pesticide are listed on the label. The list of active ingredients that need to be reported in the pyrethroids class includes: metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambdacyhalothrin, and permethrin.

Fipronil	NA	NA	NA	NA	NA	
Pesticide Category and Specific Pesticide **Active Ingredient** Used	Amount					
	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Indoxacarb	Reporting not required in FY 15-16	NA	NA	NA	NA	
Diuron	Reporting not required in FY 15-16	NA	NA	NA	NA	
Diamides	Reporting not required in FY 15-16	NA	NA	NA	NA	
Active Ingredient Chlorantraniliprole		NA	NA	NA	NA	
Active Ingredient Cyantraniliprole		NA	NA	NA	NA	

Reasons for increases in use of pesticides that threaten water quality:

Both Program cities have adopted IPM policies. This provision is handled at the city level. Please see individual city reports for this information.

IPM Tactics and Strategies Used:

Both Program cities have adopted IPM policies. This provision is handled at the city level. Please see individual city reports for this information.

C.9.b ►Train Municipal Employees

Enter the number of employees that applied or used pesticides (including herbicides) within the scope of their duties this reporting year.	NA
Enter the number of these employees who received training on your IPM policy and IPM standard operating procedures within this reporting year.	NA
Enter the percentage of municipal employees who apply pesticides who have received training in the IPM policy and IPM standard operating procedures within this reporting year.	NA

Type of Training: Due to the Covid-19 Pandemic the Program contracted with its IPM consultant, Suzanne Bontempo to provide training on IPM via video. Each city applicator was Given the opportunity the opportunity to view the video on their own time and at their own pace. In doing this the training was much more effective and personal to the individual applicator.

C.9.c ►Require Contractors to Implement IPM

Did your municipality contract with any pesticide service provider in the reporting year, for either landscaping or structural pest control?		Yes	x	No
If yes, did your municipality evaluate the contractor's list of pesticides and amounts of active ingredients used?		Yes	x	No,
If your municipality contracted with any pesticide service provider, briefly describe how contractor compliance with IPM Policy/Ordinance and SOPs was monitored Both Program cities have adopted IPM policies. This provision is handled at the city level. Please see individual city reports for this information.				

C.9.d ►Interface with County Agricultural Commissioners

Did your municipality communicate with the County Agricultural Commissioner to: (a) get input and assistance on urban pest management practices and use of pesticides or (b) inform them of water quality issues related to pesticides,		Yes	x	No

If yes, summarize the communication. If no, explain. Both Program cities have adopted IPM policies. This provision is handled at the city level. Please see individual city reports for this information.				
Did your municipality report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire.		Yes	x	No
If yes, provide a summary of improper pesticide usage reported to the County Agricultural Commissioner and follow-up actions taken to correct any violations. A separate report can be attached as your summary.				

C.9.e.ii (1) ►Public Outreach: Point of Purchase

Provide a summary of public outreach at point of purchase, and any measurable awareness and behavior changes resulting from outreach (here or in a separate report); **OR** reference a report of a regional effort for public outreach in which your agency participates.

Summary:

See attached OWOW report from Program Contractor Darleen Halstead.

C.9.e.ii (2) ►Public Outreach: Pest Control Contracting Outreach

Provide a summary of outreach to residents who use or contract for structural pest control and landscape professionals); **AND/OR** reference a report of a regional effort for outreach to residents who hire pest control and landscape professionals in which your agency participates.

Summary:

IPM Program Consultant Suzanne Bontempo provided IPM training for Solano County Master Gardeners, who in turn instruct the general public on safe gardening practices at local farmers' markets and events throughout the county. Also described was the connectivity of the streets to our local creeks; the difference between stormwater and wastewater; the wastewater treatment process; how pesticides can impact the process.

C.9.e.ii.(3) ►Public Outreach: Pest Control Operators

Provide a summary of public outreach to pest control operators and landscapers and reduced pesticide use (here or in a separate report); **AND/OR** reference a report of a regional effort for outreach to pest control operators and landscapers in which your agency participates.

Summary:

IPM Program Consultant Suzanne Bontempo provided IPM training for Solano County Master Gardeners, who in turn instruct the general public on safe gardening practices at local farmers' markets and events throughout the county. Also described was the connectivity of the streets to our local creeks; the difference between stormwater and wastewater; the wastewater treatment process; how pesticides can impact the process.

C.9.f ►Track and Participate in Relevant Regulatory Processes

Summarize participation efforts, information submitted, and how regulatory actions were affected; **AND/OR** reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected.

Summary:

The actual work of tracking and participating in the ongoing regulatory efforts related to pesticides was accomplished through CASQA. CASQA conducted its activities on behalf of members and coordinated funding contributions and activities through its Pesticides Subcommittee, a group of stormwater quality agencies affected by pesticides or pesticides-related toxicity listings, TMDLs, or permit requirements, as well as others knowledgeable about pesticide-related stormwater issues. FY 2019-20 was another productive year for the Subcommittee. The CASQA Pesticides Subcommittee continued its collaborative work with Water Board, and California Department of Pesticide Regulation staff in the development of a statewide Urban Pesticides Amendments aimed at reducing regulatory burdens on MS4s while institutionalizing effective pesticide regulations by DPR that will prevent and mitigate urban water quality impacts.

For further information, please see attached BASMAA's Annual Report letter describing regional activities pertaining to C.9.f: Tracking and Participating in Relevant Regulatory Processes.

OUR WATER - OUR WORLD

Fairfield-Suisun Sewer District

Our Water Our World Retail Partners Final Report

July 2019 – June 2020

prepared by Suzanne Bontempo, Plant Harmony

Program Notes:

The Our Water Our World retail partnership program is currently in 2 retailers:

The Home Depot	Fairfield
Ace Hardware	Suisun City

OWOW IPM Retailer Trainings

Fairfield-Suisun OWOW retailer trainings:

A total of 2 training were conducted, with 19 associates trained.

Topics covered in the training:

- An OWOW partnership program overview
- Pesticides that are water pollutants of concern
- Where to dispose of local HHW
- How less toxic products work
- IPM techniques
- Beneficial Insect Identification
- Water Conservation
- Benefits of Mulch
- Water-wise plant choices for our area
- Pests highlighted: Aphids, ants, bed bugs, citrus leaf miner, fleas, gophers, rats & mice, snails & slugs, spider mites, whitefly, fungal diseases, and many customer habits, such as how over fertilizing can increase pest populations.
- Invasive pests: Ligurian Leaf Hopper, Spotted Winged Drosophila, Asian Citrus Psyllid
- OWOW website and the 'Ask the Expert' feature, UC Davis IPM website, BIRC website
- UCIPM You Tube informational channel

Resources provided to each OWOW training attendee includes:

- The Mac's Field Guide Good Garden Bugs of California
- Monthly Pest Calendar
- How to Apply Beneficial Nematodes
- How Less Toxic Products Work handout
- Home Depot less toxic product list for the Home Depot Store trainings
- List of websites, books, and catalogs on a resource sheet
- Sheet Mulching instructions
- The CA DPR's 'How to read a pesticide label' handout
- Information on pest problem solving for the following pests: spider mites, lifecycle of grubs, whiteflies, spider mites, citrus leaf miner, Asian Citrus Psyllid, DPR's handout on bed bug management, and the UCIPM Quick tips for gopher controls
- 10 Most Wanted Bugs for Your Garden brochure
- OWOW pocket guides
- Solano County Vector Control Program

Additional materials focused on this year by OWOW:

- A one sheet informational handout on 'Keeping Rats & Mice out'
- A one sheet informational handout on 'Rats in the Garden'
- Retail Nursery & Garden Center IPM News
- Asian Citrus Psyllid Campaign fliers in the nursery, displayed in the aisle and stocked in the OWOW literature rack
- UCIPM DIY bed bug management
- Eco-herbicide recommendations for the Ace Hardware

Extra educational materials:

I provided each of the OWOW retail partners additional educational materials to assist with pest identification, as this is what many were requesting since access to online research during business hours is limited to many associates.

Educational materials were:
- UCIPM Meet the Beneficial Poster
- UCIPM Wildlife Pest Control around Gardens and Homes

Trainings conducted:

1. The Home Depot, Fairfield – 10 associates were trained, 10/23/2019
2. Ace Hardware, Suisun City – 9 associates were trained, 2/26 & 3/9/2020

The training session provided were well received by the associates. Many shared how valuable they felt the information covered was, especially the information on the 'Ask the Expert' feature on the OWOW website.

The survey results for this contract year will follow on the next pages

Summary of Store Training
Pre-Training Surveys

A total of 2 training was conducted, 19 associates were trained,
18 pre-training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	Don't Know
When water enters a storm drain, does it go to a treatment plant before it reaches a creek?	0%	50%	50%
When water enters a sanitary sewer from a house drain, like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or bay?	6%	44%	50%
Is it more effective to treat an ant infestation with a bait station rather than a spray?	39%	11%	50%
Where is your local household hazardous waste collection facility located?	28% knew the location	72% did not know the location	

Which sentence best describes Integrated Pest Management (IPM)

a. IPM only uses pesticides: 0%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only when needed): 67%
c. IPM does not rely on identifying pests/disease before treating: 0%

> Left blank or did not know: 33%

Which of these is the most effective IPM method for managing aphids?

a. Apply fast acting fertilizers: 0%
b. Spray insecticidal soap and/or prevent ants from vegetation with tanglefoot or bait station: 56%
c. Use products with pyrethroids: 6%
> Left blank or did not know: 38%

Summary of End of Training Evaluation Form

A total of 2 training was conducted, 19 associates were trained,
18 pre-training surveys were returned.
Here are the results of those surveys.

Survey Question	Yes	No	Don't Know
When water enters a <u>storm drain</u>, does it go to a treatment plant before it reaches a creek?	0%	100%	0%
When water enters a <u>sanitary sewer</u> from a house drain, like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or bay?	0%	100%	0%
Is it more effective to treat an ant infestation with a bait station rather than a spray?	100%	0%	0%
Where is your local household hazardous waste collection facility located?	100% knew the location	0% did not know the location	

Which sentence best describes Integrated Pest Management (IPM)

a. IPM only uses pesticides: 0%
b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only when needed): 100%
c. IPM does not rely on identifying pests/disease before treating: 0%
> Left blank or did not know: 0%

Which of these is the most effective IPM method for managing aphids?

a. Apply fast acting fertilizers: 6%
b. Spray insecticidal soap and/or prevent ants from vegetation with tanglefoot or bait station: 94%
c. Use products with pyrethroids: 0%
> Left blank or did not know: 0%

	Disagree	Neutral	Agree .
I learned at least one eco-friendly pest management method today		6%	94%
The training will help me recommend and/or sell eco-friendly products		6%	94%
I can comfortably share what I learned with customers and/or co-workers		11%	89%
I can easily use the Our Water – Our World shelf tags and fact sheets to inform customers about less-toxic pest management		17%	83%
Printed resource materials from this training were…	Too much 0%	Just Right 100%	Not enough 0%

What part of the training was most helpful?
All was helpful: 13%
Pest problem solving: 47%
Product information: 33%
Q&A: 7%

What part of the training could be improved?
Nothing/everything was good: 84%
More frequent trainings: 8%
Information about toxicity of eco-pesticides on food crops: 8%

Additional comments by attendees:

"This class was great, a perfect amount of time with lots of great information"

"I thought this was great, I learned a lot"

"Very helpful to learn how the (eco) products work"

Summary of outreach events 2019-2020

Unfortunately, the management teams at both retailers requested OWOW outreach tablings for their consumers for dates for the end of March and April. Due to the Shelter in Place restrictions, public outreach events were cancelled for the remainder of the fiscal year.

1) Integrated Pest Management Training for the Solano-Yolo County Master Gardeners:

An OWOW IPM training was provided to the Solano-Yolo County Master Gardeners – 34 attended this training, 2/28/20

Topics covered in the training:

- An OWOW partnership program overview
- Pesticides that are water pollutants of concern
- Principles of Integrated Pest Management, including;
    - Building healthy soil with compost
    - Benefits of using organic fertilizer
    - Benefits of mulch
    - Right plant, right place
    - Planting for the pollinators
    - Keeping water on site
    - Hydro-zoning
    - How to water effectively and efficiently
    - Water-wise plant choices for our area
    - Importance of sanitation in the landscape
    - Pest Prevention
- How less toxic products work
- Tips for using pesticides
- OWOW website and the 'Ask the Expert' feature, UC Davis IPM website, BIRC website
- UCIPM You Tube informational channel

2) Extra project for Vallejo and Fairfield-Suisun agencies:

IPM Training Video:

An OWOW IPM training program of 30-minute recording for the Fairfield-Suisun Sewer

District for team training purposes.

Retail store Mentoring and Maintenance Visits:

A total number of 16 program store mentoring and maintenance visits for the year.

- The Home Depot, Fairfield: 8 visits
- Ace Hardware, Suisun City: 8 visits

Store mentoring and maintenance activities throughout the year:

- Replenish fact sheets
- Update shelf talkers on new products
- Ask associates if they are hearing of any new or unusual pest problems from their customers
- Focus on the pest of the month calendar
- Bring the quarterly UCIPM Retail Newsletter to each retailer
- Remind associates about the 'Ask Our Expert' resource on the OWOW website
- Demonstrate how to use the UCIPM website for pest problem assistance
- Guide customers to less toxic solutions in the aisle
- Mentor buyer and manager at the Ace about new eco-friendly product on the market
- Mentor associates about the current pest problems and IPM strategies for the pests
- Mentor associates on how less toxic active ingredients work
- Follow up with emails and phone calls on pest questions from associates, as well as customers

These two retailers have witnessed a reduction of sales in the traditional pesticide categories and see an increase in sales with the eco-friendly alternative pesticides. Even throughout a challenging spring season, we see that people are looking for alternative to the toxic pesticides. As we see from the annual sales reports provided from:

- Home Depot Corporate, the sales of the eco-pesticide categories have increased over 30% with an overall increase of 8% of eco-products over the previous year.
- Sluggo sales is reported to have doubled over the previous year. This is a reflection of the recent gardening trend due to the pandemic, working from home and sheltering in place.
- Ortho Ground Clear, a new eco-herbicide for the 2020 year, has seen a growth of over 29%
- Ortho 3-in-1, pyrethrin and sulfur combination, has seen a growth in sales of over 22%

The associates value the OWOW partnership and support, assisting them with the new products, how they work, and what product they should bring in as an alternative to the problem pesticides. In addition to mentoring retail associates, each store appreciates the assistance when helping their customers in the aisle. This support of guiding the customers to choose a product that is less-toxic, also includes other IPM tools that the retailer may sell when a pesticide isn't necessarily the best solution, such as using ¼" hardware cloth behind dryer vents and foundation vents to keep rodents out of the

home, the importance of adding compost and organic fertilizer to your soil to increase plant health, choosing water-wise plants for longer term success, and the importance of mulch for water retention and optimum soil health.

Additional OWOW support services:

Industry Trade Shows:

I attended the Central Garden Trade Show in August of 2019 and the L&L Distributor Trade Show in October of 2019. The industry trade shows are important as we do meet with the retail buyers within the OWOW partnership. At these shows I have the chance to educate the buyers, show them new eco-friendly products, and explain how each works. I respond to their inquiries, make suggestions and guide them to the eco-alternatives. Our Water Our World is an extremely valuable resource for those who attend these shows.
I also attended the NorCal Landscape & Garden trade show in February 2020 where I was invited to present an IPM educational class to the audience of garden industry professionals. My presentation qualified those who attended 1 CU (continuing education unit) from the Department of Pesticide Regulations.

Overall challenge for the year and moving forward:

As March arrived, I cannot express enough how challenging this season became because of the pandemic. The retailers were stressed beyond measure. I, and all of the IPM Advocates servicing the OWOW program in other counties, did our best to provide OWOW services while sheltering in place. I certainly did what I could to provide the retailers relevant pest problem solving support remotely. Moving forward I see the value of providing OWOW education to the public through Webinar style classes. I adapted educational webinars for the public quickly and presented 14 classes for the public with the support from many OWOW sponsoring agencies throughout the greater SF Bay Area. Post webinar surveys were emailed to those attendees with good valuable feedback to report.
I am also currently working with Debi Tidd to develop virtual training platform that is best suited for the retailers and OWOW. Though it is very disappointing to me to end the year in the midst of a pandemic, I am inspired looking forward to what is possible for delivering the OWOW message to the public in a new way.

February 28th , 2020 IPM training with local Master Gardeners.

* 2020. Feb. 28 * 1PM/Sustainable landscapes

SIGN IN SHEET

Ramona Thomas
Jennifer Neumann
Gary Salcido
Kevin Cullen
Kathy Ramirez
Ron Marshall
Brad Miller
Laura J Spangler
Betty Victor
Kristina Moore
Jean Strauss
LINDA GOEI
Lori Mayoza
Kathleen O'Kelly
Alex Russell
Tim Wells
Jovina Buscagan
JoAnn Brown
Spring Tseng
Patrick Wen
Darrell Schramm
Donna Sesla
Jeanine McAvaney
Stacey Brooker
Angela Davidson
NATALIE PAN
Alan DeLeonardi
Nancy Lower

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

B A S M A A

September 30, 2020 DRAFT

Michael Montgomery, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: FY 2019-20 Annual Report: MRP Provision C.9.f - Track and Participate in Relevant Regulatory Processes

Dear Mr. Montgomery:

This letter and attachments are submitted on behalf of all 76 municipalities subject to the requirements of the Municipal Regional Stormwater NPDES Permit (MRP).

The essential requirements of provision C.9.f (text attached) are to track U.S. Environmental Protection Agency (USEPA) and California Department of Pesticide Regulation (DPR) actions related to urban-uses of pesticides and actively participate in the shaping of regulatory efforts currently underway. This provision allows for cooperation among Permittees through the California Stormwater Quality Association (CASQA), BASMAA, and/or the Urban Pesticide Pollution Prevention Project (UP3 Project) – an approach the Permittees have engaged in for a number of years. Recognizing this approach is the most likely to result in meaningful changes in the regulatory environment, Permittees elected to continue on this course in FY 2019-20 to achieve compliance with this provision. Oversight of this provision is the purview of the BASMAA Board of Directors.

The actual work of tracking and participating in the ongoing regulatory efforts related to pesticides was accomplished through CASQA. CASQA conducted its activities on behalf of members and coordinated funding contributions and activities through its Pesticides Subcommittee, a group of stormwater quality agencies affected by pesticides or pesticides-related toxicity listings, TMDLs, or permit requirements, as well as others knowledgeable about pesticide-related stormwater issues. FY 2019-20 was another productive year for the Subcommittee. The CASQA Pesticides Subcommittee's annual report for FY 2019-20 (attached) provides a comprehensive and detailed accounting of efforts to track and participate in relevant regulatory processes as well as accomplishments related to pesticides and stormwater quality.

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Bay Area
Stormwater Management
Agencies Association
P.O. Box 2385
Menlo Park, CA 94026
650.365.8678
info@basmaa.org

Jim Scanlin, Alameda Countywide Clean Water Program

Karin Graves, Contra Costa Clean Water Program

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matthew Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

Attachments

MRP Provision C.9.f

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020; California Stormwater Quality Association; August 2020

MRP Provision C.9.f states:

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description –** The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

(1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

(4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting –** In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020

California Stormwater Quality Association

Final Report

August 2020

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

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Pesticides Subcommittee Annual Report and Effectiveness Assessment

2019-2020

California Stormwater Quality Association

August 2020

Preface

The California Stormwater Quality Association (CASQA) is comprised of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout California. CASQA's membership provides stormwater quality management services to more than 22 million people in California. This report provides CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. It is a component of CASQA's Source Control Initiative, which seeks to address stormwater and urban runoff pollutants at their sources. This report was funded by CASQA, BASMAA, the Sacramento Stormwater Quality Partnership, and Alameda Countywide Clean Water Program.

This report was prepared by Stephanie Hughes under the direction of the CASQA Pesticides Subcommittee Co-Chair Dave Tamayo, with input from Dr. Kelly Moran and Tammy Qualls of Qualls Environmental Consulting.

DISCLAIMER

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Abbreviations Used in this Report

BACWA – Bay Area Clean Water Agencies

BE – Biological Evaluation

CASQA – California Stormwater Quality Association

CEQA – California Environmental Quality Act

CCRWQCB – Central Coast Regional Water Quality Control Board

CVRWQCB – Central Valley Regional Water Quality Control Board

CWA – Clean Water Act

DPR – California Department of Pesticide Regulation

EPA – United States Environmental Protection Agency

ESA – Endangered Species Act

FWS – U.S. Fish and Wildlife Service

FY – Fiscal Year (July 1 through June 30)

IPM – Integrated Pest Management

MAA – Management Agency Agreement between DPR and the Water Boards

MS4 – Municipal Separate Storm Sewer System

NACWA – National Association of Clean Water Agencies

NPDES – National Pollutant Discharge Elimination System

OPP – U.S. EPA Office of Pesticide Programs

OW – U.S. EPA Office of Water

PAH – Polycyclic aromatic hydrocarbon

PEAIP – Program Effectiveness Assessment and Improvement Plan

PMAC – Pest Management Advisory Committee

PPI – Pests, Pesticides, and Integrated Pest Management DPR initiative

PMP – Pesticides-specific Management Practice

PSC – CASQA Pesticides Subcommittee

SPCB – Structural Pest Control Board

SFBRWQCB – San Francisco Bay Regional Water Quality Control Board

STORMS – Strategy to Optimize Resource Management of Storm Water (a program of the State Water Board)

SWAMP – California Water Boards Surface Water Ambient Monitoring Program

SWRCB – State Water Resources Control Board or State Water Board

TMDL – Total Maximum Daily Load (regulatory plan for solving a water pollution problem)

UP3 – Urban Pesticides Pollution Prevention Partnership

UPA – Urban Pesticide Amendments

UPCMP – Urban Pesticides Coordinated Monitoring Program

USGS – U.S. Geological Survey

Water Boards – California State Water Resources Control Board together with the California Regional Water Quality Control Boards

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Executive Summary

This report by the Pesticides Subcommittee (PSC) of the California Stormwater Quality Association (CASQA) describes CASQA's activities related to the goal of preventing pesticide pollution in urban waterways from July 2019 through June 2020.

To address the problems caused by pesticides in California's urban waterways, CASQA collaborates with the California State Water Resources Control Board and the California Regional Water Quality Control Boards (Water Boards). By working with the Water Boards and other water quality organizations, we address the impacts of pesticides efficiently and proactively through the statutory authority of the California Department of Pesticide Regulation (DPR) and EPA's Office of Pesticide Programs (OPP). More than 17 years of collaboration with Urban Pesticides Pollution Prevention (UP3) Partnership, as well as EPA and DPR staff, has resulted in significant changes in pesticide regulation. CASQA's activities and outcomes are described in Section 2. This year's highlights include continued progress on the State Water Board's Urban Pesticides Amendments (UPA) project as well the pesticide regulator actions described below.

Near term/Current problems – Are actions being taken by State and Federal pesticides regulators and stakeholders expected to end pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

- In Fall 2019, DPR finalized regulations to restrict carbaryl use and end sale of carbaryl consumer products. This action makes all carbaryl products in California restricted materials, except for baits labeled only for agricultural use. This regulation was filed with the Secretary of State this spring and will become effective on August 1st.
- CASQA identified a product registration application containing novaluron and successfully requested this product be routed by DPR for surface water review. The subsequent evaluation did not support registration. DPR subsequently issued a Notice of Proposed Decision to Deny the product.
- CASQA shared its urban runoff expertise with pesticide regulators by preparing comment letters to EPA for seven pesticide reviews, providing the Water Boards and other Partners with information that triggered additional letters on two more pesticide reviews, and participating in meetings and conference calls focused on priority pesticides and long-term regulatory structure improvements. *(See Tables 3, 4 and 5 and the Appendix.)*
- CASQA provided feedback to EPA regarding their Framework for Pesticides Risk Assessments Incorporating Endangered Species Act Biological Evaluations (and eventually all pesticides risk evaluations for conventional pesticides) requesting that outdoor impervious surfaces be included in the list of areas that receive pesticide treatment.
- In response to continued requests from CASQA and Partners, EPA has begun following a precedent for improved label language for pool, spa, and fountain chemicals that was established by the decisions for lithium hypochlorite and copper.
- CASQA/UP3 reviewed scientific literature in order to update and prioritize the Pesticide Watch List, which it shared with pesticides regulators and with government agency and university scientists to stimulate generation of surface water monitoring and aquatic toxicity data for the highest priority pesticides. *(See Table 2.)*

Long term/Prevent future problems – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

- DPR continues to demonstrate its commitment to addressing pesticide impacts on receiving waters through timely mitigation and implementation of improved evaluation procedures.
- The State Water Board continued to work toward adoption of the UPA. These amendments would institutionalize the State's strategy of utilizing pesticide regulations as the primary mechanism for addressing pesticide water quality problems associated with urban runoff, serving as a TMDL

alternative. Implementation will be supported by a new statewide urban runoff pesticides monitoring program intended to coordinate with existing Water Board and DPR urban pesticides and toxicity monitoring programs.

- In concert with the development of UPA, the Urban Pesticides Coordinated Monitoring Program (UPCMP) continued progress to establish the initial framework of the monitoring program via the Steering Committee and Technical Committee.
- CASQA continued to be an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. CASQA organized a meeting of DPR, Water Board, and CASQA representatives for July 24th for DPR to provide details to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.
- A paper was published that was co-authored by Dr. Kelly Moran, and staff from DPR, the State Water Board, and UC Davis, describing many of the key elements of the coordination between DPR and the State Water Board.
- Although many improvements have been made by OPP since the early 2000s, improvement in scientific evaluations supporting OPP's regulatory efforts and better understanding of urban runoff management systems are still necessary to adequately protect urban surface waters from pesticide impairments. In recent years, the regulatory climate has changed, limiting support of progress by OPP in addressing these concerns.

In FY 2020-2021, CASQA plans to continue to address near-term pesticide concerns and seek long-term regulatory change. Future near-term and long-term tasks are identified in Section 3, Tables 5 and 6. Key topics include:

- Continued support of the eventual completion and adoption of the UPA by the State Water Board
- Continued development of the UPCMP in partnership with the Water Boards, DPR, and EPA Region 9
- Registration review-related activities at EPA for pyrethroids and fipronil (the only such opportunity for the next 15 years)
- DPR registration applications and proposed decisions for new products

Section 1. Introduction

1.1 IMPORTANCE OF CASQA'S EFFORTS TO IMPROVE PESTICIDE REGULATION

For decades now, the uses of certain pesticides in urban areas – even when applied in compliance with pesticide regulations – have adversely impacted urban water bodies. Currently used pesticides are the primary cause of toxicity in California surface waters, including urban water bodies.[1] Under the Clean Water Act (CWA), when pesticides impact water bodies, local agencies may be held responsible for costly monitoring and mitigation efforts. To date, some California municipalities[2] have incurred substantial costs to comply with pesticides-related Total Maximum Daily Loads (TMDLs) and additional permit requirements. In some cases (e.g., diazinon, chlorpyrifos), municipal compliance costs have continued more than a decade after termination of virtually all urban use. In the future, more municipalities throughout the state could be subject to similar requirements, as additional TMDLs and Basin Plan amendments are adopted (Table 1). Meanwhile local agencies have no authority to restrict or regulate when or how pesticides are used[3] in order to proactively prevent pesticide pollution and avoid these costs.

Under federal and state statutes, EPA and DPR have the authority and responsibility to regulate pesticides and protect water bodies from adverse effects (including impacts from pesticides in urban runoff). Unfortunately, until the relatively recent past these agencies did not recognize the need, nor did they possess the institutional capacity to exercise their authority to protect urban water quality. As a result, past registration actions have allowed a number of pesticides (such as pyrethroids and fipronil) to be used legally in ways that have resulted in widespread pollution in urban water bodies. This situation is depicted in Figure 1.

To change this situation CASQA is actively engaged with state and federal regulators in an effort to develop an effective pesticide regulatory system, based primarily on existing statutes, that includes timely identification and mitigation of urban water quality impacts, and proactively prevents additional problems through the registration and registration review processes (Figure 2).

Table 1. California TMDLs, Statewide Water Quality Control Plans, and Basin Plan Amendments Addressing Currently Registered Pesticides and/or Toxicity in Urban Watersheds[4]

Water Board Region	Water Body	Pesticide	Status
Statewide	All MS4s/All Urban Waterways: Statewide Water Quality Control Plan amendments for urban pesticides reduction ["Urban Pesticides Amendments"] (Inland Surface Waters, Enclosed Bays & Estuaries, and Ocean)	All Pesticides/All pesticide-related toxicity	In preparation
	Sediment Quality Objectives (Enclosed Bays & Estuaries)	Sediment Toxicity [5]	Approved
	Toxicity Provisions (Inland Surface Waters and Enclosed Bays & Estuaries)	Toxicity [5]	In preparation

[1] See reports from the California Surface Water Ambient Monitoring Program Sediment Pollution Trends Program including Anderson, B.S., Hunt, J.W., Markewicz, D., Larsen, K., 2011. Toxicity in California Waters, Surface Water Ambient Monitoring Program. California Water Resources Control Board. Sacramento, CA.
[2] For example, Sacramento-area municipalities spent more than $75,000 in the 2008-2013 permit term on pyrethroid pesticide monitoring alone; Riverside-area municipalities spent $617,000 from 2007 to 2013 on pyrethroid pesticide chemical and toxicity monitoring.
[3] Local agencies in California have authority over their own use of pesticides but are pre-empted by state law from regulating pesticide use by consumers and businesses.
[4] Excludes pesticides that are not currently registered in California, such as organochlorine pesticides.
[5] These TMDLs/Plan provisions can trigger toxicity testing stressor source identification studies, and additional follow up, even when toxicity is linked to current pesticides.

Water Board Region	Water Body	Pesticide	Status
San Francisco Bay (2)	All Bay Area Urban Creeks	All Pesticide-Related Toxicity	Approved
Central Coast (3)	Santa Maria River Watershed	Pyrethroids, Toxicity	Approved
	Lower Salinas River Watershed	Pyrethroids, Toxicity	Approved
		Malathion, Chlorpyrifos, Diazinon [6]	In development
	San Lorenzo River Watershed (Santa Cruz)	Chlorpyrifos [6]	Approved
Los Angeles (4)	Marina del Rey Harbor	Copper (Marine antifouling paint) [7]	Approved
	Oxnard Drain 3 (Ventura County)	Bifenthrin, Toxicity	EPA-Adopted Technical TMDL
	Calleguas Creek, its Tributaries and Mugu Lagoon	Water & Sediment Toxicity [5]	Approved
	McGrath Lake (Ventura County)	Diazinon & Chlorpyrifos [6]	Approved
	Colorado Lagoon (Long Beach)	Sediment Toxicity [5]	Approved
	Dominguez Channel and Greater Los Angeles and Long Beach Harbors Waters	Sediment Toxicity [5]	Approved
	Ballona Creek Estuary	Sediment Toxicity [5]	Approved
Central Valley (5)	Sacramento River and San Joaquin River Basins	Pyrethroids	Approved
	Sacramento-San Joaquin River Delta Waterways	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento & Feather Rivers	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento County Urban Creeks	Diazinon & Chlorpyrifos [6]	Approved
	Lower San Joaquin River	Diazinon & Chlorpyrifos [6]	Approved
Lahontan (6)	Pesticide Discharge Prohibition	All Pesticides	Approved
Santa Ana (8)	Newport Bay	Copper (Marine antifouling paint) [7]	In preparation
	San Diego Creek, and Upper and Lower Newport Bay	Toxicity (Diazinon & Chlorpyrifos) [6]	EPA-Adopted Technical TMDL
San Diego (9)	Shelter Island Yacht Basin (San Diego Bay)	Copper (Marine antifouling paint) [7]	Approved
	Chollas Creek	Diazinon [6]	Approved

[6] Use prohibited in urban areas (diazinon) or no meaningful use due to use limitations (chlorpyrifos).
[7] Primarily addresses pesticides that are directly discharged and should not ordinarily appear in stormwater (marine antifouling paint).

Figure 1. Current Pesticide Regulatory System.[8]

[8] Photos in Figures 1 and 2 of spraying pesticide along a garage was taken by Les Greenberg, UC Riverside

Figure 2. Proactive Use of the Pesticide Regulatory Structure to Restrict Pesticide Uses that have the Potential to Cause Urban Water Quality Problems.

1.2 CASQA'S GOALS AND APPLICATION TO PROGRAM EFFECTIVENESS ASSESSMENT

CASQA's Vision for Stormwater, first approved by the Board of Directors in 2015, is periodically updated to reflect developments in stormwater management. In August 2019, CASQA released an interim update to support the development of priorities for 2020.[9] CASQA's Vision, Action 1.3, is to "provide effective and efficient solutions through true source control." Among the three objectives described within Action 1.3 is "control toxicity in receiving waters from pesticide application." In support of this objective, the Vision identifies the following scope:

Anticipated Scope:

- Develop a regulatory system implemented by EPA OPP and California DPR to identify whether use of a pesticide poses a threat to water quality, and then restrict or disallow those uses proactively so that water quality impacts are avoided.
- Respond to the immediate need to participate in EPA pyrethroids, fipronil, and imidacloprid reviews (the only such opportunity for the next 15 years) and to support and encourage DPR steps toward expanded pyrethroids and new fipronil mitigation measures.
- Seek EPA risk mitigation for malathion and carbaryl in urban runoff and the continuation of traditional water quality risk assessments in tandem with Endangered Species Act (ESA) evaluations.
- Continue to leverage successes at the state level as a key stakeholder in the development of statewide Water Quality Control Plan Amendments for urban pesticides reduction.

The effectiveness of CASQA's efforts toward this scope can be expressed in relation to management questions established as part of Municipal Separate Storm Sewer Systems' (MS4s') program effectiveness assessments that are required in some MS4 permits. With respect to addressing urban pesticide impacts on water quality, the following two management questions, derived from the proposed scope for CASQA Vision Action 1.3, are suggested for inclusion in MS4s' program effectiveness assessment:

Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Question 2: (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

This report is organized to answer these management questions and is intended to serve as an annual compliance submittal for both Phase I and Phase II MS4s. It describes the year's status and progress, provides detail on stakeholder actions (by CASQA and others), and provides a roadmap/timeline showing the context of prior actions as well as anticipated end goal of these activities. This report may also be used as an element of future effectiveness assessment annual reporting.

[9] https://www.casqa.org/about/strategic-plan-vision

Section 2. Results of CASQA 2019-2020 Efforts

At any given time, there are dozens of pesticides with current or pending actions from the EPA or DPR. Addressing near term regulatory concerns is important because some pesticides may pose immediate threat to water quality that can lead to compliance liability for MS4s, and because some of the regulatory decisions made by EPA and DPR will last many years. For example, pesticide registration decisions are intended to be revisited on a fifteen-year cycle. To inform its engagement on near-term regulatory concerns, CASQA uses the pesticide "Watch List" created by the PSC and the UP3 Partnership. The Watch List aids CASQA and the UP3 Partnership in their prioritization of near-term efforts (Section 2.1).

Meanwhile, CASQA and the UP3 Partnership are also working on a parallel effort to effect long-term systemic changes in the regulatory process itself. By identifying inadequacies and inefficiencies in the pesticide regulatory process, and persistently working with EPA and DPR to improve the overall system of regulating pesticides, CASQA and the UP3 are gradually achieving results (Section 2.2).

2.1 NEAR-TERM REGULATORY CONCERNS

CASQA seeks to ensure that the Water Boards and EPA's Office of Water (OW) work with DPR and the EPA's OPP to manage problem pesticides that are creating near-term water quality impairments. These efforts address CASQA Vision Action 1.3 as well as Phase II MS4 Program Effectiveness Assessment and Improvement Plan (PEAIP) Management Question 1 regarding observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff.

Assessment Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Answer: As detailed below, at the State level, significant progress has been made by DPR in addressing near-term and current problems with pesticides in surface waters receiving urban runoff. DPR continues to implement improved registration processes and responses to observed water quality problems. DPR also continues to implement and evaluate mitigation measures for observed problems with pyrethroids and fipronil.

At the Federal level, less progress has been made at addressing near term problems. Some early actions were taken to address pyrethroid and fipronil problems at the urging of CASQA and DPR However, EPA does not show a clear understanding of key urban uses in its analyses, and it is still unclear if its upcoming risk management decisions for pyrethroids, fipronil, and imidacloprid and other neonicotinoids will provide any additional protection of urban water bodies.

2.1.1 Updated Pesticide Watch List

A key tool for identifying near-term regulatory concerns is our pesticide "Watch List." CASQA, working through the UP3 Partnership, reviews scientific literature, government reports, and monitoring studies as they are published. This information is used to prioritize pesticides based on the most up-to-date understanding of urban uses, pesticide characteristics, monitoring, and surface water quality toxicity (for pesticides and their degradates). The PSC uses these insights to update the Watch List each year (Table 2), which serves as a management tool to help us focus our efforts on the most important pesticides from the perspective of MS4 agencies.[10] Comparing the current Watch List to the version published in the 2018/19 PSC Annual Report, we see that the insecticides fipronil, imidacloprid, malathion, and pyrethroids remain as the Priority 1.

[10] The first Watch List was published by the UP3 in 2005.

Table 2. Current Pesticide Watch List (June 2020)

Priority	Basis for Priority Assignment	Pesticides		
1	Monitoring data exceeding benchmarks; linked to toxicity in surface waters; urban 303(d) listings	Pyrethroids (20 chemicals[11])	Fipronil	Imidacloprid (neonic) Malathion
2	Monitoring data approaching benchmarks; modeling predicts benchmark exceedances; very high toxicity and broadcast application on impervious surfaces; urban 303(d) listing for pesticide, degradate, or contaminant that also has non-pesticide sources	Carbendazim (Thiophanate methyl)[12] Chlorantraniliprole Copper pesticides	Creosote (PAHs) Indoxacarb Neonics (other than Imidacloprid)[13] Pendimethalin	Pesticides with dioxins impurity[14] Polyhexamethylenebiguanide Zinc pesticides (including Ziram)
3	Pesticide contains a Clean Water Act Priority Pollutant; 303(d) listing for pesticide, degradate, or contaminant in watershed that is not exclusively urban	Arsenic pesticides Chromium pesticides	Diuron Naphthenates	Simazine Silver pesticides Trifluralin
4	High or unknown toxicity (parent or degradate) and urban use pattern associated with water pollution; synergist for higher tier pesticide; on DPR priority list	Abamectin ADBAC pesticides[15] Azoxystrobin Bacillus sphaericus Bacillus thuringiensis (Bti) Bromacil N-Bromosulfamates Busan-77 Carbaryl Chlorinated isocyanurates Chlorine Chlorine dioxide Chlorfenapyr Chlorsulfuron DCOIT DDAC	Dichlobenil Dichlorvos (DDVP) Dithiopyr Halohydantoins Hydramethylnon Hypochlorites Imazapyr Isoxaben Mancozeb Methomyl Methoprene Methyl anthranilate Mineral bases, weak Mineral oil (aliphatic) MGK-264 Novaluron Oryzalin Oxadiazon Oxyfluorfen PCNB	Peroxyacetic acid Phenoxy herbicides[16] Piperonyl butoxide (PBO) Prodiamine Propiconazole Pyrethrins Pyriproxyfen Sodium bromide Sodium chlorite Sodium percarbonate Sodium tetraborate Spinosad/ Spinetoram Sulfometuron-methyl Tebuconazole Terbuthylazine Triclopyr Triclosan Trimethoxysilyl quats

[11] Allethrins, Bifenthrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Cyphenothrin, Deltamethrin, Esfenvalerate, Etofenprox, Flumethrin, Imiprothrin, Metofluthrin, Momfluothrin, Permethrin, Prallethrin, Resmethrin, Sumethrin [d-Phenothrin], Tau-Fluvalinate, Tetramethrin, Tralomethrin.
[12] Carbendazim is a registered pesticide, and also a degradate of thiophanate-methyl
[13] Acetamiprid, Clothianidin, Dinotefuran, Thiamethoxam (degrades into Clothianidin)
[14] 2,4,-D, Chlorothalonil, Dacthal, Pentachlorophenol
[15] Alkyl Dimethyl Benzyl Ammonium Chlorides (ADBAC) includes a family of 21 different quaternary ammonium pesticides.
[16] MCPA and salts, 2,4-D, 2,4-DP, MCPP, dicamba

Priority	Basis for Priority Assignment	Pesticides		
5	Frequent questions from UP3 Partners	Chlorpyrifos (near zero urban use)	Diazinon (no urban use) Glyphosate	Metaldehyde
New	Priority determined on the basis of proposed urban use, aquatic toxicity, and other information in registration application.	Not known but may include the following:	Cyantraniliprole Cyclaniliprole Flupyradifurone	Nitenpyram (Neonic) Nithiazine (Neonic) Sulfoxaflor (Neonic)
None	Based on review of available data, no approved urban use or no tracking trigger as yet identified.	Most of the >1,000 existing pesticides		
Unknown	Lack of information. No systematic screening has been completed by UP3 for the complete suite of urban pesticides.	Unknown		

2.1.2 Description of Near-Term Regulatory Processes

Immediate pesticide concerns may arise from regulatory processes undertaken at DPR or EPA's OPP. For example, when EPA receives an application to register a new pesticide, there may be two opportunities for public comment that are noticed in the Federal Register, as depicted in green in Figure 3. EPA's process usually takes less than a year while DPR typically evaluates new pesticides or major new uses of active ingredients within 120 days. Now that DPR implements relatively robust surface water quality review procedures for new pesticide registrations, there is reduced need for CASQA to provide input to EPA on new pesticides.

Figure 3. EPA's Registration Process for New Pesticides

Another regulatory process, "Registration Review," depicted in Figure 4, is meant to evaluate currently registered pesticides about every 15 years, to account for new data available since initial registration. In general, it takes EPA five to eight years to complete the entire process. In addition to this process, pesticides are typically evaluated based on Endangered Species Act criteria. EPA regularly updates its schedule for approximately 50 pesticides that will begin the review process in a given year.[17]

Figure 4. EPA's Registration Review – Process to Review Registered Pesticides at a Minimum of Every 15 Years.

[17] See https://www.epa.gov/pesticide-reevaluation/registration-review-schedules for schedule information.

DPR also has an ongoing, but informal review process (called continuous evaluation) that can address pesticides water pollution. If it needs to obtain data from manufacturers, DPR can initiate a formal action, called "Reevaluation." These evaluations, mitigation measure development, and mitigation effectiveness evaluation have involved ongoing communication with CASQA and the UP3 Partnership.

While EPA must consider water quality in all of its pesticide registration decisions, at DPR this step is not yet fully established as standard (most outdoor urban pesticide registration applications are routinely routed by DPR for surface water review, but a few – notably antimicrobial products used in storm drains – do not automatically receive this review). CASQA monitors registration applications, to identify those relevant to urban runoff, based on the pesticide watch list in Table 2 and use pattern/toxicity analysis for pesticides that have not previously been reviewed.

2.1.3 Key Near-Term Regulatory Activities and Progress in 2019-20

Table 3 presents a summary of recent UP3 activities to address near-term regulatory concerns and their 2019-2020 results; for additional insight regarding on-going pesticide registrations, see the Appendix. The positive outcomes in Table 3 reflect the success of CASQA's teamwork in the UP3 Partnership. Some of this work occurs during formal public comment periods. To accomplish this, CASQA monitors the Federal Register and DPR's website for notices of regulatory actions related to new pesticide registrations and registration reviews. Since the Watch List is not based on a comprehensive review of all pesticides, CASQA watches for additional pesticides that appear to have any of the following characteristics: proposed urban, outdoor uses with direct pathways for discharge to storm drains, high aquatic toxicity, or containing a priority pollutant. Participating in these regulatory processes can take many years to complete.

In addition, the EPA OPP strives to update their Aquatic Life Benchmarks table on an annual basis.[18] Their 2019 update included two pesticides of interest to urban surface water (see inset at right).

EPA Aquatic Life Benchmarks – 2019 Update

In September 2019, US EPA's Office of Pesticide Programs, Environmental Fate and Effects Division updated its pesticides Aquatic Life Benchmarks table.[18] From the urban surface water quality perspective, this update included two minor changes for pesticides on the Watch List:

- The category "Copper compounds" was added to clarify the applicability of EPA's Office of Water (OW) copper water quality criteria (developed independent from OPP) to all copper-containing pesticides
- The OPP benchmarks for pendimethalin were updated based on the updated toxicity data used to support its 2018 Registration Review decision

Pesticides still awaiting benchmark updates include the many pyrethroids (other than new transfluthrin, which is not yet registered in California) and fipronil and its degradates. These are currently in EPA's Registration Review process.

[18] https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk

Table 3. Latest Results of Efforts Communicating Near-Term Regulatory Concerns[19]

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
DPR					
New product registration application for a rubber product containing zinc, thiabendazole and 2-pyridinethiol-1-oxide (potential tire use)				Sacramento County	*Pending.* In response to a letter from Sacramento County, DPR stated that the product would not be allowed in rubber, correcting an error in the public notice. This correction was, unfortunately, not reflected in subsequent paperwork. DPR is requesting that the manufacturer correct the label to indicate that it may not be used in rubber in California.
New product registration for an indoxacarb product (Doxem Precise)	✓				*Pending.* CASQA requested that DPR perform an evaluation of this product. Results pending.
New product registration for a novaluron product (TEKKO 0.2G)	✓				*Success!* CASQA requested that DPR perform an evaluation of this product. The subsequent DPR evaluation (including modeling) did not support registration. DPR subsequently issued a Notice of Proposed Decision to deny registration.
EPA					
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals [Request for Extension of Comment Period]	✓			BACWA CCWQCB SFBRWQCB CVWQCB NACWA Cities of Cotati, Elk Grove, San Diego, Sacramento, Santa Barbara. County of Los Angeles, Marin County Stormwater PPP, Napa County FCWCD, Alameda	*Success.* CASQA and Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing, and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.

[19] Color coding in this table is meant to reflect the "Watch List" prioritization color coding in Table 2.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
				Countywide Clean Water Program, County of Orange, County of Sacramento, County of Santa Barbara, SCVURPPP	
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals	✓		✓	BACWA SFBRWQCB NACWA City of Salinas	*Limited Success.* Following significant efforts by CASQA and Partners in prior fiscal years, including meeting with new EPA pyrethroid chemical managers, and substantial feedback on the Preliminary Risk Assessment, EPA released the Risk Mitigation Proposal. EPA used CASQA comments to counter arguments by others suggesting that there is not a significant ecological risk. EPA acknowledged the existence of monitoring data that appears to conflict with modeled runoff exposure results. EPA virtually omitted urban runoff from its CWA compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications nor did it distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts. EPA did not concur with CASQA regarding the need for urban runoff mitigation. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. No resolution in CASQA's request for California-specific labels.
Bifenthrin Proposed Interim Decision	✓			SFBRWQCB BACWA NACWA	*Pending.* CASQA concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. CASQA continues to request that EPA terminate urban outdoor use of bifenthrin. Letter prepared this FY for 2020-2021 submittal.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pyrethroid Pesticides Cyfluthrin, Deltamethrin, Esfenvalerate, Permenthrin, Phenothrin, Prallethrin, and Tau-fluvalinate - Proposed Interim Decision	✓			BACWA NACWA SFBRWQCB	*Pending.* Prior to the release of this Proposed Interim Decision, CASQA commented on the EPA's Ecological Risk Mitigation Proposal (above). CASQA continues to request that EPA's risk / benefit finding be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals. CASQA also requests that EPA's benefits assessment include urban runoff-related costs to municipalities. Letter prepared this FY for 2020-2021 submittal.
Fipronil Risk Assessment	✓			BACWA SFBRWQCB (anticipated) SWQCB (anticipated) NACWA (anticipated)	*Pending.* Letter prepared this FY for 2020-2021 submittal. CASQA requested that EPA included updated California monitoring data and improvements to the urban risk assessment modeling methods. Also recommended additional mitigation to prevent urban surface water quality degradation.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision [Request for Extension of Comment Period]				BACWA, SFBWQCB City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County FCWCD, SCVURPPP	*Success.* Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposed decision and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision	✓			BACWA SFBRWQCB SWRCB	*Pending.* In the Proposed Interim Decision released this year, EPA proposed label improvements but did not include significant label language requests. EPA also did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff and expand modeling to include runoff from all outdoor uses including impervious surfaces. CASQA followed up to address unresolved issues.
Endangered Species Risk Assessment Process for Biological Evaluations of	✓			BACWA SFBRWQCB NACWA	*Partial Success.* EPA acknowledged CASQA's comments and incorporated a significant request by CASQA- that they address pesticides that are applied on outdoor impervious surfaces in Biological Evaluations (BE). EPA also acknowledged CASQA's comment that Bes

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pesticides - Draft Revised Method					must include invertebrate toxicity data. EPA partially incorporated other comments from CASQA and ignored one of the comments.
Zinc registration review Final Interim Decision	✓			SFBRWQCB BACWA NACWA	*Success!* CASQA and its Partners sought that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Further, for all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, CASQA and Partners recommended that the "Environmental Hazards" label statements be applied on the basis of product use (end-use products vs technical grade and manufacturing use) rather than product size to avoid potential conflicting language on product labels. EPA fully incorporated both comments.
Methoprene Registration Review Work Plan				SFBRWQCB BACWA Sacramento County NACWA	***Pending.*** Due to uses for mosquito control that are made directly to neglected swimming pools, catch basins, and other elements of stormwater drainage systems, CASQA Partners called for the collection of data to inform reasonable mitigation measures that would minimize environmental impacts while maintaining the public health benefits of methoprene applications. Asked EPA to consider label language for mitigation measures, including label language for uses with abandoned pools that is consistent with language across pool, spa, and hot tub chemicals that would indicate minimum post-application holding times or other objective criteria that local and state authorities could use in their approval process for discharges to their systems. Further, Partners asked EPA to re-evaluate the aquatic ecological risk associated with discharges of methoprene to aquatic environments by utilizing data for aquatic Dipteran insect species that are more sensitive than the species used for the aquatic risk evaluations in the Preliminary Work Plan.
Chlorine gas/swimming pools Draft Risk Assessment	✓			SFBRWQCB BACWA NACWA	*Pending.* The Proposed Interim Decision correctly identified potential impacts associated with emptying treated pools into storm drains and acknowledged that a requirement to contact local governments for direction prior to discharge would mitigate this risk (this reflects success of prior CASQA educational efforts related to other pool chemicals). Letters prepared this FY for 2020/2021 submittal supporting EPA's

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
					acknowledgement and recommending that the Registration Review decision follows the precedent for improved labels for pool, spa, hot tub, and fountain products that was established by the decisions for similar end use chemicals.
Halohydantoins/pools, fountains, spas – Draft Risk Assessment	✓			BACWA SFBRWQCB NACWA	*Pending.* The Draft Risk Assessment did not examine risks associated with discharges of swimming pool, spa, hot tub, and fountain water treated with halohydantoins. Letter prepared this FY for 2020-2021 submittal to request that the halohydantoins decision follow the precedent for improved labels for swimming pool, spa, hot tub, and fountain products that was established by the decisions for other antimicrobials with these uses.
Terbuthylazine/fountains Draft Risk Assessment	✓			Sacramento County SFBRWQCB	*Success.* In January, CASQA Partners formally requested that language to address pool, spa, and fountain emptying be required to be placed on all such product labels. EPA acknowledged the importance of such communication and will be revising future label language on these products, which will require that the sewer/storm agency be notified prior to any discharge of terbuthylazine. Follow-up letter prepared by CASQA this FY for 2020-2021 submittal.
Inorganic Halides (Sodium Bromide) Draft Risk Assessment				BACWA Sacramento County	*Pending.* Partners requested that the Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Such label language mitigates possible aquatic impacts from discharge of treated water while also providing consistency for label language across pool, spa, hot tub, and fountain chemicals.

2.2 LONG-TERM CHANGE IN THE PESTICIDES REGULATORY STRUCTURE

Since the mid-1990s, CASQA (and its predecessor organization the Storm Water Quality Task Force), have worked toward a future in which the pesticide regulatory structure at the state and federal level proactively restricts pesticide uses that have the potential to cause urban water quality problems. These efforts directly relate to Phase II MS4 PEAIP Management Question 2.

Assessment Question 2. (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

Answer: Improvements in processes at EPA and especially at DPR have moved us closer to that future. Many of these improvements are linked to the persistent work of CASQA and the UP3 Partnership to educate regulators on how previous process deficiencies did not adequately address urban pesticide problems.

As detailed below, at the State level, significant progress has been made by DPR and the Water Boards in establishing a comprehensive statewide approach to utilizing pesticide regulatory authorities to prevent pesticide toxicity in urban water bodies. Overall, DPR has a system in place that is reasonably effective at addressing pesticide toxicity in urban water bodies, although improvement is needed to better coordinate this with the requirements of the Clean Water Act and NPDES MS4 permits. DPR and the Water Board, along with CASQA and other stakeholders, are working diligently to strengthen this system and to institutionalize it. This is primarily embodied in the State's effort to establish the UPA and the Management Agency Agreement (MAA) between DPR and the State Water Board.

At the Federal level, OPP has implemented some improvements in how it evaluates and responds to water quality problems associated with pesticides, but it does not do this reliably and does not have a system in place to ensure that this will happen consistently and adequately. Meanwhile, scientific studies are being conducted by USGS and the EPA's Office of Research and Development to better understand the complexities of pollution in urban stormwater (see inset at right).

National Urban Stormwater Study Included Many Priority 1 and 2 Pesticides

In 2019, USGS and EPA scientists published a major scientific paper examining pollutants in urban runoff, entitled "*Urban Stormwater: An Overlooked Pathway of Extensive Mixed Contaminants to Surface and Groundwaters in the United States*." The authors indicate that this study "provides the most comprehensive representative snapshot of the urban stormwater-contaminant profile derived from randomly sampled sites and sampling days from across the U.S. to date." The study involved low-detection limit measurements of multiple pollutant classes (e.g., pesticides, pharmaceuticals, inorganics, PAHs, PCBs and other organochlorines) in undiluted urban runoff. Pesticides were the most frequently detected pollutant type. Further, organic chemical concentrations and loads were positively correlated with impervious surfaces and highly developed urban catchments.

The study involved 50 storm event urban runoff samples from 21 locations in 17 states, including 2 unnamed locations in California (the 2 largest watersheds sampled). Samples were collected primarily from highly urbanized watersheds, primarily from base-of-watershed discharge pipes and concrete-lined channels.

For current-use pesticides, these nationwide results were generally consistent with other scientific work published in the last decade (much of which is from California), indicating that current use pesticides like pyrethroids, fipronil (and its degradates), imidacloprid, and the fungicide carbendazim are common in urban runoff often at concentrations greater than aquatic life reference values. Multi-pesticide and multi-pollutant mixtures were the norm, raising questions about potential aquatic life effects from cumulative exposures.

While the study measured many Priority 1 and 2 pesticides on the Watch List, most other pesticides on the Watch List were omitted (due, in part, to the absence of standard or convenient low-detection limit analytical methods). For some current-use pesticides (like some pyrethroids and some fipronil degradates), reporting limits were higher than the lowest aquatic life reference values. Most pesticides samples were filtered, which affects reported concentrations of hydrophobic pesticides like pyrethroids that tend to be removed with the suspended solids filtered out of the sample; sediment was not analyzed.

Environ. Sci. Technol. 2019, 53, 17, 10070–10081. Publication Date: August 21, 2019. https://pubs.acs.org/doi/10.1021/acs.est.9b02867

Although more effective regulation of pesticides by EPA is still an important goal for CASQA,[20] due to the current regulatory climate at federal agencies, CASQA does not expect OPP to be very responsive to requests for additional improvements. Specific examples include the current administration's orders for a blanket reduction in regulations, chronic under-staffing at OPP, and lack of accessibility to OPP staff to share scientific information and stormwater expertise.

As a result, CASQA has decided for the time being to limit its efforts to affect long-term systemic change by EPA and other federal agencies. Instead, CASQA has focused more on solidifying advances made at the state level, which will leverage the considerable authority held by the State of California for regulating the use of pesticides.

2.2.1 Focus on MAA Between DPR and State Water Board

In 1997, just as pesticides were first discovered to be an important pollutant in urban waterways, DPR and the State Water Board adopted their first formal agreement to collaborate to address pesticides water pollution. That agreement focused on agricultural areas; the processes it envisioned did not work well in the urban context. CASQA (and its predecessor organization the Storm Water Quality Task Force) worked with DPR and the Water Boards for the next 20 years toward establishing pesticides water quality protection systems that would work in the urban context. During this time, DPR substantially updated its science-based pesticide registration procedures to include a "surface water protection program" review process, it initiated an urban watershed monitoring program, and it developed approaches to implementing mitigation measures addressing urban water pollution, as evidenced by its actions on pyrethroids and fipronil. The Water Boards engaged with DPR, providing scientific and regulatory information, receiving and using information from DPR to inform design of its regulatory programs (particularly TMDLs), and cooperating in monitoring programs. In mid-2019, DPR and the State Water Board received approval to sign a major update to their formal MAA that memorializes their existing systems and growing cooperation and lays out the steps they are taking toward a "unified and cooperative program to protect water quality related to the use of pesticides." The two agencies agree "to work cooperatively to address the discharge of pesticides that may cause or contribute to surface water or groundwater pollution, including surface water toxicity."

For example, DPR will evaluate surface water quality risks and consider these risks when making registration decisions; promote environmentally sound pest management; and respond to water quality concerns that pose significant adverse effects to aquatic organisms. Meanwhile, Water Boards will confer with DPR when developing regulatory programs related to pesticides; ensure waters are monitored (in coordination with DPR's monitoring and including permittee and State Water Board's own monitoring participation); and require and support use of best management practices relating to pesticides (structural management practices are not intended to be required in urban areas).

The Implementation Plan that accompanies the MAA describes opportunities for coordination and mutual enrichment (including cross-training), expectations for both staff and executive level communication (including an annual management-level meeting between the agencies), and current agency organization and interactions. Excerpts from the Implementation Plan:

> *"In the urban environment, pesticides are transported by the municipal wastewater collection system and the municipal separate storm sewer system (MS4). PMPs [pesticides-specific management practices] focus primarily on prevention through responsible use according to the pesticide label and DPR regulations and as a part of a holistic IPM [Integrated Pest Management] strategy. DPR conducts education and outreach efforts to ensure professional applicators are up to date on regulatory actions and label changes. Wastewater treatment plants and multi-benefit storm water treatment practices such as low impact development, runoff infiltration, constructed wetlands, and restoration of riparian buffers around waterways can provide some reductions. However, they are not designed for, nor implemented to address, complex mixtures of pesticides and the effectiveness of these practices to remove various pesticides from these systems is not well understood.*

[20] Long-term regulatory goals at the state and federal level are described in detail in Section 1.2.

DPR will work with the Water Boards to inform pesticide users on urban PMPs. The Water Boards, through their storm water permits, will continue to require PMPs from storm water permittees. Permittees must also include, as appropriate, education and outreach to inform residential and commercial pesticide users on responsible pesticide use and encourage municipal storm water permittees to provide local expertise into DPR's pesticide regulatory process.

The Water Boards and DPR will collaborate to assess the impacts of pesticides in the urban environment through collective and comprehensive monitoring efforts, which optimize the use of monitoring resources of Water Boards, dischargers, and DPR."

2.2.2 Focus on California's UPA

At the urging of CASQA, in 2014 the State Water Board made a strategically important decision to institutionalize its commitment to work closely with DPR and EPA to utilize pesticide regulatory authority as the primary mechanism for preventing and responding to impairments of receiving waters linked to current use pesticides in urban runoff. To accomplish this, it established an urban pesticides reduction project (now titled the Urban Pesticides Amendments or UPA) as a top priority project under the comprehensive stormwater strategy it adopted in December 2015, known as "Strategy to Optimize Resource Management of Storm Water" or STORMS.[21] In 2018/19, the State Water Board continued working towards developing the Urban Pesticides Amendments which will be changes to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries, and the Water Quality Control Plan for Ocean Waters of California. It is important to note that a critical factor in the State Water Board's decision to move in this direction was DPR's demonstrated commitment and significant progress in addressing urban water quality issues caused by pesticides.[22] A 2020 paper co-authored by Dr. Kelly Moran and staff of DPR, State Water Board, and UC Davis, describes many of the key elements of this progress.[23] The abstract for that paper is presented on the following page.

CASQA representatives have been participating actively in the development of the Urban Pesticide Amendments since their inception, as members of the projects Core Team and various work groups, to ensure that they are consistent with CASQA's vision for pesticide control.[24] The key elements that we anticipate being in the amendments are listed below.

- Element 1: Establishment of a framework for the Water Boards to work with DPR and U.S. EPA to utilize pesticide regulatory authority as the primary means for addressing pesticides in urban runoff.
- Element 2: Adopt a program of implementation addressing urban pesticides water pollution that serves as a TMDL alternative and integrates a feasible compliance pathway for MS4s.

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[21] STORMS' overall mission is to "lead the evolution of storm water management in California by advancing the perspective that storm water is a valuable resource, supporting policies for collaborative watershed-level storm water management and pollution prevention, removing obstacles to funding, developing resources, and integrating regulatory and non-regulatory interests." (http://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/)

[22] As reported in previous CASQA Pesticide Subcommittee Annual Reports, DPR's accomplishments include improved modeling, active ingredient screening for urban water quality issues, monitoring, and regulatory mitigation of pyrethroids and fipronil.

[23] Moran, et al., 2020. Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA. Environmental Toxicology and Chemistry—Volume 39, Number 5—pp. 953–966, 2020

[24] These goals have been adapted from the CASQA document, "End Goals for Pesticide Regulatory Activities," 2014. Goal 3, above, is directly tied to Goals 2, 4, and 5 of that document.

Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA

Kelly Moran, Brian Anderson, Bryn Phillips, Yuzhou Luo, Nan Singhasemanon, Richard Breuer, Dawit Tadesse, *Environ Toxicol Chem* 2020;39:953–966.
https://setac.onlinelibrary.wiley.com/doi/abs/10.1002/etc.4699.

This paper published in 2020 describes key elements of the current State water quality effort.

Abstract

The management of pesticides to protect water quality remains a significant global challenge. Historically, despite regulatory frameworks intended to prevent, minimize, and manage off-site movement of pesticides, multiple generations of pesticide active ingredients have created a seemingly unending cycle of pesticide water pollution in both agricultural and urban watersheds. In California, the most populous and most agricultural US state, pesticide and water quality regulators realized in the 1990s that working independently of each other was not an effective approach to address pesticide water pollution. Over the years, these California agencies have developed a joint vision and have continued to develop a unified approach that has the potential to minimize pesticide risks to aquatic life through a combination of prevention, monitoring, and management actions, while maintaining pesticide availability for effective pest control. Key elements of the current California pesticide/water quality effort include: 1) pesticide and toxicity monitoring, coupled with watershed modeling, to maximize information obtained from monitoring; 2) predictive fate and exposure modeling to identify potential risks to aquatic life for new pesticide products when used as allowed by the label or to identify effective mitigation measures; and 3) management approaches tailored to the different pesticide uses, discharge sources, physical environments, and regulatory environments that exist for agricultural runoff, urban runoff, and municipal wastewater. Lessons from this effort may inform pesticide management elsewhere in the world as well as other chemical regulatory programs, such as the recently reformed US Toxic Substances Control Act and California's Safer Consumer Products regulatory program. © 2020 SETAC

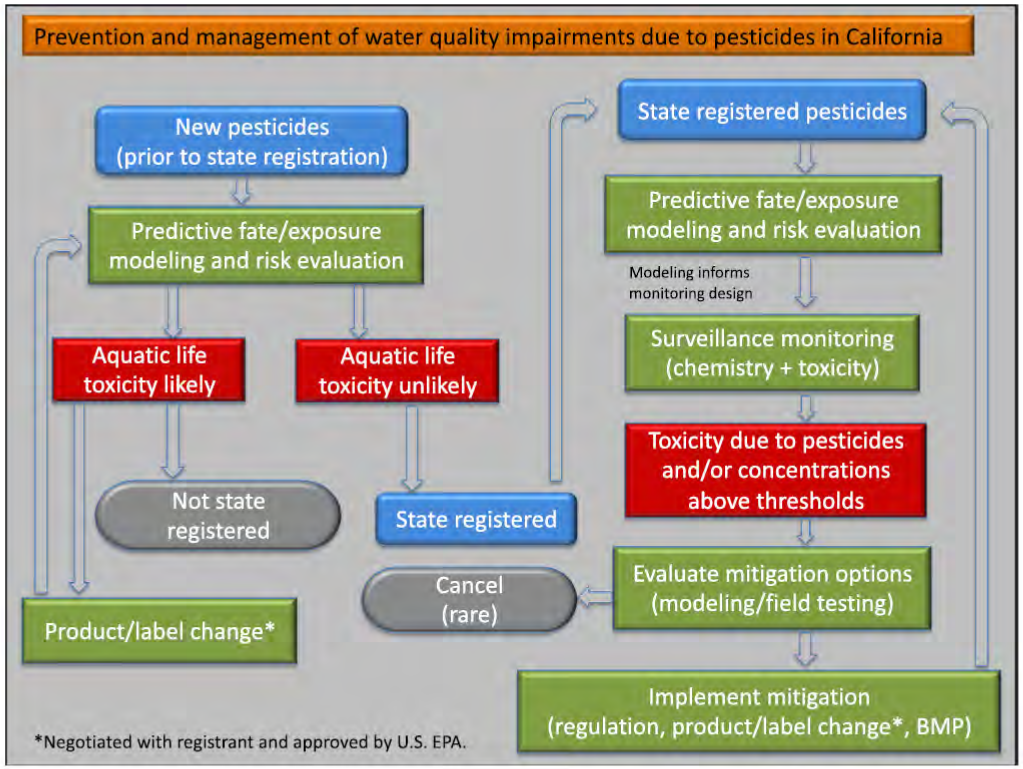

- Element 3: MS4 Monitoring program designed to coordinate with existing DPR and State Water Board pesticides and toxicity monitoring to support effective implementation of Elements 1 and 2.
- Element 4: Requirements for MS4s to support Elements 1 and 3 by contributing expertise on how pollutants present in urban environments enter and behave in urban runoff and water bodies.
- Element 5: Other actions that can reasonably be implemented by MS4s, such as IPM outreach, in support of pesticides reductions.

CASQA supports the State Water Board's stated goal of implementing the UPA "as an alternative to TMDL development to address pesticide and pesticide-related toxicity impairments in individual water bodies." Achievement of this goal would provide substantial savings of state and MS4 agency resources as compared to establishment of multiple TMDLs throughout the state.

Elements 1-4 are consistent with CASQA Vision Action 1.3. Water Board staff have indicated their intent that the Urban Pesticides Amendments, as shown in Element 5 should also establish a consistent set of "*minimum pesticides source control measures for MS4 dischargers.*"

CASQA representatives have worked with the Water Boards to ensure that such requirements are reasonable and consistent with similar measures already in place in some regions. At this time, the list of potential minimum measures includes use of IPM, education of and outreach to residents and professional pesticide applicators, providing urban runoff scientific and management expertise to support pesticide regulatory processes, non-stormwater discharge prohibitions, and pesticide and toxicity monitoring.

CASQA supports the stated goal to "create a comprehensive, coordinated statewide monitoring framework for pesticides and toxicity in urban runoff and receiving water that improves resource efficiency, usefulness of data, and coordination of data collection to support management decisions."[25] A well-designed and managed monitoring framework that is properly representative of urban areas can simultaneously provide more useful information and improve the utilization of resources by eliminating unnecessary MS4 monitoring requirements that do not contribute to effective management of pesticides and pesticide-caused toxicity.

Monitoring. In the previous FY, agreement was reached regarding decision-making channels and membership for the UPCMP. CASQA is an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. These committees have been convened by the Aquatic Science Center using grant funding from the State Water Board. The Steering Committee and Technical Committee are tasked with establishing the initial framework of the monitoring program, including a work plan for its first year of operation. It is intended to have the work plan in place upon adoption of the UPA. However, progress in this direction has been slowed this year by changes in staffing at the State Water Board, and by complications caused by COVID-19. One subsequent meeting of the Technical Group was held in June.

Key joint activities for the UPCMP this FY included:

- Initial meeting of UPCMP Steering committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[26].
- Initial meeting of UPCMP Technical Committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[27].

[25] Informational Document, CEQA Public Scoping Meeting, State Water Resources Control Board, January 25, 2017
[26] MS4 representatives on the Steering Committee are from the Alameda Countywide Clean Water Program, Orange County, and Sacramento County.
[27] MS4 representatives on the Technical Group are from the Santa Clara Valley Urban Runoff Pollution Prevention Program, Orange County, and Sacramento County (jointly funded by the Sacramento Stormwater Quality Partnership).

Technical Support. CASQA continues to provide technical support to the Water Boards on numerous crucial and highly detailed items related to the UPA, Staff Report, CEQA Document, monitoring program, model permit language, and the relationship of these to the MAA. During June, CASQA organized a meeting of DPR, Water Board, and CASQA representatives on July 24th for DPR to provide detailed information to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.

MS4 Input. CASQA Pesticides Subcommittee continued briefings for the MS4 community to explain, gather input, and obtain support for the Urban Pesticide Amendments in advance of their public release for comment. Briefings were provided to representatives of the following MS4 groups:

- Los Angeles County Permittee Group
- Central Valley MS4 Coordinating Committee
- Sacramento Stormwater Quality Partnership
- CASQA Watershed Management and Impaired Waterbodies Subcommittee
- CASQA Policy and Permitting Subcommittee
- CASQA Science and Monitoring Subcommittee
- Sonoma County MS4 Permittee Group

2.2.3 CASQA Participation in Other State Efforts

As presented in Table 4, CASQA has been actively involved with various State agencies and advisory groups that affect pesticide use and pest management in urban areas.

Table 4. Participation in Other State Efforts to Support CASQA's Goals

Agency or Conference	Latest Outcomes
DPR's Pest Management Advisory Committee (PMAC)	Participation on the PMAC has resulted in expanded focus by DPR on urban pest management and water quality issues and generated funding for urban IPM programs. This year the PMAC recommended funding for two IPM research projects that would address pesticides in urban runoff, and one project that would address copper antifouling pesticide impacts of water bodies that are receiving waters of interest to many MS4 agencies. The amount of funding recommended was approximately $570,000. The projects are listed below. • IPM for local Sacramento farmers. [addresses commercial urban farms with high pesticide uses] • Training for pest management professionals. [upgraded facilities and mass media channels for statewide structural pest control licensees] • Training for hull cleaners and boaters. [addresses copper pollution in marinas]
California Structural Pest Control Board (SPCB)	A PSC member is an appointed member of the SPCB. The SPCB recognizes the potential for excessive pesticide application to impact water quality. The SPCB is in the process of adopting regulations to increase continuing education hours required in the IPM category. Finalization of these regulations has been slowed due to the need for California to reconcile its structural licensing requirements with newly adopted Federal regulations for this industry. Five proposals were selected and collectively awarded $1.02 million to be funded by the SPCB Research Fund. Progress reports were provided at the February 2020 board meeting for five research projects funded in the previous FY by the SPCB The research topics are listed below, and detailed project updates are available online at https://www.pestboard.ca.gov/about/agenda/20200312_materials.pdf • "Diet and Colony Structure of Two Emerging Invasive Pest Ants" • "Investigation of Rodenticide Pathways in an Urban System Through the Use of Isotopically Labelled Bait" • "Evaluation of bait station system efficacy for reduced-risk subterranean termite management in California" • "Development and Evaluation of Baiting Strategies for Control of Pest Yellowjackets in California" • "Improving Urban Pest Ants Management by Low-Impact IPM Strategies" The SPCB is in the process of allocating funding for the 2021 FY.

Section 3. CASQA's Approach Looking Ahead

At any given time, EPA and DPR may be in the process of evaluating and registering various pesticides for urban use. CASQA will continue to track and engage in EPA and DPR activities, with a focus on top priority active ingredients (as identified in the annual Pesticide Watch List) and sharing relevant urban runoff information and CASQA's water-quality specific expertise with pesticides regulators. Key documents to be reviewed will include risk assessments and risk management proposals with an eye toward ensuring that pesticide regulators have and consider accurate information on relevant factors in urban areas such as pesticide use patterns, urban pollutant transport mechanisms, and receiving water conditions. CASQA strives to ensure that pesticide regulators have access to relevant information such as monitoring data, water quality regulatory requirements, and urban runoff agency compliance liabilities and cost information. As necessary, CASQA will continue to recommend changes in an individual pesticide's allowable uses or use instructions, request consideration of impacts on water bodies receiving urban runoff, or ask that regulators fill critical data gaps by obtaining more data from manufacturers. As resources allow and circumstances warrant, CASQA will collaborate with wastewater organizations (such as BACWA), other water quality stakeholders, and the Water Boards in commenting on EPA and DPR actions.

In the coming year, CASQA will continue to address near-term pesticide concerns and seek long-term regulatory change. Although changes at the federal level are important for fully achieving CASQA's goal of protecting water quality through the effective use of pesticide regulations, until there is a more favorable situation at that level, we will continue to focus our efforts on solidifying progress at the state level. In FY 2020-2021, we will continue engagement on specific regulatory actions for priority pesticides at the federal level, while continuing our strategic focus on supporting State adoption of the UPA. CASQA's current priority activities are as follows:

(1) Continue collaboration with DPR to address near-term regulatory concerns, while seeking OPP and OW actions to reduce inconsistencies:

- Ensure DPR action on fipronil water pollution is completed, including effective professional user education about restrictions on its outdoor urban use.
- Ensure DPR enforces mitigation measures for pyrethroids and fipronil, and adopts additional measures as necessary.
- Ensure the state continues to conduct surveillance monitoring to evaluate pyrethroids and fipronil mitigation effectiveness and to evaluate occurrence of new threats like imidacloprid and other neonicotinoid insecticides.
- Continue to encourage EPA to complete scientific groundwork and to identify and implement pyrethroids, fipronil, malathion, and imidacloprid mitigation measures, recognizing that it is likely that necessary mitigation cannot readily be implemented entirely by DPR.

(2) Seek long-term changes in the pesticide regulatory structure:

- Leverage our success at the state level and continue to be a key stakeholder in the STORMS project to adopt the statewide UPA. Through this process, CASQA will work with other stakeholders to implement the planned restructuring of California's urban surface water pesticides monitoring to increase its effectiveness and improve coordination.
- Seek procedure changes such that DPR continues to refine its registration procedures to address remaining gaps in water quality protection.
- Seek increased transparency of DPR regulatory activities, including timely access to scientific evaluation reports that are the basis of registration decisions.

CASQA will continue to seek opportunities to coordinate on high priority regulatory actions, with the Water Boards and other water quality stakeholders such as POTWs and non-profits, to take advantage of efficiencies, increase effectiveness, and ensure that the water quality community has a consistent message. Table 5 presents CASQA's activities and level of engagement anticipated for FY 2020-2021; CASQA will conduct these activities as priorities indicate and resources allow. Table 6 summarizes upcoming regulatory action items that are likely to proceed and may require CASQA attention in FY 2020-2021.

Table 5. CASQA Pesticide Subcommittee Activities

Activity		Purpose
Regulatory Tracking	Track Federal Register notices	Identify regulatory actions for high priority active ingredients that may require review.
	Track DPR notices of registration applications and decisions	Identify pesticides meriting surface water review that are not within DPR's automatic routing procedures, identify gaps or potential urban runoff-related problems with current DPR evaluation or registration plans other regulations, procedures & policies.
	Track activities at the Water Boards	Identify opportunities for improvements in TMDLs, Basin Plan Amendments, and permits.
	Review regulatory actions, guidance documents, and work plans	Identify potential urban runoff-related problems with current EPA evaluation or registration plans, other regulations, procedures, and policies.
Regulatory Communications	Briefing phone calls, informal in-person meetings, teleconference meetings, and emails with EPA and DPR	Information sharing about immediate issues or ongoing efforts; educate EPA and DPR about issues confronting water quality community. Provide early communication on upcoming proceedings that help reduce the need for time-intensive letters.
	Convene formal meetings, write letters and track responses to letters	Ensure current pesticide evaluation or registration process accurately addresses urban runoff and urban pesticide use and management contexts and take advantage of opportunities to formally provide information suggest more robust approaches to that could be used in future regulatory process. Request and maintain communication on mitigation actions addressing highest priority pesticides.
Advisory	Serve on EPA, DPR, and Water Board policy and scientific advisory committees	Provide information and identify data needs and collaboration opportunities toward development of constructive approaches for managing pesticides.
Educational	Presentations to and informal discussions with EPA, DPR, Water Board, CASQA members,	Educate EPA, DPR, Water Board, and CASQA members about the urban runoff-related shortcomings of existing pesticide regulatory process, educational efforts to support process improvements, and report on achievements. Encourage research and monitoring programs to address urban runoff data needs and priorities. Stimulate academic, government, or private development of analytical and toxicity identification methods to address anticipated urban runoff monitoring needs. Inform development of new pesticides by manufacturers and selection of pesticides by professional users.
	Developing and delivering public testimony	Educate Water Board members about the problems with existing pesticide regulatory process, encourage change, and report on achievements.

Activity		Purpose
Monitoring and Science	Update Pesticide Watch List based on new scientific and regulatory information	The Pesticide Watch List (Table 2) serves as a management tool to prioritize and track pesticides used outdoors in urban areas.
	Data analysis of DPR/SWAMP/USGS/MS4 monitoring, pesticide use data, and information from scientific literature	Summarize data to educate CASQA members and water quality community, Water Boards, DPR, and EPA.
Reporting	Prepare Monthly Action Plans	Coordinate CASQA's regulatory actions with Partners
	Prepare PSC Annual Report to describe the year's status and progress, provide detail on stakeholder actions, and the context of prior actions as well as anticipated end goal of these activities.	Provide CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. The document serves annual compliance submittal for both Phase I and Phase II MS4s. It may also be used as an element of PEAIPs and future effectiveness assessment annual reporting.

Table 6. Anticipated Opportunities for Pesticides Regulatory Engagement in 2020-2021

EPA Pesticide Registration Review (15-year cycle)
Environmental Risk Assessments • Priority 2-4 pesticides: Busan 77, Chlorothalonil, Irgarol, Diuron, Dichlorvos (DDVP), Isothiazolinones (DCOIT, BIT, BBIT, MIT, OIT). o-Phenyl phenol, Peroxy Compounds (includes Peroxyoctanoic Acid; Sodium Percarbonate), Propiconazole, Tebuconazole, Ziram; others (schedule unknown)
Proposed Interim Decisions • Priority 1 pesticides: Fipronil, Pyrethroids: Cyhalothrins, Cypermethrins, Allethrin, Etofenprox, Metofluthrin • Priority 2-4 pesticides: Carbaryl, Chromated Arsenicals, Creosote, Dichromic acid, DBNPA, Dithiopyr, (phenoxy herbicide), MCPA, MGK-264 (synergist), Methomyl Novaluron, Oxyfluorfen, Pentachlorophenol (Pentachlorophenol, Dioxins), Piperonyl butoxide (PBO) (pyrethroids synergist), Pyrethrins, Simazine, Sodium bromide, Thiophanate methyl, Triclopyr; others (schedule unknown)
Other EPA-related Items
• U.S. EPA "Increasing Consistency and Transparency in Considering Costs and Benefits in the Rulemaking Process" affects how the U.S. EPA uses cost and benefit analysis in setting pollution standards. Rule proposal was expected in 5/19. • Proposed rule to eliminate some OPP Federal Register Notices (was anticipated September 2018 according to U.S. EPA semi-annual regulatory agenda) • U.S. EPA Update to Guidelines for Deriving Aquatic Life Water Quality Criteria. Draft scoping document external peer review is next step. Seeking OPP engagement.
DPR New Pesticide Registration Decisions
• Proposed new urban pyrethroids (momfluorothrin, alpha-cypermethrin, phenothrin and transfluthrin products) • Proposed expansion of bifenthrin use in non-residential urban locations • Proposed new fipronil products: fipronil-bifenthrin landscaping product, termite product, product for yellow jackets • Proposed new aerated indoxacarb powder • Proposed ant and termite product containing the proposed new pesticide broflanilide. • Others (schedule unknown)
Other DPR-related Items
• Registration Application Surface Water Reviews – continue to follow up on communications requesting review of all storm drain products and outdoor antimicrobials
Water Boards
• State Water Board Provisions for Toxicity Assessment and Control, which include statewide numeric water quality objectives and implementation program • STORMS Urban Pesticides Amendments • Pesticides 303(d) listings • Pesticide TMDL implementation requirements for permittees

Appendix

Regulatory Participation Outcomes and Effectiveness Assessment Summary Tables

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Abemectin (September 2019)

Endangered Species Act Outcomes Evaluation (June 2020)

Imidacloprid (April 2020)

Neonics Extension (April 2020)

Pyrethroids (January 2020)

Pyrethroids Extension (April 2020)

Pyrethroids Update (June 2020)

Terbuthylazine (May 2020)

Zinc and Salts (September 2019 and April 2020)

Pesticide:	Abamectin; Docket: EPA–HQ–OPP–2013–0360
Use:	Insecticide used for ants, mites, and spiders (among other uses).
Why we care:	Highly toxic to aquatic invertebrates. Outdoor uses in urban environments have high potential impact MS4 and surface waters.
Actions taken:	CASQA has been tracking this pesticide since 2013.
Status:	EPA released the Final Interim Registration Review Decision in August 2019.

Next steps:	ESA Consultation is required but unlikely to begin before 2022.
Recommendation:	No action is needed at this time. Keep on tracking list.

From EPA's Final Interim Decision:	Response from CASQA's Perspective:
EPA is adding a standard Runoff Prevention Advisory Statement to the label: *"RUNOFF PREVENTION* *To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems."*	The standard runoff prevention language that EPA has proposed could be further strengthened. For example, CASQA typically recommends not allowing pesticide use if rain is predicted in the next 48 hours (instead of 24 hours as is proposed by EPA). We should consider impact of "rinsing application over the treated area" which would be highly problematic on impervious surfaces hydraulically connected to MS4 and surface waters.
From EPA's response to comments in the "Abamectin. Response to Comments Regarding HED's [EPA OPP Health Effects Division] Human Health Risk Assessment in Support of Registration Review, it appears that new crack and crevice usages are being evaluated through a different process: HED notes that the human health draft risk assessment also included a separate new use action for a proposed use on crack and crevice and spot treatment for abamectin. Mitigation measures associated with the proposed new use are separate from the registration review action and are being addressed by the registrant petitioning for that particular use pattern.	To better assess the risks from a pesticide, EPA should evaluate pesticide uses in a comprehensive manner that includes the use patterns and mitigation measures proposed and/or approved after the initiation of Registration Review.

Action:	Method for National Level Endangered Species Risk Assessment Process for Biological Evaluations of Pesticides; Docket: EPA–HQ–OPP–2019–0185
Use:	Defines procedures for assessing pesticides risks to endangered species
Why we care:	EPA intends to use these procedures to replace its current ecological risk assessment procedures
Actions taken:	CASQA submitted a comment letter in 2019. CASQA's comments were echoed by UP3 partners including BACWA, NACWA, the SF Bay Water Board, Xerces Society, Northwest Center for Alternatives to Pesticides (and 8 other groups) and Center for Biological Diversity. DPR made comments similar to CASQA's.
Status:	EPA released its revised method in March 2020
Next steps:	EPA will be using the revised procedures to conduct ecological risk assessments for pesticides in its ESA pilot program.
Recommendation:	Review ecological risk assessments for ESA pilot pesticides and comment on procedural shortcomings as warranted.

CASQA 08/15/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticides Are Applied on Outdoor Impervious Surfaces and Must Be Addressed in BEs	"EPA has corrected its discussion of applications to impervious surfaces in the Revised Method. The discussion was not meant to indicate that EPA would not evaluate applications to impervious surfaces. Rather, it was intended to generate a footprint for developed areas that was more realistic. In the Revised Method, for applications that are not intended to be made directly to impervious surfaces (e.g., to lawns), EPA will make a treated area assumption for the developed land cover class based on the percent of a typical lot that is not represented by impervious surfaces (e.g., footprints of houses, driveways are assumed to not be treated). In these cases, EPA acknowledges that overspray to impervious surfaces can occur, and, as such, the treated area will include a small percent of the impervious surface. For applications designed for impervious surfaces, EPA will model the application using the impervious PWC scenario, along with appropriate adjustments to account for the area treated." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 41.	Yes.
Clean Water Act Compliance Assessment Must Be an Integral Part of BEs and the Pesticide Endangered Species Act Consultation Process	"Office of Pesticide Programs and Office of Water work together on water issues to address issues under each of their statutes." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	No.
BEs must evaluate all uses of a pesticide that EPA is approving – not just uses that have occurred historically. When EPA reviews a pesticide, it licenses each individual use of that pesticide as described on	"EPA will consider all uses allowed on product labels for the assessed pesticide that are registered under Sections 3, 24(c), and 18 of the Federal Insecticide Fungicide Rodenticide Act (FIFRA) when developing BEs. As stated above, the proposed Revised Method included usage data in the derivation of the Action Area. EPA has changed the	Partially. EPA will consider all legal uses in its first phase, but the actual risk assessment

product labels. If EPA restricts its analysis only to uses that have occurred historically, or to select geographic areas, EPA is effectively licensing uses that it is not evaluating, which is inconsistent with the ESA. This would be the effect of the usage data methodology proposal.	Revised Method so that usage data are no longer incorporated into Step 1. Therefore, all registered uses, even those without demonstrated usage are included in Step 1, definition of the Action Area. EPA incorporates usage data into Step 2 of the Revised Method. When usage data (i.e., PCT [Percent Crop Treated], average rate, application timings, etc...) are incorporated into the risk assessment, the best available, scientifically valid data are used. EPA believes that data on pesticide usage represent critical information for determining whether an individual of a listed species is likely to be exposed and adversely impacted, which is the goal of Step 2." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 14.	will leave out any allowed pesticide uses for which there are no usage data.
BEs must use chronic invertebrate toxicity data. The proposal to use only lethal toxicity (LC50) data for aquatic invertebrates deviates from the CWA regulation of aquatic ecosystems to protect food supplies for endangered species.	"EPA will consider effects to mortality, growth or reproduction and other sublethal endpoints linked to survival or reproduction of taxa relevant to a listed species' prey, pollination, habitat and/or dispersal." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	Yes.
Urban pesticide use estimates could be greatly improved with use of reported urban use and sales data collected annually by California Department of Pesticide Regulation (CDPR). Each year, CDPR mandates reporting of pesticide product-specific sales and all professional pesticide use (including urban use). These data provide the quantity of active ingredients. The sales data are collected for every product brand-label combination. Reported use and total annual sales data are freely available and readily accessed from CDPR's online database at https://www.cdpr.ca.gov/dprdatabase.htm While CDPR considers its product-specific sales data as confidential, these data can be obtained upon request by EPA and consolidated (e.g., by use category) before publishing in risk assessments.	"EPA considers California Pesticide Use Reporting data in assessments, as appropriate. EPA agrees with CBD [Center for Biological Diversity] that pesticide sales data, including those available from California Department of Pesticide Regulation, are of limited use in characterizing the timing and location of pesticide usage. Pesticide sales data can provide some information regarding the scale of usage for a pesticide. For example, historical sales for an established pesticide may be useful in ground truthing the reasonableness of estimated usage that rely on multiple conservative assumptions. One example could be comparing sales data to usage modeled for a year and finding that the single year modelled exceeds the 20-year sales total for the AI. Such an outcome suggests that the model is highly conservative overall. Of course, at a local level, the model may be less conservative than indicated by the disparity between the sales and modelled usage estimates." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 11.	Partially.

Pesticide:	Imidacloprid; Docket: EPA–HQ–OPP–2008–0844
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California. Sales data show that use is increasing.
Actions taken:	CASQA submitted a comment letter in 2017 on the Preliminary Aquatic Risk Assessment.
Status:	EPA released the Proposed Interim Registration Review Decision (PID) per Fed. Reg. notice Feb. 3, 2020. Comments are due May 4, 2020.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Proposed Interim Decision to address unresolved issues and concerns.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
CASQA Concurs with EPA's Finding of Significant Risk.	As in the Preliminary Aquatic Risk Assessment. The EPA found significant risk to aquatic life in the Proposed Interim Decision.	Yes.
CASQA Requests EPA Identify Major Sources of Imidacloprid in Urban Runoff. CASQA noted that EPA's PARA model omits most outdoor urban imidacloprid uses. CASQA Suggested Refinements to Imidacloprid Preliminary Risk Assessment: • Include modeling of runoff from impervious surfaces for both residential and commercial models. • Evaluate and then model the runoff from all permitted outdoor uses of imidacloprid • Include leaching of impregnated materials in the model. • Perform an urban-specific analysis, including analysis of monitoring results specific to urban areas.	"EFED's risk assessment indicated, using modeling and monitoring data, that neonicotinoids can potentially enter surface water and groundwater and affect aquatic invertebrates. Although EFED did not explicitly model urban runoff sources, EFED believes the concentrations would not exceed those modeled via agricultural sources. While field and monitoring data provide supporting evidence that neonicotinoids are present in surface waters, supporting metadata for the sampling (i.e., sampling frequency, vicinity of applications to monitoring sites, timing of sample collection relative to timing of applications, etc.) are not available, precluding the quantitative use of monitoring data. While monitoring data from habitats not designed to harbor aquatic organisms may not be directly relevant for ecological risk assessment, they may be indicative of sources that may discharge into aquatic organism habitats. Likewise, while monitoring data from other countries may not be indicative of uses or	No. Although EPA acknowledged that there is a pathway to the storm drain, they did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff or improve modeling of sources.

	products in the United States, they provide a line of evidence that neonicotinoids can contaminate water sources." (PID p.14)	
CASQA Recommends Further Evaluation of Product Labels and Use Restrictions. (see specific requests below)	Although EPA made some small improvements to imidacloprid labels, they did not incorporate the majority of CASQA's label requests.	Partially.
1) Pre-construction termiticide label improvements: "…we request that EPA add a requirement that after a pre-construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured, and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would bridge a gap between the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits."	EPA did not respond to this comment.	No.
2) Require that no applications be made when rainfall is forecast within 48 hours.	EPA partially incorporated CASQA's suggested idea, but only for 24 hours of forecasted rainfall and only for spray (not granular) products.	Partially.
3) Reduce size of perimeter treatment bands around structures for treating for termites and other structural pests to the smallest treated area that will achieve target pest control. Prohibit application on impervious surfaces.	EPA reduced the perimeter treatment area to up to seven feet (on permeable surfaces), up to two feet up a structure, and up to one inch on pervious surfaces.	Partially. A reduced treatment band is an improvement, but the suggested treatment bands do not appear to be based on scientific study. Use on impervious surfaces is still allowed.
4) Prohibit application of granular products to any impervious (non-soil or unvegetated) surface and prohibit application to any area where the product may contact any surface water, storm drain, or urban runoff conveyance system (e.g., gutter).	EPA did not respond to this comment.	No.
5) Reduce target area for granular fly bait, instead of allowing the quantity to be spread over "1,000 square feet".	EPA did not respond to this comment.	No.
6) Disallow all outdoor "paint-on" applications of imidacloprid, especially if painted surface is above impervious area that drains to storm drain system or surface	EPA did not respond to this comment.	No.

water body. If any outdoor uses continue to be allowed, consider reducing application frequency (currently every 4-6 weeks), setting a maximum allowable outdoor treated area, and establishing a total annual application rate.		
7) Disallow product application in cracks and crevices along surfaces that drain into the storm drain system. If allowed, request that EPA and registrants utilize efficacy data to determine the smallest treated area that will achieve target pest control. This will enable labels to limit the spot treatments and crack and crevice treatments – to only the amount necessary – instead of the current 2' x 2' dimensions for spot treatment, and unspecified dimensions for crack and crevice treatments.	EPA updated label requirements to not limit to a 2' x 1' areas as well as limit application to 10% of the treatment area.	Partially.
8) Disallow all usage inside sanitary sewers, storm drains, or inside or around manholes.	Although manholes are not mentioned, it appears that EPA is prohibiting use in sanitary sewers, manholes etc. as they are not in the list of permitted areas.	Yes, but label would be clearer if it explicitly prohibited these uses.
9) Impregnated Materials: (1) Require end use product labels for all products bearing pesticide claims consistent with the recently adopted California guidance for labeling pesticide-impregnated materials (California Notice 2017-08). (2) Consider limiting concentration and/or use locations for materials that show high washoff potential.	EPA did not respond to this comment.	No.

Pesticide:	Neonicotinoid insecticides; Dockets EPA–HQ–OPP–2012–0329, EPA–HQ–OPP–2011–0865, EPA–HQ–OPP–2011–0920, EPA–HQ–OPP–2008–0844, EPA–HQ–OPP–2011–0581
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California
Actions taken:	In March 2020, the County of Sacramento sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: BACWA, City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County Flood Control and Water Conservation District, SCVURPPP, and the SF Bay Water Board.
Status:	EPA released Proposed Interim Decisions for Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Imidacloprid Proposed Interim Decision to address unresolved issues and concerns.

County of Sacramento Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the County of Sacramento Department of Water Resources, I request that EPA extend the comment period for the Proposed Interim Registration Decisions (PIDs) for the subject neonicotinoids for one additional month, to May 4, 2020. This will provide adequate time for review in light of the complexity of the proposed interim decisions, the number of chemicals under consideration, and the occurrence of this comment period during our winter rainy season, when staff from our agency and the organizations we collaborate with take on substantial extra duties in association with monitoring of rainfall/runoff events.	EPA extended the review period from April 3, 2020 to May 4, 2020.	Yes.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	CASQA commented on the Preliminary Ecological Risk Assessment for Pyrethroids in 2017.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

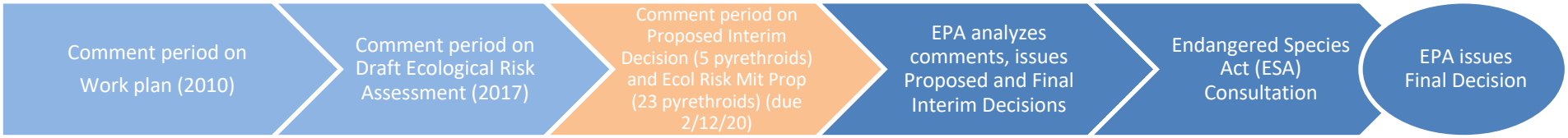

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 7/7/2017 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticide Discharges to storm drains can be costly and disruptive. Currently, EPA has listed 622 California water bodies as impaired by pesticides under Section 303(d) of the Clean Water Act; of those, 16 are listed for pyrethroids.	EPA discussed impacts, including Clean Water Act compliance challenges and costs for indoor discharges, but did not even mention these for stormwater, except a passing reference to TMDL compliance. Based primarily on market share, EPA asserted that the benefits of pyrethroids use are high.	No. It virtually omitted urban runoff from its Clean Water Act compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications (including underground It did not correctly identify alternatives for outdoor structural pest control.). It relied on an industry-supplied report on lawns/landscaping treatments as the data source for its outdoor urban benefits analysis. EPA also does not distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts.

CASQA Concurs with EPA's Finding of Significant Ecological Risk and Need for Mitigation	None. EPA used CASQAs comments to counter arguments by others suggesting that there is not a significant ecological risk.	Yes.
Mitigation addressing urban runoff is needed. To minimize ecological impacts and reduce the number of watersheds impacted by pyrethroid TMDLs and subsequent costs to state and local government agencies, we request that EPA implement mitigation measures as requested above. If these mitigation approaches are not deemed appropriate nationwide, please consider providing clear mechanisms for California-specific labels and sales restrictions.	"Outdoor urban uses of pyrethroids and pyrethrins are expected to result in potential risks of concern, primarily to aquatic invertebrates and fish. This potential risk is often a result of urban runoff, but may also be a result of spray drift or improper disposal of pyrethroid products. The potential for this risk to occur in the environment is supported by pyrethroid monitoring data from urban settings at levels that would be expected to result in potential risk to aquatic invertebrates. There has been a substantial concern from municipalities and states, particularly California, that urban pyrethroid usage adversely impacts water quality and, in the case of California, contributes to TMDL exceedances. As a result, the EPA is proposing measures to reduce to the urban footprint of the pyrethroid group while still allowing flexibility for the user community and retaining the benefits of efficacious pest control." "The potential ecological risks, which are expected to be reduced with the proposed mitigation, are outweighed by the high benefits associated with the use of pyrethroids for the control of pests with public health significance." EPA Proposed mitigation: (1) Indoor and Outdoor Use Site Clarification (2) Reduction in distance from building foundations that can be treated with pyrethroids from 10 feet to 7 feet. [California regulations prohibit applications >3 feet from building foundations] (3) Reduction in height above ground level of building treatments from 3 feet to 2 feet [this would make EPA labels consistent with this element of California regulations] (4) Prohibition on applications during rain. [California regulations already prohibit] (5) Unenforceable advisory statement to avoid applications if rain is forecast within 24 hours. [new] (6) Definition of spot treatment (2 sq. ft.)	No. Proposed mitigations are nice and might reduce slug discharges, but for California, they have no expected benefits for ongoing discharges. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. Text includes two useful mitigations are proposed for indoor products that are <u>not</u> proposed for outdoor products in the enforceable part of the proposal (the "label table in the appendix"): (a) Pictogram and new enforceable label statement: "Do not pour down the drain or sewer. Call your local solid waste agency for local disposal options." (b) New advisory label statements (English & <u>Spanish</u>): "Do not allow to enter indoor or outdoor drains" and "Follow proper disposal procedures on this label" EPA's proposal allows some impervious surface applications prohibited by California regulations: (a) Within 25 feet of an aquatic habitat located down gradient from an application site (b) Preconstruction termite site within 10 feet of a storm drain located down gradient (c) aquatic habitat protection excludes intermittent streams (which are included in California regulations) EPA mitigations cover all users (not just professional applicators) and include etofenprox, which is currently not covered by California regulations.

	(7) New requirement: "Do not allow the product to enter any drain during or after application." [No methods are specified as to how to prevent post-application washoff into storm drains] (8)Various other label clarifications.	
EPA's runoff modeling seems to underestimate some exposures as shown by the risk quotients (RQs) calculated from monitored concentrations that are generally higher than the RQs calculated from modeled concentrations (PRA, Part II, pp. 165-167).	EPA acknowledged the monitoring data and noted that it "did not agree with the PWG that it is inappropriate to compare modeled and monitored concentrations". EPA acknowledged the concerns from commenters from California concerning what is required under the Clean Water Act.	Yes.
CASQA agrees with EPA's use of all available aquatic toxicity data including those for sensitive organisms like Hyalella azteca and Americamysis bahia. The San Francisco Bay Regional Water Quality Control Board also commented on this in their 7/6/17 Letter to EPA, "It should be noted that H. azteca are not uniquely sensitive to pyrethroids. Of the few aquatic invertebrate species that have been tested for pyrethroids toxicity, several are similar to the sensitivity to H. azteca."	EPA considered arguments from both CASQA/SF Water Board and the registrant's lobbying group (Pyrethroid Working Group [PWG]) and ultimately agreed with the comments from CASQA/Water Board on this issue. EPA relied not only on these comments, but also on scientific papers submitted with the comments	Yes.
CASQA Recommends Additional Use Restrictions and Product Label Enhancements.		No, except for improvements to label readability.
1. Reducing overuse of active ingredient. We request that the EPA and registrants review such studies of application sites, applicator methods, and associated residual pesticides in runoff and coordinate with CDPR to develop additional mitigations and associated label restrictions to reduce over-application from creating regulatory and consequent financial burdens that must be borne by state and local governments.	"The EPA has worked extensively with registrants…to develop proposed mitigation to reflect what is practical while also maintaining the efficacy of these uses. The proposed mitigation is designed to reduce the pathway for these chemicals to get into surface waters and storm drainage systems. The language also informs consumers on how to prevent pyrethroids products from ending up in wastewater facilities."	No. EPA's proposal would not meaningfully expand the current California mitigations, which are proving insufficient to resolve pyrethroids water impairments.
2. Adding a minor label requirement for pre-construction (under foundation) termiticide treatments to bridge the gap between FIFRA and	"In following up on the labeling recommendations from CASQA, the EPA consulted with construction experts with specific experience with termiticide applications, regarding	No. EPA did not implement any changes to bridge the gap between FIFRA and the Clean Water act on termiticide treatments.

Clean Water Act regulatory programs. CASQA requests that EPA refine labels for pre-construction termiticide applications with the overall goal of preventing the discharge to water bodies of any water that contacts pesticide treated soil. Specifically, we request that EPA add a requirement that after a pre- construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would address a gap between FIFRA and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits. CASQA would appreciate the opportunity to discuss the specifics of this recommendation with EPA and registrants and professional applicators as appropriate. We perceive this as a relatively minor change that would address an existing gap between FIFRA and Clean Water Act construction site regulatory programs.	the suggestion that a signage requirement on pyrethroid labels could reduce the amount of pesticides running off into the drainage system. The EPA also met with Dave Tamayo, an environmental specialist from CASQA, on February 25, 2019, to discuss these comments and recommendations. The EPA officials also attended the 2019 Termite Tour, organized by the Association of Structural Pest Control Regulatory Officials, which included discussions on pre- and post-construction termite application practices. There wasn't consensus on the potential effectiveness additional posting and covering of these pre-construction termite applications could be in reducing pesticides in surface water. Therefore, the EPA is not proposing these changes in the ecological risk mitigation proposal. However, the EPA welcomes additional comments on this topic during the public comment period."	
3. Enhancing overall readability and enforceability of label language. CASQA requests that EPA seek to eliminate all conflicting and unclear language by coordinating with CDPR and registrants in the development of label language that more clearly provide instructions that result in protection of water quality. If EPA does not concur that label enhancement is necessary on a nationwide basis, CASQA requests that EPA provide clear mechanisms for establishing California-specific label instructions. CDPR is unable to take this action on its own because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA.	"The EPA has made a significant effort to propose changes to pyrethroid labels to improve consistency and help users find adequate directions."	Partially. Proposed label language includes a few useful clarifications but maintains some language that is confusing and includes many statements that are unenforceable. No changes were made to bifenthrin labels, which have additional mitigation that has confusing wording.

4. **California-Specific Labels.** If EPA does not find it appropriate to make these changes on a nationwide basis, we request that EPA provide CDPR the ability to work with registrants to establish California specific instructions on product labels. Since EPA controls product labels – the most effective means of controlling product usage – EPA's explicit approval of state-specific label language is essential.	"The EPA has worked closely with CDPR in the past on adding state-specific labeling restrictions to many pesticide products, including products containing pyrethroids. The EPA will continue to discuss implementation options with states and stakeholders when geographic-specific restrictions may be needed."	**No resolution.** EPA's proposal differs significantly from California regulations, in ways that will further confuse applicators who tend to focus on product labels (in their hands) instead of regulations (not in their hands). EPA does not explicitly state whether it will allow or support California-specific labels.
CASQA Requests EPA Terminate Urban ("Residential") Use of Bifenthrin Due to Its Persistence in Aquatic Ecosystems. CASQA has concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. • Bifenthrin Exceeds EPA Aquatic Life Benchmarks More Often Than Any Other Pyrethroid • Bifenthrin Is Substantially More Persistent in Aquatic Environments Than Other Pyrethroids • Bifenthrin is among the most highly toxic pyrethroids • Bifenthrin is One of Multiple Insecticides Commonly Used in Urban Environments • Due to Bifenthrin's Unique Persistence, It Is Too Hazardous to Use in Urban Settings CASQA further requests that if EPA does not concur that this measure is appropriate on a nationwide basis, that EPA implement such a measure for California by adding California-specific statements to all residential bifenthrin product labels (e.g., "not for use in California"). CDPR is unable to take this action because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA. While the discussion above focuses on bifenthrin, CASQA requests that EPA provide similar controls to ensure that	"With regard to aquatic risk, bifenthrin is not so unique when compared to other pyrethroids that it warrants additional bifenthrin-specific mitigation… bifenthrin does not consistently have the highest RQ exceedances for aquatic invertebrates. The agency disagrees with CASQA that bifenthrin is more toxic to aquatic invertebrates than other pyrethroids. All pyrethroids are very highly toxic to aquatic invertebrates." "The EPA is not proposing ecological mitigation for bifenthrin beyond what is outlined for all pyrethroids in the Pyrethroids and Pyrethrins: Ecological Risk Mitigation Proposal For 23 Chemicals due to the benefits of its use (USEPA 2016), and the agency's expectation that greater detection frequencies and concentrations of alternative insecticides (including other pyrethroids and fipronil) would occur if bifenthrin were removed from the market, because these alternative insecticides would likely take its place in the market."	**No.** EPA is using a scientifically questionable basis for its assertion that bifenthrin is no more problematic than other pyrethroids. The datasets EPA is using and EPA's modeling have scientific errors that have been enumerated in other studies. Bifenthrin may not be the most toxic pyrethroid, but based on monitoring data it appears to be the most persistent pyrethroid in urban watersheds. The combination of toxicity and persistence is the issue (it does not need to be the "top ranked" in either category to merit removal from the market). EPA's RQs are admittedly scientifically incorrect, so they should not be cited as the basis of any decision. Other data sources – particularly DPR's environmental monitoring data - lead to the conclusion that bifenthrin is the main contributor to ecological risks from pyrethroids and that this contribution is high relative to its usage. This indicates that substitution by another pyrethroid would improve water quality. Interestingly, despite the assertion that there should be no difference in risk mitigation among the pyrethroids, EPA notes "Bifenthrin, cypermethrin, deltamethrin, and esfenvalerate had particularly high chronic RQs."

there is adequate mitigation for any other pyrethroid that has similar or greater persistence in aquatic environments.		
Pyrethroids Have Been Identified as a Contributor to the Decline of Important Delta Fish Because of their presence and toxic effects, both directly and through food-web impacts, pyrethroids have been identified as potentially playing a significant role in the decline of important fish species in the Sacramento-San Joaquin Delta Estuary (Delta)…As a result of concerns about pyrethroid impacts in the Delta, establishing control programs for the pyrethroid discharges to the Delta was prioritized in the Delta Stewardship Council's Delta Plan and the Central Valley Regional Water Quality Control Board's Delta Strategic Workplan (CRWCB-CVR 2014). (San Francisco Bay Regional Water Quality Control Board's 7/6/17 Letter to EPA)	EPA acknowledged the SF Water Board's concerns and noted that "pyrethroids are expected to result in risks to aquatic biota in many situations. EPA has considered water quality issues in developing its ecological risk mitigation proposal for the pyrethroids/pyrethrins."	Partially. Although EPA acknowledged the SF Water Board's concerns, the mitigations proposed by EPA are not enough to address the risk. EPA stated that it will address endangered species in individual risk management decisions. This seems to conflict with the concept of the single ecological risk management decision to cover all 23 chemicals, but what it will likely be is a description of next steps for Endangered Species Act Compliance, not a set of mitigation measures for aquatic endangered species.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In November 2019, CASQA sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: NACWA, BACWA, SF Bay Water Board, Central Coast Water Board, Central Valley Water Board, SCVURPPP, Sacramento County, Santa Barbara County, City of Santa Barbara, Alameda County, Napa County Flood & Water Conservation District, Orange County, City of Cotati, City of Sacramento, City of San Diego, LA County Public Works, Marin County Stormwater PPP, and City of Elk Grove.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

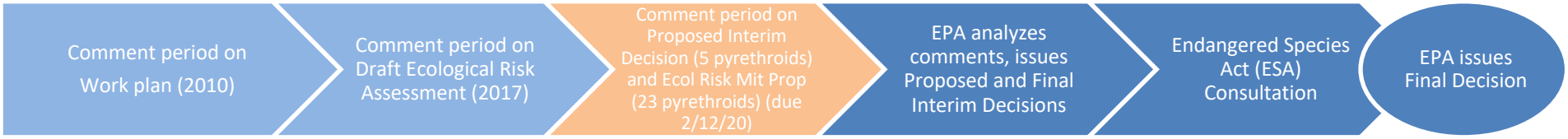

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 11/25/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the California Stormwater Quality Association (CASQA1), we request that the comment period for the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal be extended to February 28, 2020 to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing of the review period, and its timing during the winter rainy season, when staff from our member agencies and the organizations we collaborate with take on substantial extra duties in association with rain events.	EPA extended the review period from January 13, 2020 to February 12, 2020.	Yes.

Pesticide:	Several pyrethroids; Dockets: EPA-HQ-OPP-2008-0331. Docket includes: bifenthrin (EPA–HQ–OPP–2010–0384), cyfluthrin (EPA–HQ–OPP–2010–0684), deltamethrin (EPA–HQ–OPP–2009-0637), esfenvalerate (EPA–HQ–OPP–2009–0301), permenthrin (EPA–HQ–OPP–2011–0039), phenothrin (EPA–HQ–OPP–2011–0539), prallethrin (EPA–HQ–OPP–2011–1009), and tau-fluvalinate (EPA–HQ–OPP–2010–0915).
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In February 2020, CASQA sent a comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal.
Status:	EPA released Proposed Interim Decisions for bifenthrin, cyfluthrin, deltamethrin, esfenvalerate, permenthrin, phenothrin, prallethrin, and tau-fluvalinate.

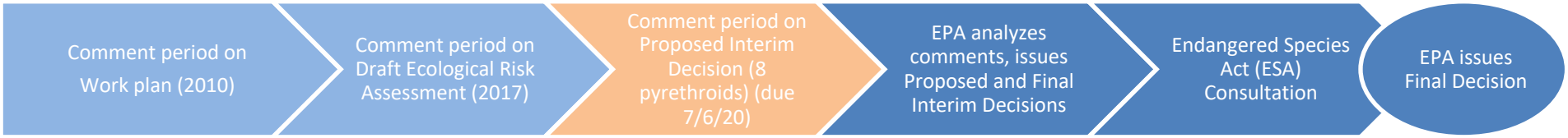

Next steps:	EPA will analyze comments and issue Final Interim Decision on these eight pyrethroids.
Recommendation:	Send comment letter to EPA on these eight Proposed Interim Decisions.

CASQA 2/12/2020 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
EPA's benefits assessment should include urban runoff-related costs to municipalities	No response. In the March 2020 PIDs EPA noted that they "had addressed" comments in a Joint Response issued on 11/12/2019, months before CASQA submitted its 2/12/20 comment letter.	No.
EPA's risk / benefit finding should be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals	EPA issued a single risk mitigation proposal with only one set of measures covering all 23 pyrethroids and pyrethrins, despite finding large differences in aquatic risks among the pyrethroids and pyrethrins.	No.
EPA should end outdoor urban use of bifenthrin	No response.	No.
EPA should provide California-specific labels for outdoor structural pest control products that are consistent with California regulations	No response.	No.
CASQA supports EPA-proposed label changes, with modifications	EPA kept the anti- dumping product label improvements but did not consider CASQA's suggested refinements from the February 2020 comment letter.	Partially.

Prepared by Tammy Qualls 6/14/20

Pesticide:	Terbuthylazine; Docket: EPA-HQ-OPP-2010-0453
Use:	Fountain algaecide / microbiocide / microbiostat.
Why we care:	Highly toxic to aquatic invertebrates.
Actions taken:	County of Sacramento (a CASQA member) sent EPA comments on the Draft Risk Assessment in January 2020, respectively.
Status:	EPA released the Proposed Interim Decision in May 2020.

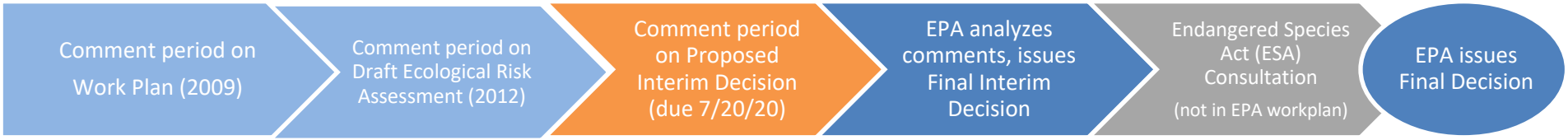

Next steps:	EPA will review comments on the Proposed Interim Decision and issue a Final Interim Decision
Recommendation:	Write a response letter, supporting the Sacramento County comments that EPA included in the Proposed Interim Decision.

Sacramento County comments to EPA (Jan. 2020):	EPA Response:	Did EPA incorporate member comments?
Our primary concern with the subject pesticides is that the Draft Risk Assessment neglected to consider storm drain discharges of terbuthylazine-containing fountain water and the ensuing risk to aquatic life. The Draft Risk Assessment assumed that there would be "*no significant exposure to aquatic organisms…from the decorative/ornamental fountain uses given that the label prohibits discharge of this product into lakes, streams, ponds, estuaries, oceans, or other waters, unless in accordance with the National Pollutant Discharge Eliminations Systems (NPDES) permit.*"	EPA made label changes (see below) that will help reduce the amount of terbuthylazine that is discharged into the storm drain by requiring notification to local sanitary sewer/ storm drain authorities.	Yes.
Sacramento County requests that the current language be changed to match the copper label, which would also provide consistency for label language across pool, spa, hot tub, and fountain chemicals, which follows: "Before draining a treated pool, spa, hot tub, or fountain, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool, spa, hot tub, or fountain water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."	"The agency agrees with the requested label changes and is proposing additional label changes to address the potential ecological risks by reducing exposure and clarifying the appropriate use methods, as described in Appendix B."	Yes.

Sacramento County also notes that the following language exists on several terbuthylazine labels: "*Experience will demonstrate the level of (product) is required."* We are concerned that this vague label language could lead to overuse these products. We are also concerned that label language states that users should maintain a concentration of product, cited in ppm, to get adequate algae control, but does not specify a practical, low-cost method for determining terbuthalyazine concentrations in treated fountain water. We respectfully request that EPA provide a dosing table, based on the size range (in volume of water) for fountains, to guide consumers in the application amount and frequency of application of the product.	EPA did not address this comment.	No.
For all fountain products, including those containing terbuthylazine, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size. This would mimic EPA's decision for lithium hypochlorite products. As explained in our attached lithium hypochlorite comments, this approach avoids potential conflicting language on product labels.	EPA did not address this comment.	No.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively.
Status:	EPA released the Proposed Interim Registration Review Decision in July 2019. Comments are due September 30, 2019.

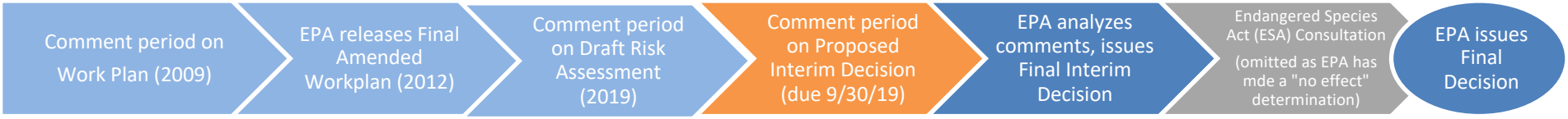

Next steps:	EPA will analyze comments and issue a Proposed Interim Decision. No ESA consultation is planned as EPA made a "no effect" determination.
Recommendation:	Send comments to EPA to declare support of the improved product label language.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
We are writing to request that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. In those Registration Review decisions, EPA worked carefully through the various issues to develop practical label language that mitigates possible aquatic impacts from discharge of treated pool, spa, and hot tub water, while preventing excess flows into sewer collection systems. Sacramento County requests that the current language be changed to match the lithium hypochlorite label, which would also provide consistency for label language across pool, spa, and hot tub chemicals, which follows: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	"Due to the scenarios outlined in these public comments, the requested label language has been added as a proposed requirement." (p. 6)	Yes.
For all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size… this approach avoids potential conflicting language on product labels.	"The requested changes to the uses triggering NPDES permit language have been considered by the Agency and are included as a proposed requirement. Both of the proposed changes are addressed in Appendix A of this document. The Agency thanks the submitters for their comments."	Yes.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively. CASQA commented on the Proposed Interim Decision in September 2019.
Status:	EPA released the Interim Decision in February 2020.

Next steps:	No ESA consultation is planned. EPA will likely proceed to issuing a Final Decision.
Recommendation:	No action is needed at this time.

CASQA Members comments to EPA (September 2019):	EPA Response:	Did EPA incorporate member comments?
CASQA supports the following proposed label language for swimming pool, spa, and hot tub products: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	The language in the Interim Decision exactly matches what was proposed in the Proposed Interim Decision. (p. 12)	Yes.
CASQA also supports EPA's clarification that Office of Pesticide Programs' standard NPDES permit label language is only for manufacturing-use products and is not suitable for end use products.	-For end-use products: NPDES permit language for pool, spa, or hot tub use is not required and must be removed if currently on the label associated with these uses. -For technical grade and manufacturing use products, the following NPDES statement must be included: "Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA." (p. 12)	Yes.

Section 10 - Provision C.10 Trash Load Reduction

C.10.a.i ► **Trash Load Reduction Summary**

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to Trash Full Capture Systems (as reported C.10.b.i)	
Percent Trash Reduction in all TMAs due to Control Measures Other than Trash Full Capture Systems (as reported in C.10.b.ii)[1]	
Percent Trash Reduction due to Jurisdictional-wide Source Control Actions (as reported in C.10.b.iv)	
SubTotal for Above Actions	
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2019-20	

Discussion of Trash Load Reduction Calculation:

This provision is handled and reported at the city level. Please see individual city reports for this information.

[1] See Appendix 10-1 for changes between 2009 and FY 19-20 in trash generation by TMA as a result of Full Capture Systems and Other Measures.

C.10.a.iii ► Mandatory Trash Full Capture Systems

Provide the following:

1) Total number and types of full capture systems (publicly and privately-owned) installed prior to FY 19-20, during FY 19-20, and to-date, including inlet-based and large flow-through or end-of-pipe systems, and qualifying low impact development (LID) required by permit provision C.3.
2) Total land area (acres) treated by full capture systems for population-based Permittees and total number of systems for non-population based Permittees compared to the total required by the permit.

Type of System	# of Systems	Areas Treated (Acres)
Installed in FY 19-20		
See individual city reports for this provision.		
Installed Prior to FY 19-20		
The cities participated in the Bay Area SFEP/ABAG Trash Capture Grant Project. In an effort to provide as much full trash capture treatment area as possible and because the city of Fairfield drains through Suisun City, the cities proposed a combined full trash capture device for approval to the Water Board. On March 11, 2011 the cities received approval from the Water Board to share their full trash capture device. The device was installed in June 2012 and is located downstream from the city of Fairfield and upstream from Suisun City Marina. The device chosen is a Contech CDS 5653, one of the largest devices made by Contech. With the MRP requiring Fairfield to fully capture 146 acres and Suisun City's to fully capture 22 acres, the total required treatment area is 168 acres. The collaborated treatment area provided resulted in 270 acres which is 102 acres (61%) above that required in the MRP. Descriptions of Maintenance Activities: As a clear indicator of the collaborative nature of our Program, maintenance for the CDS device has been accepted by the city of Fairfield. Please see city of Fairfield annual report for 2019-20 for maintenance activities on the Contech CDS 5653.	1	270

Total for all Systems Installed To-date	NA	
Treatment Acreage Required by Permit (Population-based Permittees)		NA
Total # of Systems Required by Permit (Non-population-based Permittees)		NA

C.10.b.i ► Trash Reduction - Full Capture Systems

Provide the following:

1) Jurisdictional-wide trash reduction in FY 19-20 attributable to trash full capture systems implemented in each TMA;
2) The total number of full capture systems installed to-date in your jurisdiction;
3) The percentage of systems in FY 19-20 that exhibited significant plugged/blinded screens or were >50% full when inspected or maintained;
4) A narrative summary of any maintenance issues and the corrective actions taken to avoid future full capture system performance issues; and
5) A certification that each full capture system is operated and maintained to meet the full capture system requirements in the permit.

TMA	Jurisdiction-wide Reduction (%)	Total # of Full Capture Systems	% of Systems Exhibiting Plugged/Blinded Screens or >50% full in FY 19-20	Summary of Maintenance Issues and Corrective Actions
		NA	NA	This provision is handled and reported at the city level. Please see individual city reports for this information.
Total				

Certification Statement:

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART A)

Provide a summary of trash control actions other than full capture systems or jurisdictional source controls that were implemented within each TMA, including the types of actions, levels and areal extent of implementation, and whether actions are new, including initiation date.

TMA	Summary of Trash Control Actions Other than Full Capture Systems
	This provision is handled and reported at the city level. Please see individual city reports for this information.

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART B)

Provide the following:

1) A summary of the on-land visual assessments in each TMA (or control measure area), including the street miles or acres available for assessment (i.e., those associated with VH, H, or M trash generation areas not treated by full capture systems), the street miles or acres assessed, the % of available street miles or acres assessed, and the average number of assessments conducted per site within the TMA; and
2) Percent jurisdictional-wide trash reduction in FY 19-20 attributable to trash management actions other than full capture systems implemented in each TMA; OR
3) Indicate that no on-land visual assessments were performed.

If no on-land visual assessments were performed, check here and state why: ☐ Explanation:

TMA ID or (*as applicable*) Control Measure Area	Total Street Miles[2] or Acres Available for Assessment	Summary of On-land Visual Assessments			Jurisdictional-wide Reduction (%)
		Street Miles or Acres Assessed	% of Available Street Miles or Acres Assessed	Avg. # of Assessments Conducted at Each Site	
This provision is handled and reported at the city level. Please see individual city reports for this information.					
	Total				

[2] Linear feet are defined as the street length and do not include street median curbs.

C.10.b.iv ► Trash Reduction – Source Controls

Provide a description of each jurisdictional-wide trash source control action implemented to-date. For each control action, identify the trash reduction evaluation method(s) used to demonstrate on-going reductions, summarize the results of the evaluation(s), and estimate the associated reduction of trash within your jurisdictional area. Note: There is a maximum of 10% total credit for source controls.

Source Control Action	Summary Description & Dominant Trash Sources and Types Targeted	Evaluation/Enforcement Method(s)	Summary of Evaluation/Enforcement Results To-date	% Reduction
The Program has relied on the passage of Proposition 67: Proposition 67 has been approved by the state's voters and it: • Ratifies Senate Bill 270 (2014). • Prohibits large grocery stores and pharmacies from providing plastic single-use carryout bags and bans small grocery stores, convenience stores and liquor stores from doing so the following year. • Allows single-use plastic bags for meat, bread, produce, bulk food and perishable items. • Mandate stores to charge 10 cents for recycled, compostable and reusable grocery bags. • Exempts consumers using a payment card or voucher issued by the California Special Supplemental Food Program from being charged for bags. • Provides $2 million to state plastic bag manufacturers for the purpose of helping them retain jobs and transition to making thicker, multi-use, recycled plastic bags. Local grocery stores implemented the requirements of the proposition immediately. During site cleanup events, there has been remarkable reduction in single use plastic bags. It is clear, prior to the pandemic, that the state ban has had a positive impact on our local creeks.				

C.10.b.v ► Trash Reduction – Receiving Water Monitoring

Report on the progress of developing and testing your agency's trash receiving water monitoring program.

Guidance:

Development and testing of the trash receiving water monitoring program occurred through a regional project coordinated through the Bay Area Stormwater Management Agencies Association (BASMAA) and in coordination with the Trash Monitoring Methods Project, California Ocean Protection Council and State Water Board project that is being administered via the Southern California Coastal Water Research Project (SCCWRP) and San Francisco Bay Estuary Institute (SFEI). Consistent with MRP requirements, the final report for the development and testing of the Bay Area trash receiving water monitoring program was submitted by BASMAA by July 1, 2020, consistent with the MRP requirements, following peer review.

C.10.c ► Trash Hot Spot Cleanups

Provide the FY 19-20 cleanup date and volume of trash removed during each MRP-required Trash Hot Spot cleanup during each fiscal year listed. Indicate whether the site was a new site in FY 19-20.

Trash Hot Spot	New Site in FY 19-20 (Y/N)	FY 19-20 Cleanup Date(s)	Volume of Trash Removed (cubic yards)				
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
This provision is handled and reported at the city level. Please see individual city reports for this information.							

C.10.d ►Long-Term Trash Load Reduction Plan

Provide descriptions of significant revisions made to your Long-term Trash Load Reduction Plan submitted to the Water Board in February 2014. Describe significant changes made to primary or secondary trash management areas (TMA), baseline trash generation maps, control measures, or time schedules identified in your plan. Indicate whether your baseline trash generation map was revised and if so what information was collected to support the revision. If your baseline trash generation map was revised, attach it to your Annual Report.

Description of Significant Revision	Associated TMA
This provision is handled and reported at the city level. Please see individual city reports for this information.	

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 19-20. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

Offset Program	Summary Description of Actions and Assessment Results	Volume of Trash (CY) Removed/Controlled in FY 19-20	Offset (% Jurisdiction-wide Reduction)
Additional Creek and Shoreline Cleanups (Max 10% Offset)	On September 21rst, 2019 the Program led volunteer cleanup of local creeks at 22 locations throughout both cities and unincorporated Solano County. 599 volunteers picked up 7,472 pounds of trash and recyclable on 37 miles of waterway.	37	None requested
Direct Trash Discharge Controls (Max 15% Offset)			

Appendix 10-1. Baseline trash generation and areas addressed by full capture systems and other control measures in Fiscal Year 19-20.

TMA	2009 Baseline Trash Generation (Acres)					Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems					Jurisdiction-wide Reduction via Full Capture Systems (%)	Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems and Other Control Measures					Jurisdiction-wide Reduction via Other Control Measures (%)	Jurisdiction-wide Reduction via Full Capture AND Other Control Measures (%)
	L	M	H	VH	Total	L	M	H	VH	Total		L	M	H	VH	Total		
	This provision is handled and reported at the city level. Please see individual city reports for this information.																	
Totals																		

Note: "NA" indicates that the TMA has no moderate, high or very high trash generating areas (i.e., all low trash generation and/or non-jurisdictional) and therefore no additional trash control measures are needed.

Section 11 - Provision C.11 Mercury Controls

C.11.a ► **Implement Control Measures to Achieve** Mercury Load Reductions
C.11.b ► **Assess** Mercury Load Reductions from Stormwater

- Documentation of mercury control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the mercury load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated mercury load reduced by each control measure); and
- Supporting data and information necessary to substantiate the load reduction estimates.

The above information is contained in the attached report entitled: Fairfield-Suisun Urban Runoff Management Program - Mercury and PCBs Control Measures -Implementation of Control Measures to Achieve Mercury and PCB Load Reductions- Load Reductions Consistent with Provision C.11.a.iii.(2) and C.12.a.iii.(2).

C.11.c ► Plan and Implement Green Infrastructure to Reduce Mercury Loads

See attached Implementation Plan and Schedule to Achieve TMDL Allocations, as part of reporting for information on the quantitative relationship between green infrastructure implementation and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., March 23, 2017.

C.11.d ► **Prepare Implementation Plan and Schedule to Achieve TMDL** Allocations

See attached Implementation Plan and Schedule to Achieve TMDL Allocations, as part of reporting for information on the quantitative relationship between green infrastructure implementation and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

C.11.e ► Implement a Risk Reduction Program

The City of Fairfield and Suisun City are focusing outreach efforts on residents that are most likely to consume fish caught locally in the San Francisco Bay, the Suisun Bay, the Suisun Marsh and the Mare Island Strait where the possibility of mercury and PCB contamination may be elevated.

The following has been implemented to carry out the Risk Reduction Program for public health impacts due to PCBs and mercury in San Francisco Bay/Delta fish consumption within the Fairfield-Suisun jurisdictional area:

• Point-of-purchase outreach at fishing supply stores - Program staff visited the following local fishing supply stores to ensure brochure (see attachment 1) distribution to customers:

o Virgil's Bait Shop and Icehouse: 201 Main St., Suisun City

o Big Five Sporting Goods: 1320 Gateway Blvd., Fairfield CA

Annually Program staff distribute brochures and posters to ensure adequate distribution.

- Distribution at Outreach Events - the brochures are distributed at Fairfield and Suisun City community outreach events. FSURMP permittees or representatives attend several outreach events each year. To reach the target audience of women and children, staff focus on those events attended by families and children.
- Harbor Master Quarters, Kiosks and Pier Postings - local fishing piers and kiosks have fish consumption warnings posted, inspected and maintained on an annual basis.
- Distribution to Ethnic Grocery Stores – A permitee representative will communicate the goals of the Fish Risk Reduction Program to County Health Inspectors and request distribution of the brochure to local ethnic markets during Health Inspector routine inspections.

Section 12 - Provision C.12 PCBs Controls

C.12.a ► Implement Control Measures to Achieve PCBs Load Reductions
C.12.b ► Assess PCBs Load Reductions from Stormwater

Please see the attached report entitled: Fairfield-Suisun Urban Runoff Management Program - Mercury and PCBs Control Measures - Watershed Management Areas Report - Load Reductions Consistent with Provision C.11.a.iii.(2) and C.12.a.iii.(2) for:

- Documentation of mercury/PCB control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the mercury load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated mercury load reduced by each control measure); and
- Supporting data and information necessary to substantiate the load reduction estimates.

The above information is contained in the attached report entitled: Fairfield-Suisun Urban Runoff Management Program - Mercury and PCBs Control Measures -Implementation of Control Measures to Achieve Mercury and PCB Load Reductions- Load Reductions Consistent with Provision C.11.a.iii.(2) and C.12.a.iii.(2).

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.0. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., September 19, 2016.

.12.c. ► **Plan and Implement Green Infrastructure to Reduce** PCBs **Loads**

See attached Implementation Plan and Schedule to Achieve TMDL Allocations, as part of reporting for information on the quantitative relationship between green infrastructure implementation and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

C.12.d ► Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

See attached Implementation Plan and Schedule to Achieve TMDL Allocations, as part of reporting for information on the quantitative relationship between green infrastructure implementation and mercury load reductions, including all data used and a full description of models and model inputs relied on to establish this relationship.

C.12.f. ► Manage PCB-**Containing Materials During Building Demolition**

Both cities are requiring each applicant requesting a demolition permit to fill out the attached application and follow the process delineated in the document, ***PCBs in Priority Building Materials: Model Screening Assessment Applicant Package*** (see attached). This application package can be found on each city website and has it been incorporated into the permit process.

There have been no applicable structures in either of the cities.

An Excel spreadsheet has been developed on a region wide collaboration. Through this Excel spreadsheet the permittees will quantify the loads reduced.

C.12.h ►Implement a Risk Reduction Program

The City of Fairfield and Suisun City are focusing outreach efforts on residents that are most likely to consume fish caught locally in the San Francisco Bay, the Suisun Bay, the Suisun Marsh and the Mare Island Strait where the possibility of mercury and PCB contamination may be elevated.

The following has been implemented to carry out the Risk Reduction Program for public health impacts due to PCBs and mercury in San Francisco Bay/Delta fish consumption within the Fairfield-Suisun jurisdictional area:

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- Harbor Master Quarters, Kiosks and Pier Postings - local fishing piers and kiosks have fish consumption warnings posted, inspected and maintained on an annual basis.
- Distribution to Ethnic Grocery Stores – A permitee representative will communicate the goals of the Fish Risk Reduction Program to County Health Inspectors and request distribution of the brochure to local ethnic markets during Health Inspector routine inspections.

Fairfield-Suisun Urban Runoff Management Program

Mercury and PCBs Control Measures

Implementation of Control Measures to Achieve Mercury and PCB Load Reductions

Load Reductions Calculations Consistent with

C.11.a.iii.(3), C.11.b.iii.(2), C.12.a.iii.(3), and C.12.b.iii.(2)

September 30, 2020

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1. INTRODUCTION

The following MRP requirements are addressed within this report:

- Documentation of mercury and PCBs control measures implemented in our Program's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the mercury and PCBs load reduced by each control measure implemented in our Program's jurisdictional area and the calculation results (i.e., the estimated mercury and PCB load reduced by each control measure); and
- Supporting data and information necessary to substantiate the load reduction estimates.

This updated *Mercury and PCBs Control Measures* report was prepared by the Fairfield-Suisun Urban Runoff Management Program (FSURMP) in collaboration with the Bay Area Association of Stormwater Management Agencies (BASMAA) per the Municipal Regional Permit (MRP) for urban stormwater issued by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB; Order No. R2-2015-0049). This report fulfills the requirements of MRP Provisions C.11.a.iii.(2) and C.12.a.iii.(2) for reporting a list of the watershed/management areas where mercury and PCBs control measures are currently being implemented and those in which new control measures will be or have the potential to be implemented during the term of this permit, along with the specific control measures and an implementation schedule. Although many of the control measures may be selected primarily for the purpose of achieving PCBs load reductions during this MRP permit term, substantial mercury load reductions may result as a tangential benefit and will be accounted for in tracking mercury load reductions.

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., March 23, 2017.

2. Managing PCBs In Building Materials and Infrastructure

2.a PCBs in Building Materials

Prior to the July 1, 2019 deadline, both cities in the Program adopted Ordinances which grant authority to their city to require the sampling of building materials for demolition permits from commercial, public, institutional and industrial structures constructed between the years 1950 and 1980. The Permittees have also developed and implemented, in cooperation with BASMAA, managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track-out, airborne releases, soil erosion, stormwater runoff, or improper waste disposal. Applicable structures include, at a minimum, Single family residential and wood frame structures are exempt. A demolition Permittee is exempt from this requirement if the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures[2].

The Permittees participated in a BASMAA Regional Project to address PCBs in building materials. This Regional Project developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition. This Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project. The tools and materials developed as part of the project build upon materials and outputs developed in 2010-2011 by the San Francisco Estuary Partnership with State Water Board grant funding, called the "PCBs in Caulk Project", as well as subsequent and parallel activities by BASMAA.

In addition, BASMAA has developed an assessment methodology and data collection program to quantify the PCBs loads reduced through implementation of the protocol developed by the BASMAA Regional Project, summarized below:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.

3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.

---

4. The municipality then issues the demolition permit or equivalent, according to its procedures.

5. The Program will compile the completed Screening Forms and any supporting documents. Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Data collection started with implementation of the new program on July 1, 2019. When sufficient amounts of new data have been collected, the data will support the development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new construction demolition program.

2.b PCBs in Infrastructure

PCBs may also be found in storm drain or roadway infrastructure in public rights-of-way such as caulk and sealants used in storm drains and between concrete curbs and street pavement. The Program and Permittees participated in a BASMAA Regional Project to characterize the levels of PCBs in caulks/sealants used in storm drains and roadway infrastructure to quantify the potential PCBs load reduction benefits that may result from public infrastructure improvements.

A project report prepared by the BASMAA Regional Project was included in the Program Fiscal Year 2017/18 Annual Report. The results of these investigations will inform the development and implementation of control measures to address this potential source of PCBs into the storm drain system.

2.c Stockpile, Spills, and Disposal of PCBs

This control measure includes the proper clean-up and disposal of stockpiles, spills, and/or improperly disposed quantities of PCBs. The measure would involve, for instance, a concentrated source of PCBs (e.g., a barrel) that is found leaking and cleaned-up or properly disposed and the clean-up of transformer spills by PG&E.

Program and BASMAA representatives have been working with SFBRWQCB staff to ensure thorough documentation and clean-up completion of PG&E PCBs transformer spills. PCBs transformer spill reporting is inconsistent through the OES reporting system and often cases are closed before the municipality or SFBRWQCB staff hear of the spill. This activity could have a significant effect on where PCBs in the public right-of-way are found, as many spills happen in residential areas. Residential areas are not typically considered high likelihood areas for PCBs, so no other control measures have been developed specifically for these areas. SFBRWQCB and

BASMAA representatives are working on better defining Program roles and responsibilities in responding to spills, at least for their own agencies, and are working on getting PG&E to cooperate to make a smoother and more transparent process as we try to reduce the loading of PCBs into the San Francisco Bay, San Joaquin/Sacramento Rivers Delta, and Suisun and San Pablo Bays.

BASMAA has begun the process of conducting a regional Stressor/Source Identification (SSID) project, in compliance with MRP Provision C.8.e, that will develop and implement a regional SSID workplan to further understand the magnitude and extent of PCBs released by electrical utility equipment spills, and to identify controls that could be implemented to reduce the water quality impacts of this source.

In FY 2018-19, the regional SSID project developed the SSID workplan. As a result of this project, BASMAA sent a letter to the SFBRWQCB requesting that the Regional Water Board use its authority under Section 13267 of the California Water Code to compel private electrical utilities operating in the Bay Region to provide technical information that is needed to support further investigation of electrical utility equipment and properties as potential sources of PCBs to MS4s in the Bay Region.

LOADS REDUCED

This section presents estimates of the loads reduced by the control measures:

Loads Reduced – PCBs and Mercury

Estimated PCBs And Mercury Loads Reduced For City of Fairfield**

	Mercury (g/yr)	PCB (g/yr)
Parcel-based	5.81	1.04
Green Streets	0	0
Full Trash Capture	12.41	1.64
Total	18.22	2.68

Estimated PCBs And Mercury Loads Reduced For City of Suisun City**

	Mercury (g/yr)	PCB (g/yr)
Parcel-based	0	.024
Green Streets	0	0
Full Trash Capture	.1	.013
Total	.1	.037

Total Estimated PCBs And Mercury Loads Reduced For FSURMP**

City	Hg Load Reduced (grams/yr)	PCB Load Reduced (grams/yr)
Suisun City	.8	.037
Fairfield	18.22	2.68
Totals	19.02	2.72

**Control measures implemented in Fiscal Year (FY) 2013/14, FY 2014/15, FY 2015/16, FY 2016/17, FY 2018/19, and FY 2018/19 (i.e., controls measures implemented between July 1, 2013 and June 30, 2019) are reported herein.

Solano Permittee and FSURMP Watershed Boundaries **

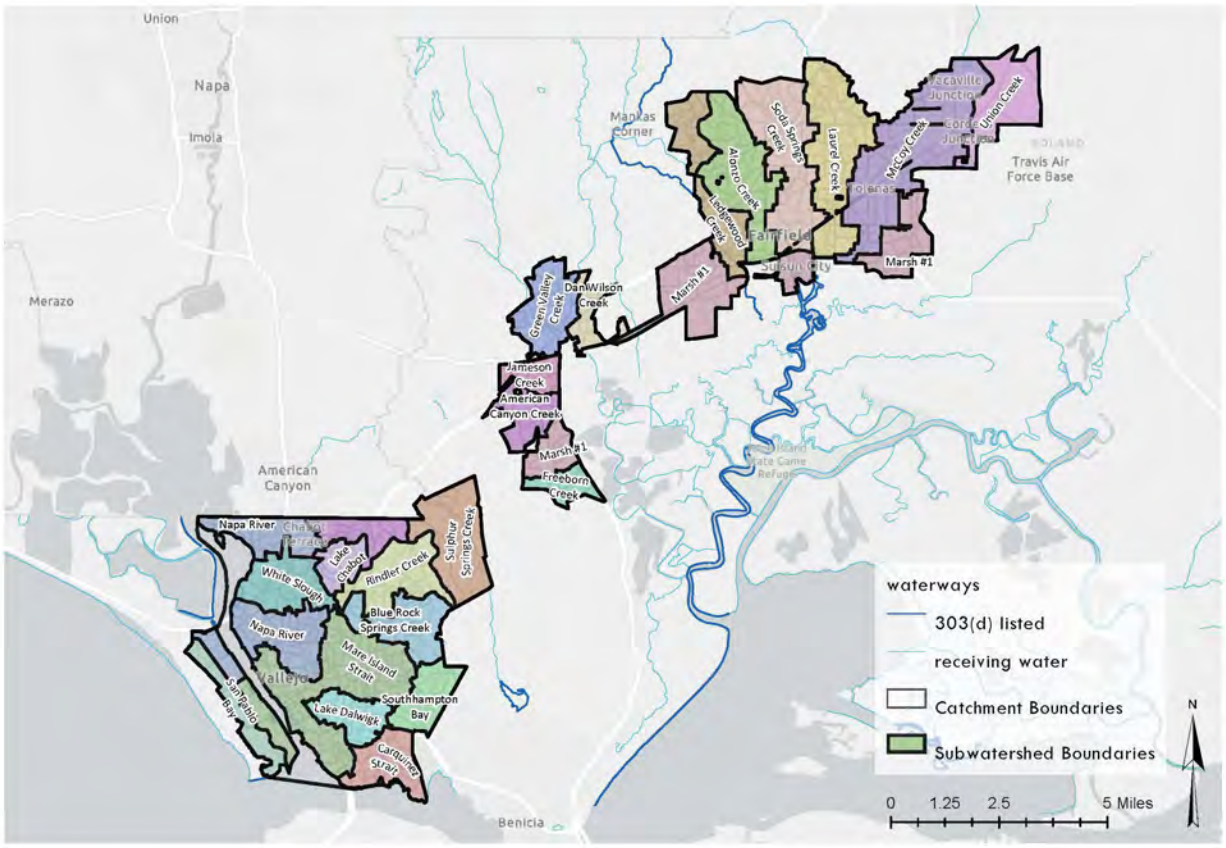

** For further detail on the program watershed boundaries, and green storm water infrastructure documentation. Please see each cities' Green Stormwater Infrastructure Plans , which are attached to this annual report.

Existing green stormwater infrastructure projects and green stormwater infrastructure projects proposed for 2020, 2030, and 2040 **

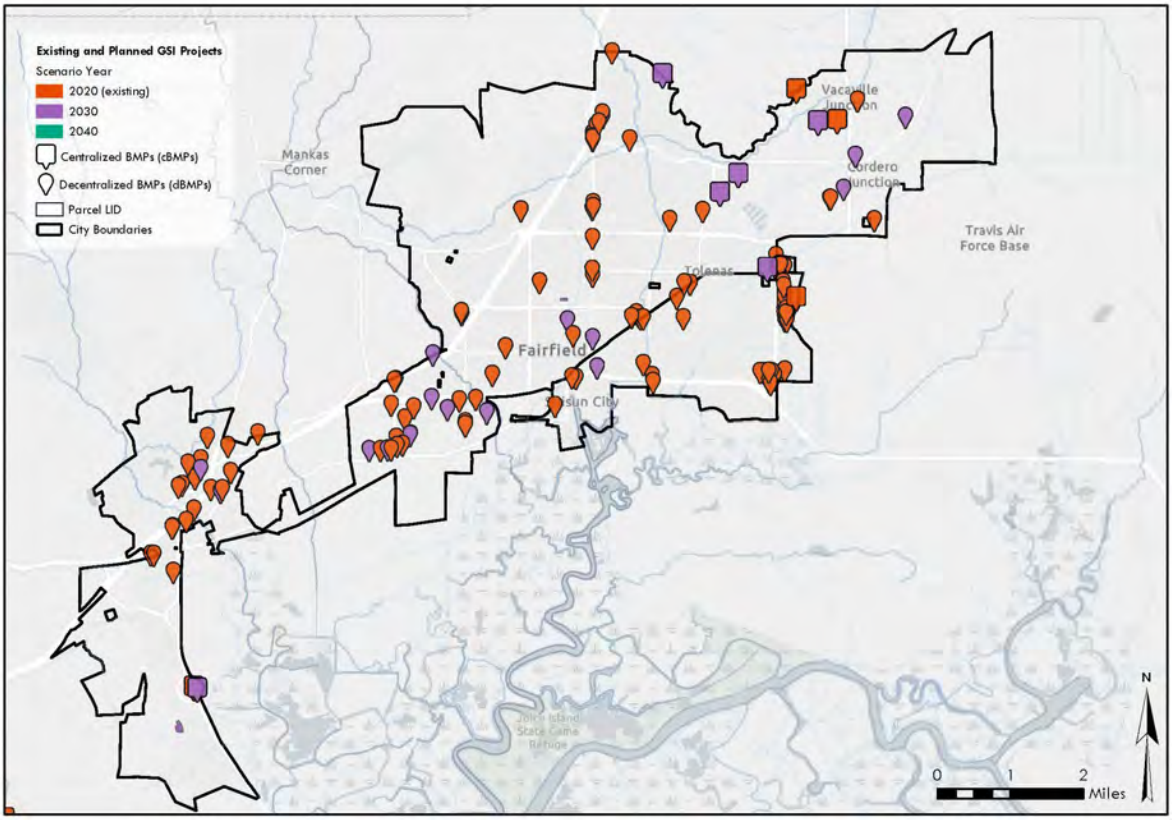

** For further detail and information on both cities Green Stormwater Infrastructure Plans please see Section C.3 of their Annual Reports

BASMAA Interim Accounting Methodology

BASMAA contracted with Geosyntec consultants and EOA, Inc in fiscal year 2016-17 for the development of an Interim Accounting Methodology to calculate TMDL loads reduced. In fiscal year 2018-19, the Program contracted with EOA Inc. for the assistance in utilizing the Interim Accounting Calculator. The cities populated the calculator utilizing historical information gathered during the approval and construction of new development projects. The calculator was then sent to EOA for review and inspection. EOA, after review and inspection, then sent the tool back to the Program for reporting.

Supporting Data and Information Necessary To Substantiate The Load Reduction Estimates

Please see each cities', section C.3 portion of their annual report for documentation and information to substantiate the load reduction estimates. Furthermore, please see each cities' Green Storm Water Infrastructure Plans for further information on load reduction efforts.

SOLANO PERMITTEES

Green Stormwater Infrastructure

Reasonable Assurance Analysis Modeling Report for PCBs and Mercury

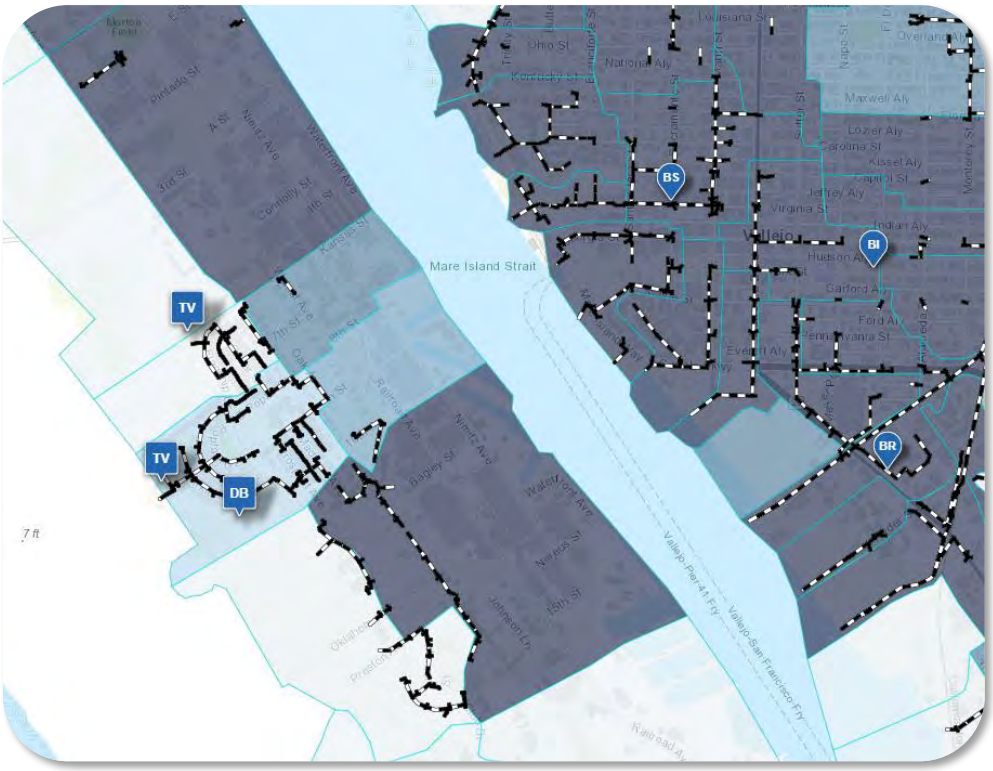

FINAL REPORT

SEPTEMBER, 2020

In compliance with Provision C.11 and C12.c of Order R2-2015

Prepared by:

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APPENDICES

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Appendix B. swTELR BMP type definitions

Appendix C. Catchment routing and attributes

Appendix D. Decentralized BMPs implemented and planned by Solano Permittees

ACRONYMS

BASMAA	Bay Area Stormwater Management Agency
BMP	Best Management Practice
C3	Refers to Provision C3 in the MRP
cBMP	Centralized BMP. Also called regional treatment measures
CN	Curve number
CRC	Characteristic runoff concentration
dBMP	Decentralized BMP, also called distributed BMPs
FSSD	Fairfield Suisun Sewer District
GI	Green Infrastructure
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
HSG	Hydrologic soil. group
LID	Low Impact Development
MRP	Municipal Regional Stormwater Permit
NLDC	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
RWQCB	Regional Water Quality Control Board
PCBs	Polychlorinated Biphenyls
SCS	Soil Conservation Service
SFEI	San Francisco Estuary Institute
swTELR	Stormwater Tool to Estimate Load Reductions
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
WLA	Waste load allocation
VFWD	Vallejo Flood and Wastewater District

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EXECUTIVE SUMMARY

This report communicates the methods and results of a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. Those provisions require Solano Permittees to quantify the degree to which they expect to meet future Polychlorinated biphenyls (PCBs) and mercury reduction targets by implementation of Green Stormwater Infrastructure (GSI). This study was coordinated with other SF Bay Area Permittees via the Bay Area Stormwater Management Agencies Association (BASMAA) to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo; the Fairfield Suisun Sewer District; and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of a Green Stormwater Infrastructure Workplan, so that the outputs may inform future GSI implementation. Thus, this report represents the result of a concerted, collaborative effort on the part of the Solano Permittees to determine PCB and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

The Solano permittees have employed a practical and proven approach for quantifying load reductions that reflects both a need to be efficient with limited resources and a commitment to transparent linkages between planned improvements and expected water quality benefits. This approach is based on outputs from the purpose-built stormwater hydrologic and pollutant loading model Stormwater Tool to Estimate Load Reductions (swTELR) reported in Beck et al. (2017), Conley et al. (2019); and Conley et al. (2020). swTELR is a scalable computational approach to quantify urban catchment-scale stormwater runoff, pollutant loading to receiving waters, and reductions from BMPs. The model provides spatially-explicit accounting of stormwater and pollutant reductions to inform more strategic stormwater management decisions with a parsimonious structure that relies strongly on the input data. This approach also makes the model easier to use and understand, lower cost, and more amenable to both field verification and updating with new information as it becomes available.

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural BMPs that infiltrate and treat stormwater runoff. These scenarios do not include source control measures, which will also contribute to TMDL wasteload allocation reductions, as these will be handled in a separate RAA study pending the completion of a regionally adopted accounting method by BASMAA scheduled to be completed in April of 2020.

Baseline modeling (no BMPs) corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, these areas represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting WLA targets in the future (see maps below). Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from swTELR were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate from swTELR was below the wasteland allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the veracity of swTELR outputs.

Future modeling scenarios showed that the Solano Permittees are expected to meet target GSI reductions for both PCB and mercury in the coming decades. Reductions calculated for the years 2020, 2030, and 2040 surpass the required GSI reductions by several multiples for both PCBs and mercury, primarily due to the conversion of Old Industrial/Source Area land uses to New Urban land use on Mare Island. The GSI reductions represent substantial progress towards WLA targets specified in the TMDL (SFRWQCB, 2006; SFRWQCB, 2008), with the PCB GSI reductions accounting for 72% of reductions required to achieve the Solano Permittee's 2040 PCBs WLA target (100 grams). Mercury reductions represent a 14% reduction from baseline estimates by 2028 which are already below the Solano Permittee WLA target. Large tracts of land have been acquired by private development firms and demolition, grading, and/or construction is already underway throughout Mare Island. If these redevelopment projects proceed as planned over the next two years, load reductions are expected to accelerate towards the modeled 2020 estimates. A spatial prioritization analysis was completed to identify the best parcels and road segment opportunities for additional GSI implementation, that may provide additional benefits, which will be addressed in the GSI Workplan. However, it is anticipated that already planned redevelopment projects will meet the GSI reduction targets and that source control measures will make up most of the remaining required reductions to meet WLA targets.

While the Solano Permittees are on track to achieve the pollutant reduction expectations for GSI implementation, as GSI and source control measures are implemented, new opportunities and challenges will inevitably arise, causing changes to the planned scenarios. It will be critical for Solano permittees to adopt a cost-effective and updateable tracking and accounting system so that iterative quantification of reductions can ensure that progress aligns with estimated projections. Integration of pollutant load reduction accounting with GSI data management and reporting can improve Solano Permittee stormwater program efficiency, and provide interim progress verification for ongoing assurance that pollution reduction expectations are indeed reasonable.

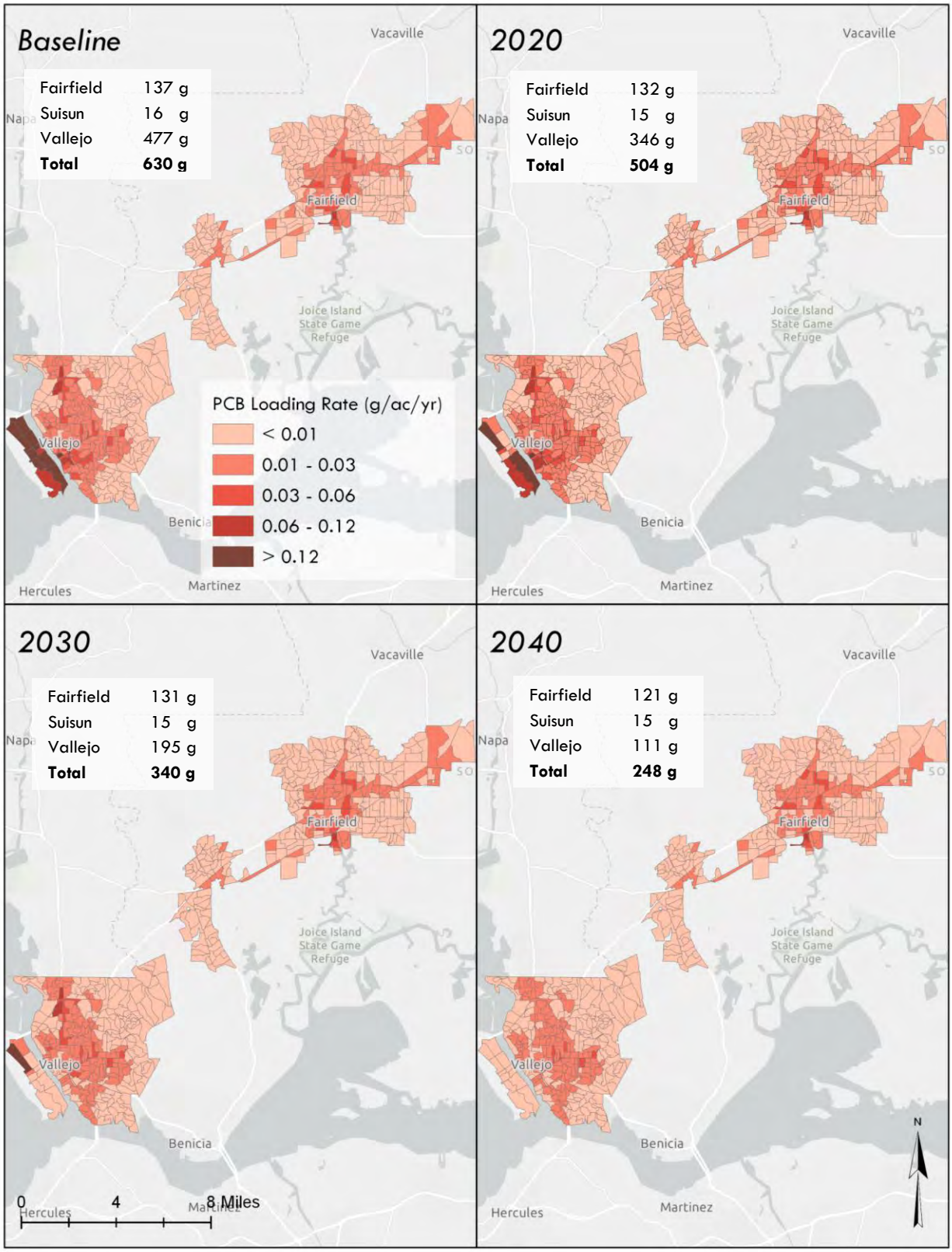

Spatial distribution of annual PCB load estimates for baseline and future scenarios

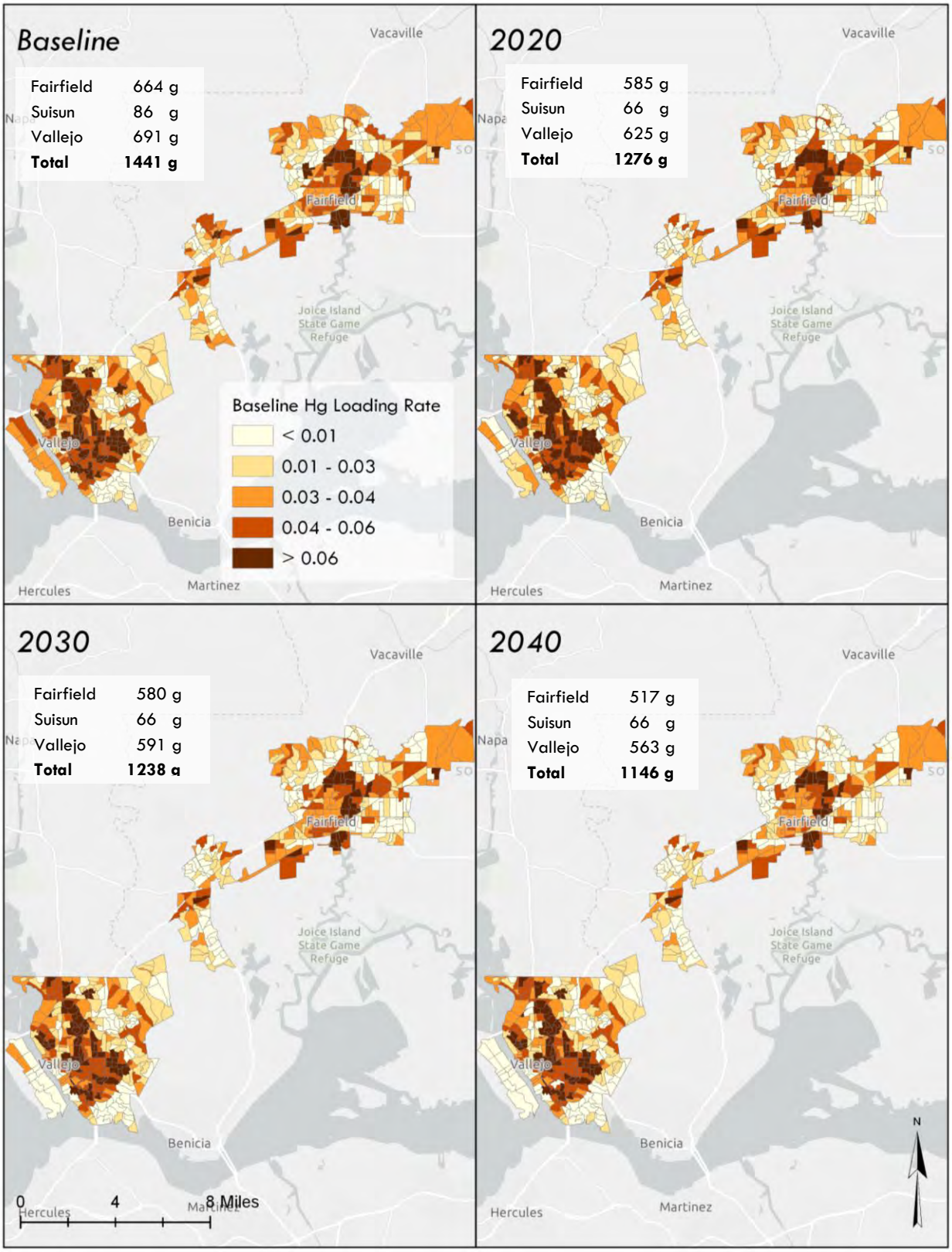

Spatial distribution of annual mercury load estimates for baseline and future scenarios

1 Introduction

1.1 Regulatory Mandate

The Solano Permittees (City of Fairfield, City of Vallejo, and Suisun City) are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1], and mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay. MRP Provision C.11and C.12.c requires the Solano Permittees to prepare a Reasonable Assurance Analysis, to be submitted with its Annual Report to the RWQCB due September 30, 2020.

"Green Infrastructure" (GI), also known as "Green Stormwater Infrastructure" (GSI[2]), refers to the construction and retrofit of storm drainage to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural systems to detain and treat runoff before it reaches receiving waters. Green stormwater infrastructure can be incorporated into construction on new and previously developed parcels, as well as new and rebuilt streets, roads, and other infrastructure within the public right-of-way.

Water quality in San Francisco Bay is impaired by polychlorinated biphenyls (PCBs) and mercury. Sources of these pollutants to the Bay include urban stormwater. By reducing and treating stormwater flows, GSI reduces the quantity of these pollutants entering the Bay and will hasten the Bay's recovery.

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, all Bay Area Permittees must also project the load reductions achieved via GSI by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040[3]. Of these regional 2040 reduction targets, the Solano Permittees are responsible for reductions of approximately 110 grams/year

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[1] Order R2-2015-0049

[2] Although the MRP uses the term green infrastructure (GI), the Solano Permittees prefer to use the term green *stormwater* infrastructure (GSI) for clarity. Henceforward, the term GSI will be used.

[3] Permittees shall "quantitatively demonstrate that PCBs load reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects" (C.12.c.ii.2.d) Percent of Solano Permittee load reduction is 20.8% PCBs and 16.1% mercury from BASMAA RAA Guidance Document (6/30/17).

PCBs and 48 grams/year mercury based on current baseline estimates (Table 1.1) (see Section 4.2.4 Compliance Demonstration for details.

Table 1.1 Future GSI reduction targets for Solano Permittees from modeled baseline loading

	Scenario	GSI Reduction Target (g)*
PCBs	2020	8
	2030	58
	2040	110
Mercury	2020	2
	2028	33
	2040	48

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury)

1.2 Scope and Purpose

This RAA provides a demonstration that GSI control measures included in the Solano Permittees' GSI Plan as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury Total Maximum Daily Load (TMDL) MRP required green infrastructure reductions for urban stormwater runoff. This RAA quantifies PCB and Mercury reductions, given the type, size, number, location, and time frame of GSI control measures needed to comply with load reduction goals stated in MRP Provisions C.3.j and C.11/C.12.c. This report fulfills the MRP requirement of quantifying reductions achieved via GSI (C.11.c/C.12.c) which will be documented in the 2020 Annual Report for the Solano Permittees.

The vision for this RAA is to map a path towards achieving TMDL wasteload allocation targets (WLA) and also provide a structure for ongoing compliance demonstration. A modeling approach has been developed that is amenable to iteratively verifying runoff and pollutant load reductions as new stormwater BMPs are implemented over time. The outputs provide timely information at spatial scales that can inform implementation decisions. It creates a practical means for quantifying load reductions over time that is also amenable to direct monitoring verification at individual BMPs and urban stormwater drainage scales. This RAA analysis has been performed in conjunction with development of a Green Stormwater Infrastructure Workplan to ensure that load reduction requirements dynamically informed the identification of sites and types of green infrastructure planned in the future.

1.3 Background and Understanding

1.3.1 PCBs and mercury Total Maximum Daily Loads

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay (a Waste Load Allocation, or WLA) from identified sources, including from urban stormwater. The urban stormwater WLA, in turn, is apportioned among MRP Permitees in proportion to population, based on the naïve assumption that PCB loadings vary in proportion to population[4]. The Solano Permittees constitute approximately 4.7% of the population total for all cities named in the MRP.

The Bay Area-wide WLA for PCBs for urban stormwater is 2 kg/yr by 2030, which is a ninety percent reduction from baseline urban stormwater loads estimated in the TMDL. The overall reduction in all external loads, including urban stormwater, was developed based on multiplying the target final sediment PCB concentration (1 µg/kg) by the estimated annual sediment load discharged from local tributaries. The target final PCB concentration in sediment was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day). The fish tissue target (10 ng/g) is translated to the sediment target (1 µg/kg) using a food web model developed by San Francisco Estuary Institute (SFEI).

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment (0.4 mg/kg or 200 µg/kg). A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of

[4] Monitoring data demonstrates that this is an oversimplified assumption, because PCB yields per unit land area are higher in some land uses (e.g., "old industrial") compared to others (e.g., "new urban"). The PCBs TMDL and resulting permit provisions allow permittees to provide alternate formulae for allocating load reduction requirements among permittees.

mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations. These receiving water goals are translated by the TMDL into a roughly 50% mercury load reduction requirement from urban stormwater.

Because the ninety percent reduction for PCBs is more stringent than the fifty percent reduction for mercury, current implementation strategies for Bay Area stormwater programs are based on the assumption that achieving PCB WLAs will result in achieving mercury WLAs. This assumption is intended to be revisited through periodic review of progress on attainment of TMDL goals.

1.3.2 PCBs and mercury sources, transport, and distribution

1.3.2.1 *PCBs sources to urban runoff*

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers (Abbot 1993, Binational Toxics Strategy 1998 and 1999, EIP Associates 1997)[5]. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

1.3.2.2 *Mercury sources to urban runoff*

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal

[5] Review of Potential Measures to Reduce Urban Runoff Loads of PCBs to San Francisco Bay, by EOA, Inc. for Santa Clara Valley Urban Runoff Pollution Prevention Program, March2004.

mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to SF Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

1.3.2.3 *PCBs and mercury transport*

Conceptual model development by Mangarella et al (2010) defined the principle pathways of PCBs and mercury transport. Wind dispersal, vehicle tracking and road deposits and surface runoff from source areas were defined as the primary transport vectors for sediment-bound pollutant transport throughout the SF Bay Area. Sediments transported into the MS4 accumulate on roadways (including curbs and gutters), storm drain inlets/catch basins, stormwater pipelines, and other structures (e.g., stormwater pump stations).

1.3.2.4 *PCBs and mercury spatial patterns in the SF Bay*

McKee et al. (2015) produced multi-year synthesis of PCBs and mercury data collected by numerous researchers as part of the SF Bay Regional Monitoring Program (RMP) to directly address management questions and identify patterns across the SF Bay Area. Sediment studies in the SF Bay Area and its watersheds have consistently measured higher PCB concentrations in areas of urban development compared to regions of open space or non-urban land uses (McKee et al, 2015, Hunt et al., 1998; Daum et al., 2000; KLI, 2002; Gunther et al., 2001). Maps included in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Watersheds that have ongoing disturbances through human development or that have legacy point sources show higher water column concentrations of total mercury than other less impacted watersheds. Elevated mercury concentrations are mostly caused by a combination of mercury stored in source areas and available for transport, and greater sediment (and perhaps organic carbon) loading rates (McKee et al., 2015). Concentrations of mercury in small fish have also been investigated by the RMP (Greenfield and Jahn, 2010). In contrast to PCBs, the small fish mercury data do not strongly indicate specific areas within the SF Bay Area of particular concern.

Sequential rounds of conceptual and mass balance model development have resulted in land-use based estimates of PCB and mercury production throughout the Bay Area (McKee et al. 2006,

Mangarella et al. 2006; 2010). These initial efforts were built upon by information extracted from BASMAA integrated monitoring reports, which used a unique land-use grouping that relied primarily on the identification of 'Old' and 'New' urban land uses. They were later used to develop the land use layer for the Regional Watershed Spreadsheet Model (RWSM), designed to estimate relative watershed-scale yields (Lent and McKee, 2011; Lent et al., 2012; McKee et al., 2014; Wu et al. 2016). McKee et al 2015 point out that a primary challenge faced in RWSM development was poor quality of the underlying land use layer and cautions that it may hamper the use of the model to smaller areas or at higher resolution.

Since the early1990's, several locations within the SF Bay nearby to Solano County have been sampled by regional monitoring programs such as the SF Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3)[6] system, administered by SFEI, provides access to these data and tools for viewing metadata. Given the nature of the sampling schedules, the mercury and PCBs data available are primarily useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. These data provide a snapshot of conditions for both PCBs and mercury at specific locations in the Bay, allow probabilistic inference over wider areas, and fulfill the objectives of specific scientific studies.

From 1993-2001 there are 28 recorded sampling sites for PCBs and mercury collected within Grizzly Bay, Suisun Bay, Carquinez Straight, nearly all of which record a single sample for each constituent. There have been 19 samples for both mercury and PCBs in water collected at one site in the Mare Island Straight as part of the RMP. There were 3 samples for PCBs in water collected at a site on Austin Creek in the NW corner of Vallejo in 2017. There are also 9 sediment sampling sites, with 1 sample at each site for both PCBs and mercury distributed throughout Vallejo Waterfront and Mare island collected in 2008. Two sites along Suisun Creek had both mercury and PCBs samples collected once in 2005 as part of the Portable Remote Sensing Image SectroMeter (PRISM) study, and one site within Suisun City had 1 mercury sample collected in 2013 as part of the Surface Waters Ambient Monitoring Program (SWAMP).

1.3.2.5 *PCBs source identification in Solano Permittee MS4s*

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis

[6] https://cd3.sfei.org/

Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD and City of Vallejo, 2016.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. More than six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire SF Bay.

The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an old industrial area based on historic land use. Some old waterfront sections of Vallejo are also considered old industrial and may be examined more closely in the future.

1.3.3 Reasonable Assurance Analysis

Given the risk of PCB and mercury delivery to local waterways, Solano Permittees are required to an analysis to provide 'reasonable assurance' that planned GSI implementation actions are expected to result in reductions that meet MRP 2.0 targets and the TMDL. Reasonable assurance can be defined as the demonstration that the implementation of control measures will, in combination with existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet TMDL waste load allocations or other water quality targets specified in a municipal separate storm sewer system (MS4) permit (USEPA, 2017). RAAs can provide MS4 permittees with a feasibility pollutant reduction roadmap to meeting their future waste load allocations and achieve receiving water limitations. If RAAs are conducted in a way that is well aligned with long-term stormwater planning information needs, they can also be used to support tracking, evaluation, and on-going reporting of the actual progress achieved enroute to the defined regulatory milestones.

2 Reasonable Assurance Analysis (RAA)

2.1 Approach Overview

2.1.1 RAA process

This goal of the Reasonable Assurance Analysis (RAA) is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet waste load allocation targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the green infrastructure RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to waste load allocation targets. This analysis includes only the RAA for green infrastructure, as the wasteload allocation attainment RAA will be documented in a separate report. By performing this RAA in parallel to development of the Green Stormwater Infrastructure Workplan, information from the RAA results were iteratively used to inform Plan development. This approach allows the Solano Permittees to efficiently integrate science-based tools with their stormwater planning processes and provide them with the power to iteratively verify outcomes and track progress over time.

The primary hypothesis addressed in this RAA can be stated as:

> The current level of GSI control measure implementation planned will result in PCBs and mercury load reductions that are sufficient to meet the reduction targets for the Solano Permittees specified in the MRP.

The experimental design is defined by a sequence of future scenarios during which the Permittee urban landscape is modified via changes in land use and impervious coverage, and implementation of GSI. If the expected changes are large enough to overwhelm the uncertainty associated with input data and the modeling process, then the primary hypothesis can be validated or rejected with a reasonable level of confidence.

The structure of this RAA draws substantially from the RAA already completed in Los Angeles County (Geosyntec, 2015). This analysis informed development of the RAA Guidance (BASMAA, 2017) that provides a process and structure for RAA in the SF Bay Area, which is reflected in the current analysis.

The RAA process involved compiling spatial data from various sources and information form Solano Permittees on levels of current and planned redevelopment, new development, and GSI implementation as inputs to several modeling scenarios. The basic steps in the RAA process were the following:

1. Define the modeling problem and identify an appropriate model structure and scale
2. Create a geodatabase to define urban catchment characteristics and drainage
3. Estimate baseline loading conditions and current levels of GSI implementation
4. Verify baseline modeling scenario results
5. Develop future modeling scenarios that reflect the level of projected land use changes and GSI implementation.
6. Compare the estimated reductions to GSI reduction targets for each relevant time horizon
7. Use the modeling scenarios to inform a parcel-scale spatial prioritization analysis for GI implantation site identification
8. Integrate additional planned GSI projects to update modeling scenarios

2.1.2 Correspondence with RAA Guidance Document recommendations

This RAA was coordinated with other Bay Area Permittees via the Bay Area Stormwater Management Association (BASMAA). This included participation in BASMAA workgroups, document review, and aligning the methods of analysis with recommendations included in the BASMAA RAA Guidance (BASMAA, 2017). The intent of the BASMAA RAA Guidance is to maintain a degree of consistency in the way that model analyses for PCBs and mercury are performed throughout the throughout the SF Bay region.

The RAA Guidance creates a useful structure in terms of specifying the scope of the analysis, input data sets, recommended modeling approaches, and allocation of control measures to various future scenarios. Modeling natural systems always requires several subjective decisions whose appropriateness depends on the data available to support the model and the information needs required from the outputs and the model structure. The RAA Guidance attempts to standardize several of these decisions. Sparse comment is provided on others, such as spatial resolution, aligning process representation complexity to the data available, or impacts of various sources of modeling uncertainty. For example, calibration and parameter set non-uniqueness has long been widely acknowledged as one of the most important sources of output uncertainty in hydrology (see Beven, 2001, 2006), and more recently in applied stormwater quality modeling (Wijesiri and Liu, 2018).

Modeling methods for pollutant load reduction estimation employed by the Solano Permittees is generally consistent with the RAA Guidance and aligns directly with recommendations whenever appropriate. Computational methods to modelling urban stormwater hydrology and pollutant loading continue to evolve to meet the needs of stormwater programs and regulators. Modeling decisions included in this analysis are grounded in commitment to create planning tools that are practical and useful for both short and long term stormwater decisions, responsive to evolving regulatory requirements, and readily updatable with new information to empower stormwater managers to implement effective and adaptable programs.

2.1.3 Study area

2.1.3.1 *Solano Permittee MS4 Area*

The study area for the RAA analysis includes the Solano Permittee MS4 area, that includes the cities of Fairfield, Suisun, and Vallejo only, and no areas draining to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 2.1) As such, the runoff and pollutant load modeling is discrete to these MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Since there are no long-term streamflow gauging stations downstream from the cities of Vallejo, Fairfield, and Suisun, the Permittee setting precludes calibration to observed flows. This precludes the need to incorporate additional drainage areas upstream of the Solano Permittee MS4 area in the modeling.

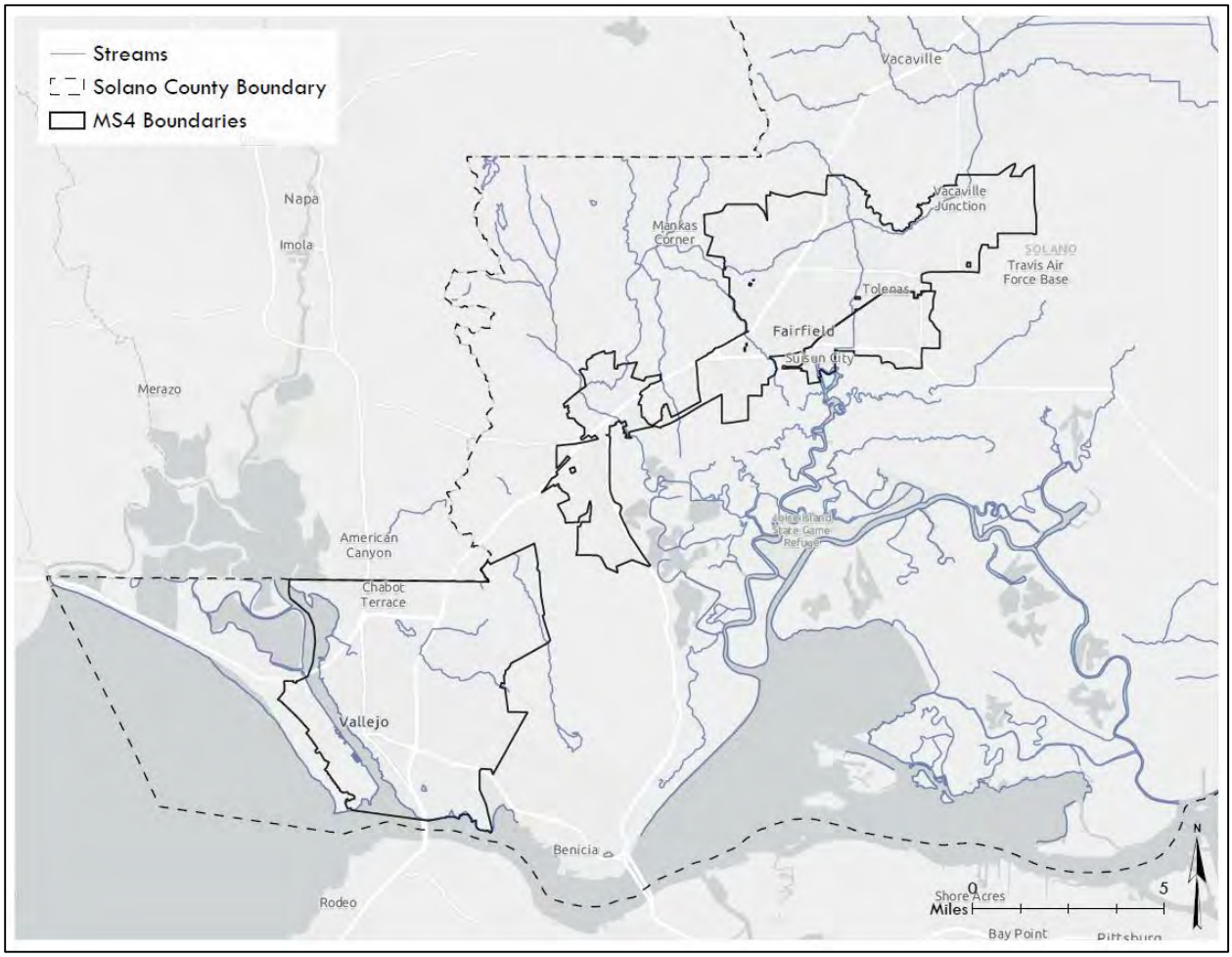

Figure 2.1. Solano Permittee MS4 Area

2.1.3.2 *Municipal Geographies*

The City of Fairfield is located along the Interstate-80 corridor between the major metropolitan areas of San Francisco and Sacramento. Fairfield is surrounded by undeveloped grazing and grasslands, hills to the north, and wetlands to the south beyond Suisun City. Fairfield is the county seat for Solano County and consists of three main areas: Central Fairfield, Cordelia, and the Travis Air Force Base.

The City of Suisun City is in the northern San Francisco Bay Area just south of the City of Fairfield. The Suisun Marsh and additional waterways lie along the southern extent of the city. The area surrounding the city includes hills and mountains. Suisun City has a downtown historic waterfront area that is its distinguishing characteristic.

The City of Vallejo is in the northern San Francisco Bay Area between San Pablo Bay and the Carquinez Strait. The city is surrounded by waterways, wetlands, rolling hills, and open space areas. Vallejo served as the California state capital in the state's infancy, before the state seat was permanently established in Sacramento. Additionally, Mare Island was the first Naval shipyard on the West Coast. Due to the historic context of the city, Vallejo has many historic buildings. Vallejo is in a desirable development location with because of transportation links via road, rail and water. The waterfront area, Mare Island, and downtown are focal points of community development.

2.1.3.3 *Climate and Physical Geography*

Solano County is the easternmost county of the North Bay has a mild coastal Mediterranean climate, with average temperatures increasing by about 10°F from the cooler coast to hotter inland cities. The coastal city of Vallejo is influenced by its position on the northeastern shore of San Pablo Bay, but less sheltered from heatwaves than areas directly on or nearer the Pacific Ocean/Golden Gate such as San Francisco and Oakland. Nearly all the precipitation is delivered between October and May, with an average annual precipitation totals of 21 inches for Vallejo and 24.9 inches for Fairfield/Suisun.

Runoff from the City of Vallejo primarily drains to the Napa River, the Mare Island Straight, and the Carquinez straight, all of which flow to San Pablo Bay. Other receiving waters for urban runoff include American Canyon Creek, Blue Rock Springs Creek, Lake Chabot, Lake Dalwigk, Rindler Creed, Southampton Bay, Sulphur Springs Creek, and White Slough. Fairfield and Suisun both drain to a complex series to tidal marshes and Sloughs that ultimately flow to Grizzly Bay and Suisun Bay. Runoff from Northern Fairfield and Suisun flows creeks and branches of the Suisun Slough, while Southern Fairfield flows primarily to Cordelia Slough. Receiving waters include Alonzo Creek, American Canyon Creek, Dan Wilson Creek, Freeborn Creek, Green Valley Creek, Jameson Creek, Laurel Creek, Ledgewood Creek, McCoy Creek, Soda Springs Creek, and Union Creek.

2.1.4 Conceptual Understanding of Pollutant Load Reduction Mechanisms

The computational model used in this RAA analysis follows from our conceptual understanding of urban drainage hydrology and redevelopment that includes pollutant fate and transport through the stormwater system. To represent these processes, a sequential accounting of runoff and pollutant load reductions is followed:

1. New development and redevelopment alter impervious cover, which affects runoff generation
2. Land use changes alter pollutant characteristic runoff concentrations
3. Source controls reduce pollutants available for transport
4. Rainfall is converted to runoff based on site-specific factors and mobilizes pollutants
5. Areas treated by non-structural LID measures produce less runoff, reducing on-site pollutant mobilization.
6. Decentralized BMPs infiltrate runoff near its source, reducing storm flows via infiltration and retention of pollutants.
7. Excess runoff leaves sites, moving downstream to centralized BMPs where runoff and pollutants are further reduced via infiltration, particle capture, filtration, and/or biogeochemical cycling.
8. Runoff and pollutants not infiltrated or treated by centralized BMPs flow downstream to other catchments or receiving waters.

In this model, water movement follows urban catchments delineations (approximately 100 acres) which define the hydrography of the urban landscape and serves as the primary unit of analysis for routing and connectivity to receiving waters. Urban drainages are aggregations urban catchments that represent the smallest non-arbitrary hydrographic divisions of the MS4.

While this RAA focuses only on GSI implementation, the computational model can easily be extended for the WLA RAA to include source control measure reductions in a subsequent modeling study. By separating the GSI RAA from the WLA RAA, care must be taken not to double count reductions since several source control and GSI components interact with each other. Inconsistencies would probably only become apparent when source control implementation can be defined in specific locations and modeling is performed in a spatially explicit manner as in swTELR. The modeling sequence defined above ensures a consistent accounting of reductions so that results are logically coherent.

2.1.5 Green Stormwater Infrastructure Definition

Green stormwater infrastructure are pollution control measures broadly defined in the MRP (as green infrastructure') (p.147) as:

> *"Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner*

water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water."

This corresponds roughly with the definition provided by the EPA, which overlaps substantially with a traditional definition of Low Impact Development (LID). One difference between the two is that LID usually includes the provision that runoff is managed as close to its source as possible. The definition used in the MRP covers most structural BMPs whether they are small decentralized/distributed BMPs that receive sub-parcel scale drainage or larger centralized/regional BMPs which typically receive neighborhood-scale stormwater drainage.

2.2 Model Selection Rationale

2.2.1 Key modeling considerations and trade-offs

Since all environmental models are simplifications of much more complex systems, an important initial step is to identify the compromises that will be required. These choices are often driven by resource availability and the purpose of the model. The most salient question is: *What do we need to use the model to do?* The answer to this question can dictate much of what gets left in and what gets left out of the model, and there are costs on both sides of that proposition. The problem is often framed as a trade-off between the degree of model complexity and the data required to support that complexity to obtain outputs with a reasonable degree of certainty. Figure 2.2 shows the problem as framed by EPA in their *Guidance on the Development, Evaluation, and Application of Environmental Models* (EPA, 2009). As structural complexity increases, the framework uncertainty decreases, since more of the system detail is represented. However, complex structures require higher order parameterizations, which rely on more data to specify and verify the model, so the additional complexity tends to produce greater uncertainty associated with the underlying data. A key modeling task is to identify the best balance these two sources of uncertainty for the specific modeling purpose.

Figure 2.2 conveys the concept that if we select a relatively simple model (e.g, computing peak flows using the rational method instead of continuous simulation), then we are left wondering if over-simplification leads to false conclusions. If we adopt a more complex model (e.g, continuous simulation at fine-scale spatial resolution), we are challenged with gathering enough real world monitoring data to supply all needed model inputs, or left wondering whether assumptions about model inputs leads to false conclusions. Thus, we seek to achieve just the level of model complexity needed to reach the point of minimum overall uncertainty resulting from the combination of model framework uncertainty and data uncertainty.

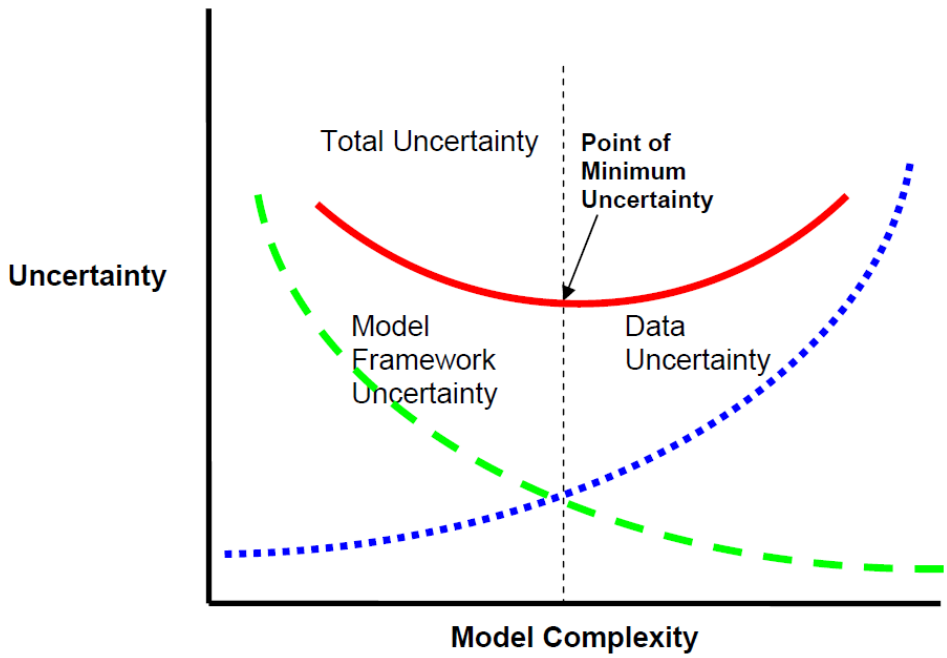

Figure 2.2. Relationship between model framework uncertainty and data uncertainty, and their combined effect on total model uncertainty (Adapted from Hanna, 1988, as presented in EPA, 2009, p.13).

In relatively complex model alternatives, there are numerous free parameters that usually require calibration, but there may be only a few input variables that contribute significantly to the outputs (Li et al. 2014). Over-parameterization, which is exceedingly common, results in a high degree of uncertainty in the model outputs due to subjective decisions required during the calibration process (Beven 1989, Beven 2001). Moreover, parameter values can vary substantially over time and space (Hossain and Imteaz 2016). Even where good hydrological data are available, they are probably only sufficient to support reliable calibration of models of very limited complexity (Jakeman and Hornberger 1993, Gaume et al. 1998). The inability to discern water quality changes over time or spatial patterns in hydrologic models is often due to poorly defined model parameters and resulting output uncertainty (Freni et al., 2011; Beven 2001, Nandakumar and Mein 1997). If the model cannot resolve the effects of management actions outside of predictive uncertainty, it is not a useful tool for estimating the water quality benefits of stormwater BMP implementation, and therefore less value to inform stormwater management decisions.

2.2.2 Aligning model specifications with management information needs

The intended use of model results should ultimately guide model selection and the necessary degree of model complexity (Leavesley et al. 2002). The least complex model that reliably meets the application at the relevant scale is often the best alternative (Chandler 1994, Rauch et al. 2002, Dotto et al. 2012). The goal of this RAA is to quantify pollutant load reductions over time associated with implantation of GSI. For stormwater planning, model selection often boils down to choice

between a greater degree of granularity across space or detail of process representation in time. Attempting to do both is computationally expensive, resource intensive, and provides more detail than required. While detailed process representation used in continuous simulation models may improve performance over short time steps, it comes at the expense of greater structural complexity (Snowling and Kramer 2001), without necessarily increasing the usefulness of outputs (Lindenschmidt 2006).

Since stormwater impact mitigation problems invariably have an important spatial component and are typically less concerned with short-term outcomes, modeling approaches that employ parsimonious process-representation in favor of greater spatial granularity make intuitive sense. While continuous simulation models provide a better way to understand dynamics of runoff generation and timing, simpler computational approaches provide a more practical alternative for stormwater managers due to lower costs and fewer data requirements. Indeed, it was recognized long ago by the earliest developers of continuous simulation stormwater models that they would be too detailed for many users and that there is a need for a wide range of procedures for assessment of stormwater pollution control costs and priorities (Heaney et al. 1976). This is especially true when resources are limited and one primary use of the outputs is to track changes over time (e.g. Schueler 1987, Chandler 1993;1994). Simpler approaches may even provide comparable performance to more complex ones (e.g., Kokkonen and Jakeman 2001, Perrin et al. 2001, Bormann and Diekkruger 2003, Reed et al. 2004; Petrucci and Bonhomme 2014), particularly when high time resolution outputs are not required.

2.2.3 RAA modeling approach

A pragmatic approach to model development was taken that eliminates elements that do not serve the purpose of ongoing stormwater load reduction quantification. The intent was to increase model transparency, usability, and updatability, to lower costs, and limit data uncertainty. Most available stormwater modeling tools are either intended exclusively for expert users (Atchison et al. 2012), or do not provide an efficient method for modeling multiple catchments or generating spatial outputs (e.g., Rossman 2013, Tetra Tech 2011).

This RAA uses the Stormwater Tool to Estimate Load Reductions (swTELR) (Beck et al 2017), a purpose-built model with an economical structure, that provides spatially explicit outputs designed to track stormwater BMP implementation over time. Identifying the best trade-offs between complexity and data requirements were a primary driver of the model structural design. These factors were considered within the context of data and resources that are likely available to stormwater managers in the long term. A computationally efficient approach can run via the web and may be used for ongoing quantification of pollutant load reductions and iterative verification of results by non-modeling experts. In this way, it can provide a dynamic alternative for ongoing planning and compliance decades after this RAA has been completed.

2.3 The swTELR Model

In this section we present the primary concepts and calculations used in the swTELR to perform this RAA. Additional documentation is available in Appendix A, contain sensitivity analyses, results of validation experiments, discussion of model limitations.

2.3.1 Model structure overview

swTELR is designed to have lower data input requirements than existing alternatives. Hydrologic computations combine a set of metrics that describe a 35-year rainfall distribution with well-tested algorithms from the National Resources Conservation District (NRCS Curve Number) for rainfall-runoff transformation and routing to generate average annual runoff estimates. Key inputs include spatially distributed rainfall, hydrography, soil types, land use, and impervious cover, along with BMP data. Pollutant generation is modelled via land-use based characteristic runoff concentrations (CRCs) to represent the generation, fate and transport of urban-derived pollutants. In effect, swTELR includes two parameters (CN and CRC), both of which are specified by the spatial data. The Curve Number method for runoff generation has been widely used in several watershed and stormwater models including the current iteration of EPA's Stormwater Management Model (SWMM 5).

A spatially explicit mass balance accounting method is used to quantify the runoff and pollutant reductions achieved with control measures. A hydrograph separation approach is used to quantify the water quality benefits of centralized, large-scale structural BMPs, and a simpler approach is used for small decentralized BMPs that omits accounting for flow timing. Validation experiments have shown that runoff estimation aligns closely with high-resolution monitoring data as well as results generated from more complex, well-accepted continuous simulation models (Beck et al., 2017), providing confidence that the swTELR computational approach is technically well-suited to inform stormwater planning applications.

2.3.2 Spatial and temporal scales of representation

Stormwater models vary widely in terms of how urban catchments are delineated and how landscape characteristics are discretized. swTELR employs a semi-distributed approach where runoff, loading and decentralized BMP reduction calculations happen on 30-meter grid scale (Figure 2.3), and hydrologic routing is performed at the urban catchment scale (approximately100 ac). Accounting of reductions from BMPs are spatially explicit so that the site-specific runoff generation and pollutant loading characteristics specific to the BMP drainage are preserved. Explicit of flows across grid cells features is not represented as it would be in fully distributed models (e.g. Bicknell et al. 1997, Lee et al. 2012), rather this is handled at the catchment scale.

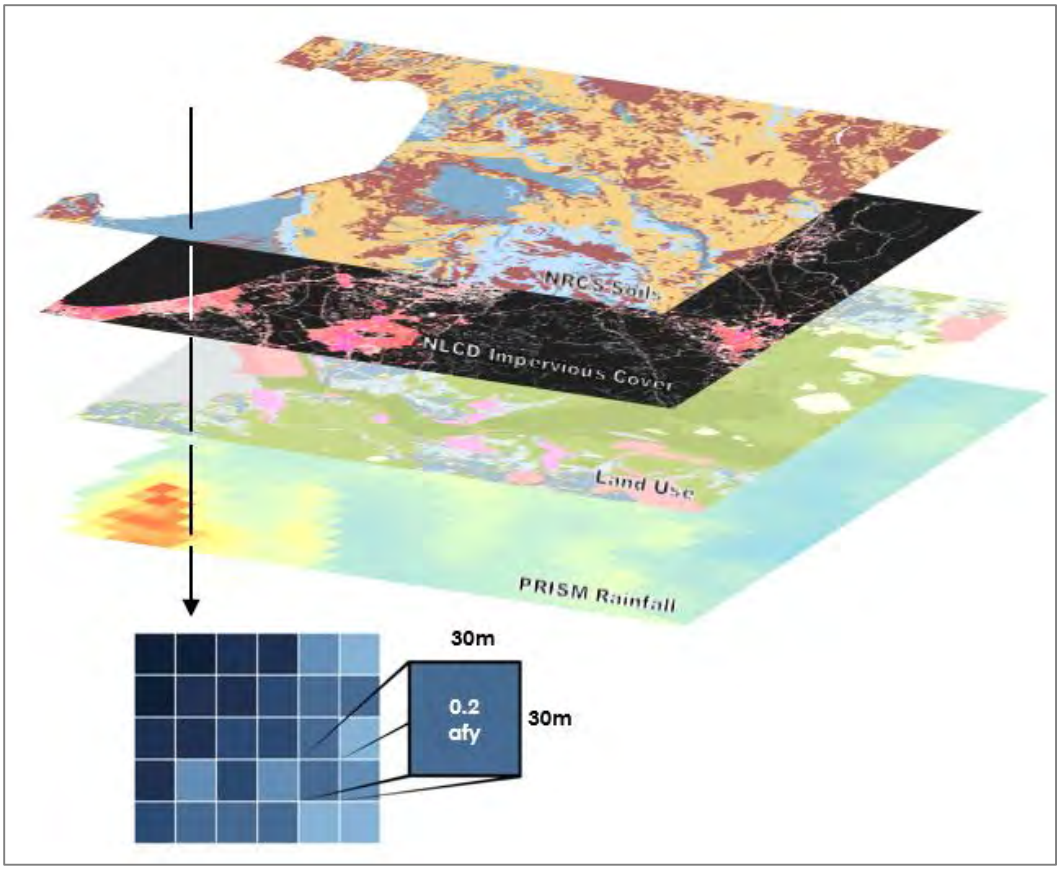

Figure 2.3. Graphical representation of raster calculations performed in swTELR to generate gridded runoff estimates.

Typically, stormwater runoff is modeled using 1 of 2 approaches: a single storm event methodology or a multi-year, high-resolution (daily or sub-daily) continuous simulation. Event-based approaches are programmatically simple but were originally designed to simulate runoff for a single storm event size (USDA 1986). Continuous simulations are generally better able to capture the dynamic range of rainfall-runoff responses by accounting for antecedent catchment moisture conditions (Harbor 1994, Bicknell 1997, Rossman 2008). swTELR employs a hybrid event-based approach that combines a set of events drawn from a long-term regional precipitation distribution to provide average annual runoff estimates. In effect, swTELR brackets the range of rainfall and runoff responses with a probabilistic approach, rather than a sequential, time-explicit approach (described in section 2.3.3).

This swTELR approach allows substantially simplified computation compared to continuous simulation, allowing substantially more spatially granular outputs that indicate precisely locations within the urban landscape that hold the greatest opportunities for runoff and pollutant load reductions. In addition, this approach avoids the model outputs being tied to a short time period, which may not capture a long-term representation of the range of event magnitudes. Given the lifespan of stormwater infrastructure is typically several decades, and the simulations included in this RAA will

span 20 years, using a multi-decadal period to characterize rainfall seems prudent. In short, we believe that a probabilistic treatment of rainfall provides the best compromise for generating outputs that most closely align with the purpose of RAA.

2.3.2.1 *Precipitation data*

Raster-based rainfall estimates are from the PRISM Climate Group[7] at Oregon State University are used for runoff generation in swTELR, typically covering a 35-year time span. These data provide spatially distributed precipitation at 800m resolution and are processed in swTELR to provide a probabilistic description of rainfall. The extracted raster-based precipitation estimates from PRISM have been independently validated using Western Regional Climate Center (WRCC) rain gauges for 15 cities located on the California Coast.

2.3.2.2 *Soils*

The USDA Natural Resource Conservation Service (NRCS) defines four hydrologic soil groups (HSGs): A, B, C, and D. A has the largest infiltration potential and is associated with the least amount of runoff whereas HSG D has the lowest infiltration potential and is associated with the most amount of runoff. The NRCS HSGs are based on soil composition and textural properties and align with NRCS curve number values for pervious surfaces. The classification of soils is determined by the soil layer with the lowest saturated hydraulic conductivity and the depth to any layer that is impermeable or depth to a water table (if present). HSGs reflect infiltration in the subsurface at depths of up to 2 feet or greater. Bay Area soils predominantly belong to groups C and D, making infiltration slower than more permeable soils in many locations. swTELR uses spatial soils data from two sources, the NRCS SSURGO database, which offers higher resolution, and the STATSGO2 database, which provides greater coverage in some areas.

2.3.2.3 *Impervious cover*

A key input for runoff generation in swTELR is satellite-derived impervious cover derived from the Landsat satellite series (https://viewer.nationalmap.gov/launch/) and available from the USGS at 30-meter resolution. Impervious cover dramatically reduces runoff infiltration to soils and thus transforms incident rainfall to runoff at substantially higher proportions than undeveloped lands. Use of satellite imagery to estimate impervious cover has several important benefits to estimate urban runoff. Satellite impervious coverage data is widely available, regularly updated, and can be easily accessed by any municipality. The use of satellite imagery rather than on-the-ground mapping of impervious cover incorporates the urban tree canopy to estimate overall impervious area. Extensive research has documented the reductions that urban trees provide to the rainfall-runoff transformation in urban drainages (Dwyer et al., 1992; Roy et al., 2012). The 30m resolution

[7] http://prism.oregonstate.edu/

of the Landsat data align with the other swTELR spatial inputs, making the data compilation and processing efficient.

2.3.2.4 *Catchment connectivity*

Catchment connectivity is a critical element of generating reliable estimates of average annual runoff and loading derived from an urban catchment and delivered to a receiving water. Catchment connectivity is defined as the proportion of stormwater discharging from a catchment discharge point that reaches the receiving water and is not diverted in some way. All catchment runoff and loading estimates reported from swTELR are adjusted based on the relative hydrologic connectivity of each catchment to the receiving water. MS4 mapping guidance (2NDNATURE, 2018) includes a systematic process for a user to determine the relative hydrologic connectivity of a catchment to receiving waters based on the distance, substrate and visual characteristics of the flow path that physically connect the discharge point of a specific catchment to the receiving water. Working inland from the receiving waters, all catchments that drain into another catchment inherit the same connectivity as the downstream catchment, unless there is evidence suggests that some surface volume loss occurs between the two catchments. Catchment delineation and connectivity is typically completed in coordination with city stormwater staff.

2.3.2.5 *Stormwater BMPs*

Stormwater TELR was developed to easily incorporate both structural and non-structural stormwater BMPs of various types, sizes, and applications. Stormwater BMP locations, types, and specifications are documented and typically communicated to 2NDNATURE via spreadsheets or uploaded to the swTELR web interface. An iterative process is performed to verify BMP attributes and recommend field verification where necessary. BMPs are stored within an asset management system that includes tracking, field protocols, and mobile apps for performance verification that are integrated to the stormwater model.

2.3.3 Precipitation data processing

Precipitation inputs are designed to bracket the seasonal and inter-annual variability demonstrated by historic data, defined using the PRISM dataset published by Oregon State University. We used the historic distribution of 24-hr rainfall depths (24-hr event frequencies) and the average annual number of days with measured rainfall to drive runoff generation. The 35-year (1981-2016) precipitation cumulative distribution function for each precipitation region was broken into a set of percentile values. This approach provides a way to bracket the likely event magnitudes in each region, incorporates extreme events in a manner proportional to their likelihood of occurrence, and serves to standardize the inputs from one modeling scenario to another using a small number of representative metrics.

Stormwater TELR calculates various 24-hr precipitation depths and the average annual number of days with measurable precipitation to represent the overall distribution and accurately estimate

total average annual depths. We calculated, d, the average number of rain days per water year when daily rainfall exceeds 0.01 inches (0.25 cm) and, P(x), various 24-hr event frequency estimates, where P is the 24-hr rainfall depth for the xth percentile event. On a water year basis, we selected 24-hr event rainfall frequencies and applied the trapezoid rule to estimate the integral of the 24-hr event cumulative distribution function to obtain a long-term average 24-hr runoff volume for days when it rains. We approximated the integral using the following equation for non-uniform intervals of x:

$$\int_0^{100} P(x)\,dx \approx$$

$$\frac{1}{2}\sum_{k=1}^{N}(x_{k+1} - x_k) * (P(x_{k+1}) + P(x_k)) \qquad (2.1)$$

where x is a number between 0 and 100, and k is number in the sequence of total, N, percentile events used to estimate the integral. To obtain a long-term average annual runoff volume, P365, we multiplied the 24-hr average by the number of rain days per year, d:

$$P_{365} = d * \int P(x)dx \qquad (2.2)$$

The average annual 24-hr rainfall for days when it rains is calculated using a set of 4 percentile events that correspond with common post-construction permit requirements and structural BMP design criteria (85th and 95th percentile storm events), which also include the median and the lower quartile. Figure 2.4 shows the historic 24-hr event frequency distribution for a typical precipitation distribution and a graphical representation of how the trapezoid rule is used to estimate the long-term average 24-hr rain events. This approach has been compared with several other approaches to characterizing the long-term precipitation distributions (Beck et al. 2017).

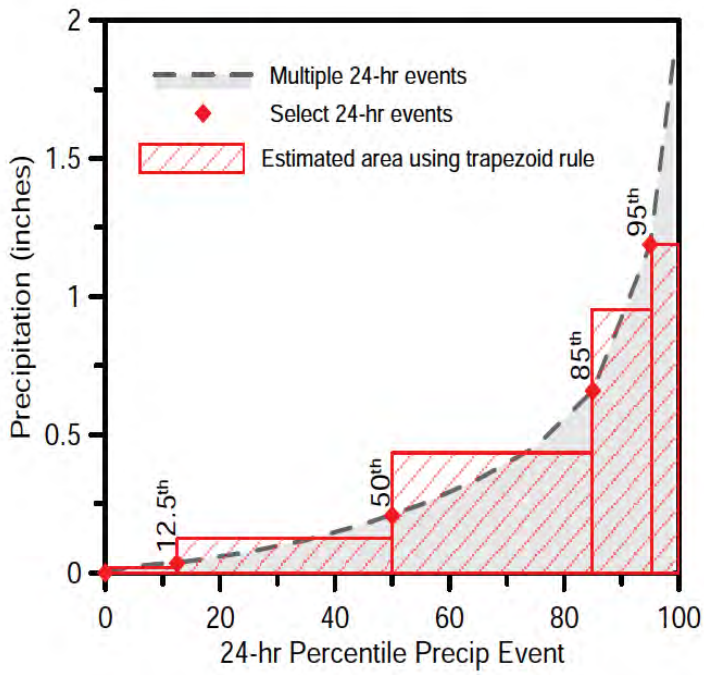

Figure 2.4. Illustration of the trapezoid method used to sum the area below the curve of the precipitation cumulative distribution function.

2.3.4 Rainfall-runoff transformation

For a given storm magnitude and duration, the runoff generation module defines the fraction of flow that infiltrates over pervious surfaces and the fraction of overland runoff that is eventually discharged to the receiving waters. Stormwater TELR relies on the Soil Conservation Service (SCS) curve number (CN) method and the approach detailed in Technical Release 55 (TR-55) to estimate runoff from small urban catchments (USDA 1986). The SCS runoff equation is:

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \tag{2.3}$$

where Q is the runoff depth, P is the 24-hr rainfall depth, S is the potential maximum retention after runoff begins, and I_a is the initial abstraction depth. The initial abstraction incorporates all losses before runoff begins, including water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. Runoff does not begin until the initial abstraction has been met. I_a is variable across the landscape but is highly correlated to the curve number. The initial abstraction is 20% of the storage,

$$I_a = 0.2S \tag{2.4}$$

and

$$S = \frac{1000}{CN} - 10 \tag{2.5}$$

More recent data suggest that 0.20*S might be too high and that 0.05*S is more appropriate (Woodward et al. 2003, Lim et al. 2006, Shi et al. 2009) especially for hydrologic soil groups C and D (Jiang 2001). If 5%, rather than 20%, is used, S must also be modified. The relationship between $S_{0.05}$ and $S_{0.20}$ obtained from model fitting results is (Lim et al. 2006, Hawkins et al. 2002)

$$S_{0.05} = 1.33 * {S_{0.20}}^{1.15} \tag{2.6}$$

We used the adjusted initial abstraction ratio (equation 6) and by substituting equation 4, modified for 5% of storage, into equation 3, we obtain

$$Q = \frac{(P - 0.05S_{0.05})^2}{P + 0.95S_{0.05}} \tag{2.7}$$

Curve numbers range from 30 to 98 and lower numbers indicate low potential runoff whereas higher numbers indicate increasing runoff potential. The major factors that determine SCS curve numbers are the soil type, the land use (specifically, the percent impervious of the land use), the hydrologic condition and soil infiltration capability. To simply account for variations in soil permeability and infiltration, the NRCS has classified soils into 4 hydrologic soil groups (HSGs). A curve number for a given land use with impervious area can be estimated by the following (USDA 1986):

$$CN_c = CN_p + \frac{P_{imp}}{100}(98 - CN_p) \tag{2.8}$$

where CN_c is the runoff curve number for the entire land use, CN_p is the pervious runoff curve number and P_{imp} is the percent imperviousness. The pervious curve numbers used are those defined for open space in poor condition (grass cover < 50%) (USDA, 1986), since urban soils are often disturbed or compacted, and are listed in Table 2.1.

Table 2.1. Urban pervious curve numbers used in swTELR (USDA, 1986)

Soil Type	A	B	C	D
Curve Number	68	79	86	89

The model generates discrete runoff outputs which mirror the 24-hr event percentile precipitation inputs. Using equations 1 and 2, we replaced the rainfall $P(x)$ with runoff $R(x)$, where R is the runoff calculated by the approach described above for a set of 24-hr rainfall events. Similar to the calculation described for the rainfall, the trapezoid rule is applied to the xth percentile event which

are summed to approximate the area under the probability distribution function and obtain the average annual runoff.

Antecedent runoff conditions are a critical component to accurately determining runoff and the SCS curve numbers originally incorporated average antecedent runoff conditions (USDA 1986). The ability of continuous models to represent varying catchment moisture condition is a distinct advantage over event-based models. Recent studies have shown the importance of adjusting CNs based on antecedent runoff conditions (Bhaduri et al. 2000, Michel et al. 2005). Because swTELR was developed to estimate long-term average annual runoff conditions, we do not adjust the CNs and assume average antecedent runoff conditions for all simulations.

2.3.5 Pollutant loading

Urban pollutant modeling approaches commonly estimate pollutant loading at the land use spatial scale and use a variety of approaches to determine the associated land use characteristic pollutant concentrations. Algorithms to represent pollutant build-up and wash-off over time are common in continuous simulation models (Freni et al., 2009; 2011; Mannina and Viviani, 2010; Hossain and Imteaz, 2016), which has been shown to improve pollutant modeling performance in some cases (Wang et al., 2011). However, optimal parameters for these calculations are difficult to identify with precision or validate with sampling (Freni et al., 2009). While Monte Carlo sampling of the parameter space can improve parameter identifiability (Strecker et al., 1990; Wagener and Kollat 2007; Freni et al., 2011), high degrees of uncertainty in model outputs remain (Petrucci and Bonhomme, 2014). Further, other researchers have found that pollutant accumulation and generation on event time scales is extremely difficult to predict and that similar seasonal or annual results could be obtained using constant concentrations (Sage et al., 2015).

Since pollutant loads are strongly dependent upon runoff volumes at longer time scales, attempting to capture the short-term variability in pollutant concentrations is less important for swTELR's application. Using static runoff concentrations for different land-uses was identified as the best approach. Stormwater TELR calculates pollutant loads as the product the stormwater volume and a pollutant concentration. This approach ignores the event-specific dynamics that depend on rainfall duration and intensity that have been linked to variations in pollutant concentrations throughout an event. However, at the average annual scale, these effects are substantially less important on catchment loads than the catchment inputs and runoff volumes for explaining pollutant loads (Lee and Bang, 2000; Brezonik and Statelmann, 2002).

Annual pollutant loading (L) is calculated for each grid cell, (Lg) as the product of the average annual land use runoff Qa, and the land use specific characteristic pollutant runoff concentration [p] (mg/L) for that grid cell, with proper unit conversions.

$$L_g = Q_a * [p]_{LU} \quad (2.9)$$

Annual catchment pollutant load (L) is the sum of the grid cells within that catchment,

$$L_c = L_{g1} + L_{g2} \ldots + L_{gi} \quad (2.10)$$

where i is the total number of grid cells in the catchment. Pollutant load estimates can be compared within and across municipalities by normalizing by the catchment size, A, to obtain an average annual loading rate, $\{La\}$,

$$\{L_a\} = L_c/A \quad (2.11)$$

2.3.6 Pollutant association with sediments

Urban pollutant load reductions calculated in swTELR for PCBs and mercury correspond to BMP reduction efficiencies associated with sediment removal, often measured as total suspended solids (TSS) or Suspended Sediment Concentration (SSC) reductions. Like many other uban pollutants, PCBs and mercury are both strongly hydrophobic and have a tendency to adsorb to particulates. Pollutants such as metals are often bound to particulate matter in runoff (Loganathan et al., 2013; Chen and Chang, 2014; Herngren et al., 2005; Sartor et al., 1972; Kayhanian et al., 2012). Strong correlations have been observed between particulates measures and total organic carbon, nutrients, heavy metals, oil and grease (Kayhanian et al., 2012; Nasrabadi et al., 2016) polycyclic aromatic hydrocarbons (PAHs) (Rugner et al., 2013), and Bacteria (Stein et al., 2007).

We expect sediment reduction in BMPs to be a useful proxy for most conservative constituents such as PCBs and mercury. PCBs are mostly found in a particulate phase, are associated with coarse-grained particles, and behave like sediment particles. Previous studies in heavily urbanized watersheds have found more than 75% to 100% of the total PCB load was associated with the particulate phase (Ko and Baker, 2004; Bressy et al. 2012). In the SF Bay Area, Gilbreath et al (2012) also noted a strong association of high turbidity levels and elevated PCB concentrations.

Yee and Mckee (2010) found that 55% of PCB particles in stormwater settled out within 30 minutes, and concluded that PCB behaved very much like a sediment particle, and that effective settling of moderate to larger sediment particles was capable of achieving a minimum 50% PCB removal. A European study found that urban tree pits and their associated bacteria have the capability to degrade PCBs in the soil (Leigh et al, 2006). This finding suggests that practices such as bioretention which have aerobic media conditions may also promote the growth of PCB-reducing bacteria.

Monitoring studies have shown that mercury levels in storm flow are strongly correlated with turbidity (Gilbreath et al, 2012), suspended particulate matter and particulate organic matter

(Mason et al, 1999). David et al (2009) reported a strong correlation between mercury concentrations and suspended sediment in urban and agricultural rivers in California. Settling column experiments by Yee and Mckee (2010) using stormwater runoff and sediment samples from urban watersheds in the San Francisco Bay area found that 10 to 30% of mercury entrained in stormwater settled out within 20 minutes, and 90% of mercury re-suspended from creek sediments settled out within 10 minutes. Based on these experiments, Yee and McKee concluded that mercury behaved very much like a sediment particle, and that any urban BMP that promoted settling of fine sediment particles or captured fine-grained street solids should be effective at reducing mercury loads in urban watersheds.

2.3.7 Decentralized BMPs

Decentralized BMPs types either reduce volume, treat pollutants, or do both (Table 2.2). Runoff volume reductions are achieved via infiltration and net exfiltration and these reductions in volume as a result of BMP interactions could be measured. Pollutant concentration reductions can be measured due to retention, filtration or capture that prevents some fraction of the particulate load delivered to structural BMP from exiting. Detailed descriptions of decentralized BMP types represented in swTELR are listed in Appendix D.

Table 2.2. Decentralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Biofiltration		✓
Bioretention	✓	✓
Bioswale	✓	✓
Filtration Device		✓
Infiltration Feature	✓	
Pervious Pavement	✓	
Sediment Trap		✓
Settling Basin		✓

Runoff and pollutant load reductions from decentralized BMPs are calculated as the difference of model outputs. Baseline flows and loads are first calculated, then decentralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.7.1 *Decentralized BMP runoff reductions*

Decentralized BMP runoff reductions are calculated based on their design storm specifications and impervious drainage areas. All runoff generated up to the design storm depth is either infiltrated or treated and flows generated above the design capacity are bypassed and routed downstream. For example, if a BMP is designed to the 85th percentile rainfall event, all runoff generated from events up to and including the 85th percentile event will be infiltrated or treated. Reduced flows from decentralized BMPs that are intended to infiltrate stormwater (see table 2.2) are calculated for each 30-meter grid cell proportional to the impervious drainage area treated for each BMP, per Equation 2.12

$$QR_g = \int_0^{85} Q_g(x)\, dx \approx \tag{2.12}$$

where QR_g is the treated runoff volume (ac-ft) for the 85th percentile design storm from a single grid cell. In this instance, events larger than the 85th percentile storm would remain untreated. The total runoff volume treated by decentralized BMPs is the sum of each cell within a decentralized BMPs drainage area,

$$QR_d = QR_{g1} + QR_{g2} \ldots + QR_{gi} \tag{2.13}$$

Based on Equation 2.13, the volume reduction realized from decentralized BMPs has a commensurate pollutant load reduction even without any reduction in pollutant concentration. In this example, the grid cell pollutant load is reduced solely due to the reduction of stormwater runoff volumes,

$$PR_g = QR_g * [p]_{LU} \tag{2.14}$$

where PR_g is the pollutant load that includes the respective runoff volume reduction (QR_g) multiplied by the is the characteristic runoff concentration ($[p]_{LU}$, mg/L) for the land use associated with that grid cell. Pollutant load reductions (PR_d) for each catchment after treatment by decentralized BMPs is the sum of all grid cells within that catchment.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.15}$$

2.3.7.2 *Decentralized BMP pollutant concentration reductions*

As already discussed (section 2.3.6), swTELR provides decentralized BMP pollutant concentration reductions commensurate with expected BMP sediment reductions. This approach mirrors that taken in the Chesapeake Bay to simplify reduction accounting for the range of urban BMP types using curves that reflect sediment removal since it closely corresponds closely with removal of particulate bound urban pollutants of concern (see Scheuler and Youngk, 2015).

To estimate pollutant concentration benefits from decentralized BMPs, we assume decentralized BMPs that capture pollutants are 80% effective at reducing pollutant concentrations up to the 85th percentile 24-hr storm event at benchmark or optimal condition (CASQA, 2003; Water Environment Federation, 1998). For example, a grid cell treated by decentralized BMPs that reduces pollutant concentrations has a treated pollutant concentration, $[p]Tr_g$ (mg/L) calculated as:

$$[p]Tr_g = [p]_g * (1 - 0.8) \tag{2.16}$$

where $[p]_g$ (mg/L) is the original grid cell land use CRC. The pollutant load reduction (PR_g) from a grid cell draining to a decentralized BMPs that only reduces pollutant concentrations is,

$$PR_g = QTr_g * [p]Tr_g \tag{2.17}$$

If a grid cell is treated by a decentralized BMP that reduces both runoff volumes and pollutant loads (e.g., bioretention), then there is an indirect and direct pollutant load reduction as a result of infiltration and pollutant retention. Following equations 2.13, the load reduction from a grid cell with both a volume and pollutant concentration reducing BMP is

$$PR_g = QR_g * [p] + (Q_g - QR_g) * [p]Tr_g \tag{2.18}$$

where QR_g is the flow reduction from the grid cell as a result of infiltration, as calculated by equation 2.12. While flows above the design level are not infiltrated by the decentralized BMP, particles are still captured via particle settling and interaction with vegetation and flows are slowed by pooling. The total catchment pollutant load after reductions from decentralized BMPs is the sum of grid cells treated by decentralized BMPs within their respective drainages.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.19}$$

2.3.8 Centralized BMPs

Large scale centralized structural BMPs (e.g., treatment vaults, infiltration basins, dry basins) typically treat stormwater runoff from mixed land use catchments and have treatment capacities on the order of an acre-foot or more (approximately 1,200 m^3). Stormwater can exit a centralized BMP in 1 of 3 ways: loss through infiltration, discharge via treatment aperture, or via bypass where no treatment or detention has occurred. Some models also include evaporative losses, but given proper functioning, structural BMPs should have drawdown times on the order of hours and we assume this term is negligible. The relative components of volume loss depend on the BMP type and design specifics. For example, an infiltration BMP has only infiltrated and bypassed volumes, while a treatment vault has only treated and bypassed volumes. Figure 2.5 provides schematics of centralized BMPs represented in swTELR, from which swTELR assumes volume loss via 3 potential critical pathways: infiltration, treated outflow, and bypass. BMP types represented in swTELR are listed in Table 2.3 with their relevant pollutant and runoff reductions.

Table 2.3. Centralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Bed Filter		✓
Detention Basin		✓
Dry Basin	✓	✓
Infiltration Basin	✓	
Media Filter		✓
Treatment Vault		✓
Wet Basin		✓
Retention Basin	✓	✓

Calculation of runoff flow and pollutant load reductions from centralized BMPs are calculated as the difference of model outuputs. Baseline flows and loads are first calculated, then centralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.8.1 *Centralized BMP runoff reductions*

Stormwater TELR derives each volume loss term from the outflow hydrograph using a hydrograph separation approach to estimate the fraction of volume infiltrated, treated, and bypassed flow based on 4 key user inputs: treatment capacity, basin footprint, and, if applicable, the infiltration rate and drawdown time (Table 2.4). Infiltrated volumes are net volume reduction as a result of BMP interaction. Stormwater discharges through a treatment aperture are termed treated volumes and assumed to have experienced pollutant retention via particle settling, filtration or biogeochemical process. Bypass volumes are those where no treatment has occurred due to unacceptable residence times within the BMPs. Other volume loss terms, such as evapotranspiration, are assumed insignificant on an average annual basis and ignored. The volume routing pathways by BMP type are graphically summarized in Figure 2.5.

Table 2.4. Centralized BMP types and attributes

BMP Type	Treatment Capacity	Footprint	Infiltration Rate	Treatment Rate	Drawdown Time	Wet Pool Capacity
Bed Filter	✓	✓		✓		
Detention Basin	✓	✓			✓	
Dry Basin	✓	✓	✓		✓	
Infiltration Basin	✓	✓	✓			
Media Filter	✓	✓		✓		
Treatment Vault	✓	✓		✓		
Wet Basin	✓	✓			✓	✓
Retention Basin	✓	✓	✓		✓	

The corresponding volumes are calculated using graphical methods (Figure 2.6). Separation of the infiltration volume is determined by drawing a flat line across the hydrograph at the infiltration flow rate, calculated as the product of the infiltration rate and the basin footprint with proper unit conversion). Separation of the treated volume is defined by drawing a flat line across the hydrograph at the treatment flow rate, estimated as quotient of the treatment capacity and the drawdown time with proper unit conversion. Both the infiltration volume and the treated volume are calculated as the area of the outflow hydrograph under the respective flow rates down to a zero flow rate. If the sum of the infiltrated and treated volumes is less than the total outflow volume, then the remaining volume is allocated to bypass. If the sum of the infiltrated and treated volumes is greater than the total outflow volume, then the treatment volume is reduced to accommodate the difference and the volumetric balance between inflow and outflow is retained.

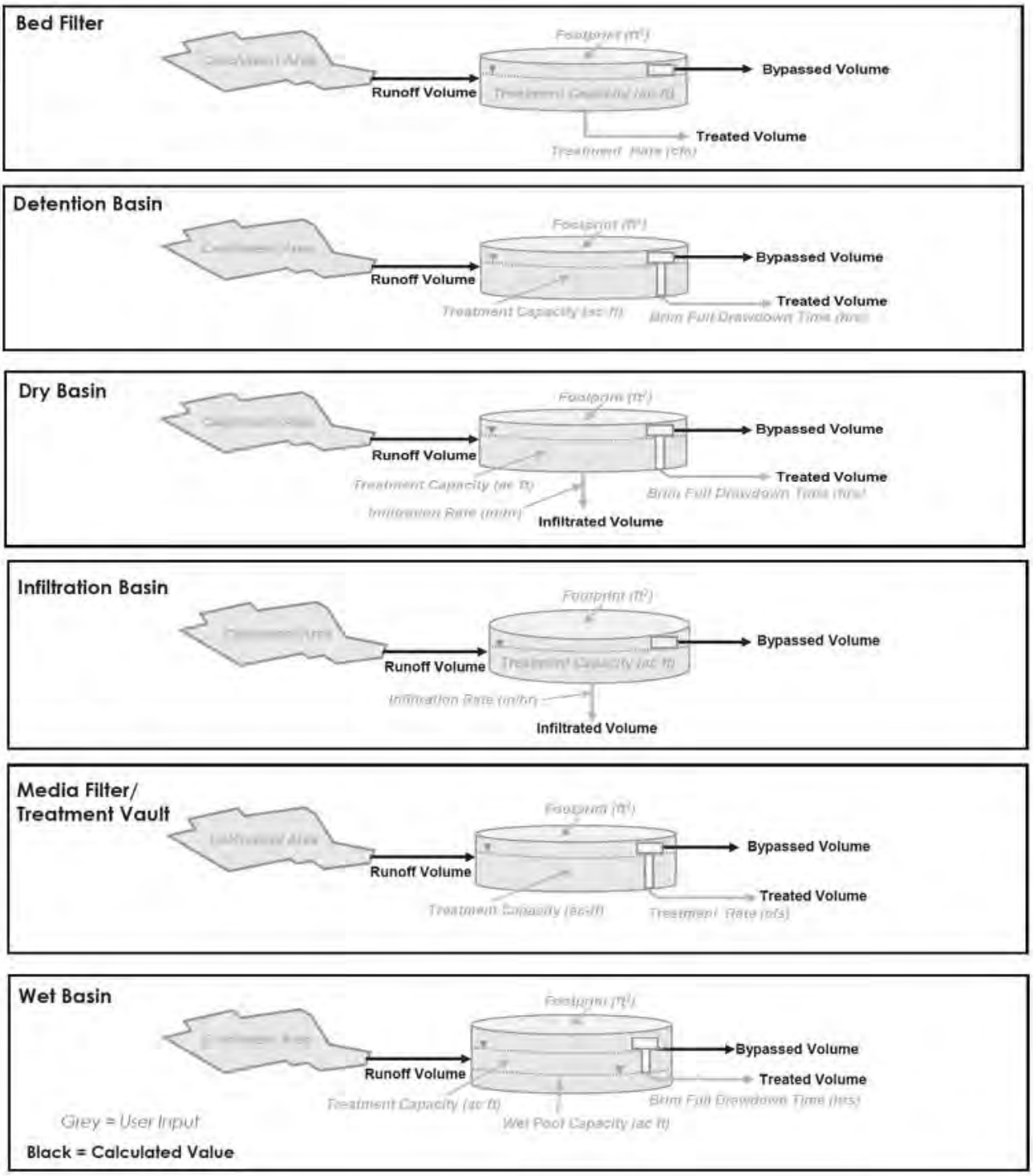

Figure 2.5. Centralized BMP types, inputs and calculated values as implemented in swTELR.

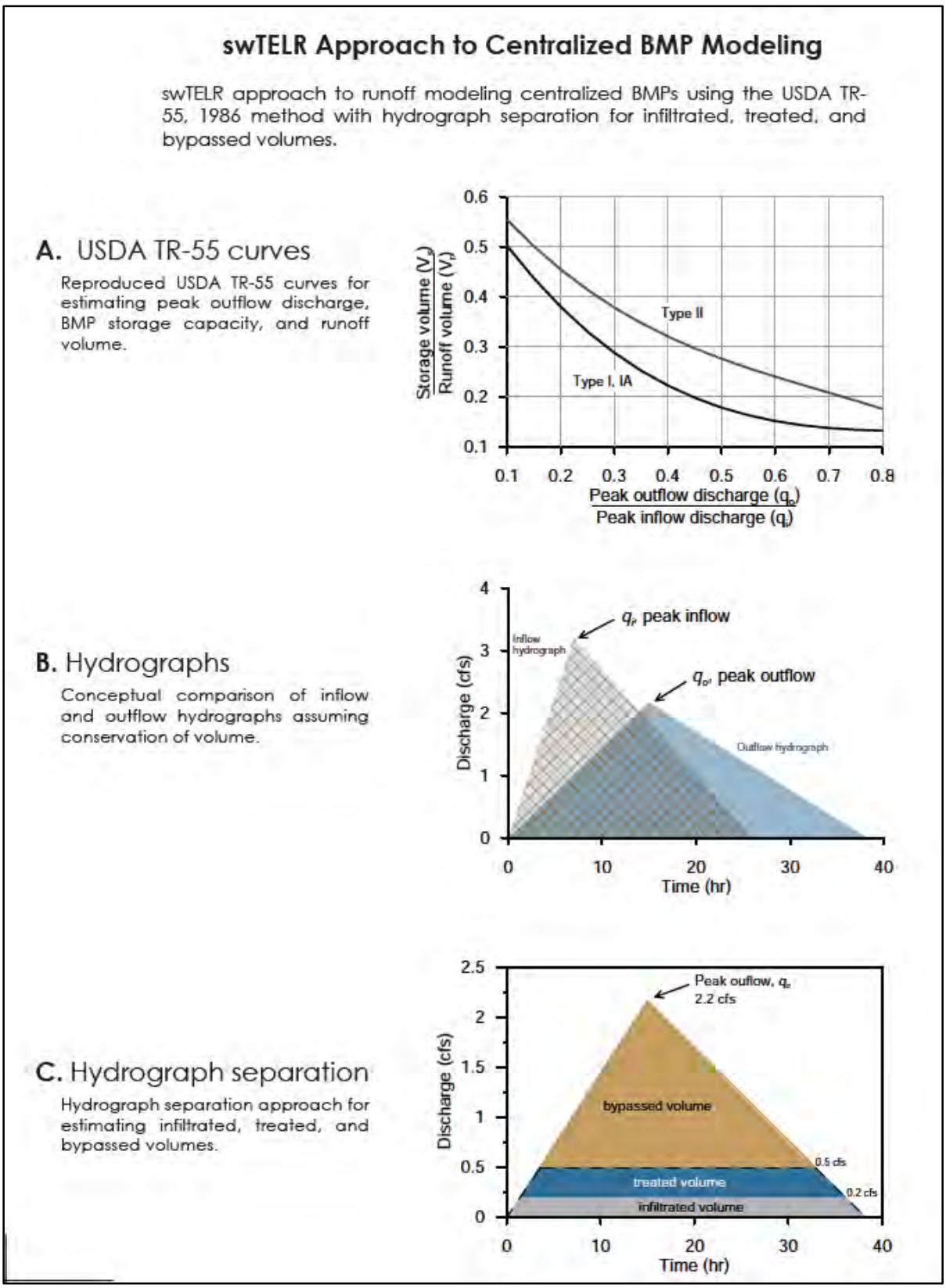

Figure 2.6. Centralized BMP flow partitioning

Average 24-hr and 365-day stormwater runoff volumes from large scale centralized BMPs are modeled using the same approach to estimate baseline runoff from selected 24-hr precipitation events (12.5, 50, 85, 95) that describe the precipitation distribution. The TR-55 (USDA, 1986) approach to estimate peak outflow and the hydrograph separation approach to estimate infiltrated, treated, and bypassed volumes is conducted for each 24-hr percentile precipitation event. Average 24-hr infiltrated, treated, and bypassed volumes for days when it rains are estimated using the trapezoid rule. Average 365-day infiltrated, treated, and bypassed volumes from catchments with large-scale centralized BMPs is estimated by the product between volume and the average number of days per year with measurable rain. When the infiltrated, treated, and bypassed volumes (Q_{infil}, Q_{CEC}, and Q_{BY}, respectively) are properly allocated, the total inflow is equal to the total outflow, Q_{OUT}

$$Q_{OUT} = Q_{infil} + Q_{CEC} + Q_{BY} \tag{2.20}$$

2.3.8.2 *Centralized BMP pollutant concentration reductions*

The pollutant load after interaction with a centralized BMP is the sum of the bypassed and treated loads. Each of these components is the product of the pollutant concentration and associated volume. The concentration of the water infiltrated and bypassed is equal to the incoming concentration of runoff prior to treatment by the centralized BMP. A characteristic effluent concentration (CEC) is assigned to the treated volumes (Table 2.5), $[p]_{CEC}$ (mg/L) that are dependent on the BMP type to calculate *reduced* pollutant loads (PT_r) associated with volumes treated (not infiltrated) by centralized BMPs (Q_{cec}) according to equation 2.21:

$$PTr_c = Q_{CEC} * [p]_{CEC} \tag{2.21}$$

The total outgoing pollutant load from a centralized BMP (PT_c) is the sum of the load from the treated load (PTr_c) and the bypassed load (PBy_c)

$$PT_c = PTr_c + PBy_c \tag{2.22}$$

Where the bypassed volumes are calculated as the product of the bypassed volume Q_{BY} and the inflow pollutant concentration for the centralized BMP drainage $[p]_C$

$$PBy_c = Q_{BY} * [p]_C \tag{2.23}$$

Based on strong evidence for association of PCBs and mercury with particulates (see section 2.3.6), we assumed different centralized BMP types to have proportional pollutant reduction efficiency to that of sediments. Therefore, PCB and mercury reductions (PR_c) are calculated as the product of the pollutant load delivered to the centralized BMP (PTr_d) for pollutants (PCB/Hg) and the percent TSS load reduction.

$$PR_{c\,PCB/Hg} = PTr_{d\,PCB/Hg} * (PTr_{d\,TSS} - PTr_{c\,TSS})/PTr_{d\,TSS} \quad (2.24)$$

Using TSS as a proxy for particulate pollutant reductions has the advantage of substantially greater BMP performance data availability compared to similar data specifically associated with mercury or PCBs. Assignment of sediment CEC values to BMPs included a substantial data compilation effort that included data directly compiled and/or analyzed by 2NDNATURE (2NDNATURE, 2006a; 2006b; 2007; 2008; 2NDNATURE and nhc, 2012a; 2013; 2014; LRWQCB and NDEP, 2007), or obtained from the National Stormwater Quality Database[8]. BMP type definitions in the NSQD are loosely defined and therefore likely include substantial variation within the same specified BMP type. To support this analysis, we also reviewed results documented in available NSQD annual data analysis reports (Geosyntec Consultants and Wright Water Engineers, 2012; 2013; 2014), as well as select marketing and design literature available online for a variety of proprietary centralized structural BMPs.

TABLE 2.5 Characteristic sediments effluent concentration (CEC) values for centralized BMP types

BMP Type	CEC TSS (mg/L)
Wet Basin	5
Dry Basin	6
Infiltration Basin	92
Treatment Vault	20
Media Filter	6
Bed Filter	3
Detention Basin	40
Retention Basin	5

The use of CEC values is preferred over percent load reduction estimates that are commonly used in structural BMP models for two key reasons. First, the use of percent reduction requires a consistent reduction across the range of event magnitudes, including very large events which often provide substantial bypassed flow (Strecker *et al.*, 2001). Secondly, since most devices have an upper limit on performance, when pollutant concentrations are very low, the percent load reduction method tends to overestimate benefits. These observations are based on specific BMP types, within a limited range of conditions, and the difference between these two methods may be less pronounced given a wider range of facility types and pollutant concentrations.

[8] http://www.bmpdatabase.org/nsqd.html

2.3.9 Runoff routing

2.3.9.1 *Routing to centralized BMPs*

swTELR models centralized BMPs using the USDA TR-55 (1986) methodology for estimating peak inflow and peak outflow. Calculations for infiltrated, treated, and bypassed stormwater runoff volumes are completed for each prescribed 24-hr percentile storm event. Estimating of peak inflow discharge requires reasonable representation of the time of concentration, the time it takes from water to flow from the most remote part of the watershed to the watershed outlet. There are several different ways to estimate time of concentration (USDA 1986 and 2010). We selected a relatively simple formula (equation 15-4b; USDA 2010) that could be easily implemented for a variety of urban catchments and required minimal additional inputs by the user. Time of concentration is estimated by the NRCS lag method as

$$T_c = \frac{l^{0.8} * (S+1)^{0.7}}{1140 * Y^{0.5}} \tag{2.25}$$

where T_c is time of concentration (hr) for average natural watershed conditions, l is the flow length (ft), Y is the average watershed slope (%), and S is the maximum potential retention from equation 5. Because the lag equation was developed for rural areas, it can overestimate the time of concentration for urban areas which have higher proportion of impervious area and channelized flow that allow water to through the catchment at a faster rate than under natural conditions. The following equation was applied to adjust the T_c calculated by the NRCS lag method (FHWA HEC-19, 1984)

$$T_c' = T_c * CF * IF \tag{2.26}$$

where T_c' is the adjusted time of concentration, T_c is the time of concentration in hours from Eq. 9, CF is the channel improvement factor, and IF is the impervious area factor, both of which are estimated from the impervious area of the catchment.

Next, unit peak discharge, q_u, is computed based on T_c and SCS rainfall distribution type

$$\log(q_u) = C_0 + C_1 \log(T_c) + C_2[\log(T_c)]^2 \tag{2.27}$$

where C_0, C_1, and C_2 are the coefficients from Table F-I (USDA 1986) based on the SCS rainfall distribution type. Rainfall distribution Type I pertains to all examples presented herein. Peak inflow discharge, q_i is estimated as

$$q_i = q_u A Q F_p \tag{2.28}$$

where A is drainage area, Q is runoff depth, and F_p is a ponding factor. Finally, estimation of the peak outflow discharge is

$$\frac{V_s}{V_r} = C_0 + C_1\frac{q_o}{q_i} + C_2(\frac{q_o}{q_i})^2 + C_3(\frac{q_o}{q_i})^3 \quad (2.29)$$

where V_s/V_r is the ratio of storage volume to runoff volume of the BMP, q_o/q_i is the ratio of peak outflow to peak inflow, and C_0, C_1, C_2, and C_3 are the coefficients from Table F-2 (USDA 1986) based on the SCS rainfall distribution type. Figure 3A shows the relationship between the storage-runoff volume ratio and the outflow-inflow discharge ratio. Figure 3B shows the shape of the inflow and outflow hydrographs where peak flows are estimated from equations 11 and 12, respectively. The inflow and outflow duration is estimated from peak flow (q_i or q_o) and Q, using graphical methods and assuming conservation of volume.

Note that because swTELR models a range of 24-hr storm events, it is likely that the storage to runoff volume ratio is outside the range ($0.14 < V_s/V_r < 0.5$) presented in Figure 2.6A for a given 24-hr storm event. In the cases where V_s/V_r is outside the range, the low or high endmember of the range is applied. For example, if the measured V_s/V_r is 0.08, swTELR assumes a V_s/V_r of 0.14. If the measured V_s/V_r is 0.56, swTELR assumes a V_s/V_r of 0.50.

2.3.9.2 *Routing between catchments*

Runoff is routed between catchments so that runoff and pollutant load reductions cumulate as flows move downslope towards centralized BMPs or receiving waters. Volumes and pollutant loads delivered to centralized BMPs include reductions achieved by other structural and non-structural BMPs within its contributing drainage. This sequential accounting ensures runoff and pollutant reduction benefits are not double counted. The runoff volume and pollutant concentration introduced at the inlet of each centralized BMP is computed based on the contributing drainage characteristics and level of BMP implementation upstream within the centralized BMP drainage. Travel lengths and slopes to a centralized BMP are calculated based on the configuration of catchments or sub-catchments and different routing configurations will result in different flow timing (see Figure 2.7).

The total runoff for a series of catchments within the same drainage (QTr_{series}) is defined by the summation off the current catchment runoff (QTr) and runoff contributions from a series of upstream catchments that contribute to the downstream centralized BMP. Contributions from upstream catchments without a centralized BMP are defined as the total catchment runoff (QTr) and those with a centralized BMP are defined as sum of the treated (Q_{CEC}) and bypassed (Q_{BY}) volumes as Q_{UBMP}.

$$Q_{UBMP} = Qu_{BY} + Qu_{CEC} \quad (2.30)$$

Variables used for calculating peak inflow discharge ($q1$) and time of concentration (Tc) for a centralized BMP with contributions from upstream catchments are defined based the combined attributes of the catchment series. Slope for a series of catchments is calculated as the average of

the contributing catchments. The contributing area is summed for all contributing catchments without centralized BMPs and with centralized BMPs such that the total area contributions are accounted for downstream. Pollutant concentrations for downstream catchments are calculated as the average concentration of the current catchment and contributing catchments. Catchments can be subdivided for routing portions to more than one centralized BMP, and these subcatchments can also receive water from upstream catchments, as in Configuration 1 in figure 2.7.

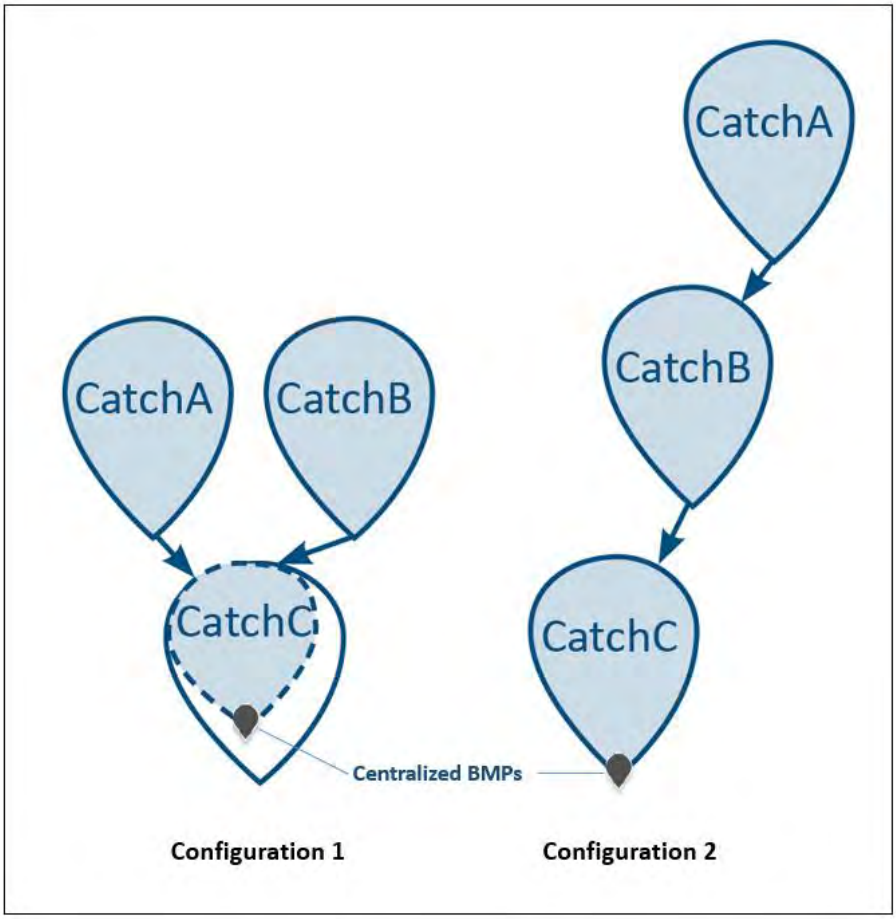

Figure 2.7. Two example catchment routing configurations.

2.3.9.3 *Runoff and pollutant load reductions reporting*

Within a catchment series, centralized BMPs receiving water from upstream catchments provide runoff reductions or pollutant treatment benefits to those upstream catchments. These reductions are allocated to upstream catchments based on their proportional contribution to the downstream centralized BMP after reductions from structural and non-structural BMPS within the catchment. Each catchment is run through the full calculations twice: once to calculate its initial within-catchment reductions and then a second time to account for the catchment series contributions. The initial flow

out of a series of the catchments ($QTrI$) is the sum of the initial flows from the current ($QTrI_{current}$) and upstream catchments ($QTrI_{current}$):

$$QTrI_{series} = QTrI_{current} + QTrI_{UC1} \ldots .. QTrI_{UCi} \quad (2.31)$$

Runoff reductions from a centralized BMP receiving contributions from upstream catchments Q_{cr} are defined as the difference between the initial runoff ($QTrI_{series}$) and the total runoff from the catchment series after reductions from that centralized BMP (QTr_{series}).

$$Q_{cr} = QTrI_{series} - QTr_{series} \quad (2.32)$$

Reductions are distributed upstream to catchments based on their proportional contribution, so that for individual catchments (i), the reduction applied to them is defined by

$$Q_{cr}D_i = Q_{cr} * QTrI_i / QTrI_{series} \quad (2.33)$$

On the second run through the runoff calculations after calculating the initial contributions, the model iterates downstream so that all BMP reductions are cumulated as runoff moves downstream. The same reporting scheme is used in pollutant load reductions reporting so that the pollutant load from a series of the catchments is the sum of the initial load from the current catchment ($PI_{current}$) and all upstream catchments PI_{uc} as:

$$PI_{series} = PI_{current} + PI_{UC1} \ldots PI_{UCi} \quad (2.34)$$

The difference between the initial pollutant load and the final load after the final centralized BMP reductions is

$$Pr = PI_{series} - P_{series} \quad (2.35)$$

Like runoff reductions, pollutant load reductions are assigned upstream to individual catchments (i) proportional to their initial loading contributions.

$$PD_i = Pcr * P_i / PI_{series} \quad (2.36)$$

3 Modeling Scenarios

Baseline and future Solano Permittee landscape scenarios were completed to fulfill the RAA modeling compliance requirements using a combination of functions automated within the swTELR model and manual GIS processing to implement each future scenario. In this section, the modeling scenario components are described, and there is some overlap with section 2.3 that is retained for clarity.

Time periods modeled include the baseline period (approximately 2005), and future scenarios estimated for the years 2020, 2028/2030, and 2040. Each of these scenarios was modeled in sequence so that land use and BMP implementation changes that occurred in the preceding scenario were preserved in each subsequent scenario. The modeling scenarios include only those stormwater treatment components that are considered part the Green Stormwater Infrastructure (GSI) Scenarios per the BASMAA RAA Guidance Document (BASMAA, 2017). These scenarios therefore do not include source control measures, such as street sweeping or source property abatements[9].

3.1 3.1 Baseline Modeling

3.1.1 Scenario Inputs

3.1.1.1 *Precipitation input data*

Daily raster rainfall data from PRISM were used form the years 1981-2016 using the procedure described in Section 2.3, so that so that the precipitation distribution bracketed the range of likely rainfall conditions across the Solano Permittee MS4 Area. Raster-based rainfall estimates from the PRISM Climate Group[10] at Oregon State University were used to describe the distribution of 24-hour event depths were used to drive runoff generation. 2NDNATURE created a raster data processing program using the R statistical programming language[11] to acquire the appropriate historical raster layers for Solano County between 1981-2016 and perform a series of raster data processing steps. After the 35-year sequence was acquired (12,775 raster layers), a time series of precipitation values was created for each 800 m^2 pixel and the swTELR required percentile rainfall values (12.5, 50, 85, 95) and average days of rain were extracted for each pixel for the entire time series. The 85th percentile precipitation values are shown for the Solano Permittee area in

[9] Since source control measure accounting methods are still under development via a current BASMAA study. Source control actions will be included in the wasteload allocation (WLA) modeling scenarios, which will be communicated in a separate report.

[10] http://prism.oregonstate.edu/

[11] https://www.r-project.org/about.html

Figure 3.1. The 800m PRISM spatial precipitation data were resampled to align with the 30m US Landsat grid used by swTELR.

While the time extent used differs from the range recommended in the RAA Guidance of 2000-2009 (BASMAA, 2017), the greater temporal coverage provides a more representative description of the 24-hour rainfall distributions.

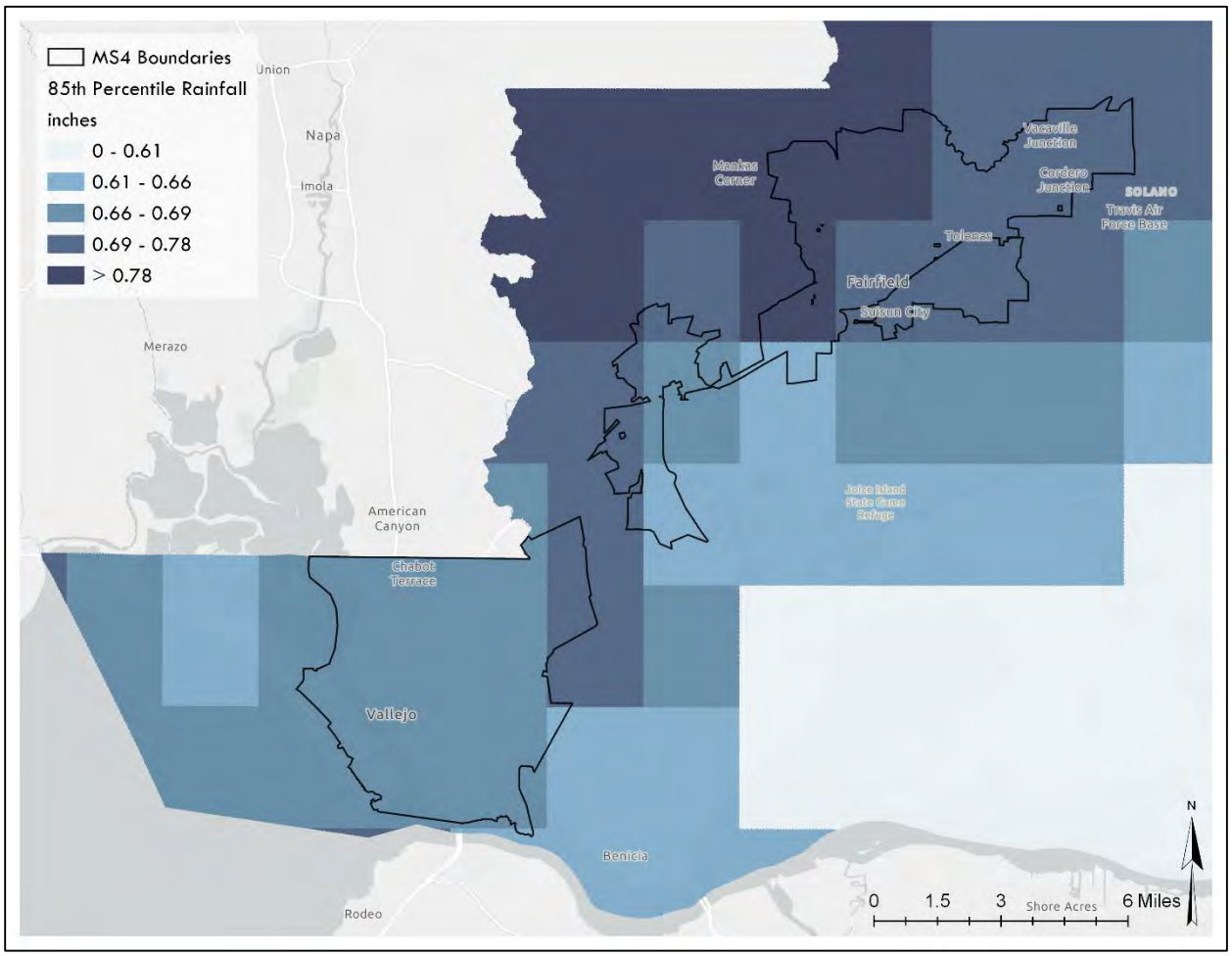

Figure 3.1. Example rainfall data used in swTELR.

3.1.1.2 *Soils*

Soils data from NRCS was used to specify soil types throughout Solano County MS4 boundaries. These data were used in their rasterized form, discretized to 30m pixels, down loaded from the NRCS website (Figure 3.2). The data were clipped to the Solano Permittee MS4 boundary and individual catchment boundaries for use swTELR. The NRCS SSURGO database was used as the primary data source, and the STATSGO2 database (which provides coarser resolution), was used to fill in spatial gaps in coverage that occurred in the SSURFO data.

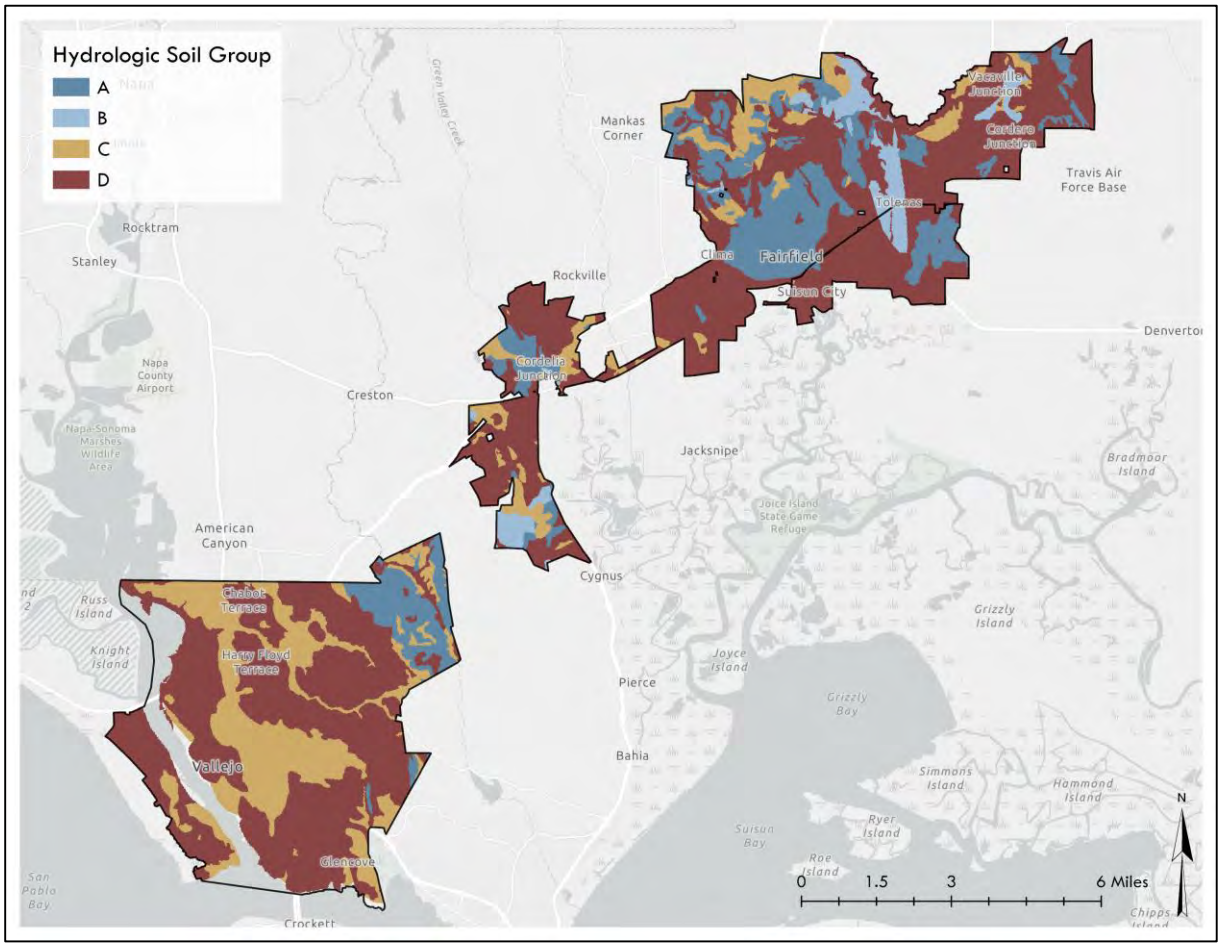

Figure 3.2. Soils data used in swTELR

3.1.1.3 *Impervious cover*

Impervious cover was specified using data from the National Land Cover Dataset[12] that represents the year 2006, provided at 30-meter grid cell resolution, which matches the spatial scale of modeling in swTELR. These data were clipped to the Solano Permittee MS4 boundaries and individual catchment boundaries for use in swTELR (Figure 3.3)

[12] https://www.mrlc.gov/data?f%5B0%5D=category%3Aurban%20imperviousness

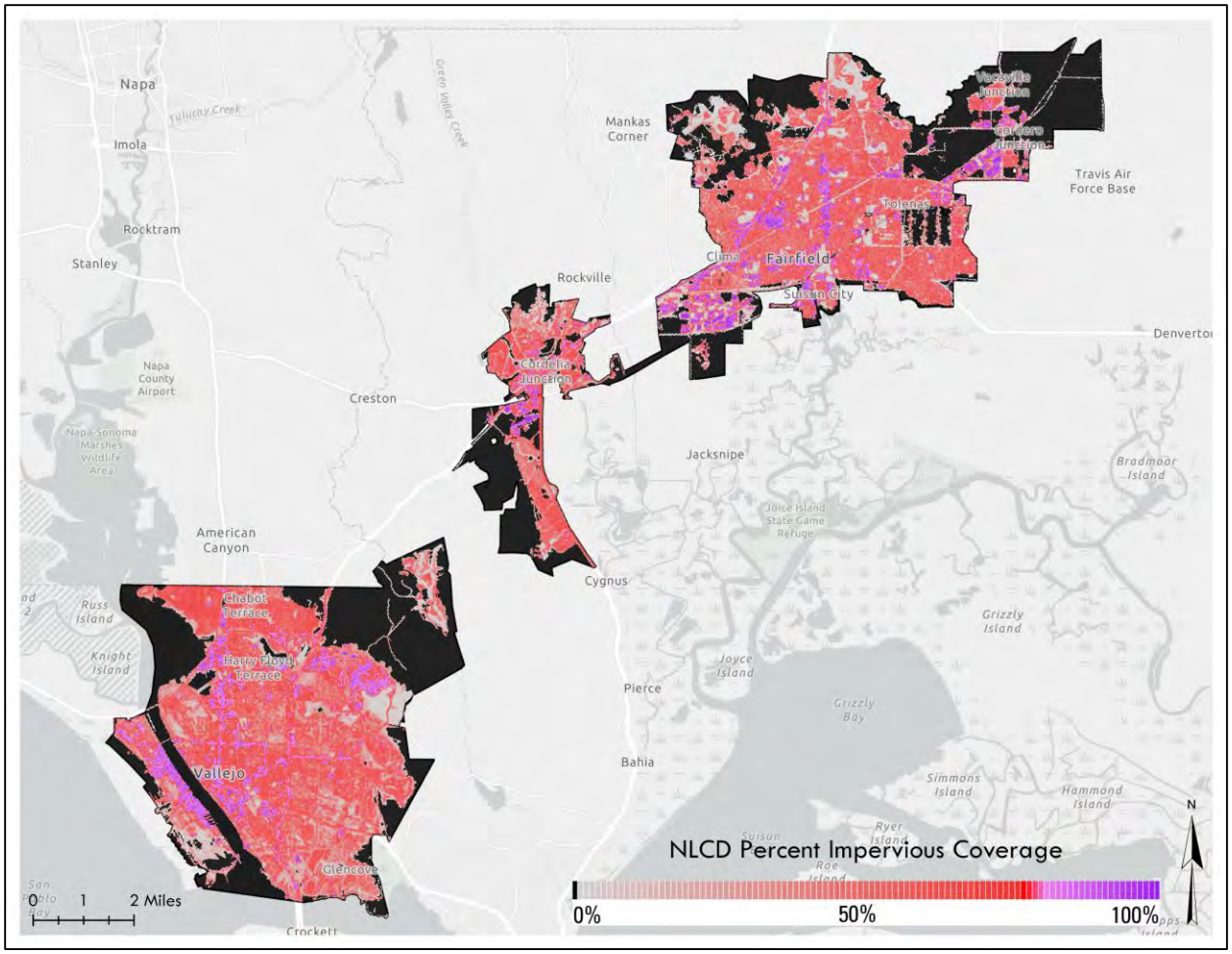

Figure 3.3. Impervious cover data used in swTELR.

3.1.1.4 *Land use*

Land-use data were developed by San Francisco Estuary Institute (SFEI) to specify characteristic PCBs and Mercury runoff concentrations for each land use developed for the Regional Watershed Spreadsheet Model (RWSM)[13]. The land-used runoff concentrations used are those contained in the current version of the RWSM, which differ slightly from those reported by SFEI in the last RWSM progress report (Wu et al, 2016). Land use designations used in RWSM are reflect categories relevant the specific pollutants of concern, PCBs and mercury, and are listed in Table 3.1. Figure 3.4 shows the distribution of difference land use types throughout the Solano MS4 Permittee Area.

[13] https://www.sfei.org/projects/regional-watershed-spreadsheet-model

Table. 3.1 Land-use based pollutant concentrations from RWSM used in swTELR. Note that these concentrations are slightly different than those reported in Wu et al. (2016).

	Land Use	Concentration (ng/L)
PCBs (ng/L)	Ag/Open/New Urban	0.2
	Old Industrial + Source Areas	204
	Old Residential	4
	Old Commercial + Old Transportation	40
Hg (ng/L)	Ag/Open	80
	Old Industrial + Source Areas	40
	New Urban	3
	Old Urban	63

This SFEI land use layer does not appear to account for historic mining activities as a mercury source area within Solano County. For example, Saint John mine that was identified in the Mercury Mines Inventory and Prioritization Report (SWRCB, 2009). This site has tailing piles and mine waste with risk of erosion into Rindler Creek. The mine is within the Vallejo MS4 boundary, located in the northeast corner, but appears to be classified as Agriculture (Figure 3.4). As a practical matter, this classification seems perfectly appropriate, since Agriculture is the highest mercury concentration specified in the dataset.

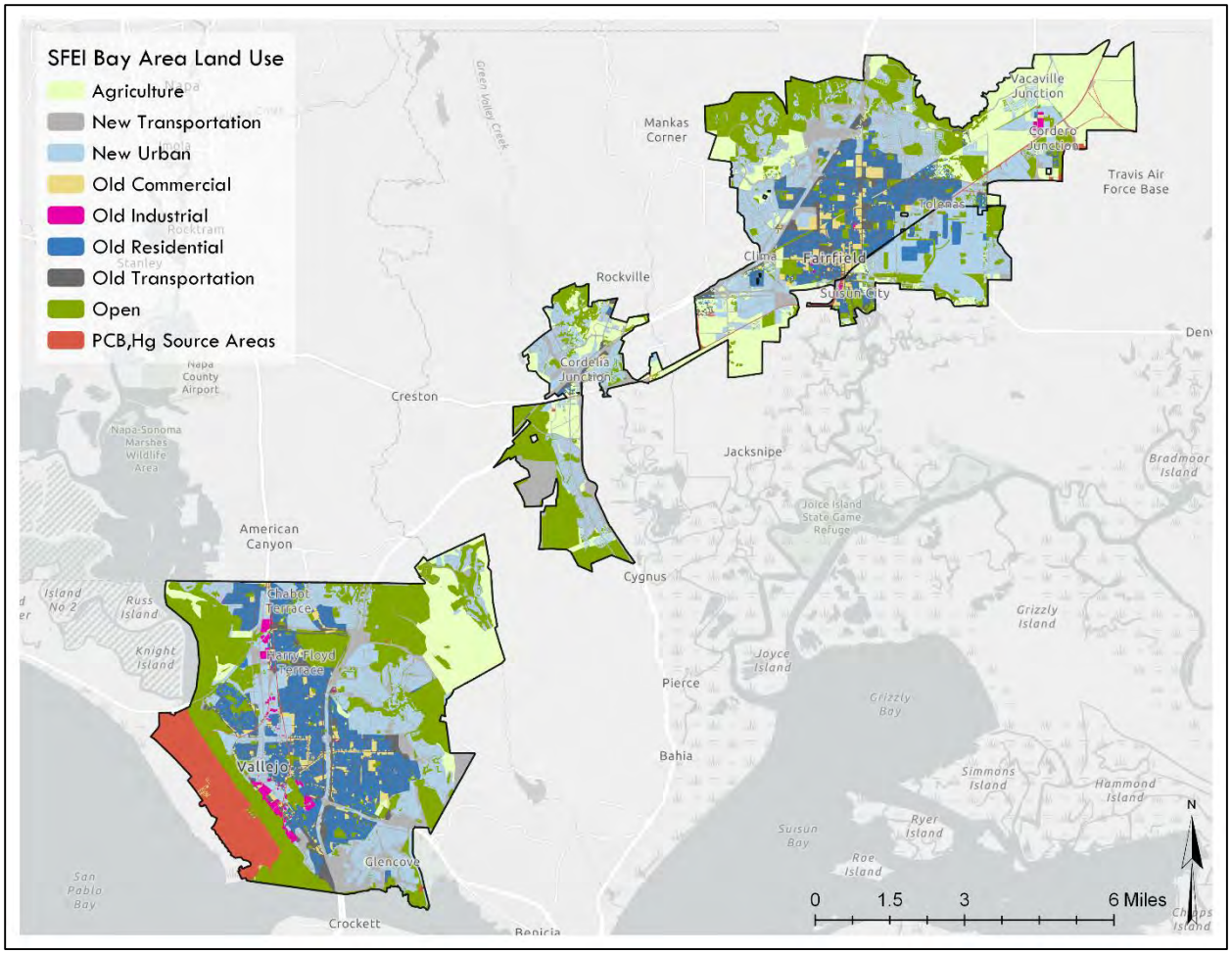

Figure 3.4. Land use map from RWSM used in swTELR.

Although some BMPs may have been implemented before 2005, baseline condition modeling assumed no existing GSI and or land-use changes that occurred after the year 2005. As such, the baseline condition model outputs essentially represent the unmitigated runoff and pollutant loading from Solano Permittees as of 2005. Existing BMPs, land-use, and impervious cover changes identified since 2005 are included in all of the future modeling scenarios.

3.1.1.5 *Drainage and routing*

The delineation of the Solano Permittee MS4 areas into urban catchments was an iterative process with verification by Solano Permittee city staff. Catchments are approximately 100 acres in size and define routing to either a discrete (single point) or distributed outlet (multiple point). Catchment boundaries and routing to receiving waters are defined by surface elevation, surface barriers, stromdrain infrastructure, and connectivity to receiving waters (Appendix C). Figure 3.5 provides an example of a catchment delineation in Fairfield based on the stormdrain network showing routing to receiving water outfalls. Beginning with catchments that had already been delineated by the City of Vallejo, City of Fairfield, and City of Suisun, catchment boundaries were refined, and

verified by city staff. The full catchment delineation process used for swTELR is documented in a *Catchment Delineation and Mapping Guidance* (2NDNATURE, 2018). This process involves using the municipal stormdrain infrastructure spatial data in concert with a 10-meter spatial resolution Digital Elevation Model (DEM)[14] to define drainage boundaries. Catchments are nested inside stormwater drainages that all flow to a common receiving water. The final catchment and stormwater drainages delineated for Fairfield/Suisun and Vallejo are shown in Figures 3.6 and 3.7 respectively.

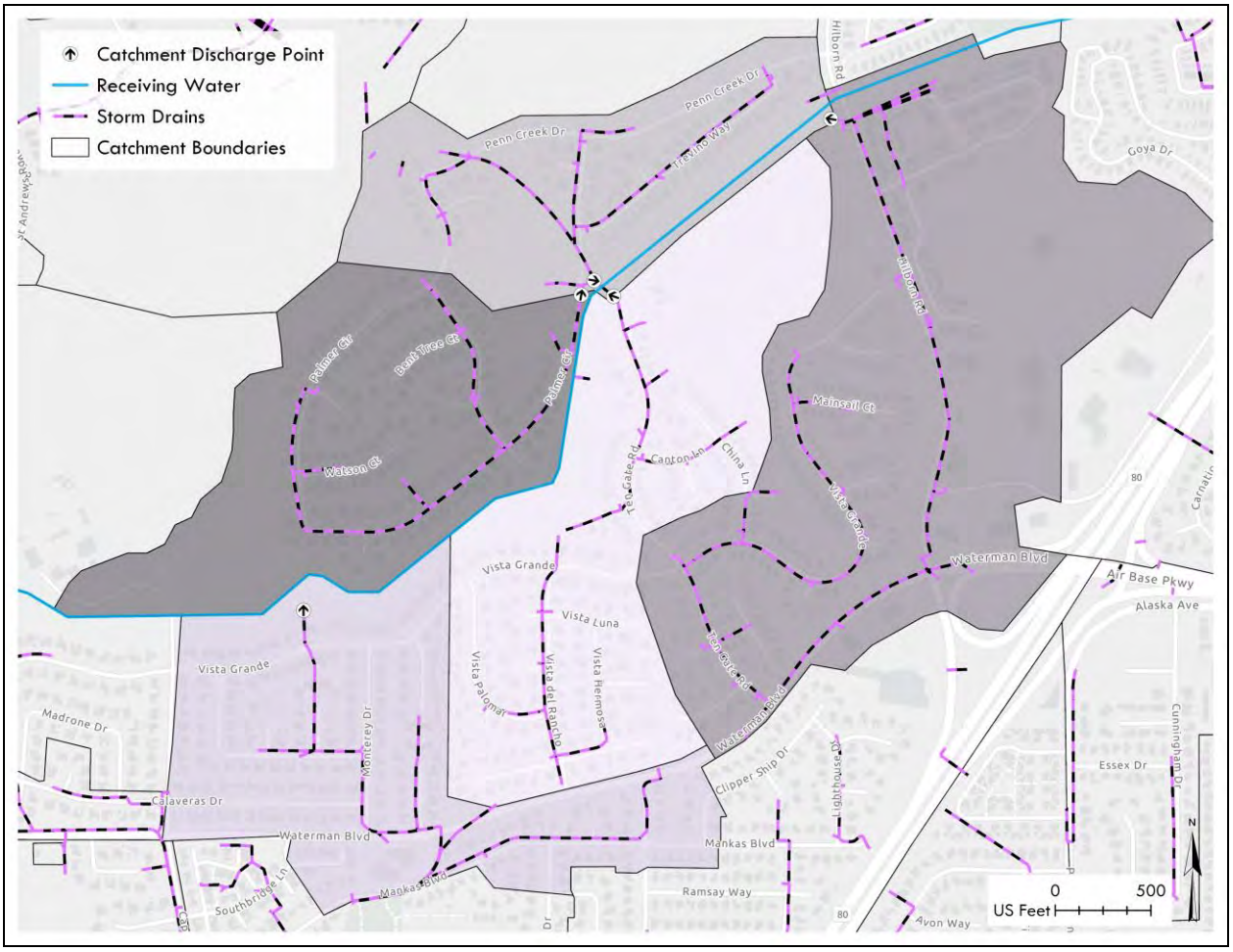

Figure 3.5. Example of catchments delineated via the stormdrain network in Fairfield.

[14] https://catalog.data.gov/dataset/usgs-national-elevation-dataset-ned

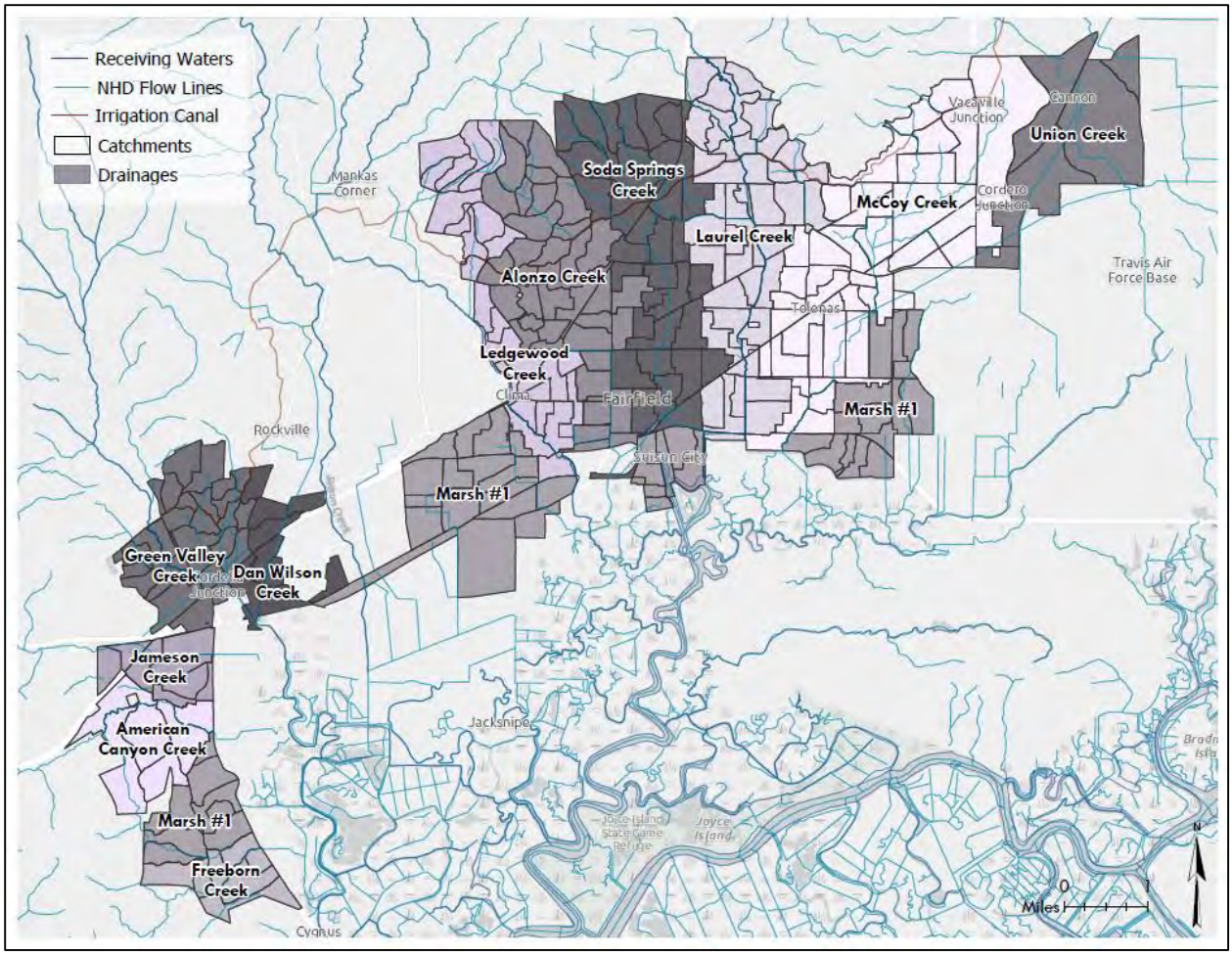

Figure 3.6. Fairfield-Suisun catchments, drainages, and receiving waters.

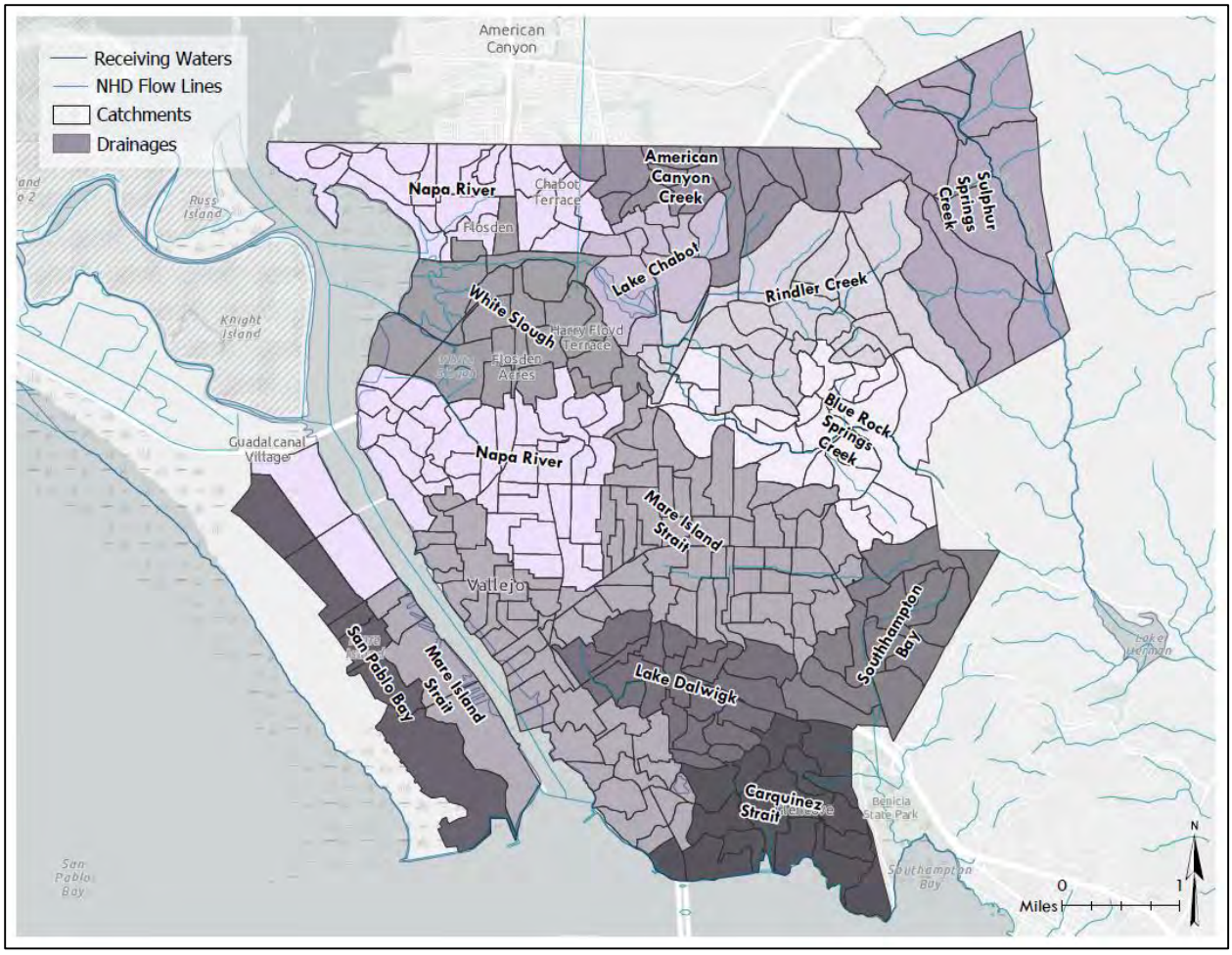

Figure 3.7. Vallejo catchments, drainages, and receiving waters

3.1.2 Model calibration

There are no long-term flow datasets available for watersheds that include the cities of Fairfield, Suisun or Vallejo. So, while the RAA Guidance from BASMAA (BASMAA, 2017) specifies that baseline model runoff estimates should employ a hydrologic calibration procedure, this is not possible for the Solano Permittee MS4 Area. Similarly, there are no concentration data for PCBs and mercury available that are amenable calibration of an urban stormwater model. The historic concentration data available have been described in detail in section in Section 1.3.2.4, and are primarily targeted to short-term study objectives, probabilistic inference over space, and characterizing spatial patterns within the receiving waters of the Bay. As such, measurements are sparse and do not capture the unique response of the urbanized areas, such as monitoring data at the outfalls of the urban drainages would. This means that the estimates from swTELR must rely wholly on the input data without adjustment of numeric quantities to tune the fit of the model to observations, which provides both advantages and shortcomings.

Contrary to the idea that uncertainty associated with model parameterization can be avoided with a careful or sophisticated calibration procedure, the process of fitting parameter values during calibration invariably injects substantial uncertainty to model outputs. This issue has been widely recognized and documented in the hydrologic literature for more than two decades (see Beven, 2001 p. 217). While lack of data with which to compare estimates clearly presents a challenge for direct verification of accuracy, it also avoids the inherent addition of uncertainty that is incurred any time model outputs depend strongly on model calibration. This is particularly true when a model is over-parameterized to a degree that is not supported by the data available, which is exceedingly commonplace (Beven, 2005). Since calibration often involves either complex optimization algorithms and/or several subjective decisions on the part of the modeler, avoiding it adds transparency to the modeling process, since relationships between model inputs and outputs are much more straightforward.

3.1.3 Baseline comparison with the Regional Watershed Spreadsheet Model (RWSM)

In place of a validation experiment via comparison with measured flow values, swTELR results were compared to outputs from the Regional Watershed Spreadsheet Model (RWSM), developed by SFEI. The RWSM is an empirical model developed to estimate average annual regional and sub-regional scale pollutant loads for the San Francisco Bay Area. Since the RWSM is an empirical model, the outputs depend strongly on an extensive dataset of flow and pollutant concentrations collected over more than a decade by regional monitoring programs. The RWSM is the most suitable tool available to extend existing measurements to estimate sub-regional scale pollutant loading in areas of the San Francisco Bay area that lack measurements. swTELR used the same land use layer employed by RWSM to specify PCBs and Mercury characteristic runoff concentrations for each land. Correspondence between swTELR and RWSM was performed using outputs provided on the SFEI RWSM website[15] by clipping raster-based RWSM runoff and pollutant load estimates from the full dataset using the MS4 boundary for each city in Solano County.

3.1.3 Key baseline modeling assumptions and limitations

The baseline modeling employs several assumptions for the purposes of either practicality or data limitations, which include:

- A spatially explicit, probabilistic approach can adequately bracket the range of rainfall-runoff responses via an uncalibrated model.
- PCBs and mercury concentrations are responsive to land use type and the concentrations used are representative of the actual values.

[15] https://www.sfei.org/projects/regional-watershed-spreadsheet-model#sthash.3ZhPRNxw.dpbs

- Uncertainties associated with the input data and model structure are not greater in magnitude than spatially varying factors that drive runoff generation and pollutant loading

These assumptions are primarily based on previously reported studies and were not tested as part of this study. Rather, they served as a practical point of departure for the work reported herein. A true validation of these assumptions and swTELR outputs require monitoring data at the urban drainage scale, which is not commonly available. However, since control measure implementation will proceed over a period of decades, this type of validation should be considered to both inform decision making, test RAA model assumptions, and provide additional information to shore up their limitations. Since swTELR operates at a granular spatial scale, the outputs are amendable to understanding the distinct runoff and pollutant loading response from urbanized drainages and changes that result from GSI implementation over time.

3.2 Model Scenarios for Compliance Demonstration

Baseline and future modeling scenarios were run for the Solano Permittee MS4 Area to demonstrate expected progress towards compliance for meeting GSI pollutant reductions. For each scenario, the rainfall input data and other spatial data that describe urban catchment characteristics remained unchanged, while other factors were altered according to documentation of expected changes (e.g. land use, BMP implementation). New development, redevelopment, and BMP implementation timing and locations were verified by Solano Permittees via a web-mapping application[16]. Three future scenarios were modelled, with a slightly different milestone schedule required for PCBs and mercury (Table 3.2).

The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the WLA RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. The scenarios reported herein include only reductions associated with GSI. Source control actions will be handled as part of the wasteload attainment (WLA) RAA analysis to be completed in 2020. Modeling scenarios for the GSI and WLA RAA's overlap substantially, with GI comprising a subset of the WLA reductions. Per the BASMAA RAA Guidance (BASMAA, 2017), pollutant load reduction measures included in the GSI RAA include GSI BMP implementation along with land use changes that accompany redevelopment. Reductions included in the WLA RAA analysis are the sum of reductions that result from GSI, land use changes, and source controls such as street sweeping and demolition controls. GSI treatment BMPs include both decentralized BMPs that are often included as part of Low Impact Development (LID) and treat stormwater on site at the parcel scale, as well as centralized BMPs, which route stormwater from several parcels to a regional treatment structure. Source controls will only be included in the 2028/2030 modeling analysis per the BASMAA RAA Guidance Document (BASMAA, 2017).

Table 3.2. RAA model scenarios

	Green Stormwater Infrastructure RAA	Waste load Allocation Attainment RAA
2020	GSI + land use changes	GSI + land use changes
2028/2030		GSI + land use changes + source control
2040		GSI + land use changes

Modeling GSI and WLA scenarios separately requires that GSI and source control reductions can be treated independently, even though there are overlapping components. This presents some conflicts with the most logical reduction sequencing that corresponds with our conceptual understanding of the urban stormwater system, in which source control reductions occur before other types of reductions that require transport of pollutants away from their source and subsequent treatment. The BASMAA source control accounting approach will not be finalized until January 2020. Any such pollutant reduction sequencing issues or assumptions will be documented in WLA RAA modeling report in 2020.

3.3 Redevelopment and new development land use changes

3.3.1 Planned and projected land use changes

Completed and projected land use changes were drawn from several different sources and compiled into a geodatabase to support the future modeling scenarios. Development and redevelopment projects were identified from city general plans, specific redevelopment area planning documents, examination of current and historical aerial imagery, and interpreted outputs from the UrbanSim[17] urban planning model. With the exception of the UrbanSim outputs, land use change data were not available in GIS formats and were translated from PDF documents and manually digitized in GIS. While the UrbanSim outputs provide a regionally standardized way to estimate redevelopment rates, using them in isolation would require ignoring the vast majority of documentation of parcels that are already planned for redevelopment

All land use changes employed in the future scenario modeling simulations are mapped in Figure 3.8 symbolized by the scenario year, and whether the changes will be redevelopment or new development. The GIS database created contains the specific information source used to determine land use change and associated time of conversion for each parcel.

[17] http://www.urbansim.com/urbansim

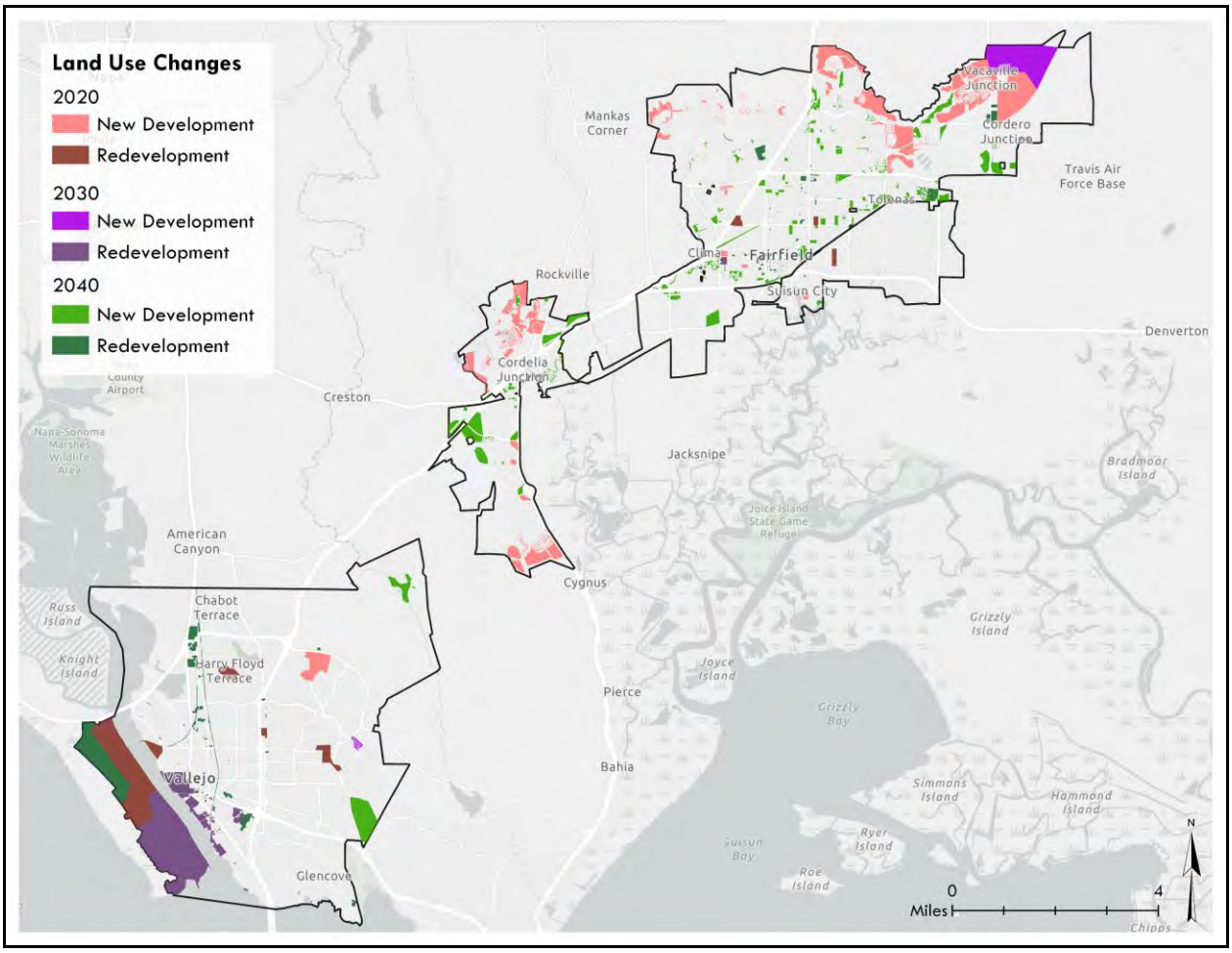

Figure 3.8. Land use changes used in future scenarios.

3.3.2 Land use corrections

Best available satellite time series imagery from Google Earth was used to identify and correct inaccuracies in the SFEI 2005 land use layer (SFEI, 2005). These changes include improper classification of open space that had been developed by 2005 or misclassification of old urban areas that had been redeveloped. Figure 3.9 shows an example of one of the areas within the City of Vallejo that was classified as Open land use and changed to New Urban land use, which was typical of these instances. Other issues identified in the land use layer were related to areas incorrectly classified as Old Transportation land uses (also previously recognized by McKee et al. 2014, p. 90). Examination of historical satellite imagery via Google Earth showed that several of these areas had been redeveloped are recently as 2004, and were therefore changed from 'Old Transportation' to New Urban land use in the 2020 and all subsequent model scenarios.

Figure 3.9. Example of a correction made in a Fairfield neighborhood to the land use layer used as input to the pollutant loading model.

3.3.3 Projected land use changes from UrbanSim

The UrbanSim model was used to project parcel-level land use changes for future scenarios. UrbanSim is an open source simulation system created by Paul Waddell and University of California, supported by grants from National Science Foundation designed to support urban planning. Spatial outputs reflect changes in residential housing units were used to infer redevelopment land use change over time. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Governments (ABAG) Committees for use in transportation projections and the regional Plan Bay Area development process.

The general workflow to extract new development and redevelopment parcels from the UrbanSim model mirrored that employed by the Contra Costa County Clean Water Program RAA analysis:

1. Intersect the parcel dataset with Solano County MS4 areas
2. Export UrbanSim model runs for the years 2010 through 2040 that includes fields that quantify total job spaces, total residential units, and year built.
3. Use an if-then statement to flag parcel differences for these metrics between 2010 and 2040 and query the year built output to determine which parcels are estimated to change during each scenario timeframe (2010-2020, 2020-2030, 2030-2040)

It was assumed that new development and redevelopment of multifamily residential and commercial/industrial parcels will incorporate GSI in accordance with MRP Provisions C.3.b., C.3.c., and C.3.d. Because of high land values, it is expected that more than 50% of the existing impervious area in each parcel will be replaced if a parcel is developed, and therefore the entire parcel will be subject to Provision C.3 requirements (that is, will be retrofit with Green Stormwater Infrastructure), consistent with the "50% rule" requirements of MRP Provision C.3.b. Land Use changes predicted via the UrbanSim[18] model were incorporated into swTELR for each scenario year according to the output time period.

3.3.4 Planned land use changes

Allocation of planned land use changes to each scenario was based on documented development plans or verification of new development initiation or completion via use of best available satellite imagery up to land use conditions as of 2018. For example, the Callahan Property Company's development in the City of Vallejo Northern Waterfront (52 acres) at Mariners Cove was allocated to the 2020 scenario as development plans have been approved by the City of Vallejo along with a schedule of parcel development[19] and satellite imagery indicates site grading has begun. The Central Waterfront area was instead allocated to the 2030 scenario (see Figure 3.8). Likewise, the 157-acre area located on the northern portion of Mare Island currently owned and under redevelopment by the Nimitz Group was allocated to the 2020 scenario. The 250 acres that Nimitz Group recently acquired from the Lennar Corporation, which is still in the scoping stages, were included as redevelopment areas in the 2030 scenario. The residential developments that have already been completed by Lennar Corporation, such as Farragut Village (completed 2007), or are in progress Coral Sea Circle, Kirkland Isle II were also allocated to the 2020 scenario. The remaining area on Mare Island still owned by Lennar Corporation (approximately 350 acres) is slated for redevelopment, but with no specific plans identified, it was allocated to the 2030 scenario. The remaining areas identified in City of Vallejo General Plans for land use change that

[18] http://www.urbansim.com/urbansim

[19] http://www.ci.vallejo.ca.us/city_hall/departments___divisions/city_manager/economic_development_division/waterfront_project

did not have any specific redevelopment planning documentation available were allocated to the 2040 scenario (Figure 3.8).

All GSI implementation within redevelopment and new development projects was assumed to be bioretention features, which are decentralized BMP types that reduce both stormwater volumes and pollutant concentrations. The sizing of planned bioretention features align with the MRP section C.3.d requirement to reduce and treat the contributing stormwater volume generated up to the 85th percentile 24-hour rainfall depth (SWRCB, 2015).

Relative to the baseline simulation scenarios, areas of new development identified typically produce additional runoff resulting from increased impervious coverage. While these increases will be mitigated with GSI implementation, conversion from Open Space land use to New Urban still usually results in net increases of runoff and pollutant loading. For these scenarios, the impervious coverage layer was changed manually in the GIS so that areas which typically had zero impervious coverage values before new development (e.g. Open Spaces land use) would reflect the typical impervious coverage of the New Urban land use. Exceptions to this rule were in areas that the impervious coverage layer accurately reflected the land use changes that had occurred since 2005, which is when the land use layer was created.

3.3.4.1 *Key land use change assumptions and limitations*

The reliability of the modelling results relies heavily on the following land use data assumptions:

- Past and future land use changes have been adequately captured via automatically classified land-use maps, planning documents, and inspection of historical satellite imagery
- UrbanSim model outputs reasonably reflect the rates and locations of land use change anticipated in the future.
- Land use changes result in reductions of characteristic pollutant runoff concentrations as defined by the PCB and mercury land use layer (SFEI, 2005).

The assumption that land use changes will result in the specified pollutant concentration changes is a substantial source of uncertainty in this analysis. It includes the implicit assumption that all remediation actions and new development standards prescribed in the MRP are closely followed and in perpetuity. While this assumption relies on the best sampling data available to date, which has already been discussed, these data are limited, especially in Solano County.

Comparison of the SFEI 2005 land use data layer to available imagery indicated misclassification of several areas. It is unlikely all errors were identified and corrected. Manual inspection of historical satellite imagery is tedious and only useful for identifying new development or areas that were incorrectly classified as open space. Historical redevelopment is not obvious and would have required a much more detailed study of the area and available data that was beyond the scope

of this effort. The options for spatially explicit land-use change estimates are few, and UrbanSim at least provides a more detailed option than applying a uniform rate across each city. However, using model outputs to drive another model holds the substantial disadvantage of compounding uncertainty through different model layers.

3.4 Reductions from Green Stormwater Infrastructure (GSI)

3.4.1 Parcel/Green Street LID

Planned and completed LID projects were mostly green streets within the City of Vallejo that were identified via capital improvement projects and are listed in Table 3.3. Since these projects did not have defined locations or types of structural BMPs yet specified, bioretention feature application for the entire drainage areas was again assumed to the 85th percentile 24-hr design storm as specified in MRP C.3 requirements. Each project area was defined by its outline that was delivered to 2NDNATURE via the City of Vallejo as a GIS shapefile.

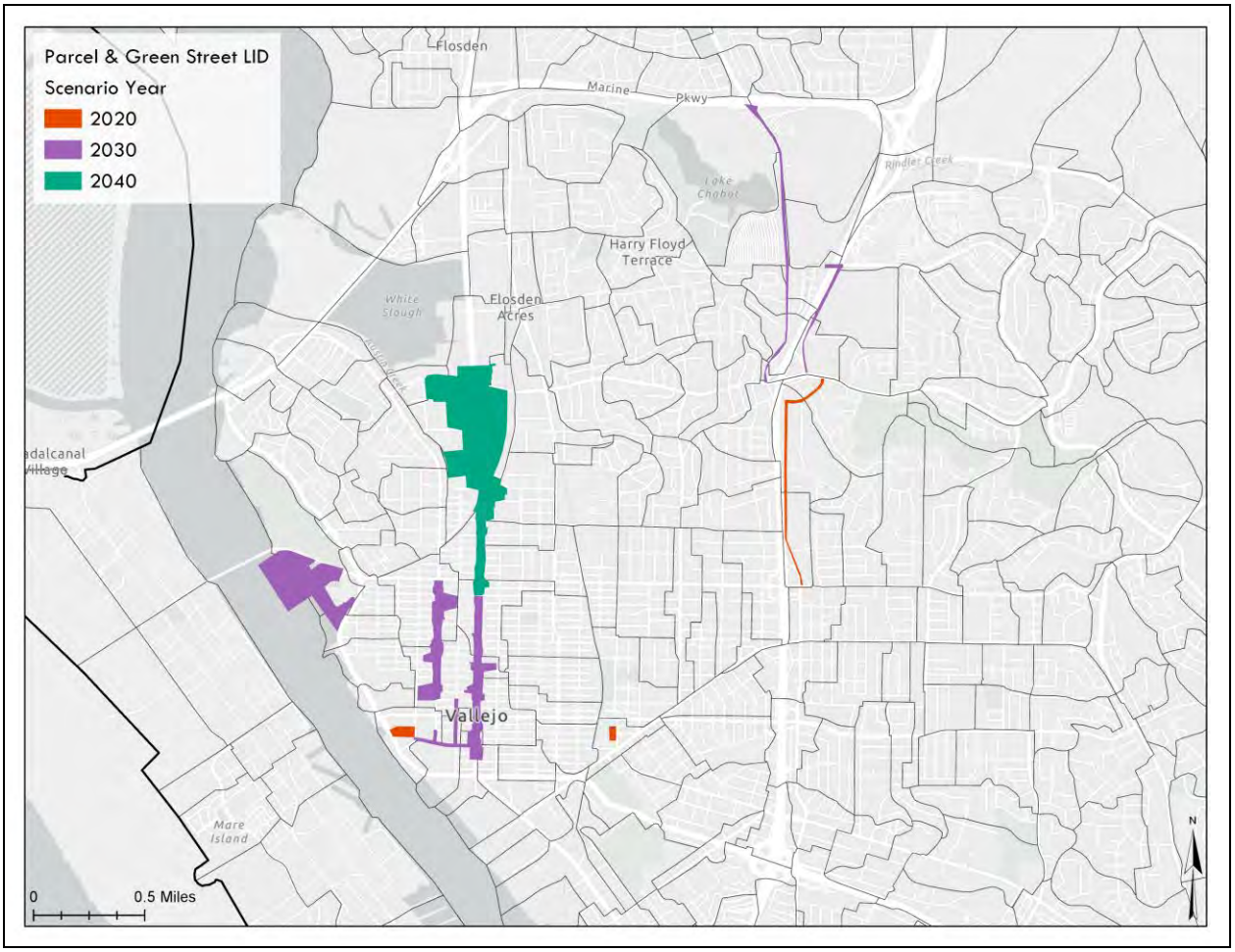

Figure 3.10. Future parcel and Green Street LID projects identified in Vallejo.

Table. 3.3. Future LID projects planned in Vallejo.

City	BMP ID	Status	Scenario	Area (ac)	Catchments	Primary Receiving Water
Vallejo	Sonoma Boulevard Streetscape Phase 5 & 6	Planned	2040	105.94	AC12, CA14, AC15, AC20, AC35, AC37, AC38, AC39, AC41, AC52, AC53	Napa River
Vallejo	Sonoma Boulevard Streetscape Phase 4	Planned	2030	9.69	AC12, DT5	Mare Island Strait
Vallejo	Benicia Road Bridge Replacement Project	Planned	2030	0.87	CP11, CP12	Southhampton Bay
Vallejo	Sonoma Boulevard Streetscape Phase 1-3	Planned	2030	12.53	DT1, DT2, DT5, SA59, DT2, DT5	Mare Island Strait
Vallejo	Marina Sea Wall	Planned	2020	44.58	DT10, DT11, MI22	Napa River
Vallejo	Sacramento Street Streetscape Phase 1	Planned	2030	8.32	DT12	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 2	Planned	2030	3.89	DT12, DT 5	Mare Island Strait
Vallejo	Downtown Streetscape Phase 4	Planned	2030	1.61	DT3, DT4	Mare Island Strait
Vallejo	Downtown Streetscape Phase 5 & 6	Planned	2030	1.44	DT3, DT4, DT2	Mare Island Strait
Vallejo	Downtown Streetscape Phase 7, 8 & 9	Planned	2030	2.07	DT3, DT5	Mare Island Strait
Vallejo	Vallejo Station Phase B	Planned	2020	3.04	DT4	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 3	Planned	2030	9.06	DT5	Mare Island Strait
Vallejo	Admiral Callaghan Widening	Planned	2020	2.85	LC10, LC11, LC13, LC15A, LC8	Blue Rock Springs Creek
Vallejo	Fairgrounds Drive Improvements	Planned	2030	9.05	LC10, LC11, LC27, LC37A, LC8, LC9, SA44, LC37B	Lake Chabot
Vallejo	Turner Parkway Overcrossing	Planned	2030	0.83	LC11, LC15A	Rindler Creek
Vallejo	Admiral Callaghan Middle Lane	Planned	2020	6.29	LC6, SA39, SA 40	Mare Island Strait
Vallejo	Public Safety Building Rehab and Design	Planned	2020	1.16	SA52	Mare Island Strait

3.4.2 Decentralized BMP implementation

Existing and planned decentralized BMP implementation was modeled in swTELR in a spatially explicit manner, with raster-based calculations for runoff and pollutant load reductions performed at the 30-meter pixel scale for each of the future scenarios (2020, 2030, 2040). Existing GSI BMP specifications were documented by Solano Permittee city staff and provided to 2NDNATURE via spreadsheets and uploaded to the 2Nform spatial platform. The city staff confirmed the locations and attributes of each BMP and GSI project via a web-based mapping interface[20] prior to finalizing the dataset.

For each modeling scenario, GSI benefits are accounted for *after* land use changes are applied. This sequencing of pollutant reduction accounting is important to avoid double counting of benefits, since where redevelopment occurs, pollutant loads delivered to GSI will be lower due to the transformation of Old Industrial to New Urban land uses within the contributing drainages. In areas were new development occurs, the land use changes typically result in additional runoff available for infiltration by BMPs due to increased impervious coverage. All structural BMP types modelled reduce either runoff through infiltration or pollutant concentration through particle capture and filtration, and several GSI types do both. The pollutant reduction processes represented depend on the BMP type as detailed in Table 2.3.

For most existing and several planned BMPs, exact locations and BMP types were available from Solano Permittees, so that benefits were calculated according to the type and location of each BMP and included in the 2020 scenario (and carried over into all subsequent scenarios). In this way, the modeling outputs preserved the uniqueness of each location in terms of runoff production and pollutant loading from each of their specified drainage areas which were explicitly accounted for in the calculations. The locations of all existing or planned decentralized BMPs are shown in Figure 3.11 and each BMP is listed in Appendix D with their relevant attributes.

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20 http://2ndnature.maps.arcgis.com/apps/webappviewer/index.html?id=839c43995b64448cb0da6b4d38c5a6b6

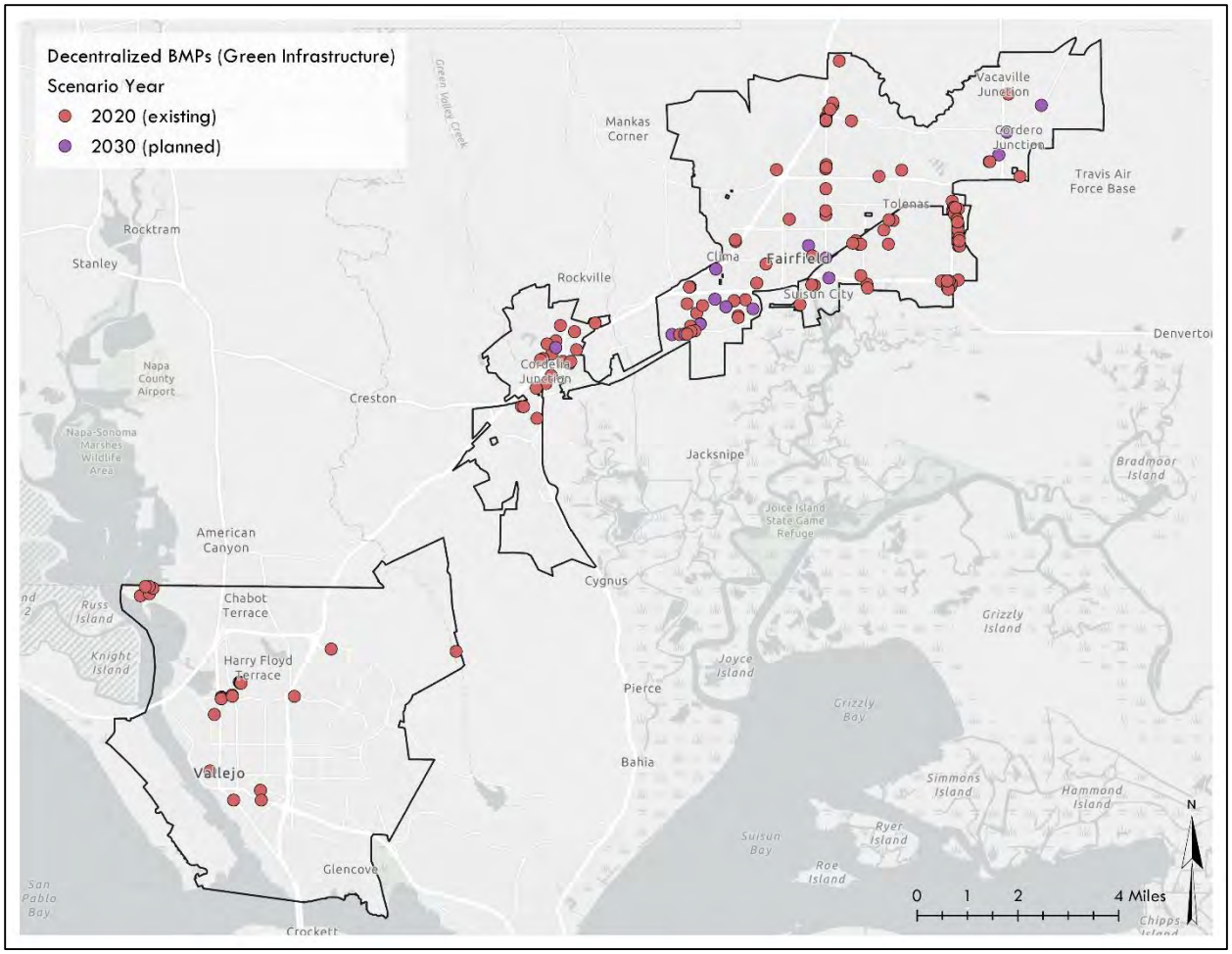

Figure 3.11. Existing and Planned Decentralized BMPs implemented throughout the Solano Permittee MS4 Area.

Current and future reductions from decentralized BMPs were modeled assuming that they were built according to MRP, section C.3d requirements, so that volume-based designs would infiltrate runoff generated by rainfall up to the 85th percentile 24-hour rainfall depth. Since swTELR generates runoff for a several percentile slices of the rainfall distribution, raster outputs of runoff were generated for each percentile rainfall depth. For decentralized BMPs, reductions were calculated as the runoff generated after land use changes minus the volume generated up to the 85th percentile rainfall event for each of the grid cells that comprised the respective BMP drainage area. For calculating pollutant load reductions, the remaining volume was multiplied by either the untreated land-use concentration or a reduced concentration, depending on whether the BMP type provides pollutant treatment in addition to runoff reductions. Since these BMPs generally receive runoff infiltration and treatment close to the site where it was generated, delivery to the BMP is assumed to be instantaneous.

3.4.3 Decentralized BMP performance efficiency

Since the decentralized BMP calculations were performed on raster datasets with coverage throughout the Solano Permittee MS4 area, we can examine the potential for pollutant reductions by sampling grid cells and calculating runoff and pollutant reduction for different BMP types. Figure 3.12 shows the range of location specific potential reductions for BMPs that perform runoff infiltration or treatment and those that do both (e.g. bioretention features). Again, all decentralized BMPs were assumed to be sized and performing in perpetuity to capture runoff generated from the 85th percentile 24-hour storm depths per MRP section C.3.d. Since there is different runoff and loading potential throughout the Permittee MS4 area, there is a range of potential runoff capture and associated BMP load reduction. Given that both PCBs and mercury are hydrophobic and have a strong tendency to adsorb to particulates, we assume similar pollutant reduction capture efficiency for both pollutants. Note that the shape of the curves in the right panels of Figure 3.12 reflect the non-linearity between rainfall and runoff production. Runoff infiltration generally provides somewhat greater benefit than runoff treatment at this design level, and BMPs that do both infiltration and treatment provide substantially greater benefits within a narrower performance range (Figure 3.12).

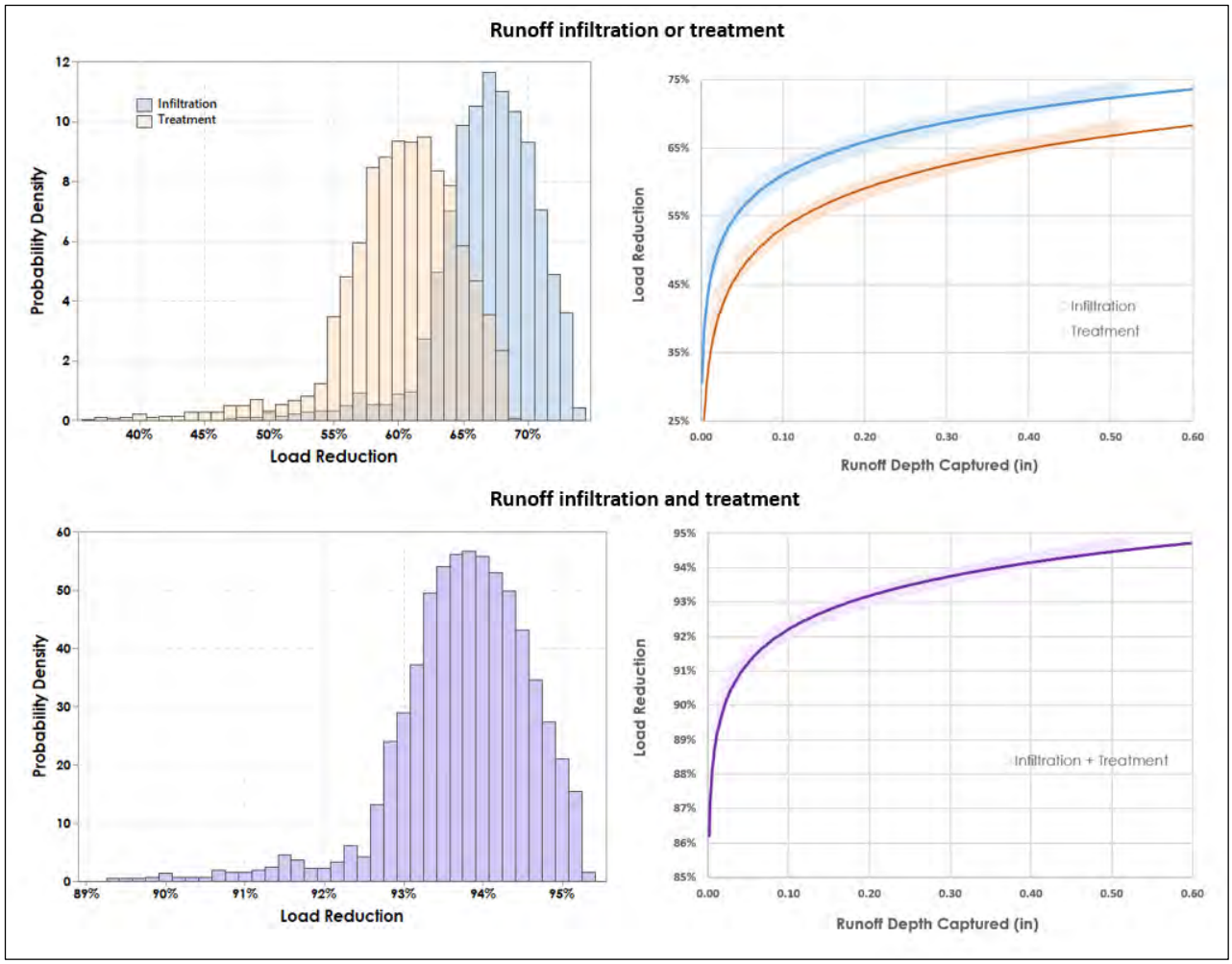

Figure 3.12. BMP performance efficiency. Histograms in panels on the left show load reduction distributions and curves in panels on the right show load reductions per runoff depth captured. Depth capture shown in the range of flows generated by the 85th percentile rainfall event.

The performance curves shown in Figure 3.12 are specific to Solano County, since they incorporate annual rainfall distribution characteristics and site-specific runoff and pollutant generation. As such, they are quasi-empirical in nature. These curves are very similar to those calculated from observed data for the purpose of standardizing load reduction accounting throughout the Chesapeake Bay to support TMDL compliance (Scheuler and Youngk, 2015). Given the sheer number of decentralized BMPs that will need to be accounted for in the SF Bay Area, ongoing accounting of their benefits will likely require a similarly simple accounting system as they have implemented in the Chesapeake Bay Region. For example, there are more than 6,000 BMPs currently catalogued in Prince George County, MD (population 900,000) alone that require ongoing pollutant reduction benefit quantification. Within the decade, the SF Bay Area will likely have tens of thousands of structural BMPs catalogued that require a practical method for accounting for reductions and ongoing verification of performance.

3.4.4 Centralized BMPs

Runoff and pollutant load reduction performance from existing and planned centralized BMPs (also called regional treatment projects) employed the methods described in Section 2.3 to determine routing, timing, and partitioning of infiltrated, treated and bypassed flows for calculating reductions for future scenarios. A primary difference from decentralized BMPs is that with centralized BMPs, stormwater is typically transported a substantial distance away from where runoff was initially generated, so that runoff timing is important for estimating centralized BMP reductions.

Centralized BMP and drainage specifications were documented by city staff and transferred to 2NDNATURE, where they were uploaded to a web-based mapping platform for verification by city staff before inclusion in the modeling scenarios. Centralized BMPs included in the modeling scenarios are listed in Table 3.4 and shown on Figure 3.13. The predominance of dry basins as a centralized BMP in Fairfield vs treatment vaults as the predominant choice for centralized BMPs in Vallejo reflects the difference in soil types: Fairfield has a much greater amount of Type A and B soils (higher infiltration rates) compared to Vallejo (see Figure 3.2).

The hydrologic and pollutant loading to each centralized BMP is calculated based on the land use changes and decentralized BMP reductions within each centralized BMP contributing drainage areas. The performance of each centralized BMP is estimated based on the computational approach outlined in Section 2. While there may be additional centralized BMPs installed with future new development, inclusion in this RAA analysis required that cities had documentation of locations, types, and capacity of future BMPs. Centralized BMPs, both planned and already installed, are listed by Solano Permittee city in Table 3.4 along with location, drainage association, and corresponding modeling scenario.

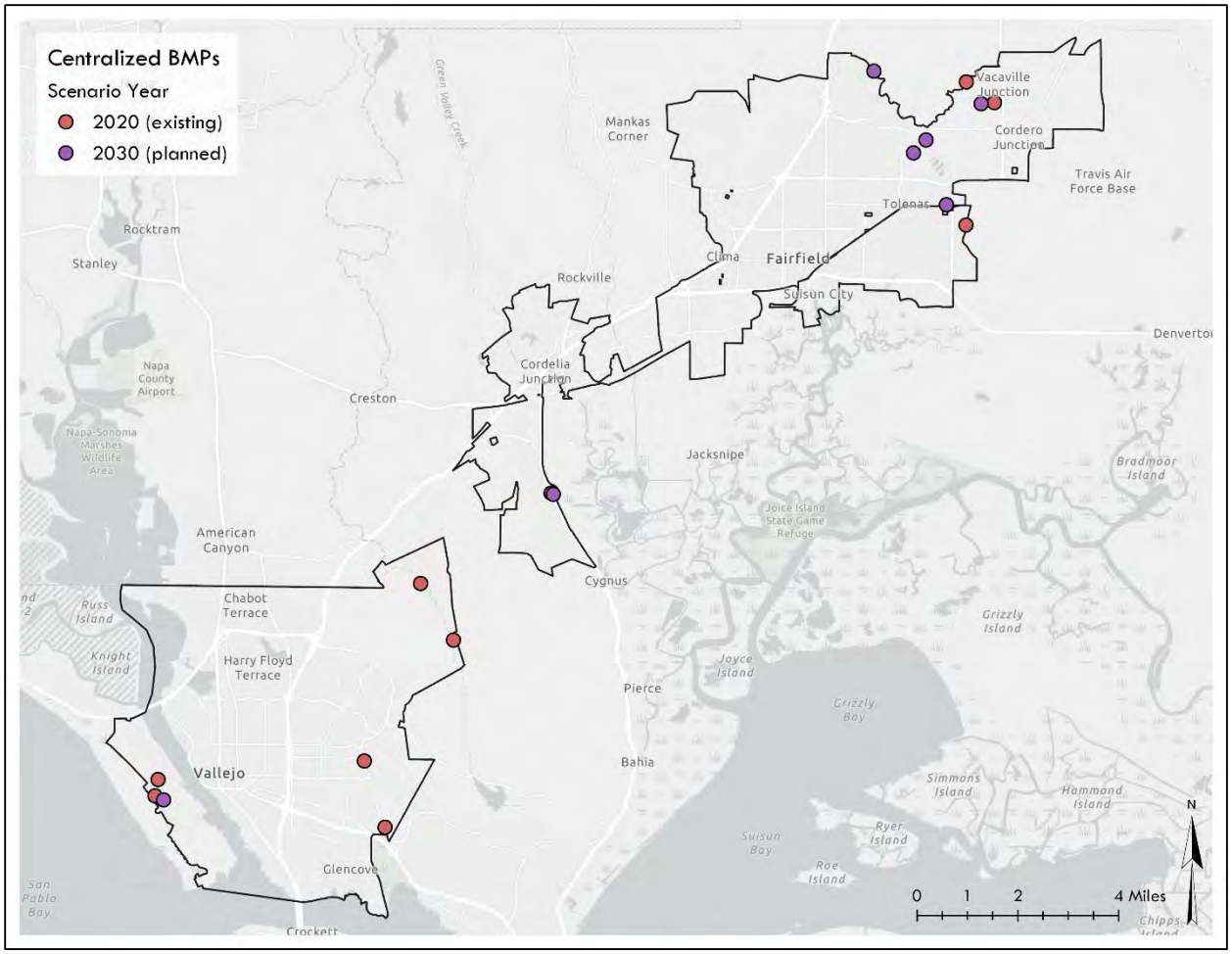

Figure 3.13. Centralized BMPs used in future modeling scenarios.

Table 3.4. Centralized BMPs and attributes.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Gold Hill Village 1	Installed	2020	Dry Basin	11	Marsh 1	MAR-2	38.18047928	-122.1342695
Fairfield	Gold Ridge-so. of Putah So. Canal	Installed	2020	Dry Basin	124	McCoy Creek	COY-26	38.2928207	-121.9726825
Fairfield	Gold Ridge-no. of Putah So. Canal	Installed	2020	Dry Basin	120	McCoy Creek	COY-30	38.29886642	-121.9829339
Fairfield	Paradise 360	Planned	2030	Dry Basin	9.7	Laurel Creek	LAU-12	38.30187014	-122.0165929
Fairfield	Gold Hill Village 2	Planned	2030	Dry Basin	11	Marsh 1	MAR-2	38.18016302	-122.1334273
Fairfield	Ivy Wreath/Strawberry Fields	Planned	2030	Dry Basin	13.8	McCoy Creek	COY-10	38.26349435	-121.9902188
Fairfield	Villages at Fairfield- Village 2	Planned	2030	Dry Basin	42	McCoy Creek	COY-19	38.27843273	-122.0021546
Fairfield	Discovery @ Gold Ridge	Planned	2030	Dry Basin	15	McCoy Creek	COY-24	38.29252809	-121.9774729
Fairfield	Villages at Fairfield- Village 1	Planned	2030	Dry Basin	76	McCoy Creek	COY-6	38.28212579	-121.9975519
Fairfield	2900 Cordelia	Installed	2020	Bioretention	38.085	Marsh 1	MAR-11	38.22804606	-122.0847827
Fairfield	Gateway 80, Buildings A & B	Planned	2030	Bioretention	35.93	Marsh 1	MAR-11	38.2280516	-122.0856715
Suisun	PR Detention Basin	Installed	2020	Dry Basin	64.7	Marsh #1	MAR-47	38.257646	-121.982987
Vallejo	SA10062T	Installed	2020	Treatment Vault	108	Mare Island Strait	SA10	38.10333666	-122.2021727
Vallejo	2183GT318	Installed	2020	Treatment Vault	35	San Pablo Bay	SP3B	38.0978149	-122.277309
Vallejo	2184GT027	Installed	2020	Treatment Vault	40	San Pablo Bay	SP4	38.09313091	-122.2783658
Vallejo	SV1401T	Installed	2020	Treatment Vault	108	Sulphur Springs Creek	SV1B	38.1381688	-122.1697917
Vallejo	SV1203T	Installed	2020	Treatment Vault	135	Sulphur Springs Creek	SV1C	38.15438193	-122.181801
Vallejo	Lennar Mare Island B3	Planned	2030	Dry Basin	37	San Pablo Bay	SP4	38.09204167	-122.275241
Vallejo	BeniciaRd_Basin	Installed	2020	Dry Basin	600	Southhampton Bay	CP12	38.08431517	-122.1944904

3.4.5 Key GSI modeling assumptions

Calculation of GSI reductions depended upon several assumptions:

- All redevelopment since the 2005 baseline year and future redevelopment complies with MRP C3 requirements to capture and/or treat runoff up to the 85th percentile 24-hr rainfall event.
- Bioretention features or comparable decentralized BMPs that reduce both volumes and pollutant concentrations will be make up a substantial proportion of future GSI implemented.
- Decentralized BMPs that reduce PCB/Hg concentrations in stormwater do so at 80% efficiency when functioning as designed. While there is some evidence to support this assumption, it is very limited. As such, this should be considered an important source of uncertainty in the outputs.
- Centralized BMPs that reduce PCB/Hg concentrations in treated outflow have characteristic effluent concentrations with correspond with sediment reductions.
- All structural BMPs will perform to their design standard in perpetuity, requiring a proactive commitment to maintenance Permittee's are encouraged to adopt a tracking and accounting system that includes field verification of GSI performance and provide permittees with useful asset management information on GSI.

4 RAA Modeling Results and Compliance Demonstration

This section presents the results of modeling experiments using the structure, methods, inputs and assumptions that have been described in sections 1-3. The results presented include baseline modeling, comparison with the Regional Watershed Spreadsheet Model (RWSM), and GSI reductions modeling.

4.1 Baseline Modeling Results

4.1.1 Baseline conditions

Baseline runoff was calculated for each Solano County Permittee MS4 Areas (Fairfield, Suisun, and Vallejo) according to the methods described in section 2.3, with the results summarized for each city in Figure 4.1. Runoff volumes are much higher in Fairfield (13,268 afy) and Vallejo (13,391) since these cities are much larger than Suisun, which only produced 2,091 afy of runoff. PCB loading is particularly high in the City of Vallejo (477 g) compared to Fairfield (137 g), and Suisun (16 g), owing to the high proportion of source area and old industrial land use in Vallejo.

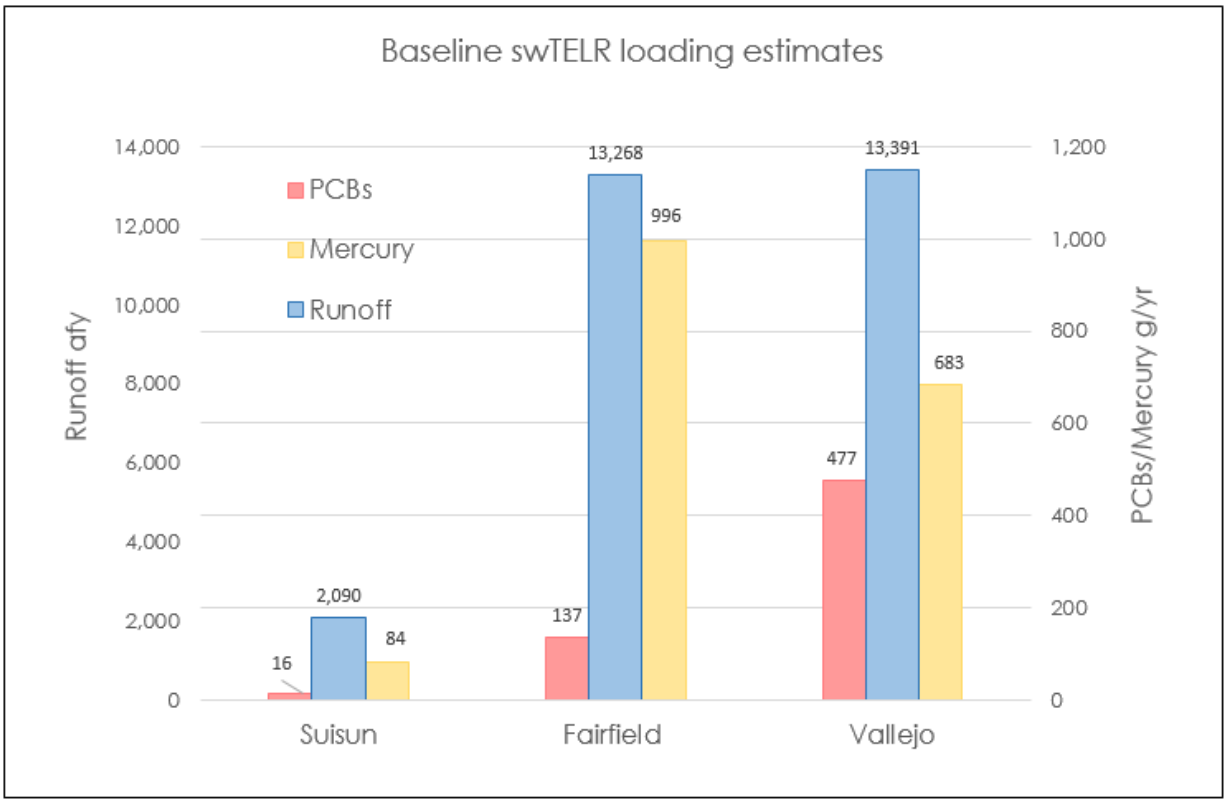

Figure 4.1. Runoff, PCBs, and mercury baseline loading estimates from swTELR.

Baseline runoff estimates were aggregated to the urban catchment scale from calculations performed at the 30-meter grid scale (Figure 4.2). As we would expect, runoff generation is generally highest in areas with high impervious cover and poorly draining soils. These include the urban centers of Vallejo and Suisun City. Baseline runoff is an important driver of spatial patterns of pollutant loading across Solano County; area-normalized runoff ranged from 0.01 ac-ft/ac/yr to 1.2 ac-ft/ac/yr, with an average value of 0.67 ac-ft/ac/yr.

Baseline pollutant loading for PCBs and mercury were calculated using the methods described in sections 2.3 and 3.1and aggregated to the urban catchment scale (Figures 4.3 and 4.4). The runoff estimates shown in Figure 4.2 were used for calculating both PCB and mercury loads. Average baseline loading values for catchments ranged from 0.01 g/ac/year to up to 0.18 g/ac/yr throughout the Solano Permittee MS4 Area (Figure 4.3). High PCB loading catchments are strongly associated with the relative proportion of Source Area or Old Industrial land use coverage within catchments. This is an intuitive result, since runoff concentration values for these land uses are substantially higher than the other land uses (Table 3.1). The greatest concentration of high loading areas is in Vallejo on Mare Island, which is classified almost entirely as Old Industrial land use. Other areas of relatively high PCB loading are the southern part of the Vallejo Waterfront, Vallejo downtown, and Central Fairfield. As we would expect, upland areas on the outskirts of both cities, which are largely undeveloped have very low PCB loading values.

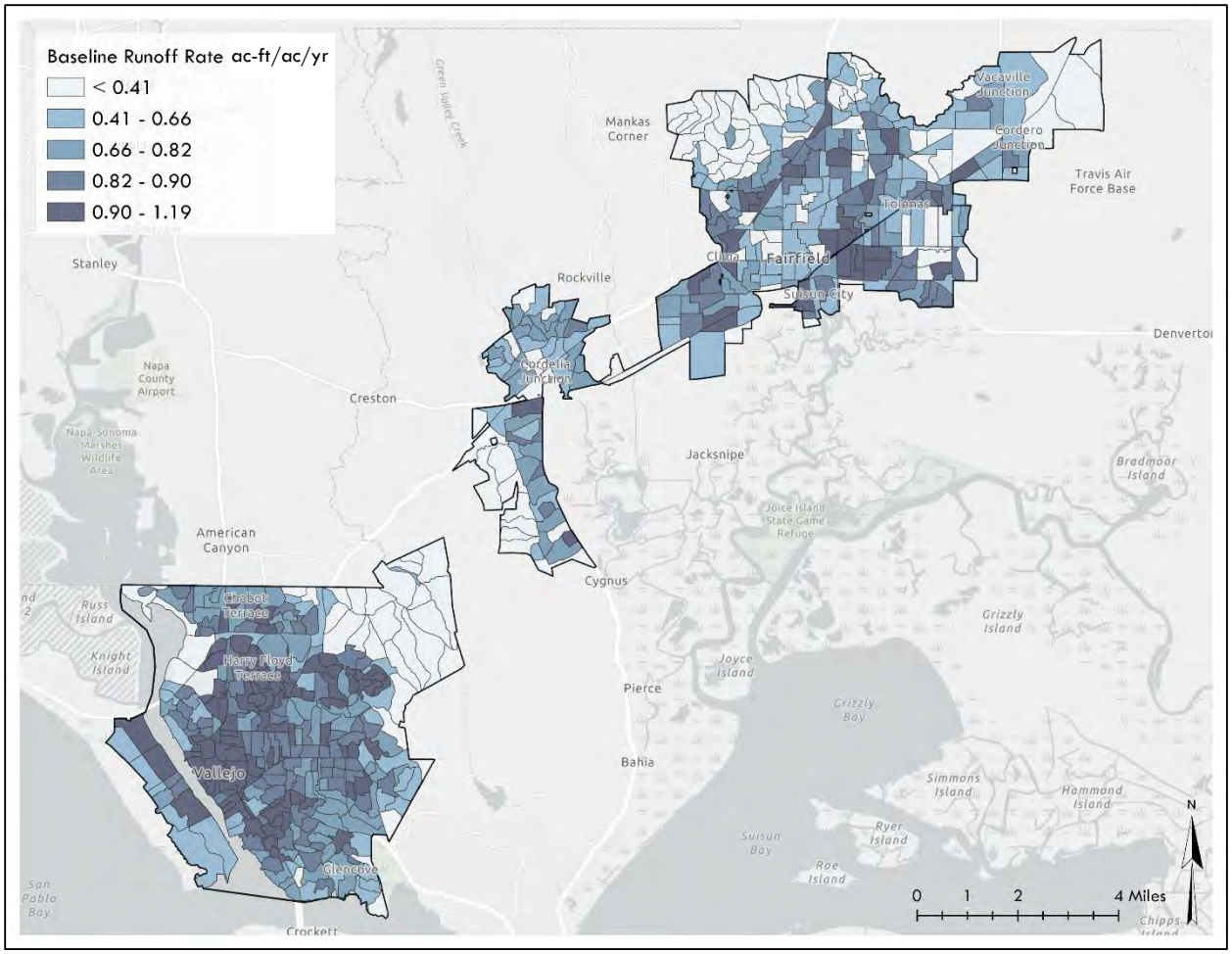

Figure 4.2. Baseline runoff estimates for Solano Permittee MS4 Area

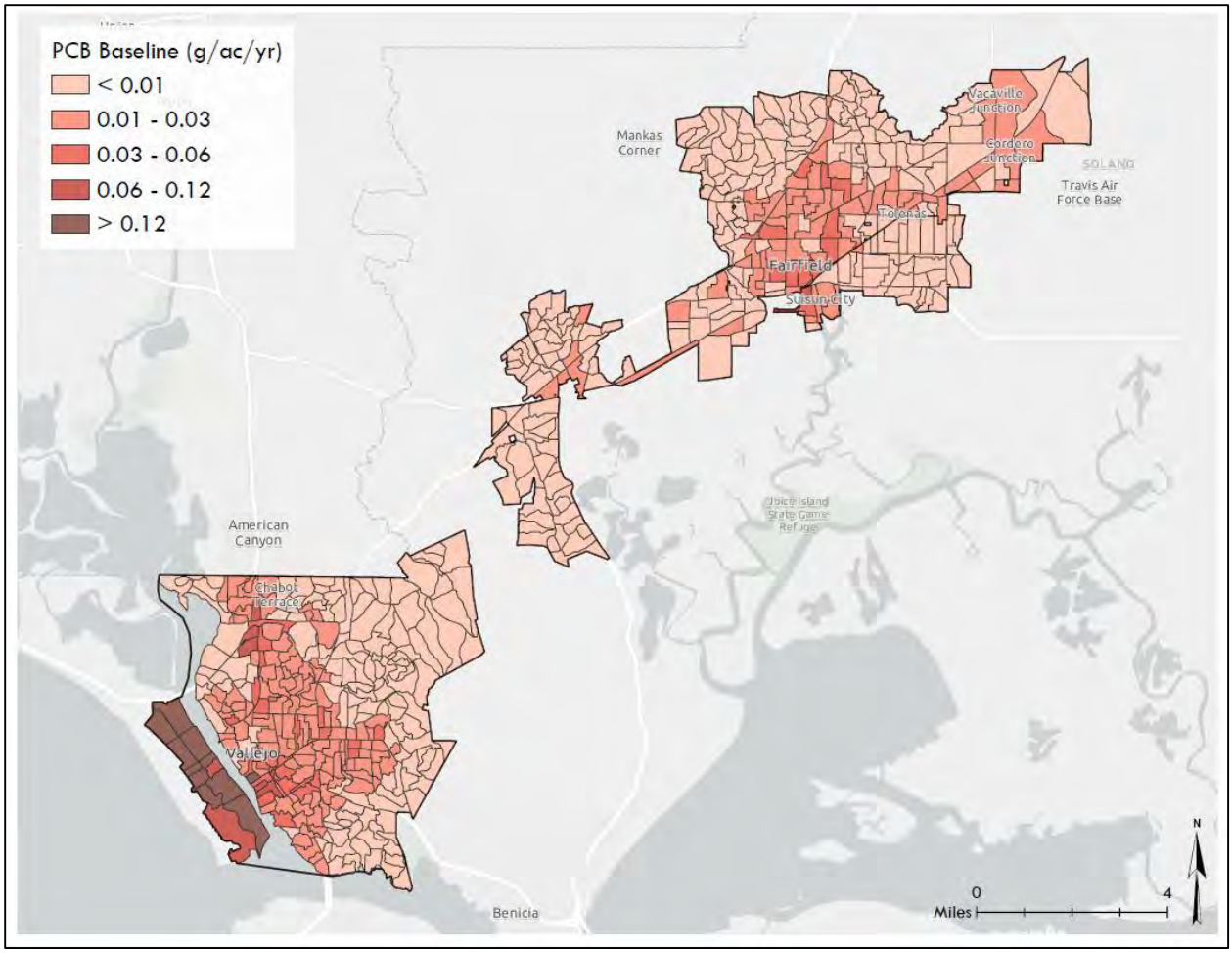

Figure 4.3. Baseline PCB loading estimates for the Solano Permittee MS4 Area

Mercury baseline loading outputs are shown in Figure 4.4. With less difference between land use characteristic runoff concentrations for mercury, loading outputs are more responsive to spatial patterns of runoff compared to PCBs. Loading values range from 0.009 to 0.125 g/acre/year throughout Solano County. Like with PCBs, the most heavily developed areas in downtown Fairfield and Vallejo both show relatively high mercury loading but areas such as Mare Island and the Vallejo waterfront show relatively lower mercury loading values compared to PCBs, primarily due the difference the high characteristic PCB runoff concentrations for Old Industrial and Source Area land uses present in those areas. Industrial areas along Highway 12 also show relatively high mercury loading, which did not show high PCB loading. Undeveloped upland areas in the northern portions of Fairfield and Vallejo show mostly low loading as with PCBs due to low runoff generation in these areas that have substantial open space coverage.

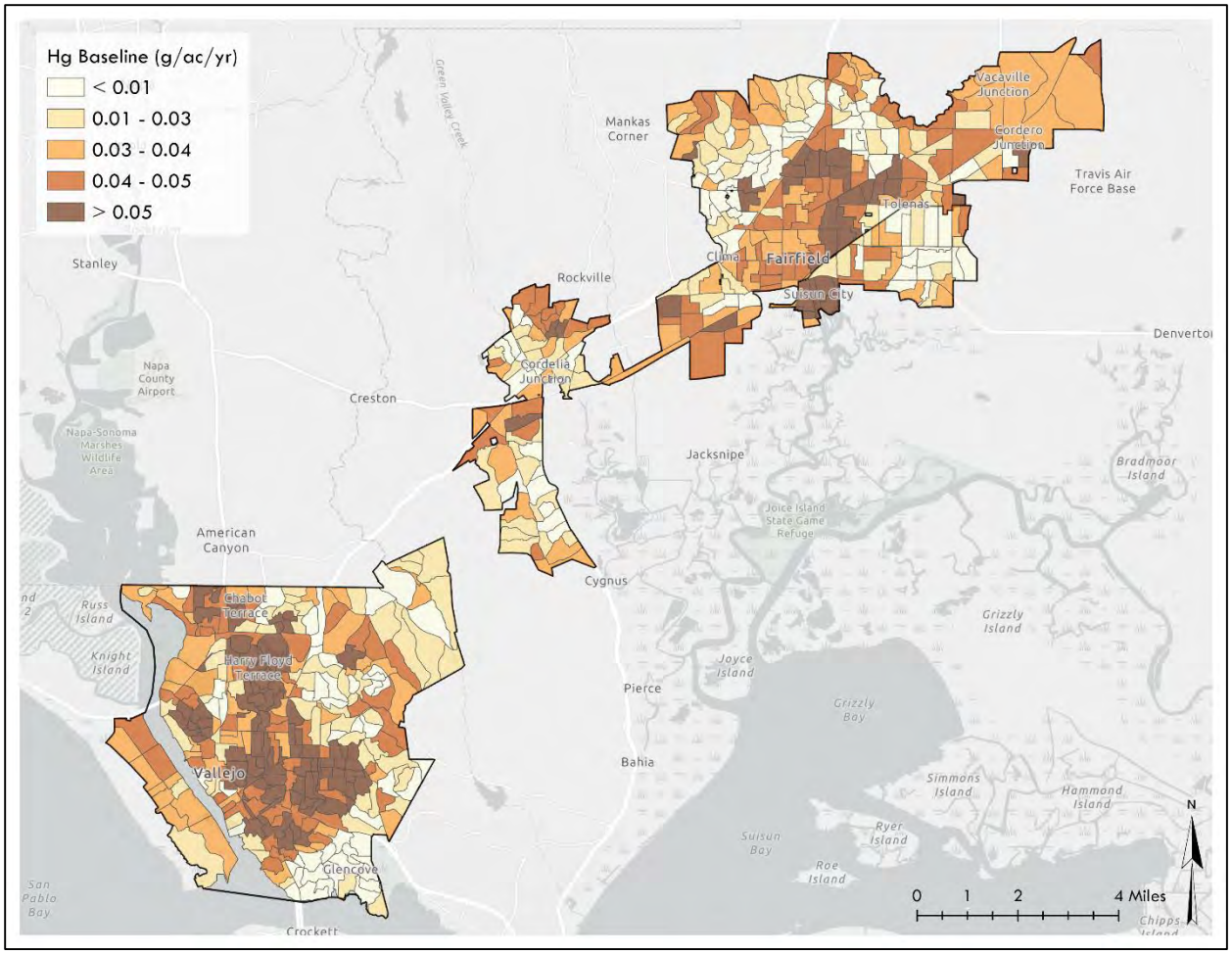

Figure 4.4. Baseline mercury loading estimates for the Solano Permittee MS4 Area

4.1.2 Comparison with Regional Watershed Spreadsheet Model (RWSM)

Comparison between outputs from swTELR and RWSM shows close correspondence between outputs from the two models (Table 4.1). Overall, there was little difference in estimates between swTELR and RWSM runoff estimates (-4%), PCB loads (-16%), or mercury loads (9%), with swTELR providing the lower estimates for runoff and PCBs, and higher estimates for mercury compared to RWSM. Discrepancies between the two models are due almost entirely to the differences in the spatial pattern of runoff estimates, since land use concentrations used in swTELR are identical to those used in RWSM. Even though Solano county is technically part of the North Bay, runoff coefficients used for the RWSM outputs are the same as those used for the East Bay, because rainfall gauges in the East Bay more closely reflect the Solano County rainfall regime. There were no calibration sites for RWSM located in the vicinity of Solano County (McKee et al., 2014); some of the North Bay calibration sites used in RWSM had nearly double the annual rainfall of Fairfield. The decision to use East Bay runoff coefficients was confirmed appropriate by SFEI staff (A. Gilbreath, pers. com., Oct 2018).

Table 4.1. Comparison of average annual loading to SF Bay from RWSM and swTELR.

	RWSM			swTELR			% Difference		
	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB	Hg	Runoff
Fairfield	131	607	13,244	137	696	12,120	-16%	-12%	-8%
Suisun	15	68	1,655	16	84	2,116	-7%	26%	28%
Vallejo	569	657	13,765	477	683	13,450	-16%	5%	-2%
Totals	**715**	**1,333**	**28,664**	**630**	**1,462**	**27,616**	**-16%**	**9%**	**-4%**

Hydrologic algorithms in swTELR are very sensitive to impervious cover and soil type - runoff generation directly reflects the local impervious cover. Since RWSM outputs are regionally calibrated, they do not appear to reflect the same degree of sensitivity to these factors at more granular scales, which probably accounts for a substantial proportion of the runoff differences between the two models at the individual city level. This is not unexpected, since RWSM was developed as a regional tool and necessarily reflects spatial factors specified at larger spatial scales (McKee et al. 2015) compared to the MS4 and urban catchment-scale estimates provided by swTELR.

To better understand the differences between swTELR and RWSM a multivariate general linear model was constructed at the urban catchment scale for both model outputs using impervious cover as a continuous independent variable and soil type as a categorical independent variable. Soils and impervious cover summarized for each urban catchment delineated in Solano County (n= 596) explained approximately 93% of runoff variance in swTELR (the expected outcome), but only 3.5% in RWSM (an initially surprising outcome). From these findings, we can conclude that: 1) use of TELR baseline estimates will not substantially affect calculations for progress towards overall waste load allocations for Solano Permittees compared to estimates from the RWSM model, 2) RWSM runoff volumes at the catchment scale strongly reflect calibrated parameters, which aligns with its purpose as a tool to estimate loading at the regional or sub-regional scale, 3) spatially explicit estimates from swTELR align more with widely held conceptualizations of how spatial factors such as impervious cover influence urban runoff generation.

4.2 Model Scenario Results

4.2.1 Spatial patterns of pollutant load reductions over time

For each modeling scenario, swTELR and the methods described in Section 3 were applied to generate outputs that incorporated runoff and pollutant loading reductions for different types of GSI. These included land-use redevelopment, decentralized BMPs, and centralized BMPs (regional treatment). These scenarios also included runoff and loading increases projected to result from

new development within the Permittee MS4 Area. Overall estimated relative (%) PCB reductions from baseline are greater than those for mercury, which primarily reflects the relatively larger PCB reduction opportunities in Old Industrial and Source Areas that are planned for redevelopment.

Spatial loading outputs for all Solano Permittees are summarized at the urban-catchment level in Figures 4.5 and 4.6, with reductions expressed as grams per acre. The maps illustrate that PCB reductions are focused on Mare Island and within the urban centers of Vallejo and Fairfield for 2020, 2030, and 2040, with less intense clustering of reductions in 2030 and 2040 compared to 2020. Over the course of implementation from the baseline scenarios to 2040, catchments shift from higher to lower loading categories. Outputs from the 2040 scenario show that all catchments that were classified in the highest percentile category in the Baseline Scenario have been eliminated on Mare Island. There are substantially fewer of these relatively high loading catchments on the Vallejo Waterfront, Vallejo and Fairfield downtown areas. Catchments that show the largest relative reductions in the scenarios were usually those which started in the baseline scenario with substantial Source Area or Old Industrial land use. Outlying areas remained virtually unchanged from the baseline scenario due to low redevelopment rates in these catchments, low proportion of high pollutant producing land uses, and new development that generates additional runoff which can create small local pollutant loading increases over time compared to the undeveloped conditions.

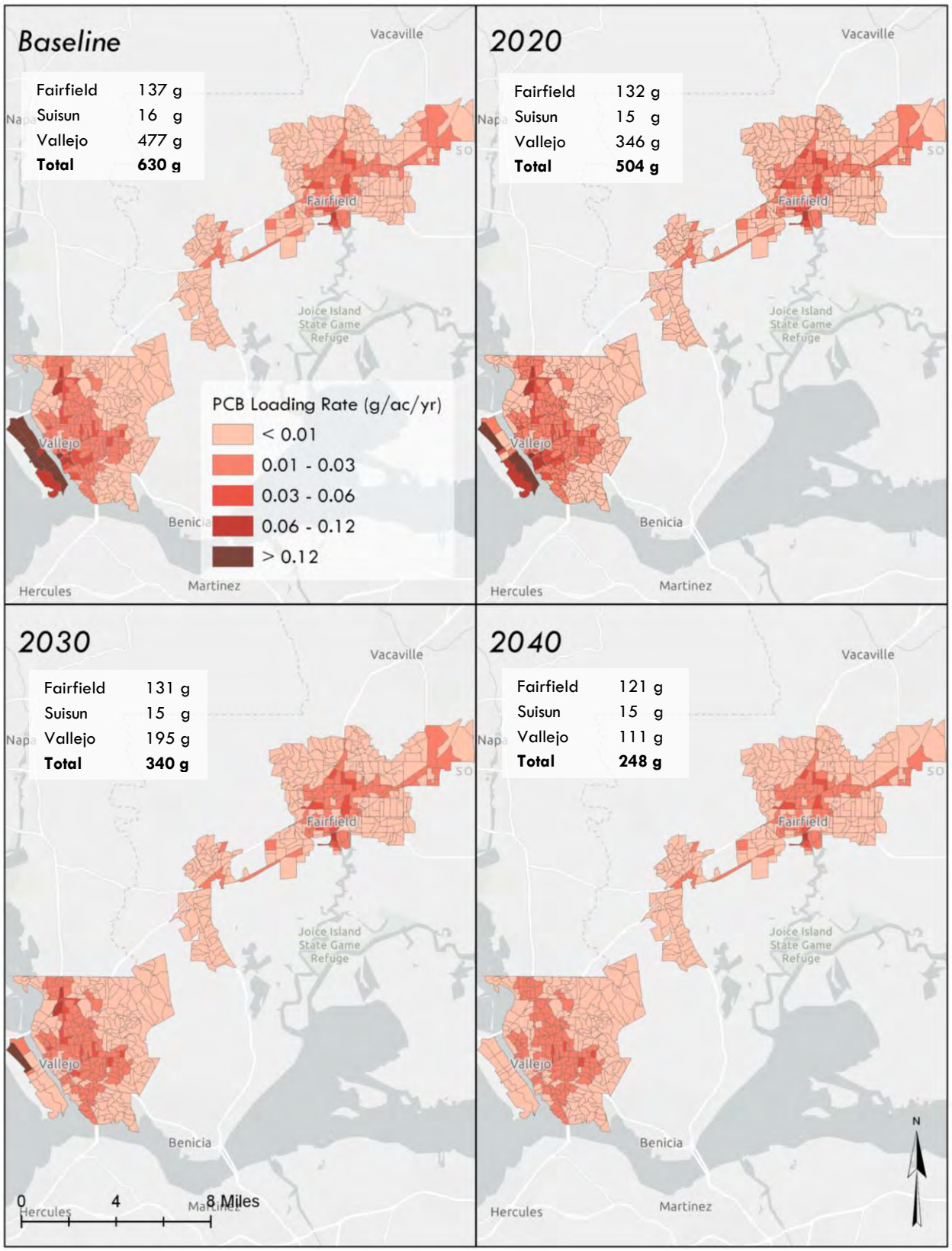

Figure 4.5. Spatial distribution of annual PCB load estimates for baseline and future scenarios

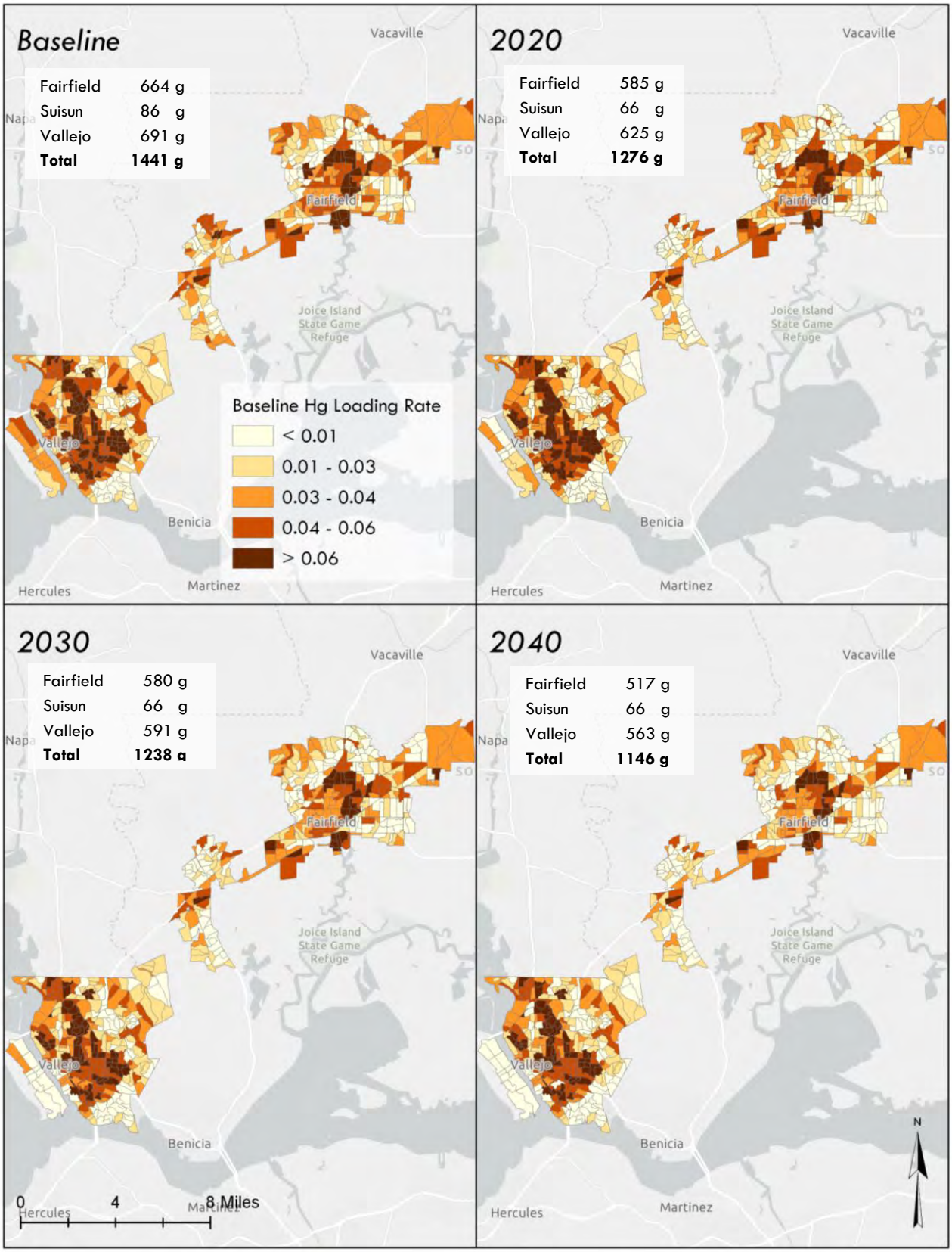

Figure 4.6 Spatial distribution of annual mercury load estimates for baseline and future scenarios

GSI load reductions summary

Total estimated GSI reductions by the year 2040 are 382 grams of PCBs, and 295 grams of Mercury Table 4.2. These reductions constitute a reduction of 61% reduction from baseline for PCBs and a 20% reduction from baseline for mercury. GSI implementation and land use changes can be lumped together compliance demonstration, since they often occur at the same time during redevelopment and both contribute to the GSI reductions targets. However, it is instructive to examine the relative contributions from each component to form a clear picture of expected reductions. For both PCBs and mercury, the primary source of reductions is land use changes that result from redevelopment, making up 98.5% of total PCB reductions and 87% of mercury reductions by 2040 (Figure 4.7). In contrast, reductions from decentralized BMPs and parcel LID make up just 0.5% of PCB load reductions and 9% of mercury load reductions. Routing to centralized BMPs for runoff infiltration and treatment accounts for 1% of PCB load reductions and 9% of mercury load reductions (Figure 4.7). The projected rate of reductions over time for both PCBs and mercury are fairly steady throughout the simulation period (see graphs in Figure 4.7).

Table 4.2. Summary of future scenario loading estimates for PCBs and mercury for the Solano Permittee MS4 Area.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCB (g)	Hg (g)	PCB (g)	Hg (g)	PCB (g)	Hg (g)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

Most planned GSI implementation is associated with redevelopment, resulting in land use conversion to New Urban, which has the lowest associated pollutant concentration values. Per Table 3.1, PCB concentrations span 3 orders of magnitude from Old Industrial/Source Areas (up to 204 ng/L) to New Urban land uses (3 ng/L); mercury concentrations span one order of magnitude (from 3 to 40 ng/L). Since GSI BMPs can only reduce pollutants that are generated by the associated land use, and since the PCB and mercury loads generated are much smaller after parcels are converted to the New Urban land use, there are simply less pollutants to reduce on redeveloped parcels. Therefore, while GSI implementation will accompany redevelopment land use conversions, the amount of pollutant load reduction that can be attributed directly to BMP capture and treatment of runoff is relatively small. This result corresponds to previous research, which showed that relatively small areas of Old Industrial and Source Area sites have a disproportionate contribution to PCBs loading (McKee et al., 2015).

The disproportionate allocation of reductions to land use conversion is strongly dependent on land use changes actually resulting in dramatic reductions of pollutants in the sediments that they generate, which may not be realistic. Legacy sediments that contain higher levels of pollutants are likely to persist after land-use conversion and GSI installation provides a viable way to mitigate those impacts. While the current inventory of GSI BMPs for Solano Permittees number 185, and their aggregate drainage area is more than 1700 acres, overall this represents only 3% of the Solano Permittee MS4 Area drainage. Specific, planned BMPs will increase total drainage coverage to 4% (2,773 acres) by 2020. With inclusion of redevelopment and new development areas that will be covered under C3 requirements, GSI coverage is projected to increase to 6% (4,414 acres) by 2020 and to 14% (6,503 acres) by 2040.

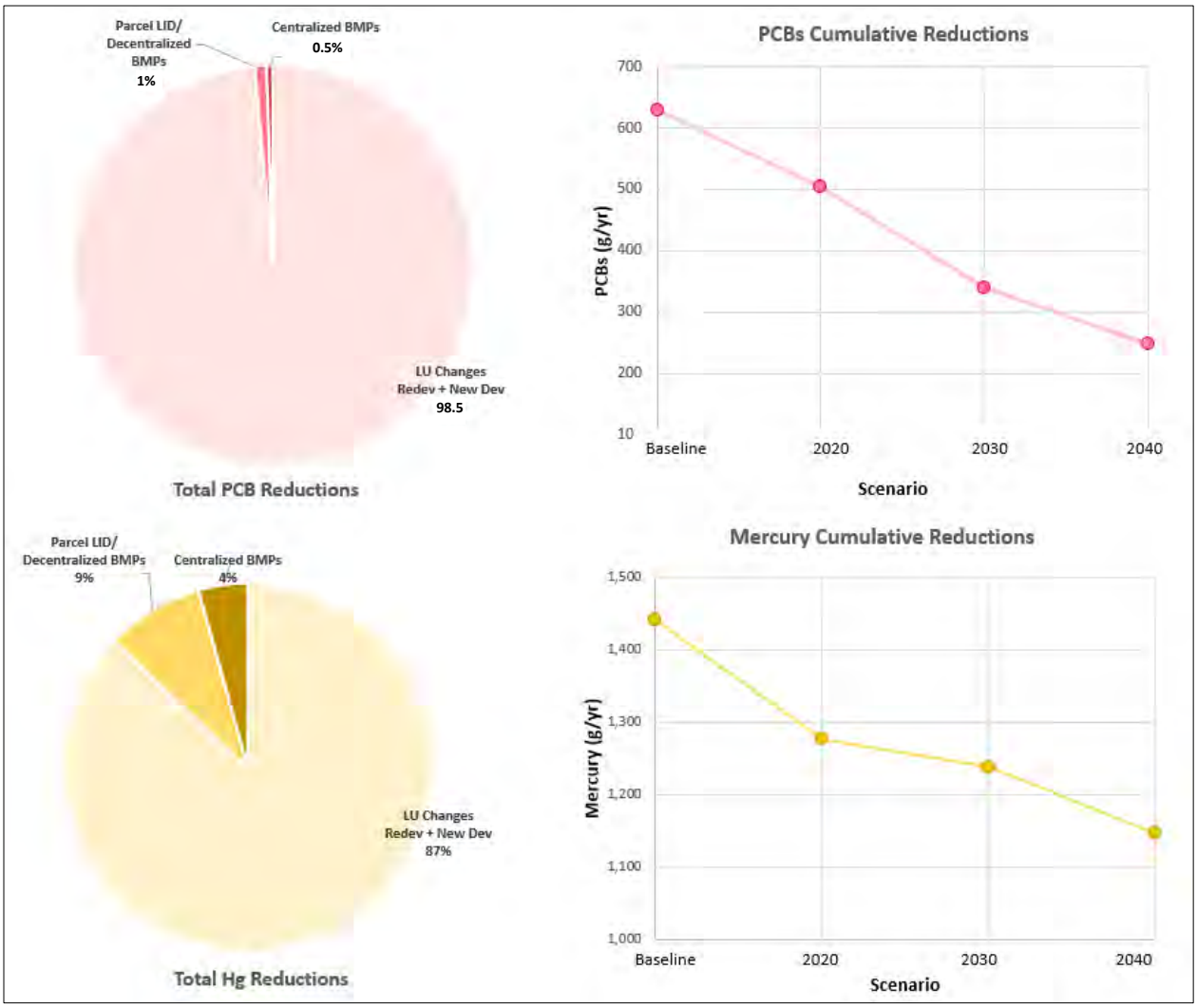

Figure 4.7. Reduction types and trajectory summary for Solano Permittees.

4.2.2 GSI load reductions detail

Examining the modeled reductions by type for each city illustrates pollutant reduction sources in greater detail. Table 4.3 lists the cumulative reductions for each scenario year for each of the Solano Permittee Cities, so that each scenario also includes the reductions from the previous decade scenario. By far, the largest PCB reductions associated with land use changes occurred in Vallejo (377 grams by 2040), compared to the other cities, since Vallejo had the greatest amount of high PCB producing land uses planned for redevelopment. Vallejo and Fairfield had comparable land use change reductions for mercury, at 112 grams and 127 grams respectively by 2040 (Table 4.4). Suisun had the smallest reductions, mostly because the drainage area is very small relative to Vallejo and Fairfield. All cities show comparatively small reductions for GSI relative to the land use changes.

Load reductions resulting from land use changes listed in tables Table 4.3 and 4.4 are the net reductions that include both redevelopment as well as new development. New development results in more pollutant loading due to additional stormwater runoff generation, but in each scenario and for each city, there a there are still net loading reductions. The runoff increases that resulted from the additional impervious coverage are shown as negative values in the reductions column for runoff. These increases are pronounced for Fairfield, where substantial areas of open space have recently been developed as new residential subdivisions. These recent changes were included in the 2020 scenario, and additional new development included in planning documents was allocated to the 2040 scenario. A smaller amount of new development was indicated in the Vallejo 2040 general plan that was allocated to the 2040 scenario and resulted in additional runoff increases. Overall, each city showed net runoff reductions due to implementation of GSU for each scenario year after accounting for new development runoff increases.

Regional treatment via routing of stormwater runoff to centralized BMPs produced similar reductions in Fairfield and Vallejo (Table 4.3). These reductions are due to centralized BMPs that have already been implemented or had detailed specifications available (2020 scenario) or were planned further out into the future (2030 scenario). No additional load reductions were calculated for centralized BMPs for the 2040 scenario, since there is no documentation of planned structures available, although new development areas will likely have adequate space for centralized treatment.

Table 4.3. Future scenarios estimated PCB reductions detail

PCBs		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Total Cumulative Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	137	-178	1.4	831.8	1.3	212.7	1.8	866	5	12,402	132
	2030			-178	1.9	864.1	1.5	419.2	2.9	1,105	6	12,163	131
	2040			-354	13.1	1,522.6	1.7	419.2	1.1	1,588	16	11,681	121
Suisun	**2020**	2,090	16	0	0.0	168.7	0.7	36.4	0.0	205	1	1,885	15
	2030			0	0.0	170.0	0.7	36.4	0.0	206	1	1,884	15
	2040			0	0.1	174.5	0.7	36.4	0.0	211	1	1,879	15
Vallejo	**2020**	13,391	477	0	128.9	642.7	0.6	83.1	2.0	726	131	12,665	346
	2030			0	278.7	1,176.4	1.0	132.8	2.0	1,309	282	12,081	195
	2040			-81	363.5	1,638.8	1.3	132.8	0.8	1,691	366	11,700	111
Solano Permittee Totals			**630**		**377**		**4**		**2**		**382**		**248**

Table 4.4. Future scenarios estimated mercury reductions detail

Mercury		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	664	-178	63.7	831.8	9.8	212.7	6.0	866	79	12,402	585
	2030			-178	65.7	864.1	10.6	419.2	7.6	1,105	84	12,163	580
	2040			-354	127.4	1,522.6	13.1	419.2	6.7	1,588	147	11,681	517
Suisun	**2020**	2,090	86	0	16.5	168.7	2.6	36.4	1.1	205	20	1,885	66
	2030			0	16.6	170.0	2.7	36.4	0.0	206	19	1,884	67
	2040			0	17.1	170.0	2.7	36.4	0.0	206	20	1,884	66
Vallejo	**2020**	13,391	691	0	54.8	642.7	4.1	83.1	7.3	726	66	12,665	625
	2030			0	85.8	1,176.4	7.4	132.8	7.4	1,309	101	12,081	591
	2040			-81	112.4	1,638.8	9.9	132.8	6.1	1,691	128	11,700	563
Solano Permittee Totals			**1,441**		**257**		**26**		**13**		**295**		**1,146**

4.2.3 Compliance demonstration

4.2.3.1 *MRP GSI reductions compliance*

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, Permittees must also project the load reductions achieved via green stormwater infrastructure by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040.

Estimated pollutant load reductions for the Solano Permittees are listed in Table 4.5 illustrate that reductions far exceed the 2020 and 2040 reduction targets. The estimated GSI reductions for each scenario correspond to totals for all cities listed in Tables 4.3 and 4.4. While the 2020 reduction targets listed in Table 4.5 for the Solano Permittees are absolute values listed in the MRP, the 2040 GSI targets have been rescaled based on new calculated baseline values per recommendations in the RAA Guidance (BASMAA, 2017, section 3.5). This calculation uses the proportions of the total estimated reductions for each pollutant to determine GSI targets: 20.8% of the total reductions for PCBs, and 16.1% for mercury. In both cases, GSI reductions are the vast majority of the total reductions. As already discussed, this is because the GSI RAA reductions include those result from redevelopment land-use conversion (BASMAA, 2017).

Table 4.5. Green stormwater infrastructure load reduction estimates and target reductions

	Scenario	Estimated Loading (g)	Estimated GSI Reduction (g)	WLA Reduction Target (g)**	GSI Reduction Target (g)*	Projected GSI % Attainment	% Reduction from Baseline	% Progress to WLA
PCBs	Baseline	630						
	2020	504	126	-	8	100%	20%	-
	2030	340	290	-	58	100%	46%	-
	2040	248	382	530	110	100%	61%	72%
Mercury	Baseline	1441						
	2020	1276	166	-	2	100%	12%	-
	2028	1238	204	0	33	100%	14%	-
	2040	1146	295	-	48	100%	21%	100%

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury). Since mercury estimates are already below WLA, they are calculated as a proportion of estimated reductions.

**Based on WLA target of 100g for PCBs, baseline estimate for mercury is below 2028 WLA target for mercury of 1600 g.

4.2.3.2 *Progress towards WLA targets*

The 2040 estimated PCB reductions (382 g) provide Solano Permittees with a 61% reduction below baseline loading estimates, which provides 72% of the reductions that will be required to reach the Solano Permittee's WLA of 100g. It is anticipated that the remainder of the required reductions will

be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment. A separate WLA RAA will be performed that includes reductions from source control measures, along with any additional GSI projects that are identified as part of the GSI Workplan that have not already been included in this the current analysis.

Estimated baseline loads for mercury (1441 g) were below the 2028 WLA (1600 g), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. If instead we appeal to a relative reduction metric, GSI reductions of 295 g are 14% below the baseline estimates, which may be compared with the regional relative mercury reduction target of 50% by 2028. Regardless of the target metric applied, additional GSI projects identified in the GSI Workplan along with source control measures will provide additional mercury reductions.

Modeled baseline estimates from swTELR may present a better alternative for tracking future progress towards mercury reductions compared to those from the TMDL. While the SF Bay regional mercury loading estimates employed extensive data analysis and modeling, allocations to individual communities relied only on population sizes. The close correspondence between swTELR and RWSM mercury load estimates provides a degree of confidence in the swTELR results.

One source of the discrepancy between the two models may be the incongruity between using population as a metric for distributing mercury loads, as in the TMDL, compared to land use, as in the SFEI mercury concentration layer used in this study. Higher populations generally correspond with a greater proportion of urbanized area. The land use layer employed in this study uses a mercury concentration of 80 ng/L for Ag/Open land use, and 3 ng for New Urban land use. So, more populated areas with greater urbanized area can actually result in relatively lower estimated mercury loading in any model using the RWSM land use layer compared to more populous areas. This is the inverse of the logic applied in the TMDL population-based model for estimating load allocations to individual communities.

4.2.4 Spatial prioritization analysis for additional GSI implementation

We explored the potential for additional reductions via GSI throughout the Solano Permittee MS4 Area. A metrics-based spatial prioritization analysis was performed to identify additional parcels and road segments that will be most suitable for GSI implementation, given logistical constraints and additional pollutant load reductions needed to meet future permit requirements. Both parcels and road segments were considered with the spatial metrics adjusted accordingly. The final scoring rubric and metrics were developed collaboratively with Solano Permittees and included and equal weighting of the following factors:

- Soil type

- Slope
- Land ownership
- Land use
- Source parcel status
- Parcel size
- Estimated catchment pollutant loading
- Redevelopment schedule
- Proximity to stormwater structures
- Proximity to Caltrans right of way

The spatial prioritization analysis provides a way to combine implementation feasibility, benefit magnitude, and other logistical factors. A geodatabase was constructed to house all of the GIS data and an automated spreadsheet was created for easy adjustments of metrics and weightings. Outputs from the spatial prioritization analysis serves two purposes: 1) provide some real practical and immediately actionable alternatives for GI implementation and 2) identification of additional means to meet GSI and WLA reduction target requirements. The full process for developing the spatial prioritization analysis is documented in the Green Infrastructure Workplan and here we focus on the outputs and how the outputs can be used to supplement the modeling results already presented to achieve additional future pollutant reductions.

Outputs from the spatial prioritization analysis are presented as maps in Figure 4.8 which shows the scores for each parcel and road segment (approximately 89,000 features total) throughout the Solano County MS4 Permittee Area. Green parcels and road segments indicate that they were in the top 20% of the priority scores and that they were not already treated in one of the modeling scenarios. Most of the parcels or road segments identified in Figure 4.8 are either Old Industrial, Old Transportation or Old Commercial land uses, which corresponds with the highest PCB concentration land uses (see Table 3.1). These parcels indicate the greatest potential for additional GSI implementation to achieve additional pollutant load reductions. GSI Projects identified using this spatial prioritization process can be incorporated for to subsequent modeling efforts to provide updated load reductions. Given that current GSI reductions exceed the GSI reduction requirements, Solano Permittees may also consider identifying synergistic opportunities within areas that have already been slated for redevelopment in the near future.

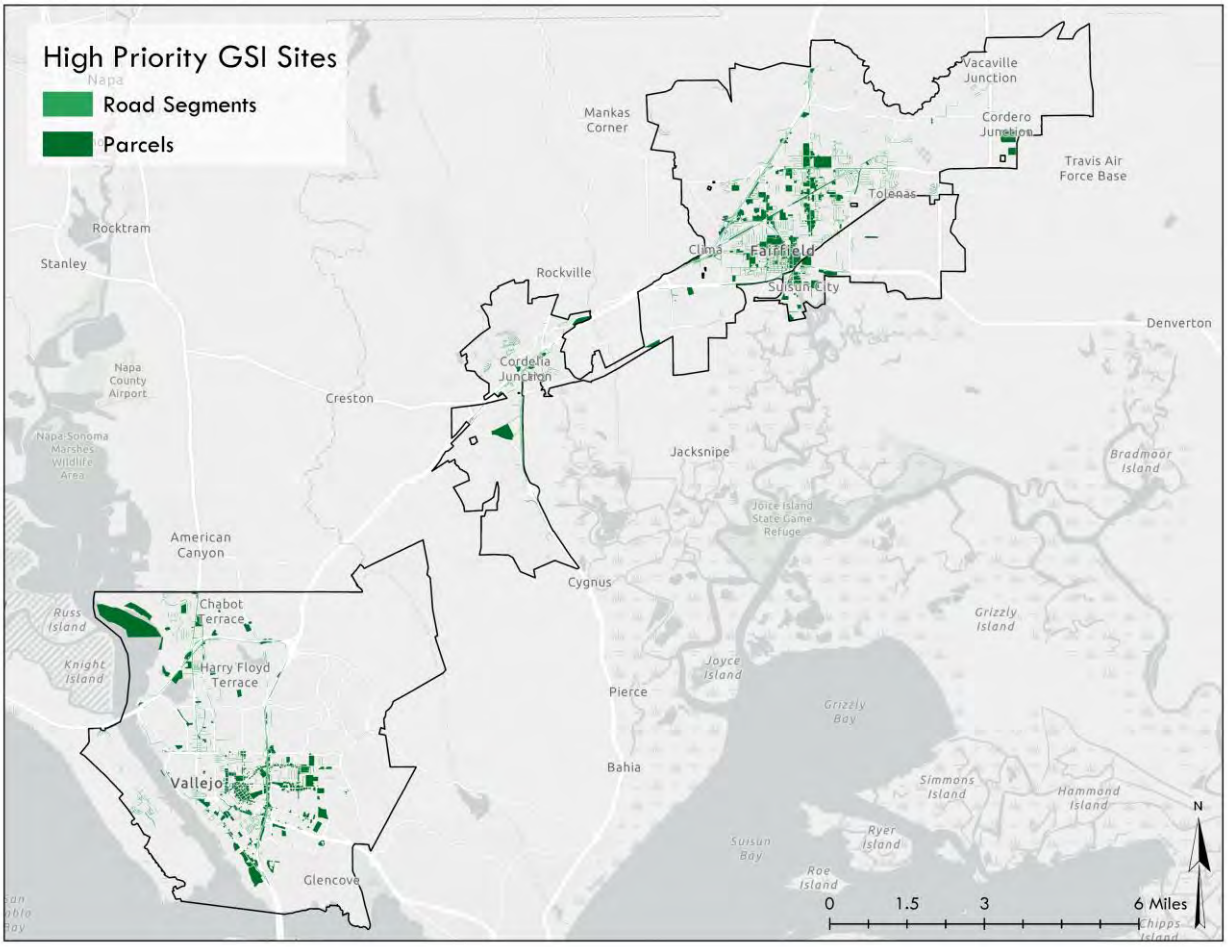

Figure 4.8. High priority parcels and road segments for GSI redevelopment

5 Conclusions

5.1 Results Summary

This data compilation and modeling effort quantifies the water quality benefits of current and planned GSI implementation for Solano County MS4 Permittees. This report satisfies MRP Provisions C.3.j and C.11/C.12.c to demonstrate that GSI implementation will meet specified targets. It also provides information to guide future implementation and development of the GSI Workplan. The modeling results clearly indicate that that if the Solano Permittee redevelopment land use changes proceed along their currently projected trajectory and continue to conform to MRP C3 GSI implementation requirements, they will exceed their GSI reductions targets for PCBs and mercury and make substantial progress towards wasteload allocation targets. Of course, there are limitations to the interpretation the model outputs imposed by various source of uncertainty (discussed in detail below), but the magnitude of exceedance of the GSI reduction targets is strong evidence that the signal of expected changes is probably beyond the boundaries of such uncertainty. Thus, the report provides reasonable assurance that PCB and mercury reduction performance standards established for GSI in MRP 2.0 will be met.

Key findings include:

- Baseline modeling showed that PCB contributions from the City of Vallejo were disproportionately large, primarily due to substantial coverage of Old Industrial land use areas on Mare Island.
- Baseline runoff, PCBs, and mercury estimates corresponded closely with outputs from RWSM at the regional scale.
- Baseline modeling results showed substantial deviations from those estimated for the Solano Permittees in the TMDL wasteload allocations, particularly for mercury. The discrepancy with the TMDL estimates may due to the TMDLs reliance on population to specify load allocations.
- Estimated PCB and mercury reductions meet the GSI reduction targets specified in the MRP for 2020, 2030, and 2040.
- Estimated reductions represent substantial progress towards WLA targets, with the PCB GSI reductions accounting for 72% of reductions required to achieve the 2040 WLA target.
- Reductions are primarily driven by land use conversion, particularly in the case of PCBs, and land use conversions on Mare Island and the Vallejo Waterfront account for most of the PCB reductions.
- A spatial prioritization analysis indicates additional opportunities throughout the Solano Permittees MS4 area for additional GSI implementation that will be further considered in the GSI Workplan.

5.2 RAA Limitations

RAA is a modeling exercise, so it is subject to all of the usual limitations associated with using model outputs to make decisions. Chief among these is the uncertainty associated with the model inputs and the model structure that includes several simplifying assumptions employed for the sake of practicality (see Wijesiri and Liu, 2018, for a recent discussion). We have taken care to communicate those assumptions and identify uncertainties associated with the modeling process throughout this report to support a transparent RAA process. Regardless of the level of rigor employed, the limitations of RAA modeling should be taken into consideration when the outputs are used as the basis for prioritizing action.

Any model is a trade-off for characterizing a system that requires decisions about which elements to simplify and which elements to represent in greater detail. In this RAA we chose to favor spatial granularity above fine scale time resolution. In other words, BMP locations were represented spatially explicitly, but rainfall inputs were represented probabilistically rather than via sequential simulation. As has already been discussed, this choice is based on alignment of the model with the purpose of RAA and the ongoing need to track BMP performance. An important limitation of this approach is that the time-sequencing of events is not preserved, which can produce unique runoff responses. But since continuous simulation model outputs are aggregated to average annual values for RAA, the fine temporal resolution of continuous model outputs are not used any differently than those driven with probabilistic inputs. Moreover, average outputs have previously been judged generally acceptable for stormwater management planning (Lent et al., 2011).

This RAA employed an uncalibrated approach that relied strongly on the input data. Fitting model parameters to observed hydrologic data can improve model performance substantially and most continuous simulation models rely heavily on a calibration of some sort. No relevant long-term hydrologic calibration data were available for the Solano County Permittee MS4 Area. Even if these data were available, the calibration process comes with several limitations related to the ambiguity of identifying optimal parameter sets (see Beven, 2001). Additionally, for several Bay Area communities, the MS4 area may be small relative to the contributing watershed that flows to a gauge. When the MS4 occupies only a small amount of the watershed, fitting a model to the flow response at the bottom of that watershed results in a parameterization that primarily reflects the non-MS4 area. Alternatively, translation of parameterizations from gauged to ungauged basins is a non-trivial task, that has prompted a decade of academic level study via the International Association of Hydrologic Sciences[21].

A key source of modeling uncertainty in this RAA is the characterization of pollutant concentrations on the basis of land-use. Since there is wide variation of PCB and mercury concentrations within

[21] https://iahs.info/pub/index.php

individual land uses it provides an imprecise way to estimate pollutant land surface concentrations. High model sensitivity to pollutant concentration parameters means that model predictions can diverge substantially if these parameters are specified differently (e.g. Park, et al, 2009). Land-use based pollutant concentrations used in this study were based on sampling work conducted by SFEI throughout the SF Bay Area (Wu et al, 2003, McKee et al 2003, McKee, et al, 2015), but this regional dataset may not be representative of the land use pollutant relationships in Solano County, particularly since recent sampling efforts do not include sites in the north side of Suisun Bay (McKee et al. 2015). Representativeness of these data have been acknowledged as a potential source of uncertainty by McKee et al., 2015.

Finally, the structure of the RAA reporting provides some limitations to the interpretation of GSI benefits. Land use changes associated with redevelopment and GSI implementation often happen at the same time. Since land use changes have such a dramatic effect on modeled outputs, and land use changes are lumped in with the GSI reduction estimates, land use changes dominate the calculated GSI reductions. Actual GSI implementation provides a much smaller role in estimated pollutant load reductions once the land use has been changed to one that has characteristically low associated pollutant concentrations. The reality is probably a much less dramatic split between land use change and GSI implementation. An unintended consequence may be that parcels classified as high pollutant concentration land uses may be disproportionately selected for redevelopment even when other factors may weigh in favor of other parcels.

5.3 Recommendations for Ongoing Compliance

Meeting MRP pollutant load reduction targets will require ongoing tracking of BMP implementation and quantification of pollutant load reductions. RAA is a valuable initial step, but it will soon be just another report sitting on a shelf, rather than a tool to direct actions. Implementation will occur over a period of decades and in that time we will learn more than we know now. New BMPs will be created, knowledge of pollutant removal efficiency will grow, and the resources of cities and their priorities will shift. A more dynamic approach to quantifying benefits that can incorporate new information as it becomes available and provide outputs at scales and in formats that are relevant to stormwater managers will be needed. As an alternative to one-off modeling studies, such an approach can provide an iterative verification of progress, reducing risk of failure and tempering expectations of success.

As the capacity of cities grows to provide quantitative estimates of reductions, regulators should consider the value of becoming more flexible on prescriptive requirements to deliver other information that is comparatively less essential. Updatable modeling approaches that focus on the most critical information needs of both stormwater managers and regulators can probably provide more useful information than excessive prescriptive reporting requirements. Such focus will become more important as cities begin to require tracking not hundreds, but thousands of BMPs and GSI projects as implementation proceeds over the coming decades. At the same time, cities will need to

move towards a more efficient programs with the capacity to demonstrate compelling evidence of success. To do that, they will need access to the right tools and a strong vision from regulators that helps permittees focus their efforts on the greatest pollutant load reduction opportunities.

The RAA modeling study has clarified a number of recommendations to improve ongoing tracking and verification of pollutant reductions:

1. **Solano permittees should adopt a comprehensive data management approach to track implementation of GSI, such as outlined in the GSI Workplan.** This will help them provide ongoing verification to regulators that the estimates contained in this modeling report are proceeding as planned and avoid accounting errors.

2. **Integrate implementation tracking with a stormwater modeling tool.** This will create efficiencies for ongoing PCB and mercury load reduction quantification as implementation proceeds and also provide ongoing support for heuristic management scenarios to optimize implementation locations and BMP types. It will also serve as a key technical node for integration of GIS datasets relevant to stormwater reporting that are currently stored in disparate manner that makes reporting inefficient.

3. **Use the spatial prioritization approach to identify additional GSI implementation opportunities.** The GIS-based approach developed as part of this study and the GSI Workplan can be used to evaluate high priority areas within privately owned areas already planned for redevelopment or within the public right of way via synergistic implementation opportunities with Caltrans.

4. **Continue to coordinate with BASMAA for quantifying source reduction control measure quantification.** The methods employed should be closely integrated with GSI reduction quantification to ensure that overall WLA accounting is coherent.

5. **Work with regulators to craft requirements for MRP3 that are focused on outcomes and reporting efficiencies.** Negotiations with regional board staff via the BASMAA MRP3 Workgroup should endeavor to reduce reporting requirements for non-essential information that overlaps with performance-based requirements whenever appropriate.

These recommendations are intended to help the Solano Permittees be efficient in demonstrating MRP compliance progress and to help them craft permit requirements and implementation strategies that are conducive to their own community development goals

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Appendix A

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Appendix B

BMP type definitions used in swTELR

CENTRALIZED BMPS – TYPICALLY PUBLICLY OWNED & MAINTAINED BMPS, TREATING A LARGE (>20 ACRES) URBAN DRAINAGE WITH MULTIPLE LAND USES AND OWNERSHIP			
STRUCTURAL BMP TYPE	**OTHER NAMES**	**DESCRIPTION**	**TREATMENT PROCESSES**
Bed Filter	*Underground Sand Filter* *Surface Sand Filter* *Perimeter Sand Filter* *Organic Media Filter*	A flow-through structure that uses granular media (e.g. sand or activated alumina) to actively filter stormwater to remove stormwater pollutants. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	MEDIA FILTRATION
Detention Basin	*Detention Pond (impervious)* *Dry Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin, though generally these BMPs do not allow for adequate settling. Little to no volume loss via infiltration due to impervious or highly impermeable base. Vegetation may or may not be present. If treating a smaller area (<20 impervious acres), it is likely a **settling basin**.	PARTICLE CAPTURE

Structural BMP Type	Other Names	Description	Treatment Processes
Dry Basin	*Extended Detention Basin* *Dry Pond* *Pervious Detention Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin. Footprint is pervious and infiltration capacity of base maintained to consistently infiltrate some fraction of volumes detained to unsaturated zone. Wetland and riparian vegetation species distribution is minimal to absent. Moderate distribution of grass and/or tree species likely and acceptable. If treating a smaller area (<20 impervious acres), it is likely a **bioretention**.	INFILTRATION PARTICLE CAPTURE
Infiltration Basin	*Large-Scale Infiltration Feature*	A flow-through BMP with highly permeable substrate (aggregate or rock) designed to store and infiltrate significant volumes of stormwater into unsaturated zone. Little to no surface detainment storage. Vegetation distribution should be minimal and preferably absent. May be confined space but not usually. If treating a smaller area (<20 impervious acres), it is likely an **infiltration feature**.	INFILTRATION
Media Filter	*Proprietary Subsurface Filtration Systems:* *Stormfilter®* *Perk Filter™* *Jellyfish®*	A proprietary subsurface flow-through structure that uses a membrane or other media to actively filter stormwater to remove stormwater pollutants. Proprietary models include media or membranes that may be selected to target the specific removal of the pollutants of concern, resulting in downgradient stormwater concentration reductions. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs.	MEDIA FILTRATION

		May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	
Treatment Vault	*Hydrodynamic Separator (e.g. Vortechs, CDS®, DVS)* *Wet Vault* *Detention Vault* *Flow Separation Vault* *Gross Solids Retention Devices* *Large Scale Settling Basins*	A subsurface flow-through structure that physically separates sediment, trash, leaf litter, debris and other particulate pollutants from stormwater via various separation or settling techniques. No volume reduction occurs due to impervious base. May be confined space but not always. Accumulation of material at base of BMP can be observed and measured via manhole access. If no access points exist, the BMP can be inventoried as Confined Space and assessed based on a set maintenance interval. If treating a smaller area (<20 impervious acres), it is likely a **sediment trap**.	PARTICLE CAPTURE

Wet Basin	*Wet Pond* *Retention Pond* *Wetland Swale* *Wet Extended Retention Pond* *Stormwater Wetlands* *Constructed Wetlands*	A flow-through basin with discrete inlets and outlets designed to retain some volume stormwater runoff in a persistent pool of surface water. Designs may include additional detainment storage of stormwater for some minimum time to reduce peak flows. Wet pool capacity, treatment capacity and draw down time of treated volumes will vary across specific BMPs. One or more outflow offices may exist at different elevations. Lowest outlet elevation sets wet pool capacity. Dense vegetation is common. Dominant vegetation is wetland species and can be supplemented with riparian species with very high densities. Substrate is typically fine organic matter and silt, making volume reductions via infiltration negligible. Volume reductions, if any, occur primarily by evapotranspiration. If treating a smaller area (<20 impervious acres), it is likely a **biofiltration**.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

DECENTRALIZED BMPS – TYPICALLY TREATING < 1 ACRE OF IMPERVIOUS AREA BUT UP TO 20 ACRES, TYPICALLY ACCEPTS RUNOFF FROM A SINGLE LAND USE DRAINAGE AREA, ASSOCIATED WITH NEW / RE-DEVELOPMENT AND ROADSIDE PROJECTS,

STRUCTURAL BMP TYPE	OTHER NAMES	DESCRIPTION	TREATMENT PROCESSES
Bio-filtration	*Lined rain garden with no infiltration* *Urban Biofilter* *Tree Box Biofilter (TreePod, Filterra)*	A vegetated BMP where stormwater is filtered through a specialized soil media and discharged via an underdrain. BMP may be lined with membrane or concrete. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Site designed biofiltration systems use specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Proprietary designs vary and may or may be confined space and difficult to access for inspection.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

		If treating a larger area (>20 impervious acres), it is likely a **wet basin**.	
Bio-retention	*Biofilter* *Rain garden with infiltration* *Self-Retaining Areas*	A vegetated retention structure where the base of the BMP is not lined and must infiltrate volumes and allow infiltration to unsaturated zone. Designs may or may not include an underdrain. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Outlet design either passive surface outlet (e.g., curb cut) or piped overflow (e.g., overflow inlet and underdrain) used to allow retention and ponding. Constructed with specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Typically includes rock or aggregate subsurface reservoir under the soil media to enhance storage/infiltration. Designs may include settling forebay at inlet(s) to remove sediment. Vegetation types include species that can tolerate stormwater ponding and drought conditions. If treating a larger area (>20 impervious acres), it is likely a **dry basin**.	INFILTRATION BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

Structural BMP Type	Other Names	Description	Treatment Processes
Bioswale	*Grass Swale* *Grass Filter Strips* *Vegetated Buffer Strips* *Bioslopes*	A flow-through area with dense vegetation coverage (>80%). Flow surface topography allows inundation of adjacent vegetated areas during storm runoff. Design includes gentle sloped flow paths and dense vegetation to promote primary stormwater surface filtration, adsorption to vegetation and settling. Biological processes include geochemical transformation and plant uptake. Infiltration performance and volume reductions may vary. These are not highly engineered systems. Size and application of bioswales can vary.	BIO-GEOCHEMICAL CYCLING INFILTRATION
Filtration Device	*Filtration Device* *Proprietary Inserts* *Catch Basin Inserts* *Drain inserts* *Inlet filters* *Decentralized Media Filter*	A proprietary flow-through structure that uses a membrane or other media to actively filter stormwater to target the specific removal of stormwater pollutants of concern, resulting in downgradient stormwater concentration reductions. Design may include the installation of an insert within the sediment trap or drop inlet structure to treat various pollutants. Examples include REM Triton Filter, CULTEC StormFilter, FlexStorm Inlet Filters, Kristar FloGard, etc. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a larger area (>20 impervious acres), it is likely a **media filter**.	MEDIA FILTRATION
Infiltration Feature	*Infiltration Trench* *Dry Well* *Exfiltration Trench* *Percolation Trench* *French Drain* *Roof Drip-Line*	A small-scale structure designed to retain stormwater from small impervious drainage area and infiltrate into unsaturated zone. Land surface modified to sustain maximum infiltration rates, typically consisting of vertical excavation of native soils and filling with coarse drain rock or other highly permeable material. Vegetation is absent. May be confined space but not usually. If treating a larger area (>20 impervious acres), it is likely an **infiltration basin**.	INFILTRATION

Structural BMP Type	Other Names	Description	Treatment Processes
Pervious Pavement	*Permeable Pavement* *Porous Asphalt* *Pervious Concrete* *Porous Aggregate* *Pervious Pavers* *Permeable Pavers*	Use of sustainable materials to create a durable, pervious surface overlaying a crushed stone base that allow stormwater to percolate and infiltrate into the underlying soil. Porous pavement can include an underlying reservoir to increase infiltration rates. Footprint of structural BMP type can vary greatly, typically used for parking lots, sidewalks, driveways or other hardscaped surfaces. When stormwater is routed to pervious pavement for treatment through infiltration, the pervious pavement is considered a structural BMP and should be inventoried in BMP RAM. When pervious pavement is solely treating the precipitation falling on the pavement, it is considered part of LID design and should be included in Parcel RAM condition observations.	INFILTRATION
Sediment Trap	*Catch Basin with sump,* *Sediment Chamber,* *Vertical CMP,* *Small Hydrodynamic Separators,* *Bubble Up*	A small decentralized BMP designed to capture and retain sediment, leaf litter, trash, coarse particles and/or other stormwater pollutants. Capture of material may occur through variable flow modifications or passive settling, but result is vertical accumulation of material at base of BMP reservoir with regular material cleanout required. Minimal to no stormwater volume reduction occurs. Water quality improvement downgradient expected as result of concentration reduction due to material capture within BMP. May be confined space but not always. Typically accepts runoff from road or a parking lot. If treating a larger area (>20 impervious acres), it is likely a **treatment vault**.	PARTICLE CAPTURE
Settling Basin	*Settling Pond,* *Sediment Basin* *Decant Pond* *Concrete Forebay* *Forebay*	Open flow-through structures used to detain stormwater volumes and settle particulate pollutants prior to outflow. Pollutant load reductions are realized by concentration reductions with no volume reduction via infiltration due to impervious or highly impermeable base. May be confined space but not usually. Size and application of settling basins can vary: • Large scale settling basin draining a mixed land use area can be classified and assessed as a **treatment vault.** • Smaller sized settling basins draining a single land use area can be classified and assessed as a **sediment trap**. • If treating a larger area (>20 impervious acres), it is likely a **detention basin**.	PARTICLE CAPTURE

Appendix C

Catchment attributes and routing.

Catchment ID	Area (acres)	Discharge Point Type	Receiving Water	Terminal Catchment	Connectivity (%)	Impervious (%)	Primary Soil Group	Average Slope
Vallejo								
DT5	62.6	Discrete	Mare Island Strait	DT6	100	76.9	D	5.2
LC13	70.7	Distributed	Blue Rock Springs Creek		100	42.1	D	4.4
GC8	104.4	Distributed	Carquinez Strait		100	28.1	C	19.7
LC43	59.6	Discrete	Napa River	LC44	100	47.2	D	6.3
SA41	35.8	Distributed	Mare Island Strait	SA55	100	66.8	C	1
SP9	30.6	Distributed	White Slough		100	57.5	D	0.9
WC4	31	Discrete	American Canyon Creek	WC7	100	13.4	D	22.1
LC15B	34.7	Distributed	Rindler Creek		100	64	C	3.6
MI24	41	Distributed	Mare Island Strait		100	59.8	C	1.5
DT4	39.4	Distributed	Mare Island Strait		100	73.1	D	4.2
LC17	67.7	Discrete	Rindler Creek	LC19B	100	33.6	D	31.5
MI11	22.7	Distributed	Napa River		100	58.9	D	15.5
SA19	50.4	Discrete	Mare Island Strait	SA55	100	60.6	C	6.2
SA51	57.8	Discrete	Mare Island Strait	SA55	100	65.6	C	2.1
LC59	130.9	Distributed	Sulphur Springs Creek		100	0.1	A	24.8
SP14	30.2	Distributed	Napa River		100	54.1	C	1.5
CP13	51.1	Distributed	Southhampton Bay		100	0	D	26.5
MI23	206.3	Distributed	Napa River		100	60.8	D	0.4
LC19B	41.1	Discrete	Rindler Creek	LC19B	100	73.7	D	19.1
AC27B	10.6	Distributed	Napa River	AC5	100	56.9	C	6.1
SP5B	102.1	Distributed	San Pablo Bay		100	48	C	4.2
AC14	55.8	Distributed	Napa River	AC5	100	71.3	C	1.3
AC15	23.1	Discrete	Napa River	AC5	100	72.3	C	0.5
AC16	48	Distributed	Napa River	AC5	100	52.7	D	7.2
AC17	29.5	Discrete	Napa River	AC5	100	52.1	D	9.1
AC18	65.4	Discrete	Napa River	AC5	100	55.3	C	5.4
AC20	54.6	Discrete	Napa River	AC5	100	71	C	1.1
AC31	31.2	Discrete	White Slough	AC31	100	70.7	C	1.7
AC21	51.4	Discrete	White Slough	AC31	100	62.7	D	9.6
DT3	37	Discrete	Mare Island Strait		100	68.9	D	4.9
CP11	97.4	Distributed	Southhampton Bay	CP12	100	3.2	C	17.2
LS18	25.6	Distributed	Lake Dalwigk	LS31	100	71.7	C	4.6
SA3	25.8	Distributed	Mare Island Strait	SA55	100	51.5	C	3.5
SA56	24.1	Discrete	Mare Island Strait	SA55	100	71.2	D	6.1
AC10B	47.6	Discrete	Napa River		100	68.5	D	6.4
DT6	16.2	Discrete	Mare Island Strait	DT6	100	59.1	D	1.5
DT7	42.1	Discrete	Mare Island Strait		100	60.1	D	9.6
SA25	20.4	Distributed	Mare Island Strait		100	60.8	C	0.8
GC1A	99.7	Discrete	Carquinez Strait		100	40.6	D	25.7
GC10	79.5	Distributed	Carquinez Strait		100	28.3	D	16.8
GC11	48.9	Discrete	Carquinez Strait	GC4A	100	46.4	D	14.9
GC12	47.7	Distributed	Carquinez Strait		100	54.9	D	20.9
LC58	17.2	Discrete	Rindler Creek	LC20B	100	76.2	D	17.3
AC41	52.9	Discrete	Napa River	AC5	100	71.1	D	0.3
LC4B	61.3	Distributed	Blue Rock Springs Creek		100	54.2	D	12.6
LC37B	54	Distributed	Lake Chabot		100	72.9	D	8.6

GC1B	77.8	Discrete	Carquinez Strait	GC1C	100	48.8	D	17.1
GC1C	51	Discrete	Carquinez Strait	GC1C	100	58.4	D	19.3
LC20B	102.7	Discrete	Rindler Creek	LC20B	100	57.8	D	13.9
CP4B	94.1	Discrete	Southhampton Bay	CP5	100	25.1	D	21.8
SA14	31.2	Discrete	Mare Island Strait	SA55	100	66.5	C	1.3
SA16	42.9	Discrete	Mare Island Strait	SA55	100	63.7	D	16.4
LS7	34.6	Distributed	Mare Island Strait		100	56	D	16.2
LS8	66.5	Distributed	Mare Island Strait		100	55.4	D	13
MI10	35.7	Distributed	Mare Island Strait		100	28	D	26.8
SA50	45.9	Discrete	Mare Island Strait	SA55	100	68.6	C	1.5
SA52	25.5	Discrete	Mare Island Strait	SA55	100	72.5	C	1.9
SA53	27.7	Distributed	Mare Island Strait		100	69.5	D	6.2
SA54	31.5	Distributed	Mare Island Strait		100	71.7	D	5.3
SA55	42.3	Discrete	Mare Island Strait	SA55	100	72.2	C	1.8
SA59	30.2	Discrete	Mare Island Strait	SA55	100	77.9	C	1.3
SA62	33.9	Discrete	Mare Island Strait	SA55	100	55.6	D	16.1
SA63	28.4	Distributed	Mare Island Strait		100	71.5	C	1
SA64	21.3	Discrete	Mare Island Strait		100	73.7	C	0.8
SA7	36	Distributed	Mare Island Strait		100	62.1	D	14.5
SA8	45.8	Discrete	Mare Island Strait	SA55	100	57.5	D	10.5
AC53	51.6	Distributed	White Slough		100	79.9	D	0.4
AC36	27.8	Distributed	Napa River		100	57.9	D	12.6
AC37	24	Distributed	Napa River	AC5	100	71.9	C	2.6
AC38	28.2	Distributed	Napa River	AC5	100	57.7	C	1.9
AC39	35.5	Discrete	Napa River	AC5	100	53.1	D	14
AC5	42.9	Discrete	Napa River	AC5	100	34.3	D	0.9
AC55	23.3	Discrete	Napa River	AC5	100	67.4	C	0.7
AC7	61.4	Discrete	Napa River	AC5	100	69.2	C	1.2
MI20	51.4	Distributed	Mare Island Strait		100	44.6	C	3.7
DT11	26.6	Discrete	Mare Island Strait	DT11	100	62.9	D	6.9
AC50	70.9	Distributed	White Slough	AC51	100	78.6	D	0.4
AC51	15.6	Discrete	White Slough	AC51	100	86.2	D	0.5
AC52	21.1	Distributed	Napa River	AC5	100	67.6	D	0.5
DT2	23	Discrete	Mare Island Strait	DT2	100	74.8	D	1.6
AC13	46.2	Distributed	Napa River	AC5	100	61.3	C	2
AC1	26.7	Discrete	Mare Island Strait	SA55	100	67.8	C	1
AC10A	70.3	Discrete	Napa River	AC5	100	66.9	C	4
AC12	53.7	Distributed	Napa River	AC5	100	75.5	D	4.5
AC22	75.9	Discrete	White Slough	AC31	100	63.1	D	9.3
AC23	27.6	Distributed	White Slough	AC31	100	58.1	D	9.3
AC24	47.6	Distributed	Napa River		100	61.9	D	5.4
AC25	45.9	Distributed	Napa River		100	55.1	D	8.6
AC26	85	Discrete	Napa River		100	61.8	D	8.6
AC27A	56.8	Discrete	Napa River	AC5	100	67.6	C	2.7
AC28	63.3	Discrete	White Slough	AC31	100	60.7	D	11.2
AC29	72.7	Discrete	White Slough	AC31	100	64.8	D	11.6
AC3	47.8	Discrete	Mare Island Strait	SA55	100	64.2	C	1.3
AC30	63	Discrete	White Slough	AC31	100	59.1	C	4.9
AC32	60.8	Discrete	White Slough	AC31	100	67.8	C	2.7
AC34	59.7	Distributed	White Slough	AC31	100	70.4	C	4.7
AC35	52.8	Distributed	Napa River	AC5	100	80.6	C	0.4
AC40	66.6	Distributed	Napa River	AC5	100	39.4	D	9.7
AC42	45.9	Distributed	Napa River		100	50.4	D	9.9
AC44	42	Distributed	Napa River	AC5	100	36	D	3.6
AC8	78.7	Distributed	Napa River	AC5	100	59.7	C	1.7

AC45	48	Discrete	Napa River	AC5	100	57.5	D	2.5
AC46	49	Distributed	White Slough		100	79.2	D	1
AC47	38.8	Discrete	White Slough	AC31	100	58.4	C	0.8
AC48A	148.3	Distributed	White Slough		100	15.9	D	0.4
CP1	124.4	Discrete	Southhampton Bay		100	38.2	D	20.2
CP10	85.8	Discrete	Southhampton Bay	CP12	100	42.8	D	13.2
CP12	125.7	Discrete	Southhampton Bay	CP12	100	43.6	D	11.2
CP2	41.3	Distributed	Southhampton Bay		100	56.1	D	11.8
CP3	65.3	Distributed	Southhampton Bay	CP12	100	45.6	D	17.1
CP4A	70.4	Discrete	Southhampton Bay	CP5	100	41	D	20.6
DT12	67.8	Discrete	Mare Island Strait	DT11	100	69.3	D	4.8
CP5	76	Discrete	Southhampton Bay	CP5	100	55	D	15
CP7	64.6	Distributed	Southhampton Bay	CP5	100	15.3	D	16.9
CP8	66.7	Discrete	Southhampton Bay	CP5	100	18.3	D	15.9
CP9	63.4	Discrete	Southhampton Bay	CP12	100	57	D	12.6
DT1	46	Discrete	Mare Island Strait	DT2	100	74.6	D	9.5
GC2A	84	Discrete	Carquinez Strait		100	57.7	D	13.5
GC3	87.2	Discrete	Carquinez Strait	GC1C	100	35.2	D	24.1
GC4A	95.3	Discrete	Carquinez Strait	GC4A	100	42.2	D	17.5
GC6	55.8	Discrete	Carquinez Strait		100	36.6	C	18
GC7	36.5	Distributed	Carquinez Strait	GC4A	100	2.5	C	26.8
LC12A	81	Discrete	Rindler Creek		100	61.9	D	10.4
LC1A	199.9	Distributed	Blue Rock Springs Creek		100	8.7	D	18.2
LC10	25.4	Distributed	Rindler Creek		100	62.5	D	5.5
LC11	23.7	Distributed	Rindler Creek		100	70.2	C	7.2
LC18	200.8	Distributed	Rindler Creek		100	1.7	A	27.4
LC19A	121.3	Distributed	Rindler Creek		100	3.5	D	26.9
LC20A	105.8	Distributed	Rindler Creek		100	4.7	D	22.9
LC21	249.9	Distributed	Rindler Creek		100	11.2	D	20.7
LC22	98.9	Distributed	American Canyon Creek		100	1.3	D	22.3
LC24	113.7	Distributed	American Canyon Creek		100	35.7	D	16.7
LC26A	108.4	Discrete	Blue Rock Springs Creek	LC34A	100	49.6	D	18.8
LC35	19.8	Discrete	Lake Chabot	LC34	100	63.6	D	4.6
LC36	62.3	Discrete	Rindler Creek		100	63.1	D	17.1
LC27	144.7	Distributed	Lake Chabot		100	47.8	C	2.1
LC3A	61.8	Discrete	Blue Rock Springs Creek	LC34A	100	57.5	D	16
LC31	85.8	Discrete	Lake Chabot	LC34	100	59.7	D	12.3
LC32	46.9	Discrete	Lake Chabot	LC34	100	66.5	C	10.7
LC33	29.3	Discrete	Lake Chabot	LC34	100	60.8	C	4.4
LC34	54.2	Discrete	Lake Chabot	LC34	100	60.3	C	3.2
LC44	90.2	Distributed	Napa River	LC44	100	57.5	C	3
LC45	53.4	Discrete	Napa River	LC44	100	65.9	D	5.8
LC56	38.3	Discrete	Blue Rock Springs Creek	LC50	100	80.9	D	16.1
LC46	83.3	Distributed	White Slough	LC38	100	60.2	D	14
LC47	54	Discrete	White Slough	LC38	100	73.9	C	1.2
LC48	33	Discrete	Rindler Creek	LC19B	100	75.5	D	20.3
LC49	31.7	Discrete	Rindler Creek	LC19B	100	71.4	D	14.7
LC5	50.5	Distributed	Blue Rock Springs Creek		100	57.6	D	14.2
LC50	53.5	Discrete	Blue Rock Springs Creek	LC50	100	77.2	D	19.3
LC51	38.9	Discrete	Blue Rock Springs Creek	LC51	100	82	D	20.5
LC52	34.3	Discrete	Blue Rock Springs Creek	LC51	100	74.1	D	20.1
LC6	86.1	Distributed	Blue Rock Springs Creek		100	42.4	D	17.5
LC8	32.4	Distributed	Blue Rock Springs Creek		100	76.8	C	3.6
LS1	66.6	Discrete	Mare Island Strait		100	55.2	D	14.4
LS10	57.5	Discrete	Mare Island Strait		100	66.6	D	6.5

LS11	30.6	Discrete	Lake Dalwigk		100	51	D	9.1
LS12	24.2	Discrete	Lake Dalwigk		100	47.4	D	12.9
LS13	41.1	Discrete	Lake Dalwigk	LS31	100	51.8	D	11.2
LS14	52.1	Discrete	Lake Dalwigk	LS31	100	44	D	10
LS15	35.3	Discrete	Lake Dalwigk	LS31	100	44.6	D	12.2
LS16	39.1	Discrete	Lake Dalwigk	LS31	100	59.1	D	7
LS23	97.5	Distributed	Lake Dalwigk	LS31	100	44.1	D	5.6
MI12	23.5	Discrete	Mare Island Strait	DT11	100	63.3	D	11
LS19	70.6	Distributed	Carquinez Strait		100	56.9	D	11.7
LS20	55.6	Distributed	Lake Dalwigk	LS31	100	38.8	D	8.4
LS21	50.6	Discrete	Lake Dalwigk	LS31	100	53.3	D	8.1
LS22	85.8	Discrete	Lake Dalwigk	LS31	100	49	D	8
LS24	42.4	Distributed	Lake Dalwigk	LS31	100	55	D	6.7
LS25	34.2	Discrete	Lake Dalwigk	LS31	100	61.4	D	6.6
LS26	53.8	Discrete	Lake Dalwigk	LS31	100	57.1	D	5.8
LS27	38.8	Distributed	Lake Dalwigk	LS31	100	58.3	D	6
LS29	34.7	Distributed	Lake Dalwigk	LS31	100	70	C	3.8
LS3	37.7	Discrete	Mare Island Strait		100	61.4	D	9.8
LS4	45.4	Distributed	Mare Island Strait		100	55.3	D	6.2
LS30	64.7	Distributed	Lake Dalwigk	LS31	100	71.7	C	1.7
LS31	24.5	Discrete	Lake Dalwigk	LS31	100	72.1	C	2.6
LS32	18.5	Distributed	Lake Dalwigk	LS31	100	52.4	D	9.2
LS33	79.4	Discrete	Lake Dalwigk		100	65.2	C	2.9
LS34	21.7	Distributed	Mare Island Strait		100	70.1	D	5
LS36	59.4	Distributed	Lake Dalwigk		100	40.5	C	3.3
LS37	35.5	Distributed	Mare Island Strait		100	66.6	C	1.2
SA13	29.5	Discrete	Mare Island Strait	SA55	100	64.9	C	1.9
MI4	26.7	Discrete	Mare Island Strait	MI4	100	45.8	D	18.6
MI17	50.5	Distributed	Napa River		100	52.1	D	14.6
MI13	20.5	Distributed	Napa River		100	49.4	D	16.8
MI15	47.6	Distributed	Napa River		100	57.2	D	7.7
MI16	47.1	Distributed	Napa River		100	49.7	D	4
MI18	37.9	Discrete	Mare Island Strait	MI18	100	31	D	4.7
MI2	29.5	Distributed	Mare Island Strait		100	32.9	D	24.1
MI3	75.3	Discrete	Mare Island Strait	MI4	100	44.4	D	22.3
SA18	20.5	Discrete	Mare Island Strait	SA55	100	68.4	C	6.4
MI6	76.9	Discrete	Mare Island Strait		100	52.3	D	12.7
MI7	76.7	Discrete	Mare Island Strait	MI18	100	60.6	D	8.5
MI8	68.2	Discrete	Mare Island Strait		100	68.4	C	2.7
SA10	67.2	Discrete	Mare Island Strait	SA55	100	39.3	D	15
SA11	26.2	Discrete	Mare Island Strait	SA55	100	53.5	D	12.3
SA12	46.6	Discrete	Mare Island Strait	SA55	100	61.4	C	3.8
SA17	68.7	Discrete	Mare Island Strait	SA55	100	57.1	D	17.5
SA2	53.4	Discrete	Mare Island Strait	SA55	100	41.8	D	12.1
SA21	52.2	Discrete	Mare Island Strait	SA55	100	55.4	D	11.9
SA22	90.9	Discrete	Mare Island Strait	SA55	100	48.4	D	12.5
SA23	31	Distributed	Mare Island Strait	SA55	100	53.1	C	2.5
SA24	37	Distributed	Mare Island Strait	SA55	100	52.9	C	5.3
SA26	56.8	Distributed	Mare Island Strait	SA55	100	54.1	C	4.9
SA27	47	Discrete	Mare Island Strait	SA55	100	51.9	D	5.6
SA29	58.7	Discrete	Mare Island Strait	SA55	100	61.2	C	1.1
SA31	48.4	Discrete	Mare Island Strait	SA55	100	70.5	C	1
SA32	41.9	Discrete	Mare Island Strait	SA55	100	63.7	C	3.5
SA37	59.1	Discrete	Mare Island Strait	SA55	100	56.6	D	11.7
SA38	30.3	Discrete	Mare Island Strait	SA55	100	58.2	C	5.7

SA39	70.1	Distributed	Mare Island Strait	SA55	100	60.2	D	13.2
SA4	22.9	Distributed	Mare Island Strait	SA55	100	59.1	C	2.3
SA40	34.4	Distributed	Mare Island Strait	SA55	100	71.7	C	6.5
SA42	65.1	Distributed	Mare Island Strait	SA55	100	57	C	1.4
SA43	36.6	Discrete	Mare Island Strait	SA55	100	57.6	D	6
SA44	43.4	Discrete	Mare Island Strait	SA55	100	45.4	D	4.4
SA6	29.6	Discrete	Mare Island Strait	SA55	100	64	C	2.2
SA45	37.1	Distributed	Mare Island Strait	SA55	100	47.7	D	4.5
SA46	50.3	Distributed	Mare Island Strait	SA55	100	59.3	D	4.4
SA48	14.6	Discrete	Mare Island Strait	SA55	100	70.8	C	0.8
SA49	51.9	Discrete	Mare Island Strait	SA55	100	51.7	C	1.2
SA5	62.1	Distributed	Mare Island Strait	SA55	100	61.1	C	5.1
SA9	73.6	Discrete	Mare Island Strait	SA55	100	55.8	D	8
SP1A	54.8	Discrete	Napa River		100	37.1	D	7
SP11	48.1	Distributed	Napa River		100	71.7	C	1.5
SP12	53.6	Distributed	Napa River		100	71.6	C	0.6
SP13	84.8	Distributed	Napa River		100	63.8	C	0.9
SP2A	73.8	Distributed	Napa River	SP7	100	33.4	D	1.4
SP3A	29.5	Discrete	Napa River	SP7	100	42.4	C	0.6
SP5A	78.2	Discrete	Napa River	SP7	100	48	C	0.6
SP6A	78.1	Discrete	Napa River	SP7	100	20.8	D	1.2
SP7	58.7	Discrete	Napa River	SP7	100	63.6	C	0.7
SV1A	247.6	Distributed	Sulphur Springs Creek		100	11.6	A	19
SWANZY	20.4	Distributed	Mare Island Strait		100	53.4	D	13.5
WC1	49.3	Discrete	American Canyon Creek	WC7	100	61.6	D	7.4
GC13	79.5	Distributed	Carquinez Strait		100	4.1	C	20.1
WC2	29.1	Discrete	American Canyon Creek	WC7	100	60.6	D	4.5
WC3	50.9	Discrete	American Canyon Creek	WC7	100	36.2	D	14.2
WC5	52.4	Distributed	American Canyon Creek		100	1.3	D	21
SV4	142.1	Distributed	Sulphur Springs Creek		100	0	A	26.1
WC6	101.1	Distributed	American Canyon Creek	WC7	100	54.6	C	7.4
WC8	51.2	Distributed	American Canyon Creek	WC7	100	0.7	D	26.4
SV3	310.4	Distributed	Sulphur Springs Creek		100	0	A	26.6
SP6B	395.8	Distributed	San Pablo Bay		100	20.8	D	10.6
AC56	213.2	Distributed	White Slough		100	6.7	D	0.3
SP15	93.5	Distributed	Napa River		100	12.9	D	0.6
MI22	105.5	Distributed	Napa River		100	39	C	1.2
LC63	163.5	Distributed	Rindler Creek		100	1.4	D	20.4
SP16	140.4	Distributed	Napa River		100	7.8	D	0.7
LC60	273.7	Distributed	Sulphur Springs Creek		100	0	A	23
MI25	51.3	Distributed	Mare Island Strait		100	61	C	2.1
MI26	195.7	Distributed	Mare Island Strait		100	70.1	D	2.3
SV2C	271.7	Distributed	Sulphur Springs Creek		100	1.9	A	25.5
SV2A	75	Discrete	Sulphur Springs Creek		100	24.3	C	14.6
SV2D	50.4	Distributed	Sulphur Springs Creek		100	17.1	C	19.2
SV1B	255.7	Distributed	Sulphur Springs Creek		100	11.5	A	20.2
SV1C	83.9	Distributed	Sulphur Springs Creek		100	16.9	A	19.7
LC1B	135.9	Distributed	Blue Rock Springs Creek		100	9.7	D	16.6
LC1C	119.4	Distributed	Blue Rock Springs Creek		100	19	D	10.4
LC61	66	Distributed	American Canyon Creek		100	2.4	C	27.5
LC62	109.1	Distributed	American Canyon Creek		100	0	A	23.1
AC48B	137.9	Distributed	White Slough		100	6.1	D	0.3
CP4C	31.9	Distributed	Southhampton Bay	CP5	100	47.8	D	21.1
GC4B	79.6	Distributed	Carquinez Strait		100	48.6	D	14.5
LC26B	63	Discrete	Blue Rock Springs Creek	LC34A	100	65.4	D	13.8

LC12B	79.5	Discrete	Rindler Creek		100	51.7	D	7.2
LC3B	35.8	Discrete	Blue Rock Springs Creek	LC34A	100	54.6	D	17.3
LC4C	52	Distributed	Blue Rock Springs Creek		100	45.3	D	20.8
GC2B	48.5	Discrete	Carquinez Strait		100	46.5	D	13.8
LC4D	48.4	Distributed	Blue Rock Springs Creek		100	47.4	D	16.9
SP1B	161	Distributed	San Pablo Bay		100	37.1	D	0.3
M121	275.7	Distributed	Mare Island Strait		100	30.4	D	11.7
SP3B	35.5	Distributed	San Pablo Bay		100	42.4	C	1.3
LC16	58.3	Discrete	Rindler Creek		100	76.8	D	13.3
LC14	46.7	Distributed	Rindler Creek		100	37	C	2
LC15A	109.5	Discrete	Rindler Creek		100	71.6	D	8
LC23	62	Distributed	American Canyon Creek		100	25.6	D	21.8
LC37A	189.6	Distributed	Lake Chabot		100	37	D	8.1
LC39	44.9	Distributed	Lake Chabot		100	71.2	D	12.2
LC4A	82	Distributed	Blue Rock Springs Creek		100	44.6	D	17.3
LC38	72.3	Discrete	White Slough	LC38	100	49.9	C	9.3
LC40	53	Distributed	Napa River	LC44	100	64.1	D	10.5
LC42	47.1	Distributed	Napa River	LC44	100	69	D	7.3
LC7	33.4	Distributed	Blue Rock Springs Creek		100	68.1	D	8.2
LS35	54.4	Distributed	Mare Island Strait		100	57.7	C	3.1
LC55	25	Discrete	Blue Rock Springs Creek		100	64.7	D	17.5
LC9	28.6	Distributed	Rindler Creek		100	69.4	D	13.7
MI5	35.4	Discrete	Mare Island Strait		100	47.2	D	20.5
SA1	20.1	Distributed	Mare Island Strait		100	47	D	9.7
SA35	56.4	Discrete	Mare Island Strait	SA55	100	60.7	C	1.6
SP10	21.1	Distributed	Napa River		100	56.8	C	1.1
MI27	166.8	Distributed	Napa River		100	79.3	D	1.1
LC3C	57.9	Discrete	Blue Rock Springs Creek	LC34A	100	42.6	D	22.7
DT10	23.9	Discrete	Mare Island Strait	DT11	100	63.1	D	6.6
GC5	55.5	Discrete	Carquinez Strait		100	41.4	C	14.9
SA15	30.6	Distributed	Mare Island Strait	SA55	100	65.7	C	1.5
SV2B	239.6	Distributed	Sulphur Springs Creek		100	15.5	A	18.7
WC7	56.5	Discrete	American Canyon Creek	WC7	100	43.9	C	7
SV2E	26.1	Distributed	Sulphur Springs Creek		100	5.6	D	10.9
SP4	73.2	Discrete	San Pablo Bay		100	36.6	D	1.1
SP2B	128	Distributed	San Pablo Bay		100	33.4	D	0.5
Fairfield								
JAM-1	50.8	distributed	Jameson Creek		100	28	C	5.1
AMER-1	107.6	discrete	American Canyon Creek		100	38.1	D	3.3
DAN-1	76.2	distributed	Dan Wilson Creek		100	45.2	D	1.3
ALZ-1	54.5	distributed	Alonzo Creek	ALZ-1	100	58.7	A	0.4
FREE-2	63.5	discrete	Freeborn Creek		100	55.6	A	2.3
AMER-3	81.9	discrete	American Canyon Creek		100	39.2	D	1.2
GRN-25	46.3	discrete	Green Valley Creek	GRN-11	100	47.4	D	9.6
GRN-26	51.4	distributed	Green Valley Creek		100	10	D	1
ALZ-4	31.5	distributed	Alonzo Creek		100	5.9	D	0.3
LED-7	45.7	discrete	Ledgewood Creek	LED-5	100	58.3	A	0.6
LED-4	47.8	discrete	Ledgewood Creek	LED-4	100	72.5	D	1
GRN-20	27.1	discrete	Green Valley Creek	GRN-21	100	33.4	D	13.3
AMER-5	122.2	distributed	American Canyon Creek		100	0.1	D	17.3
COY-22	94.5	distributed	McCoy Creek		100	69.2	A	0.6
ALZ-18	124.5	discrete	Alonzo Creek		100	43.5	D	13.1
COY-8	29.3	discrete	McCoy Creek	COY-3	100	54.8	D	1.2
COY-12	93.6	distributed	McCoy Creek		100	60.7	D	0.3
MAR-16	83.8	distributed	Marsh 1		100	0.4	D	0.5

LED-19	86.3	discrete	Ledgewood Creek	LED-22	100	11.8	A	20
COY-21	97.6	distributed	McCoy Creek		100	14.9	D	0.9
ALZ-29	39.7	distributed	Alonzo Creek		100	9.4	D	13.4
DAN-9	61	distributed	Dan Wilson Creek		100	18.4	C	4.6
COY-29	159.6	distributed	McCoy Creek		100	0.8	D	12.7
GRN-27	29.7	distributed	Green Valley Creek		100	51.5	A	1
JAM-6	76	distributed	Jameson Creek		100	1.2	C	17.3
SODA-34	54.3	distributed	Soda Springs Creek		100	59.7	C	3.2
UNI-5	354.9	distributed	Union Creek		100	1.6	D	4.4
COY-2	104.8	distributed	McCoy Creek		100	51.3	D	0.7
LED-1	80	discrete	Ledgewood Creek	LED-5	100	63.5	A	0.6
SODA-1	92.6	distributed	Soda Springs Creek		100	72.5	A	0.4
LAU-25	49.5	distributed	Laurel Creek	LED-23	100	51.9	D	5.8
AMER-4	37.6	distributed	American Canyon Creek		100	29.3	D	3.8
COY-3	46.4	discrete	McCoy Creek	COY-3	100	55.4	D	1.4
LED-2	103	discrete	Ledgewood Creek	LED-4	100	65.6	D	0.5
LAU-19	43.4	discrete	Laurel Creek		100	52.3	D	2.2
LAU-1	93.9	discrete	Laurel Creek	LED-23	100	54.9	D	0.8
SODA-2	80.1	discrete	Soda Springs Creek	SODA-25	100	55.7	A	0.8
COY-1	68.2	discrete	McCoy Creek	COY-3	100	56.1	D	1.2
LED-3	56.6	distributed	Ledgewood Creek	LED-22	100	28.2	A	16.6
LAU-2	75.4	discrete	Laurel Creek		100	24.9	C	5.6
COY-4	36	distributed	McCoy Creek		100	27.9	D	1.3
LAU-3	80.1	distributed	Laurel Creek		100	44.2	D	0.7
LAU-4	94.5	discrete	Laurel Creek		100	61.6	D	0.6
LAU-35	52.7	discrete	Laurel Creek	LED-23	100	57.8	A	0.7
ALZ-2	89.5	discrete	Alonzo Creek	ALZ-8	100	58.7	A	2.8
COY-20	72.8	distributed	McCoy Creek		100	18.8	C	2.1
LAU-5	108.5	discrete	Laurel Creek	LED-23	100	61.4	D	1
SODA-3	75.6	discrete	Soda Springs Creek	SODA-25	100	63.8	D	5.3
COY-5	125.4	distributed	McCoy Creek		100	1.2	D	0.7
LAU-6	106.7	distributed	Laurel Creek		100	60.1	D	1.2
SODA-4	88.7	distributed	Soda Springs Creek	LED-23	100	37.2	D	8.4
LAU-7	58.8	discrete	Laurel Creek		100	47.9	B	9.2
ALZ-3	111.5	discrete	Alonzo Creek		100	6.8	C	25.1
SODA-5	64.5	discrete	Soda Springs Creek		100	26.9	D	18.6
ALZ-23	42.3	discrete	Alonzo Creek		100	12	C	21.2
LAU-8	58.4	discrete	Laurel Creek		100	41.2	D	6
LAU-9	66.7	discrete	Laurel Creek		100	13.7	D	7.3
AMER-2	237.5	distributed	American Canyon Creek		100	0	D	25
GRN-1	110.7	distributed	Green Valley Creek		100	12.9	D	15.2
GRN-13	76.1	discrete	Green Valley Creek	GRN-11	100	57.8	A	1
GRN-2	70.3	distributed	Green Valley Creek		100	40.6	C	1.5
SODA-6	130	distributed	Soda Springs Creek		100	18.5	C	18.6
GRN-18	97.8	distributed	Green Valley Creek		100	0.2	D	32.5
GRN-6	46.6	discrete	Green Valley Creek	GRN-6	100	47	D	0.9
MAR-3	126.7	distributed	Marsh 1		100	39.2	D	0.6
SODA-7	50.8	distributed	Soda Springs Creek		100	34.2	A	3.5
FREE-1	128.3	discrete	Freeborn Creek		100	24	D	3.5
FREE-3	58.4	discrete	Freeborn Creek		100	36.7	D	6.8
FREE-4	43.2	discrete	Freeborn Creek		100	20.6	D	5.2
GRN-14	23.8	distributed	Green Valley Creek		100	13.5	D	13.7
ALZ-6	59	discrete	Alonzo Creek	ALZ-1	100	70.6	A	0.6
JAM-2	82.5	distributed	Jameson Creek	JAM-3	100	19.6	D	1.1
UNI-2	76.4	distributed	Union Creek		100	24.9	D	0.7

JAM-3	93.9	discrete	Jameson Creek	JAM-3	100	44.9	D	1.9
DAN-2	71.9	distributed	Dan Wilson Creek		100	53.2	C	1
GRN-3	90.8	distributed	Green Valley Creek		100	61.7	A	0.9
GRN-4	129.3	distributed	Green Valley Creek		100	53.9	D	1.2
GRN-5	49.4	discrete	Green Valley Creek	GRN-6	100	60	C	1.1
GRN-7	52.4	discrete	Green Valley Creek	GRN-6	100	57.5	A	2
GRN-8	29.3	discrete	Green Valley Creek	GRN-6	100	62.4	A	2.5
GRN-19	41.3	distributed	Green Valley Creek		100	34	D	16.6
GRN-9	53	distributed	Green Valley Creek		100	52	A	0.8
GRN-10	52.3	distributed	Green Valley Creek		100	46.3	A	0.6
GRN-11	28.9	discrete	Green Valley Creek	GRN-11	100	45.8	C	0.7
GRN-12	30.8	distributed	Green Valley Creek		100	39.4	A	0.1
GRN-15	54.1	discrete	Green Valley Creek		100	34.7	D	12.1
GRN-16	23.8	discrete	Green Valley Creek		100	33	D	11.6
GRN-17	35.6	distributed	Green Valley Creek		100	5.1	D	27.8
GRN-21	34.5	discrete	Green Valley Creek	GRN-21	100	22.2	D	20
DAN-3	61	discrete	Dan Wilson Creek		100	41.4	D	10.8
DAN-4	69.3	distributed	Dan Wilson Creek		100	53.6	D	0.9
GRN-22	36.7	distributed	Green Valley Creek		100	46.1	D	3.3
DAN-5	51.2	distributed	Dan Wilson Creek		100	26.5	C	1.2
GRN-23	50.8	discrete	Green Valley Creek		100	48.6	D	5.1
GRN-24	34	discrete	Green Valley Creek		100	46.5	D	9.5
LED-5	94.7	discrete	Ledgewood Creek	LED-5	100	40.2	D	0.5
LED-6	39.4	distributed	Ledgewood Creek		100	64.2	A	0.6
COY-17	83.5	discrete	McCoy Creek		100	52.1	D	0.5
ALZ-5	90.3	distributed	Alonzo Creek		100	55.2	A	0.5
ALZ-10	72.6	distributed	Alonzo Creek	ALZ-8	100	65.4	A	2.4
LED-8	66.6	distributed	Ledgewood Creek	LED-5	100	65.4	A	0.5
ALZ-7	101	distributed	Alonzo Creek	ALZ-8	100	66.4	D	2.8
ALZ-8	99.9	discrete	Alonzo Creek	ALZ-8	100	85	A	0.9
ALZ-9	25.5	discrete	Alonzo Creek	ALZ-8	100	73.2	A	0.8
ALZ-11	48.4	discrete	Alonzo Creek	ALZ-8	100	78.5	A	1
ALZ-12	68.8	discrete	Alonzo Creek	ALZ-8	100	62.8	A	2.6
ALZ-16	102.8	distributed	Alonzo Creek		100	0.6	C	25.8
LED-9	69.2	discrete	Ledgewood Creek		100	44.8	D	0.8
LAU-20	67	discrete	Laurel Creek	LED-23	100	61.3	A	0.6
ALZ-13	69.1	distributed	Alonzo Creek		100	7.6	A	13.4
LED-10	107.3	distributed	Ledgewood Creek		100	7	D	25
COY-6	85.6	distributed	McCoy Creek		100	1.6	A	3
SODA-8	89.9	distributed	Soda Springs Creek		100	0	C	27.2
SODA-9	109.5	discrete	Soda Springs Creek		100	33.3	D	13.5
SODA-10	74.8	discrete	Soda Springs Creek		100	45.3	D	7.5
LAU-13	66.9	distributed	Laurel Creek		100	55	D	1.4
LAU-10	76.4	discrete	Laurel Creek		100	33	A	8.7
SODA-14	117.5	distributed	Soda Springs Creek		100	56.4	A	0.6
COY-7	69.3	discrete	McCoy Creek	COY-3	100	62.1	B	0.5
LAU-11	94.8	discrete	Laurel Creek	LAU-14	100	46.1	B	4.3
LAU-12	73.3	distributed	Laurel Creek		100	5.6	B	7.4
LAU-18	104	distributed	Laurel Creek		100	39	D	1.1
LAU-14	38.6	discrete	Laurel Creek	LAU-14	100	34.9	B	1.8
LED-14	35.5	distributed	Ledgewood Creek		100	0.9	D	33.3
LAU-15	76.9	distributed	Laurel Creek		100	54	A	2.9
LAU-16	31	distributed	Laurel Creek		100	44.8	B	7.7
LAU-17	76.1	distributed	Laurel Creek		100	49.4	A	1.1
LAU-21	56.9	distributed	Laurel Creek		100	60.2	D	0.9

LAU-22	84.8	distributed	Laurel Creek		100	61.3	D	0.6
LAU-23	85	discrete	Laurel Creek	LED-23	100	66.3	D	0.6
LED-12	100.3	discrete	Ledgewood Creek		100	5.9	C	24.1
SODA-11	111.2	discrete	Soda Springs Creek	SODA-11	100	66.6	D	0.7
SODA-12	66.7	discrete	Soda Springs Creek	SODA-11	100	58.2	A	0.6
UNI-1	89.7	distributed	Union Creek		100	31.9	D	0.4
SODA-13	107.6	discrete	Soda Springs Creek	SODA-11	100	72.1	A	0.9
ALZ-14	36.5	distributed	Alonzo Creek		100	35	D	0.3
MAR-14	92.6	discrete	Marsh 1	MAR-14	100	70.7	D	0.6
SODA-15	96.3	discrete	Soda Springs Creek	SODA-25	100	66.4	A	1.3
FREE-5	119	distributed	Freeborn Creek		100	0	B	18.9
AMER-6	199.7	distributed	American Canyon Creek		100	0.1	D	15.7
ALZ-15	110.9	distributed	Alonzo Creek		100	12.5	C	22.4
ALZ-17	113.9	discrete	Alonzo Creek		100	23.2	A	16.8
LED-11	124.6	discrete	Ledgewood Creek		100	7.8	A	27.1
LED-13	106.9	distributed	Ledgewood Creek		100	5.7	D	23.7
ALZ-19	77	discrete	Alonzo Creek		100	35.6	D	8.5
ALZ-20	48.3	distributed	Alonzo Creek	ALZ-8	100	23.9	A	1
SODA-20	39.5	discrete	Soda Springs Creek	SODA-25	100	39.9	A	11.7
COY-9	31	distributed	McCoy Creek		100	64.2	D	3.4
COY-10	72	distributed	McCoy Creek		100	54.7	D	0.9
COY-11	31.8	distributed	McCoy Creek		100	58.9	D	2.5
SODA-16	122.8	distributed	Soda Springs Creek		100	0.1	C	26.4
SODA-18	97.7	distributed	Soda Springs Creek	SODA-25	100	62.1	D	5.6
LED-15	71.5	distributed	Ledgewood Creek		100	24.2	D	0.6
ALZ-21	80.6	discrete	Alonzo Creek	ALZ-28	100	39.5	A	10.4
SODA-17	89.9	distributed	Soda Springs Creek		100	4.5	C	21.8
LAU-24	52.3	distributed	Laurel Creek		100	57.9	A	1
SODA-19	72.7	distributed	Soda Springs Creek	SODA-25	100	49.6	D	6.3
LED-16	73.1	discrete	Ledgewood Creek	LED-16	100	54.2	D	0.6
SODA-22	89	distributed	Soda Springs Creek	SODA-25	100	53	D	2.5
LED-17	34.3	distributed	Ledgewood Creek		100	53.9	D	0.8
LED-18	41.7	discrete	Ledgewood Creek	LED-16	100	49.9	D	0.7
COY-13	84.9	distributed	McCoy Creek		100	8.1	D	1
SODA-21	60.6	discrete	Soda Springs Creek	SODA-25	100	50.1	D	5
SODA-23	111.3	distributed	Soda Springs Creek		100	0	C	28.6
ALZ-22	64.1	distributed	Alonzo Creek		100	10.3	C	19.9
ALZ-24	54.7	distributed	Alonzo Creek		100	3.1	D	26.5
DAN-7	40.1	distributed	Dan Wilson Creek		100	45.5	C	7.8
LAU-27	93.6	distributed	Laurel Creek		100	26.1	C	2.3
LAU-28	47	distributed	Laurel Creek		100	9.7	C	2.9
ALZ-37	50.4	discrete	Alonzo Creek		100	55.9	A	0.9
DAN-8	113	distributed	Dan Wilson Creek		100	53.2	C	0.5
LAU-26	92.2	distributed	Laurel Creek		100	7.8	B	3
FREE-7	41.3	distributed	Freeborn Creek		100	64.6	D	2.2
DAN-6	86.6	distributed	Dan Wilson Creek		100	49.1	D	2
COY-14	60.9	distributed	McCoy Creek		100	48.4	B	0.5
FREE-6	118	distributed	Freeborn Creek		100	7.2	D	12.3
SODA-24	103.8	discrete	Soda Springs Creek	SODA-25	100	61.9	A	1.4
SODA-25	32.7	discrete	Soda Springs Creek	SODA-25	100	72.6	A	0.6
ALZ-35	43.3	distributed	Alonzo Creek		100	37.4	D	10.9
SODA-26	84.9	discrete	Soda Springs Creek		100	39.5	C	12
SODA-27	69.8	distributed	Soda Springs Creek		100	35.4	C	8.3
SODA-28	45.8	distributed	Soda Springs Creek		100	1.2	D	28.1
COY-15	72.5	discrete	McCoy Creek	COY-3	100	64.1	B	0.5

COY-16	48	discrete	McCoy Creek	COY-3	100	50.8	B	0.4
SODA-29	54.1	distributed	Soda Springs Creek	SODA-25	100	76.2	A	1
LAU-29	89.3	discrete	Laurel Creek	LED-23	100	53.7	D	0.9
COY-18	67.5	distributed	McCoy Creek		100	31.9	D	0.7
COY-19	99.4	distributed	McCoy Creek		100	1.4	D	1.9
LAU-30	85.1	distributed	Laurel Creek		100	36.9	D	2.5
LED-20	56.5	discrete	Ledgewood Creek	LED-22	100	25.6	D	16.2
ALZ-25	33.4	distributed	Alonzo Creek		100	0.6	A	15.5
ALZ-27	76.9	distributed	Alonzo Creek	ALZ-8	100	54.6	D	1.3
UNI-6	338.1	distributed	Union Creek		100	2.2	D	3.1
LED-21	78.7	distributed	Ledgewood Creek		100	39.5	D	0.9
SODA-31	35.8	discrete	Soda Springs Creek	SODA-25	100	54.2	A	3.3
JAM-4	93.5	distributed	Jameson Creek		100	20.9	D	5.4
ALZ-26	42.4	distributed	Alonzo Creek		100	39	D	6.2
ALZ-28	41.4	discrete	Alonzo Creek	ALZ-28	100	59.1	C	2.4
SODA-35	61.5	discrete	Soda Springs Creek	SODA-25	100	57.1	D	3.4
LED-22	39.9	discrete	Ledgewood Creek	LED-22	100	37.9	D	5.6
LED-23	55	distributed	Ledgewood Creek		100	9.4	A	20.8
SODA-30	69.5	discrete	Soda Springs Creek	SODA-25	100	62	A	1.1
ALZ-30	95.9	discrete	Alonzo Creek		100	17.1	C	18.8
SODA-32	74.9	discrete	Soda Springs Creek		100	60.3	D	0.6
ALZ-31	98.7	distributed	Alonzo Creek		100	70.8	A	0.4
LAU-31	87.8	discrete	Laurel Creek	LED-23	100	56.7	D	0.7
ALZ-32	46.4	discrete	Alonzo Creek		100	24.5	A	16.8
SODA-33	79.7	distributed	Soda Springs Creek		100	0	C	23
LAU-33	47.6	discrete	Laurel Creek		100	29.9	D	8.8
MAR-22	39.9	distributed	Marsh 1		100	2.4	D	0.2
JAM-5	73.5	discrete	Jameson Creek	JAM-3	100	45.3	D	1.3
LAU-32	40.7	discrete	Laurel Creek		100	21.7	B	17.8
LED-24	50	distributed	Ledgewood Creek		100	14.7	A	18.7
GRN-28	63.9	distributed	Green Valley Creek		100	38	D	0.5
ALZ-33	63.2	discrete	Alonzo Creek		100	37.1	A	11.9
ALZ-34	64.3	discrete	Alonzo Creek		100	52.8	D	3.4
SODA-36	55.7	discrete	Soda Springs Creek	SODA-25	100	49.7	A	0.5
LAU-34	14.4	discrete	Laurel Creek	LED-23	100	53.1	D	1.5
COY-23	63.2	discrete	McCoy Creek	COY-3	100	58.3	B	1
ALZ-36	55.7	discrete	Alonzo Creek		100	41.5	C	9.4
JAM-7	113.6	distributed	Jameson Creek		100	65.9	D	1.2
LED-25	38.3	discrete	Ledgewood Creek	LED-5	100	65.5	A	0.5
MAR-10	109.4	distributed	Marsh 1		100	0.3	B	19.5
ALZ-38	37.2	distributed	Alonzo Creek		100	52	C	5.2
AMER-7	146.8	distributed	American Canyon Creek		100	3.1	D	11.7
UNI-3	722.4	distributed	Union Creek		100	0.2	D	3.4
COY-24	98.3	distributed	McCoy Creek		100	50.2	D	1.7
COY-25	318.6	distributed	McCoy Creek		100	2.4	D	1
COY-26	186.7	discrete	McCoy Creek		100	42.4	D	1.3
COY-27	658.9	distributed	McCoy Creek		100	11.1	D	3.1
COY-28	157.9	discrete	McCoy Creek		100	18.9	D	1.4
COY-30	90.3	distributed	McCoy Creek		100	0.1	C	8.6
COY-31	106.2	distributed	McCoy Creek		100	1.7	D	4.3
UNI-4	109.7	distributed	Union Creek		100	0.1	D	2.6
MAR-7	131.5	distributed	Marsh 1		100	0.7	D	2.8
GRN-29	35	distributed	Green Valley Creek		100	61.6	A	0.8
MAR-1	94.5	discrete	Marsh 1	MAR-14	100	41.5	D	0.5
MAR-17	36.7	distributed	Marsh 1		100	44.9	D	0.5

MAR-8	116.6	discrete	Marsh 1		100	51.6	D	0.5
MAR-9	79.6	distributed	Marsh 1		100	67.5	D	0.6
MAR-2	90.7	discrete	Marsh 1		100	37.7	B	3.5
MAR-4	94.8	discrete	Marsh 1		100	57.8	C	3.2
MAR-5	120.6	distributed	Marsh 1		100	47.4	D	2.4
MAR-6	392.5	distributed	Marsh 1		100	7.7	D	0.6
MAR-20	81.5	discrete	Marsh 1	MAR-14	100	65.2	D	0.5
MAR-11	125.6	discrete	Marsh 1	MAR-11	100	53.2	D	0.5
MAR-12	65.1	discrete	Marsh 1	MAR-11	100	39.6	D	0.8
MAR-13	113.8	distributed	Marsh 1		100	1.3	D	0.4
MAR-15	96.7	distributed	Marsh 1		100	57.4	D	0.7
MAR-18	69.2	distributed	Marsh 1		100	45.2	D	0.8
MAR-21	77.9	distributed	Marsh 1		100	0	B	19.8
MAR-25	127.7	distributed	Marsh 1		100	0	C	16.6
MAR-19	85.4	discrete	Marsh 1	MAR-14	100	16.4	D	0.5
MAR-23	46.8	discrete	Marsh 1		100	60.7	C	2.7
MAR-24	30.1	distributed	Marsh 1		100	49.4	D	1.2
Suisun								
MAR-26	81.9	distributed	Marsh #1		100	43.5	D	1.2
MAR-27	125.8	distributed	Marsh #1		100	47.9	A	3.2
COY-40	70.4	distributed	McCoy Creek		100	12.5	B	1.9
COY-32	143.4	distributed	McCoy Creek		100	11	A	2.6
MAR-28	78.3	discrete	Marsh #1	COY-35	100	57.6	D	1.1
SODA-37	92.4	distributed	Soda Springs Creek		100	41.1	D	1.7
LAU-43	117.5	discrete	Laurel Creek	LAU-43	100	62.1	D	1
LAU-42	96.6	discrete	Laurel Creek	LAU-43	100	59.1	D	2.1
MAR-29	31.9	distributed	Marsh #1		100	55.5	D	0.5
MAR-30	88.9	distributed	Marsh #1		100	28.5	D	2.5
LAU-41	96.7	discrete	Laurel Creek		100	61.8	D	1.7
MAR-42	29.4	distributed	Marsh #1		100	63.3	A	5.3
LAU-40	48	discrete	Laurel Creek	LAU-43	100	72.5	D	1.7
COY-33	67.6	distributed	McCoy Creek		100	53.7	D	2.4
COY-34	50.6	distributed	McCoy Creek		100	59.4	D	3.1
COY-35	74.7	discrete	McCoy Creek	COY-35	100	58.9	D	2.1
MAR-31	122	discrete	Marsh #1	COY-35	100	56.5	A	1.3
LAU-39	76	distributed	Laurel Creek		100	67.7	D	1.4
MAR-32	71.4	distributed	Marsh #1		100	50.6	D	1.5
MAR-33	49.8	distributed	Marsh #1		100	22.9	D	1.4
MAR-37	127.2	distributed	Marsh #1		100	10.9	A	2
COY-36	59.3	discrete	McCoy Creek		100	46.1	A	3
COY-37	37	distributed	McCoy Creek		100	47	D	2.7
MAR-39	51.9	discrete	Marsh #1		100	71	D	0.5
COY-38	137.7	distributed	McCoy Creek		100	10.6	D	3.1
COY-39	99.2	distributed	McCoy Creek		100	53.7	B	2
MAR-34	80.1	distributed	Marsh #1		100	51.4	D	1
MAR-35	56.1	distributed	Marsh #1		100	50.2	D	0.9
MAR-36	32.6	distributed	Marsh #1		100	55.2	D	1
MAR-38	60.7	distributed	Marsh #1		100	32.4	D	5.1
SODA-38	20.7	distributed	Soda Springs Creek		100	47.2	D	0.2
MAR-40	29.8	distributed	Marsh #1		100	3.9	D	0.9
MAR-41	95.8	discrete	Marsh #1		100	60.2	D	0.5
LAU-38	34.4	distributed	Laurel Creek		100	8.5	D	1.5
MAR-43	61.5	discrete	Marsh #1	MAR-44	100	60.9	A	3.9
MAR-44	67.3	discrete	Marsh #1	MAR-44	100	50.5	D	2
COY-41	94.1	distributed	McCoy Creek		100	42.4	D	2.2

LAU-37	30.6	distributed	Laurel Creek		100	13	D	4.8
MAR-45	51.9	discrete	Marsh #1	COY-35	100	57.5	A	1
COY-42	60	distributed	McCoy Creek		100	39.5	D	1.2
MAR-46	47.2	discrete	Marsh #1		100	66.1	D	0.6
COY-43	28.7	discrete	McCoy Creek		100	42.6	D	2.6
LAU-36	19.2	distributed	Laurel Creek		100	35.9	D	2.1
MAR-47	64.7	distributed	Marsh #1		100	43.6	D	6.9

Appendix D

Solano Permittee decentralized BMPs.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2455 Huntington	Installed	2020	Biofiltration	11.247	McCoy Creek	COY-2	38.27765067	-121.97435
Fairfield	1200 B Gale Wilson B	Installed	2020	Bioretention	0.241	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	Denny's Restaurant	Planned	2030	Bioretention	0.77	Dan Wilson Creek	DAN-2	38.21955338	-122.127658
Fairfield	3950 Business Center	Installed	2020	Bioretention	2.296	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	Jayo Subdivision	Planned	2030	Bioretention	4.05	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	3900 Business Center	Installed	2020	Bioretention	8.533	Dan Wilson Creek	DAN-5	38.23116717	-122.1182872
Fairfield	4475 Central	Installed	2020	Bioretention	0.509	Dan Wilson Creek	DAN-8	38.22014694	-122.1300926
Fairfield	4500 Business Center	Installed	2020	Bioretention	2.551	Green Valley Creek	GRN-26	38.22604915	-122.1326145
Fairfield	4625 Mangels	Installed	2020	Bioretention	3.688	Green Valley Creek	GRN-26	38.2251654	-122.1358266
Fairfield	Partnership Health 2	Planned	2030	Bioretention	4.43	Green Valley Creek	GRN-28	38.22411267	-122.1326464
Fairfield	3630 Ritchie	Installed	2020	Bioretention	3.295	Green Valley Creek	GRN-29	38.21379883	-122.1362455
Fairfield	2600 Estates	Installed	2020	Bioretention	0.406	Laurel Creek	LAU-27	38.30664231	-122.029309
Fairfield	3201 Hartford	Installed	2020	Bioretention	0.326	Ledgewood Creek	LED-2	38.25466074	-122.0670856
Fairfield	Caliber Collision	Planned	2030	Bioretention	1.46	Marsh 1	MAR-8	38.24675285	-122.0743114
Fairfield	2600 Maxwell	Installed	2020	Bioretention	1.737	Marsh 1	MAR-11	38.23099408	-122.0799684
Fairfield	770 Chadbourne	Installed	2020	Bioretention	4.635	Marsh 1	MAR-11	38.23034689	-122.0835006
Fairfield	800 Chadbourne	Installed	2020	Bioretention	6.313	Marsh 1	MAR-11	38.22897736	-122.0819342
Fairfield	Innova Maxwell	Planned	2030	Bioretention	2.63	Marsh 1	MAR-11	38.23087887	-122.0800178
Fairfield	2487 Courage	Installed	2020	Bioretention	1	Marsh 1	MAR-12	38.23405747	-122.081283
Fairfield	2901 Cordelia	Installed	2020	Bioretention	8.189	Marsh 1	MAR-13	38.2279119	-122.0874744
Fairfield	Solano Logistics D	Planned	2030	Bioretention	3.5	Marsh 1	MAR-13	38.22789676	-122.0903076
Fairfield	Jelly Belly Warehouse Expansion	Planned	2030	Bioretention	4.09	Marsh 1	MAR-15	38.23809914	-122.0746228
Fairfield	360 Beck A	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.2333092	-122.066136
Fairfield	360 Beck B	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.23279513	-122.0661494
Fairfield	E&P Properties	Planned	2030	Bioretention	9.92	Marsh 1	MAR-20	38.23590326	-122.0706416
Fairfield	2051 Walters	Installed	2020	Bioretention	0.981	McCoy Creek	COY-10	38.26628535	-121.9880675

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2400 Huntington	Installed	2020	Bioretention	1	McCoy Creek	COY-2	38.27764825	-121.9745453
Fairfield	Fairfield/Vacaville Train Station	Planned	2030	Bioretention	1	McCoy Creek	COY-27	38.28614529	-121.9680942
Fairfield	1800 North Texas	Installed	2020	Bioretention	0.065	Soda Springs Creek	SODA-13	38.26235658	-122.0341855
Fairfield	3329 North Texas	Installed	2020	Bioretention	0.358	Soda Springs Creek	SODA-18	38.289267	-122.0341714
Fairfield	3345 North Texas	Installed	2020	Bioretention	0.988	Soda Springs Creek	SODA-18	38.2905095	-122.0341275
Fairfield	2525 North Texas	Installed	2020	Bioretention	0.475	Soda Springs Creek	SODA-29	38.27556882	-122.0342614
Fairfield	2590 North Texas	Installed	2020	Bioretention	0.76	Soda Springs Creek	SODA-29	38.27600953	-122.0340355
Fairfield	2700 North Texas	Installed	2020	Bioretention	0.289	Soda Springs Creek	SODA-29	38.27675262	-122.0340485
Fairfield	2470 Hilborn	Installed	2020	Bioswale	0.381	Alonzo Creek	ALZ-18	38.27532514	-122.0522109
Fairfield	600 Gregory	Installed	2020	Bioswale	0.448	Alonzo Creek	ALZ-6	38.24820883	-122.0560475
Fairfield	201 Pittman	Installed	2020	Bioswale	1.071	Dan Wilson Creek	DAN-2	38.22012023	-122.1272167
Fairfield	200 Business Center	Installed	2020	Bioswale	4.295	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	4755 Business Center	Installed	2020	Bioswale	1.846	Green Valley Creek	GRN-12	38.22096842	-122.1373021
Fairfield	4775 Business Center	Installed	2020	Bioswale	2.46	Green Valley Creek	GRN-12	38.22060358	-122.1382177
Fairfield	4650 Business Center	Installed	2020	Bioswale	1.693	Green Valley Creek	GRN-26	38.22225683	-122.1340899
Fairfield	167 Grobric	Installed	2020	Bioswale	1.162	Green Valley Creek	GRN-29	38.21607168	-122.1343305
Fairfield	4856 Auto Plaza	Installed	2020	Bioswale	2.298	Green Valley Creek	GRN-3	38.21258775	-122.1396229
Fairfield	4865 Auto Plaza	Installed	2020	Bioswale	4.591	Green Valley Creek	GRN-3	38.21244225	-122.1397805
Fairfield	5001 Fermi	Installed	2020	Bioswale	5.818	Jameson Creek	JAM-3	38.2037402	-122.139484
Fairfield	5133 Fulton	Installed	2020	Bioswale	4.053	Jameson Creek	JAM-7	38.20708849	-122.144373
Fairfield	5160 Fulton	Installed	2020	Bioswale	2.388	Jameson Creek	JAM-7	38.20714647	-122.145164
Fairfield	1057 Horizon	Installed	2020	Bioswale	3.452	Laurel Creek	LAU-22	38.27342649	-122.0147834
Fairfield	2001 Meyer	Installed	2020	Bioswale	1.426	Ledgewood Creek	LED-15	38.2379282	-122.0635347
Fairfield	1200 Oliver	Installed	2020	Bioswale	2.345	Ledgewood Creek	LED-2	38.25516097	-122.0671784
Fairfield	1717 Clift	Installed	2020	Bioswale	1.033	Ledgewood Creek	LED-5	38.24272299	-122.0593736
Fairfield	Courage Dr Beck Ave	Installed	2020	Bioswale	1.5	Marsh 1	MAR-1	38.23765765	-122.0676488
Fairfield	2950 Auto Mall	Installed	2020	Bioswale	2.909	Marsh 1	MAR-9	38.24153261	-122.0839885
Fairfield	2955 Automall	Installed	2020	Bioswale	2.296	Marsh 1	MAR-9	38.24164932	-122.0836312
Fairfield	801 Chadbourne	Installed	2020	Bioswale	7.92	Marsh 1	MAR-11	38.22874137	-122.0832968
Fairfield	2700 Low	Installed	2020	Bioswale	5.016	Marsh 1	MAR-12	38.23676132	-122.0847769
Fairfield	2525 N Watney	Installed	2020	Bioswale	2.5	Marsh 1	MAR-15	38.23624603	-122.0791156
Fairfield	Sheldon Oil Company	Planned	2030	Bioswale	1	Marsh 1	MAR-19	38.23528702	-122.0607524
Fairfield	2510 Clay Bank	Installed	2020	Bioswale	0.982	McCoy Creek	COY-15	38.2752175	-122.0064988
Fairfield	Clorox	Planned	2030	Bioswale	1	McCoy Creek	COY-2	38.27960416	-121.9710685

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Peabody Road	Installed	2020	Bioswale	16.368	McCoy Creek	COY-27	38.29709076	-121.9675707
Fairfield	Texas Corners	Planned	2030	Bioswale	0.72	Soda Springs Creek	SODA-11	38.24997707	-122.0341621
Fairfield	1833 N Texas	Installed	2020	Bioswale	2.778	Soda Springs Creek	SODA-13	38.26356253	-122.0342475
Fairfield	3333 North Texas	Installed	2020	Bioswale	1.832	Soda Springs Creek	SODA-18	38.28960861	-122.0341365
Fairfield	3400 North Texas	Installed	2020	Bioswale	9.507	Soda Springs Creek	SODA-18	38.2927325	-122.0326218
Fairfield	824 Washington	Installed	2020	Bioswale	2.17	Soda Springs Creek	SODA-25	38.25055608	-122.0390686
Fairfield	Senior Manor Parking Lot	Planned	2030	Bioswale	1	Soda Springs Creek	SODA-36	38.2535156	-122.0404984
Fairfield	2910 Industrial	Installed	2020	Bioswale	0.696	Union Creek	UNI-2	38.27338698	-121.9633523
Fairfield	Jepson Parkway 2A	Planned	2030	Bioswale	1	Union Creek	UNI-5	38.2938595	-121.9554919
Fairfield	1200 B Gale Wilson A	Installed	2020	Filtration Device	3.656	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	3650 Nelson	Installed	2020	Filtration Device	1	Laurel Creek	LAU-10	38.29454858	-122.0317184
Fairfield	3500 Nelson	Installed	2020	Filtration Device	2.025	Laurel Creek	LAU-7	38.29380211	-122.0316656
Fairfield	2263 N Texas	Installed	2020	Filtration Device	0.013	Soda Springs Creek	SODA-15	38.26986308	-122.034208
Fairfield	3340 N Texas	Installed	2020	Filtration Device	2.941	Soda Springs Creek	SODA-18	38.29215565	-122.0332795
Fairfield	4350 Central	Installed	2020	Sediment Trap	3.194	Dan Wilson Creek	DAN-2	38.22350691	-122.1251014
Fairfield	4610 West America	Installed	2020	Sediment Trap	1	Green Valley Creek	GRN-22	38.23045612	-122.1309696
Fairfield	3330 Dover	Installed	2020	Sediment Trap	0.028	Laurel Creek	LAU-15	38.28939339	-122.024848
Fairfield	3355 North Texas	Installed	2020	Sediment Trap	1.015	Soda Springs Creek	SODA-18	38.28987196	-122.0341651
Suisun	Cottonwood_DB	Installed	2020	Bioretention	3.2	Laurel Creek	LAU-36	38.253919	-122.021465
Suisun	Summerwood_DB	Installed	2020	Bioretention	2.5	Laurel Creek	LAU-36	38.253905	-122.022136
Suisun	Walmart_BR_1	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24175304	-121.9886363
Suisun	Walmart_BR_2	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24255777	-121.9884485
Suisun	Walmart_BR_3	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332878	-121.9892102
Suisun	Walmart_BR_4	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332035	-121.9911978
Suisun	Walmart_BR_5	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24329929	-121.9920561
Suisun	Walmart_BR_6	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24142651	-121.9898674
Suisun	Walmart_DB	Installed	2020	Bioretention	15.8	Marsh #1	MAR-33	38.240915	-121.989429
Suisun	Holiday Inn Express	Installed	2020	Bioretention	1.6	Marsh #1	MAR-38	38.24209415	-122.0383736
Suisun	Crystal Middle School Site	Installed	2020	Bioretention	7.1	Marsh #1	MAR-39	38.23657066	-122.0436108
Suisun	Railroad Avenue Extension	Planned	2030	Bioretention	1.7	Marsh #1	MAR-41	38.24420303	-122.0330427
Suisun	Jubilee Commercial	Installed	2020	Bioretention	1.2	Marsh #1	MAR-43	38.26456217	-121.9873755
Suisun	ZE_BT_01	Installed	2020	Bioretention	1.6	Marsh #1	MAR-43	38.263235	-121.9877
Suisun	ZE_BT_03	Installed	2020	Bioretention	2.5	Marsh #1	MAR-43	38.264415	-121.986915
Suisun	ZE_BT_04	Installed	2020	Bioretention	0.7	Marsh #1	MAR-43	38.264101	-121.985862

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Suisun	ZE_BT02	Installed	2020	Bioretention	0.4	Marsh #1	MAR-43	38.264158	-121.987761
Suisun	McCoy Creek Trail	Installed	2020	Bioretention	1	McCoy Creek	COY-41	38.25395217	-122.0113701
Suisun	Caterpillar Club House	Installed	2020	Bioretention	0.5	McCoy Creek	COY-42	38.24250196	-122.0191968
Suisun	Summerwood_GS 01	Installed	2020	Bioswale	0.5	Laurel Creek	LAU-36	38.254922	-122.023184
Suisun	Summerwood_GS 02	Installed	2020	Bioswale	0.2	Laurel Creek	LAU-36	38.254427	-122.022624
Suisun	HSC_FI	Installed	2020	Filtration Device	12.8	Laurel Creek	LAU-39	38.244877	-122.021441
Suisun	RR_Storage_Filters	Installed	2020	Filtration Device	1.1	McCoy Creek	COY-39	38.260923	-122.011153
Suisun	Summerwood_CDS	Installed	2020	Sediment Trap	2.5	Laurel Creek	LAU-36	38.254196	-122.024351
Suisun	Walmart_City CDS	Installed	2020	Sediment Trap	7.5	Marsh #1	MAR-33	38.243349	-121.989895
Suisun	Hampton_CDS	Installed	2020	Sediment Trap	0.9	Marsh #1	MAR-38	38.242237	-122.039346
Suisun	Andrews_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.254194	-121.985953
Suisun	Andrews_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-42	38.253443	-121.985822
Suisun	Beale_N_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.255578	-121.986025
Suisun	Beale_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.254878	-121.986035
Suisun	Hickam_N_SC	Installed	2020	Sediment Trap	3	Marsh #1	MAR-42	38.254255	-121.985453
Suisun	Hickam_S_SC	Installed	2020	Sediment Trap	3.7	Marsh #1	MAR-42	38.253438	-121.985359
Suisun	Vandenberg_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.255659	-121.985495
Suisun	Vandenberg_S_SC	Installed	2020	Sediment Trap	2.9	Marsh #1	MAR-42	38.254884	-121.985516
Suisun	Carswell Ct_SC	Installed	2020	Sediment Trap	7	Marsh #1	MAR-43	38.262615	-121.987286
Suisun	Dover_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.257337	-121.985992
Suisun	Dover_S_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.25671	-121.985995
Suisun	Ford Ord_SC	Installed	2020	Sediment Trap	1.6	Marsh #1	MAR-43	38.259527	-121.985967
Suisun	Keesler_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.258861	-121.985965
Suisun	Keesler_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-43	38.258068	-121.985987
Suisun	Neward_N_SC	Installed	2020	Sediment Trap	5.1	Marsh #1	MAR-43	38.261022	-121.986269
Suisun	Newark_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-43	38.260269	-121.986128
Suisun	Four Seasons_CDS	Installed	2020	Sediment Trap	4.3	Marsh #1	MAR-44	38.243597	-121.985876
Suisun	Breezewood_CDS	Installed	2020	Sediment Trap	3.9	McCoy Creek	COY-39	38.260753	-122.009642
Suisun	Amberwood_CDS	Installed	2020	Sediment Trap	3.5	McCoy Creek	COY-41	38.257989	-122.012995
Suisun	McCoy_CDS	Installed	2020	Sediment Trap	3.3	McCoy Creek	COY-42	38.241326	-122.01897
Vallejo	Sonoma_Blvd_BR	Installed	2020	Bioretention	3.5	Mare Island Strait	SA55	38.0937663	-122.2497144
Vallejo	850_Redwood_BR3	Installed	2020	Bioretention	0.25	Napa River	AC35	38.1228762	-122.2543064
Vallejo	Automall_Basin	Installed	2020	Bioretention	2.7	Rindler Creek	LC21	38.13728229	-122.2143281
Vallejo	Couch_St_BR1	Installed	2020	Bioretention	0.75	White Slough	AC34	38.12397765	-122.2503421

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Vallejo	Couch_St_BR2	Installed	2020	Bioretention	0.75	White Slough	AC34	38.1236316	-122.2502697
Vallejo	850_Redwood_BR1	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12342271	-122.2542527
Vallejo	850_Redwood_BR2	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12313152	-122.2540945
Vallejo	AdmiralCallaghan_Bioswale	Installed	2020	Bioswale	1	Blue Rock Springs Creek	LC8	38.12364848	-122.2277015
Vallejo	9832_Vallejo_Streetscape	Installed	2020	Bioswale	0.05	Mare Island Strait	DT5	38.10213344	-122.2583216
Vallejo	AustinCk_Bioswale	Installed	2020	Bioswale	1	Napa River	AC41	38.11837319	-122.2568035
Vallejo	Kaiser_Broadway_2	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12756672	-122.2471529
Vallejo	Kaiser_Broadway_3	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12754984	-122.2474506
Vallejo	Kaiser_Broadway_4	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12737894	-122.2474158
Vallejo	Kaiser_Broadway_5	Installed	2020	Bioswale	0.24	White Slough	AC34	38.1273916	-122.2471368
Vallejo	HiddenbrookPark	Installed	2020	Infiltration Feature	1	Sulphur Springs Creek	SV4	38.1366937	-122.1687949
Vallejo	Kaiser_Broadway_1	Installed	2020	Infiltration Feature	0.24	White Slough	AC34	38.12769121	-122.2477591
Vallejo	9810_Curtola_Pkwy	Installed	2020	Pervious Pavement	1	Lake Dalwigk	LS33	38.09378108	-122.2396427
Vallejo	Chase_St_PP	Installed	2020	Pervious Pavement	0.4	Mare Island Strait	LS35	38.09659274	-122.2399378
Vallejo	SP14101B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15244205	-122.2838573
Vallejo	SP14201B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15302772	-122.2806181
Vallejo	SP14401B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1546249	-122.2792984
Vallejo	SP14501B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1551305	-122.2807271
Vallejo	SP14601B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15512579	-122.2820948

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

05743
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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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MEMORANDUM

TO: BASMAA Board of Directors

FROM: BASMAA Project Team: EOA, Inc., Larry Walker Associates, Geosyntec Consultants, Stephanie Hughes, and David J. Powers & Associates, Inc.

DATE: August 13, 2018

SUBJECT: Supplemental Demolition Permit Application Materials - Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

This memorandum transmits a deliverable for Task 5 (Supplemental Demolition Permit Application Materials) of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP). The MRP is issued by the San Francisco Bay Regional Water Quality Control Board[1] (Regional Water Board). Provision C.12.f requires Permittees to manage PCBs–containing building materials during demolition.

OBJECTIVES OF THIS TECHNICAL MEMORANDUM

MRP Provision C.12.f.ii (2) requires that by July 1, 2019 Permittees "implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to MS4s from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff." This memorandum was developed to assist Permittees to comply with Provision C.12.f.ii (2) by transmitting a *PCBs in Priority Building Materials: Model Screening Assessment Applicant Package*.

PCBS IN PRIORITY BUILDING MATERIALS SCREENING ASSESSMENT APPLICANT PACKAGE

The attached *PCBs in Priority Building Materials Screening Assessment Applicant Package (Applicant Package)* contains model supplemental demolition permit application materials that incorporate the PCBs in building materials control program requirements in the MRP. It includes supplemental demolition permit application model materials, including an overview of the process, forms, applicant instructions, and process flow charts. The starting point was the model process flowcharts and forms developed for the PCBs in Caulk Project in 2011.[2]

The *Applicant Package* incorporates the steps outlined in the *Protocol for Evaluating Priority PCBs–Containing Materials before Building Demolition* (BASMAA 2018), which was developed via Task 3 of this BASMAA regional project, and converts those steps into appropriate application questions and submittals. In addition, the *Applicant Package* incorporates gathering tracking and assessment

[1] The MRP was reissued November 19, 2015, with an effective date of January 1, 2016. There are 77 Phase I municipal stormwater Permittees in five Bay Area counties, which are among the over 90 local agencies represented by BASMAA.

[2] http://www.sfestuary.org/taking-action-for-clean-water-pcbs-in-caulk-project

information related to the MRP Provision C.12.f.ii (3) requirement to develop an assessment methodology and data collection program to quantify reductions in PCBs loads to MS4s through the new program for controlling PCBs during demolition. Task 7 of this BASMAA regional project developed a conceptual approach to developing the assessment methodology and data collection program that is coordinated with the *Applicant Package*.

The *Applicant Package* summarizes the typical process that a local agency will need to follow to implement a new program to manage PCBs-containing materials during building demolition. It is anticipated that each jurisdiction's approach to implementing the new program will vary depending upon that agency's current procedures and needs. Potential approaches include using the model materials as a stand-alone program, or incorporating questions in the model materials into existing demolition permit or building permit applications, Construction and Demolition (C&D) applications and plan development guidance, and/or information management systems such as GreenHalo™. However, the *Applicant Package* was developed as a stand-alone package in order to provide a complete overview of a model process.

REFERENCES

California Regional Water Quality Control Board, San Francisco Bay Region (SFBRWQCB) 2015. Municipal Regional Stormwater NPDES Permit, Order R2–2015–0049, NPDES Permit No. CAS612008. November 19, 2015.

BASMAA 2018. Protocol for Evaluating Priority PCBs–Containing Materials before Building Demolition. Prepared for Bay Area Stormwater Management Agencies Association (BASMAA). August 2018.

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

The mention of commercial products, their source, or their use in connection with information in BASMAA products is not to be construed as an actual or implied approval, endorsement, recommendation, or warranty of such product or its use in connection with the information provided by BASMAA.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

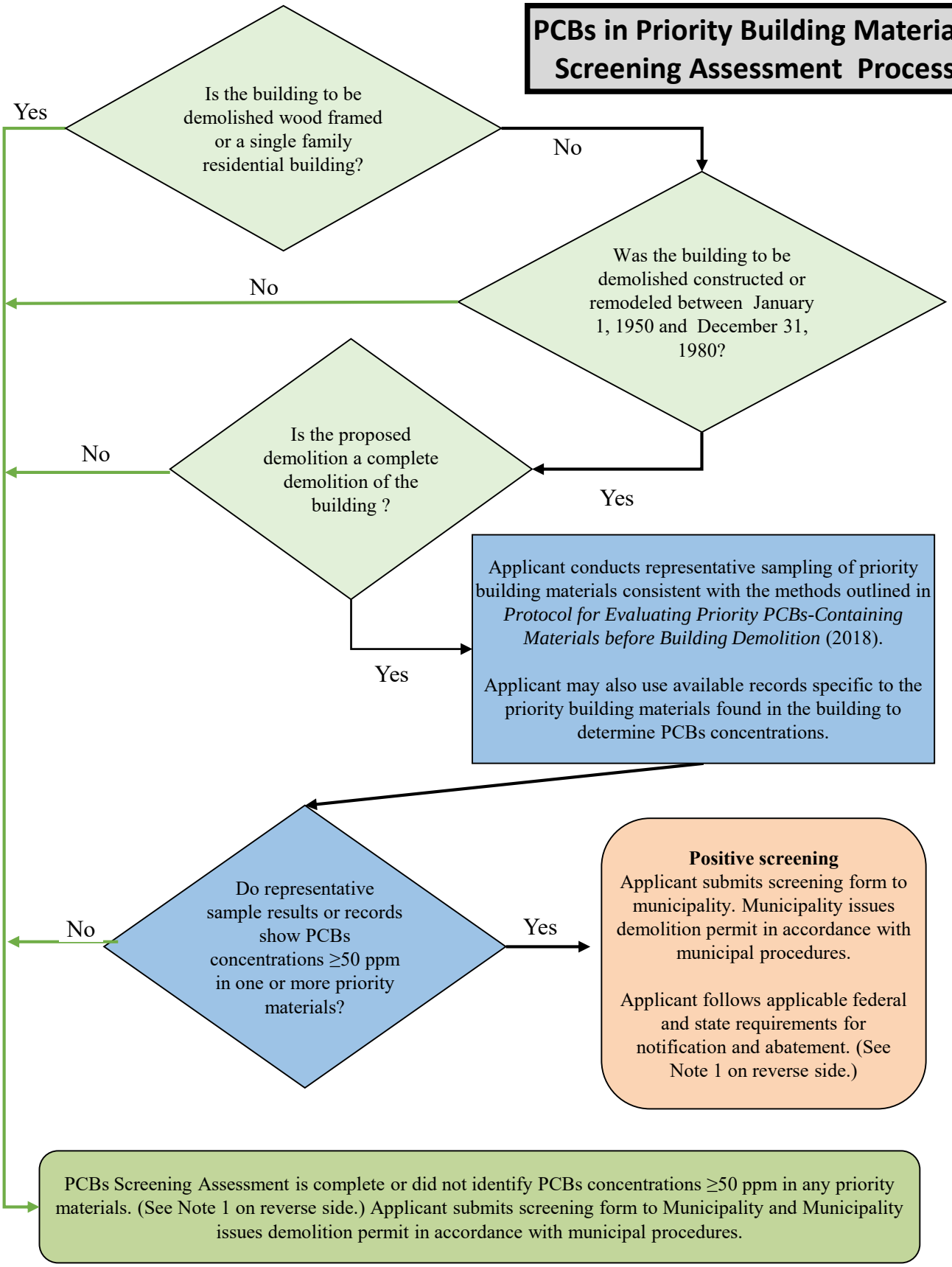

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

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Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

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Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
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Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

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Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

---

[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

---

[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

---

[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	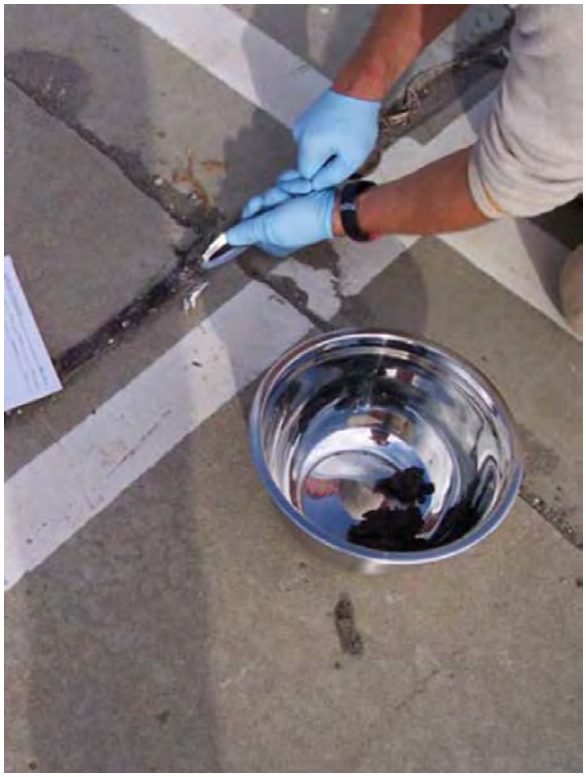
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	
Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7	
<u>Thermal Insulation</u>: **Damaged felt-style thermal insulation.**	
Photograph 8	
<u>Thermal Insulation</u>: **Exposed/damaged fiberglass insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13

<u>Adhesive / Mastic:</u>

Adhesive remnants on flooring.

Photograph 14

<u>Adhesive / Mastic:</u>

Exposed adhesive on roofing.

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	
Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

A Guide to Eating Fish from the California Coast

Advisory for Areas Without Site-specific Advice

Women 18 - 45 years and Children 1 - 17 years

Croaker

Low-PCB Surfperch

Queenfish

Very Low-PCB Surfperch

Topsmelt

2 total servings a week

Small Flatfish

Barred Sand Bass

California Corbina

Cabezon

Lingcod

Kelp Bass

Medium-Mercury Rockfish

High-Mercury Rockfish

Sharks

6 total servings a week OR **1 total serving a week** | **Do not eat**

Women 46 years and older and Men 18 years and older

Croaker

Queenfish

Medium-Mercury Rockfish

4 total servings a week

Small Flatfish

Topsmelt

Very Low-PCB Surfperch

Low-PCB Surfperch

Cabezon

Barred Sand Bass

Kelp Bass

Lingcod

California Corbina

High-Mercury Rockfish

Sharks

6 total servings a week OR **2 total servings a week** OR **1 total serving a week**

Croaker species include: White and Yellowfin
Small Flatfish species include: Diamond Turbot, Longfin Sanddab, Speckled Sanddab, Spotted Turbot

Medium-Mercury Rockfish species include: Black, Blue, Brown, Kelp, Olive, Rosethorn, and Vermillion
High-Mercury Rockfish species include: Black and Yellow, China, Copper and Gopher

Very Low-PCB Surfperch species include: Barred, Black, Pile, Rainbow, Spotfin, and White
Low-PCB Surfperch species include: Shiner, Silver, and Walleye

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'PS "EVMUT

" TFSWJOH JT about U I F TJ[F BOE U I JDLOFTT PG ZPVS I BOE for fish fillets (JWF D I JMESFO TNBMMFS TFSWJOHT

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8 I Z FBU GJT I ?

&BUJOH GJT I JT HPPE GPS ZPVS I FBMU I . 'JT I I BWF oNFHB T U I BU DBO SFEVDF ZPVS SJTL GPS I FBSU EJTFBTF BOE JNQSPWF I PX U I F CSBJO EFWFMPQT JO VOCPSO CBCJFT BOE D I JMESFO

8 I BU JT U I F DPODFSO?

4PNF GJT I I BWF I JH I MFWFMT PG NFSDVSZ BOE 1C#T . FSDVSZ DBO I BSN U I F CSBJO, eTQFDJBMMZ JO VOCPSO CBCJFT BOE D I JMESFO 1C#T DBO DBVTF DBODFS

Do not combine advice. If you eat 2 servings of fish from the "2 total servings per week group", do not eat any other fish that week from any source (caught or store bought).

California Office of Environmental Health Hazard Assessment • KKX PF I I B DB HPW GJT I • (916) 324-7572 • fish@oehha.ca.gov

0581 1
5852

Men over 17 and women over 45 can safely eat more fish

- **7 servings a week OR**
  5 servings a week of crayfish or catfish **OR**
- **2 servings a week OR**
- **2 servings a week** of striped bass **OR**
  1 serving a week of white sturgeon

Do not eat any fish or shellfish from the Port of Stockton.

♥ Why eat fish?

Eating fish is good for your health. Fish have Omega-3s that can reduce your risk for heart disease and improve how the brain develops in unborn babies and children.

What is the concern?

Some fish have high levels of mercury and PCBs. Mercury can harm the brain especially in unborn babies and children. PCBs can cause cancer.

What is a serving?

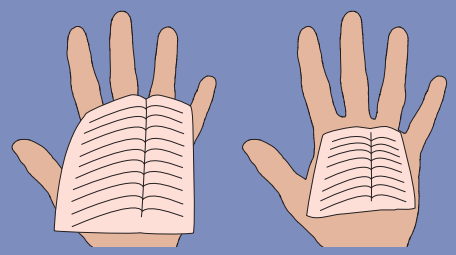

For Adults For Children

The recommended serving of fish is about the size and thickness of your hand. Give children smaller servings.

Fish buying guidelines for women 18 – 45 and children 1 – 17

Do not eat fish caught by family or friends in the same week that you eat fish bought in a store or restaurant. For fish that you buy:

- **Safe to eat 2 servings per week** of low mercury fish such as salmon ♥, pollock, catfish, tilapia, shrimp, anchovies ♥, sardines ♥, trout ♥, or canned chunk-light tuna

OR

- **Safe to eat 1 serving per week** of medium-mercury fish such as canned albacore (white) tuna ♥
- **Do not eat** shark, swordfish, tilefish, or king mackerel

♥ = High in Omega-3s

California Office of Environmental Health Hazard Assessment

www.oehha.ca.gov/fish.html

(916) 327-7319 or (510) 622-3170

4/15

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Guide to Eating Fish Caught in the **Central and South Delta**

Includes all waterbodies in the Delta south of Highway 12 (except the Sacramento River and the San Joaquin River south of Stockton).

A guide to eating fish caught in the Central and South Delta

Women 18 - 45 and children 1 - 17

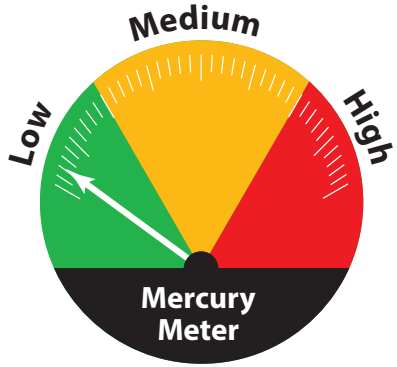

Crayfish

American shad ♥

Bluegill or other sunfish

Catfish

Asiatic clam

Steelhead trout* ♥

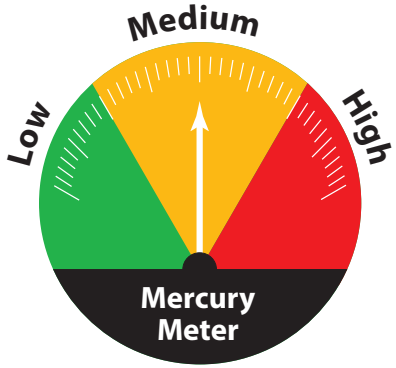

Bass ♥

Sucker

Crappie

Carp

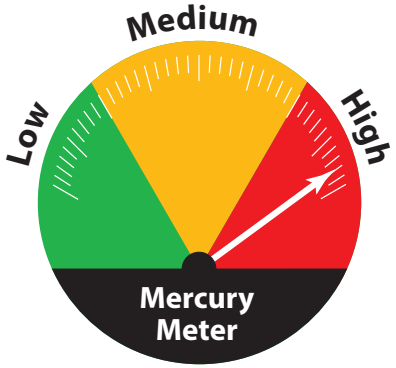

Striped bass

White sturgeon

♥ = High in Omega-3s

* It is only legal to keep hatchery steelhead and only in select waters, see www.wildlife.ca.gov/Regulations

2 servings a week OR
7 servings a week of clams

OR

1 serving per week

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Do not eat
AND
do not eat any fish or shellfish from the Port of Stockton

Geosyntec consultants

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Oakland, California 94607
PH 510.836.3034
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Memorandum

Date:	September 18, 2020
To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

*****

Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	May 2020	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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Stephanie Hughes
David J. Powers & Associates, Inc.

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

Attachment B PCBs in Priority Building Materials Screening Assessment Form B-1

Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

DISCLAIMER

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

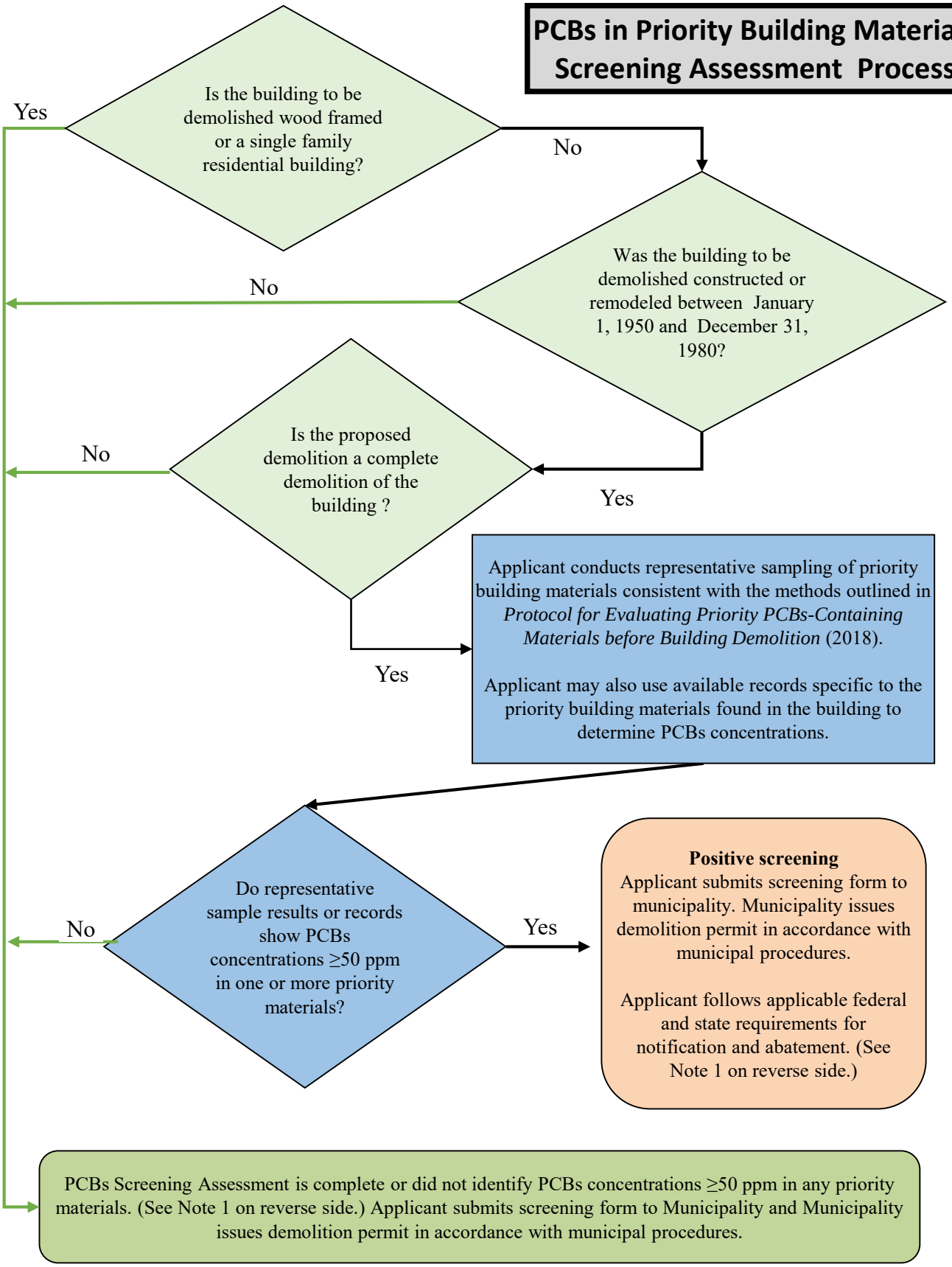

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

The mention of commercial products, their source, or their use in connection with information in BASMAA products is not to be construed as an actual or implied approval, endorsement, recommendation, or warranty of such product or its use in connection with the information provided by BASMAA.

This disclaimer is applicable to all BASMAA products, whether information from the BASMAA products is obtained in hard copy form, electronically, or downloaded from the Internet.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

---

[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

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[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

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[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	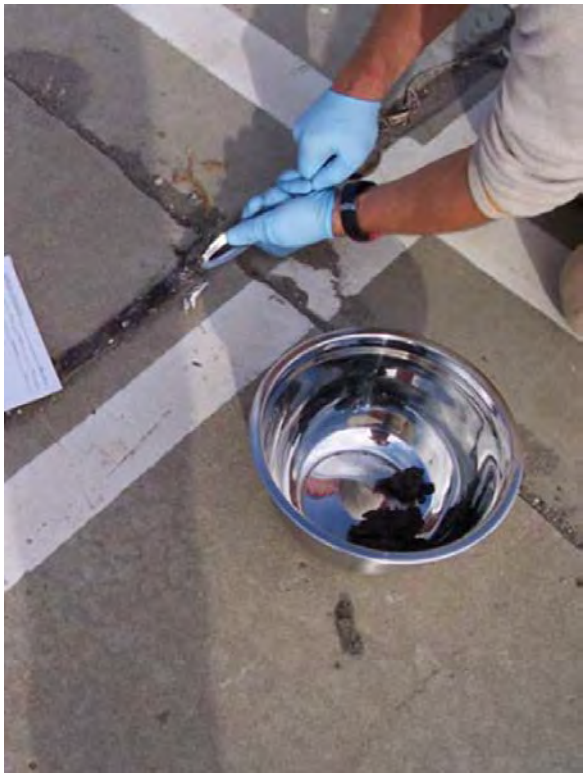
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7

<u>Thermal Insulation</u>:

Damaged felt-style thermal insulation.

Photograph 8

<u>Thermal Insulation</u>:

Exposed/damaged fiberglass insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	

Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

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SOLANO PERMITTEES'

Implementation Plan & Schedule to Achieve TMDL Allocations

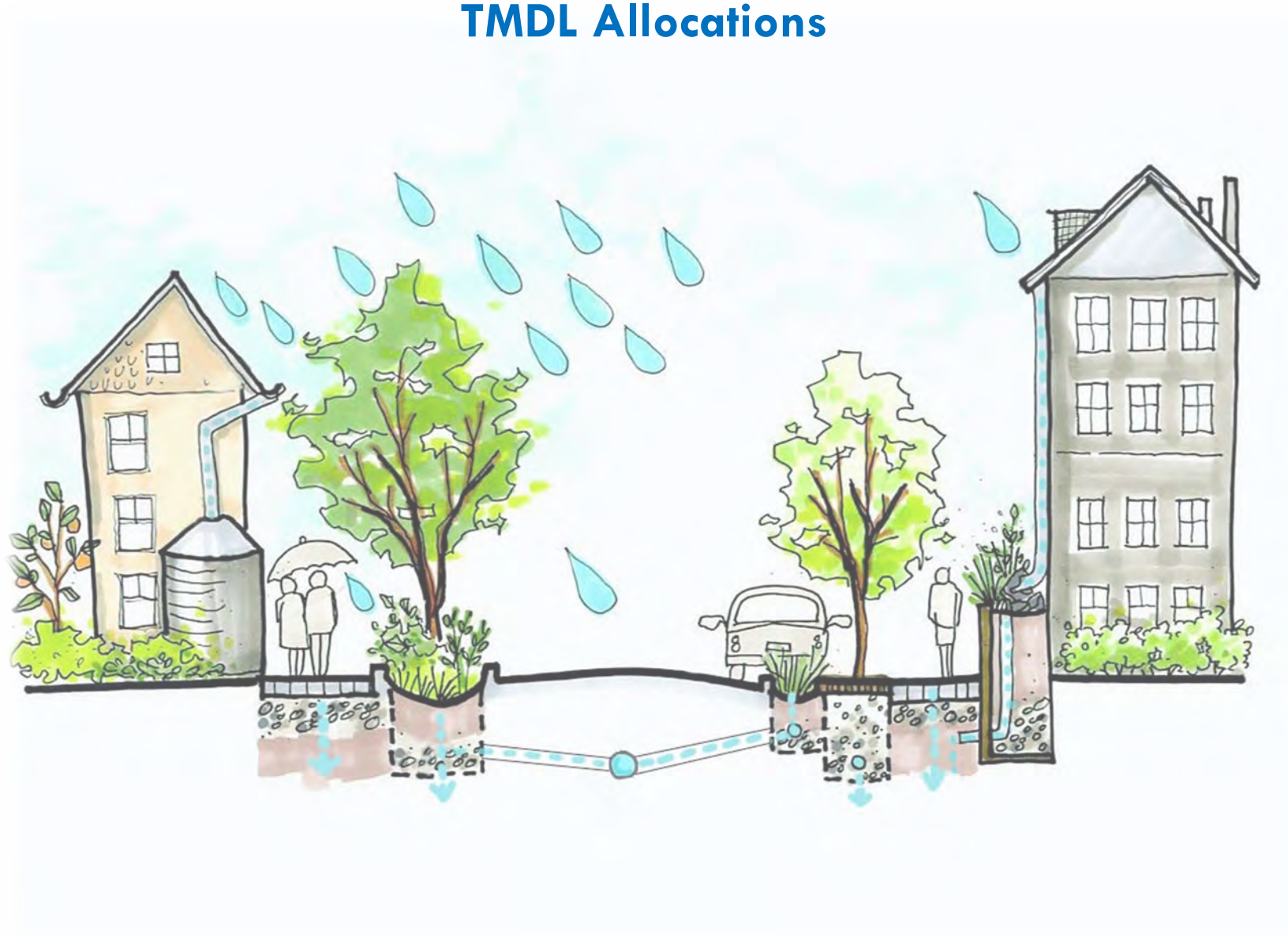

September 2020

In compliance with Provision C.11.d & C.12.d of Order R2-2015-00

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1 Executive Summary

Along with other municipalities and agencies in the Bay Area, the Solano Permittees are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP), which became effective on January 1, 2016. A section of the MRP requires Permittees to prepare a plan and schedule for PCBs and mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030 and mercury TMDL wasteload allocations by 2028 (C.11.d for mercury and C.12.d for PCBs).

This document serves to meet the MRP requirement and outlines how the cities aim to achieve the TMDL wasteload allocations. Consistent with the MRP requirements, the plan:

1. Identifies all proposed mercury and PCBs control measures to be implemented (Sections 3 and 4);
2. Includes a schedule of when mercury and PCBs control measures will be implemented (Section 4); and
3. Estimates the mercury and PCBs load reduction of the measures, as estimated through the reasonable assurance analysis (RAA) modeling, along with an evaluation of the costs, control measure efficiency and resulting significant environmental impacts (Sections 3 and 4).

Primary findings are that the Solano Permittees' estimated PCBs and mercury reductions meet wasteload allocation reduction targets specified in the MRP for 2028/2030 and 2040. While smaller than reductions associated with green stormwater infrastructure and land use redevelopment, source control reductions play an important role in attaining wasteload allocations for Solano Permittees. Source control reductions are usually largest when implemented in areas with the highest typical land use pollutant concentrations such as Mare Island in Vallejo for PCBs or Old Residential areas in Fairfield. Source control measure PCBs reduction estimates from the City of Vallejo are disproportionately large, primarily due to Old Industrial land use areas on Mare Island.

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2 Introduction and Overview

2.1 Regulatory Mandate

The Solano Permittees include the Cities of Fairfield, Suisun, and Vallejo; and the Vallejo Flood and Wastewater District. The Permittees are among 76 local government entities subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1]. The MRP mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay.

Water quality in San Francisco Bay is impaired by mercury and by polychlorinated biphenyls (PCBs). Controlling sources of these pollutants and reducing and treating stormwater flows before these pollutants enter the Bay will hasten the Bay's recovery.

2.1.1 Further Background on Mercury and PCBs in San Francisco Bay

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay from identified sources, including from urban stormwater.

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue[2]. The second objective, established to protect aquatic organisms and wildlife, applies to small fish[3] commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish[4]. To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.[5]

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[1] San Francisco Bay Regional Water Quality Control Board. 2015. Municipal Regional Stormwater Permit, Order No. R2-2015-0049. www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf.

[2] The average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans.

[3] 3-5 centimeters in length

[4] average wet weight concentration

[5] A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations.

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The PCBs TMDL was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue.[6] A food web model was developed by San Francisco Estuary Institute (SFEI) to identify the sediment target concentration that would yield the fish tissue target; this sediment target was found to be 1 microgram (µg) of PCBs per kg of sediment. Twenty percent of the estimated allowable PCB external load was allocated to urban stormwater runoff. The Bay Area-wide allocation for PCBs for urban stormwater is 2 kg/yr by 2030.[7]

2.2 PCBs Sources to Urban Runoff

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame-retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to the Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

2.3 Mercury Sources to Urban Runoff

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing

[6] This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day).
[7] This value was developed based on applying the required sediment concentration (1 µg/kg) to the estimated annual sediment load discharged from local tributaries.

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fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to San Francisco Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

2.4 PCBs and Mercury Potential Source Identification in Solano County

Since the early 1990's, several locations within the San Francisco Bay nearby to Solano County have been sampled by regional monitoring programs such as the San Francisco Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3) 6 system, administered by SFEI, provides access to these data which are useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. Maps presented in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. Six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire San Francisco Bay.

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3 PCBs and Mercury Source Control Measures

Qualified PCBs and Mercury source control measures are summarized below, and more complete descriptions and calculation methods are documented in BASMAA's Source Control Load Reduction Accounting for RAA (Final Draft 6-9-20), which is included as Appendix B to this plan.

Source Property Identification and Abatement. Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs or mercury were used, released, or disposed of or where sediment concentrations of PCBs or mercury are significantly elevated above urban background levels. Once a source property is identified, the source of PCBs or mercury on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the Regional Water Board or another appropriate agency for investigation and abatement.

PCBs in Building Materials Management Program. The MRP Permittees have developed a protocol for managing building materials and wastes with PCBs concentrations of 50 parts per million (ppm) or greater in applicable structures at the time demolition occurs so that PCBs do not enter the municipal storm drain system. Implementation of the protocol began July 1, 2019.

PCBs in electrical utilities management program. During the first three years of the permit term, the Permittees will develop and implement a program to manage PCBs-containing electrical utility equipment to prevent or reduce PCBs from entering the MS4. The Electrical Utilities Management Program will include improved practices and procedures for documenting removal and disposal of PCBs-containing electrical equipment, responding to unplanned PCBs releases, and monitoring and reporting requirements.

Managing PCBs in storm drain infrastructure caulk management program. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4.

Enhanced Operation and Maintenance Control Measures. Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line flushing may enhance the Permittees' ability to reduce PCBs and mercury loads in stormwater.

Trash Capture Systems. This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices

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(GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

Diversion to Publicly Owned Treatment Works. This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

Mercury load avoidance and reduction program. Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling.

Not all these control measures have been implemented by the Solano Permittees due to either limited resources or lack of evidence of source contributions. The following sections describe actions by the Solano Permittees with respect to each source control measure and provide an accounting of pollutant reductions associated with each applicable control measure.

3.1 Source Control Identification and Abatement

Solano Permittees have made no referrals of potential source properties to the Regional Water Board for abatement. During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD, 2016). The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an Old Industrial area based on historic land use. Waterfront sections of Vallejo are also considered Old Industrial and may be examined more closely in the future.

In 2016, four sites within the City of Fairfield and Suisun were investigated as part of a BMP retrofit study and showed that sediments did not contain elevated levels of PCBs (City of Fairfield, 2016). Remediation of two sites that comprised the Vallejo Manufactured Gas Plan Site PG&E in 2019 showed elevated levels of several contaminants but elevated levels of PCBs were not reported.

3.2 PCBs in electrical utilities management program

During MRP 3.0, Permittees propose to implement a new control measure program to manage the release of PCBs from oil filled electrical equipment (OFEE). Under this new program, load reductions will be credited for the following actions:

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Action 1: Permittee operated electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and during the five-year permit term, and provide data to support calculations of the associated stormwater load reductions due to these efforts;

Action 2: Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. To date, Solano permittees have not implemented a program to manage PCBs in electrical utilities.

In order to estimate the loads reduced since the start of the TMDL and the current (2020) PCBs loads to stormwater from PCBs-containing OFEE, the overall 65% load reduction rate shown in the McKee et al. (2006) mass balance models for the fifteen-year period between 1990 and 2005 was used as the high estimate for the load reduction rate. Reductions will be allocated regionally according to the timeframes established in BASMAA (Appendix B).

There are no PCB-containing OFEE facilities within the Solano Permittees' MS4 Area, therefore the proposed actions do not apply.

3.3 PCBs in Building Materials Management Program

Beginning in July 2019, the MRP Permittees have developed and implemented a process for managing materials with PCBs concentrations > 50 ppm during demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled from 1950 to 1980 that undergo full-building demolition. The Solano Permittees have adopted this process and since July 2019, there have been 3 buildings demolished that followed the specified BASMAA protocol to receive PCBs reductions credit. All buildings were located on Mare Island and are classified as Old Industrial land use, with relatively high PCB concentrations (see Figure 3-1). The PCBs load reduction resulting from building materials management (R_b) is calculated as the product of the number of applicable buildings demolished each year (n), the average mass of PCBs per applicable building in kg (5), the average fraction of PCBs that enters the MS4 due to demolition without controls (0.01), and the average fraction of PCBs prevented by controls from entering the MS4 (0.8) (following methods from Appendix B).

$$R_b = n * 5 * 0.01 * 0.8$$

With the three applicable buildings on Mare Island within the City of Vallejo and these parameters with appropriate unit conversions, the mass of PCBs reduced from building materials management is estimated to be 120 g/yr. for the Solano Permittees.

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Figure 3-1. Buildings demolished on Mare Island with PCBs in Building Materials Management Program in effect.

For calculating catchment-level reductions associated with this control measure, locations of the applicable buildings in the Building Materials Management Program were mapped and intersected with the previously delineated urban catchments to produce summary statistics of total PCBs reduced by catchment.

3.4 Managing PCBs in storm drain infrastructure caulk management program

Solano Permittees reported the results of an investigation into PCBs in infrastructure in their 2018 Annual Report in an attached report entitled: Evaluation of PCBs in Public Roadway and Storm Drain Infrastructure Caulk and Sealants. To date, the Solano Permittees have not yet implemented a program to manage PCB containing caulks within their storm drain infrastructure or roadways.

3.5 Enhanced Operation and Maintenance Control Measures

Solano Permittees have implemented enhanced operations and maintenance with regard to street sweeping and storm drain inlet cleaning. Both enhanced street sweeping and enhanced inlet cleaning are calculated in a similar manner with the annual load of PCBs reduced (R_s) expressed as

the product of the catchment drainage area (*A*), area weighted PCB yield (*Y*), and an enhanced efficiency factor (*E*) (following methods from Appendix B).

$$R_s = A * Y * E$$

Each factor in the reductions accounting was specified according to the relevant GIS data and city maintenance records. Efficiency factors for street sweeping and inlet cleaning were specified based on a combination of factors specified in the methods detailed by BASMAA (Appendix B).

3.5.1 Street Sweeping

Drainage areas (A) were specified as the area of each urban catchment and the yield was specified based on baseline PCBs and Mercury loads calculated for each catchment (see Appendix A). In this way, the sweeping reductions match the level of spatial granularity of both the baseline modeling and reductions calculated as part of the Green Stormwater Infrastructure (GSI) RAA (Appendix A). Enhanced efficiency factors for catchments associated with sweeping were specified using outputs from the Windows Source Loading Management Model (WinSLAMM) to evaluate various scenarios associated with street roughness and sweeping frequencies. The efficiency factor varies as a function of these two factors. We combined GIS layers of municipal sweeping schedules, pavement condition index, and sweeper types to estimate sweeping efficiency levels for each catchment throughout the MS4 area per tables provided by BASMAA (Appendix B). PCBs and mercury yields used in the calculations were specific to each catchment per baseline modeling reported per GSI RAA (Appendix A). The most common combination of factors used in Solano County was intermediate street roughness with monthly sweeping frequency (see Figure 3-2). All sweepers used throughout Fairfield, Vallejo, and Suisun are either vacuum assist or regenerative air types, which aligns with the efficiency factors calculated by BASMAA (Appendix B).

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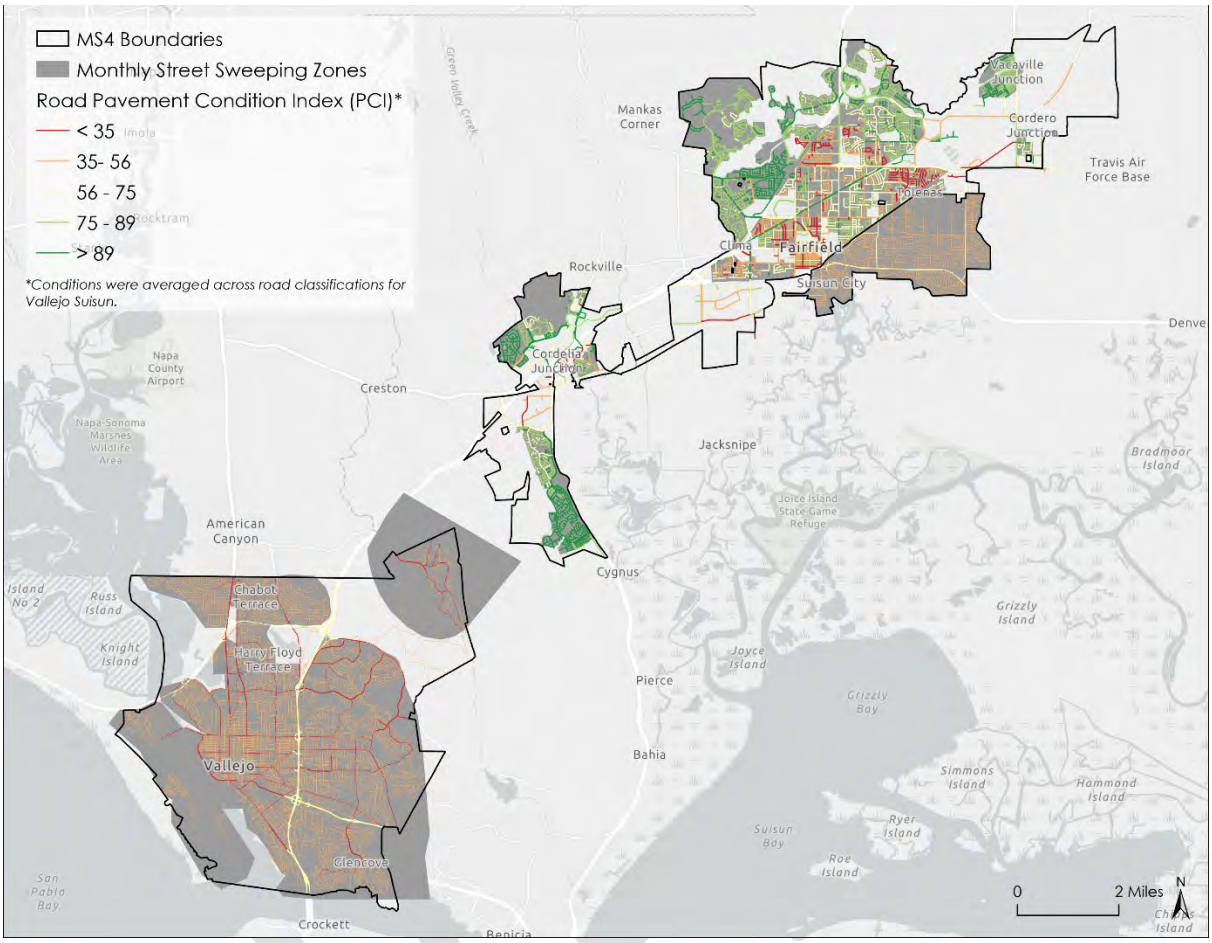

Figure 3-2. Sweeping schedules and pavement condition for Solano Permittee MS4 area.

For vacuum-assisted sweepers, based on the sweeping frequencies evaluated by BASMAA (2017b), increasing the frequency from monthly to weekly did not yield any benefits for mercury mass removal, and did not yield significant benefits for PCBs (i.e., less than 10% improvement in mass removal). A monthly sweeping frequency was therefore recommended for reducing PCBs and mercury mass (BASMAA, 2017b).

The efficiency enhancement ratio specified is relative to a no sweeping scenario since prior to the baseline year of 2005 used for this RAA, Solano Permittees did not use vacuum assist or regenerative air sweepers. While BASMAA 2017b did not evaluate the difference between mechanical broom sweepers and vacuum assist/regenerative air, these differences have been quantified in both the Lake Tahoe Basin (2NDNATURE and NHC, 2009) and the Chesapeake Bay (TetraTech, 2015), who also used WinSLAMM simulations to estimate reductions. Results show that mechanical broom sweepers provide close to zero sediment reduction benefits regardless of sweeping frequency, curb access, or pavement condition. Reductions for PCBs and Mercury calculated for each Solano Permittee cities using the appropriate parameters are shown in Table 3-1.

Table 3-1. Estimated reductions from enhance street sweeping practices

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
52.5	63.6	15.1	66.6	2.3	8.5

3.5.2 Storm Drain Inlet Cleaning

Like sweeping reductions, catch basin drainage areas were defined by catchments, and since drainage areas to individual inlets are not mapped, the PCBs and mercury yields were assumed to be uniform throughout the catchment and that each inlet drained an equal proportion of the catchment area for purposes of spatial allocation of reductions. The enhanced efficiency factor was specified based on the frequency of inlet cleaning documented by Solano Permittees and estimated reductions reported form the literature that were summarized by BASMAA (Appendix B). A baseline control measure efficiency of 11% was estimated based on annual inlet cleaning schedules (Appendix B). We assumed this baseline efficiency to align with the 2005 baseline scenario and increases above this level to contribute to enhanced efficiency of this control measure. Biannual and quarterly cleanings are estimated to provide an enhanced efficiency of 5% above the baseline scenario of annual cleaning. The City of Vallejo provided records of additional inlet cleaning that comprised approximately 2% of their storm drain inlets. The City of Suisun cleans their inlets biannually, and the City of Fairfield cleans approximately 15% at greater than annual frequency in response to storm events. Inlet density and inspection schedules are combined in Figure 3-3 to illustrate the density of inspection frequency throughout all three cities.

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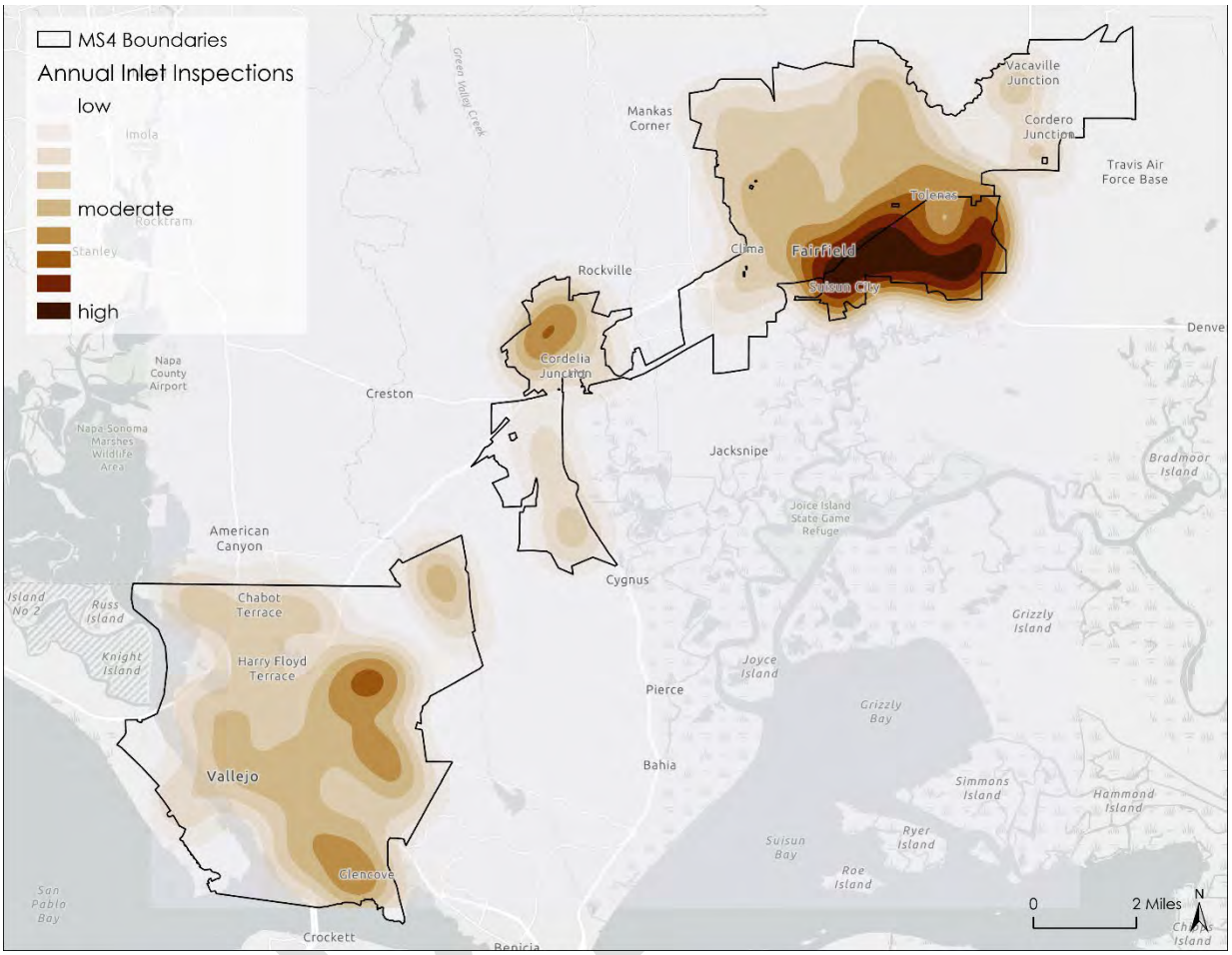

Figure 3-3. Annual inspection density based on number of inlets and inspection frequency

Storm drain inlet cleaning reductions are summarized for each city in Table 3-2. Estimated PCBs and mercury reductions resulting from the enhanced inlet cleaning efficiency show relatively small reductions due to only a small proportion of inlets being cleaned above the baseline annual frequency in Fairfield and Vallejo, which provide the largest contributing areas.

Table 3-2. Estimated reductions from enhanced storm drain inlet cleaning

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
0.5	1.0	1.0	5.2	0.8	0.1

3.6 Trash Capture Systems

Large trash full capture devices collect sediment and debris along with trash, so they are considered a source control measure for the PCBs and mercury associated with the captured sediment. These include hydrodynamic separator units (HDS), gross solids removal devices (GSRDs), and baffle boxes. Load reductions associated with large trash capture devices (R_t) are quantified as the product of treatment drainage area (A), area-weighted yield (Y), and an efficiency factor (E).

$$R_t = P * Y * E$$

Drainage areas to large trash capture devices were joined to modeled catchment scale pollutant loads for PCBs to specify yields. Both Fairfield and Suisun include MS4 areas that drain to these large trash full capture devices (see Figure 3-4). The efficiency factor was specified at 0.20 based on CDS unit sampling data of TSS recorded in the International Stormwater BMP Database (http://bmpdatabase.org/) and independent analysis of associated PCBs and mercury fractional removal rates (Appendix B).

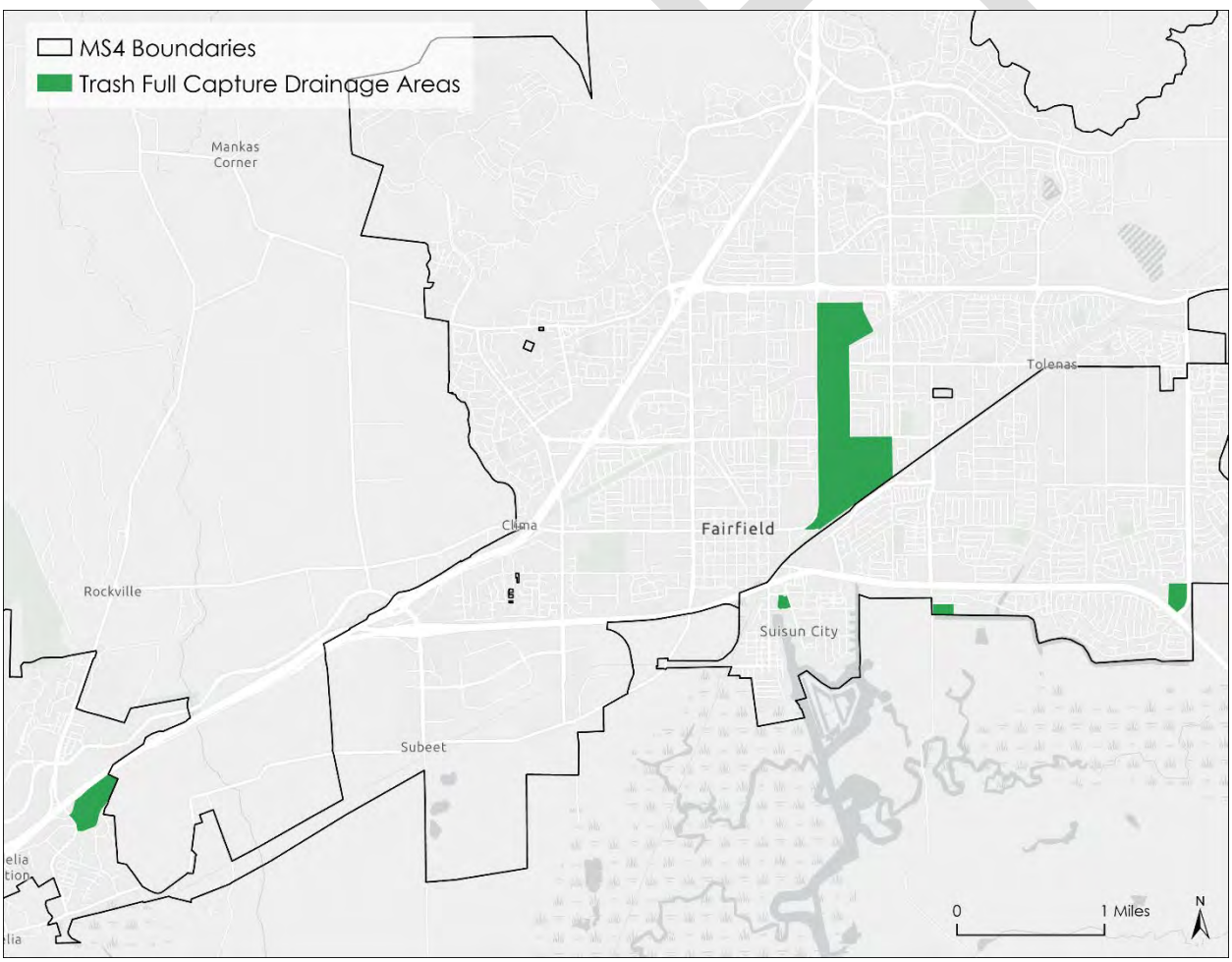

Figure 3-4. Areas draining to large full trash capture devices

Estimated load reductions are shown in Table 3-3, with the greatest reductions for the City of Fairfield, which has the largest drainage areas routed to full capture devices.

Table 3-3. Estimated reductions from large full trash capture devices

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
0.0	0.0	1.0	3.8	0.3	0.1

3.7 Diversion to Public Owned Treatment Works (POTWs)

In Solano County, the Fairfield Suisun Sewer District completed a pilot project to divert dry weather and first flush flows to POTWs. The project involved changing the operation of an existing pump station to divert stormwater from the station to the Fairfield Suisun Sewer District wastewater treatment plant. The pump station is located in the City of Fairfield just upstream from Suisun City. It serves a watershed area of approximately 6 acres all of which is zoned commercial, of which a significant portion is automotive repair. The goal of the pilot project was to comply with provision C.11/12f of the MRP by better understanding the applicability, costs, and benefits associated with this and similar projects.

Normal discharges from the State Street Pump Station were terminated in mid –June 2018. The contents of the pump stations' wet well were removed by Vactor truck and then discharged to the Fairfield Suisun Sewer District treatment plant. As dry weather runoff accumulates in the pump station, the water is removed and disposed of at the POTW. The pump station resumed its normal discharge operation settings in late September 2018. The annual reduction in loads, assuming an average volume of 2,000 gallons per year and a combined concentration of 28.3 grams per liter (based on water samples taken). The amount of PCBs being removed from the system is only 0.0002 mg. A potential added benefit of the diversion is preventing the initial flush of 2,000 gallons of water from the wet well into sloughs that ultimately reach Suisun Bay. Reducing and avoiding release of potentially stagnant water is a BMP that benefits dissolved oxygen in receiving waters. Benefits to dissolved oxygen in receiving waters can also translate to reduced mercury methylation, because the bacteria that methylate mercury thrive under low oxygen conditions. Thus, the Program continues to divert during the dry season to show good effort toward compliance with the PCBs wasteload reduction requirements in MRP-2, and because of the multiple water quality benefits achieved

3.8 Mercury Load Avoidance and Reduction Program

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and

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mercury device recycling. The Permittees coordinate local household hazardous waste (HHW) collection facilities to implement mercury collection and recycling in accordance with MRP Provisions C.11.a.i and C.11.a.ii. FSURMP Permittees collect HHW at the same regional facility in Fairfield, Solano County: Republic Services at 2901 Industrial Court, Fairfield, CA Republic Services serves the communities of Fairfield, Suisun City and parts of unincorporated Solano County. The types of data collected at this facility includes the standard Cal Recycle 303a form. However, these efforts are no longer required to be reported, but will be tracked for mercury loads reduced through implementation of mercury avoidance and reduction control measures. Reductions associated with this source control measure were not calculated in this analysis due to a lack data to reliably estimate mercury reductions.

3.9 Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) is a treatment control measure that includes new development and redevelopment projects on private and public properties regulated by Provision C.3, as well as treatment control retrofit of existing infrastructure in public right-of-way (ROW) areas and on public and private properties not subject to Provision C.3. Results of the GSI RAA analysis (Appendix A) and the Permittees' GSI Plans (2019) are summarized in Section 4, and combined with source control measures to estimate cumulative wasteload reductions.

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4 Source Control Measure Reasonable Assurance Analysis (RAA)

This goal of RAA is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet WLA targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to wasteload allocation targets.

The Solano Permittees have implemented a comprehensive approach to assessing PCBs and mercury load reductions associated with current and planned source control actions that provides articulation with the regional approach, is fully consistent with GSI RAA modeling already completed, and is amenable to ongoing tracking to assess compliance progress. Each PCB and mercury source control measure follows regionally standardized calculation methods specified by BASMAA which have been defined via various data collection and scientific efforts and documented in BASMAA (Appendix B). The modeling process is consistent with the methods defined in the BASMAA RAA Guidance (BASMAA, 2017a).

Data on control measure implementation programs was compiled and verified and control measure implementation data were incorporated into a geodatabase which uses the same spatial architecture as the GSI RAA modeling. BASMAA calculation measures were applied according to the methods described in BASMAA (Appendix B) within the GIS whenever control measure implementation included locational information to ensure that reductions associated with source controls, GSI, and land use redevelopment changes were locally consistent on a granular spatial scale. This often included using parcel-scale inputs to drive load reduction calculations. Source control measure reduction results were summarized at the urban catchment scale in maps for the Solano Permittee area and broken out by city in tables. These results were combined with the GSI reductions (reported in Appendix A) for the specified RAA future scenarios (2020, 2028/2030, 2040) to assess expected compliance with wasteload allocations for the Solano Permittees.

4.1 Study Area

The study area for the Source Control Measure RAA analysis is defined by the Solano Permittee MS4 area, which includes the cities of Fairfield, Suisun, and Vallejo only, and no outside drainage to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 4-1) since source control modeling is discrete to the MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Unlike GSI and land use redevelopment modeling, source control measures do not affect the hydrologic transport of pollutants downstream. As such, the catchment-scale hydrologic conditions represented in the baseline and GSI future scenarios (see Appendix A) are also reflected in the reduced loading calculations for comparison with wasteload allocations.

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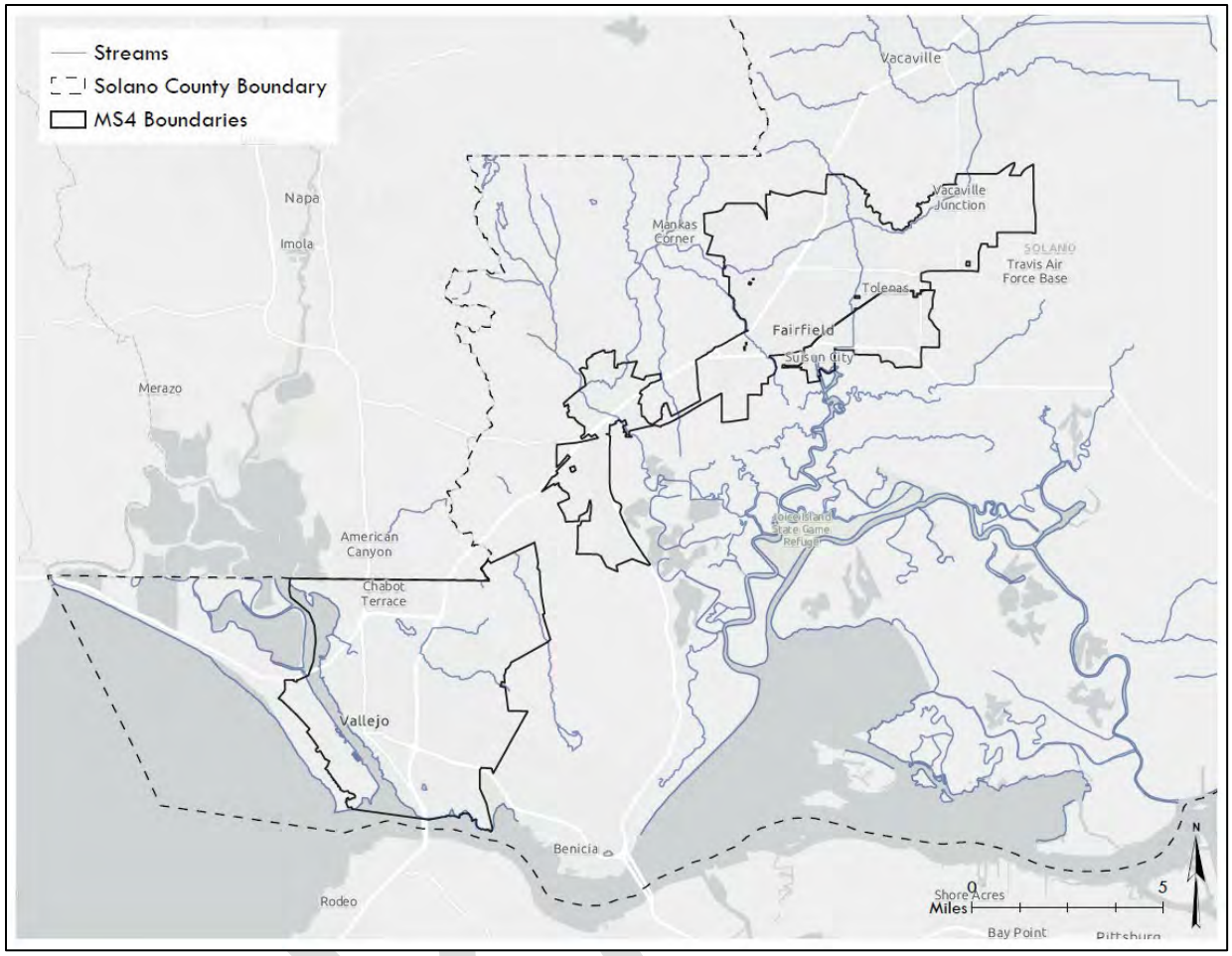

Figure 4-1. Solano Permittee MS4 Area

4.2 Refined Baseline PCB and Mercury Baseline Loads

Baseline modeling corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, they represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting wasteload allocation targets in the future. Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from the Permittes' model (swTELR) were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate was below the wasteload allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between

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swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the updated baseline loading estimates (see Appendix A).

The refined or adjusted baseline approach is common among all BASMAA program RAA modeling efforts. The approach is a technical refinement only. This aligns with the intent of the TMDL policy which directs 90% reductions in urban stormwater PCB loads and 50% reductions in urban stormwater mercury loads compared to adjusted baselines where adjustments to the original TMDL baselines are made.

4.3 Green Stormwater Infrastructure Reductions Summary

Solano Permittees have completed a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. to quantify the degree to which they expect to meet future PCBs and mercury reduction targets by implementation of GSI (Appendix A). This study was coordinated with other San Francisco Bay Area Permittees via BASMAA to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo, the Fairfield Suisun Sewer District, and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of GSI Plans, so that the outputs may inform future GSI implementation. These efforts represent a concerted, collaborative effort on the part of the Solano Permittees to determine PCBs and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

4.4 Baseline and GSI RAA Summary

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2028/2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural best management practices (BMPs) that infiltrate and treat stormwater runoff. These scenarios did not include the source control measures, summarized in Section 3. Baseline loading and reductions are summarized for each future scenario for Solano Permittees in Table 4-1, with a 61% reduction from the refined baseline load for PCBs and a 20% reduction for mercury. Reductions represent 72% of the load reduction required to meet the Solano Permittees wasteload allocation for PCBs of 110 g/yr. The GSI Plans completed by Solano Permittees outline opportunities for GSI implementation to realize the projected load reductions from GSI.

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Table 4-1. Load reduction estimate from GSI, including land use redevelopment for all Solano Permittees.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

4.5 Wasteload Allocation Compliance Demonstration

4.5.1 Combined Source Control Measure Reductions

Source control measure reductions were combined for each catchment with the Solano Permittee MS4 area using the same geospatial framework used for calculating baseline loading of PCBs and mercury as well as reductions associated with GSI. This alignment ensures that reduction estimates are internally consistent throughout the RAA process for meaningful comparisons with wasteload allocations. Spatial patterns of source control measure load reductions for PCBs throughout the Solano Permittee MS4 area are shown in Figure 4-2. The largest reductions are largely concentrated in intensively developed areas and on Mare Island, which is strongly influenced by the high degree of Old Industrial land use and associated high PCB concentrations which serve as an input to several source control measures.

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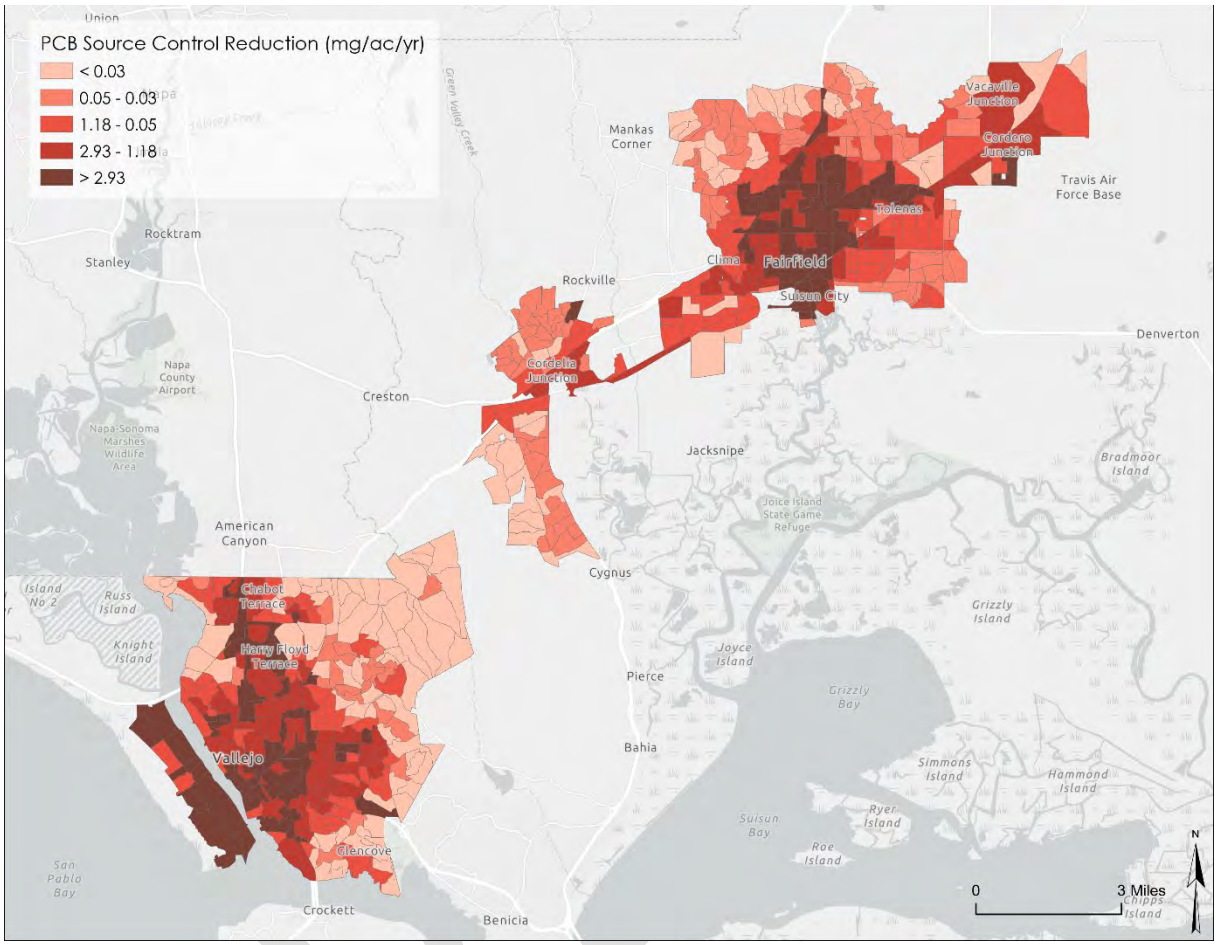

Figure 4-2. Source Control Reductions for PCBs

Mercury reductions from source control measures show a somewhat similar pattern to PCBs, with higher reductions concentrated in catchments near city centers (Figure 4-3). A notable difference is that lower relative reductions on Mare Island, which largely reflects lower variance in mercury concentrations across the land use based yields, compared to PCBs. Thus, mercury reductions more closely reflect variables associated with the control measure implementation itself, rather than levels of baseline loading.

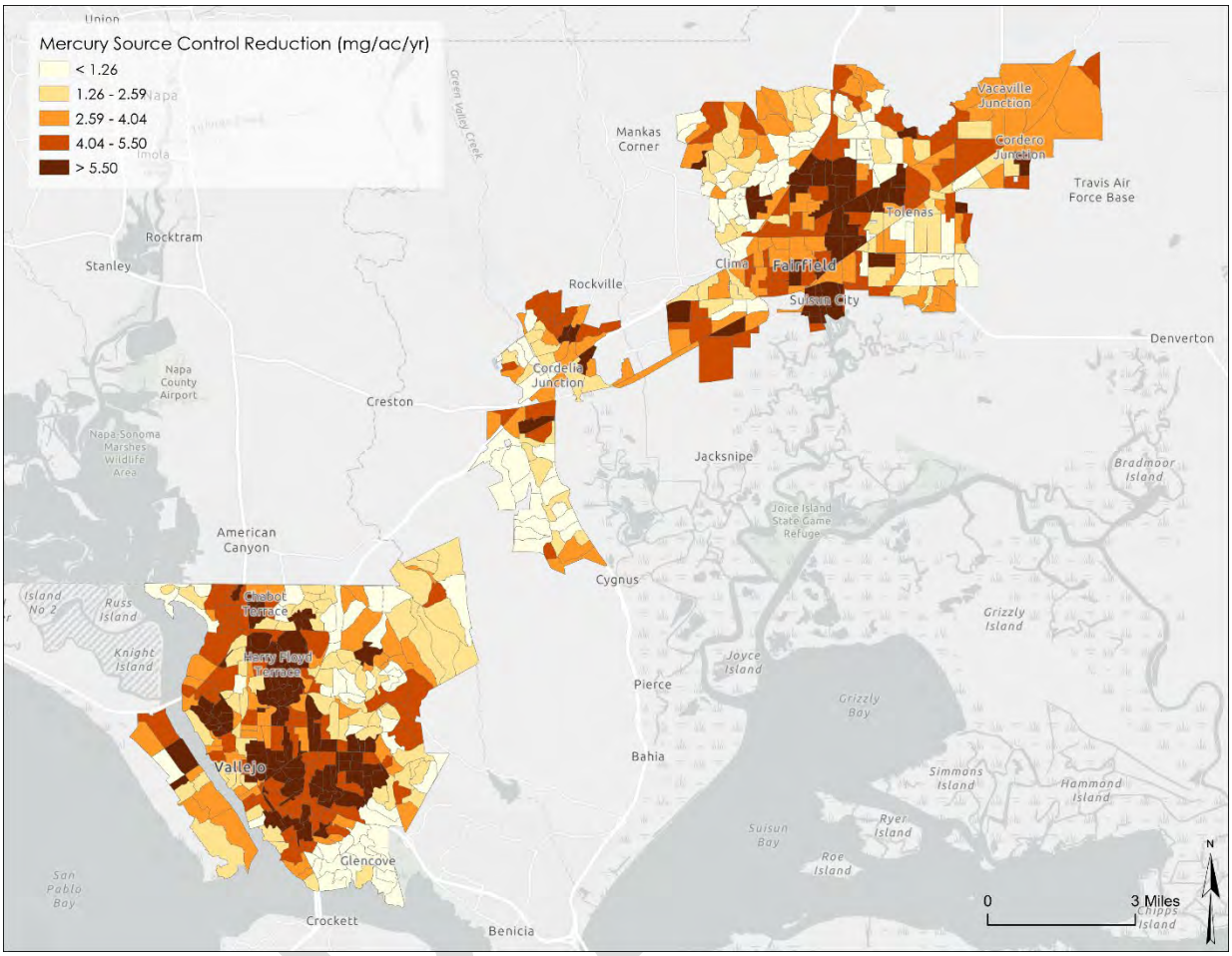

Figure 4-3. Source Control Reductions for Mercury

Source control measure reductions are summarized by city in Table 4-2. The largest reductions across all three cities for PCBs is due to building materials management (120 g/yr). For mercury, street sweeping provides the largest reductions (138.7 g/yr), while the greatest PCBs reductions are in Vallejo from and come from building materials management (120 g/yr), with street sweeping also making substantial reductions (52.5 g/yr).

Table 4-2. Source control measure reductions summary

	Vallejo		Fairfield		Suisun		Total PCBs Reduced (g/yr)	Total Mercury Reduced (g/yr)
	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)		
Sweeping	52.5	63.6	15.1	66.6	2.3	8.5	69.9	138.7
Inlet Cleaning	0.5	1.0	1.0	5.2	0.8	0.1	2.3	6.3
Trash Capture	0.0	0.0	1.0	3.8	0.3	0.1	1.4	3.9
Building Mat.	120.0	0.0	0.0	0.0	0.0	0.0	120.0	0.0
Totals	173	65	17	76	3	9	194	149

4.5.2 Projected Loading Scenarios and Comparison for Wasteload Allocation Attainment

The GSI RAA established that estimated reductions from GSI and redevelopment provided 72% of the reductions required to reach the Solano Permittees' PCBs wasteload allocation of 110g/yr by the year 2040, and that the remainder reductions would be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment (see Appendix A). Similar to the GSI RAA, reductions achieved from source control measures were applied to future loading scenarios. Per the RAA Guidance (BASMAA, 2017a), source control measure load reductions were not applied to the 2020 scenario and no new source controls were applied to the 2040 scenario. While no additional source control reductions were applied, it is reasonable to assume that source control measures implemented by 2030 will continue to 2040. The total control measure reductions were calculated as the sum of reductions resulting from projected GSI implementation, land use redevelopment, and source control measure implementation.

The spatial distribution of total PCBs loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 4-4. Note that the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A). Note that the catchment classification is unchanged from the maps presented in the GSI RAA to facilitate comparisons. In most areas, source controls provide additional PCB reductions throughout the Solano Permittee MS4 area above what were realized by GSI and land use redevelopment. City centers and Vallejo's Mare Island particularly benefit from street sweeping practices. PCB reduction benefits are disproportionately represented on Mare Island, due to the high proportion of Old Industrial land use which provides relatively high PCB yields. These outputs indicate that by 2040 all catchments on Mare Island have moved out of the highest loading category with the addition of source control measures (Figure 4-4, 2040 panel).

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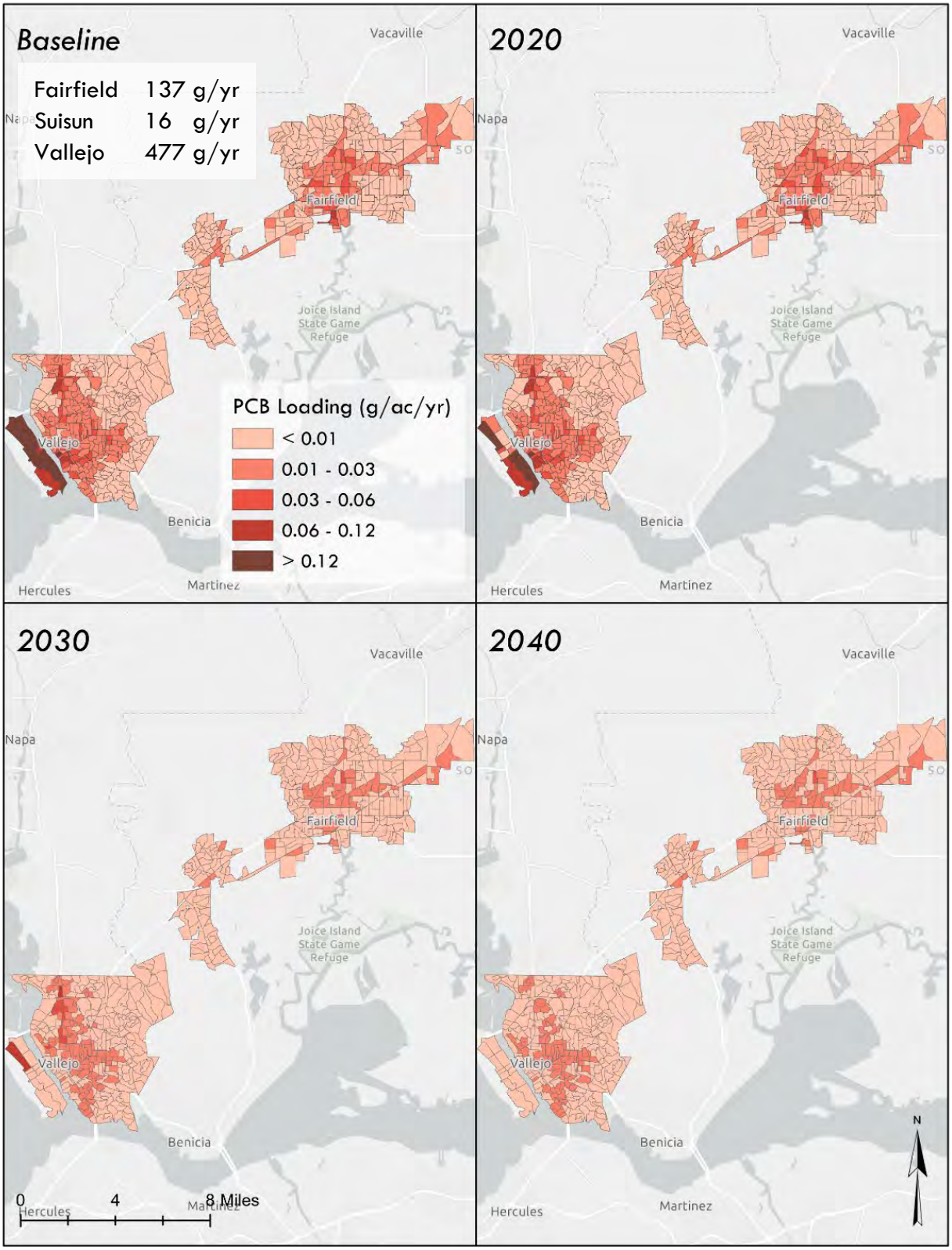

Figure 4-4. Total PCB Reductions for GSI and Source Control Measures for Future Scenarios.

The spatial distribution of total mercury loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 4-5. Like the PCBs maps, the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A), and catchment classifications are unchanged from those presented in the GSI RAA scenarios. Source control measures provide additional mercury reductions throughout the Solano Permittee MS4 area above what were realized by GSI and redevelopment, with larger relative reductions due to source control measures versus GSI or redevelopment when compared to PCBs. This is because the calculated mercury yields are generally less sensitive to land use conversion than PCBs. The most evident change is in the 2030 and 2040 scenarios, compared to what was estimated in the GSI RAA (see Appendix A). The outputs show that several catchments in the city centers of Vallejo, Fairfield, and Suisun shift out of the highest loading categories with the implementation of control measures (Figure 4-5). In Vallejo this is largely due to building materials management, while Fairfield and Suisun benefit mostly from street sweeping in these areas but also from inlet cleaning and pollutant removal by large trash capture devices.

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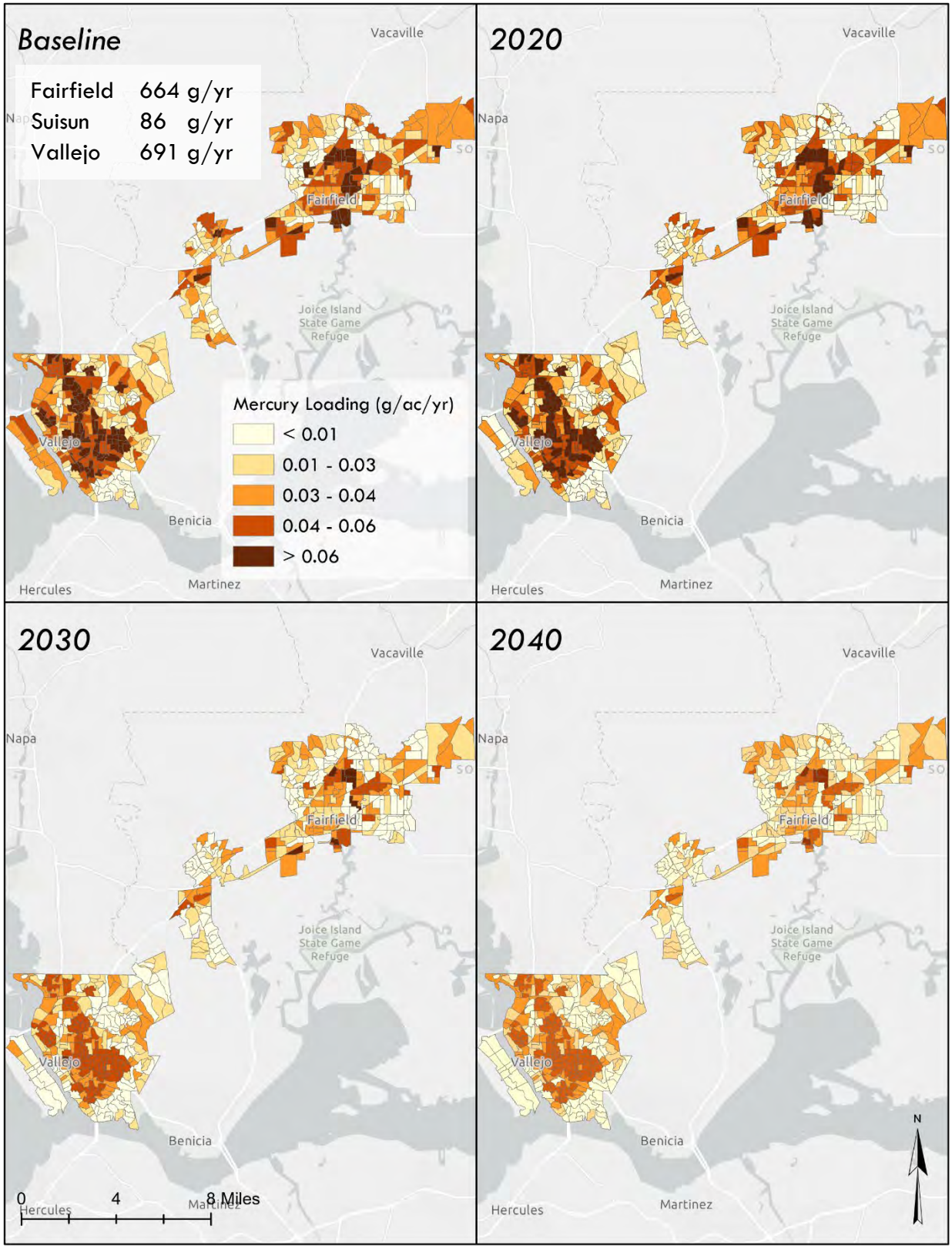

Figure 4-5. Total Mercury Reductions for GSI and Source Control Measures for Future Scenarios

The MRP (sections C.11.d, C.12.d) requires that demonstration of wasteload allocation attainment via reasonable assurance analysis (RAA) is documented in the 2020 Annual Report. The total PCBs and mercury loading after reductions from GSI, associated land-use redevelopment, and source control measure implementation are compared to the Solano County wasteload allocation in Table 4-3. The 2040 estimated PCB GSI reductions (382 g/yr) provide Solano Permittees with a 61% reduction below baseline loading estimates, which is 72% of the required reduction to meet the Solano Permittee's wasteload allocation of 110g/yr. Table 4-3 shows that the remainder of the required PCBs reductions are projected to be achieved by source control measures by the year 2040.

Table 4-3. Wasteload allocation attainment summary.

Scenario	Baseline Loading (g/yr)		GSI Reductions (g/yr)		Source Control Reductions (g/yr)		Reduction from Baseline (%)		Waste Load Allocation (g/yr)		Allocation Attainment (%)	
	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg
2020			137	166			22%	12%				
2030	630	1,441	289	204	194	149	77%	24%		1600		100%
2040			382	295	194	149	91%	31%	110		100%	

Estimated baseline loads for mercury (1441 g/yr) were below the 2028/2030 wasteload allocation (1600 g/yr), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. It does however indicate that the Solano Permittees will meet the wasteload allocation for mercury established in the TMDL. If instead we appeal to a relative reduction metric using the refined baseline estimates, combined GSI implementation and continued source control measures result a 31% reduction from current mercury loading levels by 2040. While this appears to be short of the overall regional 50% reduction in mercury loads from urban stormwater specified in the TMDL, the shortfall is likely within the modeling error and planning uncertainties. The discrepancy between the refined baseline loads and those derived from the TMDL are likely related to population-based load allocation methods used for the TMDL, which are discussed in Appendix A.

5 Schedule and Costs

The Solano Permitees' GSI Plan (2019) identified public and private priority projects with green stormwater infrastructure potential for future implementation in 2020, 2030, and 2040. These

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projects are listed in Table 5-1 along with their pollutant removal potential, status, and planning level capital and maintenance costs.

The RAA model results predict 100% attainment of the wasteload allocations, with the existing and already planned GSI and source control measures, therefore no additional source control or GSI measures are proposed.

Conceptual-level design of several GSI projects are included in Appendix C. Pollutant load reductions from these GSI projects would provide additional pollutant load removal, above the RAA model results summarized in Table 4-3.

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Table 5-1. Public and private projects with green stormwater infrastructure potential identified for future implementation in 2020, 2030, and 2040, along with their pollutant removal potential, status, and planning level capital and maintenance costs. For future scenarios, estimated PCB and mercury reductions are after land use changes have already been applied in the model, so that these reductions only reflect a small portion of the total redevelopment reductions.

Vallejo								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Vallejo Station Phase B	2020	2.3	0.0005	0.0944	$24,000	$200,000	$36,000	$3,000
Public Safety Building Rehab and Design	2020	1.0	0.0566	0.0839	$12,000	$100,000	$18,000	$2,000
Marina Sea Wall	2020	26.7	0.0001	0.0022	$138,000	$1,150,000	$207,000	$13,000
Admiral Callaghan Widening	2020	1.7	0.0096	0.0158	$24,000	$195,000	$36,000	$3,000
Admiral Callaghan Middle Lane	2020	4.0	0.1414	0.2834	$47,000	$385,000	$70,000	$5,000
Lennar Mare Island B4	2020	25.9	0.0537	0.2447	$252,000	$2,100,000	$377,000	$24,000
Downtown Streetscape Phase 4	2030	1.2	0.0003	0.0042	$15,000	$125,000	$23,000	$2,000
Downtown Streetscape Phase 5 & 6	2030	1.2	0.0003	0.0045	$6,000	$45,000	$9,000	$1,000
Downtown Streetscape Phase 7, 8 & 9	2030	1.6	0.0004	0.0053	$18,000	$150,000	$27,000	$2,000
Sonoma Boulevard Streetscape Phase 1-3	2030	10.3	0.0025	0.0377	$89,000	$735,000	$132,000	$9,000
Sonoma Boulevard Streetscape Phase 4	2030	7.7	0.0020	0.0293	$69,000	$575,000	$104,000	$7,000
Sacramento Street Streetscape Phase 1	2030	5.1	0.0258	0.2829	$60,000	$500,000	$90,000	$6,000
Sacramento Street Streetscape Phase 2	2030	2.9	0.1213	0.2178	$30,000	$250,000	$45,000	$3,000
Sacramento Street Streetscape Phase 3	2030	7.1	0.1107	0.1797	$65,000	$540,000	$97,000	$7,000
Turner Parkway Overcrossing	2030	0.5	0.0001	0.0015	$10,000	$80,000	$15,000	$1,000
Benicia Road Bridge Replacement Project	2030	0.4	0.0001	0.0012	$11,000	$85,000	$16,000	$1,000
Fairgrounds Drive Improvements	2030	6.1	0.0374	0.0743	$65,000	$540,000	$97,000	$7,000
Sonoma Boulevard Streetscape Phase 5 & 6	2040	79.4	0.1680	0.4909	$54,000	$450,000	$81,000	$6,000

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Fairfield								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Discovery @ Gold Ridge	2030	7.5	0.0212	0.3454	$35,000	$285,000	$52,000	$4,000
Gold Hill Village 2	2019	7.9	0.0048	0.6510	$26,000	$216,000	$39,000	$3,000
Ivy Wreath/Strawberry Fields	2030	7.5	0.7714	0.2944	$32,000	$265,000	$48,000	$3,000
Paradise 360	2030	5.5	0.0060	0.0358	$24,000	$195,000	$36,000	$3,000
Villages at Fairfield- Village 1	2030	51.7	0.0018	0.0056	$161,000	$1,335,000	$240,000	$15,000
Villages at Fairfield- Village 2	2030	32.8	0.0111	0.3678	$90,000	$750,000	$135,000	$9,000
Caliber Collision	2030	1.5	0.0699	0.0897	$14,000	$115,000	$21,000	$2,000
Clorox	2030	1.0	0.0001	0.0114	$11,000	$90,000	$17,000	$2,000
Denny's Restaurant	2030	0.8	0.0002	0.0025	$8,000	$60,000	$11,000	$1,000
E&P Properties	2030	9.9	0.0018	0.0269	$49,000	$405,000	$73,000	$5,000
Fairfield/Vacaville Train Station	2030	1.0	0.0001	0.0016	$11,000	$86,000	$16,000	$1,000
Gateway 80, Buildings A & B	2030	35.9	0.1994	0.9208	$247,000	$2,055,000	$369,000	$24,000
Innova Maxwell	2030	2.6	0.0002	0.0036	$22,000	$180,000	$33,000	$3,000
Jayo Subdivision	2019	4.1	0.0002	0.0559	$32,000	$260,000	$47,000	$3,000
Jelly Belly Warehouse Expansion	2030	4.1	0.0010	0.0810	$32,000	$260,000	$47,000	$3,000
Jepson Parkway 2A	2030	1.0	0.0001	0.0189	$11,000	$87,000	$16,000	$1,000
Partnership Health 2	2030	4.4	0.0005	0.0527	$34,000	$280,000	$51,000	$4,000
Senior Manor Parking Lot	2030	1.0	0.0141	0.0178	$11,000	$87,000	$16,000	$1,000
Sheldon Oil Company	2030	1.0	0.0002	0.0493	$11,000	$87,000	$16,000	$1,000
Solano Logistics D	2030	3.5	0.0004	0.0938	$28,000	$230,000	$42,000	$3,000
Texas Corners	2030	0.7	0.0161	0.0210	$9,000	$70,000	$13,000	$1,000
Cordelia Community Park	2030	2.3	0.0006	0.2174	$51,000	$425,000	$77,000	$5,000
Fire Department Training Tower	2030	1.3	0.0958	0.1206	$17,000	$140,000	$26,000	$2,000

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Suisun								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Railroad Avenue Extension	2030	1.7	0.0003	0.0726	$15,000	$125,000	$23,000	$2,000

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8 Appendices

Appendix A – Final GSI RAA Modeling Report

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Appendix B – Source Control Load Reduction Accounting for RAA (Final 8-31-20)

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Appendix C – Solano Permittees' GSI Design Concepts

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SOLANO PERMITTEES

Green Stormwater Infrastructure

Reasonable Assurance Analysis Modeling Report for PCBs and Mercury

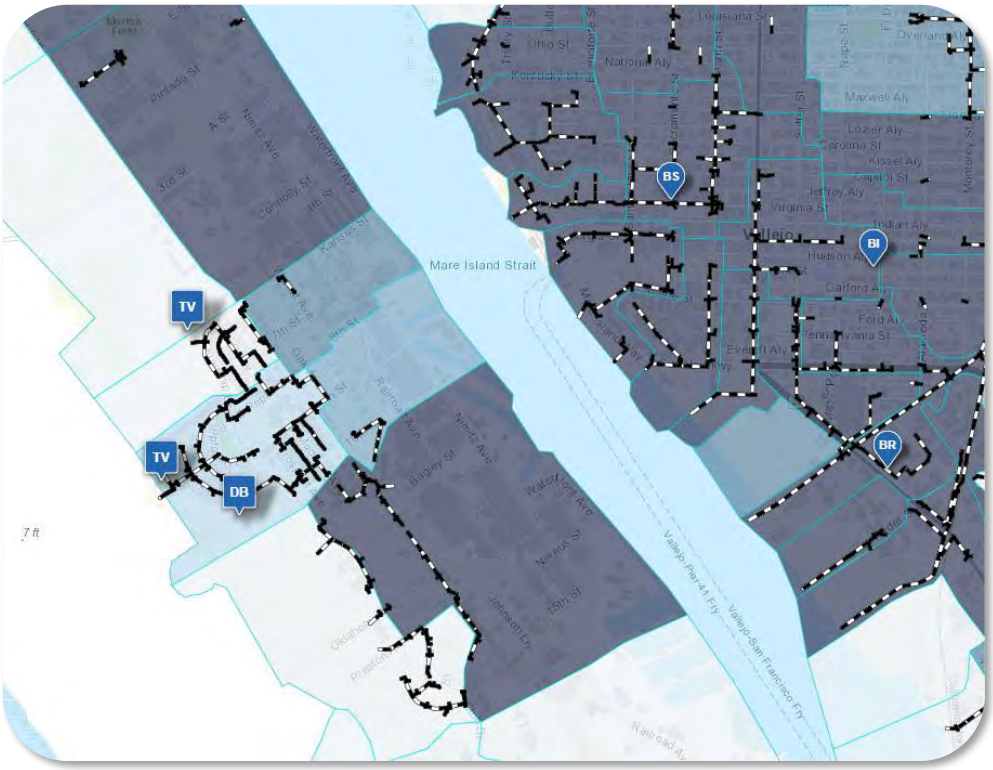

CITY OF FAIRFIELD CALIFORNIA

FINAL DRAFT REPORT

MARCH, 2020

In compliance with Provision C.11 and C12.c of Order R2-2015

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APPENDICES

Appendix A. swTELR article published in Journal of Environmental Management

Appendix B. swTELR BMP type definitions

Appendix C. Catchment routing and attributes

Appendix D. Decentralized BMPs implemented and planned by Solano Permittees

ACRONYMS

BASMAA	Bay Area Stormwater Management Agency
BMP	Best Management Practice
C3	Refers to Provision C3 in the MRP
cBMP	Centralized BMP. Also called regional treatment measures
CN	Curve number
CRC	Characteristic runoff concentration
dBMP	Decentralized BMP, also called distributed BMPs
FSSD	Fairfield Suisun Sewer District
GI	Green Infrastructure
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
HSG	Hydrologic soil. group
LID	Low Impact Development
MRP	Municipal Regional Stormwater Permit
NLDC	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
RWQCB	Regional Water Quality Control Board
PCBs	Polychlorinated Biphenyls
SCS	Soil Conservation Service
SFEI	San Francisco Estuary Institute
swTELR	Stormwater Tool to Estimate Load Reductions
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
WLA	Waste load allocation
VFWD	Vallejo Flood and Wastewater District

EXECUTIVE SUMMARY

This report communicates the methods and results of a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. Those provisions require Solano Permittees to quantify the degree to which they expect to meet future Polychlorinated biphenyls (PCBs) and mercury reduction targets by implementation of Green Stormwater Infrastructure (GSI). This study was coordinated with other SF Bay Area Permittees via the Bay Area Stormwater Management Agencies Association (BASMAA) to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo; the Fairfield Suisun Sewer District; and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of a Green Stormwater Infrastructure Workplan, so that the outputs may inform future GSI implementation. Thus, this report represents the result of a concerted, collaborative effort on the part of the Solano Permittees to determine PCB and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

The Solano permittees have employed a practical and proven approach for quantifying load reductions that reflects both a need to be efficient with limited resources and a commitment to transparent linkages between planned improvements and expected water quality benefits. This approach is based on outputs from the purpose-built stormwater hydrologic and pollutant loading model Stormwater Tool to Estimate Load Reductions (swTELR) reported in Beck et al. (2017), Conley et al. (2019); and Conley et al. (2020). swTELR is a scalable computational approach to quantify urban catchment-scale stormwater runoff, pollutant loading to receiving waters, and reductions from BMPs. The model provides spatially-explicit accounting of stormwater and pollutant reductions to inform more strategic stormwater management decisions with a parsimonious structure that relies strongly on the input data. This approach also makes the model easier to use and understand, lower cost, and more amenable to both field verification and updating with new information as it becomes available.

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural BMPs that infiltrate and treat stormwater runoff. These scenarios do not include source control measures, which will also contribute to TMDL wasteload allocation reductions, as these will be handled in a separate RAA study pending the completion of a regionally adopted accounting method by BASMAA scheduled to be completed in April of 2020.

Baseline modeling (no BMPs) corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, these areas represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting WLA targets in the future (see maps below). Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from swTELR were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate from swTELR was below the wasteland allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the veracity of swTELR outputs.

Future modeling scenarios showed that the Solano Permittees are expected to meet target GSI reductions for both PCB and mercury in the coming decades. Reductions calculated for the years 2020, 2030, and 2040 surpass the required GSI reductions by several multiples for both PCBs and mercury, primarily due to the conversion of Old Industrial/Source Area land uses to New Urban land use on Mare Island. The GSI reductions represent substantial progress towards WLA targets specified in the TMDL (SFRWQCB, 2006; SFRWQCB, 2008), with the PCB GSI reductions accounting for 72% of reductions required to achieve the Solano Permittee's 2040 PCBs WLA target (100 grams). Mercury reductions represent a 14% reduction from baseline estimates by 2028 which are already below the Solano Permittee WLA target. Large tracts of land have been acquired by private development firms and demolition, grading, and/or construction is already underway throughout Mare Island. If these redevelopment projects proceed as planned over the next two years, load reductions are expected to accelerate towards the modeled 2020 estimates. A spatial prioritization analysis was completed to identify the best parcels and road segment opportunities for additional GSI implementation, that may provide additional benefits, which will be addressed in the GSI Workplan. However, it is anticipated that already planned redevelopment projects will meet the GSI reduction targets and that source control measures will make up most of the remaining required reductions to meet WLA targets.

While the Solano Permittees are on track to achieve the pollutant reduction expectations for GSI implementation, as GSI and source control measures are implemented, new opportunities and challenges will inevitably arise, causing changes to the planned scenarios. It will be critical for Solano permittees to adopt a cost-effective and updateable tracking and accounting system so that iterative quantification of reductions can ensure that progress aligns with estimated projections. Integration of pollutant load reduction accounting with GSI data management and reporting can improve Solano Permittee stormwater program efficiency, and provide interim progress verification for ongoing assurance that pollution reduction expectations are indeed reasonable.

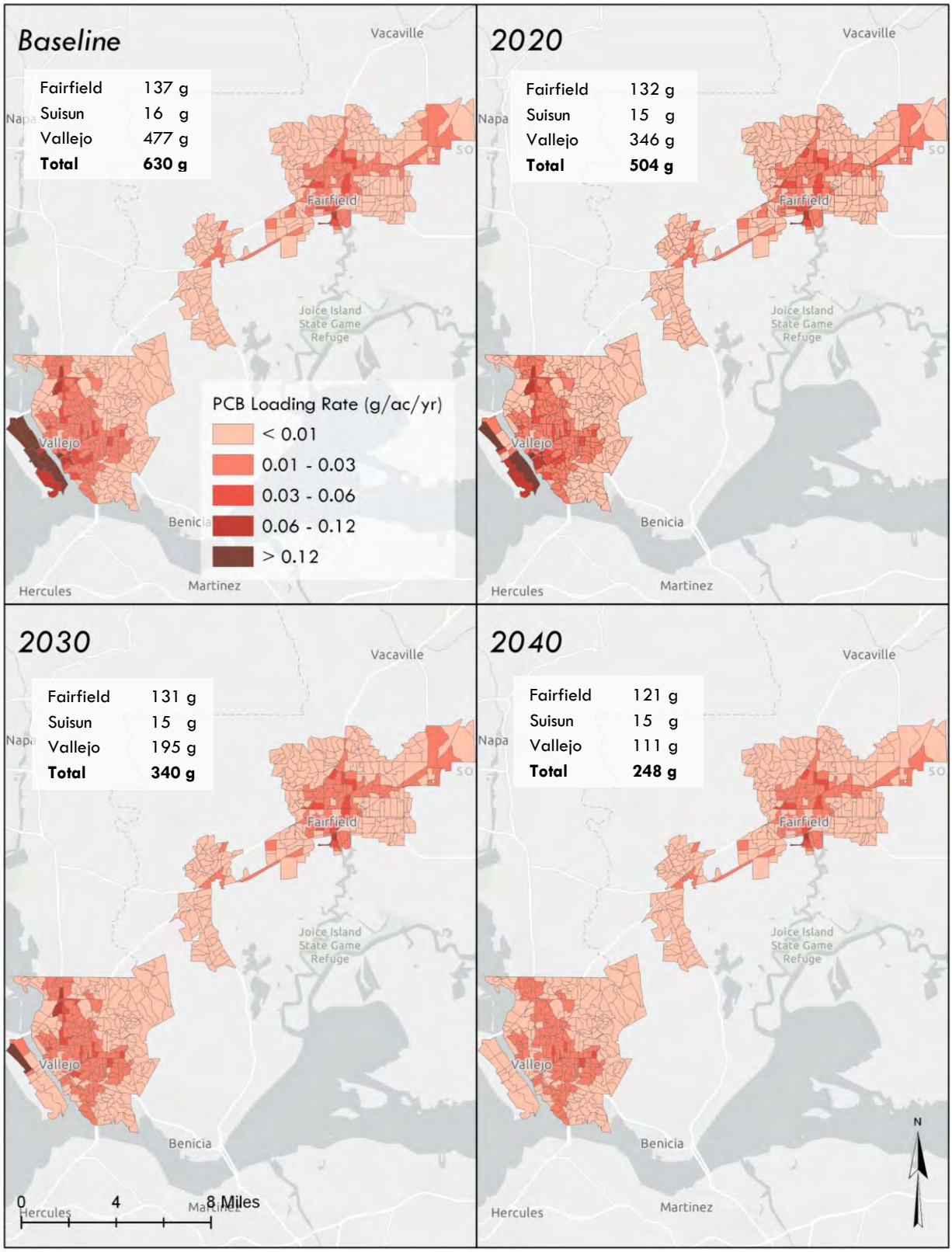

Spatial distribution of annual PCB load estimates for baseline and future scenarios

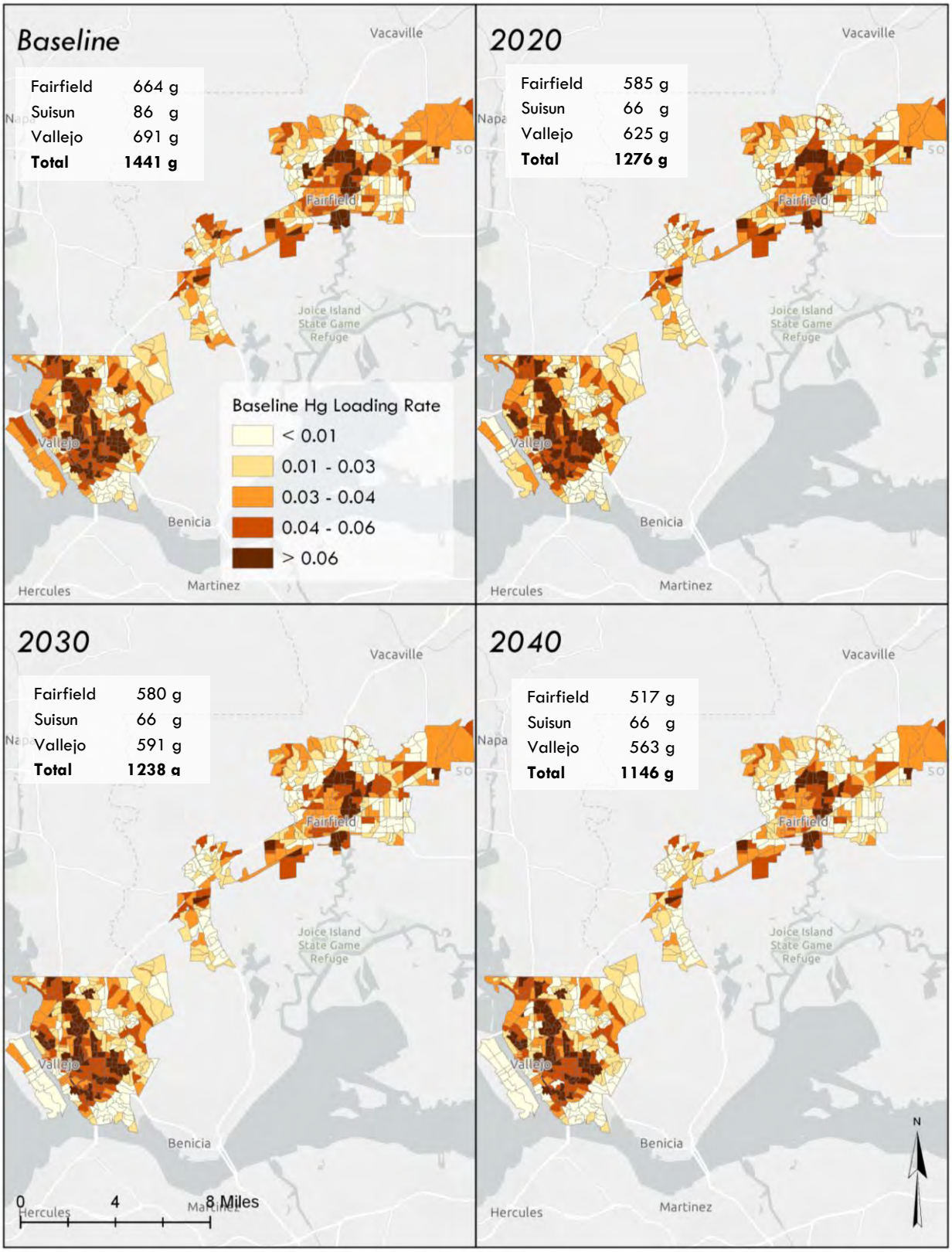

Spatial distribution of annual mercury load estimates for baseline and future scenarios

1 Introduction

1.1 Regulatory Mandate

The Solano Permittees (City of Fairfield, City of Vallejo, and Suisun City) are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1], and mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay. MRP Provision C.11and C.12.c requires the Solano Permittees to prepare a Reasonable Assurance Analysis, to be submitted with its Annual Report to the RWQCB due September 30, 2020.

"Green Infrastructure" (GI), also known as "Green Stormwater Infrastructure" (GSI[2]), refers to the construction and retrofit of storm drainage to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural systems to detain and treat runoff before it reaches receiving waters. Green stormwater infrastructure can be incorporated into construction on new and previously developed parcels, as well as new and rebuilt streets, roads, and other infrastructure within the public right-of-way.

Water quality in San Francisco Bay is impaired by polychlorinated biphenyls (PCBs) and mercury. Sources of these pollutants to the Bay include urban stormwater. By reducing and treating stormwater flows, GSI reduces the quantity of these pollutants entering the Bay and will hasten the Bay's recovery.

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, all Bay Area Permittees must also project the load reductions achieved via GSI by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040[3]. Of these regional 2040 reduction targets, the Solano Permittees are responsible for reductions of approximately 110 grams/year

---

[1] Order R2-2015-0049

[2] Although the MRP uses the term green infrastructure (GI), the Solano Permittees prefer to use the term green *stormwater* infrastructure (GSI) for clarity. Henceforward, the term GSI will be used.

[3] Permittees shall "quantitatively demonstrate that PCBs load reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects" (C.12.c.ii.2.d) Percent of Solano Permittee load reduction is 20.8% PCBs and 16.1% mercury from BASMAA RAA Guidance Document (6/30/17).

PCBs and 48 grams/year mercury based on current baseline estimates (Table 1.1) (see Section 4.2.4 Compliance Demonstration for details.

Table 1.1 Future GSI reduction targets for Solano Permittees from modeled baseline loading

	Scenario	GSI Reduction Target (g)*
PCBs	2020	8
	2030	58
	2040	110
Mercury	2020	2
	2028	33
	2040	48

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury)

1.2 Scope and Purpose

This RAA provides a demonstration that GSI control measures included in the Solano Permittees' GSI Plan as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury Total Maximum Daily Load (TMDL) MRP required green infrastructure reductions for urban stormwater runoff. This RAA quantifies PCB and Mercury reductions, given the type, size, number, location, and time frame of GSI control measures needed to comply with load reduction goals stated in MRP Provisions C.3.j and C.11/C.12.c. This report fulfills the MRP requirement of quantifying reductions achieved via GSI (C.11.c/C.12.c) which will be documented in the 2020 Annual Report for the Solano Permittees.

The vision for this RAA is to map a path towards achieving TMDL wasteload allocation targets (WLA) and also provide a structure for ongoing compliance demonstration. A modeling approach has been developed that is amenable to iteratively verifying runoff and pollutant load reductions as new stormwater BMPs are implemented over time. The outputs provide timely information at spatial scales that can inform implementation decisions. It creates a practical means for quantifying load reductions over time that is also amenable to direct monitoring verification at individual BMPs and urban stormwater drainage scales. This RAA analysis has been performed in conjunction with development of a Green Stormwater Infrastructure Workplan to ensure that load reduction requirements dynamically informed the identification of sites and types of green infrastructure planned in the future.

1.3 Background and Understanding

1.3.1 PCBs and mercury Total Maximum Daily Loads

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay (a Waste Load Allocation, or WLA) from identified sources, including from urban stormwater. The urban stormwater WLA, in turn, is apportioned among MRP Permitees in proportion to population, based on the naïve assumption that PCB loadings vary in proportion to population[4]. The Solano Permittees constitute approximately 4.7% of the population total for all cities named in the MRP.

The Bay Area-wide WLA for PCBs for urban stormwater is 2 kg/yr by 2030, which is a ninety percent reduction from baseline urban stormwater loads estimated in the TMDL. The overall reduction in all external loads, including urban stormwater, was developed based on multiplying the target final sediment PCB concentration (1 µg/kg) by the estimated annual sediment load discharged from local tributaries. The target final PCB concentration in sediment was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day). The fish tissue target (10 ng/g) is translated to the sediment target (1 µg/kg) using a food web model developed by San Francisco Estuary Institute (SFEI).

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment (0.4 mg/kg or 200 µg/kg). A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of

[4] Monitoring data demonstrates that this is an oversimplified assumption, because PCB yields per unit land area are higher in some land uses (e.g., "old industrial") compared to others (e.g., "new urban"). The PCBs TMDL and resulting permit provisions allow permittees to provide alternate formulae for allocating load reduction requirements among permittees.

mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations. These receiving water goals are translated by the TMDL into a roughly 50% mercury load reduction requirement from urban stormwater.

Because the ninety percent reduction for PCBs is more stringent than the fifty percent reduction for mercury, current implementation strategies for Bay Area stormwater programs are based on the assumption that achieving PCB WLAs will result in achieving mercury WLAs. This assumption is intended to be revisited through periodic review of progress on attainment of TMDL goals.

1.3.2 PCBs and mercury sources, transport, and distribution

1.3.2.1 *PCBs sources to urban runoff*

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers (Abbot 1993, Binational Toxics Strategy 1998 and 1999, EIP Associates 1997)[5]. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

1.3.2.2 *Mercury sources to urban runoff*

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal

[5] Review of Potential Measures to Reduce Urban Runoff Loads of PCBs to San Francisco Bay, by EOA, Inc. for Santa Clara Valley Urban Runoff Pollution Prevention Program, March2004.

mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to SF Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

1.3.2.3 *PCBs and mercury transport*

Conceptual model development by Mangarella et al (2010) defined the principle pathways of PCBs and mercury transport. Wind dispersal, vehicle tracking and road deposits and surface runoff from source areas were defined as the primary transport vectors for sediment-bound pollutant transport throughout the SF Bay Area. Sediments transported into the MS4 accumulate on roadways (including curbs and gutters), storm drain inlets/catch basins, stormwater pipelines, and other structures (e.g., stormwater pump stations).

1.3.2.4 *PCBs and mercury spatial patterns in the SF Bay*

McKee et al. (2015) produced multi-year synthesis of PCBs and mercury data collected by numerous researchers as part of the SF Bay Regional Monitoring Program (RMP) to directly address management questions and identify patterns across the SF Bay Area. Sediment studies in the SF Bay Area and its watersheds have consistently measured higher PCB concentrations in areas of urban development compared to regions of open space or non-urban land uses (McKee et al, 2015, Hunt et al., 1998; Daum et al., 2000; KLI, 2002; Gunther et al., 2001). Maps included in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Watersheds that have ongoing disturbances through human development or that have legacy point sources show higher water column concentrations of total mercury than other less impacted watersheds. Elevated mercury concentrations are mostly caused by a combination of mercury stored in source areas and available for transport, and greater sediment (and perhaps organic carbon) loading rates (McKee et al., 2015). Concentrations of mercury in small fish have also been investigated by the RMP (Greenfield and Jahn, 2010). In contrast to PCBs, the small fish mercury data do not strongly indicate specific areas within the SF Bay Area of particular concern.

Sequential rounds of conceptual and mass balance model development have resulted in land-use based estimates of PCB and mercury production throughout the Bay Area (McKee et al. 2006,

Mangarella et al. 2006; 2010). These initial efforts were built upon by information extracted from BASMAA integrated monitoring reports, which used a unique land-use grouping that relied primarily on the identification of 'Old' and 'New' urban land uses. They were later used to develop the land use layer for the Regional Watershed Spreadsheet Model (RWSM), designed to estimate relative watershed-scale yields (Lent and McKee, 2011; Lent et al., 2012; McKee et al., 2014; Wu et al. 2016). McKee et al 2015 point out that a primary challenge faced in RWSM development was poor quality of the underlying land use layer and cautions that it may hamper the use of the model to smaller areas or at higher resolution.

Since the early1990's, several locations within the SF Bay nearby to Solano County have been sampled by regional monitoring programs such as the SF Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3)[6] system, administered by SFEI, provides access to these data and tools for viewing metadata. Given the nature of the sampling schedules, the mercury and PCBs data available are primarily useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. These data provide a snapshot of conditions for both PCBs and mercury at specific locations in the Bay, allow probabilistic inference over wider areas, and fulfill the objectives of specific scientific studies.

From 1993-2001 there are 28 recorded sampling sites for PCBs and mercury collected within Grizzly Bay, Suisun Bay, Carquinez Straight, nearly all of which record a single sample for each constituent. There have been 19 samples for both mercury and PCBs in water collected at one site in the Mare Island Straight as part of the RMP. There were 3 samples for PCBs in water collected at a site on Austin Creek in the NW corner of Vallejo in 2017. There are also 9 sediment sampling sites, with 1 sample at each site for both PCBs and mercury distributed throughout Vallejo Waterfront and Mare island collected in 2008. Two sites along Suisun Creek had both mercury and PCBs samples collected once in 2005 as part of the Portable Remote Sensing Image SectroMeter (PRISM) study, and one site within Suisun City had 1 mercury sample collected in 2013 as part of the Surface Waters Ambient Monitoring Program (SWAMP).

1.3.2.5 *PCBs source identification in Solano Permittee MS4s*

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis

[6] https://cd3.sfei.org/

Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD and City of Vallejo, 2016.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. More than six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire SF Bay.

The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an old industrial area based on historic land use. Some old waterfront sections of Vallejo are also considered old industrial and may be examined more closely in the future.

1.3.3 Reasonable Assurance Analysis

Given the risk of PCB and mercury delivery to local waterways, Solano Permittees are required to an analysis to provide 'reasonable assurance' that planned GSI implementation actions are expected to result in reductions that meet MRP 2.0 targets and the TMDL. Reasonable assurance can be defined as the demonstration that the implementation of control measures will, in combination with existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet TMDL waste load allocations or other water quality targets specified in a municipal separate storm sewer system (MS4) permit (USEPA, 2017). RAAs can provide MS4 permittees with a feasibility pollutant reduction roadmap to meeting their future waste load allocations and achieve receiving water limitations. If RAAs are conducted in a way that is well aligned with long-term stormwater planning information needs, they can also be used to support tracking, evaluation, and on-going reporting of the actual progress achieved enroute to the defined regulatory milestones.

2 Reasonable Assurance Analysis (RAA)

2.1 Approach Overview

2.1.1 RAA process

This goal of the Reasonable Assurance Analysis (RAA) is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet waste load allocation targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the green infrastructure RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to waste load allocation targets. This analysis includes only the RAA for green infrastructure, as the wasteload allocation attainment RAA will be documented in a separate report. By performing this RAA in parallel to development of the Green Stormwater Infrastructure Workplan, information from the RAA results were iteratively used to inform Plan development. This approach allows the Solano Permittees to efficiently integrate science-based tools with their stormwater planning processes and provide them with the power to iteratively verify outcomes and track progress over time.

The primary hypothesis addressed in this RAA can be stated as:

> The current level of GSI control measure implementation planned will result in PCBs and mercury load reductions that are sufficient to meet the reduction targets for the Solano Permittees specified in the MRP.

The experimental design is defined by a sequence of future scenarios during which the Permittee urban landscape is modified via changes in land use and impervious coverage, and implementation of GSI. If the expected changes are large enough to overwhelm the uncertainty associated with input data and the modeling process, then the primary hypothesis can be validated or rejected with a reasonable level of confidence.

The structure of this RAA draws substantially from the RAA already completed in Los Angeles County (Geosyntec, 2015). This analysis informed development of the RAA Guidance (BASMAA, 2017) that provides a process and structure for RAA in the SF Bay Area, which is reflected in the current analysis.

The RAA process involved compiling spatial data from various sources and information form Solano Permittees on levels of current and planned redevelopment, new development, and GSI implementation as inputs to several modeling scenarios. The basic steps in the RAA process were the following:

1. Define the modeling problem and identify an appropriate model structure and scale
2. Create a geodatabase to define urban catchment characteristics and drainage
3. Estimate baseline loading conditions and current levels of GSI implementation
4. Verify baseline modeling scenario results
5. Develop future modeling scenarios that reflect the level of projected land use changes and GSI implementation.
6. Compare the estimated reductions to GSI reduction targets for each relevant time horizon
7. Use the modeling scenarios to inform a parcel-scale spatial prioritization analysis for GI implantation site identification
8. Integrate additional planned GSI projects to update modeling scenarios

2.1.2 Correspondence with RAA Guidance Document recommendations

This RAA was coordinated with other Bay Area Permittees via the Bay Area Stormwater Management Association (BASMAA). This included participation in BASMAA workgroups, document review, and aligning the methods of analysis with recommendations included in the BASMAA RAA Guidance (BASMAA, 2017). The intent of the BASMAA RAA Guidance is to maintain a degree of consistency in the way that model analyses for PCBs and mercury are performed throughout the throughout the SF Bay region.

The RAA Guidance creates a useful structure in terms of specifying the scope of the analysis, input data sets, recommended modeling approaches, and allocation of control measures to various future scenarios. Modeling natural systems always requires several subjective decisions whose appropriateness depends on the data available to support the model and the information needs required from the outputs and the model structure. The RAA Guidance attempts to standardize several of these decisions. Sparse comment is provided on others, such as spatial resolution, aligning process representation complexity to the data available, or impacts of various sources of modeling uncertainty. For example, calibration and parameter set non-uniqueness has long been widely acknowledged as one of the most important sources of output uncertainty in hydrology (see Beven, 2001, 2006), and more recently in applied stormwater quality modeling (Wijesiri and Liu, 2018).

Modeling methods for pollutant load reduction estimation employed by the Solano Permittees is generally consistent with the RAA Guidance and aligns directly with recommendations whenever appropriate. Computational methods to modelling urban stormwater hydrology and pollutant loading continue to evolve to meet the needs of stormwater programs and regulators. Modeling decisions included in this analysis are grounded in commitment to create planning tools that are practical and useful for both short and long term stormwater decisions, responsive to evolving regulatory requirements, and readily updatable with new information to empower stormwater managers to implement effective and adaptable programs.

2.1.3 Study area

2.1.3.1 *Solano Permittee MS4 Area*

The study area for the RAA analysis includes the Solano Permittee MS4 area, that includes the cities of Fairfield, Suisun, and Vallejo only, and no areas draining to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 2.1) As such, the runoff and pollutant load modeling is discrete to these MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Since there are no long-term streamflow gauging stations downstream from the cities of Vallejo, Fairfield, and Suisun, the Permittee setting precludes calibration to observed flows. This precludes the need to incorporate additional drainage areas upstream of the Solano Permittee MS4 area in the modeling.

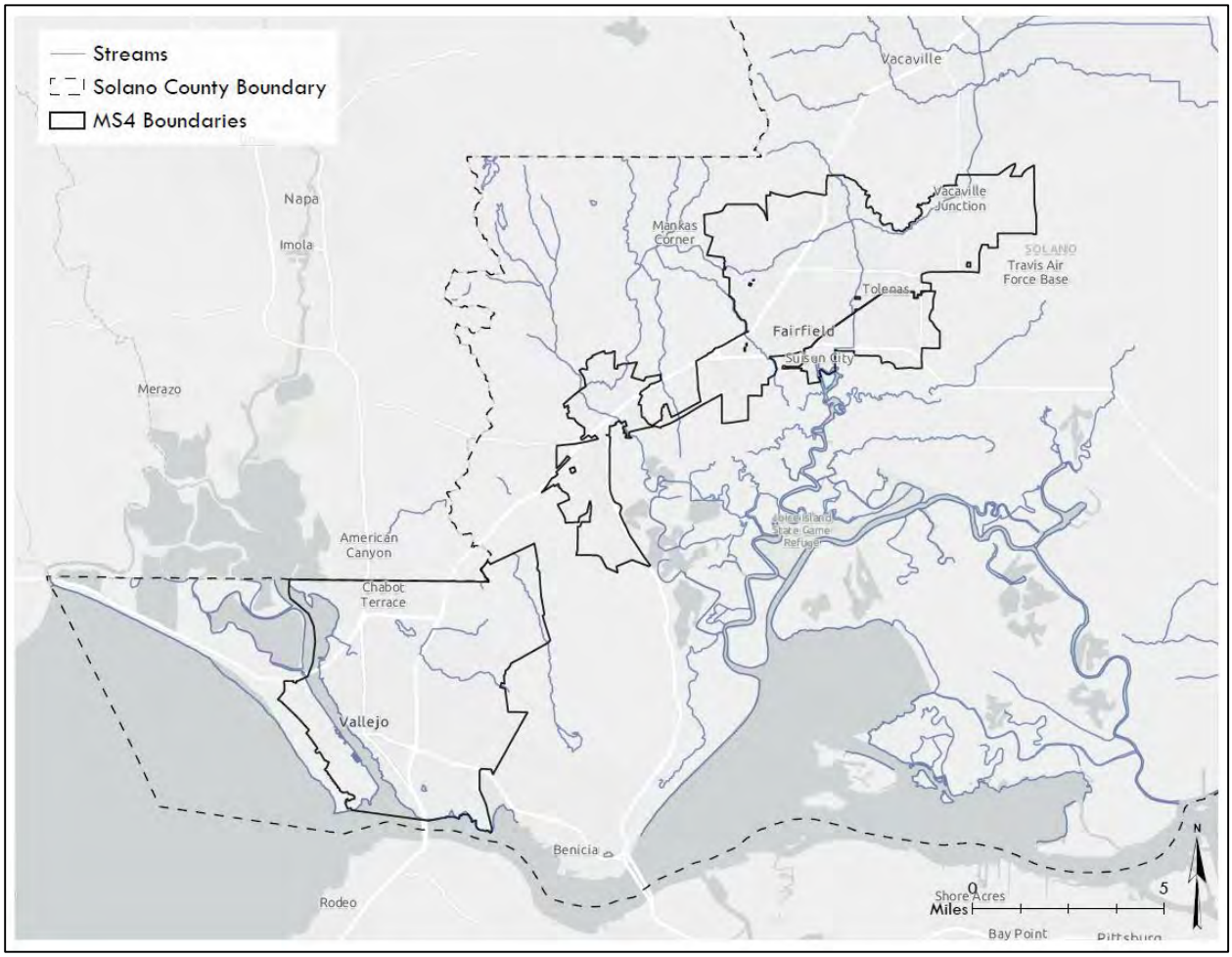

Figure 2.1. Solano Permittee MS4 Area

2.1.3.2 *Municipal Geographies*

The City of Fairfield is located along the Interstate-80 corridor between the major metropolitan areas of San Francisco and Sacramento. Fairfield is surrounded by undeveloped grazing and grasslands, hills to the north, and wetlands to the south beyond Suisun City. Fairfield is the county seat for Solano County and consists of three main areas: Central Fairfield, Cordelia, and the Travis Air Force Base.

The City of Suisun City is in the northern San Francisco Bay Area just south of the City of Fairfield. The Suisun Marsh and additional waterways lie along the southern extent of the city. The area surrounding the city includes hills and mountains. Suisun City has a downtown historic waterfront area that is its distinguishing characteristic.

The City of Vallejo is in the northern San Francisco Bay Area between San Pablo Bay and the Carquinez Strait. The city is surrounded by waterways, wetlands, rolling hills, and open space areas. Vallejo served as the California state capital in the state's infancy, before the state seat was permanently established in Sacramento. Additionally, Mare Island was the first Naval shipyard on the West Coast. Due to the historic context of the city, Vallejo has many historic buildings. Vallejo is in a desirable development location with because of transportation links via road, rail and water. The waterfront area, Mare Island, and downtown are focal points of community development.

2.1.3.3 *Climate and Physical Geography*

Solano County is the easternmost county of the North Bay has a mild coastal Mediterranean climate, with average temperatures increasing by about 10°F from the cooler coast to hotter inland cities. The coastal city of Vallejo is influenced by its position on the northeastern shore of San Pablo Bay, but less sheltered from heatwaves than areas directly on or nearer the Pacific Ocean/Golden Gate such as San Francisco and Oakland. Nearly all the precipitation is delivered between October and May, with an average annual precipitation totals of 21 inches for Vallejo and 24.9 inches for Fairfield/Suisun.

Runoff from the City of Vallejo primarily drains to the Napa River, the Mare Island Straight, and the Carquinez straight, all of which flow to San Pablo Bay. Other receiving waters for urban runoff include American Canyon Creek, Blue Rock Springs Creek, Lake Chabot, Lake Dalwigk, Rindler Creed, Southampton Bay, Sulphur Springs Creek, and White Slough. Fairfield and Suisun both drain to a complex series to tidal marshes and Sloughs that ultimately flow to Grizzly Bay and Suisun Bay. Runoff from Northern Fairfield and Suisun flows creeks and branches of the Suisun Slough, while Southern Fairfield flows primarily to Cordelia Slough. Receiving waters include Alonzo Creek, American Canyon Creek, Dan Wilson Creek, Freeborn Creek, Green Valley Creek, Jameson Creek, Laurel Creek, Ledgewood Creek, McCoy Creek, Soda Springs Creek, and Union Creek.

2.1.4 Conceptual Understanding of Pollutant Load Reduction Mechanisms

The computational model used in this RAA analysis follows from our conceptual understanding of urban drainage hydrology and redevelopment that includes pollutant fate and transport through the stormwater system. To represent these processes, a sequential accounting of runoff and pollutant load reductions is followed:

1. New development and redevelopment alter impervious cover, which affects runoff generation
2. Land use changes alter pollutant characteristic runoff concentrations
3. Source controls reduce pollutants available for transport
4. Rainfall is converted to runoff based on site-specific factors and mobilizes pollutants
5. Areas treated by non-structural LID measures produce less runoff, reducing on-site pollutant mobilization.
6. Decentralized BMPs infiltrate runoff near its source, reducing storm flows via infiltration and retention of pollutants.
7. Excess runoff leaves sites, moving downstream to centralized BMPs where runoff and pollutants are further reduced via infiltration, particle capture, filtration, and/or biogeochemical cycling.
8. Runoff and pollutants not infiltrated or treated by centralized BMPs flow downstream to other catchments or receiving waters.

In this model, water movement follows urban catchments delineations (approximately 100 acres) which define the hydrography of the urban landscape and serves as the primary unit of analysis for routing and connectivity to receiving waters. Urban drainages are aggregations urban catchments that represent the smallest non-arbitrary hydrographic divisions of the MS4.

While this RAA focuses only on GSI implementation, the computational model can easily be extended for the WLA RAA to include source control measure reductions in a subsequent modeling study. By separating the GSI RAA from the WLA RAA, care must be taken not to double count reductions since several source control and GSI components interact with each other. Inconsistencies would probably only become apparent when source control implementation can be defined in specific locations and modeling is performed in a spatially explicit manner as in swTELR. The modeling sequence defined above ensures a consistent accounting of reductions so that results are logically coherent.

2.1.5 Green Stormwater Infrastructure Definition

Green stormwater infrastructure are pollution control measures broadly defined in the MRP (as green infrastructure') (p.147) as:

> *"Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner*

water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water."

This corresponds roughly with the definition provided by the EPA, which overlaps substantially with a traditional definition of Low Impact Development (LID). One difference between the two is that LID usually includes the provision that runoff is managed as close to its source as possible. The definition used in the MRP covers most structural BMPs whether they are small decentralized/distributed BMPs that receive sub-parcel scale drainage or larger centralized/regional BMPs which typically receive neighborhood-scale stormwater drainage.

2.2 Model Selection Rationale

2.2.1 Key modeling considerations and trade-offs

Since all environmental models are simplifications of much more complex systems, an important initial step is to identify the compromises that will be required. These choices are often driven by resource availability and the purpose of the model. The most salient question is: *What do we need to use the model to do?* The answer to this question can dictate much of what gets left in and what gets left out of the model, and there are costs on both sides of that proposition. The problem is often framed as a trade-off between the degree of model complexity and the data required to support that complexity to obtain outputs with a reasonable degree of certainty. Figure 2.2 shows the problem as framed by EPA in their *Guidance on the Development, Evaluation, and Application of Environmental Models* (EPA, 2009). As structural complexity increases, the framework uncertainty decreases, since more of the system detail is represented. However, complex structures require higher order parameterizations, which rely on more data to specify and verify the model, so the additional complexity tends to produce greater uncertainty associated with the underlying data. A key modeling task is to identify the best balance these two sources of uncertainty for the specific modeling purpose.

Figure 2.2 conveys the concept that if we select a relatively simple model (e.g, computing peak flows using the rational method instead of continuous simulation), then we are left wondering if over-simplification leads to false conclusions. If we adopt a more complex model (e.g, continuous simulation at fine-scale spatial resolution), we are challenged with gathering enough real world monitoring data to supply all needed model inputs, or left wondering whether assumptions about model inputs leads to false conclusions. Thus, we seek to achieve just the level of model complexity needed to reach the point of minimum overall uncertainty resulting from the combination of model framework uncertainty and data uncertainty.

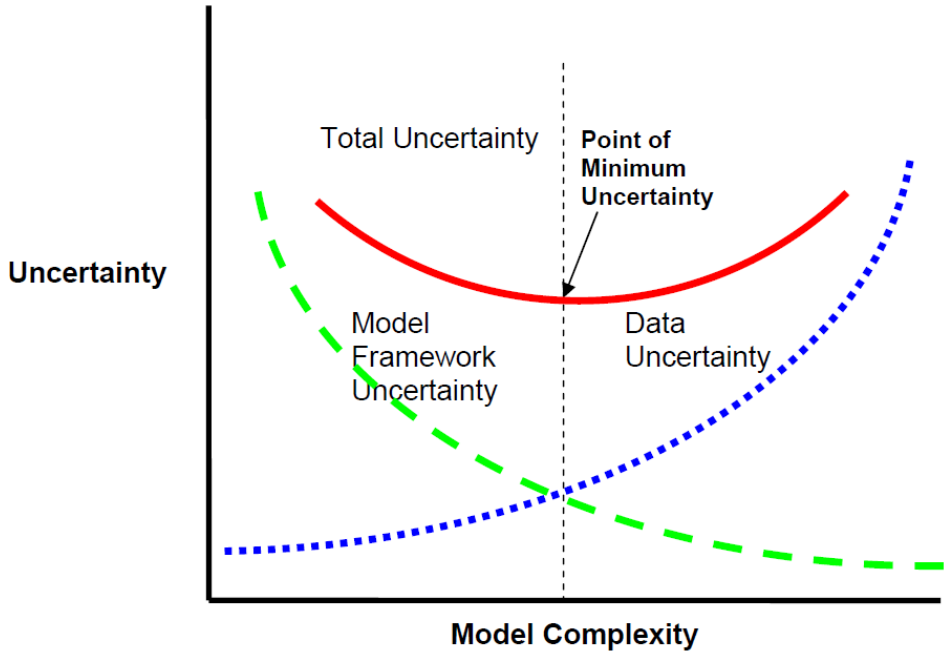

Figure 2.2. Relationship between model framework uncertainty and data uncertainty, and their combined effect on total model uncertainty (Adapted from Hanna, 1988, as presented in EPA, 2009, p.13).

In relatively complex model alternatives, there are numerous free parameters that usually require calibration, but there may be only a few input variables that contribute significantly to the outputs (Li et al. 2014). Over-parameterization, which is exceedingly common, results in a high degree of uncertainty in the model outputs due to subjective decisions required during the calibration process (Beven 1989, Beven 2001). Moreover, parameter values can vary substantially over time and space (Hossain and Imteaz 2016). Even where good hydrological data are available, they are probably only sufficient to support reliable calibration of models of very limited complexity (Jakeman and Hornberger 1993, Gaume et al. 1998). The inability to discern water quality changes over time or spatial patterns in hydrologic models is often due to poorly defined model parameters and resulting output uncertainty (Freni et al., 2011; Beven 2001, Nandakumar and Mein 1997). If the model cannot resolve the effects of management actions outside of predictive uncertainty, it is not a useful tool for estimating the water quality benefits of stormwater BMP implementation, and therefore less value to inform stormwater management decisions.

2.2.2 Aligning model specifications with management information needs

The intended use of model results should ultimately guide model selection and the necessary degree of model complexity (Leavesley et al. 2002). The least complex model that reliably meets the application at the relevant scale is often the best alternative (Chandler 1994, Rauch et al. 2002, Dotto et al. 2012). The goal of this RAA is to quantify pollutant load reductions over time associated with implantation of GSI. For stormwater planning, model selection often boils down to choice

between a greater degree of granularity across space or detail of process representation in time. Attempting to do both is computationally expensive, resource intensive, and provides more detail than required. While detailed process representation used in continuous simulation models may improve performance over short time steps, it comes at the expense of greater structural complexity (Snowling and Kramer 2001), without necessarily increasing the usefulness of outputs (Lindenschmidt 2006).

Since stormwater impact mitigation problems invariably have an important spatial component and are typically less concerned with short-term outcomes, modeling approaches that employ parsimonious process-representation in favor of greater spatial granularity make intuitive sense. While continuous simulation models provide a better way to understand dynamics of runoff generation and timing, simpler computational approaches provide a more practical alternative for stormwater managers due to lower costs and fewer data requirements. Indeed, it was recognized long ago by the earliest developers of continuous simulation stormwater models that they would be too detailed for many users and that there is a need for a wide range of procedures for assessment of stormwater pollution control costs and priorities (Heaney et al. 1976). This is especially true when resources are limited and one primary use of the outputs is to track changes over time (e.g. Schueler 1987, Chandler 1993;1994). Simpler approaches may even provide comparable performance to more complex ones (e.g., Kokkonen and Jakeman 2001, Perrin et al. 2001, Bormann and Diekkruger 2003, Reed et al. 2004; Petrucci and Bonhomme 2014), particularly when high time resolution outputs are not required.

2.2.3 RAA modeling approach

A pragmatic approach to model development was taken that eliminates elements that do not serve the purpose of ongoing stormwater load reduction quantification. The intent was to increase model transparency, usability, and updatability, to lower costs, and limit data uncertainty. Most available stormwater modeling tools are either intended exclusively for expert users (Atchison et al. 2012), or do not provide an efficient method for modeling multiple catchments or generating spatial outputs (e.g., Rossman 2013, Tetra Tech 2011).

This RAA uses the Stormwater Tool to Estimate Load Reductions (swTELR) (Beck et al 2017), a purpose-built model with an economical structure, that provides spatially explicit outputs designed to track stormwater BMP implementation over time. Identifying the best trade-offs between complexity and data requirements were a primary driver of the model structural design. These factors were considered within the context of data and resources that are likely available to stormwater managers in the long term. A computationally efficient approach can run via the web and may be used for ongoing quantification of pollutant load reductions and iterative verification of results by non-modeling experts. In this way, it can provide a dynamic alternative for ongoing planning and compliance decades after this RAA has been completed.

2.3 The swTELR Model

In this section we present the primary concepts and calculations used in the swTELR to perform this RAA. Additional documentation is available in Appendix A, contain sensitivity analyses, results of validation experiments, discussion of model limitations.

2.3.1 Model structure overview

swTELR is designed to have lower data input requirements than existing alternatives. Hydrologic computations combine a set of metrics that describe a 35-year rainfall distribution with well-tested algorithms from the National Resources Conservation District (NRCS Curve Number) for rainfall-runoff transformation and routing to generate average annual runoff estimates. Key inputs include spatially distributed rainfall, hydrography, soil types, land use, and impervious cover, along with BMP data. Pollutant generation is modelled via land-use based characteristic runoff concentrations (CRCs) to represent the generation, fate and transport of urban-derived pollutants. In effect, swTELR includes two parameters (CN and CRC), both of which are specified by the spatial data. The Curve Number method for runoff generation has been widely used in several watershed and stormwater models including the current iteration of EPA's Stormwater Management Model (SWMM 5).

A spatially explicit mass balance accounting method is used to quantify the runoff and pollutant reductions achieved with control measures. A hydrograph separation approach is used to quantify the water quality benefits of centralized, large-scale structural BMPs, and a simpler approach is used for small decentralized BMPs that omits accounting for flow timing. Validation experiments have shown that runoff estimation aligns closely with high-resolution monitoring data as well as results generated from more complex, well-accepted continuous simulation models (Beck et al., 2017), providing confidence that the swTELR computational approach is technically well-suited to inform stormwater planning applications.

2.3.2 Spatial and temporal scales of representation

Stormwater models vary widely in terms of how urban catchments are delineated and how landscape characteristics are discretized. swTELR employs a semi-distributed approach where runoff, loading and decentralized BMP reduction calculations happen on 30-meter grid scale (Figure 2.3), and hydrologic routing is performed at the urban catchment scale (approximately100 ac). Accounting of reductions from BMPs are spatially explicit so that the site-specific runoff generation and pollutant loading characteristics specific to the BMP drainage are preserved. Explicit of flows across grid cells features is not represented as it would be in fully distributed models (e.g. Bicknell et al. 1997, Lee et al. 2012), rather this is handled at the catchment scale.

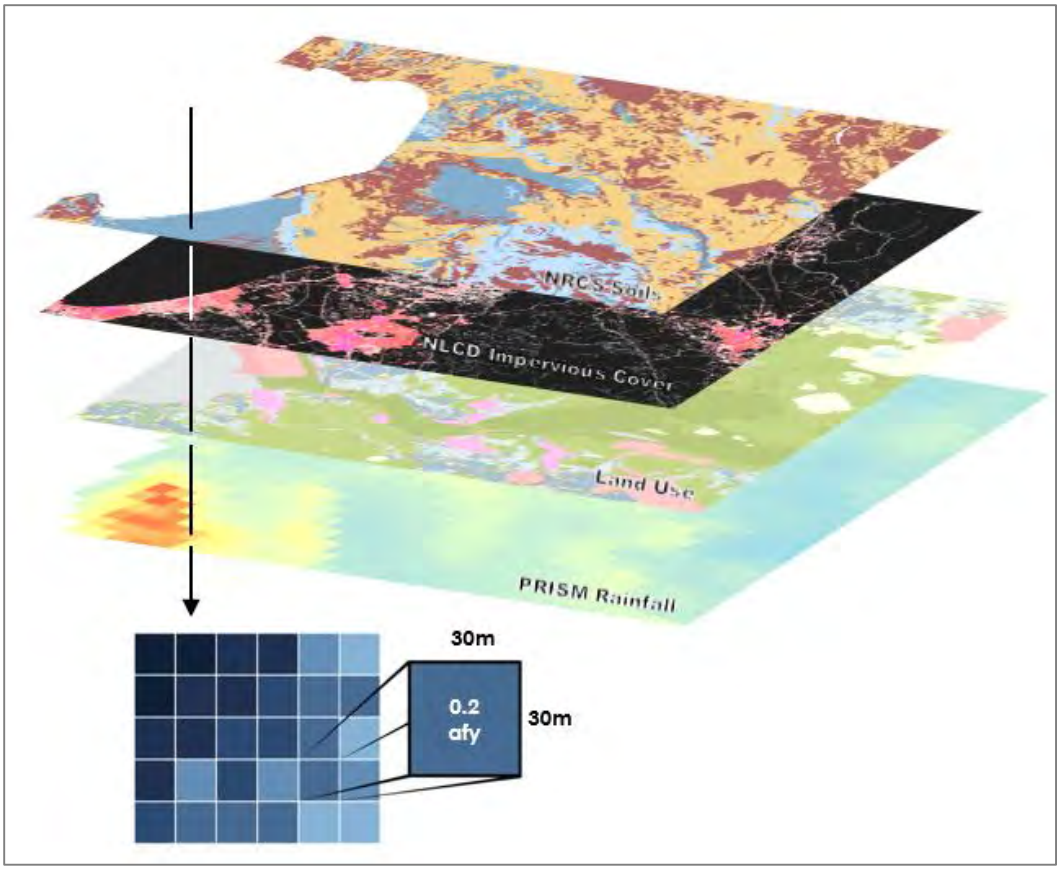

Figure 2.3. Graphical representation of raster calculations performed in swTELR to generate gridded runoff estimates.

Typically, stormwater runoff is modeled using 1 of 2 approaches: a single storm event methodology or a multi-year, high-resolution (daily or sub-daily) continuous simulation. Event-based approaches are programmatically simple but were originally designed to simulate runoff for a single storm event size (USDA 1986). Continuous simulations are generally better able to capture the dynamic range of rainfall-runoff responses by accounting for antecedent catchment moisture conditions (Harbor 1994, Bicknell 1997, Rossman 2008). swTELR employs a hybrid event-based approach that combines a set of events drawn from a long-term regional precipitation distribution to provide average annual runoff estimates. In effect, swTELR brackets the range of rainfall and runoff responses with a probabilistic approach, rather than a sequential, time-explicit approach (described in section 2.3.3).

This swTELR approach allows substantially simplified computation compared to continuous simulation, allowing substantially more spatially granular outputs that indicate precisely locations within the urban landscape that hold the greatest opportunities for runoff and pollutant load reductions. In addition, this approach avoids the model outputs being tied to a short time period, which may not capture a long-term representation of the range of event magnitudes. Given the lifespan of stormwater infrastructure is typically several decades, and the simulations included in this RAA will

span 20 years, using a multi-decadal period to characterize rainfall seems prudent. In short, we believe that a probabilistic treatment of rainfall provides the best compromise for generating outputs that most closely align with the purpose of RAA.

2.3.2.1 *Precipitation data*

Raster-based rainfall estimates are from the PRISM Climate Group[7] at Oregon State University are used for runoff generation in swTELR, typically covering a 35-year time span. These data provide spatially distributed precipitation at 800m resolution and are processed in swTELR to provide a probabilistic description of rainfall. The extracted raster-based precipitation estimates from PRISM have been independently validated using Western Regional Climate Center (WRCC) rain gauges for 15 cities located on the California Coast.

2.3.2.2 *Soils*

The USDA Natural Resource Conservation Service (NRCS) defines four hydrologic soil groups (HSGs): A, B, C, and D. A has the largest infiltration potential and is associated with the least amount of runoff whereas HSG D has the lowest infiltration potential and is associated with the most amount of runoff. The NRCS HSGs are based on soil composition and textural properties and align with NRCS curve number values for pervious surfaces. The classification of soils is determined by the soil layer with the lowest saturated hydraulic conductivity and the depth to any layer that is impermeable or depth to a water table (if present). HSGs reflect infiltration in the subsurface at depths of up to 2 feet or greater. Bay Area soils predominantly belong to groups C and D, making infiltration slower than more permeable soils in many locations. swTELR uses spatial soils data from two sources, the NRCS SSURGO database, which offers higher resolution, and the STATSGO2 database, which provides greater coverage in some areas.

2.3.2.3 *Impervious cover*

A key input for runoff generation in swTELR is satellite-derived impervious cover derived from the Landsat satellite series (https://viewer.nationalmap.gov/launch/) and available from the USGS at 30-meter resolution. Impervious cover dramatically reduces runoff infiltration to soils and thus transforms incident rainfall to runoff at substantially higher proportions than undeveloped lands. Use of satellite imagery to estimate impervious cover has several important benefits to estimate urban runoff. Satellite impervious coverage data is widely available, regularly updated, and can be easily accessed by any municipality. The use of satellite imagery rather than on-the-ground mapping of impervious cover incorporates the urban tree canopy to estimate overall impervious area. Extensive research has documented the reductions that urban trees provide to the rainfall-runoff transformation in urban drainages (Dwyer et al., 1992; Roy et al., 2012). The 30m resolution

[7] http://prism.oregonstate.edu/

of the Landsat data align with the other swTELR spatial inputs, making the data compilation and processing efficient.

2.3.2.4 *Catchment connectivity*

Catchment connectivity is a critical element of generating reliable estimates of average annual runoff and loading derived from an urban catchment and delivered to a receiving water. Catchment connectivity is defined as the proportion of stormwater discharging from a catchment discharge point that reaches the receiving water and is not diverted in some way. All catchment runoff and loading estimates reported from swTELR are adjusted based on the relative hydrologic connectivity of each catchment to the receiving water. MS4 mapping guidance (2NDNATURE, 2018) includes a systematic process for a user to determine the relative hydrologic connectivity of a catchment to receiving waters based on the distance, substrate and visual characteristics of the flow path that physically connect the discharge point of a specific catchment to the receiving water. Working inland from the receiving waters, all catchments that drain into another catchment inherit the same connectivity as the downstream catchment, unless there is evidence suggests that some surface volume loss occurs between the two catchments. Catchment delineation and connectivity is typically completed in coordination with city stormwater staff.

2.3.2.5 *Stormwater BMPs*

Stormwater TELR was developed to easily incorporate both structural and non-structural stormwater BMPs of various types, sizes, and applications. Stormwater BMP locations, types, and specifications are documented and typically communicated to 2NDNATURE via spreadsheets or uploaded to the swTELR web interface. An iterative process is performed to verify BMP attributes and recommend field verification where necessary. BMPs are stored within an asset management system that includes tracking, field protocols, and mobile apps for performance verification that are integrated to the stormwater model.

2.3.3 Precipitation data processing

Precipitation inputs are designed to bracket the seasonal and inter-annual variability demonstrated by historic data, defined using the PRISM dataset published by Oregon State University. We used the historic distribution of 24-hr rainfall depths (24-hr event frequencies) and the average annual number of days with measured rainfall to drive runoff generation. The 35-year (1981-2016) precipitation cumulative distribution function for each precipitation region was broken into a set of percentile values. This approach provides a way to bracket the likely event magnitudes in each region, incorporates extreme events in a manner proportional to their likelihood of occurrence, and serves to standardize the inputs from one modeling scenario to another using a small number of representative metrics.

Stormwater TELR calculates various 24-hr precipitation depths and the average annual number of days with measurable precipitation to represent the overall distribution and accurately estimate

total average annual depths. We calculated, d, the average number of rain days per water year when daily rainfall exceeds 0.01 inches (0.25 cm) and, P(x), various 24-hr event frequency estimates, where P is the 24-hr rainfall depth for the xth percentile event. On a water year basis, we selected 24-hr event rainfall frequencies and applied the trapezoid rule to estimate the integral of the 24-hr event cumulative distribution function to obtain a long-term average 24-hr runoff volume for days when it rains. We approximated the integral using the following equation for non-uniform intervals of x:

$$\int_0^{100} P(x)\,dx \approx$$

$$\frac{1}{2}\sum_{k=1}^{N}(x_{k+1} - x_k) * (P(x_{k+1}) + P(x_k)) \qquad (2.1)$$

where x is a number between 0 and 100, and k is number in the sequence of total, N, percentile events used to estimate the integral. To obtain a long-term average annual runoff volume, P365, we multiplied the 24-hr average by the number of rain days per year, d:

$$P_{365} = d * \int P(x)dx \qquad (2.2)$$

The average annual 24-hr rainfall for days when it rains is calculated using a set of 4 percentile events that correspond with common post-construction permit requirements and structural BMP design criteria (85th and 95th percentile storm events), which also include the median and the lower quartile. Figure 2.4 shows the historic 24-hr event frequency distribution for a typical precipitation distribution and a graphical representation of how the trapezoid rule is used to estimate the long-term average 24-hr rain events. This approach has been compared with several other approaches to characterizing the long-term precipitation distributions (Beck et al. 2017).

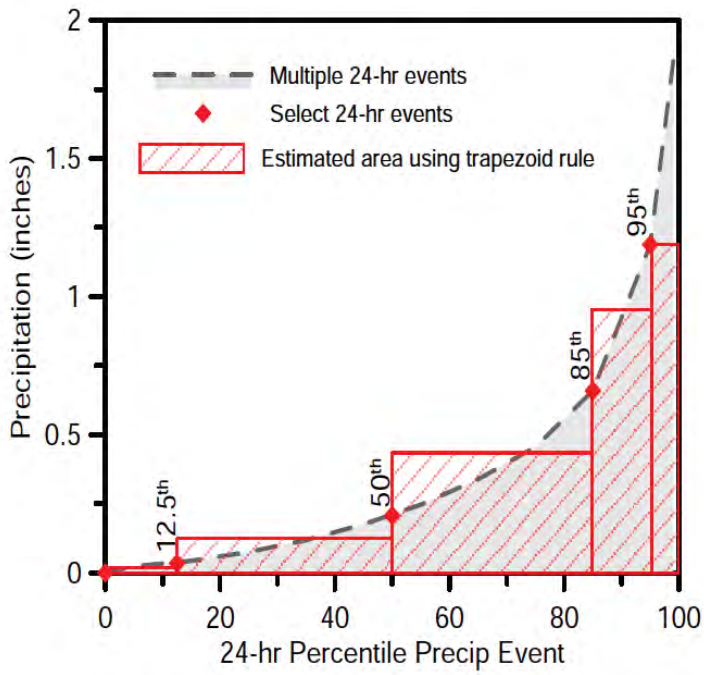

Figure 2.4. Illustration of the trapezoid method used to sum the area below the curve of the precipitation cumulative distribution function.

2.3.4 Rainfall-runoff transformation

For a given storm magnitude and duration, the runoff generation module defines the fraction of flow that infiltrates over pervious surfaces and the fraction of overland runoff that is eventually discharged to the receiving waters. Stormwater TELR relies on the Soil Conservation Service (SCS) curve number (CN) method and the approach detailed in Technical Release 55 (TR-55) to estimate runoff from small urban catchments (USDA 1986). The SCS runoff equation is:

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \tag{2.3}$$

where Q is the runoff depth, P is the 24-hr rainfall depth, S is the potential maximum retention after runoff begins, and I_a is the initial abstraction depth. The initial abstraction incorporates all losses before runoff begins, including water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. Runoff does not begin until the initial abstraction has been met. I_a is variable across the landscape but is highly correlated to the curve number. The initial abstraction is 20% of the storage,

$$I_a = 0.2S \tag{2.4}$$

and

$$S = \frac{1000}{CN} - 10 \tag{2.5}$$

More recent data suggest that 0.20*S might be too high and that 0.05*S is more appropriate (Woodward et al. 2003, Lim et al. 2006, Shi et al. 2009) especially for hydrologic soil groups C and D (Jiang 2001). If 5%, rather than 20%, is used, S must also be modified. The relationship between $S_{0.05}$ and $S_{0.20}$ obtained from model fitting results is (Lim et al. 2006, Hawkins et al. 2002)

$$S_{0.05} = 1.33 * {S_{0.20}}^{1.15} \tag{2.6}$$

We used the adjusted initial abstraction ratio (equation 6) and by substituting equation 4, modified for 5% of storage, into equation 3, we obtain

$$Q = \frac{(P - 0.05S_{0.05})^2}{P + 0.95S_{0.05}} \tag{2.7}$$

Curve numbers range from 30 to 98 and lower numbers indicate low potential runoff whereas higher numbers indicate increasing runoff potential. The major factors that determine SCS curve numbers are the soil type, the land use (specifically, the percent impervious of the land use), the hydrologic condition and soil infiltration capability. To simply account for variations in soil permeability and infiltration, the NRCS has classified soils into 4 hydrologic soil groups (HSGs). A curve number for a given land use with impervious area can be estimated by the following (USDA 1986):

$$CN_c = CN_p + \frac{P_{imp}}{100}(98 - CN_p) \tag{2.8}$$

where CN_c is the runoff curve number for the entire land use, CN_p is the pervious runoff curve number and P_{imp} is the percent imperviousness. The pervious curve numbers used are those defined for open space in poor condition (grass cover < 50%) (USDA, 1986), since urban soils are often disturbed or compacted, and are listed in Table 2.1.

Table 2.1. Urban pervious curve numbers used in swTELR (USDA, 1986)

Soil Type	A	B	C	D
Curve Number	68	79	86	89

The model generates discrete runoff outputs which mirror the 24-hr event percentile precipitation inputs. Using equations 1 and 2, we replaced the rainfall $P(x)$ with runoff $R(x)$, where R is the runoff calculated by the approach described above for a set of 24-hr rainfall events. Similar to the calculation described for the rainfall, the trapezoid rule is applied to the xth percentile event which

are summed to approximate the area under the probability distribution function and obtain the average annual runoff.

Antecedent runoff conditions are a critical component to accurately determining runoff and the SCS curve numbers originally incorporated average antecedent runoff conditions (USDA 1986). The ability of continuous models to represent varying catchment moisture condition is a distinct advantage over event-based models. Recent studies have shown the importance of adjusting CNs based on antecedent runoff conditions (Bhaduri et al. 2000, Michel et al. 2005). Because swTELR was developed to estimate long-term average annual runoff conditions, we do not adjust the CNs and assume average antecedent runoff conditions for all simulations.

2.3.5 Pollutant loading

Urban pollutant modeling approaches commonly estimate pollutant loading at the land use spatial scale and use a variety of approaches to determine the associated land use characteristic pollutant concentrations. Algorithms to represent pollutant build-up and wash-off over time are common in continuous simulation models (Freni et al., 2009; 2011; Mannina and Viviani, 2010; Hossain and Imteaz, 2016), which has been shown to improve pollutant modeling performance in some cases (Wang et al., 2011). However, optimal parameters for these calculations are difficult to identify with precision or validate with sampling (Freni et al., 2009). While Monte Carlo sampling of the parameter space can improve parameter identifiability (Strecker et al., 1990; Wagener and Kollat 2007; Freni et al., 2011), high degrees of uncertainty in model outputs remain (Petrucci and Bonhomme, 2014). Further, other researchers have found that pollutant accumulation and generation on event time scales is extremely difficult to predict and that similar seasonal or annual results could be obtained using constant concentrations (Sage et al., 2015).

Since pollutant loads are strongly dependent upon runoff volumes at longer time scales, attempting to capture the short-term variability in pollutant concentrations is less important for swTELR's application. Using static runoff concentrations for different land-uses was identified as the best approach. Stormwater TELR calculates pollutant loads as the product the stormwater volume and a pollutant concentration. This approach ignores the event-specific dynamics that depend on rainfall duration and intensity that have been linked to variations in pollutant concentrations throughout an event. However, at the average annual scale, these effects are substantially less important on catchment loads than the catchment inputs and runoff volumes for explaining pollutant loads (Lee and Bang, 2000; Brezonik and Statelmann, 2002).

Annual pollutant loading (L) is calculated for each grid cell, (Lg) as the product of the average annual land use runoff Qa, and the land use specific characteristic pollutant runoff concentration [p] (mg/L) for that grid cell, with proper unit conversions.

$$L_g = Q_a * [p]_{LU} \quad (2.9)$$

Annual catchment pollutant load (L) is the sum of the grid cells within that catchment,

$$L_c = L_{g1} + L_{g2} \ldots + L_{gi} \quad (2.10)$$

where i is the total number of grid cells in the catchment. Pollutant load estimates can be compared within and across municipalities by normalizing by the catchment size, A, to obtain an average annual loading rate, $\{La\}$,

$$\{L_a\} = L_c/A \quad (2.11)$$

2.3.6 Pollutant association with sediments

Urban pollutant load reductions calculated in swTELR for PCBs and mercury correspond to BMP reduction efficiencies associated with sediment removal, often measured as total suspended solids (TSS) or Suspended Sediment Concentration (SSC) reductions. Like many other uban pollutants, PCBs and mercury are both strongly hydrophobic and have a tendency to adsorb to particulates. Pollutants such as metals are often bound to particulate matter in runoff (Loganathan et al., 2013; Chen and Chang, 2014; Herngren et al., 2005; Sartor et al., 1972; Kayhanian et al., 2012). Strong correlations have been observed between particulates measures and total organic carbon, nutrients, heavy metals, oil and grease (Kayhanian et al., 2012; Nasrabadi et al., 2016) polycyclic aromatic hydrocarbons (PAHs) (Rugner et al., 2013), and Bacteria (Stein et al., 2007).

We expect sediment reduction in BMPs to be a useful proxy for most conservative constituents such as PCBs and mercury. PCBs are mostly found in a particulate phase, are associated with coarse-grained particles, and behave like sediment particles. Previous studies in heavily urbanized watersheds have found more than 75% to 100% of the total PCB load was associated with the particulate phase (Ko and Baker, 2004; Bressy et al. 2012). In the SF Bay Area, Gilbreath et al (2012) also noted a strong association of high turbidity levels and elevated PCB concentrations.

Yee and Mckee (2010) found that 55% of PCB particles in stormwater settled out within 30 minutes, and concluded that PCB behaved very much like a sediment particle, and that effective settling of moderate to larger sediment particles was capable of achieving a minimum 50% PCB removal. A European study found that urban tree pits and their associated bacteria have the capability to degrade PCBs in the soil (Leigh et al, 2006). This finding suggests that practices such as bioretention which have aerobic media conditions may also promote the growth of PCB-reducing bacteria.

Monitoring studies have shown that mercury levels in storm flow are strongly correlated with turbidity (Gilbreath et al, 2012), suspended particulate matter and particulate organic matter

(Mason et al, 1999). David et al (2009) reported a strong correlation between mercury concentrations and suspended sediment in urban and agricultural rivers in California. Settling column experiments by Yee and Mckee (2010) using stormwater runoff and sediment samples from urban watersheds in the San Francisco Bay area found that 10 to 30% of mercury entrained in stormwater settled out within 20 minutes, and 90% of mercury re-suspended from creek sediments settled out within 10 minutes. Based on these experiments, Yee and McKee concluded that mercury behaved very much like a sediment particle, and that any urban BMP that promoted settling of fine sediment particles or captured fine-grained street solids should be effective at reducing mercury loads in urban watersheds.

2.3.7 Decentralized BMPs

Decentralized BMPs types either reduce volume, treat pollutants, or do both (Table 2.2). Runoff volume reductions are achieved via infiltration and net exfiltration and these reductions in volume as a result of BMP interactions could be measured. Pollutant concentration reductions can be measured due to retention, filtration or capture that prevents some fraction of the particulate load delivered to structural BMP from exiting. Detailed descriptions of decentralized BMP types represented in swTELR are listed in Appendix D.

Table 2.2. Decentralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Biofiltration		✓
Bioretention	✓	✓
Bioswale	✓	✓
Filtration Device		✓
Infiltration Feature	✓	
Pervious Pavement	✓	
Sediment Trap		✓
Settling Basin		✓

Runoff and pollutant load reductions from decentralized BMPs are calculated as the difference of model outputs. Baseline flows and loads are first calculated, then decentralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.7.1 *Decentralized BMP runoff reductions*

Decentralized BMP runoff reductions are calculated based on their design storm specifications and impervious drainage areas. All runoff generated up to the design storm depth is either infiltrated or treated and flows generated above the design capacity are bypassed and routed downstream. For example, if a BMP is designed to the 85th percentile rainfall event, all runoff generated from events up to and including the 85th percentile event will be infiltrated or treated. Reduced flows from decentralized BMPs that are intended to infiltrate stormwater (see table 2.2) are calculated for each 30-meter grid cell proportional to the impervious drainage area treated for each BMP, per Equation 2.12

$$QR_g = \int_0^{85} Q_g(x)\, dx \approx \tag{2.12}$$

where QR_g is the treated runoff volume (ac-ft) for the 85th percentile design storm from a single grid cell. In this instance, events larger than the 85th percentile storm would remain untreated. The total runoff volume treated by decentralized BMPs is the sum of each cell within a decentralized BMPs drainage area,

$$QR_d = QR_{g1} + QR_{g2} \ldots + QR_{gi} \tag{2.13}$$

Based on Equation 2.13, the volume reduction realized from decentralized BMPs has a commensurate pollutant load reduction even without any reduction in pollutant concentration. In this example, the grid cell pollutant load is reduced solely due to the reduction of stormwater runoff volumes,

$$PR_g = QR_g * [p]_{LU} \tag{2.14}$$

where PR_g is the pollutant load that includes the respective runoff volume reduction (QR_g) multiplied by the is the characteristic runoff concentration ($[p]_{LU}$, mg/L) for the land use associated with that grid cell. Pollutant load reductions (PR_d) for each catchment after treatment by decentralized BMPs is the sum of all grid cells within that catchment.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.15}$$

2.3.7.2 *Decentralized BMP pollutant concentration reductions*

As already discussed (section 2.3.6), swTELR provides decentralized BMP pollutant concentration reductions commensurate with expected BMP sediment reductions. This approach mirrors that taken in the Chesapeake Bay to simplify reduction accounting for the range of urban BMP types using curves that reflect sediment removal since it closely corresponds closely with removal of particulate bound urban pollutants of concern (see Scheuler and Youngk, 2015).

To estimate pollutant concentration benefits from decentralized BMPs, we assume decentralized BMPs that capture pollutants are 80% effective at reducing pollutant concentrations up to the 85th percentile 24-hr storm event at benchmark or optimal condition (CASQA, 2003; Water Environment Federation, 1998). For example, a grid cell treated by decentralized BMPs that reduces pollutant concentrations has a treated pollutant concentration, $[p]Tr_g$ (mg/L) calculated as:

$$[p]Tr_g = [p]_g * (1 - 0.8) \tag{2.16}$$

where $[p]_g$ (mg/L) is the original grid cell land use CRC. The pollutant load reduction (PR_g) from a grid cell draining to a decentralized BMPs that only reduces pollutant concentrations is,

$$PR_g = QTr_g * [p]Tr_g \tag{2.17}$$

If a grid cell is treated by a decentralized BMP that reduces both runoff volumes and pollutant loads (e.g., bioretention), then there is an indirect and direct pollutant load reduction as a result of infiltration and pollutant retention. Following equations 2.13, the load reduction from a grid cell with both a volume and pollutant concentration reducing BMP is

$$PR_g = QR_g * [p] + (Q_g - QR_g) * [p]Tr_g \tag{2.18}$$

where QR_g is the flow reduction from the grid cell as a result of infiltration, as calculated by equation 2.12. While flows above the design level are not infiltrated by the decentralized BMP, particles are still captured via particle settling and interaction with vegetation and flows are slowed by pooling. The total catchment pollutant load after reductions from decentralized BMPs is the sum of grid cells treated by decentralized BMPs within their respective drainages.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.19}$$

2.3.8 Centralized BMPs

Large scale centralized structural BMPs (e.g., treatment vaults, infiltration basins, dry basins) typically treat stormwater runoff from mixed land use catchments and have treatment capacities on the order of an acre-foot or more (approximately 1,200 m^3). Stormwater can exit a centralized BMP in 1 of 3 ways: loss through infiltration, discharge via treatment aperture, or via bypass where no treatment or detention has occurred. Some models also include evaporative losses, but given proper functioning, structural BMPs should have drawdown times on the order of hours and we assume this term is negligible. The relative components of volume loss depend on the BMP type and design specifics. For example, an infiltration BMP has only infiltrated and bypassed volumes, while a treatment vault has only treated and bypassed volumes. Figure 2.5 provides schematics of centralized BMPs represented in swTELR, from which swTELR assumes volume loss via 3 potential critical pathways: infiltration, treated outflow, and bypass. BMP types represented in swTELR are listed in Table 2.3 with their relevant pollutant and runoff reductions.

Table 2.3. Centralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Bed Filter		✓
Detention Basin		✓
Dry Basin	✓	✓
Infiltration Basin	✓	
Media Filter		✓
Treatment Vault		✓
Wet Basin		✓
Retention Basin	✓	✓

Calculation of runoff flow and pollutant load reductions from centralized BMPs are calculated as the difference of model outuputs. Baseline flows and loads are first calculated, then centralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.8.1 *Centralized BMP runoff reductions*

Stormwater TELR derives each volume loss term from the outflow hydrograph using a hydrograph separation approach to estimate the fraction of volume infiltrated, treated, and bypassed flow based on 4 key user inputs: treatment capacity, basin footprint, and, if applicable, the infiltration rate and drawdown time (Table 2.4). Infiltrated volumes are net volume reduction as a result of BMP interaction. Stormwater discharges through a treatment aperture are termed treated volumes and assumed to have experienced pollutant retention via particle settling, filtration or biogeochemical process. Bypass volumes are those where no treatment has occurred due to unacceptable residence times within the BMPs. Other volume loss terms, such as evapotranspiration, are assumed insignificant on an average annual basis and ignored. The volume routing pathways by BMP type are graphically summarized in Figure 2.5.

Table 2.4. Centralized BMP types and attributes

BMP Type	Treatment Capacity	Footprint	Infiltration Rate	Treatment Rate	Drawdown Time	Wet Pool Capacity
Bed Filter	✓	✓		✓		
Detention Basin	✓	✓			✓	
Dry Basin	✓	✓	✓		✓	
Infiltration Basin	✓	✓	✓			
Media Filter	✓	✓		✓		
Treatment Vault	✓	✓		✓		
Wet Basin	✓	✓			✓	✓
Retention Basin	✓	✓	✓		✓	

The corresponding volumes are calculated using graphical methods (Figure 2.6). Separation of the infiltration volume is determined by drawing a flat line across the hydrograph at the infiltration flow rate, calculated as the product of the infiltration rate and the basin footprint with proper unit conversion). Separation of the treated volume is defined by drawing a flat line across the hydrograph at the treatment flow rate, estimated as quotient of the treatment capacity and the drawdown time with proper unit conversion. Both the infiltration volume and the treated volume are calculated as the area of the outflow hydrograph under the respective flow rates down to a zero flow rate. If the sum of the infiltrated and treated volumes is less than the total outflow volume, then the remaining volume is allocated to bypass. If the sum of the infiltrated and treated volumes is greater than the total outflow volume, then the treatment volume is reduced to accommodate the difference and the volumetric balance between inflow and outflow is retained.

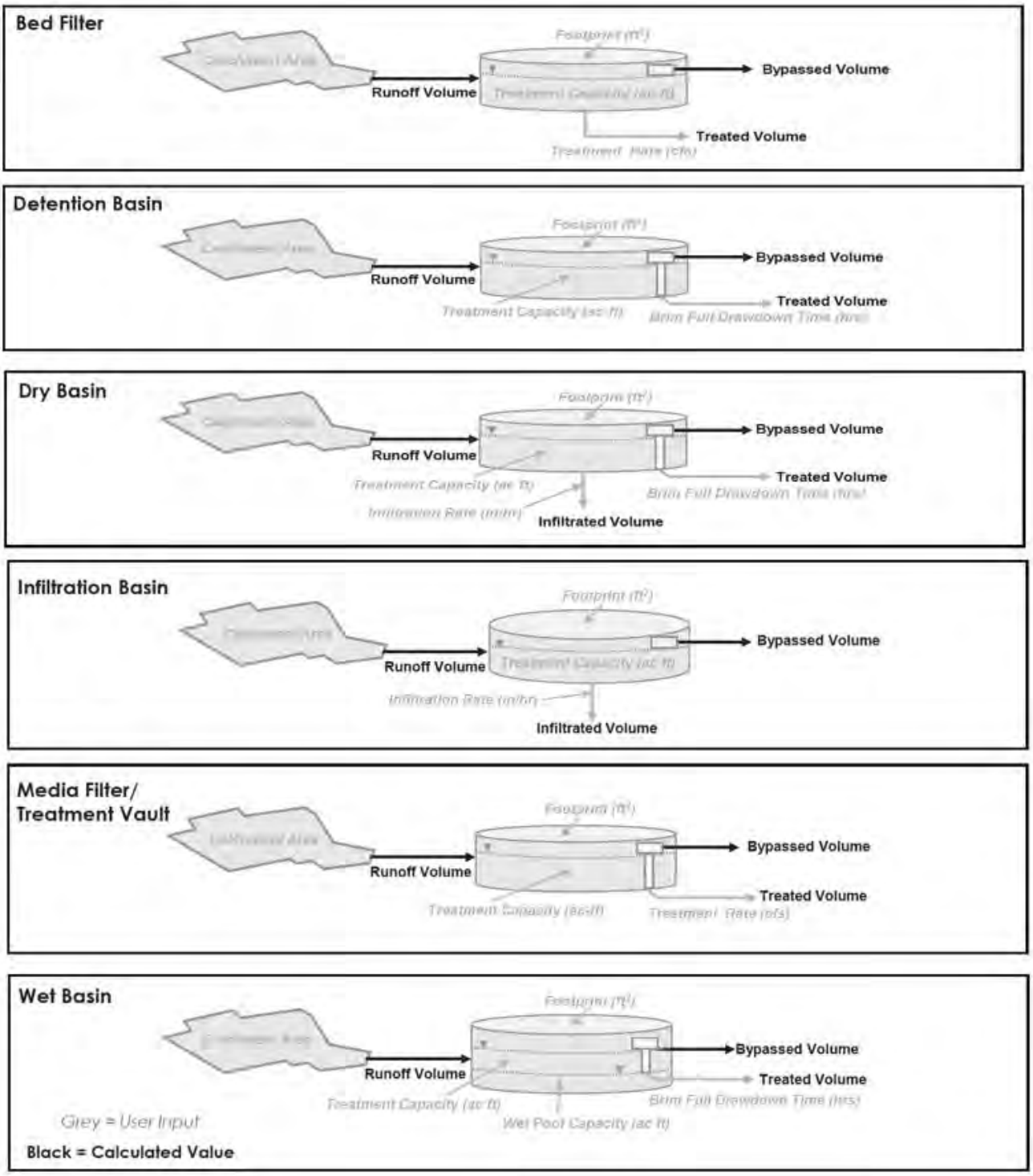

Figure 2.5. Centralized BMP types, inputs and calculated values as implemented in swTELR.

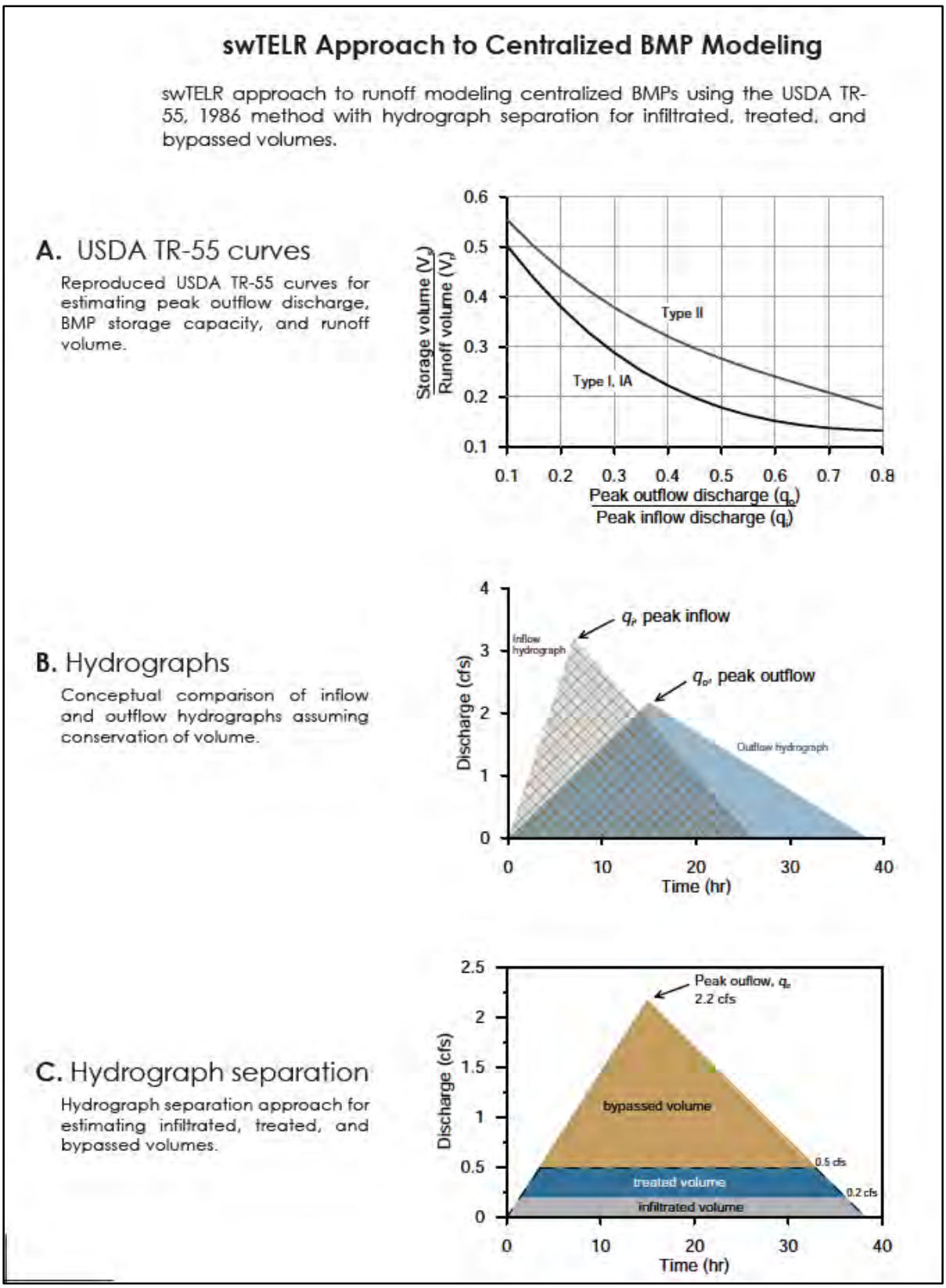

Figure 2.6. Centralized BMP flow partitioning

Average 24-hr and 365-day stormwater runoff volumes from large scale centralized BMPs are modeled using the same approach to estimate baseline runoff from selected 24-hr precipitation events (12.5, 50, 85, 95) that describe the precipitation distribution. The TR-55 (USDA, 1986) approach to estimate peak outflow and the hydrograph separation approach to estimate infiltrated, treated, and bypassed volumes is conducted for each 24-hr percentile precipitation event. Average 24-hr infiltrated, treated, and bypassed volumes for days when it rains are estimated using the trapezoid rule. Average 365-day infiltrated, treated, and bypassed volumes from catchments with large-scale centralized BMPs is estimated by the product between volume and the average number of days per year with measurable rain. When the infiltrated, treated, and bypassed volumes (Q_{infil}, Q_{CEC}, and Q_{BY}, respectively) are properly allocated, the total inflow is equal to the total outflow, Q_{OUT}

$$Q_{OUT} = Q_{infil} + Q_{CEC} + Q_{BY} \tag{2.20}$$

2.3.8.2 *Centralized BMP pollutant concentration reductions*

The pollutant load after interaction with a centralized BMP is the sum of the bypassed and treated loads. Each of these components is the product of the pollutant concentration and associated volume. The concentration of the water infiltrated and bypassed is equal to the incoming concentration of runoff prior to treatment by the centralized BMP. A characteristic effluent concentration (CEC) is assigned to the treated volumes (Table 2.5), $[p]_{CEC}$ (mg/L) that are dependent on the BMP type to calculate *reduced* pollutant loads (PT_r) associated with volumes treated (not infiltrated) by centralized BMPs (Q_{cec}) according to equation 2.21:

$$PTr_c = Q_{CEC} * [p]_{CEC} \tag{2.21}$$

The total outgoing pollutant load from a centralized BMP (PT_c) is the sum of the load from the treated load (PTr_c) and the bypassed load (PBy_c)

$$PT_c = PTr_c + PBy_c \tag{2.22}$$

Where the bypassed volumes are calculated as the product of the bypassed volume Q_{BY} and the inflow pollutant concentration for the centralized BMP drainage $[p]_C$

$$PBy_c = Q_{BY} * [p]_C \tag{2.23}$$

Based on strong evidence for association of PCBs and mercury with particulates (see section 2.3.6), we assumed different centralized BMP types to have proportional pollutant reduction efficiency to that of sediments. Therefore, PCB and mercury reductions (PR_c) are calculated as the product of the pollutant load delivered to the centralized BMP (PTr_d) for pollutants (PCB/Hg) and the percent TSS load reduction.

$$PR_{c\,PCB/Hg} = PTr_{d\,PCB/Hg} * (PTr_{d\,TSS} - PTr_{c\,TSS})/PTr_{d\,TSS} \quad (2.24)$$

Using TSS as a proxy for particulate pollutant reductions has the advantage of substantially greater BMP performance data availability compared to similar data specifically associated with mercury or PCBs. Assignment of sediment CEC values to BMPs included a substantial data compilation effort that included data directly compiled and/or analyzed by 2NDNATURE (2NDNATURE, 2006a; 2006b; 2007; 2008; 2NDNATURE and nhc, 2012a; 2013; 2014; LRWQCB and NDEP, 2007), or obtained from the National Stormwater Quality Database[8]. BMP type definitions in the NSQD are loosely defined and therefore likely include substantial variation within the same specified BMP type. To support this analysis, we also reviewed results documented in available NSQD annual data analysis reports (Geosyntec Consultants and Wright Water Engineers, 2012; 2013; 2014), as well as select marketing and design literature available online for a variety of proprietary centralized structural BMPs.

TABLE 2.5 Characteristic sediments effluent concentration (CEC) values for centralized BMP types

BMP Type	CEC TSS (mg/L)
Wet Basin	5
Dry Basin	6
Infiltration Basin	92
Treatment Vault	20
Media Filter	6
Bed Filter	3
Detention Basin	40
Retention Basin	5

The use of CEC values is preferred over percent load reduction estimates that are commonly used in structural BMP models for two key reasons. First, the use of percent reduction requires a consistent reduction across the range of event magnitudes, including very large events which often provide substantial bypassed flow (Strecker *et al.*, 2001). Secondly, since most devices have an upper limit on performance, when pollutant concentrations are very low, the percent load reduction method tends to overestimate benefits. These observations are based on specific BMP types, within a limited range of conditions, and the difference between these two methods may be less pronounced given a wider range of facility types and pollutant concentrations.

[8] http://www.bmpdatabase.org/nsqd.html

2.3.9 Runoff routing

2.3.9.1 *Routing to centralized BMPs*

swTELR models centralized BMPs using the USDA TR-55 (1986) methodology for estimating peak inflow and peak outflow. Calculations for infiltrated, treated, and bypassed stormwater runoff volumes are completed for each prescribed 24-hr percentile storm event. Estimating of peak inflow discharge requires reasonable representation of the time of concentration, the time it takes from water to flow from the most remote part of the watershed to the watershed outlet. There are several different ways to estimate time of concentration (USDA 1986 and 2010). We selected a relatively simple formula (equation 15-4b; USDA 2010) that could be easily implemented for a variety of urban catchments and required minimal additional inputs by the user. Time of concentration is estimated by the NRCS lag method as

$$T_c = \frac{l^{0.8} * (S+1)^{0.7}}{1140 * Y^{0.5}} \tag{2.25}$$

where T_c is time of concentration (hr) for average natural watershed conditions, l is the flow length (ft), Y is the average watershed slope (%), and S is the maximum potential retention from equation 5. Because the lag equation was developed for rural areas, it can overestimate the time of concentration for urban areas which have higher proportion of impervious area and channelized flow that allow water to through the catchment at a faster rate than under natural conditions. The following equation was applied to adjust the T_c calculated by the NRCS lag method (FHWA HEC-19, 1984)

$$T_c' = T_c * CF * IF \tag{2.26}$$

where T_c' is the adjusted time of concentration, T_c is the time of concentration in hours from Eq. 9, CF is the channel improvement factor, and IF is the impervious area factor, both of which are estimated from the impervious area of the catchment.

Next, unit peak discharge, q_u, is computed based on T_c and SCS rainfall distribution type

$$\log(q_u) = C_0 + C_1 \log(T_c) + C_2[\log(T_c)]^2 \tag{2.27}$$

where C_0, C_1, and C_2 are the coefficients from Table F-I (USDA 1986) based on the SCS rainfall distribution type. Rainfall distribution Type I pertains to all examples presented herein. Peak inflow discharge, q_i is estimated as

$$q_i = q_u A Q F_p \tag{2.28}$$

where A is drainage area, Q is runoff depth, and F_p is a ponding factor. Finally, estimation of the peak outflow discharge is

$$\frac{V_s}{V_r} = C_0 + C_1\frac{q_o}{q_i} + C_2(\frac{q_o}{q_i})^2 + C_3(\frac{q_o}{q_i})^3 \quad (2.29)$$

where V_s/V_r is the ratio of storage volume to runoff volume of the BMP, q_o/q_i is the ratio of peak outflow to peak inflow, and C_0, C_1, C_2, and C_3 are the coefficients from Table F-2 (USDA 1986) based on the SCS rainfall distribution type. Figure 3A shows the relationship between the storage-runoff volume ratio and the outflow-inflow discharge ratio. Figure 3B shows the shape of the inflow and outflow hydrographs where peak flows are estimated from equations 11 and 12, respectively. The inflow and outflow duration is estimated from peak flow (q_i or q_o) and Q, using graphical methods and assuming conservation of volume.

Note that because swTELR models a range of 24-hr storm events, it is likely that the storage to runoff volume ratio is outside the range ($0.14 < V_s/V_r < 0.5$) presented in Figure 2.6A for a given 24-hr storm event. In the cases where V_s/V_r is outside the range, the low or high endmember of the range is applied. For example, if the measured V_s/V_r is 0.08, swTELR assumes a V_s/V_r of 0.14. If the measured V_s/V_r is 0.56, swTELR assumes a V_s/V_r of 0.50.

2.3.9.2 *Routing between catchments*

Runoff is routed between catchments so that runoff and pollutant load reductions cumulate as flows move downslope towards centralized BMPs or receiving waters. Volumes and pollutant loads delivered to centralized BMPs include reductions achieved by other structural and non-structural BMPs within its contributing drainage. This sequential accounting ensures runoff and pollutant reduction benefits are not double counted. The runoff volume and pollutant concentration introduced at the inlet of each centralized BMP is computed based on the contributing drainage characteristics and level of BMP implementation upstream within the centralized BMP drainage. Travel lengths and slopes to a centralized BMP are calculated based on the configuration of catchments or sub-catchments and different routing configurations will result in different flow timing (see Figure 2.7).

The total runoff for a series of catchments within the same drainage (QTr_{series}) is defined by the summation off the current catchment runoff (QTr) and runoff contributions from a series of upstream catchments that contribute to the downstream centralized BMP. Contributions from upstream catchments without a centralized BMP are defined as the total catchment runoff (QTr) and those with a centralized BMP are defined as sum of the treated (Q_{CEC}) and bypassed (Q_{BY}) volumes as Q_{UBMP}.

$$Q_{UBMP} = Qu_{BY} + Qu_{CEC} \quad (2.30)$$

Variables used for calculating peak inflow discharge ($q1$) and time of concentration (Tc) for a centralized BMP with contributions from upstream catchments are defined based the combined attributes of the catchment series. Slope for a series of catchments is calculated as the average of

the contributing catchments. The contributing area is summed for all contributing catchments without centralized BMPs and with centralized BMPs such that the total area contributions are accounted for downstream. Pollutant concentrations for downstream catchments are calculated as the average concentration of the current catchment and contributing catchments. Catchments can be subdivided for routing portions to more than one centralized BMP, and these subcatchments can also receive water from upstream catchments, as in Configuration 1 in figure 2.7.

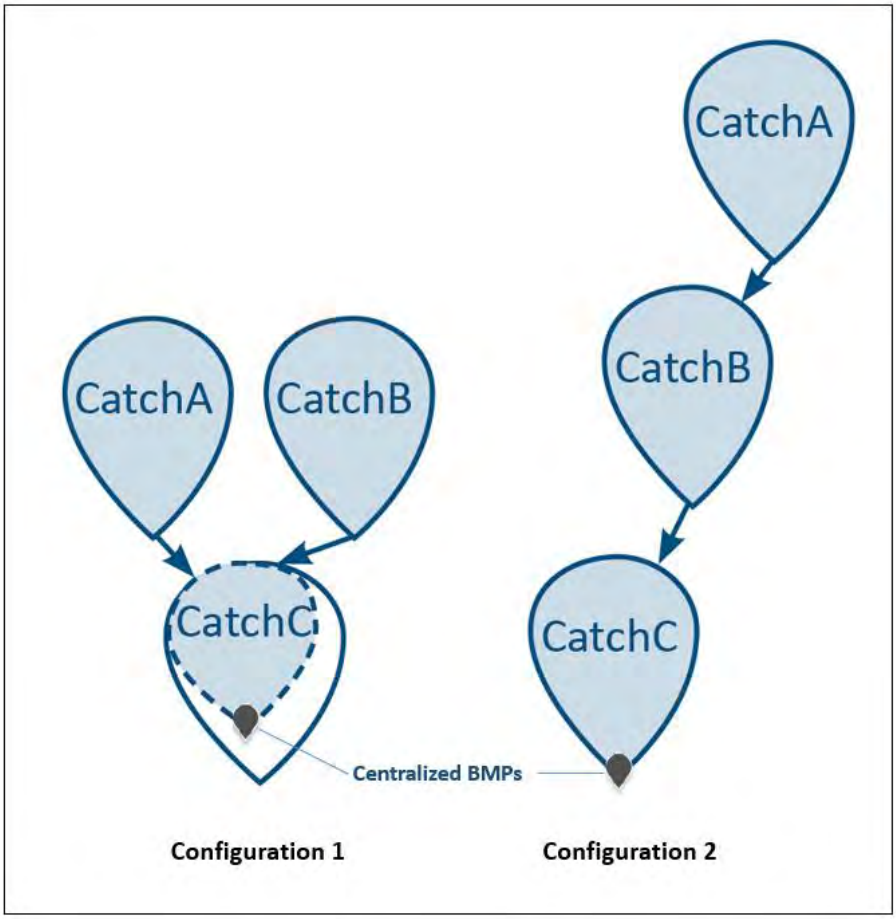

Figure 2.7. Two example catchment routing configurations.

2.3.9.3 *Runoff and pollutant load reductions reporting*

Within a catchment series, centralized BMPs receiving water from upstream catchments provide runoff reductions or pollutant treatment benefits to those upstream catchments. These reductions are allocated to upstream catchments based on their proportional contribution to the downstream centralized BMP after reductions from structural and non-structural BMPS within the catchment. Each catchment is run through the full calculations twice: once to calculate its initial within-catchment reductions and then a second time to account for the catchment series contributions. The initial flow

out of a series of the catchments ($QTrI$) is the sum of the initial flows from the current ($QTrI_{current}$) and upstream catchments ($QTrI_{current}$):

$$QTrI_{series} = QTrI_{current} + QTrI_{UC1} \ldots .. QTrI_{UCi} \quad (2.31)$$

Runoff reductions from a centralized BMP receiving contributions from upstream catchments Q_{cr} are defined as the difference between the initial runoff ($QTrI_{series}$) and the total runoff from the catchment series after reductions from that centralized BMP (QTr_{series}).

$$Q_{cr} = QTrI_{series} - QTr_{series} \quad (2.32)$$

Reductions are distributed upstream to catchments based on their proportional contribution, so that for individual catchments (i), the reduction applied to them is defined by

$$Q_{cr}D_i = Q_{cr} * QTrI_i / QTrI_{series} \quad (2.33)$$

On the second run through the runoff calculations after calculating the initial contributions, the model iterates downstream so that all BMP reductions are cumulated as runoff moves downstream. The same reporting scheme is used in pollutant load reductions reporting so that the pollutant load from a series of the catchments is the sum of the initial load from the current catchment ($PI_{current}$) and all upstream catchments PI_{uc} as:

$$PI_{series} = PI_{current} + PI_{UC1} \ldots PI_{UCi} \quad (2.34)$$

The difference between the initial pollutant load and the final load after the final centralized BMP reductions is

$$Pr = PI_{series} - P_{series} \quad (2.35)$$

Like runoff reductions, pollutant load reductions are assigned upstream to individual catchments (i) proportional to their initial loading contributions.

$$PD_i = Pcr * P_i / PI_{series} \quad (2.36)$$

3 Modeling Scenarios

Baseline and future Solano Permittee landscape scenarios were completed to fulfill the RAA modeling compliance requirements using a combination of functions automated within the swTELR model and manual GIS processing to implement each future scenario. In this section, the modeling scenario components are described, and there is some overlap with section 2.3 that is retained for clarity.

Time periods modeled include the baseline period (approximately 2005), and future scenarios estimated for the years 2020, 2028/2030, and 2040. Each of these scenarios was modeled in sequence so that land use and BMP implementation changes that occurred in the preceding scenario were preserved in each subsequent scenario. The modeling scenarios include only those stormwater treatment components that are considered part the Green Stormwater Infrastructure (GSI) Scenarios per the BASMAA RAA Guidance Document (BASMAA, 2017). These scenarios therefore do not include source control measures, such as street sweeping or source property abatements[9].

3.1 3.1 Baseline Modeling

3.1.1 Scenario Inputs

3.1.1.1 *Precipitation input data*

Daily raster rainfall data from PRISM were used form the years 1981-2016 using the procedure described in Section 2.3, so that so that the precipitation distribution bracketed the range of likely rainfall conditions across the Solano Permittee MS4 Area. Raster-based rainfall estimates from the PRISM Climate Group[10] at Oregon State University were used to describe the distribution of 24-hour event depths were used to drive runoff generation. 2NDNATURE created a raster data processing program using the R statistical programming language[11] to acquire the appropriate historical raster layers for Solano County between 1981-2016 and perform a series of raster data processing steps. After the 35-year sequence was acquired (12,775 raster layers), a time series of precipitation values was created for each 800 m^2 pixel and the swTELR required percentile rainfall values (12.5, 50, 85, 95) and average days of rain were extracted for each pixel for the entire time series. The 85th percentile precipitation values are shown for the Solano Permittee area in

[9] Since source control measure accounting methods are still under development via a current BASMAA study. Source control actions will be included in the wasteload allocation (WLA) modeling scenarios, which will be communicated in a separate report.

[10] http://prism.oregonstate.edu/

[11] https://www.r-project.org/about.html

Figure 3.1. The 800m PRISM spatial precipitation data were resampled to align with the 30m US Landsat grid used by swTELR.

While the time extent used differs from the range recommended in the RAA Guidance of 2000-2009 (BASMAA, 2017), the greater temporal coverage provides a more representative description of the 24-hour rainfall distributions.

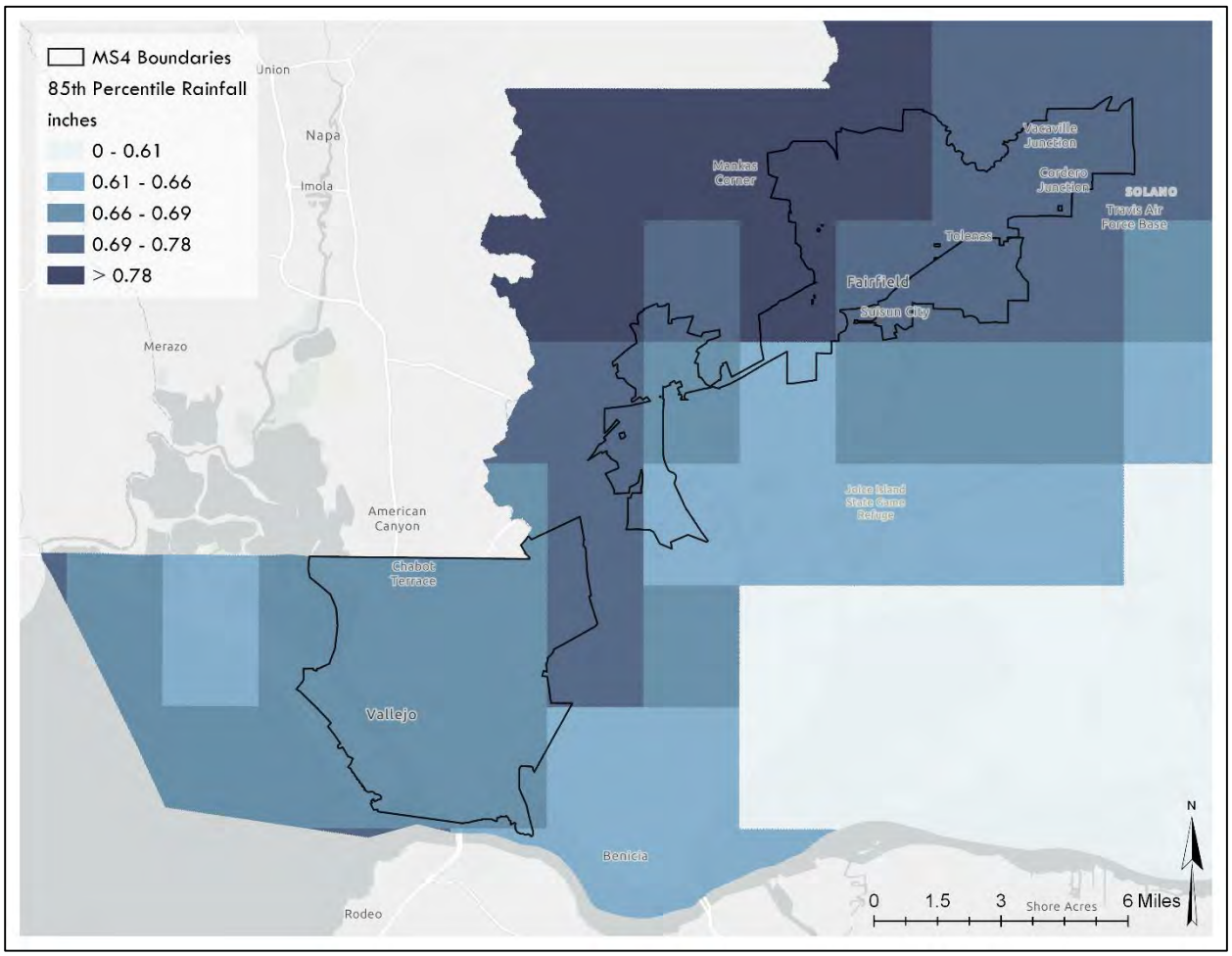

Figure 3.1. Example rainfall data used in swTELR.

3.1.1.2 *Soils*

Soils data from NRCS was used to specify soil types throughout Solano County MS4 boundaries. These data were used in their rasterized form, discretized to 30m pixels, down loaded from the NRCS website (Figure 3.2). The data were clipped to the Solano Permittee MS4 boundary and individual catchment boundaries for use swTELR. The NRCS SSURGO database was used as the primary data source, and the STATSGO2 database (which provides coarser resolution), was used to fill in spatial gaps in coverage that occurred in the SSURFO data.

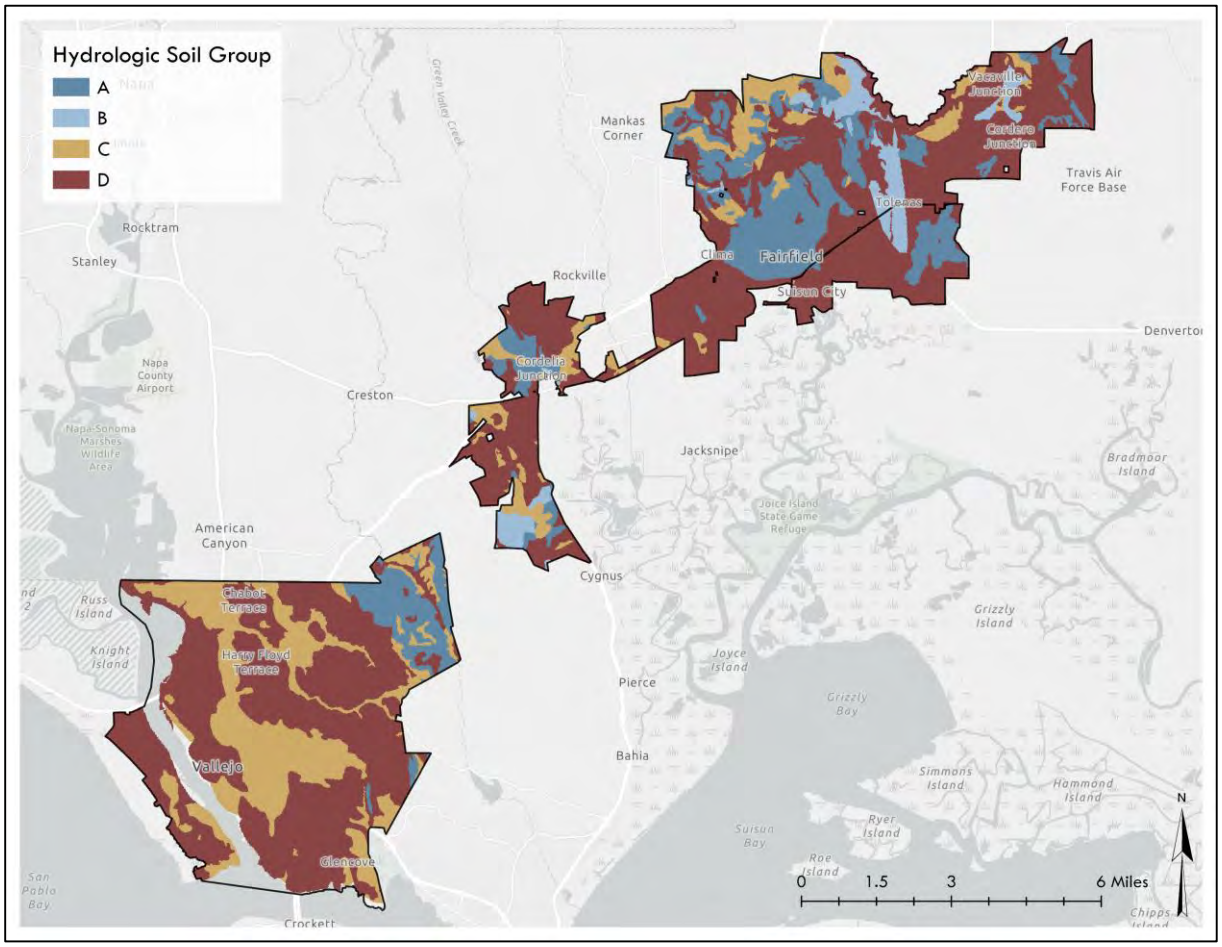

Figure 3.2. Soils data used in swTELR

3.1.1.3 *Impervious cover*

Impervious cover was specified using data from the National Land Cover Dataset[12] that represents the year 2006, provided at 30-meter grid cell resolution, which matches the spatial scale of modeling in swTELR. These data were clipped to the Solano Permittee MS4 boundaries and individual catchment boundaries for use in swTELR (Figure 3.3)

[12] https://www.mrlc.gov/data?f%5B0%5D=category%3Aurban%20imperviousness

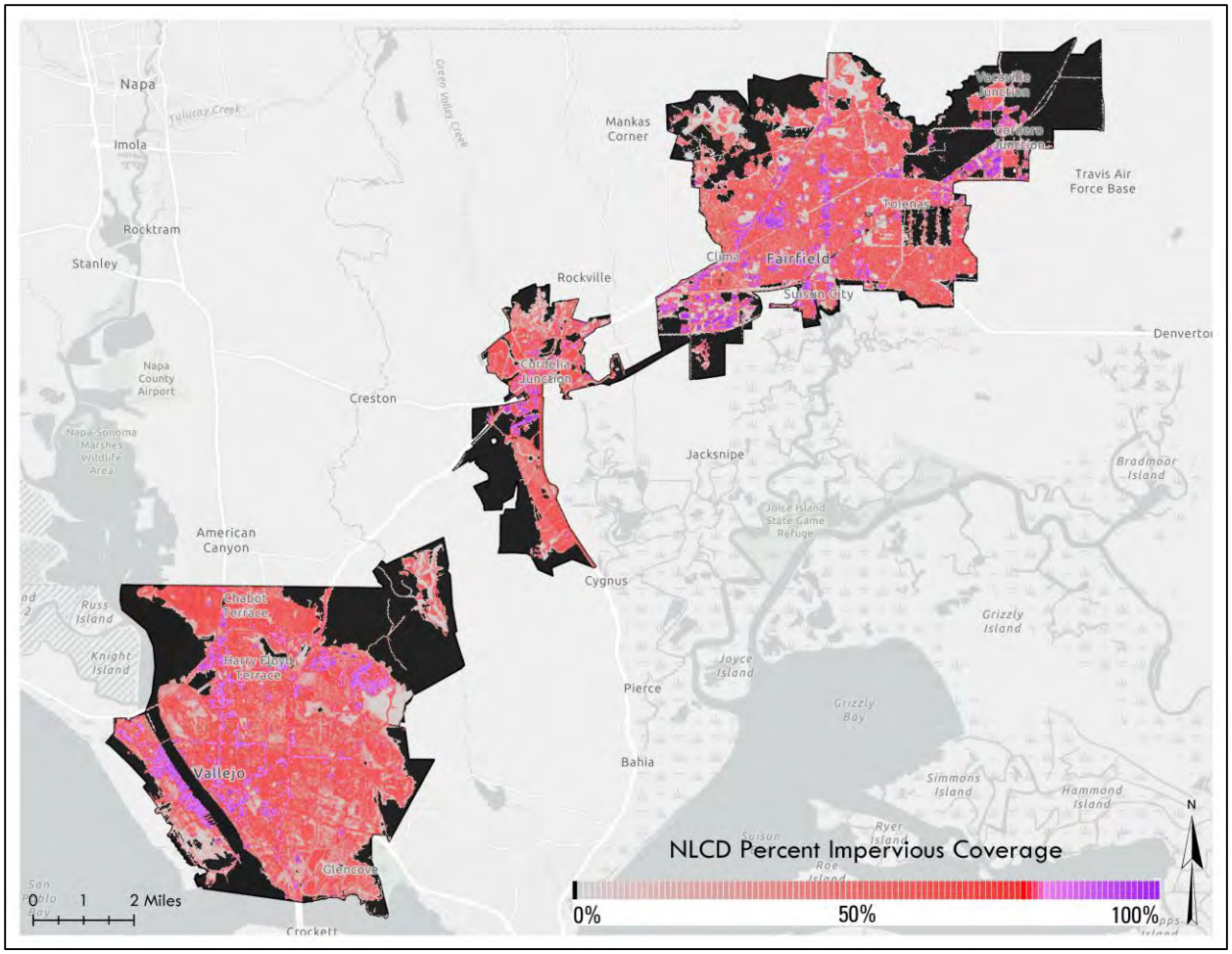

Figure 3.3. Impervious cover data used in swTELR.

3.1.1.4 *Land use*

Land-use data were developed by San Francisco Estuary Institute (SFEI) to specify characteristic PCBs and Mercury runoff concentrations for each land use developed for the Regional Watershed Spreadsheet Model (RWSM)[13]. The land-used runoff concentrations used are those contained in the current version of the RWSM, which differ slightly from those reported by SFEI in the last RWSM progress report (Wu et al, 2016). Land use designations used in RWSM are reflect categories relevant the specific pollutants of concern, PCBs and mercury, and are listed in Table 3.1. Figure 3.4 shows the distribution of difference land use types throughout the Solano MS4 Permittee Area.

[13] https://www.sfei.org/projects/regional-watershed-spreadsheet-model

Table. 3.1 Land-use based pollutant concentrations from RWSM used in swTELR. Note that these concentrations are slightly different than those reported in Wu et al. (2016).

	Land Use	Concentration (ng/L)
PCBs (ng/L)	Ag/Open/New Urban	0.2
	Old Industrial + Source Areas	204
	Old Residential	4
	Old Commercial + Old Transportation	40
Hg (ng/L)	Ag/Open	80
	Old Industrial + Source Areas	40
	New Urban	3
	Old Urban	63

This SFEI land use layer does not appear to account for historic mining activities as a mercury source area within Solano County. For example, Saint John mine that was identified in the Mercury Mines Inventory and Prioritization Report (SWRCB, 2009). This site has tailing piles and mine waste with risk of erosion into Rindler Creek. The mine is within the Vallejo MS4 boundary, located in the northeast corner, but appears to be classified as Agriculture (Figure 3.4). As a practical matter, this classification seems perfectly appropriate, since Agriculture is the highest mercury concentration specified in the dataset.

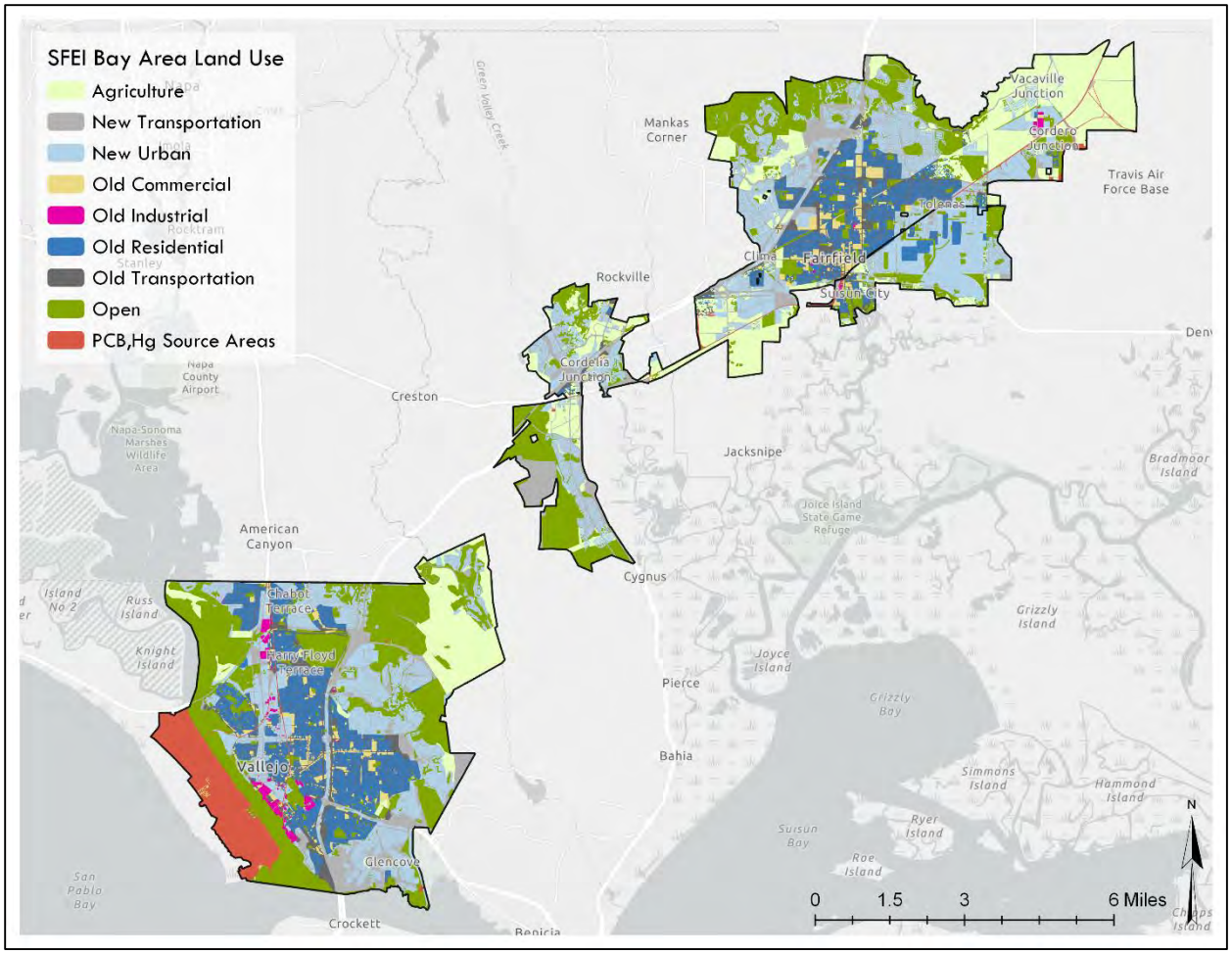

Figure 3.4. Land use map from RWSM used in swTELR.

Although some BMPs may have been implemented before 2005, baseline condition modeling assumed no existing GSI and or land-use changes that occurred after the year 2005. As such, the baseline condition model outputs essentially represent the unmitigated runoff and pollutant loading from Solano Permittees as of 2005. Existing BMPs, land-use, and impervious cover changes identified since 2005 are included in all of the future modeling scenarios.

3.1.1.5 *Drainage and routing*

The delineation of the Solano Permittee MS4 areas into urban catchments was an iterative process with verification by Solano Permittee city staff. Catchments are approximately 100 acres in size and define routing to either a discrete (single point) or distributed outlet (multiple point). Catchment boundaries and routing to receiving waters are defined by surface elevation, surface barriers, stromdrain infrastructure, and connectivity to receiving waters (Appendix C). Figure 3.5 provides an example of a catchment delineation in Fairfield based on the stormdrain network showing routing to receiving water outfalls. Beginning with catchments that had already been delineated by the City of Vallejo, City of Fairfield, and City of Suisun, catchment boundaries were refined, and

verified by city staff. The full catchment delineation process used for swTELR is documented in a *Catchment Delineation and Mapping Guidance* (2NDNATURE, 2018). This process involves using the municipal stormdrain infrastructure spatial data in concert with a 10-meter spatial resolution Digital Elevation Model (DEM)[14] to define drainage boundaries. Catchments are nested inside stormwater drainages that all flow to a common receiving water. The final catchment and stormwater drainages delineated for Fairfield/Suisun and Vallejo are shown in Figures 3.6 and 3.7 respectively.

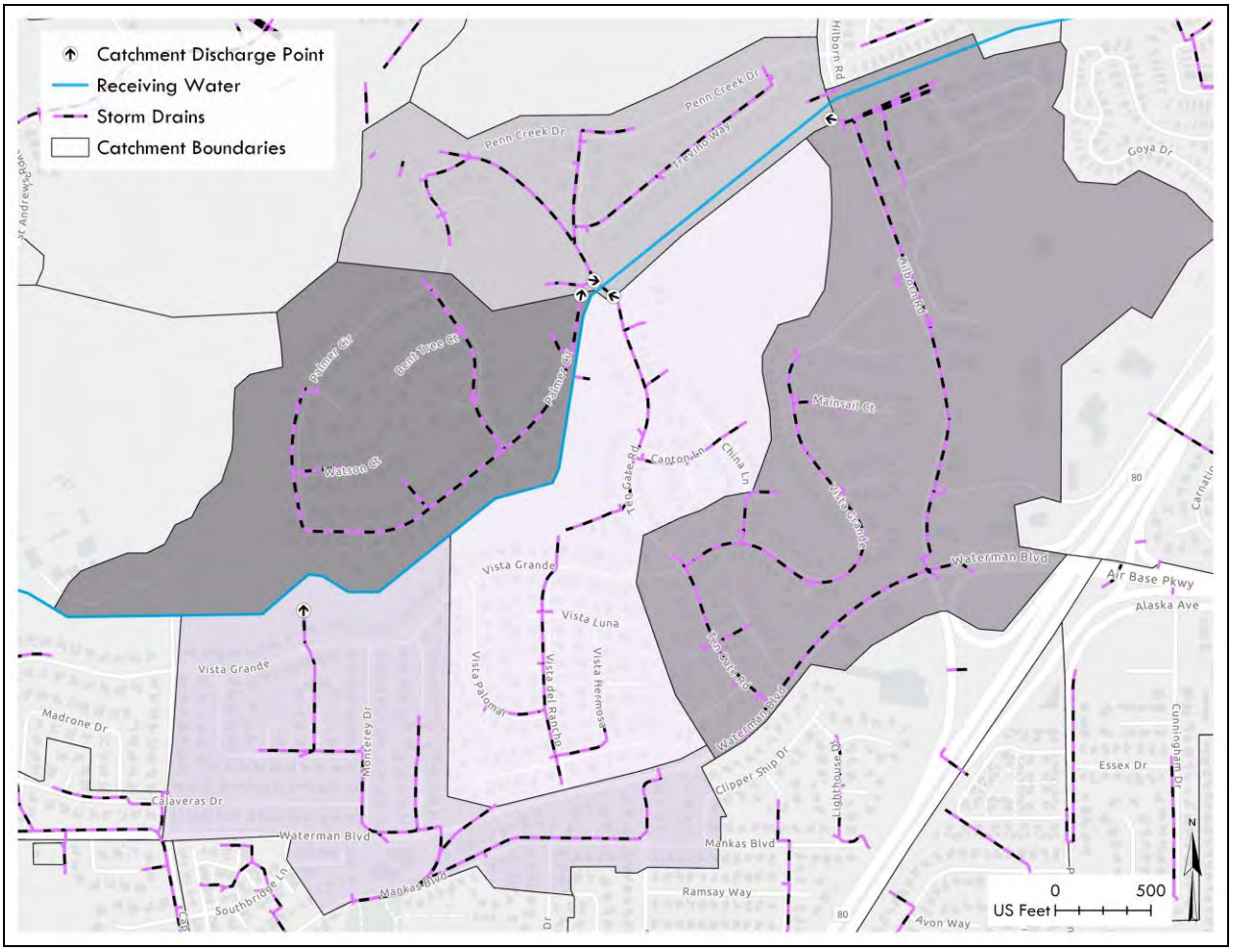

Figure 3.5. Example of catchments delineated via the stormdrain network in Fairfield.

[14] https://catalog.data.gov/dataset/usgs-national-elevation-dataset-ned

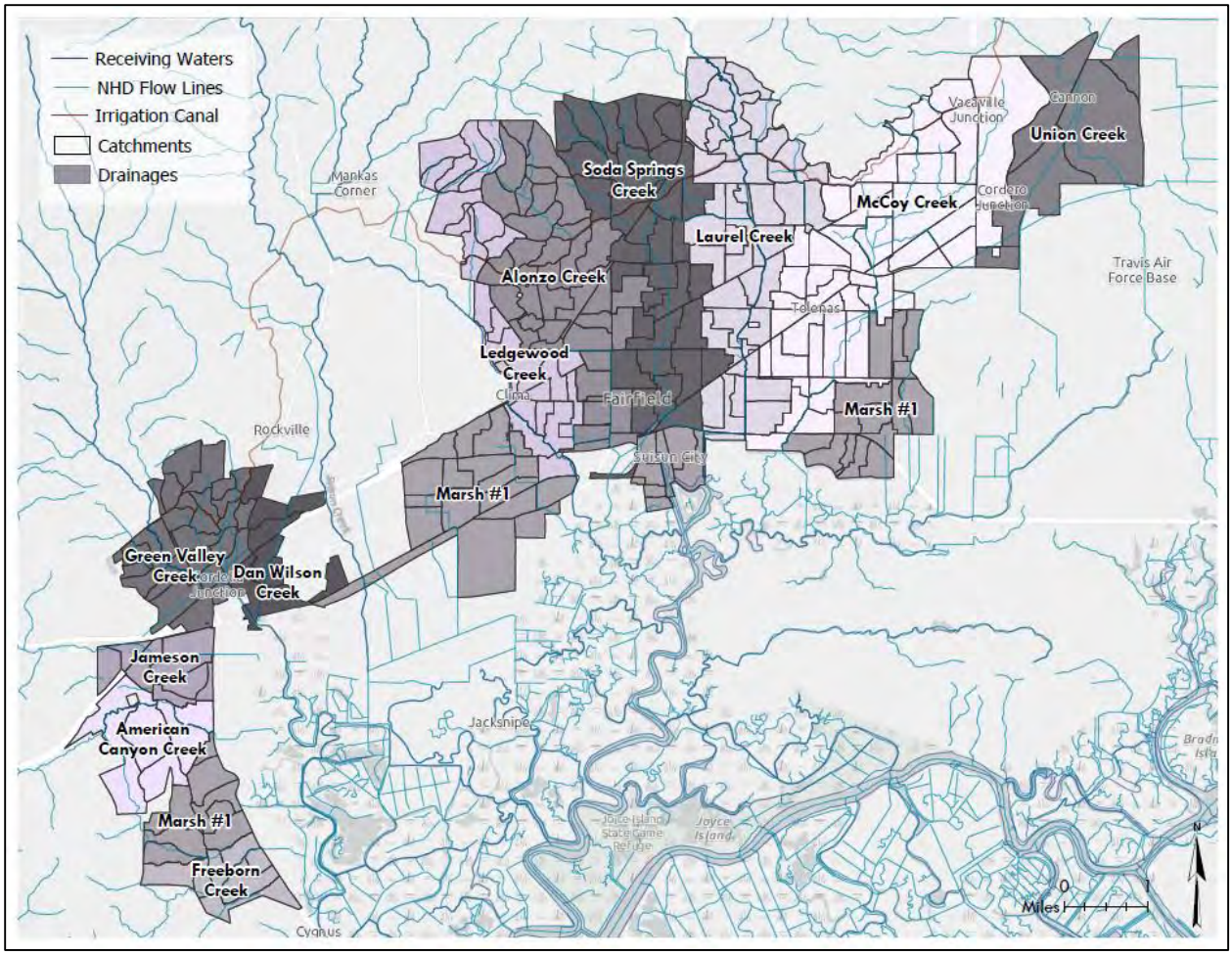

Figure 3.6. Fairfield-Suisun catchments, drainages, and receiving waters.

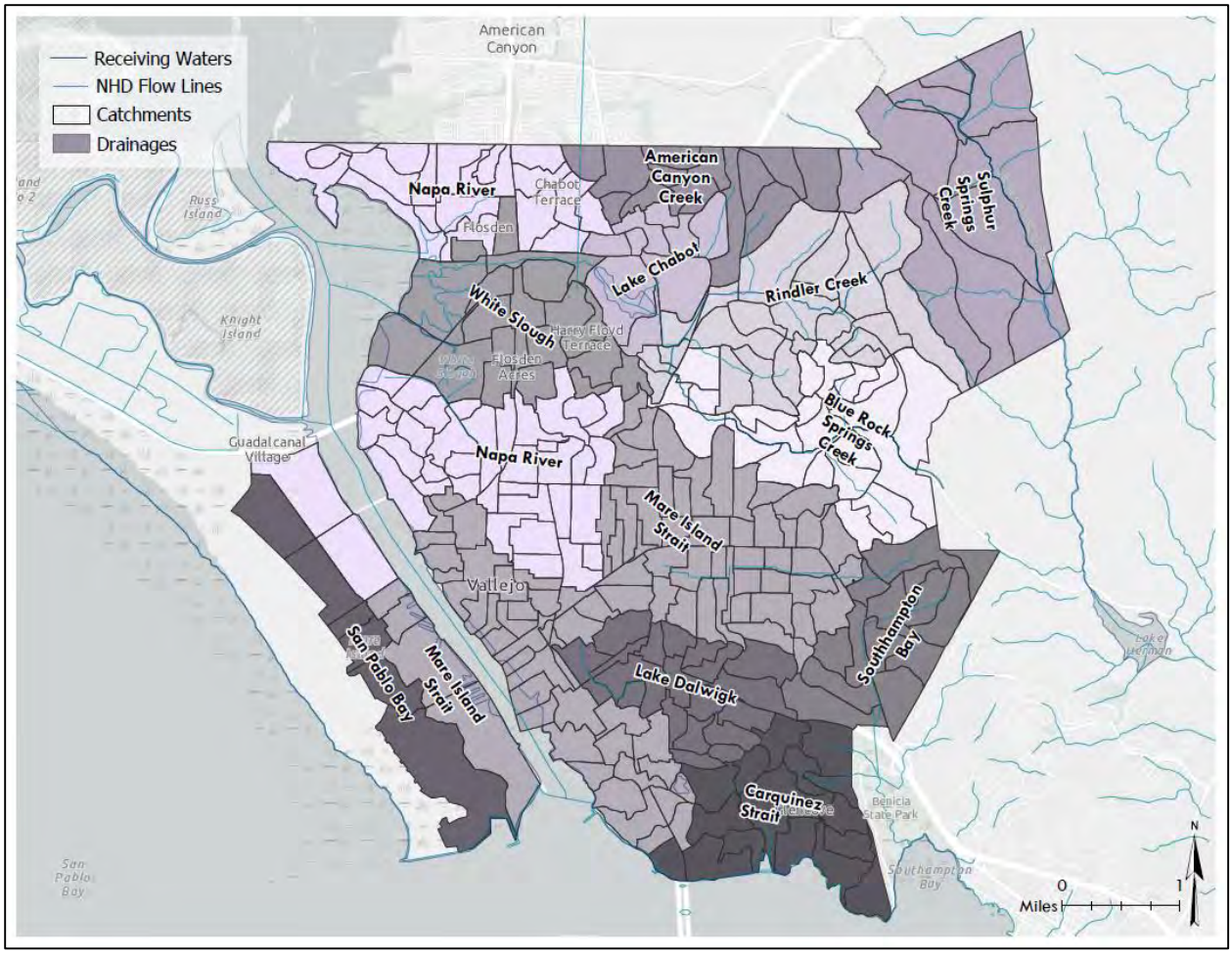

Figure 3.7. Vallejo catchments, drainages, and receiving waters

3.1.2 Model calibration

There are no long-term flow datasets available for watersheds that include the cities of Fairfield, Suisun or Vallejo. So, while the RAA Guidance from BASMAA (BASMAA, 2017) specifies that baseline model runoff estimates should employ a hydrologic calibration procedure, this is not possible for the Solano Permittee MS4 Area. Similarly, there are no concentration data for PCBs and mercury available that are amenable calibration of an urban stormwater model. The historic concentration data available have been described in detail in section in Section 1.3.2.4, and are primarily targeted to short-term study objectives, probabilistic inference over space, and characterizing spatial patterns within the receiving waters of the Bay. As such, measurements are sparse and do not capture the unique response of the urbanized areas, such as monitoring data at the outfalls of the urban drainages would. This means that the estimates from swTELR must rely wholly on the input data without adjustment of numeric quantities to tune the fit of the model to observations, which provides both advantages and shortcomings.

Contrary to the idea that uncertainty associated with model parameterization can be avoided with a careful or sophisticated calibration procedure, the process of fitting parameter values during calibration invariably injects substantial uncertainty to model outputs. This issue has been widely recognized and documented in the hydrologic literature for more than two decades (see Beven, 2001 p. 217). While lack of data with which to compare estimates clearly presents a challenge for direct verification of accuracy, it also avoids the inherent addition of uncertainty that is incurred any time model outputs depend strongly on model calibration. This is particularly true when a model is over-parameterized to a degree that is not supported by the data available, which is exceedingly commonplace (Beven, 2005). Since calibration often involves either complex optimization algorithms and/or several subjective decisions on the part of the modeler, avoiding it adds transparency to the modeling process, since relationships between model inputs and outputs are much more straightforward.

3.1.3 Baseline comparison with the Regional Watershed Spreadsheet Model (RWSM)

In place of a validation experiment via comparison with measured flow values, swTELR results were compared to outputs from the Regional Watershed Spreadsheet Model (RWSM), developed by SFEI. The RWSM is an empirical model developed to estimate average annual regional and sub-regional scale pollutant loads for the San Francisco Bay Area. Since the RWSM is an empirical model, the outputs depend strongly on an extensive dataset of flow and pollutant concentrations collected over more than a decade by regional monitoring programs. The RWSM is the most suitable tool available to extend existing measurements to estimate sub-regional scale pollutant loading in areas of the San Francisco Bay area that lack measurements. swTELR used the same land use layer employed by RWSM to specify PCBs and Mercury characteristic runoff concentrations for each land. Correspondence between swTELR and RWSM was performed using outputs provided on the SFEI RWSM website[15] by clipping raster-based RWSM runoff and pollutant load estimates from the full dataset using the MS4 boundary for each city in Solano County.

3.1.3 Key baseline modeling assumptions and limitations

The baseline modeling employs several assumptions for the purposes of either practicality or data limitations, which include:

- A spatially explicit, probabilistic approach can adequately bracket the range of rainfall-runoff responses via an uncalibrated model.
- PCBs and mercury concentrations are responsive to land use type and the concentrations used are representative of the actual values.

[15] https://www.sfei.org/projects/regional-watershed-spreadsheet-model#sthash.3ZhPRNxw.dpbs

- Uncertainties associated with the input data and model structure are not greater in magnitude than spatially varying factors that drive runoff generation and pollutant loading

These assumptions are primarily based on previously reported studies and were not tested as part of this study. Rather, they served as a practical point of departure for the work reported herein. A true validation of these assumptions and swTELR outputs require monitoring data at the urban drainage scale, which is not commonly available. However, since control measure implementation will proceed over a period of decades, this type of validation should be considered to both inform decision making, test RAA model assumptions, and provide additional information to shore up their limitations. Since swTELR operates at a granular spatial scale, the outputs are amendable to understanding the distinct runoff and pollutant loading response from urbanized drainages and changes that result from GSI implementation over time.

3.2 Model Scenarios for Compliance Demonstration

Baseline and future modeling scenarios were run for the Solano Permittee MS4 Area to demonstrate expected progress towards compliance for meeting GSI pollutant reductions. For each scenario, the rainfall input data and other spatial data that describe urban catchment characteristics remained unchanged, while other factors were altered according to documentation of expected changes (e.g. land use, BMP implementation). New development, redevelopment, and BMP implementation timing and locations were verified by Solano Permittees via a web-mapping application[16]. Three future scenarios were modelled, with a slightly different milestone schedule required for PCBs and mercury (Table 3.2).

The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the WLA RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. The scenarios reported herein include only reductions associated with GSI. Source control actions will be handled as part of the wasteload attainment (WLA) RAA analysis to be completed in 2020. Modeling scenarios for the GSI and WLA RAA's overlap substantially, with GI comprising a subset of the WLA reductions. Per the BASMAA RAA Guidance (BASMAA, 2017), pollutant load reduction measures included in the GSI RAA include GSI BMP implementation along with land use changes that accompany redevelopment. Reductions included in the WLA RAA analysis are the sum of reductions that result from GSI, land use changes, and source controls such as street sweeping and demolition controls. GSI treatment BMPs include both decentralized BMPs that are often included as part of Low Impact Development (LID) and treat stormwater on site at the parcel scale, as well as centralized BMPs, which route stormwater from several parcels to a regional treatment structure. Source controls will only be included in the 2028/2030 modeling analysis per the BASMAA RAA Guidance Document (BASMAA, 2017).

Table 3.2. RAA model scenarios

	Green Stormwater Infrastructure RAA	Waste load Allocation Attainment RAA
2020	GSI + land use changes	GSI + land use changes
2028/2030		GSI + land use changes + source control
2040		GSI + land use changes

Modeling GSI and WLA scenarios separately requires that GSI and source control reductions can be treated independently, even though there are overlapping components. This presents some conflicts with the most logical reduction sequencing that corresponds with our conceptual understanding of the urban stormwater system, in which source control reductions occur before other types of reductions that require transport of pollutants away from their source and subsequent treatment. The BASMAA source control accounting approach will not be finalized until January 2020. Any such pollutant reduction sequencing issues or assumptions will be documented in WLA RAA modeling report in 2020.

3.3 Redevelopment and new development land use changes

3.3.1 Planned and projected land use changes

Completed and projected land use changes were drawn from several different sources and compiled into a geodatabase to support the future modeling scenarios. Development and redevelopment projects were identified from city general plans, specific redevelopment area planning documents, examination of current and historical aerial imagery, and interpreted outputs from the UrbanSim[17] urban planning model. With the exception of the UrbanSim outputs, land use change data were not available in GIS formats and were translated from PDF documents and manually digitized in GIS. While the UrbanSim outputs provide a regionally standardized way to estimate redevelopment rates, using them in isolation would require ignoring the vast majority of documentation of parcels that are already planned for redevelopment

All land use changes employed in the future scenario modeling simulations are mapped in Figure 3.8 symbolized by the scenario year, and whether the changes will be redevelopment or new development. The GIS database created contains the specific information source used to determine land use change and associated time of conversion for each parcel.

[17] http://www.urbansim.com/urbansim

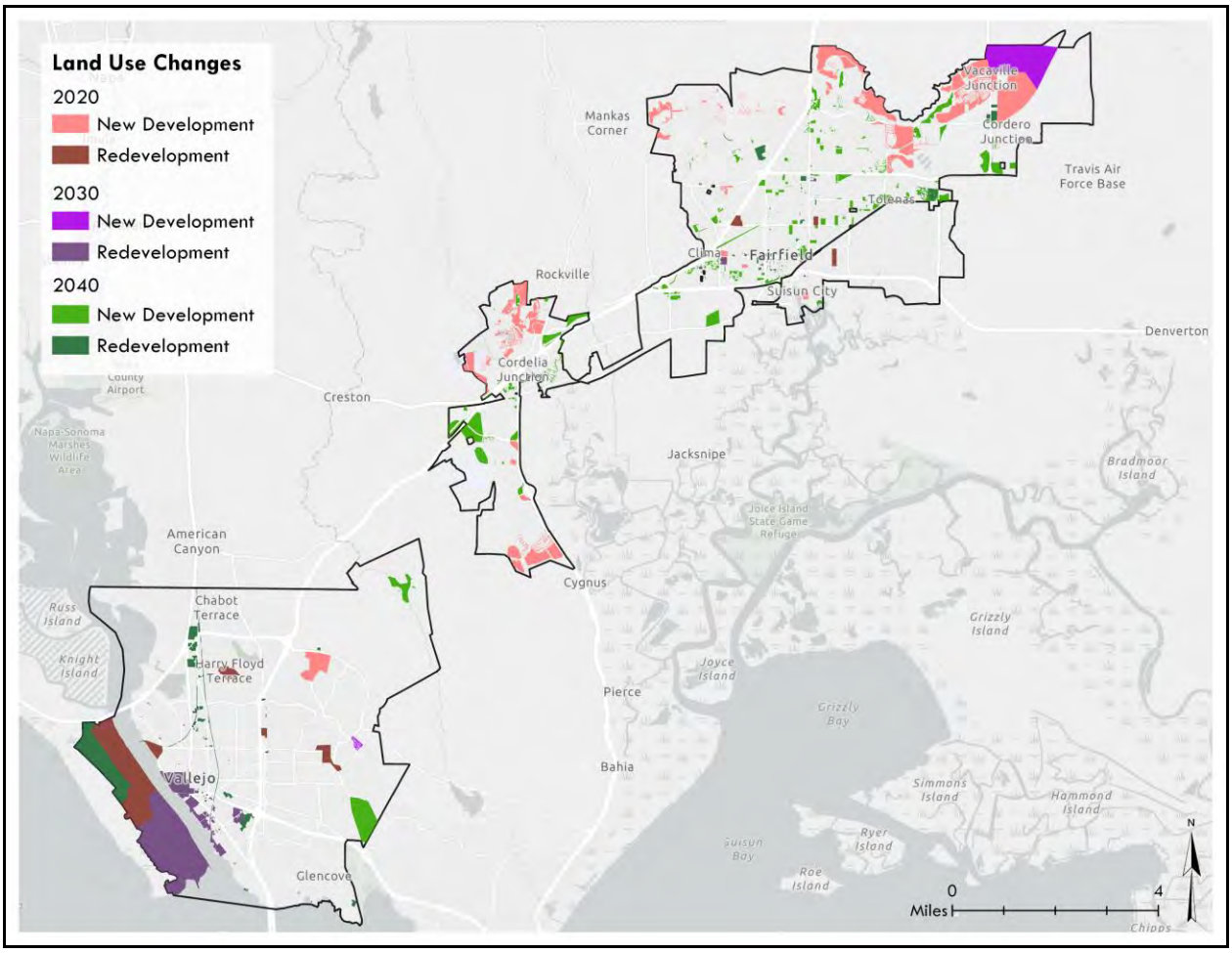

Figure 3.8. Land use changes used in future scenarios.

3.3.2 Land use corrections

Best available satellite time series imagery from Google Earth was used to identify and correct inaccuracies in the SFEI 2005 land use layer (SFEI, 2005). These changes include improper classification of open space that had been developed by 2005 or misclassification of old urban areas that had been redeveloped. Figure 3.9 shows an example of one of the areas within the City of Vallejo that was classified as Open land use and changed to New Urban land use, which was typical of these instances. Other issues identified in the land use layer were related to areas incorrectly classified as Old Transportation land uses (also previously recognized by McKee et al. 2014, p. 90). Examination of historical satellite imagery via Google Earth showed that several of these areas had been redeveloped are recently as 2004, and were therefore changed from 'Old Transportation' to New Urban land use in the 2020 and all subsequent model scenarios.

Figure 3.9. Example of a correction made in a Fairfield neighborhood to the land use layer used as input to the pollutant loading model.

3.3.3 Projected land use changes from UrbanSim

The UrbanSim model was used to project parcel-level land use changes for future scenarios. UrbanSim is an open source simulation system created by Paul Waddell and University of California, supported by grants from National Science Foundation designed to support urban planning. Spatial outputs reflect changes in residential housing units were used to infer redevelopment land use change over time. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Governments (ABAG) Committees for use in transportation projections and the regional Plan Bay Area development process.

The general workflow to extract new development and redevelopment parcels from the UrbanSim model mirrored that employed by the Contra Costa County Clean Water Program RAA analysis:

1. Intersect the parcel dataset with Solano County MS4 areas
2. Export UrbanSim model runs for the years 2010 through 2040 that includes fields that quantify total job spaces, total residential units, and year built.
3. Use an if-then statement to flag parcel differences for these metrics between 2010 and 2040 and query the year built output to determine which parcels are estimated to change during each scenario timeframe (2010-2020, 2020-2030, 2030-2040)

It was assumed that new development and redevelopment of multifamily residential and commercial/industrial parcels will incorporate GSI in accordance with MRP Provisions C.3.b., C.3.c., and C.3.d. Because of high land values, it is expected that more than 50% of the existing impervious area in each parcel will be replaced if a parcel is developed, and therefore the entire parcel will be subject to Provision C.3 requirements (that is, will be retrofit with Green Stormwater Infrastructure), consistent with the "50% rule" requirements of MRP Provision C.3.b. Land Use changes predicted via the UrbanSim[18] model were incorporated into swTELR for each scenario year according to the output time period.

3.3.4 Planned land use changes

Allocation of planned land use changes to each scenario was based on documented development plans or verification of new development initiation or completion via use of best available satellite imagery up to land use conditions as of 2018. For example, the Callahan Property Company's development in the City of Vallejo Northern Waterfront (52 acres) at Mariners Cove was allocated to the 2020 scenario as development plans have been approved by the City of Vallejo along with a schedule of parcel development[19] and satellite imagery indicates site grading has begun. The Central Waterfront area was instead allocated to the 2030 scenario (see Figure 3.8). Likewise, the 157-acre area located on the northern portion of Mare Island currently owned and under redevelopment by the Nimitz Group was allocated to the 2020 scenario. The 250 acres that Nimitz Group recently acquired from the Lennar Corporation, which is still in the scoping stages, were included as redevelopment areas in the 2030 scenario. The residential developments that have already been completed by Lennar Corporation, such as Farragut Village (completed 2007), or are in progress Coral Sea Circle, Kirkland Isle II were also allocated to the 2020 scenario. The remaining area on Mare Island still owned by Lennar Corporation (approximately 350 acres) is slated for redevelopment, but with no specific plans identified, it was allocated to the 2030 scenario. The remaining areas identified in City of Vallejo General Plans for land use change that

[18] http://www.urbansim.com/urbansim

[19] http://www.ci.vallejo.ca.us/city_hall/departments___divisions/city_manager/economic_development_division/waterfront_project

did not have any specific redevelopment planning documentation available were allocated to the 2040 scenario (Figure 3.8).

All GSI implementation within redevelopment and new development projects was assumed to be bioretention features, which are decentralized BMP types that reduce both stormwater volumes and pollutant concentrations. The sizing of planned bioretention features align with the MRP section C.3.d requirement to reduce and treat the contributing stormwater volume generated up to the 85th percentile 24-hour rainfall depth (SWRCB, 2015).

Relative to the baseline simulation scenarios, areas of new development identified typically produce additional runoff resulting from increased impervious coverage. While these increases will be mitigated with GSI implementation, conversion from Open Space land use to New Urban still usually results in net increases of runoff and pollutant loading. For these scenarios, the impervious coverage layer was changed manually in the GIS so that areas which typically had zero impervious coverage values before new development (e.g. Open Spaces land use) would reflect the typical impervious coverage of the New Urban land use. Exceptions to this rule were in areas that the impervious coverage layer accurately reflected the land use changes that had occurred since 2005, which is when the land use layer was created.

3.3.4.1 *Key land use change assumptions and limitations*

The reliability of the modelling results relies heavily on the following land use data assumptions:

- Past and future land use changes have been adequately captured via automatically classified land-use maps, planning documents, and inspection of historical satellite imagery
- UrbanSim model outputs reasonably reflect the rates and locations of land use change anticipated in the future.
- Land use changes result in reductions of characteristic pollutant runoff concentrations as defined by the PCB and mercury land use layer (SFEI, 2005).

The assumption that land use changes will result in the specified pollutant concentration changes is a substantial source of uncertainty in this analysis. It includes the implicit assumption that all remediation actions and new development standards prescribed in the MRP are closely followed and in perpetuity. While this assumption relies on the best sampling data available to date, which has already been discussed, these data are limited, especially in Solano County.

Comparison of the SFEI 2005 land use data layer to available imagery indicated misclassification of several areas. It is unlikely all errors were identified and corrected. Manual inspection of historical satellite imagery is tedious and only useful for identifying new development or areas that were incorrectly classified as open space. Historical redevelopment is not obvious and would have required a much more detailed study of the area and available data that was beyond the scope

of this effort. The options for spatially explicit land-use change estimates are few, and UrbanSim at least provides a more detailed option than applying a uniform rate across each city. However, using model outputs to drive another model holds the substantial disadvantage of compounding uncertainty through different model layers.

3.4 Reductions from Green Stormwater Infrastructure (GSI)

3.4.1 Parcel/Green Street LID

Planned and completed LID projects were mostly green streets within the City of Vallejo that were identified via capital improvement projects and are listed in Table 3.3. Since these projects did not have defined locations or types of structural BMPs yet specified, bioretention feature application for the entire drainage areas was again assumed to the 85th percentile 24-hr design storm as specified in MRP C.3 requirements. Each project area was defined by its outline that was delivered to 2NDNATURE via the City of Vallejo as a GIS shapefile.

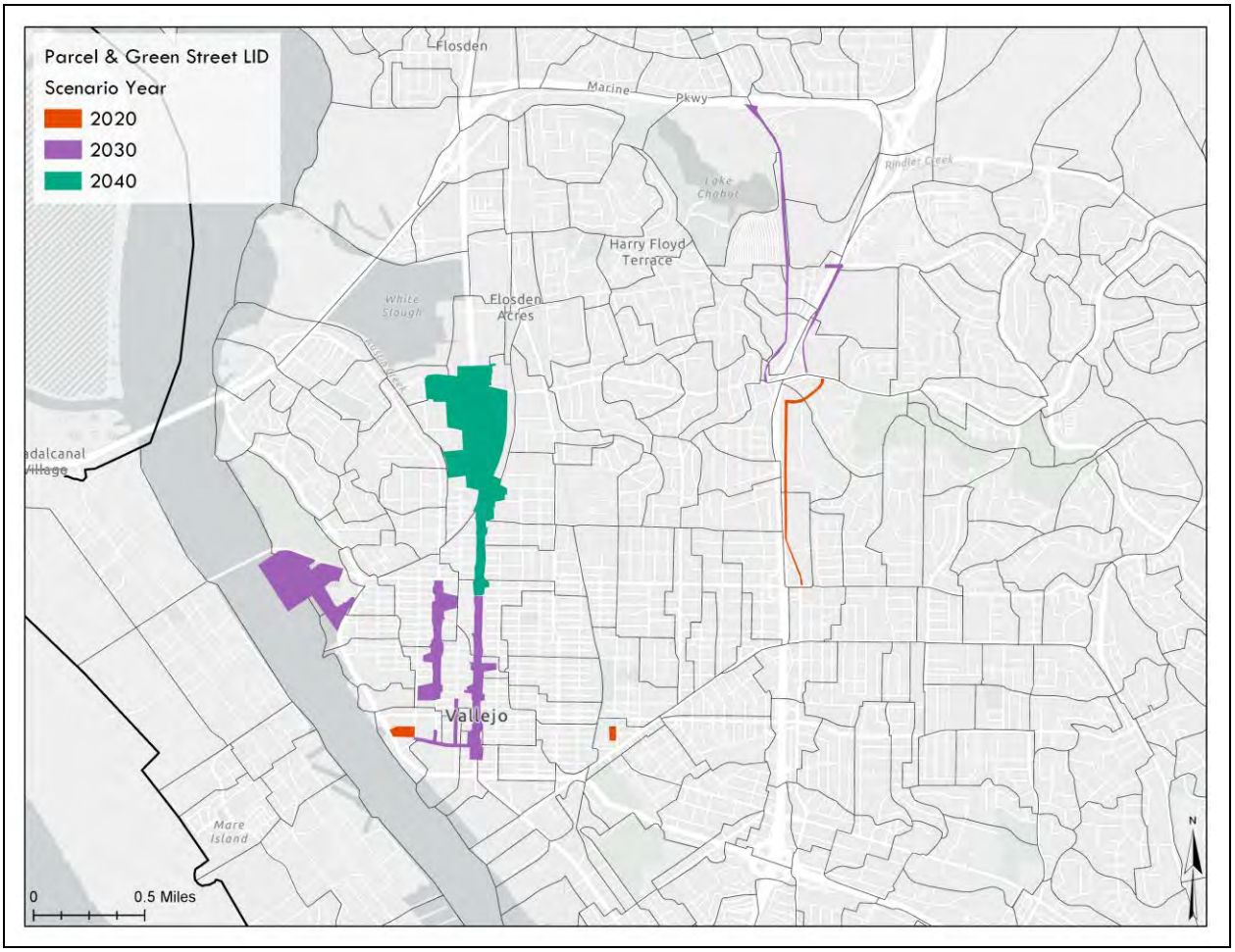

Figure 3.10. Future parcel and Green Street LID projects identified in Vallejo.

Table. 3.3. Future LID projects planned in Vallejo.

City	BMP ID	Status	Scenario	Area (ac)	Catchments	Primary Receiving Water
Vallejo	Sonoma Boulevard Streetscape Phase 5 & 6	Planned	2040	105.94	AC12, CA14, AC15, AC20, AC35, AC37, AC38, AC39, AC41, AC52, AC53	Napa River
Vallejo	Sonoma Boulevard Streetscape Phase 4	Planned	2030	9.69	AC12, DT5	Mare Island Strait
Vallejo	Benicia Road Bridge Replacement Project	Planned	2030	0.87	CP11, CP12	Southhampton Bay
Vallejo	Sonoma Boulevard Streetscape Phase 1-3	Planned	2030	12.53	DT1, DT2, DT5, SA59, DT2, DT5	Mare Island Strait
Vallejo	Marina Sea Wall	Planned	2020	44.58	DT10, DT11, MI22	Napa River
Vallejo	Sacramento Street Streetscape Phase 1	Planned	2030	8.32	DT12	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 2	Planned	2030	3.89	DT12, DT 5	Mare Island Strait
Vallejo	Downtown Streetscape Phase 4	Planned	2030	1.61	DT3, DT4	Mare Island Strait
Vallejo	Downtown Streetscape Phase 5 & 6	Planned	2030	1.44	DT3, DT4, DT2	Mare Island Strait
Vallejo	Downtown Streetscape Phase 7, 8 & 9	Planned	2030	2.07	DT3, DT5	Mare Island Strait
Vallejo	Vallejo Station Phase B	Planned	2020	3.04	DT4	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 3	Planned	2030	9.06	DT5	Mare Island Strait
Vallejo	Admiral Callaghan Widening	Planned	2020	2.85	LC10, LC11, LC13, LC15A, LC8	Blue Rock Springs Creek
Vallejo	Fairgrounds Drive Improvements	Planned	2030	9.05	LC10, LC11, LC27, LC37A, LC8, LC9, SA44, LC37B	Lake Chabot
Vallejo	Turner Parkway Overcrossing	Planned	2030	0.83	LC11, LC15A	Rindler Creek
Vallejo	Admiral Callaghan Middle Lane	Planned	2020	6.29	LC6, SA39, SA 40	Mare Island Strait
Vallejo	Public Safety Building Rehab and Design	Planned	2020	1.16	SA52	Mare Island Strait

3.4.2 Decentralized BMP implementation

Existing and planned decentralized BMP implementation was modeled in swTELR in a spatially explicit manner, with raster-based calculations for runoff and pollutant load reductions performed at the 30-meter pixel scale for each of the future scenarios (2020, 2030, 2040). Existing GSI BMP specifications were documented by Solano Permittee city staff and provided to 2NDNATURE via spreadsheets and uploaded to the 2Nform spatial platform. The city staff confirmed the locations and attributes of each BMP and GSI project via a web-based mapping interface[20] prior to finalizing the dataset.

For each modeling scenario, GSI benefits are accounted for *after* land use changes are applied. This sequencing of pollutant reduction accounting is important to avoid double counting of benefits, since where redevelopment occurs, pollutant loads delivered to GSI will be lower due to the transformation of Old Industrial to New Urban land uses within the contributing drainages. In areas were new development occurs, the land use changes typically result in additional runoff available for infiltration by BMPs due to increased impervious coverage. All structural BMP types modelled reduce either runoff through infiltration or pollutant concentration through particle capture and filtration, and several GSI types do both. The pollutant reduction processes represented depend on the BMP type as detailed in Table 2.3.

For most existing and several planned BMPs, exact locations and BMP types were available from Solano Permittees, so that benefits were calculated according to the type and location of each BMP and included in the 2020 scenario (and carried over into all subsequent scenarios). In this way, the modeling outputs preserved the uniqueness of each location in terms of runoff production and pollutant loading from each of their specified drainage areas which were explicitly accounted for in the calculations. The locations of all existing or planned decentralized BMPs are shown in Figure 3.11 and each BMP is listed in Appendix D with their relevant attributes.

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20 http://2ndnature.maps.arcgis.com/apps/webappviewer/index.html?id=839c43995b64448cb0da6b4d38c5a6b6

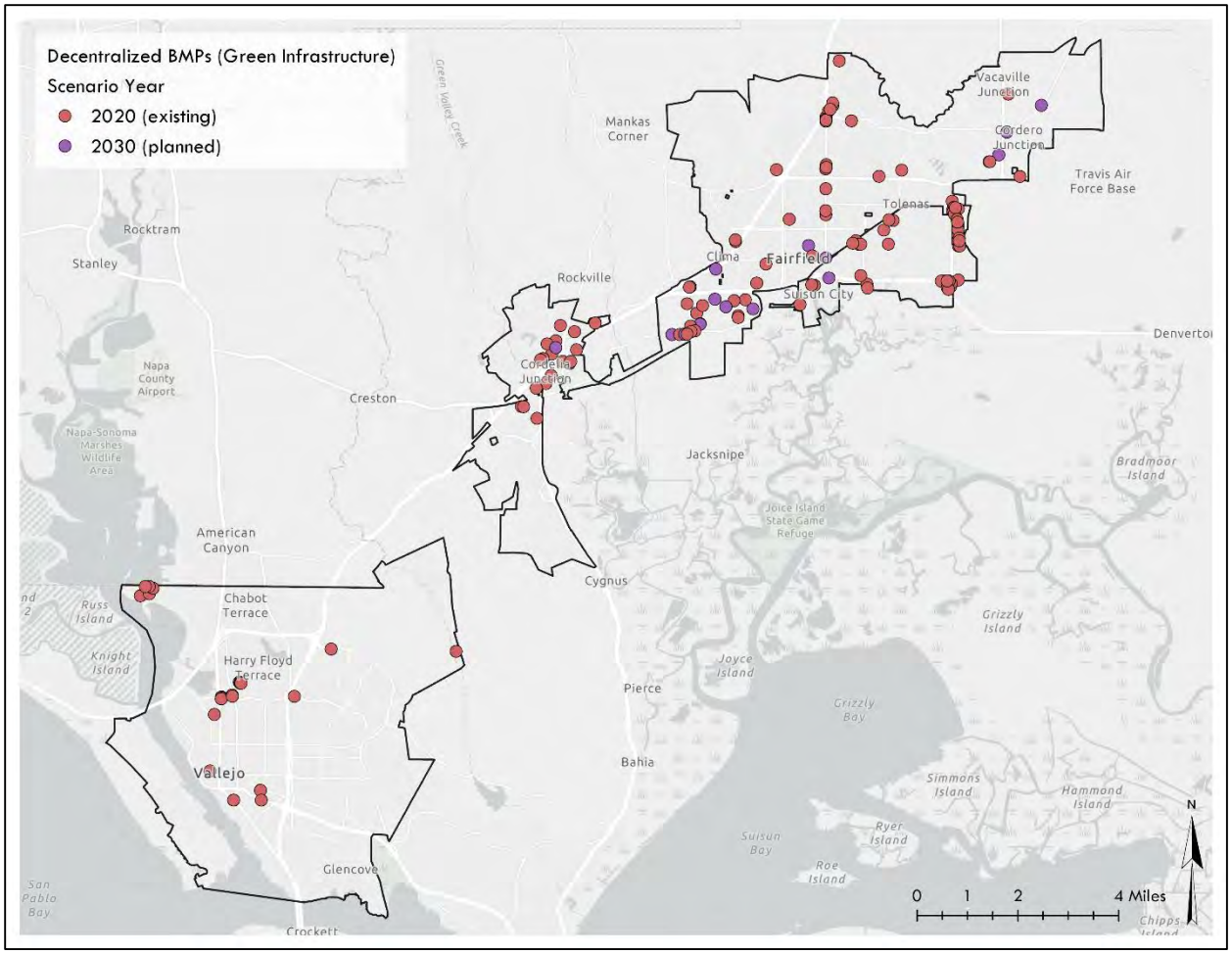

Figure 3.11. Existing and Planned Decentralized BMPs implemented throughout the Solano Permittee MS4 Area.

Current and future reductions from decentralized BMPs were modeled assuming that they were built according to MRP, section C.3d requirements, so that volume-based designs would infiltrate runoff generated by rainfall up to the 85th percentile 24-hour rainfall depth. Since swTELR generates runoff for a several percentile slices of the rainfall distribution, raster outputs of runoff were generated for each percentile rainfall depth. For decentralized BMPs, reductions were calculated as the runoff generated after land use changes minus the volume generated up to the 85th percentile rainfall event for each of the grid cells that comprised the respective BMP drainage area. For calculating pollutant load reductions, the remaining volume was multiplied by either the untreated land-use concentration or a reduced concentration, depending on whether the BMP type provides pollutant treatment in addition to runoff reductions. Since these BMPs generally receive runoff infiltration and treatment close to the site where it was generated, delivery to the BMP is assumed to be instantaneous.

3.4.3 Decentralized BMP performance efficiency

Since the decentralized BMP calculations were performed on raster datasets with coverage throughout the Solano Permittee MS4 area, we can examine the potential for pollutant reductions by sampling grid cells and calculating runoff and pollutant reduction for different BMP types. Figure 3.12 shows the range of location specific potential reductions for BMPs that perform runoff infiltration or treatment and those that do both (e.g. bioretention features). Again, all decentralized BMPs were assumed to be sized and performing in perpetuity to capture runoff generated from the 85th percentile 24-hour storm depths per MRP section C.3.d. Since there is different runoff and loading potential throughout the Permittee MS4 area, there is a range of potential runoff capture and associated BMP load reduction. Given that both PCBs and mercury are hydrophobic and have a strong tendency to adsorb to particulates, we assume similar pollutant reduction capture efficiency for both pollutants. Note that the shape of the curves in the right panels of Figure 3.12 reflect the non-linearity between rainfall and runoff production. Runoff infiltration generally provides somewhat greater benefit than runoff treatment at this design level, and BMPs that do both infiltration and treatment provide substantially greater benefits within a narrower performance range (Figure 3.12).

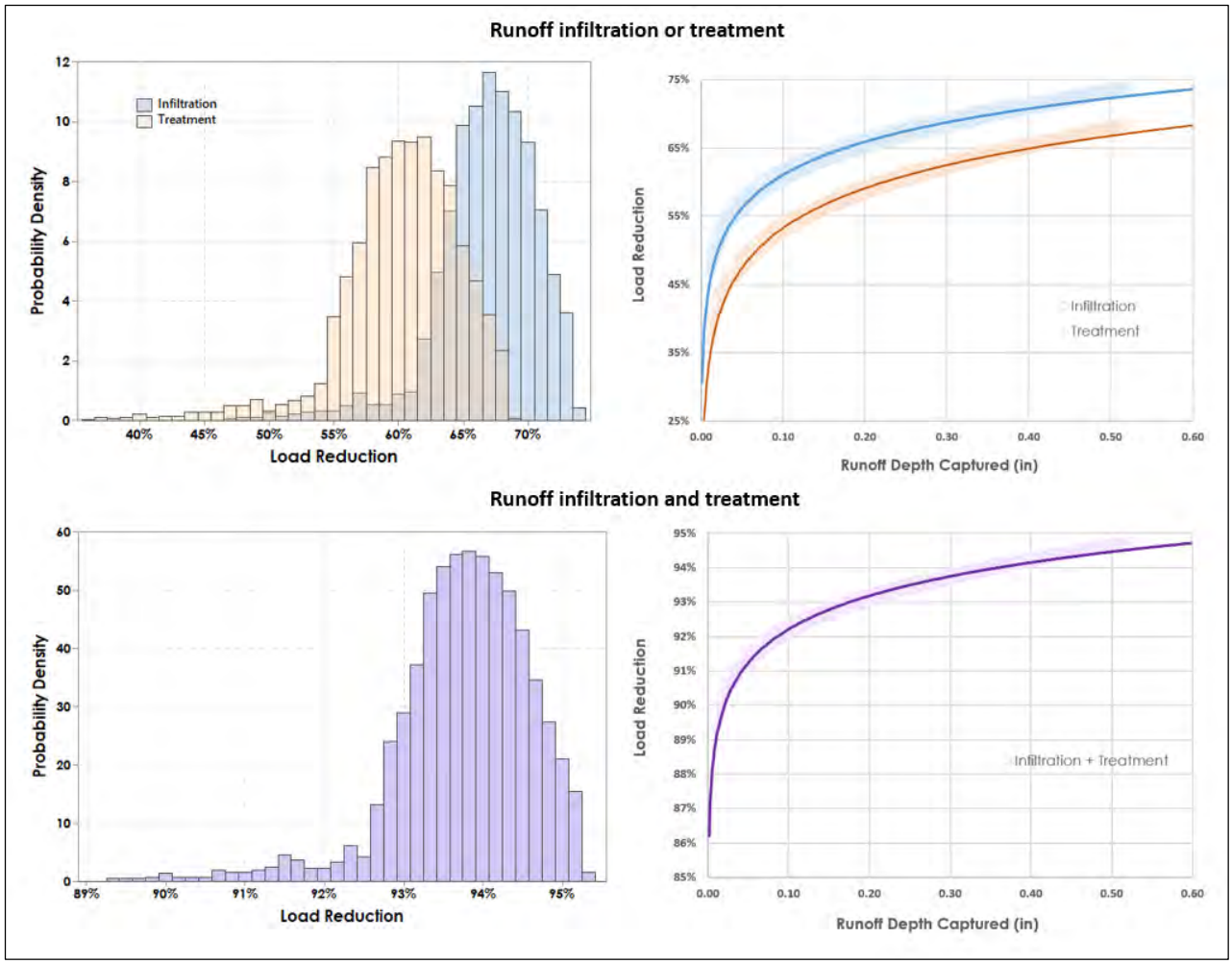

Figure 3.12. BMP performance efficiency. Histograms in panels on the left show load reduction distributions and curves in panels on the right show load reductions per runoff depth captured. Depth capture shown in the range of flows generated by the 85th percentile rainfall event.

The performance curves shown in Figure 3.12 are specific to Solano County, since they incorporate annual rainfall distribution characteristics and site-specific runoff and pollutant generation. As such, they are quasi-empirical in nature. These curves are very similar to those calculated from observed data for the purpose of standardizing load reduction accounting throughout the Chesapeake Bay to support TMDL compliance (Scheuler and Youngk, 2015). Given the sheer number of decentralized BMPs that will need to be accounted for in the SF Bay Area, ongoing accounting of their benefits will likely require a similarly simple accounting system as they have implemented in the Chesapeake Bay Region. For example, there are more than 6,000 BMPs currently catalogued in Prince George County, MD (population 900,000) alone that require ongoing pollutant reduction benefit quantification. Within the decade, the SF Bay Area will likely have tens of thousands of structural BMPs catalogued that require a practical method for accounting for reductions and ongoing verification of performance.

3.4.4 Centralized BMPs

Runoff and pollutant load reduction performance from existing and planned centralized BMPs (also called regional treatment projects) employed the methods described in Section 2.3 to determine routing, timing, and partitioning of infiltrated, treated and bypassed flows for calculating reductions for future scenarios. A primary difference from decentralized BMPs is that with centralized BMPs, stormwater is typically transported a substantial distance away from where runoff was initially generated, so that runoff timing is important for estimating centralized BMP reductions.

Centralized BMP and drainage specifications were documented by city staff and transferred to 2NDNATURE, where they were uploaded to a web-based mapping platform for verification by city staff before inclusion in the modeling scenarios. Centralized BMPs included in the modeling scenarios are listed in Table 3.4 and shown on Figure 3.13. The predominance of dry basins as a centralized BMP in Fairfield vs treatment vaults as the predominant choice for centralized BMPs in Vallejo reflects the difference in soil types: Fairfield has a much greater amount of Type A and B soils (higher infiltration rates) compared to Vallejo (see Figure 3.2).

The hydrologic and pollutant loading to each centralized BMP is calculated based on the land use changes and decentralized BMP reductions within each centralized BMP contributing drainage areas. The performance of each centralized BMP is estimated based on the computational approach outlined in Section 2. While there may be additional centralized BMPs installed with future new development, inclusion in this RAA analysis required that cities had documentation of locations, types, and capacity of future BMPs. Centralized BMPs, both planned and already installed, are listed by Solano Permittee city in Table 3.4 along with location, drainage association, and corresponding modeling scenario.

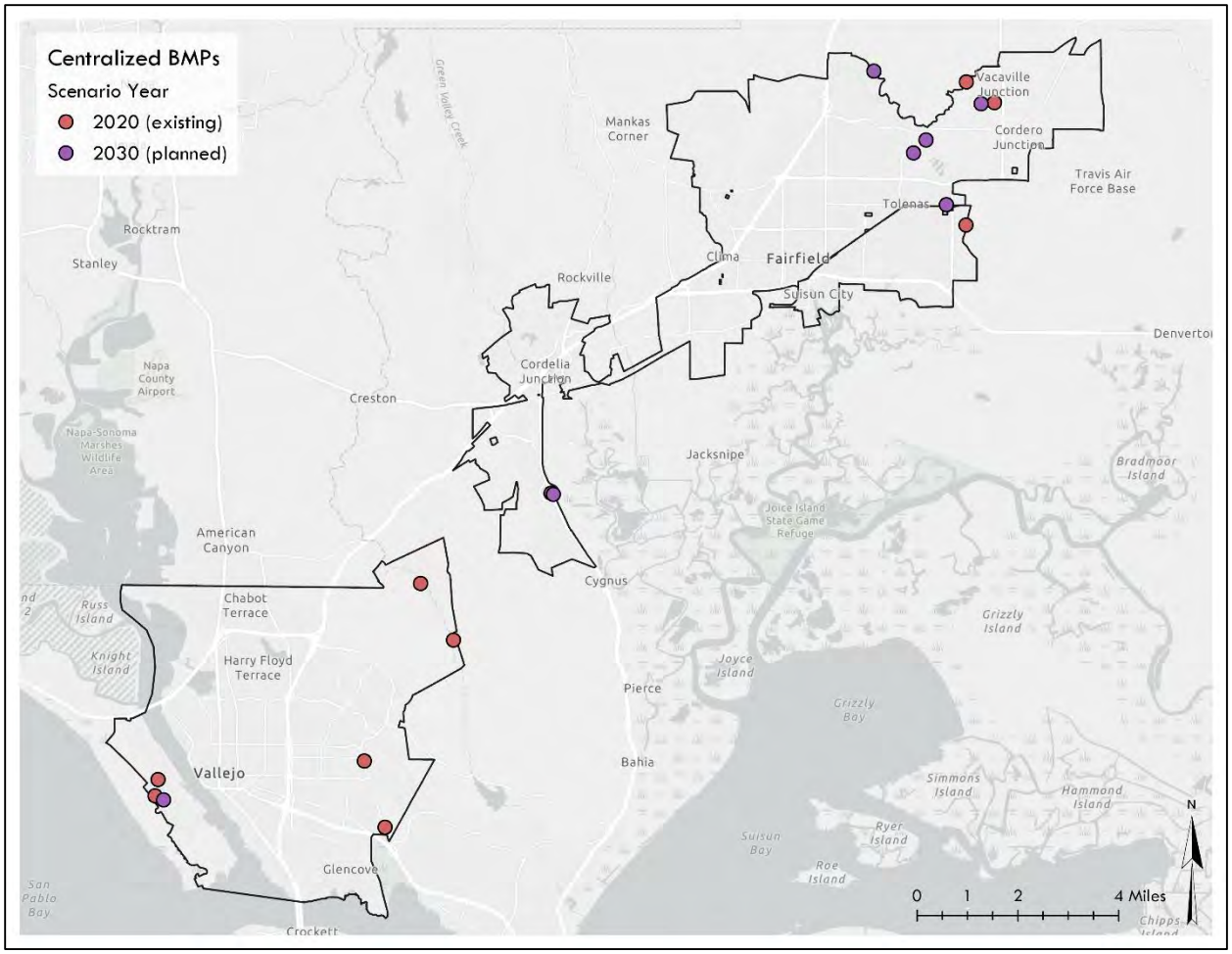

Figure 3.13. Centralized BMPs used in future modeling scenarios.

Table 3.4. Centralized BMPs and attributes.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Gold Hill Village 1	Installed	2020	Dry Basin	11	Marsh 1	MAR-2	38.18047928	-122.1342695
Fairfield	Gold Ridge-so. of Putah So. Canal	Installed	2020	Dry Basin	124	McCoy Creek	COY-26	38.2928207	-121.9726825
Fairfield	Gold Ridge-no. of Putah So. Canal	Installed	2020	Dry Basin	120	McCoy Creek	COY-30	38.29886642	-121.9829339
Fairfield	Paradise 360	Planned	2030	Dry Basin	9.7	Laurel Creek	LAU-12	38.30187014	-122.0165929
Fairfield	Gold Hill Village 2	Planned	2030	Dry Basin	11	Marsh 1	MAR-2	38.18016302	-122.1334273
Fairfield	Ivy Wreath/Strawberry Fields	Planned	2030	Dry Basin	13.8	McCoy Creek	COY-10	38.26349435	-121.9902188
Fairfield	Villages at Fairfield- Village 2	Planned	2030	Dry Basin	42	McCoy Creek	COY-19	38.27843273	-122.0021546
Fairfield	Discovery @ Gold Ridge	Planned	2030	Dry Basin	15	McCoy Creek	COY-24	38.29252809	-121.9774729
Fairfield	Villages at Fairfield- Village 1	Planned	2030	Dry Basin	76	McCoy Creek	COY-6	38.28212579	-121.9975519
Fairfield	2900 Cordelia	Installed	2020	Bioretention	38.085	Marsh 1	MAR-11	38.22804606	-122.0847827
Fairfield	Gateway 80, Buildings A & B	Planned	2030	Bioretention	35.93	Marsh 1	MAR-11	38.2280516	-122.0856715
Suisun	PR Detention Basin	Installed	2020	Dry Basin	64.7	Marsh #1	MAR-47	38.257646	-121.982987
Vallejo	SA10062T	Installed	2020	Treatment Vault	108	Mare Island Strait	SA10	38.10333666	-122.2021727
Vallejo	2183GT318	Installed	2020	Treatment Vault	35	San Pablo Bay	SP3B	38.0978149	-122.277309
Vallejo	2184GT027	Installed	2020	Treatment Vault	40	San Pablo Bay	SP4	38.09313091	-122.2783658
Vallejo	SV1401T	Installed	2020	Treatment Vault	108	Sulphur Springs Creek	SV1B	38.1381688	-122.1697917
Vallejo	SV1203T	Installed	2020	Treatment Vault	135	Sulphur Springs Creek	SV1C	38.15438193	-122.181801
Vallejo	Lennar Mare Island B3	Planned	2030	Dry Basin	37	San Pablo Bay	SP4	38.09204167	-122.275241
Vallejo	BeniciaRd_Basin	Installed	2020	Dry Basin	600	Southhampton Bay	CP12	38.08431517	-122.1944904

3.4.5 Key GSI modeling assumptions

Calculation of GSI reductions depended upon several assumptions:

- All redevelopment since the 2005 baseline year and future redevelopment complies with MRP C3 requirements to capture and/or treat runoff up to the 85th percentile 24-hr rainfall event.
- Bioretention features or comparable decentralized BMPs that reduce both volumes and pollutant concentrations will be make up a substantial proportion of future GSI implemented.
- Decentralized BMPs that reduce PCB/Hg concentrations in stormwater do so at 80% efficiency when functioning as designed. While there is some evidence to support this assumption, it is very limited. As such, this should be considered an important source of uncertainty in the outputs.
- Centralized BMPs that reduce PCB/Hg concentrations in treated outflow have characteristic effluent concentrations with correspond with sediment reductions.
- All structural BMPs will perform to their design standard in perpetuity, requiring a proactive commitment to maintenance Permittee's are encouraged to adopt a tracking and accounting system that includes field verification of GSI performance and provide permittees with useful asset management information on GSI.

4 RAA Modeling Results and Compliance Demonstration

This section presents the results of modeling experiments using the structure, methods, inputs and assumptions that have been described in sections 1-3. The results presented include baseline modeling, comparison with the Regional Watershed Spreadsheet Model (RWSM), and GSI reductions modeling.

4.1 Baseline Modeling Results

4.1.1 Baseline conditions

Baseline runoff was calculated for each Solano County Permittee MS4 Areas (Fairfield, Suisun, and Vallejo) according to the methods described in section 2.3, with the results summarized for each city in Figure 4.1. Runoff volumes are much higher in Fairfield (13,268 afy) and Vallejo (13,391) since these cities are much larger than Suisun, which only produced 2,091 afy of runoff. PCB loading is particularly high in the City of Vallejo (477 g) compared to Fairfield (137 g), and Suisun (16 g), owing to the high proportion of source area and old industrial land use in Vallejo.

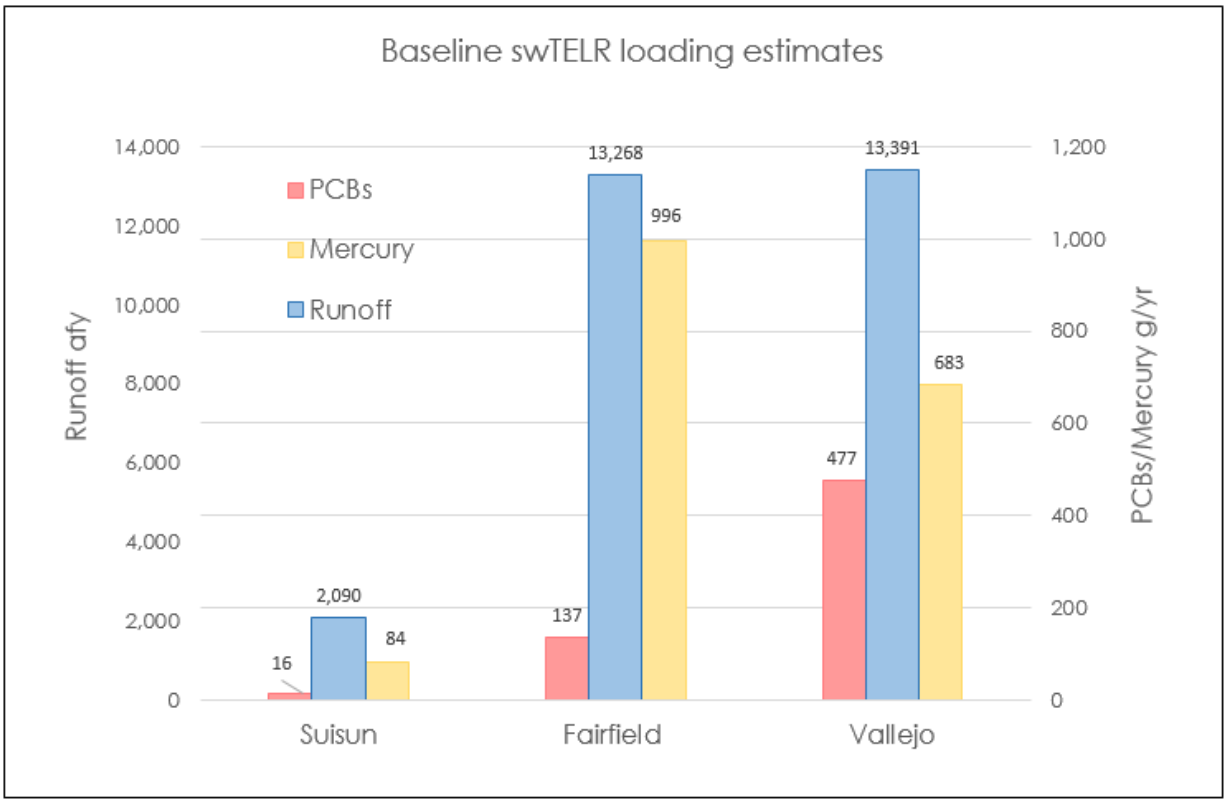

Figure 4.1. Runoff, PCBs, and mercury baseline loading estimates from swTELR.

Baseline runoff estimates were aggregated to the urban catchment scale from calculations performed at the 30-meter grid scale (Figure 4.2). As we would expect, runoff generation is generally highest in areas with high impervious cover and poorly draining soils. These include the urban centers of Vallejo and Suisun City. Baseline runoff is an important driver of spatial patterns of pollutant loading across Solano County; area-normalized runoff ranged from 0.01 ac-ft/ac/yr to 1.2 ac-ft/ac/yr, with an average value of 0.67 ac-ft/ac/yr.

Baseline pollutant loading for PCBs and mercury were calculated using the methods described in sections 2.3 and 3.1and aggregated to the urban catchment scale (Figures 4.3 and 4.4). The runoff estimates shown in Figure 4.2 were used for calculating both PCB and mercury loads. Average baseline loading values for catchments ranged from 0.01 g/ac/year to up to 0.18 g/ac/yr throughout the Solano Permittee MS4 Area (Figure 4.3). High PCB loading catchments are strongly associated with the relative proportion of Source Area or Old Industrial land use coverage within catchments. This is an intuitive result, since runoff concentration values for these land uses are substantially higher than the other land uses (Table 3.1). The greatest concentration of high loading areas is in Vallejo on Mare Island, which is classified almost entirely as Old Industrial land use. Other areas of relatively high PCB loading are the southern part of the Vallejo Waterfront, Vallejo downtown, and Central Fairfield. As we would expect, upland areas on the outskirts of both cities, which are largely undeveloped have very low PCB loading values.

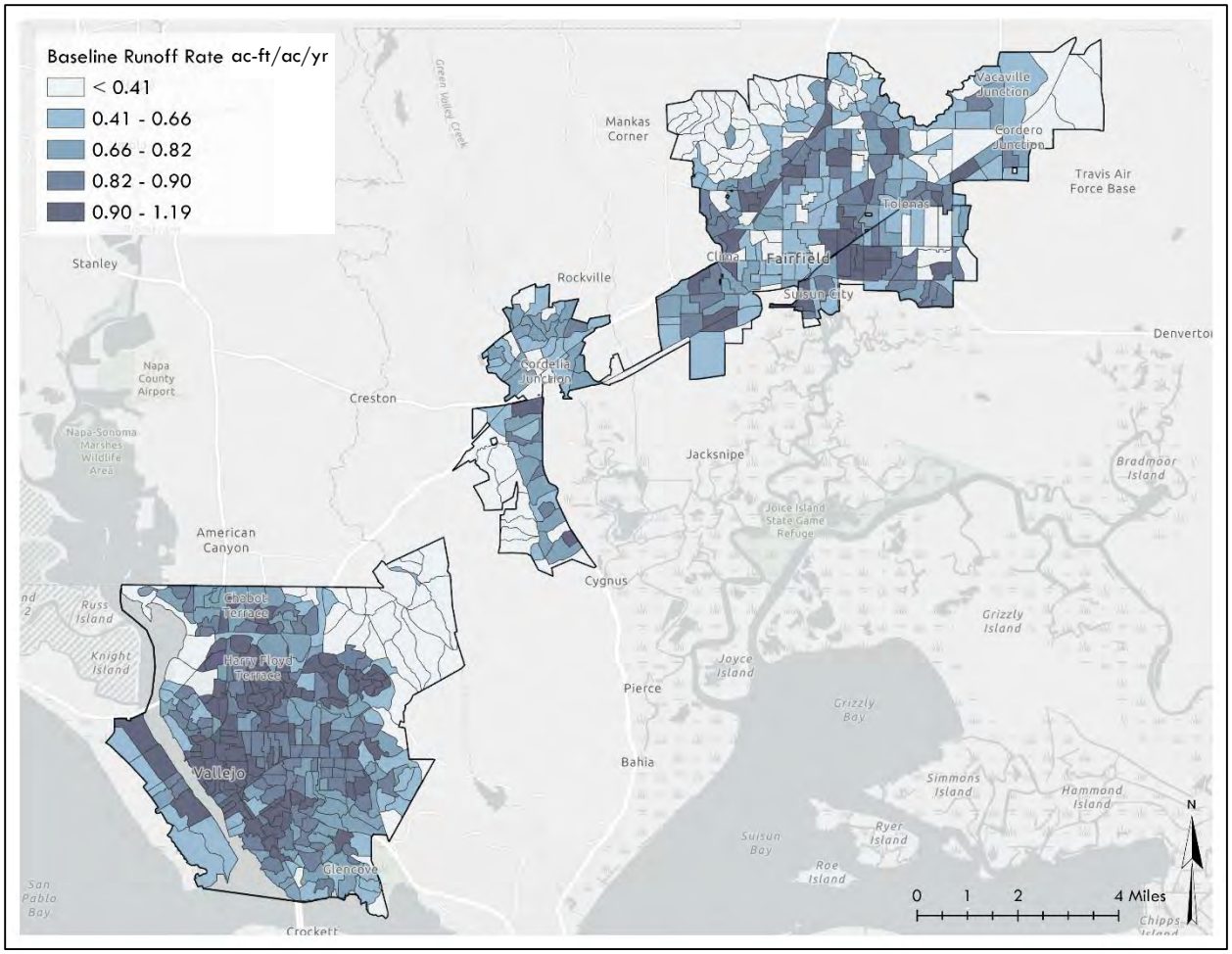

Figure 4.2. Baseline runoff estimates for Solano Permittee MS4 Area

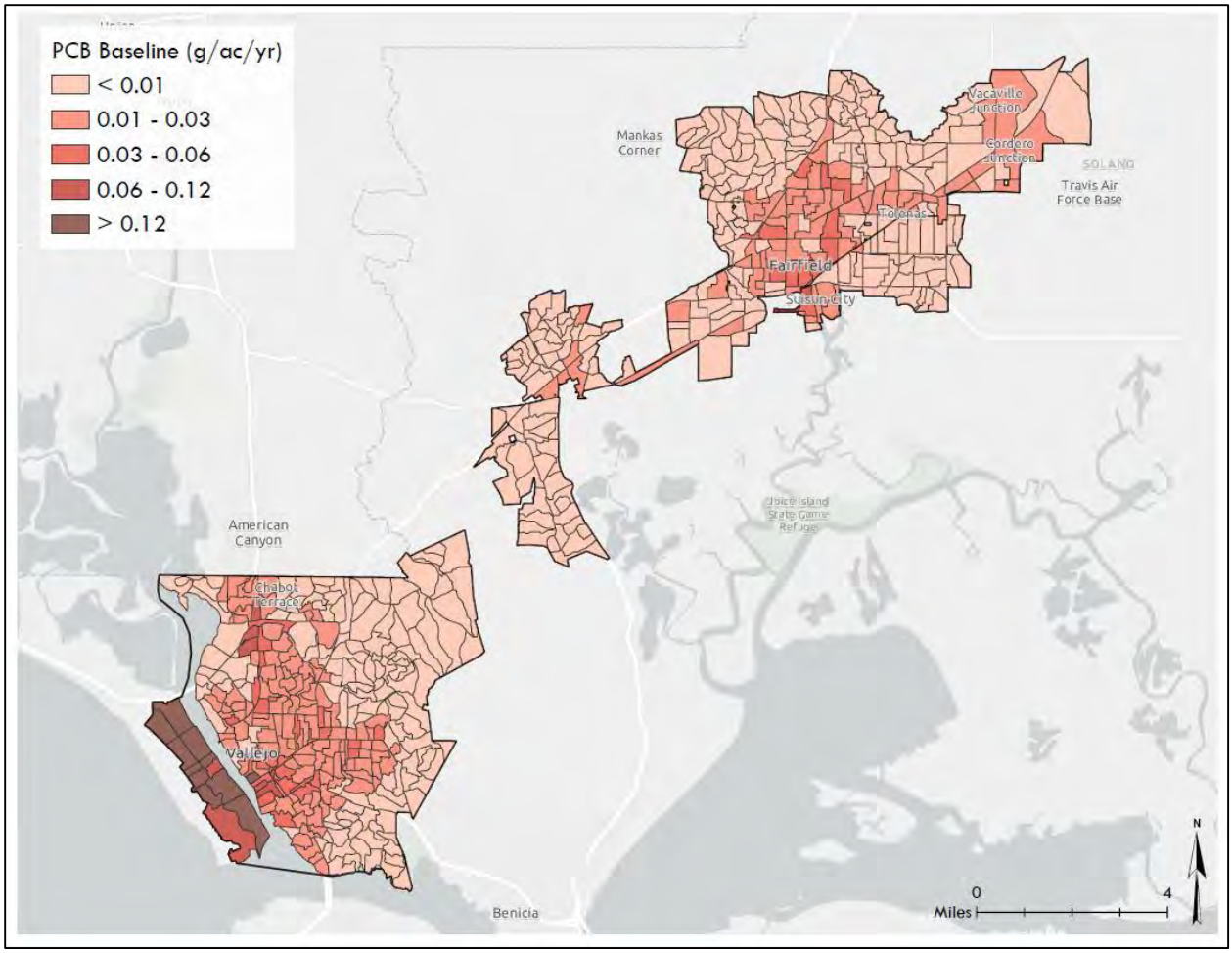

Figure 4.3. Baseline PCB loading estimates for the Solano Permittee MS4 Area

Mercury baseline loading outputs are shown in Figure 4.4. With less difference between land use characteristic runoff concentrations for mercury, loading outputs are more responsive to spatial patterns of runoff compared to PCBs. Loading values range from 0.009 to 0.125 g/acre/year throughout Solano County. Like with PCBs, the most heavily developed areas in downtown Fairfield and Vallejo both show relatively high mercury loading but areas such as Mare Island and the Vallejo waterfront show relatively lower mercury loading values compared to PCBs, primarily due the difference the high characteristic PCB runoff concentrations for Old Industrial and Source Area land uses present in those areas. Industrial areas along Highway 12 also show relatively high mercury loading, which did not show high PCB loading. Undeveloped upland areas in the northern portions of Fairfield and Vallejo show mostly low loading as with PCBs due to low runoff generation in these areas that have substantial open space coverage.

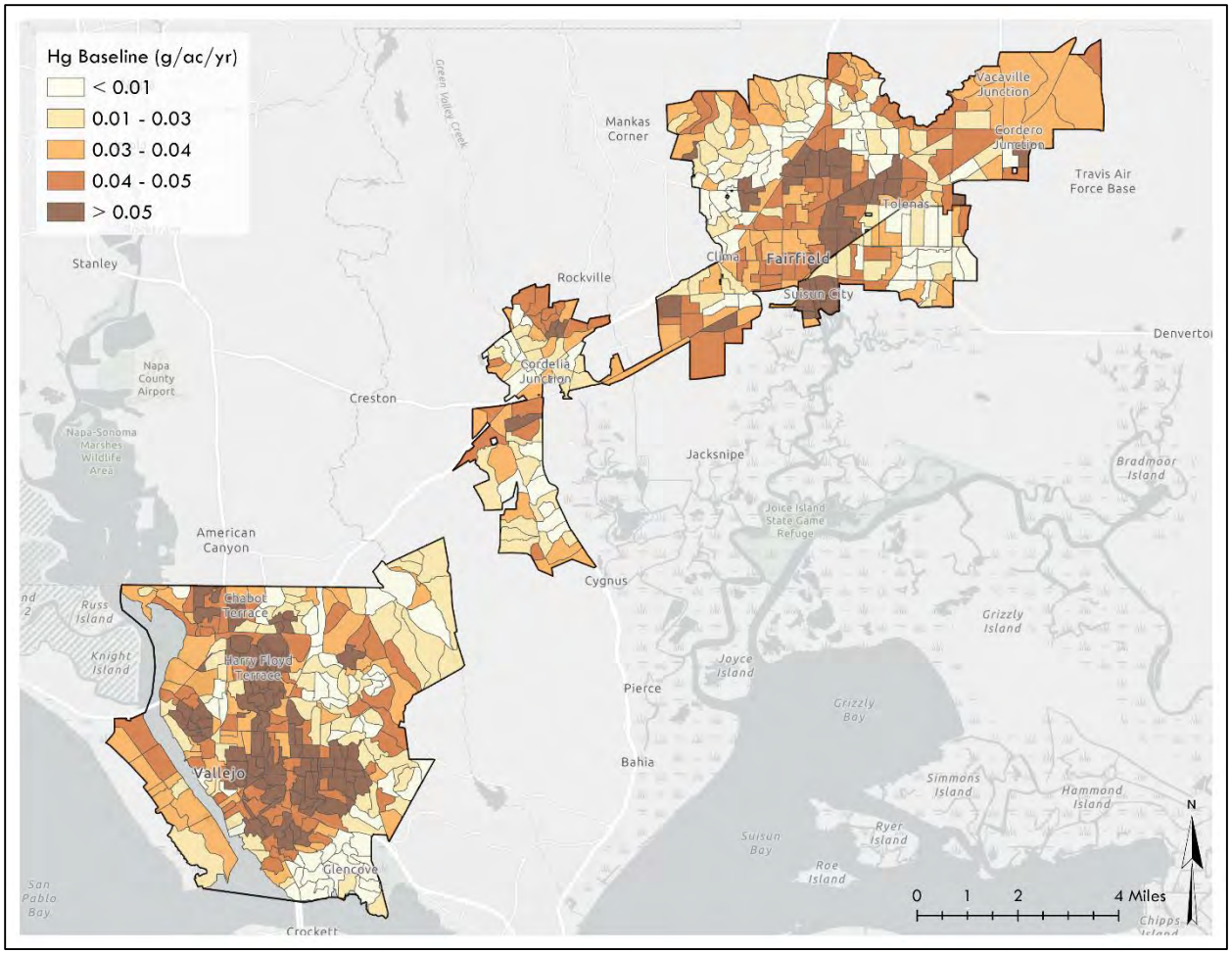

Figure 4.4. Baseline mercury loading estimates for the Solano Permittee MS4 Area

4.1.2 Comparison with Regional Watershed Spreadsheet Model (RWSM)

Comparison between outputs from swTELR and RWSM shows close correspondence between outputs from the two models (Table 4.1). Overall, there was little difference in estimates between swTELR and RWSM runoff estimates (-4%), PCB loads (-16%), or mercury loads (9%), with swTELR providing the lower estimates for runoff and PCBs, and higher estimates for mercury compared to RWSM. Discrepancies between the two models are due almost entirely to the differences in the spatial pattern of runoff estimates, since land use concentrations used in swTELR are identical to those used in RWSM. Even though Solano county is technically part of the North Bay, runoff coefficients used for the RWSM outputs are the same as those used for the East Bay, because rainfall gauges in the East Bay more closely reflect the Solano County rainfall regime. There were no calibration sites for RWSM located in the vicinity of Solano County (McKee et al., 2014); some of the North Bay calibration sites used in RWSM had nearly double the annual rainfall of Fairfield. The decision to use East Bay runoff coefficients was confirmed appropriate by SFEI staff (A. Gilbreath, pers. com., Oct 2018).

Table 4.1. Comparison of average annual loading to SF Bay from RWSM and swTELR.

	RWSM			swTELR			% Difference		
	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB	Hg	Runoff
Fairfield	131	607	13,244	137	696	12,120	-16%	-12%	-8%
Suisun	15	68	1,655	16	84	2,116	-7%	26%	28%
Vallejo	569	657	13,765	477	683	13,450	-16%	5%	-2%
Totals	**715**	**1,333**	**28,664**	**630**	**1,462**	**27,616**	**-16%**	**9%**	**-4%**

Hydrologic algorithms in swTELR are very sensitive to impervious cover and soil type - runoff generation directly reflects the local impervious cover. Since RWSM outputs are regionally calibrated, they do not appear to reflect the same degree of sensitivity to these factors at more granular scales, which probably accounts for a substantial proportion of the runoff differences between the two models at the individual city level. This is not unexpected, since RWSM was developed as a regional tool and necessarily reflects spatial factors specified at larger spatial scales (McKee et al. 2015) compared to the MS4 and urban catchment-scale estimates provided by swTELR.

To better understand the differences between swTELR and RWSM a multivariate general linear model was constructed at the urban catchment scale for both model outputs using impervious cover as a continuous independent variable and soil type as a categorical independent variable. Soils and impervious cover summarized for each urban catchment delineated in Solano County (n= 596) explained approximately 93% of runoff variance in swTELR (the expected outcome), but only 3.5% in RWSM (an initially surprising outcome). From these findings, we can conclude that: 1) use of TELR baseline estimates will not substantially affect calculations for progress towards overall waste load allocations for Solano Permittees compared to estimates from the RWSM model, 2) RWSM runoff volumes at the catchment scale strongly reflect calibrated parameters, which aligns with its purpose as a tool to estimate loading at the regional or sub-regional scale, 3) spatially explicit estimates from swTELR align more with widely held conceptualizations of how spatial factors such as impervious cover influence urban runoff generation.

4.2 Model Scenario Results

4.2.1 Spatial patterns of pollutant load reductions over time

For each modeling scenario, swTELR and the methods described in Section 3 were applied to generate outputs that incorporated runoff and pollutant loading reductions for different types of GSI. These included land-use redevelopment, decentralized BMPs, and centralized BMPs (regional treatment). These scenarios also included runoff and loading increases projected to result from

new development within the Permittee MS4 Area. Overall estimated relative (%) PCB reductions from baseline are greater than those for mercury, which primarily reflects the relatively larger PCB reduction opportunities in Old Industrial and Source Areas that are planned for redevelopment.

Spatial loading outputs for all Solano Permittees are summarized at the urban-catchment level in Figures 4.5 and 4.6, with reductions expressed as grams per acre. The maps illustrate that PCB reductions are focused on Mare Island and within the urban centers of Vallejo and Fairfield for 2020, 2030, and 2040, with less intense clustering of reductions in 2030 and 2040 compared to 2020. Over the course of implementation from the baseline scenarios to 2040, catchments shift from higher to lower loading categories. Outputs from the 2040 scenario show that all catchments that were classified in the highest percentile category in the Baseline Scenario have been eliminated on Mare Island. There are substantially fewer of these relatively high loading catchments on the Vallejo Waterfront, Vallejo and Fairfield downtown areas. Catchments that show the largest relative reductions in the scenarios were usually those which started in the baseline scenario with substantial Source Area or Old Industrial land use. Outlying areas remained virtually unchanged from the baseline scenario due to low redevelopment rates in these catchments, low proportion of high pollutant producing land uses, and new development that generates additional runoff which can create small local pollutant loading increases over time compared to the undeveloped conditions.

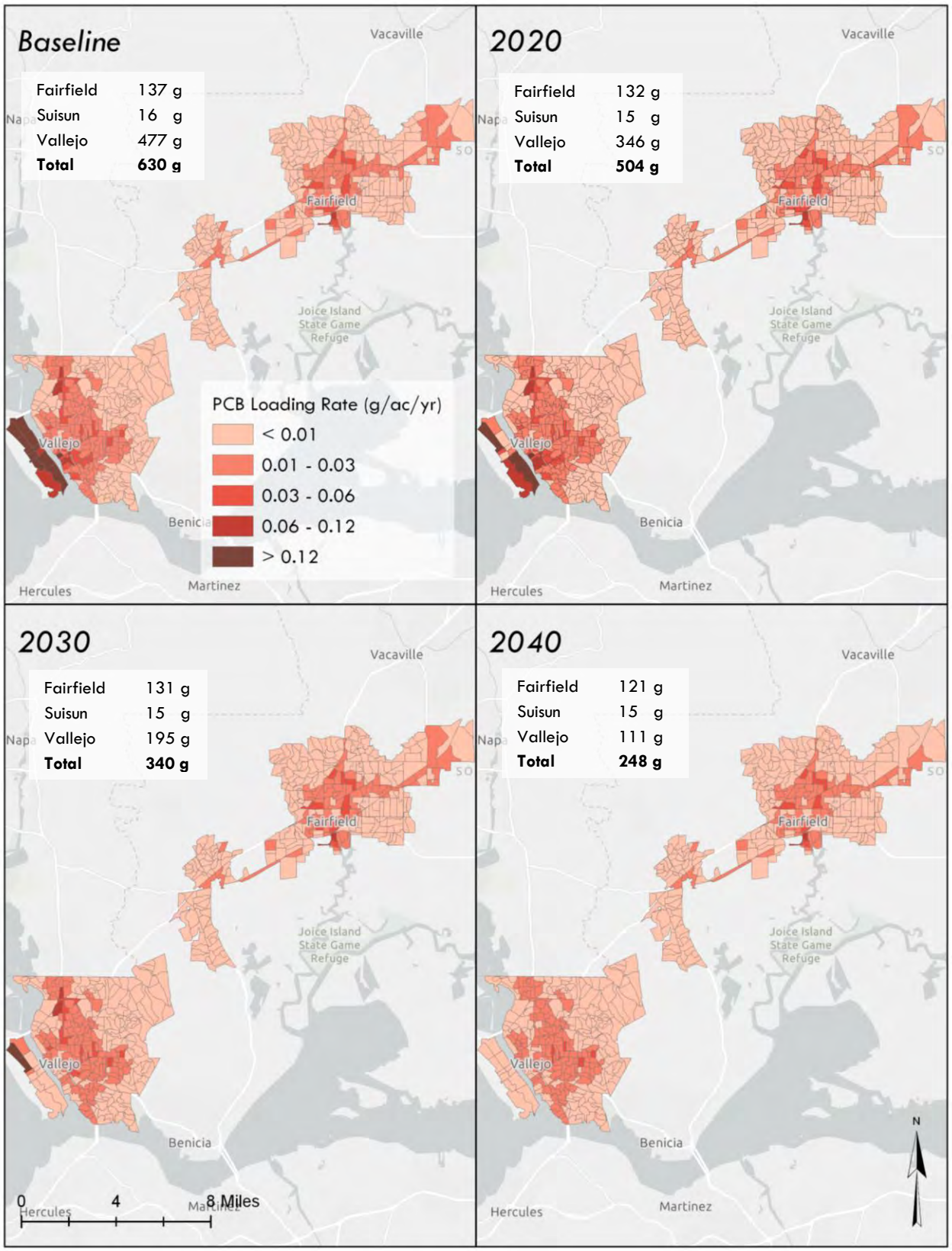

Figure 4.5. Spatial distribution of annual PCB load estimates for baseline and future scenarios

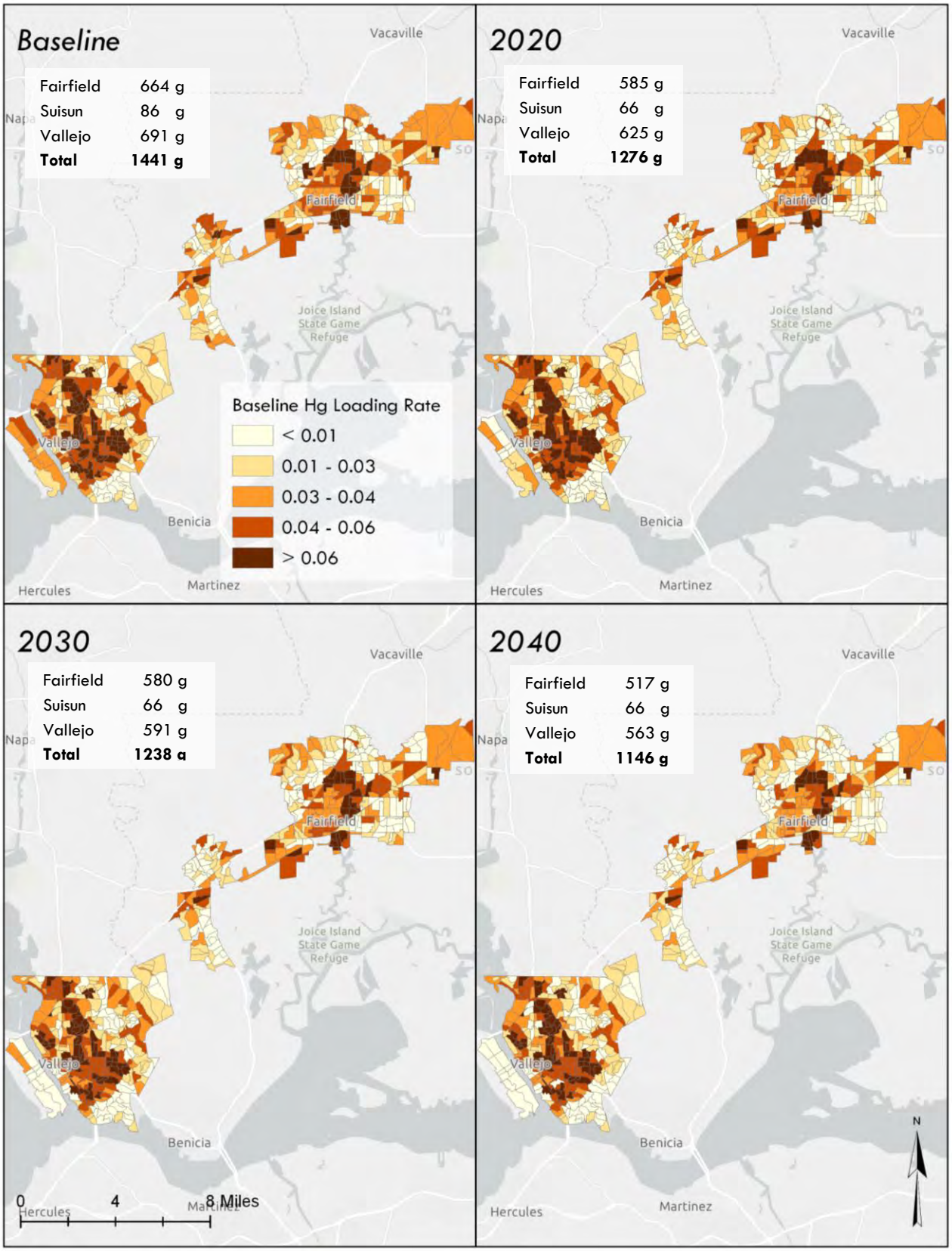

Figure 4.6 Spatial distribution of annual mercury load estimates for baseline and future scenarios

GSI load reductions summary

Total estimated GSI reductions by the year 2040 are 382 grams of PCBs, and 295 grams of Mercury Table 4.2. These reductions constitute a reduction of 61% reduction from baseline for PCBs and a 20% reduction from baseline for mercury. GSI implementation and land use changes can be lumped together compliance demonstration, since they often occur at the same time during redevelopment and both contribute to the GSI reductions targets. However, it is instructive to examine the relative contributions from each component to form a clear picture of expected reductions. For both PCBs and mercury, the primary source of reductions is land use changes that result from redevelopment, making up 98.5% of total PCB reductions and 87% of mercury reductions by 2040 (Figure 4.7). In contrast, reductions from decentralized BMPs and parcel LID make up just 0.5% of PCB load reductions and 9% of mercury load reductions. Routing to centralized BMPs for runoff infiltration and treatment accounts for 1% of PCB load reductions and 9% of mercury load reductions (Figure 4.7). The projected rate of reductions over time for both PCBs and mercury are fairly steady throughout the simulation period (see graphs in Figure 4.7).

Table 4.2. Summary of future scenario loading estimates for PCBs and mercury for the Solano Permittee MS4 Area.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCB (g)	Hg (g)	PCB (g)	Hg (g)	PCB (g)	Hg (g)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

Most planned GSI implementation is associated with redevelopment, resulting in land use conversion to New Urban, which has the lowest associated pollutant concentration values. Per Table 3.1, PCB concentrations span 3 orders of magnitude from Old Industrial/Source Areas (up to 204 ng/L) to New Urban land uses (3 ng/L); mercury concentrations span one order of magnitude (from 3 to 40 ng/L). Since GSI BMPs can only reduce pollutants that are generated by the associated land use, and since the PCB and mercury loads generated are much smaller after parcels are converted to the New Urban land use, there are simply less pollutants to reduce on redeveloped parcels. Therefore, while GSI implementation will accompany redevelopment land use conversions, the amount of pollutant load reduction that can be attributed directly to BMP capture and treatment of runoff is relatively small. This result corresponds to previous research, which showed that relatively small areas of Old Industrial and Source Area sites have a disproportionate contribution to PCBs loading (McKee et al., 2015).

The disproportionate allocation of reductions to land use conversion is strongly dependent on land use changes actually resulting in dramatic reductions of pollutants in the sediments that they generate, which may not be realistic. Legacy sediments that contain higher levels of pollutants are likely to persist after land-use conversion and GSI installation provides a viable way to mitigate those impacts. While the current inventory of GSI BMPs for Solano Permittees number 185, and their aggregate drainage area is more than 1700 acres, overall this represents only 3% of the Solano Permittee MS4 Area drainage. Specific, planned BMPs will increase total drainage coverage to 4% (2,773 acres) by 2020. With inclusion of redevelopment and new development areas that will be covered under C3 requirements, GSI coverage is projected to increase to 6% (4,414 acres) by 2020 and to 14% (6,503 acres) by 2040.

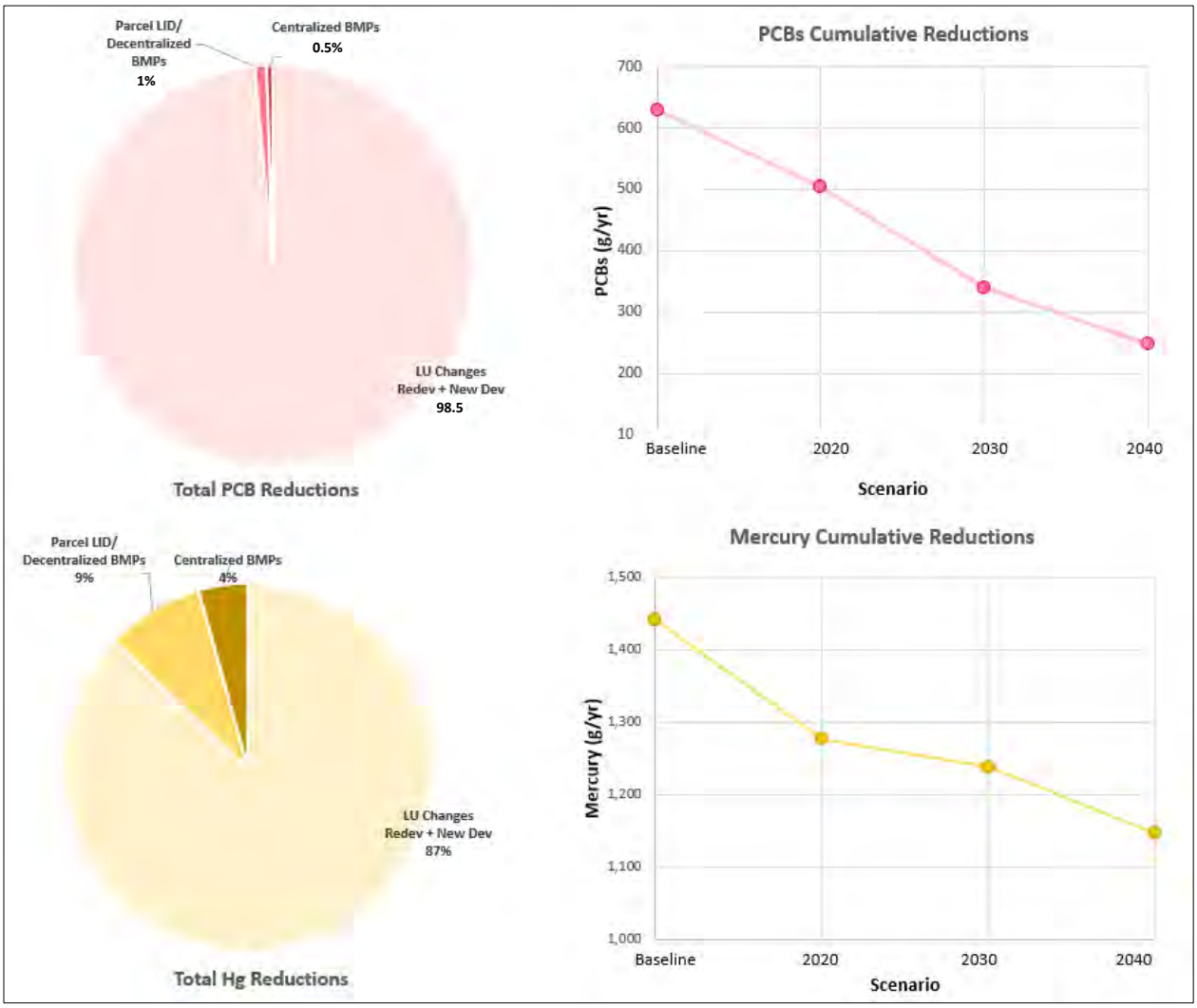

Figure 4.7. Reduction types and trajectory summary for Solano Permittees.

4.2.2 GSI load reductions detail

Examining the modeled reductions by type for each city illustrates pollutant reduction sources in greater detail. Table 4.3 lists the cumulative reductions for each scenario year for each of the Solano Permittee Cities, so that each scenario also includes the reductions from the previous decade scenario. By far, the largest PCB reductions associated with land use changes occurred in Vallejo (377 grams by 2040), compared to the other cities, since Vallejo had the greatest amount of high PCB producing land uses planned for redevelopment. Vallejo and Fairfield had comparable land use change reductions for mercury, at 112 grams and 127 grams respectively by 2040 (Table 4.4). Suisun had the smallest reductions, mostly because the drainage area is very small relative to Vallejo and Fairfield. All cities show comparatively small reductions for GSI relative to the land use changes.

Load reductions resulting from land use changes listed in tables Table 4.3 and 4.4 are the net reductions that include both redevelopment as well as new development. New development results in more pollutant loading due to additional stormwater runoff generation, but in each scenario and for each city, there a there are still net loading reductions. The runoff increases that resulted from the additional impervious coverage are shown as negative values in the reductions column for runoff. These increases are pronounced for Fairfield, where substantial areas of open space have recently been developed as new residential subdivisions. These recent changes were included in the 2020 scenario, and additional new development included in planning documents was allocated to the 2040 scenario. A smaller amount of new development was indicated in the Vallejo 2040 general plan that was allocated to the 2040 scenario and resulted in additional runoff increases. Overall, each city showed net runoff reductions due to implementation of GSU for each scenario year after accounting for new development runoff increases.

Regional treatment via routing of stormwater runoff to centralized BMPs produced similar reductions in Fairfield and Vallejo (Table 4.3). These reductions are due to centralized BMPs that have already been implemented or had detailed specifications available (2020 scenario) or were planned further out into the future (2030 scenario). No additional load reductions were calculated for centralized BMPs for the 2040 scenario, since there is no documentation of planned structures available, although new development areas will likely have adequate space for centralized treatment.

Table 4.3. Future scenarios estimated PCB reductions detail

PCBs		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Total Cumulative Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	137	-178	1.4	831.8	1.3	212.7	1.8	866	5	12,402	132
	2030			-178	1.9	864.1	1.5	419.2	2.9	1,105	6	12,163	131
	2040			-354	13.1	1,522.6	1.7	419.2	1.1	1,588	16	11,681	121
Suisun	**2020**	2,090	16	0	0.0	168.7	0.7	36.4	0.0	205	1	1,885	15
	2030			0	0.0	170.0	0.7	36.4	0.0	206	1	1,884	15
	2040			0	0.1	174.5	0.7	36.4	0.0	211	1	1,879	15
Vallejo	**2020**	13,391	477	0	128.9	642.7	0.6	83.1	2.0	726	131	12,665	346
	2030			0	278.7	1,176.4	1.0	132.8	2.0	1,309	282	12,081	195
	2040			-81	363.5	1,638.8	1.3	132.8	0.8	1,691	366	11,700	111
Solano Permittee Totals			**630**		**377**		**4**		**2**		**382**		**248**

Table 4.4. Future scenarios estimated mercury reductions detail

Mercury		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	664	-178	63.7	831.8	9.8	212.7	6.0	866	79	12,402	585
	2030			-178	65.7	864.1	10.6	419.2	7.6	1,105	84	12,163	580
	2040			-354	127.4	1,522.6	13.1	419.2	6.7	1,588	147	11,681	517
Suisun	**2020**	2,090	86	0	16.5	168.7	2.6	36.4	1.1	205	20	1,885	66
	2030			0	16.6	170.0	2.7	36.4	0.0	206	19	1,884	67
	2040			0	17.1	170.0	2.7	36.4	0.0	206	20	1,884	66
Vallejo	**2020**	13,391	691	0	54.8	642.7	4.1	83.1	7.3	726	66	12,665	625
	2030			0	85.8	1,176.4	7.4	132.8	7.4	1,309	101	12,081	591
	2040			-81	112.4	1,638.8	9.9	132.8	6.1	1,691	128	11,700	563
Solano Permittee Totals			**1,441**		**257**		**26**		**13**		**295**		**1,146**

06014
6055

4.2.3 Compliance demonstration

4.2.3.1 *MRP GSI reductions compliance*

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, Permittees must also project the load reductions achieved via green stormwater infrastructure by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040.

Estimated pollutant load reductions for the Solano Permittees are listed in Table 4.5 illustrate that reductions far exceed the 2020 and 2040 reduction targets. The estimated GSI reductions for each scenario correspond to totals for all cities listed in Tables 4.3 and 4.4. While the 2020 reduction targets listed in Table 4.5 for the Solano Permittees are absolute values listed in the MRP, the 2040 GSI targets have been rescaled based on new calculated baseline values per recommendations in the RAA Guidance (BASMAA, 2017, section 3.5). This calculation uses the proportions of the total estimated reductions for each pollutant to determine GSI targets: 20.8% of the total reductions for PCBs, and 16.1% for mercury. In both cases, GSI reductions are the vast majority of the total reductions. As already discussed, this is because the GSI RAA reductions include those result from redevelopment land-use conversion (BASMAA, 2017).

Table 4.5. Green stormwater infrastructure load reduction estimates and target reductions

	Scenario	Estimated Loading (g)	Estimated GSI Reduction (g)	WLA Reduction Target (g)**	GSI Reduction Target (g)*	Projected GSI % Attainment	% Reduction from Baseline	% Progress to WLA
PCBs	Baseline	630						
	2020	504	126	-	8	100%	20%	-
	2030	340	290	-	58	100%	46%	-
	2040	248	382	530	110	100%	61%	72%
Mercury	Baseline	1441						
	2020	1276	166	-	2	100%	12%	-
	2028	1238	204	0	33	100%	14%	-
	2040	1146	295	-	48	100%	21%	100%

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury). Since mercury estimates are already below WLA, they are calculated as a proportion of estimated reductions.

**Based on WLA target of 100g for PCBs, baseline estimate for mercury is below 2028 WLA target for mercury of 1600 g.

4.2.3.2 *Progress towards WLA targets*

The 2040 estimated PCB reductions (382 g) provide Solano Permittees with a 61% reduction below baseline loading estimates, which provides 72% of the reductions that will be required to reach the Solano Permittee's WLA of 100g. It is anticipated that the remainder of the required reductions will

be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment. A separate WLA RAA will be performed that includes reductions from source control measures, along with any additional GSI projects that are identified as part of the GSI Workplan that have not already been included in this the current analysis.

Estimated baseline loads for mercury (1441 g) were below the 2028 WLA (1600 g), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. If instead we appeal to a relative reduction metric, GSI reductions of 295 g are 14% below the baseline estimates, which may be compared with the regional relative mercury reduction target of 50% by 2028. Regardless of the target metric applied, additional GSI projects identified in the GSI Workplan along with source control measures will provide additional mercury reductions.

Modeled baseline estimates from swTELR may present a better alternative for tracking future progress towards mercury reductions compared to those from the TMDL. While the SF Bay regional mercury loading estimates employed extensive data analysis and modeling, allocations to individual communities relied only on population sizes. The close correspondence between swTELR and RWSM mercury load estimates provides a degree of confidence in the swTELR results.

One source of the discrepancy between the two models may be the incongruity between using population as a metric for distributing mercury loads, as in the TMDL, compared to land use, as in the SFEI mercury concentration layer used in this study. Higher populations generally correspond with a greater proportion of urbanized area. The land use layer employed in this study uses a mercury concentration of 80 ng/L for Ag/Open land use, and 3 ng for New Urban land use. So, more populated areas with greater urbanized area can actually result in relatively lower estimated mercury loading in any model using the RWSM land use layer compared to more populous areas. This is the inverse of the logic applied in the TMDL population-based model for estimating load allocations to individual communities.

4.2.4 Spatial prioritization analysis for additional GSI implementation

We explored the potential for additional reductions via GSI throughout the Solano Permittee MS4 Area. A metrics-based spatial prioritization analysis was performed to identify additional parcels and road segments that will be most suitable for GSI implementation, given logistical constraints and additional pollutant load reductions needed to meet future permit requirements. Both parcels and road segments were considered with the spatial metrics adjusted accordingly. The final scoring rubric and metrics were developed collaboratively with Solano Permittees and included and equal weighting of the following factors:

- Soil type

- Slope
- Land ownership
- Land use
- Source parcel status
- Parcel size
- Estimated catchment pollutant loading
- Redevelopment schedule
- Proximity to stormwater structures
- Proximity to Caltrans right of way

The spatial prioritization analysis provides a way to combine implementation feasibility, benefit magnitude, and other logistical factors. A geodatabase was constructed to house all of the GIS data and an automated spreadsheet was created for easy adjustments of metrics and weightings. Outputs from the spatial prioritization analysis serves two purposes: 1) provide some real practical and immediately actionable alternatives for GI implementation and 2) identification of additional means to meet GSI and WLA reduction target requirements. The full process for developing the spatial prioritization analysis is documented in the Green Infrastructure Workplan and here we focus on the outputs and how the outputs can be used to supplement the modeling results already presented to achieve additional future pollutant reductions.

Outputs from the spatial prioritization analysis are presented as maps in Figure 4.8 which shows the scores for each parcel and road segment (approximately 89,000 features total) throughout the Solano County MS4 Permittee Area. Green parcels and road segments indicate that they were in the top 20% of the priority scores and that they were not already treated in one of the modeling scenarios. Most of the parcels or road segments identified in Figure 4.8 are either Old Industrial, Old Transportation or Old Commercial land uses, which corresponds with the highest PCB concentration land uses (see Table 3.1). These parcels indicate the greatest potential for additional GSI implementation to achieve additional pollutant load reductions. GSI Projects identified using this spatial prioritization process can be incorporated for to subsequent modeling efforts to provide updated load reductions. Given that current GSI reductions exceed the GSI reduction requirements, Solano Permittees may also consider identifying synergistic opportunities within areas that have already been slated for redevelopment in the near future.

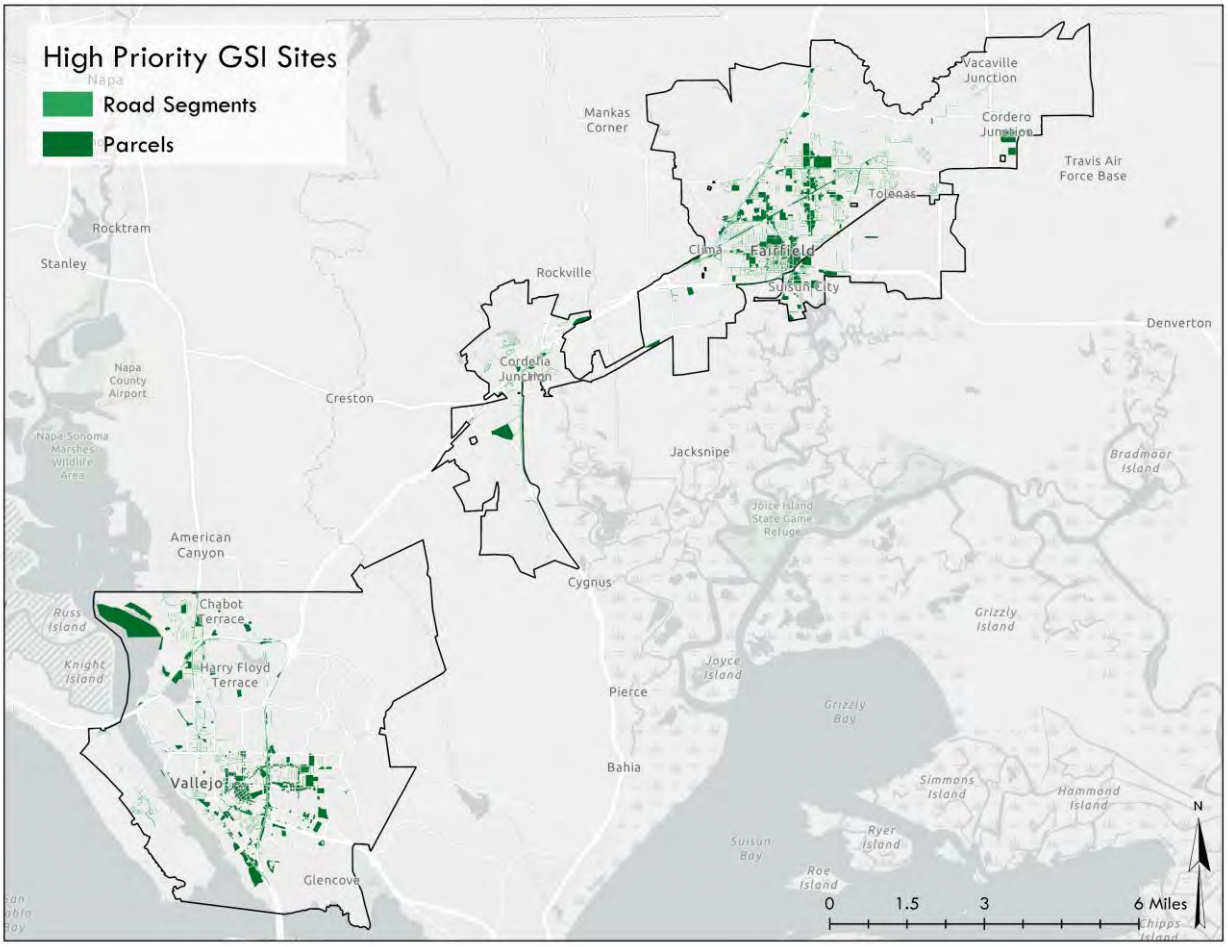

Figure 4.8. High priority parcels and road segments for GSI redevelopment

5 Conclusions

5.1 Results Summary

This data compilation and modeling effort quantifies the water quality benefits of current and planned GSI implementation for Solano County MS4 Permittees. This report satisfies MRP Provisions C.3.j and C.11/C.12.c to demonstrate that GSI implementation will meet specified targets. It also provides information to guide future implementation and development of the GSI Workplan. The modeling results clearly indicate that that if the Solano Permittee redevelopment land use changes proceed along their currently projected trajectory and continue to conform to MRP C3 GSI implementation requirements, they will exceed their GSI reductions targets for PCBs and mercury and make substantial progress towards wasteload allocation targets. Of course, there are limitations to the interpretation the model outputs imposed by various source of uncertainty (discussed in detail below), but the magnitude of exceedance of the GSI reduction targets is strong evidence that the signal of expected changes is probably beyond the boundaries of such uncertainty. Thus, the report provides reasonable assurance that PCB and mercury reduction performance standards established for GSI in MRP 2.0 will be met.

Key findings include:

- Baseline modeling showed that PCB contributions from the City of Vallejo were disproportionately large, primarily due to substantial coverage of Old Industrial land use areas on Mare Island.
- Baseline runoff, PCBs, and mercury estimates corresponded closely with outputs from RWSM at the regional scale.
- Baseline modeling results showed substantial deviations from those estimated for the Solano Permittees in the TMDL wasteload allocations, particularly for mercury. The discrepancy with the TMDL estimates may due to the TMDLs reliance on population to specify load allocations.
- Estimated PCB and mercury reductions meet the GSI reduction targets specified in the MRP for 2020, 2030, and 2040.
- Estimated reductions represent substantial progress towards WLA targets, with the PCB GSI reductions accounting for 72% of reductions required to achieve the 2040 WLA target.
- Reductions are primarily driven by land use conversion, particularly in the case of PCBs, and land use conversions on Mare Island and the Vallejo Waterfront account for most of the PCB reductions.
- A spatial prioritization analysis indicates additional opportunities throughout the Solano Permittees MS4 area for additional GSI implementation that will be further considered in the GSI Workplan.

5.2 RAA Limitations

RAA is a modeling exercise, so it is subject to all of the usual limitations associated with using model outputs to make decisions. Chief among these is the uncertainty associated with the model inputs and the model structure that includes several simplifying assumptions employed for the sake of practicality (see Wijesiri and Liu, 2018, for a recent discussion). We have taken care to communicate those assumptions and identify uncertainties associated with the modeling process throughout this report to support a transparent RAA process. Regardless of the level of rigor employed, the limitations of RAA modeling should be taken into consideration when the outputs are used as the basis for prioritizing action.

Any model is a trade-off for characterizing a system that requires decisions about which elements to simplify and which elements to represent in greater detail. In this RAA we chose to favor spatial granularity above fine scale time resolution. In other words, BMP locations were represented spatially explicitly, but rainfall inputs were represented probabilistically rather than via sequential simulation. As has already been discussed, this choice is based on alignment of the model with the purpose of RAA and the ongoing need to track BMP performance. An important limitation of this approach is that the time-sequencing of events is not preserved, which can produce unique runoff responses. But since continuous simulation model outputs are aggregated to average annual values for RAA, the fine temporal resolution of continuous model outputs are not used any differently than those driven with probabilistic inputs. Moreover, average outputs have previously been judged generally acceptable for stormwater management planning (Lent et al., 2011).

This RAA employed an uncalibrated approach that relied strongly on the input data. Fitting model parameters to observed hydrologic data can improve model performance substantially and most continuous simulation models rely heavily on a calibration of some sort. No relevant long-term hydrologic calibration data were available for the Solano County Permittee MS4 Area. Even if these data were available, the calibration process comes with several limitations related to the ambiguity of identifying optimal parameter sets (see Beven, 2001). Additionally, for several Bay Area communities, the MS4 area may be small relative to the contributing watershed that flows to a gauge. When the MS4 occupies only a small amount of the watershed, fitting a model to the flow response at the bottom of that watershed results in a parameterization that primarily reflects the non-MS4 area. Alternatively, translation of parameterizations from gauged to ungauged basins is a non-trivial task, that has prompted a decade of academic level study via the International Association of Hydrologic Sciences[21].

A key source of modeling uncertainty in this RAA is the characterization of pollutant concentrations on the basis of land-use. Since there is wide variation of PCB and mercury concentrations within

[21] https://iahs.info/pub/index.php

individual land uses it provides an imprecise way to estimate pollutant land surface concentrations. High model sensitivity to pollutant concentration parameters means that model predictions can diverge substantially if these parameters are specified differently (e.g. Park, et al, 2009). Land-use based pollutant concentrations used in this study were based on sampling work conducted by SFEI throughout the SF Bay Area (Wu et al, 2003, McKee et al 2003, McKee, et al, 2015), but this regional dataset may not be representative of the land use pollutant relationships in Solano County, particularly since recent sampling efforts do not include sites in the north side of Suisun Bay (McKee et al. 2015). Representativeness of these data have been acknowledged as a potential source of uncertainty by McKee et al., 2015.

Finally, the structure of the RAA reporting provides some limitations to the interpretation of GSI benefits. Land use changes associated with redevelopment and GSI implementation often happen at the same time. Since land use changes have such a dramatic effect on modeled outputs, and land use changes are lumped in with the GSI reduction estimates, land use changes dominate the calculated GSI reductions. Actual GSI implementation provides a much smaller role in estimated pollutant load reductions once the land use has been changed to one that has characteristically low associated pollutant concentrations. The reality is probably a much less dramatic split between land use change and GSI implementation. An unintended consequence may be that parcels classified as high pollutant concentration land uses may be disproportionately selected for redevelopment even when other factors may weigh in favor of other parcels.

5.3 Recommendations for Ongoing Compliance

Meeting MRP pollutant load reduction targets will require ongoing tracking of BMP implementation and quantification of pollutant load reductions. RAA is a valuable initial step, but it will soon be just another report sitting on a shelf, rather than a tool to direct actions. Implementation will occur over a period of decades and in that time we will learn more than we know now. New BMPs will be created, knowledge of pollutant removal efficiency will grow, and the resources of cities and their priorities will shift. A more dynamic approach to quantifying benefits that can incorporate new information as it becomes available and provide outputs at scales and in formats that are relevant to stormwater managers will be needed. As an alternative to one-off modeling studies, such an approach can provide an iterative verification of progress, reducing risk of failure and tempering expectations of success.

As the capacity of cities grows to provide quantitative estimates of reductions, regulators should consider the value of becoming more flexible on prescriptive requirements to deliver other information that is comparatively less essential. Updatable modeling approaches that focus on the most critical information needs of both stormwater managers and regulators can probably provide more useful information than excessive prescriptive reporting requirements. Such focus will become more important as cities begin to require tracking not hundreds, but thousands of BMPs and GSI projects as implementation proceeds over the coming decades. At the same time, cities will need to

move towards a more efficient programs with the capacity to demonstrate compelling evidence of success. To do that, they will need access to the right tools and a strong vision from regulators that helps permittees focus their efforts on the greatest pollutant load reduction opportunities.

The RAA modeling study has clarified a number of recommendations to improve ongoing tracking and verification of pollutant reductions:

1. **Solano permittees should adopt a comprehensive data management approach to track implementation of GSI, such as outlined in the GSI Workplan.** This will help them provide ongoing verification to regulators that the estimates contained in this modeling report are proceeding as planned and avoid accounting errors.

2. **Integrate implementation tracking with a stormwater modeling tool.** This will create efficiencies for ongoing PCB and mercury load reduction quantification as implementation proceeds and also provide ongoing support for heuristic management scenarios to optimize implementation locations and BMP types. It will also serve as a key technical node for integration of GIS datasets relevant to stormwater reporting that are currently stored in disparate manner that makes reporting inefficient.

3. **Use the spatial prioritization approach to identify additional GSI implementation opportunities.** The GIS-based approach developed as part of this study and the GSI Workplan can be used to evaluate high priority areas within privately owned areas already planned for redevelopment or within the public right of way via synergistic implementation opportunities with Caltrans.

4. **Continue to coordinate with BASMAA for quantifying source reduction control measure quantification.** The methods employed should be closely integrated with GSI reduction quantification to ensure that overall WLA accounting is coherent.

5. **Work with regulators to craft requirements for MRP3 that are focused on outcomes and reporting efficiencies.** Negotiations with regional board staff via the BASMAA MRP3 Workgroup should endeavor to reduce reporting requirements for non-essential information that overlaps with performance-based requirements whenever appropriate.

These recommendations are intended to help the Solano Permittees be efficient in demonstrating MRP compliance progress and to help them craft permit requirements and implementation strategies that are conducive to their own community development goals

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Appendix A

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Appendix B

BMP type definitions used in swTELR

CENTRALIZED BMPS – TYPICALLY PUBLICLY OWNED & MAINTAINED BMPS, TREATING A LARGE (>20 ACRES) URBAN DRAINAGE WITH MULTIPLE LAND USES AND OWNERSHIP			
STRUCTURAL BMP TYPE	**OTHER NAMES**	**DESCRIPTION**	**TREATMENT PROCESSES**
Bed Filter	*Underground Sand Filter* *Surface Sand Filter* *Perimeter Sand Filter* *Organic Media Filter*	A flow-through structure that uses granular media (e.g. sand or activated alumina) to actively filter stormwater to remove stormwater pollutants. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	MEDIA FILTRATION
Detention Basin	*Detention Pond (impervious)* *Dry Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin, though generally these BMPs do not allow for adequate settling. Little to no volume loss via infiltration due to impervious or highly impermeable base. Vegetation may or may not be present. If treating a smaller area (<20 impervious acres), it is likely a **settling basin**.	PARTICLE CAPTURE

Structural BMP Type	Other Names	Description	Treatment Processes
Dry Basin	*Extended Detention Basin* *Dry Pond* *Pervious Detention Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin. Footprint is pervious and infiltration capacity of base maintained to consistently infiltrate some fraction of volumes detained to unsaturated zone. Wetland and riparian vegetation species distribution is minimal to absent. Moderate distribution of grass and/or tree species likely and acceptable. If treating a smaller area (<20 impervious acres), it is likely a **bioretention**.	INFILTRATION PARTICLE CAPTURE
Infiltration Basin	*Large-Scale Infiltration Feature*	A flow-through BMP with highly permeable substrate (aggregate or rock) designed to store and infiltrate significant volumes of stormwater into unsaturated zone. Little to no surface detainment storage. Vegetation distribution should be minimal and preferably absent. May be confined space but not usually. If treating a smaller area (<20 impervious acres), it is likely an **infiltration feature**.	INFILTRATION
Media Filter	*Proprietary Subsurface Filtration Systems:* *Stormfilter®* *Perk Filter™* *Jellyfish®*	A proprietary subsurface flow-through structure that uses a membrane or other media to actively filter stormwater to remove stormwater pollutants. Proprietary models include media or membranes that may be selected to target the specific removal of the pollutants of concern, resulting in downgradient stormwater concentration reductions. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs.	MEDIA FILTRATION

		May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	
Treatment Vault	*Hydrodynamic Separator (e.g. Vortechs, CDS®, DVS)* *Wet Vault* *Detention Vault* *Flow Separation Vault* *Gross Solids Retention Devices* *Large Scale Settling Basins*	A subsurface flow-through structure that physically separates sediment, trash, leaf litter, debris and other particulate pollutants from stormwater via various separation or settling techniques. No volume reduction occurs due to impervious base. May be confined space but not always. Accumulation of material at base of BMP can be observed and measured via manhole access. If no access points exist, the BMP can be inventoried as Confined Space and assessed based on a set maintenance interval. If treating a smaller area (<20 impervious acres), it is likely a **sediment trap**.	PARTICLE CAPTURE

Wet Basin	*Wet Pond* *Retention Pond* *Wetland Swale* *Wet Extended Retention Pond* *Stormwater Wetlands* *Constructed Wetlands*	A flow-through basin with discrete inlets and outlets designed to retain some volume stormwater runoff in a persistent pool of surface water. Designs may include additional detainment storage of stormwater for some minimum time to reduce peak flows. Wet pool capacity, treatment capacity and draw down time of treated volumes will vary across specific BMPs. One or more outflow offices may exist at different elevations. Lowest outlet elevation sets wet pool capacity. Dense vegetation is common. Dominant vegetation is wetland species and can be supplemented with riparian species with very high densities. Substrate is typically fine organic matter and silt, making volume reductions via infiltration negligible. Volume reductions, if any, occur primarily by evapotranspiration. If treating a smaller area (<20 impervious acres), it is likely a **biofiltration**.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

DECENTRALIZED BMPS – TYPICALLY TREATING < 1 ACRE OF IMPERVIOUS AREA BUT UP TO 20 ACRES, TYPICALLY ACCEPTS RUNOFF FROM A SINGLE LAND USE DRAINAGE AREA, ASSOCIATED WITH NEW / RE-DEVELOPMENT AND ROADSIDE PROJECTS,

STRUCTURAL BMP TYPE	OTHER NAMES	DESCRIPTION	TREATMENT PROCESSES
Bio-filtration	*Lined rain garden with no infiltration* *Urban Biofilter* *Tree Box Biofilter (TreePod, Filterra)*	A vegetated BMP where stormwater is filtered through a specialized soil media and discharged via an underdrain. BMP may be lined with membrane or concrete. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Site designed biofiltration systems use specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Proprietary designs vary and may or may be confined space and difficult to access for inspection.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

		If treating a larger area (>20 impervious acres), it is likely a **wet basin**.	
Bio-retention	*Biofilter* *Rain garden with infiltration* *Self-Retaining Areas*	A vegetated retention structure where the base of the BMP is not lined and must infiltrate volumes and allow infiltration to unsaturated zone. Designs may or may not include an underdrain. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Outlet design either passive surface outlet (e.g., curb cut) or piped overflow (e.g., overflow inlet and underdrain) used to allow retention and ponding. Constructed with specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Typically includes rock or aggregate subsurface reservoir under the soil media to enhance storage/infiltration. Designs may include settling forebay at inlet(s) to remove sediment. Vegetation types include species that can tolerate stormwater ponding and drought conditions. If treating a larger area (>20 impervious acres), it is likely a **dry basin**.	INFILTRATION BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

Structural BMP Type	Other Names	Description	Treatment Processes
Bioswale	*Grass Swale* *Grass Filter Strips* *Vegetated Buffer Strips* *Bioslopes*	A flow-through area with dense vegetation coverage (>80%). Flow surface topography allows inundation of adjacent vegetated areas during storm runoff. Design includes gentle sloped flow paths and dense vegetation to promote primary stormwater surface filtration, adsorption to vegetation and settling. Biological processes include geochemical transformation and plant uptake. Infiltration performance and volume reductions may vary. These are not highly engineered systems. Size and application of bioswales can vary.	BIO-GEOCHEMICAL CYCLING INFILTRATION
Filtration Device	*Filtration Device* *Proprietary Inserts* *Catch Basin Inserts* *Drain inserts* *Inlet filters* *Decentralized Media Filter*	A proprietary flow-through structure that uses a membrane or other media to actively filter stormwater to target the specific removal of stormwater pollutants of concern, resulting in downgradient stormwater concentration reductions. Design may include the installation of an insert within the sediment trap or drop inlet structure to treat various pollutants. Examples include REM Triton Filter, CULTEC StormFilter, FlexStorm Inlet Filters, Kristar FloGard, etc. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a larger area (>20 impervious acres), it is likely a **media filter**.	MEDIA FILTRATION
Infiltration Feature	*Infiltration Trench* *Dry Well* *Exfiltration Trench* *Percolation Trench* *French Drain* *Roof Drip-Line*	A small-scale structure designed to retain stormwater from small impervious drainage area and infiltrate into unsaturated zone. Land surface modified to sustain maximum infiltration rates, typically consisting of vertical excavation of native soils and filling with coarse drain rock or other highly permeable material. Vegetation is absent. May be confined space but not usually. If treating a larger area (>20 impervious acres), it is likely an **infiltration basin**.	INFILTRATION

Structural BMP Type	Other Names	Description	Treatment Processes
Pervious Pavement	*Permeable Pavement* *Porous Asphalt* *Pervious Concrete* *Porous Aggregate* *Pervious Pavers* *Permeable Pavers*	Use of sustainable materials to create a durable, pervious surface overlaying a crushed stone base that allow stormwater to percolate and infiltrate into the underlying soil. Porous pavement can include an underlying reservoir to increase infiltration rates. Footprint of structural BMP type can vary greatly, typically used for parking lots, sidewalks, driveways or other hardscaped surfaces. When stormwater is routed to pervious pavement for treatment through infiltration, the pervious pavement is considered a structural BMP and should be inventoried in BMP RAM. When pervious pavement is solely treating the precipitation falling on the pavement, it is considered part of LID design and should be included in Parcel RAM condition observations.	INFILTRATION
Sediment Trap	*Catch Basin with sump,* *Sediment Chamber,* *Vertical CMP,* *Small Hydrodynamic Separators,* *Bubble Up*	A small decentralized BMP designed to capture and retain sediment, leaf litter, trash, coarse particles and/or other stormwater pollutants. Capture of material may occur through variable flow modifications or passive settling, but result is vertical accumulation of material at base of BMP reservoir with regular material cleanout required. Minimal to no stormwater volume reduction occurs. Water quality improvement downgradient expected as result of concentration reduction due to material capture within BMP. May be confined space but not always. Typically accepts runoff from road or a parking lot. If treating a larger area (>20 impervious acres), it is likely a **treatment vault**.	PARTICLE CAPTURE
Settling Basin	*Settling Pond,* *Sediment Basin* *Decant Pond* *Concrete Forebay* *Forebay*	Open flow-through structures used to detain stormwater volumes and settle particulate pollutants prior to outflow. Pollutant load reductions are realized by concentration reductions with no volume reduction via infiltration due to impervious or highly impermeable base. May be confined space but not usually. Size and application of settling basins can vary: • Large scale settling basin draining a mixed land use area can be classified and assessed as a **treatment vault.** • Smaller sized settling basins draining a single land use area can be classified and assessed as a **sediment trap**. • If treating a larger area (>20 impervious acres), it is likely a **detention basin**.	PARTICLE CAPTURE

Appendix C

Catchment attributes and routing.

Catchment ID	Area (acres)	Discharge Point Type	Receiving Water	Terminal Catchment	Connectivity (%)	Impervious (%)	Primary Soil Group	Average Slope
Vallejo								
DT5	62.6	Discrete	Mare Island Strait	DT6	100	76.9	D	5.2
LC13	70.7	Distributed	Blue Rock Springs Creek		100	42.1	D	4.4
GC8	104.4	Distributed	Carquinez Strait		100	28.1	C	19.7
LC43	59.6	Discrete	Napa River	LC44	100	47.2	D	6.3
SA41	35.8	Distributed	Mare Island Strait	SA55	100	66.8	C	1
SP9	30.6	Distributed	White Slough		100	57.5	D	0.9
WC4	31	Discrete	American Canyon Creek	WC7	100	13.4	D	22.1
LC15B	34.7	Distributed	Rindler Creek		100	64	C	3.6
MI24	41	Distributed	Mare Island Strait		100	59.8	C	1.5
DT4	39.4	Distributed	Mare Island Strait		100	73.1	D	4.2
LC17	67.7	Discrete	Rindler Creek	LC19B	100	33.6	D	31.5
MI11	22.7	Distributed	Napa River		100	58.9	D	15.5
SA19	50.4	Discrete	Mare Island Strait	SA55	100	60.6	C	6.2
SA51	57.8	Discrete	Mare Island Strait	SA55	100	65.6	C	2.1
LC59	130.9	Distributed	Sulphur Springs Creek		100	0.1	A	24.8
SP14	30.2	Distributed	Napa River		100	54.1	C	1.5
CP13	51.1	Distributed	Southhampton Bay		100	0	D	26.5
MI23	206.3	Distributed	Napa River		100	60.8	D	0.4
LC19B	41.1	Discrete	Rindler Creek	LC19B	100	73.7	D	19.1
AC27B	10.6	Distributed	Napa River	AC5	100	56.9	C	6.1
SP5B	102.1	Distributed	San Pablo Bay		100	48	C	4.2
AC14	55.8	Distributed	Napa River	AC5	100	71.3	C	1.3
AC15	23.1	Discrete	Napa River	AC5	100	72.3	C	0.5
AC16	48	Distributed	Napa River	AC5	100	52.7	D	7.2
AC17	29.5	Discrete	Napa River	AC5	100	52.1	D	9.1
AC18	65.4	Discrete	Napa River	AC5	100	55.3	C	5.4
AC20	54.6	Discrete	Napa River	AC5	100	71	C	1.1
AC31	31.2	Discrete	White Slough	AC31	100	70.7	C	1.7
AC21	51.4	Discrete	White Slough	AC31	100	62.7	D	9.6
DT3	37	Discrete	Mare Island Strait		100	68.9	D	4.9
CP11	97.4	Distributed	Southhampton Bay	CP12	100	3.2	C	17.2
LS18	25.6	Distributed	Lake Dalwigk	LS31	100	71.7	C	4.6
SA3	25.8	Distributed	Mare Island Strait	SA55	100	51.5	C	3.5
SA56	24.1	Discrete	Mare Island Strait	SA55	100	71.2	D	6.1
AC10B	47.6	Discrete	Napa River		100	68.5	D	6.4
DT6	16.2	Discrete	Mare Island Strait	DT6	100	59.1	D	1.5
DT7	42.1	Discrete	Mare Island Strait		100	60.1	D	9.6
SA25	20.4	Distributed	Mare Island Strait		100	60.8	C	0.8
GC1A	99.7	Discrete	Carquinez Strait		100	40.6	D	25.7
GC10	79.5	Distributed	Carquinez Strait		100	28.3	D	16.8
GC11	48.9	Discrete	Carquinez Strait	GC4A	100	46.4	D	14.9
GC12	47.7	Distributed	Carquinez Strait		100	54.9	D	20.9
LC58	17.2	Discrete	Rindler Creek	LC20B	100	76.2	D	17.3
AC41	52.9	Discrete	Napa River	AC5	100	71.1	D	0.3
LC4B	61.3	Distributed	Blue Rock Springs Creek		100	54.2	D	12.6
LC37B	54	Distributed	Lake Chabot		100	72.9	D	8.6

GC1B	77.8	Discrete	Carquinez Strait	GC1C	100	48.8	D	17.1
GC1C	51	Discrete	Carquinez Strait	GC1C	100	58.4	D	19.3
LC20B	102.7	Discrete	Rindler Creek	LC20B	100	57.8	D	13.9
CP4B	94.1	Discrete	Southhampton Bay	CP5	100	25.1	D	21.8
SA14	31.2	Discrete	Mare Island Strait	SA55	100	66.5	C	1.3
SA16	42.9	Discrete	Mare Island Strait	SA55	100	63.7	D	16.4
LS7	34.6	Distributed	Mare Island Strait		100	56	D	16.2
LS8	66.5	Distributed	Mare Island Strait		100	55.4	D	13
MI10	35.7	Distributed	Mare Island Strait		100	28	D	26.8
SA50	45.9	Discrete	Mare Island Strait	SA55	100	68.6	C	1.5
SA52	25.5	Discrete	Mare Island Strait	SA55	100	72.5	C	1.9
SA53	27.7	Distributed	Mare Island Strait		100	69.5	D	6.2
SA54	31.5	Distributed	Mare Island Strait		100	71.7	D	5.3
SA55	42.3	Discrete	Mare Island Strait	SA55	100	72.2	C	1.8
SA59	30.2	Discrete	Mare Island Strait	SA55	100	77.9	C	1.3
SA62	33.9	Discrete	Mare Island Strait	SA55	100	55.6	D	16.1
SA63	28.4	Distributed	Mare Island Strait		100	71.5	C	1
SA64	21.3	Discrete	Mare Island Strait		100	73.7	C	0.8
SA7	36	Distributed	Mare Island Strait		100	62.1	D	14.5
SA8	45.8	Discrete	Mare Island Strait	SA55	100	57.5	D	10.5
AC53	51.6	Distributed	White Slough		100	79.9	D	0.4
AC36	27.8	Distributed	Napa River		100	57.9	D	12.6
AC37	24	Distributed	Napa River	AC5	100	71.9	C	2.6
AC38	28.2	Distributed	Napa River	AC5	100	57.7	C	1.9
AC39	35.5	Discrete	Napa River	AC5	100	53.1	D	14
AC5	42.9	Discrete	Napa River	AC5	100	34.3	D	0.9
AC55	23.3	Discrete	Napa River	AC5	100	67.4	C	0.7
AC7	61.4	Discrete	Napa River	AC5	100	69.2	C	1.2
MI20	51.4	Distributed	Mare Island Strait		100	44.6	C	3.7
DT11	26.6	Discrete	Mare Island Strait	DT11	100	62.9	D	6.9
AC50	70.9	Distributed	White Slough	AC51	100	78.6	D	0.4
AC51	15.6	Discrete	White Slough	AC51	100	86.2	D	0.5
AC52	21.1	Distributed	Napa River	AC5	100	67.6	D	0.5
DT2	23	Discrete	Mare Island Strait	DT2	100	74.8	D	1.6
AC13	46.2	Distributed	Napa River	AC5	100	61.3	C	2
AC1	26.7	Discrete	Mare Island Strait	SA55	100	67.8	C	1
AC10A	70.3	Discrete	Napa River	AC5	100	66.9	C	4
AC12	53.7	Distributed	Napa River	AC5	100	75.5	D	4.5
AC22	75.9	Discrete	White Slough	AC31	100	63.1	D	9.3
AC23	27.6	Distributed	White Slough	AC31	100	58.1	D	9.3
AC24	47.6	Distributed	Napa River		100	61.9	D	5.4
AC25	45.9	Distributed	Napa River		100	55.1	D	8.6
AC26	85	Discrete	Napa River		100	61.8	D	8.6
AC27A	56.8	Discrete	Napa River	AC5	100	67.6	C	2.7
AC28	63.3	Discrete	White Slough	AC31	100	60.7	D	11.2
AC29	72.7	Discrete	White Slough	AC31	100	64.8	D	11.6
AC3	47.8	Discrete	Mare Island Strait	SA55	100	64.2	C	1.3
AC30	63	Discrete	White Slough	AC31	100	59.1	C	4.9
AC32	60.8	Discrete	White Slough	AC31	100	67.8	C	2.7
AC34	59.7	Distributed	White Slough	AC31	100	70.4	C	4.7
AC35	52.8	Distributed	Napa River	AC5	100	80.6	C	0.4
AC40	66.6	Distributed	Napa River	AC5	100	39.4	D	9.7
AC42	45.9	Distributed	Napa River		100	50.4	D	9.9
AC44	42	Distributed	Napa River	AC5	100	36	D	3.6
AC8	78.7	Distributed	Napa River	AC5	100	59.7	C	1.7

AC45	48	Discrete	Napa River	AC5	100	57.5	D	2.5
AC46	49	Distributed	White Slough		100	79.2	D	1
AC47	38.8	Discrete	White Slough	AC31	100	58.4	C	0.8
AC48A	148.3	Distributed	White Slough		100	15.9	D	0.4
CP1	124.4	Discrete	Southhampton Bay		100	38.2	D	20.2
CP10	85.8	Discrete	Southhampton Bay	CP12	100	42.8	D	13.2
CP12	125.7	Discrete	Southhampton Bay	CP12	100	43.6	D	11.2
CP2	41.3	Distributed	Southhampton Bay		100	56.1	D	11.8
CP3	65.3	Distributed	Southhampton Bay	CP12	100	45.6	D	17.1
CP4A	70.4	Discrete	Southhampton Bay	CP5	100	41	D	20.6
DT12	67.8	Discrete	Mare Island Strait	DT11	100	69.3	D	4.8
CP5	76	Discrete	Southhampton Bay	CP5	100	55	D	15
CP7	64.6	Distributed	Southhampton Bay	CP5	100	15.3	D	16.9
CP8	66.7	Discrete	Southhampton Bay	CP5	100	18.3	D	15.9
CP9	63.4	Discrete	Southhampton Bay	CP12	100	57	D	12.6
DT1	46	Discrete	Mare Island Strait	DT2	100	74.6	D	9.5
GC2A	84	Discrete	Carquinez Strait		100	57.7	D	13.5
GC3	87.2	Discrete	Carquinez Strait	GC1C	100	35.2	D	24.1
GC4A	95.3	Discrete	Carquinez Strait	GC4A	100	42.2	D	17.5
GC6	55.8	Discrete	Carquinez Strait		100	36.6	C	18
GC7	36.5	Distributed	Carquinez Strait	GC4A	100	2.5	C	26.8
LC12A	81	Discrete	Rindler Creek		100	61.9	D	10.4
LC1A	199.9	Distributed	Blue Rock Springs Creek		100	8.7	D	18.2
LC10	25.4	Distributed	Rindler Creek		100	62.5	D	5.5
LC11	23.7	Distributed	Rindler Creek		100	70.2	C	7.2
LC18	200.8	Distributed	Rindler Creek		100	1.7	A	27.4
LC19A	121.3	Distributed	Rindler Creek		100	3.5	D	26.9
LC20A	105.8	Distributed	Rindler Creek		100	4.7	D	22.9
LC21	249.9	Distributed	Rindler Creek		100	11.2	D	20.7
LC22	98.9	Distributed	American Canyon Creek		100	1.3	D	22.3
LC24	113.7	Distributed	American Canyon Creek		100	35.7	D	16.7
LC26A	108.4	Discrete	Blue Rock Springs Creek	LC34A	100	49.6	D	18.8
LC35	19.8	Discrete	Lake Chabot	LC34	100	63.6	D	4.6
LC36	62.3	Discrete	Rindler Creek		100	63.1	D	17.1
LC27	144.7	Distributed	Lake Chabot		100	47.8	C	2.1
LC3A	61.8	Discrete	Blue Rock Springs Creek	LC34A	100	57.5	D	16
LC31	85.8	Discrete	Lake Chabot	LC34	100	59.7	D	12.3
LC32	46.9	Discrete	Lake Chabot	LC34	100	66.5	C	10.7
LC33	29.3	Discrete	Lake Chabot	LC34	100	60.8	C	4.4
LC34	54.2	Discrete	Lake Chabot	LC34	100	60.3	C	3.2
LC44	90.2	Distributed	Napa River	LC44	100	57.5	C	3
LC45	53.4	Discrete	Napa River	LC44	100	65.9	D	5.8
LC56	38.3	Discrete	Blue Rock Springs Creek	LC50	100	80.9	D	16.1
LC46	83.3	Distributed	White Slough	LC38	100	60.2	D	14
LC47	54	Discrete	White Slough	LC38	100	73.9	C	1.2
LC48	33	Discrete	Rindler Creek	LC19B	100	75.5	D	20.3
LC49	31.7	Discrete	Rindler Creek	LC19B	100	71.4	D	14.7
LC5	50.5	Distributed	Blue Rock Springs Creek		100	57.6	D	14.2
LC50	53.5	Discrete	Blue Rock Springs Creek	LC50	100	77.2	D	19.3
LC51	38.9	Discrete	Blue Rock Springs Creek	LC51	100	82	D	20.5
LC52	34.3	Discrete	Blue Rock Springs Creek	LC51	100	74.1	D	20.1
LC6	86.1	Distributed	Blue Rock Springs Creek		100	42.4	D	17.5
LC8	32.4	Distributed	Blue Rock Springs Creek		100	76.8	C	3.6
LS1	66.6	Discrete	Mare Island Strait		100	55.2	D	14.4
LS10	57.5	Discrete	Mare Island Strait		100	66.6	D	6.5

LS11	30.6	Discrete	Lake Dalwigk		100	51	D	9.1
LS12	24.2	Discrete	Lake Dalwigk		100	47.4	D	12.9
LS13	41.1	Discrete	Lake Dalwigk	LS31	100	51.8	D	11.2
LS14	52.1	Discrete	Lake Dalwigk	LS31	100	44	D	10
LS15	35.3	Discrete	Lake Dalwigk	LS31	100	44.6	D	12.2
LS16	39.1	Discrete	Lake Dalwigk	LS31	100	59.1	D	7
LS23	97.5	Distributed	Lake Dalwigk	LS31	100	44.1	D	5.6
MI12	23.5	Discrete	Mare Island Strait	DT11	100	63.3	D	11
LS19	70.6	Distributed	Carquinez Strait		100	56.9	D	11.7
LS20	55.6	Distributed	Lake Dalwigk	LS31	100	38.8	D	8.4
LS21	50.6	Discrete	Lake Dalwigk	LS31	100	53.3	D	8.1
LS22	85.8	Discrete	Lake Dalwigk	LS31	100	49	D	8
LS24	42.4	Distributed	Lake Dalwigk	LS31	100	55	D	6.7
LS25	34.2	Discrete	Lake Dalwigk	LS31	100	61.4	D	6.6
LS26	53.8	Discrete	Lake Dalwigk	LS31	100	57.1	D	5.8
LS27	38.8	Distributed	Lake Dalwigk	LS31	100	58.3	D	6
LS29	34.7	Distributed	Lake Dalwigk	LS31	100	70	C	3.8
LS3	37.7	Discrete	Mare Island Strait		100	61.4	D	9.8
LS4	45.4	Distributed	Mare Island Strait		100	55.3	D	6.2
LS30	64.7	Distributed	Lake Dalwigk	LS31	100	71.7	C	1.7
LS31	24.5	Discrete	Lake Dalwigk	LS31	100	72.1	C	2.6
LS32	18.5	Distributed	Lake Dalwigk	LS31	100	52.4	D	9.2
LS33	79.4	Discrete	Lake Dalwigk		100	65.2	C	2.9
LS34	21.7	Distributed	Mare Island Strait		100	70.1	D	5
LS36	59.4	Distributed	Lake Dalwigk		100	40.5	C	3.3
LS37	35.5	Distributed	Mare Island Strait		100	66.6	C	1.2
SA13	29.5	Discrete	Mare Island Strait	SA55	100	64.9	C	1.9
MI4	26.7	Discrete	Mare Island Strait	MI4	100	45.8	D	18.6
MI17	50.5	Distributed	Napa River		100	52.1	D	14.6
MI13	20.5	Distributed	Napa River		100	49.4	D	16.8
MI15	47.6	Distributed	Napa River		100	57.2	D	7.7
MI16	47.1	Distributed	Napa River		100	49.7	D	4
MI18	37.9	Discrete	Mare Island Strait	MI18	100	31	D	4.7
MI2	29.5	Distributed	Mare Island Strait		100	32.9	D	24.1
MI3	75.3	Discrete	Mare Island Strait	MI4	100	44.4	D	22.3
SA18	20.5	Discrete	Mare Island Strait	SA55	100	68.4	C	6.4
MI6	76.9	Discrete	Mare Island Strait		100	52.3	D	12.7
MI7	76.7	Discrete	Mare Island Strait	MI18	100	60.6	D	8.5
MI8	68.2	Discrete	Mare Island Strait		100	68.4	C	2.7
SA10	67.2	Discrete	Mare Island Strait	SA55	100	39.3	D	15
SA11	26.2	Discrete	Mare Island Strait	SA55	100	53.5	D	12.3
SA12	46.6	Discrete	Mare Island Strait	SA55	100	61.4	C	3.8
SA17	68.7	Discrete	Mare Island Strait	SA55	100	57.1	D	17.5
SA2	53.4	Discrete	Mare Island Strait	SA55	100	41.8	D	12.1
SA21	52.2	Discrete	Mare Island Strait	SA55	100	55.4	D	11.9
SA22	90.9	Discrete	Mare Island Strait	SA55	100	48.4	D	12.5
SA23	31	Distributed	Mare Island Strait	SA55	100	53.1	C	2.5
SA24	37	Distributed	Mare Island Strait	SA55	100	52.9	C	5.3
SA26	56.8	Distributed	Mare Island Strait	SA55	100	54.1	C	4.9
SA27	47	Discrete	Mare Island Strait	SA55	100	51.9	D	5.6
SA29	58.7	Discrete	Mare Island Strait	SA55	100	61.2	C	1.1
SA31	48.4	Discrete	Mare Island Strait	SA55	100	70.5	C	1
SA32	41.9	Discrete	Mare Island Strait	SA55	100	63.7	C	3.5
SA37	59.1	Discrete	Mare Island Strait	SA55	100	56.6	D	11.7
SA38	30.3	Discrete	Mare Island Strait	SA55	100	58.2	C	5.7

SA39	70.1	Distributed	Mare Island Strait	SA55	100	60.2	D	13.2
SA4	22.9	Distributed	Mare Island Strait	SA55	100	59.1	C	2.3
SA40	34.4	Distributed	Mare Island Strait	SA55	100	71.7	C	6.5
SA42	65.1	Distributed	Mare Island Strait	SA55	100	57	C	1.4
SA43	36.6	Discrete	Mare Island Strait	SA55	100	57.6	D	6
SA44	43.4	Discrete	Mare Island Strait	SA55	100	45.4	D	4.4
SA6	29.6	Discrete	Mare Island Strait	SA55	100	64	C	2.2
SA45	37.1	Distributed	Mare Island Strait	SA55	100	47.7	D	4.5
SA46	50.3	Distributed	Mare Island Strait	SA55	100	59.3	D	4.4
SA48	14.6	Discrete	Mare Island Strait	SA55	100	70.8	C	0.8
SA49	51.9	Discrete	Mare Island Strait	SA55	100	51.7	C	1.2
SA5	62.1	Distributed	Mare Island Strait	SA55	100	61.1	C	5.1
SA9	73.6	Discrete	Mare Island Strait	SA55	100	55.8	D	8
SP1A	54.8	Discrete	Napa River		100	37.1	D	7
SP11	48.1	Distributed	Napa River		100	71.7	C	1.5
SP12	53.6	Distributed	Napa River		100	71.6	C	0.6
SP13	84.8	Distributed	Napa River		100	63.8	C	0.9
SP2A	73.8	Distributed	Napa River	SP7	100	33.4	D	1.4
SP3A	29.5	Discrete	Napa River	SP7	100	42.4	C	0.6
SP5A	78.2	Discrete	Napa River	SP7	100	48	C	0.6
SP6A	78.1	Discrete	Napa River	SP7	100	20.8	D	1.2
SP7	58.7	Discrete	Napa River	SP7	100	63.6	C	0.7
SV1A	247.6	Distributed	Sulphur Springs Creek		100	11.6	A	19
SWANZY	20.4	Distributed	Mare Island Strait		100	53.4	D	13.5
WC1	49.3	Discrete	American Canyon Creek	WC7	100	61.6	D	7.4
GC13	79.5	Distributed	Carquinez Strait		100	4.1	C	20.1
WC2	29.1	Discrete	American Canyon Creek	WC7	100	60.6	D	4.5
WC3	50.9	Discrete	American Canyon Creek	WC7	100	36.2	D	14.2
WC5	52.4	Distributed	American Canyon Creek		100	1.3	D	21
SV4	142.1	Distributed	Sulphur Springs Creek		100	0	A	26.1
WC6	101.1	Distributed	American Canyon Creek	WC7	100	54.6	C	7.4
WC8	51.2	Distributed	American Canyon Creek	WC7	100	0.7	D	26.4
SV3	310.4	Distributed	Sulphur Springs Creek		100	0	A	26.6
SP6B	395.8	Distributed	San Pablo Bay		100	20.8	D	10.6
AC56	213.2	Distributed	White Slough		100	6.7	D	0.3
SP15	93.5	Distributed	Napa River		100	12.9	D	0.6
MI22	105.5	Distributed	Napa River		100	39	C	1.2
LC63	163.5	Distributed	Rindler Creek		100	1.4	D	20.4
SP16	140.4	Distributed	Napa River		100	7.8	D	0.7
LC60	273.7	Distributed	Sulphur Springs Creek		100	0	A	23
MI25	51.3	Distributed	Mare Island Strait		100	61	C	2.1
MI26	195.7	Distributed	Mare Island Strait		100	70.1	D	2.3
SV2C	271.7	Distributed	Sulphur Springs Creek		100	1.9	A	25.5
SV2A	75	Discrete	Sulphur Springs Creek		100	24.3	C	14.6
SV2D	50.4	Distributed	Sulphur Springs Creek		100	17.1	C	19.2
SV1B	255.7	Distributed	Sulphur Springs Creek		100	11.5	A	20.2
SV1C	83.9	Distributed	Sulphur Springs Creek		100	16.9	A	19.7
LC1B	135.9	Distributed	Blue Rock Springs Creek		100	9.7	D	16.6
LC1C	119.4	Distributed	Blue Rock Springs Creek		100	19	D	10.4
LC61	66	Distributed	American Canyon Creek		100	2.4	C	27.5
LC62	109.1	Distributed	American Canyon Creek		100	0	A	23.1
AC48B	137.9	Distributed	White Slough		100	6.1	D	0.3
CP4C	31.9	Distributed	Southhampton Bay	CP5	100	47.8	D	21.1
GC4B	79.6	Distributed	Carquinez Strait		100	48.6	D	14.5
LC26B	63	Discrete	Blue Rock Springs Creek	LC34A	100	65.4	D	13.8

LC12B	79.5	Discrete	Rindler Creek		100	51.7	D	7.2
LC3B	35.8	Discrete	Blue Rock Springs Creek	LC34A	100	54.6	D	17.3
LC4C	52	Distributed	Blue Rock Springs Creek		100	45.3	D	20.8
GC2B	48.5	Discrete	Carquinez Strait		100	46.5	D	13.8
LC4D	48.4	Distributed	Blue Rock Springs Creek		100	47.4	D	16.9
SP1B	161	Distributed	San Pablo Bay		100	37.1	D	0.3
M121	275.7	Distributed	Mare Island Strait		100	30.4	D	11.7
SP3B	35.5	Distributed	San Pablo Bay		100	42.4	C	1.3
LC16	58.3	Discrete	Rindler Creek		100	76.8	D	13.3
LC14	46.7	Distributed	Rindler Creek		100	37	C	2
LC15A	109.5	Discrete	Rindler Creek		100	71.6	D	8
LC23	62	Distributed	American Canyon Creek		100	25.6	D	21.8
LC37A	189.6	Distributed	Lake Chabot		100	37	D	8.1
LC39	44.9	Distributed	Lake Chabot		100	71.2	D	12.2
LC4A	82	Distributed	Blue Rock Springs Creek		100	44.6	D	17.3
LC38	72.3	Discrete	White Slough	LC38	100	49.9	C	9.3
LC40	53	Distributed	Napa River	LC44	100	64.1	D	10.5
LC42	47.1	Distributed	Napa River	LC44	100	69	D	7.3
LC7	33.4	Distributed	Blue Rock Springs Creek		100	68.1	D	8.2
LS35	54.4	Distributed	Mare Island Strait		100	57.7	C	3.1
LC55	25	Discrete	Blue Rock Springs Creek		100	64.7	D	17.5
LC9	28.6	Distributed	Rindler Creek		100	69.4	D	13.7
MI5	35.4	Discrete	Mare Island Strait		100	47.2	D	20.5
SA1	20.1	Distributed	Mare Island Strait		100	47	D	9.7
SA35	56.4	Discrete	Mare Island Strait	SA55	100	60.7	C	1.6
SP10	21.1	Distributed	Napa River		100	56.8	C	1.1
MI27	166.8	Distributed	Napa River		100	79.3	D	1.1
LC3C	57.9	Discrete	Blue Rock Springs Creek	LC34A	100	42.6	D	22.7
DT10	23.9	Discrete	Mare Island Strait	DT11	100	63.1	D	6.6
GC5	55.5	Discrete	Carquinez Strait		100	41.4	C	14.9
SA15	30.6	Distributed	Mare Island Strait	SA55	100	65.7	C	1.5
SV2B	239.6	Distributed	Sulphur Springs Creek		100	15.5	A	18.7
WC7	56.5	Discrete	American Canyon Creek	WC7	100	43.9	C	7
SV2E	26.1	Distributed	Sulphur Springs Creek		100	5.6	D	10.9
SP4	73.2	Discrete	San Pablo Bay		100	36.6	D	1.1
SP2B	128	Distributed	San Pablo Bay		100	33.4	D	0.5
Fairfield								
JAM-1	50.8	distributed	Jameson Creek		100	28	C	5.1
AMER-1	107.6	discrete	American Canyon Creek		100	38.1	D	3.3
DAN-1	76.2	distributed	Dan Wilson Creek		100	45.2	D	1.3
ALZ-1	54.5	distributed	Alonzo Creek	ALZ-1	100	58.7	A	0.4
FREE-2	63.5	discrete	Freeborn Creek		100	55.6	A	2.3
AMER-3	81.9	discrete	American Canyon Creek		100	39.2	D	1.2
GRN-25	46.3	discrete	Green Valley Creek	GRN-11	100	47.4	D	9.6
GRN-26	51.4	distributed	Green Valley Creek		100	10	D	1
ALZ-4	31.5	distributed	Alonzo Creek		100	5.9	D	0.3
LED-7	45.7	discrete	Ledgewood Creek	LED-5	100	58.3	A	0.6
LED-4	47.8	discrete	Ledgewood Creek	LED-4	100	72.5	D	1
GRN-20	27.1	discrete	Green Valley Creek	GRN-21	100	33.4	D	13.3
AMER-5	122.2	distributed	American Canyon Creek		100	0.1	D	17.3
COY-22	94.5	distributed	McCoy Creek		100	69.2	A	0.6
ALZ-18	124.5	discrete	Alonzo Creek		100	43.5	D	13.1
COY-8	29.3	discrete	McCoy Creek	COY-3	100	54.8	D	1.2
COY-12	93.6	distributed	McCoy Creek		100	60.7	D	0.3
MAR-16	83.8	distributed	Marsh 1		100	0.4	D	0.5

LED-19	86.3	discrete	Ledgewood Creek	LED-22	100	11.8	A	20
COY-21	97.6	distributed	McCoy Creek		100	14.9	D	0.9
ALZ-29	39.7	distributed	Alonzo Creek		100	9.4	D	13.4
DAN-9	61	distributed	Dan Wilson Creek		100	18.4	C	4.6
COY-29	159.6	distributed	McCoy Creek		100	0.8	D	12.7
GRN-27	29.7	distributed	Green Valley Creek		100	51.5	A	1
JAM-6	76	distributed	Jameson Creek		100	1.2	C	17.3
SODA-34	54.3	distributed	Soda Springs Creek		100	59.7	C	3.2
UNI-5	354.9	distributed	Union Creek		100	1.6	D	4.4
COY-2	104.8	distributed	McCoy Creek		100	51.3	D	0.7
LED-1	80	discrete	Ledgewood Creek	LED-5	100	63.5	A	0.6
SODA-1	92.6	distributed	Soda Springs Creek		100	72.5	A	0.4
LAU-25	49.5	distributed	Laurel Creek	LED-23	100	51.9	D	5.8
AMER-4	37.6	distributed	American Canyon Creek		100	29.3	D	3.8
COY-3	46.4	discrete	McCoy Creek	COY-3	100	55.4	D	1.4
LED-2	103	discrete	Ledgewood Creek	LED-4	100	65.6	D	0.5
LAU-19	43.4	discrete	Laurel Creek		100	52.3	D	2.2
LAU-1	93.9	discrete	Laurel Creek	LED-23	100	54.9	D	0.8
SODA-2	80.1	discrete	Soda Springs Creek	SODA-25	100	55.7	A	0.8
COY-1	68.2	discrete	McCoy Creek	COY-3	100	56.1	D	1.2
LED-3	56.6	distributed	Ledgewood Creek	LED-22	100	28.2	A	16.6
LAU-2	75.4	discrete	Laurel Creek		100	24.9	C	5.6
COY-4	36	distributed	McCoy Creek		100	27.9	D	1.3
LAU-3	80.1	distributed	Laurel Creek		100	44.2	D	0.7
LAU-4	94.5	discrete	Laurel Creek		100	61.6	D	0.6
LAU-35	52.7	discrete	Laurel Creek	LED-23	100	57.8	A	0.7
ALZ-2	89.5	discrete	Alonzo Creek	ALZ-8	100	58.7	A	2.8
COY-20	72.8	distributed	McCoy Creek		100	18.8	C	2.1
LAU-5	108.5	discrete	Laurel Creek	LED-23	100	61.4	D	1
SODA-3	75.6	discrete	Soda Springs Creek	SODA-25	100	63.8	D	5.3
COY-5	125.4	distributed	McCoy Creek		100	1.2	D	0.7
LAU-6	106.7	distributed	Laurel Creek		100	60.1	D	1.2
SODA-4	88.7	distributed	Soda Springs Creek	LED-23	100	37.2	D	8.4
LAU-7	58.8	discrete	Laurel Creek		100	47.9	B	9.2
ALZ-3	111.5	discrete	Alonzo Creek		100	6.8	C	25.1
SODA-5	64.5	discrete	Soda Springs Creek		100	26.9	D	18.6
ALZ-23	42.3	discrete	Alonzo Creek		100	12	C	21.2
LAU-8	58.4	discrete	Laurel Creek		100	41.2	D	6
LAU-9	66.7	discrete	Laurel Creek		100	13.7	D	7.3
AMER-2	237.5	distributed	American Canyon Creek		100	0	D	25
GRN-1	110.7	distributed	Green Valley Creek		100	12.9	D	15.2
GRN-13	76.1	discrete	Green Valley Creek	GRN-11	100	57.8	A	1
GRN-2	70.3	distributed	Green Valley Creek		100	40.6	C	1.5
SODA-6	130	distributed	Soda Springs Creek		100	18.5	C	18.6
GRN-18	97.8	distributed	Green Valley Creek		100	0.2	D	32.5
GRN-6	46.6	discrete	Green Valley Creek	GRN-6	100	47	D	0.9
MAR-3	126.7	distributed	Marsh 1		100	39.2	D	0.6
SODA-7	50.8	distributed	Soda Springs Creek		100	34.2	A	3.5
FREE-1	128.3	discrete	Freeborn Creek		100	24	D	3.5
FREE-3	58.4	discrete	Freeborn Creek		100	36.7	D	6.8
FREE-4	43.2	discrete	Freeborn Creek		100	20.6	D	5.2
GRN-14	23.8	distributed	Green Valley Creek		100	13.5	D	13.7
ALZ-6	59	discrete	Alonzo Creek	ALZ-1	100	70.6	A	0.6
JAM-2	82.5	distributed	Jameson Creek	JAM-3	100	19.6	D	1.1
UNI-2	76.4	distributed	Union Creek		100	24.9	D	0.7

JAM-3	93.9	discrete	Jameson Creek	JAM-3	100	44.9	D	1.9
DAN-2	71.9	distributed	Dan Wilson Creek		100	53.2	C	1
GRN-3	90.8	distributed	Green Valley Creek		100	61.7	A	0.9
GRN-4	129.3	distributed	Green Valley Creek		100	53.9	D	1.2
GRN-5	49.4	discrete	Green Valley Creek	GRN-6	100	60	C	1.1
GRN-7	52.4	discrete	Green Valley Creek	GRN-6	100	57.5	A	2
GRN-8	29.3	discrete	Green Valley Creek	GRN-6	100	62.4	A	2.5
GRN-19	41.3	distributed	Green Valley Creek		100	34	D	16.6
GRN-9	53	distributed	Green Valley Creek		100	52	A	0.8
GRN-10	52.3	distributed	Green Valley Creek		100	46.3	A	0.6
GRN-11	28.9	discrete	Green Valley Creek	GRN-11	100	45.8	C	0.7
GRN-12	30.8	distributed	Green Valley Creek		100	39.4	A	0.1
GRN-15	54.1	discrete	Green Valley Creek		100	34.7	D	12.1
GRN-16	23.8	discrete	Green Valley Creek		100	33	D	11.6
GRN-17	35.6	distributed	Green Valley Creek		100	5.1	D	27.8
GRN-21	34.5	discrete	Green Valley Creek	GRN-21	100	22.2	D	20
DAN-3	61	discrete	Dan Wilson Creek		100	41.4	D	10.8
DAN-4	69.3	distributed	Dan Wilson Creek		100	53.6	D	0.9
GRN-22	36.7	distributed	Green Valley Creek		100	46.1	D	3.3
DAN-5	51.2	distributed	Dan Wilson Creek		100	26.5	C	1.2
GRN-23	50.8	discrete	Green Valley Creek		100	48.6	D	5.1
GRN-24	34	discrete	Green Valley Creek		100	46.5	D	9.5
LED-5	94.7	discrete	Ledgewood Creek	LED-5	100	40.2	D	0.5
LED-6	39.4	distributed	Ledgewood Creek		100	64.2	A	0.6
COY-17	83.5	discrete	McCoy Creek		100	52.1	D	0.5
ALZ-5	90.3	distributed	Alonzo Creek		100	55.2	A	0.5
ALZ-10	72.6	distributed	Alonzo Creek	ALZ-8	100	65.4	A	2.4
LED-8	66.6	distributed	Ledgewood Creek	LED-5	100	65.4	A	0.5
ALZ-7	101	distributed	Alonzo Creek	ALZ-8	100	66.4	D	2.8
ALZ-8	99.9	discrete	Alonzo Creek	ALZ-8	100	85	A	0.9
ALZ-9	25.5	discrete	Alonzo Creek	ALZ-8	100	73.2	A	0.8
ALZ-11	48.4	discrete	Alonzo Creek	ALZ-8	100	78.5	A	1
ALZ-12	68.8	discrete	Alonzo Creek	ALZ-8	100	62.8	A	2.6
ALZ-16	102.8	distributed	Alonzo Creek		100	0.6	C	25.8
LED-9	69.2	discrete	Ledgewood Creek		100	44.8	D	0.8
LAU-20	67	discrete	Laurel Creek	LED-23	100	61.3	A	0.6
ALZ-13	69.1	distributed	Alonzo Creek		100	7.6	A	13.4
LED-10	107.3	distributed	Ledgewood Creek		100	7	D	25
COY-6	85.6	distributed	McCoy Creek		100	1.6	A	3
SODA-8	89.9	distributed	Soda Springs Creek		100	0	C	27.2
SODA-9	109.5	discrete	Soda Springs Creek		100	33.3	D	13.5
SODA-10	74.8	discrete	Soda Springs Creek		100	45.3	D	7.5
LAU-13	66.9	distributed	Laurel Creek		100	55	D	1.4
LAU-10	76.4	discrete	Laurel Creek		100	33	A	8.7
SODA-14	117.5	distributed	Soda Springs Creek		100	56.4	A	0.6
COY-7	69.3	discrete	McCoy Creek	COY-3	100	62.1	B	0.5
LAU-11	94.8	discrete	Laurel Creek	LAU-14	100	46.1	B	4.3
LAU-12	73.3	distributed	Laurel Creek		100	5.6	B	7.4
LAU-18	104	distributed	Laurel Creek		100	39	D	1.1
LAU-14	38.6	discrete	Laurel Creek	LAU-14	100	34.9	B	1.8
LED-14	35.5	distributed	Ledgewood Creek		100	0.9	D	33.3
LAU-15	76.9	distributed	Laurel Creek		100	54	A	2.9
LAU-16	31	distributed	Laurel Creek		100	44.8	B	7.7
LAU-17	76.1	distributed	Laurel Creek		100	49.4	A	1.1
LAU-21	56.9	distributed	Laurel Creek		100	60.2	D	0.9

LAU-22	84.8	distributed	Laurel Creek		100	61.3	D	0.6
LAU-23	85	discrete	Laurel Creek	LED-23	100	66.3	D	0.6
LED-12	100.3	discrete	Ledgewood Creek		100	5.9	C	24.1
SODA-11	111.2	discrete	Soda Springs Creek	SODA-11	100	66.6	D	0.7
SODA-12	66.7	discrete	Soda Springs Creek	SODA-11	100	58.2	A	0.6
UNI-1	89.7	distributed	Union Creek		100	31.9	D	0.4
SODA-13	107.6	discrete	Soda Springs Creek	SODA-11	100	72.1	A	0.9
ALZ-14	36.5	distributed	Alonzo Creek		100	35	D	0.3
MAR-14	92.6	discrete	Marsh 1	MAR-14	100	70.7	D	0.6
SODA-15	96.3	discrete	Soda Springs Creek	SODA-25	100	66.4	A	1.3
FREE-5	119	distributed	Freeborn Creek		100	0	B	18.9
AMER-6	199.7	distributed	American Canyon Creek		100	0.1	D	15.7
ALZ-15	110.9	distributed	Alonzo Creek		100	12.5	C	22.4
ALZ-17	113.9	discrete	Alonzo Creek		100	23.2	A	16.8
LED-11	124.6	discrete	Ledgewood Creek		100	7.8	A	27.1
LED-13	106.9	distributed	Ledgewood Creek		100	5.7	D	23.7
ALZ-19	77	discrete	Alonzo Creek		100	35.6	D	8.5
ALZ-20	48.3	distributed	Alonzo Creek	ALZ-8	100	23.9	A	1
SODA-20	39.5	discrete	Soda Springs Creek	SODA-25	100	39.9	A	11.7
COY-9	31	distributed	McCoy Creek		100	64.2	D	3.4
COY-10	72	distributed	McCoy Creek		100	54.7	D	0.9
COY-11	31.8	distributed	McCoy Creek		100	58.9	D	2.5
SODA-16	122.8	distributed	Soda Springs Creek		100	0.1	C	26.4
SODA-18	97.7	distributed	Soda Springs Creek	SODA-25	100	62.1	D	5.6
LED-15	71.5	distributed	Ledgewood Creek		100	24.2	D	0.6
ALZ-21	80.6	discrete	Alonzo Creek	ALZ-28	100	39.5	A	10.4
SODA-17	89.9	distributed	Soda Springs Creek		100	4.5	C	21.8
LAU-24	52.3	distributed	Laurel Creek		100	57.9	A	1
SODA-19	72.7	distributed	Soda Springs Creek	SODA-25	100	49.6	D	6.3
LED-16	73.1	discrete	Ledgewood Creek	LED-16	100	54.2	D	0.6
SODA-22	89	distributed	Soda Springs Creek	SODA-25	100	53	D	2.5
LED-17	34.3	distributed	Ledgewood Creek		100	53.9	D	0.8
LED-18	41.7	discrete	Ledgewood Creek	LED-16	100	49.9	D	0.7
COY-13	84.9	distributed	McCoy Creek		100	8.1	D	1
SODA-21	60.6	discrete	Soda Springs Creek	SODA-25	100	50.1	D	5
SODA-23	111.3	distributed	Soda Springs Creek		100	0	C	28.6
ALZ-22	64.1	distributed	Alonzo Creek		100	10.3	C	19.9
ALZ-24	54.7	distributed	Alonzo Creek		100	3.1	D	26.5
DAN-7	40.1	distributed	Dan Wilson Creek		100	45.5	C	7.8
LAU-27	93.6	distributed	Laurel Creek		100	26.1	C	2.3
LAU-28	47	distributed	Laurel Creek		100	9.7	C	2.9
ALZ-37	50.4	discrete	Alonzo Creek		100	55.9	A	0.9
DAN-8	113	distributed	Dan Wilson Creek		100	53.2	C	0.5
LAU-26	92.2	distributed	Laurel Creek		100	7.8	B	3
FREE-7	41.3	distributed	Freeborn Creek		100	64.6	D	2.2
DAN-6	86.6	distributed	Dan Wilson Creek		100	49.1	D	2
COY-14	60.9	distributed	McCoy Creek		100	48.4	B	0.5
FREE-6	118	distributed	Freeborn Creek		100	7.2	D	12.3
SODA-24	103.8	discrete	Soda Springs Creek	SODA-25	100	61.9	A	1.4
SODA-25	32.7	discrete	Soda Springs Creek	SODA-25	100	72.6	A	0.6
ALZ-35	43.3	distributed	Alonzo Creek		100	37.4	D	10.9
SODA-26	84.9	discrete	Soda Springs Creek		100	39.5	C	12
SODA-27	69.8	distributed	Soda Springs Creek		100	35.4	C	8.3
SODA-28	45.8	distributed	Soda Springs Creek		100	1.2	D	28.1
COY-15	72.5	discrete	McCoy Creek	COY-3	100	64.1	B	0.5

COY-16	48	discrete	McCoy Creek	COY-3	100	50.8	B	0.4
SODA-29	54.1	distributed	Soda Springs Creek	SODA-25	100	76.2	A	1
LAU-29	89.3	discrete	Laurel Creek	LED-23	100	53.7	D	0.9
COY-18	67.5	distributed	McCoy Creek		100	31.9	D	0.7
COY-19	99.4	distributed	McCoy Creek		100	1.4	D	1.9
LAU-30	85.1	distributed	Laurel Creek		100	36.9	D	2.5
LED-20	56.5	discrete	Ledgewood Creek	LED-22	100	25.6	D	16.2
ALZ-25	33.4	distributed	Alonzo Creek		100	0.6	A	15.5
ALZ-27	76.9	distributed	Alonzo Creek	ALZ-8	100	54.6	D	1.3
UNI-6	338.1	distributed	Union Creek		100	2.2	D	3.1
LED-21	78.7	distributed	Ledgewood Creek		100	39.5	D	0.9
SODA-31	35.8	discrete	Soda Springs Creek	SODA-25	100	54.2	A	3.3
JAM-4	93.5	distributed	Jameson Creek		100	20.9	D	5.4
ALZ-26	42.4	distributed	Alonzo Creek		100	39	D	6.2
ALZ-28	41.4	discrete	Alonzo Creek	ALZ-28	100	59.1	C	2.4
SODA-35	61.5	discrete	Soda Springs Creek	SODA-25	100	57.1	D	3.4
LED-22	39.9	discrete	Ledgewood Creek	LED-22	100	37.9	D	5.6
LED-23	55	distributed	Ledgewood Creek		100	9.4	A	20.8
SODA-30	69.5	discrete	Soda Springs Creek	SODA-25	100	62	A	1.1
ALZ-30	95.9	discrete	Alonzo Creek		100	17.1	C	18.8
SODA-32	74.9	discrete	Soda Springs Creek		100	60.3	D	0.6
ALZ-31	98.7	distributed	Alonzo Creek		100	70.8	A	0.4
LAU-31	87.8	discrete	Laurel Creek	LED-23	100	56.7	D	0.7
ALZ-32	46.4	discrete	Alonzo Creek		100	24.5	A	16.8
SODA-33	79.7	distributed	Soda Springs Creek		100	0	C	23
LAU-33	47.6	discrete	Laurel Creek		100	29.9	D	8.8
MAR-22	39.9	distributed	Marsh 1		100	2.4	D	0.2
JAM-5	73.5	discrete	Jameson Creek	JAM-3	100	45.3	D	1.3
LAU-32	40.7	discrete	Laurel Creek		100	21.7	B	17.8
LED-24	50	distributed	Ledgewood Creek		100	14.7	A	18.7
GRN-28	63.9	distributed	Green Valley Creek		100	38	D	0.5
ALZ-33	63.2	discrete	Alonzo Creek		100	37.1	A	11.9
ALZ-34	64.3	discrete	Alonzo Creek		100	52.8	D	3.4
SODA-36	55.7	discrete	Soda Springs Creek	SODA-25	100	49.7	A	0.5
LAU-34	14.4	discrete	Laurel Creek	LED-23	100	53.1	D	1.5
COY-23	63.2	discrete	McCoy Creek	COY-3	100	58.3	B	1
ALZ-36	55.7	discrete	Alonzo Creek		100	41.5	C	9.4
JAM-7	113.6	distributed	Jameson Creek		100	65.9	D	1.2
LED-25	38.3	discrete	Ledgewood Creek	LED-5	100	65.5	A	0.5
MAR-10	109.4	distributed	Marsh 1		100	0.3	B	19.5
ALZ-38	37.2	distributed	Alonzo Creek		100	52	C	5.2
AMER-7	146.8	distributed	American Canyon Creek		100	3.1	D	11.7
UNI-3	722.4	distributed	Union Creek		100	0.2	D	3.4
COY-24	98.3	distributed	McCoy Creek		100	50.2	D	1.7
COY-25	318.6	distributed	McCoy Creek		100	2.4	D	1
COY-26	186.7	discrete	McCoy Creek		100	42.4	D	1.3
COY-27	658.9	distributed	McCoy Creek		100	11.1	D	3.1
COY-28	157.9	discrete	McCoy Creek		100	18.9	D	1.4
COY-30	90.3	distributed	McCoy Creek		100	0.1	C	8.6
COY-31	106.2	distributed	McCoy Creek		100	1.7	D	4.3
UNI-4	109.7	distributed	Union Creek		100	0.1	D	2.6
MAR-7	131.5	distributed	Marsh 1		100	0.7	D	2.8
GRN-29	35	distributed	Green Valley Creek		100	61.6	A	0.8
MAR-1	94.5	discrete	Marsh 1	MAR-14	100	41.5	D	0.5
MAR-17	36.7	distributed	Marsh 1		100	44.9	D	0.5

MAR-8	116.6	discrete	Marsh 1		100	51.6	D	0.5
MAR-9	79.6	distributed	Marsh 1		100	67.5	D	0.6
MAR-2	90.7	discrete	Marsh 1		100	37.7	B	3.5
MAR-4	94.8	discrete	Marsh 1		100	57.8	C	3.2
MAR-5	120.6	distributed	Marsh 1		100	47.4	D	2.4
MAR-6	392.5	distributed	Marsh 1		100	7.7	D	0.6
MAR-20	81.5	discrete	Marsh 1	MAR-14	100	65.2	D	0.5
MAR-11	125.6	discrete	Marsh 1	MAR-11	100	53.2	D	0.5
MAR-12	65.1	discrete	Marsh 1	MAR-11	100	39.6	D	0.8
MAR-13	113.8	distributed	Marsh 1		100	1.3	D	0.4
MAR-15	96.7	distributed	Marsh 1		100	57.4	D	0.7
MAR-18	69.2	distributed	Marsh 1		100	45.2	D	0.8
MAR-21	77.9	distributed	Marsh 1		100	0	B	19.8
MAR-25	127.7	distributed	Marsh 1		100	0	C	16.6
MAR-19	85.4	discrete	Marsh 1	MAR-14	100	16.4	D	0.5
MAR-23	46.8	discrete	Marsh 1		100	60.7	C	2.7
MAR-24	30.1	distributed	Marsh 1		100	49.4	D	1.2
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MAR-26	81.9	distributed	Marsh #1		100	43.5	D	1.2
MAR-27	125.8	distributed	Marsh #1		100	47.9	A	3.2
COY-40	70.4	distributed	McCoy Creek		100	12.5	B	1.9
COY-32	143.4	distributed	McCoy Creek		100	11	A	2.6
MAR-28	78.3	discrete	Marsh #1	COY-35	100	57.6	D	1.1
SODA-37	92.4	distributed	Soda Springs Creek		100	41.1	D	1.7
LAU-43	117.5	discrete	Laurel Creek	LAU-43	100	62.1	D	1
LAU-42	96.6	discrete	Laurel Creek	LAU-43	100	59.1	D	2.1
MAR-29	31.9	distributed	Marsh #1		100	55.5	D	0.5
MAR-30	88.9	distributed	Marsh #1		100	28.5	D	2.5
LAU-41	96.7	discrete	Laurel Creek		100	61.8	D	1.7
MAR-42	29.4	distributed	Marsh #1		100	63.3	A	5.3
LAU-40	48	discrete	Laurel Creek	LAU-43	100	72.5	D	1.7
COY-33	67.6	distributed	McCoy Creek		100	53.7	D	2.4
COY-34	50.6	distributed	McCoy Creek		100	59.4	D	3.1
COY-35	74.7	discrete	McCoy Creek	COY-35	100	58.9	D	2.1
MAR-31	122	discrete	Marsh #1	COY-35	100	56.5	A	1.3
LAU-39	76	distributed	Laurel Creek		100	67.7	D	1.4
MAR-32	71.4	distributed	Marsh #1		100	50.6	D	1.5
MAR-33	49.8	distributed	Marsh #1		100	22.9	D	1.4
MAR-37	127.2	distributed	Marsh #1		100	10.9	A	2
COY-36	59.3	discrete	McCoy Creek		100	46.1	A	3
COY-37	37	distributed	McCoy Creek		100	47	D	2.7
MAR-39	51.9	discrete	Marsh #1		100	71	D	0.5
COY-38	137.7	distributed	McCoy Creek		100	10.6	D	3.1
COY-39	99.2	distributed	McCoy Creek		100	53.7	B	2
MAR-34	80.1	distributed	Marsh #1		100	51.4	D	1
MAR-35	56.1	distributed	Marsh #1		100	50.2	D	0.9
MAR-36	32.6	distributed	Marsh #1		100	55.2	D	1
MAR-38	60.7	distributed	Marsh #1		100	32.4	D	5.1
SODA-38	20.7	distributed	Soda Springs Creek		100	47.2	D	0.2
MAR-40	29.8	distributed	Marsh #1		100	3.9	D	0.9
MAR-41	95.8	discrete	Marsh #1		100	60.2	D	0.5
LAU-38	34.4	distributed	Laurel Creek		100	8.5	D	1.5
MAR-43	61.5	discrete	Marsh #1	MAR-44	100	60.9	A	3.9
MAR-44	67.3	discrete	Marsh #1	MAR-44	100	50.5	D	2
COY-41	94.1	distributed	McCoy Creek		100	42.4	D	2.2

LAU-37	30.6	distributed	Laurel Creek		100	13	D	4.8
MAR-45	51.9	discrete	Marsh #1	COY-35	100	57.5	A	1
COY-42	60	distributed	McCoy Creek		100	39.5	D	1.2
MAR-46	47.2	discrete	Marsh #1		100	66.1	D	0.6
COY-43	28.7	discrete	McCoy Creek		100	42.6	D	2.6
LAU-36	19.2	distributed	Laurel Creek		100	35.9	D	2.1
MAR-47	64.7	distributed	Marsh #1		100	43.6	D	6.9

Appendix D

Solano Permittee decentralized BMPs.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2455 Huntington	Installed	2020	Biofiltration	11.247	McCoy Creek	COY-2	38.27765067	-121.97435
Fairfield	1200 B Gale Wilson B	Installed	2020	Bioretention	0.241	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	Denny's Restaurant	Planned	2030	Bioretention	0.77	Dan Wilson Creek	DAN-2	38.21955338	-122.127658
Fairfield	3950 Business Center	Installed	2020	Bioretention	2.296	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	Jayo Subdivision	Planned	2030	Bioretention	4.05	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	3900 Business Center	Installed	2020	Bioretention	8.533	Dan Wilson Creek	DAN-5	38.23116717	-122.1182872
Fairfield	4475 Central	Installed	2020	Bioretention	0.509	Dan Wilson Creek	DAN-8	38.22014694	-122.1300926
Fairfield	4500 Business Center	Installed	2020	Bioretention	2.551	Green Valley Creek	GRN-26	38.22604915	-122.1326145
Fairfield	4625 Mangels	Installed	2020	Bioretention	3.688	Green Valley Creek	GRN-26	38.2251654	-122.1358266
Fairfield	Partnership Health 2	Planned	2030	Bioretention	4.43	Green Valley Creek	GRN-28	38.22411267	-122.1326464
Fairfield	3630 Ritchie	Installed	2020	Bioretention	3.295	Green Valley Creek	GRN-29	38.21379883	-122.1362455
Fairfield	2600 Estates	Installed	2020	Bioretention	0.406	Laurel Creek	LAU-27	38.30664231	-122.029309
Fairfield	3201 Hartford	Installed	2020	Bioretention	0.326	Ledgewood Creek	LED-2	38.25466074	-122.0670856
Fairfield	Caliber Collision	Planned	2030	Bioretention	1.46	Marsh 1	MAR-8	38.24675285	-122.0743114
Fairfield	2600 Maxwell	Installed	2020	Bioretention	1.737	Marsh 1	MAR-11	38.23099408	-122.0799684
Fairfield	770 Chadbourne	Installed	2020	Bioretention	4.635	Marsh 1	MAR-11	38.23034689	-122.0835006
Fairfield	800 Chadbourne	Installed	2020	Bioretention	6.313	Marsh 1	MAR-11	38.22897736	-122.0819342
Fairfield	Innova Maxwell	Planned	2030	Bioretention	2.63	Marsh 1	MAR-11	38.23087887	-122.0800178
Fairfield	2487 Courage	Installed	2020	Bioretention	1	Marsh 1	MAR-12	38.23405747	-122.081283
Fairfield	2901 Cordelia	Installed	2020	Bioretention	8.189	Marsh 1	MAR-13	38.2279119	-122.0874744
Fairfield	Solano Logistics D	Planned	2030	Bioretention	3.5	Marsh 1	MAR-13	38.22789676	-122.0903076
Fairfield	Jelly Belly Warehouse Expansion	Planned	2030	Bioretention	4.09	Marsh 1	MAR-15	38.23809914	-122.0746228
Fairfield	360 Beck A	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.2333092	-122.066136
Fairfield	360 Beck B	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.23279513	-122.0661494
Fairfield	E&P Properties	Planned	2030	Bioretention	9.92	Marsh 1	MAR-20	38.23590326	-122.0706416
Fairfield	2051 Walters	Installed	2020	Bioretention	0.981	McCoy Creek	COY-10	38.26628535	-121.9880675

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2400 Huntington	Installed	2020	Bioretention	1	McCoy Creek	COY-2	38.27764825	-121.9745453
Fairfield	Fairfield/Vacaville Train Station	Planned	2030	Bioretention	1	McCoy Creek	COY-27	38.28614529	-121.9680942
Fairfield	1800 North Texas	Installed	2020	Bioretention	0.065	Soda Springs Creek	SODA-13	38.26235658	-122.0341855
Fairfield	3329 North Texas	Installed	2020	Bioretention	0.358	Soda Springs Creek	SODA-18	38.289267	-122.0341714
Fairfield	3345 North Texas	Installed	2020	Bioretention	0.988	Soda Springs Creek	SODA-18	38.2905095	-122.0341275
Fairfield	2525 North Texas	Installed	2020	Bioretention	0.475	Soda Springs Creek	SODA-29	38.27556882	-122.0342614
Fairfield	2590 North Texas	Installed	2020	Bioretention	0.76	Soda Springs Creek	SODA-29	38.27600953	-122.0340355
Fairfield	2700 North Texas	Installed	2020	Bioretention	0.289	Soda Springs Creek	SODA-29	38.27675262	-122.0340485
Fairfield	2470 Hilborn	Installed	2020	Bioswale	0.381	Alonzo Creek	ALZ-18	38.27532514	-122.0522109
Fairfield	600 Gregory	Installed	2020	Bioswale	0.448	Alonzo Creek	ALZ-6	38.24820883	-122.0560475
Fairfield	201 Pittman	Installed	2020	Bioswale	1.071	Dan Wilson Creek	DAN-2	38.22012023	-122.1272167
Fairfield	200 Business Center	Installed	2020	Bioswale	4.295	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	4755 Business Center	Installed	2020	Bioswale	1.846	Green Valley Creek	GRN-12	38.22096842	-122.1373021
Fairfield	4775 Business Center	Installed	2020	Bioswale	2.46	Green Valley Creek	GRN-12	38.22060358	-122.1382177
Fairfield	4650 Business Center	Installed	2020	Bioswale	1.693	Green Valley Creek	GRN-26	38.22225683	-122.1340899
Fairfield	167 Grobric	Installed	2020	Bioswale	1.162	Green Valley Creek	GRN-29	38.21607168	-122.1343305
Fairfield	4856 Auto Plaza	Installed	2020	Bioswale	2.298	Green Valley Creek	GRN-3	38.21258775	-122.1396229
Fairfield	4865 Auto Plaza	Installed	2020	Bioswale	4.591	Green Valley Creek	GRN-3	38.21244225	-122.1397805
Fairfield	5001 Fermi	Installed	2020	Bioswale	5.818	Jameson Creek	JAM-3	38.2037402	-122.139484
Fairfield	5133 Fulton	Installed	2020	Bioswale	4.053	Jameson Creek	JAM-7	38.20708849	-122.144373
Fairfield	5160 Fulton	Installed	2020	Bioswale	2.388	Jameson Creek	JAM-7	38.20714647	-122.145164
Fairfield	1057 Horizon	Installed	2020	Bioswale	3.452	Laurel Creek	LAU-22	38.27342649	-122.0147834
Fairfield	2001 Meyer	Installed	2020	Bioswale	1.426	Ledgewood Creek	LED-15	38.2379282	-122.0635347
Fairfield	1200 Oliver	Installed	2020	Bioswale	2.345	Ledgewood Creek	LED-2	38.25516097	-122.0671784
Fairfield	1717 Clift	Installed	2020	Bioswale	1.033	Ledgewood Creek	LED-5	38.24272299	-122.0593736
Fairfield	Courage Dr Beck Ave	Installed	2020	Bioswale	1.5	Marsh 1	MAR-1	38.23765765	-122.0676488
Fairfield	2950 Auto Mall	Installed	2020	Bioswale	2.909	Marsh 1	MAR-9	38.24153261	-122.0839885
Fairfield	2955 Automall	Installed	2020	Bioswale	2.296	Marsh 1	MAR-9	38.24164932	-122.0836312
Fairfield	801 Chadbourne	Installed	2020	Bioswale	7.92	Marsh 1	MAR-11	38.22874137	-122.0832968
Fairfield	2700 Low	Installed	2020	Bioswale	5.016	Marsh 1	MAR-12	38.23676132	-122.0847769
Fairfield	2525 N Watney	Installed	2020	Bioswale	2.5	Marsh 1	MAR-15	38.23624603	-122.0791156
Fairfield	Sheldon Oil Company	Planned	2030	Bioswale	1	Marsh 1	MAR-19	38.23528702	-122.0607524
Fairfield	2510 Clay Bank	Installed	2020	Bioswale	0.982	McCoy Creek	COY-15	38.2752175	-122.0064988
Fairfield	Clorox	Planned	2030	Bioswale	1	McCoy Creek	COY-2	38.27960416	-121.9710685

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Peabody Road	Installed	2020	Bioswale	16.368	McCoy Creek	COY-27	38.29709076	-121.9675707
Fairfield	Texas Corners	Planned	2030	Bioswale	0.72	Soda Springs Creek	SODA-11	38.24997707	-122.0341621
Fairfield	1833 N Texas	Installed	2020	Bioswale	2.778	Soda Springs Creek	SODA-13	38.26356253	-122.0342475
Fairfield	3333 North Texas	Installed	2020	Bioswale	1.832	Soda Springs Creek	SODA-18	38.28960861	-122.0341365
Fairfield	3400 North Texas	Installed	2020	Bioswale	9.507	Soda Springs Creek	SODA-18	38.2927325	-122.0326218
Fairfield	824 Washington	Installed	2020	Bioswale	2.17	Soda Springs Creek	SODA-25	38.25055608	-122.0390686
Fairfield	Senior Manor Parking Lot	Planned	2030	Bioswale	1	Soda Springs Creek	SODA-36	38.2535156	-122.0404984
Fairfield	2910 Industrial	Installed	2020	Bioswale	0.696	Union Creek	UNI-2	38.27338698	-121.9633523
Fairfield	Jepson Parkway 2A	Planned	2030	Bioswale	1	Union Creek	UNI-5	38.2938595	-121.9554919
Fairfield	1200 B Gale Wilson A	Installed	2020	Filtration Device	3.656	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	3650 Nelson	Installed	2020	Filtration Device	1	Laurel Creek	LAU-10	38.29454858	-122.0317184
Fairfield	3500 Nelson	Installed	2020	Filtration Device	2.025	Laurel Creek	LAU-7	38.29380211	-122.0316656
Fairfield	2263 N Texas	Installed	2020	Filtration Device	0.013	Soda Springs Creek	SODA-15	38.26986308	-122.034208
Fairfield	3340 N Texas	Installed	2020	Filtration Device	2.941	Soda Springs Creek	SODA-18	38.29215565	-122.0332795
Fairfield	4350 Central	Installed	2020	Sediment Trap	3.194	Dan Wilson Creek	DAN-2	38.22350691	-122.1251014
Fairfield	4610 West America	Installed	2020	Sediment Trap	1	Green Valley Creek	GRN-22	38.23045612	-122.1309696
Fairfield	3330 Dover	Installed	2020	Sediment Trap	0.028	Laurel Creek	LAU-15	38.28939339	-122.024848
Fairfield	3355 North Texas	Installed	2020	Sediment Trap	1.015	Soda Springs Creek	SODA-18	38.28987196	-122.0341651
Suisun	Cottonwood_DB	Installed	2020	Bioretention	3.2	Laurel Creek	LAU-36	38.253919	-122.021465
Suisun	Summerwood_DB	Installed	2020	Bioretention	2.5	Laurel Creek	LAU-36	38.253905	-122.022136
Suisun	Walmart_BR_1	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24175304	-121.9886363
Suisun	Walmart_BR_2	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24255777	-121.9884485
Suisun	Walmart_BR_3	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332878	-121.9892102
Suisun	Walmart_BR_4	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332035	-121.9911978
Suisun	Walmart_BR_5	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24329929	-121.9920561
Suisun	Walmart_BR_6	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24142651	-121.9898674
Suisun	Walmart_DB	Installed	2020	Bioretention	15.8	Marsh #1	MAR-33	38.240915	-121.989429
Suisun	Holiday Inn Express	Installed	2020	Bioretention	1.6	Marsh #1	MAR-38	38.24209415	-122.0383736
Suisun	Crystal Middle School Site	Installed	2020	Bioretention	7.1	Marsh #1	MAR-39	38.23657066	-122.0436108
Suisun	Railroad Avenue Extension	Planned	2030	Bioretention	1.7	Marsh #1	MAR-41	38.24420303	-122.0330427
Suisun	Jubilee Commercial	Installed	2020	Bioretention	1.2	Marsh #1	MAR-43	38.26456217	-121.9873755
Suisun	ZE_BT_01	Installed	2020	Bioretention	1.6	Marsh #1	MAR-43	38.263235	-121.9877
Suisun	ZE_BT_03	Installed	2020	Bioretention	2.5	Marsh #1	MAR-43	38.264415	-121.986915
Suisun	ZE_BT_04	Installed	2020	Bioretention	0.7	Marsh #1	MAR-43	38.264101	-121.985862

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Suisun	ZE_BT02	Installed	2020	Bioretention	0.4	Marsh #1	MAR-43	38.264158	-121.987761
Suisun	McCoy Creek Trail	Installed	2020	Bioretention	1	McCoy Creek	COY-41	38.25395217	-122.0113701
Suisun	Caterpillar Club House	Installed	2020	Bioretention	0.5	McCoy Creek	COY-42	38.24250196	-122.0191968
Suisun	Summerwood_GS 01	Installed	2020	Bioswale	0.5	Laurel Creek	LAU-36	38.254922	-122.023184
Suisun	Summerwood_GS 02	Installed	2020	Bioswale	0.2	Laurel Creek	LAU-36	38.254427	-122.022624
Suisun	HSC_FI	Installed	2020	Filtration Device	12.8	Laurel Creek	LAU-39	38.244877	-122.021441
Suisun	RR_Storage_Filters	Installed	2020	Filtration Device	1.1	McCoy Creek	COY-39	38.260923	-122.011153
Suisun	Summerwood_CDS	Installed	2020	Sediment Trap	2.5	Laurel Creek	LAU-36	38.254196	-122.024351
Suisun	Walmart_City CDS	Installed	2020	Sediment Trap	7.5	Marsh #1	MAR-33	38.243349	-121.989895
Suisun	Hampton_CDS	Installed	2020	Sediment Trap	0.9	Marsh #1	MAR-38	38.242237	-122.039346
Suisun	Andrews_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.254194	-121.985953
Suisun	Andrews_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-42	38.253443	-121.985822
Suisun	Beale_N_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.255578	-121.986025
Suisun	Beale_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.254878	-121.986035
Suisun	Hickam_N_SC	Installed	2020	Sediment Trap	3	Marsh #1	MAR-42	38.254255	-121.985453
Suisun	Hickam_S_SC	Installed	2020	Sediment Trap	3.7	Marsh #1	MAR-42	38.253438	-121.985359
Suisun	Vandenberg_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.255659	-121.985495
Suisun	Vandenberg_S_SC	Installed	2020	Sediment Trap	2.9	Marsh #1	MAR-42	38.254884	-121.985516
Suisun	Carswell Ct_SC	Installed	2020	Sediment Trap	7	Marsh #1	MAR-43	38.262615	-121.987286
Suisun	Dover_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.257337	-121.985992
Suisun	Dover_S_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.25671	-121.985995
Suisun	Ford Ord_SC	Installed	2020	Sediment Trap	1.6	Marsh #1	MAR-43	38.259527	-121.985967
Suisun	Keesler_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.258861	-121.985965
Suisun	Keesler_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-43	38.258068	-121.985987
Suisun	Neward_N_SC	Installed	2020	Sediment Trap	5.1	Marsh #1	MAR-43	38.261022	-121.986269
Suisun	Newark_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-43	38.260269	-121.986128
Suisun	Four Seasons_CDS	Installed	2020	Sediment Trap	4.3	Marsh #1	MAR-44	38.243597	-121.985876
Suisun	Breezewood_CDS	Installed	2020	Sediment Trap	3.9	McCoy Creek	COY-39	38.260753	-122.009642
Suisun	Amberwood_CDS	Installed	2020	Sediment Trap	3.5	McCoy Creek	COY-41	38.257989	-122.012995
Suisun	McCoy_CDS	Installed	2020	Sediment Trap	3.3	McCoy Creek	COY-42	38.241326	-122.01897
Vallejo	Sonoma_Blvd_BR	Installed	2020	Bioretention	3.5	Mare Island Strait	SA55	38.0937663	-122.2497144
Vallejo	850_Redwood_BR3	Installed	2020	Bioretention	0.25	Napa River	AC35	38.1228762	-122.2543064
Vallejo	Automall_Basin	Installed	2020	Bioretention	2.7	Rindler Creek	LC21	38.13728229	-122.2143281
Vallejo	Couch_St_BR1	Installed	2020	Bioretention	0.75	White Slough	AC34	38.12397765	-122.2503421

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Vallejo	Couch_St_BR2	Installed	2020	Bioretention	0.75	White Slough	AC34	38.1236316	-122.2502697
Vallejo	850_Redwood_BR1	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12342271	-122.2542527
Vallejo	850_Redwood_BR2	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12313152	-122.2540945
Vallejo	AdmiralCallaghan_Bioswale	Installed	2020	Bioswale	1	Blue Rock Springs Creek	LC8	38.12364848	-122.2277015
Vallejo	9832_Vallejo_Streetscape	Installed	2020	Bioswale	0.05	Mare Island Strait	DT5	38.10213344	-122.2583216
Vallejo	AustinCk_Bioswale	Installed	2020	Bioswale	1	Napa River	AC41	38.11837319	-122.2568035
Vallejo	Kaiser_Broadway_2	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12756672	-122.2471529
Vallejo	Kaiser_Broadway_3	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12754984	-122.2474506
Vallejo	Kaiser_Broadway_4	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12737894	-122.2474158
Vallejo	Kaiser_Broadway_5	Installed	2020	Bioswale	0.24	White Slough	AC34	38.1273916	-122.2471368
Vallejo	HiddenbrookPark	Installed	2020	Infiltration Feature	1	Sulphur Springs Creek	SV4	38.1366937	-122.1687949
Vallejo	Kaiser_Broadway_1	Installed	2020	Infiltration Feature	0.24	White Slough	AC34	38.12769121	-122.2477591
Vallejo	9810_Curtola_Pkwy	Installed	2020	Pervious Pavement	1	Lake Dalwigk	LS33	38.09378108	-122.2396427
Vallejo	Chase_St_PP	Installed	2020	Pervious Pavement	0.4	Mare Island Strait	LS35	38.09659274	-122.2399378
Vallejo	SP14101B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15244205	-122.2838573
Vallejo	SP14201B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15302772	-122.2806181
Vallejo	SP14401B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1546249	-122.2792984
Vallejo	SP14501B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1551305	-122.2807271
Vallejo	SP14601B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15512579	-122.2820948

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

Prepared by

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Project Number: LA0499

June 9, 2020

FINAL DRAFT FOR REVIEW

Bay Area Stormwater Management Agencies Association

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Appendix E: Load Reduction Credit for PCBs in Electrical Utilities Management Program

Appendix F: Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Program

Appendix G: Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

Appendix H: Enhanced Street Sweeping Efficiency Factors

Appendix I: Large Trash Capture Device Unit Efficiency Factor Data Analysis

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

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1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

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[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

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1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.

[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

In the 2020 Annual Report, the Permittees will provide:

- Documentation demonstrating implementation with each of the minimum requirements in Provision C.12.f.ii(1)(a)-(c).
- Documentation of an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition.

In the 2020 Annual Report and thereafter, the Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

During the first three years of the permit term, the Permittees will develop and implement or cause to be developed and implemented a program to manage PCBs-containing electrical utility equipment to prevent or reduce PCBs from entering the MS4. The Electrical Utilities Management Program will include improved practices and procedures for documenting removal and disposal of PCBs-containing electrical equipment, responding to unplanned PCBs releases, and monitoring and reporting requirements.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. To date, neither the Permittees nor the SFBRWQCB have been able to verify that a sound and transparent cleanup protocol is being used consistently by non-municipally owned electrical utilities for PCBs spills from their electrical utility equipment and properties across the MRP region. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the SFBRWQCB to meet the objectives of the PCBs TMDL. These differences create potential missed opportunities to account for removal of PCBs-containing OFEE, and cleanup spills (or cleanup soils on properties where past spills occurred) to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay.

For this control measure, Permittees will implement a management program that will consist of the following actions:

- Action 1: Permittee operated electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and during the five-year permit term, and provide data to support calculations of the associated stormwater load reductions due to these efforts;

- Action 2: Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr)

The PCBs loads reduced in mg/yr from implementing the Electrical Utilities Management Program will be calculated as the sum of the loads reduced due to Action 1 and Action 2. These load reductions (LR_1 and LR_2) will be assessed using the following equations:

$$Load\ of\ PCBs\ Reduced\ for\ Action\ 1\ (LR_1) = L_0 \bullet R_1$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr). For MRP 3.0, the starting year is assumed to be 2020.

R_1 = Estimated fraction of PCBs load prevented from entering the MS4 due to Action 1 (equipment removal) during the time period of interest (dimensionless fraction); the rate of load reduced is assumed equivalent to the rate of PCBs mass reduced due to equipment removal during the time period of interest.

And,

$$Load\ of\ PCBs\ Reduced\ for\ Action\ 2\ (LR_2) = M_{sp} \bullet SW_i \bullet E_f$$

Where:

M_{sp} = Average annual mass of PCBs released per spill (kg/yr)

SW_i = Estimated fraction of PCBs mass spilled that enters the MS4 without the enhanced spill cleanup and reporting protocols (dimensionless fraction)

E_f = Efficiency factor for the enhanced spill cleanup and reporting protocols to reduce PCBs released to MS4 (dimensionless fraction)

For Action 1, the above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate. For Action 2, the

above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the rate of the enhanced cleanup efficiency.

Reasonable values were developed for each of the terms shown in the equations above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program during MRP 3.0 (Table 3, see Appendix E for further detail). In 2025, Permittees will achieve a load reduction ranging from 0.069 – 0.092 kg/yr for Action 1 and from 0.002 – 0.012 kg/yr for Action 2, assuming the Electrical Utilities Management Program has been fully implemented. Table 4-1below identifies the assumed ranges of values for the terms in the above equations that were used to calculate the load reduction credit during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0 as part of implementing the program.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE in 2020; this value was calculated assuming a 25% to 65% reduction of the TMDL-normalized McKee et al. (2006) estimated load to stormwater of 1.1 kg/y occurred between 2005 and 2020.	0.385-0.825	kg/yr
R_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values were calculated assuming a 1.7% to 4.3% reduction rate per year multiplied by the 5-year permit term.	8.5-21.5	%
M_{sp}	Estimated annual mass of PCBs released due to accidental spills. This value was estimated based on spill report data.	2.3	kg/yr
SW_1	Percent of PCBs mass that enters MS4 without the enhanced spill cleanup and reporting protocols. This value is based on the McKee et al. (2006) assumption that 99% of spilled oils are successfully cleaned.	1	%
E_f	Improved efficiency of the enhanced cleanup and reporting protocols. These values are estimates that can be refined after the new spill response and reporting protocols have been implemented and evaluated.	10-50	%

All Permittees that implement or cause to be implemented the Electrical Utilities Management Program will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually, in Annual Reports during the first three years of the permit term.

A report will be prepared in Year 4 of the permit that documents implementation of the Electrical Utilities Management Program. The report will provide the following:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- For Action 1 (ongoing equipment removals), Permittees will document efforts by municipally-owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.
- For Action 2 (improved spill response and reporting), the report will include the following information:
    - Improved spill response and reporting protocols that Permittees identified and/or developed during Year 2 of the permit to address accidental releases from OFEE;
    - Tracking of the improved spill response and reporting protocols at municipally-owned electrical utilities beginning in Year 3 of the permit; tracking will include documentation of accidental spills from municipally-owned OFEE during each year of the permit; documentation and evaluation of any monitoring data collected as part of the improved spill response and reporting protocols, documentation of any notification and reporting that was done as required by the new protocols; and
    - Refined estimates of the annual PCBs loads reduced due to implementation of the new spill response and reporting protocols.

5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Total	**12.6**	**39.0**	**1,477**

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities that occur during the MRP 3.0 permit term.

6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

4. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
5. Private business take-back and recycling programs (e.g., Home Depot); and,
6. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

11. REFERENCES

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San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), 2014. Integrated Monitoring Report – Part C Pollutants of Concern Load Reduction Opportunities. March 2014.

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Wu, J., Gilbreath, A.N., McKee, L.J., 2016. Regional Watershed Spreadsheet Model (RWSM): Year 5 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 788. San Francisco Estuary Institute, Richmond, California.

APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

A.5 REFERENCES

Gilbreath, Alicia, 2019. Personal communication via email, 2/26/2019.

McKee, L.J., Gilbreath, A.N., Wu, J., Kunze, M.S., Hunt, J.A., 2014. Estimating Regional Pollutant Loads for San Francisco Bay Area Tributaries using the Regional Watershed Spreadsheet Model (RWSM): Year's 3 and 4 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 737. San Francisco Estuary Institute, Richmond, California.

San Francisco Estuary Institute (SFEI), 2018. Regional Watershed Spreadsheet Model (RWSM) Toolbox v1.0 User Manual and Pollutant Model. Available here: https://www.sfei.org/projects/regional-watershed-spreadsheet-model#sthash.kOKnKvF2.dpbs.

Wu, J., Gilbreath, A.N., McKee, L.J., 2017. Regional Watershed Spreadsheet Model (RWSM): Year 6 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 811. San Francisco Estuary Institute, Richmond, California.

Wu, J., Gilbreath, A.N., McKee, L.J., 2016. Regional Watershed Spreadsheet Model (RWSM): Year 5 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 788. San Francisco Estuary Institute, Richmond, California.

APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

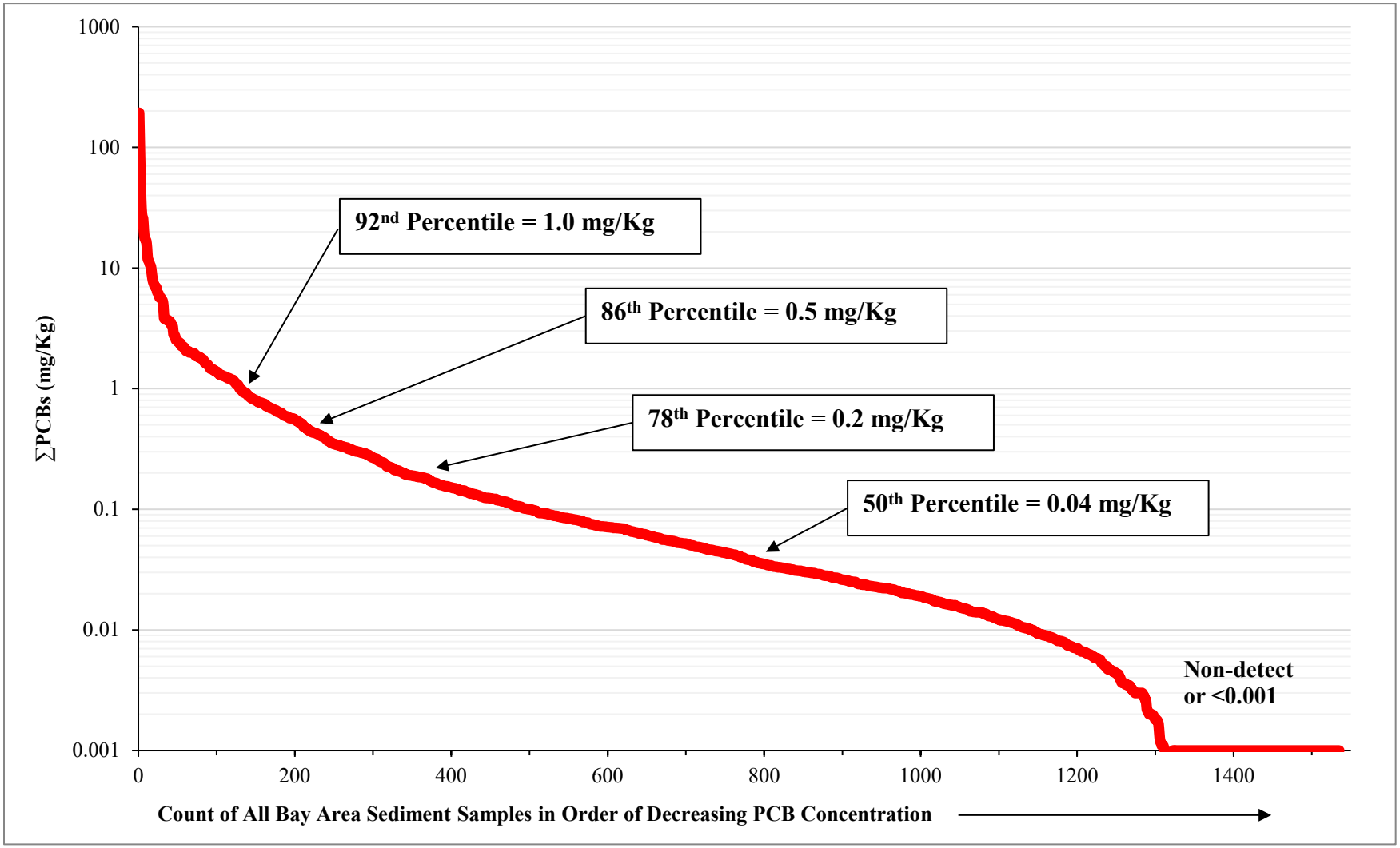

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

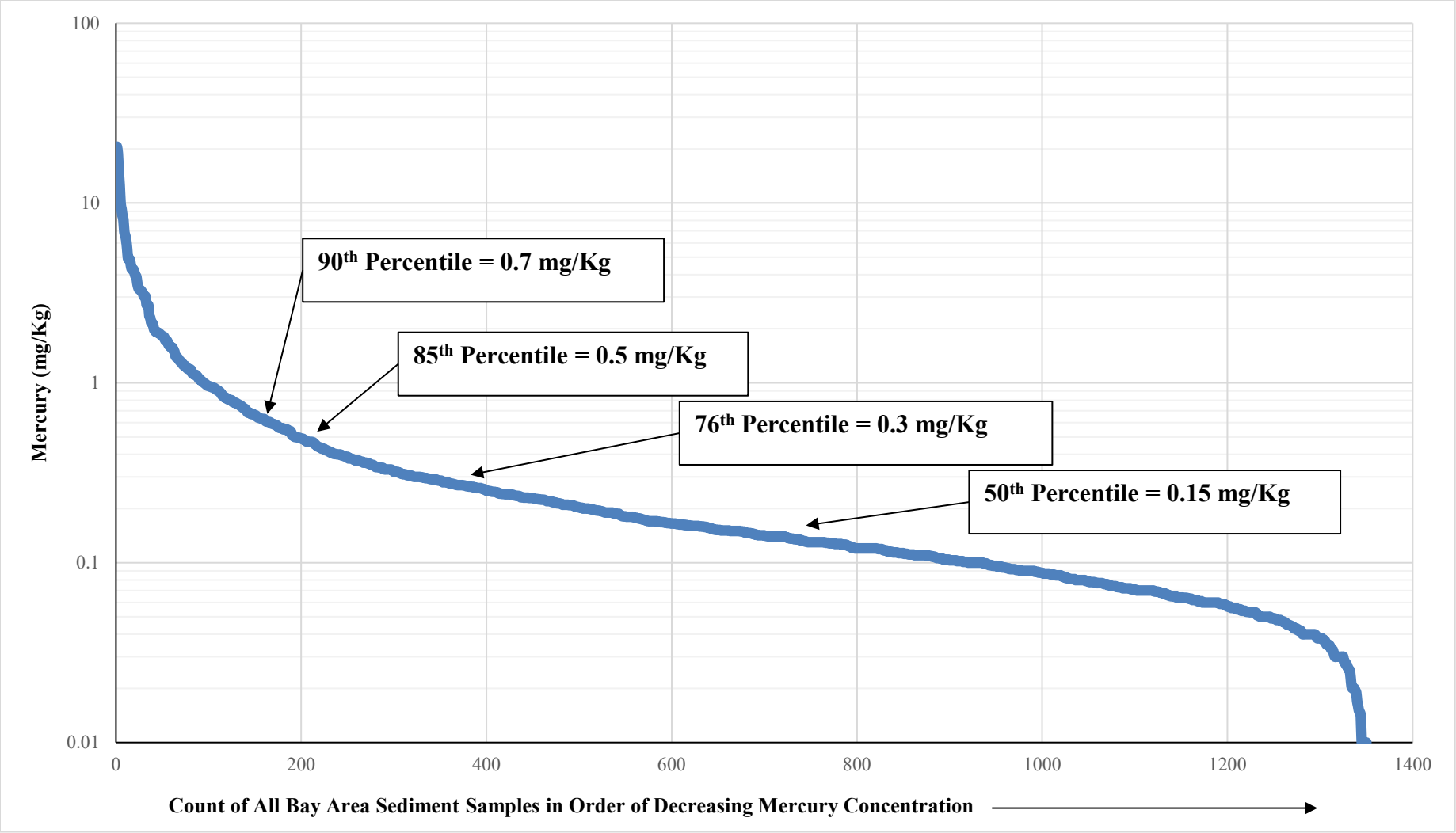

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C

Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

APPENDIX E

Load Reduction Credit for PCBs in Electrical Utilities Management Program

E.1 ESTIMATED PCBS LOADS TO STORMWATER FROM OFEE

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the SF Bay Area between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:
  - 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad, 1994; EIP Associates, 1997).
  - When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
  - Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
  - A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al., 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

The estimated stormwater load of 2.8 kg/yr from transformers and large capacitors in 2005 developed by McKee et al. (2006) as part of their PCBs mass balance model is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table E-1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table E-1). As shown in Table E-1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be **1.1 kg/yr**.

Table E-1: 2005 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load	PCBs Load Normalized to TMDL Stormwater Load
	kg/yr	kg/yr
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

E.2 MANAGEMENT OF RELEASE OF PCBS FROM OFEE DURING MRP 3.0

During MRP 3.0, Permittees propose to implement a new control measure program to manage the release of PCBs from OFEE. Under this new program, load reductions will be credited for the following actions:

- Action 1: Permittee operated electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and during the five-year permit term, and provide data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE.

The starting point for estimating load reductions that will be documented and achieved through implementation of the new program is the TMDL-normalized load of 1.1 kg/yr from transformers and large capacitors in 2005 (Table E-1). The estimated load reductions and supporting information for each of the new program actions are presented below.

E.2.1 Estimated Load Reduction Credit for Action 1

The McKee et al. (2006) load estimates demonstrate the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average load during the peak period (1950-1990). That equates to an average reduction of 4.33% per year during the fifteen-year period between 1990 and 2005.

Most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. During the late 1980's and 1990's, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by Pacific Gas and Electric Company (PG&E) support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E, 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E, 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in California Office of Emergency Services (Cal OES) records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see below for additional details on Cal OES spill reports).

In order to estimate the loads reduced since the start of the TMDL and the current (2020) PCBs loads to stormwater from PCBs-containing OFEE, the overall 65% load reduction rate shown in the McKee et al. (2006) mass balance models for the fifteen year period between 1990 and 2005 was used as the high estimate for the load reduction rate. A 50% and 25% overall load reduction rates were selected as reasonable values for mid and low estimates. These overall rates (65%, 50%, and 25%) equate to annual average load reduction rates of 4.3%, 3.3%, and 1.7% per year, respectively, during the fifteen-year period. The annual average load reduction rates are used to calculate the loads reduced each year since the start of the TMDL, and the continuing load reductions that will be achieved in the future. These calculations assume the loads are reduced primarily because of the removal and proper disposal of PCBs-containing OFEE from active service, and the equipment removal rate is approximately equal to the load reduction rate. Table E-2 presents the calculated loads reduced by 2020 and the associated loads to the MS4 in 2020 based on the assumed annual reduction rates for high, mid, and low equipment removal scenarios. Since the start of the TMDL, the information provided in Table E-2 demonstrates that the load reductions achieved to date due to removal of PCBs-containing OFEE from the system range from **0.275 kg/yr to 0.715 kg/yr**.

Table E-2: Estimated Loads Reduced between 2005 and 2020 and the current (2020) PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area.

Scenario	Estimated Load to Stormwater in 2005	Assumed Rate of Load Reduction Over 15 Years	Average Load Reduction Rate per Year	Load Reduction Achieved between 2005 and 2020	Estimated Load to Stormwater in 2020
	kg/yr	%	%	kg/yr	kg/yr
Low	1.1	25%	1.7%	0.275	0.825
Mid	1.1	50%	3.3%	0.550	0.550
High	1.1	65%	4.3%	0.715	0.385

PCBs-containing OFEE will continue to be removed each year beyond 2020 due to ongoing maintenance programs until at some point in the future, all PCBs-containing OFEE have been removed from active service. In order to calculate the additional PCBs load reductions that will occur during MRP 3.0 and beyond, the 2020 stormwater loads shown in Table E-1 are the assumed starting point. The annual average load reduction rate for each scenario in Table E-1 is assumed to represent the annual average load reduction rate that will occur during MRP 3.0 and beyond due to equipment removals. This equates to overall load reduction rates over the 5-year permit term of 8.5%, 16.5% and 21.5% for the low, mid, and high equipment removal scenarios, respectively. Across these scenarios, the calculated loads reduced during MRP 3.0 range **from 0.069 to 0.092 kg/yr** (Table E-3). This range is the proposed load reduction credit for Action 1 (ongoing equipment removal) under MRP 3.0.

Assuming the load reduction rates can be approximated by the equipment removal rate, data collected during the permit term on the rate of equipment removals at municipally-owned electrical utilities in the MRP area can be used to identify the appropriate equipment removal scenario. Note, the load reduction achieved under the high scenario during MRP 3.0 is less than the load reduction achieved under the mid scenario because the starting stormwater load in 2020 varies across the different scenarios.

Table E-3. Estimated PCBs Loads Reduced between 2020 and 2025 from removal of PCBs-containing oil-filled electrical equipment in the San Francisco Bay Area.

Scenario	Estimated Load to Stormwater in 2020 (kg/yr)	Annual Average Load Reduction Rate	Overall Load Reduction Rate over 5-year Permit Term	Load Reduction Achieved between 2020 and 2025 (kg/yr)
Low	0.825	1.7%	8.5%	0.069
Mid	0.550	3.3%	16.5%	0.092
High	0.385	4.3%	21.5%	0.083

Starting with the estimated load to stormwater in 2020 and the assumed annual average reduction rate for each scenario, the calculations were carried forward to estimate the loads reduced every 10 years due to PCBs-containing OFEE removals until the total stormwater load from active PCBs-containing OFEE is essentially zero (Table E-4). These calculations demonstrate that

under the high equipment removal scenario, it will take a little over 20 years to reduce all PCBs loads from this source, while under the low equipment removal scenario, it will take approximately 60 years.

Table E-4: Estimated PCBs Loads reduced for removal of PCBs-containing oil-filled electrical equipment between 2020 and 2080.

Description	Scenario			Units
	Low	Mid	High	
Estimated Load to Stormwater in 2020	**0.825**	**0.550**	**0.385**	**kg/yr**
Assumed Annual Average Load Reduction Rate	**1.7%**	**3.3%**	**4.3%**	**%**
Load Reduction Achieved by 2030	0.138	0.183	0.167	kg/yr
Load Reduction Achieved by 2040	0.275	0.367	**0.334**	kg/yr
Load Reduction Achieved by 2050	0.413	**0.550**		kg/yr
Load Reduction Achieved by 2060	0.550			kg/yr
Load Reduction Achieved by 2070	0.688			kg/yr
Load Reduction Achieved by 2080	**0.825**			kg/yr

E.2.2 Estimated Load Reduction for Action 2

To estimate the potential load reductions that can be achieved through implementing enhanced cleanup and reporting protocols (Action 2), ten years of Cal OES spill reports for OFEE in the Bay Area were reviewed (Cal OES 2017). Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, then 0.023 kg/yr of spilled PCBs remain in the environment. Enhanced cleanup protocols that increase the cleaning efficiency by 10% to 50% would result in an additional reduction of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table E-5.

Table E-5: Estimated Load reduction credits under MRP 3.0 for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs spilled	Current Cleanup Efficiency	PCBs Load to Stormwater Due to Spills	Improved Cleanup Protocol Efficiency	Load Reduction Due to Improved Cleanup Protocol
	kg/yr	%	kg/yr	%	kg/yr
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

E.2.3 Total Load Reduction Credit Under MRP 3.0

Combining the load reduction estimates presented above for Action 1 and Action 2, the total PCBs load reduction credit under MRP 3.0 for implementing the new program to manage the release of PCBs from OFEE ranges from **0.071 to 0.098 kg/yr** (Table E-6).

Table E-6: Estimated Load reduction credits under MRP 3.0 for implementing a control measure program to manage releases of PCBs in oil-filled electrical equipment.

Scenario	Load Reduction for Action 1	Load Reduction for Action 2	Total Load Reduction Credit Under MRP 3.0
	Equipment Removals between 2020 and 2025	Improved Cleanup and Reporting Protocol	
	kg/yr	kg/yr	kg/yr
Low	0.069	0.002	0.071
Mid	0.092	0.006	0.098
High	0.083	0.012	0.095

E.3 REFERENCES

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Pre-fabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Road Way Sample)	1.01
PCBs Concentration (Bay Bridge Upper Road Way Sample)	1.65
PCBs Concentration (Bay Bridge Upper Road Way Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

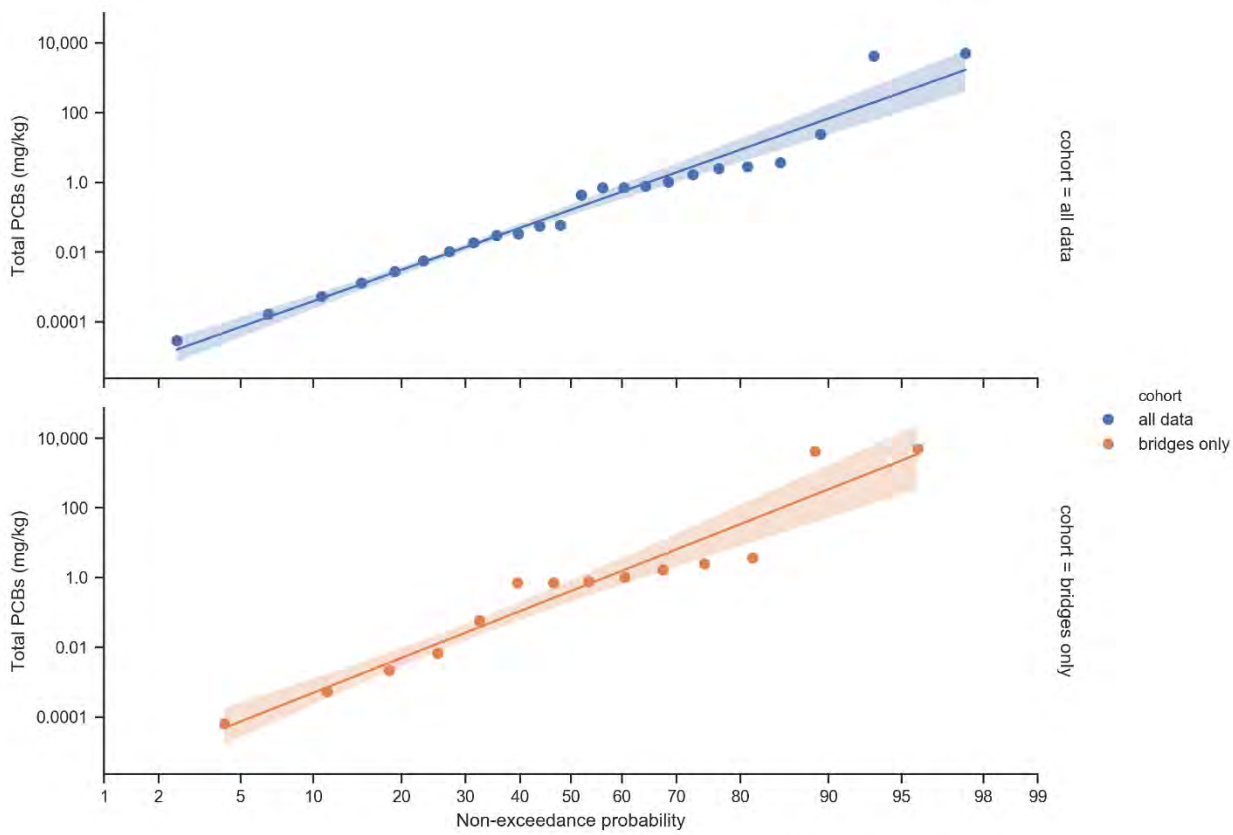

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

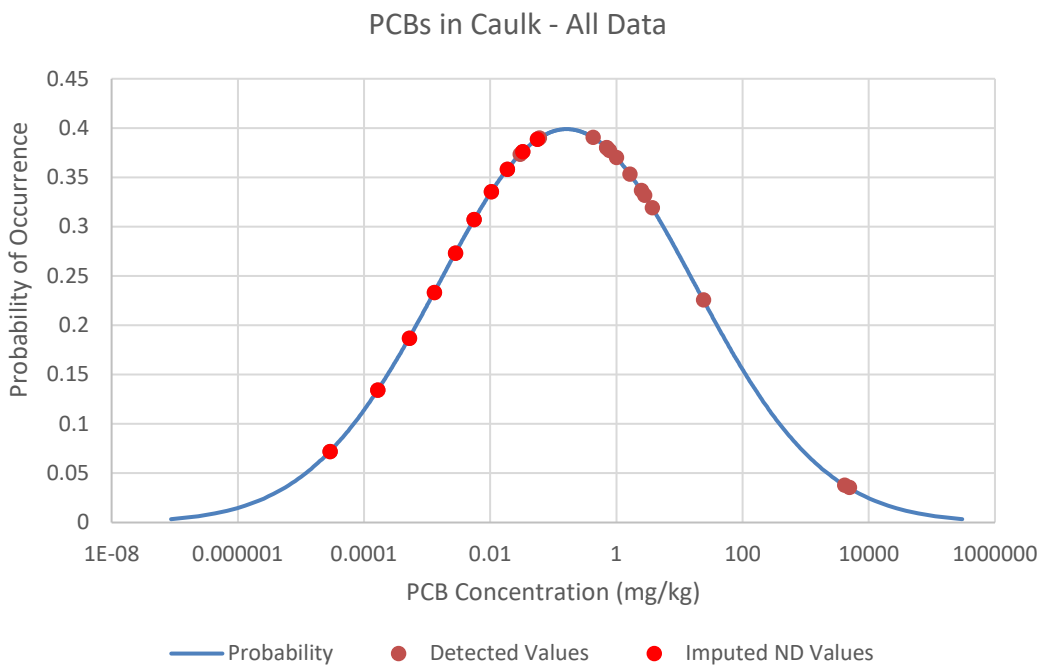

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

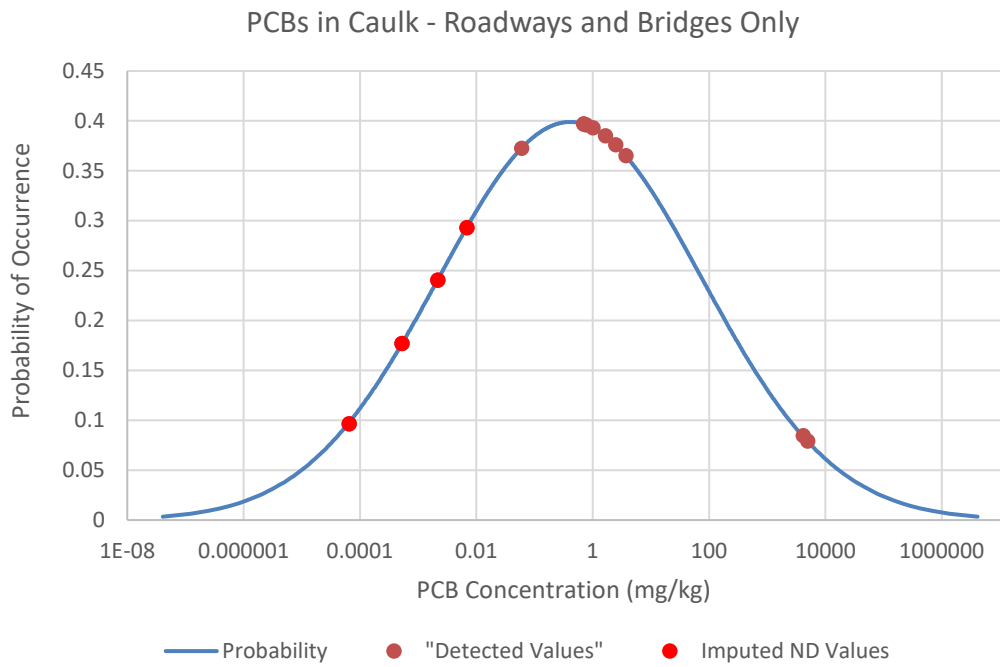

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Singh, A, Singh, A. and Engelhardt. 1997. *The Lognormal Distribution in Environmental Applications.* Technology Support Center Issue. U.S. EPA Office of Research and Development. EPA/600/R-97/006.

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

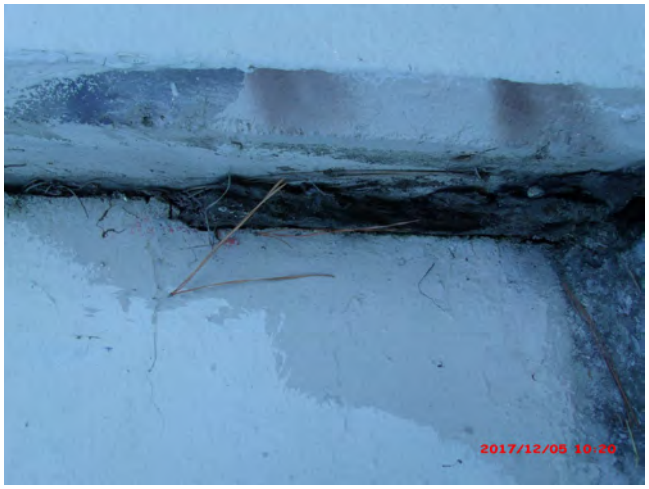

Composite D

Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

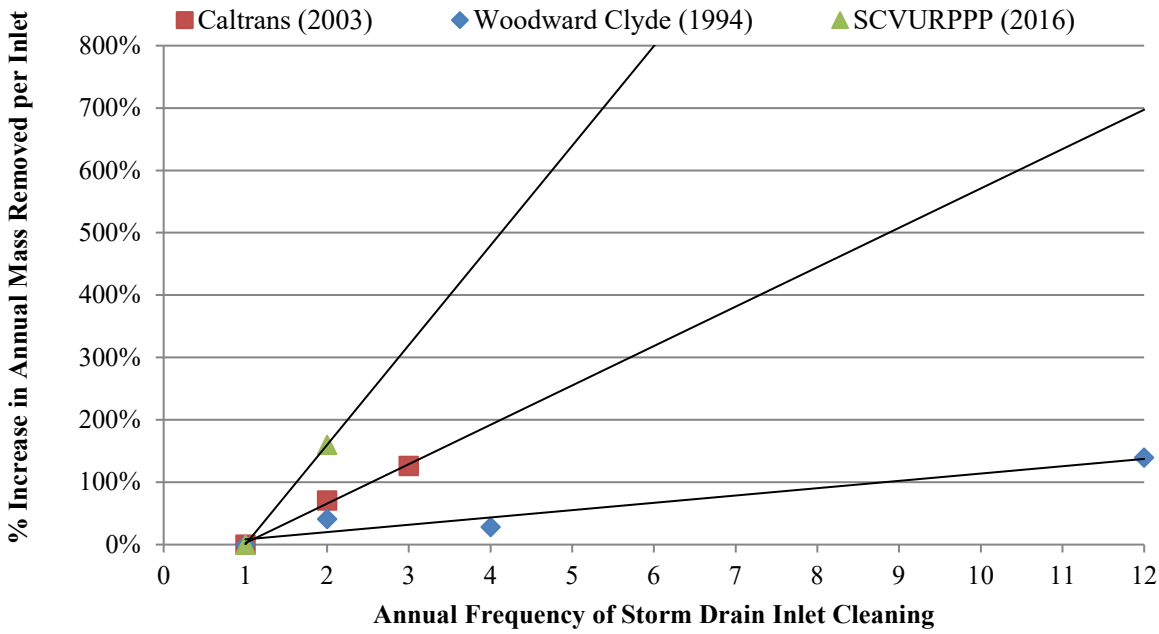

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

BASMAA (2014). San Francisco Bay Area Stormwater Trash Generation Rates - Final Technical Report. Bay Area Stormwater Management Agencies Association. Prepared by EOA, Inc. Oakland. June.

Caltrans (2003). Drain Inlet Cleaning Efficacy Study. California Department of Transportation. CTSW-RT-03-057.36.1. June.

McKee, L., P. Mangarella, B. Williamson, J. Hayworth, and L. Austin (2006). Review of methods used to reduce urban stormwater loads: Task 3.4. A Technical Report of the Regional Watershed Program: Oakland, CA, San Francisco Estuary Institute SFEI Contribution #429: 150 pp.

Paradigm Environmental (2020). Technical Memorandum: Modeled Yield Estimates from SCVURPPP (all ABAG HRUs). January 7, 2020.

SCVURPPP (2016). Storm Drain Trash Monitoring and Characterization Project. Santa Clara Valley Urban Runoff Pollution Prevention Program. Prepared by EOA, Inc. August.

Woodward-Clyde. 1994. Storm Inlet Pilot Study. Prepared for the Alameda County Urban Runoff Clean Water Program.

APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:
1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:
Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

I.5 References

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SOLANO PERMITTEES'

GREEN STORMWATER INFRASTRUCTURE

DESIGN CONCEPTS

06168

6209

Table of Contents

Green Street Inspiration

Green Stormwater Infrastructure (GSI) Concept Plans

GSI Standard Specification and Design Details

Green Street Inspiration

Ideas for incorporating green stormwater infrastructure into downtown right-of-ways

Green Streets use green stormwater infrastructure to improve safety for all users while also introducing a host of environmental multi-benefits.

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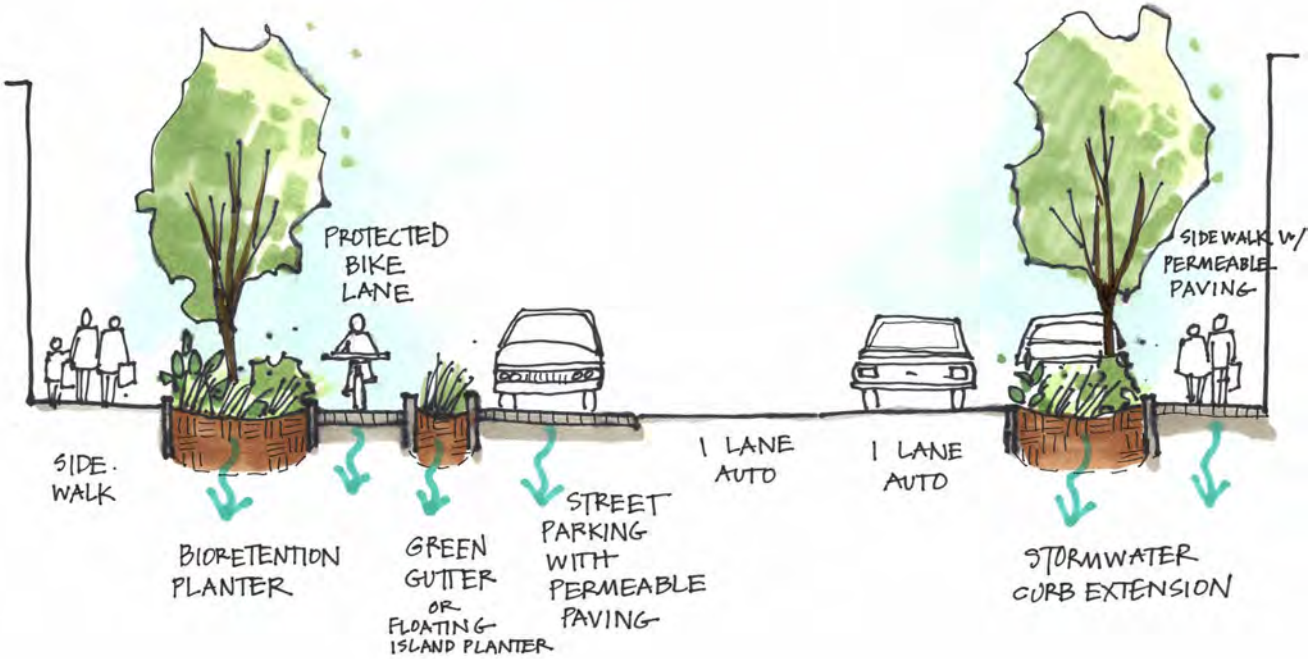
PROTECTED BIKE LANE
SIDEWALK W/ PERMEABLE PAVING
SIDE-WALK
1 LANE AUTO
1 LANE AUTO
BIORETENTION PLANTER
GREEN GUTTER OR FLOATING ISLAND PLANTER
STREET PARKING WITH PERMEABLE PAVING
STORMWATER CURB EXTENSION

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Green Streets

Green stormwater infrastructure (GSI) can be integrated into many, if not all, of the streets located within the Solano Permittees' jurisdictions. For example, through a series of retrofits, ideally coinciding with upcoming capital projects, West Texas Street in Fairfield and Sonoma Boulevard in Vallejo have the potential to transform into Green Streets. The following examples, photos and details provide ideas for how to achieve this transformation from other Cities in northern California incorporating GSI into street right-of-way retrofit projects.

"Green Streets are designed to capture, slow, and treat stormwater runoff. This approach stands in contrast to the traditional approach to stormwater management that uses "gray" infrastructure, designed to expediently collect stormwater runoff from streets through a system of storm drain inlets, pipes, culverts, and storage facilities that eventually dispose of the collected runoff in waterways or treatment facilities." - Sustainable Streets City of San Mateo, February 2015

We can transition the management of stormwater as a nuisance to a resource in the Solano Permitees' arterial, commercial and residential streets by using GSI tools like the ones described in this booklet; stormwater curb extensions, stormwater transit stops, floating island planters and stormwater medians.

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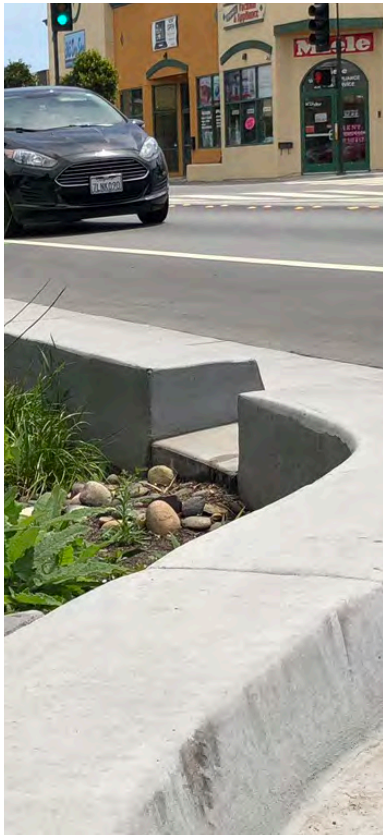
Mable

Broadway Avenue
Seaside, CA

The City of Seaside retrofitted Broadway Avenue from a 4-lane arterial street to a Green Street with two vehicle lanes, bike lanes and green stormwater infrastructure. Stormwater curb extensions integrate bioretention cells that provide traffic calming benefits, are combined with pedestrian crossings, and intercept and infiltrate stormwater runoff from the right-of-way.

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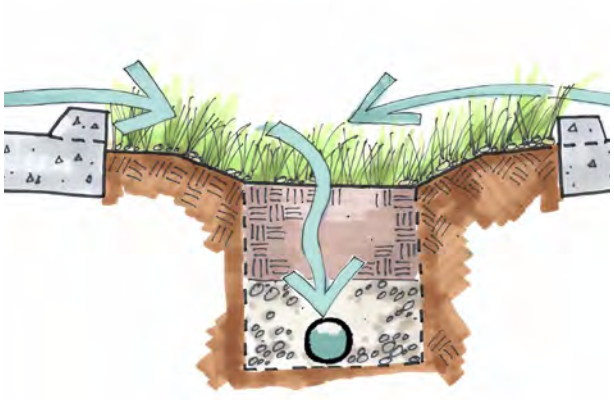

BIORETENTION

An inlet pipe, curb cuts, or sheet flow over an impervious area conveys water into the bioretention feature, where it is filtered prior to infiltration or outflowing via the storm drain system.

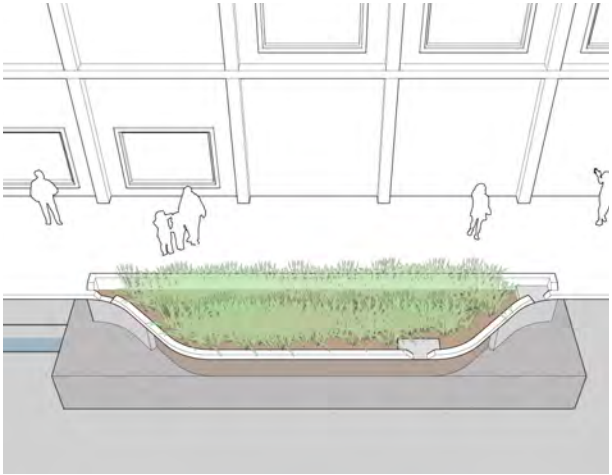

STORMWATER CURB EXTENSIONS

They visually and physically narrow the roadway width, creating safer and shorter crossings for pedestrians and providing traffic calming on low-speed neighborhood streets and commercial corridors. The available space generated by curb extensions can be used for bioretention or biofiltration GSI, plantings, street furniture, benches and street trees.

BIORETENTION BASIN

Roadside Section, Detail 1.1

Bioretention basins allows for infiltration into subsurface soils and can be constructed with or without side walls. Other common terms used to refer to bioretention features include rain gardens, self-retaining areas or biofilters.

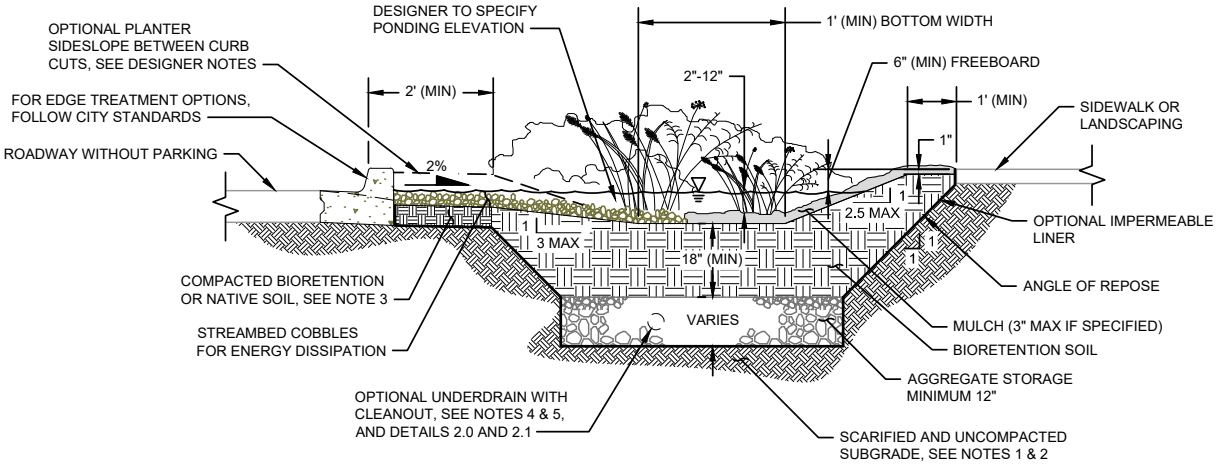

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Shellmound Street
Emeryville, CA

This Green Street retrofit includes stormwater curb extensions, stormwater transit stops, floating island planters and permeable pavement.

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STORMWATER TRANSIT STOP

Incorporating GSI into bulb outs around transit stops reduces runoff, improves water quality and is more efficient compared to bus pull-outs.

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CURB CUTS

Curb cuts can be associated with many different green stormwater infrastructure types. Runoff from impervious surfaces like roads, sidewalks, and trails can be directed into GSI through curb cuts and/or trench drains.

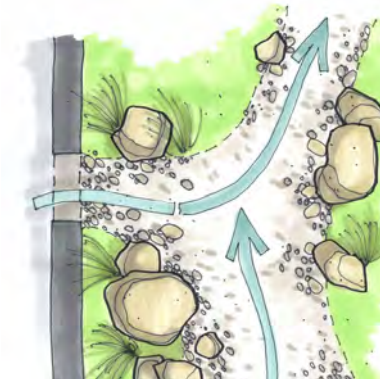

Stormwater enters a bioretention area using curb cuts. Design curb cuts and inflow areas to manage adequate flow.

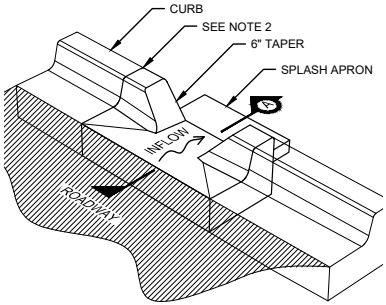

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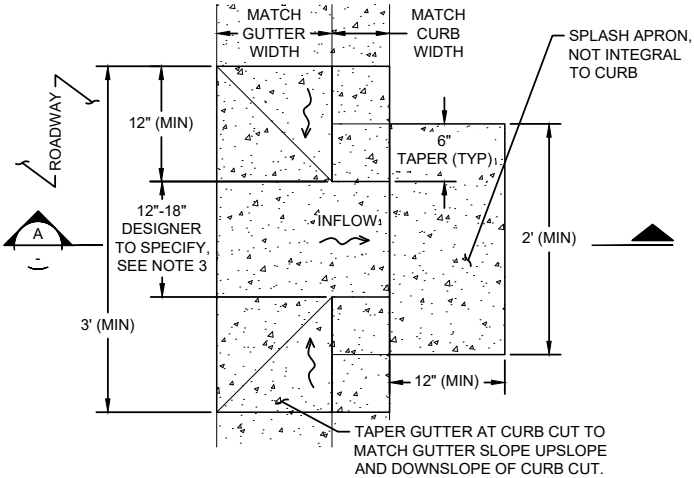

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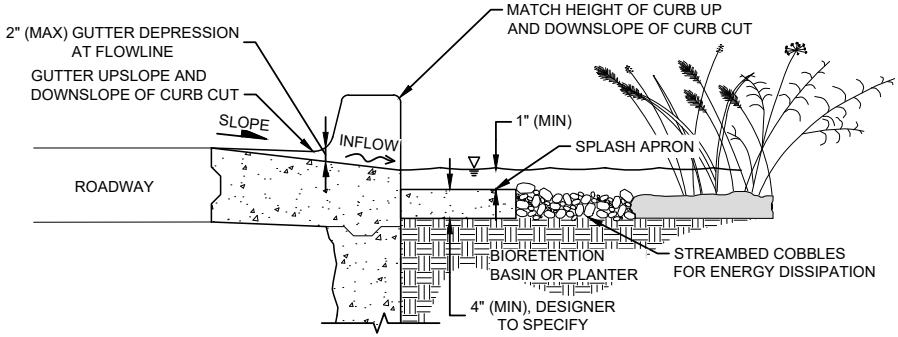

SECTION A

CURB CUT INLET

Typical Detail 3.1

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21st Street
Paso Robles, CA

This Green Street was designed with bikes in mind. Striped bike lanes are included where lane widths allow, with "sharrows" or shared bike/care lanes marked at the narrow lower portion. Bike racks located near businesses make bike errands more convenient.

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STORMWATER MEDIAN

Wide medians used to separate traffic directions can convey and infiltrate large amounts of water. On very wide streets and parkways, green stormwater infrastructure can be coupled with greenways for bicycling and walking, providing attractive public space adjacent to stormwater management.

Runoff from upstream and/or the adjacent roadways and impervious areas can be directed into a bioswale, bioretention, or biofiltration facility located in the median.

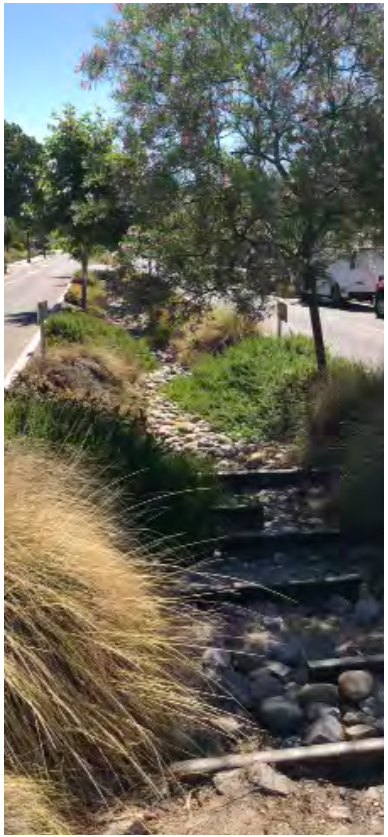

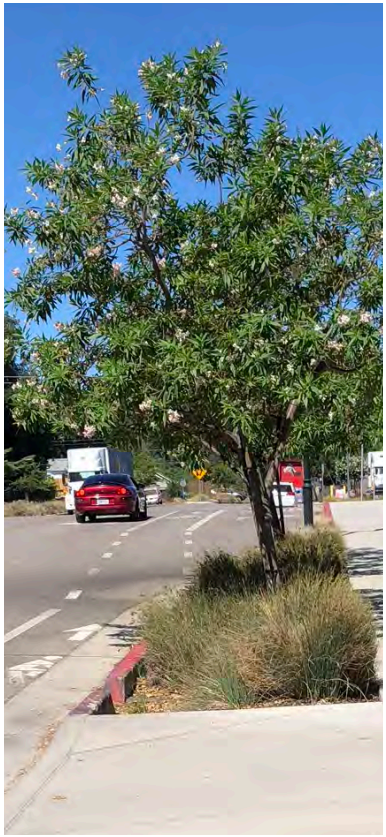

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STORMWATER MEDIANS

Stormwater medians transform a typically unused space in the right-of-way into a multi-functional GSI element that can provide a visual cue to drivers to reduce vehicle speeds. On wide parkways or boulevards, stormwater medians can provide distinctive walkways and inviting public spaces.

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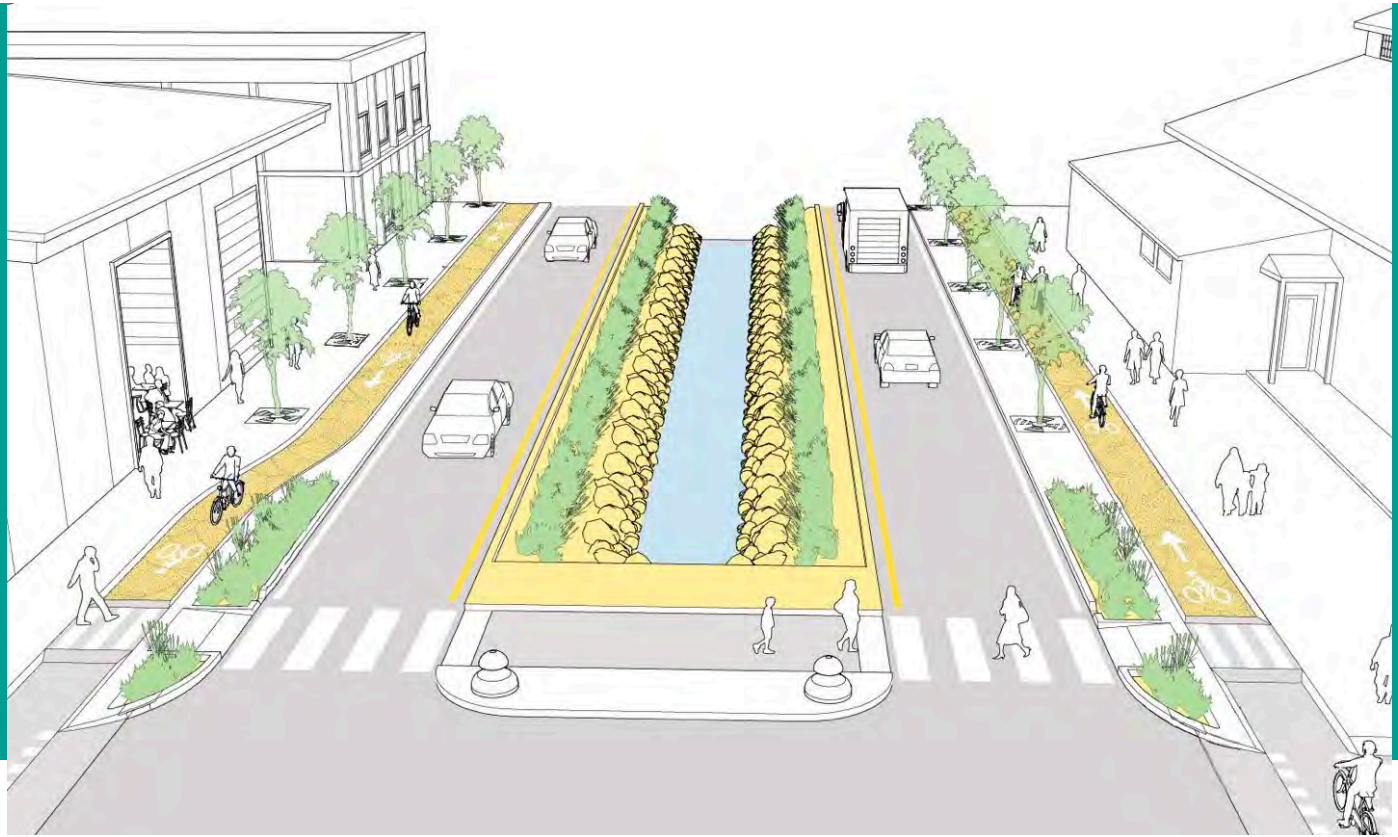

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GSI OUTLETS

Due to the predominance of soils with low infiltration capacity within the Solano Permittees area, most GSI features won't infiltrate to a significant degree and in most cases will require an underdrain and overflow connected to the existing storm drain system.

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OVERFLOW STRUCTURE

Typical Detail 4.3

Stormwater typically is designed to pond up to 6 inches prior to outflow via a surface outlet (e.g., curb cut) or a piped overflow (e.g., overflow inlet and/or underdrain). Safe overflow during large storm events is critical to minimize flooding into the roadway, which can create hazards for street users.

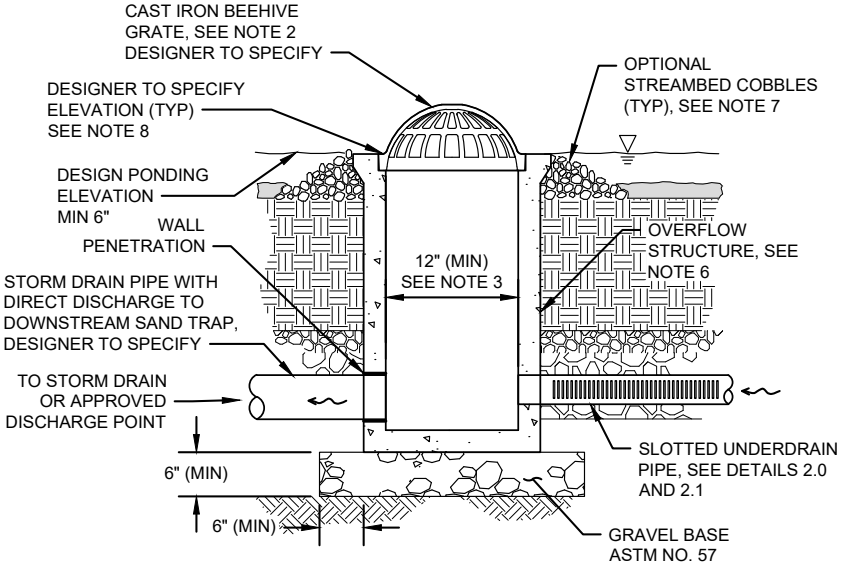

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BIG 5

San Pablo Avenue
El Cerrito, CA

Instead of sending polluted water from the street directly into the storm drain that flows into the San Francisco Bay, openings in the curb let water flow into the bioretention features first. The bioretention cells are lower than the surrounding sidewalk which helps them to catch, retain and clean water.

A challenge when identifying GSI opportunities in street retrofits is finding low points where it is also practical to incorporate GSI. Factors to consider include identifying existing and future gradient and drainage patterns.

A cost effective GSI retrofit in a right-of-way will work with existing and/or proposed gradients and drainage patterns, the storm drain system and utility locations.

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TRENCH DRAINS

Runoff from impervious surfaces like roads, sidewalks, and trails can be directed into GSI features through curb cuts and/or trench drains. Trench drains have the benefit of conveying runoff while still allowing the passage of pedestrians and wheeled vehicles.

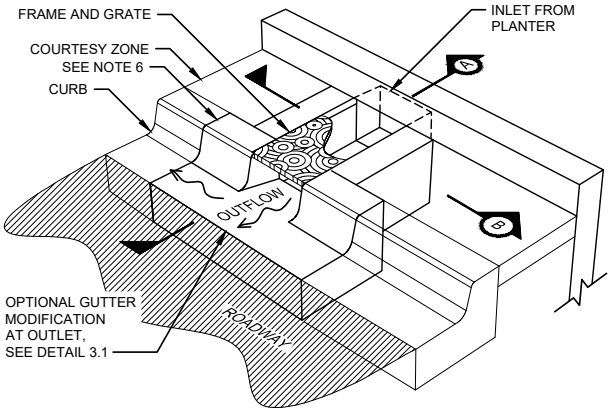

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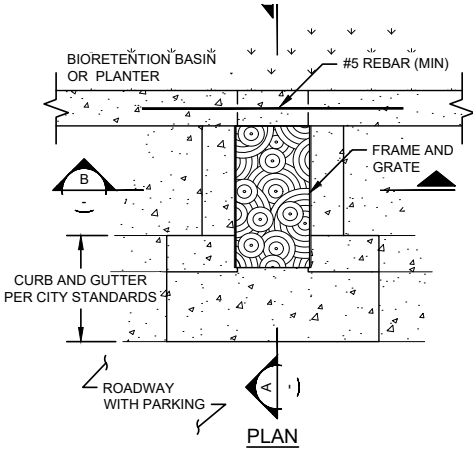

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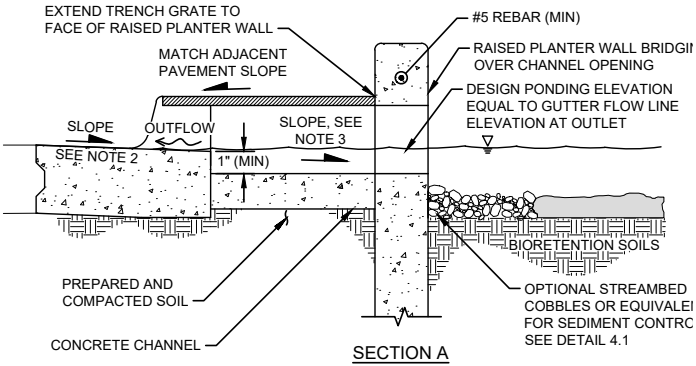

SECTION A

CURB CUT WITH TRENCH

Typical Detail 4.2

Trench drains can be designed as inlets or outlets to a GSI feature.

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WEST TEXAS ST, FAIRFIELD GREEN STREET RETROFIT

CONCEPT SKETCHES

80 ± ROW
32'
32'
7.5' SIDEWALK
8' LANDSCAPE
5' BIKE LANE
3' BUFFER
10' TRAVEL LANE
12' RAISED MEDIAN
10' TRAVEL LANE
8' LANDSCAPE
3' BUFFER
5' BIKE LANE
7.5' SIDEWALK

06194
6235

Can I retrofit this street with Green Stormwater Infrastructure (GSI)?

Are lane widths greater than 10 feet?

- Y → Is it a truck or transit route?
  - Y → Reduce lane width to 11' in each direction
  - N → Reduce lane width to 10' to reduce vehicle speeds, making streets safer while making space available for GSI

Are all vehicle lanes used at capacity?

- N → Convert one lane in each direction to GSI, bicycle lanes, and/or bike lane buffered by floating island planter
- Y → **Is the street crowned?**
  - N → Evaluate for stormwater median
  - Y → Look to the edge of the right-of-way to site floating island planters and stormwater curb extensions at midblock or intersections

Site GSI close to existing drain inlets to facilitate connection to the existing storm drain network

Are the roads and/or sidewalks in need of repair or resurfacing?

- N → Program into CIP pervious pavement replacement of sidewalk, parking strip, crosswalk and/or roadway
- Y → Retrofit with pervious pavement instead of replacing or resurfacing in-kind

Is roadway safety a concern?

- Y → Identify opportunities to plant street trees
- Y → Locate stormwater curb extensions at crosswalks to increase pedestrian visibility and reduce crossing distance

Is it a residential street?

- Y → Site GSI in planting strip between sidewalk and roadway
  - Consult an Arborist if new GSI is proposed near existing mature trees
- Alternate midblock stormwater curb extensions to create a serpentine driving lane to reduce vehicle speeds
- Direct runoff, where feasible, from adjacent arterial or commercial streets to new GSI in the right-of-way

Is parking angled?

- Y → Convert to parallel parking to make space for: wider pervious pavement walkways, bike lanes and/or... Green stormwater infrastructure (stormwater curb extensions and floating island planters

Use walled or planter style bioretention if space is constrained and incorporate walls into seating or other placemaking elements

WATERISTAS
URBAN WATER DESIGN • ENGINEERING COLLABORATIVE

06195
6236

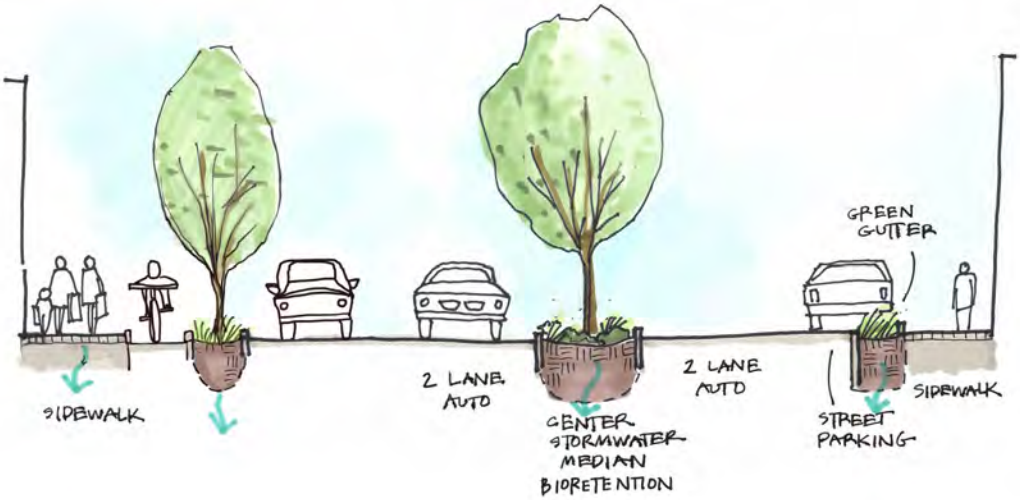

RESILIENT URBAN SPACES

To build more resilient urban spaces we need to reimagine our asphalt and concrete sidewalks and streets as sites for sustainable stormwater management. Every realm in the public right-of-way is an opportunity to incorporate green stormwater infrastructure that also can calm traffic and make way for walking, biking and public space.

Green Streets will allow projects to provide a range of functions and benefits, such as stormwater management, bicycle and pedestrian mobility and safety, public green space and urban forestry.

06196
6237

GSI Concept Plans

06197

6238

VALLEJO CONCEPT #1 - CITY HALL/ LIBRARY PARKING LOT GSI RETROFIT

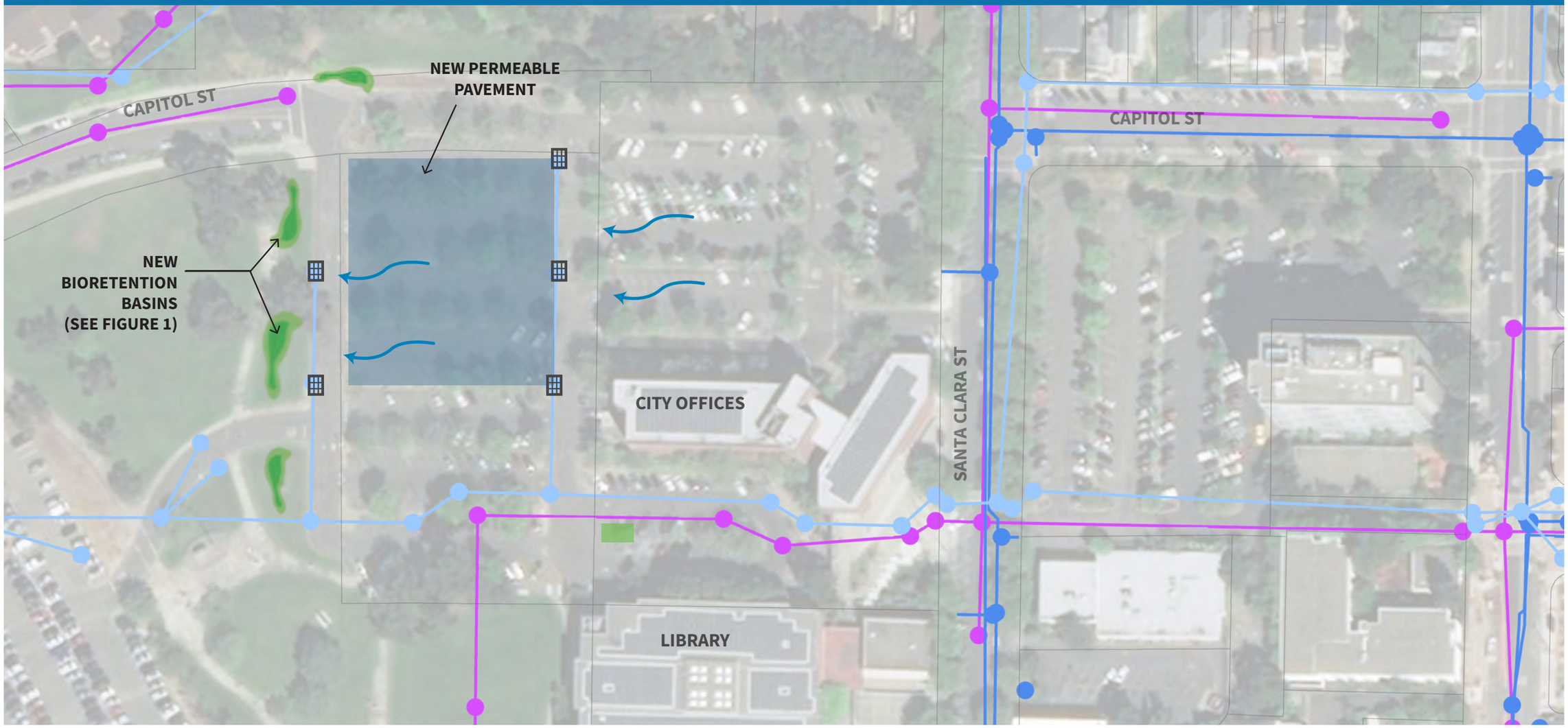

Legend

- Flow of Water
- Permeable Pavement
- Bioretention & Bioinfiltration Basin
- Parking Lot Bioretention & Biofiltration
- Stormwater Inlet
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 60 120 240 Feet

N

06198
6239

Vallejo Concept #1 - City Hall/ Library Parking Lot GSI Retrofit

FIGURE 1. Bioretention Basin

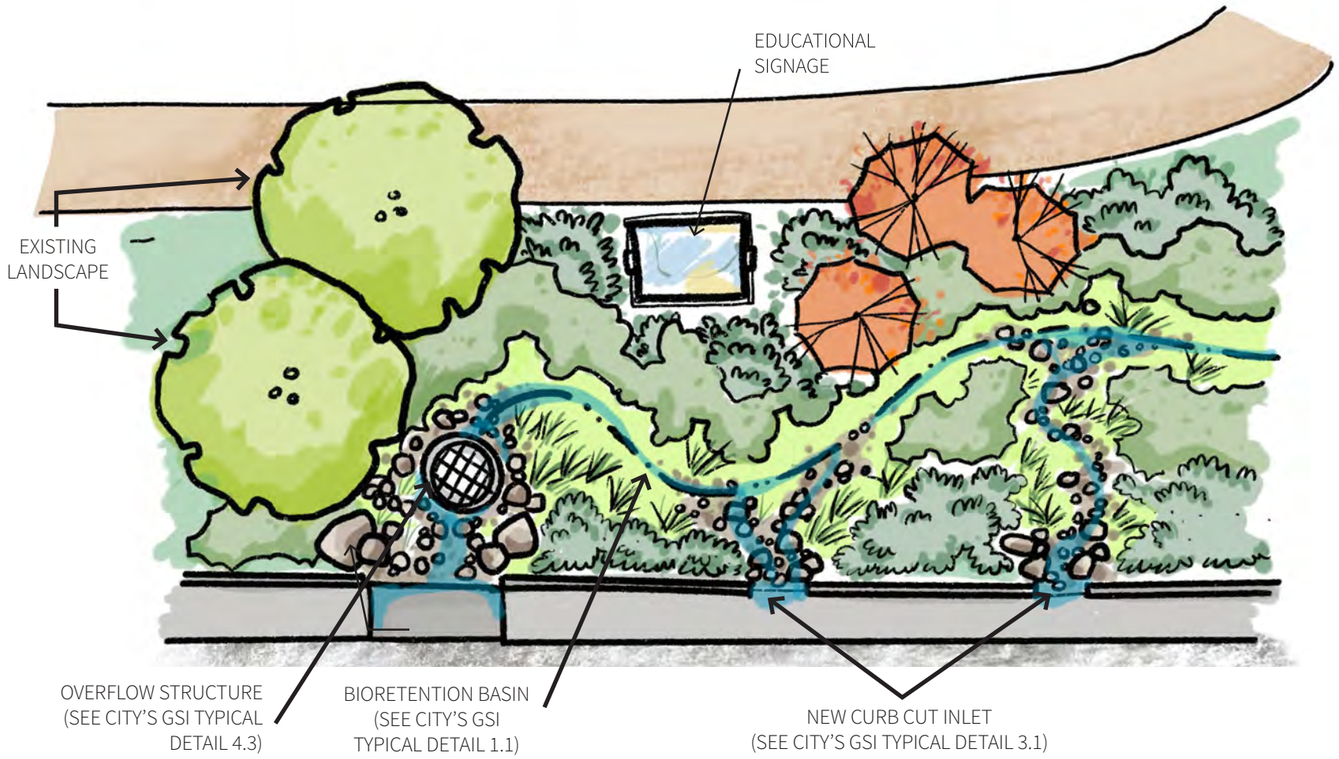

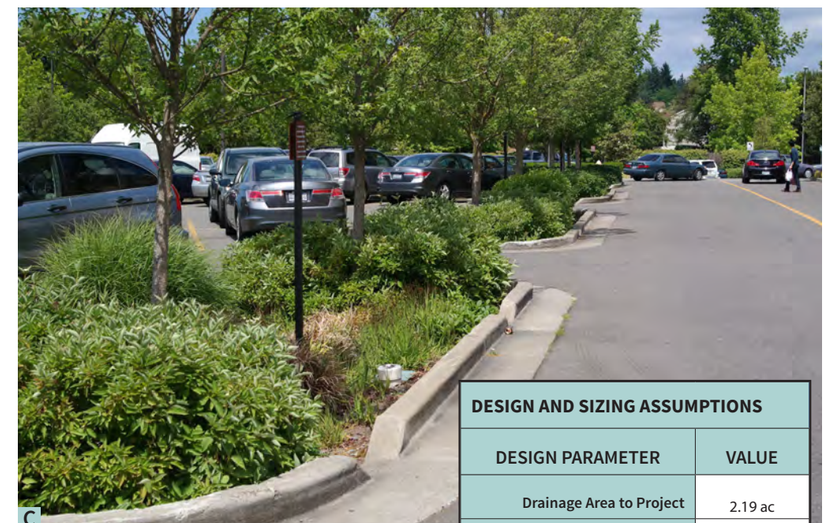

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure. These improvements will reduce the amount of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The existing parking lot proposed for replacement with permeable pavement is approximately 1 acre, in poor condition, and rarely used. The parking lot slopes towards an irrigated turf area to the west, that is well suited for conversion to a series of bioretention basins to slow and treat runoff from the parking area and educate City residents about the value and multiple benefits of green stormwater infrastructure.

The proposed project would add curb cuts along the western edge of the parking lot to direct the runoff into new bioretention basins that would replace the irrigated turf.

Stormwater Management Strategy

The bioretention areas have been designed to provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The bioswales will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswales are designed to manage in excess of the 1.5-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches. The stormwater will be treated through the bioretention soil bed media, and then allowed to infiltrate through the native soils to the underlying groundwater.

Future evaluation of this concept should consider cost effective permeable pavement alternatives, appropriate for low use sections of the parking lot.

Photos:

A. Native grass lined swale allows for treatment and infiltration of stormwater. **B.** Gravel lined swales provide an infiltration and conveyance path. **C.** New tree plantings and green stormwater infrastructure plant mixes provide infiltration areas, erosion control, and habitat in parking areas.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	2.19 ac
Bioswale Area	4,445 sq-ft
Treatment Area / Drainage Area	4.7%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.71
Area-weighted Abstraction	0.11 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	3,120 ft^3
Approximate Impervious Area Disconnection	1.9 ac

VALLEJO CONCEPT #2 - CITY PARKING LOT H

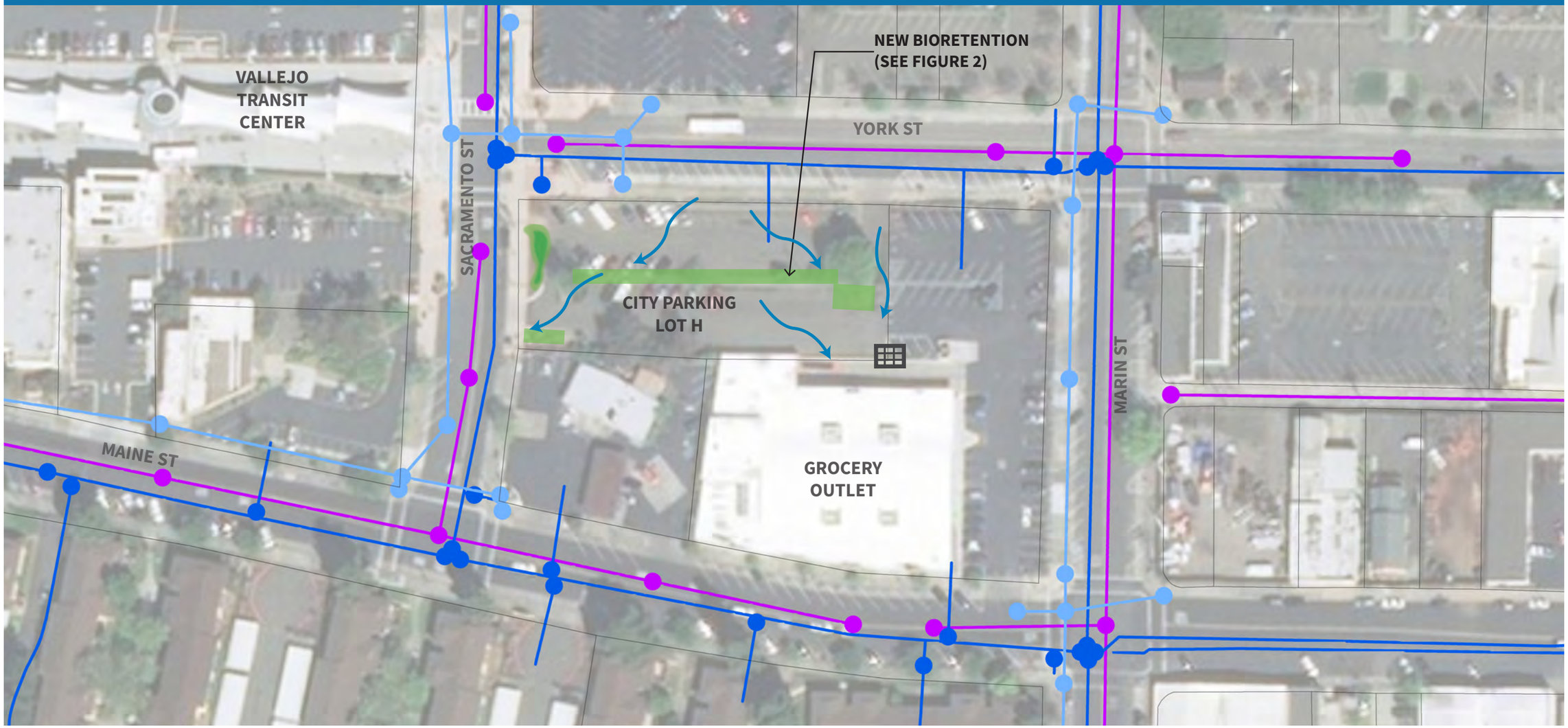

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Parking Lot Bioretention & Biofiltration
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 50 100 200 Feet

N

06200
6241

Vallejo Concept #2 - City Parking Lot H

FIGURE 2. Parking Lot Bioretention

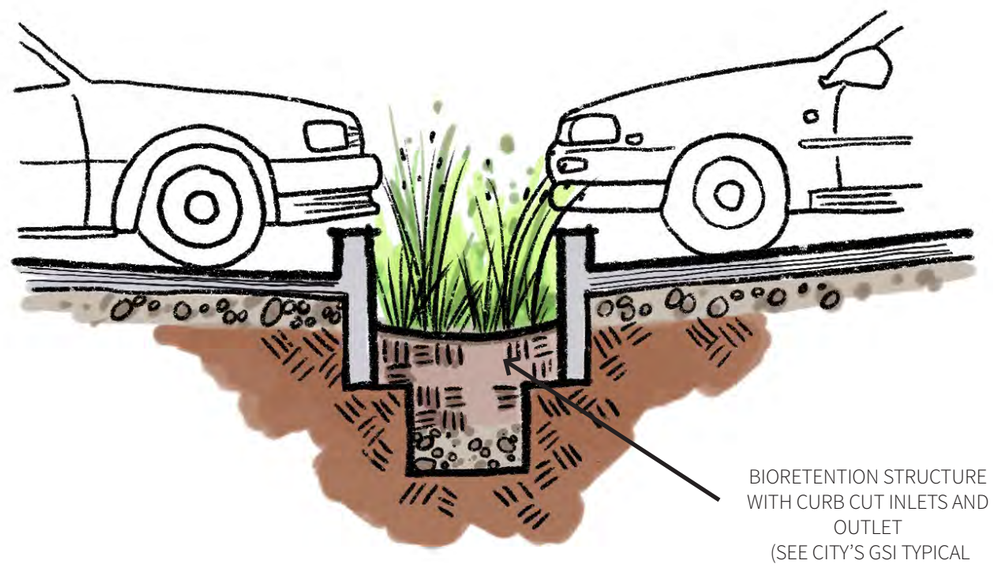

DESIGN AND SIZING ASSUMPTIONS	
DESIGN PARAMETER	**VALUE**
Drainage Area to Project	0.72 ac
Bioretention Area	3,030 sq-ft
Treatment Area / Drainage Area	9.7%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.75
Area-weighted Abstraction	0.11 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	1,100 ft^3
Approximate Impervious Area Disconnection	0.7 ac

Photos:

A. Parking lot bioretention providing stormwater treatment and shade trees.
B/C. Before and after example of a parking lot retrofit to provide stormwater treatment using bioretention located between parking stalls.

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The existing parking lot is approximately 0.72 acres with a narrow island between the parking bays and standard drainage infrastructure including curbs and gutters that allow the runoff to flow off the site and into the storm drain system. This area is well suited to be converted to bioretention to slow and treat runoff from the parking area.

The proposed project would add bioretention features between parking stalls and within unused areas by using curb cuts and removing existing impervious surfaces.

Stormwater Management Strategy

The green stormwater infrastructure features have been designed to provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The features will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswales are designed to manage in excess of the 2.75-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches. The stormwater will be treated through the bioretention soil bed media, and then allowed to infiltrate through the native soils to the underlying groundwater or overflow into the existing storm drain system.

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VALLEJO CONCEPT #3 - MONO STREET CORPS YARD

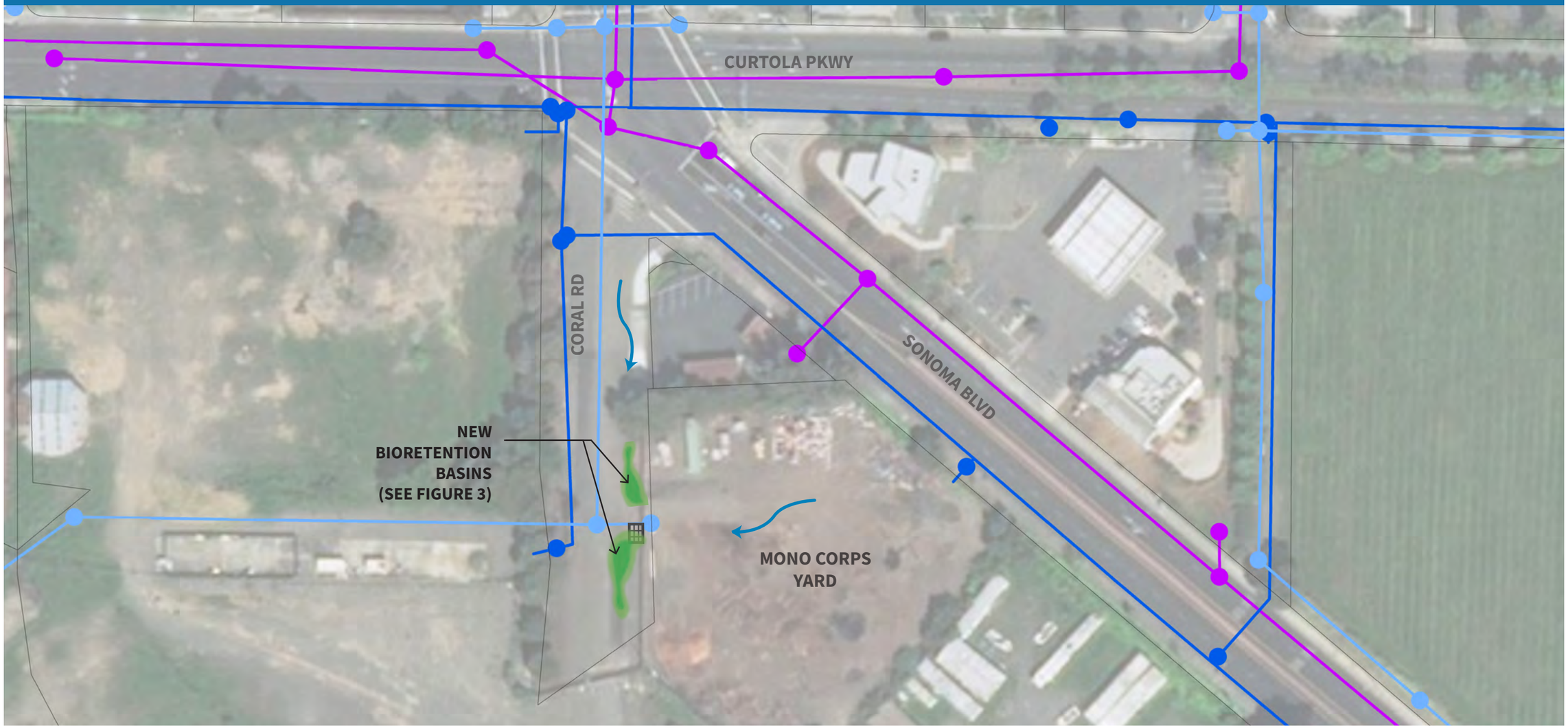

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 50 100 200 Feet

N

06202
6243

Vallejo Concept #3 - Mono Street Corps Yard

FIGURE 3. Bioretention Basins Adjacent to Roadway

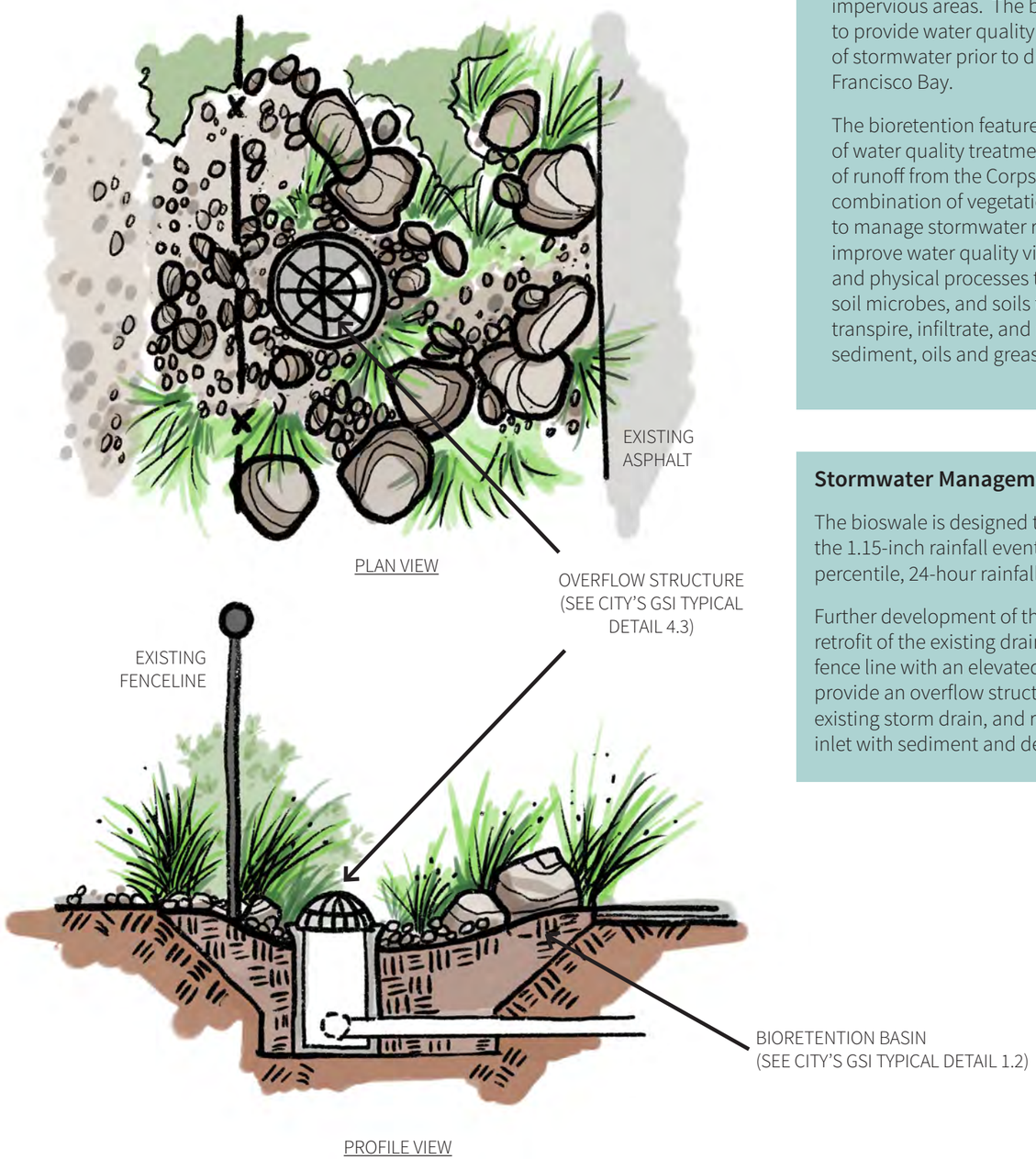

Project Description

The proposed green stormwater infrastructure area is located to collect and treat runoff from the City's Mono Street Corps Yard and adjacent impervious areas. The bioretention area is sized to provide water quality treatment and retention of stormwater prior to discharge into the San Francisco Bay.

The bioretention features will provide a high level of water quality treatment and on-site retention of runoff from the Corps Yard. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The project will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

Stormwater Management Strategy

The bioswale is designed to manage in excess of the 1.15-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches.

Further development of this GSI concept will include retrofit of the existing drain inlet along the corps yard fence line with an elevated cast iron beehive grate, to provide an overflow structure with connection to the existing storm drain, and reduce clogging of the drain inlet with sediment and debris.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	1.54 ac
Bioretention Area	1,250 sq-ft
Treatment Area / Drainage Area	1.9%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.40
Area-weighted Abstraction	0.16 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	1,150 ft^3
Approximate Impervious Area Disconnection	0.6 ac

Photos:

A/B. Riparian and native flowering plants adjacent to bioretention features.

06203
6244

SUISUN CITY CONCEPT #1 - AMTRAK PARK & RIDE

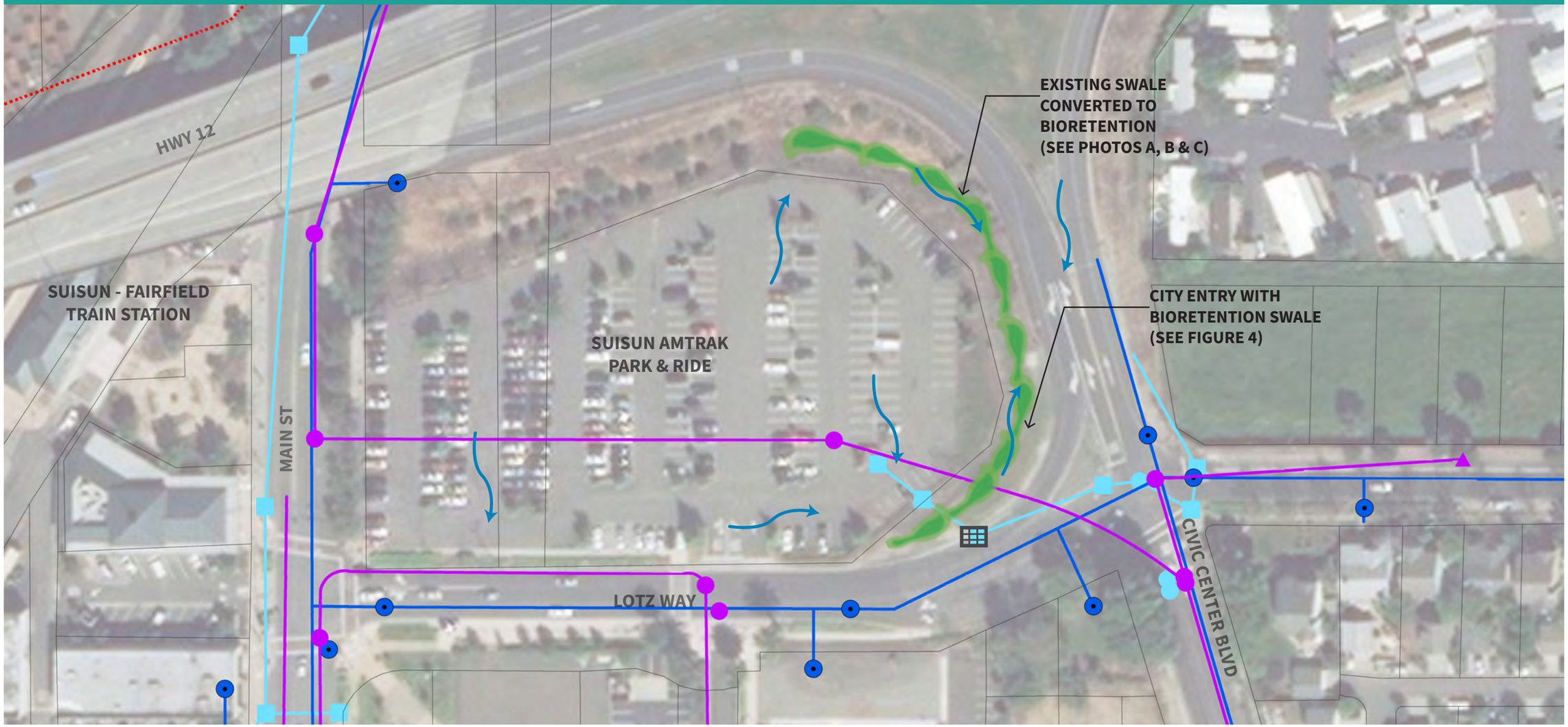

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

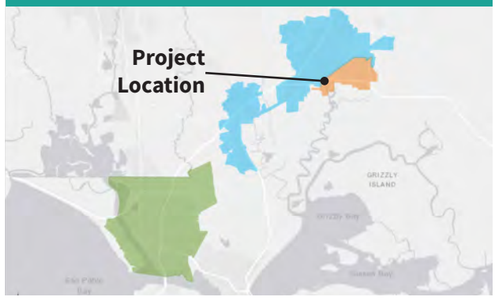

0 50 100 200 Feet

N

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Suisun City Concept #1 - Amtrak Park & Ride

FIGURE 4. City Entry with Bioretention Swale

NEW CURB CUTS TO CREATE POSITIVE DRAINAGE TOWARDS SWALE (SEE CITY'S GSI TYPICAL DETAIL 3.1)

BIORETENTION BASIN (SEE CITY'S GSI TYPICAL DETAIL 1.2)

DESIGN AND SIZING ASSUMPTIONS	
DESIGN PARAMETER	VALUE
Drainage Area to Project	3.65 ac
Bioswale Area	4,740 sq-ft
Treatment Area / Drainage Area	3%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.56
Area-weighted Abstraction	0.14 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	4,275 ft^3
Approximate Impervious Area Disconnection	2.3 ac

Photos:

A. Native grasses and boulders provide transition to existing landscape and convey stormwater.
B/C. Native grass lined bioretention swales convey stormwater and allow for treatment and infiltration.

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure, while creating a welcoming entry into the City. The improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff.

The existing drainage area is approximately 3.65 acres with narrow landscaped islands between the parking bays and standard drainage infrastructure including curbs, gutters, and curb inlets that allow the runoff to flow into the storm drain system. The parking lot slopes towards a grass swale on the eastern perimeter of the parking lot, that is well suited for conversion into a bioretention swale to slow and treat runoff from the parking area.

Stormwater Management Strategy

The bioretention features will provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The bioswale will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswale is designed to manage in excess of the 1.25-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.71-inches.

Further development of this GSI concept can evaluate potential to:

1. Re-orient parking aisles and spaces to increase the number of parking spaces while also accommodating additional bioretention features;
2. Include curb cuts from State Route 12 off-ramp to increase treatment potential;
3. Remove asphalt in low-use areas of the parking lot; and
4. Convey runoff from high flow events.

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SUISUN CITY CONCEPT #2 - CIVIC CENTER / DRIFTWOOD DRIVE PARKING LOT

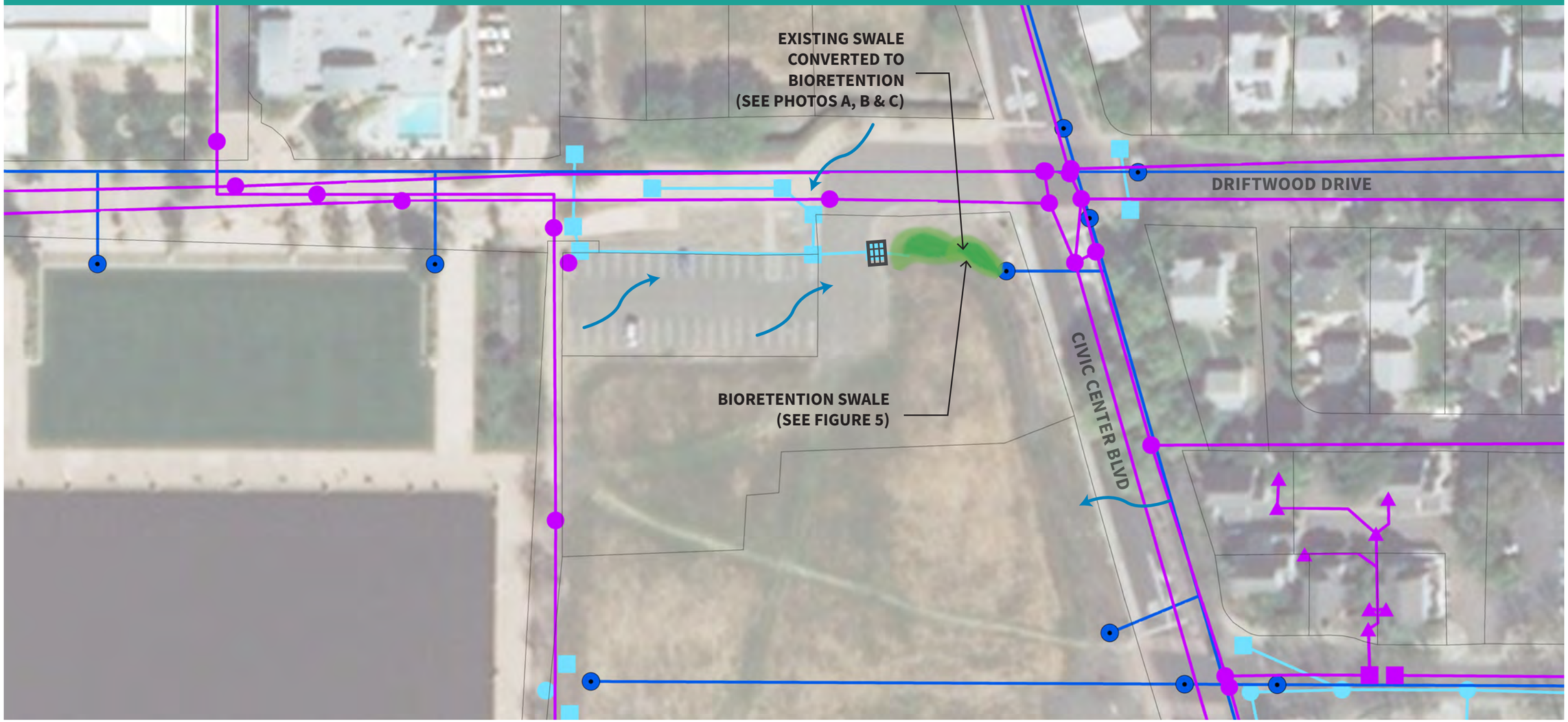

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

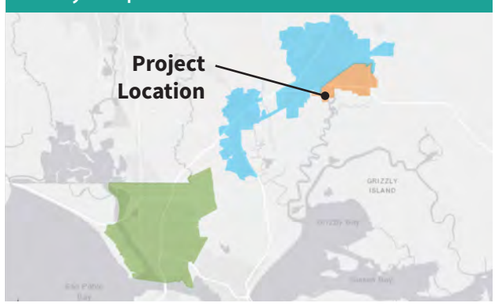

0 40 80 160 Feet

N

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6247

Suisun City Concept #2 - Civic Center / Driftwood Drive Parking Lot

FIGURE 5. Entryway with Bioretention Swale

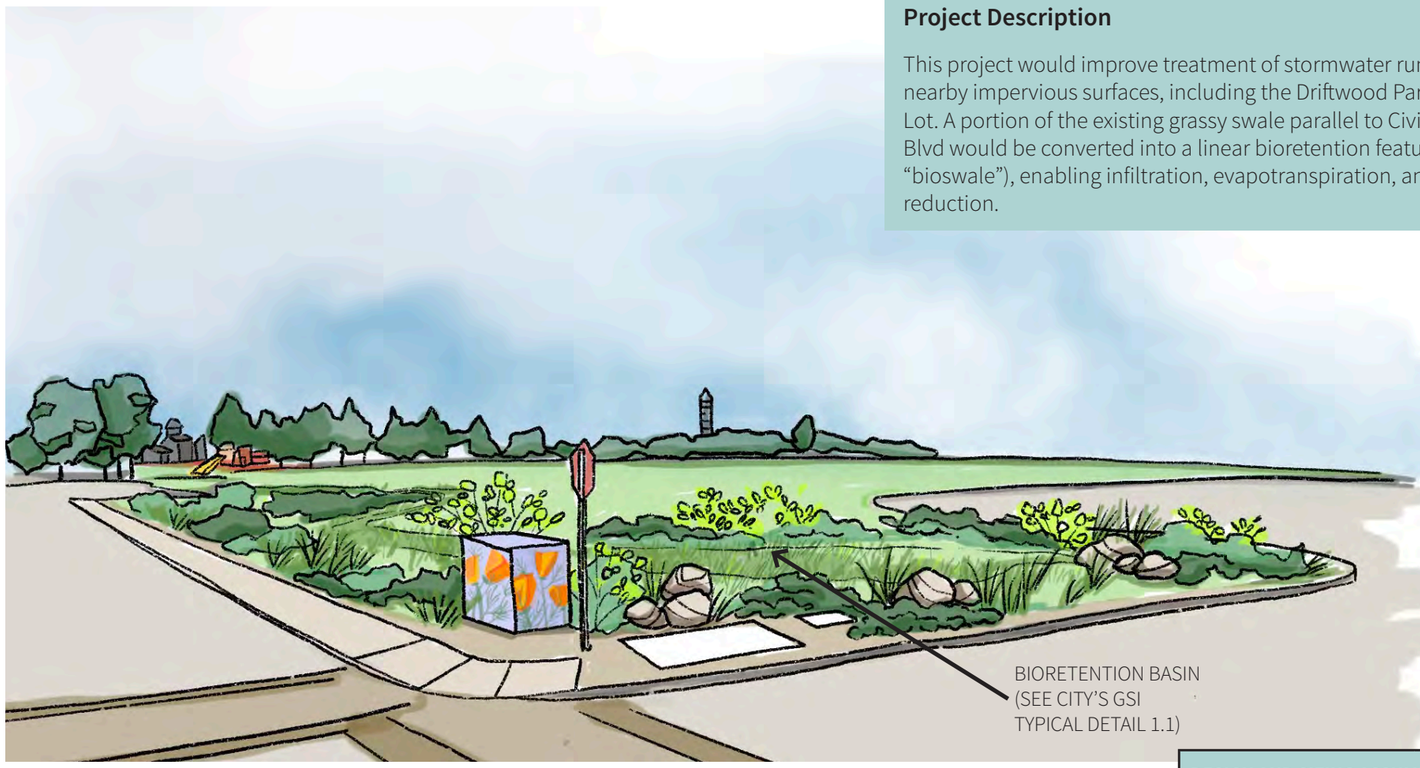

Project Description

This project would improve treatment of stormwater runoff from nearby impervious surfaces, including the Driftwood Parking Lot. A portion of the existing grassy swale parallel to Civic Center Blvd would be converted into a linear bioretention feature (aka "bioswale"), enabling infiltration, evapotranspiration, and runoff reduction.

Photos:

A. Native grasses planted at perimeters of bioretention features.

B. Natural plantings and boulders provide erosion control and provide habitat at basin edges.

C. Native grass lined swale and basin allow for infiltration and treatment of stormwater.

Stormwater Management Strategy

The drainage area is approximately 0.75 acres with an average runoff coefficient of 0.49. Assuming the bioswale inundation area is sized to be 5% of the drainage area with a soil profile of 24 inches available for water storage, the system would be capable of treating up to a design storm of 2.4 inches (greater than the 85th percentile 24 hour design storm depth of 0.71 inches).

Overflow from the bioswale would be directed back to the existing storm drain and designed to prevent ponding in the bioswale for more than 24 hours.

Further development of this GSI concept will need to be coordinated with any future plans for the property.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	0.75 acres
Bioswale Area	1,715 sq-ft
Treatment Area / Drainage Area	5.3%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.49
Area-weighted Abstraction	0.15 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	750 ft^3
Approximate Impervious Area Disconnection	0.4 ac

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6248

Concept Plan Cost Estimates

METHODOLOGY

A planning level cost estimate was prepared for each of the five (5) individual Concept Plans. The cost estimate includes necessary planning, design, permits, construction, and operation and maintenance, energy, and post construction performance monitoring. A Complexity cost multiplier was applied to each project to capture additional costs associated with known project constraints related to biologic, resource, and/or geologic constraints.

Table 1 summarizes the preliminary planning level cost estimates that will be further evaluated and updated as the project concepts are further developed.

Table 1. Preliminary Planning Level Cost Estimates

Cost Estimates			Project									
			Vallejo Concept #1		Vallejo Concept #2		Vallejo Concept #3		Suisun City Concept #1		Suisun City Concept #2	
Capital Costs			City Hall/ Library Parking Lot GSI Retrofit		City Parking Lot H		Mono Street Corps Yard		Amtrack Park & Ride		Civic Center / Driftwood Drive Parking Lot	
Description	Unit	Unit Price	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost
Mobilization/Demobilization	LS	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000
Excavation	CY	$20	3000	$60,000	400	$8,000	200	$4,000	0	$0	0	$0
Offhaul and Disposal	CY	$20	3000	$60,000	400	$8,000	200	$4,000	0	$0	0	$0
Inlet/Outlet	EA	$15,000	3	$45,000	2	$30,000	1	$15,000	2	$30,000	1	$15,000
Pipeline	LF	$100	0	$0	0	$0	0	$0	0	$0	0	$0
Manhole	LS	$5,000	0	$0	0	$0	0	$0	0	$0	0	$0
Staging and Demolition	SF	$5	2300	$11,500	1600	$8,000	200	$1,000	1800	$9,000	700	$3,500
Erosion Control	SF	$1	4500	$4,500	3100	$3,100	400	$400	7110	$7,110	2580	$2,580
Landscaping	SF	$15	4500	$67,500	3100	$46,500	1260	$18,900	7110	$106,650	2580	$38,700
Hardscape Improvements	LF	$25	200	$5,000	500	$12,500	0	$0	400	$10,000	0	$0
Permeable Pavement	SF	$10	21780	$217,800	0	$0	0	$0	0	$0	0	$0
Subtotal Costs				**$476,300**		**$121,100**		**$48,300**		**$167,760**		**$64,780**
Contingency	20%			$95,260		$24,220		$9,660		$33,552		$12,956
Complexity			20%	$95,260	20%	$24,220	15%	$7,245	15%	$25,164	5%	$3,239
Engineering Design	15%			$71,445		$18,165		$7,245		$25,164		$9,717
Construction Management	10%			$47,630		$12,110		$4,830		$16,776		$6,478
Administrative, Permitting, and Legal	10%			$47,630		$12,110		$4,830		$16,776		$6,478
		TOTAL		**$833,525**		**$211,925**		**$82,110**		**$285,192**		**$103,648**
Planning Level Cost Estimate Range	(+)	50%		$1,250,288		$317,888		$123,165		$427,788		$155,472
	(-)	35%		$541,791		$137,751		$53,372		$185,375		$67,371
O&M Costs												
Labor	hr	$50	96	$4,800	96	$4,800	48	$2,400	96	$4,800	96	$4,800
Material	EA	$500	1	$500	1	$500	1	$500	1	$500	1	$500
Monitoring and Reporting	hr	$100	4	$400	4	$400	4	$400	4	$400	4	$400
		TOTAL		**$5,700**		**$5,700**		**$3,300**		**$5,700**		**$5,700**
Equivalent Annual Cost												
Interest	i	0.05	$72,590		$22,710		$9,890		$28,590		$14,020	
Years	n	20										

FAIRFIELD CONCEPT #1 - WATERMAN BLVD GREEN STREET.

Project Description

The proposed project will retrofit an existing sidewalk and landscape strip along the north side of Waterman Blvd. with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The length of sidewalk proposed for retrofit is approximately 4,250 feet long and currently includes standard drainage infrastructure; curbs and gutters that allow runoff to flow into the storm drain system. This area is well suited for retrofit because of the need for sidewalk repairs.

The proposed project would add bioretention features between the existing roadway and sidewalk, at strategic locations along the retrofit corridor. Stormwater would enter the bioretention areas via curb cuts and overflow would be directed back into the storm drain system.

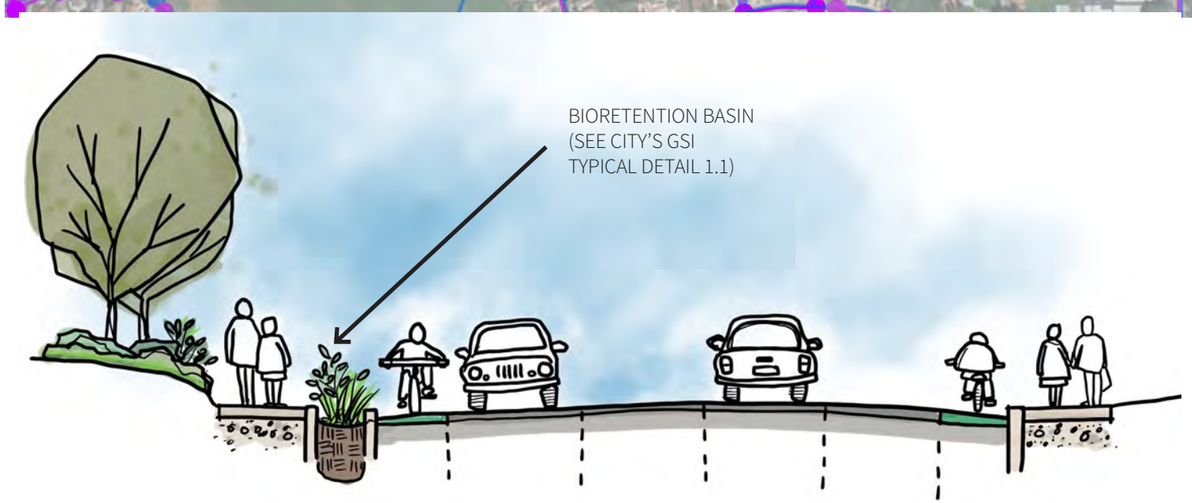

0 300 600 1,200 Feet

N

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water
- Green Street Retrofit

Key Map

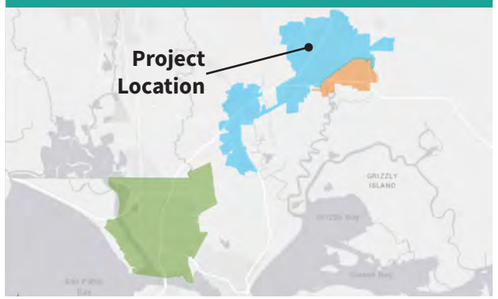

Photo:
From this example green street in Seaside, CA, curb cuts (see City detail 3.1) direct road runoff into the new brioretention area for infiltration and treatment of stormwater.

06209
6250

FAIRFIELD CONCEPT #2 - CEMENT HILL RD GREEN STREET

Photo: Existing sidewalk condition on north/northwest side of Cement Hill Road, proposed for retrofit with GSI.

Project Description

The proposed project will retrofit an existing sidewalk and landscape strip along the north / northwest side of Cement Hill Road with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The length of sidewalk proposed for retrofit is approximately 4,000 feet long and currently includes standard drainage infrastructure; curbs and gutters that allow runoff to flow into the storm drain system. This area is well suited for retrofit because of the need for sidewalk repairs and to provide safe access to Fairfield High School. The proposed project would add bioretention features between the existing roadway and sidewalk.

Existing street tress along Cement Hill Road are not well suited to the available space or climate, and at many locations roots are causing sidewalk upheaval and uneven surfaces. Based on an initial evaluation, if not removed and replaced the existing trees will likely continue to obstruct the path of travel, their health decline, and require significant additional maintenance in the next 10 years.

Assessment by a qualified arborist is recommended as a next step to identify those trees unsuitable for long-term survival, that should removed and replaced with appropriate species. New bioretention features would be constructed within newly available spaces and replacing damaged sidewalk areas. Stormwater would enter the bioretention areas via curb cuts and overflow would be directed back into the storm drain system.

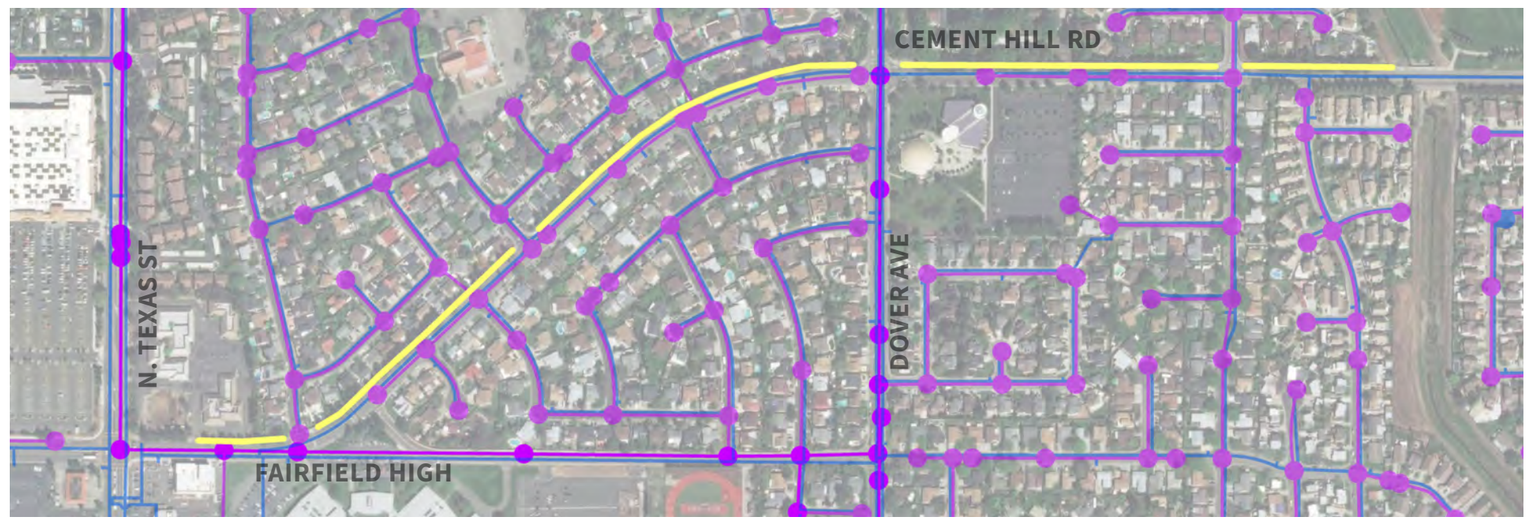

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water
- Green Street Retrofit

Key Map

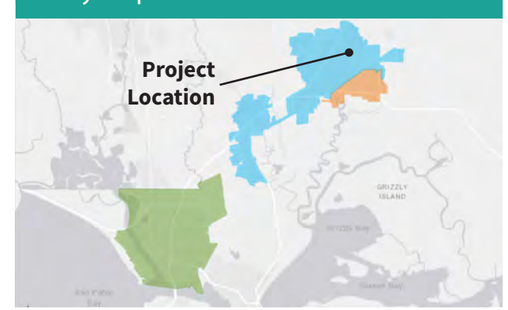

0 250 500 1,000 Feet

N

FAIRFIELD CONCEPT #3 - PG&E SUBSTATION

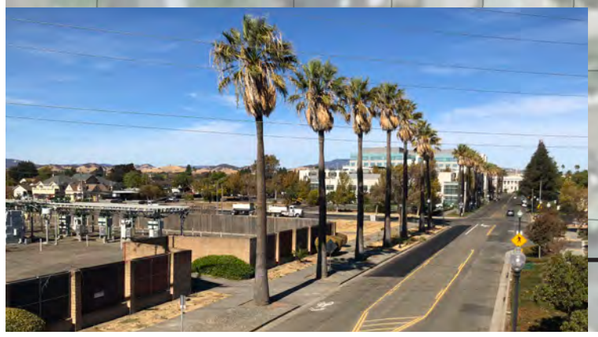

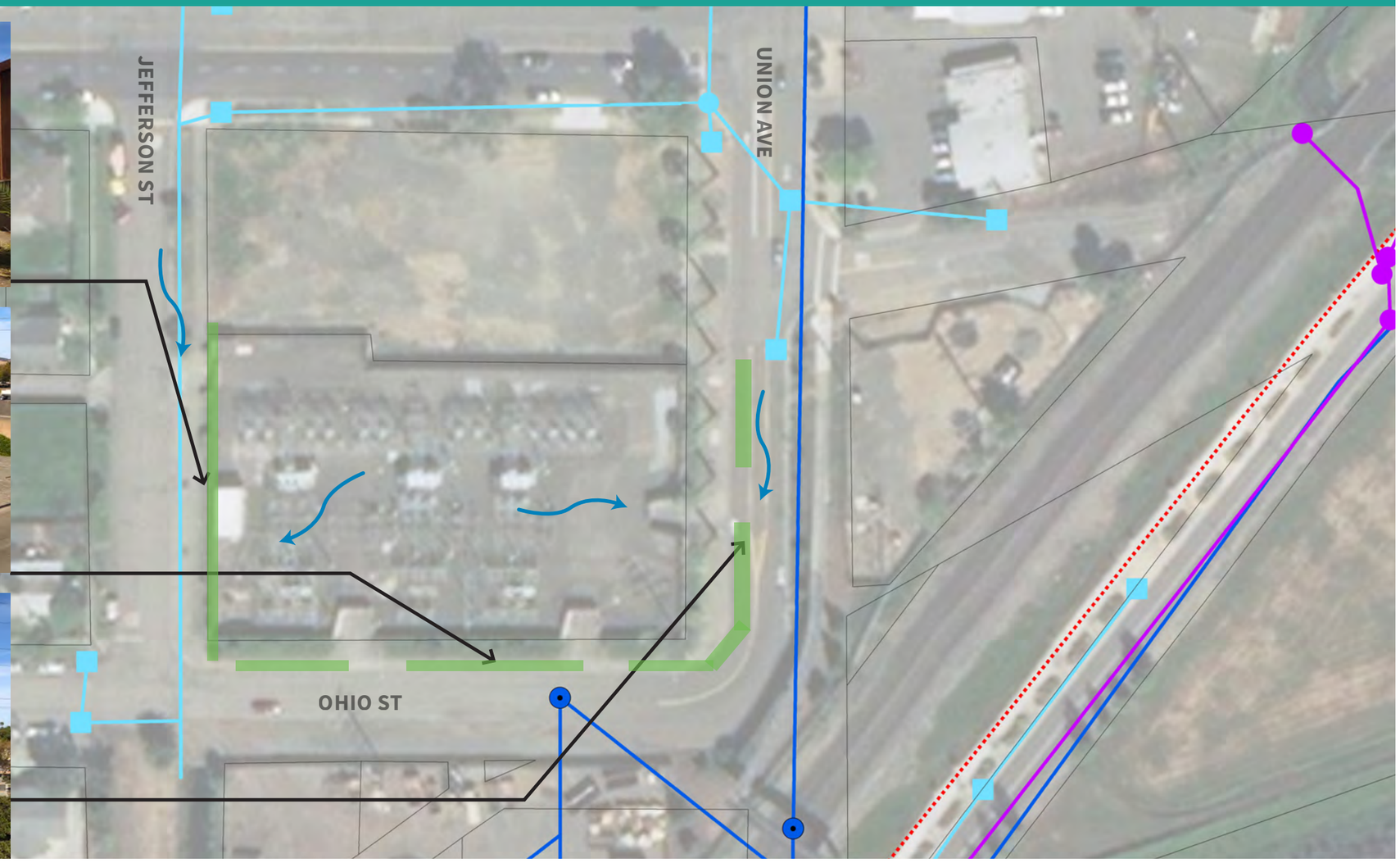

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

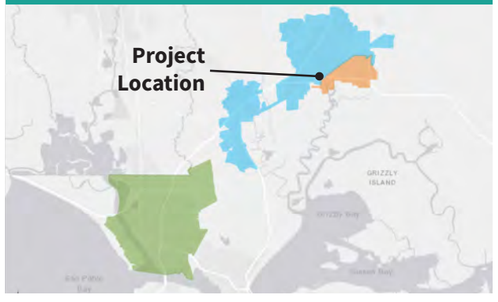

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06211
6252

GSI Standard Specification and Design Details

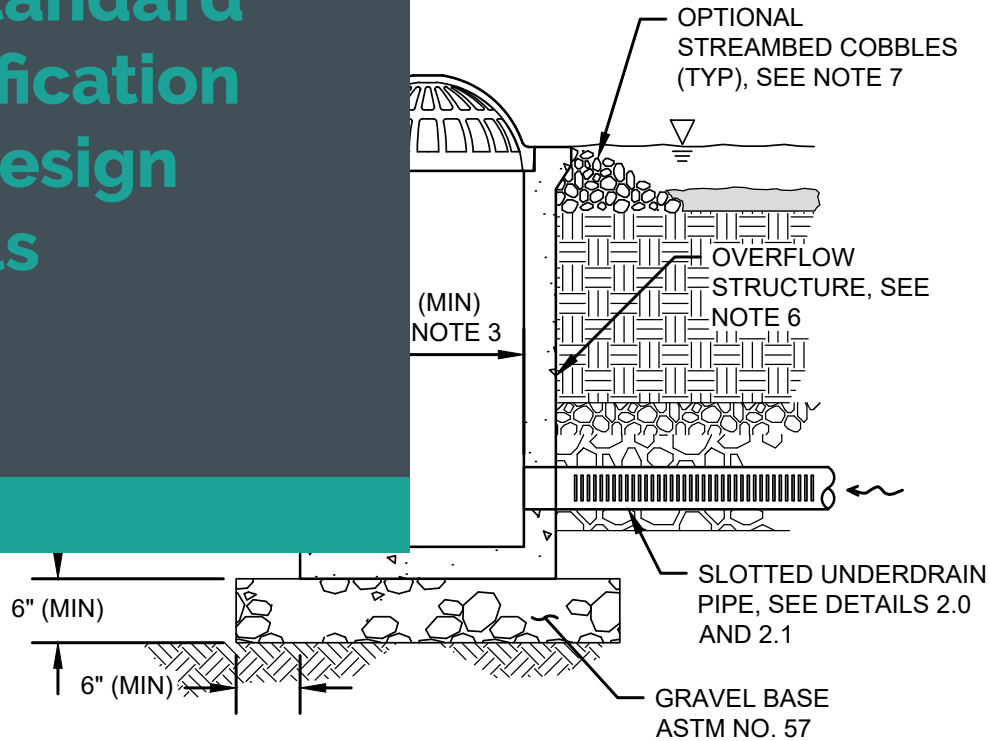

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GREEN STORMWATER INFRASTRUCTURE STANDARD SPECIFICATION AND DESIGN DETAILS

These green stormwater infrastructure details and specifications have been selected to support integration of GSI into standard practices, for example in street design, municipal capital projects, and to support private development review. Implementation of a GSI strategy will require cross departmental coordination with planning, operations and maintenance. These details and specifications can support the design and construction of GSI practices in the Permittees jurisdictions.

How to use these GSI typical details[20]

These typical details and specifications were developed to be revised and customized as needed for each individual project by design professionals. They show typical configurations, rather than a required city standard configuration. This distinction is deliberate. We recognize that to create functional, contextual, and aesthetic green infrastructure projects, design professionals must use their professional judgment and creative thinking to be responsive to each site-specific condition.

AutoCAD drawings of these typical details are provided so that design professionals must modify the plan, sections, call-outs, and/or construction notes to address the projects site-specific conditions.

These typical details are formatted, organized, and developed with the necessary informational tools to guide the design professional through the proper selection, layout, and design of GSI best management practices (BMPs) and the selection of appropriate site-specific BMP component details (i.e., inlets, outlets, and edge treatments, etc.).

Design professionals using the AutoCAD drawings must review and adjust the details and construction notes to address their site-specific conditions . To allow for site-specific design adjustments the typical details are developed as "not for construction" drawings. Title blocks are provided for document organization and reference only.

Design Detail	Detail Number
Bioretention & Biofiltration Basins	
Designer Notes	1.0
Roadside Section	1.1
Parcel Section	1.2
Bioretention & Biofiltration Components - Underdrains	
Designer Notes	2.0
Underdrains	2.1
Bioretention & Biofiltration Components - Inlets	
Designer Notes	3.0
Curb Cut Inlet	3.1
Bioretention & Biofiltration Components - Outlets	
Designer Notes	4.0
Curb Cut Outlet	4.1
Outlet Curb Cut with Trench Drain	4.2
Overflow Structure	4.3
Permeable Plavement	
Designer Notes (1/2)	5.0
Designer Notes (2/2)	5.1
Key Map	5.2
Paver Section	5.3
Pervious Concrete Section	5.4
Porous Asphalt Section	5.5

SPECIFICATIONS

Specifications for Bioretention, Pervious Concrete, Porous Asphalt, and Permeable Pavers are located in Appendix A.

20 Adapted from Green Infrastructure Typical Details, SFPUC Stormwater Management Requirements and Design Guidelines, September 2016, Version 2.0

PURPOSE:

BIORETENTION BASINS CONTROL PEAK FLOWS AND VOLUMES OF STORMWATER RUNOFF BY PROVIDING SURFACE, SUBSURFACE STORAGE AND INFILTRATION INTO NATIVE SOIL. WATER IS ALSO TREATED AS IT FILTERS THROUGH THE BIORETENTION SOIL.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT PLAN AND SECTION DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. FACILITY AREA, PONDING DEPTH, BIORETENTION SOIL DEPTH, AND AGGREGATE STORAGE DEPTH MUST BE SIZED TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS.
3. PONDING AND BIORETENTION SOIL DRAWDOWN TIME (I.E., TIME FOR MAXIMUM SURFACE PONDING TO DRAIN THROUGH THE BIORETENTION SOIL AFTER THE END OF A STORM) RECOMMENDATIONS:
   - 3 - 12 HOUR PONDING AND BIORETENTION SOIL DRAWDOWN (TYPICAL)
   - 24 HOUR MAXIMUM PONDING AND BIORETENTION SOIL DRAWDOWN
4. FACILITY DRAWDOWN TIME (I.E. TIME FOR SURFACE PONDING TO DRAIN THROUGH THE ENTIRE SECTION INCLUDING AGGREGATE STORAGE AFTER THE END OF A STORM) REQUIREMENTS:
   - 48 HOUR MAXIMUM FACILITY DRAWDOWN (I.E. ORFICE CONTROLLED SYSTEM OR EXTENDED STORAGE DEPTH WITHIN INFILTRATION SYSTEM).
5. THE FOLLOWING GUIDELINES APPLY TO RIGHT-OF-WAY APPLICATIONS:
   - BULB OUT CURB TRANSITIONS SHALL CONFORM TO CITY STANDARDS.
   - WHEN FACILITY CONSTRUCTION IMPACTS EXISTING SIDEWALK, ALL SAW CUTS MUST ADHERE TO CITY REQUIREMENTS. SAW CUTS SHOULD BE ALONG SCORE LINES AND ANY DISTURBED SIDEWALK FLAGS SHOULD BE REPLACED IN THEIR ENTIRETY.
   - DESIGNER TO SPECIFY TRANSITION OF PLANTER TO TOP OF CURB ELEVATION BETWEEN CURB CUTS OR CONTINUOUS 6 INCH REVEAL AT CURB EDGE.
6. UP TO TWO PLANTERS MAY BE CONNECTED IN SERIES, IN LIEU OF MULTIPLE INLETS, PROVIDED THE CONNECTION IS A TRENCH DRAIN OR EQUAL SURFACE CONVEYANCE AND IS ADEQUATELY SIZED TO CONVEY FLOWS.
7. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY ASSET PROTECTION STANDARDS AND OTHER UTILITY PROVIDERS REQUIREMENTS.

RELATED SPECIFICATIONS	CSI NO.
BIORETENTION: - BIORETENTION SOIL MIX - AGGREGATE STORAGE - MULCH - STREAMBED COBBLES	33 47 27

RELATED COMPONENTS	
UNDERDRAINS:	2.0 - 2.1
INLETS:	3.0 - 3.2
OUTLETS:	4.0 - 4.3

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ FACILITY WIDTH, LENGTH, SLOPES (INCLUDING SIDE, CROSS, AND LONGITUDINAL), AND SHAPE
- ☐ DEPTH OF BIORETENTION SOIL
- ☐ DEPTH AND TYPE OF GRAVEL STORAGE, IF ANY
- ☐ PLANTER SURFACE ELEVATION (TOP OF BIORETENTION SOIL) AT UPSLOPE AND DOWNSLOPE ENDS OF FACILITY
- ☐ CONTROL POINTS AT EVERY CORNER OF FACILITY AND POINT OF TANGENCY
- ☐ DIMENSIONS AND DISTANCE TO EVERY INLET, OUTLET, SIDEWALK NOTCH, ETC.
- ☐ ELEVATIONS OF EVERY INLET, OUTLET, STRUCTURE RIM AND INVERT, AND SIDEWALK NOTCH
- ☐ TYPE AND DESIGN OF FACILITY COMPONENTS (E.G., EDGE TREATMENTS, INLETS/GUTTER MODIFICATIONS, UTILITY CROSSINGS, LINER, AND PLANTING DETAILS)

LAYOUT REQUIREMENTS:

1. FOR RIGHT-OF-WAY APPLICATIONS, REFER TO THE CITY STANDARD ACCESSIBILITY REQUIREMENTS FOR CONSTRUCTION OF COURTESY STRIP, THROUGHWAY, PARKING SPACE AND ACCESSIBLE PATH REQUIREMENTS.
2. LOCATE CURB CUTS AND GUTTER MODIFICATIONS TO AVOID CONFLICTS WITH ACCESSIBILITY REQUIREMENTS (E.G., LOCATE OUTSIDE OF CROSSWALKS).

NOT FOR CONSTRUCTION

BIORETENTION & BIOINFILTRATION BASINS DESIGNER NOTES	1.0

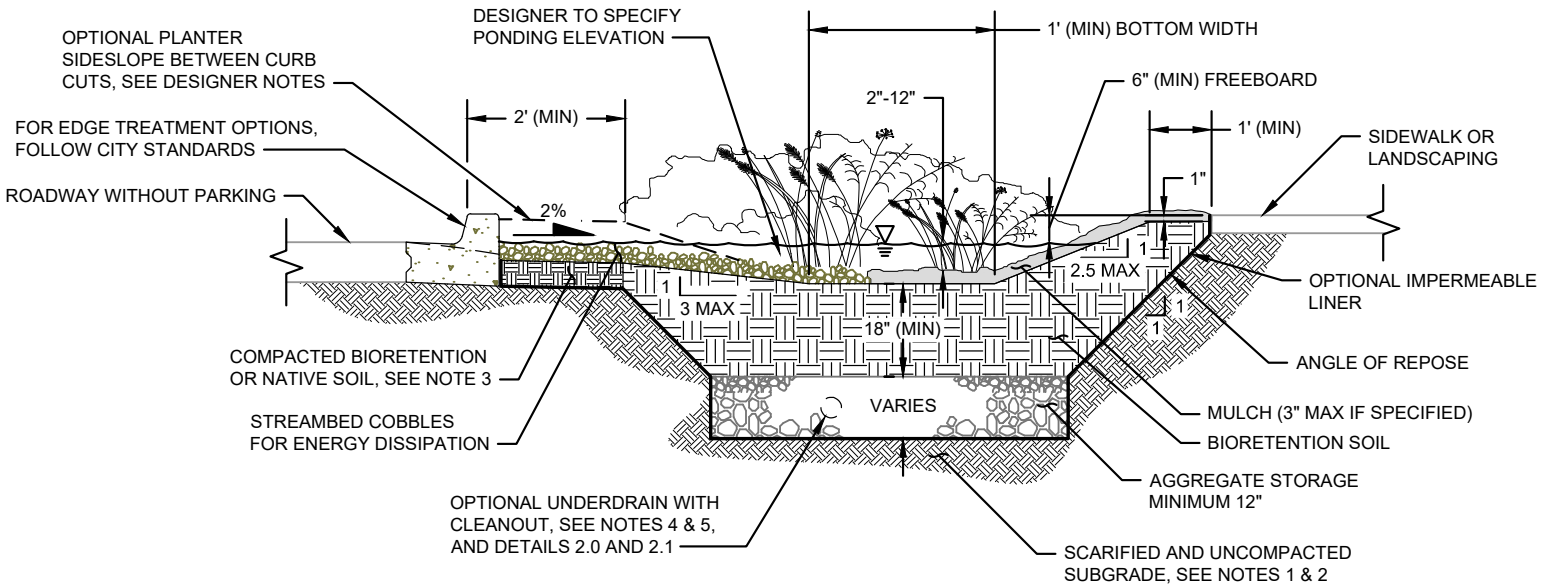

CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. COMPACT BIORETENTION SOIL IMMEDIATELY BEHIND CURB TO 90% OF MAXIMUM DENSITY PER STANDARD PROCTOR TEST (ASTM D698).
4. UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.
5. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
6. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

BIORETENTION & BIOINFILTRATION BASINS ROADSIDE SECTION	1.1

NOT FOR CONSTRUCTION

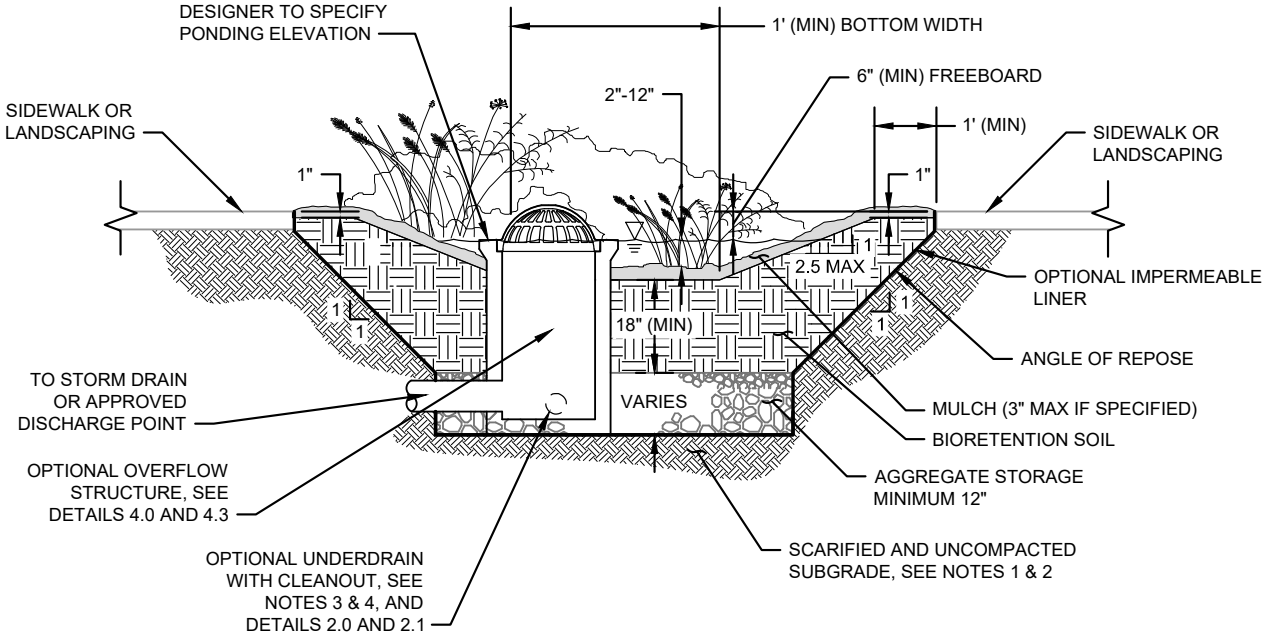

CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.
4. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
5. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

BIORETENTION & BIOINFILTRATION BASINS PARCEL SECTION	1.2

NOT FOR CONSTRUCTION

PURPOSE:

UNDERDRAINS ARE USED TO COLLECT STORMWATER THAT HAS BEEN FILTERED THROUGH BIORETENTION SOIL AND CONVEY THAT TREATED STORMWATER TO A DESIGNATED OUTLET (E.G., PLANTER OVERFLOW STRUCTURE).

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER SHOULD INCLUDE UNDERDRAINS IN FACILITY DESIGN IN THE FOLLOWING SCENARIOS:
   - INFILTRATION IS PROHIBITED OR IMPRUDENT (E.G., FACILITY NEAR SENSITIVE INFRASTRUCTURE OR STEEP SLOPES, RISK OF CONTAMINATION IS HIGH OR SITE GROUNDWATER/SOILS ARE CONTAMINATED, THERE IS POOR INFILTRATION CAPACITY DUE TO SOILS OR HIGH GROUNDWATER).
   - SUBGRADE MEASURED (I.E., UNCORRECTED) INFILTRATION RATE IS LESS THAN 0.5 INCHES PER HOUR.
   - MAXIMUM SURFACE POOL DRAWDOWN PERIOD CANNOT BE ACHIEVED.
2. AN OUTLET STRUCTURE AND/OR CLEANOUT(S) TO ALLOW MAINTENANCE ACCESS TO ALL PIPES IS REQUIRED FOR FACILITIES WITH UNDERDRAINS.
3. UNDERDRAIN PIPE SHALL HAVE A SMOOTH INTERIOR WALL TO FACILITATE MAINTENANCE WITH PRESSURIZED WATER OR ROOT CUTTING EQUIPMENT.
4. DESIGNER SHOULD CONSIDER THE INSTALLED ELEVATION OF THE UNDERDRAIN PIPE WITHIN THE BIORETENTION FACILITIES AGGREGATE STORAGE LAYER TO PROMOTE INFILTRATION, BELOW THE UNDERDRAIN, WHEN FEASIBLE. DESIGNER SHOULD ALSO CONSIDER THE USE OF ORIFICES OR OTHER CONTROL STRUCTURES TO PROVIDE ADDITIONAL INFILTRATION AND FLOW CONTROL BENEFITS WHERE APPLICABLE.
5. PIPE MATERIAL SHALL BE DESIGNED PER CITY STANDARDS.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ UNDERDRAIN MATERIAL TYPE AND SIZE
- ☐ UNDERDRAIN ELEVATION, SLOPE, AND LOCATION WITHIN BASIN OR PLANTER
- ☐ PIPE BEDDING MATERIAL SPECIFICATION (I.E. AGGREGATE STORAGE LAYER)
- ☐ DISCHARGE LOCATION TO OVERFLOW STRUCTURE
- ☐ CLEANOUT LOCATIONS AND MAINTENANCE ACCESS
- ☐ ORIFICE FLOW CONTROL STRUCTURE(S), AS APPLICABLE

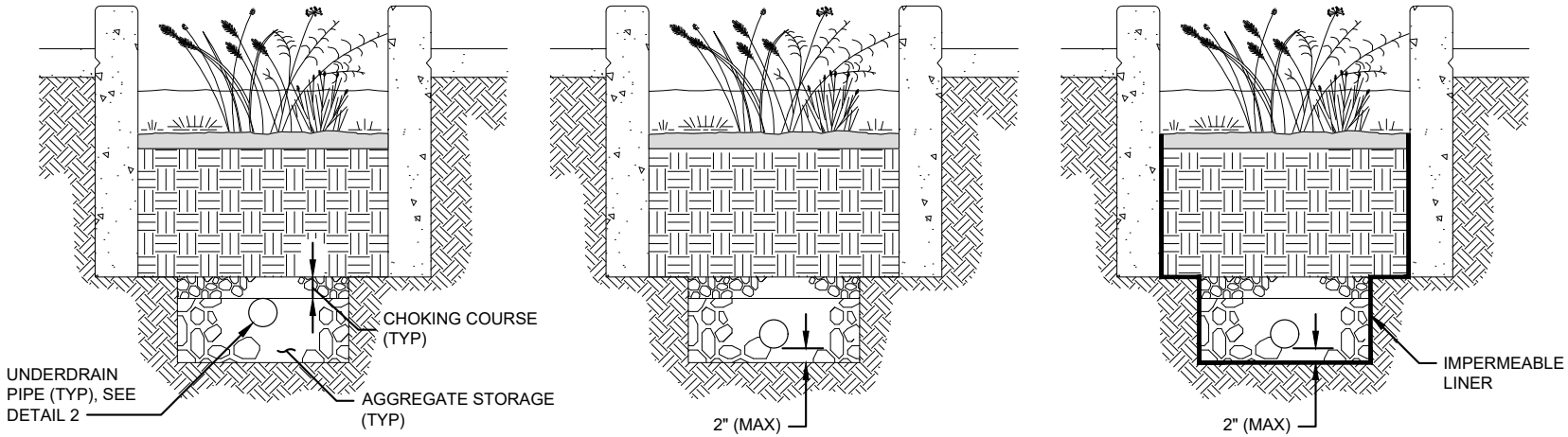

ELEVATED UNDERDRAIN
TYPE B/C SOILS (WHEN REQUIRED)

BOTTOM UNDERDRAIN
TYPE D SOILS

UNDERDRAIN WITH LINER
WHERE INFILTRATION PROHIBITED

UNDERDRAIN PLACEMENT ALTERNATIVES

CONSTRUCTION NOTES:

1. UNDERDRAIN PIPE SHALL BE SLOTTED PVC SDR 35 OR ACCEPTABLE SUBSTITUTE MATERIAL PER ENGINEERS SPECIFICATION.
2. ALL MATERIAL AND WORKMANSHIP FOR UNDERDRAINS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
3. SET CROWN OF UNDERDRAIN PIPE AT OR BELOW BOTTOM OF CHOKING COURSE. SEE DESIGNER NOTES FOR ADDITIONAL GUIDANCE ON LOCATING UNDERDRAIN PIPE IN GRAVEL STORAGE.
4. LONGITUDINAL SLOPE OF UNDERDRAIN PIPE SHALL BE 0.5% MINIMUM.
5. UNDERDRAIN PIPE SHALL BE SLOTTED PVC SDR 35 OR ACCEPTABLE SUBSTITUTE MATERIAL PER ENGINEERS SPECIFICATION. SINGLE WALL AND DUAL WALL CORRUGATED HDPE PIPE (AASHTO M252 AND M294 TYPES C, S, AND D) ARE NOT ACCEPTABLE.
6. UNDERDRAIN PIPE SHALL BE SLOTTED TYPE, MEASURING 0.032 INCH WIDE (MAX), SPACED AT 0.25 INCH (MIN), AND PROVIDING A MINIMUM INLET AREA OF 5.0 SQUARE INCH PER LINEAR FOOT OF PIPE.
7. SLOTS SHALL BE ORIENTED PERPENDICULAR TO LONG AXIS OF PIPE, AND EVENLY SPACED AROUND CIRCUMFERENCE AND LENGTH OF PIPE.

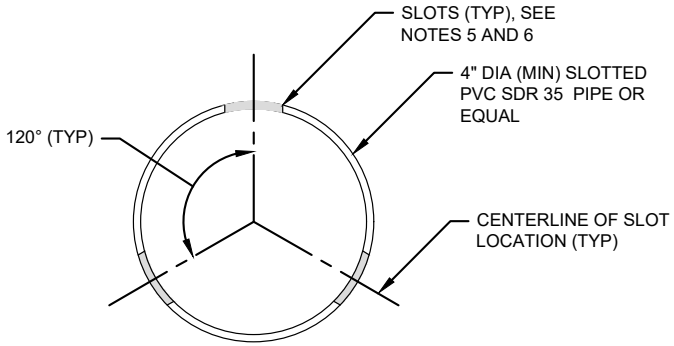

SLOTTED UNDERDRAIN PIPE 2

BIORETENTION & BIOINFILTRATION COMPONENTS UNDERDRAINS	2.1

NOT FOR CONSTRUCTION

PURPOSE:

CURB CUTS SERVE AS INLETS TO CONVEY STORMWATER RUNOFF TO A BIORETENTION FACILITY. CURB CUTS ARE TYPICALLY USED IN PLANTER APPLICATIONS WHEN THE FACILITY IS IMMEDIATELY ADJACENT TO THE ROADWAY (I.E. NO COURTESY STRIP), PROVIDING AN OPENING TO INTERCEPT AND CONVEY STORMWATER FROM THE GUTTER TO THE PLANTER. CURB CUT INLETS INCLUDE MODIFICATIONS TO THE GUTTER TO HELP DIRECT FLOW INTO THE FACILITY.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. THE DESIGNER MUST ENSURE THAT CURB CUT INLETS ARE ADEQUATELY SIZED, SPACED, AND SLOPED TO SATISFY CITY HYDRAULIC REQUIREMENTS. THE CURB CUT OPENING WIDTH MUST BE SIZED BASED ON THE CATCHMENT AREA, LONGITUDINAL SLOPE ALONG THE CURB, AND THE CROSS SLOPE OF THE GUTTER OR ADJACENT PAVEMENT AT THE INLET. SEE SIZING EQUATIONS AND NOMOGRAPHS FOR CURB OPENING INLETS IN THE U.S. DEPARTMENT OF TRANSPORTATION HYDRAULIC ENGINEERING CIRCULAR NO. 22.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ CURB CUT DIMENSIONS
- ☐ FRAME AND GRATE TYPE/MATERIAL AND DIMENSIONS
- ☐ CHANNEL DIMENSIONS
- ☐ CONTROL ELEVATIONS FOR OPENINGS AT GUTTER AND PLANTER WALL

NOT FOR CONSTRUCTION

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - DESIGNER NOTES	3.0

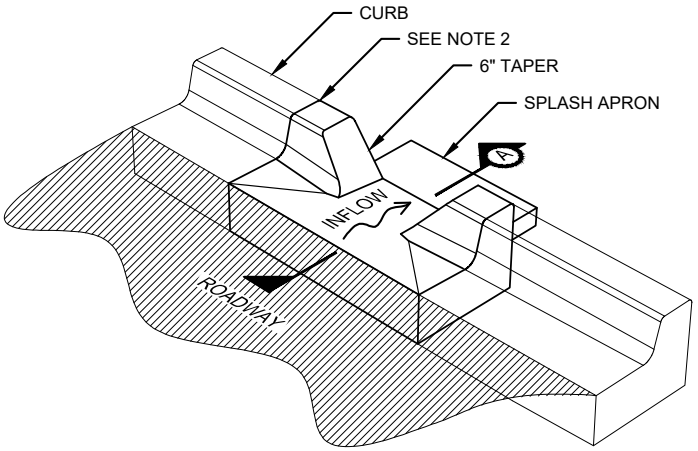

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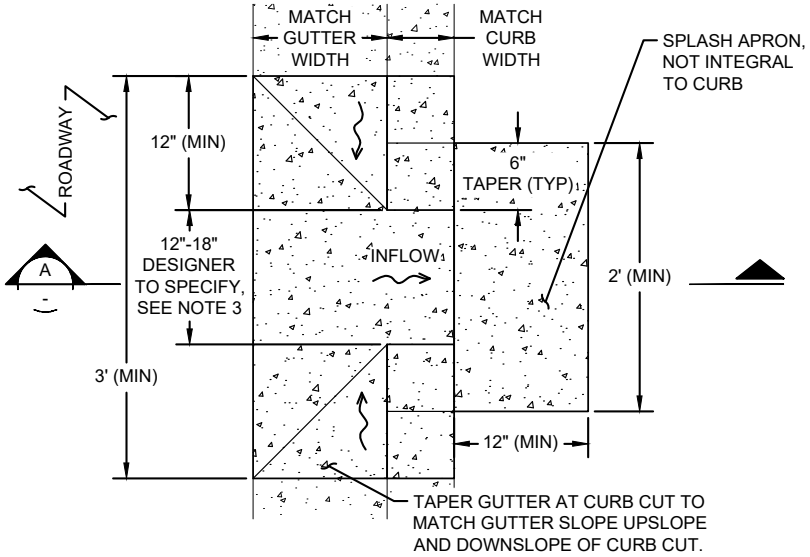

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
3. INLET CURB CUT WIDTH SHALL BE 18" ON GUTTER SLOPES ≥ 5%.

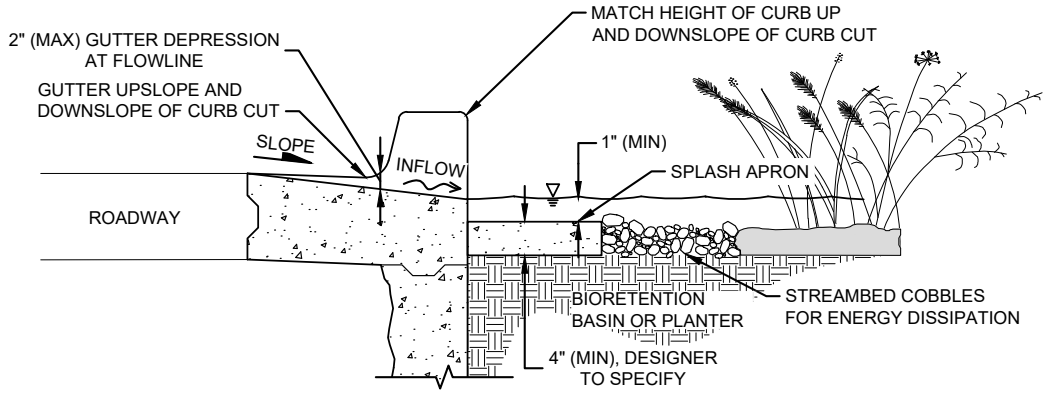

SECTION A

INLET - CURB CUT TYPE 1 (1)

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - CURB CUT INLET	3.1

NOT FOR CONSTRUCTION

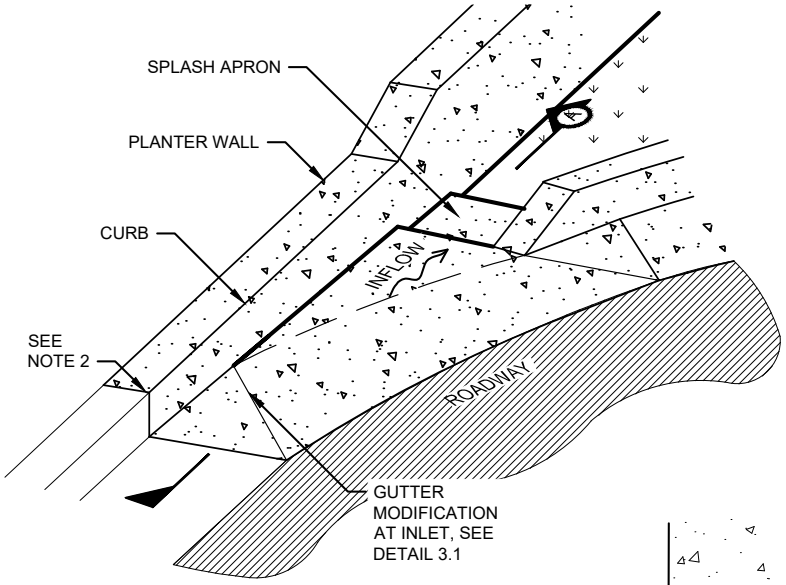

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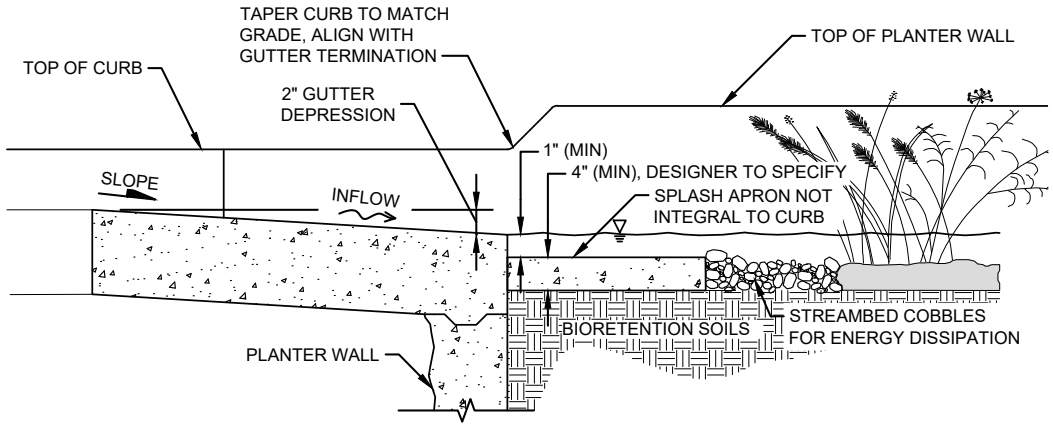

SECTION A

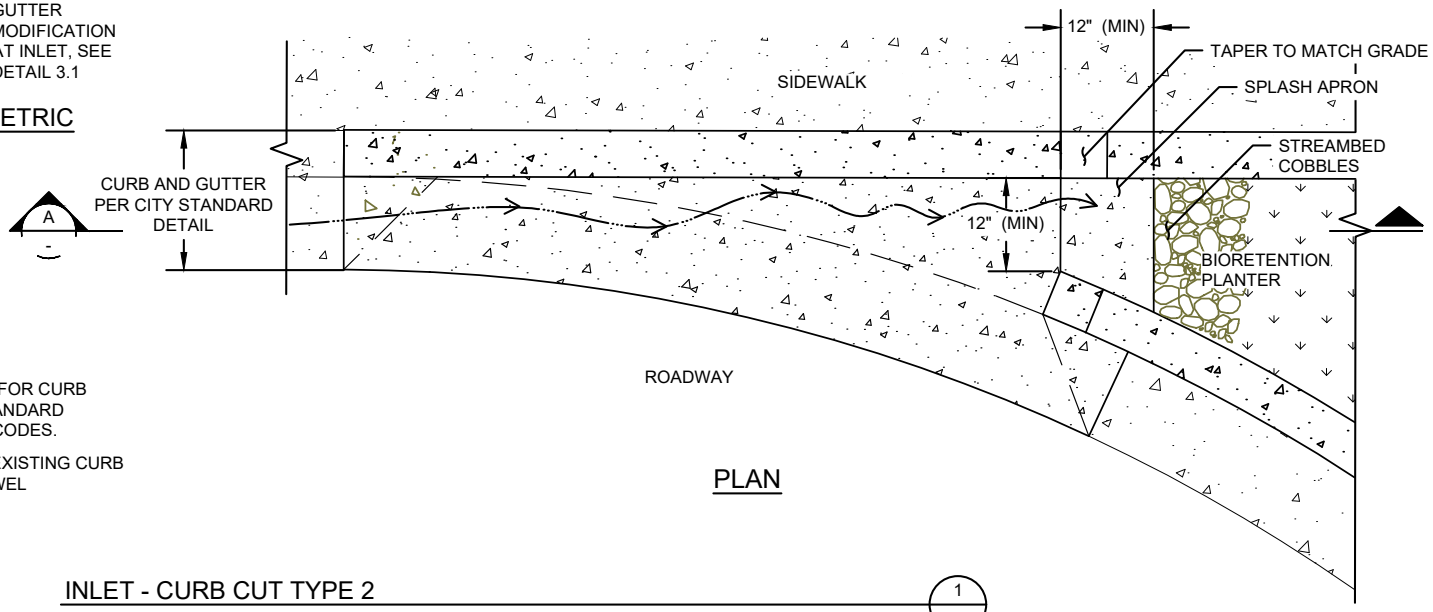

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.

INLET - CURB CUT TYPE 2 (1)

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - CURB CUT INLET AT BULB OUT	3.2

NOT FOR CONSTRUCTION

PURPOSE:

BIORETENTION OUTLET STRUCTURES CONVEY SURFACE AND/OR SUBSURFACE OUTFLOWS FROM A BIORETENTION FACILITY TO AN APPROVED DISCHARGE LOCATION.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. THE DESIGNER MUST SIZE CURB CUT, GRATE, AND OTHER OVERFLOW STRUCTURE FEATURES TO SATISFY CITY HYDRAULIC REQUIREMENTS.
3. AN OUTLET STRUCTURE OR CLEANOUT(S) THAT ALLOWS MAINTENANCE ACCESS TO ALL PIPES IS REQUIRED FOR FACILITIES WITH UNDERDRAINS.
4. IF SITE CONSTRAINTS NECESSITATE STORM DRAIN PIPE IN AN AREA SUBJECT TO VEHICULAR TRAFFIC OR OTHER LOADING, APPROPRIATE COVER DEPTH AND PIPE MATERIAL MUST BE SPECIFIED.
5. OUTLET PIPES MUST BE EQUIPPED WITH CLEANOUTS, SEE CITY STANDARD CLEANOUT DETAIL(S).
6. DESIGNER SHALL EVALUATE BUOYANCY OF STRUCTURES FOR SITE SPECIFIC APPLICATION AND SPECIFY THICKENED OR EXTENDED BASE / ANTI-FLOTATION COLLAR, AS NECESSARY.
7. SAND TRAP REQUIREMENTS (12 INCH SUMP AND CAST IRON HOOD/TRAP) MAY BE ELIMINATED WHEN OVERFLOW DIRECTLY DISCHARGES TO DOWNSTREAM (CITY) SAND TRAP.
8. LOCATE ALL OVERFLOW PIPES AT AN ELEVATION HIGHER THAN THE SEWER HYDRAULIC GRADE LINE TO PREVENT BACKFLOW INTO THE BIORETENTION FACILITY.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ OUTLET STRUCTURE TYPE/MATERIAL, DIAMETER, AND DEPTH
- ☐ ATRIUM GRATE MANUFATURER, MODEL NO., AND SIZE
- ☐ SAND TRAP COMPONENTS AND DIMENSIONS
- ☐ FRAME AND GRATE TYPE, MODEL NO., AND SIZE
- ☐ CONTROL ELEVATIONS FOR OUTLET STRUCTURE RIMS
- ☐ MATERIAL AND DIAMETER FOR ALL PIPES
- ☐ WATER TIGHT CONNECTOR TYPE FOR ALL WALL PENETRATIONS (E.G., GROUTED, COMPRESSION, BOOT)

NOT FOR CONSTRUCTION

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - DESIGNER NOTES	4.0

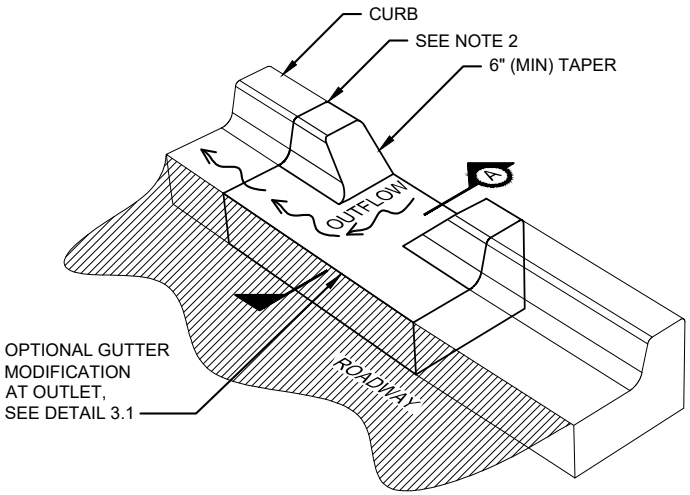

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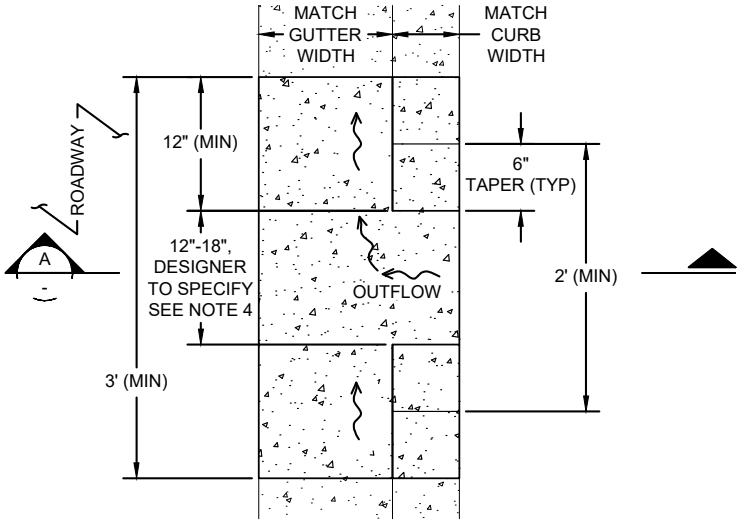

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
3. MATCH GUTTER SLOPE UP AND DOWNSLOPE OF CURB CUT SLOPE SIMILAR TO INLET DETAIL 3.1 UNLESS MODIFYING GUTTER.
4. OUTLET CURB CUT WIDTH SHALL BE 18" ON GUTTER SLOPES ≥ 5%.

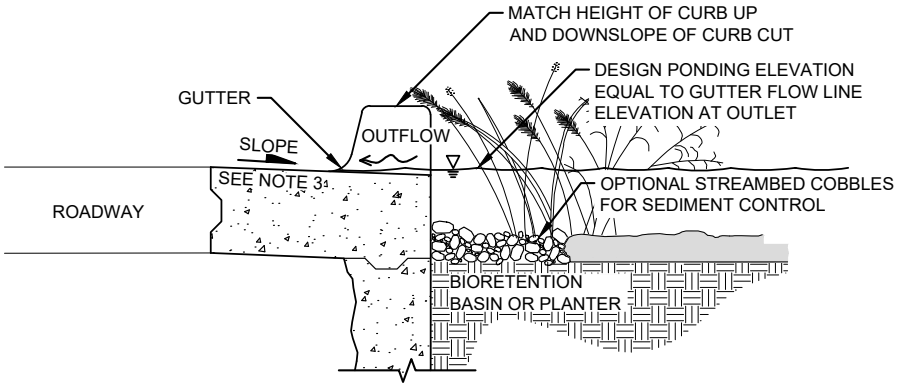

SECTION A

OUTLET - CURB CUT (1)

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - CURB CUT OUTLET	4.1

NOT FOR CONSTRUCTION

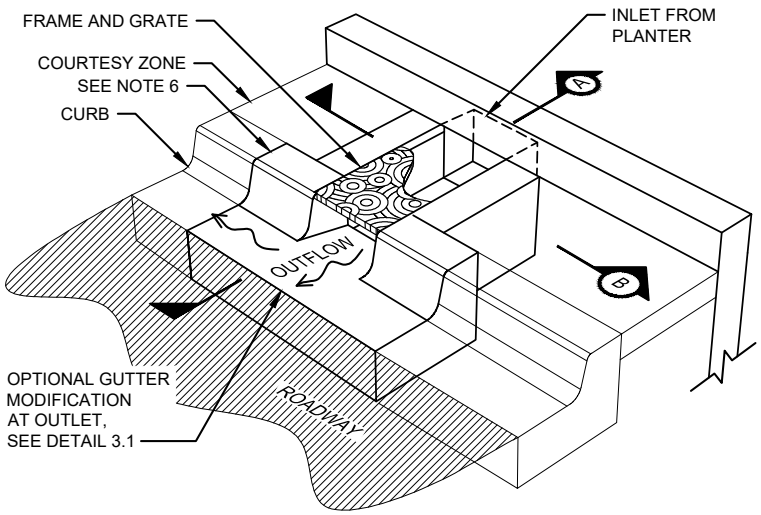

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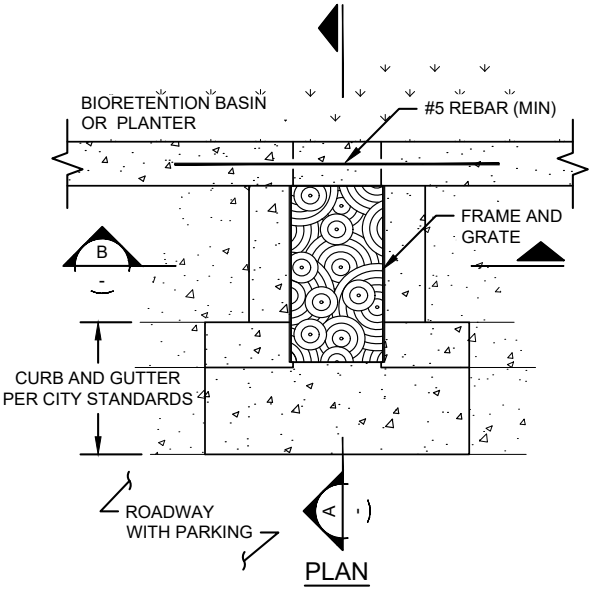

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR TRENCH DRAIN ASSEMBLY SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. MATCH GUTTER SLOPE UP AND DOWNSLOPE (UNLESS MODIFYING GUTTER SLOPE SEE INLET DETAIL 3.1).
3. SLOPE TO PROVIDE AT LEAST 1 INCH DROP OVER LENGTH OF CHANNEL OR A MINIMUM OF 2 PERCENT, WHICHEVER IS LARGER.
4. ALL TRENCH GRATES SHALL BE REMOVABLE, RATED PER THE ANTICIPATED LOADING, AND BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM, FLUSH OR RECESSED IN GRATE.
5. HORIZONTAL CONTROL JOINTS SHALL BE PROVIDED EVERY 10 LINEAR FEET, OR PER MANUFACTURER'S RECOMMENDATIONS.
6. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
7. APPLY EPOXY BONDING AGENT AT ALL TRENCH DRAIN CONSTRUCTION COLD JOINTS.
8. INLET/OUTLET CURB CUT AND CONCRETE CHANNEL WIDTH SHALL BE 16" (MIN) ON GUTTER SLOPES ≥ 5%.

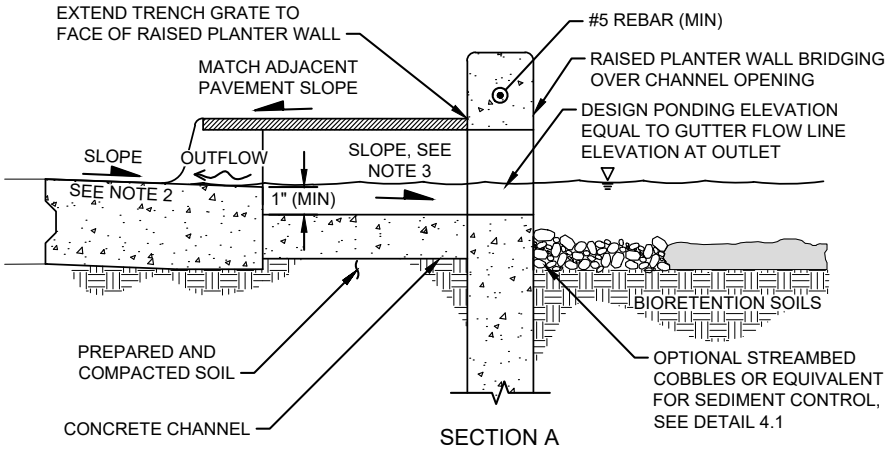

SECTION A

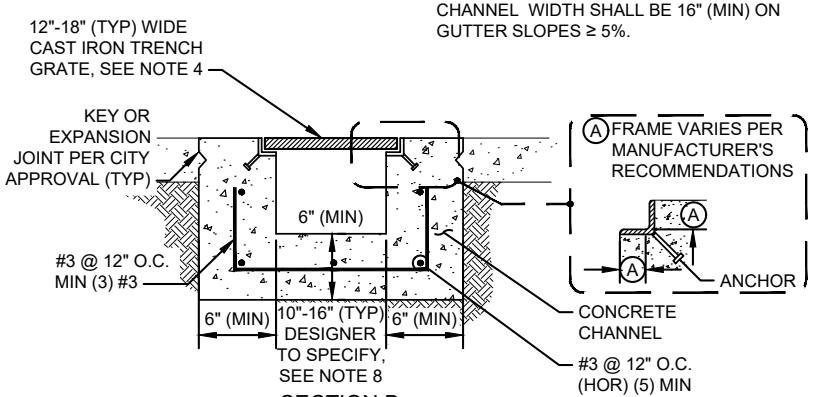

SECTION B

OUTLET - TRENCH DRAIN

1

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - OUTLET CURB CUT WITH TRENCH	4.2

NOT FOR CONSTRUCTION

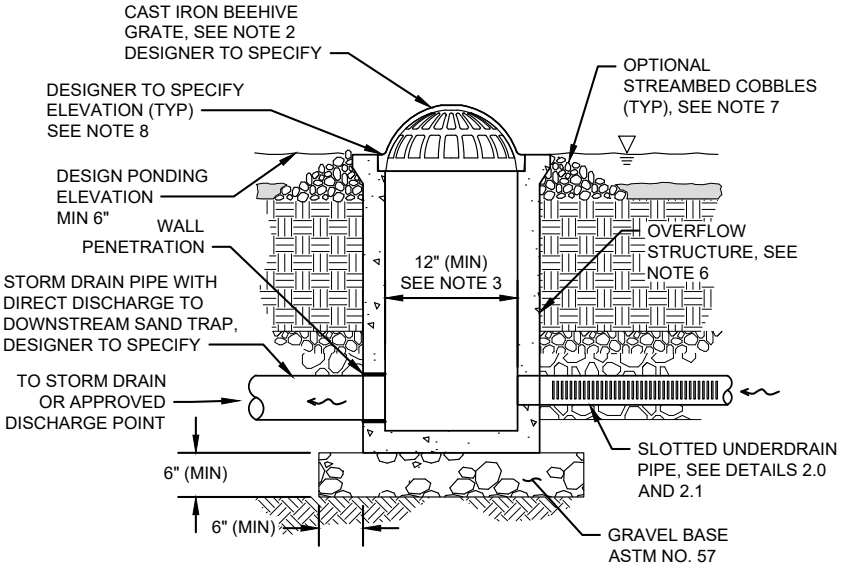

OVERFLOW STRUCTURE AREA DRAIN 1

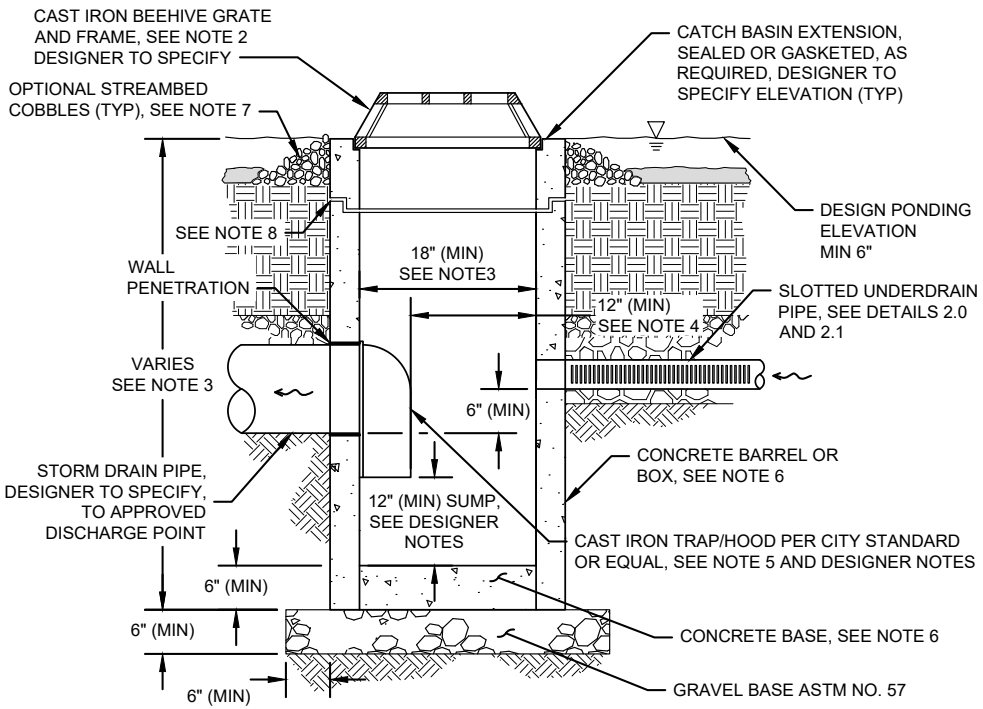

OVERFLOW STUCTURE WITH INTERGAL SAND TRAP 2

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR OVERFLOW STRUCTURES SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. SIZE OF ATRIUM GRATE SHALL MATCH SIZE OF RISER SPECIFIED IN PLANS, SHALL BE REMOVABLE TO PROVIDE MAINTENANCE ACCESS, AND SHALL BE BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM. MAXIMUM GRATE OPENING SHALL BE 4 INCHES.
3. IF INTERIOR DEPTH OF OVERFLOW STRUCTURE EXCEEDS 5 FEET, A PERMANENT BOLTED LADDER AND MINIMUM CLEAR SPACE OF 30 INCH BY 30 INCH SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
4. 12 INCH (MIN) CLEARANCE WITHIN OVERFLOW STRUCTURE SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
5. INSTALL CAST IRON TRAP/HOOD PER MANUFACTURER'S RECOMMENDATIONS.
6. BARREL/BOX AND BASE OF CATCH BASIN MAY BE PRE-CAST WITH REINFORCING STEEL PER MANUFACTURER'S RECOMMENDATIONS, POURED IN PLACE CONCRETE WITHOUT STEEL PER CITY STANDARD PLANS AND SPECIFICATIONS, OR NYLOPLAST DRAIN BASIN (2812AG OR EQUAL). ENGINEER TO SPECIFY.
7. MINIMUM STREAMBED COBBLE DIAMETER SHALL BE LARGER THAN MAXIMUM GRATE OPENING.
8. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - OVERFLOW STRUCTURE	4.3

NOT FOR CONSTRUCTION

PURPOSE:

PERVIOUS PAVEMENT (PAVEMENT) CONTROLS PEAK FLOWS AND VOLUMES OF STORMWATER RUNOFF VIA INFILTRATION THROUGH THE PAVEMENT SURFACE, STORAGE IN THE PAVEMENT SECTION, INFILTRATION INTO NATIVE SOIL, AND OVERFLOW THROUGH OPTIONAL SUBSURFACE OUTLETS. RUNOFF IS TREATED AS IT FILTERS THROUGH THE PAVEMENT SECTION, AND INFILTRATES INTO UNDERLYING NATIVE SOIL.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT PLAN, SECTION DRAWINGS, AND CALCULATE DEPTH TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. ALL PAVEMENT SYSTEMS MUST BE DESIGNED BY A LICENSED ENGINEER IN ACCORDANCE WITH THE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES BASED ON SITE-SPECIFIC CONDITIONS INCLUDING TRAFFIC LOADS AND SUBGRADE CONDITIONS. PAVEMENT SECTIONS SET FORTH IN THESE TYPICAL DETAILS ARE PROVIDED TO REPRESENT THE ANTICIPATED RANGE OF DESIGN REQUIREMENTS, BASED ON "GOOD" AND "POOR" SOIL CHARACTERIZATIONS NORMALLY ENCOUNTERED IN THE CITY. **ACTUAL SECTION DEPTHS MUST BE DETERMINED AS DESCRIBED IN GUIDELINE #3, BELOW**. SEE TABLES BELOW FOR TRAFFIC LOADING AND EFFECTIVE ROADBED SOIL RESILIENT MODULUS ASSUMPTIONS USED IN DEVELOPING THESE TYPICAL SECTIONS.
3. TRAFFIC LOADING ASSUMPTIONS:

DESIGN ASSUMPTION	MODERATE VEHICULAR	LIGHT VEHICULAR	PEDESTRIAN
EQUIVALENT SINGLE AXLE LOADS*	2,000,000	40,000	800
TRAFFIC INDEX (TI)**	10	6.5	4
* SEE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES FOR DEFINITIONS			
** SEE CALTRANS HIGHWAY DESIGN MANUAL FOR DEFINITIONS			

SUBGRADE ASSUMPTIONS:

DESIGN ASSUMPTION	GOOD SOILS	POOR SOILS
EFFECTIVE ROADBED SOIL RESILIENT MODULUS, M_R (PSI)*	6,800	3,700
CALIFORNIA R-VALUE **	33.3	15.6
DRAINAGE COEFFICIENT, m *	1.15	0.75
LAYER COEFFICIENT, a * FOR OPEN GRADED AGGREGATE BASE	0.08	
* SEE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES FOR DEFINITIONS		
** SEE CALTRANS HIGHWAY DESIGN MANUAL FOR DEFINITIONS		

4. GEOTECHNICAL EVALUATION OF SUBGRADE SOILS TO VERIFY THEIR STRUCTURAL SUITABILITY FOR PERMEABLE PAVEMENT INSTALLATIONS IS REQUIRED. INFILTRATION TESTING REQUIREMENTS ARE SUBJECT TO DIFFERENT THRESHOLDS. REFER TO CITY STORMWATER MANAGEMENT REQUIREMENTS FOR GUIDANCE.
5. THE PERMEABLE PAVEMENT FACILITY MUST BE DESIGNED TO PROVIDE SUFFICIENT SUBSURFACE STORAGE IN THE PAVEMENT SECTION TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS. THE SECTION THICKNESS WILL BE A FUNCTION OF THE SUBGRADE INFILTRATION RATE (DRAINAGE COEFFICIENT), AND SUBGRADE SLOPE.
6. ENTIRE PAVEMENT BASE SECTION MAY BE USED TO MEET SUBSURFACE STORAGE REQUIREMENTS.
7. SUBSURFACE STORAGE DRAWDOWN TIME (I.E. TIME FOR MAXIMUM SUBSURFACE STORAGE VOLUME TO INFILTRATE INTO SUBGRADE AFTER THE END OF A STORM) SHOULD NOT EXCEED 48 HOURS. DRAWDOWN TIME IS CALCULATED AS THE MAXIMUM SUBSURFACE PONDING DEPTH DIVIDED BY THE NATIVE SOIL INFILRATION RATE.
8. THE DESIGNER MUST ENSURE THAT THE PAVEMENT EDGES ARE RESTRAINED AND THAT WATER IS CONTAINED IN THE PAVEMENT SECTION AS NEEDED TO PROTECT ADJACENT PAVEMENT SECTIONS OR STRUCTURES.
9. THE DESIGNER MUST EVALUATE UTILITY SURVEYS FOR POTENTIAL UTILITY CROSSINGS OR CONFLICTS.

RELATED SPECIFICATIONS	CSI NO.
PERMEABLE/POROUS UNIT PAVERS: - PERMEABLE /POROUS UNIT PAVERS - JOINT FILLER AGGREGATE - PAVEMENT BASE - EDGE RESTRAINTS - GEOTEXTILE FOR SOIL SEPARATION	32 14 43
PERVIOUS CONCRETE PAVEMENT: - PERVIOUS CONCRETE - PAVEMENT BASE - GEOTEXTILE FOR SOIL SEPARATION	32 13 43
POROUS ASPHALT PAVEMENT: - POROUS ASPHALT - PAVEMENT BASE - GEOTEXTILE FOR SOIL SEPARATION	32 12 43

PERMEABLE PAVEMENT DESIGNER NOTES (1/2)	5.0

NOT FOR CONSTRUCTION

LAYOUT REQUIREMENTS:

1. ALL PERMEABLE PAVEMENT APPLICATIONS SHALL CONFORM TO CITY STANDARDS. THE DESIGN MUST COMPLY WITH CITY STANDARD ACCESSIBILITY REQUIREMENTS.
2. THE PREFERRED AND ALLOWED CATCHMENT AREA CONTRIBUTING RUN-ON TO A PERMEABLE PAVEMENT FACILITY IS PROVIDED IN THE FOLLOWING TABLE:

WEARING COURSE	PREFERRED RUN-ON RATIO	MAXIMUM RUN-ON RATIO** (AREA CONTRIBUTING RUN-ON: PERMEABLE PAVEMENT AREA)
PERVIOUS CONCRETE AND POROUS ASPHALT	MINIMAL	3:1
PERMEABLE UNIT PAVERS (≥ 1/2" GAPS) [PARCEL ONLY]*	0:1	3:1
PERMEABLE UNIT PAVERS (≥ 3/8" GAPS)*	0:1	2:1
POROUS PAVERS	0:1	0:1 (NO RUN-ON)

*PAVERS WITH 3/8 INCH OR 1/2 INCH GAPS SHALL BE PERMEABLE INTERLOCKING CONCRETE PAVERS WITH INTEGRATED PRECAST INTERLOCKING SPACER.

**THE DESIGNER AND OWNER SHOULD CONSIDER THE INCREASED MAINTENANCE REQUIREMENTS ASSOCIATED WITH HIGHER RUN-ON RATIOS WHEN DESIGNING THE FACILITY.

3. WHEN DESIGNED TO ACCEPT RUN-ON FROM OTHER CATCHMENT AREAS, PERMEABLE PAVEMENT AREAS MUST BE PROTECTED FROM SEDIMENTATION WHICH CAN CAUSE CLOGGING AND DIMINISHED FACILITY PERFORMANCE. THE FOLLOWING REQUIREMENTS APPLY FOR RUN-ON CONTRIBUTIONS:
   - RUN-ON FROM LAWN, LANDSCAPE OR OTHER ERODIBLE SURFACES IS DISCOURAGED. IF MINOR RUN-ON FROM LAWN OR LANDSCAPE AREAS IS UNAVOIDABLE, THOSE ERODIBLE AREAS MUST BE FULLY STABILIZED.
   - CONCENTRATED RUN-ON (E.G., DIRECT DISCHARGE FROM A DOWNSPOUT) SHOULD BE DISPERSED PRIOR TO DISCHARGE TO A PERMEABLE PAVEMENT FACILITY. ACCEPTABLE METHODS INCLUDE SHEET FLOW OR SUBSURFACE DELIVERY TO THE STORAGE RESERVOIR. IF SUBSURFACE DELIVERY IS USED, PRIMARY SETTLING IS REQUIRED (E.G., VIA SAND TRAP) FOLLOWED BY DISTRIBUTION TO STORAGE RESERVOIR (E.G., VIA PERFORATED PIPE).
4. WEARING COURSE SHALL BE SET FLUSH (± 3/16 INCH) WITH ADJACENT WALKING SURFACES.
5. WEARING COURSE SHALL HAVE A MINIMUM SURFACE SLOPE OF 0.5% TO ALLOW FOR SURFACE OVERFLOW AND A MAXIMUM SURFACE SLOPE AS LISTED BELOW:
   a. POROUS ASPHALT SURFACE: = 5 PERCENT SLOPE
   b. PERVIOUS CONCRETE SURFACE: = 10 PERCENT SLOPE
   c. PERMEABLE UNIT PAVERS: = 12 PERCENT SLOPE (PER MANUFACTURER'S RECOMMENDATION)

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ PERMEABLE PAVEMENT SPECIFICATIONS AND/OR PAVER TYPE AND GAP WIDTH
- ☐ PERMEABLE PAVEMENT WIDTH AND LENGTH
- ☐ ELEVATIONS AND CONTROL POINTS AT EVERY CORNER OR POINT OF TANGENCY
- ☐ THICKNESS OF EACH LAYER IN THE PAVEMENT SECTION
- ☐ JOINT SPACING AND TYPE
- ☐ SUBGRADE SLOPE
- ☐ ELEVATIONS OF EACH PIPE INLET AND OUTLET INVERT
- ☐ TYPE AND DESIGN OF PERMEABLE PAVEMENT COMPONENTS (E.G., EDGE TREATMENTS, OUTLETS, UNDERDRAINS, etc.)

PERMEABLE PAVEMENT DESIGNER NOTES (2/2)	5.1

NOT FOR CONSTRUCTION

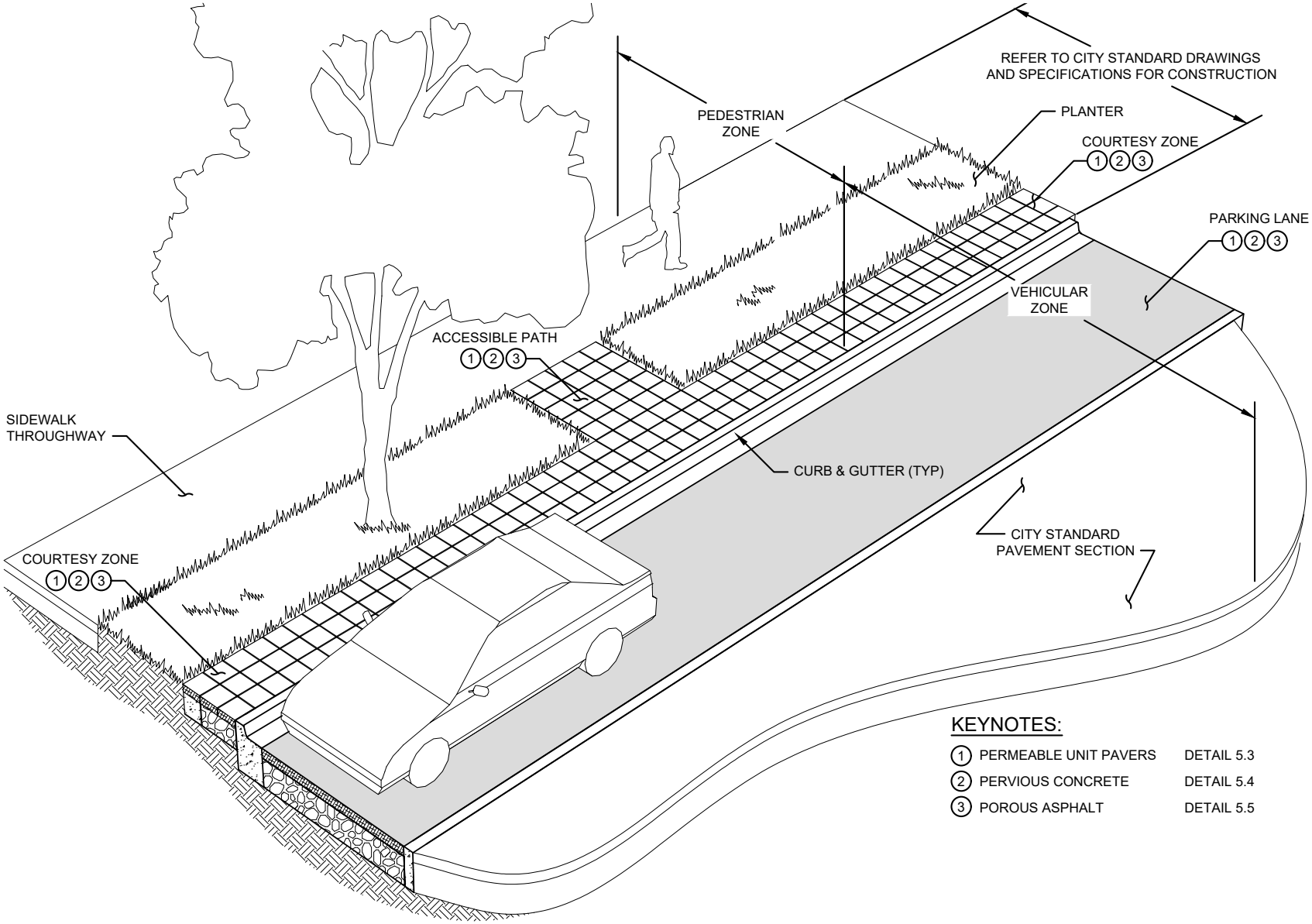

KEYNOTES:

1	PERMEABLE UNIT PAVERS	DETAIL 5.3
2	PERVIOUS CONCRETE	DETAIL 5.4
3	POROUS ASPHALT	DETAIL 5.5

PERMEABLE PAVEMENT KEY MAP	5.2

NOT FOR CONSTRUCTION

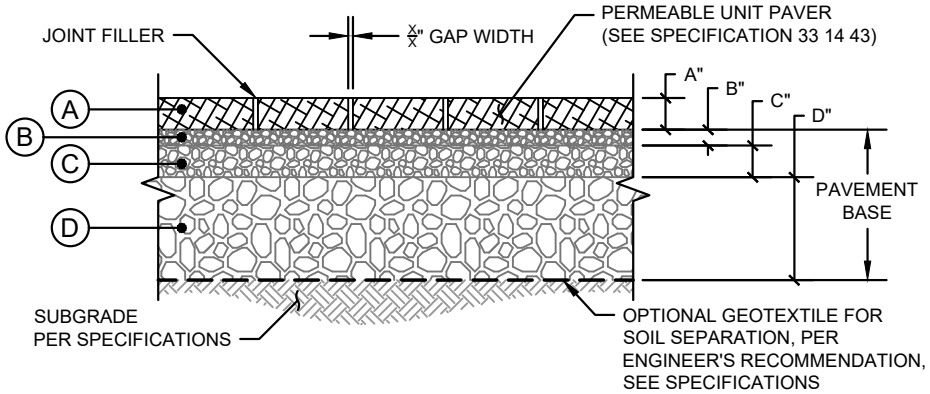

PERMEABLE UNIT PAVERS 1

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	PERMEABLE UNIT PAVERS	3 1/8	3 1/8	3 1/8	3 1/8	3 1/8	3 1/8
B	LEVELING COURSE ASTM NO. 8	2	2	2	2	2	2
C	BASE COURSE ASTM NO. 57	6	6	6	4	4	4
D	RESERVOIR COURSE ASTM NO. 2, 3, OR 57	22	28	-	10	-	-

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

TYPICAL JOINT FILLER AGGREGATE SIZE:

GAP WIDTH (IN)	JOINT FILLER AGGREGATE*
3/8 OR 1/2	ASTM NO. 8
* PROVIDED FOR REFERENCE ONLY, FOLLOW MANUFACTURER'S RECOMMENDATIONS	

CONSTRUCTION NOTES:

1. SEE PERMEABLE/POROUS UNIT PAVER SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR PERMEABLE/POROUS UNIT PAVER FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT PAVER SECTION	5.3

NOT FOR CONSTRUCTION

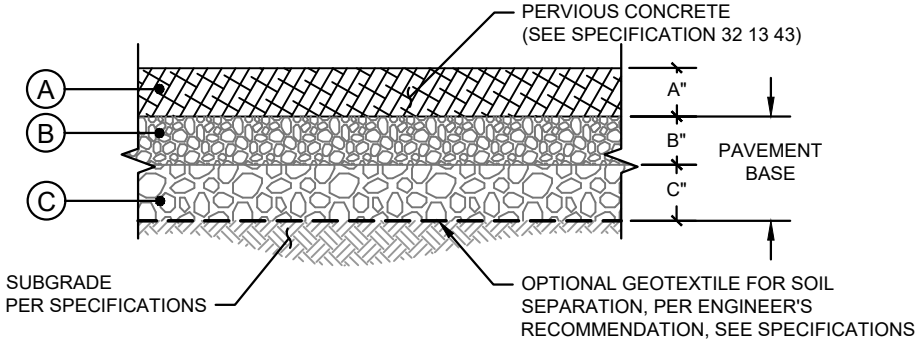

PERVIOUS CONCRETE 1

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	PERVIOUS CONCRETE	9	9.5	6.5	7	4.5	5
B	BASE COURSE ASTM NO. 3 OR 57	6	6	6	6	6	6
C	OPTIONAL RESERVOIR COURSE ASTM NO. 2, 3, OR 57	-	-	-	-	-	-

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

CONSTRUCTION NOTES:

1. SEE PERVIOUS CONCRETE SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR PERVIOUS CONCRETE FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT PERVIOUS CONCRETE SECTION	5.4

NOT FOR CONSTRUCTION

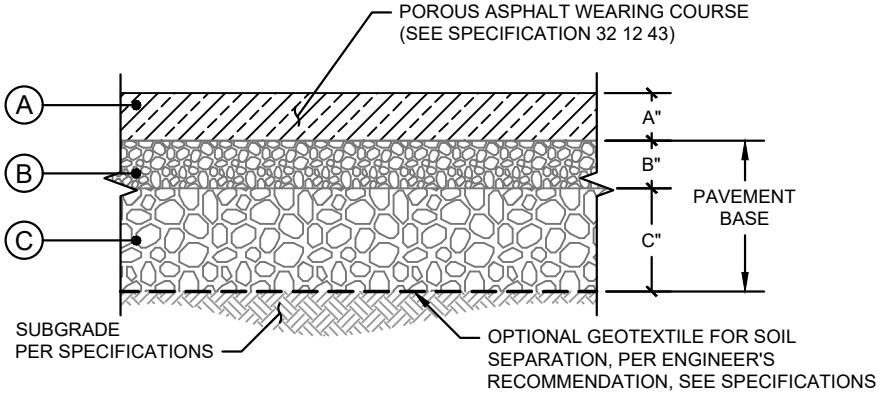

POROUS ASPHALT (1)

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	POROUS ASPHALT	6	8	4	4	3	4
B	BASE COURSE ASTM NO. 57	6	6	5	4	6	4
C	RESERVOIR COURSE ASTM NO. 2, 3, OR 57	10	19	-	11	-	8

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

CONSTRUCTION NOTES:

1. SEE POROUS ASPHALT SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR POROUS ASPHALT FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT POROUS ASPHALT SECTION	5.5

NOT FOR CONSTRUCTION

Specification of Soils for Biotreatment or Bioretention Facilities

Soils for biotreatment or bioretention areas shall meet two objectives:

- Be sufficiently permeable to infiltrate runoff at a minimum rate of 5" per hour during the life of the facility, and
- Have sufficient moisture retention to support healthy vegetation.

Achieving both objectives with an engineered soil mix requires careful specification of soil gradations and a substantial component of organic material (typically compost).

Local soil products suppliers have expressed interest in developing 'brand-name' mixes that meet these specifications. At their sole discretion, municipal construction inspectors may choose to accept test results and certification for a 'brand-name' mix from a soil supplier.

Tests must be conducted within 120 days prior to the delivery date of the bioretention soil to the project site.

Batch-specific test results and certification shall be required for projects installing more than 100 cubic yards of bioretention soil.

SOIL SPECIFICATIONS

Bioretention soils shall meet the following criteria. "Applicant" refers to the entity proposing the soil mixture for approval by a Permittee.

1. General Requirements – Bioretention soil shall:
   a. Achieve a long-term, in-place infiltration rate of at least 5 inches per hour.
   b. Support vigorous plant growth.
   c. Consist of the following mixture of fine sand and compost, measured on a volume basis:
      60%-70% Sand
      30%-40% Compost
2. Submittal Requirements – The applicant shall submit to the Permittee for approval:
   a. A minimum one-gallon size sample of mixed bioretention soil.
   b. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.
   c. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils or Caltrans Test Method (CTM) C202.
   d. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in 4.
   e. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".
   f. Grain size analysis results of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
   g. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

h. Provide the name of the testing laboratory(s) and the following information:

(1) Contact person(s)

(2) Address(s)

(3) Phone contact(s)

(4) E-mail address(s)

(5) Qualifications of laboratory(s), and personnel including date of current certification by USCC, ASTM, Caltrans, or approved equal

3. Sand for Bioretention Soil
   a. Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be nonplastic.
   b. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40 or #50, #30, #16. #8, #4, and 3/8 inch sieves (ASTM D 422, CTM 202 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40 or No.50	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

4. Composted Material

Compost shall be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

a. Compost Quality Analysis by Laboratory – Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Examination of Composting and Compost (TMECC). The lab report shall verify:
   (1) Organic Matter Content: 35% - 75% by dry wt.
   (2) Carbon and Nitrogen Ratio: C:N < 25:1 and C:N >15:1
   (3) Maturity/Stability: Any one of the following is required to indicate stability:
      (i) Oxygen Test < 1.3 O2 /unit TS /hr
      (ii) Specific oxy. Test < 1.5 O2 / unit BVS /hr
      (iii) Respiration test < 8 mg CO_2-C /g OM / day
      (iv) Dewar test < 20 Temp. rise (°C) e.
      (v) Solvita® > 5 Index value
   (4) Toxicity: Any one of the following measures is sufficient to indicate non-toxicity.
      (i) NH_4^+ : NO_3^--N < 3
      (ii) Ammonium < 500 ppm, dry basis
      (iii) Seed Germination > 80 % of control
      (iv) Plant Trials > 80% of control
      (v) Solvita® = 5 Index value
   (5) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
      (i) Total Nitrogen content 0.9% or above preferred.
      (ii) Boron: Total shall be <80 ppm;
   (6) Salinity: Must be reported; < 6.0 mmhos/cm
   (7) pH shall be between 6.2 and 8.2 May vary with plant species.

b. Compost Quality Analysis by Compost Supplier – Before delivery of the compost to the soil supplier the Compost Supplier shall verify the following:
   (1) Feedstock materials shall be specified and include one or more of the following: landscaping/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
   (2) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell or containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable.
   (3) Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

c. Compost for Bioretention Soil Texture – Compost for bioretention soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***

1 inch	99	100
1/2 inch	90	100
1/4 inch	40	90
No. 200	1	10

d. Bulk density shall be between 500 and 1100 dry lbs/cubic yard
e. Moisture content shall be between 30% - 55% of dry solids.
f. Inerts – compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.

g. Select Pathogens – Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.
h. Trace Contaminants Metals (Lead, Mercury, Etc.) – Product must meet US EPA, 40 CFR 503 regulations.
i. Compost Testing – The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

VERIFICATION OF ALTERNATIVE BIORETENTION SOIL MIXES

Bioretention soils not meeting the above criteria shall be evaluated on a case by case basis. Alternative bioretention soil shall meet the following specification: "Soils for bioretention facilities shall be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and provide sufficient retention of moisture and nutrients to support healthy vegetation."

The following steps shall be followed by municipalities to verify that alternative soil mixes meet the specification:

1. General Requirements – Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. The applicant refers to the entity proposing the soil mixture for approval.
   a. Submittals – The applicant must submit to the municipality for approval:
      (1) A minimum one-gallon size sample of mixed bioretention soil.
      (2) Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

(3) Certification from an accredited geotechnical testing laboratory that the Bioretention Soil has an infiltration rate between 5 and 12 inches per hour as tested according to Section 1.b.(2)(ii).
(4) Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".
(5) Grain size analysis results of mixed bioretention soil performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
(6) A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.
(7) The name of the testing laboratory(s) and the following information:
  (i) Contact person(s)
  (ii) Address(s)
  (iii) Phone contact(s)
  (iv) E-mail address(s)
  (v) Qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal.

b. Bioretention Soil
(1) Bioretention Soil Texture: Bioretention Soils shall be analyzed by an accredited lab using #200, and 1/2" inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
1/2 inch	97	100
No. 200	2	5

(2) Bioretention Soil Permeability testing: Bioretention Soils shall be analyzed by an accredited geotechnical lab for the following tests:
  (i) Moisture – density relationships (compaction tests) shall be conducted on bioretention soil. Bioretention soil for the permeability test shall be compacted to 85 to 90 percent of the maximum dry density (ASTM D1557).
  (ii) Constant head permeability testing in accordance with ASTM D2434 shall be conducted on a minimum of two samples with a 6-inch mold and vacuum saturation.

MULCH FOR BIORETENTION FACILITIES

Three inches of mulch is recommended for the purpose of retaining moisture, preventing erosion and minimizing weed growth. Projects subject to the State's Model Water Efficiency Landscaping Ordinance (or comparable local ordinance) will be required to provide at least three inches of mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Aged mulch can be obtained through soil suppliers or directly from commercial recycling yards. It is recommended to apply 1" to 2" of composted mulch, once a year, preferably in June following weeding.

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints.

DESIGNER NOTE: Green text corresponds to notes to the designer.

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Porous Asphalt Pavement

2. Pavement Base

3. Geotextile for Soil Separation

B. Related Sections:

DESIGNER NOTE: The designer should list any additional specification sections which relate to the porous asphalt work (i.e., traffic control, temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards: This section incorporates by reference the latest revisions of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications (published by State of California Business, Transportation, and Housing Agency, Department of Transportation)
AASHTO	Standards of the American Association of State Highway and Transportation Officials, 1998 or latest edition
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.
NAPA IS 115	Design, Construction, and Maintenance of Open-Graded Asphalt Friction Courses
NAPA IS 131	Porous Asphalt Pavements for Stormwater Management, Design, Construction, and Maintenance.

1. Caltrans Standard Specifications: Any references to Caltrans Standard Specifications invoke technical specifications in Section 39 for material, construction, and quality control and quality assurance only. Caltrans contractual requirements, general specifications, and measurement and payment do not apply.

2. Caltrans Standard Specifications Term Equivalencies

Terms Equivalencies	
Term or Clause in Caltrans Standard Specifications	**Term or Clause in These Specifications**
The Department	The Owner
OGFC	Porous Asphalt

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. Project experience and personnel qualification examples as specified in Section 1.05.B for the contractor and personnel assigned to this project.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: Submittals shall conform to the requirements of Caltrans Standard Specifications including:

1. Proposed job mix formula per Section 1.05.B of this Specification.

2. Proposed QC plan per Section 39-1.04A (General Requirements for Contractor Quality Control) and Section 39-2.02A (Quality control plan requirements for the “Standard Construction Process”). The QC Plan shall satisfactorily test the porous asphalt for compliance with Section 39-2.02B (Quality Control for Standard Construction Process) of the Caltrans Standard Specifications, with the following modifications and additions:

a. Aggregate durability index shall be tested in accordance with Caltrans Test Method 229 at least one time per each 750 tons of porous asphalt.

b. Aggregate cleanliness value shall be tested in accordance with Caltrans Test Method 227 at least one time per each 750 tons of porous asphalt.

c. Air voids shall be tested for by determining the bulk specific gravity in accordance with ASTM D6752 or AASHTO T275, the maximum theoretical specific gravity with AASHTO T209, and the voids by test ASTM D3203.

d. Draindown shall be tested in accordance with ASTM D6390.

e. Retained tensile strength shall be tested in accordance with AASHTO 283.

f. Three (3) surface infiltration tests per ASTM C1701 shall be conducted per 10,000 square feet of porous asphalt, in place and one (1) additional test per 5,000 square feet of porous asphalt, or fraction thereof, in place. Document and record the results of each field infiltration test with a designated test number. Include infiltration rate, date pavement was placed, date test was taken, and location on the site (via stationing or other means) where test was performed in each test record. If minimum required field infiltration rate is not achieved at any location as defined in this Section, re-test for field infiltration rate at a new location for each failed field infiltration test. Coordinate location with Owner's Representative.

The QC plan shall be consistent with the Caltrans Quality Control Quality Assurance Manual for Asphalt Concrete Production and Placement (latest version).

In addition to the Caltrans submittal requirements, the Contractor shall submit the following:

3. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base and reservoir course materials performed within one (1) month of product delivery to site.

4. Product data sheets for geotextiles.

5. Testing agency qualifications as specified in Section 1.05.A.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect asphalt materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

DESIGNER NOTE: This specification does not include a test panel/mockup due to the difficulty of installation and because physical properties of the material are known from the plant test. Consider whether project design objectives warrant the cost of a test panel/mockup.

1. Contractor and Personnel Qualifications

DESIGNER NOTE: The designer should adjust the required qualifications for the contractor and personnel based on the availability of qualified bidders and project size, complexity, and risk.

a. Contractor qualification: The Contractor shall provide documentation showing one of the following for the general contractor or paving subcontractor:

1) One (1) example owner-accepted porous asphalt project, similar (or greater) in extent to the proposed project, completed in the last one (1) year with reference.

   OR

2) Three (3) example owner-accepted open graded friction course projects completed in the last one (1) year with references.

Documentation shall include name and address of project, and contact information for project owner.

b. Personnel qualification: The Contractor or paving subcontractor shall provide a qualified foreman with experience installing porous asphalt and documentation showing with following:

1) One (1) example owner-accepted porous asphalt project, similar (or greater) in extent to the proposed project, completed in the last one (1) year with reference.

Documentation shall include name and address of project, and contact information for project owner.

The qualified foreman shall be onsite for the duration of asphalt work including preparation, placement, testing, and completion.

c. Testing agency qualification: Agencies that perform testing on porous asphalt materials shall meet the requirements of Caltrans Standard Specification Section 39-1.03A or be accredited by the AASHTO Accreditation Program (AAP) for the scope and standard being evaluated.

d. Plant qualification: Batch or continuous mixing plants used for porous asphalt shall meet the requirements of Caltrans Standard Specification Section 39-1.08A.

B. Authorized Job Mix Formula (JMF): The mix design process shall conform to Caltrans Specification Section 39-1.03 except as noted below.

1. The final paragraph under Section 39-1.03A is deleted and replaced with the following:

a. Submit a complete JMF submittal including identification of asphalt binder percentage in form CEM-3511 Contractor Job Mix Formula Proposal. Determine the optimum asphalt binder content using California Test 368 in a lab that meets the requirements of 1.05.A. of these specifications.

The products used in the JMF shall meet the requirements in Section 2.01 of this Specification.

The JMF shall meet the quality characteristics defined in Section 39-2.02B (Quality Control for Standard Construction Process) with the modified and additional quality characteristics listed in the table below.

Quality Characteristics	Test Method	Requirement
Aggregate Durability Index	CT 229	DI >= 35
Aggregate Cleanness Value	CT 227	CV >= 75
Air Void Content by Corelok (%)[1]	ASTM D6752 (with AASHTO T209 and ASTM D3203)	16–20%
Air Void Content by Paraffin Wax (%)[1]	AASHTO T275 (with AASHTO T209 and ASTM D3203)	18–22%
Draindown (% of total weight)	ASTM D6390	<= 3%
Retained Tensile Strength (%)	AASHTO 283	>= 80%
Infiltration Rate (Average Inches per Hour)	ASTM C1701	See Note 2.

[1] Either method of determining air void content is acceptable.

[2] The finish surface shall yield an infiltration rate that is consistent with the following: The average infiltration rate from three (3) infiltration tests conducted per ASTM C1701 shall be greater than 100 inches per hour with no single test less than 50 inches per hour. Water shall infiltrate rapidly and uniformly through the surface without formation of large puddles when applied at a rate of 5 gallons per minute (gpm).

2. Once verified and accepted by the Engineer, the JMF meeting the criteria above shall become the Authorized JMF. Acceptance of the JMF shall be per Caltrans Standard Specification Section 39-1.03G, except that verification of the JMF by the City shall be considered equivalent to verification of the JMF by Caltrans. Any adjustments or renewals of the JMF shall be per Caltrans Standard Specifications Section 39-1.03 (Hot Mix Asphalt Mix Design Requirements). Submit a letter from the asphalt supplier with the recommended temperature ranges for mixing, laying, breakdown rolling, and finished rolling, as well as the recommended maximum temperature of the finished mat before placement of subsequent lifts.

C. Responsibilities of Contractor

1. General: Conform to the requirements set forth in Section 39-1.04 (Contractor Quality Control) and Section 39-2.02 (Standard Construction Process Contractor Quality Control) of the Caltrans Standard Specifications.

2. Pre-Placement Conference: A mandatory pre-placement conference will take place, including at a minimum the Engineer, the Owner, the general Contractor, and paving subcontractor, to review preparation, placement, testing procedures, and responsibilities.

3. Quality Control: Contractor quality control inspection and testing of porous asphalt shall be conducted in accordance with the approved QC plan.

4. Load Slip: Provide a load slip certified by a licensed weightmaster showing combined mixture weight for each load of porous asphalt transported to the location.

5. Infiltration Rate Testing: Perform surface infiltration tests per ASTM C1701 as described below.

a. Three (3) test locations per 10,000 square feet of porous asphalt in place.

b. One (1) additional test location per 5,000 square feet of porous asphalt, or fraction thereof, in place.

DESIGNER NOTE: Designer to specify the number and location(s) of required post-construction infiltration tests.

6. Required Inspections: Notify the Engineer at least 5 business days prior placement of porous asphalt.

7. Failed Tests: Each test shall meet the acceptance criteria as defined in this section. For any single quality characteristic except smoothness, if two consecutive quality control test results do not comply with the action limits or specifications:

a. Stop production.

b. Notify the Engineer.

c. Take corrective action.

d. Demonstrate compliance with the specifications before resuming production and placement.

DESIGNER NOTE: The following table is a Sample Contractor Quality Control Sampling and Testing Plan; it is provided to illustrate the type and frequency of testing that may be required The Contractor will need to develop a similar table as part of their QC plan. Frequency and standard for all tests should be project specific.

Sample Contractor Quality Control Sampling and Testing Plan						
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**	
Plant Operations						
Aggregate Gradation	CT 202	1/750 tons	Plant	Plant Inspector	1/2"	TV ± 6
					3/8"	TV ± 6
					No. 4	TV ± 7
					No. 8	TV ± 5
					No. 30	TV ± 4
					No. 200	TV ± 2
Asphalt Binder Content	CT 382	Daily	Plant	Plant Inspector	Design ± 0.5%	
Percent of crushed particles coarse aggregate (%, min)	CT 205	1/project	Plant	Plant Inspector		
One fractured face					90	
Two fractured faces					75	
Fine aggregate (%, min) (Passing no. 4 sieve and retained on no. 8 sieve.)						
One fractured face					90	
Los Angeles Rattler (%, max)	CT 211	1/project	Plant	Plant Inspector		
Loss at 100 rev.					12	
Loss at 500 rev.					40	
Aggregate Durability Index	CT 229	1/750 tons	Plant	Plant Inspector	DI > 35	
Aggregate Cleanness Value	CT 227	1/750 tons	Plant	Plant Inspector	CV > 75	
Asphalt Temp.	Recorded	Continuous	Plant	Plant Inspector	120–190	
Plant Mix Temperature	Recorded	Continuous	Plant	Plant Inspector	165 Maximum	
Aggregate moisture content	CT 226	2/day	Plant	Plant Inspector	For adjusting the plant controller at the HMA plant	
Flat and elongated particles (%, max by weight @ 5:1)	CT 235	1/project	Plant	Plant Inspector	Report Only	

Sample Contractor Quality Control Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**
Street Operations					
Subgrade Preparation	Visual	Daily	Jobsite	Field Inspector	Smooth and Clean
Asphalt Paver & Hopper	Visual and Measure	Daily	Jobsite	Field Inspector	Manufacturer Standards
Compaction Equipment	Visual and Measure	Daily	Jobsite	Field Inspector	Manufacturer Standards
Compaction Process	Visual	Continuous	Jobsite	Field Inspector	Per Specifications
Pavement Temp. at Breakdown	Temperature Equipment	Hourly	Mat Behind Paver	Field Inspector	Per Specifications
Asphalt Binder Content	CT 382	Daily	Mat Behind Paver	Field Inspector/Tester	Design ± 0.5%
HMA Moisture Content (%, max)	CT 226	Daily	Mat Behind Paver	Field Inspector/Tester	1.0
Lift Thickness	Measured	Hourly	Mat Behind Paver	Field Inspector	Per Specifications
Pavement Temp. at Finish	Temperature Equipment	Daily	At Finish Roller	Field Inspector	Per Specifications
Air Void Content by Paraffin Wax (%)	AASHTO T275 (with AASHTO T209 and ASTM D3203)	Daily	Cores of Finished Surface	Field Inspector	16–20%
Tensile Strength	AASHTO 283	Daily	Cores of Finished Surface	Engineer	>= 80%
Long./Transverse Joints	Visual	Continuous	Pavement Joints	Field Inspector	Industry Standards
Smoothness	10 ft straightedge	Hourly	Finished Surface	Field Inspector	Per Specifications

Sample Contractor Quality Control Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**
Street Operations (continued)					
Infiltration Rate (average Inches per hour)	ASTM C1701	Three (3) test locations per 10,000 square feet of pervious asphalt, in place One (1) additional test location per 5,000 square feet of pervious asphalt, or fraction thereof, in place	Finished Surface	Field Inspector	Each Test: 50”/hr min Daily Avg.: 100”/hr min
Pavement Transitions	Visual	Daily	AC Transitions	Field Inspector	Per Specifications

D. Acceptance: Acceptance of porous asphalt shall be determined based on the criteria defined in Section 39-2.03A (Acceptance) of the Caltrans Standard Specifications, with the following modifications and additions:

1. Source aggregate will not be subject to acceptance testing once is has been approved as part of the JMF, unless samples are requested by the Engineer.

2. Air Voids: Air voids shall be tested for by determining the bulk specific gravity in accordance with ASTM D6752 or AASHTO T275, the maximum theoretical specific gravity with AASHTO T209, and the voids by test ASTM D3203.

3. Retained Tensile Strength: Retained tensile strength shall be tested in accordance with AASHTO 283.

Test results for air voids, draindown, and retained tensile strength shall be consistent with the characteristics of the approved JMF.

4. Infiltration Testing

a. Infiltration Rate Testing: The average of all surface infiltration tests shall be greater than 200 inches per hour with no single test less than 100 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For porous asphalt that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 200 inches per hour with no single test less than 100 inches per hour
- For porous asphalt not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 50 inches per hour

b. Infiltration Visual Testing: Visual flood testing of the surface shall be conducted by application of clean water at the rate of at least 5 gpm over the surface, using a hose or other distribution devise. Water used for the test shall be clean, free of suspended solids and deleterious liquids and will be provided at no extra cost to the Owner. All applied water shall infiltrate directly without large puddle formation or surface runoff, and shall be observed by the

Engineer. The Engineer shall mark areas where large puddles form in the field. Areas with slow infiltration shall not exceed 10 percent of the total surface.

DESIGNER NOTE: Smoothness specification should be revised as needed to reflect project design objectives (e.g., smoothness specifications from Section 212 of the City Streets and Highways specifications).

5. Smoothness: Porous asphalt smoothness shall be checked with a 10-foot straightedge. Vertical measurement shall be taken between the pavement's determined plane and straight edge in a direction perpendicular and parallel to the centerline. The finished pavement shall be uniform to a degree such that no variations greater than 3/8-inch are present between the straightedge and pavement surface.

6. Grade: Porous asphalt shall be true to designed spot elevations plus or minus ½ inch and shall not deviate from designed slope more than ¼ inch in ten (10) feet. Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the porous asphalt shall be flush.

7. Line: Porous asphalt margins shall be true to designed lines plus or minus ½ inch at any point.

8. Slope: Porous asphalt shall be sloped as shown on the Plans. Slope shall be consistent to within 1/4 inch in ten (10) feet.

9. Thickness: Each core sample shall be equal to the minimum section depth or more as specified on the Plans.

DESIGNER NOTE: Revise the load slip specification as needed to align with the measurement and payment specifications.

10. Load Slip: Each load of porous asphalt transported to the location of placement shall have a load slip delivered with the load that is certified by a licensed weightmaster and includes the combined mixture weight.

DESIGNER NOTE: Designer should specify consequences of any failed acceptance tests (e.g., reduced payment for lower infiltration rate and lower percent voids, reduced payment for failed smoothness tests) or if consequences are full replacement.

11. Reduced Payment Factors: The reduced payment factors in Caltrans Standard Specification 39-2.03A (Testing) do not apply.

DESIGNER NOTE: The following table is a Sample Owner Quality Assurance Sampling and Testing Plan is provided to illustrate the type and frequency of testing that may be required. Frequency and standard for all tests should be project specific.

Sample Owner Quality Assurance Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Responsibility**	**Attribute or Tolerance**
Plant Operations					
Street Operations					
Asphalt Binder Content	CT 382	Daily	Hopper	Engineer	Design ± 0.5%
HMA Moisture Content (%, max)	CT 226	Daily	Hopper	Engineer	1.0
Lift Thickness	Measured	Hourly	Cores of Finished Surface	Engineer	Per Specifications
Air Void Content by Paraffin Wax (%)	AASHTO T275 (with AASHTO T209 and ASTM D3203)	Daily	Cores of Finished Surface	Engineer	16–20%
Tensile Strength	AASHTO 283	Daily	Cores of Finished Surface	Engineer	>= 80%
Long./Transverse Joints	Visual	Continuous	Pavement Joints	Engineer	Per Specifications
Smoothness	10 ft straightedge	Hourly	Finished Surface	Engineer	Per Specifications
Infiltration Rate (average inches per hour)	ASTM C1701	3/day	Finished Surface	Engineer	Each Test: 50”/hr min Daily Avg.: 100”/hr min
Pavement Transitions	Visual	Daily	AC Transitions	Engineer	Per Specifications

PART 2 PRODUCTS

DESIGNER NOTE: If a product is not available, the designer needs to ensure that the desired voids and surface texture will meet the desired pavement characteristics for surface smoothness, voids, and bonding.

2.01 POROUS ASPHALT

Porous Asphalt mixture must comply with the approved Job Mix Formula (See Section 1.05 of this Specification). The components of the asphalt mixture must comply with the specifications below.

A. Asphalt Binder: Asphalt binder must comply with Caltrans Specification Section 92 except as noted below.

1. Performance Graded (PG) Asphalt Binder: PG asphalt binder must be PG 70-10 per Caltrans Specification Section 92-1.02B.

2. PG Polymer Modified Asphalt Binder:

PG polymer modified asphalt binder must be PG 76-22 PM per Caltrans Specification Section 92-1.02B for use in vehicular applications.

PG polymer modified asphalt binder must be either PG 64-28 PM or PG 76-22 PM per Caltrans Specification Section 92-1.02B for use in pedestrian applications.

B. Aggregates: Aggregates shall conform to Caltrans Specification Section 39-1.02E for Open Graded Friction Course (OGFC) with the following additions and modifications:

1. Durability Index: 35 (minimum) tested in accordance with California Test 229 at least once per 750 tons of porous asphalt.

2. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 750 tons of porous asphalt.

3. Aggregate for porous asphalt shall meet the following gradation:

Porous Asphalt Aggregate Gradation	
Sieve[1]	**Percent Passing by Weight**
3/4 inch	100
1/2 inch	85 to 100
3/8 inch	55 to 75
No. 4	10 to 25
No. 8	5 to 12
No. 30	0 to 10
No. 200	0 to 3

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

C. Materials Not to Be Used: The following materials shall not be used unless approved in advance by the Engineer.

1. Geosynthetic pavement interlayer

2. Tack Coat (except on vertical faces of curbs, edges of PCC structures, or when paving over areas with impermeable bases).

3. Asphalt Rubber Binder.

4. Crumb Rubber Modifier.

5. Reclaimed Asphalt Pavement.

6. Paint Binder per Section 212.06 of the DPW Standard Specifications

D. Job Mix Formula (JMF): The JMF shall comply with the requirements of Section 1.05.C of this Specification.

2.02 PAVEMENT BASE

A. Pavement Base Material shall consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials are not permitted. The Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than 10 Working Days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to two (2) layers as specified on the Plans and included herein:

1. "Base Course" shall be ASTM No. 3 (modified) or ASTM No. 57 (modified) stone per Section 2.02.C.

DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

2. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.02.C.

DESIGNER NOTE: This layer of the pavement base is intended to provide storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed gravel to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying coarser graded materials or reduction in permeability relative to the underlying material..

C. Pavement Base Material shall meet the following specifications for grading and quality.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

2.

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
3 inch	100	–	–	–
2 1/2 inch	90 to 100	100	–	–
2 inch	35 to 70	90 to 100	–	–
1 1/2 inch	0 to 15	35 to 70	–	100
1 inch	–	0 to 15	–	95 to 100
3/4 inch	0 to 5	–	–	–
1/2 inch	–	0 to 5	100	25 to 60
3/8 inch	–	–	85 to 100	–
No. 4	–	–	10 to 30	0 to 10
No. 8	–	–	0 to 10	0 to 5
No. 16	–	–	0 to 5	–
No. 100[2]	0 to 2	0 to 2	0 to 2	0 to 2

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 sieve.

3. R-Value: 78 (minimum) tested in accordance with California Test 301.

4. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C 131.

5. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.

6. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.

7. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.03 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The

geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%
Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer, and shall be recompacted in accordance with 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

F. After compaction and proof roll, scarify subgrade ¼ to ½ inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.
2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct the over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer, at the Contractor's expense. Overlaps of the geotextile shall be a minimum of 1 foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6)-inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10)-ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction

indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. The pavement base shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any porous asphalt.

3.03 POROUS ASPHALT PREPARATION

DESIGNER NOTE: Designer should specify where a tack coat should be applied, if at all. See 3.03.A.2 for list of potential locations.

A. Preparation for placement of porous asphalt pavement shall comply with Section 39-1.09 of the Caltrans Standard Specifications, except as noted below.

1. Pavement Base: Confirm that the completed pavement base conforms to these specifications.

2. Tack Coat: Shall not be used except on vertical faces of curbs, edges of PCC structures, or when paving over areas with impermeable bases.

3. Geosynthetic Pavement Interlay: Shall not be used.

4. Environmental Conditions: Do not place porous asphalt when the ambient temperature is less than 60 degrees Fahrenheit, on any wet surface, or when the average ground surface temperature is less than 45 degrees Fahrenheit.

5. Qualified Personnel: The qualified foreman as defined in 1.05.B.2 shall be onsite for the duration of porous asphalt preparation.

3.04 POROUS ASPHALT PLACEMENT

DESIGNER NOTE: Designer should specify where a tack coat should be applied (e.g., face of curb, structures,) if at all.

A. Porous asphalt equipment, transportation, spreading, and compacting shall comply with the Caltrans Specification applicable to Open Graded Friction Course (OGFC), except as noted below or as specified in the approved mix design.

B. Qualified Personnel: The qualified foreman as defined in 1.05.B.2 shall be onsite for the duration of porous asphalt placement.

C. Spreading and Compacting Equipment: shall conform to Section 39-1.10 of the Caltrans Standard Specifications except that pneumatic tire rollers shall not be used.

DESIGNER NOTE: The compaction could be established by the contractor rather than prescribed below depending on whether the contracting agency prefers to take a prescriptive approach or performance based approach. Prescriptive is used here because full depth porous asphalt is an emerging technology and there are limited density specifications for open graded (porous) asphalt mixtures. But care must be taken to ensure this prescriptive specification is compatible with the acceptance criteria.

D. Spreading and Compacting:

The type of rollers to be used and their relative position in the compaction sequence shall be dictated by the contractor provided the requirements below are met and the completed porous asphalt meets the required quality characteristics specified in Section 1.05. Deviation from the requirements below must be approved in advance by the Engineer.

1. The porous asphalt shall be laid in lifts of up to 4 inches in thickness using approved equipment to achieve the total thickness indicated in the Plans.

DESIGNER NOTE: Designer should consider using thinner lifts to the extent practical to ensure better compaction.

2. The temperature of the Porous HMA mix during laying, breakdown rolling, and finished rolling, shall be within the supplier-recommended temperature range.

3. Breakdown rolling shall be performed with one or two passes of a 7.5- to 10-ton vibratory roller operated in low amplitude mode when the mix temperature is within the supplier-recommended temperature range.

4. Finished rolling shall be performed with a double-drum finish roller operated in static mode when the mix temperature is within the supplier-recommended temperature range.

5. Finished paving shall be even, without pockets, and graded to elevations shown on the Plans. Finished porous asphalt shall meet the acceptance criteria for Smoothness set forth in Section 1.05.D.

DESIGNER NOTE: Designer should specify details of the straightedge test and tolerance if different than specified in Section 1.05E.

6. The Contractor shall take care to insure that the porous asphalt lifts join completely to previous lifts. The Contractor shall keep the time between lift placements to a minimum, keeping the surface of the previous lift clear from dust and moisture between lifts, and restrict traffic from initial lifts until the full depth of asphalt pavement has been placed.

7. Sufficient time shall be allowed between lifts to allow the asphalt to set and cool to at or below the supplier recommended maximum temperature for placement of subsequent lifts.

3.05 OPENING TO TRAFFIC

A. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement surface until cooling and hardening has taken place, and in no case within the first six (6) hours. Provide traffic control measures as necessary to prevent vehicular use and remove when no longer required.

3.06 PROTECTION OF PAVEMENT

A. Hardened porous asphalt pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the porous pavement voids, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If porous asphalt pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

3.07 REJECTION

A. Porous asphalt that does not meet the acceptance criteria set forth in Section 1.05.E will be rejected by the Engineer. Porous asphalt that has been rejected by the Engineer shall be removed and replaced at the Contractor's expense.

END OF SECTION

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints.

DESIGNER NOTE: Green text corresponds to notes to the designer. Blue text corresponds to requirements taken directly from ACI 522.1.

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Pervious Concrete
2. Pavement Base
3. Geotextile for Soil Separation

B. Related Sections:

DESIGNER NOTE: The designer should list any additional specification sections which relate to the pervious concrete work (i.e., temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards This section incorporates by reference the latest versions of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications
AASHTO	Standards of the American Association of State Highway and Transportation Officials, 1998 or latest edition
ACI 522.1	Specifications for Pervious Concrete Pavement
ACI 301	Specifications for Structural Concrete
ACI 305.1	Standard Specifications for Hot Weather Concreting
ACI 306.1	Standard Specifications for Cold Weather Concreting
ACI 308.1	Standard Specifications for Curing Concrete
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. National Ready Mix Concrete Association (NRMCA) Pervious Concrete Contractor Certifications and project experience as specified in Section 1.05.A for the crew assigned to this project.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: The Contractor shall submit to the Engineer the following a minimum of 20 calendar days prior to the construction of the pervious cement concrete pavement:

1. NRMCA Certifications for the batch plant to be used in the production of pervious concrete for this project.

2. Proposed mix design including the following:

a. Batch weights of all constituents.

b. Portland cement type and brand.

c. Non-Portland cement pozzolan type and source.

d. Microfiber brand and type.

e. Admixture type and brand.

f. Aggregate source(s), gradation(s), LA abrasion, and cleanness value(s).

g. Fresh density of the pervious concrete per ASTM C1688.

No concrete shall be placed until the Engineer has provided written acceptance of the mix design per Section 1.05.B.

3. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base and reservoir course materials performed within one (1) month of product delivery to site.

DESIGNER NOTE: Consider revising acceptable age of sieve test depending on scale of project. On a larger project it may be appropriate to require testing by an independent lab with samples taken at the supplier's yard from the stockpile to be used for the project.

4. Product data sheets for all proposed admixtures and geotextiles.

5. A detailed plan of the proposed paving pattern showing the location and type (saw cut or rolled in plastic concrete) of all planned joints. No deviation from the jointing pattern shown on the Plans will be allowed without written approval of the Engineer.

6. A detailed procedure for the production, transportation, placement, protection, curing, and temperature monitoring of concrete for hot

and/or cold weather, unless written approval of the Engineer waiving the requirement is received.

7. Field technician qualifications as specified in Section 1.05.A.

8. Testing agency qualifications as specified in Section 1.05.A.

9. Density of fresh pervious concrete, length of cores, and density of cores for one (1) reference panel. Reference panel shall be placed, jointed, cured, and tested as specified in Section 1.05.D.1 and be within tolerance of the required thickness defined by the Contract Documents.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect concrete materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

1. Contractor and Personnel Qualifications

a. Contractor qualification: Unless otherwise approved by Engineer, Contractor shall provide evidence of employment for one (1) NRMCA certified Pervious Concrete Installer and four (4) NRMCA certified Pervious Concrete Technicians who must be on site, working as members of each placement crew, during all concrete placement.

For all projects where the total pervious concrete pavement area exceeds 20,000 square feet (sf), the Contractor shall provide evidence of employment for at least one (1) NRMCA certified Pervious Concrete Craftsman who must be onsite, working as part of the placement crew, during all concrete placement. Additionally, for every 10,000 sf of pavement area over 20,000 sf, one (1) additional NRMCA certified Pervious Concrete Installer is required on site, working as part of the placement crew.

The Contractor shall provide documentation showing three (3) successful pervious concrete projects completed in the last three (3) years collectively totaling more than 20,000 square feet. Documentation shall include name and address of project, and contact information for project owner.

DESIGNER NOTE: The designer should adjust as required based on the availability of qualified bidders and the size of the project.

b. Field technician qualification: Field tests of concrete required in the responsibilities of the testing agency shall be performed by an individual certified as both an NRMCA Certified Pervious

Concrete Technician, or equivalent, and an ACI Concrete Field Testing Technician – Grade I, or equivalent.

DESIGNER NOTE: The designer should adjust as required based on the availability of qualified personnel and the size of the project.

c. Testing agency qualification: Agencies that perform testing on concrete materials shall meet the requirements of ASTM C1077 and provide evidence of employment for at least one (1) NRMCA Certified Pervious Concrete Technician, responsible for testing, or providing direct oversight of testing, of all concrete materials. Agencies inspecting the Work shall meet the requirements of ASTM E329. Testing agencies performing the testing shall be accepted by the Engineer before performing any Work.

d. Batch plant qualification: Batch plant used for pervious concrete shall be a semi-automatic or automatic batching plant with a current NRMCA certification.

DESIGNER NOTE: Volumetric (truck mounted) Site Mixed Mobile Mixers may be used at the designers discretion. Mixing operations should be per manufactures directions. Designer should specify certification and calibration requirements for Volumetric Mobile Mixers including, but not limited to:

- Proof of Volumetric Mixer Manufacturer Bureau (VMMB) certification, compliance with VMMB 100-01 Volumetric Mixer Standards, and associated VMMB rating plate, or equal
- Provisions for calibration of Volumetric Mobile Mixers performed with aggregate manufactured for the project and recalibrated with each restocked stock pile

Additionally, the designer should specify required quality control measures to ensure aggregates, cementitious material, and admixtures are free from contamination from deleterious material or other stockpiles/storage containers, protected from damage by equipment, vehicles, or weather, and properly batched in lieu of batch ticket (e.g., labeling of aggregate bins to ensure correct aggregate is fed into appropriate mixer material compartment.

B. Approved Mix Design: Once accepted by the Engineer, the mix design meeting the criteria specified in Section 2.01.F shall become the Approved Mix Design and shall not be modified in any way. The Approved Mix Design shall be determined from information submitted under Section 1.04 and from results of reference panel testing as described in Section 1.05.D.1.

Modifications to the Approved Mix Design will not be allowed and any modified mix placed in the Work will be rejected. Proposed modifications to

the Approved Mix Design shall be submitted as a new mix design and shall require a new reference panel to validate the proposed mix design and determine the new Approved Mix Design. If accepted by the Engineer, the new mix design shall become the Approved Mix Design. The requirement for a new reference panel may be waived at the discretion of the Engineer. Only one (1) Approved Mix Design shall be valid at any time. Admixture and water dosages may be modified as needed to maintain mix properties.

C. Responsibilities of Contractor

1. Pre-Placement Conference: A mandatory pre-placement conference will take place including at a minimum the Engineer, the Owner, general contractor, pervious concrete installer, concrete supplier, and field testing agency representative. The document Checklist for the Concrete Pre-Construction Conference (available from the National Ready Mix Concrete Association) will be used to review all materials, personnel qualifications, concrete production, delivery, maintaining moisture retention of fresh mixture, preparation, placing, curing (including timing, placement, and securing of curing cover), jointing, testing procedures, and responsibilities. Meeting emphasis will be on how pervious concrete differs from conventional concrete.

2. Reference Panel: Place reference panels on the project site, on a subgrade and base prepared as specified, using the material and construction requirements for pavement in this Specification. Each panel must have a surface area of at least 225 square feet, and a width and thickness as specified for the pavement in the Contract Documents. The Engineer shall observe and accept each element of the pervious concrete construction. Construction and evaluation of the reference panel(s) will occur as follows:

   a. Notify the Engineer at least ten (10) Working Days before installing pervious concrete reference panel.

   b. Coordinate the location of the reference panel with the Engineer.

   c. Notify the Engineer when each element of the reference panel is ready for inspection.

   d. Remove, replace, and dispose of any unsatisfactory portions of reference panel as determined by the Engineer and at no additional cost to the Owner.

   e. Retain and maintain approved reference panels during construction in an undisturbed condition as a standard for judging completed portions of the final installations.

   Approved reference panels may remain as final installations of the Work at the discretion of the Engineer. If not retained, the reference panel shall be removed and disposed of at no additional cost to the Owner.

3. Testing facilitation: Owner's use of testing services will not relieve Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents. Unless otherwise specified in the Contract Documents, Contractor shall assume the following duties and responsibilities:

   a. Furnish the materials to be tested, including concrete cores.

   b. Furnish any necessary labor to assist Owner's testing agency in obtaining and handling samples, including concrete cores, at the project site or at the source of materials.

   c. Provide measures to collect slurry and debris during coring operation in order to avoid sealing adjacent pavement.

   d. Fill core holes in accordance with Section 1.05.D.2.

   e. Advise Owner's testing agency at least 24 hours in advance of operations to allow for completion of quality tests and for assignment of personnel.

4. Pressure wash testing: Before final acceptance by the Engineer, the Contractor shall pressure wash the pervious concrete. Pressure washing shall be provided and completed by using portable washer equipment working at a minimum of 3,000 psi at 2.0 to 2.5 gpm. The nozzle shall be a zero degree nozzle and be held a maximum of three (3) inches off the concrete surface. The Contractor shall pressure test three (3) locations per lot or as determined by the Engineer. Any sections of pervious concrete that breaks up, ravels, or does not infiltrate shall be removed and replaced with acceptable pervious concrete to the nearest joints. The Engineer will reject the concrete if the pressure washing dislodges aggregate particles from more than two (2) percent of the pervious concrete in a single panel (joint to joint) or dislodges aggregates from a contiguous area of the pavement surface exceeding five times the nominal maximum aggregate size in any direction.

   The Contractor shall decide, after placing the pervious concrete, when to perform the quality assurance pressure wash testing for the acceptance.

DESIGNER NOTE: The designer should consider requiring verification of subgrade infiltration rate and provision to increase reservoir course depth based on results.

D. Testing

1. Reference Panel: Testing for the reference panel shall adhere to the requirements for testing of Pavement per Section 1.05.D.2 for approval by the Engineer. Each test shall meet the acceptance criteria for Reference Panel as defined in Section 1.05.E.1.

The Engineer shall inspect and approve the reference panel prior to the placement of additional pervious concrete.

Failure to install acceptable reference panels of pervious concrete will indicate an unqualified installer.

Production sections of this Work shall not be placed until achieving a complete reference panel that fully complies with the Plans and Specifications and has written acceptance issued by the Engineer.

The completed and accepted reference panels shall be maintained and protected throughout the duration of the Work and may not be demolished and disposed of without written permission from the Engineer. If a reference panel is incorporated into the Work, it shall remain in place and be accepted as a single lot.

Unless otherwise determined by the Engineer, density testing of fresh concrete and hardened cores will be used to validate the mix design per the design criteria set forth in Section 1.04.B and the acceptance criteria in Section 1.05.E.1.

The average fresh density and average hardened density of the cores shall be the densities used for the Approved Mix Design.

2. Pavement: The following testing shall be conducted for approval by the Engineer for each reference panel and each lot of pervious concrete placed, where a lot is defined as the lesser of one (1) day's production or 5,000 square feet of pervious concrete, in place, unless otherwise specified below:

   a. Density testing of at least one (1) cubic foot of fresh concrete in accordance with ASTM C1688.

   b. Thickness testing of three (3), four- (4)-inch hardened concrete cores in accordance with ASTM C174 and adhering to the following requirements:

      1) Removed not less than seven (7) days after placement of pervious concrete.

      2) Location selected in accordance with ASTM D3665.

      3) Cut in accordance with ASTM C42.

   c. Density and void content testing of the three (3) hardened concrete cores extracted for thickness testing and trimmed to produce flat core ends per ASTM C42 paragraph 7.4.1 and 7.4.2. Samples shall be tested in accordance with ASTM C1754.

   d. Surface infiltration tests per ASTM C1701 and at the frequency described below.

1) Three (3) test locations per 10,000 square feet of pervious concrete, in place

2) One (1) additional test location per 5,000 square feet of pervious concrete, or fraction thereof, in place

DESIGNER NOTE: Designer to specify the number and location(s) of required post construction infiltration tests.

Core holes shall be filled with solid concrete, pre-blended grout, or pervious concrete and shall match adjacent pavement color, and grade. At the Engineer's discretion, a sacrificial panel for cores may be required or allowed.

Each test shall meet the acceptance criteria for Pavement as defined in Section 1.05.E.2.

E. Acceptance

1. Reference Panel: Acceptance of the reference panel will be based on the criteria for acceptance of Pavement per Section 1.05.E.2 with the following deviations:

   a. Hardened Density: The density of each core shall be within five (5) pounds per cubic foot of the average hardened density of the three (3) cores.

   b. Fresh Density: The fresh density shall be within or equal to five (5) pounds per cubic foot of the average fresh density of the three (3) samples.

2. Pavement: Acceptance of a lot of pervious concrete will be based on the following criteria:

   a. Smoothness: Pervious concrete pavement smoothness shall be checked with a 10-foot straightedge. Vertical measurement should be taken between the pavement's determined plane and straight edge, discounting surface void and roughness irregularities, in a direction perpendicular and parallel to the centerline. The finished pavement shall be uniform to a degree such that no variations greater than 3/8-inch are present between the straight edge and pavement surface over a distance of at least 6 inches.

   b. Grade: Pervious concrete shall be true to designed spot elevations plus or minus ½ inch and shall not deviate from designed slope more than ¼ inch in ten (10) feet. Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the pervious concrete shall be flush.

   c. Line: Pervious concrete margins shall be true to designed lines plus or minus ½ inch at any point.

d. Slope: Pervious concrete shall be sloped as shown on the Plans. Slope shall be consistent to within 1/4 inch in ten (10) feet.

e. Thickness: Each core sample shall be equal to the minimum section depth or more as specified on the Plans.

f. Hardened Density: The density of the core samples for each lot shall be within five (5) pounds per cubic foot of the density as accepted in the reference panel.

g. Void Content: The total void content of the core samples for each reference panel and lot shall be twenty (20) percent, plus or minus five (5) percent, in place, as constructed.

h. Infiltration Rate: The average of all surface infiltration tests shall be greater than 250 inches per hour with no single test less than 100 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For permeable pavement that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 250 inches per hour with no single test less than 100 inches per hour
- For permeable pavement not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 75 inches per hour

i. Fresh Density: The fresh density shall be within or equal to five (5) pounds per cubic foot of the fresh density indicated by the Approved Mix Design.

j. Batch Ticket: Each load of pervious concrete transported to the location of placement shall have a Batch Ticket delivered with the load. Batch Tickets shall be provided upon request for each load and shall be in accordance with ASTM C94, with the following additions:

1) Batch weights of all constituents in the mix, including cement, aggregate, admixtures, water, and fibers

2) Signature of responsible representative of the concrete producer, affirming the accuracy of the information provided

k. Appearance: Each lot of finished pervious concrete will be inspected for appearance by the Engineer after completion of pressure wash testing per Section 1.05.C.4. The pervious concrete shall have a consistent surface texture, shall have no more than five (5) percent of the surface area within each panel (joint to joint) filled with paste, shall be free of ridges or other surface imperfections, shall have joints that are in the specified location and are constructed per specification, shall be free of cracks and shall not be raveled.

A panel will be considered raveled if aggregate is dislodged from a contiguous area of the pavement surface or longitudinally along a joint exceeding five times the nominal maximum aggregate size in any direction OR if aggregate particles are dislodged from more than two (2) percent of the pervious concrete within each panel (joint to joint).Raveling occurring during the first three (3) months after installation is subject to complete removal and replacement of affected panels with acceptable pervious concrete at the Owner's discretion and Contractor's expense. Requirement to replace affected panels shall continue until three (3) months after the date of replacement. Written notification of defects is the sole responsibility of the Owner.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

l. Conformance to Approved Mix Design: The pervious concrete used shall conform to the Approved Mix Design within the limits set forth in ASTM C94.

3. Required Inspections: Notify the Engineer at least 48 hours prior to required inspections specified in Sections 3.01, 3.02, and 3.03.B.

PART 2 PRODUCTS

DESIGNER NOTE: Designers should maximize the use of regionally available materials.

2.01 PERVIOUS CONCRETE

DESIGNER NOTE: No reinforcing bars or tie bars will be used in the installation of pervious concrete.

Pervious Concrete shall comply with ASTM C94, except sections 4.2, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 7, 8, 16, 17, 18, 19, 20 and the requirements specified herein. The volume of fresh concrete in a given batch shall be determined from the total mass of the batch divided by the design density of the concrete. The total mass

of the batch shall be determined as the net mass of the concrete in the batch as delivered, including the total mixing water as defined in ASTM C94 Paragraph 9.3.

A. Cement: Cement in the mix design shall conform to the requirements for Portland Cement or Blended Hydraulic Cement as specified herein:

1. Portland Cement: Portland Cement shall meet the requirements of ASTM C150 Type I, II, or V Portland cement.

2. Blended Hydraulic Cement: Blended Hydraulic Cement shall be Type IP or IS Cement conforming to ASTM C595. Type IP(X), Portland Pozzolan Cement, and IS(X) where (X) dictates pozzolan and slag percentage, respectively, shall be Portland Cement and Pozzolan. The pozzolan shall be limited to fly ash or ground granulated blast furnace slag.

   The fly ash or ground granulated blast furnace slag constituent content in the finished cement shall not vary more than plus or minus 5 percent by weight of the finished cement from the certified value.

3. Supplementary cementitious material shall be as specified herein:

   a. Fly Ash: Fly ash shall conform to the requirements of ASTM C618, Class F or C.

   b. Slag Cement: Slag cement shall meet the requirements of ASTM C989, Grade 100 or Grade 120.

   c. Silica Fume: Silica fume shall meet the requirements of ASTM C1240.

B. Aggregates: Aggregates shall conform to ASTM C33 except as specified herein, unless otherwise approved by the Engineer.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 300 cubic yards of concrete.

Sieve[1]	Percent Passing by Weight				
	Coarse Aggregate				Fine Aggregate
	ASTM No. 7	ASTM No. 8	ASTM No. 89	ASTM No. 9	
2 inch	–	–	–	–	–
1 1/2 inch	–	–	–	–	–
1 inch	–	–	–	–	–
3/4 inch	100	–	–	–	–
1/2 inch	90 to 100	100	100	–	–
3/8 inch	40 to 70	85 to 100	90 to 100	100	100
No. 4	0 to 15	10 to 30	22 to 55	85 to 100	95 to 100
No. 8	0 to 5	0 to 10	5 to 30	10 to 40	80 to 100
No. 16	–	0 to 5	0 to 10	0 to 10	50 to 85
No. 30	–	–	0 to 5	0 to 5	25 to 60

No. 50	–	–	–	–	5 to 30
No. 100	–	–	–	–	0 to 10
No. 200	–	–	–	–	0 to 3

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

In individual tests, a variation of 4 percent under the minimum percentages or over the maximum percentages will be allowed. The average of three successive tests shall be within the percentages stated above. Aggregate shall contain no pieces larger than two times the maximum sieve size for the specified grading measured along the line of greatest dimension.

2. Coarse Aggregate

   a. LA Abrasion: 35 percent (maximum) tested in accordance with ASTM C131 at least once per 300 cubic yards of concrete.

   b. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 300 cubic yard of concrete.

3. Acceptance of grading and quality of the aggregate may be based on samples taken from stockpiles at the concrete plant or a submitted gradation report at the discretion of the Engineer. The point of acceptance will be determined in the field by the Engineer.

C. Admixtures

1. Air Entraining Admixtures: Air entraining admixtures shall meet the requirements of ASTM C260.

2. Water Reducing Admixtures: Water reducing admixtures shall meet the requirements of ASTM C494, Type A.

3. Hydration Stabilizing Admixtures: Hydration stabilizing admixtures shall meet the requirements of ASTM C494, Type B or Type D.

4. Superplasticizers: Superplasticizers and retarders shall meet the requirements of ASTM C494, Type F or Type G and ASTM C1017, Type 1.

5. Viscosity Modifying Admixtures: Viscosity modifying admixtures may be used if approved by the Engineer.

6. Color Pigment: Color pigment shall meet the requirements of ASTM C979 for integrally colored concrete. Pigments shall be color stable, non-fading, and resistant to lime and other alkalis.

   DESIGNER NOTE: Designer to specify color, as indicated by manufacturer's designation, architect's sample, etc. with provision for approved equal color.

D. Water: Clean potable water or water conforming to ASTM C1602 shall be used in the mix design and on the jobsite. The use of hot water is not permitted.

E. Microfibers: Microfibers shall conform to the requirements of ASTM C1116, Type III and shall be monofilament and ½ inch in length.

F. Mix Design:

1. General: The Contractor shall propose a mix design for pervious concrete and shall submit the mix design to the Engineer for acceptance prior to constructing the reference panels. Pervious concrete shall not be placed in the reference panels without a mix design that has been reviewed and accepted by the Engineer.

2. Mix Design Criteria: The Contractor shall include the following elements and results of the described procedures in the proposed mix design:

   a. The cementitious content, including pozzolans if used, shall be a minimum of 480 and a maximum of 600 pounds per cubic yard.

   b. The mix may incorporate up to 5 percent fine aggregate, by weight.

   c. The mix shall incorporate a hydration stabilizing admixture.

   d. The mix may incorporate microfibers or fibers per Manufacturer's recommendations.

   e. The mix shall be designed to meet the acceptance criteria for Void Content per Section 1.05.F.2 as determined by the testing methods specified in Section 1.05.E.2.

   f. The water/cement ratio shall be between 0.27 and 0.35.

   g. Up to 50 percent of cementitious material in the mix, by weight, may be fly ash, slag cement, or a combination of silica fume and either or both of the above, with silica fume not exceeding 10 percent.

   Deviations from this mix design, such as the use of internal curing admixtures, cementitious content outside of the range specified, or finer aggregate gradations may be permitted at the sole discretion of the Engineer provided the Contractor can demonstrate the viability of the mix design through past successful installations or sound science.

2.02 PAVEMENT BASE

A. Pavement Base Material shall consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials or round river gravel are not permitted. Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than Working 10 days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take

preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to two (2) layers as specified on the Plans and included herein:

1. "Base Course" shall be ASTM No. 3 (modified) or ASTM No. 57 (modified) stone per Section 2.02.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

2. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.02.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed rock to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying courser graded materials or reduction in permeability relative to the underlying material.

C. Pavement Base Material shall meet the following specifications for grading and quality.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
3 inch	100	–	–	–
2 1/2 inch	90 to 100	100	–	–
2 inch	35 to 70	90 to 100	–	–
1 1/2 inch	0 to 15	35 to 70	–	100
1 inch	–	0 to 15	–	95 to 100
3/4 inch	0 to 5	–	–	–
1/2 inch	–	0 to 5	100	25 to 60
3/8 inch	–	–	85 to 100	–

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
No. 4	–	–	10 to 30	0 to 10
No. 8	–	–	0 to 10	0 to 5
No. 16	–	–	0 to 5	–
No. 100[2]	0 to 2	0 to 2	0 to 2	0 to 2

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 sieve.

2. R-Value: 78 (minimum) tested in accordance with California Test 301.
3. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C131.
4. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.
5. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.
6. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.03 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%

Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer and shall be recompacted in accordance with Section 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade.

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

DESIGNER NOTE: Other subgrade verification methods may be required if site conditions limit proof rolling. Consult with geotechnical engineer for acceptable methods.

F. After compaction and proof roll, scarify subgrade ¼- to ½-inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer at no additional cost to the Owner. Overlaps of the geotextile shall be a minimum of one (1) foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6) inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10) ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots, additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. The pavement base shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any pervious concrete.

DESIGNER NOTE: Consider developing a testing plan for the required testing and inspection of the pavement base. Verification of the in place density/compaction of the open graded base materials is typically not possible with the use of a nuclear densometer due to nature of these materials. Therefore other means to verify these materials are firm and unyielding (such as observation of the compaction process by a geotechnical engineer) are necessary.

DESIGNER NOTE: Consider requiring the Contractor to compact aggregates without crushing them.

3.03 MIXING, PLACEMENT & CURING OF PERVIOUS CONCRETE

A. Pervious concrete formwork

1. Forms shall be made of steel or wood and shall be in good condition, clean, and capable of being anchored in place so as to ensure pavement placement true to the grades, lines and slopes as specified on the Plans.

2. Forms that are bent, warped, unclean, or otherwise deemed inadequate by the Engineer shall not be used.

3. Existing curbs, structures, or the vertical face of previously placed pervious concrete may be used as a form.

4. Set, align, and brace forms to satisfy the lines, grades, and slopes on the Plans.

5. Apply form-release agent to the form face immediately before placing concrete.

6. No pervious concrete shall be placed until the forms are inspected and accepted by the Engineer.

7. Slip forming is an acceptable method for placement of pervious concrete.

B. Batching, mixing, and delivery

1. Pervious concrete shall be batched and centrally mixed at a batching plant meeting the requirements set forth in Section 1.06.A.4. Pervious concrete shall not be shrink mixed or transit mixed.

2. Begin mixing immediately after cement has been added to aggregates. Batch and mix concrete in compliance with ASTM C94, with the following exceptions:

   a. Placement of concrete shall occur no more than 60 minutes from the time water or aggregate is added to the cement.

   b. If a hydration-stabilizing admixture is used, up to 60 minutes may be added to the placement time, resulting in a maximum placement time of 120 minutes.

   Additional water may be added on site, but the fresh density must still meet the requirements of Section 2.01.F.2 after water addition.

C. Placing and consolidation

1. Pervious concrete shall not be placed on standing water or frozen pavement base.

2. Wet the pavement base with water before concrete placement such that the material is saturated but without any standing water on the prepared base immediately before concrete placement.

3. Place pervious concrete on the prepared pavement base as close to its final position as possible, either directly from the transporting equipment or by conveyor, unless otherwise specified. Spread the concrete using mechanized equipment or hand tools, without segregation.

4. Strike off concrete between forms using a form riding paving machine or roller screed at the appropriate height, as determined by the Contractor, to allow for compaction to finished grade. Equipment used for striking off the pervious concrete shall leave a smooth surface, free of ridges or other imperfections, without drawing excessive paste to the surface. Vibratory screeds are not permitted. Other strike-off devices may be used when accepted by the Engineer.

5. Compact pervious concrete with a purpose built pervious concrete cross roller or alternate method approved by the Engineer. Rollers shall be of sufficient weight and width to compact the fresh pervious concrete to grade, leaving a smooth surface, free of ridges or other imperfections, without drawing excessive paste to the surface.

Compacted pervious concrete shall meet the acceptance criteria for Smoothness set forth in Section 1.05.E.2.

6. Contractor's personnel shall take care to avoid foot traffic in the pervious concrete to prevent non-uniform compaction and to keep contaminated material from entering the pavement mix. Foot traffic on the fresh concrete shall not be allowed after it has been struck off.

7. Place pervious concrete continuously. Where placement has been halted for a period of 15 minutes, a header shall be placed between the forms and a construction joint formed. The construction joint shall be located at a contraction joint location, unless otherwise approved by the Engineer. The pervious concrete shall be compacted and finished to the header before placement may continue. Upon resuming placement, the header may be carefully removed and a construction joint formed at that location. Any sloughing or sagging of the previously placed pervious concrete at the header location shall be corrected prior to placing new pervious concrete against the joint.

D. Edging: Edging of the top surface shall be completed in plastic concrete to a radius of not less than 1/4 inch. Defects shall be repaired immediately.

E. Jointing: Joints shall be of three (3) types: construction, contraction, and isolation. Wherever possible, the angle between intersecting joints shall be between 80 and 100 degrees. Construct joints at the locations and to the horizontal dimensions indicated on the Plans.

1. Construction Joints: Construction joints shall be formed at the end of a day's work or when necessary to stop production for any reason.

   a. Construction joints shall be located as near as possible to the location of a planned contraction or isolation joint.

   b. Construction joints are to be formed by placing a header between the forms, at right angles, to the full depth of the finished pervious concrete, and set to the height of the forms. Pervious concrete shall be placed against the header and compacted and finished as normal, including edging.

   c. Upon resuming paving, the header shall be carefully removed and new pervious concrete placed directly against the existing pervious concrete. The new pervious concrete shall be compacted and finished against the hardened pervious concrete as if it were a form.

   d. If an isolation joint is planned at this location, then the premolded joint filler shall be placed against the existing pervious concrete and the new pervious concrete shall be placed against the premolded joint filler. The joint shall be tooled on both sides of the premolded joint filler.

2. Contraction Joints: Contraction joints shall be used to control random cracking.

   a. Contraction joints shall be placed every 15 feet unless otherwise shown on the Plans.

      DESIGNER NOTE: Designer should consider size and aspect ratio of panels when locating joints.

   b. Plastic Formed Joints: Contraction joints may be formed in the plastic concrete using a roller designed for this purpose or by other methods accepted by the Engineer.

      1) Rollers shall have sufficient weight to produce the joint and shall not otherwise damage or mar the surface.

      2) Plastic formed joints shall be a minimum depth of 1 and 3/4 inches and have a width of no more than 1/8 inch.

      3) Joints shall be tooled on both sides of the joint with a radius not less than 1/4 inch.

   c. Saw Cut Joints: At the option of the Contractor, contraction joints may be saw cut provided joints are early-entry dry-cut type.

      1) Joints shall be cut using purpose built early-entry saw cutting equipment.

      2) Saw cut joints shall be a minimum depth of 1/4 of the pervious concrete thickness, up to a maximum required depth of 1 and 1/4 inches, and have a joint width of no more than 1/8 inch.

      3) Saw cutting shall occur as soon as the concrete is sufficiently cured so that it may be cut without raveling or dislodging aggregate from the finished surface, no longer than four (4) hours after placement of pavement.

      4) Remove cuttings from surface immediately after saw cutting of joints.

      5) To minimize drying, curing materials shall be removed only as needed to make cuts and shall be replaced immediately after cutting. The exposed pervious concrete shall be kept moist for the entire duration of exposure.

3. Isolation Joints: Isolation joints shall be used where the pervious concrete abuts existing facilities or where shown on the Plans.

   a. Isolation joints shall continue through the depth of the pervious concrete using a 3/8 inch premolded joint filler.

   b. Isolation joints may be formed by inserting the premolded joint filler into the plastic concrete or by forming a construction joint

and affixing the premolded joint filler against one side of the joint and placing fresh pervious concrete against it.

c. Isolation joints and filler shall be flush with the surrounding pervious concrete and shall not deviate from the acceptance criteria for Grade as specified in Section 1.05.E.2.

d. The edges of the pervious concrete on either side of the premolded joint filler shall be hand tooled to a radius not less than 1/4 inch.

F. Curing

1. Begin curing within 20 minutes of concrete discharge from the truck, unless otherwise specified or approved by the Engineer.

2. Completely cover the pavement surface and all exposed edges with a minimum six- (6)-mil-thick white polyethylene sheet, unless otherwise specified or approved by the Engineer. No wetted burlap or cloth shall be used.

3. Thoroughly secure a polyethylene sheet at all exterior edges and interior laps without using soil. The method of securing the cover material shall prevent wind from removing the sheet and from blowing under the sheet across the surface of the concrete.

4. Curing compound shall not be used on any pervious cement concrete surface.

5. Cure pavement for a minimum of 7 uninterrupted days, unless otherwise specified or approved by the Engineer.

6. With the exception of saw cutting equipment, all traffic shall be kept off of the pervious concrete during the curing period.

7. Any testing for acceptance shall not occur until the end of the curing period.

G. Cold-weather construction

1. Protect concrete from freezing and record concrete temperature no less than twice per 24-hour period in accordance with ACI 306.1.

3.04 OPENING TO TRAFFIC

A. No traffic shall be allowed on the pervious cement concrete pavement for 10 days.

3.05 PROTECTION OF PAVEMENT

A. Cured and exposed pervious cement concrete pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the pervious pavement voids, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If

pervious cement concrete pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

3.06 REJECTION

A. Pervious concrete that does not meet the acceptance criteria set forth in Section 1.05.E.2 will be rejected by the Engineer on a lot-by-lot basis. Pervious concrete that has been rejected by the Engineer or the Contractor shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints. The City uses the term "Permeable Unit Pavers" when infiltration achieved via aggregate filled joints and "Porous Unit Pavers" when infiltration is achieved through the paver material itself.

DESIGNER NOTE: Green text corresponds to notes to the designer.

PART 1 GENERAL

1.01 SUMMARY

A. This section Includes:

1. Permeable/Porous Unit Pavers
2. Joint Filter Aggregate
3. Pavement Base
4. Edge Restraints
5. Geotextile for Soil Separation

B. Related Sections

DESIGNER NOTE: The designer should list any additional specification sections which relate to the permeable/porous unit paver work (i.e., temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards: This section incorporates by reference the latest version of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications
ASTM C67	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C13	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Method for Sieve Analysis for Fine and Coarse Aggregate
ASTM C140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM D448	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM C936	Standard Specification for Solid Interlocking Concrete Pavers

ASTM C979	Specification for Pigments for Integrally Colored Concrete
ASTM C1781	Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems
ASTM E2835	Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

A. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavement manual.

DESIGNER NOTE: The designer should consider the use of the ICPI Permeable Design Pro software for structural design and determination of adequate depth for the pavement section.

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. Paver Installation Subcontractor:

a. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute's Concrete Paver Installer Certification program.

b. Job references from three (3) projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone number, and email address.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: The Contractor shall submit to the Engineer the following a minimum of 20 calendar days prior to the construction of the permeable/porous unit pavers:

1. Paver manufacturer's/installation subcontractor's drawings and details indicating perimeter conditions, junctions with other materials, expansion and control joints, paver layout/patterns, joint spacing and/or tabs, color arrangement, and installation [and setting] procedures. Drawings and details shall also indicate layout, pattern and relationship of paving joints to fixtures and project formed details.

2. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base, reservoir course, and joint filler materials performed within one (1) month of product delivery to site.

DESIGNER NOTE: Consider revising acceptable age of sieve test depending on scale of project. On a larger project it may be appropriate to require testing by an independent lab with samples taken at the supplier's yard from the stockpile to be used for the project.

3. Product data sheets for unit pavers and geotextiles.
4. Laboratory test reports certifying compliance of the concrete pavers with ASTM C936.
5. Manufacturer's certification of concrete pavers by ICPI as having met applicable ASTM standards.

DESIGNER NOTE: Especially when using colored pavers, consider requiring submittal of full-size samples of each paver type, thickness, color, and finish. Require submittal of samples indicating the range of color expected in the finished installation. Accepted samples would become the standard of acceptance for the work of this Section.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect permeable/porous unit paver materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

1. Paver Installation Subcontractor Qualifications:
2. Installer shall provide documentation showing three (3) successful permeable/porous unit paver installations completed in the last three (3) years, collectively totaling more than 10,000 square feet. Documentation shall include name and address of project, and contact information for project owner.
3. Installer shall utilize job foremen holding a record of completion from the Interlocking Concrete Pavement Institute PICP Installer Technician Course.

DESIGNER NOTE: Consider changing these requirements to match scale and complexity of project including a minimum total amount of pavers placed.

B. Responsibilities of Contractor

1. Pre-Placement Conference: A mandatory pre-placement conference will take place, including at a minimum the Engineer, the Owner, general Contractor, and paver installer, to review the manufacturers' quality control plan, personnel qualifications, and the paver installers' Method Statement and Quality Control Plan.
2. Reference Panel: Place reference panels on the project site, on a subgrade and base prepared as specified, using the material and

construction requirements for pavement in this Specification. Each panel must have a surface area of at least 100 square feet (sf), and a width and thickness as specified for the pavement in the Contract Documents. The Engineer shall observe and accept each element of the paver construction prior to the placement of additional pavement. Failure to install acceptable reference panels of permeable/porous unit pavers will indicate an unqualified installer. Construction and evaluation of the reference panel(s) will occur as follows:

a. Notify the Engineer at least ten (10) Working Days before installing paver reference panel.

b. Coordinate the location of the reference panel with the Engineer.

c. Notify the Engineer when each element of the reference panel is ready for inspection.

d. Remove, replace, and dispose of any unsatisfactory portions of reference panel as determined by the Engineer and at no additional cost to the Owner.

e. Retain and maintain approved reference panel during construction in an undisturbed condition as a standard for judging completed portions of the final installations.

Approved reference panels may remain as final installations of the Work at the discretion of the Engineer. If not retained, the reference panel shall be removed and disposed at no additional cost to the Owner.

DESIGNER NOTE: Mechanized installations may require a larger mock up area. Consult with the paver installation (Sub) Contractor on the size of the reference panel.

DESIGNER NOTE: Use this panel to determine expected settlement (surcharge) of the leveling course, joint sizes, and lines, laying pattern, color and texture of the job.

DESIGNER NOTE: The designer should consider requiring verification of subgrade infiltration rate and provision to increase reservoir course depth based on results.

3. Infiltration Testing: Perform surface infiltration tests per ASTM C1781 as described below.

a. Three (3) test locations per 10,000 square feet of permeable/porous unit pavers, in place

b. One (1) additional test location per 5,000 square feet of permeable/porous unit pavers, or fraction thereof, in place

DESIGNER NOTE: Designer to specify the number and location(s) of required post construction infiltration tests.

C. Acceptance

1. The surface elevation of pavers shall be 1/8 to 1/4 inch (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

2. Lippage: No greater than 1/8 inch (3 mm) difference in height between adjacent pavers.

3. Bond lines for paver courses shall be within ½ inch (± 15 mm) over a 50-foot (15 m) string line.

4. The final surface tolerance of compacted pavers shall not deviate more than ± 3/8 inch (10 mm) under a 10-foot (3 m) long straightedge.

5. Infiltration Rate: The average of all tests shall be greater than 50 inches per hour with no single test less than 25 inches per hour.

   DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

   - For permeable/porous unit pavers that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
     - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 50 inches per hour
   - For permeable pavement not subject to run-on OR vehicular traffic:
     - The average of all surface infiltration tests shall be greater than 50 inches per hour with no single test less than 25 inches per hour

DESIGNER NOTE: The surface of the pavers may be 1/8 to 1/4 inch (3 to 6 mm) above the final designed elevations after compaction. This helps compensate for possible minor settling normal to pavements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged container packaging with identification tags intact on each paver bundle.

1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

2. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.

D. Unload pavers at job site in such a manner that no damage occurs to the product or existing construction.

E. Storage and Protection: Store materials in a protected area such that they are kept free from mud, dirt, and other foreign materials.

1.07 MAINTENANCE

DESIGNER NOTE: Consider requiring the provision of additional pavers to be retained and stored by the Owner for future maintenance.

- Extra materials: Provide [Specify area] [Specify percentage] additional material for use by Owner for maintenance and repair.
- Extra pavers shall be from the same production run as installed materials.

PART 2 PRODUCTS

DESIGNER NOTE: Some projects may include permeable/porous and solid unit pavers. Specify each product, as required.

2.01 PERMEABLE/POROUS UNIT PAVERS

A. Manufacturer: [Specify manufacturer name.].

1. Contact: [Specify ICPI member manufacturer contact information.].

B. Permeable/Porous Unit Paver Type: [Specify name of product group, family, series, etc.].

1. Material Standard: Comply with ASTM C 936.
2. Color [and finish]: [Specify color.] [Specify finish].
3. Color Pigment Material Standard: Comply with ASTM C979.
4. Size: [Specify.] inches [({Specify.}mm)] x [Specify.] inches [({Specify}mm)] x [Specify.] inches [({Specify.} mm)] thick.
5. Joint Gap Size: [Specify.] inches
6. Joint Gap Mechanism: [Specify if integral spacer, or other paver spacer.] type
7. Bevel Size: [Specify.] inches, [Specify.] type

DESIGNER NOTE: Concrete pavers with spacers integral to each unit are recommended for mechanically installed pavers and pavers subject to vehicular traffic. Verify with manufacturer that overall dimensions do not include spacers.

2.02 JOINT FILLER AGGREGATE

A. Crushed Particles: 90 percent (minimum) tested in accordance with California Test 205.

B. LA Abrasion: Less than 40 tested in accordance with ASTM C131.

C. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.

D. Rounded river gravel may not be used.

E. Permeable Unit Paver: The following aggregate shall be used to fill joints unless manufacturer recommends otherwise. Aggregate gradations shall be per Section 2.03.C.1. If manufacturer recommendation is different from the gradations shown below the Contractor shall be notified at least 48 hours prior to placement of the joint filler.

Gap Width	Aggregate Gradation
3/8" or ½"	ASTM No. 8 (modified)

F. Porous Unit Pavers: Joint filler shall be per manufacturer's recommendation.

2.03 PAVEMENT BASE

A. Pavement Base Material shall be consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials or rounded river gravel are not permitted. Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than ten (10) Working Days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to three (3) layers as specified on the Plans and included herein:

1. "Leveling Course" shall be ASTM No. 8 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide a smooth, level surface for placement of pavers.

2. "Base Course" shall be ASTM No. 57 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

3. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide water storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed rock to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

   DESIGNER NOTE: ASTM No. 2 stone is preferred.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying courser graded materials or reduction in permeability relative to the underlying material.

C. Pavement Base Material shall meet the following specifications for grading and quality.

DESIGNER NOTE: If the designer chooses to specify materials per the procedure above, provide the required gradation the in the table below.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

Sieve[1]	Percent Passing by Weight					
	ASTM No. 10 (modified)	ASTM No. 89 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)	ASTM No. 3 (modified)	ASTM No. 2 (modified)
3 inch	–	–	–	–	–	100
2 1/2 inch	–	–	–	–	100	90 to 100
2 inch	–	–	–	–	90 to 100	35 to 70
1 1/2 inch	–	–	–	100	35 to 70	0 to 15
1 inch	–	–	–	95 to 100	0 to 15	–
3/4 inch	–	–	–	–	–	0 to 5
1/2 inch	–	100	100	25 to 60	0 to 5	–
3/8 inch	100	90 to 100	85 to 100	–	–	–
No. 4	85 to 100	20 to 55	10 to 30	0 to 10	–	–
No. 8	–	5 to 30	0 to 10	0 to 5	–	–
No. 16	–	0 to 10	0 to 5	–	–	–
No. 30	–	–	–	–	–	–
No. 50	–	0 to 5	–	–	–	–
No. 100[2]	10 to 30	–	0 to 2	0 to 2	0 to 2	0 to 2
No. 200[2]	0 to 2	0 to 2	–	–	–	–

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 and 200 sieve, as shown.

2. R-Value: 78 (minimum) tested in accordance with California Test 301.
3. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C131.
4. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.
5. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.
6. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.04 ACCESSORIES

A. Provide accessory materials as follows: Edge Restraints

1. Manufacturer: [Specify manufacturer.].
2. Material(s): [Pre-cast concrete] [Cut stone] [steel].
3. Material Standard: [Specify material standard.].
4. Configuration: [Specify geometry, manufacturer's model number, stakes or spikes, paver spacers, coatings, color, etc.]

DESIGNER NOTE: Curbs will typically be cast-in-place concrete or precast set in concrete haunches. Cast in place concrete curbs should be specified in another Section. Do not use plastic edging with steel spikes to restrain unit pavers for vehicular applications.

2.05 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: See ICPI publication, Permeable Interlocking Concrete Pavements for guidance on geotextile selection. Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%
Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer and shall be recompacted in accordance with Section 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade.

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

DESIGNER NOTE: Other subgrade verification methods may be required if site conditions limit proof rolling. Consult with geotechnical engineer for acceptable methods.

F. After compaction and proof roll, scarify subgrade ¼- to ½-inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct the over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer, at no additional cost to the Owner. Overlaps of the geotextile shall be a minimum of 1 foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6)-inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10)-ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots, additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. Pavement base materials shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Do not subject placed and compacted gravel leveling course to any pedestrian or vehicular traffic before unit paver installation begins.

3. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any pavers.

DESIGNER NOTE: Consider developing a testing plan for the required testing and inspection of the pavement base. Verification of the in place density/compaction of the open graded base materials is typically not possible with the use of a nuclear densometer due to nature of these materials. Therefore other means to verify these materials are firm and unyielding (such as observation of the compaction process by a geotechnical engineer) are necessary.

DESIGNER NOTE: Consider requiring the Contractor to compact aggregates without crushing them.

3.03 PAVERS AND JOINT/OPENING FILL MATERIAL

A. Lay the unit pavers in the pattern(s) and joint widths shown on the Plans. Maintain straight pattern lines.

B. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.

C. Cut pavers and place along the edges with a double-bladed splitter or masonry saw.

D. Fill all openings and joints with joint filler aggregate conforming to Section 2.02.

E. Remove excess aggregate on the surface by sweeping pavers clean.

F. Compact and seat the pavers into the bedding material using a low-amplitude, 75 to 90 Hz plate compactor capable of at least 5,000 lbf (22 kN). This will require at least two passes with the plate compactor.

G. Do not compact within 6 feet (2 m) of the unrestrained edges of unit pavers.

H. Apply additional joint filler aggregate to the openings and joints if needed, filling them completely. Remove excess aggregate by sweeping, then compact the pavers. This will require at least two passes with the plate compactor.

I. All pavers within 6 feet (2 m) of the laying face must be left fully compacted and joints must be filled at the completion of each working day.

J. Compacted unit pavers shall meet the acceptance criteria set forth in Section 1.05.C.

3.04 PROTECTION OF PAVEMENT

A. Pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the pavers/joints, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

B. Paver installation (Sub) Contractor shall return to the site after 6 months from the completion of the Work and provide the following as needed to fully meet the specifications described herein: fill paver joints with stones, replace broken or cracked pavers, and re-level settled pavers to initial elevations. **Any additional work shall be considered part of the original bid price and with no additional compensation.**

3.05 REJECTION

A. Pavers that do not meet the acceptance criteria set forth in Section 1.05.C will be rejected by the Engineer on a lot by lot basis. Permeable/porous unit pavers that have been rejected by the Engineer or the Contractor shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

Section 13 - Provision C.13 Copper Controls

C.13.a.iii.(3) ►Manage Waste Generated from Cleaning and Treating of Copper Architectural Features

Provide summaries of permitting and enforcement activities to manage waste generated from cleaning and treating of copper architectural features, including copper roofs, during construction and post-construction.

Summary:

Both cities have specific requirements in their stormwater ordinance for prohibition of copper-containing water to the storm drain system.

The Program has revised its C.3 New Development Guidance Document and BMPs which will reduce the impact of architectural copper features, including copper roofs, during construction and post construction. Because architectural Copper is not a popular feature in the Fairfield Suisun area, discharge of copper laden water from these structures is not seen as a significant source of copper.

In addition, the Program has developed a flyer for the permit counter entitled: Requirements for Architectural Copper. The flyer is based on a similar version from the San Mateo County-wide Water Pollution Prevention Program. The flier (see attached) describes how copper can harm aquatic life and best management practices which must be implemented to prevent prohibited discharges to the storm drain system.

C.13.b.iii.(3) ►Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

Provide summaries of any enforcement activities related to copper-containing discharges from pools, spas, and fountains.

Summary:

Both cities have specific requirements in their storm water ordinance for prohibition of copper laden water to the storm drain system. Specifically, all swimming pools, spas, hot codes, and fountains that utilize copper-based chemicals shall not discharge into any storm drain within the city's jurisdiction.

C.13.c.iii ►Industrial Sources Copper Reduction Results

Based upon inspection activities conducted under Provision C.4, highlight copper reduction results achieved among the facilities identified as potential users or sources of copper, facilities inspected, and BMPs addressed.

Summary:

Training of Health Inspectors was performed on January 14, 2020. The focus of the training was consistency in enforcement levels, enforcement authority; city stormwater ordinances (including Copper controls); high-priority facilities needed to be inspected during the fiscal year and enforcement levels associated with illegal discharges.

The Program has revised its C.3 New Development Guidance Document and BMPs to reduce the impact of architectural copper features, including copper roofs, during construction and post construction. Because architectural Copper is not a popular feature in the Fairfield Suisun area, discharge of copper laden water from these structures is not seen as a significant source of copper.

Requirements for Architectural Copper

Fairfield-Suisun Urban Runoff Management Program

Protect water quality during installation, cleaning, treating, and washing!

Copper from Buildings May Harm Aquatic Life

Copper can harm aquatic life in San Francisco Bay. Water that comes into contact with architectural copper may contribute to impacts, especially during installation, cleaning, treating, or washing. Patination solutions that are used to obtain the desired shade of green or brown typically contain acids. After treatment, when the copper is rinsed to remove these acids, the rinse water is a source of pollutants. Municipalities prohibit discharges to the storm drain of water used in the installation, cleaning, treating and washing of architectural copper.

Building with copper flashing, gutter and drainpipe.

Use Best Management Practices (BMPs)

The following Best Management Practices (BMPs) must be implemented to prevent prohibited discharges to storm drains.

During Installation

- If possible, purchase copper materials that have been pre-patinated at the factory.
- If patination is done on-site, implement one or more of the following BMPs:
  - Discharge the rinse water to landscaping. Ensure that the rinse water does not flow to the street or storm drain. Block off storm drain inlet if needed.
  - Collect rinse water in a tank and pump to the sanitary sewer. Contact your local sanitary sewer agency before discharging to the sanitary sewer.
  - Collect the rinse water in a tank and haul off-site for proper disposal.
- Consider coating the copper materials with an impervious coating that prevents further corrosion and runoff. This will also maintain the desired color for a longer time, requiring less maintenance.

Storm drain inlet is blocked to prevent prohibited discharge. The water must be pumped and disposed of properly.

During Maintenance

Implement the following BMPs during routine maintenance activities, such as power washing the roof, re-patination or re-application of impervious coating:

- Block storm drain inlets as needed to prevent runoff from entering storm drains.
- Discharge the wash water to landscaping or to the sanitary sewer (with permission from the local sanitary sewer agency). If this is not an option, haul the wash water off-site for proper disposal.

Protect the Bay/Ocean and yourself!

If you are responsible for a discharge to the storm drain of non-stormwater generated by installing, cleaning, treating or washing copper architectural features, you are in violation of the municipal stormwater ordinance and may be subject to a fine.

Photo credit: Don Edwards National Wildlife Sanctuary

Section 15 -Provision C.15 Exempted and Conditionally Exempted Discharges

C.15.b.vi.(2) ► Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

Provide implementation summaries of the required BMPs to promote measures that minimize runoff and pollutant loading from excess irrigation. Generally the categories are:

- Promote conservation programs
- Promote outreach for less toxic pest control and landscape management
- Promote use of drought tolerant and native vegetation
- Promote outreach messages to encourage appropriate watering/irrigation practices
- Implement Illicit Discharge Enforcement Response Plan for ongoing, large volume landscape irrigation runoff.

Summary:

See Program's annual report, section C.7. This portion of the annual report shows the Program's efforts towards the promotion of the School Water Education Program (SWEP). One of the primary focuses of this Program is water conservation. SWEP provides free water education resources to teach water awareness and conservation to students, teachers and parents in our service areas of Fairfield, Suisun City and Travis Air Force Base. The in-class education Programs include resource materials and assembly Programs are multi-discipline and aligned to the content standards for California public schools. The Programs encourage students and adults to develop a healthy attitude of personal responsibility towards our environment and develop skills needed to contribute meaningfully to decision-making process on issues involving our resources and particularly conserving our most precious resource, water.

Also, see section C.9 of the Program's annual report. This portion of the annual report shows the Program's efforts toward the promotion of less toxic pest control and landscape management. This year the Program contracted with consultant Suzanne Bontempo regarding Our Water Our World, including outreach efforts toward pesticide reduction or the use of less toxic products to pesticides.

Suisun City Council has adopted a water efficient landscaping ordinance. The goal of this ordinance is to promote the conservation and efficient use of water and to prevent the waste of this valuable resource and use water efficiently without waste by setting a maximum applied water allowance as an upper limit for water use and reduce water use to the lowest practical amount. This ordinance, effective January 1, 2010 applied to all new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check or design review.

The City of Fairfield has also put the State Water Efficient Landscape Ordinance into effect. The ordinance focuses on new development design to be highly water efficient and minimize run-off. It applies to large developments and large re-landscaping in the city.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

September 30, 2020

Mr. Michael Montgomery
Executive Officer
San Francisco Bay Region
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: Submittal of FY 2019-2020 Program Annual Report

Dear Mr. Montgomery:

I am pleased notify you that the Santa Clara Valley Urban Runoff Pollution Prevention Program's (SCVURPPP) FY 2019-20 Annual Report and FY 2019-20 SCVURPPP Co-permittee Annual Reports have been submitted electronically to the San Francisco Bay Regional Water Quality Control Board (SF Bay Water Board) in accordance with the directions provided by SF Bay Water Board staff in the document entitled *Guide for Submitting Electronic Documents.* Together, these reports fulfill provision C.17.a of NPDES Permit No. CAS612008 (Order No. R2-2015-0049) and document activities conducted during FY 2019-2020.

The SCVURPPP Annual Report includes a certification statement pursuant to Permit Provision C.17.c signed by the Program Manager, who was authorized by the Program's Management Committee at its September 17, 2020 meeting to submit the report on the behalf of all SCVURPPP Co-permittees. The Program's *FY 19-20 Annual Report* consists of 13 sections. Each section reports on the Program's activities associated with a specific Permit Provision, including our involvement in regional activities. Tasks and activities conducted by the Program, but not required by a specific Permit Provision (e.g., street sweeping, Santa Clara Basin Watershed Management Initiative (SCBWMI) activities, etc.), are included in the most appropriate section of the Annual Report.

Co-permittee Annual Reports were prepared by each SCVURPPP member agency and each also includes a signed certification statement, pursuant to Provision C.17.c. In addition to the certification statement, each Annual Report includes a completed Annual Report Form: Sections 1-15 and relevant appendices and/or attachments.

I would like to draw your attention to two components of the Program's FY 19-20 Annual Report regarding PCBs and mercury load reduction requirements, that are submitted by the Program on behalf of all SCVURPPP Co-permittees:

- ***Section 11: Mercury and PCBs Controls***, which demonstrates the achievement of the MRP-stipulated PCBs load reductions for all SCVURPPP Co-permittees by July 1, 2020, as required by Provision C.12.; and
- ***Appendix 11-1: PCBs and Mercury TMDL Control Measures Implementation Plan and Reasonable Assurance Analysis for the Santa Clara Basin***, which is submitted in compliance with Provisions C.11/12.c.ii(2) and C.11/12.d.iii, and describes control measure

** The Program's *FY 19-20 Annual Report* is also available at www.scvurppp.org.

implementation scenarios and timelines that could be implemented to achieve the PCBs and Mercury TMDLs Wasteload Allocations for the Santa Clara Basin.

Please note that the SCVURPPP Program Manager submitted a Report of Waste Discharge (ROWD) to the Water Board on July 1, 2020, as directed by the SCVURPPP Management Committee and in compliance with Permit Provision C.20.

Additionally, the Program appreciates the flexibility of the SF Bay Water Board staff in allowing for possible modifications of MRP-related activities during the ongoing COVID-19 pandemic. We are pleased to report that SCVURPPP Co-permittees continued to affect good faith compliance with MRP 2.0 and continued activities necessary to protect the public from a further imminent public health threats (should that condition be identified in association with their municipal stormwater discharges) and to protect water quality. The Program and Co-permittee Annual Reports provide further detail on any modifications that were made during FY 19-20 to the extent, procedures, and/or timing of activities required in relevant sections of the MRP to achieve compliance under the current circumstances.

The Program and SCVURPPP Co-permittees look forward to continued implementation of cost-effective stormwater management programs in the future and working with you and your staff to successfully prioritize and address new challenges during FY 2020-21. Please visit our website (www.scvurppp.org) for additional information on the stormwater management activities conducted by the Program and SCVURPPP Co-permittees.

Please contact me or Program staff (Jill Bicknell and Chris Sommers) if you have any comments or questions.

Very truly yours,

Adam W. Olivieri, Dr. P.H., P.E.
Program Manager

cc: SCVURPPP Management Committee Members

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Water Environment Federation
the water quality people

National Municipal Stormwater and Green Infrastructure Awards Program
Overall Highest Score
Phase I Organization

FY 2019-2020 Annual Report

Submitted in Compliance with NPDES Permit No. CAS612008 (Order R2-2015-0049)

Program Annual Report
Sections 1 - 13

September 30, 2020

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FY 19-20 Annual Report

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

Certification Regarding SCVURPPP Program Annual Report

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted.[1] Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete.[2] I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.[3]"

Submitted on behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (per Management Committee Direction)

September 30, 2020

Adam W. Olivieri, Dr. P.H., P.E.
Program Manager

[1] Notwithstanding the above, certain attachments were prepared as regional submissions as part of BASMAA collaborative efforts on behalf of all MRP Co-permittees.

[2] Notwithstanding the above, some of the attachments are works-in-progress and are submitted only with the intent and for the purpose of illustrating progress.

[3] Even though the Program report contains and incorporates the individual Co-permittee annual reports as attachments, this certification is made only with respect to the former; separate Co-permittee certifications have been provided with the latter.

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CREDITS

This Annual Report was a collaborative effort of the fifteen agencies participating in the Santa Clara Valley Urban Runoff Pollution Prevention Program (Program). EOA, Inc., as the Program management consultant, coordinated and compiled the Annual Reports submitted by the fifteen Co-permittees; and was responsible for the overall preparation of the Program's Annual Report. The Program expresses its appreciation to all those who contributed to this twenty-ninth Annual Report.

Management Committee Voting Members

- Cupertino – Ursula Syrova
- Los Altos – Emiko Ancheta
- Los Altos Hills – Nichol Bowersox
- Milpitas – Elaine Marshall
- Mountain View – Carrie Sandahl
- Palo Alto – Karin North
- San José – Sharon Newton, MC Vice Chair
- Santa Clara – Rinta Perkins
- Sunnyvale – Melody Tovar, Budget AHTG/Executive Committee Chair
- Santa Clara County – Vanessa Marcadejas
- Santa Clara Valley Water District – Kirsten Struve, MC Chair
- West Valley Communities – Sheila Tucker
  - Campbell
  - Los Gatos
  - Monte Sereno
  - Saratoga

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 1

Introduction

Section 1 Introduction

■ Background

Program Description

The Santa Clara Valley Urban Runoff Pollution Prevention Program ("Program") is an association of thirteen cities and towns in Santa Clara Valley, the County of Santa Clara, and Santa Clara Valley Water District ("Co-permittees") that share a common permit to discharge stormwater to South San Francisco Bay. The Program incorporates regulatory, monitoring and outreach measures aimed at reducing pollution in urban runoff to the "maximum extent practicable" to improve the water quality of South San Francisco Bay and the streams of Santa Clara Valley. The Program is organized, coordinated, and implemented in accordance with a Memorandum of Agreement (MOA) signed by the Co-permittees in 1990, 1999, 2005, 2006 and 2016. The MOA covers the responsibilities of each Co-permittee and a cost-sharing formula for joint expenditures.

In June 1990, the San Francisco Bay Regional Water Quality Control Board (Water Board or RWQCB) issued the Program its first NPDES permit.[1] The permit was reissued in 1995[2], 2001[3] (amended in 2001[4] and 2005[5]), 2009[6] (amended in 2011[7]) and 2015[8]. The permit reissued in 2009, amended in 2011, and reissued in 2015 is referred to as the Municipal Regional Stormwater NPDES Permit (MRP). The MRP covers stormwater discharges from a total of 76 municipalities and local agencies in Alameda, Contra Costa, San Mateo, and Santa Clara Counties, and the cities of Fairfield, Suisun City, and Vallejo[9].

Program Management

At the inception of the Program, the Santa Clara Valley Water District (Valley Water) took the lead responsibility for management of the Program. EOA, Inc. was later retained to provide Program management services, and the Program's Management Committee designated the District as the Program's fiscal agent. On July 1, 2005, the City of Sunnyvale became the Program's fiscal agent.

The Program's Management Committee (MC) is the official decision-making body for the Program. The MC consists of at least one person from each Co-permittee who is officially designated and duly authorized to vote in his or her capacity as representative to the Program. In most instances, Co-permittees have also designated and authorized alternative representatives to vote in the absence of the primary representative. In all cases, the person authorizing and designating the representative to the Program is a duly authorized representative of the principal executive officer or ranking official of the Co-permittee.

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[1] NPDES Permit No. CAS029718, Order No. 90-094.
[2] NPDES Permit No. CAS029718, Order No. 95-180 (as amended 7/21/99).
[3] NPDES Permit No. CAS029718, Order No. 01-024 (2/21/01).
[4] NPDES Permit No. CAS029718, Order No. 01-119, Amendment Revising Provision C.3. (10/17/01).
[5] NPDES Permit No. CAS029718, Order No. R2-2005-0035, Amendment Revising Order 01-119 (7/20/05).
[6] NPDES Permit No. CAS612008, Order No. R2-2009-0074 (10/14/09).
[7] NPDES Permit No. CAS612008, Order No. R2-2011-0083, Amendment Revising Order R2-2009-0074 (11/28/11).
[8] NPDES Permit No. CAS612008, Order No. R2-2015-0049 (11/19/15).
[9] NPDES Permit No. CAS612008, Order No. R2-2019-0004 (2/13/19), Amendment Revising Order R2-2015-0049 to include the Cities of Antioch, Brentwood, and Oakley in Contra Costa County as part of the MRP, increased the number of MRP permittee agencies to 79.

During the term of the Permit, the Program Manager will submit, on a "joint basis", certain permit-required reports and a certification statement to the Water Board on behalf of the Co-permittees. In August 2010, Co-permittees authorized the Program to continue submitting "joint reports" and a certification statement on their behalf. A signed confirmation statement from each Co-permittee designating a MC representative and/or alternate for their agency and authorizing the Program Manager to submit certain reports to the Water Board on their behalf was included within Appendix 1-1 of the Program's *FY 09-10 Annual Report*. During FY 19-20, there were several changes made to MC representatives and alternates. The signed confirmation statements authorizing these changes are included within Appendix 1-1 of this Annual Report.

Program Annual Report

Permit Provision C.17.a of the MRP requires each Co-permittee to submit an Annual Report by September 30 of each year. Program annual reports are not required in accordance with the MRP; however, the Program's Management Committee decided at its June 17, 2010 meeting that a Program Annual Report is useful for documenting Program-wide activities and should be developed each year. Individual Co-permittee annual reports refer to information provided within the Program Annual Report.

■ Organization of Report

The Program's *FY 19-20 Annual Report* consists of 13 sections, with relevant tables placed at the end of each section, and one Appendix. Each section reports on a specific Permit Provision. The Appendix provides final work products and other relevant information related to the completion of Program activities for specific provisions. Related tasks and activities not related to a specific Permit Provision (e.g., street sweeping, Santa Clara Basin Watershed Management Initiative (SCBWMI) activities, etc.) are placed in the most appropriate section. The structure of each Annual Report section, in most cases, consists of the following:

- Introduction – provides brief background information about the specific Permit Provision and its requirements;
- Program Activities – provides Program accomplishments for specific sub-provisions and/or projects; and
- Regional Activities – provides accomplishments conducted at the regional-level (e.g., BASMAA-related tasks) for specific sub-provisions and/or projects.

Following Section 1, the Program *FY 19-20 Annual Report* volume consists of the following sections:

Program FY 19-20 Annual Report
Section 2- Provision C.2 Municipal Operations
Section 3- Provision C.3 New Development and Redevelopment
Section 4- Provision C.4 Industrial and Commercial Site Controls
Section 5- Provision C.5 Illicit Discharge Detection and Elimination
Section 6- Provision C.6 Construction Site Control
Section 7- Provision C.7 Public Information and Outreach
Section 8- Provision C.8 Water Quality Monitoring
Section 9- Provision C.9 Pesticides Toxicity Control
Section 10- Provision C.10 Trash Controls
Section 11- Provision C.11/12 Mercury and PCBs Controls
Section 12- Provision C.13 Copper Controls
Section 13- Provision C.15 Exempted and Conditionally Exempted Discharges

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 2

Municipal Operations

September 30, 2020

Section 2 Municipal Operations

Introduction

Provision C.2 of the MRP requires Permittees to implement appropriate best management practices (BMPs) during operation, inspection and routine repair and maintenance of municipal facilities and infrastructure to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses. The provision identifies the following specific maintenance activities that require development and implementation of BMPs:

- Street and road repair and maintenance (C.2.a.),
- Sidewalk/plaza maintenance and pavement washing (C.2.b.),
- Bridge and structure maintenance and graffiti removal (C.2.c.),
- Stormwater pump stations (C.2.d.),
- Rural public works construction and maintenance (C.2.e.), and
- Corporation yards (C.2.f.).

Provision C.10.b.i of the MRP requires Permittees to maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of full trash capture systems. The provision identifies specific maintenance activities to ensure that devices are operated and maintained to meet full trash capture system requirements.

Program Activities

The SCVURPPP Municipal Maintenance Ad Hoc Task Group (AHTG) was formed in 2009 to assist Co-permittees with implementing the new requirements in Provision C.2. The AHTG meets as needed to address issues related to municipal maintenance activities. The AHTG did not meet in FY 19-20. An updated pesticide tracking template for FY 19-20 was distributed to the AHTG in July 2020. While the development of this template is related to the requirements in Provision C.9 Pesticide Toxicity Control, the Municipal Maintenance AHTG will address compliance activities in Provision C.9 that are related to municipal maintenance staff responsibilities.

Program staff continued to communicate with the AHTG via email to inform the group of MRP requirement due dates and training opportunities.

Regional Activities

Program staff continues to participate in the BASMAA Municipal Operations Committee as needed and provides input on activities being conducted at the regional level. The Municipal Operations Committee did not meet during FY 19-20.

Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 Reporting and Tracking Workgroup. This workgroup discussed issues related to reporting in Provision C.2 of MRP 3.0. Provision C.2 topics were discussed at the February 19, 2020 and May 12, 2020 meetings.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 3

New Development and Redevelopment

September 30, 2020

Section 3 New Development and Redevelopment Control Measures

Introduction

Provision C.3 contains the requirements for appropriate source control, site design, stormwater treatment and hydromodification management measures in new development and redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows, with emphasis on implementation of low impact development (LID) techniques and Green Stormwater Infrastructure (GSI). This section of the Annual Report describes the Program's efforts during FY 19-20 to assist Co-permittees to control the impacts of development on stormwater quality and flow through the development project planning, review and approval process, and begin long term planning for implementation of green infrastructure in public projects.

Program Activities

During FY 19-20, Program efforts continued providing assistance to Co-permittees on GSI requirements, C.3 and Hydromodification Management Plan (HMP) implementation, and conducting training workshops for municipal staff. The Program continued to support the C.3 Provision Oversight Ad Hoc Task Group (C3PO AHTG) and use it as a forum to discuss Co-permittee needs, C.3 implementation issues, and regional activities, and get input on Program and regional products. The C3PO AHTG met approximately every other month in FY 19-20 to accomplish required tasks.

C.3.a. New Development and Redevelopment Performance Standard Implementation

This provision requires Co-permittees to update legal authority and development review and permitting processes, and conduct training and outreach to address new C.3 requirements. It also requires Co-permittees to encourage all projects not regulated by Provision C.3, but subject to the Co-permittees' planning, building, development, or other comparable review, to include adequate source control and site design measures.

The Program planned and held the Annual C.3 Workshop entitled "Installation and O&M Inspections of Stormwater Treatment Measures" on October 29, 2019. The workshop included guidance on conducting installation inspections and O&M inspections of stormwater treatment measures, and presentations on Co-permittee inspection programs. A total of 114 municipal staff attended the workshop. The workshop flyer, agenda, evaluation summary, and attendance list are included in Appendix 3-1.

C.3.c. Low Impact Development (LID)

LID Guidance

Program staff provided on-call technical assistance as needed to Co-permittee staff and consultants, via email, phone conversations, and meetings, on implementation of LID at private and public development projects.

Biotreatment Soil Media (BSM) Specifications

During FY 19-20, the Program continued to support municipal staff, consultants, and suppliers who had questions on the review and use of BSM. Program staff screened and worked with vendors that are supplying the BSM product in the Bay Area and wished to be added to the vendor list that is posted on the SCVURPPP website. The vendors must demonstrate an understanding of the BASMAA specification, submit lab results and a sample of their BSM product, and use consistent terminology on their websites advertising the product. Program staff updated the "SCVURPPP Biotreatment Soil Media Supplier List" in December 2019 to add a new vendor. The updated list is posted at https://scvurppp.org/2020/01/01/biotreatment-soil-media-supplier-list/. For the latest BSM specification and verification checklists, see Appendix C of the SCVURPPP C.3 Stormwater Handbook[1].

Participation in BASMAA Development Committee

Program and Co-permittee staff continued to participate in the BASMAA Development Committee to implement the requirements under this provision, as many of the requirements were or will be met by the development of regional products. Highlights of the tasks implemented by the BASMAA Development Committee in FY 19-20 are presented under "Regional Activities".

Site Design Awards

In 2006, the Program began an awards program for exemplary site designs to protect water quality. This awards program recognizes Santa Clara Valley's public agency and private development community leaders who are solving site design challenges, reducing stormwater pollution and runoff quantity, and going above and beyond the requirements of the MRP. An Awards Committee consisting of Program staff, Co-permittee representatives, and an environmental group representative reviews the submittals and selects the winners. The Program continued the Site Design Awards program in 2019-20 and issued a request for nominations in January 2020. However, no nominations were received.

C.3.f. Alternative Certification of Stormwater Treatment Systems

Update of Qualified Consultants List

To assist Co-permittees in identifying third parties to conduct alternative certification reviews of stormwater plans for proposed development projects and inspect LID treatment measures, the Program has maintained a "List of Qualified Consultants" on its website. This is a list of licensed engineers who are qualified to design or review proposed storm water treatment control measures and hydromodification flow control facilities for new and redevelopment projects, have experience with the sizing and design of LID treatment and HM measures, and/or experience with inspection of constructed LID measures for consistency with approved plans. The list is updated every two to three years. The current version of the list, completed August 22, 2018, is posted on the SCVURPPP website.

In June 2020, Program staff sent out a Request for Qualifications (RFQ) to consultants already on the list as well as those who had requested to receive the RFQ. Program staff are reviewing the submitted Statements of Qualifications and developing an updated list of qualified consultants. The final updated list will be posted on the SCVURPPP website in September 2020.

[1] https://scvurppp.org/2016/06/20/c-3-stormwater-handbook-june-2016/

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

Program staff continued to collect data from Co-permittees on newly installed treatment systems for submittal to the Santa Clara County Vector Control District and Regional Water Board per Provision C.3.h.iv.(2).

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

Site Design Fact Sheets

Per MRP Provision C.3.i., Permittees must require development projects that create and/or replace ≥ 2,500 to < 10,000 square feet of impervious surface and detached single family home projects that create and/or replace 2,500 square feet or more of impervious surface to install one of six site design measures, beginning December 1, 2012. Program staff worked with the BASMAA Development Committee and Geosyntec Consultants during FY 11-12 to develop regional standard specifications in the form of four fact sheets on the following measures: pervious paving, landscape dispersion, rainwater harvesting and use, and rain gardens. (The first three fact sheets cover the six required site design measures, and the fourth fact sheet on rain gardens is an optional measure available to small and single-family home projects). The completed fact sheets were distributed to MRP Permittees in early September 2012 as a resource for their use. The Program customized the fact sheets for SCVURPPP member agencies and posted the fact sheets on its website (www.scvurppp.org). Co-permittees continued to use the fact sheets as a resource in FY 19-20.

C.3.j. Green Infrastructure Planning and Implementation

The MRP contains requirements for green infrastructure planning, early implementation, outreach, tracking and reporting. To continue to assist Co-permittees with meeting these requirements, Program staff developed a GSI Work Plan for Program activities during FY 19-20 and completed the following tasks.

Development of the Green Stormwater Infrastructure Handbook

In August 2019, Program staff completed the SCVURPPP GSI Handbook, which includes GSI project design guidelines, details, and specifications. The GSI Handbook includes two parts. Part 1, General Guidelines, provides guidance on selection, integration, prioritization, siting, and maintenance for GSI applications. Part 2 provides engineering and technical details and specifications that can be customized for construction plan submittals by designers, developers, and municipal agencies. The Final GSI Handbook is available at: https://scvurppp.org/swrp/gsi/ . A webinar was held on November 7, 2019 to update Co-permittees staff on the development process, sources of details, typical changes made, and next steps. The webinar attracted 19 participants.

During FY 19-20, Program staff continued to update the details in Part 2 of the Handbook. The update included revisions to bioretention details, pervious pavement details, and general typical details based on comments received. Revised details, in PDF and CAD, are added to the SCVURPPP website as they are completed.

Development of Guidance Materials

Program staff developed the following guidance materials to assist Co-permittees in implementing the GSI requirements:

- **Provision C.3 Data Form** – Program staff updated the "Provision C.3 Data Form" and distributed it to the C3PO AHTG in September 2019. The updated form is a fillable PDF that includes equations that auto-calculate the replaced and new impervious areas for Regulated Projects. The C.3 Data Form is posted on the SCVURPPP website at https://scvurppp.org/2019/09/24/provision-c-3-data-form/
- **GSI Resource Library** – Program staff continued to research and compile documents and resources on GSI planning and implementation for an online GSI Resource Library for SCVURPPP Co-permittees. The Resource Library also contains all final SCVURPPP GSI products and guidance developed to date. The GSI Resource Library is currently hosted on a "members only" section of the SCVURPPP website.

Green Infrastructure Outreach and Education

The Program conducted the following outreach/education activities about the GSI requirements:

- **Outreach to the Public** - In FY 17-18, Program staff worked with the Watershed Watch consultant and the Program's Scripts Review Work Group to develop animated advertisements on LID techniques (e.g., rain gardens, rain barrels and pervious surfaces). In FY 19-20 the Watershed Watch Campaign continued to use these advertisements in social media and online advertising.

  In FY 17-18, the Program developed an interactive Green Street webpage (http://www.mywatershedwatch.org/residents/green-streets/) for the Watershed Watch website. The webpage was in the list of top ten visited pages on the Watershed Watch website in FY 19-20. The BASMAA fact sheet on installing rain gardens was one of the top ten downloads on the Watershed Watch website in FY 19-20.
- **Green Streets Symposium -** Program staff worked with the organization Transportation Choices for Sustainable Communities (TCSC) to plan a full-day symposium entitled "Green Streets for Sustainable Communities". The purpose of the symposium was to bring together elected officials, city staff leaders, stormwater experts, complete street/transportation experts, environmental activists, tree and urban ecology experts, and other stakeholders to explore how to better fund, design, build, manage and maintain streets to optimize performance for people and nature. The symposium, originally scheduled for March 2020, was postponed due to COVID-19 and is now being planned as three half-day virtual sessions to be held on September 10, September 25, and October 8, 2020.

Tracking and Reporting Progress on Green Infrastructure

Provision C.3.j.iv(2) requires Permittees to report progress on development and implementation of methods to track and report implementation of green infrastructure measures and provide reasonable assurance that load allocations for TMDLs are being met. In FY 2018-19, the Program developed the "GSI Database", an online GSI tracking system to obtain, store, and access C3 Regulated and GSI project data at a county-wide level. The system also allows projects, control measures, and acres of treatment to be visualized spatially on the web. After the SCVURPPP Reasonable Assurance Analysis (RAA) is completed, the system will also calculate pollutant load reductions associated with these projects. The first version of the GSI Database was only available to SCVURPPP Permittees; however, during FY 19-20, public access and improved functionality were added to the system. SCVURPPP's progress on development and

implementation of methods to track and report pollutant load reductions associated with green infrastructure implementation is described in Section 12 of the Annual Report.

Santa Clara Basin Stormwater Resource Plan

As a result of SB 985, the California Water Code now requires that any stormwater capture and use project seeking grant funds from bond measures after January 1, 2014 must be part of a Stormwater Resource Plan (SWRP). Proposition 1 (Water Bond) includes approximately $200 million for stormwater projects, of which about $20 million was made available for planning grants in 2016. Program staff worked with Valley Water staff (as lead agency) on a Prop 1 planning grant proposal to develop a countywide SWRP that would be coordinated with Valley Water's "One Water" Plan and Co-permittee GSI Plans, and help make Co-permittees eligible for grant funding for GSI projects. The proposal was submitted in March 2016, and in early July 2016, SCVURPPP and Valley Water were successful in obtaining Prop 1 planning grant funds ($471,708) for development of a Storm Water Resource Plan (SWRP) for the Santa Clara Basin in Santa Clara County. The grant agreement was finalized in February 2017, and SCVURPPP and Valley Water completed the SWRP in December 2018 and submitted it to the State Grant Manager. Based on comments received, the SWRP was updated and the Revised Final SWRP (August 2019) was re-submitted on September 19, 2019. On December 17, 2019, State Board staff sent a letter of concurrence stating that that the SWRP is consistent with California Water Code requirements. The final SWRP is posted at https://scvurppp.org/swrp/docs-maps/.

■ Regional Activities

Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 C3/GI Work Group to discuss, internally and with Water Board staff, issues to be addressed in Provision C.3 of MRP 3.0. Program staff helped to lead these efforts and was co-lead of the Work Group. In FY 19-20, the Work Group met approximately monthly, including 10 meetings held with Water Board staff and several internal meetings. Key issues discussed included: regulated project thresholds; regulation of single-family homes; regulation of road reconstruction projects; alternative compliance options, Special Projects provisions, asset management, and future GSI requirements.

Program and Co-permittee staff continued to participate actively in the BASMAA Development Committee (DC) to implement regional MRP requirements under this provision. The Development Committee accomplished the following regional tasks in FY 19-20:

Participation in Processes to Promote Green Infrastructure

Provision C.3.j.iii requires that Permittees individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Program staff and Co-permittees continued to track and participate in the activities described in this section to comply with this provision.

- Urban Greening Bay Area – BASMAA's efforts in FY 19-20 included continuing work on its portion of the Urban Greening Bay Area grant from EPA (Water Quality Improvement Fund) to the San Francisco Estuary Partnership/Association of Bay Area Governments. There were two components of the grant project: 1) a Regional Green Infrastructure Roundtable process to develop recommendations for integrating green infrastructure and stormwater management funding and investments with future climate change and transportation investments within the

region; and 2) a Bay Area Design Charrette to develop cost-effective and innovative "typical" designs for integrating green infrastructure with bicycle and pedestrian improvements at roadway intersections. The term of the grant project was July 1, 2015 to June 30, 2018, but the term was extended to December 31, 2020 and additional funding provided to support follow-up implementation for the Regional Roundtable.[2]

The main product of the Regional Roundtable was the "Roadmap of Funding Solutions for Sustainable Streets" (Roadmap[3]), which was published in April 2018. The Roadmap identifies specific actions to improve the funding of projects that include both complete streets improvements and GSI, and is intended to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GSI measures into local infrastructure projects, including transportation projects. Following completion of the Roadmap, BASMAA and SFEP formed a Roadmap Committee to guide implementation of the Roadmap.

During FY 19-20, BASMAA's participation in activities to implement the Roadmap included:

- Continued coordination with transportation agencies – including the Metropolitan Transportation Commission (MTC), the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Federal Highway Administration (FHWA) – to clarify GSI eligibility in federal, regional, and state transportation grant programs (Roadmap Specific Actions 1- 1, 1-2, and 1-3).
- In November 2019, BASMAA transmitted a memorandum to the above-listed regional and state agencies, documenting the eligibility of GSI in applicable regional, state and federal transportation funding programs and requesting the agencies' participation in developing fact sheets that clarify eligibility for sustainable streets in two federal transportation funding programs – the Surface Transportation Block Grant Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) – as well as the California Senate Bill 1 (SB 1) Road Maintenance and Rehabilitation Program.
- On February 4, 2020, BASMAA representatives met with staff from MTC and Caltrans District 4 (the Caltrans District for the nine-county Bay Area), to develop an approach for a regional fact sheet that focuses on the eligibility of GSI in projects funded by the STP and CMAQ through the One Bay Area Grant (OBAG) program administered by MTC. The draft regional fact sheet was reviewed by MTC staff and is scheduled to be finalized by September 2020.
- On February 10, 2020, BASMAA held a conference call with CTC staff to develop an approach for a statewide fact sheet that focuses on the eligibility of GSI in projects funded by Senate Bill 1. CTC staff provided comments on the draft statewide fact sheet but deferred further action pending documentation that there is interest in this topic beyond the San Francisco Bay Area.
- BASMAA worked with the U.S. Environmental Protection Agency (USEPA) staff liaison to the Federal Highway Administration (FHWA) to have FHWA staff review BASMAA's November 2019 research memorandum. Similar to the CTC, FHWA questioned whether this issue is of interest beyond the San Francisco Bay Area and California.

[2] Work products of the Urban Greening Bay Area grant are posted at http://www.sfestuary.org/urban-greening-bay-area/#planning .

[3] The Final Roadmap is available at: https://www.sfestuary.org/wp-content/uploads/2018/05/Roadmap_Funding_Solutions_Sustainable_Streets_FINAL_reduced.pdf .

Additionally, BASMAA representatives, including Program staff, participated in various other efforts to promote GSI. BASMAA's Annual Report Regional Supplement provides additional information on regional participation in processes to promote GSI, along with a regional plan and schedule for new and ongoing efforts to participate in processes to promote GSI. [4]

- Green Streets for Sustainable Communities Symposium – Program staff participated in ongoing meetings of the organization Transportation Choices for Sustainable Communities, a research and policy institute whose mission is to "advance understanding and support for sustainable transportation as an essential component of livable communities and cities," to plan a "Green Streets for Sustainable Communities" symposium. The event was originally scheduled for March 2020, and has now been rescheduled as a three-day virtual series of seminars in September and October 2020. The symposium will focus on multi-benefit approaches to rethinking streets as Complete Streets, Green Streets, creating eco-corridors, and as people habitat for public gathering and interaction. Details can be found at http://transportchoice.org/events/.

[4] For more information, see BASMAA *Annual Reporting for FY 2019-2020, Regional Supplement for New Development and Redevelopment* (Appendix 3-2).

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 4

Industrial and Commercial Site Controls

September 30, 2020

Section 4 Industrial and Commercial Site Controls

Introduction

Provision C.4 requires Permittees to implement an industrial and commercial site inspection and control program at all sites which could reasonably be considered to cause or contribute to pollution of stormwater runoff, with follow-up and enforcement consistent with local Enforcement Response Plans (ERPs), to prevent discharges of pollutants and impacts on beneficial uses of receiving waters. The provision identifies specific elements of the program including identifying sites to inspect (C.4.b.ii.(1)), inspection frequency (C.4.b.ii.(2)), inspection content (C.4.d.ii.(1)), data tracking (C.4.b.ii.(3) and C.4.d.ii.(2)) and staff training (C.4.e).

Program Activities

The SCVURPPP Industrial and Commercial Business Inspection and Illicit Discharge Detection and Elimination (IND/IDDE) Ad Hoc Task Group (AHTG) was formed in 2009 to assist Co-permittees with implementing new requirements in the MRP. In FY 19-20 the AHTG met in October 2019, March 2020 and May 2020. Regional Water Board staff attended the October 2019 AHTG meeting. The AHTG accomplished the following tasks related to industrial and commercial business inspection:

- Outreach Material -- The AHTG updated the English, Spanish and Vietnamese versions of the *Preventing Storm Drain Pollution: Guidelines for Commercial and Light Industrial Facilities* booklet, updated the saw cutting BMP postcard, updated the Mobile Cleaner brochure into a Fact Sheet format, and finalized a Fact Sheet on *Restaurant BMPs*. All of the materials are available on the Watershed Watch website (www.mywatershedwatch.org).
- SB 205 -- Program staff provided a November 2019 memo *Interim Guidance on Implementation of Senate Bill 205* to the AHTG. SB 205 applies to municipalities that issue business licenses. The bill requires that applications for initial business licenses or business license renewals submitted on or after January 1, 2020 demonstrate compliance with the General Permit for Stormwater Discharges Associated with Industrial Activities (Order 2014-0057-DWQ) (Industrial General Permit or IGP), by providing specific information including the Standard Industrial Classification (SIC) codes for the business. Prior to issuing the business license, the municipality must determine if the SIC codes require coverage under the IGP and confirm that documentation of IGP enrollment (i.e. application, WDID, NEC or NONA identification numbers) corresponds to the business. The city or county must transfer compliance information received to the State Water Resource Control Board (State Water Board) if requested.
- Industrial Inspector Training -- The Program did not have a training for inspectors this FY due to the COVID-19 shelter-in-place order. Program staff provided a May 2020 memo *Internal Training Opportunities for IND/IDDE Stormwater Inspectors* that included guidance and materials for inspectors to complete in-house training.

Regional Activities

Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 C4/C5 Workgroup to discuss, internally and with Water Board staff, issues to be addressed in Provision C.4 of MRP 3.0. Program staff helped to lead these efforts and was co-lead of the Workgroup. There were two internal Workgroup meetings held in December 2019 and January 2020. The Workgroup met with Water Board staff on February 11, April 2, and May 13, 2020.

In addition, Program staff participated in the CASQA Industrial Subcommittee conference calls and provided information of interest to Co-permittee staff. The Program also maintains a subscription to the CASQA Industrial BMP Handbook portal for Co-permittees' use.

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Section 5

Illicit Discharge Detection and Elimination

September 30, 2020

Section 5 Illicit Discharge Detection and Elimination

Introduction

Provision C.5 requires Permittees to implement an illicit discharge control program that includes a centralized complaint collection component, and a follow-up component to target illicit discharge and non-stormwater sources. The provision identifies specific elements of the program including follow up and enforcement consistent with local Enforcement Response Plans (C.5.b), a central contact point for complaints and spill reporting (C.5.c.), mobile business discharge control program (C.5.e.), and spill and discharge complaint tracking system (C.5.d).

Program Activities

The SCVURPPP Industrial and Commercial Business Inspection and Illicit Discharge, Detection and Elimination (IND/IDDE) Ad Hoc Task Group (AHTG) was formed in 2009 to assist Co-permittees with implementing new requirements in the MRP. In FY 19-20 the AHTG met in October 2019, March 2020 and May 2020. Regional Water Board staff attended the October 2019 AHTG meeting. The AHTG accomplished the following tasks related to illicit discharges:

- Mobile Business Program – During FY 13-14, the AHTG developed an inventory and conducted an outreach mailing to 160 mobile businesses located in Santa Clara County. The mailing consisted of a letter introducing the stormwater program and the mobile business BMP brochure. During FY 19-20, the AHTG members continued to provide additional businesses for the inventory and outreach materials were mailed to newly identified businesses. The BMP brochure was updated in FY 19-20 to a Fact Sheet that is available on the Watershed Watch website. The regional inventory is available on the SCVURPPP members only webpage. Co-permittees will also continue to distribute the fact sheet to mobile businesses as part of their illicit discharge detection and elimination (IDDE) programs.

  AHTG members provided information on mobile businesses that received enforcement actions in their jurisdictions in FY 16-17 through FY 18-19 to compile into a table. This enforcement action table was updated in FY 19-20 and is available on the SCVURPPP members only webpage. This table will be used to track businesses that may receive enforcement actions from multiple municipalities as part of the countywide mobile business enforcement strategy.

- Inspector Training – The Program did not have a training for inspectors this FY due to the COVID-19 shelter-in-place order. Program staff provided a May 2020 memo *Internal Training Opportunities for IND/IDDE Stormwater Inspectors* that included guidance and materials for inspectors to complete in-house training.

- Outreach Material -- The AHTG updated the English, Spanish and Vietnamese versions of the *Preventing Storm Drain Pollution: Guidelines for Commercial and Light Industrial Facilities* booklet, updated the saw cutting BMP postcard, updated the Mobile Cleaner brochure into a Fact Sheet format, and finalized a Fact Sheet on *Restaurant BMPs*. All of the materials are available on the Watershed Watch website (www.mywatershedwatch.org).

■ Regional Activities

Regional activities related to Provision C.5 are addressed, as needed, by the BASMAA Municipal Operations Committee. Program staff continues to participate in this Committee and provides input on activities that will be conducted by the Committee. There were no meetings this FY. The main regional project conducted by this Committee related to Provision C.5 requirements is the *Surface Cleaner Training and Recognition Program*. BASMAA currently maintains a Surface Cleaner Training and Recognition Program that educates mobile surface cleaners about proper BMPs to protect water quality and allows them to market themselves as "recognized" cleaners.

Program and Co-permittee staff actively participated in the following BASMAA MRP 3.0 Workgroups.

- BASMAA MRP 3.0 C4/C5 Workgroup: Discussed, internally and with Water Board staff, issues to be addressed in Provision C.5 of MRP 3.0. Program staff helped to lead these efforts and was co-lead of the Workgroup. There were two internal Workgroup meetings held in December 2019 and January 2020. The Workgroup met with Water Board staff on February 11, April 2, and May 13, 2020.
- BASMAA MRP 3.0 Homelessness Workgroup: Discussed with Water Board staff issues related to illicit discharges from homeless encampments and recreational vehicles (RVs). Meetings were held February 24, April 1, and May 27, 2020.

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Section 6

Construction Site Controls

September 30, 2020

Section 6 Construction Site Controls

Introduction

Provision C.6 requires Permittees to implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with local Enforcement Response Plans (ERPs), to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters. The provision identifies specific elements of the program including six Best Management Practices (BMPs) categories (C.6.c), the plan approval process (C.6.d), inspection frequency (C.6.e.ii.(2)), inspection content (C.6.e.ii.(3)), data tracking and reporting (C.6.e.ii.(4) and iii.) and staff training (C.6.f). In addition, Permittees maintain legal authority and an Enforcement Response Plan.

Program Activities

Co-permittee Guidance

The SCVURPPP Construction Inspection Ad Hoc Task Group (AHTG) was formed in September 2009 to assist Co-permittees with implementing the new requirements in the MRP. The AHTG has developed a number of tools to assist with implementation of the MRP, including an enforcement response plan (ERP) outline, a model stormwater construction inspection form, an Excel workbook template for construction inspection data tracking, and guidance for identifying high priority construction sites for inspection during the wet season. The AHTG also has a series of eight tri-fold brochures of stormwater BMPs related to different construction activities that are translated into Spanish and Vietnamese. There is also a BMP Plan Sheet that includes BMPs from all of these brochures. These materials are available on the SCVURPPP website and Watershed Watch website.

In FY 19-20, the AHTG met on November 5, 2019. At this meeting, the AHTG discussed the status of the State Construction Stormwater General Permit reissuance, MRP 3.0 reissuance and the training workshop.

Construction Inspector Training

The Program conducted a *Construction Site Stormwater Compliance Workshop* for municipal staff on February 5 and 13, 2020 at Valley Water conference and field facilities in San Jose. The same workshop content was offered on both days. The workshops included a presentation on BMP basics and the MRP for new inspectors. The remaining workshop consisted of field sessions with several different vendors. There were the following three field sessions: 1) mats/blankets, silt fence, compost socks, and straw wattles; 2) storm drain inlet protection and check dams; and 3) stabilized construction site exit. A total of approximately 124 municipal staff attended the two workshops. The evaluation forms indicated that the majority of the attendees thought the workshop was either very useful or somewhat useful. The agenda, attendance list and evaluation summary for the workshop are included in Appendix 6-1. Workshop presentations are available on the Program's website (www.scvurppp.org).

■ Regional Activities

Program staff participated in the BASMAA Development Committee, which serves as the forum for discussion of regional issues and activities related to Construction Site Control. In FY 19-20, there were no construction-related issues discussed by the Committee.

Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 Reporting and Tracking Workgroup. This workgroup discussed issues related to reporting in Provision C.6 of MRP 3.0. Provision C.6 topics were discussed at the February 19, 2020 and May 12, 2020 meetings.

In addition, Program staff participated in the CASQA Construction Subcommittee conference calls and provided information of interest to Co-permittee staff. The Program also maintains a subscription to the CASQA Construction BMP Handbook portal for Co-permittees' use.

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Section 7

Public Information and Outreach

September 30, 2020

Section 7 Public Information and Outreach

Introduction

The goals of the Public Information and Outreach (Public Information and Participation or PI/P) element of the Program are to identify and change behaviors that adversely affect water quality, and to increase the understanding and appreciation of streams and the Bay. The Program's FY 19-20 PI/P Work Plan provided a strategy to achieve these education and public participation goals with specific projects funded in the Program's FY 19-20 budget. The Program's Watershed Education and Outreach Ad Hoc Task Group (WEO AHTG) helps direct and provide input on PI/P Work Plan projects.

Highlights of the accomplishments of FY 19-20 PI/P projects and ongoing projects from previous years are described in the sections below according to permit requirements.

The Program implemented the following PI/P projects in FY 19-20:

- Program Activities
  - Outreach Campaigns – Watershed Watch Campaign (Provision C.7.b.)
  - Public Opinion Survey (Provision C.7.b.iii)
  - Stormwater Pollution Prevention Education (C.7.c)
  - Public Outreach Events (Provision C.7.d.)
  - Citizen Involvement Events - Watershed Watchers Program at the Don Edwards San Francisco Bay National Wildlife Refuge, and funding for advertising the Coastal Cleanup Day (Provision C.7.d.)
  - Watershed Stewardship Collaborative Efforts (C.7.e)
  - School-Age Children Outreach - ZunZun School Assemblies and Watershed Watchers Program at the Don Edwards San Francisco Bay National Wildlife Refuge. (Provision C.7.f.)

Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 Tracking and Reporting Work Group to discuss, internally and with Water Board staff, issues related to reporting in Provision C.7 of MRP 3.0. Program staff helped to lead these efforts and was co-lead of the Work Group. Provision C.7 topics were discussed at the February 19, 2020 and May 12, 2020 meetings.

Program Activities

The Program's outreach activities are guided by the goals and objectives described in the SCVURPPP Watershed Education and Outreach Strategy (Strategy), updated in FY 15-16. The 2016 Strategy identifies target audiences and example messages and includes goals and measurable objectives for implementation through FY 19-20.

C.7.b. Outreach Campaign

The Program's outreach activities are conducted under the umbrella of the Watershed Watch Campaign (Campaign). The Campaign completed 20 years of implementation (and 19 years of advertising) in FY 19-

20. The Campaign implemented various outreach activities including media advertising. The FY 19-20 Campaign Work Plan and Media Advertising Plan are included in Appendix 7-1.

The following tasks were completed by the Program's consultant, with assistance from Program and Co-permittee staff, during FY 19-20. The FY 19-20 Watershed Watch Campaign Annual Report is included in Appendix 7-1.

- **Task 1: Creative Development** – Developed new artwork for Watershed Watch string backpacks. Assisted with developing a flyer on proper disposal of masks, gloves, and wipes. Updated various outreach pieces/advertisements as needed for media promotions, outreach events, and website posting.

Watershed Watch backpack showing Santa Clara Valley creeks

- **Task 2: Media Advertising** – Conducted a media promotion consisting of radio, television, and digital advertising. Messages included less-toxic pest management, litter prevention, Green Gardener program promotion, car washing, and proper disposal of household hazardous waste. Overall, the Watershed Watch media buys included 1,812 radio advertisements (949 paid and 863 free), 107 television advertisements (81 paid and 26 free), and 42 digital media advertisements (39 paid and 3 free). The net advertising budget for media was $102,952. Media partners provided an added value package of benefits and resources of $75,112. Additional details on the media campaign are included in the FY 19-20 Watershed Watch Campaign Year-End Report included in Appendix 7-1.

Watershed Watch Discount Card

- **Task 3: Partnership and Added Value Development**– Continued development of the partner database. In FY 19-20, 11 Watershed Watch partners offered discounts with the Watershed Watch discount card. Negotiated significant added-value resources from media and community partners. These include free advertising, discounts on products and services, live promotions, etc. Additional details are included in the Watershed Watch Campaign Year-End Report included in Appendix 7-1.
- **Task 4: Website Maintenance** – Continued to maintain the Watershed Watch website. The Watershed Watch Web Statistics Report is included in Appendix 7-1.
- **Task 5: Social Media Campaign** – Continued to maintain the Campaign's Facebook and Twitter pages. Conducted monthly quizzes on Facebook to increase engagement. The Campaign's Facebook page currently has 1,553 fans and the Twitter page has 534 followers. The Campaign's Instagram page currently has 265 followers.
- **Task 6: Events Coordination** – Coordinated and attended community outreach events, as needed.
- **Task 7: Public Relations** – Publicized the fall 2019 Green Gardener Training.

- **Task 8: FY 19-20 Annual Report and FY 20-21 Work Plan Development** – Developed the FY 19-20 Year-End Report and the FY 20-21 Work Plan.

Evaluation of Effectiveness

Many factors indicate that the FY 19-20 Watershed Watch Campaign was a success (see the FY 19-20 Watershed Watch Campaign Year-End Report in Appendix 7-1). Some of these include:

- The continued successful partnership with Classic Car Wash, Premier Car Wash, Happy Hollow Park and Zoo, and Jiffy Lube;
- The large number of gross impressions made by media advertising: 12,771,794;
- The added value package of benefits and resources of $81,807 provided by media and community partners;
- The added value of car washes and discounts ($3,020); and
- The increase in Watershed Watch website visits (122,723 visits in FY 19-20, compared to 61,033 total visits in FY 18-19).

C.7.b.Post-Campaign Public Opinion Surveys

Municipal Regional Permit (MRP) Provision C.7.b. Advertising Campaign requires Permittees to conduct an outreach campaign, and to conduct a post-campaign effectiveness assessment/evaluation to identify and quantify the audiences' knowledge, trends, and attitudes and/or practices and measure the overall population's awareness of the messages and behavior changes achieved by the outreach campaigns. The Program conducted a Public Opinion Survey of Santa Clara Valley residents in May 2020 to meet this requirement and track progress towards the Goals described in the SCVURPPP Public Outreach Strategy. Information on the 2020 Public Opinion Survey is provided below.

SCVURPPP 2020 Public Opinion Survey

In March 1991, the Program conducted its first public opinion survey to determine public awareness of urban runoff pollution issues. The Program has been conducting public opinion surveys approximately every five years since the 1991 survey. Surveys were conducted in 1996, 1999, 2003, 2009, and 2014. In 2020, SCVURPPP again conducted a public opinion survey to estimate if any changes have occurred in the public's understanding of watershed and pollution prevention issues since 2014.

The Program contracted with FM3 Research to conduct the Public Opinion Survey. FM3 Research conducted an online and phone (landline and cell) survey of Santa Clara Valley residents in May 2020. Overall, 651 interviews were conducted, including 80 high school students. Highlights of survey results are below:

- Santa Clara Valley residents continue to understand that their actions impact local water quality. 79% of respondents believe that private residents are "somewhat responsible" or "very responsible" for water pollution; compared to 75% in 2014.
- Many pollution prevention actions show positive changes (sum of "Do Now" and "Very Willing"), including the following:
  - Hire exterminators and pest control professionals that use less-toxic pest control or are very willing to - 61% in 2020, compared to 54% in 2014.

  - Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden methods – 63% in 2020, compared to 55% in 2014.
  - Wash cars on an unpaved surface, instead of in the street or driveway – 42% in 2020, compared to 37% in 2014.
- Understanding of the watershed concept has improved. In 2020, 32% of respondents could define a watershed compared to 27% in 2014.
- In 2020, 80% of residents understand that water that runs into the storm drains is not treated compared to 75% in 2014.

In FY 20-21, the WEO AHTG will further analyze survey results and develop an outreach strategy for conducting future outreach.

The 2020 Public Opinion Survey Report is included in Appendix 7-2.

SCVURPPP Partnership with the City of San José's Outreach Campaign with San José Sharks

In FY 19-20, the City of San José's Environmental Services Department (ESD) continued its partnership with the San José Sharks to conduct outreach to encourage residents to adopt behaviors that will help reduce waste and prevent stormwater pollution. SCVURPPP provided funding to the City of San José to support this partnership.

In March 2020, ESD's Watershed Protection division and SCVURPPP partnered for a one-month mass media English-language campaign to promote creek cleanups. Sharks players Timo Meier and Kevin Lebanc were featured on advertisements with the call to action "*Be a team player for healthy creeks! Volunteer for a creek cleanup. MyWatershedWatch.org."* The campaign included advertising on local VTA bus shelters and light rail stations, and digital advertising on Facebook, Twitter, and Google. The SCVURPPP Scripts Review Work Group provided feedback on the creative for the advertisements. Program staff helped identify shelters in high/medium trash hot spots for placing the advertisements

Evaluation of Effectiveness

Transit advertising received an estimated 5.2 million impressions, and digital advertising received more than 1.27 million impressions. The Facebook ad garnered 870 clicks to the Watershed Watch website. In-stadium outreach included four home games with LED signage that reached nearly 69,000 fans.

Visits to the Watershed Watch website increased from 5,204 in March 2019 to 21,267 in March 2020, a 309 percent increase. SCVURPPP also ran a non-Sharks YouTube and radio ad campaigns the same month that also contributed to the website visits.

C.7.c. Stormwater Pollution Prevention Education

Program's Toll-Free Telephone Numbers and Websites

The Program maintained two toll free telephone numbers, the Program's information number (800-794-2482) and the Watershed Watch hotline (866-WATERSHED), for calls from the public and requests for information. Program and Watershed Watch consultant staff continued to maintain the Program and Watershed Watch websites respectively.

The Watershed Watch website includes extensive information on stormwater pollution prevention and watershed protection for residents, businesses, and students. All SCVURPPP outreach brochures are available on the website for download. Program and Co-permittees activities such as outreach events, thermometer exchange events, and the Santa Clara Valley Green Gardener training are promoted on the website. The website also includes a contact form that visitors can fill out to request brochures or information. The website address is included on all Watershed Watch Campaign outreach materials, giveaways, and advertisements

Individual agency points of contact are publicized on Program outreach materials and websites and the point of contact list is maintained by the Program and their authorized agents. The Management Committee Contact List and the Construction-Illegal Discharge-Industrial Inspection Contact List are included in Appendix 7-3.

Regional Point of Contact

BASMAA continued to maintain the Baywise website (www.Baywise.org) as a regional point of contact.

Evaluation of Effectiveness

The Watershed Watch website continued to receive many visits this year. The website received a total of 122,723 visits in FY 19-20, compared to 61,033 in FY 18-19. COVID-19 shelter-in-place order for Santa Clara County coincided with an increase in website activity. More people were home and using the internet. Media campaigns that may have also contributed to the increase in activity during the same time frame included the City of San Jose's Google Ad campaign in March and May that directed people to the Watershed Watch website, Watershed Watch radio and digital ad campaigns promoting less-toxic pest control and litter prevention messages, and the Watershed Watch car wash giveaway radio contest. Additional details are included in the Watershed Watch Web Statistics Report provided in Appendix 7-1. Program staff received 8 requests on the Watershed Watch website for outreach materials, and 21 requests for information. Program staff also responded to approximately 10 calls from the public in FY 19-20. The number of calls on the hotline have been low in the last few years due to more people using the website to obtain information.

C.7.d. Public Outreach and Citizen Involvement Events

Public Outreach Events

Program staff, the Watershed Watch consultant, and Co-permittees staffed five events to conduct outreach on IPM, proper car washing, litter, and general storm water pollution prevention outreach was conducted. Events were selected based upon target audience and expected attendance. Outreach events in conducted in FY 19-20 included:

- Day on the Bay, Sunday, October 13, 2019, Alviso Marina County Park, San José
- Pumpkins in the Park, October 12, 2019, San José
- Delta Queen Classic Car Wash, September 10, 2019, Campbell
- Montague Premier Car Wash, San José, September 25, 2019
- Valley Water Landscape Summit, February 27, 2020

The Watershed Watch event display was used at most events. The display features a central panel titled "You are the Solution to Water Pollution" that includes an illustration to show the impact of daily activities on stormwater pollution. The side panels are pollutant/behavior specific and changed

according to the event focus. The side panels address the following issues: preventing litter, practicing Integrated Pest Management, and environmentally friendly car washing.

Event staff distributed the following brochures at the events: Less-Toxic Pest Management fact sheets, "10 Most Wanted Backyard Bugs" brochures, "Manage Pests in your Home and Garden" pocket guides, "You are the Solution to Water Pollution" brochures, and "Clean Cars & Clean Creeks" brochures. Giveaways included flyswatters, Watershed Watch sports backpacks, and temporary tattoos. The flyswatters have the Watershed Watch website, hotline number and the words "The Original Earth-Friendly Pest Control" printed on them. The bean bag game for children was used at most of the outreach events. Children learn about the proper disposal of wastes by tossing bean bags that represent different wastes (e.g., soap, paint, fluorescent light bulbs, candy wrappers, pesticides etc.) into appropriate holes (sanitary sewer, storm drain, household hazardous waste collection center, recycle, or garbage). The bean bag labeled "rain" is the only one that is tossed into the hole marked "storm drain".

Children lining up to play the bean bag toss game at an outreach event.

Due to the cancellation of planned public outreach events in spring and summer as a result of the COVID-19 shelter-in-place order, the following tasks were conducted to continue outreach to residents:

- **Publicizing virtual events** – Virtual events conducted by community organizations and Permittees were promoted on the Watershed Watch website and social media platforms.
- **Car wash contest** - The three 50% off car wash events scheduled for May and June 2020 were canceled due to the COVID-19 order and replaced with an on-air contest. Montague Premier Car Wash (located at 790 Montague Expressway, San José), a Watershed Watch partner, donated 40 full-service car wash gift cards for the contest. The contest ran on four radio stations from June 29 through July 10. Participating radio stations were: KBAY, KEZR, KUFX and KRTY. Radio DJs for KBAY, KEZR and KUFX directed listeners to their station websites to enter to win, and KRTY announced the daily question and took responses to award one car wash gift card per weekday to someone who answered correctly. SCVURPPP staff provided them with questions that were previously approved for use in the Watershed Watch monthly Facebook quiz.

Evaluation of Effectiveness

Event staff distributed approximately 1,700 fact sheets, brochures, and giveaways at the five outreach events. The bean bag game continued to be very popular at events and offered a good opportunity to educate children and adults about stormwater pollution prevention. Approximately 545 children and adults played the bean bag game at events this year.

The car wash radio contest received good participation from listeners. KBAY and its partner radio station KEZR received 61 entries via their website contest entry form. KRTY conducted a daily on-air quiz question Monday-Friday for two weeks, and awarded a car wash gift certificate to the first caller with the correct answer. KUFX received 45 entries for their online context.

Citizen Involvement Events

The Program provided funding for the following citizen involvement events:

1) The Don Edwards San Francisco Bay Wildlife Refuge (Refuge) – A number of citizen involvement and stewardship programs were conducted as part of the Program-funded Watershed Watchers Program at the Refuge. Participants worked in the Refuge gardens planting native plants, pulling non-native plants, and mulching. More details are included in the Watershed Watchers Report provided in Appendix 7-4

2) Creek Cleanup Events – In FY 19-20, the Creek Connection Action Group (CCAG) sponsored one creek cleanup event: Coastal Cleanup Day on September 21, 2019. The National River Cleanup Day on May 15, 2020 was canceled due to COVID-19 shelter-in-place order. The Program provided financial support for advertising the Coastal Cleanup Day event and promoted it on the Watershed Watch website and social networking sites.

Evaluation of Effectiveness

Citizen Involvement Events at the Refuge – A total of 358 people participated in the citizen involvement events conducted at the Refuge, which is a decrease from 825 attendees in FY 18-19. However, this decrease can be attributed to the cancelation of events from March through June due to the COVID-19 shelter-in-place order.

Creek Cleanup Events – Table 7-1 summarizes the results by Coastal Cleanup Day event for FY 19-20. Table 7-2 summarizes the total number of sites, number of volunteers, and pounds of materials collected each year since FY 00-01.

Table 7-1 Results for Coastal Cleanup Day for FY 19-20.*

	Coastal Cleanup Day September 21, 2019
Number of sites	46
Number of volunteers	2,166
Pounds of recyclables	4404
Pounds of trash	48,893
Pounds of material (trash plus recyclables)	53,297

* Data includes quantities of trash and volunteers from sites located in Gilroy and Morgan Hill

Beginning in FY 01-02, some site managers implemented a procedure for separating out recyclable materials from trash prior to weighing it. Thus, the total pounds of material collected are the sum of the recyclables and trash quantities. According to Valley Water, this procedure is done more frequently at Coastal Cleanup Event sites than at National River Day sites. Since this procedure is not done at all sites, it is more appropriate to compare the total quantities of materials collected rather than the individual components.

The total amount of trash and recyclables collected during the two creek cleanup events for the last ten years (one cleanup event during FY 19-20) is plotted in Figure 7-1. The average pounds of trash and recyclables collected at each site during the two creek cleanup events for the last ten years (one cleanup event during FY 19-20) is plotted in Figure 7-2.

Table 7-2 Summary Results of Creek Cleanup Events, September 2000 – June 2019*

	No. of sites	No. of volunteers	lbs. of recyclables	lbs. of trash	Total lbs. collected	Average lbs./site
FY 00-01	41	1,745	n/a	58,108	58,108	1,417
FY 01-02	37	1,742	13,750	59,340	73,090	1,975
FY 02-03	48	2,091	8,071	44,883	52,954	1,103
FY 03-04	56	1,943	6,537	36,718	43,255	778
FY 04-05	61	1,618	7,890	39,730	47,620	781
FY 05-06	55	1,458	4,110	29,248	33,358	607
FY 06-07	44	1,631	15,394	52,067	67,461	1,533
FY 07-08	51	1,534	23,570	49,194	72,764	1,427
FY 08-09	56	2,298	38,960	123,591	162,551	2,903
FY 09-10	69	2,554	13,893	52,271	66,164	958
FY 10-11	87	2,827	10,656	51,044	61,700	701
FY 11-12	86	2,740	9,183	50,700	64,065	745
FY 12-13	80	2,582	12,330	50,601	62,931	787
FY 13-14	97	2,758	8,694	62,862	71,556	738
FY 14-15	99	2,703	6,676	78,424	85,130	860
FY 15-16	93	2,953	6,002	80,291	86,293	927
FY 16-17	81	3,134	9,529	81,975	91,144	1,125
FY 17-18	94	3,382	9,043	98,856	107,898	1,052
FY 18-19	89	3,001	11,098	92,355	103,453	1,137
FY 19-20	46	2,166	4,404	48,893	53,297	1,159
Annual Average	69	2,343	11,568	62,058	73,240	1,134
Total	1,372	46,860	219,790	1,241,151	1,464,792	21,554

* Data includes quantities of trash and volunteers from sites located in Gilroy and Morgan Hill. Data for FY 19-20 do not include results from National River Cleanup Day, which was scheduled for May 15, 2020 but canceled due to the COVID-19 shelter-in-place order.

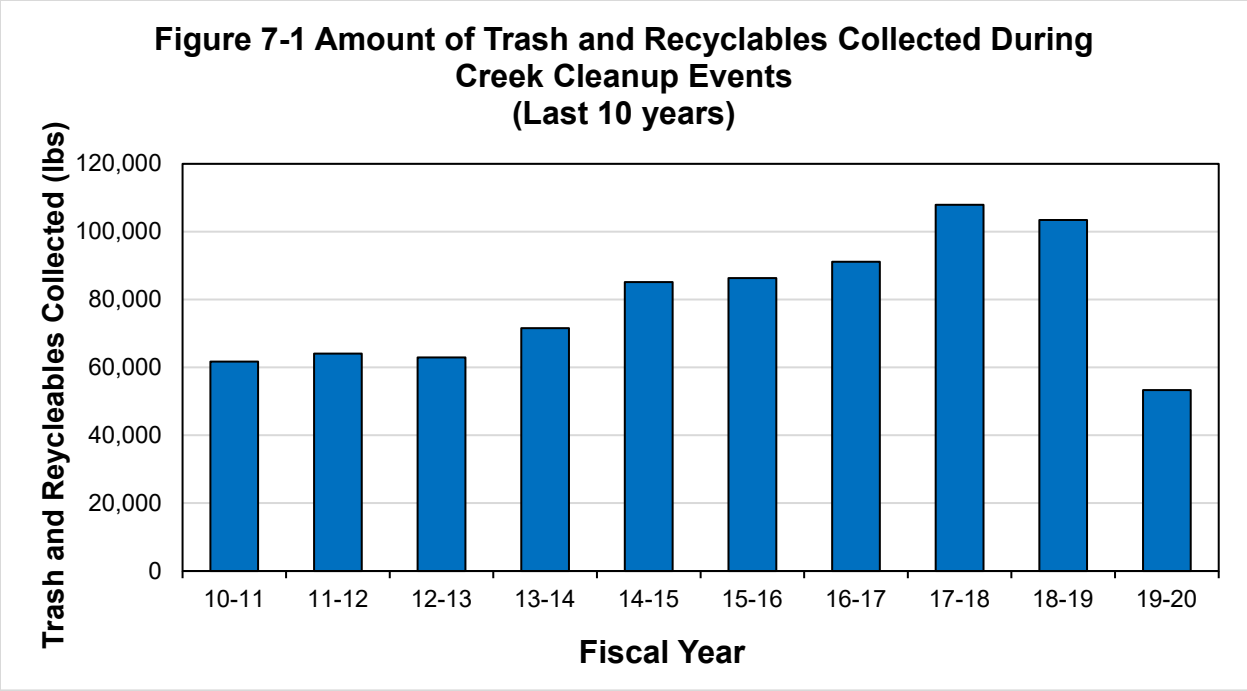

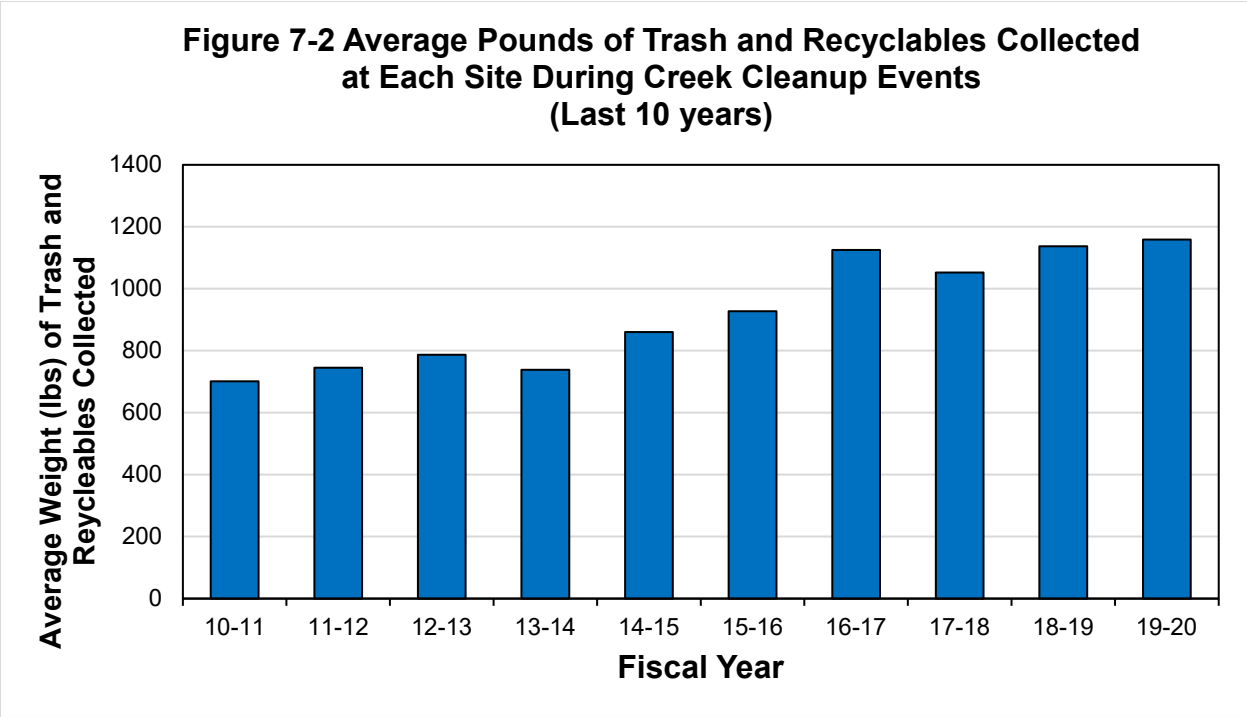

Co-permittees intend to continue participating in creek cleanups in future fiscal years, as they provide a valuable opportunity for citizen participation as well as an important element of a trash management program. Table 7-3 summarizes the Program-funded FY 19-20 public outreach and citizen involvement events, including evaluation of effectiveness.

C.7.e. Watershed Stewardship Collaborative Efforts

Santa Clara Basin Watershed Management Initiative

During FY 19-20, the Program actively supported the Santa Clara Basin Watershed Management Initiative (SCBWMI) by participating in the Land Use Subgroup and the Santa Clara Valley Zero Litter Initiative.

Zero Litter Initiative

The Zero Litter Initiative (ZLI) Steering Committee continued to meet monthly, and focused on the following efforts:

- Coordination with Caltrans, Caltrain and Valley Transportation Authority (VTA): ZLI participants continued coordination meetings with Caltrans, Caltrain and VTA on trash-related issues, including Adopt-A-Highway and on/off ramps, homeless encampment cleanups, and using highway message boards for anti-litter awareness. The ZLI conducted a web-based conference with Caltrans, Caltrain and VTA staff on March 30, 2020 and discussed stormwater trash management activities and coordination with municipal staff.
- Alameda County Regional Illegal Dumping Task Force: The ZLI coordinated on illegal dumping issues with a statewide task force organized by the office of Alameda County Board of Supervisor, Nate Miley. The Task Force meets quarterly and many Bay Area municipal staff are active participants, sharing best management practices related to illegal dumping actions, enforcement and reduction practices. The Task Force was planning a conference to be held in San Jose in April of 2020, but it was postponed due to the shelter-in-place order.
- Trash Information Sharing Webinars: The ZLI has held three webinars to provide information on trash in stormwater and management actions that can reduce trash in waterways. The first webinar was held in 2016 and covered franchise agreements, multi-family dwellings and right-size-right service for solid waste management. The second webinar in January 2018 focused on the impacts of cigarette butts on stormwater quality and controls for managing this frequently littered item. A third webinar was held in July 2018 and focused on actions being taken to reduce the impacts of plastic straws on stormwater quality. Another webinar is currently planned for fiscal year 2020-21.
- Volunteer Creek Cleanup Fact Sheet: The ZLI created a four-page factsheet on the actions taken by municipal agencies related to Volunteer Creek Cleanups in the Santa Clara Valley. The factsheet contained information on data, coordination, background and goals. Additional information can be found in Section 10. The factsheet can be found at https://scvurppp.org/2020/04/13/volunteer-creek-cleanups-in-santa-clara-county/.
- Coordination with the Technical Advisory Committee of the Santa Clara County Recycling and Waste Reduction Commission (RWRC TAC): In 2019, the ZLI shared litter management practices with the RWRC TAC to reduce litter and waste in relation to the design and operation of new and existing buildings including multi-family properties. In 2019-20, the ZLI assisted the RWRC TAC with the development of a model ordinance to reduce single-use foodware and litter that could be used county-wide by municipal agencies to achieve sustainability and stormwater goals.

C.7.f. School-Age Children Outreach

ZunZun Musical Assembly

Each year the Program sponsors up to fifty ZunZun assemblies at elementary schools in the Santa Clara Valley. These bilingual musical assemblies educate elementary school students and their teachers on watersheds and urban runoff pollution prevention. ZunZun performances use physical comedy, audience participation and musical instruments to educate teachers and children about watersheds and stormwater pollution prevention.

The Program's Schools and Youth Education and Outreach Work Group provides a list of schools for ZunZun to contact. The list includes schools with high Hispanic populations and high Asian/Pacific Islander populations. A list of 188 schools was provided to ZunZun in FY 19-20.

Due to COVID-19 shelter-in-place order, seven assemblies scheduled for spring 2020 were canceled. The remaining budget was used to record the assembly and make it available on YouTube, along with three other existing educational videos. A flyer publicizing the online assembly was distributed to local schools. The flyer included a link to an online quiz for students to gauge their awareness of watershed and pollution prevention behaviors.

Evaluation of Effectiveness

In FY 19-20, ZunZun conducted 43 assemblies at 22 elementary schools in eight cities. The assemblies reached approximately 10,490 students and their teachers. The list of schools that received the assemblies is included in Appendix 7-5. ZunZun assemblies were evaluated using postage-paid evaluation cards that were distributed to all teachers present at the performances, and online surveys sent after the assembly. The Program received completed evaluation cards from 105 teachers. In addition, two teachers completed the online surveys. Overall, the feedback has been very positive and indicates an increase in the students' knowledge about watersheds and pollution prevention. The recording of the assembly posted on YouTube received 448 views and 40 students completed the quiz. The FY 19-20 Teacher Evaluation Report and the FY 19-20 ZunZun School Assembly Report are included in Appendix 7-5.

ZunZun continued to distribute pledge forms titled "I Pledge to Keep My School Clean" to teachers after each assembly. The pledge form requires students to dispose of trash or recyclables properly or pick up litter, for a week. Students sign the pledge each day to indicate completion of the activity. Teachers were asked to fax or email the completed pledge form to Program staff and enter their class to win monthly prizes. The Program received completed pledge forms from nine classrooms. The Watershed Watch sports backpacks were sent to one classroom each month. In addition, Watershed Watch tattoos and a certificate of appreciation were sent to each classroom that sent a completed pledge form.

Watershed Watchers Program at the Don Edwards San Francisco Bay Wildlife Refuge

SCVURPPP funds an interpretive specialist position to conduct the Watershed Watchers Program at the Refuge. The Watershed Watchers program conducts numerous activities and sessions to educate children about watersheds and urban runoff pollution prevention. These include marsh walks, gardening events, bird watching, wildlife observation, etc. Following the shelter-in-place order, Refuge staff conducted several virtual programs to continue engaging the public. More details are included in the Watershed Watchers Report provided in Appendix 7-4.

Evaluation of Effectiveness

In FY 19-20, Refuge staff conducted 121 educational activities and sessions at the Refuge, attracting approximately 2,484 participants. Visitor surveys and pledges are used to determine visitor

demographics, effectiveness of publicity, and the effectiveness or the Watershed Watchers Program. Refuge staff also conducted five virtual live programs which were attended by 42 people

Table 7-4 summarizes the Program's school-age children outreach, including evaluation of effectiveness.

Virtual Learning Resources

Program staff researched and compiled a list of online/virtual educational resources to assist teachers and students looking for such resources during the COVID-19 shelter-in-place period. The list, which included activities by grade level, was posted on the Watershed Watch website and sent to Co-permittees for distribution to local schools. In addition, the resource page for teachers and students on the Watershed Watch website was updated with videos, activity sheets, and virtual field trip information.

Evaluation of Effectiveness

A total of 127 people visited the resource page for teachers and students during March – June 2020. This is a significant increase from the same period in 2019 when this page was visited by 11 people.

C.7.g. Outreach to Municipal Officials

SCVURPPP has been conducting outreach to municipal officials (e.g., elected officials, city/county managers etc.) to inform them about MRP requirements, trash plans, Green Stormwater Infrastructure (GSI), and other activities being implemented by SCVURPPP and Co-permittees to meet MRP requirements. Outreach activities implemented by the Program from FY 15-16 to FY 19-20 are summarized below:

- Development of the Annual Program Summary – SCVURPPP staff develop an Executive Summary annually to highlight Program accomplishments. Electronic and printed copies of the Executive Summary are distributed to Co-permittees for conducting outreach to local municipal officials on stormwater regulatory requirements and Program accomplishments. The Annual Program Summaries are available on the SCVURPPP website.
- Site Design Awards Program - In 2006, the Program began a "Site Design for Protecting Water Quality" awards program to recognize Santa Clara Valley's public agency and private development community leaders who are solving site design challenges and reducing stormwater pollution and runoff quantity. The award winners are formally recognized at awards events typically held every other year. To reach a wider audience, most award events have been held at luncheon meetings organized by professional organizations such as the American Public Works Association (APWA) Silicon Valley Chapter and the American Planning Association (APA) Northern California Chapter. Since many local municipal officials attend these luncheons, and/or receive information about them via newsletters or emails sent to them, the awards ceremony offers an excellent opportunity to inform them about stormwater regulatory requirements and exemplary efforts to meet and exceed those requirements.
- GSI Outreach - The scale of GSI implementation throughout a municipality requires that elected officials understand the requirements of the MRP, and the concepts, intent and multiple benefits of the transition from gray to green infrastructure. SCVURPPP staff implemented the following activities to educate elected officials on this topic:
    - Developed a fact sheet titled "Integrating Green Stormwater Infrastructure into Public Streets, Roads, Building, and Parking Lots", and a brief presentation on GSI. Co-

permittees used the fact sheet and presentation for conducting outreach to elected officials.

- Developed a staff report and resolution for Co-permittees to use when presenting their GSI Frameworks to elected officials.
- Developed a presentation and a staff report and resolution for Co-permittees to use when presenting their GSI Plans to elected officials.

Table 7-3 Summary of SCVURPPP's FY 19-20 Public Outreach and Citizen Involvement Events (C.7.d.)

Event Details	Focus & Short Description	Evaluation of Effectiveness
Name: Watershed Watch "half-off" two hour Car Wash Event Date: September 10, 2019 Location: Delta Queen Classic Car Wash, 981 E Hamilton, Campbell Region: Countywide Type: Public Outreach	Audience: Car wash customers Messages: Stormwater pollution prevention and proper car washing.	General Feedback: The event is an annual Watershed Watch event and offers an opportunity to reach car wash customers. Estimated Overall Event Attendance: 75 Number of Brochures/Flyers Distributed: 14 Number of Watershed Watch Discount Cards Distributed: 43
Name: Watershed Watch "half-off" two hour Car Wash Event Date: September 25, 2019 Location: Montague Premier Car Wash, 790 Montague Expressway, San Jose Region: Countywide Type: Public Outreach	Audience: Car wash customers Messages: Stormwater pollution prevention and proper car washing.	General Feedback: The event is an annual Watershed Watch event and offers an opportunity to reach car wash customers. Estimated Overall Event Attendance: 60 Number of Brochures/Flyers Distributed: 22 Number of Watershed Watch Discount Cards Distributed: 59
Name: Pumpkins in the Park Date: October 12, 2019 Location: Guadalupe River Park/Discovery Meadow, San Jose Region: Countywide Type: Public Outreach	Audience: Families with children Messages: Stormwater pollution prevention, less-toxic pest control, litter prevention, and proper disposal of HHW.	General Feedback: This is a great event for educating families with small children. As always, the bean bag game was very popular with the kids. Estimated Overall Event Attendance: 13,000-15,000 Number of Brochures/Flyers Distributed: 281 Number of Giveaways Distributed: 315 Number of Watershed Watch Discount Cards Distributed: 255 Number of kids that played the bean bag game: 255

Event Details	Focus & Short Description	Evaluation of Effectiveness
Name: Day on the Bay Date: October 13, 2019 Location: Alviso Marina County Park 1195 Hope St., Alviso Region: Countywide Type: Public Outreach	Audience: Families with children Message: Stormwater pollution prevention, less-toxic pest control, litter prevention, and mercury in fish consumption advisory.	General Feedback: There were a lot of families with children at the event. The bean bag game was very popular with the kids. A number of adults also played the bean bag game. Estimated Overall Event Attendance: 10,000 Number of Brochures/Flyers Distributed: 190 Number of Giveaways Distributed: 393 Number of Watershed Watch Discount Cards Distributed: 105 Number of kids and adults that played the bean bag game: 293
Name: Landscape Summit 2020 Date: February 27, 2020 Location: Valley Water, 5700 Almaden Expressway, San Jose Region: Countywide Type: Outreach	Audience: Landscape professionals Message: Stormwater pollution prevention, less-toxic pest control, Green Gardener Program	General Feedback: Landscape professionals were interested in the brochures and fact sheets. Estimated Overall Event Attendance: 105 Number of Brochures/Flyers Distributed: 115 Number of Giveaways Distributed: 9
Name: Coastal Cleanup Day Date: September 21, 2019 Location: Various locations throughout the County Focus: Countywide Type: Citizen Involvement	Description: The Creek Connections Action Group coordinated the Coastal Cleanup Day on September 21, 2019. The Program provided funding for local advertising.	A total of 2,166 volunteers participated in cleaning 46 sites in Santa Clara County, and removed approximately 53,297 pounds of trash and recyclables.

Event Details	Focus & Short Description	Evaluation of Effectiveness
Name: Stewardship and Citizen Science Programs – Gardening Without Chemicals Dates: 7/27/19, 8/21/19, 9/20/19, 9/21/19, 10/19/19, 10/24/19, 10/25/19, 11/2/19, 11/19/19, 12/14/19, 1/11/20, 1/16/20, 1/31/20, 2/6/20, 2/13/20, 2/22/20, 2/22/20, 2/26/20, 3/3/20 Location: Don Edwards Wildlife Refuge, Alviso Focus: Countywide Type: Citizen Involvement	Description: Stewardship programs are conducted in partnership with corporate groups, schools, and not-for-profit organizations. Participants pick up trash, and work in the Refuge garden planting native plants, pulling non-native plants, and mulching. Citizen science programs monitor the effects of climate change and the results of the stewardship activities on plants and wildlife. Messages: Stormwater pollution prevention, sustainable gardening, litter prevention.	General Feedback - Many youth and adults continued to participate in stewardship programs this year. Overall Attendance: Stewardship programs reached a total of 358 attendees, including 2 preschool children, 169 elementary school students, 9 middle school students, 42 high school students, and 136 adults.

Table 7-4 Summary of SCVURPPP's FY 19-20 School-Age Children Outreach (C.7.f.)

Program Details	Focus & Short Description	Number of Students Reached	Evaluation of Effectiveness
Name: Watershed Watchers Program at Don Edwards Wildlife Refuge in Alviso Grade or level: pre-school, elementary, middle, high school.	The Refuge offers a number of interpretive programs to educate children and youth about preventing urban runoff pollution.	16 pre-kindergarteners, 685 elementary school students, 117 middle school students, and 226 high school students.	Participant surveys and pledges are used to determine visitor demographics, effectiveness of publicity, and the effectiveness or the Watershed Watchers Program. Details are included within the Watershed Watchers Report included in Appendix 7-4 of the SCVURPPP FY 19-20 Annual Report.
Name : ZunZun Musical Assembly – both live and via distance learning videos Grade or level: elementary	Interactive, musical school assemblies educating K-6 children about watersheds and pollution prevention.	Approximately 10,490 students reached by live assembly (43 live assemblies at 22 schools) 40 students responded to an online evaluation survey of the distance learning assembly video. The video received over 450 views on YouTube.com	ZunZun assemblies were evaluated using postage-paid evaluation cards that were distributed to all teachers present at the performances. The Program received 105 evaluation cards from teachers. Teachers were also given the option to complete the survey online. A total of two teachers submitted the online survey. A few highlights of the evaluations are: • After the performance, 33 teachers reported that 100% of their students knew what a watershed was; 34 teachers indicated that 75% of their students knew what a watershed was; 19 teachers indicated that 50% of their students knew what a watershed was; and 20 teachers indicated that 25% of their students knew what a watershed was. • After the performance, 66 teachers indicated that 100% of their students could name a way to prevent pollution in the watershed; 26 teachers indicated that 75% of their students could name a way to prevent pollution in the watershed; 11 teachers indicated that 50% of their students could name a way to prevent pollution in the watershed; and 4 teachers indicated that 25% of their students could name a way to prevent pollution in the watershed.

Program Details	Focus & Short Description	Number of Students Reached	Evaluation of Effectiveness
			A total of 10 classrooms completed the "I Pledge to Keep My School Clean" activity distributed after the assembly. The pledge requires students to dispose of trash or recyclables properly or pick up litter for a week. Students sign the pledge each day to indicate completion. Teachers are asked to fax or email the completed pledge form to Program staff to be entered into a monthly drawing. Watershed Watch sports backpacks were distributed to students in 6 classrooms. A certificate of appreciation and Watershed Watch tattoos were sent to each classroom that submitted a pledge. A total of 40 students completed an online evaluation of the distance learning ZunZun assembly videos. A summary of the quiz results is provided below: • After viewing the video, 89% of students knew what a watershed was. • After viewing the video, 92% of students could name a way to prevent pollution in the watershed. • After viewing the video, 92% of students correctly identified that water from storm drains flows to creeks, the Bay and ocean.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 8

Water Quality Monitoring

September 30, 2020

Section 8 Water Quality Monitoring

Introduction

The Program has maintained an effective and scientifically sound water quality monitoring and assessment program since its inception in 2002. During this time, the *SCVURPPP Monitoring and Assessment Program* has provided Co-permittees, the Water Board, and other stakeholders with invaluable information on the condition of water quality and associated beneficial uses in Santa Clara Basin creeks and the San Francisco Bay Estuary (Bay). The Program currently conducts water quality monitoring and associated projects for all Co-permittees in compliance with Provision C.8 of the MRP. By conducting monitoring for all Co-permittees, the costs are optimized by reducing a duplication of effort that could occur if conducted individually. The monitoring requirements of the MRP reflect the longstanding Program goal to develop high quality information on water quality in local creeks and the Bay that leads to effective municipal stormwater management.

This section of the Program's FY 19-20 Annual Report is intended to provide brief summaries of the status of water quality monitoring activities/projects conducted during Water Year 2020[1] in compliance with Provision C.8 of the MRP. No water quality data are included within this section. The interpretation and discussion of all monitoring results and conclusions of all water quality monitoring activities conducted in Water Year 2020 (WY 2020) in compliance with the MRP will be described in the Program's Urban Creeks Monitoring Report (UCMR), which will be submitted to the Water Board by March 31, 2021.

Bay Area Regional Monitoring Coalition (C.8.a)

Since 2009, SCVURPPP Co-permittees have participated in a regional monitoring collaborative to address requirements in Provision C.8. The regional monitoring collaborative is referred to as the BASMAA Regional Monitoring Coalition (RMC). The RMC is focused on providing a forum to implement regionally consistent creek monitoring approaches and designs among Bay Area municipal stormwater monitoring programs subject to the MRP. The costs of creek monitoring are decreased by reducing duplication of effort. Participation in the RMC is coordinated by stormwater program and/or Co-permittee representatives (or equivalent), and facilitated through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) and the RMC Work Group. Representation at MPC and RMC meetings by SCVURPPP is coordinated through the Program's Monitoring Ad Hoc Task Group (AHTG).

Monitoring Protocols and Data Quality (C.8.b)

Provision C.8.b requires that water quality data collected by Co-permittees in compliance with the MRP be consistent with the State's Surface Water Ambient Monitoring Program (SWAMP) standards, set forth in the SWAMP Quality Assurance Program Plan (QAPrP). To assist Permittees in meeting SWAMP data quality standards and developing data management systems that allow for easy access of water quality monitoring data by Co-permittees, the Program completed the following regional projects via the RMC:

[1] Water quality monitoring is conducted on a Water Year (WY) basis, which begins on October 1 and ends on September 30 of the named year. For example, Water Year 2020 (WY 2020) began on October 1, 2019 and will conclude on September 30, 2020.

- **Standard Operating and Data Quality Assurance Procedures** – In Water Year (WY) 2013 the RMC adapted existing creek monitoring standard operating procedures (SOPs) and the QAPrP developed by SWAMP into a document applicable to local monitoring requirements. The RMC SOPs and Quality Assurance Project Plan (QAPP) document the field, laboratory, and data validation procedures necessary to maintain comparable, high quality data among RMC participants. The RMC SOPs and the QAPP were revised in WY 2014 (FY 13-14), WY 2015 (FY 14-15) and WY 2016 (FY 15-16) in response to lessons learned, evolving MRP monitoring requirements, and changes to the SWAMP QAPrP. In WY 2020 (FY 19-20), the RMC QAPP was updated to reflect new SWAMP protocols that eliminate the need for toxicity field duplicates. No revisions to the RMC SOPs were made in WY 2020 (FY 19-20).
- **COVID-19 Protocol** – Fieldwork protocols for FY 19-20 were modified by SCVURPPP in order to adhere to public health Orders issued by Santa Clara County related to the COVID-19 pandemic. However, the modifications did not impact sampling results or data quality. The following measures were taken to ensure worker safety: separate cars were driven to each sampling site, a distance of six feet was kept between employees, masks and protective eye wear were worn at all times, each person was tasked with a specific role for the week to reduce equipment sharing, and if equipment needed to be shared or transferred, it was disinfected before the next person handled it.
- **Information Management System Development/Adaptation** – Information management systems developed in previous fiscal years store and manage water quality data collected in compliance with Provision C.8. Creek status, pesticides/toxicity, and Pollutants of Concern (POC) monitoring data collected in the Santa Clara Valley are managed by the Program. On an annual basis, data from SCVURPPP and other RMC partners are combined into a regional database.

■ San Francisco Estuary Receiving Water Monitoring (C.8.c)

Provision C.8.c requires Co-permittees to contribute their fair-share financially on an annual basis towards implementing an Estuary receiving water monitoring program that at a minimum is equivalent to the Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP). During FY 19-20, Co-permittees complied with this Provision by contributing a total of roughly $210,000 to the RMP. In addition, Program and Co-permittee staff actively participated in RMP committees and work groups. Specifically, the SCVURPPP Program Manager represented all BASMAA member agencies on the RMP Steering Committee and the SCVURPPP Watershed Monitoring and Assessment Coordinator represented BASMAA on the RMP's Technical Review Committee. Program staff also played active roles on a number of RMP work groups and strategy teams. Additional information on the RMP, including monitoring results and conclusions, can be found on the San Francisco Estuary Institute's website (www.sfei.org/rmp/).

■ Creek Status Monitoring (C.8.d)

The RMC's regional monitoring strategy for complying with MRP Provision C.8 - Creek Status Monitoring, was developed in FY 11-12. The strategy, which is described in *RMC Creek Status and Long-Term Trends Monitoring Plan*, includes ambient/probabilistic and targeted monitoring designs. These monitoring designs allow each individual RMC participating program to assess the status of beneficial uses in local creeks within its Program area while contributing data to answer regional management questions (e.g., differences in aquatic life condition between urban and non-urban creeks). The creek status monitoring designs are primarily intended to answer the following core management questions:

- What is the condition of aquatic life in creeks in the San Francisco Bay Area; are water quality objectives met and are beneficial uses supported?
- What are the major stressors to aquatic life?
- What are the long-term trends in water quality in creeks over time?

Creek status monitoring requirements, including monitoring parameters, methods, occurrences, durations and minimum number of sampling sites for each stormwater program, are prescribed in MRP Provision C.8.d. Chemical, biological and physical response and stressor indicators, including benthic macroinvertebrate and algae bioassessments, physical habitat assessments and water chemistry (i.e., nutrients and chlorine) parameters, are measured at probabilistic sites. General water quality and temperature (continuous), and pathogen indicators are monitored at targeted sites.

The Program recently completed required monitoring for WY 2020 and is currently conducting quality assurance and control procedures on data collected during this fiscal year. Specifically, bioassessment monitoring to support creek condition assessments, and physical habitat, chlorine, and nutrient monitoring to support stressor assessments were completed in May and June 2020 at 20 sites in the Santa Clara Valley. SCVURPPP also successfully completed pathogen indicator (bacteria) monitoring at five sites in July 2020. Continuous temperature monitoring was conducted at eight sites and continuous general water quality monitoring was conducted at three sites at frequencies consistent with the MRP. All monitoring data collected in WY 2020 will be described in the Program's UCMR, which will be submitted to the Water Board by March 31, 2021.

A comprehensive analysis of bioassessment data collected by the Program over an eight-year period was presented in the Program's 2019 Integrated Monitoring Report (IMR) that was submitted to the Water Board on March 31, 2020. The IMR evaluated bioassessment data collected at 172 sites in Santa Clara County that were sampled between WY 2012 and WY 2019. The data were evaluated to assess overall biological condition of streams within Santa Clara Valley, as well as the extent and influence of stressor data on biological condition scores. In addition, the IMR evaluated the RMC probabilistic monitoring design and provided recommendations for future revisions.

■ Stressor/Source Identification Projects (C.8.e)

Provision C.8.e requires implementation of stressor/source identification (SSID) studies based on creek status, POC, and pesticides/toxicity monitoring. The MRP requires a minimum of eight new SSID projects (including at least one for toxicity) during the Permit term, providing the Permittees conduct projects through a regional collaborative. Under this approach, the SCVURPPP is required to complete a minimum of two SSID projects during the Permit term. SCVURPPP also participated in a regional SSID project that was conducted through BASMAA.

The Coyote Toxicity SSID Project was conducted over a two-year time period (WY 2018 and WY 2019). The project entailed an investigation of the magnitude and extent of sediment toxicity in an urban reach of the Coyote Creek mainstem. A final report was submitted to the Water Board with the IMR on March 31, 2020.

In WY 2019, the Program initiated the second SSID project under MRP 2.0. The Lower Silver-Thompson Creek SSID Project was triggered by creek status/condition data suggesting Lower Silver Creek and Thompson Creek have reduced biological integrity. In addition, existing water chemistry data collected

during bioassessments indicate elevated nutrient concentrations at most of the monitoring locations. Nutrients are biostimulatory substances that may cause eutrophic conditions that can influence biological conditions. The Program's Lower Silver – Thompson Creek SSID Work Plan was submitted as Appendix 8-1 in Program's FY 18-19 Annual Report. Field sampling for the SSID project was initiated in August 2019 and will continue through fall season of 2020. It is anticipated that a final report will be submitted to the Water Board with the WY 2020 UCMR in March 2021.

Lastly, in WY 2018 the Program and its RMC partners initiated a regional SSID project addressing releases and spills of polychlorinated biphenyls (PCBs) from electrical utility equipment. The project was triggered by fish tissue monitoring in the Bay that resulted in the adoption of a Total Maximum Daily Load (TMDL) for PCBs. PCBs were historically used in several types of electrical utility equipment, some of which still contain these chemical compounds. The work plan submitted with the Program's WY 2018 UCMR describes the information that will be gathered from Bay Area utilities, and identifies the need for improved spill response and cleanup procedures and a mechanism for municipalities to track this information. The final regional SSID report for PCBs in Electric Utilities is included as Appendix 8-1.

■ POC Monitoring (C.8.f)

Provision C.8.f. requires monitoring for pollutants of concern identified in the MRP, which include PCBs, mercury, copper, nutrients, and emerging contaminants. The MRP prescribes the minimum number of samples required annually and over the Permit term for each POC. POC monitoring is intended to address five priority POC management information needs (i.e., Management Questions). The Permit describes the minimum number of samples required for each Management Question depending on the specific POC.

1. **Source Identification** – identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;
2. **Contributions to Bay Impairment** – identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);
3. **Management Action Effectiveness** – providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions;
4. **Loads and Status** – providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and
5. **Trends** – evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

Like creek status monitoring, POC monitoring is conducted as part of the BASMAA RMC. Collaboration on POC monitoring is supplemented through the Small Tributaries Loading Strategy Workgroup (STLS), which is a subcommittee of the RMP's Sources, Pathways and Loadings Workgroup (SPLWG). Stakeholders involved in the STLS include BASMAA representatives, staff of the San Francisco Estuary Institute (SFEI), and staff of the Water Board. The objective of the STLS is to implement a comprehensive planning framework to coordinate POC monitoring, POC loads modeling, and long-term trends assessment between the RMP and RMC participants.

In Water Year 2020, the Program sampled for PCBs, mercury, copper, and nutrients. The MRP-required yearly minimum number of samples was met or exceeded for all POCs. PCBs and mercury monitoring in stormwater runoff by the Program continued in accordance with the Program's *Pollutant of Concern*

Monitoring - Sampling and Analysis Plan. The primary goal of the monitoring is to identify Watershed Management Areas where the application of control measures would have the greatest benefit toward required load reductions of PCBs and mercury. In WY 2020, PCBs and mercury monitoring also included collection of upland sediment samples as part of several Source Property Investigations. The goal of the investigations is to identify source properties that can be referred to the Water Board for abatement.

Details of Water Year 2020 POC monitoring will be described in the *POC Monitoring Report*, which will be submitted to the Water Board under separate cover letter by October 15, 2020. The *POC Monitoring Report* lists WY 2020 accomplishments including monitoring locations, number and types of samples collected, analytes measured, and purpose of sampling (i.e., priority information need addressed). Data and interpretations will be provided in the UCMR which will be submitted to the Regional Water Board by March 31, 2021. Emerging contaminant monitoring is being addressed through Program participation in the RMP. Details of emerging contaminant special studies conducted by the RMP will be described in the *POC Monitoring Report*.

■ Pesticide and Toxicity Monitoring (C.8.g)

Pesticide and toxicity monitoring requirements, including monitoring parameters, methods, occurrences, durations, and minimum number of sampling sites for each stormwater program, are described in MRP Provision C.8.g. The Program collected water toxicity and sediment chemistry and toxicity monitoring at two sites during the dry season (i.e., July 2020). Dry season sampling in WY 2020 was conducted at the same locations sampled the previous four years.

■ Reporting (C.8.h)

Provision C.8.h requires Permittees to report annually on water quality data collected in compliance with the MRP. Annual reporting requirements include: 1) water quality standard exceedances; 2) creek status monitoring electronic reporting; 3) urban creeks monitoring reporting; and 4) pollutants of concern monitoring reporting. Each annual report must include a status report for all SSID projects.

The electronic data and annual Urban Creeks Monitoring Reports are required by March 31 and the POC Monitoring Reports no later than October 15 of each year.

Santa Clara Valley
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Section 9

Pesticides Toxicity Control

September 30, 2020

Section 9 Pesticides Toxicity Control

Introduction

Provision C.9 of the MRP requires Co-permittees to implement pesticide toxicity control programs within their jurisdictions to address the use of pesticides that pose a threat to water quality and have a potential to enter the municipal stormwater conveyance system. Consistent with the requirements of Provision C.9, the Program's (and Co-permittees') approach to pesticide management focuses on the use of best management practices (BMPs) for source control and pollution prevention. Program BMPs for pesticide management include significant education and outreach efforts to residents, businesses, pest control professionals, and municipal staff to promote behavior changes relative to pesticide use and less-toxic pest control methods. Outreach efforts have been supplemented by: local and regional studies to define the need; participation in regional organizations to address pesticide regulations and other issues; and development of local Integrated Pest Management (IPM) plans.

In FY 19-20, activities associated with Provision C.9 were conducted at the Co-permittee, Program and regional levels. These activities built upon a large body-of-knowledge gained through tasks completed in previous fiscal years. Local actions are documented in each Co-permittee's annual report. This section highlights pesticide toxicity control activities conducted at the Program and/or regional levels that are associated with the following sub-provisions of the C.9 Provision:

- Program Activities
  - Interface with County Agricultural Commissioner (C.9.d)
  - Public Outreach (C.9.e)
- Regional Activities
  - Track and Participate in Relevant Regulatory Processes (C.9.f)

Program Activities

C.9.d. Interface with County Agricultural Commissioners

Program staff coordinated with Michelle Thom (Deputy Agricultural Commissioner, Santa Clara County Division of Agriculture) to obtain input on conducting outreach to structural Pest Control Operators (PCOs). Program staff obtained a list of Pest Control Operators registered in Santa Clara County from Santa Clara County Division of Agriculture with the intent of sending information on IPM certification programs to them. However, the mailing could not be completed due to the COVID-19 shelter-in-place order. The mailing will be conducted in Summer/Fall 2020.

In future years, Program staff intends to continue interfacing with the County's Agricultural Commissioner through meetings, phone conversations and sharing of information by email.

C.9.e. Public Outreach

Point of Purchase Outreach to Consumers (C.9.e.ii(1))

The Program contributed funds to and actively participated in, the BASMAA IPM Store Partnership Program (also known as the Our Water Our World Program). The aim of the Our Water Our World (OWOW) Program is

to partner with retail stores and nurseries to provide less-toxic pest control information to residents at the point of purchase. This involves stocking literature racks at stores with *Less Toxic Pest Management* fact sheets and placing "shelf-tags" on store shelves. Shelf-tags are small product identification signs that are placed on store shelves to help customers identify less-toxic products. The OWOW Program also includes a training component where store employees are trained on IPM and selling less-toxic pest control products to customers.

Currently, 22 local stores in Santa Clara Valley participate in the OWOW Program. Program staff visited most participating stores two times in FY 19-20 to restock literature racks and update shelf-tags. Store visits planned for spring were canceled due to the shelter-in-place order. Modified store visits that allow for social distancing are being planned for Summer 2020.

Program staff trained 15 employees at two stores. This on-site training informed attendees about stormwater issues and IPM, and supplied them with informational handouts and lists of less-toxic products. A list of stores participating in the IPM Store Partnership Program in Santa Clara Valley is provided in Appendix 9-1.

Evaluation of Effectiveness

The OWOW Program has been very successful in engaging stores, educating customers, and training employees to promote less-toxic products to customers. In FY 19-20, the store managers continued to be enthusiastic about the program and extremely receptive to having the OWOW materials in their stores.

Store employees attending the training were asked to complete knowledge evaluation surveys before and after the training. The summary of evaluations is included in Appendix 9-1. The Program intends to continue local implementation of the IPM Store Partnership Program in FY 20-21.

Pest Control Contracting Outreach (C.9. e.ii.(2)) – Outreach to Residents

The Program continued to conduct outreach about less-toxic pest control to residents who use or contract for structural pest control or landscape pest control and landscape professionals. Messages included the following: information on pesticide use and water quality, proper use and disposal of pesticides, IPM, hiring a Green Gardener, the list of trained Green Gardeners, IPM Certification Programs, and the OWOW Program. The Program conducted the following IPM outreach activities in FY 19-20 to meet this requirement:

- Media Advertising – IPM advertisements were placed online and on local radio stations and television channels as part of the Watershed Watch Campaign media advertising. A summary of the components of the media advertising campaign on pesticides is presented below:
  - 15-second English radio PSAs and paid 30-second spots promoting becoming an IPM-trained Green Gardener ran on KUFX, KOIT, KRTY, KEZR and KBAY; Spanish 30-second spots aired on KSOL
  - Digital (paid) posts on Facebook and Instagram promoted Green Gardener classes
  - "Hire a Green Gardener" 30-second video ran in English on YouTube; Spanish on KSTS TV
  - "Hire a Green Gardener" 30-second radio and 15-second PSA in English on KUFX and KOIT

- Interview segment for *Despierto Area de la Bahia* on KDTV Univision 14 (Spanish) created awareness of Green Gardener training program and class registration
- 30-second radio spot "Choose less toxic DIY" ran on KSOL (Spanish), KEZR, KBAY, KUFX, KOIT and KRTY
- 30-second English TV spot "Choose less toxic DIY" ran on YouTube; in Spanish on KSTS
- 30-second Spanish TV spot "Hire an IPM-trained pest pro" ran on KSTS; English spots ran on YouTube
- 30-second radio ad promoting "Hire an IPM-trained pest pro" ran on KSOL (Spanish), KOIT and KUFX
- IPM messages posted on Facebook and Twitter

- "Pests Bugging You? Choose less-toxic products" English and Spanish targeted digital ads ran via CoreAudience
- 15-second radio ad promoting IPM for pest control ran on KEZR, KBAY, KUFX, KOIT and KRTY

Overall, Watershed Watch Campaign advertising included 870 total spots on IPM topics, including 28 spots on hiring an eco-friendly pest control professional, and 228 spots on the Santa Clara Valley Green Gardener program. Additional details on the media campaign are included in Appendix 7-1.

- Watershed Watch Website - Messages about less-toxic pest management information, including the list of Green Gardeners, IPM Certification Programs, OWOW Fact Sheets, and the list of stores selling less-toxic products were posted on the website throughout the year. The website also promotes proper disposal of pesticides and refers users to the County Household Hazardous Waste Program's website (www.hhw.org) to find a disposal location near them.
- Outreach at Events – Program, Co-permittee and Watershed Watch Campaign staff conducted IPM outreach at the following three events. IPM events scheduled for spring were canceled due to the COVID-19 shelter-in-place order.
    - Day on the Bay, Sunday, October 13, 2019, Alviso Marina County Park, San José
    - Pumpkins in the Park, October 12, 2019, San José
    - Valley Water Landscape Summit, February 27, 2020

The Program distributed IPM related materials at these events, including the following: *Less-Toxic Pest Control for Multi-Unit Properties*, *Less Toxic Pest Management* fact sheets, *10 Most Wanted Backyard Bugs* brochures, *Don't Plant a Pest* brochures, and flyswatters. The flyswatters have the Watershed Watch website and the words "The Original Earth-Friendly Pest Control" printed on them.

After the shelter-in-place order went into effect, Program staff routinely compiled information on online IPM trainings and presentations and posted it on Watershed Watch website.

- Going Native Garden Tour - The Program provided funding to support the Going Native Garden Tour (GNGT) which was scheduled for May 2 and May 3, 2020. Due to the shelter-in-place order, the in-person tour was replaced with virtual tours of participating native gardens. The virtual tours were held on May 2, May 9, May 16, June 13, and July 22. Recordings of the virtual tours can be accessed at https://www.gngt.org/GNGT/VirtualTours.php.

- South Bay Green Gardens – Since FY 12-13, the Santa Clara County Recycling and Waste Reduction Commission (SCCRWRC) and SCVURPPP have funded a website (www.southbaygreengardens.org) to educate residents, landscape construction maintenance professionals, and municipal staff on sustainable landscaping techniques. SCVURPPP and SCCRWRC continued to allocate funds in FY 19-20 toward website maintenance and promotion. Program staff and several Co-permittee staff participated in meetings of the South Bay Green Gardens Subcommittee. In FY 19-20, the Subcommittee implemented the following activities to promote the website:
    - Purchased 10,000 seed packets as promotional giveaways. The seed packets include seeds for three California native plants and have South Bay Green Gardens information printed on them.
    - Purchased advertising on Facebook and Instagram. Also purchased advertisements using Google Ad Words.

Evaluation of Effectiveness

Results from FY 19-20 media advertising and outreach events conducted by the Program yielded the following conclusions regarding their effectiveness:

- Media Advertising and Website - The Watershed Watch media campaign, which included digital/online placements as well as 1,961 radio, television, and digital (online) spots on various stormwater pollution prevention topics, delivered over 12 million gross impressions. Additional details are included in the FY 19-20 Watershed Watch Campaign and Media Report included in Appendix 7-1.
- Outreach at Events - Overall, the three outreach events were successful in providing opportunities for educating the public about less-toxic pest control methods. Additional details on outreach events, numbers of brochures distributed, and website visit statistics are included in Section 7 of this Annual Report.
- Going Native Garden Tour – The live virtual tours received a total of 580 views. The recordings posted on YouTube have received over 2,100 views so far.
- South Bay Green Gardens Program – The website received 16,770 total visits in FY 19-20, compared to 24,400 total visits in FY 18-19. The total number of visits reflect a net -34.2% decline in visits compared to the previous year. however, the January-June 2020 period experienced an increase of 107.8% (10,962 visits compared to 5,288 in 2019) once advertising began. The Google Ads paid search campaign conducted January-June 2020 achieved 918,629 impressions which resulted in 6,985 clicks. The Facebook advertising campaign conducted February 19-March 20, 2020 resulted in 659 engagements, and 465 new page likes.

Outreach to Structural Pest Control Operators (C.9.e.ii.(3))

Program staff coordinated with Michelle Thom (Deputy Agricultural Commissioner, Santa Clara County Division of Agriculture) to conduct outreach to structural pest control contractors. The Program's outreach efforts are summarized under Section C.9.d Interface with County Agricultural Commissioners (Page 9-1).

Outreach to Landscape Maintenance Professionals (C.9.e.ii.(3))

In FY 07-08, the Program began the Santa Clara Valley Green Gardener Training Program, an educational initiative that brings quality training to professional landscapers, gardeners and landscape maintenance

workers on how to “garden green”. Each training session consists of ten 2-hour classes, held once a week for ten weeks. The training is conducted in collaboration with Sunnyvale-Cupertino Adult Community Education (ACE) training center in Sunnyvale, and the Master Gardeners of Santa Clara County.

The Green Gardener Program is offered at Basic and Advanced levels. Each training level consists of ten, 2-hour classes on the core curriculum topics. Students must attend at least 80 percent of the classes and pass a final examination on the core subjects to be placed on the Green Gardener list promoted to the public. To maintain their status as Green Gardeners, individuals must meet annual continuing education requirements or demonstrate that they are implementing the practices learned.

Fall 2019 Green Gardener graduates

The Program conducted one Basic Green Gardener training session in FY 19-20. The Program provided funds toward student fees, instructor fees, guest speaker fees, and supplies (handouts, binders, Green Gardener hats, and materials for hands-on activities).

The Green Gardener trainings were publicized via mailings, email, radio ads, the Watershed Watch website, and social networking sites. Media advertising efforts included the following:

- Digital (paid) posts on Facebook and Instagram promoted Green Gardener classes
- “Hire a Green Gardener” 30-second video ran in English on YouTube; Spanish on KSTS TV
- “Hire a Green Gardener” 30-second radio and 15-second PSA in English on KUFX and KOIT

To assist Green Gardeners in meeting the re-certification requirements, the Program conducts recertification classes in spring. The re-certification classes scheduled for spring 2020 were canceled due to the COVID-19 shelter-in-place order. Program staff sent a list of online trainings to Green Gardeners to help them meet the re-certification requirements.

Evaluation of Effectiveness

A total of 21 individuals completed the Green Gardener training in FY 19-20. A total of 14 Green Gardeners re-certified in FY 19-20 using options such as viewing training videos, attending in-person sustainable landscaping classes held earlier in the fiscal year, and submitting self-assessments.

The Program plans to continue implementing the Green Gardener Training Program in FY 19-20, if in-person classes are allowed by County Health. The Green Gardener training includes hands on activities which are not suited for remote teaching. In addition, email communications with current Green Gardeners indicate low interest in attending online trainings.

If the training is conducted, the Program will continue to work with the Santa Clara County Master Gardeners to receive their help in teaching the class and promoting Green Gardeners through their hotline and other outreach venues.

The list of current Green Gardeners, summary of evaluations, and copies of outreach materials are included in Appendix 9-2.

Regional Activities

During FY 19-20, the Program participated in the following regional activities to address MRP C.9 Provisions:

- MRP 3.0 Tracking and Reporting Work Group - Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 Tracking and Reporting Work Group to discuss, internally and with Water Board staff, issues related to reporting in Provision C.9 of MRP 3.0. Program staff helped to lead these efforts and was co-lead of the Work Group. Provision C.9 topics were discussed at the February 19, 2020 and May 12, 2020 meetings.
- Track and Participate in Relevant Regulatory Processes (C.9.e) – This provision requires Permittees to track U.S. Environmental Protection Agency (EPA) and California Department of Pesticide Regulation (DPR) actions related to urban uses of pesticides and actively participate in the shaping of regulatory efforts. The Program and Co-permittees work with CASQA to communicate to the EPA Office of Pesticide Programs and DPR the need to reduce pesticide-related toxicity in Bay Area water bodies by considering the impact on water quality during the pesticide approval and registration process. Through contributions to CASQA and BASMAA, SCVURPPP helped fund the efforts of the CASQA Pesticide Subcommittee and its consultants to track regulatory efforts and write letters regarding pesticide reregistration and maintain other communications with State and Federal agencies. Program staff participates in the CASQA Pesticide Subcommittee and provides input on draft letters and regulatory efforts related to pesticides. Subcommittee tasks generally fall into the following categories:
    - Tracking Federal Register notices;
    - Tracking DPR notices of evaluations and decisions;
    - Tracking activities at the Water Boards;
    - Briefing EPA and DPR via phone calls and emails;
    - Writing letters and tracking responses to letters;
    - Meeting with EPA and DPR;
    - Presenting to EPA, DPR, Water Board, CASQA members and other collaborators;
    - Developing and delivering public testimony; and,
    - Analyzing DPR/SWAMP/MS4 monitoring data.

  A full report of the accomplishments of the CASQA Pesticide Subcommittee and its consultants and the effectiveness of their efforts is included in Appendix 9-3.
- Regional OWOW Program – The Program provided funds toward implementing the Regional OWOW Program. Program staff participated in the BASMAA PIP Subcommittee and provided input, as needed. The Regional OWOW Program implemented the following activities in FY 19-20:
    - Coordinated program implementation with major chains Home Depot and Ace Hardware National. Home Depot Corporate (Atlanta) directed support of the program by providing a support letter.

- Completed the development and creation of two new fact sheets for Bed Bugs (in English and Spanish) and Moles, Voles, and Gophers.
- Recruited for, developed, planned, and conducted an IPM Advocates training course to qualify five new Advocates, almost doubling the IPM Advocates corps to 12 individuals.
- Conducted monthly seasonal pests meetings with IPM Advocates for month /season ahead.
- Updated less-toxic product lists
- Maintained the OWOW website.
- Provided Ask-the-Expert service— the Bio-Integral Resource Center (BIRC) provides 24-hour turnaround on answers to pest management questions. BIRC researched and provided answers to about 28 questions in FY 19-20.
- Provided and staffed exhibitor booths and made presentations to attendees

Additional details are included in the BASMAA FY 19-20 Regional Supplement for Training and Outreach included in Appendix 9-4.

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Section 10

Trash Load Reduction

September 30, 2020

Section 10 Trash Load Reduction

Introduction

The goal of MRP Provision C.10 (Trash Load Reduction) is to implement control measures and other actions to reduce trash loads from the stormwater conveyance system to local urban creeks by 80 percent by July 1, 2019. This goal is intended to set the course for additional load reductions in future years. To make progress towards reduction goals, Co-permittees were required to develop and implement trash reduction plans that include the installation and maintenance of trash full-capture devices designed to treat a mandatory minimum level of land area, and other control measures and best management practices that prevent or intercept trash before entering local water bodies. Additionally, Co-permittees are required to remove trash from creek and shoreline hot spots within their jurisdictional boundaries. To address longer-term goals of trash reduction, Co-permittees were also required to maintain a Long-Term Trash Load Reduction Plan designed to attain a 100% trash load reduction by July 1, 2022.

Activities associated with Provision C.10 requirements were conducted at the Co-permittee, Program and Regional levels in FY 19-20. Local actions are documented in each Co-permittee's annual report. This section highlights trash management and assessment activities conducted at the Program and/or regional levels, including:

- Implementation of the SCVURPPP Trash Assessment Strategy, including managing the Program-wide On-land Visual Trash Assessment (OVTA) Program, managing information on trash full capture locations and drainage areas, and the calculation of Co-permittee Trash Load Reductions;
- Control Measure Trash Performance Standard Development;
- Trash Hot Spot Cleanup and Assessment Guidance and Data Management;
- Implementation of the BASMAA Receiving Water Trash Monitoring Program Plan;
- Participation in the Ocean Protection Council's Trash Monitoring Field Methods Testing, Validation and Standardization Project;
- Identification of Areas >10,000 ft^2 Draining to Inlets Directly Connected to MS4s;
- Coordination of SCVURPPP Trash Ad hoc Task Group Meetings;
- Participation in SCBWMI Zero Litter Initiative;
- Participation in BASMAA Trash Committee; and
- Development FY 19-20 Annual Report Template and Guidance

These activities built upon a large body of knowledge gained through tasks completed in previous fiscal years.[1] Program and regional task highlights presented in this section are organized by Permit provision or by major heading (both marked in bold).

[1] Trash-related work products completed by the Program in previous fiscal years and task summaries of Program efforts can be found on the "trash" section of the SCVURPPP website (https://scvurppp.org/trash/).

■ Program Activities

Calculation of Trash Load Reductions (C.10.a.ii)

The Program developed the *Pilot Trash Assessment Strategy* (Strategy) in FY 13-14 on behalf of SCVURPPP Co-permittees. The Strategy was submitted to the Water Board on February 3, 2014 as part of Co-permittee Long-Term Trash Load Reduction Plans. The Program implements the Strategy on behalf of and in collaboration with, all SCVURPPP Co-permittees.

The Strategy is intended to provide information to demonstrate the magnitude and extent of trash reductions associated with stormwater in the Santa Clara Valley. The Strategy is consistent with trash monitoring, assessment and reporting requirements in the MRP and is primarily designed to answer the following core management question:

Have Co-permittees achieved MS4 trash load reduction targets (i.e., 40%, 70%, 80%, and No Adverse Impacts)?

The primary environmental and programmatic indicators that the Program and Co-permittees currently track to answer this core management question are:

1. **Full Capture Systems** – The extent of areas effectively treated by trash full capture devices and the operation and maintenance of these devices.
2. **Other Trash Controls** – Reductions in the levels of trash observed on-land and available to enter MS4s.
3. **Source Controls** – Reductions in the levels of litter prone items observed in the environment that are subject to source controls, such as ordinances that limit or prohibit the distribution of specific types of items.
4. **Additional Creek and Shoreline Cleanups (Offset)** – The volumes of trash removed via creek and shoreline cleanup events conducted above and beyond those required by the MRP.
5. **Direct Discharge Programs (Offset)** – The extent and magnitude of trash removed or prevented from entering a receiving water body from pathways other than stormwater that are directly impacting those water bodies (e.g., illegal dumping or illegal homeless encampments).

In selecting the indicators above, SCVURPPP Co-permittees recognize that no one indicator can provide the information necessary to effectively determine progress made in reducing trash discharged from MS4s. SCVURPPP's methods used to collect or track information on the primary indicators 1-4 listed above are briefly described below, along with summaries of associated activities conducted by the Program. Methods used to assess indicator 5 are specific to Co-permittee direct discharge control plans and can be found in the applicable Co-permittee Annual Reports (e.g., City of San José). Additional information and the results of data collected to support indicators 1-4 can be found in Co-permittee Annual Reports (see Sections 10 – Provision C.10.b.ii Parts A and B), or made available upon request.

1. Full Capture Systems (Including Operation/Maintenance)

Devices and facilities meeting the trash full capture design criteria described in the MRP and certified by the State Water Resources Control Board (State Water Board) are effective trash controls if adequately maintained to ensure their capture efficiency. Consistent with the Long-Term Plan Framework and the State Water Board's Trash Amendments, if a full capture device is

maintained effectively then trash from the area draining to the device is effectively reduced to a level of "no adverse impacts" and has achieved the ultimate trash reduction goals outlined in the MRP. Additional trash reductions, therefore, are not needed in areas draining to (and treated by) full capture systems.

Every year since FY 13-14, Program and Co-permittee staff have spent considerable time identifying and mapping areas draining to full capture systems using a combination of field work and Geographical Information Systems (GIS). Newly installed full capture devices are delineated and mapped as part of an annual update of individual Co-permittee GIS full-capture device data layers. The Program and Co-permittees have now delineated all drainage areas for devices installed in the Santa Clara Valley. Nearly 20,000 acres of land area is currently treated by full capture systems in the Santa Clara Valley. Trash reductions associated with these areas are calculated based on the baseline trash generation rates established on Co-permittee maps.

Additionally, the Program completed the development of a Model Trash Full Capture Device O&M Verification Program in FY 15-16. The O&M Verification Program is intended to ensure that devices are operated at a level necessary to maintain their full capture designation. In FY 19-20, Program staff continued to provide guidance to Co-permittees on MRP operation and maintenance requirements and standard operating procedures developed for the Program as part of the Model Verification Program. Co-permittees with full capture devices have an O&M verification program tailored to fit the types of devices in their stormwater conveyance system and maintenance procedures needed to adequately maintain them. Information regarding maintenance and operation of full capture devices (and any issues arising) can be found in Co-permittee Annual Reports (see Sections 10 – Provision C.10.b.i).

2. Other Trash Control Measures (via On-land Visual Trash Assessments)

In FY 13-14, the Program developed an approach to assess trash reductions in land areas that generate substantial levels of trash (i.e., very high, high or moderate trash generation) and are not treated by full capture systems. The approach uses OVTA protocols developed in the Bay Area to observe changes in the levels of trash on streets, sidewalks and properties over time. The assessment protocol scores sites/areas using a 4-tier system (A, B, C and D, with A being the least amount of trash). The four OVTA scores correspond with the four trash generation rate categories (i.e., low, moderate, high and very high) and the associated weighting factors included in the MRP.

Consistent with the MRP, OVTAs are conducted at randomly selected street/sidewalk sites representing 10% of the applicable street miles in each trash management area (TMA) where trash reductions are being reported by Co-permittees. OVTAs are conducted at a frequency necessary to confidently detect reductions in trash levels at these sites. Based on the findings of the *Tracking California's Trash* State Water Board funded project, on average conducting between 4 and 6 assessments at a site will allow detection of trash levels within an acceptable level of confidence. Currently, the Program annually conducts roughly 3 assessments at each site and then averages two years of data to calculate trash load reductions in a given fiscal year. For example, in reporting reductions for FY 19-20, results from assessments conducted in both FY 18-19 and 19-20 were averaged and represent the current levels of trash generation in the Santa Clara Valley.

Collectively for all Co-permittees, SCVURPPP conducted over 1,050 OVTAs during FY 19-20 at 424 assessment sites (averaging 1,000 feet in length). All sites were assessed two times during FY 19-20 and many were assessed three times. During a typical year, all sites are assessed three times. Table 1 provides a summary of the number of OVTAs conducted by SCVURPPP between FY 14-15 and FY 19-20.

Table 1. Number of OVTAs completed in Santa Clara Valley by fiscal year.

FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
946	917	915	1529	1435	1052

Assessment results are stored in the Program's on-line *Visual Trash Assessment Database*. In FY 19-20, Program staff entered assessment results within one week of conducting an assessment, which allowed Co-permittees access to the results in relatively "real-time."

Effects of COVID-19 Pandemic on OVTA Scores

In March 2020, the County of Santa Clara issued a Shelter-in-Place (SIP) Order to slow the spread of COVID-19 in the County. As a result, OVTAs were ceased from March 19, 2020 until late May 2020. During those months, a determination was made that OVTAs are essential services because they are conducted in response to regulatory mandates and as a result, OVTA Standard Operating Procedures (SOPs) were adjusted to conform to the SIP Order. Assessments using the modified SOPs were conducted from late May through July 2020. Because trash control measures implemented by Co-permittees may have been suspended or modified during these months due to the COVID-19 pandemic (see additional descriptions in Co-permittee FY 2019-20 annual reports), an evaluation of OVTA data collected during that timeframe was compared to data collected during the previous FY. The following comparisons were made to evaluate the potential effects of the pandemic on OVTA scores:

- Average OVTA scores at each site assessed during both FY 18-19 and FY 19-20
- Baseline trash generation and average OVTA scores at each site assessed during both FY 18-19 and FY 19-20

Only sites assessed at least once during FY 18-19 and at least once during the SIP Order in FY 19-20 were included in the analysis. A total of 412 sites met this requirement across nine (9) SCVURPPP Co-permittees that conduct OVTAs. A summary of the results from the data analysis is shown below:

- **Changes in average OVTA scores at sites between FYs 18-19 and 19-20 -** Results from this analysis indicate that on average, OVTA scores declined by 33% at sites in FY 19-20. Declines in OVTA scores resulted in less trash load reductions associated with "Other Management Actions" being reported by SCVURPPP Co-permittees in FY 19-20 (Table 2).

Table 2. Changes in average OVTA scores (0 to 1 – Low, 1 to 2 - Moderate, 2 to 3 – High, and 3 to 4 - Very High) on a Co-permittee and Countywide level in FY 19-20.

Co-permittee	FY 2018-19 Average Score	FY 2019-20 Average Score	% Change
Campbell	0.41	0.51	23%
Cupertino	0.17	0.25	48%
Los Gatos	0.18	0.34	85%
Mountain View	0.32	0.47	47%
San Jose	0.77	0.93	21%
Santa Clara	0.47	0.58	22%
Santa Clara County	0.88	0.91	4%
Saratoga	0.13	0.33	150%
Countywide	***0.29***	***0.51***	***33%***

Possible reasons for the decline in OVTA scores in FY 19-20 include the following:

- Modifications in Co-permittee trash control measure implementation (e.g., reductions in street sweeping/ parking enforcement and suspension of on-land cleanups by volunteers) due to the SIP Order.
- Increases in residents staying at home during the SIP Order, resulting in more vehicles parked on the street during street sweeping events, reducing the effectiveness of this control.
- Closures of businesses during SIP Order, reducing cleanup efforts conducted by private parties in commercial and retail areas.

Although each of these are possible reasons for declines in observed OVTA scores, the worsening of OVTA results cannot be attributed to a single cause. Based on the analysis performed, it is likely that a combination of one or more the causes above are responsible for changes in FY 19-20.

- **Baseline trash generation compared to average OVTA scores at each site assessed during both FY 18-19 and FY 19-20**
  - In 18-19, 92% of sites showed improvements compared to baseline conditions. In FY 19-20, improvements were again observed at 92% of sites.
  - These observations demonstrate that the average trash levels observed continue to be better than baseline conditions, despite the decreases in scores observed in FY 19-20.

Regardless of the declines in OVTA results observed during the SIP Order, all OVTA data collected between July 2018 and July 2020 were used by SCVURPPP Co-permittees to report trash load reduction estimates for “Other Trash Management Actions” in Section C.10 (Provision C.10.b.ii., Part B) of their FY 19-20 Annual Reports. This resulted in some Co-permittees reporting less trash load reductions in FY 19-20 than in the previous FY. Additional assessments are planned for FY 20-21, consistent with the SCVURPPP Trash Assessment Strategy.

3. Source Controls (via surveys and characterization studies)

SCVURPPP Co-permittees have implemented actions to reduce the sale or distribution of litter-prone items and stop litter at its source. These source controls include the adoption and enforcement of ordinances enacted by Co-permittees to eliminate the distribution of single-use plastic grocery bags and expanded polystyrene (EPS) food service ware in their jurisdictions. To assist Co-permittees in determining to what degree these ordinances have substantially reduced the level of these products found in the environment, the Program conducted a Storm Drain Trash Monitoring and Characterization Project between March 2015 and July 2016. As part of this Project, debris and trash were collected from large and small trash full capture treatment systems within jurisdictions who have installed these devices.

Results from the Project, which characterized the number of bags and amount of EPS observed in trash full capture systems pre- and post-ordinance, indicate that on average 72% fewer single-use plastic grocery bags and 74% less EPS food service ware was observed in storm drain systems after the ordinances went into effect. These observed average reductions are used by Co-permittees to demonstrate trash load reductions associated with the implementation of these ordinances. For additional details on results of the Project, see the *Storm Drain Trash Monitoring and Characterization Project Technical Report* provided in Appendix 10.1 of the Program's FY 15-16 Annual Report.

<u>Effects of COVID-19 Pandemic</u>

In March 2020 as part of the County of Santa Clara's Department of Public Health Shelter-in-Place Order due to the COVID-19 pandemic, the use of reusable grocery bags by customers in stores was suspended to protect public health. Additionally, single-use plastic bags were temporarily allowed in some jurisdictions. In June 2020, the County reinstated its Order, which allows customers to use their own reusable bags as long as businesses require customers using these bags to bag their own groceries.

In an effort to evaluate whether the 3-month moratorium on the use of reusable bags and the temporary allowance of single-use plastic bags, the number of single-use plastic bags observed during OVTAs conducted in FY 18-19 (pre-COVID) were compared to FY 19-20 (during-COVID). Results indicate that no statistically significant ($p<0.05$) changes in the number of single-use plastic bags observed on streets and sidewalks occurred between FYs 18-19 and 19-20. The average number of bags observed per 1,000 feet did increase slightly in FY 19-20, but not to a level that would be considered statistically significant.

4. Additional Creek and Shoreline Cleanups (via volumes of trash removed from waterways)

Co-permittees are also allowed to claim up to 10% trash load reduction for conducting trash cleanups in local water bodies above and beyond cleanups required by the MRP. The Program assists Co-permittees by calculating load reductions associated with these efforts based on the volumes of trash reported by Co-permittees. Load reductions associated with these efforts are calculated based on methods described in the MRP and are reported in Section C.10.e of Co-permittees annual reports.

Control Measure Trash Performance Standard Development: Curb Inlet Screens

Provision C.10.b.ii.b.(iv) states that Co-permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Should the Water Board Executive Officer accept the evidence, Co-permittees could then apply this performance standard and receive a trash load reduction credit for adequately doing so.

In FY 16-17, SCVURPPP developed a preliminary concept and study design for a project devised to collect information and establish performance standards for a trash control measure – curb inlet screens. The curb-inlet screen performance standard project included participation by four Co-permittees (Cupertino, San José, Sunnyvale and County of Santa Clara) and the City of Oakland. In FY 17-18, SCVURPPP developed a Sampling & Analysis Plan (SAP) for this project, and provided it to Water Board staff for review/comment. A list of monitoring questions was created to guide the implementation of the project, listed below.

Monitoring Questions

1. To what extent do curb inlet screens reduce the amount of trash entering storm drains?
2. Are curb inlet screens effective in reducing all types and sizes of trash?
3. Is there a difference in curb inlet screen effectiveness in High trash-generating areas vs. Moderate trash-generating areas?
4. Are curb inlet screens effective in reducing trash to Low trash levels (< 5 gal/acre-year)?
5. To what extent does seasonality (i.e., dry vs. wet season) affect trash generation in storm drains, with and without curb inlet screens?

A total of 66 storm drains equipped with trash full capture devices and curb inlet screens were selected to determine the effectiveness of curb inlet screens during wet and dry periods. The five sampling events took place between July 2018 and July 2019. The first sampling event occurred in July 2018. Four additional sampling events occurred in November 2018, January 2019, April 2019 and July 2019. Because of the accidental cleaning or removal of CPS devices, seven sites were removed from the study, which left 59 sites that were included in the analysis.

Key Findings

A draft report was provided to Water Board staff in May 2020. The draft report includes multiple key findings that correlate with the monitoring questions listed above:

- Curb inlet screens appear to be effective at reducing the volume of trash entering MS4s. Trash was reduced by 69% (on average) once curb inlet screens were installed.
- Curb inlet screens appear to be very effective at blocking larger trash items, such as bottles or plastic bags, but their trash reduction effectiveness decreases for smaller trash items. Reductions in larger items were substantial, in some cases intercepting all larger items before they entered the MS4. Lower reduction rates were observed for smaller items, such as straws and cigarette butts, but reductions were still observed at substantial levels (e.g., 30-40%).

- Based on the trash reduction goal of "low trash generation" the report recommends the following curb inlet screen performance standard be included in the MRP:

  For land areas that generate Moderate levels of trash, the installation and maintenance of curb inlet screens on inlets draining these areas, together with street sweeping 2x/month on the streets in the area, will achieve the low trash generation goal.

In early FY 20-21, the draft report will be finalized and the findings will be discussed with Water Board staff with the goal of establishing a trash performance standard for curb-inlet screens, and include the standard into MRP 3.0.

Enhanced Business Inspection and Control Program

In FY 16-17, SCVURPPP developed a preliminary concept and study design for an enhanced business inspection and control program in Sunnyvale. In FY 17-18, a revised preliminary concept and study design for the enhanced business inspection project was distributed to Co-permittees and Water Board staff for comment. The Program has addressed those comments and made revisions where necessary. From 2015 onwards, more than 2,000 enhanced business inspections were completed at over 1,400 businesses in Sunnyvale. Of those 2,000 inspections, only 133 were businesses that were inspected more than one time and had higher than a "Low" trash score. Throughout the program, businesses received better grades over time – in particular, fewer "High" trash scores were issued to businesses (more than 25% in 2015, and less than 5% in 2019). The number of follow-up inspections deemed necessary over the same time frame show a similar trend, decreasing 60% in four years. The effectiveness of the follow-up inspections were evaluated by looking at the differences between routine OVTA scores and follow-up OVTA scores. On average, trash scores decreased by one category between routine and follow up inspections. This seems to indicate that the enhanced business inspection and control program is effective at getting non-compliant businesses to adopt better trash BMPs and thereby reduce their trash generation. It is anticipated that the findings from this preliminary study will be documented in late 2020 via a memorandum.

Trash Hot Spot Cleanup and Assessment Guidance (C.10.c)

Provision C.10.c.i of the MRP requires Permittees to clean up trash hot spots to a level of "no visual impact" at least one time per year for the term of the permit. To assist Co-permittees in meeting this requirement, Program staff developed a guidance memorandum, Trash Hot Spot Cleanup Data Collection Form and Trash Hot Spot Activity Reports to report trash hot spot assessment and cleanup activities conducted during FY 19-20. Trash Hot Spot Activity Reports for individual Co-permittees are included in Co-permittee Annual Reports (see Section C.10.c).

During FY 19-20, Co-permittees continued annual cleanups required by the MRP. A total of 93 trash hot spot assessments and cleanups were conducted within the Program's jurisdiction this year, in which approximately 580 cubic yards of trash were removed.[2] The timing of annual assessments and cleanups varies between hot spots due to the locations, potential for natural resource impacts, crew availability, and other site-specific factors (e.g., safety).

[2]Only hot spot cleanups and assessments conducted in compliance with MRP provision C.10.c are included in the numbers presented in this paragraph. Many SCVURPPP member agencies conduct cleanups at trash hot spots more frequently, and/or at more sites than the MRP requires. See Section 10, C.10.e.i of Co-permittee Annual Reports for additional information.

Identification of Trash Generating Areas >10,000 ft^2 Directly Connected to MS4s

Provision C.10.a.ii. (b) required that Permittees identify land areas that are greater than 10,000 ft^2, have very high, high, or moderate baseline levels of trash generation, and have a direct connection to an MS4 by July 1, 2018. Additionally, the trash control status of these areas must also be determined. The Permit also requires that these areas are equipped with full trash capture systems or managed with equivalent trash discharge control actions.

In FY 17-18, the Program started a project to assist member agencies in identifying land areas applicable to this provision and their trash control status. The project resulted in the identification of over 12,500 acres of land (including rooftops) that drain to storm drain inlets located on land areas >10,000 ft^2 that are directly connected to Co-permittee MS4s. Results of the virtual OVTAs are presented in the Program's FY 17-18 Annual Report. Maps that illustrate the land areas and trash control status for each SCVURPPP Co-permittee can be found at http://scvurppp.org/trash-maps/ .

The results presented in the Program's FY 17-18 Annual Report were preliminary since they were primarily based on desktop, rather than field based OVTAs. In FY 18-19, Co-permittees began conducting field based OVTAs on these land areas to validate the current trash control status. The results of the area based OVTAs were used by Co-permittees in FY 19-20 to either revise baseline trash generation maps or demonstrate progress toward MRP trash load reduction goals. The most recent version of each SCVURPPP Co-permittee baseline trash generation map can be found at http://scvurppp.org/trash-maps/. This link was also was provided in each FY 19-20 Co-permittee Annual Report- Section 10.

Coordination of SCVURPPP Trash Ad hoc Task Group Meetings

The Program's Trash Ad Hoc Task Group (Trash AHTG) met a total of seven (7) times during FY 19-20 to discuss the following: 1) MRP 2.0 Section C.10 – Trash Load Reduction; 2) MRP 3.0 Discussions with Water Board Staff on Provision C.10; 3) FY 18-19 Annual Reporting for Provision C.10; 4) FY 19-20 Annual Report format for Provision C.10; 5) Trash BMP Performance Standard Development; 6) On-land Visual Trash Assessments; 7) SCBWMI Zero Litter Initiative; 8) Receiving Water Trash Monitoring; 9) Opportunities for Collaboration with Caltrans; and 10) Co-permittee Full Trash Capture Systems Installations. Program staff coordinated all AHTG meetings.

During FY 20-21, the Trash AHTG plans to continue to meet monthly to discuss Section C.10 – Trash Load Reduction requirements, On-land Visual Trash Assessments, Trash BMP Performance Standard Development, Receiving Water Trash Monitoring, and other permit-related requirements.

Participation in SCBWMI Zero Litter Initiative

The SCBWMI Zero Litter Initiative (ZLI) is a self-organized group of agencies that are impacted by litter issues or have an interest in reducing litter in Santa Clara County. The ZLI was formed in 2009 as an outgrowth of the Santa Clara Basin Watershed Management Initiative's Trash Subgroup. The ZLI includes representatives from the Cities of Palo Alto, San José, Sunnyvale, and Cupertino, West Valley Communities (the Cities of Campbell, Monte Sereno and Saratoga and the Town of Los Gatos), the Program, Santa Clara Valley Water District (Valley Water), non-governmental organizations (e.g., CLEAN South Bay, franchised waste haulers), and other interested parties and agencies (e.g., VTA).

In 2018 and 2019, ZLI Steering Committee members attended meetings with Caltrans District 4 staff to discuss future coordination on litter issues in the Santa Clara Valley. Topics discussed at the meetings

included homeless encampment response efforts, littering enforcement by the California Highway Patrol (CHP), litter messaging on Caltrans message boards, and other public education and outreach activities. On March 30, 2020, the ZLI Steering Committee coordinated a virtual meeting, the Stormwater Trash Management Coordination Roundtable - Municipal & Transportation Agencies, with SCVURPPP Co-permittees, Caltrans, Caltrain and Valley Transportation Agency (VTA) staff to coordinate efforts and resources related to trash capture device installation, illegal dumping and homeless encampments in the Valley. Participants asked questions and suggested future collaboration on potential multi-benefit projects are intended to assist with achieving trash reduction goals outlined in the MRP, Phase II and Caltrans stormwater permits. The presentations and other materials are posted on the ZLI webpage at: http://www.scbwmi.org/webinars.htm.

SCVURPPP also began the collection, compilation and interpretation of trash cleanup data collected by volunteers during California Coastal Cleanup Day and National River Cleanup events. Program staff worked with Valley Water to compile data from 2007-2019. Data were evaluated and used to develop a repository for cleanup data and a fact sheet on the benefits of these cleanups. The fact sheet and data management system were completed in FY 19-20. The fact sheet is posted on the SCVURPPP website at https://scvurppp.org/2020/04/13/volunteer-creek-cleanups-in-santa-clara-county/.

In FY 2019-20 the ZLI continued to focus on the reduction of single use foodware and specifically plastic litter. The efforts have included material reduction and harm-mitigation strategies that municipalities can take through policy and waste hauler partnerships. The ZLI coordinates with Bay Area partners who are working on similar issues such as the Regional Reusables Campaign, from the non-profit organization Upstream, and work with restaurants by Rethink Disposables, a campaign from the non-profit Clean Water Action. The ZLI also supports to the Santa Clara County Recycling and Waste Reduction Commission, its Technical Advisory Committee and the Foodware Policy Work Group focusing on the development of a model foodware and litter reduction ordinance for municipalities in the Santa Clara Valley and beyond. The ZLI has coordinated with similar efforts organized in San Mateo County by the Litter Work Group, part of the countywide stormwater program.

■ Regional Activities

BASMAA Final Receiving Water Trash Monitoring Report (C.10.b.v)

Provision C.10.b.v of MRP 2.0, issued by the San Francisco Bay Regional Water Quality Control Board (Water Board) to 76 cities, counties and flood control districts in the SF Bay Area, requires public agencies to develop, submit and test a Receiving Water Trash Monitoring Program Plan (Trash Monitoring Plan).

In July 2017, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted the first iteration of the Trash Monitoring Plan to Water Board staff for review and comment. The Final Trash Monitoring Plan that addressed all comments was submitted to the SF Bay Water Board staff in October 2017 (BASMAA 2017). Implementation of the Trash Monitoring Plan represents the “pilot-testing phase” of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were applied during the MRP 2.0-specified timeframe of October 2017 to July 2020.

The MRP requires that the results of the testing phase of the Trash Monitoring Plan be submitted to the Water Board as a Final Report by July 1, 2020. The Final Report provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020.

Monitoring Plan objectives and scientific monitoring questions outlined in the Trash Monitoring Plan were used to guide the evaluation of trash monitoring and assessment data results presented in the Final Report.

Monitoring Questions

1. Are significantly strong correlations observed between qualitative and quantitative methods?
2. What is the current level of trash deposited in flowing waterbodies in the entire MRP area?
3. What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
4. Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
5. What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
6. Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

The Trash Monitoring Plan primarily focuses on two types of monitoring designs: 1) probabilistic (randomly) selected monitoring sites that are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area; and 2) targeted sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. The design also includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Two trash assessment tools were developed and applied for the pilot testing phase of the Trash Monitoring Plan. Qualitative trash assessments are visual surveys of trash levels (i.e., conditions). Trained personnel assign a trash condition score from 1 to 12 (12 being the most trash) to a site based on the level of trash that is observed both within the water body and along its banks or shoreline within a defined assessment area. Quantitative trash monitoring entails removing, sorting and measuring the volume of trash that is found within the assessment area at a targeted site. Both quantitative trash monitoring methods and the qualitative assessment methods were used at targeted sites to allow for the comparison of qualitative and quantitative approaches.

A total of 125 urban creek, channel and riverine probabilistic sites throughout the MRP Area were qualitatively assessed for trash. A total of 625 qualitative trash assessments were conducted over five sampling events (three during wet season and two during dry season) between October 2017 and March 2020. A total of 100 targeted sites were selected for both qualitative and quantitative trash assessments. A total of 200 trash assessments were conducted over two sampling events at targeted sites. Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara and San Mateo Counties.

Key Findings

1. Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both regional and countywide scale. The visual assessment tool is recommended as a valid approach to assess conditions when using volume of trash as the indicator for trash conditions.

2. Regionwide, approximately 77% of the urban stream lengths in the MRP Area exhibit low to moderate levels of trash.
3. Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
4. Seasonality appears to have no effect on trash levels observed/measured at receiving water sites. Trash levels were highly similar between the dry and wet seasons. Storm intensity and frequency did not appear to have an influence on trash levels observed during the wet season.
5. Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with largest proportion of trash observed.

An evaluation of methods and monitoring design used during the pilot-testing phase of the Trash Monitoring Plan is provided in the report. This evaluation provides guidance for potential revisions to methods that may be used to monitor trash in receiving waters.

Participation in BASMAA Trash Subcommittee

The BASMAA Trash Subcommittee was formed in FY 09-10 to provide a forum to discuss trash-related activities, projects and issues that have regional applicability. It meets bimonthly, as needed. A Valley Water staff member currently serves as the Vice Chair of the Subcommittee and Program and Co-permittee staff attend the meetings. Subcommittee agendas in FY 19-20 included the following topics: 1) MRP 2.0 Section C.10 – trash load reduction requirements; 2) FY 18-19 Annual Report format for Provision C.10; 3) BASMAA Receiving Water Trash Monitoring Plan Reporting; 4) Implementation of trash control measures on land areas draining directly to Co-permittee MS4s; 5) Discussions with Water Board staff on trash load reduction and MRP 3.0 informational items; 6) Opportunities for collaboration with Caltrans; 7) Asset management tracking for full trash capture systems; and 8) SIP Order and COVID-19 impacts on Provision C.10 activities. The Subcommittee plans to continue meeting in FY 20-21 on a bimonthly basis and coordinate on regionally applicable projects and requirements.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 11

Mercury and PCBs Controls

September 30, 2020

Section 11 Mercury and PCBs Controls

Introduction

Provisions C.11 (Mercury Controls) and C.12 (Polychlorinated Biphenyl Controls) of the MRP require Co-permittees to implement control programs to reduce the stormwater impacts of these pollutants on the Bay. The Water Board has previously determined that the water quality objectives and associated beneficial uses of the Bay are impacted as a result of stormwater (and other) discharges of these legacy pollutants. The Water Board adopted water quality attainment strategies called Total Maximum Daily Loads (TMDLs), which assign load reductions (through waste load allocations) to Bay Area municipal stormwater programs that have to be addressed within 20 years of the adoption of the TMDLs.

The MRP requires that Co-permittees must demonstrate attainment of interim PCBs and mercury performance criteria (i.e., load reductions) during the term of the MRP. Load reductions can be demonstrated at the regional, countywide, or Co-permittee level. If choosing to report at the countywide level, SCVURPPP Co-permittees must collectively demonstrate the following pollutant reductions:

- **Mercury:**
  - June 30, 2020 - 16 grams per year (g/yr) via the implementation of Green Stormwater Infrastructure (GSI);
- **PCBs:**
  - June 30, 2018 – 160 g/yr via all control measures
  - June 30, 2020 - 37 g/yr via the implementation of GSI;
  - June 30, 2020 – 940 g/yr via all control measures

Control measures that Co-permittees may use to address these load reduction requirements and the methodologies that may be used to calculate load reductions are described in the *Interim Accounting Methodology for TMDL Loads Reduced*[1]*,* which was approved by the Water Board's Executive Officer in 2016.

In addition to implementing control measures to achieve PCBs and mercury load reductions during the permit term, the MRP also requires Co-permittees to do the following:

- **MRP 2.0 Control Measures Plan** - Develop, submit, and maintain a PCBs and Mercury Control Measures Plan that includes a list of watershed management areas and the locations and types of control measures implemented to-date and planned for implementation over the term of the permit and demonstrates attainment of MRP 2.0 load reductions (C.11/12.a);
- **Load Reduction Accounting Method** - Develop, document, and implement an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of control measures (C.11/12.b);

[1] Bay Area Stormwater Management Agencies Association (BASMAA) 2017. Interim Accounting Methodology for TMDL Loads Reduced. Version 1.0. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc. September 19 2016.

- **RAA for GSI** - Conduct a reasonable assurance analysis (RAA) to demonstrate quantitatively that PCBs and mercury load reductions will occur through GSI implementation (C.11/12.c);
- **Quantitative Relationship Between GSI and Load Reductions** - Report on the quantitative relationship between GSI and PCBs and mercury load reductions (C.11/12.c);
- **Longer-term GSI Reductions Analysis** - Develop and report on the estimated amount and characteristics of land area that will be treated through GSI by 2020, 2030, and 2040 (C.11/12.c);
- **TMDL Control Measure Implementation Plan and RAA** - Prepare and submit a plan and schedule for PCBs and mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain PCBs and Mercury TMDL wasteload allocations (C.11/12.d);
- **PCBs in Storm Drain Infrastructure Evaluation** - Evaluate the presence of PCBs in caulks/sealants used in storm drain or roadway infrastructure (C.12.e);
- **Managing PCBs during Building Demolition** - Manage PCB-containing materials and wastes during building demolition activities (C.12.f);
- **Fate and Transport of PCBs** - Conduct studies to evaluate the fate and transport of PCBs from urban runoff to the Bay margins (C.12.g); and
- **Risk Reduction Program** - Continue to implement a risk reduction program for PCBs and mercury (C.11.3/C.12.h).

With assistance from the Program, Co-permittees have continued to successfully address PCBs and mercury requirements described in the MRP and TMDL wasteload allocations. In FY 19-20, MRP requirements were addressed directly by Co-permittees, at a countywide level via SCVURPPP, and at a regional level via BASMAA. The status of activities conducted at the Co-permittee, Program (SCVURPPP) and regional (BASMAA) levels to-date to address these requirements are described in this section. PCBs and mercury requirements are written identically in the permit due to the similarities in the sediment-associated and legacy nature of their occurrence. Therefore descriptions of the activities conducted in compliance with these requirements are grouped in single section of this report. References to the applicable MRP provisions are included under each summary of the activity.

■ ■ PCBs and Mercury Control Measure Implementation

This section provides summaries of PCBs and mercury control measures implemented during the permit term consistent with MRP provisions C.11 and C.12. Full detail on these control measures and the associated load reductions are fully documented in the *Stormwater Control Measure Plan for PCBs and Mercury in the Santa Clara Valley – Version 4.0 (2016-2020)*, which was included as Appendix 11-1 of the Program's FY 18-19 Annual Report. The information provided in Version 4.0 of the Control Measures Plan (Version 4.0 Plan) was submitted by SCVURPPP (on behalf of all SCVURPPP Co-permittees). The Version 4.0 Plan provides documentation of all current and planned control measures in the Santa Clara Valley through the end of the permit term. The Version 4.0 Plan included the following information in compliance with MRP provision C.11/12.a and C.11/12.b.iii(2):

- The list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit, along with the specific control measures currently being implemented and those that will be implemented in these watersheds and management areas, and an implementation schedule (C.12.a.ii(3)) for these control measures.

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- The number, type, and locations and/or frequency (if applicable) of control measures.
- A cumulative listing of all sites that are potentially contaminated with PCBs that Co-permittees have discovered and referred to the Water Board to-date, with a brief summary description of each site and where to obtain further information.
- The description, scope, and start date of PCBs control measures.
- For each structural control and non-structural best management practice (BMP), interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement.
- Clear statements of the roles and responsibilities of each participating Co-permittee for implementation of pollution prevention or control measures
- PCBs and mercury loads reduced using the Water Board approved *Interim Accounting Methodology for TMDL Loads Reduced* and supporting data and information necessary to substantiate the load reduction estimates.

This section summarizes and updates (as needed) the information provided in the Version 4.0 Plan on control measure implementation during MRP 2.0. The Version 4.0 Plan provides all supporting data and information necessary to substantiate load reduction estimates presented later in this section in order to demonstrate achievement of load reductions consistent with MRP 2.0 load reduction requirements.

Source Property Identification and Abatement

PCBs and mercury source properties are those that disproportionately contribute pollutants to Co-permittee stormwater conveyance systems. Identification and subsequent abatement of these properties and/or focused control measure implementation in the public right-of-way (ROW) around source properties to reduce pollutant release can provide an opportunity for meaningful PCBs and mercury stormwater load reductions. Source property investigations typically include the following tasks:

1. Project Planning and Management;
2. Property Records and Aerial Photography Review;
3. Public Right-of-Way (ROW) Surveys and Property Site Visits;
4. Public ROW and Private Property Soil/Sediment or Stormwater Sampling; and
5. Reporting and Planning/Identifying Control Measures (including referrals to regulatory agencies).

In recent years, a number of source property investigations have been conducted in the Santa Clara Valley by SCVURPPP in an effort to identify PCBs and mercury source properties. These include projects conducted via the Clean Watersheds for a Clean Bay (CW4CB) project during the previous MRP, as well as all new efforts under the current MRP. These investigations have resulted in three source property referrals submitted to the Regional Water Board by Co-permittees during MRP 2.0 to date (Table 11-1). A description and status update on the source property referrals submitted to date, and descriptions of all source investigations (completed and ongoing) that have been conducted during the current permit term are presented below.

Source Property Referrals Submitted During MRP 2.0

Table 11-1 provides a current listing of all of the source properties that have been identified in the Santa Clara Valley and referred to the Regional Water Board during the permit term. In total, 3 source properties comprising 91.25 acres have been referred to the Regional Water Board for abatement. This list will continue to be updated in future annual reports as additional source properties are referred and abated. Additional information on the status of these source property referrals is provided below.

Table 11-1. List of PCBs source properties identified in the Santa Clara Valley that have been referred to the Regional Water Board by MRP Co-permittees.

Co-Permittee	Site Name	Location/APN	Type of Source Property	Referral Date	Abatement Date	Area (Acres)
San José	Union Pacific Railroad	Leo Avenue Cul-de-Sac Railroad Right-Of-Way, San José	Referral	FY 15-16	TBD	5.00
Sunnyvale	Westinghouse Electric Federal Superfund	401 East Hendy Ave, Sunnyvale; APNs: 204-47-001, 204-47-002, 204-48-028, 204-46-008	Referral	FY 17-18	TBD	74.00
Santa Clara	Brokaw Road Property	335 Brokaw Road, Santa Clara	Referral	FY 18-19	TBD	12.25
					TOTAL ACRES	**91.25**

<u>Leo Avenue Source Property Referral (WMA 083CTC990 -San José)</u>

During the previous MRP, SCVURPPP Co-permittees, in coordination with the CW4CB project, began a source investigation in WMA 083CTC990 (i.e., the Leo Avenue watershed) located in an older industrial area of San José. The investigation provided evidence that high concentrations of PCBs originating from the Union Pacific Railroad (UPRR) track ROW were entering the City's stormwater system. This evidence resulted in the City of San José, in collaboration with the Program, referring the UPRR parcel to the Regional Water Board for follow-up investigation and abatement. The final project report and referral was included in the Program's FY 14-15 Annual Report. In an effort to reduce the on-going contribution of PCBs-containing sediment to the City's stormwater conveyance system that originates from the UPRR ROW, pending property abatement, three enhanced operation and maintenance measures have been implemented on Leo Avenue. First, as an interim measure, the City of San José required property owners along Leo Avenue to conduct weekly street sweeping on the Leo Avenue cul-de-sac. Second, UPRR installed a chain link fence along their ROW to reduce vehicle access and avoid the tracking of sediment from the railroad ROW to the street. Lastly, the City installed a large Hydrodynamic Separator (HDS) unit in the stormwater conveyance system directly downstream of Leo Avenue that receives and treats runoff from the entire Leo Avenue cul-de-sac and adjacent properties.

In August 2016 the Regional Water Board issued a request for monitoring data to UPRR based on the information provided by the City and the Program in their September 2015 referral. The request was issued under California Water Code section 13267 and required UPRR to develop, submit and implement a Sampling and Analysis Plan (SAP) that would effectively characterize PCBs concentrations in sediment on the railroad ROW and in the public ROW adjacent to the rail line. The City and the Program provided

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comments on the proposed SAP and sampling was conducted in FY 16-17. UPRR reported the sampling results to the Regional Water Board in September 2017. PCBs concentrations on the railroad property were as high as 127 mg/kg.

Following review of the sampling report by both the City of San José and Program staff, the Regional Water Board directed Union Pacific to prepare a work plan to stabilize the soil on-site and prevent off-site transport. In February 2018, following evaluation of the flow patterns on-site, UPRR installed filter rolls secured to the chain link fence along the ROW, and agreed to evaluate the effectiveness during subsequent rain events. In March 2018, Regional Water Board and U.S. Environmental Protection Agency (USEPA) staff continued discussions with UPRR representatives about requirements for additional soil stabilization at the site. In early FY 18-19, UPRR submitted a "Removal Action Work Plan" to USEPA and Regional Water Board staff for review, which was subsequently forwarded to City and Program staff. The "Removal Action Work Plan" provided details on the actions UPRR planned to take to conduct the cleanup and soil stabilization work at the Leo Avenue location. Comments on the UPRR work plan and input on additional action items were provided to the Regional Water Board by City and Program staff, and USEPA. After the work plan had been finalized, UPRR was expected to commence cleanup and soil stabilization actions at the site during FY 19-20. However, these efforts have been delayed because UPPR is currently trying to identify other responsible parties.

Both the City and the Program will continue to follow up with the Regional Water Board for status updates and next steps for this source property during FY 20-21.

East Hendy Avenue Source Property Referral (WMA 049SVE900 - Sunnyvale)

Elevated concentrations of PCBs in sediments and stormwater collected adjacent to and downstream of a property located in the Sunnyvale East Channel watershed in the City of Sunnyvale have been observed during recent monitoring investigations. Between 2011 and 2014, the San Francisco Bay Regional Monitoring Program (RMP) collected 45 stormwater samples in the Sunnyvale East Channel located downstream of the property. The PCBs in these samples averaged 97 ng/L, with the highest recorded at 980 ng/L. Based on a preliminary analysis conducted by the Program, the PCBs in these samples appear to have originated from the 74-acre former Westinghouse property located at 401 East Hendy Avenue. This property has a history of PCBs-related contamination in soils and groundwater on the site and is currently a Superfund site overseen by USEPA. As recently as FY 15-16, the Program measured multiple sediment concentrations above 1 ppm in the MS4 adjacent to the property.

The preliminary data analysis was forwarded to USEPA in FY 16-17. Based on the results, the City of Sunnyvale and Program staff engaged in discussions with USEPA in FY 16-17 during the reissuance of a Consent Order between USEPA and the site owner (CAD001864081) to attempt to incorporate follow up actions into the Order. In response, USEPA requested that the property owner develop a SAP to characterize PCBs in stormwater being discharged from the site. The City and the Program, at the request of USEPA, reviewed and provided comments on the proposed SAP in FY 16-17. Five stormwater sampling events were conducted by the property owner at multiple locations on and adjacent to the property, including two events during the 2016-2017 wet weather season and three events during the 2017-2018 wet weather season. The PCBs concentrations of the stormwater samples ranged from 13 ng/L to 2,330 ng/L. Seven samples had some of the highest PCBs concentrations observed in stormwater in the Bay Area to-date. These data confirmed that the property was a source of PCBs to the City's stormwater system and the Bay. In January 2018, the City of Sunnyvale, in collaboration with the Program, submitted a referral of this property to both the Regional Water Board and USEPA for follow-

up investigation and abatement. The property is currently owned by Northrop Grumman Systems Corporation (Northrop Grumman).

Based on information provided to-date, Northrop Grumman has implemented or plans to implement, under the oversight of USEPA, a number of actions to reduce PCBs in stormwater from the property and reduce PCBs-laden sediment in the adjacent public ROW. These actions include the following:

- Fit storm drain inlets with gravel bags, filtrexx-type socks with gravel bag anchors, or geotech filter fabric to capture PCBs-laden sediment before it leaves the site, and inspect these inlets prior to the rainy season to remove accumulated sediments;
- Install fiber rolls near the facility boundary along Fair Oaks Avenue and California Avenue to slow the flow of stormwater off-site;
- Cover unpaved areas around the property with gravel to reduce erosion;
- Remove sediment from the valley gutter next to building 41;
- Inspect areas around drains before forecasted rain events to verify BMPs are in place and functioning; repair or replace BMPs if not functioning;
- Conduct weekly sweeping of all accessible areas of the property;
- Conduct intensive area sweeping with a HEPA filter vacuum throughout the property twice each year; and
- Conduct biweekly street sweeping in the public streets adjacent to the property to supplement the current biweekly sweeping conducted by the City of Sunnyvale.

In addition, Northrup Grumman conducted a survey of buried storm drain pipelines to confirm locations and connections, evaluate the integrity of the storm drainpipe, and identify accumulated sediment. Pipe locations and facility drawings will be updated accordingly. Pipelines requiring maintenance will be addressed by jetting out and capturing accumulated sediment and replacing selected storm drain piping. Completion of this work will support the overall evaluation of PCBs sources on the property that have a potential to impact stormwater and work toward the abatement of stormwater leaving the site.

Beginning in 2018, PCBs were added to the stormwater discharge monitoring requirements at this site that are associated with the Industrial General Permit and Site Stormwater Pollution Prevent Plan (SWPPP). This additional monitoring, which began in the 2018-2019 wet season, includes the collection and PCBs analysis of stormwater samples from three on-site locations annually to monitor the effectiveness of BMP implementation. Northrup Grumman provides an annual summary report to USEPA documenting the monitoring conducted and the effectiveness current BMPs and the need for new BMPs if samples have PCBs detection. Sample results are uploaded annually to the State Water Resources Control Board Stormwater Multiple Application and Report Tracking System (SMARTS). To date, samples collected in 2018-2019 and 2019-2020 have been lower than samples collected previously, with PCBs concentrations ranging from non-detects up to 65 ng/L. These PCBs concentrations are lower than the concentrations in samples collected prior to BMP implementation. Note, the reporting limit of ~95 ng/L for EPA Method 8082 that were identified in the most recent sampling report submitted to USEPA[2] are relatively high compared with more sensitive analytical

[2] Geosyntec Consultants. 2020. Westinghouse Electric Corporation Superfund Site PCBs and Stormwater – Update. Memorandum prepared by Geosyntec Consultants for Northrop Grumman and sent to Mark Samolis at USEPA on July 22, 2020.

methods that are typically used by SCVURPPP and the RMP for PCBs in stormwater (EPA Method 1668).

The City and Program will continue to coordinate with USEPA throughout the property abatement process and identify additional next steps as needed.

Brokaw Road Source Property Referral (WMA 066GAC150 – Santa Clara)
In WY 2015, the Program began a source investigation of WMA 066GAC150, which drains into the Guadalupe River on the eastern side of the Airport in the City of Santa Clara. Sampling conducted in 2016 documented elevated levels of PCBs in sediment collected from the storm drain manhole on Brokaw Road where a private lateral from the 12.5-acre property at 335 Brokaw Road connects to the main storm drain line. In WY 2017, another sediment sample with elevated PCBs was collected from this same manhole This time, however, the sample was collected exclusively from sediment that was contained inside the private lateral that drains the parcel, at the intersection with the public system. This sample contained PCBs concentrations of 3.81 mg/Kg, substantially above SCVURPPP's threshold for identifying a PCBs source property (> 1 mg/kg). The private lateral appears to drain the southern portion of the parcel, which is the same area where the former FPE building site, active transformers, and associated PCBs contamination were located. The monitoring data clearly demonstrate that elevated concentrations of PCBs continue to migrate from the underground drainage system on this property to the City's MS4.

The site of the 335 Brokaw Road property was used for agricultural purposes prior to its industrial development in 1950 by Federal Pacific Electric (FPE). FPE manufactured electrical utility components on the property during the 1950's and 1960's. Transformers were assembled, filled, and then stored onsite. In 1968, FMC Corporation purchased this parcel along with a number of adjacent parcels that then comprised the 100-acre FMC property. Activities at FMC included manufacturing various products, such as military equipment. The two active transformers that supplied energy to FPE, and subsequently to FMC manufacturing processes, were removed in 1985. Previous site assessments reported on Geotracker indicate that past PCBs cleanup efforts have occurred on this property, with PCBs in surface oil samples as high as 15,000 mg/kg. The soil cleanup level for PCB-contaminated soils at the site was 10 mg/kg, well above the threshold for potential PCBs impacts on water quality. Both the WY 2015 and WY 2017 sediment samples collected by the Program had PCBs homolog profiles with a dominant hexa-chloro group, similar to Aroclor 1260 (SCVURPPP 2018). The main uses of Aroclor 1260 included transformers and hydraulic fluids, both which could have been used in electrical equipment manufactured by FPE at the site during the 1950's and 1960's.

The PCBs concentration data from the recent SCVURPPP investigations, in conjunction with the site history, demonstrate that the property at 335 Brokaw Road continues to be a source of PCBs to the City's MS4. A referral for the 12.5 acre property at 335 Brokaw Road in Santa Clara was submitted to the Regional Water Board in FY 19-20. As part of that referral, the City of Santa Clara committed to conduct enhanced O&M in the public ROW adjacent to the property. As a first step, on April 23, 2020 the City of Santa Clara performed a video survey of the main storm drain line on Brokaw Road to provide information on the location and quantity of historically deposited sediment in the line. On April 28, 2020, the City of Santa Clara conducted a cleanout of the storm drain line adjacent to the property at 335 Brokaw Road to remove any historically deposited sediment in the line. During the cleanout, the City flushed the public storm drain line in front of the property on Brokaw Road, and collected the wash water at the downstream manhole at the western boundary of the property on Brokaw Road. The wash water was decanted and sent to the sanitary sewer. The residual solids were taken to the City's corporation yard for appropriate disposal.

As of the end of FY 19-20, the Regional Water Board has not initiated any follow-up action based on this source property referral. Both the City and the Program will continue to follow up with the Regional Water Board for status updates and next steps for this source property during FY 20-21.

Source Investigations Conducted during MRP 2.0

In FY 15-16, the Program conducted a comprehensive desktop screening and monitoring project that identified 139 stormwater catchments as WMAs of high interest for mercury and PCBs[3]. Sediment and water monitoring conducted by the Program (in collaboration with the BASMAA Regional Monitoring Coalition) identified stormwater catchments with elevated concentrations of PCBs or mercury. Based on these results, the Program initially targeted seven catchments with the highest PCBs concentrations for source property investigations beginning in FY 16-17. Four of the seven WMAs were located in the City of San José (WMAs 051CTC275, 051CTC400, 067SCL080 and 083GAC900), two were in the City of Santa Clara (WMAs 050GAC400 and 066GAC150) and one was in the City of Palo Alto (WMA 001SFC100). Four additional catchments were targeted for source investigations starting in FY 18-19. Three of the WMAs were located in the City of San José (WMAs 067CTC250, 067SCL120 and 050GAC020) and one was in the City of Palo Alto (WMAs 031SCH250). The geographical extent and land uses associated with each of these eleven WMAs are presented in Table 11-2.

Table 11-2. Eleven Watershed Management Areas (WMAs) in the Santa Clara Valley where PCBs/Mercury source investigations were conducted between FY 16-17 through FY 19-20.

WMA	Co-permittee	Associated Water Body	Total Acres	% Old Ind	% Old Ind Redeveloped	% Old Urban	% New Urban	% Open Space/Other
051CTC275	San José	Coyote Creek	443.0	52%	4%	22%	15%	7%
051CTC400	San José	Coyote Creek	140.0	57%	10%	31%	0%	2%
067SCL080	San José	Lower Silver Creek	42.2	56%	23%	20%	0%	1%
083GAC900	San José	Guadalupe River	610.8	18%	16%	38%	0%	28%
050GAC400	Santa Clara	Guadalupe River	718.1	34%	8%	58%	0%	0%
066GAC150	Santa Clara	Guadalupe River	499.6	13%	14%	57%	0%	17%
001SFC100	Palo Alto	San Francisquito Creek	35.9	3%	5%	92%	0%	0%
031SCH250	Palo Alto	Matadero Creek via Stanford Channel	41.8	31%	7%	14%	48%	0%
067CTC250	San José	Coyote Creek	41.2	62%	0%	24%	14%	0%
067SCL120	San José	Lower Silver Creek	40.3	38%	8%	12%	41%	1%
050GAC020	San José	Guadalupe River	842.8	35%	1%	10%	45%	9%

[3] The process used to identify WMAs and next steps were described in the Program's *Progress Report: Identifying Watershed Management Areas for PCBs and Mercury,* which was submitted to the Regional Water Board by the Program on behalf of Co-permittees in March 2016. The progress report was submitted in compliance with provisions C.11.a.iii / C.12.a.iii of MRP 2.0.

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In FY 17-18, the Program completed initial investigations and prepared a report describing the results for WMAs 051CTC275, 051CTC400, 067SCL080, 083GAC900, 050GAC400, 066GAC150 and 001SFC100 (i.e., the seven WMA investigations that were started in FY 16-17). The report was submitted in the Program's FY 17-18 Annual Report. That report includes a description of the investigation that identified the 335 Brokaw Road source property that was referred to the Regional Water Board as described above. However, in a number of cases, the Program determined that follow-up investigation was needed in these WMAs to confirm additional source properties. These follow-up investigations continued in FY 18-19 and FY 19-20, along with the continuing investigations into the remaining WMAs identified in Table 11-2 (i.e., WMAs 067CTC250, 067SCL120, 050GAC020 and 031SCH250).

The investigation process and sampling results for all of the targeted source property investigations conducted during MRP 2.0 are summarized here. For each of the investigations conducted in the WMAs identified in Table 11-2, the Program collected information on all parcels that were industrialized prior to 1980 (i.e., old industrial). For each of these parcels, the Program then conducted records and aerial photography review, to further categorize the parcels of interest, followed by public ROW surveys. Program staff, accompanied by municipal inspectors, conducted site visits at businesses categorized as high-interest. Information gathered from these efforts was used to identify properties for follow-up sampling. Between FY 17-18 and FY 19-20, the Program collected 148 soil, sediment, or storm drain material samples on or adjacent to high-interest properties in the eleven WMAs identified in Table 11-2. PCBs concentrations in these samples ranged from 0.003 to 12 mg/kg (dry weight). Total mercury concentrations ranged from 0.004 to 9.9 mg/kg (dry weight). A total of 31 samples had elevated PCBs concentrations ≥ 0.2 mg/kg and 20 samples had elevated total mercury concentrations ≥ 0.3 mg/kg. Based on these results, SCVURPPP identified 18 potential PCBs source properties, seven of which also had elevated mercury concentrations. Table 11-3 identifies the potential PCBs source properties and other high-interest properties that are currently under evaluation to determine if any of these properties can be confirmed as sources and referred to the Regional Water Board. The Program will continue to review all of the information gathered to date during the source property investigations and follow-up described above and expects to complete a final report with the findings during the next fiscal year.

Table 11-3. Potential Source Properties and/or Properties of Interest that are currently under evaluation for next steps based on source investigations in the Santa Clara Valley during MRP 2.0.

Co-permittee	Associated Water Body	Site Name or Current Business	Location/APN	Area (Acres)	Status
Santa Clara	Guadalupe River	Industrial Park	280 Martin Ave., APN: 23005058	1.97	Under Evaluation
San José	Coyote Creek	Z-Con Specialty Group	1645 Old Bayshore Hwy., APN: 23727033	0.24	Under Evaluation
San José	Guadalupe River	P-S industrial Park	1755-1815 Monterey Rd., APNs: 45503003,45503004, 45503005, 45503006, 45503008, 45503009, 45503010, 45504003, 45504004	12.97	Under Evaluation
San José	Guadalupe River	Xstrata Recycling	1695 Monterey Rd., APN: 45502042	2.72	Under Evaluation
San José	Coyote Creek	Tung Tai Group	1726 Rogers Ave, APN: 23709128	1.35	Under Evaluation
San José	Coyote Creek	Union Pacific Railroad	Rail Crossing Schallenberger Rd, APN: 23714090	3.23	Under Evaluation
San José	Lower Silver Creek	TransPak	520 Marburg Way, APNs: 25403046, 25403010	13.7	Under Evaluation
San José	Guadalupe River	SIMs Metal	1800 Monterey Rd., APNs: 47724041, 47724042, 47724043	3.65	Under Evaluation
San José	Coyote Creek	Industrial Park	701 Kings Row Lane A, APN: 237300009	4.03	Under Evaluation
San José	Coyote Creek	Alco Metal	1788 Rogers Ave, APN: 23709133	1.86	Under Evaluation
Palo Alto	Matadero Creek via Stanford Channel	Medical Device Manufacturer	1300 Hansen, APN: 142200093	14.56	Further investigation
Santa Clara	Guadalupe River	Com/Industrial Park - Former Monsanto cleanup site	1135 Walsh Avenue, APN: 22456001	15.51	Further investigation
Santa Clara	Guadalupe River	Electrical Utility Substation	960 Central Expressway, APN:22408149	0.38	Further investigation
San José	Coyote Creek	Pallet Recycler	1259 Yard Ct., APN:25439028, 25439027	4.14	Further investigation
San José	Coyote Creek	Paving Company	1255 Yard Ct., APN: 25417073	3.49	Further investigation
San José	Coyote Creek	Multiple businesses including Plastic extrusion	1750 Rogers Ave., APNs: 23709129, 23709130	4.12	Further investigation
San José	Coyote Creek	Multiple businesses including equipment storage and repair	701 Kings Row, APN: 23730014	9.46	Further investigation
San José	Coyote Creek	Specialty Truck Parts	1605 Industrial Ave., APN: 237300015	5.67	Redeveloped

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New Source Investigations in FY 19-20

In FY 19-20, the Program began new source investigations in six WMAs in the City of Mountain View (WMAs 017SVC500, 032SVC400, 032SVC470, 017PMC600 ,032PMC200, 032PMC100). The impetus for these investigations was based on information discovered about a cleanup site in the City that was slated for redevelopment. The site contained a TCE groundwater plume and significantly elevated PCBs concentrations in soil at depths from 3 to 20 feet, ranging from 1.1 to 3,900 mg/kg. PCB concentrations in four sediment samples collected at 3 feet below the surface were greater than 1.0 mg/kg. Since the initial cleanup targeted groundwater contamination, no surface soils were sampled. The Program initiated new source property investigations in the six WMAs that encompass the groundwater plume. The geographical extent and land uses associated with each priority WMA where new source property investigations were initiated are included in Table 11-4.

Table 11-4. Watershed Management Areas (WMAs) in the Santa Clara Valley where new PCB/Mercury source identification projects began in during FY 19-20.

WMA	Co-permittee	Associated Water Body	Total Acres	% Old Industrial	% Old Urban Commercial	% Old Urban Residential	% New Urban	% Open Space
017SVC500	Mountain View	Stevens Creek	208.5	6.8%	12.9%	16.7%	62.2%	1.4%
032SVC400	Mountain View	Stevens Creek	81.7	28.2%	17.9%	0.0%	51.9%	2.0%
032SVC470	Mountain View	Stevens Creek	71.2	27.1%	38.2%	11.9%	21.8%	1.1%
017PMC600	Mountain View	Permanente Creek	66.3	0.0%	1.5%	0.0%	37.3%	61.4%
032PMC200	Mountain View	Permanente Creek	69.2	29.0%	59.8%	0.7%	10.3%	0.0%
032PMC100	Mountain View	Permanente Creek	31.6	20.9%	13.3%	1.6%	64.6%	0.0%

Next Steps: The following actions will be conducted during FY 20-21:

- The Program will continue to work with the Cities of Palo Alto, Santa Clara and San José to identify appropriate next steps for the potential source properties identified in Table 11-3, which may include submitting referrals to the Regional Water Board for abatement.
- The Program will continue all ongoing source property investigations in the cities of Mountain View, Palo Alto, Santa Clara, and San José. The next steps in these investigations include review and analysis of all information gathered to date, and collection of additional stormwater and/or sediment samples to identify and confirm any source properties.
- The Program will continue to evaluate additional stormwater catchments identified as areas of high interest for PCBs and mercury to identify WMAs in the Santa Clara Valley where new source investigations are warranted.

Regional PCBs Sources - Electrical Utility Equipment

In addition to the site-specific source property investigations described above, the Program also evaluated available information in FY 17-18 on electrical utilities, due to their known use of PCBs.

Electrical utility applications are a particularly challenging potential source of PCBs for Permittees to control because of their quantity, dispersed nature, and general lack of authority over these distributed sources. As a first step towards addressing electrical utility applications as a potential source of PCBs to stormwater, SCVURPPP prepared a report that summarizes Co-permittees' current state of knowledge about electrical utility applications and PCBs titled *Potential Contributions of PCBs to Stormwater from Electrical Utilities in the San Francisco Bay Area*. That report was submitted with the Program's FY 17-18 Annual Report as Appendix 11-2. The report provides an overview of electrical utility applications in the Bay Area, summarizes existing information on the release of PCBs from utility equipment, identifies the information gaps, and recommends preliminary next steps. The report also recommends that because electrical utility equipment is widespread and distributed across multiple jurisdictions, addressing PCBs from this source should be done at the regional level, rather than on a site-by-site basis.

Following up on that recommendation, during FY 18-19 BASMAA developed a work plan for a regional stressor/source identification (SSID) project to further evaluate the extent and magnitude of electrical utilities as a source of PCBs to urban stormwater runoff. In compliance with MRP provision C.8.e, the work plan for conducting the SSID project included in SCVURPPP's *WY 2018 Pollutant of Concern Monitoring Report* that was submitted to the Regional Water Board on March 31, 2019.

The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. As the first step in implementing the work plan, BASMAA submitted a letter to the Regional Water Board late in FY 18-19 requesting assistance in obtaining information from PG&E. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a "13267 letter" to PG&E and is currently considering other options for moving forward with PG&E on this issue.

In response, BASMAA developed a revised approach to the SSID project, which would implement the work plan but with a focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[4] to this revised approach at the BASMAA Monitoring and Pollutants of Concern Meeting held on March 4, 2020. BASMAA then implemented the work plan with the revised approach during the remainder of FY 19-20. The project gathered data from municipally-owned electrical utilities on their current and past inventories of PCBs-containing electrical equipment and current spill response and reporting procedures. These data were used to develop a source control framework that identified improved management and reporting of PCBs-containing equipment removals and spill response. The data were also used to estimate the load reductions that can be achieved through implementing these measures. The final BASMAA project report *PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification Project* is included as an attachment to Appendix 11-1.

Enhanced MS4 Operation and Maintenance Controls

Program-wide, Co-permittees continued to implement enhanced operation and maintenance (O&M) controls in FY 19-20. The Program continued to work with Co-permittees to document the baseline

[4] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 4, 2020

levels of O&M controls conducted in the Santa Clara Valley, and document all enhancements that are ongoing in order to calculate the load reductions associated with enhanced actions. Enhancements include any of the following actions that result in increased sediment removal from MS4 structures:

- Increased cleaning frequencies at inlet-based full trash capture devices;
- Increased street sweeping frequencies;
- Use of improved street sweeper technologies;
- Implementation of enhanced parking controls in areas where street sweeping occurs;
- Street flushing;
- Storm drain line cleanouts;
- Increased stormwater pump station or channel maintenance.

The O&M controls implemented in each WMA in FY 18-19 were described in the Program's Version 4.0 Plan which was submitted as an attachment to the Program's FY 18-19 Annual Report. During FY 19-20, these controls continued as described in the Version 4.0 Plan. In addition, one type of O&M enhancement that was not reported in the Version 4.0 Plan, but is currently implemented throughout the Santa Clara Valley is the installation and subsequent enhanced cleaning frequency of small, inlet-based full trash capture (FTC) devices. The use of FTC devices improves the cleanout efficiency well beyond the improvement achieved through increased cleaning frequency of inlets that do not contain these devices. However, the methodologies to evaluate this enhancement and account for loads reduced were not included in the *Interim Accounting Methodology for TMDL Loads Reduced* that was approved by the Regional Water Board's EO for use during MRP 2.0. Therefore, this type of O&M enhancement is not included in the load reductions reported later in this section to demonstrate compliance with MRP 2.0 requirements.

However, those enhancements are included in the Program's *PCBs and Mercury TMDL Control Measures Implementation Plan and RAA for the Santa Clara Basin* (Appendix 11-1). The Program has continued to participate in an ongoing BASMAA Regional Project to further update and refine the methods and data inputs for POC load reduction accounting for TMDL compliance in the future. That project is described later in this section. The final report for that project, which is included as an attachment to Appendix 11-1, presents methodologies and data inputs that can be used to account for enhanced cleanouts of inlets with small FTC devices.

Green Stormwater Infrastructure Planning, Implementation and Tracking

Provision C.3 of MRP 2.0 contains significant new requirements for green stormwater infrastructure (GSI) planning, early implementation, outreach, tracking and reporting. Additionally, Provisions C.11 and C.12 set targets for mercury and PCBs load reductions specifically for green stormwater infrastructure. To assist Co-permittees with meeting these requirements, Program staff developed a GSI Work Plan for Program activities during FY 19-20 and continued to implement the following tasks, which are more fully described in Section 3 of the Program's Annual Report:

- Guidance materials for Co-permittees, including a GSI Framework Template, model GSI language for incorporation into municipal plans, GSI Project Design Guidelines, Details, and Specifications, an overview of GSI funding options, and a GSI Resource Library; and
- Green stormwater infrastructure outreach and education, including municipal staff training, presentations to individual Co-permittee agencies, and outreach to elected officials and the

public.

In FY 15-16, the Program initiated a process to track and report on a countywide basis the implementation of existing and planned private and public GSI facilities. The Program requested annual updates from Co-permittees on GSI facilities and stored the information provided in Excel spreadsheets. The Program used this information to geo-locate the projects and created Geographic Information System (GIS) software to create maps displaying the projects. The Program also used the information to calculate PCBs and mercury load reductions, consistent with the *Interim Accounting Methodology for TMDL Loads Reduced*. The information on the extent of current and planned GSI facilities was provided previously in the Program's Version 4.0 Plan. The associated load reductions achieved for existing projects in the Santa Clara Valley during MRP 2.0 are reported later in this section.

The information on GSI facilities in the Santa Clara Valley was also used in the modeling that was done to prepare the Reasonable Assurance Analysis (RAA) for PCBs and mercury that began in FY 17-18 and was completed during FY 19-20. The RAA is provided in the *PCBs and Mercury TMDL Control Measure Implementation Plan and Reasonable Assurance Analysis for the Santa Clara Basin* (Appendix 11-1).

Tracking GSI Facilities in the Santa Clara Valley

Early in FY 17-18, the Program identified the need for a more sophisticated mechanism for tracking and mapping GSI facilities in the Santa Clara Valley. To accommodate this need, the Program began developing a new web-based data management system with a connection to geographic information system (GIS) platforms for tracking and mapping the extent of GSI implementation, and reporting PCBs and mercury load reductions for all facilities in the Santa Clara Valley. The primary goals of the new GSI data management system include the following:

- Provide a centralized, accessible platform for Co-permittee staff to efficiently collect, upload, and store data associated with GSI facilities;
- Assist the tracking and mapping of all completed projects in the Santa Clara Valley;
- Enhance the Program's ability to efficiently and confidently calculate and report water quality benefits associated with GSI; and
- Allow the information about GSI facilities to be publicly available in a more user-friendly manner.

Development of the new GSI information management system began in FY 17-18 and continued through FY 19-20. The Program released a beta version of the system that Co-permittees began using in FY 18-19. The Program revised and updated the system based on input from Co-permittees, and released the new SCVURPPP GSI Database Version 1.0 to all Co-permittees in spring 2019 (Figure 11-1). The Program produced a technical guidance manual to accompany the release of the new GSI Database, which provides users with detailed instructions on how to use the online database.

In June 2019, the Program held a training webinar on the use of the new GSI database for all Co-permittees. Co-permittees began using the new GSI database for reporting on GSI project updates and associated PCBs and mercury load reductions in FY18-19. During FY 19-20, Program staff continued to improve the system, addressing bugs and adding features, and providing user support and guidance to Co-permittees. The GSI database has been renamed the "Stormwater Treatment Measure Data Portal." The Program will continue to update and improve the system in the future, and plans to include other types of stormwater treatment controls in addition to GSI facilities. Public access to the "Stormwater Treatment Measure Data Portal" is expected in the Fall of 2020.

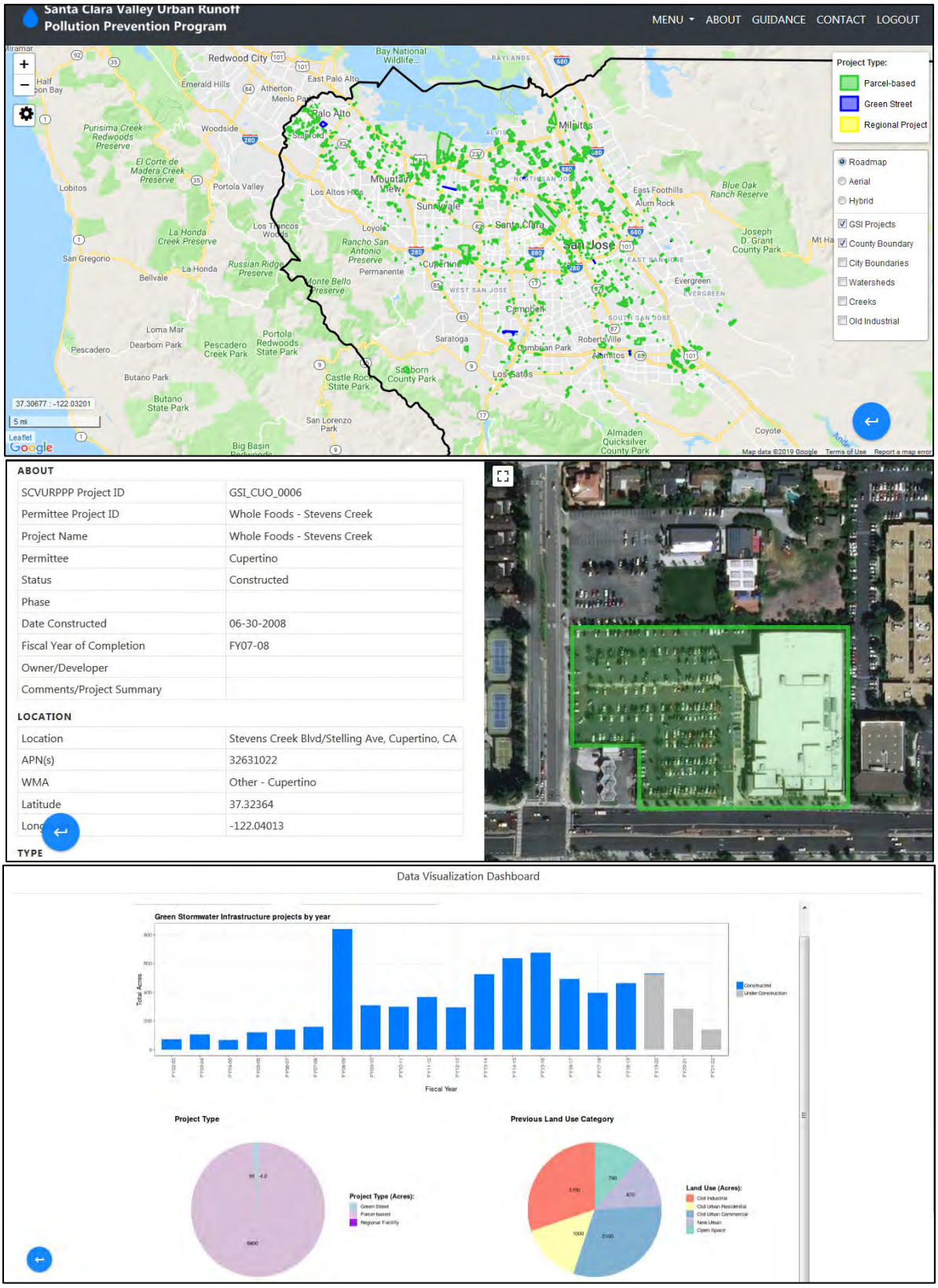

Figure 11-1. Screenshots of SCVURPPP GSI Database.

Managing PCB-Containing Materials/Wastes during Building Demolition

MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 parts per million or greater in applicable structures[5] at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. A Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its FY 16-17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.[6]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

- The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
- A method for identifying applicable structures prior to their demolition; and,
- Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff; and,
- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, BASMAA conducted a multi-year regional project to assist MRP Permittees to address Provision C.12.f. The BASMAA project, which began in FY 16-17 and was completed in March 2019, assisted Permittees in developing local programs to manage PCBs-containing materials during building demolition. It developed guidance materials, tools and training materials and conducted outreach. SMCWPPP actively participated in the project, including providing BASMAA's project manager.

At the outset of the project, a BASMAA Steering Committee was convened to provide project oversight and guidance during the project. The Steering Committee included BASMAA Directors, countywide stormwater program staff, and Permittee staff from various relevant municipal departments. The Steering Committee met periodically throughout the project. In addition, a project TAG, a small balanced advisory group formed from industry, regulatory, and Permittee representatives to provide review and input on selected project work products, was convened. The TAG was comprised of representatives from industry and state/federal regulatory agencies, and Permittees. Other efforts to engage key stakeholders included an industry stakeholder roundtable meeting (August 2017) and two larger stakeholder group meetings (December 2017 and May 2018) that included industry, regulatory and municipal representatives. During FY 18-19, Permittees tailored the BASMAA products for local use,

[5] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

[6] The City of Clayton in Contra Costa County provided acceptable evidence and is exempt from this provision.

adopted the program (e.g., via local policy or ordinance), and trained local staff to implement the new program starting July 1, 2019.

Key BASMAA project deliverables provided to each Permittee to use as appropriate given local procedures and needs included:

- A protocol for pre-demolition building survey for priority PCBs-containing building materials;
- Model language for municipal adoption (e.g., ordinance) of the new program to manage PCBs materials during building demolition and model supporting staff report and resolution;
- CEQA strategy and model notice of exemption;
- Supplemental demolition permit model application materials, including forms, process flow charts, and applicant instructions; and
- An analysis to assist municipalities that pursue cost recovery.

Other project deliverables included:

- A coordination/communication strategy for the project;
- A technical memorandum summarizing any new information & decisions needed by BASMAA at outset, including an annotated table of regulatory drivers and relevant requirements;
- A technical memorandum with the state of the practice for identifying PCBs-containing building materials (developed to inform development of the pre-demolition building survey protocol listed below);
- Industry stakeholder outreach materials and a fact sheet for municipal staff;
- A spreadsheet tool used to develop the prioritized list of potential PCBs-containing building materials that the demolition program will focus on;
- A conceptual approach for an assessment methodology and data collection program to quantify PCBs loads reduced through managing PCBs-containing materials during building demolition.

During FY 18-19, the BASMAA project concluded by conducting the following outreach and training tasks:

- Prepared training materials for municipal staff on adoption and implementation of the new program;
- Developed outreach materials and a standard presentation to inform industry stakeholders including developers, planning firms, urban planning non-governmental organizations, demolition firms, property owners, property managers, and realtors about the new program to manage PCBs in building materials during demolition;
- Using the above training materials, conducted training workshops (in-person and a webinar) for key municipal and countywide stormwater program staff;
- Conducted a webinar for industry stakeholders; and
- Developed a list of Bay Area opportunities, including contact information and dates, for municipal and/or stormwater program staff to conduct additional outreach to industry stakeholders using the above industry outreach materials.

In addition, during FY 18-19 and FY 19-20, the Program and other MRP Permittees worked together through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) to develop a framework to comply with data collection/evaluation and reporting requirements under Provision C.12.f. As mentioned previously, these requirements include developing an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the new program. The regional process developed includes the following steps:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.[7]
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

All Co-permittees began implementing the program on or before July 1, 2019. **Appendix 11-2** includes two documents prepared collaboratively by the Program and other MRP Permittees in compliance with MRP reporting requirements in Provision C.12.f. (3) – (5):

1. Documentation of (a) the number of applicable structures that applied for a demolition permit during the reporting year, and (b) a running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used (*PCBS in Building Materials Management Program – Regional Data Summary, September 18, 2020*).
2. An assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition (*Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program, September 23, 2020*).

Risk Reduction Program for PCBs and Mercury

The MRP requires that Co-permittees develop and implement or participate in effective programs to reduce PCBs and mercury-related risk to humans eating Bay fish, and report on the effectiveness of these programs in the FY 19-20 Annual Report. Provisions of the Water Board's Mercury Watershed Permit covering industrial and municipal wastewater treatment plant discharges to San Francisco Bay contain a similar requirement to the MRP. A partnership composed of the Bay Area Clean Water Agencies (BACWA), Western States Petroleum Association, and BASMAA was formed to develop a

[7] Municipalities should require that applicants fill out and certify a Screening Form for every demolition. For non-Applicable Structures, applicants simply check the boxes, certify, and submit to municipality. Then the municipality can authorize the demolition (e.g., issue a demolition permit). In general, municipalities should have a completed and certified Screening Form before authorizing a demolition, unless they are a small community that is exempt or has some other arrangement with Regional Water Board staff. Municipalities do not need to track non-Applicable Structures otherwise.

regional approach to raise public awareness regarding fish contamination issues in San Francisco Bay and to encourage fish-consuming populations to reduce their exposure to mercury in contaminated fish. The partnership engaged the services of the SFEI/Aquatic Sciences Center and the California Department of Public Health (CDPH), Office of Environmental Health Hazard Assessment (OEHHA) to manage and develop the project entitled San Francisco Bay Fish Project (SFBFP).

The SFBFP was a two-year project (October 2010 to October 2012) implemented by the CDPH. Project oversight was provided by the Bay Area Risk Communication and Exposure Reduction Work Group that included representatives from BASMAA, CDPH, BACWA, Regional Water Board, EPA, and County Health Departments. CDPH developed several new educational materials under this project. These included a four-panel brochure, a kiosk flyer, a coloring book for kids, a warning sign, and an educational video. The brochures were produced in English and 10 other languages. The SFBFP also funded four community groups to conduct outreach and education projects tailored to the needs of fishing populations and underserved communities (i.e., communities that consume Bay fish disproportionately to other populations). Examples of outreach included bilingual workshops for Asian Pacific Islander families with high fish consumption, outreach to people fishing in Southeast San Francisco, and outreach to school children that have families fishing in Bay piers.

In FY 12-13, the SCVURPPP Watershed Education and Outreach Ad Hoc Task Group (WEO AHTG) discussed using the CDPH four-panel brochures titled "Guide to Eating Fish and Shellfish from San Francisco Bay" for conducting local outreach about health impacts of eating San Francisco Bay-caught fish. Although the brochures provide guidance specific to the consumption of fish found in San Francisco Bay, the WEO AHTG agreed that it would be useful to provide these brochures to Santa Clara residents, regardless of whether consumption of Bay fish was likely. The main reasons for outreaching to a broader audience included:

- Residents could be travelling outside Santa Clara County to fish;
- The outreach will make residents fishing in local creeks and reservoirs aware about the possibility of mercury contamination; and
- The brochures contain useful information for residents that purchase fish and/or eat fish at restaurants.

Based on feedback from the WEO AHTG, an outreach plan was developed to reach residents that are likely to consume fish that are caught locally or from the San Francisco Bay. As part of that plan, SCVURPPPP implemented the following outreach activities from FY 14-15 to FY 19-20 to address MRP requirements associated with risk reduction:

- <u>Point of purchase outreach at fishing supply stores</u> – Program staff worked with local fishing supply stores to distribute the "Guide to Eating Fish and Shellfish from San Francisco Bay" brochures (in English, Spanish, Vietnamese and Chinese) to customers. However, many of these stores closed over the years.
    - Fisherman's Warehouse – 1120 Branham Ln., San José, CA 95118 (*Began distributing in FY 13-14)*
    - Bass Pro Shop – 5160 Cherry Ave., San José, CA 95118 *(began distributing in FY 15-16)*

- Coyote Bait & Tackle – 8215 Monterey Rd., Coyote, CA 95101 (*began distributing in FY 13-14; store closed in 2019)*
- Orvis Retail Store – 377 Santana Row, Suite 1040, San Jose, CA 95128 (*began distributing in FY 13-14; store closed in 2017)*
- Stevens Creek Market – 10629 S. Foothill Blvd., Cupertino, CA 95014 *(began distributing in FY 14-15; store closed in 2018)*
- West Marine – 375 Saratoga Ave., Suite C, San Jose, CA 95129 *(began distributing in FY 13-14; store closed in 2015)*
- Bateh Brothers - 22690 Stevens Creek Blvd., Cupertino 95014 *(began distributing in FY 16-17; store closed in 2019)*

Each year, Program staff visited each store at least two times to restock the brochure display racks.

Figure 11-2 Brochures displayed at the Bass Pro Shop, San Jose

- <u>Website and social media posting</u> – The "Guide to Eating Fish and Shellfish from San Francisco Bay" brochures (in English, Spanish, Vietnamese and Chinese) are posted on Watershed Watch Campaign[8] websites. A message promoting safe consumption of SF Bay-caught fish is in rotation on the home page of the Watershed Watch Campaign website, and frequently promoted on the Campaign's Facebook, Twitter and Instagram pages.
- <u>Media advertising</u> - The Watershed Watch Campaign conducts significant media advertising each year. The following table describes media advertising that included messages on safe fish consumption and promoted the "Guide to Eating Fish and Shellfish from San Francisco Bay" brochure. If available, data on impressions are also included.

Figure 11-3 Digital advertisement

[8] The Watershed Watch Campaign website www.MyWatershedWatch.org is SCVURPPP's main public education website. The website is promoted in all SCVURPPP public outreach materials including media advertisements, giveaways and brochures.

Table 11-5 Summary of Fish Consumption Media Advertising

Fiscal Year	Media Advertising Summary	Impressions
FY 14-15	▪ A new ad on safe fish consumption was created and placed on online media as part of the Watershed Watch Campaign advertising.	Not available
FY 15-16	▪ A total of ten spots on KBAY radio informed the public about potential dangers of mercury in fish, and promoted the "Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures. In addition, one e-blast ran on the KBAY radio and Planet KBAY web page. ▪ Spanish-language digital ads promoting the Guide ran on KTRB radio website ESPNDeportesSanFrancisco.com. ▪ Digital ads promoted the Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures on the Watershed Watch Facebook and Instagram pages.	Not available
FY 16-17	▪ A total of 756 PSAs on KUFX, KBLX, KOIT, KRBQ, and KGMZ radio informed the public about potential dangers of mercury in fish, and promoted the Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures. ▪ Eleven digital ads promoting the "Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures ran on websites for KUFX, KBLX, KOIT, KRBQ, KGMZ, and Planet KBAY. The ads were also delivered via KUFX and KBAY email blasts to subscribers, included in a targeted mobile campaign on CBS LOCAL (programmatic digital), and placed as paid ads on Facebook and Instagram. ▪ Spanish-language banner ads promoting the "Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures were placed on KKSF web page and KSTS web page.	Not available
FY 17-18	▪ Spanish Banner advertisements promoting the brochures were placed on KKSF ESPN Deportes web page from July through December 2017. ▪ Digital advertisements ran in English and Spanish in targeted mobile campaigns for one month each.	176,000 impressions
FY 18-19	▪ A total of 87 15-second PSAs ran on the following radio stations: KUFX, KOIT, KBLX and KMVQ. ▪ Digital advertisements ran in English on the websites of the following radio stations: KUFX, KMVQ, KBLX and KOIT. ▪ Two email blasts were sent to KBAY, KUFX, KMVQ, KBLX and KOIT station subscribers. ▪ Targeted digital mobile advertisements in English and Spanish languages ran for one month in May 2019. ▪ A paid Facebook promotion was conducted from March 27, 2019 to - April 3, 2019 to promote the Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures.	844,875 impressions
FY 19-20	▪ Interview segment for *Despierto Area de la Bahia* on KDTV Univision 14 (Spanish) created awareness of mercury in fish and promoted the Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures. ▪ Targeted digital ads in English and Spanish languages ran online for one month.	353,505 impressions

- Outreach at Community Events –The "Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures are distributed at SCVURPPP community outreach events each year. In addition, the brochures are also distributed at the South Bay "Fishing the City" events. At these free events, children age 5-15 learn fishing techniques, and discover opportunities to fish at public lakes, ponds, and streams in their own community. Some Co-permittee agencies also distribute the brochures at community events.

- Signage - Due to mercury and PCB contamination issues, several sites in Santa Clara County have fish consumption advisories issued by the OEHHA. Signage prohibiting fishing or recommending catch and release only is posted at all sites. Signage developed by CDPH for the San Francisco Bay Fish Project is posted at Alviso Marina and Palo Alto Baylands.

Assembly Bill No. 762 (Public health: fish and shellfish: health advisories) requires local agencies to post specific signage near local water bodies with advisories regarding fish consumption. The Bill also requires OEHHA to make available digital posters of health warning for each site-specific fish or shellfish health advisory. As required by this Bill, the Santa Clara County Parks Department will post site-specific signage at the following locations:

- Anderson Lake
- Coyote Lake
- Guadalupe Reservoir
- Calero Reservoir
- Almaden Reservoir
- Lexington Reservoir
- Stevens Creek Reservoir
- Uvas Reservoir
- Chesbro Reservoir
- Vasona Lake
- Camden Ponds

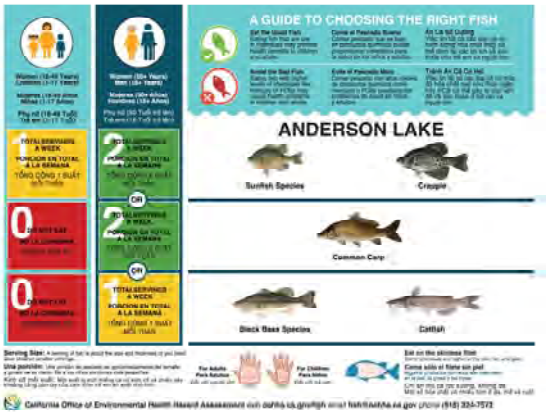

Figure 11-4 Site-specific signage proposed at Anderson Lake

A total of 31 signs will be posted by the end of 2020.

- Outreach at Perinatal Clinics – Program staff coordinated with Santa Clara County Public Health Department to distribute the brochures at health clinics. The brochures were distributed in FY 14-15 and FY 15-16 at the local Comprehensive Perinatal Services Program Department, Valley Health Center (San Jose). Due to staff changes at the County Public Health Department, distribution discontinued after FY 15-16.

- Education Programs at the Don Edwards San Francisco Bay Wildlife Refuge – The brochures continue to be provided to Don Edwards San Francisco Bay Wildlife Refuge staff for incorporation into outreach conducted through the SCVURPPP-funded Watershed Watchers Program. The Watershed Watchers program conducts numerous activities and sessions to educate children about watersheds and urban runoff pollution prevention.

Evaluation of Effectiveness

The following measures indicate the success of the Program's outreach about health impacts of eating San Francisco Bay-caught fish:

- The brochures continue to be popular at participating fishing supply stores, and store managers are enthusiastic about stocking them. Overall, customers at these stores pick up between 300-500 brochures each year.
- The "Guide to Eating Fish and Shellfish from San Francisco Bay" is a popular download from the Watershed Watch website. As an example, the Guide to Eating Fish and Shellfish from the San Francisco Bay" brochures was downloaded 240 times in FY 19-20 (combined number for all five languages).
- Visitors at the Watershed Watch booth at outreach events are interested in learning about the guidance on fish consumption. Approximately, 125 brochures are distributed to residents at these events each year.
- Many adults and children receive the fish consumption messages during outreach programs at the Don Edwards San Francisco Bay Wildlife Refuge. Attendance numbers per year are provided in in the Table below:

Table 11-6 Number of Attendees at Mercury Outreach Programs held at the Don Edwards San Francisco Bay Wildlife Refuge

Fiscal Year	Number of Attendees (adults and children)
FY 14-15	209
FY 15-16	868
FY 16-17	739
FY 17-18	205
FY 18-19	406
FY 19-20	353

Overall, SCVURPPP's outreach efforts have been successful in reaching a larger population each year. SCVURPPP plans to continue these activities in future years. SCVURPPP staff will research and reach out to additional fishing supply stores to make the brochures available to customers. The installation of advisory signage by the County will help extend the outreach to many more residents.

Collection/Recycling of Mercury-Containing Devices and Products

MRP 1.0 Provision C.11.a.i required Co-permittees to promote, facilitate and/or participate in the collection and recycling of mercury-containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs). Although MRP 2.0 does not specifically require Co-permittees to address this source of mercury, Co-permittees continued to participate in the Santa Clara County Environmental Health Department's Household Hazardous Waste Program (HHW Program) during FY 19-20 to reduce mercury in stormwater. The amount of mercury collected via these activities is reported below.

The HHW Program offers residents the opportunity to drop-off mercury-containing devices and equipment and other hazardous wastes at their permanent drop-off facilities every other Wednesday; and every Thursday, Friday and Saturdays (except holiday weekends) free of charge, by appointment

only. Due to shelter-in-place orders, the HHW Program suspended all collection activities on March 16, 2020; collection events were authorized to resume at the permanent facilities on June 10, 2020. As a result, the number of collection events during FY 19-20 were reduced by 25 percent. HHW Program provides an inexpensive hazardous waste disposal option to eligible businesses that generate less than 100 kilograms of waste per month. It operates by appointment only and charges a fee to cover the cost of transportation and disposal. During FY 19-20, the HHW Program served 289 small business drop-offs including local governments, Goodwill Industries, and The Salvation Army. Many Co-permittees promote the availability of the HHW Program on their agency websites.

During FY 19-20, the HHW Program collected a total of 62,433 pounds[9] of fluorescent lamps at HHW Program events and 25 retail drop-off locations within Santa Clara County[10]. This equates to 333,815 linear feet of fluorescent lamps (e.g., tubes, circular, and u-shaped) and 46,362 compact fluorescent lamps. In addition, the HHW Program also collected the following mercury-containing devices and equipment during FY 19-20:

- 111,979 pounds of household batteries; and
- 450 pounds of elemental mercury (including thermostats, thermometers and other products).

MRP 1.0 Provision C.11.a.ii required Co-permittees to include an estimate of the mass of mercury collected. To assist with calculating the mass of mercury collected during FY 19-20 by the HHW Program, SCVURPPP used a BASMAA spreadsheet entitled "Estimated Mass of Mercury Collected Calculator (Version 1.0)." The estimated mass of mercury collected is based on the total amount of mercury-containing devices and equipment collected and calculated using the best available information from manufacturers and trade organizations regarding the amount of mercury in devices and equipment of interest. The estimated mass of mercury collected by the HHW Program during FY 19-20 is provided in Table 11-7.

[9] Since fluorescent light bulbs come in different sizes, quantities are reported in terms of the total pounds. A new conversion factor for fluorescent lamps is used beginning in FY 09-10. The new conversion was established by the California Integrated Waste Management Board, now CalRecycle, in 2009, and is: 1 foot equals 0.125 lbs and 1 CFL equals 0.25lbs. Previously, the conversion used was: 1 foot equals 0.25lbs, and 1 CFL equals 0.0625lbs.

[10] Information regarding the collection of mercury containing products (e.g., fluorescent bulbs, thermostats, thermometers and other products) during FY 19-20 was obtained from a memorandum entitled *Fiscal Year 2019-2020 HHW Program Update* (dated August 27, 2020). This memorandum was prepared by William (Bill) Grimes, Household Hazardous Waste Program, County of Santa Clara.

Table 11-7. Estimated mercury mass collected by the Santa Clara County HHW Program in FY 2019-20.

Mercury Containing Device/Equipment	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)
Fluorescent Lamps (linear feet)[11]	320,132	0.693
CFLs (each)[12]	31,958	0.209
Thermostats (lbs)[13],[14]	225	1.2
Thermometers (each)[15],[16]	225	0.137
Total Mass of Mercury Collected During FY 2019-20:		**2.239**

■ ■ Additional PCBs and Mercury Control Measure Planning Projects

In addition to attainment of PCBs and mercury load reductions during the permit term, the MRP also requires Permittees implement projects to assist with planning for future control measure implementation, including GSI. This section provides summaries of these additional projects completed during the permit term or currently underway, consistent with requirements in MRP provisions C.11 and C.12.

Evaluating PCBs in Storm Drain or Roadway Infrastructure Caulks/Sealants

MRP 2.0 provision C.12.e requires that Co-permittees collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement, and investigate whether PCBs are present in such material and in what concentrations. Co-permittees are required to collect at least 20 composite samples (throughout the permit-area) of caulk and sealants and analyze this material for PCBs using methods that can detect a minimum PCB concentration of 200 ppb. The results of the investigation (including all data gathered) must be submitted to the Regional Water Board no later than the 2018 Annual Report.

To achieve compliance with Provision C.12.e, MRP Co-permittees agreed to collectively conduct this sampling/investigation as a regional study via BASMAA. This effort also contributes to partial fulfillment

[11] The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

[12] The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.

[13] Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.

[14] It is estimated that approximately 50 % of elemental mercury collected by household hazardous waste facilities is thermostats. Thermostats are shipped to the Thermostat Recycling Corporation for recycling. Fifty percent of 450 pounds is 225 pounds. Therefore, 225 pounds of thermostats were shipped in FY 19-20. Source: personal communication, Dermot Casey, San Mateo County Hazardous Materials Specialist, August 20, 2012.

[15] USEPA reports that glass mercury fever thermometers contain about 0.61 g (0.00061 kg) of mercury. Source: USEPA 2012. Thermometers. Available at http://www.epa.gov/mercury/thermometer-main.html. Accessed April 11, 2012.

[16] It is estimated that approximately 25 % of elemental mercury collected by household hazardous waste facilities is thermometers. Twenty-five percent of 450 pounds is approximately 112.5 pounds. Two thermometers equal one pound. Two thermometers per pound is equal to 225 thermometers. Therefore, 225 thermometers were shipped in FY 19-20. Source: personal communication, Dermot Casey, San Mateo County Hazardous Materials Specialist, August 20, 2012. Average weight of thermometers obtained from retail websites - www.amazon.com.

of pollutants of concern (POC) monitoring required in Provision C.8.f of the MRP to address source identification, one of the five management information needs identified in the MRP. Source identification monitoring focuses on identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff.

In February 2017, BASMAA selected a consultant team to develop a study design for the investigation and implement sampling under the direction of a project management team (PMT) consisting of members of the BASMAA Monitoring and Pollutants of Concern (MPC) Committee. The following tasks were completed as part of the regional study by the end of FY 18-19:

- Developed a final study design
- Developed a final Sampling and Analysis Plan and Quality Assurance Project Plan
- Developed screening criteria to inform selection of infrastructure for sampling
- Conducted outreach efforts and recruited municipal partners to participate in the project
- Collected 54 samples of caulk and sealant materials from ten types of roadway and storm drain infrastructure throughout the permit area;
- Determined how samples would be combined into 20 composites;
- Submitted the samples to the lab for compositing and analysis for the RMP-40 PCB congeners[17] using a modified EPA Method 8270C (Gas Chromatography/Mass Spectroscopy-Selective Ion Monitoring, GC/MS-SIM).
- Prepared a project report presenting the full details of the investigation, including the PCBs concentrations of the 20 composite samples.

A final project report *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* that includes the results and conclusions of the investigative study was submitted as an Appendix to the SCVURPPP FY 17-18 Annual Report in compliance with MRP Provision C.12.e.

Evaluating the Fate and Transport of PCBs from Urban Runoff

MRP Provision C.12.g requires Permittees to conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. The provision states: “the specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.” Conceptually, advances in this type of knowledge could allow the Regional Water Board to explore revising the PCBs TMDL to incentivize implementing PCBs management actions in such drainages that drain to sensitive Bay margin areas. Prioritizing actions in these drainages could possibly facilitate reaching TMDL goals more efficiently, though establishing this type of prioritization process would involve many challenges.

[17] The 40 individual congeners routinely quantified by the Regional Monitoring Program (RMP) for Water Quality in the San Francisco Estuary include: PCBs 8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, l05, 110, 118, 128, 132, 138, 141, 149, l51, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203.

Provision C.12.g. is being addressed through a multi-year project by the San Francisco Bay (Bay) Regional Monitoring Program (RMP) to identify, model, and investigate embayments along the Bay shoreline designated "Priority Margin Units" (PMUs). The project:

- Identified four PMUs for initial study that are located downstream of urban watersheds where PCBs management actions are ongoing and/or planned;
- Is developing conceptual and PCBs mass budget models for each of the four PMUs; and
- Is conducting monitoring in the PMUs to evaluate trends in pollutant levels and track responses to pollutant load reductions.

The objectives of this effort to model and investigate Bay PMUs include:

- Characterizing concentrations and the spatial distribution of PCBs in sediment and food web biota in PMUs, including establishing baseline data on PCBs concentration and loading;
- Evaluating the response of PMU receiving waters over time to load reduction efforts in the watershed, such as remediation of PCBs-contaminated properties, including tracking PCBs in sport fish as the ultimate indicator of progress in reduction of impairment; and
- Informing the review and possible revision of the PCBs TMDL and the reissuance of the MRP, both of which were initially tentatively scheduled to occur in 2020 (while the MRP reissuance process in underway and is anticipated to be completed in 2021, the status of evaluating and possibly revising the Bay PCBs TMDL remains uncertain at this time).

A general description and multi-year budget for this project is in the "PCBs" section of the RMP Multi-Year Plan, 2020 Annual Update, dated January 2020 (sfei.org/documents/2020-rmp-multi-year-plan).

The RMP PCBs Workgroup, which includes representative from BASMAA, the Regional Water Board, and other RMP stakeholders, provides oversight over the project, including reviewing and commenting on draft conceptual model reports and plans for PMU-related RMP Special Studies (e.g., PMU monitoring plans).

In accordance with MRP Provision C.12.g., Permittees submitted in their FY 16-17 Annual Reports a workplan for meeting the above information needs, which included descriptions of studies proposed or underway and a preliminary schedule. Permittees then reported on the status of the studies in their FY 17-18 Annual Reports. In their Integrated Monitoring Reports (IMRs), due by March 30, 2020, Permittees reported the findings and results of the studies completed, planned, or in progress as well as implications of the studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

The four PMUs initially selected were:

- Emeryville Crescent (Alameda County)
- San Leandro Bay (Alameda County)
- Steinberger Slough (San Mateo County)
- Richmond Harbor (Contra Costa County)

The PMU conceptual models are intended to provide a foundation for future monitoring to track responses to load reductions and may eventually help guide planning of management actions. Three of the selected embayments (all except San Leandro Bay) receive drainage from pilot watersheds that were included in BASMAA's Clean Watersheds for a Clean Bay project (basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project).

Status of PMU Conceptual Models

The following sections summarize the status of conceptual model development in each of the four PMUs.

Emeryville Crescent

A final conceptual model report (dated April 2017) is available on the San Francisco Estuary Institute (SFEI) website:
sfei.org/sites/default/files/biblio_files/Emeryville%20Crescent%20Draft%20Final%20Report%2005-02-17%20Final%20Clean_0.pdf

The report's key finding, which was based on a simple one-box pollutant fate model and dependent on assumptions made for the model's input parameters, was that PCBs concentrations in sediment and the food web could potentially decline fairly quickly (within 10 years) in response to load reductions from the watershed.

San Leandro Bay

A conceptual model for San Leandro Bay was developed in three phases, with reports available on the SFEI website. The Phase 1 report (dated June 2017) presented analyses of watershed loading, initial retention, and long-term fate, including results of sediment sampling in 2016:
sfei.org/sites/default/files/biblio_files/Yee%20et%20al%202017%20Conceptual%20Model%20Report%20San%20Leandro%20Bay%20Phase%201.pdf.

The Phase 2 report (dated December 2017) is designated a data report and documented the methods, quality assurance, and all of the results of the 2016 field study:
sfei.org/sites/default/files/biblio_files/San%20Leandro%20Bay%20PCB%20Study%20Data%20Report%20Final.pdf

The Phase 3 report (dated November 2019) was recently completed and is available here:
sfei.org/sites/default/files/biblio_files/San%20Leandro%20Bay%20PCBs%20Phase%203%20Final%20Report%20_0.pdf

This final report incorporates all of the results of the 2016 field study, and includes additional discussion of the potential influence of contaminated sites in the watershed and the results of passive sampling by Stanford researchers. It also includes a comparative analysis of long-term fate in San Leandro Bay and the Emeryville Crescent, a section on bioaccumulation, and a concluding section with answers to the management questions that were the impetus for the work.

The report included a discussion of the results of mass budget modeling that illustrated one type of challenge encountered during the PMU conceptual modeling effort. A wetland sediment core profile at Damon Slough indicated a substantial reduction in PCBs between the 1970s and the early 2000s. The simple mass budget model developed during this study suggested continued reductions in PCBs. However, a comparison of the results of extensive sampling of San Leandro Bay surface sediment in

1998 and in 2016 suggested minimal decline in PCBs over this more recent 18 year period. This finding may suggest that continuing PCBs inputs from the watershed are greater than estimated as part of the mass budget modeling and are slowing the recovery of San Leandro Bay. It is important to note that numerous uncertainties associated with the model and its parameters influence projected system response time.

Steinberger Slough / Redwood Creek
A conceptual model for Steinberger Slough / Redwood Creek is currently under development. SFEI staff released a draft report in February 2020. Like the other conceptual models, it includes results of existing monitoring efforts in the PMU and watershed, analyses of watershed loading, development of a mass budget, and long-term fate modeling, including projected PCBs concentrations in sediment and the food web in response to load reductions from the watershed.

Richmond Harbor
Due to budget limitations and because other RMP efforts were deemed higher priority, a conceptual model for the Richmond Harbor PMU is not yet under development.

RMP Special Studies Related to PMUs
In addition to ongoing conceptual model development (as described above), and continuing technical and logistical support for the RMP PCBs Workgroup, various types of RMP Special Studies[18] related to PMUs are ongoing, including the following:

- Shiner Surfperch PCBs Monitoring in PMUs – shiner surfperch is a crucial indicator of impairment, due to its explicit inclusion as an indicator species in the TMDL, importance as a sport fish species, tendency to accumulate high concentrations, site fidelity, and other factors. The conceptual site models recommend periodic monitoring of shiner surfperch to track trends in the PMUs, and as the ultimate indicator of progress in reduction of impairment. A coordinated sampling of PCBs in shiner surfperch in PMUs is being conducted as an add-on to RMP Status and Trends (S&T) sport fish sampling. A dataset for shiner surfperch will be developed that is directly comparable across the PMUs and the five locations that are sampled in S&T monitoring.
- Stormwater Runoff PCBs Monitoring in PMUs – this study is collecting information on PCBs concentrations and particle ratios in stormwater in watersheds draining to the PMUs to better estimate current PCBs loads into the PMUs (a critical component of the PMU mass budgets) and to help track the effectiveness of PCBs controls such as remediation of PCBs-contaminated properties.
- Assess Loading and Spatial Distribution of PCBs in Steinberger Slough / Redwood Creek PMU – this study will address information gaps in the conceptual model for this area and establish baseline data for evaluating the response of these receiving waters to load reduction efforts in the watershed. Passive sampling devices (PSDs) will be deployed to assess spatial patterns in dissolved PCBs in pore water and surface water, providing information on spatial patterns in an index of current biotic exposure. In addition, analysis of depth profiles of pore water with PSDs, accompanied by bulk sediment chemistry in cores, will provide information on the chronology of

[18]These efforts are partly funded by Supplemental Environmental Projects (SEPs).

loading and exposure over the past 50 years. This study is being conducted in collaboration with Stanford researchers.

Discussion

During FY 19-20, the PMU conceptual modeling and associated special studies continued to progress. Four PMUs for initial study, characterization, and tracking have been identified, and conceptual models have been completed for two of the PMUs, the Emeryville Crescent and San Leandro Bay. A draft conceptual model for a third PMU, Steinberger Slough / Redwood Creek, is under development. In conjunction with the modeling, RMP Special Studies are characterizing concentrations and the spatial distribution of PCBs in sediment and food web biota in PMUs and establishing baseline data on PCBs concentration and loading, and will help evaluate the response of the PMUs to load reduction efforts in their watersheds.

The efforts to model and investigate the PMUs are generating valuable new data and knowledge that will inform future revisions of the PCBs TMDL. However, it would be premature to propose major changes to the TMDL at this time, such as revising the stormwater allocation (e.g., assigning allocations to watershed areas that vary depending upon the sensitivity of the Bay margin area to which they drain). Similarly, additional work should be completed before attempting to project any implications of the modeling and studies on potential control measures to be investigated, piloted, or implemented in future stormwater permit cycles.

During FY 20-21 and future years, BASMAA representatives to the RMP will continue to participate in the RMP PCBs Workgroup and other applicable workgroups to help oversee this work and guide it towards developing information that will inform implementing controls for PCBs in stormwater runoff and reducing the Bay's PCBs impairment.

POC Monitoring to Assist with Prioritization of WMAs

In an effort to continue prioritizing Watershed Management Areas (WMAs) for future control measure implementation, the Program continued to conduct POC monitoring of stormwater from WMAs of interest. This monitoring was conducted in collaboration with the BASMAA RMC. In FY 19-20, a total of five stormwater composite samples and eight sediment samples from priority WMAs that contain industrial areas were collected by the Program. Data from these sites are currently under review and depending on the results, this monitoring may result in the Program conducting additional source property investigations in FY 20-21 or future years in these WMAs.

■ PCBs and Mercury Load Reductions Achieved During MRP 2.0

MRP 2.0 requires Permittees to develop and implement control measures to reduce PCBs and mercury in stormwater runoff to the San Francisco Bay throughout the permit area (Table 11-8). For PCBs, Permittees are collectively required to reduce loads by a minimum of 500 g/yr by June 30, 2018, and 3,000 g/yr by June 30, 2020. At least 120 g/yr of PCBs load reduction must be achieved through implementation of GSI projects on public and private lands. The June 30, 2020 date may be extended to December 31, 2020 if Permittees provide documentation that control measures that will attain the load reduction will be implemented by that date. For mercury, Permittees are collectively required to reduce stormwater loads by 48 g/yr by June 30, 2020 through implementation of GSI projects on public and private lands. These load reduction performance criteria may be met regionally. However, should

regional load reductions not be achieved, MRP 2.0 requires each Permittee to achieve load reductions on a county-wide basis. **The Santa Clara Valley load reduction performance criteria are identified in Table 11-8.**

Table 11-8. PCBs and Mercury Load Reduction Performance Criteria Required by the Municipal Regional Permit (MRP) in 2018 and 2020 for the entire MRP Region and Santa Clara Valley Co-permittees.

Responsible Permittees	**PCBs (g/yr)**			**Mercury (g/yr)**
	By July 2018	By July 2020		By July 2020
	All Control Measures	*All Control Measures*	*Green Stormwater Infrastructure*	*Green Stormwater Infrastructure*
Regional	500	3,000	120	48
Santa Clara Valley	160	940	37	16

The PCBs and mercury performance criteria in Table 11-8 can be achieved through implementation of the following control measures:

1. Source Property Identification and Abatement
2. Green Stormwater Infrastructure and Treatment Controls, including:
   - Parcel-based new/re-development/Green Streets/Regional Retrofits
   - Public Large FTC Systems (i.e., HDS Units)
3. Enhanced Operation and Maintenance (O&M) Measures, including:
   - Street Sweeping or Flushing
   - Increased storm drain inlet cleanouts (with or without Inlet-based FTC Devices)
   - Other MS4 Cleaning
4. Managing PCBs-containing Materials/Wastes during Building Demolition
5. Managing PCBs in Infrastructure
6. Diversions to Publicly Owned Treatment Works (POTWs)
7. Source Controls/Other Actions

Beginning with the 2017 Annual Reports, MRP 2.0 Permittees are required to report the annual PCBs and mercury load reductions achieved due to control measures implemented each year of the permit term. The control measures implemented to-date across the MRP region are described in more detail in "Control Measures Plans" prepared by individual Bay Area countywide stormwater programs or Permittees. The data reported here on regional PCBs and mercury loads reduced by all Permittees were provided by the following countywide stormwater programs and municipal agencies:

- Alameda Countywide Clean Water Program
- Contra Costa Clean Water Program
- Santa Clara Valley Urban Runoff Pollution Prevention Program
- San Mateo Countywide Water Pollution Prevention Program

- Fairfield-Suisun Urban Runoff Management Program
- City of Vallejo and the Vallejo Flood and Wastewater District

For the SCVURPPP Co-permittees, the data needed to calculate the PCBs and mercury loads reduced by all current (i.e., existing) control measures that have been implemented during MRP 2.0, including the total acres (and associated land-uses) addressed by each type of control measure were provided previously in the Version 4.0 Plan, submitted as Appendix 11-1 with the Program's FY 18-19 Annual Report.

All load reductions reported here are based on the best available information at the time this report was written and may not reflect the most up-to-date accounting of all reductions achieved through all control measures that have been implemented in the region.

Summary of Loads Reduced Accounting Methodology

The accounting methodologies used to calculate the load reductions reported in this section were developed by BASMAA and approved by the Executive Officer of the Regional Water Board for the purpose of load reduction reporting during MRP 2.0 in accordance with MRP provisions C.11.B.iii(1) and C.12.B.iii(1). These methods and data inputs are described fully in the ***Interim Accounting Methodology for TMDL Loads Reduced***. The major equations and default data inputs that are used to calculate load reductions for the control measures implemented by SCVURPPP Co-permittees are summarized below. For Managing PCB-Containing Materials/Wastes During Building Demolition, the MRP identifies a stipulated load reduction of 2,000 g/yr for all Permittees in the region if all Permittees have implemented the required program by July 1, 2019. SCVURPPP Co-permittees' portion of this stipulated load reduction is 627 g/yr.

Source Property Identification and Abatement (including Referrals)
The pollutant of concern (POC) loads reduced through source property identification and abatement were calculated using the equation below:

$$Load\ of\ POC\ Reduced = SP_A \bullet (SP_Y - OU_Y)$$

Where:
SP_A = *Source property area (acres (ac))*
SP_Y = *Source property POC yield*
OU_Y = *Old Urban land use POC yield*

Default inputs:
PCBs Source property yield = 4,065 mg/ac/yr
PCBs Old urban land use yield = 30.3 mg/ac/yr
Mercury Source property yield = 1,300 mg/ac/yr
Mercury Old urban land use yield = 215 mg/ac/yr

Fifty percent of the load reduced is reported here for each source property referral that has been submitted to the Regional Water Board to date. The remaining 50% will be credited upon completion of the abatement process, or at ten years, whichever occurs first.

Green Stormwater Infrastructure and Treatment Controls

Parcel Based New Development, Redevelopment and Retrofit

The POC loads reduced through parcel based new development, redevelopment, and retrofit projects were calculated using the equation below:

$$Load\ of\ POC\ Reduced = P_A \bullet (P_Y - NU_Y)$$

Where:

P_A = *New development/redevelopment/parcel based retrofit project area (ac)*

P_Y = *Existing PCBs or mercury yield (mg/ac/yr)*

NU_Y = *New Urban PCBs or mercury yield (mg/ac/yr)*

Default inputs:

PCBs New Urban land use yield = 3.5 mg/ac/yr

Mercury New Urban land use yield = 33 mg/ac/yr

Green Streets, Regional Retrofit Projects, and Large Full Trash Capture Systems

The POC loads reduced due to green streets, regional retrofit projects, and large FTC devices (i.e., HDS units) were calculated using the equation and inputs provided below:

$$Annual\ Mass\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A = *Tributary area treated by green stormwater infrastructure/retrofit treatment measure/HDS unit (acres)*

P_Y = *Area weighted PCBs or mercury yield (mg/acre year)*

E_f = *Efficiency factor for green stormwater infrastructure/retrofit treatment control measure (assumed to be 70%) or HDS units (assumed to be 20%)*

Regional PCBs Loads Reduced

The cumulative PCBs loads reduced to date by all Permittees during the MRP 2.0 compliance period (FY 13-14 through FY 19-20) are presented in Table 11-9. A total of 3,017 g/yr of PCBs were reduced across the permit area over that time period, demonstrating that the MRP performance criterion of 3,000 g/yr of PCBs loads reduced by July 2020 has been achieved at the regional level.

Table 11-9. PCBs loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	PCB Load Reductions (g/yr)
Source Property Identification and Abatement	610
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	231
Large Full Trash Capture (i.e. HDS Units)	157
Enhanced O&M Measures	18
PCBs in Building Materials	2,000
Stormwater Diversion to Sanitary Sewer	1
TOTAL - All Control Measures	**3,017**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

The PCBs loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 11-5. The PCBs in building materials program achieved the MRP-stipulated load reduction of 2,000 g/yr because all Permittees successfully implemented the program by July 1, 2019. This load reduction accounts for 66%of the total PCBs loads reduced during MRP 2.0. The remaining 1,017 g/yr was achieved through all other control measures. Of these, source property identification and abatement accounts for 610 g/yr, or 20% of the total PCBs load reduction during MRP 2.0. Next to managing PCBs in building materials, source property identification and abatement remains the most effective control measure currently available for reducing PCBs loads to the Bay. GSI has been the third largest contributor to load reductions, providing 231 g/yr of PCBs loads reduced and accounting for 8% of the total PCBs loads reduced during MRP 2.0. These data demonstrate the MRP performance criterion of 120 g/yr of PCBs loads reduced through GSI has been met across the region. An additional 157 g/yr have been reduced by large, FTC devices (i.e., HDS Units), accounting for 5% of the total PCBs loads reduced. The remaining < 1% of the regional PCBs loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

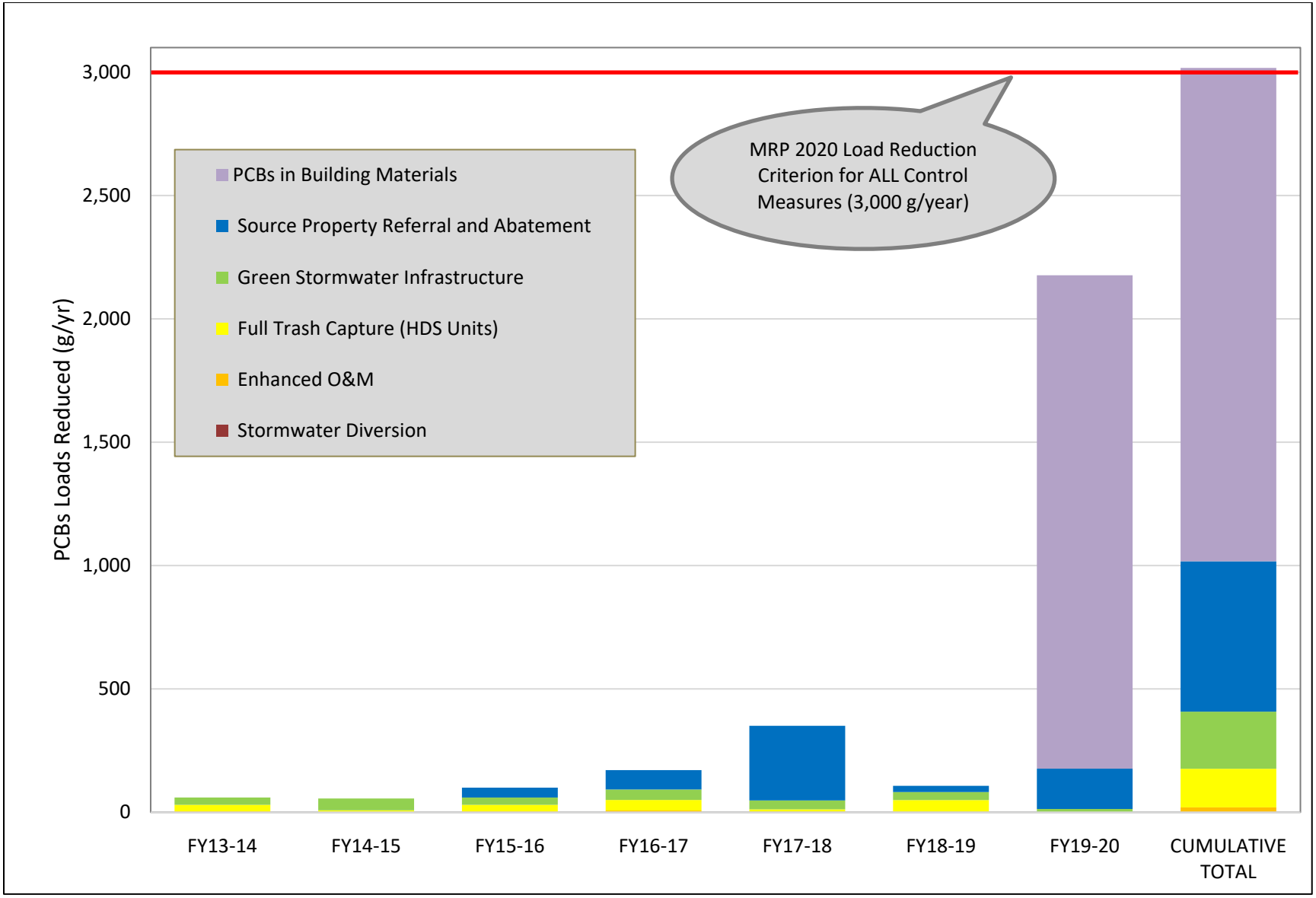

Figure 11-5. PCBs loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

Regional Mercury Loads Reduced

The cumulative mercury loads reduced by MRP Permittees from FY13-14 through FY 19-20 are presented in Table 11-10. An estimated total of 4,414 g/yr of mercury were reduced across the permit area over that time period. The mercury loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 11-6. GSI has been the largest contributor to mercury load reductions during the permit term. Total mercury loads have been reduced by 2,752 g/yr through GSI, accounting for 62% of the total loads reduced. These data demonstrate the MRP performance criterion of 48 g/yr of mercury loads reduced through GSI by 2020 has been met across the region. An additional 1,347 g/yr of mercury have been reduced by large, FTC devices (i.e., HDS Units), accounting for 30% of the total loads reduced. Source property identification and abatement has reduced mercury loads by 191 g/yr, accounting for 4% of the total mercury loads reduced to date. The remaining < 3% of the regional mercury loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

Table 11-10. Mercury loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	Mercury Load Reductions (g/yr)
Source Property Identification and Abatement	191
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	2,752
Large Full Trash Capture (i.e. HDS Units)	1,347
Enhanced O&M Measures	120
Stormwater Diversion to Sanitary Sewer	3
TOTAL - All Control Measures	**4,414**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

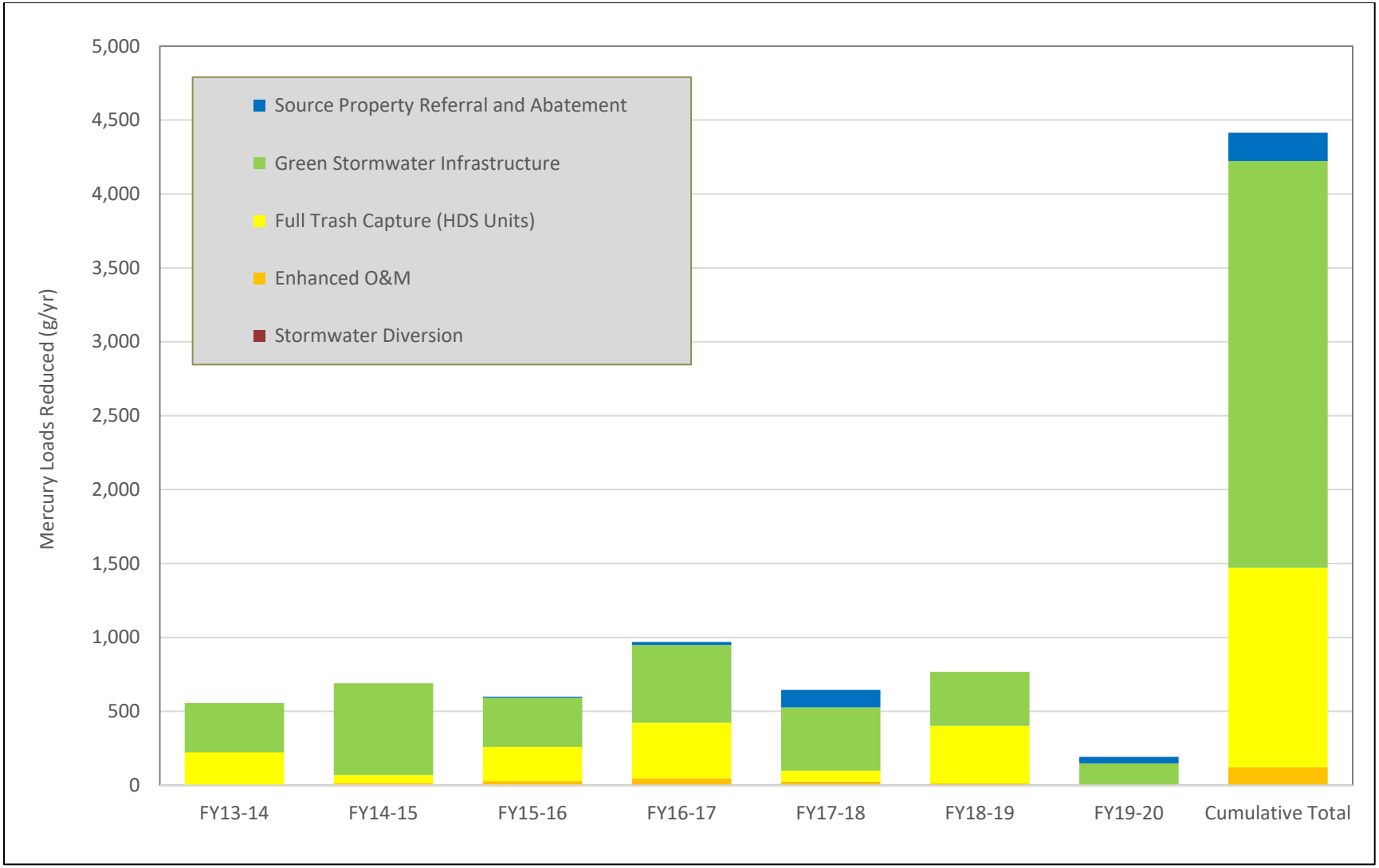

Figure 11-6. Mercury loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

PCBs Loads Reduced in the Santa Clara Valley

Co-permittees in the Santa Clara Valley have reduced PCBs by 1,011 g/year during the MRP 2.0 compliance period (i.e., FY 13-14 to FY 19-20). This amount of load reduction exceeds the required MRP performance criterion of 940 g/yr by 2020. Thus, the Santa Clara Valley Co-Permittees achieved, and even exceeded, the PCBs MRP performance criterion.

The PCBs loads reduced by each SCVURPPP Co-permittees during the MRP 2.0 compliance period are presented in Table 11-11 and Figure 11-7. The total PCBs loads reduced by each control measure type are provided in Table 11-12 and Figure 11-8. The successful implementation of the programs to manage PCB-containing materials during building demolition by all Santa Clara Valley Co-Permittees on or before July 1, 2019 resulted in 627 g/yr of PCBs load reduction during FY 19-20. Prior to FY 19-20, the total cumulative load of PCBs reduced across the Santa Clara Valley was 384 g/yr. Nearly half of this load reduction was due to source property identification and referral, which provided 183 g/yr of PCBs load reduction. Based on the results of the cost-benefit analyses conducted as part of the CW4CB Project, source property identification and abatement remains the most cost-effective control measure currently available for reducing PCBs loads to the Bay. The Program continues to conduct source property investigations to identify additional source properties for referral and/or abatement in the future.

Parcel-based GSI (i.e., new and re-development) projects have been and will continue to be important controls for reducing PCBs. Table 11-12 and Figure 11-8 demonstrate the importance of GSI installation as part of parcel-based redevelopment projects in the Santa Clara Valley. Since FY 13-14, more than 5,348 acres have undergone new or redevelopment in the Santa Clara Valley and are currently treated by GSI facilities, including more than 1,762 acres of old industrial and 2,324 acres of old urban land uses. The installation of GSI facilities on private and public lands that have undergone redevelopment contributes 102 g/yr of PCBs load reduction. These data demonstrate the 2020 MRP performance criterion of 37 g/yr of PCBs loads reduced through GSI across the Santa Clara Valley has been achieved and exceeded.

By comparison, public green street projects currently account for less than 1% of the PCBs loads reduced to-date (Table 11-12). With the development and implementation of Co-permittee GSI Implementation Plans that are required by the MRP, green street and regional projects are expected to increase over the next decade. With this increase in these projects, PCBs load reductions are expected to increase as well over time.

Large FTC systems (i.e., HDS Units) owned and operated by Co-permittees also play an important role in reducing PCBs reaching the Bay from the Santa Clara Valley. To-date, more than 15,600 acres of land, including 1,200 acres of old industrial land use, have been treated by these systems. The bulk of land treated by these systems are located in the cities of San José and Sunnyvale. Currently, these systems provide an additional 100 g/yr of PCBs load reductions.

Not all source and treatment control measures that are currently implemented in the Santa Clara Valley are included in the load reductions achieved during MRP 2.0 that are presented in Tables 11-11 and 11-12, and Figures 11-7 and 11-8. Only control measures that had accounting methodologies provided in the *Interim Accounting Methodology for TMDL Loads Reduced* are reported in this section. For SCVURPPP Co-permittees, load reductions due to enhanced O&M that occurs with the installation of small inlet-based FTC devices is not reported in this section. However, accounting methods and required data inputs have been provided for these controls in the recently completed *Source Control Load*

Reduction Accounting for RAA report that is included as an attachment to Appendix 11-1. The load reductions associated with any new or updated accounting methods provided in that report are included in the *PCBs and Mercury TMDL Control Measure Implementation Plan and RAA* (Appendix 11-1) and will be reported in future Annual Reports.

Table 11-11. Total annual PCBs loads reduced by all Santa Clara Valley Co-permittees during MRP 2.0 (FY13-14 – FY19-20).[1,2]

Permittee	PCBs Loads Reduced (g/yr)							
	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Cumulative Load Reduced
Cupertino	1.2	0.1	0.2	0.1	1.6	4.1	21	**28**
Los Altos	0.7	0.2	0.1	0.1	0.1	0.0	11	**12**
Los Altos Hills	0	0	0	0	0	0	3	**3**
Milpitas	0.1	0.1	1.7	2.3	1.9	1.6	24	**32**
Mountain View	4.2	3.7	0.5	1.7	0.4	6.9	28	**45**
Palo Alto	1.9	2.7	1.8	0.7	1.1	1.8	23	**33**
San Jose	18	8.7	32	45	6.4	18	353	**482**
Santa Clara	2.9	2.5	2.1	4	1.2	25	40	**78**
Santa Clara County Unincorporated	2.3	0.2	1.0	0.4	0.2	0.0	34	**38**
Sunnyvale	1.5	2.2	11	2	149	1.0	51	**217**
West Valley Communities	0.4	0.2	1.0	1.4	0.1	0.5	39	**43**
TOTAL - All Co-permittees	***33***	***21***	***52***	***57***	***162***	***59***	***627***	**1,011**

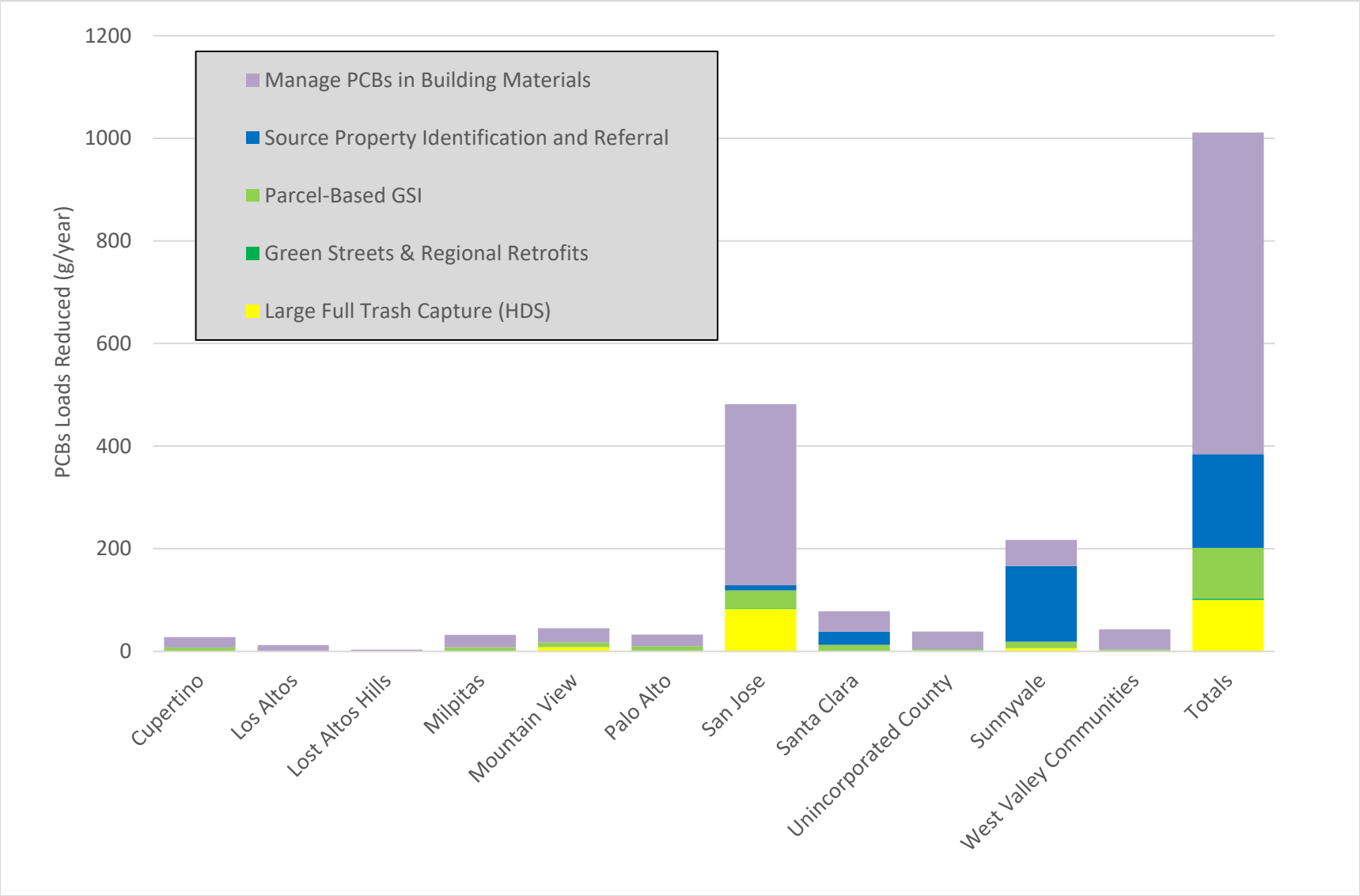

Figure 11-7. PCBs Loads Reduced by each Co-Permittee within the Santa Clara Valley by Control Measure Category (FY 13-14 through FY 19-20).

Table 11-12. Total Annual PCBs Loads Reduced in the Santa Clara Valley during MRP 2.0 by Control Measure Category and Fiscal Year.

Control Measure Category		PCBs Loads Reduced (g/yr)							
		FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Cumulative Load Reduced
Source Property Identification and Referral	Leo Avenue Property (San José)	--	--	10.1	--	--	--	--	**10**
	East Hendy Avenue Property (Sunnyvale)	--	--	--	--	147	--	--	**147**
	Brokaw Road Property (Santa Clara)	--	--	--	--	--	25	--	**25**
Green Stormwater Infrastructure and Other Stormwater Treatment Controls	Parcel Based Green Stormwater Infrastructure (i.e., New & Redevelopment Projects)	14	21	16	21	14	13	--	**99**
	Green Streets and Regional Retrofits	0.4	0.0	1.8	0.2	0.4	--	--	**2.9**
	Large Full Trash Capture Systems (Hydrodynamic Separators)[3]	19	--	24	36	--	21	--	**100**
Enhanced O&M Measures[4]		--	--	--	--	--	--	--	--
Manage PCBs in Building Materials[4]		--	--	--	--	--	--	627	**627**
Manage PCBs in Infrastructure[4]		--	--	--	--	--	--	--	--
Diversion to POTW[4]		--	--	--	--	--	--	--	--
Source Controls/Other[4]		--	--	--	--	--	--	--	--
Total - All Co-permittees & Controls		***33***	***21***	***52***	***57***	***162***	***59***	***627***	***1,011***

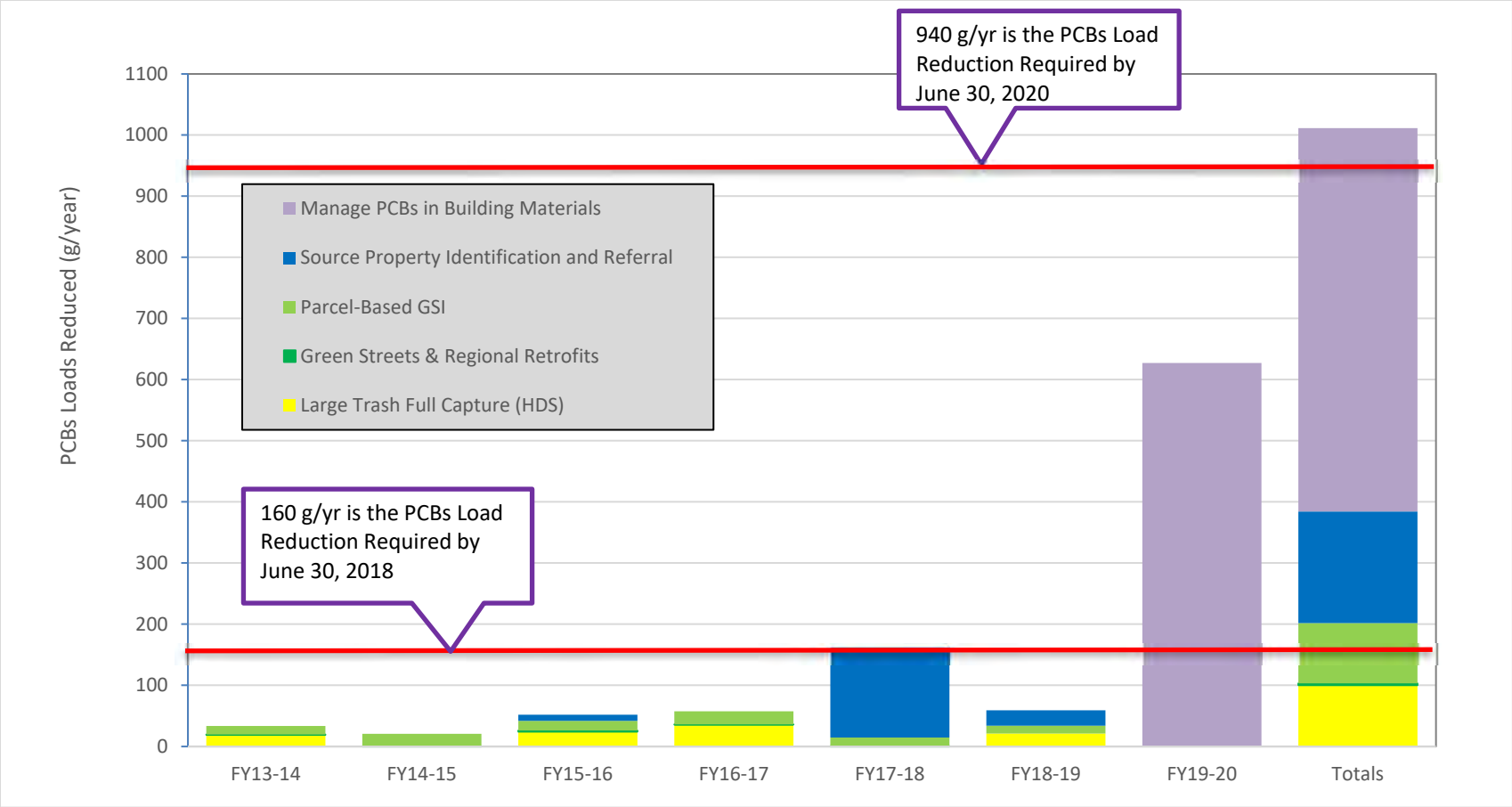

Figure 11-8. Total Annual PCBs Loads Reduced in the Santa Clara Valley during MRP 2.0 by Control Measure Category and Fiscal Year.

Mercury Loads Reduced in the Santa Clara Valley

Co-permittees in the Santa Clara Valley have reduced mercury by **2,132 g/year** during the MRP 2.0 compliance period (i.e., FY 13-14 to present). The mercury loads reduced by each Permittee are provided in Table 11-13 and Figure 11-9. Figure 11-9 illustrates the load reductions achieved each fiscal year across all Co-permittees, clearly demonstrating the substantial progress Co-permittees in the Santa Clara Valley have made to-date.

The mercury loads reduced by control measure category each fiscal year and the cumulative total for the Santa Clara Valley are presented in Table 11-14 and Figure 11-10. The largest single contributor to the mercury load reductions achieved to-date has been through parcel based new development and redevelopment projects where GSI has been installed. New and redevelopment projects have been and continue to be implemented across all Santa Clara Valley Co-permittees. These projects currently account for 55% of the mercury load reduction. By comparison, Green Street and regional retrofit projects account for 1% of the total mercury loads reduced to-date. These data demonstrate that the MRP performance criterion of 16 g/yr reduced through GSI by 2020 has been achieved.

Full trash capture systems are also an important component of mercury load reductions, accounting for 41% of the Program-wide total to-date. The remaining 2% load reduction results from the three source properties that were referred to the Regional Water Board, including the property on Leo Avenue in the City of San José, the property on East Hendy Avenue in the City of Sunnyvale, and the property on Brokaw Road in the City of Santa Clara.

The interim mercury load reduction target of 16 g/yr through green stormwater infrastructure has already been achieved. Continued progress is expected from ongoing redevelopment and retrofit of treatment controls (including full trash capture systems) into existing old industrial and old urban land uses throughout the remainder of the permit term.

As noted previously, mercury load reductions are not reported here for all controls that have been implemented to-date, including increases in the frequency of inlet cleaning associated with inlet-based full trash capture devices, and mercury removed via Valley Water's stream maintenance activities. Over the next fiscal year, efforts will be made to document the information required to account for these actions. As progress is made on continued implementation of mercury control measures, the Program will document load reductions achieved in future reports.

As noted previously, load reductions achieved through controls that were not included in the *Interim Accounting Methodology for TMDL Loads Reduced* are not reported in this section. Additional control measures are included in the *PCBs and Mercury TMDL Control Measure Implementation Plan and RAA* (Appendix 11-1) and will be reported in future Annual Reports.

Table 11-13. Total annual mercury loads reduced by all Santa Clara Valley Co-permittees during the MRP 2.0 term to date (FYs 13-14 to 19-20).[1,2]

Permittee	Mercury Loads Reduced (g/yr)							
	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Cumulative Load Reduced
Cupertino	13	0.7	1.6	0.3	24	28	0	**67**
Los Altos	4.9	1.1	0.9	0.5	0.9	0.0	0	**8**
Los Altos Hills	0	0	0	0	0	0	0	**0**
Milpitas	1.0	1.0	22	32	28	18	0	**103**
Mountain View	46	52	4.7	19	4.2	71	0	**198**
Palo Alto	18	28	15.1	7.8	14.5	25	0	**109**
San Jose	170	117	203	449	83	162	0	**1,184**
Santa Clara	34	26	28	47	8.4	8	0	**151**
Santa Clara County Unincorporated	18	1.4	6.9	2.6	1.3	0	0	**30**
Sunnyvale	12	31	123	20	51	7.2	0	**245**
West Valley Communities	2.6	1.5	7.8	17.4	0.7	6.0	0	**36**
TOTAL - All Co-permittees	***320***	***260***	***413***	***596***	***217***	***325***	***0***	***2,132***

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.
2 - Load Reductions have not yet been calculated for the following control measures: Source Controls/Other. Not all enhanced O&M measures have been included in the load reductions reported here. These will be added as updates in future annual reports.

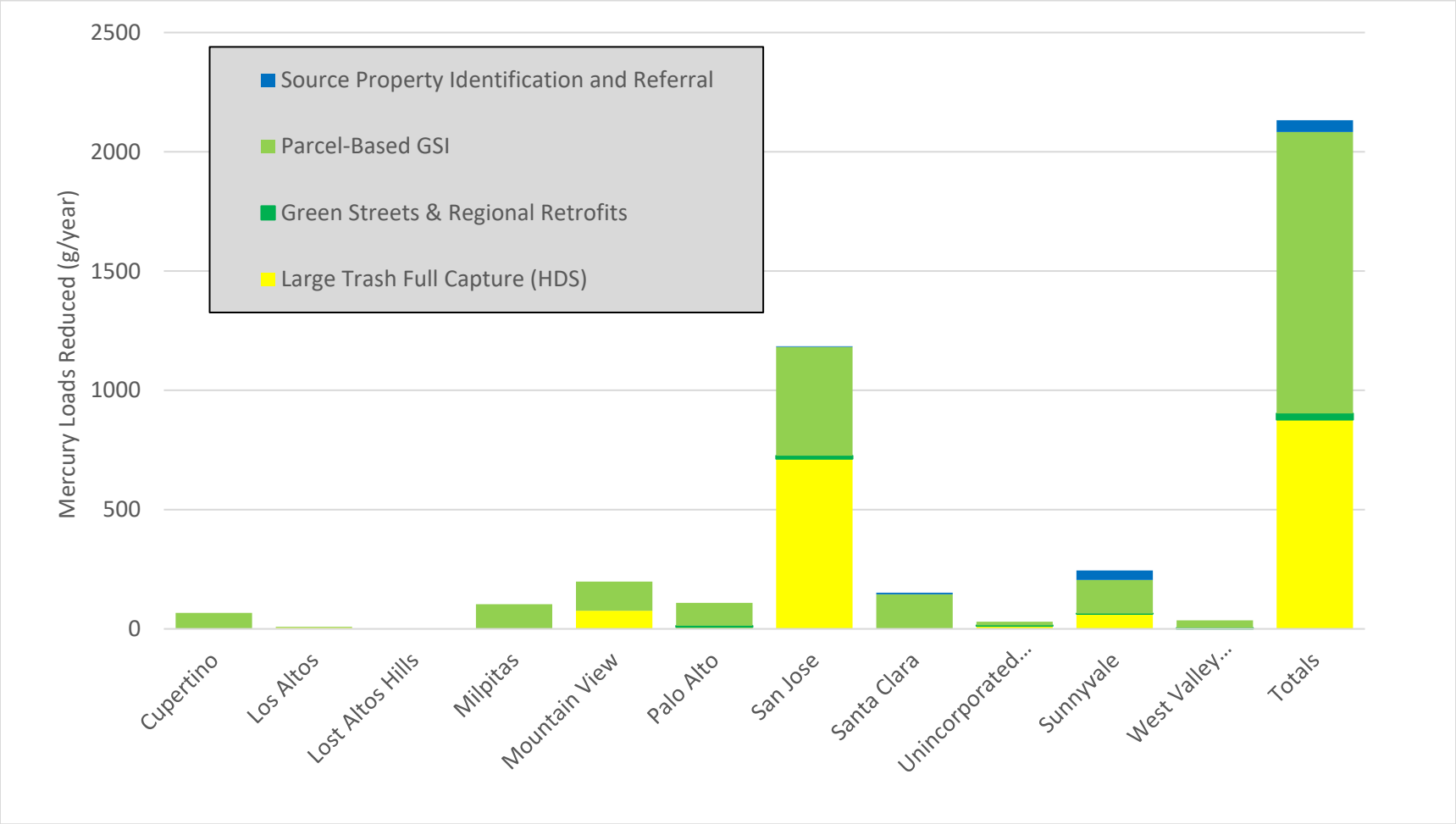

Figure 11-9. Mercury Loads Reduced by each Permittee within the Santa Clara Valley by Control Measure Category (FY 13-14 through FY 19-20).

Table 11-14. Total Annual Mercury Loads Reduced in the Santa Clara Valley during MRP 2.0 by Control Measure Category and Fiscal Year.

Control Measure Category		Mercury Loads Reduced (g/yr)							
		FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Cumulative Load Reduced
Source Property Identification and Referral	Leo Avenue Property (San José)	--	--	2.7	--	--	--	--	**2.7**
	East Hendy Avenue Property (Sunnyvale)	--	--	--	--	--	--	--	**40**
	Brokaw Road Property (Santa Clara)	--	--	--	--	7	--	--	**6.8**
Green Stormwater Infrastructure and Other Stormwater Treatment Controls	Parcel Based Green Stormwater Infrastructure (i.e., New & Redevelopment Projects)	154	260	188	275	130	--	--	**1,180**
	Green Streets and Regional Retrofits	3.3	0.1	15	3.6	--	--	--	**26**
	Large Full trash capture Systems (Hydrodynamic Separators)[3]	163	--	208	318	188	--	--	**877**
Enhanced O&M Measures[4]		--	--	--	--	--	--	--	--
Manage PCBs in Building Materials[4]		--	--	--	--	--	--	--	--
Manage PCBs in Infrastructure[4]		--	--	--	--	--	--	--	--
Diversion to POTW[4]		--	--	--	--	--	--	--	--
Source Controls/Other[4]		--	--	--	--	--	--	--	--
Total - All Co-permittees & Controls		***320***	***260***	***413***	***596***	***217***	***325***	***0***	***2,132***

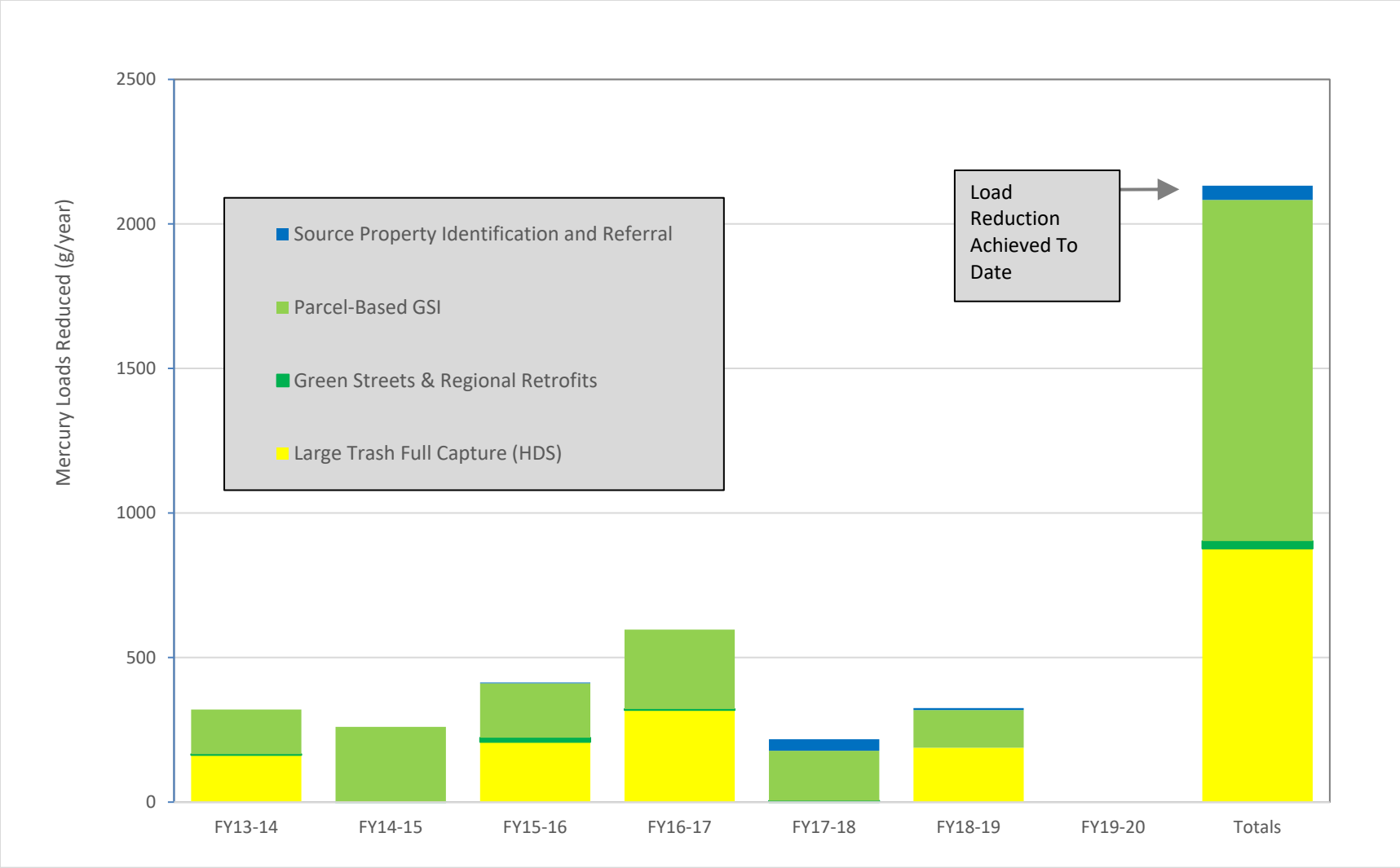

Figure 11-10. Mercury Loads Reduced in the Santa Clara Valley During MRP 2.0 by Control Measure Category and Fiscal Year.

■ TMDL Implementation Plan and Reasonable Assurance Analysis (RAA)

In parallel to documenting PCBs and mercury control measures that have been implemented during MRP 2.0 and calculating the associated loads reduced using the *Interim Accounting Methodology for TMDL Loads Reduced* (see previous section), the Program also continued moving forward in FY 19-20 with actions to address MRP requirements in Provisions C.11/12.d, C.11/12.c and C.3.i. Specifically, C.11/12.d requires Permittees to submit a PCBs and Mercury Control Measures Implementation Plan and corresponding Reasonable Assurance Analysis (RAA) that demonstrates quantitatively that the plan will result in PCBs and Mercury load reductions sufficient to attain TMDL wasteload allocations by 2030 and 2028, respectively. The plan must include the following:

- Identify all technically and economically feasible PCBs control measures to be implemented (including green infrastructure projects); and
- Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and
- Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Provisions C.11/12.c and C.3.i include requirements specific to green stormwater infrastructure planning and implementation, including development of an RAA to quantitatively demonstrates the following:

- Mercury reductions of at least 10 kg/yr and PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of GSI projects throughout the permit-area.
- Quantify the relationship between the areal extent of green infrastructure implementation and PCBs load reductions, taking into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies.
- Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040.
- Estimate the amount of PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.
- Quantitatively demonstrate that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects.
- Ensure that the calculation methods, models, model inputs and modeling assumptions used to fulfill C.12.c.ii (2)a-d have been validated through a peer review process.

Co-permittees are required to submit the quantitative relationship between GSI implementation and PCBs load reductions with their 2018 Annual Reports, including all data used and a full description of models and model inputs relied on to establish this relationship.

To begin addressing these requirements, the Program and Co-permittees conducted a regional project via BASMAA to develop the *Bay Area Reasonable Assurance Analysis Guidance Document* which establishes a regional framework and provides guidance for conducting PCBs and mercury RAAs in the San Francisco Bay Area. A regionally representative project management team, consisting of SCVURPPP Co-permittee and Program staff and staff from other countywide stormwater programs, and a Technical Advisory Committee (TAC) were convened for the development of the RAA Guidance Document. The

TAC was comprised of Regional Water Board Staff, USEPA Region 9 staff, and industry experts and served to provide "technical peer review" for the document from an objective regulatory and/or technical perspective. The *Bay Area Reasonable Assurance Analysis Guidance Document* was finalized on June 30, 2017. In late 2017, a BASMAA RAA workgroup was formed as an outgrowth of the BASMAA RAA Guidance Document. The work group consists of member agency staff and technical consultants to work on RAA development for Bay Area Programs. The purpose of the work group was to help the Bay Area Programs move forward with consistent RAA approaches and to provide a forum for collaboration by BASMAA Phase I member agencies in an effort to create transparent and consistent assumptions and approaches to the development of countywide PCBs and Mercury RAAs.

During FY 17-18, SCVURPPP created a RAA work plan for addressing all MRP requirements associated with the RAA, which includes tasks for modeling the baseline PCBs and mercury loads from the Santa Clara Valley watersheds to the Bay and developing load reduction accounting methodologies used to demonstrate compliance with TMDL wasteload allocations. The Program also formed a SCVURPPP RAA Work Group to oversee the development of the RAA for the Santa Clara Valley. Via the RAA Work Group, the Program evaluated a number of existing hydrologic/hydraulic modeling platforms, water quality models and stormwater treatment modules that were available to develop baseline loading estimates and quantify reductions via GSI over time. The Program selected a combination of LSPC (Loading Simulation Program C++) and SUSTAIN (System of Urban Stormwater Treatment & Analysis Integration). LSPC is used to simulate baseline hydrology and pollutant loading for characterization of existing conditions, to compare baseline pollutant loads to TMDL wasteload allocations and pollutant reductions for GSI required by the MRP, and determine stormwater improvement goals to be achieved by GSI. SUSTAIN is used to simulate processes within GSI facilities, estimate volume captured and pollutant loads reduced, and compare load reductions to goals set for determination of the amount of GSI needed within each municipality. The Program, via its RAA consultant, developed a document identifying the quantitative relationship between GSI and PCBs load reductions for the Santa Clara Valley, including all data used and a full description of models and model inputs relied on to establish this relationship. The memorandum titled Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reduction was submitted with the SCVURPPP FY 17-18 Annual Report as Appendix 11-4 in compliance with provision C.11/12.c.iii on behalf of all Co-permittees.

During FY 18-19, the Program and Co-permittees continued the RAA development process for the Santa Clara Valley with ongoing oversight by SCVURPPP RAA Work Group and participation in the BASMAA RAA Work Group. The Program's RAA Consultant completed development of the initial baseline hydrology model and conducted initial baseline water quality modeling for the Santa Clara Valley to determine the load reduction goals for PCBs and mercury and support Co-permittee GSI Plans.

During FY 19-20, the Program and Co-permittees, in coordination with the BASMAA RAA Work Group, finalized a control measures implementation plan and corresponding RAA for the Santa Clara Valley, which included the following tasks:

- **SCVURPPP RAA Work Group** -– The SCVURPPP RAA Work Group continued to meet as needed in FY 19-20 to oversee RAA development in the Santa Clara Valley. A total of three work group meetings were held in October 2019, November 2019 and May 2020.
- **BASMAA RAA Work Group –** Co-permittees continued to participate in the BASMAA work group. Two work group meetings were held in February 2020 and June 2020.
- **GSI RAA Modeling** – The Program's RAA Consultant finalized the GSI RAA Modeling for the Santa Clara Valley, including the following tasks:

- Finalized PCBs and mercury baseline modeling;
- Finalized modeling the water quality benefits of existing GSI facilities and GSI projected to occur by 2040 via redevelopment projects;
- Conducted RAA for GSI by quantifying the optimized level of future public GSI projects needed to achieve MRP PCBs/mercury reduction goals for GSI;
- Participated in the Peer Review Process facilitated by the BASMAA RAA Work Group for the Program's RAA for GSI; and
- Developed Draft and Final RAA Technical Reports for the Santa Clara Valley, including: the *Phase I RAA – Baseline Modeling Report* which describes the revised baseline pollutant modeling used to establish the starting point for measuring progress towards TMDL WLAs; and the *Phase II RAA – GSI Modeling Report* that describes the modeling conducted to identify the extent of GSI needed to achieve PCBs/mercury load reductions included in MRP Provision C.11/12.c.ii(2) by 2040. Both reports are included as attachments to Appendix 11-1.

- **Source Control Load Reduction Accounting for RAA** – The Program continued to participate in a BASMAA Regional Project to update and refine the *Interim Accounting Methodology for Loads Reduced* into methods that will be used to demonstrate load reductions via non-GSI control measures in the future. The BASMAAA project finalized the *Phase III RAA – Source Control Load Reduction Accounting Report* that describes the revised PCBs and mercury load reduction methodologies used to account for PCBs and mercury load reductions associated with implementation of source controls and non-GSI stormwater treatment (i.e., source controls). The final report is included as an attachment to **Appendix 11-1**.
- **TMDL Control Measures Implementation Plan and Reasonable Assurance Analysis** – The Program developed the *PCBs and Mercury TMDL Control Measure Implementation Plan and Reasonable Assurance Analysis for the Santa Clara Basin* (the Plan) that is included as **Appendix 11-1**. The Plan demonstrates the level of control measures needed to attain the TMDL Wasteload Allocations (WLAs) for PCBs and mercury in urban stormwater runoff in the Santa Clara Basin. The Plan describes the current and planned implementation actions to address PCBs and mercury and quantitatively demonstrates that those implementation actions will attain TMDL WLAs for PCBs and mercury based on modeling and load reduction quantification methods that are described in the Phase I, Phase II and Phase III RAA reports.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 12

Copper Controls

September 30, 2020

Section 12 Copper Controls

Introduction

Provision C.13 of the MRP is intended to address copper control measures identified in the Basin Plan that the Water Board has deemed necessary to support copper site specific objectives in San Francisco Bay. Requirements in the MRP are included in the following sub-provisions:

- C.13.a. Manage waste generated from cleaning and treating copper architectural features, including copper roofs, during construction and post-construction;
- C.13.b. Manage discharges from pools, spas and fountains that contain copper-based chemicals; and
- C.13.c. Industrial Sources.

In FY 19-20, activities associated with Provision C.13 were conducted at the Co-permittee and Program levels. Local actions are documented in each Co-permittee's section of the annual report. This section highlights copper control activities conducted at the Program level.

Program Activities

C.13.a Manage waste generated from cleaning and treating copper architectural features, including copper roofs, during construction and post-construction

Provision C.13.a. requires the management of wastewater generated from cleaning and treating of copper architectural features, including copper roofs, during construction and post-construction. The requirements include the following:

- Establish local ordinance authority to prohibit the discharge of water to storm drains generated from the installation, cleaning, treating, and washing of the surfaces of copper architectural features, including copper roofs.
- Educate installers and operators on appropriate BMPs to manage wastewater during and post construction and enforce against noncompliance. Require use of appropriate BMPs when issuing building permits.

To assist Co-permittees in implementing these requirements, Program staff developed a guidance memorandum that provides:

- A description of ordinances related to copper architectural features that have been adopted by Co-permittees;
- Model ordinance language that may be used to develop local ordinances;
- A condition added to the SCVURPPP Model Conditions of Approval to address copper source control in development projects; and
- Best management practices (BMPs) for managing wastewater generated from the installation, cleaning, treating, and washing of the surfaces of copper architectural features.

Program staff also developed a fact sheet entitled *Requirements for Copper Roofs and Other Architectural Copper - Protect water quality during installation, cleaning, treating, and washing!* for use in educating municipal staff, contractors, and property owners. The fact sheet describes BMPs for proper disposal of copper-containing wash water. The fact sheet was originally provided (via email) in 2012. Architectural copper BMPs were presented and discussed at the Program's *Construction Site Stormwater Inspection Workshops* on March 5 and 7, 2019.

C.13.b. Manage discharges from pools, spas and fountains that contain copper-based chemicals

Co-permittee efforts to manage discharges from pools, spas and fountains are described in their annual reports. This copper source is addressed in two ways: 1) through conditions of approval in the development project review process for new construction; and 2) through outreach to homeowners and pool maintenance businesses. Program staff assisted with implementation of this permit requirement by: 1) providing model conditions of approval requiring pools, spas and fountains to be connected to the sanitary sewer or drained to a nearby cleanout or landscaped area; and 2) continuing to reprint and distribute the brochure entitled *Draining Pools and Spas*, which provides information on proper methods of draining, maintaining, and cleaning pools and spas and avoiding use of copper-based algaecides.

C.13.c. Industrial Sources

Co-permittee efforts to manage industrial sources of copper are described in their annual reports. This copper source is addressed through routine industrial inspections conducted in compliance with Provision C.4. The BASMAA educational tools to train industrial inspectors to identify facilities likely to use copper or have sources of copper and proper BMPs continue to be available on the SCVURPPP website. Industrial sources of copper and appropriate BMPs were last presented at the Program's *IND/IDDE Stormwater Inspectors Training* in May 2016.

Copper (and other pollutant) Loads Removed via Street Sweeping

A summary of street sweeping activities conducted by Co-permittees is provided within the table entitled *Summary of Co-permittee Street Sweeping Activities- FY 2019-2020* (Appendix 12-1). All data presented within Appendix 12-1 was submitted to Program staff by individual Co-permittees for inclusion into this Annual Report.[1] During FY 19-20, Co-permittees swept approximately 195,312 miles of paved streets and removed approximately 51,200 yd^3 or 33,255 tons of material[2]. Approximately 64,107 yd^3 of leaf litter was also removed by Co-permittees who have leaf removal programs other than routine street sweeping. In addition, approximately 55,333 yd^3 and 168,952 tons of yard waste (which includes large amounts of leaves) was routinely collected by Co-permittees[3].

[1] All Co-permittees submitted data for inclusion into Appendix 12-1.

[2] To determine the total volume of material removed in tons, it is necessary to convert cubic yards to tons. It is estimated that the average density of street sweeping material is 1,299 pounds per cubic yard (0.6495 tons per cubic yard) (Source: EOA, Inc., October 1996, *Estimation of Copper Collected Through Street Sweeping Efforts*. Prepared for San Mateo Countywide Stormwater Pollution Prevention Program). A value of 33,255 tons is calculated when 51,200 cubic yards is converted over to tons (51,200 cubic yards* .6495 tons/cubic yard= 33,255tons).

[3] Co-permittees who collect yard waste calculate the total volume in yd^3 or total weight in pounds. Yard waste includes leaves. Co-permittees do not have the ability to separate the volume or weight of leaves from yard waste.

One way to measure street sweeping effectiveness is to determine what solids and associated pollutants are collected within street sweeping debris. A typical unit of measure is the total volume of the pollutant removed by the sweeper relative to the curb length swept (e.g., yd^3/curb mile). This unit is typically referred as the removal rate. In the case of this effectiveness evaluation, the Program uses average removal rate to show the effectiveness of Co-permittee street sweeping activities within the Program's jurisdiction. The average Co-permittee removal rate during FY 19-20 was 0.26 yd^3/curb mile (see Appendix 12-1) with a range from 0.005 yd^3/curb mile to 0.96 yd^3/curb miles. In comparison, the average Co-permittee removal rate during FY 18-19 was 0.33 yd^3/curb mile.

The removal rate is influenced by a number of factors including accumulation rates of pollutants, the relationship between rainfall and sweeping frequencies, particle size, pavement condition and automobile parking controls[4]. As a result, effectiveness (i.e., removal rate) may vary each year depending on a change to any one of these factors. Many studies have shown that street sweeping removes significant quantities of dirt and debris from street surfaces[5]. However, results also demonstrate that the coefficient of variation of copper values and other metals (e.g., lead and zinc) in street sweeping debris is quite high[6]. In addition, the estimated pollutant load reduction is dependent on the volume of material collected (i.e., the more material collected, the greater the pollutant removal).

To illustrate the effectiveness of street sweeping activities for pollutant removal, Program staff estimated the mean pollutant reduction for the following four metals: copper, nickel, lead and zinc. These estimates are provided within the tables entitled *Summary of Co-permittee Street Sweeping Activities and estimated Mean Pollutant Load Reduction for Copper and Nickel- FY 2019-2020* and *Summary of Co-permittee Street Sweeping Activities and estimated Mean Pollutant Load Reduction for Lead and Zinc- FY 2019-2020*. Both tables are provided within Appendix 12-1.

To determine the estimated pollutant load reduction (in pounds), the volume of material collected (in cubic yards) for each Co-permittee land use type (i.e., residential, commercial and industrial) was determined. This value was then multiplied by the mean concentration of trace metal content for street sweeping samples collected in the study entitled *Chemical and Physical Characteristics of Street Sweeping Sediments in Tampa, Florida, May 1999* and converted to pounds of pollutant removed (mean concentration values and the algorithm used to calculate the pounds of pollutant removed are provided in Appendix 12-1). The estimated mean pollutant load reduction values for each land use type were then summed. Estimated pollutant load reductions for copper, nickel, lead and zinc via street sweeping in FY 19-20 are presented in Table 12-1. Estimated removals for copper, nickel, lead and zinc because of street sweeping activities from FY 14-15 through FY 19-20 are presented in Figure 12-1. It is important to note that there is uncertainty with these estimates since certain assumptions were made regarding the exact volume of material collected from a particular land use type.

[4] Woodward Clyde Consultants, December 1994. *Street Sweeping Literature Review/Storm Inlet Modification*, Prepared for Alameda County Urban Runoff Clean Water Program.
[5] Sartor, J. and G. Boyd, 1972. *Water Pollution Aspects of Street Surface Contaminants*. Prepared for United States Environmental Protection Agency, Washington, DC.
[6] EOA, Inc, October 1996. *Estimation of Copper Collected Through Street Sweeping Efforts: Final Report*. Prepared for San Mateo Countywide Stormwater Pollution Prevention Program.

Table 12-1. Estimated average pollutant load reduction from street sweeping conducted by Co-permittees in FY 19-20.

Land Use Type	Estimated Mean Pollutant Load Reduction (Pounds)			
	Copper	Nickel	Lead	Zinc
Residential	665	1,314	1,238	1,667
Commercial	243	481	1,161	822
Industrial	705	136	661	544
Total	**1,612**	**1,931**	**3,060**	**3,033**

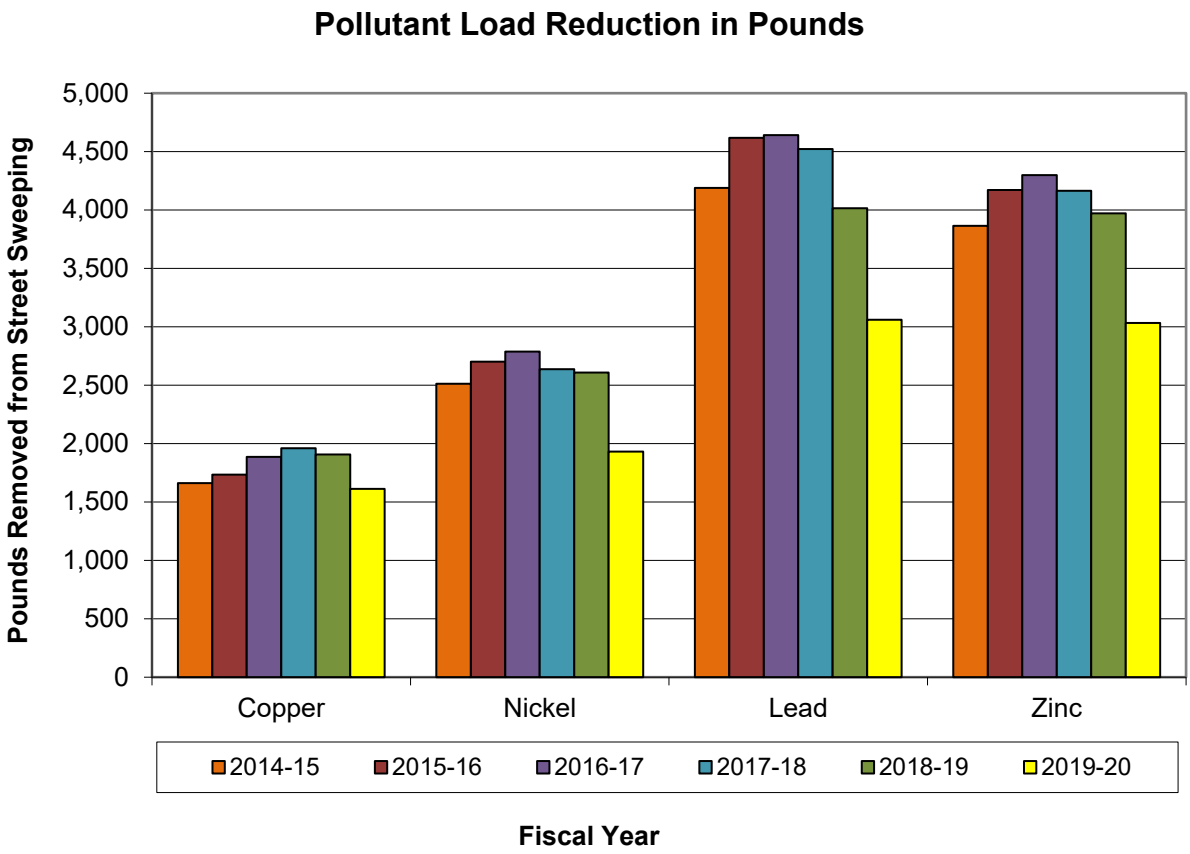

Figure 12-1. Estimated pollutant load reductions from Co-permittee street sweeping activities (in pounds) from FY 14-15 through FY 19-20.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Section 13

Exempted and Conditionally Exempted Discharges

September 30, 2020

Section 13 Exempted and Conditionally Exempted Discharges

Introduction

Provision C.15 identifies the types of non-stormwater discharges that are exempted from the discharge prohibitions in Provision A.1 if such discharges are unpolluted and do not violate water quality standards. Provision C.15 also conditionally exempts certain non-stormwater discharges from the discharge prohibitions in Provision A.1 if they are identified by the Co-permittee or the Executive Officer as not being sources of pollutants to receiving waters. Per Provision C.15.b., the following categories of non-stormwater discharges are conditionally exempted from Provision A.1 if they are either identified as not being sources of pollutants or if appropriate control measures are developed and implemented prior to the discharge, and monitoring and reporting occur:

- Pumped groundwater from non-drinking water aquifers;
- Pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;
- Air conditioning condensate;
- Emergency discharges resulting from firefighting activities;
- Individual residential car washing;
- Swimming pool, hot tub, spa and fountain water discharges;
- Irrigation water, landscape irrigation and lawn or garden watering.

This section describes the Program's activities to assist Co-permittees in reporting compliance with the requirements of C.15 and implementing appropriate control measures, monitoring and reporting for conditionally exempted discharges.

Program Activities

Potable Water System Discharges

The Water Utility Operation and Maintenance Pollution Prevention AHTG was formed to evaluate and recommend Program strategies for meeting requirements in Provision C.15.b.iii. under Order R2-2009-0074 (the previous MRP) for planned, unplanned and emergency discharges that apply to water utility operations. As of January 1, 2016, the reissued MRP no longer contains requirements related to potable water discharges, as these requirements are now contained in the State General Permit for Drinking Water Systems Discharges to Waters of the U.S. (Order WQ 2014-0194-DWQ). SCVURPPP Co-permittees that are also water utilities and may have potable water discharges have filed for coverage under the State General Permit.

In FY 15-16, the AHTG updated the SCVURPPP *Water Utility Operation and Maintenance Discharge Model Pollution Prevention Plan* (WUDPPP), which was approved by the Management Committee in February 2016, to reflect the State General Permit requirements. The WUDPPP is available on the Program website (www.scvurppp.org). The AHTG also developed field form templates, Fact Sheets on

visual turbidity monitoring, chlorine residual false positives, and General Permit requirements, and a guidance memo on identifying annual representative monitoring locations.

Program staff continue to communicate with the AHTG via email to inform the group of State General Permit requirement due dates and training opportunities.

Other Conditionally Exempted Discharges

In FY 16-17 Program staff updated the SCVURPPP Conditionally Exempted Discharges (CED) Report for MRP Provision C.15 and obtained approval by the Management Committee in December 2016. The final report is available on the Program website (www.scvurppp.org).

Public outreach efforts that would benefit from Program-wide collaboration are being addressed in the Program's Watershed Watch Campaign (see Section 7). The following activities were implemented to help the Program and Co-permittees comply with the outreach requirements for C.15.b.iv. Individual Residential Car Washing Discharge, C.15.b.v. Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges; and C.15.b.vi.(1)(a) Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering:

C.15.b.iv. Individual Residential Car Washing Discharge:

- Continued distributing the "Clean Cars and Clean Creeks" brochure at outreach events. The brochure can be downloaded from Watershed Watch website and is available in four languages (English, Spanish, Chinese and Vietnamese). The brochure recommends washing your car at a commercial car wash and also provides pollution prevention BMPs for washing your car at home.
- The Watershed Watch Campaign once again partnered with two commercial car washes (Classic Car Wash and Capitol Premier Car Wash) to conduct discounted car wash events in Fall 2019. Customers received 50% off car washes at these events and were provided with information about proper car washing practices and general stormwater pollution prevention. Three 50% off car wash events scheduled for May and June 2020 were canceled due to the COVID-19 order and replaced with an on-air contest. Montague Premier Car Wash (located at 790 Montague Expressway, San José), a Watershed Watch partner, donated 40 full-service car wash gift cards for the contest. The contest ran on four radio stations from June 29 through July 10. Participating radio stations were: KBAY, KEZR, KUFX and KRTY. Radio DJs for KBAY, KEZR and KUFX directed listeners to their station websites to enter to win, and KRTY announced the daily question and took responses to award one car wash gift card per weekday to someone who answered correctly. SCVURPPP staff provided them with questions that were previously approved for use in the Watershed Watch monthly Facebook quiz. Additional details on this promotion are included in Section 7 of this Annual Report.
- The following commercial car washes provided discounts on car washes to residents using the Watershed Watch Discount Card: Classic Car Wash, Capitol Premier Car Wash, Pacific Car Wash, Montague Premier Car Wash, Sunnyvale Carwash & Detail, Vikhar Valero, and Sunnyvale Car Spa. Details on these partnerships and discounts are available on the Watershed Watch website at http://www.mywatershedwatch.org/partners-discounts/current-partners/.

C.15.b.v. Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

- The "Draining Pools, Spas and Fountain Water" brochure is available for download on the Watershed Watch website. The brochure provides information on potential pollutants in pool, spa and fountain discharges; proper methods for maintaining, cleaning and draining pools, spas and fountains; and how to find the closest sanitary sewer cleanout.

C.15.b.vi.(1)(a). Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

- The Watershed Watch website continued to include information on water conservation and proper lawn and garden watering.

Additional details on these activities are included in Section 7 of this Annual Report.

Regional Activities

Program staff continues to participate in the regional Water Agency Task Force (WATF) which serves as a forum to discuss the implementation of the State General Permit for drinking water systems discharges and the reissuance of the permit. The Task Force met once in FY19-20 on December 5, 2019.

Program and Co-permittee staff actively participated in the BASMAA MRP 3.0 Discharges Associated with Firefighting Foam Workgroup to discuss with Water Board staff issues to be addressed in Provision C.15.b.iii of MRP 3.0. There was one meeting held on February 25, 2020.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Water Environment Federation
the water quality people

National Municipal Stormwater and Green Infrastructure Awards Program
Overall Highest Score
Phase I Organization

FY 2019-2020 Annual Report

Submitted in Compliance with NPDES Permit No. CAS612008 (Order R2-2015-0049)

Program Annual Report Appendices

September 30, 2020

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San José • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

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- Management Committee Representatives/Attendees
- SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Appendix 7-4: Watershed Watchers: Keeping Our Waterways Clean: FY 19-20 Fourth Quarter Report April-June 2020

Appendix 7-5: Zun Zun School Assemblies for Watershed Watch FY 19-20

- Memorandum – End-of-Year Evaluation of the FY 19-20 School Assembly Program, August 7, 2020
- Zun Zun Assembly Programs for Watershed Watch – Final Report FY 2019-2020 School Year

Section 8: Water Quality Monitoring

Appendix 8-1: PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project: Project Report – June 30, 2020

Section 9: Pesticides Toxicity Control

Appendix 9-1: IPM Store Partnership Program

- List of Stores in the IPM Store Partnership Program and Training Dates
- Our Water – Our World Training Pre-Training Survey Summary
- Our Water – Our World Training Post-Training Survey Summary

Appendix 9-2: FY 19-20 Green Gardener Training Program

- Santa Clara Valley Green Gardener Training Program – FY 19-20 Activities
- Green Gardener Final Evaluation Summary
- Green Gardener Training Announcements – English & Spanish
- Green Gardener List

Appendix 9-3: CASQA Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020

Appendix 9-4: BASMAA Annual Reporting for FY 2019-2020 Regional Supplement for Training and Outreach

Section 11: Mercury and PCBs Controls

Appendix 11-1: PCBs and Mercury TMDL Control Measure Implementation Plan & Reasonable Assurance Analysis for the Santa Clara Basin

Appendix 11-2: PCBs in Building Materials Management Program

- Regional Data Summary
- Regional Collaboration for a Data Collection and Assessment Program

Section 12: Copper Controls

Appendix 12-1: Collection of Street Sweeping Data- Co-permittees

- Summary of Street Sweeping Activities for FY 2019-2020
- Summary of Co-permittee Street Sweeping Activities and Estimated Mean Pollutant Load Reduction for Copper and Nickel - FY 2019-2020
- Summary of Co-permittee Street Sweeping Activities and Estimated Mean Pollutant Load Reduction for Lead and Zinc - FY 2019-2020

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 1-1

Updated Confirmation Statements from Milpitas, Cupertino, Santa Clara County, Los Altos and Mountain View designating a Management Committee representative and/or alternate

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: 7/11/19

Name of Co-permittee: City of Milpitas

Name of Management Committee Representative: Elaine Marshall

Email and phone number of Representative: emarshall@ci.milpitas.ca.gov
408-586-2603

Name of Management Committee Alternate (if any): Kan Xu

Email and phone number of Alternate Representative: kxu@ci.milpitas.ca.gov
408-586-3253

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor:

Title of Appropriately Delegated Supervisor: Public Works Director

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: 9/5/2019

Name of Co-permittee: City of Cupertino

Name of Management Committee Representative: Alex Wykoff

Email and phone number of Representative: AlexW@cupertino.org 408 777-3255

Name of Management Committee Alternate (if any): Roger Lee

Email and phone number of Alternate Representative: 408-777-3354

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: Chris Dorally

Title of Appropriately Delegated Supervisor: Environmental Programs Mgr. Public Works Dept.

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: 10/10/19

Name of Co-permittee: County of Santa Clara

Name of Management Committee Representative: Julianna Martin

Email and phone number of Representative: julianna.martin@cep.sccgov.org (408) 918-4684

Name of Management Committee Alternate (if any): Garik Iosilevsky

Email and phone number of Alternate Representative: garik.iosilevsky@cep.sccgov.org (408) 282-3186

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: DocuSigned by: Jo Zientek 23BC95461D52437...

Title of Appropriately Delegated Supervisor: Director

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: 12/9/19

Name of Co-permittee: City of Cupertino

Name of Management Committee Representative: Ursula Syrova

Email and phone number of Representative: UrsulaS@cupertino.org
408-777-7603

Name of Management Committee Alternate (if any): Alex Wykoff

Email and phone number of Alternate Representative: AlexW@cupertino.org
408-777-3255

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: Roger S. Lee

Title of Appropriately Delegated Supervisor: Director of Public Works

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: 1/14/20

Name of Co-permittee: City of Los Altos

Name of Management Committee Representative: Andrea Trese

Email and phone number of Representative: atrese@losaltosca.gov/650-947-2602

Name of Management Committee Alternate (if any): Emiko Ancheta

Email and phone number of Alternate Representative: eancheta@losaltosca.gov/650-947-2646

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: Aida Fanine

Title of Appropriately Delegated Supervisor: Engineering Services Manager

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: February, 19, 2020

Name of Co-permittee: City of Mountain View

Name of Management Committee Representative: Carrie Sandahl

Email and phone number of Representative: carrie.sandahl@mountainview.gov
650-903-6224

Name of Management Committee Alternate (if any): Eric Anderson

Email and phone number of Alternate Representative: eric.anderson@mountainview.gov
650-903-6821

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: _____

Title of Appropriately Delegated Supervisor: Fire Marshal

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: March 2, 2020

Name of Co-permittee: County of Santa Clara

Name of Management Committee Representative: Vanessa Maracadejas

Email and phone number of Representative: vanessa.maracadejas@cep.sccgov.org
(408) 282-3165

Name of Management Committee Alternate (if any): Julianna Martin

Email and phone number of Alternate Representative: julianna.martin@cep.sccgov.org
(408) 918-4684

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: Jo Zientek

Title of Appropriately Delegated Supervisor: Director, CEPA

CONFIRMATION OF AUTHORIZATION FOR NPDES PERMIT SUBMITTALS BY SCVURPPP PROGRAM MANAGER

Date: 8/18/20

Name of Co-permittee: City of Los Altos

Name of Management Committee Representative: Emiko Ancheta

Email and phone number of Representative: eancheta@losaltosca.gov/650-947-2646

Name of Management Committee Alternate (if any): Thanh Nguyen

Email and phone number of Alternate Representative: tnguyen@losaltosca.gov/650-947-2624

This is to confirm that the above referenced individuals have been officially designated and duly authorized to vote in their capacities as representative and alternate representative to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Management Committee, and that such prior designations and authorizations extend to casting votes to direct the SCVURPPP Program Manager to provide certain reports to the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) on behalf of the above referenced co-permittee as required by NPDES permits adopted by the Regional Water Board and in compliance with the signatory and certification for such reports in the manner required as specified by the Regional Water Board with respect to municipal stormwater permit programs in the San Francisco Bay Area.

Signature of Appropriately Delegated Supervisor: Aida Fanie

Title of Appropriately Delegated Supervisor: Engineering Services Manager

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 3-1

Annual C.3 Workshop: Installation and O&M Inspections of Stormwater Treatment Measures – October 29, 2019

- Workshop Announcement
- Workshop Agenda
- Attendance List
- Workshop Evaluation Summary

Annual C.3 Workshop: Installation and O&M Inspections of Stormwater Treatment Measures

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October 29, 2019

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

WORKSHOP ANNOUNCEMENT

Annual C.3 Workshop

Installation and O&M Inspections of Stormwater Treatment Measures

Tuesday, October 29, 2019
8:00/9:00 am – 3:00 pm**

Mountain View Community Center
Redwood Hall
201 S. Rengstorff Avenue, Mountain View

***8:00 am – 9:00 am - "Basic Training"** (for staff with little prior stormwater experience).*
9:00 am start time for main workshop!

Who should attend this workshop: Municipal stormwater program coordinators, planning and public works staff, and consultants that:

- Design and construct public projects
- Oversee stormwater treatment measure inspections
- Conduct stormwater treatment measure inspections

Workshop topics:

- Requirements for inspecting stormwater treatment measures
- Guidance on conducting installation and routine O&M Inspections
- Design for maintenance: lessons learned from the field
- Maintaining plant health and trimming guidance
- Data collection and management, and tools for compliance

*There will be **no charge** for the workshop. Continental breakfast & box lunch will be served.*
Please pass this flyer to appropriate staff within your organization.

Registration Link

https://c3_inspection_workshop_oct29.eventbrite.com

Registration Deadline: Thursday, October 24, 2019. Questions? Call Lynn Pinell at 510-832-2852 ext. 101 or email lpinell@eoainc.com

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Annual C3 Workshop

Installation and O&M Inspections of Stormwater Treatment Measures

Tuesday, October 29, 2019

City of Mountain View Community Center, Redwood Hall
201 S. Rengstorff Avenue, Mountain View

WORKSHOP AGENDA

8:00 AM	Early Registration for Basic Training (and Refreshments)	
8:15 AM	Pre-Workshop Basic Training– Stormwater Controls for Development Projects	Jill Bicknell *SCVURPPP*
9:00 AM	Registration (for registrants not attending Basic Training)	
9:15 AM	**Main Workshop** Introduction – Why Do We Do Inspections?	Jill Bicknell
9:30 AM	What Do We Look For During Installation Inspections? - Key Elements to Inspect and Common Issues	Peter Schultze-Allen *SCVURPPP*
10:15 AM	Design for Maintenance: Lessons Learned from the Field	Kristin Kerr *SCVURPPP*
10:45 AM	**BREAK**	
11:00 AM	Panel Discussion - Internal Communication and Processes • Checklists • Tracking Processes • Data Management Systems	Permittee staff
11:45 AM	Mosquito Breeding and Stormwater Treatment Measures	Santa Clara County Vector Control staff
12:00 PM	**LUNCH**	
12:45 PM	What Do We Look For During Routine O&M Inspections? - Common Problems and Solutions	Peter Schultze-Allen
1:30 PM	Maintaining Plant Health and Trimming Guidance	Thomas Eddy *San Jose*
2:15 PM	Panel Discussion – Experience from the Field • Inspection Challenges and Solutions • Addressing Common Issues	Permittee staff
3:00 PM	Adjourn	

*** Attendance at the workshop is acceptable for 5.5 PDUs toward maintaining CPESC, CESSWI and/or CPSWQ certifications. ***

	Agency	Last	First	Main Workshop
1	City of Campbell	Schloetter	Michael	X
2	City of Campbell	Siudzinski	Robert	X
3	City of Campbell	Taormina	Ron	X
4	City of Campbell	Villanueva	Arlyn	X
5	City of Campbell	Wahidi	Syed	X
6	City of Cupertino	Barone	Dan	X
7	City of Cupertino	Baumgartner	Lori	X
8	City of Cupertino	Mosley	Chad	X
9	City of Cupertino	Pagan	Winnie	X
10	City of Cupertino	Rieden	Kevin	X
11	City of Los Altos	Chen	Victor	X
12	City of Los Altos	Fairman	Aida	X
13	City of Los Altos	Kim	Kahty	X
14	City of Los Altos	Musaefendic	Harun	X
15	City of Los Altos	Trese	Andrea	X
16	City of Los Altos	Watanabe	Gaku	X
17	City of Milpitas	Alonzo	Roberto	X
18	City of Milpitas	Liu	Jennifer	X
19	City of Milpitas	Petrovic	Brian	X
20	City of Monte Sereno	Kahn	Jessica	X
21	City of Mountain View	Abdon	Gabrielle	X
22	City of Mountain View	Anderson	Eric	X
23	City of Mountain View	Boyd	Martin	X
24	City of Mountain View	Fung	Wing	X
25	City of Mountain View	Gabon	Marichrisse	X
26	City of Mountain View	Gomes	Jose	X
27	City of Mountain View	Kopper	Lauren	X
28	City of Mountain View	Printy	David	X
29	City of Mountain View	Sandahl	Carrie	X
30	City of Palo Alto	Aguirre	David	X

	Agency	Last	First	Main Workshop
31	City of Palo Alto	Boyle Rodriguez	Pam	X
32	City of Palo Alto	Chun	Pam	X
33	City of Palo Alto	Fujimoto	Christopher	X
34	City of Palo Alto	Godinez	Oscar	X
35	City of Palo Alto	Henderson	Chuck	X
36	City of Palo Alto	Kumar	Ajay	X
37	City of Palo Alto	Mcpherson	Todd	X
38	City of Palo Alto	Mora	Fermin	X
39	City of Palo Alto	Myers	Lisa	X
40	City of Palo Alto	Petithomme	Tony	X
41	City of Palo Alto	Richman	Angela	X
42	City of Palo Alto	Zacharczuk	Isabel	X
43	City of San Jose	Ajluni	Nicholas	X
44	City of San Jose	Alviar	Armand	X
45	City of San Jose	Barajas	Trino	X
46	City of San Jose	Bebeau	William	X
47	City of San Jose	Brasil	David	X
48	City of San Jose	Campos	Jose	X
49	City of San Jose	Colin	Pedro	X
50	City of San Jose	Duran	Paul	X
51	City of San Jose	Eddy	Thomas	X
52	City of San Jose	Ernst	Heather	X
53	City of San Jose	Esparza	Gabriela	X
54	City of San Jose	Flores	Ruben	X
55	City of San Jose	Garcia	Paul	X
56	City of San Jose	Hernandez	Miguel	X
57	City of San Jose	Jillo	Mahmoud	X
58	City of San Jose	Massey	Brandon	X
59	City of San Jose	Murphy	Bryan	X
60	City of San Jose	Ngo	Tiffany	X

	Agency	Last	First	Main Workshop
61	City of San Jose	Ody	Phil	X
62	City of San Jose	Osuna	George	X
63	City of San Jose	Parker	Robert	X
64	City of San Jose	Stagi	Jeremiah	X
65	City of San Jose	Uribe	Jose	X
66	City of San Jose	Zacarias	Jose	X
67	City of Santa Clara	Castro	Minette	X
68	City of Santa Clara	Cruz	William	X
69	City of Santa Clara	Erkel	Brent	X
70	City of Santa Clara	Folkes	Steven	X
71	City of Santa Clara	Hickey	Karin	X
72	City of Santa Clara	Keller	Veronica	X
73	City of Santa Clara	Lara	Yolanda	X
74	City of Santa Clara	McAvery	Jaime	X
75	City of Santa Clara	Nichols	Allen	X
76	City of Santa Clara	Perkins	Rinta	X
77	City of Santa Clara	Ramirez	Ismael	X
78	City of Santa Clara	Staub	Dave	X
79	City of Santa Clara	Warner	Raffles	X
80	City of Sunnyvale	Barajas	Jerardo	X
81	City of Sunnyvale	Brunnings	Matt	X
82	City of Sunnyvale	Choun	Julie	X
83	City of Sunnyvale	Tovar	Melody	X
84	City of Sunnyvale	Tripiano	Frank	X
85	City of Sunnyvale	Wilson	Bob	X
86	City of Sunnyvale	Wong	Joey	X
87	County of Santa Clara	Alcazar	Jose	X
88	County of Santa Clara	Caceres	Bernardine	X
89	County of Santa Clara	Cruz	Peter	X
90	County of Santa Clara	Ellsbury	Chris	X

	Agency	Last	First	Main Workshop
91	County of Santa Clara	Finley	Gavin	X
92	County of Santa Clara	Garcia	GIlbert	X
93	County of Santa Clara	Johnson	Jay	X
94	County of Santa Clara	Jones	Dave	X
95	County of Santa Clara	Lau	Grace	X
96	County of Santa Clara	Li	Christine	X
97	County of Santa Clara	Martin	Julianna	X
98	County of Santa Clara	Naraval	Herbert	X
99	County of Santa Clara	Njuguna	Nicodemus	X
100	County of Santa Clara	Roncal	Barni	X
101	County of Santa Clara	Yamaichi	George	X
102	CSG	Carroll	Kelly	X
103	Keish Environmental	Devore	Ashley	X
104	Ruth and Going	Sarmiento	Joseph	X
105	San Jose Airport	Avalos	Jose	X
106	Stanford University	Gu	Stanley	X
107	Stanford University	Hernandez	Gilbert	X
108	Town of Los Altos Hills	Kong	Kaho	X
109	Town of Los Altos Hills	Lee	Janelle	X
110	Valley Water	Bijoor	Neeta	X
111	Valley Water	Kammerer	Kylie	X
112	Valley Water	Shannon	Ashley	X
113	WVCWPA	Kinnon	Riley	X
114	WVCWPA	Schaer	Julie	X

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Installation and O&M Inspections of Stormwater Treatment Measures
Evaluation Form Summary

Number of Evaluations: 56
Number of attendees: 114

Community Center, Mountain View — Tuesday October 29,2019

1. **Stormwater Controls for Development Projects - Jill Bicknell, SCVURPPP**

Very Useful 39 **Somewhat Useful** 6 **Not useful** 0

Comments:
- I'm new to the field & found this very helpful
- Good coverage (3)

2. **Why Do We Do Inspections? - Jill Bicknell, SCVURPPP**

Very Useful 46 **Somewhat Useful** 0 **Not useful** 0

Comments:
- A brief overview is always appreciated
- Good information. Good detail

3. **What Do We Look for During Installation Inspections? - Peter Schultze-Allen, SCVURPPP**

Very Useful 46 **Somewhat Useful** 8 **Not useful** 0

Comments:
- Learning to do these is so very relevant (2)
- Would be nice to see a few different types of systems being built up step by step
- Good examples of what to avoid
- Producing more examples of common mistakes should be helpful
- Slides with pictures could have basics (i.e. good design or bad design, the location and name of the drainage structure

4. **Design for Maintenance: Lessons Learned from the field - Kristin Kerr, SCVURPPP**

Very Useful 44 **Somewhat Useful** 7 **Not useful** 1

Comments:
- Good to visit projects and lessons learned
- Good information
- Would have liked a bit more technical design insight

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

5. **Internal Communication and Processes - Panel Discussion**

Very Useful 37 **Somewhat Useful** 15 **Not useful** 1

Comments:

- Very helpful tools were shared and happy to know what others are implementing
- Interesting to see different processes
- Not relevant for small agency. Not very engaging
- Not enough discussion of practical applications of processes - too much background
- Only useful to compliance staff
- Names and emails of speakers for follow up questions

6. **Mosquito Breeding and Stormwater Treatment Measures - Noor Tietze, SCC Vector Control**

Very Useful 32 **Somewhat Useful** 21 **Not useful** 2

Comments:

- Really glad you invited this group to present
- Don't deal with it too much personally
- Interesting but limited practical info i.e. what can be done procedurally to address issues
- Perhaps too technical but basic idea was well presented
- Should be designed NOT to retain water that allows mosquitos

7. **What Do We Look for during Routine O&M Inspections? Common Problems and Solutions - Peter Schultze-Allen, SCVURPPP**

Very Useful 44 **Somewhat Useful** 8 **Not useful** 1

Comments:

- Great photos
- Really solidified discussed issues
- I was a little unclear about the differences between annual O&M verification inspections and routine O&M Inspections
- Would like to see more examples from the south Bay/Peninsula. Emeryville/Berkeley site examples from 2 permit cycles ago isn't super enlightening
- Moved quickly through topics that had been covered already
- Other presentations addressed this mostly

8. **Maintaining Plant Health and Trimming Guidance - Thomas Eddy, San Jose**

Very Useful 39 **Somewhat Useful** 13 **Not useful** 0

Comments:

- This was great and needed (4)

- Really appreciated more info about plants that work in stormwater treatment systems
- Engaging speaker - very usable information
- Very practical - information that applies to all project stages
- Appreciated the list of 5 plants
- Talk about those shrubs - why don't we use them?
- Good information for long 20 min function
- Foreign topic & entertaining presenter & interesting points

9. Experience from the field - Panel Discussion

Very Useful 39 **Somewhat Useful 9** **Not useful 0**

Comments:

- Really helpful (3)

10. Did this training meet your expectations? Yes: 51 No: 1

- Having not read the itinerary before, I assumed this would be more engineering focused, but enjoyed the other tropics.

11. What parts of the training were most helpful?

- Inspection and plant material (9)
- All (4)
- Stuff on inspections (2)
- Panel discussion and slides w/photos videos (4)
- Would like a longer workshop geared toward newbies like me
- Having some perspective from maintenance side
- Actual photos from sites visits
- Seeing designs to avoid that don't necessarily meet the needs for stormwater designs and learning about planting considerations like spacing and types of plants that will survive in CA
- Panel discussions and plant health & trimming presentation
- Repeating information so it is easier to retain
- Design for maintenance
- Personal experiences exchanging different approaches to O&M
- As an engineer the topics I don't deal with daily were the most informative & interesting
- C.3 requirements - what makes a design good/bad
- Practical examples of issues faced and essential solutions

12. What would have made this workshop more useful?

- Divide training so that different staff attend the appropriate sections (5)
- More construction topics (3)

- How to fill out the TCM table & pervious/impervious table (2)
- Group exercises (3)
- Added points with new information
- More information on specific plants or maintaining plant health outside of public right of way
- Maybe a discussion of O&M agreements vs. conditions of approval pros vs cons
- Explaining stormwater compliance thoughts and theories behind MRP for non-stormwater people, residents, business owners. Real nuts & bolts stuff extension of the basic training this morning
- It would have been helpful to hear from the maintenance crew perspectives and discuss more on solutions to designs that can't be rebuilt
- Swap out PSA presentations with presentations from someone who does these types of inspections in Santa Clara County
- Trash capture devices
- Type of plants to filter hydrocarbons
- More examples of common errors
- Big picture - drainage general mention of drainage in other locations for perspective i.e. Houston
- Working with engineers - 3rd party review in reference to C3 completion-installation
- Treatment and sizing evaluations
- Trash capture lessons learned - maintenance concerns
- Complex treatment system inspections sites with pumps, training, tracking & reporting methods
- Asset management
- Upcoming requirements in the new MRP

13. What topics would you recommend for a future workshop?

- Checking discussions & video of inspection walk through
- More discussion on other jurisdictions' C.3 processes
- Step by step installation for each system
- Continue providing more experience and knowledge on various issues
- More on the inspections process and what to look up
- Enforcement of O&M maintenance issues and approaches to compliance

14. General Comments?

- Great workshop - Great panels (3)
- Very good and informative presentations (3)
- Great & informative (4)
- Thank you (5)
- It would be nice to have at another site so we can hear about measures installed

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 3-2

BASMAA Annual Reporting for FY 2019-2020, Regional Supplement for New Development and Redevelopment

Annual Reporting for FY 2019-2020

Regional Supplement for New Development and Redevelopment

San Francisco Bay Area Municipal Regional Stormwater Permit

B A S M A A

Bay Area Stormwater Management Agencies Association

September 2020

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B A S M A A

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

To Whom It May Concern:

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James Scanlin

James Scanlin, Alameda Countywide Clean Water Program

Karin Graves

Courtney Riddle, Contra Costa Clean Water Program

Kevin A. Cullen

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matthew Fabry

Matt Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam W. Olivieri

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

Bay Area
Stormwater Management
Agencies Association

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Menlo Park, CA 94026

650.365.8678

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INTRODUCTION

This Regional Supplement has been prepared to report on regionally implemented activities complying with portions of the Municipal Regional Stormwater Permit (MRP), issued to 76 municipalities and special districts (Permittees) by the San Francisco Bay Regional Water Quality Control Board (Water Board). The Regional Supplement covers new development and redevelopment activities related to the following MRP provision:

- C.3.j.iii. Participate in Processes to Promote Green Infrastructure.

These regionally implemented activities are conducted under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA), a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Most of the 2019-20 annual reporting requirements of the specific MRP Provisions covered in this Supplement are completely met by BASMAA Regional Project activities, except where otherwise noted herein or by Permittees in their reports. Scopes, budgets and contracting or in-kind project implementation mechanisms for BASMAA Regional Projects follow BASMAA's Operational Policies and Procedures as approved by the BASMAA Board of Directors. MRP Permittees, through their program representatives on the Board of Directors and its committees, collaboratively authorize and participate in BASMAA Regional Projects or Regional Tasks. Depending on the Regional Project or Task, either all BASMAA members or Phase I programs that are subject to the MRP share regional costs.

GREEN INFRASTRUCTURE PLANNING AND IMPLEMENTATION

C.3.j.iii. Participation in Processes to Promote Green Infrastructure

This provision requires:

> *(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.*

The BASMAA activities described in this section provide compliance for MRP Permittees with this provision. This section describes: 1) activities and accomplishments during FY 19-20; and 2) a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure (GI).

Activities and Accomplishments during FY 19-20

Grant – Urban Greening Bay Area

Urban Greening Bay Area is a large-scale, grant-funded effort to re-envision Bay Area urban landscapes to develop stormwater-friendly dense, green urban infrastructure that addresses challenges associated with climate change, infiltrates or captures stormwater and pollutants near their sources, and in turn, promotes improved water quality in San Francisco Bay. *Urban Greening Bay Area* is funded by an EPA Water Quality Improvement Fund grant awarded to the Association of Bay Area Governments (ABAG), a joint powers agency acting on behalf of the San Francisco Estuary Partnership (SFEP), a program of ABAG. The term of the *Urban Greening Bay Area* grant project was July 1, 2015 to June 30, 2018, but the term was extended to December 31, 2020 and additional funding provided to support follow-up implementation.

BASMAA is one of the subrecipients of the grant and took the lead on two of the grant project tasks – a Regional Green Infrastructure Roundtable process and a Design Charrette, both of which were implemented between May 2016 and May 2018.

The Regional Roundtable was a two-year process, with work groups as needed, to identify and develop a list of recommendations for integrating GI and stormwater management funding and investments with future climate change and transportation investments within the region. The Roundtable included convening meetings with local, regional, and state stakeholders, agencies, elected officials, and staff to produce draft and final task reports that identified and recommended possible legislative fixes, agency agreements, consolidated funding mechanisms, and other means and actions as appropriate. The Roundtable used innovative participatory processes that included key experts, regulators, decision-makers, and other stakeholders to share information, solicit and discuss ideas and solutions, and to identify next steps (i.e., develop a "roadmap"). The Final Roadmap of Funding Solutions for Sustainable Streets was completed in April 2018. Following completion of the Roadmap, BASMAA and SFEP formed a Roadmap Committee to guide future implementation of the Roadmap.

The Design Charrette task involved coordinating with the cities of San Mateo and Sunnyvale to conduct a Bay Area design charrette to develop cost-effective and innovative "typical" designs for integrating GI with bicycle and pedestrian improvements at roadway intersections. The overall goal of developing standardized, transferable designs was to make progress in addressing the high cost of design, implementation, operations, and maintenance that inhibits the widespread use of GI and LID features.

Work products of the Urban Greening Bay Area grant are posted at: http://www.sfestuary.org/urban-greening-bay-area/#planning . The Planning section includes documents related to the Regional Roundtable and the Implementation section includes documents related to the Design Charrette.

During FY 19-20, BASMAA's participation in activities to implement the Roadmap of Funding Solutions for Sustainable Streets included:

- Continued coordination with transportation agencies – including the Metropolitan Transportation Commission (MTC), the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Federal Highway Administration (FHWA) – to clarify GI eligibility in federal, regional, and state transportation grant programs (Roadmap Specific Actions 1-1, 1-2, and 1-3).

- In November 2019, BASMAA transmitted a memorandum to the above-listed regional and state agencies, documenting the eligibility of GI in applicable regional, state and federal transportation funding programs and requesting the agencies' participation in developing fact sheets that clarify eligibility for sustainable streets in two federal transportation funding programs – the Surface Transportation Block Grant Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) – as well as the California Senate Bill 1 (SB 1) Road Maintenance and Rehabilitation Program.

- On February 4, 2020, BASMAA representatives met with staff from MTC and Caltrans District 4 (the Caltrans District for the nine-county Bay Area), to develop an approach for a regional fact sheet that focuses on the eligibility of GI in projects funded by the STP and CMAQ through the One Bay Area Grant (OBAG) program administered by MTC. The draft regional fact sheet was reviewed by MTC staff and is scheduled to be finalized by September 2020.

- On February 10, 2020, BASMAA held a conference call with CTC staff to develop an approach for a statewide fact sheet that focuses on the eligibility of GI in projects funded by Senate Bill 1. CTC staff provided comments on the draft statewide fact sheet but deferred further action pending documentation that there is interest in this topic beyond the San Francisco Bay Area. To address that information need, BASMAA drafted an online survey initially intended for distribution to stormwater programs within California. However, before it was distributed, BASMAA worked with the U.S. Environmental Protection Agency (USEPA) staff liaison to the Federal Highway Administration (FHWA) to have FHWA staff review BASMAA's November 2019 research memorandum. Similar to the CTC, FHWA questioned whether this issue is of interest beyond the San Francisco Bay Area and California. Accordingly, BASMAA is updating the draft online survey for national distribution through the Green Infrastructure Leadership Exchange. The SB 1 fact sheet is scheduled to be finalized by December 2020.

Other Participation and Comments

In addition to the *Urban Greening Bay Area* grant efforts described above, Countywide Program representatives participated in the following forums related to GI promotion:

- Matthew Fabry (C/CAG, representing SMCWPPP and BASMAA) continued to attend a series of meetings with RWQCB, BAFPAA, SFEP, and MTC to discuss ways to integrate stormwater issues into MTC efforts, including Plan Bay Area. To-date, five meetings have been conducted (March 19, 2019; June 12, 2019; July 16, 2019; October 15, 2019; and January 21, 2020). A meeting scheduled for early April 2020 was postponed due to the COVID-19 pandemic.

- Matthew Fabry (C/CAG, representing SMCWPPP) participated in the ReNUWIt "Stormwater for Water Supply" workshop on July 25-26, 2019, and presented information on efforts to manage stormwater via GI, including larger regional facilities that can help recharge groundwater. This workshop was part of a larger effort by ReNUWIt to create a "Bay Area One Water Network." He also participated as a panelist during a follow-on one-hour webinar on July 6, 2020. Relevant information can be found at www.bayareawater.org.

- Matthew Fabry (C/CAG, representing SMCWPPP) and Jill Bicknell (EOA, representing SCVURPPP) participated in ongoing meetings of the organization Transportation Choices for Sustainable Communities, a research and policy institute whose mission is to "advance understanding and support for sustainable transportation as an essential component of livable communities and cities," to plan a "Green Streets for Sustainable Communities" symposium. The event was originally scheduled for March 2020, and has now been rescheduled as a three-day virtual series of seminars on September and October 2020. The symposium will focus on multi-benefit approaches to rethinking streets, including Complete Streets, Green Streets, creating eco-corridors, and as people habitat for public gathering and interaction. Details can be found at http://transportchoice.org/events/.

- Matthew Fabry (C/CAG, representing SMCWPPP) participated in USEPA's Environmental Finance Advisory Board (EFAB) Stormwater Finance Workgroup to respond to a request from Congress in accordance with Section 4101 of the America's Water Infrastructure Act (AWIA) for a report looking at funding sources for stormwater and the adequacy of those sources to support the needs of stormwater management programs. The workgroup met twice – in April and October 2019 and held two public teleconferences in December 2019. On March 30, 2020, EFAB submitted its report, "Evaluating Stormwater Infrastructure Funding and Financing", to USEPA, which accepted the report on July 16, 2020 as satisfying the requirements of Section 4101 of AWIA.

Plan for New and Ongoing Efforts

The plan provided below shows how BASMAA will support its member agencies to collectively and regionally implement the requirements of MRP Provision C.3.j.iii during FY 20-21 and through the remainder of the current permit term. The requirements of Provision C.3.j.iii may change in the reissued MRP and may affect the planning and scheduling of participation in the promotion of GI during the next permit term.

Continue Ongoing Efforts to Participate in Processes to Promote GI

During FY 20-21 and through the end of the permit term for the current MRP (December 31, 2020 or later if extended), BASMAA will continue ongoing efforts to participate in processes to promote GI as described below.

Urban Greening Bay Area. BASMAA will continue to participate in the Urban Greening Bay Area Project's ongoing activities with regard to the implementation of prioritized specific actions in the 2018 Roadmap of Funding Solutions for Sustainable Streets (Roadmap). The Roadmap identifies specific actions to improve the funding of projects that include both complete streets improvements and GI, and is intended to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects. Various specific actions included in the Roadmap address coordinating the timing of funding from different sources, GI designs and design criteria, potential modifications of processes to evaluate projects for funding, and coordination regarding the potential development of cooperative in-lieu programs. The following ongoing activities are anticipated to continue during the period of July 2019 through December 2020:

O-1. Complete the ongoing coordination with the Metropolitan Transportation Commission (MTC) and Caltrans to clarify GI eligibility in federal transportation grants (Roadmap Specific Action 1-1).

O-2. Complete the preparation of a Roadmap fact sheet (Roadmap Specific Action 3-7). The fact sheet is anticipated to advise municipalities on how GI may be included in One Bay Area Grants (OBAG)-funded projects

O-5. Continue to participate in ongoing meetings with RWQCB, BAFPAA, SFEP, and MTC to discuss ways to integrate stormwater issues into MTC efforts, including Plan Bay Area.

O-X. Complete the ongoing coordination with the California Transportation Commission (CTC) to clarify GI eligibility in the Senate Bill 1 Local Streets and Roads Program (Roadmap Specific Action 1-3).

O-X Conduct an online survey for national distribution through the Green Infrastructure Leadership Exchange and continue coordinating with the FHWA liaison to EPA regarding the eligibility of GI in federal surface transportation programs (Roadmap Specific Action 1-1)

New Efforts to Participate in Processes to Promote GI

Between July and December 31, 2020, BASMAA may initiate the following new activities to further implement the Roadmap and participate in other ways to promote GI:

N-X: Coordinate with MTC to develop an approach for including information about the eligibility of GI in federally funded in guidance materials that MTC will

provide to counties for OBAG's third round of funding (Roadmap Specific Action 1-2).

N-X: Coordinate with MTC to include a discussion of GI and green streets implementation in the anticipated update of Plan Bay Area (Roadmap Specific Action 3-8, Incorporate Roadmap specific actions in funding agencies' planning documents).

N-X: Coordinate with MTC regarding opportunities to present information about Sustainable Streets at statewide meetings of officials from Metropolitan Planning Organizations throughout California, in support of the ongoing coordination with MTC to clarify GI eligibility in federal transportation grants (Roadmap Specific Action 1-1), and ongoing coordination with the CTC to clarify GI eligibility in the SB 1 Local Streets and Roads Program (Roadmap Specific Action 1-3).

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 6-1

Construction Site Municipal Stormwater Inspector Training – February 5 & 13, 2020

- Workshop Announcement
- Workshop Agenda
- Attendance List
- Workshop Evaluation Summary

Construction Site Municipal Stormwater Inspector Training

February 5 , 2020

FEB
05

Construction Site Stormwater (C.6) Municipal Inspector Training Workshop

by Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Follow

Free

Register

This workshop is for municipal staff who inspect construction sites for compliance with stormwater requirements in MRP Provision C.6.

About this Event

The first presentation will be a Basic Training on construction site BMPs and MRP requirements. Staff who do not need the basic training can come later to participate in the field session. There will be three field stations with BMP materials to discuss construction exit BMPs, storm drain inlet protection, check dams, silt fences, compost socks, straw wattles, and mat/blankets. Please be prepared to be outside for an hour and a half.

An agenda will be emailed to those registered before the workshop with an exact time for registration and basic training.

Attendance at this workshop is acceptable for up to 2.5 PDHs toward maintaining CPESC, CESSWI and/or CPSWQ certification. Certificates are not provided. Certified professionals are responsible for documenting professional development hours.

This training is FREE. Lunch will be available during the classroom

Please register by January 28th

For questions please contact Lynn at EOA, Inc. at lpinell@eoainc.com or 510-832-2852 x101

Date And Time

Wed, February 5, 2020
11:00 AM - 2:00 PM PST
Add to Calendar

Location

Valley Water Boardroom
5750 Almaden Expressway
San Jose, CA 95123
View Map

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Organizer of Construction Site Stormwater (C.6) Municipal Inspector Training Workshop

Follow Contact

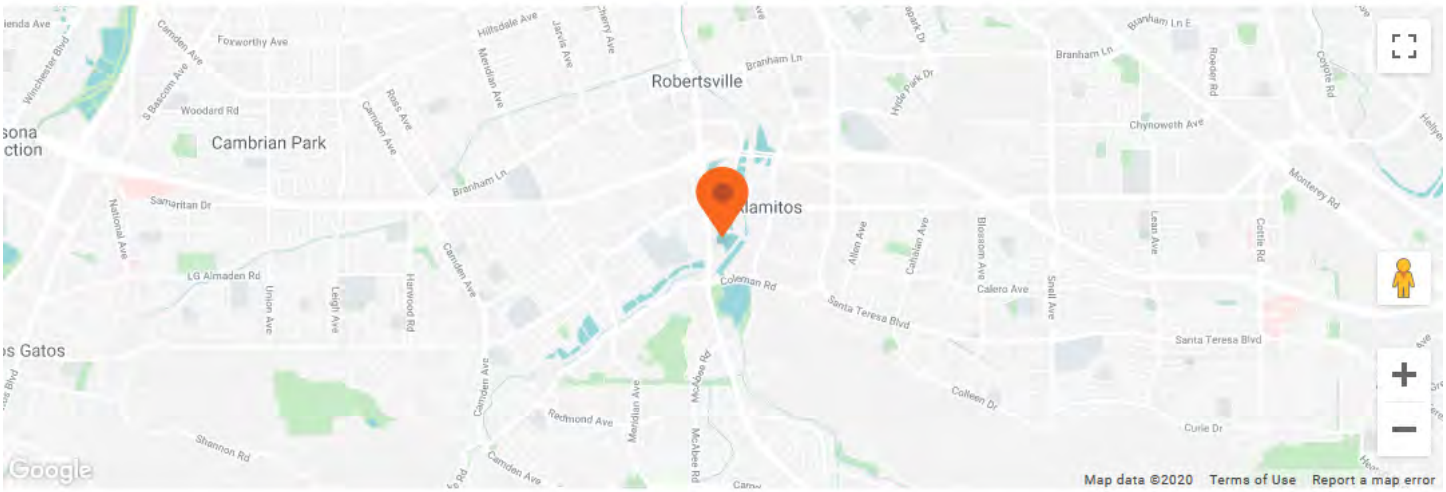

Construction Site Stormwater (C.6) Municipal Inspector Training Workshop

at

Valley Water Boardroom

5750 Almaden Expressway, San Jose, CA 95123

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

CONSTRUCTION SITE STORMWATER INSPECTOR WORKSHOP

Wednesday, February 5 and Thursday, February 13, 2020

Santa Clara Valley Water District – Headquarters Board Room (Indoor) and Admin Building (Field)
5750 Almaden Expressway, San Jose, CA

WORKSHOP AGENDA

10:45 AM	**Registration for Basic Training**	
11:00 AM	Basic Training - Construction Site BMPs and MRP Requirements (Lunch during presentation)	Peter Schultze-Allen, *Program Staff*
12:00 Noon	**Registration/Break**	
12:10 PM	Main Workshop Welcome	Kristin Kerr, *Program Staff*
12:20 PM	Walk to Field Session Areas	
12:30 PM	Field Session	Kristin Kerr and Peter Schultze-Allen, *Program Staff*
	Station #1: Mats/Blankets, Silt Fence, Compost Socks, Straw Wattles *(45 minutes)*	David Franklin and Filtrexx Vendor
	Station #2: Storm Drain Inlet Protection and Check Dams *(20 minutes)*	Reed & Graham Vendor
	Station #3: Stabilized Construction Exit *(20 minutes)*	GraniteRock and FODS Vendors
2:10 PM	Evaluation Forms and Summary Remarks	Kristin Kerr and Peter Schultze-Allen, *Program Staff*
2:20 PM	**Adjourn**	

FIELD SESSION SCHEDULE

		Group 1A	Group 1B	Group 2A	Group 2B
12:30 PM	Begin Field Session	Station #1	Station #1	Station #2	Station #3
12:50 PM	Groups 2A&2B Switch	Station #1	Station #1	Station #3	Station #2
1:15 PM	All Groups Switch	Station #2	Station #3	Station #1	Station #1
1:45 PM	Groups 1A&1B Switch	Station #3	Station #2	Station #1	Station #1
2:10 PM	Group 1B Switch	Station #3	Station #3	Station #1	Station #1

*** Attendance at this workshop is acceptable for 2.5 PDUs toward maintaining CPESC, CESSWI and/or CPSWQ certifications. ***

SCVURPPP Construction Site Municipal Stormwater Inspector Workshop

February 5, 2020 Attendance List

	First Name	Last Name	Company
1	Dustin	Burch	City of Campbell
2	Bob	Lennen	City of Campbell
3	Randy	Sweet	City of Campbell
4	Syed	Wahidi	City of Campbell
5	James	Lee	City of Cupertino
6	Antonio	Torrez	City of Cupertino
7	Gerardo	Amador	City of Milpitas
8	Willard	Balisi	City of Milpitas
9	Gary	King	City of Milpitas
10	Preston	Lorin	City of Milpitas
11	David	Lucero	City of Milpitas
12	Leon	Taing	City of Milpitas
13	Michael	Valentine	City of Milpitas
14	Richard	Whalen	City of Milpitas
15	Jessica	Kahn	City of Monte Sereno
16	Isabel	Zacharczuk	City of Palo Alto
17	Nicholas	Ajluni	City of San Jose
18	Jose	Avalos	City of San Jose
19	Trino	Barajas	City of San Jose
20	Jose	Campos	City of San Jose
21	Chris	Hernandez	City of San Jose
22	Hugo	Hernandez	City of San Jose
23	Kevin	Ho	City of San Jose
24	Catherine	Hoang-Mendoza	City of San Jose
25	Mahmoud	Jillo	City of San Jose
26	Rina	Laxamana	City of San Jose
27	Rick	Martin	City of San Jose
28	Brandon	Massey	City of San Jose
29	Phil	Ody	City of San Jose
30	Steve	Pletsch	City of San Jose
31	Ivonne	Zamora	City of San Jose
32	Mark	Blaszczyk	City of San Jose - Public Works
33	Brian	Lee	City of San Jose - Public Works
34	Damaris	Han	City of Santa Clara
35	Jaime	McAvoy	City of Santa Clara
36	Jose	Gomes	Mountain View Fire Department
37	Juan	Guardado	Santa Clara County
38	Jay	Johnson	Santa Clara County
39	Mark	Norman	Santa Clara County

SCVURPPP Construction Site Municipal Stormwater Inspector Workshop

February 5, 2020 Attendance List

	First Name	Last Name	Company
40	Barni	Roncal	Santa Clara County
41	Stacy	Ball	Santa Clara County Roads & Airports
42	Albert	Eydam	Santa Clara County Roads & Airports
43	Gavin	Finley	Santa Clara County Roads & Airports
44	Gilbert	Garcia	Santa Clara County Roads & Airports
45	Grace	Lau	Santa Clara County Roads & Airports
46	Christine	Li	Santa Clara County Roads & Airports
47	Leland	O'Hanlon	Santa Clara County Roads & Airports
48	Paul	Pascoal	Santa Clara County Roads & Airports
49	Rowdy	Pipkin	Santa Clara County Roads & Airports
50	Michael	Schuat	Santa Clara County Roads & Airports
51	Steve	Wilson	Santa Clara County Roads & Airports
52	Nigel	Bullock	Santa Clara Valley Water District
53	Yanni	Karoglou	Santa Clara Valley Water District
54	Uday	Mandlekar	Santa Clara Valley Water District
55	Alen	Masic	Santa Clara Valley Water District
56	Jonathan	Nelson	Santa Clara Valley Water District
57	Christian	Ruiz	Santa Clara Valley Water District
58	Avinek	Shelopal	Santa Clara Valley Water District
59	Stanley	Gu	Stanford University
60	Gilbert	Hernandez	Stanford University
61	Brian	Manning	Stanford University
62	Janelle	Lee	Town of Los Altos Hills
63	Roy	Alba	Town of Los Gatos
64	Noal	Grover	Town of Los Gatos

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

CONSTRUCTION SITE STORMWATER INSPECTOR WORKSHOP

Number of Evaluations: 49
Number of Attendees: 67

Valley Water Board Room – 5750 Almaden Expressway Wednesday, February 5, 2020

1. Workshop Basic Training – Peter Schultze-Allen, SCVURPPP Program Staff

Very Useful 35 **Somewhat Useful** 10 **Not useful** 0

Comments:
- Peter was great (2)
- Current information always helpful
- Good refresher class
- Good to have details of the basics
- Some slides were missing
- If you show pictures of something done incorrect, make sure you explain why
- Very basic descriptions. A bit more practical information for measures beyond fiber roll/mulch socks would help

2. Field Session Station #1 Mats/Blankets, Silt Fence, Compost Socks, Straw Wattles – Filtrexx Vendor

Very Useful 41 **Somewhat Useful** 6 **Not useful** 0

Comments
- Very informative (5)
- Love the demos
- Very engaging presenter
- David is tops in his field
- Nice to see set up in field
- Very good presentation. Liked the presenter. He obviously has relevant field experience.
- Amusing presenter. Decent practical information with demonstration of different methods. Can see how they work.

3. Field Session Station #2 Storm Drain Inlet Protection and Check Dams – Reed & Graham Vendor

Very Useful 39 **Somewhat Useful** 6 **Not useful** 0

Comments:
- Good to see the different options

- Nice to see the materials in person
- Decent practical information with examples on hand
- Nice demonstration
- Good product reminder

4. Field Session Station #3 Construction Exits – Granite Rock and FODS Vendors

Very Useful **35** **Somewhat Useful** **9** **Not useful** **0**

Comments:
- Nice to have three examples
- Good products
- Good information on rock entrance for a site of mine
- Limited practical information beyond FODS presentation
- Nice to see materials in person

5. Did this training meet your expectations? **Yes** **46** **No** **0**

6. At previous workshops SCVURPPP provided folders with all of the workshop handouts. There were no workshop folders provided at this training. The presentation handouts were emailed to those registered in advance of the workshop. Is this new method o.k.?

40 **Yes, having handouts emailed ahead of the workshop is fine**

5 **No, I prefer the Program to create folders with all of the printed handouts**

7. What parts of the training were most useful to you?
- The field session w/Reed & Graham with actual water was good to see
- Field stations (12)
- Inlet protection (3)
- Station #1 (5)
- I like the actual demonstration of the installation of the coir netting at Station #1. Very helpful to see the trenching and explanation of purpose. Very good explanation of wattle installation with rope.
- Both slide and field presentation (5)
- Slides, pictures (2)
- Construction exits (3)
- Actual field applications
- Showing the physical silt/wattle BMPs
- The outside stations were a nice change from PowerPoint presentations
- The information about new technologies was very helpful
- MRP and CGP overview

8. What would have made this training more useful?
- A recap at the end of the presentation (summary)
- More basic training on regulations

- Training was the best
- John McCullah of "Watch Your Dirt" is a good presenter
- Questions and answers
- More CGP information
- Highlight the benefits of the products and the disadvantages
- More real outdoors examples (2)
- More site issues
- Explain all acronyms
- Better describe how different drain inlet protections are installed
- Videos
- Rainy conditions in slope area to see if material works
- Break session #1 into smaller sections
- More examples of successful and unsuccessful uses in presentation
- This year's training was the best yet so leave as is
- When can the BMPs be removed, after physical work or after Notice of Termination (NOT) in SMARTs
- Last year was a case study of problem project with escalation of enforcement, very helpful.

9. What topics would you recommend for a future training?
   - Every topic was helpful
   - More recommendations
   - Use of biodegradable BMPs, compostable, etc
   - Open forum for discussion
   - Future products being developed
   - Dealing with work orders, change orders and contract language as it pertains to SWPPP as a lump sum.
   - Field examples of failures
   - More videos
   - Notice of Intent, Permit Related Documents, SMARTs

10. General Comments?
    - Parking was a nightmare (3)
    - Always good training
    - Too bad it wasn't raining
    - More information to assist for deficiency/code violation enforcement
    - Excellent training and Valley Water site
    - Save paper and email this questionnaire
    - Have recycle cans by all trash cans
    - Change orders as they relate to SWPPP work perceived to be extra work per the contractors
    - Let attendees know how to dress for weather and wear a hat if sunny (I had to look into the sun during the presentation)
    - Thank you for the information
    - Very good presentation with lots of helpful information
    - I like the format of class and field

Construction Site Municipal Stormwater Inspector Training

February 13, 2020

FEB
13

Construction Site Stormwater (C.6) Municipal Inspector Training Workshop

by Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Follow

Free

Register

This workshop is for municipal staff who inspect construction sites for compliance with stormwater requirements in MRP Provision C.6

About this Event

The first presentation will be a Basic Training on construction site BMPs and MRP requirements. Staff who do not need the basic training can come later to participate in the field session. There will be three field stations with BMP materials to discuss construction exit BMPs, storm drain inlet protection, check dams, silt fences, compost socks, straw wattles, and mat/blankets. Please be prepared to be outside for an hour and a half.

An agenda will be emailed to those registered before the workshop with an exact time for registration and basic training.

Attendance at this workshop is acceptable for up to 2.5 PDHs toward maintaining CPESC, CESSWI and/or CPSWQ certification. Certificates are not provided. Certified professionals are responsible for documenting professional development hours.

This training is FREE. Lunch will be available during the classroom session at the workshop.

Please register by February 7th

For questions please contact Lynn at EOA, Inc. at lpinell@eoainc.com or 510-832-2852 x101

Date And Time

Thu, February 13, 2020
11:00 AM - 2:00 PM PST
Add to Calendar

Location

Valley Water Boardroom
5750 Almaden Expressway
San Jose, CA 95123
View Map

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Organizer of Construction Site Stormwater (C.6) Municipal Inspector Training Workshop

Follow Contact

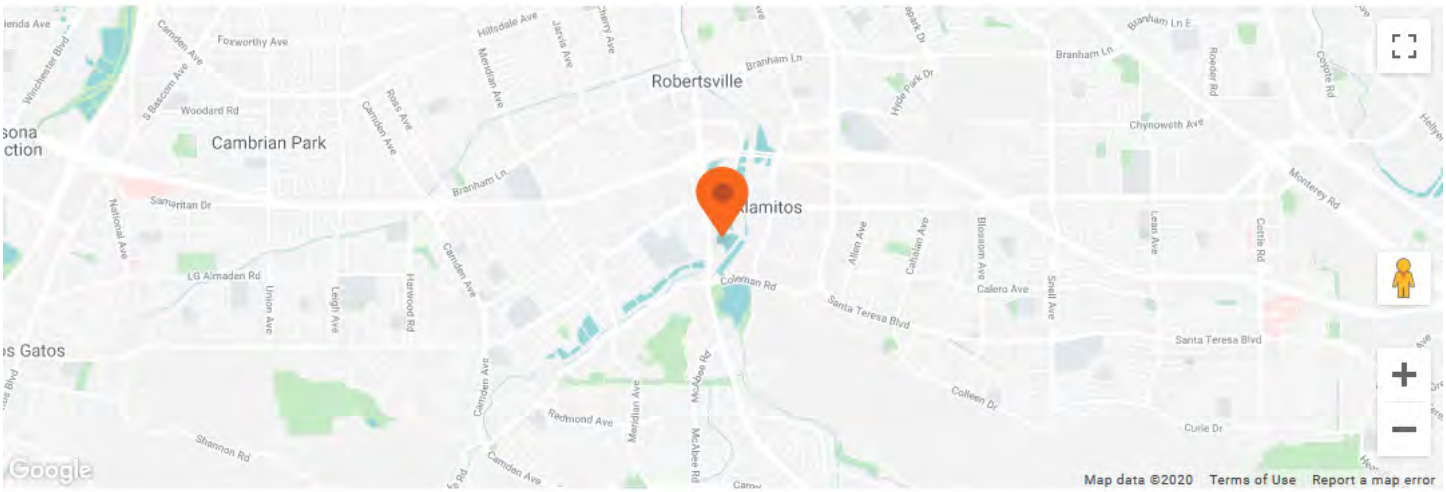

Construction Site Stormwater (C.6) Municipal Inspector Training Workshop

at

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Santa Clara Valley
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CONSTRUCTION SITE STORMWATER INSPECTOR WORKSHOP

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12:30 PM	Begin Field Session	Station #1	Station #1	Station #2	Station #3
12:50 PM	Groups 2A&2B Switch	Station #1	Station #1	Station #3	Station #2
1:15 PM	All Groups Switch	Station #2	Station #3	Station #1	Station #1
1:45 PM	Groups 1A&1B Switch	Station #3	Station #2	Station #1	Station #1
2:10 PM	Group 1B Switch	Station #3	Station #3	Station #1	Station #1

*** Attendance at this workshop is acceptable for 2.5 PDUs toward maintaining CPESC, CESSWI and/or CPSWQ certifications. ***

SCVURPPP Construction Site Municipal Stormwater Inspector Workshop
February 13, 2020

	First Name	Last Name	Company
1	Manny	Barragan	City of Cupertino
2	Lori	Baumgartner	City of Cupertino
3	Kevin	Reiden	City of Cupertino
4	Alex	Wykoff	City of Cupertino
5	Emiko	Ancheta	City of Los Altos
6	Harun	Musaefendic	City of Los Altos
7	Andrea	Trese	City of Los Altos
8	Gaku	Watanabe	City of Los Altos
9	Brian	Chu	City of Milpitas
10	Casey	Crary	City of Milpitas
11	Weston	Gray	City of Milpitas
12	Christian	Greene	City of Milpitas
13	Mike	Mariano	City of Milpitas
14	Carol	Martin	City of Milpitas
15	Tessa	Myers	City of Milpitas
16	Vernon	Sanders	City of Milpitas
17	Carrie	Sandahl	City of Mountain View
18	Christopher	Fujimoto	City of Palo Alto
19	Brian	Jones	City of Palo Alto
20	Jose	Alcazar	City of San Jose
21	Armand	Alviar	City of San Jose
22	David	Brasil	City of San Jose
23	Tony	Cruz	City of San Jose
24	Chris	Dominguez	City of San Jose
25	Paul	Duran	City of San Jose
26	Paul	Garcia	City of San Jose
27	Laura	Markel	City of San Jose
28	Frank	Moreno	City of San Jose
29	Tiffany	Ngo	City of San Jose
30	Alex	Pinon	City of San Jose
31	Shayan	Serajeddini	City of San Jose
32	Ryan	Sommers	City of San Jose
33	Wanda	Wong	City of San Jose
34	Jose	Zacarias	City of San Jose
35	Jonathan	Lindstrom	City of San Jose - DPW
36	Michael	Olejnik	City of Santa Clara
37	Rafles	Warnars	City of Santa Clara
38	David	Dorcich	City of Saratoga
39	Rikti	Dalal	Santa Clara County
40	Tran	Ho	Santa Clara County
41	James	Johnson	Santa Clara County
42	Paul	Soltero	Santa Clara County
43	Solomon	Tegegne	Santa Clara County
44	George	Yamaichi	Santa Clara County

SCVURPPP Construction Site Municipal Stormwater Inspector Workshop
February 13, 2020

	First Name	Last Name	Company
45	Peter	Cruz	Santa Clara County Roads & Airports
46	Jason	Props	Santa Clara County Roads & Airports
47	Jim	Schramm	Santa Clara County Roads & Airports
48	Terry	Crites	Santa Clara Valley Water District
49	Kevin	Gonzales	Santa Clara Valley Water District
50	LeeAnn	Hoa	Santa Clara Valley Water District
51	Bobby	Ladine	Santa Clara Valley Water District
52	John	Luna	Santa Clara Valley Water District
53	Brandon	Ponce	Santa Clara Valley Water District
54	Martin	Rivera	Santa Clara Valley Water District
55	Amandeep	Saini	Santa Clara Valley Water District
56	Andy	Trinh	Santa Clara Valley Water District
57	Noah	Walker	Santa Clara Valley Water District
58	Eric	Zozaya	Santa Clara Valley Water District
59	Erica	Kudyba	Stanford University
60	Julia	Nussbaum	Stanford University
61	Christine	Hoffmann	Town of Los Altos Hills
62	Kaho	Kong	Town of Los Altos Hills
63	Bobby	Deherrera	Town of Los Gatos
64	Mark	Hillabrandt	Town of Los Gatos

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

CONSTRUCTION SITE STORMWATER INSPECTOR WORKSHOP

Number of Evaluations: 39
Number of Attendees: 73

Valley Water Board Room – 5750 Almaden Expressway Wednesday, February 13th, 2020

1. Workshop Basic Training – Peter Schultze-Allen, SCVURPPP Program Staff

Very Useful 30 **Somewhat Useful** 9 **Not useful** 0

Comments:

- Explanation of difference between CGP and MRP was very clear
- Good overview of requirement (2)
- Great refresher (3)
- Thorough presentation on the basics.
- Interesting information regarding copper
- Great presenter; good information for new inspectors
- Provide additional site photos of violations - large projects along with small ones
- I also like the pictures of good and bad BMPs

2. Field Session Station #1 Mats/Blankets, Silt Fence, Compost Socks, Straw Wattles – Filtrexx Vendor

Very Useful 30 **Somewhat Useful** 9 **Not useful** 0

Comments

- Passionate speaker with valuable experience and insight. Appreciated his emphasis on reducing plastic for both waste and wildlife reasons
- Passionate speaker but more useful tips for QSP/QSD than for inspectors.
- Can see how products should be installed
- Appreciated information on compost socks and the demonstration
- Practical installation and inspection tips
- David Franklin was a very interesting, unique presenter
- Very entertaining presentation; dramatic scenarios; liked demonstrations
- A bit hard to follow. Entertaining speaker.
- Great to see in place usage of various materials.

3. Field Session Station #2 Storm Drain Inlet Protection and Check Dams – Reed & Graham Vendor

Very Useful 36 **Somewhat Useful** 3 **Not useful** 0

Comments:

- Good to see working, installed products.
- Enjoyed the large variety of products for demonstration
- Good overview of products
- Helpful information on available products
- Clear and straight forward
- Very informative, useful types of drain inlet protection
- Saw some new potentially effective BMPs presented. Water used for display was helpful.

4. Field Session Station #3 Construction Exits – Granite Rock and FODS Vendors

Very Useful **30** **Somewhat Useful** **8** **Not useful** **1**

Comments:

- Demonstration very helpful
- Clear and straight forward
- No new information presented; seen before
- Good information on products
- Nice having all the products discussed in one session
- Could use more examples of best option for various grade, base, site specific application
- Not really new products. However good to see on the ground products

5. Did this training meet your expectations? **Yes** **37** **No** **0**

6. At previous workshops SCVURPPP provided folders with all of the workshop handouts. There were no workshop folders provided at this training. The presentation handouts were emailed to those registered in advance of the workshop. Is this new method o.k.?

31 **Yes, having handouts emailed ahead of the workshop is fine**

5 **No, I prefer the Program to create folders with all of the printed handouts**

7. What parts of the training were most useful to you?

- All
- All, as they all apply to my daily activities
- Enjoyed discussions on the picture slides of good and bad
- Storm drain inlet protection; very insightful
- Field training (13)
- In place examples of products
- Refresher
- Basic training is always good; even after hearing many years
- Demonstrating proper vs improper installation
- Photos as examples (i.e. good or bad practice)
- Silt fence set up and return up slope
- The variety of BMPs showcased in the field section

- Field Station #1
- Seeing the products and how to use them
- I thought all parts were valuable. Field portion was very well organized and thorough.
- I like the overview of the permits as a refresher or introduction to new inspectors

8. What would have made this training more useful?
   - Some information on pricing of BMP products
   - More handouts for the BMPs reviewed during field training which include specs, such as suppliers, prices, etc. and installation recommended actions
   - A cool room; it was a bit warm in there
   - More workshops
   - Actual site visit to a SCVWD project
   - Sitting
   - Handouts at classroom session
   - More speakers
   - More time to go over classroom session in more detail
   - Dewatering BMPs/methods
   - More experiences and comparing solutions
   - More hands on
   - More time in the field
   - Films of trout and salmon fish to emphasize reason we implement BMPs

9. What topics would you recommend for a future training?
   - Drone survey
   - Vegetation management
   - Organized group discussions between municipalities, etc.
   - All topics today were useful
   - Updates/changes to the MRP
   - Fill out inspection form
   - In the field training workshops
   - Films of sustainable practices during the early 1900s
   - Water treatment products and equipment
   - Always good to include PCB information related to sediment
   - Photos of actual problems and discussion
   - Wastewater Plant or areas that may be exempt
   - Differentiating between what is cost effective and practical vs. ideal (purchasing proper BMPs) for contractors
   - Would be interesting seeing the innovative BMPs at an active construction site
   - Example of sites where different BMPs have been used. Inspectors' experience seeing BMPs in action and whether they are effective. New products are good alternative or traditional products are better.

10. General Comments?
    - Great job
    - Always good training (3)
    - Best presentation goes to Reed & Graham

- Need more films/ videos
- Always a great time; I like the elimination of group exercises
- Add videos of hydro mulch/seed applications and/or post construction applications
- The copper slides were not included in the emailed PDF file
- Overall very thorough and informatiave
- Well put together
- Enjoyed demonstrations of installation by vendors
- Thank you (2)
- Kudos to James Downing
- Enjoyed/appreciated the hours of this training, making it easier to attend.
- Thanks for lunch
- Thanks for the great presentations
- Need two sessions: one for engineers who do the plans and one for inspectors who do the field review. The field reviews are never done before the work is awarded (plans in place and hard to make change).

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 7-1

FY 19-20 Watershed Watch Campaign

- FY 19-20 Watershed Watch Campaign Work Plan
- Watershed Watch Campaign FY 19-20 Media Plan
- FY 19-20 Watershed Watch Campaign Annual Campaign Report – July 1, 2019 through June 30, 2020
- Watershed Watch Website Statistics FY 19-20

FY 19-20 Watershed Watch Campaign Work Plan

BACKGROUND

The primary goals of the Watershed Watch Campaign (Campaign) are to:

1. Change behaviors that negatively impact the watershed.
2. Encourage behaviors that protect, preserve and restore the watershed.
3. Inform audiences about activities that impact the watershed.
4. Build awareness of watershed issues in general.

In fiscal year FY 18-19, the Watershed Watch consultant AdManor, Inc.:

- Implemented the FY 18-19 Watershed Watch Campaign work plan
- Maintained and developed partnership relationships that benefit the Program
- Maximized campaign resources through value-added development and effective media implementation
- Coordinated campaign activities in consultation with the Watershed Education and Outreach Ad Hoc Task Group (WEO AHTG)
- Increased social media posting and engagement
- Created new English & Spanish 30-second television spots about cigarette litter
- Implemented creative for added-value digital and PSAs with monthly message themes

The Campaign's FY 18-19 media buys balanced radio, broadcast television, targeted mobile digital media, and boosted social media posts. It leveraged added value media to expand the variety of messages delivered and greatly expand reach. The Campaign was also represented in transit and stadium ads placed by City of San José in a campaign (partially funded by SCVURPPP) with the Earthquakes professional soccer team and Sharks professional hockey team.

Campaign messages included less-toxic pest control choices, hiring a pest control professional trained in IPM, Green Gardener program, anti-litter messages, volunteer / cleanup event promotion, safe fish consumption, hazardous waste disposal, LID/green infrastructure, mobile cleaning services, and event-specific messages for car wash promotions. A wider variety of messages, tips, resources and community partnerships was promoted via social media posts.

Each year, the campaign effectiveness has been measured through:

- Hits on the www.MyWatershedWatch.org website
- Interactions via social media
- Requests for information and comments on the hotline and website
- Media gross impressions
- Attendance at Watershed Watch promotional and community events
- Added-value resources obtained through partnerships

FY 19-20 Watershed Watch Campaign Work Plan

The FY 19-20 Work Plan is based on a campaign budget of approximately $140,000. If additional funds become available, they will be allocated according to the prioritized needs of the Campaign and feedback from the WEO AHTG.

To meet the requirements in the Municipal Regional Permit (MRP), the current priorities of the Campaign include public education on pollution potential from pesticides, alternatives to conventional pesticides, anti-litter messages and general storm drain awareness. Additional or secondary messages include proper disposal of household hazardous waste, guide to eating San Francisco Bay caught fish, car wash / automotive maintenance messages, proper discharge of pool and spa water, promotion of LID/Green Streets, responsible mobile cleaning services, and water conservation.

The Campaign will help the Program and Co-permittees comply with the following MRP Provisions:

- C.7.b. Outreach Campaigns
- C.7.c. Stormwater Pollution Prevention Education
- C.7.d. Public Outreach & Citizen Involvement Events
- C.9.e.ii (2) Pest Control Contracting Outreach (outreach to residents who use or contract for structural or landscape pest control)
- C.9.e.ii (3) Outreach to Pest Control Professionals
- C.15.b.iv. Individual Residential Car Washing Discharge
- C.15.b.iv. Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges
- C.15.b.vi. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering (messages on promoting water conservation, proper irrigation, use of less-toxic pesticides, and use of drought tolerant, native vegetation).

Where applicable, Campaign activities will be coordinated with activities of other local and regional outreach programs (e.g. San Jose's litter/recycling campaign with the Earthquakes and Sharks teams, South Bay Green Gardens, Santa Clara County Household Hazardous Waste Program, WMI Zero Litter Initivative and Caltrans Protect Every Drop) to promote the goals of the Campaign while maximizing regional campaign resources.

AdManor Inc. ("consultant") will adapt this Work Plan as needed upon the development and release of information about these other programs. After evaluating their strategies and creative, the consultant will recommend effective ways to support them and align Watershed Watch strategies and tactics with them, in order to benefit SCVURPPP.

Campaign activities will be evaluated on an ongoing basis, and changes made as required for effectiveness. Additional information on effectiveness evaluation is included under each task.

In FY 19-20, the consultant will implement the following tasks to achieve the goals of the Campaign.

TASK 1: Creative Development

The Campaign will utilize existing IPM and litter TV, digital and radio ads as applicable to the FY 19-20 media plan. Where possible, existing creative will be utilized when implementing new creative for visual and thematic continuity for the Campaign.

Additional creative needs will be determined by the WEO AHTG as dictated by the priorities of the Campaign, media selection with applicable production needs, and new messages needed to fulfill outreach messaging requirements of the MRP.

TASK 1 DELIVERABLES:

Final deliverables are contingent upon media plans and WEO AHTG agreement about the message focus for each campaign flight. Dictated by priorities and as budget allows, deliverables may include:

- Radio
    - Recorded messages for new themes where needed
    - Time-sensitive public service announcements, promotion of new Green Gardener class schedules / recruitment; car wash promotions
- Collateral / Display
    - Graphics for outreach event table display/booth
    - Interactive booth activity
- Digital media advertisements and sponsorship messages (internet, opt-in email, social media, mobile, video adaptation for pre-roll, etc.)
- Discount Card revisions and printing

TASK 1 EFFECTIVENESS EVALUATION

The following metrics will be used to measure effectiveness:

- Number of outreach pieces / messages developed
- Number of outreach pieces requested on the website; distributed at events and by partners
- Number of downloads from the website
- Number of website visits following the media placement of an outreach piece
- Amount of audience engagement with online messages

TASK 1 BUDGET: $9,000

TASK 2: Media Advertising

The FY 19-20 media plan will be developed through review of media options and proposals from local radio, television, and digital media companies.

Outdoor, point of sale, print, transit and movie theater ads have been reviewed in prior years and deemed cost prohibitive. Currently transit/outdoor are achieved with City of San Jose sports team co-sponsorships.

Multilingual media outlets will be explored as deemed appropriate by market demographics, the needs of the community, resources available, and outreach goals for the Campaign. Currently Spanish is prioritized based on the these criteria.

The consultant reviews all media opportunities that are presented to the Watershed Watch campaign throughout the year and evaluates their viability and cost effectiveness for achieving the Campaign goals.

The consultant will develop media partnerships, schedules / flight plans and budget allocations in a comprehensive media plan. In developing these plans, the consultant will work with the WEO AHTG to clearly identify and define their media goals and preferences, and obtain their approval.

Requests for proposals (RFPs) will be developed to educate the media regarding the goals of the campaign, the prospective media schedule(s)/plan, budget levels, and the criteria on which proposals will be judged.

RFPs will be distributed to media serving the geographic target area, defined as Santa Clara County geographic area, also known as the area of dominant influence (ADI). San Francisco media may also be invited to prepare proposals, with the condition that comparative data is based on coverage of Santa Clara County audiences.

Media Allocation

The consultant will allocate the media budget proportionate to language/population of the target audiences identified in the SCVURPPP Outreach Strategy, and the media's effectiveness in delivering audiences and added-value to the campaign.

The consultant will create an appropriate balance based on the goals, budget for the campaign, any timely circumstances and/or other campaign partner activities relevant to Watershed Watch goals and messages.

Media Selection

Measured results of the FY 18-19 campaign (such as media impacts on website activity, responses to direct-response media), trends in audience media usage such as Over-the-Top (OTT) streaming TV on demand, changes in the media market, and relevant activities in other regional advertising/outreach campaigns may impact media selection.

Media will also be evaluated for its: effective reach in the ADI (ratings); efficiency based on cost per thousand, reach and frequency to target audience(s), added value, partnership opportunities, creativity, promotions/event support, and overall appropriateness of the proposal.

Media will be selected to create a desirable balance of reach and frequency; limited duplication in programming and formats for maximum reach to targeted audiences; maximum impact weighing rating points and impressions; and adequate frequency to create impact. Media firms will also be encouraged to bring in third-party promotion opportunties and contests.

News programming, program sponsorships and other broadcast media have consistently generated measurable interest and response for the campaign.

Digital ads have generated direct and specific measurable response as viewers clicked through the ads to related content MyWatershedWatch.org indicating interest in the ads, including Spanish-language digital targeted to Spanish-language mobile users. Direct links to relevant information engage the audience and provide information about each message and medium's effectiveness.

Content-driven media opportunities can allow distribution of expanded information in an editorial-style format that appeals to audiences on a different level than traditional advertising.

Selection will consider the proportion of media in English and Spanish relative to the population, effectiveness in delivery of the message, the messages the Campaign wants to deliver (appropriate to any medium), partnerships and value-added media and

promotions.

Media Schedule

The FY 19-20 media schedule will strive for continuous presence of pollution prevention messages, and support for Campaign events and special interests such as car wash partnership promotions, Santa Clara Valley Green Gardener Program, etc.

When feasible, Campaign messages will not compete with regional messages for the same digital audiences. When Campaign schedules run concurrently with regional messages, we will strive to use different messages/pollutant focus for better measure of our media results vs. impacts of the other campaign.

FY 19-20 is a Campaign Evaluation year, and will require the media campaign to take a brief haitus during the public opinion survey period.

2020 is also an election year. The Presidential Primary will be held March 3, 2020 in California, and political advertising rates and regulations may impact our scheduling January 17-March 3 (45 days prior).

The consultant will present the recommended detailed media plan to the WEO AHTG for approval. The media plan will be revised as needed based on comments received. The plan includes a calendar to indicate the media placement and flow, messages, and events (when known); updated to reflect any changes as the year progresses.

Upon approval of the media plan, the consultant will confirm schedules with the media and secure contracts, including written commitments of added value and promotions. All creative materials and traffic instructions/insertion orders will be distributed to the media to ensure deadlines and Campaign goals are met.

Message Scheduling

Messages in summer and spring will focus on Integrated Pest Management as alternative to toxic pesticides and chemicals that can contribute to urban runoff pollution and harm the watershed.

Messages regarding automotive pollutants and car washing messages will accompany promotional car wash events scheduled in spring and summer.

Home improvement / yard improvements are also prevalent in the spring, summer and fall, creating opportunities to promote LID features (e.g. rain gardens, pervious paving, etc.).

Fishing in the Bay may be a year-round activity when weather permits, but fishing season is roughly defined within the months of April – September, making those potentially peak months for educational messages about eating fish from the Bay (mercury in fish).

Green Gardener recruiting and promotional messages will be integrated as needed to fill class sessions and promote hiring Green Gardeners, especially following graduations. Registration for classes will be advertised in August. Classes begin August 28 and run through October.

Messages in fall and winter will focus on litter prevention and general storm drain awareness messages, with some specific IPM messages as appropriate with weather-related issues/reminders.

Messages may also promote the Watershed Watch website and social networking opportunities as a means to develop new social media audiences, thus expanding our

direct-messaging audience(s).

Digital ads and social media messages benefit from more frequently changing messages, as the pace of social / digital media moves and changes rapidly.

Task 2 DELIVERABLES:

- RFPs to Media/Media Negotiation
- Media Recommendations (media mix options)
- Media Plan (calendar of selected media schedules)
- Media Buy/Placement
- Traffic (creative and scheduling instructions)
- Billing/Reconciliation/Documentation (record-keeping)
- Media Campaign Summary (report)

TASK 2 EFFECTIVENESS EVALUATION

The following metrics will be used to measure effectiveness:

- Number of impressions made by advertising
- Added-value resources provided by the media
- Number of direct-responses to digital advertising (click-throughs, etc.)
- Increases in website visits and social media interactions as a result of advertising

Task 2 BUDGET: $95,000

Task 3: Added- Value + Partnership Development and Coordination

Developing partners has proven successful in expanding campaign resources and generating incentives for the public. Partners have distributed Watershed Watch materials and messages through targeted events, educational and promotional activities, website links, and other added-value resources. The consultant will continue to work with existing partners to ensure that they continue to promote the Campaign to their customers/membership.

The consultant will target like-minded businesses and organizations in development of additional partnerships that present opportunities to increase audience reach, awareness and messaging impact, such as:

- Community and neighborhood organizations; like-minded non-profits
- Outdoor (especially water-related) events, recreational venues, sporting goods and active lifestyle retailers
- Home improvement
    - Hardware, garden and home improvement retailers and wholesalers
    - Home service providers (pest control, permeable paving, rain harvesting, lawn substitution, sustainable landscape design and maintenance)
- Gardening / IPM programs and groups, including Green Gardeners who wish to expand their relationships with the Campaign
- Automotive-related retailers, oil change / service centers, car washes (targeting expansion in northern and eastern areas of the County)

The consultant will distribute partnership tools to all new partners and potential partners, which present partnership benefits and opportunities, provide ways to display their support of WW, and thank them for their partnership. In pursuing new partners, when

appropriate, the consultant will develop customized proposals with specific benefits and creative partnering opportunities, developing mutually beneficial relationships and activities.

The support of these relationships includes coordinating outreach materials or messages, promoting the partner's interests that are shared with the Program, participating in key activities and events, suggesting or developing win-win opportunities, and including added-value to the Campaign.

The media offers excellent value added opportunities. The consultant will negotiate with the media for added media exposure (including news and editorial opportunities), prizes for contests, and request innovative partnerships and sponsorship opportunities with the media and their advertisers.

Existing and new partnerships (non-media) will also be explored for added-value opportunities. Opportunities include but are not limited to:

- Donations of merchandise or services to be used as incentives for increased participation, impact and awareness among audience
- Discount Card offers
- Signs or space to provide prompts, distribute Campaign materials
- Public Service Announcements / donated airtime, space and impressions
- Events; in-kind Campaign participation in events, promoting the Campaign as a sponsor/participant for added exposure, and on-site hosting for Campaign events
- Educational public workshop events for LID and IPM home and garden improvements
- Media programming or content sponsorships
- Cross-promotions, contests
- Web links and online features; social networking
- News and editorial opportunities (e.g., interviews)
- Production of creative related to media partnership

Partnerships will be promoted through social networking activities and on the Campaign website, at minimum.

The Watershd Watch Discount Card offers will be further developed as well as Card distribution options (distribution by other partners, media and through Campaign events and outreach), and the Campaign will promote the offers and partnerships using the Campaign website, social media, etc.

Discount Card layout and production may be reimagined to accommodate more partners/offers, and to include acceptance of Discount Card via mobile device (show the card on your smartphone, get the discount), Discount Card App, etc.

As needed, the consultant will help the WEO AHTG review other local and regional campaigns (e.g., BASMAA Regional Campaigns, South Bay Green Gardens, SJ Earthquakes), and provide feedback.

TASK 3 EFFECTIVENESS EVALUATION

The following metrics will be used to measure effectiveness:

- Number of new and continuing partners
- Number of discounts provided by Classic Car Wash to people using the Watershed Watch discount card
- Participation and outreach materials distributed by partners
- Added-value resources provided by media and non-media partners

- Comparison of added-value with actual funds spent on media buys

Task 3 DELIVERABLES:

- Ongoing contact with partners; work with existing partners and renew previous partners
- Watershed Watch Discount Card offer expansion and enhancement
- Partnership tools (ongoing; currently sent via email instead of hard copy)
- Maintain updated contact data and partnership details
- Development of new creative partnership opportunities / scenarios
- Monthly written report of results or activities
- Two new community/business partnerships
- Three third-party or partnership promotions, e.g. car wash promotions, community event sponsorship, contest, etc.

Task 3 BUDGET: $7,000

Task 4: Website Maintenance

The consultant will maintain the Watershed Watch website on an ongoing basis, encouraging partners to provide updates, and creating more ways and reasons for the public to frequent the site via inbound marketing.

The consultant will update it regularly and frequently with the latest news, creative, partnership links, and events/announcements, including removal of expired or past events and news in a timely manner.

The Campaign will post appropriate news and events provided by Campaign partners and related organizations such as City of San José with San José Earthquakes and Sharks, South Bay Green Gardens, Creek Connections Action Group, Master Gardeners, Watershed Watchers at Alviso Education Center, and more.

The consultant will track web activity and comment on any potentially relevant trends observed, trouble-shoot any issues, and develop new content (e.g., pertaining to LID) as needed to meet Campaign goals and promote Campaign events, partnerships and programs, and promote public interaction.

Task 4 DELIVERABLES:

- Ongoing and on-demand maintenance to website
- Updates to news, events, downloadable content
- Security and software updates
- New page development as needed
- Monthly written report of results or activities

TASK 4 EFFECTIVENESS EVALUATION

The following measures will be used to measure effectiveness:

- Measuring website visits and downloads. The consultant will track website visits and impacts from media campaigns and outreach events.

Task 4 BUDGET: $4,500

Task 5: Social Media + Networking

Social media can be an effective tool to engage the audience with the Campaign mission, messages and resources and give the audience a voice to interact directly with the Campaign.

While considered “free media” it requires a high level of attention (labor) to be effective, and benefits from paid “boosts” to ensure key messages are delivered to desired audiences.

The consultant will implement the Campaign’s social networking outreach strategy, develop and post new messages, monitor and share partner postings and related campaign posts, and regularly evaluate and adjust the social networking strategy as needed.

The current strategy uses Facebook,Twitter and Instagram.

Message goals include:

- Promote the Campaign website as a leading content provider for pollution prevention resources in the Santa Clara Valley
- Promote events, participation and social engagement with the client’s followers, partners and programs

In order to ensure timely postings of key messages throughout the year, and to meet our goal of minimum one new post per week, consultant will:

- Continually, develop posts with original content, promoting the branding and messages using existing creative and assets of the campaign; excerpts from existing productions in brochures, web pages, TV and Radio commercials, digital ads, displays, posters, bus ads, etc.
- Schedule pre-approved messages for delivery
- Post timely messages, tips and programs related to current events and news
- Build and use photo assets: Take new photos, use existing photos, search/acquire stock photos, encourage sharing of event/local photos from co-permittees
- Build and use video assets: Use royalty-free stock footage, new footage and existing footage to create messages with movement to engage audiences

Social media is a two-way and interactive media, that also requires constant contact with the audience and other groups. In addition to posting our own Watershed Watch content, activities will also include:

- Monitoring feeds; frequently share relevant and interesting content
- Interaction and responses to posts on our page, comments, retweets, etc.
- Like and share posts by:
    - Co-permittees
    - Campaign Partners
    - Local not-for-profit groups, other organizations
    - Followers / Fans / Followed

Task 5 DELIVERABLES:

- Post and interact on accounts regularly
- Engage with other posts
- Monitor responses to promotions
- Develop original content (new messages); goal of 52 new messages

- Scheduled posts for timely distribution of key campaign messages; minimum 3x weekly (1x new and 2x shared)
- Monthly (12) Contests with prizes/incentives for engagement
- Boosted/sponsored (paid) posts for increased exposure (media/ad investment)
- Identify potential trends and adjust strategy as needed; includes adjusting to ad delivery policies/trends

TASK 5 EFFECTIVENESS EVALUATION

The following metrics will be used to measure effectiveness:

- Number of messages delivered and shared
- Overall engagement
- Engagement for specific posts (response rates)
- Reach / Impressions
- Participating audience demographics
- Cost per engagement for paid posts

Task 5 BUDGET: $13,000

Task 6: Outreach Event Coordination + Staffing

The consultant will work with the Program to implement outreach events. The consultant will strive to present a variety of community event opportunities in Santa Clara Valley that reach a large number and broad demographic range of SCVURPPP target audiences. These include:

- Earth Day and other environmental sustainability themed events
- Health & Wellness related events
- Santa Clara County Parks & Recreation events and venues
- Outdoor events/activities that take place in a watershed recreation area
- Wildlife and nature awareness and educational events
- Family and/or student related events
- Multicultural themed events
- Watershed Watch Partner Car Wash Events

The consultant, Program staff and Co-permittees will provide staffing for the community events. Program staff will coordinate the staffing schedule, compile outreach materials for distribution, and prepare the post-event summary report.

For public information, a calendar of Campaign and Campaign Partner events will be published online through the Campaign website.

Task 6 DELIVERABLES:

- Event calendar development and maintenance (website).
- Coordination of events with Program staff (applications and registration fees).
- Staffing the Watershed Watch booth at events (equivalent to minimum of 3 days).

TASK 6 EFFECTIVENESS EVALUATION

The following metrics will be used to measure effectiveness:

06496
6537

- Number of events staffed and coordinated
- Number of outreach materials distributed
- Staff feedback
- Event attendance
- Increased traffic to website immediately following the event

Task 6 BUDGET: $5,000

Task 7: Media and Public Relations

Public and press relations, both proactive and reactive, will be utilized to increase audience awareness and understanding of current events and activities that affect the watersheds. The consultant will implement the following tasks:

- Promote Santa Clara Valley Green Gardener class training schedules.
- Develop and distribute new stories as needed for the Campaign.
- Support relevant local news and Campaign stories for local media outreach.
- Coordinate speaking opportunities with our media partners, when provided as added value with media buys; schedule interviews, coordinate with spokesperson, provide talking points and translations, and any props relevant to the story.

Additional messages may include low-impact design article for media distribution.

Task 7 DELIVERABLES:

- Ongoing maintenance of press contact data.
- Publicize the Green Gardener class and certified Green Gardeners training programs.
- Coordinate interviews for earned media and negotiated added value with paid media.

TASK 7 EFFECTIVENESS EVALUATION

The following metrics will be used to measure effectiveness:

- Number of press releases developed/modified
- Number of media placements/mentions
- Number of interviews conducted

Task 7 BUDGET: $1,000

Task 8: FY 20-21 Work Plan Development + FY 19-20 Reporting

The consultant will compile and submit monthly, mid-year and year-end campaign activity reports for all applicable tasks. Details will include descriptions of deliverables by task, messages, measurable results of campaign activities and estimated added-value amounts.

The consultant will develop the FY 20-21 Work Plan and Media Plan adapting to the measured results of the FY 19-20 campaign.

Task 8 DELIVERABLES:

- FY 20-21 Work Plan
- FY 19-20 mid-year and year-end reports
- Monthly reports
- WEO AHTG meeting reports and presentationas as needed

Task 8 BUDGET: $5,500

BUDGET SUMMARY:

BUDGET SUMMARY:

TASK 1 Creative Development	$9,000
TASK 2 Media Advertising	$95,000
TASK 3 Added-Value + Partnership Development	$7,000
TASK 4 Website Maintenance	$4,500
TASK 5 Social Media	$13,000
TASK 6 Event Coordination + Staffing	$5,000
TASK 7 Media/Public Relations	$1,000
TASK 8 FY 20-21 Work Plan + FY 19-20 Reports	$5,500
TOTAL CONSULTANT BUDGET	$140,000

Watershed Watch Campaign
FY 19-20 Media Plan

Presented to SCVURPPP
September 16, 2019

Sandi Manor | 831.662.3646 | Sandi@AdManor.com

AdManor inc
Multimedia Marketing

Thank you for your time in helping to determine the FY 19-20 Watershed Watch Campaign media plan. This report exhibits the process to receive media proposals, and the basis on which they were evaluated. The final selections were determined by review of the WE&O AHTG and their preferences for a media mix to maximize the resources to achieve strategic communications goals for the Watershed Watch Campaign.

Please note that Social Media advertising (boosted posts) is covered in a separate task for the Watershed Watch Campaign FY 19-20 Workplan and Budget. Social media ads will help the Campaign achieve additional messaging/outreach as required for the Permit.

Media RFP (July-August)
Proposals were solicited from the media with an emphasis on relevant and effective delivery of our messages to our target audiences, and maximum added value to expand the resources of the Campaign.

Examples of added value include:

- Production services
- Public Service Announcements (PSAs) or other bonus air time
- Branding / co-sponsorship of produced media messages or programs
- Branding / co-sponsorship of community or station events
- Interviews / produced segments
- Editorial
- Digital impressions / web ads
- Onsite and onair promotional support for events

A written RFP was distributed with a deadline in order to give all media the same opportunities to respond with their best offers for the Watershed Watch Campaign. The Consultant evaluated all proposals for their potential to serve the Watershed Watch Campaign, and summarized all offerings for WE&O AHTG review.

Target Audiences
As defined by the SCVURPPP Watershed Education and Outreach Strategy (June 2016) the primary target audiences for the Campaign are:

- Residents/ household decision makers age 35 and over

- Homeowners
- High school students

Secondary target audiences::
- Residents age 15-34
- Spanish speaking residents
- Lower income households
- Elementary and middle school students
- Businesses

The Campaign has recently focused our media campaigns to the primary audience of educated homeowners 35+, Spanish-speaking adults for most messages, and youth 16-24 for cleanup/volunteer messages. While our media plans do not exclude the other audiences, they are developed to effectively reach these particular audiences.

Media Strategy
- Use DIGITAL MEDIA for immediate and measured results, and unwasted reach (geo-targeted to SCVURPPP areas).
    - Provide a distinct call to action and/or useful offering for best results.
    - Link directly to the related content on our website.
    - Use a clear and single-focus message targeted to a specific group.

- Use RADIO & TV to deliver messages to large audiences; they have been effective in stimulating activity to the website.

- Use RADIO to generate traffic for Car Wash events.

- Focus media investment to reach educated homeowners and parents for general awareness, IPM / pest control messages and HHW, as messages are likely most relevant to these individuals. Green Streets improvement messages apply primarily to a homeowner, property owner or developer.

Scheduling
<u>Seasonal & Program Considerations</u>
Begin our campaign in late August to promote Green Gardener training class registration, and meet our goal of holding car wash promotional events in September when there is less chance of rain.

Schedule media to achieve a consistent presence with the audience, timed to support seasonal messages such as IPM and gardening, time-sensitive events like Green Gardener class recruitment, and Campaign car wash events.

2020 marks the 5-year cycle for the campaign evaluation requirement of the Permit. It is projected to be conducted in May, and therefore the media campaign may take a brief hiaitus in the weeks preceding and during the public survey. To accommodate this, we will schedule all spring car wash events for June 2020.

Election Year Considerations
2020 is an election year so most media will be schedule outside the political window, 45-days prior to the March 3 state primary election.

Partnership Considerations
City of San Jose / San Jose Earthquakes co-sponsorship campaign included transit shelters in June and July; any available scheduling information for Watershed Watch messaging for the Quakes and Sharks campaigns will be considered when scheduling messages for the Campaign media. We will also coordinate with the Caltrans "Protect Every Drop" campaign and other community partnerships based on direction from the WEO AHTG.

Campaign Tasks / Continuity
For message continuity, campaign strength and synergy, message delivery will be coordinated with other campaign tasks: **Events**, **Web, Public Relations** + **Social**.

Creative Strategy
The general creative strategy is to utilize existing creative, and develop new creative as needed to support permit requirements, requirements for selected media, Campaign goals and general awareness of the Watershed Watch.

Most of the Campaign's existing messages are applicable to the adult head-of-household and homeowner target audience, with regard to hiring contractors and making decisions that impact the home/family (pest control choices, proper disposal of hazardous household waste).

To target high school students, we will utilize "Volunteer" messages to encourage participation in cleanup events and other

volunteer activities presented by the Campaign, and to create awareness about litter as a social and environmental problem.

We currently have three :30-second Integrated Pest Management (IPM) messages for television (English & Spanish) that were produced in 2013. These messages promote hiring a Green Gardener, choosing less-toxic pest control, and hiring a pest control professional trained in Integrated Pest Management. A new :30-second litter video (TV/Digital) was developed in 2019 (English & Spanish) featuring cigarette butt litter.

The IPM Radio :60s ads that were developed to match the newer TV spots in 2013, and edited to :30s in 2018. HHW (mercury in fluorescent bulbs) in English/Spanish exists from 2006. In 2015 we developed new Litter radio, and in 2016 we developed new car wash event spots in :30s and :15s to meet our radio scheduling needs.

The Campaign also has a number of existing digital messages produced (static images in standard sizes), including IPM, car washing, litter, volunteerism, mercury in fish, green streets, etc. plus CalTrans "Protect Every Drop" images/messages in static format. Static digital is relatively inexpensive to create.

Budget and Resources

The total media budget for the fiscal year is $95,000, with target allocations of approximately:

- $25,000 to Spanish-language media
- $70,000 to general market media

Budget allocated to Spanish is based on proportion of County population with Spanish language preferences (2010 Census).

Paid social media campaigns are budgeted in the Social Media task of the Watershed Watch media plan.

GENERAL MARKET (ENGLISH) MEDIA

General market media is targeted to the primary desired audience of Santa Clara Valley Basin college educated homeowners aged 35+. Wherever available, efficiency data is based on the 35+ (or 35-54) age demographic. There are estimated 1,065,800 persons 35+ in Santa Clara County.

The secondary target audience is all other adults (18+), and students for volunteer/community service messages. Some media offers opportunties to reach these audiences, including targeting for specific goals, and general broadcast reach.

RADIO

Primary benefits of radio are our abilities to target audiences while achieving a relatively broad reach. It is a passive companion medium, accompanying audiences while they go about their lives (not requiring active engagement).

Radio is community-oriented and active at the grassroots level. Station promotional appeal and impact help support Campaign events and create event opportunities for the Campaign.

ALPHA MEDIA GROUP
KBAY 94.5 "Bay FM" and KEZR 106.5 "Mix 106" FM

KBAY 94.5 "Bay FM" Radio
KBAY remains the #1 top ranked station in Santa Clara County with target audiences 35+ and homeowners 35+ for weekly share of audience in Santa Clara County.

KEZR 106.5 "Mix 106" FM
KBAY's sister station KEZR "Mix" 106 ranks #2 consistently with our target audience. They are also one of the top-rated stations with Spanish-speaking adults 18+ in our target area.

Together they offer a broad reach of adults in our target area with complementary formats of classic/nostalgic (BAY FM) and current (MIX 106) Adult Top 40 hits.

KBAY + KEZR COMBO
8 weeks with 30's plus 15-second traffic spots with live "brought to you by" intros and PSAs to add frequency.

- 48 spots per station per week (96 spots total per week)

Adults 35+		
M-Su 6a-12m		
	Station	*Weekly Cume Persons**
1	KBAY-FM	231,000
2	KEZR-FM	216,600
3	KUFX-FM	201,400
4	KOIT-FM	192,100
5	***KCBS-AM***	***173,000***
6	KIOI-FM	168,600
7	KQED-FM	153,100
8	KMVQ-FM	146,800
9	KYLD-FM	142,800
10	KISQ-FM	137,300
11	KBRG-FM	133,800
12	KVVF-FM	114,800
13	***KLLC-FM***	***110,100***
14	KRTY-FM	103,900
15	KNBR-AM	100,300

- Monday – Sunday Schedules
- 11x :30-second spots in prime + weekend
- 6x :15-second spots w/Traffic reports M-F prime
- 8x :30-second spots in evenings and broad rotation
- 8x :30-second PSAs (added value)
- 15x :15-second PSAs (added value)

- $2,080 per week (rates are discounted significantly to incentivize the 2-station combo)
  Reach approximately 204,727 targeted adults (19.2%) with a 2.2x weekly frequency; 450,400 gross impressions per week.

  Added value:
- 8x :30-second PSAs per station per week
- 15x :15-second PSAs per station per week
- 2 Car Wash Events (or other promotional events) with booth, DJ talent (talent fee $300 per event) or no talent, street team, music and prizes. Each event includes:
  - 20x 15-second promotional announcements
  - 20x 15-second promotional announcements – online streaming
  - 2x 30-second pre-recorded call-ins from event
  - 3x social media posts (1x prior and 1x per hour during event)
  - Inclusion on station Events webpage
  - Dedicated landing page on station website(s)
- Watershed Watch Discount Card distribution

BONNEVILLE RADIO GROUP

KUFX "KFOX" 98.5 FM / 102.1 FM

This classic rock station is ranked #3 for the target audience of South Bay adult homeowners 35+. It consistently holds it's high ranking position with audiences 18+, men, persons and homeowners 35+, and eco-motivated adults. The station also has a strong Hispanic audience (speaking Spanish at home) to help us reach a broad segment of our target audience.

KOIT 96.5 FM

Currently ranked #4 for weekly audience reach in the South Bay, KOIT plays “Today’s hits and yesterday’s favorites” for a broad listening audience and conducive to workplace listening.

This year, we are engaging a KUFX “KFOX” and KOIT combo to reach a broad Bay Area/South Bay audience.

KFOX SCHEDULE
23x :30-second spots per week for 10 weeks, plus 2 FREE weeks in December

- 8x :30-second spots in M-F prime
- 7x :30-second spots in rotation
- 4x :30-second PSAs in rotation (added value)
- 4x :15-second PSAs in rotation (added value)
- $775 per week
  Reach approximately 53,100 adults (5%) 35+ with a 1.4x frequency; 72,300 gross impressions per week.

KOIT SCHEDULE
15x :30-second spots per week for 10 weeks, plus 2 FREE weeks in December.

- 3x :30-second spots in W-F prime
- 5x :30-second spots in rotation
- 4x :30-second PSAs in rotation (added value)
- 3x :15-second PSAs in rotation (added value)
- $825 per week
  Reach approximately 42,300 adults (4%) 35+ with a 1.3x frequency; 53,800 gross impressions per week.

COMBO reaches 95,400 (9%) of the target audience per week with a 1.3x frequency; 126,100 gross impressions per week.

<u>Added value:</u>

- KUFX 4x :30s per week
- KUFX 4x :15s per week
- KUFX 19x :30s plus 4x :15s per week for 2 weeks in December
- KOIT 4x :30s per week

- KOIT 3x :15s per week
- KOIT 11x :30s plus 3x :15s per week for 2 weeks in December
- "Today's World" – interview segments with Sue Hall; public affairs program that airs Sunday mornings on 6 Bay Area radio signals

Carwash Promotion(s)

3x Car wash promotions on KFOX and KFOX.com (or other promotional events)

- Onsite promotional team
- 25x promotional/event announcements each event/week
- Event calendar listing on all 4 Bonneville station websites
- Social media posts before and during event

KRTY "San Jose Hot Country" 95.3 FM

KRTY is the South Bay's country music station, which boasts a loyal audience with high level of "time spent listening," and strong participation in station promotions.

6 weeks on air

- 15x :30-second M-F prime spots (morning, mid-day and afternoon drive)
- 10x :30-second rotator spots M-F
- 6x :30-seconds 10A-3P Weekends
- 5x :15-second PSAs M-F prime rotation (added value)
- 31x :30-second PSAs M-Sun in broad rotation (added value)
- 36x Streaming (online) :30-second M-F broad rotation (added value)
- $2,300 per week
  Reach approximately 90,474 adults (8.5%) 35+ with a 4.1x frequency; 370,943 gross impressions per week.

Added value:

- :15-second and :30-second PSAs in rotation
- :30-second streaming in rotation
- 2 Car Wash Events

    - 2-Hour live remote with talent, team, and music
    - 25x 20-second live announcements
    - 4x 60-second live call-ins from event (additional talent and call-in costs paid by Watershed Watch)
    - Web exposure / events listing
- E-blast(s) to KRTY subscribers
- TBD – Contest (Possibly car wash giveaways; 5 per week, provided by Watershed Watch)
    - 25x 20-second live announcements
    - 10x 10-second contest announcements
    - Web exposure

DIGITAL MEDIA

Site-specific is where the user visits the site via desktop website or mobile media app (for example Pandora, YouTube, etc.). These reach only the users of the selected site/app, so potential audiences are visitors to those sites.

We balance with non-site-specific media in order to expand our reach and achieve specific messaging goals. Often referred to as "**programmatic**" they use cookies, key words and other targeting tools to find our desired audience and deliver our ads to them wherever they are on the internet.

PANDORA

Pandora maintains the lionshare of digital music subscribers for registered free users; only users of Pandora Free receive ads. Paid subcribers (Pandora Plus) make up just 5% of all streaming audio audiences. This chart helps illustrate the share of market that Pandora Free reaches for persons 13+ as applicable to reaching high school students:

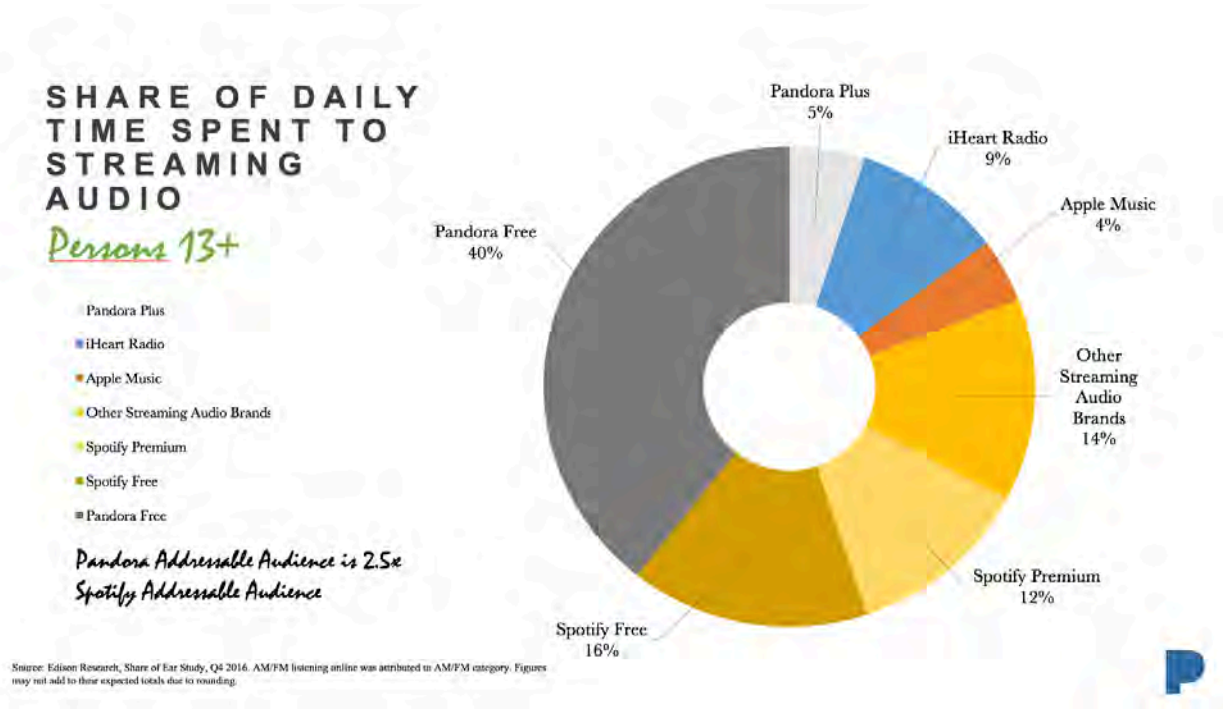

In our geographic area, our potential audiences are:

- Homeowners: 271,650 mobile users
- 18-65+: 535,315 potential reach
- Students ages 13-18 approximately 21,000 reach

Mobile Audio / Display

- :30 or :15 recorded audio
- 500x500 and 300x250 display ad
- $22 per thousand impressions *(costs are lower for less targeting, higher for more targeting criteria)*
- 1x impression of the audio, accompanying 2x digital impressions are included as added-value

- To meet Pandora's $2,500 monthly minimum, we are scheduling one flight in the fall, and one in the spring to promote volunteerism among our younger audiences.

Added value:

- 300x250 static display ads additional added value impressions; 10% of total impressions.

HEARST MEDIA – COREAUDIENCE

Hearst CoreAudience is a programmatic digital media buying service. It uses real-time bidding to place ads in brand-safe websites (they screen out potentially questionable sites) and apps based on targeting parameters. We do not choose the sites; we choose the audiences we want to reach. There is a minimum of $2,000 per month (any month) for CoreAudience.

Programmatic targeting may include:

- Geo-fencing – User is visiting a home and garden center; near a creek/stream; car wash; litter hot-spot, etc.
- Behavioral retargeting – Once they visit targeted venue
- Site retargeting – User has visited our site
- Search targeting – User has exhibited search behavior based on our criteria
- Contextual – User is consuming content relevant to our campaign

We are engaging CoreAudience static ads in both English and Spanish.

- $6 per thousand impressions (CPM) for basic targeting (geographic, key word, homeownership) with clickable ads.
- 4 months @ $1,000 per month; 166,666 monthly impressions targeting Spanish
- 4 months @ $1,000 per month; 166,666 monthly impressions targeting English
- 5 months @ $2,000 per month; 333,333 monthly impressions targeting English

Ads click-through to specific content on Watershed Watch campaign website: www.MyWatershedWatch.org to help measure ad and message effectiveness.

YOUTUBE

Video ads on YouTube content are available via Google Ads. With similar targeting and pricing strategies as Google Ads, we set up the campaign, and our video(s) are attached to video content related to key words or themes. We set a budget with bidding criteria and YouTube delivers the ads until our budget is spent. Cost per thousand and cost per delivery may vary according to how much competition we have for our defined audiences at any given time.

YouTube is a highly popular platform with 18-34 year olds, with older adults increasing usage every year. According to Ipsos (independent market research firm), YouTube mobile ads receive viewer attention about 62% of the time, compared to broadcast TV at 45%.

Google Ads is a pay-up-front program and requires a high level of hands-on maintenance, evaluation and adjustment to consistently monitor and fine-tune campaigns. It is not commissioned media, so AdManor will charge a percentage markup or hourly fee for placing and managing these services.

Our budget is set at $3,500 which includes a minimum of $2,975 in media. Number of impressions or plays delivered will depend on the competition in real-time bidding on campaigns.

SPANISH LANGUAGE MEDIA

Spanish language media is targeted to the audience of Spanish-speaking adults 18+ (or 18-49), though TV is geared toward the 35+ audience.

SPANISH RADIO

KSOL Estero Sol 98.9 / 99.1 FM –
Mexican Regional format, this station is #2 in the market for Spanish listeners 18+.

- 13x per week with 8x :30-second prime + weekend spots + 5x added value rotators

- $1,400 per week
- Reaches 8.8% of Spanish-speaking audience 1.5x per week

Added value:

- 5x :30-second PSAs supplement the paid schedule
- 3x 2-minute "Despierta Area de la Bahia" Univision TV 14 interview segments production and air time

SPANISH TELEVISION

KSTS Telemundo 48

Schedule is targeted to Santa Clara County Spanish-speaking adults 35+. A focus on news and primetime helps deliver audiences regularly to build frequency of our messages.

On-Air

- 30-second spots
- Morning news + early evening news M-F
- Daytime and weekend rotators
- Weekend prime + news

Proposed levels include:

- 203 total spots, including 20 PSAs for $25,005
- 83 total spots, including 20 PSAs for $15,000
- 62 total spots, including 10 PSAs for $7,520 (weekend rotation; no weekend news or prime)

Added Value

- :30-second PSAs in flight weeks
- Interviews on KNTV and KSTS community affairs program "Comunidad del Valle"will be requested

SPANISH DIGITAL

Hearst CoreAudience – See English Digital; targeting for Spanish digital will be based on Spanish-language preference, and behavioral and age/gender demographics related to each message.

MEDIA MIX RECAP

SPANISH MEDIA

- KSTS Telemundo TV reaches viewers through a trusted medium; target 35+.
- KSOL Radio targets 18+, with KDTV "Despierta Area de la Bahia" segments as added value.
- DIGITAL targeted (programmatic) with Spanish creative; proven effective for audience engagement.

ENGLISH MEDIA

- KBAY is a consistent market leader; has proven effective, offers wide reach and significant added value.
- KEZR is on par with KBAY for reaching our target audience.
- KUFX "KFOX" has proven effective and offers robust promotional support.
- KOIT in combination with KUFX offers a wide reach in adults 35+.
- KRTY Radio has a loyal audience that show up for onsite promotions (carwash events); different audience than the Adult Contemporary, Top 40 and Classic Rock stations.
- PROGRAMMATIC DIGITAL helps us reach a lot of people regardless of where they browse, and direct them to specific information on our website. Hearst CoreAudience delivers best pricing with proven accountability and service.
- PANDORA offers engaged younger audiences with audio/visual options.
- YOUTUBE provides featured video messages attached to related or targeted content.

With an emphasis on audio, this package of five radio stations reach varied audiences with more options for Car Wash Events and/or other grassroots promotions. Pandora reaches the radio-on-demand audience plus click-through opportunities for measurement.

Radio and digital combination offers wide reach balanced with measurable digital engagement and targeted delivery of specific messages to the right audiences.

THANK YOU!

Watershed Watch Campaign
FY 19-20 MEDIA

ENGLISH (General Market) MEDIA												
Station		Weeks	Spots/ Week	Sponsor/ PSA's	Total Spots	Week Freq.	Total Freq.	Cost Week	GI's Week	GI's Total	CPM	Total Cost
Radio									35+			
KBAY 94.5 + KEZR Mix 106.5 FM COMBO	15s + 30s On air	8	50	46	768	2.6	5.5	$ 2,080	450,400	3,603,200	$ 4.62	$ 16,640
	Event talent	1						$ 412				$ 412
KUFX "KFOX" 98.5	30s on air + 15s PSA	10	15	8	230	1.4	2.8	$ 775	72,300	723,000	$ 8.93	$ 7,750
KUFX "KFOX" 98.5	2 weeks free 30s + 15s	2		23	46	1.4		$ -	72,300	144,600	$ -	$ -
KOIT 96.5 FM	30s on air + 15s PSA	10	8	7	150	1.3	2.4	$ 825	53,800	538,000	$ 12.78	$ 8,250
KOIT 96.5 FM	2 weeks free 30s + 15s	2		15	30	1.3		$ -	53,800	107,600	$ -	$ -
KRTY 95.3 FM	15s + 30s On-air, Streamin	6	27	64	546	3.7	9.8	$ 2,000	326,877	1,961,262	$ 6.12	$ 12,000
	Event call-ins & talent	2	3	25	56	3.7		$ 500				$ 1,000
Digital Media	Example months							*Rate*	*Impressions*	*Total Impressi*	*CPM*	*Total Cost*
Hearst CoreAudience - Target English	300x250 standard	7						$ 2,000	333,333	2,333,331	$ 6.00	$ 14,000
YouTube	Video 30s	3.5						$ 1,000	50,000	175,000	$ 20.00	$ 3,500
Pandora	mobile audio :30	2						$ 2,941	138,888	277,776	$ 21.18	$ 5,883
	bonus display 500x500	2						$ -	138,888	277,776	$ -	$ -
TOTAL ENGLISH MEDIA										***10,141,545***	***$ 6.85***	***$ 69,435***
SPANISH MEDIA												
Station		Weeks	Spots/ Week	Sponsor/ PSA's	Total Spots	Week Freq.	Total Freq.	Cost Week	GI's Week	GI's Total	CPM	Total Cost
Radio												
KSOL "Estero Sol" 98.9 FM / 91.9 FM	30s	6	8	5	78	1.5	3.1	$ 1,400	25,600	153,600	$ 54.69	$ 8,400
Television												
Telemundo KSTS 48	30s & news, weekend	7	12	3	102			$ 1,875	38,622	270,354	$ 48.55	$ 13,125
Digital		Months										
CoreAudience - Target Spanish-speakers	300x250 standard banner	4						$ 1,000	166,666	666,664	$ 6.00	$ 4,000
TOTAL SPANISH MEDIA										**1,090,618**	**$ 23.40**	**$ 25,525**
TOTAL 2019-20 MEDIA INVESTMENT										**11,232,163**	**$ 8.45**	**$ 94,960**

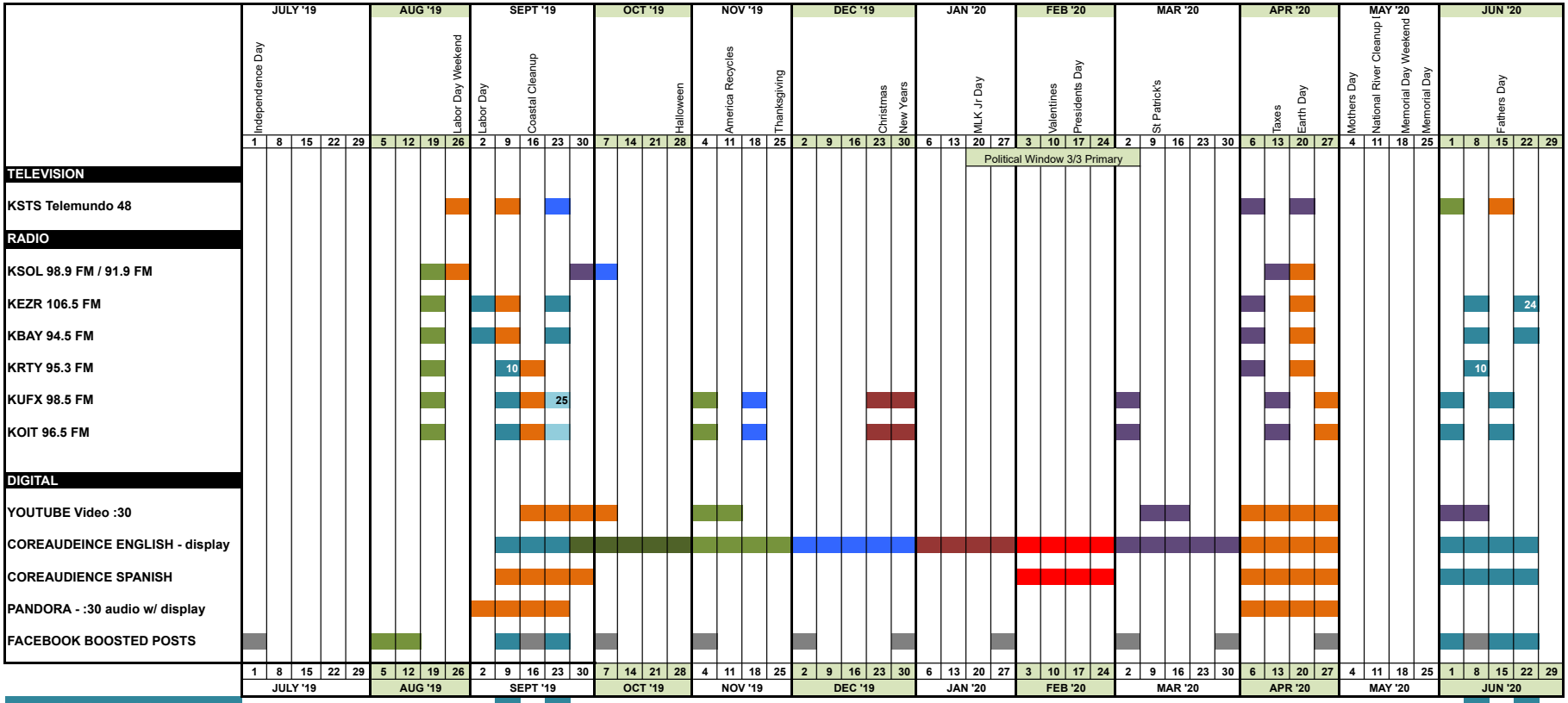

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AdManor inc
Multimedia Marketing

July 28, 2020

To: **Jill Bicknell, SCVURPPP**
Vishakha Atre, SCVURPPP

From: **Sandi Manor**

Re: **FY 19-20 Watershed Watch Campaign**
Annual Campaign Report – July 1, 2019-June 30, 2020

Campaign Summary

Throughout the fiscal year**,** the consultant worked with SCVURPPP to implement the FY 19-20 Watershed Watch Campaign (Campaign) Work Plan, including creative production, events, partnership relations, negotiating and executing the media plan, social networking and website updates. The consultant attended meetings and provided event staffing, consulting, reporting and support as needed.

Pollution prevention messages were implemented in the frequency-based multi-media campaign, leveraging social, paid and negotiated add-value media to keep the Campaign messages continually present with local audiences.

Media messages were scheduled for seasonality and to achieve the messaging goals for using less toxic pest control, hiring IPM-trained professionals, car wash promotions, promoting the Green Gardener program, installing low-impact design features, household hazardous waste (HHW) disposal, mercury in fish caught in the Bay, mobile cleaner hiring/best practices and preventing and cleaning up litter.

This report summarizes completion of tasks, activities, and effectiveness of the campaign year.

Summary of Tasks

Task 1: Creative Development

The consultant worked with Program staff and the Scripts Review Work Group to develop the following creative:

NEW CREATIVE

<u>PERSONAL PROTECTION EQUIPMENT (PPE) LITTER FLYER and GRAPHICS</u>

The onset of COVID-19 created a new set of litter problems with PPE and sanitizing wipes being left as litter in public places. A flyer with customized images indicated the wrong and right way to

dispose of PPE, with basic storm drain education messaging. Images were provided for social media and other uses.

SPORT PACK "WATERSHED MAP" DESIGN

New sport pack design was developed and implemented with "Find Your Creek Connection" message and featuring a map of the Santa Clara Basin watershed creeks, rivers and the Bay.

LID "GREEN STREETS" EVENT DISPLAY

Work began and progressed for an interactive table-top display featuring "Green Streets" low impact design elements.

UPDATES TO EXISTING CREATIVE

CAR WASH EVENT RADIO FOR DELTA QUEEN CLASSIC CAR WASH

15-seond and 30-second radio spots were edited to promote a Watershed Watch 50% off car wash event on Tuesday, September 10th at Delta Queen Classic Car Wash in Campbell (existing spots all promote Wednesday events).

CAR WASH FLYERS

The event flyer was updated in the fall for two scheduled events.

GREEN GARDENER TRAINING PROGRAM RADIO

15-second English and 30-second English and Spanish radio spots were updated with new class information.

CIGARETTE LITTER VIDEO FOR MOVIE THEATERS

Edited "Smoked Salmon" 30-second TV commercial for City of Sunnyvale use in movie theaters.

NEW CREATIVE DEVELOPED

CAR WASH EVENT RADIO FOR MONTAGUE PREMIER CAR WASH

A 30-second radio spot was produced to promote a Watershed Watch car wash gift certificate giveaway from Montague Premier Car Wash in San Jose, through local radio stations. Our existing graphic was altered for social/web.

WATERSHED WATCH DISCOUNT CARDS

Card layouts were updated with new 2020 expiration dates and reprinted in English & Spanish.

WATERSHED WATCH BROCHURE

"You Are the Solution to Water Pollution" brochure was updated with current contact information; art was provided for printing and posted on the website.

IPM FOR PANDORA
Modified "Choose Less Toxic" IPM message for 30-second Pandora production.

Task 2: Media
The FY 19-20 Media Plan was developed to include broadcast television, broadcast radio, and digital advertising. Target audiences for the media campaign included college-educated Santa Clara County homeowners aged 35-54, youth 16-24, and Spanish-speaking adults aged 18-49.

MEDIA BUDGET
The annual FY 19-20 media budget for the Watershed Watch Campaign was $95,000. The actual media investment for the year was **$102,952** including talent fees for fall car wash event promotions. (Facebook ad budget was separate, with expenditures reported in Task 5 **Social Media.** However, Facebook advertising is described below.). Extra radio media was added to utilize surplus event staffing funds and support the June Car Wash Giveaway contest on KRTY, KFOX, KBAY and KEZR after all spring community events were cancelled.

MEDIA SELECTIONS
Media selections for the fiscal year included:

RADIO
- KBAY "THE BAY" 94.5 FM top-rated general market (English language) adult-contemporary/classic hits format radio with added value media, promotions and partnership support.
- KEZR "MIX 106" 106.5 FM top-rated general market hot-hits format radio with added value media, promotions and partnership support.
- KUFX "KFOX" 98.5 / 102.1 FM top-rated general market (English language) classic-rock format radio with added value media and promotions. The station also ranks well with Hispanic young males, providing broad coverage for our target audience.
- KOIT 96.5 FM top-rated adult contemporary general market radio with added value media.
- KRTY 95.3 FM South Bay's only country music format station, with added value media and promotions.
- KSOL "ESTERO SOL" 98.9 / 91.9 FM Spanish broadcast radio with regional Mexican music format, including added value media.

DIGITAL
- COREAUDIENCE Behaviorally targeted digital mobile campaign delivered ads to geographically and demographically defined audiences on their mobile devices within "brand safe" apps and web content. Separate campaigns targeted English-preference and Spanish-preference mobile users.

- YOUTUBE Digital video advertising, targeted by geography, key words (searched content), age and lifestyle demographics.
- PANDORA Advertisements within music and podcasts delivering audio and static-image, targeted by geography and age demographics.

TELEVISION

- KSTS TELEMUNDO 48 Spanish broadcast television, including PSAs.

MEDIA SERVICES

Media services provided by the consultant include the following:

- Received and reviewed media proposals, ratings data and contracts; conferred/met with digital, radio and TV media reps
- Developed final media plans including media mix options for English & Spanish
- Negotiated final media buys and added-value
- Developed and maintained a media calendar with planned media dates and corresponding creative messages
- Sent traffic orders and all creative to fulfill media buy according to the approved plan
- Received, reconciled, processed and paid invoices
- Resolved issues and schedule changes (make goods) as needed
- Managed fulfillment of all added-value media / creative

MEDIA MESSAGES

INTEGRATED PEST MANAGEMENT

- 15-second English radio PSAs and paid 30-second spots promoting becoming an IPM-trained Green Gardener ran on KUFX, KOIT, KRTY, KEZR and KBAY; Spanish 30-second spots aired on KSOL
- Digital (paid) posts on Facebook and Instagram promoted Green Gardener classes
- "Hire a Green Gardener" 30-second video ran in English on YouTube; Spanish on KSTS TV
- "Hire a Green Gardener" 30-second radio and 15-second PSA in English on KUFX and KOIT
- Interview segment for *Despierto Area de la Bahia* on KDTV Univision 14 (Spanish) created awareness of Green Gardener training program and class registration
- 30-second radio spot "Choose less toxic DIY" ran on KSOL (Spanish), KEZR, KBAY, KUFX, KOIT and KRTY

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- 30-second English TV spot “Choose less toxic DIY” ran on YouTube; in Spanish on KSTS
- 30-second Spanish TV spot “Hire an IPM-trained pest pro” ran on KSTS; English spots ran on YouTube
- 30-second radio promoting “Hire an IPM-trained pest pro” ran on KSOL (Spanish), KOIT and KUFX
- IPM messages posted on Facebook and Twitter
- “Pests Bugging You?”/Choose less toxic English and Spanish targeted digital ads ran via CoreAudience
- 15-second radio promoting IPM for pest control ran on KEZR, KBAY, KUFX, KOIT and KRTY

LITTER

- 30-second cigarette litter “Smoked Salmon” Spanish TV on KSTS; English on YouTube
- “Karma” English 30-second video on YouTube
- 15-second radio PSA “Volunteer” Coastal Cleanup Day message on KBAY, KEZR, KUFX, KOIT, and KRTY radio
- “Volunteer” Coastal Cleanup Day digital delivered via e-blast to subscribers KBAY
- “Volunteer” audio and digital ads delivered on Pandora
- “Litter” 30-second Spanish radio on KSOL; 15-second and 30-second radio messages ran on KUFX, , KEZR, KBAY, KOIT and KRTY
- “Volunteer” English and Spanish targeted mobile digital ads delivered via CoreAudience
- Various litter prevention and waste reduction messages on social media including paid quiz regarding fines for littering; paid quiz about Coastal Cleanup Day and PPE litter promoted post
- Interview segment for *Despierto Area de la Bahia* on KDTV Univision 14 (Spanish) created awareness of litter and storm drains

CAR WASHING + AUTO CARE

- 15-second + 30-second radio spots on KBAY, KEZR, KRTY, KOIT and KUFX radio promoting car wash promotional events; live call-ins during KUFX and KRTY events

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- Website event/calendar postings, and contest promotion on KRTY, KEZR, KBAY and KFOX web pages
- Facebook paid ads to promote 50% off car wash events, car wash quiz
- Social media posts about car wash giveaway promotion

LOW IMPACT DEVELOPMENT/GREEN STREETS

- CoreAudience targeted mobile campaign featuring Rain Barrel, Rain Garden and Pervious Paving animated GIFs ran for one month (English)

HHW DISPOSAL

- 30-second radio and 15-second PSAs promoting proper disposal and hhw.org ran on KUFX and KOIT
- Facebook boosted quiz regarding HHW Disposal
- Targeted digital ads promoting proper disposal of HHW via CoreAudience

MOBILE CLEANERS

- Boosted video post on Facebook and Instagram promoted best practices for mobile cleaners, hiring a responsible cleaning company
- Facebook Quiz promoted post about wash water disposal

STORM WATER / STORM DRAINS

- Promoted quizzes for Facebook were used to create awareness on storm drains

MERCURY IN FISH

- Interview segment for *Despierto Area de la Bahia* on KDTV Univision 14 (Spanish) created awareness of mercury in fish and promoted the brochure/reference guide for safe consumption of fish caught in the SF Bay
- Targeted digital ads in English and Spanish via CoreAudience

SOUTH BAY GREEN GARDENS WEBSITE

- Social media posts promoting events and information offered via South Bay Green Gardens

WATERSHED WATCHERS PROGRAM at the Don Edwards SF Wildlife Refuge Environmental Education Center in Alviso

- Boosted social media post featuring the Don Edwards SF Wildlife Refuge Coloring Page

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SUMMARY OF MEDIA DELIVERED

The paid media schedule delivered included the following:

949 Radio ads:

- 250 paid spots on KBAY
- 200 paid spots on KEZR
- 170 paid spots on KUFX
- 64 paid spots on KOIT
- 217 paid spots on KRTY
- 48 paid spots on KSOL

81 Television ads:

- 81 paid spots on KSTS

Digital Media:

- FACEBOOK.COM w/INSTAGRAM – 16 post promotions (details in Social Media Task 5)
- PANDORA – 277,776 audio impressions
- COREAUDIENCE – behaviorally-targeted mobile banners
  300x250 and 320x50, desktop 728x90 – total of 3,155,608 impressions
  - ENGLISH – 2,030,073 impressions
    - "Volunteer Opportunities" one month
    - "Rain Barrels" "Rain Gardens" + "Pervious Paving" LID/Green Streets – one month
    - "Hire a Green Gardener" – one month
    - "Hire an IPM-Pro"– one month
    - "HHW Safe Disposal"- one month
    - "Mercury in Fish" – one month
    - "Choose Less Toxic Pest Control" – three months
  - SPANISH – 1,125,535 impressions
    - "Volunteer/Litter" – one month
    - "LID/Green Streets" – one month
    - "Hire a Green Gardener" – one month
    - "Mercury in Fish" – one month
    - "Choose Less Toxic Pest Control" – three months
- YOUTUBE – 634,013 impressions. See table below for additional details.

YouTube Video Campaign Results

Video :30	Dates	Cost	Impressions	Clicks	CTR	Views	VCR	CPC	CPM
Hire a GG	Nov 18-Dec 16	$481	41,465	54	0.13%	17,378	41.91%	$8.91	$11.60
Hire IPM Pro	Jan 1-19	$356	51,310	277	0.54%	24,377	47.51%	$1.28	$6.64
IPM DIY	Feb 17-Mar 30 Apr 6-27	$1,857	222,336	659	0.30%	44,862	20.18%	$2.82	$8.35
Smoked Salmon	Apr 20-May 31	$1,060	158,267	742	0.47%	38,047	24.04%	$1.43	$6.70
Karma (Litter)	May 18-Jun 29	$1,250	160,635	323	0.20%	32,207	20.05%	$3.87	$7.78
Total		$5,004	634,013	2,055	0.32%	156,872	24.74%	$2.44	$7.89

Definitions:
CTR – Click through rate; number of clicks divided by impressions
Views – Those who viewed the ad to completion (did not skip at any point)
VCR – Views to completion rate; number of views divided by impressions
CPC – Cost per click; total cost divided by number of clicks, measuring effectiveness/response
CPM – Cost per one-thousand impressions; a measure of cost-efficiency relative to other media

The added-value advertisements and promotions that the Campaign received *free* from the Campaign's media partners include the following:

- KRTY
  - 190 30-second PSAs (our recorded spots)
  - 27 15-second PSAs
  - 1 onsite car wash promotional event
    - On-air talent and promotional team, prizes at event
    - 20-second event promotional announcements
    - 1 web page and promotional ad on KRTY.com
  - On-air interview June 18, 2020 with Sheila Tucker, WVCWA as spokesperson for Watershed Watch Campaign; "Gary & Julie" Morning Show segment about PPE litter and storm drains
  - 1 on-air/online car wash promotional giveaway (1 of 2 weeks)
    - 1 web page and promotional ad on KRTY.com
    - 20-second promotional announcements
- KBAY "BAY FM"
  - 89 30-second PSAs (our recorded spots)

    - 120 15-second PSAs
    - 1 on-air/online car wash promotional giveaway (1 of 2 weeks)
        - 1 web page and promotional ad
        - 20-second promotional announcements
- KEZR "MIX 106"
    - 64 30-second PSAs (our recorded spots)
    - 120 15-second PSAs
    - 1 on-air/online car wash promotional giveaway (1 of 2 weeks)
        - 1 web page and promotional ad
        - 20-second promotional announcements
- KUFX "KFOX"
    - 80 30-second PSAs (our recorded spots)
    - 43 15-second PSAs
    - 1 onsite car wash promotional event
        - Street team with prizes and entertainment at event
        - 15-second event promotional announcements
        - 1 web page/event promotion on KFOX.com
    - 1 on-air/online car wash promotional giveaway (1 of 2 weeks)
        - 1 web page and promotional ad
          (all promotional announcements in week 2 – FY 20-21)
- KOIT Radio
    - 64 30-second PSAs (our recorded spots)
    - 28 15-second PSAs
- KSOL Radio / KDTV Univision TV
    - 30 30-second PSAs on KSOL Radio
- KSTS TV
    - 19 30-second PSAs
- CoreAudience Targeted Mobile/Digital
    - 155,613 impressions
- Pandora Mobile/Digital
    - 279,340 added value (image) impressions
    - 1,564 added value audio impressions

The following table shows estimated gross impressions for the Campaign year:

Media Gross Impressions

MEDIA	Type	Impressions*
KBAY 94.5 FM + KEZR 106.5 FM	Radio	4,053,600
KUFX 98.5 / 102.1 FM	Radio	1,012,200
KOIT 96.5 FM	Radio	645,600
KRTY 95.3 FM	Radio	2,288,139
KSOL 98.9 / 91.9 FM	Radio	153,600
PANDORA	Audio/Digital	558,680
YOUTUBE	Digital Video	634,013
KSTS Telemundo 48	Television	270,354
COREAUDIENCE (Mobile on various apps/sites)	Digital	3,155,608
TOTAL		**12,771,794**

**Data represents paid media and verfied digital impressions.*

- *Does not include unverified gross impressions on radio station websites, non-invoiced bonafide PSAs and posts earned via Task 7: Public Relations*
- *Does not include paid or organic social impressions on Facebook and Twitter (Task 5: see Social Media)*

The table below describes the media costs and conservative estimated value-added media advertising:

Media Buy

MEDIA	TOTAL COST	ADDED VALUE (minimum)	TOTAL VALUE
KBAY 94.5 FM	$10,820	$8,694	$19,514
KEZR 106.5 FM	$8,320	$7,694	$16,014
KUFX 98.5 / 102.1 FM	$10,250	$10,104	$20,354
KOIT 96.5 FM	$8,250	$9,488	$17,738
KRTY 95.3 FM	$15,000	$21,058	$36,058
KSOL 98.9 / 91.9 FM	$8,400	$12,750	$21,150
PANDORA	$5,882.50	$1,422	$7,305
YOUTUBE	$5,004.56	-	$5,005
KSTS Telemundo 48	$13,026	$2,969	$15,995
COREAUDIENCE	$17,999.40	$933.68	$18,933
TOTAL	**$102,952.46**	**$75,112.68**	**$178,065**

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Creative Messages Breakdown

	IPM	IPM PCO	IPM GG*	Litter **	Moblie Cleaning	Car Wash	HHW	FISH	GSI/LID	Stormwater - other	Total
Radio - Paid	334	8	108	258		241					949
Radio - PSA	237	5	99	290		156	76				863
Digital *** Paid	9	2	5	10	2	2	2	4	1	2	39
Digital – PSA	1					2					3
TV - Paid	24	10	12	35							81
TV – PSA	9	3	4	9				1			26
Total	**614**	**28**	**228**	**602**	**2**	**401**	**78**	**5**	**1**	**2**	**1,961**

**Additional PSAs for Green Gardener class registration/promotion may have aired through public affairs departments who do not report on PSAs delivered.*

*** Creek cleanup and Volunteer promotions are counted in Litter.*

**** Digital includes E-blasts, banner/tile display ads, YouTube video ads, sponsored social posts. Ads are counted as 1 each but may represent thousands of impressions.*

Task 3: Added-Value + Partner Development

The consultant worked at maintaining relationships with existing partners, creating new partnerships, and updated and maintained partner contact information.

Existing partnership and related added-value activities included:

- Happy Hollow Park & Zoo
  - Provided $2 per person admission discount with WW Discount Card.
- KSTS Telemundo - added value media PSAs
- KBAY + KEZR

  In addition to added-value media advertising, KBAY + KEZR provided the following resources:
  - Production of :15 announcement promoting Green Gardener Training ($375)
  - Production of :15 announcement for IPM "Choose less toxic" ($375)
  - Production of :30 announcement for Car Wash Giveaway ($475)
  - Discount Card distribution at community events
  - Promotional support for Montague Car Wash gift card giveaways; received 61 entries via website contest entry form and awarded 20 car wash prizes.

- KUFX "KFOX" + KOIT

  In addition to added-value media advertising, KFOX provided the following resources:
  - Production of :15 announcement promoting Green Gardener Training ($375)
  - Production of :15 announcement for IPM "Choose less toxic" ($375)
  - Production of :30 announcement for Car Wash Giveaway ($475)
  - Discount Card distribution at community events
  - Promotional support and onsite event for Montague Car Wash event
  - Promotional support for Montague Car Wash gift card giveaways; resulted in 45 contest entries.

- KRTY
  In addition to added-value media advertising, KRTY provided the following resources:
  - Production of :15 announcement promoting Green Gardener Training ($375)
  - Production of :15 announcement for IPM "Choose less toxic" ($375)
  - Production of :30 announcement for Car Wash Giveaway ($475)
  - Discount Card distribution at community events
  - Promotional support and onsite event for Delta Queen Classic Car Wash event
  - Promotional support for Montague Car Wash gift card giveaways; delivered a daily on-air quiz question Monday-Friday for two weeks, and awarded car wash to the first caller with the correct answer.
- Yamagami's Nursery
  - Web link on "helpful links" page on Yamagamisnursery.com.
- Capitol Premier Car Wash
  - Provided ongoing discounts of $2 off Premier Wash, $3 off Supreme Wash and $4 off Works Wash to customers with the WW Discount Card.
- Pacific Car Wash
  - Provided ongoing $3 discounts to customers with the WW Discount Card.
- Classic Car Wash
  - Provided ongoing discounts to customers at all 4 locations with the WW Discount Card.
    - 158 discounts at $4 each provided to cardholders ($632 value) – July-Dec
    - Hosted 1 on-site event; labor and overhead
    - 75 discounted washes 50%-off for September 10th event at Delta Queen ($750 minimum value)
- Creek Connections Action Group
  - Campaign promoted the Coastal Cleanup Day events by posting information on the Watershed Watch website, social media.
  - Utilized Facebook boosted posts and radio added value to promote Coastal Cleanup Day
- Jiffy Lube
  - Offered $10 off Signature Oil Change service with WW Discount Card.
- SprinklerTimes.com
  - Provides $4 discount on annual subscription with Watershed Watch Discount Card.
- Capitol Wholesale Nursery
  - Features WW, Green Gardener Program and Bay Area Eco-Gardens on their webpage. Consistently generates referrals to our website.
- South Bay Clean Creeks Connection / Friends of Los Gatos Creek
  - Cross posting on Facebook.
  - Features WW on their Partners webpage.

- City of San Jose ESD – Earthquakes and Sharks Media Sponsorship/Partnership
    - SCVURPPP provides funding for transit shelter advertisements on litter. The City of San Jose coordinates the partnership with team, creative and media buy. The advetisements direct viewers to the Watershed Watch website for information on creek cleanup events
    - Consultant posted the creative on the Watershed Watch website home page and featured Volunteer for Cleanups page
- Bass Pro Shops (mutliple locations)
    - Stocks the "Guide to Eating Fish & Shellfish from the San Francisco Bay" brochures.
- Sunnvyvale Carwash & Gas
    - Discount Card partner; offers a $3 discount on Premium Wash
- Sunnyvale Car Spa, Inc. (E. Duane Ave location)
    - Discount Card partner offers $5 discount on all car washes
- EarthBaby Compostable Diaper Service
    - Discount Card partner offers free pack of diapers and wipes with new service subscribers
- Montague Premier Car Wash
    - Discount Card partner offers $3 off Premier Wash, $5 off The Works, $10 off any detail over $50
    - Hosted a 50% off car wash event September 25th with an estimated 21 discounted car washes with total value of $560
    - Donated 40 full-wash gift cards for June/July 2020 radio station promotions ($26.95 each; $1,078 value)
- Vikhar Valero
    - Discount Card partner offers $1 off any car wash (drive through washes)

Partnerships in development:

- Loop Car Washes
    - Potential partner for Discount Card; promotional events.
- Planet Orange
    - Potential IPM partner for Discount Card.
- Got Gophers?
    - Potential IPM partner for Discount Card.

Minimum measurable estimated value-added provided to the Campaign from media and community partners is **$81,807.**

Task 4: Website Maintenance
The consultant performed ongoing functional tuning and content updates to keep *myWatershedWatch.org* current. Functional repair and maintenance keeps the site current with security, SEO, and mechanics.

Content updates keep information current and applicable to the new creative, partnerships and Co-permittee news and events, primarily through slideshow graphics and "What's New" featured links. Linked files / downloadable items were added and replaced as new versions became available. Green Gardener class information and Green Gardener lists were updated.

The website was promoted in television, radio and online (including social media), as well as on Campaign materials and promotional items handed out at community events.

The consultant reported monthly on page views (gross impressions), visitors (people visiting the site) and popular content.

The site had **122,723 visits** resulting in **155,325 page views** (average of **424** page views per day, 366 days in Leap Year):

Total Visits: 122,723; compared to **61,033** in July 1, 2018-June 30, 2019 (+101%)
Unique Visitors: 104,292; compared to **53,168** in July 1, 2018-June 30, 2019 (+96%)
California Visits: 26,060; compared to **11,553** in July 1, 2018-June 30, 2019 (+126%)
Total Page Views: 155,325; compared to **78,887** in in July 1, 2018-June 30, 2019 (+96%)
Average Daily Page Views: 424; compared to **220** in in July 1, 2018-June 30, 2019 (+93%)

Of the total 122,723 visits, 26,060 (21.2%) were from California. Shown in top 10 ranking order, California visitors came from:

1. San Jose
2. Santa Clara
3. San Francisco
4. Cupertino
5. Campbell
6. Chula Vista
7. Milpitas
8. Sunnyvale
9. Mountain View
10. Alameda

Other SCVURPPP areas:

16. Palo Alto
17. Saratoga
18. Los Gatos
22. Los Altos

104,292 Visitors arrive at the site via three different ways:

1. **Direct traffic** – entering the URL directly into their browsers
2. **Referring sites** –external links to www.mywatershedwatch.org from other sites, online ads, mobile applications and emails; Google Analytics reports referrals from Social Media referrals as "Social"
3. **Search engines** – key word searches resulting in hits to the site

Sources of traffic / visitors to site:

1. Search Engines / Organic Search 65,902 (62.4%)
2. Paid Search 18,997 (18%) Google Ads
3. Direct Traffic 16,057 (15.2%)
4. Referral 2,698 (2.6%)
5. Social 1,867 (1.8%)
6. "Other" 11 (0.01%) "Univision" display

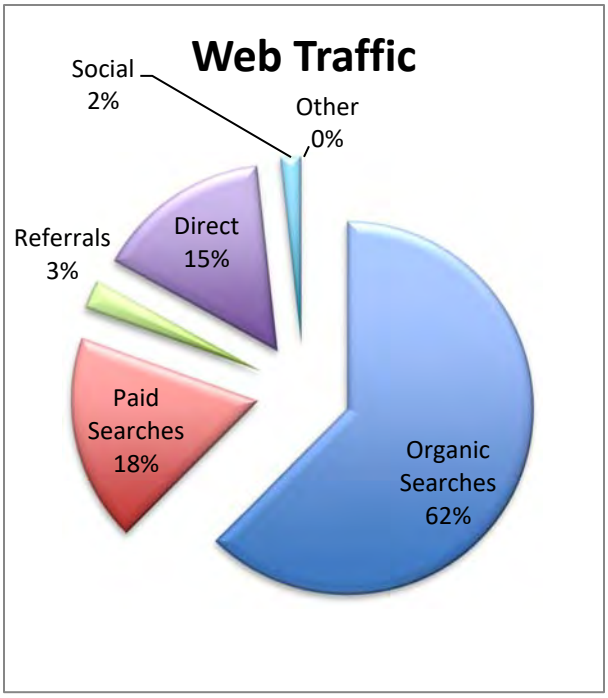

Top search engines:

1. Google
2. Bing
3. Yahoo

Top search terms / key words:

1. Importance of watershed/watershed important to humans/why are watersheds important?
2. Stormwater pollution
3. Prevent litter/water pollution

Top 10 referring sites were:

1. Google (cost per click)
2. Ad links (our ads appear on hundreds of sites; combined, these are the top sources for ad referrals)
3. m.facebook.com (Facebook mobile)
4. facebook.com
5. capitolwholesalenursery.com
6. mgsantaclara.ucanr.edu instagram.com
7. pandora.com
8. amazon.com
9. cuencashidfrograficaskim1.blogspot.com (River Basins of Venezula, links Importancia de las cuencas hidrogràficas to www.mywatershedwatch.org/es/about-watersheds/)
10. sanjoseca.gov

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Top 10 pages:

1. **mywatershedwatch.org/es/pollution-prevention-tips/** (Spanish Pollution Prevention Tips)
2. **mywatershedwatch.org/es/about-watersheds/why-are-watersheds-important/** (Spanish About Watersheds)
3. **mywatershedwatch.org/** (Home page)
4. **mywatershedwatch.org/es/** (Spanish Home page)
5. **mywatershedwatch.org/about-watersheds/why-are-watersheds-important/** (About Watersheds)
6. **mywatershedwatch.org/es/residents/prevent-mercury-pollution/** (Spanish Prevent Mercury Pollution)
7. **mywatershedwatch.org/residents/pollution-mercury-prevention/** (Mercury Pollution)
8. **mywatershedwatch.org/about-watersheds/** (About Watersheds)
9. **mywatershedwatch.org/residents/green-streets/** (Green Streets)
10. **mywatershedwatch.org/about-watersheds/volunteer-opportunities/** (Volunteer Opportunities)

60% of the top 10 pages were English, 40% were Spanish.

Total events (video views, downloads, outbound referrals/links clicked, etc.): **5,205** (+14.4% from 4,550 in previous year).

Total downloads: 2,181 (+1.1% from 2,156 in previous year).

Top 10 downloads:

1. How Trash Gets Into Creeks (Single Family Residence version)
2. Mercury in Fish Caught in Lakes
3. Mercury in Fish Caught in SF Bay (English)
4. Preventing Storm Drain Pollution Commercial Booklet
5. Where Does Your Water Go
6. Green Gardener List
7. Volunteer Opportunities List
8. Rain Garden Fact Sheet
9. Watershed Watch Discount Card
10. Watershed Watch Brochure

Technology

Mobile activity accounted for 58% of all visits, desktop users were 36.5% and tablet users 4.8% of all visits. Number of mobile users were up 143.9% of previous year, desktop users up 55.8%, and tablet up 130.9%.

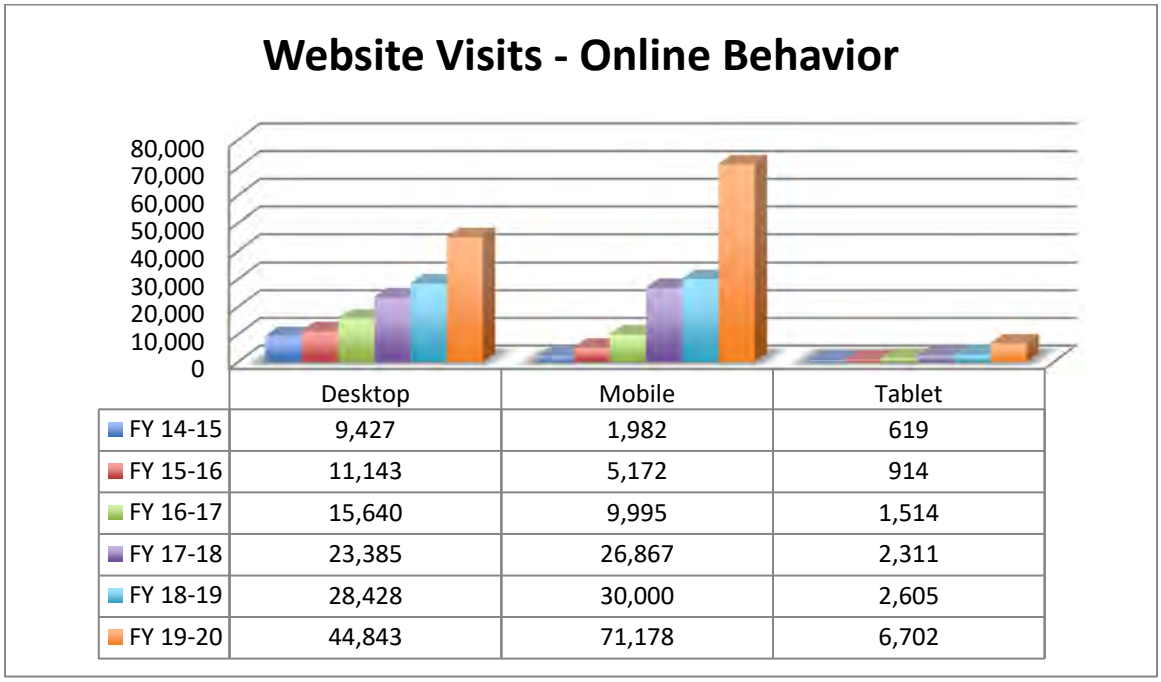

	Desktop	Mobile	Tablet
FY 14-15	9,427	1,982	619
FY 15-16	11,143	5,172	914
FY 16-17	15,640	9,995	1,514
FY 17-18	23,385	26,867	2,311
FY 18-19	28,428	30,000	2,605
FY 19-20	44,843	71,178	6,702

Campaign Event Impacts on Web Activity

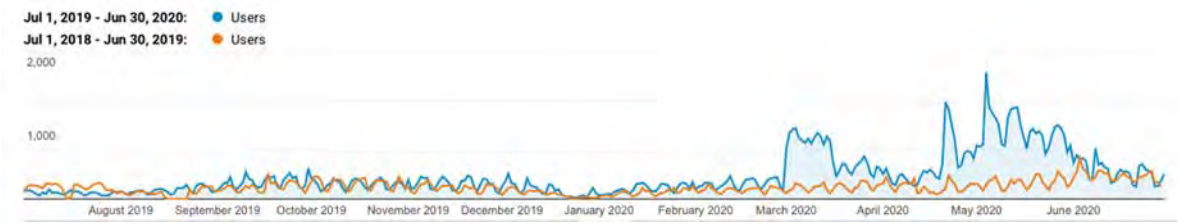

Website was stimulated by Watershed Watch promotion of sponsored 50% Off Car Wash Events on September 10 and September 25.

Media Campaign Impacts on Web Activity

The Campaign was able to maintain some media presence throughout the year starting with the paid media campaign kicking off in August. As described below, media advertising contributed to increases in web activity.

COVID-19 shelter-in-place orders for Santa Clara County coincided with an increase in website activity. More people were home and using the internet for school and business, and people were doing more home and garden projects. During the same March-June timeframe media included City of San Jose's Google Ad campaign in March and May featuring San Jose Sharks, Watershed Watch radio and digital ad campaigns promoting less-toxic pest control and litter prevention messages, and a virtual event (car wash giveaway contest) helped to increase website activity.

Other media-related impacts were also evident from the beginning of the media campaign which was launched August 19, 2019. The site experienced a 53% increase in visits for the last two weeks of August, compared to the first two weeks of the month with no media.

In August, three of the 10 most pages visited featured Green Gardener information. This was likely a result of the "Hire a Green Gardener" message and the Green Gardener class messages in media advertising. The Green Gardener Training flyer was the #1 most downloaded item for the month.

In September, volunteering-related messages in digital, paid social and PSA radio resulted in the Volunteer page being the 3rd most visited page, and Volunteer Opportunties being the #1 downloaded item for the month.

During the October digital campaign featuring Green Streets in our mobile campaign targeted to homeowners, the Green Streets page was the 3rd most visited page, with the Rain Garden Fact Sheet among the most downloaded items for the month.

Green Gardener digital/mobile and radio messages contributed to the Green Gardener program being the 3rd most visited page for the month of November, and the Green Gardner List being among the 10 most downloaded.

In December, the "Hire an IPM Pro" for pest control digital campaign put the "Hiring a Pest Control Company" webpage as the 4th most visited. The page was in the top 10 again in January coniciding with our YouTube video ad.

In January, the "HHW/Mercury" radio and digital campaign helped boost the "How to Dispose of HHW" page to #3 in the top 10, and Fluorescent Light Drop off was the 3rd most downloaded item.

In February and March, our "Mercury in Fish" digital campaign in English & Spanish helped the "Mercury in Fish" brochure be the 2nd most downloaded item for both months, and drove the "prevent Mercury Pollution" webpage (English & Spanish) as one of the most visited pages for the month.

March through June "Choose Less Toxic" in radio and digital advertising, and "Litter" messages in radio and digital also reflected directly in the web content consumed, with English & Spanish "Less Toxic Gardening,""Prevent Litter" and "Pollution Prevention Tips" web pages seeing increases in activity.

The targeted digital ad campaign with CoreAudience delivered 3,155,608 impressions which resulted in 2,879 clicks on our ads (0.091% average click-through rate or CTR, vs. current industry average of 0.05% CTR). Click-through rate is calculated by number of clicks divided by number of impressions.

1,125,535 impressions targeted to Spanish audiences delivered 1,008 clicks (0.090% average CTR) and 2,030,0073 impressions targeted to English audiences delivered 1,871 clicks (0.092% CTR).

Our highest performing targeted digital messages were:

- "LID Green Streets" rotation of 3 GIF messages (October) – 306 clicks from 303,085 impressions (0.101% CTR)
- "HHW Disposal" (January) – 283 clicks from 303,012 impressions (0.093% CTR)
- "IPM Pests Bugging You?" (Mar-June) – 1,260 clicks from 1,285,644 impressions (0.098% CTR overall; 0.103% CTR from English audiences)

YouTube skippable video strategy (via Google Ads) also performed well, delivering 634,013 impressions, resulting in a 25% video completion rate (VCR), 2,055 clicks (avg 0.32% CTR) at an average cost of $7.89 per thousand impressions. Most popular and engaging videos were:

- "Hire an IPM Pro" – 277 clicks from 51,310 impressions (0.54% CTR) and 47.51% VCR
- "IPM DIY – Choose Less Toxic" – 659 clicks from 222,336 impressions (0.30% CTR)
- "Smoked Salmon" (Cigarette Litter) – 742 clicks from 158,267 impressions (0.47% CTR)

Task 5: Social Media + Networking

Social Media Campaign

Posts to Facebook and Twitter promoted Watershed Watch Campaign resources, programs and partners. Posts included events, links to news, partner and program updates, Discount Card, IPM tips, HHW disposal information, green infrastructure/LID information, media (videos, photos), car washing, volunteerism, litter reduction, storm drain awareness, mercury in fish, and more.

Paid post promotions on Facebook also included Instagram when available. Instagram ads appear in feeds of those selected through our targeting but are not posted automatically on our Instagram page. Therefore we limit adding post promotions to Instagram when they require engagement monitoring, such as Quiz Contests.

The Campaign made unique posts, plus engaged via comments, shares/retweets (RT), and likes/favorites to other posts (including but not limited to members of SCVURPPP and Campaign Partners). The Program began adding more regular posts to Instagram which helped drive engagement on Instagram.

Using a list of approved urban runoff polluton prevention messages, sharing relevant content from other pages, and promoting timely messages/news from the Campaign, the consultant posted photos, videos, tips, contests, resources and volunteer opportunities.

All posts made to the social media accounts are publicly available at the links below:
www.twitter.com/watershed_watch
www.facebook.com/mywatershedwatch
www.instagram.com/watershed_watch

DEFINITIONS:
Reach refers to unique audience members (Facebook users) to whom the ad was delivered.

Impressions refers to the Reach x Frequency of messages appearing in feeds (some people may be delivered the ad more than once)

Engagements are the interactions with our posts. Engagements may include post likes/reactions, comments, post shares, page likes, link clicks and/or photo clicks.

Click Rate is the number of Engagements vs. the Reach, which provides a standardized measure to gauge response to a promoted post. In Facebook, an industry average is 0.9%-2.3%.

Facebook
The Campaign's Facebook page is www.facebook.com/mywatershedwatch.
The period ended with **1,553 fans; 37 net gain** from 1,516 July 1, 2019 (+2.4%).

Fan / Page Demographics:

- Male 48% / Female 52%
- Age breakdown is:

13-17	<1%
18-24	12%
25-34	30%
35-44	19%
45-54	17%
55+	20%

- Largest group of followers is Male 25-34 (16% of followers)

119 Posts (average 1 post every 3 days)

- 388,814 Total Reach
- 440,368 Total Impressions
- 18,766 Engaged Users
- 77,654 Video Views
- 4,751 Clicks

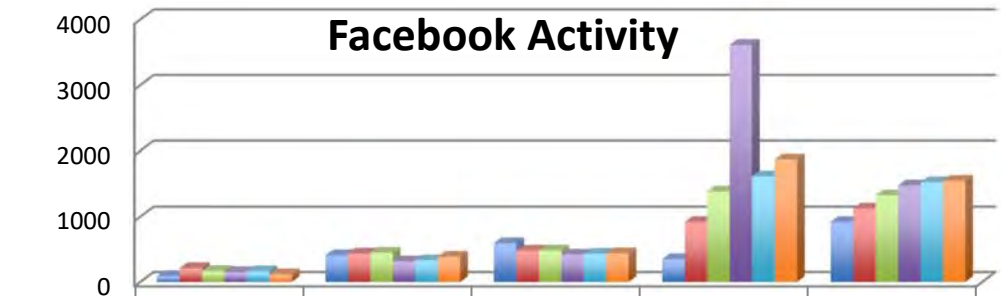

	Posts	Reach (000)	Impressions(000)	Engaged Users (0)	Page Likes
FY 14-15	92	410.147	595.133	352.6	922
FY 15-16	214	438.126	482.411	920.8	1,128
FY 16-17	170	449.646	484.777	1388.5	1,328
FY 17-18	153	318.809	421.006	3614.7	1,480
FY 18-19	167	333.75	432.747	1618	1,529
FY 19-20	119	388.814	440.368	1876.6	1,553

Promoted Posts

The Campaign utilized paid promotions to boost post reach for key messages and stimulate engagement with **Facebook** and **Instagram** users. The following are details of the 16 promoted posts.

- **Mobile Cleaners**
  - Featuring stock video footage of carpet cleaner
  - Boosted on Facebook June 30-July 10, 2019
  - Delivered 8,130 paid reach; 21,224 impressions
  - 17,110 through-plays of video; 72 clicks
- **Quiz: Litter Fines**
  - Boosted on Facebook July 3-9, 2019
  - Delivered 12,632 paid reach; 36,256 impressions
  - 425 engagements; 8.2% engagement rate**;**
  - Winner awarded $25 Amazon Gift Card
- **Green Gardener Training "Grow Your Business"**
  - Boosted video July 25-August 13
  - 21,975 reach x 1.94 frequency; 42,633 impresssions
  - 33,925 thru-plays/37,100 3-second views
  - 1 reaction; 138 clicks
- **Green Gardener Training "Is Your Gardener a Green Gardener?"**
  - Boosted August 10-19
  - Delivered 2,204 paid reach x 1.36 frequency; 3,008 impressions
  - 669 Instagram engagements; 22 Facebook engagements
  - 662 reactions, 2 comments, 4 saves, 3 shares, 20 clicks

- **Delta Queen Classic Car Wash 50% off Event**
    - Boosted post September 4-9
    - 5,051 reach x 1.5 frequency; 7,565 impresssions
    - 266 organic reach; 5,266 total reach
    - 820 engagements
    - 47 link clicks, 6 photo clicks, 15 shares, 7 saves
- **Montague Premier Car Wash 50% off Event**
    - Boosted post September 19-24
    - 4,457 reach x 1.78 frequency; 7,948 impresssions
    - 949 engagements
    - 900 reactions, 23 link clicks, 6 photo clicks, 2 comments, 8 shares; 10 saves
- **Watershed Watch QUIZ – Coastal Cleanup Day**
    - Boosted video September 17-20
    - Delivered 13,936 paid reach x 1.13 frequency; 15,743 impressions;
    - 6,485 video through-plays; 9,139 video views, 42 link clicks, 3 shares; 5 reactions
    - Winner awarded $25 Amazon Gift Card
- **Quiz: Green Gardener Program**
    - Boosted post October 17-24
    - Delivered 2,488 paid reach; 4,644 impressions;
    - 310 engagements; 4 comments; 4 link clicks
    - Winner awarded $25 Amazon Gift Card
- **Quiz: HHW Disposal**
    - Boosted post November 25-December 3
    - Delivered 3,044 paid reach; 4,319 impressions;
    - 368 engagements; 37 comments; 6 link clicks; 16 photo clicks; 12 shares
    - Winner awarded $25 Amazon Gift Card
- **Quiz: Leaves in Storm Drains**
    - Boosted post January 19-22
    - Delivered 3,582 paid reach; 6,827 impressions;
    - 472 engagements (6.91% engagement rate); 34 comments; 8 link clicks; 39 photo clicks; 24 shares
    - Winner awarded $25 Amazon Gift Card
- **Quiz: California Native Plants**
    - Boosted post February 19-29
    - Delivered 4,602 paid reach; 9,498 impressions;
    - 763 engagements (8% engagement rate); 35 comments; 9 link clicks; 71 photo clicks; 36 shares
    - Winner awarded $25 Amazon Gift Card
- **Quiz: Less-Toxic Pest Control (ants animatd gif)**
    - Boosted post March 19-29
    - Delivered 50,452 paid reach; 96,763 impressions;
    - 87,604 :03 plays; 1,060 clicks; 8 comments; 3 shares; 91.6% engagement rate
- **Quiz: Cigarette Litter**
    - Boosted post April 27-May 4
    - Delivered 21,020 paid reach; 34,893 impressions;
    - 413 engagements; 336 clicks; 55 comments; 5 shares; 17 reactions; 1.18% engagement rate

- **Don Edwards Coloring Page / Virtual Activities**
  - Boosted post May 6-13
  - Delivered 11,852 paid reach; 22,498 impressions;
  - 979 engagements; 37 clicks; 7 comments; 66 shares; 762 reactions; 4.35% engagement rate
- **PPE Litter Goes in the Trash**
  - Boosted post June 12-22
  - Delivered 41,152 paid reach; 68,906 impressions;
  - 5,083 engagements; 348 clicks; 63 comments; 448 shares; 7.38% engagement rate
- **Quiz: Carpet Cleaner/Steam Cleaner**
  - Boosted post June 23-28
  - Delivered 8,097 paid reach; 13,371 impressions;
  - 597 engagements; 76 clicks; 29 comments; 3 shares; 4.46% engagement rate

The following table offers an overview of the promoted posts, budgets and engagement results. Total paid reach of 220,742 resulted in 405,008 impressions and delivered 158,409 engagements; 39.11% average engagement rate.

Facebook.com Boosted Post	Dates	Cost	Reach & Impressions	Engagements	Engagement Rate
1. Mobile Cleaners	6/30-7/10	$300.00	8,130 21,224	17,110 video 72 clicks	81%
2. Quiz – Litter	7/3-7/9	$300.00	12,632 36,256	425	8.2%
3. GG Training	7/25-8/13	$500.00	21,975 42,633	33,925 video 138 clicks	79.9%
4. GG Training	8/10-8/19	$99.99	2,204 3,008	691	23%
5. Delta Queen Carwash Event	9/4-9/9	$200.00	5,051 7,565	820	10.8%
6. Montague Carwash Event	9/19-24	$250.00	4,457 7,948	949	12.5%
7. Quiz – Coastal Cleanup Day	9/17-9/20	$200.00	13,936 15,743	6,485 video 42 clicks	41.5%
8. Quiz – GG	10/17-10/24	$200.00	2,488 4,644	310	6.7%
9. Quiz – HHW	11/25-12/3	$299.83	9,112 13.231	471	5.2%
10. Quiz – Leaves in Stormdrains	1/19-22	$300	3,582 6,827	472	6.91%
11. Quiz – CA Natives	2/19-29	$350	4,602 9,498	763	8%

Facebook.com Boosted Post	Dates	Cost	Reach & Impressions	Engagements	Engagement Rate
12. Quiz – IPM Ants	3/19-29	$300	50,452 96,763	87,604 video 1,060 clicks	91.6%
13. Quiz – Litter Cigarettes	4/27-5/4	$300	21,020 34,893	413	1.18%
14. Don Edwards Coloring Page	5/6-13	$300	11,852 22,498	979	4.35%
15. PPE Litter	6/12-22	$500	41,152 68,906	5,083	7.38%
16. Quiz – Steam Clean	6/23-28	$500	8,097 13,371	597	4.46%
16 Boosted Posts		**$4,949.82**	**220,742 405,008**	**158,409**	**39.11%**

Twitter
@watershed_watch currently has 534 followers; net loss of 1 follow since July 1, 2019.

We tweeted 24 times during the fiscal year which generated 36 engagements (Facebook discontinued automatic cross-posting to other media).

Our tweets received 5,852 organic impressions.

Instagram
@watershed_watch currently has 265 followers (net gain of 84 followers since July 1, 2019). 15 new posts in the fiscal year.

Task 6: Outreach Events
The consultant sought outreach events and registered for approved events. Materials distributed at these events included Our Water Our World fact sheets and pocket guides; flyswatters; Watershed Watch branded sport packs; tattoos; "10 Most Wanted" brochure; Watershed Watch "You are the Solution" brochures (English and Spanish); Green Gardener lists; Clean Cars Clean Creeks brochures; "Guide to Eating Fish & Shellfish from the SF Bay" brochures in multiple languages; and Watershed Watch Discount Cards.

The Watershed Watch Campaign booth was present at the following events:

Watershed Watch 50% Off Car Wash Event –
Delta Queen Classic Car Wash, Campbell, Tuesday, September 10, 2019

- Watershed Watch sponsored and promoted this event with KRTY Radio.
- Attendance at this event was estimated at 75 auto owners.

Watershed Watch 50% Off Car Wash Event –
Montague Premier Car Wash, San Jose, Wednesday, September 25, 2019

- Watershed Watch sponsored and promoted this event with KUFX Radio.
- Attendance at this event was estimated at 60 auto owners.

Pumpkins in the Park –
Guadalupe River Park & Gardens (GRPG) at Discovery Meadow, Saturday, October 12, 2019

- Watershed Watch had a booth for the event
- The Consultant staffed the event
- Attendance was estimated at 13,000-15,000; audience is families with children.

Day on the Bay –
Alviso Marine Park, Sunday, October 13, 2019

- Watershed Watch had a booth for the event.
- Attendance was estimated at 10,000; audience is residents.

All Spring 2020 events were cancelled because of the COVID-19 pandemic and resulting health and safety restrictions for public gatherings. In lieu of in-person events the Program adapted to provide:

- ONLINE EVENTS – Gathered webinars, virtual events, and online learning opportunities and posted on the website "Events" page; advertised the page on Facebook
- VIRTUAL EVENT – Created a Car Wash Giveaway contest promoted through (4) radio station partners

Task 7: Earned Media / Public Relations
Public Relations (PR) efforts are described below:

- Green Gardener Training Program – Fall 2019 class registration outreach
    - Updated news release and radio commercials in English & Spanish; pitched news to media / news outlets and requested sharing by Campaign Partners
    - Posted news to blogs and media breaking news sites
    - Media coverage included digital posts, radio Public Service Announcements and a produced segment for KDTV *Despierto Area de la Bahia*

- Green Gardener Training, Litter Prevention, and Mercury In Fish editorial recorded segments on KDTV Univision 14 *Despierto Area de la Bahia*, Spanish TV
    - 2 minute segments featuring Aida Fairman (Watershed Watch spokesperson, Town of Los Altos):
        - "Green Gardener Training Program" – Air date July 30, 2019 https://youtu.be/8xMtcJff2LY
        - "Preventing Litter" – Air date August 7, 2019 https://youtu.be/Lm71cTNtWrU
        - "Mercury in Fish" – Air date August 13, 2019 (link not available)
    - Consultant coordinated the opportunities, provided stock footage, photos and props, and translations

Task 8: Report + Workplan Development
Work completed by the consultant includes:

- Completed all media plans including establishing calendar of media schedules, corresponding messages and events.
- Provided annual report of FY 18-19 Watershed Watch Campaign activities and results.
- Provided mid-year report of FY 19-20 Watershed Watch Campaign activities and results.
- Provided monthly activity reports, media summaries, invoices, partnership updates, and web statistics.
- Prepared PowerPoint Presentations and delivered reports for meetings of the WEO AHTG.
- Examined SCVURPPP Public Opinion Survey report and recommendations; applied to Work Plan developed for FY 20-21

Task 9: Meetings & Communications
The consultant attended and/or participated in WEO AHTG meetings as needed. Time was not billed for attendance or travel/expenses; participation was donated to the campaign as added-value.

Campaign Evaluation:
The following is a summary of the measurable results of the FY 19-20 Campaign:

- Media advertising delivered a minimum of **12,771,794** targeted and general audience gross impressions.
- The media partners provided a minimum added value package of benefits and resources of **$78,787** in addition to the $102,952 spent on advertising.
- **16** paid social media campaigns delivered **405,008** impressions and **158,409** engagements.
- Social media delivered **36,187** organic impressions.

- Total (measured/realized) Value Added Resources from media and community partners: **$81,807.**
- The Campaign was present at **four** community events.
- Car washes and discounts minimum (measured / reported) value **$3,020**

WEBSITE ACTIVITY

- **Total Visits: 122,723**; compared to **61,033** in July 1, 2018-June 30, 2019 (+101%)
- **Unique Visitors: 104,292**; compared to **53,168** in July 1, 2018-June 30, 2019 (+96%)
- **California Visits: 26,060**; compared to **11,553** in July 1, 2018-June 30, 2019 (+126%)
- **Total Page Views: 155,325**; compared to **78,887** in in July 1, 2018-June 30, 2019 (+96%)
- **Average Daily Page Views: 424;** compared to **220** in in July 1, 2018-June 30, 2019 (+93%)
- **Total Events** (video views, downloads, outbound referrals/links clicked, etc.): **5,205** (+14.4% from 4,550 in previous year).
- **Total Downloads: 2,181** (+1.1% from 2,156 in previous year).
- Requests on the website for materials (brochure, discount card, etc.): **8**
- Number of IPM or other queries via the website: **21**

ASSESSMENTS AND RECOMMENDATIONS

Based on the consultant's evaluation of Watershed Watch activities in FY 19-20, the following tactics are recommended FY 20-21 to improve Watershed Watch Campaign effectiveness. These tactics will be implemented as part of the FY 20-21 Work Plan if approved by the WEO AHTG.

- Reserve onsite events budget and media promotions for Spring 2021 pending post-pandemic resuming of public events. Evaluate real-time situation in early 2021 to reallocate assets and plan accordingly.
- Schedule car wash events for June 2021 for lower risk of inclement weather.
- Seek virtual event sponsorship opportunities with media and community partnerships, such as online concert sponsorships, webinars,etc.
- Develop video and online resources to use in lieu of in-person community engagement.

- Schedule WW media outside of San Jose's planned sports partnership media to help our resources go farther, not overlap with their efforts (minimal spending in October, March/May).
- Consider alternate kid-friendly activities or alternate use of beanbag toss board for low-contact event participation if Spring 2021 events resume.

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
July 19	115	Total Visits: 2,775 Visits from California: 375	1. es/about-watersheds/why-are-watersheds-important/ 2. /es/residents/pollution-prevention-tips/ 3. / (home page) 4. /about-watersheds/why-are-watersheds-important/ 5. /residents/green-gardener-program/find-a-green-gardener/ 6. /resources/for-businesses/ 7. /residents/green-gardener-program 8. /es/residents/prevent-mercury-pollution/ 9. /about-watersheds/volunteer-opportunities/ 10. /es/about-watersheds/stormwater-pollution/	English-6 Spanish-4	Search Engines: Google (+mobile) Yahoo Bing 17.9% direct 1.7% referral 78.8% search engines 1.2% social Referral sources: 1. Facebook 2. Capitol Wholesale Nursery 3. Univision	• Green Gardener Fall Training • Green Gardener List • Storm Drain Pollution Brochure • How Trash Gets into Creeks SFR • Volunteer Opportunities • Concrete Brochure • Rain Garden Fact Sheet • TIE: Green Streets Fact Sheet • Preventing Storm Drain Pollution brochure • Earthmove/Heavy Equipment Brochure • General Construction and Site Supervision Trifold • Spill Response Fact Sheet • ICID Dumpster • ZunZun Flyer Total 127 downloads	Requests / Comments: English – 0 Spanish – 0 Requests for Discount Card / Brochure: English – 0 Spanish – 0	<u>Media and events:</u> No paid media this month Approximately 72% fewer page views and visits than June when TV, radio, web, events and several social boosts drove traffic to the site Boosted post: Mobile Cleaner Litter Quiz Events: (none)
August 19	171	Total Visits: 3,977 Visits from California: 572	1. /es/residents/pollution-prevention-tips/ 2. es/about-watersheds/why-are-watersheds-important/ 3. / (home page) 4. /residents/green-gardener-program	English-6 Spanish-4	Search Engines: Google (+mobile) Bing Yahoo 19.2% direct 1.5% referral	• Green Gardener (GG) Fall Training • How Trash Gets into Creeks SFR • Mobile Cleaner Trifold • Green Gardener List	Requests / Comments: English – 1 Spanish – 0 Requests for Discount Card /	<u>Media and events:</u> Green Gardener radio, boosted social

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
			5. /residents/green-gardener-program/upcoming-green-gardener-classes/ 6. /es/residents/prevent-mercury-pollution/ 7. /residents/green-gardener-program/find-a-green-gardener/ 8. /about-watersheds/why-are-watersheds-important/ 9. /resources/for-businesses/ 10. /es/about-watersheds/stormwater-pollution/		78.2% search engines 1.1% social Referral sources: 1. Facebook 2. Capitol Wholesale Nursery 3. Master Gardeners SC	• Car Wash Brochure • ZunZun Flyer • Controlling Mosquitoes Fact Sheet • General Construction and Site Supervision Trifold • ICID Concrete Brochure • Machine Shop Fact Sheet Total 135 downloads	Brochure: English – 0 Spanish – 0	
Sep 19	311	Total Visits: 7,363 Visits from California: 863	1. /es/residents/pollution-prevention-tips/ 2. es/about-watersheds/why-are-watersheds-important/ 3. /about-watersheds/volunteer-opportunities/ 4. /residents/automotive-maintenance/ 5. / (home page) 6. /residents/green-streets/ 7. /about-watersheds/why-are-watersheds-important/ 8. /es/residents/prevent-mercury-pollution/ 9. /residents/pollution-	English-6 Spanish-4	Search Engines: Google (+mobile) Yahoo Bing 25.4% direct 6.5% referral 67.4% search engines 0.7% social Referral sources: 1. Digital Ads 2. Pandora 3. Facebook 4. Capitol Wholesale	• Public Participation Opportunities • Guidelines for Commercial and Light Industrial Facilities • Car Wash Brochure • WW Discount Card • CarWash Flyer 9/10 • CarWash Flyer 9/25 • How Trash Gets into Creeks SFR • Guidelines for Commercial and Light Industrial Facilities - Vietnamese • Rain Garden Fact Sheet • You are the Solution	Requests / Comments: English – 1 Spanish – 0 Requests for Discount Card / Brochure: English – 1 Spanish – 0	<u>Media and events:</u> Car Wash Event radio, boosted social Volunteer digital

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
			prevention-tips/ 10. /es/about-watersheds/volunteer-opportunities/		Nursery	Brochure Total 187 downloads		
Oct 19	283	Total Visits: 6,639 Visits from California: 521	1. /es/residents/pollution-prevention-tips/ 2. es/about-watersheds/why-are-watersheds-important/ 3. /residents/green-streets/ 4. /about-watersheds/why-are-watersheds-important/ 5. / (home page) 6. /residents/pollution-prevention-tips/ 7. /es/residents/prevent-mercury-pollution/ 8. /residents/where-does-your-water-go/ 9. /residents/green-gardener-program/training-materials/ 10. /residents/green-gardener-program/find-a-green-gardener/	English-7 Spanish-3	Search Engines: Google (+mobile) Yahoo Bing 18.2% direct 2.4% referral 79.1% search engines 0.3% social Referral sources: 1. Digital Ads 2. Facebook 3. Capitol Wholesale Nursery 4. Master Gardeners 1.	• How Trash Gets into Creeks SFR • WW Discount Card • Irrigation GG Training • Rain Garden Fact Sheet • Mulch/Compost GG Training • IPM GG Training • Public Participation Opportunities • Fertilizers/Air Qual GG Training • Guidelines for Commercial and Light Industrial Facilities • How Trash Gets into Creeks (Schools) 199 downloads	Requests / Comments: English – 0 Spanish – 0 Requests for Discount Card / Brochure: English – 0 Spanish – 0	<u>Media and events:</u> 10/12 Pumpkins in the Park 10/13 Day on the Bay Green Streets digital Green Gardener social boost

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
Nov 19	299	Total Visits: 6,639 Visits from California: 436	1. /es/residents/pollution-prevention-tips/ 2. es/about-watersheds/why-are-watersheds-important/ 3. /residents/green-gardener-program/ 4. /about-watersheds/ 5. /about-watersheds/why-are-watersheds-important/ 6. / (home page) 7. /es/residents/prevent-mercury-pollution/ 8. /residents/green-streets/ 9. /residents/where-does-your-water-go/ 10. /residents/pollution-prevention-tips/	English-7 Spanish-3	Search Engines: Google (+mobile) Yahoo Bing 22% direct 4% referral 73% search engines 0.4% social Referral sources: 1. Digital Ads 2. YouTube 3. Facebook Cuencashidfrograficaskim1 4. Capitol Wholesale 2.	• How Trash Gets into Creeks- SFR • Guidelines for Commercial and Light Industrial Facilities • Green Streets Fact Sheet • Public Participation Opportunities • Outdoor Storage andSpill Responseat Your BusinessFact Sheet • Green Gardener List • Whre Does Your Water Go • Rain Garden Fact Sheet • Grow It Guide* • How Trash Gets into Creeks-Schools Total 157 downloads	Requests / Comments: English – 2 Spanish – 0 Requests for Discount Card / Brochure: English – 0 Spanish – 0	<u>Media and events:</u> Green Gardeer digital + radio IPM Pro radio HHW social boost
Dec 19	179	Total Visits: 4,171 Visits from California: 683	1. /es/about-watersheds/why-are-watersheds-important/ 2. /es/residents/pollution-prevention-tips/ 3. /about-watersheds/ 4. /residents/less-toxic-gardening/hiring-a-pest-control-company/ 5. /residents/how-to-dispose-	English-7 Spanish-3	Search Engines: Google (+mobile) Yahoo Bing 34% direct 11% referral 54% search engines 0.5%% paid search 0.5% social	• How Trash Gets into Creeks- SFR • Whre Does Your Water Go • Guidelines for Commercial and Light Industrial Facilities • Rain Garden Fact Sheet • Green Gardener List • Spill Response FS	Requests / Comments: English – 3 Spanish – 0 Requests for Discount Card / Brochure: English – 0 Spanish – 0	<u>Media and events:</u> Green Gardeer digital (YouTube) IPM Pro Digital HHW/Mercury radio

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
			of-household-hazardous-waste/ 6. /about-watersheds/why-are-watersheds-important/ 7. / (home page) 8. /residents/where-does-your-water-go/ 9. /residents/green-gardener-program/find-a-green-gardener/ 10. /es/about-watersheds/stormwater-pollution/		Referral sources: 1. Digital Ads 2. YouTube 3. Master Gardeners 4. Facebook 5. Capitol Wholesale	• Home Repair Brochure • Roadwork Brochure • Carwash Brochure • Property Mgr Brochure (IPM) • WW Discount Card Total 83 downloads		HHW social boost (completion) Lift of 82% in visits, 94% page views; 187% California users vs. December 2018
Jan 20	191	Total Visits: 4,596 Visits from California: 945	1. /es/residents/pollution-prevention-tips/ 2. /es/about-watersheds/why-are-watersheds-important/ 3. /residents/how-to-dispose-of-household-hazardous-waste/ 4. /about-watersheds/ 5. /about-watersheds/why-are-watersheds-important/ 6. /residents/less-toxic-gardening/hiring-a-pest-control-company/ 7. / (home page) 8. /residents/prevent-	English-8 Spanish-2	Search Engines: Google (+mobile) Bing Yahoo 25.9%% direct 5.9%% referral 63.2% search engines 4.5%% paid search 0.5% social Referral sources: 1. Digital Ads 2. YouTube **3.** Capitol Wholesale	• Guidelines for Commercial and Light Industrial Facilities • How Trash Gets into Creeks- SFR • Fluorescent Lamp Drop-offs • Volunteer Opportunities • Moible Cleaners FS • Concrete Brochure • General Contractor Brochure • ZunZun Flyer TIE 3 each: • Heavy Equipment Brochure	Requests / Comments: English – 0 Spanish – 1 Requests for Discount Card / Brochure: English – 1 Spanish – 0	<u>Media and events:</u> IPM Pro video (YouTube) HHW Digital HHW/Mercury radio Storm Drain social boost Lift of 61% in visits; 66.5% page views;

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
			mercury-pollution/ 9. /residents/where-does-your-water-go/ 10. /residents/prevent-litter/		3. Facebook	• Painting Contractor Brochure • Roadwork Brochure • You are the Solution Brochure • Rain Garden Fact Sheet Total 109 downloads		93.7% visits from California over Jan 2019
Feb 20	278	Total Visits: 6,341 Visits from California: 609	1. /es/residents/pollution-prevention-tips/ 2. /es/about-watersheds/why-are-watersheds-important/ 3. /residents/prevent-mercury-pollution/ 4. /es/residents/prevent-mercury-pollution/ 5. /about-watersheds/why-are-watersheds-important/ 6. / (home page) 7. /residents/where-does-your-water-go/ 8. /residents/prevent-litter/ 9. /es/about-watersheds/stormwater-pollution/ 10. /es/about-watersheds/frequently-asked-questions/	English-5 Spanish-5	Search Engines: Google (+mobile) Yahoo Bing 17.4%% direct 4.8%% referral 76.9% search engines 0.9% social Referral sources: 1. Digital Ads 2. Facebook **3.** Capitol Wholesale 4.	• How Trash Gets into Creeks- SFR • Mercury In Fish Brochure English • WW Discount Card • Where Does Your Water Go • Green Gardener List • Rain Garden FS • Green Streets FS • You are the Solution brochure TIE 4 each: Good Bug Tub FS • Healthy Garden FS • Volunteer Opportunities Total 138 downloads	Requests / Comments: English – 0 Spanish – 0 Requests for Discount Card / Brochure: English – 3 Spanish – 0	<u>Media and events:</u> Mercury in Fish Digital (Eng/Span) (580 hits to Eng page; 398 hits to Spanish) Native Plants social boost Lift of 72% in visits; 73% page views; 17% visits from California over Feb 2019

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
Mar 20	867	Total Visits: 21,267 Visits from California: 8,189	1. / (home page) 2. /es/about-watersheds/why-are-watersheds-important/ 3. /es/residents/pollution-prevention-tips/ 4. /es/ (Span home page) 5. /residents/less-toxic-gardening/integrated-pest-management-ipm/ 6. residents/prevent-mercury-pollution/ 7. /es/residents/prevent-mercury-pollution/ 8. /about-watersheds/volunteer-opportunities 9. /about-watersheds/why-are-watersheds-important/ 10. /residents/less-toxic-gardening/	English-6 Spanish-4	Search Engines: Google (+mobile) Bing Yahoo 14.21% direct 39.9%% referral 39.77% search engines 6.12% social Referral sources: 1. YouTube/google ads 2. Digital Ads 3. Facebook 4. Capitol Wholesale	• Mercury In Fish LAKES • Mercury In Fish (English) • How Trash Gets into Creeks- SFR • Where Does Your Water Go • Storm Drain Pollution Bro • You are the Solution brochure • CFL Disposal Locations • Green Gardener List • Mobile Cleaner Fact Sheet TIE: • Spill Response/Outdoor Stg FS • WW Disocunt Card Total 285 downloads	Requests / Comments: English – 4 Spanish – 0 Requests for Discount Card / Brochure: English – 1 Spanish – 0	<u>Media and events:</u> IPM Digital + Mercury in Fish Digital (Eng/Span) Youtube IPM DIY video IPM Radio IPM Quiz Lift of 216% in visits; 214% page views; 1344% visits from California vs prev 31 days City of San Jose Google ads campaign
April 20	610	Total Visits: 14,561 Visits from California: 2,046	1. /es/residents/pollution-prevention-tips/ 2. /es/about-watersheds/why-are-watersheds-important/ 3. /es/residents/prevent-mercury-pollution/	English-5 Spanish-5	Search Engines: Google (+mobile) Yahoo Bing 14.94% direct 1.18% referral	• How Trash Gets into Creeks- SFR • Mercury In Fish (English) • Where Does Your Water Go • Green Streets LID FS • Volunteer Opportunities	Requests / Comments: English – 2 Spanish – 0 Requests for Discount Card /	<u>Media and events:</u> IPM Digital (Eng/Span) Youtube IPM DIY video + Cigarette

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
			4. /about-watersheds/why-are-watersheds-important/ 5. / (home page) 6. residents/prevent-mercury-pollution/ 7. /es/residents/less-toxic-gardening 8. /residents/where-does-your-water-go/ 9. /residents/less-toxic-gardening/ 10. /es/ (Spanish home page)		1.99% youtube 81.08% search engines 0.81% social Referral sources: 1. YouTube/google ads 2. Digital Ads 3. Facebook **4.** Capitol Wholesale	• Water Beat Book • Solution To Water Pollution • Rain Garden FS • Fluorescent Lights Disposal Locations • Controlling Ants IPM FS Total 160 downloads	Brochure: English – 0 Spanish – 0	Liter IPM Radio Cigarette Litter Quiz 3900 visits from Peru!
May 20	1,275	Total Visits: 32,324 Visits from California: 11,024	1. / (home page) 2. /es/residents/pollution-prevention-tips/ 3. /es/about-watersheds/why-are-watersheds-important/ 4. /es/ (Spanish home page) 5. /about-watersheds/why-are-watersheds-important/ 6. /residents/ pollution-prevention-tips/ 7. /es/residents/prevent-mercury-pollution/ 8. /residents/where-does-your-water-go/ 9. /residents/events/ 10. /es/about-watersheds/stormwater-	English-5 Spanish-5	Search Engines: Google (+mobile) Bing Yahoo 5.75% direct 1.14% referral 50.32% youtube 41.62% search engines 1.18% social Referral sources: 1. YouTube/google ads 2. Digital Ads 3. Facebook 4. Capitol	• Don Edwards Coloring Page • How Trash Gets into Creeks- SFR • Mercury In Fish (English) • Mercury in Fish (LAKES) • Where Does Your Water Go • Keep Family Safe Mercury Fact Sheet • Outdoor Sensory Scav Hunt • Mercury In Fish (Vietnamese) • Controlling Ants IPM Fact Sheet • Snails Slugs IPM Fact Sheete	Requests / Comments: English – 2 Spanish – 0 Requests for Discount Card / Brochure: English – 0 Spanish – 0	<u>Media and events:</u> Youtube IPM Cigarette Liter FB Boost Online Activities – Promote WW website for activities City of San Jose Google Ads campaign

Watershed Watch Campaign
Website Statistics Report
FY 19-20

Month	Avg. Page Views/ Day	Total Visits CA Visits	Top pages	No. of Top Pages	Sources: Top Search Engine Top Referrals	Most Downloaded	Contact Form	Watershed Watch Activities
			pollution/		Wholesale	Total 387 downloads		
Jun 20	504	Total Visits: 12,070 Visits from California: 1,172	11. /es/residents/pollution-prevention-tips/ 12. /es/about-watersheds/why-are-watersheds-important/ 13. / (home page) 14. /residents/prevent-mercury-pollution/ 15. /es/residents/less-toxic-gardening/ 16. /es/residents/prevent-mercury-pollution/ 17. /residents/where-does-your-water-go/ 18. /residents/prevent-litter/ 19. /es/about-watersheds/frequently-asked-questions/ 20. /about-watersheds/why-are-watersheds-important/	English-5 Spanish-5	Search Engines: Google (+mobile) Bing Yahoo 14.6% direct 1.1% referral 3.6% youtube 80% search engines 0.6% social Referral sources: 5. YouTube/google ads 6. Digital Ads 7. Facebook	• How Trash Gets into Creeks- SFR • Storm Drain Pollution • CFL Disposal Sites HHW • Restaurant Fact Sheet • Where Does Your Water Go • Mercury In Fish (English) • Mercury in Fish (LAKES) • Green Gardener List Total 214 downloads	Requests / Comments: English – 5 Spanish – 0 Requests for Discount Card / Brochure: English – 2 Spanish – 0	<u>Media and events:</u> Youtube "Karma" Liter FB Boost Online Activities – Promote WW website for activities

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 7-2

SCVURPPP 2020 Public Opinion Survey Report

2020 Public Opinion Survey

Prepared for Santa Clara Valley Pollution Prevention Program

Contact:
Miranda Everitt
Senior Researcher

FM3 RESEARCH | OPINION RESEARCH & STRATEGY

August 10, 2020

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FM3 RESEARCH

TO Interested Parties

FROM Dave Metz and Miranda Everitt
FM3 Research

RE: 2020 Public Opinion Survey Results

DATE August 10, 2020

Fairbank, Maslin, Maullin, Metz & Associates (FM3) recently completed a survey of residents of the Santa Clara Valley basin on behalf of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). The primary objectives of this survey were:

- Measuring Goals from the SCVURPPP Watershed Education and Outreach Strategy
- Assess resident attitudes and opinions about water pollution, water quality, the watershed, and related issues
- Provide tracking and new data on resident behaviors with respect to specific actions to be taken to prevent pollution of local creeks, wetlands, and the San Francisco Bay
- Tracking attitudes and opinions on water issues and pollution prevention behaviors among local high school students

Methodology

The survey was conducted May 3-10 and 15-21, 2020, via online and phone (landline and cell) interviews with 651 residents of the Santa Clara Valley Basin. This includes 571 adults (ages 18+) drawn from voter households and 80 high-school-aged residents drawn from voter households and online panels.[1]

The survey's overall margin of sampling error is +/-3.8% at the 95% confidence level. Due to rounding, some percentages do not add up to 100%.

When appropriate, results have been compared to previous surveys with similar populations, including:

- 2014 EMC Research survey among Santa Clara Basin residents ages 15 and older
- 2009 EMC Research survey among Santa Clara Basin residents ages 15 and older
- 2003 EMC Research survey among Santa Clara Basin residents ages 15 and older
- 2002 EMC Research survey in the Santa Clara Water Pollution Control Plant Service Area among respondents ages18 and older
- 1999 Fairbank, Maslin, Maullin & Associates (FMMA)survey among Santa Clara Basin residents ages 16 and older

[1] Weights were applied to match the age distribution of residents ages 15+.

- 1996 Fairbank, Maslin, Maullin & Associates (FMMA) survey among Santa Clara Basin residents ages 16 and older
- 1994 Fairbank, Maslin, Maullin & Associates (FMMA) survey among City of San José residents ages 18 and older
- 1991 Sievers Research Company survey among Santa Clara County residents ages 18 and older

Executive Summary

Overall, the study showed that Santa Clara Valley Basin residents continue to understand that their actions impact local water quality, and they continue to value pollution prevention. Three of six objectives for increased knowledge and action on watershed protection have been met.

- While residents are broadly concerned about pollution and litter, these rank far behind housing costs, homelessness, traffic and unemployment. However, residents are largely optimistic generally.
- Residents are more likely to report taking several pollution prevention actions, specifically hiring exterminators who use less-toxic methods, using less-toxic substances at home, washing a car on an unpaved surface, and using watershed-friendly gardening.
- Three goals for behavior and attitude change have been achieved.
  - 80% of residents know that water that flows into storm drains is not treated
  - 79% of residents recognize that their daily actions contribute to water pollution
  - 85% of high school students have taken at least one of three watershed pollution prevention actions (proper disposal of trash, taking their car to a commercial car wash, or washing it on an unpaved surface)
- Three goals for behavior and attitude change have not been achieved.
  - 22% of Santa Clara Valley residents reporting taking at least two stormwater pollution prevention actions. While this is an improvement over the last survey, when 18% took at least two actions, the goal was 35%.
  - 17% of residents report using watershed-friendly, sustainable techniques (such as rain gardens, and removing paved surfaces) in their yard or garden to reduce runoff. Again, this is an improvement over the last survey (7%) but falls short of the goal of 20%.
  - 33% of residents reported throwing litter in garbage cans and not in the street -- short of the goal of 67%. However, the share who either already do this or are "very willing" to is 92%. As described in Page 28 of this report, we believe this difference is due to the structure of the online questionnaire first employed this year. We piloted a different approach to inform future tracking surveys which found that 98% say they throw their litter in garbage cans and not the street.
- While younger residents were less likely to report taking many of these actions, they report substantial willingness to do so -- an indication that as they age into adulthood, they will have pollution prevention behaviors in mind.
- Familiarity with the Household Hazardous Waste program and MyWatershedWatch.org has increased.

The remainder of this report includes slides with our key findings and communications recommendations, as well as topline survey results for all respondents, respondents ages 18+ and for respondents ages 15 to 17, presented separately.

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Santa Clara Valley *Urban Runoff* Pollution Prevention Program

Santa Clara Valley Resident Awareness of Stormwater Issues

Key Findings from a Survey of Residents
Conducted May 3-10 & 15-21, 2020

FM3 RESEARCH | OPINION RESEARCH & STRATEGY

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Methodology

- ✓ 651 interviews with residents of the Santa Clara Valley Basin drawn from voter households
- ✓ Includes 80 high-school-aged residents drawn from voter households and online panels
- ✓ Conducted May 3-10 and 15-21, 2020, online and via landline and cell phones
- ✓ Margin of sampling error of +/-3.8% at the 95% confidence level
- ✓ Due to rounding, some percentages do not add up to 100%
- ✓ Selected comparisons to prior research by EMC and FM3

Goals

The primary objectives of this survey were:

- ✓ Measuring Goals from the SCVURPPP Watershed Education and Outreach Strategy
- ✓ Assess resident attitudes and opinions about water pollution, water quality, the watershed, and related issues
- ✓ Provide tracking and new data on resident behaviors with respect to specific actions to be taken to prevent pollution of local creeks, wetlands, and the San Francisco Bay
- ✓ Tracking attitudes and opinions on water issues and pollution prevention behaviors among local high school students

Key Findings

- ✓ Santa Clara Valley Basin residents continue to understand that their actions impact local water quality, and they continue to value pollution prevention and watershed protection actions.
- ✓ While residents are broadly concerned about pollution and litter, these rank far behind housing costs, homelessness, traffic and unemployment. However, residents are largely optimistic generally.
- ✓ Several goals for behavior and attitude change have been achieved.
- ✓ Familiarity with the Household Hazardous Waste program and MyWatershedWatch.org has increased.

General Issue Environment

Residents increasingly felt the county is on the right track.

Do you feel that things in Santa Clara County are generally going in the right direction or do you feel things have gotten pretty seriously off on the wrong track?

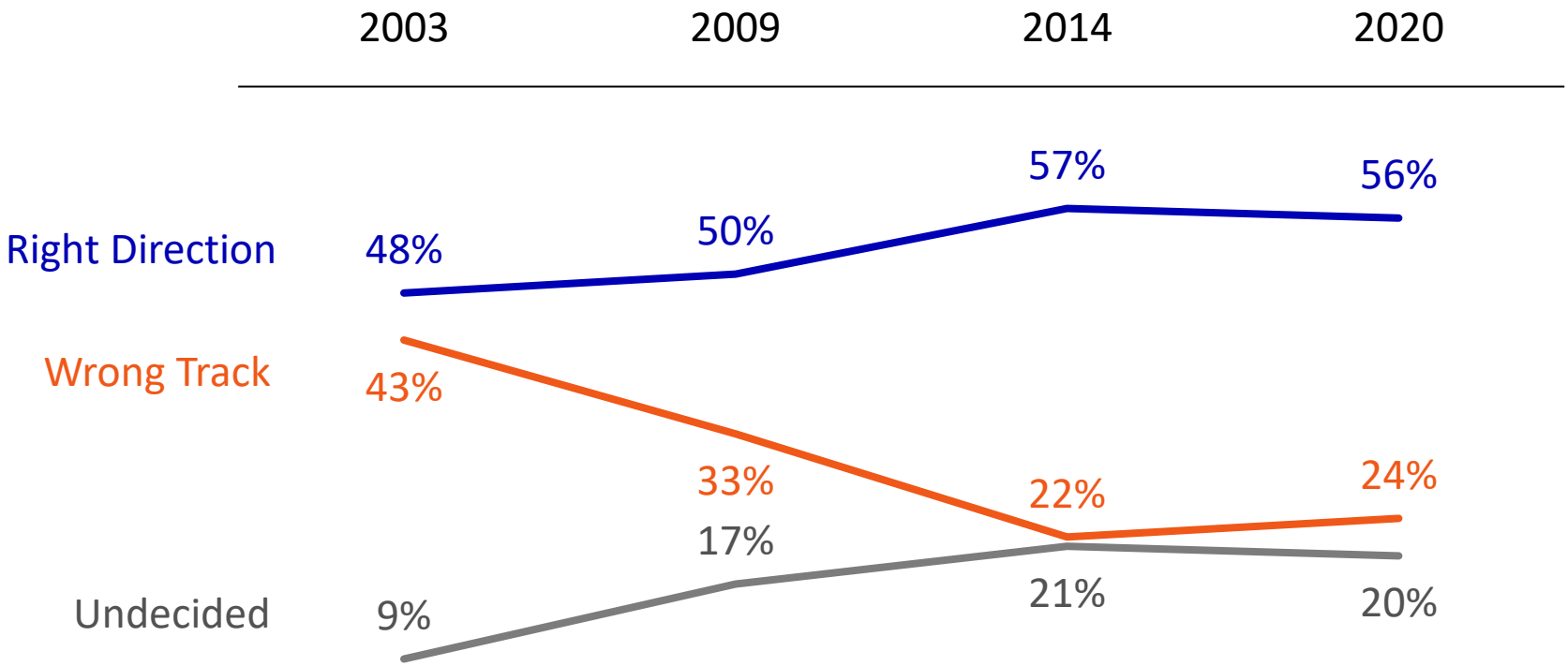

Q1.

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Residents were broadly concerned about housing costs; climate and pollution were in a lower tier though majorities were concerned.

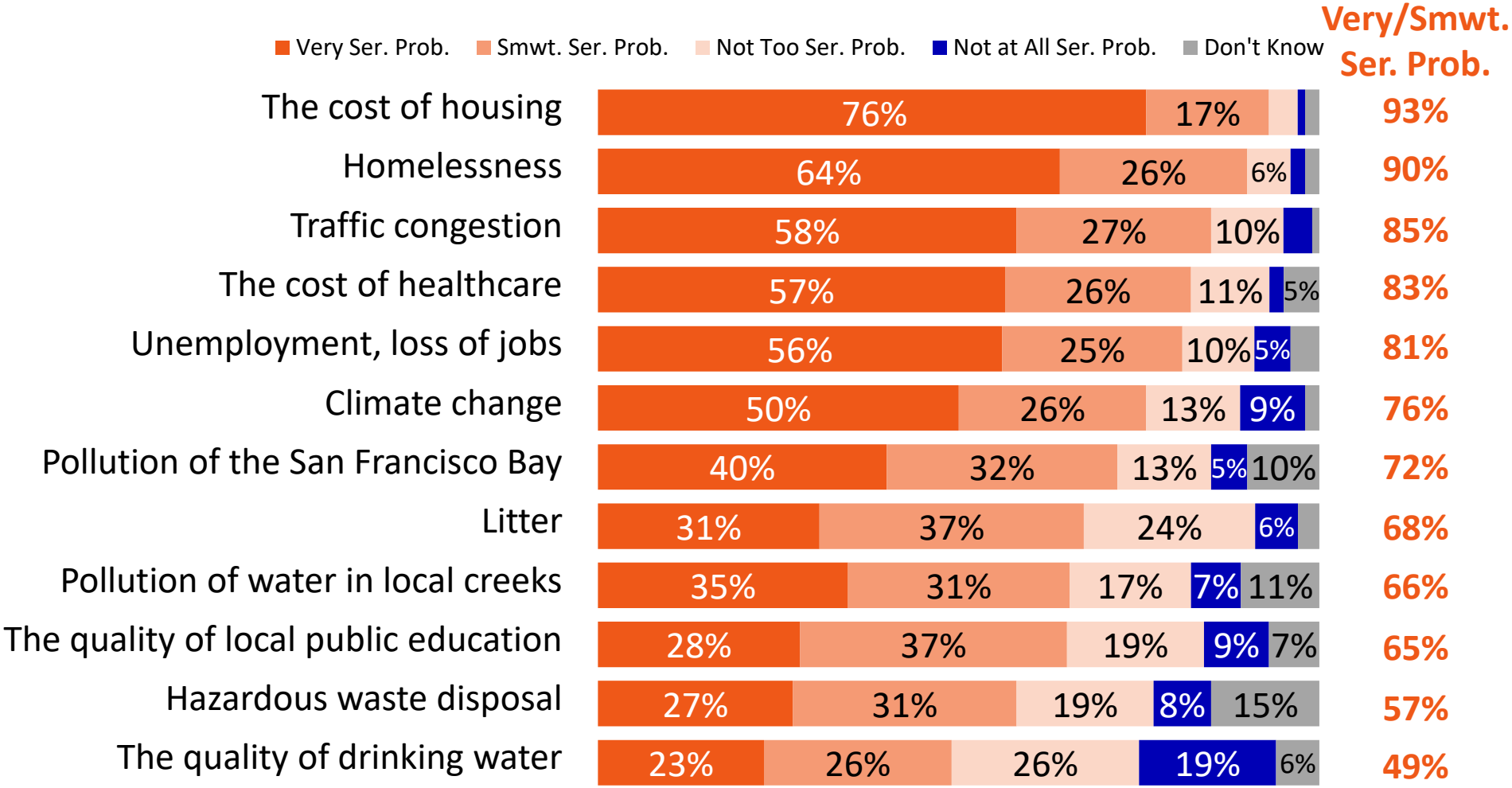

Q2. Please tell me if you feel each of the following is a very serious problem facing the Santa Clara Valley region, is a very serious problem, a somewhat serious problem, a not too serious problem, or not a serious problem at all in this region.

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Pollution of the Bay and hazardous waste disposal were more concerning than prior years.

(Very/Somewhat Serious Problem)

Problem	March 1996	May 1999	February 2002	September 2003	February 2009	April 2014	May 2020	2014-2020 Difference
Pollution of the San Francisco Bay	83%	81%	--	77%	68%	57%	72%	**+17%**
Hazardous waste disposal	79%	70%	--	59%	47%	42%	57%	**+15%**
Litter	--	--	--	--	55%	55%	68%	**+13%**
Unemployment, loss of jobs	73%	52%	83%	96%	93%	69%	81%	**+12%**
The quality of drinking water	65%	54%	--	58%	39%	39%	49%	**+10%**
Pollution of water in local creeks	77%	75%	--	68%	58%	58%	66%	**+8%**
Traffic congestion	91%	95%	90%	86%	73%	83%	85%	**+2%**
The quality of local public education	76%	71%	--	77%	65%	63%	65%	**+2%**

Q2. Please tell me if you feel each of the following is a very serious problem facing the Santa Clara Valley region, is a very serious problem, a somewhat serious problem, a not too serious problem, or not a serious problem at all in this region.

Watershed Issues

Two in five said they recall the term "watersheds," a 10-point increase since 2014.

Do you recall ever seeing or hearing anything about "watersheds"? (Yes)

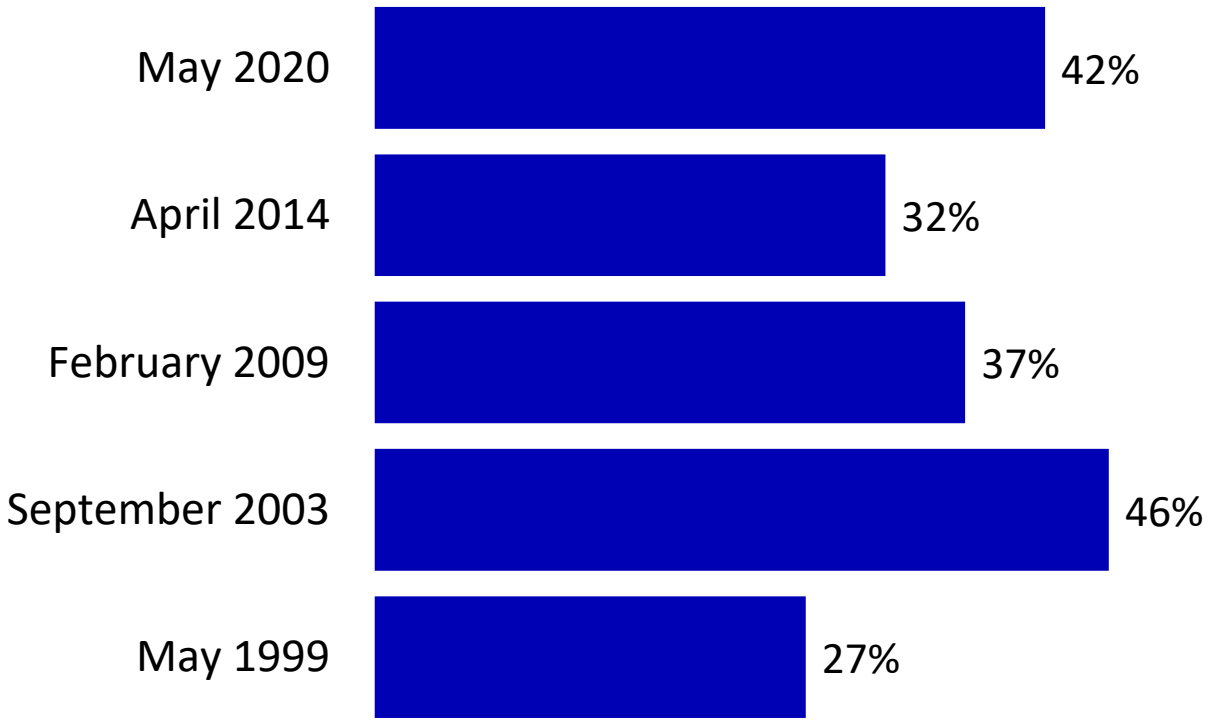

Q3.

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Those most likely to say they recalled "watersheds" were older and had more formal education.

Do you recall ever seeing or hearing anything about "watersheds"? (Yes)

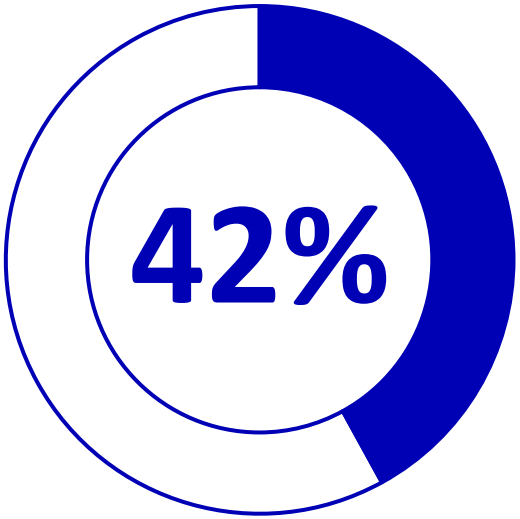

These residents were disproportionately:

- **Ages 65-74 (69%)**
- **Retired (64%)**
- **Men ages 50+ (63%)**
- **Ages 65+ (61%)**
- **Newspaper readers (61%)**
- **College-educated men (60%)**
- **White residents (59%)**

Q3. Do you recall ever seeing or hearing anything about "watersheds"?

06569
6610

Most who are familiar with "watersheds" identify what they are or say they are polluted.

Can you tell me in a few words what you heard or saw?
(Open-ended; Asked of Those Aware of "Watersheds" Only; N=275)

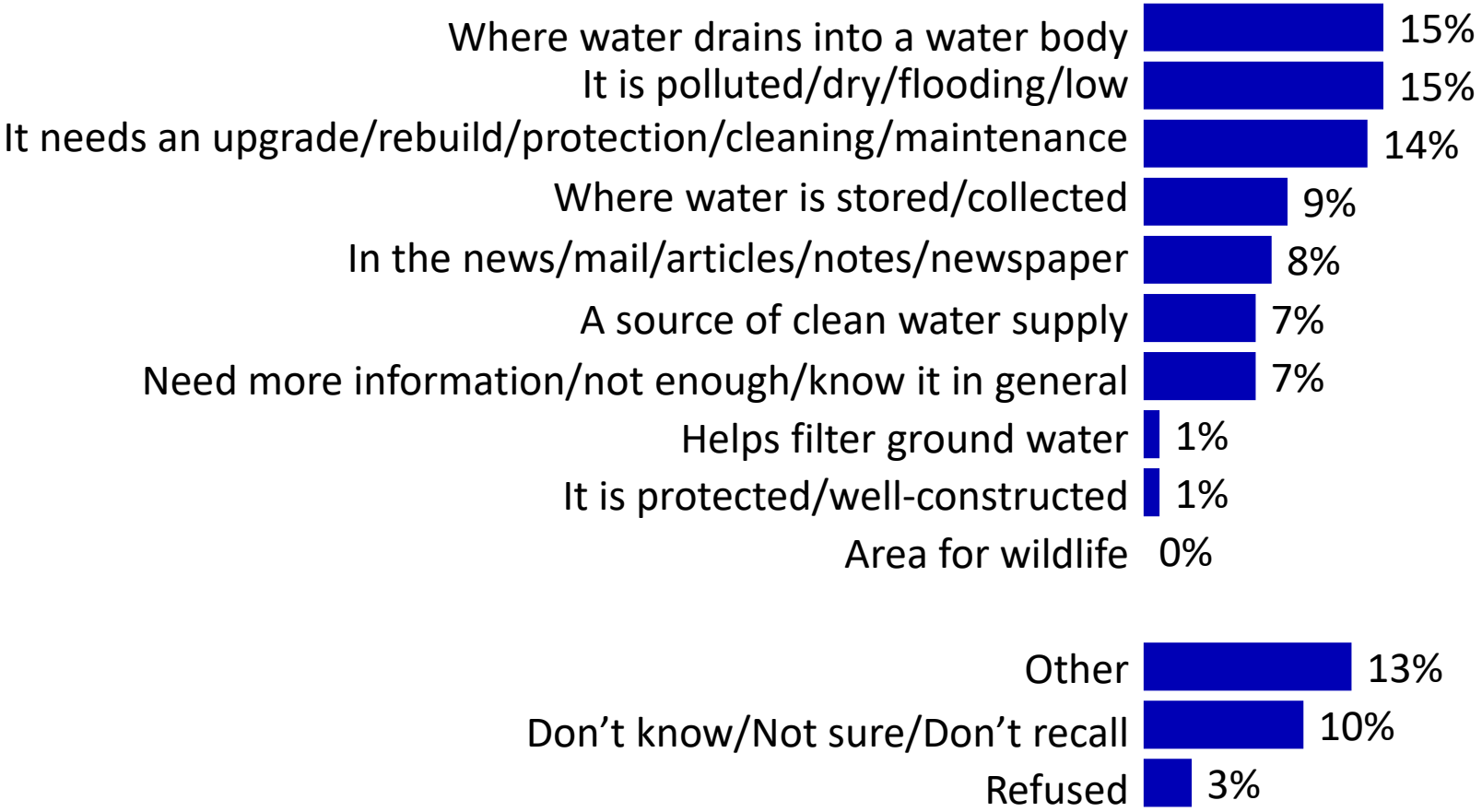

Q4.

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Verbatim Responses on Watershed Awareness

Can you tell me in a few words what you heard or saw?
(Open-ended; Asked of Those Aware of "Watersheds" Only; N=275)

For people living on higher ground or on a hill, it had something to do with floods, I think ...

Large area of land where water naturally runs toward the sea.

It's a stagnant pool of water.

I've heard info about Coyote Creek, Guadalupe River, Pajero River, Stevens Creek, Penetencia Creek and others and the effects of trash and chemical runoff and flooding.

Watersheds are being depleted and we need to be ready for next drought.

I just remember Watershed Watch. "Don't waste water" was one of the messages.

Not much except signs saying "Watershed drainage."

They are important for the environment and we are losing our watersheds.

I think the watersheds are where they store the water underground and access is seen in the ponds above it.

Q4. Can you tell me in a few words what you heard or saw?

06571
6612

One-third correctly identified a watershed as an area where water collects and drains to a lower elevation.

In your own words, can you tell me what the term "watershed" means to you?

Response	May 1999	February 2009	April 2014	May 2020
Area where water collects then drains to lower elevation	27%	27%	27%	**32%**
A structure or building for holding or keeping water	26%	14%	16%	**19%**
A network or structure essential to clean drinking water	N/A	N/A	N/A	**7%**
An overhang that shades water	1%	1%	1%	**3%**
Water pollution mention	N/A	N/A	N/A	**2%**
An underground water source	N/A	N/A	N/A	**1%**
Other	6%	4%	4%	**6%**
Don't Know	39%	48%	41%	**29%**

FM3 RESEARCH

Q5.

06572
6613

Residents were largely aware that water from storm drains ends up in the Bay; they were split on whether that water is filtered.

For each of the following statements, please tell me if you believe it is definitely true, probably true, probably not true or definitely not true.

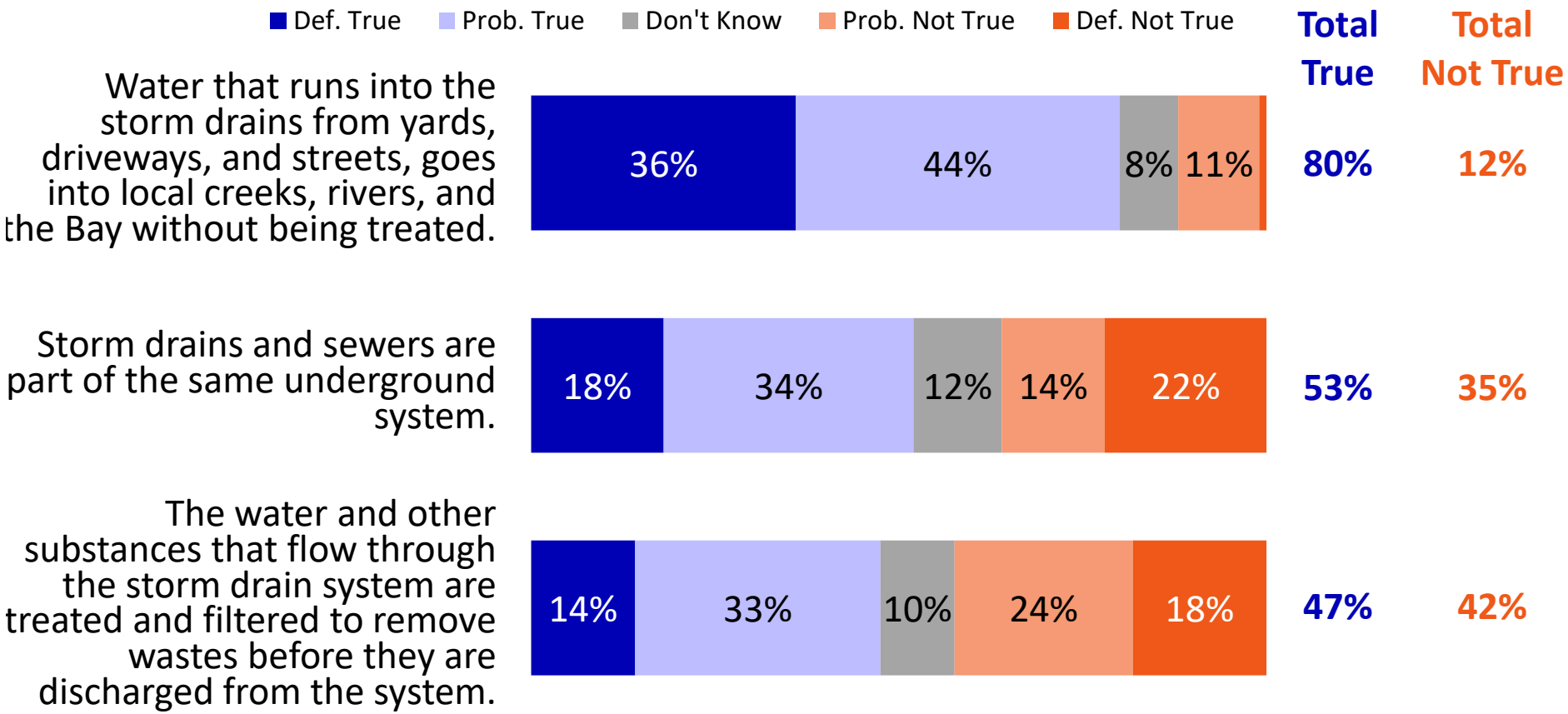

Q8.

06573
6614

There has been relatively little change in residents' understandings of these facts.

(Total True)

Problem	May 1999	February 2002	September 2003	February 2009	April 2014	May 2020	2014-2020 Difference
Storm drains and sewers are part of the same underground system.	51%	49%	54%	49%	48%	53%	**+5%**
Water that runs into the storm drains from yards, driveways, and streets, goes into local creeks, rivers, and the Bay without being treated.	--	--	--	81%	76%	80%	**+4%**
The water and other substances that flow through the storm drain system are treated and filtered to remove wastes before they are discharged from the system.	41%	52%	56%	51%	49%	47%	**-2%**

Q8. For each of the following statements, please tell me if you believe it is definitely true, probably true, probably not true or definitely not true.

As in prior years, residents identified garbage, oil and chemicals as chief pollutants.

From what you know, what are two types of pollutants that enter the bay and affect its water quality? (Up to 2 Responses Accepted)

Type of Pollutants	September 2003	February 2009	April 2014	May 2020
Garbage/trash	16%	19%	20%	34%
Oil/grease from automobiles that leak or is spilled/disposed of in storm drains	44%	43%	35%	28%
Chemicals	25%	27%	28%	23%
Pesticides, herbicides and fertilizer from lawns, gardens, farms, etc.	19%	18%	19%	20%
Industrial wastes	14%	13%	12%	9%
Biological contaminants from litter, organic matter, and animal wastes	4%	8%	8%	9%
Sewage	8%	3%	6%	5%
Metals found in vehicle exhaust, weathered paint, metal plating, tires, etc.	7%	2%	2%	3%
Mercury	--	1%	2%	3%
Hazardous waste/carcinogens	6%	2%	5%	2%
Medical/hospital waste	0%	1%	3%	2%
Oil from ships/boats	3%	1%	5%	0%
Other mentions	12%	6%	3%	3%
Don't Know	7%	12%	16%	15%

FM3 RESEARCH

Q9.

06575
6616

High-school students are least likely to understand that water from storm drains goes into waters without being treated.

Water that runs into the storm drains from yards, driveways, and streets, goes into local creeks, rivers, and the Bay without being treated.

Demographic Group	Total True
Age	
15-17	52%
18-29	77%
30-39	79%
40-49	83%
50-64	81%
65+	83%
Gender	
Men	80%
Women	79%

06576
6617

Q8c. For each of the following statements, please tell me if you believe it is definitely true, probably true, probably not true or definitely not true

Two in five felt that their personal choices have a "very large impact" on water quality.

In general, would you say that the personal choices of families and individuals have a very large impact, only a minor impact, or no impact at all on the quality of water in the watershed?

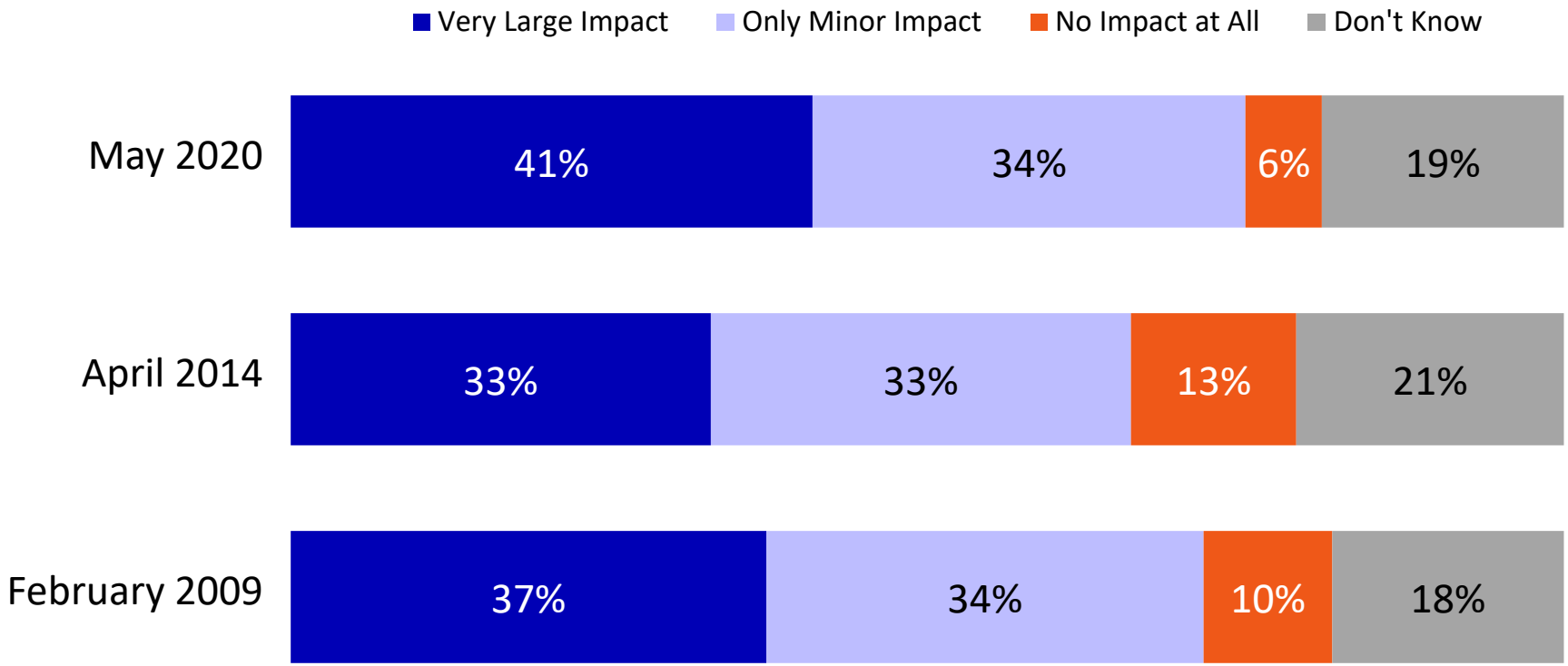

Q6.

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Older residents, Latinos and those in West Valley communities were more likely to assign a "very large impact" to personal choices.

In general, would you say that the personal choices of families and individuals have a very large impact, only a minor impact, or no impact at all on the quality of water in the watershed? (Very Large Impact)

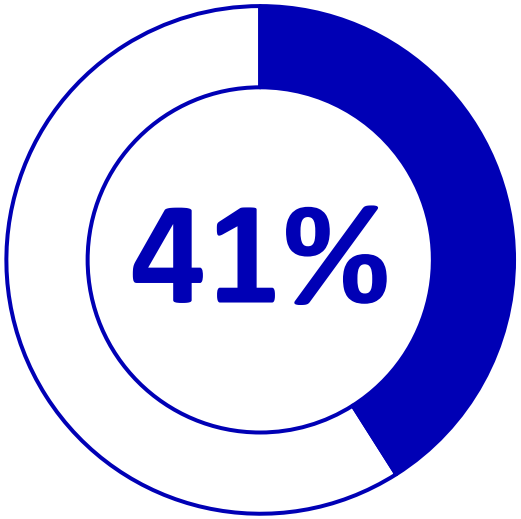

Disproportionately Saw a "Very Large Impact" from Personal Choices:

- **Ages 65-74 (56%)**
- **West Valley communities (53%)**
- **Unemployed residents (49%)**
- **Ages 40-49 (48%)**
- **Latino residents (47%)**
- **Ages 50-64 (46%)**

More than nine in ten said that large companies are "very responsible" for causing water pollution.

I'm going to mention some people and groups of people that may be responsible for causing water pollution. Please tell me whether you personally believe that group is very responsible, somewhat responsible, or not at all responsible for causing water pollution.

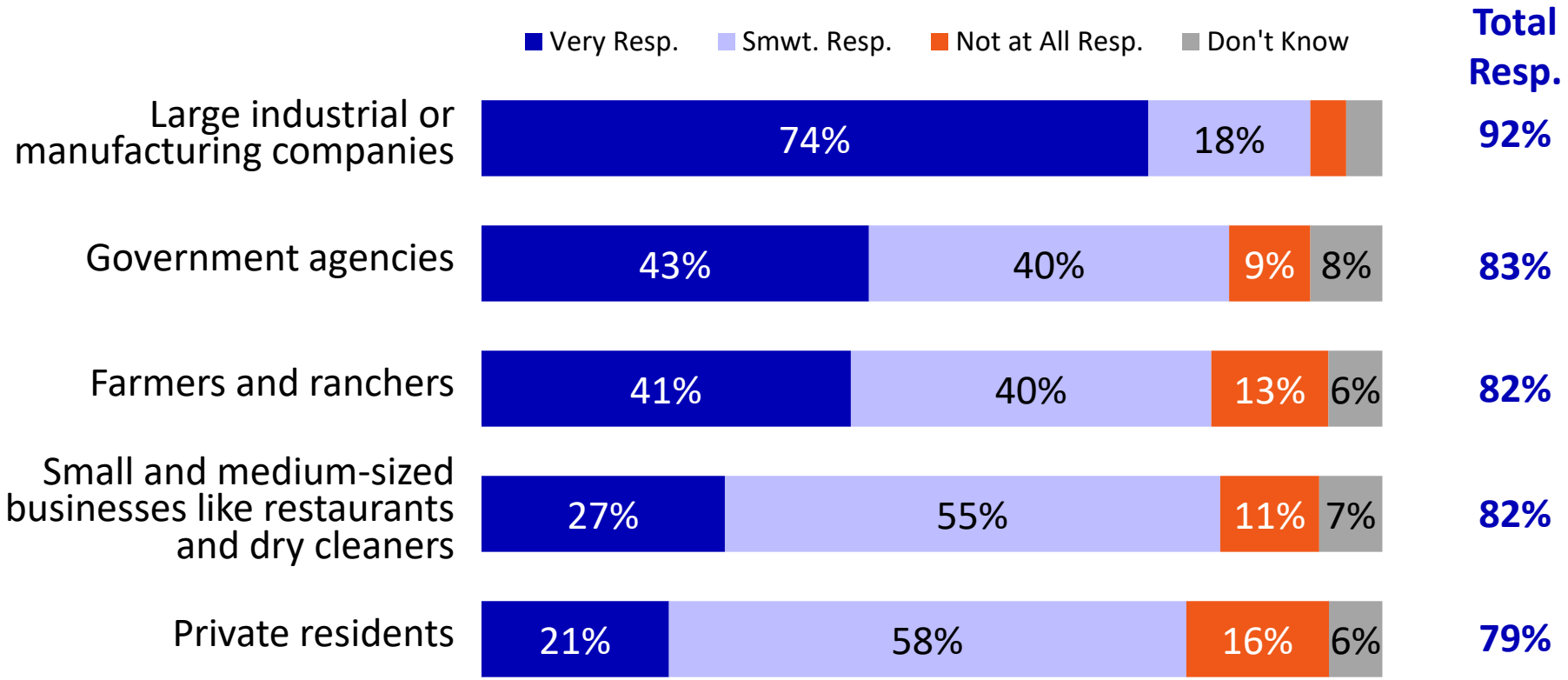

Q7.

06579
6620

The degree of responsibility they assign to each agency has changed little since 2014.

(Total Responsible)

Response	May 1999	February 2009	April 2014	May 2020	2014-2020 Difference
Government agencies	80%	76%	76%	83%	**+7%**
Farmers and ranchers	76%	75%	75%	82%	**+7%**
Private residents	74%	81%	75%	79%	**+4%**
Large industrial or manufacturing companies	93%	92%	90%	92%	**+2%**
Small and medium-sized businesses like restaurants and dry cleaners	78%	84%	82%	82%	**0%**

Q7. I'm going to mention some people and groups of people that might be responsible for causing water pollution. Please tell me whether you personally believe that group is very responsible, somewhat responsible, or not at all responsible for causing water pollution.

Education and Outreach Strategy Short-Term Goals

Familiarity with the Household Hazardous Waste program and MyWatershedWatch.org has increased.

I'm going to read you a list of items. Please tell me if you have a favorable or unfavorable opinion of each one.

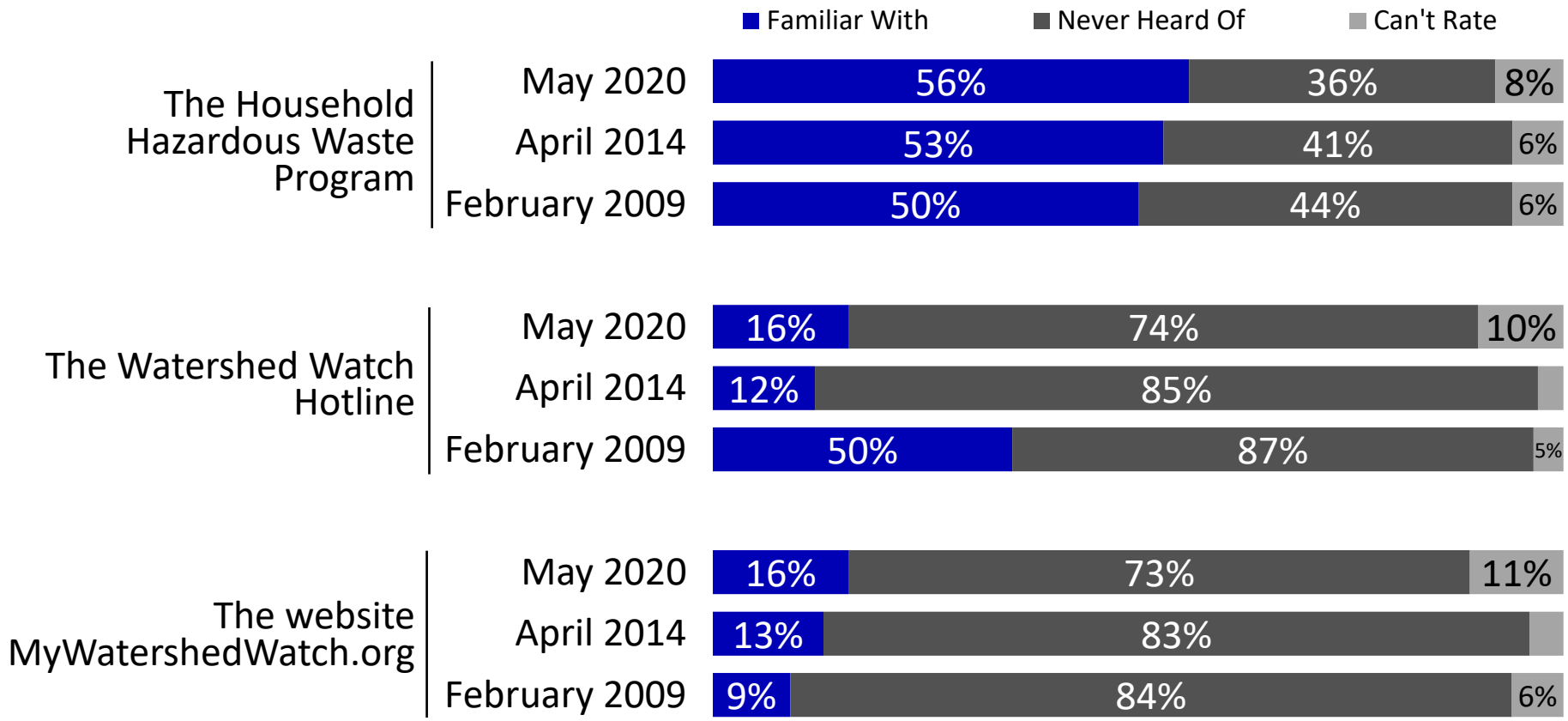

Q13.

06582
6623

Goals Assessment and Survey Approach

- ✓ This is the first SCVURPPP survey conducted with a dual-mode approach, employing phone and online interviews. This necessary transition away from the expensive practice of Random Digit Dialing (RDD) allows for more representative responses by providing cell phone, landline and email modes of interview.
- ✓ In the battery question asking about pollution prevention behaviors, respondents have historically been offered the options to say whether they were "very willing," "somewhat willing," "somewhat unwilling," or "very unwilling" to take an action – or to say that they already do that action now.
- ✓ In this year's survey, online respondents were systematically more likely than phone respondents to select "very willing" than "do now" in Question 12. Therefore, to maintain consistency, results of the combined "do now" and "very willing" shares are noted where appropriate.
- ✓ We have tested a modified online questionnaire approach to address this issue for future iterations of the survey; results of this are presented beginning on Slide 45.

Build resident awareness of watershed and urban runoff pollution issues

Objective: In 2019, 75% of residents will know that water that flows into storm drains is not treated.

Share of residents who knew that water flows into storm drains is not treated

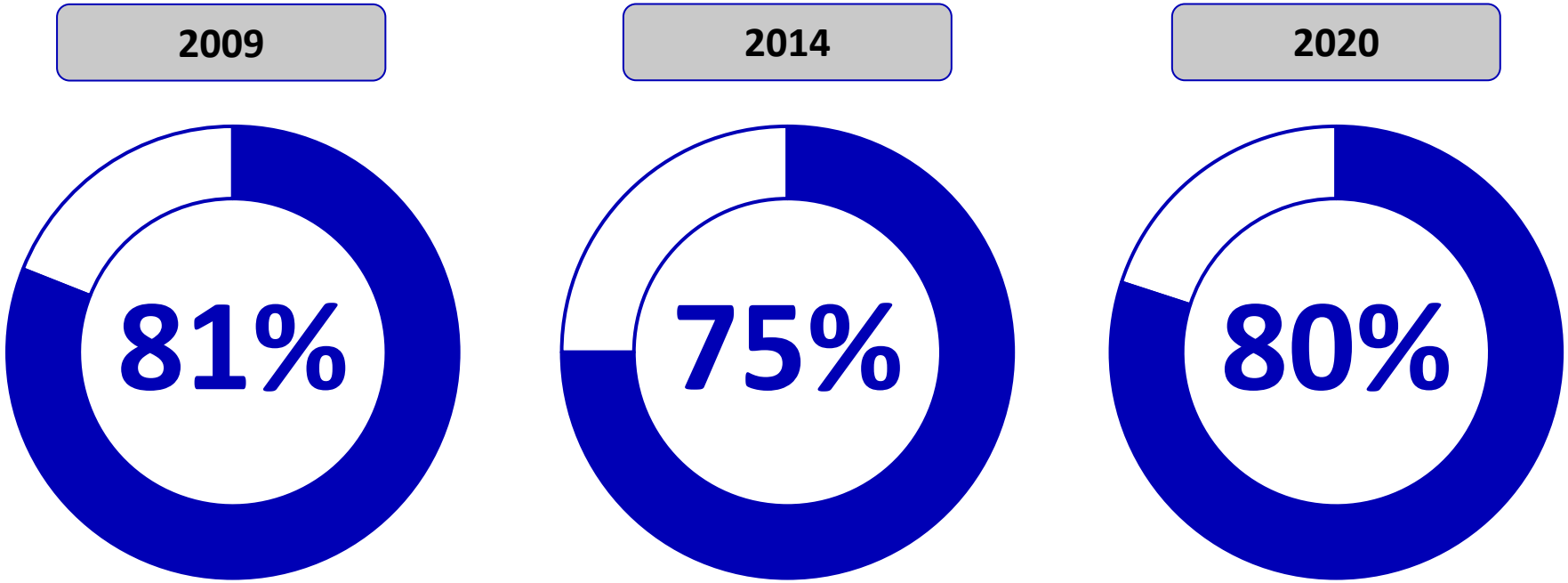

Inform audiences that indoor and outdoor daily activities impact our watershed

Objective: In 2019, 75% of residents will recognize that their daily actions contribute to water pollution.

Share of residents who recognize that their daily actions contribute to water pollution

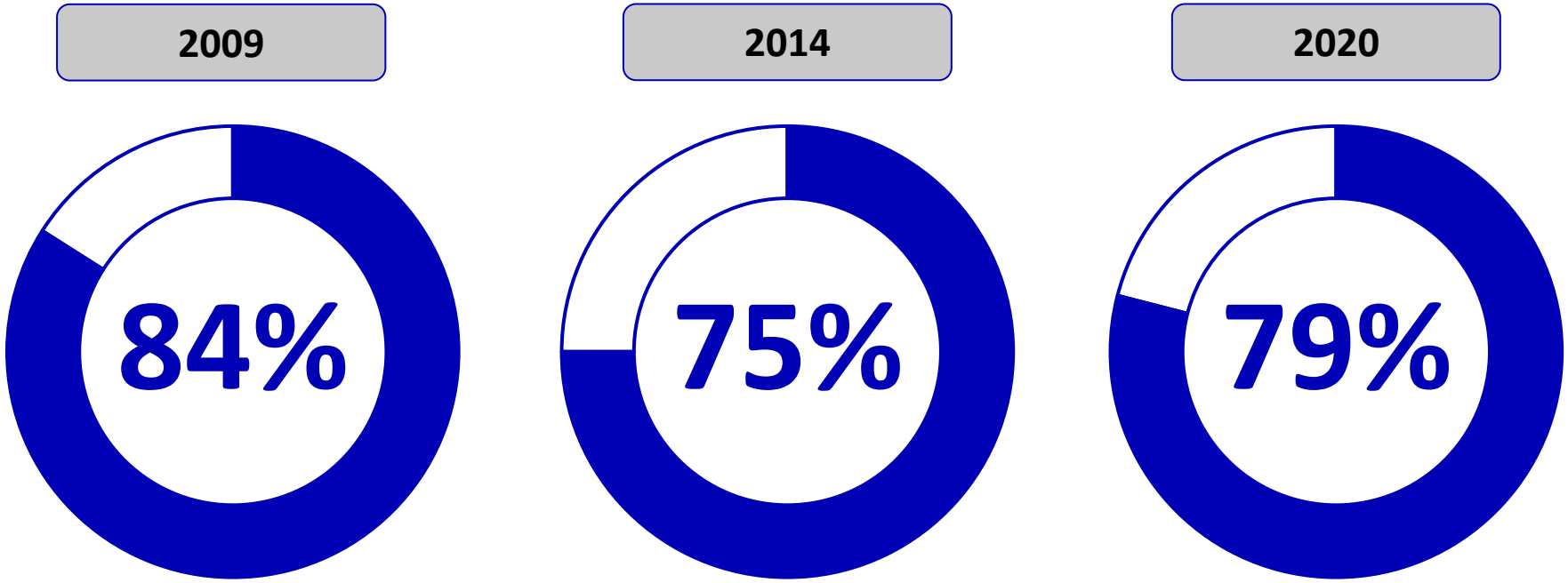

Change behaviors that negatively impact the watershed

Objective: By 2019, 35% of Santa Clara Valley residents will take at least two stormwater pollution prevention actions.

Share of Residents Doing At Least 2: Recycle Used Motor Oil, Take Leftover Paints to HHW Collection, Use Less-Toxic Methods, Sweep Driveway, Use Carwash, Wash on Unpaved Surface

2014

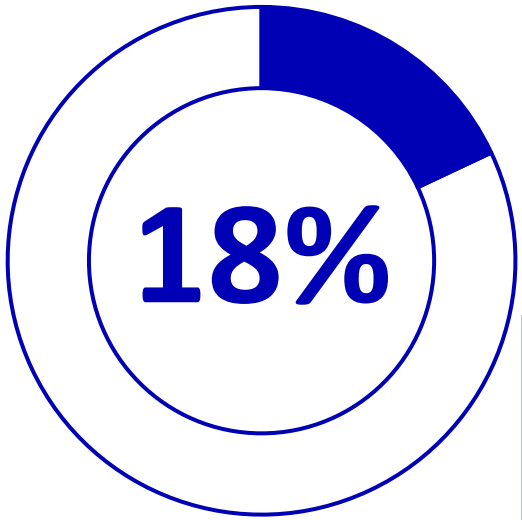

2020

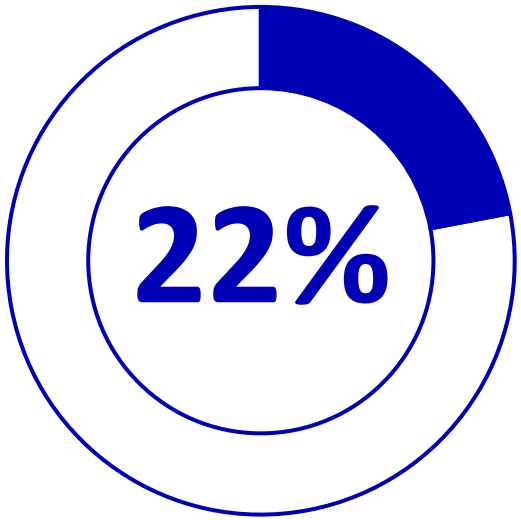

Do Now & Very Willing: 88% in 2020

06586
6627

Encourage behaviors that protect, preserve, and restore the watershed

Objective: By 2019, 20% of residents will report using watershed-friendly, sustainable techniques (such as rain gardens, and removing paved surfaces) in their yard or garden to reduce runoff.

Share Who Already Use Watershed-Friendly Techniques

2014

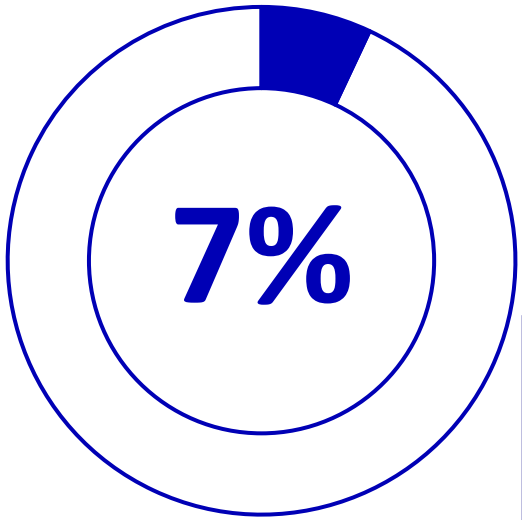

2020

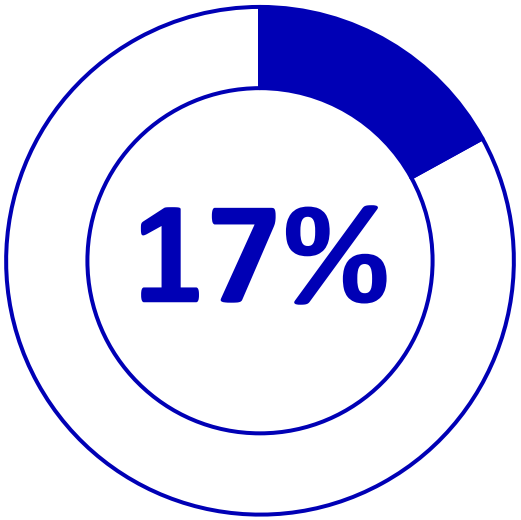

Do Now & Very Willing:
49% in 2014
53% in 2020

06587
6628

Encourage behaviors that protect, preserve, and restore the watershed

Objective: By 2019, 67% of residents will report throwing litter in garbage cans and not in the street.

Share Who Already Throw Litter in Garbage Cans and Not on The Street

2014

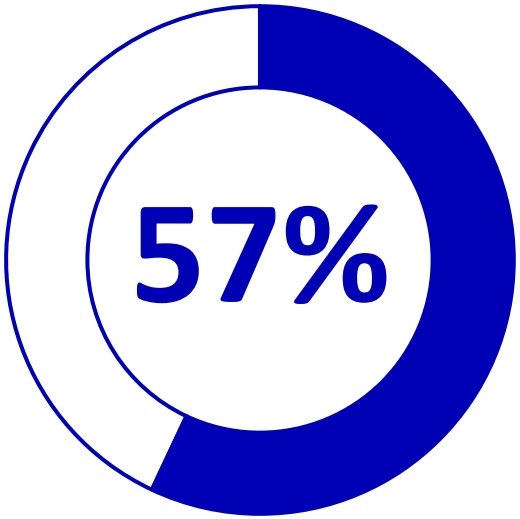

2020

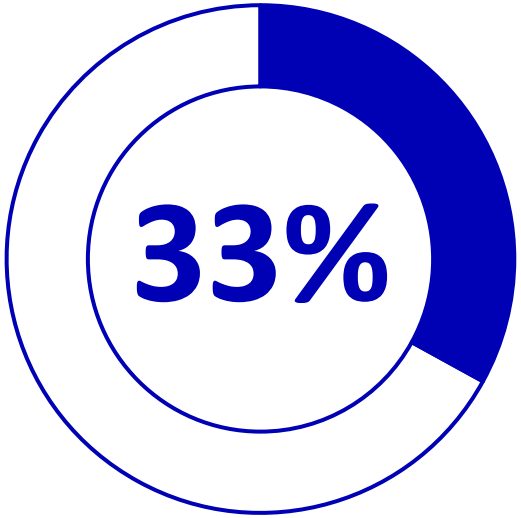

Do Now & Very Willing:
96% in 2014
92% in 2020

06588
6629

High school students will make educated choices about behaviors that benefit the watershed

Objective: In 2019, 75% of high school students will take at least one of 3 watershed pollution prevention actions (proper disposal of trash, taking their car to a commercial car wash, or washing it on an unpaved surface).

Share of High School Students Taking At Least One of Three Specific Watershed Pollution Prevention Actions

2014

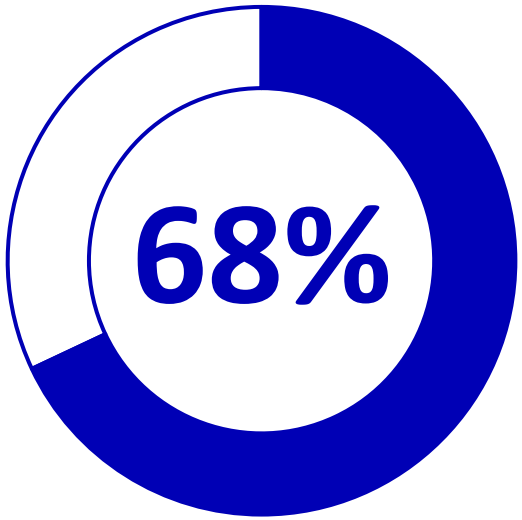

2020

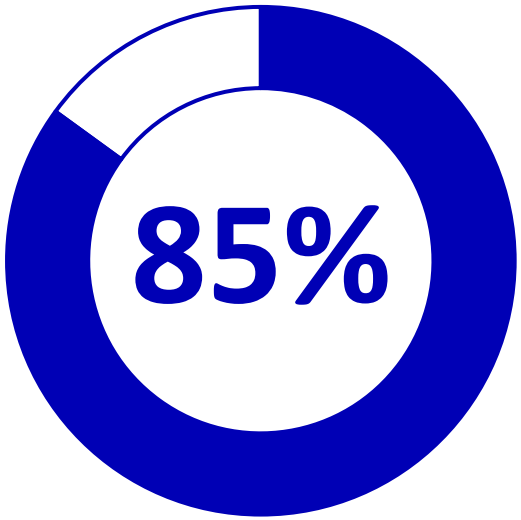

Pollution Behaviors

Very broad majorities said they are "very willing" or already throw litter in the garbage, use re-usable bags, and dispose of paint and oil.

Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing.

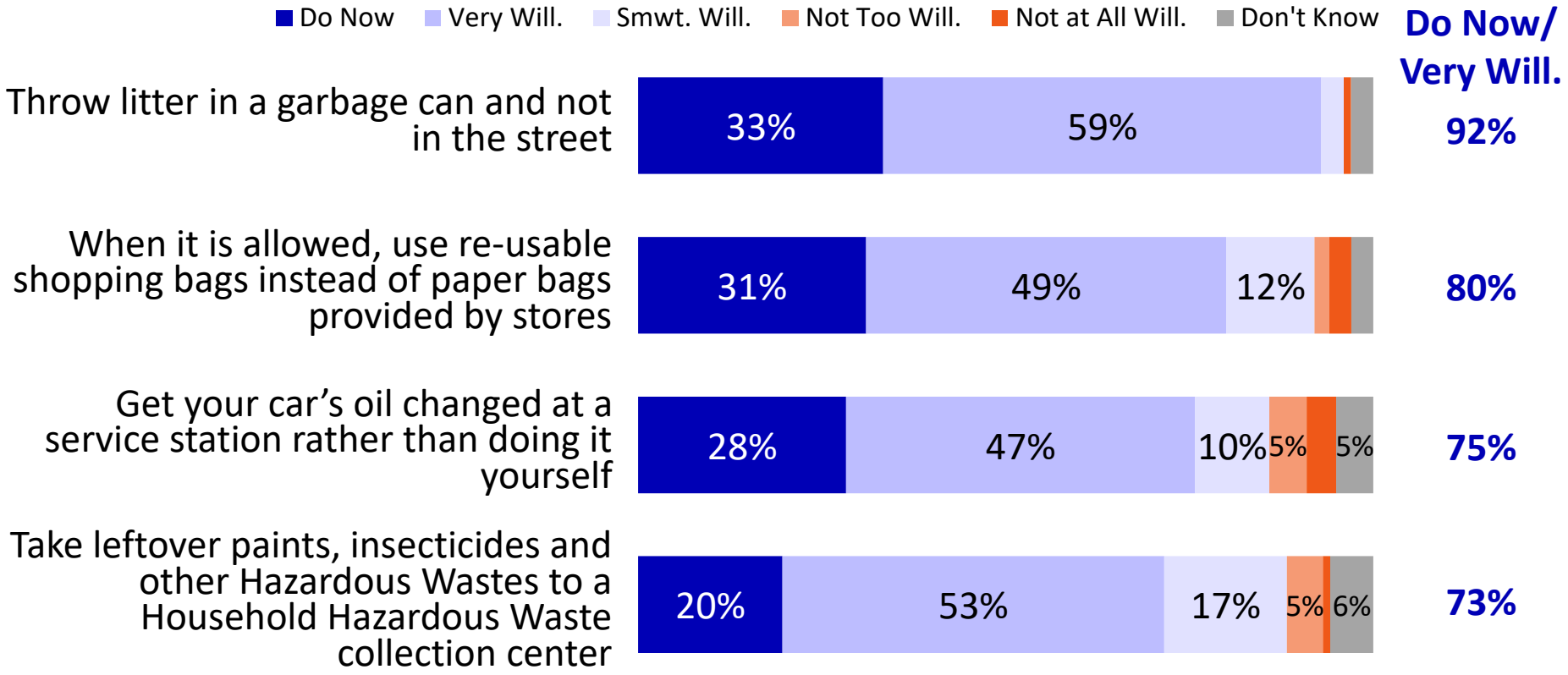

Q12.

06591
6632

More than three in five were "very willing" or already take their car to a car wash, sweep their driveway, and use less-toxic practices.

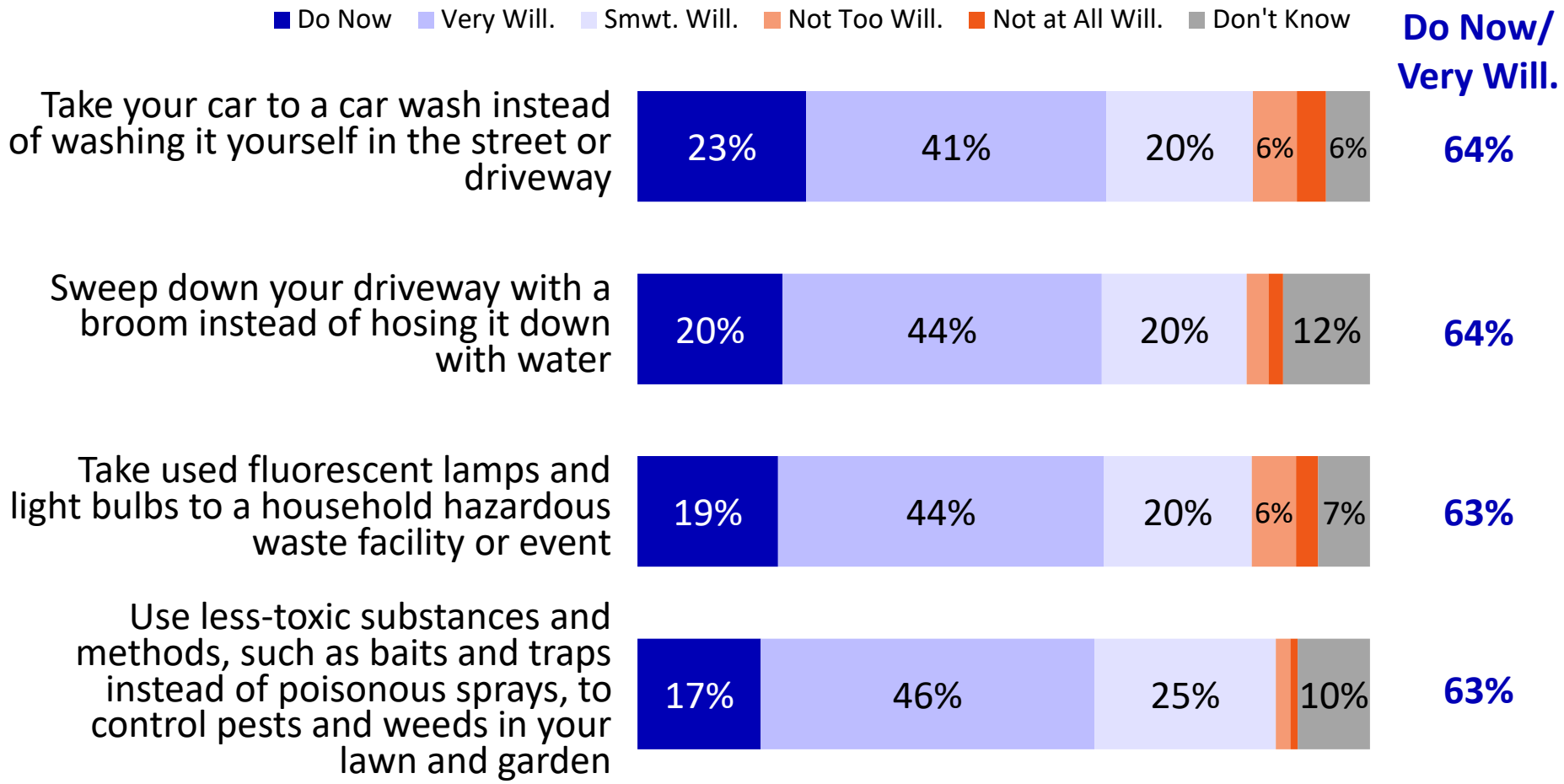

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing.

Fewer reported willingness to recycle used motor oil after changing it themselves.

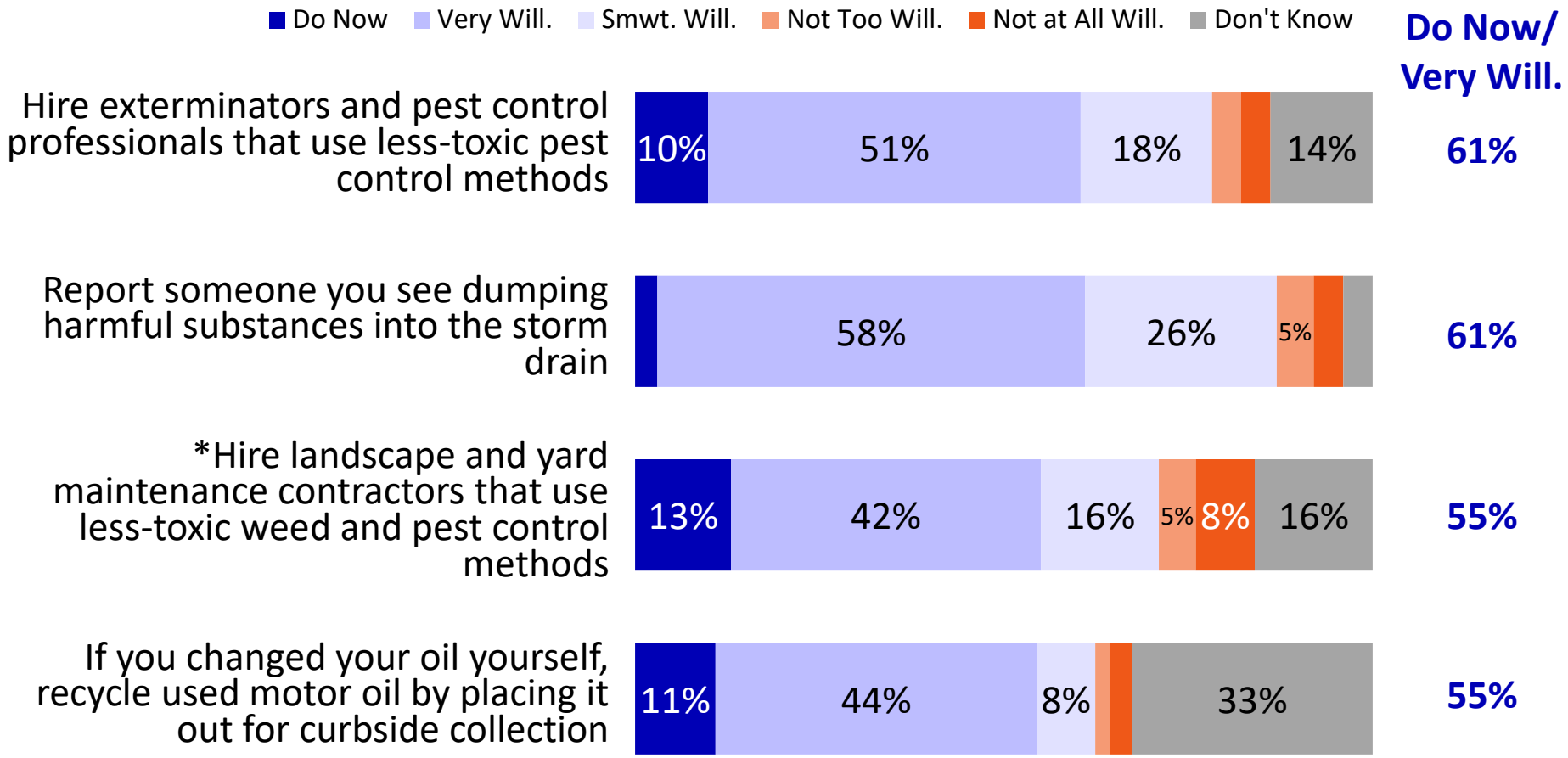

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06593
6634

Residents were less enthusiastic about creek clean-ups compared with other pollution prevention actions.

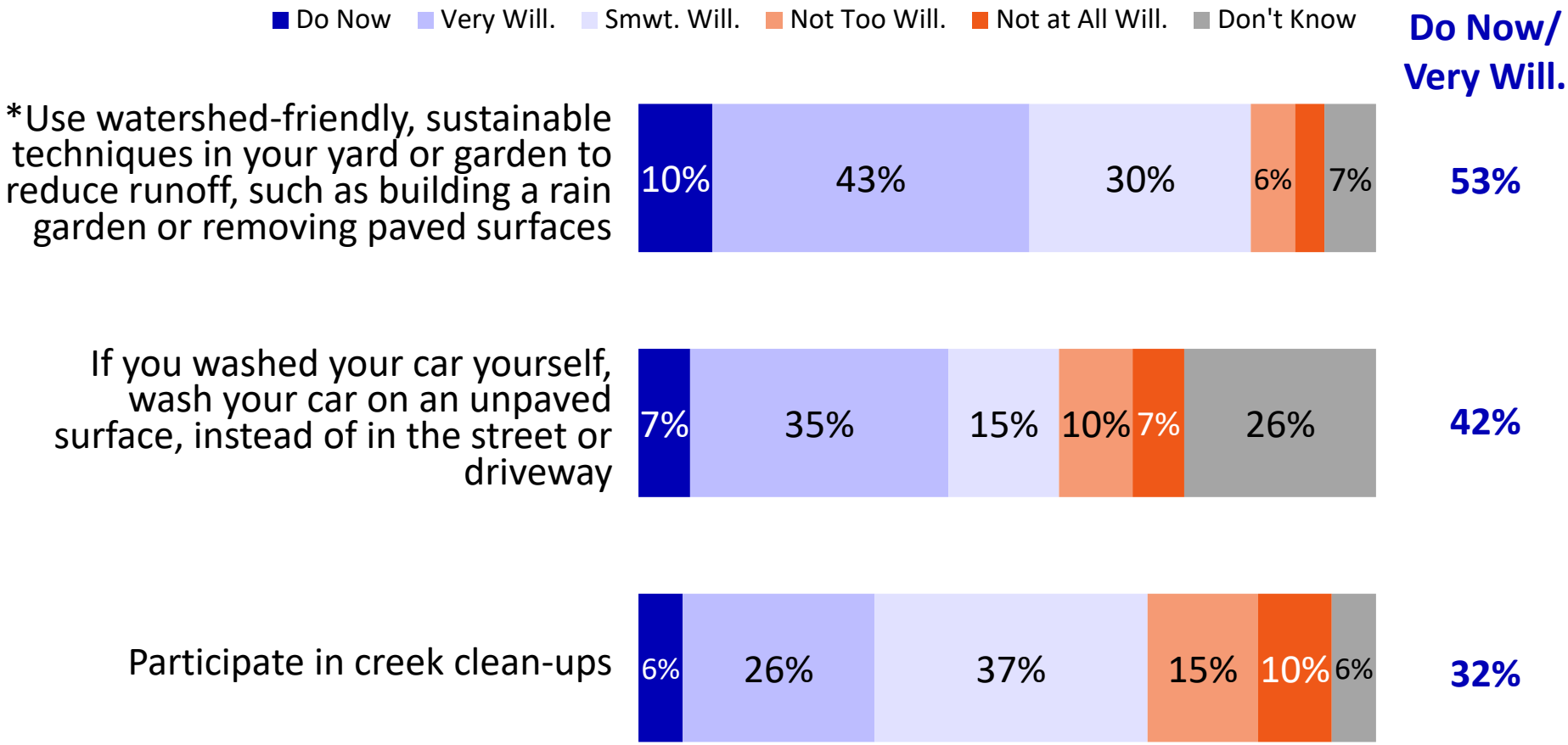

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06594
6635

Positive Changes in Behaviors

(Do Now/Very Willing)

Action	March 1996	May 1999	February 2002	September 2003	February 2009	April 2014	May 2020	2014-2020 Difference
Hire exterminators and pest control professionals that use less-toxic pest control methods	--	--	--	--	--	54%	61%	**+11%**
Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden	69%	63%	59%	63%	63%	55%	63%	**+8%**
If you washed your car yourself, wash your car on an unpaved surface, instead of in the street or driveway	45%	40%	38%	36%	37%	37%	42%	**+5%**
*Hire landscape and yard maintenance contractors that use less-toxic weed and pest control methods	--	--	--	--	--	50%	55%	**+5%**
*Use watershed-friendly, sustainable techniques in your yard or garden to reduce runoff, such as building a rain garden or removing paved surfaces	--	--	--	--	--	49%	53%	**+4%**

tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06595
6636

No Change in Behaviors

(Do Now/Very Willing)

Action	March 1996	May 1999	February 2002	September 2003	February 2009	April 2014	May 2020	2014-2020 Difference
Report someone you see dumping harmful substances into the storm drain	--	66%	--	--	71%	60%	61%	**+1%**
Participate in creek clean-ups	--	38%	--	--	40%	32%	32%	**0%**
Take leftover paints, insecticides and other Hazardous Wastes to a Household Hazardous Waste collection center	79%	75%	70%	74%	79%	74%	73%	**-1%**
Take your car to a car wash instead of washing it yourself in the street or driveway	65%	66%	61%	58%	67%	65%	64%	**-1%**
Throw litter in a garbage can and not in the street	--	--	--	95%	--	96%	92%	**-4%**

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06596
6637

Negative Changes in Behaviors

(Do Now/Very Willing)

Action	March 1996	May 1999	February 2002	September 2003	February 2009	April 2014	May 2020	2014-2020 Difference
Take used fluorescent lamps and light bulbs to a household hazardous waste facility or event	--	--	--	58%	74%	67%	63%	**-4%**
Get your car's oil changed at a service station rather than doing it yourself	--	--	73%	79%	78%	80%	75%	**-5%**
If you changed your oil yourself, recycle used motor oil by placing it out for curbside collection	79%	79%	75%	68%	65%	61%	55%	**-6%**
Sweep down your driveway with a broom instead of hosing it down with water	70%	69%	65%	62%	74%	71%	64%	**-7%**
When it is allowed, use re-usable shopping bags instead of paper bags provided by stores	--	--	--	--	70%	88%	80%	**-8%**

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing.

Younger residents were less likely to act.

(Do Now/Very Willing)

Action	All Residents	Age					
		15-17	18-29	30-39	40-49	50-64	65+
Throw litter in a garbage can and not in the street	**92%**	69%	97%	87%	96%	95%	95%
When it is allowed, use re-usable shopping bags instead of paper bags provided by stores	**80%**	66%	81%	74%	83%	83%	83%
Get your car's oil changed at a service station rather than doing it yourself	**76%**	45%	78%	69%	78%	80%	83%
Take leftover paints, insecticides and other Hazardous Wastes to a Household Hazardous Waste collection center	**72%**	48%	48%	74%	77%	83%	85%
Take your car to a car wash instead of washing it yourself in the street or driveway	**64%**	42%	55%	59%	72%	73%	66%
Sweep down your driveway with a broom instead of hosing it down with water	**64%**	48%	54%	61%	68%	71%	71%

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06598
6639

Teens were less likely to report using less-toxic substances or hiring exterminators, likely because they do not have purchasing power.

(Do Now/Very Willing)

Action	All Residents	Age					
		15-17	18-29	30-39	40-49	50-64	65+
Take used fluorescent lamps and light bulbs to a household hazardous waste facility or event	**64%**	47%	39%	69%	63%	75%	76%
Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden	**62%**	47%	67%	60%	60%	68%	66%
Hire exterminators and pest control professionals that use less-toxic pest control methods	**61%**	34%	58%	61%	68%	63%	64%
Report someone you see dumping harmful substances into the storm drain	**61%**	40%	55%	74%	68%	60%	51%

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06599
6640

Residents in their 20s were especially likely to garden sustainably and do creek cleanups.

(Do Now/Very Willing)

Action	All Residents	Age					
		15-17	18-29	30-39	40-49	50-64	65+
*Hire landscape and yard maintenance contractors that use less-toxic weed and pest control methods	**55%**	40%	46%	48%	60%	61%	60%
If you changed your oil yourself, recycle used motor oil by placing it out for curbside collection	**54%**	39%	62%	52%	59%	54%	48%
*Use watershed-friendly, sustainable techniques in your yard or garden to reduce runoff, such as building a rain garden or removing paved surfaces	**53%**	42%	60%	57%	59%	47%	53%
If you washed your car yourself, wash your car on an unpaved surface, instead of in the street or driveway	**42%**	40%	51%	53%	35%	42%	27%
Participate in creek clean-ups	**32%**	28%	43%	38%	25%	32%	24%

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

FM3 RESEARCH

06600
6641

Women are more likely to do or be willing to do a variety of pollution prevention actions.

(Do Now/Very Willing)

Action	All Residents	Gender	
		Men	Women
Throw litter in a garbage can and not in the street	**92%**	91%	94%
When it is allowed, use re-usable shopping bags instead of paper bags provided by stores	**80%**	76%	83%
Get your car's oil changed at a service station rather than doing it yourself	**76%**	70%	81%
Take leftover paints, insecticides and other Hazardous Wastes to a Household Hazardous Waste collection center	**72%**	70%	74%
Take your car to a car wash instead of washing it yourself in the street or driveway	**64%**	54%	73%
Sweep down your driveway with a broom instead of hosing it down with water	**64%**	60%	68%
Take used fluorescent lamps and light bulbs to a household hazardous waste facility or event	**64%**	62%	64%
Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden	**62%**	56%	70%

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

FM3 RESEARCH

06601
6642

Men were more likely to say they place oil out for curbside collection; women were more likely to participate in creek clean-ups.

(Do Now/Very Willing)

Action	All Residents	Gender	
		Men	Women
Hire exterminators and pest control professionals that use less-toxic pest control methods	**61%**	53%	68%
Report someone you see dumping harmful substances into the storm drain	**61%**	57%	65%
*Hire landscape and yard maintenance contractors that use less-toxic weed and pest control methods	**55%**	53%	58%
If you changed your oil yourself, recycle used motor oil by placing it out for curbside collection	**54%**	61%	50%
*Use watershed-friendly, sustainable techniques in your yard or garden to reduce runoff, such as building a rain garden or removing paved surfaces	**53%**	48%	58%
If you washed your car yourself, wash your car on an unpaved surface, instead of in the street or driveway	**42%**	42%	42%
Participate in creek clean-ups	**32%**	28%	37%

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06602
6643

Modified Questionnaire Test

Modified Questionnaire Approach

- ✓ In this year's survey, online respondents were systematically more likely than phone respondents to select "very willing" than "do now" (as shown on Slides 46-49).
- ✓ Therefor, a modified approach was tested with 150 residents online.
- ✓ For each pollution prevention behavior, they were offered just three choices:
  - Already do that action
  - Do not do that action
  - That action does not apply to them
- ✓ If they said they do not do that action, they were *then* asked how willing they were to take that action.
- ✓ This resulted in much higher reporting of pollution prevention behaviors (examples to right).

Selected Test Results:

- **Recycle used motor oil when changing it yourself: 26% do now, 67% does not apply.**
- **Get oil changed at a service station: 83% do now.**
- **Participate in creek clean-up: 20% do now, 54% willing.**
- **Use reusable shopping bags: 95% do now.**
- **Throw litter in the garbage, not the street: 98% do now.**
- **Hire exterminators: 36% do now, 52% does not apply, and 11% willing.**
- **Watershed-friendly gardening: 49% of those with yards do now, and 25% are willing.**

Respondents were more likely to report that they already do several pollution prevention actions on the phone than they did online.

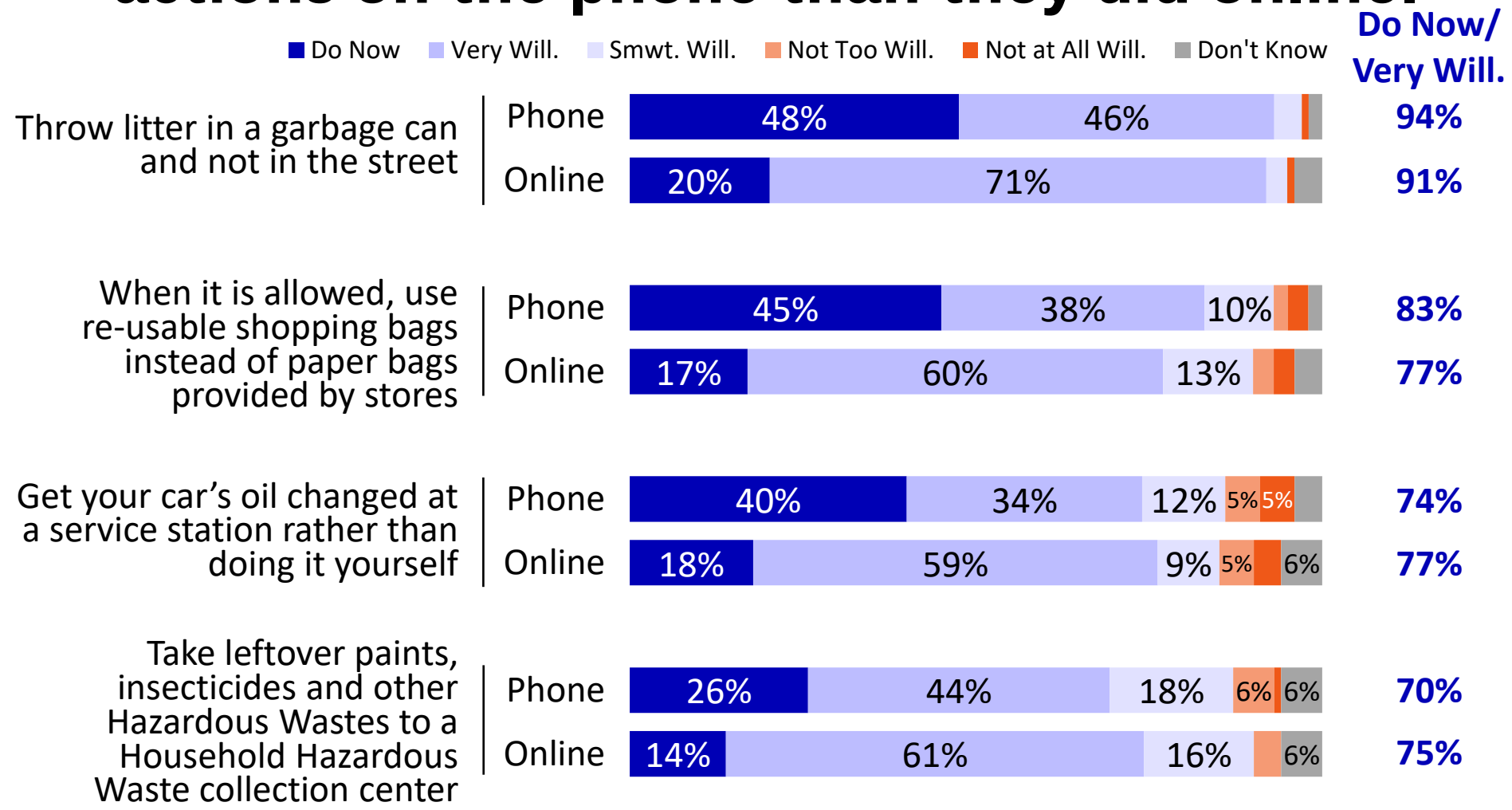

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing.

06605
6646

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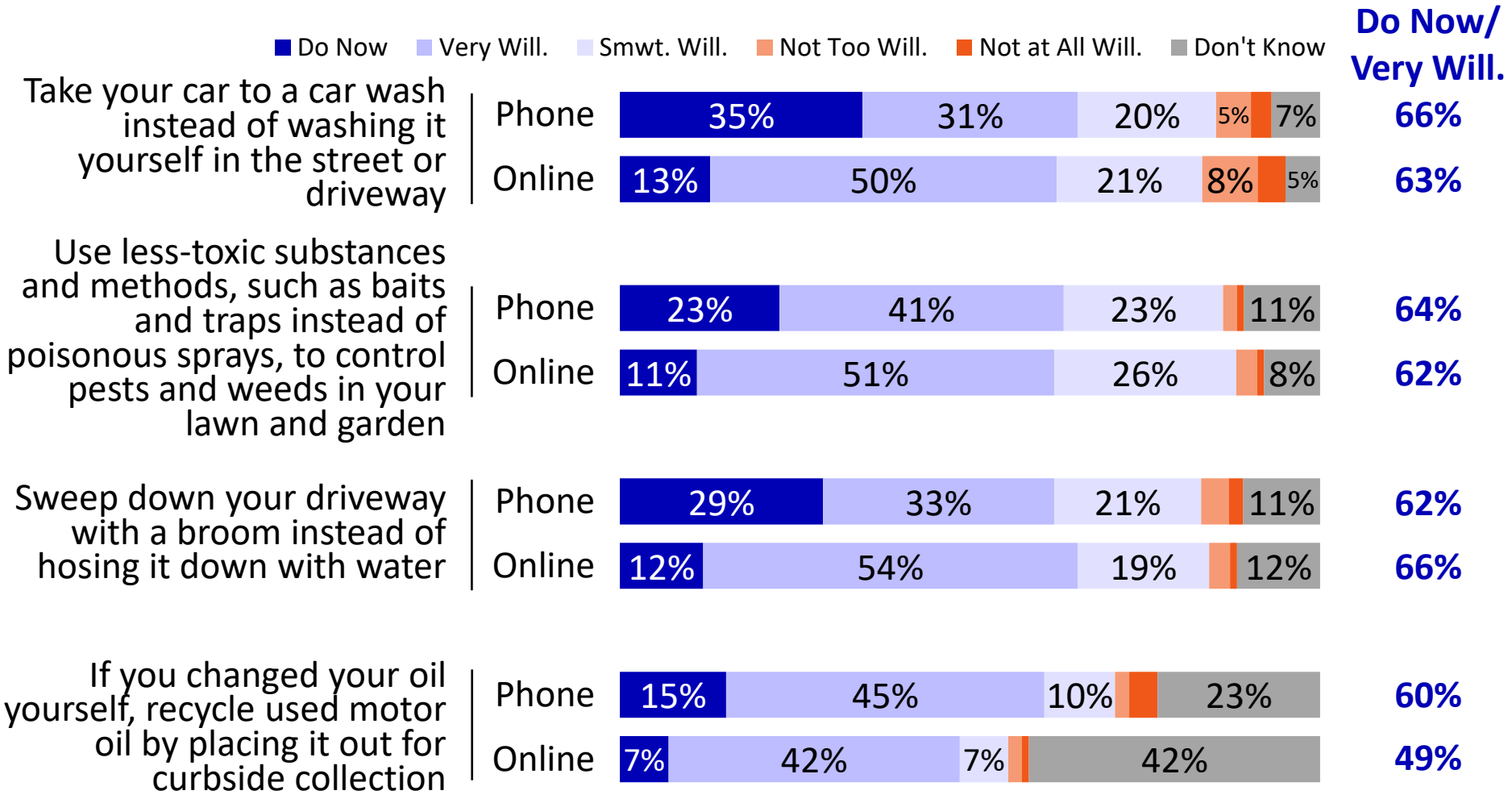

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing.

06606
6647

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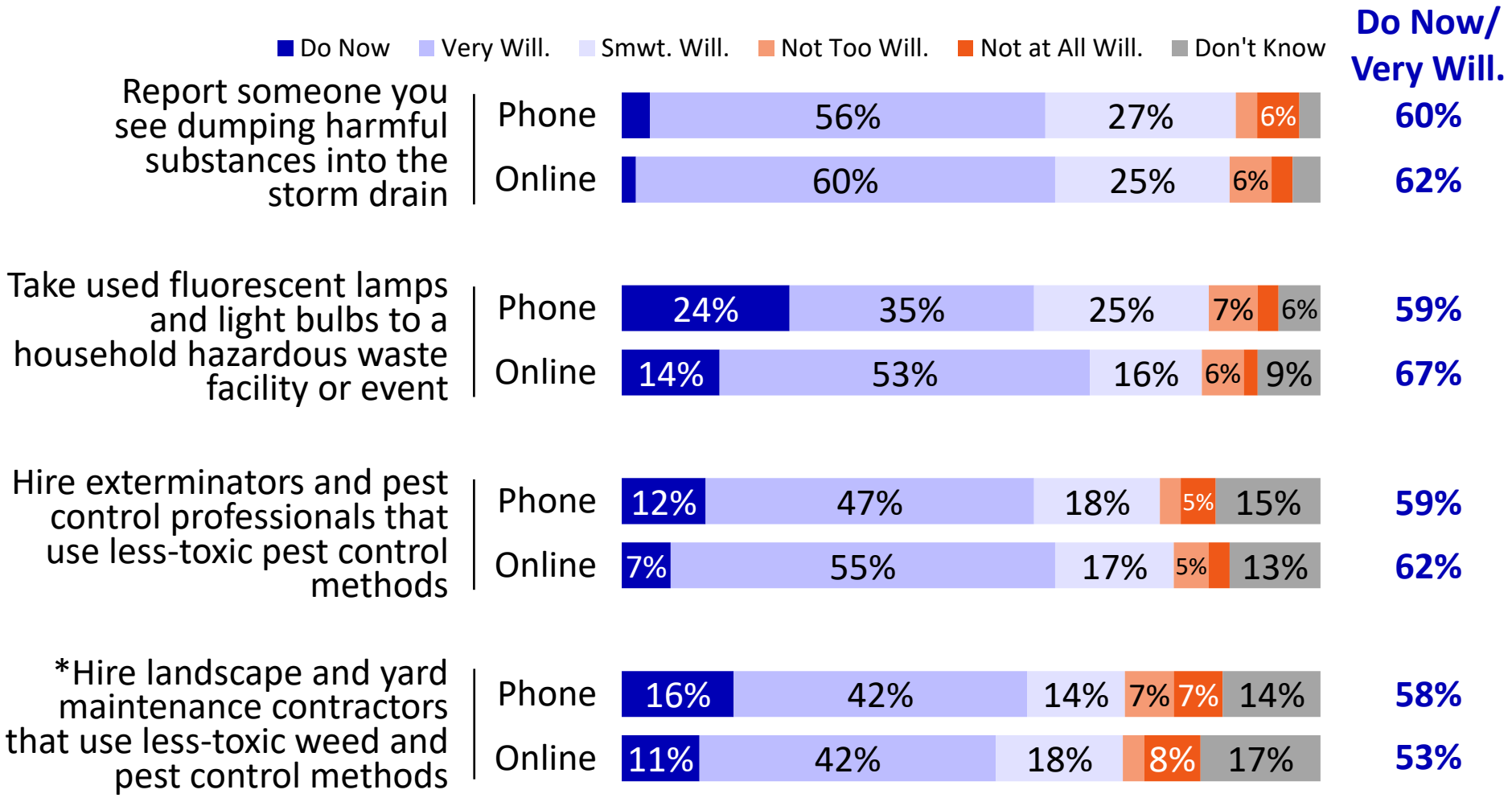

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06607
6648

Continued

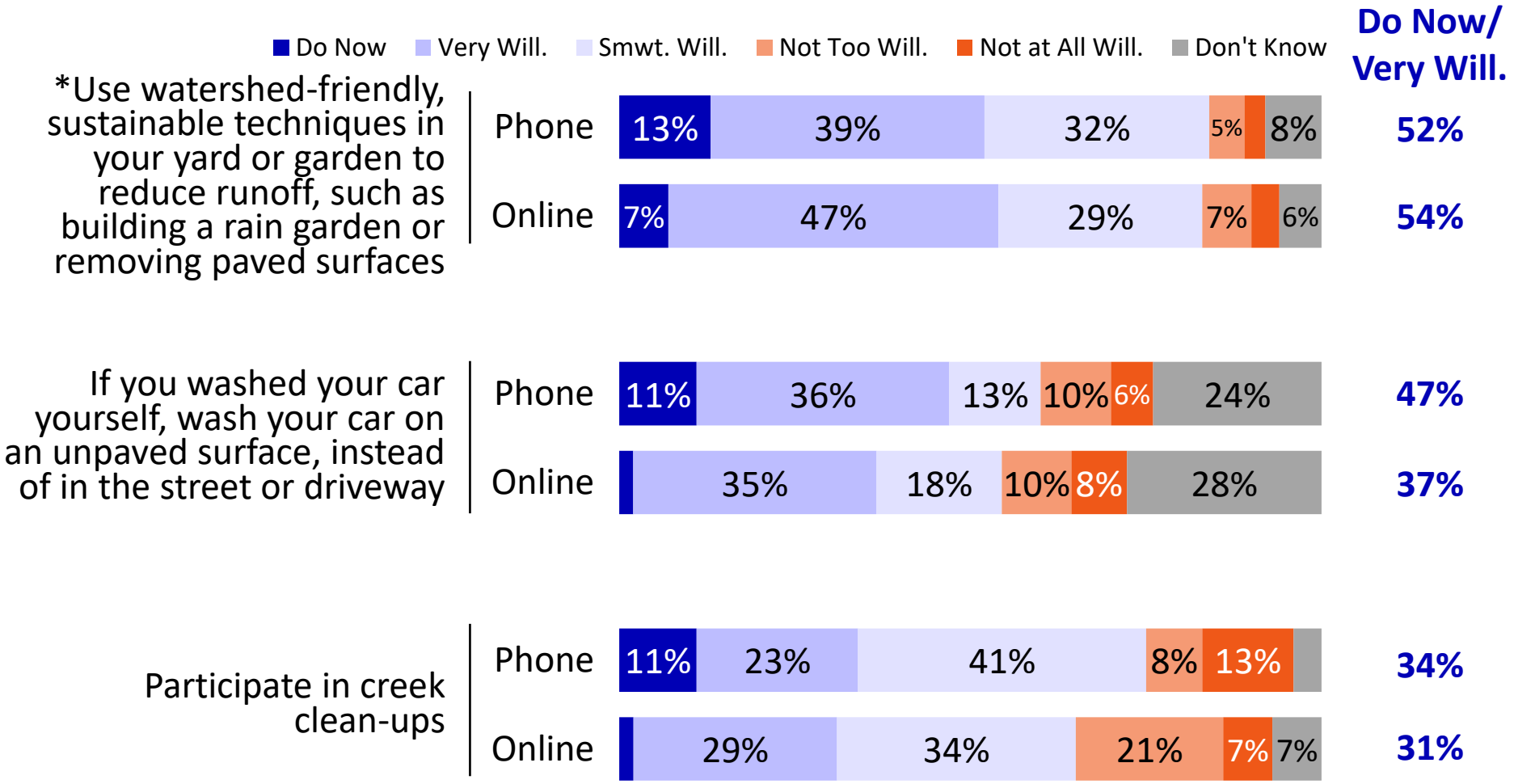

Q12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. Please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. *Asked of Those with a Yard or Garden

06608
6649

Demographics and Communication

Email was increasingly preferred as a method of receiving environmental information.

What is your preferred method for receiving environmental messaging and other related information?

Method	February 2009	April 2014	May 2020
Email	22%	23%	**30%**
Television	17%	15%	**17%**
Social media like Facebook and Twitter	--	--	**13%**
Mail/flyers/door hangers	34%	29%	**12%**
The newspaper, either in print or online	8%	7%	**10%**
Neighborhood websites like Patch and Nextdoor	--	--	**5%**
Text message	--	1%	**5%**
Blogs	--	--	**1%**
Phone call	2%	3%	**0%**
Other	1%	3%	**2%**
Don’t want environmental messages	2%	4%	**2%**
Don't know	3%	5%	**3%**

Q14.

06610
6651

Social media has become a more important source of information.

On a scale of 1 to 5, how much do you rely on each of the following sources to receive your local news and information, where 1 means you do not rely on the source at all, and a 5 means you rely on the source very heavily?

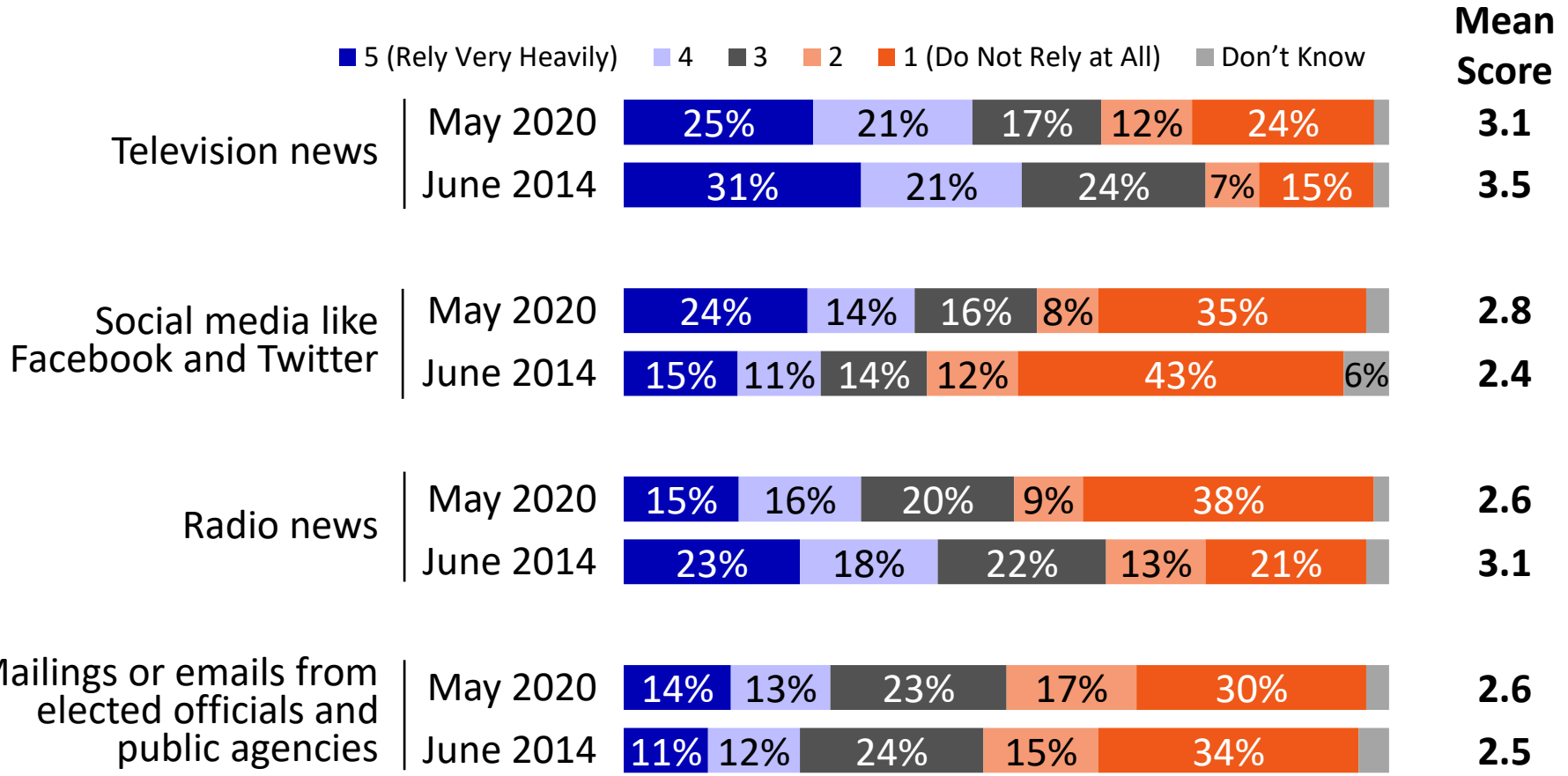

Q15.

06611
6652

Print media were less-important sources than in 2014.

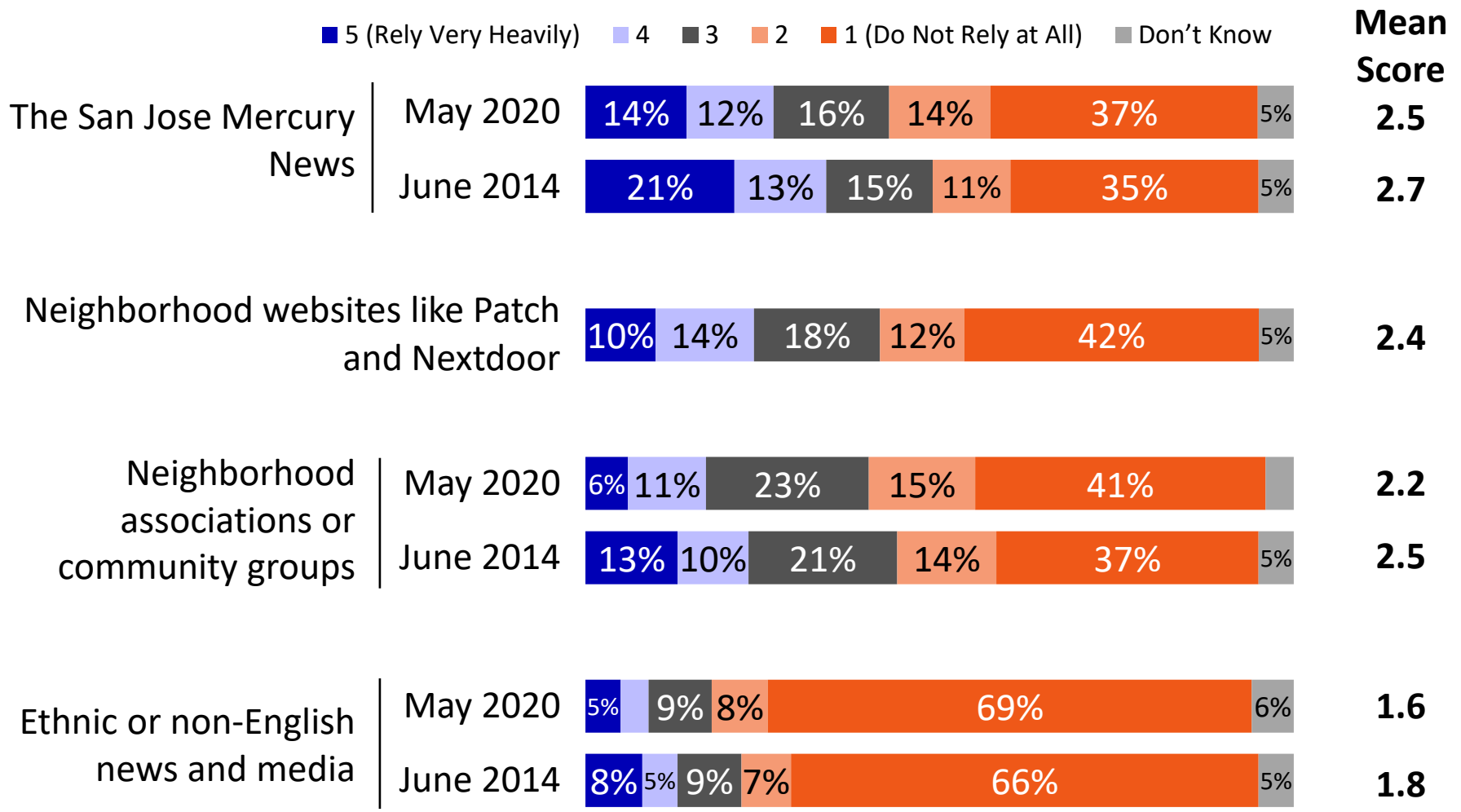

Q15. On a scale of 1 to 5, how much do you rely on each of the following sources to receive your local news and information, where 1 means you do not rely on the source at all, and a 5 means you rely on the source very heavily?

06612
6653

Social media was used more often by residents under 40; teenagers looked to ethnic media a bit more than their elders.

(Mean Score)

Source	All Residents	Age					
		15-17	18-29	30-39	40-49	50-64	65+
Television news	**3.1**	3.2	2.8	2.9	2.8	3.5	3.7
Social media like Facebook and Twitter	**2.8**	3.4	4.0	3.3	2.7	2.1	1.9
Radio news	**2.6**	2.6	2.2	2.4	2.7	2.9	2.7
Mailings or emails from elected officials and public agencies	**2.6**	2.6	2.6	2.3	2.8	2.7	2.7
The *San Jose Mercury News*	**2.5**	2.4	2.8	2.2	2.3	2.6	2.8
Neighborhood websites like Patch and Nextdoor	**2.4**	2.2	1.9	2.6	2.4	2.5	2.3
Neighborhood associations or community groups	**2.2**	2.2	2.0	2.3	2.3	2.2	2.3
Ethnic or non-English news and media	**1.6**	2.1	1.7	1.6	1.6	1.4	1.4

Q15. On a scale of one to five, how much do you rely on each of the following sources to receive your local news and information, where one means you do not rely on the source at all, and a five means you rely on the source very heavily?

The shares who have a garden or yard and maintain them themselves were similar.

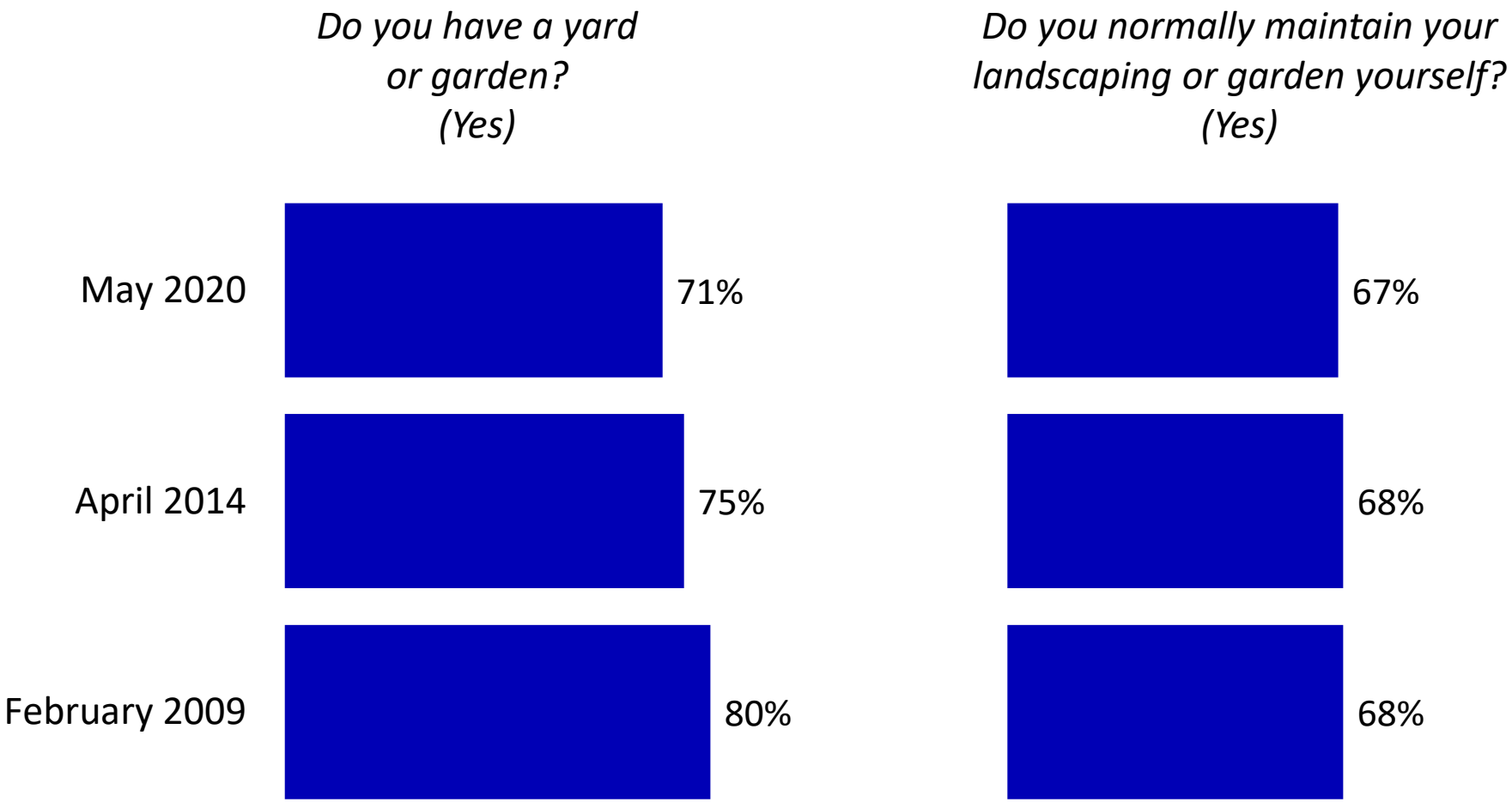

Q10.
Q11. Asked of Those with a Yard or Garden

06614
6655

Recommendations

Communications Recommendations

- ✓ **Continue to connect pollution-prevention behaviors to protection of the Bay.** Residents see pollution of the Bay especially concerning, and this has increased over time.
- ✓ **Continue to inform residents that what goes into storm drains ends up in the Bay untreated.** The share who understand this fact is high and increasing. The connections between storm drains and sewers are less clear and perhaps less useful in motivating behavior change.
- ✓ **Promote MyWatershedWatch.org.** Use and awareness of the watershed hotline has decreased as people move much of their information-seeking online. Continue to promote the website as an alternative source of information.
- ✓ **Use online channels for information.** Residents are increasingly looking to email and social media like Facebook and Twitter for environmental information. Younger residents are a key segment in need of information and they are especially broad adopters of those platforms.

For more information, contact:

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MAY 3-10, 15-21, 2020

SCVURPPP 2020 SURVEY
320-888-WT
N=651
MARGIN OF SAMPLING ERROR ±3.8% (95% CONFIDENCE INTERVAL)

Hello, I'm _____ from public opinion research firm _____, surveying about issues in Santa Clara Valley. We are not trying to sell anything or ask for a donation of any type. May I speak to the youngest person in the household aged 15 or older? (**VERIFY THAT THE PERSON IS ASSOCIATED WITH THE ADDRESS LISTED--OTHERWISE TERMINATE. IF RESPONDENT WISHES TO COMPLETE THE INTERVIEW IN SPANISH, PLEASE HAND OFF TO BILINGUAL INTERVIEWER. IF NOT AVAILABLE, ASK WHEN IT WOULD BE CONVENIENT TO CALL AGAIN.)**

A. Before we begin, I need to know if I have reached you on a cell phone, and if so, are you in a place where you can talk safely without endangering yourself or others?

Yes, cell and can talk safely ---------- 89%
Yes, cell and cannot talk safely ---------- **TERMINATE**
No, not on cell ---------- 11%
(DON'T READ) DK/NA/REFUSED---------- **TERMINATE**

(ASK QX1 AND QX2 UNTIL AGES 15-17 QUOTA REACHED)
X1. Are you the parent and/or legal guardian of a child age 15 to 17?

Yes ---------- 10%
No ---------- 90%

(ASK IF CODE 1 IN QX1)
X2. Do you consent to the child participating in this survey? The topic is water use and pollution.

Yes ---------- 14%
No ---------- 86%

IF CODE 1 IN QX2, CONTINUE INTERVIEW WITH MINOR.

(RESUME ASKING ALL RESPONDENTS)

B. To make sure we are talking to a representative population of people, can you tell me what year you were born? **(RECORD YEAR AND CATEGORIZE BELOW)**

2005-2003 (15-17)----------5%
2002-1996 (18-24)----------9%
1995-1991 (25-29)----------8%
1990-1986 (30-34)---------- 10%
1985-1981 (35-39)----------9%
1980-1976 (40-44)---------- 11%
1975-1971 (45-49)---------- 11%
1970-1966 (50-54)----------8%
1965-1961 (55-59)----------7%
1960-1956 (60-64)----------7%
1955-1946 (65-74)----------7%
1945 or earlier (75 & over)----------6%
(DON'T READ) Refused----------2%

(ASK IF CODE 1 IN QB)

C. Are you currently enrolled in high school?

Yes ---------- 95%
No ----------3%
(DON'T READ) DK/NA ----------2%

QUOTA: 75 RESPONDENTS FROM QC CODE 1.

(RESUME ASKING ALL RESPONDENTS)

D. What was the last level of school you completed?

High school graduate or less---------- 15%
Some college ---------- 19%
Business/Vocational School----------5%
College graduate ---------- 34%
Post-graduate work/Professional
school ---------- 25%
(DON'T READ) DK/Refused ----------1%

E. With which racial or ethnic group do you identify yourself: Latino or Hispanic, African American or Black, White or Caucasian, Asian or Pacific Islander, or some other ethnic or racial background? **(IF ASIAN OR PACIFIC ISLANDER, ASK**: "Are you Vietnamese, Chinese, South Asian or East Indian, or of some other Asian background?")

Latino/Hispanic	17%
African American/Black	2%
White/Caucasian	46%
Vietnamese	5%
Chinese	6%
South Asian/East Indian	7%
Other Non-Asian/Pacific Islander	2%
Other Asian/Pacific Islander	9%
(DON'T READ) Mixed race	2%
(DON'T READ) DK/NA/Refused	4%

F. What is your gender?

Male	48%
Female	50%
Non-binary	1%
Rather not say	1%

1. First, do you feel that things in Santa Clara County are generally going in the right direction or do you feel things have gotten pretty seriously off on the wrong track?

	Sept. 2003	**Feb. 2009**	**April 2014**	**May 2020**
Right direction	48%	50%	57%	56%
Wrong track	43%	33%	22%	24%
Don't know	9%	17%	21%	20%

2. Next, please tell me if you feel each of the following is a very serious problem facing the Santa Clara Valley region, is a very serious problem, a somewhat serious problem, a not too serious problem, or not a serious problem at all in this region. **(RANDOMIZE)**

	VERY SER	**SMWT SER**	**NOT TOO SER**	**NOT AT ALL SER**	**(DK/ NA)**	***EXT/ VERY***
[ ]a. Traffic congestion						
May 2020	58%	27%	10%	4%	1%	*85%*
April 2014	48%	35%	12%	3%	13%	*83%*
Feb. 2009	37%	36%	19%	6%	2%	73%
Sept. 2003	48%	38%	13%	2%	0%	*86%*
Feb. 2002	67%	23%	6%	3%	1%	90%
May 1999	72%	23%	4%	0%	1%	95%
March 1996	59%	32%	8%	0%	0%	91%

	VERY SER	SMWT SER	NOT TOO SER	NOT AT ALL SER	(DK/ NA)	*EXT/ VERY*
[ ]b. Unemployment, loss of jobs						
May 2020	56%	25%	10%	5%	4%	*81%*
April 2014	38%	31%	20%	5%	5%	69%
Feb. 2009	68%	25%	5%	1%	2%	93%
Sept. 2003	79%	17%	3%	0%	1%	96%
Feb. 2002	57%	26%	11%	2%	4%	83%
May 1999	18%	34%	43%	0%	4%	52%
March 1996	39%	34%	12%	0%	4%	73%
[ ]c. The quality of local public education						
May 2020	28%	37%	19%	9%	7%	*65%*
April 2014	32%	31%	20%	9%	7%	63%
Feb. 2009	39%	26%	17%	10%	7%	65%
Sept. 2003	48%	29%	13%	5%	5%	77%
May 1999	40%	31%	14%	0%	15%	71%
March 1996	47%	29%	12%	0%	12%	76%
[ ]d. Pollution of the San Francisco Bay						
May 2020	40%	32%	13%	5%	10%	*72%*
April 2014	25%	32%	19%	6%	19%	57%
Feb. 2009	32%	36%	14%	6%	12%	68%
Sept. 2003	38%	39%	13%	3%	7%	77%
May 1999	50%	31%	10%	0%	9%	81%
March 1996	51%	32%	9%	0%	8%	83%
[ ]e. Pollution of water in local creeks						
May 2020	35%	31%	17%	7%	11%	*66%*
April 2014	27%	31%	20%	8%	14%	58%
Feb. 2009	27%	31%	21%	11%	10%	58%
Sept. 2003	31%	37%	19%	5%	7%	68%
May 1999	43%	32%	14%	0%	11%	75%
March 1996	40%	37%	14%	0%	8%	77%
[ ]f. The quality of drinking water						
May 2020	23%	26%	26%	19%	6%	*49%*
April 2014	18%	21%	31%	24%	6%	39%
Feb. 2009	19%	20%	27%	31%	3%	39%
Sept. 2003	27%	31%	29%	11%	2%	58%
Feb. 2002	28%	26%	29%	13%	4%	54%
May 1999	34%	31%	31%	0%	5%	65%
[ ]g. Hazardous waste disposal						
May 2020	27%	31%	19%	8%	15%	*57%*
April 2014	18%	24%	27%	13%	18%	42%
Feb. 2009	24%	23%	22%	15%	16%	47%
Sept. 2003	26%	33%	24%	8%	8%	59%
May 1999	43%	27%	16%	0%	14%	70%
March 1996	51%	28%	13%	0%	8%	79%

		VERY SER	SMWT SER	NOT TOO SER	NOT AT ALL SER	(DK/ NA)	*EXT/ VERY*
[ ]h.	Litter						
	May 2020	31%	37%	24%	6%	3%	*68%*
	April 2014	22%	33%	31%	11%	3%	*55%*
	Feb. 2009	23%	32%	31%	14%	0%	*55%*
[ ]i.	Homelessness	64%	26%	6%	2%	2%	*90%*
[ ]j.	The cost of housing	76%	17%	4%	1%	2%	*93%*
[ ]k.	The cost of healthcare	57%	26%	11%	2%	5%	*83%*
[ ]l.	Climate change	50%	26%	13%	9%	2%	*76%*

3. Next, do you recall ever seeing or hearing anything about "watersheds"?

	May 1999	Sept. 2003	Feb. 2009	April 2014	May 2020
Yes	27%	46%	37%	32%	42%
No	71%	53%	60%	61%	49%
(**DON'T READ**) DK/NA	3%	1%	4%	7%	8%

(ASK IF CODE 1 IN Q3, N=275)

4. Can you tell me in a few words what you heard or saw? **(OPEN END, RECORD VERBATIM RESPONSES)**

Where water is stored/collected/drained (from rainfall, snow) into water body	15%
It is polluted/dry/flooding/low	15%
It needs an upgrade/rebuild/protection/cleaning/maintenance	14%
Where water is stored/collected	9%
In the news/mail/articles/notes/newspaper	8%
A source of clean water supply	7%
Need more information/not enough/know it in general	7%
Helps filter ground water	1%
It is protected/well-constructed	1%
Area for wildlife	0%
Other	13%
Don't know/Not sure/Don't recall	10%
Refused/N/A	3%

(RESUME ASKING ALL RESPONDENTS)

5. In your own words, can you tell me what the term "watershed" means to you? **(DO NOT READ LIST)**

	May 1999	Feb. 2009	April 2014	May 2020
Area where water collects then drains to lower elevation	27%	27%	27%	22%
A structure or building for holding or keeping water	26%	14%	16%	19%
An overhang that shades water	1%	1%	1%	2%
Other **(SPECIFY)**	6%	4%	4%	28%
(DON'T READ) DK/NA	39%	48%	41%	29%

6. In general, would you say that the personal choices of families and individuals have a very large impact, only a minor impact, or no impact at all on the quality of water in the watershed?

	Feb. 2009	April 2014	May 2020
Very large impact	37%	33%	41%
Only minor impact	34%	33%	34%
No impact at all	10%	13%	6%
(DON'T READ) DK/NA	18%	21%	19%

7. Now I'm going to mention some people and groups of people that may be responsible for causing water pollution. For each one I mention, please tell me whether you personally believe that group is very responsible, somewhat responsible, or not at all responsible for causing water pollution. **(RANDOMIZE)**

	VERY RESP	SMWT RESP	NOT AT ALL RESP	(DK/ NA)	*TOTAL RESP*
[ ]a. Large industrial or manufacturing companies					
May 2020	74%	18%	4%	4%	*92%*
April 2014	60%	30%	5%	5%	*90%*
Feb. 2009	62%	30%	4%	4%	*92%*
May 1999	68%	25%	4%	2%	*93%*
[ ]b. Government agencies					
May 2020	43%	40%	9%	8%	*83%*
April 2014	32%	44%	13%	10%	76%
Feb. 2009	29%	47%	15%	9%	76%
May 1999	40%	40%	13%	7%	80%
[ ]c. Small and medium-sized businesses like restaurants and dry cleaners					
May 2020	27%	55%	11%	7%	*82%*
April 2014	20%	62%	13%	5%	82%
Feb. 2009	26%	58%	12%	4%	84%
May 1999	24%	54%	18%	4%	78%

	VERY RESP	SMWT RESP	NOT AT ALL RESP	(DK/ NA)	*TOTAL RESP*
[ ]d. Private residents					
May 2020	21%	58%	16%	6%	*79%*
April 2014	14%	61%	21%	3%	75%
Feb. 2009	18%	63%	17%	3%	81%
May 1999	19%	55%	25%	1%	74%
[ ]e. Farmers and ranchers					
May 2020	41%	40%	13%	6%	*82%*
April 2014	30%	45%	17%	8%	75%
Feb. 2009	28%	47%	20%	6%	75%
May 1999	30%	46%	20%	3%	76%

8. Next, for each of the following statements, please tell me if you believe it is definitely true, probably true, probably not true or definitely not true. **(RANDOMIZE)**

	DEF TRUE	PROB TRUE	PROB NOT	DEF NOT	(DK/ NA)	*TOTAL TRUE*	*TOTAL NT TRUE*
[ ]a. Storm drains and sewers are part of the same underground system.							
May 2020	18%	34%	14%	22%	12%	*53%*	*35%*
April 2014	16%	32%	18%	21%	13%	48%	*39%*
Feb. 2009	22%	27%	16%	24%	10%	49%	*40%*
Sept. 2003	13%	41%	19%	22%	5%	54%	*41%*
Feb. 2002	19%	30%	13%	17%	21%	49%	*40%*
May 1999	15%	36%	18%	21%	10%	51%	*39%*
[ ]b. The water and other substances that flow through the storm drain system are treated and filtered to remove wastes before they are discharged from the system.							
May 2020	14%	33%	24%	18%	10%	*47%*	*42%*
April 2014	11%	38%	24%	16%	11%	49%	*40%*
Feb. 2009	17%	34%	21%	22%	6%	51%	*43%*
Sept. 2003	13%	43%	24%	19%	2%	56%	*43%*
Feb. 2002	16%	36%	16%	16%	16%	52%	*32%*
May 1999	11%	30%	25%	24%	10%	41%	*49%*
[ ]c. Water that runs into the storm drains from yards, driveways, and streets, goes into local creeks, rivers, and the Bay without being treated.							
May 2020	36%	44%	11%	1%	8%	*80%*	*12%*
April 2014	37%	39%	13%	5%	7%	76%	*18%*
Feb. 2009	45%	36%	11%	3%	4%	81%	*14%*

9. From what you know, what are two types of pollutants that enter the bay and affect its water quality? **(DO NOT READ LIST; ACCEPT UP TO TWO RESPONSES)**

Garbage/trash	34%
Oil/grease from automobiles that leak or is spilled/disposed of in storm drains	28%
Chemicals	23%
Pesticides, herbicides and fertilizer from lawns, gardens, farms, etc.	20%
Industrial wastes	9%
Biological contaminants from litter, organic matter, and animal wastes	9%
Sewage	5%
Metals found in vehicle exhaust, weathered paint, metal plating, tires, etc.	3%
Mercury	3%
Hazardous waste/carcinogens	2%
Medical/hospital waste	2%
Oil from ships/boats	0%
Other mentions	3%
(**DON'T READ)** DK/NA	15%

10. Do you have a yard or garden?

Yes	71%
No	29%
(**DON'T READ)** DK/NA	0%

(ASK ONLY IF YES IN Q10)

11. Do you normally maintain your landscaping or garden yourself?

Yes	67%
No	33%
Don't have a yard or garden	0%
(**DON'T READ)** DK/NA	0%

(RESUME ASKING ALL RESPONDENTS)

IN THE SANTA CLARA VALLEY, THE STORM DRAIN SYSTEM IS SEPARATE FROM THE SEWER SYSTEM. THE STORM DRAIN SYSTEM EMPTIES INTO LOCAL CREEKS AND WETLANDS AND INTO THE SAN FRANCISCO BAY. THE MIXTURE OF WATER, TRASH AND EVERYTHING ELSE THAT ENDS UP IN STORM DRAINS IS NOT TREATED OR FILTERED BEFORE IT IS DISCHARGED. WHAT FLOWS THROUGH THE STORM DRAINS POLLUTES LOCAL CREEKS, WETLANDS, AND THE BAY.

12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. For each one I mention, please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. If it is something you already do, or it really doesn't apply to you, you can tell me that too. **(RANDOMIZE)**

	VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]a. If you changed your oil yourself, recycle used motor oil by placing it out for curbside collection.								
May 2020	44%	8%	2%	3%	11%	33%	*52%*	*4%*
April 2014	36%	5%	1%	2%	25%	33%	*41%*	*3%*
Feb. 2009	39%	4%	0%	1%	26%	29%	*43%*	*1%*
Sept. 2003	42%	4%	0%	0%	26%	27%	*46%*	*0%*
Feb. 2002	50%	7%	2%	1%	25%	15%	*57%*	*3%*
May 1999	40%	2%	1%	1%	39%	17%	*42%*	*2%*
March 1996	44%	2%	1%	0%	35%	17%	*46%*	*1%*
[ ]b. Get your car's oil changed at a service station rather than doing it yourself.								
May 2020	47%	10%	5%	4%	28%	5%	*57%*	*9%*
April 2014	25%	5%	1%	5%	55%	8%	*30%*	*6%*
Feb. 2009	29%	7%	4%	5%	49%	6%	*36%*	*9%*
Sept. 2003	32%	8%	3%	5%	47%	5%	*40%*	*8%*
Feb. 2002	40%	9%	7%	6%	33%	5%	*49%*	*13%*
[ ]c. Take leftover paints, insecticides and other Hazardous Wastes to a Household Hazardous Waste collection center.								
May 2020	53%	17%	5%	1%	20%	6%	*70%*	*5%*
April 2014	42%	10%	2%	1%	32%	13%	*52%*	*3%*
Feb. 2009	49%	13%	1%	2%	30%	6%	*62%*	*3%*
Sept. 2003	49%	12%	5%	2%	25%	8%	*61%*	*7%*
Feb. 2002	52%	14%	3%	3%	18%	10%	*66%*	*6%*
May 1999	50%	10%	3%	1%	25%	12%	*60%*	*4%*
March 1996	58%	7%	2%	1%	21%	12%	*65%*	*3%*

	VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]d. Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden								
May 2020	46%	25%	2%	1%	17%	10%	*71%*	*3%*
April 2014	34%	15%	2%	2%	21%	26%	*49%*	*4%*
Feb. 2009	41%	18%	2%	3%	22%	14%	*59%*	*5%*
Sept. 2003	43%	18%	3%	3%	20%	14%	*61%*	*6%*
Feb. 2002	45%	16%	6%	4%	14%	16%	*61%*	*10%*
May 1999	43%	16%	4%	1%	20%	16%	*59%*	*5%*
March 1996	51%	12%	2%	2%	18%	16%	*63%*	*4%*
[ ]e. Sweep down your driveway with a broom instead of hosing it down with water								
May 2020	44%	20%	3%	2%	20%	12%	*63%*	*5%*
April 2014	31%	9%	2%	2%	40%	16%	*40%*	*4%*
Feb. 2009	40%	10%	1%	2%	34%	12%	*50%*	*3%*
Sept. 2003	33%	18%	3%	3%	29%	14%	*51%*	*6%*
Feb. 2002	41%	16%	5%	3%	24%	12%	*57%*	*8%*
May 1999	39%	13%	3%	1%	30%	13%	*52%*	*4%*
March 1996	40%	9%	3%	3%	30%	14%	*49%*	*6%*
[ ]f. Take your car to a car wash instead of washing it yourself in the street or driveway								
May 2020	41%	20%	6%	4%	23%	6%	*61%*	*10%*
April 2014	26%	14%	8%	6%	39%	7%	*40%*	*14%*
Feb. 2009	28%	14%	4%	9%	39%	5%	*42%*	*13%*
Sept. 2003	24%	22%	9%	6%	34%	6%	*46%*	*15%*
Feb. 2002	32%	17%	8%	6%	29%	8%	*49%*	*14%*
May 1999	28%	12%	7%	6%	38%	9%	*40%*	*13%*
March 1996	29%	11%	8%	7%	36%	10%	*40%*	*14%*
[ ]g. If you washed your car yourself, wash your car on an unpaved surface, instead of in the street or driveway								
May 2020	35%	15%	10%	7%	7%	26%	*51%*	*17%*
April 2014	25%	14%	4%	7%	12%	38%	*39%*	*11%*
Feb. 2009	28%	13%	4%	8%	9%	39%	*41%*	*12%*
Sept. 2003	28%	19%	8%	8%	8%	30%	*57%*	*16%*
Feb. 2002	29%	14%	10%	9%	9%	28%	*43%*	*19%*
May 1999	28%	13%	8%	6%	12%	33%	*41%*	*14%*
March 1996	30%	10%	6%	9%	15%	30%	*40%*	*15%*
[ ]h. Take used fluorescent lamps and light bulbs to a household hazardous waste facility or event								
May 2020	44%	20%	6%	3%	19%	7%	*65%*	*9%*
April 2014	36%	16%	3%	4%	31%	10%	*52%*	*7%*
Feb. 2009	47%	16%	3%	3%	27%	4%	*63%*	*6%*
Sept. 2003	49%	18%	7%	3%	9%	14%	*67%*	*10%*

	VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]i. Report someone you see dumping harmful substances into the storm drain								
May 2020	58%	26%	5%	4%	3%	4%	*84%*	*9%*
April 2014	57%	24%	6%	5%	3%	5%	*81%*	*11%*
Feb. 2009	68%	17%	3%	5%	3%	4%	*85%*	*8%*
May 1999	62%	20%	6%	2%	4%	5%	*82%*	*8%*
[ ]j. Participate in creek clean-ups								
May 2020	26%	37%	15%	10%	6%	6%	*64%*	*25%*
April 2014	25%	32%	10%	18%	7%	8%	*57%*	*28%*
Feb. 2009	35%	30%	11%	14%	5%	4%	*65%*	*25%*
May 1999	31%	39%	11%	8%	7%	3%	*70%*	*19%*
[ ]k. When it is allowed, use re-usable shopping bags instead of paper bags provided by stores								
May 2020	49%	12%	2%	3%	31%	3%	*61%*	*5%*
April 2014	27%	6%	1%	3%	61%	1%	*33%*	*4%*
Feb. 2009	34%	18%	5%	5%	36%	2%	*52%*	*10%*
[ ]l. Throw litter in a garbage can and not in the street								
May 2020	59%	3%	0%	1%	33%	3%	*62%*	*1%*
April 2014	39%	1%	1%	1%	57%	1%	*40%*	*2%*
Sept. 2003	45%	2%	0%	1%	50%	3%	*47%*	*1%*
[ ]m. Hire exterminators and pest control professionals that use less-toxic pest control methods								
May 2020	51%	18%	4%	4%	10%	14%	*69%*	*8%*
April 2014	37%	13%	3%	3%	17%	27%	*50%*	*6%*
(ASK ONLY IF CODE 1 IN Q10)								
[ ]n. Hire landscape and yard maintenance contractors that use less-toxic weed and pest control methods								
May 2020	42%	16%	5%	8%	13%	16%	*58%*	*12%*
April 2014	31%	13%	5%	7%	19%	25%	*44%*	*13%*
[ ]o. Use watershed-friendly, sustainable techniques in your yard or garden to reduce runoff, such as building a rain garden or removing paved surfaces								
May 2020	43%	30%	6%	4%	10%	7%	*74%*	*9%*
April 2014	35%	22%	5%	7%	14%	17%	*57%*	*12%*

(RESUME ASKING ALL RESPONDENTS)

13. I'm going to read you a list of items. Please tell me if you have a favorable or unfavorable opinion of each one. If you have never heard of one, please say so. **(IF RESPONDENT SAYS "DON'T KNOW," "NO OPINION," PROBE FOR CAN'T RATE OR NEVER HEARD: "WOULD YOU SAY THAT YOU HAVE HEARD OF [ITEM] BUT CANNOT RATE IT, OR HAVE YOU NEVER HEARD OF IT?") (RANDOMIZE)**

	FAV	UNFAV	NHO	CAN'T RATE
[ ]a. The Watershed Watch Hotline				
May 2020	14%	2%	74%	10%
April 2014	9%	3%	85%	3%
Feb. 2009	48%	2%	87%	5%
[ ]b. The Household Hazardous Waste Program				
May 2020	52%	4%	36%	8%
April 2014	50%	3%	41%	6%
Feb. 2009	48%	2%	44%	6%
[ ]c. The website MyWatershedWatch.org				
May 2020	15%	1%	73%	11%
April 2014	10%	3%	83%	4%
Feb. 2009	7%	2%	84%	6%

NOW I'D LIKE TO ASK YOU A FEW QUESTIONS FOR STATISTICAL PURPOSES ONLY.

14. What is your preferred method for receiving environmental messaging and other related information? **(DO NOT READ LIST; ACCEPT ONE RESPONSE)**

	Feb. 2009	April 2014	May 2020
Email	22%	23%	30%
Television	17%	15%	17%
Social media like Facebook and Twitter	N/A	N/A	13%
Mail/flyers/door hangers	34%	29%	12%
The newspaper, either in print or online	8%	7%	10%
Neighborhood websites like Patch and Nextdoor	N/A	N/A	5%
Text message	0%	1%	5%
Blogs	N/A	0%	1%
Phone call	2%	3%	0%
Other	1%	3%	2%
Don't want environmental messages	2%	4%	2%
(**DON'T READ**) DK/NA	3%	5%	3%

15. On a scale of one to five, how much do you rely on each of the following sources to receive your local news and information, where one means you do not rely on the source at all, and a five means you rely on the source very heavily? **(RANDOMIZE)**

	MEAN SCORE	DO NOT RELY AT ALL 1	2	3	4	5	(DK/ NA)
[ ]a. The *San Jose Mercury News*							
May 2020	***2.5***	37%	14%	16%	12%	14%	5%
June 2014	***2.7***	35%	11%	15%	13%	21%	5%
[ ]b. Social media like Facebook and Twitter							
May 2020	***2.8***	35%	8%	16%	14%	24%	3%
June 2014	***2.4***	43%	12%	14%	11%	15%	6%
[ ]c. Ethnic or non-English news and media							
May 2020	***1.6***	69%	8%	9%	4%	5%	6%
June 2014	***1.8***	66%	7%	9%	5%	8%	5%
[ ]d. Radio news							
May 2020	***2.6***	38%	9%	20%	16%	15%	2%
June 2014	***3.1***	21%	13%	22%	18%	23%	3%
[ ]e. Television news							
May 2020	***3.1***	24%	12%	17%	21%	25%	2%
June 2014	***3.5***	15%	7%	24%	21%	31%	2%
[ ]f. Neighborhood websites like Patch and Nextdoor	***2.4***	42%	12%	18%	14%	10%	5%
[ ]g. Mailings or emails from elected officials and public agencies							
May 2020	***2.6***	30%	17%	23%	13%	14%	3%
June 2014	2.5	34%	15%	24%	12%	11%	4%
[ ]h. Neighborhood associations or community groups							
May 2020	***2.2***	41%	15%	23%	11%	6%	4%
June 2014	***2.5***	37%	14%	21%	10%	13%	5%

16. In terms of your current job status, are you employed, unemployed but looking for work, retired, a student or a homemaker?

Employed	60%
Unemployed	12%
Retired	14%
Student	8%
Homemaker	4%
Other	2%
(DON'T READ) DK/Refused	1%

17. Do you own or rent your apartment or home?

Own ---------- 53%
Rent ---------- 37%
Live with parents or
someone who owns ----------9%
Live with parents or
someone who rents----------1%
(DON'T KNOW/NA) ----------1%

THANK AND TERMINATE

LANGUAGE: BY OBSERVATION

English---------- 95%
Spanish ----------5%

MODE OF INTERVIEW:

Phone ---------- 47%
Online---------- 53%

CITY

Campbell----------4%
Cupertino ----------4%
Los Altos ----------2%
Los Altos Hills----------0%
Los Gatos----------3%
Milpitas ----------4%
Monte Sereno ----------0%
Palo Alto----------3%
San José---------- 51%
Santa Clara ----------7%
Saratoga----------1%
Sunnyvale----------9%
Other ---------- 11%

MAY 3-10, 15-21, 2020

SCVURPPP 2020 SURVEY
320-888-WT
AGES 18+ ONLY
N=571
MARGIN OF SAMPLING ERROR ±3.8% (95% CONFIDENCE INTERVAL)

Hello, I'm _____ from public opinion research firm _____, surveying about issues in Santa Clara Valley. We are not trying to sell anything or ask for a donation of any type. May I speak to the youngest person in the household aged 15 or older? (**VERIFY THAT THE PERSON IS ASSOCIATED WITH THE ADDRESS LISTED--OTHERWISE TERMINATE. IF RESPONDENT WISHES TO COMPLETE THE INTERVIEW IN SPANISH, PLEASE HAND OFF TO BILINGUAL INTERVIEWER. IF NOT AVAILABLE, ASK WHEN IT WOULD BE CONVENIENT TO CALL AGAIN.)**

A. Before we begin, I need to know if I have reached you on a cell phone, and if so, are you in a place where you can talk safely without endangering yourself or others?

Yes, cell and can talk safely ---------- 89%
Yes, cell and cannot talk safely ---------- **TERMINATE**
No, not on cell ---------- 11%
(DON'T READ) DK/NA/REFUSED---------- **TERMINATE**

(ASK QX1 AND QX2 UNTIL AGES 15-17 QUOTA REACHED)
X1. Are you the parent and/or legal guardian of a child age 15 to 17?

Yes ----------8%
No ---------- 92%

(ASK IF CODE 1 IN QX1)
X2. Do you consent to the child participating in this survey? The topic is water use and pollution.

Yes ----------0%
No ----------100%

IF CODE 1 IN QX2, CONTINUE INTERVIEW WITH MINOR.

(RESUME ASKING ALL RESPONDENTS)

B. To make sure we are talking to a representative population of people, can you tell me what year you were born? **(RECORD YEAR AND CATEGORIZE BELOW)**

2005-2003 (15-17)----------0%
2002-1996 (18-24)----------9%
1995-1991 (25-29)----------9%
1990-1986 (30-34)---------- 11%
1985-1981 (35-39)----------9%
1980-1976 (40-44)---------- 11%
1975-1971 (45-49)---------- 12%
1970-1966 (50-54)----------8%
1965-1961 (55-59)----------7%
1960-1956 (60-64)----------8%
1955-1946 (65-74)----------7%
1945 or earlier (75 & over)----------6%
(DON'T READ) Refused----------2%

(ASK IF CODE 1 IN QB)

C. Are you currently enrolled in high school?

Yes ----------0%
No ----------0%
(DON'T READ) DK/NA ----------0%

QUOTA: 75 RESPONDENTS FROM QC CODE 1.

(RESUME ASKING ALL RESPONDENTS)

D. What was the last level of school you completed?

High school graduate or less---------- 12%
Some college ---------- 20%
Business/Vocational School----------5%
College graduate ---------- 36%
Post-graduate work/Professional
school ---------- 27%
(DON'T READ) DK/Refused ----------0%

E. With which racial or ethnic group do you identify yourself: Latino or Hispanic, African American or Black, White or Caucasian, Asian or Pacific Islander, or some other ethnic or racial background? **(IF ASIAN OR PACIFIC ISLANDER, ASK**: "Are you Vietnamese, Chinese, South Asian or East Indian, or of some other Asian background?")

Latino/Hispanic ---------- 17%
African American/Black----------1%
White/Caucasian ---------- 47%
Vietnamese----------4%
Chinese ----------6%
South Asian/East Indian ----------7%
Other Non-Asian/Pacific Islander --------1%
Other Asian/Pacific Islander----------9%
(DON'T READ) Mixed race----------2%
(DON'T READ) DK/NA/Refused -------4%

F. What is your gender?

Male---------- 49%
Female ---------- 50%
Non-binary----------1%
Rather not say ----------1%

1. **(T)** First, do you feel that things in Santa Clara County are generally going in the right direction or do you feel things have gotten pretty seriously off on the wrong track?

Right direction ---------- 56%
Wrong track ---------- 25%
(DON'T READ) DK/NA ---------- 19%

2. Next, please tell me if you feel each of the following is a very serious problem facing the Santa Clara Valley region, is a very serious problem, a somewhat serious problem, a not too serious problem, or not a serious problem at all in this region. **(RANDOMIZE)**

		VERY SER	SMWT SER	NOT TOO SER	NOT AT ALL SER	(DK/ NA)	*EXT/ VERY*
[ ]a.	**(T)** Traffic congestion	59%	26%	9%	4%	1%	*86%*
[ ]b.	**(T)** Unemployment, loss of jobs	56%	25%	10%	5%	3%	*81%*
[ ]c.	**(T)** The quality of local public education	28%	37%	19%	9%	7%	*65%*
[ ]d.	**(T)** Pollution of the San Francisco Bay	40%	32%	13%	5%	10%	*72%*
[ ]e.	**(T)** Pollution of water in local creeks	35%	31%	17%	7%	10%	*66%*
[ ]f.	**(T)** The quality of drinking water	23%	26%	26%	19%	6%	*49%*
[ ]g.	**(T)** Hazardous waste disposal	27%	31%	19%	8%	15%	*58%*
[ ]h.	**(T)** Litter	31%	37%	25%	6%	2%	*68%*
[ ]i.	Homelessness	64%	26%	6%	2%	2%	*90%*
[ ]j.	The cost of housing	77%	16%	4%	1%	1%	*94%*
[ ]k.	The cost of healthcare	58%	26%	10%	2%	4%	*84%*
[ ]l.	Climate change	51%	26%	13%	9%	1%	*77%*

3. **(T)** Next, do you recall ever seeing or hearing anything about "watersheds"?

Yes	43%
No	49%
(**DON'T READ**) DK/NA	7%

(ASK IF CODE 1 IN Q3, N=269)

4. **(T)** Can you tell me in a few words what you heard or saw? **(OPEN END, RECORD VERBATIM RESPONSES)**

Where water is stored/collected/drained (from rainfall, snow) into water body	15%
A source of clean water supply	7%
Need more information/not enough/know it in general	7%
In the news/mail/articles/notes/newspaper	9%
It needs an upgrade/rebuild/protection/cleaning/maintenance	15%
Helps filter ground water	1%
It is polluted/dry/flooding/low	15%
It is protected/well-constructed	1%
Area for wildlife	0%
Where water is stored/collected	9%
Other	13%
Don't know/Not sure/Don't recall	10%
Refused/N/A	3%

(RESUME ASKING ALL RESPONDENTS)

5. **(T)** In your own words, can you tell me what the term "watershed" means to you? **(DO NOT READ LIST)**

Area where water collects then drains to lower elevation	32%
A structure or building for holding or keeping water	19%
An overhang that shades water	3%
A network or structure essential to clean drinking water	7%
An underground water source	1%
Water pollution	2%
Other **(SPECIFY)**	7%
(**DON'T READ**) DK/NA	29%

6. **(T)** In general, would you say that the personal choices of families and individuals have a very large impact, only a minor impact, or no impact at all on the quality of water in the watershed?

Very large impact	42%
Only minor impact	34%
No impact at all	6%
(**DON'T READ**) DK/NA	18%

7. Now I'm going to mention some people and groups of people that may be responsible for causing water pollution. For each one I mention, please tell me whether you personally believe that group is very responsible, somewhat responsible, or not at all responsible for causing water pollution. **(RANDOMIZE)**

		VERY RESP	SMWT RESP	NOT AT ALL RESP	(DK/ NA)	*TOTAL RESP*
[ ]a.	**(T)** Large industrial or manufacturing companies	75%	17%	4%	4%	*92%*
[ ]b.	**(T)** Government agencies	44%	40%	9%	8%	*83%*
[ ]c.	**(T)** Small and medium-sized businesses like restaurants and dry cleaners	27%	56%	11%	6%	*83%*
[ ]d.	**(T)** Private residents	21%	58%	16%	5%	*79%*
[ ]e.	**(T)** Farmers and ranchers	42%	41%	12%	5%	*83%*

8. Next, for each of the following statements, please tell me if you believe it is definitely true, probably true, probably not true or definitely not true. **(RANDOMIZE)**

		DEF TRUE	PROB TRUE	PROB NOT	DEF NOT	(DK/ NA)	*TOTAL TRUE*	*TOTAL NT TRUE*
[ ]a.	**(T)** Storm drains and sewers are part of the same underground system.	19%	34%	14%	22%	11%	*52%*	*36%*
[ ]b.	**(T)** The water and other substances that flow through the storm drain system are treated and filtered to remove wastes before they are discharged from the system.	14%	33%	25%	19%	9%	*47%*	*44%*
[ ]c.	**(T)** Water that runs into the storm drains from yards, driveways, and streets, goes into local creeks, rivers, and the Bay without being treated.	36%	45%	11%	1%	7%	*81%*	*12%*

9. From what you know, what are two types of pollutants that enter the bay and affect its water quality? **(DO NOT READ LIST; ACCEPT UP TO TWO RESPONSES)**

Industrial wastes	9%
Biological contaminants from litter, organic matter, and animal wastes	9%
Oil/grease from automobiles that leak or is spilled/disposed of in storm drains	28%
Chemicals	23%
Metals found in vehicle exhaust, weathered paint, metal plating, tires, etc.	3%
Pesticides, herbicides and fertilizer from lawns, gardens, farms, etc.	21%
Garbage/trash	34%
Sewage	5%
Hazardous waste/carcinogens	2%
Medical/hospital waste	2%
Oil from ships/boats	0%
Mercury	3%
Other mentions	3%
(**DON'T READ)** DK/NA	14%

10. Do you have a yard or garden?

Yes	71%
No	29%
(**DON'T READ)** DK/NA	0%

(ASK ONLY IF YES IN Q10)

11. Do you normally maintain your landscaping or garden yourself?

Yes	69%
No	31%
Don't have a yard or garden	0%
(**DON'T READ)** DK/NA	0%

(RESUME ASKING ALL RESPONDENTS)

IN THE SANTA CLARA VALLEY, THE STORM DRAIN SYSTEM IS SEPARATE FROM THE SEWER SYSTEM. THE STORM DRAIN SYSTEM EMPTIES INTO LOCAL CREEKS AND WETLANDS AND INTO THE SAN FRANCISCO BAY. THE MIXTURE OF WATER, TRASH AND EVERYTHING ELSE THAT ENDS UP IN STORM DRAINS IS NOT TREATED OR FILTERED BEFORE IT IS DISCHARGED. WHAT FLOWS THROUGH THE STORM DRAINS POLLUTES LOCAL CREEKS, WETLANDS, AND THE BAY.

12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. For each one I mention, please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. If it is something you already do, or it really doesn't apply to you, you can tell me that too. **(RANDOMIZE)**

		VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]a.	**(T*)** If you changed your oil yourself, recycle used motor oil by placing it out for curbside collection	44%	7%	2%	2%	11%	33%	*51%*	*4%*
[ ]b.	**(T)** Get your car's oil changed at a service station rather than doing it yourself	48%	9%	5%	4%	29%	5%	*57%*	*9%*
[ ]c.	**(T)** Take leftover paints, insecticides and other Hazardous Wastes to a Household Hazardous Waste collection center	53%	16%	4%	0%	20%	5%	*70%*	*5%*
[ ]d.	**(T)** Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden	46%	24%	2%	1%	17%	10%	*70%*	*3%*
[ ]e.	**(T)** Sweep down your driveway with a broom instead of hosing it down with water	44%	19%	3%	1%	20%	12%	*63%*	*5%*

	VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]f. **(T)** Take your car to a car wash instead of washing it yourself in the street or driveway	41%	19%	6%	4%	24%	6%	*61%*	*10%*
[ ]g. **(T*)** If you washed your car yourself, wash your car on an unpaved surface, instead of in the street or driveway	35%	14%	10%	7%	7%	26%	*50%*	*17%*
[ ]h. **(T)** Take used fluorescent lamps and light bulbs to a household hazardous waste facility or event	45%	20%	6%	2%	20%	7%	*65%*	*8%*
[ ]i. **(T)** Report someone you see dumping harmful substances into the storm drain	59%	26%	4%	4%	3%	3%	*85%*	*9%*
[ ]j. **(T)** Participate in creek clean-ups	26%	37%	15%	10%	6%	5%	*63%*	*25%*
[ ]k. **(T*)** When it is allowed, use re-usable shopping bags instead of paper bags provided by stores	49%	11%	2%	3%	31%	3%	*61%*	*5%*
[ ]l. **(T)** Throw litter in a garbage can and not in the street	60%	3%	0%	1%	34%	3%	*62%*	*1%*
[ ]m. **(T)** Hire exterminators and pest control professionals that use less-toxic pest control methods	53%	17%	4%	4%	10%	14%	*69%*	*7%*
(ASK ONLY IF CODE 1 IN Q10)								
[ ]n. **(T)** Hire landscape and yard maintenance contractors that use less-toxic weed and pest control methods	43%	16%	4%	8%	13%	16%	*58%*	*12%*
[ ]o. **(T)** Use watershed-friendly, sustainable techniques in your yard or garden to reduce runoff, such as building a rain garden or removing paved surfaces	44%	30%	6%	4%	10%	7%	*74%*	*9%*

(RESUME ASKING ALL RESPONDENTS)

13. I'm going to read you a list of items. Please tell me if you have a favorable or unfavorable opinion of each one. If you have never heard of one, please say so. **(IF RESPONDENT SAYS "DON'T KNOW," "NO OPINION," PROBE FOR CAN'T RATE OR NEVER HEARD: "WOULD YOU SAY THAT YOU HAVE HEARD OF [ITEM] BUT CANNOT RATE IT, OR HAVE YOU NEVER HEARD OF IT?") (RANDOMIZE)**

		FAV	UNFAV	NHO	CAN'T RATE
[ ]a.	**(T)** The Watershed Watch Hotline	14%	2%	74%	10%
[ ]b.	**(T)** The Household Hazardous Waste Program	53%	4%	35%	8%
[ ]c.	**(T)** The website my watershed watch dot org	15%	1%	73%	11%

NOW I'D LIKE TO ASK YOU A FEW QUESTIONS FOR STATISTICAL PURPOSES ONLY.

14. **(T*)** What is your preferred method for receiving environmental messaging and other related information? **(DO NOT READ LIST; ACCEPT ONE RESPONSE)**

Television	17%
The newspaper, either in print or online	11%
Neighborhood websites like Patch and Nextdoor	5%
Blogs	1%
Email	31%
Phone call	0%
Text message	5%
Mail/flyers/door hangers	12%
Social media like Facebook and Twitter	13%
Other	2%
Don't want environmental messages	2%
(**DON'T READ**) DK/NA	2%

15. On a scale of one to five, how much do you rely on each of the following sources to receive your local news and information, where one means you do not rely on the source at all, and a five means you rely on the source very heavily? **(RANDOMIZE)**

		MEAN SCORE	DO NOT RELY AT ALL 1	2	3	4	5	(DK/ NA)
[ ]a.	**(T)** The *San Jose Mercury News*	***2.5***	37%	14%	16%	12%	15%	5%
[ ]b.	**(T)** Social media like Facebook and Twitter	***2.8***	36%	8%	16%	14%	23%	2%
[ ]c.	**(T)** Ethnic or non-English news and media	***1.6***	70%	8%	8%	4%	5%	5%
[ ]d.	**(T)** Radio news	***2.6***	38%	9%	20%	16%	15%	2%
[ ]e.	**(T)** Television news	***3.1***	24%	12%	17%	21%	25%	2%
[ ]f.	**(T)** Neighborhood websites like Patch and Nextdoor	***2.4***	42%	12%	18%	15%	10%	4%
[ ]g.	**(T)** Mailings or emails from elected officials and public agencies	***2.6***	30%	18%	23%	13%	14%	3%
[ ]h.	**(T)** Neighborhood associations or community groups	***2.2***	41%	15%	23%	11%	7%	4%

16. In terms of your current job status, are you employed, unemployed but looking for work, retired, a student or a homemaker?

Employed	63%
Unemployed	12%
Retired	14%
Student	4%
Homemaker	4%
Other	2%
(DON'T READ) DK/Refused	0%

17. Do you own or rent your apartment or home?

Own	55%
Rent	38%
Live with parents or someone who owns	6%
Live with parents or someone who rents	1%
(DON'T KNOW/NA)	1%

THANK AND TERMINATE

LANGUAGE: BY OBSERVATION

English---------- 95%
Spanish ----------5%

MODE OF INTERVIEW:

Phone ---------- 49%
Online---------- 51%

CITY

Campbell----------4%
Cupertino ----------4%
Los Altos ----------2%
Los Altos Hills----------0%
Los Gatos----------3%
Milpitas ----------4%
Monte Sereno ----------0%
Palo Alto ----------3%
San José ---------- 51%
Santa Clara ----------7%
Saratoga ----------1%
Sunnyvale ----------9%
Other---------- 11%

MAY 3-10, 15-21, 2020

SCVURPPP 2020 SURVEY
320-888-WT
N=80
AGES 15-17
MARGIN OF SAMPLING ERROR ±17.0% (95% CONFIDENCE INTERVAL)

Hello, I'm _____ from public opinion research firm _____, surveying about issues in Santa Clara Valley. We are not trying to sell anything or ask for a donation of any type. May I speak to the youngest person in the household aged 15 or older? (**VERIFY THAT THE PERSON IS ASSOCIATED WITH THE ADDRESS LISTED--OTHERWISE TERMINATE. IF RESPONDENT WISHES TO COMPLETE THE INTERVIEW IN SPANISH, PLEASE HAND OFF TO BILINGUAL INTERVIEWER. IF NOT AVAILABLE, ASK WHEN IT WOULD BE CONVENIENT TO CALL AGAIN.)**

A. Before we begin, I need to know if I have reached you on a cell phone, and if so, are you in a place where you can talk safely without endangering yourself or others?

Yes, cell and can talk safely ---------- 85%
Yes, cell and cannot talk safely ---------- **TERMINATE**
No, not on cell ---------- 15%
(DON'T READ) DK/NA/REFUSED---------- **TERMINATE**

(ASK QX1 AND QX2 UNTIL AGES 15-17 QUOTA REACHED)
X1. Are you the parent and/or legal guardian of a child age 15 to 17?

Yes ----------100%
No ----------0%

(ASK IF CODE 1 IN QX1)
X2. Do you consent to the child participating in this survey? The topic is water use and pollution.

Yes ----------100%
No ----------0%

IF CODE 1 IN QX2, CONTINUE INTERVIEW WITH MINOR.

(RESUME ASKING ALL RESPONDENTS)

B. To make sure we are talking to a representative population of people, can you tell me what year you were born? **(RECORD YEAR AND CATEGORIZE BELOW)**

2005-2003 (15-17)----------100%
2002-1996 (18-24)----------0%
1995-1991 (25-29)----------0%
1990-1986 (30-34)----------0%
1985-1981 (35-39)----------0%
1980-1976 (40-44)----------0%
1975-1971 (45-49)----------0%
1970-1966 (50-54)----------0%
1965-1961 (55-59)----------0%
1960-1956 (60-64)----------0%
1955-1946 (65-74)----------0%
1945 or earlier (75 & over)----------0%
(DON'T READ) Refused----------0%

(ASK IF CODE 1 IN QB)

C. Are you currently enrolled in high school?

Yes ---------- 95%
No ----------3%
(DON'T READ) DK/NA ----------2%

QUOTA: 75 RESPONDENTS FROM QC CODE 1.

(RESUME ASKING ALL RESPONDENTS)

D. What was the last level of school you completed?

High school graduate or less---------- 83%
Some college ----------1%
Business/Vocational School----------0%
College graduate ----------1%
Post-graduate work/Professional school ----------0%
(DON'T READ) DK/Refused ---------- 15%

E. With which racial or ethnic group do you identify yourself: Latino or Hispanic, African American or Black, White or Caucasian, Asian or Pacific Islander, or some other ethnic or racial background? **(IF ASIAN OR PACIFIC ISLANDER, ASK**: "Are you Vietnamese, Chinese, South Asian or East Indian, or of some other Asian background?")

Latino/Hispanic ---------- 26%
African American/Black----------5%
White/Caucasian ---------- 19%
Vietnamese---------- 13%
Chinese ---------- 10%
South Asian/East Indian ----------6%
Other Non-Asian/Pacific Islander --------5%
Other Asian/Pacific Islander----------5%
(DON'T READ) Mixed race----------6%
(DON'T READ) DK/NA/Refused -------5%

F. What is your gender?

Male---------- 38%
Female ---------- 59%
Non-binary----------1%
Rather not say ----------3%

1. **(T)** First, do you feel that things in Santa Clara County are generally going in the right direction or do you feel things have gotten pretty seriously off on the wrong track?

Right direction ---------- 49%
Wrong track ---------- 14%
(DON'T READ) DK/NA ---------- 37%

2. Next, please tell me if you feel each of the following is a very serious problem facing the Santa Clara Valley region, is a very serious problem, a somewhat serious problem, a not too serious problem, or not a serious problem at all in this region. **(RANDOMIZE)**

		VERY SER	SMWT SER	NOT TOO SER	NOT AT ALL SER	(DK/ NA)	*EXT/ VERY*
[ ]a.	**(T)** Traffic congestion	31%	37%	19%	6%	8%	*68%*
[ ]b.	**(T)** Unemployment, loss of jobs	44%	26%	10%	4%	15%	*70%*
[ ]c.	**(T)** The quality of local public education	29%	33%	18%	8%	12%	*62%*
[ ]d.	**(T)** Pollution of the San Francisco Bay	43%	30%	9%	3%	15%	*73%*
[ ]e.	**(T)** Pollution of water in local creeks	41%	24%	11%	7%	18%	*65%*
[ ]f.	**(T)** The quality of drinking water	19%	19%	25%	22%	15%	*39%*
[ ]g.	**(T)** Hazardous waste disposal	26%	27%	19%	8%	20%	*53%*
[ ]h.	**(T)** Litter	35%	36%	10%	6%	12%	*72%*
[ ]i.	Homelessness	49%	27%	12%	4%	7%	*76%*
[ ]j.	The cost of housing	57%	19%	10%	2%	12%	*76%*
[ ]k.	The cost of healthcare	37%	28%	18%	0%	16%	*66%*
[ ]l.	Climate change	44%	17%	13%	9%	18%	*61%*

3. **(T)** Next, do you recall ever seeing or hearing anything about "watersheds"?

Yes ---------- 21%
No ---------- 54%
(**DON'T READ**) DK/NA ---------- 25%

(ASK IF CODE 1 IN Q3, N=7)

4. **(T)** Can you tell me in a few words what you heard or saw? **(OPEN END, RECORD VERBATIM RESPONSES)**

A source of clean water supply ---------- 16%
It is polluted/dry/flooding/low ---------- 14%
Where water is stored/collected/drained (from rainfall, snow) into water body ------ 14%
Where water is stored/collected ---------- 13%
Need more information/not enough/know it in general ----------8%
It needs an upgrade/rebuild/protection/cleaning/maintenance----------4%
In the news/mail/articles/notes/newspaper----------0%
Helps filter ground water ----------0%
It is protected/well-constructed ----------0%
Area for wildlife----------0%

Other ---------- 16%
Don't know/Not sure/Don't recall ---------- 10%
Refused/N/A ----------7%

(RESUME ASKING ALL RESPONDENTS)

5. **(T)** In your own words, can you tell me what the term "watershed" means to you? **(DO NOT READ LIST)**

Area where water collects then drains to lower elevation ----- 21%
A structure or building for holding or keeping water ---------- 24%
An overhang that shades water ----------6%

Other **(SPECIFY)** ---------- 17%
(**DON'T READ**) DK/NA ---------- 31%

6. **(T)** In general, would you say that the personal choices of families and individuals have a very large impact, only a minor impact, or no impact at all on the quality of water in the watershed?

Very large impact ---------- 27%
Only minor impact ---------- 35%
No impact at all ----------7%
(**DON'T READ**) DK/NA ---------- 31%

7. Now I'm going to mention some people and groups of people that may be responsible for causing water pollution. For each one I mention, please tell me whether you personally believe that group is very responsible, somewhat responsible, or not at all responsible for causing water pollution. **(RANDOMIZE)**

		VERY RESP	SMWT RESP	NOT AT ALL RESP	(DK/ NA)	*TOTAL RESP*
[ ]a.	**(T)** Large industrial or manufacturing companies	59%	25%	3%	13%	*84%*
[ ]b.	**(T)** Government agencies	28%	44%	11%	17%	*72%*
[ ]c.	**(T)** Small and medium-sized businesses like restaurants and dry cleaners	18%	55%	10%	18%	*73%*
[ ]d.	**(T)** Private residents	17%	55%	8%	20%	*72%*
[ ]e.	**(T)** Farmers and ranchers	30%	33%	22%	15%	*63%*

8. Next, for each of the following statements, please tell me if you believe it is definitely true, probably true, probably not true or definitely not true. **(RANDOMIZE)**

		DEF TRUE	PROB TRUE	PROB NOT	DEF NOT	(DK/ NA)	*TOTAL TRUE*	*TOTAL NT TRUE*
[ ]a.	**(T)** Storm drains and sewers are part of the same underground system.	11%	48%	13%	5%	24%	*59%*	*17%*
[ ]b.	**(T)** The water and other substances that flow through the storm drain system are treated and filtered to remove wastes before they are discharged from the system.	15%	37%	11%	8%	29%	*52%*	*18%*
[ ]c.	**(T)** Water that runs into the storm drains from yards, driveways, and streets, goes into local creeks, rivers, and the Bay without being treated.	23%	28%	21%	2%	26%	*52%*	*23%*

9. From what you know, what are two types of pollutants that enter the bay and affect its water quality? **(DO NOT READ LIST; ACCEPT UP TO TWO RESPONSES)**

Garbage/trash	35%
Oil/grease from automobiles that leak or is spilled/disposed of in storm drains	25%
Chemicals	19%
Pesticides, herbicides and fertilizer from lawns, gardens, farms, etc.	9%
Biological contaminants from litter, organic matter, and animal wastes	7%
Industrial wastes	5%
Hazardous waste/carcinogens	5%
Sewage	4%
Metals found in vehicle exhaust, weathered paint, metal plating, tires, etc.	1%
Medical/hospital waste	0%
Oil from ships/boats	0%
Mercury	0%
Other mentions	5%
(**DON'T READ)** DK/NA	31%

10. Do you have a yard or garden?

Yes	71%
No	25%
(**DON'T READ)** DK/NA	4%

(ASK ONLY IF YES IN Q10)

11. Do you normally maintain your landscaping or garden yourself?

Yes	40%
No	56%
Don't have a yard or garden	0%
(**DON'T READ)** DK/NA	4%

(RESUME ASKING ALL RESPONDENTS)

IN THE SANTA CLARA VALLEY, THE STORM DRAIN SYSTEM IS SEPARATE FROM THE SEWER SYSTEM. THE STORM DRAIN SYSTEM EMPTIES INTO LOCAL CREEKS AND WETLANDS AND INTO THE SAN FRANCISCO BAY. THE MIXTURE OF WATER, TRASH AND EVERYTHING ELSE THAT ENDS UP IN STORM DRAINS IS NOT TREATED OR FILTERED BEFORE IT IS DISCHARGED. WHAT FLOWS THROUGH THE STORM DRAINS POLLUTES LOCAL CREEKS, WETLANDS, AND THE BAY.

12. Here are some actions people can take to keep pollution out of storm drains so it won't harm local creeks, wetlands, and the San Francisco Bay. For each one I mention, please tell me how willing you would be to take that action, using a scale of very willing, somewhat willing, not too willing, or not at all willing. If it is something you already do, or it really doesn't apply to you, you can tell me that too. **(RANDOMIZE)**

		VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]a.	**(T*)** If you changed your oil yourself, recycle used motor oil by placing it out for curbside collection	39%	27%	7%	7%	0%	21%	*66%*	*14%*
[ ]b.	**(T)** Get your car's oil changed at a service station rather than doing it yourself	32%	32%	5%	4%	12%	15%	*64%*	*9%*
[ ]c.	**(T)** Take leftover paints, insecticides and other Hazardous Wastes to a Household Hazardous Waste collection center	41%	29%	11%	2%	7%	10%	*70%*	*13%*
[ ]d.	**(T)** Use less-toxic substances and methods, such as baits and traps instead of poisonous sprays, to control pests and weeds in your lawn and garden	41%	37%	7%	1%	7%	7%	*78%*	*8%*
[ ]e.	**(T)** Sweep down your driveway with a broom instead of hosing it down with water	40%	30%	7%	4%	8%	11%	*69%*	*12%*

	VERY WILL	SMWT WILL	NOT TOO WILL	NOT AT ALL WILL	DO NOW	(DK/ NA)	*TOTAL WILL*	*TOTAL NOT WILL*
[ ]f. **(T)** Take your car to a car wash instead of washing it yourself in the street or driveway	34%	35%	11%	2%	9%	8%	*69%*	*14%*
[ ]g. **(T*)** If you washed your car yourself, wash your car on an unpaved surface, instead of in the street or driveway	35%	32%	7%	6%	4%	16%	*68%*	*12%*
[ ]h. **(T)** Take used fluorescent lamps and light bulbs to a household hazardous waste facility or event	38%	25%	11%	9%	9%	9%	*62%*	*19%*
[ ]i. **(T)** Report someone you see dumping harmful substances into the storm drain	38%	31%	12%	5%	3%	11%	*69%*	*17%*
[ ]j. **(T)** Participate in creek clean-ups	26%	41%	19%	4%	2%	8%	*67%*	*23%*
[ ]k. **(T*)** When it is allowed, use re-usable shopping bags instead of paper bags provided by stores	51%	19%	4%	2%	15%	9%	*69%*	*6%*
[ ]l. **(T)** Throw litter in a garbage can and not in the street	51%	13%	5%	2%	18%	12%	*63%*	*7%*
[ ]m. **(T)** Hire exterminators and pest control professionals that use less-toxic pest control methods	26%	36%	11%	8%	8%	11%	*62%*	*19%*
(ASK ONLY IF CODE 1 IN Q10)								
[ ]n. **(T)** Hire landscape and yard maintenance contractors that use less-toxic weed and pest control methods	29%	28%	12%	5%	11%	15%	*57%*	*16%*
[ ]o. **(T)** Use watershed-friendly, sustainable techniques in your yard or garden to reduce runoff, such as building a rain garden or removing paved surfaces	36%	39%	7%	4%	6%	8%	*75%*	*11%*

(RESUME ASKING ALL RESPONDENTS)

13. I'm going to read you a list of items. Please tell me if you have a favorable or unfavorable opinion of each one. If you have never heard of one, please say so. **(IF RESPONDENT SAYS "DON'T KNOW," "NO OPINION," PROBE FOR CAN'T RATE OR NEVER HEARD: "WOULD YOU SAY THAT YOU HAVE HEARD OF [ITEM] BUT CANNOT RATE IT, OR HAVE YOU NEVER HEARD OF IT?") (RANDOMIZE)**

		FAV	UNFAV	NHO	CAN'T RATE
[ ]a.	**(T)** The Watershed Watch Hotline	16%	5%	60%	19%
[ ]b.	**(T)** The Household Hazardous Waste Program	25%	8%	48%	20%
[ ]c.	**(T)** The website my watershed watch dot org	14%	6%	65%	15%

NOW I'D LIKE TO ASK YOU A FEW QUESTIONS FOR STATISTICAL PURPOSES ONLY.

14. **(T*)** What is your preferred method for receiving environmental messaging and other related information? **(DO NOT READ LIST; ACCEPT ONE RESPONSE)**

Television	29%
The newspaper, either in print or online	5%
Neighborhood websites like Patch and Nextdoor	3%
Blogs	2%
Email	11%
Phone call	1%
Text message	4%
Mail/flyers/door hangers	3%
Social media like Facebook and Twitter	23%
Other	3%
Don't want environmental messages	6%
(**DON'T READ**) DK/NA	9%

15. On a scale of one to five, how much do you rely on each of the following sources to receive your local news and information, where one means you do not rely on the source at all, and a five means you rely on the source very heavily? **(RANDOMIZE)**

		MEAN SCORE	DO NOT RELY AT ALL 1	2	3	4	5	(DK/ NA)
[ ]a.	**(T)** The *San Jose Mercury News*	***2.4***	37%	11%	16%	16%	8%	12%
[ ]b.	**(T)** Social media like Facebook and Twitter	***3.4***	19%	6%	19%	17%	32%	8%
[ ]c.	**(T)** Ethnic or non-English news and media	***2.1***	45%	7%	20%	9%	5%	16%
[ ]d.	**(T)** Radio news	***2.6***	27%	16%	28%	15%	7%	7%
[ ]e.	**(T)** Television news	***3.2***	16%	14%	16%	25%	22%	7%
[ ]f.	**(T)** Neighborhood websites like Patch and Nextdoor	***2.2***	39%	10%	21%	8%	5%	16%
[ ]g.	**(T)** Mailings or emails from elected officials and public agencies	***2.6***	30%	9%	26%	10%	12%	13%
[ ]h.	**(T)** Neighborhood associations or community groups	***2.2***	36%	14%	27%	9%	3%	11%

16. In terms of your current job status, are you employed, unemployed but looking for work, retired, a student or a homemaker?

Employed ---------- 7%
Unemployed ---------- 12%
Retired ---------- 0%
Student ---------- 75%
Homemaker ---------- 0%
Other ---------- 1%
(DON'T READ) DK/Refused ---------- 5%

17. Do you own or rent your apartment or home?

Own ---------- 15%
Rent ---------- 8%
Live with parents or someone who owns ---------- 59%
Live with parents or someone who rents ---------- 17%
(DON'T KNOW/NA) ---------- 2%

THANK AND TERMINATE

LANGUAGE: BY OBSERVATION

English---------- 98%
Spanish ----------2%

MODE OF INTERVIEW:

Phone ---------- 13%
Online---------- 87%

CITY

Campbell----------9%
Cupertino ----------3%
Los Altos ----------4%
Los Altos Hills----------1%
Los Gatos----------2%
Milpitas ----------2%
Monte Sereno ----------0%
Palo Alto----------2%
San José---------- 51%
Santa Clara ---------- 10%
Saratoga----------3%
Sunnyvale----------8%
Other ----------5%

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 7-3

Program Contact Lists

- Management Committee Representatives/Attendees
- SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Santa Clara Valley Urban Runoff Pollution Prevention Program (Management Committee Representatives*/Alternates)

Organization	Contact	Address	Phone/Fax	E-mail
Campbell	*Sheila Tucker	70 North First Street Campbell, CA 95008-1423	tel 408-354-5385	stucker@wvcwp.org
Cupertino	*Ursula Syrova Alex Wycoff	10300 Torre Avenue Cupertino, CA 95014	tel 408-777-7603 tel 408-777-3255	UrsulaS@cupertino.org alexw@cupertino.org
Los Altos	* Emiko M. Ancheta Thanh Ngyuen	One North San Antonio Road Los Altos, CA 94022-3087	tel 650- 947-2646 tel 650-947-2624	eancheta@losaltosca.gov tnguyen@losaltosca.gov
Los Altos Hills	*Nichol Bowersox Kaho Kong	26379 Fremont Road Los Altos Hills, CA 94022	tel 650-941-7222 tel 650- 947-2511	nbowersox@losaltoshills.ca.gov kkong@losaltoshills.ca.gov
Los Gatos	* Sheila Tucker	41 Miles Ave or P.O. Box 949 Los Gatos, CA 95031	tel 408-354-5385	stucker@wvcwp.org
Milpitas	*Elaine Marshall Kan Xu	455 East Calaveras Boulevard Milpitas, CA 95035	tel 408-586-2603 tel 408-586-3253	emarshall@ci.milpitas.ca.gov kxu@ci.milpitas.ca.gov
Monte Sereno	*Sheila Tucker	18041 Saratoga-Los Gatos Rd. Monte Sereno, CA 95030	tel 408-354-5385	stucker@wvcwp.org
Mountain View	* Carrie Sandahl Eric Anderson	500 Castro Street, City Hall, 4th Floor Mountain View, CA 94041	tel 650-903-6225 tel 650-903-6821	carrie.sandahl@mountainview.gov eric.anderson@mountainview.gov
Palo Alto	*Karin North Pamela Boyle Rodriguez Michel Jeremias	250 Hamilton Ave., 6th Floor, Palo Alto, CA 94301 City of Palo Alto, PO Box 10250, Palo Alto, 94303 2501 Embarcadero Way, Palo Alto, CA 94303	tel 650-329-2104 tel 650-329-2421	karin.north@cityofpaloalto.org Pamela.BoyleRodriguez@cityofpaloalto.org michel.jeremias@cityofpaloalto.org
San José	*Sharon Newton Jeff Sinclair	Environmental Services Department Watershed Protection, City of San Jose 200 East Santa Clara Street, 7th Floor San Jose, CA 95113	tel 408-793-5351 tel 408.793.5358	sharon.newton@sanjoseca.gov Jeff.Sinclair@sanjoseca.gov
Santa Clara	*Rinta Perkins Dave Staub	CSC Street Corp. Yard 1700 Walsh Avenue Santa Clara, CA 95050	tel 408-615-3081 tel 408-615-3086 fax 408-988-0237	rperkins@santaclaraca.gov dstaub@santaclaraca.gov
Santa Clara County	* Vanessa Marcadejas Julianna Martin	Clean Water Program 1553 Berger Drive, Bldg. 1 San Jose, CA 95112	tel 408-918-4684 tel 408-282-3186 tel 408-282-3165	Vanessa.marcadejas@cep.sccgov.org Julianna.martin@cep.sccgov.org
Valley Water	*Kirsten Struve James Downing	5750 Almaden Expressway San José, CA 95118	tel 408-630-3138 tel 408-630-2653	kstruve@valleywater.org jdowning@valleywater.org
Saratoga	*Sheila Tucker	13777 Fruitvale Avenue Saratoga, CA 95070	tel 408-354-5385	stucker@wvcwp.org
Sunnyvale	*Melody Tovar Nupur Hiremath	City of Sunnyvale P.O. Box 3707 Sunnyvale, CA 94088	tel 408-730-7740	mtovar@sunnyvale.ca.gov nhiremath@sunnyvale.ca.gov
West Valley Communities	*Sheila Tucker	West Valley Clean Water Program One West Campbell Avenue, H-73 Campbell, CA 95008-1039	tel 408-354-5385	stucker@wvcwp.org

* Current Voting Members

SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Agency	Construction Inspection	Illegal Discharge	Industrial Inspection
Campbell	**John Burchfiel** Public Works 408-866-2150 johnb@campbellca.gov **Randy Sweet** Code Enforcement Officer 408-866-2760 randys@campbellca.gov **Bob Lennen** Acting Building Official 408-866-2130 bobl@campbellca.gov **Peri Newby** Environmental Programs Specialist 408-866-2150 perin@campbellca.gov	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Peri Newby** Environmental Programs Specialist 408-866-2150 perin@campbellca.gov	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Michael Benjamin** SCC FD, Haz Mat 408-378-4010 michael.benjamin@sccfd.org
Cupertino	**Kevin Rieden** Public Works Inspector 408-777-3104 KevinR@cupertino.org **Ursula Syrova** Environmental Programs Manager (408) 777-7603 UrsulaS@cupertino.org **Chad Mosley** Assistant Public Works Director/City Engineer 408-777-7604 ChadM@cupertino.org	**Alex Wykoff** Environmental Programs Specialist 408-777-3255 AlexW@cupertino.org **Ursula Syrova** Environmental Programs Manager (408) 777-7603 UrsulaS@cupertino.org **Manny Barragan** IND/IDDE Inspector 408-472-9907 ManuelB@cupertino.org	**Alex Wykoff** Environmental Programs Specialist 408-777-3255 AlexW@cupertino.org **Ursula Syrova** Environmental Programs Manager (408) 777-7603 UrsulaS@cupertino.org **Manny Barragan** IND/IDDE Inspector 408-472-9907 ManuelB@cupertino.org

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SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Agency	Construction Inspection	Illegal Discharge	Industrial Inspection
Los Altos Hills	**Janelle Lee** 650-947-2517 jlee@losaltoshills.ca.gov	**Janelle Lee** 650-947-2517 jlee@losaltoshills.ca.gov	**Los Altos Hills does not have any industrial or commercial sites**
Los Altos	**Kirk Ballard** 650-947-2634 kirk.ballard@losaltosca.gov **Andrea Trese, P.E.** Phone: (650) 947-2602 atrese@losaltosca.gov	**Andrea Trese, P.E.** Phone: (650) 947-2602 atrese@losaltosca.gov	**Andrea Trese, P.E.** Phone: (650) 947-2602 atrese@losaltosca.gov **Los Altos does not have any industrial sites (the City inspects its commercial sites)**
Los Gatos	**Robert Gray** CBO 408-354-6815 rgray@losgatosca.gov **Eric Christianson** Engineering Inspector 408-395-6824 echristianson@losgatosca.gov	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Dan Keller** Facilities & Environmental Programs Manager 408-395-5310 (Mon thru Fri) dkeller@losgatosca.gov ***Parks & Public Works General Line*** 7am-4pm (Mon thru Fri) 408-399-5770	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Michael Benjamin** SCC FD, Haz Mat 408-378-4010 benjamin@cnt.sccgov.org
Milpitas	**Sharon Goei** Building & Housing Director 408-586-3260 sgoei@ci.milpitas.ca.gov **Gary King** Building Permit Manager 408-586-3262 gking@ci.milpitas.ca.gov	**Albert Zamora** Fire Marshall 408-586-3370 azamora@ci.milpitas.ca.gov **Eric Emmanuele** Chief Enforcement Officer/Investigator (408) 586-3383 eemmanuele@ci.milpitas.ca.gov	**Matt Lambert** Environmental and Regulatory Compliance Specialist 408-586-2614 mlambert@ci.milpitas.ca.gov **Elaine Marshall** Deputy Public Works Director 408-586-2603 emarshall@ci.milpitas.ca.gov

Revised: August 2020

SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Agency	Construction Inspection	Illegal Discharge	Industrial Inspection
Monte Sereno	**Jessica Kahn** City Engineer 408-354-7635 jessica@cityofmontesereno.org	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Jessica Kahn** City Engineer 408-354-7635 jessica@cityofmontesereno.org	**City of Monte Sereno does not have any industrial or commercial sites**
Mountain View	**Eric Anderson** 650-903-6378 main 650-903-6821 direct eric.anderson@mountainview.gov **Carrie Sandahl** 650-903-6378 main 650-903-6224 direct carrie.sandahl@mountainview.gov **Jose Gomes** 650-903-6378 main 650-903-6815 direct jose.gomes@mountainview.gov	**Eric Anderson** 650-903-6378 main 650-903-6821 direct eric.anderson@mountainview.gov **Carrie Sandahl** 650-903-6378 main 650-903-6224 direct carrie.sandahl@mountainview.gov **Jose Gomes** 650-903-6378 main 650-903-6815 direct jose.gomes@mountainview.gov **City of Mountain View Police Department** (after hours) 650-903-6395	**Eric Anderson** 650-903-6378 main 650-903-6821 direct eric.anderson@ci.mtnview.ca.us **Carrie Sandahl** 650-903-6378 main 650-903-6224 direct **carrie.sandahl@mountainview.gov** **Jose Gomes** 650-903-6378 main 650-903-6815 direct jose.@mountainview.gov
Palo Alto	**Chris Fujimoto** 650-329-2430 christopher.fujimoto@cityofpaloalto.org **Watershed Protection** 650-329-2122	**Watershed Protection** 650-329-2122 **Palo Alto Police Department** 650-329-2413 (after hours)	**James Stuart** 650-329-2292 James.Stuart@CityofPaloAlto.org

Revised: August 2020

SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Agency	Construction Inspection	Illegal Discharge	Industrial Inspection
San José	**Mary Morse** 408-793-5323 mary.morse@sanjoseca.gov **Jeff Sinclair** 408-793-5358 Jeff.sinclair@sanjoseca.gov	**Mary Morse** 408-793-5323 mary.morse@sanjoseca.gov **No Dumping Hotline** 408-945-3000 http://ca-sanjose.civicplus.com/FormCenter/Environment-13/Storm-Drain-Discharge-Complaint-Form-71	**Chris Donaldson** 408-793-5374 Chris.Donaldson@sanjoseca.gov **Mary Morse (restaurants only-FOG)** 408-793-5300 (hotline) Mary.Morse@sanjoseca.gov
Santa Clara	**Jaime McAvoy** 408-615-3092 jmcavoy@santaclaraca.gov **Rinta Perkins** 408-615-3081 rperkins@santaclaraca.gov	**Jaime McAvoy** 408-615-3092 jmcavoy@santaclaraca.gov **Rinta Perkins** 408-615-3081 rperkins@santaclaraca.gov	**Jaime McAvoy** 408-615-3092 jmcavoy@santaclaraca.gov **Rinta Perkins** 408-615-3081 rperkins@santaclaraca.gov

Revised: August 2020

SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Agency	Construction Inspection	Illegal Discharge	Industrial Inspection
Santa Clara County (Unincorporated)	**Steve Beams** Senior Construction Inspector 408-299-6867 Steve.Beams@pln.sccgov.org	**Discharge Reporting Hotline** 408-918-4609 CleanwaterSCC@cep.sccgov.org **Martha Wien** Environmental Health Program Manager Land Use & Solid Waste depts. 408-918-3409 Martha.Wien@cep.sccgov.org	**Garik Iosilevsky** Clean Water Program 408-282-3186 Garik.Iosilevsky@cep.sccgov.org **Department of Environmental Health (DEH)** 408-918-3400 **Jennifer Kaahaaina** HazMat Program Manager 408-918-4795 Jennifer.Kaahaaina@cep.sccgov.org **Rochelle Gaddi** Consumer Protection Division (CPD) Director 408 918-3449 Rochelle.Gaddi@cep.sccgov.org **Beatrice Santiago** CPD Program Manager 408-918-4725 Beatrice.Santiago@cep.sccgov.org
Santa Clara Valley Water District (Valley Water)	Uday Mandlekar 408-630-2732 umandlekar@valleywater.org **Pollution Hotline** 1-888-510-5151	**Pollution Hotline** 1-888-510-5151	**Not Applicable**

Revised: August 2020

SCVURPPP Construction, Illegal Discharge, and Industrial Inspection Contacts

Agency	Construction Inspection	Illegal Discharge	Industrial Inspection
Saratoga	**David Dorcich** Associate Civil Engineer 408-868-1232 ddorcich@saratoga.ca.us **Skylar McLean** Grading / Land Development Inspections 408-868-1237 skyelarm@saratoga.ca.us	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Mainini L. Cabute** Public Works Analyst 408-868-1258 mcabute@saratoga.ca.us **Rick Torres** Streets Maintenance Supervisor 408-868-1244 408-857-6545 cell rtorres@saratoga.ca.us	**Rafles Warners** West Valley Clean Water Program (408) 354-4734 rwarners@wvcwp.org **Michael Benjamin** SCC FD, Haz Mat 408-378-4010 michael.benjamin@sccfd.org
Sunnyvale	**Richard Gutierrez** 408-730-7459 rgutierrez@sunnyvale.ca.gov	**Julie Choun** 408-730-7282 jchoun@sunnyvale.ca.gov	**Julie Choun** 408-730-7282 jchoun@sunnyvale.ca.gov

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 7-4

Watershed Watchers: Keeping Our Waterways Clean: FY 19-20 Fourth Quarter Report April – June 2020

WATERSHED WATCHERS:
Keeping Our Waterways Clean

FY19-20
4th Quarter Report
April - June 2020

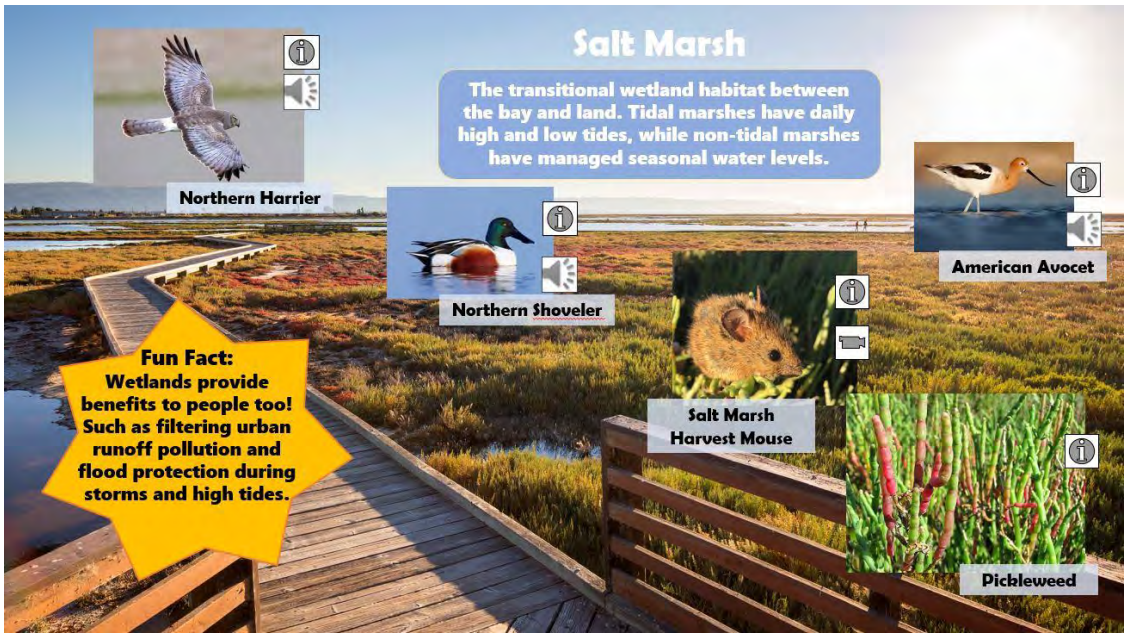

Interactive PowerPoint activity about the Salt Marsh habitat & wetland importance.

Prepared for:
Santa Clara Valley Urban Runoff Pollution Prevention Program
San Francisco Bay Wildlife Society
Don Edwards San Francisco Bay National Wildlife Refuge

06663
6704

A. Program Title and General Focus:

This partnership program between the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), the U.S. Fish and Wildlife Service's Don Edwards San Francisco Bay National Wildlife Refuge Environmental Education Center (EEC), and the San Francisco Bay Wildlife Society (SFBWS) provides services and programming that interpret the message of the Watershed Watchers program. The purpose of the Watershed Watchers program is to increase the surrounding communities' knowledge of urban runoff pollution and how to reduce its harmful effects through personal behavior changes.

B. Program Team:

- Hope Presley is a current graduate student at Prescott College, working towards a Master of Science in Resilient and Sustainable Communities. She completed her undergraduate work at the University of North Carolina, Wilmington, earning a B.S. in Environmental Science and Conservation. She has also completed the Sustainability and Behavior Change Certificate program through UC San Diego. Hope's experience includes endangered species management, plastic pollution education, habitat restoration and environmental education. Hope started as the Watershed Watchers Coordinator on January 24, 2017 after two internships with Don Edwards SF Bay National Wildlife Refuge. She works to develop programs, partnerships, and unique learning opportunities that will strengthen the Watershed Watchers Program.

- Genie Moore is the Environmental Education Center Director. She brings her experiences of coordinating the "Wetland Round-Up" and "Trekking the Refuge" field trip programs, and the Common Murre Restoration Project for the Visitor Center in Fremont. Genie has worked at the Refuge for over 20 years!

- Rachel Caoili has joined our team at the Environmental Education Center once again, this time as the Watershed Watchers Interpretive Associate for FY19-20! Rachel started at the Refuge as a volunteer, then moved into a Student Conservation Association intern position as the Summer Camp Coordinator for 2017. Since then, she has finished her Bachelor's degree in Society & Environment at UC Berkeley.

- San Francisco Bay Wildlife Society, established in 1987, is a not-for-profit friends group that has supported education, interpretation and other public use programs at the Don Edwards San Francisco Bay National Wildlife Refuge. The San Francisco Bay Wildlife Society administers the Watershed Watchers Program.

- Volunteers are vital and are often very involved with the Watershed Watchers Program by assisting with interpretive programs, field trips, special events and restoration efforts.

C. Highlights

Virtual Programing and Outreach

In March of 2020, Santa Clara County enacted a shelter in place order as a response to the growing public health crisis related to COVID-19. As a result, San Francisco Bay Wildlife Society and other Refuge staff members began working from home. Programs for the foreseeable future were postponed, and ultimately cancelled due to the prolonged shelter in place order. The Watershed Watchers program adapted to offering virtual and self-guided activities/programs to the public and to teachers to do with their students. Watershed Watchers staff also took time to learn about live virtual programing, how-to conduct, and tools/platforms use options in order to prepare for a prolonged shelter in place order throughout 2020.

A few programs were offered in a live virtual platform, including an alternate version of our Drawbridge Tour program. A variety of resources and activities were provided to local K-12 teachers and college professors. The San Francisco Bay Wildlife Society's presence on social media, specifically Facebook, increased greatly (see page 11). Planning for Marsh-In Summer Camp 2020 adjusted to a virtual format, and will provide a great opportunity for developing virtual programming skills to use into the 2020-2021 fiscal year.

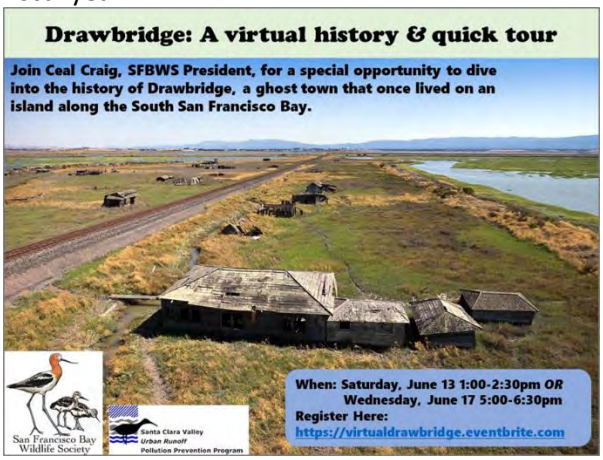

SFBWS President and Refuge Volunteer, Ceal Craig, presented her Drawbridge Tour in a virtual format. Key topics include the history of pollution effecting people and the Bay. Watershed Watchers messaging and the Santa Clara Valley Urban Runoff Pollution Prevention Program was highlighted and links provided.

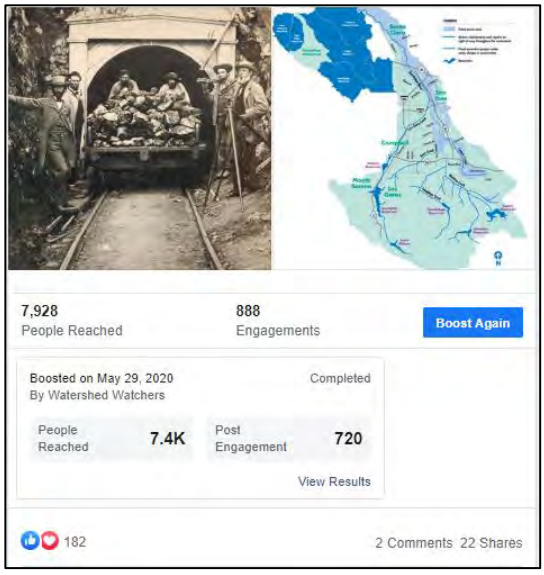

Facebook post highlighting the Guadalupe Watershed and the history of mercury contamination, reaching a total of 7,928 people by views, likes, comments, shares, link clicks, etc.

D. Fourth Quarter Summary (April – June)

Total Number of Programs Summary

Program Type	# of Programs Proposed	# of Programs Offered	# of Programs Conducted	Total # of Hours	Proposal Met?
At-home Activities	10	11	11		Exceeded
Virtual LIVE Programs	3	5	5	6	Exceeded
Virtual Outreach	12	24	24		Exceeded
Summer Camp	Planning	-	-	-	Met
Mercury Outreach	4	4	4	3	Met
TOTAL	29	44	44	9	Exceeded

Total Number of Participants Summary: Age Ranges

Program Type	Pre K	Elem	Middle	High	Adult	Total #
At-home Activities		~500*				1,254
Virtual LIVE Programs					42**	3,198
Virtual Outreach						
Summer Camp	Planning	-	-	-	-	-
Mercury Outreach		~60*	~60*		~122*	242**
TOTAL		~560*	~60*		~122*	4,452

Totals include participants/viewers who did not indicate age

* ~ an approximate number based on teacher feedback.

**numbers are overlapped with other program types and totals are not represented in overall total

Total Number of Participants Summary: Engagement

Program Type	Emailed Directly	Google Drive Link	Social Media Engagement	Website Engagement	Virtual Meeting Platforms	Total #
At-home Activities		~500*		754		1,254
Virtual LIVE Programs			3,156		42	3,198
Virtual Outreach			38,744	262		39,006
Summer Camp	Planning	-	-	-	-	-
Mercury Outreach	~200**		7,928**		42**	8,170**
TOTAL	~200**	~500*	41,900	1,016	42	43,458

* ~ an approximate number based on teacher feedback.

**numbers are overlapped with other program types and totals are not represented in overall total

E. Program Details:

At-Home Activities

At-home activities are offered to the public, groups, and schools as alternative activities for families sheltering in place. Activities focus on wildlife viewing, endangered species conservation, and how individual behaviors cause urban runoff pollution and affect wildlife habitat in our watershed. (See Appendix A for descriptions)

Goal – 10 programs

Date	Programs	Website *(Views & Downloads)*	Google Drive Link (Elementary School Age)	Total #
3/30/20	Community Clean-up	45		45
4/7/20	Natural Dyes Egg Decorating	203		203
4/15/20	Sensory Scavenger Hunt	37		37
4/19/20	Refuge Coloring Page	24		24
4/22/20	Earth Day Celebration	8		8
5/4/20	Explore the Salt Marsh	219	~100* (5 classes)	319
5/5/20	Explore the Salt Pond	69	~100* (5 classes)	169
5/6/20	Explore the Slough	42	~100* (5 classes)	142
5/7/20	Explore the Mudflats	6	~100* (5 classes)	106
5/8/20	Explore the Upland	33	~100* (5 classes)	133
5/15/20	Endangered Species Day – Board Game	68		68
Offered: Conducted:	11 11	754	~500*	1,254

** ~ an approximate number based on teacher feedback. These numbers reflect known use, not just distribution. Distribution was to at least an additional 10 classes.*

Proposal: ___Met ___Not Met _X_ Exceeded

Various at-home activities offered to the public, schools, and groups.

Virtual LIVE Programs

Virtual live programs are held on a variety of virtual platforms such as Facebook, YouTube, GoToMeeting, and Zoom. Programs connect people with nature, foster connections to wildlife and habitats, and focus on each individual's role in caring for the Bay habitats, plants and animals. Participants will learn ways they can be a part of the solution to protect the Bay by preventing urban runoff pollution. (See Appendix A for program descriptions)

Goal – 3 programs

Date	Programs	Hours	Facebook LIVE	YouTube LIVE	GoTo Meeting	Total #
4/4/20	Tai Chi	1	576	367		943
5/2/20	Tai Chi	1	952	207		1,159
6/6/20	Tai Chi	1	880	174		1,054
6/13/20	Drawbridge	1.5			20	20
6/17/20	Drawbridge	1.5			22	22
Offered: Conducted:	5 5	6	2,408	748	42	3,198

Proposal: ___Met ___Not Met _X_ Exceeded

Tai Chi offered by Morning Crane Healing Arts Center.

Virtual Outreach

Virtual Outreach connects existing and potential Refuge visitors to our local wildlife, habitats, and watersheds via photographs, videos, and narratives shared on the SFBWS Facebook page and/or the website. Topics include information about local endangered species, how important watersheds are to our natural and urban worlds, history of our local community, and other conservation topics. Posts also include advertisements for activities, whether at-home or virtual. (See Appendix A for descriptions)

Goal – 12 posts

Date	Post	Facebook Engagement *(Views, Likes, Comments, Shares, etc)*	Website *(Views & Downloads)*	Total #	Paid Boosted FB Post?
4/7/20	Natural Dyes Egg Decorating	62	203	265	
4/10/20	Outdoor Sensory Scavenger Hunt Activity	323	37	360	
4/13/20	Water Your Pollinators	66		66	
4/14/20	Look Up at the Sky Day!	113		113	
4/16/20	Citizen Science - iNaturalist	167	37	204	
4/18/20	Junior Ranger Day activity	279		279	
4/21/20	Earth Day! #1	375	24	399	
4/22/20	Earth Day! #2	223	8	231	
4/24/20	Earth Day! #3	57	45	102	
4/28/20	A Home for Salty book reading video	187		187	
4/30/20	Explore 5 Habitats Adv	3,319	168	3,487	Yes
5/5/20	Teacher Appreciation Week	1,507		1,507	Yes
5/8/20	Teacher Appreciation Week Video	69		69	
5/12/20	Endangered Species Day – Clues post	1,164		1,164	Yes
5/15/20	Endangered Species Day – Activity post	2,749	68	2,817	Yes
5/20/20	Monarch Butterflies & Pollinator Garden info	94	12	106	
5/22/20	Coyote Creek Watershed	9,675		9,675	Yes
5/27/20	Rachel Carson Celebration Video	3,860		3,860	Yes
5/29/20	Guadalupe Watershed/Mercury	7,928		7,928	
6/3/20	Black Birders Week	85		85	
6/5/20	World Environment Day	80		80	
6/8/20	World Oceans Day	262		262	
6/20/20	Summer Solstice: Young/Juvenile Wildlife Photos	5,760		5,760	Yes
6/26/20	Pollinator Week	340			
Offered: Conducted:	24 24	38,744	262	39,006	7

Proposal: ___Met ___Not Met _X_ Exceeded

Mercury Outreach

Provide information for college groups and the public in regards to human health and environmental impacts of mercury, with specific focus on mercury in fish.

Goal – 4 programs

Date	Programs	Hours	Pre K	Elem	Middle	High	Adult	Total #
4/1/20	Refuge PowerPoint Presentation			~60	~60		~80	~200
6/13/20	Drawbridge	1.5					20	20
6/18/20	Drawbridge	1.5					22	22
Offered: Conducted:	3 3	3		60	60		122	242

Totals include participants/viewers who did not indicate age

* ~ an approximate number based on teacher feedback.

Proposal: _X_Met ___Not Met ___ Exceeded

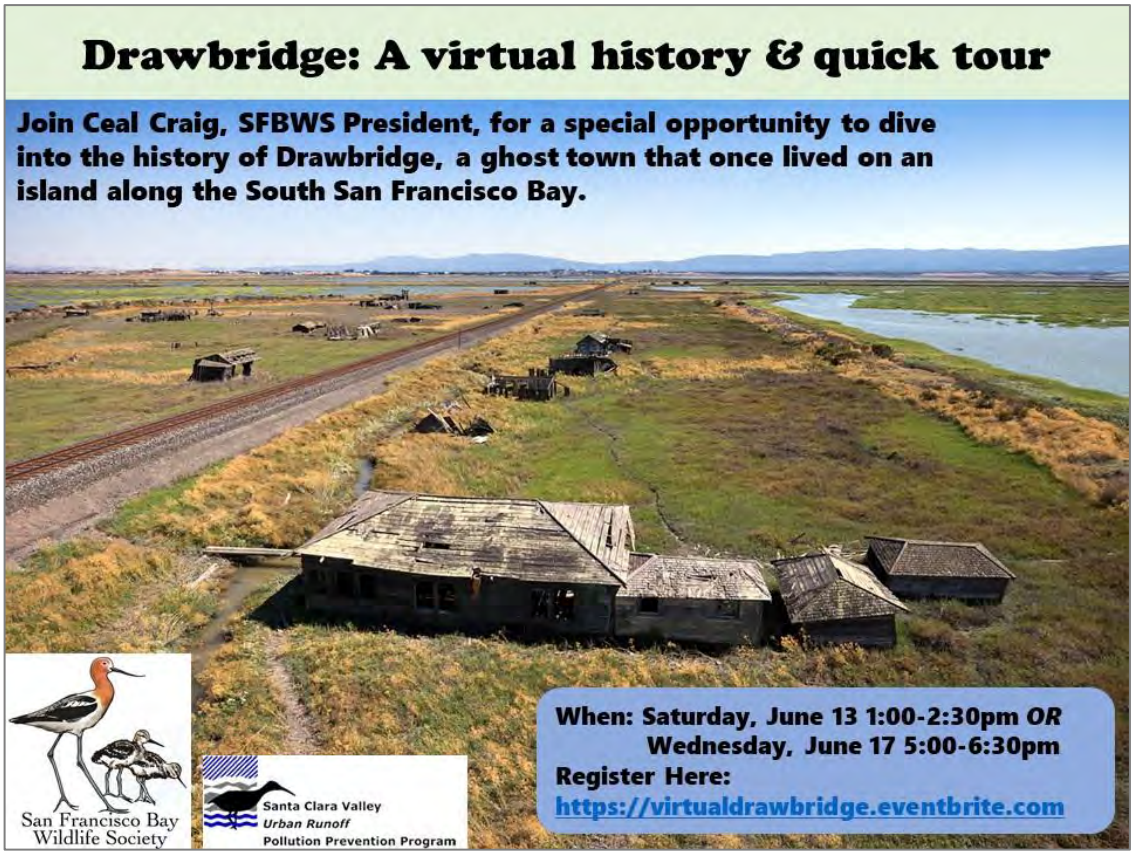

Advertisement for live virtual Drawbridge programs.

Marsh-In Summer Camp

This week long camp, Marsh-In Summer Camp, is designed to provide opportunities for young campers to learn about and connect with the wetland habitats, animals and plants. Summer Camp 2020 will be offered in a virtual online format (see flier below).

Goal – Planning

Proposal: _X_ Met ___Not Met ___Exceeded

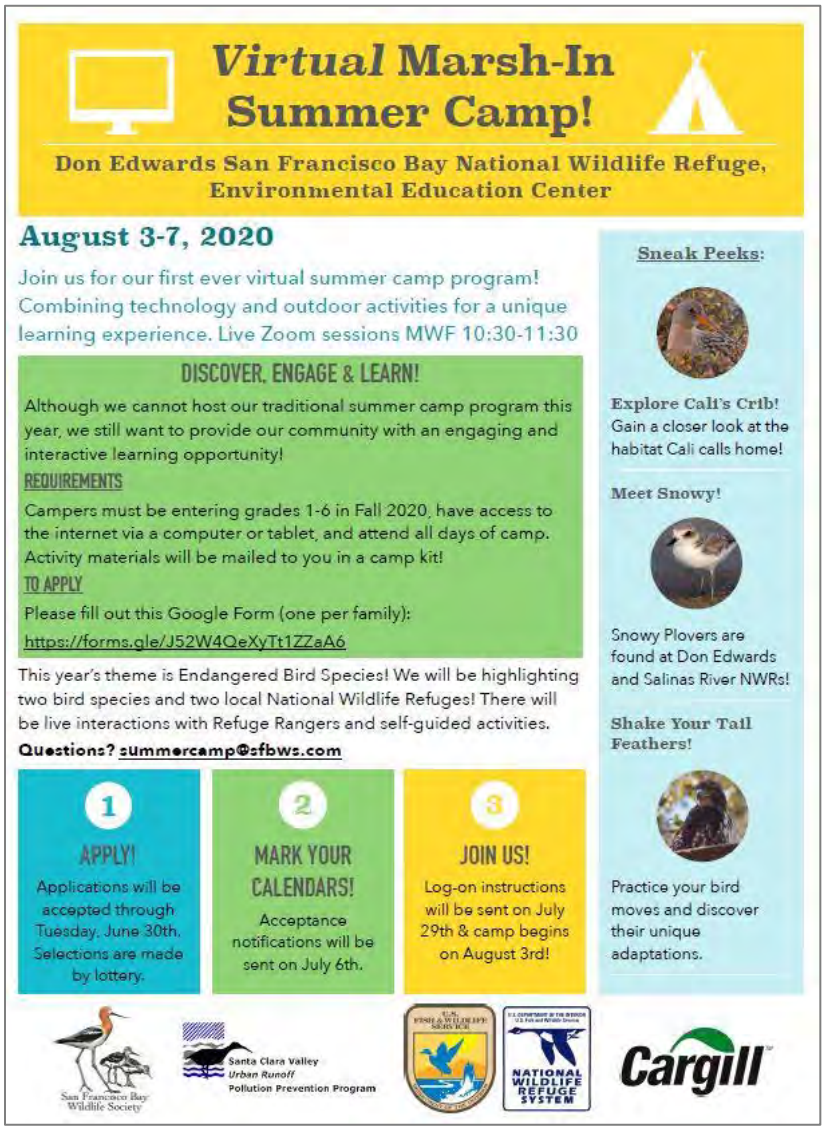

Virtual Marsh-In Summer Camp!

Don Edwards San Francisco Bay National Wildlife Refuge, Environmental Education Center

August 3-7, 2020

Join us for our first ever virtual summer camp program! Combining technology and outdoor activities for a unique learning experience. Live Zoom sessions MWF 10:30-11:30

DISCOVER, ENGAGE & LEARN!

Although we cannot host our traditional summer camp program this year, we still want to provide our community with an engaging and interactive learning opportunity!

REQUIREMENTS

Campers must be entering grades 1-6 in Fall 2020, have access to the internet via a computer or tablet, and attend all days of camp. Activity materials will be mailed to you in a camp kit!

TO APPLY

Please fill out this Google Form (one per family):

https://forms.gle/J52W4QeXyTt1ZZaA6

This year's theme is Endangered Bird Species! We will be highlighting two bird species and two local National Wildlife Refuges! There will be live interactions with Refuge Rangers and self-guided activities.

Questions? summercamp@sfbws.com

1 APPLY! Applications will be accepted through Tuesday, June 30th. Selections are made by lottery.

2 MARK YOUR CALENDARS! Acceptance notifications will be sent on July 6th.

3 JOIN US! Log-on instructions will be sent on July 29th & camp begins on August 3rd!

Sneak Peeks:

Explore Cali's Crib! Gain a closer look at the habitat Cali calls home!

Meet Snowy!

Snowy Plovers are found at Don Edwards and Salinas River NWRs!

Shake Your Tail Feathers!

Practice your bird moves and discover their unique adaptations.

San Francisco Bay Wildlife Society

Santa Clara Valley Urban Runoff Pollution Prevention Program

NATIONAL WILDLIFE REFUGE SYSTEM

Cargill

Upcoming summer camp flier.

F. Public Outreach – The Audience and How it was Reached

This project involves public outreach encompassing a wide variety of groups and individuals in Santa Clara County. The audience varies in age, ethnicity, interest, occupations, and income levels. The following programs offer an opportunity for public outreach:

•The Environmental Education Center in Alviso offers trails and access to wildlife viewing for the public to gain first-hand knowledge of the value of our Bay habitats. Visitors who tour the Environmental Education Center have an opportunity to use the interactive kiosk with Watching Our Watershed and other interesting modules, speak with the interpretive specialist about the salt marsh, have access to "things to see," as well as learn about current threats to wildlife of the salt marsh. The "audience" is as diverse as the population in the Bay Area, including people from varied ethnic backgrounds and socioeconomic status.

•The Watershed Watchers programs are primarily held at the Environmental Education Center. Visitors attending these programs are given informational flyers produced by SCVURPPP "You are the Solution to Water Pollution". The Guide to Fish and Shellfish from San Francisco Bay is provided by the California Department of Health. Watershed Watchers is continually trying to reach new and different audiences.

G. Outreach and Partnerships

Organization	Contact Method	Contact	Outcome
Saved by Nature	Email	Richard Tejeda	Planning virtual program for local Boys & Girls Clubs
Morning Crane Healing Arts Center	Email	Chris Shelton Parisa Shelton	Virtual Tai Chi programming offered via Facebook and YouTube Live

H. Making the Project Known to the Community at Large

- GovDelivery (monthly email newsletter, USFWS)
- Tide Rising (the SFBWS quarterly newsletter)
- Don Edwards San Francisco Bay National Wildlife Refuge website and Facebook
- San Francisco Bay Wildlife Society website and Facebook
- Eventbrite.com
- Volunteermatch.org

San Francisco Bay Wildlife Society Facebook Page

The SFBWS Facebook page has proven to be a great public outreach and engagement tool. From April 1 – June 30, 2020 (Quarter 4), the number of people following our page increased by 160, from 297 to 457. Our posts reached almost 40,000 people through organic and paid (boosted) posts. Boosted posts were targeted to reach audiences within Santa Clara County, and helped to increase the number of followers to our page. Post engagements include likes, link clicks, photo clicks, comments, and shares. Links to mywatershedwatch.org were included in appropriate posts.

I. Watershed Watchers: 2019-2020 Quarters 1-3 in Review

Program Numbers

Program Type	# Proposed	# of Conducted	# of Participants	# of Hours
Public Programs	12	32	446	63.5
Group Programs	12	35	664	85.5
Stewardship & Community Science	16	19	358	51.5
Outreach Programs	1	2	175	4
Summer Camp	1	1	446	46
Special Events	1	1	269	2
Mercury Outreach	12	18	353**	42.5
Volunteer Coordination	9	13	117	23
TOTAL	64	121	2,484	318

***numbers are overlapped with other program types and totals are not represented in overall total*

Participant Numbers

Quarter	Pre K	Elem	Middle	High	Adult	Total #
Quarter 1	1	265	86	143	309	895
Quarter 2	9	75	16	27	283	679
Quarter 3	6	354	15	56	370	910
Quarter 4	*Programs conducted virtually due to shelter-in-place restrictions, see below.*					
TOTAL	16	694	117	226	962	2,484

Totals include participants who did not indicate age

J. Watershed Watchers: 2019-2020 Grant Year in Review

Total # Reached: 2,484 (in person) + 43,458* (virtually) = 45,942

**See table below.*

Total Number of Participants Summary: Engagement

Program Type	Emailed Directly	Google Drive Link	Social Media Engagement	Website Engagement	Virtual Meeting Platforms	Total #
At-home Activities		~500*		754		1,254
Virtual LIVE Programs			3,156		42	3,198
Virtual Outreach			38,744	262		39,006
Summer Camp	Planning	-	-	-	-	-
Mercury Outreach	~200**		7,928**		42**	8,170**
TOTAL	~200**	~500*	41,900	1,016	42	43,458

* ~ an approximate number based on teacher feedback.

**numbers are overlapped with other program types and totals are not represented in overall total

2019 – 2020 Highlights

- Watershed Watchers reached 2,484 people in-person during Q1-3, and 43,458 virtually during Q4; exceeded program number goals.
- Due to shelter-in-place orders as a result of the COVID-19 public health crisis, programing transitioned into virtual platforms as was able. New virtual programming was created and planned for the following fiscal year.
- Conducted a successful 2019 Marsh-In Summer Camp program with 66 campers and 26Habitat Heroes.
- Habitat Restoration Service-Learning Field Trips for grades 5-12 reached a total of 193 students, totaling 574.5 hours of service for FY19-20.
- Restoration efforts in the Butterfly Garden shown to be successful, and continue with the assistance from school, corporate and public groups.
- Restoration Work Days have continued to be a valuable tool to reach middle, high and college students and give them the opportunity to volunteer. This program reached a total of 70 people, totaling 166 hours of service.
- Additional restoration volunteer days (for corporate and special groups) reached 68 people, totaling 167 hours.
- In total, the restoration volunteer programing reached 331 people and 907.5 total hours.
- Developed new programing with partners, volunteers, and staff.
- WW Interpretive Associate, Rachel Caoili, worked with us during FY19-20; and will continue into FY20-21.

K. Attachments

- Appendix A: Program Descriptions
- Appendix B: Watershed Watchers Proposed Work Plan for July 2019 – June 2020
- Appendix C: Amended Work Plan for Q4, April – June 2020

Appendix A: Program Descriptions

Drawbridge Tour – Virtually
Ceal Craig, a volunteer, gives a presentation about the historic town of Drawbridge. Urban runoff pollution is mentioned as one reason people abandoned the town. People are reminded that urban runoff starts at their homes and techniques to reduce runoff pollution are suggested.

Tai Chi – Virtually
In the busy San Francisco Bay it has become important for Refuge visitors to take time to slow down and observe nature. Tai Chi promotes mental and physical well-being while connecting to nature.

Community Clean-up
Clean-up your own neighborhood/community following safe practices. Use of the Literati app to document trash types and locations.

Natural Dyes Egg Decorating
Celebrate Spring by creating your own natural dyes for coloring eggs! Safe for your family and our environment.

Sensory Scavenger Hunt
Take some time to go outside into your backyard or patio – nature can be found anywhere! Use your senses to observe the nature and wildlife around you.

Refuge Coloring Page
Learn about the plants and wildlife that live at the Refuge through this numbered coloring page!

Earth Day Celebration
What is Earth Day and why is it important? What activities can I do to celebrate, and help the plant?

Explore the: Salt Marsh, Salt Pond, Slough, Mudflats, and Upland
Interactive PowerPoint activity allows people and students to explore the 5 habitats at the Refuge virtually! Learn about the various wildlife and plants through listening to bird calls, and watching educational videos. Learn about why these habitats are also important to us, humans!

Endangered Species Day Board Game
Make your very own Salty Board game! Learn about who 'Salty' is, where they live, and why they are listed as endangered. Salty encounters many challenges throughout their life, help them survive!

Virtual Outreach
Virtual outreach is conducted on social media and web-based platforms, such as Facebook and the SFBWS Blog. Various topics are introduced to viewers that educate them, update them on Refuge activities, or provide fun and inspirational ways to connect with nature!

Appendix B: Work Plan FY19-20

PROGRAM TITLE AND GOALS	JULY – SEPTEMBER 2019 QUANTITY	OCTOBER – DEC. 2019 QUANTITY	JANUARY – MARCH 2020 QUANTITY	APRIL – JUNE 2020 QUANTITY
Public Programs at the EEC	4 programs	4 programs	4 programs	4 programs
Group Programs at the EEC	4 programs	6 programs	4 programs	6 programs
Special Events	Plan and Conduct 1 Special Event			
Outreach	0 outreach opportunity	1 outreach opportunity	0 outreach opportunity	1 outreach opportunity
Stewardship and Citizen Science at the EEC-	4 programs	6 programs	6 programs	6 programs
Visitor Contact and EEC Operations	Ongoing Activity			
Advertising and Promotion	Ongoing Activity			
Developing and Maintaining Partnerships	Establish at least 2 new partnerships; and host programs for these groups on site			
Recruiting and Coordinating Refuge Volunteers (orientations and training)	3 programs	3 programs	3 programs	3 programs
Marsh-In Summer Camp	Implemented this quarter	N/A	Conduct Planning for camp	Conduct Planning for camp
Program Research, Development and Documentation	Ongoing Activity			
Mercury Outreach- College Groups	4 programs	4 programs	4 programs	4 programs
				.

WATERSHED WATCHERS PROGRAM TITLE AND GOALS JULY 2019 – JUNE 2020	METHODS AND OBJECTIVES OF PROGRAMS
Public Programs at the Environmental Education Center **Goal:** Interpretive programs offered to the public, focusing on how individual behaviors cause urban runoff pollution and affect wildlife habitat in our watershed.	The interpretive specialist will coordinate with docents and the associate to offer a variety of programs for adults and children. These programs can include but are not limited to nature walks, hands-on activities, holiday programs, and other interpretive programs that introduce visitors to the habitats, plants and animals of the refuge. These programs will increase visitors' awareness of Bay habitats and will provide opportunities for visitors' to connect to them. Program offerings vary by season and availability of volunteer docents. **Objective:** Participants will state various ways they can protect the refuge, such as reducing litter by participating in trash clean ups and reducing their own trash output through using less packaging and recycling. They can also reduce urban runoff by using fewer pesticides or using alternatives at home or work.
Group Programs at the Environmental Education Center **Goal:** Interpretive programs focusing on each individual's role in caring for the Bay habitats, plants and animals. Participants will learn ways they can be a part of the solution to protect the Bay by preventing urban runoff pollution.	These programs will be conducted by the interpretive specialist and associate for boy scouts, girl scouts, senior groups, youth groups, special interest clubs, day care, after school programs, and other local organizations. These programs will be reserved in advance by the group. **Objective:** Participants will state two examples of actions they will try at home to prevent urban runoff pollution. I.e. Litter reduction, recycling and pick up, utilizing less toxic pest management alternatives.
Special Events **Goal:** These open house style events are designed to attract at least 100 people to the EEC for various activities educating about the wildlife that use the wetland habitats.	This year we are proposing 1 special event. We plan to offer one in the spring. *Planning for events begins 3-6 months in advance.* **Objective**: Visitors will learn how to prevent urban runoff pollution prevention to protect wildlife. (i.e. less litter, and less toxic pest management).

WATERSHED WATCHERS PROGRAM TITLE AND GOALS JULY 2019 – JUNE 2020	METHODS AND OBJECTIVES OF PROGRAMS
Outreach **Goal:** Participating in outreach activities helps spread the word about the refuge and urban runoff pollution prevention program.	The interpretive specialist and associate would attend outreach opportunities in the community. Outreach activities include, festivals, fairs, watershed clean-ups, webinars, broadcasts, or off site interpretive programs in the local community. **Objective**: Provide opportunities to spread the word about the refuge and provides information for people to learn about the effects of litter and how to prevent urban runoff pollution in the watershed.
Stewardship and Citizen Science at the Environmental Education Center **Goal:** Stewardship activities encourage and inspire visitors to create wildlife habitats and use chemical-free garden techniques in their own backyards. Habitat clean-up days help participants connect their trash habits with the effects on the environment and wildlife. The iPads were purchased by a grant from the Santa Clara Valley Water District. Service learning field trips for grades 5-12 offer the opportunity for students to learn about the Refuge and its role in mitigating the effects of urban runoff. Students will participate in stewardship activities and habitat clean up. The citizen science programs monitor the effects of climate change and the results of the stewardship activities on plants and wildlife.	The interpretive specialist will maintain the following programs. 1. Garden work days emphasizing chemical-free and low water use gardening techniques. **Objective**: Through the upkeep of the native plant demonstration gardens visitors can replicate native plant and chemical free gardening techniques in their home gardens. 2. Habitat clean-up days allow visitors to take action to clean up the local environment. **Objective**: These programs provide volunteer's a first-hand experience to see the effects of trash from urban runoff on coastal environments and wildlife. We will continue to incorporate the use of iPads with the #Litterati app to gather data about the type of trash and trash hot spots. 3. Service learning field trips for grades 5-12 provide learning and volunteer opportunities. **Objective:** This field trip program will provide students with the opportunity to learn more about the Refuge's habitats and wildlife, while also volunteering to help improve these habitats. Students will learn about chemical free gardening practices and their connection to the watershed. Stewardship will include habitat restoration and trash pickups. 4. Citizen science programs provide visitors and volunteers an opportunity to take action to monitor and observe the changes and effects of climate and habitat restoration of the native plant garden.

WATERSHED WATCHERS PROGRAM TITLE AND GOALS JULY 2019 – JUNE 2020	METHODS AND OBJECTIVES OF PROGRAMS
	Objective: The opportunity to observe plants and wildlife closely provides a chance for visitors to develop a deeper understanding and appreciation of the wildlife and plants that can be effected by urban runoff pollution.
Marsh-In Summer Camp **Goal:** This week long camp is designed to provide opportunities for young campers to learn about and connect with the wetland habitats, animals and plants.	The interpretive specialist will assist with Summer Camp through the planning/organization and supervision of the Summer Camp Associate. This includes acting as a leader during the week of camp and assisting in the training for the older students that participate in the Habitat Heroes program. The one week annual summer camp encourages participation of students from the local elementary school in Alviso, but it is open to all students in the local area. *Planning for this program begins 6 months in advance.* **Objective**: This camp provides an opportunity to introduce young students to how individual behaviors cause urban runoff pollution and effect wildlife habitat in our watershed.
Recruit and Coordinate Refuge Volunteers and Interns for Programs and Projects **Goal:** To maintain and grow a volunteer and intern program that aids the Watershed Watchers programs and projects.	The interpretive specialist will recruit new volunteers and interns for the Watersheds Watchers program to build and maintain program capacity. Work with and maintain ongoing relationships with volunteers at the Refuge that assist with Watershed Watchers programs and projects. Provide necessary trainings and educational opportunities for volunteers to spread the Watershed Watchers and Refuge's messages. **Objective**: By building and maintaining a highly trained volunteer core, volunteers will help provide a variety of programs and help reach diverse audiences. In addition, they will increase capacity of the Watershed Watchers program at the Environmental Education Center.

WATERSHED WATCHERS PROGRAM TITLE AND GOALS JULY 2019 – JUNE 2020	METHODS AND OBJECTIVES OF PROGRAMS
Visitor Contact and Operations of Environmental Education Center **Goal**: Assist visitors over the telephone and in person. Provide excellent customer service to all visitors. Assists with quality visitor services by working with FWS staff to provide a clean and safe environment for visitors, staff and volunteers.	Includes interaction with visitors at the EEC, answering questions over the phone and in person. Aides in the day to day operations of the Environmental Education Center, including one weekend day. **Objective**: Providing a high quality experience to visitors will provide incentive and opportunity for the visitors to return and continue to connect to the resource. The visitor may become more active and involved with the refuge and learning about how to protect the bay habitats using ideas and information from the Watershed Watchers program to incorporate changes into their daily lives.
Advertising and Promotion of Public/ Group Programs and Special Events **Goal:** Create and distribute informational fliers and advertisements about the Watershed Watchers program to local media.	Create and distribute a listing of programs on a regular basis to provide to websites, online calendars, newsletters and newspapers. Informational fliers to distribute for special events and weekend programs. Develop an annual advertising plan to advertise weekend programming in conjunction with the Living Wetlands Program. **Objective**: To reach new audiences with the Watershed Watchers messages (i.e. urban runoff, trash prevention, less toxic pesticide alternatives, and mercury education) and refuge messages.
Developing and Maintaining Partnerships with Local Community Organizations **Goal:** Maintain and create partnerships with local community organizations via phone calls, emails, and in person meetings to groups.	The interpretive specialist will reach out to new audiences to break down barriers and invite these groups to participate in hands on experiences on the Refuge. The specialist will reach out to groups that have traditionally not used the Refuge as a resource, such as but not limited to, groups for children and adults with special needs, League of United Latino Citizens, and Outdoor Afro, etc. During the year, relationships will be cultivated and maintained through the exchange of information and collaboration on issues related to urban runoff pollution prevention and wildlife with local collaborative groups and consortiums. Groups will be invited out for education and interpretive programs.

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WATERSHED WATCHERS PROGRAM TITLE AND GOALS JULY 2019 – JUNE 2020	METHODS AND OBJECTIVES OF PROGRAMS
	Objective: Support the longevity, effectiveness and relevance of this program.
Program Research, Development, and Documentation **Goal:** Research and development time is necessary for the creation of new urban runoff pollution prevention programs and learning new information to supplement and expand existing programs. This also includes time spent planning and scheduling future programs. Documentation includes writing scripts, lesson plans and quarterly and annual reports.	Time spent reviewing historical program offerings and analyzing the results of evaluations to plan future programs to maximize attendance and the variety of programs. This includes researching programs, and participating in program development trainings (in house or local) to expand knowledge of the subject, create and develop new ideas for programs. As well as time spent learning information for specific programs by reading and researching topics, and communicating with knowledgeable staff and volunteers for additional information related to the program topic. **Objective**: Support the longevity, effectiveness, relevance and efficiency of this program.
Mercury Risk Reduction Outreach **Goal:** Provide information for college groups in regards to human health and environmental impacts of mercury, with specific focus on mercury in fish.	The associate will assist the interpretive specialist to offer programs to college groups. Provide handouts and guides to eating fish and shellfish in the San Francisco Bay as well as information about current research projects on the Refuge relating to the impacts of mercury on wildlife and the Bay. **Objective**: Provide information for the public about the impact of mercury on human health and the environment by incorporating the information in to existing programming. This message will be incorporated into all college Programs.

Appendix C: Amended Work Plan for Q4, April – June 2020

Due to the Coronavirus outbreak in California, the Environmental Education Center at Don Edwards San Francisco Bay National Wildlife Refuge, the base location of the Watershed Watchers program at the Refuge, closed on Friday, March 13th until further notice. The San Francisco Bay Wildlife Society (SFBWS) cannot host programs onsite, and school districts have closed their schools, so many programs have been cancelled or postponed. On Wednesday, March 18th, a shelter in place order was placed for Santa Clara County and all staff have been working from home. This document explains how the San Francisco Bay Wildlife Society will continue to provide the Watershed Watchers program in partnership with the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) for Quarter 4 of FY19-20.

Proposed annual goals v What have we accomplished to date for FY19-20

Program Type	# Proposed (Total FY19-20)	# Conducted to date
Public Programs	16	15+8+9= 32
Group Programs	20	6+14+15= 35
Stewardship & Community Sc	22	4+6+9= 19
Outreach	2	1+0+1= 2
Summer Camp	1	1+0+0= 1
Special Events	1	0+1+0= 1
Mercury Outreach	16	6+7+5= 18
Volunteer Coordination	12	4+3+6= 13
TOTAL	91	121

As you can see from the table above, we have already exceeded our total number of required programs for the year. We have also met or exceeded almost all program type requirements, the only one currently falling short being Stewardship & Community Science by 3 programs, which may still be met given the alternative programming listed below.

How do we intend to continue to meet the requirements for the remainder of FY19-20 (Q4)?

Since our staff, one Specialist and one Associate, are now working from home, their time is being spent evaluating and updating programs, creating training tools for conducting programs, and finding new ways to reach audiences while they are at home. Some examples of what we have started working on are a Scavenger Hunt activity that can be printed out at home and done in the home/neighborhood, creating and supplying alternative online resources for those that signed up for scheduled programming such as a how-to guide for decorating eggs with natural dyes, and discussing ideas for virtual programming. We also have been supplying teachers who had programs scheduled during this time with online resources they can share and do with their students online. Once allowed to return to the Refuge, we anticipate that we may not be able to host large groups for programs so we are investigating our options for doing online programs in the summer/fall.

Below are *examples* of what we have already done, in-progress of doing, and plan to do. These are developing ideas and more could be added. We plan to create and distribute at least 10 activities.

#	Activity	Status
1	Community Clean-up Flyer	DONE
2	Egg Decorating with Natural Dyes guide	DONE

3	Outdoor Sensory Scavenger Hunt	DONE
4	Educational Board Game	DONE
5	Educational Coloring pages	DONE
6	Educational Puzzle	Future Idea
7	Endangered Species Scout Badge	DONE
8	Watershed Watcher iSpy Game	Future Idea
9	Become a Watershed Watcher at-home	Future Idea
10	Native vs. Invasive Plants activity	Future Idea
11	How you can be a scientist at home!	Future Idea

Are SFBWS employees under the Watershed Watchers program fully equipped to work from home?

Yes, both the Specialist and Associate are equipped to telework. They were able to bring materials and files home with them, have access to their SFBWS email accounts, and have a work laptop or are working from their own laptop. Both participate in daily and weekly meetings organized by their USFWS supervisor and Refuge Manager. They are also allowed to gain access to materials left in the building if needed as we move forward during this time.

Scheduled Programs (April – June): Alternate Plans

Program	Date(s)	Alternate Plan	Audience
Tai Chi	April 4, May 2 & June 6	Live stream videos on Facebook and YouTube, links to WW and Refuge websites **(April 4 has had over 700 views!)**	Public
Egg decorating with natural dyes	April 11	Provide list of materials and instructions to those signed up; posted on Facebook and website; **shared by national U.S. Fish and Wildlife Service Facebook page!**	Current signups, volunteers, and public
College Groups	April 22 (2 classes) May 1, 15, 19 & 21	Send professors links to PowerPoint presentation, videos, and Watershed Watch info to share with students. Offer to join Zoom meetings if available/interested.	College professors and students
Service Learning Field Trips	April 30 June 4	Send teachers links to PowerPoint presentation, videos, Jr Ranger booklet, at-home activities as developed	Teachers and students
Insect Exploration	April 4	Send participants links to videos, Jr Ranger booklet, at-home activities as developed	Current signups and public
Corporate Groups	April 21	Send organizer resources to share with participants such as the community cleanup and Watershed Watch info	Corporate group participants
Restoration Work Days	March 14, April 25, May 9	Send resources to participants such as the community cleanup and Watershed Watch info	Current signups and public

Scout Programs	April 4, 25 & May 16 (2 programs)	Send resources and activities to scout group leaders for at-home activities that fit badge requirements; share online learning resources for Endangered Species Badge	Scout group leaders and scouts
Ohlone in the Marsh	May 2	Send participants links to videos, Jr Ranger booklet, at-home activities	Current sign-ups and public
Special Groups	April 2, May 16, 19	Send resources (online and at-home activities) to group leader to share with participants	Group leaders & participants

How will the remainder of the budget be spent?

Currently there is about a quarter of the budget remaining, on track with a quarter of the fiscal year remaining. The planned budget for the Specialist and Associate will still be carried out. Materials/Promo/Supplies budget can be spent on boosting social media posts in order to reach a wider audience other than those that follow our page, on PeachJar in order to reach schools and families, and for purchasing incentive items for those that participate in our at-home and virtual activities. These incentive items could be reusable items (such as water bottles, utensils, straws, etc.) and materials about the Refuge and the Watershed Watchers program. We also have "I'm A Watershed Watcher" sticker that could easily/cheaply be mailed. Incentives help promote our programming and encourage people to return to the Refuge once safe to do so.

How do we intend to move forward into FY20-21?

Moving into the next Fiscal Year we imagine that programming could look differently for some time, even if/when we are allowed back onto the Refuge and into the office. Part of our work during the remainder of the fiscal year will be planning potential alternate and virtual programming, programming for small groups (such as families that live together), informal interpretation type programming such as trail ranger talks, and other opportunities for schools, groups, and public members to participate in. We will provide a Scope of Work and Budget for 2020/2021 at a later date.

Social Media Plan for remaining Q4 (2-4 posts per week):

Below is a schedule of potential social media shares and posts that we will be doing to stay engaged with people while at home. Some posts are sharing the activities we are developing, others could be sharing online learning resources from partner organizations, as well as photos and fun facts about wildlife. This is a *working list* of ideas, themes, and celebratory days.

Week 1: March 29 – April 4

- March 31: Shared CondorKids learning resources from USFWS
- April 1: Shared Morning Crane Healing Arts Center initial advertisement for Tai Chi LIVE stream on Saturday, April 4th
- April 3: Shared reminder advertisement for Tai Chi LIVE stream

Week 2: April 5 – 11

- April 7: Created post to share Egg Decorating with Natural Dyes blog post and handout – shared by the San Francisco Bay NWR Complex and U.S. Fish and Wildlife Service Facebook pages
- April 10: Created post to share Outdoor Sensory Scavenger Hunt!

Week 3: April 12 – 18

- April 14: Create post for “Look up at the Sky Day!” – Do you see any birds?
- April 16: Create post: Neighborhood Walk – Scavenger Hunt – Poppies, birds, butterflies – using iNaturalist (stewardship & citizen science)
- April 18: Getting ready for Earth Day next week – share a post by the Watershed Watch Campaign?

Week 4: April 19 – 25

- April 21: Happy Earth Week! – share a post by the Watershed Watch Campaign?
- April 22: Happy Earth Day! – importance of watersheds
- April 25: Community Cleanup Activity – using Litterati (stewardship & citizen science)

Week 5: April 26 – May 2

- April 26: National Audubon Day! Share post by Santa Clara Valley Audubon Society?
- May 1: Appreciation for our volunteers

Week 6: May 3 – 9

- May 3: National Pet Week – appreciating the time we have at home & reminder to pick up after your pets to prevent urban runoff pollution
- May 5: Teacher Appreciation Day!
- May 7: National Wildflower Week – photos of flowers in the Butterfly Garden
- May 9: World Migratory Bird Day! – using eBird (stewardship & citizen science)
- May 10: Mother’s Day – photo of Goose & goslings

Week 7: May 10 – 16

- May 12: Highlight Salt Marsh habitat – clues for National Endangered Species Day
- May 15: National Endangered Species Day – Salty photo & fun facts
- May 16: National Love a Tree Day – what do trees do for us?

Week 8: May 17 – 23

- May 19: Info about Monarch Butterflies and the conservation work being done
- May 21: Highlight Coyote Creek Watershed
- May 24: National Scavenger Hunt Day – share activity to do at home

Week 9: May 24 – 30

- May 26: Highlight habitat restoration at the Refuge – Tuesday volunteer work crew
- May 27: Rachel Carson’s birthday! Nature Journaling, Poetry writing,
- May 30:

More to Continue…

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 7-5

Zun Zun School Assemblies for Watershed Watch FY 19-20

- Memorandum-End of Year Evaluation of the FY 19-20 School Assembly Program, August 7, 2020
- ZunZun Assembly Programs for Watershed Watch-Final Report FY 2019-2020 School Year

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

MEMORANDUM

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San José • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Valley Water

TO: Schools and Youth Outreach Work Group

FROM: Program staff

DATE: August 7, 2020

SUBJECT: **End-of-Year Evaluation of the FY 19-20 School Assembly Program**

The school education assembly program is in its eighteenth year of implementation. Each year, the Schools and Youth Outreach Work Group develops a target list of schools for ZunZun to contact. In FY 19-20, ZunZun conducted 43 assemblies at 22 schools.

ZunZun continued to fax the vocabulary lists (one for students from grades K-2 and another for grades 3-6) to each school before the assembly. Teachers were requested to familiarize the students with the vocabulary words. Schools were also e-mailed a short write-up about the assembly for inclusion in the parent newsletter. Watershed Watch brochures were distributed to teachers after the assembly. In addition, an e-mail with follow-up activities for teachers and students was sent to all schools.

To track effectiveness, ZunZun continued distributing postage-paid survey cards to teachers attending the assemblies. An online survey option also provided. A total of 107 completed surveys were received (105 survey cards, 2 online surveys). Of these, 45 were from grades K-2 teachers and 40 from grades 3-6 teachers. There were also 22 surveys where the grade was not indicated. As requested by the Work Group, results are presented as "Grades K-2", "Grades 3-6" and "overall".

ZunZun also distributed pledge forms titled "I Pledge to Keep My School Clean" to teachers. The pledge form required students to dispose of trash or recyclables properly or pick up litter for a week. Students signed the pledge each day to indicate completion of the activity. Teachers were asked to fax or email the completed pledge form to Program staff and enter their class to win monthly prizes. The Program received completed pledge forms from 9 classrooms.

Due to the shelter-in-place mandate beginning in March 2020, ZunZun replaced the remaining in-person assemblies with a distance learning package consisting of a recording of the assembly. The video was sent to 68 schools. Students were asked to complete a quiz to track their understanding of the assembly content. A summary of quiz results is included in this memo.

The list of schools that received in-person assemblies and the list of schools that received distance learning materials are provided at the end of this memo.

End-of-Year Survey Results

1. What percentage of your students know what a watershed is? (Circle one)

	25%	50%	75%	100%	Total Responses
Grades K-2 results (#)	9	9	14	12	44
Grades K-2 results (%)	20%	20%	32%	27%	
Grades 3-6 results (#)	6	5	12	17	40
Grades 3-6 results (%)	15%	13%	30%	43%	
Grades not marked (#)	5	5	8	4	22
Grades not marked (%)	23%	23%	36%	18%	

2. What percentage of your students can name a way to prevent pollution in the watershed? (Circle one)

	25%	50%	75%	100%	Total Responses
Grades K-2 results (#)	0	6	11	28	45
Grades K-2 results (%)	0%	13%	24%	62%	
Grades 3-6 results (#)	1	1	10	28	50
Grades 3-6 results (%)	3%	3%	25%	70%	
Grades not marked (#)	3	4	5	10	22
Grades not marked (%)	14%	18%	23%	45%	

3. How would you characterize the content of the assembly? (Circle One)

	Educational	Balanced	Entertaining	Neither	Total Responses
Grades K-2 results (#)	5	38	1	0	44
Grades K-2 results (%)	11%	86%	2%	0%	
Grades 3-6 results (#)	1	35	3	0	39
Grades 3-6 results (%)	3%	89%	8%	0%	
Grades not marked (#)	1	13	8	0	22
Grades not marked (%)	5%	59%	36%	0%	

Sampling of Comments:

Grades K-2

Comments

- Great assembly
- Did a wonderful job of keeping students engaged.
- The kids really enjoyed the assembly & learned a lot.
- Lots of kids are helping keep school clean
- Loved the interaction with audience.
- Fun & learned a lot.
- It was amazing! You used various strategies with students, and they were very engaged.

Grades 3-6

Comments

- It was a great assembly. Students enjoyed it! We all enjoyed it!
- It was interactive, educational, yet entertaining - which kept the students engaged.
- Great job! Very animated and engaging presentation!
- Great assembly, short and educational.
- Thank you so much for doing this assembly for no cost.
- Thank you. Fun & educational.
- We really enjoyed the music and learning. Thank you so much.
- Awesome show! Very catchy tunes.
- Super cool recycled instruments.
- Wonderful! They loved learning about Brazilian instruments.
- I enjoyed your use of various instruments in your presentation.
- Cool inclusion of Spanish!
- Great show! Loved that it was in Spanish for our Bilingual population!
- Super great job engaging our students and giving them opportunities to use language.
- Content perfectly aligned with 3rd grade curriculum. Entertaining too!
- Very engaging with academic language and useful information.
- We had a really good discussion afterward on watersheds.
- Excellent content and visuals.
- The kids loved and enjoyed the examples and information presented in songs and chants. Engaging.

Suggestions

- Watershed needs to be explicitly taught more - maybe have a written definition visible.
- It would have been better if it were a little longer. You did a great job!

Comments from surveys with grades not marked

- No suggestions. Absolutely loved it!
- Fun! Awesome! Wonderful!
- We LOVE this assembly. Thank you!
- You are so engaging! Thank you for a wonderful assembly!

Distance Leaning Quiz Results

	Grades K-2	Grades 3-5	Total
Total Responses	8	32	40
Number and percentage of students who provided one correct way to stop water pollution	5	32	37
	62.5%	100%	92.5%
Number and percentage of students who correctly identified that water from storm drains flows to creeks, the Bay and ocean	7	29	36
	87.5%	90.6%	90%
Number and percentage of students who knew the definition of a watershed	7	29	36
	87.5%	90.6%	90%

FY 19-20 - List of In-Person School Assemblies

Date	School	No. of Shows	No. of students	City
7/1/2019	Majestic Way	1	518	San Jose
9/4/2019	Central Park	2	400	Santa Clara
9/5/2019	Montague	2	426	Santa Clara
9/16/2019	Farnham	2	528	San Jose
10/3/2019	Los Arboles	2	353	San Jose
10/4/2019	Dove Hill	2	420	San Jose
10/10/2019	Marshall Lane	2	570	Saratoga
10/14/2019	Windmill Springs	2	440	San Jose
10/28/2019	Del Roble	2	460	San Jose
10/29/2019	Castlemont	2	626	Campbell
11/7/2019	Stratford Pomeroy	2	624	Santa Clara
11/15/2019	Sartorette	2	430	San Jose
12/3/2019	San Miguel	2	403	Sunnyvale
12/9/2019	Vargas	2	484	Sunnyvale
1/7/2020	Hellyer	2	420	San Jose
1/28/2020	De Vargas	2	530	San Jose
2/3/2020	Blossom Hill	2	660	Los Gatos
2/3/2020	Sanders	1	419	San Jose
2/14/2020	Randall	2	375	Milpitas
2/26/2020	Braly	2	400	Sunnyvale
2/28/2020	McKinley	2	388	San Jose
3/2/2020	Sedgewick	3	617	Cupertino
3/26/2020	Fairmeadow	2	Cancelled*	Palo Alto
4/14/2020	Landels	2	Cancelled*	Mountain View
4/23/2020	Arbor Day Event	1	Cancelled*	Santa Clara
5/28/2020	Meyerholz	2	Cancelled*	San Jose
Total	22 schools	43 assemblies of 50 planned	10,491	

* Cancelled due to COVID-1 Shelter-in Place Guidance

FY19-20 List of Schools that Received Distance Learning Materials**

Date Materials Sent	School	City
05/21/20	Don Callejon	Santa Clara
05/21/20	Stocklmeir	Santa Clara
05/21/20	Argonaut	Saratoga
05/21/20	Zanker	Milpitas
05/21/20	Sinnott	Milpitas
05/21/20	Laurelwood	San Jose
05/21/20	John Muir	San Jose
05/21/20	Blue Hills	Saratoga
05/21/20	Dahl	San Jose
05/21/20	Montclair	Los Altos
05/21/20	Hughes	Santa Clara
05/21/20	Mt Pleasant	San Jose
05/21/20	Sacred Heart	Saratoga
05/21/20	Stonegate	San Jose
05/21/20	Franklin	San Jose
05/21/20	Galarza	San Jose
05/21/20	Gabriela Mistral	Mountain View
05/21/20	Foothill	Saratoga
05/21/20	Regnart	Cupertino
05/21/20	Eaton	Cupertino
05/21/20	Fairwood	Sunnyvale
05/21/20	Stratford	Santa Clara
05/22/20	Alexander Rose	Milpitas
05/22/20	Nixon	Stanford
05/22/20	Montgomery	San Jose
05/22/20	Matsumoto	San Jose
05/22/20	Gardner	Los Altos Hills
05/22/20	Lynhaven	San Jose
05/22/20	Olinder	San Jose
05/22/20	Stratford	Santa Clara
05/22/20	Lakewood	Sunnyvale
05/22/20	Indigo Program	San Jose
05/22/20	Escondido	Stanford
05/22/20	Santee	San Jose
05/22/20	Carolyn Clark	San Jose
05/22/20	Nimitz	Sunnyvale
05/22/20	Rosemary School	Campbell
05/22/20	Pomeroy	Milpitas
05/22/20	McAuliffe	Saratoga
05/22/20	Forest Hill	San Jose
05/22/20	Santa Rita	Los Altos

** In addition to the schools listed in this table, all schools on the in-person assembly list also received the distance learning materials

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ZunZun Assembly Programs for Watershed Watch
FINAL REPORT 2019-2020 School Year

INTRODUCTION

This year's final report is, for obvious reasons, different than in previous years. Due to COVID-19 guidelines, seven assemblies scheduled for this school year were canceled. In an effort to explain the many hours that went into both live performances and distance learning, we will break the report into five sections:

Section 1: Overview of numbers of students, teachers and schools reached

Section 2: Live performance summary

Section 3: Distance Learning summary

Section 4: Ideas moving forward for 2020-2021 school year

Section 5: List of school names, cities, number of students, and a list of multiple dates when they received either a distance learning package or a live performance, or both.

Attachments - Sample of our pre- and post-assembly activities, and a sample distance learning flyer as additional attachments.

Please note that both the live and distance learning presentations have the same content and state standards, and they are only explained once in the live presentation section.

Section 1: NUMBERS OVERVIEW

Live Assembly Attendees:

Number of Live Assemblies:	43
Schools Receiving Live Performances	22
Number of Students Reached with Live Assemblies	10,491
Number of Teachers and Administrators	476

Distance Learning (DL) Recipients:

Schools Receiving Distance Learning Materials	26 + 44 (26 schools scheduled for 2019-20 plus 44 more)
Number of Teachers at "DL only" schools	546
Teacher and Administrator Totals	*1,035 (all teachers on 2019-20 schedule and "DL only")*

Distance Learning Material Use Number Summary:
Each "use" of a video means either a single family or student used the materials, or **a teacher has *shared his or her screen with the whole class***. This is true especially in younger grades. Therefore, each view could mean that multiple people are viewing the video.

A Watershed Watch Assembly! ~ what we would present live at schools~	448 views
WaterBeat Movement Activity~ 8 minutes of activity and movements/water science and watersheds:	279 views
The Red Bag~ 8-minute word-free video for kids to watch and tell what they see!	162 views
The WaterBeat Activity Book Video~ Lots of NGSS standards and activities to go with the book.	164 views
The WaterBeat Activity Book - Available in pdf format for easy viewing & sharing	15 downloads

Section 2: LIVE PEFORMANCE

ZunZun performed 43 live, informative, interactive, and participatory assemblies about watershed and watershed pollution prevention at Watershed Watch (WW) eligible schools. The assemblies were in Spanish and English, depending on the language spoken by audience members. All assemblies included California State Education standards in Science (Next Generation Science Standards), Math, History-Social Science, Language Arts and English Language Development, and Fine Arts so that they easily tied into the classroom curriculum. All assemblies had lots of student participation. All of the information was geared to be solid, hands-on ideas that students could take home and share with their families preserve and protect our watersheds.

Included in this "live assembly" section of the report are the following:

- Outreach
- State Content Standards
- Performances
- A Final Performance Schedule (also See Section 5 additional excel sheet)

OUTREACH

Using the list of target schools provided by Watershed Watch, ZunZun advertised this year's program to the principals and assembly coordinators at eligible elementary schools. We have to spend many hours collecting contact information from the schools, so outreach is a slow process. Once a contact is established, ZunZun emailed a flyer to the school contact person and then followed up to answer questions and book assemblies. Schools booked directly with ZunZun and a performance update was sent to SCVURPPP as schools booked dates. Because the assemblies are only available to schools every third year, we keep track of a waiting list of the schools requesting assemblies so we can honor their requests within the Watershed Watch requested timelines. We strived to do outreach to cities and towns that had not had an assembly in the previous two years, and we stay in contact with Vishakha Atre to keep checking in throughout the year.

SUPPLEMENTAL MATERIALS

Prior to each assembly, supplemental materials to aid in retention of the assembly information were sent to each school. A **vocabulary list** for grades K-2 and another for grades 3-6 were emailed to each assembly coordinator for distribution to teachers for use before and after the performances. At the assembly, ZunZun provided WW brochures, evaluation postcards, and school clean up pledge sheets to every teacher. At the front of the stage we kept other follow up materials available for teachers to take if they liked. After the assembly each school was emailed a post-assembly hand out, and a link to the electronic evaluation form.

A newsletter article about the performance was also sent to help inform students' families of the presentation and to encourage parents to ask questions about what the students learned about watershed pollution prevention. The parent newsletter article facilitates discussions at home about Watershed Watch's message, the ZunZun show, and provides information and links on how to prevent pollution at home as well as ideas on how to get involved.

We also continued to use the follow-up sheet, to provide ideas for grade level-appropriate activities that integrate the lessons learned in the assemblies into the classroom. These activity sheets were offered to teachers at each assembly along with Watershed Watch brochures and evaluation postcards. We were careful however to try and not bog down teachers as they also received the pledge sheets, which we emphasized in the assembly as a fun, productive activity that empowers students to help our watershed.

STATE CONTENT STANDARDS-COMMON CORE

We are always continuing to update our content to meet NGSS and common core curriculum goals. As Common Core standards are designed to encourage critical thinking and holistic learning, they are greatly addressed in the water assemblies provided.

In addition to being an extremely fun water education experience, ZunZun assemblies cover a large number of California State Content Standards for grades K-8. Because we use music and musical instruments, they meet many Visual and Performing Arts Standards. As the assemblies are about water issues, they cover Science Content Standards. Students are learning new vocabulary and words, so they are meeting many Language Arts and English Language Development Standards.
We introduce instruments from around the world, which meets many standards in History-Social Science Standards. Finally, we use both Spanish and English which meets English Language Development Standards and World Language Content Standards. Most importantly, the assemblies are designed to help students feel empowered to make changes in their daily lives and the lives of their families that help prevent wasting water. The assemblies encourage being proactive about water conservation.

A few specific examples of State Content Standards in Science, Language Arts, and Visual and Performing Arts met in our shows are as follows:

Science: Water education for all grade levels is included in every assembly. (i.e.: Grade 3 physical science 1.e, 1.f.; Grade 5, earth sciences 3a, 3b, 3c) Education standards regarding water on earth, evaporation, properties of a solid, liquid and a gas, water present in the form of salt and fresh water, etc. is addressed.

Language Arts: Use of rhythm and rhyme to remember a concept. Learning new words such as "adaptations" and "drought" and seeing/ hearing a description while repeating a rhyme that reiterates the definition. (See CA Content Standards, Reading Standards- Craft

and Structure, Key Ideas and Details Integration and Knowledge of Ideas. Also, Speaking and Listening Standards for grades K-6).

Visual and Performing Arts: As students sing and perform with us in the assembly, they are not only hearing music (All grades, Music Standards 1.1-1.5), but performing it (Grade 2, Music Standards, 2.1, 2.2 for example).

Because all students learn differently, ZunZun strives to use as many different types of learning tools as possible in the assemblies, so students are learning *visually, musically, physically, scientifically, mathematically,* and *verbally*. Students are thinking things through, using movements and singing throughout. So many standards are contained in the assemblies it would be a very long list to include them all here.

PERFORMANCES

This year we made sure the program was aligned with as many NGSS standards as possible. As always, we design our assembly segments to be interactive and to appeal to the many learning styles of the students. Always included are the following elements: visuals, call and response, movement, comedy, and lots of fun informative facts. We have incorporated an activity with 8 languages, so children can be excited to see different home languages as part of the assembly. All assemblies are performed in English and Spanish, with a greater emphasis on Spanish whenever needed. Each assembly is 45 minutes in length and introduces students to the topic of watershed. We chose from many segments to present at each school. Performance segments we pulled from at each school for this year's program are as follows:

Musical Rain First, we show our backdrops and look at the land. We then show two watersheds on the land, one flowing to a creek, and one flowing to a lake. We describe our land as draining to the San Francisco Bay. We then create a musical rain storm. Using Andean instruments such as zampona, kena, bombo, chakchas and charango we create wind, more wind, sounds of birds, thunder, rain and then the rain going down a creek and river. 10 students come up front to play the "rain" or chakchas from the Andes. We use this segment to review the water cycle, and the fact that all of our rain that falls either sinks into the ground, or runs off the land to a creek, or into a storm drain, to a creek, to the bay and the ocean.

Run Off This segment uses berim bao from Brasil and the audience, singing "run run run run run run run run off!" Two students are asked to come up and "run off" the water (a blue stretch of fabric) down the "street" (an aisle in the middle of the room) and in to a storm drain. They are surprised when we tell them "You're not done yet!" and we keep having things that run off: oil from a car, soap from a car wash, paint from washing paint brushes, and of course garbage! We talk about pollution prevention, and what they can do, even choices they make for packaging lunches or team snacks with less disposables and less plastics. We use this segment to also talk about surface tension, and the chemistry of water and why something as simple as soap can damage a watershed. Finally, we celebrate our

close connection to the watershed, our creeks, our wetlands, our delta, our San Francisco Bay and our Pacific Ocean.

Watershed Saving Dances

(Content Standards: fine arts, language arts, language retention) This segment was designed to inspire the whole audience (including the teachers!) to dance. After hearing all of the instruments representing a watershed, we introduce the watershed dances. The music played is performed on berimbau and students sing, "Doing the water dance! Protect the water when you've got the chance!" The dances we do are "the jellyfish", "the car wash", and "the rainbow".

We use "the jellyfish" to discuss plastic bags entering the watershed and ways to prevent this (mainly bring your own bag, recycle plastic bags, tie used and dirty bags in a knot before throwing away so they cannot fly).

The second dance is "the car wash," during which students pretend to wash a car. This segment shows the audience the difference between a storm drain and the sewer. We show a sink and then explain how a sewer system works and how it is different than a storm drain. Many students live with adults who do not know the difference between a sewer drain and a storm drain, and this simple explanation can help a whole family learn the difference, and keep soap and other toxins out of the storm drain. We explain that it is best to wash vehicles at a commercial car wash because they use less water and the dirty water drains to "the sewer", to treatment facilities that remove pollutants. If students must wash their vehicles at home, the first thing they should do is use a rag to wipe brake dust off of wheels. Then, use a hose with a nozzle to conserve water and to wash over a lawn, dirt or gravel so that the dirty water will not run to the storm drain. When washing is done, dirty soapy water should be dumped into the toilet or onto landscaping. We say soap is a thumbs-up inside, it gets us clean, but outside, soap is thumbs-down- it is no longer clean; it is pollution.

We use "the rainbow" to invite teachers to dance (always a highlight!) and then to remind students about oil from cars going down the storm drain when the rains come. After the dance, we explain that we love seeing rainbows in the sky, but when you see a rainbow on top of water, it is usually oil that has leaked from a car. Then we go on to help audience members to think of ways to prevent oil from going into the watershed.

Polluted Water

(Content Standards: fine arts, language arts, earth science, water science) This is a call and response song during which we invite students to come up front while the audience sings the call and response. The whole audience sings "Polluted water, down the storm drain, goes to a creek which reaches the sea where the fish are swimming. They start to feel sick, the poor, poor fish, it makes you think." The song is repeated three times as the students dance faster and faster.

Introduction of Watershed Art

We showcase two art banners made by local artists of water in action. One is a mural of a

watershed complete with town, people, trees, storm-drains, wildlife, lakes, streams and ocean. The other is a panel of photographs of water in many forms (lake, ocean, waves, waterfall, ice etc.) We mention that there are many ways to celebrate our connection to water, one being art. “Do you like to make art?” we ask them.

Water Instruments
We show the instruments used in the previous recording which all use water to create interesting sounds. We use water phones, water glasses, Brazilian cuicas and other interesting water instruments.

Birds of Watershed
We introduce the idea that by protecting water in our watershed (stopping plastic pollution, storm drain pollution prevention and reduction of garbage) we also protect wildlife which depend on clean sources. We showcase some of the common birds that can be seen locally, with movements that show their specific adaptation which help them survive by or in water. We get volunteers to represent each bird and its corresponding movement. We then get the whole audience to try the bird adaptation movements accompanied by our music. The birds showcased are, pelican, sanderling, duck, coot, kingfisher and gull.

Water in 12 Languages “H20 go with the Flow” This segment celebrates our diverse backgrounds, and the science of water is reviewed to tie in with more NGSS standards. We celebrate the diversity of language and our common purpose of protecting our natural resources, with a song which follows the path of water, the water cycle and the properties of water. Whole audience participates. Words are “aqua, vatten, amanzi, su, mizu, apa, wai, pani, shui, tubig, ran, and H2O". Though we have tried to end the show with a new song, everyone requests "H2O Go With the Flow" so we have ended every assembly with this hit!

High Tide/ Low Tide Limbo
(Content Standards: earth science, geography, fine arts) Using steel pan and marímbula, two instruments from the Caribbean made from recycled things, we celebrate our bay getting cleaner because of the actions of the audience. This segment allows us to define the San Francisco Bay as an estuary where fresh water drains from our towns and cities and mixes with salty water from the Pacific Ocean. We teach students that there are two high tides and two low tides per day. During low tide, mudflats, which are a rich habitat and space where egrets, herons, and other animals find food, are exposed. Students then come up front for the limbo and act as though they are fish under a high tide with lots of water and under a low tide. The segment is a celebration of a clean watershed, recycling, and wetland and tidal flat ecology.

We’re All Connected
(Content Standards: language arts, fine arts, Earth science) Our last call and response song has all the of excited assembly attendees sing a call and response with a rhythm: “We’re all connected, you and me. From where we live down to the sea.” We then end our assembly by thanking Watershed Watch and reminding teachers about evaluations and the fun follow up activities and brochures they have.

Section 3: DISTANCE LEARNING SUMMARY

Here is a summary of what Distance Learning we have done so far. It is broken into 4 sections:

~ What Materials Are Out There and a Timeline of When They Were Sent

~ What Our Numbers Are So Far

~ What We Have Learned and Changed and Trouble Shooting!

~Moving Forward

What Materials Are Out There

March: We met with SCVURPPP staff to discuss options for distance learning, and came up with the tools created (described in Section 1). We made sure all of the materials created and used were exclusive to Watershed Watch in an effort to collect the correct number of uses by SCVURPPP residents exclusively.

April: All videos and online distance learning materials were created and posted on our YouTube Channel. SCVURPP staff created an online survey to collect feedback from students. We embedded the survey below musical assembly video. We began distributing a flyer describing the online materials to teachers at the schools on our initial assembly performance list. We then expanded the outreach to 44 additional schools in the SCVURPPP area for whom we had teacher contacts. A link to the survey was included in the flyer.

May: After hearing from parents who appreciated being assigned "The Red Bag", we began resending the flyer every two weeks. We sent it to teachers during Teacher Appreciation Week. We sent out another round the week of May 18 up until May 27 with a list of NGSS content standards to help teachers reach their science instruction goals, and included a surface tension experiment link.

What We Learned and Changed and Trouble Shooting!

We decided to send materials every other week in an effort to get them to educators without "spamming" or annoying them. Our goal has always been to represent Watershed Watch as a ***help*** to teachers and educators.

We began by sending the materials to administrators but they have been so bogged down with policy we looked for teacher email contacts instead. **This is a very time consuming but worthwhile process, and ate up many, many hours March -May.** Now we have

taken the time to find as many teacher emails as possible so they receive the lessons directly.

All of our materials need to be simple, simple, simple, to use. **We try to keep things a single click away!** In addition to embedding links into the flyer, we began including the links in the cover email sent to teachers.

We have had no requests for live streaming, as most teachers prefer to have materials they can assign and have students complete on their own time line because of **equity and access issues**. We included some "do at home" lessons as well, such as the "water surface tension and soap experiment" kids can do at home.

This has been a back and forth process. We will continue to listen to requests and try to keep materials easily accessible and useful.

We look forward to 2020-2021 as a year to tie in a WW take home activity with the distance learning materials.

Section 4: Ideas moving forward for 2020-2021 school year

We look forward to working closely with Watershed Watch to ask teachers and schools how we can best serve them through 2020-2021. Also, we have been attending conferences on ***equity*** and learning so as to better serve as many students as possible despite economic barriers.

This is a key time for WW to support schools and families as school budgets will be cut, and school schedules will be difficult at best. So, we would do whatever work necessary to accommodate the needs of schools, delivering follow up activities and educational packets and coordinating with schools about what we can offer them.

Section 5: List of Schools that Received Live Assemblies/Distance Learning Materials

Table 5.1 – List of Schools that Received Live Assemblies*

Date	School	No. of Shows	No. of students	City
7/1/2019	Majestic Way	1	518	San Jose
9/4/2019	Central Park	2	400	Santa Clara
9/5/2019	Montague	2	426	Santa Clara
9/16/2019	Farnham	2	528	San Jose
10/3/2019	Los Arboles	2	353	San Jose
10/4/2019	Dove Hill	2	420	San Jose
10/10/2019	Marshall Lane	2	570	Saratoga
10/14/2019	Windmill Springs	2	440	San Jose
10/28/2019	Del Roble	2	460	San Jose
10/29/2019	Castlemont	2	626	Campbell
11/7/2019	Stratford Pomeroy	2	624	Santa Clara
11/15/2019	Sartorette	2	430	San Jose
12/3/2019	San Miguel	2	403	Sunnyvale
12/9/2019	Vargas	2	484	Sunnyvale
1/7/2020	Hellyer	2	420	San Jose
1/28/2020	De Vargas	2	530	San Jose
2/3/2020	Blossom Hill	2	660	Los Gatos
2/3/2020	Sanders	1	419	San Jose
2/14/2020	Randall	2	375	Milipitas
2/26/2020	Braly	2	400	Sunnyvale
2/28/2020	McKinley	2	388	San Jose
3/2/2020	Sedgewick	3	617	Cupertino
3/26/2020	Fairmeadow	2	Cancelled**	Palo Alto
4/14/2020	Landels	2	Cancelled**	Mountain View
4/23/2020	Arbor Day	1	Cancelled**	Santa Clara
5/28/2020	Meyerholz	2	Cancelled**	San Jose

* All schools on this list also received Distance Learning Materials
**These assemblies were cancelled due to COVID-19 guidelines

Table 5.2 – List of Schools that Received Distance Learning Materials

School	Date Materials Sent
Don Callejon	05/21/20
Stocklmeir	05/21/20
Argonaut	05/21/20
Zanker	05/21/20
Sinnott	05/21/20
Laurelwood	05/21/20
John Muir	05/21/20
Blue Hills	05/21/20
Dahl	05/21/20
Montclair	05/21/20
Hughes	05/21/20
Mt Pleasant	05/21/20
Sacred Heart	05/21/20
Stonegate	05/21/20
Franklin	05/21/20
Galarza	05/21/20
Gabriela Mistral	05/21/20
Foothill	05/21/20
Regnart	05/21/20
Eaton	05/21/20
Fairwood	05/21/20
Arbor Day	05/21/20
Stratford	05/21/20
Alexander Rose	05/22/20
Nixon	05/22/20
Montgomery	05/22/20
Matsumoto	05/22/20
Gardner	05/22/20
Lynhaven	05/22/20
Olinder	05/22/20
Stratford	05/22/20
Lakewood	05/22/20
Indigo Program	05/22/20
Escondido	05/22/20
Santee	05/22/20
Carolyn Clark	05/22/20
Nimitz	05/22/20
Rosemary School	05/22/20
Pomeroy	05/22/20
McAuliffe	05/22/20
Forest Hill	05/22/20
Santa Rita	05/22/20

YOUR SCHOOL IS ELIGIBLE FOR A FREE ASSEMBLY IN THE 19-20 SCHOOL YEAR!

Funded by the Santa Clara Valley Urban Runoff Pollution Prevention Program:
A coalition of local government agencies.

Watershed Watch has again partnered with ZunZun, the award-winning children's performing arts group, to perform "The H2O Show" at local elementary schools.

This interactive, musical and energetic show teaches about watershed awareness and clean water. Students learn what they can do to protect our waterways!

Appropriate for K-6 grades.
Bi-lingual shows available!
(Spanish-English)

Meets State Science, Math, and Fine Arts Content Standards.

"Fun, fun, fun while being educational!"

"The best assembly our school has ever had!"

"Outstanding!"

"Excellent program. Totally creative!"

BOOKING NOW FOR 2019-2020!

Call 831.426.0684
or email
zunzun@zunzuntunes.com

For more information, please visit:

www.zunzuntunes.com
www.mywatershedwatch.org

06706
6747

Thank you for having us come to your school to perform a Watershed Watch assembly for your students. We are including some vocabulary lists for your teachers to share with students, and make the most of this assembly.

The assembly is performed by ZunZun, a husband and wife duo who bring interactive, lively concerts and assemblies of music from all over North Central and South America to audiences all over the Western United States. The assembly can be in English, Spanish or both and is highly interactive with students joining us on stage to play many instruments "de las Americas". For more information about ZunZun check their website at www.zunzuntunes.com.

The Watershed Watch Campaign is dedicated to educating and informing the public about the importance and value of local watersheds, and why protection of watersheds is so important to you, your children and future generations. It emcompasses cities from Milpitas to Palo Alto, whose storm drains drian to the bay.

For the assembly:

ZunZun will arrive at least one half hour before the assemblies to unload and set up. Please be ready to have them get **as close to the assembly hall as possible** for load in. They bring in many heavy instruments and equiptment, and need to unload close to the stage/ performance area. If this is a problem, please let us know before we come. Unfortunately, the Watershed Watch programs cannot be performed outside.

ZunZun needs nothing other than access to electricity (with in 50 feet of performance space) and they bring their own sound system. Please have your students sit in a way so that there is a middle aisle so it is easy to find and bring up student volunteers during the show.

We are very excited to perform this Watershed Watch assembly for your school. Please let us know if you have any questions!

Sincerely,

ZunZun

Vocabulary List for Grades K-2

Bay: A body of water near the ocean that is almost totally surrounded by land but still touches the ocean.

Contaminate: To make dirty.

Conservation: Careful protection or wise use of something.

Estuary: A body of water on the coast where fresh water from rivers mixes with salt water from the ocean.

Fertilizer: Something added to soil that gives plants food they need to grow.

Hazardous: The chance of being injured or harmed is possible. OR Something that can hurt us.

Pesticide: A poison used to get rid of bugs or weeds.

Runoff: Water (for example from rain and watering lawns) that runs off the land and into storm drains, creeks and the Bay.

Sanitary sewer system: A network of drains and underground pipes that collects and sends wastewater from indoor uses to waste water treatment plants for cleaning.

Storm Drain System: All the curbside drains and underground pipes that collect rain water and carry it to the nearest creek.

Used Motor Oil: Oil taken from a car after it is no longer useful.

Wastewater: Water that has been used inside the house (for example, in toilets, sinks, showers, and washing machines). This water is collected and cleaned at a wastewater treatment plant and then sent to creeks, the Bay or ocean.

Wastewater treatment plant: A place built to clean wastewater before it is returned to the environment.

Watershed: A watershed is a land area that drains water into a creek, river, lake, wetland, bay, or groundwater aquifer. In the Santa Clara Valley, all the water from rain and irrigation which flows over the land surface (called runoff) goes into storm drains, creeks, and rivers that flow directly to San Francisco Bay. You live in a watershed that flows to a local creek, and all of the runoff from your home, yard and neighborhood flows to that creek.

Wetlands: A land area that is sometimes covered with water. Wetlands can be found near the coast, lakes, ponds, rivers, and streams. They can be salt water, fresh water, or a mix of salt and fresh waters, called brackish water. Wetlands get rid of pollutants from water, reduce the damage caused by floods, and are a special habitat for many plants and animals.

Vocabulary List for Grades 3-6

Bay: A body of water with a small opening through which ocean water freely flows in and out.

Contaminate: To harm or damage by contact. OR To make dirty.

Conservation: Careful protection or wise use of something OR the protection, maintenance, and care of natural resources for now and the future.

Estuary: A semi-enclosed body of water on the coast where fresh water from rivers and creeks mixes with salt water from the ocean.

Fertilizer: Something added to soil that gives plants nutrients they need to grow.

Hazardous: Something that can cause damage or harm due to its nature, content, or properties.

Pesticide: A chemical, often a poison used to destroy pests.

Runoff: Water (for example, from rain and watering lawns) that runs off the land and into storm drains, creeks and the Bay.

Sanitary sewer system: A network of drains and underground pipes that collects and sends wastewater from indoor uses to treatment plants.

Storm Drain System: A network of above ground openings (drains) and underground pipes that collect and deliver storm water and runoff, to local waterways. Storm drain systems do not treat the water.

Used Motor Oil: Oil taken from any vehicle or engine driven machine after it is no longer useful.

Wastewater: Water that has been used inside the house (for example, in toilets, sinks, showers, and washing machines). This water is collected and cleaned at a wastewater treatment plant and then sent to creeks, the Bay or ocean.

Wastewater treatment plant: A place built to clean wastewater before it is returned to the environment.

Watershed: A watershed is a land area that drains water into a creek, river, lake, wetland, Bay or underground. In the Santa Clara Valley, all the water from rain and irrigation which flows over the land surface (called runoff) goes into storm drains, creeks, and rivers that flow directly to San Francisco Bay. You live in a watershed that flows to a local creek, and all of the runoff from your home, yard and neighborhood flows to that creek

Wetlands: A land area that is sometimes covered with water, such as a swamp or marsh. Wetlands can be found near the coast, lakes, ponds, rivers, and streams. They can be salt water, fresh water, or a mix of salt and fresh waters, called brackish water. Wetlands filter pollutants from water, reduce the damage caused by floods, and are a special habitat for many plants and animals.

Watershed Watch
Protect Our Creeks And Bay
Sponsored by SCVURPPP

CRACK THE CODE – SAVE THE BAY!

Find the letter that matches the number. Write that letter in the space.

___	___	___	___		___	___	___	___		___	___	___	___
23	13	18	8		24	7	16	13		14	23	17	13

___	___	___		___	___	___	___	___		___	___	___	___	___
26	6	9		20	26	23	24	11		14	24	7	16	13

Clues:

A	B	C	D	E	F	G	H	I	J	K	L	M
7	3	12	14	9	21	25	6	16	10	2	18	11

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	23	5	4	24	20	26	22	1	17	19	8	15

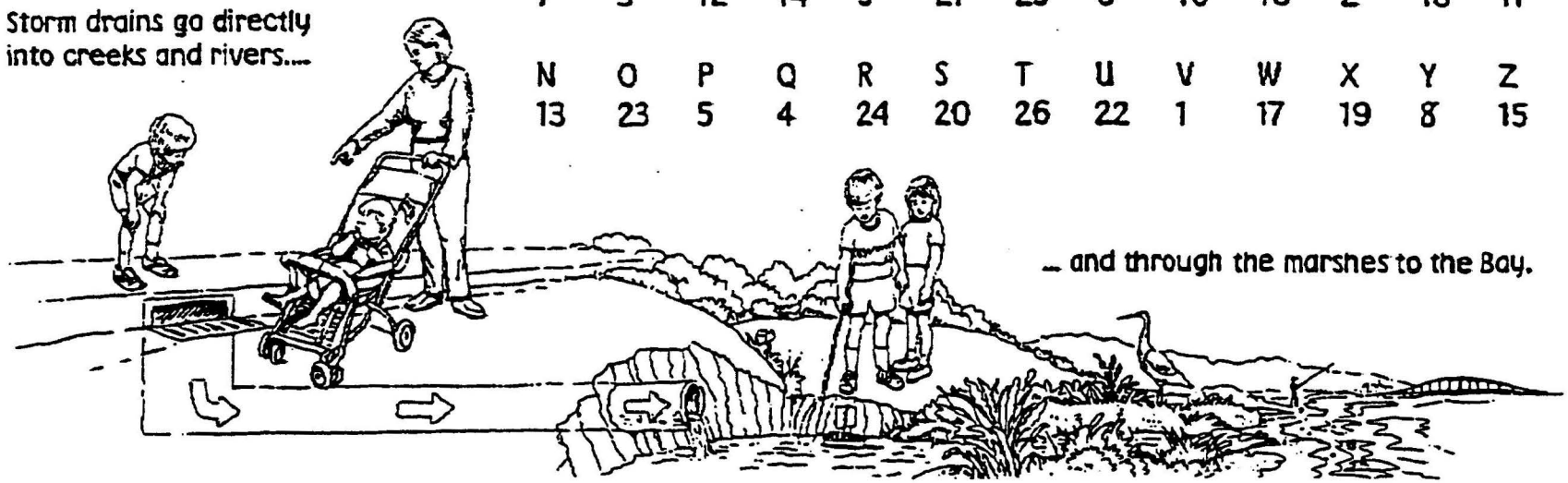

Watershed Watch
Protect Our Creeks And Bay
Sponsored by SCVURPPP

WORD SEARCH!

Words may be backwards, forwards, up, down, or diagonal.

CONSERVATION	preserve natural resources from loss, injury, decay, or waste
HERBICIDE	chemicals used to destroy particular plants
PESTICIDE	chemicals used to destroy particular insects
POLLUTION	something that dirties our air or water
RUNOFF	water that drains or flows off roofs, parking lots, driveways, or streets, and goes into storm drains and creeks
SANITARY SEWER	a system of pipes under the streets that connects indoor drains (in sinks, showers and toilets) with the local wastewater treatment plant
STORM DRAINS	a different system of pipes under the streets that carries rainwater and runoff directly to creeks and the Bay. Drains in the gutters (usually marked "No Dumping! Flows to Creek") are also called storm drains.
STORMWATER	rain water that flows down the streets during and after a storm
TOXIC	poisonous, harmful
WATERSHED	a region in which all land drains into the same body of water, such as into a bay, creek, river, or lake
WETLANDS	land next to creeks, rivers and the Bay where many birds, animals, and plants live

E	S	M	W	I	A	H	E	R	B	I	C	I	D	E
D	O	A	X	A	S	N	I	T	A	R	Y	F	F	R
I	C	O	N	S	E	R	V	A	T	I	O	N	S	N
C	E	T	L	I	O	N	F	U	I	E	X	I	D	U
A	R	U	W	O	T	I	G	F	O	B	H	E	N	F
S	T	O	R	M	W	A	T	E	R	O	T	Z	A	F
P	S	T	O	R	M	D	R	A	I	N	S	L	L	O
X	O	H	A	W	B	P	K	Y	V	S	O	Y	T	R
O	M	L	E	D	I	C	I	T	S	E	P	B	E	K
T	I	K	L	R	D	E	H	S	R	E	T	A	W	Y
T	B	H	L	U	V	A	O	A	N	B	W	M	C	T
A	R	U	G	E	T	N	I	U	L	L	O	E	U	N
W	E	T	W	Y	A	I	U	F	F	O	N	U	R	S
M	H	O	E	K	S	T	O	X	I	C	O	I	D	E
O	S	I	R	D	R	A	L	N	A	L	T	I	Z	P

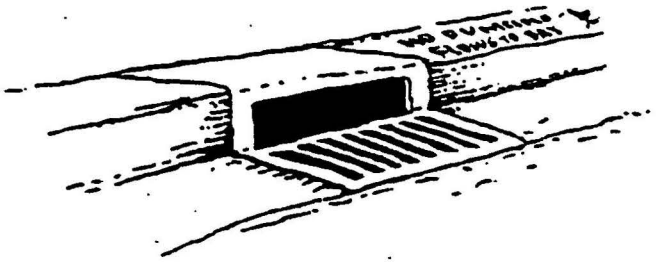

ZunZun Follow-up Activities: Explore Your Watershed!

www.mywatershedwatch.org

Basura Batucada Band (For all grades)
Your class can create a band from recycled materials just like ZunZun! Visit www.zunzuntunes.com and click on the "Kid Zone" to find a list of instruments and the recycled materials that were used in their construction.

Explore Your Watershed (For all grades)
Visit the Don Edwards National Wildlife Refuge in San Jose with your class for your next field trip. It's fun, it's interesting, and your students will remember what they learn at the refuge for years to come. For more information about this and other field trips, visit http://mywatershedwatch.org/fieldtrips.html

Mapping Storm Drains (For grades K-2)
Take a "field trip" to visit your school storm drains. Walk around the school campus and identify storm drains. Help the class draw a map showing school buildings, grounds, play yard, trash cans and storm drains.

Mapping Storm Drains and Identifying Pollutant Sources on Campus (For grades 3-5)
Complete the activity above. For each storm drain, identify sources of runoff (i.e., rain, roof downspouts, sprinklers or garden hose) and possible pollutants (e.g., litter, leaking oil from cars, pesticides, chemicals used for cleaning, soapy water, overflowing trash cans).

The Big Picture Map (For grades 3-5)
For this activity you will need a map of your city or watershed. Have students find the school on the map and identify the creek or river to which the school storm drains probably flow. Have students mark how water and pollutants can flow from the school storm drains to the San Francisco Bay. Students can also find their own house on the map and identify the names of nearby creeks. Discuss the impact of everyday activities on local creeks and the Bay and steps that can be taken to prevent storm water pollution.

TIP: Contact your local city to get a "Creek and Watershed" map. These maps, developed by the Oakland Museum, provide detailed watershed features including the location of creeks and large storm drains. You can view the maps at http://www.scvurppp-w2k.com/museum_maps.shtml

Storm Drain Monitoring (For grades 3-5)
Perform an audit on your school's storm drains and monitor the litter that collects around them throughout the year. Have the class record the types of litter (plastic, paper, leaves, etc.). Create graphs to display the types of litter found, storm drains with the most litter, and peak months of litter collection. Discuss ways to prevent litter. (Remember to clean up litter too!) Storm drain monitoring can be a class activity, or a specific classroom job that is rotated every month.

ZunZun assemblies and the Watershed Watch Campaign are funded by the Santa Clara Valley Urban Runoff Pollution Prevention Program, a coalition of local government agencies.

Local Stormwater Education Contacts

Contact your local city's stormwater education program for assistance with these follow-up activities and to find out about other educational opportunities for your class.

City	Contact
Campbell, Los Gatos, Monte Sereno, and Saratoga	West Valley Clean Water Program 408-354-5385
Cupertino	Environmental Programs environmental@cupertino.org 408-777-3354
Los Altos, Los Altos Hills, Mountain View, and Palo Alto	Regional Water Quality Control Plant Joanna Tran Joanna.Tran@CityofPaloAlto.org 650-329-2518
San Jose	Environmental Services Stormwater Hotline 408-945-3000
Santa Clara	Karin Hickey kahickey@santaclaraca.gov 408-615-3097
Sunnyvale	Environmental Outreach wpcp@ci.sunnyvale.ca.us 408-730-7717

The Santa Clara Valley Water District also offers a wide range of educational programs for teachers and students. These are available to all elementary schools in Santa Clara County.

Santa Clara Valley Water District
School Outreach Program
Mera Burton
408-630-3174

Santa Clara Valley Water District
Adopt-A-Creek Program and
Countywide Creek Cleanup Events
Ricardo Barajas
408- 921-1366

We are so excited to offer Watershed Watch and ZunZun's
DISTANCE LEARNING PACKAGE to help your students learn about water!

Funded by the Santa Clara Valley Urban Runoff Pollution Prevention Program:
A coalition of local government agencies.

These activities are designed to teach about watershed using NGSS while keeping kids moving! Choose any you like!

These activities are designed to teach about watershed using NGSS while keeping kids moving! Choose any you like!

WaterBeat Movement Activity~ 8 minutes of activity and movements to learn about water science and watersheds, use this link:
https://youtu.be/IW24Pwx0SjA

The Red Bag~ 8 minute *word-free* video for kids to watch and tell you what they see! Use this link:
https://youtu.be/yE7CiyEkoHg

A Watershed Watch Assembly!~ Here's what we would present at schools!
https://youtu.be/gZW_Kspd270

The WaterBeat Activity Book Video~ Lots of NGSS standards and activities to go with the book. Use this link:
https://youtu.be/d-EjwVhjHaI

The WaterBeat Activity Book ~ Available in pdf format for easy viewing & sharing

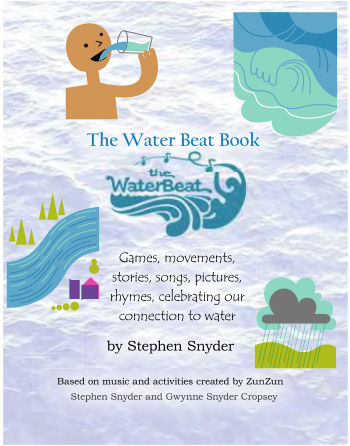

If you have time can you take a short survey? It helps us improve!

(insert survey here once Vishakha has it cleared

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 8-1

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project: Project Report – June 30, 2020

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

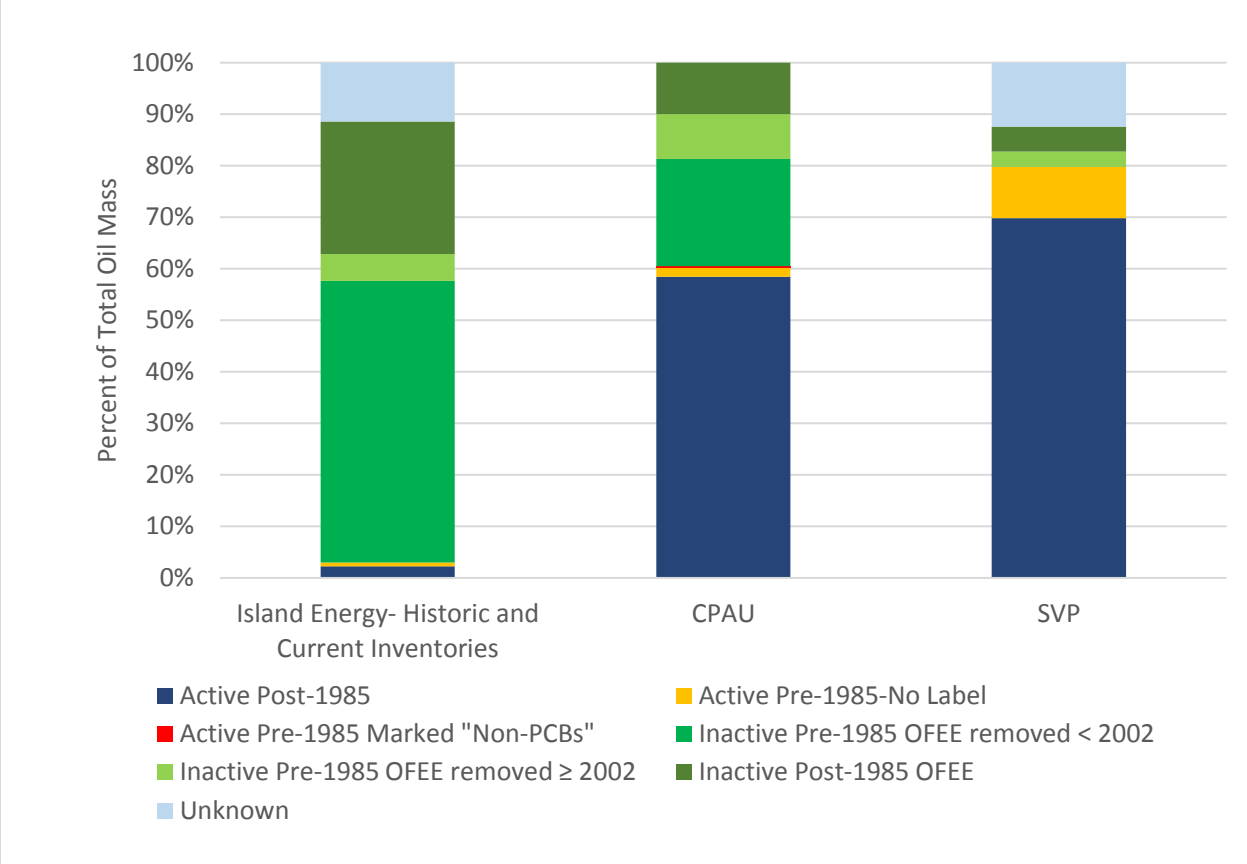

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

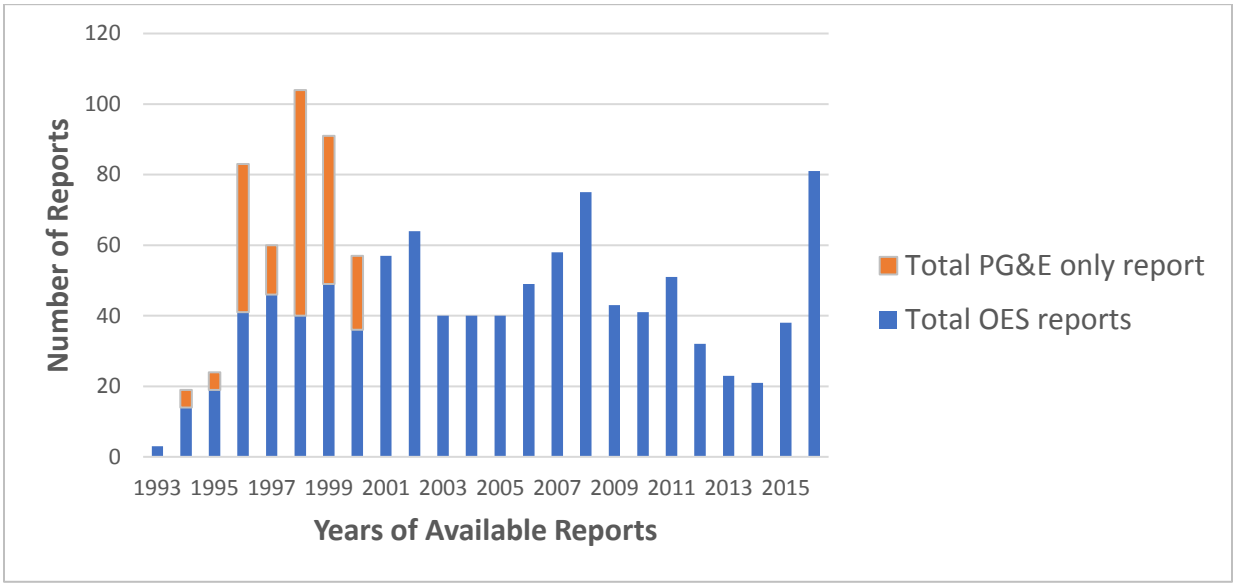

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

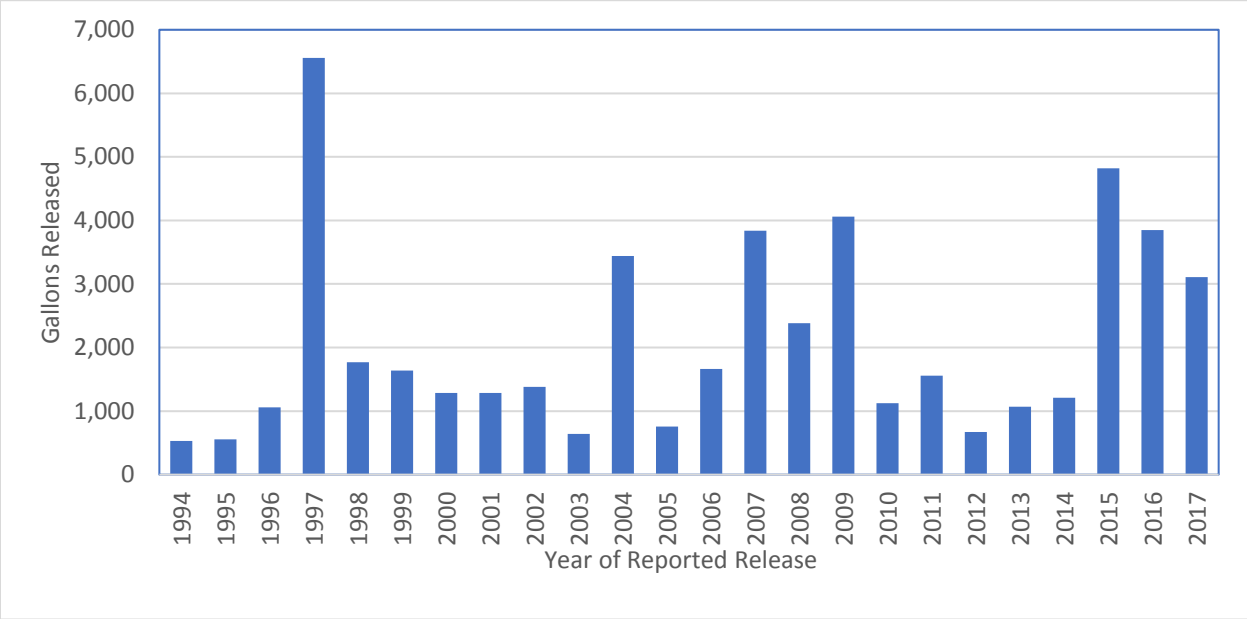

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

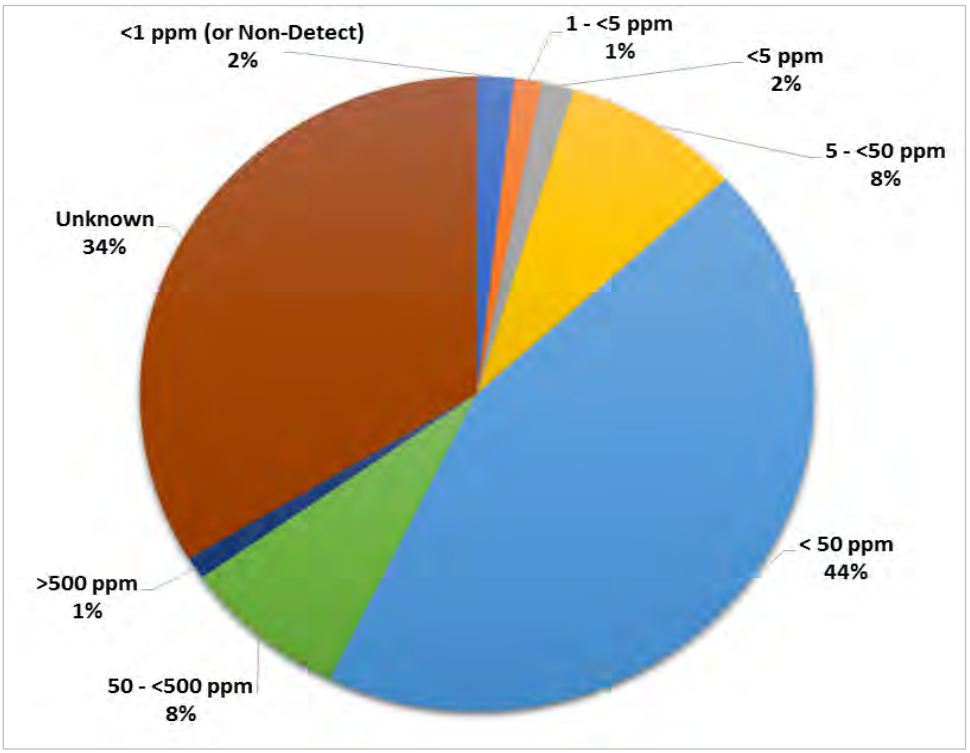

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

6.0 References

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 9-1

IPM Store Partnership Program

- List of Stores in the IPM Store Partnership Program and Training Dates
- Our Water - Our World Training Pre-Training Survey Summary
- Our Water - Our World Training Post-Training Survey Summary

City	Store Name	Address	FY11-12 Training	FY12-13 Training	FY13-14 Training	FY14-15 Training	FY15-16 Training	FY16-17 Training	FY17-18 Training	FY18-19 Training	FY19-20 Training
Campbell											
1	Home Depot	480 E Hamilton Ave			5/15/14						2/25/20 (2 trainings)
2	SummerWinds Nursery	2460 S Winchester Blvd	9/19/11	6/26/13		3/9/15		5/31/17	1/31/18		
Cupertino											
3	SummerWinds Nursery	1491 S De Anza Blvd	6/25/12		6/11/14		2/17/16		2/28/18		
4	Yamagami's Nursery	1361 S De Anza Blvd	1/24/12		1/21/14				1/11/18		
Los Altos											
5	Los Altos Nursery	245 Hawthorne Ave				8/19/14					
6	Los Altos True Value Hardware	441 1st St								1/24/19	
Los Gatos											
7	Ace Los Gatos Hardware	15300 Los Gatos Blvd				10/10/14		3/10/17			
Milpitas											
8	Home Depot	1177 Great Mall Drive				11/19/14					10/21/2019
Mountain View											
9	Blossom True Value Hardware	1297 W El Camino Real									
Palo Alto											
10	Ace Hardware	875 Alma Street				1/29/15		5/2/17		1/29/19	
11	SummerWinds Nursery	725 San Antonio Rd	6/8/12		6/5/14		2/24/16		2/28/18 2 trainings		
Santa Clara											
12	Home Depot	2435 Lafayette St	2/23/12				11/24/15				

City	Store Name	Address	FY11-12 Training	FY12-13 Training	FY13-14 Training	FY14-15 Training	FY15-16 Training	FY16-17 Training	FY17-18 Training	FY18-19 Training	FY19-20 Training
San Jose											
13	Ace Hardware	2253 Lincoln Ave			6/20/14			11/22/16			
14	Almaden Valley Nursery	15800 Almaden Exwy	6/29/12	6/28/13				2/10/17			
15	Home Depot	2181 Monterey Road			3/14/14		4/13/16				
16	Home Depot	2855 Story Road			4/18/14				6/18/18		
17	Home Depot	635 W Capitol Expy		2/24/13			12/9/15				
18	Home Depot	1855 Hillsdale Ave		5/8/13				10/26/16		1/31/19	
19	Home Depot	975 De Anza Blvd				11/8/14					
20	Home Depot	920 Blossom Hill Rd			4/25/14			3/1/17			
21	Payless Nursery	2927 S King Rd									
Saratoga											
22	Ace Hardware	12870 Saratoga Sunnyvale Rd									
Sunnyvale											
23	Home Depot	680 Kifer Rd				3/27/15					

Our Water - Our World Training
Pre-Training Survey Summary
FY 19-20

(Home Depot in Milpitas and Campbell)

Number of Attendees: 15
Number of Evaluations: 15

#	Knowledge Survey Question	Yes	No	I Don't know
1.	**When water enters a storm drain, does it go to a treatment plant before it reaches a creek?**	**2**	**12**	**1**
2.	**When water enters a sanitary sewer from a house drain like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or Bay?**	**4**	**8**	**3**
3.	**Is it more effective to treat an ant infestation with a bait station rather than a spray?**	**10**	**5**	**0**
4.	**Where is your local household hazardous waste collection facility located?**	• Online (3) • Don't know (3) • Customer service • Receiving • Santa Clara Hazardous Waste • HHW.org • Waste Water dept • City (2) • SCC Website PA Zero Waste website		

5. Which sentence best describes Integrated Pest Management (IPM) (choose one)

(**0**) a. IPM only uses pesticides.
(**15**) b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only of needed).
(**0**) c. IPM does not rely on identifying pests/diseases before treating.

6. Which of these is the most effective IPM method for managing aphids? (choose one)

(**2**) a. Apply fast acting fertilizers
(**11**) b. Spray insecticidal soaps and/or prevent ants from vegetation with tanglefoot or bait stations.
(**2**) c. Use products with pyrethroids

The Our Water – Our World program is a consortium of local water pollution prevention agencies and the Bay Area Stormwater Management Agencies Association (BASMAA), working to protect local creeks, bays and wetlands, including San Francisco Bay.

Our Water - Our World Training
Post-Training Survey Summary
FY 19-20

(Home Depot in Milpitas and Campbell)

Number of Attendees: 15
Number of Evaluations: 15

#	Knowledge Survey Question	Yes	No	I Don't know
1.	**When water enters a <u>storm drain</u>, does it go to a treatment plant before it reaches a creek?**	**2**	**13**	**0**
2.	**When water enters a <u>sanitary sewer</u> from a house drain like your sink or toilet, are pesticides removed at the sewage treatment plant before the treated water reaches a creek or Bay?**	**3**	**12**	**0**
3.	**Is it more effective to treat an ant infestation with a bait station rather than a spray?**	**13**	**2**	**0**
4.	**Where is your local household hazardous waste collection facility located?**	• HHW.org (9) • Look online (4) • Customer service UC IPM • Water Treatment Facility		

5. Which sentence best describes Integrated Pest Management (IPM) (<u>choose one</u>)

(**0**) a. IPM only uses pesticides.
(**14**) b. IPM uses pest identification, trapping, beneficial insects, and pesticides (only of needed).
(**1**) c. IPM does not rely on identifying pests/diseases before treating.

6. Which of these is the most effective IPM method for managing aphids? (<u>choose one</u>)

(**1**) a. Apply fast acting fertilizers
(**11**) b. Spray insecticidal soaps and/or prevent ants from vegetation with tanglefoot or bait stations.
(**3**) c. Use products with pyrethroids

Training Evaluation Questions	Disagree	Neutral	Agree
I learned at least one eco-friendly pest management method today	**0**	**1**	**14**
The training will help me recommend and/or sell eco-friendly products	**1**	**0**	**14**
I can comfortably share what I learned with customers and/or co-workers	**0**	**1**	**14**
I can easily use the Our Water - Our World shelf-tags and fact sheets to inform customers about less toxic pest management	**0**	**1**	**13**

	Too much info	Just right	Not enough info
Printed resource materials from this training were	**0**	**13**	**0**
What part of the Training was most helpful?	• **How to treat specific pests** • **All of it (5)** • **Knowing the different resources available** • **New product info** • **Folder (2)** • **Identifying proper products for insect control** • **Understanding labels – demo** • **Details on insect treatment**		
What part of the training could be improved?	• **Don't know** • **None** • **No (bring coffee)** • **Sitting down and taking more time** • **Survey**		

The Our Water – Our World program is a consortium of local water pollution prevention agencies and the Bay Area Stormwater Management Agencies Association (BASMAA), working to protect local creeks, bays and wetlands, including San Francisco Bay.

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 9-2

FY 19-20 Green Gardener Training Program

- Santa Clara Valley Green Gardener Training Program – FY 19-20 Activities
- Green Gardener Final Evaluation Summary
- Green Gardener Training Announcements – English & Spanish
- Green Gardeners List

Santa Clara Valley *Green Gardener* Training Program
FY 19-20 Activities

Background

In FY 07-08, the Program piloted the first Santa Clara Valley Green Gardener training. The Green Gardener program is an educational initiative that brings quality training to professional landscapers, gardeners, and landscape maintenance workers on how to "garden green".

The Green Gardener Program is offered at two levels, Basic and Advanced. Each training level consists of ten, two-hour sessions on sustainable landscaping topics. Students must attend at least 80 percent of the classes and pass a final examination to be placed on the Green Gardener list promoted to the public. To maintain their status as Green Gardeners, individuals must meet annual continuing education requirements.

All trainings are conducted in collaboration with the Sunnyvale-Cupertino Adult Community Education (ACE) and the Master Gardeners of Santa Clara County.

FY 19-20 Santa Clara Valley Basic Green Gardener Training

The Program conducted the Basic Green Gardener training in FY 19-20. Due to low enrollment numbers, the English and Spanish classes were combined into one bilingual (English and Spanish) class. The bilingual class was held on Wednesdays, August 28 to November 6, 2019. The Program provided funds toward student fees, guest speaker fees, teacher fees, and supplies (binders, handouts, and baseball caps with the Green Gardener logo).

Due to shelter-in-place mandates, the Program did not offer in-person spring classes for Green Gardeners to re-certify. Program staff sent a list of available online classes to Green Gardeners as a re-certification option.

The Green Gardener trainings were publicized via mailings, email, radio ads, the Watershed Watch website, and social networking sites. Outreach was conducted to landscape companies to inform them of the opportunity to become certified Green Gardeners and help them expand their business prospects. Outreach to residents was conducted to inform them about the availability of trained Green Gardeners. Outreach efforts included the following:

- Advertising on radio, television and online;
- Posting training announcements on the Watershed Watch website, Facebook, and Twitter pages;
- Mailing of the registration flyer to landscape maintenance companies by the Program.
- Distributing flyers at outreach events; and
- Posting the list of trained Green Gardeners on the Watershed Watch website.

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Evaluation of Effectiveness

In FY 19-20, a total of 21 individuals completed the Green Gardener training.

A summary of the evaluations from the Green Gardener training indicates that attendees found the class very useful and will be making changes to their landscape management practices based on what they learned at the trainings. Attendees were required to take a final test to receive the certificate of completion. This ensured that they understood the curriculum and will be able to implement the practices at their client locations.

Currently, the Santa Clara Valley *Green Gardener* List includes 90 Green Gardeners. Of these, 65 are landscape professional and 25 are individuals that do not provide professional services. The list of Green Gardeners is distributed at outreach events and is available online at http://www.mywatershedwatch.org/findgardener.html.

Santa Clara Valley Green Gardener Final Evaluation

Number of Evaluations in English: 18

Number of Evaluations in Spanish: 3

1. **Which cities do you have clients located in or have worked on jobs there within the past year? (Circle all that apply)**
   Campbell **10** Cupertino **8** Los Altos **7** Los Altos Hills **6** Los Gatos **9**
   Santa Clara **7** Milpitas **2** Monte Sereno **5** Mtn. View **6** Palo Alto **8**
   San Jose **14** Saratoga **9** Sunnyvale **8** Unincorporated Santa Clara County **6**
   Other San Francisco, Pleasanton, Fremont (**2**), Atherton, San Carlos, San Mateo, Hillsborough, Redwood City, Woodside, Union City, Hollister, Fresno.

2. **Were the following topics useful? (check one that applies)**

TOPIC	*USEFUL*	*SOMEWHAT USEFUL*	*NOT USEFUL*	*DID NOT ATTEND*	*COMMENTS*
Soils	**18**	**2**	**0**	**0**	• A very important aspect in any type of gardening. • Learned a lot.
Pruning	**17**	**2**	**1**	**1**	• Too many landscapers do not know the proper pruning needed for a healthy landscape. • You should touch on following municipal codes, following City/County ordinances and getting proper permits. This is super important for contractors so that they and their clients don't get citations and fines. • Great lesson. • I feel like technique could have gone over more. • Already knew some. • Pruning wasn't hands on up close (tools).
Right Plant, Right Place	**16**	**4**	**0**	**0**	• This is important to educate clients on this aspect. • Already knew some. • They could teach how to plant and how deep in the soil.

TOPIC	*USEFUL*	*SOMEWHAT USEFUL*	*NOT USEFUL*	*DID NOT ATTEND*	*COMMENTS*
Integrated Pest Mgmt.	**15**	**4**	**0**	**1**	• Not all pests require the use of chemicals and it is important to be educated on other methods. • Need more of the brochures. • Information on the types of flowers to attract beneficial insects wasn't in the handouts.
Compost / Mulches	**15**	**3**	**1**	**0**	• I love mulch and know it's so beneficial • Worm bin on test but wasn't in the handout.
Fertilizers	**15**	**5**	**0**	**0**	
Irrigation (1, 2, 3)	**17**	**3**	**1**	**0**	• Lawn sprinklers not part of my job. • They didn't teach how to install irrigation. • Previously knew the info.
Air Quality	**12**	**7**	**1**	**0**	• Great to keep in mind. • Can't relate to the point.

3. What did you think of the following guest speaker presentations? (check one that applies)

TOPIC	*USEFUL*	*SOMEWHAT USEFUL*	*NOT USEFUL*	*DID NOT ATTEND*	*COMMENTS*
Air Quality	**11**	**5**	**0**	**1**	• I had no idea how much lawn equipment pollutes. • Very helpful. • So many interesting facts. • Was late b/c job. • One sided info – too anti-gas.
Right Plant Right Place	**14**	**4**	**1**	**0**	• More info. • I love CA natives. • Love anyone CNPS. • This guy was awesome. • In depth knowledge of native plants. • More worksheets would have been helpful. Too personal.

4. **Will you be changing any of your landscape management practices based on what you have learned in class?** Yes **18** No **0**

5. **Please provide one or two examples of a practice that you will be changing:**
   - Talking to clients about leaving leaf debris and reduce green waste.
   - Catch can test. To be able to set up proper irrigations. E, M, P, B, and C to educate clients and all other resources.
   - Irrigation, I used to only do design but now can take it a step further.
   - Keeping more organic matter in landscape areas where appropriate. Utilizing some of the irrigation forms to stay aware of my contractor's successes and areas for improvement. Try more IPM for landscape pests where appropriate.
   - Pruning, trimming (fertilizing, schedule, water schedule).
   - Implementing a more thought out and well-designed irrigation system by hydrozone and water needs. Creating my own compost for my personal garden.
   - Pruning. Air quality.
   - Better Irrigation (especially in terms of setting the correct timing).
   - Change the setting of irrigation system.
   - Use IPM to control pests. Use catch can test for irrigation management.
   - Irrigation.
   - Irrigation: change the controllers to ones that can be run more than once a day.
   - Mulching of grass.
   - Better use of irrigation.
   - Irrigation system. Pruning trees.
   - Less leaf blowing and better IPM practices.
   - Be loyal to the soil. Start from analyzing to soil first then troubleshooting.
   - Will now specify fertilizers when requiring bids from contractors.

6. **Which benefits from this program are important to you? (check one that applies)**

BENEFIT	*IMPORTANT*	*SOMEWHAT IMPORTANT*	*NOT IMPORTANT*	*COMMENTS*
Information & Training	**17**	**0**	**0**	
Comparing ideas with others	**13**	**7**	**1**	• Best way to learn new techniques.
Meeting with experts and guest lecturers	**10**	**5**	**0**	• Loved meeting and learning by industry professionals.
Getting on the certification list for Green Gardeners for public outreach	**10**	**6**	**1**	

7. **Would you recommend this Green Gardener class to a co-worker or another landscape professional?**
   Yes **18** No **1**

8. **Would you be interested in taking an advanced Green Gardener course?**
   Yes **19** No **1** Maybe **1**

9. **Do you work for:** Yourself **12** Company **5** Government Agency **2**

10. **How many different landscape maintenance clients do you have?**
    None **3** 1-10 **7** 11-20 **3** 20+ **5**

11. **Please tell us about how much landscape maintenance training you have had before taking this class:**
    None **5** Some classes **9** A degree in horticulture or other program **5**

12. **Please tell us other suggestions you may have to make the Green Gardener classes better:**
    - I would like to see more info class on the importance of soil. More native plants choices.
    - If possible, have a binder or photos of a Green Landscape.
    - A program for apprenticeships with industry professionals. Lots of second language students, sometimes details get lost.
    - Great class learned a lot.
    - Some exam questions were not clear. Questions should not lead to confusion.
    - More practice.
    - I think a list of key vocabulary words with definitions would be helpful. Work sheets are always helpful.
    - Grading took too long.
    - Shorten last class for only review and grading of test. No extra explanations necessary

Green Gardener Training – Fall 2019

(Dé la vuelta para obtener información en español)

Expand your business using Green Gardening techniques!

Two Training Sessions: One in *English* and one in *Spanish*

Each training session consists of 10 classes

Wednesdays: August 28, 2019 to October 30, 2019, 4:30 PM - 6:30 PM – *English*
Thursdays: August 29, 2019 to October 31, 2019, 4:00 PM - 6:00 PM – *Spanish*

Cost: $60 for landscape professionals (with proof of employment); $120 for others
Location: Fremont Union High School District – Adult School
(Located at Vallco – next to Benihaha)
10123 North Wolfe Rd., Suite 2085, Cupertino, CA 95014

Register Online:
https://fuhsdadultschool.asapconnected.com/?#CourseGroupID=44847

Learn to:

- Design and fix sprinklers and drip irrigation systems
- Select the right plants to save water and reduce the use of pesticides and fertilizers
- Solve pest problems without using toxic pesticides
- Prune correctly
- Mulch and Compost

"All the practices are just about trying to make your yard work better – work in a more natural manner." – *Green Gardener Brian Debasitis, Owner of Mauby Landscape Service*

"I paid for two of the people I work with to do the training in Spanish, because I think it's a great program." – *Green Gardener Bonnie Brock, Owner of Bonnie Brock Landscape Design*

"A healthier, more sustainable garden saves money in the long run." – *Green Gardener Maryanne Quincy, Owner of Q-Gardens*

Receive:

- *Certification of Completion and Green Gardener Card*
- *Free Publicity on Local Gardening Websites*
  - *http://ourwaterourworld.org/Green-Gardener*
  - *www.MyWatershedWatch.org/greengardener.html*
  - *http://mgsantaclara.ucanr.edu/community-programs/*

For More Information, visit

www.MyWatershedWatch.org/greengardener.html

The Santa Clara Valley Green Gardener Program is funded by the Santa Clara Valley Urban Runoff Pollution Prevention Program, a coalition of local government agencies.

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Entrenamiento de Jardineros Verdes – Otoño 2019

(Turn Over for Information in English)

¡Aumente su negocio usando practicas de jardinería sostenibles!

Dos sesiones a partir de septiembre: Una en *inglés* y una en *español*

Cada sesión de entrenamiento consta de 10 clases

Wednesdays: August 28, 2019 to October 30, 2019, 4:30 PM - 6:30 PM – *English*
jueves: 29 agosto hasta 31 octubre, 2019, 4:00 PM - 6:00 PM - *español*

Costo: $60 para profesionales del jardinería (con prueba de empleo); $120 para otros

Localidad: Fremont Union High School District – Adult School
(Located at Vallco – next to Benihaha)
10123 North Wolfe Rd., Suite 2085, Sunnyvale, CA 95014

Para registrarse
https://fuhsdadultschool.asapconnected.com/?#CourseGroupID=44847

Aprenda como:

- Diseñar y fijar aspersores y sistemas de riego por goteo
- Seleccione las plantas adecuadas para ahorrar agua y reducir el uso de pesticidas y fertilizantes
- Resuelva los problemas de plagas sin usar pesticidas tóxicos
- Podar correctamente
- El mantillo y abono

"Todas las prácticas son sólo acerca de tratar de hacer que su jardín trabaje mejor - que trabaje de una manera más natural." – *Brian Debasitis. Jardinero verde y Propietario de Mauby Landscape Service*

"Pagué por dos de las personas con las que trabajaron para facilitar en entrenamiento en español, porque creo que es un gran programa." – *Bonnie Brock. Jardinero verde y Propietario de Bonnie Brock Landscape Design*

"Un jardín más aludable y más sostenible ahorra dinero en el largo plazo." – *Maryanne Quincy, Jardinero verde y Propietario de Q-Gardens*

(Todos los testimonios traducidos del Inglés)

Recibirá:

- *Certificación de Finalización*
- *Tarjeta de jardinero verde*
- *Publicidad gratuita en los sitios web de jardinería local*
  - *http://ourwaterourworld.org/Green-Gardener*
  - *www.MyWatershedWatch.org/greengardener.html*
  - *http://mgsantaclara.ucanr.edu/community-programs/*

Para más información, visite www.MyWatershedWatch.org/greengardener.html

El programa de jardineros verdes "Santa Clara Valley Green Gardener Program" está financiado por el programa "Santa Clara Valley Urban Runoff Pollution Prevention Program," una coalición de agencias gubernamentales locales.

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Is Your Gardener a Green Gardener?

Hire a Santa Clara Valley *Green Garden*er to maintain your garden using sustainable landscape maintenance practices. Santa Clara Valley Green Gardeners have received training to:

- Use resources wisely, conserve water, protect the soil, and reduce waste.
- Improve the health, appearance and value of landscapes.
- Reduce urban runoff and stormwater pollution from landscape maintenance activities

These Santa Clara Valley *Green Gardeners* provide professional landscape design, construction and/or maintenance services throughout Santa Clara County.

Green Gardener Name	Business Name	Type of Service	Phone Number
Agustin Barrera Sanchez	California Nativescapes	Design, Construction & Maintenance	408-243-5663
Alberto Ayala	Gachina Landscape Management	Construction & Maintenance	650-853-0400
Alejandro Gatica	N/A	Maintenance	650-793-1311
Alex Meija	C. Guzman Landscaping	Maintenance	408-533-3068
Antonio Ocegueda	Greener Maintenance Service	Maintenance	408-729-6097
Arnold Gutierrez	Azthetic Landscaping	Maintenance	408-646-6513
Astrid Chevallier	The Art Garden – by Purple Red	Design	310-770-0164
Aureliano Rueda Rios	Green Works – In Silence	Maintenance	408-781-7624
Bonnie Brock *	Bonnie Brock Landscape Design	Design & Maintenance	650-465-9073
Brian Bost	Paradise Garden & Landscape	Construction, Maintenance, Design	408-770-6661
Brian Brownie	Clean Air Lawn Care	Maintenance	408-702-5965
Carlos Arreola	Arreola's Landscaping	Maintenance	408-393-0680
Carrie Parker *	Carrie Parker	Fine Gardening & Maintenance	650-450-8122
Cesar Arellano	AB Landscaping, Inc.	Design and Construction	408-489-1576
Christopher Mahan	Mahan & Sons, Inc.	Construction & Maintenance	408-761-0028
Cruz Sandoval *	Sandoval Garden Service	Maintenance	408-272-8806
Daniel Mahan	Mahan & Sons, Inc.	Construction & Maintenance	408-688-7415
Dawson Bean	Lane Irrigation Equipment Company	Irrigation Troubleshooting	408-377-5600
Diane Mahan	Mahan & Sons, Inc.	Construction & Maintenance	408-761-8480
Dominique Lala	Dominique Lala	Design & Maintenance	408-279-1993

Green Gardener Name	Business Name	Type of Service	Phone Number
Emigdio Barrera Sanchez	California Nativescapes	Design, Construction & Maintenance	408-243-5663
Ernesto Jasso	Ernesto Jasso	Maintenance	650-417-1174
Francisco Vargas	JPA Landscape & Construction, Inc.	Construction & Maintenance	925-960-9602
Gabriel Sanchez Garcia	C. Guzman Landscaping	Maintenance	408-375-0507
Gerold Marroquin	MM Landscape Services, Inc.	Design, Construction & Maintenance	510-449-1209
Guillermo Inguanzo	JPA Landscape & construction, Inc.	Construction & Maintenance	925-960-9602
Haide Guzman	C. Guzman Landscaping	Maintenance	831-902-9153
Israel Fonseca *	F&H Landscaping & Maintenance	Maintenance	408-201-2984
Jacqueline Marsey	Paradise Garden & Landscape	Construction, Maintenance, Design	408-691-9358
Jaime Hernandez *	Maranatha Landscaping	Design, Construction & Maintenance	408-348-0655
Janet Bell *	Garden Sense, Inc.	Design, Construction & Maintenance	650-369-3400
Jeremy Moss	J. Moss Landscaping	Construction & Maintenance	408-772-0309
Jesus Alvarado	Alvarado Landscape Consulting	Design, Construction & Maintenance	510-304-3400
Jonny Sanchez	California Nativescapes	Design, Construction & Maintenance	408-243-5663
Jose Berumen *	BG Landscaping Services	Maintenance	408-706-8792
Juan C. Gonzalez *	Miranda's Landscaping	Maintenance	408-509-6435
Juan Guzman	C. Guzman Landscaping	Maintenance	408-687-5320
Julie Chau	J J & J Landscape Management, Inc.	Design & Maintenance	510-304-3199
Julie Eaton	Farmscape	Urban Farming	408-910-5133
Jying Yang	Promised Greenland	Design & Maintenance	408-409-9316
Kimberley Jamar	Kim Jamar Landscape Design	Design & Maintenance	925-818-3477
Konstantin Kuehn	Garden Sense, Inc.	Design, Construction, Maintenance	650-369-3400
Linda Eaton	N/A	Maintenance	408-739-4543
Lisa Sucre	Lisa's Landscape Designs	Design/Arborist	408-533-3068
Manuel Ramirez	JPA Landscape & Construction, Inc.	Construction & Maintenance	925-960-9602
Marie Haka	California Nativescapes	Design, Construction & Maintenance	408-243-5663
Mark McCabe *	Mark R. McCabe Landscape	Construction	408-978-2965
Mary Dateo	Dateo Design	Design	650-440-6279
Maryanne Quincy *	Q-Gardens Landscape Design	Design	408-739-5493
Miguel Vazquez *	Vazquez Landscaping	Maintenance	408-702-0699
Mike Lefforge	Paradise Garden & Landscape	Construction, Maintenance, Design	408-561-6231

Green Gardener Name	Business Name	Type of Service	Phone Number
Morgan Kelly	Garden Sense, Inc.	Design, Construction, Maintenance	650-369-3400
Natalie Honjo	Natalie's Workshop	Water conservation, garden consultation and design	408-421-1754
Nick Nevarez	Clean Air Lawn Care	Maintenance	408-603-9440
Nolan Holl	Azthetic Design	Construction, Maintenance, Design	408-843-3835
Pedro Alvarez *	F&H Landscaping	Maintenance	408-201-2984
Peggy Lin Hung *	Peggy Lin Hung Landscape Design	Design	650-949-3639
Philip Orta	N/A	Design & Maintenance	408-409-9316
Rebecca Schoenenberger	California Nativescapes	Design, Construction, Maintenance	408-666-1822
Shelkie Tao	WaterSmart Garden	Design & Maintenance	669-232-3798
Stefanie Tal	TalScapes Design and Consultation	Design	650-492-1779
Valerie Whitehill	Whitehill Landscape, Inc.	Construction	408-691-4607
Victor Orozco	N/A	Maintenance	408-691-4607
Victor Prosak	Avery Construction Co.	Construction & Maintenance	408-209-6007
Wendy Vuong	J J & J Landscape Management, Inc.	Design, Construction, Maintenance	510-396-6945

* Green Gardeners marked with an asterisk (*) have taken the Advanced Green Gardener training in addition to the Basic Green Gardener training.

The following individuals have taken our *Green Gardener* training but do not provide professional services.

Erik Acosta
Arturo Apreciado
Robert Brown
Gloria Chen
Jaime Echeverria
Gus Fotis
Cecily Gordon
Cindy Hart
Laura Monczynski
Gernaro Munoz
Sajeemas (Mint) Pasakdee
Raul Salazar
Nazmeen Schroeder
Nidhi Shah
Sheila Strand
Yuki Takizawa
Alexandra Taratutin
Jose Segura
Stefanie Tal
Vera Cordova Mendoza
Kazuyo Levitan
Vanessa Swing
Bryan Murphy
Heather Ernst
Chin-Yen Yang

Congratulations Graduates!

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 9-3

CASQA Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

B A S M A A

September 30, 2020

Michael Montgomery, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: FY 2019-20 Annual Report: MRP Provision C.9.f - Track and Participate in Relevant Regulatory Processes

Dear Mr. Montgomery:

This letter and attachments are submitted on behalf of all 76 municipalities subject to the requirements of the Municipal Regional Stormwater NPDES Permit (MRP).

The essential requirements of provision C.9.f (text attached) are to track U.S. Environmental Protection Agency (USEPA) and California Department of Pesticide Regulation (DPR) actions related to urban-uses of pesticides and actively participate in the shaping of regulatory efforts currently underway. This provision allows for cooperation among Permittees through the California Stormwater Quality Association (CASQA), BASMAA, and/or the Urban Pesticide Pollution Prevention Project (UP3 Project) – an approach the Permittees have engaged in for a number of years. Recognizing this approach is the most likely to result in meaningful changes in the regulatory environment, Permittees elected to continue on this course in FY 2019-20 to achieve compliance with this provision. Oversight of this provision is the purview of the BASMAA Board of Directors.

The actual work of tracking and participating in the ongoing regulatory efforts related to pesticides was accomplished through CASQA. CASQA conducted its activities on behalf of members and coordinated funding contributions and activities through its Pesticides Subcommittee, a group of stormwater quality agencies affected by pesticides or pesticides-related toxicity listings, TMDLs, or permit requirements, as well as others knowledgeable about pesticide-related stormwater issues. FY 2019-20 was another productive year for the Subcommittee. The CASQA Pesticides Subcommittee's annual report for FY 2019-20 (attached) provides a comprehensive and detailed accounting of efforts to track and participate in relevant regulatory processes as well as accomplishments related to pesticides and stormwater quality.

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Bay Area
Stormwater Management
Agencies Association
P.O. Box 2385
Menlo Park, CA 94026
650.365.8678
info@basmaa.org

Jim Scanlin, Alameda Countywide Clean Water Program

Karin Graves, Contra Costa Clean Water Program

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matthew Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

Attachments

MRP Provision C.9.f

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020; California Stormwater Quality Association; August 2020

MRP Provision C.9.f states:

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description –** The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

   (1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

   (2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

   (3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

   (4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting –** In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020

California Stormwater Quality Association

Final Report

August 2020

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

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Pesticides Subcommittee Annual Report and Effectiveness Assessment

2019-2020

California Stormwater Quality Association

August 2020

Preface

The California Stormwater Quality Association (CASQA) is comprised of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout California. CASQA's membership provides stormwater quality management services to more than 22 million people in California. This report provides CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. It is a component of CASQA's Source Control Initiative, which seeks to address stormwater and urban runoff pollutants at their sources. This report was funded by CASQA, BASMAA, the Sacramento Stormwater Quality Partnership, and Alameda Countywide Clean Water Program.

This report was prepared by Stephanie Hughes under the direction of the CASQA Pesticides Subcommittee Co-Chair Dave Tamayo, with input from Dr. Kelly Moran and Tammy Qualls of Qualls Environmental Consulting.

DISCLAIMER

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Abbreviations Used in this Report

BACWA – Bay Area Clean Water Agencies

BE – Biological Evaluation

CASQA – California Stormwater Quality Association

CEQA – California Environmental Quality Act

CCRWQCB – Central Coast Regional Water Quality Control Board

CVRWQCB – Central Valley Regional Water Quality Control Board

CWA – Clean Water Act

DPR – California Department of Pesticide Regulation

EPA – United States Environmental Protection Agency

ESA – Endangered Species Act

FWS – U.S. Fish and Wildlife Service

FY – Fiscal Year (July 1 through June 30)

IPM – Integrated Pest Management

MAA – Management Agency Agreement between DPR and the Water Boards

MS4 – Municipal Separate Storm Sewer System

NACWA – National Association of Clean Water Agencies

NPDES – National Pollutant Discharge Elimination System

OPP – U.S. EPA Office of Pesticide Programs

OW – U.S. EPA Office of Water

PAH – Polycyclic aromatic hydrocarbon

PEAIP – Program Effectiveness Assessment and Improvement Plan

PMAC – Pest Management Advisory Committee

PPI – Pests, Pesticides, and Integrated Pest Management DPR initiative

PMP – Pesticides-specific Management Practice

PSC – CASQA Pesticides Subcommittee

SPCB – Structural Pest Control Board

SFBRWQCB – San Francisco Bay Regional Water Quality Control Board

STORMS – Strategy to Optimize Resource Management of Storm Water (a program of the State Water Board)

SWAMP – California Water Boards Surface Water Ambient Monitoring Program

SWRCB – State Water Resources Control Board or State Water Board

TMDL – Total Maximum Daily Load (regulatory plan for solving a water pollution problem)

UP3 – Urban Pesticides Pollution Prevention Partnership

UPA – Urban Pesticide Amendments

UPCMP – Urban Pesticides Coordinated Monitoring Program

USGS – U.S. Geological Survey

Water Boards – California State Water Resources Control Board together with the California Regional Water Quality Control Boards

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Executive Summary

This report by the Pesticides Subcommittee (PSC) of the California Stormwater Quality Association (CASQA) describes CASQA's activities related to the goal of preventing pesticide pollution in urban waterways from July 2019 through June 2020.

To address the problems caused by pesticides in California's urban waterways, CASQA collaborates with the California State Water Resources Control Board and the California Regional Water Quality Control Boards (Water Boards). By working with the Water Boards and other water quality organizations, we address the impacts of pesticides efficiently and proactively through the statutory authority of the California Department of Pesticide Regulation (DPR) and EPA's Office of Pesticide Programs (OPP). More than 17 years of collaboration with Urban Pesticides Pollution Prevention (UP3) Partnership, as well as EPA and DPR staff, has resulted in significant changes in pesticide regulation. CASQA's activities and outcomes are described in Section 2. This year's highlights include continued progress on the State Water Board's Urban Pesticides Amendments (UPA) project as well the pesticide regulator actions described below.

Near term/Current problems – Are actions being taken by State and Federal pesticides regulators and stakeholders expected to end pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

- In Fall 2019, DPR finalized regulations to restrict carbaryl use and end sale of carbaryl consumer products. This action makes all carbaryl products in California restricted materials, except for baits labeled only for agricultural use. This regulation was filed with the Secretary of State this spring and will become effective on August 1st.
- CASQA identified a product registration application containing novaluron and successfully requested this product be routed by DPR for surface water review. The subsequent evaluation did not support registration. DPR subsequently issued a Notice of Proposed Decision to Deny the product.
- CASQA shared its urban runoff expertise with pesticide regulators by preparing comment letters to EPA for seven pesticide reviews, providing the Water Boards and other Partners with information that triggered additional letters on two more pesticide reviews, and participating in meetings and conference calls focused on priority pesticides and long-term regulatory structure improvements. *(See Tables 3, 4 and 5 and the Appendix.)*
- CASQA provided feedback to EPA regarding their Framework for Pesticides Risk Assessments Incorporating Endangered Species Act Biological Evaluations (and eventually all pesticides risk evaluations for conventional pesticides) requesting that outdoor impervious surfaces be included in the list of areas that receive pesticide treatment.
- In response to continued requests from CASQA and Partners, EPA has begun following a precedent for improved label language for pool, spa, and fountain chemicals that was established by the decisions for lithium hypochlorite and copper.
- CASQA/UP3 reviewed scientific literature in order to update and prioritize the Pesticide Watch List, which it shared with pesticides regulators and with government agency and university scientists to stimulate generation of surface water monitoring and aquatic toxicity data for the highest priority pesticides. *(See Table 2.)*

Long term/Prevent future problems – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

- DPR continues to demonstrate its commitment to addressing pesticide impacts on receiving waters through timely mitigation and implementation of improved evaluation procedures.
- The State Water Board continued to work toward adoption of the UPA. These amendments would institutionalize the State's strategy of utilizing pesticide regulations as the primary mechanism for addressing pesticide water quality problems associated with urban runoff, serving as a TMDL

alternative. Implementation will be supported by a new statewide urban runoff pesticides monitoring program intended to coordinate with existing Water Board and DPR urban pesticides and toxicity monitoring programs.

- In concert with the development of UPA, the Urban Pesticides Coordinated Monitoring Program (UPCMP) continued progress to establish the initial framework of the monitoring program via the Steering Committee and Technical Committee.
- CASQA continued to be an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. CASQA organized a meeting of DPR, Water Board, and CASQA representatives for July 24th for DPR to provide details to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.
- A paper was published that was co-authored by Dr. Kelly Moran, and staff from DPR, the State Water Board, and UC Davis, describing many of the key elements of the coordination between DPR and the State Water Board.
- Although many improvements have been made by OPP since the early 2000s, improvement in scientific evaluations supporting OPP's regulatory efforts and better understanding of urban runoff management systems are still necessary to adequately protect urban surface waters from pesticide impairments. In recent years, the regulatory climate has changed, limiting support of progress by OPP in addressing these concerns.

In FY 2020-2021, CASQA plans to continue to address near-term pesticide concerns and seek long-term regulatory change. Future near-term and long-term tasks are identified in Section 3, Tables 5 and 6. Key topics include:

- Continued support of the eventual completion and adoption of the UPA by the State Water Board
- Continued development of the UPCMP in partnership with the Water Boards, DPR, and EPA Region 9
- Registration review-related activities at EPA for pyrethroids and fipronil (the only such opportunity for the next 15 years)
- DPR registration applications and proposed decisions for new products

Section 1. Introduction

1.1 IMPORTANCE OF CASQA'S EFFORTS TO IMPROVE PESTICIDE REGULATION

For decades now, the uses of certain pesticides in urban areas – even when applied in compliance with pesticide regulations – have adversely impacted urban water bodies. Currently used pesticides are the primary cause of toxicity in California surface waters, including urban water bodies.[1] Under the Clean Water Act (CWA), when pesticides impact water bodies, local agencies may be held responsible for costly monitoring and mitigation efforts. To date, some California municipalities[2] have incurred substantial costs to comply with pesticides-related Total Maximum Daily Loads (TMDLs) and additional permit requirements. In some cases (e.g., diazinon, chlorpyrifos), municipal compliance costs have continued more than a decade after termination of virtually all urban use. In the future, more municipalities throughout the state could be subject to similar requirements, as additional TMDLs and Basin Plan amendments are adopted (Table 1). Meanwhile local agencies have no authority to restrict or regulate when or how pesticides are used[3] in order to proactively prevent pesticide pollution and avoid these costs.

Under federal and state statutes, EPA and DPR have the authority and responsibility to regulate pesticides and protect water bodies from adverse effects (including impacts from pesticides in urban runoff). Unfortunately, until the relatively recent past these agencies did not recognize the need, nor did they possess the institutional capacity to exercise their authority to protect urban water quality. As a result, past registration actions have allowed a number of pesticides (such as pyrethroids and fipronil) to be used legally in ways that have resulted in widespread pollution in urban water bodies. This situation is depicted in Figure 1.

To change this situation CASQA is actively engaged with state and federal regulators in an effort to develop an effective pesticide regulatory system, based primarily on existing statutes, that includes timely identification and mitigation of urban water quality impacts, and proactively prevents additional problems through the registration and registration review processes (Figure 2).

Table 1. California TMDLs, Statewide Water Quality Control Plans, and Basin Plan Amendments Addressing Currently Registered Pesticides and/or Toxicity in Urban Watersheds[4]

Water Board Region	Water Body	Pesticide	Status
Statewide	All MS4s/All Urban Waterways: Statewide Water Quality Control Plan amendments for urban pesticides reduction ["Urban Pesticides Amendments"] (Inland Surface Waters, Enclosed Bays & Estuaries, and Ocean)	All Pesticides/All pesticide-related toxicity	In preparation
	Sediment Quality Objectives (Enclosed Bays & Estuaries)	Sediment Toxicity [5]	Approved
	Toxicity Provisions (Inland Surface Waters and Enclosed Bays & Estuaries)	Toxicity [5]	In preparation

[1] See reports from the California Surface Water Ambient Monitoring Program Sediment Pollution Trends Program including Anderson, B.S., Hunt, J.W., Markewicz, D., Larsen, K., 2011. Toxicity in California Waters, Surface Water Ambient Monitoring Program. California Water Resources Control Board. Sacramento, CA.
[2] For example, Sacramento-area municipalities spent more than $75,000 in the 2008-2013 permit term on pyrethroid pesticide monitoring alone; Riverside-area municipalities spent $617,000 from 2007 to 2013 on pyrethroid pesticide chemical and toxicity monitoring.
[3] Local agencies in California have authority over their own use of pesticides but are pre-empted by state law from regulating pesticide use by consumers and businesses.
[4] Excludes pesticides that are not currently registered in California, such as organochlorine pesticides.
[5] These TMDLs/Plan provisions can trigger toxicity testing stressor source identification studies, and additional follow up, even when toxicity is linked to current pesticides.

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Water Board Region	Water Body	Pesticide	Status
San Francisco Bay (2)	All Bay Area Urban Creeks	All Pesticide-Related Toxicity	Approved
Central Coast (3)	Santa Maria River Watershed	Pyrethroids, Toxicity	Approved
	Lower Salinas River Watershed	Pyrethroids, Toxicity	Approved
		Malathion, Chlorpyrifos, Diazinon [6]	In development
	San Lorenzo River Watershed (Santa Cruz)	Chlorpyrifos [6]	Approved
Los Angeles (4)	Marina del Rey Harbor	Copper (Marine antifouling paint) [7]	Approved
	Oxnard Drain 3 (Ventura County)	Bifenthrin, Toxicity	EPA-Adopted Technical TMDL
	Calleguas Creek, its Tributaries and Mugu Lagoon	Water & Sediment Toxicity [5]	Approved
	McGrath Lake (Ventura County)	Diazinon & Chlorpyrifos [6]	Approved
	Colorado Lagoon (Long Beach)	Sediment Toxicity [5]	Approved
	Dominguez Channel and Greater Los Angeles and Long Beach Harbors Waters	Sediment Toxicity [5]	Approved
	Ballona Creek Estuary	Sediment Toxicity [5]	Approved
Central Valley (5)	Sacramento River and San Joaquin River Basins	Pyrethroids	Approved
	Sacramento-San Joaquin River Delta Waterways	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento & Feather Rivers	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento County Urban Creeks	Diazinon & Chlorpyrifos [6]	Approved
	Lower San Joaquin River	Diazinon & Chlorpyrifos [6]	Approved
Lahontan (6)	Pesticide Discharge Prohibition	All Pesticides	Approved
Santa Ana (8)	Newport Bay	Copper (Marine antifouling paint) [7]	In preparation
	San Diego Creek, and Upper and Lower Newport Bay	Toxicity (Diazinon & Chlorpyrifos) [6]	EPA-Adopted Technical TMDL
San Diego (9)	Shelter Island Yacht Basin (San Diego Bay)	Copper (Marine antifouling paint) [7]	Approved
	Chollas Creek	Diazinon [6]	Approved

[6] Use prohibited in urban areas (diazinon) or no meaningful use due to use limitations (chlorpyrifos).
[7] Primarily addresses pesticides that are directly discharged and should not ordinarily appear in stormwater (marine antifouling paint).

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Figure 1. Current Pesticide Regulatory System.[8]

[8] Photos in Figures 1 and 2 of spraying pesticide along a garage was taken by Les Greenberg, UC Riverside

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Figure 2. Proactive Use of the Pesticide Regulatory Structure to Restrict Pesticide Uses that have the Potential to Cause Urban Water Quality Problems.

1.2 CASQA'S GOALS AND APPLICATION TO PROGRAM EFFECTIVENESS ASSESSMENT

CASQA's Vision for Stormwater, first approved by the Board of Directors in 2015, is periodically updated to reflect developments in stormwater management. In August 2019, CASQA released an interim update to support the development of priorities for 2020.[9] CASQA's Vision, Action 1.3, is to "provide effective and efficient solutions through true source control." Among the three objectives described within Action 1.3 is "control toxicity in receiving waters from pesticide application." In support of this objective, the Vision identifies the following scope:

Anticipated Scope:

- Develop a regulatory system implemented by EPA OPP and California DPR to identify whether use of a pesticide poses a threat to water quality, and then restrict or disallow those uses proactively so that water quality impacts are avoided.
- Respond to the immediate need to participate in EPA pyrethroids, fipronil, and imidacloprid reviews (the only such opportunity for the next 15 years) and to support and encourage DPR steps toward expanded pyrethroids and new fipronil mitigation measures.
- Seek EPA risk mitigation for malathion and carbaryl in urban runoff and the continuation of traditional water quality risk assessments in tandem with Endangered Species Act (ESA) evaluations.
- Continue to leverage successes at the state level as a key stakeholder in the development of statewide Water Quality Control Plan Amendments for urban pesticides reduction.

The effectiveness of CASQA's efforts toward this scope can be expressed in relation to management questions established as part of Municipal Separate Storm Sewer Systems' (MS4s') program effectiveness assessments that are required in some MS4 permits. With respect to addressing urban pesticide impacts on water quality, the following two management questions, derived from the proposed scope for CASQA Vision Action 1.3, are suggested for inclusion in MS4s' program effectiveness assessment:

Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Question 2: (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

This report is organized to answer these management questions and is intended to serve as an annual compliance submittal for both Phase I and Phase II MS4s. It describes the year's status and progress, provides detail on stakeholder actions (by CASQA and others), and provides a roadmap/timeline showing the context of prior actions as well as anticipated end goal of these activities. This report may also be used as an element of future effectiveness assessment annual reporting.

[9] https://www.casqa.org/about/strategic-plan-vision

Section 2. Results of CASQA 2019-2020 Efforts

At any given time, there are dozens of pesticides with current or pending actions from the EPA or DPR. Addressing near term regulatory concerns is important because some pesticides may pose immediate threat to water quality that can lead to compliance liability for MS4s, and because some of the regulatory decisions made by EPA and DPR will last many years. For example, pesticide registration decisions are intended to be revisited on a fifteen-year cycle. To inform its engagement on near-term regulatory concerns, CASQA uses the pesticide "Watch List" created by the PSC and the UP3 Partnership. The Watch List aids CASQA and the UP3 Partnership in their prioritization of near-term efforts (Section 2.1).

Meanwhile, CASQA and the UP3 Partnership are also working on a parallel effort to effect long-term systemic changes in the regulatory process itself. By identifying inadequacies and inefficiencies in the pesticide regulatory process, and persistently working with EPA and DPR to improve the overall system of regulating pesticides, CASQA and the UP3 are gradually achieving results (Section 2.2).

2.1 NEAR-TERM REGULATORY CONCERNS

CASQA seeks to ensure that the Water Boards and EPA's Office of Water (OW) work with DPR and the EPA's OPP to manage problem pesticides that are creating near-term water quality impairments. These efforts address CASQA Vision Action 1.3 as well as Phase II MS4 Program Effectiveness Assessment and Improvement Plan (PEAIP) Management Question 1 regarding observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff.

Assessment Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Answer: As detailed below, at the State level, significant progress has been made by DPR in addressing near-term and current problems with pesticides in surface waters receiving urban runoff. DPR continues to implement improved registration processes and responses to observed water quality problems. DPR also continues to implement and evaluate mitigation measures for observed problems with pyrethroids and fipronil.

At the Federal level, less progress has been made at addressing near term problems. Some early actions were taken to address pyrethroid and fipronil problems at the urging of CASQA and DPR However, EPA does not show a clear understanding of key urban uses in its analyses, and it is still unclear if its upcoming risk management decisions for pyrethroids, fipronil, and imidacloprid and other neonicotinoids will provide any additional protection of urban water bodies.

2.1.1 Updated Pesticide Watch List

A key tool for identifying near-term regulatory concerns is our pesticide "Watch List." CASQA, working through the UP3 Partnership, reviews scientific literature, government reports, and monitoring studies as they are published. This information is used to prioritize pesticides based on the most up-to-date understanding of urban uses, pesticide characteristics, monitoring, and surface water quality toxicity (for pesticides and their degradates). The PSC uses these insights to update the Watch List each year (Table 2), which serves as a management tool to help us focus our efforts on the most important pesticides from the perspective of MS4 agencies.[10] Comparing the current Watch List to the version published in the 2018/19 PSC Annual Report, we see that the insecticides fipronil, imidacloprid, malathion, and pyrethroids remain as the Priority 1.

[10] The first Watch List was published by the UP3 in 2005.

Table 2. Current Pesticide Watch List (June 2020)

Priority	Basis for Priority Assignment	Pesticides		
1	Monitoring data exceeding benchmarks; linked to toxicity in surface waters; urban 303(d) listings	Pyrethroids (20 chemicals[11])	Fipronil	Imidacloprid (neonic) Malathion
2	Monitoring data approaching benchmarks; modeling predicts benchmark exceedances; very high toxicity and broadcast application on impervious surfaces; urban 303(d) listing for pesticide, degradate, or contaminant that also has non-pesticide sources	Carbendazim (Thiophanate methyl)[12] Chlorantraniliprole Copper pesticides	Creosote (PAHs) Indoxacarb Neonics (other than Imidacloprid)[13] Pendimethalin	Pesticides with dioxins impurity[14] Polyhexamethylenebiguanide Zinc pesticides (including Ziram)
3	Pesticide contains a Clean Water Act Priority Pollutant; 303(d) listing for pesticide, degradate, or contaminant in watershed that is not exclusively urban	Arsenic pesticides Chromium pesticides	Diuron Naphthenates	Simazine Silver pesticides Trifluralin
4	High or unknown toxicity (parent or degradate) and urban use pattern associated with water pollution; synergist for higher tier pesticide; on DPR priority list	Abamectin ADBAC pesticides[15] Azoxystrobin Bacillus sphaericus Bacillus thuringiensis (Bti) Bromacil N-Bromosulfamates Busan-77 Carbaryl Chlorinated isocyanurates Chlorine Chlorine dioxide Chlorfenapyr Chlorsulfuron DCOIT DDAC	Dichlobenil Dichlorvos (DDVP) Dithiopyr Halohydantoins Hydramethylnon Hypochlorites Imazapyr Isoxaben Mancozeb Methomyl Methoprene Methyl anthranilate Mineral bases, weak Mineral oil (aliphatic) MGK-264 Novaluron Oryzalin Oxadiazon Oxyfluorfen PCNB	Peroxyacetic acid Phenoxy herbicides[16] Piperonyl butoxide (PBO) Prodiamine Propiconazole Pyrethrins Pyriproxyfen Sodium bromide Sodium chlorite Sodium percarbonate Sodium tetraborate Spinosad/ Spinetoram Sulfometuron-methyl Tebuconazole Terbuthylazine Triclopyr Triclosan Trimethoxysilyl quats

[11] Allethrins, Bifenthrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Cyphenothrin, Deltamethrin, Esfenvalerate, Etofenprox, Flumethrin, Imiprothrin, Metofluthrin, Momfluothrin, Permethrin, Prallethrin, Resmethrin, Sumethrin [d-Phenothrin], Tau-Fluvalinate, Tetramethrin, Tralomethrin.
[12] Carbendazim is a registered pesticide, and also a degradate of thiophanate-methyl
[13] Acetamiprid, Clothianidin, Dinotefuran, Thiamethoxam (degrades into Clothianidin)
[14] 2,4,-D, Chlorothalonil, Dacthal, Pentachlorophenol
[15] Alkyl Dimethyl Benzyl Ammonium Chlorides (ADBAC) includes a family of 21 different quaternary ammonium pesticides.
[16] MCPA and salts, 2,4-D, 2,4-DP, MCPP, dicamba

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Priority	Basis for Priority Assignment	Pesticides		
5	Frequent questions from UP3 Partners	Chlorpyrifos (near zero urban use)	Diazinon (no urban use) Glyphosate	Metaldehyde
New	Priority determined on the basis of proposed urban use, aquatic toxicity, and other information in registration application.	Not known but may include the following:	Cyantraniliprole Cyclaniliprole Flupyradifurone	Nitenpyram (Neonic) Nithiazine (Neonic) Sulfoxaflor (Neonic)
None	Based on review of available data, no approved urban use or no tracking trigger as yet identified.	Most of the >1,000 existing pesticides		
Unknown	Lack of information. No systematic screening has been completed by UP3 for the complete suite of urban pesticides.	Unknown		

2.1.2 Description of Near-Term Regulatory Processes

Immediate pesticide concerns may arise from regulatory processes undertaken at DPR or EPA's OPP. For example, when EPA receives an application to register a new pesticide, there may be two opportunities for public comment that are noticed in the Federal Register, as depicted in green in Figure 3. EPA's process usually takes less than a year while DPR typically evaluates new pesticides or major new uses of active ingredients within 120 days. Now that DPR implements relatively robust surface water quality review procedures for new pesticide registrations, there is reduced need for CASQA to provide input to EPA on new pesticides.

Figure 3. EPA's Registration Process for New Pesticides

Another regulatory process, "Registration Review," depicted in Figure 4, is meant to evaluate currently registered pesticides about every 15 years, to account for new data available since initial registration. In general, it takes EPA five to eight years to complete the entire process. In addition to this process, pesticides are typically evaluated based on Endangered Species Act criteria. EPA regularly updates its schedule for approximately 50 pesticides that will begin the review process in a given year.[17]

Figure 4. EPA's Registration Review – Process to Review Registered Pesticides at a Minimum of Every 15 Years.

[17] See https://www.epa.gov/pesticide-reevaluation/registration-review-schedules for schedule information.

DPR also has an ongoing, but informal review process (called continuous evaluation) that can address pesticides water pollution. If it needs to obtain data from manufacturers, DPR can initiate a formal action, called "Reevaluation." These evaluations, mitigation measure development, and mitigation effectiveness evaluation have involved ongoing communication with CASQA and the UP3 Partnership.

While EPA must consider water quality in all of its pesticide registration decisions, at DPR this step is not yet fully established as standard (most outdoor urban pesticide registration applications are routinely routed by DPR for surface water review, but a few – notably antimicrobial products used in storm drains – do not automatically receive this review). CASQA monitors registration applications, to identify those relevant to urban runoff, based on the pesticide watch list in Table 2 and use pattern/toxicity analysis for pesticides that have not previously been reviewed.

2.1.3 Key Near-Term Regulatory Activities and Progress in 2019-20

Table 3 presents a summary of recent UP3 activities to address near-term regulatory concerns and their 2019-2020 results; for additional insight regarding on-going pesticide registrations, see the Appendix. The positive outcomes in Table 3 reflect the success of CASQA's teamwork in the UP3 Partnership. Some of this work occurs during formal public comment periods. To accomplish this, CASQA monitors the Federal Register and DPR's website for notices of regulatory actions related to new pesticide registrations and registration reviews. Since the Watch List is not based on a comprehensive review of all pesticides, CASQA watches for additional pesticides that appear to have any of the following characteristics: proposed urban, outdoor uses with direct pathways for discharge to storm drains, high aquatic toxicity, or containing a priority pollutant. Participating in these regulatory processes can take many years to complete.

In addition, the EPA OPP strives to update their Aquatic Life Benchmarks table on an annual basis.[18] Their 2019 update included two pesticides of interest to urban surface water (see inset at right).

EPA Aquatic Life Benchmarks – 2019 Update

In September 2019, US EPA's Office of Pesticide Programs, Environmental Fate and Effects Division updated its pesticides Aquatic Life Benchmarks table.[18] From the urban surface water quality perspective, this update included two minor changes for pesticides on the Watch List:

- The category "Copper compounds" was added to clarify the applicability of EPA's Office of Water (OW) copper water quality criteria (developed independent from OPP) to all copper-containing pesticides
- The OPP benchmarks for pendimethalin were updated based on the updated toxicity data used to support its 2018 Registration Review decision

Pesticides still awaiting benchmark updates include the many pyrethroids (other than new transfluthrin, which is not yet registered in California) and fipronil and its degradates. These are currently in EPA's Registration Review process.

[18] https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk

Table 3. Latest Results of Efforts Communicating Near-Term Regulatory Concerns[19]

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
DPR					
New product registration application for a rubber product containing zinc, thiabendazole and 2-pyridinethiol-1-oxide (potential tire use)				Sacramento County	*Pending.* In response to a letter from Sacramento County, DPR stated that the product would not be allowed in rubber, correcting an error in the public notice. This correction was, unfortunately, not reflected in subsequent paperwork. DPR is requesting that the manufacturer correct the label to indicate that it may not be used in rubber in California.
New product registration for an indoxacarb product (Doxem Precise)	✓				*Pending.* CASQA requested that DPR perform an evaluation of this product. Results pending.
New product registration for a novaluron product (TEKKO 0.2G)	✓				*Success!* CASQA requested that DPR perform an evaluation of this product. The subsequent DPR evaluation (including modeling) did not support registration. DPR subsequently issued a Notice of Proposed Decision to deny registration.
EPA					
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals [Request for Extension of Comment Period]	✓			BACWA CCWQCB SFBRWQCB CVWQCB NACWA Cities of Cotati, Elk Grove, San Diego, Sacramento, Santa Barbara. County of Los Angeles, Marin County Stormwater PPP, Napa County FCWCD, Alameda	*Success.* CASQA and Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing, and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.

[19] Color coding in this table is meant to reflect the "Watch List" prioritization color coding in Table 2.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
				Countywide Clean Water Program, County of Orange, County of Sacramento, County of Santa Barbara, SCVURPPP	
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals	✓		✓	BACWA SFBRWQCB NACWA City of Salinas	*Limited Success.* Following significant efforts by CASQA and Partners in prior fiscal years, including meeting with new EPA pyrethroid chemical managers, and substantial feedback on the Preliminary Risk Assessment, EPA released the Risk Mitigation Proposal. EPA used CASQA comments to counter arguments by others suggesting that there is not a significant ecological risk. EPA acknowledged the existence of monitoring data that appears to conflict with modeled runoff exposure results. EPA virtually omitted urban runoff from its CWA compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications nor did it distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts. EPA did not concur with CASQA regarding the need for urban runoff mitigation. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. No resolution in CASQA's request for California-specific labels.
Bifenthrin Proposed Interim Decision	✓			SFBRWQCB BACWA NACWA	*Pending.* CASQA concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. CASQA continues to request that EPA terminate urban outdoor use of bifenthrin. Letter prepared this FY for 2020-2021 submittal.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pyrethroid Pesticides Cyfluthrin, Deltamethrin, Esfenvalerate, Permenthrin, Phenothrin, Prallethrin, and Tau-fluvalinate - Proposed Interim Decision	✓			BACWA NACWA SFBRWQCB	*Pending.* Prior to the release of this Proposed Interim Decision, CASQA commented on the EPA's Ecological Risk Mitigation Proposal (above). CASQA continues to request that EPA's risk / benefit finding be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals. CASQA also requests that EPA's benefits assessment include urban runoff-related costs to municipalities. Letter prepared this FY for 2020-2021 submittal.
Fipronil Risk Assessment	✓			BACWA SFBRWQCB (anticipated) SWQCB (anticipated) NACWA (anticipated)	*Pending.* Letter prepared this FY for 2020-2021 submittal. CASQA requested that EPA included updated California monitoring data and improvements to the urban risk assessment modeling methods. Also recommended additional mitigation to prevent urban surface water quality degradation.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision [Request for Extension of Comment Period]				BACWA, SFBWQCB City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County FCWCD, SCVURPPP	*Success.* Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposed decision and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision	✓			BACWA SFBRWQCB SWRCB	*Pending.* In the Proposed Interim Decision released this year, EPA proposed label improvements but did not include significant label language requests. EPA also did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff and expand modeling to include runoff from all outdoor uses including impervious surfaces. CASQA followed up to address unresolved issues.
Endangered Species Risk Assessment Process for Biological Evaluations of	✓			BACWA SFBRWQCB NACWA	*Partial Success.* EPA acknowledged CASQA's comments and incorporated a significant request by CASQA- that they address pesticides that are applied on outdoor impervious surfaces in Biological Evaluations (BE). EPA also acknowledged CASQA's comment that Bes

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pesticides - Draft Revised Method					must include invertebrate toxicity data. EPA partially incorporated other comments from CASQA and ignored one of the comments.
Zinc registration review Final Interim Decision	✓			SFBRWQCB BACWA NACWA	*Success!* CASQA and its Partners sought that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Further, for all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, CASQA and Partners recommended that the "Environmental Hazards" label statements be applied on the basis of product use (end-use products vs technical grade and manufacturing use) rather than product size to avoid potential conflicting language on product labels. EPA fully incorporated both comments.
Methoprene Registration Review Work Plan				SFBRWQCB BACWA Sacramento County NACWA	***Pending.*** Due to uses for mosquito control that are made directly to neglected swimming pools, catch basins, and other elements of stormwater drainage systems, CASQA Partners called for the collection of data to inform reasonable mitigation measures that would minimize environmental impacts while maintaining the public health benefits of methoprene applications. Asked EPA to consider label language for mitigation measures, including label language for uses with abandoned pools that is consistent with language across pool, spa, and hot tub chemicals that would indicate minimum post-application holding times or other objective criteria that local and state authorities could use in their approval process for discharges to their systems. Further, Partners asked EPA to re-evaluate the aquatic ecological risk associated with discharges of methoprene to aquatic environments by utilizing data for aquatic Dipteran insect species that are more sensitive than the species used for the aquatic risk evaluations in the Preliminary Work Plan.
Chlorine gas/swimming pools Draft Risk Assessment	✓			SFBRWQCB BACWA NACWA	*Pending.* The Proposed Interim Decision correctly identified potential impacts associated with emptying treated pools into storm drains and acknowledged that a requirement to contact local governments for direction prior to discharge would mitigate this risk (this reflects success of prior CASQA educational efforts related to other pool chemicals). Letters prepared this FY for 2020/2021 submittal supporting EPA's

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
					acknowledgement and recommending that the Registration Review decision follows the precedent for improved labels for pool, spa, hot tub, and fountain products that was established by the decisions for similar end use chemicals.
Halohydantoins/pools, fountains, spas – Draft Risk Assessment	✓			BACWA SFBRWQCB NACWA	*Pending.* The Draft Risk Assessment did not examine risks associated with discharges of swimming pool, spa, hot tub, and fountain water treated with halohydantoins. Letter prepared this FY for 2020-2021 submittal to request that the halohydantoins decision follow the precedent for improved labels for swimming pool, spa, hot tub, and fountain products that was established by the decisions for other antimicrobials with these uses.
Terbuthylazine/fountains Draft Risk Assessment	✓			Sacramento County SFBRWQCB	*Success.* In January, CASQA Partners formally requested that language to address pool, spa, and fountain emptying be required to be placed on all such product labels. EPA acknowledged the importance of such communication and will be revising future label language on these products, which will require that the sewer/storm agency be notified prior to any discharge of terbuthylazine. Follow-up letter prepared by CASQA this FY for 2020-2021 submittal.
Inorganic Halides (Sodium Bromide) Draft Risk Assessment				BACWA Sacramento County	*Pending.* Partners requested that the Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Such label language mitigates possible aquatic impacts from discharge of treated water while also providing consistency for label language across pool, spa, hot tub, and fountain chemicals.

2.2 LONG-TERM CHANGE IN THE PESTICIDES REGULATORY STRUCTURE

Since the mid-1990s, CASQA (and its predecessor organization the Storm Water Quality Task Force), have worked toward a future in which the pesticide regulatory structure at the state and federal level proactively restricts pesticide uses that have the potential to cause urban water quality problems. These efforts directly relate to Phase II MS4 PEAIP Management Question 2.

Assessment Question 2. (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

Answer: Improvements in processes at EPA and especially at DPR have moved us closer to that future. Many of these improvements are linked to the persistent work of CASQA and the UP3 Partnership to educate regulators on how previous process deficiencies did not adequately address urban pesticide problems.

As detailed below, at the State level, significant progress has been made by DPR and the Water Boards in establishing a comprehensive statewide approach to utilizing pesticide regulatory authorities to prevent pesticide toxicity in urban water bodies. Overall, DPR has a system in place that is reasonably effective at addressing pesticide toxicity in urban water bodies, although improvement is needed to better coordinate this with the requirements of the Clean Water Act and NPDES MS4 permits. DPR and the Water Board, along with CASQA and other stakeholders, are working diligently to strengthen this system and to institutionalize it. This is primarily embodied in the State's effort to establish the UPA and the Management Agency Agreement (MAA) between DPR and the State Water Board.

At the Federal level, OPP has implemented some improvements in how it evaluates and responds to water quality problems associated with pesticides, but it does not do this reliably and does not have a system in place to ensure that this will happen consistently and adequately. Meanwhile, scientific studies are being conducted by USGS and the EPA's Office of Research and Development to better understand the complexities of pollution in urban stormwater (see inset at right).

National Urban Stormwater Study Included Many Priority 1 and 2 Pesticides

In 2019, USGS and EPA scientists published a major scientific paper examining pollutants in urban runoff, entitled "*Urban Stormwater: An Overlooked Pathway of Extensive Mixed Contaminants to Surface and Groundwaters in the United States*." The authors indicate that this study "provides the most comprehensive representative snapshot of the urban stormwater-contaminant profile derived from randomly sampled sites and sampling days from across the U.S. to date." The study involved low-detection limit measurements of multiple pollutant classes (e.g., pesticides, pharmaceuticals, inorganics, PAHs, PCBs and other organochlorines) in undiluted urban runoff. Pesticides were the most frequently detected pollutant type. Further, organic chemical concentrations and loads were positively correlated with impervious surfaces and highly developed urban catchments.

The study involved 50 storm event urban runoff samples from 21 locations in 17 states, including 2 unnamed locations in California (the 2 largest watersheds sampled). Samples were collected primarily from highly urbanized watersheds, primarily from base-of-watershed discharge pipes and concrete-lined channels.

For current-use pesticides, these nationwide results were generally consistent with other scientific work published in the last decade (much of which is from California), indicating that current use pesticides like pyrethroids, fipronil (and its degradates), imidacloprid, and the fungicide carbendazim are common in urban runoff often at concentrations greater than aquatic life reference values. Multi-pesticide and multi-pollutant mixtures were the norm, raising questions about potential aquatic life effects from cumulative exposures.

While the study measured many Priority 1 and 2 pesticides on the Watch List, most other pesticides on the Watch List were omitted (due, in part, to the absence of standard or convenient low-detection limit analytical methods). For some current-use pesticides (like some pyrethroids and some fipronil degradates), reporting limits were higher than the lowest aquatic life reference values. Most pesticides samples were filtered, which affects reported concentrations of hydrophobic pesticides like pyrethroids that tend to be removed with the suspended solids filtered out of the sample; sediment was not analyzed.

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Although more effective regulation of pesticides by EPA is still an important goal for CASQA,[20] due to the current regulatory climate at federal agencies, CASQA does not expect OPP to be very responsive to requests for additional improvements. Specific examples include the current administration's orders for a blanket reduction in regulations, chronic under-staffing at OPP, and lack of accessibility to OPP staff to share scientific information and stormwater expertise.

As a result, CASQA has decided for the time being to limit its efforts to affect long-term systemic change by EPA and other federal agencies. Instead, CASQA has focused more on solidifying advances made at the state level, which will leverage the considerable authority held by the State of California for regulating the use of pesticides.

2.2.1 Focus on MAA Between DPR and State Water Board

In 1997, just as pesticides were first discovered to be an important pollutant in urban waterways, DPR and the State Water Board adopted their first formal agreement to collaborate to address pesticides water pollution. That agreement focused on agricultural areas; the processes it envisioned did not work well in the urban context. CASQA (and its predecessor organization the Storm Water Quality Task Force) worked with DPR and the Water Boards for the next 20 years toward establishing pesticides water quality protection systems that would work in the urban context. During this time, DPR substantially updated its science-based pesticide registration procedures to include a "surface water protection program" review process, it initiated an urban watershed monitoring program, and it developed approaches to implementing mitigation measures addressing urban water pollution, as evidenced by its actions on pyrethroids and fipronil. The Water Boards engaged with DPR, providing scientific and regulatory information, receiving and using information from DPR to inform design of its regulatory programs (particularly TMDLs), and cooperating in monitoring programs. In mid-2019, DPR and the State Water Board received approval to sign a major update to their formal MAA that memorializes their existing systems and growing cooperation and lays out the steps they are taking toward a "unified and cooperative program to protect water quality related to the use of pesticides." The two agencies agree "to work cooperatively to address the discharge of pesticides that may cause or contribute to surface water or groundwater pollution, including surface water toxicity."

For example, DPR will evaluate surface water quality risks and consider these risks when making registration decisions; promote environmentally sound pest management; and respond to water quality concerns that pose significant adverse effects to aquatic organisms. Meanwhile, Water Boards will confer with DPR when developing regulatory programs related to pesticides; ensure waters are monitored (in coordination with DPR's monitoring and including permittee and State Water Board's own monitoring participation); and require and support use of best management practices relating to pesticides (structural management practices are not intended to be required in urban areas).

The Implementation Plan that accompanies the MAA describes opportunities for coordination and mutual enrichment (including cross-training), expectations for both staff and executive level communication (including an annual management-level meeting between the agencies), and current agency organization and interactions. Excerpts from the Implementation Plan:

> *"In the urban environment, pesticides are transported by the municipal wastewater collection system and the municipal separate storm sewer system (MS4). PMPs [pesticides-specific management practices] focus primarily on prevention through responsible use according to the pesticide label and DPR regulations and as a part of a holistic IPM [Integrated Pest Management] strategy. DPR conducts education and outreach efforts to ensure professional applicators are up to date on regulatory actions and label changes. Wastewater treatment plants and multi-benefit storm water treatment practices such as low impact development, runoff infiltration, constructed wetlands, and restoration of riparian buffers around waterways can provide some reductions. However, they are not designed for, nor implemented to address, complex mixtures of pesticides and the effectiveness of these practices to remove various pesticides from these systems is not well understood.*

[20] Long-term regulatory goals at the state and federal level are described in detail in Section 1.2.

DPR will work with the Water Boards to inform pesticide users on urban PMPs. The Water Boards, through their storm water permits, will continue to require PMPs from storm water permittees. Permittees must also include, as appropriate, education and outreach to inform residential and commercial pesticide users on responsible pesticide use and encourage municipal storm water permittees to provide local expertise into DPR's pesticide regulatory process.

The Water Boards and DPR will collaborate to assess the impacts of pesticides in the urban environment through collective and comprehensive monitoring efforts, which optimize the use of monitoring resources of Water Boards, dischargers, and DPR."

2.2.2 Focus on California's UPA

At the urging of CASQA, in 2014 the State Water Board made a strategically important decision to institutionalize its commitment to work closely with DPR and EPA to utilize pesticide regulatory authority as the primary mechanism for preventing and responding to impairments of receiving waters linked to current use pesticides in urban runoff. To accomplish this, it established an urban pesticides reduction project (now titled the Urban Pesticides Amendments or UPA) as a top priority project under the comprehensive stormwater strategy it adopted in December 2015, known as "Strategy to Optimize Resource Management of Storm Water" or STORMS.[21] In 2018/19, the State Water Board continued working towards developing the Urban Pesticides Amendments which will be changes to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries, and the Water Quality Control Plan for Ocean Waters of California. It is important to note that a critical factor in the State Water Board's decision to move in this direction was DPR's demonstrated commitment and significant progress in addressing urban water quality issues caused by pesticides.[22] A 2020 paper co-authored by Dr. Kelly Moran and staff of DPR, State Water Board, and UC Davis, describes many of the key elements of this progress.[23] The abstract for that paper is presented on the following page.

CASQA representatives have been participating actively in the development of the Urban Pesticide Amendments since their inception, as members of the projects Core Team and various work groups, to ensure that they are consistent with CASQA's vision for pesticide control.[24] The key elements that we anticipate being in the amendments are listed below.

- Element 1: Establishment of a framework for the Water Boards to work with DPR and U.S. EPA to utilize pesticide regulatory authority as the primary means for addressing pesticides in urban runoff.
- Element 2: Adopt a program of implementation addressing urban pesticides water pollution that serves as a TMDL alternative and integrates a feasible compliance pathway for MS4s.

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[21] STORMS' overall mission is to "lead the evolution of storm water management in California by advancing the perspective that storm water is a valuable resource, supporting policies for collaborative watershed-level storm water management and pollution prevention, removing obstacles to funding, developing resources, and integrating regulatory and non-regulatory interests." (http://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/)

[22] As reported in previous CASQA Pesticide Subcommittee Annual Reports, DPR's accomplishments include improved modeling, active ingredient screening for urban water quality issues, monitoring, and regulatory mitigation of pyrethroids and fipronil.

[23] Moran, et al., 2020. Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA. Environmental Toxicology and Chemistry—Volume 39, Number 5—pp. 953–966, 2020

[24] These goals have been adapted from the CASQA document, "End Goals for Pesticide Regulatory Activities," 2014. Goal 3, above, is directly tied to Goals 2, 4, and 5 of that document.

Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA

Kelly Moran, Brian Anderson, Bryn Phillips, Yuzhou Luo, Nan Singhasemanon, Richard Breuer, Dawit Tadesse, *Environ Toxicol Chem* 2020;39:953–966.
https://setac.onlinelibrary.wiley.com/doi/abs/10.1002/etc.4699.

This paper published in 2020 describes key elements of the current State water quality effort.

Abstract

The management of pesticides to protect water quality remains a significant global challenge. Historically, despite regulatory frameworks intended to prevent, minimize, and manage off-site movement of pesticides, multiple generations of pesticide active ingredients have created a seemingly unending cycle of pesticide water pollution in both agricultural and urban watersheds. In California, the most populous and most agricultural US state, pesticide and water quality regulators realized in the 1990s that working independently of each other was not an effective approach to address pesticide water pollution. Over the years, these California agencies have developed a joint vision and have continued to develop a unified approach that has the potential to minimize pesticide risks to aquatic life through a combination of prevention, monitoring, and management actions, while maintaining pesticide availability for effective pest control. Key elements of the current California pesticide/water quality effort include: 1) pesticide and toxicity monitoring, coupled with watershed modeling, to maximize information obtained from monitoring; 2) predictive fate and exposure modeling to identify potential risks to aquatic life for new pesticide products when used as allowed by the label or to identify effective mitigation measures; and 3) management approaches tailored to the different pesticide uses, discharge sources, physical environments, and regulatory environments that exist for agricultural runoff, urban runoff, and municipal wastewater. Lessons from this effort may inform pesticide management elsewhere in the world as well as other chemical regulatory programs, such as the recently reformed US Toxic Substances Control Act and California's Safer Consumer Products regulatory program. © 2020 SETAC

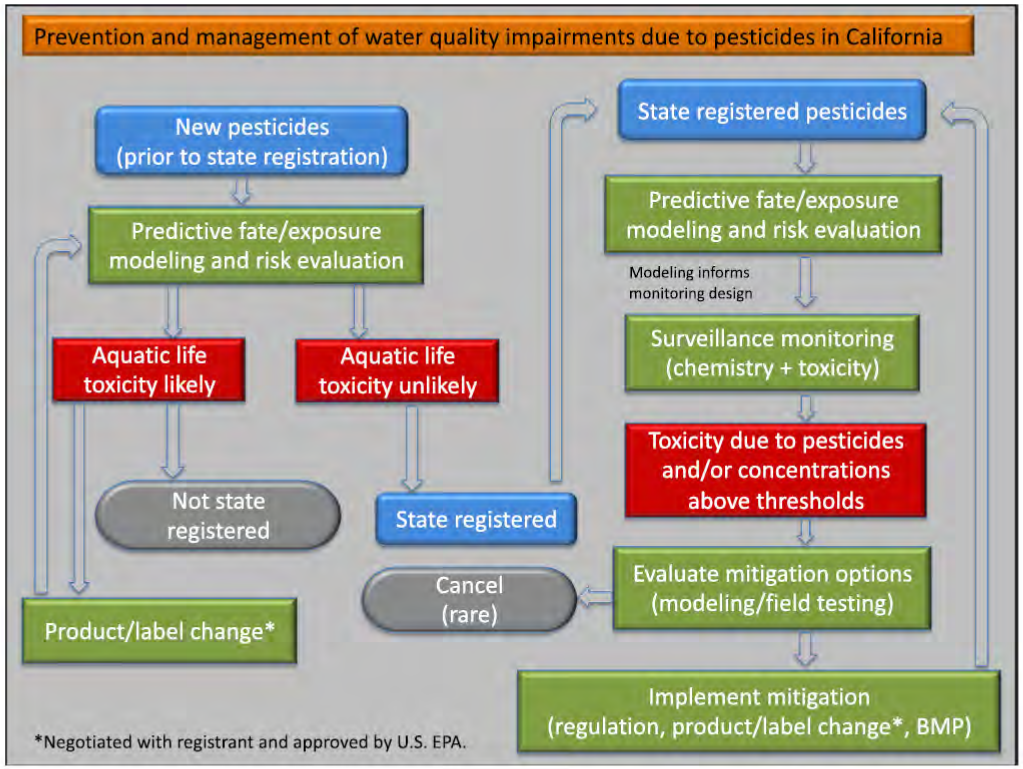

- Element 3: MS4 Monitoring program designed to coordinate with existing DPR and State Water Board pesticides and toxicity monitoring to support effective implementation of Elements 1 and 2.
- Element 4: Requirements for MS4s to support Elements 1 and 3 by contributing expertise on how pollutants present in urban environments enter and behave in urban runoff and water bodies.
- Element 5: Other actions that can reasonably be implemented by MS4s, such as IPM outreach, in support of pesticides reductions.

CASQA supports the State Water Board's stated goal of implementing the UPA "as an alternative to TMDL development to address pesticide and pesticide-related toxicity impairments in individual water bodies." Achievement of this goal would provide substantial savings of state and MS4 agency resources as compared to establishment of multiple TMDLs throughout the state.

Elements 1-4 are consistent with CASQA Vision Action 1.3. Water Board staff have indicated their intent that the Urban Pesticides Amendments, as shown in Element 5 should also establish a consistent set of "*minimum pesticides source control measures for MS4 dischargers.*"

CASQA representatives have worked with the Water Boards to ensure that such requirements are reasonable and consistent with similar measures already in place in some regions. At this time, the list of potential minimum measures includes use of IPM, education of and outreach to residents and professional pesticide applicators, providing urban runoff scientific and management expertise to support pesticide regulatory processes, non-stormwater discharge prohibitions, and pesticide and toxicity monitoring.

CASQA supports the stated goal to "create a comprehensive, coordinated statewide monitoring framework for pesticides and toxicity in urban runoff and receiving water that improves resource efficiency, usefulness of data, and coordination of data collection to support management decisions."[25] A well-designed and managed monitoring framework that is properly representative of urban areas can simultaneously provide more useful information and improve the utilization of resources by eliminating unnecessary MS4 monitoring requirements that do not contribute to effective management of pesticides and pesticide-caused toxicity.

Monitoring. In the previous FY, agreement was reached regarding decision-making channels and membership for the UPCMP. CASQA is an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. These committees have been convened by the Aquatic Science Center using grant funding from the State Water Board. The Steering Committee and Technical Committee are tasked with establishing the initial framework of the monitoring program, including a work plan for its first year of operation. It is intended to have the work plan in place upon adoption of the UPA. However, progress in this direction has been slowed this year by changes in staffing at the State Water Board, and by complications caused by COVID-19. One subsequent meeting of the Technical Group was held in June.

Key joint activities for the UPCMP this FY included:

- Initial meeting of UPCMP Steering committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[26].
- Initial meeting of UPCMP Technical Committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[27].

[25] Informational Document, CEQA Public Scoping Meeting, State Water Resources Control Board, January 25, 2017
[26] MS4 representatives on the Steering Committee are from the Alameda Countywide Clean Water Program, Orange County, and Sacramento County.
[27] MS4 representatives on the Technical Group are from the Santa Clara Valley Urban Runoff Pollution Prevention Program, Orange County, and Sacramento County (jointly funded by the Sacramento Stormwater Quality Partnership).

Technical Support. CASQA continues to provide technical support to the Water Boards on numerous crucial and highly detailed items related to the UPA, Staff Report, CEQA Document, monitoring program, model permit language, and the relationship of these to the MAA. During June, CASQA organized a meeting of DPR, Water Board, and CASQA representatives on July 24th for DPR to provide detailed information to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.

MS4 Input. CASQA Pesticides Subcommittee continued briefings for the MS4 community to explain, gather input, and obtain support for the Urban Pesticide Amendments in advance of their public release for comment. Briefings were provided to representatives of the following MS4 groups:

- Los Angeles County Permittee Group
- Central Valley MS4 Coordinating Committee
- Sacramento Stormwater Quality Partnership
- CASQA Watershed Management and Impaired Waterbodies Subcommittee
- CASQA Policy and Permitting Subcommittee
- CASQA Science and Monitoring Subcommittee
- Sonoma County MS4 Permittee Group

2.2.3 CASQA Participation in Other State Efforts

As presented in Table 4, CASQA has been actively involved with various State agencies and advisory groups that affect pesticide use and pest management in urban areas.

Table 4. Participation in Other State Efforts to Support CASQA's Goals

Agency or Conference	Latest Outcomes
DPR's Pest Management Advisory Committee (PMAC)	Participation on the PMAC has resulted in expanded focus by DPR on urban pest management and water quality issues and generated funding for urban IPM programs. This year the PMAC recommended funding for two IPM research projects that would address pesticides in urban runoff, and one project that would address copper antifouling pesticide impacts of water bodies that are receiving waters of interest to many MS4 agencies. The amount of funding recommended was approximately $570,000. The projects are listed below. • IPM for local Sacramento farmers. [addresses commercial urban farms with high pesticide uses] • Training for pest management professionals. [upgraded facilities and mass media channels for statewide structural pest control licensees] • Training for hull cleaners and boaters. [addresses copper pollution in marinas]
California Structural Pest Control Board (SPCB)	A PSC member is an appointed member of the SPCB. The SPCB recognizes the potential for excessive pesticide application to impact water quality. The SPCB is in the process of adopting regulations to increase continuing education hours required in the IPM category. Finalization of these regulations has been slowed due to the need for California to reconcile its structural licensing requirements with newly adopted Federal regulations for this industry. Five proposals were selected and collectively awarded $1.02 million to be funded by the SPCB Research Fund. Progress reports were provided at the February 2020 board meeting for five research projects funded in the previous FY by the SPCB The research topics are listed below, and detailed project updates are available online at https://www.pestboard.ca.gov/about/agenda/20200312_materials.pdf • "Diet and Colony Structure of Two Emerging Invasive Pest Ants" • "Investigation of Rodenticide Pathways in an Urban System Through the Use of Isotopically Labelled Bait" • "Evaluation of bait station system efficacy for reduced-risk subterranean termite management in California" • "Development and Evaluation of Baiting Strategies for Control of Pest Yellowjackets in California" • "Improving Urban Pest Ants Management by Low-Impact IPM Strategies" The SPCB is in the process of allocating funding for the 2021 FY.

Section 3. CASQA's Approach Looking Ahead

At any given time, EPA and DPR may be in the process of evaluating and registering various pesticides for urban use. CASQA will continue to track and engage in EPA and DPR activities, with a focus on top priority active ingredients (as identified in the annual Pesticide Watch List) and sharing relevant urban runoff information and CASQA's water-quality specific expertise with pesticides regulators. Key documents to be reviewed will include risk assessments and risk management proposals with an eye toward ensuring that pesticide regulators have and consider accurate information on relevant factors in urban areas such as pesticide use patterns, urban pollutant transport mechanisms, and receiving water conditions. CASQA strives to ensure that pesticide regulators have access to relevant information such as monitoring data, water quality regulatory requirements, and urban runoff agency compliance liabilities and cost information. As necessary, CASQA will continue to recommend changes in an individual pesticide's allowable uses or use instructions, request consideration of impacts on water bodies receiving urban runoff, or ask that regulators fill critical data gaps by obtaining more data from manufacturers. As resources allow and circumstances warrant, CASQA will collaborate with wastewater organizations (such as BACWA), other water quality stakeholders, and the Water Boards in commenting on EPA and DPR actions.

In the coming year, CASQA will continue to address near-term pesticide concerns and seek long-term regulatory change. Although changes at the federal level are important for fully achieving CASQA's goal of protecting water quality through the effective use of pesticide regulations, until there is a more favorable situation at that level, we will continue to focus our efforts on solidifying progress at the state level. In FY 2020-2021, we will continue engagement on specific regulatory actions for priority pesticides at the federal level, while continuing our strategic focus on supporting State adoption of the UPA. CASQA's current priority activities are as follows:

(1) Continue collaboration with DPR to address near-term regulatory concerns, while seeking OPP and OW actions to reduce inconsistencies:

- Ensure DPR action on fipronil water pollution is completed, including effective professional user education about restrictions on its outdoor urban use.
- Ensure DPR enforces mitigation measures for pyrethroids and fipronil, and adopts additional measures as necessary.
- Ensure the state continues to conduct surveillance monitoring to evaluate pyrethroids and fipronil mitigation effectiveness and to evaluate occurrence of new threats like imidacloprid and other neonicotinoid insecticides.
- Continue to encourage EPA to complete scientific groundwork and to identify and implement pyrethroids, fipronil, malathion, and imidacloprid mitigation measures, recognizing that it is likely that necessary mitigation cannot readily be implemented entirely by DPR.

(2) Seek long-term changes in the pesticide regulatory structure:

- Leverage our success at the state level and continue to be a key stakeholder in the STORMS project to adopt the statewide UPA. Through this process, CASQA will work with other stakeholders to implement the planned restructuring of California's urban surface water pesticides monitoring to increase its effectiveness and improve coordination.
- Seek procedure changes such that DPR continues to refine its registration procedures to address remaining gaps in water quality protection.
- Seek increased transparency of DPR regulatory activities, including timely access to scientific evaluation reports that are the basis of registration decisions.

CASQA will continue to seek opportunities to coordinate on high priority regulatory actions, with the Water Boards and other water quality stakeholders such as POTWs and non-profits, to take advantage of efficiencies, increase effectiveness, and ensure that the water quality community has a consistent message. Table 5 presents CASQA's activities and level of engagement anticipated for FY 2020-2021; CASQA will conduct these activities as priorities indicate and resources allow. Table 6 summarizes upcoming regulatory action items that are likely to proceed and may require CASQA attention in FY 2020-2021.

Table 5. CASQA Pesticide Subcommittee Activities

Activity		Purpose
Regulatory Tracking	Track Federal Register notices	Identify regulatory actions for high priority active ingredients that may require review.
	Track DPR notices of registration applications and decisions	Identify pesticides meriting surface water review that are not within DPR's automatic routing procedures, identify gaps or potential urban runoff-related problems with current DPR evaluation or registration plans other regulations, procedures & policies.
	Track activities at the Water Boards	Identify opportunities for improvements in TMDLs, Basin Plan Amendments, and permits.
	Review regulatory actions, guidance documents, and work plans	Identify potential urban runoff-related problems with current EPA evaluation or registration plans, other regulations, procedures, and policies.
Regulatory Communications	Briefing phone calls, informal in-person meetings, teleconference meetings, and emails with EPA and DPR	Information sharing about immediate issues or ongoing efforts; educate EPA and DPR about issues confronting water quality community. Provide early communication on upcoming proceedings that help reduce the need for time-intensive letters.
	Convene formal meetings, write letters and track responses to letters	Ensure current pesticide evaluation or registration process accurately addresses urban runoff and urban pesticide use and management contexts and take advantage of opportunities to formally provide information suggest more robust approaches to that could be used in future regulatory process. Request and maintain communication on mitigation actions addressing highest priority pesticides.
Advisory	Serve on EPA, DPR, and Water Board policy and scientific advisory committees	Provide information and identify data needs and collaboration opportunities toward development of constructive approaches for managing pesticides.
Educational	Presentations to and informal discussions with EPA, DPR, Water Board, CASQA members,	Educate EPA, DPR, Water Board, and CASQA members about the urban runoff-related shortcomings of existing pesticide regulatory process, educational efforts to support process improvements, and report on achievements. Encourage research and monitoring programs to address urban runoff data needs and priorities. Stimulate academic, government, or private development of analytical and toxicity identification methods to address anticipated urban runoff monitoring needs. Inform development of new pesticides by manufacturers and selection of pesticides by professional users.
	Developing and delivering public testimony	Educate Water Board members about the problems with existing pesticide regulatory process, encourage change, and report on achievements.

Activity		Purpose
Monitoring and Science	Update Pesticide Watch List based on new scientific and regulatory information	The Pesticide Watch List (Table 2) serves as a management tool to prioritize and track pesticides used outdoors in urban areas.
	Data analysis of DPR/SWAMP/USGS/MS4 monitoring, pesticide use data, and information from scientific literature	Summarize data to educate CASQA members and water quality community, Water Boards, DPR, and EPA.
Reporting	Prepare Monthly Action Plans	Coordinate CASQA's regulatory actions with Partners
	Prepare PSC Annual Report to describe the year's status and progress, provide detail on stakeholder actions, and the context of prior actions as well as anticipated end goal of these activities.	Provide CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. The document serves annual compliance submittal for both Phase I and Phase II MS4s. It may also be used as an element of PEAIPs and future effectiveness assessment annual reporting.

Table 6. Anticipated Opportunities for Pesticides Regulatory Engagement in 2020-2021

EPA Pesticide Registration Review (15-year cycle)
Environmental Risk Assessments • Priority 2-4 pesticides: Busan 77, Chlorothalonil, Irgarol, Diuron, Dichlorvos (DDVP), Isothiazolinones (DCOIT, BIT, BBIT, MIT, OIT). o-Phenyl phenol, Peroxy Compounds (includes Peroxyoctanoic Acid; Sodium Percarbonate), Propiconazole, Tebuconazole, Ziram; others (schedule unknown)
Proposed Interim Decisions • Priority 1 pesticides: Fipronil, Pyrethroids: Cyhalothrins, Cypermethrins, Allethrin, Etofenprox, Metofluthrin • Priority 2-4 pesticides: Carbaryl, Chromated Arsenicals, Creosote, Dichromic acid, DBNPA, Dithiopyr, (phenoxy herbicide), MCPA, MGK-264 (synergist), Methomyl Novaluron, Oxyfluorfen, Pentachlorophenol (Pentachlorophenol, Dioxins), Piperonyl butoxide (PBO) (pyrethroids synergist), Pyrethrins, Simazine, Sodium bromide, Thiophanate methyl, Triclopyr; others (schedule unknown)
Other EPA-related Items
• U.S. EPA "Increasing Consistency and Transparency in Considering Costs and Benefits in the Rulemaking Process" affects how the U.S. EPA uses cost and benefit analysis in setting pollution standards. Rule proposal was expected in 5/19. • Proposed rule to eliminate some OPP Federal Register Notices (was anticipated September 2018 according to U.S. EPA semi-annual regulatory agenda) • U.S. EPA Update to Guidelines for Deriving Aquatic Life Water Quality Criteria. Draft scoping document external peer review is next step. Seeking OPP engagement.
DPR New Pesticide Registration Decisions
• Proposed new urban pyrethroids (momfluorothrin, alpha-cypermethrin, phenothrin and transfluthrin products) • Proposed expansion of bifenthrin use in non-residential urban locations • Proposed new fipronil products: fipronil-bifenthrin landscaping product, termite product, product for yellow jackets • Proposed new aerated indoxacarb powder • Proposed ant and termite product containing the proposed new pesticide broflanilide. • Others (schedule unknown)
Other DPR-related Items
• Registration Application Surface Water Reviews – continue to follow up on communications requesting review of all storm drain products and outdoor antimicrobials
Water Boards
• State Water Board Provisions for Toxicity Assessment and Control, which include statewide numeric water quality objectives and implementation program • STORMS Urban Pesticides Amendments • Pesticides 303(d) listings • Pesticide TMDL implementation requirements for permittees

Appendix

Regulatory Participation Outcomes and Effectiveness Assessment Summary Tables

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Abemectin (September 2019)

Endangered Species Act Outcomes Evaluation (June 2020)

Imidacloprid (April 2020)

Neonics Extension (April 2020)

Pyrethroids (January 2020)

Pyrethroids Extension (April 2020)

Pyrethroids Update (June 2020)

Terbuthylazine (May 2020)

Zinc and Salts (September 2019 and April 2020)

Pesticide:	Abamectin; Docket: EPA–HQ–OPP–2013–0360
Use:	Insecticide used for ants, mites, and spiders (among other uses).
Why we care:	Highly toxic to aquatic invertebrates. Outdoor uses in urban environments have high potential impact MS4 and surface waters.
Actions taken:	CASQA has been tracking this pesticide since 2013.
Status:	EPA released the Final Interim Registration Review Decision in August 2019.

Next steps:	ESA Consultation is required but unlikely to begin before 2022.
Recommendation:	No action is needed at this time. Keep on tracking list.

From EPA's Final Interim Decision:	Response from CASQA's Perspective:
EPA is adding a standard Runoff Prevention Advisory Statement to the label: *"RUNOFF PREVENTION* *To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems."*	The standard runoff prevention language that EPA has proposed could be further strengthened. For example, CASQA typically recommends not allowing pesticide use if rain is predicted in the next 48 hours (instead of 24 hours as is proposed by EPA). We should consider impact of "rinsing application over the treated area" which would be highly problematic on impervious surfaces hydraulically connected to MS4 and surface waters.
From EPA's response to comments in the "Abamectin. Response to Comments Regarding HED's [EPA OPP Health Effects Division] Human Health Risk Assessment in Support of Registration Review, it appears that new crack and crevice usages are being evaluated through a different process: HED notes that the human health draft risk assessment also included a separate new use action for a proposed use on crack and crevice and spot treatment for abamectin. Mitigation measures associated with the proposed new use are separate from the registration review action and are being addressed by the registrant petitioning for that particular use pattern.	To better assess the risks from a pesticide, EPA should evaluate pesticide uses in a comprehensive manner that includes the use patterns and mitigation measures proposed and/or approved after the initiation of Registration Review.

Action:	Method for National Level Endangered Species Risk Assessment Process for Biological Evaluations of Pesticides; Docket: EPA–HQ–OPP–2019–0185
Use:	Defines procedures for assessing pesticides risks to endangered species
Why we care:	EPA intends to use these procedures to replace its current ecological risk assessment procedures
Actions taken:	CASQA submitted a comment letter in 2019. CASQA's comments were echoed by UP3 partners including BACWA, NACWA, the SF Bay Water Board, Xerces Society, Northwest Center for Alternatives to Pesticides (and 8 other groups) and Center for Biological Diversity. DPR made comments similar to CASQA's.
Status:	EPA released its revised method in March 2020
Next steps:	EPA will be using the revised procedures to conduct ecological risk assessments for pesticides in its ESA pilot program.
Recommendation:	Review ecological risk assessments for ESA pilot pesticides and comment on procedural shortcomings as warranted.

CASQA 08/15/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticides Are Applied on Outdoor Impervious Surfaces and Must Be Addressed in BEs	"EPA has corrected its discussion of applications to impervious surfaces in the Revised Method. The discussion was not meant to indicate that EPA would not evaluate applications to impervious surfaces. Rather, it was intended to generate a footprint for developed areas that was more realistic. In the Revised Method, for applications that are not intended to be made directly to impervious surfaces (e.g., to lawns), EPA will make a treated area assumption for the developed land cover class based on the percent of a typical lot that is not represented by impervious surfaces (e.g., footprints of houses, driveways are assumed to not be treated). In these cases, EPA acknowledges that overspray to impervious surfaces can occur, and, as such, the treated area will include a small percent of the impervious surface. For applications designed for impervious surfaces, EPA will model the application using the impervious PWC scenario, along with appropriate adjustments to account for the area treated." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 41.	Yes.
Clean Water Act Compliance Assessment Must Be an Integral Part of BEs and the Pesticide Endangered Species Act Consultation Process	"Office of Pesticide Programs and Office of Water work together on water issues to address issues under each of their statutes." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	No.
BEs must evaluate all uses of a pesticide that EPA is approving – not just uses that have occurred historically. When EPA reviews a pesticide, it licenses each individual use of that pesticide as described on	"EPA will consider all uses allowed on product labels for the assessed pesticide that are registered under Sections 3, 24(c), and 18 of the Federal Insecticide Fungicide Rodenticide Act (FIFRA) when developing BEs. As stated above, the proposed Revised Method included usage data in the derivation of the Action Area. EPA has changed the	Partially. EPA will consider all legal uses in its first phase, but the actual risk assessment

product labels. If EPA restricts its analysis only to uses that have occurred historically, or to select geographic areas, EPA is effectively licensing uses that it is not evaluating, which is inconsistent with the ESA. This would be the effect of the usage data methodology proposal.	Revised Method so that usage data are no longer incorporated into Step 1. Therefore, all registered uses, even those without demonstrated usage are included in Step 1, definition of the Action Area. EPA incorporates usage data into Step 2 of the Revised Method. When usage data (i.e., PCT [Percent Crop Treated], average rate, application timings, etc...) are incorporated into the risk assessment, the best available, scientifically valid data are used. EPA believes that data on pesticide usage represent critical information for determining whether an individual of a listed species is likely to be exposed and adversely impacted, which is the goal of Step 2." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 14.	will leave out any allowed pesticide uses for which there are no usage data.
BEs must use chronic invertebrate toxicity data. The proposal to use only lethal toxicity (LC50) data for aquatic invertebrates deviates from the CWA regulation of aquatic ecosystems to protect food supplies for endangered species.	"EPA will consider effects to mortality, growth or reproduction and other sublethal endpoints linked to survival or reproduction of taxa relevant to a listed species' prey, pollination, habitat and/or dispersal." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	Yes.
Urban pesticide use estimates could be greatly improved with use of reported urban use and sales data collected annually by California Department of Pesticide Regulation (CDPR). Each year, CDPR mandates reporting of pesticide product-specific sales and all professional pesticide use (including urban use). These data provide the quantity of active ingredients. The sales data are collected for every product brand-label combination. Reported use and total annual sales data are freely available and readily accessed from CDPR's online database at https://www.cdpr.ca.gov/dprdatabase.htm While CDPR considers its product-specific sales data as confidential, these data can be obtained upon request by EPA and consolidated (e.g., by use category) before publishing in risk assessments.	"EPA considers California Pesticide Use Reporting data in assessments, as appropriate. EPA agrees with CBD [Center for Biological Diversity] that pesticide sales data, including those available from California Department of Pesticide Regulation, are of limited use in characterizing the timing and location of pesticide usage. Pesticide sales data can provide some information regarding the scale of usage for a pesticide. For example, historical sales for an established pesticide may be useful in ground truthing the reasonableness of estimated usage that rely on multiple conservative assumptions. One example could be comparing sales data to usage modeled for a year and finding that the single year modelled exceeds the 20-year sales total for the AI. Such an outcome suggests that the model is highly conservative overall. Of course, at a local level, the model may be less conservative than indicated by the disparity between the sales and modelled usage estimates." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 11.	Partially.

Pesticide:	Imidacloprid; Docket: EPA–HQ–OPP–2008–0844
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California. Sales data show that use is increasing.
Actions taken:	CASQA submitted a comment letter in 2017 on the Preliminary Aquatic Risk Assessment.
Status:	EPA released the Proposed Interim Registration Review Decision (PID) per Fed. Reg. notice Feb. 3, 2020. Comments are due May 4, 2020.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Proposed Interim Decision to address unresolved issues and concerns.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
CASQA Concurs with EPA's Finding of Significant Risk.	As in the Preliminary Aquatic Risk Assessment. The EPA found significant risk to aquatic life in the Proposed Interim Decision.	Yes.
CASQA Requests EPA Identify Major Sources of Imidacloprid in Urban Runoff. CASQA noted that EPA's PARA model omits most outdoor urban imidacloprid uses. CASQA Suggested Refinements to Imidacloprid Preliminary Risk Assessment: • Include modeling of runoff from impervious surfaces for both residential and commercial models. • Evaluate and then model the runoff from all permitted outdoor uses of imidacloprid • Include leaching of impregnated materials in the model. • Perform an urban-specific analysis, including analysis of monitoring results specific to urban areas.	"EFED's risk assessment indicated, using modeling and monitoring data, that neonicotinoids can potentially enter surface water and groundwater and affect aquatic invertebrates. Although EFED did not explicitly model urban runoff sources, EFED believes the concentrations would not exceed those modeled via agricultural sources. While field and monitoring data provide supporting evidence that neonicotinoids are present in surface waters, supporting metadata for the sampling (i.e., sampling frequency, vicinity of applications to monitoring sites, timing of sample collection relative to timing of applications, etc.) are not available, precluding the quantitative use of monitoring data. While monitoring data from habitats not designed to harbor aquatic organisms may not be directly relevant for ecological risk assessment, they may be indicative of sources that may discharge into aquatic organism habitats. Likewise, while monitoring data from other countries may not be indicative of uses or	No. Although EPA acknowledged that there is a pathway to the storm drain, they did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff or improve modeling of sources.

	products in the United States, they provide a line of evidence that neonicotinoids can contaminate water sources." (PID p.14)	
CASQA Recommends Further Evaluation of Product Labels and Use Restrictions. (see specific requests below)	Although EPA made some small improvements to imidacloprid labels, they did not incorporate the majority of CASQA's label requests.	Partially.
1) Pre-construction termiticide label improvements: "…we request that EPA add a requirement that after a pre-construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured, and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would bridge a gap between the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits."	EPA did not respond to this comment.	No.
2) Require that no applications be made when rainfall is forecast within 48 hours.	EPA partially incorporated CASQA's suggested idea, but only for 24 hours of forecasted rainfall and only for spray (not granular) products.	Partially.
3) Reduce size of perimeter treatment bands around structures for treating for termites and other structural pests to the smallest treated area that will achieve target pest control. Prohibit application on impervious surfaces.	EPA reduced the perimeter treatment area to up to seven feet (on permeable surfaces), up to two feet up a structure, and up to one inch on pervious surfaces.	Partially. A reduced treatment band is an improvement, but the suggested treatment bands do not appear to be based on scientific study. Use on impervious surfaces is still allowed.
4) Prohibit application of granular products to any impervious (non-soil or unvegetated) surface and prohibit application to any area where the product may contact any surface water, storm drain, or urban runoff conveyance system (e.g., gutter).	EPA did not respond to this comment.	No.
5) Reduce target area for granular fly bait, instead of allowing the quantity to be spread over "1,000 square feet".	EPA did not respond to this comment.	No.
6) Disallow all outdoor "paint-on" applications of imidacloprid, especially if painted surface is above impervious area that drains to storm drain system or surface	EPA did not respond to this comment.	No.

water body. If any outdoor uses continue to be allowed, consider reducing application frequency (currently every 4-6 weeks), setting a maximum allowable outdoor treated area, and establishing a total annual application rate.		
7) Disallow product application in cracks and crevices along surfaces that drain into the storm drain system. If allowed, request that EPA and registrants utilize efficacy data to determine the smallest treated area that will achieve target pest control. This will enable labels to limit the spot treatments and crack and crevice treatments – to only the amount necessary – instead of the current 2' x 2' dimensions for spot treatment, and unspecified dimensions for crack and crevice treatments.	EPA updated label requirements to not limit to a 2' x 1' areas as well as limit application to 10% of the treatment area.	Partially.
8) Disallow all usage inside sanitary sewers, storm drains, or inside or around manholes.	Although manholes are not mentioned, it appears that EPA is prohibiting use in sanitary sewers, manholes etc. as they are not in the list of permitted areas.	Yes, but label would be clearer if it explicitly prohibited these uses.
9) Impregnated Materials: (1) Require end use product labels for all products bearing pesticide claims consistent with the recently adopted California guidance for labeling pesticide-impregnated materials (California Notice 2017-08). (2) Consider limiting concentration and/or use locations for materials that show high washoff potential.	EPA did not respond to this comment.	No.

Pesticide:	Neonicotinoid insecticides; Dockets EPA–HQ–OPP–2012–0329, EPA–HQ–OPP–2011–0865, EPA–HQ–OPP–2011–0920, EPA–HQ–OPP–2008–0844, EPA–HQ–OPP–2011–0581
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California
Actions taken:	In March 2020, the County of Sacramento sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: BACWA, City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County Flood Control and Water Conservation District, SCVURPPP, and the SF Bay Water Board.
Status:	EPA released Proposed Interim Decisions for Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Imidacloprid Proposed Interim Decision to address unresolved issues and concerns.

County of Sacramento Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the County of Sacramento Department of Water Resources, I request that EPA extend the comment period for the Proposed Interim Registration Decisions (PIDs) for the subject neonicotinoids for one additional month, to May 4, 2020. This will provide adequate time for review in light of the complexity of the proposed interim decisions, the number of chemicals under consideration, and the occurrence of this comment period during our winter rainy season, when staff from our agency and the organizations we collaborate with take on substantial extra duties in association with monitoring of rainfall/runoff events.	EPA extended the review period from April 3, 2020 to May 4, 2020.	Yes.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	CASQA commented on the Preliminary Ecological Risk Assessment for Pyrethroids in 2017.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

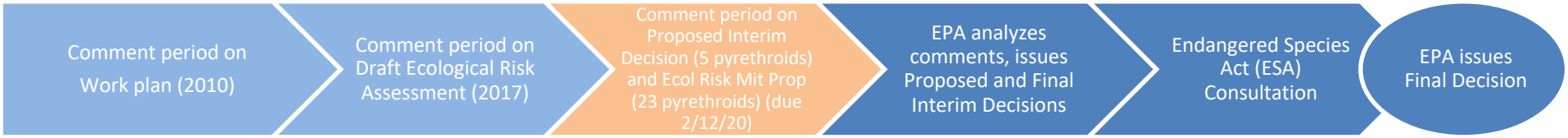

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 7/7/2017 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticide Discharges to storm drains can be costly and disruptive. Currently, EPA has listed 622 California water bodies as impaired by pesticides under Section 303(d) of the Clean Water Act; of those, 16 are listed for pyrethroids.	EPA discussed impacts, including Clean Water Act compliance challenges and costs for indoor discharges, but did not even mention these for stormwater, except a passing reference to TMDL compliance. Based primarily on market share, EPA asserted that the benefits of pyrethroids use are high.	No. It virtually omitted urban runoff from its Clean Water Act compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications (including underground It did not correctly identify alternatives for outdoor structural pest control.). It relied on an industry-supplied report on lawns/landscaping treatments as the data source for its outdoor urban benefits analysis. EPA also does not distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts.

CASQA Concurs with EPA's Finding of Significant Ecological Risk and Need for Mitigation	None. EPA used CASQAs comments to counter arguments by others suggesting that there is not a significant ecological risk.	Yes.
Mitigation addressing urban runoff is needed. To minimize ecological impacts and reduce the number of watersheds impacted by pyrethroid TMDLs and subsequent costs to state and local government agencies, we request that EPA implement mitigation measures as requested above. If these mitigation approaches are not deemed appropriate nationwide, please consider providing clear mechanisms for California-specific labels and sales restrictions.	"Outdoor urban uses of pyrethroids and pyrethrins are expected to result in potential risks of concern, primarily to aquatic invertebrates and fish. This potential risk is often a result of urban runoff, but may also be a result of spray drift or improper disposal of pyrethroid products. The potential for this risk to occur in the environment is supported by pyrethroid monitoring data from urban settings at levels that would be expected to result in potential risk to aquatic invertebrates. There has been a substantial concern from municipalities and states, particularly California, that urban pyrethroid usage adversely impacts water quality and, in the case of California, contributes to TMDL exceedances. As a result, the EPA is proposing measures to reduce to the urban footprint of the pyrethroid group while still allowing flexibility for the user community and retaining the benefits of efficacious pest control." "The potential ecological risks, which are expected to be reduced with the proposed mitigation, are outweighed by the high benefits associated with the use of pyrethroids for the control of pests with public health significance." EPA Proposed mitigation: (1) Indoor and Outdoor Use Site Clarification (2) Reduction in distance from building foundations that can be treated with pyrethroids from 10 feet to 7 feet. [California regulations prohibit applications >3 feet from building foundations] (3) Reduction in height above ground level of building treatments from 3 feet to 2 feet [this would make EPA labels consistent with this element of California regulations] (4) Prohibition on applications during rain. [California regulations already prohibit] (5) Unenforceable advisory statement to avoid applications if rain is forecast within 24 hours. [new] (6) Definition of spot treatment (2 sq. ft.)	No. Proposed mitigations are nice and might reduce slug discharges, but for California, they have no expected benefits for ongoing discharges. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. Text includes two useful mitigations are proposed for indoor products that are <u>not</u> proposed for outdoor products in the enforceable part of the proposal (the "label table in the appendix"): (a) Pictogram and new enforceable label statement: "Do not pour down the drain or sewer. Call your local solid waste agency for local disposal options." (b) New advisory label statements (English & <u>Spanish</u>): "Do not allow to enter indoor or outdoor drains" and "Follow proper disposal procedures on this label" EPA's proposal allows some impervious surface applications prohibited by California regulations: (a) Within 25 feet of an aquatic habitat located down gradient from an application site (b) Preconstruction termite site within 10 feet of a storm drain located down gradient (c) aquatic habitat protection excludes intermittent streams (which are included in California regulations) EPA mitigations cover all users (not just professional applicators) and include etofenprox, which is currently not covered by California regulations.

	(7) New requirement: "Do not allow the product to enter any drain during or after application." [No methods are specified as to how to prevent post-application washoff into storm drains] (8)Various other label clarifications.	
EPA's runoff modeling seems to underestimate some exposures as shown by the risk quotients (RQs) calculated from monitored concentrations that are generally higher than the RQs calculated from modeled concentrations (PRA, Part II, pp. 165-167).	EPA acknowledged the monitoring data and noted that it "did not agree with the PWG that it is inappropriate to compare modeled and monitored concentrations". EPA acknowledged the concerns from commenters from California concerning what is required under the Clean Water Act.	Yes.
CASQA agrees with EPA's use of all available aquatic toxicity data including those for sensitive organisms like Hyalella azteca and Americamysis bahia. The San Francisco Bay Regional Water Quality Control Board also commented on this in their 7/6/17 Letter to EPA, "It should be noted that H. azteca are not uniquely sensitive to pyrethroids. Of the few aquatic invertebrate species that have been tested for pyrethroids toxicity, several are similar to the sensitivity to H. azteca."	EPA considered arguments from both CASQA/SF Water Board and the registrant's lobbying group (Pyrethroid Working Group [PWG]) and ultimately agreed with the comments from CASQA/Water Board on this issue. EPA relied not only on these comments, but also on scientific papers submitted with the comments	Yes.
CASQA Recommends Additional Use Restrictions and Product Label Enhancements.		No, except for improvements to label readability.
1. Reducing overuse of active ingredient. We request that the EPA and registrants review such studies of application sites, applicator methods, and associated residual pesticides in runoff and coordinate with CDPR to develop additional mitigations and associated label restrictions to reduce over-application from creating regulatory and consequent financial burdens that must be borne by state and local governments.	"The EPA has worked extensively with registrants…to develop proposed mitigation to reflect what is practical while also maintaining the efficacy of these uses. The proposed mitigation is designed to reduce the pathway for these chemicals to get into surface waters and storm drainage systems. The language also informs consumers on how to prevent pyrethroids products from ending up in wastewater facilities."	No. EPA's proposal would not meaningfully expand the current California mitigations, which are proving insufficient to resolve pyrethroids water impairments.
2. Adding a minor label requirement for pre-construction (under foundation) termiticide treatments to bridge the gap between FIFRA and	"In following up on the labeling recommendations from CASQA, the EPA consulted with construction experts with specific experience with termiticide applications, regarding	No. EPA did not implement any changes to bridge the gap between FIFRA and the Clean Water act on termiticide treatments.

Clean Water Act regulatory programs. CASQA requests that EPA refine labels for pre-construction termiticide applications with the overall goal of preventing the discharge to water bodies of any water that contacts pesticide treated soil. Specifically, we request that EPA add a requirement that after a pre- construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would address a gap between FIFRA and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits. CASQA would appreciate the opportunity to discuss the specifics of this recommendation with EPA and registrants and professional applicators as appropriate. We perceive this as a relatively minor change that would address an existing gap between FIFRA and Clean Water Act construction site regulatory programs.	the suggestion that a signage requirement on pyrethroid labels could reduce the amount of pesticides running off into the drainage system. The EPA also met with Dave Tamayo, an environmental specialist from CASQA, on February 25, 2019, to discuss these comments and recommendations. The EPA officials also attended the 2019 Termite Tour, organized by the Association of Structural Pest Control Regulatory Officials, which included discussions on pre- and post-construction termite application practices. There wasn't consensus on the potential effectiveness additional posting and covering of these pre-construction termite applications could be in reducing pesticides in surface water. Therefore, the EPA is not proposing these changes in the ecological risk mitigation proposal. However, the EPA welcomes additional comments on this topic during the public comment period."	
3. Enhancing overall readability and enforceability of label language. CASQA requests that EPA seek to eliminate all conflicting and unclear language by coordinating with CDPR and registrants in the development of label language that more clearly provide instructions that result in protection of water quality. If EPA does not concur that label enhancement is necessary on a nationwide basis, CASQA requests that EPA provide clear mechanisms for establishing California-specific label instructions. CDPR is unable to take this action on its own because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA.	"The EPA has made a significant effort to propose changes to pyrethroid labels to improve consistency and help users find adequate directions."	Partially. Proposed label language includes a few useful clarifications but maintains some language that is confusing and includes many statements that are unenforceable. No changes were made to bifenthrin labels, which have additional mitigation that has confusing wording.

4. **California-Specific Labels.** If EPA does not find it appropriate to make these changes on a nationwide basis, we request that EPA provide CDPR the ability to work with registrants to establish California specific instructions on product labels. Since EPA controls product labels – the most effective means of controlling product usage – EPA's explicit approval of state-specific label language is essential.	"The EPA has worked closely with CDPR in the past on adding state-specific labeling restrictions to many pesticide products, including products containing pyrethroids. The EPA will continue to discuss implementation options with states and stakeholders when geographic-specific restrictions may be needed."	**No resolution.** EPA's proposal differs significantly from California regulations, in ways that will further confuse applicators who tend to focus on product labels (in their hands) instead of regulations (not in their hands). EPA does not explicitly state whether it will allow or support California-specific labels.
CASQA Requests EPA Terminate Urban ("Residential") Use of Bifenthrin Due to Its Persistence in Aquatic Ecosystems. CASQA has concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. • Bifenthrin Exceeds EPA Aquatic Life Benchmarks More Often Than Any Other Pyrethroid • Bifenthrin Is Substantially More Persistent in Aquatic Environments Than Other Pyrethroids • Bifenthrin is among the most highly toxic pyrethroids • Bifenthrin is One of Multiple Insecticides Commonly Used in Urban Environments • Due to Bifenthrin's Unique Persistence, It Is Too Hazardous to Use in Urban Settings CASQA further requests that if EPA does not concur that this measure is appropriate on a nationwide basis, that EPA implement such a measure for California by adding California-specific statements to all residential bifenthrin product labels (e.g., "not for use in California"). CDPR is unable to take this action because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA. While the discussion above focuses on bifenthrin, CASQA requests that EPA provide similar controls to ensure that	"With regard to aquatic risk, bifenthrin is not so unique when compared to other pyrethroids that it warrants additional bifenthrin-specific mitigation… bifenthrin does not consistently have the highest RQ exceedances for aquatic invertebrates. The agency disagrees with CASQA that bifenthrin is more toxic to aquatic invertebrates than other pyrethroids. All pyrethroids are very highly toxic to aquatic invertebrates." "The EPA is not proposing ecological mitigation for bifenthrin beyond what is outlined for all pyrethroids in the Pyrethroids and Pyrethrins: Ecological Risk Mitigation Proposal For 23 Chemicals due to the benefits of its use (USEPA 2016), and the agency's expectation that greater detection frequencies and concentrations of alternative insecticides (including other pyrethroids and fipronil) would occur if bifenthrin were removed from the market, because these alternative insecticides would likely take its place in the market."	**No.** EPA is using a scientifically questionable basis for its assertion that bifenthrin is no more problematic than other pyrethroids. The datasets EPA is using and EPA's modeling have scientific errors that have been enumerated in other studies. Bifenthrin may not be the most toxic pyrethroid, but based on monitoring data it appears to be the most persistent pyrethroid in urban watersheds. The combination of toxicity and persistence is the issue (it does not need to be the "top ranked" in either category to merit removal from the market). EPA's RQs are admittedly scientifically incorrect, so they should not be cited as the basis of any decision. Other data sources – particularly DPR's environmental monitoring data - lead to the conclusion that bifenthrin is the main contributor to ecological risks from pyrethroids and that this contribution is high relative to its usage. This indicates that substitution by another pyrethroid would improve water quality. Interestingly, despite the assertion that there should be no difference in risk mitigation among the pyrethroids, EPA notes "Bifenthrin, cypermethrin, deltamethrin, and esfenvalerate had particularly high chronic RQs."

there is adequate mitigation for any other pyrethroid that has similar or greater persistence in aquatic environments.		
Pyrethroids Have Been Identified as a Contributor to the Decline of Important Delta Fish Because of their presence and toxic effects, both directly and through food-web impacts, pyrethroids have been identified as potentially playing a significant role in the decline of important fish species in the Sacramento-San Joaquin Delta Estuary (Delta)…As a result of concerns about pyrethroid impacts in the Delta, establishing control programs for the pyrethroid discharges to the Delta was prioritized in the Delta Stewardship Council's Delta Plan and the Central Valley Regional Water Quality Control Board's Delta Strategic Workplan (CRWCB-CVR 2014). (San Francisco Bay Regional Water Quality Control Board's 7/6/17 Letter to EPA)	EPA acknowledged the SF Water Board's concerns and noted that "pyrethroids are expected to result in risks to aquatic biota in many situations. EPA has considered water quality issues in developing its ecological risk mitigation proposal for the pyrethroids/pyrethrins."	Partially. Although EPA acknowledged the SF Water Board's concerns, the mitigations proposed by EPA are not enough to address the risk. EPA stated that it will address endangered species in individual risk management decisions. This seems to conflict with the concept of the single ecological risk management decision to cover all 23 chemicals, but what it will likely be is a description of next steps for Endangered Species Act Compliance, not a set of mitigation measures for aquatic endangered species.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In November 2019, CASQA sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: NACWA, BACWA, SF Bay Water Board, Central Coast Water Board, Central Valley Water Board, SCVURPPP, Sacramento County, Santa Barbara County, City of Santa Barbara, Alameda County, Napa County Flood & Water Conservation District, Orange County, City of Cotati, City of Sacramento, City of San Diego, LA County Public Works, Marin County Stormwater PPP, and City of Elk Grove.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

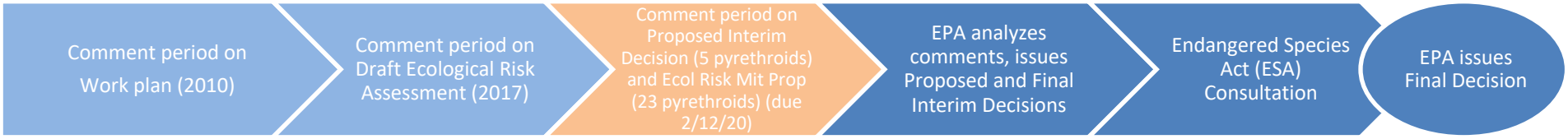

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 11/25/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the California Stormwater Quality Association (CASQA1), we request that the comment period for the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal be extended to February 28, 2020 to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing of the review period, and its timing during the winter rainy season, when staff from our member agencies and the organizations we collaborate with take on substantial extra duties in association with rain events.	EPA extended the review period from January 13, 2020 to February 12, 2020.	Yes.

Pesticide:	Several pyrethroids; Dockets: EPA-HQ-OPP-2008-0331. Docket includes: bifenthrin (EPA–HQ–OPP–2010–0384), cyfluthrin (EPA–HQ–OPP–2010–0684), deltamethrin (EPA–HQ–OPP–2009-0637), esfenvalerate (EPA–HQ–OPP–2009–0301), permenthrin (EPA–HQ–OPP–2011–0039), phenothrin (EPA–HQ–OPP–2011–0539), prallethrin (EPA–HQ–OPP–2011–1009), and tau-fluvalinate (EPA–HQ–OPP–2010–0915).
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In February 2020, CASQA sent a comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal.
Status:	EPA released Proposed Interim Decisions for bifenthrin, cyfluthrin, deltamethrin, esfenvalerate, permenthrin, phenothrin, prallethrin, and tau-fluvalinate.

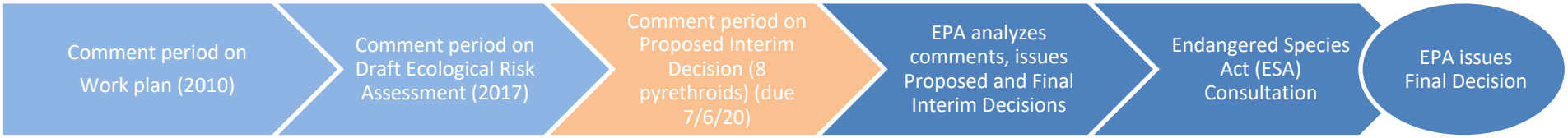

Next steps:	EPA will analyze comments and issue Final Interim Decision on these eight pyrethroids.
Recommendation:	Send comment letter to EPA on these eight Proposed Interim Decisions.

CASQA 2/12/2020 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
EPA's benefits assessment should include urban runoff-related costs to municipalities	No response. In the March 2020 PIDs EPA noted that they "had addressed" comments in a Joint Response issued on 11/12/2019, months before CASQA submitted its 2/12/20 comment letter.	No.
EPA's risk / benefit finding should be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals	EPA issued a single risk mitigation proposal with only one set of measures covering all 23 pyrethroids and pyrethrins, despite finding large differences in aquatic risks among the pyrethroids and pyrethrins.	No.
EPA should end outdoor urban use of bifenthrin	No response.	No.
EPA should provide California-specific labels for outdoor structural pest control products that are consistent with California regulations	No response.	No.
CASQA supports EPA-proposed label changes, with modifications	EPA kept the anti- dumping product label improvements but did not consider CASQA's suggested refinements from the February 2020 comment letter.	Partially.

Prepared by Tammy Qualls 6/14/20

Pesticide:	Terbuthylazine; Docket: EPA-HQ-OPP-2010-0453
Use:	Fountain algaecide / microbiocide / microbiostat.
Why we care:	Highly toxic to aquatic invertebrates.
Actions taken:	County of Sacramento (a CASQA member) sent EPA comments on the Draft Risk Assessment in January 2020, respectively.
Status:	EPA released the Proposed Interim Decision in May 2020.

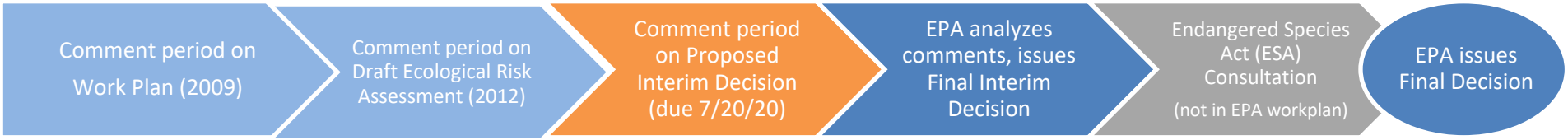

Next steps:	EPA will review comments on the Proposed Interim Decision and issue a Final Interim Decision
Recommendation:	Write a response letter, supporting the Sacramento County comments that EPA included in the Proposed Interim Decision.

Sacramento County comments to EPA (Jan. 2020):	EPA Response:	Did EPA incorporate member comments?
Our primary concern with the subject pesticides is that the Draft Risk Assessment neglected to consider storm drain discharges of terbuthylazine-containing fountain water and the ensuing risk to aquatic life. The Draft Risk Assessment assumed that there would be "*no significant exposure to aquatic organisms…from the decorative/ornamental fountain uses given that the label prohibits discharge of this product into lakes, streams, ponds, estuaries, oceans, or other waters, unless in accordance with the National Pollutant Discharge Eliminations Systems (NPDES) permit.*"	EPA made label changes (see below) that will help reduce the amount of terbuthylazine that is discharged into the storm drain by requiring notification to local sanitary sewer/ storm drain authorities.	Yes.
Sacramento County requests that the current language be changed to match the copper label, which would also provide consistency for label language across pool, spa, hot tub, and fountain chemicals, which follows: "Before draining a treated pool, spa, hot tub, or fountain, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool, spa, hot tub, or fountain water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."	"The agency agrees with the requested label changes and is proposing additional label changes to address the potential ecological risks by reducing exposure and clarifying the appropriate use methods, as described in Appendix B."	Yes.

Sacramento County also notes that the following language exists on several terbuthylazine labels: "*Experience will demonstrate the level of (product) is required."* We are concerned that this vague label language could lead to overuse these products. We are also concerned that label language states that users should maintain a concentration of product, cited in ppm, to get adequate algae control, but does not specify a practical, low-cost method for determining terbuthalyazine concentrations in treated fountain water. We respectfully request that EPA provide a dosing table, based on the size range (in volume of water) for fountains, to guide consumers in the application amount and frequency of application of the product.	EPA did not address this comment.	No.
For all fountain products, including those containing terbuthylazine, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size. This would mimic EPA's decision for lithium hypochlorite products. As explained in our attached lithium hypochlorite comments, this approach avoids potential conflicting language on product labels.	EPA did not address this comment.	No.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively.
Status:	EPA released the Proposed Interim Registration Review Decision in July 2019. Comments are due September 30, 2019.

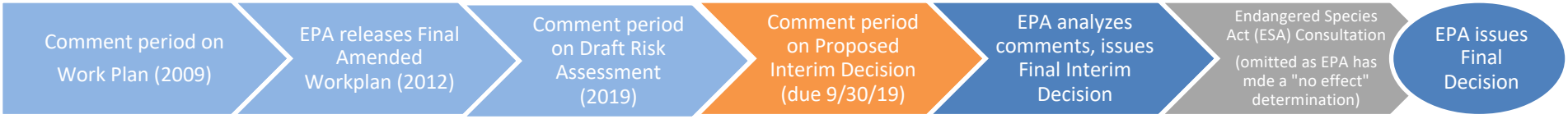

Next steps:	EPA will analyze comments and issue a Proposed Interim Decision. No ESA consultation is planned as EPA made a "no effect" determination.
Recommendation:	Send comments to EPA to declare support of the improved product label language.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
We are writing to request that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. In those Registration Review decisions, EPA worked carefully through the various issues to develop practical label language that mitigates possible aquatic impacts from discharge of treated pool, spa, and hot tub water, while preventing excess flows into sewer collection systems. Sacramento County requests that the current language be changed to match the lithium hypochlorite label, which would also provide consistency for label language across pool, spa, and hot tub chemicals, which follows: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	"Due to the scenarios outlined in these public comments, the requested label language has been added as a proposed requirement." (p. 6)	Yes.
For all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size… this approach avoids potential conflicting language on product labels.	"The requested changes to the uses triggering NPDES permit language have been considered by the Agency and are included as a proposed requirement. Both of the proposed changes are addressed in Appendix A of this document. The Agency thanks the submitters for their comments."	Yes.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively. CASQA commented on the Proposed Interim Decision in September 2019.
Status:	EPA released the Interim Decision in February 2020.

Next steps:	No ESA consultation is planned. EPA will likely proceed to issuing a Final Decision.
Recommendation:	No action is needed at this time.

CASQA Members comments to EPA (September 2019):	EPA Response:	Did EPA incorporate member comments?
CASQA supports the following proposed label language for swimming pool, spa, and hot tub products: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	The language in the Interim Decision exactly matches what was proposed in the Proposed Interim Decision. (p. 12)	Yes.
CASQA also supports EPA's clarification that Office of Pesticide Programs' standard NPDES permit label language is only for manufacturing-use products and is not suitable for end use products.	-For end-use products: NPDES permit language for pool, spa, or hot tub use is not required and must be removed if currently on the label associated with these uses. -For technical grade and manufacturing use products, the following NPDES statement must be included: "Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA." (p. 12)	Yes.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 9-4

BASMAA Annual Reporting for FY 2019-2020, Regional Supplement for Training and Outreach

Annual Reporting for FY 2019-2020

Regional Supplement for Training and Outreach

San Francisco Bay Area Municipal Regional Stormwater Permit

B A S M A A

Bay Area Stormwater Management Agencies Association

September 2020

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B A S M A A

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

To Whom It May Concern:

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James Scanlin

James Scanlin, Alameda Countywide Clean Water Program

Karin Graves

Courtney Riddle, Contra Costa Clean Water Program

Kevin A. Cullen

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matthew Fabry

Matt Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam W. Olivieri

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

Bay Area
Stormwater Management
Agencies Association

P.O. Box 2385

Menlo Park, CA 94026

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C.9.e.ii.(1) Point of Purchase Outreach

Home Depot Letter of Support
Our Water, Our World Consultant's Summary Report

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INTRODUCTION

This Regional Supplement has been prepared to report on regionally implemented activities complying with portions of the Municipal Regional Stormwater Permit (MRP), issued to 76 municipalities and special districts (Permittees) by the San Francisco Bay Regional Water Quality Control Board (Water Board). The Regional Supplement covers training and outreach activities related to the following MRP provisions:

- Provision C.5.e., Control of Mobile Sources,
- Provision C.7.c.ii.(1), Stormwater Point of Contact, and
- Provision C.9.e.ii.(1), Point of Purchase Outreach.

These regionally implemented activities are conducted under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA), a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Most of the 2019-2020 annual reporting requirements of the specific MRP Provisions covered in this Supplement are completely met by BASMAA Regional Project activities, except where otherwise noted herein or by Permittees in their reports. Scopes, budgets, and contracting or in-kind project implementation mechanisms for BASMAA Regional Projects follow BASMAA's operational Policies and Procedures as approved by the BASMAA Board of Directors. MRP Permittees, through their program representatives on the Board of Directors and its committees, collaboratively authorize and participate in BASMAA Regional Projects or Regional Tasks. Depending on the Regional Project or Task, either all BASMAA members or Phase I programs that are subject to the MRP share regional costs.

Training

C.5.e. Control of Mobile Sources

This provision requires:

Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.

(b) Implementation of an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.

(c) Regularly updating mobile business inventories.

(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.

(e) Inspection of mobile businesses, as needed.

(2) Permittees may cooperate county-wide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

BASMAA's long-standing Surface Cleaner Training and Recognition Program addresses

the BMP and training aspects of the provision by focusing on the most common type of outdoor cleaning – cleaning of flat surfaces like sidewalks, plazas, parking areas, and buildings. Individual Permittees address the inspection and enforcement aspects of the provision.

Cleaners that take the web-based training and a self-quiz are designated by BASMAA as Recognized Surface Cleaners. BASMAA also created and provides marketing materials for use by Recognized Surface Cleaners. Cleaners can use the website to get trained and recognized for the first time or renew their training and recognition, as required annually. Recognized cleaners can also download marketing materials from the website. Potential customers, including Permittees can use the site to verify the recognition status of any cleaner, as can municipal inspectors.

In July 2014, the State Water Board adopted a temporary Emergency Regulation for Statewide Urban Water Conservation that directly affected some of the surface cleaning activities and best management practices of the Surface Cleaner Training and Recognition Program. Among other actions, the emergency regulations "prohibited, except where necessary to address an immediate health and safety need:...

2) The use of a hose that dispenses potable water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use;
3) The application of potable water to driveways and sidewalks;"

The regulation was to remain in effect for 270 days, unless extended by the State Water Board due to ongoing drought conditions.

Of particular concern was item 3), which prohibited many of the activities conducted by surface cleaners if an immediate health and safety need could not be demonstrated and would require significant changes in the Surface Cleaner Training and Recognition Program. However, both the term and content of the emergency regulations were temporary, and the State Water Board might need to change either with minimal notice. Given the uncertain long-term future of the emergency regulations, BASMAA adopted a two-part strategy:

1) track the status of the emergency regulations with a plan to make the necessary changes to the Surface Cleaner Training and Recognition Program if the regulations became permanent, and
2) alert the cleaners that are in the Surface Cleaner Training and Recognition Program to the emergency regulations.

To effect part 2), in August 2014, BASMAA sent a notice to all the Recognized Cleaners alerting them to the emergency regulations. Part 1) progressed along the following chronology of events:

- May 2015, the State Water Board amended and readopted the emergency regulation extending its effectiveness to February 2016.
- February 2016, the State Water Board extended the emergency regulation through October 2016 (into FY 16-17).
- May 2016, the State Water Board replaced the emergency regulation adopted in

February 2016 and extended the regulation through February 2017.

- February 2017, the State Water Board extended the emergency regulation for 270 days until November 25, 2017.
- April 2017, the Governor issued Executive Order B-40-17, which builds on actions taken in Executive Order B-37-16, including the State Water Board maintaining prohibitions on wasteful practices such as hosing off sidewalks. And as directed by the Governor in Executive Order B-37-16, the State Water Board is to separately take action to make wasteful water practices permanent.
- February 2018, the State Water Board attempted to make wasteful water practices permanent but after receiving significant opposition from water agencies before the adoption meeting, postponed adoption to allow more time to address comments.

In discussions with BASMAA, State Water Board staff have indicated that the regulations would regulate water use and not the discharge, and the regulations would regulate the use of potable water. BASMAA continues to track any developments and will work with the State Water Board as they develop and adopt a permanent regulation to try to ensure that necessary outdoor surface cleaning activities can be conducted in accordance with both stormwater regulations and urban water conservation regulations.

Public Information and Outreach

C.7.c.ii.(1) Stormwater Point of Contact

This provision requires:

> *Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively and Permittees may combine this function with the spill and dumping complaint central contact point required in C.5.*

BASMAA assists with this provision by using the regional website: BayWise.org to list or link to member programs' lists of points of contact and contact information for the stormwater agencies in the Bay Area (https://baywise.org/about/).

Pesticides Toxicity Control

C.9.e.ii.(1) Point of Purchase Outreach

This provision requires Permittees to:

- *Conduct outreach to consumers at the point of purchase;*
- *Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and*
- *Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.*

The Annual Reporting provision requires:

> *Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted…, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f. [Ed. C.9.g]).*

Below is a report of activities and accomplishments of the *Our Water, Our World* program for FY 2019-2020. For a detailed report of activities, see the attached Consultant's Final Report.

- Coordinated program implementation with major chains Home Depot and Ace Hardware National.
    - Home Depot Corporate (Atlanta) directed support of the program with their stores (see letter attached).
- Completed the development and creation of two new fact sheets for Bed Bugs (in English and Spanish) and Moles, Voles, and Gophers. There are now 22 fact sheets – 18 in English and 4 in Spanish.
- Maintained an inventory of the following: fact sheets, shelf tags, literature rack display signage, *10 Most Wanted* brochures, *Pest or Pal Activity Guide for Kids*, custom-designed product guide dispensers, and two versions of product guides (Home Depot and generic), from which participating agencies could purchase materials.
- Recruited for, developed, planned, and conducted an IPM Advocates training course to qualify 5 new Advocates, almost doubling the IPM Advocates corps to 12 individuals.
- Conducted monthly seasonal pests meetings with IPM Advocates for month / season ahead.
- Updated less-toxic Product List by-manufacturer.
- Coordinated employee trainings and tabling events at *Our Water, Our World* stores.
- Maintained *Our Water, Our World* website.
- Provided Ask-the-Expert service—in which the Bio-Integral Resource Center (BIRC) provides 24-hour turnaround on answers to pest management questions. BIRC researched and provided answers to about 28 questions in FY 19-20.
- Provided and staffed exhibitor booths and made presentations to attendees:

- Central Trade Show, Las Vegas (August 2019)
- L&L Dealer Show, Reno (October 2019)
- NorCal trade show, San Mateo (February 2020)

- Participated in UCIPM Continuing Education for IPM Advocates.

Below are some outputs and outcomes for FY 19-20:

- 36 *Our Water, Our World* Store Trainings[1]
- 301 employees trained at *Our Water, Our World* stores[2]
- 54 outreach events at *Our Water, Our World* stores[3]
- 3,146 customers contacted by Advocates at tabling events at stores and virtual events[4]
- 28 questions researched and answered by technical expert
- Over 30% increase in sales of eco-pesticide categories and an overall 8% increase in sales of eco-products over the previous year (Home Depot Corporate)
- Doubling of Sluggo sales over the previous year
- Over 29% growth in sales of Ortho Ground Clear, a newer eco-herbicide (Scotts Miracle-Gro)
- Over 22% growth in sales of Ortho 3-in-1, pyrethrin and sulfur combination

[1,2,3,4] Funded by permittees at local level.

Attachments

Point of Purchase Outreach

Home Depot Letter of Support

Interoffice
MEMORANDUM

DATE: **January 1, 2020**

TO: **California Store Managers, D28 ASMs and Department Heads**

FROM: **Ron Jarvis**

CC: **Steve Knott, Scott Jacobson**

SUBJECT: **Our Water Our World training**

OUR WATER, OUR WORLD is a coalition of organizations whose purpose is to encourage consumers to use less toxic pest controls in and around their homes. They specialize in retail friendly education. Their goal is not to alienate consumers by telling them what they can't use, but instead their information focuses on less toxic pest management and ties into products currently on our shelves.

An Our Water, Our World (OWOW) representative will be in your store to help train employees and label less-toxic products with shelf-talkers. The representative may also schedule a tabling event to educate consumers. This ties in well with "How-to" weekend events. The representative will display a sampling of excellent less toxic and Eco Options products off our shelves. They will provide free informational literature and a wealth of knowledge and experience. Please enjoy this additional help in your store.

A representative will contact you before the training or demonstration date to arrange details. Please contact Suzanne Bontempo at (415) 317-0475 if you have any questions.

Thank you

Ron Jarvis

from the desk of.....
Ron Jarvis
Merchandising Vice President – Sustainability
THE HOME DEPOT USA, INC.
2455 Paces Ferry Road
Atlanta, GA 30339
(770) 384-4835
Fax (770) 384-4411

Attachments

Point of Purchase Outreach

Our Water, Our World Consultant's Summary Report

OUR WATER - OUR WORLD

BASMAA

Our Water Our World Retail Partners Summary Report
July 2019 – June 2020

prepared by Suzanne Bontempo, Plant Harmony - July 2020

Program Annual Overview:

The fiscal year started off by attending the Central Trade Show in August, then the L&L show in October, where we saw some changes among the vendors. Safer Brand is rebranding many of their products, transitioning both the Concern and some Havahart branding to Safer branding. I saw that Ferti-lome has OMRI certification for its eco-pesticide line. Miracle-Gro has expanded the Performance Organics fertilizer line and the EcoSmart line has new labeling and branding image.

The focus during August – December was preparing for the IPM Advocate training I conducted in January. This involved many hours of collaboration with Debi Tidd and Karey Windbiel-Rojas. I gave my full attention to recruiting, following up with these new recruits, preparing the curriculum, finding a location for the training, scheduling the dates and times of our classes to meet.

As October came, PG&E began exercising the power shut offs, that impacted many residences as well as the retailers throughout the Bay Area. Then the Kincade Fire ignited on October 23rd, halting OWOW services throughout the North Bay Area for the weeks that followed. As soon as the fire was behind us, the retail holiday season was in full swing, which meant OWOW services didn't resume until mid-December.

In January the new IPM Advocates attended and completed their training. This was a wonderful accomplishment. The new Advocates bring wonderful support to the OWOW program and are open to moving the program forward where possible. They come with insightful ideas and dynamic energy.

In February I began working with the new Advocates, having them shadow me with each store visit and OWOW task. I also joined the NorCal Trade Show with the help of IPM Advocate Lisa Ratusz. The NorCal show invited me to give a presentation on IPM to the garden industry professionals. The Department of Pesticide Regulations qualified my class for one continuing education unit for the garden industry professionals. The new IPM Advocates were invited to come experience the show which Charlotte Caner, Sherri Sunahara, and Emily Holly were each available to do.

Then March arrived and life as we knew it went sideways. I cannot express enough how challenging this spring season became because of the Covid-19 pandemic. The retailers were

stressed beyond measure. I, and all of the IPM Advocates servicing the OWOW program did our best to provide OWOW services while sheltering in place. Many of the retailers, including the Home Depot Corporate, requested that we pause our services during that time, which we did. I certainly did what I could to provide the retailers relevant pest problem solving support remotely.

Though these challenges have been significant, this has been a year of transitions. With more IPM Advocates retiring last year, I am happy to include our new, recently training IPM Advocates to the group this year. Next I am finding ways to offer public education to the public remotely. I have been able to transition OWOW public education and outreach to virtual platforms through Zoom.[1] And I am happy to say that I have been able to navigate this new approach to public outreach with success. Two incredible triumphs for the 2019-2020 contract year.

Moving forward, I am currently working with Debi Tidd to develop virtual OWOW trainings that are best suited for the retailers and OWOW. I am also supporting the IPM Advocates with OWOW Pest of the Month social media posts, IPM educational videos, and written articles that expand the OWOW message to a broader reach[2]. I am extremely inspired looking forward to what is possible for delivering the OWOW message to the public in new ways.

We, the IPM Advocates have continued our focus on problem pesticide reduction by educating and mentoring the associates and consumers about alternative approaches to pest problem solving.

- Throughout the year, we continue to provide educational support and resources for the Asian Citrus Psyllid. We share the message of "Inspect, detect and then report'" to the CDFA or local agricultural department.
- The public's concerns around Roundup and glyphosate continues, however with the influence of the IPM Advocates, every retailer has at least one eco-herbicide alternative for sale.
- Rats and mice continue to be the most prevalent pest problem that people are battling. Working with exclusion and trapping is the message for success the we encourage.
- Then with the recent Sheltering in Place gardening trend, we have heard from most retailers that the sales of eco-pesticides and "organics" is up. This is wonderful to see during such a challenging time.
- Other pests that have been in the focus this year are; yellowjackets, spiders and fleas. We have provided additional education and support with eco-management solutions.

Educational retail trainings and public outreach[3]:

- **Total number of OWOW retailer trainings in the 2019-2020 fiscal year = 36**
  - Out of this total, 16 were at the Home Depot Stores
- **Total number of associates trained at these OWOW trainings = 301**
  - Out of this total, 148 were Home Depot associates
- **Total number of OWOW public outreach events in the 2019-2020 fy = 54**
  - Out of this total, 9 were at the Home Depot Stores

[1, 2, 3] Funded by permittees at local level.

- **Total number of people reaches at both in-people + virtual OWOW events = 3,146**
  - Out of this total, 351 were reached at the Home Depot store
  - Out of this total, 943 were reached through virtual classes

These numbers reflect a 220% decrease in trainings conducted over the previous year and a 192% decrease in the number of public outreach events.

Most of the OWOW events are scheduled during the spring retail season, per the request of the retailer and to capture the larger crowds that the spring retail season brings. Unfortunately, the pandemic paused these services with all trainings and in-person outreach events during this time subsequently canceled. I can also add that I didn't receive the Sacramento OWOW contract NTP until January 1st, which was 3 months of opportunities lost.

The encouraging piece we are seeing is with the virtual education webinars. The OWOW IPM educational webinar events were created in lieu of in-person public outreach. Due to the health measures related to Covid, lower staffing levels left customers unsupported in the aisle at the point of purchase. These webinars are intended to introduce the OWOW program, the OWOW & UCIPM websites, and how to use these websites as a tool to properly identify pest problems with less toxic solutions.

Each webinar shares the common goal of introducing IPM Practices and over all healthy garden practices, to pre-educate consumers for their instore purchase decisions. Each participating agency assisted by promoting these events. The attendance rate for these no fee webinars averages 50%, which are encouraging numbers since 20% is the average for no fee webinars. Moving forward I plan to expand this remote outreach education.

Retailer support and sales overview:

- Home Depot Corporate provided a letter of 'Thanks' and "Support" for the OWOW program partnership in October, which Geoff sent to the agencies
- Home Depot Corporate provided a letter to BASMAA for the IPM Advocates outlining this program partnership and participation
- Home Depot Corporate, the sales of the eco-pesticide categories have increased over 30% with an overall increase of 8% of eco-products over the previous year.
- Sluggo sales is reported to have doubled over the previous year. This is a reflection of the recent gardening trend due to the pandemic, working from home and sheltering in place and the efforts of the IPM Advocates
- Ortho Ground Clear, a newer eco-herbicide Scotts Miracle-Gro was showcasing for 2020, has seen a growth of over 29%
- Ortho 3-in-1, pyrethrin and sulfur combination, has seen a growth in sales of over 22%

Throughout the 2020 year, Scott's Miracle Gro's newest organic fertilizer under the name of 'Performance Organics' continues to sell at an amazing rate.

Final comments:

As I mentioned in my review of the 2019-2020 fiscal year, this may have been the most challenging year we will ever see. With the fires and power shutoffs in the fall, the hardware and home improvement stores were faced with many retail stresses. Then, as March arrived, I cannot express enough how challenging this season became because of the pandemic. The

immediate challenge I was then faced with was how to reach the public when we were restricted to Sheltering in Place. How do I transition a public outreach program virtually? With the wonderful support and encouragement of a few agencies, I dove into the virtual training world through Zoom. Moving forward I see the value of providing OWOW education to the public through Webinar style classes. Also, to develop a virtual training platform that is best suited for the retailers and OWOW, this will only broaden our reach with OWOW education. Though it is very disappointing to me to end the year on this note, I am inspired looking forward to what is possible for delivering the OWOW message to the public in a new way.

The other encouraging discovery we witnessed once we began again to provide in-person OWOW services to the retailers is that many of the retailer's shelves were emptied of product from sell through, primarily the eco-products. This was from the supplier's inability to keep up with the consumer's demand. Retail teams also reported that their customers were asking for organic alternatives over the traditional products. A remarkable transition for the marketplace.

In addition, I am encouraged to hear that upgrading OWOW website is currently being discussed. This seems to be more relevant than ever before given the current state of affairs. As I have shared before, the OWOW website has the potential to be a valuable vital tool for the IPM Advocates, the retailers, and the public.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 11-1

PCBs and Mercury TMDL Control Measure Implementation Plan & Reasonable Assurance Analysis for the Santa Clara Basin

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

PCBs and Mercury TMDLs Control Measure Implementation Plan & Reasonable Assurance Analysis for the Santa Clara Basin

Submitted in Compliance with NPDES Permit No. CAS612008 – Provisions C.11/12.c.ii(2) and C.11/12.d.iii by the Santa Clara Valley Urban Runoff Pollution Prevention Program on behalf of all Co-permittees in Santa Clara County

September 30, 2020

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This report is submitted by the agencies participating in the

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

City of Campbell	City of Milpitas	City of Santa Clara
City of Cupertino	City of Monte Sereno	City of Saratoga
City of Los Altos	City of Mountain View	City of Sunnyvale
Town of Los Altos Hills	City of Palo Alto	County of Santa Clara
Town of Los Gatos	City of San José	Valley Water

Prepared for:

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)

Prepared by:

EOA, Inc.

1410 Jackson St., Oakland, CA 94612

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APPENDICES

A - Phase I RAA – Baseline Modeling Report

B - Phase II RAA – Green Stormwater Infrastructure Modeling Report

C - Phase III RAA – Source Control Load Reduction Accounting for RAA Report

D – SCVURPPP Co-permittee Green Stormwater Infrastructure (GSI) Implementation Maps

LIST OF ABBREVIATIONS

ABAG	Association of Bay Area Governments
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practice
CW4CB	Clean Watersheds for a Clean Bay
CWA	Clean Water Act
FTC	Full Trash Capture
FY	Fiscal Year
GE	General Electric
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
GSRD	Gross Solids Removal Device
HDS	Hydrodynamic Separator Unit
HHW	Household Hazardous Waste
HRU	Hydrologic Response Unit
HSPF	Hydrologic Simulation Program FORTRAN
LID	Low Impact Development
LSPC	Loading Simulation Program in C++
MIP	Model Implementation Process
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NLDAS2	North American Land Data Assimilation System
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PPM	Parts Per Million
PRISM	Parameter-elevation Regressions on Independent Slopes Model
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric
POC	Pollutant of Concern
POTW	Publicly Owned Treatment Works
Program	Santa Clara Valley Urban Runoff Pollution Prevention Program
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SAP	Sampling and Analysis Plan
SFEP	San Francisco Estuary Partnership
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SSID	Stressor/Source Identification
SUSTAIN	System for Urban Stormwater Treatment & Analysis Integration
SWRP	Santa Clara Basin Stormwater Resource Plan
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
Valley Water	Santa Clara Valley Water District
WLA	Wasteload Allocation
WMA	Watershed Management Area

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1 INTRODUCTION

This Control Measure Implementation Plan (Control Measures Plan) and Reasonable Assurance Analysis (RAA) describes the planned implementation actions and schedule to achieve the Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Polychlorinated Biphenyls (PCBs) and mercury in urban stormwater runoff in the Santa Clara Basin. This report was developed by the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program) on behalf of all SCVURPPP member agencies (i.e. Co-permittees) in compliance with Provisions C.11/12.c and C.11/12.d of the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order No. R2-2015-004; Permit No. CAS612008), also known as the Municipal Regional Permit (MRP). This Control Measures Plan builds upon the foundational set of actions that have been implemented by SCVURPPP Co-permittees over the past two decades. These actions include both the collection and analysis of hundreds of sediment and stormwater samples, the investigation of sources and source areas, and the development and implementation of control measures to reduce the level of PCBs and mercury in urban stormwater runoff in the Santa Clara Basin (BASMAA 2014, 2017b, SCVURPPP 2015, 2016a, 2016b, 2017, 2018, 2019a, 2019b, 2020).

This document is organized in the following manner:

- Control Measures Plan and RAA (Main Report) – Describes implementation actions to address PCB and Mercury TMDL WLAs assigned to the Santa Clara Basin. In compliance with MRP Provisions C.11/12.d, quantitatively demonstrates that those implementation actions will achieve TMDL WLAs based on modeling and load reduction quantification methods described in Appendices A, B, and C.
- Phase I RAA - Baseline Modeling Report (Appendix A) – Describes the revised baseline pollutant modeling used to establish the starting point for measuring progress towards TMDL WLAs.
- Phase II RAA - Green Stormwater Infrastructure (GSI) Modeling Report (Appendix B) – Describes the modeling conducted to identify the extent of GSI needed to achieve PCBs/mercury load reductions included in MRP Provision C.11/12.c.ii(2) by 2040.
- Phase III RAA - Source Control Load Reduction Accounting Report (Appendix C) – Describes the revised PCB/mercury load reduction methods used to account for PCBs/mercury load reductions associated with the implementation of source controls and non-GSI stormwater treatment.

In the *Stormwater Control Measure Plan for PCBs and Mercury in the Santa Clara Valley, Version 4.0* that was submitted as an appendix to the SCVURPPP 2019 Annual Report, SCVURPPP previously described all control measures that have been implemented to date to achieve TMDL WLAs for PCBs and mercury at Co-permittee and Watershed Management Area (WMA) scales. For the purpose of this Control Measures Plan, controls are presented at the Basin-wide scale. Tracking and reporting of control measure implementation that occurs as a result of this Control Measures Plan will occur at the appropriate geographical level needed to demonstrate progress towards the TMDL WLAs.

1.1 Regulatory Background

Fish tissue monitoring in San Francisco Bay (Bay) has revealed the bioaccumulation of PCBs, mercury, and other pollutants in Bay sportfish. The levels found are thought to pose a health risk to people consuming these fish and as a result, an interim advisory has been issued on the consumption of sportfish from the Bay. The advisory led to the Bay being designated as an

06873
6914

impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs and mercury. In response, the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) has developed TMDL water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources of these pollutants to achieve water quality standards and restore beneficial uses (SFBRWQCB 2006, 2008).

The urban stormwater runoff requirements of the mercury and PCBs TMDLs are being implemented through Provisions C.11 and C.12 of the MRP, respectively. The mercury TMDL identifies the regionwide urban stormwater runoff WLA as 82 kg/yr to be achieved by February 2028. The PCBs TMDL identifies the regionwide urban stormwater runoff WLA as 2 kg/yr, with 1.6 kg/yr allocated to MRP Permittees, to be achieved by March 2030. Santa Clara Basin's population-based proportions of the TMDL WLAs is 23 kg/yr for mercury and 0.5 kg/yr for PCBs, and form the goals for this Control Measures Plan.

The first MRP issued in 2009 (MRP 1.0; Order R2-2009-0074) required Permittees to implement pilot-scale control measures during the permit term to reduce PCBs and mercury discharges from Municipal Separate Storm Sewer Systems (MS4s). These pilot studies were intended to enhance our collective knowledge about the costs and benefits of different control measures to reduce the levels of PCBs and mercury in urban stormwater. The reissued MRP (MRP 2.0, Order R2-2015-0049), requires Co-permittees to move from pilot-scale work to focused implementation in areas where benefits are most likely to occur and to achieve the defined regionwide interim load reduction goal of 3 kg/year for PCBs by 2020. MRP Co-permittees achieved this interim load reduction goal, as reported in the SCVURPPP FY 2019-20 Annual Report.

In addition to the interim load reduction goal for PCBs, MRP 2.0 also requires the following:

- <u>Provisions C.11c/12.c - Plan and Implement Green Infrastructure to Reduce Mercury/PCBs Loads</u>:

  ii(2). Permittees shall prepare a reasonable assurance analysis of future mercury/PCBs load reductions by doing the following:

  a. Quantify the relationship between areal extent of green infrastructure implementation and mercury/PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies.

  b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040.

  c. Estimate the amount of mercury/PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.

  d. Quantitatively demonstrate that mercury reductions of at least 10 kg/yr and PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects.

  e. Ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill C.11.c.ii(2)(a-d) have been validated through a peer-review process.

- <u>Provisions C.11.d/C.12.d - Prepare Implementation Plan and Schedule to Achieve TMDL Allocations:</u>

  i. Permittees shall prepare a plan and schedule for mercury/PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient

control measures will be implemented to attain the TMDL wasteload allocations by 2028 (Mercury) and 2030 (PCBs).

ii. The plan must:

(1) Identify all technically and economically feasible mercury/PCBs control measures (including green infrastructure projects) to be implemented;

(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and

(3) Provide an evaluation and quantification of the mercury/PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

1.2 Types of Control Measures

SCVURPPP Co-permittees have implemented a variety of control measures since the development and adoption of PCBs and Mercury TMDLs by the Regional Water Board. Control measures are implemented to reduce PCBs and/or mercury in urban stormwater runoff and improve the overall quality of stormwater in the Santa Clara Basin. These control measures have a direct benefit towards reducing the impacts of PCBs and mercury on the Bay.

The types of control measures implemented to control PCBs and mercury in stormwater generally fall into two categories:

- Source Controls (Load Avoidance and Reduction) – Source controls are a broad term used to describe actions designed to reduce the potential for pollutants to enter the environment (load avoidance) or actions that intercept pollutants once available for transport to waterways via stormwater runoff (load reduction). For the purpose of this Control Measure Plan, source controls include stormwater treatment systems that are not included in the definition of Green Stormwater Infrastructure (GSI).
- Green Stormwater Infrastructure (Load Reduction) – GSI is infrastructure that uses vegetation, soils, and natural processes to remove pollutants from stormwater. At the scale of a neighborhood or site, GSI refers to stormwater treatment systems that mimic nature by soaking up and storing water. GSI includes public, non-regulated projects and both public and private GSI/LID facilities installed as part of new or redevelopment.

The selection of stormwater control measures needed to achieve the PCBs and Mercury TMDL WLAs are based on continued evaluations of sources of these pollutants and load reduction benefits associated with control measures recently implemented. Source controls and GSI implemented to-date and those planned for implementation within the Santa Clara Basin in the future are summarized in Sections 3 and 4 of this Control Measures Plan.

1.3 Approach to Control Measure Planning and Organization of Plan

A stepwise approach was used to develop this Control Measures Plan that builds upon the success of control measure implementation to-date and the knowledge gained over the past two decades on both the sources of PCBs and mercury and the most cost-effective approaches to managing/reducing these pollutants in stormwater. The approach maximizes the use of source controls to manage these pollutants, and then evaluates the costs and benefits of further implementing GSI to address the remaining load reductions needed to achieve TMDL WLAs.

The approach also adheres to the guidance provided in the *Bay Area RAA Guidance Document* (BASMAA 2017c), which established a regional framework and guidance for

conducting RAAs in the Bay Area. The *Bay Area RAA Guidance Document* describes the types of modeling and data inputs that may be used by the Programs and Permittees for calculating baseline loading and load reduction targets, and estimating loads reduced by current and potential future GSI. The guidance document also states that load reductions for source control measures (i.e., non-GSI controls) should be calculated based on methods provided in an approved refinement of the *Interim Accounting Methodology* (BASMAA 2017a), which was previously developed by BASMAA and approved by the Regional Water Board's Executive Officer in 2017. The refined load reduction quantification methods are fully described in Appendix C.

The subsequent sections of this Control Measures Plan are organized as follows:

- Section 2.0. Refinements to Baseline PCBs & Mercury Loading Estimates and Establishing Load Reduction Targets - This section presents the refined baseline loads for PCBs and mercury in the Santa Clara Basin that were modeled as part of the RAA process. The refined baseline loads reflect the mass of PCBs and mercury that entered the Bay via stormwater runoff from the Santa Clara Basin. The refined baseline loads define the starting point for quantifying PCBs and mercury load reductions towards the attainment of TMDL WLAs. The refined baseline loads of PCBs and mercury presented in this section were based on the results of the County's RAA process presented in the Phase I RAA Report (Appendix A).
- Section 3.0. Control Measure Implementation - This section describes existing and potential future control measures to achieve the PCBs and Mercury TMDL WLAs for the Santa Clara Basin. Estimated PCBs and mercury load reductions achieved to-date and load reduction estimates associated with the implementation of future potential source controls and GSI by SCVURPPP Co-permittees or other entities contributing PCBs in stormwater in the Santa Clara Basin within three different implementation timelines (2030, 2040 and 2080) are included.
- Section 4.0. Economic and Technical Feasibility Evaluation - This section identifies three control measures implementation scenarios and associated schedules to achieve the TMDL WLAs, and discusses the economic and technical feasibility of each implementation scenario. Economic feasibility is evaluated based on a comparison of current and estimated future costs to SCVURPPP Co-permittees for each implementation scenario. Technical feasibility is evaluated based on the ability of Co-permittees alone to fully address the TMDL WLAs through control measures. Potential environmental impacts associated with this plan and the implementation timelines are also described.
- Section 5.0. Tracking and Reporting Control Measure Implementation and Progress Towards Load Reduction Goals – This section describes the tracking and reporting methods and tools that will be used by Co-permittees to demonstrate the extent and magnitude of control measure implementation, and the associated pollutant load reductions. This includes the SCVURPPP Stormwater Treatment Control Data Portal and other tracking and reporting mechanisms.
- Section 6.0. Conclusions and Planned Next Steps - This section describes the next steps that SCVURPPP Co-permittees plan to conduct to enhance the implementation of PCBs and mercury control measures over time in a cost-effective manner, and continue to improve the knowledge of pollutant sources, the entities that should also participate in the implementation of controls, and the effectiveness of sources controls and GSI in reducing PCBs and mercury in stormwater.

2 Refinements to Baseline PCBs & Mercury Loading Estimates and Establishing Load Reduction Targets

This section presents the refined baseline loading estimates of PCBs and mercury in urban stormwater runoff from the Santa Clara Basin. The refined baseline loads were developed via modeling conducted as part of SCVURPPP's RAA process, which is described in full detail in the Phase I RAA Report (Appendix A). The refined baseline loads define the starting point for load reduction accounting towards attainment of the TMDL WLAs. Load reduction targets for PCBs and mercury based on a comparison of the baseline loads and the WLAs are also discussed.

2.1 RAA Process and Modeling Results

Hydrologic, sediment and pollutant modeling was conducted as part of the RAA process to refine the 2002 baseline loads of PCBs and mercury in urban stormwater runoff from the Santa Clara Basin. Refined baseline loads were estimated for all areas within the Santa Clara Basin that drain to the Bay, including land areas not subject to MRP requirements but contributing pollutant loads to stormwater in the Basin (e.g., Caltrans properties, Industrial General Permit facilities). Refinement of baseline loading was the first step in the Program's RAA process. The refined baseline loads are the starting point for calculating the total load reduction that is needed to achieve TMDL WLAs. The load reduction targets described in this section are the basis for the control measures implementation plan presented in Section 3.0.

2.1.1 Regional RAA Guidance Document

To ensure comparable results across the region, MRP Co-permittees participated in a regional project to establish criteria for RAA modeling. The Bay Area RAA Guidance Document (BASMAA 2017c) was developed out of this project and establishes specific methodologies to calculate baseline PCBs and mercury loading and load reduction targets. It also recommends methods for evaluating the type, size, number, location, and phasing of GSI measures needed to comply with the GSI load reduction targets defined in MRP 2.0 (see Appendix B). The Bay Area RAA Guidance Document was built upon guidance from the Los Angeles Regional Water Quality Control Board (LARWQCB 2014) and the United States Environmental Protection Agency (USEPA 2017), particularly in terms of the mechanics of the analysis, control measure identification, critical condition selection, choice of models, model calibration criteria, modeling inputs, and model outputs. The Santa Clara Basin RAA process was conducted according to the Bay Area RAA Guidance.

2.1.2 Regional Watershed Spreadsheet Model

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the San Francisco Bay Regional Monitoring Program's Small Tributaries Loading Strategy. The RWSM was developed as a planning tool, primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al. 2017). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant model(s). The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant

concentrations on fine sediment particles as particle ratios[1] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[2] and the model was released in 2018.

2.1.3 RAA Baseline Model Summary

The RAA Phase I Report (Appendix A) documents the development and calibration of the hydrologic and water quality model that was used to refine baseline loads of PCBs and mercury from the Santa Clara Basin. For the purpose of the model, baseline conditions were defined as the average water year (2002) conditions. The baseline hydrology and pollutant loading model achieved the criteria established in the Bay Area RAA Guidance Document (BASMAA 2017c) for acceptable calibration and validation sufficient to estimate existing loads of mercury and PCBs, to compare to TMDL WLAs, and to determine necessary load reductions to support control measure planning. The model and the model results are summarized in the following sections. A full description of the model and model results are described in Appendix A.

Modeling System

The watershed modeling system selected by SCVURPPP was the Loading Simulation Program in C++ (LSPC), a watershed modeling system that includes Hydrologic Simulation Program FORTRAN (HSPF) algorithms to simulate watershed hydrology, erosion, water quality processes, and in-stream fate and transport processes. The model simulated upland loading and transport of sediment, in combination with methods developed for the RWSM for assigning PCBs and mercury runoff concentrations, to estimate PCBs and mercury loads associated with various land uses. Model inputs included available spatial and monitoring datasets to represent the land use, meteorological, hydrological, and pollutant loading characteristics of Santa Clara Basin watersheds.

Land Use Characteristics

The model relies on hydrologic response units (HRUs) to represent areas of similar physical characteristics and processes. HRUs are typically defined by soils, slope, land cover, and land-use. Various data sets were layered to create HRUs in the model, including:

- Slope (USGS)
- Soils Group (USDA SSURGO 2016)
- Imperviousness (NLCD 2011)
- Land Cover (NLCD 2011)
- Land Use (ABAG 2005, as modified by SCVURPPP)

Within the model, the Association of Bay Area Governments (ABAG) land-use layer (modified by SCVURPPP to identify old and new land uses) was the main source of information for representing land areas associated with PCBs and mercury (Table 2-1). This GIS layer includes five land use categories that are consistent with those used in the RWSM. Although hydrology and sediment were initially modeled at higher HRU resolution (using a different land use data set), the ABAG/SCVURPPP layer was intersected during water quality model development. This allowed for PCBs and mercury sediment concentrations to be assigned spatially, under the assumption that the ABAG/SCVURPPP land use categories reflect the spatial distribution of pollutant contributions from Santa Clara Basin watersheds, which includes contributions from

[1] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[2] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et. al. 2017).

land areas upstream and downstream of impoundments (e.g., reservoirs). Based on the data inputs described above, a set of representative HRUs were developed for use in the watershed model to reflect key land characteristics of the Santa Clara Basin.

Table 2-1. Land areas within the Santa Clara Basin classified by PCBs and mercury land use categories established through the RWSM and used for modeling pollutant loads to the San Francisco Bay from stormwater runoff.

Land Use Category	Area (acres)
Agriculture/Open	286,024
New (post-1980) Urban	24,740
Old (pre-1980) Industrial	8,758
Old (pre-1980) Urban - Other	33,344
Old (pre-1980) Urban – Residential & Parks	92,990
Total	445,857

Meteorological Conditions

Hydrologic models are highly dependent on the quantity and quality of meteorological forcing data, such as precipitation. Actual rainfall gauge data in Santa Clara Basin has a number of common issues, such as intervals of missing data. Furthermore, the network of local gauges does not represent the full range of conditions in the Santa Clara Basin which are heavily influenced by orographic effects. Therefore, the model used monthly precipitation totals from the Parameter-elevation Regressions on Independent Slopes Model (PRISM) and hourly precipitation distributions and potential evapotranspiration (ET) estimates from the North American Land Data Assimilation System (NLDAS2). The resultant meteorological timeseries covered the period between 1996 and 2017 at an hourly timestep (i.e., inclusive of the baseline year of 2002). Meteorological data were assigned to each of the HRUs based on the HRU location, elevation, and aspect.

Hydrology Model Calibration

A two-phase weight-of-evidence approach was used for hydrology calibration. The Bay Area RAA Guidance specifies annual percent difference calibration metrics, which aligns with the spatial and temporal scales of the Bay TMDLs. For additional resolution regarding the timing of flow and pollutant loads, monthly and seasonal model hydrology performance were also evaluated as part of the calibration effort. Model output was compared to local flow monitoring gauges. When model results diverged from observed data, Google Earth was used to investigate and identify unrepresented hydraulic features which were then added to the model whenever possible. Model parameters were fine-tuned so that the calculated error statistics fell within the targeted model performance ranges.

Baseline Sediment Loading/Calibration

Because of the close association of PCBs and mercury with suspended sediment, the Phase I RAA model simulated erosion and suspended sediment mobilization as the next step in the weight of evidence-based approach for hydrology model calibration. A soil erodibility ("K") factor was assigned to each HRU based on soil type, slope, and meteorological conditions to estimate the amount of sediment generated from land. These sediments were then partitioned into sand, silt, and clay (i.e., suspended sediment) before being routed to stream segments and "transported" downstream using the LSPC sediment transport processes. To calibrate and validate suspended sediment transport, modeled results were compared to suspended

sediment concentration and discharge data measured at the United States Geological Survey (USGS) gauging station on Guadalupe River at Highway 101 (USGS Station 11169025).

PCBs and Mercury Loading

Land-use based runoff concentrations from the RWSM (Wu et. al. 2017, Table 2-2) were used in combination with the HRU-based LSPC hydrology model to estimate baseline PCBs and mercury loads for the Santa Clara Basin. This method is consistent with the Bay Area RAA Guidance Document (BASMAA 2017c).

Table 2-2. Average runoff concentrations for PCBs and mercury land use categories as established through the RWSM and used for modeling pollutant loads to the San Francisco Bay from stormwater runoff.[a]

Land Use Category	PCBs (ng/L)[b]	Mercury (ng/L)
Agriculture/Open	0.2	80.0
New (post-1980) Urban	0.2	3.0
Old (pre-1980) Industrial	204.0	40.0
Old (pre-1980) Urban - Other	40.0	63.0
Old (pre-1980) Urban – Residential & Parks	4.0	63.0

[a] Land-use based PCBs and mercury concentration data modeled by the RWSM (Wu et. al. 2017).

[b] ng/L = nanograms per liter

2.1.4 Refined Baseline Loads

The purpose of the RAA is to quantitatively demonstrate that sufficient control measures will be implemented to achieve the PCBs and Mercury TMDL WLAs for urban stormwater runoff. The first step in preparation of an RAA is to establish the baseline loads of PCBs and mercury in urban runoff to the Bay. Baseline load estimates are used to determine the load reductions that are needed to achieve TMDL WLAs. The difference between the baseline loads and the TMDL WLA is the load reduction target, or the amount of load reduction that must be achieved to attain the TMDL WLAs. This section presents the refined baseline loads for PCBs and mercury in urban stormwater runoff from the Santa Clara Basin and the associated load reduction targets that need to be achieved.

The Phase I RAA model estimated a total refined baseline annual PCBs load of 2.99 kg/yr (i.e., 2,990 g/yr) from stormwater runoff in the Santa Clara Basin (Table 2-3). Of this PCBs baseline load, 2,960 g/yr is associated with stormwater runoff from the urban areas in the Basin. Approximately 2.21 kg/yr of the urban stormwater runoff baseline load is associated with the land areas within the Santa Clara Basin that are addressed by SCVURPPP Co-permittees under the MRP. A portion of this SCVURPPP Co-permittee area load is contributed by private entities that own and operate distributed assets, such as railroads and electrical utilities. However, the individual loads contributed by these entities within the SCVURPPP Co-permittee area were not quantified during Phase I RAA modeling. Approximately 0.75 kg/yr is associated with urban stormwater runoff that is addressed by other entities that are currently or expected to be subject to NPDES permit or Waste Discharge Requirements (WDRs) issued by the Regional or State Water Boards. These entities include the California Department of Transportation (Caltrans), industrial facility owners/operators subject to the State of California's Industrial General Permit (IGP), and public schools that are likely to be subject to the reissued Phase II Small Municipal Stormwater Permit. These areas are generally considered outside the jurisdiction of SCVURPPP Co-permittees and

although some control measures implemented by SCVURPPP Co-permittees address a portion of pollutant loading from these entities, responsibility for reducing PCBs and mercury from these land areas ultimately falls onto the owners/operators of these properties. The remaining 0.03 kg/yr of PCBs baseline load is associated with non-urban runoff from open space areas.

The Phase I RAA model also estimated a refined baseline annual mercury load of 19.3 kg/yr (i.e., 19,296 g/yr) from stormwater runoff in the Santa Clara Basin (Table 2-3). Of this mercury load, approximately 6.3 kg/yr is associated with stormwater runoff from the urbanized portion of the Basin. Approximately 5.6 kg/yr of the urban stormwater load is associated with the land areas within the Santa Clara Basin that are addressed by SCVURPPP Permittees under the MRP, and 0.69 kg/yr is associated with urban stormwater runoff that is associated by other entities. The remaining 13 kg/yr is associated with non-urban runoff from open space areas.

Table 2-3. Summary of refined baseline annual PCBs and mercury loading from Phase I RAA model (Appendix A) by entity and for the entire Santa Clara Basin.

Entity	PCBs (kg/yr)	Mercury (kg/yr)
SCVURPPP Co-permittee Area [a]	2.21	5.6
Other NPDES Permitted Areas	0.750	0.69
Public Schools (Phase II Permittees)	0.12	0.21
Caltrans NPDES	0.149	0.26
Individual Industrial NPDES Permittees	0.053	0.03
Industrial General Permittees	0.424	0.18
Phase 2 Small MS4 NPDES Permittees	0.004	0.006
Subtotal - Urban Runoff Stormwater Load	2.960	6.29
Non-Urban Areas (Open Space)	0.030	13.01
Total Baseline Load (urban and non-urban runoff) for the Santa Clara Basin	2.990	19.30

[a] portion of the PCBs and mercury loads within the SCVURPPP Co-permittee area are contributed by private entities such as railroads and electrical utility companies.

With regard to land use, Figure 2-1 illustrates the proportion of the total (basin-wide) baseline PCBs and mercury stormwater loads associated with each land use category presented in Section 2.1.3 and Table 2-1. For PCBs, roughly 89% of the PCBs in stormwater are associated with two land use categories – Old (pre-1980) Industrial and Old (pre-1980) Urban – Other, which includes older commercial and transportation land use areas. These two land use categories represent 27% of the urban land area in the Santa Clara Basin. For mercury, the vast majority (70%) of the load originates from open space land use, mostly due to the important source of atmospheric deposition for this pollutant. The remaining portion of the mercury stormwater load originates from urban land areas in the Basin.

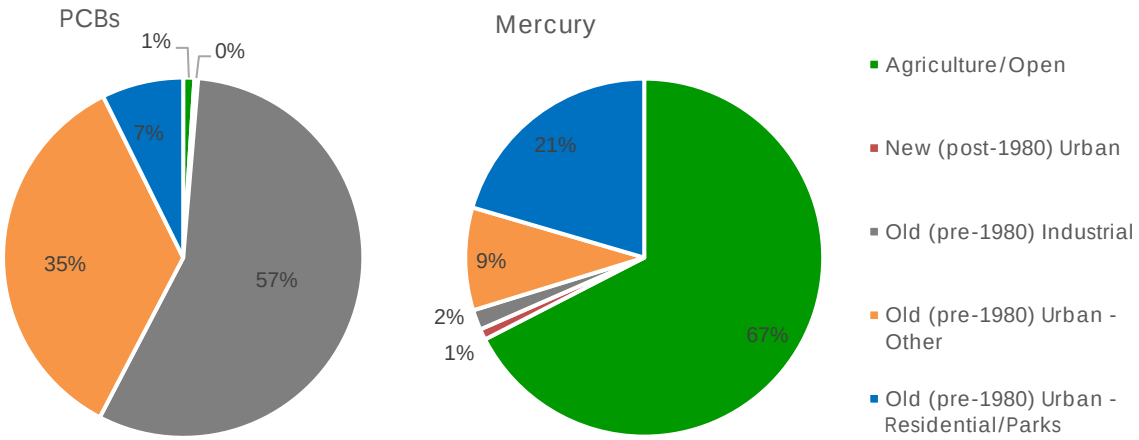

Figure 2-1. Proportion of Santa Clara Basin PCBs and Mercury baseline load associated with each land use category established through the RWSM and used for modeling pollutant loads to the San Francisco Bay from stormwater runoff.

2.1.5 PCBs and Mercury Load Reduction Targets

Mercury and PCBs load reduction targets were developed by comparing the refined urban runoff baseline loads to the urban runoff WLAs for the Santa Clara Basin, established through the TMDLs (SFBRWQCB 2006, 2008). The WLAs and the calculated load reduction targets for PCBs and mercury are listed in Table 2-4. These load reduction targets form the goals for control measure implementation described in Section 3.

The calculated load reduction target for PCBs is 2.460 kg/yr from the Santa Clara Basin, representing an 83% reduction of the refined baseline load from urban stormwater runoff needed to achieve the TMDL WLA for PCBs. For mercury, the refined baseline load is less than the mercury WLA established through the Mercury TMDL, indicating that the mercury WLA for urban stormwater runoff in the Santa Clara Basin may have been achieved. That said, there is uncertainty in mercury baseline loads due to the lower level of confidence in the ability of the average mercury concentrations developed via the RWSM to adequately represent concentrations in stormwater runoff (Wu et. al. 2017). Regardless, because the refined baseline load is less than the mercury WLA, for the purpose of this Control Measures Plan, it is assumed that no additional mercury load reductions are needed. Therefore, the control measures described in this Plan are primary focused on PCBs, with mercury reduction benefits occurring as a secondary benefit.

Table 2-4. PCB and Mercury Load Reduction Targets for the Santa Clara Basin.

	PCBs (kg/yr)	Mercury (kg/yr)
A. Refined Urban Runoff Baseline Load (2002)[a]	2.960	6.29
B. TMDL Urban Runoff Waste Load Allocation	0.500	23.00
C. Load Reduction Target (A – B)	2.460	NA

[a] Refined baseline load estimate was provided in Appendix A *Phase I RAA – Baseline Modeling Report*.

3 CONTROL MEASURE IMPLEMENTATION

This section describes existing and potential future control measures to achieve the PCBs and Mercury TMDL Wasteload Allocations (WLAs) for the Santa Clara Basin. Estimated PCBs and mercury load reductions achieved to-date and load reduction estimates for future potential actions implemented by SCVURPPP Co-permittees or other entities contributing PCBs in stormwater in the Santa Clara Basin are included. Methods used to quantify load reductions are fully described in Appendix B for GSI and Appendix C for Source Controls.

Future actions that are assumed to be implemented by other entities are included in this Control Measures Plan because (as described in both the PCBs and Mercury TMDLs) baseline loads and TMDL WLAs inherently include loads and required load reductions from all permitted and non-permitted stormwater dischargers, not only SCVURPPP Co-permittees. Some, but not all, entities discharging stormwater in the Santa Clara Basin currently have NPDES permits or Waste Discharge Requirements (WDRs). These permits and WDRs, however, do not explicitly include specific PCBs and/or mercury control measure implementation requirements. Additionally, other entities contributing PCBs to stormwater do not currently have permits or WDRs. Because land areas managed by these permitted and unpermitted entities contribute significant loads of PCBs to the San Francisco Bay (see Section 2.0), load reductions from stormwater associated with land areas owned, managed or impacted by these entities will be necessary to achieve the PCBs TMDL WLA for the Santa Clara Basin in a more cost-effective and equitable manner. As such, entities that should also participate in the implementation of PCBs control measures in the Santa Clara Basin are identified as important actors in addressing the PCBs TMDL, and additional regulatory actions will likely be needed from the State and Regional Water Boards to assist with this implementation.

As described in Section 2, the baseline load for mercury appears to be lower than the TMDL WLA for the Santa Clara Basin. Therefore, control measures described in this section are primarily focused on addressing PCBs. The overall load reduction needed to achieve the PCBs TMDL WLA for the Santa Clara Basin is 2.460 kg/yr (i.e., 2,460 g/yr). Estimated load reductions for each type of control measure and progress towards this overall PCBs load reduction goal are described. The levels of control measure implementation described in this section are consistent with recent discussions with Regional Water Board staff regarding future MRP requirements.

3.1 Approach to Identifying Effective Control Measures and Progress towards Addressing Load Reduction Targets

As described in Section 1 and illustrated in Figure 2-1, PCBs are legacy pollutants that are largely associated with old (pre-1980) industrial and commercial/transportation areas. Based on source evaluations conducted by multiple entities over the last two decades and during MRP 1.0 and MRP 2.0, PCBs-containing materials and equipment that were historically (and are currently) used in these areas are the largest sources of PCBs within these land areas. As such, the most cost-effective approach to reducing PCBs in urban stormwater runoff that SCVURPPP Co-permittees have instituted to-date and plan to continue implementing via the actions described in this Control Measures Plan is to conduct the following:

1) Source Identification - Identify PCBs sources (e.g., oil-filled electrical equipment) and source areas (e.g., historically contaminated old industrial properties) that disproportionately contribute high levels of PCBs to urban stormwater runoff;
2) Source Controls - Implement source control measures focused on addressing PCBs from high priority sources and source areas to prevent the release and transport of PCBs to the urban stormwater conveyance system and the Bay;

3) Multi-beneficial Treatment Controls - Implement multi-beneficial stormwater treatment controls (e.g., trash full capture systems) and track and account for the PCBs load reductions associated with the implementation of these measures and other treatment measures implemented as a result of new and redevelopment requirements included in the MRP; and
4) Public GSI Projects - Where appropriate and cost-effective, expend public resources to implement GSI projects (i.e., regional projects and/or green street projects) to address PCBs that are more distributed throughout the urban environment at moderate levels.

This approach has aided SCVURPPP Co-permittees in making significant progress to-date on reducing PCBs (and mercury) in stormwater and is consistent with the findings of the *Clean Watersheds for Clean Bay* project (BASMAA 2017b), which was funded by the USEPA and documented the costs and benefits of implementing a number of different types of PCBs control measures.

3.2 Timing of Control Measure Implementation

The remainder of this section describes the suite of control measures needed to achieve the PCBs load reduction target for the Santa Clara Basin (i.e., 2,460 g/yr). Existing and planned PCBs source control measures (including non-GSI treatment controls) are described in Section 3.3 and include actions that will be implemented by SCVURPPP Co-permittees and other entities that directly manage PCBs sources or source areas. Because SCVURPPP Co-permittees do not have the authority to require implementation of source controls by these entities, the implementation timelines presented for these actions extend beyond the current 2030 PCBs TMDL schedule (i.e., through 2080). Although TMDL timelines may need to be extended, these source controls are anticipated to largely address the PCBs load reduction target and as described in Section 4, are the most cost-effective approaches to addressing PCBs in urban stormwater runoff. PCBs load reduction estimates are also included for each source control, along with a summary of the method used to quantify the load reduction, which is fully described in Appendix C.

Section 3.4 describes the extent of GSI that has been implemented to-date in the Santa Clara Basin and the level of GSI that is anticipated via new and redevelopment requirements in the future. The timeframe that was used to project GSI implementation is 2080, consistent with the anticipated timeline for source control implementation described in Section 3.3. Associated PCBs load reductions for GSI that were derived via methods described in the Phase II RAA Report (Appendix B) are also included in Section 3.4.

A summary of the progress made to-date and the anticipated PCBs load reductions that will occur through the implementation of control measures described in Sections 3.3 and 3.4 is provided in Section 3.5. A comparison of load reductions anticipated for the 2030, 2040 and 2080 implementation timelines to the PCBs load reduction target is also provided. The economic and technical feasibility of implementing additional public GSI projects to achieve the remaining load reductions need to reach the PCBs TMDL WLA is presented in Section 4.0.

3.3 Source Controls and Non-GSI Treatment Controls

This section describes each type of source control measure, including non-GSI treatment controls, implemented to-date or planned for implementation to address the PCBs load reduction target for the Santa Clara Basin. The magnitude and extent of implementation and the associated load reductions are also provided.

The source control programs that SCVURPPP Co-Permittees currently implement and the source controls planned for future implementation to reduce stormwater loads of PCBs and mercury in the Santa Clara Basin include the following:

1. Source Area Identification and Abatement
2. PCBs in Building Materials Management
3. PCBs in Electrical Utilities Management
4. PCBs in Roadway and Storm Drain Infrastructure Caulk Management
5. High Flow Capacity (Large) Trash Full Capture Systems
6. Enhanced Operation and Maintenance Controls
7. Mercury Load Avoidance

Implementation of these controls may occur directly by Co-permittees or via other appropriate entities. Potential future actions focused on Co-permittee implementation include those that are expected to occur based on current SCVURPPP Co-permittee planning efforts and expectations about likely requirements in future iterations of the MRP. The load reductions that are estimated for these potential future actions assume each program is fully implemented as described, and the maximum load reductions for these actions are realized.

Accounting methodologies were developed for each source control program to calculate the PCBs and mercury load reductions achieved for a given unit of implementation. These methodologies are presented in Appendix C *Phase III RAA – Source Control Load Reduction Accounting for RAA Report.* This report was developed by BASMAA with input and direction from Regional Water Board staff to refine and update the interim accounting methodologies that were used during MRP 2.0. The Program anticipates the Regional Water Board Executive Officer will approve this report prior to issuance of the next permit. The basis for the source control load reduction accounting methodologies used in this report is the relative mercury and PCBs yield from the land use categories derived via the RWSM. As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. Because PCBs were more heavily used in older industrial areas, older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas.

The average PCBs and mercury land-use based yields that were used to calculate load reductions for source controls presented in this section are provided in Table 3-1 (Wu et. Al. 2017). Details on the derivation of the yield values are provided in Appendix C. The yield values presented in Table 3-1 have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

Table 3-1. Average PCBs and mercury yields for land use categories in the San Francisco Bay Area established through the RWSM and used to calculate load reductions from urban stormwater runoff. [a]

Land Use Category	PCBs Yield (mg/ac/yr)[b]	Mercury Yield (mg/ac/yr)
Source Property	5,031	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

[a] Source: Wu et. Al. (2017); RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.

[b] mg/ac/yr – milligrams per acre per year

3.3.1 Source Area Identification and Abatement

Control Measure Description

The Source Area Identification and Abatement control measure is focused on stormwater catchment areas or individual properties that disproportionately contribute PCBs to MS4s. Identification and subsequent abatement of these properties and/or focused control measure implementation in the public right-of-way (ROW) associated with these source areas/properties can provide significant PCBs load reductions. Reductions occur through the abatement of these areas/properties via referrals to the Regional Water Board or through enforcement actions brought against property owners by Co-permittees or regulatory agencies (e.g., USEPA).

To identify PCBs source areas, investigations are typically conducted in areas with historical (pre-1980) industrial land uses (i.e., old industrial land use) or other areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are elevated above urban background levels.[3] The source area investigation process includes the following steps:

1) Screening to Identify High-Priority Catchments (i.e., catchments that have elevated MS4 sediment and/or stormwater concentrations). Screening may involve visual inspections and review of land-use classifications and aerial photography followed up with surface soil/sediment sampling or stormwater sampling in public ROWs or from catchment outfalls.
2) Targeted Investigation of High-Priority Catchments to identify specific source areas and/or individual properties. Targeted investigations generally include records review, public ROW surveys, property inspections, and sampling in public ROW areas and on private properties.
3) Confirmation of Source Areas or Properties. Sources are confirmed if significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than

[3] See Appendix C for a statistical summary of urban sediment concentrations.

1.0 mg/kg, a sediment PCBs concentration equal to or greater than 0.5 mg/kg and other lines of evidence, or a particle concentration in stormwater greater than 0.5 mg/kg) are present in soil/sediment or stormwater from a property or adjacent public ROW.

4) Determination of Next Steps for confirmed source areas or properties. Once a source area or property is confirmed, the Permittee may take actions to cause the property to be abated or may refer that property to the Regional Water Board to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Co-permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source area during the abatement process, or will implement a stormwater treatment system downstream of the source area to intercept historically deposited sediment. The intent is to prevent contaminated sediment from continuing to be discharged from the storm drain system.

Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another NPDES permit.

Load Reduction Accounting Method

The amount of PCBs loads (i.e., annual mass or mg/yr) reduced for source property identification and abatement is calculated as the difference between the source property yield of 5,031 mg/ac/yr and the old commercial/old transportation land use yield of 49 mg/acre/yr (i.e., 5,031 – 49, or 4,982 mg/ac/yr) multiplied by the source property acres. This method assumes that upon full abatement of the source property, the PCBs yield for that property will be reduced to the average old commercial/old transportation land use yield. In other words, abatement will reduce the PCBs yield by nearly 5,000 mg/yr for every acre that is abated.

Fifty percent (50%) of this load reduction will be credited to the Permittee for properties that are referred to the Regional Water Board for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the source property to prevent contaminated sediment from continuing to discharge from the storm drain system. The remaining 50% load reduction will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The Regional Water Board will notify the Permittee when the abatement process is complete.

If a source property has been abated without referral to the Regional Water Board, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete.

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated mercury yield values for source property, old industrial, old residential, and old commercial/old transportation land use classes. This issue is discussed in more detail in Appendix C *Phase III RAA – Source Control Load Reduction Accounting for RAA Report*.

Estimated Load Reductions

Since about 2012, Co-permittees have conducted desktop analysis and catchment-scale stormwater or MS4 sediment monitoring to screen over 3,600 acres of old industrial land-use area

within the Santa Clara Basin to identify areas for targeted source investigations. Within the screened areas, targeted source investigations have been conducted in over 1,000 acres. These in-depth investigations include records review, public ROW surveys, business inspections, and targeted sampling of MS4 sediment and stormwater both in public ROW areas and on private properties. To date, these efforts have resulted in the identification and referral of 90 acres of source properties to the Regional Water Board for further investigation and abatement (Figure 3-1). Enhanced O&M activities are currently implemented in the public ROW adjacent to each of these source properties, including increased street sweeping and storm drain line cleanouts, and installation of stormwater treatment measures downstream of sources. Fifty percent (50%) of the load reduction associated with abatement of these properties is currently credited to SCVURPPP Co-Permittees. For all of these properties, the remaining 50% of the load reduction credit will be realized by 2030.

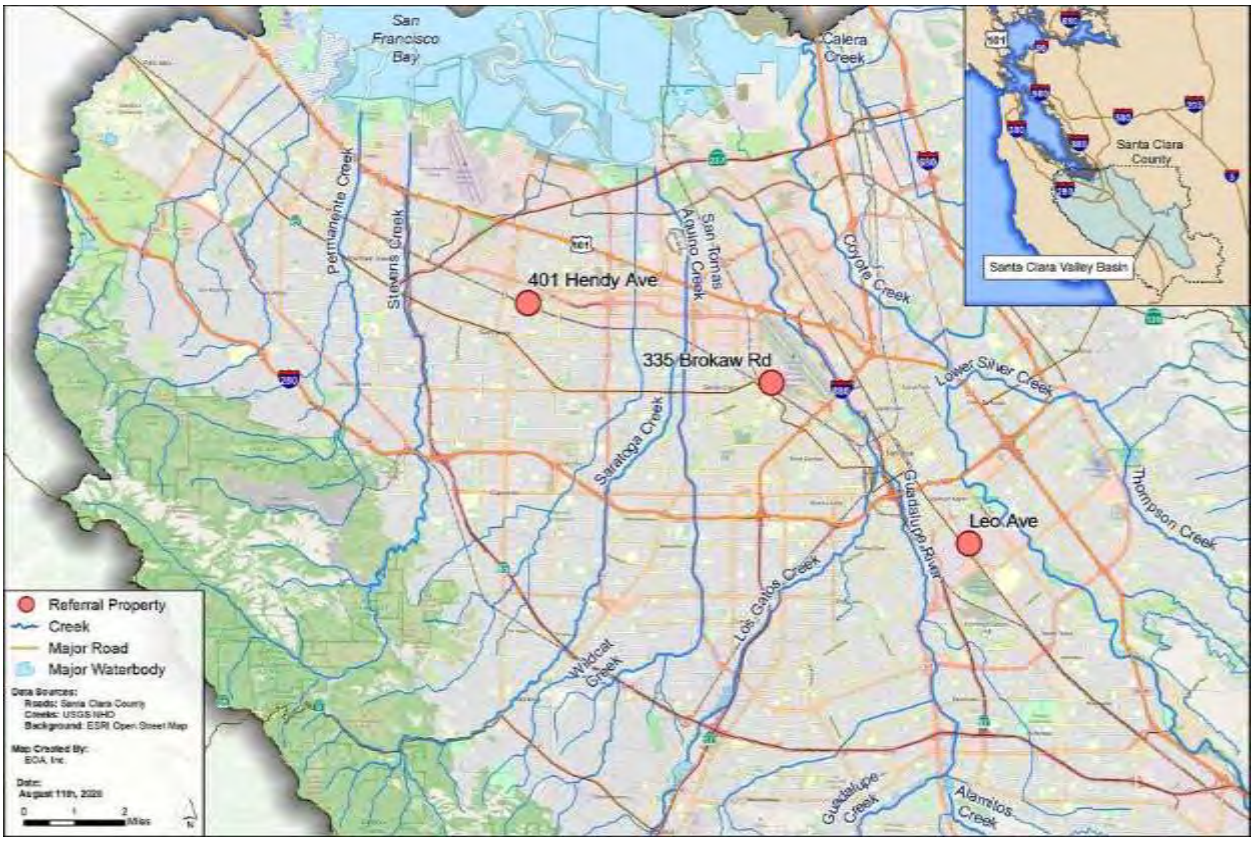

Figure 3-1. Locations of source properties referred to-date to the Regional Water Board for follow-up investigation and abatement.

In addition, SCVURPPP Co-permittees are planning to continue investigating old industrial land-use areas to identify additional source areas. Full implementation of this control measure entails screening and investigation of all remaining old industrial areas that have not yet been investigated, and identification, referral and abatement of any source properties or source areas identified through these investigations. The potential future load reductions based on full implementation of this control measure were estimated using the following assumptions.

- Based on the rate of old industrial acres screened and investigated to date (3,600 acres screened and over 1,000 of those screened acres fully investigated over a 10-year timeframe), the Program estimates it could take 10 to 20 years to investigate all of the remaining 2,500 acres of old-industrial areas that have not yet been screened or investigated.
- Assumed rates of source area identification per acre of old industrial land use area investigated were developed to estimate the potential future source area acres identified and abated through this program. The rate of acres of source property identified per acre of old-industrial land-use investigated to date is approximately 2.5%. Acknowledging that the efforts conducted to date have focused on the most likely candidates for containing source areas, the Program estimates the rate of source area identification will reduce in the future. A 1% source area identification rate for 25% of the remaining old industrial area and a 0.5% source area identification rate for the rest of the remaining old industrial area appear to be reasonable estimates.

Based on these assumptions, SCVURPPP Co-permittees estimate that an additional 15.8 acres of source areas will be identified. Full abatement of these source areas will result in up to 79 g/yr of PCBs load reduction by no later than 2050. The timing of when the full load reduction credit will be granted depends on when the investigations are completed and when all referrals are submitted to the Regional Water Board. The anticipated cumulative load reduction associated with this control measure by 2030, 2040 and 2080 is presented in Table 3-2. All source properties are assumed to be abated within 10 years of referral. The anticipated maximum load reduction credit based on current and future implementation of this source control is 528 g/yr, realized by no later than 2050.

Table 3-2. PCBs load reductions to-date and potential future load reductions based on planned implementation.

Status of Source Areas	Source Area Identified (acres)	Cumulative PCBs Load Reduction (g/yr)			
		By 2020	By 2030	By 2040	By 2080
Referred by 2020; abated by 2030	90	225	450	450	450
Referred by 2030; abated by 2040	6.3	0	16	32	32
Referred by 2040; abated by 2050	9.5	0	0	24	47
Totals	106.1	225	465	505	528

3.3.2 PCBs In Building Materials Management

Control Measure Description

MRP Co-permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition (Figure 3-2). Single-family residential and wood frame structures are exempt.

SCVURPPP Co-permittees participated in a BASMAA regional project conducted over the past several years that developed regionally consistent model tools and guidance in order to assist Permittees in developing and implementing programs to control PCBs in building materials. All SCVURPPP Co-permittees developed PCBs in Building Materials control programs by July 1, 2019, as required by MRP Provision C.12.f. The programs include the following process:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Load Reduction Accounting Method

Per the MRP 2.0 Fact Sheet, the regional load of PCBs reduced through implementation of the PCBs in Building Materials Management Program is 2 kg/yr beginning in 2019. This value is based on assumptions about the number of applicable buildings demolished each year, the mass of PCBs per building, the fraction of PCBs that enters the MS4 during demolition without controls, and the fraction of PCBs prevented from entering the MS4 as a result of the program. The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained during the MRP 3.0 permit term. However, Permittees may, with the necessary supporting data, request an increase in the credit

received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

Estimated Load Reductions

The PCBs load reductions due to implementation of the building materials management program beginning in July 2019 provide an estimated 627 g/yr of PCBs load reduction in the Santa Clara Basin. This value represents the Santa Clara Basin's population-based proportion of the total 2 kg/yr stipulated load reduction for all MRP Permittees. Additional annual load reductions for the PCBs in Building Materials Management Program are not currently anticipated beyond this load reduction estimate.

3.3.3 PCBs in Electrical Utilities Management

Control Measure Description

PCBs are present in some electrical equipment still in service in the Santa Clara Basin (e.g., see Figure 3-3) and, through on-going efforts, the equipment and/or PCBs are gradually being replaced. SCVURPPP Co-permittees plan to implement a PCBs in Electrical Utilities Management Program that will include improved practices and procedures for documenting removal and disposal of PCBs-containing oil-filled electrical equipment (OFEE). As part of this program, Co-permittee-operated electrical utilities plan to document the removal of PCBs-containing OFEE since the start of the TMDL, and in the future, continue to remove PCBs in OFEE and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that larger, privately-owned regional electrical utilities that are not currently subject to PCBs load reduction requirements will also remove PCBs in OFEE and document these efforts, consistent with methods used by applicable MRP Co-permittees. Regional Water Board oversight of private electrical utility efforts is needed to ensure appropriate control measure implementation and documentation.

Figure 3-3. Pole-mounted electrical transformers with PCBs-containing oils.

Load Reduction Accounting Method

PCBs load reductions documented through implementation of this program will be calculated based on an assumed equipment removal rate (based on information provided by municipal electrical utilities in the Bay Area on equipment removals since 2002), and an assumed PCBs load to stormwater from electrical utility equipment at the start of the PCBs TMDL. These methods are fully described in the Phase III RAA Report (Appendix C).

Estimated Load Reductions

Electrical utilities in the Bay Area have removed PCBs-containing OFEE from active service since 2002, as documented in the Regional Stressor/Source Identification (SSID) project report that is included as an appendix to the Phase III RAA Report (Appendix C). Removal of PCBs-containing equipment stops any active PCBs releases and prevents future PCBs releases from occurring. Therefore, each piece of PCBs-containing OFEE that is removed from service and disposed of properly represents an additional mass of PCBs that is prevented from release to the MS4. Based on the equipment removal rates documented in Appendix C, approximately 67 g/yr of PCBs have been prevented from release to the MS4 in the Santa Clara Basin through 2020 (Table 3-3).

Electrical utility equipment removals are expected to continue at a similar rate in the future, providing an additional 278 g/yr of potential future load reductions within the Santa Clara Basin once all PCBs-containing OFEE have been removed from active service. Because equipment removals are expected to occur gradually over time, the estimated timeframes over which load reductions will be realized are shown in Table 3-3. Based on current removal rates, all PCBs-containing OFEE will be removed from active service by approximately 2080.

Table 3-3. Estimated PCBs load reductions via the implementation of the **electrical utilities'** Oil Filled Electrical Equipment (OFEE) management program.

Control Measure	Cumulative PCBs Load Reduced (g/yr)			
	By 2020	By 2030	By 2040	By 2080
PCBs-Containing OFEE Removal	67	112	157	345

3.3.4 PCBs in Roadway and Storm Drain Infrastructure Caulk Management

Control Measure Description

The PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program was developed to reduce the release of PCBs during demolition of bridges and overpasses. For this control measure, Co-permittees will track the development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges and roadway overpasses during bridge replacement or joint maintenance (see Figure 3-4). The new Caltrans standard specification for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to stormwater. Applicable structures include those built between 1950 and 1980 when PCBs-containing joint sealants and caulk were available. As part of this program, Co-permittees will maintain lists of applicable bridges and overpasses within their jurisdiction that are scheduled for replacement or joint maintenance and implement or cause to be implemented the Caltrans specification during all applicable bridge projects that are under the direction of Co-permittees. Co-permittees will

Figure 3-4. PCBs-containing black caulking material on a roadway overpass structure.

also track and report on the use of the new Caltrans specification for all bridge projects within their jurisdictions. Additional details about the PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program are provided in Appendix C.

Load Reduction Accounting Method

In order to estimate the load reduction that will be realized through implementation of the PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program, Co-permittees identified the number of applicable bridges and overpasses within their jurisdictions that are expected to undergo replacement or joint maintenance. Estimates were made to quantify the average mass of PCBs potentially contained in these structures, combined with estimates of the ongoing PCBs release rate from bridge joints that would be prevented during replacement or joint maintenance due to implementation of the new Caltrans specification. The load reduction estimate is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual load is also removed. This is based on the assumption that ongoing leaching of PCBs from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

An average annual release rate (i.e., average over the life of the seal) of 0.5% was assumed to calculate the estimated load reduction from removing the joint seal. This average annual release rate was applied to the estimated mass for all bridges in the Santa Clara Basin that meet the identified age criteria. These releases would be eliminated through joint or bridge replacement.

Estimated Load Reductions

This control measure program has not yet been implemented in the Santa Clara Basin. The potential PCBs load reduction that can be achieved through full implementation of the PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program in the Santa Clara Basin is 50 g/yr. This is the total amount of PCBs load reduction that will be realized once the program has been fully implemented by Co-permittees and other non-MRP entities, and all applicable structures have been replaced and/or maintained. This load reduction is expected to occur gradually over the next 60 years under the assumption that all older joints will be removed or replaced within 100 years of installation (i.e., by 2080). Table 3-4 identifies the potential future load reductions that will be realized by 2030, 2040, and 2080.

Table 3-4. Estimated PCBs load reductions via the implementation of the PCBs in roadway and storm drain infrastructure caulk management program post-2020.

Control Measure	Cumulative PCBs Load Reduction (g/yr)		
	By 2030	By 2040	By 2080
Use of Caltrans specification during applicable bridge replacement or joint maintenance	8.3	16.6	50

3.3.5 High Flow Capacity (Large) Trash Full Capture Systems

Control Measure Description

This control measure includes the implementation of high flow capacity (large) trash full capture systems, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes (see Figure 3-5). These types of systems have been installed in urban areas for the purposes of MRP Provision C.10 compliance. These devices trap all particles retained by a 5mm mesh screen and have a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm. Large trash full capture devices typically treat large drainage areas (tens to hundreds of acres).

Figure 3-5. Two types of high-capacity full trash capture systems (HDS above, Baffle box below) installed by SCVURPPP Co-permittees.

Load Reduction Accounting Method

The load of PCBs or mercury in stormwater that is reduced by High Flow Capacity Trash Full Capture Systems is calculated by multiplying the drainage area treated by the system by the PCBs or mercury yield of the drainage area, and an assumed load reduction efficiency factor for the system. The drainage area PCBs and mercury yields are calculated as an area-weighted yield based on the acres of each land use class within the drainage area. Load reduction efficiency factors for each type of device were developed using the best available data, as reported in detail in Appendix C. For both HDS units and baffle boxes, the assumed load reduction efficiency factor is 20%. For GSRDs, the assumed load reduction efficiency factor is 14%. This methodology indicates that these systems reduce the PCBs and mercury loads from the drainage area by 14% to 20%.

Estimated Load Reductions

A total of 39 High Flow Capacity Trash Full Capture Systems have been installed to-date in the Santa Clara Basin. These devices treat more than 16,000 acres of land area, including nearly 1,500 acres of old industrial and 4,500 acres of old urban – other (commercial/transportation) land uses (Table 3-5). The land use classifications of the drainage areas treated by these systems that have been installed since 2002 are also illustrated in Table 3-5, along with the count of each system type and the total PCBs and mercury load reductions achieved through 2020. In total, these systems have reduced 121 g/yr of PCBs and 173 g/yr of mercury. For PCBs and mercury control measures planning purposes, no additional High Flow Capacity Trash Full Capture Systems are included in load reduction estimates post-2020. However additional systems may be implemented to further address trash load reduction requirements.

Table 3-5. Summary of High Flow Capacity Trash Full Capture Systems and associated load reductions by 2020.

Device Type	# of Devices	Area Treated (acres)	Land Use Distribution (acres)					Loads Reduced (g/yr) By 2020	
			Old Industrial	Old Urban-Other	Old Urban - Residential	New Urban	Ag/ Open	PCBs	Mercury
Baffle Boxes	7	3,233	278	1,068	1,572	195	120	26	35
GSRD	1	732	233	92	61	335	11	11	4
HDS	31	12,207	931	3,324	6,735	615	602	85	135
Totals	39	16,172	1,443	4,484	8,369	1,145	732	121	173

3.3.6 Enhanced Operations and Maintenance Controls

Control Measure Description

All SCVURPPP Co-permittees conduct routine operation and maintenance (O&M) activities to ensure the proper functioning of their stormwater conveyance systems. Operation and maintenance activities include street sweeping, storm drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are routinely maintained (e.g., desilted). Through these efforts, sediment and organic material (and associated pollutants) are removed from the stormwater conveyance system. This control measure includes any enhancements to routine O&M and new actions such as storm drain line and street flushing.

Figure 3-6. Operation and maintenance of an inlet-based trash control measure.

Inlet-based (small) trash capture systems are devices or series of devices that trap all particles retained by a 5mm mesh screen and have a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area. Inlet-based typically treat one acre or less and generally consist of screens or baskets that are installed in storm drain inlets. These devices may be installed in series to cumulatively treat larger areas. In recent years, many SCVURPPP Co-permittees have increased cleaning frequencies due to additional maintenance requirements for newly installed inlet-based devices (see Figure 3-6).

Other types of enhanced O&M are not discussed further in this report because no other enhancements are ongoing in the County and none are currently planned for future implementation on a regular basis. However, if other types of enhanced O&M occur in the future, they will be tracked and load reductions will be calculated per the methods described in Appendix C.

Load Reduction Accounting Method

To account for PCBs and mercury load reductions from enhanced cleaning of inlet-based devices, the area-weighted PCBs or mercury land-use based yield is calculated for the appropriate drainage area and multiplied by an assumed efficiency factor of 18%. This efficiency factor was developed based on available data on sediment removal efficiencies for twice annual cleanout of inlets that have devices. Additional details on the accounting methodology and the data used to develop the efficiency factor are provided in Appendix C.

Estimated Load Reductions

To date, 1,423 inlet-based devices that are treating more than 2,500 acres have been installed within the Santa Clara Basin. Enhanced cleaning combined with the additional sediment removal associated with these devices is currently providing 21 g/yr and 25 g/yr of PCBs and mercury load reductions, respectively (Table 3-6). Based on current planning, additional installations of at least 259 small, inlet-based FTC devices and implementation of the enhanced inlet-cleaning that is associated with these devices is expected in the Santa Clara Basin. Potential future load reductions of 3 g/yr of PCBs and 2 g/yr of mercury will be realized once planned inlet-based FTC devices are installed and enhanced cleanouts are conducted. This estimate does not include any future devices that are not currently planned for installation.

Table 3-6. Summary of enhanced operations and maintenance program implementation and associated load reductions by 2020 and 2030.

Status	# of Inlet-based Trash Full Capture Devices Installed and Maintained	Total Acres Treated	Land Use Distribution (acres)					Loads Reduced (g/yr)	
			Old Industrial	Old Urban-Other	Old Urban - Residential	New Urban	Ag/ Open	PCBs	Mercury
Existing (2020)	1,423	2,589	192	1266	824	221	87	21	25
Planned (2030)	259	TBD						3	2

3.3.7 Mercury Load Avoidance and Reduction Program

Control Measure Description

Mercury load avoidance and reduction includes a number of true source control measures listed in the California Mercury Reduction Act which was adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and requirements for mercury-containing device recycling (see Figure 3-7). The following source control bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

Figure 3-7. Compact fluorescent lightbulbs recycled via Household Hazard Waste (HHW) Programs.

In addition, fluorescent lamp manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufacturers have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury-containing bulbs has also decreased through replacement of these bulbs with LED bulbs.

Mercury Device Recycling Programs resulting in mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury-containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

Load Reduction Accounting Method

To account for the current level of load reduction achieved through recycling of mercury-containing lamps, switches and thermostats, data collected by the Santa Clara County HHW Program are compiled annually. These data provide the total mass of mercury that is collected through the program each year. To estimate the load avoided by collection and proper recycling, it is assumed that 4.8% of the mercury contained in these devices would have been transported to the Bay via urban stormwater if improperly discarded. Appendix C provides additional details on the methodology and data inputs used to calculate the mercury load avoided due to the HHW recycling program.

Estimated Loads Avoided

Based on the annual average mass of mercury collected in the Santa Clara HHW program during recent years, the total annual load of mercury avoided is estimated to be 108 g/yr. The mass of mercury recycled each year is expected to decrease over time as less mercury is used in household products.

3.4 Green Stormwater Infrastructure

This section provides an overview of the different types of GSI projects that remove pollutants in stormwater in the Santa Clara Basin, and documents the magnitude and extent of implementation and the associated load reductions achieved to date (2002 to 2020). Predictions of GSI implementation that may occur in the future in the Basin as a result of MRP new development and redevelopment requirements and associated load reductions over time are also summarized.

The construction of GSI facilities in the Santa Clara Basin has and will continue to provide significant benefits to stormwater quality and support reductions of PCBs (and mercury) loads to the Bay. GSI facilities are stormwater management systems that use vegetation, soils, and natural processes to capture and treat stormwater runoff and improve water quality.

There are three main categories of GSI facilities, which are largely based on their location and extent of upstream catchment area:

1. Parcel-based New Development and Redevelopment Projects. These projects include Low Impact Development (LID) treatment measures that are designed to capture/treat runoff generated on a parcel. LID measures are implemented during development or re-development of a parcel and are currently required by the MRP for any project creating or replacing greater than 10,000 square feet[4] of impervious area. These projects can be located on either publicly- or privately-owned parcels.
2. Public Green Street Projects. These projects include GSI facilities that are located along or within a street or public ROW. They are typically designed to capture and treat runoff from the street and possibly portions of adjacent parcels.
3. Regional Projects. These projects include parcel-based GSI measures that capture runoff from off-site areas. Typically located on publicly owned lands, development and implementation of regional projects may involve collaboration among multiple municipalities and/or public agencies to construct large facilities that capture and treat stormwater from large drainage areas. Collaboration among multiple jurisdictions may allow for larger projects with greater economies of scale, specifically cost-sharing opportunities and greater flood control and pollutant reduction capacity.

The most common types of GSI facilities that are constructed in urban areas include bioretention, stormwater tree well filters, pervious pavement, infiltration facilities, green roofs, and rainwater harvesting and use facilities.

3.4.1 Existing GSI Projects

As described in previous Control Measure Plans submitted during MRP 2.0 and illustrated in Appendix D (SCVURPPP Co-permittee Green Stormwater Infrastructure (GSI) Implementation Maps), numerous GSI facilities treating thousands of acres of land in the Santa Clara Basin have been implemented on public and private properties as a result of new development and redevelopment stormwater requirements in MRP Provision C.3 (C.3 requirements). Co-permittees have little control over the pace and extent to which private redevelopment occurs; however, as redevelopment projects are permitted, Co-permittees ensure that stormwater treatment controls are incorporated into those projects per C.3 requirements. Co-permittees currently track

[4] Per MRP Provision C.3.b requirements. The threshold for LID requirements on projects associated with Special Land Uses (i.e., auto service facilities, retail gasoline outlets, restaurants, and stand-alone uncovered parking lots) is 5,000 square feet of created and/or replaced impervious surface.

the installation and maintenance of these projects to ensure proper long-term operation and to demonstrate pollutant load reductions, and will continue to do so in the future.

In addition to parcel-based new development and redevelopment GSI projects, a number of other GSI facilities have been implemented by SCVURPPP Co-permittees on public property or within the public ROW. Many of these projects have served as demonstration projects (see Figure 3-8). Similar to GSI facilities on private property, Co-permittees currently track the installation and maintenance of public GSI facilities to ensure proper long-term operation and to assist with demonstrating pollutant load reductions.

Figure 3-8. Public green street project in Southgate Neighborhood, Palo Alto (CA).

The GSI RAA model (Appendix B) was used to estimate the PCBs load reductions that have been achieved since the start of the TMDL (i.e. between 2002 and 2020) due to all existing GSI projects in the Santa Clara Basin. To date, 1,984 acres of impervious surface are treated by GSI facilities, which provide an estimated PCBs load reduction of 48 g/yr.

3.4.2 Potential Future GSI Projects

Based on projected levels of redevelopment in the Santa Clara Basin, the Program anticipates that the number of parcel-based GSI facilities will continue to grow in the Santa Clara Basin in future decades. The load reduction predicted for the Basin by 2030 and by 2040 through future parcel-based new development and redevelopment projects is based on an analysis of projected development rates across the Basin that is described in Appendix B. Figure 3-9 shows the projected countywide annual redevelopment rates extended to 2080 based on the analysis predicting redevelopment rates from 2020 to 2040.

On average, the projected rate of land redevelopment in the Santa Clara Basin that would be subject to current stormwater treatment requirements is 2.8% per year. The annual average PCBs load reductions calculated for GSI associated with this projected amount of land redevelopment is 2.9 g/yr of PCBs from 2020 to 2040. This average rate of pollutant reduction from 2020-2040 was used to estimate future pollutant load reductions through 2080 as a result of GSI implementation (Table 3-7). The total load reductions due to GSI for future new development and redevelopment projects by 2080 is 171 g/yr for PCBs.

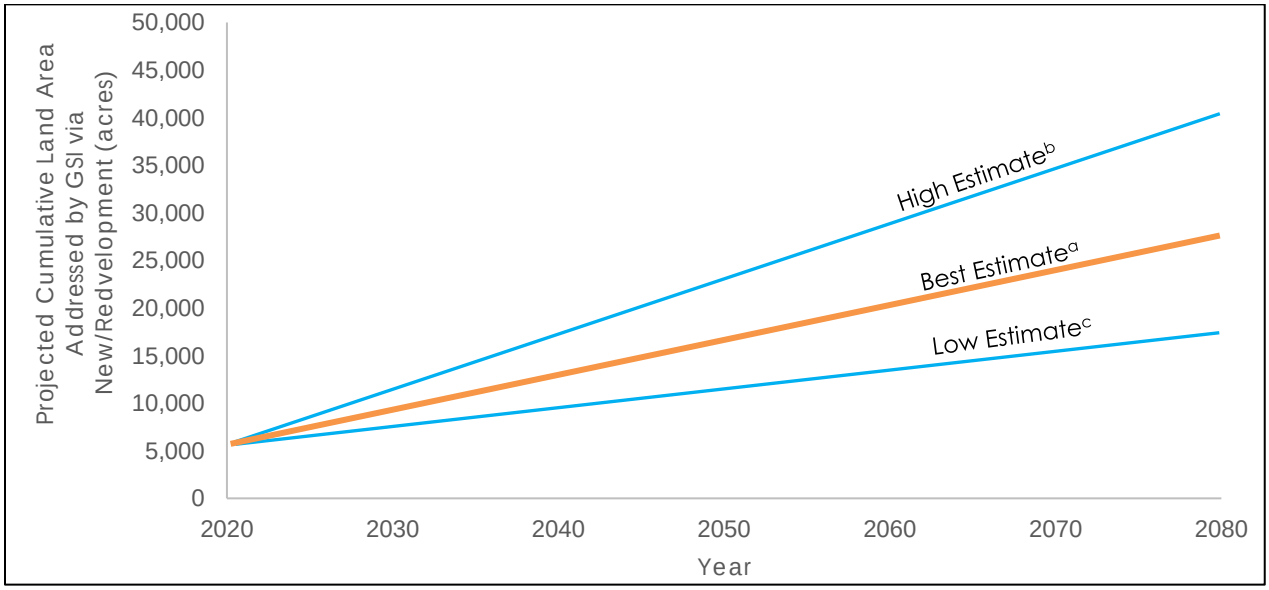

Figure 3-9. Projected cumulative land area in the Santa Clara Basin that will be addressed via GSI facilities installed as a result of redevelopment between 2020 and 2080.

[a] Best estimate – rate of redevelopment based on 10-year average (2008-2017)

[b] High estimate – approximately 150% of "best estimate"

[c] Low estimate – approximately 50% of "best estimate"

Table 3-7 PCBs loads reduced due to Countywide green stormwater infrastructure (GSI) implementation to date and future implementation due to projected new development and redevelopment in the Santa Clara Basin.[a]

GSI Type	Cumulative Load Reduction (g/yr)			
	By 2020	By 2030	By 2040	By 2080
Existing GSI Projects (includes both public and private projects)	48	48	48	48
Anticipated Future Parcel-based GSI via New Development and Redevelopment Projects (includes both public and private projects)	--	27	57	171

[a] Load reductions due to anticipated future parcel-based GSI facilities occurring via new development and redevelopment projects are based on projected development rates in the Santa Clara Basin as described in Appendix B.

3.5 Summary of PCBs Load Reductions via Existing and Planned Control Measures

As presented in the previous sections under each control measure, SCVURPPP Co-permittees have made substantial progress in reducing the loads of PCBs (and mercury) in urban stormwater since the TMDLs were established in the early 2000s. Table 3-8 summarizes all PCBs load reductions achieved to-date (through 2020) and the load reductions anticipated to occur over time as a result of future GSI and source control measure implementation documented in Sections 3.3 and 3.4.

Through the implementation of source control programs and GSI, the annual PCBs load in stormwater from the Santa Clara Basin has been reduced by nearly 40% to-date, almost halfway towards the 83% reduction needed to achieve the TMDL WLA. For mercury, the modeled baseline load for the Santa Clara Basin is less than the TMDL WLA of 23 kg/yr, indicating that the WLA for mercury has been achieved. GSI and many of the source controls documented in Sections 3.3 and 3.4 and those discussed later in Section 4 have (or will have) further mercury load benefits.

Co-permittees anticipate continuing and expanding the implementation of stormwater control measures over time, consistent with requirements included in future iterations of the MRP. As demonstrated in Table 3-8, these Co-permittee actions, in concert with actions taken by other entities in the Santa Clara Basin, are anticipated to address 45% to 78% of the PCBs load reduction target of 2,460 g/yr. Based on load reductions anticipated to occur over time, a load reduction gap will likely remain for the 2030, 2040, and 2080 implementation timelines, once existing and planned control measures are accounted for. These predicted load reduction gaps are further described in Section 4.0 along with the technical and economic feasibility of multiple control measure implementation scenarios designed to address these gaps.

Table 3-8 Summary of existing (2002-2020) and potential future PCBs load reductions as a result of stormwater control measure implementation in the Santa Clara Basin during three implementation timeframes (2030, 2040 and 2080).

Control Measure		Estimated PCBs Load Reduction (g/yr)			
		By 2020	By 2030	By 2040	By 2080
Source Area Identification, Referral and Abatement		225	466	505	528
PCBs in Building Materials Management		627	627	627	627
High Flow Capacity Full Trash Capture Systems		121	121	121	121
Enhanced Operation & Maintenance – Enhanced Cleaning of Inlet-based Full Trash Capture Systems		21	24	24	24
PCBs in Electrical Utilities Management		67	112	157	345
PCBs in Roadway and Storm Drain Infrastructure Caulk Management		--	8	16	50
Green Stormwater Infrastructure (GSI)	Existing Projects (public and private)	48	48	48	48
	Anticipated Future parcel-based GSI projects via New Development and Redevelopment (public and private)	--	27	57	171
Controls to Address Contributions from Caltrans Right-of-Way[a]		TBD	TBD	TBD	TBD
Controls to Address Contributions from Railroad Right-of-Way[a]		TBD	TBD	TBD	TBD
Totals		1,108	1,432	1,554	1,913
Percent of Load Reduction Achieved To-Date Through Existing/Planned Actions		*45%*	*58%*	*63%*	*78%*
Load Reduction Needed to Achieve TMDL WLA		*2,460*	*2,460*	*2,460*	*2,460*

[a] Control measures that would be implemented by these entities responsible for stormwater discharges from their land areas have not yet been identified and therefore are not incorporated into these load reduction estimates. Future implementation of controls and tracking of associated reductions may reduce the need for one or more control measures listed above.

4 Economic and Technical Feasibility of Achieving the PCBs TMDL Load Reduction Target

This section evaluates the economic and technical feasibility of attaining the PCBs TMDL load reduction target for the Santa Clara Basin (i.e., 2,460 g/yr), including the load reduction gap anticipated to occur once the control measures described in Section 3.0 are implemented (Table 4-1). Three implementation scenarios that vary in timelines (i.e., 2030, 2040 and 2080) and control measures are evaluated. Multiple implementation scenarios are included, rather than just the current 2030 PCBs TMDL timeline, because some source controls implemented by entities other than SCVURPPP Co-permittees are outside of Co-permittees' control and the timelines for implementation of these actions are anticipated to occur beyond the current TMDL schedule (i.e., 2030). The approximate date by which the source controls implemented by these entities will achieve their maximum load reduction potential is 2080 and therefore this is the most extended timeline included as an implementation scenario.

Table 4-1. Summary of existing (2002-2020) and planned future PCBs load reductions as a result of stormwater control measure implementation in the Santa Clara Basin and the resulting load reduction gaps during three implementation timeframes (2030, 2040 and 2080).

	Cumulative PCBs Load Reduction (g/yr)			
	By 2020	By 2030	By 2040	By 2080
Existing and Planned Control Measures	1,108	1,432	1,554	1,913
PCBs TMDL Load Reduction Target	2,460	2,460	2,460	2,460
Load Reduction Gap	*1,352*	*1,028*	*906*	*547*

Each implementation scenario described in this section largely relies on the expanded implementation of public GSI projects. The economic feasibility of each scenario was evaluated based on a comparison of current and estimated future costs to SCVURPPP Co-permittees to implement controls described in Section 3.0 and controls described in this section that would address the PCBs load reduction gap. Technical feasibility was evaluated based on the ability of Co-permittees alone to fully address the PCBs load reduction gap. Potential environmental impacts associated with this plan and the implementation timelines are also described, as a further basis for an extension to the current implementation timeframe outlined in the PCBs TMDL (i.e., 2030).

4.1 Potential Additional Load Reductions via Public GSI Projects

The PCBs load reduction scenarios were developed in part to evaluate the feasibility of filling the load reduction gaps identified in Table 4-1 via public GSI projects. The number of public GSI projects are anticipated to increase in the future in the Santa Clara Basin as a result of the implementation of Co-permittee GSI plans developed per MRP 2.0 requirements. Project prioritization will likely be based on a number of factors, which may include PCBs and mercury load reduction potential. Modeling conducted as part of the Phase II RAA for GSI (see Appendix B) was utilized to identify the extent of GSI projects that would be needed to address the 2030 and 2040 load reduction gaps listed in Table 4-1 (results were extrapolated to 2080). The GSI model builds on the baseline RAA model summarized in Section 2 and detailed in the Phase I

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RAA Report (Appendix A) to estimate loads reduced by current and potential future GSI and demonstrate the amount of GSI needed to achieve MRP 2.0 load reduction targets. The GSI load reduction targets under MRP 2.0 and model outputs are summarized below and detailed in the Phase II RAA Report (Appendix B).

4.1.1 GSI Load Reduction Targets in MRP 2.0

MRP 2.0 identifies a regionwide load reduction target via GSI of 3.0 kg/yr PCBs by 2040. This represents approximately 20.8% of the total PCBs TMDL stormwater load reduction target of 14.4 kg/yr. The SCVURPPP Co-Permittee portion of the GSI load reduction goal is calculated as 20.8% of the load reduction target for the SCVURPPP Co-permittee area within the Santa Clara Basin. As described in detail in the RAA Phase I Report (Appendix A), the refined baseline load for the SCVURPPP Co-permittee area is the Santa Clara Basin is 2.21 kg/yr of PCBs (see Table 2-3). Applying the same 83% load reduction that is required across the entire Santa Clara Basin to the SCVURPPP Co-permittee area gives a load reduction target for the SCVURPPP Co-permittee area of 1.83 kg/yr (i.e., 2.21 kg/yr x 83% = 1.83 kg/yr). The load reduction required via GSI is 20.8% of the SCVURPPP Co-permittee area load reduction target, or 380 g/yr (1.83 kg/yr x 20.8% = 0.380 kg/yr). Thus, SCVURPPP Co-permittees have identified the level of GSI implementation that would collectively need to be implemented to demonstrate a PCBs load reduction of at least 380 g/yr by 2040. This represents 17.3% of the SCVURPPP Co-permittee area baseline load of 2.21 kg/yr. A GSI model was developed to estimate the type and amount of GSI projects that would provide this level of PCBs load reduction by 2040, as required by MRP 2.0.

4.1.2 GSI Model Methods and Outputs

As described in Section 2.0, the refined baseline model uses LSPC to provide hourly simulation of historical hydrology and pollutant loads for watersheds discharging from the Santa Clara Basin to San Francisco Bay. The GSI modeling approach for conducting the RAA builds on the baseline model to quantify the load reductions associated with existing, planned and potential future GSI projects. The RAA model for GSI links the baseline model with a GSI performance model based on the System for Urban Stormwater Treatment & Analysis Integration (SUSTAIN). SUSTAIN simulates flow and pollutant transport routing through various types of GSI projects and includes a cost-benefit optimization model to quantify the implementation costs associated with various types of GSI projects (USEPA 2009, Riverson et al. 2014).

GSI projects were represented in the model based on the best available information about existing, planned and potential future GSI implementation in the Santa Clara Basin at the time of model development (~2018). Each type of project included in the model and the source of information for that project type are identified here:

- Existing Projects. SCVURPPP compiled a dataset of projects that were constructed in the Santa Clara Basin between 2002 and 2018 that included stormwater treatment facilities. These projects include both public green street projects and LID on regulated new development and redevelopment projects[5].
- Future New Development and Redevelopment. SCVURPPP conducted an analysis that projected acres addressed by future new development and redevelopment on private parcels in the Santa Clara Basin subject to MRP Provision C.3 regulations between 2018 and 2040.
- Regional Projects. The Santa Clara Basin Stormwater Resource Plan (SWRP) identified five (5) high-priority opportunities for regional projects in the Santa Clara Basin. The City of San

[5] Between 2002 and 2011, some projects used non-LID treatment but are represented in the model as GSI.

José identified three (3) potential additional regional project opportunities within their jurisdiction subsequent to completion of the SWRP. All eight (8) of the identified regional project opportunities were included in the GSI RAA model.

- Green Streets. The SWRP prioritized green street opportunities in the Santa Clara Basin. All green street opportunities that were considered high priority were included in the GSI RAA model.
- Other GSI Projects. This category is a placeholder in case the above projects are inadequate to achieve needed load reductions. This category can include all of the GSI project types and other project opportunities that have not yet been identified.

For each project category (e.g., parcel-based, green streets, and regional projects), the GSI RAA model applied a set of assumptions to evaluate treatment and stormwater management effectiveness. GSI facilities on both parcel-based new development and redevelopment projects and green streets were represented in the model as bioretention (with and without underdrains, depending on underlying soil infiltration rates). For the eight Regional Projects, the modeling assumptions were based on configurations for storage and treatment outlined in each project's conceptual design.

The GSI RAA model estimated the most cost-effective amount and types of GSI that will need to be implemented by 2020, 2030, and 2040, to achieve the MRP 2.0 GSI load reduction goal of 380 g/yr in the Santa Clara Basin by 2040 (Figure 4-1). The model-predicted sediment load reductions were used as a surrogate for PCBs and mercury load reductions associated with GSI implementation. Additional information on the GSI RAA model development and results, including the Co-Permittee specific load reduction targets for the amount and type of GSI are detailed in the Phase II RAA Report (Appendix B).

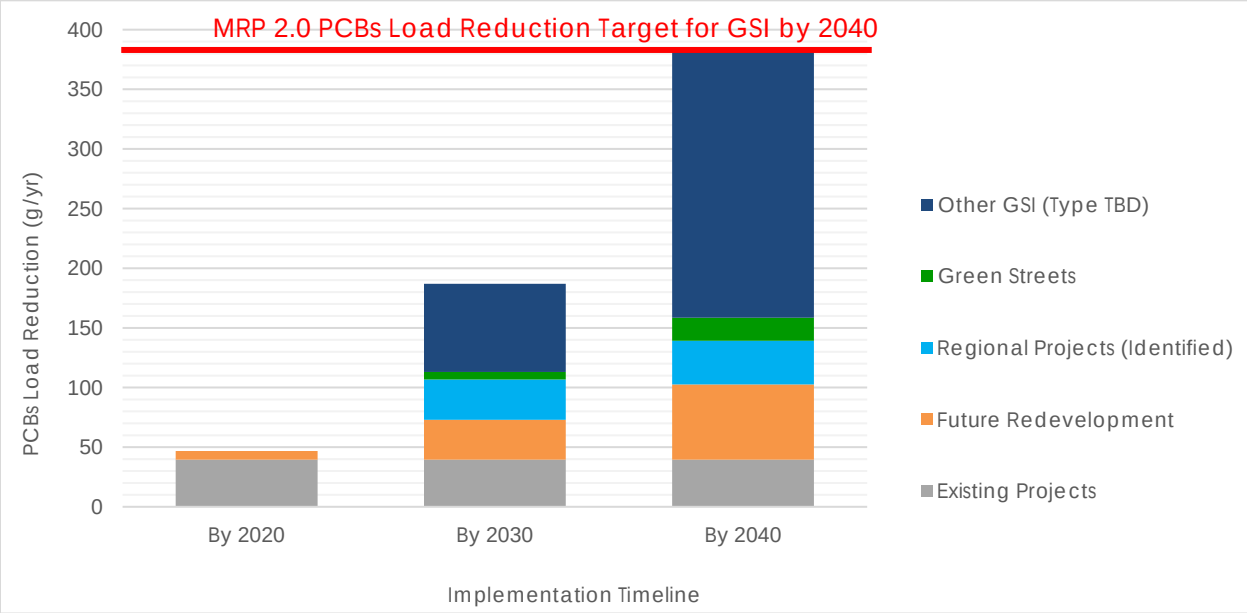

Figure 4-1. Combination of GSI project types predicted to address the MRP 2.0 GSI load reduction target for the Santa Clara Basin.

4.2 Implementation Scenarios for Additional Control Measures

The GSI RAA modeling described in Section 4.1 was primarily conducted to identify the level of GSI implementation that would be needed to achieve the MRP 2.0 GSI load reduction target for the Santa Clara Basin (i.e., 380 g/yr). The GSI modeling was extended beyond the MRP 2.0 target to estimate the extent of additional public GSI projects that would be needed to address the load reduction gaps listed in Table 4-1, which would address the overall PCBs load reduction target within the 2030, 2040 and 2080 implementation timelines. The results of the extended modeling are presented within the context of three conceptual public GSI implementation scenarios. Please note that these scenarios are presented as one type of conceptual implementation approach to achieve the overall PCBs load reduction target for the Santa Clara Basin (i.e., 2,460 g/yr). These conceptual scenarios allow the economic and technical feasibility of each to be evaluated. Alternative implementation scenarios that do not solely rely upon the planning, construction, and maintenance of publicly owned GSI facilities, but will likely attain the PCBs TMDL WLA, are likely possible and should also be further evaluated.

4.2.1 Scenario #1 – Achieve TMDL Load Reduction Target by 2030

For this implementation scenario, the PCBs TMDL WLA would conceptually be achieved by 2030 under the following assumptions regarding the implementation of control measures in the Santa Clara Basin:

1. All source control measures are implemented and load reductions are realized as described in Section 3.0. Only the source controls that are scheduled for implementation by 2030 are included.
2. The construction of GSI facilities due to new development and redevelopment by 2030 will occur as projected in the Phase II RAA Report (Appendix B) and the load reductions described in Section 3.4, Table 3-7 will be realized.
3. After accounting for all load reductions described in #1 and #2 above, the remaining load reduction gap will be addressed via public GSI projects estimated by the GSI RAA model.

Under this scenario, the total PCBs load reduction achieved by 2030 through source controls, existing GSI, and future new development and redevelopment is 1,432 g/yr. The remaining PCBs load reduction gap of 1,028 g/yr would need to be addressed by some combination of public green streets and public regional projects that would treat stormwater from 22,702 acres of impervious surface. This level of GSI implementation between 2020 and 2030 (10 yrs) is roughly 11 times the amount of GSI implementation (nearly 2,000 acres of impervious surface) that occurred in the Santa Clara Basin between 2002 and 2020 (19 years). Most of that GSI implementation (97%) was a result of new development and redevelopment. The control measure implementation for this scenario and the associated load reductions for each type of control measure are illustrated in Figure 4-2 (the first column represents Scenario #1).

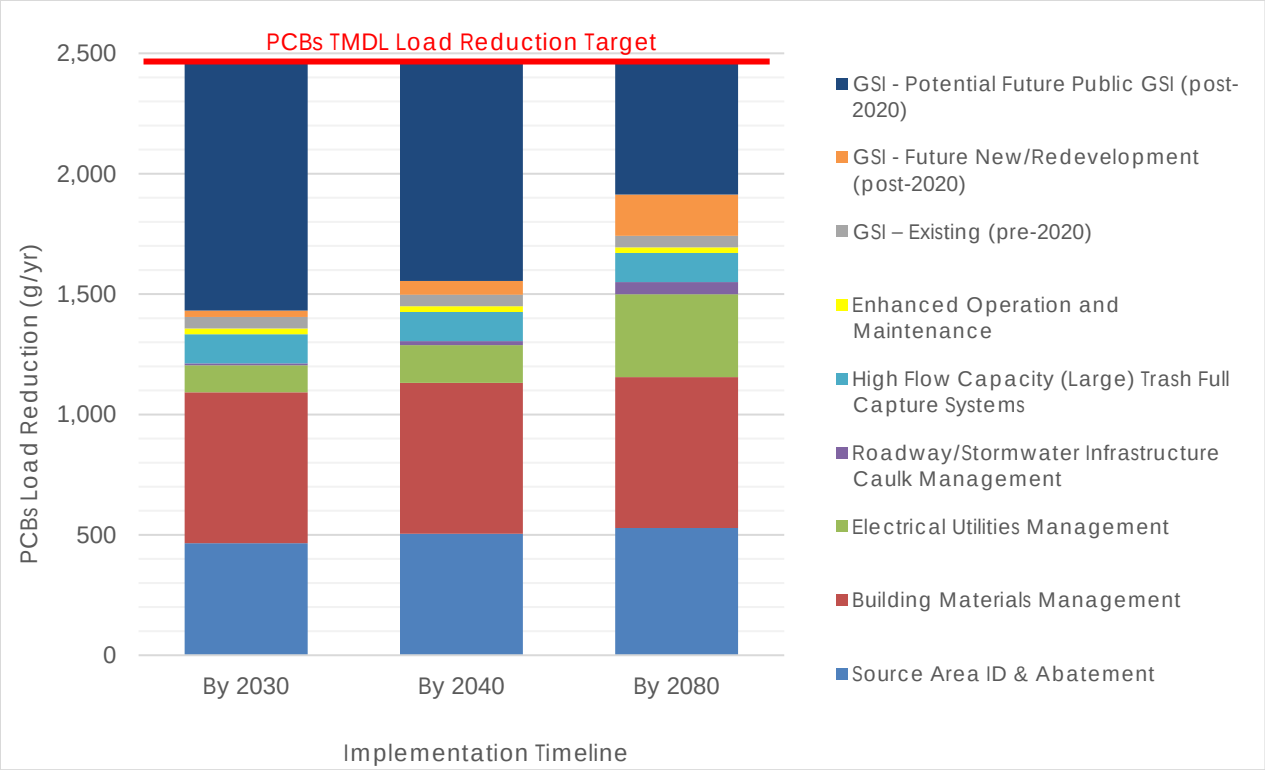

Figure 4-2. Combination of control measures predicted to address the overall PCBs load reduction target for the Santa Clara Basin (i.e., 2,460 g/yr) by 2030, 2040 and 2080.

4.2.2 Scenario #2 – Achieve TMDL Load Reduction Target by 2040

For this implementation scenario, the PCBs TMDL WLA is conceptually achieved by 2040 under the following assumptions regarding the implementation of control measures in the Santa Clara Basin:

1. All source control measures are implemented and load reductions are realized as described in Section 3.0. Only the source controls that are scheduled for implementation by 2040 are included.
2. The construction of GSI facilities due to new development and redevelopment by 2040 will occur as projected in the Phase II RAA Report (Appendix B) and the load reductions described in Section 3.4, Table 3-7 will be realized.
3. After accounting for all load reductions described in #1 and #2 above, the remaining load reduction gap will be addressed via public GSI projects estimated by the GSI RAA model.

The control measure implementation for this scenario and the associated load reductions for each type of control measure are presented in Table 3-8. Under this scenario, the total PCBs load reduction achieved by 2040 through source controls, existing GSI, and future new and redevelopment is 1,554 g/yr. The remaining PCBs load reduction gap is 906 g/yr. The total amount of public GSI that would be needed by 2040 to fill this load reduction gap would involve the treatment of 19,622 acres of impervious surfaces via some combination of public green streets and regional projects. This level of GSI implementation that would need to occur between 2020 and 2040 is roughly ten times the amount of GSI implementation that occurred

between 2002 and 2020 in the Santa Clara Basin. Again, the vast majority of the existing GSI (> 90%) is due to LID on private parcels, not public GSI projects. The control measure implementation for this scenario and the associated load reductions for each type of control measure are illustrated in Figure 4-2 (the second column represents Scenario #2).

4.2.3 Scenario #3 – Achieve TMDL Load Reduction Target by 2080

For this implementation scenario, the PCBs TMDL WLA is achieved by 2080 under the following assumptions regarding the implementation of control measures in the Santa Clara Basin:

1. All source control measures are implemented and load reductions are realized as described in Section 3.0. Only the source controls that can be implemented by 2080 are included in this scenario.
2. GSI due to new development and redevelopment by 2080 occurs as projected in the Phase II RAA Report (Appendix B) and load reductions described in Section 3.4, Table 3-7 are realized.
3. After accounting for all load reductions described in #1 and #2 above, the remaining load reduction gap would be addressed via public GSI projects estimated by the GSI RAA model (Appendix B), extended through 2080.

The control measure implementation for this scenario and the associated load reductions for each type of control measure are presented in Table 3-8. Under this scenario, the total PCBs load reduction achieved by 2080 through source controls, existing GSI, and future new and redevelopment is 1,913 g/yr. The remaining load reduction gap is 547 g/yr. The total amount of public GSI that would be needed by 2080 to address this load reduction gap would involve the treatment of 10,349 acres of impervious surfaces via some combination of public green streets and regional projects. This level of GSI implementation that would need to occur between 2020 and 2080 is roughly 5 times the amount of GSI implementation that occurred between 2002 and 2020 in the Santa Clara Basin. Again, the vast majority of the existing GSI (> 90%) is due to LID on private parcels, not public GSI projects. The control measure implementation for this scenario and the associated load reductions for each type of control measure are illustrated in Figure 4-2 (the third column represents Scenario #3).

4.2.4 Economic and Technical Feasibility of 2030, 2040 and 2080 Scenarios

The MRP requires that Co-permittees identify all technically and economically feasible control measures (including GSI) to attain the TMDL WLAs for urban stormwater runoff. Due to the extent of land area that would need to be addressed via public GSI projects, it is technically infeasible to implement scenarios #1, 2 and 3 as presented above. Technical feasibility is further discussed below, along with an evaluation of economic feasibility. Technical and economic feasibility are primarily based upon the comparison of key features of each conceptual implementation scenario. These key features include the total acres treated or addressed by different types of control measures, the timelines for control measure implementation, and the costs associated with that level of implementation. These features are further discussed below within the context of the current level of control measure implementation and the associated costs for all actions implemented within the Santa Clara Basin since the starting point of the PCBs TMDL (i.e., 2002).

Approach to Cost Estimating

Preliminary planning level cost estimates were developed for each of the control measure scenarios presented in Section 4.2.3. The primary data inputs used to estimate costs were unit costs for each type of control measure, which were based on Bay Area-wide regional averages that were developed through a collaboration among Bay Area Stormwater Management

Agencies Association (BASMAA) member agencies. These average unit costs, listed in Table 4-2, were used to estimate the costs for all control measures, with the exception of potential regional GSI projects identified through the Program's Stormwater Resources Plan (SWRP). For those regional projects, preliminary planning level cost estimates were provided for project concepts that were developed as part of the SWRP or via Co-permittees' GSI Plans (SCVURPPP 2019, City of San Jose 2019). These costs are in 2018 dollars and assumed to represent initial/capital regional GSI project costs, as shown in Table 4-3.

A number of assumptions were applied to the unit and regional project-specific costs for each type of PCBs control measure. First, the capital or initial costs for all GSI projects and source controls are calculated as upfront costs in current (2020) dollars. In reality, these projects will be constructed gradually, over the timeframe specified for achievement of the TMDL WLA (i.e., 2030, 2040 or 2080). Therefore, the total initial/capital costs to construct all GSI projects within a given scenario are divided by the number of years in each scenario's timeframe to provide the annual average cost for GSI project construction for each scenario. The current (2020) annual cost for the O&M that will be required once all GSI projects are fully constructed and operational is also provided for comparison across scenarios. These costs do not account for future inflation or replacement costs for capital projects that have finite lifespans of approximately 20 to 30 years. Finally, these estimates do not include any costs associated with administrative municipal staff time for tracking and reporting source control implementation and associated load reduction accounting.

Because average regional unit costs (see Table 4-2) do not fully represent the actual costs of implementing PCBs control measures, these estimates should be considered preliminary and used to compare costs across scenarios and between existing and projected future costs.

Table 4-2. Regional Average Unit Implementation Costs by Control Measure.

Control Measure Category	Control Measure	Unit of Implementation	Estimated Unit Costs[a]				Reference
			Initial/Capital[b]		Annual Ongoing[c]		
			Cost	Unit	Cost	Unit	
Source Area Identification and Referral	Identify and Refer Source Properties	Acres of old industrial land use area investigated	$382	$/acre	NA	NA	BASMAA 2017b
Green Stormwater Infrastructure (GSI)	GSI - Private/Parcel-based Development/ Redevelopment	Acres treated	$153,000	$/acre	$6,120	$ per acre treated per year	Average value for parcel-based (distributed GSI) from Geosyntec 2018 memo
	GSI - Public ROW Retrofits (Green Streets)	Acres treated	$213,000	$/acre	$8,520	$ per acre treated per year	Geosyntec 2018
	GSI - Regional Projects[d]	Acres treated	$101,000	$/acre	$4,040	$ per project per year	Geosyntec 2018
Full Trash Capture (FTC)	FTC Implementation - Large Devices	Acres treated	$4,500	$/acre	$6,000	$ per device per year	CASQA 2020; City of San Mateo 2019; City of Oakland 2018
	FTC Implementation - Small Devices	Acres treated	$1,000	$/acre	$400	$ per device per year	CASQA 2020; City of San Mateo 2019; City of Oakland 2018
Managing PCBs-containing Materials during Building Demolition		Annual cost			$400	$ per application	BASMAA 2018; Costs are likely recovered through permit fees
PCBs in Infrastructure Management Program		Annual cost	Annual costs to municipalities assumed to be negligible compared with other control measure costs.				
Management of PCBs in Electrical Utility Equipment		Annual cost					

[a] The unit costs are rough planning level estimates provided in 2018 dollars that do not consider net present worth cost adjustments or other complexities.

[b] Initial costs generally include planning, design, capital, and other initial one-time costs.

[c] Ongoing costs include operation & maintenance and other ongoing costs.

[d] The unit cost estimates reported here for Regional Projects were not used to estimate the costs for the 8 identified regional projects in the Santa Clara Basin. Those project costs were estimated based on preliminary planning level cost estimates for project concepts prepared for the SWRP (see Table 4-3).

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Table 4-3. Estimated regional GSI project costs based on project concepts developed for identified potential projects in the Santa Clara Basin.

Potential Regional Project Description	Effective Impervious Area (acres)[a]	Estimated Costs[b]		
		Initial/Capital[c]		Annual Ongoing [c,d]
		Total Initial	$/acre treated	
Kelley Park Disc Golf Course[d]	422	$16,222,000	$38,000	$649,000
River Oaks Pump Station[e]	212	$7,348,000	$35,000	$294,000
Vinci Park[e]	37	$8,771,000	$236,000	$351,000
Fuller Street Park[e]	102	$12,908,000	$126,000	$516,000
Upper Penitencia Creek[e]	82	$13,537,000	$165,000	$541,000
Roy M Butcher Park[f]	189	$12,738,000	$67,400	$510,000
Tully Community Ballfields[f]	280	$17,202,000	$61,400	$690,000
Kelley Park Stables[f]	349	$18,062,000	$51,800	$722,000

[a] Effective Impervious Area is the portion of the impervious area that is hydraulically connected to the storm drain system.

[b] The projects identified in this table are potential projects. The information provided in this table is based on preliminary project concepts. These projects have not been approved and may not be implemented as described in this report. All project costs are provided in 2020 dollars and do not account for future inflation.

[c] Initial costs include planning level costs for design and construction, and do not include "soft" costs for administration and project management.

[d] O&M costs were calculated based on 4% of initial costs.

[e] Project concepts were provided in the SCVURPPP Stormwater Resource Plan (SCVURPPP 2019)

[f] Project concepts were provided in the City of San Jose Green Stormwater Infrastructure Plan (City of San Jose 2019).

Scenario #1 – Achievement of Load Reduction Target by 2030

Table 4-4 summarizes the extent of land area in the Santa Clara Basin addressed by the combination of control measures and the associated costs for implementation of Scenario #1. Of all conceptual scenarios evaluated, Scenario #1 would require the largest expenditure of public resources over the shortest implementation timeline. Stormwater from more than 22,000 acres of impervious surfaces would need to be treated via new public GSI projects. The upfront capital cost associated with this level of new public GSI over the next ten (10) years would be $2.4 billion (in 2020 dollars). This equates to roughly $240 million per year over the next ten (10) years. In addition to capital costs, this level of public GSI implementation would also require the additional expenditure of approximately $96 million annually for the ongoing operation and maintenance of these GSI facilities, once fully implemented. For comparison, this level of GSI implementation would require capital expenditures on public GSI implementation and funding for ongoing annual operation of these systems to increase by nearly 200 times.

Table 4-4. Scenario 1- Estimated SCVURPPP Co-permittee costs to achieve PCBs TMDL WLA by 2030.[a]

Control Measure	Area[b] (acres)	PCBs Loads Reduced by 2030 (g/yr)	Cost Estimates			
			Initial/Capital		Annual Ongoing	
			Existing (pre-2020)	Future	Existing (pre-2020)	Future
Source Controls	25,000	1,357	$76 Million	$1 Million	$1 Million	$1.5 Million
Existing (pre-2020) GSI[c]	1,984	48	$13 Million	--	$0.5 Million	$0.5 Million
Anticipated GSI via New/Redevelopment[c]	1,106	27	--	--	--	--
Additional Public GSI[d]	22,702	1,028	--	$2.4 Billion	--	$96 Million
Totals	50,792	2,460	$89 Million	$2.4 Billion	$1.5 Million	$98 Million

[a] The costs presented are based on average unit costs presented in Tables 4-2 and 4-3 and may not represent actual implementation costs expended by SCVURPPP Co-permittees.

[b] Source controls include all actions as described in Section 3.3 and GSI includes actions described in Sections 3.4 and 4.2. The area addressed by each control measure is determined as follows: 1) source area investigations includes the total area of old industrial land use that was investigated; 2) Full trash capture area treated includes the entire area that drains to a system; 3) GSI projects only include the impervious area treated.

[c] Costs to SCVURPPP Co-permittees associated with the development or redevelopment of private parcels are assumed to be relatively minimal and are therefore not included.

[d] Cost estimates include future potential public green streets and regional projects.

PCB and mercury source controls have an existing cost of approximately $89 million, which would be expected to increase by an additional $1 million over the next ten (10) years of implementation. Ongoing annual costs, which are currently at $1 million would be expected to increase by $500,000 per year as a result of additional source control implementation under Scenario #1.

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Scenario #2 – Achievement of Load Reduction Target by 2040

Table 4-5 summarizes the extent of land area in the Santa Clara Basin addressed by the combination of control measures and the associated costs for implementing Scenario #2. Stormwater from over 19,000 acres of impervious surfaces would need to be treated via new public GSI projects. The upfront capital cost associated with this level of new public GSI over the next twenty (20) years would be $2.1 billion (in 2020 dollars). This equates to roughly $100 million per year over the next twenty (20) years. In addition to capital costs, this level of public GSI implementation would also require the additional expenditure of approximately $84 million annually for the ongoing operation and maintenance of these GSI facilities, once fully implemented. For comparison, this level of GSI implementation would require capital expenditures on public GSI implementation and funding for ongoing annual operation of these systems to increase by over 160 times.

Table 4-5. Scenario 2- Estimated SCVURPPP Co-permittee costs to achieve PCBs TMDL WLA by 2040.[a]

Control Measure	Area[b] (acres)	PCBs Loads Reduced by 2040 (g/yr)	Cost Estimates			
			Initial/Capital		Annual Ongoing	
			Existing (pre-2020)	Future	Existing (pre-2020)	Future
Source Controls	25,000	1,449	$76 Million	$1 Million	$1 Million	$1.5 Million
Existing (pre-2020) GSI[c]	1,984	48	$13 Million	--	$0.5 Million	$0.5 Million
Anticipated GSI via New/Redevelopment[c]	2,361	57	--	--	--	--
Additional Public GSI[d]	19,622	906	--	$2.1 Billion	--	$84 Million
Totals	48,967	2,460	$89 Million	$2.1 Billion	$1.5 Million	$86 Million

[a] The costs presented are based on average unit costs presented in Tables 4-2 and 4-3 and may not represent actual implementation costs expended by SCVURPPP Co-permittees.

[b] Source controls include all actions as described in Section 3.3 and GSI includes actions described in Sections 3.4 and 4.2. The area addressed by each control measure is determined as follows: 1) source area investigations includes the total area of old industrial land use that was investigated; 2) Full trash capture area treated includes the entire area that drains to a system; 3) GSI projects only include the impervious area treated.

[c] Costs to SCVURPPP Co-permittees associated with the development or redevelopment of private parcels are assumed to be relatively minimal and are therefore not included.

[d] Cost estimates include future potential public green streets and regional projects.

Scenario #3 – Achievement of Load Reduction Target by 2080

Table 4-6 summarizes the extent of land area in the Santa Clara Basin addressed by the combination of control measures and the associated costs for implementing Scenario #3. Stormwater from over 10,000 acres of impervious surfaces would need to be treated via new public GSI projects. The upfront capital cost associated with this level of new public GSI over the next sixty (60) years would be $1.2 billion (in 2020 dollars). This equates to roughly $19 million per year over the next sixty (60) years. In addition to capital costs, this level of public GSI implementation would also require the additional expenditure of approximately $47 million annually for the ongoing operation and maintenance of these GSI facilities, once fully implemented. For comparison, this level of GSI implementation would require capital

expenditures on public GSI implementation and funding for ongoing annual operation of these systems to increase by nearly 90 times current levels.

Table 4-6. Scenario 3- Estimated SCVURPPP Co-permittee costs to achieve PCBs TMDL WLA by 2080.[a]

Control Measure	Area[b] (acres)	PCBs Loads Reduced by 2080 (g/yr)	Cost Estimates			
			Initial/Capital		Annual Ongoing	
			Existing (pre-2020)	Future	Existing (pre-2020)	Future
Source Controls	25,000	1,694	$76 Million	$1 Million	$1 Million	$1.5 Million
Existing (pre-2020) GSI[c]	1,984	48	$13 Million	--	$0.5 Million	$0.5 Million
Anticipated GSI via New/Redevelopment[c]	7,063	171	--	--	--	--
Additional Public GSI[d]	10,349	547	--	$1.2 Billion	--	$47 Million
Totals	44,396	2,460	$89 Million	$1.2 Billion	$1.5 Million	$49 Million

[a] The costs presented are based on average unit costs presented in Tables 4-2 and 4-3 and may not represent actual implementation costs expended by SCVURPPP Co-permittees.

[b] Source controls include all actions as described in Section 3.3 and GSI includes actions described in Sections 3.4 and 4.2. The area addressed by each control measure is determined as follows: 1) source area investigations includes the total area of old industrial land use that was investigated; 2) Full trash capture area treated includes the entire area that drains to a system; 3) GSI projects only include the impervious area treated.

[c] Costs to SCVURPPP Co-permittees associated with the development or redevelopment of private parcels are assumed to be relatively minimal and are therefore not included.

Comparison of 2020, 2030 and 2080 Implementation Scenarios

Each implementation scenario described in this section that would conceptually address the PCBs load reduction gap to achieve the PCBs TMDL WLA for the Santa Clara Basin would require a massive increase to current funding levels to support the construction and operation of public GSI in the Santa Clara Basin.

Scenario #1 has the largest PCBs load reduction gap (1,028 g/yr) and implementation costs primarily because of the implementation timeline (10 years) not providing the time for source controls to reach their maximum load reduction potential and reducing the timeframe to account for GSI via future redevelopment, both of which have minimal costs to SCVURPPP Co-permittees. To fill the load reduction gap under Scenario #1, public GSI projects would need to address over 22,000 acres of impervious land area, roughly three (3) orders-of-magnitude greater than currently addressed by public GSI in the Santa Clara Basin and at a rate that is more than 10 times the rate of private redevelopment across the Basin during the past decade. This rate of public GSI implementation, given the amount of labor and technical resources that would be required to site, design, and construct these projects, is technically infeasible to implement. The capital expenditure of an estimated $2.4 billion, or the equivalent of $240 million each year for the next ten (10) years, also makes this scenario economically infeasible to implement. Therefore, Scenario #1 is considered neither technically nor economically feasible.

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Compared with Scenario #1, Scenario #2 has a smaller load reduction gap of 906 g/yr due to the additional load reduction achieved via source controls and the additional ten (10) years of GSI implementation through private redevelopment. That said, Scenario #2 would also require the treatment of a significantly large amount impervious area (~19,000 acres) over a relatively short timeline of twenty (20) years, which makes this scenario also technically infeasible for the same reasons discussed under Scenario #1. Additionally, the costs to design and construct 19,000 acres of GSI projects within 20 years is an estimated $2.1 billion, with an average annual cost of approximately $100 million per year. Again, the amount of resources needed to accomplish this level of public GSI implementation is neither technically nor economically feasible to implement.

Scenario #3 has the smallest load reduction gap across the three (3) scenarios, at 547 g/yr. The main advantages of this scenario are that: (1) all of the source control programs identified in Section 3.3 are expected to reach their full maturity (i.e., maximum load reduction potential) by 2080; (2) sixty (60) years of GSI implemented via private redevelopment contributes substantial load reduction; and (3) the extended timeline provides additional time needed to further identify PCB source areas and identify, plan, design and construct multi-beneficial public GSI projects that are not only focused on PCBs (and mercury) but provide other environmental benefits as well. The combined load reduction that could be achieved through source controls and private redevelopment by 2080 is nearly 2 kg/yr, or approximately 80% of the total load reduction needed to achieve the TMDL WLA in the Santa Clara Basin. The remaining load reduction gap, however, would still require public GSI projects to assist with addressing over 14,000 acres at a cost of $1.2 billion in capital expenditures. With the 60-year timeframe, however, annual costs are reduced to approximately $19 million per year, which is well beyond the current levels of expenditures for public GSI project in the Santa Clara Basin, but somewhat closer to a more realistic approach to public GSI implementation. Although the annualized costs for Scenario #3 are 5 to 12 times less than those for Scenarios #1 and #2, the costs are more than 90 times higher than current levels, and therefore are not likely economically feasible for Co-permittees in the Santa Clara Basin to fund. This level of funding requires significant assistance from partner agencies and other responsible entities.

4.2.5 The Need for Other Entities to Participate in PCBs Control Measure Implementation

New public GSI projects, as demonstrated in each of the control measure implementation scenarios presented in Section 4.2.4, are a major component of scenarios to achieve the PCBs load reduction target in the Santa Clara Basin over time. Other scenarios may include the implementation of control measures by other entities (e.g., Caltrans, Public Schools, and Industrial General Permittees) in the Basin that are subject to existing and future NPDES permits or WDRs, as well as other entities that are not currently subject to NPDES permits (e.g., private railroads and electrical utilities). As illustrated in Table 2-1, land areas associated with these entities contribute a substantial portion (i.e., 26%) of the PCBs load to the Bay from urban stormwater runoff in the Santa Clara Basin.

Many of the existing and planned control measures described in this Control Measures Plan overlap into land areas owned or operated by these entities, and therefore a portion of the PCBs load from these areas is (or is planned to be) addressed through the expenditure of SCVURPPP Co-permittee resources. This is especially true for stormwater treatment systems that address PCBs from hundreds of acres of land (e.g., high capacity full trash capture systems and regional GSI projects), including those associated with non-MRP entities. However, PCBs loads from these and other land areas that are currently not addressed via NPDES stormwater permits or WDRs (e.g., railroads) continue to be an important source of PCBs to the Bay.

The need for SCVURPPP Co-permittees to plan, construct and maintain public GSI projects presented in Section 4.2.4 must be significantly reduced through participation of other entities who are also responsible for PCBs loads to urban stormwater in the Santa Clara Basin. The Regional Water Board (or other appropriate regulatory agency) should engage these entities The improved management of PCBs-containing equipment/materials and the enhanced containment of sediment/soils on properties owned and operated by these entities would result in PCBs load reductions at a significant cost-savings compared to Co-permittees addressing PCBs further "downstream" through GSI constructed in the public ROW, and maintained in perpetuity by municipalities through the use of limited local public agency funds.

4.3 Potential Significant Environmental Impacts of Control Measure Implementation

The California Environmental Quality Act (CEQA) establishes requirements and procedures for state and local agency review of the environmental effects of projects proposed within their jurisdictions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of their decisions. The applicable statutes are contained in California Public Resources Code, Sections 21000 - 21189, and Title 14 CCR, Division 6, Chapter 3, Sections 15000 – 15387.

CEQA applies to all California public agencies that carry out or approve projects. CEQA compliance is only required if a lead agency is considering approval of a proposed "project." The distinction between the normal and the specific CEQA meaning of "project" is very important, as it can determine whether an action is subject to CEQA compliance or not. Section 15378 of the State CEQA Guidelines provides the following definition of a project:

- "Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is any of the following:
    a. An activity directly undertaken by a public agency including but not limited to public works construction and related activities clearing or grading of land, improvement to existing public structures, enactment and amendment of zoning ordinances, and the adoption and amendment of local General Plans or elements thereof pursuant to Government Code Sections 65100-65700.
    b. An activity undertaken by a person which is supported in whole or in part through public agency contacts, grants subsidies, or other forms of assistance from one or more public agencies.
    c. An activity involving the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

CEQA requires the preparation of an Initial Study to determine if a project may result in significant effects on the environment. If there is substantial evidence in the record that supports a fair argument that significant effects may occur, an Environmental Impact Report will be prepared. A Negative Declaration or Mitigated Negative Declaration must be prepared if there is no substantial evidence that the project may have a significant effect on the environment, or if revisions to the project would avoid or mitigate the effects, resulting in the finding of no significant effects.

The CEQA Guidelines stipulate that a public agency shall prepare or have prepared a proposed Negative Declaration or Mitigated Negative Declaration for a project subject to CEQA when:

- The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or
- The initial study identifies potentially significant effects, but:
    - Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and
    - There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment.

CEQA requires that reasonable alternatives to implement a proposed project should be considered during the planning process and potential environmental effects should be included in the evaluation of the project. CEQA also requires state and local agencies to disclose and consider the environmental impacts of their actions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of the implementation of their action.

This Control Measure Plan is statutorily exempted under Public Resources Code (California Administrative Code Sec. 15262 et seq.) because it involves feasibility or planning studies for possible future actions that the Permittees have not approved or adopted. Any future projects that are to be constructed as recommended by this Plan will either be determined to be exempt from CEQA or an initial study to determine potential environmental impacts will be prepared. In general, this Control Measure Plan has been determined to have no potential to generate significant adverse impacts to the environment, but instead will lessen adverse water quality impacts through reducing loads of PCBs and mercury into the Bay.

5 Control Measure Tracking and Reporting

Tracking and reporting on PCBs and mercury control measure implementation in the Santa Clara Basin is an important component of demonstrating progress towards the achievement of TMDL WLAs over time. SCVURPPP initiated a tracking and reporting process beginning in 2016. Annual updates are provided by Co-permittees on control measures that began or were enhanced starting from 2002 onward (i.e., after the mercury and PCBs TMDLs were established) and are compiled at the Basin-level, via spreadsheets. The Program used this information to geo-locate any GSI projects or location-specific controls (e.g., full trash capture systems) and created geographic information system (GIS) files to display the GSI projects and/or locations of other control measures on maps. The Program also used this information to calculate PCBs and mercury load reductions, consistent with the Interim Accounting Methodology for TMDL Loads Reduced, per MRP 2.0 requirements (BASMAA 2017a). Beginning with the FY 16-17 Annual Report and continuing through FY 18-19, the Program prepared a Control Measures Plan that was updated and submitted each year as an attachment to the Program's Annual Report (SCVURPPP 2016b, 2017, 2018b, 2019b). The Control Measures Plans reported information on the extent of implementation throughout the Basin and the associated PCBs and mercury load reductions achieved during the permit term. The information reported included the extent of current and planned GSI facilities and other control measures and the associated load reductions achieved to-date through the implementation of all PCBs and mercury control measures in the Santa Clara Basin.

Early in FY 17-18, SCVURPPP identified the need for a more sophisticated mechanism for tracking and mapping GSI facilities and other stormwater treatment measures in the Santa Clara Basin. To accommodate this need, the Program began developing a new web-based data management system with a connection to its GIS platforms for tracking and mapping the extent of GSI and other stormwater treatment implementation, and reporting PCBs and mercury load reductions for all facilities in the Santa Clara Basin. The primary goals of the data management system include the following:

- Provide a centralized, accessible platform for Co-permittee staff to efficiently collect, upload, and store data associated with GSI and other stormwater treatment facilities;
- Assist the tracking and mapping of all completed projects in the Santa Clara Basin;
- Enhance the Program's ability to efficiently and confidently calculate and report water quality benefits associated with GSI and other stormwater treatment controls; and
- Allow the information about GSI facilities and other stormwater treatment controls to be publicly available in a more user-friendly manner.

Development of the new information management system began in FY 17-18. SCVURPPP initially released Version 1.0 of the SCVURPPP GSI Database in spring 2019 to Co-permittees. This version of the SCVURPPP database focused exclusively on tracking and mapping GSI facilities. The Program produced a technical guidance manual to accompany the release of the new database, which provides users with detailed guidance on how to use the online database, including the uploading of information about specific GSI projects.

In June 2019, the Program held a training webinar on the use of the new GSI database for all Co-permittees. Co-permittees began using the new GSI database for reporting on GSI project updates and associated PCBs and mercury load reductions starting in summer 2019.

Over the past year, the Program has continued to update and revise the database to also include other types of stormwater treatment controls (e.g., full trash capture systems). The system, initially referred to as the "GSI Database" has been renamed the "Stormwater Treatment

Measure Data Portal" to reflect the broader goals of the system. Current efforts are underway to incorporate other types of stormwater treatment controls into the database, including full trash capture systems, and to provide public access to maps and other information in the database. Public access to the new "Stormwater Treatment Measure Data Portal" is expected in the fall of 2020.

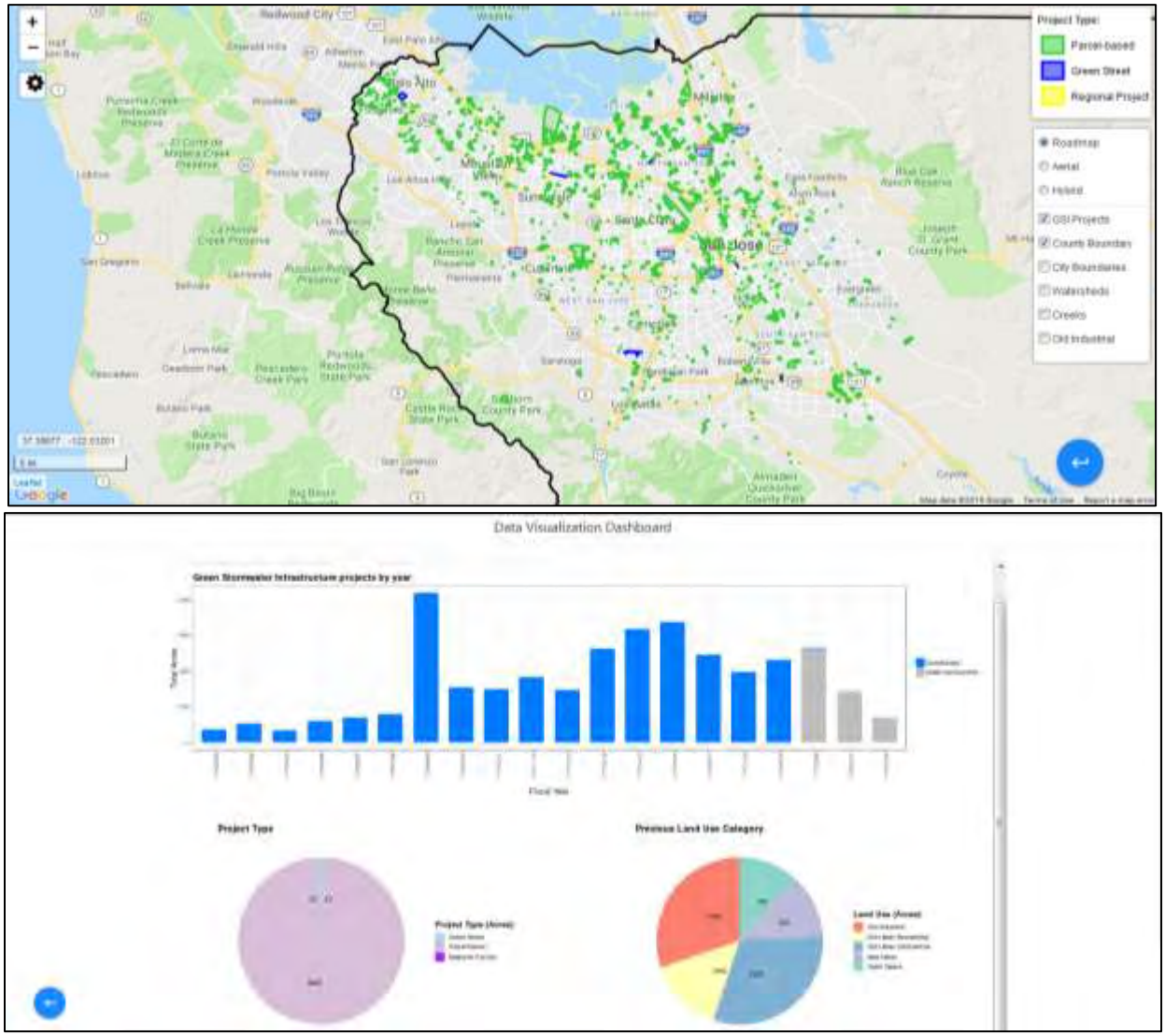

Figure 5-1. **Screenshots of SCVURPPP's** Stormwater Treatment Measure Data Portal **–** a map illustrating the extent of GSI currently constructed in the Santa Clara Basin (above) and a dashboard with tracking and reporting metric graphs (below).

6 Summary of Findings and Adaptive Management

6.1 Summary of Planned Control Measure Implementation

This Control Measures Plan and Reasonable Assurance Analysis (RAA) describes the planned implementation actions and schedule to achieve the PCBs and Mercury TMDL Waste Load Allocations (WLAs) for urban stormwater runoff in the Santa Clara Basin, in compliance with Provisions C.11/12.c and C.11/12.d of the MRP. The control measures described build upon the foundational set of actions that have been implemented by SCVURPPP Co-permittees over the past two decades to reduce the impacts of these legacy pollutants on the San Francisco Bay.

Refined baseline modeling described in Section 2.0 indicates that a load reduction of 2,460 g/yr for PCBs is needed in the Santa Clara Basin to achieve the PCBs TMDL WLA. The mercury TMDL WLA appears to have already been achieved, although there is a relatively high degree of uncertainty in the modeling results for mercury, due to the limited information on land-use specific mercury concentrations.

SCVURPPP Co-permittees are dedicated to implementing a set of scientifically sound and fiscally responsible control measures to address PCBs and mercury in urban stormwater runoff from the Santa Clara Basin. The technically and economically feasible source control measures, mostly focused on PCBs, that are outlined in this Control Measures Plan for the set of actions that Co-permittees currently plan to implement to address the PCBs and mercury TMDLs include:

- Source Area Identification and Abatement
- PCBs in Building Materials Management
- PCBs in Electrical Utilities Management
- PCBs in Roadway and Storm Drain Infrastructure Caulk Management
- High Flow Capacity (Large) Full Trash Capture Systems
- Enhanced Operation and Maintenance Controls
- Mercury Load Avoidance

This set of controls is consistent with the expectations recently discussed with Regional Water Board staff for non-GSI source control implementation via the MRP that is scheduled for reissuance in 2021.

These source controls will be coupled with the implementation of GSI via requirements for new development and redevelopment projects described in the MRP, and the ongoing implementation of each Co-permittee's GSI Plans, which were submitted to the Regional Water Board in 2019 and are intended to guide public GSI implementation in the Santa Clara Basin over time. Together, source controls and GSI are predicted to significantly reduce the levels of PCBs (and mercury) entering the Bay from urban stormwater runoff in the Santa Clara Basin. Although there is inherent uncertainty in predicting load reductions, the following level and pace of progress towards reaching the PCBs load reduction target (i.e., 2,460 g/yr, as reported previously in Table 3-8)as a result of implementing this comprehensive set of control measures is anticipated to be:

- 58% by 2030;
- 63% by 2040; and
- 78% by 2080.

Based on the modeling and control measure scenarios described in this Control Measures Plan, additional actions to reduce PCBs will be needed to achieve the WLA. As described, this may include the construction of additional GSI facilities. The reliance on public GSI facilities to solely

address the remaining load reduction needed to achieve the PCBs WLA for urban stormwater runoff in the Santa Clara Basin, however, is neither a technically nor economically feasible approach to achieve the load reduction target by 2030, 2040 or 2080. That said, SCVURPPP Co-permittees are dedicated to the continued identification and implementation of cost-effective public GSI projects that are focused on achieving multiple environmental benefits, including stormwater quality. As demonstrated in the Stormwater Resource Plan (SWRP) for the Santa Clara Basin (SCVURPPP and Valley Water, 2019) and each Co-permittee's GSI Plan, SCVURPPP Co-permittees envision the ongoing implementation of publicly owned and operated GSI facilities in the Santa Clara Basin over time. These efforts will supplement the PCBs and mercury load reductions as a result of the implementation of source controls and the construction of GSI facilities via MRP new development and redevelopment requirements.

6.2 Uncertainties and Adaptive implementation

The refined baseline urban stormwater loading estimates and estimated load reductions associated with source controls and GSI presented in this Control Measures Plan are based on the most readily available information on pollutant sources and pathways and the pollutant removal effectiveness of these control measures. Although significant resources have been spent collectively over the past two decades on collecting and interpreting these data, significant information gaps continue to create uncertainties in our collective ability to track progress towards pollutant load reduction goals and attainment of TMDL WLAs. These uncertainties should be acknowledged and over time be reduced to the extent practicable, so that reasonable decisions on investments in control measure implementation can be made.

To support the reasonable and cost-effective implementation of control measures to address PCBs (and mercury) in urban stormwater, investments in control measures by local public agencies should be informed by the level of uncertainty associated with the effectiveness of the actions being proposed. The control measures outlined in this plan are informed by the current level of knowledge and uncertainties present, to form a set of technically feasible and cost-effective actions that Co-permittees can implement with the appropriate level of confidence that is needed to ensure that the actions will have a positive impact on stormwater quality. Control measure implementation will be adaptively managed by SCVURPPP Co-permittees over time, based on new information regarding PCBs sources and source areas, and the costs and effectiveness of controls. This adaptive management approach is consistent with the PCBs and mercury TMDLs, in which adaptive management for urban stormwater runoff is explicitly discussed with the expectation that information on the technical feasibility, effectiveness and cost-efficiency of control measures will evolve over time (SFBRWQCB 2006, 2008). As such, SCVURPPP Co-permittees intend to continue collecting and evaluating information on the PCBs and mercury levels in stormwater runoff and the technical feasibility and cost-effectiveness of various stormwater controls. Based on this information, Co-permittees plan to update this Control Measures Plan on a timeframe consistent with MRP requirements.

6.3 Request for Review and Revision of the TMDLs

Although uncertainties remain regarding many aspects of the PCBs and mercury TMDLs and the information used to refine baseline urban stormwater loads and calculate load reductions to-date and those predicted to occur in the future, one thing has become clear as a result the development of this Control Measures Plan – the 2030 schedule for attainment of the PCBs TMDL WLAs for urban stormwater runoff in the Santa Clara Basin cannot be achieved through the implementation of technically and economically feasible control measures. Therefore, SCVURPPP Co-permittees, through the submittal of this Control Measures Plan, are formally requesting that the Regional Water Board review and revise the schedule for attainment of the WLAs for urban stormwater runoff in the TMDLs. This request is consistent with the PCBs and

Mercury TMDLs, which explicitly state that a review and revision of the load reduction expectations for urban stormwater runoff will be conducted during the term of the third implementing NPDES permit, which is tentatively scheduled to begin in 2021 (SFBRWQCB 2006, 2008). SCVURPPP Co-permittees plan to participate in this review and revision process and to the extent that resources are available, provide support to the Regional Water Board on this task.

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Appendix A

Phase I RAA – Baseline Modeling Report

Santa Clara Basin Reasonable Assurance Analysis Addressing PCBs and Mercury:

Phase I Baseline Modeling Report

Prepared for:

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Prepared by:

PARADIGM
ENVIRONMENTAL

SEPTEMBER 30, 2020

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EXECUTIVE SUMMARY

This report provides a summary of the methods and modeling approaches used to represent baseline hydrology and sediment, Polychlorinated Biphenyls (PCBs), and mercury loads resulting from municipal stormwater discharges within the Santa Clara Basin to San Francisco Bay. This baseline model supports the first step in preparation of a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed control measures will result in sufficient load reductions of PCBs and mercury to meet Total Maximum Daily Load (TMDL) wasteload allocations assigned to municipal stormwater discharges to San Francisco Bay. The report documents the major steps, decisions, and assumptions made in the model development process. The report also provides documentation of model performance and calibration results based on local data. This documented calibration is critical to ensuring that the baseline model reliably captures the watershed characteristics and conditions and is sufficient for estimating pollutant loads and calculating pollutant reduction goals assigned to control measures to support implementation of TMDLs.

The hydrologic and water quality model selected for the baseline model of Santa Clara Basin watersheds was the Loading Simulation Program in C++ (LSPC), a watershed modeling system that includes Hydrologic Simulation Program FORTRAN (HSPF) algorithms for simulating watershed hydrology, erosion, water quality processes, and in-stream fate and transport processes. The model can simulate upland loading and transport of sediment, mercury, and PCBs. The model was configured based on the best available spatial and monitoring datasets to represent the land, meteorological, hydrological, and pollutant loading characteristics of Santa Clara Basin watersheds. Based on criteria established by the *Bay Area Reasonable Assurance Analysis Guidance Document* (BASMAA 2017), the baseline hydrology and pollutant loading model was demonstrated to be sufficiently calibrated and validated and acceptable for estimation of existing loads of mercury and PCBs, comparison to TMDL wasteload allocations, and determination of necessary load reductions to support the planning of control measures.

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Acronyms

ABAG	Association of Bay Area Governments
AGWO	Active Groundwater Outflow
BAHM	Bay Area Hydrology Model
BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
BMP	Best Management Practice
Caltrans	California Department of Transportation
CIMIS	California Irrigation Management Information System
DCIA	Directly Connected Impervious Area
DEM	Digital Elevation Model
ECHO	Enforcement and Compliance History Online
EIA	Effective Impervious Area
EMC	Event-Mean Concentration
EPA	Environmental Protection Agency
ET	Evapotranspiration
FTABLE	Functional Table (Model Rating Curve)
GHCN	Global Historical Climatology Network
GIS	Geographic Information Systems
GSI	Green Stormwater Infrastructure
Hg	Mercury
HRU	Hydrologic Response Units
HSG	Hydrologic Soil Group
HSPF	Hydrologic Simulation Program–FORTRAN
IFWO	Interflow Outflow
IGP	Industrial General Permit
LSM	Land Surface Models

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LSPC	Loading Simulation Program in C++
MIA	Mapped Impervious Area
MRP	Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
NED	National Elevation Dataset
NHD	National Hydrography Database
NLCD	National Land Cover Database
NLDAS2	North American Land Data Assimilation System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NOAA	National Oceanic and Atmospheric Administration
PCBs	Polychlorinated Biphenyls
PEVT	Potential Evapotranspiration
POI	Points of Interest
PRISM	Parameter-elevation Regressions on Independent Slopes Model
QAPP	Quality Assurance Project Plans
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SCVWD	Santa Clara Valley Water District
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSURGO	Soil Survey Geographic Database
STATSGO	State Soil Geographic Database
STLS	Small Tributaries Loading Strategy
SWRCB	State Water Resources Control Board
TAET	Total Actual Evapotranspiration
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WLA	Waste Load Allocation
WMMS	Watershed Management Modeling System
WY	Water Year

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1 INTRODUCTION

The Municipal Regional Stormwater Permit (MRP) requires Bay Area cities and counties to develop Green Stormwater Infrastructure (GSI) Plans (Provision C.3) and PCBs and Mercury Control Measure Implementation Plans (Provisions C.11 and C.12) that provide the necessary pollutant load reductions to meet Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) over specified compliance periods. A key component of these plans is a Reasonable Assurance Analysis (RAA) to quantitatively demonstrate that proposed control measures will result in enough load reductions of PCBs and mercury to meet WLAs for municipal stormwater discharges to San Francisco Bay. The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) has initiated a county-wide effort to develop an RAA to estimate baseline PCB and mercury loads to the Bay, determine load reductions needed to meet WLAs, and set goals for the amount of GSI needed to meet the portion of PCB and mercury load reduction set as a goal for GSI in the MRP (SFBRWQCB 2015).

In 2017, the U.S. Environmental Protection Agency (EPA) Region 9 released *Developing Reasonable Assurance: A Guide to Performing Model-Based Analysis to Support Municipal Stormwater Program Planning* (EPA RAA Guide) (USEPA 2017), which provides guidance on the technical needs of the RAA and considerations for model selection. Building upon the EPA RAA Guide, the Bay Area Stormwater Management Agencies Association (BASMAA) prepared the *Bay Area Reasonable Assurance Analysis Guidance Document* (Bay Area RAA Guidance) (BASMAA 2017) to provide specific guidance on modeling to support RAAs performed in the Bay Area to meet MRP requirements, address TMDLs for PCBs and mercury, and support GSI planning. The EPA RAA Guide and Bay Area RAA Guidance both outline essential steps for performing an RAA, as depicted in Figure 1-1. The purpose of this memorandum is to document the first phase of the RAA, which includes development of a baseline hydrology and water quality model to address the first three steps of the RAA outlined in the USEPA RAA Guide and Bay Area RAA Guidance. These steps include:

1. **Designation of the Area Addressed by the Analysis**: As the RAA associated with GSI plans is developed in the context of the MRP and WLAs assigned to municipal stormwater discharges to the Bay, the area where it is applied is typically specific to urban areas within municipal jurisdictions addressed by the MRP. The first step in the designation of the area addressed by RAA is the delineation of watersheds and smaller "subwatersheds" that provide spatial resolution of model-predicted hydrology and characterization of the Santa Clara Basin stormflows discharged to the Bay. The RAA area of analysis was further refined to designate areas addressed by the WLAs assigned to municipal urban stormwater runoff (MRP areas), other National Pollutant Discharge Elimination System (NPDES) permitted areas, and open space or areas upstream of impoundments or reservoirs that are not addressed by the RAA or WLAs.
2. **Characterization of Existing Conditions**: Critical to the RAA is careful characterization of stormwater pollutant loads or flows under existing baseline conditions (average water year 2002). This understanding serves as the foundation of the RAA and identifies the starting point for planning management actions. The first step in the characterization of existing conditions is the representation of baseline hydrology and water quality. This report provides documentation of the development of the baseline model to represent hydrology and water quality and estimate Santa Clara Basin PCB and mercury loads to the Bay.
3. **Determination of Stormwater Improvement Goals**: Based on the area of analysis (Step 1), characterization of baseline hydrology and PCB and mercury loads (Step 2), and through comparison with TMDL WLAs for PCBs and mercury, goals can be determined in terms of the amount of pollutant load reduction to attain the WLAs assigned to the Santa Clara Basin.

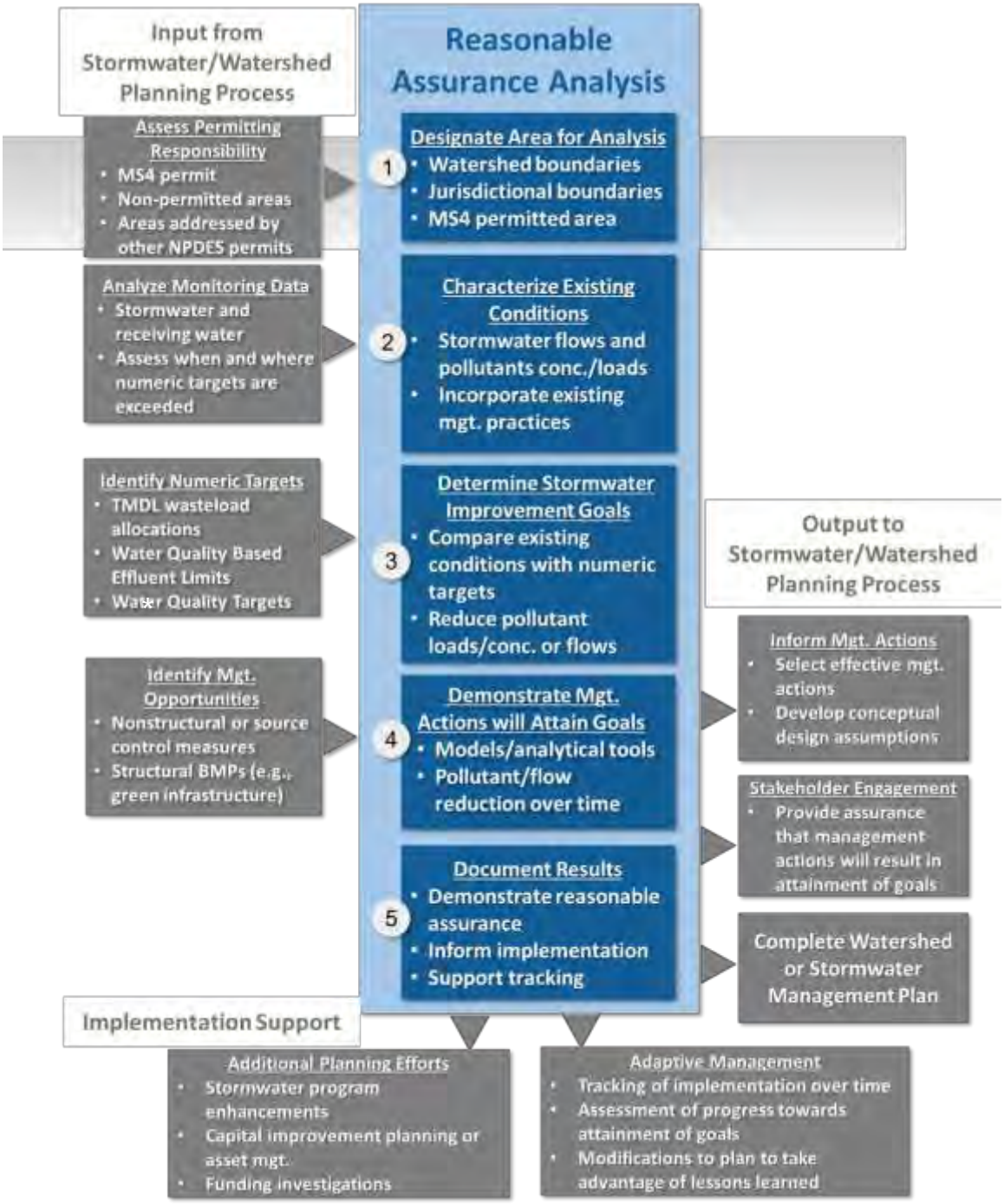

Figure 1-1. Reasonable Assurance Analysis process flow chart (USEPA 2017).

This report provides a summary of the methods and modeling approaches used to represent baseline PCB and mercury loads discharged to San Francisco Bay from the Santa Clara Basin (RAA Step 2) and the estimate of the PCB and mercury load reductions needed to achieve the TMDL WLA assigned to urban stormwater runoff in the Santa Clara Basin (Step 3). The report provides the necessary documentation of model performance for predicting water quality and validation results based on methods consistent with the Bay Area RAA Guidance. The water quality modeling approach utilizes

methods developed for the Regional Watershed Spreadsheet Model (RWSM) by the San Francisco Estuary Institute (SFEI) for assigning PCB and mercury runoff concentrations (Wu et al. 2017) in combination with methods included within LSPC for simulating hydrology and sediment loads, which allows for estimation of PCB and mercury loads associated with various land uses within the Santa Clara Basin. The Bay Area RAA Guidance states that "if RWSM is used to represent pollutant concentrations or loads, this calibration is assumed to be conducted as part of the RWSM process," and "if sufficient concentration and loading data are available, these data should be used as part of model validation." The report documents the major steps, decisions, and assumptions made in the model development process.

2 OVERVIEW OF THE BASELINE MODELING APPROACH

The model development process can be a good platform for gaining valuable information and insight about the system. If well-designed, the model development process is an iterative and adaptive cycle that improves understanding of the system over time as better information becomes available. Ultimately a model can inform future data acquisition efforts and management decisions by highlighting factors that have the most impact on the behavior of a natural system. Figure 2-1 is a conceptual schematic of a model development cycle, which is conceptually represented as circular as opposed to linear. That cycle can be summarized in six interrelated steps:

1. **Assess Available Data**: these data are used for source characterization, trends analysis, and defining modeling objectives.
2. **Delineate Project Extent**: model segmentation and discretization needed to simulate stream flows at temporal and spatial scales appropriate for defining instream flow needs at specified Points of Interest (POIs).
3. **Set Boundary Conditions**: spatial and temporal model inputs defining the appropriate hydrologic inputs and outputs.
4. **Model Calibration**: the adjustment of model rates and constants to mimic observed physical processes of the natural system.
5. **Model Validation**: confirmation of model processes and patterns over space and time to assess if the model is a robust predictive tool.
6. **Assess Data Gaps**: Sometimes the nature of modeled responses can indicate the influence of unrepresented physical processes in the modeled system. A well-designed model can be adapted for future applications as new information about the system becomes available. Depending on the study objectives, data gaps sometimes provide a sound basis for further data collection efforts to refine the model, which cycles back to Step 1.

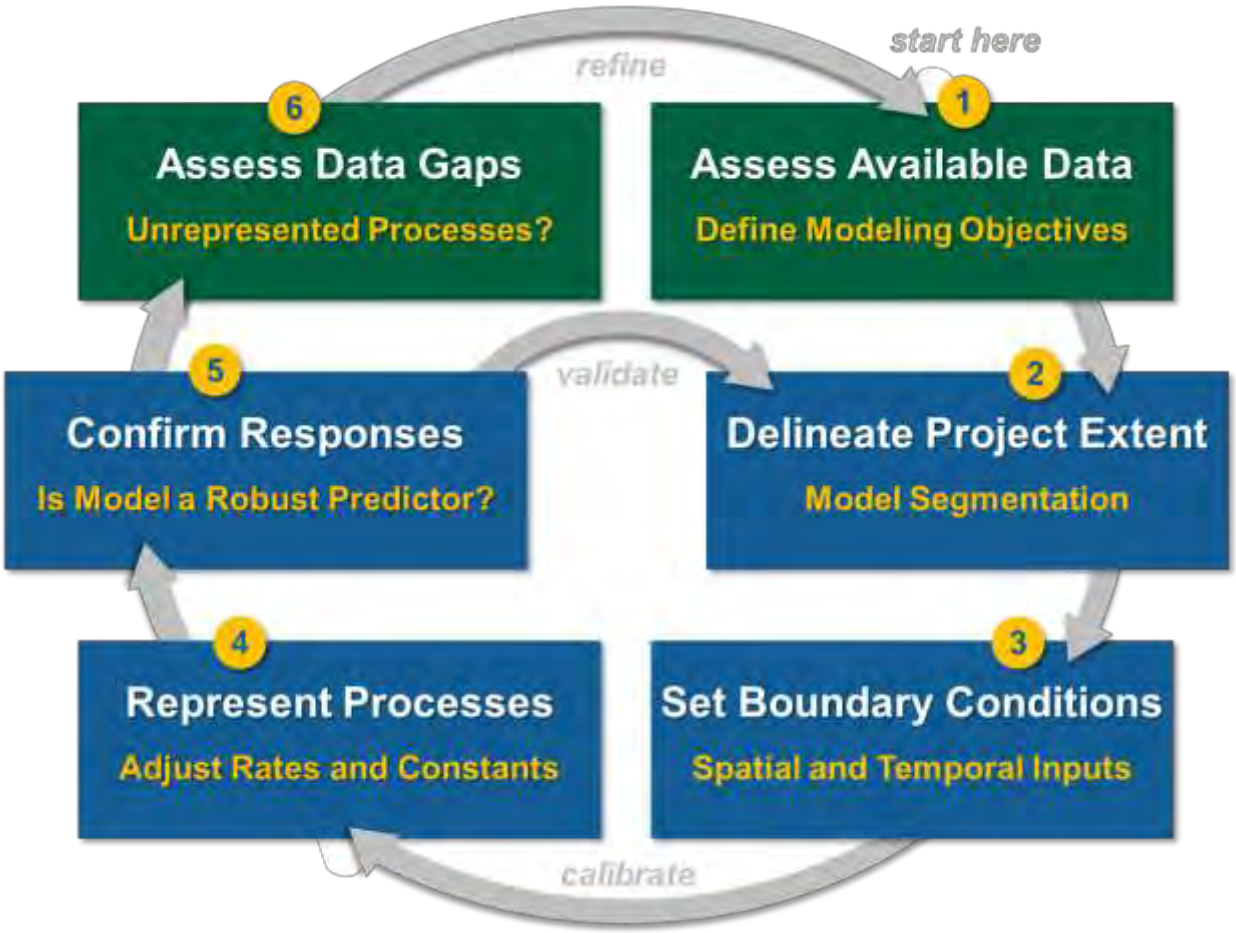

Figure 2-1. Conceptual schematic of a model development cycle.

The hydrologic and water quality model selected for the baseline model of Santa Clara Basin watersheds was the Loading Simulation Program in C++ (LSPC) (Shen et al., 2004), a watershed modeling system that includes Hydrologic Simulation Program FORTRAN (HSPF) algorithms for simulating watershed hydrology, erosion, water quality processes, and in-stream fate and transport processes. The model can simulate upland loading and transport of sediment, mercury, and PCBs.

LSPC is built upon a relational database platform, making it easier to collate diverse datasets to produce robust representations of natural systems. LSPC integrates GIS outputs, comprehensive data storage and management capabilities, the original HSPF algorithms, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the HSPF model with selected additions, such as algorithms to address land use change over time. A recent user's manual for LSPC is available with the Watershed Management Modeling System (WMMS), a large-scale application of LSPC in the Los Angeles, CA Region (http://dpw.lacounty.gov/wmd/wmms/) (LACDPW 2010). Figure 2-2 is a generalized schematic of the underlying hydrology model (Stanford Watershed Model) used in HSPF and LSPC. The schematic represents land-based processes for a single land unit in the model.

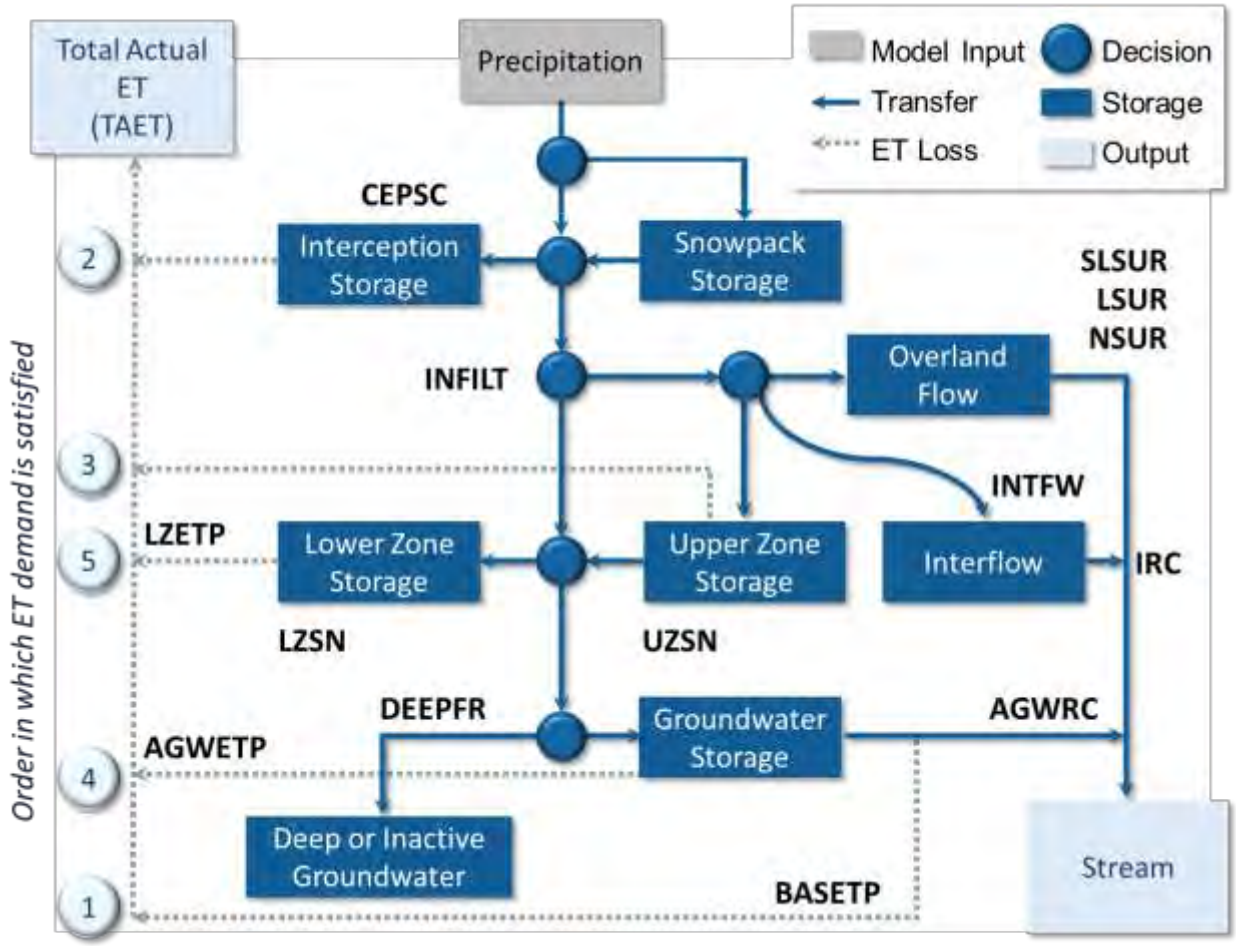

Figure 2-2. Hydrology model schematic (based on Stanford Watershed Model).

Meteorological data are the driver for the modeled hydrologic processes. As shown in the schematic, precipitation is the primary input, while total actual evapotranspiration (TAET) and streamflow are the primary outputs in the water budget. Potential evapotranspiration (PEVT; not explicitly shown in the schematic) is another key meteorological boundary condition for the model. The interaction of model parameters shown above in Figure 2-2 will ultimately determine how much PEVT becomes TAET. There are several pathways that water can take as it makes its way through the network. For each land unit, process-based parameters that reflect differences in geology, soils, vegetation, and land cover will govern the rates and volumes of water at each stage throughout the schematic.

LSPC and HSPF are open-source public-domain watershed models available from EPA and represent the state-of-the science for creating robust models that represent baseline hydrology and water quality. A representative calibrated model becomes the baseline for comparison to scenarios that consider future policies and infrastructure. An important aspect of the application of LSPC to complex hydrologic and water quality issues is the development of an approach that considers available data for model parameterization, model calibration and validation, regulatory requirements, and practical considerations. The approach developed for this RAA combines these important considerations and is consistent with the Bay Area RAA Guidance and EPA RAA Guide. The resulting model, in combination with the Phase II modeling effort described in a companion report (SCVURPPP 2020), will provide a means for identifying and quantifying the load reduction benefits of GSI

implementation options in all locations but will also identify certain locations or activities for prioritized efforts based on benefits versus costs. GSI investment is most cost effective when costs of implementation are relatively low and pollutant load reduction is relatively high. The following provides a description of the baseline modeling approach used for this RAA.

A three-step approach was developed that leverages RWSM methods for representing PCB and mercury concentrations with the LSPC process-based modeling approach (Figure 2-3):

1. The first step entailed applying the calibrated, land-use-based PCB and mercury runoff concentrations from RWSM to estimate long-term average PCB and mercury loads from LSPC. The products of Step 1 are the total loads of PCBs and mercury within the Santa Clara Basin. Using EMCs alone would result in a constant concentration during storm events, which would not be representative of natural processes like first-flush responses.
2. In the second step, the ratio of LSPC-modeled PCB and mercury loads to LSPC-modeled sediment load was used to estimate average PCB and mercury concentrations on suspended sediment, expressed as the mass of pollutant per mass of suspended sediment. The resulting PCB and mercury concentrations on suspended sediment (i.e., potency factors) were then used to simulate pollutant loadings as a function of sediment rather than runoff. Simulating pollutants as a function of sediment allows the model to capture the first-flush effect, dilution of subsequent events, and non-linear variability of loads with storm intensity.
3. Finally, simulated concentrations are calculated in Step 3, which were then compared to observations from the Small Tributaries Loading Strategy (STLS) as validation.

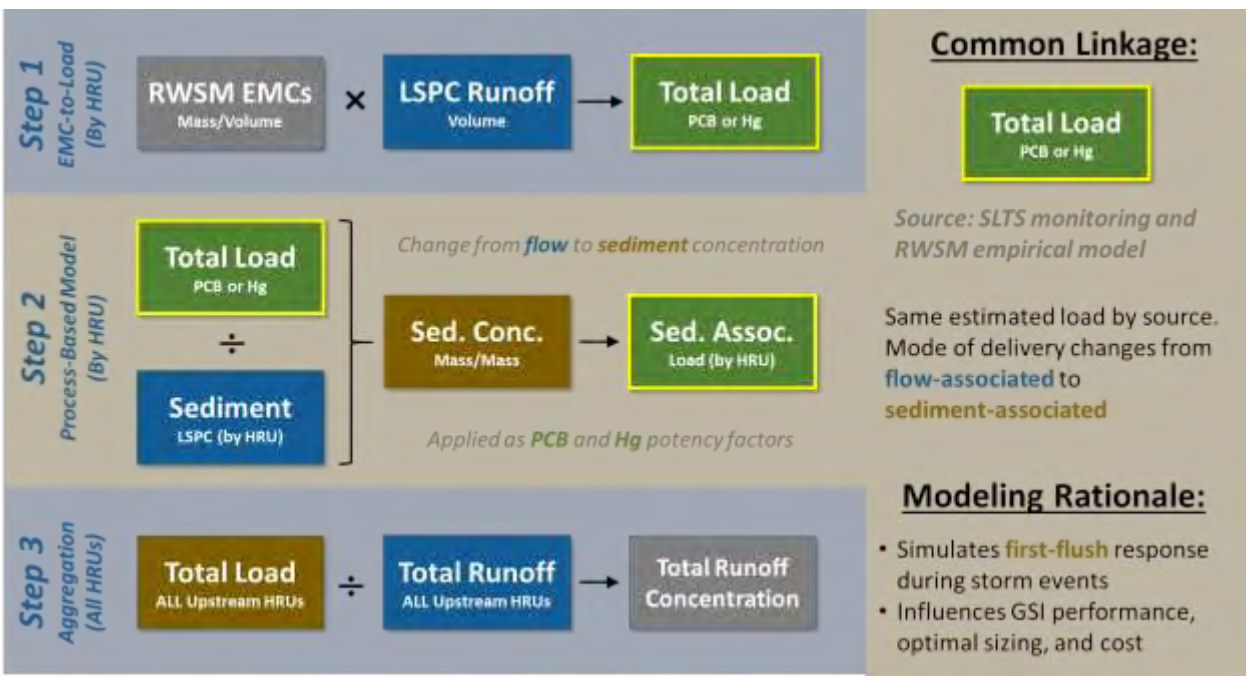

Figure 2-3. Schematic for deriving a process-based, sediment associated modeling approach for PCBs and mercury.

3 WATERSHED DELINEATION

One of the primary requirements in hydrologic model development involves watershed delineation. Identifying watershed boundaries enables modelers to portray specific characteristics of the region's watersheds such as slope, land use, impervious cover, climatic variations, elevation, etc. to inform hydrology of the region. A fine-resolution subwatershed delineation provides increased spatial resolution and model accuracy for predicting hydrologic characteristics within a watershed and allows for routing of flows and associated pollutant loads within each watershed to the Bay. The watershed delineation focused on the Santa Clara Basin, which includes the Coyote Creek and Guadalupe River watersheds and other adjacent watersheds discharging to the Bay. The Uvas and Llagas watersheds were also included in the model because of overlap with the City of San José boundary, but pollutant loads from these areas were not included in results presented since these watersheds do not drain to the Bay.

3.1 Digital Elevation Model (DEM)

A Digital Elevation Model (DEM), or terrain surface, is a raster representing the physical land surface elevation of the watershed. This elevation dataset is critical for analyzing flow direction, natural drainage networks, and for calculating the slope of overland flow. Therefore, the DEM resolution is a key to represent level of detail and accuracy of the data. Two different DEMs were available for representing elevation in the Santa Clara Basin:

- Santa Clara County and City of San José DEM – Derived from high-resolution LiDAR data in 2006 and available at a 1-meter spatial resolution.
- USGS National Elevation Dataset – National coverage of DEMs expressing landscape elevation through a raster grid data product with 30-meter resolution.

Figure 3-1 shows the extent of the 1-meter and 30-meter DEM boundaries. The high-resolution 1-meter DEM covers 45 percent of the Santa Clara Basin primarily within the urban core around the City of San José. Much of the high-resolution coverage falls within the Coyote Creek and Guadalupe River subwatersheds. The 30-meter USGS DEM raster dataset for Santa Clara County area and 1-meter high-resolution DEM for City of San José (derived from high-resolution LiDAR data in 2006) were merged into one raster dataset with 1-meter resolution. Figure 3-2 show the absolute elevation across the entire Santa Clara Basin. Elevation ranges from less than 75 ft along the northern and south western parts of the watershed to over 2,000 ft at the highest peaks along the western and eastern edges of the watershed.

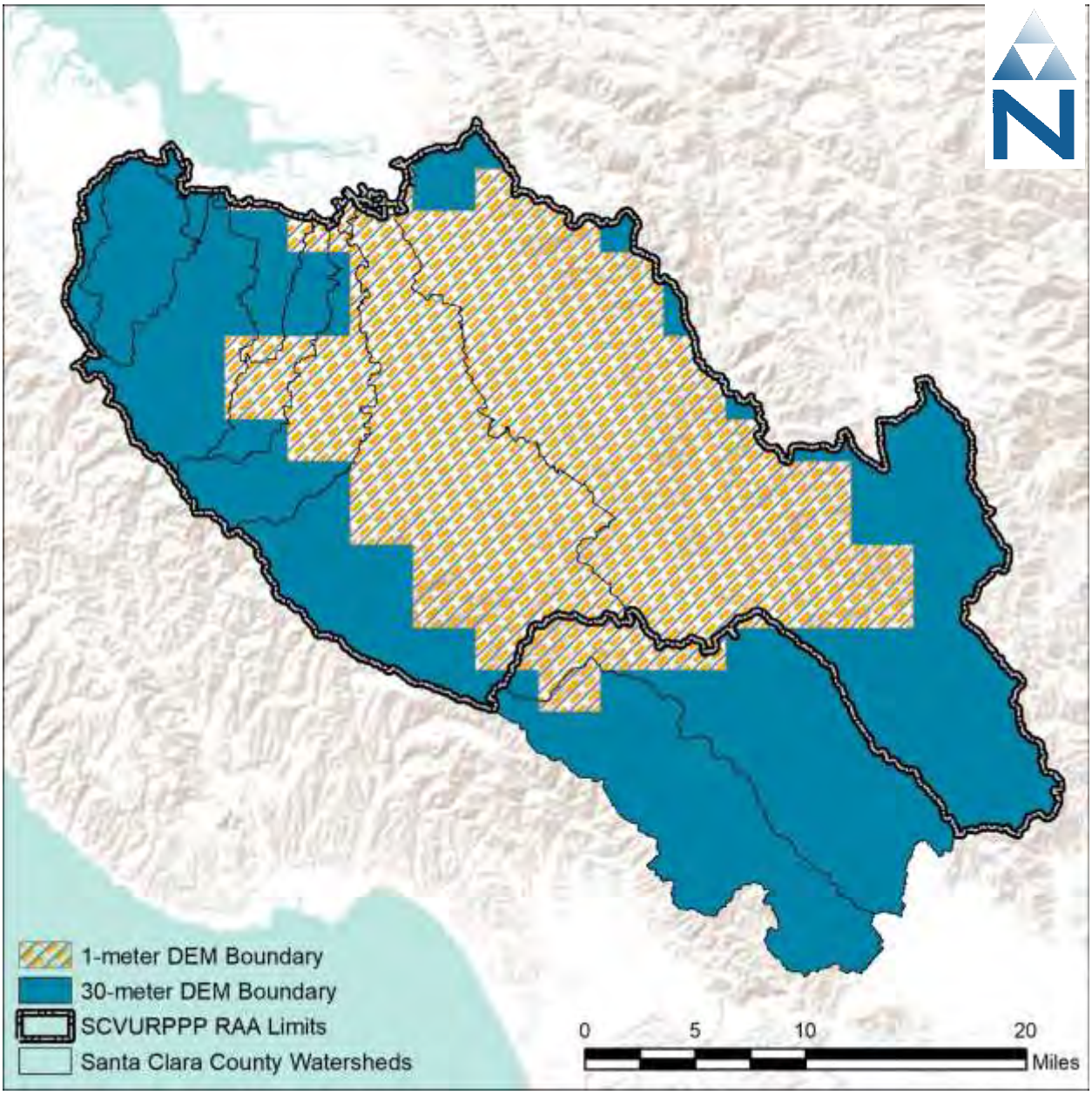

Figure 3-1. Spatial extent of the 1-meter (source: City of San José) and 30-meter (source: USGS) DEM data products.

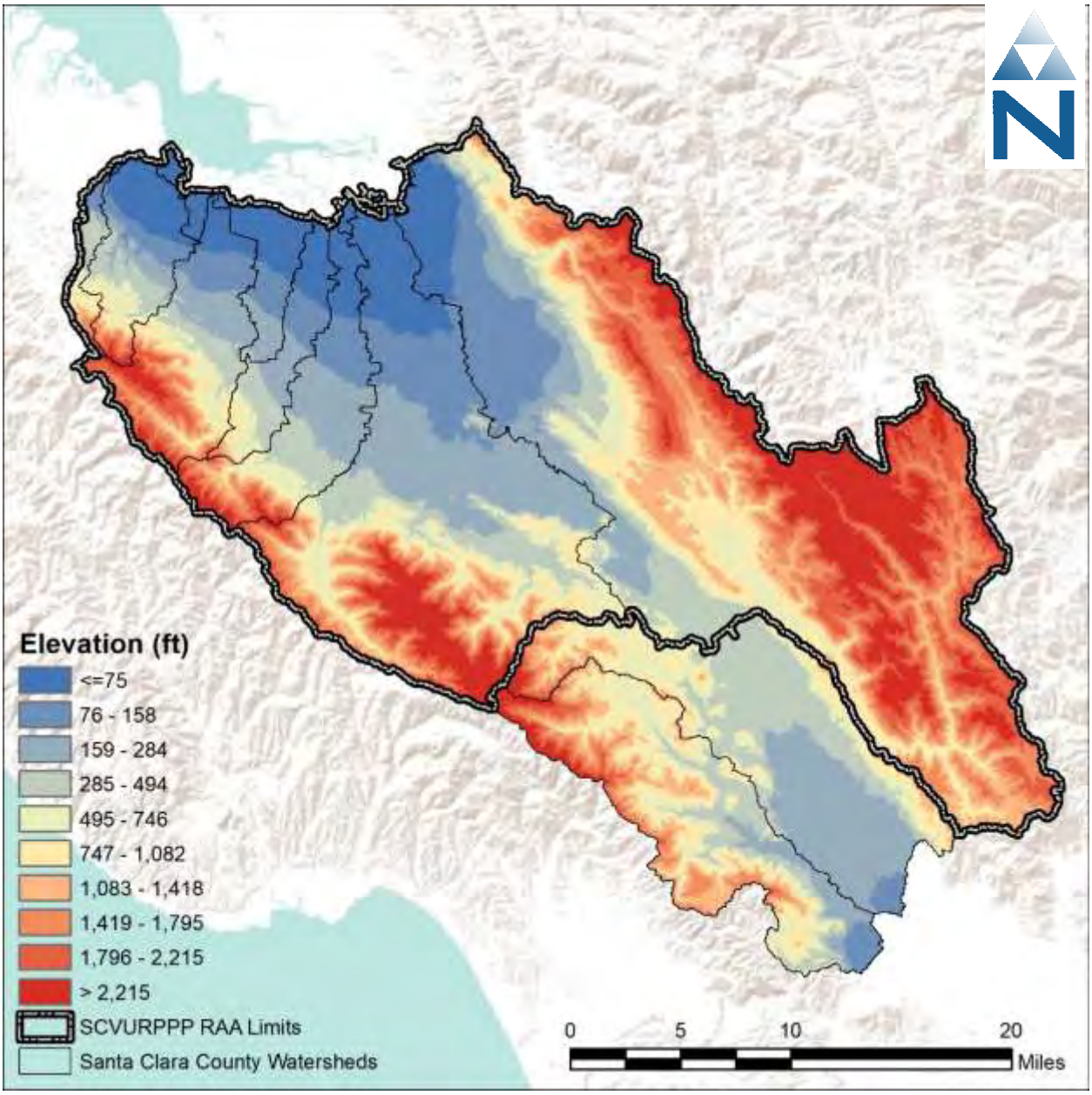

Figure 3-2. Elevation and Santa Clara County watershed boundaries.

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3.2 Delineation Methodology

The subwatershed delineation was performed using the combined DEM (Figure 3-2) and an inventory of storm drains, streams, and other waterways compiled from the Santa Clara Basin SWRP and the City of San José Storm Sewer Master Plan (SSMP). A multi-step delineation process was used in GIS to ensure accuracy of the boundaries, consistency with other local efforts (e.g., SWRP, SSMP), and alignment with locations of assessment points used for model calibration. The sequence of steps for subwatershed delineation included:

1. GIS datasets representing waterways (i.e., storm drains, streams, etc.) were *burned* into the combined DEM, meaning they were inset into the raster as low points.
2. Any resulting sinks (i.e., raster cells that do not flow to a neighboring cell) were filled in to prevent artificial accumulation of potential flows.
3. A flow direction raster was then created using the filled DEM from Step 2.
4. A flow accumulation raster was created from the flow direction file from Step 3.
5. A stream flowlines raster was created from the flow accumulation layer from Step 4.

Finally, the stream flowlines created in Step 5 were used in conjunction with a set of key observation points, including locations of streamflow gages, to create a subwatershed raster that was ultimately converted into polygon subwatershed layer for sampling other spatial data for LSPC model configuration. The spatial extent of the delineated major watershed was verified to mostly align with the extents of the Santa Clara Basin and Santa Clara Valley Water District (SCVWD) watershed boundaries. The spatial extent of the delineated watersheds was also referenced against the City of San José SSMP catchments. Since the planning-level scale of the RAA water quality model does not require high-resolution subcatchments on the order of the SSMP catchments, each delineated subwatershed may include several SSMP catchments.

3.3 Model Subwatersheds

The subwatershed delineation included outlets for monitoring gages and reservoirs, while preserving stream connectivity and routing requirements for the model. Within the heavily urbanized areas that were relatively flat, the higher-resolution 1-meter DEM improved the representation of subwatershed boundaries within those areas. For non-urbanized areas, the 30-meter DEM with a coarser resolution was sufficient to establish the flow boundaries. Consequently, the mostly urban areas covered by the 1- meter DEM were divided into more subwatersheds, while the non-urban areas covered by the 30-meter DEM were divided into fewer.

Table 3-1 summarizes the number of subwatersheds within the Santa Clara Basin. The Uvas and Llagas watersheds were included in the model because of overlap of the City of San José boundary. The delineation process resulted in 862 subwatersheds. The Coyote Creek watershed, the largest watershed in the Santa Clara Basin, has the most subwatersheds. The Sunnyvale Channel watershed, which includes the area draining to both Sunnyvale East and West Channels, is the smallest in Santa Clara Basin with the fewest subwatersheds. Figure 3-3 depicts the delineated subwatersheds in the area.

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Table 3-1. Summary statistics of subwatershed delineations by major watershed.

Watershed	Count	Mean Size (acres)	Median Size (acres)
Coyote Creek	295	755	576
Guadalupe River	200	548	464
Llagas Creek	92	718	627
San Tomas Aquino Creek	62	455	370
Uvas Creek	57	967	691
Permanente/Stevens Creeks	52	582	370
San Francisquito Creek	20	598	328
Adobe/Barron/Matadero Creeks	32	563	567
Calabazas Creek	31	427	324
Sunnyvale Channel	16	592	445
Baylands	5	1326	1678
Total	**862**	--	--

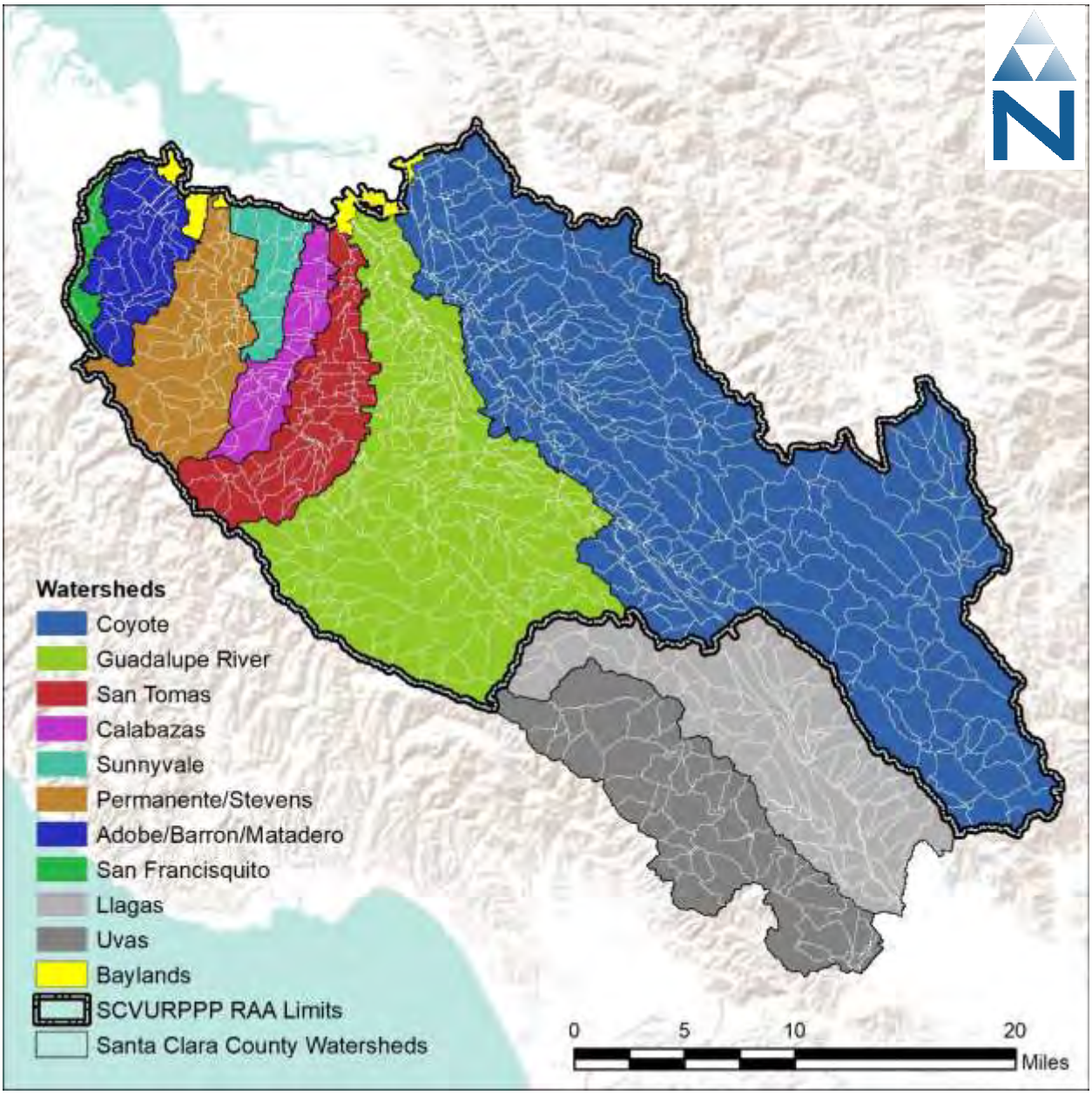

Figure 3-3. Santa Clara Basin watershed and subwatershed delineations.

4 HYDROLOGIC RESPONSE UNITS

Hydrologic Response Units (HRUs) are the core hydrologic modeling land units in the watershed model. Each HRU represents areas of similar physical characteristics attributable to certain processes. Spatial or geological characteristics, such as soils, slope or steepness, land cover, and land use, are typically used to define HRUs. These four datasets were the primary attributes used in the Santa Clara Basin for classifying HRUs. Stratifying land use with imperviousness, soil, and slope introduces more texture for characterizing spatial variability of hydrology than using land use alone. It also provides a basis for compartmentalizing parameters. For example, all HRUs of a given soil type can have the same infiltration rate, but different interception storage values because that varies by land use and vegetative cover. The areal combination of primary characteristics ultimately determines the number of meaningful HRU categories considered for the model. Some consolidation of HRUs is required to balance the need for spatial resolution with model simulation efficiency. Figure 4-1 shows the organizational relationship of HRUs, subwatersheds, and model parameterization. Secondary attributes are properties (e.g., impervious cover) that are summarized by HRU to estimate numerical values for the model.

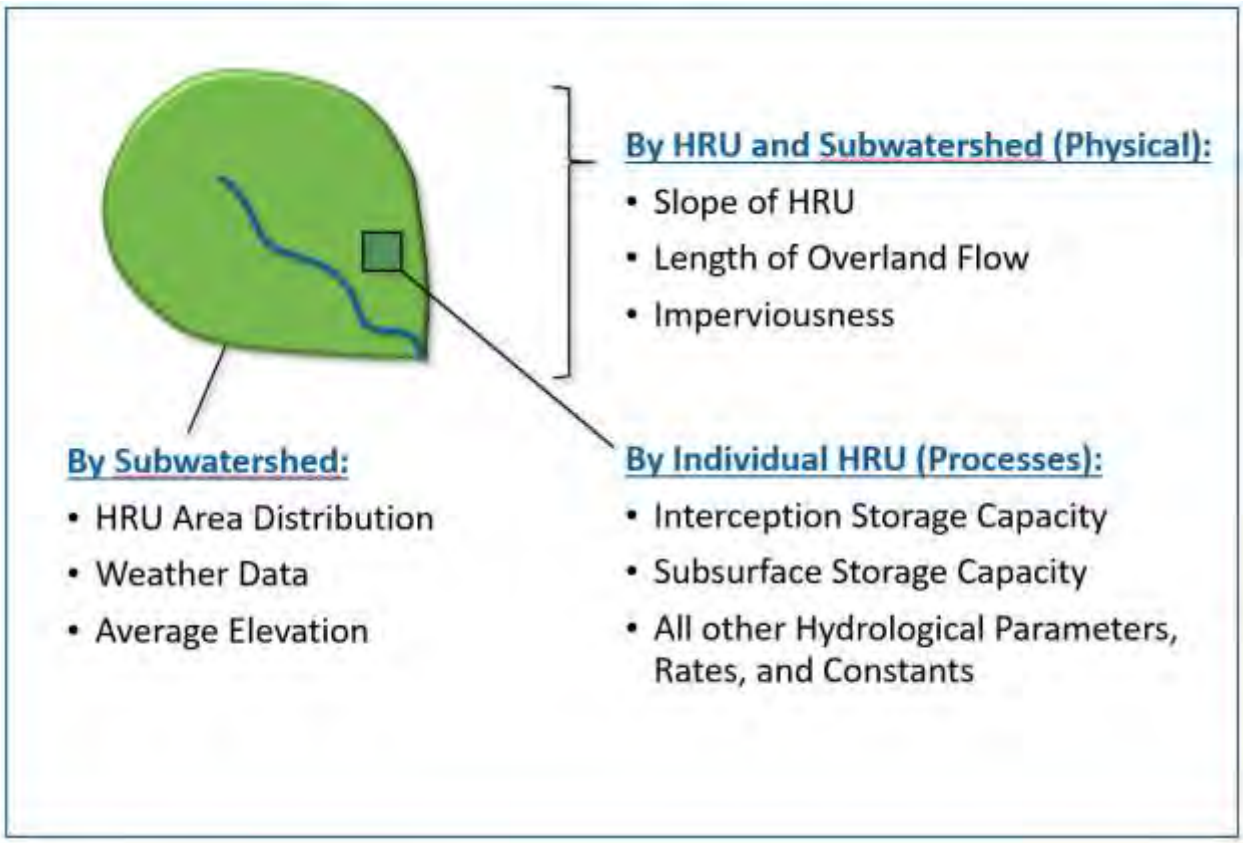

Figure 4-1. Organizational relationship of HRUs, subwatersheds, and model parameterization.

Table 4-1 summarizes the GIS datasets and the corresponding data sources used in HRU processing. All data layers were downloaded from publicly available data sources or received from municipalities (e.g. City of San José). The following subsections provide detailed descriptions of each HRU component dataset.

Table 4-1. Summary of input datasets detailing data source and type

GIS Layer	Data Source	Description
Soil Survey Geographic Database (SSURGO)	United States Department of Agriculture (NRCS 2016a)	2016 - polygon layer
State Soil Geographic Database (STATSGO)	United States Department of Agriculture (NRCS 2016b)	2016 - polygon layer
Slope	Generated from DEM	30m raster
Land Use	Association of Bay Area Governments (ABAG) as modified by SCVURPPP City of San José Zoning Map	c. 2005 (modified in 2012) c. 2018 – polygon layer
Land Cover	NLCD (Xian et al. 2011)	c. 2011 – 30m raster
Imperviousness Cover	NLCD (Xian et al. 2011)	c. 2011 – 30m raster

4.1 Hydrologic Soil Group

Soils data were obtained from the Soil Survey Geographic Database (SSURGO) and State Soil Geographic Database (STATSGO), both published by the Natural Resource Conservation Service (NRCS). There are four primary hydrologic soil groups (HSG) used to characterize soil runoff potential. Group A generally has the lowest runoff potential whereas Group D has the highest runoff potential. Both SSURGO and STATSGO soils databases are composed of a GIS polygon layer of map units and a linked database with multiple layers of soil property. Soil characteristics of each hydrologic soil group are described in Table 4-2.

Table 4-2. NRCS Hydrologic soil group descriptions.

Hydrologic Soil Group	Description
A	Sand, Loamy Sand, or Sandy Loam
B	Silt, Silt Loam or Loam
C	Sandy Clay Loam
D	Clay Loam, Silty Clay Loam, Sandy Clay, Silty Clay, or Clay

Data Source: Natural Resource Conservation Service (NRCS), Technical Release 55 (TR-55)

Figure 4-2 presents the spatial distribution and a tabular summary of the SSURGO hydrologic soil groups for the watershed. The dominant soil group in the watershed is Group C, containing sandy clay loam with relatively low infiltration rates. Group D is the next most common soil group in the watershed, containing clay loam, and silty clay loam that typically have lowest infiltration rates, compared to other hydrologic soil groups. Less than 1 percent of the watershed areas had mixed soils, which were grouped with the nearest primary group as follows: A/D → B, B/D → C, and C/D → D. Approximately 2 percent of the watershed HSG area was unknown in the SSURGO database. For those areas, the corresponding HSG from the STATSGO dataset was used to supplement the data gaps. Finally, about 1 percent of the watershed was also unknown in the STATSGO dataset and was classified as D soil group.

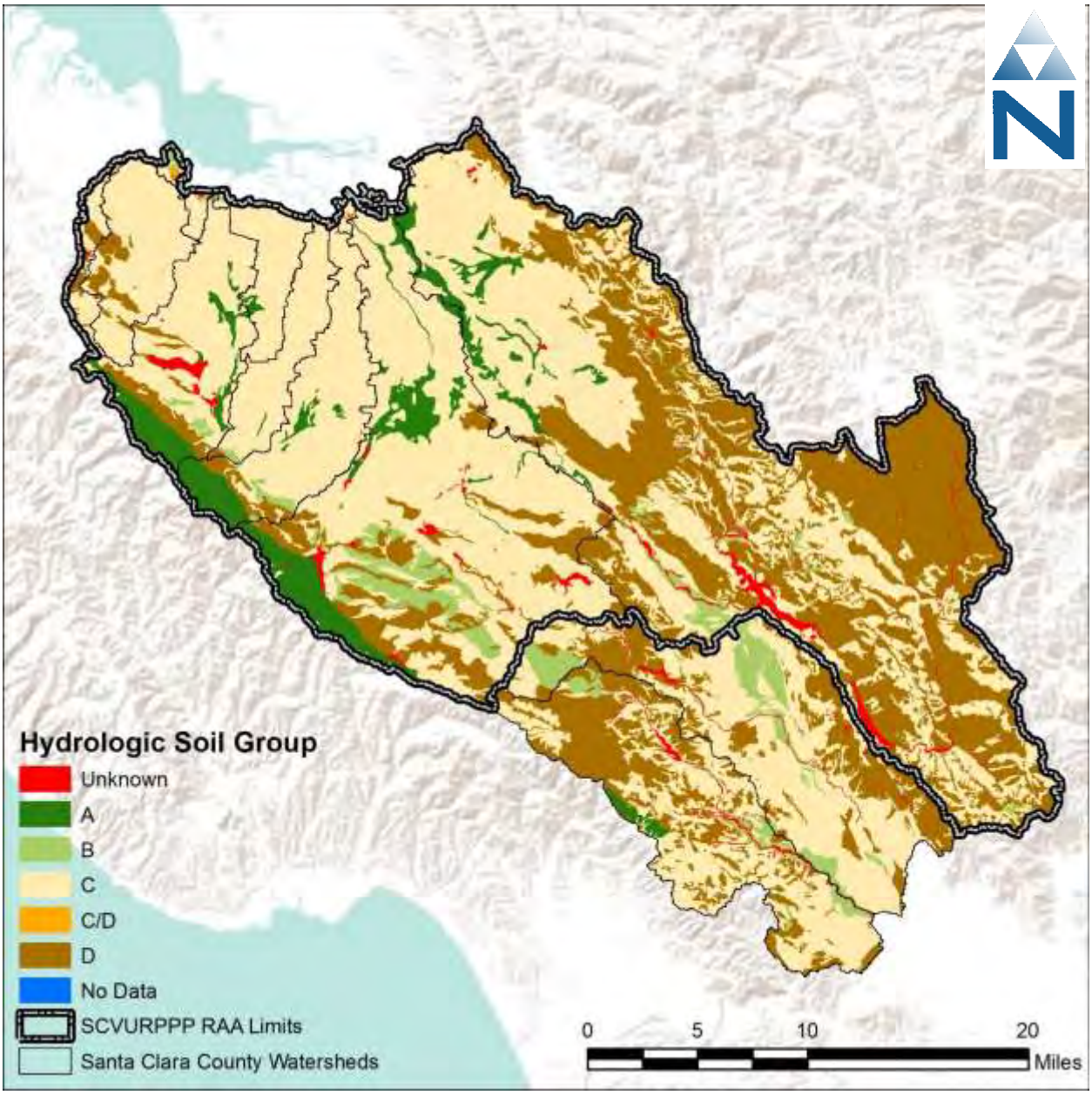

Figure 4-2. SSURGO hydrologic soil groups in the Santa Clara Basin.

4.2 Slope

The DEM grid was used to develop a percent slope raster, which was then reclassified into three groups (i.e., ≤10 percent, 10 – 35 percent, and >35 percent) corresponding to *low*, *medium*, and *high* slope areas, respectively. The *low* slope threshold of 10 percent was selected primarily as a threshold for representing urban areas as 77 percent of the total developed area lies below the 10 percent slope threshold. The slope threshold between *medium* and *high* of 35 percent was selected based on a natural breakpoint identified in the distribution of slopes across the total watershed area. This threshold results in about 48 percent of the total Santa Clara Basin area falling into the *medium* slope group, 36 percent as low and 16 percent as high. Figure 4-3 presents a map showing the spatial distribution of the reclassified slope categories.

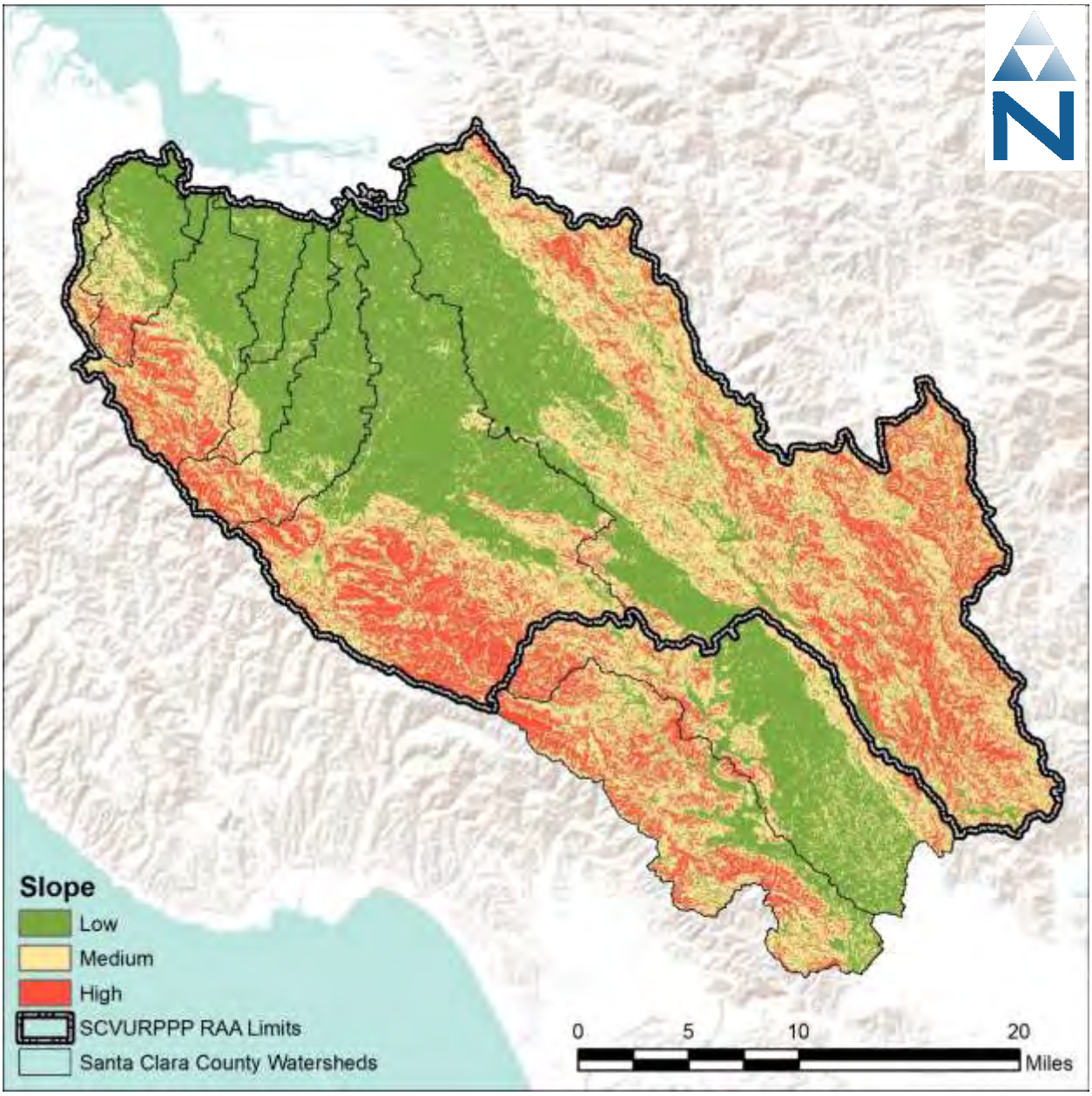

Figure 4-3. Map showing reclassified landscape slope groups.

4.3 Land Cover & Land Use

Land cover and land use data are the primary base layers for HRUs. Land cover describes the physical characteristics that cover the landscape (e.g., forest, wetlands, development) while land use describes the programmatic nature of land cover (e.g., type of development, functional use of open space, zoning etc.). The sources of land cover and land use data used in developing the LSPC watershed model were the Association of Bay Area Governments (ABAG) land use layer, the 2011 National Land Cover Database (NLCD), and the 2018 City of San José zoning map. The ABAG layer, modified by SCVURPPP staff to identify old and new urban land uses, was used as the main source of information for representing PCB and mercury loads. This GIS layer includes the five land use categories consistent with those used by RWSM. While hydrology and sediment were initially modeled at a higher HRU resolution using the NLCD land use data, the ABAG layer was intersected during water quality model development, allowing for PCB and mercury sediment concentrations to be assigned spatially. Further descriptions of each dataset are as follows:

- The modified ABAG land use categories are shown in Figure 4-5. These categories were incorporated as the basis for assignment of water quality parameters (i.e., PCBs and mercury) to appropriately reflect the spatial distribution of pollutant contributions from the Santa Clara Basin watersheds.
- The City of San José Zoning dataset is the basic means of land use regulation for the City. It has 44 land use categories, including industrial, commercial, residential, open space, agriculture, water, as well as planned development lands. The zoning dataset also provides detailed classification for each zoning district (e.g. single-family residential, multifamily residential, etc.). The planned development indicates the type of development that may be built on all parcels within each district.
- The NLCD is maintained by the Multi-Resolution Land Consortium (MRLC), a joint effort between multiple federal agencies. The primary objective of the MRLC NLCD is to provide a current data product in the public-domain which provides a consistent characterization of land cover across the United States. The first iteration of the NLCD dataset was 1992. Since the 2001 NLCD version, a consistent 16-class land cover classification scheme has been adopted nationwide. The 2011 NLCD adopted this 16-class scheme at a 30-meter grid resolution. The minimum mapping unit is 5 30-m pixels (1.1 acres) for most land cover classes, except urban (1 pixel, 0.2 acres) and cropland and hay/pasture (12 pixels, 2.7 acres) (Homer et al. 2015).
- The NLCD 2011 Imperviousness layer is maintained by MRLC and is published as a companion to the National land Cover Dataset (NLCD). This imperviousness dataset is provided as a raster with a 30-meter grid resolution. Impervious cover is expressed in each raster pixel as a percentage of total area ranging from 0 to 100 percent.

Figure 4-4 shows the organizational relationship of the various datasets used to create HRUs.

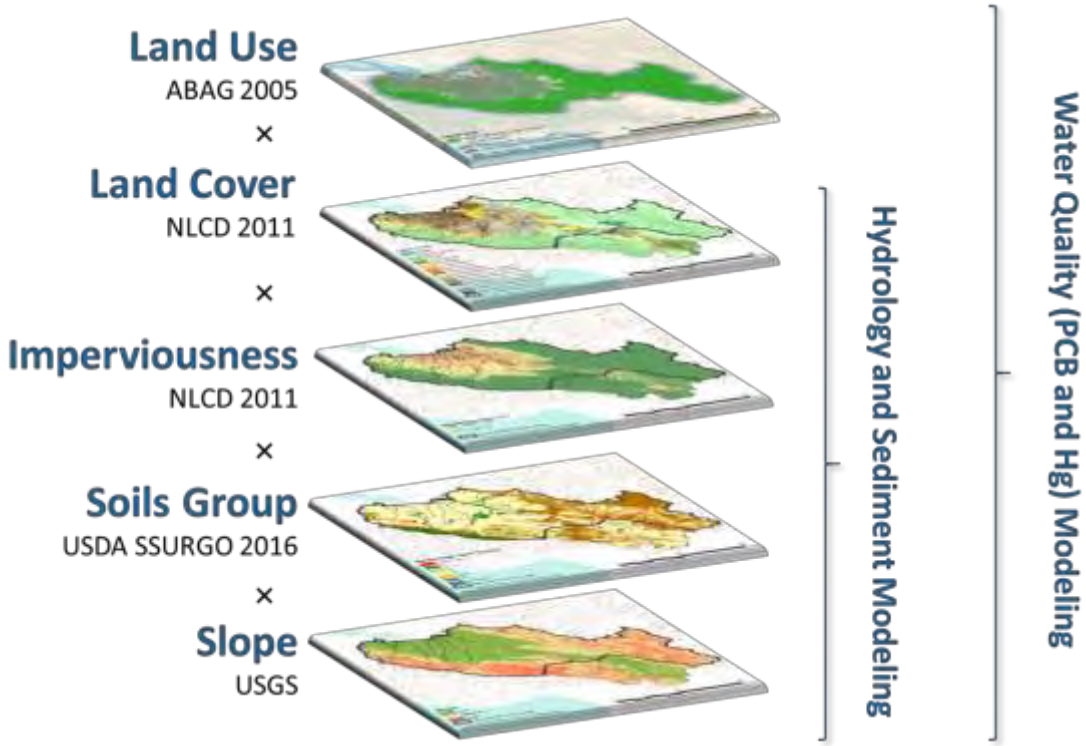

Figure 4-4. Key land characteristic datasets used to create HRUs.

Figure 4-5 shows a land use map for the Santa Clara Basin based on the ABAG dataset. Agriculture/Open areas are the dominant classification in the Santa Clara Basin, comprising approximately 63.3 percent of the total watershed area. Old Urban – Residential/Parks was the second most dominant land use, comprising 21.8 percent of the watershed. Old Urban – Not Residential/Parks, Old Industrial, and New Urban comprise the remaining 14.9 percent of the watershed.

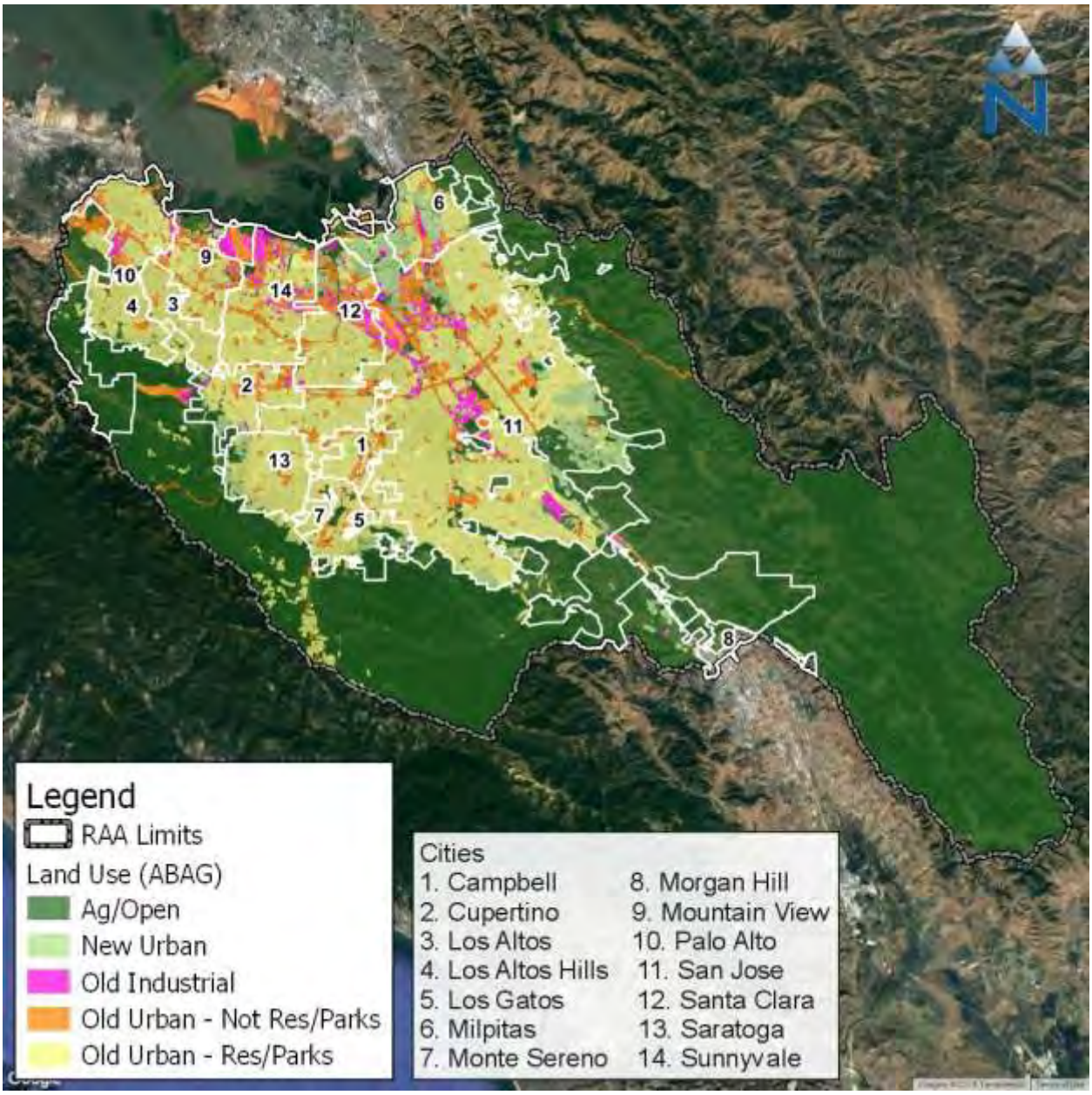

Figure 4-5. PCB and mercury land use categories developed by SCVURPPP for use with RWSM.

4.4 Impervious Cover

Impervious cover is used as the basis for calculating directly connected impervious area (DCIA), or the portion of impervious cover whose runoff ultimately reaches the drainage network. The calculation of DCIA and how it is used to define the HRUs is discussed in further detail in Section 4.5. MRLC publishes a developed impervious cover dataset as a companion to the NLCD land cover. This dataset is also provided as a raster with a 30-meter grid resolution. Impervious cover is expressed in each raster pixel as a percentage of total area ranging from 0 to 100 percent. Figure 4-6 shows the NLCD 2011 developed impervious cover dataset for the Santa Clara Basin. Because this dataset provides impervious cover estimates for areas classified as *developed,* non-zero values in Figure 4-6 closely align with urban and industrial areas in Figure 4-5.

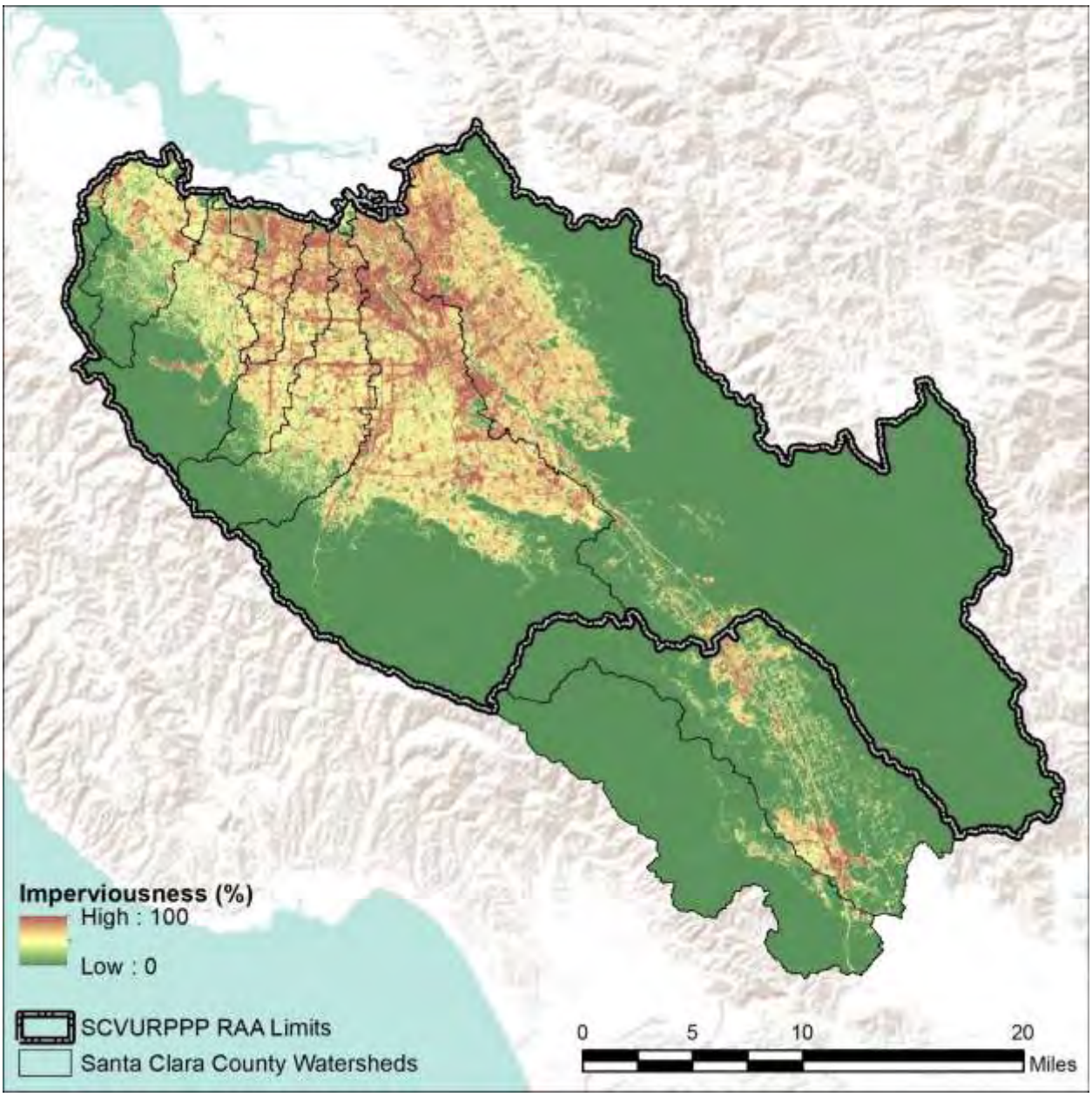

Figure 4-6. NLCD 2011 percent impervious cover in the Santa Clara Basin.

4.5 Directly Connected Impervious Cover

In the physical environment, sometimes the lines between impervious and pervious land are not clearly distinguished. Runoff from impervious surfaces may flow over pervious land on route to a storm drain or watercourse. For modeling purposes, Effective Impervious Area (EIA) represents the portion of total, or Mapped Impervious Area (MIA), that routes runoff directly to the stream segments. It is derived as a function of directly connected impervious area (DCIA), with other adjustments as needed to account for other structural and non-structural management practices in the flow network.

Figure 4-7 illustrates the transitional sequence from MIA to DCIA. Runoff from impervious areas that are not connected to the drainage network may flow onto pervious surfaces, infiltrate, and become part of pervious subsurface and overland flow. Because segments are modeled as being parallel to one another in LSPC, this process can be approximated using a conversion of a portion of impervious land to pervious land. On the open landscape, runoff from disconnected impervious surfaces can overwhelm the infiltration capacity of adjacent pervious surfaces during large rainfall/runoff events creating sheet flow over the landscape—therefore, the MIA→EIA translation is not actually a direct linear conversion. Finding the right balance between MIA and EIA can be an important part of the hydrology calibration effort.

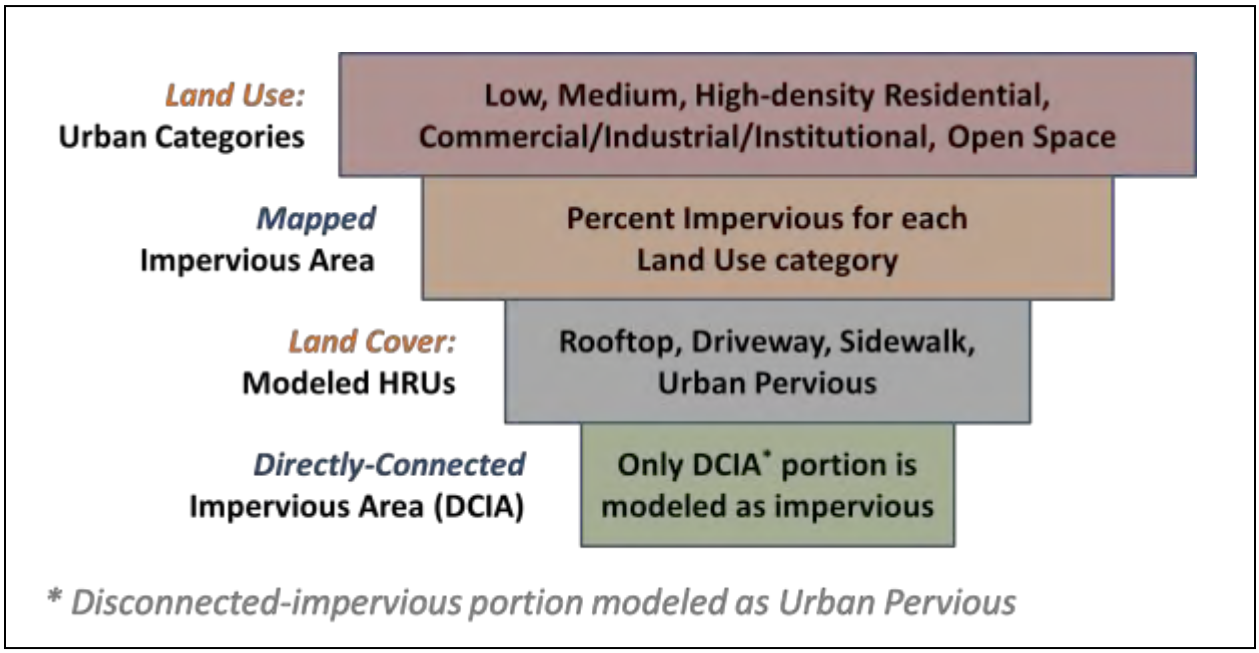

Figure 4-7. Translation sequence from MIA to DCIA.

Empirical relationships like the Sutherland Equations (2000) presented in Figure 4-8 show a strong correlation between the density of developed area and DCIA. The curve for high-density developed land trends closer to the line of equal value than the curve for less developed areas. Similarly, as the density of mapped impervious area approaches 1, the translation to DCIA also approaches 1.

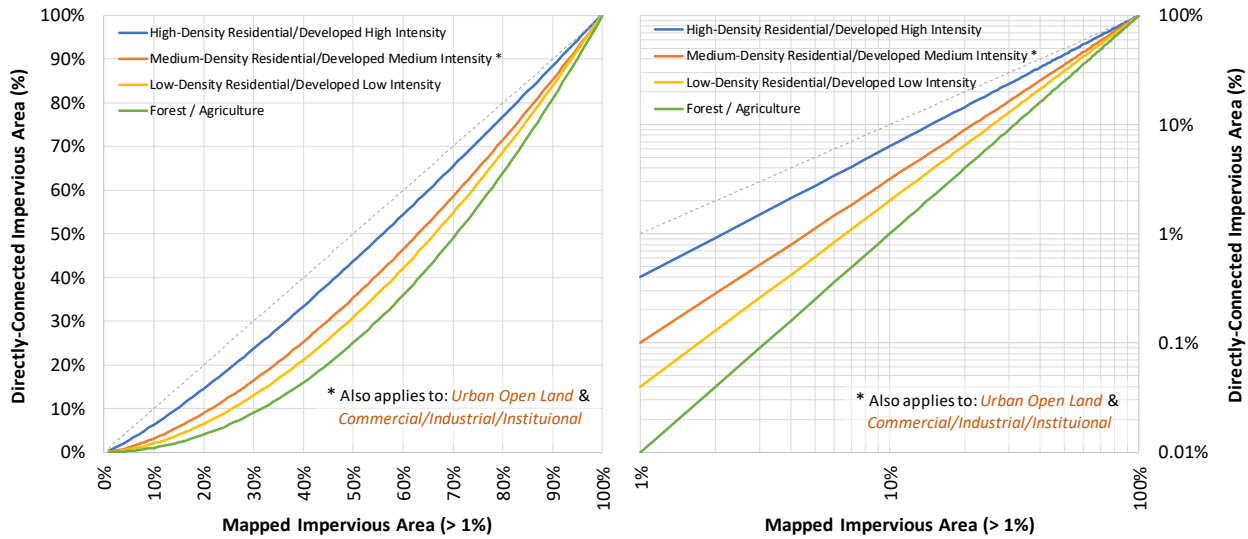

Figure 4-8. Relationships between MIA and DCIA (Sutherland 2000).

An initial estimate of EIA (acres) for each land use type in each subcatchment is determined by: (1) extracting the DCIA (%) corresponding to the MIA (%) in Figure 4-7 and (2) multiplying that DCIA (%) by the total area for that land use type. This refinement is necessary to avoid an initial overestimation of impervious surfaces contributing runoff before initiating process-based model calibration.

4.6 Hydrologic Response Units

Using the reclassified datasets discussed in the previous sections, a set of representative HRUs was developed to reflect key land characteristics of the Santa Clara Basin. These HRUs serve as the functional pervious and impervious land segment units in the watershed model. The following steps were performed to develop HRU categories:

- Re-project all GIS layers into USA Contiguous Albers Equal Area Conic projected coordinate system (EPSG-102003) to ensure proper overlay and accurate area calculations
- Clip all GIS layers to watershed extent to ensure data overlay to the same spatial extent
- Convert all vector GIS layers into raster grids, resampled to a 30-meter resolution (i.e., 30-meter pixel width by 30-meter pixel height)
- Intersect all input spatial layers and tabulate area distribution for unique combinations of "primary attributes," including land use/land cover, imperviousness, soil, and slope
- Using the final set of HRUs, summarize "secondary attributes" by HRU. Secondary attributes include characteristics such as canopy cover, which can be used to inform the parameterization of model processes

Table 4-3 summarizes the percent area by soil and slope HRU groups by each land cover HRU category. Combining the land cover groups (LUC) originally used for hydrology and sediment calibration, four soil groups, three slope groups and the ABAG groups resulted in 79 unique HRU combinations.

Table 4-3. Summary of percent land cover area distribution by HRU categories for the Santa Clara Basin.

Order	LUC	Percent of Area	Soil Group (% Landuse Area)				Slope (% Landuse Area)			ABAG (% Landuse Area)					
			A	B	C	D	0-10	10-35	>35	Ag/Open	New Urban	Old Industrial	ban – Not Res	Urban – Res/P	No Data
			1	2	3	4	1	2	3	1	2	3	4	5	6
1	Developed	40.8%	8.4%	3.7%	76.4%	11.5%	77.3%	21.6%	1.1%	17.4%	8.5%	3.7%	14.0%	39.1%	17.4%
2	Forest	31.7%	8.7%	5.5%	43.9%	42.0%	0.9%	59.5%	39.6%	69.5%	0.5%	0.0%	0.1%	0.9%	29.0%
3	Grass_Shrub	22.9%	1.9%	2.4%	36.5%	59.2%	5.6%	82.6%	11.9%	71.0%	0.5%	0.0%	0.2%	0.3%	27.9%
4	Agriculture	4.0%	5.3%	9.7%	63.7%	21.3%	74.9%	24.9%	0.3%	38.3%	1.9%	0.2%	1.8%	1.2%	56.5%
5	Water	0.6%	80.4%	1.9%	11.9%	5.9%	54.9%	44.8%	0.3%	83.1%	0.3%	0.1%	0.1%	0.3%	16.0%

Color gradients indicate more Watershed Area and increasing percentage of Soil, and Slope, and Land Use respectively.

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5 METEOROLOGICAL BOUNDARY CONDITIONS

Meteorological data such as precipitation, evapotranspiration, temperature, and other climate time series are the primary forcing functions of the model. Analytical considerations of data sources include data quantity and quality. Primary meteorological data products compiled and reviewed for this effort included two observed precipitation data products from the National Climatic Dataset Center (Global Historical Climatology Network daily—GHCND and Local Climatic Data). Secondary meteorological data, which are derived or interpolated from primary sources, included monthly precipitation totals from the Parameter-elevation Regressions on Independent Slopes Model (PRISM), hourly precipitation distributions and potential evapotranspiration (ET) estimates from the North American Land Data Assimilation System (NLDAS2), a quality-controlled spatiotemporal dataset supported by the National Aeronautics and Space Administration (NASA), and reference ET rates from the California Irrigation Management Information System (CIMIS).

Because hydrologic models are highly dependent on the quantity and quality of meteorological forcing data, sometimes challenges arise when trying to associate point-sampled weather gauge data over complex terrain (Henn et al. 2018). The development and application of high-resolution gridded data products, or land surface models (LSM), to support continuous-simulation modeling and other geophysical applications has increased with advancements in computing capability and resources. Research related to those products focuses on methodology refinements, assessment of differences between products, and identification of primary drivers and geophysical conditions that affect the robustness of their application in different settings (Henn et al 2018; Behnke et al. 2016). All seven of the gridded products reviewed by Behnke et al. (2016) use the PRISM methodology to interpolate spatially because it considers orographic influence on rainfall variability.

The use of products like NLDAS2 and PRISM also helps to overcome some of the common issues encountered when working with rainfall gauge data, which sometimes contain impaired intervals of missing, deleted, or accumulated data. Missing or deleted intervals are periods during which either the gauge malfunctioned, or the data records were lost. Accumulated intervals contain cumulative precipitation reported over several hours or days, but the exact temporal distribution of the data is unknown due to a gauge malfunction. The LSM uses observed gauge data to guide the meteorological data extrapolation at fixed spatial intervals. LSM extrapolation considers orographic influence on the spatial variation, which can capture the influence of weather movements like those depicted in Figure 5-1. Topographic properties like elevation, aspect, and the windward/leeward location of the prediction point are considered when modeling rainfall variability (both timing and volume) across the landscape. As a result, LSMs extrapolate conditions for ungauged areas and interpolate spatial variability between gauged areas in a non-linear way. Gridded meteorological data representations can capture localized impacts such as rain shadow over the landscape. The quality-control and increased spatiotemporal resolution of meteorological boundary conditions improves the predictions of continuous simulation watershed models and benefits water balance calculations in large-scale continuous-simulation applications. NLDAS2 and PRISM are both also updated in real-time in a consistent format, making it easier to periodically update boundary conditions for the watershed model as new information becomes available.

Figure 5-1. Orographic influence on weather movement.

Table 5-1 presents a summary of available meteorological data by source that were reviewed as part of model development. Table icons indicate the temporal resolution of the data by source. NLDAS2 also includes the full suite of hourly meteorological timeseries that the model uses, except for dewpoint temperature; however, dewpoint temperature, which is a function of air temperature, station pressure, and specific humidity, was computed from those NLDAS2 timeseries. The approach used was to intersect NLDAS2 and PRISM and scale the NLDAS2 hourly rainfall timeseries distributions with PRISM monthly precipitation totals. The resulting intersect is an hourly 4-km spatial distribution of PRISM timeseries (based on NLDAS2 rainfall distributions) for the Santa Clara Basin—there are 137 unique sets of meteorological timeseries available for assignment to the modeled subwatersheds. The sets of meteorological timeseries covered the period between WY 1996 to WY 2017 at an hourly timestep. These timeseries includes the representative water year 2002 suggested by the Bay Area RAA Guidance for simulation of baseline loading, which is used as the evaluation period in this RAA.

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Table 5-1. Summary of the climate parameters evaluated during the initial inventory

Meteorological Data	Temporal Resolution of Meteorological Data by Source (Timestep: ● Hourly, ○ Daily, ☐ Monthly)						
	(a) GHCN	(b) LCD	(c) CDEC	(d) RAWS	(e) DRI	(f) PRISM	(g) NLDAS2
Precipitation	○	●	●	●	○	☐	●
Potential Evapotranspiration	--	--	--	--	--	--	●
Air Temperature (Min/Max)	○	--	--	--	--	☐	--
Air Temperature	--	●	--	●	--	--	●
Solar Radiation	--	●	--	●	--	--	●
Cloud Cover	--	●	--	●	--	--	●
Wind Speed	--	●	--	●	--	--	●
Wind Direction	--	●	--	●	--	--	●
Station Pressure	--	--	--	--	--	--	●
Specific Humidity	--	--	--	--	--	--	●[1]
Dewpoint Temperature	--	●	--	●	--	--	●[2]

Acronyms: (a) Global Historical Climatology Network, (b) Local Climatic Data, (c) California Data Exchange Center, (d) Remote Automated Weather Stations, (e) Desert Research Institute, (f) Parameter-elevation Regressions on Independent Slopes Model-Monthly aggregated timeseries, (g) North American Land Data Assimilation System.
1: *Specific Humidity* converted to *Relative Humidity* as a function of *Air Temperature* and *Station Pressure*
2: *Dewpoint Temperature* calculated as a function of *Air Temperature* and *Relative Humidity*

5.1 Subwatershed Assignment

In the LSPC model, one set of meteorological timeseries is assigned to each of the 882 delineated model subwatersheds—it is also assumed that the associated rainfall falls uniformly within each subwatershed. To better manage the rigidity of that assumption, subwatersheds were delineated at a finer resolution in portions of the watershed where rainfall variability was relatively high over short distances. Data analysis from other modeling studies at times show notable differences in observed rainfall data collected at different locations at the same facility (e.g., opposite ends of an airport runway). Henn et al. (2018) also describe paired comparisons of observed rainfall gauges located within the extent of a single LSM grid, which report different rainfall volumes and distributions. Ultimately, the predicted hydrologic response of higher-resolution meteorological boundary conditions validates how representative they are of weather conditions upstream of the modeled assessment point.

Figure 5-2 shows regional distribution of annual average PRISM rainfall overlaid with modeled subwatersheds, PRISM, and NLDAS2 data centroids. Meteorological boundary conditions were associated with subwatersheds by assigning the grid that covered most of the subwatershed area.

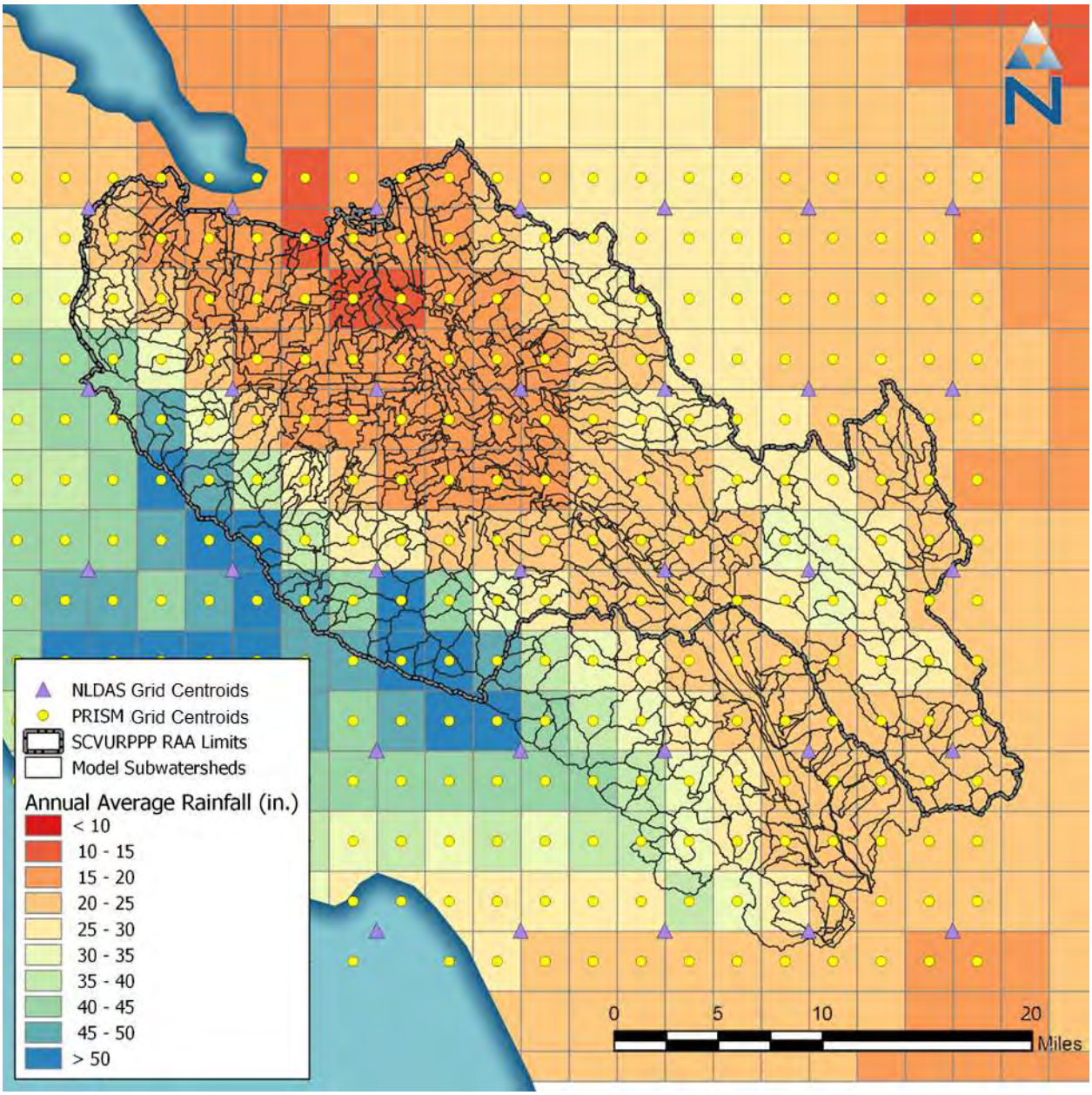

Figure 5-2. Annual average PRISM rainfall depths with associated PRISM and NLDAS2 data centroids.

5.2 Elevation and Aspect Analysis

The PRISM data were analyzed against topographic data to better understand the implications of orographic influences reflected in the PRISM annual average rainfall totals. The normal elevation of each PRISM centroid was paired with its corresponding long-term average rainfall total. The PRISM outputs are at a 4-km resolution, meaning that the model only knows about those points. It is on the basis of those elevation normal that precipitation is determined. The dominant hillslope aspect for each PRISM grid was derived from the National Elevation Dataset (NED) Digital Elevation Model (DEM). The representative aspect values were categorized into north-, east-, south-, and west-facing quadrants.

The influence of elevation was evaluated first. PRISM centroids were sorted by increasing elevation and associated average annual rainfall was plotted. The data were grouped into five equal elevation bins for analysis (low, medium-low, medium, medium-high, and high)—the median elevation of each bin is plotted for reference, as shown in Figure 5-3.

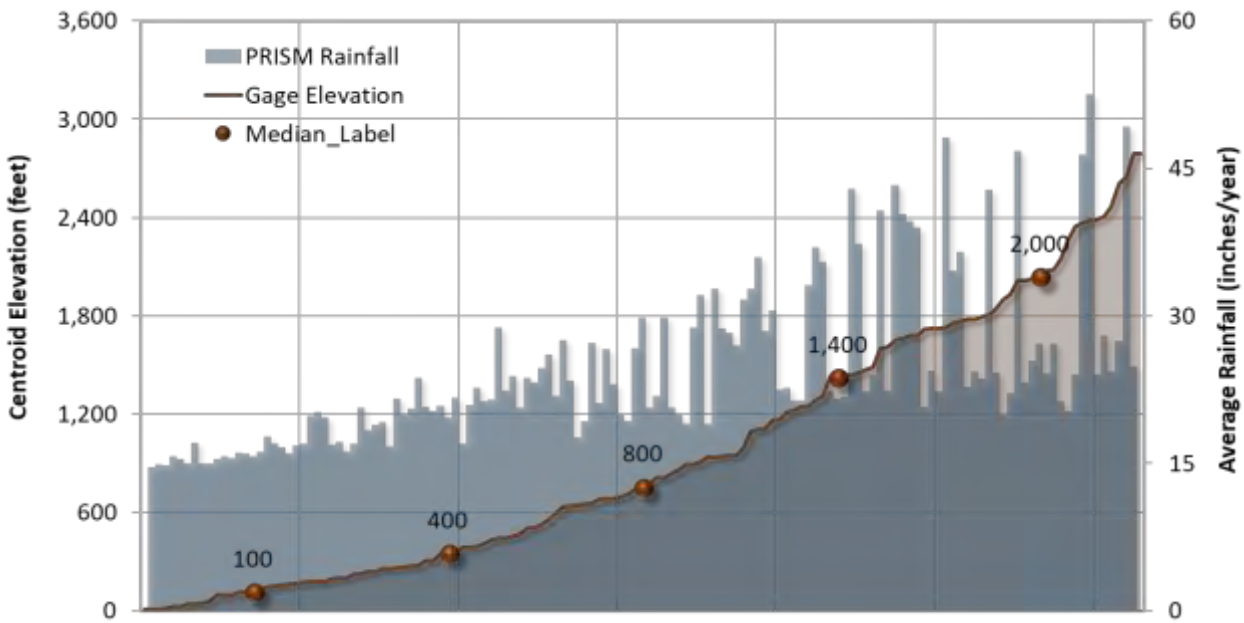

Figure 5-3. Average annual PRISM rainfall vs. centroid elevation (with median elevation of 5 bins).

The graph shows a gradual increase in rainfall with elevation; however, the variability suggests that other factors besides elevation also have an influence on annual average rainfall. The data were also binned and analyzed by aspect. Figure 5-4 shows how average rainfall varies by both elevation and aspect.

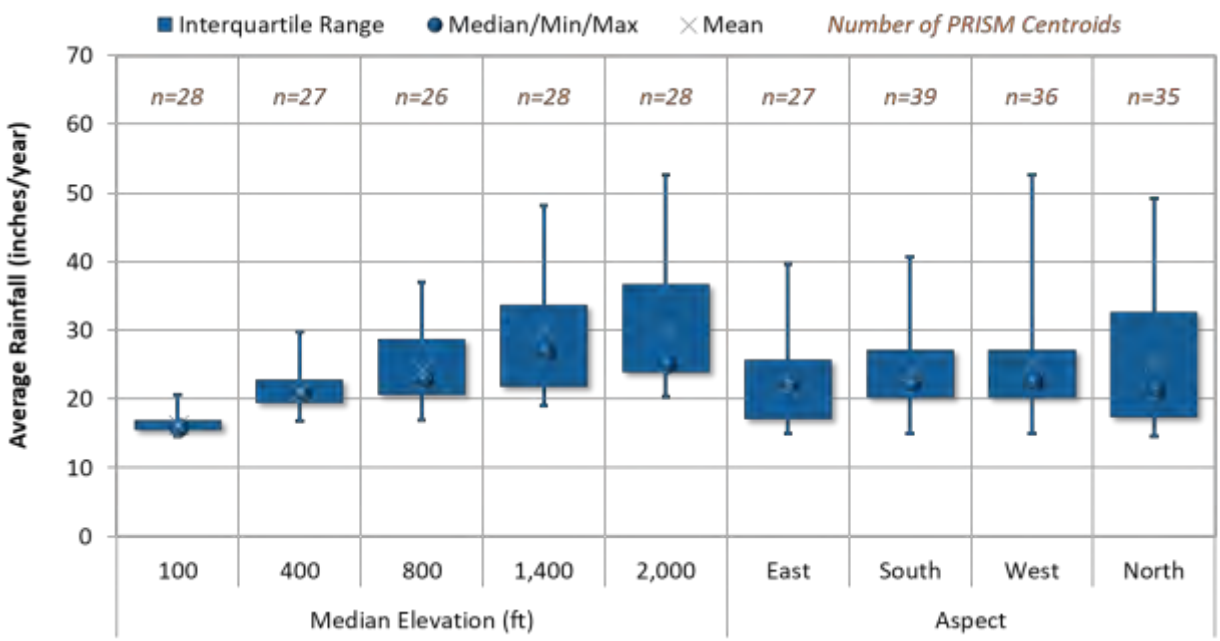

Figure 5-4. Box plots of average annual rainfall variability by elevation and aspect.

To assess the combined impact of elevation and aspect in Santa Clara Valley, PRISM average annual rainfall, the centroids were grouped into 20 bins of elevation and aspect (5 elevation × 4 aspect groups). There were about 5 to 8 centroids within each of the 20 bins, and the median rainfall was calculated for each bin, as summarized in Table 5-2.

Table 5-2. Median rainfall (and distribution of PRISM centroids) by elevation and aspect

Elevation		Hillslope Aspect (No. Centroids)				Total
Bin	Median (ft)	East	South	West	North	
1	100	6	8	7	7	**28**
2	400	5	8	7	7	**27**
3	800	5	7	7	7	**26**
4	1,400	6	8	7	7	**28**
5	2,000	5	8	8	7	**28**
Total		**27**	**39**	**36**	**35**	**137**
Elevation		**Hillslope Aspect (Median Rainfall, in./yr)**				**Median**
Bin	**Median (ft)**	**East**	**South**	**West**	**North**	
1	100	16	17	17	16	**16**
2	400	22	23	21	19	**21**
3	800	23	21	29	22	**23**
4	1,400	27	25	24	39	**31**
5	2,000	27	25	24	37	**25**
Median		**22**	**22**	**23**	**21**	**22**

Color gradient shows relative rainfall depth. Darker is higher.

Figure 5-5 is a surface plot of the median rainfall (vertical axis) versus elevation and aspect (horizontal plane)—the surface illustrates the central tendency of the combined impact of elevation and aspect on average annual rainfall. The right panel of Figure 5-5 is the birds-eye view from the top of the surface shown in the left panel—it shows horizontal and vertical surface transects for aspect and elevation, respectively.

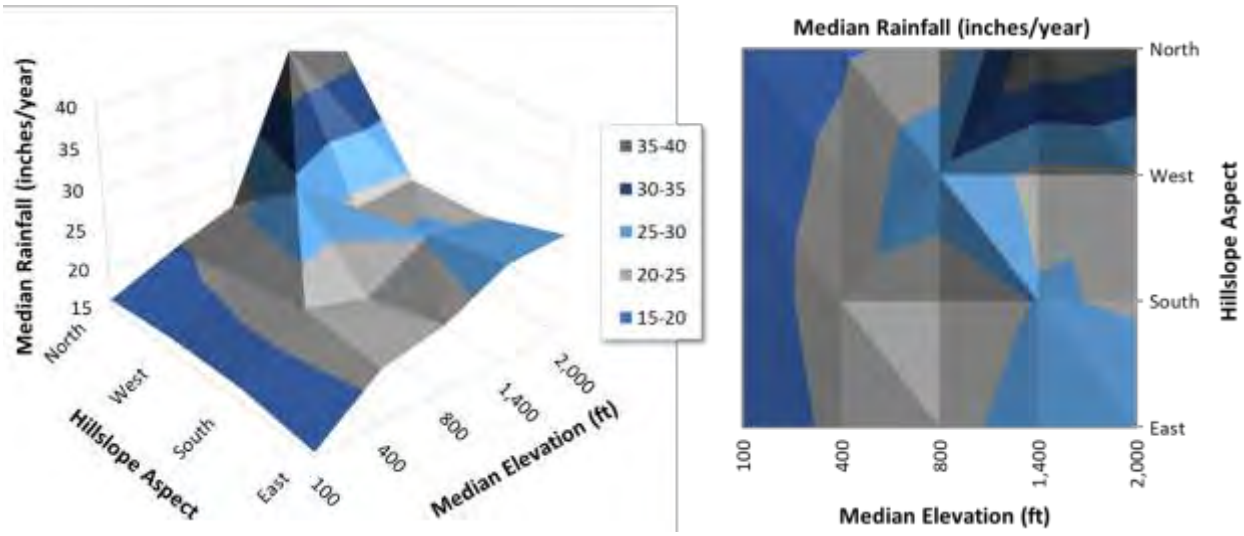

Figure 5-5. Surface plot of median rainfall (vertical axis) vs. elevation and aspect (horizontal plane).

Figure 5-5 shows that the driest areas of the study area are the lowest-elevation areas, regardless of aspect; however, the wettest are highest-elevation north-facing slopes. In general, at about 400 feet the impact of aspect on annual average rainfall volume appears to be negligible. The 100- and 400-feet elevation transects have the least variability in median rainfall. There is a lot of variability along the aspect transects, with the north-facing slopes having the widest range of variability across the range of elevations. Sometimes this insight can guide the selection/assignment of representative gages to subwatersheds and help with understanding modeled responses; however, the default assignments used for model calibration were sufficiently reflective of the spatial variability and resolution.

6 HYDROLOGY MODEL CALIBRATION

A phased weight-of-evidence approach was used for hydrology calibration. An initial set of model parameters were selected from the Bay Area Hydrologic Model (BAHM) (Clear Creek Solutions 2014) and refined by HRU using guidance from BASINS *Technical Note 6: Estimating Hydrology and Hydraulic Runoff Parameters* (USEPA 2000). The goal was to characterize the relative hydrological response of the various HRU combinations of land cover, soil type, and slope such that the routed aggregate response of the model was representative of observed trends at the flow monitoring gages. When model results diverged from observed data, Google Earth was used to further investigate and identify unrepresented features such as impoundments, concrete-lined channels, or other hydraulic features that may be attributable to the divergent model results. Finally, wherever it was possible to represent those notable features, model parameters were fine-tuned so that the calculated error statistics fell within the targeted model performance ranges.

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6.1 Calibration Process & Objectives

Table 6-1 presents the recommended model performance metrics for hydrology, sediment, and PCBs from the Bay Area RAA Guidance (BASMAA 2017). The Bay Area RAA Guidance specifies annual percent difference calibration metrics, which aligns with the spatial and temporal scales of the Bay TMDLs. For additional resolution regarding the timing of flow and pollutant loads, monthly and seasonal model hydrology performance were also evaluated as part of the calibration effort.

Table 6-1. Model calibration performance targets (Bay Area RAA Guidance document, Table 4-2)

Model Parameters	%-Difference (Annual Simulated vs. Observed)		
	Very Good	Good	Fair
Hydrology/Flow[1]	< 10%	10-15%	15-25%
Sediment[1]	< 20%	20-30%	30-45%
PCBs/mercury[2]	< 30%	30-50%	50-80%

1: From Donigian 2000 as cited in LARWQCB 2014
2: Regional Watershed Spreadsheet Model (RWSM) estimates (if used) already reflect calibration considerations (Source: Wu 2017)

A two-phase weight-of-evidence approach was used to guide LSPC's calibration. In the first phase, typical parameter values from BASINS Technical Note 6: *Estimating Hydrology and Hydraulic Runoff Parameters* (USEPA 2000) were selected to refine the initial set of BAHM parameters and stratify their variability to the modeled HRUs. Land-level hydrology was calibrated to best reflect the central tendency of land use runoff using supporting information such as soil type, canopy cover, and surface cover conditions. After the model was calibrated to reflect overall trends and reasonable process dynamics, the second phase involved fine-tuning the parameters and calculating various error statistics to find a most appropriate calibration within the range of acceptable parameter values to characterize instream transport routing processes in conjunction with other natural or anthropogenic activities, as applicable. Adjusted parameters are discussed in greater detail in Section 6.3.

For hydrologic calibration of HSPF (Bicknell et al. 1997), performance targets have been specified in various literature sources to guide the assessment of long-term, annual, and seasonal patterns (Donigian et al. 1984, Lumb et al. 1994, and Donigian 2000). The LSPC model is functionally identical to the HSPF model. Based on those literature sources, performance targets for simulation of the water balance components are summarized in Table 6-2. The error is the ratio of the absolute mean error to the mean of the observations and is expressed as a percent. Model performance was deemed fully acceptable where a performance evaluation of "Good" or "Very Good" was attained. If these levels are not attained, an analysis of sources of uncertainty and implications for model usability were conducted. The values for Error in Annual Storm Volumes in Table 6-2 are equivalent to the hydrology calibration metrics recommended by the Bay Area RAA Guidance and listed in Table 6-1. The additional calibration metrics listed in Table 6-2 were considered in the hydrology calibration to provide added confidence in model performance, beyond the minimal performance criteria recommended from the Bay Area RAA Guidance.

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Table 6-2. Performance targets for HSPF hydrology simulation (modeled vs. observed)

Model Statistic	Very Good	Good	Fair	Poor
Error in Total Volume	<5%	5-10%	10-15%	>15%
Error in 50% Lowest Flow Volumes	<10%	10-15%	15-25%	>25%
Error in 10% Highest Flow Volumes	<10%	10-15%	15-25%	>25%
Error in Annual Storm Volumes	<10%	10-15%	15-25%	>25%
Winter Total Volume Error	<15%	15-30%	30-50%	>50%
Winter Storm Volume Error	<15%	15-30%	30-50%	>50%
R^2 Monthly	≥0.85	≥0.75	≥0.65	<0.65

Sources: Donigian et al. (1984), Lumb et al. (1994), and Donigian (2000)

6.2 Model Assessment Points

Figure 6-1 presents a temporal summary of available streamflow data within the Santa Clara Basin from the United States Geological Survey (USGS) and SCVWD. A weight-of-evidence based modeling approach is strengthened by evaluating model performance against observed streamflow across different sized watersheds and time periods that capture a range of hydrologic conditions.

Eight streamflow gages were selected for comparison during the model calibration and validation process. Three gages with relatively large drainage areas, predominantly one land use type or another, were selected as primary calibration stations. Additionally, three small headwater gages were also segments for calibration. Finally, two large gages with mixed drainage areas and a long period of record were selected for validation. In general, USGS gages tended to have a longer observed period and provided continuous data over the entire year while SCVWD gages primarily provided more recent data with some gages operating over limited timeframes to only capture the wet season. These streamflow records were flagged to differentiate periods of "good" data from "missing" or "estimated" records, which were derived using non-standard methods. Data with a lower percentage of "missing" or "estimated" records are of higher quality.

Agency	Station Name	Station ID	Drainage Area (sq. mi.)	Water Years (October 1, 1998 – September 30, 2017)																			
				1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
USGS	Matadero Ck at Palo Alto CA	11166000	7.3	◕	◕	◕	◕	◓	◓	◕	◕	◕	◕	◕	◓	◕	◕	◕	◕	◕	◕	◕	◕
USGS	Guadalupe River above Highway 101 at San Jose CA	11169025	160.0					◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕
USGS	Saratoga Ck at Saratoga CA	11169500	9.2	◕	◓	◕	◕	◓	◕	◕	◕	◓	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕
USGS	Coyote Ck near Gilroy CA	11169800	109.0								◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕
USGS	Coyote Ck ab Highway 237 at Milpitas CA	11172175	319.0		◓	◕	◓	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕
SCVWD	Hale Creek below Magdalena Ct- High Flow Only	1456	2.7	◕	◕	◕	◕	◕	◕	◕	◕	◕	◓	◕	○	○	◕	◕	○	○	○	○	○
SCVWD	Thompson Creek at Quimby Rd.-High Flow Only	1463	18.1	◕	◕	◕	◕	◕	◓	◕	◕	◕	◕	◓	◓	◕	○	○	○	○	○	○	○
SCVWD	San Tomas Creek above Williams Rd	2050	13.4	◓	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◕	◓

Legend:

Data Quality (Percent Estimated):

	○	◔	◑	◕	●
No Data	90-100%	65-90%	35-65%	10-35%	0-10%

Data Quantity (Percent Complete, **Calibration** watersheds)

0%	25%	50%	75%	100%	Primary	Headwater

Data Quantity (Percent Complete, **Validation** watersheds):

0%	25%	50%	75%	100%	Validation

Figure 6-1. Temporal summary of USGS and SCVWD streamflow gages in the Santa Clara Basin.

The gages selected for calibration had at least five continuous years of "good" data records. Smaller, isolated watersheds with shorter periods of record were used for calibration, while the larger watersheds with longer continuous data were used for validation. The gages selected for calibration represent headwater areas where it was possible to isolate specific categories of HRUs or other features of interest for adjustment of model parameters during the calibration process (discussed in Section 6.3).

6.3 Model Calibration

A disciplined approach to calibration was employed that emphasized meaningful adjustments to a limited set of model parameters, identifying physical processes to justify parameter changes during successive iterations, and deemphasizing simple curve-fitting to match observed data. The watershed model calibration process focused on refining LSPC hydrology parameters while assessing the impact on model performance at three headwater USGS gages. Table 6-3 presents a summary of the drainage area characteristics for these three gages. These gages are in very different parts of the watershed: one is northern and more urban, one is western and highly forested, with high slopes, and the third represents the most western part of the watershed with high elevation. The watershed sizes, elevation ranges, locations, slope types, and land use distributions vary. Each gage is separately covering different, isolated aspects of the HRU combinations to accurately depict the hydrology of the region. Figure 6-2 presents a map showing the location of each of the three USGS gages selected for model calibration. All three sites are isolated from major impoundments or other visible hydromodifications that would heavily influence the calibration process.

Table 6-3. Summary of watershed characteristics for primary calibration sites

Calibration Site	Drainage Area	Predominant Land Cover	Predominant Hydrologic Soil Group	Predominant Slope
MATADERO C A PALO ALTO CA (USGS 11166000)	7.26	**Developed (85%)** Forest (14%)	**D (61%)** C (36%)	**Low (59%)** Med (39%)
SARATOGA C A SARATOGA CA (USGS 11169500)	9.22	**Forest (91%)** Developed (9%)	**A (58%)** C (19%) D (17%)	**Med (85%)** Low (14%)
COYOTE C NR GILROY CA (USGS 11169800)	109	**Grass (49%)** **Forest (49%)**	**D (68%)** C (30%)	**Low (50%)** **Med (50%)**

As previously discussed in Section 6.1, initial hydrology parameters were selected based on guidance from BASINS Technical Note 6: *Estimating Hydrology and Hydraulic Runoff Parameters* (USEPA 2000) often using land cover, soil type, or annual precipitation as the basis for selecting the starting values. Specific attention was given to the most sensitive hydrology parameters which govern total annual volume including Lower Zone Nominal Soil Moisture Storage (LZSN), Nominal Upper Zone Soil Moisture Storage (UZSN), Index to Mean Soil Infiltration (INFILT), and Groundwater Recession Rate (AGWRC). The Groundwater Recession parameter describing non-linear groundwater recession rates (KVARY) was initially set to 0.0 globally and subsequently not changed during calibration. The ranges of individual parameter values correspond to the HRU differences and seasonal fluctuations.

Monthly values were used for Interception Storage Capacity (CEPSC), Upper Zone Nominal Storage (UZSN), and Lower Zone Evapotranspiration (LZETP) parameters for each HRU to adjust for seasonal variation.

Initial hydrology parameters were then refined in the model for each of the three gages while focusing on selecting appropriate parameters for the most dominant HRU elements contributing to flows at each gage. For instance, the drainage area upstream of the Saratoga USGS gage (USGS 11169500) is heavily forested and is also one of the only instances in the model where HSG-A dominates the mix of soils. This site provided an opportunity to then target the adjustment of parameters during calibration for both forested land cover and HSG-A soils, specifically INFILT and AGWRC.

Table 6-4 and Table 6-5 present the quantitative and qualitative assessment of final model calibration at the three headwater USGS gages. Error statistics were computed using only days during the evaluation period with observed data. (i.e., days with missing data were excluded from the calculation). The following provides a summary of observations of the model performance from evaluating the quantitative, qualitative, and visual comparisons against observed data:

- At all three sites, results of these simulations meet the RAA guidance criteria requiring the error in model prediction of total annual volume within 10 percent of the observed data.
- The model performs well for both Matadero Creek and Coyote Creek when compared with observed data, achieving a *Very Good* assessment across all six error statistics.
- The model performs well at the Saratoga Creek monitoring location when evaluating the total annual volume, highest 10 percent of flows, and winter total volume; The annual storm volume and winter storm volume show error greater than the 15 percent threshold used to distinguish *Good* from *Very Good* performance. This could result from missing the timing or magnitude of an individual storm event.

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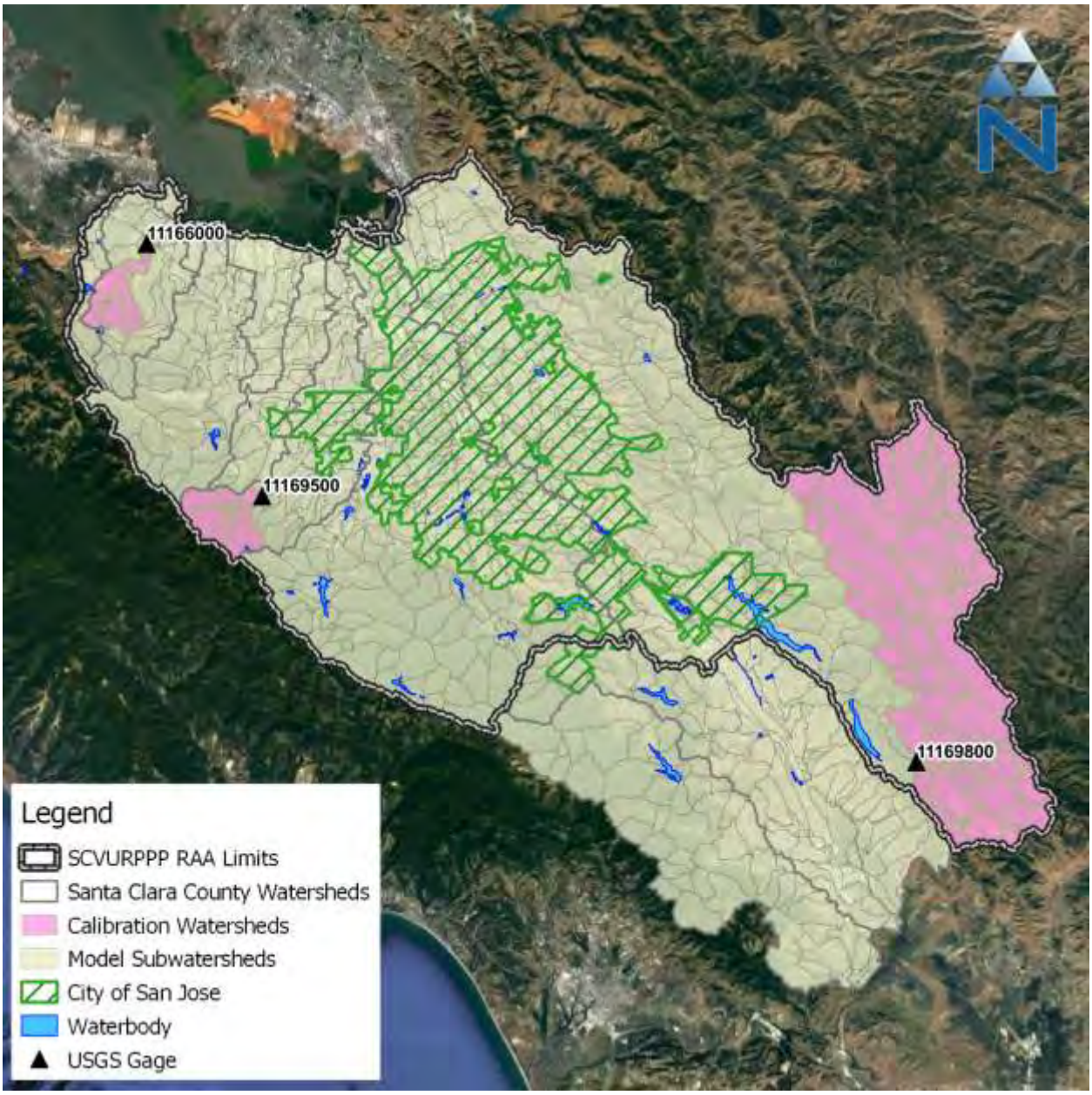

Figure 6-2. Locations of the three USGS headwater calibration gages and corresponding drainage areas.

Table 6-4. Summary of quantitative hydrology calibration performance by gage (modeled vs. observed).

Model Statistic	Matadero Creek at Palo Alto CA (USGS 11166000)	Saratoga Creek at Saratoga CA (USGS 11169500)	Coyote Creek near Gilroy CA (USGS 11169800)
Percent Error in Total Volume	1.0%	3.4%	4.0%
Error in 10% Highest Flow Volumes	-5.3%	-9.9%	0.8%
Error in Annual Storm Volumes	-9.9%	19.3%	9.0%
Winter Total Volume Error	6.3%	2.3%	-4.2%
Winter Storm Volume Error	-5.0%	15.7%	-0.8%
R^2 Monthly	0.96	0.91	0.92

Table 6-5. Summary of qualitative hydrology calibration performance by gage (modeled vs. observed).

Model Statistic	Matadero Creek at Palo Alto CA (USGS 11166000)	Saratoga Creek at Saratoga CA (USGS 11169500)	Coyote Creek near Gilroy CA (USGS 11169800)
Error in Total Volume	Very Good	Very Good	Very Good
Error in 10% Highest Flow Volumes	Very Good	Very Good	Very Good
Error in Annual Storm Volumes	Very Good	Good	Very Good
Winter Total Volume Error	Very Good	Very Good	Very Good
Winter Storm Volume Error	Very Good	Good	Very Good
R^2 Monthly	Very Good	Very Good	Very Good

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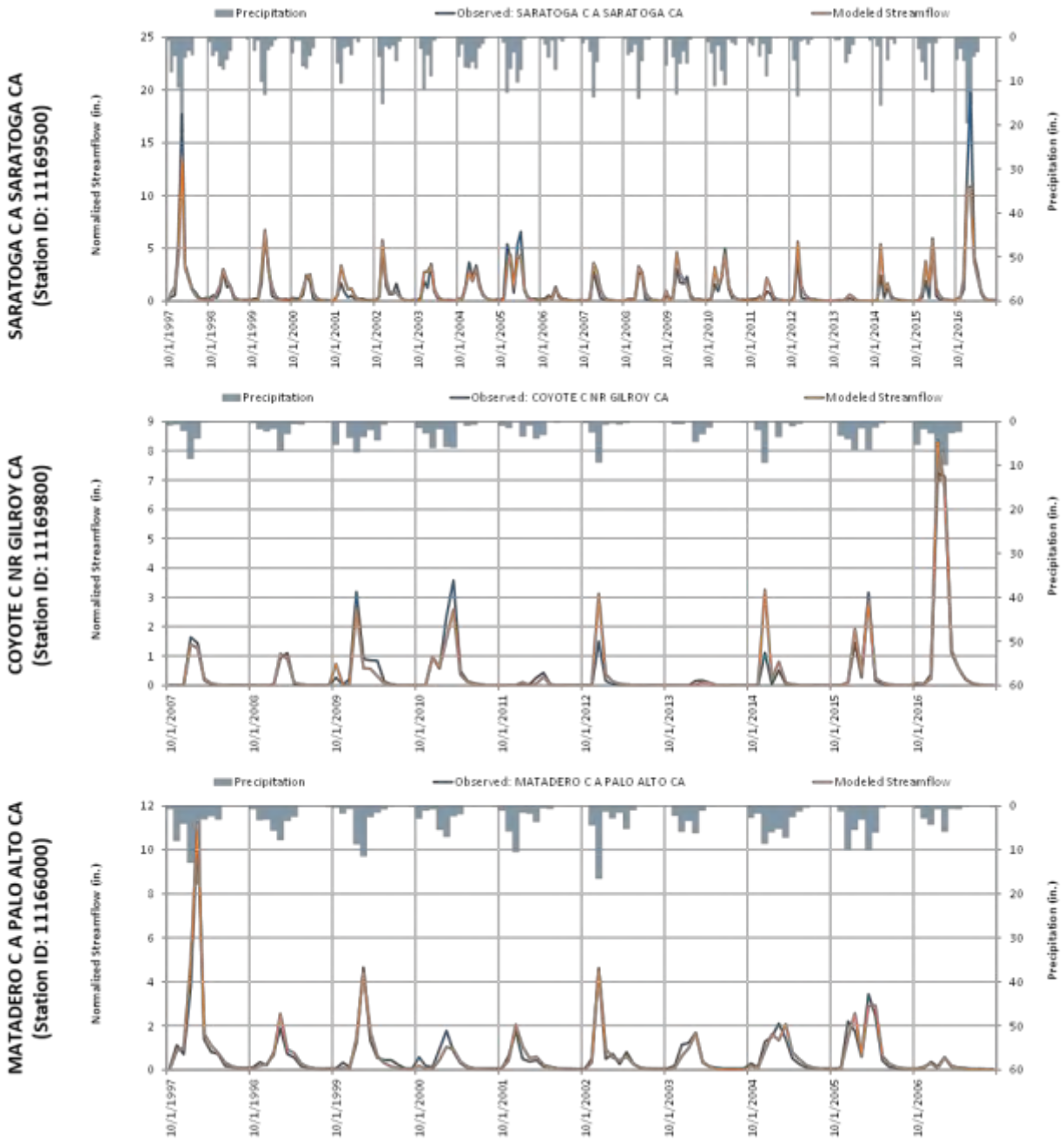

Figure 6-3. Summary of modeled vs. observed monthly streamflow at headwater calibration sites.

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6.4 Model Validation: Headwaters

Model validation is often defined as a quantitative comparison of model results independently derived from experiments or observations of the environment (USEPA 2015). Sometimes validations are performed using independent points in space (i.e., observed data at different locations) while other times validation assesses independent periods of time (i.e., different years at the same locations used for calibration). An important distinction from model calibration is that no elements of the model physical or process representation are changed during the validation process.

Figure 6-4 presents a map showing the location of each of the three headwater SCVWD gages selected for model validation. These gages are located on smaller, urban tributaries with isolated upstream drainage areas and no major impoundments that were visible doing a desktop analysis of aerial photography and readily available GIS data. Some of these gages are described as only monitoring during high-flow periods, therefore, the validation statistics were calculated using only days when observed data were available.

Table 6-6 and Table 6-7 present quantitative and qualitative assessments of model validation performance. Error statistics were computed using only days during the evaluation period with observed data (i.e., days with missing data were excluded from the calculation). This is most relevant to the validation comparisons using SCVWD observed streamflow data as several stations, including Thompson Creek and Hale Creek, are noted as monitoring only during high flow periods.

The following provides a summary of observations of the model performance from evaluating the quantitative, qualitative, and visual comparisons against observed data:

- Model performance meets the RAA guidance criteria requiring the error in model prediction of total annual volume to be within 10 percent of the observed data at all three sites.
- The model performs well when compared with observed data for San Tomas Aquino Creek, achieving a *Very Good* assessment across five of six metrics. Several notable years in the graphs (i.e., Water Years 2009, 2009, 2017) were missing observed data and therefore were excluded from the calculation of performance metrics.
- Hale Creek and Thompson Creek achieve a *Very Good* assessment across all but two metrics. Error in annual storm volumes still achieves a *Good* assessment based on criteria from Table 6-2. The winter total volume error also includes periods of lower flow which were not a focus of the calibration.

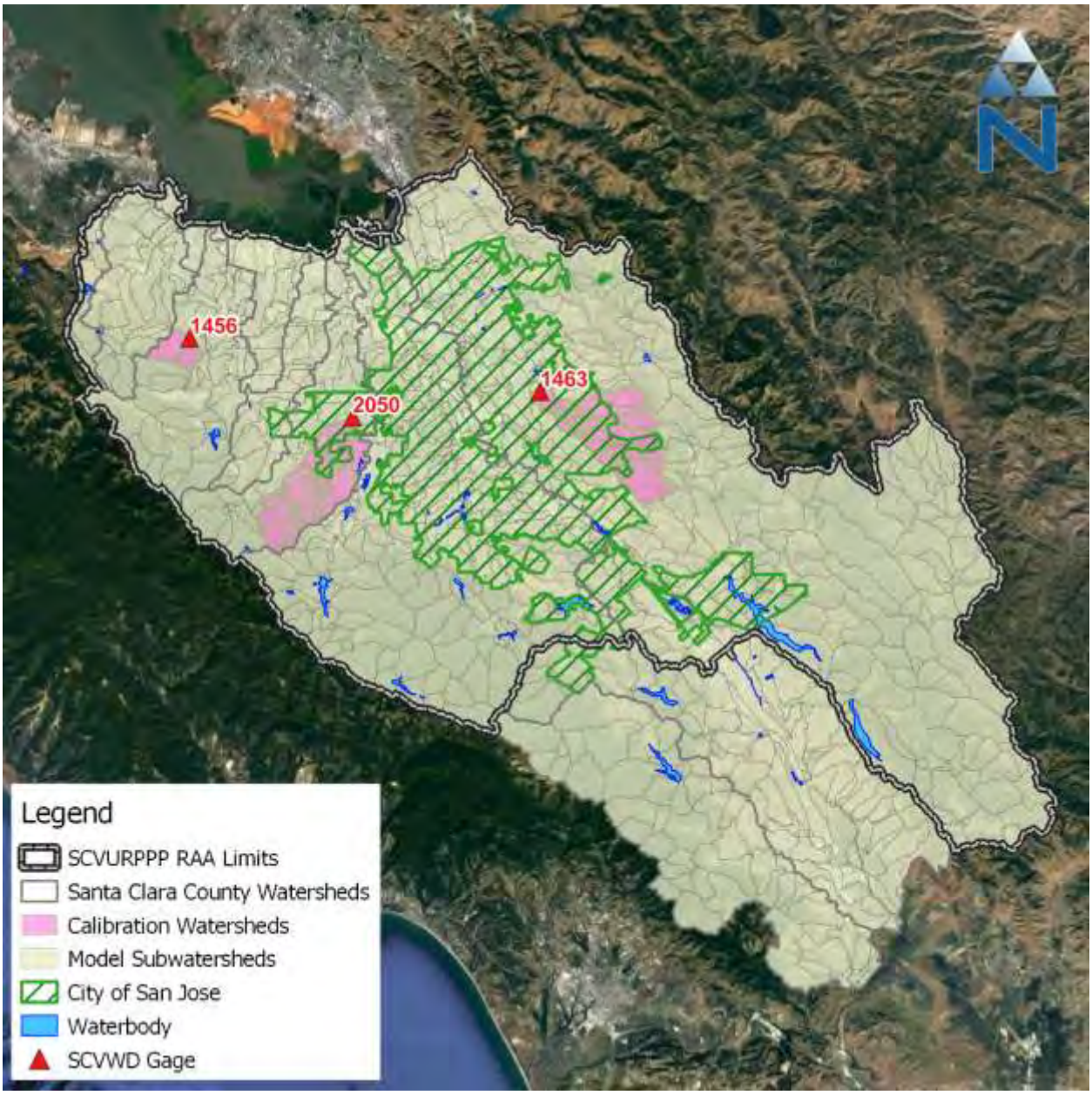

Figure 6-4. Locations of the three SCVWD headwater validation gages and corresponding drainage areas.

Table 6-6. Summary of quantitative headwater validation performance by gage (modeled vs. observed).

Model Statistic	Hale Creek below Magdalena Ct (SCVWD 1456)	San Tomas Creek at Williams Rd (SCVWD 2050)	Thompson Creek at Quimby Rd. (SCVWD 1463)
Error in Total Volume	2.6%	2.7%	0.5%
Error in 10% Highest Flow Volumes	-4.3%	-15.6%	-5.5%
Error in Annual Storm Volumes	-12.4%	-4.7%	-9.6%
Winter Total Volume Error	13.6%	-1.9%	12.2%
Winter Storm Volume Error	-3.9%	-7.4%	3.9%
R^2 Monthly	0.88	0.94	0.72

Table 6-7. Summary of qualitative headwater validation performance by gage (modeled vs. observed).

Model Statistic	Hale Creek below Magdalena Ct (SCVWD 1456)	San Tomas Creek ab Williams Rd (SCVWD 2050)	Thompson Creek at Quimby Rd. (SCVWD 1463)
Error in Total Volume	Very Good	Very Good	Very Good
Error in 10% Highest Flow Volumes	Very Good	Fair	Very Good
Error in Annual Storm Volumes	Good	Very Good	Very Good
Winter Total Volume Error	Good	Very Good	Good
Winter Storm Volume Error	Very Good	Very Good	Very Good
R^2 Monthly	Very Good	Very Good	Fair

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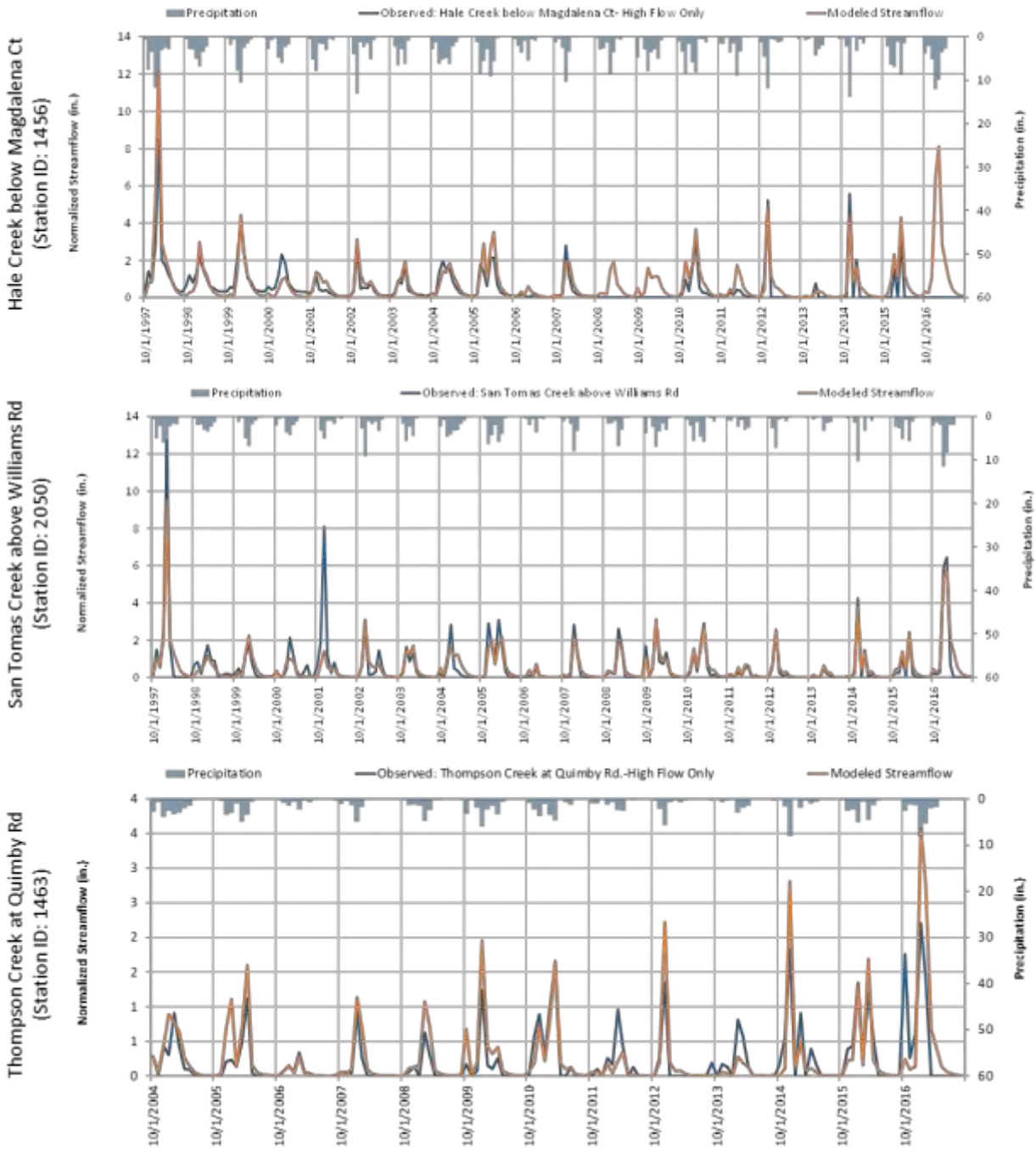

Figure 6-5. Summary of modeled vs. observed monthly streamflow at headwater validation sites.

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6.5 Model Validation: Downstream

After performing calibration and validation for isolated headwater gages presented in Section 6.3 and Section 6.4, two downstream USGS gages on Coyote Creek and Guadalupe River were assessed as a final validation of the full model domain for those two watersheds. Figure 6-6 presents a map showing the location of the two downstream USGS gages selected for model validation.

The model results at these two sites required the representation of large reservoirs/impoundments in the routing network, including Guadalupe Reservoir, Coyote Reservoir, and Anderson Reservoir. The drainage area to Coyote and Anderson Reservoirs represents approximately 61 percent of the total drainage area at the downstream USGS gage on Coyote Creek. In 2011, restrictions were implemented for Anderson Reservoir that reduced the operating storage levels below full capacity of approximately 90,000 acre-feet (SCVWD 2018a). These restrictions were then adjusted in July 2011, increasing the currently allowed storage capacity by 11 percent (SCVWD 2018b). Since the watershed model is not capable of simulating this impoundment with dynamic changes in storage capacity, the validation at the Coyote Creek gage was evaluated for the three-year period from 10/1/2006 through 9/30/2009, prior to when these storage restrictions took effect.

Because reservoir releases are mostly mechanical, observed streamflow data from Coyote Creek at Madrone (SCVWD #1498) were used to develop a timeseries of operational releases for Anderson Reservoir. This process was primarily visual and involved establishing a threshold under which the observed streamflow was considered an operational release. Those releases were added to the model as a point withdrawal/diversion. Extreme events were allowed to naturally overflow the modeled reservoir spillway.

Table 6-8 and Table 6-9 present the quantitative and qualitative assessment of validation performance at the two downstream USGS gages on Coyote Creek and Guadalupe River. Error statistics were computed using only days during the evaluation period with observed data (i.e., days with missing data were excluded from the calculation). The following provides a summary of observations of the model performance from evaluating the quantitative, qualitative, and visual comparisons against observed data:

- For both gages, results of the model met the RAA guidance criteria requiring the error in model prediction of total annual volume to be within 10 percent of the observed streamflow.
- The model performs well when compared with observed data for Coyote Creek, achieving a *Very Good* assessment across all six metrics. Close to 40 percent of the drainage area to this streamflow gage is downstream of Anderson Reservoir which reflects the outcome of the LSPC model setup and calibration primarily within the City of San José.
- The model performs well for Guadalupe River when comparing against the total annual volume and highest 10 percent of flows metrics; however, the annual storm volume and wet season metrics may need additional refinement. There are other known hydraulic controls in the watershed that may not be fully represented in terms of timing and volume impacts on modeled instream flow. These include the Almaden-Calero diversion channel, recharge operations at Los Alamitos ponds, and the inflatable Kirk Dam on Los Gatos Creek (Figure 6-7). Sometimes water from behind Kirk Dam is also diverted out of the Guadalupe River watershed into recharge ponds in the neighboring watershed. Nevertheless, because differences in model performance are most likely attributable to instream hydraulic controls, the predicted runoff at the HRU level is considered suitable and representative for use as boundary conditions for GSI modeling for the RAA.

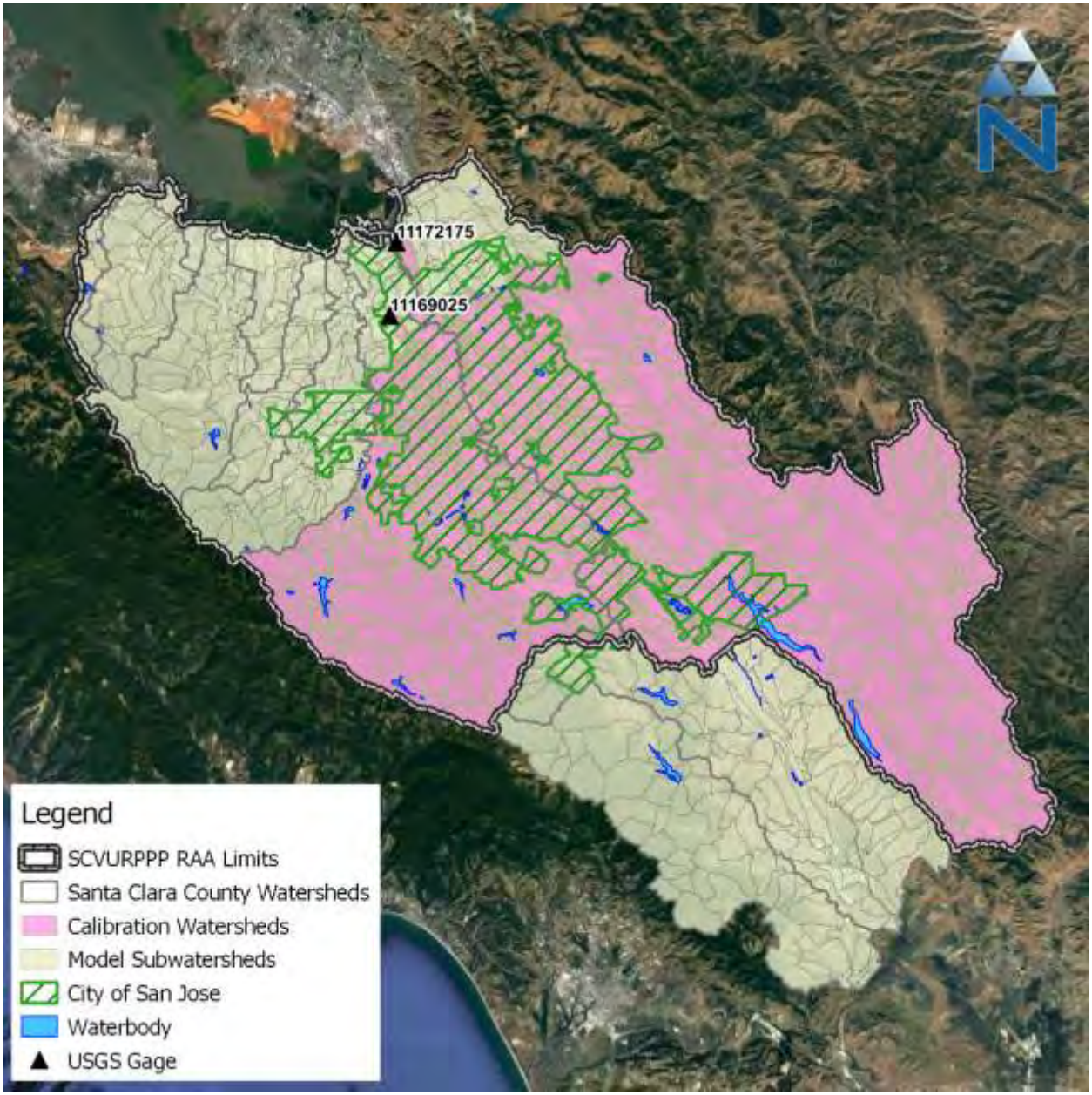

Figure 6-6. Locations of the two USGS downstream validation gages and corresponding drainage areas.

Table 6-8. Summary of quantitative downstream validation performance by gage (modeled vs. observed).

Model Statistic	Coyote Creek above Highway 237 at Milpitas CA (USSG 11172175)	Guadalupe River above Highway 101 at San José CA (USGS 11169025)
Error in Total Volume	2.7%	-3.1%
Error in 10% Highest Flow Volumes	1.2%	8.9%
Error in Annual Storm Volumes	5.6%	34.7%
Winter Total Volume Error	9.7%	13.3%
Winter Storm Volume Error	5.6%	31.2%
R^2 Monthly	0.87	0.81

Table 6-9. Summary of qualitative downstream validation performance by gage (modeled vs. observed).

Model Statistic	Coyote Creek above Highway 237 at Milpitas CA (USSG 11172175)	Guadalupe River above Highway 101 at San José CA (USGS 11169025)
Error in Total Volume	Very Good	Very Good
Error in 10% Highest Flow Volumes	Very Good	Very Good
Error in Annual Storm Volumes	Very Good	Poor
Winter Total Volume Error	Very Good	Good
Winter Storm Volume Error	Very Good	Fair
R^2 Monthly	Very Good	Good

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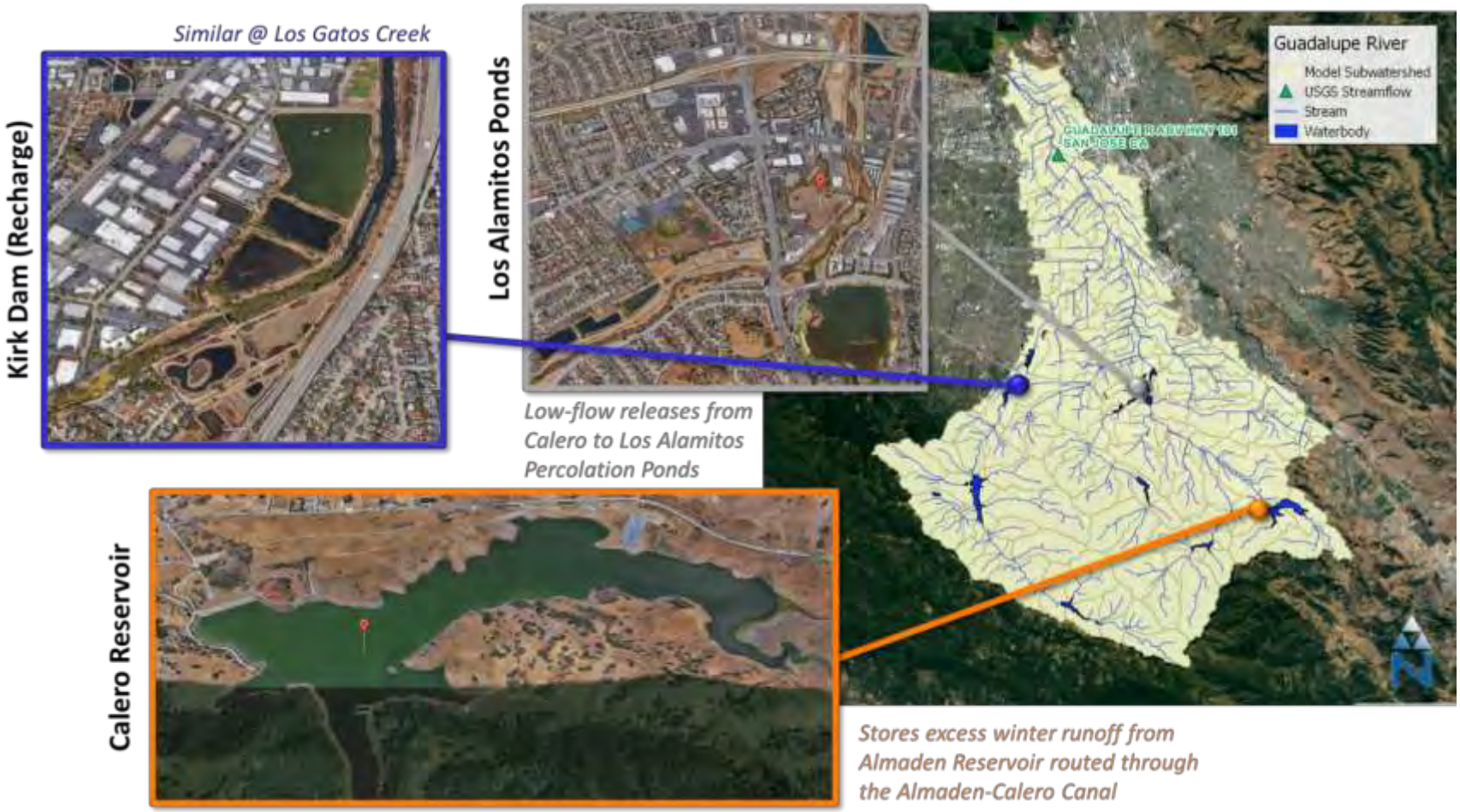

Figure 6-7. Guadalupe River watershed delineation, reservoir segments, and hydromodification features.

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7 BASELINE SEDIMENT LOADING

Regional studies conducted in the Bay Area have assessed monitoring data and quantified mercury and PCB loading rates with sediment as the primary mode of delivery (Gilbreath et al. 2018; McKee 2017). Those studies show that the relative distribution of mercury and PCB yields vary spatially as a function of contributing land use, sediment, and pollutant sources. Figure 7-1 shows regression-based pollutant yield estimates at two locations in the Guadalupe River watershed. The watershed upstream of the Almaden Expressway is largely undeveloped; however, there is an urbanized portion between the Expressway and Highway 101. Yield estimates show relatively comparable sediment yield at both locations; however, PCBs and mercury are notably different and inverted in relative magnitudes. Findings from those datasets provide meaningful insight for source characterization and model parameterization. It suggests that in the Guadalupe River, PCBs are predominantly associated with urban sediment, while mercury is predominantly associated with loads from natural areas.

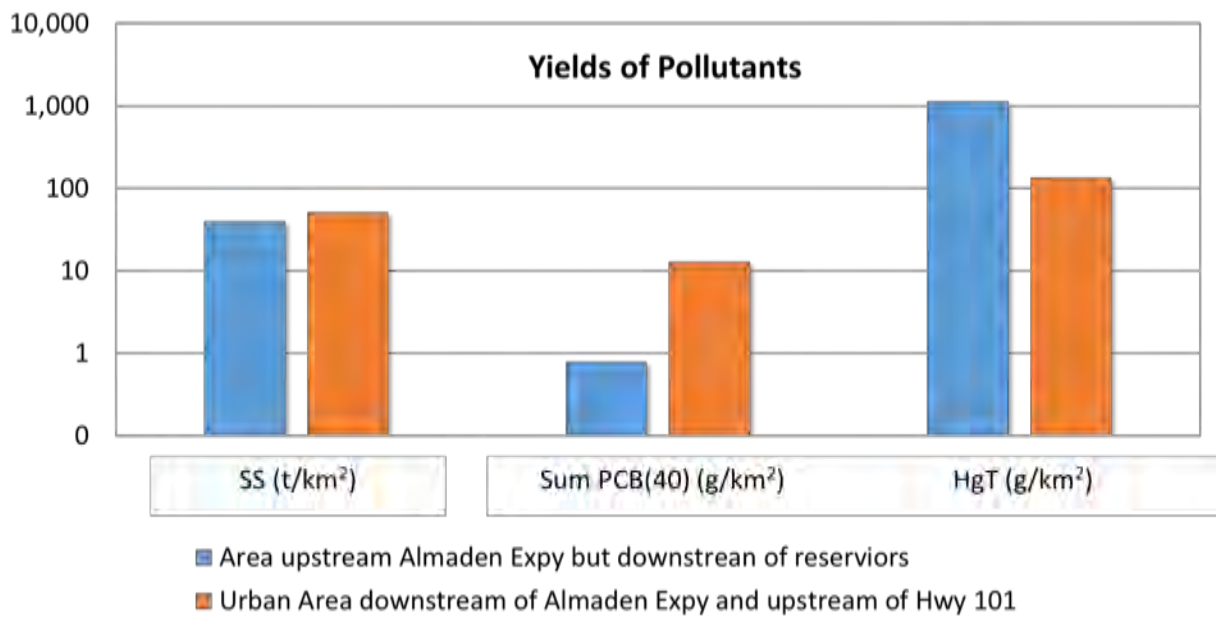

Figure 7-1. Regression-based pollutant yield estimates derived from instream monitoring data in the Guadalupe River (McKee et. al 2017).

Model representation of sediment builds upon the hydrology calibration and is considered the primary mode of delivery for PCBs and mercury in this study; therefore, modeling erosion and sediment mobilization is the next step in the top-down weight of evidence-based approach implemented for the hydrology model calibration. Once that primary mode of pollutant delivery has been established, sediment-associated mercury and PCBs are simulated. Throughout the water quality calibration process, intermediate checks, data sources, and references are consulted to ensure that assumptions are reasonable and error propagation is minimized. This section describes sediment calibration.

Sediment sources and mobilization processes vary with land cover (pervious/impervious) and soil type. PCBs and some mercury are associated with urban runoff; but, when calibrating to mixed instream sediment samples, it is helpful to characterize relative loadings from all sources. The advantage of an HRU-based approach is that it retains much of the resolution of spatial variability for

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model parameterization at the level of the smallest modeling unit (land unit). This minimizes the need to specify diverse combinations of model parameter groups at the subwatershed level. Sediment calibration was performed in two steps: (1) edge-of-field yield estimation and (2) instream transport.

7.1 Edge-of-Field Sediment Yield Estimation

The edge-of-field sediment yield is the load as measured at an individual source (e.g., runoff load by land use). One of the key attributes of the STATSGO/SSURGO soil layer is the K-factor, which is a measure of soil erodibility (detachment and runoff). K-factor was estimated as an area-weighted average value of the uppermost soil layer for each HRU raster pixel. In the model, soil erodibility is a calibrated process by HRU. Clay soils, which are more resistant than sand and silt to detachment, tend to have relatively low K values (0.05 to 0.15). Likewise, coarse-textured sandy soils that are easily detached, but are not easily mobilized by runoff, also have low K values (0.05 to 0.2). Soils with moderate silt and loam content have moderate K values (0.2 to 0.4) because they are moderately susceptible to both detachment and runoff. Soils with high silt content are the most erodible of all soils (K > 0.4), because they are easily detached and are associated with high rates of runoff. K-factor was cross-tabulated for areas having the same hydrologic soil group, as summarized in Table 7-1. Soil erodibility metrics in the Santa Clara Basin differ notably. The K-factor percentile distribution was computed across all modeled watersheds. The STATSGO/SSURGO spatial layers were intersected with the model subwatersheds. Areas were binned by hydrologic soil group into 10 percentile bins of K-factor magnitude. Table 7-1 shows erodible soils composition in the Santa Clara Basin. The analysis showed that D soils were moderately erodible, while C soils were generally more erodible in both areas, suggesting that C soils parameterization should result in slightly more erodibility than D soils, even though D soils produce more runoff than C soils. This finding was used to inform parameter selection for each HRU associated with hydrologic soil groups.

Table 7-1. K-Factor vs. hydrologic soil group and associated soil erodibility (Source Data: STATSGO/SSURGO)

K-Factor (Soil Erodibility)					Hydrologic Soil Group (% of Area)			
Percentile			Min	Max	A	B	C	D
Guadalupe Watershed	← High Moderate Low →	0-10%	0.00	0.03	11.2%	1.2%	9.7%	7.7%
		10-20%	0.03	0.05	0.8%	7.1%	14.8%	1.3%
		20-30%	0.05	0.07	--	0.0%	37.7%	0.0%
		30-40%	0.07	0.10	--	--	4.4%	0.6%
		40-50%	0.10	0.13	--	--	0.2%	--
		50-60%	0.13	0.17	--	--	0.1%	--
		60-70%	0.17	0.20	--	--	--	--
		70-80%	0.20	0.21	--	--	1.2%	--
		80-90%	0.21	0.24	0.1%	--	1.9%	--
		90-100%	0.24	0.44	--	--	--	--

Erodibility	HSG	Soils Composition
Low	A	Sand, Loamy Sand, or Sandy Loam
Moderate	B	Silt, Silt Loam or Loam
High	C	Sandy Clay Loam
Moderate	D	Clay Loam, Silty Clay Loam, Sandy Clay, Silty Clay, or Clay

As shown in Table 7-1 and illustrated in Figure 7-2, soil texture and soil erodibility are both associated with hydrologic soil group. Most Santa Clara Basin watersheds that drain to the Bay do not have any soil classification because of the density of urban land cover; however, PCB-contaminated sediment originates from aging and deterioration of old urban infrastructure, building demolition, and build-up/deposition on associated urban surfaces. This analysis is part of establishing relative sediment load levels across among all sources of sediment – pollutants of interest (PCBs and mercury) are modeled as sediment-associated constituents. Within a given soil group, K-factor varies with soil texture. About 60 percent of the soils are C and 25 percent are D soils. The spatial variability of K-factor within the region is shown in Figure 7-3.

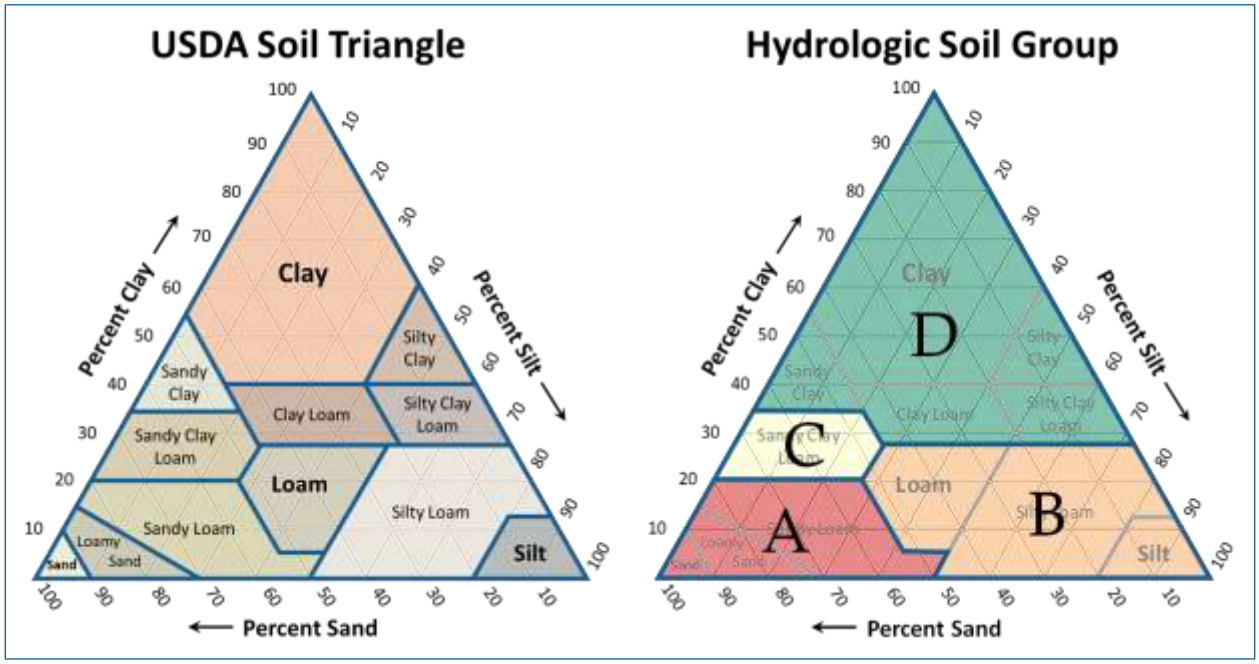

Figure 7-2. Standard USDA Soil Triangle with Hydrologic Soil Group mapping.

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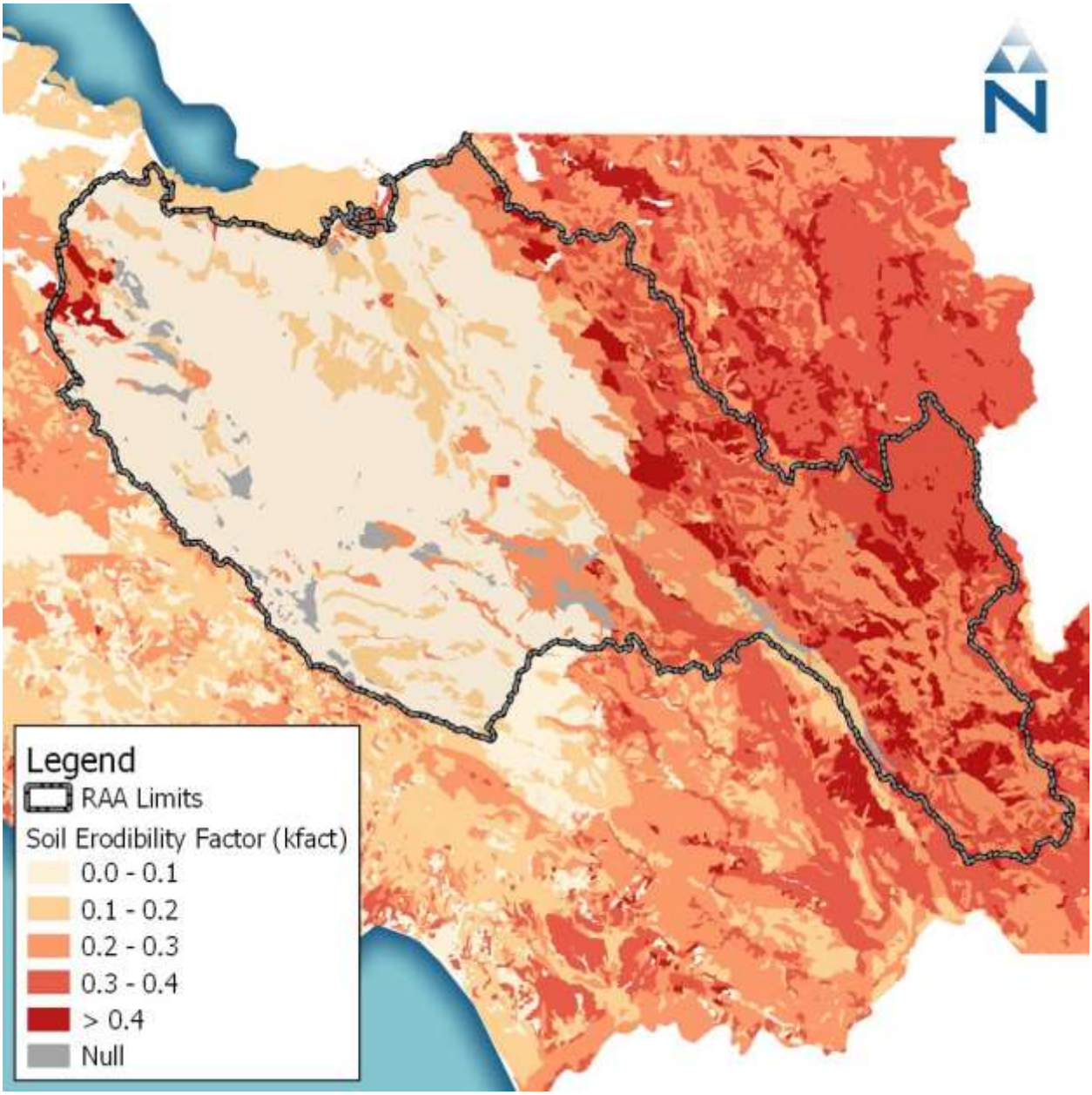

Figure 7-3. Soil Erodibility K-Factor (Source: USDA SSURGO).

A literature review of local and natural sediment yields and event-mean concentrations by land use type was conducted to summarize documented ranges of variability by source. Because the model configuration reflects physical characteristics of the land surface, such as slope and soil type, and spatial variability of meteorological conditions, the goal of model calibration is to parameterize sediment properties that capture the relative range of variability among sources observed in literature. Table 7-2 summarizes yield estimates from literature and Figure 7-4 shows the range of variability in the modeled response across different watersheds.

Table 7-2. Summary of regional sediment yield estimates by land use

Land Use	Load ($t/km^2/year$)			Data Sources and Locations
	Min	Mean	Max	
Natural	0.3	--	72	San Francisco Bay Region[1], National[4]
Agriculture	--	2,461	--	San Francisco Bay Region[1], National[4]
Low Density Urban	21	--	450	San Francisco Bay Region[1], National[4]
High Density Urban	47	--	996	San Francisco Bay Region[1], National[4]
Industrial	--	1,836	--	San Francisco Bay Region[1], National[4]
Commercial	--	112	--	National[4]
Urban Watersheds ALL	44	--	788	San Francisco Bay Region[1]
Urban	--	24.9	--	Hayward, CA. San Francisco Bay Region[2]
Combined	--	36	--	Guadalupe River Watershed, Santa Clara, CA[2]
Combined	11.9	--	28.2	Guadalupe River Watershed, Santa Clara, CA[3]

1. Watershed specific and regional scale suspended sediment loads for Bay Area small tributaries. (McKee et al. 2009)
2. Concentrations and loads of trace contaminants in the Zone 4 Line A small tributary, Hayward, California: Water Year 2007. (McKee et al.2009)
3. Watershed specific and regional scale suspended sediment loads for Bay Area small tributaries. (McKee et al.2009)
4. Typical Pollutant loading from Runoff by Urban Land Use (USEPA 1999)

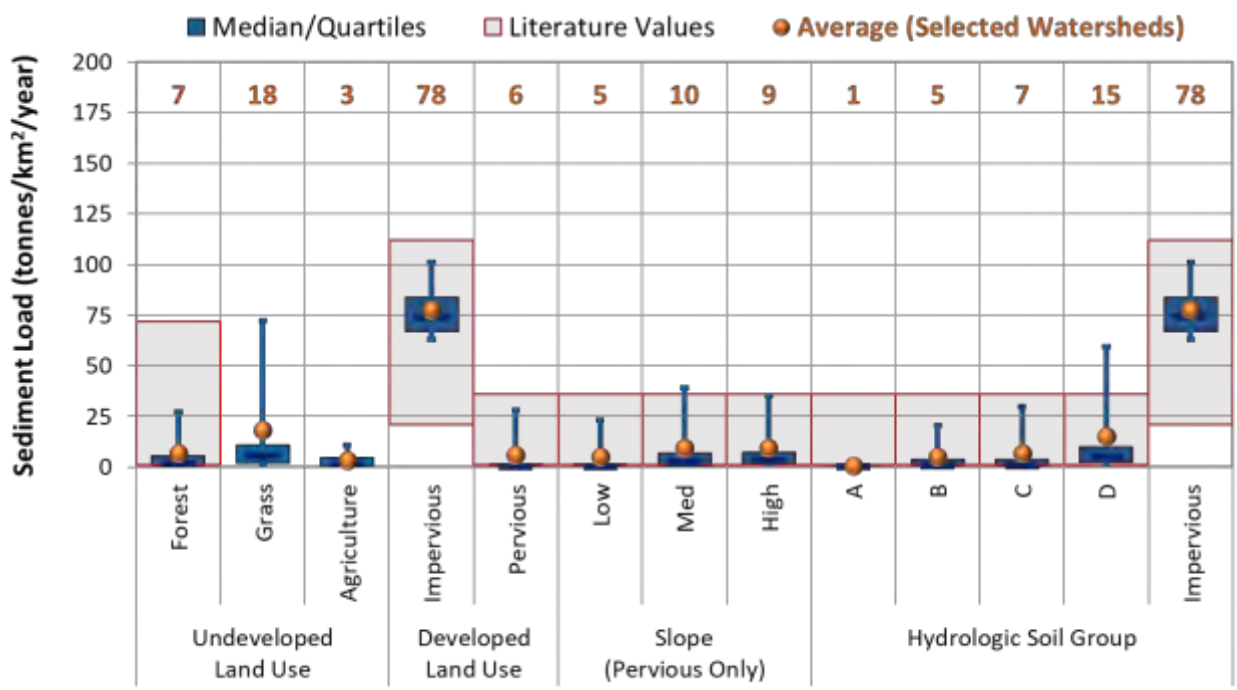

Figure 7-4. Modeled vs. literature ranges for sediment yield by broad land use categories, slope and hydrological soil group.

7.2 Instream Sediment Transport

Sediment generated from the land is partitioned into sand, silt, and clay using fractions by land use before getting routed to stream segments associated with each subwatershed. LSPC represents sediment transport processes (i.e., settling and resuspension) as a function of modeled shear stress (τ), the lateral force of the water imposed on the channel cross-section (USEPA 2006). Simulated τ values vary as a function of stream cross-sectional area, slope, and streamflow. Modeled τ timeseries from the 882 stream segments were grouped and sorted by normalized flow depth over a long-term simulation time period, as summarized in Figure 7-5. Normalized flow depth was calculated for each modeled segment by dividing the average annual streamflow rate through the segment by the cumulative upstream drainage area for the segment. As expected, wetter stream segments have τ values that vary more widely over time than drier stream segments. The most variation in τ also occurs with wet weather (i.e., during the highest 10 percent of flows and time).

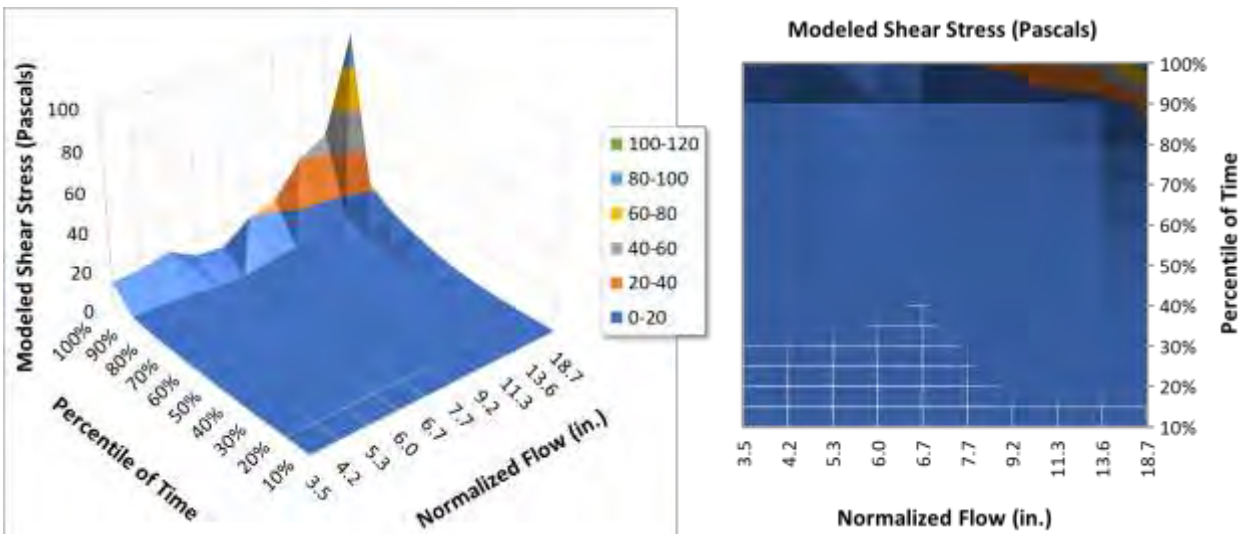

Figure 7-5. Modeled sheer stress × normalized streamflow duration surface for all modeled SCVURPPP stream segments.

Critical shear stress, the threshold that triggers settling or resuspension, is a property of the sediment classes in the transport system. Lighter particles are more easily resuspended than heavier particles and tend to remain in suspension longer than heavier particles. Streams with higher slopes and flow rates will tend to resuspend sediment more easily and more often, while streams with lower slopes and lower flow rates will tend to experience more sediment deposition. The critical shear stress values (for silt and clay) derived through calibration are summarized in Table 7-3.The critical shear stress values are plotted against the range of modeled τ-values in Figure 7-6. Figure 7-7 summarizes the percent of time that silt and clay are in deposition, transport, or resuspension by flow rate.

Table 7-3. Calibrated critical sheer stress values by sediment class

Sediment Class	Deposition	Resuspension
Sand	Power Function[1]	Power Function[1]
Silt	1.5 Pa (0.15 kg/m^2)	3.4 Pa (0.35 kg/m^2)
Clay	0.3 Pa (0.03 kg/m^2)	2.5 Pa (0.25 kg/m^2)

1: Sand transport is modeled using a power function on velocity (coefficient and exponent)

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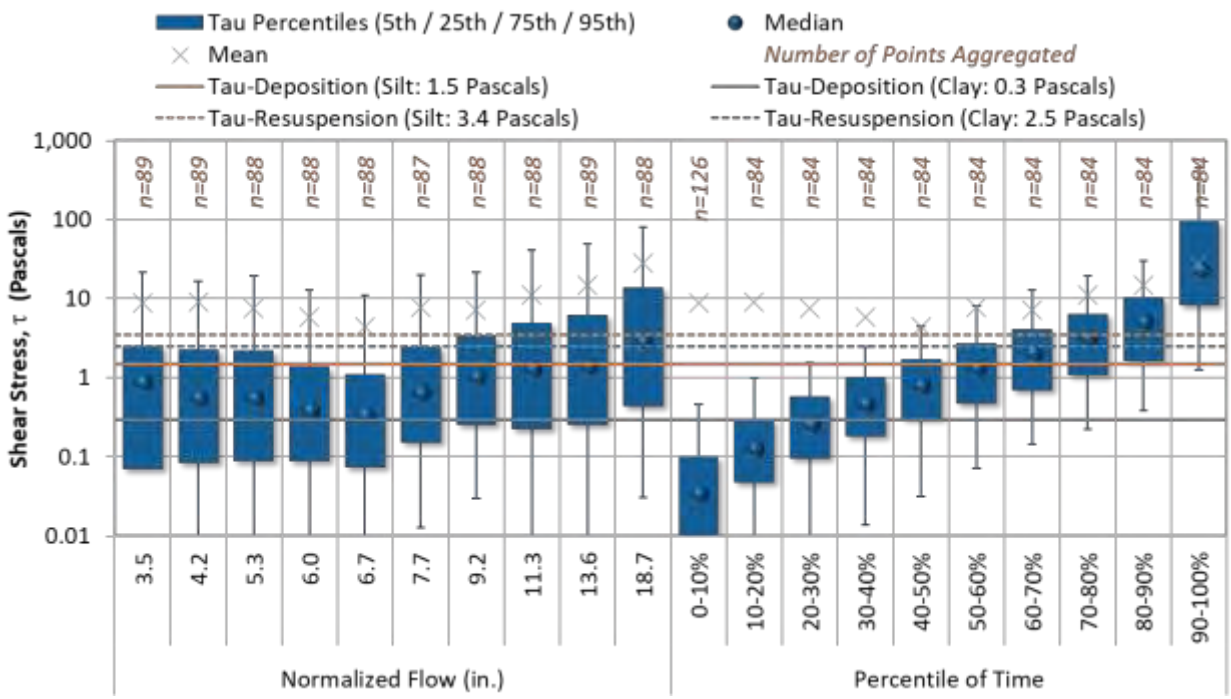

Figure 7-6. Critical shear stress for silt and clay against the range of modeled τ-values by flow and over time.

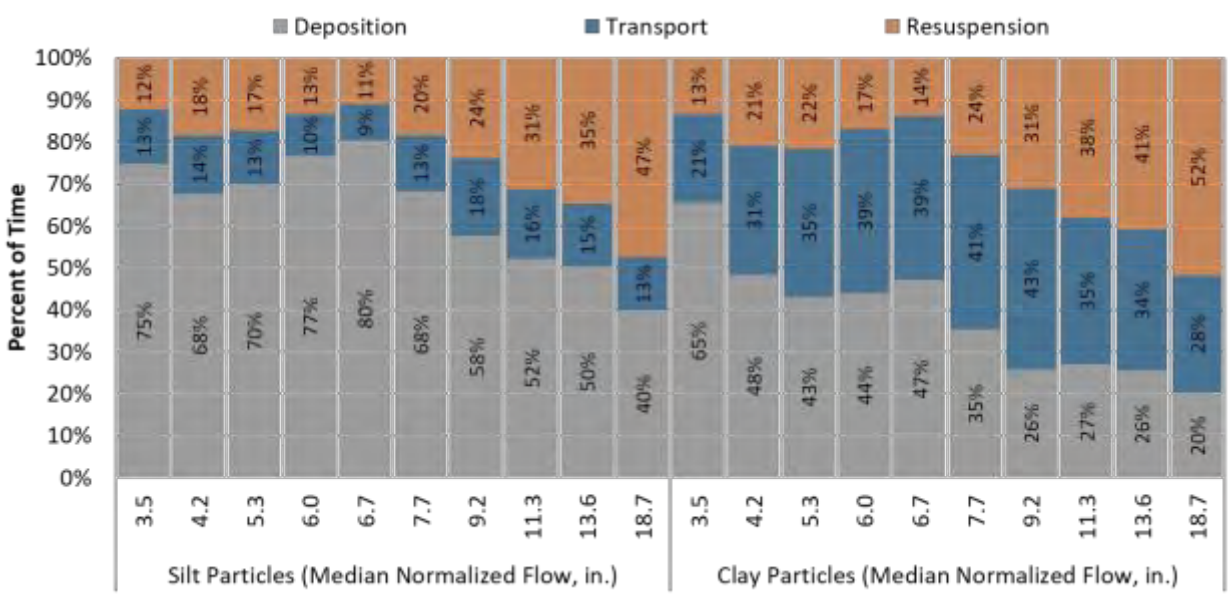

Figure 7-7. Percent of time that silt and clay particles spend in deposition, transport, and resuspension vs. normalized flow for all modeled segments (based on calibrated critical shear stress values).

Figure 7-7 highlights the fate and transport of silt and clay particles, which represent "cohesive" or "suspended" sediment, to which PCB and mercury loads are associated in the model. During sediment transport, heavier silt particles tend to settle more than clay particles, which tend to resuspend and remain in transport more of the time. Total sediment is modeled during model calibration because the observed data represent the sum of sand, silt, and clay; however, because PCBs and mercury are

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associated with cohesive sediment (i.e., silts and clays), the transport of cohesive sediment portion will be more closely aligned with those pollutants' fate and transport for instream routing and through green stormwater infrastructure devices.

Daily mean suspended sediment concentration and discharge data from the United States Geological Survey (USGS) monitoring location on the Guadalupe River (USGS 11169025 GUADALUPE River above Highway 101 A SAN JOSE CA) were used to calibrate and validate sediment transport. Comparing point-to-point daily, monthly or annual loads produced some scatter because of underlying model configuration assumptions and differences in precipitation/runoff timing. Figure 7-8 shows a comparison of annual loads by water year from 2004 through 2015. The goal of model calibration was to replicate the range of magnitude and frequency observed instream. Load duration curves of modeled and observed loads were used to gage the central tendency and the distribution/range of modeled load relative to observed. Figure 7-9 presents a comparison of the modeled vs. observed sediment load for the period from 10/1/2003 through 4/30/2015. The left panel shows a scatter plot comparison of the load-duration curve, while the right two panels show median, average, and range of annual and monthly modeled vs. observed values, respectively. The slope (1.0183) and R^2 (0.9947) values both suggest that the LSPC model is a robust predictor of both the magnitude and range of observed sediment load over a wide range of years (water years 2004-2015).

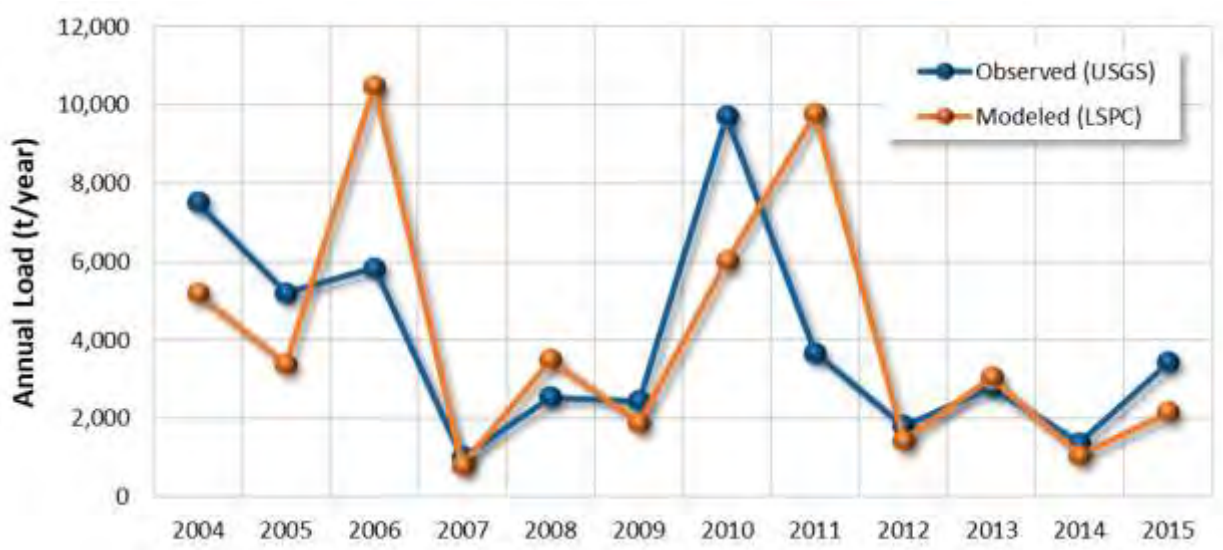

Figure 7-8. Comparison of modeled vs. observed annual sediment load for Guadalupe River (USGS 11169025 GUADALUPE River above Highway 101 A SAN JOSE CA).

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Table 7-4. Summary of annual observed and modeled loads at for Guadalupe River (USGS 11169025 GUADALUPE River above Highway 101 A SAN JOSE CA)

Water Year	Annual Load (t/year)		Rank	Ranked Comparison (t/year)		
	Observed	Modeled		Observed	Modeled	RME (%)
2004	7,503	5,191	1	9,704	10,489	7%
2005	5,205	3,389	2	7,503	9,780	23%
2006	5,839	10,489	3	5,839	6,019	3%
2007	1,006	808	4	5,205	5,191	0%
2008	2,545	3,498	5	3,677	3,498	-5%
2009	2,445	1,889	6	3,426	3,389	-1%
2010	9,704	6,019	7	2,800	3,049	8%
2011	3,677	9,780	8	2,545	2,149	-18%
2012	1,808	1,444	9	2,445	1,889	-29%
2013	2,800	3,049	10	1,808	1,444	-25%
2014	1,376	1,055	11	1,376	1,055	-30%
2015	3,426	2,149	12	1,006	808	-24%
Average	**3,944**	**4,063**	**Average**	**3,944**	**4,063**	**3%**

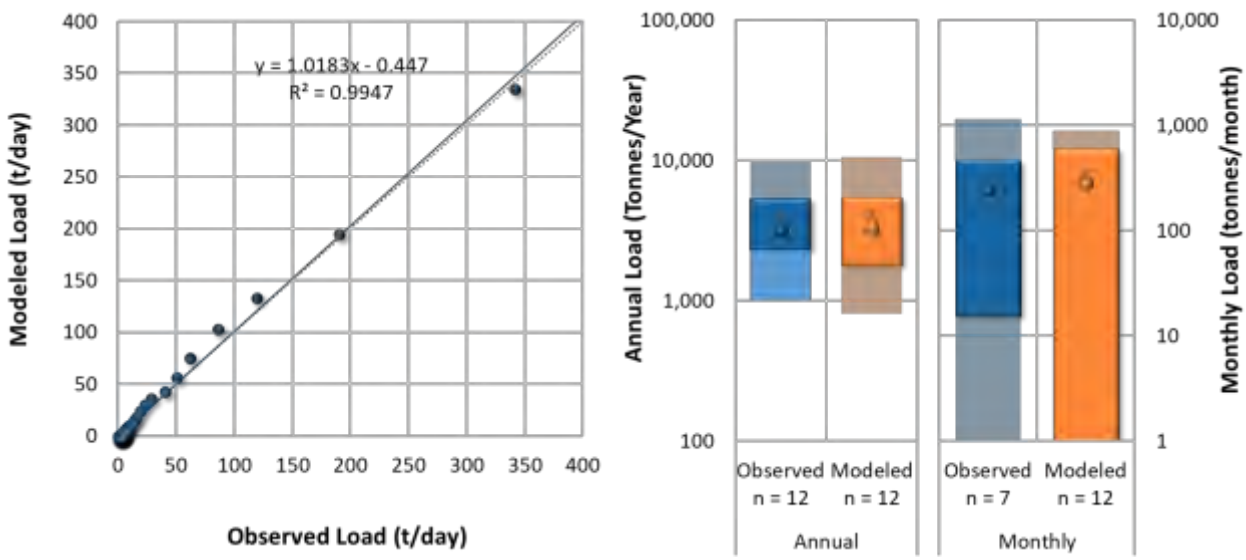

Figure 7-9. Comparison of modeled vs. observed load duration (left) and annual and monthly loads (right) for Guadalupe River (USGS 11169025 GUADALUPE River above Highway 101 A SAN JOSE CA).

To assess annual and seasonal storm impact on instream sediment concentrations, Figure 7-10 and Figure 7-11 compare modeled vs. observed instream sediment concentration during wet-weather (i.e., approximated as the top 10 percent of modeled streamflow) and the inverse condition (i.e., lower 90 percent of modeled flows). In general, both figures demonstrate by visual comparison that the model also predicts across the interquartile ranges of observed instream suspended sediment concentration. The model tends to underpredict the median concentrations but is able to capture the range of concentrations reflected in the observed data for the critical-condition winter wet-weather period (Figure 7-10). The top 10 percent of flows during the winter period is most representative of the wet-weather conditions for which runoff management through GSI is appropriate suggesting the calibrated model is suitable for conducting the RAA.

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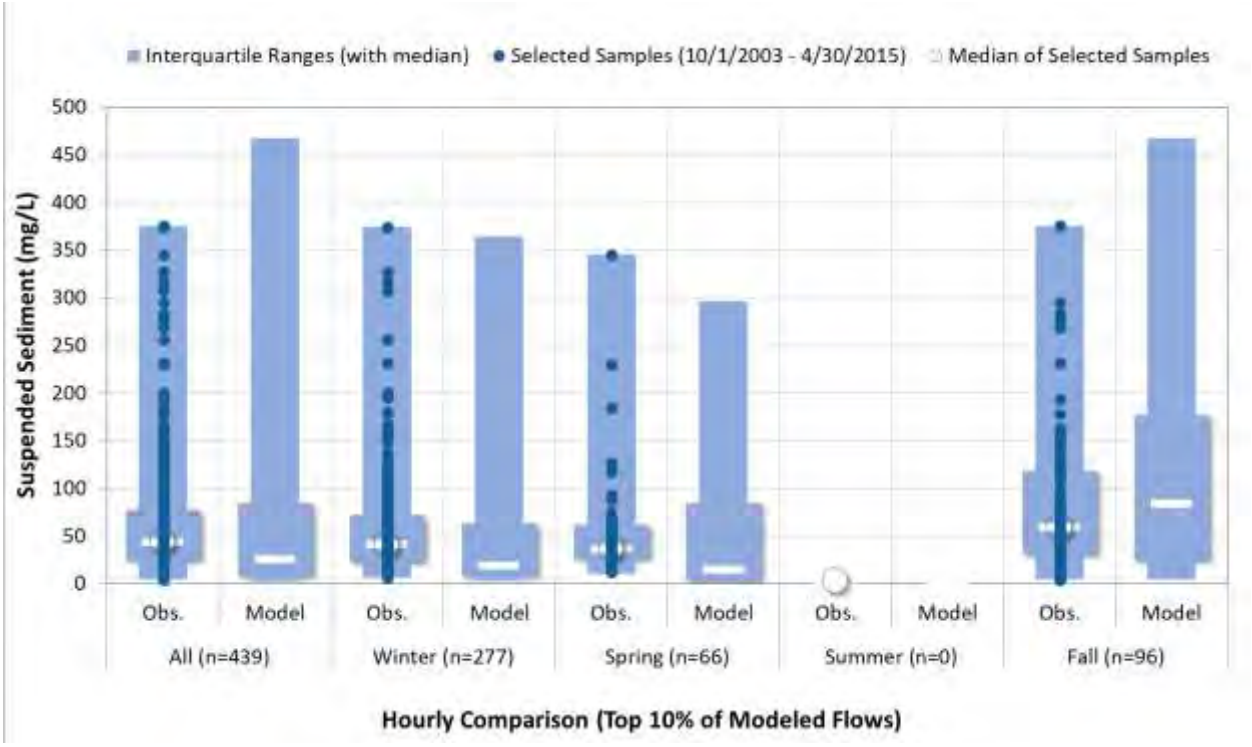

Figure 7-10. Modeled vs. observed wet-weather suspended sediment concentrations for top 10% of modeled flows at Guadalupe River (USGS 11169025 GUADALUPE River above Highway 101 A SAN JOSE CA).

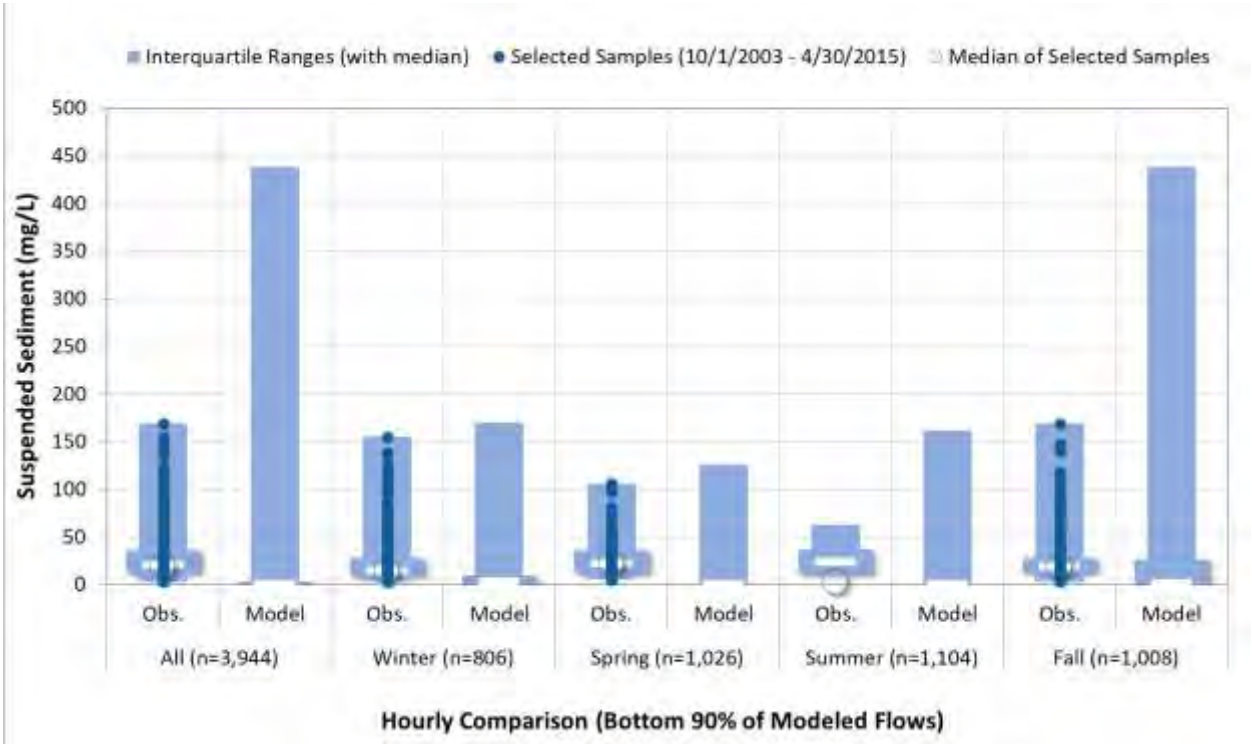

Figure 7-11. Modelled vs. observed suspended sediment concentrations for bottom 90% of modeled flows at Guadalupe River (USGS 11169025 GUADALUPE River above Highway 101 A SAN JOSE CA).

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8 POLYCHLORINATED BIPHENYL (PCB) LOADING

During development of the Bay Area RAA Guidance, it was acknowledged through multiple discussions between permittees, USEPA, the Water Board, and researchers (e.g., SFEI) that limited local water quality data may impact the robustness of any new computational method developed by an individual Bay Area Permittee or stormwater program to represent PCB or mercury loading. Although Bay-wide tools such as RWSM are deemed acceptable through model calibration utilizing monitoring data collected throughout Bay watersheds, there is often not enough data within a single County jurisdiction to provide the same level of resolution needed for calibration of a model within that jurisdiction.

As demonstrated in Section 6 and 7, enough data are available for calibration of a model for simulation of hydrology and sediment loading for Santa Clara Basin watersheds. The modeling approach used for the RAA, and outlined in Figure 2-3, combines this LSPC hydrology and sediment loading model with RWSM, using RWSM values for pollutant concentrations representative of PCB and mercury land use categories. The Bay Area RAA Guidance states that "if RWSM is used to represent pollutant concentrations or loads, this calibration is assumed to be conducted as part of the RWSM process," and "if sufficient concentration and loading data are available, these data should be used as part of model validation" (BASMAA 2017). This section describes the approach for using RWSM in combination with LSPC for simulating PCB loads, summarizes the local PCB monitoring data available for validation, and presents results of the calibration. The calibrated PCB runoff concentrations from RWSM are presented in Table 8-1. From the results of that model run, simulated long-term PCB and sediment loads were calculated for the model simulation period.

Table 8-1. Calibrated RWSM runoff concentrations for PCBs (BASMAA 2017, Geosyntec Consultants 2019, Wu et al. 2017)

Land Use Category	PCB Average Concentration (ng/L)
Old Industrial	204.0
Old Urban (Not Residential/Parks)	40.0
Old Urban (Residential/Parks)	4.0
New Urban	0.2
Ag/Open	0.2

As part of monitoring conducted by partners of the Small Tributaries Loading Strategy (STLS), in coordination with the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP)[1], over 350 grab samples were collected for PCBs and over 600 grab samples were collected for mercury across the five monitoring locations in the Santa Clara Basin between 2003 and 2017. The Guadalupe River station accounted for a majority of the samples for PCBs (126 of 199 total) and mercury (278 of 387).

Table 8-2 presents a summary of the time period(s) covered by each of the five monitoring locations.

[1] The RMP is a collaborative effort between the San Francisco Estuary Institute (SFEI), the San Francisco Regional Water Quality Control Board, and the regulated discharger community.

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Table 8-2. Summary of data collected in Santa Clara Basin watersheds from WY 2003 – WY 2017 via STLS partners.

STLS Station Name	Water Year (October 1st – September 30th)														
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Coyote Creek	--	--	●	●	--	--	--	--	--	--	--	--	●	●	--
Guadalupe at Foxworthy Road	--	--	--	--	●	--	--	--	--	--	--	--	--	--	●
Guadalupe River	●	●	●	●	●	--	●	●	●	●	●	●	●	●	●
Stevens Creek	--	--	--	--	--	●	--	--	--	--	--	--	--	--	--
Sunnyvale East Channel	--	--	--	--	--	--	--	--	--	●	●	●	--	--	--

Table 8-3 presents a summary of land areas with PCB and mercury land uses in the Santa Clara Basin discharging to San Francisco Bay (i.e., SCVURPPP RAA Limits). For each STLS station used for model validation, Table 8-4 summarizes the associated land use distribution, computed percent imperviousness (based on the National Land Cover Dataset [NLDC]), and RWSM-calibrated PCB runoff concentrations.

Table 8-3. Summary of land areas in each PCB/mercury land category area in the SCVURPPP RAA Limits.

Land Use Category	Summary	
	Area (acres)	% Total Area
Ag/Open	286,024	64.2%
New Urban	24,740	5.5%
Old Industrial	8,758	2.0%
Old Urban (Not Residential/Parks)	33,344	7.5%
Old Urban (Residential/Parks)	92,990	20.9%
Total	**445,857**	**100.0%**

Figure 8-1 through Figure 8-5 show drainage area boundaries and land use categories for the five STLS monitoring locations. For the catchment boundaries shown in the map, Table 8-4 summarizes land use distribution and modeled percent imperviousness. These sites present a mix of small-scale, isolated and highly urbanized locations and large watersheds containing a mix of land use categories, including open space, to validate the model PCB response against observed data for multiple storms.

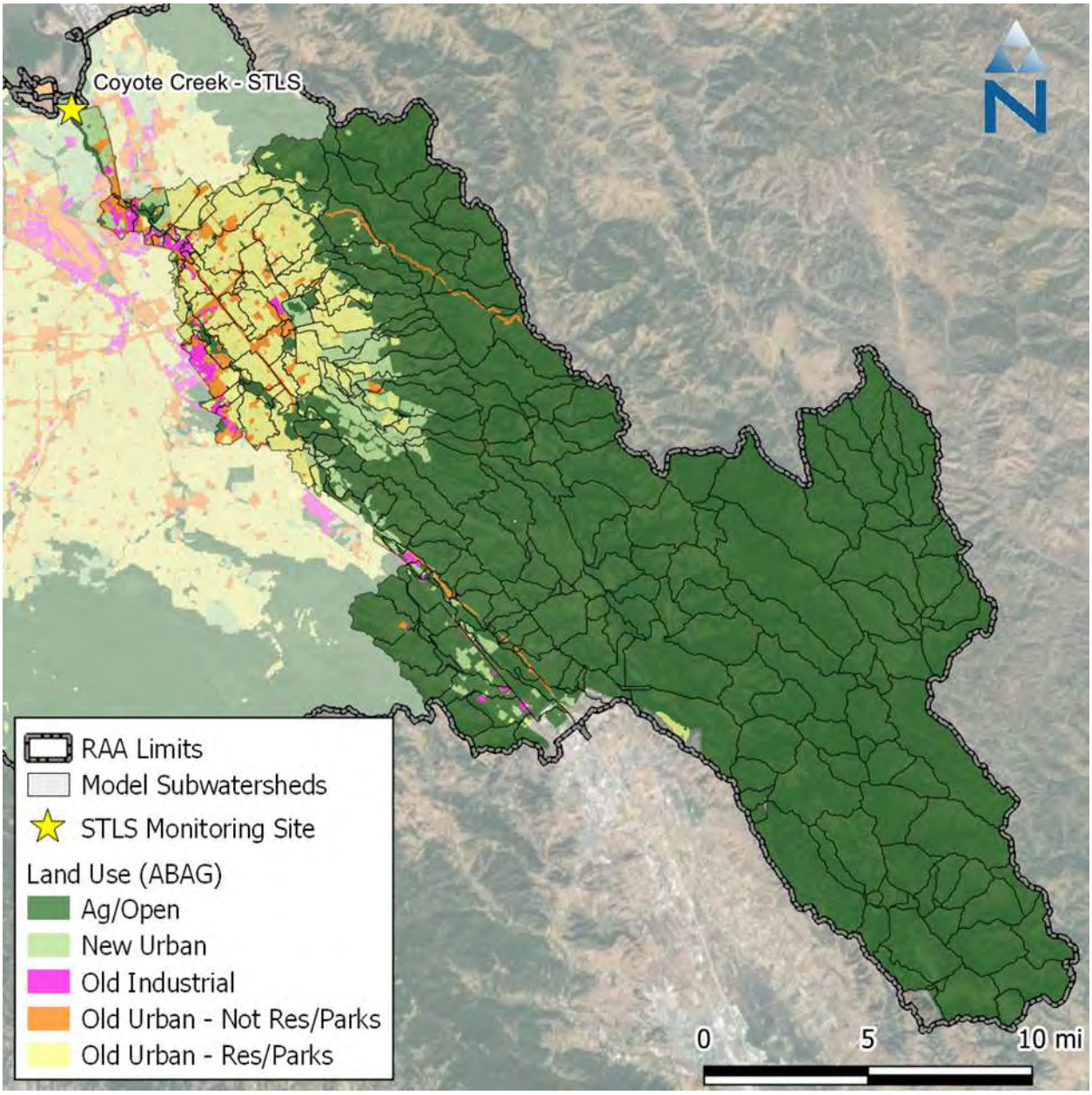

Figure 8-1. Map of the Coyote Creek STLS monitoring station and drainage area.

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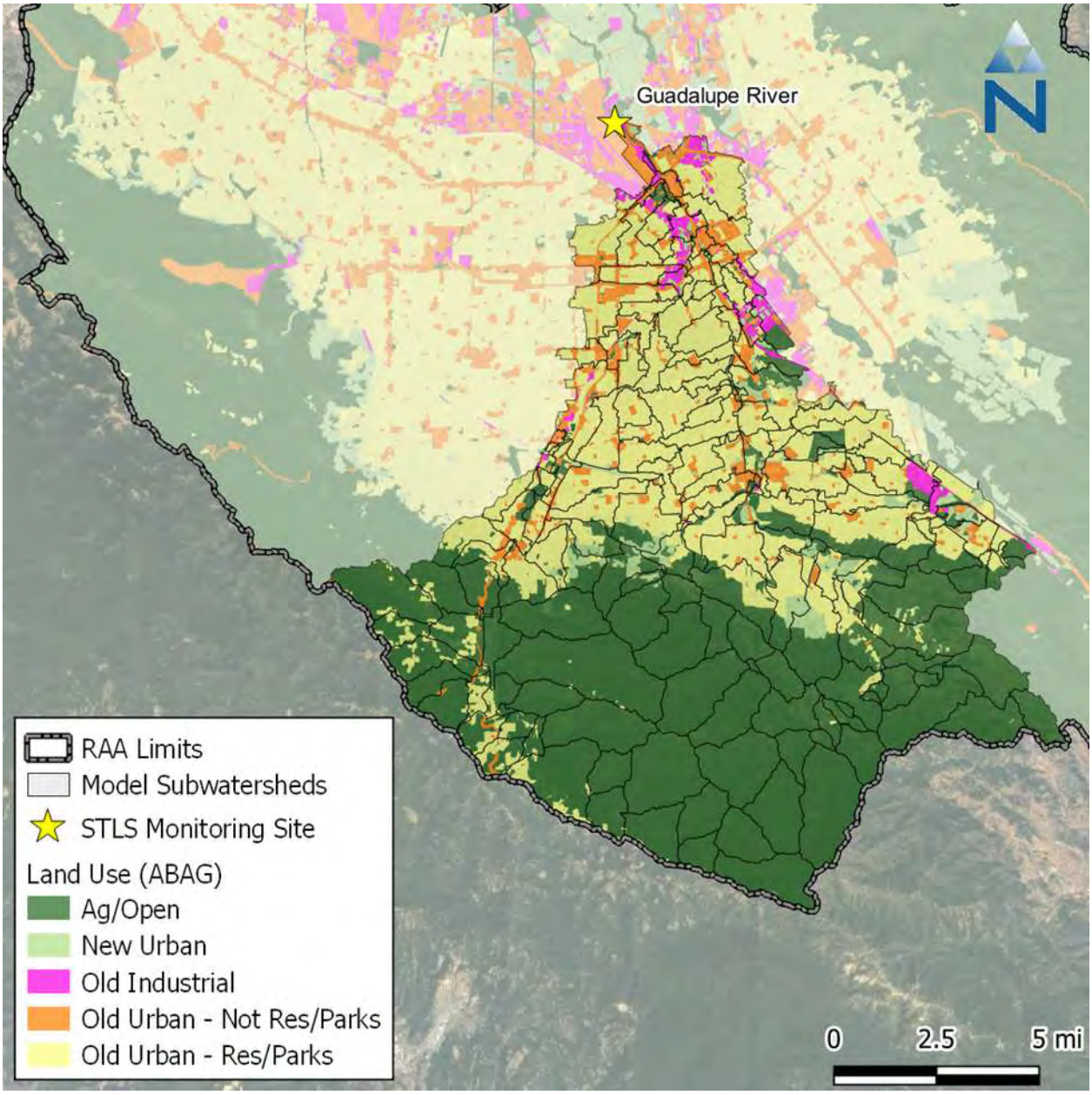

Figure 8-2. Map of the Guadalupe River STLS monitoring station and drainage area.

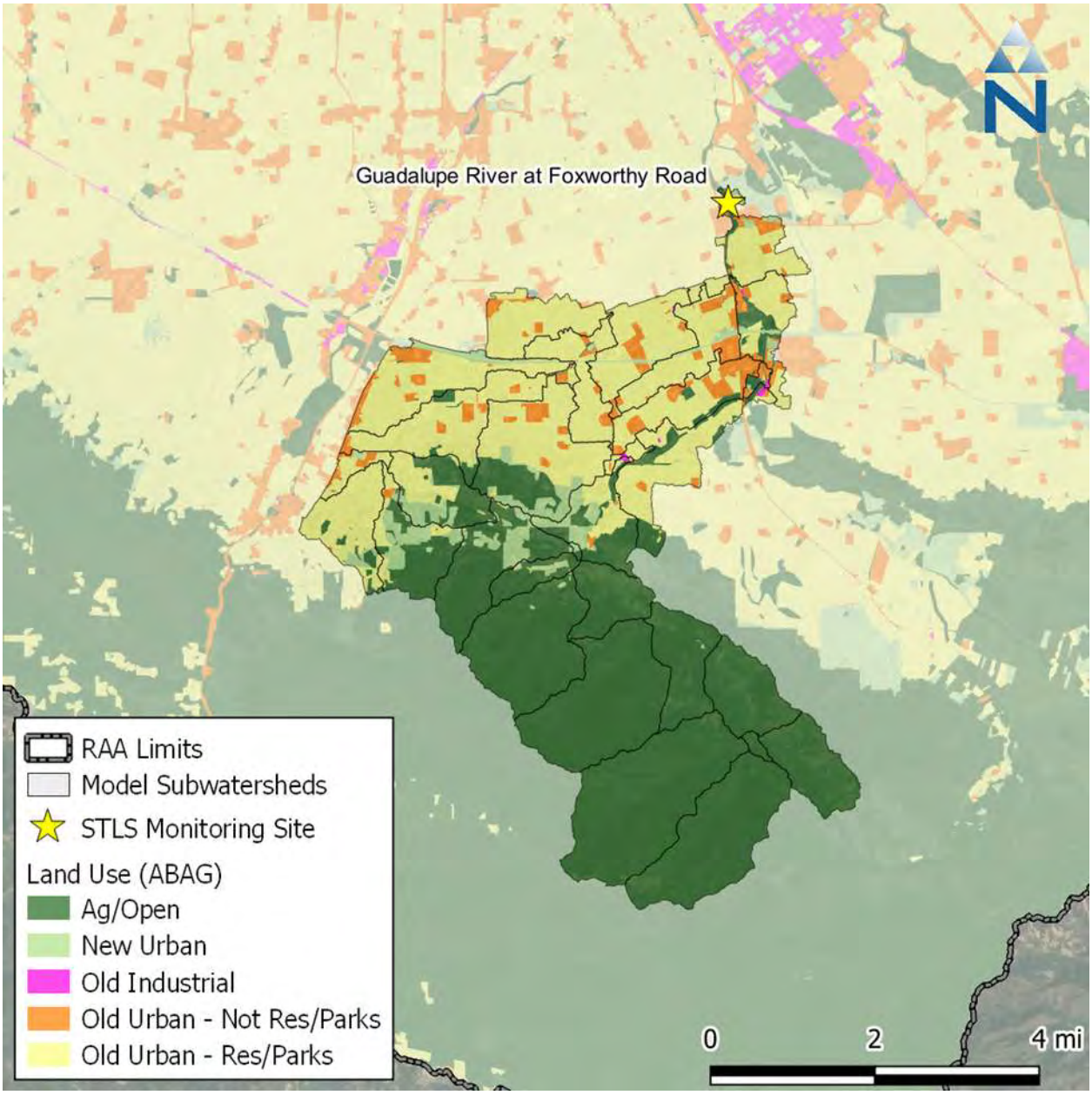

Figure 8-3. Map of the Guadalupe River at Foxworthy Road STLS monitoring station and drainage area.

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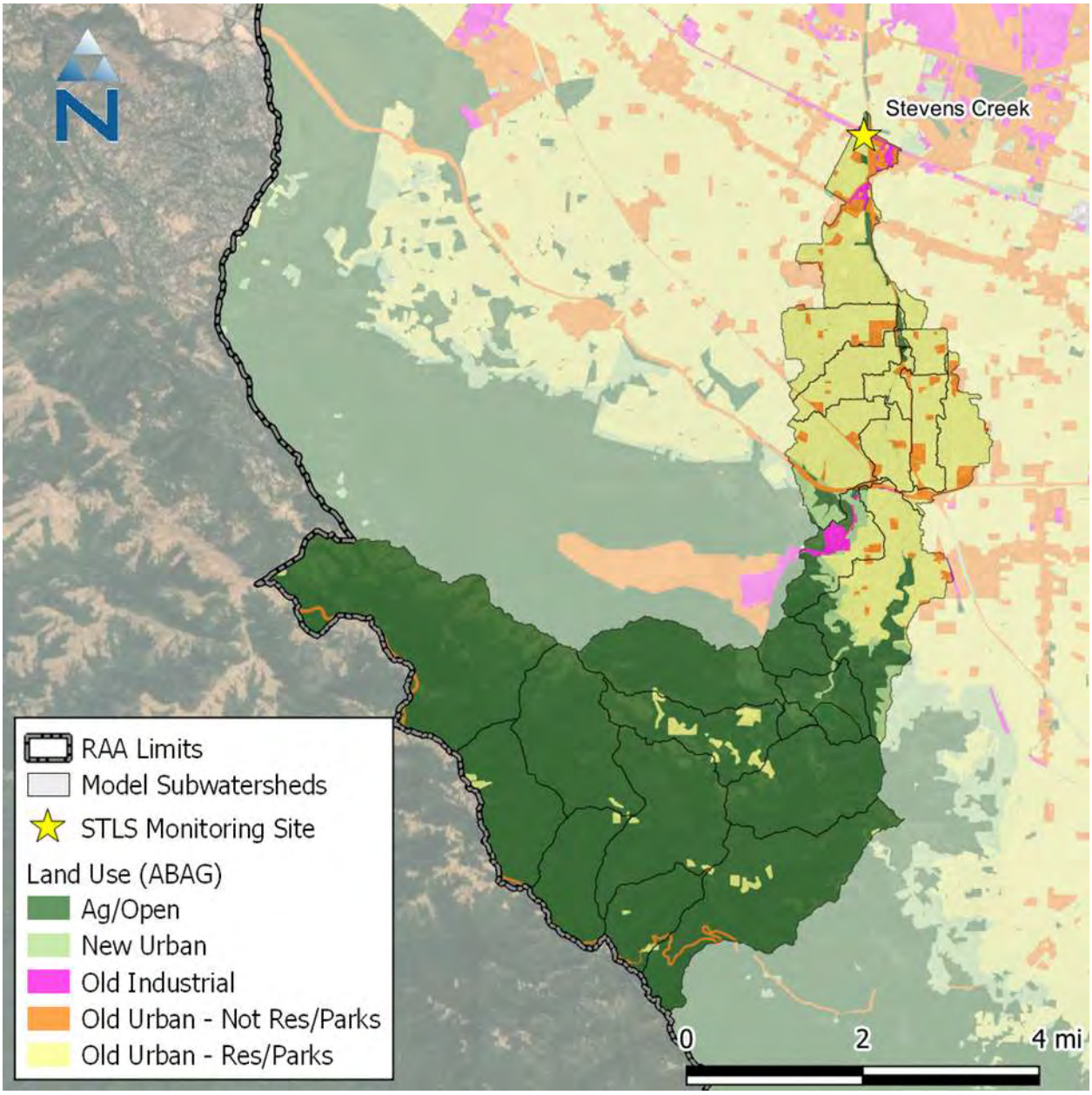

Figure 8-4. Map of the Stevens Creek STLS monitoring station and drainage area.

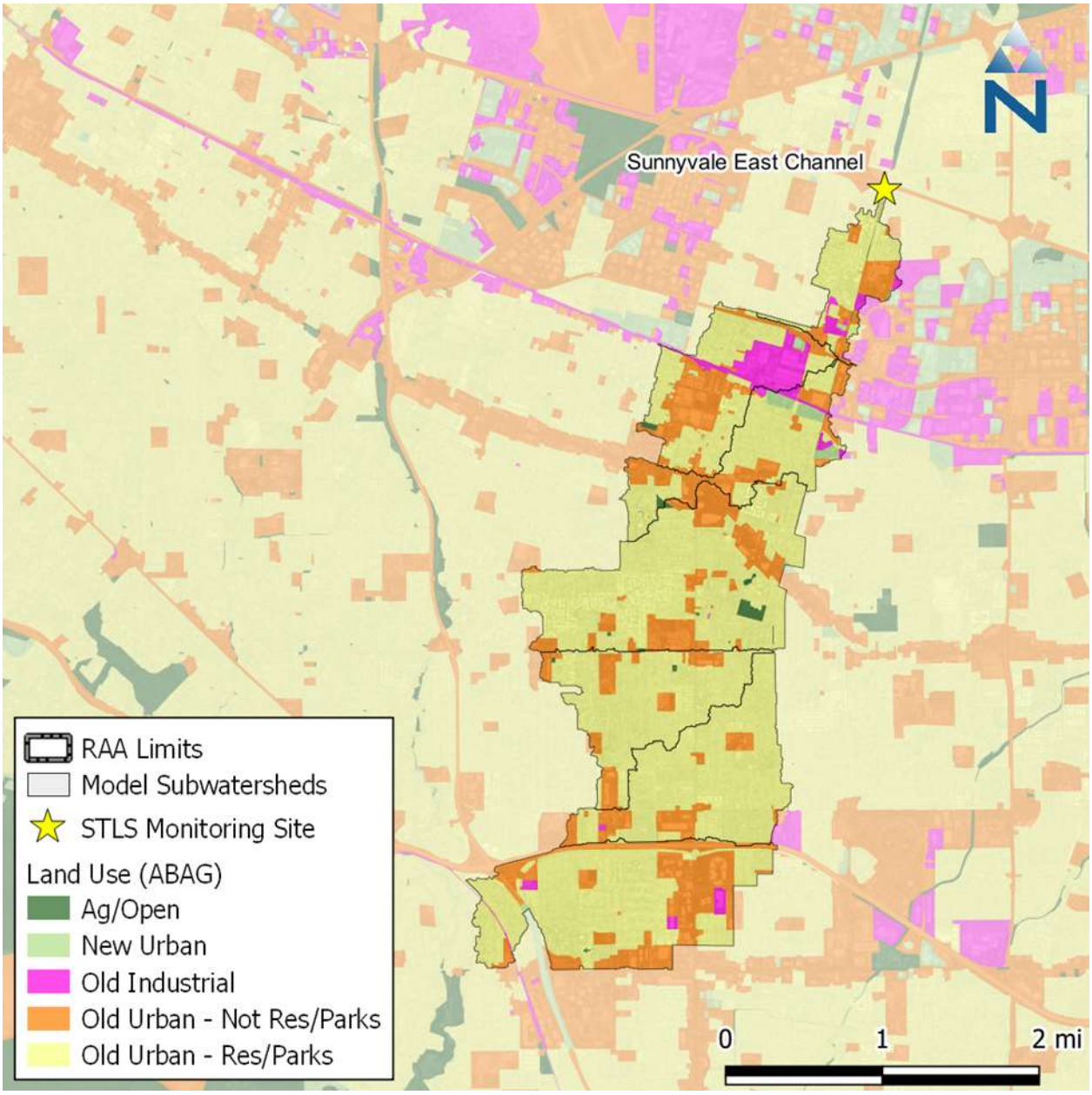

Figure 8-5. Map of the Sunnyvale East Channel STLS monitoring station and drainage area.

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Table 8-4. Distribution of PCB and mercury land uses and percent impervious cover for the five STLS monitoring locations.

Land Use Category	Coyote Creek	Guadalupe River	Guadalupe River at Foxworthy Road	Sunnyvale East Channel	Stevens Creek
Total Area (acres)					
Ag/Open	174,364	59,637	10,001	52	12,275
New Urban	8,435	3,450	672	40	270
Old Industrial	1,502	1,866	13	142	117
Old Urban (Not Residential/Parks)	4,948	7,972	1,082	936	715
Old Urban (Residential/Parks)	15,224	28,702	5,614	2,469	3,438
Total Area (acres)	**204,474**	**101,626**	**17,382**	**3,639**	**16,815**
Percent of Total Area					
Ag/Open	85.3%	58.7%	57.5%	1.4%	73.0%
New Urban	4.1%	3.4%	3.9%	1.1%	1.6%
Old Industrial	0.7%	1.8%	0.1%	3.9%	0.7%
Old Urban (Not Residential/Parks)	2.4%	7.8%	6.2%	25.7%	4.3%
Old Urban (Residential/Parks)	7.4%	28.2%	32.3%	67.8%	20.4%
Percent Impervious Cover					
Ag/Open	0.5%	1.1%	0.9%	28.0%	0.5%
New Urban	32.9%	35.6%	23.9%	57.9%	14.9%
Old Industrial	65.9%	66.9%	42.3%	74.2%	39.9%
Old Urban (Not Residential/Parks)	51.1%	53.0%	48.3%	59.0%	41.4%
Old Urban (Residential/Parks)	38.0%	32.6%	30.5%	40.5%	25.7%

Except for Sunnyvale East Channel, which is about 98 percent "Old Urban" and "Old Industrial", the drainage areas for the other four STLS stations are composed of at least 50 percent "Ag/Open" land use categories. These drainage areas for the five monitoring locations were already represented explicitly in the model subwatershed delineations, allowing for comparison of the model's PCB prediction to observed STLS monitoring data. Figure 8-6 through Figure 8-10 present validation comparisons for five storm events, one for each STLS monitoring location. These plots show the modeled PCB concentration from the watershed model versus the observed grab sample concentrations. The observed data in most cases bracket the model concentrations and demonstrate the model's capability to reproduce the same magnitude PCB concentrations, even though timing of peaks may be slightly off because of differences in the timing of small-scale rainfall runoff variability.

In some cases, such as Sunnyvale East Channel, the model result matches the grab sample peak concentrations. In the case of the 3-day storm sequence shown at Stevens Creek (Figure 8-10), the model peak is highest for the first day and reduces for the second and third day. The model uses a build-up wash-off approach for sediment, and PCBs are associated with sediment. Figure 8-10 demonstrates that the model predicts the potential magnitude of observed PCB concentrations on the first day, but there was not enough time to build-up loads before the second day's event. Because of uncertainties in the timing of rainfall events, tuning rates to match the second day peaks at Stevens Creek would cause overprediction for other events and locations.

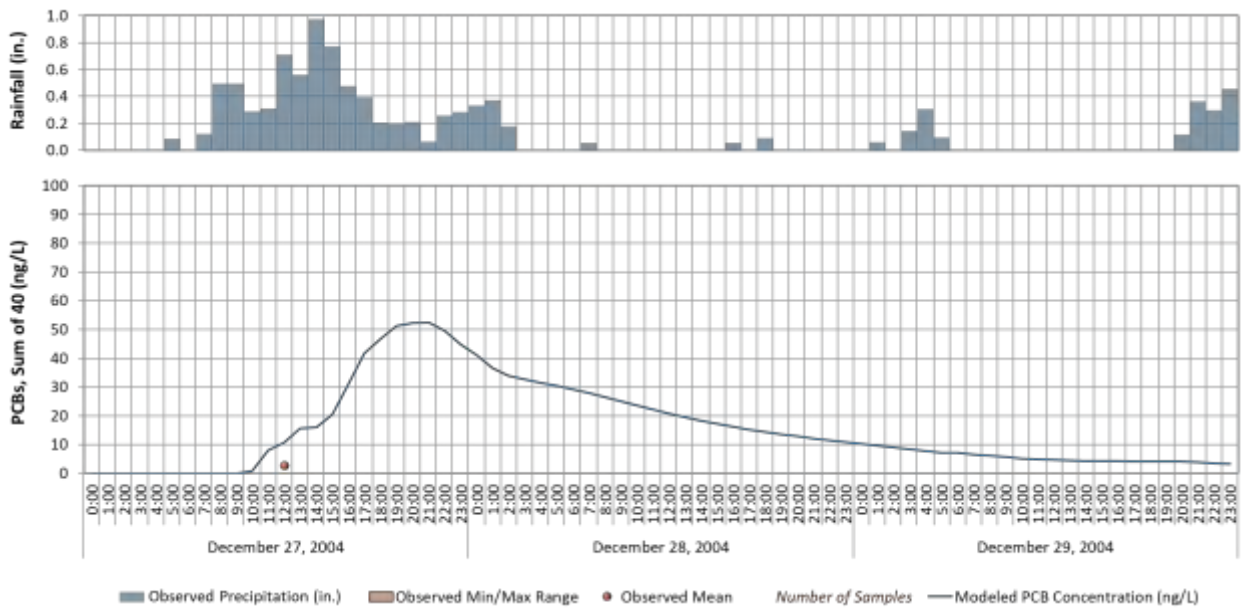

Figure 8-6. Modeled vs. observed PCBs for a selected storm at Coyote Creek Gage (12/27/2014 - 12/29/2014).

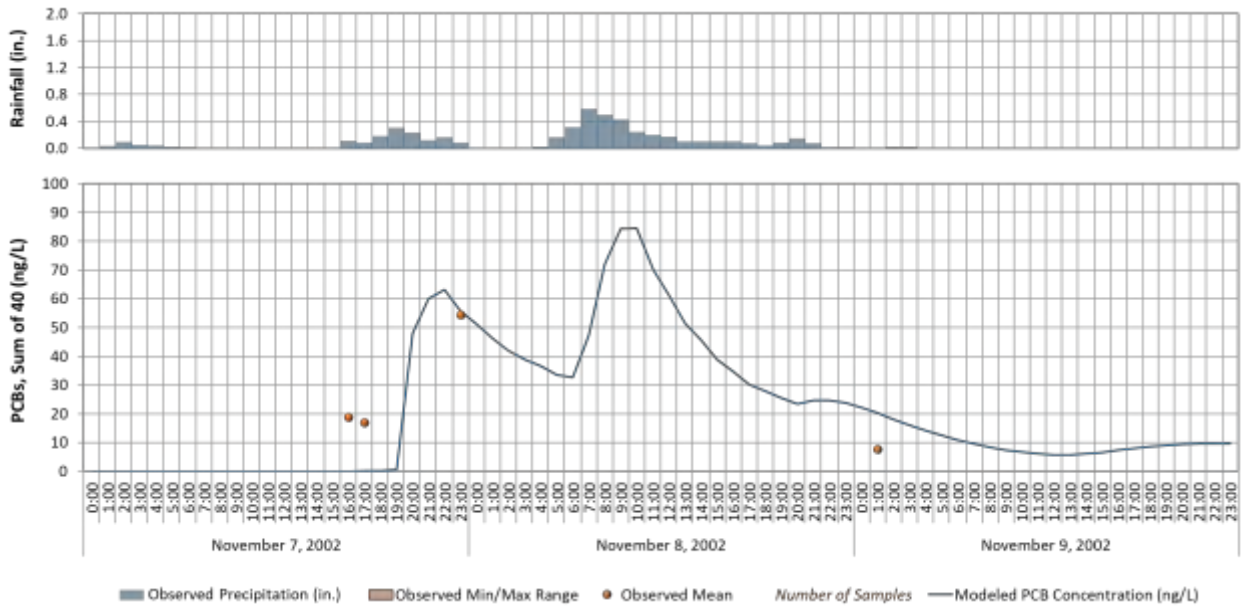

Figure 8-7. Modeled vs. observed PCBs for a selected storm at Guadalupe River Gage (11/7/2002 - 11/9/2002).

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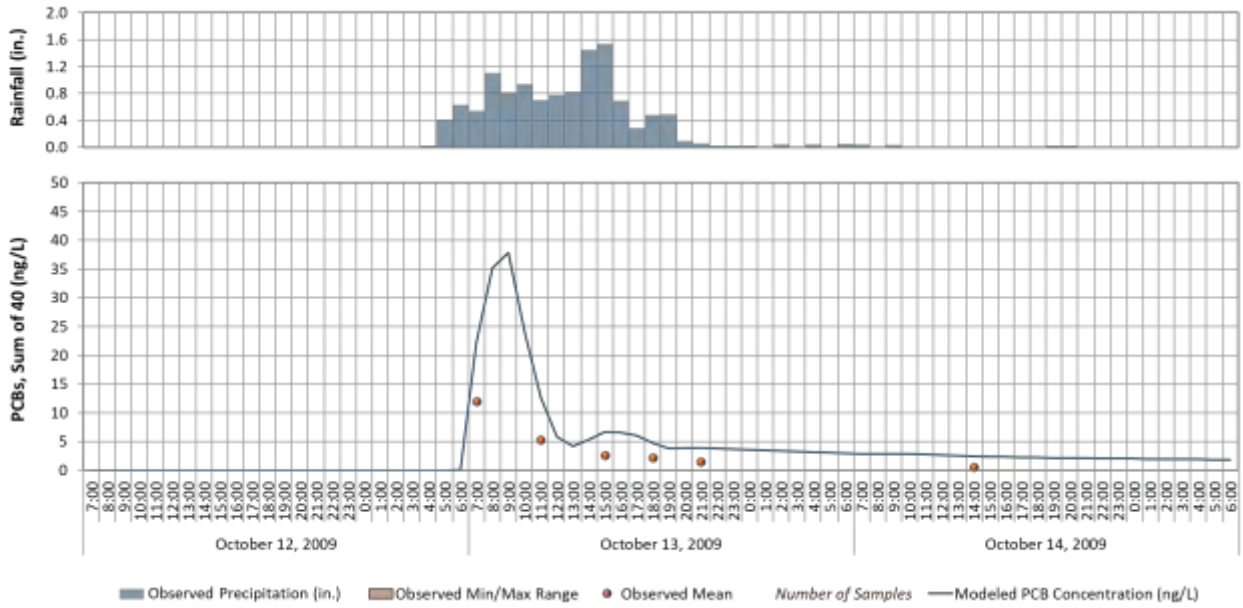

Figure 8-8. Modeled vs. observed PCBs for a selected storm at Guadalupe River at Foxworth Road (10/12/2009 - 10/14/2009).

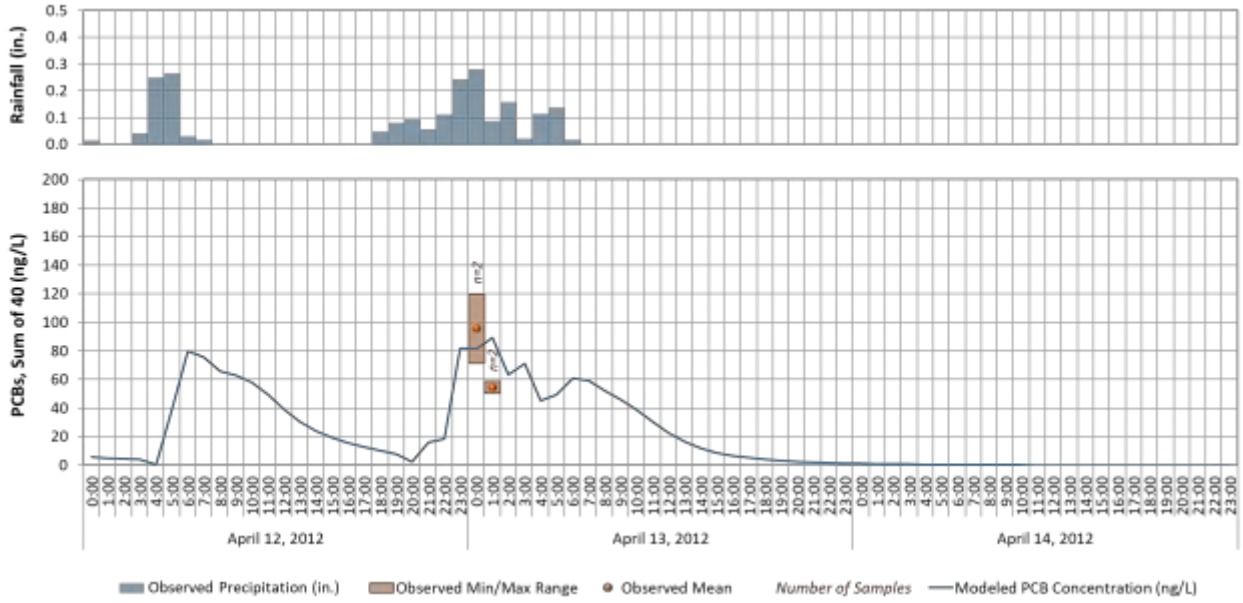

Figure 8-9. Modeled vs. observed PCBs for a selected storm at Sunnyvale East Channel (4/12/2012 - 4/14/2012).

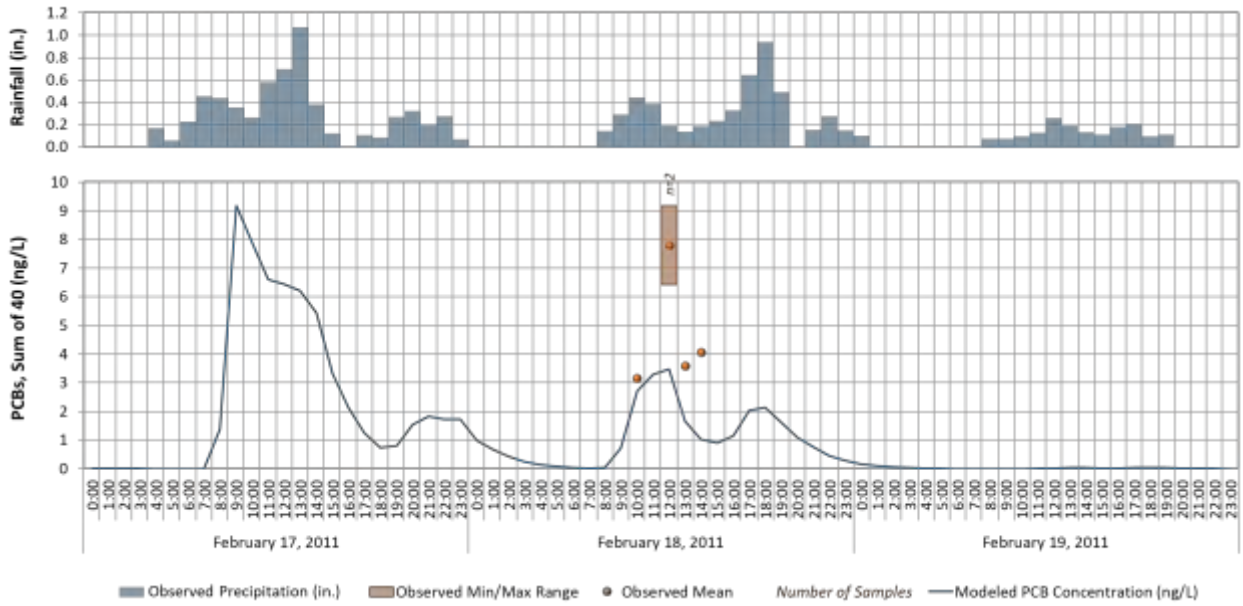

Figure 8-10. Modeled vs. observed PCBs for a selected storm at Stevens Creek Gage (2/17/2011 - 2/19/2011).

The timeseries comparisons for PCBs were for specific storms and locations and included limited samples during wet-weather events. Figure 8-11 and Figure 8-12 show boxplot ranges of modeled sediment and PCB concentrations associated with the top 1 percent of flows that were queried and compared against the full set of observed sediment and PCB samples respectively, at each station. A limited number of the observed samples (n values shown) were plotted against *all* concentrations that met the 1 percent flow threshold; therefore, the median of the modeled values are expected to be lower than the median of the limited number of samples. Nevertheless, those summary plots suggest that the relative variability of concentrations predicted by the model between stations generally follows the pattern of observed.

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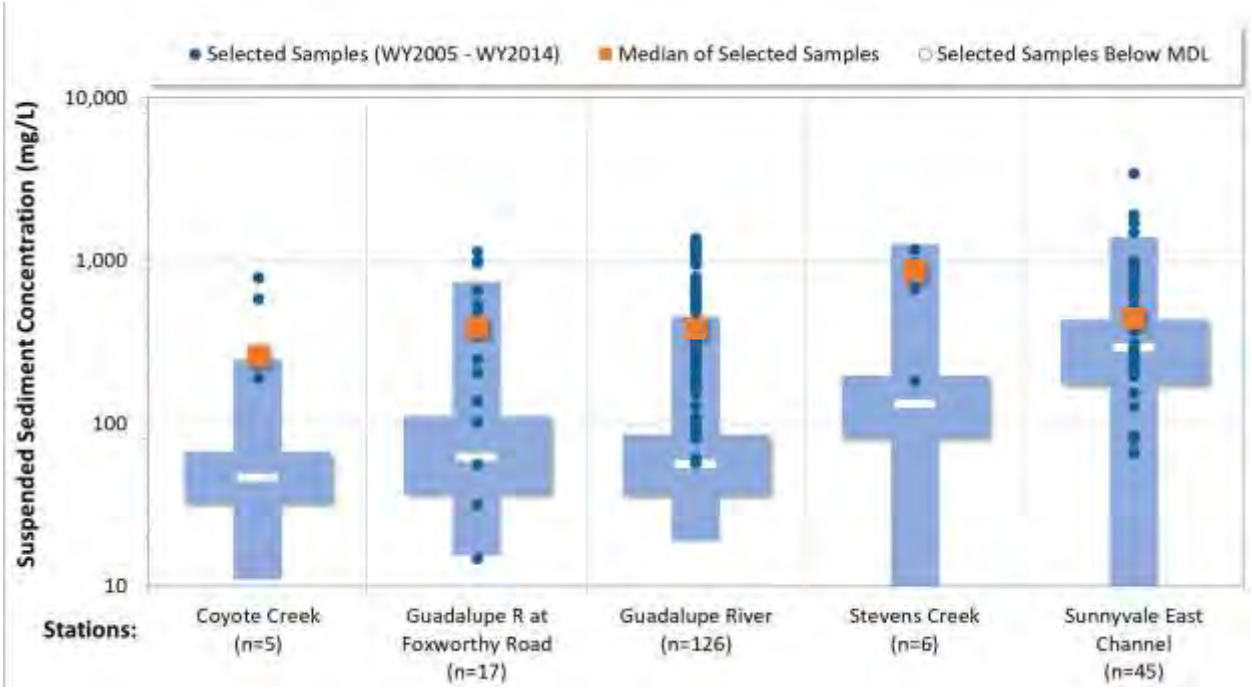

Figure 8-11. Summary of modeled concentrations as boxplots (for the top 1% of modeled flows) vs. observed sediment storm sample concentration at the five SLTS stations.

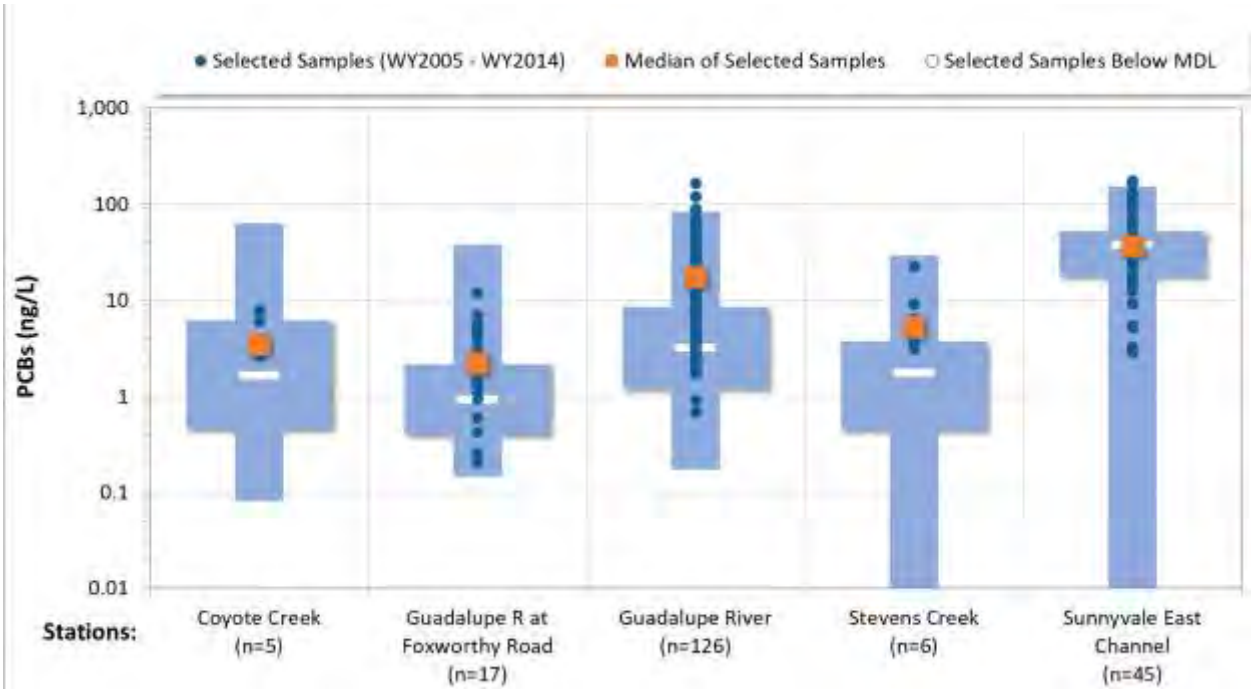

Figure 8-12. Summary of modeled concentrations as boxplots (for the top 1% of modeled flows) vs. observed PCBs storm sample concentration at the five SLTS stations.

Like the analysis for the validation drainage areas above, the RWSM land use concentrations for PCBs were combined with the baseline LSPC model to provide an estimate of PCB loads throughout the Santa Clara Basin. The GIS layer for the PCBs/mercury land use categories (Figure 4-5 and Table 8-3) was intersected with the modeled HRU layer to estimate the contribution of PCBs from each land use at the subwatershed level. Basin-wide sediment, PCB, and mercury loads were estimated for water year 2002[2] (10/1/2001 to 9/30/2002). Mercury results will be further discussed in Section 9. Figure 8-13 shows the relative contributions of cohesive/suspended sediment and PCBs by land use for water year 2002. The loads "at source" represent edge-of-field summaries of sediment and PCB loads, whereas the "delivered" loads account for instream pollutant transport impacts. The "delivered" loads have been adjusted to reflect the mass from each source that reaches the Bay. Many of the land use areas are located near the shoreline of the Bay; therefore, the losses via in-stream transport are lower for those areas than for others that are farther upstream. Figure 8-14 presents the unit-area sediment and PCBs loads at the source (left) and the sediment and PCBs loads from each subwatershed that are ultimately delivered to the Bay (right).

[2] For the RAA analysis and direct comparison to TMDL WLAs based on average annual loading conditions, the Bay Area RAA Guidance recommends two options for simulation of baseline loading: (1) water years 2000-2009 (for long-term continuous simulation), or (2) water year 2002 (for representative water year).

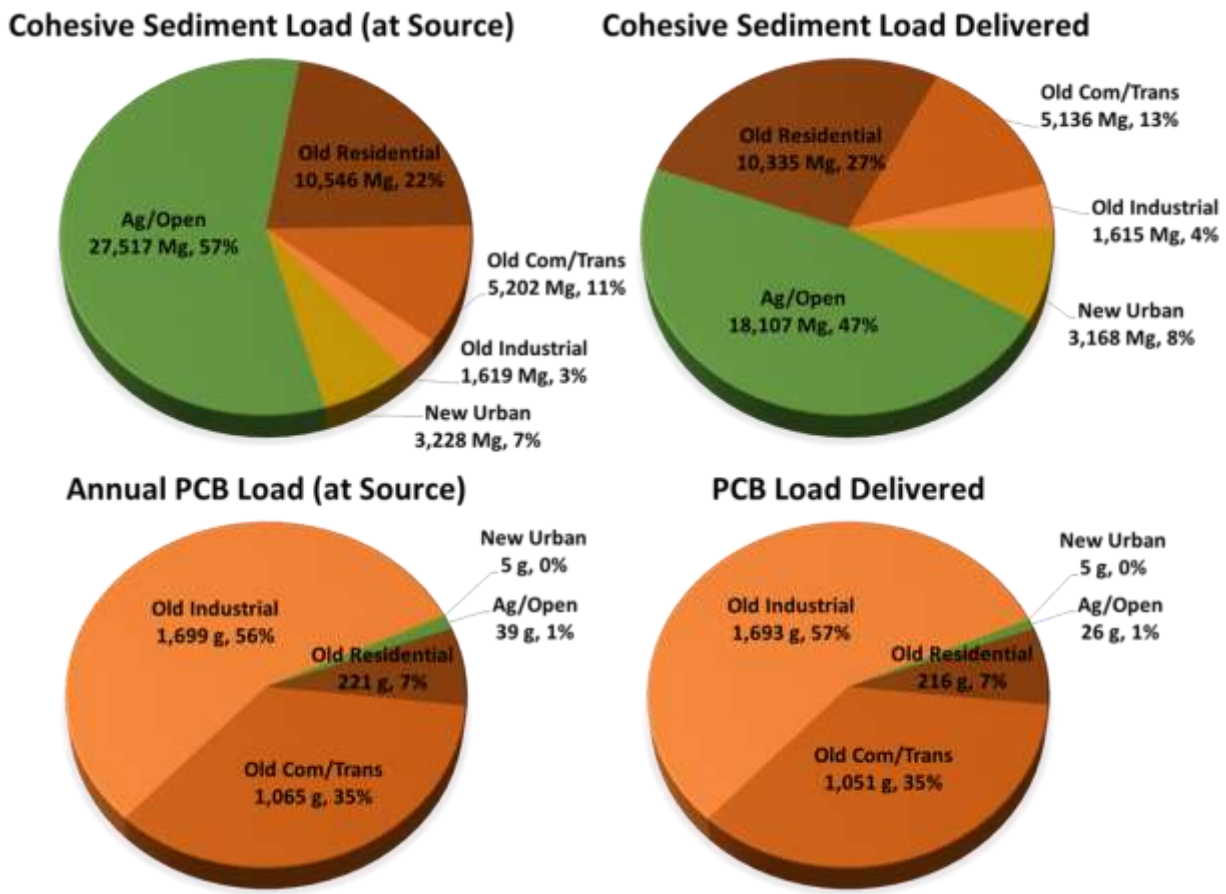

Figure 8-13. Distribution of cohesive sediment and PCB loads by land use category for an average water year (2002) **– "Source" is edge-of-field load; "Delivered" is adjusted for instream transport losses** and represents loads to the Bay.

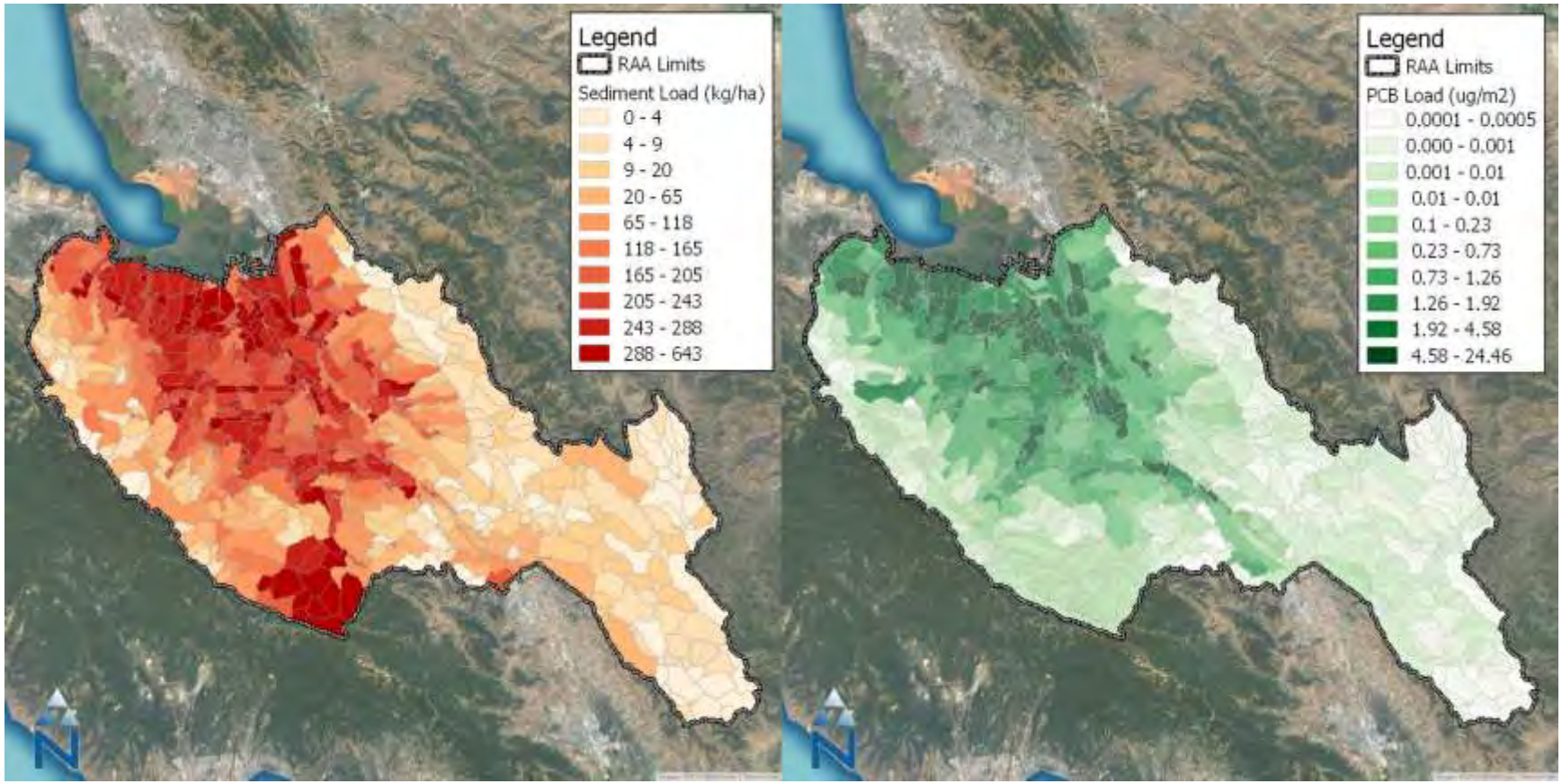

Figure 8-14. Modeled sediment and PCB unit-area loads (at source) by subwatershed in the Santa Clara Basin.

9 MERCURY LOADING

Mercury was also sampled at all five STLS station locations presented in Section 8. The observed data showed high concentrations associated with the mining district in the Guadalupe watershed. The average RWSM values are not representative of Guadalupe sources, but are assumed to be representative of regional long-term mean concentrations from developed areas. Because the mining areas are also not part of the MRP area under consideration for this analysis, validation results from the two Guadalupe stations (which include drainage from the mining areas) were excluded in the validation comparisons. SFEI calibrated mercury runoff concentrations for RWSM based on the same land use categories utilized for modeling PCBs, although the TMDL (SFBRWQCB 2006 and 2008a) and other research has not established that different mercury concentrations can be linked to these land uses. Since the major source of mercury from urban areas is generally understood to result from atmospheric deposition, mercury loading from urban land is expected to be more a function of imperviousness than land use. Regardless, since RWSM concentrations are presently accepted as the current primary method for estimating mercury loads to the Bay (BASMAA 2017), they were utilized for the RAA. Mercury runoff concentrations from RWSM, based on PCB/mercury land use categories presented in Section 8, were combined with LSPC-modeled hydrology to model mercury loading from each of these drainage areas.

Table 9-1. Average RWSM runoff concentrations for mercury (BASMAA 2017, Geosyntec Consultants 2019, Wu et al. 2017)

Land Use Category	Mercury Average Concentration (ng/L)
Old Industrial	40.0
Old Urban – Not Res/Parks	63.0
Old Urban – Res/Parks	63.0
New Urban	3.0
Ag/Open	80.0

Previous SFEI studies of sediment and mercury in other regional tributaries have demonstrated a positive relationship between instream sediment and mercury concentrations. Results from a mercury monitoring study conducted in an urban tributary in Hayward, CA are plotted in black in the upper-left panel of Figure 9-1 (McKee et al. 2009). The other panels in Figure 9-1 present the results of modeled sediment and mercury concentrations for the modeled drainage areas corresponding to the three STLS monitoring locations. Consolidated data from these three stations are superimposed in blue on the Hayward samples, showing how those levels trend slightly higher than the Hayward levels, although the slopes are similar. The slope of the line provides a rough estimate of mercury concentration relative to sediment concentrations; however, because the trend line does not intersect at zero, it is reasonable to expect some level of background mercury concentration in the water column, presumably from background sources, when sediment concentrations are near zero.

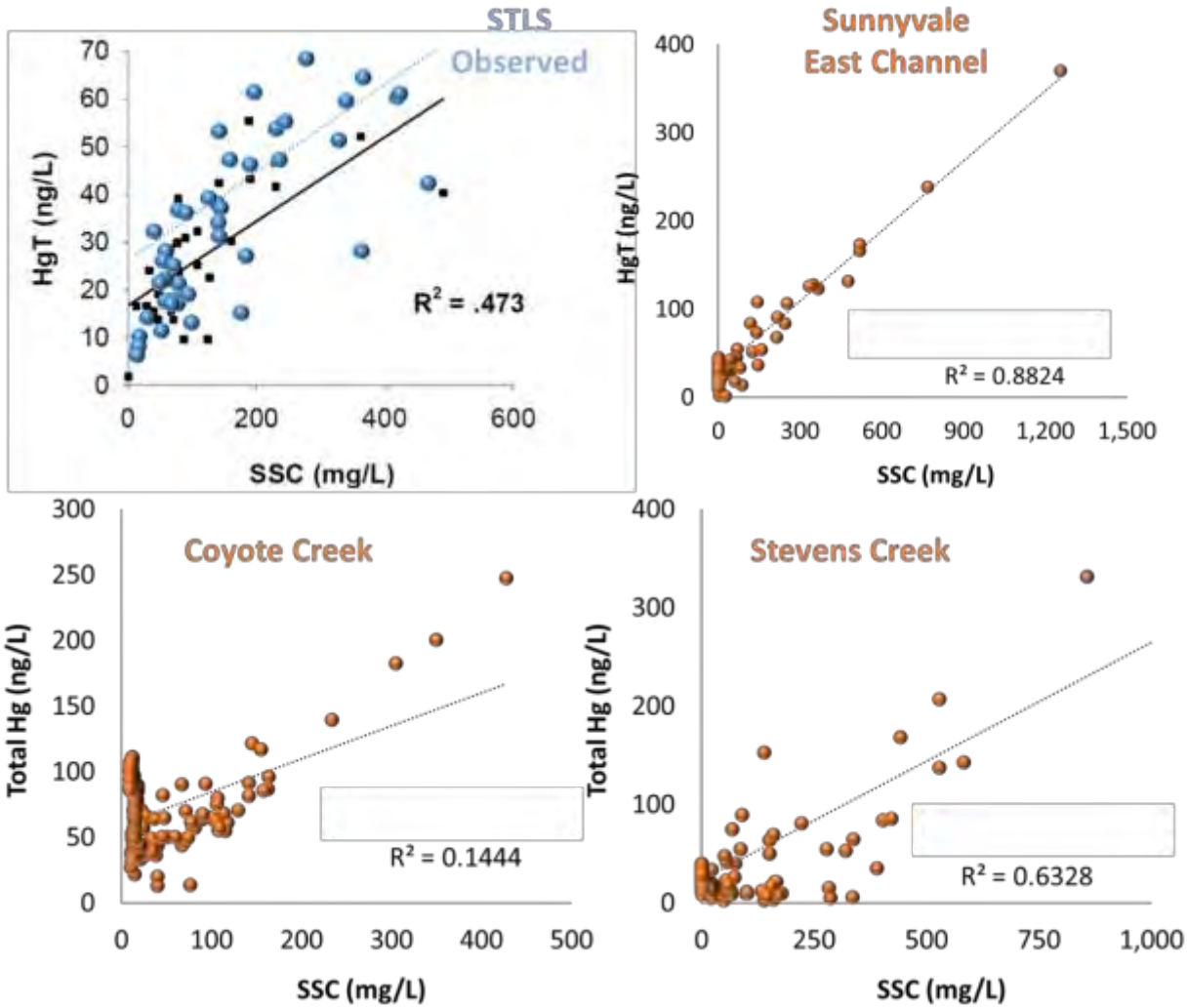

Figure 9-1. Modeled (orange) vs. observed (blue) mercury trends for SLTS sampling sites.

When applied to the timeseries output, this approach by itself produces a linear relationship that intersects the y-axis of Figure 9-1 at the zero point; however, the observed STLS relationships (McKee et al. 2009) suggest that the intercept is not zero. To better reflect this trend, a background mercury concentration of 20 ng/L was assigned to modeled baseflows as shown Figure 9-1. The model also assumes atmospheric wet-deposition concentration of 9.7 ng/L and a dry-deposition rate of 19 µg/m2/year; however, studies also indicated that only about 5 percent of the atmospheric deposition load is exported from land into waters (SFBRWQCB 2008a). As a result, the model was parameterized to reflect net mercury delivery to waterbodies from atmospheric deposition (0.485 ng/L wet deposition and 0.95 µg/m2/year for dry deposition) (SFBRWQCB 2008a). With those two mercury loading signatures added to represent contributions from natural sources, the RWSM land-based mercury sediment estimates were proportionally adjusted (maintaining the same relative distributions by source) to match the slope of the curve in the calibration panels shown in Figure 9-1.

Figure 9-2 through Figure 9-4 show modeled versus observed mercury concentrations for sampled storm events using the sediment-based RWSM concentration values in order to assess model performance at the same five STLS monitoring locations. The selected storm events are consistent with the events presented in Section 8 showing PCB concentrations. In some cases, the model

predicted mercury concentrations do not match the timing or peaks of the observed STLS concentration data. Historic sources of mercury (i.e., mines), effects of reservoirs and groundwater contributions, and other unknown processes may affect the timing or magnitude of the model concentrations versus the observed grab samples. Figure 9-6 shows sediment and mercury source area land use distribution and modeled mercury loads for water year 2002. The loads "at source" represent edge-of-field summaries of sediment and mercury loads, whereas the "delivered" loads account for instream pollutant transport impacts. The "delivered" loads have been adjusted to reflect the mass from each source that reaches the Bay. Figure 9-7 is a map of unit-area sediment loads at the source (left) and mercury loads from each subwatershed that are ultimately delivered to the Bay (right).

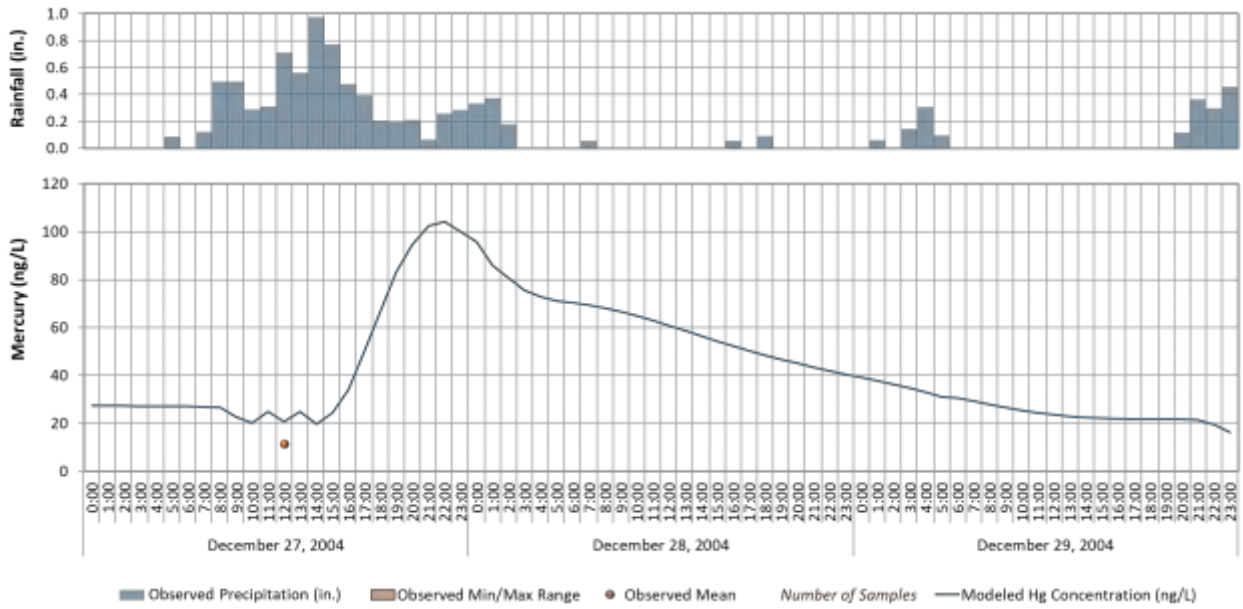

Figure 9-2. Modeled vs. observed mercury for a selected storm at Coyote Creek Gage (12/27/2014 - 12/29/2014).

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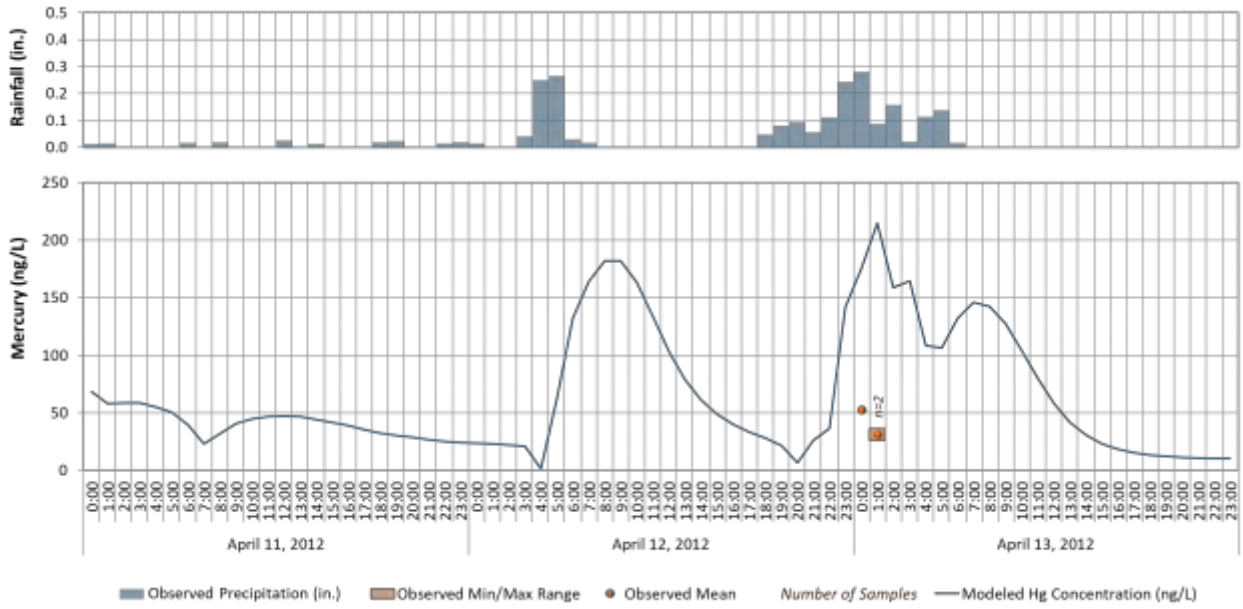

Figure 9-3. Modeled vs. observed mercury for a selected storm at Sunnyvale East Channel (4/12/2012 - 4/14/2012).

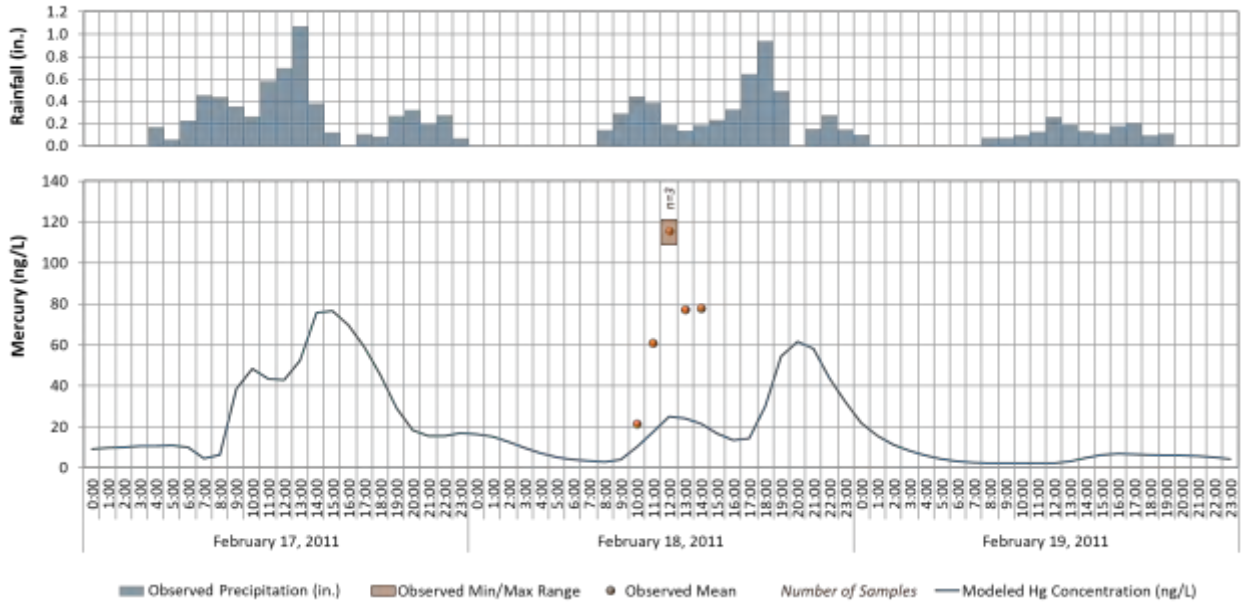

Figure 9-4. Modeled vs. observed mercury for a selected storm at Stevens Creek Gage (2/17/2011 - 2/19/2011).

Figure 9-5 shows the range of concentrations associated with the top 1 percent of flows that were queried and compared against the full set of mercury samples respectively, at each station. A limited number of observed sample (n values shown) were plotted against ALL modeled concentrations that met the 1 percent flow threshold; therefore, the median values of modeled are expected to be lower than the median value of the limited number of samples. With the exception of Guadalupe River, for which mining-related loadings were not modeled, the summary plots suggest that the relative

variability of concentrations predicted by the model between stations generally follows the pattern of observed.

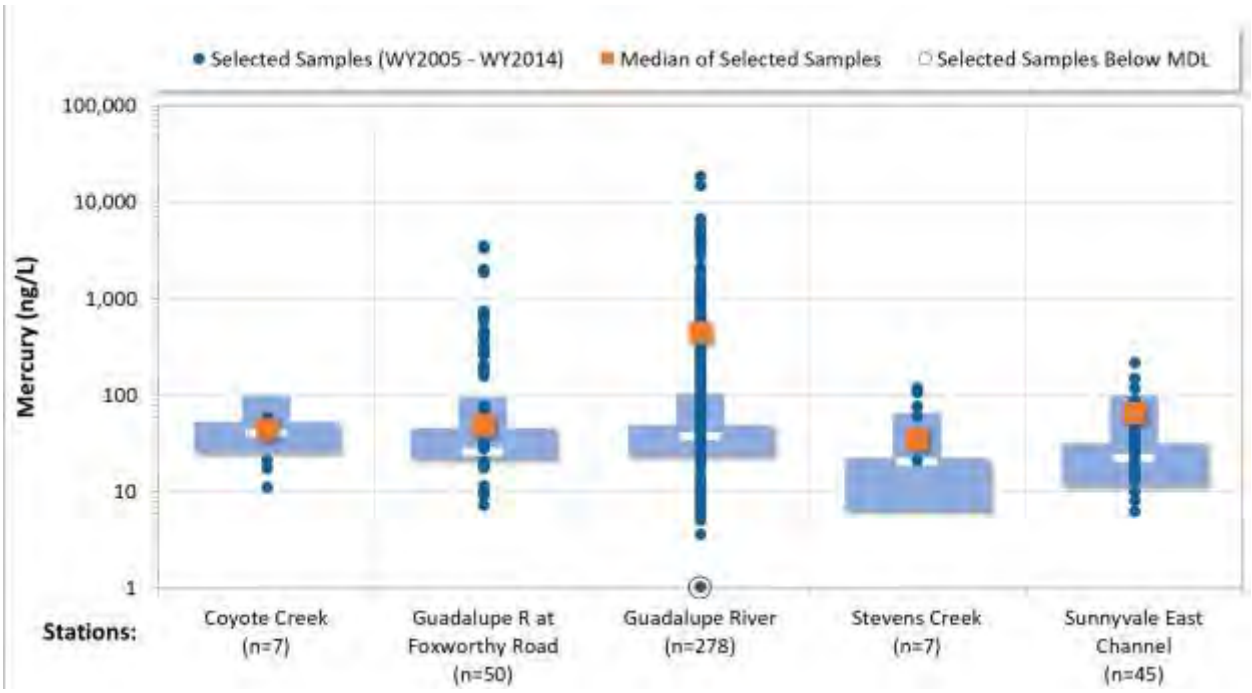

Figure 9-5. Summary of modeled concentrations (for the top 1% of modeled flows) vs. observed mercury storm sample concentration at SLTS stations.

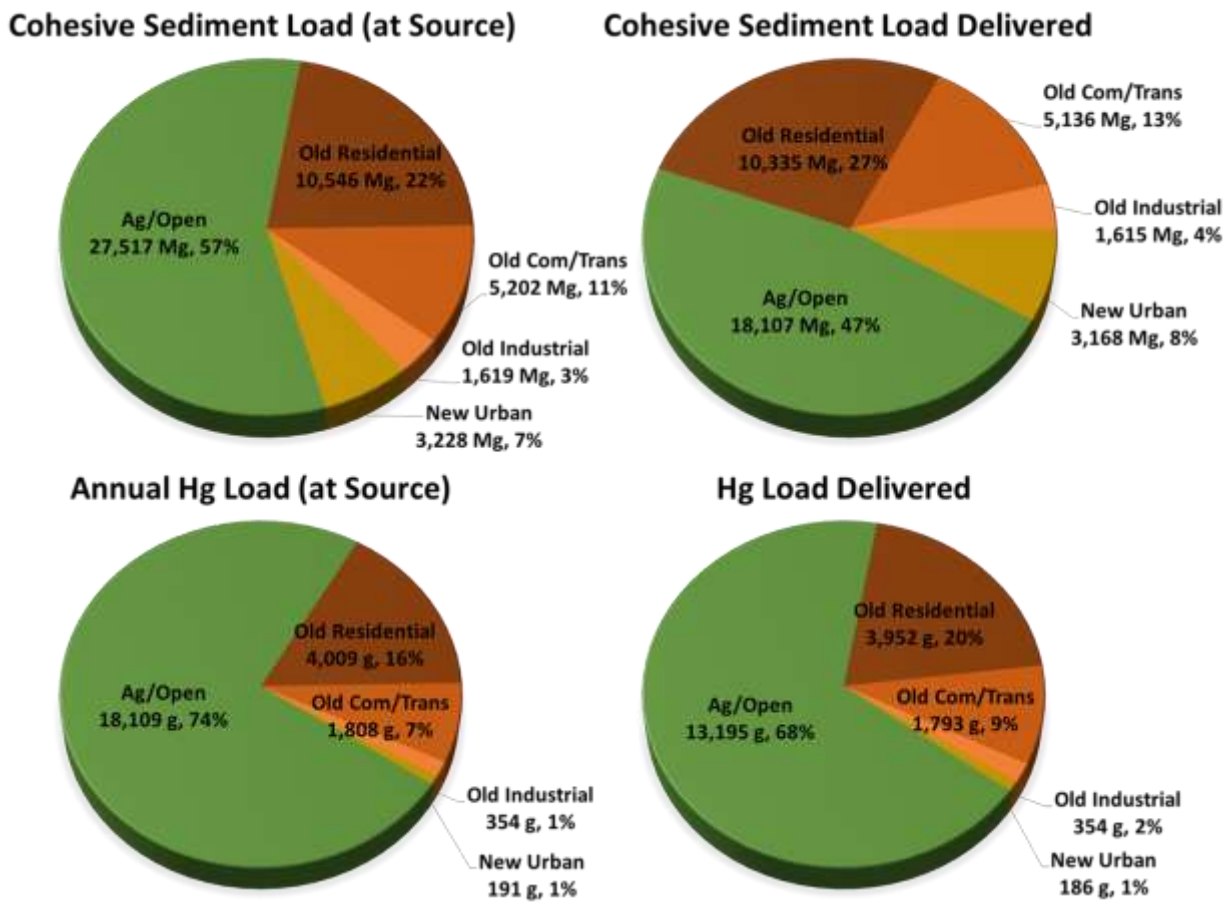

Figure 9-6. Distribution of cohesive sediment and mercury loads by land use category for an average water year (2002) **–"Source" is edge-of-field load; "Delivered" is adjusted for instream transport losses** and represents loads to the Bay.

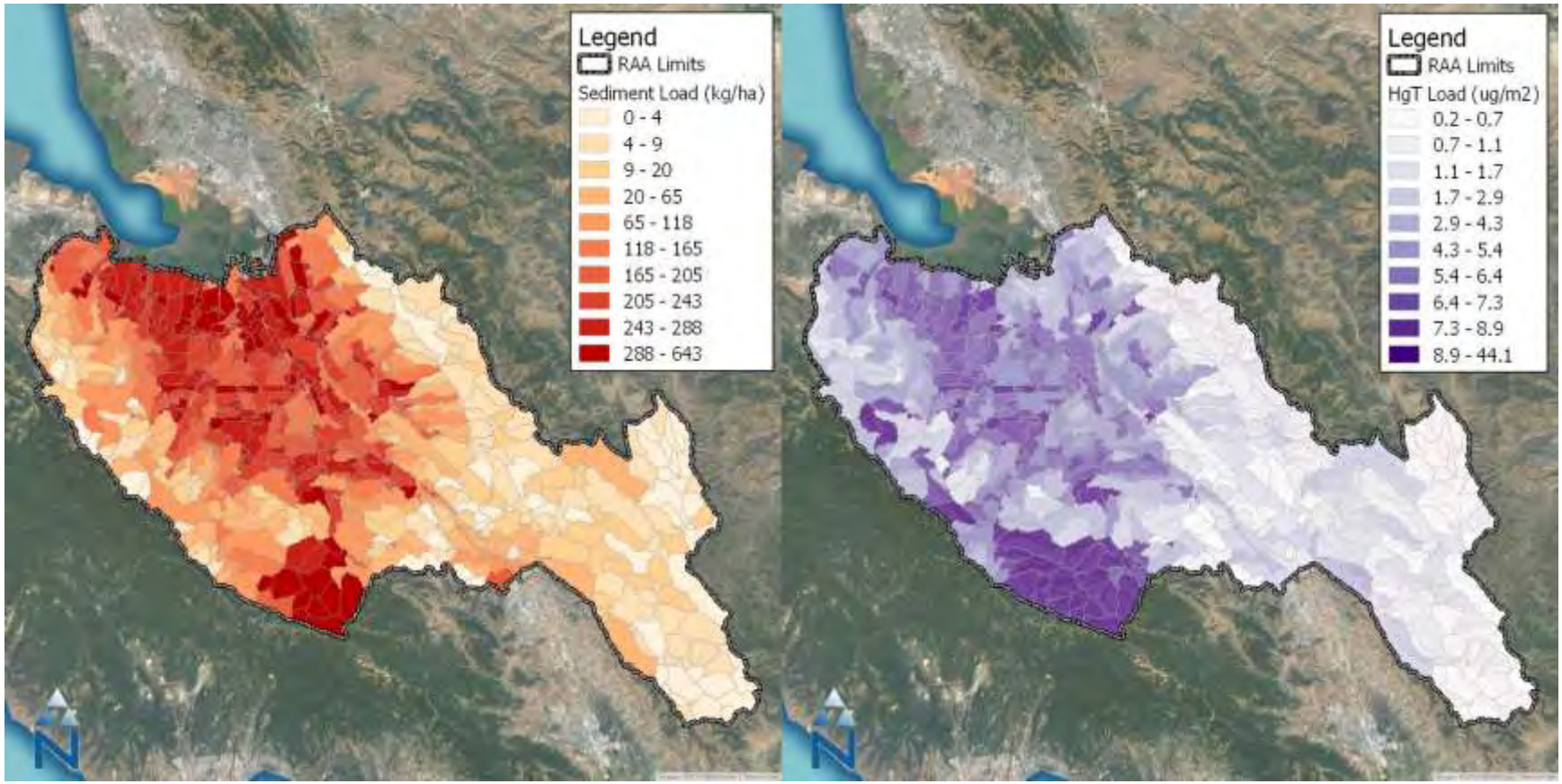

Figure 9-7. Modeled sediment and mercury unit-area loads (at source) by subwatershed in SCVURPPP.

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10 IDENTIFICATION OF AREA FOR ANALYSIS

As recommended in the EPA RAA Guide and Bay Area RAA Guidance, the RAA provides an accounting of sources of stormwater from areas addressed by Municipal Separate Storm Sewer System (MS4) permits, areas addressed by other National Pollutant Discharge Elimination System (NPDES) permits, and other non-permitted areas (e.g., open space) (BASMAA 2017, USEPA 2017). This allows for estimation of stormwater improvement goals specific to areas addressed by MS4 permits, and identification of management actions (e.g., GSI) that are designed to manage stormwater runoff from these areas. The Bay Area RAA Guidance states that "if areas not subject to municipal jurisdiction are included, their flows and loads should be distinguishable" (BASMAA 2017). Therefore, the RAA area of analysis includes MS4 permitted areas, other NPDES permitted areas, and non-urban areas with stormwater volumes estimated for each category. However, the stormwater improvement goal for GSI was identified for only those areas addressed by the MRP. The following subsections describe the processes for distinguishing PCB and mercury loads from the MRP area, other areas addressed by NPDES permits (e.g., Caltrans, industrial areas), and non-urban open space/agriculture.

10.1 Non-Urban Open Space

The PCB and mercury TMDLs present WLAs specific to urban stormwater runoff. Consequently, non-urban open space within the Santa Clara Basin was categorized as non-MS4 and separated into distinguishable modeled areas for the RAA. These areas were identified by separating all the land designated as *Ag/Open* in the ABAG land use layer from the other categories.

10.2 Public Schools

K-12 public schools are currently not subject to the NPDES requirements, including requirements for new development and redevelopment. However, the State Water Resources Control Board (State Water Board) recently released *Guidance on Stormwater and Dry Weather Runoff Capture (California Practices to Use Runoff Effectively) at Schools*, which encourages public schools to collaborate with Permittees on joint use projects that can capture stormwater runoff (SWRCB 2018). Additionally, the State Water Board intends to incorporate K-12 public schools into the next Phase II NDPES stormwater permit, which is currently scheduled for reissuance in 2021. To facilitate discussions on potential collaborative efforts between K-12 schools and SCVURPPP Permittees, public school parcels were separated from the MS4 permitted area to distinguish load contributions from these areas.

10.3 Caltrans

Caltrans operates with a statewide stormwater NPDES permit that regulates the discharge of stormwater associated with the operation and management of the State's highway system. Since the State's highways are permitted separately, these areas are classified as non-MS4. Caltrans properties and rights-of-ways were provided by Caltrans directly to SCVURPPP and were used to distinguish Caltrans areas and load contributions.

10.4 Industrial Stormwater Permits

Land areas with either individual NPDES permits or covered under the Industrial General Permit (IGP) are regulated under a program separate from MS4 permits and must meet requirements outlined in their respective permits for managing stormwater at the parcel or site level. SCVURPPP identified land areas regulated by individual industrial NPDES permits by querying the USEPA Environmental

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Compliance History Online (ECHO) database and areas addressed by the IGP by querying the Stormwater Multiple Application and Reporting System (SMARTS) database. These industrial parcel areas were separated from the MS4 area within the model to distinguish MS4 load contributions from those covered by the industrial permits. While these parcels encompass a relatively small area compared to the size of the Santa Clara Basin, some of these facilities are located within areas of higher pollutant loading.

10.5 Phase II Small MS4 Permits

Phase II Small MS4 permit which are considered as a non-traditional permit regulated separately form industrial permits and the MRP. Within the SCVURPPP RAA boundary, Phase II Small MS4 permits were identified by querying the State Water Board SMARTs database. San José State University operates under a Phase II Small MS4 permit totaling approximately 131 acres within the City of San José. This is the only Phase II Small MS4 permit which was identified within the SCRURPPP RAA limits. Figure 10-1 shows MS4-permitted areas, other NPDES-permitted areas, and non-urban areas.

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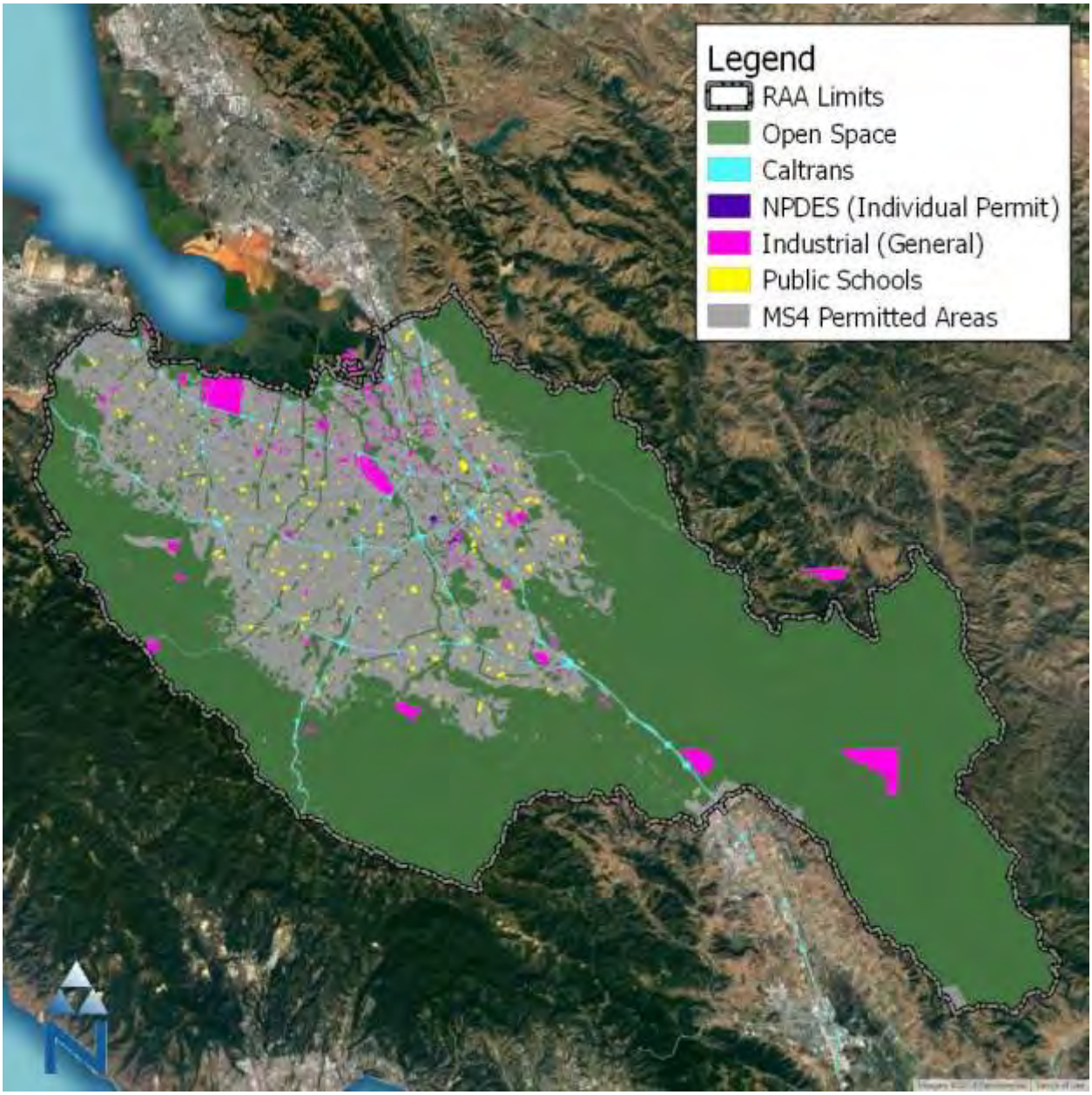

Figure 10-1. MS4 permitted areas, other NPDES permitted areas, and non-urban areas considered in the area of analysis.

11 SUMMARY OF BASELINE POLLUTANT LOADS AND STORMWATER IMPROVEMENT GOALS

Based on the modeling described in this report, the estimated average annual volume of water and sediment, PCBs, and mercury loads that are delivered to the San Francisco Bay from Santa Clara Basin watersheds are presented in Table 11-1. All estimates are based on Water Year 2002, a year with average rainfall in the Bay Area, and represent the baseline loads of these pollutants to the San Francisco Bay from urban stormwater runoff from the Santa Clara Basin at the time when the PCBs and Mercury TMDLs were established.

Table 11-1. Estimated average annual water volume and sediment, PCB, and mercury load delivered to San Francisco Bay from the Santa Clara Basin.

Land Use Category	Area (acres)	Water Volume (ac-ft/year)	Sediment Load (Mg/year)	PCBs Load (kg/year)	Mercury Load (kg/year)
Ag/Open	286,024	35.4	18,107	0.03	13.01
New Urban	24,740	3.6	3,168	0.01	0.19
Old Industrial	8,758	1.1	1,615	1.69	0.35
Old Urban (Not Residential/Parks)	33,344	4.4	5,136	1.05	1.79
Old Urban (Residential/Parks)	92,990	12.5	10,335	0.22	3.95
Totals	**445,857**	**57.1**	**38,361**	**2.99**	**19.30**

The PCB and mercury loads presented in Table 11-1 were redistributed based on permitted entity in Table 11-2 to provide a comparison between SCVURPPP Permittee-associated pollutant loads and loads from other NPDES permitted and non-urban areas, as described in Section 10. SCVURPPP Co-permittee area loads are approximately 74% and 29% of the total Santa Clara Basin PCBs and mercury loads, respectively.

Table 11-2. Land area and pollutant loading by the categories of permitted entities and non-urban areas.

Permitted and Other Areas		Area (acres)	PCBs Load (kg/year)	Mercury Load (kg/year)
SCVURPPP Permittees		143,747	2.21	5.60
Other NPDES Permitted Areas and Non-Urban Areas	Open Space	286,024	0.03	13.01
	Public Schools	4,567	0.12	0.21
	Caltrans	5,742	0.15	0.26
	Individual Industrial NPDES Permit	627	0.053	0.03
	Industrial General Permit (IGP)	5,020	0.42	0.18
	Phase 2 Small MS4	131	0.004	0.006
Totals		**445,858**	**2.99**	**19.30**

Tables 11-3and Table 11-4 provide a summary of the calculation of Stormwater Improvement Goals, or pollutant load reductions, to meet WLAs for PCBs and mercury, respectively. The tables summarize values reported in the TMDLs for existing (baseline) pollutant and sediment loads for all urban stormwater loads to the Bay (Rows 1 and 2, Column 1); sediment targets (Row 3); WLAs and pollutant reductions assigned to all municipal stormwater discharges to the Bay (Rows 4 and 5, Column 1); the portion of the WLAs assigned to the Santa Clara Basin (Row 4, Column 2); and the existing pollutant and sediment loads and load reductions estimated by the RAA model for permitted areas in the Santa Clara Basin designated (Rows 1, 2, and 5, Column 2). For PCBs, an 83.1 percent reduction in annual loads is estimated for permitted discharges to meet the Santa Clara Basin's portion of the TMDL wasteload allocation. For mercury, the baseline annual load is estimated to be less than the Santa Clara Basin's portion of the wasteload allocation, requiring no load reduction. The model is not determined to be under-predicting mercury load, as can be demonstrated by the validation of modeled mercury concentrations presented in Section 9 and sediment loads (basis for mercury load predictions) presented in Section 7.

Table 11-3. Calculation of Stormwater Improvement Goals to Address PCBs TMDL

TMDL Component		PCB Loads	
		1	2
		Bay-wide	Santa Clara Basin
1	Existing PCB Load – Urban Stormwater (kg/year)	20[2]	2.96[1]
2	Existing Sediment Load (t/year)	2,000,000[2]	17,943[1]
3	Target Sediment Concentration (µg/kg)	1[2]	n/a
4	Wasteload Allocation for PCBs in Urban Stormwater Discharges (kg/year)	2[2]	0.5[2]
5	Load Reduction for Urban Stormwater Discharges (kg/year)	18[3]	2.46[4]
6	Percent Reduction	90[2]%	83.1%

1 Based on the RAA model. Represents loading from NPDES permitted areas (total load [2.99 kg/yr] – open space load [0.03 kg/yr] = 2.96 kg/yr)
2 Reference: SFBRWQCB 2008b
3 Calculated by subtracting the Municipal WLA from the Bay-wide Existing PCB Load.
4 Orange is calculated based on the difference between the RAA modeled Existing PCB Load (blue = 2.96 kg/yr) and the Wasteload Allocation (green = 0.5 kg/yr)

Table 11-4. Calculation of Stormwater Improvement Goals to Address Mercury TMDL

TMDL Component		Mercury Loads	
		1	2
		Bay-wide	Santa Clara Basin
1	Existing Mercury Load (kg/year)	160[2]	6.29[1]
2	Existing Sediment Load (t/year)	410,000[2]	17,943[1]
3	Target Sediment Concentration (mg/kg)	0.2[2]	n/a
4	Wasteload Allocation for Urban Stormwater Discharges(kg/year)	82[2]	23[2]
5	Load Reduction for Urban Stormwater Discharges (kg/year)	78[3]	0[4]
6	Percent Reduction	48.8[2]%	0%

1 Based on RAA the model. Represents loading from NPDES permitted areas (total load [19.30 kg/yr] – open space load [13.01 kg/yr] = 6.29 kg/yr)
2 Reference: SFBRWQCB 2006
3 Calculated by subtracting the Municipal WLA from the Bay-wide Existing Mercury Load.
4 Orange is calculated based on the difference between the RAA modeled Existing Mercury Load (blue = 6.29 kg/yr) and the Wasteload Allocation (green = 23 kg/yr)

12 PEER REVIEW

MRP provisions C.11.ii(2) and C.12.ii(2) require that MRP permittees ensure that the calculation methods, models, model inputs and modeling assumptions used in the RAA have been validated through a peer review process. To assist with the development and implementation of a regionally consistent process, a regional RAA Work Group was created through BASMAA. The RAA Work Group collectively created the peer review process used by MRP permittees, including the development of peer review guidance and a set of questions to assist/focus the peer reviewers. The guidance and questions were reviewed and modified based on Water Board staff review.

The scope of the peer review was focused on the methods, models, inputs, and assumptions used to model the baseline conditions and load reduction benefits associated GSI. Estimations of PCB and mercury load reductions associated with source controls, as described in the Bay Area RAA Guidance (BASMAA 2017), were not included in the scope of the peer review. The peer review focused on addressing the following four questions:

1. Have the modeling approach and components, including the calculation methods, model, model inputs, and modeling assumptions, been adequately documented?
2. Are the modeling approach and components consistent with the guidelines and criteria provided in the Bay Area RAA Guidance? If not, is the deviation adequately documented and justified?
3. Are the modeling approach and components based on sound scientific knowledge, methods, and practice, given the available information and data?
4. Are key assumptions or simplifications used in the modeling approach and components reasonable and/or adequately justified?

For the baseline modeling portion of the RAA described in this report, these four questions were posed to peer reviewers relative to the twelve (12) following modeling components:

A. Model Selection (rationale, spatial/temporal resolution, alignment with information needs/data available)
B. Geographic area of analysis
C. Period of time used to model baseline condition
D. Method used for simulation of flows and pollutant loads
E. Representation of rainfall/ runoff processes
F. Representation of the variability in pollutant loadings based on land use
G. Representation of watershed characteristics (i.e., topography, imperviousness, drainage areas, soils)
H. Watershed hydrology parameterization
I. Representation of meteorology (Precipitation, Evaporation, Temperature)
J. Representation of the drainage system
K. Baseline model calibration process - hydrology
L. Baseline model validation process - hydrology and pollutant loading

Coordination with the peer reviewers was conducted through the BASMAA Executive Director (ED). Each RAA Work Group participant provided the BASMAA ED with technical review documents (e.g., reports, memorandum, etc.) that should be reviewed. A standardized matrix was used by the reviewers to organize their comments and suggestions was also developed through this process.

Peer reviewer comments on the SCVURPPP Phase I RAA Report showed that each of the above components were mostly determined to be adequately documented and justified and based on sound scientific knowledge, methods, and practice. To improve documentation of the baseline model, the peer reviewers provided the following suggestions for the Phase I RAA Report:

- Additional clarity was requested regarding how pollutant concentrations specific to each land use were utilized in the model in combination with sediment transport processes.
- Additional clarity was requested regarding documentation of modeling assumptions associated with directly connected impervious area (DCIA).
- Additional clarity was requested regarding the sources of spatial data characterizing soils (i.e., SSURGO) and used as the basis for modeling assumptions.
- Additional clarity was requested regarding the purpose of HRUs for characterizing hydrologic response, and how impervious cover was used in the development of the HRUs.
- Additional clarity was requested regarding the documentation of the spatial variability of rainfall datasets (PRISM and NLDAS2) utilized by the model.
- Additional clarity was requested regarding documentation of the flow gages utilized for model hydrology calibration and validation.
- Additional clarity was requested regarding the presentation of water quality validation results utilizing statistical box plots. Methods used to demonstrate model performance for the validation process were limited by the number of samples available at each of the water quality monitoring stations.

Each peer reviewer's comment was reviewed by the SCVURPPP RAA consultant team and modifications to the calculation methods, models, model inputs, and modeling assumptions described in this report were performed accordingly. Responses were also provided to the peer reviewers. A summary of the comments received from peer reviewers and associated responses from the SCVURPPP RAA consultant team can be found in Appendix A.

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Table A-1. RAA Phase I Peer Review Comments/Response – Reviewer #1

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1A	Model Selection (rationale, spatial/temporal resolution, alignment with information needs/data available)	Section 3.2/3.4/4.1/4.5.1 of RAA Guidance Document EPA, 2009. Section 3.3.1 Guidance Document on the Development, Evaluation and Application of Environmental Models, https://www.epa.gov/measurements-modeling/guidance-document-development-evaluation-and-application-environmental-models	Phase I Baseline Modeling Report, Sections 1 through 9.	Per the RAA Guidance Document (Section 3.2.2), a "computational method" was selected as the baseline model, based on LSPC (listed as an acceptable model in Table 4-1 of the RAA Guidance Document). Selection of the baseline model considered study questions to be answered, previous modeling studies, data needs and availability, and model processes that could be utilized to represent the hydrologic and PCB and mercury loading characteristics of the watersheds. Rather than fully document the assessment of available data that informed model selection, the report focuses on demonstrating how data was used for model configuration.	Yes	Yes	Yes	Yes	No response needed.
1B	Geographic area of analysis	Section 3.3 of RAA Guidance Document.	Phase I Baseline Modeling Report, Sections 3 and 10.	Section 3 of the Phase I Baseline Modeling Report documents the model domain for all Santa Clara Basin watersheds. Section 10 of the Phase I Baseline Modeling Report documents the area of analysis used for quantifying loads for comparison with countywide TMDL wasteload allocations and determination of pollutant load reduction goals. All loads for Co-permittees and other areas are distinguished and considered in load estimates for the area of analysis.	Yes, the geographic areas of analysis for the county and permittees are nicely documented in the draft document. Section 10 describes high-detail spatial anlaysis used to parse out areas regulated under other permits or not at all.	Yes	Yes	Yes	No response needed.

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1C	Period of time used to model baseline condition	Section 3.4, page 20-21 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section 8 (p. 68), Section 8 (p. 75), and Section 11 (Tables 11-2 and 11-3).	Water Year 2002 was selected as the representative average loading condition, consistent with the RAA Guidance Document	Yes, water year 2002 is used.	Yes	Yes	Yes	No response needed.
1D	Method used for simulation of flows and pollutant loads	Section 4.1.2/ Page 29 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section 2 through 9.	LSPC provides dynamic continuous simulation of flows and pollutant loads. LSPC is listed as an available model acceptable for use for Bay Area RAAs (Table 4.1 of RAA Guidance Document). LSPC includes simulation of surface rainfall/runoff process and represents baseflow through simulation of shallow groundwater storage and release to each stream (see Figure 2-2 of Phase I Baseline Modeling Report). Hydrology was calibrated based on all available flow data. LSPC utilized land use EMCs from the SFEI RWSM for simulation of PCB and mercury loads (see Figure 2-3 of Phase I Baseline Modeling Report), which was validated based on available monitoring data within the County (Sections 8 and 9).	Yes	Yes	Yes	Yes	No response needed.

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1E	Representation of rainfall/ runoff processes	Section 4.1.2/ Page 29 and Table 4.1 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section2 through 6.	LSPC provides dynamic continuous simulation of flows and pollutant loads. LSPC is listed as an available model acceptable for use for Bay Area RAAs (Table 4.1 of RAA Guidance Document).	No. The equation for effective impervious area does not make sense (pg 21, first paragraph). How does the product of mapped impervious area and diretly connected impervious area equal effective impervious area? Does this refer to the "intersection" of these two spatial layers, in a GIS sense? Or perhaps I do not understand the procedure. Some further nuance in describing the method for deriving EIA- which is useful based on literature- would improve the estimation of runoff that influences loading.	Yes	Is there an inherent assumption associated with using effective impervious area and pollutant loads? Would some sediment- potentially with mercury or PCBs, be washed off the non-connected impervious area that would not be included in the DCIA?	See cell F7. There are regression estimates in literature for DCIA that do not appear to be referenced. They may not be relevant for this jurisdiction, but they need to be recognized.	Column F Response: Section 4.5 was modified to more explicitly explain the calculation of EIA with associated units to avoid confusion. Column H Response: DCIA is used to adjust MIA because HRUs are modeled in parallel. Water from one HRU does not flow over another before reaching a stream routing segment. This adjustment is commonly made in models to better account for disconnection that are not explicitly represented. As described in Section 1.2, runoff concentrations vary by land use; therefore, adjustments in HRU area also result in adjustments in loading potential. Pervious areas will have less runoff than their impervious counterparts. Column I Response: See response above for Column F.
1F	Representation of the variability in pollutant loadings based on land use	Section 4.1.2/ Page 29 and Table 4-3 in the RAA Guidance Document. Note that due to paucity of data, all programs are using the Regional Watershed Spreadsheet Model (RWSM) land-use based average concentrations for PCBs and Mercury pollutant loading (as suggested by Table 4-4 in the RAA Guidance Document). RWSM Overview and data summary is provided in "Regional Watershed Spreadsheet Model (RWSM). Year 6 Final Report" (SFEI, 2017). We are not asking that the RWSM itself be peer reviewed as part of this effort.	Phase I Baseline Modeling Report, Section 2, 8, and 9.	RWSM land use average concentrations were combined with LSPC hydrologic and sediment modeling results for estimation of pollutant loads.	Yes	Yes	Yes	Yes	No response needed.

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1G	Representation of watershed characteristics (i.e., topography, imperviousness, drainage areas, soils)	Table 4-4 of RAA Guidance Document for Suggested Data Sources.	Phase I Baseline Modeling Report, Section 3 through 9.		Yes, the description of datasets used to represent the watershed characteristics is highly detailed.	Yes	Yes	From Figure 4-2, is more detailed SSURGO data with soil stratification of the upper layers used in the analysis? There is better data available from new SSURGO layers for many areas that can yield a composite k-sat and underlying k-values based on soil type. For stormwater planning, this is important. BMP excavation may go deeper than the top layer. Further, if a layer below the top layer has a lower k-sat value, it would be the limiting layer for infiltration. It may be more effective to use the lowest value of k-sat within the soil horizon, or use an average value. Some discussion of this would be useful	Column I Response: The most current data available were used in this effort. The most current SSURGO data (and all associated attribute information) were depth-weighted and used for 98% of the watersheds modeled in this effort. Data gaps were patched with the older STATSGO data.
1H	Watershed hydrology parameterization	Should be consistent with generally accepted hydrologic principles and appropriate for model used, and support a level of model complexity that aligns with the data available.	Phase I Baseline Modeling Report, Section 2 through 4.		Yes	Yes	Yes	Yes	No response needed.
1I	Representation of meteorology (Precipitation, Evaporation, Temperature)	Table 4-4 of RAA Guidance Document for Suggested Data Sources.	Phase I Baseline Modeling Report, Section 5.		Was the PRISM data ever validated against local rain gauge data?	Yes	Yes	Yes	Column F Response: PRISM precipitation have been compared against independently collected rainfall data and found to be representative. The benefit of reflecting spatial variability in the model toward the calibration tends to be greater when gridded data are used as compared to observed stations only—especially where rainfall variability is notable over relatively short distances.

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1J	Representation of the drainage system	Table 4-4 of RAA Guidance Document for Suggested Data Sources; Detailed routing of flows not warranted at this model scale. Please review general watershed to receiving water "routing" for annual calibration and handling of baseflow contributions.	Phase I Baseline Modeling Report, Section 3.	As the focus of the modeling project is watershed hydrology and pollutant loading and not hydraulic analysis, the drainage network was not an emphasis of model configuration and was therefore represented as simple representative channels for each model subwatershed (this was to ensure proper timing of flow routing). For notable watersheds utilized for calibration, details for the drainage system were incorporated into the LSPC model in order to isolate hydrologic processes from other factors influencing flow routing, and focus the calibration of hydrologic and sediment transport processes associated with the land surface.	The HRU approach that simplifies the drainage system based on response units is one method to simplify hydrologic modeling. A note discussing how the accuracy of runoff estimates relates to the size of the HRU and corresponding estimation procedure would be useful.	Yes	Yes	Yes	Column I Response: Added two sentences to further clarify the benefit an HRU-based approach provides for building a more representative model: "Stratifying land use with imperviousness, soil, and slope introduces more texture for characterizing spatial variability of hydrology than using land use alone. It also provides a basis for compartmentalizing parameters. For example, all HRUs of a given soil type can have the same infiltration rate, but different interception storage values because that varies by land use and vegetative cover."
1K	Baseline model calibration process - hydrology	Section 4.4.2 of the RAA Guidance Document. Accepted calibration range for average annual results provided in Table 4-2 of RAA Guidance Document. Calibration period should match or be representative of baseline modeling period.	Phase I Baseline Modeling Report, Section 6.	The documented calibration process for hydrology and sediment go beyond the minimum reporting metrics suggested by the RAA Guidance Document, and provide a full description of model performance under a range of conditions. The model tends to over-predict sediment loads during wetter periods (see Table 7-4 and Figure 7-10 of Phase I Baseline Modeling Report), adding a degree of conservativeness to the RAA in terms of assessing necessary load reductions to meet TMDL wasteload allocations.	Yes, the approach uses the full hydrologic record for 3 sub-watershed areas, chosen to represent urbanized, forested, and mixed areas. Runoff was compared to observed gauge data.	Yes	Yes	It is not clear if evaluations in futher watersheds would improve the model's performance.	Column I Response: Comment noted. All watersheds with available monitoring data were considered in the model calibration/validation process.
1L	Baseline model validation process - hydrology and pollutant loading	Section 4.4.2 of the RAA Guidance Document	Phase I Baseline Modeling Report, Sections 6.4, 6.5, 7, 8, and 9.	The model was validated for hydrology, sediment loading, PCBs, and mercury.	Yes	Yes	Yes	Yes	No response needed.

Table A-2. RAA Phase I Peer Review Comments/Response – Reviewer #2

A	B	C	D	E	F	G	H	I	J
ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1A	Model Selection (rationale , spatial/temporal resolution, alignment with information needs/data available)	Section 3.2/3.4/4.1/4.5.1 of RAA Guidance Document EPA, 2009. Section 3.3.1 Guidance Document on the Development, Evaluation and Application of Environmental Models, https://www.epa.gov/measurements-modeling/guidance-document-development-evaluation-and-application-environmental-models	Phase I Baseline Modeling Report, Sections 1 through 9.	Per the RAA Guidance Document (Section 3.2.2), a "computational method" was selected as the baseline model, based on LSPC (listed as an acceptable model in Table 4-1 of the RAA Guidance Document). Selection of the baseline model considered study questions to be answered, previous modeling studies , data needs and availability, and model processes that could be utilized to represent the hydrologic and PCB and mercury loading characteristics of the watersheds. Rather than fully document the assessment of available data that informed model selection, the report focuses on demonstrating how data was used for model configuration.	Yes; they use the Loading Simulation Program in C (LSPC) to simulate hydrology and sediment loads. They calculate Hg and PCB loads for a few sample events and divide by mean sediment concentration to get Hg or PCB concentration on sediment, which they then assume is constant.	Yes, LSPC is listed as an acceptable model in the GD (Table 4-1).	Yes; use of sediment concentration instead of water-based concentration is justified by the nature of the pollutants.	Yes; the approach taken is reasonable and reflects current state of the art.	No responses needed.
1B	Geographic area of analysis	Section 3.3 of RAA Guidance Document.	Phase I Baseline Modeling Report, Sections 3 and 10.	Section 3 of the Phase I Baseline Modeling Report documents the model domain for all Santa Clara Basin watersheds. Section 10 of the Phase I Baseline Modeling Report documents the area of analysis used for quantifying loads for comparison with countywide TMDL wasteload allocations and determination of pollutant load reduction goals. All loads for Co-permittees and other areas are distinguished and considered in load estimates for the area of analysis.	Mostly; p1 has a section "Designation of the Area Addressed by the Analysis", and distinguishes between the RAA area (MRP and NPDES) and non-RAA areas (open space and impoundments), which I think corresponds to SCVURPPP RAA area and "Santa Clara County Watersheds" areas in Figure 3-1...but it would be helpful to have an overview study area diagram showing the RAA area and non-RAA area, and MRP and NPDES areas as separate if that is in fact an important distinction. The basemap for such a map could be the topographic map or streets map basemaps in ArcGIS, with the RAA boundary from Figure 3-1. An overview map of this type would help orient the reader.	Yes; the definition of the study area follows the GD.	Yes.	Yes.	Column E Response: Note that the discussion in Section 1 (p. 1) referenced in the comment is providing an overview of the RAA process as described by the USEPA RAA Guide and RAA Guidance Document, and is not yet discussing the area specifically addressed by this RAA. Sections 3 and 4 provide a full description of the area of analysis addressed by the RAA.

A	B	C	D	E	F	G	H	I	J
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1C	Period of time used to model baseline condition	Section 3.4, page 20-21 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section 8 (p. 68), Section 8 (p. 75), and Section 11 (Tables 11-2 and 11-3).	Water Year 2002 was selected as the representative average loading condition, consistent with the RAA Guidance Document	Yes, they use the 2002 water year.	Yes; 2002 is specified as an acceptable water year for the analysis.	The GD justiifies the use of 2002 as representative.	Yes, assuming that the mean year is the most important for loading to the coast (could be the 5 or 10-year event that determines long-term loading rates).	No responses needed.
1D	Method used for simulation of flows and pollutant loads	Section 4.1.2/ Page 29 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section 2 through 9.	LSPC provides dynamic continuous simulation of flows and pollutant loads. LSPC is listed as an available model acceptable for use for Bay Area RAAs (Table 4.1 of RAA Guidance Document). LSPC includes simulation of surface rainfall/runoff process and represents baseflow through simulation of shallow groundwater storage and release to each stream (see Figure 2-2 of Phase I Baseline Modeling Report). Hydrology was calibrated based on all available flow data. LSPC utilized land use EMCs from the SFEI RWSM for simulation of PCB and mercury loads (see Figure 2-3 of Phase I Baseline Modeling Report), which was validated based on available monitoring data within the County (Sections 8 and 9).	Yes, Figure 2-3 explains the modeling approach well, though I wasn't sure if contaminant concentrations on sediment differ by land use as of p 6 (see column H). Just clarify on p6 that sediment concentration differs by land use.	The GD does not specify whether water or sediment concentrations of contaminants is preferable.	Main assumptions include that the contaminant concentrations in the RWSM represent the long-term mean concentrations accurately, and that contaminant concentrations on sediment are constant over time. As of p. 6, it's not clear if concentrations on sediment vary by land use or not, though p. 16 says that the land use data allowed for contaminant concentrations to be assigned spatially--I assume that means that concentrations on sediment varied by land use. Please clarify if that's not the case.	Yes, the LSPC is fine for this application, and the strategy to use contaminant concentration on sediment instead of in water is good (unless sediment concentration is assumed constant, in which case the spatial pattern in loadings will not reflect hotspots from certain land uses (e.g. Old Industrial, which probably has high Hg/PCB loads but low sediment concentrations since I assume it's mostly non-eroding impervious surfaces (concrete, asphalt, etc).	Column H Response: Yes, contaminant concentrations vary by land use. In step 1, land-use based loads are generated using RWSM land-use concentrations. Those loads are then attributed to sediment (instead of flow) in step 2, preserving the mass balance. Loading still varies by land use.

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A	B	C	D	E	F	G	H	I	J
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1E	Representation of rainfall/ runoff processes	Section 4.1.2/ Page 29 and Table 4.1 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section2 through 6.	LSPC provides dynamic continuous simulation of flows and pollutant loads. LSPC is listed as an available model acceptable for use for Bay Area RAAs (Table 4.1 of RAA Guidance Document).	Mostly; they use Hydrologic Response Units (HRUs) in the LSPC. On p 19, please start the section with a sentence about how Impervious cover was used in the model. The layers used to identify HRUs differ--for example Figure 4-4 does not have geology but does have imperviousness, but the text on p21, 4th bullet point, lists bedrock geology but not impervious (which is a secondary attribute used to inform model parameter selection). And then Table 4-3 lists only soil, slop, and land use. Which variables were used in the end to define the HRUs? Please make the figures and text consistent.	Yes, LSPC is listed as an acceptable model in the GD (Table 4-1).	Yes, but clarify if geology was considered, and if so, what geologic units are present in the watershed and how they are hypothesized to impact runoff processes (preferably a map).	Yes, LSPC is adequate for modeling hydrology in this type of watershed.	Column F Response: Added explanation to Section 4.4 on how impervious cover was used in development of the HRUs. Column H Response: Removed mention of geology. While it is an example of a possible HRU attribute, geology was not used in this study.
1F	Representation of the variability in pollutant loadings based on land use	Section 4.1.2/ Page 29 and Table 4-3 in the RAA Guidance Document. Note that due to paucity of data, all programs are using the Regional Watershed Spreadsheet Model (RWSM) land-use based average concentrations for PCBs and Mercury pollutant loading (as suggested by Table 4-4 in the RAA Guidance Document). RWSM Overview and data summary is provided in "Regional Watershed Spreadsheet Model (RWSM). Year 6 Final Report" (SFEI, 2017). We are <u>not</u> asking that the RWSM itself be peer reviewed as part of this effort.	Phase I Baseline Modeling Report, Section 2, 8, and 9.	RWSM land use average concentrations were combined with LSPC hydrologic and sediment modeling results for estimation of pollutant loads.	Yes; figures 8-14 and a=9-7 clearly show loading rates from each cell that reach the bay. The RWSM is used to calculate long-term loading rates, then those loads are divided by sediment load to get contaminant load on sediment. Modelled sediment load is then multiplied by contaminant concentration on sediment to get load.	Yes; they followed the GD.	They assume the RWSM concentrations are correct and represent the long-term mean concentration, and that concentration on sediment is constant for all events including first flush. The last assumption isn't stated but should be; this could be erroneous particularly if Hg is predominantly from atmospheric deposition (and therefore would have higher concentrations on sediment during the first flush)	The methods used are defensible; just articulate the assumptions about concentrations on sediment more clearly.	Column H Response: Discussion of atmospheric sources of mercury is provided in Section 9. As suggested by the BASMAA RAA guidance document, RWSM EMCs provide a basis for spatial variability of PCB and mercury concentrations by source--using those EMCs as-is would technically have been acceptable. This modeling effort coupled a higher-resolution hydrology and sediment model with RWSM to increase spatial and temporal resolution of source loading estimates. This resolution better aligns model predictions as boundary conditions for SUSTAIN.

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1G	Representation of watershed characteristics (i.e., topography, imperviousness, drainage areas, soils)	Table 4-4 of RAA Guidance Document for Suggested Data Sources.	Phase I Baseline Modeling Report, Section 3 through 9.		Yes; they merge two DEMs with diferent resolutions (1 and 30m), and used datasets described in Table 4-1.	Yes, the DEMs, and other datasets as listed in Table 4-1, follow the GD.	Yes; they calculate "dirctly connected impervious cover" (DCIC) using Sutherland's equations (I think, based on p 21). They may have adjusted the parameters further to calculate DCIC, though it wasn't clear how or if those adjustments make any difference in assigning model parameters.	Yes; the maps are good.	Column H Response: No further adjustments were made beyond the DCIA application described. Text was revised to avoid confusion.
1H	Watershed hydrology parameterization	Should be consistent with generally accepted hydrologic principles and appropriate for model used, and support a level of model complexity that aligns with the data available.	Phase I Baseline Modeling Report, Section 2 through 4.		They use a two-phase "weight of evidence" approach. First phase used the Bay Area Hydrological Model parameters to constrain their LSPC parameters.	yes, the parameters are from the BAHM, which has been peer-reviewed.	They wrote that geology was used in the HRUs and parameter assignment, but I don't think it was (Table 4-3). If it was, please clarify how. It also wasn't totally clear how "secondary attributes" (p21) were used in the parameterization. What parameters used the secondary information?	The HRU concept is common practice in hydrology and they appear to do it well.	Geology was not used for HRUs in this watershed. Section was updated to reflect the layers intersected.

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A	B	C	D	E	F	G	H	I	J
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1I	Representation of meteorology (Precipitation, Evaporation, Temperature)	Table 4-4 of RAA Guidance Document for Suggested Data Sources.	Phase I Baseline Modeling Report, Section 5.		Yes, though the symbols in the legend of Table 5-1 are confusing (is the white dot in the legend the black dot in the table)? Figure 5-2 labels the centroids of PRISM and NLDAS2 grids as "stations", but they're not stations; please relabel the legend. Add a scale bar to Figure 5-2...and to all maps.	Yes; they fused PRISM and NLDAS2 to get hourly resolution (from NLDAS2) at PRISM's higher spatial resolution (4km)	p23 discussed a land surface model (LSM), but should clearly indicate that the LSM is embedded in NLDAS2, and isn't part of the LSPC. Also, I don't think the LSM itself distributes precipitation using topography, etc--LSMs typically take precipitation as input, and precip is downscaled by a different routine. Please clarify.	Fusion of NLDAS2 and PRISM seem reasonable. I didn't see the point of section 5.2, which analyzes the elevation and aspect controls on precipitation, but doesn't inform the modeling or analysis later.	Column F Response: Table 5-1 legend was revised to provide more clarity. Figures 5-2, 8-1, 8-2, 8-3, 8-4, and 8-5 were also revised with improved legends and scale bar to address the comment.. Column H Response: Section 5 discussion has been revised to add clarity. Column I Response: The purpose of this section is to further illustrate the spatial variability of meteorological data used in the model. Insights from this analysis may be used to inform gage assignments to subwatersheds. Revised the last sentence in Section 5.2 because for this study, the default assignment appear to be sufficiently representative.
1J	Representation of the drainage system	Table 4-4 of RAA Guidance Document for Suggested Data Sources; Detailed routing of flows not warranted at this model scale. Please review general watershed to receiving water "routing" for annual calibration and handling of baseflow contributions.	Phase I Baseline Modeling Report, Section 3.	As the focus of the modeling project is watershed hydrology and pollutant loading and not hydraulic analysis, the drainage network was not an emphasis of model configuration and was therefore represented as simple representative channels for each model subwatershed (this was to ensure proper timing of flow routing). For notable watersheds utilized for calibration, details for the drainage system were incorporated into the LSPC model in order to isolate hydrologic processes from other factors influencing flow routing, and focus the calibration of hydrologic and sediment transport processes associated with the land surface.	Yes, this was very clear; they burned artificial drainages into the DEM and used the burned DEM to delineate watersheds.	Table 4-4 lists the National Hydrography Dataset; the DEM and watershed boundaries derived here are probably an improvement since they use recent LiDAR and street and sewer networks to guide delineation.	Yes; the coarse resolution DEM did an adequate job delineating watershed boundaries in the non-urban area, and the 1m was needed for the urban area.	Yes; LiDAR DEMs are probably the best data source for urban watersheds.	No responses needed.

A	B	C	D	E	F	G	H	I	J
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1K	Baseline model calibration process - hydrology	Section 4.4.2 of the RAA Guidance Document. Accepted calibration range for average annual results provided in Table 4-2 of RAA Guidance Document. Calibration period should match or be representative of baseline modeling period.	Phase I Baseline Modeling Report, Section 6.	The documented calibration process for hydrology and sediment go beyond the minimum reporting metrics suggested by the RAA Guidance Document, and provide a full description of model performance under a range of conditions. The model tends to over-predict sediment loads during wetter periods (see Table 7-4 and Figure 7-10 of Phase I Baseline Modeling Report), adding a degree of conservativeness to the RAA in terms of assessing necessary load reductions to meet TMDL wasteload allocations.	They say (p30) that hydrology was calibrated using supporting information, but I wasn't sure if they meant that they ported parameters from the BAHM to the different HRUs, or did they compare the results to observed streamflow in the first phase? The second phase involved "fine tuning the parameters" and calculating error statistics. In section 6.3 they list what parameters they adjusted and how they rationalize those adjustments in terms of landscape properties--in section 6.1 please state that you will list those details in section 6.3. I was confused that 6.2 says 8 gages were used, but 6.3 says 3 gages were used for "primary calibration". Why? Please clarify in 6.2 that of the 8, 3 were used for "primary calibration sites", and define what you mean by "primary calibration sites".	The GD is somewhat brief about how calibration is to be done; the current effort seems to meet those requirements.	Yes, but clarify if the first phase actually involved comparison of model predictions with observations, and what parameters were adjusted in the second phase. Section 6.2 says that eight streamflow gages were used; Figure 6-1 lists more than that--please indicate in Figure 6-1 which gages were used for the calibration and validation. I also find the legend confusing...please make the legned also have a blue background--as-is, I can't tell whether open blue circles or black circles represent 90-100% data quality...looks like black dots and therefore most of the dataset has only 0-10% high quality data. Also, please define "data qualtiy" in the text.	They compare model predictions with observed data, including the mean but also other metrics (Table 6-2). This is good practice.	Column F Response: Added statement earlier in Section 6.1 that states adjusted parameters are described in greater detail in Section 6.3. Column H Response: Table has been updated to includes primary and secondary calibration and validation stations. Symbol legend is independent of the color gradient. Legends have been further expanded for clarity. Regarding the legend, data with a lower percentage of “missing” or “estimated” records are of higher quality.

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A	B	C	D	E	F	G	H	I	J
ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
1L	Baseline model validation process - hydrology and pollutant loading	Section 4.4.2 of the RAA Guidance Document	Phase I Baseline Modeling Report, Sections 6.4, 6.5, 7, 8, and 9.	The model was validated for hydrology, sediment loading, PCBs, and mercury.	Three headwater and two downstream gages were used for validation of water flow; this is a true validation exercise, since points from different watersheds, not just different parts of the time series of a given site, were used for validation. This spatial validation is more challenging than temporal, and the authors should be commended for submitting their model to such a rigorous validation exercise. Note that the legend of Figure 6-6 says the watersheds were for "calibration" but I think that should be changed to "validation", no? Sediment was modelled by calibrating LSPC to observations at one stream gage. It did not appear that separate calibration and validation were peformed, which is understandable given data availability (though please clarify how many suspended sediment samples were collected over the period used for comparison).	The flow validation was very good. Sediment validation was merged with calibration likely due to data availability--insufficient to separate the data into calibration and validation. PCB validation was good…but Figure 8-11 and 8-12 need more explanation. Figure 9-1 is good but complicates comparions of observation with the model...why not also show the observed regression line on the modelled panels, for comparison?	Yes; they assume that the concentrations by land use in the RWSM are correct, but with an offset to reflect background deposition/concentrations.	Yes; the y validated the hydrology, PCBs and sediment using available data. The major piece missing is a quantiative error/uncertainty analysis. The model predicts PCBs and Hg concentrations with what error (ng/L and % of mean)?	Column G Response: Added text in the paragraph and “as boxplots” to the captions of Figures 8-11 and 8-12 to better explain the content. Regarding Figure 9-1, The RWSM EMCs also show elevated Hg levels from certain non-MS4 areas. The report describes an analysis of instream data, which shows that a 1-to-1 line of instream Hg vs. sediment concentration has a positive Y-intercept value, suggesting elevated background Hg levels independent of storm-driven sources. As a result, the model was parameterized accordingly as part of the baseline model representation. However, those areas are not associated with urban runoff regulated by the MRP, meaning that ultimately, they are not part of the area to be managed with GI. Column I Response: See response in cell K8. The model was compared against the limited observed data to perform meaningful statistical analyses to validate trends. The limited amount of monitoring data within each San Francisco County is the primary reason that the regionally calibrated RWSM was selected for assigning pollutant concentrations, with validations performed as part of the RAA.

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Appendix B

Phase II RAA – Green Stormwater Infrastructure Modeling Report

Santa Clara Valley Reasonable Assurance Analysis Addressing PCBs and Mercury:

Phase II Green Stormwater Infrastructure Modeling Report

Prepared for:

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Prepared by:

PARADIGM
ENVIRONMENTAL

SEPTEMBER 30, 2020

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EXECUTIVE SUMMARY

To support municipalities in the Santa Clara Basin (collectively referred to as "Co-permittees) with implementation of Green Stormwater Infrastructure (GSI) and to address requirements of the Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049) (SFBRWQCB 2015), the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) performed a study to quantify baseline hydrology and loadings of Polychlorinated Biphenyls (PCBs) and mercury to San Francisco Bay, and evaluate the benefits of existing, planned and potential future GSI projects to reduce pollutant loads through the capture, infiltration, and/or treatment of stormwater. The previous *Santa Clara Basin Reasonable Assurance Analysis Addressing PCBs and Mercury: Phase I Baseline Modeling Report* (RAA Phase I Report) provided documentation of the methods and modeling approaches used to represent baseline hydrology, sediment, PCBs, and mercury loads to San Francisco Bay from municipal stormwater discharges within the Santa Clara Basin (SCVURPPP 2020a). This Reasonable Assurance Analysis (RAA) for GSI (i.e., the RAA Phase II Report) focuses on quantifying load reductions associated with existing, planned and potential future GSI projects. The RAA Phase II Report provides a summary of the modeling approaches used to: 1) simulate hydraulic and pollutant removal processes associated with GSI projects and opportunities within each of the Co-permittee areas throughout the Santa Clara Basin, 2) determine the amount of GSI needed within each municipal jurisdiction to address GSI pollutant load reduction goals, and quantify metrics that can support GSI planning, implementation, and tracking. Results from this report can be considered by each Co-permittee to set goals for GSI implementation, which will be addressed through each municipality's GSI Plan. Together with the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis Report* (i.e., the RAA Phase III Report), which documents the methods used to quantify the PCB and mercury load reduction benefits of implementing source controls (e.g., source property abatement, control program for PCBs in buildings, and stormwater system operation and maintenance) in parallel with GSI, the results of the RAA for GSI analyses included in this Phase II Report provide reasonable assurance that GSI and source control measures outlined in the *PCBs and Mercury TMDL Control Measures Implementation Plan and Reasonable Assurance Analysis for the Santa Clara Basin* will achieve PCB and Mercury Total Maximum Daily Load (TMDL) wasteload allocations (WLAs) for the Santa Clara Basin.

The baseline model documented in the RAA Phase I Report provided the first step in preparation of a RAA that quantitatively demonstrates that proposed GSI control measures will result in sufficient load reductions of PCBs and mercury to assist with meeting WLAs assigned to municipal stormwater discharges to San Francisco Bay. Based on the Loading Simulation Program C++ (LSPC), the baseline model was calibrated and validated using available historic monitoring data and was demonstrated to meet performance criteria specified in the *Bay Area Reasonable Assurance Analysis Guidance Document* (Bay Area RAA Guidance) (BASMAA 2017). The LSPC model provides hourly simulation of historical hydrology and pollutant loads for multiple watersheds discharging to San Francisco Bay.

The RAA for GSI includes linkage of the LSPC baseline model with a GSI performance model based on the System for Urban Stormwater Treatment & Analysis Integration (SUSTAIN). Developed by the U.S. Environmental Protection Agency's (EPA) Office of Research and Development, SUSTAIN was primarily designed as a decision-support system for selection and placement of GSI projects at strategic locations in urban watersheds. It includes a process-based continuous project simulation module for representing flow and pollutant transport routing through various types of GSI projects. A distinguishing feature of SUSTAIN is a robust cost-benefit optimization model that incorporates

dynamic, user-specified project unit-cost functions to quantify the implementation costs associated with various types of GSI projects (USEPA 2009, Riverson et al. 2014). The cost-benefit optimization model was run iteratively to generate cost-effectiveness curves representing different combinations of projects within each municipal jurisdiction. Those results were used to evaluate cost-effective goals for GSI implementation by evaluating the trade-offs between different scenarios.

The output from the RAA for GSI needs to consider multiple perspectives of regulators, stakeholders, and Co-permittees, and balance appropriate detail and specificity with ample opportunity for future adaptive management. The following are key considerations for the output from the RAA for GSI:

- **Demonstrate PCBs and Mercury Load Reductions** – The primary goal of the RAA for GSI is to quantitatively demonstrate that GSI implementation will achieve stormwater improvement goals for PCBs and mercury that are outlined in the MRP. Based on the baseline hydrology and water quality model (SCVURPPP 2020a), the RAA determined that a 17.3% reduction in PCB loads (i.e., 0.38 kg/yr) is needed to meet the stormwater improvement goals for GSI that are outlined in the MRP. Zero reduction in mercury loads was determined to be needed because baseline loads were predicted to be below the TMDL WLA for the Santa Clara Basin. As a result, a 17.3% reduction in PCB loads is established as the primary pollutant reduction target for the RAA for GSI.
- **Develop Metrics to Support Implementation Tracking** – The MRP (Provision C.3.j) requires tracking methods to provide reasonable assurance that GSI stormwater improvement goals for PCBs and mercury outlined in the MRP are being met. Provision C.3.j states that the GSI Plan "shall include means and methods to track the area within each Co-permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area." SCVURPPP is currently leading the development of a tracking tool that will enable calculation of metrics consistent with the results of the RAA.
- **Support Adaptive Management** – Given the relatively small scale of most GSI projects (e.g., low impact development [LID] on an individual parcel or a single street block converted to green street), numerous individual GSI projects will be needed to address the pollutant reduction target. All the GSI projects will require site investigations to assess feasibility and costs. As a result, the RAA for GSI provides a preliminary investigation of the amount of GSI needed spatially (e.g., by subwatershed and municipal jurisdiction) to achieve the basin-wide pollutant load reduction goal. The RAA for GSI sets the GSI planning "goals" in terms of the amount of GSI implementation needed over time to address pollutant load reductions. As GSI Plans are implemented and more comprehensive municipal engineering analyses (e.g., project designs, masterplans, capital improvement plans) are performed, the adaptive management process will be key to ensuring that goals are met. In summary, the RAA for GSI informs GSI implementation goals, but the pathway to meeting those goals is subject to adaptive management and can potentially change based on new information or engineering analyses performed over time.

This RAA Phase II Report provides necessary documentation of the methods and assumptions for modeling GSI and selecting GSI implementation goals to meet the 17.3% basin-wide reduction of PCB loads to San Francisco Bay from municipal stormwater. The RAA for GSI predicts the most cost-effective GSI implementation plan for each municipal jurisdiction and subwatershed throughout the Santa Clara Basin and sets implementation goals for the amount of stormwater volumes to be managed and impervious area to be retrofitted. These can serve as metrics with which to track GSI implementation and PCBs and mercury load reductions over time. Through the adaptative management process, future implementation of GSI may vary from results presented in this report, based on further engineering analysis and evaluation of GSI project opportunities. However, the RAA

for GSI provides goals for GSI planning that can be adapted over time as lessons are learned through GSI implementation.

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Acronyms

ABAG	Association of Bay Area Governments
AGWO	Active Groundwater Outflow
BAHM	Bay Area Hydrology Model
BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
BMP	Best Management Practice
Caltrans	California Department of Transportation
CIMIS	California Irrigation Management Information System
DCIA	Directly Connected Impervious Area
DEM	Digital Elevation Model
ECHO	Enforcement and Compliance History Online
EIA	Effective Impervious Area
EMC	Event-Mean Concentration
EPA	Environmental Protection Agency
ET	Evapotranspiration
FTABLE	Functional Table (Model Rating Curve)
GHCN	Global Historical Climatology Network
GSI	Green Stormwater Infrastructure
GIS	Geographic Information Systems
HgT	Total Mercury
HRU	Hydrologic Response Units
HSG	Hydrologic Soil Group
HSPF	Hydrologic Simulation Program–FORTRAN
IFWO	Interflow Outflow
IGP	Industrial General Permit
LSM	Land Surface Models
LSPC	Loading Simulation Program in C++
MIA	Mapped Impervious Area
MRP	Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
NED	National Elevation Dataset
NHD	National Hydrography Database
NLCD	National Land Cover Database
NLDAS2	North American Land Data Assimilation System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NOAA	National Oceanic and Atmospheric Administration
PCBs	Polychlorinated Biphenyls
PEVT	Potential Evapotranspiration
POI	Points of Interest

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PRISM	Parameter-elevation Regressions on Independent Slopes Model
QAPP	Quality Assurance Project Plans
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
SCVURPPP	Santa Clara Valley Urban Runoff Pollutant Prevention Program
SCVWD	Santa Clara Valley Water District
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSURGO	Soil Survey Geographic Database
STATSGO	State Soil Geographic Database
STLS	Small Tributaries Loading Strategy
SWRCB	State Water Resources Control Board
TAET	Total Actual Evapotranspiration
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WLA	Waste Load Allocation
WMMS	Watershed Management Modeling System
WY	Water Year

1 INTRODUCTION

The Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049) requires Bay Area cities and counties to develop Green Stormwater Infrastructure (GSI) Plans (Provision C.3) and PCBs and Mercury Control Measure Implementation Plans (Provisions C.11 and C.12) that provide the pollutant load reductions necessary to meet Total Maximum Daily Load (TMDL) wasteload allocations (WLA) over specified compliance periods (SFBRWQCB 2008b and 2015). A key component of these plans is a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed control measures will result in sufficient load reductions of Polychlorinated Biphenyls (PCBs) and mercury to meet WLAs for stormwater discharges from urban areas to San Francisco Bay. The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) has initiated a county-wide effort to develop an RAA to: 1) estimate the baseline PCB and mercury loads to the Bay, 2) determine load reductions needed to meet WLAs, 3) set goals for the amount of GSI needed to meet the portion of the overall PCB and mercury load reduction that is set as a goal in the MRP (SFBRWQCB 2015); and 4) set goals for achievement of the remaining load reductions that may be needed via the implementation of additional GSI or other (non-GSI) control measures (i.e., source controls).[1]

In 2017, the U.S. Environmental Protection Agency (EPA) Region 9 released *Developing Reasonable Assurance: A Guide to Performing Model-Based Analysis to Support Municipal Stormwater Program Planning* (EPA RAA Guide) (USEPA 2017), which provides guidance on the technical needs of the RAA and considerations for model selection. Building upon the EPA RAA Guide, the Bay Area Stormwater Management Agencies Association (BASMAA) prepared the *Bay Area Reasonable Assurance Analysis Guidance Document* (Bay Area RAA Guidance) (BASMAA 2017) to provide specific guidance on modeling to support RAAs performed in the Bay Area to meet MRP requirements, address TMDLs for PCBs and mercury, and support GSI planning. The EPA RAA Guide and Bay Area RAA Guidance both outline essential steps for performing an RAA, as depicted in Figure 1-1.

In 2020, SCVURPPP completed the *Santa Clara Basin Reasonable Assurance Analysis Addressing PCBs and Mercury: Phase I Baseline Modeling Report* (RAA Phase I Report), which includes development of a baseline model to address the first 3 steps of the RAA outlined in the EPA RAA Guide and Bay Area RAA Guidance (SCVURPPP 2020a). These steps included: (1) Designation of Area Addressed by Analysis; (2) Characterization of Existing Conditions; and (3) Determination of Overall Stormwater Improvement Goals for the Santa Clara Basin. This RAA Phase II Report builds upon the RAA Phase I Report to address the following final steps of the RAA:

- **Determination of Stormwater Improvement Goals Specific to GSI** – The RAA Phase II Report includes a description of the methods used to establish the PCB and mercury load reduction goals for GSI in the Santa Clara Basin, consistent with the goals outlined in the MRP.
- **Estimating Load Reduction Achieved by GSI (Demonstrating Management Actions Will Attain Goals)** – The RAA Phase II Report includes methods for estimating pollutant load reductions associated with GSI. Load reductions from GSI can include: (1) GSI installed when land is redeveloped, (2) low impact development (LID) and non-LID treatment controls on land development projects as required by MRP Provision C.3, and (3) retrofit of existing streets

[1] The source control component of the RAA (i.e., RAA Phase III) will be performed through a separate coordinated effort based on regionally accepted methods and assumptions for an accounting methodology, and together with the RAA Phase I and II reports will be reported as part of the PCBs and Mercury Control Measure Implementation Plans for Santa Clara Valley due for completion in 2020.

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and developed sites with GSI features and LID treatment controls (e.g., green streets and regional projects). The Bay Area RAA Guidance states that "GSI performance should be simulated directly using a process-based model, or simulated using a combination of continuous simulation-based volume performance and empirically based concentration performance to estimate load reductions."

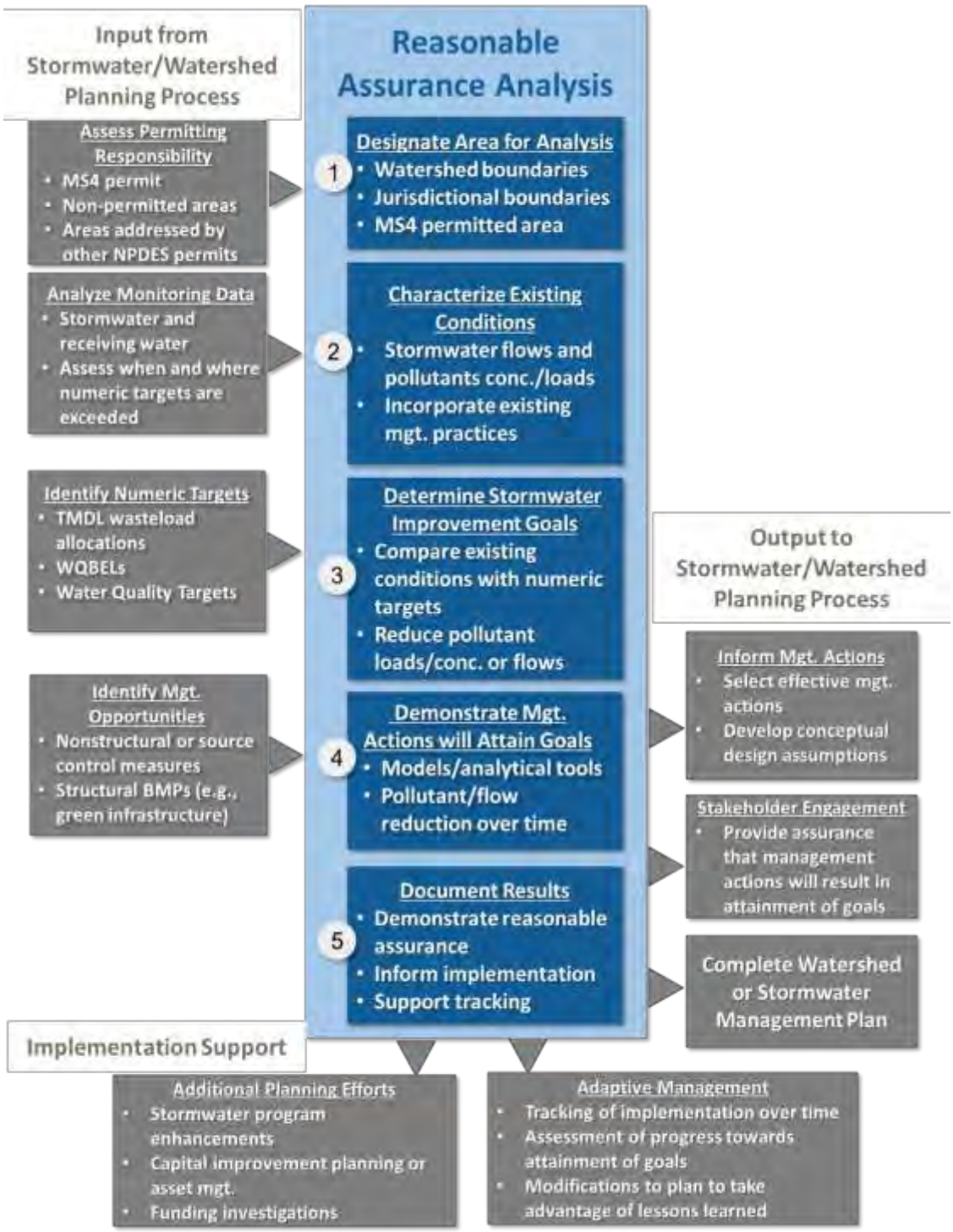

Figure 1-1. Reasonable Assurance Analysis process flow chart (USEPA 2017).

- **Documentation** – Documentation of RAA results is critical to the demonstration that existing and planned and potential future GSI projects, in combination with source controls, will result in the attainment of TMDL pollutant load reduction goals. The documentation can serve various purposes, including providing: (1) reasonable assurance to stakeholders and regulators that the plans will lead to effective implementation, (2) information to support next steps for implementation (e.g., capital improvement planning, investigation of funding options), and (3) quantitative results to support an adaptive management process, tracking of implementation over time, and/or assessment of progress towards attainment of pollutant reduction goals (USEPA 2017). The Bay Area RAA Guidance provides recommendations for minimum requirements for RAA documentation, including summaries of model input (e.g., model parameters, data sources, or other assumptions), calibration results, model processes and procedures, key model outputs (e.g., baseline loads, load reduction goals), modeled GSI and source control measures, and modeled load reductions by control measure category. The combination of the following reports fulfills all required documentation for the SCVURPPP Co-permittees relative to RAA requirements in the MRP, which are intended to address both the overall PCBs and mercury TMDL WLA and the load reduction goals for GSI:
    - RAA Phase I Report - Baseline Modeling Report (SCVURPPP 2020a)
    - RAA Phase II Report - Phase II GSI Modeling Report (this report)
    - RAA Phase III Report - Source Control Load Reduction Accounting for Reasonable RAA (BASMAA 2020); and
    - PCBs And Mercury TMDL Control Measure Implementation Plan & Reasonable Assurance Analysis for the Santa Clara Basin (SCVURPPP 2020c).

1.1 Summary of Overall Stormwater Improvement Goals

The methods used to establish the baseline (2002) contribution of PCBs and mercury to the San Francisco Bay from watersheds in the Santa Clara Basin are fully described in the RAA Phase I Report (SCVURPPP 2020a). The estimated baseline pollutant loads via stormwater from urban areas, the WLAs for these pollutants established via the TMDLs, and the overall load reductions needed to achieve the WLAs are listed in Table 1-1.

Table 1-1. Summary of Overall Stormwater Improvement Goals to Address PCBs and Mercury TMDL WLAs assigned to the Santa Clara Basin.

	PCBs (kg/year)	Mercury (kg/year)
Baseline (2002) Pollutant Load for Urban Stormwater in the Santa Clara Basin[1]	2.96	6.3
Santa Clara Basin Wasteload Allocation (WLA) for Urban Stormwater	0.50[2]	23.0[3]
Overall Load Reduction Needed to Achieve the WLAs	**2.46[4]**	**0**
Percent Reduction	*83.1%*	--

1: Based on the Phase I RAA model (SCVURPPP 2020a)
2: From PCBs TMDL (SFBRWQCB 2008b)
3: From Mercury TMDL (SFBRWQCB 2006)
4: Calculated by subtracting the WLA from the Baseline PCBs Load for the Santa Clara Basin

As a result of the more robust baseline loads modeling conducted at part of the RAA, documented in the RAA Phase I report (SCVURPPP 2020a) and summarized in Table 1-1, PCBs and mercury loads

for the Santa Clara Basin are less than those described in the PCBs and Mercury TMDLs. This is particularly relevant for mercury, where the modeling conducted via the RAA Phase I modeling determined that the baseline mercury load for urban stormwater in the Santa Clara Basin is less than the mercury WLA for urban stormwater runoff included in the Mercury TMDL. Based on the results of the improved modeling, this report assumes that no additional load reductions from urban stormwater in the Santa Clara Basin are needed to achieve the Mercury TMDL WLA. Therefore, mercury load reductions associated with existing, planned or potential GSI in the Santa Clara Basin are not quantified in this report.

1.2 Stormwater Improvement Goals via GSI

The TMDLs estimate that load reductions of 62 kg/yr of mercury and 14.4 kg/yr of PCBs in urban stormwater would be needed throughout the MRP-permitted portion of the Bay Area to achieve the WLAs for these pollutants. Based on these estimates in the TMDL, the MRP requires all MRP Co-permittees to collectively (quantitatively) demonstrate that at least 10 kg/yr of mercury and 3 kg/yr of the PCBs will be achieved through the implementation of GSI by 2040. This equates to a **16.1% of the mercury load reduction** (i.e., 10 kg of the 62 kg) and **20.8% of the PCBs load reduction** (i.e., 3 kg of the 14.4 kg) **addressed through GSI**. As described in the RAA Guidance (BASMAA 2017), these percentages should be used by MRP permittees to set GSI improvement goals in their RAAs if baseline pollutant loading estimates established via improved modeling differ from the loading estimates included in the TMDLs. Such is the case for SCVURPPP Co-permittees. Table 1-2 provides a summary of the portion of the overall PCBs and mercury load reductions that should be addressed by GSI.

Table 1-2. MRP Pollutant Load Reduction Goals to be Achieved Regionwide through GSI Implementation.

Pollutant	2040 Load Reduction Goals for GSI in MRP (kg/yr)	Equivalent Percent of Co-permittee Load Reduction to Establish GSI-Specific Load Reduction Goals[2]
PCBs	3.0[1]	20.8%
Mercury	10.0[1]	16.1%

1: MRP (SFBRWQCB 2015)
2: RAA Guidance (BASMAA 2017)

As previously described, the refined baseline modeling estimates indicate that no additional load reduction is needed for mercury from urban stormwater in the Santa Clara Basin, so no additional calculations are presented for mercury reductions via GSI in this report. For PCBs, however, a substantial load reduction (i.e., 83.1%) appears to be needed to achieve the WLA in the Santa Clara Basin (see Section 1.1). Based on the goal that 20.8% of the overall load reduction needed for PCBs is achieved via GSI, a refined 2040 load reduction goal for GSI was calculated for SCVURPPP Co-permittees using the portion of the refined baseline PCBs loads summarized in Section 1.1 that is associated with SCVURPPP Co-permittees. The GSI-specific load reduction goal for all SCVURPPP Co-permittees is presented in Table 1-3. This load reduction goal (0.38 kg/yr) equates to a 17.3% reduction of the 2.21 kg/yr baseline (2002) pollutant load for urban stormwater associated with SCVURPPP Co-permittees that is estimated via Phase I modeling (see Table 11-2 in Phase I Report). This **17.3% reduction in the baseline PCBs load** from SCVURPPP Co-permittee urban stormwater discharges via GSI, guides the identification and optimization for GSI implementation planning described later in this document.

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Table 1-3. Calculation of the PCBs Load Reduction Goal for GSI by 2040.

	Entire Santa Clara Basin	SCVURPPP Co-permittee Portion
Existing PCBs Load – Urban Stormwater (kg/yr)	2.96	2.21
PCBs Load Reduction (kg/yr)	2.46[1]	1.84[2]
Percent of MRP Permittee Load Reduction via GSI	--	20.8%[3]
Load Reduction Goal for all SCVURPPP Co-permittees via the Implementation of GSI by 2040 (kg/yr)	**--**	**0.38[4]**
Percent of SCVURPPP Co-permittee Load Reduction via GSI	**--**	**17.3%[5]**

1: From RAA Phase I Report (SCVURPPP 2020a)
2: As described in the RAA Phase I Report (see Section 11 in SCVURPPP 2020a) many entities are responsible for managing stormwater discharges in the Santa Clara Basin. Roughly 74% of the overall baseline PCBs load for the entire Santa Clara Basin is directly associated with SCVURPPP Co-permittees.
3: RAA Guidance (BASMAA 2017)
4: Calculated by multiplying 20.8% by 1.84 kg/yr.
5. Calculated by dividing 0.38 kg/yr by 2.21 kg/yr.

2 PURPOSE OF THE RAA

Depending on the audience, the purpose of the RAA can vary in terms of what constitutes reasonable assurance. The EPA RAA Guide provides an example of three differing perspectives for defining reasonable assurance (USEPA 2017):

- **Regulator Perspective** - Reasonable assurance is a demonstration that the implementation of a GSI Plan will result in sufficient pollutant reductions over time to meet TMDL WLAs or other targets specified in the MRP.
- **Stakeholder Perspective** - Reasonable assurance is a demonstration that specific management practices are identified with sufficient detail and implemented on a schedule to ensure that necessary improvements in water quality will occur.
- **Co-permittee Perspective** - Reasonable assurance is based on a detailed analysis of the TMDL WLAs and associated MRP targets themselves, and a determination of the feasibility of those requirements. The RAA may also assist in evaluating the financial resources needed to meet pollutant reductions based on schedules identified in the MRP.

The output from the RAA must consider multiple perspectives and strike the right balance between detail and specificity and to allow for future adaptive management. The following are key considerations for the RAA output:

- **Demonstrate PCBs and Mercury Load Reductions** – GSI implementation will achieve stormwater improvement goals for PCBs and mercury outlined in the MRP. Based on the baseline hydrology and water quality model (SCVURPPP 2020a), the analysis conducted via the RAA Phase I determined that a PCBs reduction of 0.38 kg/yr is needed to achieve the GSI-specific stormwater improvement goal established by the MRP. This equates to a 17.3% reduction in PCB baseline loads. As previously described, the refined baseline modeling estimates indicate that no additional load reduction is needed for mercury from urban stormwater in the Santa Clara Basin. As a result, a 17.3% reduction in PCB loads is established

as the primary pollutant reduction goal for the RAA for GSI. However, there is some uncertainty in terms of how land use areas are represented in the model. More monitoring and analysis in the future is needed to improve understanding of contributions of PCBs from different land use types in order to consider targeting these areas for the implementation of GSI or other control measures. Because PCBs are generally understood to be transported with cohesive (suspended) sediment (e.g., silt and clay), cohesive sediment loading can serve as a surrogate on which to base a PCBs load reduction target. The RAA for GSI considers a 17.3% reduction of cohesive sediment load as a conservative surrogate to PCBs, until the distribution of specific PCBs within different land areas/uses in the Santa Clara Basin is better identified. If additional information on the relationship between PCBs and land area types/uses are confirmed, these areas could be targeted for either source control measures or additional GSI implementation, likely resulting in greater effectiveness for GSI to reduce PCB loads in those areas, and thus redistributing or reducing the overall amount of GSI needed to meet the PCB load reduction target based on the surrogate to PCBs (i.e., cohesive sediment).

- **Develop Metrics to Support Implementation Tracking** – The MRP (Provision C.3.j) requires tracking methods to provide reasonable assurance that GSI stormwater improvement goals for PCBs and mercury outlined in the MRP are being met. Provision C.3.j states that the GSI Plan "shall include means and methods to track the area within each Co-permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area." SCVURPPP is currently developing a tool to track metrics relevant to the RAA. The tracking tool is planned for completion and public availability in late 2020.
- **Support Adaptive Management** – Given the relatively small scale of most GSI projects (e.g., LID on an individual parcel or a single street block converted to green street), many individual GSI projects will be needed to address the pollutant reduction goals. All the GSI projects will require site investigations to assess feasibility and costs. The RAA for GSI provides a preliminary investigation of the amount of GSI needed (by subwatershed and municipal jurisdiction) to achieve the basin-wide pollutant load reduction target. The RAA for GSI sets "goals" in terms of the amount of GSI implementation over time needed to achieve pollutant load reductions. As GSI Plans are implemented and more comprehensive municipal engineering analyses (e.g., masterplans, capital improvement plans) are performed, the adaptive management process will help ensure that goals are met. In summary, the RAA for GSI informs GSI implementation goals, but the pathway to meeting those goals is subject to adaptive management and can change based on new information or engineering analyses.

The outputs of the RAA for GSI, or goals for GSI implementation, attempt to identify the appropriate balance in terms of detail and specificity needed to address the above considerations.

This RAA Phase II Report provides documentation of the methods and assumptions for modeling GSI and selecting implementation strategies to achieve a 0.38 kg/yr load reduction, which equate to a 17.3% reduction of PCB baseline loads via GSI implementation in the Santa Clara Basin. The RAA for GSI predicts the most cost-effective GSI implementation scenario for each SCVURPPP Co-permittee, and sets implementation goals for the amount of stormwater volumes to be managed and impervious area to be retrofitted via GSI. Through the adaptative management process, future implementation of GSI may vary from the results presented in this report, based on further engineering analysis and evaluation of GSI project opportunities. However, the RAA for GSI provides goals for GSI planning that can be adapted over time as lessons are learned through GSI implementation.

3 OVERVIEW OF GSI PERFORMANCE MODEL

The GSI Performance Model is based on EPA's System of Urban Stormwater Treatment & Analysis Integration (SUSTAIN). Developed by EPA's Office of Research and Development, SUSTAIN was primarily designed as a decision-support system for selection and placement of GSI projects in urban watersheds (Figure 3-1). It includes a process-based continuous project simulation module for representing flow and pollutant transport routing through various types of GSI projects. A distinguishing feature of SUSTAIN is a robust cost-benefit optimization model that incorporates dynamic, user-specified project unit-cost functions to quantify the implementation costs associated with various types of GSI projects. The cost-benefit optimization model runs iteratively to generate a cost-effectiveness curve that is sometimes comprised of millions of GSI implementation scenarios representing different combinations of projects throughout a watershed. Those results are used to make cost-effective management recommendations by evaluating the trade-offs between different scenarios. The "benefit" component can be represented in several ways: (1) reduction in flow volume (2) reduction in load of a specific pollutant or (3) other conditions including numeric water quality targets, frequency of exceedances of numeric water quality targets, or minimizing the difference between developed and pre-developed flow-duration curves (USEPA 2009, Riverson et al. 2014).

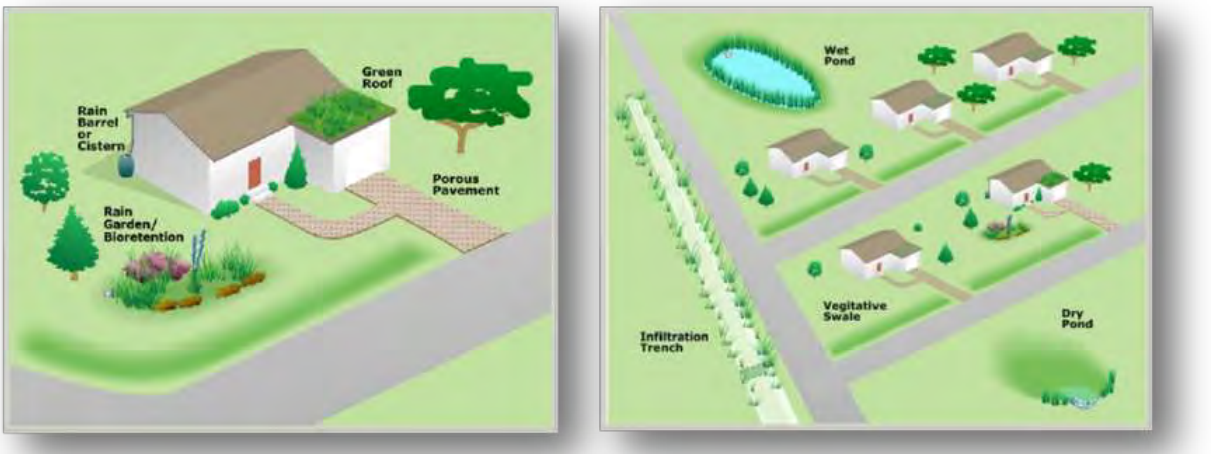

Figure 3-1. SUSTAIN figure illustrating GSI opportunities in watershed settings (USEPA 2009).

The SUSTAIN model was linked to the baseline hydrology and pollutant loading model developed as part of the RAA Phase I (SCVURPPP 2020a), based on the Loading Simulation Program C++ (LSPC) (Shen et al. 2004), to simulate the combination of hydrology and the processes associated with GSI. The LSPC model was used to simulate the continuous flow and PCB concentrations as inputs to the SUSTAIN model. SUSTAIN was then used to simulate the GSI response in terms of stormwater capture, infiltration, routing through the GSI project designs (e.g., underdrain or overflow), and removal of sediment and PCBs. SUSTAIN was used to perform the analysis of alternative implementation scenarios and costs to determine cost-optimal solutions for basin-wide management of stormwater and associated sediment and PCB loads. Figure 3-2 provides an overview of the linked LSPC-SUSTAIN modeling system.

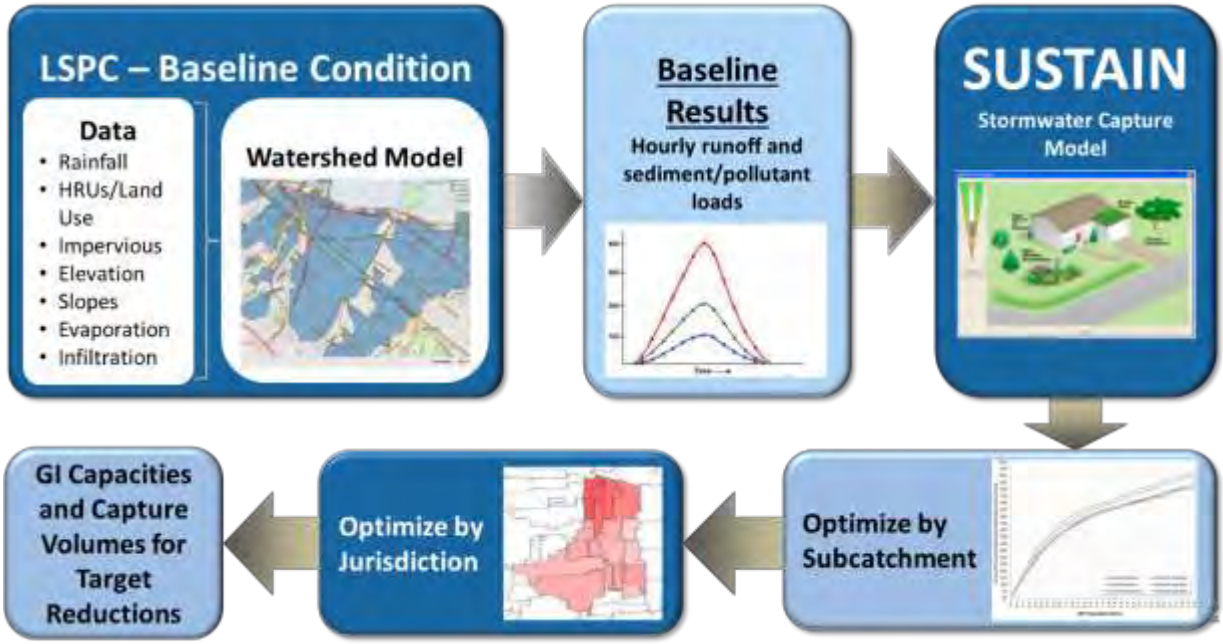

Figure 3-2. Linked modeling system supporting the RAA.[2]

4 GSI MODELING ASSUMPTIONS

The representation of GSI projects in the model is an important element of the RAA for GSI, as it provides the link between existing, planned, and potential future GSI implementation and model-predicted water quality improvement, and ultimately determines the necessary amount of GSI projects to meet the PCBs load reduction goal for GSI outlined in the MRP. Since the GSI modeling parameters will greatly influence the outcome of the RAA for GSI, it is imperative that the suite of GSI assumptions is based on the best available data and represent the latest understanding in GSI project designs and effectiveness. Further, the technical rigor of the analysis must be appropriately balanced with the resolution of the modeling system and the accuracy of the key datasets.

As depicted in Figure 4-1, the SUSTAIN optimization approach provides estimates of GSI effectiveness and costs to select the most cost-optimal combination of GSI projects to meet the PCBs load reduction goal associated with GSI implementation. This section presents and reviews the following three primary elements for representing GSI projects in the RAA model:

- **Opportunity** – Where can the GSI projects be located and how many can be accommodated?
- **System Configuration** – How is the runoff routed to and through the GSI projects and what is the maximum GSI project size?
- **Cost Functions** – What is the relationship between GSI project volume/footprint/design elements and costs?

[2] For further description of the baseline LSPC model, see the RAA Phase I Report (SCVURPPP 2020a).

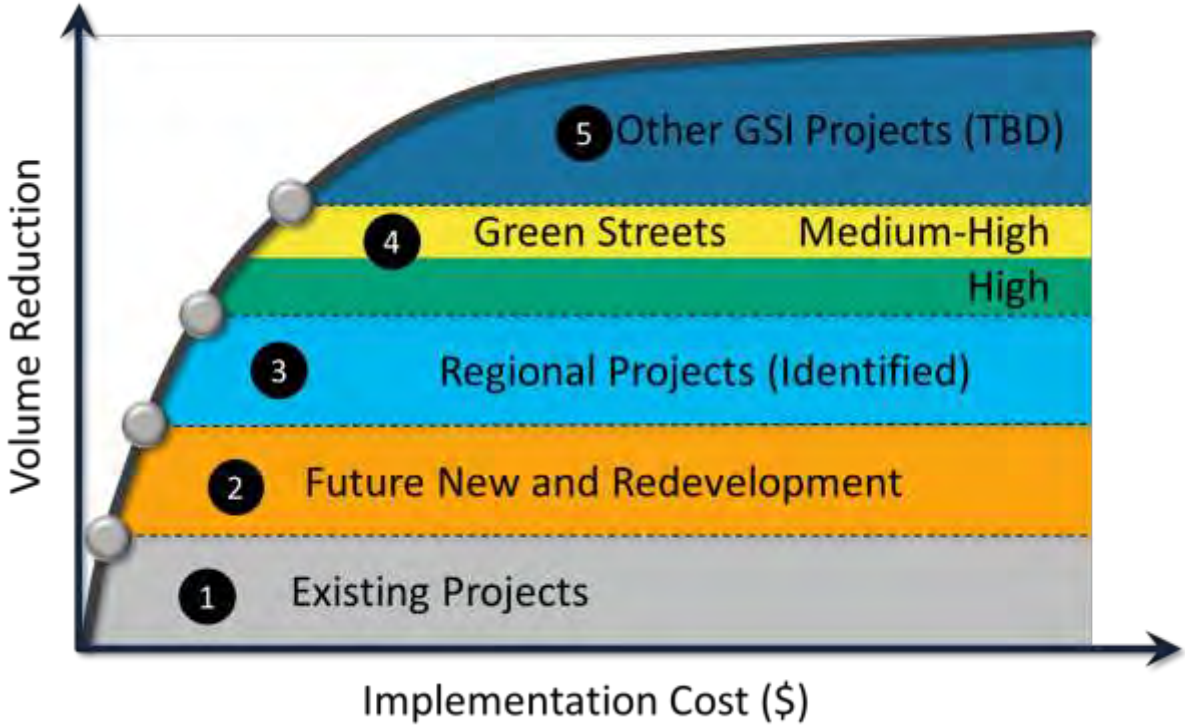

Figure 4-1. Overview of cost-optimization approach and sequencing of GSI projects.

4.1 GSI Project Opportunities

To support the RAA and GSI Plans, SCVURPPP has initiated a number of planning efforts that identify opportunities for GSI implementation. The following is a summary of those efforts:

- **LID for New Development and Redevelopment** – The MRP includes a Provision (C.3) for the integration of LID within new development and redevelopment. As LID techniques are implemented in new and redevelopment projects throughout the Santa Clara Basin, the urban runoff flow and pollutant reduction benefits of such practices can be added to the pollutant load reductions attributed to implementation of GSI. To support the preparation of annual reports to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), SCVURPPP (2018a) has worked with Co-permittees to compile information on LID practices that have been implemented within new development and redevelopment since water year 2003 (baseline year for the TMDL). SCVURPPP has also performed an analysis to project the number of acres of future new development and redevelopment that would be regulated by Provision C.3 by 2020, 2030 and 2040. Section 4.2.3 includes the results of the SCVURPPP analysis of projected new development and redevelopment. The RAA considers existing LID practices and projections of LID in future new development and redevelopment areas to estimate anticipated PCBs load reductions from 2003 to 2040.
- **Santa Clara Basin Stormwater Resource Plan (SWRP)** – The SWRP is a comprehensive plan that identifies and prioritizes thousands of GSI project opportunities throughout the Santa Clara Basin and within each Co-permittee jurisdiction. Prioritized project opportunities include: (1) large regional projects within publicly owned parcels (e.g., public parks) that infiltrate or treat stormwater runoff generated from surrounding areas (e.g., diversion from

neighborhood storm drain system; diversions from creeks draining large urban areas); (2) retrofit of public street rights-of-way with GSI, or "green streets"; and (3) GSI/LID retrofit projects on publicly owned parcels. The SWRP included a multi-benefit scoring and prioritization process that ranks GSI project opportunities based on multiple factors beyond pollutant load reduction (e.g., proximity to flood prone channels, potential groundwater basin recharge). Figure 4-2 shows green street opportunities identified, scored, and designated as high priority (scores in 90th percentile) in the SWRP for the Santa Clara Basin (SCVURPPP and Valley Water 2019). High-priority opportunities for regional projects are located within San José (River Oaks Pump Station, Vinci Park, Kelley Park Disc Golf Course, and Upper Penitencia Creek) and City of Santa Clara (Fuller Park). The SWRP includes conceptual designs for these potential projects.

Figure 4-2. High priority Green Street opportunities identified in the Santa Clara Basin SWRP.

Following completion of the SWRP, the City of San José (2019) continued to identify new regional project opportunities and initiate engineering designs for their municipal GSI Plan. That effort resulted in the identification and development of conceptual designs for three additional regional projects within San José (i.e., Butcher Park, Tully Community Ballfields, and Kelley Park Stables).

The SWRP and subsequent planning and engineering work by the City of San José (2019) have resulted in the identification of a total of eight regional project opportunities for GSI planning efforts and included in the RAA for GSI. Figure 4-3 shows the location of these regional projects and their associated drainage areas.

Figure 4-3. Regional Project Opportunities and Associated Drainage Areas.

The above planning efforts and resulting technical products provide the preliminary identification of opportunities for GSI projects in the Santa Clara Basin. These GSI project opportunities serve as the foundation for the RAA for GSI and municipal GSI Plans, as the Countywide Control Measures Plan to meet the PCBs and mercury TMDL load reduction goals is developed. Table 4-1 provides a summary of the categories of GSI project opportunities included in the RAA for GSI.

Table 4-1. Summary of potential GSI project opportunities included in the RAA for GSI.

GSI Project Category	GSI Type	Opportunity Identified
Existing Projects	LID and Green Streets	SCVURPPP staff worked with Santa Clara Basin Co-permittees to identify GSI projects implemented since 2003, including LID within new development and redevelopment and retrofit projects, green streets, and regional retrofit projects, and report progress in annual reports to the SFBRWQCB (SCVURPPP 2018a, City of San José 2018). The combination of these projects represents the "Existing Projects" category in the RAA for GSI model (Figure 4-1).
Future New and Redevelopment	LID	Provision C.3 of the MRP requires new development and redevelopment projects that create and/or replace defined amounts of impervious surface to implement post-construction control measures to address stormwater runoff generated on-site and comply with other applicable elements of the provision. SCVURPPP staff worked with Co-permittees to develop and apply a methodology, based on historic development trends, to predict the amount of land area that will be redeveloped in the Santa Clara Basin and for which stormwater runoff will be addressed via GSI installed on privately owned parcels from 2018 to 2040 (see Section 4.2.3). For model configuration, these areas are assumed to include LID to capture stormwater runoff onsite. See Section 4.2.3 for additional information.
Regional Projects (Identified)	Regional Projects	The RAA for GSI considers implementation of the eight potential regional projects for which concept designs have been developed (Figure 4-3). These potential projects were configured in the RAA for GSI model to match their concept designs. See Section 4.2.1 for additional information.
Green Streets	Green Streets	The SWRP identified, scored, and prioritized green street opportunities throughout the Santa Clara Basin as "High", "Medium", and "Low". The "High" opportunity sites are identified in Figure 4-2. All green street opportunities prioritized in the SWRP as "High" (i.e., scores in the 90th percentile scoring) were included in the RAA model (SCVURPPP and Valley Water 2019).
Other GSI Projects (TBD)	LID, Green Streets, or Regional Projects	In the case that the above projects are insufficient to provide necessary load reductions for each SCVURPPP Co-permittee, or are determined to not be cost-efficient through the model optimization, an additional category of "Other GSI Projects (TBD)" was considered. This category serves as a placeholder to set goals in terms of needed storage capacity of GSI projects within each Co-permittee jurisdiction, in addition to the above identified project opportunities. Further investigation can determine how these goals can be met, either through: (1) increased incentives for LID on private land or increased future development resulting in more C.3 Regulated Projects; (2) additional regional projects for which concept designs can be developed; and/or (3) additional green streets or onsite LID on publicly owned land.

4.2 GSI Model Configuration

For each of the types of GSI projects outlined in Table 4-1, design and modeling assumptions were developed to represent the projects in SUSTAIN and simulate their effectiveness in terms of managing stormwater. The following sections provide summaries of the design and modeling assumptions for each type of GSI.

4.2.1 Regional Projects

Regional projects can consist of both subsurface and above-ground systems that manage stormwater runoff through any combination of infiltration, filtration, and reuse. In the SUSTAIN model, both subsurface and above-ground systems are functionally the same and will use the same assumptions. Depending on specific site constraints, these facilities can capture stormwater diverted from adjacent channels or storm drains, which often results in greater captured drainage area compared to other GSI measures. Regional projects typically require a diversion structure and may require pumping, increasing capital and operation and maintenance (O&M) costs. Modeling assumptions for the eight identified regional projects were based on configurations outlined in each project's conceptual design. Table 4-2 summarizes design assumptions for each of the regional projects included in the RAA.

Table 4-2. Modeling assumptions for regional projects.

Project	City	Footprint (acres)	Capacity (acre-feet)	Pump Rate (cfs)	Estimated Infiltration Rate (in/hr)	Filtration/ Discharge Rate (cfs)
Fuller Park	Santa Clara	0.7	7	11.14	--	1.76[1]
Butcher Park	San José	2	7	25	1.0	--
Kelley Park Disc Golf Course	San José	3.9	11.7	23	2.0	--
Kelley Park Stables	San José	3.2	8.9	40	2.0	--
River Oaks Pump Station	San José	3.1	10	67	2.0	--
Tully Community Ballfields	San José	1.4	7.6	30	1.0	--
Upper Penitencia Creek[3]	San José	7.5	15	--[2]	1.6	--
Vinci Park	San José	0.48	3.8	7.8	1.6	--

1: Fuller Park regional project assumes a discharge of treated water back to the storm drain.
2: Upper Penitencia Creek regional project includes a gravity diversion of a storm drain, and therefore does not require pumping.
3: Upper Penitencia Creek regional project was included in the SWRP, but not included in the City of San Jose's GSI Plan.

Only the Butcher Park regional project captures runoff from drainage areas intersecting more than one Co-permittee jurisdiction, the City of San José and unincorporated Santa Clara County. The remaining regional project drainage areas are contained entirely within one jurisdiction. To utilize model output to report the benefits of the Butcher Park regional project in terms of stormwater volume captured and treated, the RAA required assumptions for assigning the benefits from the project to each Co-permittee. Because the predominant source of stormwater produced in each project's drainage area is associated with impervious runoff, the amount of impervious area within each Co-permittee jurisdiction in the project drainage area was used to allocate the "credit" associated with stormwater

captured and treated by the Butcher Park regional project. Table 4-3 provides a summary of the percentage of each Co-permittees impervious area within each project's upstream drainage area.

Table 4-3. Amount of impervious areas for Co-permittees within each regional project drainage area.

Project	Upstream Impervious Area (acres)	Santa Clara		San José		Unincorporated County	
		Acres	%	Acres	%	Acres	%
Fuller Park	103	103	100%	--	--	--	--
Butcher Park	178	--	--	75	42%	103	58%
Kelley Park Disc Golf Course	417	--	--	417	100%	--	--
Kelley Park Stables	392	--	--	392	100%	--	--
River Oaks Pump Station	219	--	--	219	100%	--	--
Tully Community Ballfields	305	--	--	305	100%	--	--
Upper Penitencia Creek	81	--	--	81	100%	--	--
Vinci Park	37	--	--	37	100%	--	--

4.2.2 Green Streets

Green streets are implemented in public rights-of-way and typically capture runoff from the street and portions of adjacent parcels. Green streets were represented in the model using bioretention either with or without an underdrain, depending on infiltration rates. The modeling assumptions for both the bioretention components of green streets are listed in Table 4-4.

The footprint for green street bioretention was estimated by assuming available length and width for GSI improvements. Fifty percent of the street segment length is assumed to be available for bioretention. The other 50 percent of length is assumed to be unavailable due to constraints like driveways, fire hydrants, and utilities. The available width for bioretention is assumed to be 8 feet (4 feet on each side of the street).

Bioretention consists of three components: a surface layer, a media layer, and an aggregate/underdrain layer. The surface layer is typically vegetated and provides storage through ponding and removal of runoff volume through evapotranspiration. The media layer typically consists of an engineered soil mixture, designed to support plant growth and promote adequate infiltration, provide storage in pore space, and reduce pollutants through filtration and plant root uptake. The media layer must be a minimum of 18 inches (SCVURPPP 2016). The aggregate/underdrain layer provides additional storage in the aggregate pore space and is typically required for bioretention when the underlying soils have infiltration rates below a specific threshold. In most of Santa Clara Valley, underdrains will generally be required unless exempted by the local jurisdiction on a case-by-case basis depending on soil permeability (SCVURPPP 2016). According to several regional design resources across the United States, underdrains should be included when underlying soils have an infiltration rate below 0.5 inches per hour (DOEE 2013; VA DEQ 2011; SF DPW Order No. 178,493). This threshold is used in the model to determine which projects include underdrains. When included, the

aggregate/underdrain layer is assumed to be 12 inches (SCVURPPP 2016; SFPUC 2016). Underdrains are typically placed at the top of the aggregate/underdrain layer to maximize infiltration (BASMAA 2015; SCVURPPP 2016) and is the default configuration used by SUSTAIN. The underdrain's 90% removal estimate for sediment, which is associated with PCBs and mercury, comes from studies of bioretention performance reported by the *California Best Management Practice Handbook: New Development and Redevelopment* (CASQA 2003). BASMAA's white paper on Provision C.3 cites a reduction in PCBs of 98% through the bioretention underdrain. However, an assumed sediment removal of 90% provides a conservative assumption for bioretention performance. During model simulation, the sediment reduction was only applied to the portion of flow that exits the underdrain outlet, which is a relatively constant outflow rate. Overall green streets performance diminishes during larger events with bypass flow because that portion is untreated.

Table 4-4. Modeling assumptions for green streets (bioretention).

Groups	Item Description	Value	Units	Source
Bioretention/Biofiltration				
Surface	Design Drainage Area	*Sized for runoff from 0.2 inches per hour intensity rainfall event*		[1] C.3.d.i.(2).(c) pg.22
	Footprint Length	*50% of street segment length*		
	Footprint Width	*8 ft (4 ft each side of street)*		
	Ponding Depth	6	in	[2] Section 6.1 pg.6-4
Media	Depth	18	in	[2] Section 6.1 pg.6-5
	Media Porosity	0.35	-	[3] Appendix A
	Media Infiltration Rate	5	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
Aggregate/ Underdrain	Depth	12	in	[2] Section 6.1 pg.6-5, [3]
	Media Porosity	0.4	-	[3] Appendix A
	Native Soil Infiltration	*Match underlying soils*		
	Underdrain is used when native soil infiltration is less than	< 0.5	in/hr	SF DPW Order No. 178,493
	Pollutant Filtration	*90% sediment reduction*		[4] CA BMP Handbook, TC-32 pg.3

[1] Reference: SFBRWQCB 2015
[2] Reference: SCVURPPP 2016
[3] Reference: ULAR WMG 2016[4] Reference: CASQA 2003
[4] Reference: CASQA 2003

4.2.3 Low Impact Development

As mentioned in Section 4.1, the MRP requires new and redevelopment projects to incorporate stormwater control measures that mitigate the impact of runoff generated from impervious surfaces (Provision C.3). SCVURPPP staff and Co-permittees developed a two-step methodology to predict the levels of redevelopment and the associated GSI implementation that will occur within the Santa Clara Basin by 2020, 2030 and 2040. The methodology focused on parcel-based redevelopment, as opposed to projects in the public right-of-way (i.e., green streets), because the timing and implementation of projects in the public right-of-way is uncertain and the contribution of these projects

to overall redevelopment in the Santa Clara Basin is expected to be relatively minor. The following were steps used in the methodology:

1. **Establish an Average Annual Rate of Redevelopment**: non-spatial analysis was performed to predict future GSI implementation on private and public parcels based on the historical rate of redevelopment in the Santa Clara Basin. SCVURPPP used data on the development date of each parcel within the County and Co-permittee, and SCVURPPP staff knowledge of completed redevelopment projects, to determine which parcels have developed or redeveloped since 2002. Only parcels that would be regulated by new and redevelopment requirements in the current MRP were considered.[3] For future redevelopment predictions, the 10-year timeframe of 2009 to 2018 was determined to best represent future redevelopment (2019-2040) in the region. Therefore, the cumulative area of the parcels redeveloped between 2009 and 2018 was used to calculate a redevelopment rate (acres/year) for each Co-permittee. Rates were adjusted as needed based on Co-permittee expectations for future redevelopment within their jurisdiction. The final rate for each Co-permittee was used to calculate the cumulative land area predicted to redevelop and be addressed by GSI within each jurisdiction by the 2020, 2030, and 2040 milestones. The estimated land area (acres) predicted to be addressed by GSI for each milestone is presented in Table 4-5. Note that these predictions do not include redevelopment that may be addressed by projects in the public right-of-way, and that these predictions have a high level of uncertainty because future redevelopment rates may differ from previous historic development trends and staff knowledge on which these predictions were based. Therefore, actual redevelopment during each timeframe may increase or decrease relative to what is presented in Table 4-5.[4]

2. **Identify Parcels Predicted to Redevelop with GSI by 2020, 2030 and 2040**: spatial analysis was conducted to identify the geographical locations of parcels most likely to redevelop during each milestone. SCVURPPP staff worked with Co-permittees to gather spatial data on all planned projects and those under construction. For parcels that had already redeveloped, variables such as parcel size, date of previous development, and land use were used to create a GIS model for future redevelopment that weights each of these variables so that predicted future redevelopment would be of a similar character as previous redevelopment. Parcels in the Santa Clara Basin were then filtered to create a dataset that contained approximately 20,000 parcels, that if redeveloped would require that GSI be implemented as specified in the current MRP. Any individual parcel that was identified as planned for redevelopment by 2020 or 2030 was flagged to ensure it would be selected by the model. Areas identified by Co-permittees as expected to redevelop at a higher rate (e.g. via specific plan areas) were assigned an additional weighting factor in the model, so that the model would select parcels within these areas at a higher rate. The GIS model was then used to select parcels for predicted redevelopment by the 2020, 2030 and 2040 milestones. Parcels were selected so that the total acres selected per milestone matched the cumulative land area predicted to redevelop and be addressed by GSI within each jurisdiction in Step #1. The selected parcels were used in Co-permittee GSI Plans to develop impervious surface targets for GSI associated with predicted future new and redevelopment.

[3] Only parcel-based new and redevelopment projects greater than 10,000 square feet (i.e. those that would trigger C.3 requirements under the current MRP) were considered.

[4] Projections of LID implementation due to future new and redevelopment should be considered planning level estimates that will likely not materialize in the pace or magnitude predicted. Additionally, due to the timing of the RAA Phase II development, relative to the timing of the finalization of Co-permittee GSI Plans, the projections of LID for 2030 and 2040 presented in this section may differ from projections included in Co-permittee GSI Plans. Should future iterations of this RAA occur, the LID projections presented in this report will be updated accordingly.

Table 4-5. Estimated area (acres) within each Co-permittee's jurisdiction that is predicted to undergo redevelopment by 2020, 2030, and 2040 and include GSI.[1]

Co-permittee	2002-18 (Existing GSI)[2]	2019-2020	2021-2030	2031-2040	Total
Campbell	98	9	59	60	226
Cupertino	333	3	176	150	662
Los Altos Hills	0	0	32	0	32
Los Altos	33	0	33	28	94
Los Gatos	84	9	43	43	179
Milpitas	272	42	312	308	934
Monte Sereno	0	0	5	0	5
Mountain View	434	133	317	350	1,234
Palo Alto	273	20	164	149	606
San Jose	1,924	508	1,366	1,581	5,379
Santa Clara	561	114	509	370	1,554
Santa Clara County	220	12	100	104	436
Saratoga	35	0	12	9	56
Sunnyvale	1,184	98	358	441	2,081
Total	**5,451**	**948**	**3,486**	**3,593**	**13,478**

1: Estimated acres of future redevelopment presented in this table are based on historical redevelopment rates and expectations for future redevelopment within each jurisdiction. The projections presented here may differ from projections included in Co-permittee GSI Plans. These numbers should be considered draft preliminary estimates and will be updated as new information becomes available.

2: Total area addressed by parcel-based redevelopment projects with GSI completed as of 2018 (excluding green street and regional projects).

Assumptions for parcel-based LID were incorporated in the model and linked to existing, planned and predicted future GSI to represent the implementation of Provision C.3 over time. LID treatment measures typically treat runoff generated onsite so the drainage area for LID is typically no larger than the parcel size. Though implementation will vary by site, these features were represented as bioretention in SUSTAIN. This is because 1) bioretention is the most common LID measure in the Santa Clara Valley and 2) LID is typically sized using the same criteria (MRP Provision C.3), regardless of the type of device. The components for bioretention are discussed in Section 4.2.2. The modeling assumptions for LID are the same as bioretention for green streets with the exception of project footprint. The project footprint for LID is estimated using 4 percent of the parcel's impervious area, specified in the SCVURPPP C.3 Stormwater Handbook. Assumptions for LID are presented in Table 4-6.

Table 4-6. Modeling assumptions for LID (bioretention).

Groups	Item Description	Value	Units	Source
Bioretention/Biofiltration				
Surface	Design Drainage Area	*Sized for runoff from 0.2 inches per hour intensity rainfall event*		[1] C.3.d.i.(2).(c) pg.22
	Project Footprint	*4% of impervious drainage area*		[2] Section 6.1 pg.6-4
	Ponding Depth	6	in	[2] Section 6.1 pg.6-4
Media	Depth	18	in	[2] Section 6.1 pg.6-5
	Media Porosity	0.35	-	[3] Appendix A
	Media Infiltration Rate	5	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
Aggregate/ Underdrain	Depth	12	in	[2] Section 6.1 pg.6-5, [3]
	Media Porosity	0.4	-	[3] Appendix A
	Native Soil Infiltration	*Match underlying soils*		
	Underdrain is used when native soil infiltration is less than	< 0.5	in/hr	SF DPW Order No. 178,493
	Pollutant Filtration	*90% sediment reduction*		[4] CA BMP Handbook, TC-32 pg.3

[1] Reference: SFBRWQCB 2015
[2] Reference: SCVURPPP 2016
[3] Reference: ULAR WMG 2016
[4] Reference: CASQA 2003

4.3 GSI Cost Functions

To support GSI project optimization, cost functions were developed for each GSI type to relate capital costs to physical GSI project characteristics such as depth, footprint, and configuration. The cost functions are primarily based on Enhanced Watershed Management Plans (EWMPs) developed in the Los Angeles Region (ULAR WMG 2016). They are 20-year lifecycle costs that include both construction and O&M. O&M is assumed to maintain consistent performance of the GSI throughout its life cycle. There will be some uncertainty regarding the true costs pertaining to GSI projects implemented in the Santa Clara Basin, but the relative costs between project types are well represented for the optimization of project types in the RAA. In other words, although it would not be recommended to use these cost functions for projections of basin-wide implementation costs, these functions are sufficient for optimization and comparison of alternative implementation scenarios that can be used to select the most cost-effective strategy and combination of GSI to meet necessary pollutant reductions. The cost functions used for the SUSTAIN optimization analysis are listed in Table 4-7.

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Table 4-7. GSI project cost functions for SUSTAIN cost-optimization.

Project Type	Project Subtype	Cost Estimate Formula ($)	User inputs
Regional Project	Infiltration basin w/o pump station	10.01 (A_f) + 100,013.76 (S) + 2.8 (V_m)	S - Capacity A_f - Footprint area V_m - Media volume
	Infiltration basin w/ pump station	10.01 (A_f) + 100,013.76 (S) + 2.8 (V_m) + 56,227 (P) + 1,207,736	S - Capacity A_f - Footprint area V_m - Media volume P - Pumping rate
Green Streets	Bioretention w/ underdrain[1]	17.688 (A_f) + 94,307.4 (S) + 2.64 (V_m) + 10.367 $(R)^2$ (U)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume R - Underdrain radius U - Underdrain length
	Bioretention w/o underdrain	9.438 (A_f) + 94,307.4 (S) + 2.64 (V_m)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume
Low Impact Development	Bioretention retrofit w/ underdrain[1]	17.688 (A_f) + 94,307.4 (S) + 2.64 (V_m) + 10.367 $(R)^2$ (U)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume R - Underdrain radius U - Underdrain length
	Bioretention retrofit w/o underdrain	9.438 (A_f) + 94,307.4 (S) + 2.64 (V_m)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume

Units: S [ac-ft], V_m [ft^3], A_f [ft^2], P [cfs], R [ft], U [ft]

1: Underdrain radius (R) was assumed 4 inches and underdrain length (U) was assumed equal to the length of the bioretention basin.

5 ESTIMATING LOAD REDUCTION ACHIEVED BY CONTROLS

The SUSTAIN model provides a powerful tool for considering millions of scenarios for alternative combinations of GSI projects throughout the Santa Clara Basin and recommending cost-effective solutions to serve as implementation goals supporting GSI planning by each Co-permittee. The cost functions described in the previous subsection were used to weigh the costs of different GSI implementation scenarios with benefits of managing stormwater and the reduction of PCBs loads. The primary scenario for the RAA (Scenario 1) assumes that each SCVURPPP Co-permittee achieves the goal of 17.3% reduction of PCB loads within their jurisdiction, regardless of their baseline load and priority of projects identified in the SWRP. However, since the 17.3% reduction in PCBs is a basin-wide goal for all Co-permittees combined, a second scenario (Scenario 2) is considered where the load reduction goal is collectively achieved on a basin-wide level, but each individual Co-permittee is not required to achieve a 17.3% load reduction individually. These modeling scenarios are further described in Section 7, and each may be considered for future GSI planning through the adaptive management process.

The Scenario 1 GSI optimization modeling was conducted using a stepwise process to determine the GSI projects located in each Co-permittee's jurisdiction to identify the most cost-effective stormwater management "solution" of GSI projects. The stepwise process used is summarized as follows:

1. **Determine the cost-effective GSI solutions <u>for each subwatershed</u>**: an example set of "GSI solutions" is shown in Figure 5-1, which shows thousands of scenarios considered for

an individual subwatershed. The scenarios are based on the available opportunity (*e.g.*, the available footprints for regional projects and length of right-of-way for green streets) and the predicted performance of managing stormwater and reducing pollutant loads. The most cost-effective GSI solutions for each of the subwatersheds provide the basis for cost optimization for each Co-permittee jurisdiction. Based on GSI project categories and modeling assumptions defined in Section 4, SUSTAIN was used to simulate effectiveness/load reductions and estimate planning-level costs for various combinations of GSI projects within each Co-permittee's jurisdiction (along the x-axis, from low pollutant reduction/effectiveness to high reduction/effectiveness). As previously described, for the purposes of estimating PCBs load reductions associated with GSI implementation, model-predicted sediment load reductions were used as a surrogate for estimating reductions in PCBs.[5]

2. **Determine the cost-effective scenario for each Co-permittee jurisdiction:** by rolling up the GSI solutions from the subwatershed level to the jurisdictional level, the most cost-effective scenario can be determined for increasing levels of pollutant reduction for each Co-permittee. Figure 5-2 shows an example cost optimization curve for City of San José. The optimization curve demonstrates the capacity of each type of GSI project (colored layers corresponding to "Structural BMP Capacity [acre-ft]" for the primary y-axis) and resulting model-estimated capital costs (black line corresponding to the secondary y-axis). As noted in Section 4.3, caution should be exercised in interpreting model-predicted capital costs, as those cost functions are meant for comparison of model scenarios and are not meant for projections of capital improvement costs for GSI implementation. For this reason, costs shown in Figure 5-2 are reported as the percent of the basin-wide capital costs for GSI implementation, based on GSI projects selected within City of San José. Cost optimization curves for each Co-permittee jurisdiction are provided in Appendix A.

3. **Extract the cost-effective scenario to meet stormwater improvement goal:** Figure 5-3 illustrates the process for extracting the cost effective GSI Implementation Strategy, providing 17.3% reduction in PCB loads (via sediment reduction) via GSI, from the cost optimization curve. SUSTAIN is used to provide cost-optimization and selection of the most cost-effective combination of GSI projects to attain the target reduction. This solution is depicted in Figure 5-3 as the vertical slice that intersects the point on the x-axis at 17.3% reduction (i.e., the first model optimization step available that is above the target goal of 17.3% reduction). The combination of GSI structural capacities in that slice represents the proposed GSI Implementation Approach for City of San José. The table to the right provides details on that implementation approach for the multiple subwatersheds within City of San José jurisdiction (represented by each row in table). Optimization results recommend that varying amounts of GSI capacity in different subwatersheds (different rows) are needed to achieve the most cost-effective solution, but the overall PCBs load (via sediment) reduction exceeds the 17.3% goal (bottom row of table). The extracted GSI Implementation Approach comprises a cost-optimized amount of each GSI type within each Co-permittee's

[5] The San Francisco Bay TMDL assumes that PCBs in urban stormwater are associated with suspended sediment, and therefore the WLAs were calculated based on estimated sediment loading to the Bay (SFBRWQCB 2008b). Additionally, PCBs concentrations derived via the RWSM for different land use categories are uncertain. As such, suspended (cohesive) sediment was used as a conservative surrogate to PCBs when modeling the extent of GSI needed to achieve the 17.3% PCBs load reduction goal outlined in the MRP. Modeled decreases in cohesive sediment via GSI are therefore assumed to result in a proportionally equivalent reduction in PCBs transported on that sediment.

jurisdiction. The resulting GSI Implementation Approach to address the PCB load reduction goal is presented in Section 6.

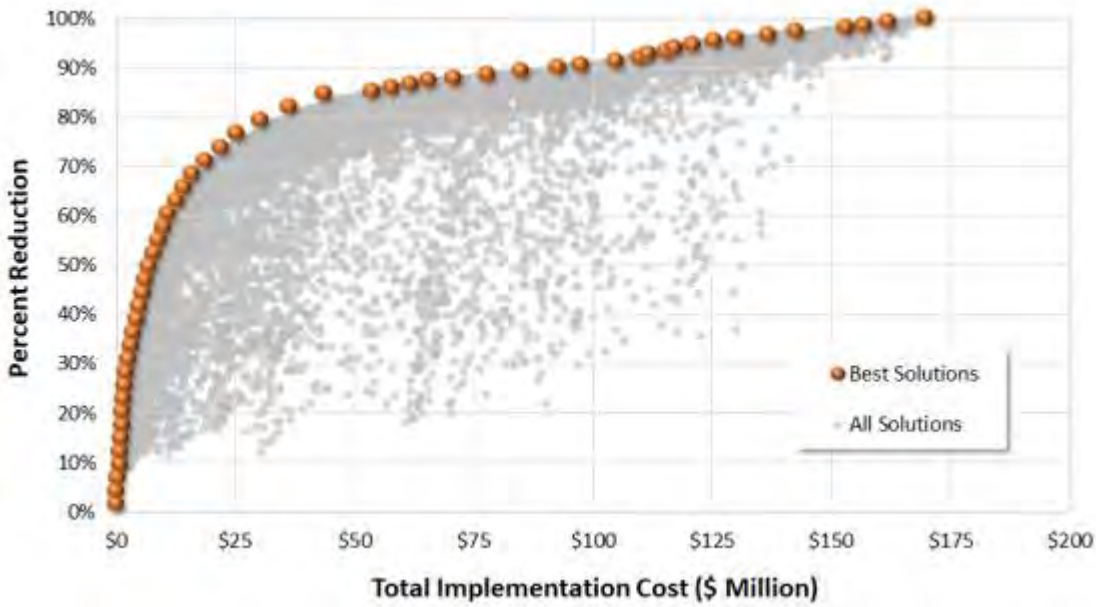

Figure 5-1. Example GSI solutions for a single subwatershed and the advantage of cost-benefit optimization.

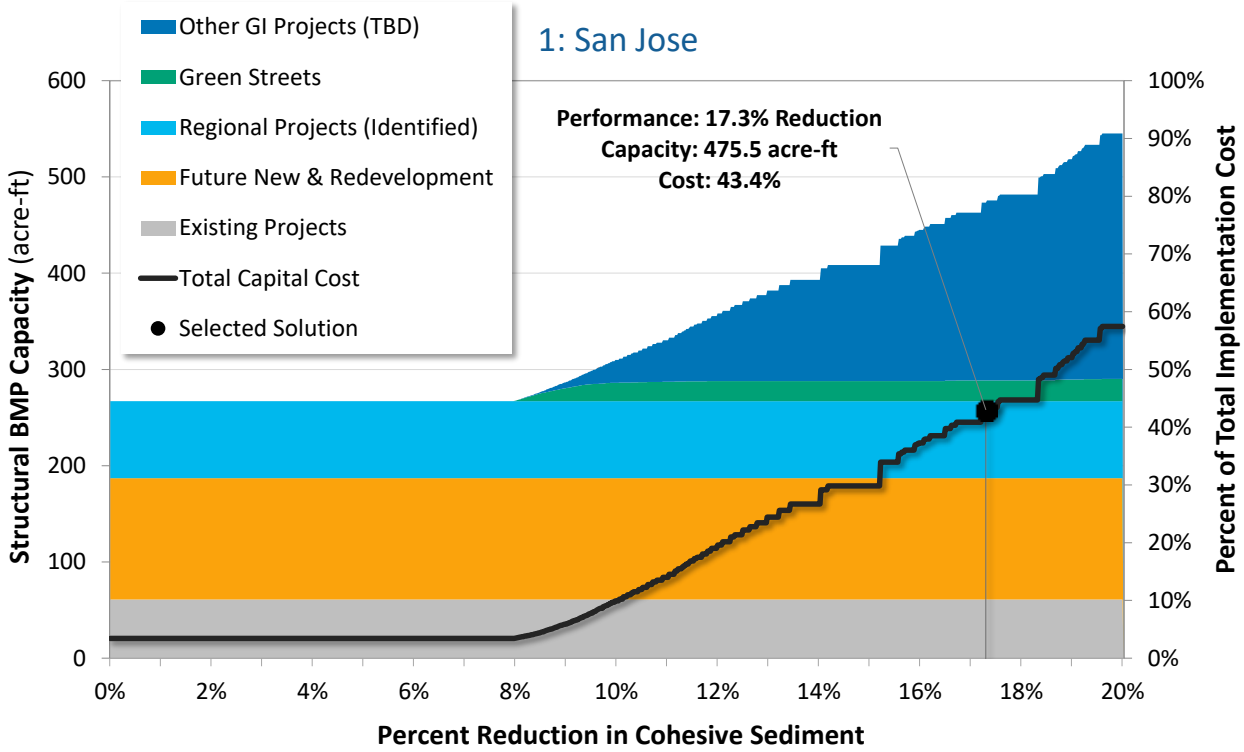

Figure 5-2. Example GSI optimization curve for the City of San José to achieve the PCBs load reduction goal outlined in the MRP.[6]

[6] SUSTAIN model was configured to incorporate "Existing Projects," "Future New & Redevelopment," "and Regional Projects (Identified)" based on assumptions listed in Table 4-1 and Section 4.2, and therefore were not subject to cost optimization (i.e., these projects were "locked in the model). SUSTAIN was then used to provide cost optimization of the additional GSI needed to meet the load reduction goal.

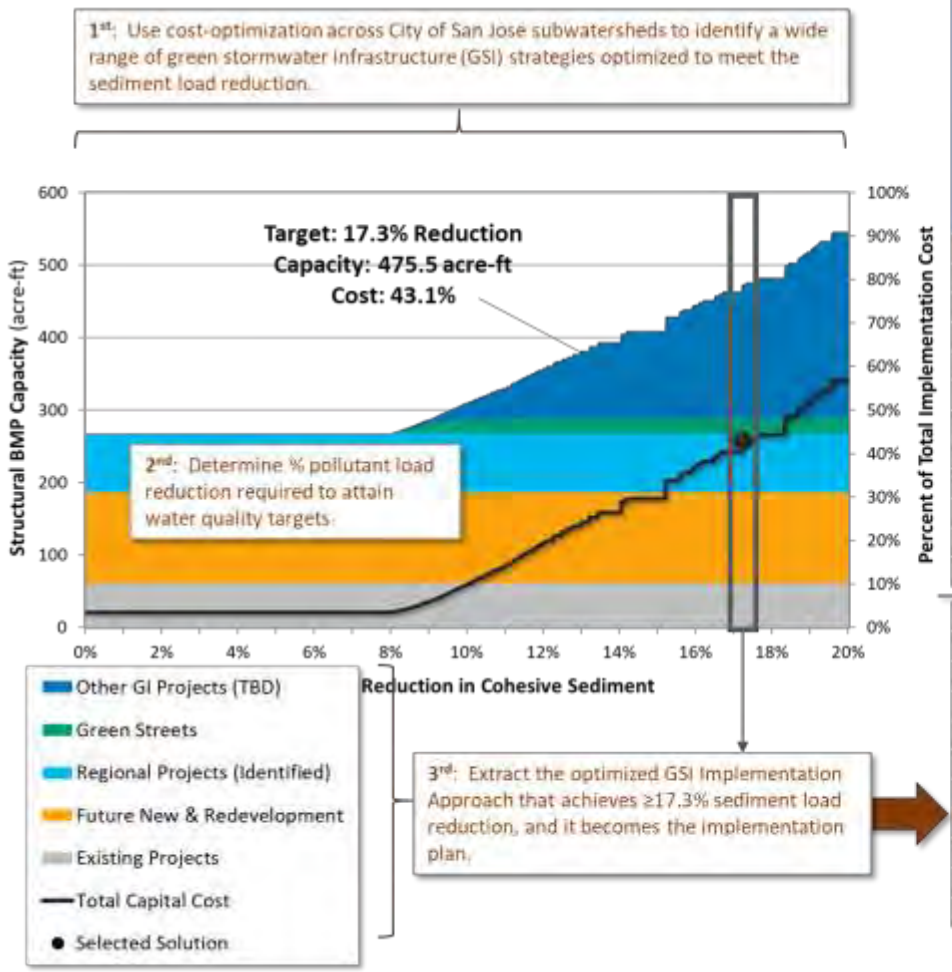

Subwatershed ID	Management Metrics for GSI: % Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Green Stormwater Infrastructure Capacity to Achieve ≥17.3% Reduction Target (Capacity expressed in units of acre-feet): Existing/Planned: Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	Green Streets	Other GSI Projects (TBD)	Total GSI Capacity (acre-ft)
900302	22%	14.56	26.17	0.76	0.88	–	–	1.68	3.3
900402	42%	1.36	2.50	–	0.27	–	–	–	0.3
900502	38%	0.90	1.66	–	0.18	–	–	–	0.2
1001102	38%	1.02	1.83	–	0.02	–	–	0.27	0.3
1001202	26%	21.51	36.64	–	0.01	–	0.08	5.49	5.6
1001302	27%	0.52	0.93	–	–	–	–	0.13	0.1
1001402	0%	0.00	–	–	–	–	–	–	0.0
1001602	0%	0.00	–	–	–	–	–	–	0.0
1001702	0%	0.00	–	–	–	–	–	–	0.0
1001802	8%	13.16	21.84	0.01	0.05	5.04	–	–	5.1
1002202	0%	0.00	–	–	–	–	–	–	0.0
1002402	24%	25.85	75.73	1.20	7.03	–	–	–	8.2
1206102	14%	1.75	30.49	0.88	0.90	–	0.06	0.40	2.2
1300002	0%	0.00	–	–	–	–	–	–	0.0
1301702	0%	0.00	–	–	–	–	–	–	0.0
1302002	3%	0.00	0.54	0.02	0.15	–	–	–	0.2
1302102	0%	0.00	–	–	–	–	–	–	0.0
1302202	8%	0.02	6.65	0.29	0.45	–	–	–	0.7
1302302	1%	0.00	0.08	0.01	0.07	–	–	–	0.1
1302402	3%	0.00	0.85	0.02	–	–	–	–	0.0
1302902	0%	0.00	–	–	–	–	–	–	0.0
1400102	0%	0.00	–	–	–	–	–	–	0.0
Total	**17.3%**	**1,607.6**	**3,892.7**	**61.0**	**125.9**	**80.0**	**21.5**	**187.1**	**475.5**

RED = Subwatersheds with highest required % load reductions
BLUE = Subwatersheds with highest BMP capacities within a BMP category

Figure 5-3. Example extraction of the most cost-effective "GSI Implementation Approach" for the City of San José to achieve the PCBs load reduction goal outlined in the MRP.

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6 GSI IMPLEMENTATION APPROACH

The optimized GSI Implementation Approach for each SCVURPPP Co-permittee is expressed as (1) the percent load reduction of PCBs, (2) the volumes of stormwater that would be managed spatially by GSI to address the PCB load reduction goal, (3) the amount of impervious area that GSI is planned to treat (or manage), and (4) the amount of GSI that will be needed spatially to manage the stormwater volumes. The two primary elements of the GSI Implementation Approach are as follows:

- **Implementation Goals**: to track implementation progress over time, the primary metrics serving as goals for GSI implementation are (1) the volume[7] of stormwater managed by implemented GSI projects, and (2) the impervious area treated by GSI. To support future implementation and adaptive management, the performance metrics are reported along with the capacities of GSI to be implemented based on the optimized GSI Implementation Approach.
- **GSI Implementation Approach**: the network of GSI capacities that provides reasonable assurance of reducing PCBs to meet the basin-wide load reduction goal of 17.3% via GSI is referred to as the GSI Implementation Approach. The identified GSI capacities (and GSI preferences) of the approach will likely evolve over the course of the implementation of each Co-permittee's GSI Plan through an adaptive management process and in response to "lessons learned." As such, it is anticipated the capacities specific to the various types of GSI will not be tracked explicitly. As GSI projects are substituted over the course of GSI Plan implementation (e.g., replace green street capacity in a subwatershed with additional regional project capacity), Co-permittees will show equivalency for achieving the corresponding implementation goals via stormwater volumes managed or impervious surface addressed via GSI.

For each of the results for the primary Scenario 1 (i.e., all Co-permittees achieve a 17.3% reduction individually), Appendix A also includes a corresponding GSI Implementation Approach for each Co-permittee. These results demonstrate the cost-optimization implementation of different combinations and amounts of GSI projects within each subwatershed. These combinations were based on: (1) number and type of GSI project opportunities identified within each subwatershed, and (2) cost-effectiveness given various characteristics associated with GSI control measure efficiency (typically governed by infiltration rates), higher sediment (or PCBs) generation in upstream areas, etc. During implementation, it is almost certain that the actual implementation of GSI will not exactly follow the Implementation Approach outlined in Appendix A, however, the approach provides "management metrics" (described below) to guide the adaptive management process and track progress towards PCB load reduction goals. Dimensions and location of GSI projects will vary based on on-the-ground feasibility and site-specific constraints. GSI performance varies based on factors like the physical properties of the facility and upstream drainage area managed. For these reasons, it is not recommended that *GSI capacity* serve as the focus for stormwater improvement goals for each Co-permittee's GSI Plan.

The output from the RAA for GSI recommends management metrics to support GSI planning and implementation that can be easily measured and tracked throughout implementation. Section 8

[7] The reported volume is determined by estimating the amount of water to be retained (and/or infiltrated) by GSI over the course of the average annual period (Water Year 2002) that was used for simulating the baseline load and comparing to the TMDL WLA for PCBs (BASMAA 2017). Additional volume would be *treated* (e.g., filtration or removal of PCBs) by these GSI projects, but that additional treatment is *implicit* to the reported volume. For the purposes of future tracking of GSI implementation, volumes metrics can be tracked in terms of the stormwater volumes that are either retained and/or treated to reduce PCB concentrations.

outlines the Santa Clara Basin management metrics anticipated to be attained over the course of the implementation schedule. These management metrics include "% Load Reduction PCBs (Annual)," "Annual Volume Managed (acre-ft)," and "Impervious Area Treated (acres)." The "% Load Reduction PCBs (Annual)" and "Annual Volume Managed (acre-ft)" metrics are based on annualized results represented in the RAA modeling system that are directly comparable to TMDL WLAs. The "Annual Volume Managed (acre-ft)" reports the acre-feet of water captured and infiltrated and/or treated, resulting in a total annual volume to be managed by GSI to meet the PCB load reduction goal. This total stormwater managed could serve as the primary metric to be tracked for GSI implementation. In other words, stormwater volume managed can serve as a unifying metric to evaluate GSI effectiveness. "Impervious Area Treated (acres)" is an additional metric suggested by the MRP for implementation tracking. As a result of adaptive management, the implementation plan may change over time and alternative GSI projects can be substituted without having to re-run the RAA model for GSI, as long as the "Management Metrics for GSI" remain on track.

7 ALTERNATIVE GSI IMPLEMENTATION SCENARIOS TO INFORM ADAPATIVE MANAGEMENT

To further inform GSI implementation and the adaptive management process, the RAA for GSI also considered alternative scenarios that test the underlining assumptions for GSI implementation, and demonstrate the need for further research, potential enhanced collaboration among SCVURPPP Co-permittees, and the incorporation of lessons learned to gain efficiencies and maximize the cost-effectiveness of GSI to both reduce pollutant loads and improve the overall management of stormwater in the Santa Clara Basin over time. The two modeling scenarios included in this analysis are summarized below and illustrated in Figure 7-1:

1. **Jurisdictional Scenario** – Assumes that each SCVURPPP Co-permittee will individually achieve a 17.3% PCBs load reduction based on the reduction of cohesive (suspended) sediment via the installation of GSI within optimal locations within each Co-permittee's jurisdictional boundary. This scenario does not consider whether baseline levels of PCBs specific to each Co-permittee need to be reduced to achieve the TMDL WLA. GSI projects, including new regional projects, that address PCBs from multiple jurisdictions are not included in this scenario.
2. **Basin-wide Scenario** – Assumes SCVURPPP Co-permittees will collectively achieve a 17.3% PCBs load reduction at a basin-wide scale based on the reduction of cohesive (suspended) sediment. GSI implementation would occur at the most optimal locations in the basin and Co-permittees would collectively benefit. The basin-wide approach may provide significant cost savings over the jurisdictional approach. Where there is cooperation among jurisdictions, results from these two scenarios can provide a useful analytical framework for future cost-sharing and implementation of the most cost-effective management scenarios.

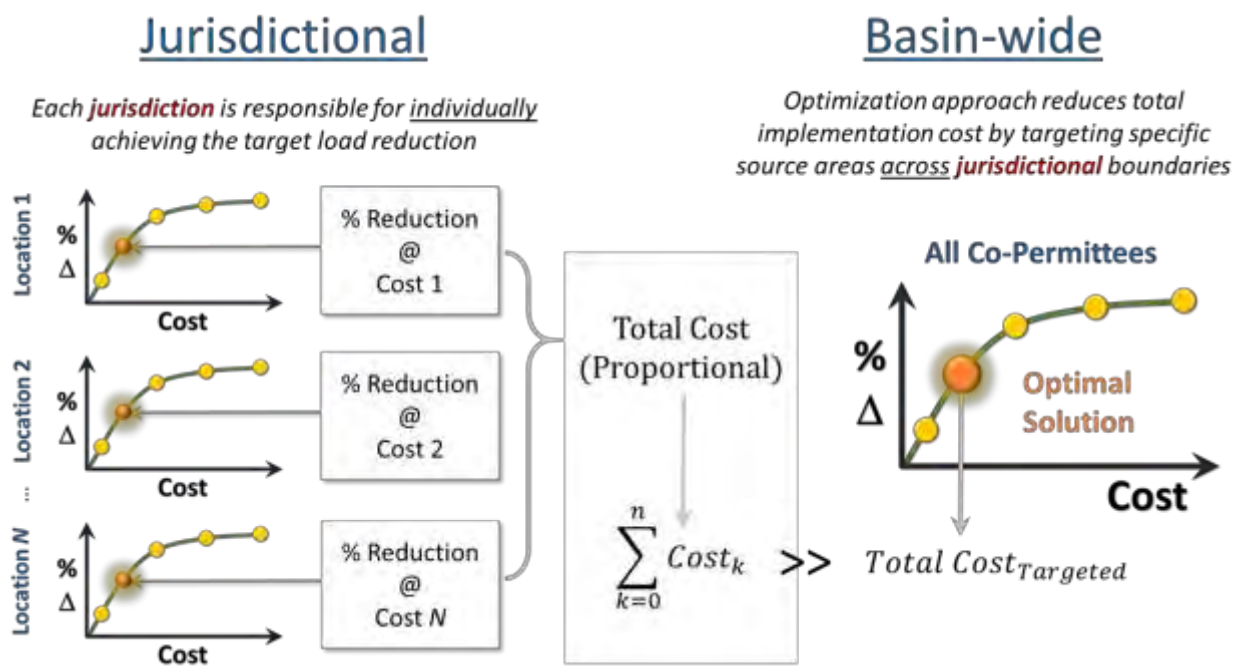

Figure 7-1. Jurisdictional vs. basin-wide scenarios for cost-benefit optimization.

7.1 Comparison of Jurisdictional versus Basin-wide Scenarios

To compare results of Scenario 1 (jurisdictional) and Scenario 2 (basin-wide), Figure 7-2 and Figure **7-3** show stacked optimization curves that present summations of results (GSI capacity and implementation cost vs. load reduction benefit) for each Co-permittee jurisdiction, respectively. Like the optimization curves provided for each individual jurisdiction (Appendix A), Figure 7-2 presents the proportion of the basin-wide cost for GSI implementation. Because these results are presented as a summation of individual Co-permittee results throughout the Santa Clara Basin, the solution for Scenario 1 is presented as 100% of basin-wide implementation costs in Figure 7-2. To provide relative comparison of Scenarios 1 and 2, costs for Scenario 2 in Figure **7-3** are normalized relative to the total cost of Scenario 1. Scenario 2 is 78.5% of the cost of Scenario 1. This suggests that if GSI were implemented throughout the Santa Clara Basin where projects are most cost-effective, independent of Co-permittee jurisdiction (resulting in disproportional implementation of GSI), basin-wide costs for GSI could be significantly reduced.

For some Co-permittees, the combination of Existing Projects, Future New & Redevelopment, and/or Regional Projects (Identified) load reductions exceed the 17.3% load reduction goal for the jurisdictional scenario. The basin-wide Scenario 2 adjusts for the extra reduction provided by those facilities and redistributes the remaining management burden, concentrating on areas where it is the most cost-effective to achieve cohesive sediment load reduction.

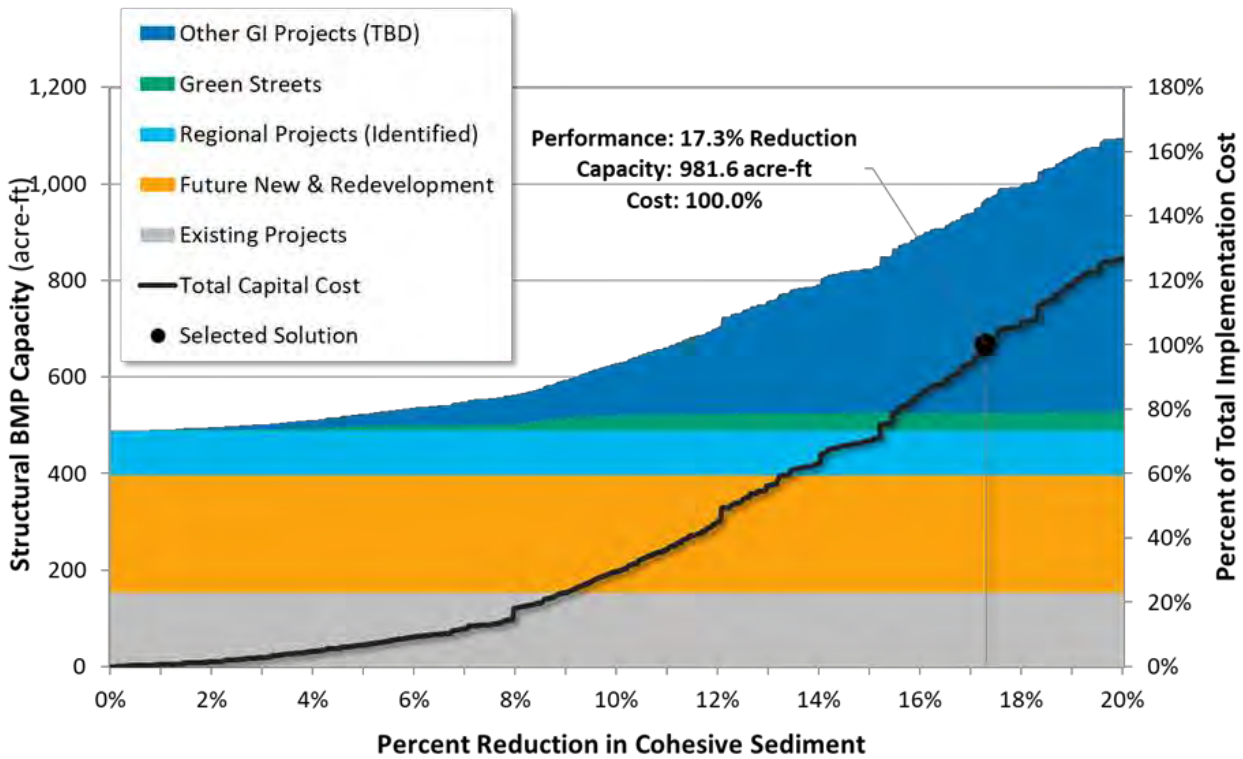

Figure 7-2. Summation of SCVURPPP Co-permittee optimization results for Scenario 1 (jurisdictional).

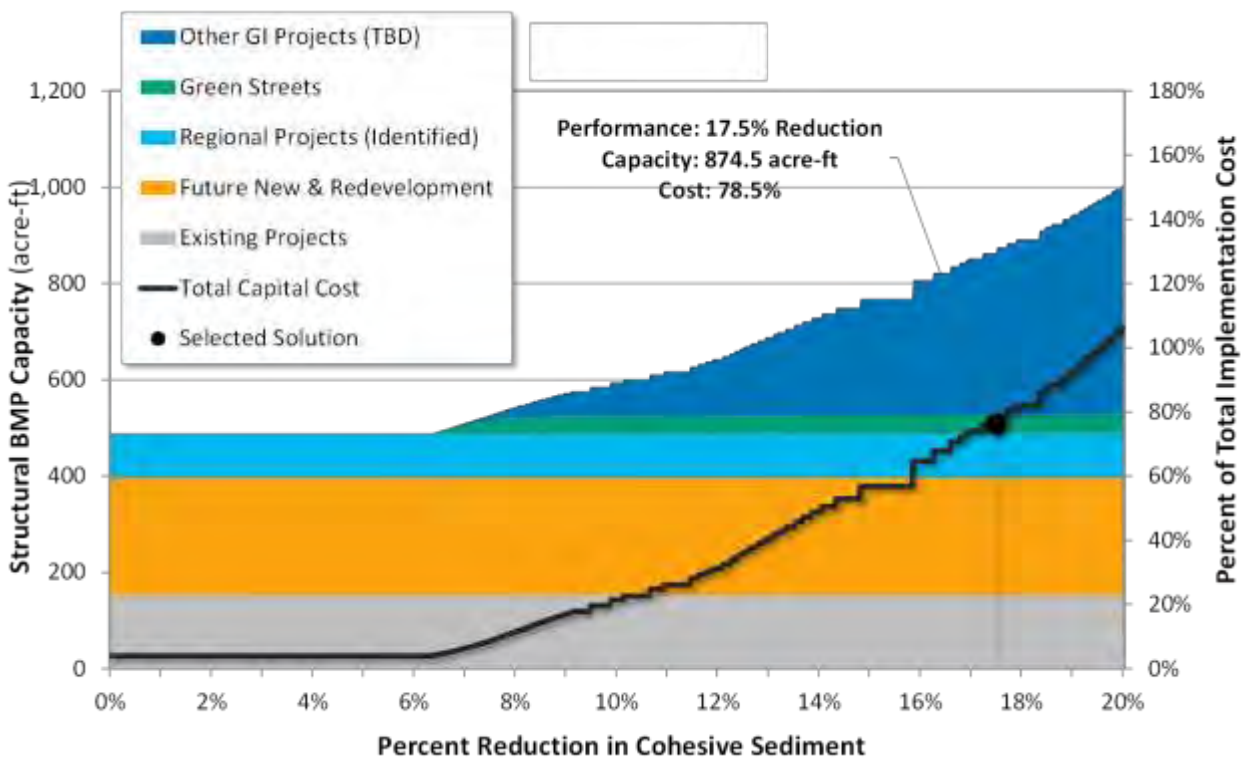

Figure 7-3. Summation of SCVURPPP Co-permittee optimization results for Scenario 2 (basin-wide).

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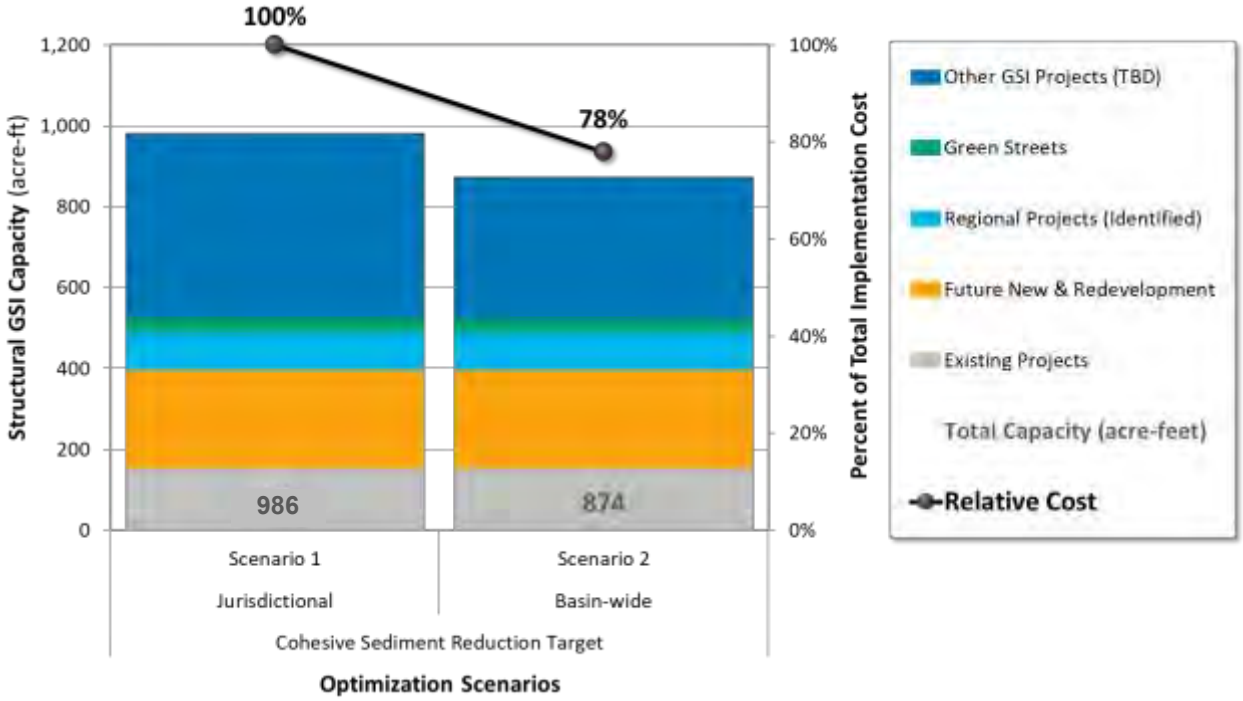

Figure 7-4. Summary of GSI storage capacity and relative implementation cost by scenario.

8 GSI IMPLEMENTATION SCHEDULES

Throughout the adaptive management process for GSI implementation, each Co-permittee will continue to identify and test feasible opportunities for GSI projects to meet the PCBs load reduction goal of 17.3% by 2040. The process will include the tracking of management metrics and continued re-evaluation of GSI project opportunities considered for the RAA. For instance, the RAA assumed projected amounts of LID associated with new and redevelopment, which are subject to change based on factors that are outside the control of the Co-permittees. If less development occurs over time, more green streets or regional projects on public land may be needed to provide equivalent stormwater volume management. To support the GSI Plans, preliminary schedules were developed to chart a potential course for GSI implementation (based on available funding and project feasibility), which considered the various project opportunities.

The MRP requires reporting of goals for implementation of GSI for interim milestones 2020 and 2030, in addition to the final milestone of 2040. Various assumptions were made about the order and pace of implementation for various GSI project types to estimate the amount of GSI to be implemented at each of these milestones. As discussed in Section 4.2.3, SCVURPPP determined the projected amount of LID associated with new development and redevelopment by 2020, 2030, and 2040. Consistent with project implementation timeframes outlined in the SWRP (SCVURPPP and Valley Water 2019) and the City of San José (2019) GSI Plan, all seven regional projects identified in the City of San José, including the Upper Penitencia Creek regional project[8], are assumed to be built and operational by 2030. The Fuller Park regional project is assumed to be implemented between 2030 and 2040 (see Table 4-2). Finally, for each Co-permittee, it is assumed that 33% of green streets required by 2040

[8] This project was identified in the SWRP, but although it is located in the City of San José, it is not included in the City of San José GSI Plan.

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will be implemented by 2030. The resulting schedule presented in Figure 8-1 demonstrates anticipated interim and final milestones for GSI implementation in terms of structural capacity (corresponding to the capacities presented right side of **Error! Reference source not found.**).

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Table 8-1 shows milestones for both structural capacities and management metrics (e.g., volume managed, treated imperviousness). These interim and final GSI capacities are subject to adaptive management; however, the 2040 Management Metrics for GSI (top of

Table 8-1) set the ultimate goals for GSI planning efforts and tracking. Individual Co-permittee implementation schedules are provided in Appendix A.

The implementation milestones (Figure 8-1 and

Table 8-1) and individual Co-permittee schedules (Appendix A) also provide comparisons of the amount of required GSI capacities estimated to address 2040 goals for Scenario 1 (jurisdictional) and Scenario 2 (basin-wide). The basin-wide scenario offers notable cost savings; however, in light of existing jurisdictional autonomies, there would need to be significant additional discussions among Co-permittees to establish cost-share agreements that would result in more GSI implementation within some Co-permittee jurisdictions resulting in less GSI implemented in other jurisdictions. Comparison of these scenarios further demonstrates the need for an adaptive management framework to further investigate the most cost-effective approach to basin-wide GSI implementation.

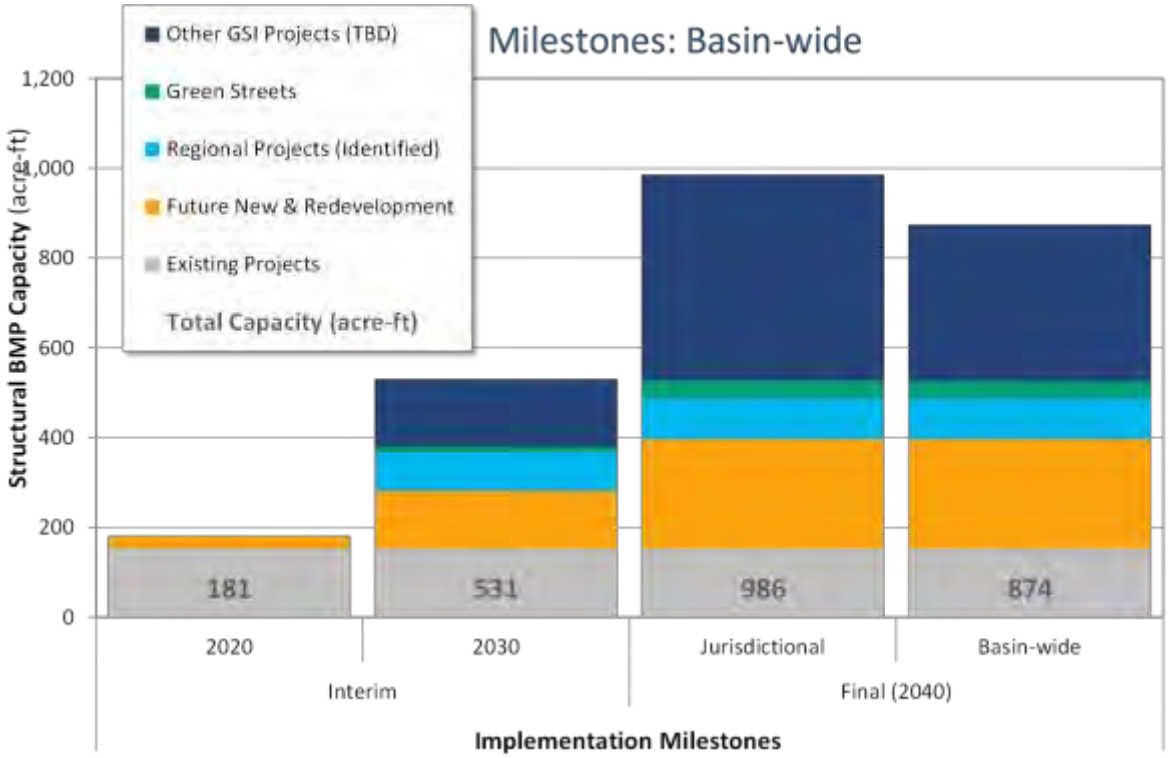

Figure 8-1. Summary of GSI storage capacity by implementation milestone.

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Table 8-1. Implementation Milestones: Scenario 1 (Jurisdictional).

Implementation Metrics		Implementation Milestones					
		Incremental (Jurisdictional)		Cumulative (Jurisdictional)		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Basin-wide
Management Metrics	% Load Reduction	6.4%	8.9%	2.1%	8.5%	17.4%	17.5%
	Volume Managed (acre-ft/yr)	1,043.8	1,379.2	413.4	1,457.2	2,836.4	2,751.7
	Treated Impervious (acres)	1,711.7	2,809.7	4,068.2	5,779.9	8,589.6	8,306.0
Capacities (acre-ft)	Existing Projects	0.0	0.0	152.9	152.9	152.9	152.9
	Future New & Redevelopment	101.0	114.6	28.3	129.3	243.9	243.9
	Regional Projects (Identified)	84.1	7.0	--	84.1	91.1	91.1
	Green Streets	12.9	26.2	--	12.9	39.1	38.0
	Other GSI Projects (TBD)	151.5	307.6	--	151.5	459.1	348.7
	Total	**349.5**	**455.3**	**181.2**	**530.7**	**986.0**	**874.5**

9 CONCLUSIONS

The RAA for GSI provides analysis of multiple implementation scenarios that can inform the adaptive management process for GSI implementation, help garner support for collaborative efforts for GSI implementation, and inform further research of PCB source areas that can seek more cost-effective implementation strategies over time. To set GSI implementation goals, results of Scenario 1 (Appendix A) provide a conservative assessment of the amount of GSI needed to address the 17.3% PCBs reduction goal, using cohesive sediment reduction as a surrogate for PCBs load reduction. An alternative "Basin-wide" scenario was evaluated to better understand the sensitivity of modeling assumptions and help guide future decisions on data collection (e.g., improve understanding of sources of PCBs that can be addressed with GSI), project selection (e.g., regional projects or green streets), or collaboration of Co-permittees to jointly meet the basin-wide load reduction goal.

The adaptive management process will utilize a GSI tracking tool that will enable agencies to continuously quantify and evaluate progress towards meeting the 2040 goal for PCBs load reduction. As demonstrated in the Table 8-1, these management metrics can include percent PCBs load reduction, stormwater volumes managed, or impervious area treated. SCVURPPP is currently leading the development of a GSI tracking tool, which will enable Co-permittees to enter GSI project information and calculate management metrics. The tool will also allow Co-permittees to evaluate alternative GSI projects prior to implementation, providing a mechanism to inform cost-effective decisions that maximize progress towards addressing management goals. The tracking tool can also serve as a future repository of GSI project information as projects are implemented, which can be used to support future updates of the RAA for GSI over time.

As Co-permittees initiate implementation of GSI Plans and future studies are implemented to better understand GSI processes to capture and treat stormwater, SCVURPPP Co-permittees will continue to gain more understanding of the water quality benefits of various GSI projects that can inform the

adaptive management process. For example, Section 4 documented a number of assumptions on the potential locations for GSI project opportunities and their associated effectiveness at capturing, infiltrating, or treating stormwater. Future more-detailed field reconnaissance performed by each Co-permittee can result in improved understanding of these GSI project opportunities, identification of new opportunities not identified in the SWRP or GSI Plans, or identification of impediments to potential projects (e.g., multiple driveways or other obstructions for bioretention in streets rights-of-way). As projects are implemented, additional studies performed within the Santa Clara Basin or throughout the San Francisco Bay region can provide an improved understanding of infiltration and treatment processes associated with GSI project designs. As a result, it is anticipated that the RAA for GSI may need to be periodically updated to reassess GSI project opportunities and GSI Implementation Approaches for each Co-permittee, likely resulting in fine-tuning of management metrics over time. This adaptive management process will provide continued assurance that GSI project implementation is on track to meet 2040 goals for PCBs reduction, while seeking to maximize cost-efficiency associated with project prioritization and selection.

10 PEER REVIEW

MRP provisions C.11.ii(2) and C.12.ii(2) require that MRP permittees ensure that the calculation methods, models, model inputs and modeling assumptions used in the RAA have been validated through a peer review process. To assist with the development and implementation of a regionally consistent process, a regional RAA Work Group was created through BASMAA. The RAA Work Group collectively created the peer review process used by MRP permittees, including the development of peer review guidance and a set of questions to assist/focus the peer reviewers. The guidance and questions were reviewed and modified based on Water Board staff review.

The scope of the peer review was focused on the methods, models, inputs, and assumptions used to model the baseline conditions and load reduction benefits associated GSI. Estimations of PCB and mercury load reductions associated with source controls, as described in the Bay Area RAA Guidance (BASMAA 2017), were not included in the scope of the peer review. The peer review focused on addressing the following four questions:

1. Have the modeling approach and components, including the calculation methods, model, model inputs, and modeling assumptions, been adequately documented?
2. Are the modeling approach and components consistent with the guidelines and criteria provided in the RAA Guidance Document? If not, is the deviation adequately documented and justified?
3. Are the modeling approach and components based on sound scientific knowledge, methods, and practice, given the available information and data?
4. Are key assumptions or simplifications used in the modeling approach and components reasonable and/or adequately justified?

For the GSI modeling portion of the RAA described in this report, these four questions were posed to peer reviewers relative to the three (3) following modeling components:

A. Load reduction goal from GSI calculation procedures and assumptions
B. Overall methodology to account for load reductions from GI, including representation of GI facility type, depth, inlet/outlet considerations, drawdown/ filtration rate, underlying infiltration, pollutant reduction mechanism, and input data

C. Load reduction calculation method

Coordination with the peer reviewers was conducted through the BASMAA Executive Director (ED). Each RAA Work Group participant provided the BASMAA ED with technical review documents (e.g., reports, memorandum, etc.) that should be reviewed. A standardized matrix used by the reviewers to organize their comments and suggestions was also developed through this process.

Peer reviewer comments on the SCVURPPP Phase II RAA Report showed that each of the above components were mostly determined to be adequately documented and justified and based on sound scientific knowledge, methods, and practice. To improve documentation of the GSI model, the peer reviewers provided the following suggestions for the Phase I Report:

- Additional clarity was requested regarding how WLAs were calculated by the TMDL and the basis for calculation of the MRP pollutant reduction goals for GSI.
- Additional clarity was requested regarding the modeling of GSI underdrains and associated removal of sediment prior to discharge from the underdrain.
- Additional clarity was requested regarding how alternative modeling scenarios were generated and selected during the optimization processes to identify cost-effective approaches for implementation.
- Additional clarity was requested regarding how parcels were identified to be potentially subject to future development or redevelopment.

Each peer reviewer's comment was reviewed by the SCVURPPP RAA consultant team and modifications to the calculation methods, models, model inputs, and modeling assumptions described in this report were performed accordingly. Responses were also provided to the peer reviewers. A summary of the comments received from peer reviewers and associated responses from the SCVURPPP RAA consultant team can be found in Appendix B.

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APPENDIX A: RAA RESULTS FOR SCENARIO 1 AND IMPLEMENTATION MILESTONES

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Campbell

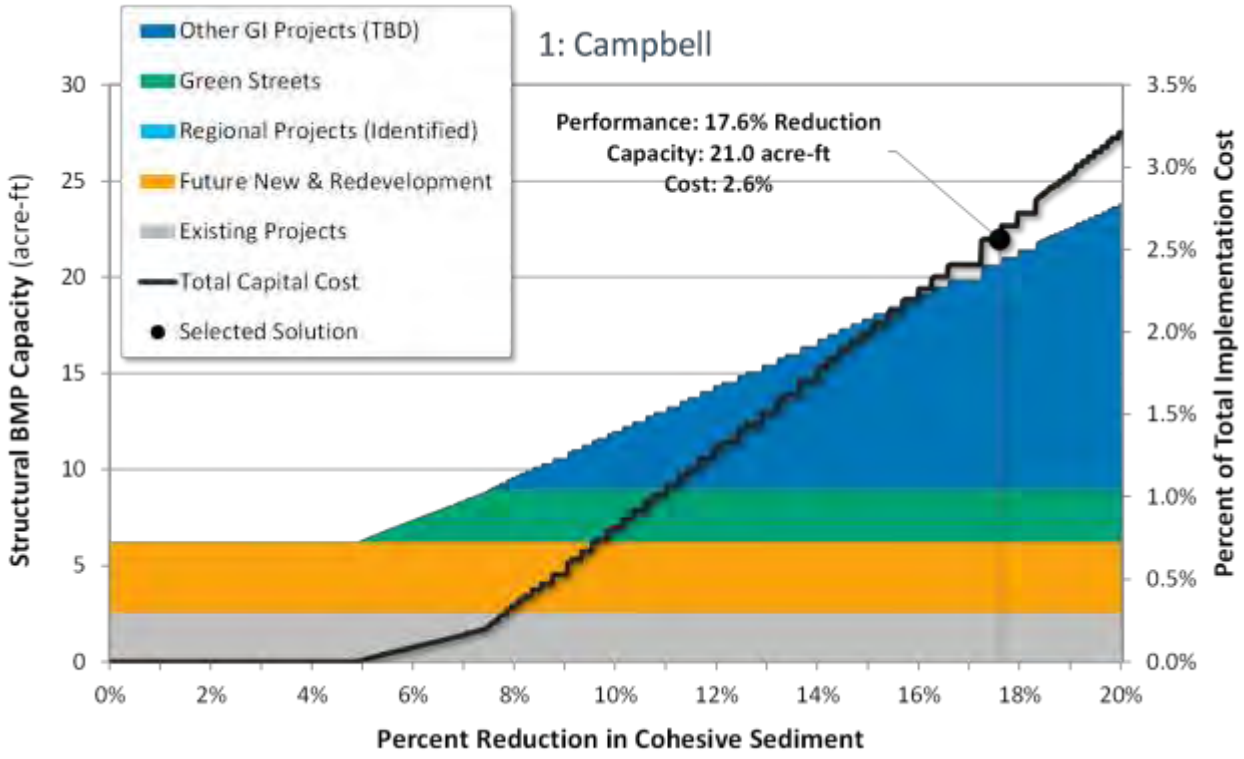

Figure A-1. Optimization summary for Campbell - Scenario 1.

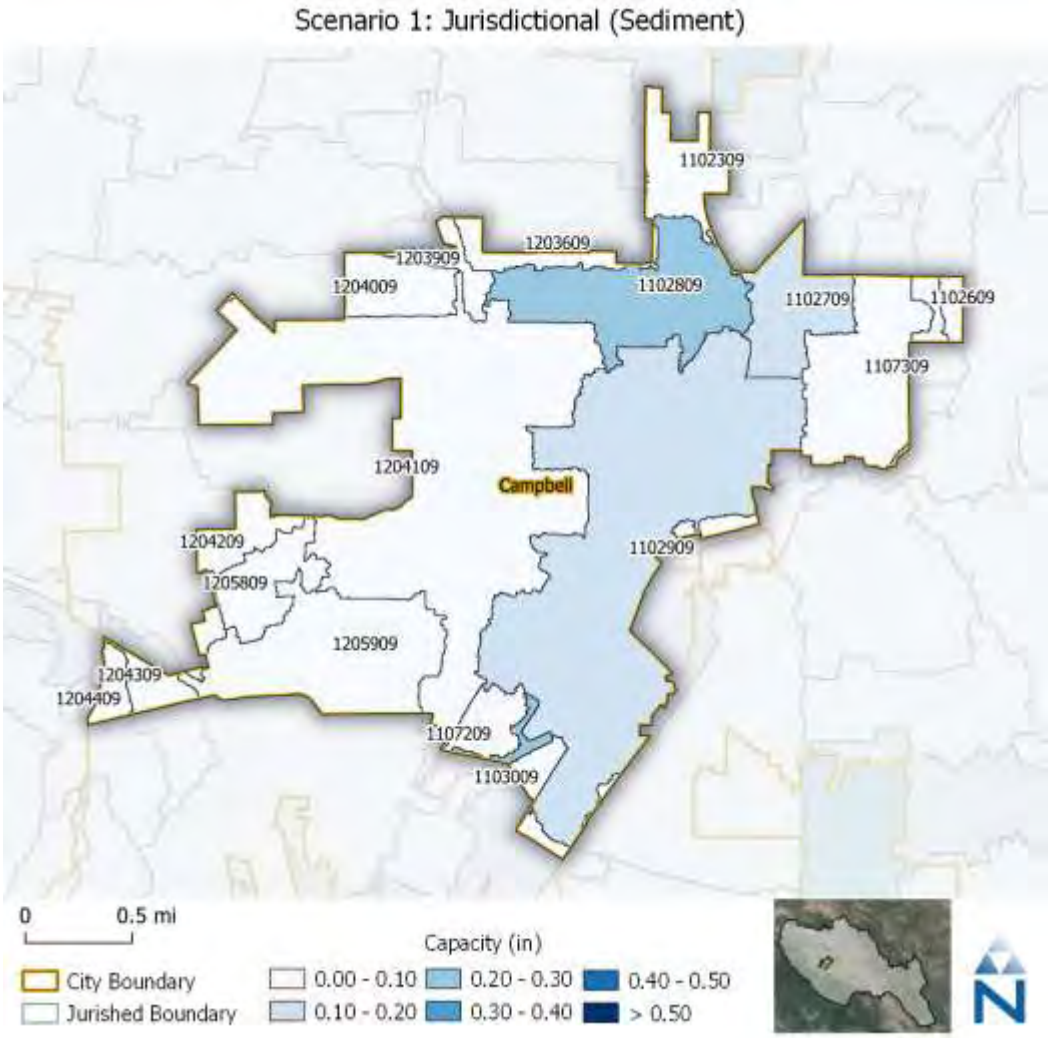

Figure A-2. Map of GSI capacities by subwatershed in Campbell - Scenario 1.

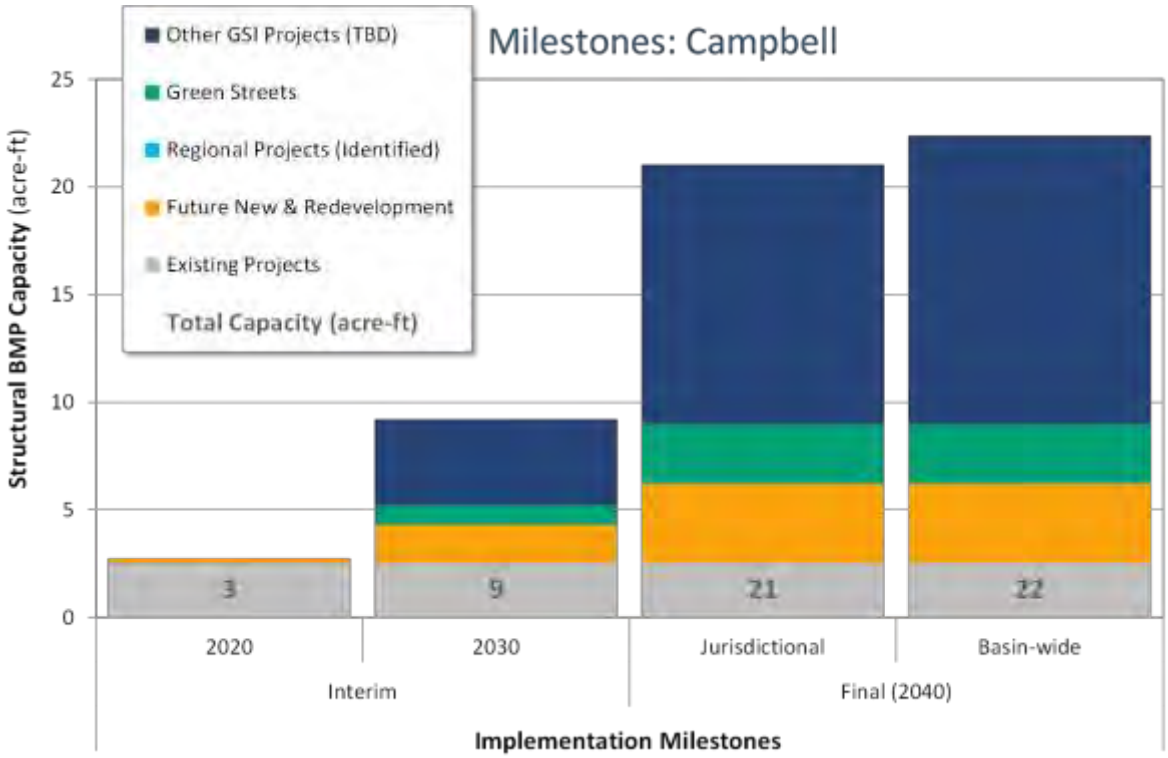

Figure A-3. Implementation Milestones: Campbell.

Cupertino

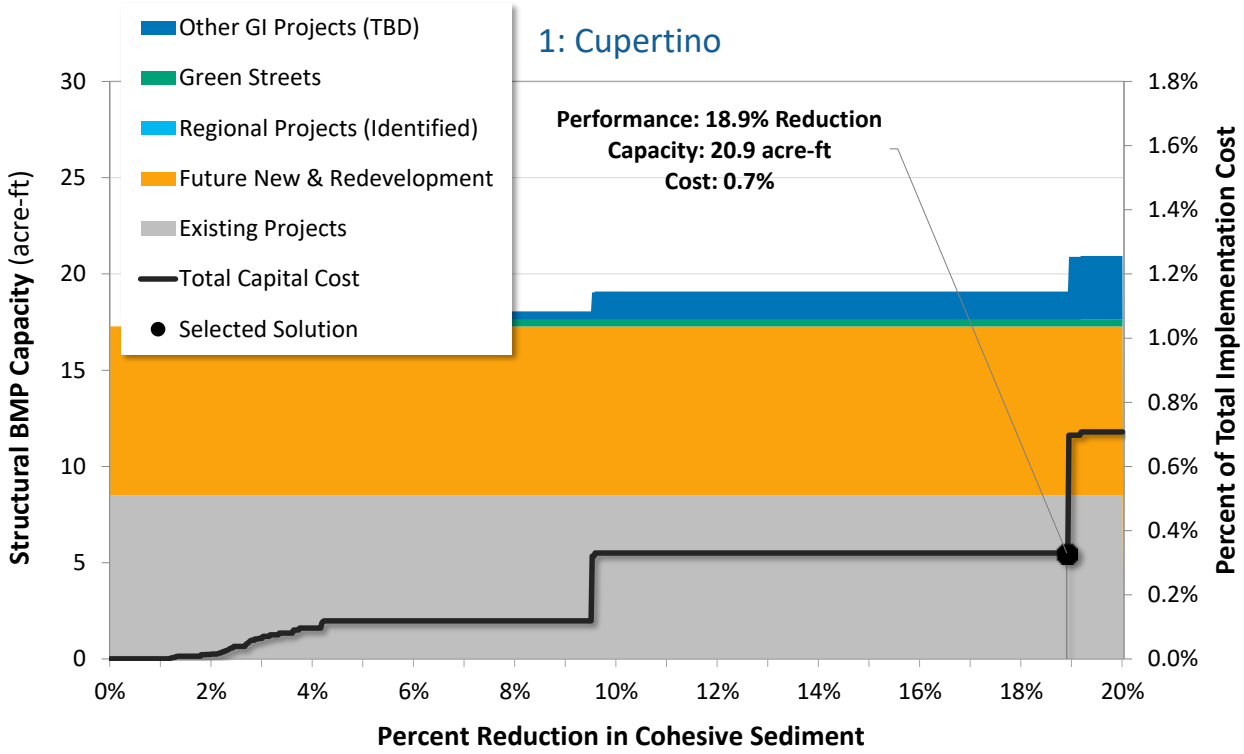

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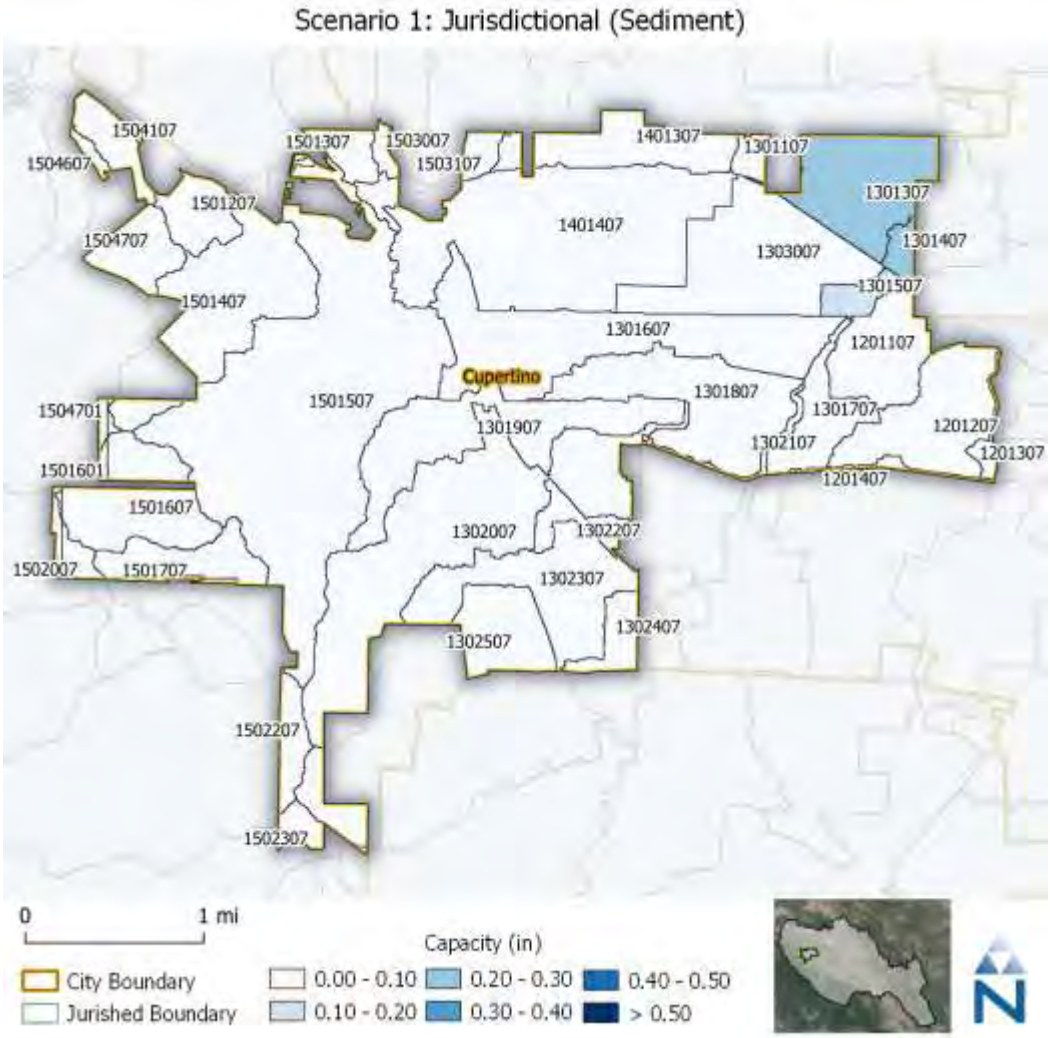

Figure A-5. Map of GSI capacities by subwatershed in Cupertino - Scenario 1.

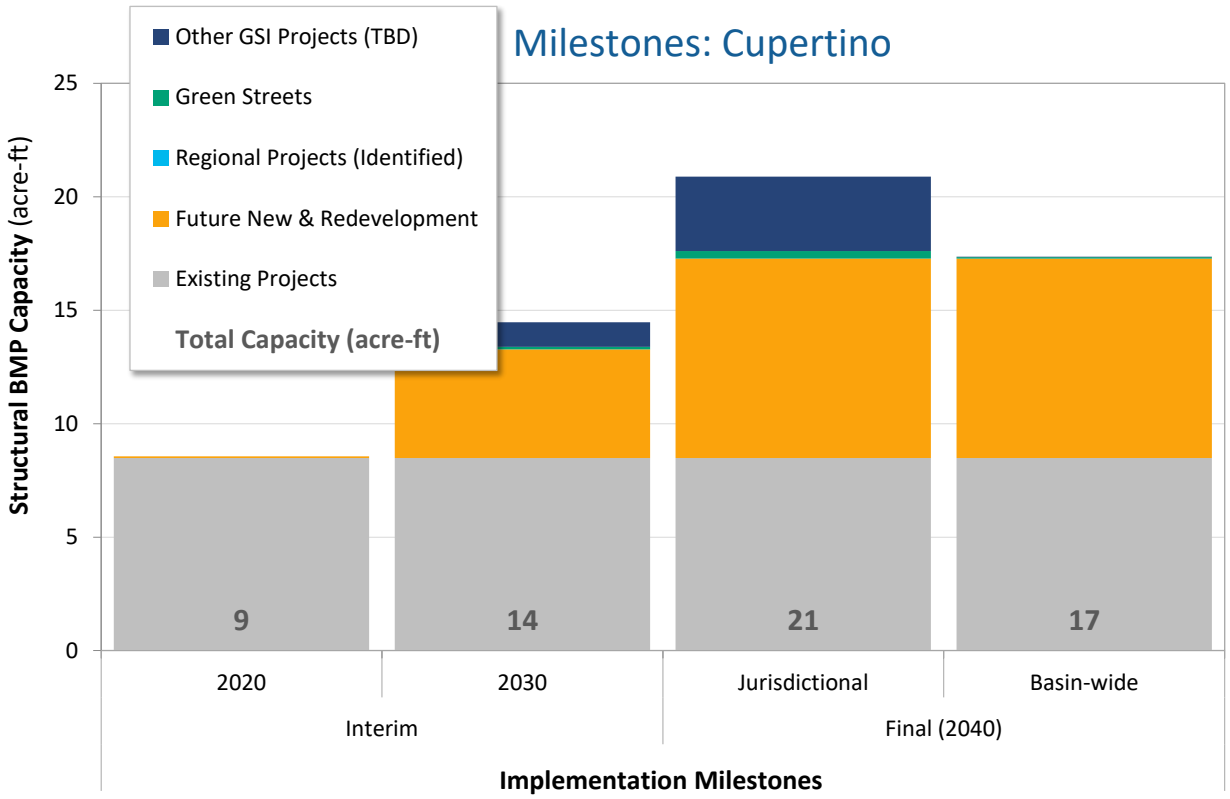

Figure A-6. Implementation Milestones: Cupertino.

Los Altos

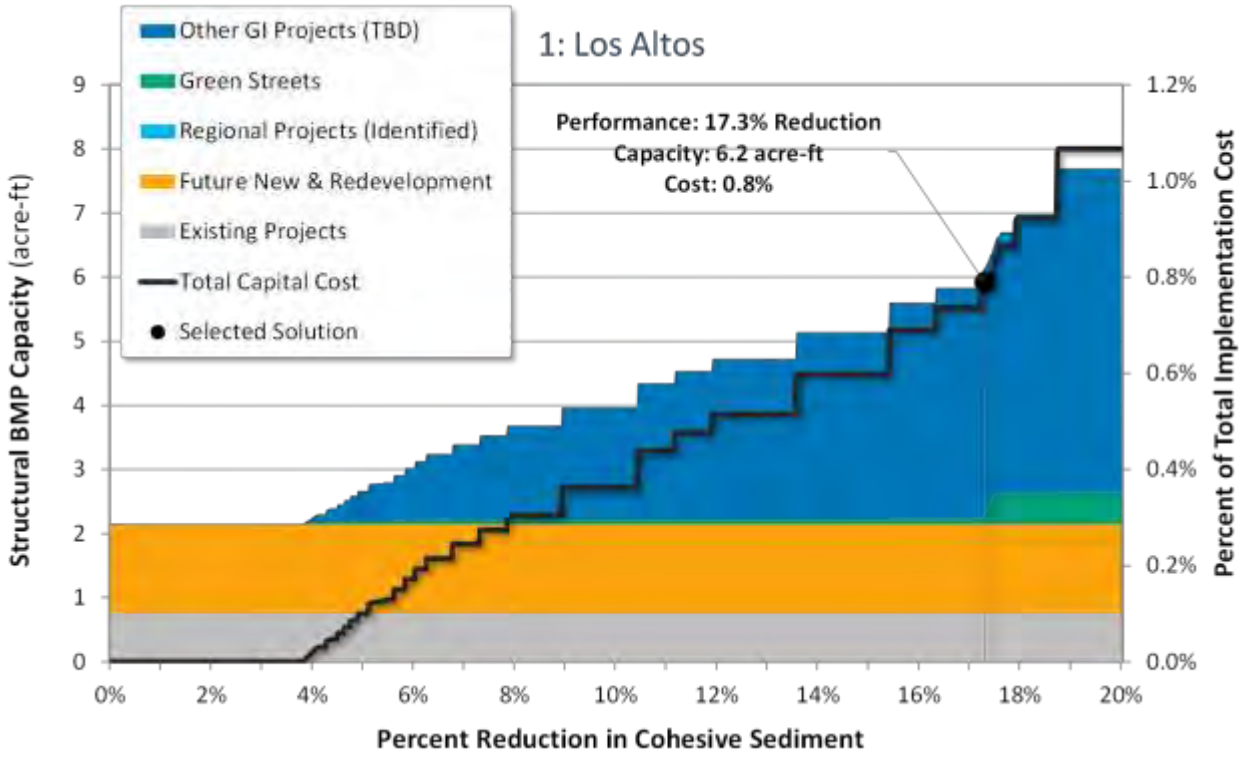

Figure A-7. Optimization summary for Los Altos - Scenario 1.

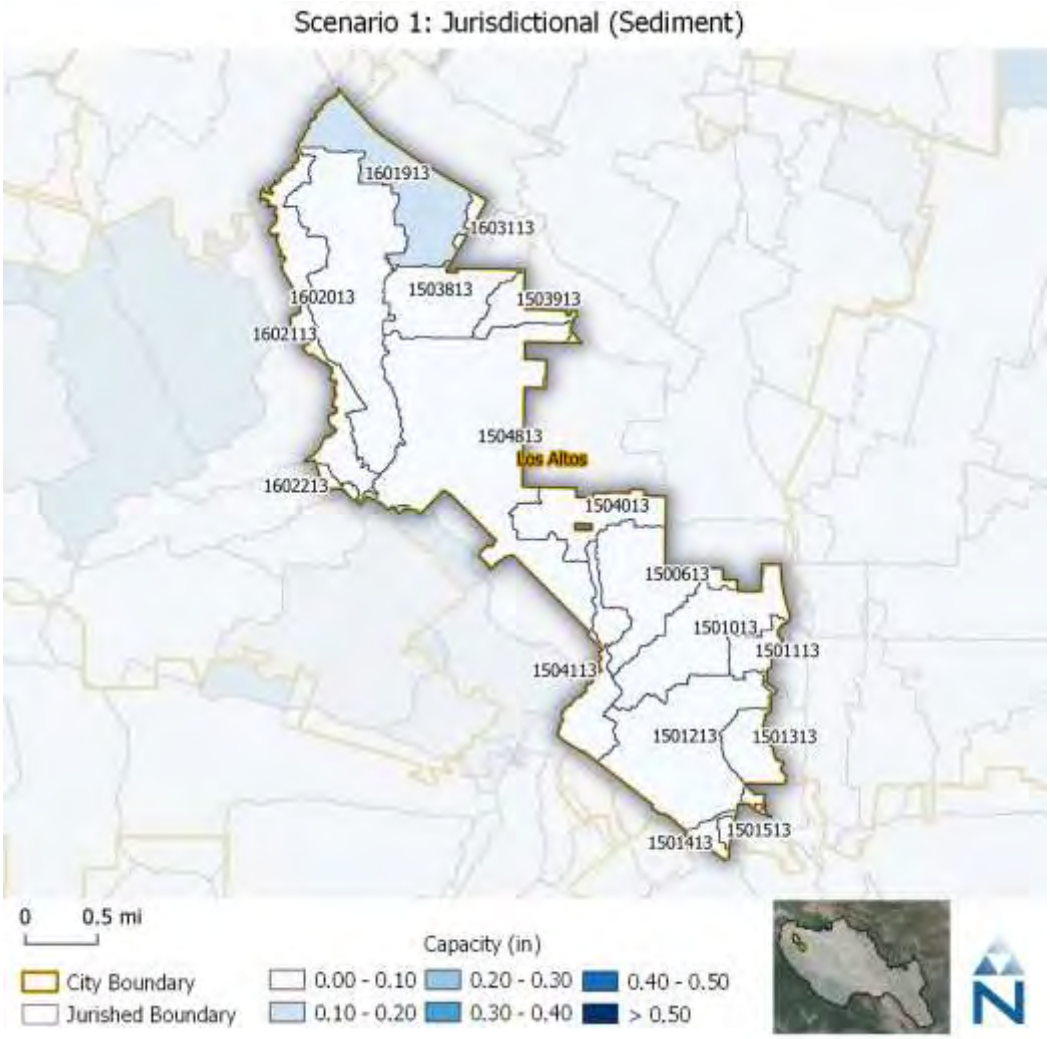

Figure A-8. Map of GSI capacities by subwatershed in Los Altos - Scenario 1.

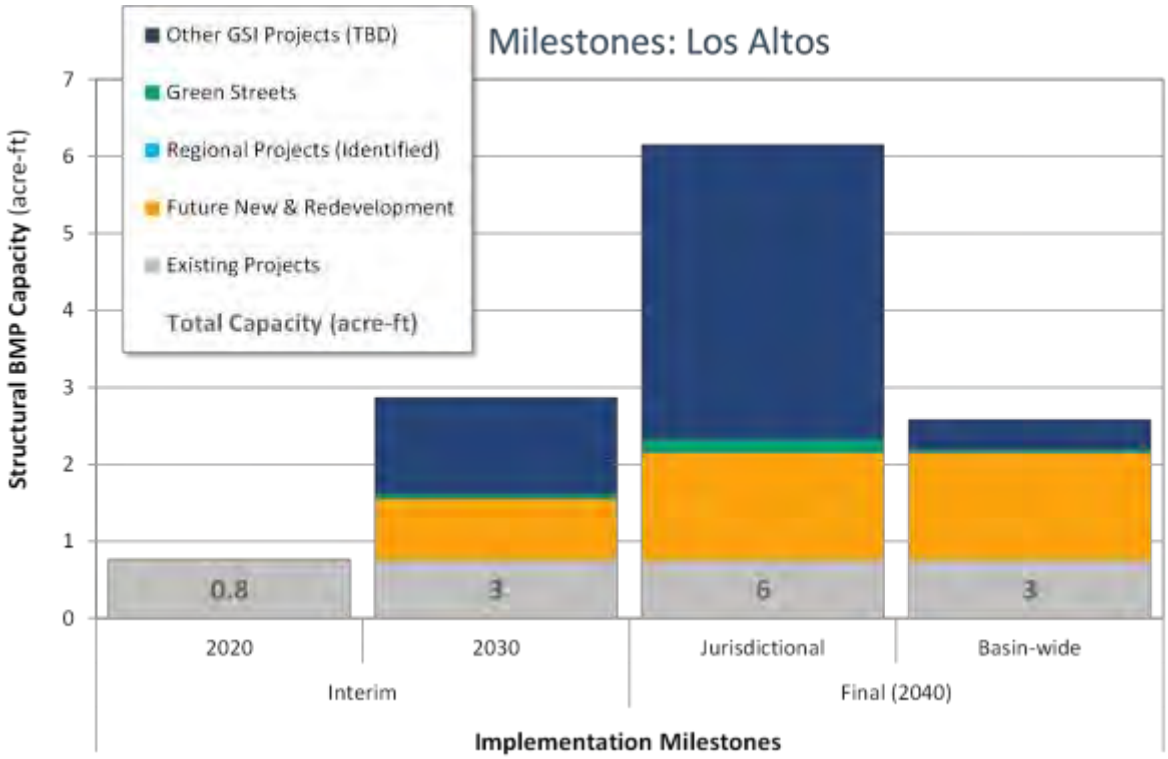

Figure A-9. Implementation Milestones: Los Altos.

Los Altos Hills

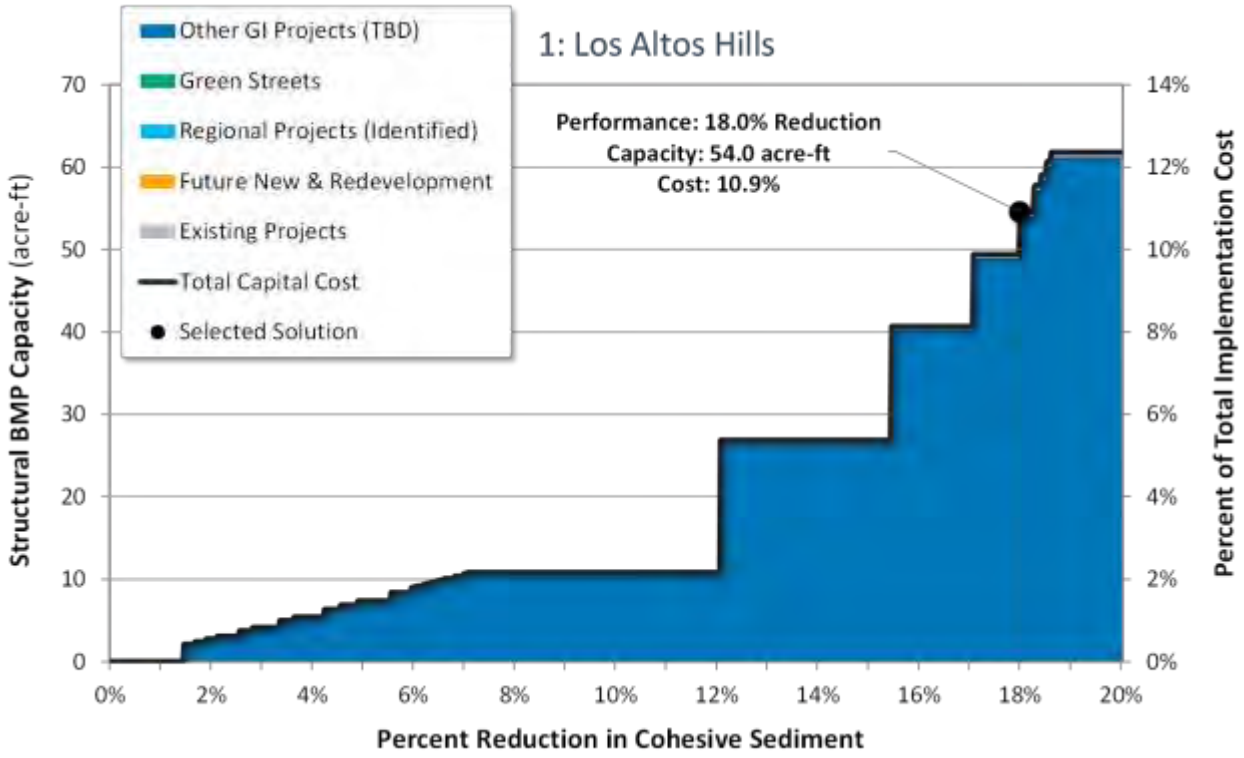

Figure A-10. Optimization summary for Los Altos Hills - Scenario 1.

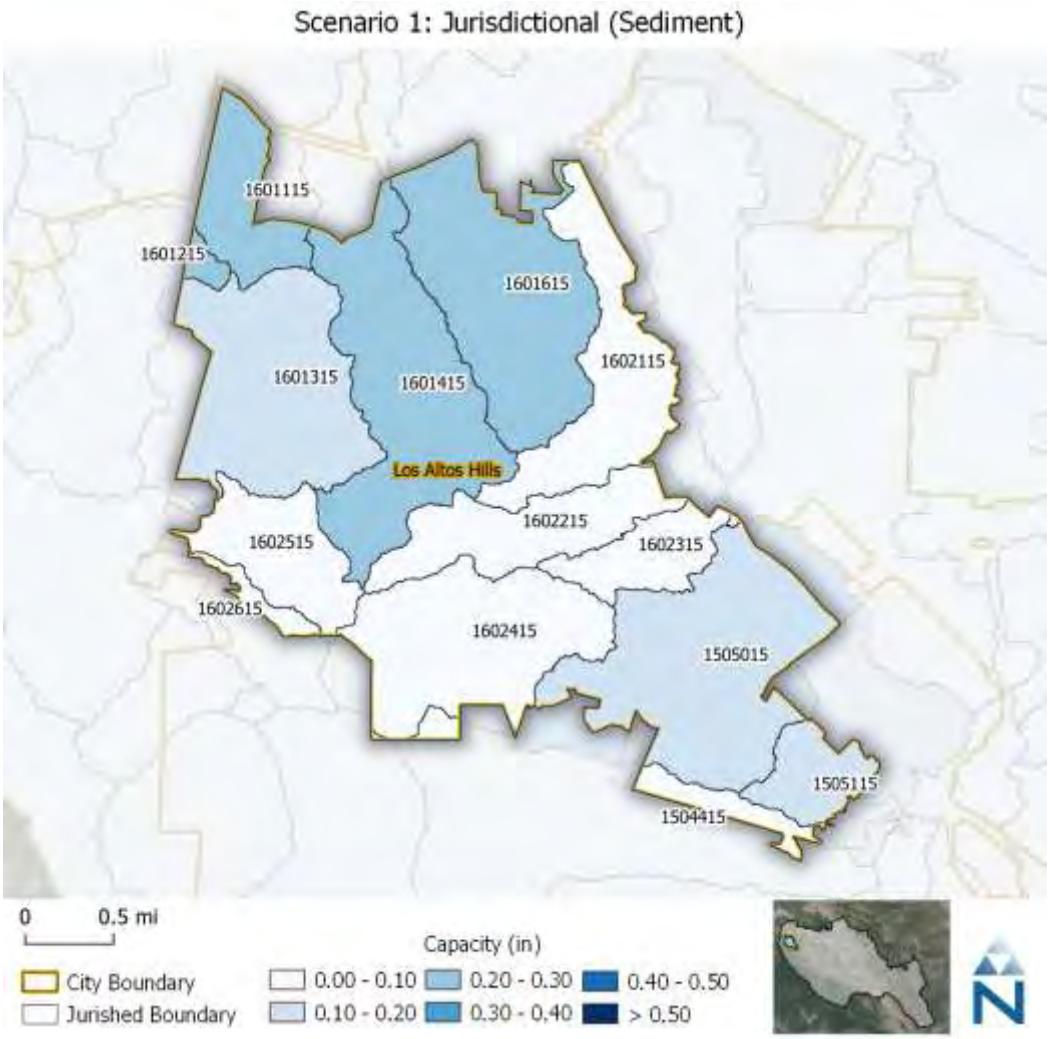

Figure A-11. Map of GSI capacities by subwatershed in Los Altos Hills - Scenario 1.

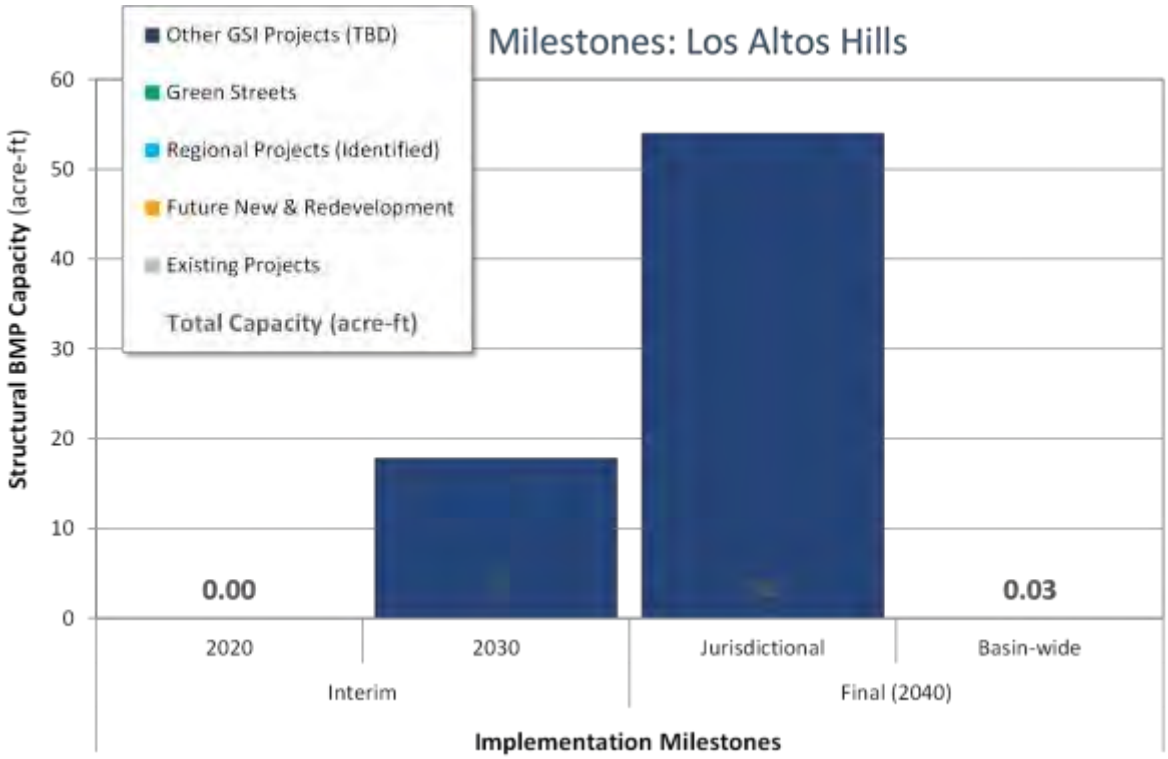

Figure A-12. Implementation Milestones: Los Altos Hills.

Los Gatos

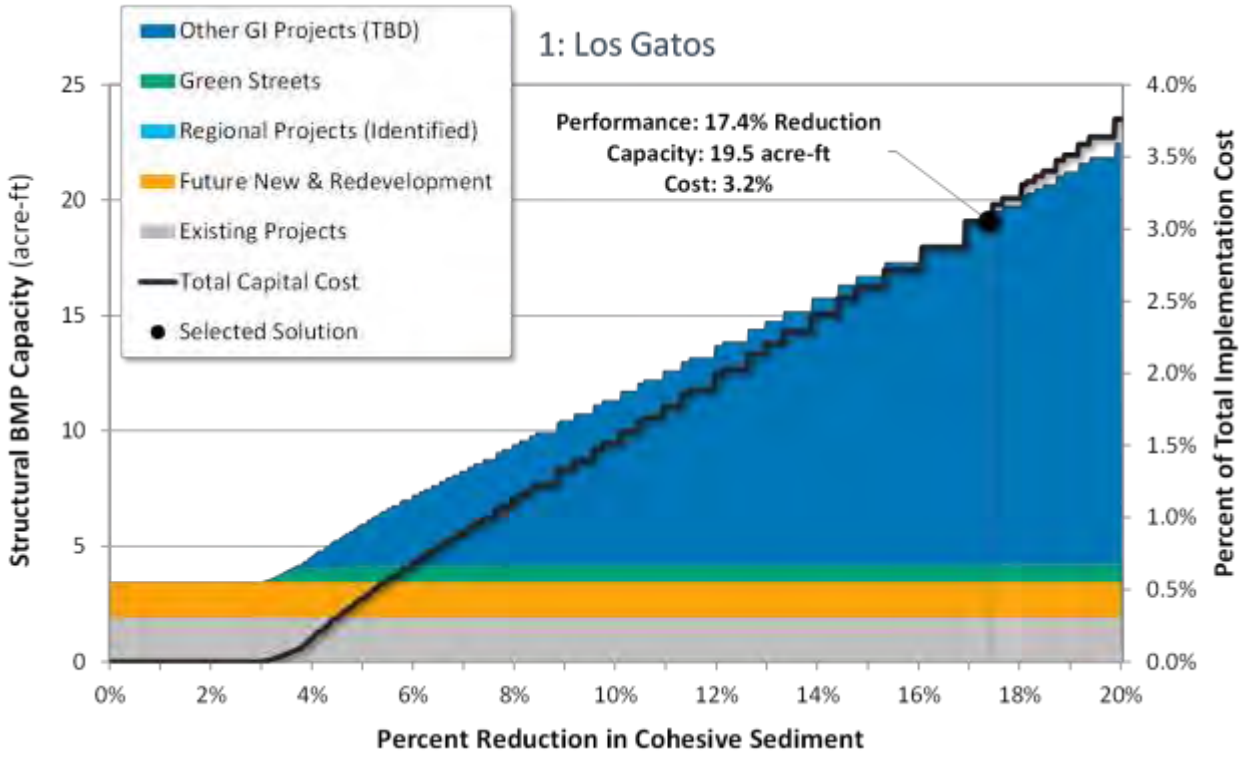

Figure A-13. Optimization summary for Los Gatos - Scenario 1.

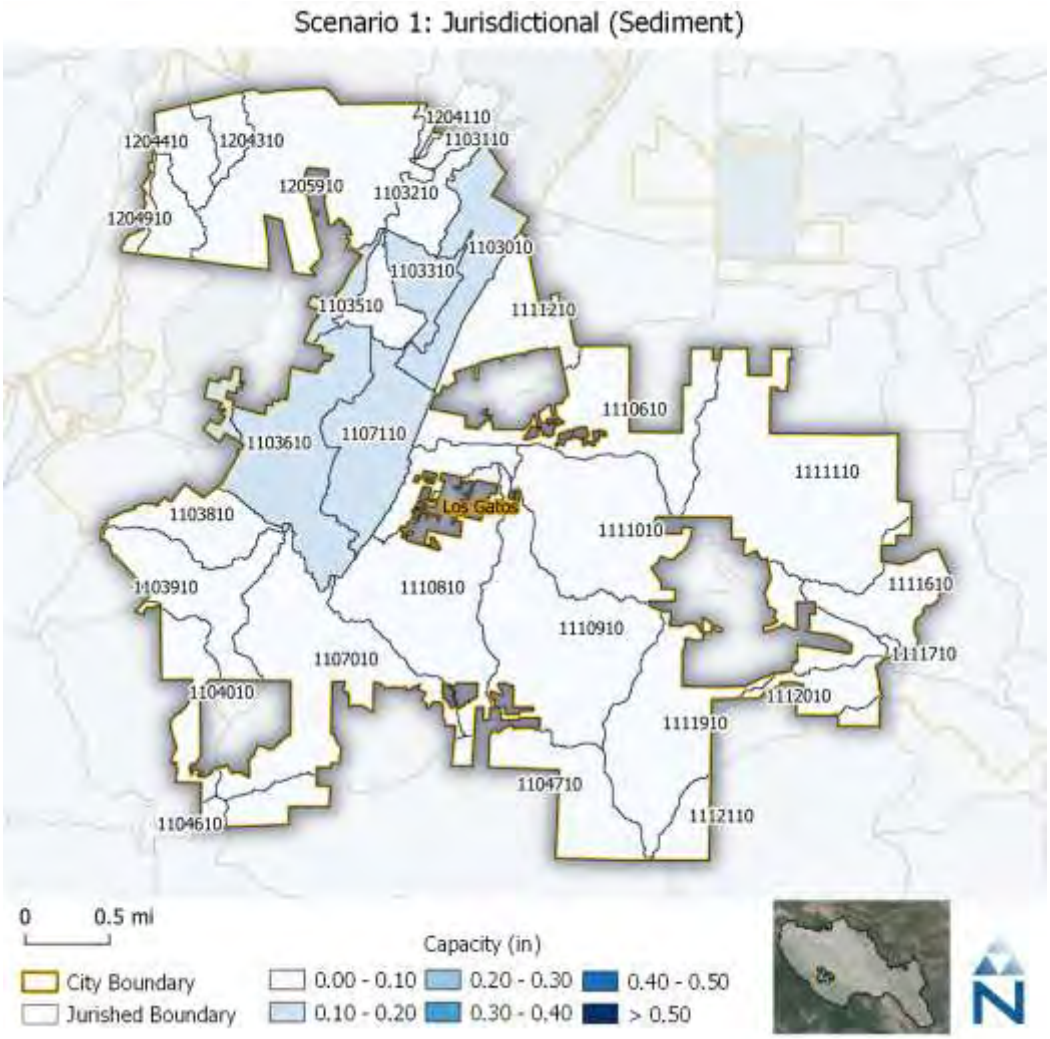

Figure A-14. Map of GSI capacities by subwatershed in Los Gatos - Scenario 1.

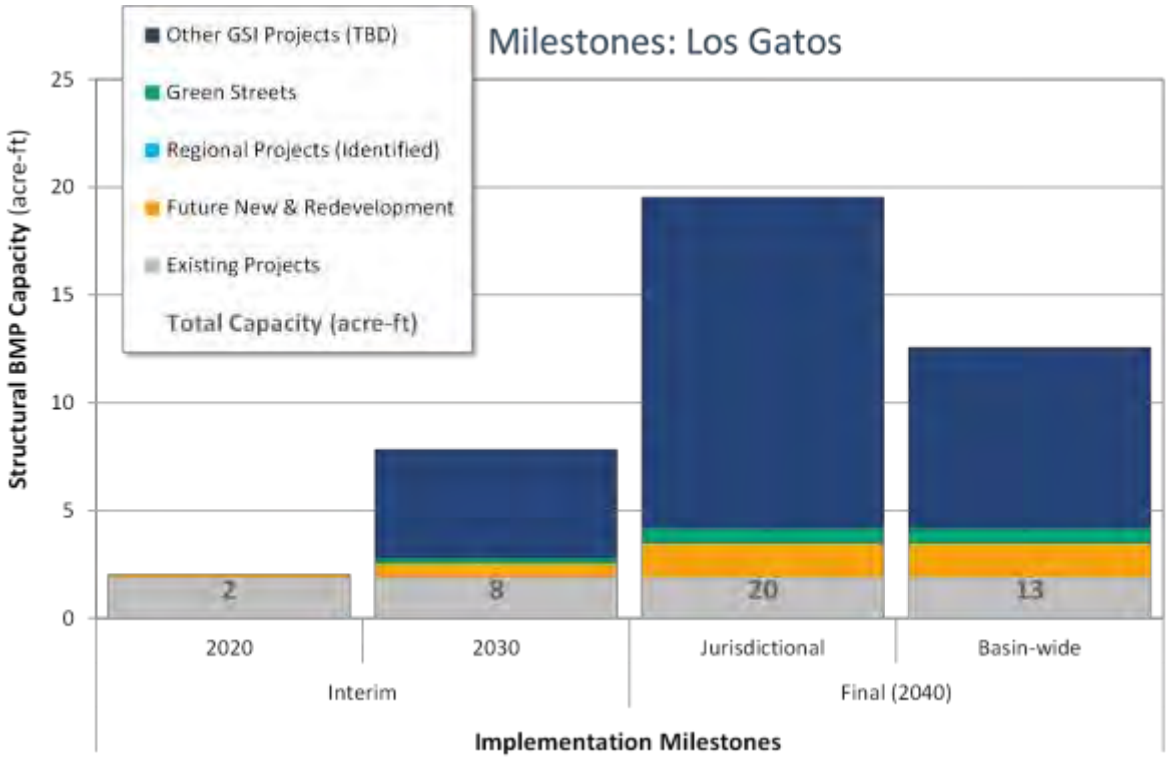

Figure A-15. Implementation Milestones: Los Gatos.

Milpitas

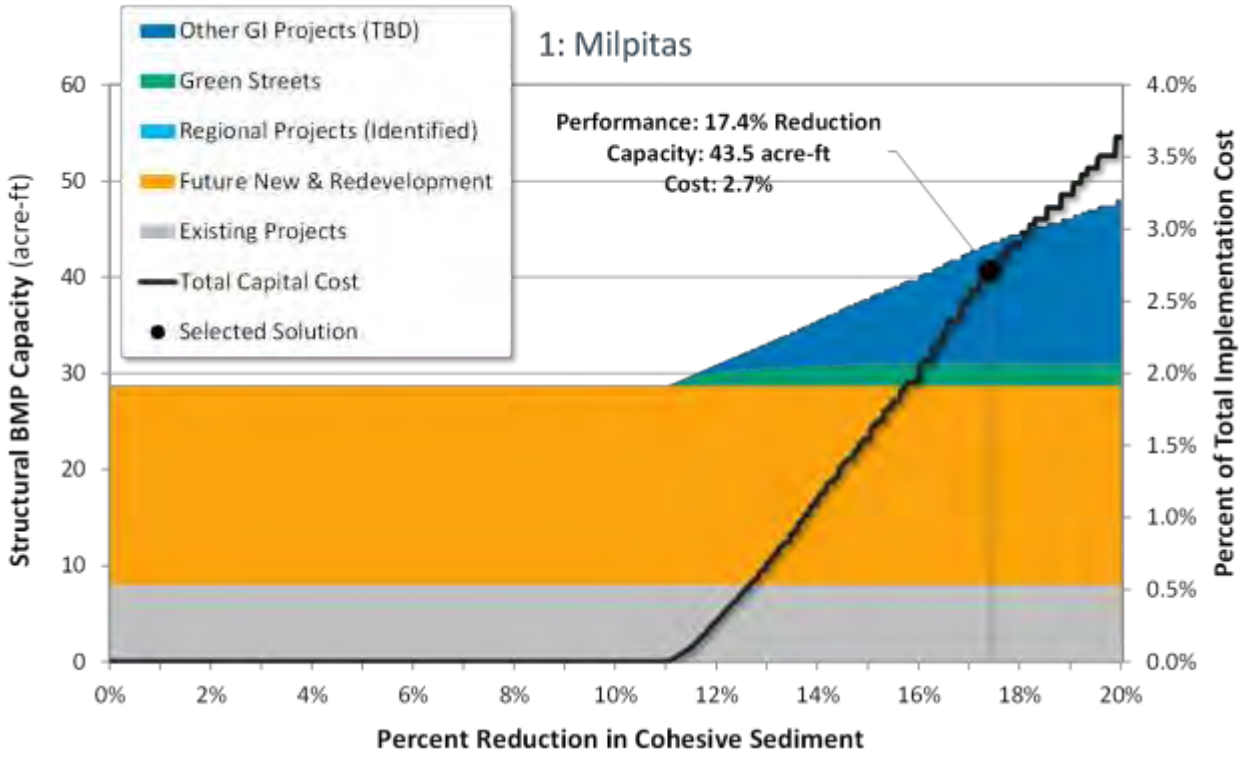

Figure A-16. Optimization summary for Milpitas - Scenario 1.

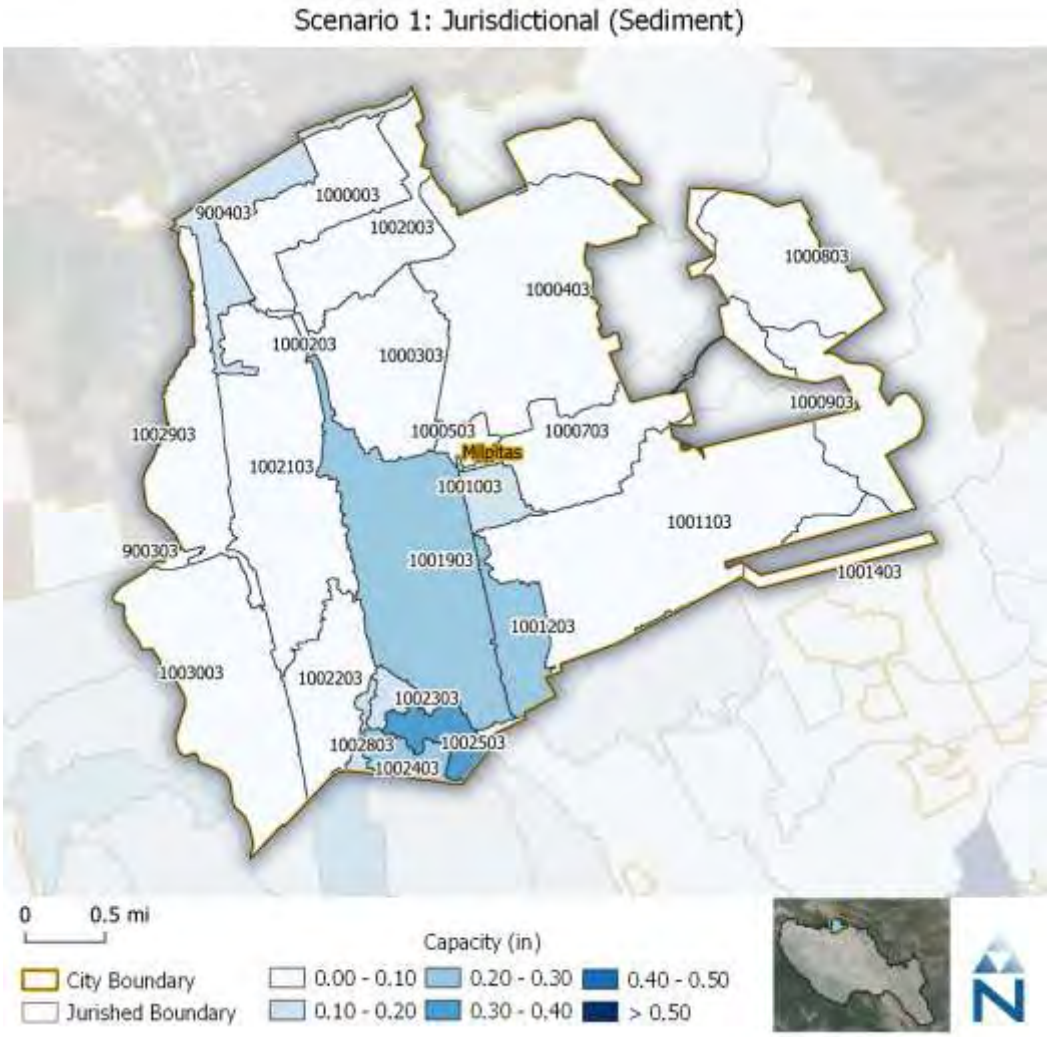

Figure A-17. Map of GSI capacities by subwatershed in Milpitas - Scenario 1.

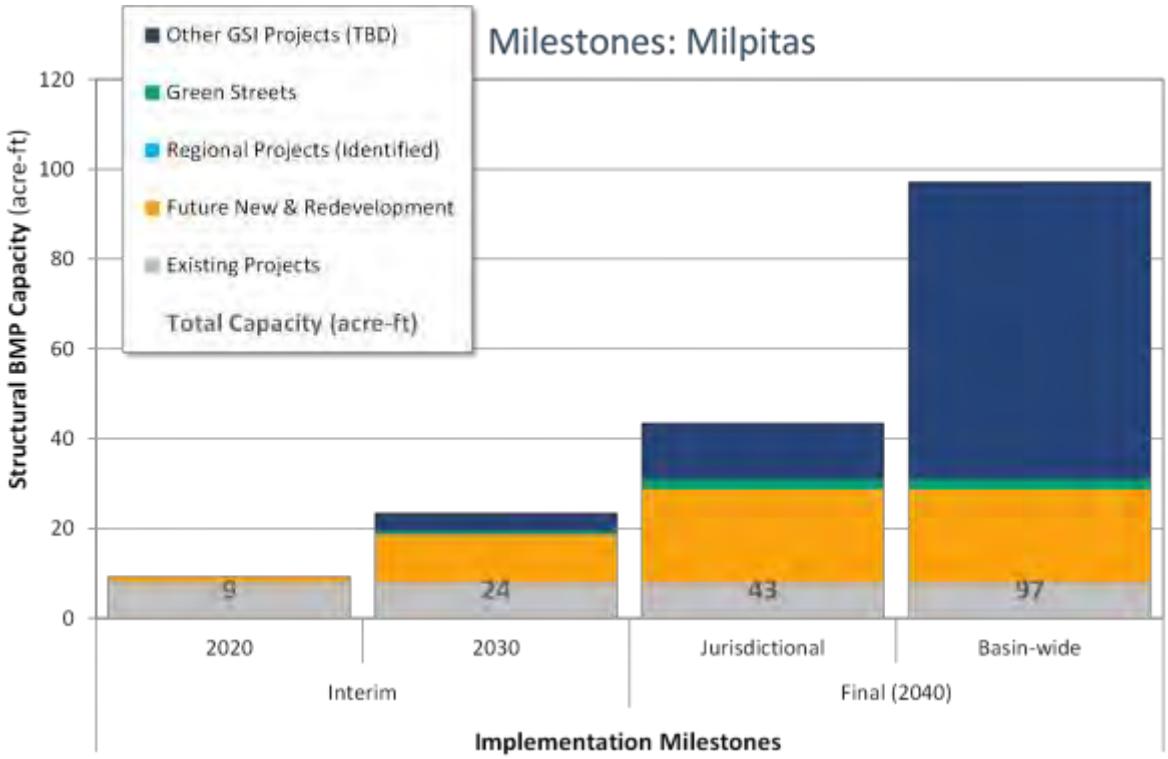

Figure A-18. Implementation Milestones: Milpitas.

Monte Sereno

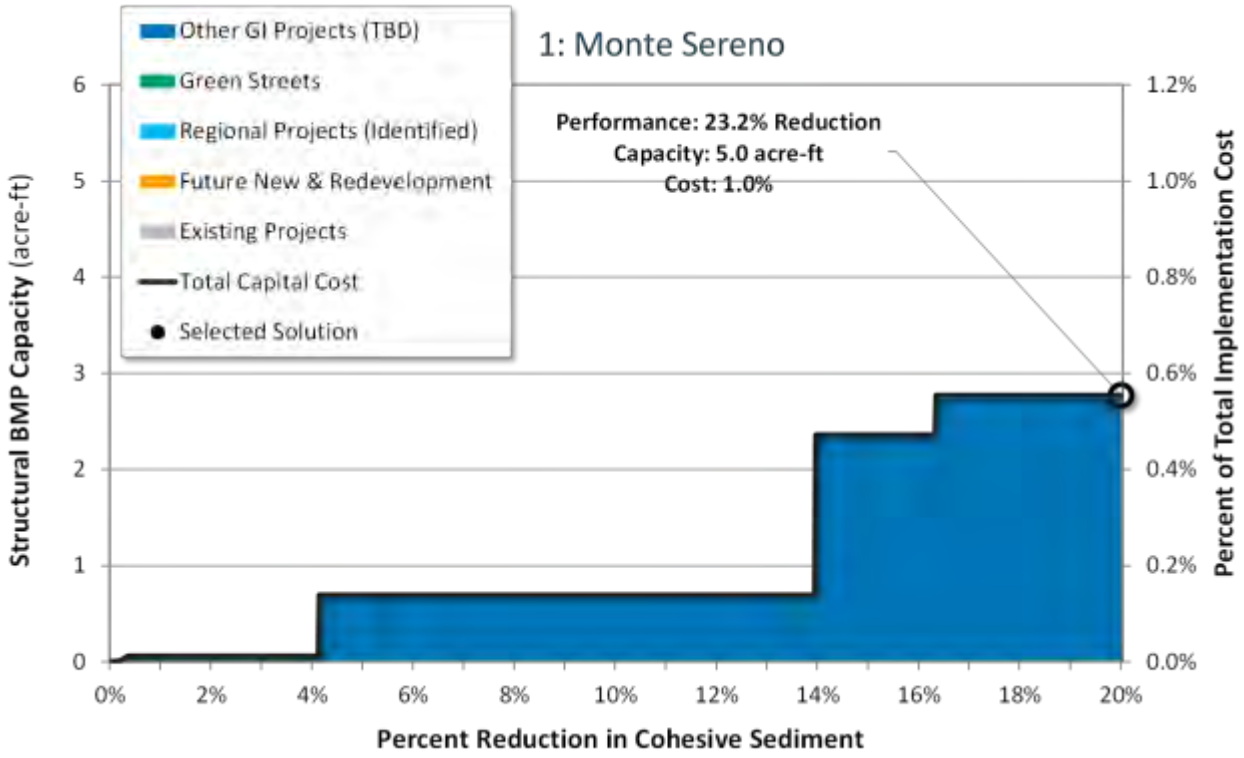

Figure A-19. Optimization summary for Monte Sereno - Scenario 1.

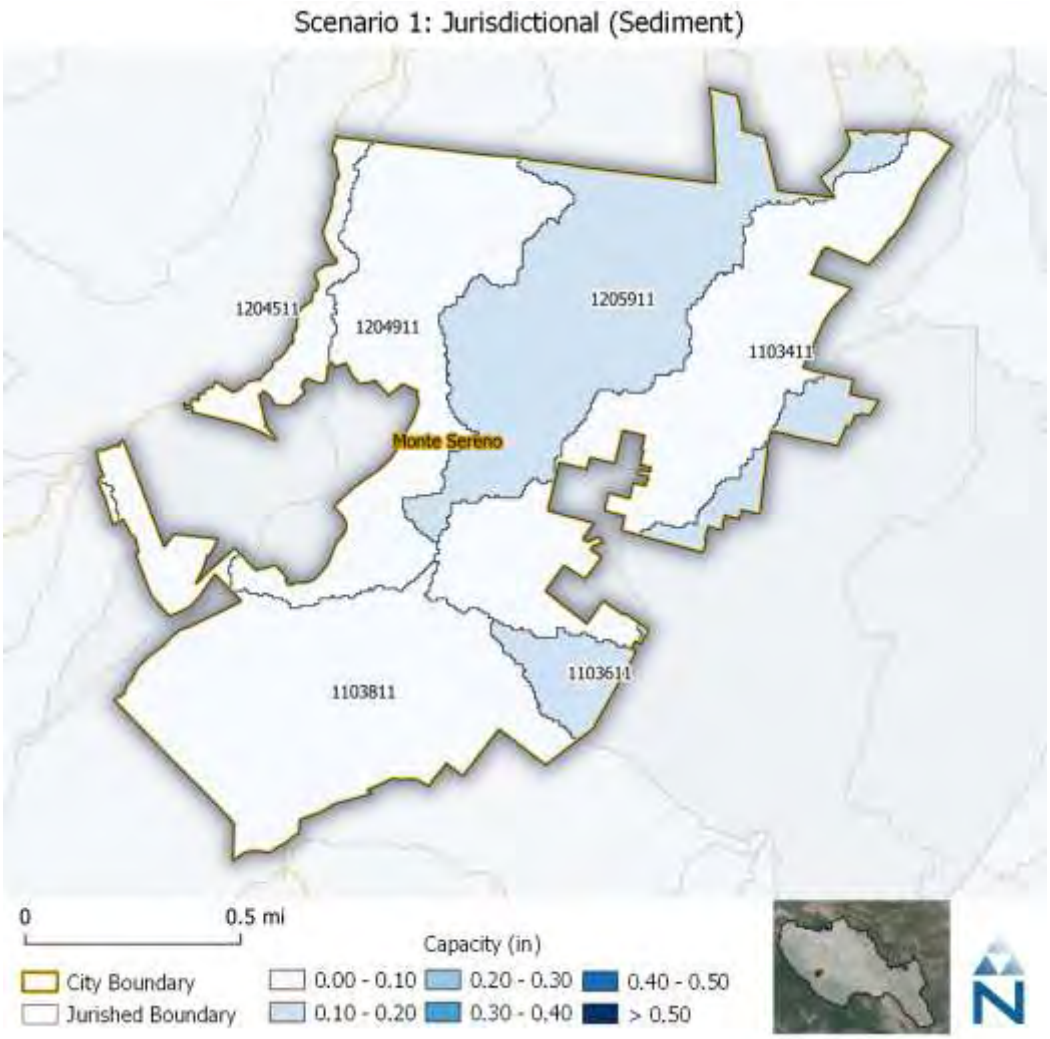

Figure A-20. Map of GSI capacities by subwatershed in Monte Sereno - Scenario 1.

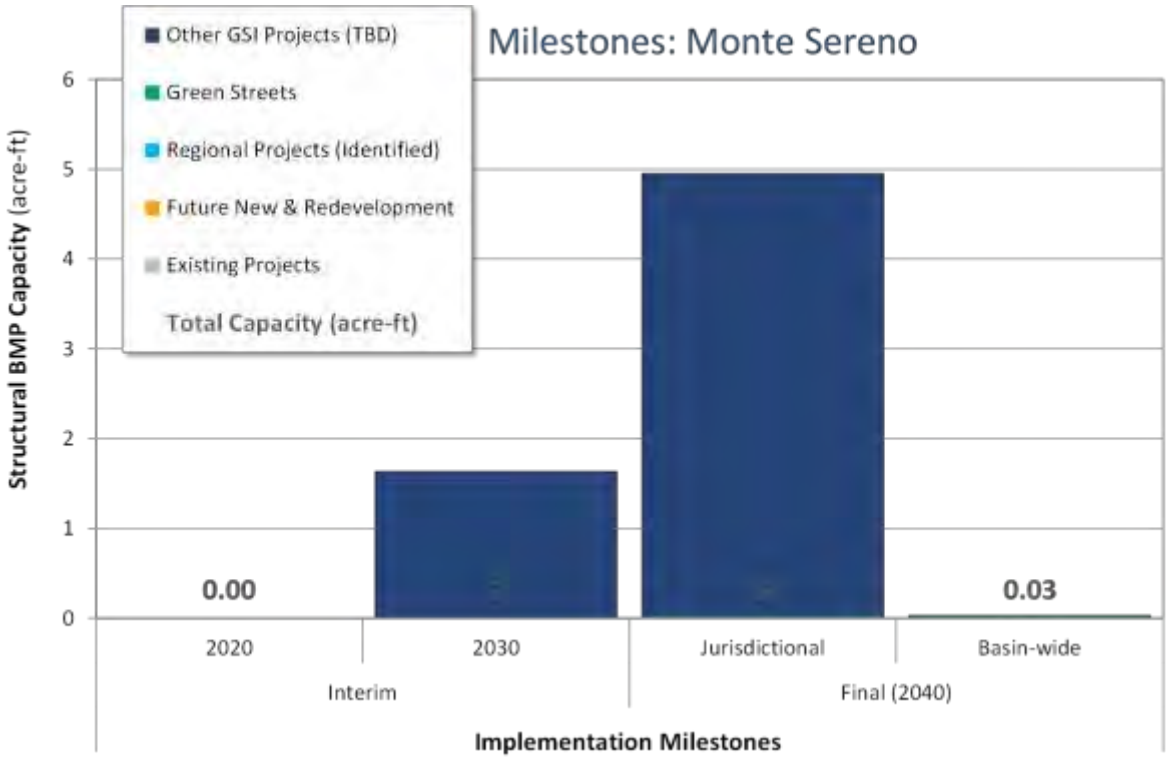

Figure A-21. Implementation Milestones: Monte Sereno.

Mountain View

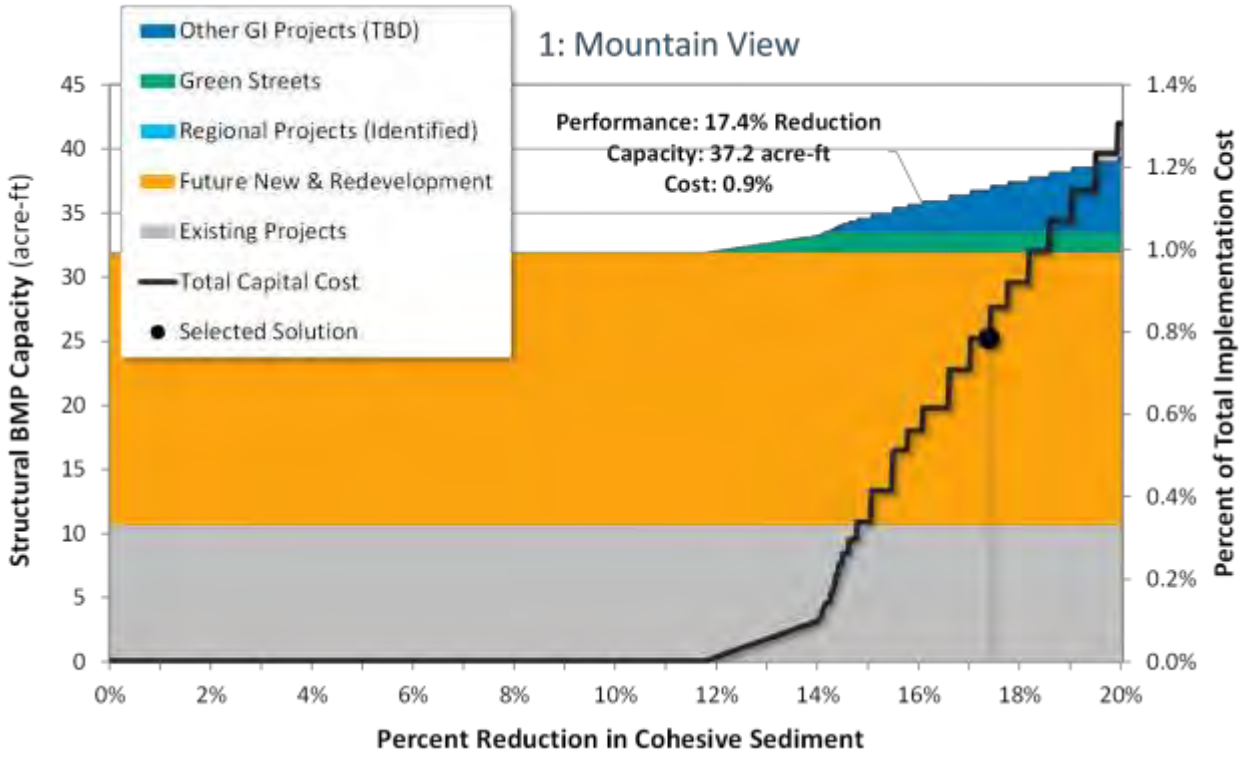

Figure A-22. Optimization summary for Mountain View - Scenario 1.

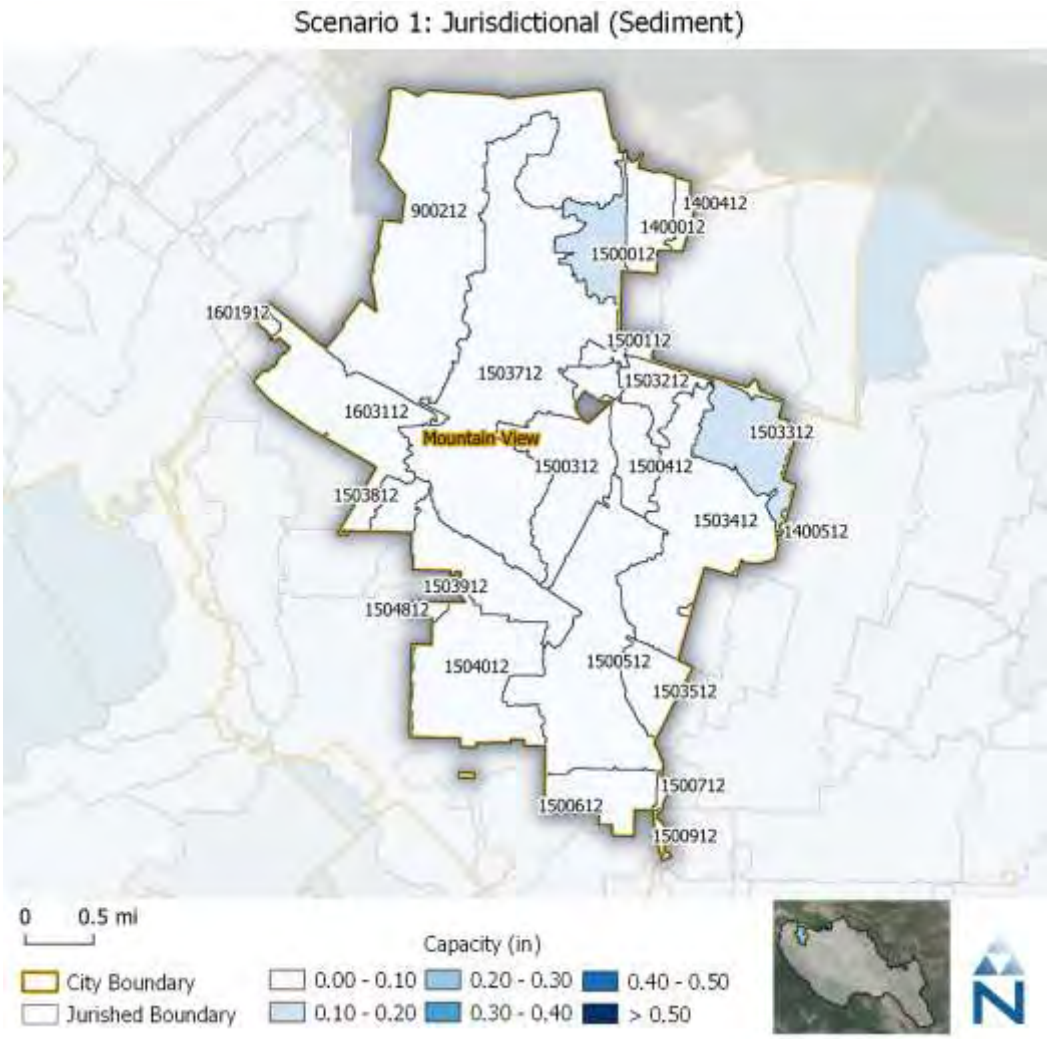

Figure A-23. Map of GSI capacities by subwatershed in Mountain View - Scenario 1.

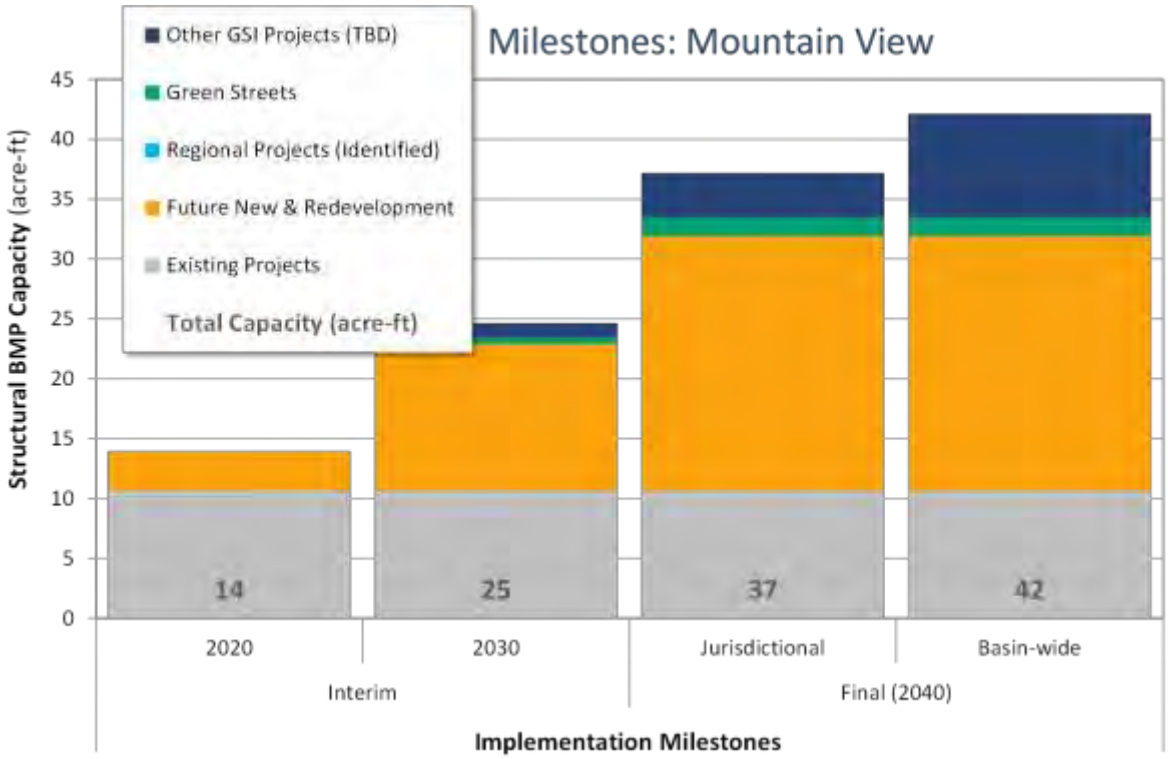

Figure A-24. Implementation Milestones: Mountain View.

Palo Alto

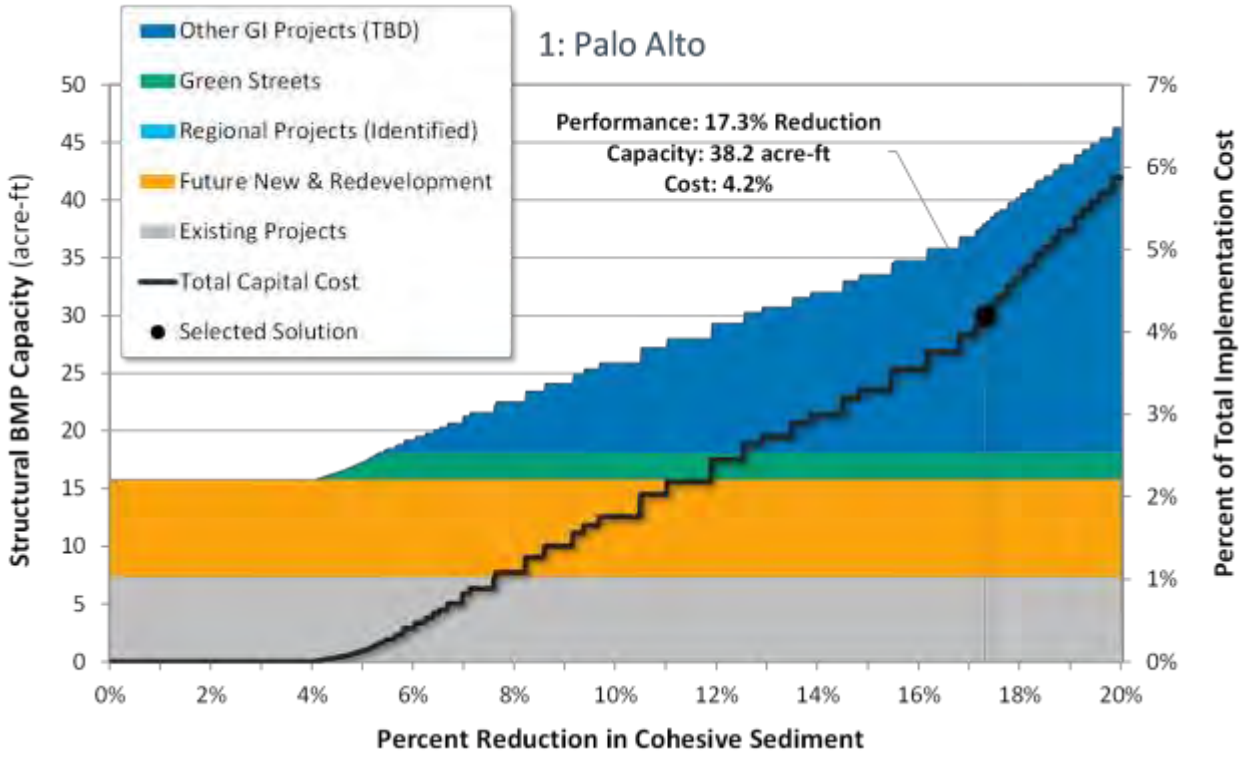

Figure A-25. Optimization summary for Palo Alto - Scenario 1.

Figure A-26. Map of GSI capacities by subwatershed in Palo Alto - Scenario 1.

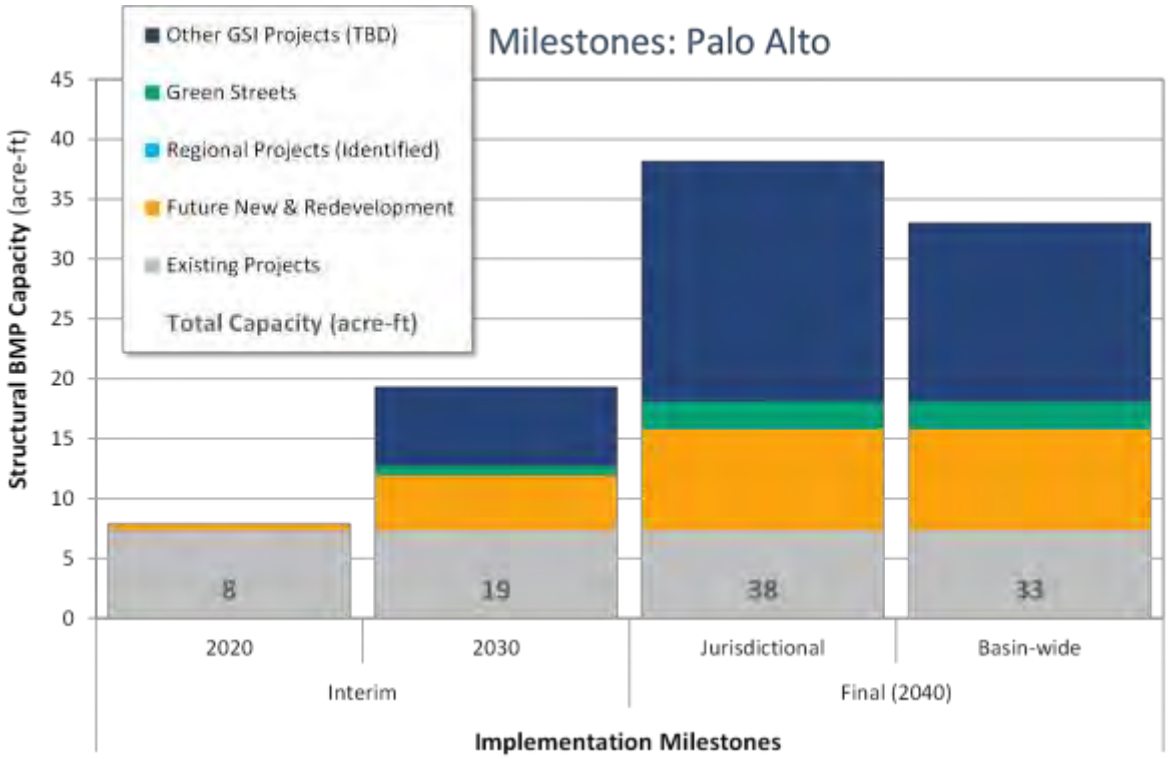

Figure A-27. Implementation Milestones: Palo Alto.

San José

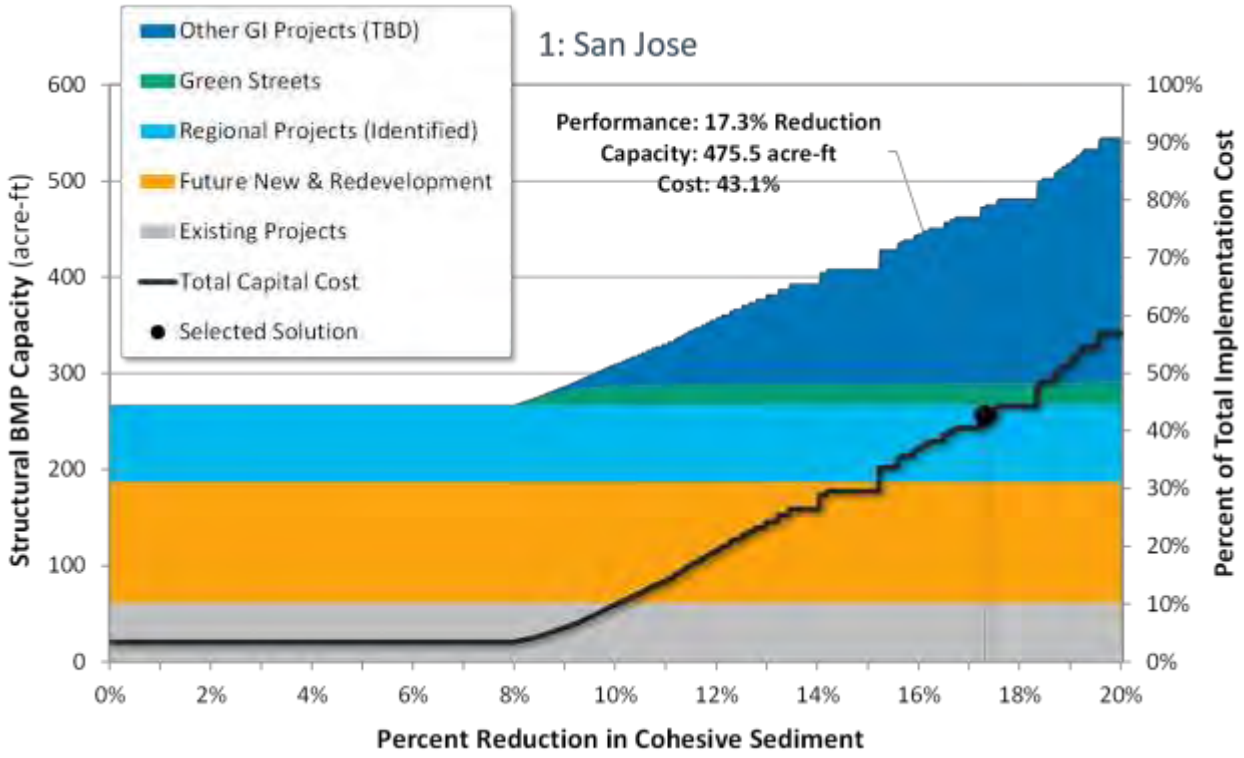

Figure A-28. Optimization summary for San José - Scenario 1.

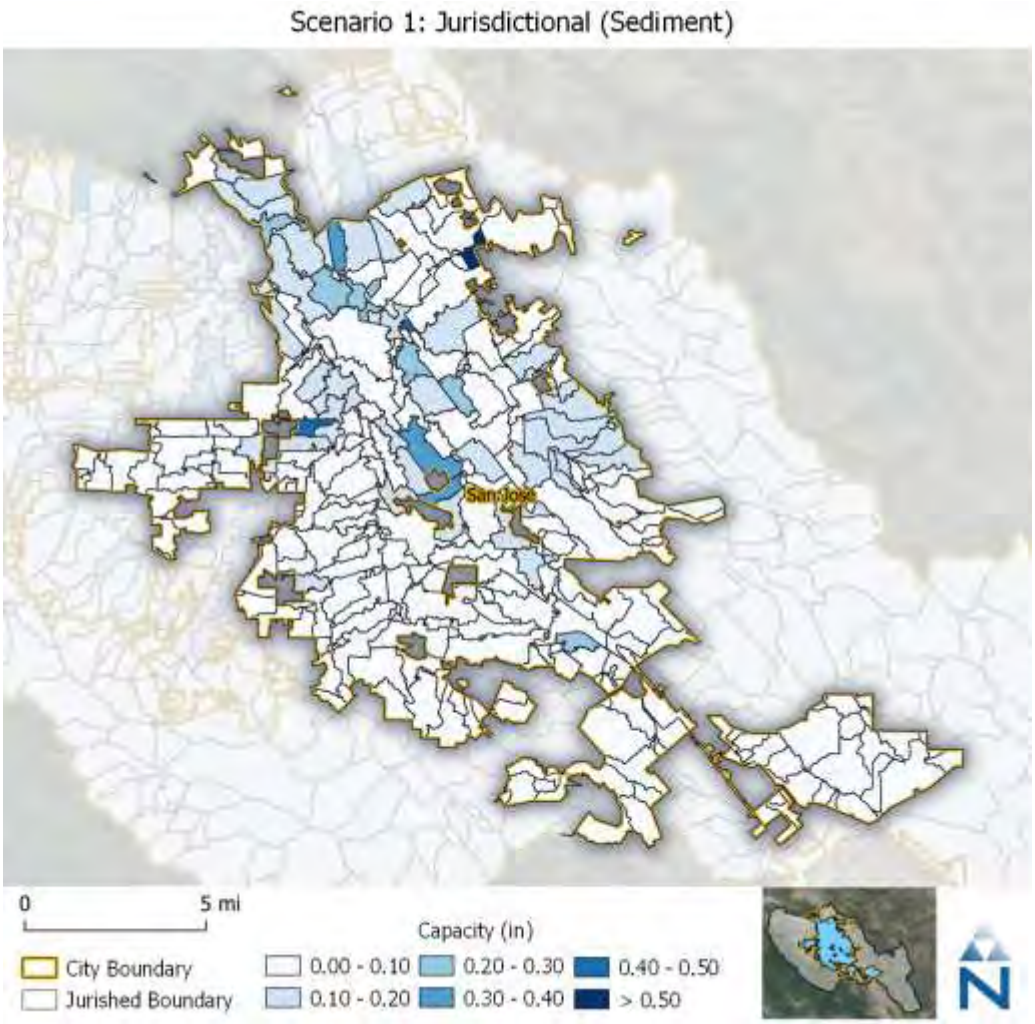

Figure A-29. Map of GSI capacities by subwatershed in San José - Scenario 1.

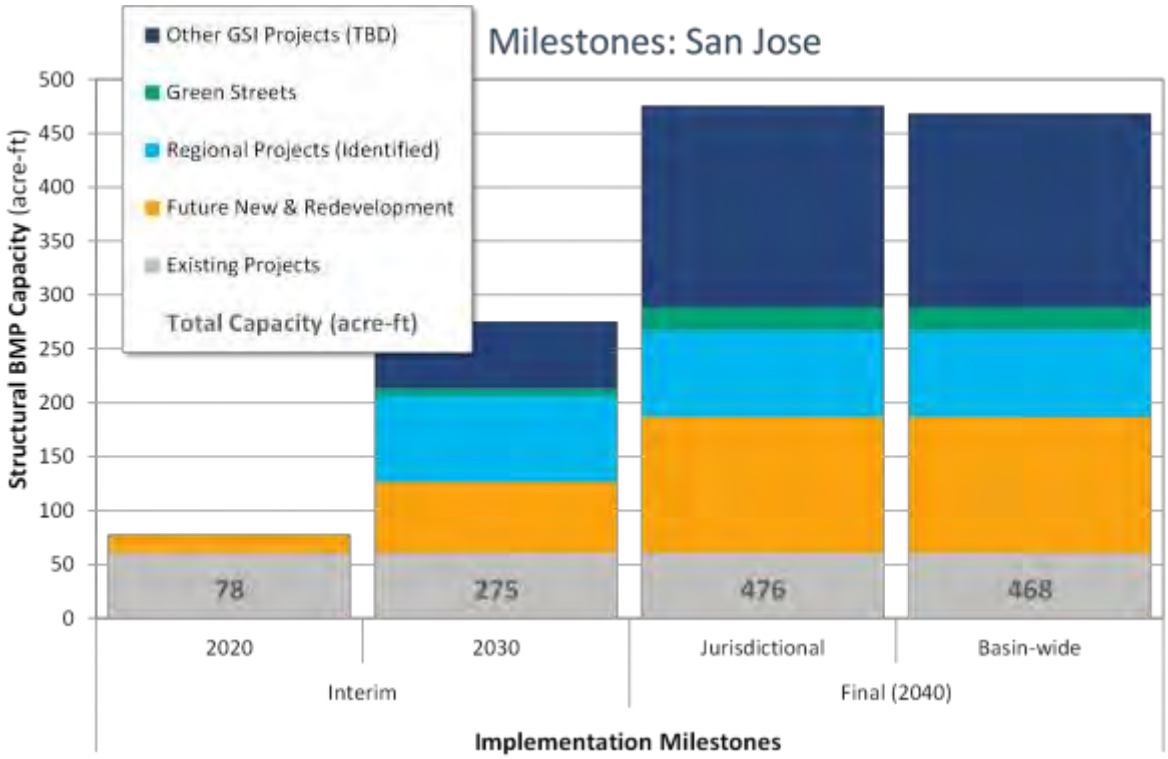

Figure A-30. Implementation Milestones: San José.

Santa Clara

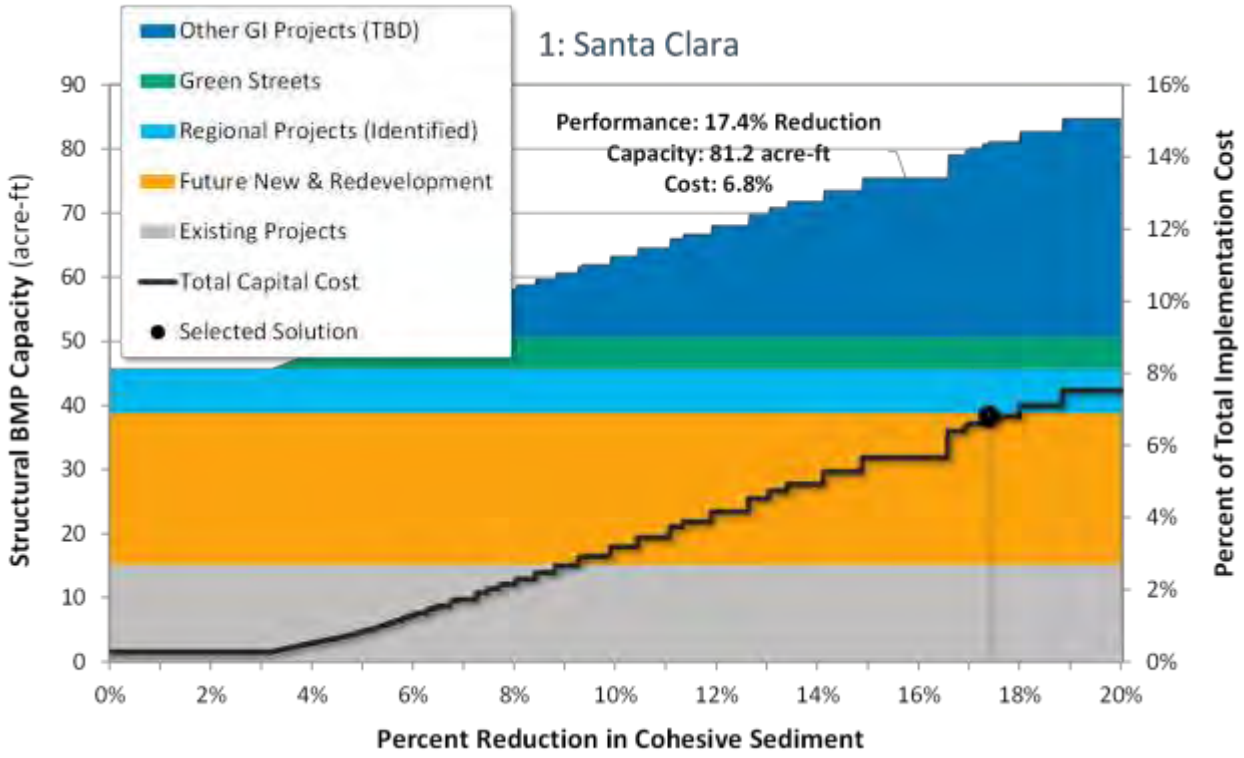

Figure A-31. Optimization summary for Santa Clara - Scenario 1.

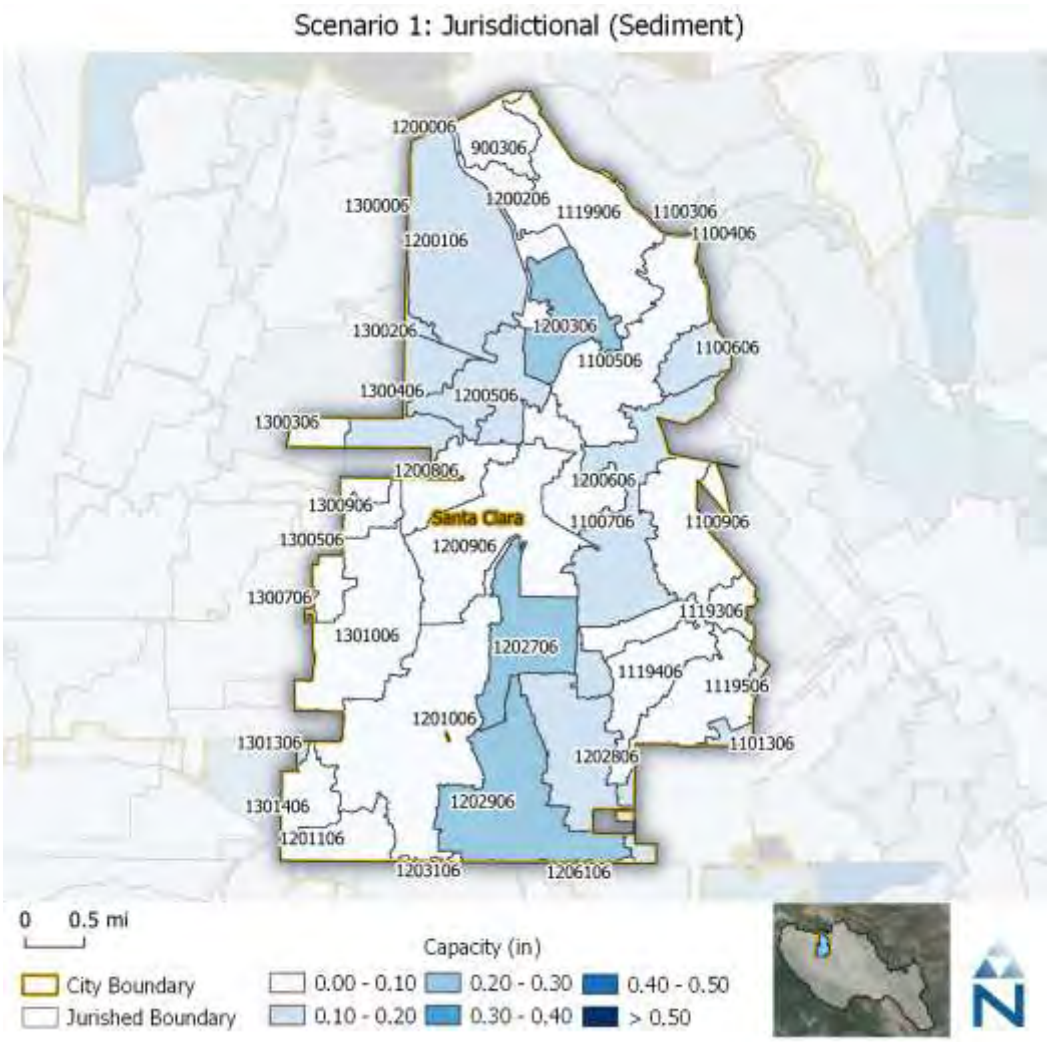

Figure A-32. Map of GSI capacities by subwatershed in Santa Clara - Scenario 1.

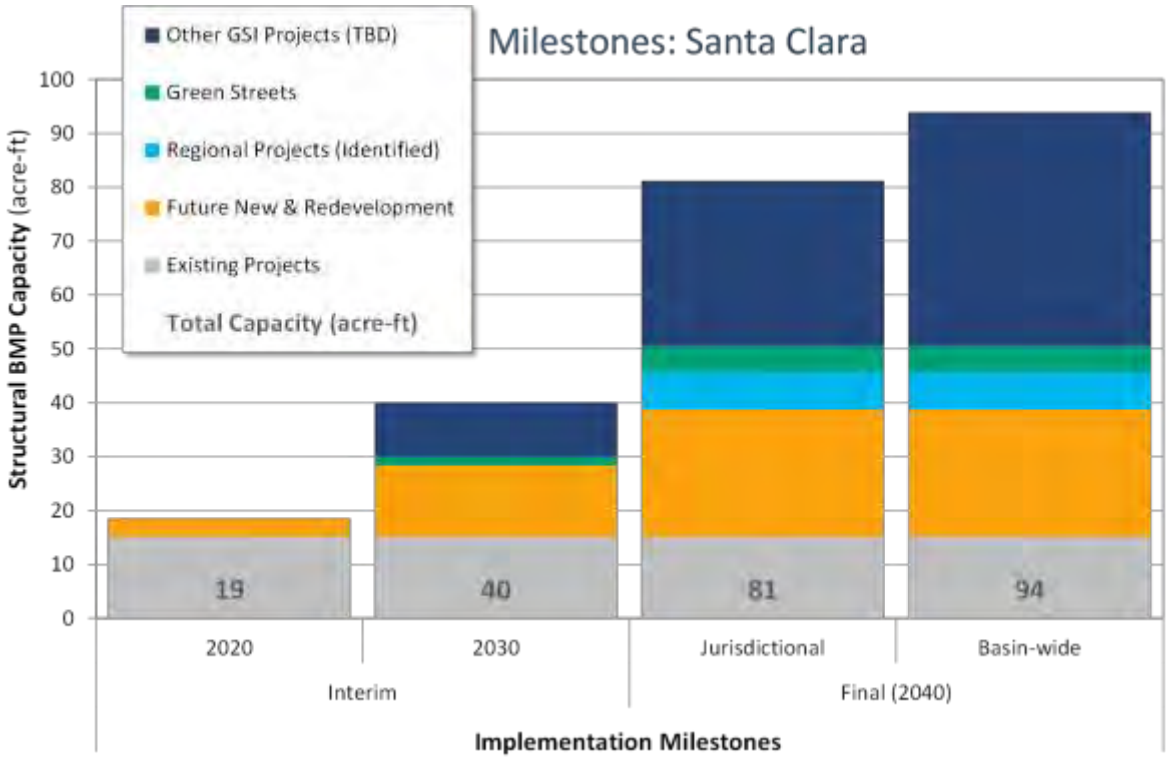

Figure A-33. Implementation Milestones: Santa Clara.

Saratoga

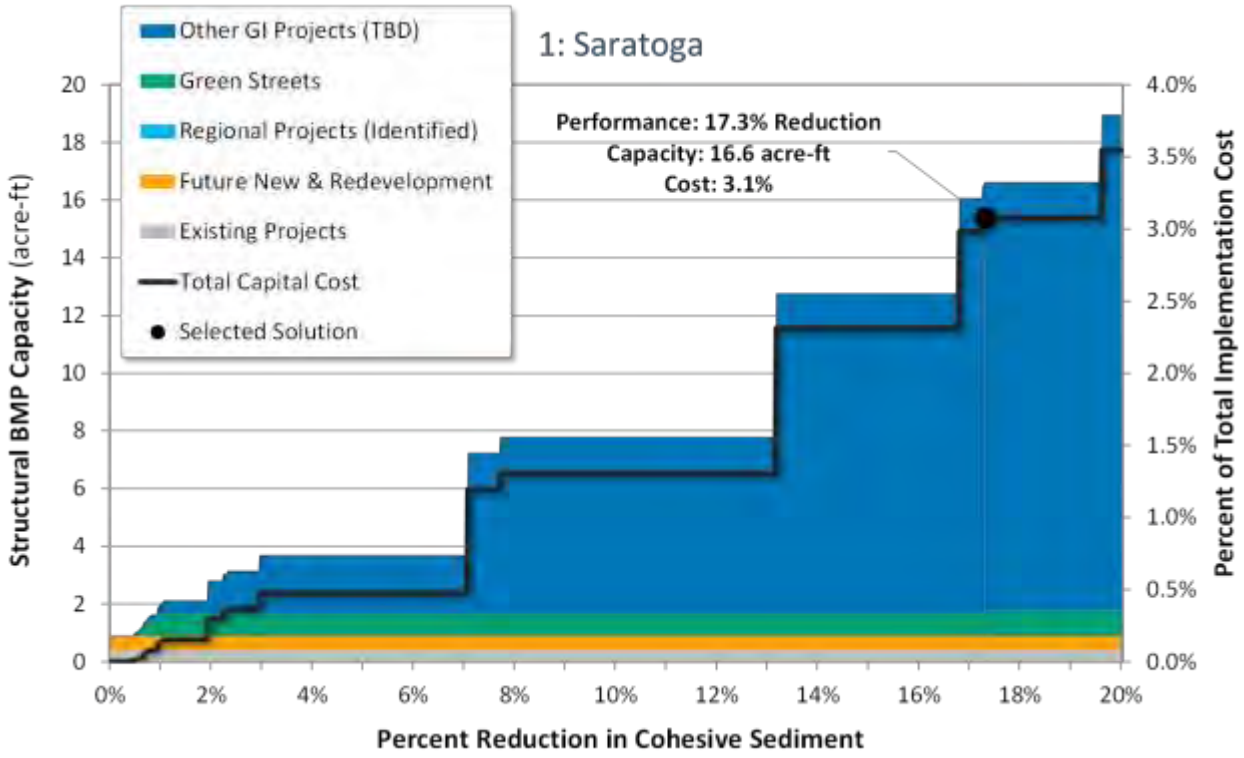

Figure A-34. Optimization summary for Saratoga - Scenario 1.

Figure A-35. Map of GSI capacities by subwatershed in Saratoga - Scenario 1.

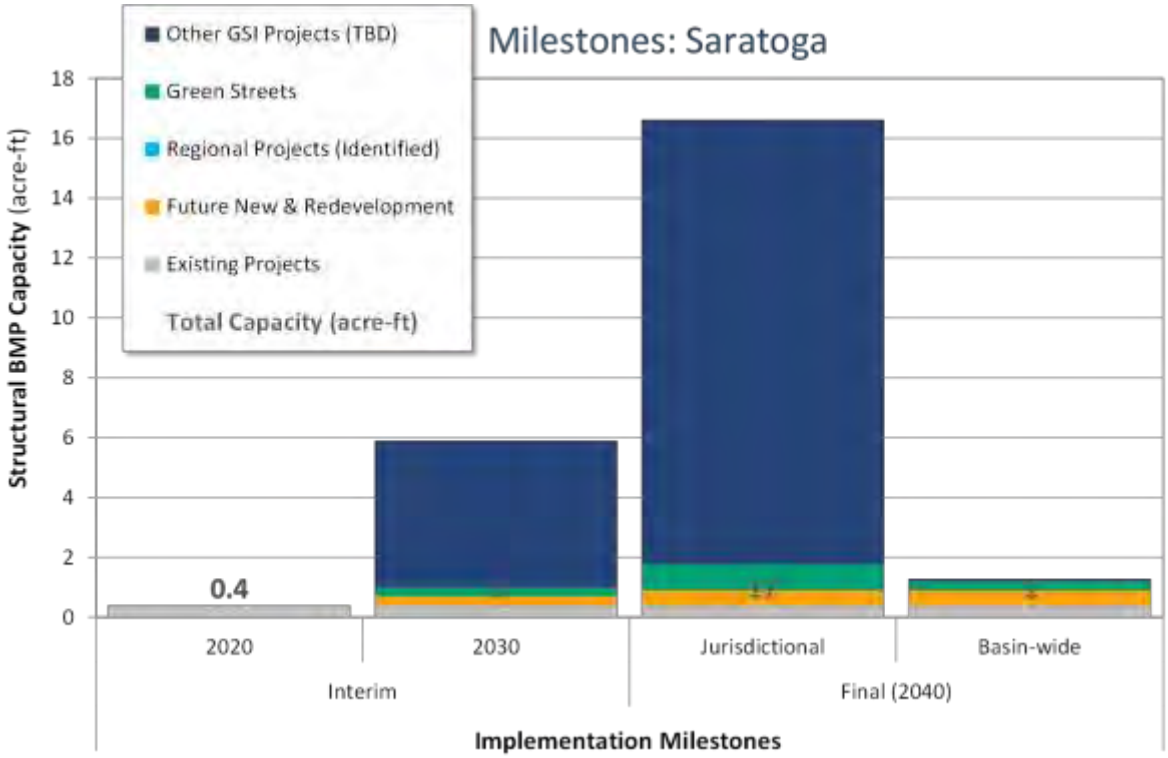

Figure A-36. Implementation Milestones: Saratoga.

Sunnyvale

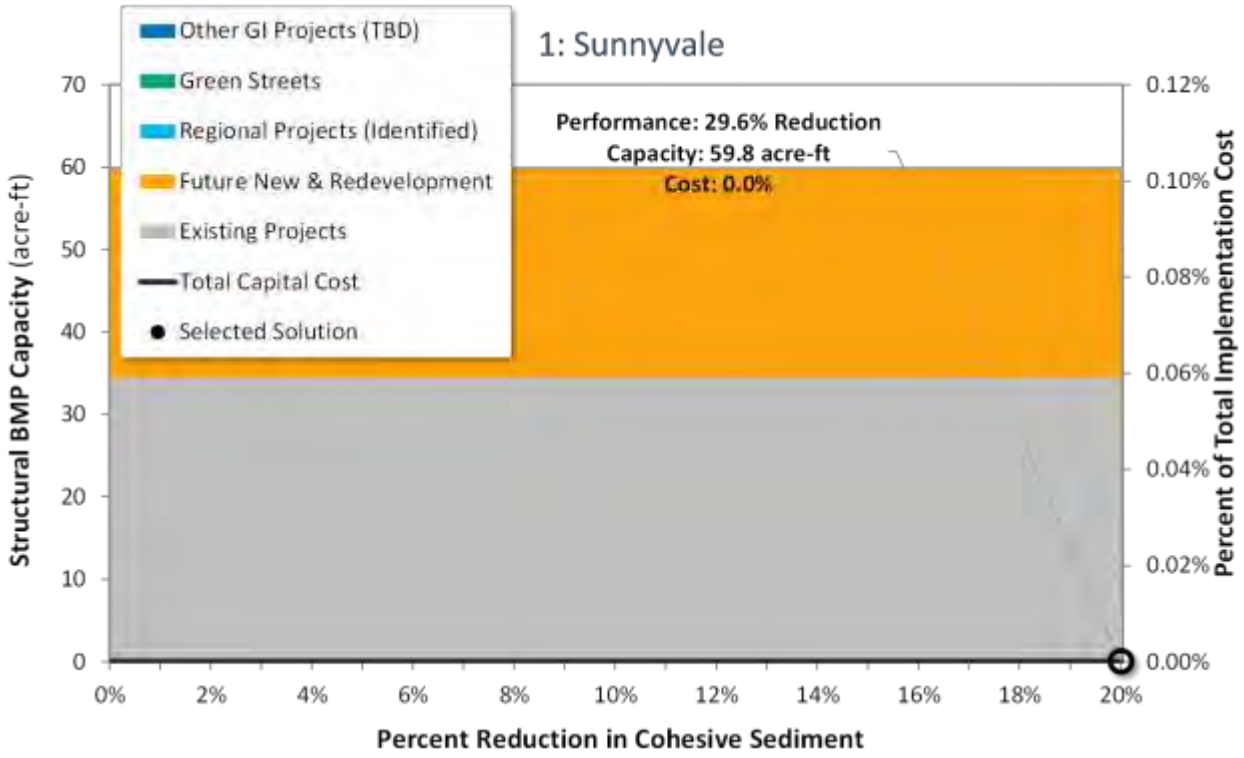

Figure A-37. Optimization summary for Sunnyvale - Scenario 1.

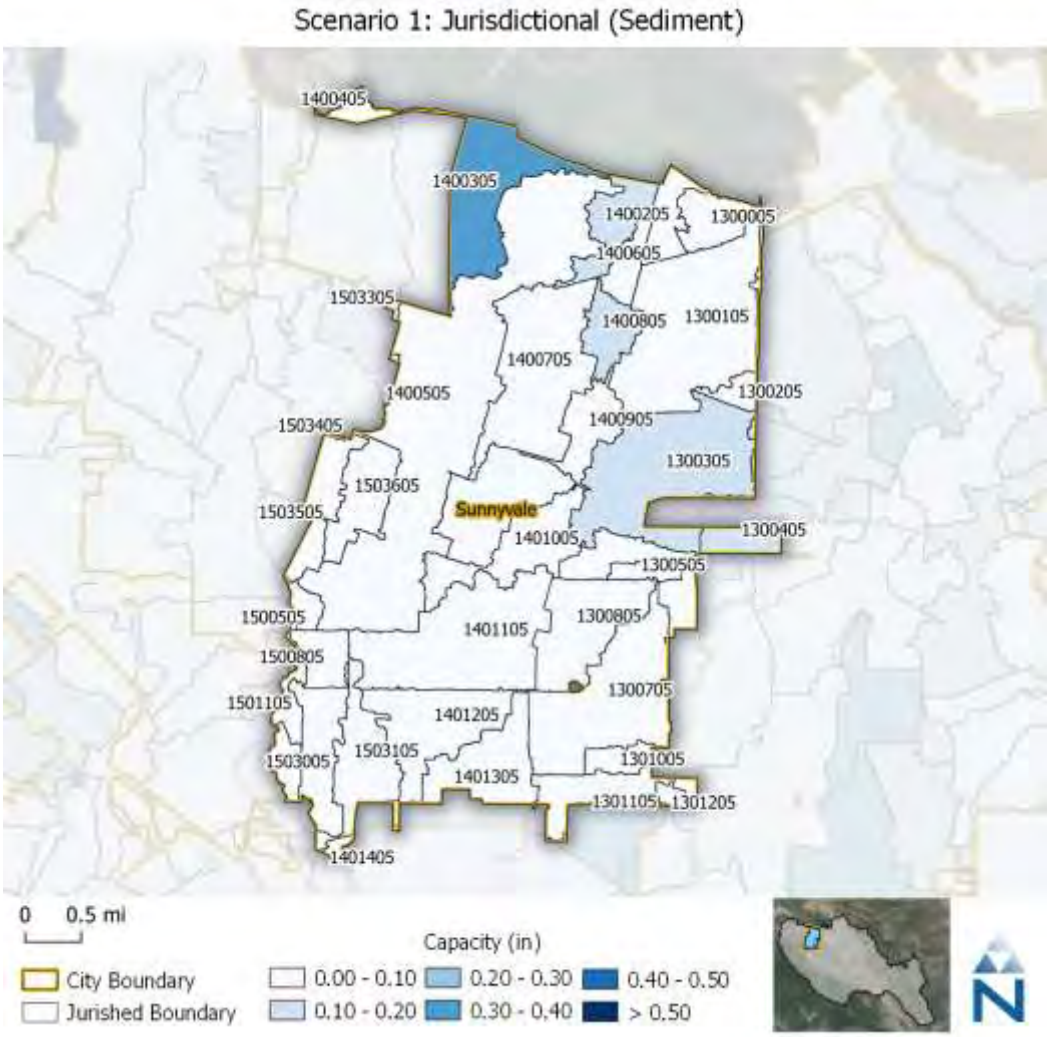

Figure A-38. Map of GSI capacities by subwatershed in Sunnyvale - Scenario 1.

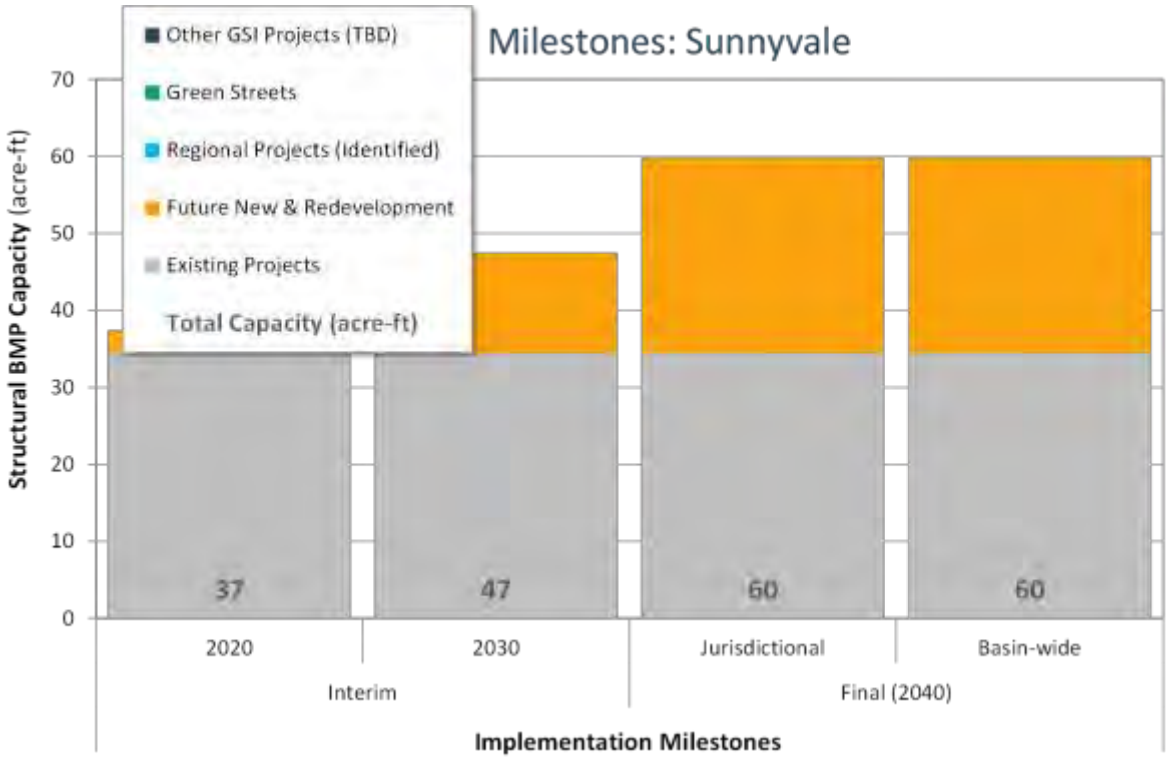

Figure A-39. Implementation Milestones: Sunnyvale.

Unincorporated County

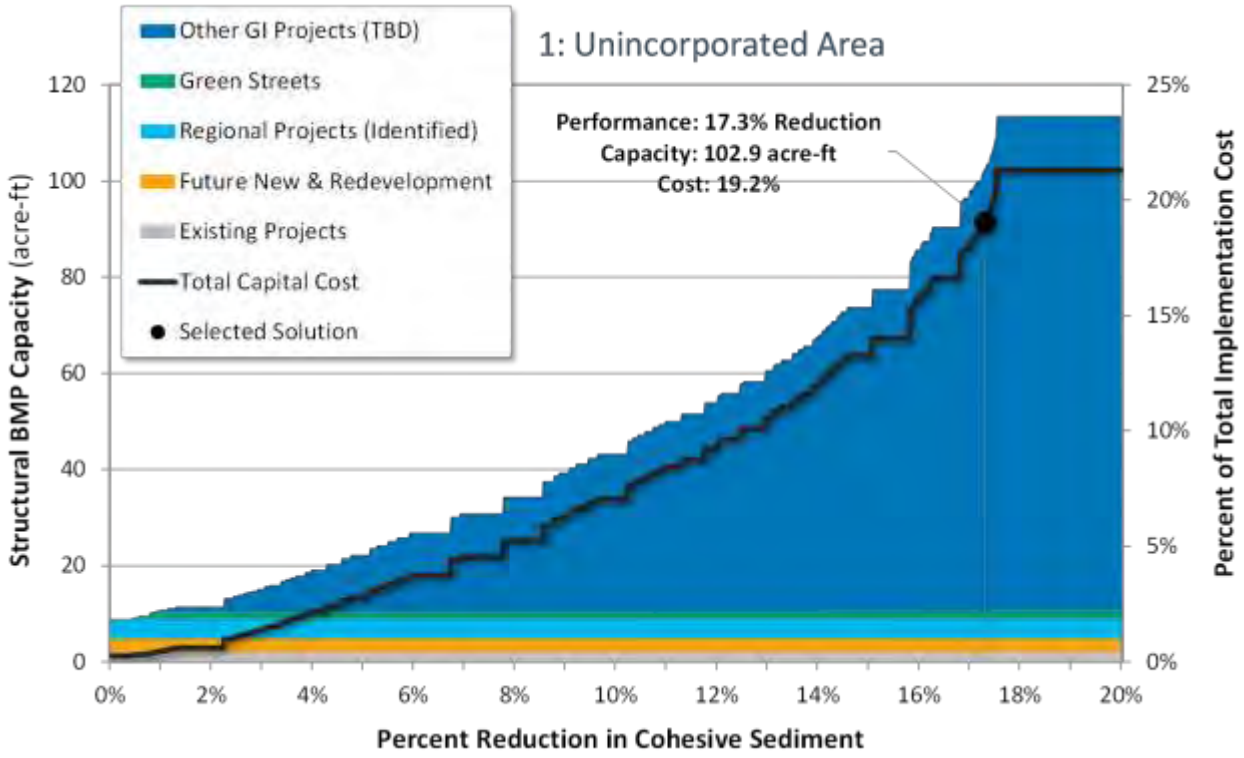

Figure A-40. Optimization summary for Unincorporated County - Scenario 1.

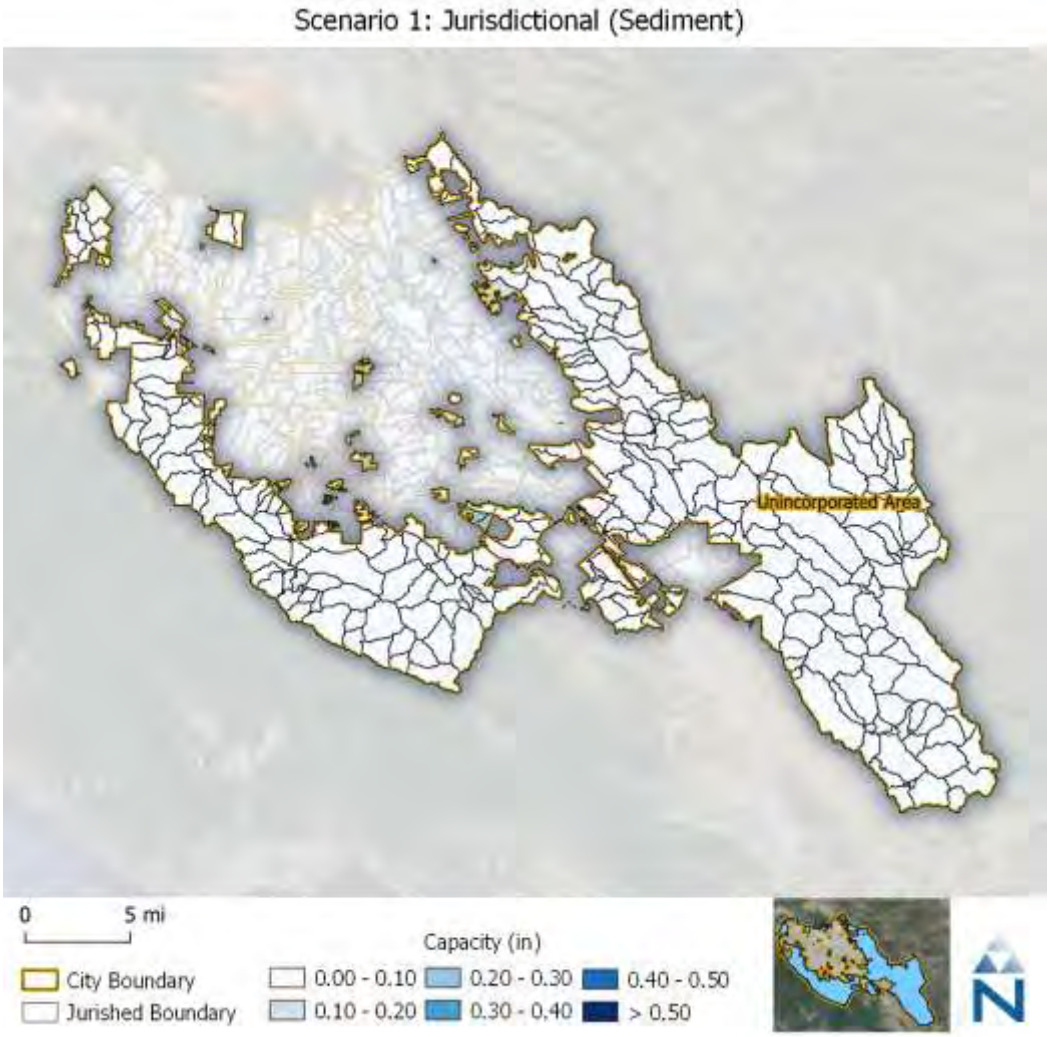

Figure A-41. Map of GSI capacities by subwatershed in Unincorporated County - Scenario 1.

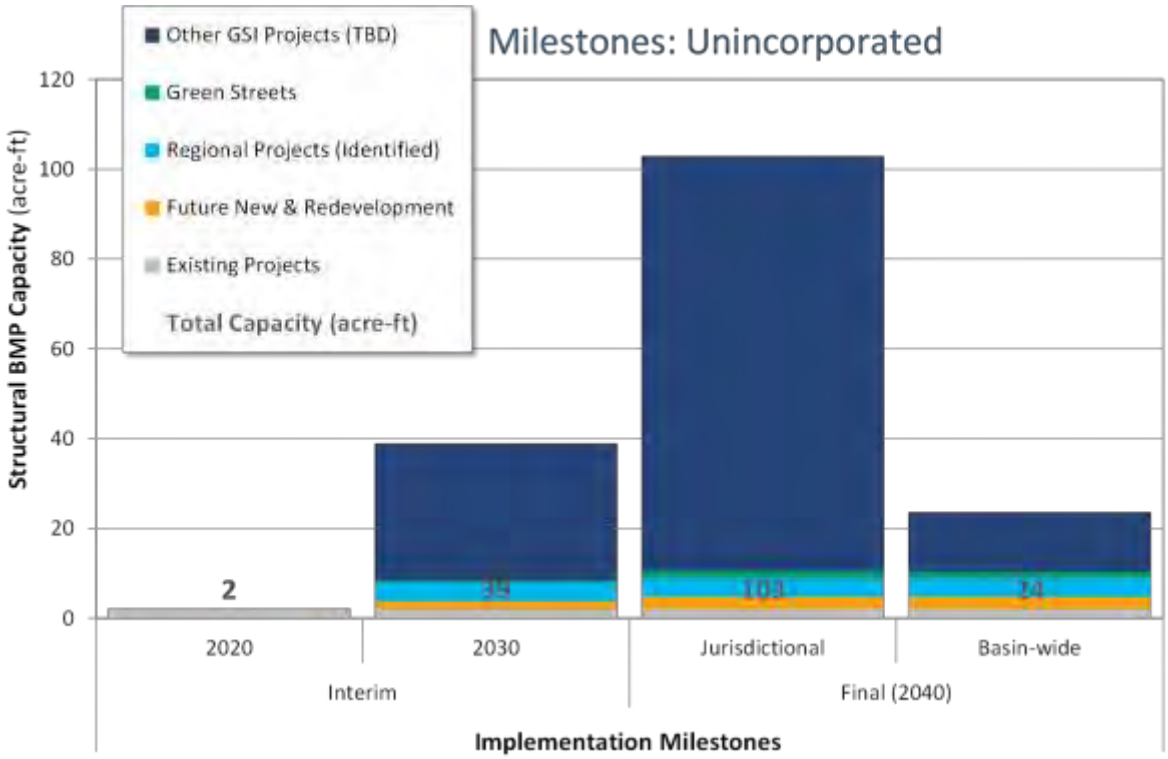

Figure A-42. Implementation Milestones: Unincorporated Santa Clara County.

APPENDIX B: RAA PHASE II PEER REVIEW COMMENTS AND RESPONSES

Table B-1. RAA Phase II Peer Review Comments/Response – Reviewer #1

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
2A	Load Reduction Goal from Green (Stormwater) Infrastructure (GI) Calculation Procedures and Assumptions	Section 3.5 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section 11.		No. Where do the values in the "Percent of Permittee Reduction" column come from? From the text, it appears that there was an arbitrary baseline reduction for each contaminant specified in the permit/regulation, which could be refined based on empirical modeling. The modeling for this anlaysis provided that basis, but how exactly were the 20.8% and 16.1% values developed? Perhaps this is provided in the RAA text but it was not identifiable In general, it would be helpful to reduce the confusion between the baseline and revised % reductions goals- e.g 17.6% and 15.9% for PCB- through clearer presentation of the modeling methods.	Yes	See cell F3. There are multiple assumptions within underlying analyses and models that contribute to this understanding. It was not apparent what the empirical justification was for evaluating the adjusted % of permittee reduction. Doing so would address provide much greater clarity in the draft RAA. Also, in the footnote of pg. 23 of the Phase II report it notes that for PCB load modeling, "assumptions for sources of PCBs were not determined sufficient for detailed planning of site-scale GI projects that potentially treat runoff from these source areas." Please state why?	Limited data exists, so the analysis does as best as possible to evaluate load reductions through green infrastructure implementation	Column F Response: As stated in the text preceding Table 11-4 (location of the referenced "Percent of Permittee Load Reduction"), "Table 11-4 provides a summary of the MRP required PCB and mercury load reductions and the interpretation of percent of permittee load reductions reported by the Bay Area RAA Guidance." The 20.8% and 16.1% values were reported in the RAA Guidance Document, and not developed by the RAA. Footnotes were added to Table 11-4 to clearly indicate that the Percent of Permittee Load Reduction is based on the Bay Area RAA Guidance. (Note that following peer review this section was moved to the Phase II GSI Modeling Report and now refers to Table 1-3 of that report). With the above clarification, the remaining presentation of the 15.9% PCB load reduction reported in Table 11-5 should be more clear. (Note that the 17.6% referenced in the comment is associated with the San Mateo Countywide RAA, not the Santa Clara Basin RAA; also note that following the peer review process, this calculation was revised and the PCB load reduction goal for GSI is now 17.3%). Column H response: See response to Column F response regarding the calculation of Percent of Permittee Reduction. Regarding the footnote on page 23 of the Phase II Report, Section 7.2 of the Phase II report provides more discussion on this topic, stating that "the PCB source categories were determined to be too uncertain for estimating GSI performance in reducing PCB loads and optimizing the selection of GSI projects for cost-effective implementation (e.g., relying on GSI projects in areas with higher PCB loading, although these PCB source areas have not been verified). More study is recommended to further understand the locations of PCB source areas and their associated concentrations of PCBs transported via stormwater."

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
2B	Overall methodology to account for load reductions from GI, including representation of GI facility type, depth, inlet/outlet considerations, drawdown/ filtration rate, underlying infiltration, pollutant reduciton mechanism, and input data.	Section 3.6.1.2 and 4.3 and Tables 4-3 and 4-4 of the RAA Guidance Document. Should be reflective of permittee input on planned projects and consistent with volumetric sizing requirements per the MRP (e.g., provision C.3.d for C.3.b Regulated projects).	Phase II Green Stormwater Infrastructure Modeling Report, Sections 1 through 4.		Yes	Yes	Is bioretention the only form of LID simulated? The text of the Phase II report appears to indicate this is the case. If so, why? Is it due to limitations within the modeling via HSPF/LSPC, or due to other technical/regulatory reasons?	Yes	Column H Response: Because of the uncertainty in the types of LID devices that will ultimately be implemented on each site, bioretention was selected as the representative LID device in SUSTAIN. Additionally, performance across different LID devices should not vary significantly if sized using the same criteria.
2C	Load reduction calculation method	Section 4.3.5 of RAA Guidance Document.	Phase II Green Stormwater Infrastructure Modeling Report, Sections 5 through 8.	Load reductions are reported as percent reductions from the baseline load, which are compared to the 15.9% Load Reduction Goal reported in the Phase I Baseline Modeling Report (Section 11). Additional metrics for Annual Volume Managed and Impervious Area Treated are calculated to support green stormwater infrastructure implementation and tracking. Results are reported for each individual municipal jurisdiction.	The analysis uses a 90% reduction assumption from green infrastructure based on the CA BMP handbook.	Does the RAA guidance specifically note cost-effectiveness as a goal? If not, the scenarios that minimize costs- while useful- may not align with the RAA guidance.	No. What assumptions are inherently included regarding maintenance of installed GI devices? Would they continue to operate at a 90% pollutant reduction rate continuously?	How does this 90% value compare to existing data from the International BMP database or other sources?	Column G Response: Cost-effectiveness is not specifically noted in the RAA Guidance Document. Considerations for cost-effectiveness in the modeling approach is irrelevant in terms of assessing consistency with the RAA Guidance Document. Column H Response: Added text in Section 4.3 indicating that cost functions are for a 20-year life cycle including O&M, which is assumed to maintain GI performance. Column I Response: CA BMP Handbook (CASQA 2003) is the most relevant reference of BMP performance for the region. BASMAA studies cite a 98% reduction in PCBs, but using a 90% sediment-associated reduction provides an even more conservative estimate.

Table B-2. RAA Phase II Peer Review Comments/Response – Reviewer #2

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
2A	Load Reduction Goal from Green (Stormwater) Infrastructure (GI) Calculation Procedures and Assumptions	Section 3.5 of RAA Guidance Document.	Phase I Baseline Modeling Report, Section 11.		Partly; on p 80 (P1 document) the authors state that they calculated WLAs, but didn't specify whether it was based on population or what other variable. Please specify, and include the population of Santa Clara vs Bay-wide. Tables 11-2 and 11-3 could be simplified to one column for Santa Clara Basin.	Yes; the tables and methods they use are consistent with the RAA GD.	Yes; they use the population-based WLAs and the reduction value calculations using the assumptions in the GD.	Yes, as defined by the GD.	The WLA was not calculated for the RAA. It should be noted that the WLA was reported by the TMDL and MRP, which was based on population. It is not the purpose of the RAA to describe how the WLA was calculated by the Water Board. Instead, Section 11 describes how the RAA model was used to calculate the mercury and PCB stormwater improvement goals to meet the portion of the WLA assigned by the Water Board to the Santa Clara Basin. Tables 11-2 and 11-3 were re-organized as suggested by the peer reviewer to better summarize the process used to calculate the stormwater improvement goals for mercury and PCBs (i.e., load reductions to meet TMDL WLAs).

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
2B	Overall methodology to account for load reductions from GI, including representation of GI facility type, depth, inlet/outlet considerations, drawdown/ filtration rate, underlying infiltration, pollutant reduciton mechanism, and input data.	Section 3.6.1.2 and 4.3 and Tables 4-3 and 4-4 of the RAA Guidance Document. Should be reflective of permittee input on planned projects and consistent with volumetric sizing requirements per the MRP (e.g., provision C.3.d for C.3.b Regulated projects).	Phase II Green Stormwater Infrastructure Modeling Report, Sections 1 through 4.		They used EPA's SUSTAIN model to quantify load reductions and cost of GSI. Three types of projects were modelled: parcel-based, green streets, and regional projects (retention basins). The list on p 83 (1-5), which breaks down the three primary categories, is confusing. Why not list the three primary categories as 1, 2, and 3, and the sub-categories as e.g. 1.1, 1.2, 2.1, etc? I can't easily see how they correspond to the 3 main categories. e.g. Green streets appears twice (both in primary and "further grouped"--how is that further grouped or broken down? For existing projects, I see how each of the 3 primary categories could have existing projects--but the list of 1-5 is more confusing than it should be and should be re-written. In P2 p 8, they again list the 3 types of projects, but changed the order (regional, parcel, green streets), then on P2 p12, the order and terminology changed again (LID, green streets, regional); keeping the order and terminology consistent would ease readability.	They appeared to go above-and-beyond the GD in modeling the cost of 3 different GSI types, and finding an optimal/low cost scenario. The input data was from the LSPC and the parameters describing GSI needed for SUSTAIN.	Yes; they clearly state the assumptions about the materials and properties of the three GSI types in Sections 4.2.1-4.2.3. LID (parcel-based) was based on analysis of historical redevelopment rates, which was then used to run a GIS model of likely redevelopment properties. The cost function for each of the 3 types was specified in P2 Table 4-7. They assume that the % PCB removal equals the % sediment removal. They assume 90% removal of sediment (and PCBs) on both green streets and parcel-based LID. Please clarify that the parcel-redevelopment included old-industrial and old comm/trans, which were the largest sources of PCB in the study area (from P1 p 68).	The cost optimization and scenario analysis is great. For others, it would be helpful if the authors describe in 1-2 sentences how the 1000s of scenarios were generated. Did you have a list of all possible projects of each type, then select at random those that totaled the required reduction?	Column F Response: The listed order of projects is revised to be consistent throughout the document (p.8, p.12) Column H Response: Please note that the 90% removal of sediment if only associated with an underdrain, where water is filtered through a soil media. Another dominate process associated with GSI is infiltration to native soils, which will result in a loss of volume and associated pollutant load. This process is also simulated in SUSTAIN. Parcels identified for redevelopment was a result of a separate process discussed in Section 4.2.3, and the presence of old-industrial and old commercial/transportation land uses at these parcels did not drive ther identification for redevelopment. Instead, the process for identifying areas for redevelopment was focused on providing an accurate prediction in terms of what is likely to occur in the future (not neccessarily resulting in redevelopment of areas including priority PCB source areas). Response to Column I: Thank you for the comment. As stated on in Section 5 (p. 18), "The scenarios are based on the available opportunity (e.g., the available footprints for regional projects and length of right-of-way for green streets) and the predicted performance of managing stormwater and reducing pollutant loads. The most cost-effective GSI solutions for each of the subwatersheds provide the basis for cost optimization for each Co-permittee jurisdiction."

ID	Component	RAA Guidance Document References and Considerations for Review	Attached RAA Technical Documentation Reference	Notes for Peer Reviewer	Is the component (see column B) adequately documented?	Is the component consistent with the RAA Guidance Document (see column C for reference)? If not, is the deviation adequately documented and justified?	Are key assumptions or simplifications reasonable and/or adequately justified?	Is the component based on sound scientific knowledge, methods, and practice, given the available information and data?	Response
2C	Load reduction calculation method	Section 4.3.5 of RAA Guidance Document.	Phase II Green Stormwater Infrastructure Modeling Report, Sections 5 through 8.	Load reductions are reported as percent reductions from the baseline load, which are compared to the 15.9% Load Reduction Goal reported in the Phase I Baseline Modeling Report (Section 11). Additional metrics for Annual Volume Managed and Impervious Area Treated are calculated to support green stormwater infrastructure implementation and tracking. Results are reported for each individual municipal jurisdiction.	Mostly--they ran 4 scenarios. First they assumed that 1) jurisdictions each meet the % reduction or 2) basin-wide % reduction is met. For both of these, they then allocated projects based on reduction of sediment, regardless of PCB concentration, and then taking into account PCB concentration on sediment when determining which GSI project mix to use. Targeting high-PCB areas reduced costs up to 93% compared to the jurisdictional, sediment-focused scenario.	yes; they met an exceeded GD suggestions by running multiple scenarios.	Yes; most of the assumptions are in the SUSTAIN model. The simplest assumptions are for parcel-based LID and green streets, which remove 90% of PCBs. More complicated methods were needed for large projects; the details of the removal methods are presumably in the SUSTAIN model. The only GSI category I found confusing was "Future New and Redevelopment". I assume that New develpment would have very low PCB concentrations, so implementing LID on them would not reduce PCB loading from a given parcel, but implementing LID on old-urban or old-industrial would be very effective. Why consider "Future new" development at all?	They outline a process to keep track of GSI implementation, which will be very useful going forward. Overall, the report describes a comprehensive GSI optimization and assessment strategy that appears to have identified cost-effective proposed GSI scenarios that will meet the desired targets.	Response to Column H The process to identify parcels that are predicted to develop or redevelop over the course of the next 10+ years was conducted consistent with Provision C.3.j. of the MRP. The development/redevelopment prediction was based on a model developed by SCVURPPP that used data from the last 10 years to identify and select parcels likely to develop/redevelop and be subject to GSI requirements. The model only foucsed on the urbanized portion of the Santa Clara Basin, and did not include new development areas in rural/undeveloped areas. The model did inlcude "urban infill" parcels in the urban area that could be developed, as well as parcels that are already developed, but may be primed for redevelopment over the next two decades. We will update the report to make this clearer and less confusing.

Appendix C

Phase III RAA – Source Control Load Reduction Accounting for RAA Report

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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August 31, 2020

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

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[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.

[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

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$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

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10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

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Wu, J., Gilbreath, A.N., McKee, L.J., 2016. Regional Watershed Spreadsheet Model (RWSM): Year 5 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 788. San Francisco Estuary Institute, Richmond, California.

APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

A.5 REFERENCES

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APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

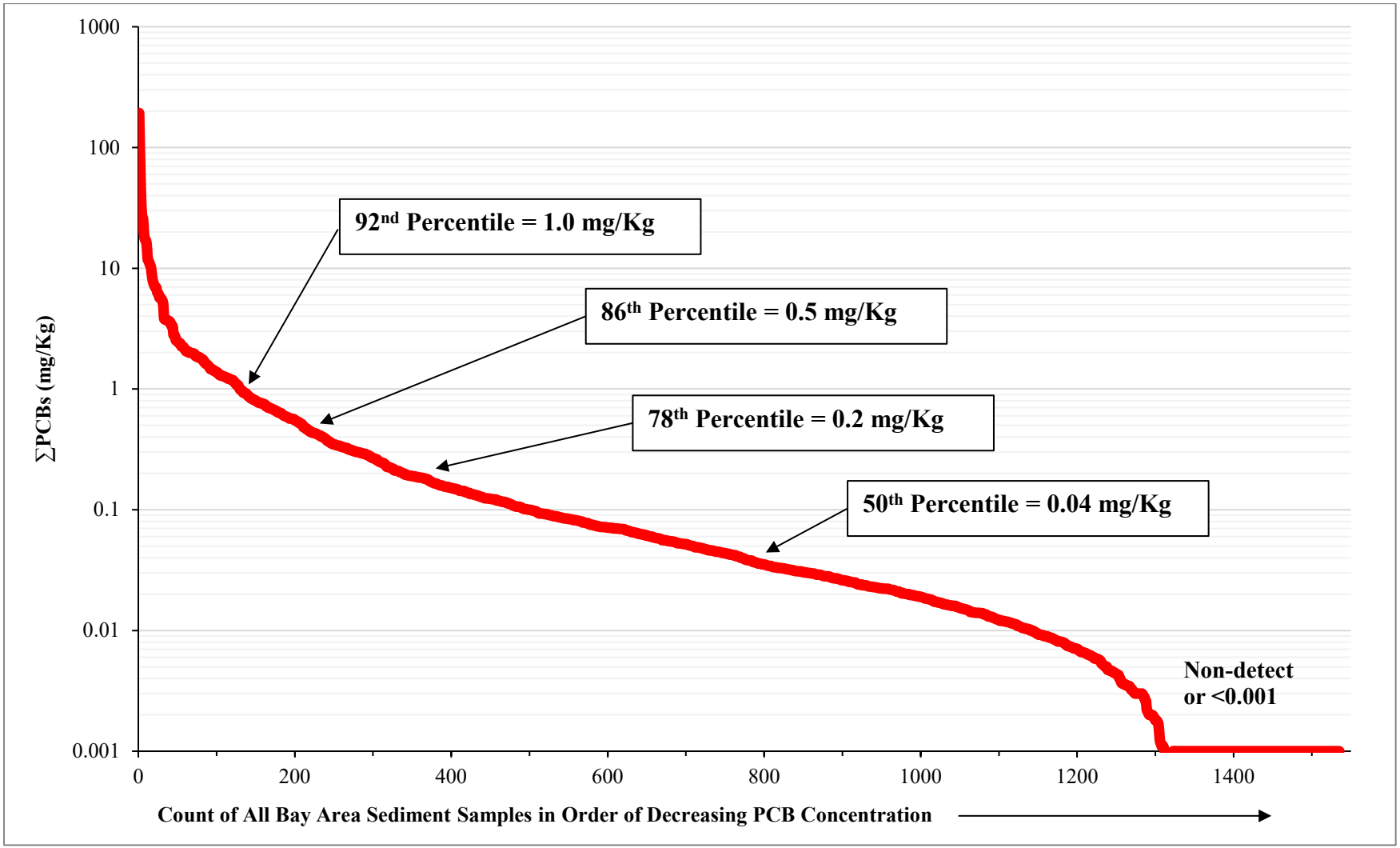

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

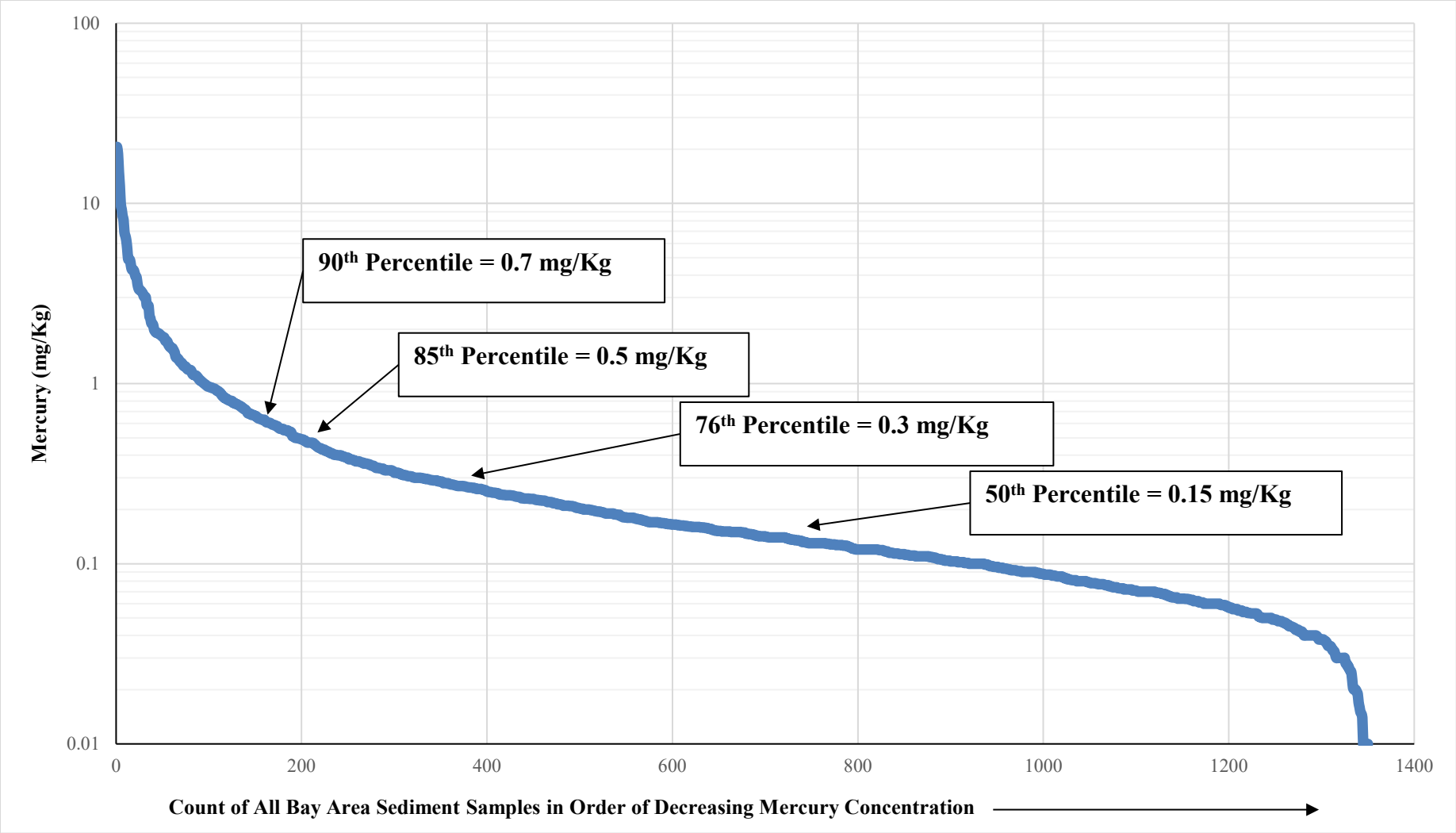

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C
Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

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APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

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6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

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11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

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SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

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6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

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APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

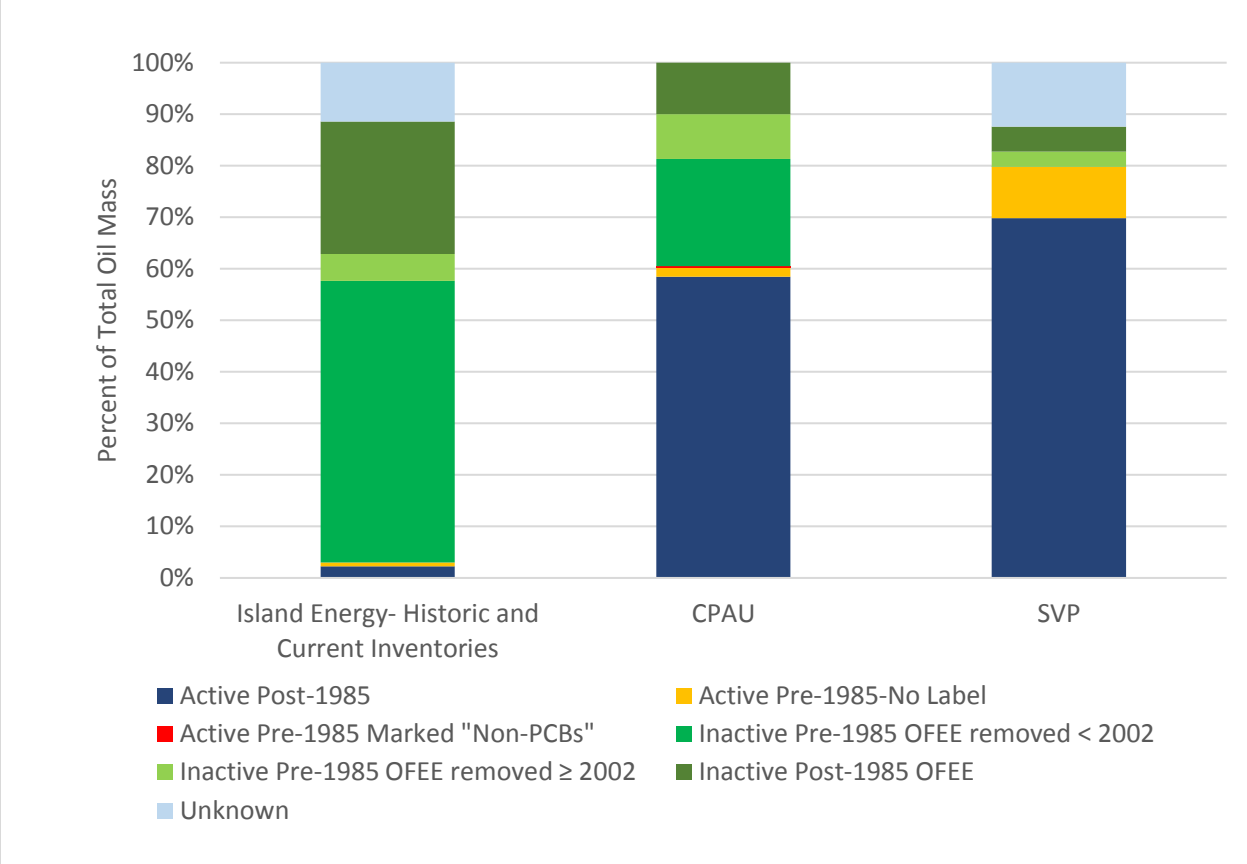

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

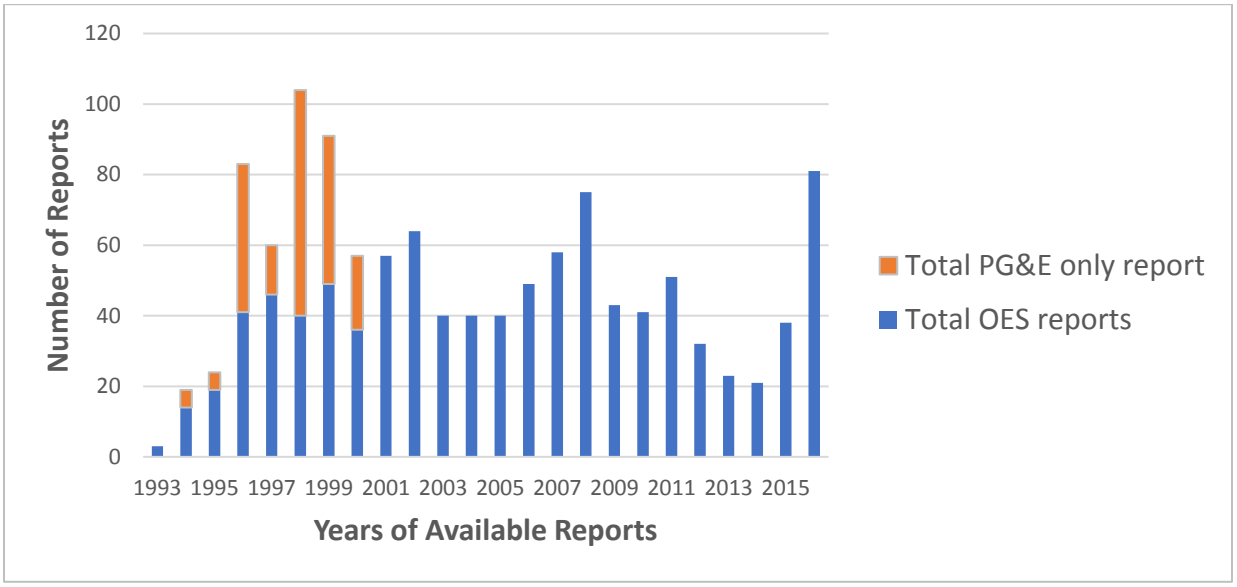

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

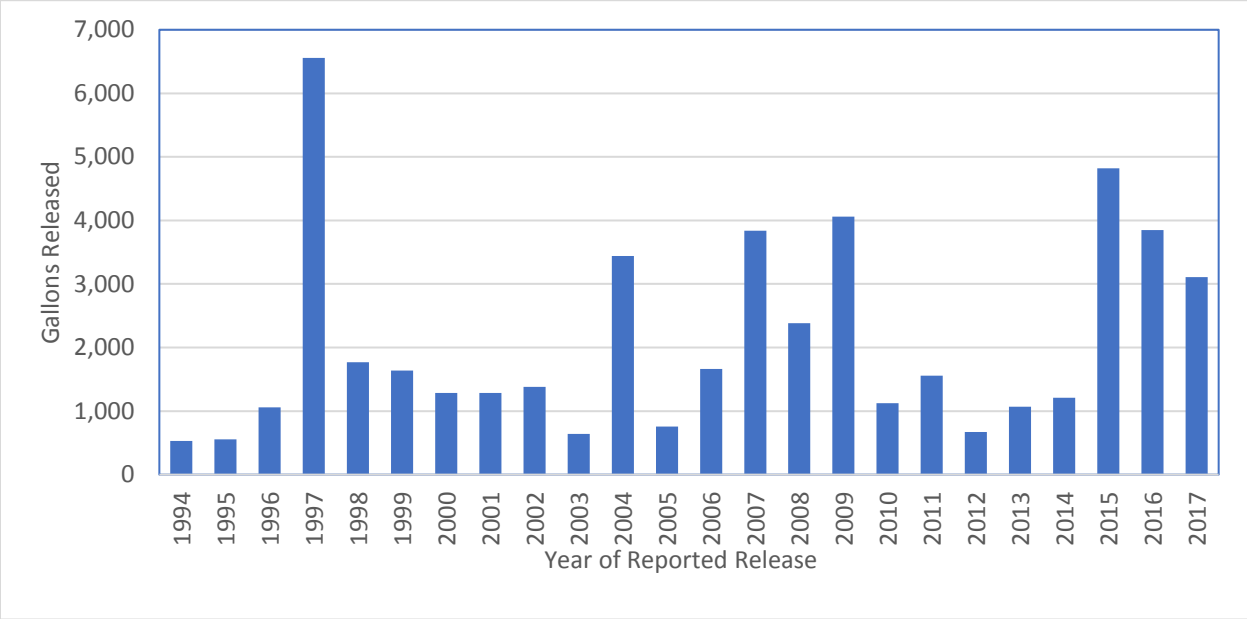

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

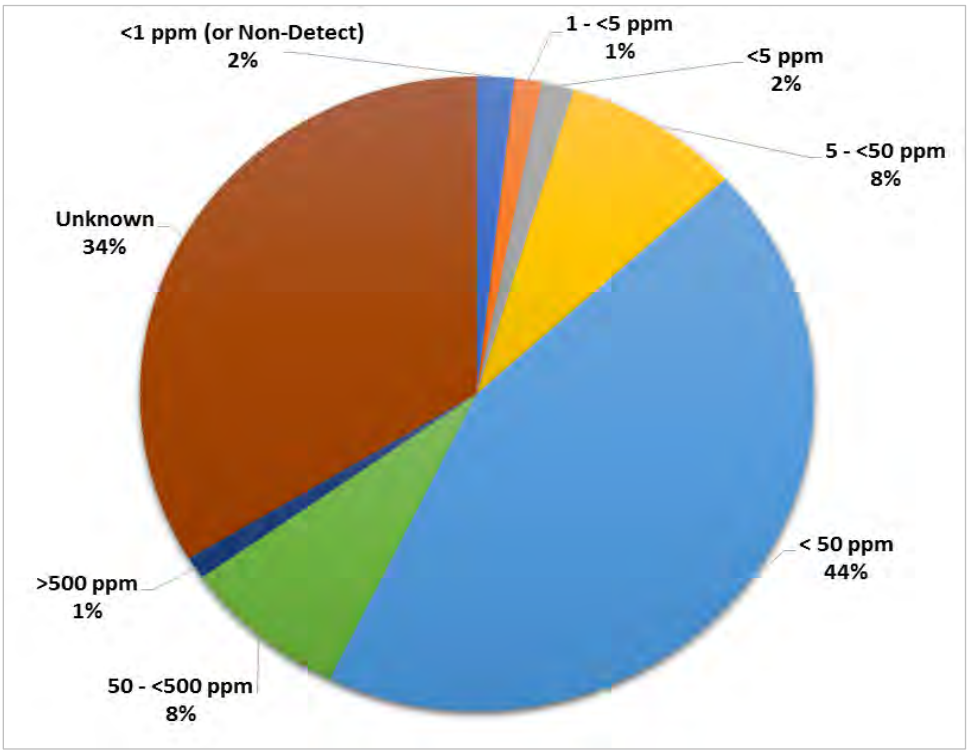

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

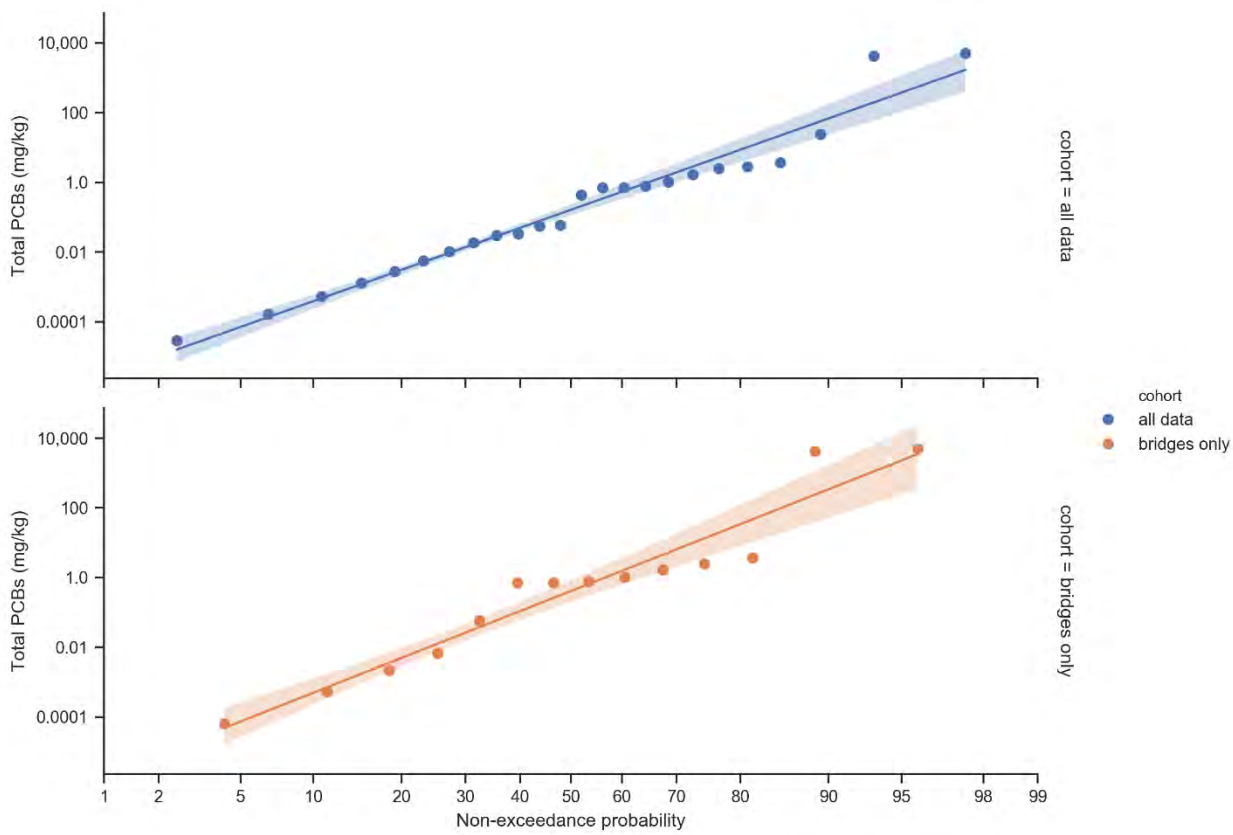

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

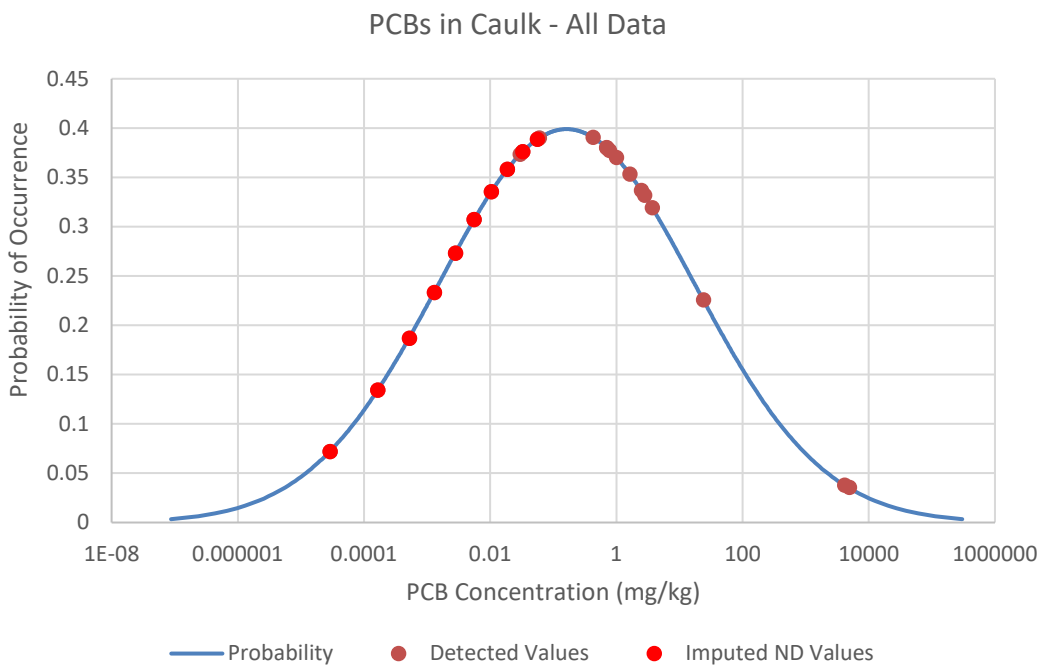

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

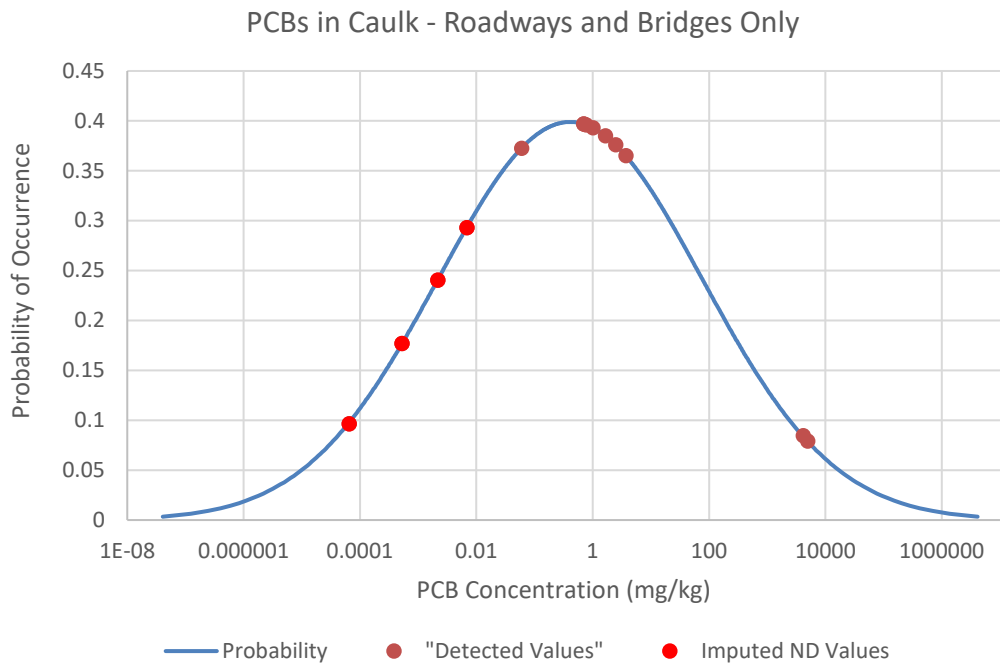

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

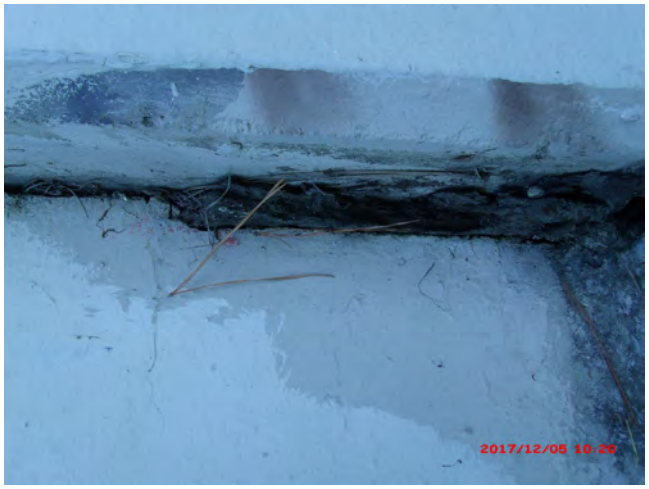

Composite D

Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

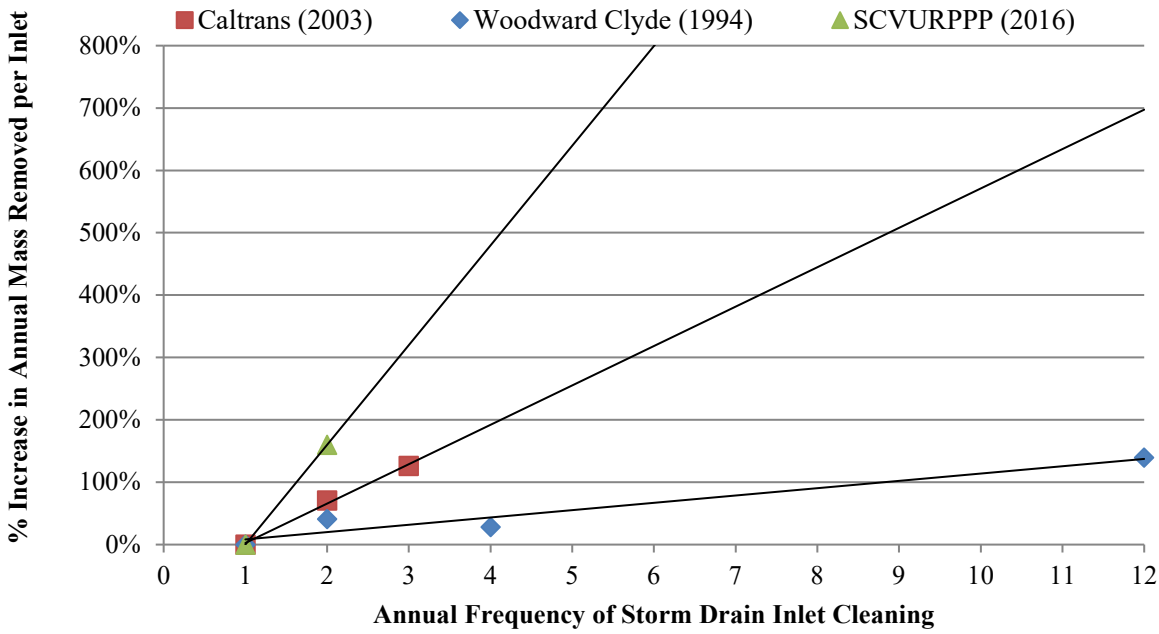

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

BASMAA (2014). San Francisco Bay Area Stormwater Trash Generation Rates - Final Technical Report. Bay Area Stormwater Management Agencies Association. Prepared by EOA, Inc. Oakland. June.

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:
1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:
Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

I.5 References

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Appendix D

SCVURPPP Co-permittee Green Stormwater Infrastructure (GSI) Implementation Maps

City of San Jose

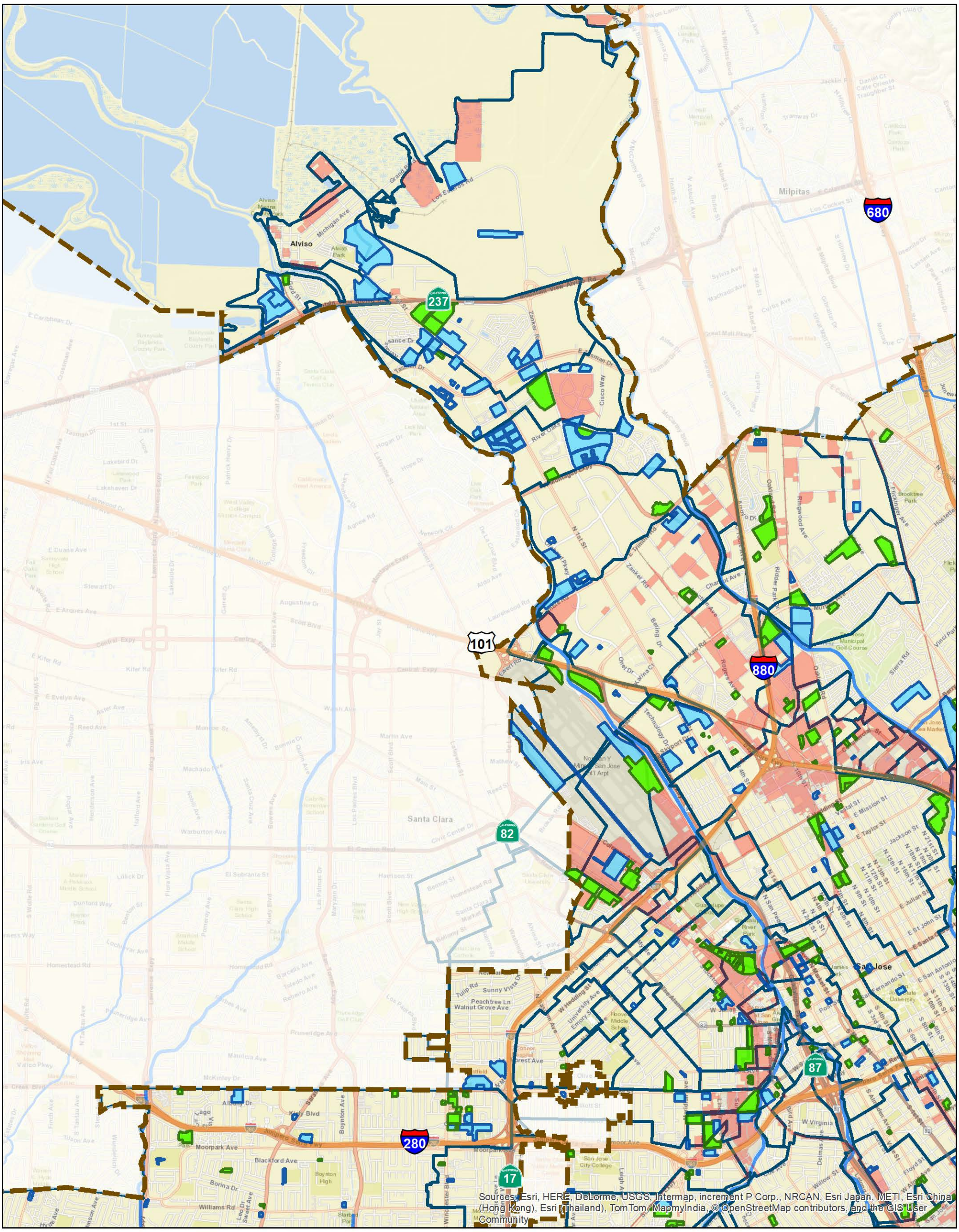

City of San Jose - Northwest - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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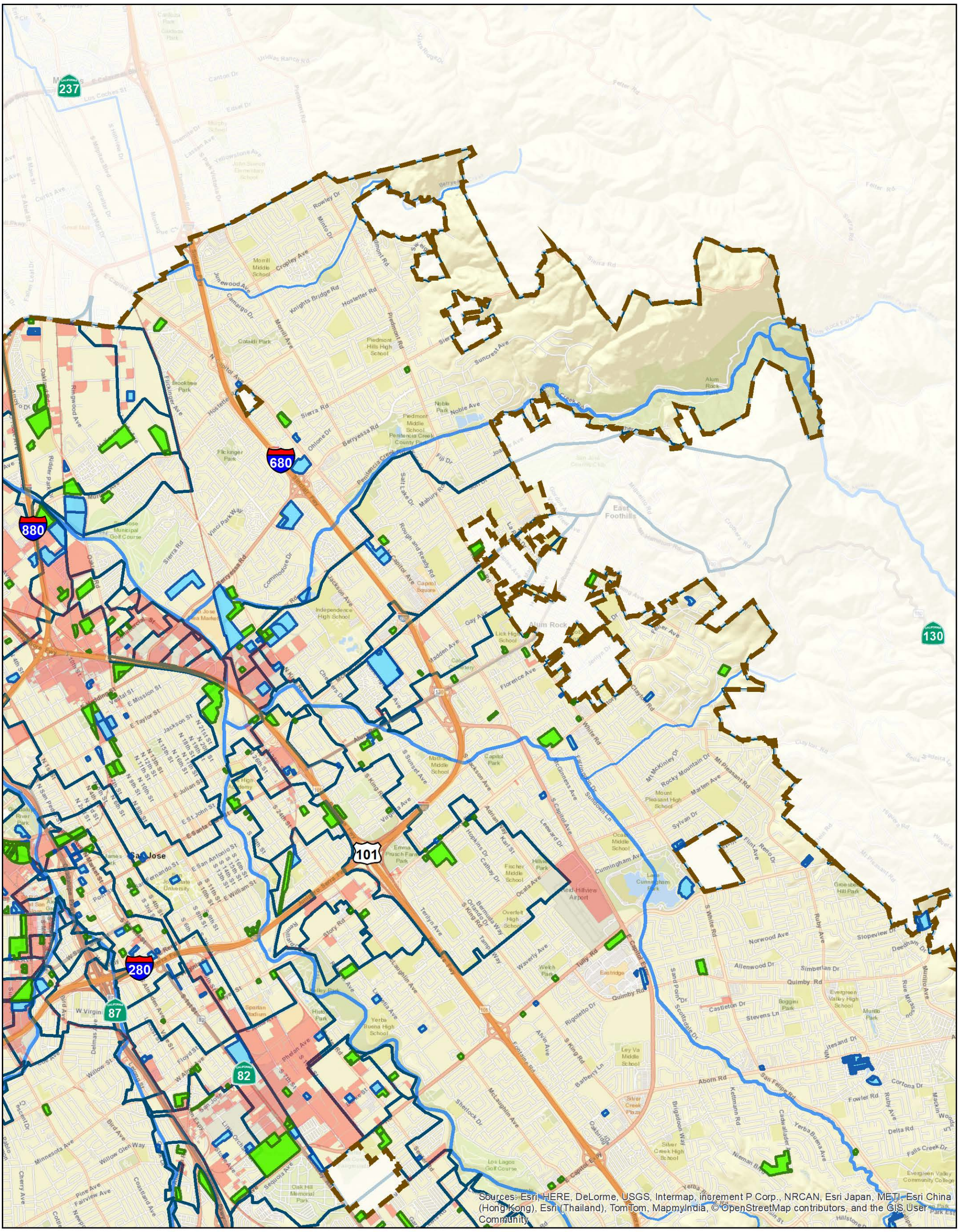

City of San Jose - Northeast - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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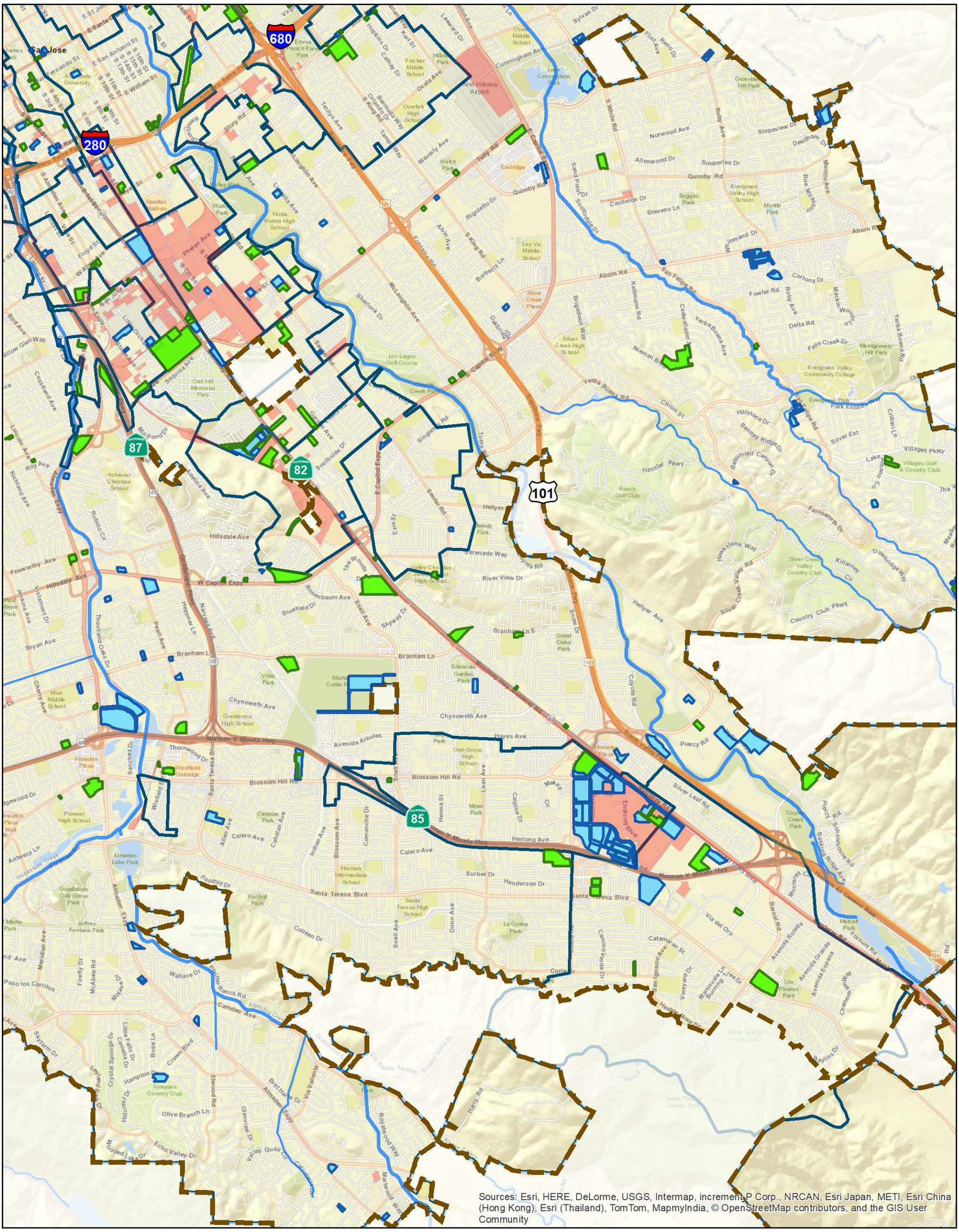

City of San Jose - Southeast -Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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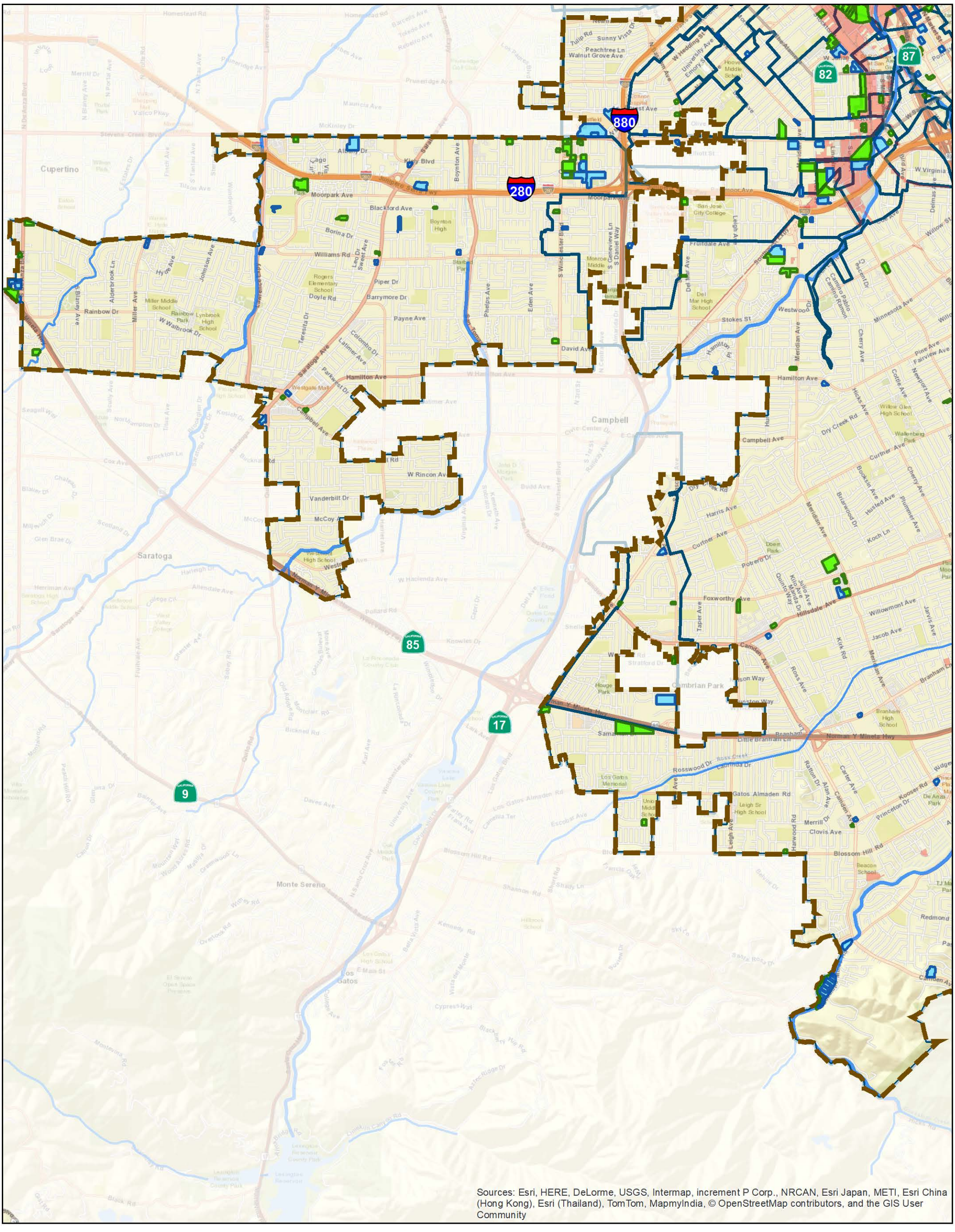

City of San Jose - Southwest - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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City of Sunnyvale

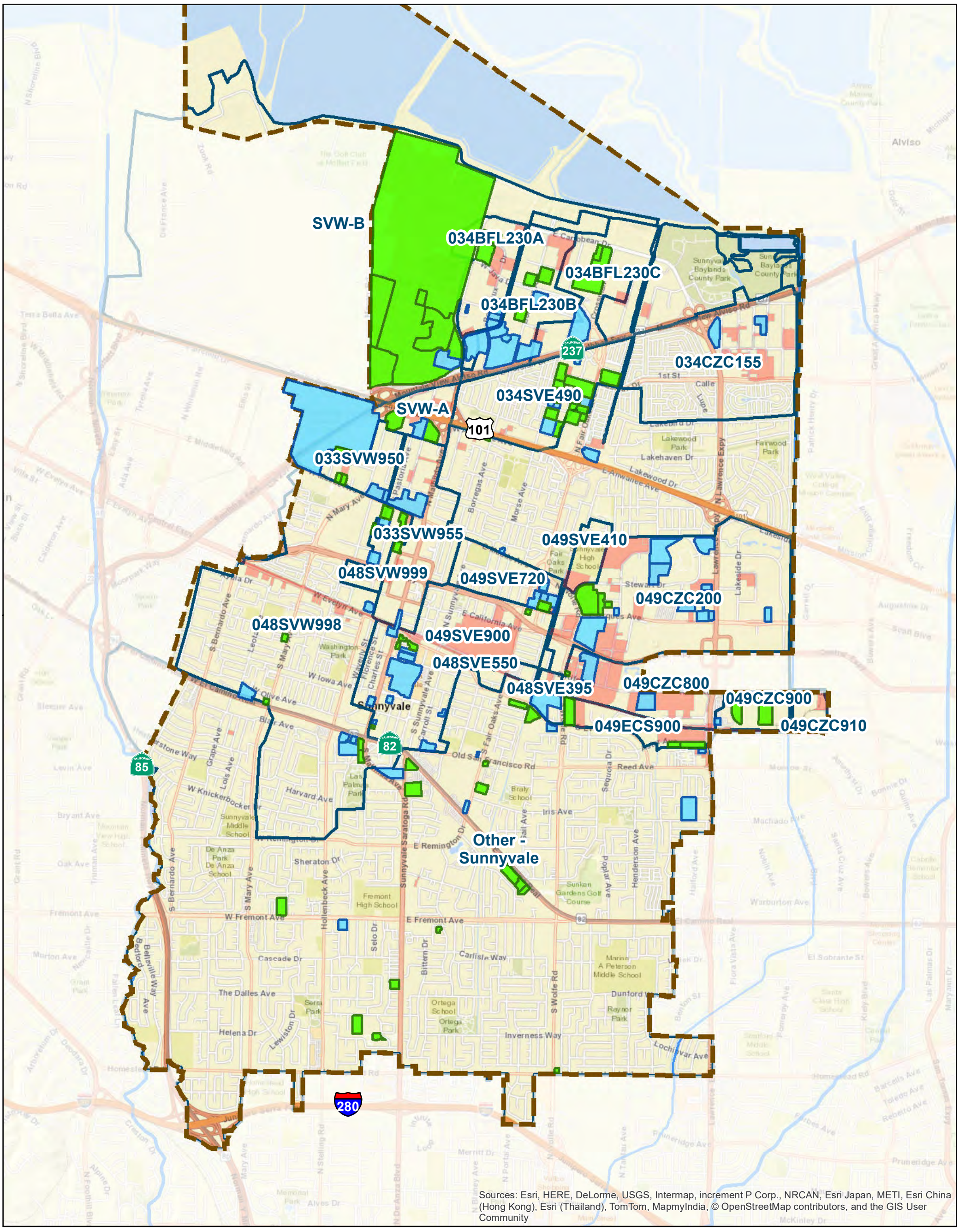

City of Sunnyvale - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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City of Santa Clara

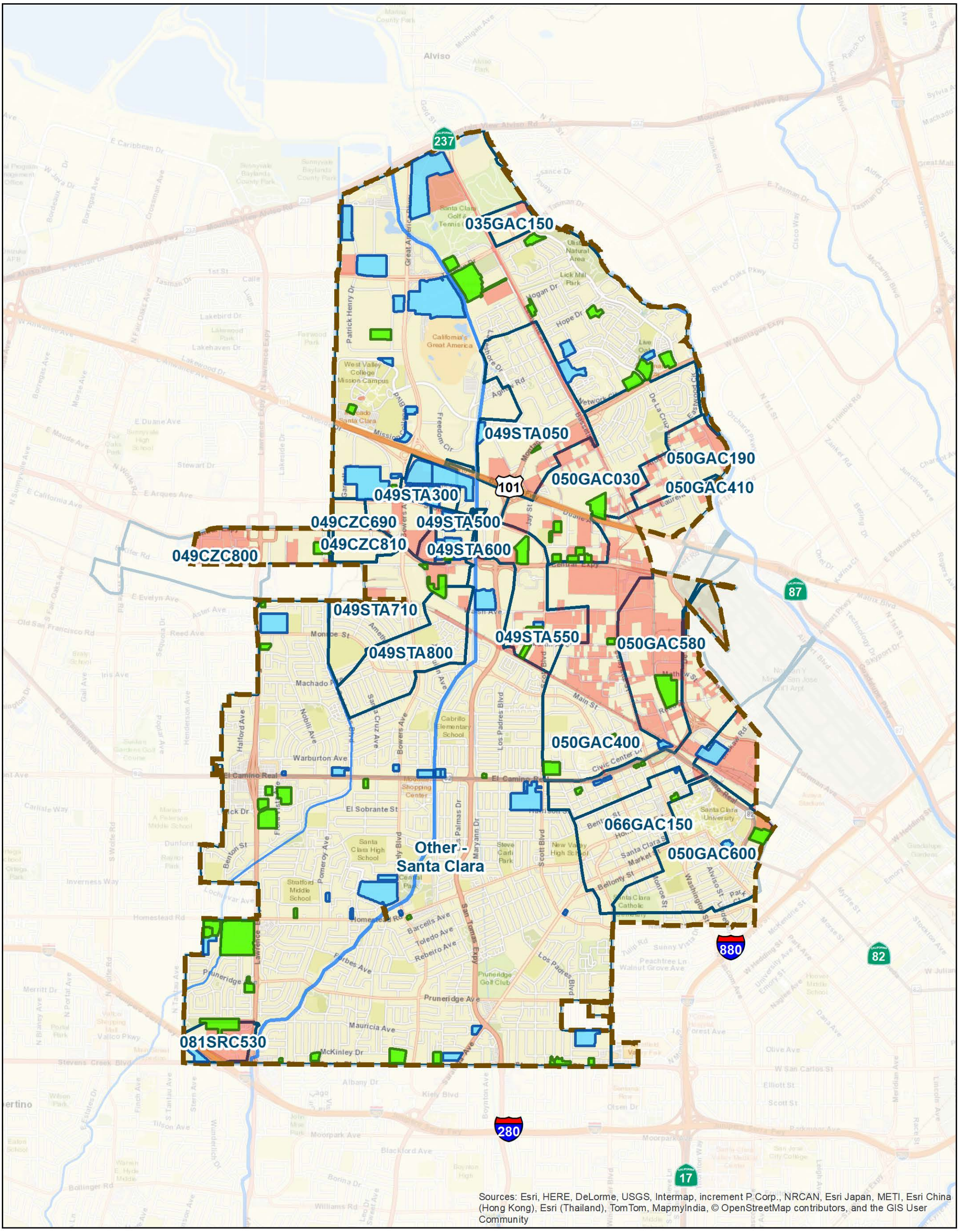

City of Santa Clara - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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0 0.5 1 2 Miles

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City of Mountain View

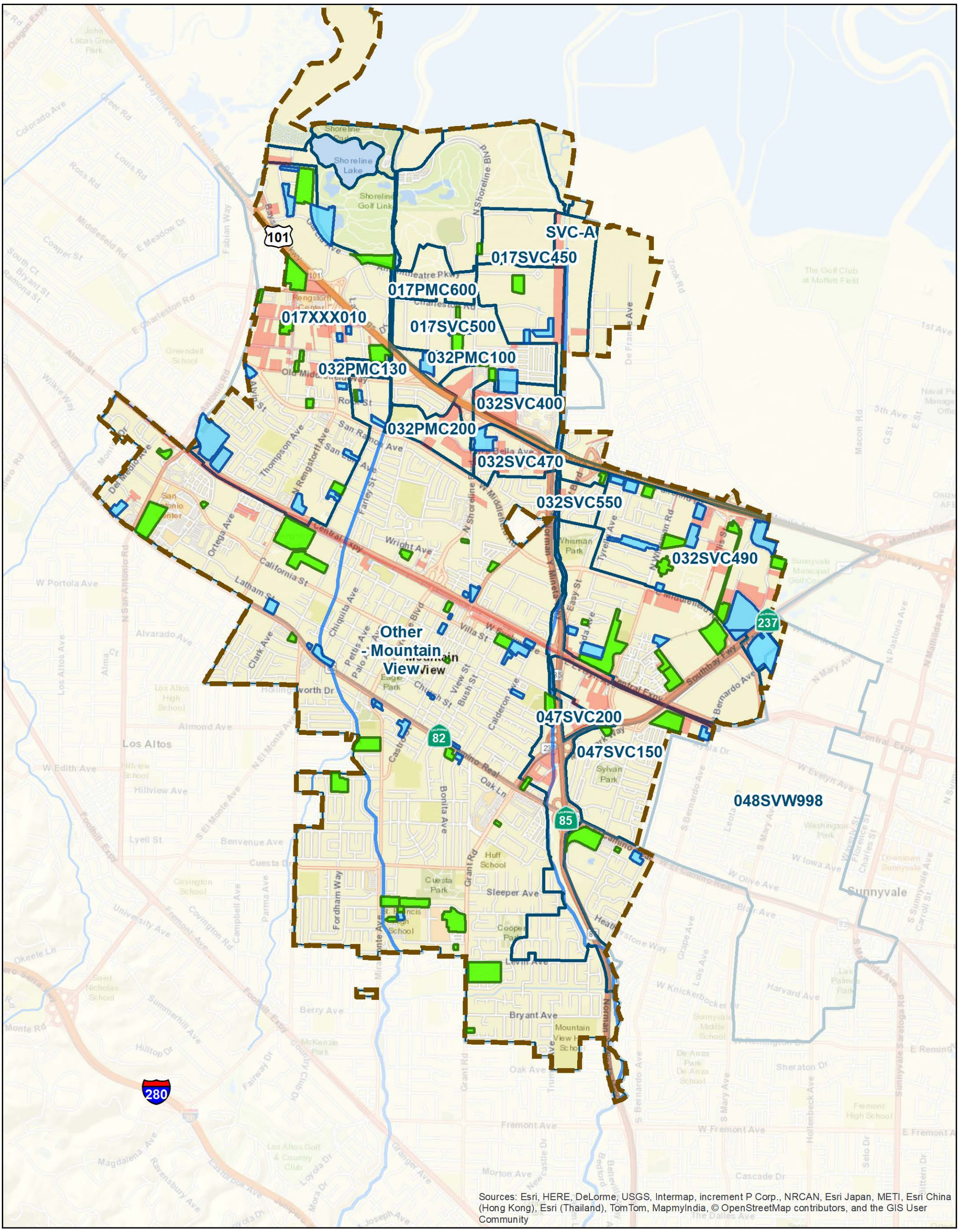

City of Mountain View - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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0 0.25 0.5 1 Miles

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7335

City of Milpitas

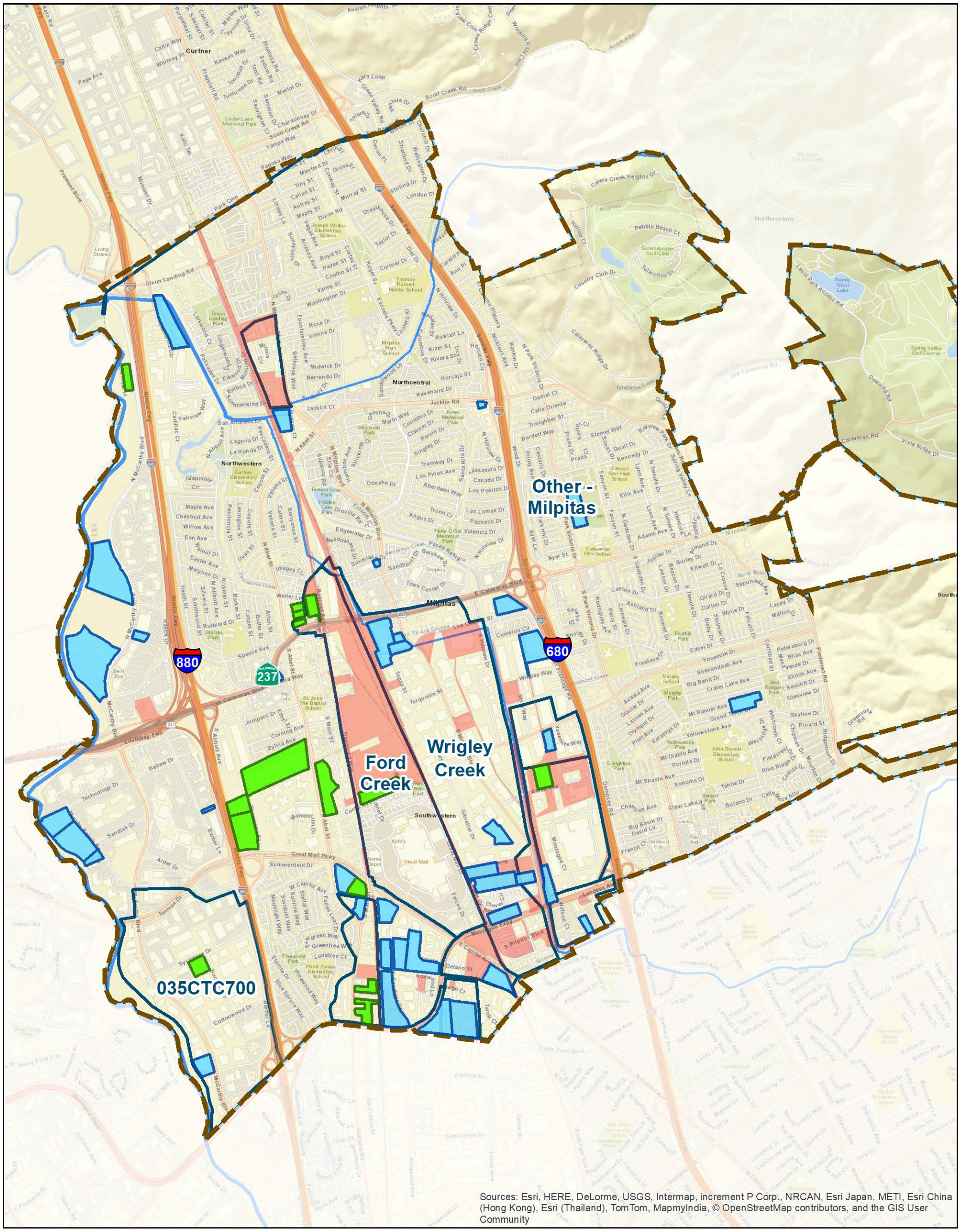

City of Milpitas - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.25 0.5 1 Miles

07296
7337

City of Palo Alto

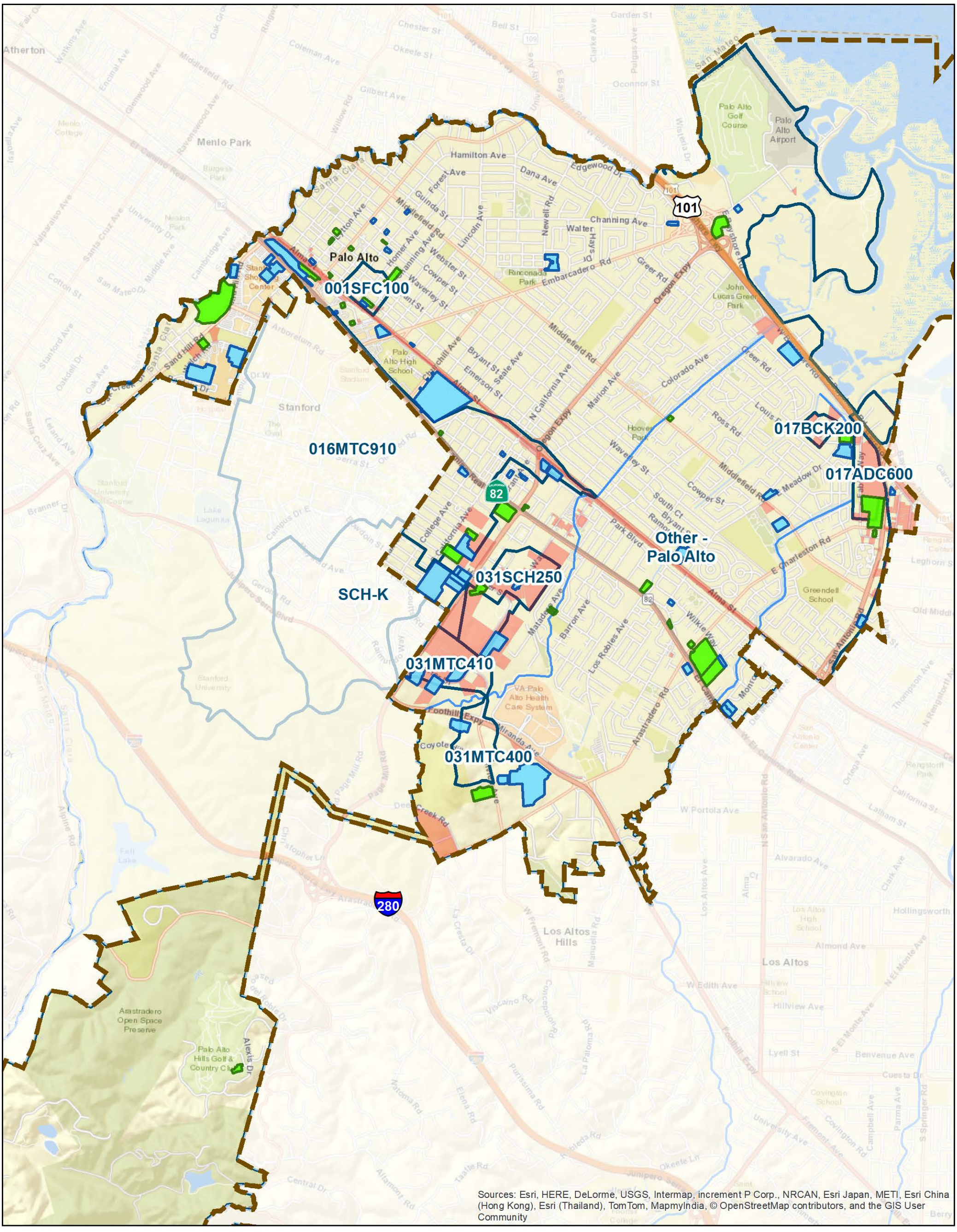

City of Palo Alto - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

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City of Cupertino

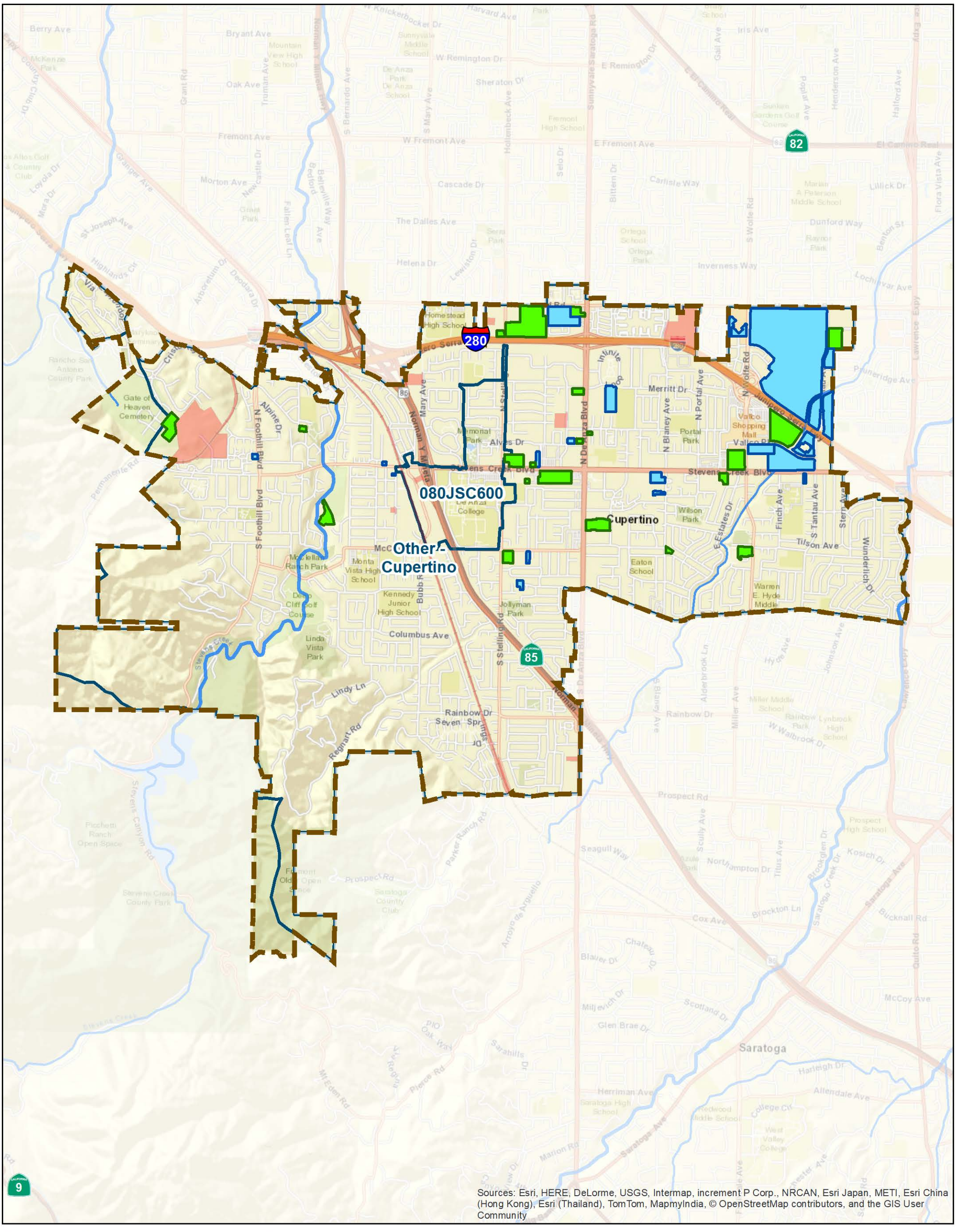

City of Cupertino- Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.4 0.8 1.6 Miles

07300
7341

Unincorporated Santa Clara County

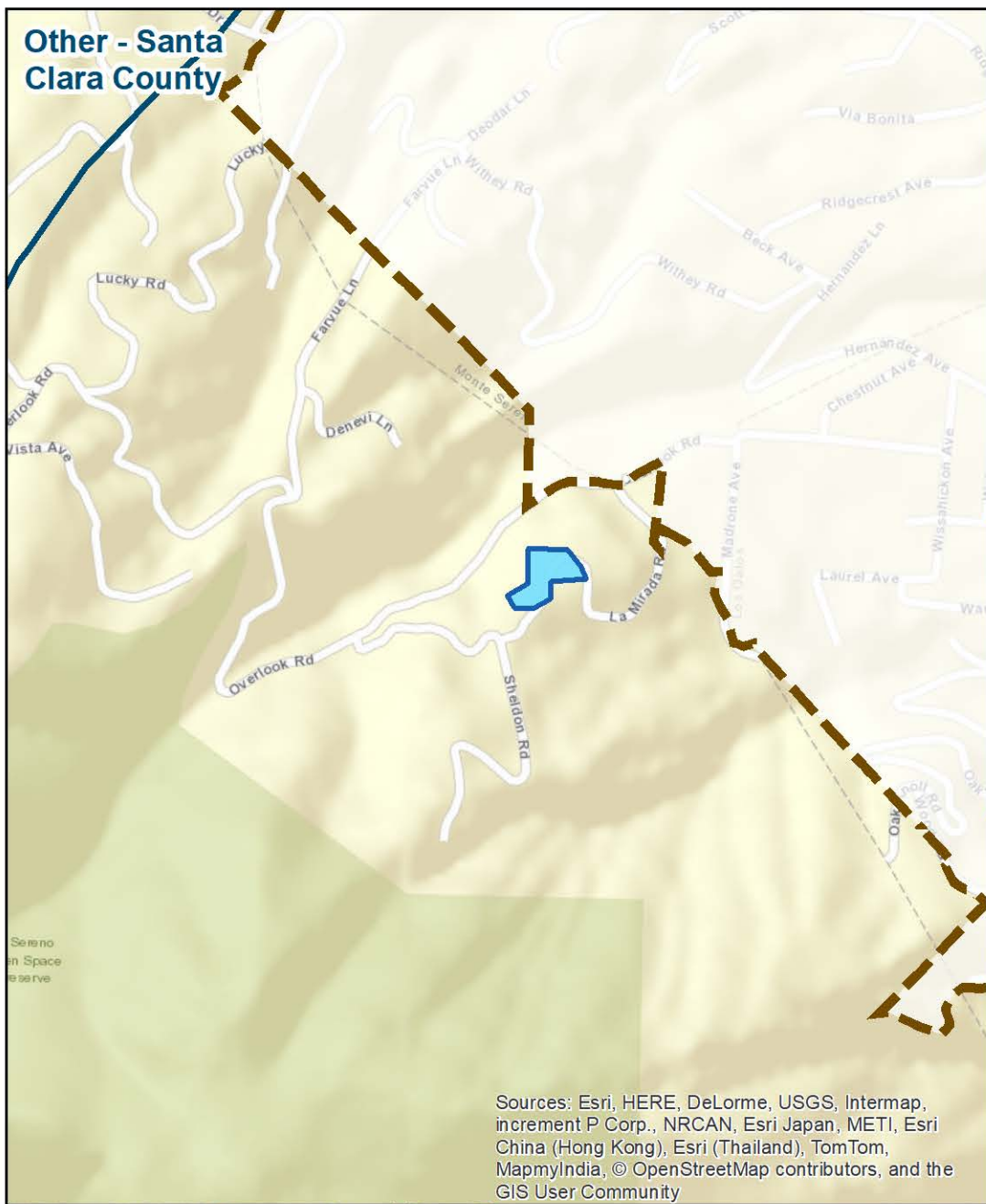

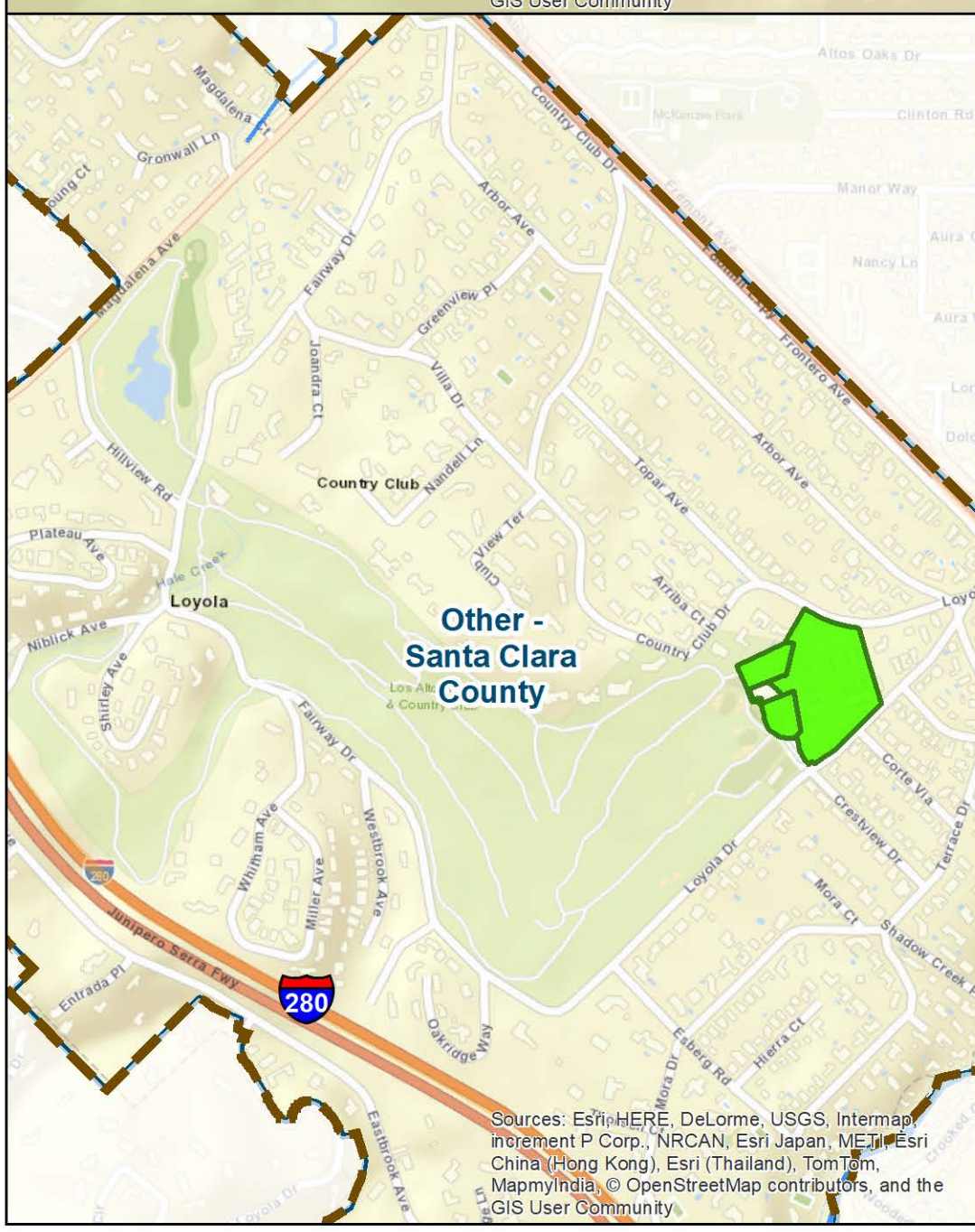

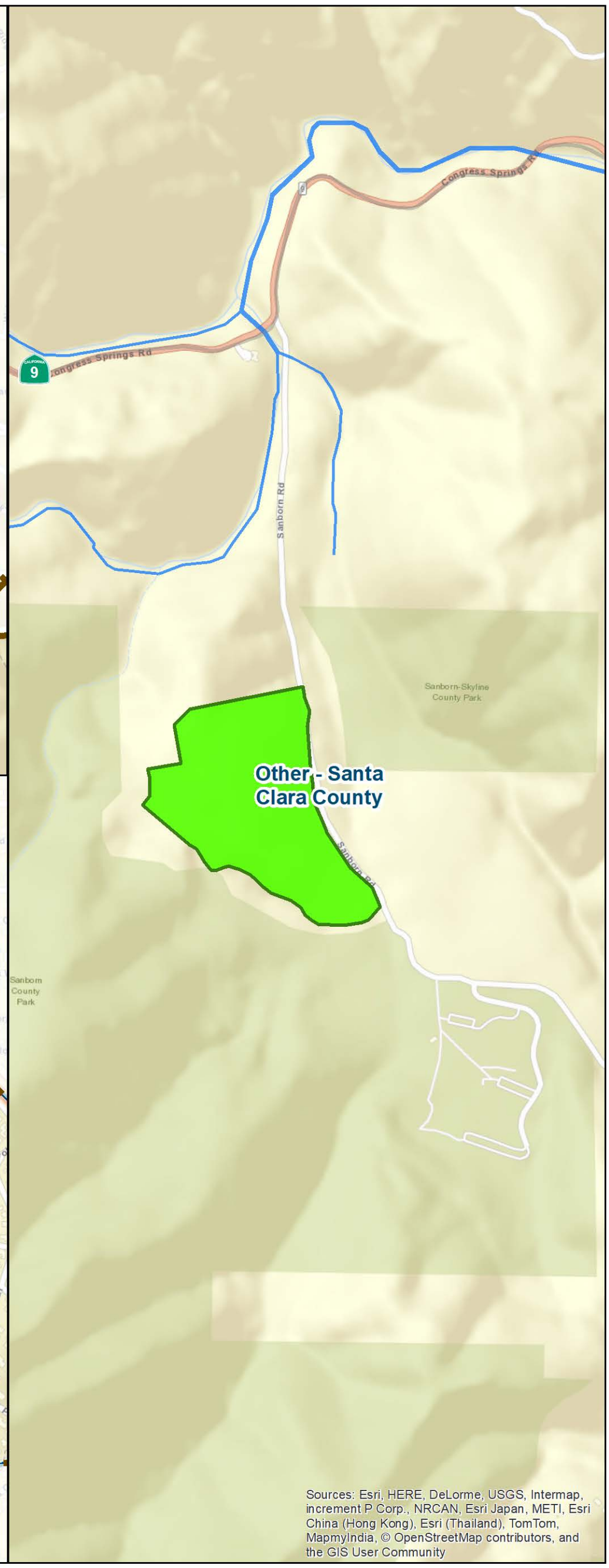

County of Santa Clara - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.1 0.2 0.4 Miles

07302
7343

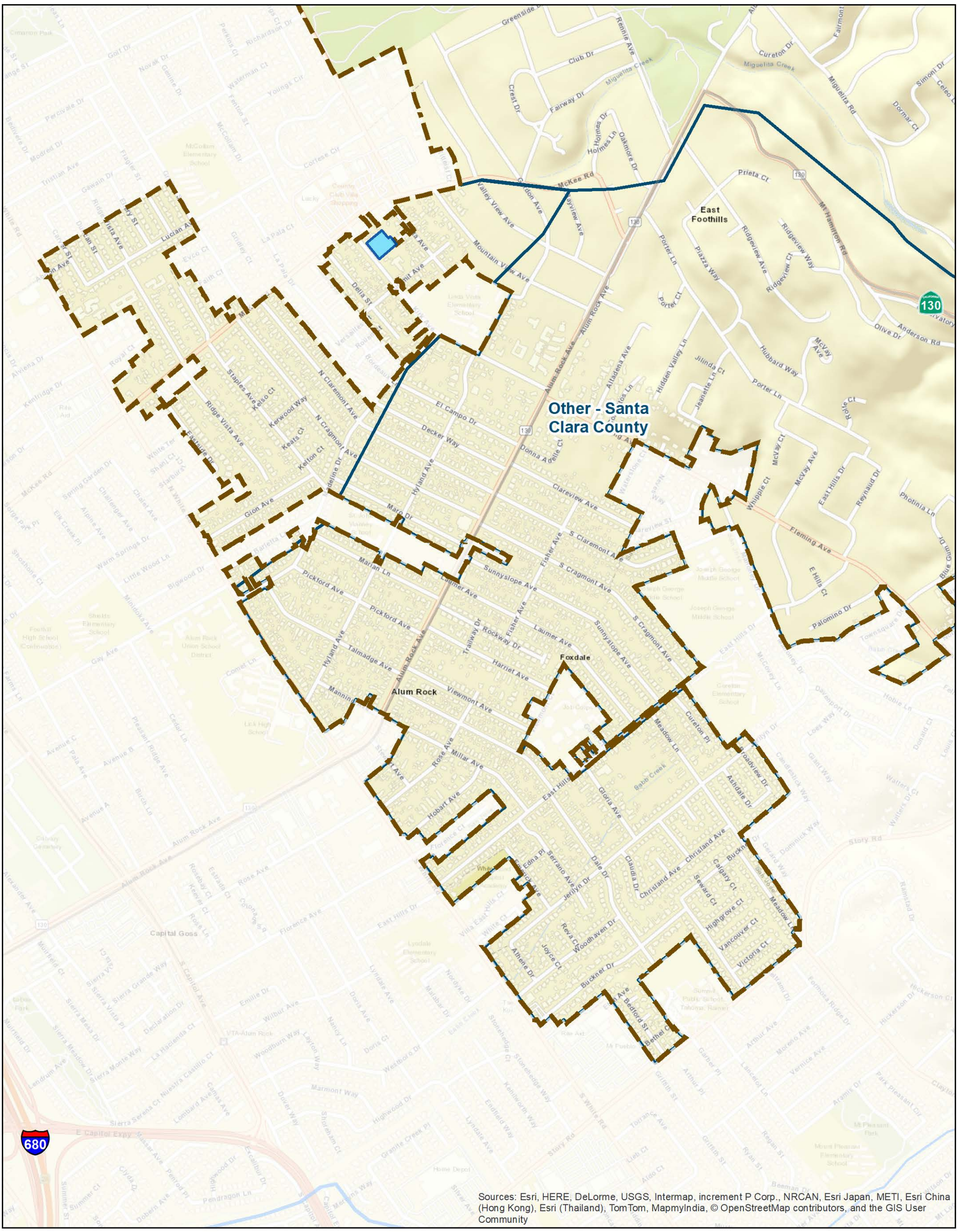

County of Santa Clara - Alum Rock- Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

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07308
7344

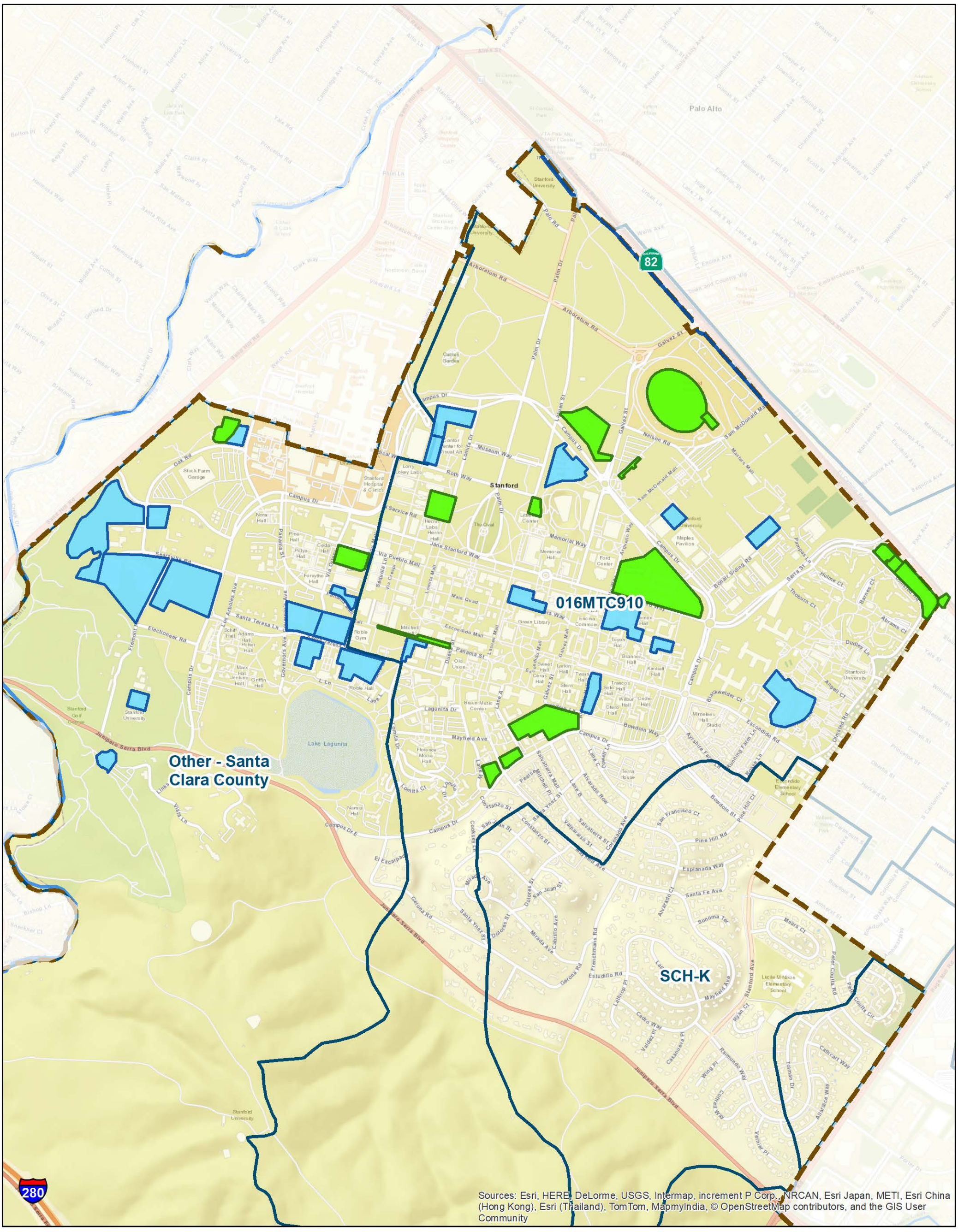

County of Santa Clara - Stanford - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

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07304
7345

City of Campbell

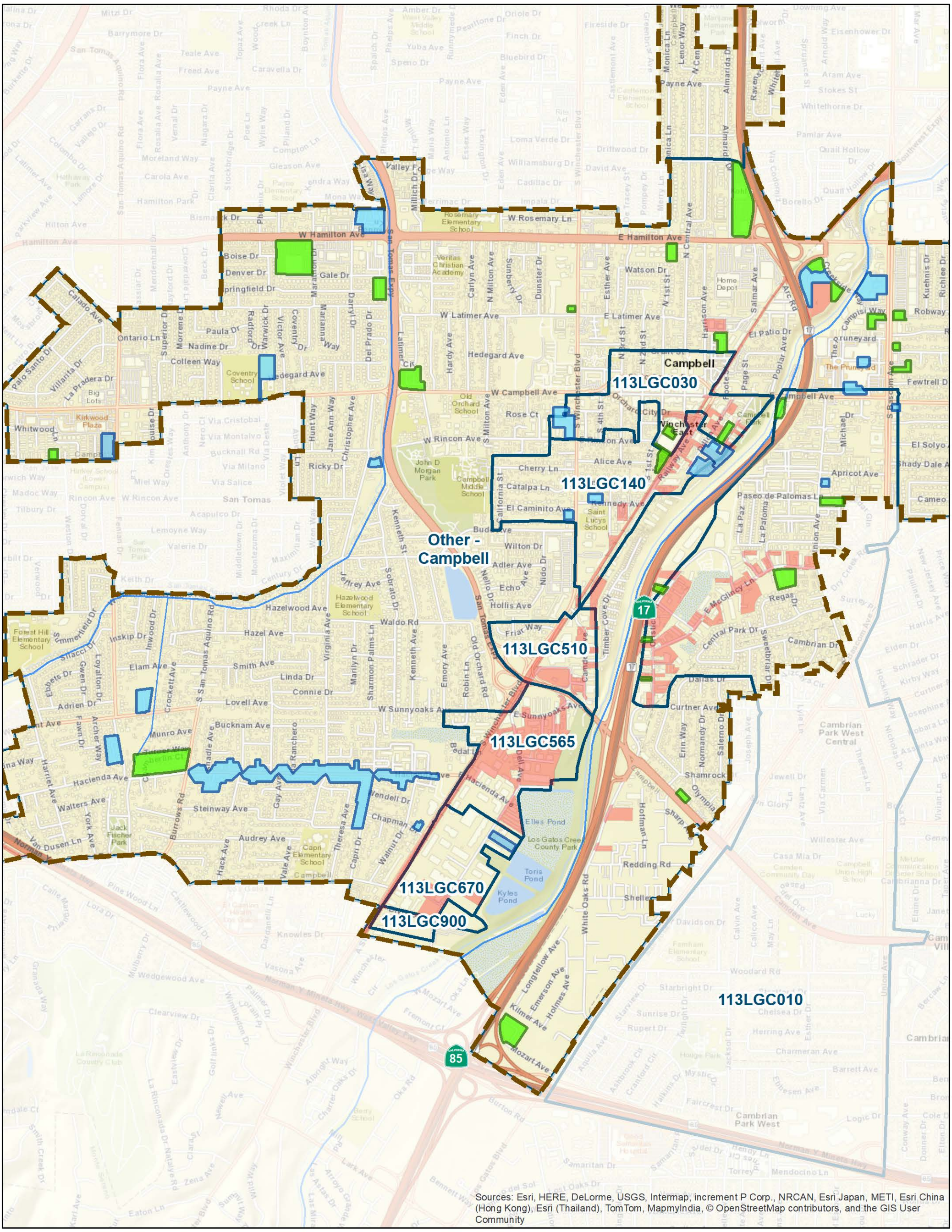

City of Campbell - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.2 0.4 0.8 Miles

07306
7347

Town of Los Gatos

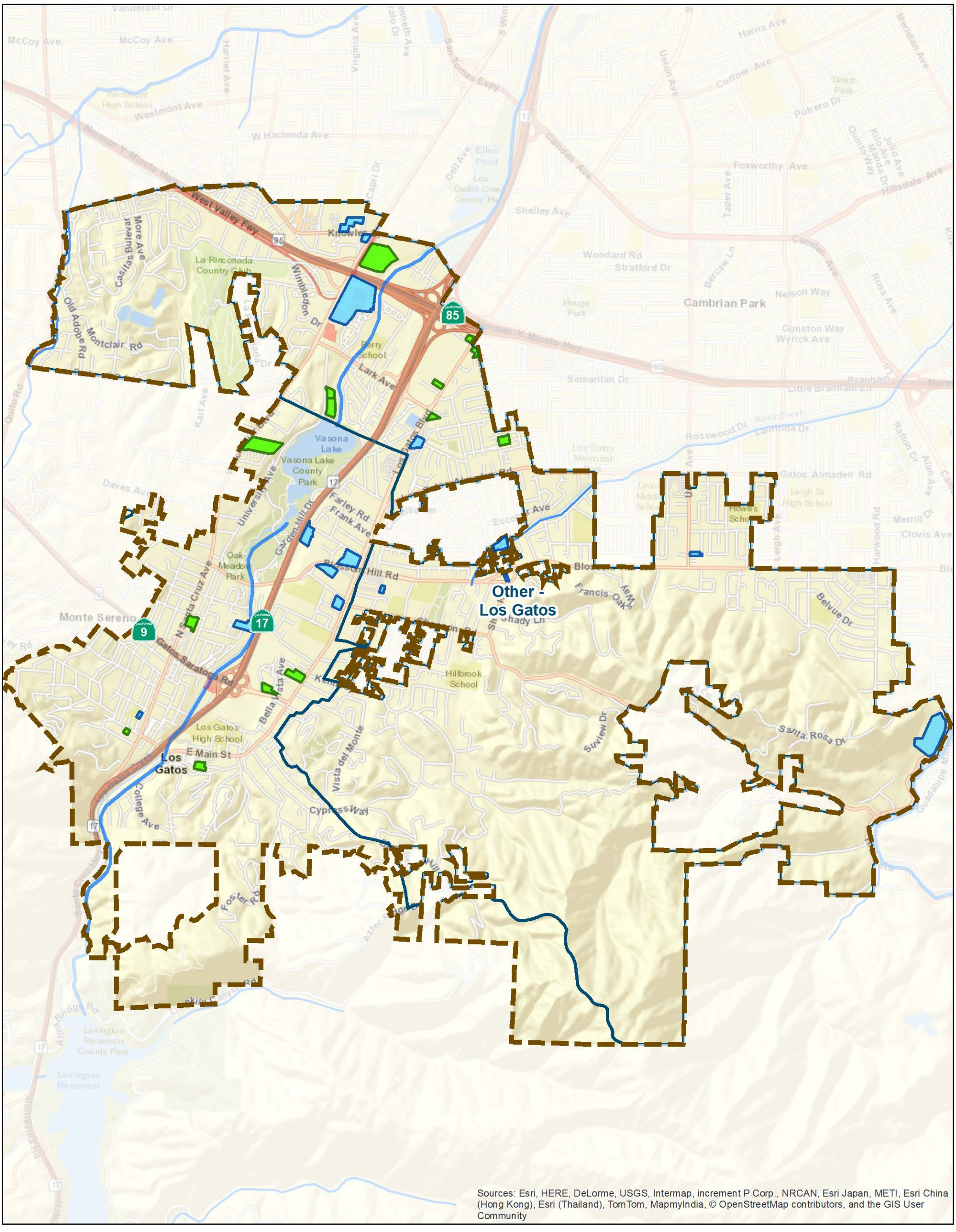

Town of Los Gatos - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.25 0.5 1 Miles

07308
7349

City of Saratoga

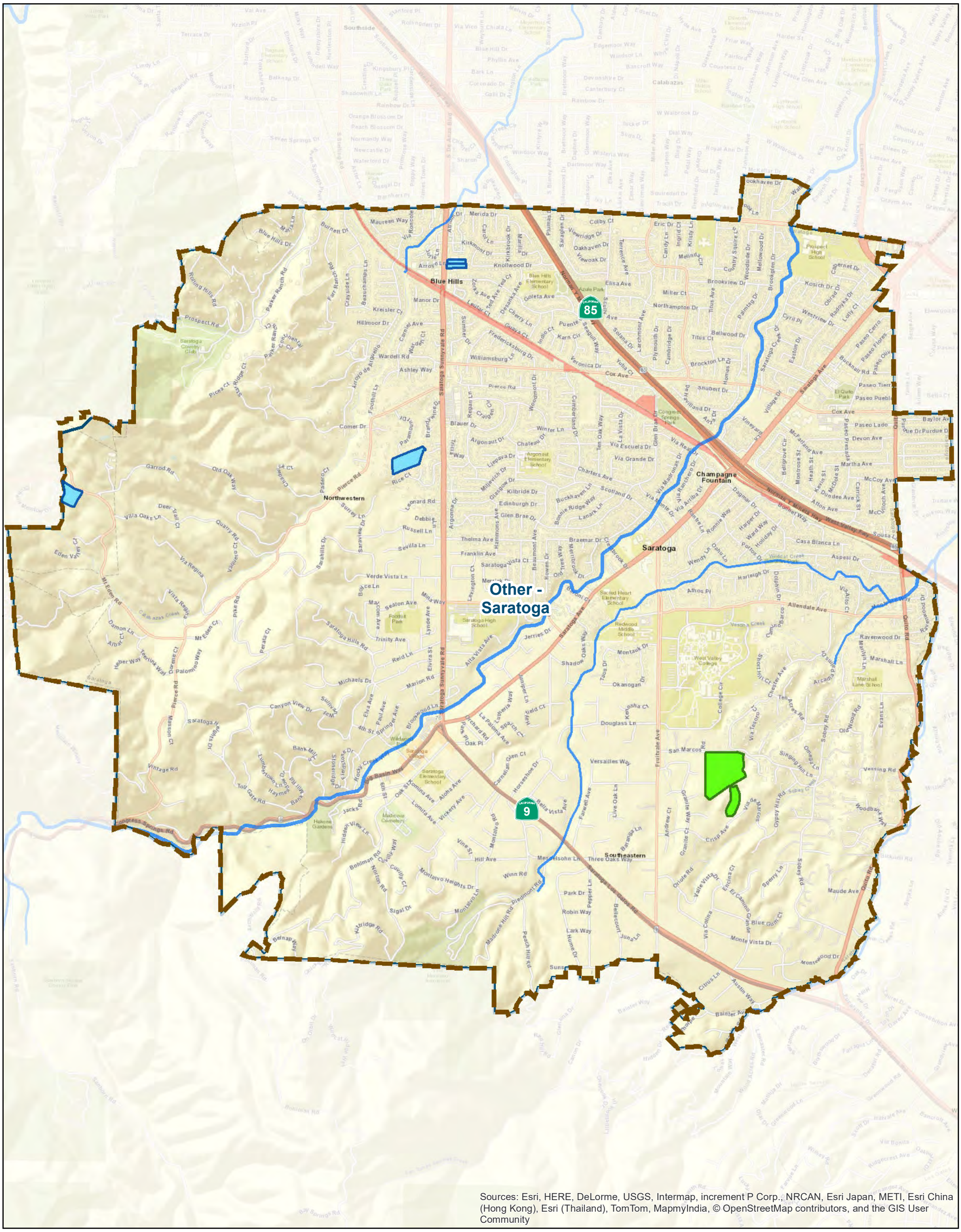

City of Saratoga - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

07310
7351

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.25 0.5 1 Miles

City of Monte Sereno

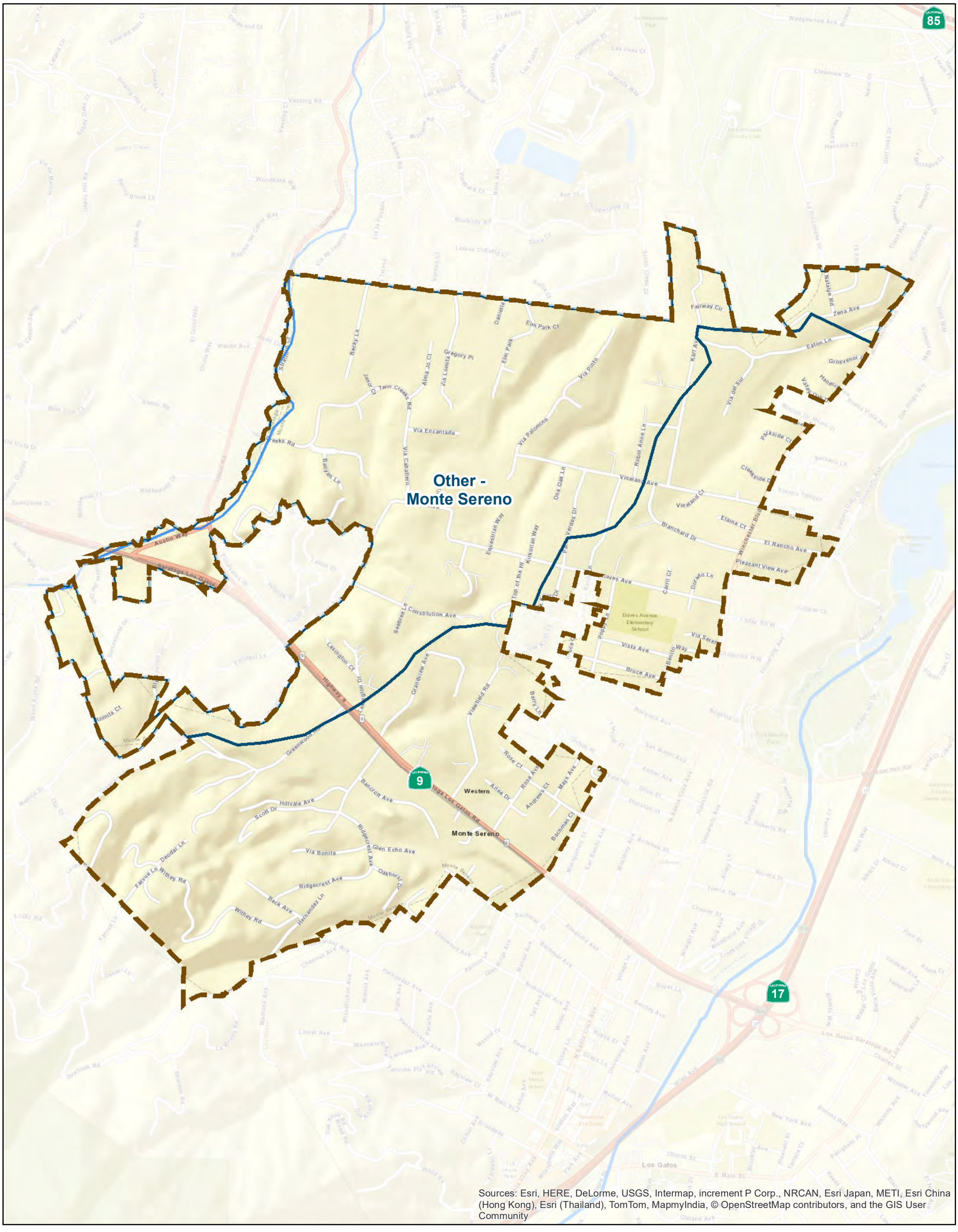

City of Monte Sereno - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.1 0.2 0.4 Miles

City of Los Altos

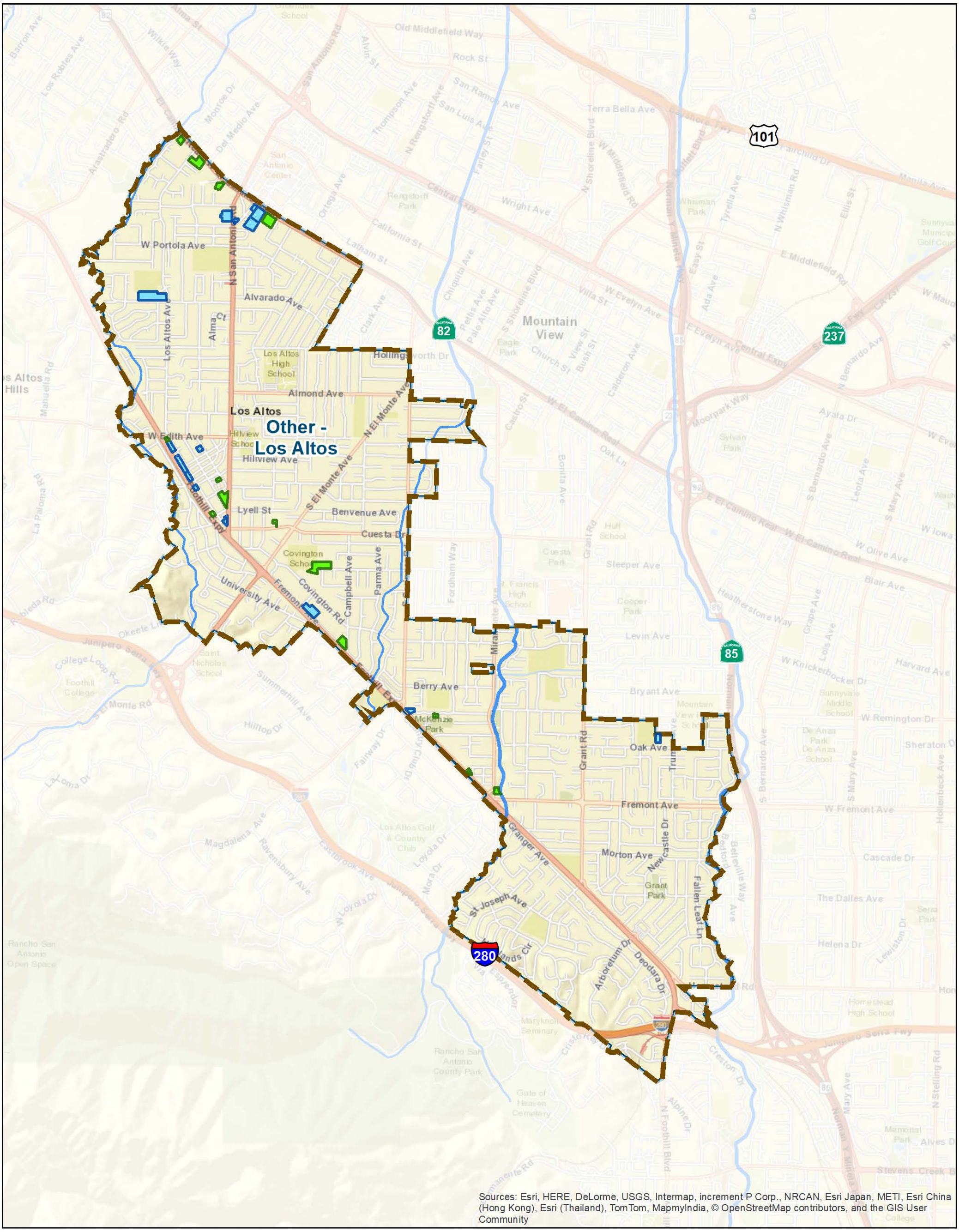

City of Los Altos - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

07314
7355

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.25 0.5 1 Miles

Town of Los Altos Hills

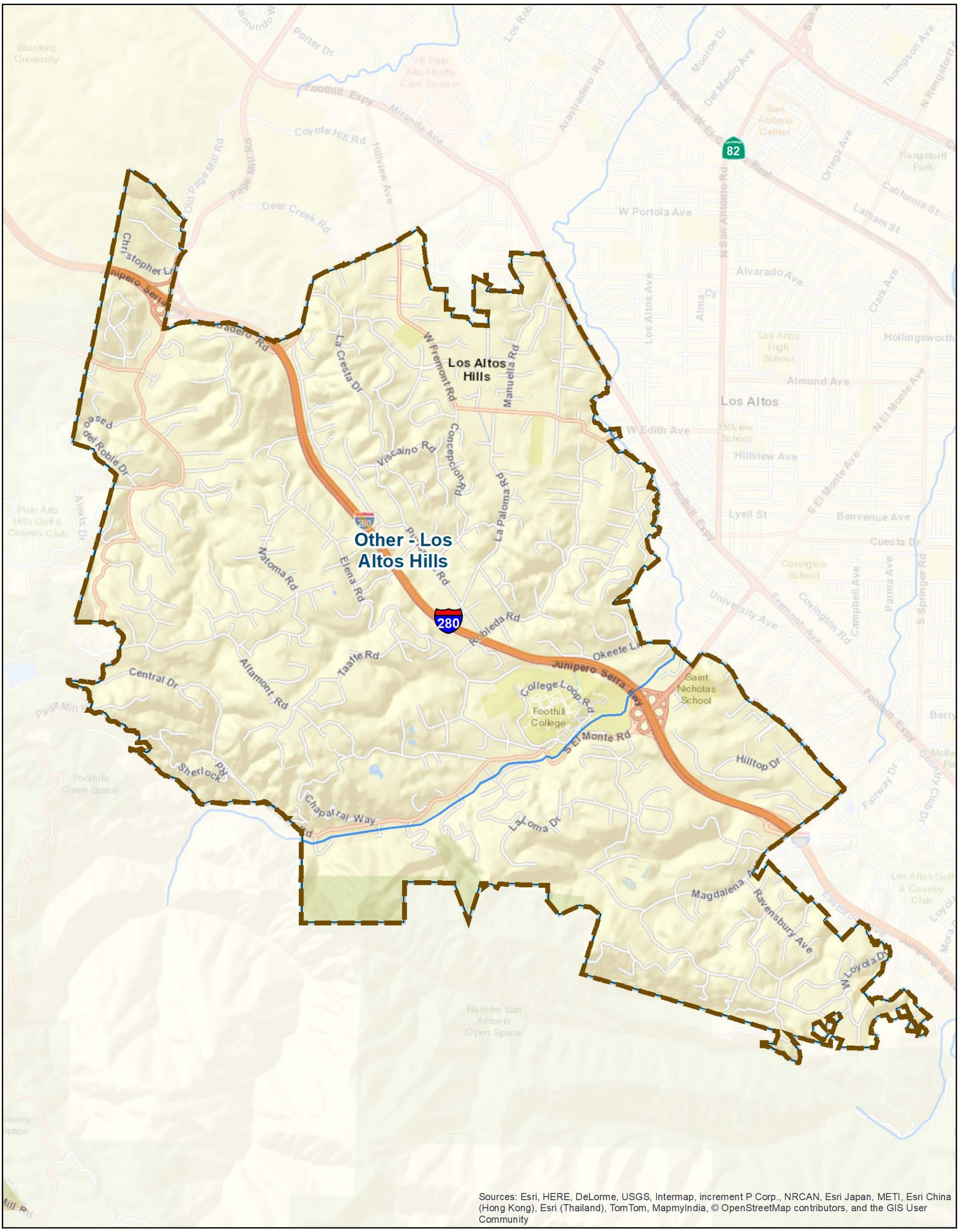

Town of Los Altos Hills - Green Stormwater Infrastructure Projects

Green Stormwater Infrastructure Projects

- Completed FY 13-14 to FY 18-19
- Completed Prior to FY 13-14
- Old Industrial Land Use
- Permittee Boundary
- Watershed Management Area (WMA)

Data Sources:
City Boundaries: Santa Clara County
Catchment Boundaries: Mattern/WLA
Background: ESRI World Street Map

Map Created By: EOA, Inc.
Date: August 31, 2020

N

0 0.25 0.5 1 Miles

07316
7357

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 11-2

PCBs in Building Materials Management Program

- Regional Data Summary
- Regional Collaboration for a Data Collection and Assessment Program

Geosyntec consultants

1111 Broadway, 6th Floor
Oakland, California 94607
PH 510.836.3034
www.geosyntec.com

Memorandum

Date:	September 18, 2020
To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

*****

Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	Unknown	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

07329

7370

This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

Prepared for:

BASMAA
P.O. Box 2385
Menlo Park, CA 94026

Prepared by:

EOA, Inc.
Larry Walker Associates
Geosyntec Consultants
Stephanie Hughes
David J. Powers & Associates, Inc.

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Part 2. Is building subject to the screening requirement based on type, use, and age of the building? 2

Part 3. Report concentrations of PCBs in priority building materials 3

Part 4. Certification 4

Notices to Applicants Regarding Federal and State PCBs Regulations 5

Agency Contacts 6

Attachment A Process Flow Chart A-1

Attachment B PCBs in Priority Building Materials Screening Assessment Form B-1

Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

DISCLAIMER

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

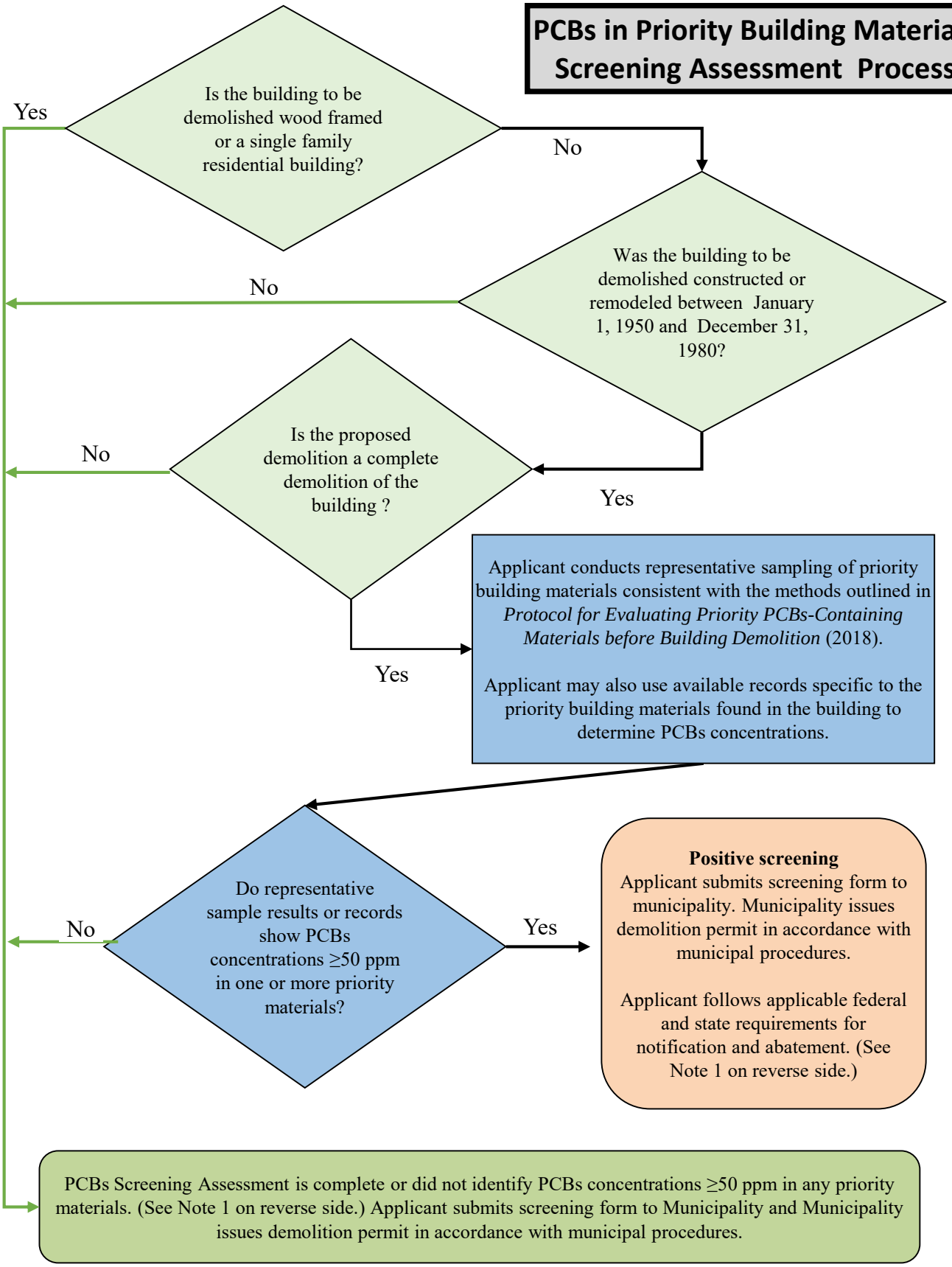

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

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Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

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[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

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[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	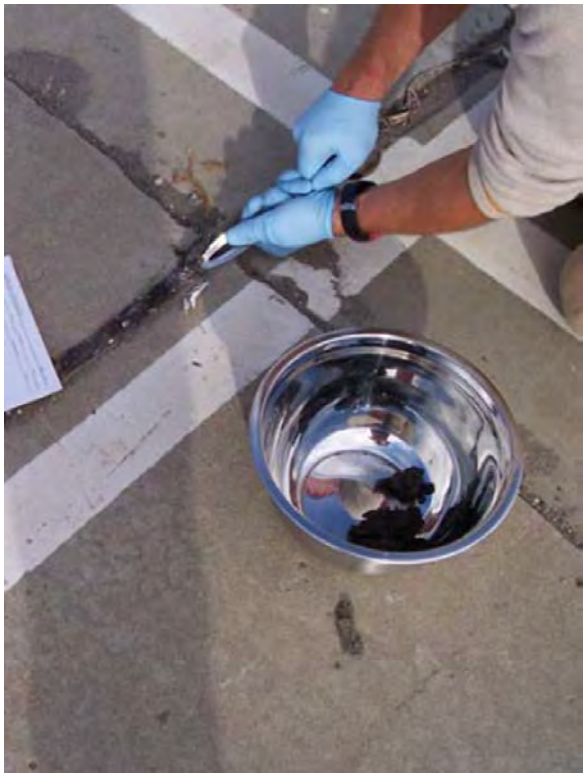
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 7	
<u>Thermal Insulation</u>: **Damaged felt-style thermal insulation.**	
Photograph 8	
<u>Thermal Insulation</u>: **Exposed/damaged fiberglass insulation.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 9	
<u>Thermal Insulation</u>: **Exposed and damaged pipe insulation.**	
Photograph 10	
<u>Thermal Insulation</u>: **Pipe insulation.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	
Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

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APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

MEMORANDUM

TO: **BASMAA MPC Committee**

FROM: **Lisa Sabin and Jon Konnan, EOA, Inc.**

DATE: **September 23, 2020**

SUBJECT: **Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program**

1. BACKGROUND

The San Francisco Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. Provision C.12.f.ii(3) requires development of a data collection and assessment methodology program by July 1, 2019 to quantify PCBs loads reduced through implementation of the new program for controlling PCBs during building demolition, which began implementation on that date. Provision C.12.f.iii requires Permittees to submit the data collection and assessment methodology with their Fiscal Year (FY) 2019/20 Annual Reports, and states that this reporting should be at the regional level on behalf of all Permittees.

This technical memorandum provides administrative and technical support at the regional level for ongoing efforts by MRP Permittees to comply with data collection, evaluation, and reporting requirements under MRP Provision C.12.f. by:

- Documenting the regional process to collect data from the new program for controlling PCBs during building demolition;
- Presenting the assessment methodology to calculate PCBs loads reduced via the building demolition program;
- Documenting the results of additional literature searches and data gathering efforts conducted to set the stage for refining and reducing uncertainty in the parameters of the assessment methodology equation;
- Describing how data generated from the new demolition control program will be incorporated into the assessment methodology, including providing conversion factors needed for the load reduction calculations; and
- Addressing the MRP Provision C.12.f.iii requirement to submit the data collection and assessment methodology with their FY 2019/20 Annual Reports.

This technical memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration). The information provided builds upon a previous BASMAA effort that outlined a conceptual approach for the regional data collection process and assessment methodology (BASMAA 2018).

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2. REGIONAL DATA COLLECTION PROCESS

This section documents the regional data collection process for the new programs to manage PCBs-containing building materials during demolition that began on July 1, 2019. This process was developed through a collaborative effort by municipalities subject to the MRP, the associated countywide stormwater management programs, and BASMAA. The regional data collection process focuses on collecting, compiling, and evaluating the data generated by the new programs on a regional basis. In addition, when sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program.
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

The regional data collection process involves collection of data from individual permit applicants at the municipal level, followed by compilation of data for applicable structures[1] at the countywide level, and data evaluation and reporting at the regional level. The process is described below.

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality. For non-applicable buildings, applicants simply check the boxes, certify, and submit to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and estimated demolition dates, with their FY 2019/20 Annual Reports.

The regional data management system is an Excel spreadsheet-based tool for storing and managing the data from each Permittee. The tool also calculates the estimated loads avoided throughout the region via implementation of the new management program, using the assessment methodology and data inputs described below.

3. ASSESSMENT METHODOLOGY

This section describes the assessment methodology and refined data inputs for estimating the loads of PCBs to municipal separate storm sewer systems (MS4s) that are avoided due to implementation of new controls to manage PCBs in building materials during demolition activities. To-date, the load of PCBs reduced through management of PCBs during demolition has been calculated using Equation 1:

Equation 1. $$Load\ of\ PCBs\ Reduced = N \bullet M \bullet SW \bullet E_f$$

Where:

N = Number of applicable structures with PCBs concentrations ≥ 50 ppm demolished each year (structures/yr)

M = Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm (kg/structure)

SW = Average fraction of PCBs that enters the MS4 due to demolition without new demolition program controls (dimensionless fraction)

E_f = Average fraction of PCBs prevented by new demolition program controls from entering MS4 (dimensionless fraction)

The MRP 2.0 Factsheet (SFBRWQCB 2015) provides values for each of the four terms in Equation 1 that were used to stipulate the load reduction for implementing the new demolition control program across the MRP area, which was a total of 2 kg/yr. Table 1 presents the values used for each of the four terms in the Factsheet to derive the 2 kg/yr PCBs load reduction credit. The Factsheet notes that each of the terms could be represented by a range of values and the information available to estimate the values of these terms shown in Table 1 was limited.

BASMAA (2018) summarized the above MRP 2.0 Factsheet approach and other previous efforts to estimate PCBs loads from demolition and potential loads reduced by control programs. It also presented a conceptual approach to refining the 2 kg/year PCBs load reduction estimate by describing methods to potentially refine the values of each of the four Equation 1 parameters shown in Table 1. Building upon the approach described in that document, additional literature searches and data gathering efforts were conducted to set the stage for refining and reducing uncertainty in the values of the four terms. For the first two parameters, data will be incorporated as they are generated from the new demolition control programs. The results of these efforts are presented below.

Table 1. Terms in MRP 2.0 Factsheet (SFBRWQCB 2015) equation used to stipulate the loading of PCBs to MS4s avoided by implementing demolition control measures.

Term	Symbol	Term Definition	Value	Units
1	*N*	Number of applicable structures demolished per year with PCBs concentrations ≥ 50 ppm	50	structures/year
2	*M*	Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm	5	kg/structure
3	*SW*	Average fraction of PCBs that enters MS4s due to demolition without controls[1]	0.01	dimensionless fraction
4	E_f	Average fraction of PCBs prevented by controls[1] from entering MS4 (i.e., assumed effectiveness of controls)	0.8	dimensionless fraction

1. The term "controls" refers to the proposed new demolition management program, not existing construction controls.

Term 1: Number of Applicable Structures Demolished Per Year

Current Basis

A study conducted by the San Francisco Estuary Institute (SFEI) reported a medium estimate of 521 building demolitions per year in commercial and industrial land uses in the study area, based on Bay Area Air Quality Management District (BAAQMD) asbestos abatement permitting data.[2] The SFEI study also reported the following medium estimates: 46% of the demolished buildings were built between 1950 and 1980 and 36% had PCBs concentration in caulks/sealants greater than 50 ppm (Klosterhaus et al. 2011). Multiplying (521) x (0.46) x (0.36) results in an estimated 86 commercial and industrial buildings demolished per year that were built between 1950 and 1980 and had PCBs concentration in caulks/sealants greater than 50 ppm.

Based upon information in the SFEI study and considering that the scope of the program to manage PCBs during demolition is limited to exclude wood frame buildings, the MRP Factsheet assumed 50 applicable structures with PCBs concentrations ≥ 50 ppm are demolished per year in the Bay Area (SFBRWQCB 2015).

Basis for Refinement

Data gathered during the new demolition control programs will be used to document the number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year throughout the MRP area. These data will be used to calculate a regional annual average number of applicable

[2] The BAAQMD regulations require that a "J Number" be applied for and obtained before applying for a building permit for demolition of an existing structure or renovations removing greater than 100 square feet of asbestos material within the San Francisco Bay air basin.

structures with PCBs concentrations ≥ 50 ppm that are demolished. This regional annual average value will be used for Term 1 in Equation 1 (see Table 1).

As part of implementing the new demolition controls that began in July 2019, applicants for demolition permits are required to submit a Screening Form to the municipality with jurisdiction for each applicable structure. Permittees will submit these forms to their countywide stormwater programs, which will document the number of applicable structures with PCBs concentrations ≥ 50 ppm within each jurisdiction that are demolished each year. This information will be compiled in the regional database described previously (Section 2) and used to calculate an annual average number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year in the region. Use of these real-world data collected in the MRP area will substantially reduce the uncertainty that is currently associated with the estimated value for Term 1 that was used in the MRP 2.0 Factsheet.

Term 2: Average Mass of PCBs per Applicable Structure

Current Basis

The SFEI study included estimating the mass of PCBs in caulks in Bay Area buildings and releases to stormwater runoff during renovation and demolition (Klosterhaus et al. 2011). Using a blind sampling approach, the SFEI study collected 25 caulk samples from the exterior of ten commercial and industrial buildings constructed in the study area between 1950 and 1980. The study area was the portion of the San Francisco Bay Area covered by the MRP: Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and the cities of Fairfield, Suisun, and Vallejo. The caulk samples were analyzed for PCBs, which were detected in 88% of the samples, with 40% exceeding 50 ppm, the concentration at which caulk falls under U.S. Environmental Protection Agency (USEPA) regulations (Federal Register 2010). Detectable PCBs concentrations ranged over six orders of magnitude, from 1 to 220,000 ppm. These data were consistent with previous studies in other cities (Klosterhaus et al. 2011).

A geographic information system (GIS)–based approach was then used to estimate the number, area, and volume of currently standing buildings in the study area that were built during the era of greatest PCBs use in caulk. The approach used historical imagery and contemporary land use and involved characterization of randomly selected buildings within the study area, with the result scaled up to extrapolate total building counts and areas in the MRP footprint. Various assumptions, including the frequency of anticipated PCBs detection and PCBs concentrations in the caulk, average mass of caulk per unit building volume, and average building volume, were then applied to calculate an estimate of the total PCBs mass in building caulk in the study area. The evaluation resulted in a mid–range estimate of 10,500 kg PCBs in caulk in buildings located in the study area (low and high estimates were 767 and 46,000 kg, respectively), which equated to an average of 4.7 kg PCBs per building (low and high estimates were 0.6 and 16 kg per building, respectively). The estimate included caulk located on both the interior and exterior of buildings (Klosterhaus et al. 2011). Based upon the information in the SFEI study, the MRP Factsheet assumed an average applicable structure with PCBs concentrations ≥ 50 ppm in the Bay Area contains 5 kg of PCBs (SFBRWQCB 2015).

Basis for Refinement

Data gathered as part of the new demolition control programs will be used to document the quantities and associated PCBs concentrations of priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm. These data will be used to calculate a regional average mass of PCBs per

applicable structure with PCBs concentrations ≥ 50 ppm in priority materials. This calculated regional average mass will be used for the value of Term 2 in Equation 1 (see Table 1).

Because of the new program to manage PCBs in building materials during demolition activities, Permittees have the opportunity to gather real-world data to estimate the mass of PCBs in priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm that is demolished in the region. Over time, these data will be compiled into a dataset that can be used to calculate a regional average mass. This calculated average will account for five priority building materials that potentially contain PCBs previously identified for the program (caulk, rubber window gaskets, thermal insulation, fiberglass insulation, and mastic adhesives), while the estimate in the MRP Factsheet (Table 1) is based upon caulk only.

The information provided in the Screening Form includes two types of data that are needed to calculate the mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm: (1) the quantity of each priority material in the structure, and (2) the concentration of PCBs in each priority material in the structure. These data will be used as inputs in Equation 2 to calculate the total mass of PCBs in the five priority materials for each applicable structure with PCBs concentrations ≥ 50 ppm that undergoes demolition beginning July 1, 2019.

Equation 2. $$Mass\ of\ PCBs\ per\ Structure\ (mg) = [\sum_{i=1}^{n}(C_i \bullet Q_i \bullet F_i)]$$

Where:

C_i = Concentration of PCBs in priority material i (mg/kg)

Q_i = Quantity of priority material i (linear feet or square feet)

F_i = Conversion factor – mass of priority material per linear foot of priority material i (kg/ft) or mass of priority material i per square foot of priority material i (kg/ft^2)

Equation 2 only accounts for the PCBs mass associated with the five priority building materials, so may represent an underestimate of the total PCBs mass in a given building. However, the extent of the underestimate would be small if the five priority materials contain most of the PCBs mass in a building.

The PCBs concentrations in each priority material (C_i) that will be used in Equation 2 is provided on the Screening Form for each applicable structure in units of mg of PCBs per kg of priority material (mg/kg).[3]

[3] Please note that this memorandum does not provide guidance on determining a representative PCBs concentration when multiple samples are collected from a single homogeneous area of a building material, per the sampling protocol (e.g., applying average vs. geomean vs. median to determine central tendency when multiple sample results are available). This type of determination should be made once sufficient data are available about PCBs concentration distributions in building material samples (e.g., after two or three years of data have been collected).

The quantity of each priority material (Q_i) that will be used in Equation 2 is provided on the Screening Form in units of linear feet (ft) for caulk and rubber window gaskets, and square feet (ft^2) for thermal or fiberglass insulation and mastic adhesives. Conversion factors (F_i) for each priority material i were developed to provide the mass of priority material per linear foot or per square foot using Equation 3.

Equation 3. $$\boldsymbol{F_i = (D_i \times \rho_i)}$$

Where:

F_i = mass of priority material i per linear foot (of caulk or rubber window gaskets) of i (kg/ft) or mass of priority material i per square foot (of insulation or mastic) of i (kg/ft^2)

D_i = Assumed dimensions of priority material i (ft^2 or ft)

- For caulk and rubber window gaskets, this represents the assumed cross-sectional area of the caulk bead or the gasket in square feet.
- For insulation and mastic, this represents the thickness of the layer of material in feet.

ρ_i = Assumed density of priority material i (kg/ft^3)

Conversion factors that were developed for each priority building material are shown in Table 2. For caulk and rubber window gaskets, the conversion factors estimate the mass of material per linear foot (kg/ft). For thermal or fiberglass insulation and mastic adhesives, the conversion factors estimate the mass of material per square foot (kg/ft^2). Table 2 identifies typical applications for each priority material and the associated conversion factors that were developed for that application. The conversion factors are presented as a range of values and a "Best" value based on the average or mid-range value.

To develop the conversion factors shown in Table 2, data on common priority material dimensions and densities used in typical building construction were gathered through literature review, product technical specifications, building construction guidelines, and other relevant resources (Panke and Cook 1992, Scheffler and Connolly 1996, Jester 1995). The ranges of assumed dimensions and densities that were used to develop the conversion factors are shown in Table 3. Additional information on the assumptions and data used to populate Table 3 and develop the conversion factors shown in Table 2 is presented below.

Product Dimensions

Multiple construction guides were consulted to identify typical dimensions for common applications of priority materials in building construction. For caulk or rubber gaskets, Table 3 provides a range of typical heights and widths of applications around windows and doorframes, and for caulk, also between concrete expansion joints. For fiberglass or thermal insulation, Table 3 provides a range of typical thicknesses for applications used around HVAC systems, heathers, boilers, and pipes, and inside walls or crawl spaces. For mastic adhesives, Table 3 provides typical thicknesses of the material used under or between roofing material and flashing or used on surfaces between carpet and floor tiles. These dimensions apply to newly applied or installed products and may not reflect the dimensions of an aged/weathered product but represent the best information currently readily available.

Table 2. Conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Descriptions of typical application	Material[1,2,3]	Conversion Factors				
			Range			Best (Average or mid-range value)	Units
Caulk	Around windows or window frames; around door frames	polysulfide caulk	0.009	-	0.04	0.02	kg/ft
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.01	-	0.15	0.04	kg/ft
Rubber Window Gaskets	Around windows or window frames	Butyl Rubber	0.02	-	0.06	0.03	kg/ft
Thermal or Fiberglass Insulation	Around HVAC systems/ heaters/boilers	Felt Insulation	0.09	-	2.3	0.82	kg/ft^2
		Unfaced Blanket Fiberglass	0.03	-	0.28	0.16	kg/ft^2
	Around heated transfer piping	Fiberglass Pipe Insulation	0.06	-	0.62	0.26	kg/ft^2
	Inside walls or crawl spaces	Loose Fiberglass Fill/Batting	0.17	-	0.24	0.21	kg/ft^2
		Rigid Fiberglass Foam Board	0.03	-	0.45	0.17	kg/ft^2
Adhesive Mastics	Below carpet and floor tiles	Floor Mastic	0.06	-	0.13	0.10	kg/ft^2
	On, under or between roofing materials and flashing	Roof Mastic	0.30	-	0.74	0.50	kg/ft^2

1. Panke and Cook, 1992.
2. Scheffler, M. and Connolly, J. 1996.
3. Jester, T.C. 1995.

Product Densities

The density information reported in Table 3 was gathered from readily available commercial literature on a range of reported densities for the five priority materials. Where possible, information on products that were used in the 1950s to 1980s time period and that were known to contain PCBs were used. However, because this type of product-specific information was not readily available, much of the information used to estimate typical product densities (and dimensions) was based on commercially available products that are currently in use for similar types of building and construction applications. For example, prior to 1980, polysulfide caulks and sealants were frequently formulated with PCBs and are commonly found in buildings constructed between 1950 and 1980. Although currently available polysulfide sealants do not contain PCBs, the densities of these types of sealants were used in Table 3 as reasonable approximations of the densities of polysulfide sealants used in the past. Similarly, the densities for other priority materials shown in Table 3 are primarily based on current use products that are similar to products used in the past.

In addition to the lack of technical data on products in use during the 1950s – 1980s, there is a lack of data about the impact of age and weathering on priority material densities. Loss of volatile material will reduce product densities over time, while other weathering factors, such as compression or stretching, may increase or decrease densities over time. In an attempt to better account for age and weathering, available literature was reviewed to identify information on the densities of priority materials in construction and demolition debris and wastes. This type of information was not found on the specific priority materials of interest. However, US EPA (2016) provides estimates for the weight to volume ratios (i.e., densities) of a number of construction and demolition (C&D) waste categories. These categories include concrete, asphalt paving, roofing, wood, gypsum board, metal, rock/gravel/dirt and sand, and bulk waste. The bulk waste category is a generic catchall grouping for the remainder of C&D debris that does not fit into one of the other categories. Although the materials that are included in this generic category are not specified, the priority materials would likely all fall into the generic bulk waste category when disposed.

Therefore, in the absence of other data, the density for C&D bulk waste may be somewhat comparable to the densities of aged/weathered priority materials and can be compared to the densities of new products provided in Table 3. The average priority material densities in Table 3 range from about 1 kg/ft^3 to 40 kg/ft^3, with an average of 12 kg/ ft^3 across all priority materials. The C&D bulk waste density of 8 kg/ft^3 fits within the range of the priority material densities reported in Table 3 and is about 30% less than the average density across all priority materials. This comparison is limited because of the unknown composition of C&D bulk waste but suggests the densities in Table 3 are reasonable approximations for aged/weathered materials.

Average Conversion Factors

Use of the conversion factors shown in Table 2 requires information on the application and material type of the priority building material. It is anticipated that in some cases the available data may be incomplete or may not match the categories in Table 2. Conversion factors that are not specific to the priority building material's application or material type were therefore developed by averaging across applications/types (Table 4). When calculating the mass of PCBs removed from a demolition site, conversion factors from Tables 2 and/or 4 should be selected as appropriate given the level of information available about the associated sample(s).

Table 3. Dimensions and densities for typical construction applications of priority materials used to develop conversion factors.

Priority Material Category	Descriptions of typical application	Material	Typical Product Dimensions (Inches)						Typical Product Density (kg/ft^3)		
			Width			Depth/Thickness					
			Low	Mid	High	Low	Mid	High	Low	Mid	High
Caulk[1,2,3,4,5]	Around windows or window frames; around door frames	polysulfide caulk	0.25	0.38	0.50	0.13	0.19	0.25		42	
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.25	0.5	1	0.125	0.25	0.5		42	
Rubber Window Gaskets[5]	Around windows or window frames	butyl rubber	0.30	0.40	0.50	0.20	0.30	0.40		41	
Thermal/Fiberglass Insulation[5]	Around HVAC systems/ heaters/boilers	felt insulation[6]	n/a			1.0	3.0	5.0	1.1	3.3	5.4
		unfaced blanket fiberglass[7]				0.5	2.8	5		0.68	
	Around heated transfer piping	fiberglass pipe insulation[8]				1.0	2.0	3.0	0.68	1.6	2.5
	Inside walls or crawl spaces	loose fiberglass fill/batting[9]					3.5		0.59	0.70	0.82
		rigid fiberglass foam board[10]				1.0	2.5	4.0	0.32	0.84	1.4
Adhesive Mastics[5]	Below carpet and floor tiles	floor mastic[11]	n/a			0.13	0.19	0.25		6.2	
	On, under or between roofing materials and flashing	roof mastic[12]				0.13	0.19	0.25	29	32	36

1 Pfeiffer M.J., Darwin, D., 1987.
2 Panke, J.R. and John P. Cook. 1992.
3 Hammer & Hand. 2016.
4 M. Scheffler, M. and J. Connolly, J. 1996.
5 Jester, T.C. 1995.
6 Owens-Corning Thermafiber Industrial Felt
7 Owens-Corning unfaced fiber glass blanket
8 Owens-Corning fiberglass pipe insulation
9 Owens-Corning Loose fill insulation and NIST Fiberglass Batt (wall and ceiling insulation)
10 Owens-Corning Foamular Products - rigid polyurethane foam (PUR/PIR)
11 Latricrete Premium Mastic
12 Henry Company Pro-Grade Flashing Cement, Pro-Grade Plastic Cement and Pro-Grade Repair Cement

Table 4. Average conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Conversion Factor	Units
Caulk	0.03	kg/ft
Rubber Window Gaskets	0.03	kg/ft
Thermal/Fiberglass Insulation	0.32	kg/ft^2
Adhesive Mastics	0.30	kg/ft^2

Term 3: Average fraction of PCBs that enters MS4 due to demolition without controls

Current Basis

The average fraction of PCBs that enters the MS4 due to demolition without controls has been estimated at 0.01, based upon professional judgment (i.e., 1% of PCBs in building materials enter MS4s due to demolition without additional controls beyond standard construction site controls). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 3 (see Table 1).

The one percent value presumably incorporates losses to the environment both at the site and during disposal and recycling. Conceptually, this approach assumes that without controls, the transport and fate of the PCBs–containing materials that were in the demolished building fall within three general categories:

1. Released during the demolition (e.g., as part of an initially airborne plume of small particles) and settled in a "halo" around the site. Any wash waters used during the demolition (e.g., during cleaning of equipment, onsite or offsite) that are not fully contained and treated or disposed of could also transport PCBs–containing materials to the MS4.
2. Removed from the site and disposed of as part of the general waste stream (e.g., at a landfill), with some fraction potentially released to the environment during the handling, transport, and disposal process (e.g., during transportation of waste materials by truck to a landfill).
3. Removed from the site with recycled materials, with some fraction potentially released to the environment during the handling, transport, and recycling process (e.g., during transportation of waste materials by truck to a transfer station or recycling facility) or returned to the environment with recycled materials.

This methodology assumes that all PCBs–containing materials released into the environment via any of the above three categories eventually enter the MS4. For example, permanent storage in onsite or offsite pervious areas is assumed to be negligible. All three transport and fate categories are presumably

incorporated into the third term of Equation 1, the average fraction of PCBs that enters MS4s due to demolition without controls.

This methodology also assumes that the effectiveness of any existing controls (e.g., proper offsite disposal of PCBs–containing materials, erosion and sediment controls, and other routine construction site controls) is incorporated into the third term of Equation 1.

Basis for Refinement

BASMAA (2018) summarized the readily available information and studies on the release of PCBs to stormwater from building materials during demolition activities. Building upon those efforts, a follow-up literature review was conducted in 2019 to identify any additional information that could be used to refine the assumed fraction of PCBs that enters MS4s due to demolition without controls in Equation 1, Term 3 (see Table 1). This literature review was also conducted to identify new information that could be used to refine Term 4 (i.e., the fraction of PCBs prevented by controls from entering MS4s). This section summarizes the literature review efforts and identifies the outcomes for Term 3. The literature review outcomes for Term 4 are presented in the next section.

Literature Review

The literature review conducted in 2019 built upon the information summarized in BASMAA (2018). The Google search engine as well as specific scientific literature databases and government websites were searched, including:

- Google Scholar
- Google Books
- SpringerLink
- Wiley Online Library
- American Chemical Society
- ScienceDirect.com
- Elsevier
- US EPA Website

Major search terms (and similar variations or combinations of these terms) that were used included the following:

- PCBs transport and fate
- PCBs in soils/stormwater/demolition/building materials/building demolition/building renovation
- PCBs in caulk/rubber window gaskets/thermal insulation/fiberglass insulation/mastic
- PCBs contaminated sites/cleanup sites/remediation sites
- PCBs in school buildings
- Remediation of PCBs in buildings/building materials
- Construction and Demolition Debris/Waste

- Demolition dust and stormwater impacts
- Soil contamination from PCB-containing caulk/materials/buildings
- PCBs in soil after demolition
- PCB contamination from polysulfide sealants
- PCB-contaminated soil/demolition dust
- Mass of PCBs in Building materials
- Fate of PCBs in the environment/urban environment/caulk/building materials
- PCBs Source apportionment
- PCBs Waste characterization
- Accumulation rates of PCBs in soils
- PCB cleanup and disposal programs
- Managing remediation waste from PCB cleanups
- Handling and disposal of PCBs waste
- Improved recycling practices/BMP effectiveness and stormwater impacts
- PCBs sources/emissions/releases from caulk/buildings/schools
- PCBs emissions during demolition/renovation/abatement/replacement/removal of caulk
- Dust from demolition and construction sites

In addition, online searches were performed to identify any new research that had cited one or more of the studies previously described in BASMAA (2018). These citations were reviewed to identify any relevant studies that may have occurred more recently and relied upon these earlier studies.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs entering MS4s due to demolition activity without controls in Equation 1, Term 3 (see Table 1). To date, the vast majority of research on the release of PCBs contained in building materials has focused on human health risks and quantifying human exposures via air, ingestion, and/or dermal pathways. It appears the release of PCBs to stormwater from building materials in general, and specifically during demolition or renovation activities has not been quantitatively studied, outside of the limited studies reported previously in BASMAA (2018). These earlier studies developed conceptual models and thought experiments to estimate the fraction of PCBs released based on the limited measurement data available. Without new measurement data, however, further attempts to improve upon these efforts and reduce uncertainty in the current estimate of Term 3 are not warranted.

BASMAA (2018) recommends exploring whether disposal and/or recycling practices have improved in recent years such that less PCBs would be lost to the environment via these pathways. Evidence was not found during the literature review of improved recycling or disposal practices implemented in the Bay Area in recent years that would result in reduced releases of PCBs to MS4s from demolition materials.

This finding is further supported by anecdotal information about recycling facilities in the South Bay Area. Over the past 5+ years Santa Clara Valley MRP Permittees have been investigating sources of PCBs to public ROWs in industrial areas and have frequently targeted facilities where demolition materials are brought on site for recycling. These investigations have documented poor housekeeping practices, visible scrap material and soils tracking off sites, and general lack of appropriate stormwater BMPs at many of these types of facilities which have resulted in citations during municipal stormwater inspections. Overall, these investigations have found large inconsistencies in materials handling practices across facilities, and even at the same facility over time. Although not a quantitative assessment, this information suggests that it is unlikely consistent improvements in recycling practices across facilities have occurred in recent years.

Term 4: Average fraction of PCBs prevented by new controls from entering MS4

Current Basis

The estimated fraction of PCBs prevented by new controls from entering MS4s has been estimated at 0.8, based mainly upon professional judgment (i.e., 80% of PCBs are prevented from entering MS4s due to the new programs to manage PCBs during building demolition). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 4 (see Table 1).

Basis for Refinement

As described above, a review of readily available literature was conducted in 2019 to identify any new information that could be used to refine the assumed effectiveness of controls to prevent PCBs from entering MS4s (Term 4). The literature review efforts are summarized in the above section on Term 3. This section presents the outcomes of the literature review for Term 4.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs prevented by new controls from entering MS4s. However, BASMAA (2018) identified two earlier studies that estimated 99% capture of PCBs contained in caulk removed from buildings using appropriate abatement measures (high power vacuums and power washing during removal). Based on these data, a reasonable assumption is that the new control programs will be similarly effective at capturing PCBs in priority materials that, prior to demolition, are removed from a building using appropriate abatement methods. Given the new programs are focused on controlling PCBs in priority materials only, the use of a lower (80%) value for the overall effectiveness of the controls at preventing PCBs from entering MS4s (Term 4) appears reasonable.

Using Data from New Program on PCBs Mass in Priority Building Materials

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs presumably removed from the building before demolition. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0

Factsheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Equation 1 and Table 1 may be set to 1 when evaluating the PCBs load avoided using PCBs mass in priority building materials data from the new program, since it may be assumed that the program removes 100% of the priority materials with PCBs ≥ 50 ppm that were identified by the sampling protocol.

4. POTENTIAL FUTURE REFINEMENTS TO THIS METHODOLOGY

It should be noted that the new program for controlling PCBs during building demolition is in its early stages, having begun implementation only recently (i.e., on July 1, 2019). The data generated during the first fiscal year of the program have not yet been compiled and evaluated. As experience is gained in implementing the program and the associated data are collected and evaluated, and/or new information becomes available from any other source, the need may arise to revise the data collection and assessment methodology presented in this memorandum. As needed, staff from the countywide programs in the MRP area will work with MRP Permittee and Regional Water Board staff to make any future refinements to the program and methodology.

5. REFERENCES

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Appendix 12-1

Collection of Street Sweeping Data- Co-permittees

- Summary of Street Sweeping Activities for FY 2019-2020
- Summary of Co-permittee Street Sweeping Activities and Estimated Mean Pollutant Load Reduction for Copper and Nickel - FY 2019-2020
- Summary of Co-permittee Street Sweeping Activities and Estimated Mean Pollutant Load Reduction for Lead and Zinc - FY 2019-2020

Santa Clara Valley Urban Runoff Pollution Prevention Program

Summary of Co-permittee Street Sweeping Activities - FY 2019-2020

Municipality	Miles of Paved Streets	Total Miles Swept	Volume of Material Collected	Removal Rate Vol./ Mile	Leaves Collected	Yard Waste Collected
City of Cupertino[1,2,3,14,15]	308	9,558	1,840 yd^3	0.19 yd^3/miles		8,695 yd^3
City of Los Altos	108	5,793	2,322 yd^3	0.40 yd^3/miles		14,226 yd^3
Town of Los Altos Hills[1,2]	57	1,364	6 yd^3	0.005 yd^3/miles		86 tons
City of Milpitas	126	10,544	1,780 yd^3	0.17 yd^3/miles		21,685 yd^3
City of Mountain View	340	6,685	6,442 yd^3	0.96 yd^3/miles	340 yd^3	
City of Palo Alto[7]	419	19,783	1,239 yd^3	0.06 yd^3/miles	10,500 yd^3	14,799 tons
City of San José[1,2,8,14]	6,930	60,977	7,366 yd^3	0.12 yd^3/miles	49,552 yd^3	135,575 tons
City of Santa Clara[9,16,20]	247	29,837	8,759 yd^3	0.29 yd^3/miles	1,785 yd^3	10,727 yd^3
City of Sunnyvale[4,17,18]	734	21,751	12,409 yd^3	0.57 yd^3/miles	1,930 yd^3	
West Valley Communities						
City of Campbell[5,6,10,14,21]	149	9,339	2,784 yd^3	0.30 yd^3/miles		7,590 tons
Town of Los Gatos[14]	110	2,849	1,318 yd^3	0.46 yd^3/miles		7,403 tons
City of Monte Sereno[14,19]	28	154	49 yd^3	0.32 yd^3/miles		1,011 tons
City of Saratoga[2,11,14]	275	6,600	2,486 yd^3	0.38 yd^3/miles		2,488 tons
County of Santa Clara	232	10,078	2,400 yd^3	0.24 yd^3/miles		
Santa Clara Valley Water District[12]	---	---	---	---	---	---
TOTALS	**10,063 miles**	**195,312 miles**	**51,200 yd^3 (33,255 tons)[13]**		**64,107 yd^3**	**168,952 tons** **55,333 yd^3**
AVERAGE		**13,951 miles**	**3,657 yd^3**	**0.26 yd^3/miles**		

Notes:

1. Leaf litter included in material removed.
2. No leaf removal program other than routine street sweeping or yard waste collection.
3. Regenerative air equipment is used for sweeping.
4. Report total miles covered by sweepers including areas operated in tandem or repeated.
5. Heavy leaf areas are swept weekly.
6. Heavy leaf sweeping conducted in January.
7. Food scraps are collected as part of yard waste collection program.
8. DOT uses a small parking lot sweeper for cleaning small tight areas. .
9. Annual Cleanup Campaign - residential streets are only swept once during the durationof the Cleanup Campaign (4 weeks).
10. Performed two enhanced sweeps per month in areas of heavy parking traffic. (e.g., apartment complexes and commercial buildings).
11. Beginning July 1, 2012, sweeping on residential streets has increased from once a month to twice a month.
12. Does not conduct street sweeping.
13. To determine the total volume of material removed in tons, it is necessary to convert cubic yards to tons. It is estimated that the average density of street sweeping material is 1,299 pounds per cubic yard (0.6495 tons per cubic yard) (Source: EOA, Inc., October 1996, Estimation of Copper Collected Through Street Sweeping Efforts. Prepared for San Mateo Countywide Stormwater Pollution Prevention Program). A value of 44,052 tons is calculated when 67,824 cubic yards is converted over to tons (67,824 cubic yards* .6495 tons/cubic yard= 44,052 tons).
14. Co-permittees co-mingle leaf litter with yard trimmings. The value reported represents the total weight or total volume of yard waste collected by individual Co-permittees. Co-perrmittees do not have the ability to separate the weight or volume of leaves from this waste stream.
15. As in previous years, the City of Cupertino promoted leaf collection. Advertisements were placed on social media to promote moving cars to allow access to the curb. Door hangers were placed in certain parts of a neighborhood to promote extra leaf collection. Additional sweeping was added to a section of Foothill Expressway to control gravel debris.
16. Leaf Season is November and December. During the annual clean-up campaign, street sweeping crews were reassigned to follow clean-up campaign crews
17. Staff posted twelve (15) street for special sweeps
18. Posted four streets and performed 34 special sweeps.
19. Two days of sweeping once every quarter (four times/year). COVID-19 sweeping occurred October to December.
20. Starting in March 2020, there was a brief lapse in street sweeping due to the Covid-19 pandemic and the associated shelter-in-place order. Street sweeping frequency has since returned to pre Covid-19 levels.
21. Parr Ave. swept at Capri School.

Santa Clara Valley Urban Runoff Pollution Prevention Program

Summary of Co-permittee Street Sweeping Activities and Estimated Mean Pollutant Load Reduction for Copper and Nickel - FY 2019-2020

Municipality	Miles of Paved Streets	Miles Swept				Volume of Material Collected (Cubic Yards)				Estimated Mean Pollutant Load Reduction (Pounds)							
										Copper[2]				Nickel[3]			
		Res.	Com.	Ind.	Total	Res.	Com.	Ind.	Total	Res.	Com.	Ind.	Total	Res.	Com.	Ind.	Total
City of Cupertino	308	6,723	2,835	---	9,558	1,216	624	---	1,840	24.78	12.57	---	37.35	48.98	24.88	---	73.86
City of Los Altos	108	3,803	1,990	---	5,793	1,710	612	---	2,322	34.85	12.33	---	47.18	68.88	24.41	---	93.28
City of Los Altos Hills	57	1,364	---	---	1,364	6	---	---	6	0.13	---	---	0.13	0.26	---	---	0.26
City of Milpitas	126	5,482	5,062	---	10,544	940	841	---	1,780	19.14	16.94	---	36.08	37.84	33.52	---	71.36
City of Mountain View	340	4,188	1,502	996	6,685	4,007	1,467	968	6,442	81.65	29.55	104.63	215.83	161.39	58.49	20.25	240.13
City of Palo Alto	419	12,132	5,983	1,668	19,783	759	376	104	1,239	15.47	7.57	11.24	34.28	30.57	14.99	2.18	47.74
City of San José	6,930	36,084	5,307	19,586	60,977	4,655	818	1,893	7,366	94.86	16.48	204.62	315.95	187.49	32.61	39.61	259.72
City of Santa Clara	247	22,509	---	7,328	29,837	6,315	---	2,444	8,759	128.68	---	264.18	392.86	254.36	---	51.14	305.49
City of Sunnyvale[3]	734	13,041	5,957	2,753	21,751	8,977	2,323	1,109	12,409	182.93	46.79	119.87	349.59	361.57	92.62	23.20	477.40
West Valley Communities																	
City of Campbell	149	6,702	2,637	---	9,339	1,568	1,216	---	2,784	31.95	24.49	---	56.45	63.16	48.48	---	111.64
Town of Los Gatos	110	1,212	1,637	---	2,849	489	829	---	1,318	9.96	16.69	---	26.65	19.70	33.03	---	52.73
City of Monte Sereno[4]	28	154	---	---	154	49	---	---	49	1.00	---	---	1.00	1.97	---	---	1.97
City of Saratoga	275	5,040	1,560	---	6,600	1,928	558	---	2,486	39.29	11.24	---	50.53	77.66	22.25	---	99.90
County of Santa Clara	232	---	10,078	---	10,078	---	2,400	---	2,400	---	48.34	---	48.34	---	95.69	---	95.69
Santa Clara Valley Water District[1]																	
TOTALS	**10,063**	**118,434**	**44,548**	**32,331**	**195,312**	**32,619**	**12,063**	**6,518**	**51,200**	**665**	**243**	**705**	**1,612**	**1,314**	**481**	**136**	**1,931**

Notes:

1. Does not conduct street sweeping.

2. To determine the estimated pollutant load reduction of copper (in pounds), the volume of material collected from each Co-permittee land use type (i.e., residential, commercial and industrial) was multiplied by the mean concentration of trace metal content for street sweeping samples determined in the study entitled Chemical and Physical Characteristics of Street Sweeping Sediments in Tampa, Florida, May 1999. In this study, the mean copper concentration for samples collected in residential areas (n=51) was 23.51 mg/kg. In addition the mean copper concentrations for samples collected in commercial (n=17) and industrial (n=7) areas was 23.24 mg/kg and 124.71 mg/kg, respectively. These values were then converted over to pounds and summed to represent the estimated mean pollutant load reduction for copper. A sample calculation is as follows: (1216*23.51*6.43*0.785*0.85)/(0.00495*1000*1000) =24.78

3. To determine the estimated pollutant load reduction of nickel (in pounds), the volume of material collected from each Co-permittee land use type (i.e., residential, commercial and industrial) was multiplied by the mean concentration of trace metal content for street sweeping samples determined in the study entitled Chemical and Physical Characteristics of Street Sweeping Sediments in Tampa, Florida, May 1999. In this study, the mean nickel concentration for samples collected in residential areas (n=51) was 46.47 mg/kg. In addition the mean nickel concentrations for samples collected in commercial (n=17) and industrial (n=7) areas was 46.00 mg/kg and 24.14 mg/kg, respectively. These values were then converted over to pounds and summed to represent the estimated mean pollutant load reduction for nickel. A sample calculation is as follows: (1710*46.47*6.43*0.785*0.85)/(0.00495*1000*1000)= 68.88

4. The City of Monte Sereno is entirely residential zoned development. However, for the purposes of applying pollutant load rates, the City Hall parking lot area is reported separately and categorized as commercial type of use.

Santa Clara Valley Urban Runoff Pollution Prevention Program

Summary of Co-permittee Street Sweeping Activities and Estimated Mean Pollutant Load Reduction for Lead and Zinc - FY 2019-2020

Municipality	Mile of Paved Streets	Miles Swept				Volume of Material Collected (Cubic Yards)				Estimated Mean Pollutant Load Reduction (Pounds)							
										Lead[2]				Zinc[3]			
		Res.	Com.	Ind.	Total	Res.	Com.	Ind.	Total	Res.	Com.	Ind.	Total	Res.	Com.	Ind.	Total
City of Cupertino	308	6,723	2,835	---	9,558	1,216	624	---	1,840	46.16	60.03	---	106.20	62.14	42.54	---	104.68
City of Los Altos	108	3,803	1,990	---	5,793	1,710	612	---	2,322	64.92	58.90	---	123.82	87.39	41.73	---	129.12
City of Los Altos Hills	57	1,364	---	---	1,364	6	---	---	6	0.24	---	---	0.24	0.32	---	---	0.32
City of Milpitas	126	5,482	5,062	---	10,544	940	841	---	1,780	35.67	80.89	---	116.56	48.01	57.31	---	105.33
City of Mountain View	340	4,188	1,502	996	6,685	4,007	1,467	968	6,442	152.12	141.13	98.16	391.41	204.77	100.00	80.79	385.56
City of Palo Alto	419	12,132	5,983	1,668	19,783	759	376	104	1,239	28.81	36.17	10.55	75.54	38.79	25.63	8.68	73.10
City of San José	6,930	36,084	5,307	19,586	60,977	4,655	818	1,893	7,366	176.72	78.70	191.97	447.39	237.89	55.76	157.99	451.64
City of Santa Clara	247	22,509	---	7,328	29,837	6,315	---	2,444	8,759	239.74	---	247.85	487.59	322.72	---	203.97	526.69
City of Sunnyvale	734	13,041	5,957	2,753	21,751	8,977	2,323	1,109	12,409	340.80	223.49	112.46	676.76	458.76	158.36	92.56	709.67
West Valley Communities																	
City of Campbell	149	6,702	2,637	---	9,339	1,568	1,216	---	2,784	59.53	116.99	---	176.52	80.13	82.89	---	163.03
Town of Los Gatos	110	1,212	1,637	---	2,849	489	829	---	1,318	18.56	79.71	---	98.27	24.99	56.48	---	81.47
City of Monte Sereno[4]	28	154	---	---	154	49	---	---	49	1.86	---	---	1.86	2.50	---	---	2.50
City of Saratoga	275	5,040	1,560	---	6,600	1,928	558	---	2,486	73.19	53.68	---	126.88	98.53	38.04	---	136.57
County of Santa Clara	232	---	10,078	---	10,078	---	2,400	---	2,400	---	230.90	---	230.90	---	163.61	---	163.61
Santa Clara Valley Water District[1]																	
TOTALS	**10,063**	**118,434**	**44,548**	**32,331**	**195,312**	**32,619**	**12,063**	**6,518**	**51,200**	**1,238**	**1,161**	**661**	**3,060**	**1,667**	**822**	**544**	**3,033**

Notes:

1. Does not conduct street sweeping.

2. To determine the estimated pollutant load reduction of lead (in pounds), the volume of material collected from each Co-permittee land use type (i.e., residential, commercial and industrial) was multiplied by the concentration of trace metal content for street sweeping samples determined in the study entitled Street Sweeping for Pollutant Removal, Department of Environmental Protection, Montgomery County, Maryland, February 2002. In this study, the lead concentration for samples collected in residential areas was 43.8 mg/kg. In addition the lead concentrations for samples collected in commercial and industrial areas was 111 mg/kg and 117 mg/kg, respectively. These values were then converted over to pounds and summed to represent the estimated mean pollutant load reduction for lead. A sample calculation is as follows: (1216*43.8*6.43*0.785*0.85)/(0.00495*1000*1000)= 46.16

3. To determine the estimated pollutant load reduction of zinc (in pounds), the volume of material collected from each Co-permittee land use type (i.e., residential, commercial and industrial) was multiplied by the mean concentration of trace metal content for street sweeping samples determined in the study entitled Chemical and Physical Characteristics of Street Sweeping Sediments in Tampa, Florida, May 1999. In this study, the mean zinc concentration for samples collected in residential areas (n=51) was 58.96 mg/kg. In addition the mean zinc concentrations for samples collected in commercial (n=17) and industrial (n=7) areas was 78.65 mg/kg and 96.29 mg/kg, respectively. These values were then converted over to pounds and summed to represent the estimated mean pollutant load reduction for zinc. A sample calculation is as follows: (1710*58.96*6.43*0.785*0.85)/(0.00495*1000*1000)= 87.39.

4. The City of Monte Sereno is entirely residential zoned development. However, for the purposes of applying pollutant load rates, the City Hall parking lot area is reported separately and categorized as commercial type of use.

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

555 County Center
Redwood City, CA 94063

P 650.599.1406
F 650.361.8227
flowstobay.org

September 30, 2020

Mr. Michael Montgomery
Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

SUBJECT: SUBMITTAL OF THE SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM'S FY 2019/20 ANNUAL REPORT

Dear Mr. Montgomery:

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), a program of the City/County Association of Governments of San Mateo County (C/CAG), is pleased to submit the attached Fiscal Year 2019/20 Annual Report. This report describes Municipal Regional Permit (MRP) compliance activities conducted at the regional and countywide levels on behalf of San Mateo County municipalities. It also incorporates by reference and includes as appendices three reports submitted by the Bay Area Stormwater Management Agencies Association (BASMAA) on behalf of all Bay Area MRP Permittees.

I certify under penalty of law that the SMCWPPP FY 2019/20 Annual Report was prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my enquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

SMCWPPP and the 22 municipal agencies in San Mateo County look forward to continuing to work with you and your staff on implementation of the MRP. If you have any questions or comments, please email me at mfabry@smcgov.org.

Sincerely,

Matthew Fabry

Matthew Fabry
Program Manager

Attachment: SMCWPPP FY 2019/20 Annual Report

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
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www.flowstobay.org

FY 2019/2020 Annual Report

September 30, 2020

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Credits

This report is being submitted by the participating agencies in the

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
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Town of Atherton
City of Belmont
City of Brisbane
City of Burlingame
Town of Colma
City of Daly City
City of East Palo Alto
City of Foster City
City of Half Moon Bay
Town of Hillsborough
City of Menlo Park
City of Millbrae
City of Pacifica
Town of Portola Valley
City of Redwood City
City of San Bruno
City of San Carlos
City of San Mateo
County of San Mateo
SM County Flood Control District
City of South San Francisco
Town of Woodside

Prepared for:
San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)
555 County Center, Redwood City, CA 94063
A Program of the City/County Association of Governments (C/CAG)

Prepared by:
EOA, Inc.
1410 Jackson St., Oakland, CA 94610

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- Annual Reporting for FY 2019-2020, New Development and Redevelopment

LIST OF ACRONYMS

BASMAA	Bay Area Stormwater Management Agencies Association
BAWSCA	Bay Area Water Supply and Conservation Agency
BMPs	Best Management Practices
BSM	Biotreatment Soil Mix
C3TG	C.3 Stormwater Technical Guidance
CALBIG	California Building Inspectors Group
CASQA	California Stormwater Quality Association
C/CAG	City/County Association of Governments of San Mateo County
CEH	County Environmental Health
CEQA	California Environmental Quality Act
CII	Commercial/Industrial/Illicit Discharge
DC	Development Committee
DIY	Do-It-Yourself
DO	Dissolved Oxygen
DPR	Department of Pesticide Regulation
EPA	Environmental Protection Agency
FY	Fiscal Year
GSRD	Gross Solids Removal Device
GI	Green Infrastructure
GIS	Geographic Information System
IPM	Integrated Pest Management
IMR	Information Monitoring Report
JPA	Joint Powers Authority
LID	Low Impact Development
MRP	Bay Area Stormwater NPDES Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NDS	New Development Subcommittee
NPDES	National Pollutant Discharge Elimination System
OAL	California Office of Administrative Law
O&M	Operations and Maintenance
OWOW	Our Water Our World

PCBs	Polychlorinated Biphenyls
PIP	Public Information and Participation
POC	Pollutants of Concern
POTW	Publicly-Owned Treatment Works (sewage treatment plants)
RFQ	Request for Qualifications
RMP	San Francisco Estuary Regional Monitoring Program
SAP	Sampling and Analysis Plan
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEP	San Francisco Estuary Partnership
SFEI	San Francisco Estuary Institute
SMC	San Mateo County
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
STLS	Small Tributaries Load Strategy
SWRP	Stormwater Resource Plan
SWPPP	Stormwater Pollution Prevention Plan
TAC	Technical Advisory Committee
TMA	Trash Management Area
TMDL	Total Maximum Daily Load
WLA	Waste Load Allocation
WY	Water Year

EXECUTIVE SUMMARY

INTRODUCTION

This FY 2019/20 Annual Report was developed in compliance with the reissued National Pollutant Discharge Elimination System (NPDES) Municipal Regional Permit (referred to as the MRP)[1] for stormwater runoff discharges from San Mateo County and certain other San Francisco Bay Area communities. It summarizes stormwater management activities implemented by the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP or Countywide Program) in FY 2019/20. SMCWPPP's activities benefit 22 municipal agencies in San Mateo County: 15 cities, five towns, the County of San Mateo, and the San Mateo County Flood Control District.[2] Each of these agencies also separately submits an individual Annual Report to the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) focusing on that agency's stormwater management activities during FY 2019/20.

SMCWPPP is a program of the City/County Association of Governments (C/CAG) of San Mateo County. C/CAG is a Joint Powers Authority (JPA) that addresses issues of regional importance to San Mateo County jurisdictions such as congestion management and water quality. The C/CAG Board of Directors is comprised of a local elected city council representative from each city and town in San Mateo County, a member of the County Board of Supervisors, and representatives from the transit district and transportation authority. A 1993 amendment to the JPA Agreement made C/CAG responsible for assisting San Mateo County municipalities with complying with the municipal stormwater NPDES permit, including its latest incarnation as the MRP. Stormwater management-related activities of C/CAG and its various related committees and workgroups are described below.

C/CAG Board

Throughout FY 2019/20, the C/CAG Board of Directors received presentations, updates, and took actions on various stormwater-related issues, as summarized below (all C/CAG Board meeting agenda materials and minutes are available at www.ccag.ca.gov/board-of-directors):

- July 2019 - Board received a copy of extended Task Order with EOA, Inc. of Oakland CA for technical support to the Countywide Program;
- September 2019 – Received a presentation on the County's proposed disposable foodware ordinance including its benefits for trash load reduction; received copies letters to Assembly Member Mullin for his support in securing a $3 million budget allocation for C/CAG to advance multi-benefit regional stormwater projects and supporting AB 825 to establish the San Mateo County Flood and Sea Level Rise Resiliency District (FSLRRD);

[1]NPDES Permit No. CAS612008 (Order No. R2-2015-0049), dated November 19, 2015. The MRP has a five-year term: effective January 1, 2016 and expires December 31, 2020.

[2]As of January 1, 2020, the San Mateo County Flood and Sea Level Rise Resiliency District (SMCFSLRRD).

- October 2019 – Approved an amendment adding additional funds to the Paradigm Environmental Funding Agreement for developing a Countywide Sustainable Streets Master Plan; approved appointing Nikki Nagaya to the C/CAG Stormwater Committee to represent the City of Menlo Park;
- December 2019 – Approved materials to execute $2.94 M funding agreement with the California Natural Resources Agency (CNRA) for advancing multi-benefit regional stormwater projects, endorsing a new FSLRRD proposal; appointed of Sam Bautista to Stormwater Committee for City of Pacifica;
- February 2020 – Received notice of the March "Green Streets for Sustainable Communities" symposium and "Shore to Shore: Envisioning San Mateo County's Resilient Water Future" event (both were subsequently canceled due to COVID-19);
- April 2020 – Approved appointments of Peter Brown (Belmont) and Andrew Yang (Millbrae) to the C/CAG Stormwater Committee; approved reallocating unspent Measure M vehicle registration administration and interest earnings revenue to C/CAG programs, including $228k to the Countywide Stormwater Program;
- May 2020 - Received copies of no-cost time extensions for six Safe Routes to School / Green Streets Infrastructure Pilot Program projects for the following jurisdictions: Brisbane, Colma, East Palo Alto, Menlo Park, Pacifica and Redwood City; approved Resolution 20-21, authorizing the application for $97,671 in grant funding from the California Resilience Challenge for the Resilient San Carlos Schoolyards project; and
- June 2020 – Approved the FY 2019/20 C/CAG Budget, including budget for SMCWPPP; approved consultant Task Orders and Funding Agreements.

Program Manager and Staff

C/CAG's Program Manager oversees the overall Countywide Program, serving as staff to the C/CAG Board and liaison among San Mateo County municipalities, technical consultants, committees, the Bay Area Stormwater Management Agencies Association (BASMAA), the California Stormwater Quality Association (CASQA), and Regional Water Board staff. The Program Manager represents San Mateo County municipalities at regional and statewide meetings and manages technical consultants that support programmatic activities. C/CAG's Stormwater Program Specialist supports the Program Manager in implementing the Countywide Program. In addition to providing regular staff support, agenda reports, and presentations to the C/CAG Board and the Stormwater Committee, the Program Manager and staff participated in the following activities during the FY 2019/20 reporting year:

- BASMAA: The Program Manager continued representing the Countywide Program on the Board of Directors (continued serving as Vice-Chair in 2019 and again as Chair starting in 2020). Program Manager and staff participated in Board meetings, BASMAA regional project meetings, and BASMAA committee meetings.
- CASQA: The Program Manager finished the two-year term as co-chair of the CASQA Legislative Committee; staff attended and presented at the annual CASQA conference.
- San Francisco Estuary Partnership Implementation Committee: The Program Manager continued serving on the committee representing the municipal stormwater perspective, participating in quarterly meetings.

- The Program Manager continued serving a one-year term as an expert consultant to the US EPA Environmental Finance Advisory Board to assist in responding to a congressional request for information regarding stormwater funding and financing, including attending a second in-person meeting in Kansas City, MO in October.
- The Program Manager / staff gave presentations via organizations such as the Regional Water Board, Metropolitan Transportation Commission, FSLRRD, BASMAA, San Francisco Bay Regional Monitoring Program (RMP), and CASQA on a variety of topics such as stormwater management, sustainable streets, and green infrastructure (GI).
- Grant-funded Project Activities:
    - Continued representing BASMAA on the Urban Greening Bay Area grant from EPA (Water Quality Improvement Fund) to the San Francisco Estuary Partnership / Association of Bay Area Governments. Although BASMAA's grant project finished in FY 2018/19, additional unused funding from other grant tasks was shifted to the BASMAA Roundtable effort to further advance the specific actions to prioritize sustainable streets in funding sources. The Program Manager, in conjunction with the project consultant and Roadmap Implementation Committee, began work to create fact sheets that clarify the eligibility of GI in transportation funding programs. This work continued in FY 2019/20, including meeting with Metropolitan Transportation Commission, Caltrans, and California Transportation Commission staff, and getting review/comment on draft materials from Federal Highway Administration staff.
    - C/CAG staff worked with the CNRA to allocate $2.94 million in State General Funds to advance designs of multi-benefit regional stormwater capture facilities. $200K of the funds were kept with C/CAG for additional planning to find more regional stormwater capture project opportunities and develop project concepts and a business case for countywide collaboration on regional stormwater management (leveraging $100K obtained by the County Office of Sustainability for a similar purpose) and $913K each to the Cities of Belmont, Redwood City, and San Bruno for initiating design of regional stormwater capture projects at Twin Pines Park, the I-280/380 interchange, and Red Morton Park, respectively. C/CAG staff worked with the Cities of San Bruno and Redwood City and the County Office of Sustainability on a joint Request for Proposals for technical consultant support for each agency's respective components of the work. Belmont is working with the FSLRRD to pursue its regional project in conjunction with a $1 million grant to design creek restoration efforts in Twin Pines Park on Belmont Creek.
    - Continued implementing the Countywide Sustainable Streets Master Plan under the $986,300 Caltrans Adaptation Planning grant. This plan will prioritize street segments for including GI with other planned investments, such as bike/pedestrian and complete streets projects, safe routes to school improvements, and pavement rehabilitation. In developing the plan, C/CAG's consultant team will also be doing climate change modeling related to precipitation, public outreach/engagement, developing project concepts, and creating a web-based tracking tool. See Section 3 of this report (C.3 New Development and Redevelopment) for more details.
    - C/CAG staff submitted a successful grant proposal to the California Resilience Challenge, receiving $97K to develop resilient schoolyard concepts for San Carlos School District sites, showing how GI can be integrated to help reduce runoff, improve water quality, recharge groundwater, and reduce urban heat islands.

Stormwater Committee

C/CAG's stormwater management-related decisions are generally made in consultation with the NPDES Stormwater Committee. At its November 2012 meeting, the C/CAG Board authorized reconvening this committee to include director-level appointees with decision-making authority for implementing stormwater management programs within San Mateo County municipalities in compliance with requirements in the MRP. The Committee meets on an approximate bimonthly basis (depending on need) on the third Thursday of the month at the San Mateo County Transit District Office in San Carlos.

The Stormwater Committee met six times during FY 2019/20 (August, September, November, April, May, and June) to assist with planning and organizing SMCWPPP's stormwater management activities including MRP compliance actions. Appendix 1 includes a table summarizing attendance at the Stormwater Committee meetings held during FY 2019/20. Details on Stormwater Committee meeting agendas, minutes, and presentations can be found on the Committee's website.

Technical Advisory Committee and Subcommittees

The Stormwater Committee provides direction to and receives feedback and recommendations from the Technical Advisory Committee (TAC). During FY 2012/13, the TAC transferred its former policy-related functions to the Stormwater Committee and transitioned to a quarterly workshop format. The new format allowed more detailed discussion of MRP compliance topics, including check-ins on what jurisdictions should be focused on in the coming quarter and what should have been accomplished and documented in the preceding quarter. The TAC did not meet in FY 2019/20 but received regular emails from the Program Manager and staff with updates on key permit compliance topics and occasional requests for feedback. SMCWPPP has also established various subcommittees and work groups to the TAC that met regularly during FY 2019/20 to help implement the different aspects of MRP, as discussed below.

Flood and Sea Level Rise Resiliency District

AB 825 (Mullin) became law on January 1, 2020, officially revamping the San Mateo County Flood Control District to become the San Mateo County Flood and Sea Level Rise Resiliency District. The FSLRRD is intended to address sea level rise, coastal erosion, flooding, and regional stormwater management. As such, assuming the FSLRRD can secure long-term, sustainable funding during the startup period, it will likely play a key role in helping to design, build, and maintain regional stormwater facilities that will help achieve water quality goals in the MRP. The three-year funding commitment by the County and cities/towns ($4.5 million over three years) is an important step forward for achieving integrated water management in San Mateo County.

The C/CAG Board appointed the five city/town elected officials to the governing board. The County Board of Supervisors appointed the two supervisors. The seven governing board members representing the different geographic areas in the county are:

- North: Donna Colson, City of Burlingame
- Central: Diane Papan, City of San Mateo
- South: Lisa Gauthier, City of East Palo Alto
- Coast: Debra Ruddock, City of Half Moon Bay

- At-Large: Maryann Derwin, Town of Portola Valley
- Coast Supervisor: Don Horsley
- At-Large Supervisor: Dave Pine

In June 2019, the governing board began acting as an advisory committee to the Board of Supervisors in its capacity as the governing board of the existing Flood Control District as AB 825 moved through the legislature. The advisory committee initially focused on hiring an Executive Director for the FSLRRD, and Len Materman (former San Francisquito Creek Joint Powers Authority Executive Director) was brought on as Chief Executive Officer in May 2020. The advisory committee officially became the FSLRRD Board of Directors on January 1, 2020. Interim information from the advisory committee can be found at www.resilientsanmateo.org and information on the official FSLRRD can be found at its new website, www.oneshoreline.org. The FSLRRD inherits the MRP permittee responsibilities of the prior Flood Control District, with those duties currently contracted back to the County Department of Public Works for implementation and reporting. The FSLRRD will need to be included as a replacement permittee under the MRP with its reissuance in 2021.

Municipal Regional Permit Reissuance

It is anticipated that the MRP will be reissued in 2021. The reissued permit is referred to as MRP 3.0 (the current permit is referred to as MRP 2.0). During FY 2019/20, SMCWPPP and San Mateo County Permittee staff continued to participate in the ongoing reissuance process. The process facilitates Regional Water Board, Bay Area countywide stormwater program, and MRP Permittee staff, and representatives from other organizations, working together through an overarching Steering Committee and several workgroups specific to MRP provisions/topics. For example, SMCWPPP and San Mateo County Permittee staff participated in the MRP 3.0 C.3/GI Work Group to discuss, internally and with Regional Water Board staff, issues to be addressed in Provision C.3 (New Development and Redevelopment) of MRP 3.0. SMCWPPP staff helped to lead these efforts and co-led the Work Group. In FY 2019/20, the C.3/GI Work Group met approximately monthly, including 10 meetings held with Regional Water Board staff and several internal meetings. Key issues discussed included: regulated project thresholds, regulation of single-family homes, regulation of road reconstruction projects, alternative compliance options, Special Projects provisions, asset management, and future GSI requirements. During FY 2019/20, the Program Manager, SMCWPPP, and Permittee staff also participated in the Steering Committee and several other MRP 3.0 work groups (e.g., C.4/5, C.8, C.10, and C.11/12). In addition, SMCWPPP staff co-led the MRP 3.0 C.8 (Water Quality Monitoring) Work Group.

ORGANIZATION OF REPORT

This FY 2019/20 Annual Report is structured around the following major provisions of the MRP:

- C.2. Municipal Operations
- C.3. New Development and Redevelopment
- C.4. Industrial and Commercial Site Controls
- C.5. Illicit Discharge Detection and Elimination
- C.6. Construction Site Control

- C.7. Public Information and Outreach
- C.8. Water Quality Monitoring
- C.9. Pesticides Toxicity Control
- C.10. Trash Load Reduction
- C.11. Mercury Controls
- C.12. PCBs Controls
- C.13. Copper Controls
- C.15. Exempted and Conditionally Exempted Discharges

The following sections briefly summarize how SMCWPPP provided assistance in FY 2019/20 in implementing the MRP for each of the above provisions.

C.2 Municipal Operations

The objective of MRP Provision C.2 is "to ensure development and implementation of appropriate Best Management Practices (BMPs) by all Permittees to control and reduce discharges of non-stormwater and stormwater runoff pollutants to storm drains and watercourses during operation, inspection, repair and maintenance activities of municipal facilities and infrastructure." Most MRP-required Provision C.2 Municipal Operations tasks are implemented individually by each Permittee in San Mateo County. The Countywide Program helps agency staff to understand MRP requirements and develops various tools that assist agency staff to effectively plan, implement, and report on compliance activities. SMCWPPP's assistance and the implementation of Municipal Operations tasks are coordinated through the SMCWPPP Public Works Municipal Maintenance Subcommittee.

SMCWPPP performs a number of tasks to assist San Mateo County Permittees with implementation of Provision C.2, with input and assistance provided by the Public Works Municipal Maintenance Subcommittee. FY 2019/20 accomplishments included the following:

- Held three Public Works Municipal Maintenance Subcommittee meetings; and
- Updated a pesticide tracking template, in coordination with SMCWPPP's Parks Maintenance and IPM Work Group, to assist San Mateo County Permittees comply with pesticide tracking and reporting requirements in MRP Provision C.9.a.

C.3 New Development and Redevelopment

During FY 2019/20, SMCWPPP continued to provide compliance assistance with MRP Provision C.3, New Development and Redevelopment, through the New Development Subcommittee (NDS).

In support of the Green Infrastructure (GI) Plan requirement in the MRP and to more broadly plan for precipitation-based climate change impacts to the transportation network in San Mateo County, C/CAG has continued developing the San Mateo Countywide Sustainable Streets Master Plan under the Caltrans Adaptation Planning Grant program. This plan will provide an implementation-level approach to achieving water quality goals in the MRP and other community benefits associated with GI. To further support cost-effective GI implementation, and leveraging a State Budget Grant administered by the California Natural Resources Agency in the amount of $2.94 million, C/CAG is coordinating with the

Cities of Redwood City, San Bruno, Belmont, San Mateo County and the Flood and Sea Level Rise Resiliency District to advance designs of multi-benefit regional stormwater capture projects. C/CAG is also engaging consultant support with a portion of these funds in coordination with the County Office of Sustainability to identify new opportunities for regional stormwater capture projects and to develop initial design concepts to support project implementation. Lastly, C/CAG was awarded $97,000 from the Bay Area Council's California Resilience Challenge Grant to develop schoolyard greening concepts for up to six schools in San Carlos to accelerate climate adaptation with respect to managing climate change related precipitation impacts, mitigating urban heat island effects, and promoting sustainable stormwater management at schools, while making campuses safer and more enjoyable learning spaces.

SMCWPPP's accomplishments during FY 2019/20 include the following tasks to assist San Mateo County municipalities with implementation of Provision C.3:

- Held four meetings of the NDS to assist municipal agencies in San Mateo County to comply with MRP Provisions C.3 (New Development and Redevelopment) and C.6 (Construction Controls). SMCWPPP's facilitation of the four meetings and related review of work outside of the meetings allowed SMCWPPP to participate in further advancement of key elements included in the Permittee GI Plans, including the adoption of new GI-related policies, review of proposed project opportunities, integration with deliverables in the Countywide Sustainable Streets Master Plan and implementation of C.3 requirements.
- Completed a significant update to the C.3 Regulated Projects Guide (formerly known as the C.3 Stormwater Technical Guidance), part of the SMCWPPP GreenSuite, and minor updates to other SMCWPPP products for consistency with MRP requirements and ease of use by municipal staff.
- Completed an update to the Green Infrastructure Design Guide (GI Design Guide), the other part of the new SMCWPPP GreenSuite, for San Mateo County Permittees. The Green Infrastructure Design Guide includes broad guidance on the design and implementation of various green stormwater infrastructure treatment measures, typical details and standard specifications for numerous GI design options and settings. In FY 2019/20, the GI Design Guide was updated to an interactive PDF document for greater ease of use and functionality, given the size of the document and breadth of resources.
- Conducted a variety of GI outreach activities, including rain barrel program promotion, publishing newsletter articles, and social media posts. C/CAG staff attended classroom presentations and participated in efforts to engage schools via programs led by the San Mateo County Office of Education, including the C/CAG-funded Sustainable Watersheds teacher fellowship program and the Community Based Environmental Literacy Partners Program. C/CAG staff also supported local and regional implementation of GI, through presenting the Countywide Sustainable Streets Master Plan project at the CASQA Annual Conference in October 2019 and in regional planning meetings with the Metropolitan Planning Commission on identifying funding nexuses among stormwater and transportation programs. C/CAG staff has also stayed engaged with other regional and statewide efforts, including the Green Infrastructure Leadership Exchange and the Green Streets for Sustainable Communities Symposium. Other outreach on GI included C/CAG staff and consultants participating in a ReScape CA Maintenance Qualification Training on November 14, 2020, which included a session focused on maintaining green stormwater infrastructure and featured the SMCWPPP GI Design Guide. C/CAG also updated its outreach website, flowstobay.org, which includes several pages focused on raising awareness about GI in San Mateo County.

- Conducted two half-day C.3 workshops/webinars entitled “Reviewing C.3 Regulated Projects” and “Implementing Green Street Projects.”
- Participated in the BASMAA Development Committee.

C.4 Industrial and Commercial Site Controls

A primary goal of SMCWPPP's Commercial, Industrial and Illicit Discharge (CII) component is to assist San Mateo County Permittees in controlling the discharge of pollutants in stormwater from commercial and industrial businesses to the maximum extent practicable. San Mateo County Permittees are responsible for complying with various business inspection requirements under MRP Provision C.4. SMCWPPP's CII component assists San Mateo County Permittee staff with understanding these MRP requirements and develops various related tools, templates, reporting forms, and other MRP compliance support materials. SMCWPPP’s assistance with MRP Provision C.4 is coordinated through the CII Subcommittee, which met four times in FY 2019/20, with good participation by municipal staff.

During FY 2019/20, SMCWPPP performed a variety of tasks to assist San Mateo County Permittees with implementation of MRP Provision C.4, with input and assistance provided by the CII Subcommittee. Accomplishments included the following:

- Developed a Vehicle Service BMP fact sheet;
- Translated the Vehicle Service BMP fact sheet and Food Service Facility BMP fact sheet into Spanish and Chinese; and
- Updated the business stormwater inspector contact list on the SMCWPPP website.

C.5 Illicit Discharge Detection and Elimination

Another important goal of SMCWPPP's CII component is to assist San Mateo County Permittees effectively prohibit the discharge of illicit, non-stormwater discharges to the municipal storm drain system. San Mateo County Permittees are responsible for controlling non-stormwater discharges prohibited by MRP Provision C.5. SMCWPPP's CII component assists San Mateo County Permittee staff with understanding these MRP requirements and develops various related tools, templates, reporting forms, and other MRP compliance support materials. SMCWPPP’s assistance with MRP Provision C.5 is coordinated through the CII Subcommittee.

During FY 2019/20, SMCWPPP performed a number of tasks to assist San Mateo County Permittees with implementation of MRP Provision C.5, with input and assistance provided by the CII Subcommittee. Accomplishments included the following:

- Updated the inventory of mobile cleaner businesses in San Mateo County;
- Updated the table of stormwater enforcement actions against mobile businesses to share countywide with stormwater inspectors;
- Updated the Illicit Discharge Responder/Storm Drain Cleaning Contract List;
- Translated the mobile cleaner businesses BMP fact sheet into Spanish and Chinese;
- Conducted public outreach via the SMCWPPP website (flowstobay.org) to inform consumers about hiring mobile businesses that implement best practices for preventing non-stormwater discharges to storm drains; and

- Updated the Illicit Discharge contact list on the SMCWPPP website.

C.6 Construction Site Control

This component of SMCWPPP assists San Mateo County municipalities in complying with MRP Provision C.6 (Construction Site Control). This assistance continued to be provided through the New Development Subcommittee. SMCWPPP's accomplishments during FY 2019/20 include the following tasks to assist San Mateo County municipalities with implementation of MRP Provision C.6:

- Conducted a construction site controls training for the California Building Inspectors Group (CALBIG) on November 13, 2019.
- Printed 2,000 copies of the Construction Site Inspection Form and distributed them to the Subcommittee members.

The 2020 Construction Site Inspector Workshop scheduled for April 2020 was canceled due to the COVID-19 pandemic. The associated shelter-in-place order precluded conducting an in-person training with the field component that Permittee staff found to be very informative in previous years. A workshop is planned for FY 2020/21.

C.7 Public Information and Outreach

The primary goals of SMCWPPP's Public Information and Participation (PIP) component are to:

- Educate the public about the causes of stormwater pollution and its adverse effects on water quality in local creeks, lagoons, shorelines and neighborhoods;
- Encourage residents to adopt less polluting and more environmentally beneficial practices; and
- Increase residents' participation and involvement in SMCWPPP activities.

PIP is essential for controlling and reducing the source of pollution since many preventable pollutants are associated with everyday residential activity. Stormwater pollution may be reduced when residents are educated and motivated by the benefits of reducing pollutants. This approach of education and motivation is cost-effective and efficient in meeting the goal of reducing pollutants in stormwater to the maximum extent practicable.

The SMCWPPP PIP Subcommittee oversees the development of outreach and educational materials and guides the implementation of the PIP component of the program. The Subcommittee met two times in FY 2019/20 with good participation by municipal staff. SMCWPPP's PIP accomplishments during FY 2019/20 included the following:

- Partnered with the Bay Area Water Conservation Supply Agency (BAWSCA) on a Rain Barrel outreach campaign that received 474 website page views. Received 27 rebate applications from residents for a total of 33 rain barrel installations and distributed rain barrel rebate fliers at outreach events. Over 2,000 rain barrels have been installed to-date in San Mateo County under the rebate program.
- Promoted the Sustainable Streets Master Plan by conducting public outreach to educate the public about the project, convey technical issues in a clear manner, continue collecting feedback on priorities and preferences, and publicize upcoming public participation opportunities, reaching 231 residents in multiethnic communities.

- Conducted a countywide stormwater and green infrastructure community survey that recorded the opinions and findings of 1,214 San Mateo County residents.
- Promoted the San Mateo County Environmental Health Services (EHS) campaign to reduce littering of cigarette butts, as well as the San Mateo County Reusable Bag Ordinance Emergency Regulation and HHW Collection Program.
- Promoted Coastal Cleanup Day for 5,245 volunteers, raising awareness of the event and the consequences of littering behaviors.
- Promoted Caltrans educational materials regarding uncovered loads in English and Spanish.
- Gained 8,054 new Facebook fans and a total page reach of 121,789 with stormwater pollution prevention Facebook messaging.
- Sent 12 newsletters to a list of 3,515 active, opt-in subscribers with topics covering eco-friendly gardening practices, local cleanup events and stormwater pollution prevention information and tips.
- Received 24,357 visitors to the SMCWPPP website (flowstobay.org), which focuses on stormwater pollution prevention messaging and resources.
- Participated in 13 public outreach events in San Mateo County to speak one-on-one with residents and hand out collateral materials.
- Participated in a new, countywide stormwater-focused teacher fellowship program in coordination with the County Office of Education and also supported countywide school outreach efforts by creating a green infrastructure lesson plan and conducting in-class presentations.
- Performed point-of-purchase outreach with Our Water Our World materials to 10 hardware stores in San Mateo County while conducting in-store tabling events to engage residents on eco-friendly alternatives to pesticides.
- Promoted outreach messaging to residents regarding eco-friendly alternatives to pesticides in SMCWPPP's newsletter, website and social media channels.

C.8 Water Quality Monitoring

On behalf of its member agencies, SMCWPPP performs water quality monitoring activities in compliance with MRP Provision C.8. Some of this work is accomplished through participation in BASMAA regional projects. Per Provision C.8, a complete documentation of all water quality monitoring data collected from October 1, 2019 through September 30, 2020 (i.e., Water Year 2020 or WY 2020) will be presented in SMCWPPP's Urban Creeks Monitoring Report, which will be submitted to the Regional Water Board by March 31, 2021.

In addition, in accordance with MRP Provision C.8.f., Pollutants of Concern (POC) Monitoring, SMCWPPP will submit by October 15, 2020 a report describing the POC Monitoring tasks accomplished in WY 2020 and the planned allocation of sampling effort for POC Monitoring in WY 2021. The report will include monitoring locations, number and types of samples collected, a description of the objectives of the sampling (i.e., management question addressed), and the analytes measured. However, per Provision C.8.h., the results of the monitoring will not be included, but instead will be documented in the Urban Creeks Monitoring Report.

C.9 Pesticides Toxicity Control

The primary objective of MRP Provision C.9 Pesticides Toxicity Control is to prevent the impairment of urban streams by pesticide-related toxicity. As such, Provision C.9 helps implement the *TMDL for Diazinon and Pesticide-related Toxicity for Urban Creeks* in the San Francisco Bay region. Permittees are required to implement a pesticide toxicity control program that addresses their own use of pesticides and use by others within their jurisdictions. The focus is on pesticides that pose a threat to water quality, including applications with the potential to enter the municipal stormwater conveyance system.

Most MRP-required Provision C.9 tasks are implemented individually by each San Mateo County Permittee. SMCWPPP helps agency staff to understand MRP requirements and develops various tools that assist agency staff to effectively plan, implement, and report on compliance activities. SMCWPPP's assistance with MRP Provision C.9 is coordinated through SMCWPPP's Parks Maintenance and Integrated Pest Management (IPM) Work Group. The exception is Provision C.9.h, the public outreach portion of Provision C.9, which is implemented through the SMCWPPP Public Information and Participation (PIP) component.

During FY 2019/20, SMCWPPP performed a number of tasks to assist San Mateo County Permittees with implementation of Provision C.9, with input and assistance provided by the Parks Maintenance and IPM Work Group. SMCWPPP's accomplishments included the following:

- Held one meeting of the Parks Maintenance and IPM Work Group with good participation by municipal staff.
- Conducted SMCWPPP's Annual Landscape IPM Training Workshop in March 2020.
- Continued coordinating with San Mateo County Agriculture / Weights and Measures staff.
- Participated in relevant BASMAA and CASQA activities.
- Continued to maintain retail partnerships at 10 top-tier stores (e.g., Home Depot and Hassett Ace Hardware) within San Mateo County. Tasks included ordering materials, organizing outreach collateral, checking in with store managers, and providing outreach to residents.
- Conducted outreach at community events to educate customers about less toxic alternatives to commercial pesticides and fertilizers. Conducted seven in-store tabling events for store customers.
- Facilitated an online webinar where residents were able to submit questions and discuss less toxic solutions to their specific pest problems with experts at the UC Master Gardeners of San Mateo and San Francisco Counties.
- Conducted outreach to all pest control operators in San Mateo County and created a database of active-licensed operators, a list of their IPM certifications, and contact information.

C.10 Trash Load Reduction

MRP Provision C.10 Trash Load Reduction tasks are implemented by each San Mateo County Permittee. SMCWPPP helps agency staff to understand trash load reduction requirements and develops various tools needed to effectively plan, implement, and report on compliance with the requirements. Provision C.10 requires Permittees (as applicable) to:

- Reduce trash discharges from 2009 levels by 80% by July 2019;

- Ensure that lands they do not own or operate but that are plumbed directly to their storm drain systems in Very High, High and Moderate trash generation areas are identified and equipped by full capture systems or managed to a level equivalent to full capture systems;
- Install and maintain full capture systems that treat a mandatory minimum acreage;
- Assess trash reductions associated with control measures other than full capture systems using a visual assessment protocol;
- Develop and implement a receiving waters trash monitoring program plan;
- Annually cleanup and assess a mandatory minimum number of creek/shoreline trash hotspots; and
- Maintain a Long-Term Trash Load Reduction Plan designed to achieve 100% trash reduction by July 2022.

SMCWPPP performs a variety of tasks to assist San Mateo County Permittees with implementation of MRP Provision C.10 and the requirements listed above, with input and assistance provided by the SMCWPPP Trash Subcommittee and Litter Work Group. FY 2019/20 accomplishments included the following:

- Coordinated and facilitated five meetings of SMCWPPP's Trash Subcommittee and one meeting of SMCWPPP's Litter Work Group;
- Assisted San Mateo County Permittees in delineating trash full capture treatment areas and managing trash full capture information in GIS (currently nearly 10,000 acres are treated by full capture systems in San Mateo County);
- Continued to implement SMCWPPP's Trash Assessment Strategy, including conducting roughly 560 On-land Visual Trash Assessments (OVTAs) at 236 sites and maintaining the Countywide Program's online OVTA database to allow San Mateo County Permittees access to timely load reduction estimates;
- Continued providing guidance to San Mateo County Permittees on MRP operation and maintenance requirements and standard operating procedures for trash full capture systems;
- Compiled and standardized data from 47 trash hot spot assessments and cleanups, and entered the data into the SMCWPPP hot spot database;
- Finalized and distributed the *New Development Projects Litter Reduction Fact Sheet* summarizing the best practices of the *Litter Reduction Toolkit for Multi-family Dwellings*;
- Coordinated with the SMCWPPP Public Information and Participation (PIP) Subcommittee on countywide school outreach and countywide litter campaign branding efforts;
- Responded to Regional Water Board staff requests for information on existing, planned, and potential locations for trash full capture systems that are mutually beneficial to San Mateo County Permittees and Caltrans;
- Coordinated with Caltrans on trash capture efforts, including the installation of trash full-capture systems through cooperative implementation agreements;
- Conducted qualitative trash receiving water monitoring at 30 creek/channel sites included in the *BASMAA Receiving Waters Trash Monitoring Program Plan;*

- Participated in the development and submittal of the *BASMAA Final Receiving Water Trash Monitoring Report*, in compliance with MRP provision C.10.b.v.; and
- Assisted San Mateo County Permittees in developing information necessary for reporting trash load reductions with their FY 2019/20 Annual Reports.

C.11 Mercury Controls

MRP Provision C.11 Mercury Controls implements stormwater runoff-related actions required by the San Francisco Bay mercury Total Maximum Daily Load (TMDL) water quality restoration program. SMCWPPP performs a variety of activities to address mercury in stormwater runoff in compliance with MRP Provision C.11. Some of this work is accomplished via participation in BASMAA regional projects. Please note that efforts that address both PCBs and mercury are described in this section rather than the following section (Section 12, PCBs Controls). Section 12 focuses on efforts that address PCBs only.

Beginning with the FY 2016/17 Annual Report, Permittees are required to report annually the mercury loads reduced in stormwater runoff. Permittees are required to use the approved Interim Accounting Methodology to demonstrate cumulative pollutant loads reduced from each control measure implemented and progress toward achieving the load reductions required this permit term. SMCWPPP is tracking all existing and planned control measures that should result in pollutant load reduction credits towards meeting the San Mateo County portion of the mercury TMDL wasteload allocation and MRP 2.0 load reduction requirements. MRP 2.0 requires that an at least 6 grams/year mercury load reduction is achieved in San Mateo County via GI by June 30, 2020. From FY 2013/14 through FY 2019/20,[3] a 535 grams/year mercury load reduction has been realized via GI (parcel-based GI/LID and green streets) in the County and thus this requirement has been fulfilled.

Permittees are required to submit in this FY 2019/20 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate. Permittees are also required to submit in this FY 2019/20 Annual Report a Reasonable Assurance Analysis (RAA) to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. The MRP requires this submittal to include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the RAA. San Mateo County Permittees have fulfilled these MRP requirements via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

MRP Provisions C.11/12.d require that Permittees prepare a plan and schedule for mercury and PCBs control measure implementation and a corresponding RAA demonstrating quantitatively that sufficient control measures will be implemented to attain the mercury and PCBs TMDL wasteload allocations by 2028 and 2030, respectively. The plan must:

[3]Based on language in the MRP and discussions with Regional Water Board staff, it is assumed that applicable controls implemented from July 1, 2013 through the end of the permit term should result in credit towards the MRP 2.0 mercury and PCBs load reduction requirements.

1. Identify all technically and economically feasible mercury and PCBs control measures to be implemented (including green infrastructure projects).
2. Include a schedule according to which these technically and economically feasible control measures will be fully implemented.
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

San Mateo County Permittees have fulfilled this requirement via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

MRP Provisions C.11.e and C.12.h require Permittees to conduct an ongoing risk reduction program to address public health impacts of mercury and PCBs in San Francisco Bay fish. The fish risk reduction program is required to include actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The program is required to have the potential to reach 3,000 individuals annually (Bay Area-wide total for all MRP 2.0 Permittees) who are likely consumers of San Francisco Bay-caught fish. Permittees are required to report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish.

SMCWPPP is assisting San Mateo County municipalities comply with the risk reduction program requirements by coordinating with and reporting on the Fish Smart program conducted by San Mateo County Environmental Health Services (EHS). Fish Smart builds upon the San Francisco Bay Fish Project (sfei.org/sfbfp#sthash.eOcfwrhA.dpbs), a risk reduction framework developed regionally in the previous permit term. The Fish Project funded Bay Area community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities about how to reduce their exposure to mercury and PCBs from consuming San Francisco Bay fish.

During FY 2019/20, EHS conducted a variety of activities via its Fish Smart program that target at-risk populations (e.g., subsistence fisherman), including the following:

- EHS staff maintained signs posted along the San Francisco Bay shore (e.g., at fishing piers) in the Cities of Brisbane, South San Francisco, San Mateo, Burlingame, and Redwood City. One sign was replaced at the Brisbane Lagoon due to the previous sign and pole being knocked down.
- EHS continued to promote the Fish Smart program using the California OEHHA fish consumption advisories in various languages through flyer distribution at community events, bait and tackle stores, harbormaster offices, and WIC community offices. 1,075 flyers in various languages were distributed at 20 locations within the County.
- EHS staff spoke with 1,128 residents at 4 events where information on the Fish Smart in San Francisco Bay, California Coast, and Monterey Bay Aquarium's Seafood Watch Programs was provided.
- EHS maintained the smchealth.org/fishsmart webpage, which received 4,212 views.

- EHS created three social media posts and shared them on both Facebook and Twitter for a total of six posts. One of the posts was also shared to over 124,000 households countywide on Nextdoor.com. Posts combined had a reach or impression total of 16,961, depending on the platform. Combined, the posts had 1,250 engagements.

A review of the Fish Smart program's accomplishments from FY 2015/16 through FY 2019/20 revealed the program succeeding in providing wide-ranging outreach about potential health impacts of consuming certain types of fish caught in San Francisco Bay. The review documented various quantitative measures of outreach efforts and outcomes (e.g., numbers of brochures distributed, numbers of people interacted with at outreach events, numbers of people receiving electronic newsletters, and social media postings impressions and reach). Based on the magnitude and targeting of these efforts, it is likely that the Fish Smart program has led to reduced health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families.

In addition, on February 13th, 2020, 13 surveys were conducted at the Pacifica Pier to discuss the OEHHA fish consumption guidelines. Results showed that 92% of respondents eat the fish they caught and shared at least some types of the fish they caught with their friends or family. When asked if they knew that certain fish were not safe to eat due to high mercury and PCB levels, 84% indicated they were aware of this. This result suggests the Fish Smart program's outreach and/or other related risk reduction information has reached most members of the group surveyed. However, the representativeness of the small group surveyed and the extent that this result could be extrapolated to a larger population have not been evaluated. EHS plans to continue to conduct surveys in FY 2020/21 to better understand Bay and Coast fish consumption patterns and fish consumption advisory knowledge.

C.12 PCBs Controls

MRP Provision C.12, PCBs Controls, implements stormwater runoff-related actions required by the San Francisco Bay PCB Total Maximum Daily Load (TMDL) water quality restoration program. SMCWPPP performs a variety of activities to address PCBs in stormwater runoff in compliance with MRP Provision C.12. Please note that efforts that address both PCBs and mercury are described in the previous section (Section 11, Mercury Controls). This section focuses on efforts that address PCBs only.

Beginning with the FY 2016/17 Annual Report, Permittees are required to report annually the PCBs loads reduced in stormwater runoff. Permittees are required to use the approved Interim Accounting Methodology to demonstrate cumulative pollutant loads reduced from each control measure implemented and progress toward achieving the load reductions required this permit term. SMCWPPP is tracking all existing and planned control measures that should result in pollutant load reduction credits towards meeting the San Mateo County portion of the PCBs TMDL wasteload allocation and MRP 2.0 load reduction requirements.

MRP 2.0 requires that an at least 15 grams/year PCBs load reduction is achieved in San Mateo County via GI by June 30, 2020. From FY 2013/14 through FY 2019/20,[4] a 42.5 grams/year PCBs load reduction

[4]Based on language in the MRP and discussions with Regional Water Board staff, it is assumed that applicable controls implemented from July 1, 2013 through the end of the permit term should result in credit towards the MRP 2.0 mercury and PCBs load reduction requirements.

has been realized via GI (parcel-based GI/LID and green streets) in the County and thus this requirement has been fulfilled.

In addition, the estimated PCBs load reduced to-date by all MRP Permittees during the FY 2013/14 through FY 2019/20 time period is described in a document entitled *PCBs and Mercury Regional Loads Reduced during MRP 2.0, September 30, 2020* (included in Appendix 11). The estimated PCBs load reduction across the permit area over this time period is 3017 grams/year, indicating that the MRP regional performance criterion of 3,000 grams/year of PCBs load reduced by June 30, 2020 has been achieved.[5]

Permittees are required to submit in this FY 2019/20 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate. Permittees are also required to submit in this FY 2019/20 Annual Report a RAA to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects. The MRP requires this submittal to include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the RAA. San Mateo County Permittees have fulfilled the above MRP requirements via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

As described in more detail above (C.11 Mercury Controls), MRP Provisions C.11/12.d require that Permittees prepare a plan and schedule for mercury and PCBs control measure implementation and a corresponding RAA demonstrating quantitatively that sufficient control measures will be implemented to attain the mercury and PCBs TMDL wasteload allocations by 2028 and 2030, respectively. San Mateo County Permittees have fulfilled this requirement via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

MRP 2.0 Provision C.12.e requires that Permittees collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. BASMAA has completed a regional investigation that addresses this requirement. SMCWPPP reported on the results of the investigation in its FY 2017/18 Annual Report.

MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 parts per million or greater in applicable structures[6] at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. A Permittee is exempt from this requirement if it provided

[5]It is important to note that the MRP allows Permittees to meet the regional criterion as a group – criteria for individual counties would only apply when the regional group criterion was not met.

[6]Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

evidence acceptable to the Executive Officer in its FY 2016/17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

- The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
- A method for identifying applicable structures prior to their demolition; and,
- Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff; and,
- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, BASMAA conducted a multi-year regional project to assist MRP Permittees to address Provision C.12.f. The BASMAA project, which began in FY 2016/17 and was completed in March 2019, assisted Permittees in developing local programs to manage PCBs-containing materials during building demolition. It developed guidance materials, tools and training materials and conducted outreach. SMCWPPP actively participated in the project, including providing BASMAA's project manager.

At the outset of the project, a BASMAA Steering Committee was convened to provide project oversight and guidance during the project. The Steering Committee included BASMAA Directors, countywide stormwater program staff, and Permittee staff from various relevant municipal departments. The Steering Committee met periodically throughout the project. In addition, a project TAG, a small balanced advisory group formed from industry, regulatory, and Permittee representatives to provide review and input on selected project work products, was convened. The TAG was comprised of representatives from industry and state/federal regulatory agencies, and Permittees. Other efforts to engage key stakeholders included an industry stakeholder roundtable meeting (August 2017) and two larger stakeholder group meetings (December 2017 and May 2018) that included industry, regulatory and municipal representatives. During FY 2018/19, Permittees tailored the BASMAA products for local use, adopted the program (e.g., via local policy or ordinance), and trained local staff to implement the new program starting July 1, 2019.

Key BASMAA project deliverables provided to each Permittee to use as appropriate given local procedures and needs included:

- A protocol for pre-demolition building survey for priority PCBs-containing building materials;
- Model language for municipal adoption (e.g., ordinance) of the new program to manage PCBs materials during building demolition and model supporting staff report and resolution;

- CEQA strategy and model notice of exemption;
- Supplemental demolition permit model application materials, including forms, process flow charts, and applicant instructions; and
- An analysis to assist municipalities that pursue cost recovery.

Other project deliverables included:

- A coordination/communication strategy for the project;
- A technical memorandum summarizing any new information & decisions needed by BASMAA at outset, including an annotated table of regulatory drivers and relevant requirements;
- A technical memorandum with the state of the practice for identifying PCBs-containing building materials (developed to inform development of the pre-demolition building survey protocol listed below);
- Industry stakeholder outreach materials and a fact sheet for municipal staff;
- A spreadsheet tool used to develop the prioritized list of potential PCBs-containing building materials that the demolition program will focus on;
- A conceptual approach for an assessment methodology and data collection program to quantify PCBs loads reduced through managing PCBs-containing materials during building demolition.

During FY 2018/19, the BASMAA project concluded by conducting the following outreach and training tasks:

- Prepared training materials for municipal staff on adoption and implementation of the new program;
- Developed outreach materials and a standard presentation to inform industry stakeholders including developers, planning firms, urban planning non-governmental organizations, demolition firms, property owners, property managers, and realtors about the new program to manage PCBs in building materials during demolition;
- Using the above training materials, conducted training workshops (in-person and a webinar) for key municipal and countywide stormwater program staff;
- Conducted a webinar for industry stakeholders; and
- Developed a list of Bay Area opportunities, including contact information and dates, for municipal and/or stormwater program staff to conduct additional outreach to industry stakeholders using the above industry outreach materials.

In addition, during FY 2018/19 and FY 2019/20, San Mateo County and other MRP Permittees worked together through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) to develop a framework to comply with data collection/evaluation and reporting requirements under Provision C.12.f. As mentioned previously, these requirements include developing an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the new program.

The regional process developed includes the following steps:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Permittees began implementing the program on or before July 1, 2019. Appendix 12 includes two documents prepared collaboratively by San Mateo County and other MRP Permittees in compliance with MRP reporting requirements in Provision C.12.f. (3) – (5):

1. Documentation of (a) the number of applicable structures that applied for a demolition permit during the reporting year, and (b) a running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used (*PCBS in Building Materials Management Program – Regional Data Summary, August 20, 2020*).
2. An assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition (*Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program, August 20, 2020*).

MRP Provision C.12.g requires Permittees to conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. This requirement is being addressed through a multi-year project by the San Francisco Bay Regional Monitoring Program (RMP) to develop a series of conceptual models of PCBs in Priority Margin Units (PMUs). SMCWPPP's FY 2016/17 Annual Report included a workplan developed by BASMAA that describes how these information needs will be accomplished, including the studies to be performed and a preliminary schedule. SMCWPPP's March 30, 2020 Integrated Monitoring Report included a summary of the findings and results of the studies completed, planned, or in progress and the implications of the studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

SMCWPPP is assisting San Mateo County municipalities to comply with the risk reduction program requirements by coordinating with and reporting on the Fish Smart program conducted by San Mateo County Environmental Health Services (EHS). Please see Section 11 above for additional details.

C.13 Copper Controls

Provision C.13 of the MRP addresses copper control measures identified in the San Francisco Bay Basin Water Quality Control Plan (commonly referred to as the Basin Plan) that the Regional Water Board has deemed necessary to support copper site-specific objectives in San Francisco Bay. SMCWPPP's accomplishments during FY 2019/20 include the following tasks to assist San Mateo County Permittees with implementation of Provision C.13:

- Continued to train municipal inspectors on the MRP requirements and BMPs for architectural copper installation, cleaning, and treating. The trainings utilized a SMCWPPP factsheet entitled "Requirements for Architectural Copper: Protect water quality during installation, cleaning, treating, and washing!" which targets suppliers and installers of copper materials and is available on the SMCWPPP website (flowstobay.com). Building inspectors received the information from a SMCWPPP presentation at the California Building Inspectors Group (CALBIG) meeting on November 13, 2019.
- Provided information through the SMCWPPP website, via a fact sheet entitled *Best Management Practices for Pools, Hot Tubs, and Fountain Water Discharges,* and social media posts related to managing discharges from pools, spas and fountains that includes information on avoiding the use of copper-based algaecides.
- Provided information through the SMCWPPP website on ensuring through routine industrial facility inspections that proper BMPs are in place at industrial facilities likely to use copper or have sources of copper.

C.15 Exempted and Conditionally Exempted Discharges

The objective of MRP Provision C.15, Exempted and Conditionally Exempted Discharges, is to exempt unpolluted non-stormwater discharges from the MRP's general non-stormwater discharge prohibition (Provision A.1) and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. SMCWPPP helps municipal staff understand the MRP's requirements and makes various MRP compliance support materials available for their use. SMCWPPP's PIP component conducts selected activities to assist San Mateo County Permittees comply with outreach requirements in Provision C.15.b.iv. (Individual Residential Car Washing Discharge), C.15.b.v (Swimming Pool, Hot Tub, Spa and Fountain Water), and Provision C.15.b.vi. (Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering).

SMCWPPP performs a variety of activities to assist San Mateo County Permittees with implementation of Provision C.15. SMCWPPP's FY 2019/20 accomplishments included the following:

- Continued outreach efforts through social media posts to encourage residents to use car washes rather than washing their cars at home;
- Partnered with a local car wash company to offer an exclusive discount to residents in an effort to make professional car wash companies more accessible;

- Conducted targeted outreach to mobile car wash businesses and residents to educate them on the hazards of dumping their used wash waters down storm drains and related BMPs;
- Using a BMP fact sheet for swimming pools, hot tubs, spas, and fountain water discharges, promoted these types of BMPs through social media posts;
- Continued conducting outreach to San Mateo County residents, via social media, the SMCWPPP e-newsletter and blog, and through SMCWPPP's point-of-purchase program, to support and promote eco-friendly alternatives to toxic pesticides and help avoid pollutants in groundwater and surface water discharges;
- Promoted planting of drought tolerant, native vegetation via social media, and the SMCWPPP e-newsletter and blog; and
- Continued to promote water-saving tips via social media.

SECTION 1
INTRODUCTION

BACKGROUND

This FY 2019/20 Annual Report was developed in compliance with the reissued National Pollutant Discharge Elimination System (NPDES) Municipal Regional Permit (referred to as the MRP)[1] for stormwater runoff discharges from San Mateo County and certain other San Francisco Bay Area communities. It summarizes stormwater management activities implemented by the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP or Countywide Program) in FY 2019/20. SMCWPPP's activities benefit 22 municipal agencies in San Mateo County: 15 cities, five towns, the County of San Mateo, and the San Mateo County Flood Control District.[2] Each of these agencies also separately submits an individual Annual Report to the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) focusing on that agency's stormwater management activities during FY 2019/20.

The organizational structure of SMCWPPP is shown on Figure 1-1. SMCWPPP is a program of the City/County Association of Governments (C/CAG) of San Mateo County. C/CAG is a Joint Powers Authority (JPA) that addresses issues of regional importance to San Mateo County jurisdictions such as congestion management and water quality. The C/CAG Board of Directors is comprised of a local elected city council representative from each city and town in San Mateo County, a member of the County Board of Supervisors, and representatives from the transit district and transportation authority. A 1993 amendment to the JPA Agreement made C/CAG responsible for assisting San Mateo County municipalities with complying with the municipal stormwater NPDES permit, including its latest incarnation as the MRP. Stormwater management-related activities of C/CAG and its various related committees and workgroups are described below.

C/CAG Board

Throughout FY 2019/20, the C/CAG Board of Directors received presentations, updates, and took actions on various stormwater-related issues, as summarized below (all C/CAG Board meeting agenda materials and minutes are available at www.ccag.ca.gov/board-of-directors):

- July 2019 - Board received a copy of extended Task Order with EOA, Inc. of Oakland CA for technical support to the Countywide Program;

[1]NPDES Permit No. CAS612008 (Order No. R2-2015-0049), dated November 19, 2015. The MRP has a five-year term: effective January 1, 2016 and expires December 31, 2020.

[2]As of January 1, 2020, the San Mateo County Flood and Sea Level Rise Resiliency District (SMCFSLRRD).

- September 2019 – Received a presentation on the County's proposed disposable foodware ordinance including its benefits for trash load reduction; received copies letters to Assembly Member Mullin for his support in securing a $3 million budget allocation for C/CAG to advance multi-benefit regional stormwater projects and supporting AB 825 to establish the San Mateo County Flood and Sea Level Rise Resiliency District (FSLRRD);
- October 2019 – Approved an amendment adding additional funds to the Paradigm Environmental Funding Agreement for developing a Countywide Sustainable Streets Master Plan; approved appointing Nikki Nagaya to the C/CAG Stormwater Committee to represent the City of Menlo Park;
- December 2019 – Approved materials to execute $2.94 M funding agreement with the California Natural Resources Agency for advancing multi-benefit regional stormwater projects, endorsing a new FSLRRD proposal; appointed of Sam Bautista to Stormwater Committee for City of Pacifica;
- February 2020 – Received notice of the March "Green Streets for Sustainable Communities" symposium and "Shore to Shore: Envisioning San Mateo County's Resilient Water Future" event (both were subsequently canceled due to COVID-19);
- April 2020 – Approved appointments of Peter Brown (Belmont) and Andrew Yang (Millbrae) to the C/CAG Stormwater Committee; approved reallocating unspent Measure M vehicle registration administration and interest earnings revenue to C/CAG programs, including $228k to the Countywide Stormwater Program;
- May 2020 - Received copies of no-cost time extensions for six Safe Routes to School / Green Streets Infrastructure Pilot Program projects for the following jurisdictions: Brisbane, Colma, East Palo Alto, Menlo Park, Pacifica and Redwood City; approved Resolution 20-21, authorizing the application for $97,671 in grant funding from the California Resilience Challenge for the Resilient San Carlos Schoolyards project; and
- June 2020 – Approved the FY 2019/20 C/CAG Budget, including budget for SMCWPPP; approved consultant Task Orders and Funding Agreements:
    - Amendment No. 1 to Task Order EOA-10 for completion of Water Year 2020 monitoring activities;
    - Task Orders EOA-11 and EOA-12 for FY 2019/20 general program support and Water Year 2021 monitoring activities;
    - Task Order LWA-06 for FY 2019/20 green infrastructure (GI) and Reasonable Assurance Analysis (RAA) support;
    - Task Order SGA-06 for FY 2019/20 outreach support; and,
    - Amendment No. 5 to the Bay Area Water Supply and Conservation Agency funding agreement for FY 2018/19 for countywide rain barrel rebate program.

Program Manager and Staff

C/CAG's Program Manager oversees the overall Countywide Program, serving as staff to the C/CAG Board and liaison among San Mateo County municipalities, technical consultants, committees, the Bay Area Stormwater Management Agencies Association (BASMAA), the California Stormwater Quality Association (CASQA), and Regional Water Board staff. The Program Manager represents San Mateo County

municipalities at regional and statewide meetings and manages technical consultants that support programmatic activities. C/CAG's Stormwater Program Specialist supports the Program Manager in implementing the Countywide Program. In addition to providing regular staff support, agenda reports, and presentations to the C/CAG Board and the Stormwater Committee, the Program Manager and staff participated in the following activities during the FY 2019/20 reporting year:

- BASMAA: The Program Manager continued representing the Countywide Program on the Board of Directors (continued serving as Vice-Chair in 2019 and again as Chair starting in 2020). Program Manager and staff participated in Board meetings, BASMAA regional project meetings, and BASMAA committee meetings.
- CASQA: The Program Manager finished the two-year term as co-chair of the CASQA Legislative Committee; staff attended and presented at the annual CASQA conference.
- San Francisco Estuary Partnership Implementation Committee: The Program Manager continued serving on the committee representing the municipal stormwater perspective, participating in quarterly meetings.
- The Program Manager continued serving a one-year term as an expert consultant to the US EPA Environmental Finance Advisory Board to assist in responding to a congressional request for information regarding stormwater funding and financing, attending a second in-person meeting in Kansas City, MO in October.
- Presentations by the Program Manager / staff:
    - California's San Francisco Bay Regional Water Quality Control Board (Comments on the State's proposed Water Resilience Portfolio, September).
    - California Stormwater Quality Association, Annual Conference ("Battle-Testing Green Infrastructure Plans for Future Climate Change," October).
    - State of the Estuary Conference ("Modeling and Planning for Long-Term Green Infrastructure Implementation in San Mateo County," October).
    - San Francisco Bay Regional Monitoring Program (RMP) Annual Meeting (Contributions of the RMP to Local Stormwater Program Monitoring/Modeling Efforts and Vice Versa, October).
    - ReScape Landscape Maintenance Qualification Training (San Mateo Countywide Green Infrastructure Design Guide). November
    - FSLRRD ("Planning for Long-Term Green Infrastructure Implementation in San Mateo County," December).
    - Home for All's Housing and Climate Readiness Task Force ("Managing Runoff: The Housing-Climate Connection," February).
    - Bay Area Stormwater Management Agencies Association's Development Committee ("GI Implementation – LID, Sustainable Streets, and Regional Projects," February).
    - Sustainable Streets Regional Roundtable meetings with MTC and CTC ("Sustainable Streets Regional Roundtable: Developing Fact Sheets," February).
    - Green Infrastructure Leadership Exchange Annual Meeting ("Modeling and Planning for Long-Term Green Infrastructure Implementation in San Mateo County," May).

- California Resilience Challenge grant awards program virtual launch ("Resilient San Carlos Schoolyards Project," July).

- Grant-funded Project Activities:
  - Continued representing BASMAA on the Urban Greening Bay Area grant from EPA (Water Quality Improvement Fund) to the San Francisco Estuary Partnership / Association of Bay Area Governments. Although BASMAA's grant project finished in FY 2018/19, additional unused funding from other grant tasks was shifted to the BASMAA Roundtable effort to further advance the specific actions to prioritize sustainable streets in funding sources. The Program Manager, in conjunction with the project consultant and Roadmap Implementation Committee, began work to create fact sheets that clarify the eligibility of GI in transportation funding programs. This work continued in FY 2019/20, including meeting with Metropolitan Transportation Commission, Caltrans, and California Transportation Commission staff, and getting review/comment on draft materials from Federal Highway Administration staff.
  - C/CAG staff worked with the Natural Resources Agency to allocate $2.94 million in State General Funds to advance designs of multi-benefit regional stormwater capture facilities. $200K of the funds were kept with C/CAG for additional planning to find more regional stormwater capture project opportunities and develop project concepts and a business case for countywide collaboration on regional stormwater management (leveraging $100K obtained by the County Office of Sustainability for a similar purpose) and $913K each to the cities of Belmont, Redwood City, and San Bruno for initiating design of regional stormwater capture projects at Twin Pines Park, the I-280/380 interchange, and Red Morton Park, respectively. C/CAG staff worked with the cities of San Bruno and Redwood City and the County Office of Sustainability on a joint Request for Proposals for technical consultant support for each agency's respective components of the work, while Belmont is working with the FSLRRD to pursue its regional project in conjunction with a $1 million grant to design creek restoration efforts in Twin Pines Park on Belmont Creek.
  - Continued implementing the Countywide Sustainable Streets Master Plan under the $986,300 Caltrans Adaptation Planning grant. This plan will prioritize street segments for including GI with other planned investments, such as bike/pedestrian and complete streets projects, safe routes to school improvements, and pavement rehabilitation. In developing the plan, C/CAG's consultant team will also be doing climate change modeling related to precipitation, public outreach/engagement, developing project concepts, and creating a web-based tracking tool. See Section 3 of this report (C.3 New Development and Redevelopment) for more details.
  - C/CAG staff submitted a successful grant proposal to the California Resilience Challenge, receiving $97K to develop resilient schoolyard concepts for San Carlos School District sites, showing how GI can be integrated to help reduce runoff, improve water quality, recharge groundwater, and reduce urban heat islands.

Stormwater Committee

C/CAG's stormwater management-related decisions are generally made in consultation with the NPDES Stormwater Committee. At its November 2012 meeting, the C/CAG Board authorized reconvening this committee to include director-level appointees with decision-making authority for implementing

stormwater management programs within San Mateo County municipalities in compliance with requirements in the MRP. The Committee meets on an approximate bimonthly basis (depending on need) on the third Thursday of the month at the San Mateo County Transit District Office in San Carlos. Public notices for Committee meetings are posted in accordance with Brown Act requirements on the ground floor of the same location.

The Stormwater Committee met six times during FY 2019/20 (August, September, November, April, May, and June) to assist with planning and organizing SMCWPPP's stormwater management activities including MRP compliance actions. Appendix 1 includes a table summarizing attendance at the Stormwater Committee meetings held during FY 2019/20. Details on Stormwater Committee meeting agendas, minutes, and presentations can be found on the Committee's website.

The below sections describe the Stormwater Committee's mission statement, membership criteria, and roles and responsibilities.

Mission Statement

The Stormwater Committee provides policy and technical advice and recommendations to the C/CAG Board of Directors and direction to technical committees (described below) on all matters relating to stormwater management and compliance with associated regulatory mandates from the State and Regional Water Boards.

Membership

The Stormwater Committee is comprised of one director-level representative from each San Mateo County municipality, recommended by City/Town/County Managers, with decision-making authority and primary responsibility for implementing stormwater management programs within their jurisdictions, and one non-voting executive management representative from the Regional Water Board staff, all appointed by the C/CAG Board. There are no term limits and members may be removed and replaced as needed.

Roles & Responsibilities

The role of the Stormwater Committee is to provide policy and technical advice, recommendations to the C/CAG Board, and direction to stormwater technical committees on matters related to stormwater management and associated regulatory requirements. While the Stormwater Committee may consider any item reasonably related to stormwater and associated regulatory requirements, the following issues are the primary focus of the Stormwater Committee:

- Review and provide recommendations for SMCWPPP's annual budget as part of the overall C/CAG budget approval process;
- Authorize submittal of countywide and regional compliance documents on behalf of their respective agencies for activities performed via C/CAG through SMCWPPP or BASMAA;
- Convey relevant program and compliance information and direction to appropriate staff and departments within their agencies;
- Form ad-hoc work groups to address stormwater-related issues on an as-needed basis (e.g., permit reissuance);

- Discuss and provide policy recommendations on stormwater issues, such as:
    - Funding stormwater compliance activities at the local and countywide level;
    - Unfunded mandate test claims;
    - Permit appeals and litigation;
    - Reissuance of the MRP;
    - Permit requirements, especially those related to new and redevelopment, GI, monitoring, and pollutants of concern, including trash, mercury, PCBs, and pesticides;
    - Training and technical support needs for municipal staffs; and
    - Legislation and statewide policy issues impacting San Mateo County municipalities.

Technical Advisory Committee and Subcommittees

The Stormwater Committee provides direction to and receives feedback and recommendations from the Technical Advisory Committee (TAC). During FY 2012/13, the TAC transferred its former policy-related functions to the Stormwater Committee and transitioned to a quarterly workshop format. The new format allowed more detailed discussion of MRP compliance topics, including check-ins on what jurisdictions should be focused on in the coming quarter and what should have been accomplished and documented in the preceding quarter. The TAC did not meet in FY 2019/20 but received regular emails from the Program Manager and staff with updates on key permit compliance topics and occasional requests for feedback.

SMCWPPP has established various subcommittees and work groups to the TAC to help implement the different aspects of MRP, as shown on Figure 1-1. The subcommittees and work groups met regularly during FY 2019/20 and are discussed further in the remaining sections of this report.

Flood and Sea Level Rise Resiliency District

AB 825 (Mullin) became law on January 1, 2020, officially revamping the San Mateo County Flood Control District to become the San Mateo County Flood and Sea Level Rise Resiliency District. The FSLRRD is intended to address sea level rise, coastal erosion, flooding, and regional stormwater management. As such, assuming the FSLRRD can secure long-term, sustainable funding during the startup period, it will likely play a key role in helping to design, build, and maintain regional stormwater facilities that will help achieve water quality goals in the MRP. The three-year funding commitment by the County and cities/towns ($4.5 million over three years) is an important step forward for achieving integrated water management in San Mateo County.

The C/CAG Board appointed the five city/town elected officials to the governing board. The County Board of Supervisors appointed the two supervisors. The seven governing board members representing the different geographic areas in the county are:

- North: Donna Colson, City of Burlingame
- Central: Diane Papan, City of San Mateo
- South: Lisa Gauthier, City of East Palo Alto

- Coast: Debra Ruddock, City of Half Moon Bay
- At-Large: Maryann Derwin, Town of Portola Valley
- Coast Supervisor: Don Horsley
- At-Large Supervisor: Dave Pine

In June 2019, the governing board began acting as an advisory committee to the Board of Supervisors in its capacity as the governing board of the existing Flood Control District as AB 825 moved through the legislature. The advisory committee initially focused on hiring an Executive Director for the FSLRRD, and Len Materman (former San Francisquito Creek Joint Powers Authority Executive Director) was brought on as Chief Executive Officer in May 2020. The advisory committee officially became the FSLRRD Board of Directors on January 1, 2020. Interim information from the advisory committee can be found at www.resilientsanmateo.org and information on the official FSLRRD can be found at its new website, www.oneshoreline.org. The FSLRRD inherits the MRP permittee responsibilities of the prior Flood Control District, with those duties currently contracted back to the County Department of Public Works for implementation and reporting. The FSLRRD will need to be included as a replacement permittee under the MRP with its reissuance in 2021.

Municipal Regional Permit Reissuance

It is anticipated that the MRP will be reissued in 2021. The reissued permit is referred to as MRP 3.0 (the current permit is referred to as MRP 2.0). During FY 2019/20, SMCWPPP and San Mateo County Permittee staff continued to participate in the ongoing reissuance process. The process facilitates Regional Water Board, Bay Area countywide stormwater program, and MRP Permittee staff, and representatives from other organizations, working together through an overarching Steering Committee and several workgroups specific to MRP provisions/topics. For example, SMCWPPP and San Mateo County Permittee staff participated in the MRP 3.0 C.3/GI Work Group to discuss, internally and with Regional Water Board staff, issues to be addressed in Provision C.3 (New Development and Redevelopment) of MRP 3.0. SMCWPPP staff helped to lead these efforts and co-led the Work Group. In FY 2019/20, the C.3/GI Work Group met approximately monthly, including 10 meetings held with Regional Water Board staff and several internal meetings. Key issues discussed included: regulated project thresholds, regulation of single-family homes, regulation of road reconstruction projects, alternative compliance options, Special Projects provisions, asset management, and future GSI requirements. During FY 2019/20, the Program Manager, SMCWPPP, and Permittee staff also participated in the Steering Committee and several other MRP 3.0 work groups (e.g., C.4/5, C.8, C.10, and C.11/12). In addition, SMCWPPP staff co-led the MRP 3.0 C.8 (Water Quality Monitoring) Work Group.

ORGANIZATION OF REPORT

The remainder of this FY 2019/20 Annual Report is structured around the following major provisions of the reissued MRP:

- C.2. Municipal Operations
- C.3. New Development and Redevelopment
- C.4. Industrial and Commercial Site Controls
- C.5. Illicit Discharge Detection and Elimination

- C.6. Construction Site Control
- C.7. Public Information and Outreach
- C.8. Water Quality Monitoring
- C.9. Pesticides Toxicity Control
- C.10. Trash Load Reduction
- C.11. Mercury Controls
- C.12. PCBs Controls
- C.13. Copper Controls
- C.15. Exempted and Conditionally Exempted Discharges

The following sections of this report summarize how SMCWPPP assisted San Mateo County Permittees with implementing the MRP in FY 2019/20 for each of the above provisions. Each section includes three sub-sections: 1) Introduction, 2) Implementation of MRP Actions, and 3) Future Actions.

Figure 1-1. Organizational Structure and FY 2019/20 Meeting Schedule.

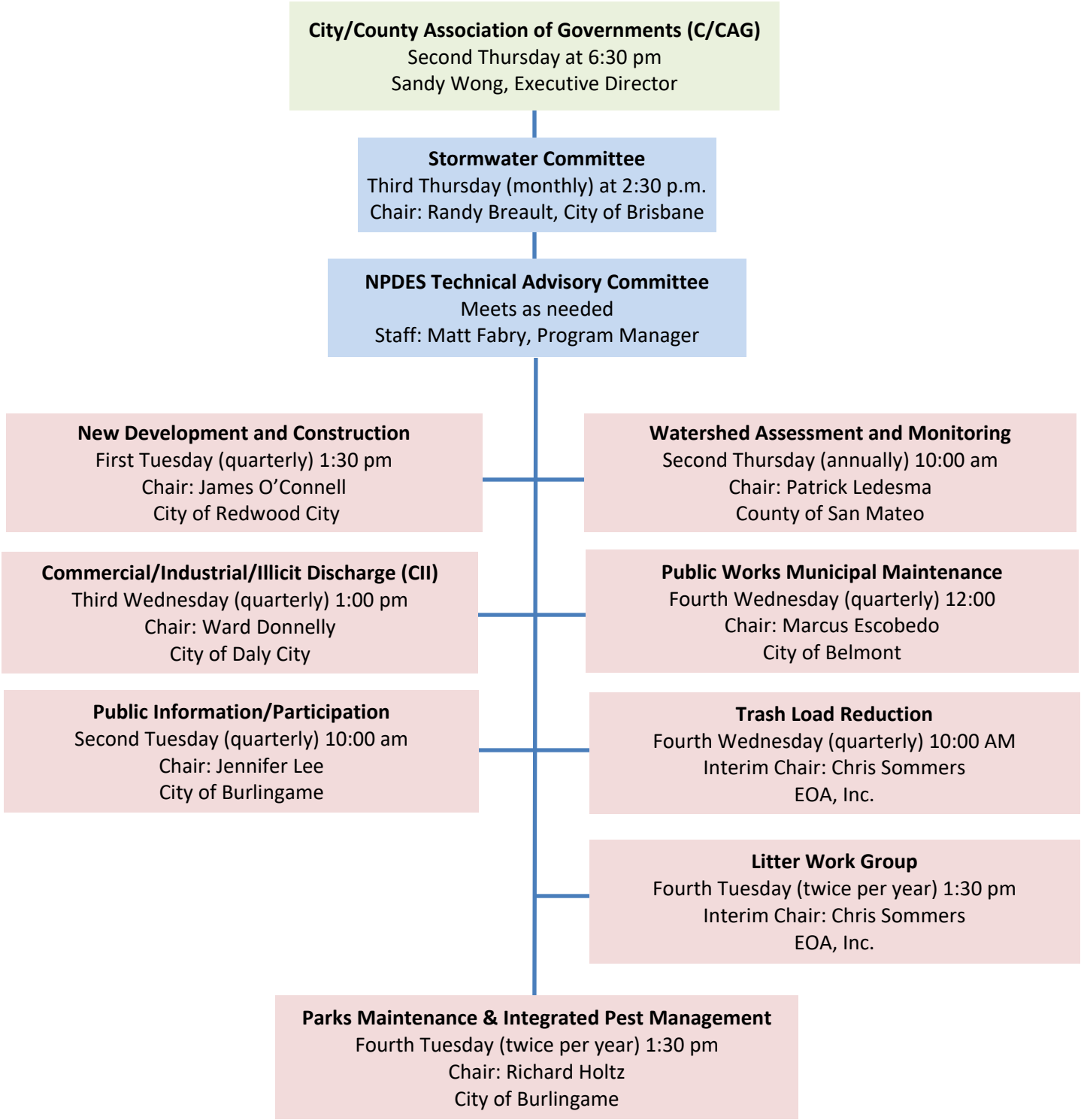

SECTION 2
C.2 MUNICIPAL OPERATIONS

INTRODUCTION

The objective of MRP Provision C.2 is "to ensure development and implementation of appropriate Best Management Practices (BMPs) by all Permittees to control and reduce discharges of non-stormwater and stormwater runoff pollutants to storm drains and watercourses during operation, inspection, repair and maintenance activities of municipal facilities and infrastructure."

Most MRP-required Provision C.2 Municipal Operations tasks are implemented individually by each Permittee in San Mateo County. The Countywide Program helps agency staff to understand MRP requirements and develops various tools that assist agency staff to effectively plan, implement, and report on compliance activities. SMCWPPP's assistance and the implementation of Municipal Operations tasks are coordinated through the SMCWPPP Public Works Municipal Maintenance Subcommittee.

IMPLEMENTATION OF MRP PROVISIONS

SMCWPPP performs a number of tasks to assist San Mateo County Permittees with implementation of Provision C.2, with input and assistance provided by the Public Works Municipal Maintenance Subcommittee. FY 2019/20 accomplishments included the following:

- Held three Public Works Municipal Maintenance Subcommittee meetings; and
- Updated a pesticide tracking template, in coordination with SMCWPPP's Parks Maintenance and IPM Work Group, to assist San Mateo County Permittees comply with pesticide tracking and reporting requirements in MRP Provision C.9.a.

More information on each of these accomplishments is provided below.

Public Works Municipal Maintenance Subcommittee

The Public Works Municipal Maintenance Subcommittee provides the opportunity for sharing information about municipal operations-related MRP requirements and methods for achieving compliance. The meetings provided a forum to share experiences with implementing MRP provisions and applying associated BMPs related to activities such as:

- Street and road repair maintenance activities;
- Sidewalk/plaza maintenance and pavement washing;
- Graffiti removal;
- Corporation yard activities; and
- Stormwater pump station monitoring and inspections.

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Marcus Escobedo from the City of Belmont continued to chair the Subcommittee during FY 2019/20. The Subcommittee generally meets twice during each fiscal year. The second meeting in FY 2018/19 was postponed until July 2019 to allow for a review of the MRP Annual Reporting forms. Therefore, the Subcommittee met three times in FY 2019/20, with good participation by municipal staff, as shown by the attendance list (Appendix 2).

Countywide Program staff also facilitated discussions at meetings about a variety of pertinent topics, including storm drain markers, asset management programs, corporation yard BMPs, activities during COVID-19, proposed revisions to Provision C.2, Municipal Operations, of MRP 3.0, and the SMCWPPP Green Infrastructure Design Guide. At one meeting, municipal staff received a presentation on the Rescape California training program that includes integrated pest management, firescaping, carbon sequestration, maintenance for Green Stormwater Infrastructure and Rescape Rated Landscapes. At another meeting, two of the CASQA municipal maintenance training videos were shown on concrete saw cutting and minor spill and leak cleanup.

Program Materials

Since the first version of the MRP was adopted in 2009, SMCWPPP staff has developed a variety of materials to assist municipal maintenance agency staff with implementing Provision C.2. These materials are all available on the SMCWPPP website (flowstobay.org) and continue to be useful tools that assist agency staff to achieve permit compliance. The materials are described below.

In FY 2009/10, SMCWPPP developed a Stormwater Pollution Prevention Plan (SWPPP) template for use by San Mateo County Permittees in tailoring, updating, or creating SWPPPs for their corporation yards, satellite facilities, and maintenance facilities.

In FY 2010/11, SMCWPPP prepared the “Municipal Corporation Yard Inspection Form.” This form provides detailed checklists for the types of BMPs recommended in the corporation yard SWPPP template. During FY 2010/11, SMCWPPP also prepared “Sources of Stormwater BMP information for Maintenance Activities Listed in MRP’s Provision C.2,” to assist San Mateo County Permittees with complying with the following Provision C.2 requirements: Provision C.2.a Street and Road Repair and Maintenance; Provision C.2.b Sidewalk/Plaza Maintenance and Pavement Washing; Provision C.2.c Graffiti Removal; and Provision C.2.f Corporation Yards. The sources of BMP information used to develop these materials were CASQA’s Stormwater BMP Handbook Municipal and Caltrans’ Storm Water Quality Handbook Maintenance Staff Guidance.

During FY 2010/11, SMCWPPP developed the “Stormwater Pump Station Dry Season DO Monitoring and Inspection Form” to assist San Mateo County Permittees in developing a systematic and efficient way to collect DO monitoring and inspection information. The following twelve agencies in San Mateo County operate stormwater pump stations: Cities of Belmont, Burlingame, East Palo Alto, Foster City, Menlo Park, Millbrae, Pacifica, Redwood City, San Carlos, San Mateo, and South San Francisco, and the San Mateo County Flood Control District.

In FY 2015/16, SMCWPPP developed a trash full capture device inspection and cleaning field form template, a Small Full Capture Device O&M Standard Operating Procedure (SOP), a Hydrodynamic Separator O&M SOP, and a Trash Full-Capture Device O&M Verification Program Template and Guidance document. These materials were developed in coordination with the Trash Subcommittee to help

municipal staff comply with new requirements in MRP Provision C.10.b.i., Full Trash Capture Systems. These requirements include certifying that trash full capture systems are operated and maintained to meet full trash capture system requirements and keeping associated maintenance records.

In FY 2016/17, SMCWPPP developed a trash full capture device inspection and cleaning data tracking Microsoft Excel template to assist with tracking and reporting requirements in MRP Provision C.10.b.i. Also in FY 2016/17, SMCWPPP developed a template in Excel to assist with pesticide tracking and reporting requirements in MRP Provision C.9.a. The pesticides tracking template utilizes a lookup list of pesticides and active ingredients compiled from data tables available on the Department of Pesticide Regulation (DPR) website. In coordination with the Parks Maintenance and IPM Work Group, the template was updated during FY 2019/20 with the current two years of pesticide product data from the DPR website.

FUTURE ACTIONS

FY 2020/21 activities planned by SMCWPPP to assist San Mateo County Permittees comply with MRP requirements in Provision C.2 include the following:

- Continue holding Public Works Municipal Maintenance Subcommittee meetings;
- Update tracking templates and guidance materials, as needed; and
- Coordinate with SMCWPPP's New Development Subcommittee to provide guidance on GI maintenance and related training materials.

SECTION 3
C.3 NEW DEVELOPMENT AND REDEVELOPMENT

INTRODUCTION

This section describes SMCWPPP's activities to assist municipal agencies in San Mateo County to comply with MRP Provision C.3, New Development and Redevelopment. SMCWPPP continued to provide compliance assistance with MRP Provision C.3 (and Provision C.6 Construction Site Controls – see Section 6) through the New Development Subcommittee (NDS). In FY 2019/20, the Green Infrastructure Committee was merged into the NDS. SMCWPPP also obtained input and direction from agency representatives through the NDS. During FY 2019/20, the NDS was chaired by James O'Connell with the City of Redwood City. The NDS met four times in FY 2019/20 with good participation by municipal staff, as shown by the attendance list (Appendix 3).

In support of the Green Infrastructure (GI) Plan requirement in the MRP and to more broadly plan for precipitation-based climate change impacts to the transportation network in San Mateo County, C/CAG has continued developing the San Mateo Countywide Sustainable Streets Master Plan under the Caltrans Adaptation Planning Grant program. This plan will provide an implementation-level approach to achieving water quality goals in the MRP and other community benefits associated with GI. To further support cost-effective GI implementation, and leveraging a State Budget Grant administered by the California Natural Resources Agency in the amount of $2.94 million, C/CAG is coordinating with the Cities of Redwood City, San Bruno, Belmont, San Mateo County and the Flood and Sea Level Rise Resiliency District to advance designs of multi-benefit regional stormwater capture projects. C/CAG is also engaging consultant support with a portion of these funds in coordination with the County Office of Sustainability to identify new opportunities for regional stormwater capture projects and to develop initial design concepts to support project implementation. Lastly, C/CAG was awarded $97,000 from the Bay Area Council's California Resilience Challenge Grant to develop schoolyard greening concepts for up to six schools in San Carlos to accelerate climate adaptation with respect to managing climate change related precipitation impacts, mitigating urban heat island effects, and promoting sustainable stormwater management at schools, while making campuses safer and more enjoyable learning spaces.

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IMPLEMENTATION OF MRP PROVISIONS

SMCWPPP's accomplishments during FY 2019/20 include the following tasks to assist San Mateo County municipalities with implementation of Provision C.3:

- Held four meetings of the New Development Subcommittee (NDS) to assist municipal agencies in San Mateo County to comply with MRP Provisions C.3 (New Development and Redevelopment) and C.6 (Construction Controls). SMCWPPP's facilitation of the four meetings and related review of work outside of the meetings allowed SMCWPPP to participate in further advancement of key elements included in the Permittee GI Plans, including the adoption of new GI-related policies, review of proposed project opportunities, integration with deliverables in the Countywide Sustainable Streets Master Plan and implementation of C.3 requirements.
- Completed a significant update to the C.3 Regulated Projects Guide (formerly known as the C.3 Stormwater Technical Guidance), part of the SMCWPPP GreenSuite, and minor updates to other SMCWPPP products for consistency with MRP requirements and ease of use by municipal staff.
- Completed an update to the Green Infrastructure Design Guide (GI Design Guide), the other part of the new SMCWPPP GreenSuite, for San Mateo County Permittees. The Green Infrastructure Design Guide includes broad guidance on the design and implementation of various green stormwater infrastructure treatment measures, typical details and standard specifications for numerous GI design options and settings. In FY 2019/20, the GI Design Guide was updated to an interactive PDF document for greater ease of use and functionality, given the size of the document and breadth of resources.
- Conducted two half-day C.3 workshops/webinars entitled "Reviewing C.3 Regulated Projects" and "Implementing Green Street Projects."
- Participated in the BASMAA Development Committee.
- Conducted a variety of GI outreach activities, including rain barrel program promotion, publishing newsletter articles, and social media posts. C/CAG staff also attended classroom presentations and participated in efforts to engage schools via programs led by the San Mateo County Office of Education, including the C/CAG-funded Sustainable Watersheds teacher fellowship program and the Community Based Environmental Literacy Partners Program. C/CAG staff has also supported local and regional implementation of GI, through presenting the Countywide Sustainable Streets Master Plan project at the California Stormwater Quality Association Annual Conference in October 2019 and in regional planning meetings with the Metropolitan Planning Commission on identifying funding nexuses among stormwater and transportation programs. C/CAG staff has also stayed engaged with other regional and statewide efforts, including the Green Infrastructure Leadership Exchange and the Green Streets for Sustainable Communities Symposium. Other outreach on GI included C/CAG staff and consultants participating in a ReScape CA Maintenance Qualification Training on November 14, 2020, which included a session focused on maintaining green stormwater infrastructure and featured the SMCWPPP GI Design Guide. C/CAG also updated its outreach website, flowstobay.org, which includes several pages focused on raising awareness about green infrastructure in San Mateo County.

More information on these accomplishments is provided below.

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C.3 Implementation and Outreach Products

With the assistance of the NDS, SMCWPPP developed, updated and/or assisted with the following technical and outreach products:

- Biotreatment Soil Media (BSM) Products – SMCWPPP updated the BSM Supplier List (Appendix 3). The NDS approved the update in January 2020 and the document is posted on the SMCWPPP website (flowstobay.org).
- C.3 Regulated Projects Guide – In 2019, SMCWPPP began updating the guide (formerly known as the C.3 Stormwater Technical Guidance) with new content and graphics, to match the look and feel of the Green Infrastructure Design Guide, for Permittee and design community use. The new guide was completed in January 2020 and incorporated several hundred comments from the NDS. It was finalized and posted on the SMCWPPP website (flowstobay.org) in February 2020.

2020 New Development (C.3) Workshops

In light of restrictions on in-person workshops due the the shelter-in-place order associated with the COVID-19 pandemic, SMCWPPP conducted two half-day on-line only webinars in June of 2020: Part 1 - "Reviewing C.3 Regulated Projects" was conducted on June 3 and Part 2 - "Implementing Green Street Projects" on June 17. The first webinar was attended by 77 people and the second webinar by 58 people. The first webinar started with a "basic training" providing an overview of stormwater control measures and the development-related requirements in the MRP with a focus on C.3 regulated projects. This was followed by an "advanced topics" presentation on hydraulic sizing and other issues related to regulated project review and design. Presentations were also given on reviewing regulated project submittals for compliance with the MRP with a presentation of an example project from Redwood City given by NDS Chair, James O'Connell. The second webinar focused on green streets – including GI types, design, and maintenance. The webinar agendas, attendance lists, and evaluation form summaries are provided in Appendix 3. Based on the evaluation forms submitted, attendees generally found that the webinars were valuable and met their expectations.

Green Infrastructure Planning

During FY 2019/20, SMCWPPP continued to provide GI Plan assistance to San Mateo County municipalities to meet the requirements of the MRP by:

- Providing guidelines and standards, typical details, and specifications approach, organization, and content, via updates to the Green Infrastructure Design Guide and the C.3 Regulated Projects Guide;
- Preparing final drafts of the Phase I and II reports for the Green Infrastructure Reasonable Analysis Assurance (RAA) that document its various modeling inputs, including new and redevelopment land use projections and regional project opportunities;
- Tracking and promoting development of GI-related policies (i.e., sharing and promoting new policies adopted by some jurisdictions to require stormwater treatment control measures on a broader array of projects, beyond what is required in the MRP, and/or requiring green stormwater infrastructure on the public right-of-way in association with development project frontage improvements); and

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- Supporting GI implementation through the advancement of the San Mateo Countywide Sustainable Streets Master Plan project.

In FY 2019/20, SMCWPPP also completed an update to the San Mateo Countywide Green Infrastructure Design Guide and finalized the new C.3 Regulated Projects Guide. Both documents (comprising the GreenSuite) were posted to the SMCWPPP website (flowstobay.org) in February 2020 with the redesign of the SMCWPPP website.

Green Infrastructure Outreach

During FY 2019/20, SMCWPPP continued performing a variety of GI-related outreach, including the following efforts:

- Created and promoted the Green Infrastructure, Green Infrastructure Story Map, Green Infrastructure Design Guide, and the Sustainable Streets Master Plan pages on the redesigned SMCWPPP website (flowstobay.org).
- Developed a GI lesson plan for students in grades 9 through 12 in collaboration with the San Mateo County Office of Sustainability and their YESS Program (Youth Exploring Sea Level Rise). This lesson plan helps students understand how green infrastructure can help lessen the impacts of climate change, introduces various types of GI to students, and encourages them to them to explore and design GI solutions for their campus.
- Conducted a hands-on rain barrel installation at Tierra Linda Middle School in San Carlos to support the Eco Club in their sustainable school efforts. The 100-gallon catchment system was installed with the purpose of directly irrigating a newly installed rain garden. Students as well as members of the school and greater community engaged in a step-by-step instruction of a rain barrel installation and drip irrigation system.
- Continued the partnership with the County Office of Education to implement the Clean Water Pathways teacher fellowship program (now called the Sustainable Watersheds Institute), designed to support long-term incorporation of stormwater pollution prevention and GI design solutions into school curricula and programming across age groups (Pre-K through 12) throughout San Mateo County. SMCWPPP supported additional school-age outreach via classroom presentations and project ideation meetings with representatives from school districts, schools and partner agencies. More details on this program and other outreach activities are provided in Section C.7.
- Continued the Countywide Rain Barrel Rebate Program in partnership with the Bay Area Water Supply and Conservation Agency (BAWSCA), including regular social media, newsletter, and community outreach event promotion. The Rain Barrel Rebate Campaign received 5,029 website page views, and 27 applications for 33 rebates were submitted by San Mateo residents. Over 2,000 rain barrels have been installed to-date through this program. More details on this program and other outreach activities are provided in Section C.7 of this report. SMCWPPP also worked with BAWSCA to include expanded rebates for larger volume rain barrel capacity and to incentivize adding rain gardens to residential lawn replacement projects.
- Conducted and promoted three rain barrel workshops for community residents to learn more about rain barrel use, benefits, and installation. One participant from each workshop was awarded a free rain barrel for attending. C/CAG was also selected to present on its rain barrel rebate program at the 2019 Annual CASQA Conference.

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- Held three outreach and public education events for Phase 2 of the community engagement for the San Mateo Countywide Sustainable Streets Master Plan that reached approximately 230 residents who learned about Sustainable Streets and were provided with the opportunity to provide their feedback on priorities and preferences. These events were identified as locations to reach a high volume of people, engage with diverse communities, specifically near disadvantaged or vulnerable areas, and target a wide range of locations within San Mateo County.
- Developed and promoted 4 blogs discussing the value of GI which received 663 pageviews. One specifically highlighted a "community" champion who told her story about how her 6,000-gallon cisterns have helped her farm prosper while conserving water.
- Conducted a combination intercept/online survey throughout the County to ask over 1,200 San Mateo County residents about their perceptions of GI. The results revealed that approximately 60% of those surveyed recognized the term "green infrastructure" and show strong support for spending on GI if it costs 0-25% more than traditional infrastructure.
- Developed four e-newsletters with GI-related topics that were distributed to 3,544 people.
- Made 39 social media posts related to GI, reaching 26,174 followers, including the following examples:
    - GI reduces pollution by allowing for natural filtration that removes pollutants like PCBs, mercury, and trash from the water column before these contaminants enter the Bay and ocean. At the same time, GI works above ground to filter air pollutants and particulates. Click here to learn more: bit.ly/TheFutureIsGreenInfrastructure.
    - NYC is adding 5,000 specially designed curbside rain gardens to their green infrastructure plans in an effort to combat ocean pollution and promote water infiltration. Similar work is underway in San Mateo County through our Sustainable Streets Master plan. Learn about your local Green Infrastructure projects here: bit.ly/SMCSustainableStreetsMasterPlan.
    - GI promotes traffic calming, thus increasing bike and pedestrian safety through protected lanes and other planned community designs. Learn more here: bit.ly/WhatIsGreenInfrastructure.
    - GI projects create protected habitat for wildlife in urban areas by increasing the safe, vegetative areas available to animals. Click here to learn more about the numerous benefits of GI: bit.ly/TheFutureIsGreenInfrastructure.
    - Looking for a low-cost project that's simple and will save you money? Look no further! We talk through the benefits of ownership and demystify the San Mateo County rain barrel rebate in our blog. Click here: bit.ly/smc-rb-rebate.
    - "If we want to protect our cities from flooding, reduce Bay pollution, and improve our resilience to climate change, we need to change the way we manage stormwater." Learn more about GI on @Save the Bay's recent blog!

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- Great news for supporters of GI! In a new case study published in the Journal of Water Resources Planning and Management, researchers examined two distinct watersheds and demonstrated that even small decentralized stormwater management practices like rain gardens can make a big cumulative difference to the resiliency of a watershed. Read more here: http://bit.ly/2KxGl8N.

San Mateo Countywide Stormwater Resource Plan

In 2017 SMCWPPP completed the Countywide Stormwater Resource Plan (SRP) to support San Mateo County MRP Permittees in developing GI Plans and achieving San Francisco Bay mercury and PCBs TMDL implementation requirements. It also serves an essential role in pursuing funding needs and opportunities (e.g., Proposition 1 grants) for project implementation. The SRP identified and prioritized LID retrofit, green streets, and regional stormwater capture project opportunities, and the resulting prioritized list of potential projects included conceptual designs for four LID retrofit projects, three regional projects, and 15 green streets. These concepts include maps of the proposed projects and associated drainage areas, information to support future designs, modeled estimates of stormwater capture volumes and mercury and PCBs loads reduced, and cost estimates. The SRP and associated products (including a web-based map viewer) are now included on a dedicated page on the redesigned SMCWPPP website (flowstobay.org).

The SRP also provided the modeling foundation for the GI portion of the RAA for local GI Plans, as detailed in Section C.11 and Appendix 11 of this report and also supported the project opportunity and prioritization process laid out in the San Mateo Countywide Sustainable Streets Master Plan.

The following sections provide an update of early GI implementation and “no missed opportunity” efforts stemming from the SRP concepts and related prioritization efforts. C/CAG’s recently awarded $3 million State General Fund Grant for regional project designs and additional project opportunity identification will advance designs on multiple regional stormwater capture projects, including the projects described below.

Atherton

Atherton continued pursuing a new regional stormwater capture facility to help reduce existing flooding issues in the lower reaches of Atherton Creek and reduce pollutant loads. The Town hired a consultant that developed a preliminary project design in early 2018. The project was presented at the Town’s Park and Recreation Committee and Town Council multiple times. The project received significant public opposition with respect to siting the project in the Town’s only park (Holbrook-Palmer Park). As a result, the Council directed Town staff to evaluate other potential project locations at which a facility could be sited and still take advantage of the $13.6 million funding commitment for the project from Caltrans. The project team proposed relocating to Cartan Field at Menlo College in Atherton, but after advancing through the permitting and CEQA process, the project has since stalled as a result of a shift in priorities and resources at Menlo College following the COVID-19 pandemic. Local agency staff are continuing efforts to maintain the Caltrans funding for alternative projects in Atherton / San Mateo County.

Redwood City

Redwood City advanced through construction two green street projects that received funding via Round 1 of Proposition 1 stormwater implementation grants administered by the State Water Resources Control Board: Middlefield Road Streetscape and Kennedy Middle School Safe Routes to School. These

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green streets were originally included as a project concept in the Stormwater Resource Plan to ensure San Mateo County MRP Permittees would be eligible to compete for this type of funding. SMCWPPP also prepared the successful grant proposal for the City. SMCWPPP also further advanced a concept for regional stormwater retention facilities beneath playing fields at the City's Red Morton Park that would potentially manage runoff from up to 1,650 acres. The concept was presented to the City's Utilities Subcommittee and City Council as part of its GI Plan adoption, and C/CAG has since coordinated with the County Office of Sustainability to advance preliminary design of the project via funds awarded from the EPA San Francisco Bay Water Quality Improvement Fund to the County. C/CAG, the County Office of Sustainability, and the Cities of Redwood City and San Bruno released a Request for Proposals in May 2020 for advancing designs through CEQA documentation for the project in Redwood City, as well as for a project location at an the I-280/380 interchange in San Bruno (as described below).

San Bruno/Caltrans

SMCWPPP developed another concept for a regional retention facility on Caltrans property between the I-280 and I-380 interchange. The project concept was responsive to an identified need for upstream retention in San Bruno's Storm Drain Master Plan to alleviate downstream flooding. The project concept was submitted to Caltrans for consideration for funding given that approximately 40 acres of Caltrans rights-of-way are in the project drainage area. The concept is currently on a list for Caltrans consideration for future funding, but it is anticipated to be a low priority project for Caltrans due to low overall benefit relative to Caltrans interests (primarily trash load reduction and then TMDL pollutant load reductions). Because there is also upstream drainage area within unincorporated San Mateo County and the City of San Bruno, C/CAG, the County Office of Sustainability, and the City of San Bruno have coordinated to leverage the State General Fund Grant referred to above, as well as the County's EPA funds, to advance project designs through CEQA documentation in the same joint effort described above for the Redwood City project.

City of San Mateo

The City of San Mateo built Green Street projects at 4th Avenue and Fremont (with a stormwater curb extension), 5th Avenue and Delaware (stormwater curb extension and sidewalk planter), and 9th Avenue and Delaware (stormwater curb extensions) as part of the San Francisco Estuary Partnership / BASMAA Urban Greening Bay Area grant from EPA through its San Francisco Bay Water Quality Improvement Fund.

City of South San Francisco

The City of South San Francisco continues to pursue a regional retention facility at Orange Memorial Park with $9.5 million in funding from Caltrans in an initial Cooperative Implementation Agreement and an additional $6 million also from Caltrans to support their trash reduction goals. The City has completed the design and permitting phase for a stormwater capture facility that will remove sediment, clean water flowing from Colma Creek into San Francisco Bay, and potentially provide for parkland irrigation at Orange Memorial Park. This regional stormwater capture project would potentially capture flows from a large multi-jurisdictional area of primarily old urban land uses. The City anticipates starting construction in FY 2020/21.

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City of Belmont and San Mateo County Flood and Sea Level Rise Resiliency District

SMCWPPP also developed a project concept for a small regional stormwater capture project at Twin Pines Park in Belmont as part of the SRP. The original project concept proposed approximately 0.5 acre-feet of storage capacity, draining about 30 acre-feet of upstream watershed area in Belmont, San Carlos and County unincorporated areas. In FY 2019/20, the County's Flood Resilience Program developed a Watershed Management Plan for Belmont Creek that included a revised project concept-level assessment and proposed a larger stormwater capture facility. The new proposed project described in the Belmont Creek Watershed Management Plan is a much larger detention facility, with a capacity of approximately 21 acre-feet. The Flood Resilience Program successfully obtained grant funds from the California Department of Water Resources to restore part of Belmont Creek and manage erosion issues upstream of Twin Pines Park. C/CAG has coordinated with the City of Belmont and the new San Mateo County Flood and Sea Level Rise Resiliency District (see Section 1 of this report) to leverage a portion of the State General Fund Grant referenced above along with the restoration grant to advance planning and design for the creek restoration project in coordination with the regional stormwater capture project at Twin Pines Park. The District and the Cities of Belmont and San Carlos will be leading a separate procurement process in FY 2020/21 for this coordinated effort on Belmont Creek.

Safe Routes to School/Green Streets Infrastructure Pilot Program

C/CAG awarded $2.1 million in December 2017 for 10 Safe Routes to School / Green Streets Infrastructure Pilot Projects funded by local Safe Routes to School and stormwater funding, all from vehicle registration fees imposed by C/CAG on registered vehicles in San Mateo County. Grants were awarded to the following jurisdictions:

- City of Brisbane
- Town of Colma
- City of Daly City
- City of East Palo Alto
- City of Half Moon Bay
- City of Menlo Park
- City of Millbrae (Figure 3-1)
- City of Pacifica
- City of Redwood City
- County of San Mateo

Figure 3-1. Completed Taylor Middle School Pilot Project, Millbrae

To date, projects have been completed in Half Moon Bay, Daly City, Millbrae, San Mateo County, Menlo Park and Pacifica (still needs to be planted, but substantially complete). Two additional projects (Brisbane, and Redwood City) will be completed in FY 2020/21, and two projects (Colma and East Palo Alto) will be constructed in early FY 2021/22. These and other green infrastructure projects can be viewed in more detail in the Program's Green Infrastructure Story Map.

Collectively these projects demonstrate commitment by SMCWPPP and San Mateo County MRP Permittees to pursue early implementation opportunities during the term of MRP 2.0. These projects will augment groundwater recharge, remove pollutants, and reduce the volume and velocity of

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stormwater runoff entering the storm drainage system and discharging into local creeks. They demonstrated proactive implementation of GI while these cities completed their GI Plans (which were submitted September 2019) as required by MRP 2.0.

Calm Before the Storm: San Mateo Countywide Sustainable Streets Master Plan

In May 2019, C/CAG was awarded a Caltrans Adaptation Planning Grant for $986,300 (with $145,185 in matching funds) to develop the San Mateo Countywide Sustainable Streets Master Plan. Now in its second (and final) year, this project is aimed at supporting GI Plan implementation with a variety of deliverables, including a refined drainage area analysis of San Mateo County watersheds at the catch-basin scale; a revised opportunity identification and prioritization analysis (which includes new ranking criteria related to opportunity engineering feasibility and new multi-benefit criteria related to climate change adaptation with respect to urban heat islands, vegetation gaps, and increased flow/volume management), as well as providing key linkages to transportation network project investments and planning timelines; an evaluation of future climate change related precipitation impacts on roadway runoff; and an interactive web-based mapping and tracking tool designed to support GI project implementation and tracking towards water quality and volume management goals. The San Mateo Countywide Sustainable Streets Master Plan will further support GI implementation via additional project concepts and typical details and the development of model Sustainable Streets policies to compliment local Complete Streets policies and expand local regulations and requirements for new and redevelopment projects to install and maintain green stormwater infrastructure in the public right-of-way via frontage improvements.

The overall goals and elements of the San Mateo Countywide Sustainable Streets Master Plan are:

- High resolution drainage mapping of street segments draining to individual catch-basins;
- Downscaled climate change analysis of precipitation-based climate change impacts to the transportation network and associated water quality and flood reduction benefits of GI;
- Countywide Master Plan with prioritized street segments and project opportunities associated with Sustainable Streets typologies and linked to funding mechanisms and implementation timelines;
- Model Sustainable Streets policies;
- Project concepts and typical design details;
- Updated web-based project mapping and tracking tool; and,
- Community engagement and consideration of disproportionate impacts to vulnerable communities.

Sustainable Streets combine Complete Streets that accommodate all modes and users' safety and Green Streets that incorporate GI to manage stormwater. As climate change impacts local infrastructure, it will be increasingly important to focus on disadvantaged and vulnerable communities – flooding can have a disproportionate impact on those dependent upon walking, biking, or transit. The proposed project will take a multi-benefit approach to prioritizing Sustainable Streets opportunities throughout San Mateo County that includes evaluation of community-specific needs for safer, more sustainable streets.

The San Mateo Countywide Sustainable Streets Master Plan builds on existing efforts via the countywide modeling for the RAA and the SRP project prioritization, but its intent is to create a tangible and

practical set of tools to further GI implementation and to address major obstacles, especially funding limitations. The San Mateo Countywide Sustainable Streets Master Plan also incorporates further refinements to the prioritization framework in the SRP to include more community priorities (various infrastructure improvements, pavement maintenance planning, community vulnerability to climate change, and climate resiliency).

The project team has convened multiple Stakeholder Advisory Committee meetings to provide a forum for input from transportation agencies and bike/pedestrian advocacy groups and continues to engage the public through a phased engagement strategy, now being done virtually via development of a project-specific website. The project team and C/CAG staff plan to present on several project deliverables at the California Stormwater Quality Association Annual Conference in September 2020, including a 2-hour workshop designed to walk participants through the entirety of developing a sustainable streets master plan. Other planned work includes finalizing the internal and public-facing components of the GI mapping and tracking tool, which also involves updating the process and forms that San Mateo County Permittees use for collecting data on C.3 regulated and voluntary GI projects. The project is due to be completed by the end of February 2021, with the rollout of the final Sustainable Streets Master Plan via a virtual workshop at the end of the calendar year.

Tracking and Reporting Progress on Green Infrastructure

During FY 2019/20, SMCWPPP continued to make progress towards development and implementation of methods to track and report implementation of GI in San Mateo County and track associated pollutant load reductions. The ongoing effort to update the associated GI inventory is described in Section 11 (Mercury Controls) of this report.

As mentioned above, C/CAG is leveraging funding through the San Mateo Countywide Sustainable Streets Master Plan project to create an updated San Mateo County GI tracking tool. The project will support local GI Plans by providing enhanced detail on green street priorities, higher-resolution drainage mapping, and an updated tracking tool consistent with the requirements in MRP Provision C.3.j.

Regional Collaboration

As in past years, throughout FY 2019/20 SMCWPPP participated in BASMAA's Development Committee (DC). Through the BASMAA DC, SMCWPPP participated in regional projects that assist SMCWPPP and its San Mateo County municipalities in meeting specific requirements of Provision C.3, as described below.

Biotreatment Soil Media (BSM) Specifications

In FY 2019/20, SMCWPPP continued to support municipal staff, consultants and suppliers who have questions on the review and use of BSM. SMCWPPP staff screened and worked with vendors that are supplying the BSM product in the Bay Area and wish to be added to the vendor list that is posted on the SMCWPPP website (flowstobay.org). The vendors must demonstrate an understanding of the BASMAA specification, submit lab results and a sample of their BSM product, and use consistent terminology on their websites advertising the product. See the basmaa.org/Announcements/basmaa-revisions-to-mrp-biotreatment-soil-mix-bsm-spec and flowstobay.org/newdevelopment for more details.

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Biotreatment Soil Media Specifications and Bioretention Design with Trees

As a result of the Biotreatment Soil Roundtable held on June 30, 2016, a regional work group was formed to discuss designs that incorporate trees into bioretention areas. SMCWPPP staff took the lead on facilitating this Trees and BSM Design Work Group. In FY 2019/20, the Trees and BSM Design Work Group met and continued to compile information on various design issues with trees in bioretention areas. Members of the work group include several arborists, GI consultants, and municipal staff from parks departments and stormwater programs. City of Fremont staff provided design and maintenance information on their tree well filter systems. Information related to the integration of trees and stormwater treatment has been added to the C.3 Regulated Projects Guide. In FY 2020/21, the Work Group will continue to meet and review examples of tree-specific treatment measure designs, discuss soil and maintenance issues, and develop recommendations for design and maintenance of stormwater tree systems using the BASMAA GI Alternative Sizing guidance.

Participation in Processes to Promote Green Infrastructure

Provision C.3.j.iii requires that Permittees individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects. SMCWPPP is tracking and participating in the BASMAA activities to assist Permittees comply with this provision.

To support San Mateo County Permittees in complying with the requirements of MRP Provision C.3.j.iii (Participate in Processes to Promote GI), the Countywide Program participated through BASMAA in the Urban Greening Bay Area Project's activities to implement the 2018 Roadmap of Funding Solutions for Sustainable Streets, which identifies specific actions to improve the funding of projects that include both complete streets improvements and GI. The work during the reporting period included continuing coordination with transportation agencies – including the Metropolitan Transportation Commission (MTC), the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Federal Highway Administration (FHWA) – to clarify GI eligibility in federal, regional, and state transportation grant programs (Roadmap Specific Actions 1-1, 1-2, and 1-3). In November 2019, BASMAA transmitted a memorandum to the above-listed regional and state agencies, documenting the eligibility of GI in applicable regional, state and federal transportation funding programs and requesting the agencies' participation in developing fact sheets that clarify eligibility for sustainable streets in two federal transportation funding programs – the Surface Transportation Block Grant Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) – as well as the California Senate Bill 1 (SB 1) Road Maintenance and Rehabilitation Program.

On February 4, 2020, BASMAA representatives met with staff from MTC and Caltrans District 4 (the Caltrans District for the nine-county Bay Area), to develop an approach for a regional fact sheet that focuses on the eligibility of GI in projects funded by the STP and CMAQ through the One Bay Area Grant (OBAG) program administered by MTC. The draft regional fact sheet was reviewed by MTC staff and is scheduled to be finalized by September 2020.

BASMAA held a conference call with CTC staff on February 10, 2020, to develop an approach for a statewide fact sheet that focuses on the eligibility of GI in projects funded by Senate Bill 1. CTC staff provided comments on the draft statewide fact sheet but deferred further action pending documentation that there is interest in this topic beyond the San Francisco Bay Area. BASMAA drafted an online survey for distribution to stormwater programs within California. Before the fact sheet was

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distributed, BASMAA worked with the U.S. Environmental Protection Agency (USEPA) staff liaison to the Federal Highway Administration (FHWA) to have FHWA staff review BASMAA's November 2019 research memorandum. Similar to the CTC, FHWA questioned whether this issue is of interest beyond the San Francisco Bay Area and California. BASMAA is updating the draft online survey for national distribution through the Green Infrastructure Leadership Exchange. The SB 1 fact sheet is scheduled to be finalized by December 2020.

SMCWPPP's Program Manager was also on the planning committee and a participant in ReNUWIt's (Renewing our Nation's Urban Water Infrastructure) two-day July 2019 stormwater workshop among stormwater, flood, water supply, regulatory, and environmental organizations to talk about how stormwater could be better utilized as a water supply resource. The Program Manager also participated in a follow-up one-hour webinar on July 6, 2020.

The Program Manager participates in the Green Infrastructure Leadership Exchange, a national network of municipal/district/agency green infrastructure representatives, including attending the annual meeting (virtual this year, in May 2020), and actively participating in the Funding/Financing, GIS/Prioritization, and Climate Change workgroups.

The Program Manager is also participating in a Green Infrastructure Funding Academy hosted by American Rivers, Corona Environmental, and the Water Now Alliance, focused on developing GI credit trading marketplaces and approaches for debt-financing distributed GI. This is complementary to the Program Manager's role on the Advisory Committee for the EPA grant-funded Regional Compliance for a Sustainable Bay project being implemented in Contra Costa County.

FUTURE ACTIONS

In FY 2020/21, SMCWPPP plans to continue working with the NDS to conduct the following activities to assist San Mateo County municipalities to comply with MRP Provision C.3:

- Continue to exchange information with San Mateo County municipalities on MRP implementation and other timely issues through quarterly NDS meetings and the annual C.3 workshop.
- Revise checklists and outreach flyers as needed to respond to San Mateo County municipal staff issues, concerns, and suggestions for improvement.
- Support San Mateo County municipalities with GI Plan implementation.
- Conduct GI outreach and education with the public, municipal staff, and elected officials, including presentations to city councils and other relevant groups on the final Sustainable Streets Master Plan and further raising awareness about GI through the redesigned SMCWPPP website.
- Continue to coordinate with other related SMCWPPP subcommittees as needed (e.g., Litter Workgroup and deployment of the Litter Reduction Toolkit for Multi-Family Dwellings, Public Information and Participation Subcommittee to engage on GI outreach).
- Finalize process for tracking and mapping completed GI projects, through the tool developed as part of the San Mateo Countywide Sustainable Streets Plan effort.

- Continue to collaborate with BASMAA and Bay Area countywide stormwater programs on GI implementation and guidance, update the BSM specifications and BSM suppliers list, and develop designs for biotreatment areas with trees. To the extent possible, work with biotreatment mulch suppliers to develop better specifications for that product.
- Continue working with BASMAA on issues related to MRP implementation, particularly the GI requirements and related provisions.
- Plan and conduct a C.3 workshop for municipal staff (tentatively scheduled for June of 2021), building on the trainings conducted in previous years. Topics may include implementation of GI Plans, using SMCWPPP resources such as the GreenSuite, and example reviews of development project plans.
- Continue efforts to work with San Mateo County municipalities, schools, and the San Mateo County Office of Sustainability, to pursue funding for and facilitate implementation of cost-effective GI, including regional multi-jurisdiction and multi-benefit stormwater capture and treatment projects. This will include continuing to advance regional multi-benefit project designs in San Bruno, Belmont and Redwood City and additional project opportunities analyses/project concept designs through the $2.94 million in state grant funds issued to C/CAG by the California Natural Resources Agency. C/CAG will also be conducting a procurement process in FY 20/21 to develop schoolyard greening concept plans for up to six schools in the San Carlos School District.
- Continue developing an implementation-level approach to achieving water quality goals and other community benefits associated with GI, via final deliverables from the San Mateo Countywide Sustainable Streets Master Plan (funded by a Caltrans Adaptation Planning Grant issued to C/CAG).
- Support completion of the remaining four (of 10 total) integrated Safe Routes to School and Green Streets Infrastructure Projects, funded by C/CAG's local vehicle registration fee.
- Roll-out a pilot program to provide additional incentives for residential rain garden installations as part of the Lawn Be Gone! rebate in partnership with the Bay Area Water Supply and Conservation Agency.
- Where feasible, continue coordinating regional scale, multi-benefit stormwater capture efforts to support GI implementation and seek new project funding through the newly established Flood and Sea Level Rise Resiliency Agency (FSLRRD) (resilientsanmateo.org). C/CAG has set aside a portion of the State General Fund Grant ($2.94 million) to advance regional collaboration on sustainable stormwater management in San Mateo County, which will be supportive of building a business case for broader collaboration and potentially cost-sharing or credit trading for water quality and resiliency goals. See Section 1 for additional details.

SECTION 4
C.4 INDUSTRIAL AND COMMERCIAL SITE CONTROLS

INTRODUCTION

A primary goal of SMCWPPP's Commercial, Industrial and Illicit Discharge (CII) component is to assist San Mateo County Permittees in controlling the discharge of pollutants in stormwater from commercial and industrial businesses to the maximum extent practicable. San Mateo County Permittees are responsible for complying with various commercial and industrial business facility inspection requirements under MRP Provision C.4. SMCWPPP's CII component assists San Mateo County Permittee staff with understanding these MRP requirements and develops various related tools, templates, reporting forms, and other MRP compliance support materials. The CII component also assists San Mateo County Permittees to comply with other MRP provisions that are discussed in other sections of this report (Sections 5, Illicit Discharge Detection and Elimination and Section 13, Copper Controls).

SMCWPPP's assistance with MRP Provision C.4 and other CII component provisions is coordinated through the CII Subcommittee.

IMPLEMENTATION OF MRP PROVISIONS

SMCWPPP performs a variety of tasks to assist San Mateo County Permittees with implementation of MRP Provision C.4, with input and assistance provided by the CII Subcommittee. FY 2019/20 accomplishments included the following:

- Held four CII Subcommittee meetings;
- Developed a Vehicle Service BMP fact sheet;
- Translated the Vehicle Service BMP fact sheet and Food Service Facility BMP fact sheet into Spanish and Chinese; and
- Updated the business stormwater inspector contact list on the SMCWPPP website.

More information on each of these accomplishments is provided below.

CII Subcommittee

The CII Subcommittee provides the opportunity for sharing information about MRP requirements related to commercial/industrial facility inspections and methods for achieving compliance. The Subcommittee met four times during FY 2019/20 with good participation by municipal staff, as shown by the attendance list (Appendix 4). Ward Donnelly from the City of Daly City continued to chair the CII Subcommittee during FY 2019/20.

The meetings provided the opportunity for municipal staff to share their experiences with implementing MRP provisions related to the CII component, including Provision C.4. During FY 2019/20 meetings, SMCWPPP staff focused on facilitating discussions about developing business inspection lists, potable water discharges, illicit discharges, inspection fees, SB205, inspection activities during the COVID-19 pandemic, and proposed revisions to Provision C.4, Industrial and Commercial Site Controls, of MRP 3.0.

Program Materials

In FY 2017/18 Countywide Program staff updated the SMCWPPP Stormwater Inspection Form Template and developed a Stormwater Inspection Tracking Excel Template for cities to track their stormwater inspection data, if needed.

In FY 2019/20, Countywide Program staff continued to update or develop outreach materials identified by the Subcommittee. A Vehicle Service BMP fact sheet was developed. The Vehicle Service BMP fact sheet and Restaurant BMP fact sheet were translated into Spanish and Chinese. These outreach materials are available on the SMCWPPP website (flowstobay.org) and are included in Appendix 4.

CII Training Workshop

The Countywide Program postponed the inspector training workshop this fiscal year, which was scheduled for April 2020, due to the COVID-19 shelter-in-place orders.

FUTURE ACTIONS

FY 2020/21 activities planned by SMCWPPP to assist San Mateo County Permittees comply with MRP requirements in Provision C.4 include the following:

- Continue holding quarterly CII Subcommittee meetings;
- Continue to update existing or develop new business outreach materials as needed;
- Hold an inspector training workshop; and
- Assist San Mateo County Permittees with the implementation of commercial and industrial stormwater inspection tasks, including continuing to assist with Business Inspection Plans (BIPs) and associated prioritizing of inspections, data management, and Enforcement Response Plans (ERPs).

SECTION 5
C.5 ILLICIT DISCHARGE DETECTION AND ELIMINATION

INTRODUCTION

A primary goal of SMCWPPP's Commercial, Industrial and Illicit Discharge (CII) component is to assist San Mateo County Permittees to effectively prohibit the discharge of illicit, non-stormwater discharges to the municipal storm drain system. San Mateo County Permittees are responsible for controlling non-stormwater discharges prohibited by MRP Provision C.5. SMCWPPP's CII component assists San Mateo County Permittee staff with understanding these MRP requirements and develops various related tools, templates, reporting forms, and other MRP compliance support materials. SMCWPPP's CII component also assists Permittees to comply with other MRP provisions that are discussed in other sections of this report (see Sections 4, Industrial and Commercial Site Controls, and 13, Copper Controls).

SMCWPPP's CII component is coordinated through the CII Subcommittee. See Section 4 for further details about the CII Subcommittee.

IMPLEMENTATION OF MRP PROVISIONS

During FY 2019/20, SMCWPPP performed a number of tasks to assist San Mateo County Permittees with implementation of MRP Provision C.5, with input and assistance provided by the CII Subcommittee. Accomplishments included the following:

- Updated the inventory of mobile cleaner businesses in San Mateo County;
- Updated the table of stormwater enforcement actions against mobile businesses to share countywide with stormwater inspectors;
- Updated the Illicit Discharge Responder/Storm Drain Cleaning Contract List;
- Translated the mobile cleaner businesses BMP fact sheet into Spanish and Chinese; and
- Conducted public outreach via the SMCWPPP website (flowstobay.org) to inform consumers about hiring mobile businesses that implement best practices for preventing non-stormwater discharges to storm drains;
- Updated the Illicit Discharge contact list on the SMCWPPP website.

More information on these accomplishments is provided below.

Countywide Program Materials

SMCWPPP has developed a variety of materials to assist municipal agency staff with implementing Provision C.5. These materials are all available on the SMCWPPP website (flowstobay.org) and continue

to be useful tools that assist agency staff to achieve permit compliance. The materials include an Illicit Discharge Investigation Field Form template, an Illicit Discharge Tracking Excel Template, and outreach items.

Also available on the password protected section of the SMCWPPP website is the countywide inventory of mobile businesses operating in San Mateo County. The mobile businesses identified in the inventory fall into the following categories: carpet cleaners, auto washers, steam cleaners, power washers, and pet care providers. The county inventory of mobile businesses is also periodically updated. Beginning in FY 2013/14, the CII Subcommittee surveyed San Mateo County agencies and compiled information on mobile businesses that were subject to stormwater enforcement actions during that fiscal year. This information was compiled in a table and made available on the password protected section of the SMCWPPP website. The table is periodically updated with additional enforcement action information, including an update that was conducted during FY 2019/20.

In FY 2018/19, the Mobile Business BMPs brochure was updated to a new fact sheet format. In FY 2019/20 the Mobile Business BMPs fact sheet was translated into Spanish and Chinese. SMCWPPP also conducted public outreach to inform consumers about hiring mobile businesses that implement best practices for preventing non-stormwater discharges to storm drains by making these materials available on the SMCWPPP website (flowstobay.org). The materials are also included in Appendix 5.

In addition, BASMAA has a long-standing Surface Cleaner Training and Recognition program that focuses on improving the use of BMPs for businesses that clean surfaces (i.e., sidewalks, plazas, parking areas and building exteriors). See the following BASMAA report for more information: *Annual Reporting for FY 2019-2020, Regional Supplement for Training and Outreach* (Appendix 13). San Mateo County Permittees have continued to refer cleaners to BASMAA's website for surface cleaning training materials.

FUTURE ACTIONS

During FY 2020/21, SMCWPPP will assist San Mateo County Permittees comply with the requirements in MRP Provision C.5 by continuing to:

- Hold CII Subcommittee meetings;
- Assist with the implementation of illicit discharge detection and elimination tasks, including updating existing or developing new outreach materials as needed, Enforcement Response Plans (ERPs), and complaint tracking and follow-up; and
- Assist Permittees comply with the requirements for controlling mobile sources in MRP Provision C.5.e., including providing updated information on mobile business BMPs as needed, sharing enforcement information, periodically updating the regional enforcement inventory, and conducting outreach activities.

SECTION 6
C.6 CONSTRUCTION SITE CONTROL

INTRODUCTION

This component of SMCWPPP assists San Mateo County municipalities in complying with MRP Provision C.6 (Construction Site Control). This assistance continued to be provided through the New Development Subcommittee (NDS, see Section 3 for more details). SMCWPPP staff also obtained input and direction from municipal agency representatives through the NDS when planning the trainings and other compliance assistance activities described below.

IMPLEMENTATION OF MRP PROVISIONS

SMCWPPP's accomplishments during FY 2019/20 include the following tasks to assist San Mateo County municipalities with implementation of MRP Provision C.6:

- Conducted a construction site controls training for the California Building Inspectors Group (CALBIG) on November 13, 2019; and
- Printed 2,000 copies of the Construction Site Inspection Form and distributed them to the Subcommittee members;

CALBIG Training Meeting

In FY 2019/20, SMCWPPP continued its partnership with CALBIG, a group in which many building inspectors from San Mateo County municipalities participate. At the group's November 13, 2019 meeting, SMCWPPP staff gave a presentation covering an overview of the MRP and Provisions C.3 and C.6, current stormwater requirements for construction sites, proper implementation of construction BMPs, Provision C.13.a (architectural copper), tips for keeping construction inspection programs in compliance, and the new program to manage PCBs during building demolition. Approximately 33 people attended the training, including agency inspectors, local stormwater program staff, and contractors. The meeting announcement, agenda, and attendance list are provided in Appendix 6.

Construction Site Inspection Form

In August 2019, SMCWPPP staff printed and distributed 2,000 copies in triplicate form of the SMCWPPP Construction Site Inspection Report to San Mateo County municipalities.

2020 Construction Site Inspector Workshop

The 2020 Construction Site Inspector Workshop scheduled for April 2020 was canceled due to the COVID-19 pandemic. The associated shelter-in-place order precluded conducting an in-person training with the field component that Permittee staff found to be very informative in previous years. A workshop is planned for FY 2020/21.

FUTURE ACTIONS

In FY 2020/21, SMCWPPP staff plans to work with the NDS to conduct the following activities to assist San Mateo County municipalities comply with MRP Provision C.6:

- Continue to share information about construction site controls among San Mateo County municipalities through quarterly NDS meetings;
- Plan and conduct a Construction Site Inspector Workshop focusing on field trainings, BMP inspections, Enforcement Response Plans and/or other topics of interest to the NDS; and
- Continue to coordinate with partner organizations, such as CALBIG, to provide additional training on construction-related stormwater issues.

07480
7521

SECTION 7
C.7 PUBLIC INFORMATION AND PARTICIPATION

INTRODUCTION

The primary goals of SMCWPPP's Public Information and Participation (PIP) component are to:

- Educate the public about the causes of stormwater pollution and its adverse effects on water quality in local creeks, lagoons, shorelines, and neighborhoods;
- Encourage residents to adopt less polluting and more environmentally beneficial practices; and
- Increase residents' participation and involvement in SMCWPPP activities.

PIP is essential for controlling and reducing the source of pollution since many preventable pollutants are associated with everyday residential activity. Stormwater pollution may be reduced when residents are educated and motivated by the benefits of reducing pollutants. This approach of education and motivation is cost-effective and efficient in meeting the goal of reducing pollutants in stormwater to the maximum extent practicable.

Summary of Accomplishments in FY 2019/20

The SMCWPPP PIP Subcommittee oversees the development of outreach and educational materials and guides the implementation of the PIP component of the program. The Subcommittee met two times in FY 2019/20 with good participation by municipal staff, as shown by the attendance list, included in Appendix 7.

SMCWPPP's PIP accomplishments during FY 2019/20 include the following:

- Partnered with the Bay Area Water Conservation Supply Agency (BAWSCA) on a Rain Barrel outreach campaign that received 474 website page views. Received 27 rebate applications from residents for a total of 33 rain barrel installations and distributed rain barrel rebate fliers at outreach events. Over 2,000 rain barrels have been installed to-date in San Mateo County under the rebate program.
- Promoted the Sustainable Streets Master Plan by conducting public outreach to educate the public about the project, convey technical issues in a clear manner, continue collecting feedback on priorities and preferences, and publicize upcoming public participation opportunities, reaching 231 residents in multiethnic communities.
- Conducted a countywide stormwater and green infrastructure community survey that recorded the opinions and findings of 1,214 San Mateo County residents.

- Promoted the San Mateo County Environmental Health Services (EHS) campaign to reduce littering of cigarette butts, as well as the San Mateo County Reusable Bag Ordinance Emergency Regulation and HHW Collection Program.
- Promoted Coastal Cleanup Day for 5,245 volunteers, raising awareness of the event and the consequences of littering behaviors.
- Promoted Caltrans educational materials regarding uncovered loads in English and Spanish.
- Gained 8,054 new Facebook fans and a total page reach of 121,789 with stormwater pollution prevention Facebook messaging.
- Sent 12 newsletters to a list of 3,515 active, opt-in subscribers with topics covering eco-friendly gardening practices, local cleanup events and stormwater pollution prevention information and tips.
- Received 24,357 visitors to the SMCWPPP website, which focuses on stormwater pollution prevention messaging and resources.
- Participated in 13 public outreach events in San Mateo County to speak one-on-one with residents and hand out collateral materials.
- Participated in a new, countywide stormwater-focused teacher fellowship program in coordination with the County Office of Education and also supported countywide school outreach efforts by creating a green infrastructure lesson plan and conducting in-class presentations.
- Performed point-of-purchase outreach with Our Water Our World materials to 10 hardware stores in San Mateo County while conducting in-store tabling events to engage residents on eco-friendly alternatives to pesticides.
- Promoted outreach messaging to residents regarding eco-friendly alternatives to pesticides in SMCWPPP's newsletter, website and social media channels.

IMPLEMENTATION OF MRP PROVISION C.7

C.7.b. Outreach Campaigns

(1) Rain Barrel Outreach Campaign Description

As a result of the California drought and in an attempt to pursue alternative approaches to public engagement, SMCWPPP partnered with the Bay Area Water Supply Conservation Agency (BAWSCA) in 2014 to implement a pilot countywide rain barrel rebate program. During FY 2019/20, SMCWPPP continued its partnership with BAWSCA to promote the program, which subsidizes the cost of purchasing a rain barrel by providing rebates up to $100. The program objectives include: 1) educate residents about the benefits of rain barrels to water conservation and water quality efforts, 2) promote green infrastructure tools for keeping local waters clean, and 3) encourage residents to participate in the Rain Barrel Rebate Program. Over 1,080 rain barrels have been installed to-date in San Mateo County under the rebate program.

Prior to this partnership, the only agency in San Mateo County offering rain barrel rebates was the City of Millbrae. C/CAG previously provided BAWSCA with an additional $25,000 to subsidize the rebates for San Mateo County residents, which, like BAWSCA's other water conservation programs, is a

subscription-based program in which BAWSCA's member agencies (water supply agencies that receive water from the San Francisco Public Utilities Commission) can choose to participate. Those funds were still being used in FY 2019/20 to supplement countywide residential rebates. The program provides rebates for up to two rain barrels for single-family residential and four for multi-family/commercial properties. C/CAG's funding provides rebates of $50 per barrel, countywide. Rebates are matched (total of $100 per barrel) in areas of the county where a water supply agency is participating in the program.

(2) Summary of How the Effectiveness Assessment was Implemented

The rain barrel campaign measured and tracked three different metrics to access the effectiveness of the campaign:

- Online reach and impressions
- Workshop attendance and post-workshop surveys
- Number of rain barrel rebates applied for

An-depth review of the outreach strategy and tactics follows.

During FY 2019/20, SMCWPPP's PIP component continued efforts to promote the rain barrel program and inspire San Mateo County residents to join the rainwater harvesting movement. SMCWPPP conducted outreach to inform residents about the rebate and also the non-monetary benefits. The outreach strategy consisted of promoting the rain barrel rebate program through offline, online, and community outreach tactics.

As an offline tactic, rain barrel tip cards were distributed at community outreach events and made available as point-of-purchase materials at home improvement stores. The tip cards helped to create awareness of the purpose of rain barrels, emphasize how easy they are to install, and provide examples of financial and environmental benefits for installing a rain barrel.

Online tactics included an "opt-in" map hosted on the rain barrel page of the SMCWPPP website. The "opt-in" map allows users to enter their location onto a map to demonstrate that they have installed a rain barrel and place themselves on a map of San Mateo County. By placing themselves on the map, all website visitors will see how many rain barrels are being used throughout San Mateo County. This helps to establish the social norm of rainwater harvesting and encourage others to join the movement. The opt-in map (Figure 7-1) can be viewed on the SMCWPPP website (flowstobay.org/rainbarrel).

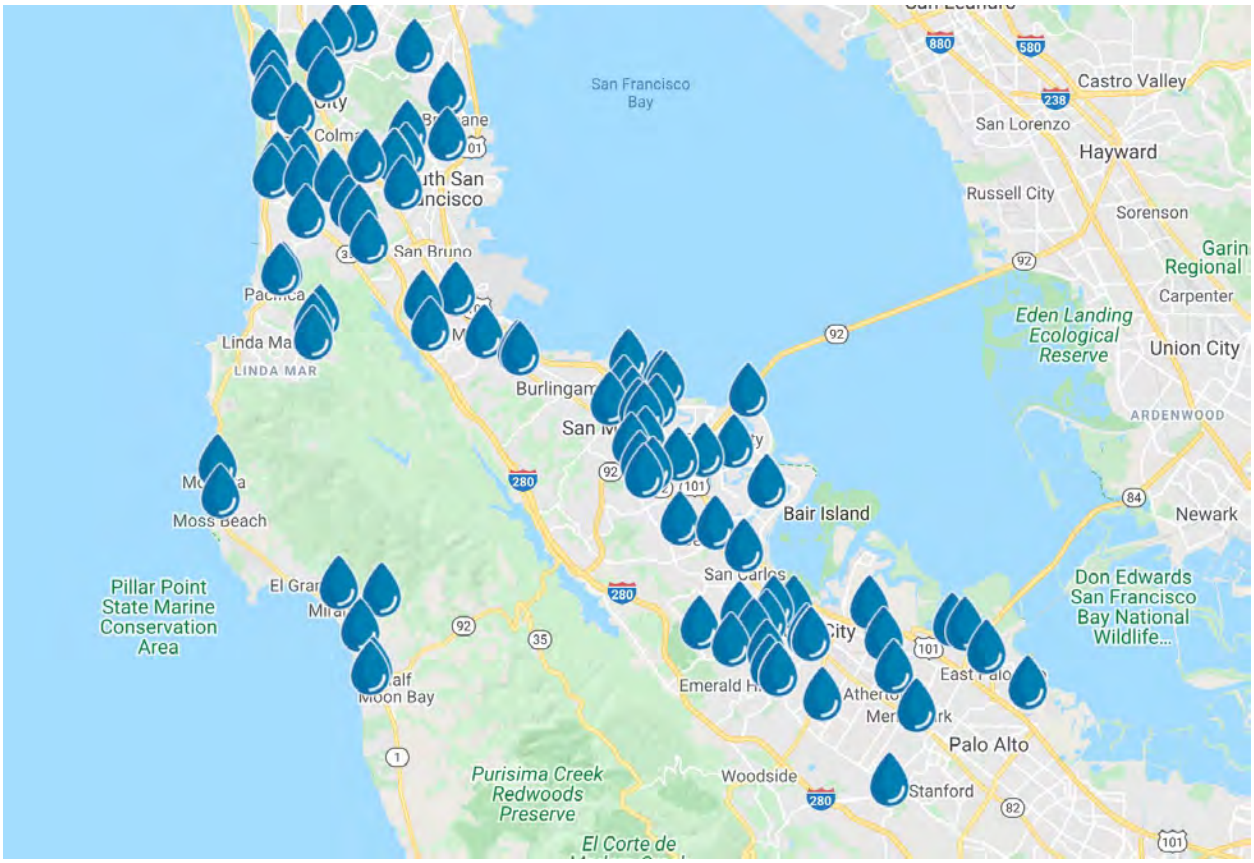

Figure 7-1. Rain Barrel Opt-in Map.

SMCWPPP also promoted the rain barrel rebate program via a social media channel on Facebook. Educational posts were created to inform residents about the functions and benefits of rain barrels. SMCWPPP used posts showing photos of various rain barrels, while encouraging use of the "opt-in" map and using ads to reach a wider audience. Posts were also created to promote three free rain barrel workshops for County residents, including one hands-on installation workshop where participants learned step-by-step instructions for installing a rain barrel and drip irrigation system connected to a rain garden.

Another tool used for analyzing outreach success was the signups received on SMCWPPP's online rain barrel opt-in map, which provides a record of locations in San Mateo County where residents have installed barrels (Figure 7-1). As a result of these workshops and the promotion conducted through e-newsletters, partners, and on Facebook, the rain barrel opt-in map showed that the number of rain barrels installed grew 116% during the fiscal year.

Figure 7-2 provides examples of Facebook posts regarding the rain barrel rebate program.

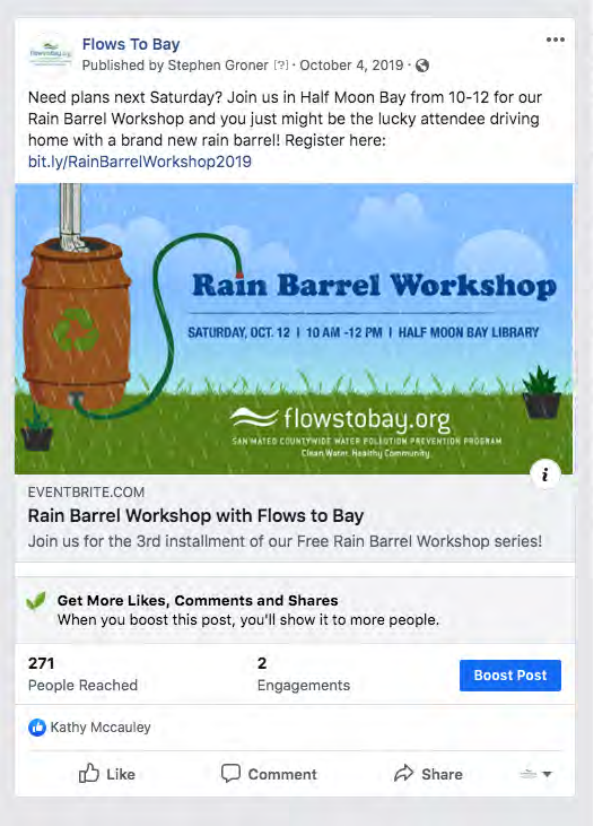
Flows To Bay
Published by Stephen Groner · October 4, 2019 ·
Need plans next Saturday? Join us in Half Moon Bay from 10-12 for our Rain Barrel Workshop and you just might be the lucky attendee driving home with a brand new rain barrel! Register here: bit.ly/RainBarrelWorkshop2019
Rain Barrel Workshop
SATURDAY, OCT. 12 | 10 AM -12 PM | HALF MOON BAY LIBRARY
flowstobay.org
EVENTBRITE.COM
Rain Barrel Workshop with Flows to Bay
Join us for the 3rd installment of our Free Rain Barrel Workshop series!
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
271 People Reached
2 Engagements
Boost Post
Kathy Mccauley
Like
Comment
Share

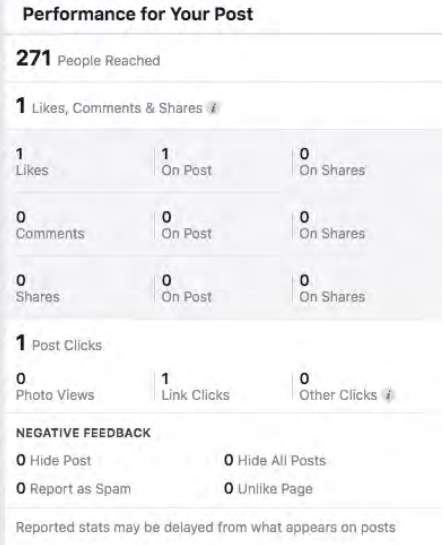
Performance for Your Post
271 People Reached
1 Likes, Comments & Shares
1 Likes
1 On Post
0 On Shares
0 Comments
0 On Post
0 On Shares
0 Shares
0 On Post
0 On Shares
1 Post Clicks
0 Photo Views
1 Link Clicks
0 Other Clicks
NEGATIVE FEEDBACK
0 Hide Post
0 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

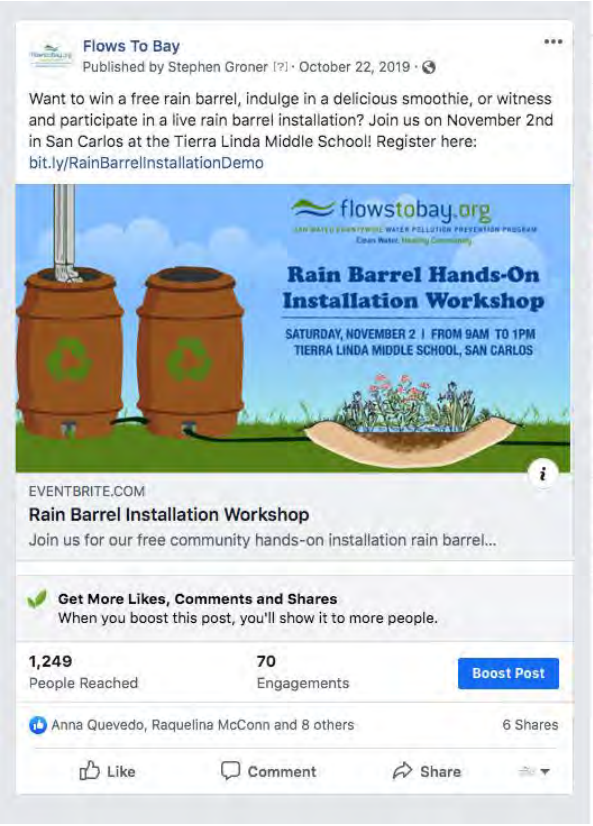
Flows To Bay
Published by Stephen Groner · October 22, 2019 ·
Want to win a free rain barrel, indulge in a delicious smoothie, or witness and participate in a live rain barrel installation? Join us on November 2nd in San Carlos at the Tierra Linda Middle School! Register here: bit.ly/RainBarrelInstallationDemo
flowstobay.org
Rain Barrel Hands-On Installation Workshop
SATURDAY, NOVEMBER 2 | FROM 9AM TO 1PM
TIERRA LINDA MIDDLE SCHOOL, SAN CARLOS
EVENTBRITE.COM
Rain Barrel Installation Workshop
Join us for our free community hands-on installation rain barrel...
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
1,249 People Reached
70 Engagements
Boost Post
Anna Quevedo, Raquelina McConn and 8 others
6 Shares
Like
Comment
Share

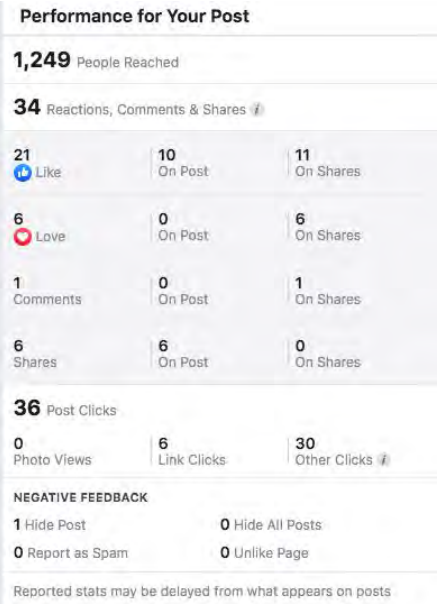
Performance for Your Post
1,249 People Reached
34 Reactions, Comments & Shares
21 Like
10 On Post
11 On Shares
6 Love
0 On Post
6 On Shares
1 Comments
0 On Post
1 On Shares
6 Shares
6 On Post
0 On Shares
36 Post Clicks
0 Photo Views
6 Link Clicks
30 Other Clicks
NEGATIVE FEEDBACK
1 Hide Post
0 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

Flows To Bay
Published by Stephen Groner [?] · November 16, 2019 ·

Today is #americarecyclesday and do you know what's great for recycling?? Rainwater

We recently hosted a hands-on rain barrel workshop at the Tierra Linda Elementary School in San Carlos. Our rain barrel specialist, Chris Corvetti, worked with residents from across San Mateo County and the students from the school's eco club to install two permanent rain barrels and demonstrate the installation of low-flow drip irrigation which will help water their new rain garden. There was a raffle for a free rain barrel, snack, giveaways, and even a person-powered, smoothie-making bike providing delicious refreshments. Learn more about rain barrels and the San Mateo County Rain Barrel Rebate Program of up to $100 at flowstobay.org and start that rainwater recycling!! Join our e-newsletter list to learn more about upcoming fun, free, and educational workshops.

Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.

542	47	
People Reached	Engagements	Boost Post

Davena Gentry, RethinkWaste and 13 others — 1 Share

Like — Comment — Share

Performance for Your Post

542 People Reached

16 Reactions, Comments & Shares

12 Like	12 On Post	0 On Shares
3 Love	3 On Post	0 On Shares
0 Comments	0 On Post	0 On Shares
1 Shares	1 On Post	0 On Shares

31 Post Clicks

10 Photo Views	0 Link Clicks	21 Other Clicks

NEGATIVE FEEDBACK

1 Hide Post	0 Hide All Posts
0 Report as Spam	0 Unlike Page

Reported stats may be delayed from what appears on posts

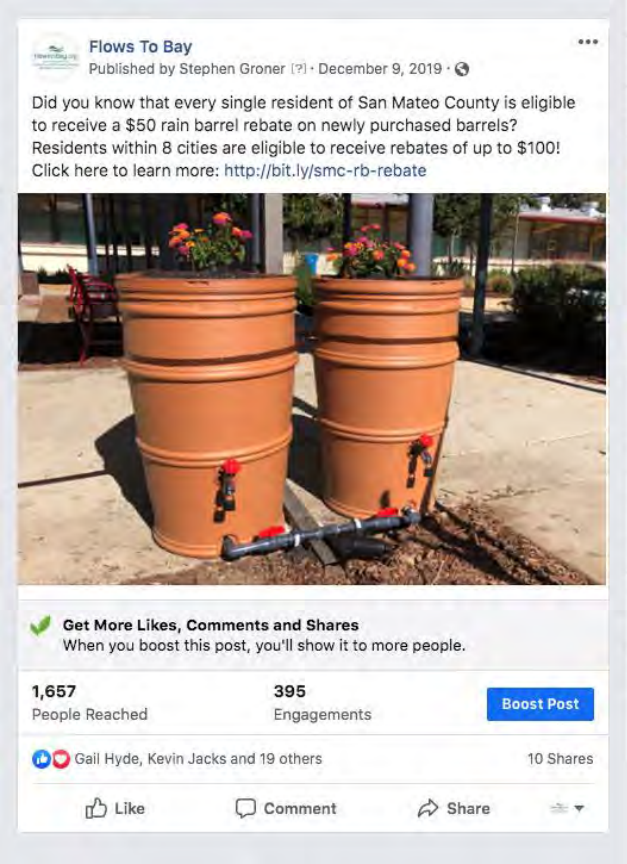

Performance for Your Post

1,657 People Reached

85 Reactions, Comments & Shares

41 Like	20 On Post	21 On Shares
8 Love	1 On Post	7 On Shares
5 Wow	0 On Post	5 On Shares
21 Comments	0 On Post	21 On Shares
10 Shares	10 On Post	0 On Shares

310 Post Clicks

22 Photo Views	55 Link Clicks	233 Other Clicks

NEGATIVE FEEDBACK

2 Hide Post	0 Hide All Posts
0 Report as Spam	0 Unlike Page

Reported stats may be delayed from what appears on posts

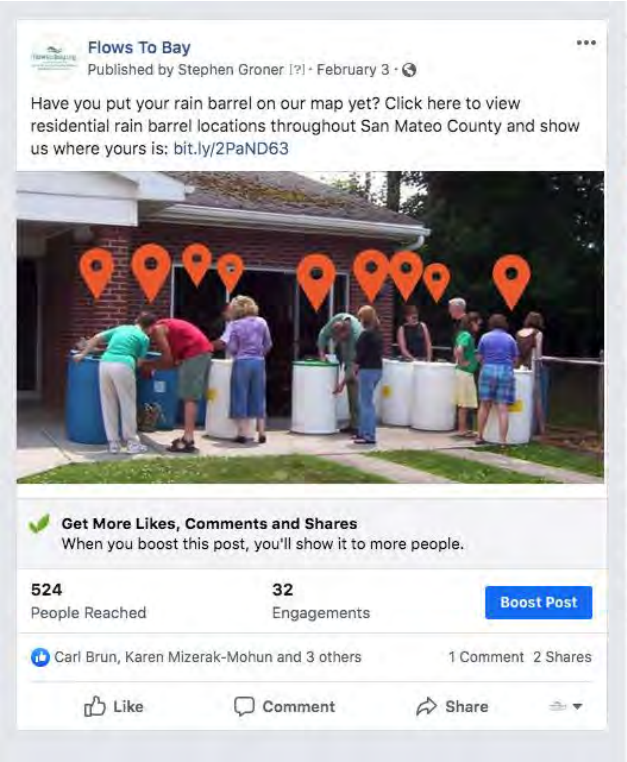

Performance for Your Post

524 People Reached

15 Reactions, Comments & Shares

7 Like	5 On Post	2 On Shares
1 Love	0 On Post	1 On Shares
5 Comments	4 On Post	1 On Shares
2 Shares	2 On Post	0 On Shares

17 Post Clicks

0 Photo Views	4 Link Clicks	13 Other Clicks

NEGATIVE FEEDBACK

0 Hide Post	0 Hide All Posts
0 Report as Spam	0 Unlike Page

Reported stats may be delayed from what appears on posts

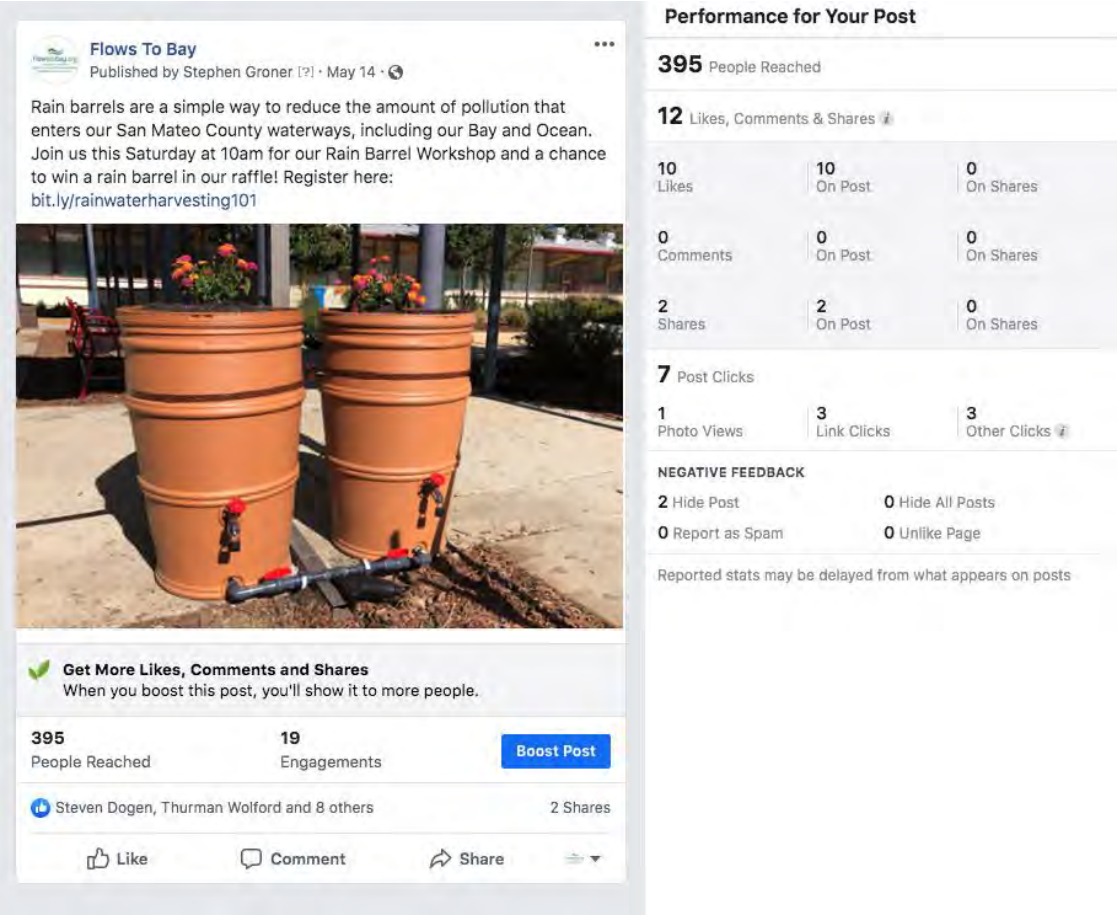

Figure 7-2. Examples of Rain Barrel Facebook Posts.

SMCWPPP hosted a rain barrel workshop at the Half Moon Bay Public Library on October 12, 2019. There were a total of 80 registrations for the workshop and a total of 27 attendees representing seven different jurisdictions. Based on the post-workshop survey, 78% of attendees responded that they were likely or very likely to purchase or use a rain barrel within the next 12 months. At the workshop, one free 50-gallon rain barrel was raffled off (Figure 7-3), and materials on stormwater pollution prevention, the countywide rebate program, and rain barrel tip cards were provided. Noah Katz, from the San Mateo Resource Conservation District (RCD), presented on the free services that the RCD provides to residents. Workshop attendees were also given the opportunity to tour the library's green roof.

On November 2, 2019 at Tierra Linda Elementary School in San Carlos, SMCWPPP hosted its second rain barrel workshop of the year (Figure 7-4). This workshop was a hands-on installation demonstration of two rain barrels that were donated by Hassett ACE Hardware. With the help of Chris Corvetti, a rain barrel specialist and expert installer, county residents and the school's environmental club permanently installed the donated barrels on campus as an example of a small-scale green infrastructure project. The rain barrel specialist also showed attendees how to attach a low-pressure drip irrigation system to the barrels. There were a total of 39 attendees representing 13 jurisdictions. Similar to the October workshop, one free 50-gallon rain barrel was raffled off, and materials on stormwater pollution prevention, the countywide rebate program, and rain barrel tip cards were provided.

Figure 7-3. Photo of the Rain Barrel Winner (left), and classroom workshop (right) from the October 12, 2019 Rain Barrel Workshop - Half Moon Bay.

THINK
OUTSIDE

EarthMinded

Figure 7-4. Photos from the November 2, 2019 Rain Barrel Workshop at Tierra Linda Elementary School in San Carlos.

Due to the COVID-19 pandemic, SMCWPPP also helped promote, facilitate, and sponsor a third virtual rain barrel event on May 16, 2020 in partnership with the City of Burlingame and BAWSCA. There were a total of 352 registrants (a record high for SMCWPPP), and a total of 143 attendees (another record high for SMCWPPP).

As an incentive for attending the workshop, a rain barrel was raffled off for participants who filled out the post-event survey. The rain barrel raffle winner was a resident of Redwood City and she sent images of the newly installed barrel (Figure 7-5).

Figure 7-5. Rain barrel drawing winner from the May 16, 2020 rain barrel event.

(3) Effectiveness Assessment Results and (4) Measurable Change in Awareness/Behavior

The Rain Barrel Campaign achieved measurable and impressive results in FY 2019/20 even while facing COVID-19 challenges. What follows is a summary of the results and discussion of measurable changes in awareness and behavior change.

Online Reach and Impressions

There was a total of 29 posts online regarding rain barrel related factoids and rain barrel rebate information and promoting the three rain barrel workshops held this fiscal year. A total of 13,544 impressions and 1,039 engagements (which includes links, comments, or post shares) were received. The impression figure provides a sense of awareness while the engagement count indicates how many people interacted or engaged with the post, displaying an even greater awareness. Figure 7-6 shows that the rain barrel and rebate page on SMCWPPP's website (flowstobay.org) achieved a total of 4,443 pageviews, of which 87% were unique. The average time visitors spent on the page was about five minutes. The number of unique pageviews demonstrates that SMCWPPP was able to broaden and expand the reach of its audience, attracting almost 4,000 new members of the San Mateo County community that hadn't previously visited the rain barrel and rebate page, speaking to an increase in awareness. The time spent on the page, especially in comparison to the average time of 2:47, speaks to the visitor's intentions and attitudes. The number of link clicks (226) to the BAWSCA website to apply for the rebate (Figure 7-7) shows not only interest and intention, but also demonstrates the beginning stages of behavior change.

	Page	Pageviews	Unique Pageviews	Avg. Time on Page
		47,226 % of Total: 100.00% (47,226)	39,963 % of Total: 100.00% (39,963)	00:02:47 Avg for View: 00:02:47 (0.00%)
1.	/	7,355 (15.57%)	6,123 (15.32%)	00:01:21
2.	/preventing-stormwater-pollution/at-home/rain-barrels-rebate-program/	4,553 (9.64%)	3,957 (9.90%)	00:04:58
3.	/newdevelopment	3,365 (7.13%)	2,836 (7.10%)	00:10:16
4.	/construction	1,420 (3.01%)	1,213 (3.04%)	00:08:36
5.	/preventing-stormwater-pollution/with-new-redevelopment/c-3-regulated-projects/	1,083 (2.29%)	853 (2.13%)	00:06:07
6.	/preventing-stormwater-pollution/in-my-community/teacher-parent-resources/	973 (2.06%)	875 (2.19%)	00:02:30

Figure 7-6. Google Analytics results for FY 19/20 highlighting the metrics of the rain barrel page.

Secondary dimension | Sort Type: Default

	Event Label	Total Events
		5,386 % of Total: 29.30% (18,382)
1.	https://protect-us.mimecast.com/s/LLbnBMH7JlNuZ	612 (11.36%)
2.	http://www.smchealth.org/ccd	281 (5.22%)
3.	http://bawsca.org/conserve/rebates/barrels	226 (4.20%)
4.	http://museumca.org/creeks/wb-AA-LowerPeninsula.html	188 (3.49%)
5.	http://www.smchealth.org/hhw	165 (3.06%)
6.	http://flowstobay.org/sites/default/files/SMCWPPP-C-6_Inspection_Report-August-2017-PDF-Form.pdf	146 (2.71%)

Figure 7-7. Google Analytics showing number of direct clicks to the BAWSCA rain barrel page.

Workshop Attendance and Post-Workshop Surveys

Between the three workshops, 209 residents attended, representing 18 of 20 jurisdictions within San Mateo County. SMCWPPP partnered and cross-promoted these workshops with multiple local organizations and partners, including: Grassroots Ecology, the RCD, Sea Hugger, and the SMC Office of Sustainability. Furthermore, a partnership with a local business, Hassett Ace Hardware, enabled us to raffle off two rain barrels and provide a 20% discount for a 50-gallon EarthMinded rain barrel to all attendees. After each workshop, attendees were encouraged to fill out a survey which provided insight into their intentions and behavior change.

Workshop attendees were asked to fill out a survey designed to gauge previous knowledge of rain barrels and how helpful the attendees found the workshop. The overall results of the survey were favorable, with the majority of survey participants indicating they learned the following: the environmental benefits of rain barrels, preparation of how to install rain barrels, and knowledge of local rebates – and that they learned those items in an interesting/fun format.

Tables 7-1 to 7-4 highlight a portion of the survey results for the October 12th and November 2nd workshops. Appendix 7 includes the event invitations and full survey results.

Table 7-1. Rating Percentages of Environmental Information Provided (1 - poor, 5 - great)

	1	2	3	4	5
Attendees	0%	0%	1.8%	21.8%	76.4%

Table 7-2. Rating Percentages of Rain Barrel Installation Instruction (1 - poor, 5 - great)

	1	2	3	4	5
Attendees	0%	0%	0%	30.9%	69.1%

Table 7-3. Rating Percentages regarding Rain Barrel Rebate Information Provided (1 - poor, 5 - great)

	1	2	3	4	5
Attendees	1.85%*	0%	1.85%	12.96%	83.33%

*The 1 attendee who responded with this rating noted with it "came late."

Table 7-4. Rating Percentages regarding if the Information was Presented in an Interesting/Fun Format (1 - poor, 5 - great)

	1	2	3	4	5
Attendees	0%	0%	0%	21.8%	78.2%

Table 7-5 summarizes the results of a question asked at all 3 workshops:

Table 7-5. Rating Percentages regarding the Likelihood of Purchasing/Using a Rain Barrel within the Next 12 Months? (1 - not at all likely, 5 - very likely)

	1	2	3	4	5
Attendees	1.34%	6.71%	18.79%	22.15%	51.01%

Table 7-5 show results for the question most likely to measure intention and behavior change. Of all survey takers, 73% expressed that they were likely to very likely to purchase or use a rain barrel within the next 12 months, while only 1% indicated they were not at all likely.

Number of Applications for Rain Barrel Rebates

In FY 2019/20, a total of 33 rain barrel rebates were issued from 27 applications. This was a 36% decrease from the previous year's efforts. This decline in rebate applications does not align from the impressions, webpage visitors, clicks to the BAWSCA webpage, or information gathered from workshop surveys. SMCWPPP hypothesizes that there may be additional behavior change barriers involved in the actual rebate application. Another theory is that the incentive amount is to small for the amount of work needed to apply for the rebate.

(5) Future Outreach Plans

SMCWPPP plans to extend its rain barrel rebate contributions to a tiered system in FY 2020/21 that increases monetary incentives for larger rain barrel systems. SMCWPPP will work with the lead agency, BAWSCA, to adjust the application system to make it easier to apply. To promote this new and restructured rebate and campaign, there will also be a countywide digital ad campaign and supplemental workshops to educate the public.

During FY 2019/20, PIP Subcommittee members were provided with marketing material to promote the rain barrel rebate program:

1. Pre-crafted copy and photos to be used for any medium that best suits their constituents;
2. Redesigned Rain Barrel Tip cards to provide at community outreach events (Figure 7-8);
3. BAWSCA rain barrel rebate cards (Figure 7-9); and
4. A link to the Rain Barrel Opt-in map to encourage residents to join the movement at FlowsToBay.org/rainbarrel.

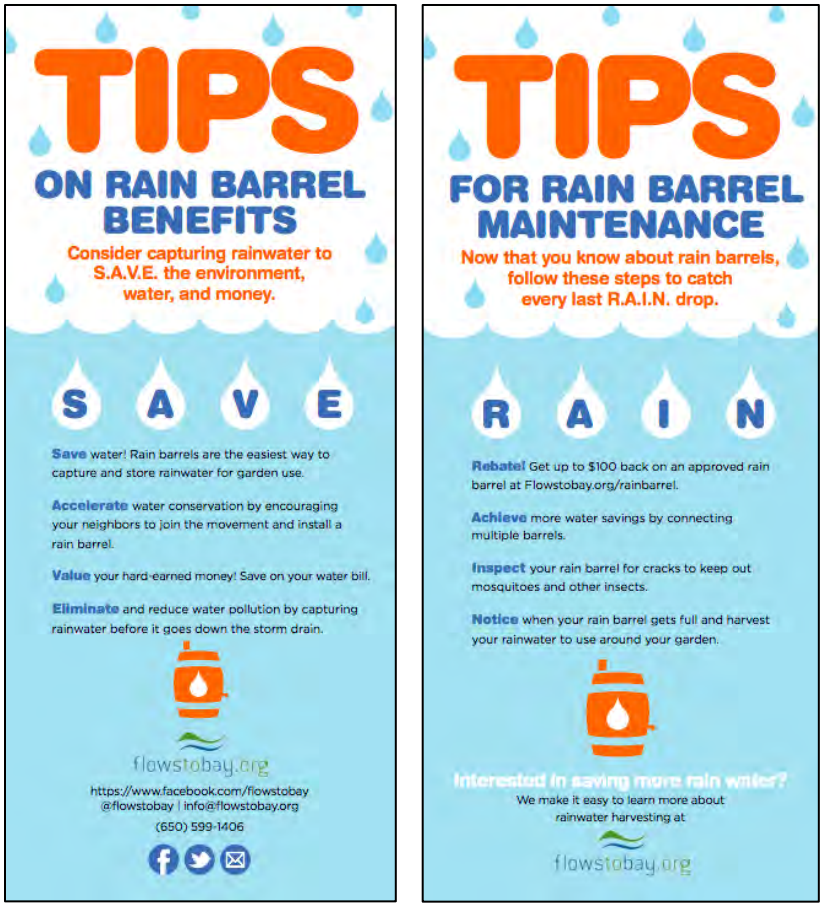

Figure 7-8. Rain Barrel Tip Card

Figure 7-9. Rain Barrel Rebate Card

San Mateo Countywide Sustainable Street Master Plan Outreach

Phase 2 of the community engagement for the San Mateo Countywide Sustainable Streets Master Plan (SSMP) took place in January and February of 2020 as part of sustained project community outreach. During Phase 2 of the outreach, the planning team engaged with the community to educate people about the project, convey technical issues in a clear manner, continue collecting feedback on priorities and preferences, and publicize upcoming public participation opportunities. Public feedback gathered during the outreach activities will help guide the final stages of the project development, ensure that priority project designs and implementation plans meet the needs of the community, and publicize upcoming community engagement opportunities to help gather public support for the plan.

In January and February 2020, Alta Planning + Design, an outreach consultant for the County's Sustainable Streets Master Plan, attended pop-up workshops at high profile community events and popular community destinations in the cities of Millbrae, Redwood City, and East Palo Alto. These events were identified as locations to reach a high volume of people, engage with diverse communities, specifically near disadvantaged or vulnerable areas, and target a wide range of locations within San Mateo County.

The Phase 2 Outreach events raised public awareness about the San Mateo Sustainable Streets Master Plan Project. Alta staff had conversations to educate the public about the SSMP project and collect public feedback with almost 300 people who work, live, and visit San Mateo County. Hundreds more walked by the Alta pop-up events, reading the project boards, and learning that the county is working to improve sustainable transportation and green infrastructure efforts. Detailed descriptions of each outreach event can be found in the following sections of the memo.

Overall, staff learned that:

- School Safety Plans, Streetscape Characteristics, Bicycle and Pedestrian Improvements, and Vulnerable Communities stood out as the most important prioritization criteria for the public. Low Vehicle Ownership Rates and the Urban Heat Island Effect were less important to the people Alta talked to.
- People responded positively to the idea of maximizing public investment by constructing green infrastructure alongside transportation projects.
- Climate change, bicycle and pedestrian safety, and overburdened transportation systems are public concerns in San Mateo County. The public is supportive of the project and appreciates San Mateo County's work to address these issues

Table 7-6 is a list of the events attended, number of people reached, and number of email signups received.

Table 7-6. San Mateo Countywide Sustainable Streets Master Plan Outreach Events

Date	Event Location	Booth Attendance	# of Fliers Distributed	# of Email Signups
1/26/20	Lunar New Year Festival, Millbrae, CA	101	50	15
2/1/20	Lunar New Year Festival, Redwood City, CA	90	40	0
2/22/20	Cardenas Market, East Palo Alto, CA	40	10	0

Stormwater & Green Infrastructure Community Survey

SMCWPPP conducted a survey from June to August 2019 among San Mateo County residents in order to better understand (a) how important water pollution is to residents of the County, (b) which types of potential stormwater activities residents engage with the most, (c) which types of events/activities residents engage with the most, and finally (d) to get a sense residents' knowledge of and support for green infrastructure in the County. Overall, 1,214 individuals participated in the survey; 208 participated in the intercept survey and 1,006 participated in the online survey. Figure 7-10 provides a detailed summary of the demographic characteristics of these participants.

	Intercept n=208	Online n=1006	Combined* n=1214
Gender			
Male	57.2%	29.4%	34.2%
Female	42.8%	62.1%	58.8%
Non-binary	0.0%	0.4%	0.3%
Declined	0.0%	7.2%	5.9%
Age			
18-25	13.5%	1.2%	1.0%
26-35	26.4%	10.1%	8.4%
36-45	16.3%	17.0%	14.1%
46-55	16.3%	17.9%	14.8%
56-65	14.9%	21.7%	18.0%
66+	12.0%	26.1%	21.7%
Declined	0.5%	6.4%	5.3%
Household languages			
English	47.1%	83.3%	77.1%
Bilingual English + Other	39.9%	8.7%	14.1%
Monolingual (non-English)	13.0%	2.3%	4.1%
Declined	0.0%	1.5%	1.2%
Single-family homeowner			
Yes	38.9%	70.3%	58.2%
No	61.1%	25.0%	20.7%
Declined	0.0%	5.2%	4.3%
City of residence			
San Mateo	11.5%	23.6%	19.5%
Redwood City	10.6%	11.9%	9.9%
Pacifica	9.6%	10.2%	8.5%
Half Moon Bay	0.5%	6.7%	5.5%
Daly City	26.0%	5.9%	4.9%
Menlo Park	4.8%	4.6%	3.8%
Belmont	1.0%	4.5%	3.7%
South San Francisco	3.4%	4.1%	3.4%
San Bruno	6.7%	3.7%	3.0%
Burlingame	2.9%	3.5%	2.9%
Foster City	2.9%	2.7%	2.2%
Millbrae	1.9%	2.7%	2.2%
Other	18.3%	7.5%	6.2%

Figure 7-10. Demographics by survey type

Campaign Evaluation

Participant Demographics

Participants in the intercept survey had a more equal distribution across gender and age and were more likely to live in households that used languages other than English. Online participants tended to be more female (61.9% online v. 42.8% intercept) and older: 61.9% of online participants were female and nearly half (47.6%) of online participants were over age 56. Overall, 77.1% of households spoke English only, however participants in the intercept survey were more than twice as likely to speak a language other than English at home. Interestingly, the overall homeownership rate among participants (58.2%) was similar to that of the County's (61%). The most common city of residence among intercept and online participants was Daly City and San Mateo, respectively. Overall, 19.5% of participants lived in San Mateo. The cities of Hillsborough, East Palo Alto and Colma each comprised less than 1% of the total sample and were therefore included in the "Other" category. One question, "Which race or ethnicity do you associate with?" had a high refusal rate (n=407 or 33.5% of total sample) among survey participants and as such, meaningful insights regarding participants' race could not be made. For this reason, participants' race was omitted from Figure 7-10.

How important is water pollution to residents of the County?

Most participants expressed concern over water pollution. Overall, 76.3% of participants stated that they were 'moderately concerned' or 'very concerned'. Concern over water pollution was more prevalent among online participants (79.8%) than intercept participants (59.1%). Water pollution ranked fourth overall among a list of eight environmental concerns (third among online and fifth among intercept participants).

	Intercept n=208	Online n=1006	Combined* n=1214
Have you seen, read or heard about how to dispose of pollutants or minimize what goes into the Bay?			
Have seen	58.7%	75.6%	72.7%
Have not seen	36.5%	11.8%	16.1%
Unsure	4.8%	11.6%	10.5%
Declined	0.0%	0.9%	0.7%
Which of the following have you or someone in your household done in the last 3 months?			
Worked on lawn/yard	54.8%	70.0%	67.4%
Gardened	56.3%	66.5%	64.7%
Picked up litter	61.1%	54.5%	55.6%
Walked a dog	44.7%	42.6%	43.0%
Worked on vehicle	45.7%	36.9%	38.4%
Declined	5.3%	2.5%	3.0%
Do you wash your car yourself or take it to a car wash?			
Take to car wash	53.4%	70.1%	67.2%
Wash at home	28.4%	24.2%	24.9%
Do not own a car	13.5%	2.2%	4.1%
Unsure	1.9%	2.7%	2.6%
Declined	4.8%	0.9%	1.6%

Figure 7-11. Participants' engagement in potential stormwater activities

What types of potential stormwater activities do residents engage with most?

Overall, most participants (72.7%) have heard, read or seen information about how to minimize or dispose of stormwater pollutants (Figure 7-11). Participants in the online survey were much more likely than intercept participants to have encountered this information (75.6% versus 58.7%). Participants were most likely to have spent time working on their lawns (67.8%) or gardening (64.7%) in the past three months. However, online participants were more likely to engage in these activities than intercept participants; 70.0% of online participants worked on their lawns compared to only 54.8% of intercept participants, and 66.5% of online participants gardened compared to 56.3% of intercept participants. Overall, about half of participants stated that they had picked up litter (55.6%). Participants were least likely to have spent time walking a dog (43.0%) or working on a vehicle (38.4%) in the past three months. Regarding car washing behaviors, most participants take their cars to a car wash to get washed (67.2%); the remainder either wash their car at home (24.9%) or don't own a car (4.1%).

Regarding pesticide use, most participants reported not using pesticides in their home and garden; only 11% of participants stated they used pesticides. Pesticide use was equal across intercept and online survey types (11.1% and 11.2%, respectively). Compared to the 2009 Countywide Stormwater Survey, self-reported pesticide usages decreased from 15% in 2009 to 11% in 2019.

Do residents understand what is meant by "green infrastructure"? To what extent do they support government investment in green infrastructure?

Most participants recognized the term "green infrastructure" (60.6%) and showed strong support for spending on green infrastructure if it cost 0-25% more than traditional infrastructure (88.8%). Intercept participants were less likely than online participants to support green infrastructure if it cost 75-100% more than conventional infrastructure (13.0% intercept versus 21.7% online).

There was not a significant difference in support for green infrastructure across survey groups and, in fact, intercept survey participants were slightly more likely than online participants to support green

infrastructure if they know that it reduces pollution in neighborhoods (+6.7%) and makes communities greener (+10.0%) and safer (+12.1%).

Survey Limitations

Given that participants in the online survey were recruited via member agency and agency partner social media accounts or email newsletters, and that they opted to participate (as opposed to being randomly selected), there is an inherent degree of selection bias which resulted in higher rates of pro-environmental responses among this sample. Specifically, online survey participants expressed greater familiarity with the subject matter and reported higher levels of concern over water pollution and water quality. Online survey participants were also more likely to belong to environmental organizations like the Sierra Club and Nature Conservancy. Additionally, because the intercept surveys were conducted in-person, it's possible that favorable responses are slightly inflated due to social desirability bias—or the tendency of some participants to report and answer in a way they deem to be more socially acceptable than would be their "true" answer. Appendix 7 includes the full survey report.

C.7.c. Stormwater Pollution Prevention Education

SMCWPPP continued to use social media, the FlowsToBay.org website, and the electronic newsletter to promote stormwater pollution prevention messages.

Social Media

SMCWPPP continued to maintain the social media platform Facebook. This platform was used as a tool for two-way communication and has continued to be an effective method to engage with residents in the absence of face-to-face interactions. The SMCWPPP Facebook page (facebook.com/flowstobay) experienced a significant increase in followers this reporting period and gained 8,054 total page Likes (accounting for followers gained minus followers lost), reaching a total of 26,174 page Likes between July 1, 2019 and June 30, 2020, a 44% increase from FY 2018/19.

Facebook was used to publicize stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. The platform was primarily used to inform the public of environmental outreach events, to promote a shift towards incorporating sustainable behaviors into daily lifestyles, and to provide environmental and marine news relevant to San Mateo County pollution prevention. The accounts were monitored on a daily basis throughout the fiscal year. As part of the overall effort to enhance social presence and engagement with followers, polls were published to the SMCWPPP Facebook page to get a sense of followers' areas of interest and gaps in their knowledge. The SMCWPPP social media team wrote blogs and posted about "community champions" (i.e., residents of San Mateo County who had gone above and beyond to be environmental stewards in their communities), and responded to residents' questions—often directing them to SMCWPPP's web-based resources.

The following is a breakdown of tasks and evaluation metrics associated with social media activity for FY 2019/20:

- Continued utilizing Facebook as a two-way communication tool to share and exchange information between SMCWPPP residents, businesses, nonprofits, and community stakeholders within San Mateo County on pollution prevention messages. Specific program messages included watershed protection, water pollution and Bay area marine news, wash water pollution prevention, the benefits of Green Infrastructure, household hazardous waste, and used motor oil & filter recycling content.

- Continued to utilize Facebook as the SMCWPPP website's advertising platform to further promote messages.
- Facebook metrics:
  - Gained 8,054 Facebook Page Likes, reaching a total of 26,174 Page Likes.
  - Garnered 516,436 total page impressions (number of people that viewed SMCWPPP's page).
  - Reached a total of 121,789 people (number of people who had content from SMCWPPP's page enter their screen).
  - Garnered 3,655 interactions (likes, comments, and shares).
  - Published a total of 227 Facebook posts.

Figure 7-12 presents some examples of FY 2019/20 Facebook Posts.

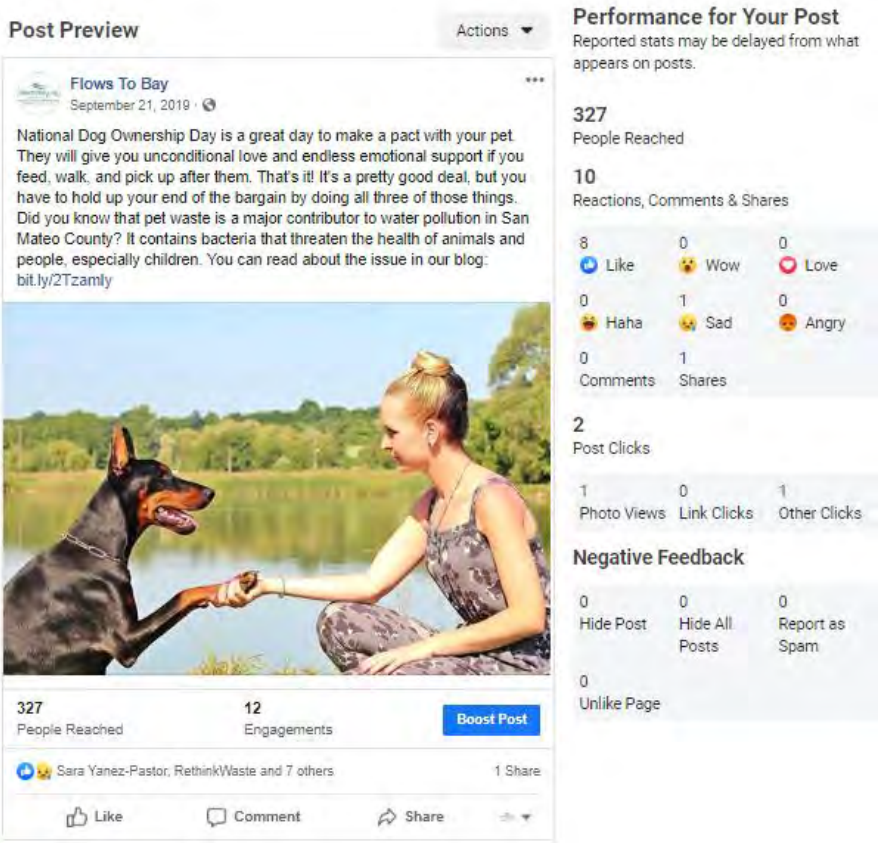

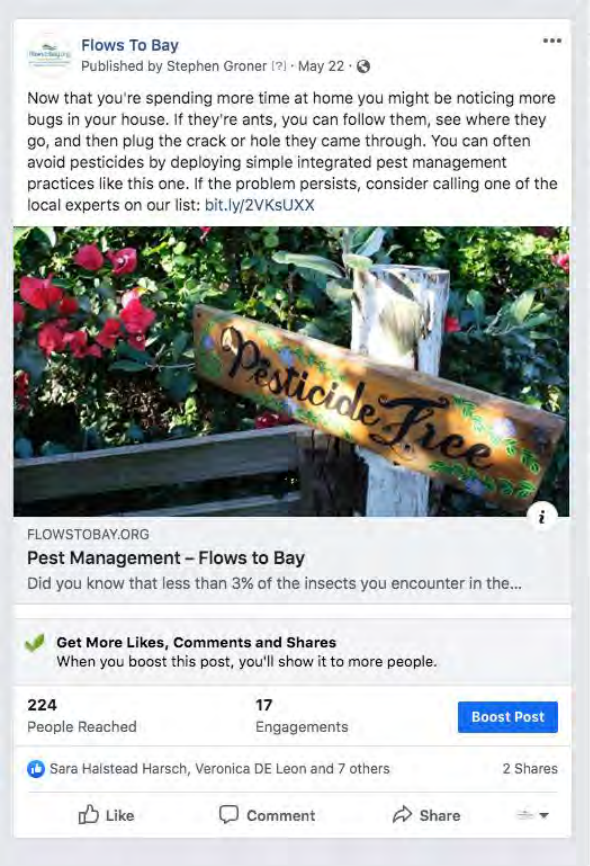
Flows To Bay
Published by Stephen Groner [?] · May 22 ·
Now that you're spending more time at home you might be noticing more bugs in your house. If they're ants, you can follow them, see where they go, and then plug the crack or hole they came through. You can often avoid pesticides by deploying simple integrated pest management practices like this one. If the problem persists, consider calling one of the local experts on our list: bit.ly/2VKsUXX
Pesticide Free
FLOWSTOBAY.ORG
Pest Management – Flows to Bay
Did you know that less than 3% of the insects you encounter in the...
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
224
People Reached
17
Engagements
Boost Post
Sara Halstead Harsch, Veronica DE Leon and 7 others
2 Shares
Like
Comment
Share

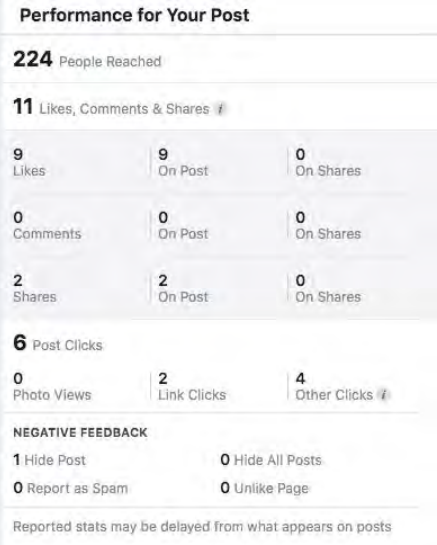
Performance for Your Post
224 People Reached
11 Likes, Comments & Shares
9 Likes
9 On Post
0 On Shares
0 Comments
0 On Post
0 On Shares
2 Shares
2 On Post
0 On Shares
6 Post Clicks
0 Photo Views
2 Link Clicks
4 Other Clicks
NEGATIVE FEEDBACK
1 Hide Post
0 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

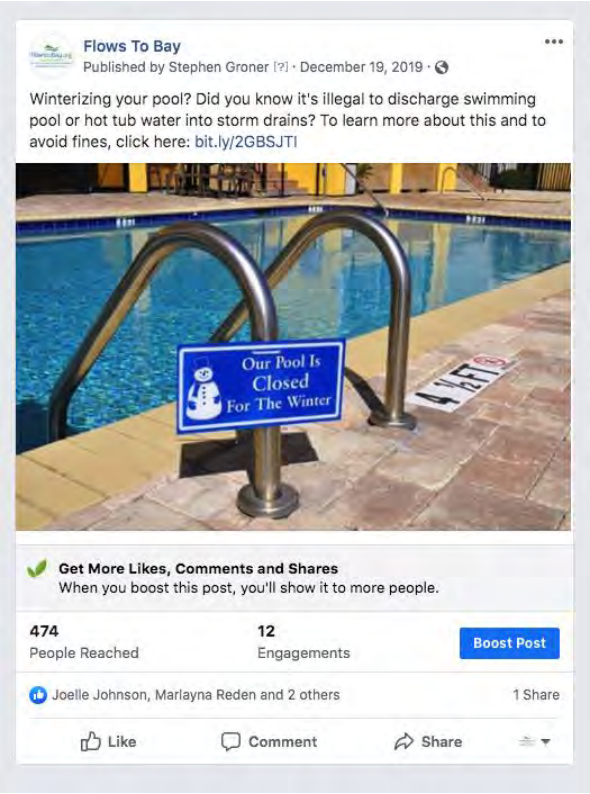
Flows To Bay
Published by Stephen Groner [?] · December 19, 2019 ·
Winterizing your pool? Did you know it's illegal to discharge swimming pool or hot tub water into storm drains? To learn more about this and to avoid fines, click here: bit.ly/2GBSJTI
Our Pool Is Closed For The Winter
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
474
People Reached
12
Engagements
Boost Post
Joelle Johnson, Marlayna Reden and 2 others
1 Share
Like
Comment
Share

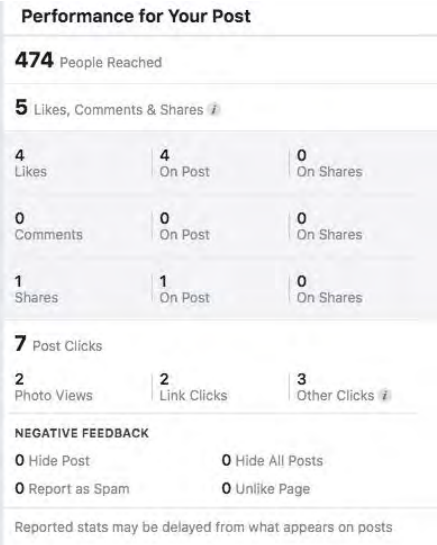
Performance for Your Post
474 People Reached
5 Likes, Comments & Shares
4 Likes
4 On Post
0 On Shares
0 Comments
0 On Post
0 On Shares
1 Shares
1 On Post
0 On Shares
7 Post Clicks
2 Photo Views
2 Link Clicks
3 Other Clicks
NEGATIVE FEEDBACK
0 Hide Post
0 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

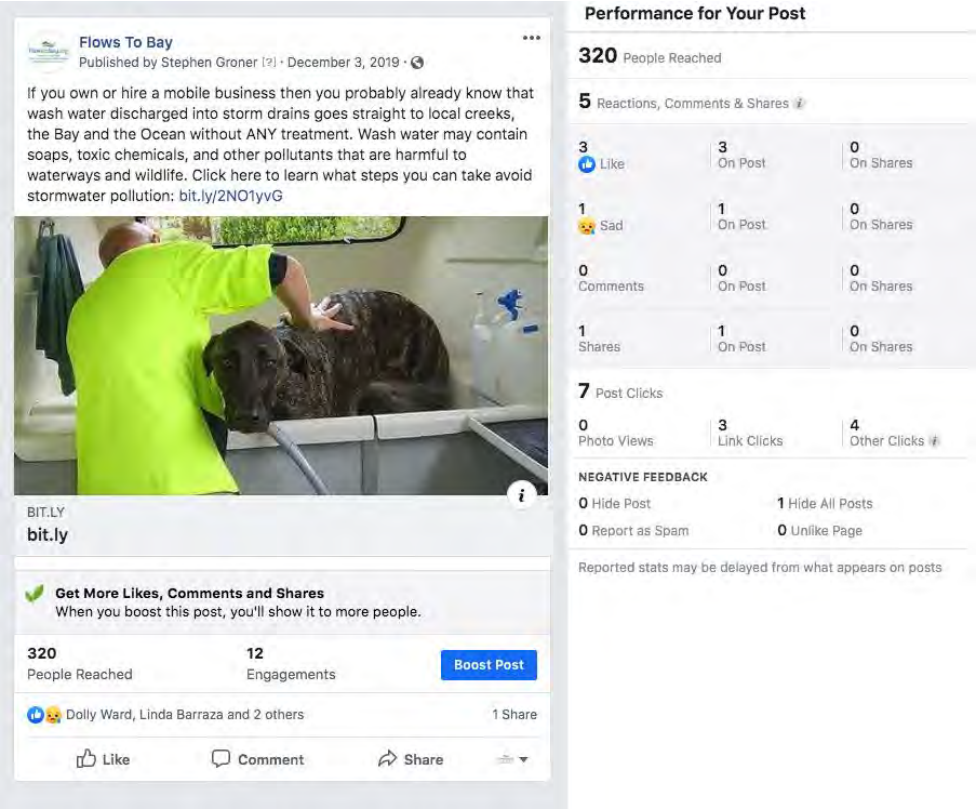
Flows To Bay
Published by Stephen Groner [?] · December 3, 2019 ·
If you own or hire a mobile business then you probably already know that wash water discharged into storm drains goes straight to local creeks, the Bay and the Ocean without ANY treatment. Wash water may contain soaps, toxic chemicals, and other pollutants that are harmful to waterways and wildlife. Click here to learn what steps you can take avoid stormwater pollution: bit.ly/2NO1yvG
BIT.LY
bit.ly
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
320 People Reached
12 Engagements
Boost Post
Dolly Ward, Linda Barraza and 2 others
1 Share
Like
Comment
Share
Performance for Your Post
320 People Reached
5 Reactions, Comments & Shares
3 Like
3 On Post
0 On Shares
1 Sad
1 On Post
0 On Shares
0 Comments
0 On Post
0 On Shares
1 Shares
1 On Post
0 On Shares
7 Post Clicks
0 Photo Views
3 Link Clicks
4 Other Clicks
NEGATIVE FEEDBACK
0 Hide Post
1 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

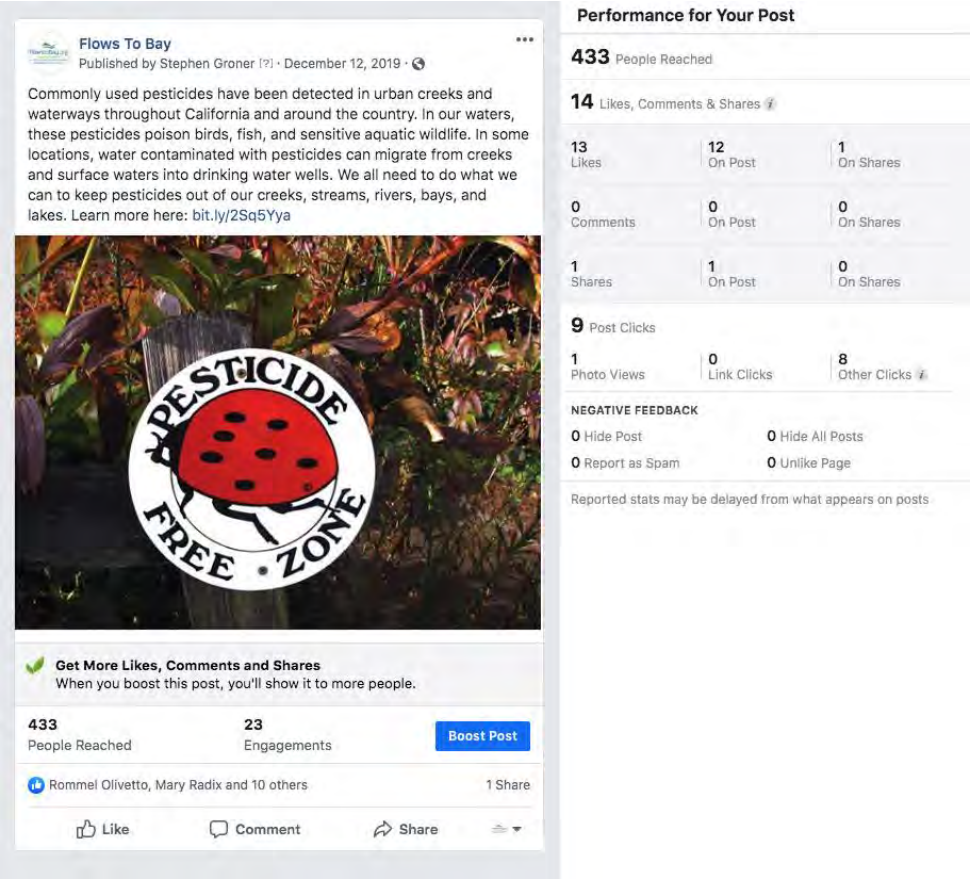
Flows To Bay
Published by Stephen Groner [?] · December 12, 2019 ·
Commonly used pesticides have been detected in urban creeks and waterways throughout California and around the country. In our waters, these pesticides poison birds, fish, and sensitive aquatic wildlife. In some locations, water contaminated with pesticides can migrate from creeks and surface waters into drinking water wells. We all need to do what we can to keep pesticides out of our creeks, streams, rivers, bays, and lakes. Learn more here: bit.ly/2Sq5Yya
PESTICIDE FREE ZONE
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
433 People Reached
23 Engagements
Boost Post
Rommel Olivetto, Mary Radix and 10 others
1 Share
Like
Comment
Share
Performance for Your Post
433 People Reached
14 Likes, Comments & Shares
13 Likes
12 On Post
1 On Shares
0 Comments
0 On Post
0 On Shares
1 Shares
1 On Post
0 On Shares
9 Post Clicks
1 Photo Views
0 Link Clicks
8 Other Clicks
NEGATIVE FEEDBACK
0 Hide Post
0 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

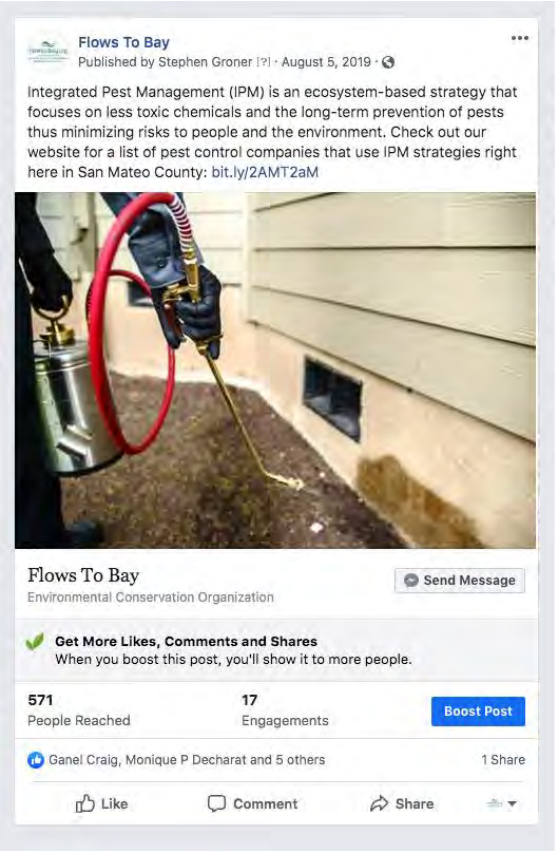
Flows To Bay
Published by Stephen Groner [?] · August 5, 2019 ·
Integrated Pest Management (IPM) is an ecosystem-based strategy that focuses on less toxic chemicals and the long-term prevention of pests thus minimizing risks to people and the environment. Check out our website for a list of pest control companies that use IPM strategies right here in San Mateo County: bit.ly/2AMT2aM
Flows To Bay
Environmental Conservation Organization
Send Message
Get More Likes, Comments and Shares
When you boost this post, you'll show it to more people.
571
People Reached
17
Engagements
Boost Post
Ganel Craig, Monique P Decharat and 5 others
1 Share
Like
Comment
Share

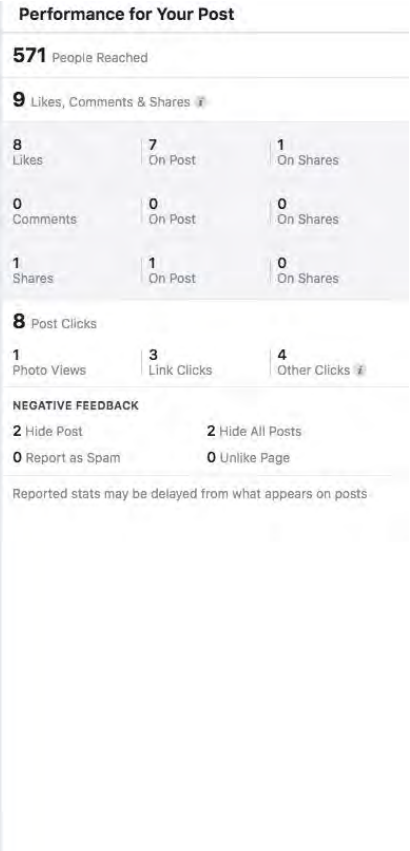
Performance for Your Post
571 People Reached
9 Likes, Comments & Shares
8 Likes
7 On Post
1 On Shares
0 Comments
0 On Post
0 On Shares
1 Shares
1 On Post
0 On Shares
8 Post Clicks
1 Photo Views
3 Link Clicks
4 Other Clicks
NEGATIVE FEEDBACK
2 Hide Post
2 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

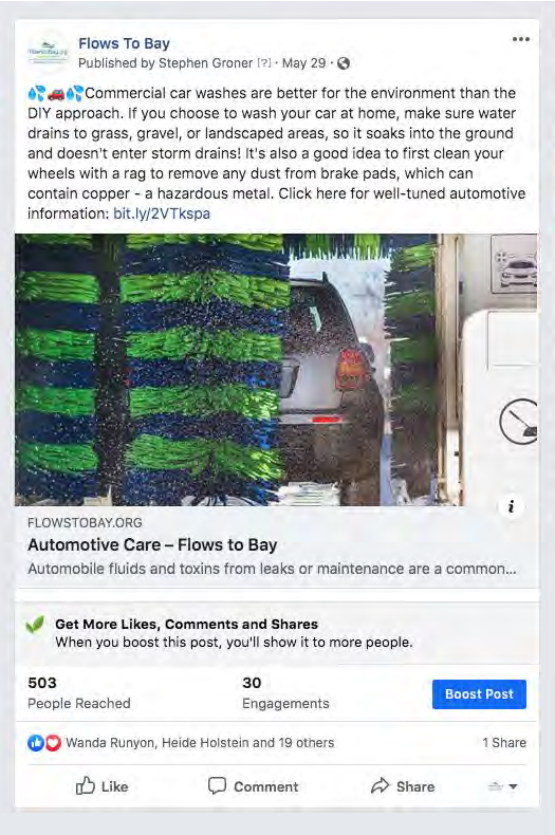
Flows To Bay
Published by Stephen Groner [?] · May 29 ·
Commercial car washes are better for the environment than the DIY approach. If you choose to wash your car at home, make sure water drains to grass, gravel, or landscaped areas, so it soaks into the ground and doesn't enter storm drains! It's also a good idea to first clean your wheels with a rag to remove any dust from brake pads, which can contain copper - a hazardous metal. Click here for well-tuned automotive information: bit.ly/2VTkspa
FLOWSTOBAY.ORG
Automotive Care – Flows to Bay
Automobile fluids and toxins from leaks or maintenance are a common...
Get More Likes, Comments and Shares
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503
People Reached
30
Engagements
Boost Post
Wanda Runyon, Heide Holstein and 19 others
1 Share
Like
Comment
Share

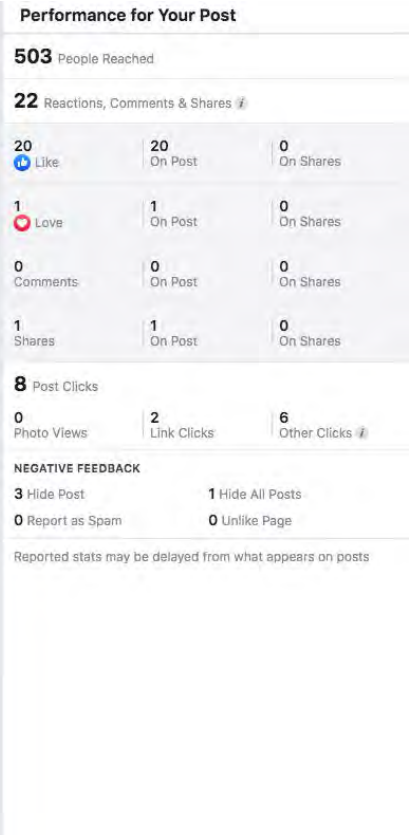
Performance for Your Post
503 People Reached
22 Reactions, Comments & Shares
20 Like
20 On Post
0 On Shares
1 Love
1 On Post
0 On Shares
0 Comments
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0 On Shares
1 Shares
1 On Post
0 On Shares
8 Post Clicks
0 Photo Views
2 Link Clicks
6 Other Clicks
NEGATIVE FEEDBACK
3 Hide Post
1 Hide All Posts
0 Report as Spam
0 Unlike Page
Reported stats may be delayed from what appears on posts

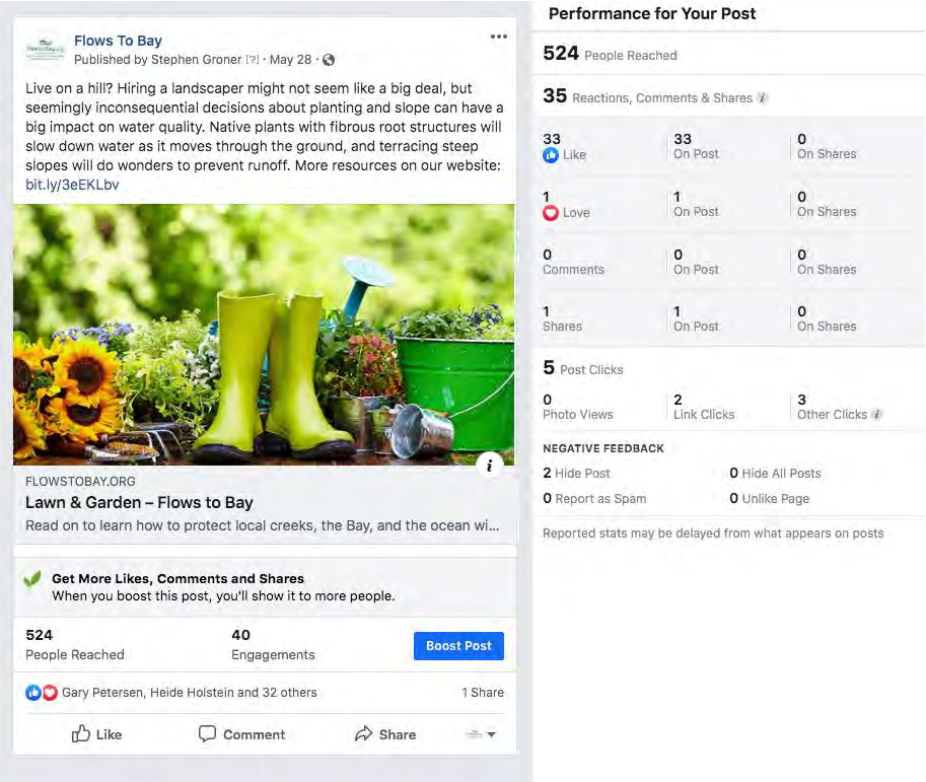

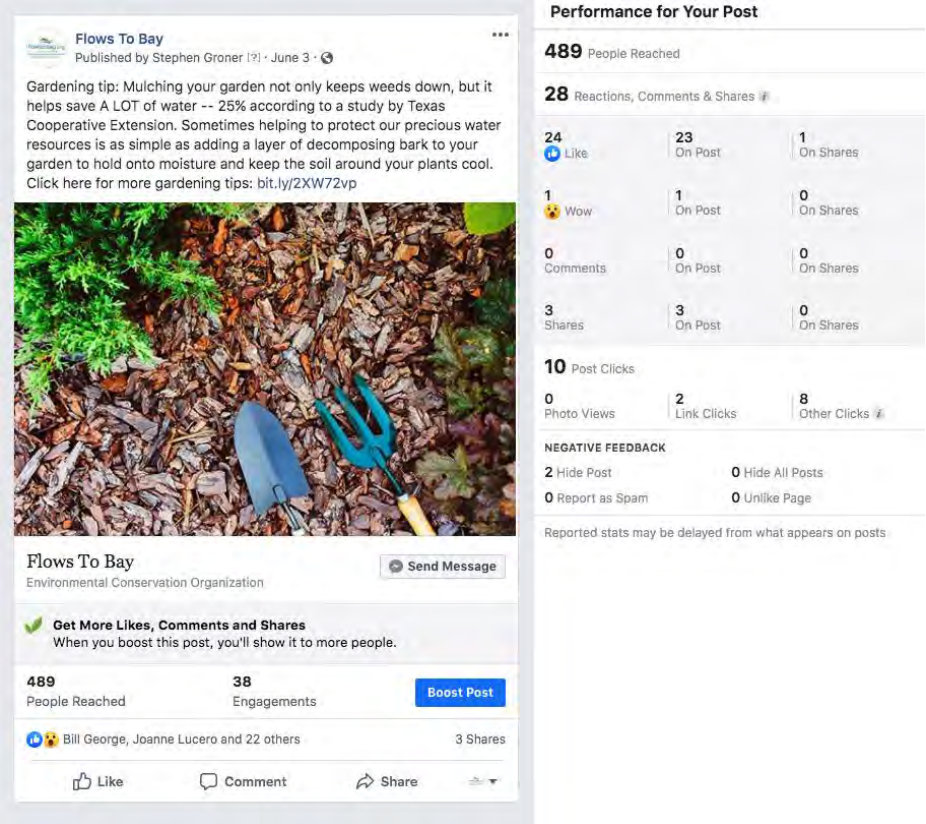

Figure 7-12. Examples of FY 2019/20 Facebook Posts

In addition to the standard Facebook social media activity, Facebook Ads Campaigns consistently ran from July 1, 2019 – June 30, 2020. These campaigns ran on an appropriate monthly budget approved by SMCWPPP and increased SMCWPPP's reach to potential community members through the use of audience location and interest targeting. The Facebook Ads Campaigns resulted in a significant increase in followers during this reporting period. Over the entire fiscal year, the SMCWPPP Facebook page (facebook.com/flowstobay) gained 8,054 total page Likes (accounting for followers gained minus followers lost), reaching a total of 26,174 page Likes between July 1, 2019 and June 30, 2020, a 44% increase from FY 2018/19.

In April 2020, the traction of the Facebook ads was tested among Spanish speakers by running two parallel campaigns, one in English and one in Spanish, that were identical in their budget, copy, creative, and targeting. During that month, the Spanish campaign outperformed the English campaign, garnering 161 likes at $0.53 each, as opposed to the English campaign's 151 likes at $0.56 each.

In May and June, SMCWPPP's social media team did not run Page Likes campaigns because annual goals had already been exceeded. Instead, the remaining ad budget was used to promote events that had to be adapted into webinar format due to the outbreak of COVID-19.

Facebook Ads in FY 2019/20 resulted in a total of:

- 8,054 Page Likes
- 13,240 total clicks on Ad Campaigns
- 134,214 total reach of Ad Campaigns
- $0.68 per like on average (total cost of all ad campaigns/total # of likes garnered on all ad campaigns)
- $0.31 per click on average (Cost Per Click (All)/# of Ad Campaigns)

Figure 7-13 presents some examples of FY 2019/20 Facebook Advertisements.

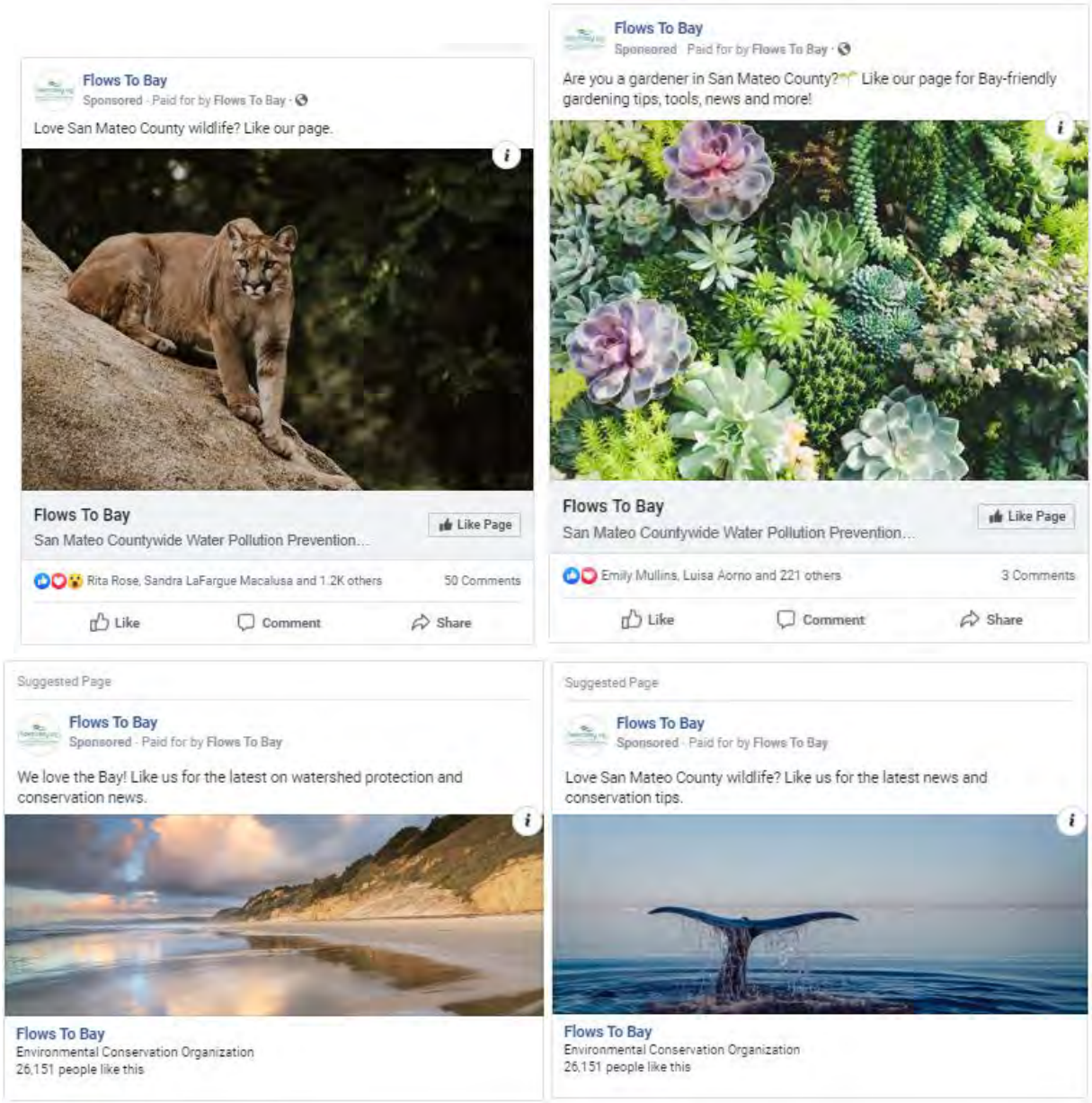

Figure 7-13. Examples of FY 2019/20 Facebook Advertisements.

Newsletter

The SMCWPPP newsletter was utilized to publicize stormwater issues, watershed information, upcoming workshops and webinars, and stormwater pollution prevention options to residents. A total of fourteen community newsletters were sent out to a subscriber list. SMCWPPP's subscriber list reached a total of 3,787 subscribers in FY 2019/20. For examples of the newsletter, please see Appendix 7. Table 7-7 provides a breakdown for each newsletter in the FY 2019/20 campaign.

Table 7-7. SMCWPPP E-Newsletter Metrics for FY 2019/20.

Subject line	E-newsletter content	Send Date	Total Recipients	Open rate	Click through rate	Opened Click Rate
Join our Garden and Pesticide Q&A Webinar	• Register for the Master Gardener Webinar • Learn More about the Webinar	6/9/20	3,544	19.5%	1.5%	7.7%
Join Our May 16th Rain Barrel Webinar	• Rain Barrel Webinar • San Mateo Environmental Learning Collaborative (SMELC) Fellowship	5/14/20	3,585	22.4%	1.7%	7.4%
Hot off the Keyboard: Our New Website!	• New Website • T-Shirt Design Contest	5/12/20	3,612	24.5%	1.3%	5.2%
5 Water Wise Activities from Home this Earth Day	• Water Wise Activities from Home • HHW Storage Do's and Don'ts • Online Event Opportunities	4/22/20	3,633	23.0%	3.2%	14.1%
Are You a Community Champion?	• Community Champion Nomination Form • 3 Featured Community Champions	3/10/20	3,678	22.5%	1.1%	4.8%
2 Simple Actions that Build Eco-Resilience During the Rains	• About Rain Barrels + Rebate • Adopt a Drain	12/18/19	3,684	20.4%	2.6%	12.5%
Only 13 spots left for our rain barrel installation workshop – Nov.2 ☔	• Space is Limited – Reserve Your Spot Today • Why You Should Install and Own a Rain Barrel	10/26/19	3,666	24.2%	0.8%	3.2%
Hands-on Rain Barrel Workshop - Nov. 2 ☔	• Space is Limited – Reserve Your Spot Today • Why You Should Install and Own a Rain Barrel	10/22/19	3,637	23.3%	1.0%	4.4%
Reminder: Free rain barrel workshop on Oct. 12! ☔	• Why You Should Install and Own a Rain Barrel • Space is Limited – Reserve Your Spot Today	10/05/19	3,644	21.9%	0.4%	1.8%

Subject line	E-newsletter content	Send Date	Total Recipients	Open rate	Click through rate	Opened Click Rate
Join our rain barrel workshop on Oct. 12! ☂	• Why You Should Install and Own a Rain Barrel • Space is Limited – Reserve Your Spot Today	9/27/19	3,690	23.8%	0.8%	3.6%
Volunteers Wanted: First Flush & Coastal Cleanup Day!	• First Flush Training • Coastal & Bay Cleanup Day	9/06/19	3,705	22.5%	1.8%	7.8%
🐾 🐶 Do you have a 4-legged fury friend? Here are a few tips and a coupon!	• Reasons Why Picking Up After Your Pet Matters • DoodyCalls Coupon	8/14/19	3,742	22.1%	2.6%	11.7%
We want to hear about what matters most to you!	• Share your Thoughts in this 5-minute Survey	7/30/19	3,701	27.0%	5.8%	21.7%
Getting Your Car Washed in San Mateo County? Here Are a Few Tips and a Coupon!	• Responsible (And Eco-Friendly) Car Washing • Ducky's Car Wash Coupon	7/18/19	3,787	37.3%	6.4%	17.1%

** Industry average open rate is 28.77% and average click rate on articles is 3.99% (source from October 2019)*

SMCWPPP Website Update

During FY 2019/20, SMCWPPP planned, designed, and launched an updated SMCWPPP website (flowstobay.org).

The challenges SMCWPPP experienced with the old website included: its lack of being mobile-friendly; the Drupal content management system (CMS was difficult to use, thus difficult to update content on the site when needed); difficulty faced for each target audience to quickly find what they are seeking; an outdated appearance that is not as aesthetically-pleasing to the viewer compared to current government websites.

The previous website content (links, contact information, and resources) was analyzed and edited to be up-to-date. The various design options for the website were created and then decided upon and the website migrated from Drupal to WordPress. The website redesign incorporated the following principles:

- User-friendly, public-facing look and feel

- Responsive design that adapts to visitors using smartphones and tablets, especially since 26% of people who have accessed the website since July 1, 2018 have used mobile and tablet devices.
- Ease of customization for new pages including but not limited to blog posts and calendar updates

Also, the site's web content was restructured and reconfigured to make things easier to find for each target audience that visits the site including residents, businesses, and agency partners; that content features the importance and benefits of stormwater capture and community use. Stock images were used for webpages' featured image and within webpage copy to support its polished and professional aesthetic. The events calendar can have narrow search results by: event category, city, and organizers.

The approach taken to redesign the Flows to Bay website was completed in several phases to ensure the new website fulfills the program's requirements. The phases were:

1. Research & Strategy
2. Architecture
3. Design
4. Content Migration/Site Creation
5. Test and Finalize
6. Launch and Post-Launch

Figures 7-14 through 7-16 compare the old website and the new website.

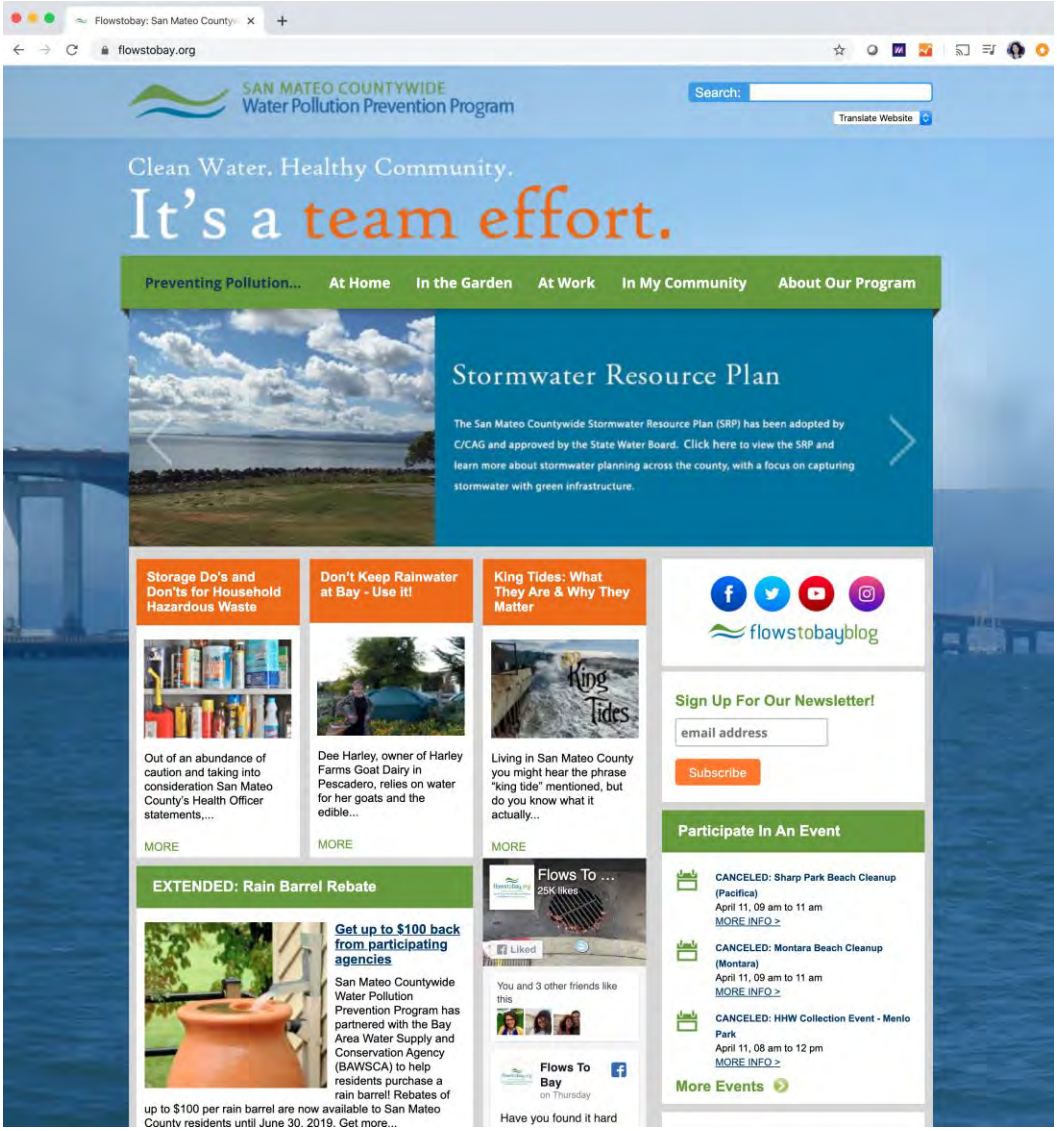
Flowstobay: San Mateo County
flowstobay.org
SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Search:
Translate Website
Clean Water. Healthy Community.
It's a team effort.
Preventing Pollution...
At Home
In the Garden
At Work
In My Community
About Our Program
Stormwater Resource Plan
The San Mateo Countywide Stormwater Resource Plan (SRP) has been adopted by C/CAG and approved by the State Water Board. Click here to view the SRP and learn more about stormwater planning across the county, with a focus on capturing stormwater with green infrastructure.
Storage Do's and Don'ts for Household Hazardous Waste
Out of an abundance of caution and taking into consideration San Mateo County's Health Officer statements,...
MORE
Don't Keep Rainwater at Bay - Use it!
Dee Harley, owner of Harley Farms Goat Dairy in Pescadero, relies on water for her goats and the edible...
MORE
King Tides: What They Are & Why They Matter
Living in San Mateo County you might hear the phrase "king tide" mentioned, but do you know what it actually...
MORE
flowstobayblog
Sign Up For Our Newsletter!
email address
Subscribe
Participate In An Event
CANCELED: Sharp Park Beach Cleanup (Pacifica)
April 11, 09 am to 11 am
MORE INFO >
CANCELED: Montara Beach Cleanup (Montara)
April 11, 09 am to 11 am
MORE INFO >
CANCELED: HHW Collection Event - Menlo Park
April 11, 08 am to 12 pm
MORE INFO >
More Events
EXTENDED: Rain Barrel Rebate
Get up to $100 back from participating agencies
San Mateo Countywide Water Pollution Prevention Program has partnered with the Bay Area Water Supply and Conservation Agency (BAWSCA) to help residents purchase a rain barrel! Rebates of up to $100 per rain barrel are now available to San Mateo County residents until June 30, 2019. Get more...
Flows To ...
25K likes
Liked
You and 3 other friends like this
Flows To Bay
on Thursday
Have you found it hard

Figure 7-14. Homepage: Old Website (Top) Compared to the New Website (Bottom).

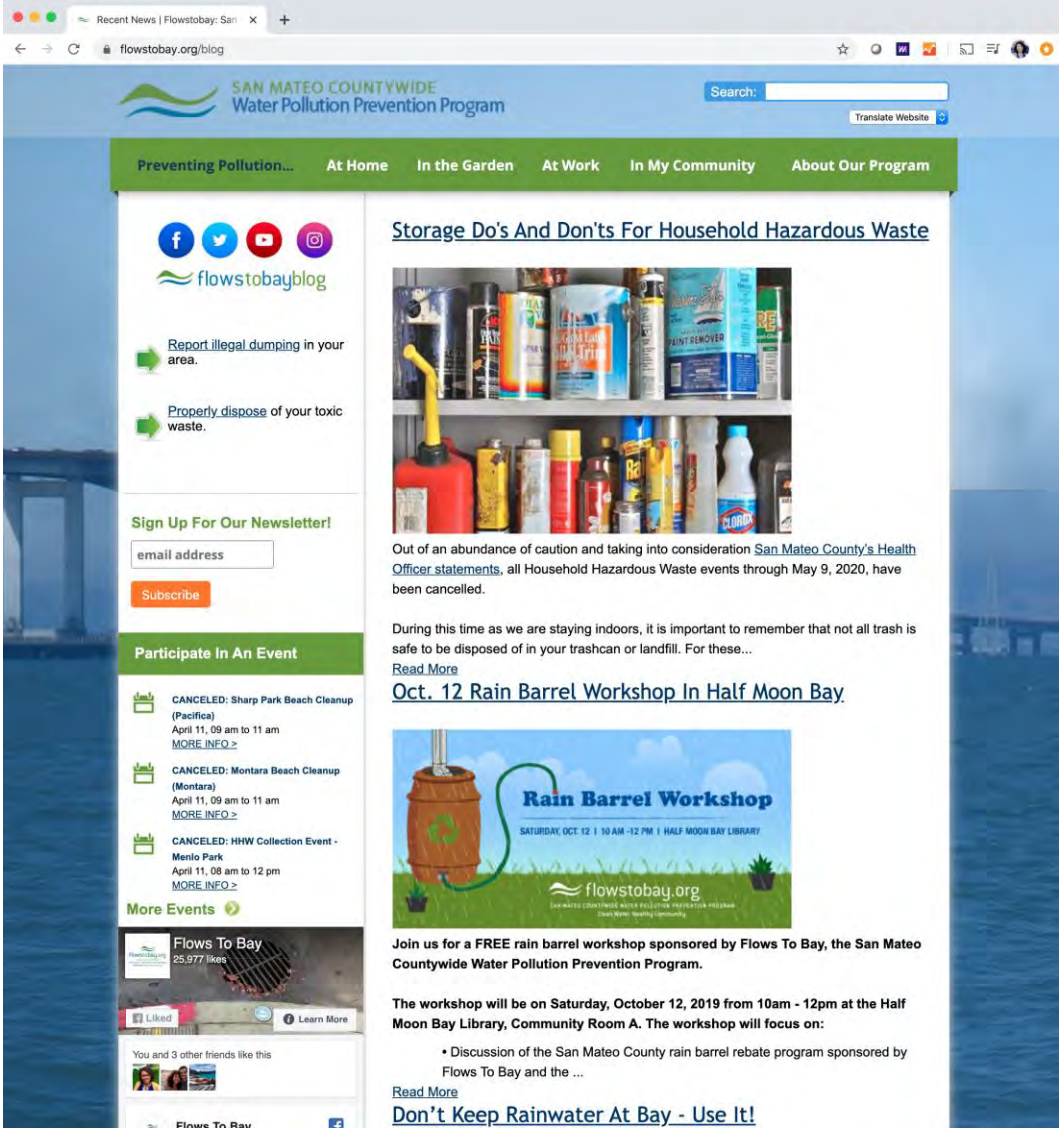
Recent News | Flowstobay: San
flowstobay.org/blog
SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Search:
Translate Website
Preventing Pollution...
At Home
In the Garden
At Work
In My Community
About Our Program
flowstobayblog
Report illegal dumping in your area.
Properly dispose of your toxic waste.
Sign Up For Our Newsletter!
email address
Subscribe
Participate In An Event
CANCELED: Sharp Park Beach Cleanup (Pacifica)
April 11, 09 am to 11 am
MORE INFO >
CANCELED: Montara Beach Cleanup (Montara)
April 11, 09 am to 11 am
MORE INFO >
CANCELED: HHW Collection Event - Menlo Park
April 11, 08 am to 12 pm
MORE INFO >
More Events
Flows To Bay
25,977 likes
Liked
Learn More
You and 3 other friends like this
Storage Do's And Don'ts For Household Hazardous Waste
Out of an abundance of caution and taking into consideration San Mateo County's Health Officer statements, all Household Hazardous Waste events through May 9, 2020, have been cancelled.
During this time as we are staying indoors, it is important to remember that not all trash is safe to be disposed of in your trashcan or landfill. For these...
Read More
Oct. 12 Rain Barrel Workshop In Half Moon Bay
Rain Barrel Workshop
SATURDAY, OCT. 12 | 10 AM -12 PM | HALF MOON BAY LIBRARY
flowstobay.org
Join us for a FREE rain barrel workshop sponsored by Flows To Bay, the San Mateo Countywide Water Pollution Prevention Program.
The workshop will be on Saturday, October 12, 2019 from 10am - 12pm at the Half Moon Bay Library, Community Room A. The workshop will focus on:
• Discussion of the San Mateo County rain barrel rebate program sponsored by Flows To Bay and the ...
Read More
Don't Keep Rainwater At Bay - Use It!

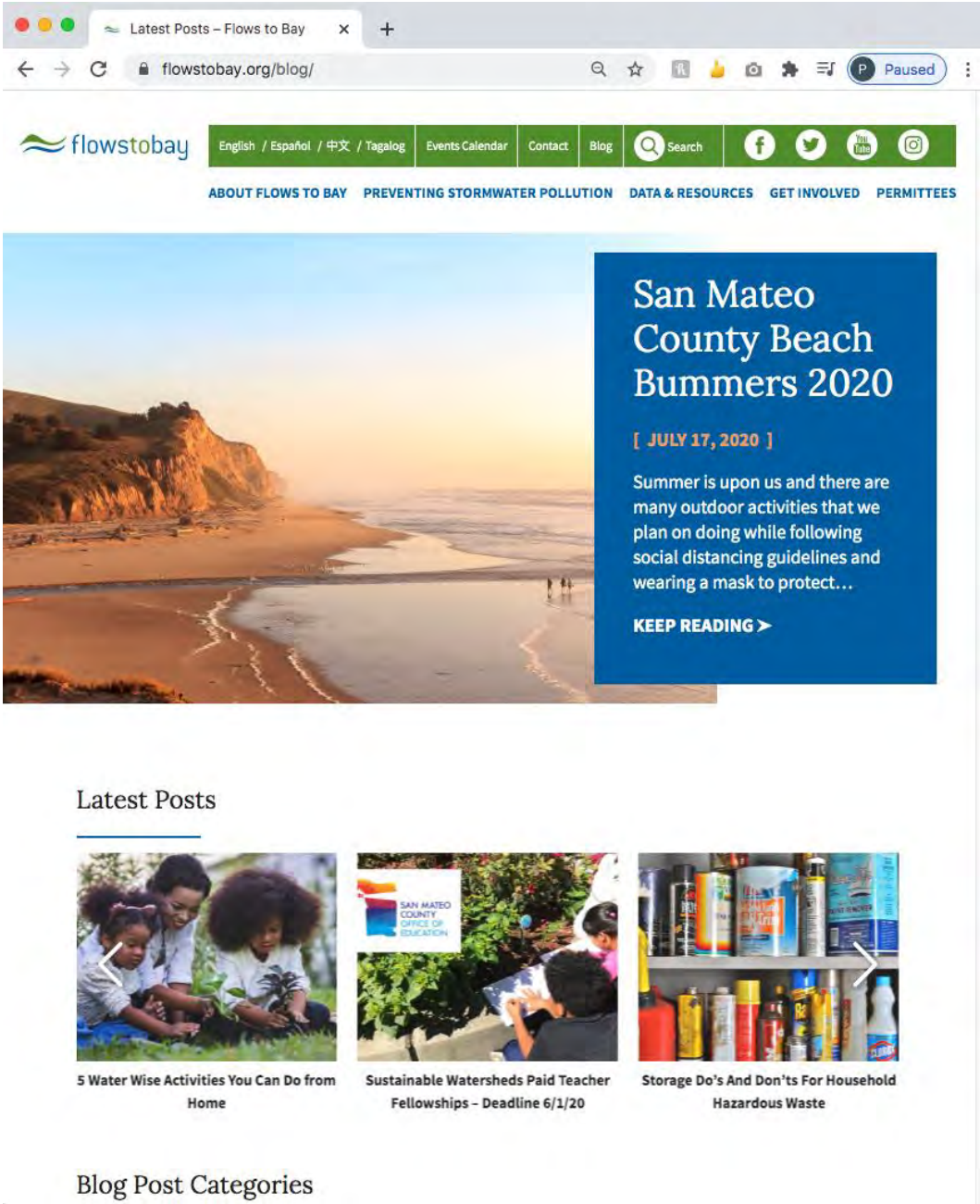

Figure 7-15. Blog Page: Old Website (Top) Compared to the New Website (Bottom).

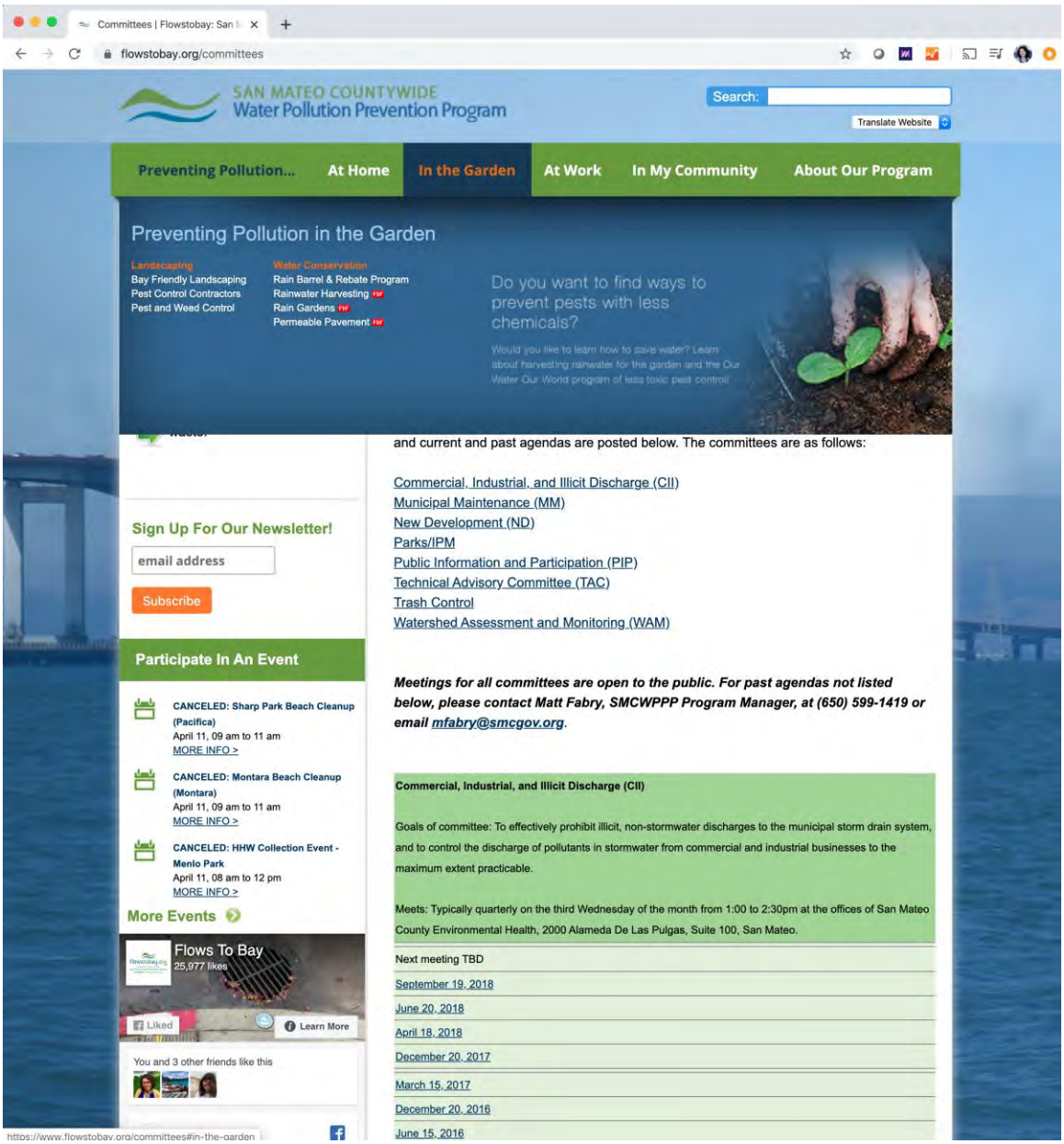
Committees | Flowstobay: San
flowstobay.org/committees
SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Search:
Translate Website
Preventing Pollution...
At Home
In the Garden
At Work
In My Community
About Our Program
Preventing Pollution in the Garden
Landscaping
Bay Friendly Landscaping
Pest Control Contractors
Pest and Weed Control
Water Conservation
Rain Barrel & Rebate Program
Rainwater Harvesting
Rain Gardens
Permeable Pavement
Do you want to find ways to prevent pests with less chemicals?
Would you like to learn how to save water? Learn about harvesting rainwater for the garden and the Our Water Our World program of less toxic pest control!
Sign Up For Our Newsletter!
email address
Subscribe
Participate In An Event
CANCELED: Sharp Park Beach Cleanup (Pacifica)
April 11, 09 am to 11 am
MORE INFO >
CANCELED: Montara Beach Cleanup (Montara)
April 11, 09 am to 11 am
MORE INFO >
CANCELED: HHW Collection Event - Menlo Park
April 11, 08 am to 12 pm
MORE INFO >
More Events
Flows To Bay
25,977 likes
Liked
Learn More
You and 3 other friends like this
and current and past agendas are posted below. The committees are as follows:
Commercial, Industrial, and Illicit Discharge (CII)
Municipal Maintenance (MM)
New Development (ND)
Parks/IPM
Public Information and Participation (PIP)
Technical Advisory Committee (TAC)
Trash Control
Watershed Assessment and Monitoring (WAM)
Meetings for all committees are open to the public. For past agendas not listed below, please contact Matt Fabry, SMCWPPP Program Manager, at (650) 599-1419 or email mfabry@smcgov.org.
Commercial, Industrial, and Illicit Discharge (CII)
Goals of committee: To effectively prohibit illicit, non-stormwater discharges to the municipal storm drain system, and to control the discharge of pollutants in stormwater from commercial and industrial businesses to the maximum extent practicable.
Meets: Typically quarterly on the third Wednesday of the month from 1:00 to 2:30pm at the offices of San Mateo County Environmental Health, 2000 Alameda De Las Pulgas, Suite 100, San Mateo.
Next meeting TBD
September 19, 2018
June 20, 2018
April 18, 2018
December 20, 2017
March 15, 2017
December 20, 2016
June 15, 2016
https://www.flowstobay.org/committees#in-the-garden

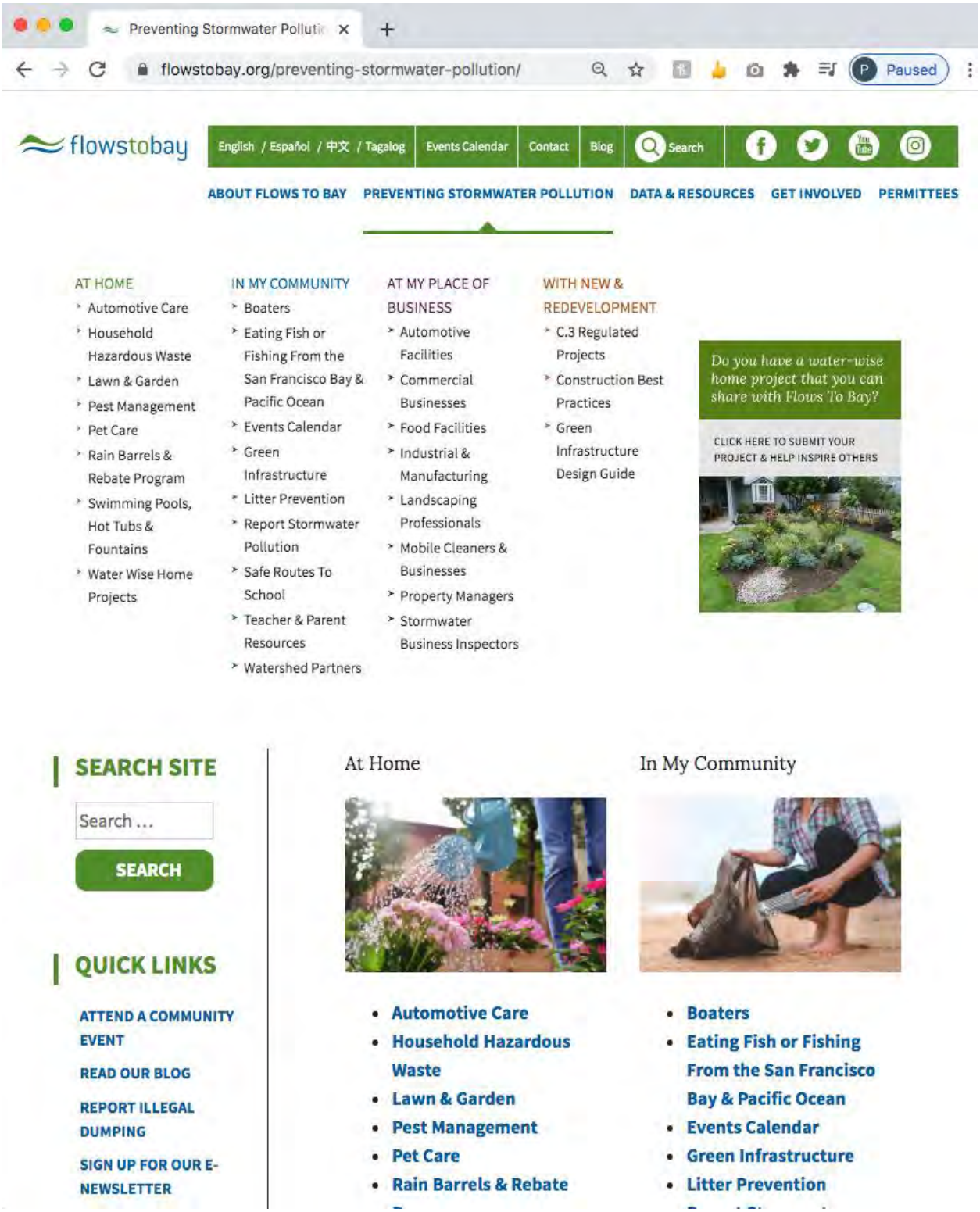

Figure 7-16. Restructuring of Menu to Enhance the User-Experience to Make Items Easier to Find for Each Target Audience: Old Website (Top) Compared to the New Website (Bottom).

To promote SMCWPPP's new, informative, mobile-friendly, and user-friendly website, a variety of strategies were incorporated:

- Facebook Posts and Ads. A Facebook post announced the updated SMCWPPP website (Figure 7-17) and subsequent posts were linked to various pages on the new website to drive traffic to its informative content. Figure 7-18 shows one of the posts.
- E-Newsletter: Sent on 5/12/20, was received by 3,612 recipients, and had an open rate of 24.5%, click through rate of 1.3%, and opened click rate of 5.2% (Figure 7-19).
- Email to all PIP members: Sent on April 23, 2020 and was received by 63 PIP members.
- Google Ads Search Campaign: Launched on 5/1/20 and received 58,714 impressions, 1,250 clicks, and had an average click-through rate of 2.13%. The campaign was based off of particular interests, including IPM, DIY projects, activities for children (due to COVID-19), HHW disposal, etc. The campaign was used to drive traffic to various pages on the new website (Figure 7-20).

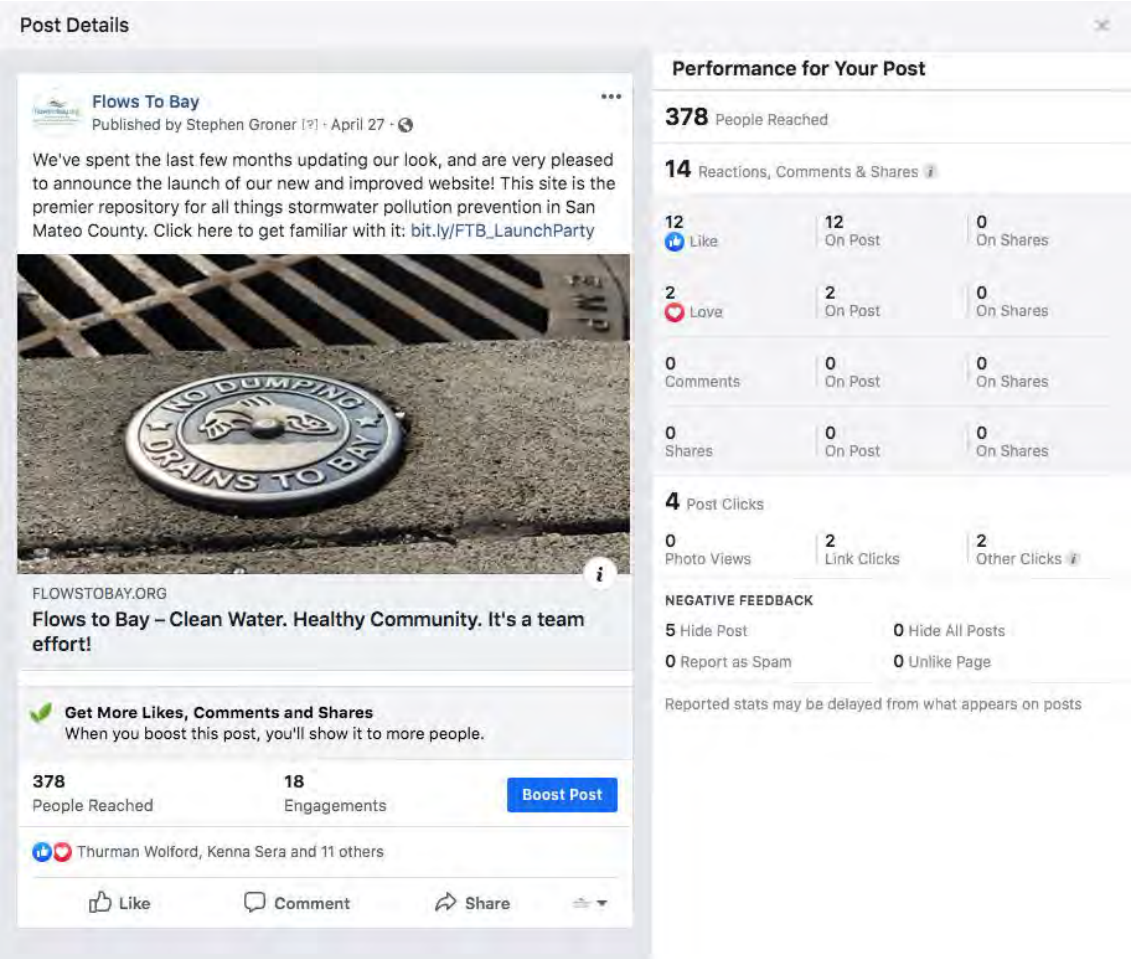

Figure 7-17. Facebook Post Announcing the Updated SMCWPPP Website.

Figure 7-18. Facebook Post Linked to the Updated Website to Drive Traffic to its Informative Content.

View this email in your browser

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Two Exciting Announcements

Our New Website | T-Shirt Design Contest

We've been hard at work at revamping the **flowstobay.org** website to provide you more content and resources!

Some of the many features include a filterable **events calendar** (search by event category, city, and event organizer) and webpages to **nominate a Community Champion**, find **water wise home projects**, learn how to **prevent stormwater pollution**, and view new **stormwater related data & resources** and **educational materials**.

That's just a sample of what's new—there's plenty more to see!

Learn more about our new website here

Figure 7-19. Part of the E-Newsletter Announcing the Updated SMCWPPP Website.

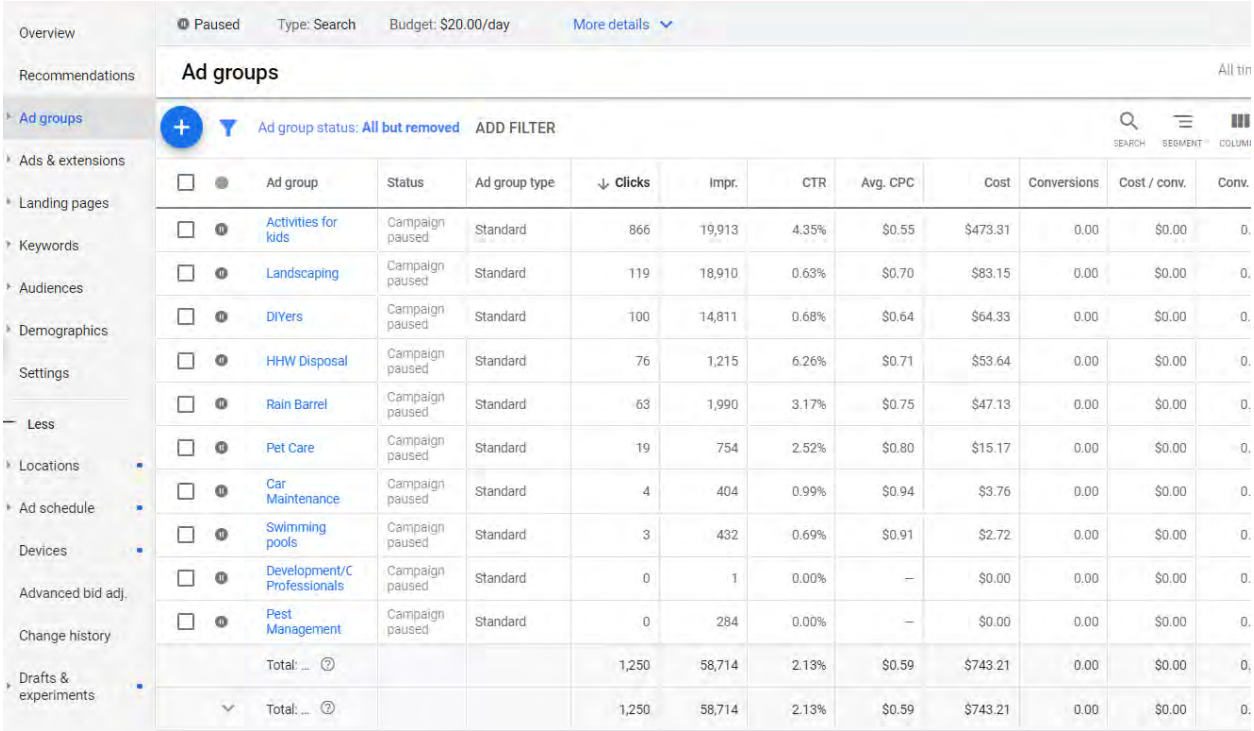

Ad group	Status	Ad group type	Clicks	Impr.	CTR	Avg. CPC	Cost	Conversions	Cost / conv.	Conv.
Activities for kids	Campaign paused	Standard	866	19,913	4.35%	$0.55	$473.31	0.00	$0.00	0.
Landscaping	Campaign paused	Standard	119	18,910	0.63%	$0.70	$83.15	0.00	$0.00	0.
DIYers	Campaign paused	Standard	100	14,811	0.68%	$0.64	$64.33	0.00	$0.00	0.
HHW Disposal	Campaign paused	Standard	76	1,215	6.26%	$0.71	$53.64	0.00	$0.00	0.
Rain Barrel	Campaign paused	Standard	63	1,990	3.17%	$0.75	$47.13	0.00	$0.00	0.
Pet Care	Campaign paused	Standard	19	754	2.52%	$0.80	$15.17	0.00	$0.00	0.
Car Maintenance	Campaign paused	Standard	4	404	0.99%	$0.94	$3.76	0.00	$0.00	0.
Swimming pools	Campaign paused	Standard	3	432	0.69%	$0.91	$2.72	0.00	$0.00	0.
Development/C Professionals	Campaign paused	Standard	0	1	0.00%	–	$0.00	0.00	$0.00	0.
Pest Management	Campaign paused	Standard	0	284	0.00%	–	$0.00	0.00	$0.00	0.
Total: ...			1,250	58,714	2.13%	$0.59	$743.21	0.00	$0.00	0.
Total: ...			1,250	58,714	2.13%	$0.59	$743.21	0.00	$0.00	0.

Figure 7-20. Google Ads Search Campaign Driving Traffic to Various Pages on the Updated Website.

After launch, the website was updated several times a month to include new blog posts and add events to a calendar. Regular maintenance and updates were also performed on SMCWPPP's "members only" pages for subcommittee members, such as the PIP Subcommittee and to upload new entries to the form "Current Records for Applicable Structures Being Demolished" on the page "Managing PCBs In Building Materials During Demolition."

Total statistics for website total visits, unique users, pageviews, and other significant website metrics for FY 2019/20 fiscal year are shown in Table 7-8 (examples of website pages are available in Appendix 7).

Table 7-8. Cumulative data for the flowstobay.org website for FY 2019/20, compared to FY2018/19 to express the increased amount of website traffic and activity.

Time Period	Sessions (Total Visits)	Users (Unique)	Page Views (Unique)	New Visitors %	Returning Visitors %	Overall Bounce Rate
July 1, 2019 through June 30, 2020	29,742	21,888	39,963	88.7%	11.3%	60.97%
July 1, 2018 through June 30, 2019	20,839	14,415	29,102	87.3%	12.7%	54.9%

C.7.d. Public Outreach and Citizen Involvement Events

Overview

SMCWPPP directly participated in 13 public outreach events in FY 2019/20 in order to reach a wide array of residents in different parts of the County. SMCWPPP partnered with the UC Master Gardeners of San Mateo & San Francisco Counties to table 7 events throughout the County's hardware stores and held one virtual event with them during the COVID-19 pandemic to safely reach residents during the shelter in place order. There were also three free community rain barrel workshops (two in person, and one online). The first of these was held at the Half Moon Bay Library. The second, a hands-on installation workshop, took place at Tierra Linda elementary school in San Carlos where SMCWPPP installed 2 permanent rain barrels on campus. The third event was done virtually during the COVID-19 pandemic to safely reach residents during the shelter-in-place directive. SMCWPPP also partnered with the San Mateo Resource Conservation District and individual Permittees to distribute outreach materials and promote these events through their own channels. There were an additional eight public outreach and citizen involvement events where SMCWPPP materials were distributed by the San Mateo Resource Conservation District. Table 7-9 provides a breakdown of these events.

SMCWPPP used online channels, such as Facebook and the SMCWPPP website, to promote events and gather volunteers. In addition, SMCWPPP collected a total of 23 signups from San Mateo County residents to join an email marketing program from the events that SMCWPPP coordinated. There was more of an emphasis, however, on one-on-one conversations about stormwater pollution and how residents can help reduce it with 1,572 total personal interactions. Event metrics are shown below.

Event Goals

- Educate residents through personal interaction and educational materials
- Build the existing database of residents interested in stormwater issues
- Provide a platform for residents to engage with SMCWPPP messages
- Develop outreach partnerships with County agencies, NGOs and CBOs
- Promote local cleanup events, such as Coastal Cleanup Day

Outreach Materials

The following SMCWPPP items are given out at outreach events and/or by request provided to Permittees, organizations, and residents in San Mateo County (not including the less-toxic pest control items listed in section C.9.h.ii).

- "You Are the Solution To Water Pollution" pamphlet (English and Spanish)
- Stormwater tip card (English, Mandarin, and Spanish)
- Rain barrel tip card
- BAWSCA Rain barrel rebate card
- Two children's activity books: "Pest or Pal" (OWOW – Our Water, Our World) and "Discover Storm Water"
- Green Infrastructure Fact Sheet
- Dog waste bag canister

- Branded metal straw with rubber tip and cleaner
- Recycled water bottle pens
- Reusable bags
- Sea animal stickers
- Fish carabiners
- Fish erasers

Table 7-9. FY 2019-20 Public Outreach and Citizen Involvement Events and Metrics

Dates	Event Location	Event Name	Type of Event	Estimated Event Attendance	Estimated Reach
8/3/19	San Pedro Valley Park Visitors Center	San Pedro Watershed Coalition Public Meeting	Public Outreach	50	50
8/3/19	Pacifica State Beach	Dog Surfing Competition	Public Outreach	5,000	61
8/17/19	Pescadero	Pescadero Arts and Fun Festival	Public Outreach	5,000	250
8/24/19	San Mateo, Home Depot	Master Gardener Tabling Event	Public Outreach	150	28
8/31/19	Daly City, Home Depot	Master Gardener Tabling Event	Public Outreach	150	22
9/7/19	Colma, Home Depot	Master Gardener Tabling Event	Public Outreach	150	35
9/10/19	Half Moon Bay	RCD First Flush Training	Citizen Involvement + Public Outreach	13	13
9/14/19	Redwood City, Hassett ACE Hardware	Master Gardener Tabling Event	Public Outreach	100	27
9/21/19	San Mateo County	Coastal Cleanup Day	Public Outreach	5,245	500
9/21/19	East Palo Alto, Home Depot	Master Gardener Tabling Event	Public Outreach	200	43
9/28/19	San Mateo, Home Depot	Master Gardener Tabling Event	Public Outreach	150	23
10/5/19	Half Moon Bay, Hassett ACE Hardware	Master Gardener Tabling Event	Public Outreach	100	10
10/12/19	Half Moon Bay	Rain Barrel Workshop	Citizen Involvement + Public Outreach	29	29
11/2/19	San Carlos	Rain Barrel Installation Workshop	Citizen Involvement + Public Outreach	39	39

Dates	Event Location	Event Name	Type of Event	Estimated Event Attendance	Estimated Reach
11/26/19	San Mateo County (Midcoast)	First Flush Event	Citizen Involvement	13	13
1/26/20	Millbrae	Millbrae Lunar New Year Festival	Public Outreach	1,000	101
2/1/20	Redwood City	Redwood City Lunar New Year Festival	Public Outreach	1,000	90
2/20/20	Half Moon Bay	First Flush Results Presentation	Citizen Involvement + Public Outreach	27	27
2/22/20	East Palo Alto	Cardenas Market Pop-Up		150	40
3/18/20	Online	First Flush Results Presentation	Public Outreach	28	28
5/16/20	Online	Master Gardener Q&A Webinar	Citizen Involvement + Public Outreach	143	143

**Events highlighted in grey were attended by the San Mateo Resource Conservation District where SMCWPPP outreach materials were distributed or referenced.*

C.7.e. Watershed Stewardship Collaborative Efforts

Rain Barrel Rebate Program

During FY 2019/20, SMCWPPP continued its partnership with BAWSCA to promote a countywide rain barrel rebate program and inspire San Mateo County residents to join the rainwater harvesting movement and to help promote other water conservation events. The program subsidizes the cost of purchasing a rain barrel by providing rebates up to $100. As part of this collaborative effort, SMCWPPP:

- Promoted 26 social media posts about rain barrels and rebate related information;
- Hosted 3 separate rain barrel workshops where the BAWSCA rebate and partnership with SMCWPPP was discussed in detail;
- Created and launched online paid ads to bring awareness to the rebate program;
- Sent multiple communications to over 4,000 Flowstobay newsletter subscribers about the BAWSCA program; and
- Promoted various BAWSCA events taking place in San Mateo County or online.

In FY 2019/20, a total of 33 rain barrel rebates were issued from 27 rain barrel applications. Over 2,000 rain barrels have been installed to-date in San Mateo County under the rebate program. There was a total of 29 posts online regarding rain barrel related factoids, rain barrel rebate information, and promoting the three rain barrel workshops we held throughout the year. A total of 13,544 impressions and 1,039 engagements (which includes links, comments, or post shares) were received. The impression figure provides a sense of awareness while the engagement count indicates how many people

interacted or engaged with the post, displaying an even greater awareness. The rain barrel and rebate page on the outreach website (flowstobay.org) which highlighted the BAWSCA rebate program achieved a total of 4,443 pageviews and of these 87% were unique pageviews. The average time visitors spent on that particular page was 4 minutes and 58 seconds. In terms of evaluation, the number of unique pageviews means that we were able to broaden and expand the reach of the audience, attracting almost 4,000 new members of the San Mateo County community that hadn't previously visited the rain barrel and rebate page, speaking to the increase in awareness. The time spent on the page, especially in comparison to the average time of 2:47 on the site total, speaks to the visitors intentions and attitudes. The number of link clicks (226) to the BAWSCA website to apply for the rebate (Figure 7-7), shows not only interest and intention, but also demonstrates that beginning stages of behavior change.

Workshop attendance and post-workshop surveys

Between the three workshops which the BAWSCA rain barrel rebate was spotlighted, 209 residents representing 18 of 20 jurisdictions within San Mateo County attended. Workshop attendees were asked to fill out a survey designed to gauge previous knowledge of rain barrels and how helpful the attendees found the workshop. For the question "How likely are you to purchase/use a rain barrel within the next 12 months?" 73% of survey takers expressed that they were likely to very likely to purchase or use a rain barrel within the next 12 months, while only 1% indicated they were not at all likely. Full survey results and questions can be found in Appendix 7.

In FY 2019/20, a total of 33 rain barrel rebates were issued from 27 applications. This was a 36% decrease from the previous year's efforts. This decline in rebate applications does not align with the impressions, webpage visitors, clicks to the BAWSCA webpage, or information gathered from workshop surveys. SMCWPPP hypothesizes that there may be additional behavior change barriers involved in the actual rebate application. Another possible explanation is that the incentive amount is too small for the amount of work needed to apply for the rebate.

Social Media on Behalf of Partners

As part of SMCWPPP's watershed stewardship collaborative efforts, content was posted on SMCWPPP's Facebook social media platform. Requests from partners to post and promote their messaging to SMCWPPP's social media platforms included the following:

- Partner Event Promotion: 12 posts
- Battery Recycling Promotion: 1 post
- Wash Water Pollution Prevention: 8 posts
- Clean Water Pathways Teacher Fellowship: 6 posts

Figure 7-21 presents some examples of FY 2019/20 Facebook Posts on Behalf of Partners.

Post Preview

Actions

Flows To Bay
October 18, 2019 ·

Need help figuring out how to turn your yard into a serene, pollinator-friendly habitat? Join our friends at the Millbrae Library on Wednesday, Oct. 23 evening for a free workshop! Copy and paste this link into your browser to find the event and register: http://bawsca.org/conserve/programs/events

326	11	Boost Post
People Reached	Engagements	

Sarah Ramstetter Coffey, Samantha Spare and 2 others — 1 Share

Like · Comment · Share

Performance for Your Post

Reported stats may be delayed from what appears on posts.

326
People Reached

7
Reactions, Comments & Shares

6 Like	0 Wow	0 Love
0 Haha	0 Sad	0 Angry
0 Comments	1 Shares	

4
Post Clicks

2 Photo Views	0 Link Clicks	2 Other Clicks

Negative Feedback

1 Hide Post	0 Hide All Posts	0 Report as Spam
0 Unlike Page		

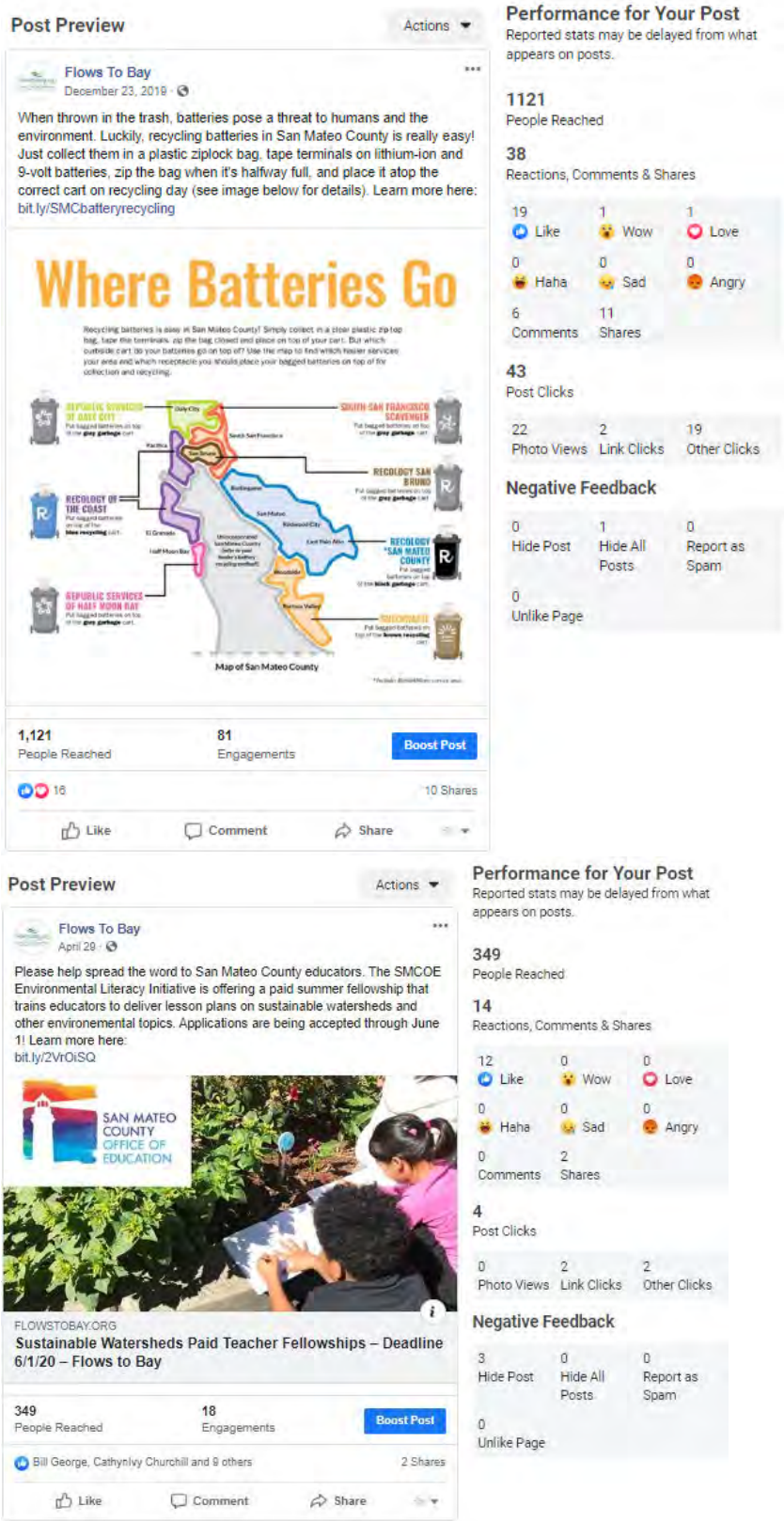

Figure 7-21. Examples of FY 2019/20 Facebook Posts on Behalf of Partners.

C.7.f. School-Age Children Outreach

Overview

During FY 2019/20, SMCWPPP partnered with the San Mateo County Office of Education (SMCOE). The collaboration between the SMCOE and SMCWPPP, and the funding from SMCWPPP, provided the opportunity for the SMCOE to pilot a topical strand for water in the SMELC Teacher Fellowship Program. This strand was referred to as the "Clean Water Teacher Fellowship Program." The fellowship was a semester-long professional learning program that supported teachers at each grade-band level (K-2, 3-5, 6-8, 9-12) to develop and implement comprehensive, standards-aligned, project-based learning units. The focus of the water strand was on the environmental, social, and economic issues related to the water system. Solutionary Units of Study were grounded in developing student awareness of the problems and issues associated with the water system and culminated with students engaging in civic action. Teachers were awarded a $500 stipend for completion of the following requirements:

- Summer Institute Training: 3 Days
- Guided Implementation: Working with a coach to develop and implement a Solutionary Unit of Study with students
- Deliverables: Completing a unit write-up and capstone presentation at the completion of the program in February

During the pilot program, a total of 14 fellows were recruited to participate in the summer training, with six fellows completing the program with pollution prevention projects in San Mateo County. Recruitment included a mailer, multiple email blasts, and outreach to district curriculum and instruction, principals, and department heads. The six fellows who completed the program meeting all the requirements for this grant came from the districts and grade levels listed in Table 7-10.

Table 7-10. Teachers Who Participated in the Clean Water Pathways Program

Teacher Name	Grades Taught	School District	# of Students Reached
James Anderson	6-7 Social Studies	San Mateo-Foster City SD	185
Oceane Stanek	4 All Science	San Mateo-Foster City SD	27
Racquel Fiz	K-1 All	Redwood City SD	20
Christopher Reily	1 All	Ravenswood SD	29
Kristin Duriseti	9-12 Math	Sequoia Union HSD	24
Charlene Calaunan	4-8 Math	Private – Millbrae	15
			300 Total Students

Survey results showed that for those who completed the program, it was highly successful with 85% reporting the program was extremely effective and the remaining 15% reporting it was very effective.

A few quotes from participants on the final survey:

- "This project was so powerful for our students. They loved being given the opportunity to find solutions to a problem and make an impact on our community."
- "This program has inspired me to incorporate environmental education into all content areas, not just science."

- "Marine Science Institute and the Pollution Prevention Program were wonderful community partners to work with. They made information available, answered questions, and were kind to the students. I will work with these partners in the future."
- "This was a wonderful opportunity and I learned a lot; I am grateful for the learning and sharing of ideas. I feel quite isolated on my school site (lack of teamwork and administrative support) so it was very refreshing to discuss ideas and points of view with other teachers during summer institute ;) Thank You!"
- "Thank you for the opportunity to sit, reflect, and put my unit into action. Thank you for my teaching practice and for my students."
- "This was a really valuable experience as it allowed me to provide my students with a unique opportunity that they would not have been able to have with the traditional curriculum."
- "Thank you for the very well developed summer institute, and program. It is very nice that the follow up has a stipend. It all was extremely well thought out and organized!"
- "I thought the support provided by my instructional coach was super helpful. It allowed me to develop ideas I had swimming around in my head but could not quite make concrete."

It should also be noted that the remaining fellows did complete the program, but were either out of San Mateo County, or did not do a stormwater pollution prevention project in the solutionary phase. Additionally, the other "Science and the Environment" SMELC Teacher Fellowship had 12 teachers focus on the topic of water, with ten who focused specifically on pollution prevention content and projects.
Benefits to teachers were promoted as the following:

- A $500 stipend upon completion of the program
- A deep understanding of the environmental, social, and economic issues related to stormwater pollution prevention
- The confidence and ability to successfully use problem-based learning strategies, including: inquiry, systems thinking, and civic engagement
- Connection with local stormwater community-based organizations, and hands-on experiences to enhance classroom teaching
- Increased student engagement and comprehension, and greater and lasting educational impact on your students
- The tools and resources to make a significant impact in your school community towards cleaner waterways
- The chance to collaborate and share best practices with fellow teachers within their cohort

C.7.g. Outreach to Municipal Officials

SMCWPPP has conducted the following outreach to municipal officials (e.g., elected officials, city/county managers etc.) to inform them about Green Infrastructure and other activities being implemented to meet MRP requirements:

- Outreach to municipal officials in regard to presentations to the C/CAG Board
    - Annual Stormwater Program update to the C/CAG Board in October 2019, including a summary of C/CAG's multi-pronged approach to green infrastructure implementation (site level LID, green streets, regional projects). The Board received specific information on efforts to advance green infrastructure with the updated GI Design Guide and C.3 Regulated Projects Guide, Green Infrastructure Modeling for the RAA, development of regional project designs at several sites with $2.4 million in State grant funds, continued work on the Sustainable Streets Master Plan (including an analysis of future runoff impacts related to climate change) and the 10 C/CAG-funded Safe Routes to School and Green Streets Infrastructure Projects.
- Outreach to municipal staff related to the Sustainable Streets Master planning activities
    - Four quarterly updates to the New Development/Green Infrastructure Subcommittee, providing status updates and opportunities for municipal staff to engage with project deliverables, including reviewing the approach to developing model sustainable streets policies and providing review/comment on draft technical memorandums for the climate adaptation and green infrastructure analysis and project opportunity identification and prioritization methodology and related prioritization outputs.
    - Six Stormwater Committee meetings, including updates to the municipal Public Works Directors on the Countywide Green Infrastructure Reasonable Assurance Analysis reports and project updates for the Sustainable Streets Master Plan.

FUTURE ACTIONS

In FY 2020/21, SMCWPPP plans to continue working with the PIP Subcommittee to conduct the following activities to assist member agencies to comply with MRP Provision C.7:

- Continue to grow the reach, engagement, and following of SMCWPPP's Facebook account with posts and advertisements while starting engagement on a new social media platform, Instagram, to help reach a different segment of the San Mateo County audience;
- Promote county outreach events through the website and social media;
- Continue facilitating online virtual events while COVID-19 continues to be a challenge for in-person events and outreach;
- Maintain and update SMCWPPP's website to revise and update the content;
- Continue outreach and promotion of stormwater messaging through the e-newsletter, one of the top performing platforms;
- Growing SMCWPPP's e-newsletter subscribership numbers through cross-promotion on the website, social media platforms, giveaways, contests, and paid advertising media;

- Support the new tiered Rain Barrel Rebate Program pilot and Rain Garden Rebate program in partnership with BAWSCA, with C/CAG providing ongoing funding;
- Extend rain barrel rebate contributions to a tiered system that increases monetary incentives for larger rain barrel systems. SMCWPPP will work with the lead agency, BAWSCA, to adjust the application system to make it easier to apply. To promote this new and restructured rebate and campaign, there will also be a countywide digital ad campaign and supplemental workshops to educate the public.
- Spearhead a Green Streets Stewards Youth Pilot Program to encourage learning, stewardship, and cleanup efforts of green infrastructure facilities throughout San Mateo County;
- Create a comprehensive program that shares eco-friendly and stormwater pollution prevention practices, rebates and educational workshops with residents; and
- Build upon a partnership with the San Mateo County Office of Education to expand the school outreach program and become a staple within San Mateo County schools and curriculum.

SECTION 8
C.8 WATER QUALITY MONITORING

On behalf of its member agencies, SMCWPPP performs water quality monitoring activities in compliance with MRP Provision C.8. Some of this work is accomplished through participation in BASMAA regional projects. Per Provision C.8, a complete documentation of all water quality monitoring data collected from October 1, 2019 through September 30, 2020 (i.e., Water Year 2020 or WY 2020) will be presented in SMCWPPP's Urban Creeks Monitoring Report, which will be submitted to the Regional Water Board by March 31, 2021.

In addition, in accordance with MRP Provision C.8.f., Pollutants of Concern (POC) Monitoring, SMCWPPP will submit by October 15, 2020 a report describing the POC Monitoring tasks accomplished in WY 2020 and the planned allocation of sampling effort for POC Monitoring in WY 2021. The report will include monitoring locations, number and types of samples collected, a description of the objectives of the sampling (i.e., management question addressed), and the analytes measured. However, per Provision C.8.h., the results of the monitoring will not be included, but instead will be documented in the Urban Creeks Monitoring Report, as described above.

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7573

SECTION 9
C.9 PESTICIDE TOXICITY CONTROLS

INTRODUCTION

The primary objective of MRP Provision C.9 Pesticides Toxicity Control is to prevent the impairment of urban streams by pesticide-related toxicity. As such, Provision C.9 helps implement the *TMDL for Diazinon and Pesticide-related Toxicity for Urban Creeks* in the San Francisco Bay region. Permittees are required to implement a pesticide toxicity control program that addresses their own use of pesticides and use by others within their jurisdictions. The focus is on pesticides that pose a threat to water quality, including applications with the potential to enter the municipal stormwater conveyance system.

Most MRP-required Provision C.9 tasks are implemented individually by each San Mateo County Permittee. SMCWPPP helps agency staff to understand MRP requirements and develops various tools that assist agency staff to effectively plan, implement, and report on compliance activities. SMCWPPP's assistance with MRP Provision C.9 is coordinated through SMCWPPP's Parks Maintenance and Integrated Pest Management (IPM) Work Group. The exception is Provision C.9.h, the public outreach portion of Provision C.9, which is implemented through the SMCWPPP Public Information and Participation (PIP) component.

IMPLEMENTATION OF MRP PROVISIONS

During FY 2019/20, SMCWPPP performed a number of tasks to assist San Mateo County Permittees with implementation of Provision C.9, with input and assistance provided by the Parks Maintenance and IPM Work Group. SMCWPPP's accomplishments included the following:

- Held one meeting of the Parks Maintenance and IPM Work Group;
- Conducted SMCWPPP's Annual Landscape IPM Training Workshop in March 2020.
- Continued coordinating with San Mateo County Agriculture / Weights and Measures staff;
- Participated in relevant BASMAA and CASQA activities;
- Continued to maintain retail partnerships at 10 top-tier stores (e.g., Home Depot and Hassett Ace Hardware) within San Mateo County. Tasks included ordering materials, organizing outreach collateral, checking in with store managers, and providing outreach to residents.
- Conducted outreach at community events to educate customers about less toxic alternatives to commercial pesticides and fertilizers. Conducted seven in-store tabling events for store customers.
- Facilitated an online webinar where residents were able to submit questions and discuss less toxic solutions to their specific pest problems with experts at the UC Master Gardeners of San Mateo and San Francisco Counties.

- Conducted outreach to all pest control operators in San Mateo County and created a database of active-licensed operators, a list of their IPM certifications, and contact information.
- Presented at ReScape Landscape Maintenance Qualification Training in Redwood City on November 7 - 15, featuring ReScape regenerative landscape best practices and training for landscape maintenance to reduce the need for use of pesticides.

More information on each of these accomplishments is provided below.

Parks Maintenance and IPM Work Group

The Parks Maintenance and IPM Work Group provides the opportunity for sharing information about MRP Provision C.9 requirements and approaches for achieving compliance. Richard Holtz from the City of Burlingame chaired the work group. The Parks Maintenance and IPM Work Group met one time in FY 2019/20. The attendance list is included in Appendix 9.

Coordination with San Mateo County Department of Agriculture

As in past years, San Mateo County Agriculture / Weights and Measures staff attended the FY 2019/20 meeting of the Parks Maintenance and IPM Work Group and received information on water quality issues and the MRP. In addition, SMCWPPP worked closely with San Mateo County Agriculture / Weights and Measures staff to provide Department of Pesticide Regulations Continuing Education Credits for participants in the Landscape IPM Workshop.

Seventeenth Annual Landscape Integrated Pest Management Workshop

The seventeenth Annual SMCWPPP Landscape IPM Workshop was held on March 3, 2020 at the City of Foster City's Library Community Center. The workshop was attended by 64 municipal staff and contractors and covered the following topics:

- Pesticides and Water Quality
- Soil Management for Weed Control
- Using Goats for Vegetation Management in Urban Landscapes
- Spring Applications for Landscape and Tree Care
- Regulatory Update and Common Violations

Evaluation forms completed by the workshop's attendees included many positive comments and indicated that overall, the workshop met expectations. Appendix 9 includes the workshop agenda, attendance list and a summary of the evaluations. Other workshop materials are available on the SMCWPPP website (flowstobay.org).

SMCWPPP also presented at the ReScape Landscape Maintenance Qualification Training in Redwood City on November 7 - 15, 2019, featuring ReScape regenerative landscape best practices and training for landscape maintenance to reduce the need for use of pesticides.

Pesticide Tracking Template

In FY 2016/17, SMCWPPP developed a template in Excel to assist with pesticide tracking and reporting requirements in MRP Provision C.9.a. The pesticides tracking template utilizes a lookup list of pesticides and active ingredients compiled from data tables available on the Department of Pesticide Regulation (DPR) website. The template was updated during FY 2019/20 with the current two years of pesticide product data from the DPR website.

Participation in BASMAA and CASQA

MRP Provision C.9.f requires Permittees to track and participate in regulatory processes relevant to pesticide toxicity control. During FY 2019/20, SMCWPPP accomplished this task by working with BASMAA and CASQA. For additional information, see *Pesticides Subcommittee Annual Report and Effectiveness Assessment - 2019-2020, California Stormwater Quality Association, Final Report, August 2020* (Appendix 13). In addition, SMCWPPP staff stayed current with pesticide controls and regulatory efforts by participating in selected CASQA Pesticide Committee meetings.

Point of Purchase Outreach

SMCWPPP conducted point-of-purchase outreach to home improvement store consumers at frequently visited stores (e.g., Home Depot and Hassett Ace Hardware), providing tips to residents about the proper use and disposal of pesticides and other lawn and garden chemicals. Through a partnership with experts at the UC Master Gardeners of San Mateo and San Francisco Counties, SMCWPPP was able to provide the public with a credible and reliable source of information at these tabling events. Master Gardeners educated consumers about proper pesticide use, less toxic pesticide options, and effective alternatives to pesticides. Tabling events were held at larger store locations to optimize the outreach effort (Figure 9-1). The COVID-19 shelter-in-place order forced the cancellation of three tabling events, but SMCWPPP coordinated, promoted, and executed an online event with the Master Gardeners instead. Both tabling events and the online event were promoted via Facebook, by the SMCWPPP event calendar, and through the PIP Subcommittee members.

SMCWPPP's in-store tabling events consisted of educating consumers about: (1) stormwater runoff, (2) the role residents play in reducing pesticide use, (3) the less toxic pesticides sold in the store, and (4) proper usage of pesticides and current pest problems and less toxic solutions to these problems. A total of 188 consumers were engaged with directly. Table 9-1 lists information from the seven in-person tabling events and the one online event held during FY 2019/20.

During the in-person tabling events, program materials were provided directly to the public via point-of-purchase displays, a time when residents may be most receptive to hearing the message. Additionally, shelf talkers were placed next to products that have been certified as "less-toxic" by the Our Water Our World (OWOW) program. All of these efforts helped to promote the regional OWOW program. Table 9-2 lists the 10 San Mateo County stores that currently participate in the OWOW point-of-purchase program.

The online educational event featured an expert panel of four Master Gardeners who fielded both pre-submitted and live questions from workshop attendees. Before the workshop, SMCWPPP worked with member agencies to promote the event and created a landing page where registrants could pre-submit questions. Following the event, SMCWPPP created a permanent webpage to host a complete list of all of the questions asked by residents and the subsequent answers provided by the Master Gardeners, as well

as links to resources related to Integrated Pest Management, proper plant care, and water pollution prevention tips.

Table 9-1. FY 2019/20 San Mateo County IPM in-Store Tabling Events & Online Webinar

Store	Date of Tabling Event	Number of People Reached	Number of Surveys Taken
Home Depot, San Mateo	08/24/2019	28	N/A
Home Depot, Daly City	08/31/2019	22	10
Home Depot, Colma	09/07/2019	35	10
Hassett Hardware, Redwood City	09/14/2019	27	10
Home Depot, East Palo Alto	09/21/2019	43	5
Home Depot, San Mateo	09/28/2019	23	10
Hassett Hardware, Half Moon Bay	10/05/2019	10	4
Online: Master Gardener Q&A Webinar	06/13/2020	35	15

Table 9-2. FY 2019/20 San Mateo County Participating OWOW Hardware Stores

Store Name	Address	City
Brisbane Hardware	1 Visitacion Ave.	Brisbane
Hassett Ace Hardware	1029 Alameda de las Pulgas	Belmont
Hassett Ace Hardware	545 1st Ave.	San Mateo
Hassett Ace Hardware	111 Main St.	Half Moon Bay
Hassett Ace Hardware	282 Woodside Plaza	Redwood City
Home Depot	2 Colma Blvd.	Colma
Home Depot	303 Lake Merced Blvd.	Daly City
Home Depot	1781 E Bayshore Rd.	East Palo Alto
Home Depot	2001 Chess Dr.	San Mateo
Lyngso Garden Materials, Inc	345 Shoreway Rd.	San Carlos

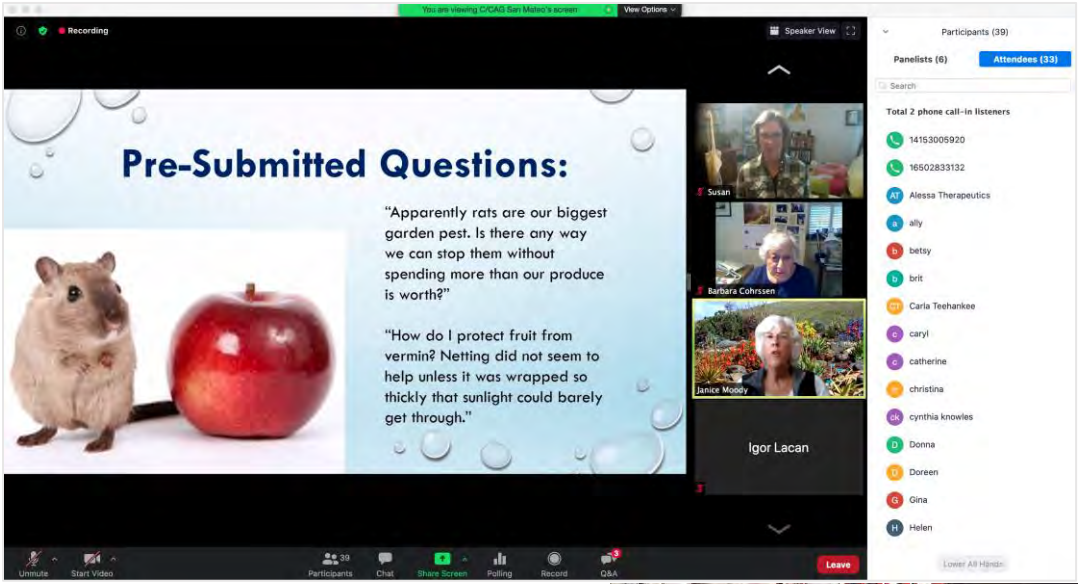
Recording
Speaker View
Pre-Submitted Questions:
"Apparently rats are our biggest garden pest. Is there any way we can stop them without spending more than our produce is worth?"
"How do I protect fruit from vermin? Netting did not seem to help unless it was wrapped so thickly that sunlight could barely get through."
Susan
Barbara Cohrssen
Janice Moody
Igor Lacan
Participants (39)
Panelists (6)
Attendees (33)
Total 2 phone call-in listeners
14153005920
16502833132
Alessa Therapeutics
ally
betsy
brit
Carla Teehankee
caryl
catherine
christina
cynthia knowles
Donna
Doreen
Gina
Helen
Unmute
Start Video
Participants
Chat
Share Screen
Polling
Record
Q&A
Leave

PESTICIDES
HEALTHY GARDEN
ANTS
APHIDS
COCKROACHES
FLEAS
PULGAS
LAWN
RATS AND MICE
ROSES
pest problems

Figure 9-1. FY 2019/20 San Mateo County IPM Events: (from top to bottom row) Screenshot of Online Master Gardener Q&A Webinar in June 2020; Master Gardener tabling event in Daly City; Our Water Our World shelf talkers on display in Half Moon Bay; and Master Gardener tabling event in Colma.

Pest Control Contracting Outreach

During FY 2019/20, SMCWPPP also implemented outreach that directly targeted residents and pest control contractors, to (1) encourage San Mateo County communities to reduce their reliance on toxic pesticides that threaten water quality, (2) encourage public and private landscape irrigation practices that minimize pesticide runoff, (3) promote appropriate disposal of unused pesticides, and (4) encourage residents to hire pest control professionals that use IPM practices.

SMCWPPP conducted this outreach via Facebook. Examples of social media posts are shown in Figure 9-2. The following is a breakdown of posts related to pest control promoted during FY 2019/20:

Facebook

- 39 posts
- 501 Engagements (likes, comments, shares, and link clicks)
- 19,071 reach

In addition to social media posts, SMCWPPP stocked OWOW fact sheets detailing IPM approaches to various pest-related problems, as well as resources for hiring pest control companies and disposing of pesticides responsibly in literature racks at the hardware stores listed in Table 9-2.

In addition, to help fulfill the MRP Provision C.9.e.ii.(3) requirement for outreach to pest control operators, the Countywide Program incorporated direct outreach to pest control operators. The aim of this outreach was to inform pest control operators of the hazards of pesticides and to encourage the reduction of their usage. Businesses that agreed to sign a pledge were asked to take a photo of themselves with the pledge, which would then be spotlighted on flowstobay.org and on the SMCWPPP Facebook page. Businesses were also encouraged to share the signed pledged on their digital platforms. The operators who use IPM practices were added to the list of pest control operators on the SMCWPPP website Pest Operators webpage. This project can be broken down into multiple steps and focuses, which all build upon each other:

- Conducted research about pest control operators - 40 operators were found from the DCA License Search Database using the following parameters:
    - License Type (Rank) = Structural Pest Control Board > Operator
    - Counties = San Mateo
    - Primary Status = Active
- Created a pledge (Appendix 9)
- Created a database with pertinent data about pest control operators (Appendix 9)
- Researched additional contact information not found in the DCA License Search Database
- Created the call script
- Conducted outreach calls
- Created email templates
- Followed up with contacts

Results of the outreach included the following:

- Six contacts agreed to sign the pledge and they sent a signed pledge back to us, (12) contacts could not be reached after multiple attempts via phone and email communication, and (14) had phone numbers that didn't work, had an expired license, or didn't hold a valid position. Table 9-3 summarizes the total numbers of communications with contacts throughout this project (105 phone calls were conducted, and 33 e-mails were sent).
- The phone calls also aimed to learn about the contacts' IPM practices, certifications, and if they received SMCWPPP's letter in April 2019 regarding the focuses of this outreach. Table 9-4 summarizes the numbers of contacts who: (11) use IPM practices, (8) received SMCWPPP's letter, (5) are EcoWise certified, and (1) are GreenPro certified (1).

Table 9-3. Summary of FY 2019/20 Communications with Pest Control Operators by Type

Type of Communication	Total Amount Conducted
Phone	105
E-mail	33

Table 9-4. Results of FY 2019/20 Pest Control Operator Inquiries

Uses IPM	Sometimes Uses IPM	Received Letter	Unsure if Received Letter	EcoWise Certification	GreenPro Certification
11	1	8	6	5	1

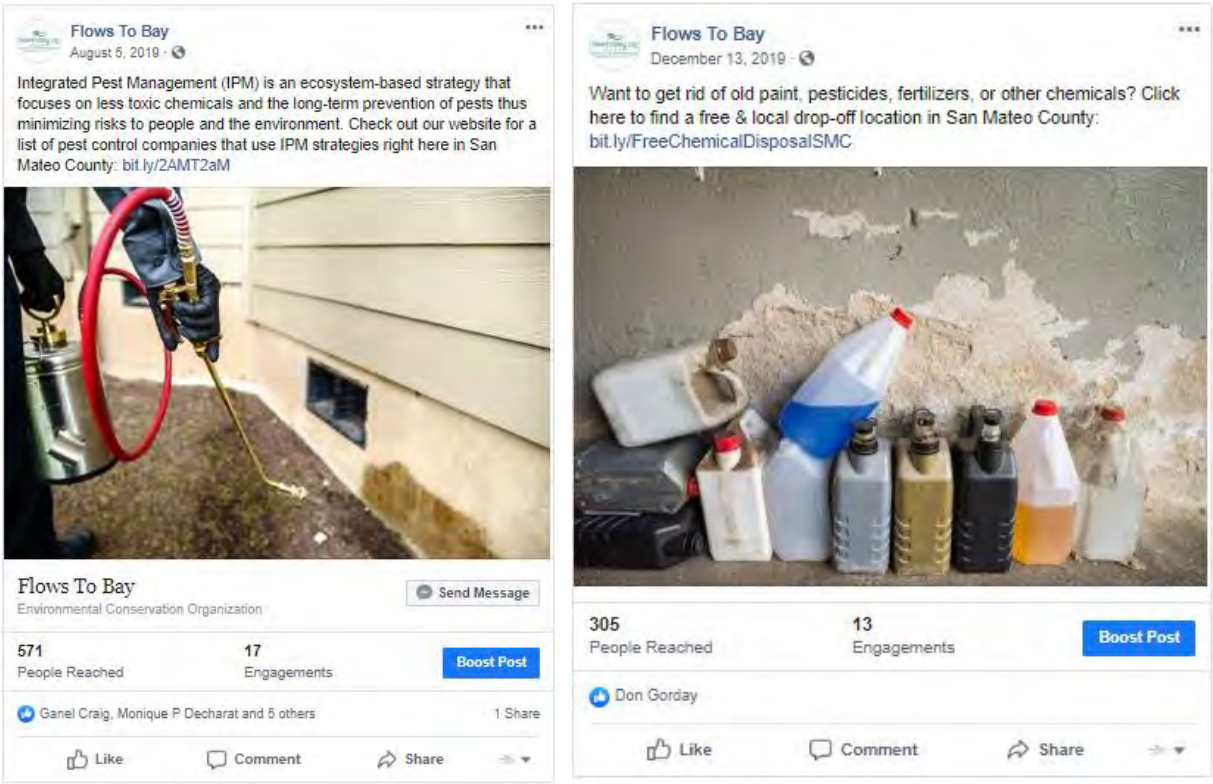

Figure 9-2. Examples of Social Media Posts Promoting Pesticide Pollution Prevention

FUTURE ACTIONS

SMCWPPP activities planned for FY 2020/21 to assist San Mateo County Permittees comply with MRP requirements in Provision C.9 include the following:

- Continue to assist San Mateo County Permittees implement their IPM programs and policies, with input and assistance provided by the Parks Maintenance and IPM Work Group;
- Hold one Parks Maintenance and IPM Work Group meeting;
- Continue to coordinate with San Mateo County Agriculture / Weights and Measures staff, as needed;
- Conduct a landscape IPM training workshop;
- Continue participating in relevant BASMAA and CASQA activities;

- Continued to maintain retail partnerships at top-tier stores within San Mateo County, using signage and materials developed by BASMAA for the point-of-purchase program;
- Continue conducting outreach at community events to educate customers about less toxic alternatives to commercial pesticides and fertilizers;
- Perform outreach messaging to residents on best practices for hiring pest control contractors certified in IPM via fact sheets, SMCWPPP's website, social media posts, and a quarterly newsletter;
- Send direct mailers to pest control professionals that encourage IPM certification and education; and
- Conduct direct outreach to pest control professionals by speaking with them directly regarding their certifications and IPM practices.

SECTION 10
C.10 TRASH LOAD REDUCTION

INTRODUCTION

MRP Provision C.10 Trash Load Reduction tasks are implemented by each San Mateo County Permittee. SMCWPPP helps agency staff to understand trash load reduction requirements and develops various tools needed to effectively plan, implement, and report on compliance with the requirements. Provision C.10 requires Permittees (as applicable) to:

- Reduce trash discharges from 2009 levels by 80% by July 2019;
- Ensure that lands they do not own or operate but that are plumbed directly to their storm drain systems in Very High, High and Moderate trash generation areas are identified and equipped by full capture systems or managed to a level equivalent to full capture systems;
- Install and maintain full capture systems that treat a mandatory minimum acreage;
- Assess trash reductions associated with control measures other than full capture systems using a visual assessment protocol;
- Develop and implement a receiving waters trash monitoring program plan;
- Annually cleanup and assess a mandatory minimum number of creek/shoreline trash hotspots; and
- Maintain a Long-Term Trash Load Reduction Plan designed to achieve 100% trash reduction by July 2022.

IMPLEMENTATION OF MRP PROVISIONS

SMCWPPP performs a variety of tasks to assist San Mateo County Permittees with implementation of MRP Provision C.10 and the requirements listed above, with input and assistance provided by the SMCWPPP Trash Subcommittee and Litter Work Group. FY 2019/20 accomplishments included the following:

- Coordinated and facilitated five meetings of SMCWPPP's Trash Subcommittee and one meeting of SMCWPPP's Litter Work Group;
- Assisted San Mateo County Permittees in delineating trash full capture treatment areas and managing trash full capture information in GIS (currently nearly 10,000 acres are treated by full capture systems in San Mateo County);
- Continued to implement SMCWPPP's Trash Assessment Strategy, including conducting roughly 560 On-land Visual Trash Assessments (OVTAs) at 236 sites and maintaining the Countywide Program's online OVTA database to allow San Mateo County Permittees access to timely load reduction estimates;

- Continued providing guidance to San Mateo County Permittees on MRP operation and maintenance requirements and standard operating procedures for trash full capture systems;
- Compiled and standardized data from 47 trash hot spot assessments and cleanups, and entered the data into the SMCWPPP hot spot database;
- Finalized and distributed the *New Development Projects Litter Reduction Fact Sheet* summarizing the best practices of the *Litter Reduction Toolkit for Multi-family Dwellings*;
- Coordinated with the SMCWPPP Public Information and Participation (PIP) Subcommittee on countywide school outreach and countywide litter campaign branding efforts;
- Responded to Regional Water Board staff requests for information on existing, planned, and potential locations for trash full capture systems that are mutually beneficial to San Mateo County Permittees and Caltrans;
- Coordinated with Caltrans on trash capture efforts, including the installation of trash full-capture systems through cooperative implementation agreements;
- Conducted qualitative trash receiving water monitoring at 30 creek/channel sites included in the *BASMAA Receiving Waters Trash Monitoring Program Plan;*
- Participated in the development and submittal of the *BASMAA Final Receiving Water Trash Monitoring Report*, in compliance with MRP provision C.10.b.v.; and
- Assisted San Mateo County Permittees in developing information necessary for reporting trash load reductions with their FY 2019/20 Annual Reports.

More information on each of these accomplishments is provided below.

Trash Subcommittee

SMCWPPP's Trash Subcommittee assists San Mateo County Permittees with the implementation of new or enhanced trash control measures and actions required by the MRP. The Trash Subcommittee generally meets quarterly. Additional meetings are scheduled as necessary to address high priority issues.

During FY 2019/20, SMCWPPP staff facilitated five Trash Subcommittee meetings, which were chaired by Chris Sommers (EOA, Inc.). The Trash Subcommittee continued to have excellent participation by municipal staff and other stakeholders as shown in the FY 2019/20 attendance list (Appendix 10).

During the Trash Subcommittee meetings in FY 2019/20, Subcommittee members discussed and provided input on the following topics/projects:

- C.10 requirements in the MRP;
- SMCWPPP Litter Work Group activities, reports, and work plan;
- New or planned installations of trash full capture systems in San Mateo County Permittee jurisdictions;
- BASMAA's Receiving Water Monitoring Plan;
- The FY 2019/20 Annual Report format for Provision C.10;
- Opportunities for collaboration with Caltrans;

- SMCWPPP Trash Assessment Strategy, including OVTAs conducted in Trash Management Areas (TMAs); and
- Modifications to Permittee trash control measures occurring as a result of the COVID-19 pandemic.

Demonstration of Trash Load Reductions (C.10.a.ii)

SMCWPPP developed the *Pilot Trash Assessment Strategy* (Strategy) in FY 2013/14 on behalf of San Mateo County Permittees. The Strategy was submitted to the Regional Water Board on February 3, 2014 as part of San Mateo County Permittee Long-Term Trash Load Reduction Plans, and was intended to serve as version 2.0 of the trash tracking method required by the Permit. SMCWPPP began to implement the Strategy in FY 2013/14 and continued to implement it at a full-scale in FY 2019/20 on behalf of (and in collaboration with) all San Mateo County Permittees.

The Strategy is intended to provide information on the magnitude and extent of trash reductions associated with stormwater in the San Mateo County. It is consistent with trash monitoring, assessment and reporting requirements in the MRP and is primarily designed to answer the following core management question:

> *Have MS4 trash load reduction targets (i.e., 40%, 70%, and No Adverse Impacts) been achieved by San Mateo County Permittees?*

The primary environmental and programmatic indicators that SMCWPPP and San Mateo County Permittees currently track to answer this core management question are:

1. **Full Capture Systems** – The extent of areas effectively treated by trash full capture devices and the operation and maintenance of these devices;
2. **Other Trash Controls** – Reductions in the levels of trash observed on-land and available to enter MS4s;
3. **Source Controls** – Reductions in the levels of litter prone items observed in the environment that are subject to source controls, such as ordinances that limit or prohibit the distribution of specific types of items;
4. **Additional Creek and Shoreline Cleanups (Offset)** – The volumes of trash removed via creek and shoreline cleanup events (above and beyond those required by the MRP); and
5. **Direct Discharge Programs (Offset)** – The extent and magnitude of trash removed or prevented from entering a receiving water body from pathways other than stormwater that are directly impacting those water bodies (e.g., illegal dumping or illegal encampments).

In selecting the indicators above, San Mateo County Permittees recognized that no one indicator can provide the information necessary to effectively determine progress made in reducing trash discharged from MS4s. SMCWPPP's methods used to collect or track information on the primary indicators 1 - 4 listed above are briefly described below, along with summaries of associated activities conducted by SMCWPPP in FY 2019/20. Methods used to assess indicator 5 have not been implemented to-date because none of the San Mateo County Permittees has submitted or implemented an optional direct discharge plan as outlined in the MRP. Additional information and the results of data collected to support indicators 1 - 4 are found in Section 10, Provision C.10.b.ii., Parts A and B, of individual San Mateo County Permittee FY 2019/20 Annual Reports.

1. Full Capture Systems (Including Operation and Maintenance)

Devices and facilities meeting the trash full capture design criteria described in the MRP and certified by the State Water Resources Control Board (State Water Board) are effective trash controls if adequately maintained to ensure their capture efficiency. Consistent with the Long-Term Plan Framework and the State Water Board's Trash Amendments, if a full capture device is maintained effectively then trash from the area draining to the device is effectively reduced to a level of "no adverse impacts" and has achieved the ultimate trash reduction goals outlined in the MRP. Additional trash reductions, therefore, are not needed in areas draining to (and treated by) full capture systems.

From FY 2013/14 through FY 2019/20, SMCWPPP and San Mateo County Permittees have expended considerable time and resources identifying and mapping areas draining to full capture devices, using a combination of fieldwork and desktop Geographical Information System (GIS) analysis. Drainage areas for newly installed full capture devices are delineated and mapped as part of an annual update of individual San Mateo County Permittee full-capture device GIS data layers. As a result, all drainage areas have been delineated for all devices installed to-date in San Mateo County. Nearly 10,000 acres of land area is currently treated by full capture systems in San Mateo County. Trash reductions associated with these areas are calculated based on the baseline trash generation levels established on San Mateo County Permittee baseline trash generation maps.

Additionally, SMCWPPP completed the development of a Model Trash Full Capture Device O&M Verification Program in FY 2015/16. The O&M Verification Program is intended to ensure that devices are operated at a level necessary to maintain their full capture designation. In FY 2019/20, SMCWPPP continued to provide guidance to San Mateo County Permittees on O&M requirements and standard operating procedures developed for San Mateo County Permittees as part of the Model Verification Program. San Mateo County Permittees with full capture devices have an O&M verification program tailored to fit the types of devices in their stormwater conveyance system and the associated maintenance procedures needed to adequately maintain these devices. Individual San Mateo County Permittee Annual Reports provide information regarding O&M of full capture devices and any associated issues with the devices (see Section 10, Provision C.10.b.i).

2. Other Trash Control Measures (via On-land Trash Visual Assessments)

In FY 2013/14, SMCWPPP developed a pilot approach to assess trash reductions on land areas that generate substantial levels of trash (i.e., very high, high or moderate trash generation) and are not treated by full capture devices. The approach uses on-land visual trash assessment (OVTA) protocols to record changes in the levels of trash on streets, sidewalks, and properties over time. The assessment protocols score sites/areas using a 4-tier system (A - D, A being the least amount of trash). The four OVTA scoring categories correspond with the four trash generation rate categories (i.e., very high, high, moderate and low) and the associated weighting factors included in the MRP.

Consistent with the MRP, OVTAs are conducted at randomly selected street/sidewalk sites representing 10% of the applicable street miles in each trash management area (TMA) where trash reductions are being reported by San Mateo County Permittees. OVTAs are conducted at a frequency necessary to confidently detect reductions in trash levels at these sites. Based on the findings of the *Tracking California's Trash* State Water Resources Control Board funded project, conducting between 4 and 6 assessments at a site will allow improvements in trash levels to be detected with an acceptable level of confidence. Currently, SMCWPPP annually conducts roughly three assessments at each site and then averages two years of data to calculate trash load reductions in a given fiscal year. For

example, in reporting reductions for FY 2019/20, results from assessments conducted in both FY 2018/19 and FY 2019/20 were averaged and used to represent the "current" levels of trash within the applicable land areas.

During FY 2019/20, SMCWPPP staff conducted 562 OVTAs at 236 assessment sites (averaging 1,000 feet in length). All OVTA sites were assessed at least two times during FY 2019/20 and many were assessed three times. During a typical year, all sites are assessed three times. Table 1 provides a summary of OVTAs conducted between FY 2014/15 and FY 2019/20.

Table 10-1. Number of OVTAs completed in San Mateo County by fiscal year.

FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20
601	688	499	827	704	562

Assessment results are stored in SMCWPPP's online OVTA Database. In FY 2019/20, SMCWPPP staff entered assessment results within one week of conducting an assessment, which provided San Mateo County Permittee staff with timely access to the results.

Effects of Covid-19 Pandemic on OVTA Scores

In March 2020, the County of San Mateo issued a Shelter-in-Place (SIP) Order to slow the spread of COVID-19 in the county. As a result, OVTAs were ceased from March 19, 2020 until May 2020. During those months, a determination was made that OVTAs are essential services because they are conducted in response to regulatory mandates and as a result, OVTA Standard Operating Procedures (SOPs) were adjusted to conform to the Order. Assessments using the modified SOPs were conducted from late May through July 2020. Because trash control measures implemented by Permittees may have been suspended or modified during these months due to the CODIV-19 pandemic (see additional descriptions in Permittee FY 2019/20 annual reports), an evaluation of OVTA data collected during that timeframe was compared to data collected during the previous fiscal year. The following comparisons were made to evaluate the potential effects of the pandemic on OVTA scores:

1. Average OVTA scores at each site assessed during both FY 2018/19 and FY 2019/20.
2. Baseline trash generation and average OVTA scores at each site assessed during both 2018/19 and FY 2019/20.

Only sites assessed at least once during FY 2018/19 and at least once during the SIP Order in FY 2019/20 were included in the analysis. A total of 205 sites met this requirement across 18 SMCWPPP Permittees that conduct OVTAs. Results of the data analysis are summarized below:

- **Changes in Average OVTA Scores at Sites in FY 2018/19 and FY 2019/20**
    - Results from this analysis indicate that on average, OVTA scores increased by 29% at sites in FY 2019/20 (Table 2). Increases in average OVTA scores resulted in lower trash load reductions associated with "Other Management Actions" being reported by SMCWPPP Permittees in FY 2019/20.

Table 10-2. Changes in average OVTA scores (0 to 1 – Low, 1 to 2 - Moderate, 2 to 3 – High, and 3 to 4 - Very High) on a Permittee and Countywide level in FY 2019/20.

Permittee	FY 2018/19 Average Score	FY 2019/20 Average Score	% Change
Atherton	0.26	0.25	-2%
Belmont	0.31	0.36	14%
Brisbane	1.00	1.25	25%
Burlingame	0.33	0.33	1%
Colma	0.63	0.49	-23%
Daly City	0.96	1.01	5%
East Palo Alto	0.92	1.20	30%
Foster City	0.23	0.38	60%
Menlo Park	0.31	0.55	80%
Millbrae	0.55	0.63	14%
Pacifica	0.43	0.40	-7%
Portola Valley	0.08	0.67	700%
Redwood City	0.70	0.90	27%
San Bruno	0.41	0.71	73%
San Carlos	0.37	0.41	12%
San Mateo	0.49	0.66	35%
San Mateo County	0.47	0.55	18%
South San Francisco	0.51	0.83	63%
Countywide	***0.50***	***0.64***	***29%***

Possible reasons for the increase in average OVTA scores in FY 2019/20 include the following:

- Modifications in Permittee trash control measure implementation such as street sweeping and parking enforcement due to the SIP Order.
- Increases in residents staying at home during the SIP Order, resulting in more vehicles parked on the street during street sweeping events, reducing the effectiveness of this control.
- Closures of businesses during SIP, reducing clean-up efforts conducted by private parties in commercial and retail areas.

Although each of these are possible reasons for the increases in average OVTA scores, the worsening of OVTA results cannot be attributed to a single cause. Based on the analysis performed, it is likely that a combination of one or more the causes above are responsible for changes in FY 2019/20.

- **Baseline trash generation compared to average OVTA scores at each site assessed during both FY 2018/19 and FY 2019/20.**
  - In 2018/19, 94% of sites showed improvements compared to baseline conditions. In FY 2019/20, improvements were observed at 90% of sites.
  - These observations demonstrate that the average trash levels observed continue to be better than baseline conditions, despite the increases in scores observed in FY 2019/20.
- **Changes in the number of single-use plastic grocery bags observed each site assessed during both FY 2018/19 and FY 2019/20.**

- A total of six SMCWPPP Permittees observed no single-use plastic grocery bags in at least one of the two years analyzed. Therefore, the results from these Permittees could not be compared. The remaining 10 Permittees that have OVTA data were analyzed to compare the number of bags observed during FY 2018/19 and FY 2019/20.
- The average number of bags observed per 1,000 feet on a countywide scale decreased by 17% in FY 2019/20, when compared to FY 2018/19. Results on a Permittee-scale were also evaluated. Based on statistical test of significance (i.e., paired t-test) conducted to determine if the changes observed at either the Countywide or Permittee level were significant or likely due to chance, however, it appears that there is no significant difference between the number of bags observed between the two fiscal years.

Regardless of the changes in OVTA results observed during the SIP Order, all OVTA data collected between July 2018 and July 2020 were used by San Mateo County Permittees to report trash load reduction estimates for "Other Trash Management Actions" in Section C.10 (Provision C.10.b.ii., Part B) of their FY 2019/20 Annual Reports. This resulted in some Permittees reporting less trash load reduction in FY 2019/20 compared to the previous fiscal year. Additional assessments are planned for FY 2020/21, consistent with the SMCWPPP Trash Assessment Strategy.

3. Source Controls (Via Surveys and Characterization Studies)

San Mateo County Permittees are implementing actions to reduce the sale or distribution of litter-prone items and stop litter at its source. These source controls include the adoption and enforcement of ordinances enacted by San Mateo County Permittees to eliminate the distribution of single-use plastic grocery bags and expanded polystyrene (EPS) food service ware in their jurisdictions. To assist San Mateo County Permittees in determining to what degree these ordinances have reduced the level of these products found in the environment, SMCWPPP used the findings of a study conducted in Santa Clara County between March 2015 and July 2017. As part of the study, debris and trash were collected from large and small full-capture treatment systems within jurisdictions that have installed these devices.

Results from the project, which characterized the number of bags and amount of EPS observed in trash full capture systems pre- and post-ordinance, indicate that on average 72% fewer single-use plastic grocery bags and 74% less EPS food service ware was observed in storm drains systems after the ordinances went into effect. Along with other lines of evidence, these observed average reductions are used by San Mateo County Permittees to demonstrate trash load reductions associated with the implementation of these ordinances. For additional details on results of the project, see the *Storm Drain Trash Monitoring and Characterization Project Technical Report* provided in Appendix 10.1 of the Santa Clara Valley Urban Runoff Pollution Prevention Program's FY 2015/16 Annual Report.

<u>Effects of COVID-19 Pandemic</u>

In March 2020 as part of the County of San Mateo's Department of Public Health Shelter-in-Place Order due to the COVID-19 pandemic, the use of reusable grocery bags by customers in stores was disallowed to protect public health. Additionally, single-use plastic bags were temporarily allowed in some jurisdictions. In June 2020, the County reissued its Order, which allows customers to use their own reusable bags as long as businesses require customers using these bags to bag their own groceries.

In an effort to evaluate whether the 3-month moratorium on the use of reusable bags and the temporary allowance of single-use plastic bags, the number of single-use plastic bags observed during OVTAs conducted in FY 2018/19 (pre-COVID) were compared to FY 2019/20 (during-COVID). Results

did not indicate statistically significant ($p<0.05$) changes in the number of single-use plastic bags observed on streets and sidewalks occurred between FY 2018/19 and FY 2019/20. The average number of bags observed per 1,000 feet did increase slightly in FY 2019/20, but not to a level that would be considered statistically significant.

4. **Additional Creek and Shoreline Cleanups (via volumes of trash removed from waterways)**

   San Mateo County Permittees are also allowed to claim up to a 10% trash load reduction for conducting trash cleanups in local water bodies above and beyond cleanups required by the MRP. SMCWPPP assists San Mateo County Permittees by calculating load reductions associated with these efforts based on the volumes of trash reported. Load reductions associated with these efforts are calculated based on methods described in the MRP and are reported in Section C.10.c. of individual San Mateo County Permittee Annual Reports.

5. **Direct Discharge Programs**

   To-date, San Mateo County Permittees have not submitted or implemented an optional direct discharge plan as outlined in the MRP.

Trash Hot Spot Cleanup and Assessment Guidance

Provision C.10.c.i. of the MRP requires Permittees to clean up trash hot spots to a level of "no visual impact" at least annually over the permit term. To assist Permittees in meeting this requirement, SMCWPPP developed the necessary tools (i.e., guidance memorandum, Trash Hot Spot Cleanup Data Collection Form, and Trash Hot Spot Activity Reports) used to report trash hot spot assessment and cleanup activities conducted during the reporting period. Trash Hot Spot Activity Reports for each Permittee are included in individual San Mateo County Permittee Annual Reports.

During FY 2019/20, San Mateo County Permittees continued conducting annual cleanups and assessments required by the MRP. Results from this year's annual cleanups indicated that a total of 47 trash hot spot assessments and cleanups were conducted within San Mateo County Permittee jurisdictions. Approximately 116 cubic yards of trash was removed from these hot spots during FY 2019/20.[1] The timing of annual assessments and cleanups vary among hot spots due to the location of the hot spot, potential for natural resource impacts, crew availability, and other site-specific factors.

BASMAA Final Receiving Water Trash Monitoring Report

Permit Provision C.10.b.v requires public agencies to develop, submit and test a Receiving Water Trash Monitoring Program Plan (Trash Monitoring Plan). In July 2017, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted the first iteration of the Trash Monitoring Plan to Water Board staff for review and comment. The Final Trash Monitoring Plan that addressed all comments was submitted to Water Board staff in October 2017. Implementation of the Trash Monitoring Plan represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were applied during the MRP 2.0-specified timeframe of October 2017 to July 2020.

[1]Only hot spot cleanups and assessments conducted in compliance with MRP provision C.10.b.iii. are included in this estimate. Some SMCWPPP San Mateo County Permittees conduct cleanups at trash hot spots more frequently than the MRP-required annual cleanup, and/or at more sites than the MRP requires. See Section 10, C.10.e. of San Mateo County Permittee Annual Reports for additional information.

The results of the testing phase of the Trash Monitoring Plan were submitted to the Water Board as a Final Report on July 1, 2020. The Final Report provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020. Monitoring Plan objectives and scientific monitoring questions outlined in the Trash Monitoring Plan were used to guide the evaluation of trash monitoring and assessment data results presented in the Final Report.

Monitoring Questions

1. Are significantly strong correlations observed between qualitative and quantitative methods?
2. What is the current level of trash deposited in flowing waterbodies in the entire MRP area?
3. What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
4. Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
5. What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
6. Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

The Trash Monitoring Plan primarily focuses on two types of monitoring designs: 1) probabilistic (randomly) selected monitoring sites that are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area; and 2) targeted sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. The design also includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to San Francisco Bay.

Two trash assessment tools were developed and applied for the pilot testing phase of the Trash Monitoring Plan. Qualitative trash assessments are visual surveys of trash levels (i.e., conditions). Trained personnel assign a trash condition score from 1 to 12 (12 being the most trash) to a site based on the level of trash that is observed both within the water body and along its banks or shoreline within a defined assessment area. Quantitative trash monitoring entails removing, sorting and measuring the volume of trash that is found within the assessment area at a targeted site. Both quantitative trash monitoring methods and the qualitative assessment methods were used at targeted sites to allow for the comparison of qualitative and quantitative approaches.

A total of 125 urban creek, channel and riverine probabilistic sites throughout the MRP Area were qualitatively assessed for trash. A total of 625 qualitative trash assessments were conducted over five sampling events (three during wet season and two during dry season) between October 2017 and March 2020. A total of 100 targeted sites were selected for both qualitative and quantitative trash assessments. A total of 200 trash assessments were conducted over two sampling events at targeted sites. Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara, and San Mateo Counties.

Key findings included the following:

1. Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both regional and countywide scale. The visual assessment tool is recommended as a valid approach to assess conditions when using volume of trash as the indicator for trash conditions.
2. Regionwide, approximately 77% of the urban stream lengths in the MRP Area exhibit low to moderate levels of trash.
3. Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
4. Seasonality appears to have no effect on trash levels observed/measured at receiving water sites. Trash levels were highly similar between the dry and wet seasons. Storm intensity and frequency did not appear to have an influence on trash levels observed during the wet season.
5. Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with largest proportion of trash observed.

An evaluation of methods and monitoring design used during the pilot-testing phase of the Trash Monitoring Plan is provided in the report. This evaluation provides guidance for potential revisions to methods that may be used to monitor trash in receiving waters.

Coordination with San Mateo Countywide Recycling Committee

To increase coordination among solid waste and recycling programs and San Mateo County Permittee MS4 trash reduction activities, SMCWPPP staff began attending Countywide Recycling Committee meetings in FY 2012/13. SMCWPPP continued to coordinate with the Recycling Committee in FY 2019/20, specifically targeting outreach and coordination with municipally solid waste/recyclables haulers in San Mateo County to reduce trash impacts associated with inadequate waste container management. SMCWPPP staff also coordinated with the Recycling Committee on collection activities, PCBs and demolition regulations, litter reduction and zero waste building design and operation, source reduction policies and zero waste programs.

Litter Work Group

SMCWPPP's Litter Work Group, which was formed in March 2014, coordinates litter reduction efforts among SMCWPPP, waste and stormwater program staff from San Mateo County municipalities, the San Mateo Countywide Recycling Committee, and franchised waste collection and processing companies serving those jurisdictions. The Litter Work Group met one time in fiscal year 2019/20. Attendees included representatives from San Mateo County municipalities (especially stormwater and zero waste program staff), the local hauling community and staff from Rethink Waste (the South Bayside Waste Management Authority) to work on litter reduction efforts both in Santa Clara and San Mateo Counties. The goals of the Litter Work Group include developing a litter reduction program for San Mateo County related to waste issues and specific to its needs, developing BMPs for the waste collection industry, educating the public and those involved with litter control efforts, producing guidance on building design and operation related to litter and waste reduction and coordinating and sharing information with the Zero Litter Initiative in Santa Clara County.

The Litter Work Group completed the following tasks in FY 2019/20:

- Held a Work Group remote meeting on April 27, 2020. Attendance by municipal staff is provided in the FY 2019/20 attendance list (Appendix 10). In addition to municipal staff, attendees included staff from Rethink Waste, Recology - San Mateo County and South San Francisco Scavenger Company.
- Provided support to a single-use plastic foodware effort coordinated by Thrive, a San Mateo County non-profit organization that brings together experts on various important issues affecting county residents, businesses and municipalities. The effort is a three phase multi-year campaign to identify the problems with single-use plastic foodware, strategies for reducing the problems and actions that can be taken locally. https://www.thrivealliance.org/env-reduce-rethink
- Started developing a Sampling and Analysis Plan (SAP) for conducting a trash characterization study in San Mateo County. The purpose of the trash study is to evaluate the effectiveness of existing single-use carryout plastic bag and EPS food & beverage ware ordinances and filling information gaps on the dominant types of trash in stormwater in San Mateo to inform future source control measures in San Mateo County. The SAP will include a summary of existing information on trash types in stormwater, specific management questions that will be addressed via the SAP, monitoring site locations, sampling frequencies, a trash characterization plan, and data analysis techniques that will be employed.
- Continued to distribute the report on *Franchise Agreement Best Practices for Litter Reduction*. Provided technical support for Rethink Waste's franchise agreement with Recology of San Mateo County.
- Finalized and distributed the *New Development Projects Litter Reduction Fact Sheet* (Appendix 10), which summarizes the best practices of the *Litter Reduction Toolkit for Multi-family Dwellings* (Toolkit). The fact sheet was produced for building and planning permit counter staff to distribute to professionals in the design and construction sector. It highlights the most important aspects of the Toolkit and can be customized by the jurisdiction to reiterate the local requirements for development permits and conditions of approval. It references documents developed by SMCWPPP and other agencies for reducing litter and waste at existing and new multi-family residential properties in San Mateo County. The fact sheet and Toolkit are posted on the Countywide Program's website (www.flowstobay.org/preventing-stormwater-pollution/in-my-place-of-business/property-managers/).
- Coordinated with Caltrans on trash capture efforts, including the installation of trash full-capture systems through cooperative implementation agreements.
- Coordinated litter reduction action and policy development with the Zero Litter Initiative from the Santa Clara Valley.
- Coordinated with SMCWPPP's PIP Subcommittee on public outreach efforts targeting litter reduction.
- Developed the FY 2019/20 Litter Work Group Work Plan (included in Appendix 10) which includes the following tasks:
    - Supporting ongoing Litter Work Group meetings;
    - Coordinating and facilitating a 5th Litter Roundtable on the results of the trash characterization study and coordination with franchised waste haulers and transportation agencies;

- Finalizing and implementing the Sampling and Analysis Plan (SAP) for conducting a trash characterization study which assesses the types of trash found in stormwater and informing future source control actions;
- Assisting SMCWPPP's PIP Subcommittee with outreach efforts to reduce litter; and
- Conducting other countywide coordination efforts.

Identification of Existing, Planned and Potential Locations for Trash Full Capture Systems Mutually Beneficial to San Mateo County Permittees and Caltrans

On February 13, 2019, the Regional Water Board adopted a Cease and Desist Order (CDO) against Caltrans, requiring it to significantly increase the rate and extent of control measure implementation to address trash discharges from its right-of-way (ROW). To meet the CDOs required targets, Caltrans is attempting to identify trash full capture systems that would be mutually beneficial to Caltrans and MRP Permittees. In an effort to assist Caltrans in identifying these systems, on April 24, 2019, Regional Water Board staff requested that all MRP Permittees identify the following:

- Mapped drainage areas of municipal jurisdiction that abut Caltrans ROW; and
- A list of already completed, planned, or potential projects in municipal drainage areas that abut Caltrans ROW that control or would control trash from the adjacent Caltrans ROW.

In response to this request, SMCWPPP conducted a preliminary analysis and worked with San Mateo County Permittees to develop a list and series of maps illustrating completed, planned, and potential trash full capture projects in municipal drainage areas in San Mateo County that also address trash in stormwater that is generated on Caltrans ROW. The list included the following preliminary information:

- Estimated Caltrans ROW addressed by San Mateo County Permittees' existing or planned Trash Capture Systems (large and small);
- Whether the Permittee has an existing Cooperative Implementation Agreement with Caltrans on Trash Capture System(s);
- Caltrans ROW within Permittee boundaries that is not addressed by existing systems;
- Estimated Caltrans ROW that may be addressed by potential (future) trash capture systems and should be evaluated further; and
- San Mateo County Permittee contact Information.

This information was submitted to Regional Water Board staff in June 2019, in response to the request.

In FY 2019/20, San Mateo County Permittees with support from SMCWPPP Program staff, continued to discuss potential cooperative agreements and reimbursements with Caltrans for existing, planned and potential full capture systems that are mutually beneficial to Caltrans and San Mateo County Permittees. A number of meetings between Caltrans and SMCWPPP Permittees were coordinated by SMCWPPP in an effort to continue the discussion. This resulted in at least one project being included for a cooperative implementation agreement with Caltrans.

FUTURE ACTIONS

FY 2020/21 activities that are planned by SMCWPPP to assist San Mateo County Permittees comply with MRP requirements in Provision C.10 include the following:

- Continued facilitation of SMCWPPP Trash Subcommittee meetings;
- Continued implementation of the SMCWPPP trash assessment strategy designed to demonstrate progress towards MRP trash load reduction goals;
- Continued maintenance of the SMCWPPP online OVTA database;
- Continued support for long-term plan implementation and control actions for trash management;
- Continued calculation and reporting on trash load reductions for each San Mateo County Permittee;
- Continued calculation and reporting on the amount and types of trash removed via creek and/or shoreline cleanups required by the MRP;
- Continued update/revision of trash generation and full capture system maps and GIS data layers in preparation for the FY 2019/20 Annual Report submittal;
- Continued implementation of the Litter Work Group FY 2019/20 Work Plan tasks, including supporting ongoing Litter Work Group meetings, conducting the 5th Litter Roundtable, developing a sampling and analysis plan for assessing the types of trash found in stormwater, and informing future source control actions;
- Continued coordination and information sharing with the SMCWPPP PIP Subcommittee on countywide litter reduction efforts;
- Continued coordination and information sharing with the Zero Litter Initiative in Santa Clara County;
- Continued implementation of the Sampling and Analysis Plan (SAP) for conducting a trash characterization study in San Mateo County;
- Receiving water monitoring data scoring/collection training for municipal staff;
- Continued coordination with Caltrans for trash capture device design review, purchase, installation, and maintenance agreements; and
- Continued coordination with the New Development Subcommittee (and State Water Resources Control Board) on trash load reduction credits for LID facilities.

SECTION 11
C.11 MERCURY CONTROLS

INTRODUCTION

MRP Provision C.11 Mercury Controls implements stormwater runoff-related actions described in the San Francisco Bay mercury Total Maximum Daily Load (TMDL) water quality restoration program. SMCWPPP performs a variety of activities to address mercury in stormwater runoff in compliance with MRP Provision C.11. Some of this work is accomplished through participation in BASMAA regional projects.

Efforts that address PCBs in addition to mercury are described in this section rather than Section 12 (PCBs Controls). Section 12 focuses on efforts that address PCBs only.

IMPLEMENTATION OF MRP PROVISIONS

C.11/12.a. Implement Control Measures to Achieve Mercury/PCBs Load Reductions

Efforts by SMCWPPP and San Mateo County Permittees to address MRP Provisions C.11/12.a., Implement Control Measures to Achieve Mercury/PCBs Load Reductions, are described below and in a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

C.11/12.b. Assess Mercury/PCBs Load Reductions from Stormwater

MRP Provisions C.11/12.b., Assess Mercury/PCBs Load Reductions from Stormwater, required Permittees to submit in their 2015/16 Annual Report for Executive Officer approval an assessment methodology. The purpose of the assessment methodology is to quantify in a technically sound manner mercury and PCBs loads reduced through implementation of a variety of pollutant controls, including pollution prevention, source control, and stormwater runoff treatment measures such as green infrastructure. SMCWPPP and San Mateo County municipalities helped develop the assessment methodology through participation in a BASMAA regional project. The methodology developed via the BASMAA regional project is referred to as the Interim Accounting Methodology and has been approved by the Executive Officer of the Regional Water Board.

Beginning with the FY 2016/17 Annual Report, Permittees are required to report annually the mercury and PCBs loads reduced in stormwater runoff. Permittees are required to use the approved assessment methodology to demonstrate cumulative pollutant loads reduced from each control measure implemented and progress toward achieving the load reductions required this permit term.

SMCWPPP is tracking all existing and planned control measures that should result in pollutant load reduction credits towards meeting the San Mateo County portion of the PCBs and mercury TMDL

wasteload allocations and MRP 2.0 load reduction requirements. All existing controls that commenced or were enhanced in about 2005 or later are assumed to reduce stormwater runoff pollutant loads relative to the baseline loads in the TMDLs. This year was selected because load reductions due to controls fully implemented before about 2005 were already accounted for in the TMDL baseline stormwater runoff load estimates.

SMCWPPP has identified selected urban catchments with potential pollutant source areas, which are referred to as Watershed Management Areas (WMAs). The WMAs identified in San Mateo County and the associated control measures currently implemented within these WMAs are described in SMCWPPP's FY 2018/19 Annual Report. An update of this information is summarized in Appendix 11, Table App11-1 (*PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee, September 30, 2020*). In addition, each WMA and the GI/LID facilities within it are shown in maps in Appendix 11, Figures App11-1 through App11-19. The Cities of Half Moon Bay and Pacifica drain to the Pacific Ocean and therefore were not included, since this plan is focused on the PCBs and mercury TMDLs for San Francisco Bay.

The estimated mercury loads reduced by San Mateo County Permittees from July 1, 2013 through June 30, 2020 (i.e., FY 2013/14 through FY 2019/20) are shown in Table 11-1. Table 11-2 shows the mercury loads reduced, itemized by control measure category. Supporting data for Tables 11-1 and 11-2 are included in Appendix 11, Table App11-1.

MRP 2.0 requires that an at least 6 grams/year mercury load reduction is achieved in San Mateo County via GI by June 30, 2020. Table 11-2 shows that from FY 2013/14 through FY 2019/20,[1] a 535 grams/year mercury load reduction has been realized via GI (parcel-based GI/LID and green streets) in the County and thus this requirement has been fulfilled.

In addition, the estimated mercury loads reduced to-date by all Permittees during the MRP 2.0 compliance period (FY 2013/14 through FY 2019/20) are described in a document entitled *PCBs and Mercury Regional Loads Reduced during MRP 2.0, September 30, 2020* (included in Appendix 11).

Finally, San Mateo County municipalities participate in San Mateo County Health Department's Household Hazardous Waste (HHW) Program and Very Small Quantity Generator Business Collection (VSQG) Program. The estimated mass of mercury collected in FY 2014/15 through FY 2019/20 via these programs is shown in Table 11-3. It should be noted that these mass estimates are not directly comparable to pollutant load reductions in stormwater runoff discharges. The HHW Program canceled all collections from March 12 through June 3, 2020 due to the COVID-19 Shelter-in-Place order. This resulted in a relatively lower number of devices and associated mass of mercury collected in FY 2019/20.

[1]Based on language in the MRP and discussions with Regional Water Board staff, it is assumed that applicable controls implemented from July 1, 2013 through the end of the permit term should result in credit towards the MRP 2.0 mercury and PCBs load reduction requirements.

Table 11-1. Estimates of mercury loads reduced by San Mateo County Permittees from July 1, 2013 through June 30, 2020 (FY 2013/14 through FY 2019/20).

Permittee	Mercury Loads Reduced (g/year)							
	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Cumulative Load Reduced
Atherton	0.2	0	0	0	0	0	0.7	**0.9**
Belmont	3.1	0	0.01	0.07	0.8	4	0.08	**9**
Brisbane	16	0	0	0	37	0	0	**54**
Burlingame	0.7	1	0.09	10	0.8	0.5	0.3	**14**
Colma	0.001	0.5	0	0	2	0.4	0	**2**
Daly City	0.6	1	0	3	15	0.6	0	**21**
East Palo Alto	34	4	0.2	5	0	0	0	**43**
Foster City	3	0	0.8	0	0	7	0	**11**
Hillsborough	0	0	0.02	0	0	0	0	**0.02**
Menlo Park	33	2	21	9	56	0.4	5	**128**
Millbrae	4	0	0	0	15	0	0.08	**19**
Portola Valley	0	0	0	0	0.3	0	0	**0.3**
Redwood City	7	14	8	5	6	15	0	**56**
San Bruno	2	0	7	0	0	0	0.3	**10**
San Carlos	30	0	11	0	15	0	3	**60**
San Mateo City	24	7	2	2	0.8	1	18	**56**
San Mateo County	10	5	2	0.4	0.8	0	2	**21**
South San Francisco	67	22	0	4	16	24	28	**160**
Woodside	0	0	0	0	0	0	0	**0**
Total	**236**	**58**	**54**	**39**	**166**	**54**	**57**	**663**

Table 11-2. Estimates of mercury loads reduced in San Mateo County by control measure category from July 1, 2013 through June 30, 2020 (FY 2013/14 through FY 2019/20).

Control Measure Category		Mercury Loads Reduced (g/year)							
		FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	Cumulative Load Reduced
Source Property Identification and Referral	270 Industrial Road / 495 Bragato Road, San Carlos					4			**4**
	977 and 1007/1011 Bransten Road, San Carlos					1			**1**
GI and Other Stormwater Treatment Controls	Parcel-based GI/LID (i.e., new and redevelopment projects)	136	57	53	31	145	53	55	**530**
	Green Streets	0.08	0.7	0.5	0.1	0.4	0.4	3	**5**
	Large Full Trash Capture Systems[3]	56				15			**71**
Enhanced O&M Measures[4]		44	0.4	0.01	7				**52**
Diversion to POTW[4]									**0**
Total		**236**	**58**	**54**	**39**	**166**	**54**	**57**	**663**

1. Load Reduced = (Source Property Area (acre)) x (1.033 – 0.215 (g/acre/year)).
2. For parcel-based projects, Load Reduced = (Project Area (acre)) x (Existing Yield – 0.033 (g/acre/year)). For green street or regional retrofit projects, Load Reduced = (Project Drainage Area (ac)) x (area-weighted mercury yield (g/acre/year)) x 70% (assumed efficiency factor for green street projects).
3. Load Reduced = (Project Drainage Area (acre)) x (area-weighted mercury yield (g/acre/year)) x 20% (assumed efficiency factor for large full trash capture).
4. Loads reduced = (Project Drainage Area (acres)) X (area-weighted mercury yield (g/acre/year) x 2% (assumed efficiency factor for enhanced inlet cleanouts twice annually).

Table 11.3. Estimated mercury mass collected via the San Mateo County Health Department's Household Hazardous Waste (HHW) and Very Small Quantity Generator Business Collection (VSQG) program.

Mercury Containing Device/Equipment	FY 2014/15		FY 2015/16		FY 2016/17		FY 2017/18		FY 2018/19		FY 2019/20	
	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)	Total Amount of Devices Collected	Estimated Mass of Mercury Collected (kg)
Fluorescent Lamps (linear ft)[1,2]	25,532	0.05	89,662	0.2	93,896	0.2	125,582	0.3	107,269	0.2	77,004	0.2
CFLs (each)[3]	1,881	0.01	17,211	0.08	17,354	0.08	18,689	0.08	18,513	0.08	10,014	0.05
Thermostats (each)[4]	26	0.1	12	0.05	10	0.04	11	0.04	15	0.06	8	0
Thermometers (each)[5]	313	0.2	13	0.01	19	0.01	0	0	25	0.02	6	0
Switches (each)	18	0.05	0	0	0	0	0	0	26	0.07	0	0
Total Mass of Mercury Collected (Kg)		**0.4**		**0.3**		**0.3**		**0.4**		**0.5**		**0.2**

C.11/12.c. Plan and Implement Green Infrastructure to Reduce Mercury/PCBs Loads

Permittees are required to submit in this FY 2019/20 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate.

Permittees are also required to submit in this FY 2019/20 Annual Report a Reasonable Assurance Analysis (RAA) to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. The MRP requires this submittal to include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the RAA.

San Mateo County Permittees have fulfilled the above MRP requirements via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

C.11/12.d. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

MRP Provisions C.11/12.d require that Permittees prepare a plan and schedule for mercury and PCBs control measure implementation and a corresponding RAA demonstrating quantitatively that sufficient control measures will be implemented to attain the mercury and PCBs TMDL wasteload allocations by 2028 and 2030, respectively. The plan must:

1. Identify all technically and economically feasible mercury and PCBs control measures to be implemented (including green infrastructure projects).
2. Include a schedule according to which these technically and economically feasible control measures will be fully implemented.
3. Provide an evaluation and quantification of the mercury and PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

San Mateo County Permittees have fulfilled this requirement via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

C.11.e./C.12.h. Risk Reduction Program

MRP Provisions C.11.e and C.12.h require Permittees to conduct an ongoing risk reduction program to address public health impacts of mercury and PCBs in San Francisco Bay fish. The fish risk reduction program is required to include actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The program is required to have the potential to reach 3,000 individuals annually (Bay Area-wide total for all MRP 2.0 Permittees) who are likely consumers of San Francisco Bay-caught fish. Permittees

are required to report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish.

SMCWPPP is assisting San Mateo County municipalities comply with the risk reduction program requirements by coordinating with and reporting on the Fish Smart program conducted by San Mateo County Environmental Health Services (EHS). Fish Smart builds upon the San Francisco Bay Fish Project (sfei.org/sfbfp#sthash.eOcfwrhA.dpbs), a risk reduction framework developed regionally in the previous permit term. The Fish Project funded Bay Area community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities about how to reduce their exposure to mercury and PCBs from consuming San Francisco Bay fish.

During FY 2019/20, EHS conducted a variety of activities that target at-risk populations (e.g., subsistence fisherman) via the Fish Smart program. These efforts are summarized in the following sections.

Sign Maintenance and Installation

There are currently 16 Fish Smart program signs posted in San Mateo County. In FY 2019/20, EHS staff maintained signs posted along the San Francisco Bay shore (e.g., at fishing piers) in the Cities of Brisbane, South San Francisco, San Mateo, Burlingame, and Redwood City. One sign was replaced at the Brisbane Lagoon due to the previous sign and pole being knocked down (Figure 11-1).

Figure 11-1. Fish Smart Sign replacement at Brisbane Lagoon, installed January 2020.

Community Outreach

In FY 2019/20, EHS continued to promote the Fish Smart program using the California Office of Environmental Health Hazard Assessment's (OEHHA) fish consumption advisories in various languages through flyer distribution at community events, bait and tackle stores, harbormaster offices, and through Women, Infant, and Children (WIC) community offices. EHS also provided flyers to Public Information and

Participation (PIP) members at a SMCWPPP quarterly meeting which had representatives from many cities. There were 1,075 flyers in various languages distributed at 20 locations within the County. In addition to Coast and Bay consumption advisory outreach, EHS continued to promote the Monterey Bay Aquarium's Seafood Watch Guides at community outreach events and through a social media post. The Seafood Watch Guides help consumers and businesses choose seafood that is fished or farmed in ways that support a healthy ocean.

Figure 11-2. Pacifica Fog Fest attendee participating in EHS's interactive fishing game (image posted on Twitter in October 2019).

Due to the COVID-19 pandemic, in person outreach at community events was significantly hindered in FY 2019/20 as many events were canceled. EHS staff was still able to speak with 1,128 residents at 4 events where information on the Fish Smart in San Francisco Bay, California Coast, and Monterey Bay Aquarium's Seafood Watch Programs was provided:

1. Pacifica - Fog Fest (Figure 11-2)
2. San Mateo – City of San Mateo's Health and Wellness Fair
3. Redwood City – Cañada College Wellness Fair
4. Daly City – District 5 Health Fair

Social Media and Website

In FY 2019/20, EHS continued to maintain the smchealth.org/fishsmart website, which had 4,212 page views total, of which 3,270 were new visitors to the page. There were 942 returning page visitors. In February of 2020, EHS added a sign-up form to the website for people to receive email updates on the Program. In four months, through June 30th, 2020, 66 people signed up to receive the updates. The COVID-19 pandemic led to a decrease in social media posts compared to the previous fiscal year as the County's health-related social media pages were restricted for several months to only COVID-19 related content. Before the pandemic, EHS created three social media posts and shared them on both Facebook and Twitter for a total of six posts (see Figure 11-3 for an example post). One of the posts was also shared to over 124,000 households countywide on Nextdoor.com. Posts combined had a reach or impression total of 16,961, depending on the platform. Facebook reach is defined as the number of people who saw

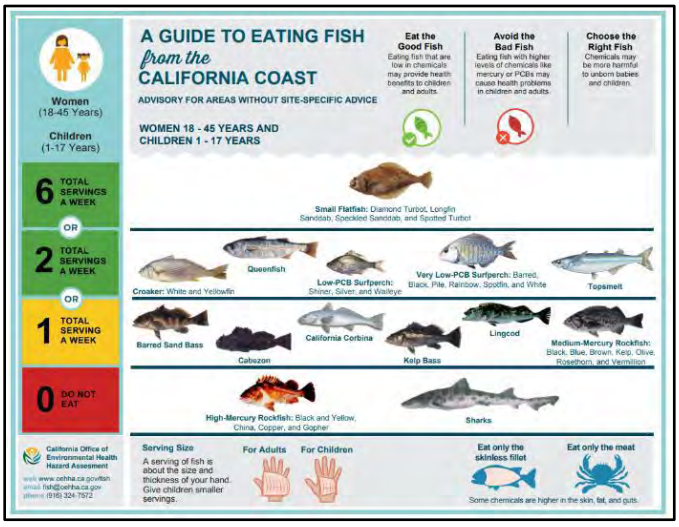

Figure 11-3. Social media post example.

the posts at least once. Twitter impressions are defined as the number of times that a given tweet has been viewed on the Twitter platform. Combined, the posts had 1,250 engagements. Engagements on Facebook are defined as actions such as reacting to, commenting on, or sharing the post, viewing a photo or video, or clicking on a link. Engagements on Twitter are defined as when a link in the post was clicked on, retweeted, replied to, or liked. Engagements on Nextdoor.com are defined as thanks and replies. The Facebook posts were geotargeted to individuals with fishing interests within San Mateo County.

Surveys

On February 13th, 2020, 13 surveys were conducted at the Pacifica Pier to discuss the OEHHA fish consumption guidelines in exchange for a $5 Starbucks gift card. Results showed that 92% of respondents eat the fish they caught and shared at least some types of the fish they caught with their friends or family. Some of the most popular fish respondents eat include California Halibut, Striped Bass, Surfperch, Brown Rockfish, and the Red Rock Crab. When asked if they knew that certain fish were not safe to eat due to high mercury and PCB levels, 84% indicated they knew. Twelve out of the 13 respondents provided their age, gender, ethnicity, and languages spoken. All were male expect for one female. Three out of 12 were in their 20s, one was in their 30s, five in their 40s, 2 in their 50s, and one was in their 60s. Of the 12 that provided demographic information, three self-identified as Caucasian, three Latino, two Asian, one Chinese, one American, and one Jamaican. In addition, there were three people who declined to speak with us, one of which indicated they did not speak English, another because they were busy, and the third person did not respond at all when spoken to. People who took the survey were handed the OEHHA guideline flyer after the survey was complete to review at their leisure. Of the people surveyed, 30% provided their email address to stay updated on new guidelines that come out. From this survey EHS learned that people who fish at the Pacifica Pier have a wide demographic background. Because most who catch fish also feed the fish to friends and families, and because many of the popular fish eaten do have high levels of mercury and PCBs, continued education on this matter is important, especially for the most sensitive population – women of child bearing age and children. Another observation was that many of the fishermen are friends, so word of mouth is suspected to be very helpful when getting the Fish Smart program message out.

Effectiveness Evaluation

Table 11-4 summarizes accomplishments of the Fish Smart program from FY 2015/16 through FY 2019/20. Various quantitative measures of outreach and outcomes are underlined (e.g., numbers of brochures distributed, numbers of people interacted with at outreach events, numbers of people receiving electronic newsletters, and social media postings impressions and reach). The summary illustrates the Fish Smart program's success over the past several years in providing outreach about potential health impacts of consuming certain types of fish caught in San Francisco Bay. It is likely these efforts have led to reduced health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families.

In addition, as discussed in the previous section, on February 13th, 2020, 13 surveys were conducted at the Pacifica Pier to discuss the OEHHA fish consumption guidelines. Results showed that 92% of respondents eat the fish they caught and shared at least some types of the fish they caught with their friends or family. When asked if they knew that certain fish were not safe to eat due to high mercury and PCB levels, 84% indicated they were aware of this. This result suggests the Fish Smart program's outreach or other related risk reduction information has reached most members of the small group surveyed. However, the representativeness of the group surveyed and the extent that this result could be extrapolated to a larger population have not been evaluated. EHS plans to continue to conduct surveys in

FY 2020/21 to better understand Bay and Coast fish consumption patterns and consumption advisory knowledge.

Table 11-4. Summary of Fish Smart program accomplishments.

Fiscal Year	Summary of Accomplishments
2015/16	During FY 2015/16, CEH conducted the following activities that target at-risk populations (e.g., subsistence fisherman) via its Fish Smart program: ▪ Maintained signs that were previously posted by CEH along the Bay's shore (e.g., at fishing piers) in most cities in San Mateo County. ▪ Continued to distribute educational materials (i.e., a Fish Project brochure entitled "Guide to Eating Fish and Shellfish from San Francisco Bay") at targeted locations: • CEH provided 100 brochures to the San Mateo Medical Center (a county health services clinic). • CEH provided 50 brochures to Save Our Shores, a non-profit that works with boaters. • CEH displayed an example sign and provided brochures at the County Fair and interacted there with about 300 persons regarding Fish Smart and other CEH programs. ▪ Conducted a "train the trainer" effort by presenting risk reduction information to nurses with the San Mateo County Health System, including nurses who serve appropriate communities. ▪ Presented risk reduction information and handed out brochures at code enforcement and food inspection team meetings. ▪ Posted an entry dated June 7, 2016 about Fish Smart on the CEH blog which has been viewed 20 times based on a web page analytic report.
2016/17	During FY 2016/17, CEH conducted the following activities that target at-risk populations (e.g., subsistence fisherman) via its Fish Smart program: ▪ Maintained signs that were previously posted by CEH at 12 locations along the Bay's shore (e.g., at fishing piers) in the Cities of Brisbane, Burlingame, Redwood City, San Mateo, and South San Francisco. ▪ Provided new signs to the North Fair Oaks Community Center, Docktown Marina, and 9 fishing supply stores ▪ Continued to distribute educational materials (i.e., a Fish Project brochure entitled "Guide to Eating Fish and Shellfish from San Francisco Bay") at targeted locations: • CEH provided 50 brochures each to 4 marinas in San Mateo County. • CEH provided 50 brochures to Save Our Shores, a non-profit that works with boaters. • CEH attended 6 community health fairs and the San Mateo County Fair, where brochures were provided and where a spinning wheel game was played. Over 1,500 people were reached regarding Fish Smart and other CEH programs. • CEH provided brochures to 11 fishing supply stores in San Mateo County. ▪ Included a Fish Smart article in the Pollution Prevention Post Newsletter which was distributed to over 5,000 people electronically, and 800 people via hard copy. ▪ Presented the Fish Smart program to 14 San Mateo County employees from various departments. ▪ Posted an entry dated March 28th, 2017 about Fish Smart on the CEH blog which has been viewed 17 times based on a web page analytic report. ▪ Posted 3 social media posts on the program totaling 16,517 impressions combined. ▪ Maintained the smchealth.org/fishsmart webpage which received 538 views over a 10-month period

Fiscal Year	Summary of Accomplishments
	Cumulatively, CEH had over 23,000 electronic or in person Fish Smart program impressions for FY 2016-17.
2017/18	During FY 2017/18, CEH conducted the following activities that target at-risk populations (e.g., subsistence fisherman) via its Fish Smart program: ▪ Maintained signs that were previously posted by CEH at 11 locations along the Bay's shore (e.g., at fishing piers) in the Cities of Brisbane, Burlingame, Redwood City, San Mateo, and South San Francisco. ▪ Printed Fish Project brochure "Guide to Eating Fish and Shellfish from San Francisco Bay" in English, Spanish, Chinese, and Tagalog. ▪ Continued to distribute educational materials (i.e., a Fish Project brochure entitled "Guide to Eating Fish and Shellfish from San Francisco Bay") at targeted locations: • CEH provided 50 brochures each to 4 marinas in San Mateo County. • CEH attended 17 community health fairs, events, and the San Mateo County Fair, where brochures were provided and where a spinning wheel game was played. Over 4,000 people were reached regarding Fish Smart and other CEH programs. • CEH created a Fish Smart fishing game where children catch fish with a fishing pole and identify if the fish is safe or not safe to each in exchange for a prize. ▪ Presented the Fish Smart program to 30 San Mateo County Family Health Division Women, Infant, and Children (WIC) employees and provided brochures to them to distribute to their clients. ▪ Posted 4 social media posts on the program totaling 4,114 impressions combined. ▪ Maintained the smchealth.org/fishsmart webpage which received 3,800 views over a 11-month period. Cumulatively, CEH had nearly 12,000 electronic or in person Fish Smart program impressions for FY 2017/18.
2018/19	During FY 2018/19, CEH conducted the following activities that target at-risk populations (e.g., subsistence fisherman) via its Fish Smart program: ▪ EHS staff maintained signs posted along the San Francisco Bay shore (e.g., at fishing piers) in the Cities of Brisbane, South San Francisco, San Mateo, Burlingame, and Redwood City. In addition, two new Fish Smart in San Francisco Bay signs were installed at locations where fishing has been observed. ▪ The Office of Environmental Health Hazard Assessment (OEHHA) updated its statewide advisory for the California Coast in FY 2018/19. EHS provided signs in English, Spanish, Tagalog, and Chinese to City of Pacifica staff to post at the Pacifica Pier and printed the advisories in four languages to distribute in flyer format. ▪ EHS staff spoke with 2,500 residents at 10 events where information on the Fish Smart in San Francisco Bay, California Coast, and Monterey Bay Aquarium's Seafood Watch Programs was provided. ▪ Maintained the smchealth.org/fishsmart webpage which received over 2,700 views. ▪ EHS created 10 social media posts about safe fish consumption guidelines for the Bay and Ocean. Posts combined totaled over 110,000 impressions (number of times a post was on-screen), and over 9,800 engagements (e.g., a link in the post was clicked on). ▪ One social media post about surfperch reached over 16,000 people and had over 500 shares.

Fiscal Year	Summary of Accomplishments
2019/20	During FY 2019/20, CEH conducted the following activities that target at-risk populations (e.g., subsistence fisherman) via its Fish Smart program: ▪ EHS staff maintained signs posted along the San Francisco Bay shore (e.g., at fishing piers) in the Cities of Brisbane, South San Francisco, San Mateo, Burlingame, and Redwood City. One sign was replaced at the Brisbane Lagoon due to the previous sign and pole being knocked down. ▪ EHS continued to promote the Fish Smart program using the California OEHHA fish consumption advisories in various languages through flyer distribution at community events, bait and tackle stores, harbormaster offices, and WIC community offices. 1,075 flyers in various languages were distributed at 20 locations within the County. ▪ EHS staff spoke with 1,128 residents at 4 events where information on the Fish Smart in San Francisco Bay, California Coast, and Monterey Bay Aquarium's Seafood Watch Programs was provided. ▪ Maintained the smchealth.org/fishsmart webpage which received 4,212 views. ▪ EHS created three social media posts and shared them on both Facebook and Twitter for a total of six posts. One of the posts was also shared to over 124,000 households countywide on Nextdoor.com. Posts combined had a reach or impression total of 16,961, depending on the platform. Combined, the posts had 1,250 engagements. ▪ On February 13th, 2020, 13 surveys were conducted at the Pacifica Pier to discuss the OEHHA fish consumption guidelines. Results showed that 92% of respondents eat the fish they caught and shared at least some types of the fish they caught with their friends or family. When asked if they knew that certain fish were not safe to eat due to high mercury and PCB levels, 84% indicated they were aware of this.

FUTURE ACTIONS

SMCWPPP activities that are planned for FY 2020/21 to assist San Mateo County municipalities comply with MRP requirements in Provisions C.11/12. to reduce mercury and PCBs loads in stormwater runoff and report on the load reductions are described in the separate report mentioned earlier (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

During FY 2020/21, SMCWPPP also plans to continue to assist San Mateo County municipalities comply with the MRP risk reduction program requirements by coordinating with and reporting on the Fish Smart program conducted by EHS:

- EHS will continue to maintain signs and scout new locations to place signs to reach subsistence fishermen. Fish consumption messaging via social media will continue. Discussions with fishermen and their families at local events will continue as well as providing consumption guidelines to marinas and targeted retail and community locations. EHS also plans to continue to conduct surveys in FY 2020/21 to better understand Bay and Coast fish consumption patterns and consumption advisory knowledge.
- SMCWPPP will continue to work with EHS staff to document the risk reduction program and provide an update in the SMCWPPP FY 2020/21 Annual Report.

SECTION 12
C.12 PCBS CONTROLS

INTRODUCTION

MRP Provision C.12, PCBs Controls, implements stormwater runoff-related actions required by the San Francisco Bay PCB Total Maximum Daily Load (TMDL) water quality restoration program. SMCWPPP performs a variety of activities to address PCBs in stormwater runoff in compliance with MRP Provision C.12. Many of these activities address mercury in addition to PCBs and are described in the previous chapter (Section 11, Mercury Controls) rather than this section.

IMPLEMENTATION OF MRP PROVISIONS

C.11/12.a. Implement Control Measures to Achieve Mercury/PCBs Load Reductions

Efforts by SMCWPPP and San Mateo County Permittees to address MRP Provisions C.11/12.a., Implement Control Measures to Achieve Mercury/PCBs Load Reductions, are described below and in a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

C.11/12.b. Assess Mercury/PCBs Load Reductions from Stormwater

MRP Provisions C.11/12.b., Assess Mercury/PCBs Load Reductions from Stormwater, required Permittees to submit in their 2015/16 Annual Report for Executive Officer approval an assessment methodology. The purpose of the assessment methodology is to quantify in a technically sound manner mercury and PCBs loads reduced through implementation of a variety of pollutant controls, including pollution prevention, source control, and stormwater runoff treatment measures such as green infrastructure. SMCWPPP and San Mateo County municipalities helped develop the assessment methodology through participation in a BASMAA regional project. The methodology developed via the BASMAA regional project is referred to as the Interim Accounting Methodology and has been approved by the Executive Officer of the Regional Water Board.

Beginning with the FY 2016/17 Annual Report, Permittees are required to report annually the mercury and PCBs loads reduced in stormwater runoff. Permittees are required to use the approved assessment methodology to demonstrate cumulative pollutant loads reduced from each control measure implemented and progress toward achieving the load reductions required this permit term.

SMCWPPP is tracking all existing and planned control measures that should result in pollutant load reduction credits towards meeting the San Mateo County portion of the PCBs and mercury TMDL wasteload allocations and MRP 2.0 load reduction requirements. All existing controls that commenced or were enhanced in about 2005 or later are assumed to reduce stormwater runoff pollutant loads

07567
7608

relative to the baseline loads in the TMDLs. This year was selected because load reductions due to controls fully implemented before about 2005 were already accounted for in the TMDL baseline stormwater runoff load estimates.

SMCWPPP has identified selected urban catchments with potential pollutant source areas, which are referred to as Watershed Management Areas (WMAs). The WMAs identified in San Mateo County and the associated control measures currently implemented within these WMAs are described in SMCWPPP's FY 2018/19 Annual Report. An update of this information is summarized in Appendix 11, Table App11-1 (*PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee, September 30, 2020*). In addition, each WMA and the GI/LID facilities within it are shown in maps in Appendix 11, Figures App11-1 through App11-19. The Cities of Half Moon Bay and Pacifica drain to the Pacific Ocean and therefore were not included, since this plan is focused on the PCBs and mercury TMDLs for San Francisco Bay.

The estimated PCBs loads reduced by San Mateo County Permittees via all control measures from July 1, 2013 through June 30, 2020 (i.e., FY 2013/14 through FY 2019/20) are shown in Table 12-1. Table 12-2 shows the PCBs loads reduced, itemized by control measure category. As mentioned in Section 11, supporting data for Tables 12-1 and 12-2 are included in Appendix 11, Table App11-1.

MRP 2.0 requires that an at least 15 grams/year PCBs load reduction is achieved in San Mateo County via GI by June 30, 2020. Table 12-2 shows that from FY 2013/14 through FY 2019/20,1 a 42.5 grams/year PCBs load reduction has been realized via GI (parcel-based GI/LID and green streets) in the County and thus this requirement has been fulfilled.

Finally, the estimated PCBs loads reduced to-date by all Permittees during the MRP 2.0 compliance period (FY 2013/14 through FY 2019/20) are described in a document entitled *PCBs and Mercury Regional Loads Reduced during MRP 2.0, September 30, 2020* (included in Appendix 11). The estimated PCBs load reduction across the permit area over this time period is 3,017 g/yr, indicating that the MRP regional performance criterion of 3,000 grams/year of PCBs load reduced by June 30, 2020 has been achieved.[2]

[1]Based on language in the MRP and discussions with Regional Water Board staff, it is assumed that applicable controls implemented from July 1, 2013 through the end of the permit term should result in credit towards the MRP 2.0 mercury and PCBs load reduction requirements.

[2]It is important to note that the MRP allows Permittees to meet the regional criterion as a group – criteria for individual counties would only apply when the regional group criterion was not met.

Table 12-1. Preliminary estimates of PCBs loads reduced by San Mateo County Permittees via all control measures from July 1, 2013 through June 30, 2020 (FY 2013/14 through FY 2019/20).

Permittee	PCBs Loads Reduced (g/year)							
	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	Cumulative Load Reduced
Atherton	0.03	0	0	0	0	0	3	**3**
Belmont	0.4	0	0.002	0.01	0.1	0.4	9	**10**
Brisbane	1	0	0	0	2	0	1	**5**
Burlingame	0.08	0.2	0.01	0.7	0.07	0.07	11	**12**
Colma	0.005	0.06	0	0.0009	0.2	0.06	0.5	**0.9**
Daly City	0.08	0.2	0	0.5	2	0.05	39	**42**
East Palo Alto	4	0.2	0.03	0.4	0	0	11	**16**
Foster City	0.3	0	0.1	0.0005	0.001	0.5	11	**12**
Hillsborough	0	0	0.003	0	0.0005	0	4	**4**
Menlo Park	2	0.2	2	0.6	4	0.1	12	**21**
Millbrae	0.5	0	0	0	2	0	8	**10**
Portola Valley	0	0	0	0	0.04	0	2	**2**
Redwood City	0.7	1	0.7	0.5	0.6	1	28	**33**
San Bruno	0.3	0	0.5	0	0	0	15	**16**
San Carlos	2	0	0.7	0	21	0	11	**35**
San Mateo City	3	0.5	0.3	0.2	0.07	0.1	38	**41**
San Mateo County	1	0.4	0.3	0.05	0.09	0	23	**25**
South San Francisco	5	1	0	0.3	1	2	25	**34**
Woodside	0	0	0	0	0	0	2.06	**2**
Total	**21**	**4**	**4**	**3**	**34**	**4**	**253**	**323**

Table 12-2. Preliminary estimates of PCBs loads reduced in San Mateo County by control measure category from July 1, 2013 through June 30, 2020 (FY 2013/14 through FY 2019/20).

Control Measure Category		PCBs Loads Reduced (g/year)							
		FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	FY 19/20	Cumulative Load Reduced
Source Property Identification and Referral[1]	270 Industrial Road / 495 Bragato Road, San Carlos					16			**16**
	977 and 1007/1011 Bransten Road, San Carlos					5			**5**
GI and Other Stormwater Treatment Controls	Parcel-based GI/LID (i.e., new & redevelopment projects)[2]	10	4	4	3	11	4	5	**42**
	Green Streets [2]	0.01	0.1	0.07	0.02	0.05	0.06	0.2	**0.5**
	Large Full Trash Capture Systems[3]	7				2			**9**
Enhanced O&M Measures[4]		4	0.06	0.002	0.6				**5**
Manage PCBs in Building Materials								247	**247**
Manage PCBs in Infrastructure									**0**
Diversion to POTW									**0**
Source Controls / Other									**0**
Total		**21**	**4**	**4**	**3**	**34**	**4**	**253**	**323**

1. Load Reduced = (Source Property Area (acre)) x (4.065 – 0.0303 (g/acre/year)).
2. For parcel-based projects, Load Reduced = (Project Area (acre)) x (Existing Yield – 0.0035 (g/acre/year)). For green street or regional retrofit projects, Load Reduced = (Project Drainage Area (ac)) x (area-weighted PCBs yield (g/acre/year)) x 70% (assumed efficiency factor for green street projects).
3. Load Reduced = (Project Drainage Area (acre)) x (area-weighted PCBs yield (g/acre/year)) x 20% (assumed efficiency factor for large full trash capture).
4. Loads reduced = (Project Drainage Area (acres)) X (area-weighted PCBs yield (g/acre/year) x 2% (assumed efficiency factor for enhanced inlet cleanouts twice annually).

C.11/12.c. Plan and Implement Green Infrastructure to Reduce Mercury/PCBs Loads

Permittees are required to submit in this FY 2019/20 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate.

Permittees are also required to submit in this FY 2019/20 Annual Report a Reasonable Assurance Analysis (RAA) to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects. The MRP requires this submittal to include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the RAA.

San Mateo County Permittees have fulfilled the above MRP requirements via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

C.11/12.d. Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations

As described in more detail in Section 11 (C.11 Mercury Controls), MRP Provisions C.11/12.d require that Permittees prepare a plan and schedule for mercury and PCBs control measure implementation and a corresponding RAA demonstrating quantitatively that sufficient control measures will be implemented to attain the mercury and PCBs TMDL wasteload allocations by 2028 and 2030, respectively. San Mateo County Permittees have fulfilled this requirement via development of a separate report (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report.

C.12.e. Evaluate PCBs Presence in Caulks/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way

MRP 2.0 Provision C.12.e requires that Permittees collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. BASMAA has completed a regional investigation that addresses this requirement. SMCWPPP reported on the results of the investigation in its FY 2017/18 Annual Report.

C.12.f. Manage PCB-Containing Materials and Wastes during Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains

MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 parts per

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million or greater in applicable structures[3] at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. A Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its FY 2016/17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.[4]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

- The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
- A method for identifying applicable structures prior to their demolition; and,
- Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff; and,
- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, BASMAA conducted a multi-year regional project to assist MRP Permittees to address Provision C.12.f. The BASMAA project, which began in FY 2016/17 and was completed in March 2019, assisted Permittees in developing local programs to manage PCBs-containing materials during building demolition. It developed guidance materials, tools and training materials and conducted outreach. SMCWPPP actively participated in the project, including providing BASMAA's project manager.

At the outset of the project, a BASMAA Steering Committee was convened to provide project oversight and guidance during the project. The Steering Committee included BASMAA Directors, countywide stormwater program staff, and Permittee staff from various relevant municipal departments. The Steering Committee met periodically throughout the project. In addition, a project TAG, a small balanced advisory group formed from industry, regulatory, and Permittee representatives to provide review and input on selected project work products, was convened. The TAG was comprised of representatives from industry and state/federal regulatory agencies, and Permittees. Other efforts to engage key stakeholders included an industry stakeholder roundtable meeting (August 2017) and two larger stakeholder group meetings (December 2017 and May 2018) that included industry, regulatory and municipal representatives. During FY 2018/19, Permittees tailored the BASMAA products for local use, adopted the program (e.g., via local policy or ordinance), and trained local staff to implement the new program starting July 1, 2019.

[3] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

[4] The City of Clayton in Contra Costa County provided acceptable evidence and is exempt from this provision.

Key BASMAA project deliverables provided to each Permittee to use as appropriate given local procedures and needs included:

- A protocol for pre-demolition building survey for priority PCBs-containing building materials;
- Model language for municipal adoption (e.g., ordinance) of the new program to manage PCBs materials during building demolition and model supporting staff report and resolution;
- CEQA strategy and model notice of exemption;
- Supplemental demolition permit model application materials, including forms, process flow charts, and applicant instructions; and
- An analysis to assist municipalities that pursue cost recovery.

Other project deliverables included:

- A coordination/communication strategy for the project;
- A technical memorandum summarizing any new information & decisions needed by BASMAA at outset, including an annotated table of regulatory drivers and relevant requirements;
- A technical memorandum with the state of the practice for identifying PCBs-containing building materials (developed to inform development of the pre-demolition building survey protocol listed below);
- Industry stakeholder outreach materials and a fact sheet for municipal staff;
- A spreadsheet tool used to develop the prioritized list of potential PCBs-containing building materials that the demolition program will focus on;
- A conceptual approach for an assessment methodology and data collection program to quantify PCBs loads reduced through managing PCBs-containing materials during building demolition.

During FY 2018/19, the BASMAA project concluded by conducting the following outreach and training tasks:

- Prepared training materials for municipal staff on adoption and implementation of the new program;
- Developed outreach materials and a standard presentation to inform industry stakeholders including developers, planning firms, urban planning non-governmental organizations, demolition firms, property owners, property managers, and realtors about the new program to manage PCBs in building materials during demolition;
- Using the above training materials, conducted training workshops (in-person and a webinar) for key municipal and countywide stormwater program staff;
- Conducted a webinar for industry stakeholders; and
- Developed a list of Bay Area opportunities, including contact information and dates, for municipal and/or stormwater program staff to conduct additional outreach to industry stakeholders using the above industry outreach materials.

In addition, during FY 2018/19 and FY 2019/20, San Mateo County and other MRP Permittees worked together through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) to develop a framework to comply with data collection/evaluation and reporting requirements under Provision

C.12.f. As mentioned previously, these requirements include developing an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the new program. The regional process developed includes the following steps:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.[5]
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Permittees began implementing the program on or before July 1, 2019. Appendix 12 includes two documents prepared collaboratively by San Mateo County and other MRP Permittees in compliance with MRP reporting requirements in Provision C.12.f. (3) – (5):

1. Documentation of (a) the number of applicable structures that applied for a demolition permit during the reporting year, and (b) a running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used (*PCBS in Building Materials Management Program – Regional Data Summary, August 20, 2020*).
2. An assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition (*Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program, August 20, 2020*).

[5] Municipalities should require that applicants fill out and certify a Screening Form for every demolition. For non-Applicable Structures, applicants simply check the boxes, certify, and submit to municipality. Then the municipality can authorize the demolition (e.g., issue a demolition permit). In general, municipalities should have a completed and certified Screening Form before authorizing a demolition, unless they are a small community that is exempt or has some other arrangement with Regional Water Board staff. Municipalities do not need to track non-Applicable Structures otherwise.

C.12.g. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins

MRP Provision C.12.g requires Permittees to conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. This requirement is being addressed through a multi-year project by the San Francisco Bay Regional Monitoring Program (RMP) to develop a series of conceptual models of PCBs in Priority Margin Units (PMUs). SMCWPPP's FY 2016/17 Annual Report included a workplan developed by BASMAA that describes how these information needs will be accomplished, including the studies to be performed and a preliminary schedule. SMCWPPP's March 30, 2020 Integrated Monitoring Report includes a summary of the findings and results of the studies completed, planned, or in progress and the implications of the studies on potential control measures to be investigated, piloted, or implemented in future permit cycles.

C.12.h. Risk Reduction Program

SMCWPPP is assisting San Mateo County municipalities to comply with the risk reduction program requirements by coordinating with and reporting on the Fish Smart program conducted by San Mateo County Environmental Health Services (EHS). Please see Section 11 for additional details.

FUTURE ACTIONS

SMCWPPP activities that are planned for FY 2020/21 to assist San Mateo County municipalities comply with MRP requirements in Provisions C.11/12. to reduce mercury and PCBs loads in stormwater runoff and report on the load reductions are described in the separate report mentioned earlier (*Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020*). Appendix 11 contains the report. SMCWPPP also plans to:

- Continue to participate in the RMP PCBs Work Group to help oversee RMP studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. A continued focus will be the conceptual model under development for Steinberger Slough in San Mateo County and associated monitoring fieldwork by the RMP.
- Assist San Mateo County municipalities to implement their programs to manage PCBs during building demolition and compile, evaluate and report the new data generated by the programs.
- Assist San Mateo County municipalities to comply with the risk reduction program requirements by coordinating with and reporting on the Fish Smart program conducted by EHS, and working with EHS to conduct an evaluation of the program (see Section 11).

SECTION 13
C.13 COPPER CONTROLS

INTRODUCTION

Provision C.13 of the MRP addresses copper control measures identified in the San Francisco Bay Basin Water Quality Control Plan (commonly referred to as the Basin Plan). The Regional Water Board has deemed these controls are necessary to support copper site-specific objectives in San Francisco Bay. C.13 includes the following sub-provisions:

- C.13.a. Manage waste generated from cleaning and treating copper architectural features, including copper roofs, during construction and post-construction;
- C.13.b. Manage discharges from pools, spas and fountains that contain copper-based chemicals; and
- C.13.c. Industrial Sources.

In FY 2019/20, Permittees and the Countywide Program continued to conduct activities related to complying with Provision C.13. Local actions are documented in each Permittee's individual Annual Report. This section summarizes copper control activities conducted by the Countywide Program.

IMPLEMENTATION OF MRP PROVISIONS

C.13.a. Copper Architectural Features

Provision C.13.a requires Permittees to manage waste from cleaning and treating copper architectural features, including copper roofs, during construction and post-construction.

During 2019/20, SMCWPPP continued to train municipal staff on the MRP requirements and BMPs for architectural copper installation, cleaning, and treating. The trainings utilized a SMCWPPP factsheet entitled "Requirements for Architectural Copper: Protect water quality during installation, cleaning, treating, and washing!" which targets suppliers and installers of copper materials and is available on the SMCWPPP website (flowstobay.org). Building inspectors and other municipal staff received the information from a SMCWPPP staff presentation at the California Building Inspectors Group (CALBIG) meeting on November 13, 2019 (see Section 6).

C.13.b. Manage Discharges from Pools, Spas and Fountains

Provision C.13.b requires Permittees to manage discharges from pools, spas and fountains that contain copper-based chemicals by adopting local ordinances. These requirements are implemented by individual Permittees and are reported on in their Annual Reports. Guidance on these requirements for illicit discharge inspectors is provided through SMCWPPP's CII Subcommittee and public outreach on related BMPs is provided through SMCWPPP's PIP Subcommittee. A fact sheet entitled *Best Management*

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Practices for Pools, Hot Tubs, and Fountain Water Discharges was developed in FY 2018/19 and includes information on avoiding the use of copper-based algaecides. The fact sheet is available on the SMCWPPP website (flowstobay.org). Section 15 discusses related public outreach by SMCWPPP to promote pool, spa, and fountain discharge BMPs through social media posts.

C.13.c. Industrial Sources

Provision C.13.c requires Permittees to ensure through routine industrial facility inspections that proper BMPs are in place at industrial facilities likely to use copper or have sources of copper. SMCWPPP's CII Subcommittee assists San Mateo County municipal agency staff with understanding this MRP requirement and SMCWPPP develops MRP compliance support materials, as necessary. In addition, in June 2010 BASMAA developed pollutants of concern commercial/industrial inspector training materials and a guidance manual that address industrial sources of copper. These materials are available on SMCWPPP's members only website. Industrial inspectors received information on this topic in a guidance document prepared by SMCWPPP entitled *Stormwater Inspector Guidance on Meeting Annual MRP C.4.d Training Requirements* (June 1, 2019).

FUTURE ACTIONS

FY 2020/21 activities planned by SMCWPPP to assist San Mateo County Permittees comply with MRP requirements in Provision C.13 include the following:

- Continue to provide information on MRP requirements regarding architectural sources of copper to construction site and building inspectors at New Development Subcommittee meetings, SMCWPPP's FY 2020/21 Construction Site Inspector Workshop, and at presentations to CALBIG or other partner organizations;
- Provide guidance to San Mateo County Permittees via SMCWPPP's CII Subcommittee and/or SMCWPPP stormwater business inspector training workshops and materials to assist them with conducting routine industrial facility inspections that ensure proper BMPs are in place at industrial facilities likely to use copper or have sources of copper; and
- Continue to provide outreach material and guidance via SMCWPPP's CII and PIP Subcommittees regarding pool, spa and fountain discharge BMPs.

SECTION 15
C.15 EXEMPTED AND CONDITIONALLY EXEMPTED DISCHARGES

INTRODUCTION

The objective of MRP Provision C.15, Exempted and Conditionally Exempted Discharges, is to exempt unpolluted non-stormwater discharges from the MRP's general non-stormwater discharge prohibition (Provision A.1) and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. This section describes SMCWPPP's countywide activities conducted to help its member agencies implement this provision. SMCWPPP helps municipal staff understand the MRP's requirements and makes various MRP compliance support materials available for their use. The SMCWPPP CII Subcommittee, discussed in Section 4, facilitates and coordinates providing this assistance to the member agencies for a variety of different types of non-stormwater discharges that may be conditionally exempted.

In addition, during FY 2019/20 SMCWPPP's PIP component conducted selected activities to help San Mateo County Permittees comply with outreach requirements in Provision C.15.b.iv., Individual Residential Car Washing Discharge, C.15.b.v., Swimming Pool, Hot Tub, Spa and Fountain Water, and Provision C.15.b.vi., Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering. These activities are described below.

IMPLEMENTATION OF MRP PROVISIONS

Provision C.15.b.iv. Individual Residential Car Washing

During FY 2019/20, SMCWPPP continued previous years' outreach efforts through social media posts to encourage residents to use professional car wash companies rather than washing their cars at home (Figure 15-1). The practice of using commercial car washes helps keep soaps, automotive pollutants, and environmental toxins from washing into San Mateo County storm drains. SMCWPPP also partnered with a local car wash company to offer an exclusive discount to members in an effort to make professional car wash companies more accessible. SMCWPPP also targeted mobile car wash businesses and residents to educate them on the hazards of dumping their used wash waters down storm drains and about best management practices. The associated mobile business fact sheet (Figure 15-2) was translated into Spanish and Chinese.

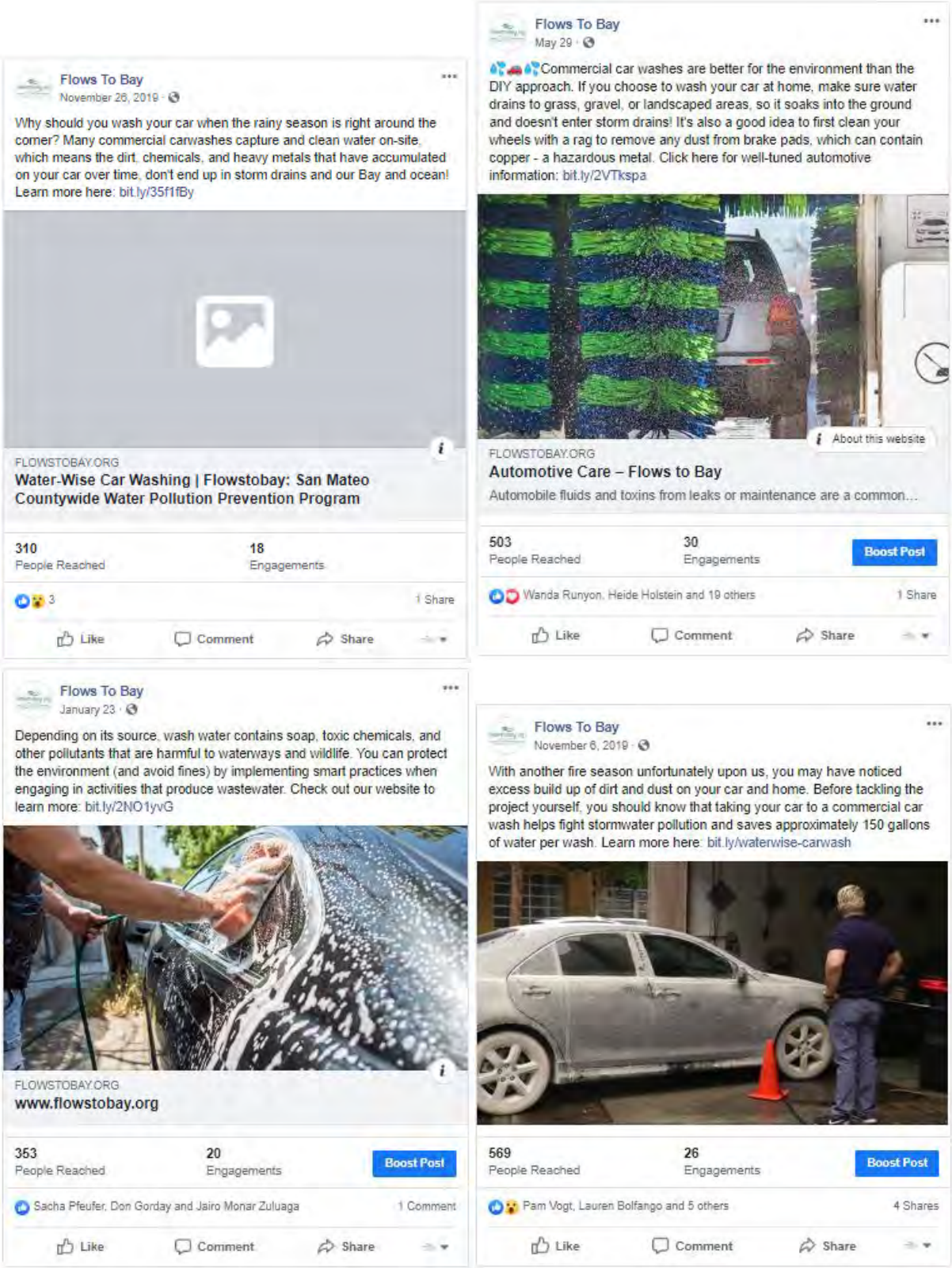

Figure 15-1. Examples of Facebook Posts about Car Washing.

flowstobay.org
SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

MEJORES PRÁCTICAS DE GESTIÓN PARA
NEGOCIOS MÓVILES
Limpiadores de alfombras | Lavadores/elementos de limpieza de vehículos | Lavadoras de energía | Servicios de cuidado de mascotas | Limpiadores de vapor

Información sobre el uso de las mejores prácticas de gestión (Best Management Practices, BMPs) para evitar que las aguas de lavado y enjuague entren en los sistemas de drenaje pluvial y contaminen las vías fluviales locales, la bahía de San Francisco y el Océano Pacífico.

¿POR QUÉ DEBERÍAMOS PREOCUPARNOS POR LOS DESECHOS DE AGUA DE LAVADO?

El agua de lavado de la limpieza móvil NO es solo suciedad y agua. También puede contener jabones, productos químicos tóxicos, metales pesados, aceite o grasa que son perjudiciales para nuestros arroyos y vías fluviales. Los contaminantes que drenan de las actividades de limpieza móvil se lavan en la calle y en el sistema de drenaje pluvial que luego fluye a nuestros arroyos, bahía y océano sin ninguna limpieza ni filtrado.

Las regulaciones federales, estatales y locales prohíben la descarga de cualquier cosa que no sea agua de lluvia en el drenaje pluvial.

La implementación de las mejores prácticas de gestión (BMPs) adecuadas es fácil y es necesaria para el cumplimiento de las regulaciones de prevención de la contaminación de aguas pluviales.

¿QUÉ PASA CON LOS PRODUCTOS DE LIMPIEZA BIODEGRADABLES Y NO TÓXICOS?

Los productos de limpieza etiquetados como "no tóxicos" y "biodegradables" todavía pueden dañar la vida silvestre si entran en un sistema de drenaje pluvial. ¡Los peces, por ejemplo, se ven afectados por el jabón común y biodegradable! Sin embargo, si se eliminan en el sistema de alcantarillado sanitario, las plantas de tratamiento de aguas residuales prefieren productos biodegradables antes que limpiadores tóxicos.

¡Todos los jabones, incluso los biodegradables, son dañinos para los peces!

PLANIFIQUE CON ANTICIPACIÓN

- Determine dónde descargará las aguas residuales antes de comenzar un nuevo trabajo.
- Asegúrese de tener el equipo a mano (es decir, mangueras largas, bomba de sumidero, etc.) para dirigir la descarga a los puntos de acceso de alcantarillado sanitario.
- Asegúrese de que las mangueras sean lo suficientemente largas como para llegar a los puntos de acceso que estén lejos de su tanque de retención.
- Póngase en contacto con sus ferreterías locales o tiendas de materiales de construcción para conocer las herramientas y materiales disponibles para empresas móviles, incluidas aspiradoras húmedas/secas y bombas de sumidero, esteras, bolsas de arena o grava, cañas, etc.

4 PASOS PARA TENER EN CUENTA ANTES DE LIMPIAR

1. **Sea un limpiador móvil reconocido por BASMAA**
   Realice la capacitación en línea de "limpieza de superficie móvil" de BASMAA (Bay Area Stormwater Management Agencies Association). Este programa lo capacitará sobre cómo limpiar diferentes superficies de una manera aceptable en términos ambientales y publicar su nombre como un limpiador entrenado. Visite www.basmaa.org.
2. **Identificar ubicaciones de drenaje de tormentas**
   Recorra el lugar de trabajo e identifique dónde se encuentran todos los drenajes pluviales. No se debe permitir que el agua de lavado fluya hacia los drenajes pluviales.
3. **Proteja drenajes y recoja agua**
   Póngase en contacto con su inspector de aguas pluviales de la ciudad local para determinar los requisitos específicos de descarga. Obtenga permiso para descargar a la tubería de alcantarillado sanitario o paisajismo del propietario antes de comenzar el trabajo.
4. **Deseche el agua de lavado**
   Póngase en contacto con su planta local de tratamiento de aguas residuales para conocer los requisitos de descarga específicos que ingresan al sistema de alcantarillado sanitario (los números de teléfono se enumeran en la página siguiente). Obtenga permiso del propietario de la propiedad para descargar agua de lavado en el lugar de trabajo o en el lugar de trabajo del contratista.

flowstobay.org
Para obtener más información sobre la prevención de la contaminación de aguas pluviales, envíe un correo electrónico a info@flowstobay.org; actualizada
EN ABRIL DE 2015

flowstobay.org
SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

最佳管理办法–
流动业务
地毯清洗机 | 洗车机/清洁剂 | 电动清洗机 | 宠物护理服务 | 蒸汽清洗机

保护海湾，保护海洋，保护你自己！洗涤水流入暴雨排水道时，它不经过清洗或过滤，直接流入当地的小河和旧金山湾或太平洋。

做好本职工作：BMP一览表

- 到该区域走一走，确定是否有暴雨排水道。
- 清扫清洗区域，清除碎屑。
- 如果可行，在有植被或砾石的表面冲洗，洗涤水可以渗透到地表而不产生径流。
- 使用沙袋、塞子、围堵垫或护堤，控制清洗区域，不让洗涤水顺着街道和排水沟流走。
- 堵塞或密封防洪排水道入水口以及向排水沟排水的斜坡区域，防止洗涤水进入防洪排水道。
- 在开始清洗前，设置暴雨排水道保护装置，并在离开洗涤区前将其移除。
- 用吸尘器或抖动地垫，将垃圾收入垃圾桶里。
- 尽量减少用水；在软管上使用喷嘴。
- 使用毒性较低的清洁产品（或如果可能的话，不要用肥皂和洗涤剂来清洗）。
- 使用"湿式真空吸尘器"将其中的洗涤水吸干，以便正确处理。
- 清除清洗过程中积聚的所有碎屑或沉淀物，并将其置于垃圾桶中；如果是有害物质，则要善处理。

污水处理厂

Burlingame 污水处理设施 ..... (650) 342-3727
Burlingame, Burlingame Hills 和 Hillsborough
Millbrae 污水处理厂 ..... (650) 259-2388
San Mateo 县环卫区 ..... (650) 991-8200
Daly City 和 Westborough 一些地区
Pacifica's Calera 溪水回收站 ..... (650) 738-4660
San Mateo 县污水处理厂 ..... (650) 522-7300
Foster City, Hillsborough 和 San Mateo
Mid Coastside 污水管理局 ..... (650) 726-0124
Half Moon Bay, El Granada, Miramar, Moss Beach, Montara, Princeton by the Sea
Silicon Valley 净水厂 ..... (650) 832-6243
Belmont, Redwood City, San Carlos, Woodside, 和 West Bay 对之服务区
South San Francisco/San Bruno 水质控制厂 ..... (650) 877-8555
Colma, San Bruno, South San Francisco, 和 Daly City 市界

处理方案

1. **切勿将清洗或洗涤水排入街道、排水沟、停车场或暴雨排水道。**
2. 清洗和洗涤水通常可以通过业主家或企业的排水管排放到生活污水管道，如公用水槽、地漏、拖把洗涤槽、清理孔或卫生间。采取预防措施，防止碎屑、危险物质或任何可能引起堵塞的物体进入水槽、厕所或生活污水管道。
3. 将水引至园林景观或砾石表面。离开洗涤区前，洗涤水必须完全被植被吸收。

如果您将流动清洁活动产生的洗涤水排放到暴雨排水道，则违反了市政雨水管理条例，可能会被处以罚款。

flowstobay.org
San Mateo 县水污染防治计划认可"Santa Clara 河谷城市径流污染防治计划"。并制定本手册，以及与本手册共享统计划的内容。

Figure 15-2. Mobile Businesses BMP Fact Sheet in Spanish and Chinese.

Provision C.15.b.v. Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

During FY 2019/20, SMCWPPP continued public outreach and educational efforts to encourage implementation of the required BMPs in commercial, municipal, and residential facilities. SMCWPPP shared BMP fact sheets with San Mateo County Permittees that are specifically target swimming pools, hot tubs, spas, and fountain water discharges (Figure 15-3), and promoted best practices through social media posts (Figure 15-4).

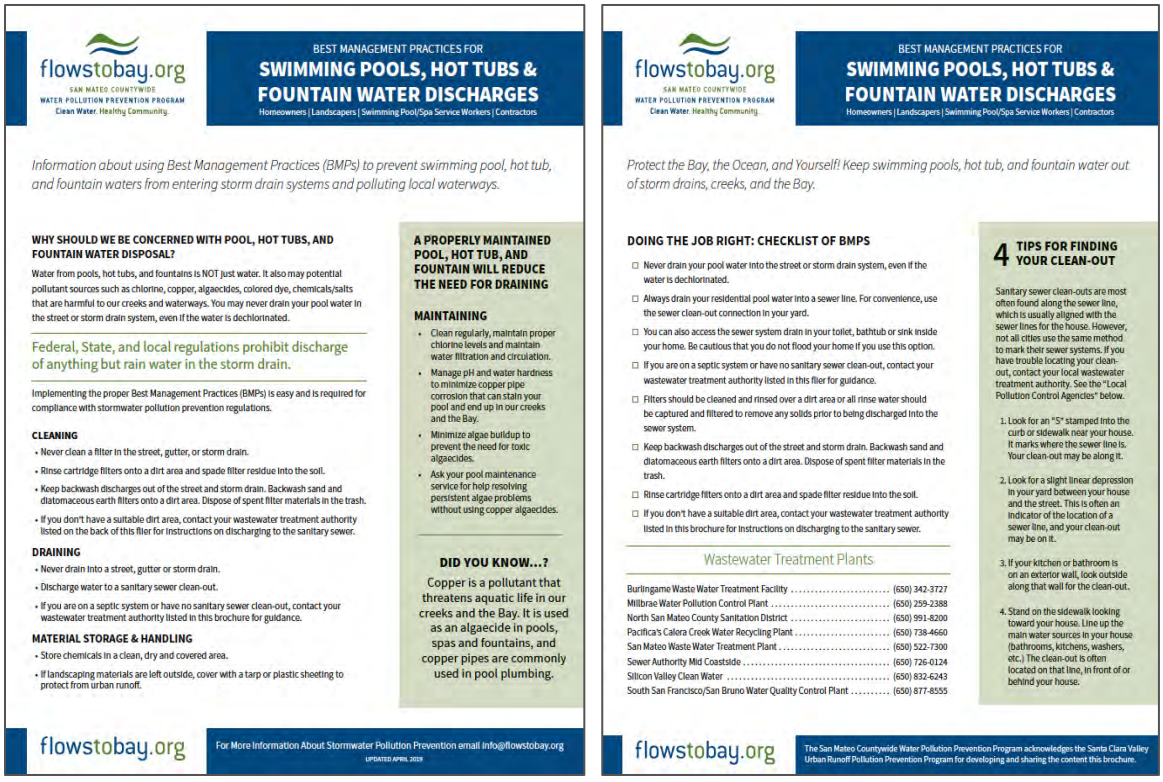

flowstobay.org
SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

BEST MANAGEMENT PRACTICES FOR
SWIMMING POOLS, HOT TUBS & FOUNTAIN WATER DISCHARGES
Homeowners | Landscapers | Swimming Pool/Spa Service Workers | Contractors

Information about using Best Management Practices (BMPs) to prevent swimming pool, hot tub, and fountain waters from entering storm drain systems and polluting local waterways.

WHY SHOULD WE BE CONCERNED WITH POOL, HOT TUBS, AND FOUNTAIN WATER DISPOSAL?

Water from pools, hot tubs, and fountains is NOT just water. It also may potential pollutant sources such as chlorine, copper, algaecides, colored dye, chemicals/salts that are harmful to our creeks and waterways. You may never drain your pool water in the street or storm drain system, even if the water is dechlorinated.

Federal, State, and local regulations prohibit discharge of anything but rain water in the storm drain.

Implementing the proper Best Management Practices (BMPs) is easy and is required for compliance with stormwater pollution prevention regulations.

CLEANING
- Never clean a filter in the street, gutter, or storm drain.
- Rinse cartridge filters onto a dirt area and spade filter residue into the soil.
- Keep backwash discharges out of the street and storm drain. Backwash sand and diatomaceous earth filters onto a dirt area. Dispose of spent filter materials in the trash.
- If you don't have a suitable dirt area, contact your wastewater treatment authority listed on the back of this flier for instructions on discharging to the sanitary sewer.

DRAINING
- Never drain into a street, gutter or storm drain.
- Discharge water to a sanitary sewer clean-out.
- If you are on a septic system or have no sanitary sewer clean-out, contact your wastewater treatment authority listed in this brochure for guidance.

MATERIAL STORAGE & HANDLING
- Store chemicals in a clean, dry and covered area.
- If landscaping materials are left outside, cover with a tarp or plastic sheeting to protect from urban runoff.

A PROPERLY MAINTAINED POOL, HOT TUB, AND FOUNTAIN WILL REDUCE THE NEED FOR DRAINING

MAINTAINING
- Clean regularly, maintain proper chlorine levels and maintain water filtration and circulation.
- Manage pH and water hardness to minimize copper pipe corrosion that can stain your pool and end up in our creeks and the Bay.
- Minimize algae buildup to prevent the need for toxic algaecides.
- Ask your pool maintenance service for help resolving persistent algae problems without using copper algaecides.

DID YOU KNOW...?
Copper is a pollutant that threatens aquatic life in our creeks and the Bay. It is used as an algaecide in pools, spas and fountains, and copper pipes are commonly used in pool plumbing.

flowstobay.org
For More Information About Stormwater Pollution Prevention email info@flowstobay.org
UPDATED APRIL 2019

flowstobay.org
SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

BEST MANAGEMENT PRACTICES FOR
SWIMMING POOLS, HOT TUBS & FOUNTAIN WATER DISCHARGES
Homeowners | Landscapers | Swimming Pool/Spa Service Workers | Contractors

Protect the Bay, the Ocean, and Yourself! Keep swimming pools, hot tub, and fountain water out of storm drains, creeks, and the Bay.

DOING THE JOB RIGHT: CHECKLIST OF BMPS
- ☐ Never drain your pool water into the street or storm drain system, even if the water is dechlorinated.
- ☐ Always drain your residential pool water into a sewer line. For convenience, use the sewer clean-out connection in your yard.
- ☐ You can also access the sewer system drain in your toilet, bathtub or sink inside your home. Be cautious that you do not flood your home if you use this option.
- ☐ If you are on a septic system or have no sanitary sewer clean-out, contact your wastewater treatment authority listed in this flier for guidance.
- ☐ Filters should be cleaned and rinsed over a dirt area or all rinse water should be captured and filtered to remove any solids prior to being discharged into the sewer system.
- ☐ Keep backwash discharges out of the street and storm drain. Backwash sand and diatomaceous earth filters onto a dirt area. Dispose of spent filter materials in the trash.
- ☐ Rinse cartridge filters onto a dirt area and spade filter residue into the soil.
- ☐ If you don't have a suitable dirt area, contact your wastewater treatment authority listed in this brochure for instructions on discharging to the sanitary sewer.

Wastewater Treatment Plants

Burlingame Waste Water Treatment Facility	(650) 342-3727
Millbrae Water Pollution Control Plant	(650) 259-2388
North San Mateo County Sanitation District	(650) 991-8200
Pacifica's Calera Creek Water Recycling Plant	(650) 738-4660
San Mateo Waste Water Treatment Plant	(650) 522-7300
Sewer Authority Mid Coastside	(650) 726-0124
Silicon Valley Clean Water	(650) 832-6243
South San Francisco/San Bruno Water Quality Control Plant	(650) 877-8555

4 TIPS FOR FINDING YOUR CLEAN-OUT

Sanitary sewer clean-outs are most often found along the sewer line, which is usually aligned with the sewer lines for the house. However, not all cities use the same method to mark their sewer systems. If you have trouble locating your clean-out, contact your local wastewater treatment authority. See the "Local Pollution Control Agencies" below.

1. Look for an "S" stamped into the curb or sidewalk near your house. It marks where the sewer line is. Your clean-out may be along it.
2. Look for a slight linear depression in your yard between your house and the street. This is often an indicator of the location of a sewer line, and your clean-out may be on it.
3. If your kitchen or bathroom is on an exterior wall, look outside along that wall for the clean-out.
4. Stand on the sidewalk looking toward your house. Line up the main water sources in your house (bathrooms, kitchens, washers, etc.) The clean-out is often located on that line, in front of or behind your house.

flowstobay.org
The San Mateo Countywide Water Pollution Prevention Program acknowledges the Santa Clara Valley Urban Runoff Pollution Prevention Program for developing and sharing the content this brochure.

Figure 15-3. Swimming Pool, Hot Tub, Spa, and Fountain Water Discharge BMP Fact Sheet.

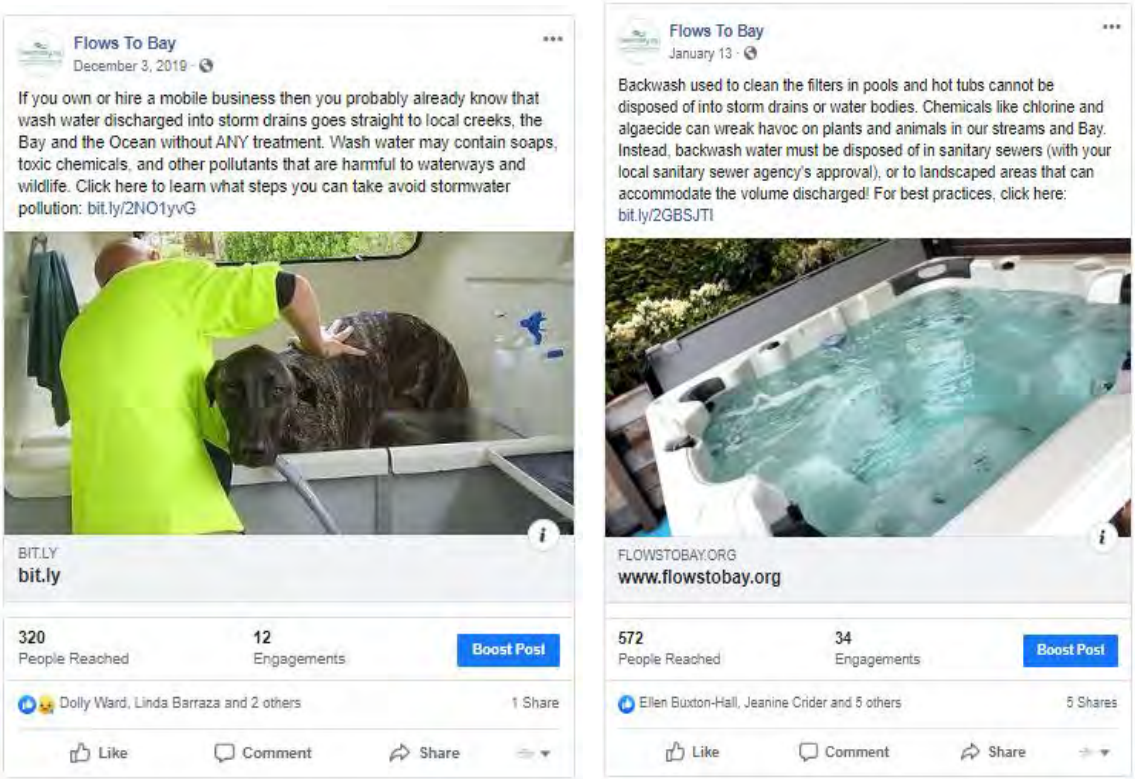

Flows To Bay
December 3, 2019

If you own or hire a mobile business then you probably already know that wash water discharged into storm drains goes straight to local creeks, the Bay and the Ocean without ANY treatment. Wash water may contain soaps, toxic chemicals, and other pollutants that are harmful to waterways and wildlife. Click here to learn what steps you can take avoid stormwater pollution: bit.ly/2NO1yvG

BIT.LY
bit.ly

320 People Reached | 12 Engagements | Boost Post

Dolly Ward, Linda Barraza and 2 others | 1 Share

Like | Comment | Share

Flows To Bay
January 13

Backwash used to clean the filters in pools and hot tubs cannot be disposed of into storm drains or water bodies. Chemicals like chlorine and algaecide can wreak havoc on plants and animals in our streams and Bay. Instead, backwash water must be disposed of in sanitary sewers (with your local sanitary sewer agency's approval), or to landscaped areas that can accommodate the volume discharged! For best practices, click here: bit.ly/2GBSJTI

FLOWSTOBAY.ORG
www.flowstobay.org

572 People Reached | 34 Engagements | Boost Post

Ellen Buxton-Hall, Jeanine Crider and 5 others | 5 Shares

Like | Comment | Share

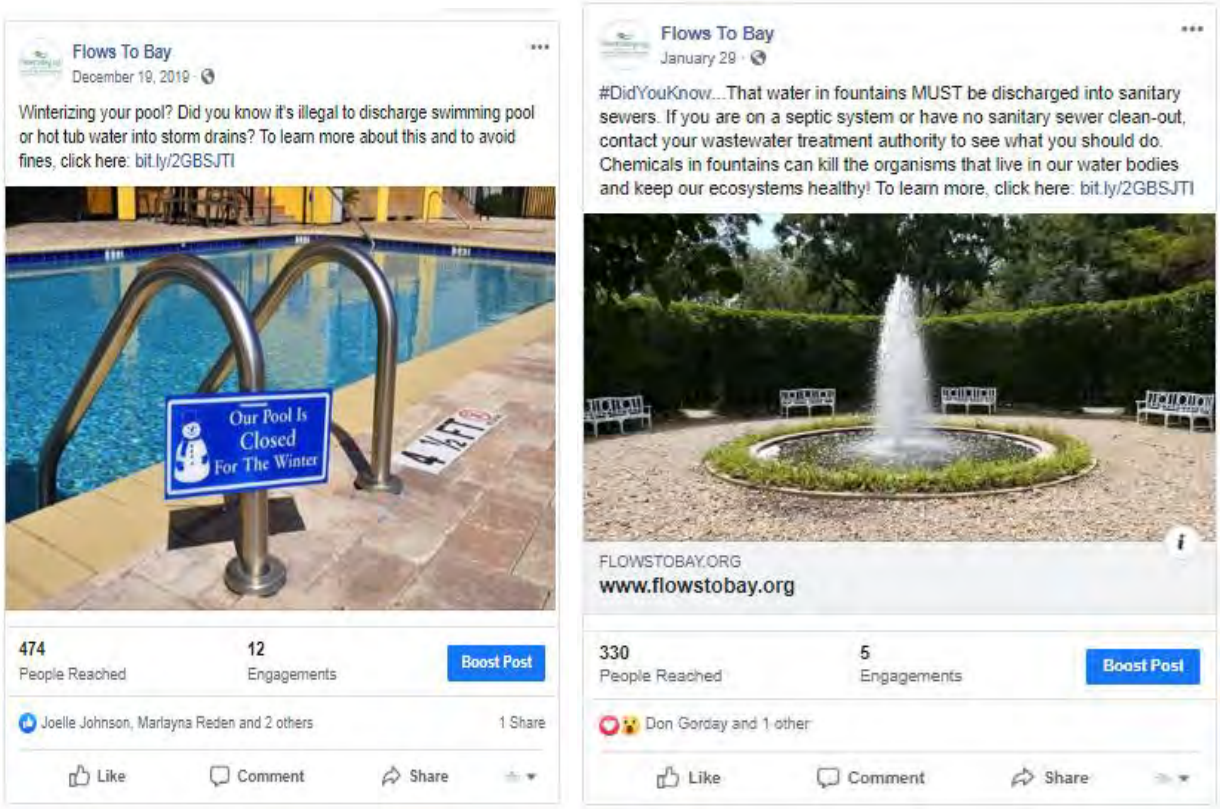

Figure 15-4. Examples of Facebook Posts about Swimming Pool, Hot Tub, Spa, and Fountain Water Discharge.

Provision C.15.b.vi. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

In FY 2019/20, SMCWPPP implemented the following outreach activities to promote the use of less-toxic options for pest control and landscape management, and the use of drought tolerant, native vegetation to minimize landscape irrigation demands:

- Conducted outreach to San Mateo County residents to support and promote eco-friendly alternatives to toxic pesticides and help avoid pollutants in groundwater and surface water discharges. This promotion took place on social media and through the SMCWPPP newsletter and blog. Additional messaging was provided through SMCWPPP's point-of-purchase program, where OWOW materials were distributed that educate residents about eco-friendly pesticide alternatives. Example posts are shown in Figure 15-5. Table 15-1 summarizes the reach of Facebook posts made on pesticide pollution prevention.
- Promoted planting of drought tolerant, native vegetation through online media channels, including social media and the SMCWPPP newsletter and blog. Messaging focused on the environmental benefits of planting native plants, including their tolerance to drought. Example posts are shown in Figure 15-6.
- Continued to promote water-saving tips via social media.

- Developed a pilot program for supplementing the BAWSCA *Lawn Be Gone!* lawn replacement program with a new rain garden incentive (the full program starts in FY 2020/21).

Table 15-1. Summary of Facebook Posts on Pesticide Pollution Prevention Topics

Post Focus	Reach	Engagements (likes, comments, and shares)	Clicks
Integrated Pest Management (19 posts)	8,332	200	155
Hiring a Pest Control Operator (6 posts)	2,317	52	38
Promotions of Community Partners (20 posts)	9,927	205	316
Links Between Pesticides & Water Quality (10 posts)	3,723	132	79
Totals:	**24,299**	**589**	**588**

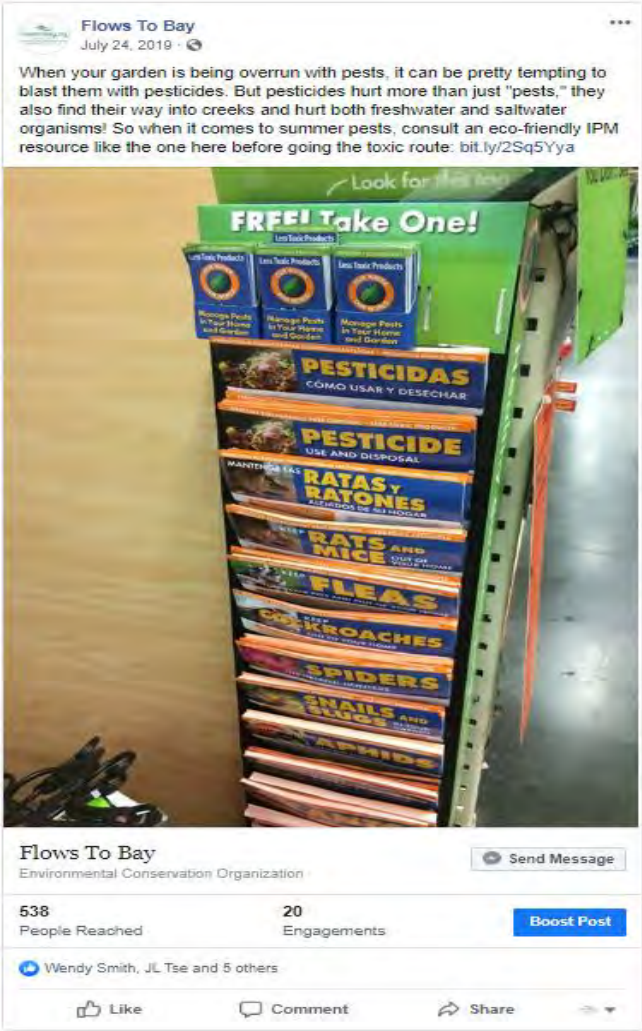

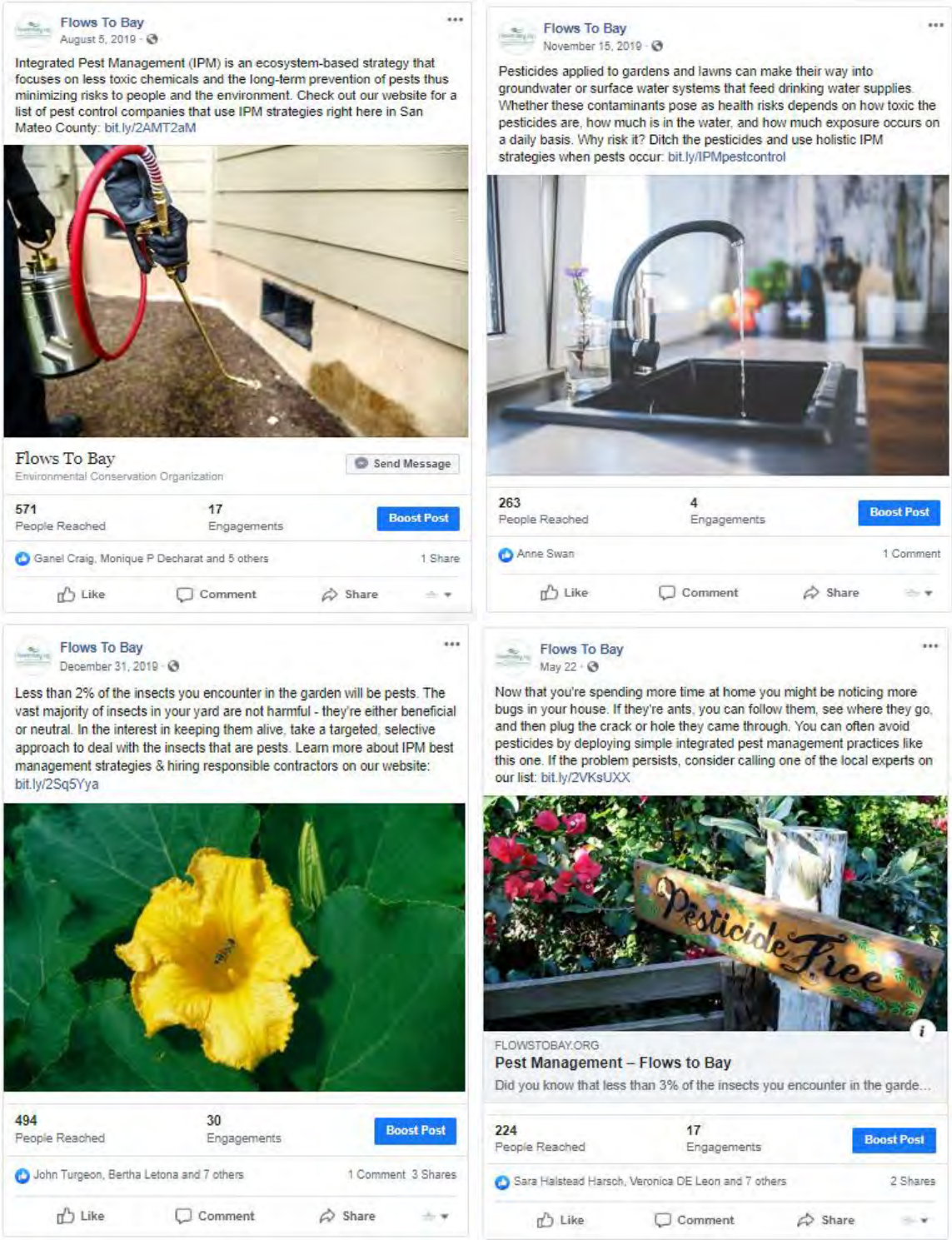

Figure 15-5. Social Media Posts Promoting Eco-Friendly (IPM) Alternatives to Pesticides

Flows To Bay
May 15 ·

With the weather getting warmer as we shelter at home, now is a great time to do that garden or yard project you've been wanting to get to! Some ideas we have that help protect our local waterways include removing plants considered invasive in our local ecosystem and planting drought-resistant species. Check out more ideas on our website: bit.ly/2XW72vp

FLOWSTOBAY.ORG
Lawn & Garden – Flows to Bay
Read on to learn how to protect local creeks, the Bay, and the ocean...

253 People Reached
2 Engagements

Thurman Wolford

Like Comment Share

Flows To Bay
July 17, 2019 ·

A recent Stanford University study on urban irrigation and vegetation health during extreme drought leaves off with some good tips for residential homeowners interested adopting helpful water management practices: shift to climate-appropriate landscaping, create more shaded areas, implement drip irrigation and nighttime watering. You can read more about the study here: stanford.io/2KOQRIT

WATERINTHEWEST.STANFORD.EDU
Keeping Green During Drought | Water in the West
June 06, 2019 | Water in the West | News By Karly Chin FL_Sprinklers-...

453 People Reached
18 Engagements
Boost Post

Samantha Spare, Eileen Dion and 3 others
1 Comment 2 Shares

Like Comment Share

Flows To Bay
June 3 ·

Gardening tip: Mulching your garden not only keeps weeds down, but it helps save A LOT of water -- 25% according to a study by Texas Cooperative Extension. Sometimes helping to protect our precious water resources is as simple as adding a layer of decomposing bark to your garden to hold onto moisture and keep the soil around your plants cool. Click here for more gardening tips: bit.ly/2XW72vp

Flows To Bay
Environmental Conservation Organization
Send Message

489 People Reached
38 Engagements
Boost Post

Bill George, Joanne Lucero and 22 others
3 Shares

Like Comment Share

Flows To Bay
August 7, 2019 ·

Live on a hill? Hiring a landscaper might not seem like a big deal, but small decisions about planting and slope can have a big impact on water quality. Native plants with fibrous root structures will slow down water as it moves through the ground, and terracing steep slopes will do wonders to prevent runoff. More resources on our website: bit.ly/2mzYIS

Flows To Bay
Environmental Conservation Organization
Send Message

753 People Reached
50 Engagements
Boost Post

Anna Radcliffe, Nancy Luck and 14 others
4 Shares

Like Comment Share

Figure 15-6. Social Media Posts Promoting Landscape Management and the Use of Drought-Tolerant, Native Vegetation

FUTURE ACTIONS

In FY 2020/21, SMCWPPP will continue to assist member agencies to comply with MRP Provision C.15 requirements related to conditionally exempt non-stormwater discharges, including conducting selected types of related outreach.

Appendix 1

- Stormwater Committee – Attendance List for FY 2019/20

2019-20 Stormwater Committee Attendance														
Agency	**Representative**	**Position**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**
Atherton	Robert Ovadia	Public Works Director		X	X		X					X	X	
Belmont	Peter Brown	Public Works Director		X	X		X					X	X	
Brisbane	Randy Breault	Public Works Director/City Engineer		X	X		X					X	X	
Burlingame	Syed Murtuza	Public Works Director		O			O					X	X	
Colma	Brad Donohue	Director of Public Works and Planning	C	X	X	C	X	C	C	C	C	X	O	
Daly City	Richard Chiu	Public Works Director	A	X	X	A	X	A	A	A	A	X	X	
East Palo Alto	Kamal Fallaha	City Engineer	N			N		N	N	N	N			
Foster City	Norm Dorais	Public Works Director	C	X	X	C		C	C	C	C	X	X	
Half Moon Bay	Maziar Bozorginia	City Engineer	E	X		E		E	E	E	E		X	
Hillsborough	Paul Willis	Public Works Director	L	X	X	L		L	L	L	L		X	
Menlo Park	Nikki Nagaya	Public Works Director	E	X	X	E	X	E	E	E	E	X	X	
Millbrae	Andrew Yang	Senior Engineer	D			D		D	D	D	D	X	X	
Pacifica	Sam Bautista	Public Works Director/City Engineer			O							X	X	
Portola Valley	Howard Young	Public Works Director		X								X	X	
Redwood City	Saber Sarwary	Supervising Civil Engineer			O									
San Bruno	Jimmy Tan	City Engineer		X	X							X	X	
San Carlos	Steven Machida	Public Works Director		X	X		X					X	X	
San Mateo	Brad Underwood	Public Works Director		X	X		X					X	X	
South San Francisco	Eunejune Kim	Public Works Director												
Woodside	Sean Rose	Public Works Director										X	X	
San Mateo County	Jim Porter	Public Works Director		X	X		X					X	X	
Regional Water Quality Control Board	Tom Mumley	Assistant Executive Officer												

"X" - Committee Member Attended
"O" - Other Jurisdictional Representative Attended

Appendix 2

- Municipal Maintenance Subcommittee – Attendance List for FY 2019/20

SMCWPPP Municipal Maintenance Subcommittee Attendance FY 2019/20

NAME	MUNICIPALITY	7/25/2019	9/25/2019	6/24/2020
Marcus Escobedo	Belmont	✓		
Rick Locke	Belmont	✓		
Tim Murray	Belmont	✓	✓	
Jennifer Lee	Burlingame	✓	✓	✓
Sven Edlund	City of San Mateo			✓
Louis Gotelli	Colma	✓		
Alan Chu	Daly City	✓		
Jeff Fornesi	Daly City	✓		
Jose Padilla	Daly City	✓	✓	
Jose Rodrigues	Daly City		✓	
Rick Medina	Daly City	✓		
Sibely Calles	Daly City	✓	✓	✓
Lenin Malgar	East Palo Alto		✓	
Allen Smith	Foster City	✓		
Greg Baeza	Foster City	✓		
Todd Seeley	Half Moon Bay			✓
Gary Francis	Hillsborough	✓	✓	
Hugo Torres	Menlo Park	✓		
Christopher Falzon	Millbrae	✓	✓	
Noel Gantley	Millbrae	✓	✓	
Bernie Mau	Pacifica	✓		
Chris Martin	Pacifica		✓	
Paul Lavorini	Pacifica	✓		
Vicki Sherman	Redwood City	✓	✓	✓
Dennis Bosch	San Bruno	✓		
Ed Maxion	San Bruno		✓	✓
Sean Morris	San Bruno	✓		✓
Ted Chapman	San Bruno		✓	
Angel Noriega	San Carlos		✓	
Dempsey Davis	San Carlos	✓		
Ken Tongol	San Carlos		✓	
Ted Rutledge	San Carlos	✓		
John Allan	San Mateo County			✓
Brian Weber	San Mateo County Mosquito & Vector Control District			✓
Casey Stevenson	San Mateo County Mosquito & Vector Control District	✓		✓

NAME	MUNICIPALITY	7/25/2019	9/25/2019	6/24/2020
Reid Bogert	SMCWPPP		✓	✓
Kelly Carroll	CSG for Half Moon Bay/Colma	✓	✓	✓
Nick Zigler	CSG for Half Moon Bay/Colma			✓
Kristin Kerr	EOA, Inc.	✓	✓	

Appendix 3

- New Development Subcommittee – Attendance List for FY 2019/20
- Biotreatment Soil Media Supplier List 1/1/20
- Annual C.3 Workshop: Part 1 – Reviewing C.3 Regulated Projects – June 3, 2020
    - Workshop Agenda
    - Attendance List
    - Evaluations Summary
- Annual C.3 Workshop: Part 2 – Implementing Green Street Projects - June 17, 2020
    - Workshop Agenda
    - Attendance List
    - Evaluations Summary

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

New Development Subcommittee

FY 2019/20 Meeting Attendance

Representing	Name	Phone Number	Meetings Attended			
			Aug	Nov	Feb	May
Atherton	Jake Garcia	650-752-0544		X	X	X
Belmont	Julie Freitas	650-595-7425	X		X	
	Anwar Mirza	650-637-2985	X	X		X
Brisbane	Ken Johnson/ Alberto Viana	415-508-2120	X	X	X	X
Burlingame	Jennifer Lee	650-558-7381	X	X	X	X
Colma	Muneer Ahmed/Michael Laughlin	650-757-8894	X	X	X	X
	Katherine Sheehan/Catherine Chan	650-522-2506				X
County of San Mateo	Camille Leung	650-363-1826	X		X	X
	Susan Wright/Lawrence Truong	650-363-4372	X		X	
	John Allan	650-363-4071	X	X	X	X
	Julie Casagrande/Brian Oh	650-599-1457	X		X	X
	Melody Eldridge	650-363-1812	X		X	X
C/CAG – SMCWPPP	Matt Fabry	650-599-1419		X	X	X
	Reid Bogert	650-599-1433	X		X	X
CD+A, URD	Connie Goldade (CD+A) Kevin Robert Perry (URD)	510-839-4568 x238 503-928-5522		X		X
Daly City	Sibely Calles	650-991-8054	X		X	X
	Carmelisa Morales	650-991-8156	X	X		X
East Palo Alto	Tiffany Deng	650-853-3126				
EOA-SMCWPPP	Jill Bicknell	408-720-8811 x1	X	X		X
	Peter Schultze-Allen	510-832-2852 x128	X	X	X	X
Foster City	Vivian Ma	650-286-3270	X	X		
	Stephanie MacDonald	650-286-3274		X		
Half Moon Bay	Kelly Carroll	650-522-2506	X	X	X	X
	Maziar Bozorgina	650-726-7177				X
Hillsborough	Natalie Gribben/Katherine Sheehan	650-375-7444	X	X	X	X
	Irfan Aziz	650-375-7444				X
Menlo Park	Clarence Li	650-330-6797	X			X
	Rambod Hakhamaneshi	650-330-6740		X		X
Millbrae	Linda Roberson	650-259-2351		X		
	Sam Fielding	650-522-2506		X		
	Kelly Carroll/Andrew Yang	650-522-2506	X			X
Pacifica	Christian Murdock/Helen Gannon	650-738-7444	X	X		X
	Raymond Donguines	650-738-3767	X			
Portola Valley	CheyAnne Brown	650-851-1700		X	X	X
Redwood City	James O'Connell	650-780-5923	X	X	X	X
San Bruno	Matt Neuebaumer/ David Wong	650-616-7042	X	X	X	
	Joanna Kwok	650-616-7052	X	X		X
San Carlos	Kathryn Robertson/Vatsal Patel	650-802-4212	X	X	X	X
San Mateo	Karen Magallanes/Mark Swenson	650-522-7333	X		X	
	Sarah Scheidt/Sven Edlund	650-522-7296	X	X		X
San Mateo County RCD	Noah Katz	650-712-7765 x117			X	
South S.F.	Daniel Garza	650-829-3882		X	X	
	Andrew Wemmer	650-829-3840	X			X
Woodside	Dong Nguyen	650-851-6790	X			

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

BIOTREATMENT SOIL MEDIA SUPPLIER LIST

Company	Contact Name	Phone	Address	City	Zip	E-mail	Website
American Soil & Stone Products Inc.	Ryan Hoffman	510-292-3018	Richmond Annex, 2121 San Joaquin Street, Building A	Richmond	94804	ryan@americansoil.com	www.americansoil.com
California Landscape Supply	Ryan Thornberry	209-538-8493	4107 Morgan Road	Ceres	95307	ryan@californialandscapesupply.com	www.californialandscapesupply.com
L.H. Voss Materials, Inc.	Nyoka Corley	925-676-7910 x102	5965 Dougherty Road	Dublin	94568	nyoka.corley@gmail.com	www.lhvoss.com
Lehigh Hanson Aggregates	Chris Stromberg	510-246-0393	4501 Tidewater Avenue	Oakland	94601	chris.stromberg@lehighhanson.com	www.lehighhanson.com
Lyngso Garden Materials, Inc.	Kan Parthiban Erik Aichelen	650-257-9836 650-333-1044	345 Shoreway Road	San Carlos	94070	kparthiban@lyngsogarden.com eaichelen@lyngsogarden.com	www.lyngsogarden.com
Marshall Brothers Enterprises, Inc.	Phillip Marshall	925-449-4020	P.O. Box 2188	Livermore	94551	phillip@mbenterprises.com	www.mbenterprises.com
Pleasanton Trucking Inc.	Tom Bonnell	925-449-5400	P.O. Box 11462	Pleasanton	94588	tom@ptisoils.com	
Recology Blossom Valley Organics	Jake Oosterman	209-872-0734 209-545-7718	6133 Hammett Court	Modesto	95358	joosterman@recology.com	www.recology.com/blossom-valley-organics-modesto
Soiland Company	Willie Leuzinger	707-889-7800	7171 Stony Point Rd.	Cotati	94931	WLeuzinger@SoilandRocks.com	www.SoilandRocks.com
South County Rockery	Todd Quilici	408-842-0022	281 Yamane Dr.	Gilroy	95020	todd@southcountyrockery.net	www.southcountyrockery.net/florite-blend-bioswale
TMT Enterprises, Inc.	Matt Moore	408-432-9040	1996 Oakland Road	San Jose	95131	info@tmtenterprises.net	www.tmtenterprises.net

As of: 1/1/2020

Disclaimer: SMCWPPP provides this list of biotreatment soil media suppliers for the use of its member agencies, contractors, designers and others in finding suppliers for their projects. Suppliers are listed based on a general review of their soil media product including test results, adherence to the BASMAA Biotreatment Soil Media specification (required in the MRP) and knowledge of the specification. Therefore users of this SMCWPPP list must make the final determination as to the products and adherence to the BASMAA specification and the MRP. Users of the list assume all liability directly or indirectly arising from use of this list. The listing of any soil supplier is not be construed as an actual or implied endorsement, recommendation, or warranty of such soil provider or their products, nor is criticism implied of similar soil suppliers that are not listed. This disclaimer is applicable whether the information is obtained in hard copy or downloaded from the Internet. Check the SMCWPPP website for the "Biotreatment Soil Mix Verification Checklist" and "Biotreatment Soil Mix Supplier Verification Statement" for assistance in reviewing and approving soil media submittals. www.flowstobay.org/newdevelopment

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

Annual "C.3" Workshop:

Reviewing C.3 Regulated Projects

Webinar

Wednesday, June 3, 2020 9:00 AM – 12:00 PM

DRAFT AGENDA

Arrival	9:00 am – 9:05 am
Welcome	*Matt Fabry, SMCWPPP* 9:05 am – 9:10 am
1. Basic Training: Stormwater Control Measures Overview of stormwater regulations, Provision C.3 requirements, and stormwater control measures	*Kristin Kerr, EOA* 9:10 am – 9:55 am
BREAK	9:55 am – 10:00 am
2. Advanced Training: C.3 Regulated Project Requirements Sizing and design guidance and available resources	*Jill Bicknell, EOA* 10:00 am – 10:55 am
BREAK	10:55 am – 11:00 am
3. C.3 Regulated Project Compliance Review Process, project submittals, tips for review, example project in Redwood City and resources	*Peter Schultze-Allen, EOA* *James O'Connell, Redwood City* 11:00 am – 12:00 pm
ADJOURN	12:00 pm

	First Name	Last Name	Agency/Company
1	Anwar	Mirza	City of Belmont
2	Julia	Ayres	City of Brisbane
3	Keegan	Black	City of Brisbane
4	Kenneth	Johnson	City of Brisbane
5	Jeremiah	Robbins	City of Brisbane
6	Jennifer	Lee	City of Burlingame
7	Martin	Quan	City of Burlingame
8	Sibely	Calles	City of Daly City
9	Shirley	Chan	City of Daly City
10	Camelisa	Morales	City of Daly City
11	Roland	Yip	City of Daly City
12	Vivian	Ma	City of Foster City
13	Francine	Magno	City of Foster City
14	Lawrence	Tam	City of Foster City
15	Clarence	Li	City of Menlo Park
16	Andy	Wong	City of Millbrae
17	Andrew	Yang	City of Millbrae
18	Helen	Gannon	City of Pacifica
19	Lawrence	Henriquez	City of Pacifica
20	James	O'Connell	City of Redwood City
21	Patti	Schrotenboer	City of Redwood City
22	Vicki	Sherman	City of Redwood City
23	Joanna	Kwok	City of San Bruno
24	Hae Won	Ritchie	City of San Bruno
25	Jason	Tong	City of San Bruno
26	David	Wong	City of San Bruno
27	Evan	Cai	City of San Carlos
28	Justin	Erickson	City of San Carlos
29	Sophia	Lee	City of San Carlos
30	Vatsal	Patel	City of San Carlos

	First Name	Last Name	Agency/Company
31	Leo	Chow	City of San Mateo
32	Sven	Edlund	City of San Mateo
33	Richard	Kraft	City of San Mateo
34	Sarah	Scheidt	City of San Mateo
35	Daniel	Garza	City of South San Francisco
36	Thomas	Siphongsay	City of South San Francisco
37	Christina	Tai	City of South San Francisco
38	Andrew	Wemmer	City of South San Francisco
39	Nelson	Yuk	City of South San Francisco
40	John	Allan	County of San Mateo
41	Olivia	Boo	County of San Mateo
42	Summer	Burlison	County of San Mateo
43	Angela	Chavez	County of San Mateo
44	Melody	Eldridge	County of San Mateo
45	Katie	Faulkner	County of San Mateo
46	Camille	Leung	County of San Mateo
47	Wency	Ng	County of San Mateo
48	Sina	Oshaghi	County of San Mateo
49	John	Schabowski	County of San Mateo
50	Kim	Springer	County of San Mateo
51	Johnson	Young	County of San Mateo
52	Alex	Zhang	County of San Mateo
53	Kareem	Arabi	CSG Engineering
54	Michelle	Bocalan	CSG Engineering
55	Kelly	Carroll	CSG Engineering
56	Catherine	Chan	CSG Engineering
57	Jen	Chen	CSG Engineering
58	Jay	Gonzales	CSG Engineering
59	Rhafael	Herrera	CSG Engineering
60	Babak	Kaderi	CSG Engineering

	First Name	Last Name	Agency/Company
61	Jeffrey	Lee	CSG Engineering
62	Heba	Masri	CSG Engineering
63	Sandra	Meditch	CSG Engineering
64	Frank	Navarro	CSG Engineering
65	Mehdi	Sharifi	CSG Engineering
66	Katherine	Sheehan	CSG Engineering
67	Paramjit	Uppal	CSG Engineering
68	Nick	Zigler	CSG Engineering
69	Robin	Lee	Schaaf and Wheeler
70	Erika	Marshall	Schaaf and Wheeler
71	Cameo	Tsui	Schaaf and Wheeler
72	Matt	Fabry	SMCWPPP
73	David	Wong	Town of Atherton
74	Muneer	Ahmed	Town of Colma
75	Irfan	Aziz	Town of Hillsborough
76	Natalie	Gribben	Town of Hillsborough
77	Dan	Farah	Veolia

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

EVALUATION SUMMARY

Attendance: 77
Evaluations: 30

SMCWPPP C.3 WORKSHOP
Part 1 - Reviewing C.3 Regulated Projects
Tuesday, June 3, 2020
Webex

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1. **Overall, how informative did you find the webinar?**
   Very helpful **25** Somewhat helpful **5** Not helpful **0**

   - I imagine there are different levels of knowledge among the audience so the webinar presenters should be more aware of that possibility and try to gauge the presentation to all the audience. In general, the webinar was very good. Looking forward to the next one.
   - Mostly review information for me
   - It would be great if we could alternate with every other year being totally focused on advanced topics.
   - The examples were very helpful.
   - Very good presentations

2. **Basic Training: Stormwater Control Measures**
   Kristin Kerr, *EOA*

   Very helpful **25** Somewhat helpful **5** Not helpful **0**

   Comments
   - This was more to my level of knowledge and understanding.
   - I have seen this presentation quite a few times at this point
   - Well-presented, but personally a re-hash of a lot of previously known information (which makes sense).
   - Thank you for the overview. It was very helpful and simple to understand.
   - Mostly review information for me
   - For me personally, I know this information already, but Kristin did a great job at presenting it.
   - Great speaker

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3. **Advanced Training: C.3 Regulated Project Requirements**
Jill Bicknell, *EOA*

Very helpful **24** Somewhat helpful **4** Not helpful **1**

Comments

- Some parts were a bit more than my exposure, but I imagine I do need to get more knowledge in this department even though I may not directly use it in my work, but the knowledge definitely adds value to my work.
- I have seen this presentation quite a few times at this point
- The emphasis on sizing criteria can get a bit dry -- perhaps a little more break-up to that section?
- The fillable calculation sheet was a good improvement
- Mostly review information for me
- Excellent

4. **C.3 Regulated Project Compliance Review**
Peter Schultze-Allen, *EOA*

Very helpful **26** Somewhat helpful **4** Not helpful **0**

Comments

- This seems to be more in the area that I need knowledge in.
- I like the way that it showed a lot of examples with dos and don'ts. It is probably a good presentation to guide a designer to.
- I'm actually still a little perplexed on the "new" impervious surface definition as laid out in the C.3 checklist discussion. The checklist of common pitfalls was helpful.
- The colored C3/C6 form grid was very helpful
- Mostly review information for me
- Great

5. **Redwood City Example Project**
James O'Connell, *Redwood City*

Very helpful **27** Somewhat helpful **3** Not helpful **0**

Comments

- At this point, part of my plan reviews could be involved with different aspects of stormwater management. Seeing specific examples was great and felt more hands-on.
- I very much liked the presentation, particularly on the way the project had to be modified to adapt to real-world conditions as design progressed and the introduction/discussion of Silva Cells (and I am always impressed by the high level of requirements Redwood City applies to its projects). I admit I am a little disappointed that the project itself was a "special project" -- with rumors of removal of the category from MRP 3.0 abounding, I

would have liked an example of how C.3 was implemented on a challenging site (though the lessons from the example can obviously be applied to C.3).

- Not helpful for my particular work focus, but thought it was a good presentation.
- Looks like Silva Cells would be more popular. Need more information and guidance (fact sheet) if possible.
- Examples are always helpful
- Very good

6. What did you find most valuable from the webinar/workshop?

Comments

- Specific references to the regulations, calculations and how to use them on specific projects, design or plan review.
- The general introduction of the information - would prefer to have the slides earlier to review ahead of time. Information went pretty fast.
- Putting the presentation together, just because you forget a lot of details over the course of a project.
- More in-depth explanation of the forms since I wasn't too familiar with them.
- Great refresher and nice to see the case study presented as it provided pros and cons, what worked and what didn't.
- Example Reviews
- Basic refresher on C.3 design criteria and the different treatment measures
- The examples provided regarding the worksheets.
- I've been to these previous annual workshops and I always appreciate the basic C3 refreshers. I also think the pictures are very helpful visual aids for this sort of information heavy type of workshop.
- This presentation is much improved from previous workshops. Thank you.
- The updates, examples and the review of the processes
- Applications/examples of pervious areas
- Good refresher on the design criteria and Silva Cell product.
- Real life projects are always helpful case studies!
- Examples of where mistakes are made when filling out forms, etc.
- It's always helpful to be able to ask Peter, Jill, and Kristin questions. Thanks for your help.
- The examples and walking through them
- Example of what Redwood City is doing
- Good refresher and learned a few things.

7. **What would you like to see in future workshops/webinars?**

Comments

- I wonder if having a pdf of the presentation before the session could add value. That way, the audience might have specific, well-thought-of items that could use clarification. Just an idea.
- Information was great, just seemed to go too fast.
- More Silva Cell (or similar product) examples. I feel like there is still a lot of stuff to learn about newer facilities.
- Updates and new requirements if any; it was helpful to refresh when liner was used in the past and why it was no longer required or installed nowadays.
- Incorrect design of stormwater treatment measures and the fixed design
- I always appreciate lessons learned discussions. Everyone always talks about how filter fabric is bad, but where are the examples of early site implementation that show this failure? Overall presentation comment for webinars: I think adding extra presenters/voices helps improve audience retention for a remote presentation when so much of the experience is auditory.
- Other worksheet samples.
- Much of the same
- Some sort of resource regarding C.6 regulations/inspections
- Design constraints, site issues, conflicts and changes during construction
- Advanced topics
- More C3 regulated projects
- Examples from other cities and how they are complying with C.3 regulations

8. **Have you attended previous C.3 in-person workshops?**

Yes: **21** No: **6**

9. **Do you prefer webinars or in-person workshops?**

Webinar: **7** In-person: **7** No choice: **15**

10. **How did you view the webinar?**

Own my own: **30** In a group: **0**

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
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Annual "C.3" Workshop/Webinar

Part 2: Implementing Green Street Projects

Wednesday, June 17, 2020 9:00 AM – 12:30 PM

AGENDA

Arrival	9:00 am – 9:05 am
Welcome and Introduction Update on Green Suite and Flowstobay.org website	*Reid Bogert, SMCWPPP* 9:05 am – 9:30 am
1. Green Street Feasibility: Assessing Public Projects Initial desktop analysis and field assessment approaches	*Peter Schultze-Allen, EOA* 9:30 am – 10:25 am
BREAK	10:25 am – 10:30 am
2. Green Street Project Design Guidelines Key design features for bioretention, lessons learned, examples, and available resources	*Jill Bicknell, EOA* 10:30 am – 11:25 am
BREAK	11:25 am – 11:30 am
3. Green Street Operation and Maintenance Key operation requirements, maintenance practices, plant identification, plant maintenance practices, pervious pavement O&M, and using the GI Design Guide and other resources	*Peter Schultze-Allen, EOA* 11:30 am – 12:30 pm
ADJOURN	12:30 pm

Attendance C.3 Workshop June 17, 2020

	First Name	Last Name	Company
1	Anwarbeg	Mirza	City of Belmont
2	Craig	West	City of Belmont
3	Julia	Ayres	City of Brisbane
4	Keegan	Black	City of Brisbane
5	Ken	Johnson	City of Brisbane
6	Jeremiah	Robbins	City of Brisbane
7	Jennifer	Lee	City of Burlingame
8	Sibely	Calles	City of Daly City
9	Carmelisa	Morales	City of Daly City
10	Theresa	Avedian	City of Menlo Park
11	Eric	Hinkley	City of Menlo Park
12	Esther	Jung	City of Menlo Park
13	Clarence	Li	City of Menlo Park
14	Jason	Santos	City of Menlo Park
15	Jane	Kao	City of Millbrae
16	Helen	Gannon	City of Pacifica
17	James	O'Connell	City of Redwood City
18	Patti	Schrotenboer	City of Redwood City
19	Vicki	Sherman	City of Redwood City
20	Joanna	Kwok	City of San Bruno
21	Jacinta	Liang	City of San Bruno
22	Hae Won	Ritchie	City of San Bruno
23	Evan	Cai	City of San Carlos
24	Justin	Erickson	City of San Carlos
25	Sophia	Lee	City of San Carlos
26	Vatsal	Patel	City of San Carlos
27	Sven	Edlund	City of San Mateo
28	Richard	Kraft	City of San Mateo
29	Andrew	Wemmer	City of South San Francisco
30	Connie	Goldade	Community Design + Architecture

Attendance C.3 Workshop June 17, 2020

	First Name	Last Name	Company
31	John	Allan	County of San Mateo
32	Olivia	Boo	County of San Mateo
33	Summer	Burlison	County of San Mateo
34	Julie	Casagrande	County of San Mateo
35	Melody	Eldridge	County of San Mateo
36	Camille	Leung	County of San Mateo
37	Sina	Oshaghi	County of San Mateo
38	Ruemel	Panglao	County of San Mateo
39	John	Schabowski	County of San Mateo
40	Johnson	Young	County of San Mateo
41	Alex	Zhang	County of San Mateo
42	Kareem	Arabi	CSG Consultants
43	Cesar	Caronongan	CSG Consultants
44	Kelly	Carroll	CSG Consultants
45	Catherine	Chan	CSG Consultants
46	Jen	Chen	CSG Consultants
47	Son	Hoang	CSG Consultants
48	Sandra	Meditch	CSG Consultants
49	David	Seto	CSG Consultants
50	Mehdi	Sharifi	CSG Consultants
51	Katherine	Sheehan	CSG Consultants
52	Stephen	Tovmassian	CSG Consultants
53	Nick	Zigler	CSG Consultants
54	Reid	Bogert	SMCWPPP-C/CAG
55	Matt	Fabry	SMCWPPP-C/CAG
56	Muneer	Ahmed	Town of Colma
57	Irfan	Aziz	Town of Hillsborough
58	Natalie	Gribben	Town of Hillsborough

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Water Pollution Prevention Program
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EVALUATION SUMMARY

Attendance: 58
Evaluations: 21

SMCWPPP C.3 WORKSHOP/WEBINAR
Part 2 – Implementing Green Street Projects
Wednesday, June 17, 2020

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1. **Overall, how informative did you find the webinar?**
   Very helpful **19** Somewhat helpful **2** Not helpful **0**

   Comments
   - The pictures were very helpful in showing the items to consider when designing - especially regarding keeping long-term operations and maintenance in mind when designing.
   - Very informative and well presented
   - Pace of the seminar went well. It felt like the first seminar. I really enjoyed the visuals and thorough explanations of the visuals.
   - Well done! Good moderation of muting attendees (few distractions). Good pictures or drawings used as examples. Better in-depth discussion of current issues rather than the basic introductory discussions in the past.
   - Having quite a few actual field pictures gave a more complete perspective for the presentation.
   - I think this should be a recurring annual webinar, updated to reflect new examples and best practices.
   - Thank you for making this presentation smooth and easy to understand!
   - Perhaps we could make it a little more interactive instead of solely presentations, like quizzes or polls. Maybe have other guest speakers from cities and how they are implementing some of the requirements.

2. **Green Street Feasibility: Assessing Public Projects**
   Peter Schultze-Allen, *EOA*

   Very helpful **17** Somewhat helpful **4** Not helpful **0**

   Comments

- It was helpful to walk through the feasibility spreadsheet. It may be helpful to do a live example next time.
- Interesting - it shows there has been a lot of thought and effort in beefing up resources with a Green Street focus.
- Would like a link to the curb extension/bulb-out feasibility tool (did not see it in FlowstoBay website).
- Having field pictures/examples was helpful.

3. Green Street Project Design Guidelines
Jill Bicknell, *EOA*

Very helpful **17** Somewhat helpful **4** Not helpful **0**

Comments

- Not a lot of new information for me, but a good refresher.
- Good examples of what not to do and pictures to show. Wish some of the contractors attended.
- Once again, using examples did help.
- Consider splitting this out as it's own presentation and workshop

4. Green Street Operation and Maintenance
Peter Schultze-Allen, *EOA*

Very helpful **19** Somewhat helpful **2** Not helpful **0**

Comments

- The pictures were very helpful in showing the items to consider when designing, especially regarding keeping long-term operations and maintenance in mind when designing.
- It seems like it would be helpful to have yearly trainings that could be held for City arborists and Parks staff if possible, especially since there is more maintenance that may be expected of City staff.
- Might discuss how maintenance can be enforced when not the municipalities' responsibility (O&M Agreements - legal language vs. reality similar to LID when dealing with private owner, HOA, etc.). Maybe just enforcement in general and timeframe for compliance that is appropriate (it's going to be longer than 10 business days).
- Great tips.

5. What did you find most valuable from the webinar/workshop?

Comments

- Going over the assessment tool.
- Picture examples of what works and what does not.
- The photos and documents presented and going through them.

- Reid's introduction presentation as it was the "newest" information for me in terms of familiarity with workshop topics.
- All presentations used references/examples from the Green Suite and reinforced the idea that many answers can be found there. Sometimes that is not my first go-to, but it will be now.
- I have been exposed to a few webinars and the old workshops before. In this one, in addition to covering sources for information, the presentations seemed to have included a lot more field examples that really add value to the whole sessions.
- Love the examples of less than ideal conditions and thoughts on how sites can be improved.
- Picture and design examples are great.

6. GI What would you like to see in future workshops/webinars?

Comments

- How to read plans to inspect for stormwater.
- Maybe take the criteria/evaluation process used for the current County RFP to find Regional Projects and train the cities to see if they can use it to develop their own projects.
- Not sure if it was just on my screen, but I think it would be helpful if the mouse pointer arrow on the screen was even a little bigger and maybe a bright fluorescent color. It was hard to follow the arrow on photos that were darker with the black arrow, more helpful with the white outline though.
- Enforcement: how it differs from C.4/C.5 and timelines for compliance.
- Obstacles and methods employed to overcome them.
- Assessing system performance: Are there any techniques to assess LID systems other than visual observations? One example is the "bucket test" (ASTM Method) for permeable pavers that measures the permeability to see if the void space has been filled with sediment and no longer drains. Anything for bioretention or flow through planters other than being present during a steady rainfall to see how it performs.
- Some very basic points such as where you start from, etc.
- Case studies or examples from other cities. Peer to peer learning.

7. Have you attended previous C.3 in-person workshops?

Yes: **16** No: **5**

8. Do you prefer webinars or in-person workshops?

Webinar: **7** In-person: **3** No Preference: **11**

Appendix 4

- CII Subcommittee – Attendance List for FY 2019/20
- BMP Brochure for Food Service Facilities
- BMP Brochure for Vehicle Service Facilities

SMCWPPP Commercial/Industrial/Illicit Discharge (CII) Subcommittee Attendance – FY 2019/20

Name	Agency	9/18/19	12/18/19	3/3/20	6/2/20
Jake Garcia	City of Atherton				✓
Bozhena Palatnik	City of Belmont		✓		✓
Keegan Black	City of Brisbane		✓		✓
Jennifer Lee	City of Burlingame	✓	✓	✓	✓
Dan Ferah	City of Burlingame (Veolia)	✓	✓	✓	✓
Louis Gotelli	City of Colma				✓
Sibely Calles	City of Daly City			✓	✓
Ward Donnelly	City of Daly City	✓	✓	✓	✓
June Canter	City of East Palo Alto			✓	
Stephanie MacDonald	City of Foster City	✓	✓	✓	
Vivian Ma	City of Foster City	✓		✓	✓
Clarence Li	City of Menlo Park	✓	✓	✓	✓
Cliff Ly	City of Millbrae			✓	
Lawrence Henriquez	City of Pacifica			✓	
Oscar Murillo	City of Redwood City			✓	
Robin Kim	City of Redwood City			✓	
Vicki Sherman	City of Redwood City				✓
Sven Edlund	City of San Mateo	✓		✓	✓
Kathryn Robertson	City San Carlos		✓		
Breann Liebermann	County of San Mateo	✓			
John Allan	County of San Mateo		✓	✓	✓
Pat Ledesma	County of San Mateo	✓	✓	✓	
Susan Hiestand	Silicon Valley Clean Water (SVCW)		✓	✓	✓
Daniel Garza	South San Francisco	✓		✓	✓
Nick Zigler	CSG for Colma/Half Moon Bay				✓
Kelly Carroll	CSG for Colma/Half Moon Bay/Portola Valley	✓		✓	✓
Kristin Kerr	EOA	✓	✓	✓	✓

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BEST MANAGEMENT PRACTICES FOR

FOOD SERVICE FACILITIES

Information for Restaurants | Cafeterias | Grocery Stores | Food Handling Facilities

Storm drains flow directly into creeks, San Francisco Bay and the Pacific Ocean without any treatment. Non-stormwater and other wastes that flow into a storm drain cause pollution. Food handling facilities can cease stormwater pollution through proper cleanup practices that ensure food particles, oil and grease, litter, wash water and cleaning products flow to interior sewer connections, which ensures the water is treated prior to being released.

NEVER RINSE OUTDOOR AREA WITH HOSE

Only rain water is allowed down the storm drains, because storm drains connect directly to local creeks.

It is the responsibility of your business to use appropriate Best Management Practices (BMPs) to keep wind or rain from carrying pollution into the street.

Roofed trash enclosure with doors closed. Bilingual sign reminds staff to keep area tidy.

Dumpster lid is closed, and there is no loose trash on ground.

GENERAL BEST MANAGEMENT PRACTICES

Keep Dumpster Area Clean

- ☐ Close dumpster lids.
- ☐ Routinely inspect dumpster area for cleanliness.
  - If dumpsters overfill, consider having more dumpsters, or increasing trash pick-up service.
  - Replace leaking or cracked dumpsters.
  - If loose waste is on the ground, then sweep up.
- ☐ Educate all staff on keeping dumpster areas tidy. With high rates of employee turnover, or when sharing a dumpster area, post signs or have routine meetings on proper BMPs.

Cooking Oil & Grease

- ☐ Store oil and grease properly in permitted tallow bins; never pour oil or grease in the trash, storm drain, street, sinks or floor drains.
- ☐ Keep tallow bins clean & lids sealed.
- ☐ Have tallow bin collection scheduled to maintain adequate storage capacity.
- ☐ Check rooftop exhaust fans at least monthly. Place tray under exhaust fan shrouds to collect oil; empty weekly at a minimum.
- ☐ Clean up spills right away (See back of this sheet).

Manage Outdoor Areas (Parking Lots, Outdoor Seating, Staff Break Areas, Outdoor Storage)

- ☐ Empty trash bins into dumpster regularly.
- ☐ Sweep frequently in trash-prone places.
- ☐ If frequent litter issues, consider adding trash cans.
- ☐ Place ash trays in cigarette-prone areas.

Outdoor seating area is swept frequently, is covered, and has fencing to keep debris from blowing into the street.

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BEST MANAGEMENT PRACTICES FOR

FOOD SERVICE FACILITIES

Information for Restaurants | Cafeterias | Grocery Stores | Food Handling Facilities

Properly cleaning and disposing of wash waters helps prevent pollution.

CLEANING BEST MANAGEMENT PRACTICES

Use Dry Cleaning Methods

- ☐ Sweep up dust, debris, and trash.
- ☐ Vacuum floor mats. If water is needed, rinse mats in dishwasher or mop utility sink. Never wash floor mats outdoors or allow wash water to flow to outdoor areas.
- ☐ Do not clean equipment outdoors.
- ☐ When hiring cleaning companies (e.g. for cleaning hood/roof equipment), make sure the company uses dry cleaning methods. If wet methods are used, block off gutters & use a pump/wet-vac, so no water spills off roof.

Sweeping is an example of a dry cleaning method.

Contain and Manage Spills Promptly

- ☐ Keep a spill kit near high risk areas (e.g. near oil tallow bins, loading dock). Kit may include: Barrier/Sock, Storm Drain Inlet Protection; Absorbent granules or kitty litter, Towels, Pads; Dustpan, Broom, Gloves, Trash Bags.
- ☐ Contain the spill and protect nearby storm drains immediately.
- ☐ Use absorbents/towels to manage spill. Sweep up and dispose of properly.
- ☐ Make sure staff know spill plan and spill kit location.

Never rinse water down storm drains.

STORM DRAINS VS. SANITARY SEWERS:

Do your employees know the difference?

All **outdoor drains** are storm drains. Pollution that enters storm drains flows directly to creeks and San Francisco Bay or the Ocean, not treated or properly cleaned.

Indoor drains (such as sink, toilet, mop sink, kitchen floor drain) lead to the sanitary sewer system, which is connected to a wastewater treatment plant.

Mop sinks go to the sanitary sewer and wastewater treatment plant.

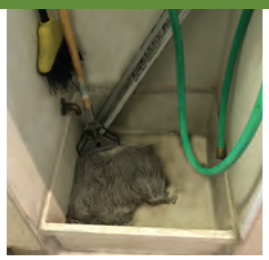

LOCAL STORMWATER AGENCIES:

Atherton	(650) 752-0555	Foster City	(650) 286-3270	Redwood City	(650) 780-7477
Belmont	(650) 637-2972	Half Moon Bay	(650) 726-7177	San Bruno	(650) 616-7020
Brisbane	(415) 508-2130	Hillsborough	(650) 375-7444	San Carlos	(650) 802-4212
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Daly City	(650) 991-8208	Pacifica	(650) 738-3769	South San Francisco	(650) 877-8555
East Palo Alto	(650) 372-3189	Portola Valley	(650) 851-1700	Woodside	(650) 851-6790

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最佳管理办法–

餐饮服务设施

餐厅 | 自助餐厅 | 杂货店 | 食品加工设施相关信息

暴雨排水道的水未经任何处理直接流入小河、旧金山湾和太平洋。非雨水和其他废物排入暴雨排水道会造成污染。食品加工设施可以通过采取适当的清洁措施来阻止雨水污染，确保食物颗粒、油脂、垃圾、洗涤水和清洁产品流向内部下水道，从而确保水在排放前得到处理。

切勿用软管冲洗室外区域

只有雨水才允许流入暴雨排水道，
因为暴雨排水道与当地小河直接相连。

您的企业有责任采取适当的最佳管理办法（Best Management Practices, BMPs），防止风或雨水把污染物带到街上。

带盖的垃圾箱，门关闭。用双语标示牌提醒员工保持区域干净整洁。

盖上垃圾桶盖子，地面无散落的垃圾。

通用最佳管理办法–

保持垃圾桶区域清洁

- ☐ 关闭垃圾桶盖子。
- ☐ 定期检查垃圾桶区域是否干净。
  - 如果垃圾桶太满，考虑多放一些垃圾桶，或者增加垃圾回收服务。
  - 更换漏水或破裂的垃圾桶。
  - 如果地上有散落的垃圾，则应打扫干净。
- ☐ 教育所有员工保持垃圾桶区域干净整洁。在员工流动性大，或者在共用垃圾桶的区域，就“最佳管理办法”张贴告示或召开例会。

食用油和油脂

- ☐ 将油和油脂妥善存放在许可的油桶中；切勿将油或油脂倒入垃圾桶、下水道、街道、水槽或地漏。
- ☐ 保持油桶干净，盖好盖子。
- ☐ 定期收集油桶，保持足够的储存容量。
- ☐ 至少每月检查一次屋顶排气扇。将托盘放在排气扇罩下方收集漏油；每周至少清空一次。
- ☐ 立即清理溢出物（见本页背面）。

管理室外区域（停车场、室外座椅、员工休息区、室外仓库）

- ☐ 定期清空垃圾桶，把垃圾倒进垃圾箱。
- ☐ 经常打扫垃圾较多的地方。
- ☐ 如果经常出现乱扔垃圾的问题，考虑添加垃圾桶。
- ☐ 把烟灰缸放在吸烟区。

经常打扫和遮盖室外座椅区，并设围栏，防止碎屑被吹到街上。

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最佳管理办法–

餐饮服务设施

餐厅 | 自助餐厅 | 杂货店 | 食品加工设施相关信息

正确清洁和妥善处理洗涤水，有助于防止污染。

关于清洁的最佳管理办法–

采用干洗法

- 清扫灰尘、碎屑和垃圾。
- 用吸尘器吸干净地垫。如需用水，在洗涤槽或拖把公用水槽把垫子洗干净。切勿在室外清洗地垫或让洗涤水流向室外区域。
- 切勿在室外清洗设备。
- 在雇用保洁公司时（例如清洗盖子/屋顶设备），确保公司使用干洗法。如果采用湿洗法，请堵住排水沟，并使用泵式/除湿真空吸尘器，以免屋顶漏水。

清扫是其中一种干洗法。

及时控制和管理溢出物

- 在高风险区域附近（例如，靠近油桶、灌油台）放置一套防溢工具。整套防溢工具包括：屏障/袜子、暴雨排水道进水口保护装置；吸收性颗粒或猫砂、毛巾、垫子；簸箕、扫帚、手套、垃圾袋。
- 立即盛装溢出物并防止进入周边的防洪排水道。
- 使用吸收剂/毛巾处理溢出物。擦干净并妥善处理。
- 确保员工均知晓防溢计划和防溢工具的位置。

切勿将水冲到下水道。

暴雨排水道与生活污水管道：

您的员工知道两者的区别吗？

所有**室外排水道**均为暴雨排水道。进入暴雨排水道的污水未经处理或适当清洁，直接流入小河和旧金山湾或大海。

室内排水道（如水槽、马桶、拖把洗涤槽、厨房地漏）通向与污水处理厂相连的生活污水管道系统。

拖把洗涤槽通往生活污水管道和污水处理厂。

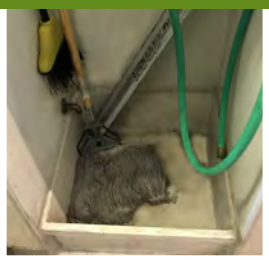

地方雨水管理机构：

Atherton	(650) 752-0555	Foster City	(650) 286-3270	Redwood City	(650) 780-7477
Belmont	(650) 637-2972	Half Moon Bay	(650) 726-7177	San Bruno	(650) 616-7020
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MEJORES PRÁCTICAS DE GESTIÓN PARA

ESTABLECIMIENTOS CON SERVICIO DE COMIDA

Información para restaurantes | Cafeterías | Tiendas de comestibles | Establecimientos con manipulación de alimentos

Los drenajes pluviales fluyen directamente hacia los arroyos, la bahía de San Francisco y el Océano Pacífico sin ningún tratamiento. Las aguas no pluviales y otros desechos que fluyen hacia un drenaje pluvial causan contaminación. Los establecimientos con manipulación de alimentos pueden terminar con la contaminación de las aguas pluviales mediante prácticas de limpieza adecuadas que garantizan que las partículas de alimentos, el aceite y la grasa, la basura, el agua de lavado y los productos de limpieza fluyan a las conexiones interiores de alcantarillado, lo que garantiza que el agua reciba tratamiento antes de ser liberada.

NUNCA ENJUAGUE EL ÁREA EXTERIOR CON MANGUERA

Solo se permite el agua de lluvia por los drenajes pluviales, ya que los drenajes pluviales se conectan directamente a los arroyos locales.

Es responsabilidad de su empresa utilizar las Mejores Prácticas de Gestión (Best Management Practices, BMPs) apropiadas para evitar que el viento o la lluvia contaminen la calle.

Recinto para la basura techado con puertas cerradas. El letrero bilingüe le recuerda al personal mantener el área ordenada.

La tapa del contenedor está cerrada y no hay basura suelta en el suelo.

MEJORES PRÁCTICAS DE GESTIÓN GENERALES

Mantenga limpia el área del contenedor

- ☐ Cierre las tapas del contenedor.
- ☐ Inspeccione rutinariamente el área del contenedor para ver si está limpio.
  - Si los contenedores están demasiado llenos, considere tener más contenedores o aumentar el servicio de recolección de residuos.
  - Reemplace los contenedores con fugas o que estén agrietados.
  - Si hay residuos sueltos en el suelo, barra.
- ☐ Capacite a todo el personal sobre mantener las áreas de contenedores ordenados. Con altas tasas de rotación de empleados o cuando comparta un área de contenedores, publique letreros o tenga reuniones rutinarias acerca de las BMP adecuadas.

Aceite de cocina y grasa

- ☐ Almacene el aceite y la grasa correctamente en los recipientes de sebo permitidos; nunca vierta aceite ni grasa en la basura, drenaje pluvial, calle, fregaderos o drenajes de pisos.
- ☐ Mantenga los contenedores de sebo limpios y las tapas selladas.
- ☐ Tenga la recolección de contenedores de sebo programada para mantener una capacidad de almacenamiento adecuada.
- ☐ Revise los ventiladores de extracción en la azotea al menos una vez al mes. Coloque la bandeja debajo de las cubiertas del ventilador de extracción para recoger el aceite; vacíelo al menos una vez por semana.
- ☐ Limpie los derrames de inmediato (consulte la parte posterior de esta hoja).

Control de áreas al aire libre (estacionamientos, asientos al aire libre, áreas de descanso del personal, almacenamiento al aire libre)

- ☐ Vacíe los contenedores de basura en el contenedor de basura periódicamente.
- ☐ Barra con frecuencia en lugares propensos a la basura.
- ☐ Si tiene problemas frecuentes con la basura, considere agregar botes de basura.
- ☐ Coloque ceniceros en áreas propensas a cigarrillos.

La zona de asientos al aire libre se barre con frecuencia, está cubierta y tiene cerca para evitar que los residuos vayan hacia la calle.

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MEJORES PRÁCTICAS DE GESTIÓN PARA

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Limpiar y desechar adecuadamente las aguas de lavado ayuda a prevenir la contaminación.

MEJORES PRÁCTICAS DE CONTROL DE LIMPIEZA

Use métodos de limpieza en seco

- ☐ Barra el polvo, los residuos y la basura.
- ☐ Aspire las alfombras de los pisos. Si se necesita agua, enjuague las alfombras en el lavavajillas o el fregadero de servicio. Nunca lave las alfombras del piso al aire libre ni permita que el agua de lavado se vierta al exterior.
- ☐ No limpie el material al aire libre.
- ☐ Al contratar empresas de limpieza (p. ej., para la limpieza de equipos de campana/techo), asegúrese de que la empresa utilice métodos de limpieza en seco. Si se utilizan métodos húmedos, bloquee las canaletas y utilice una bomba/vacío húmedo, para que no se derrame agua del techo.

Barrer es un ejemplo de un método de limpieza en seco.

Contenga y controle los derrames rápidamente

- ☐ Mantenga un kit de derrames cerca de áreas de alto riesgo (p, ej., cerca de contenedores de sebo de aceite, muelle de carga). El kit puede incluir: Barrera/calcetín, protección de entrada de drenaje de tormenta; gránulos absorbentes o piedras sanitarias, toallas, almohadillas; pala, escoba, guantes, bolsas de basura.
- ☐ Contenga el derrame y proteja inmediatamente los drenajes pluviales cercanos.
- ☐ Use absorbentes/toallas para gestionar el derrame. Barra y deseche correctamente.
- ☐ Asegúrese de que el personal conozca el plan de derrames y la ubicación del kit de derrames.

Nunca enjuague el agua por los drenajes pluviales.

DRENAJES DE TORMENTA COMPARADOS CON ALCANTARILLADOS SANITARIOS:

¿Sus empleados conocen la diferencia?

Todos los **drenajes al aire libre** son drenajes pluviales. La contaminación que entra en los drenajes pluviales fluye directamente a los arroyos y la bahía de San Francisco o al océano sin recibir el tratamiento o la limpieza adecuada.

Los drenajes interiores (como fregadero, inodoro, fregadero, drenaje del piso de la cocina) conducen al sistema de alcantarillados sanitarios, que está conectado a una planta de tratamiento de aguas residuales.

Los fregaderos van a la planta de tratamiento de alcantarillados sanitarios y aguas residuales.

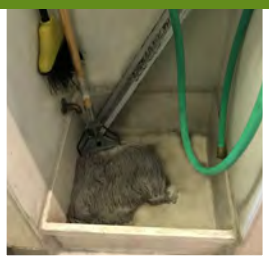

AGENCIAS LOCALES DE AGUAS PLUVIALES:

Atherton	(650) 752-0555
Belmont	(650) 637-2972
Brisbane	(415) 508-2130
Burlingame	(650) 342-3727
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BEST MANAGEMENT PRACTICES FOR

VEHICLE SERVICES

Information for Vehicle Repair | Refueling | Washing | Detailing | Automotive Service Facilities

Storm drains flow directly into creeks, San Francisco Bay and the Pacific Ocean without any treatment. Non-stormwater and other wastes that flow into a storm drain cause pollution.

Vehicle service facilities can stop stormwater pollution through proper cleanup, storage and best management practices (BMPs) that ensure oils, antifreeze, soapy water, tires, brake dust and other debris stay out of the streets and local waterways. Help keep our county clean! Use these BMPs to keep wind or rain from carrying pollution into the street.

ONLY RAIN DOWN THE STORM DRAIN

Only rain water is allowed down storm drains, because storm drains connect directly to local creeks, the San Francisco Bay and Ocean

STORAGE AND DISPOSAL

Batteries, antifreeze, oil filters, used tires, new or used car parts, and vehicle waste

- ☐ Store items indoors to keep rainfall from coming into contact with items and carrying pollutants into storm drains.
- ☐ If storing items outdoors, prevent contact with rainwater and runoff by doing ALL of the following:
  1. **Cover** with a tarp or roofed area;
  2. **Elevate** on a rack, shelf or pallet; and
  3. **Contain** fluids or wastes in closed, labeled containers with proper secondary containment.
- ☐ Plan regular waste pick-ups with special haulers (e.g. tire hauler, oil recycler, scrap metal recycler, battery recycler, hazardous waste pick-up).

Good Storage: *Tires are stored indoors, behind roll-down door*

GENERAL BEST MANAGEMENT PRACTICES

Protect outdoor areas from pollution

- ☐ Perform all work indoors liquids or small debris might be spilled (e.g. painting, vehicle repairs, parts changing, brake removal, oil changing, vehicle washing, sanding, metal filing).
- ☐ Store items indoors whenever possible. If unable to store items indoors, then always COVER, ELEVATE and CONTAIN materials to protect from contact with rain.
- ☐ Keep outdoor areas free of prohibited discharges: trash, oil/chemical spills, debris, and hose water.
- ☐ Train all staff on BMPs, and post signs in common areas to remind staff of BMPs (e.g. "Always keep dumpster lids closed" near the dumpster area, and "No washing, flows to bay" near a storm drain inlet).

Routinely clean and maintain your facility

- ☐ Do not discharge wash water or hose sidewalks off into the street, gutters or storm drains.
- ☐ Perform maintenance to prevent storm drain clogging.
- ☐ Parking areas, access roads and fueling areas should be free of trash, oil/ liquid stains and debris.
- ☐ Dumpsters should not be over-filled, and lids should be closed.
- ☐ Waste storage areas should be tidy and well-labeled.
- ☐ Sweep or vacuum up shop floor frequently.

Good Storage: *Items are COVERED and ELEVATED*

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BEST MANAGEMENT PRACTICES FOR

VEHICLE SERVICES

Information for Vehicle Repair | Refueling | Washing | Detailing | Automotive Service Facilities

VEHICLE/EQUIPMENT WASHING

- ☐ Keep vehicle wash/rinse water out of the storm drain.
- ☐ Contain all wash water.
- ☐ Wash vehicles, engines and parts in a designated wash area that is roofed, bermed, and drains to the sanitary sewer through an oil/water separator.
- ☐ Alternatively, take vehicles to a commercial car wash.

SPILL PREVENTION AND CLEAN UP

- ☐ Never let fluids flow into a storm drain or accumulate on surfaces.
- ☐ Inspect vehicles frequently for drips. Drain fluids from leaking or wrecked vehicles immediately.
- ☐ Use drip pans, secondary containment and absorbents to control leaking vehicles and spills.
- ☐ When pouring liquids, use a funnel to prevent drips and spills.
- ☐ Have a labeled spill kit near areas with the potential for spills. Spill kit should include towels/absorbents and instructions.
- ☐ Clean up spills immediately with rags, absorbents, etc. Dispose of used absorbent/rags in appropriate containers.
- ☐ Use dry cleaning practices (e.g. sweep, shop vac).

Good Spill Preparation: *Spill kit with absorbents, towels, berms, storm drain covers and instructions*

STORM DRAIN VS. SANITARY SEWERS:

Do your employees know the difference?

All outdoor drains are storm drains. Pollutants that runs off sidewalks, alleys, and street gutters flows into storm drains. This water flows directly to creeks and the San Francisco Bay or Pacific Ocean, not treated or properly cleaned.

Indoor drains (such as sink, toilet, mop sink) lead to the sanitary sewer system, which is connected to a wastewater treatment plant.

Properly cleaning and disposing of wash waters helps prevent pollution.

Never let fluids flow into a storm drain

LOCAL STORMWATER AGENCIES:

Atherton	(650) 752-0555
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San Mateo County	(650) 372-6200
South San Francisco	(650) 877-8555
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最佳管理办法–

车辆服务

车辆维修 | 加油 | 清洗 | 彻底清洗 | 汽车服务设施相关信息

暴雨排水道的水未经任何处理直接流入小河、旧金山湾和太平洋。非雨水和其他废物排入暴雨排水道会造成污染。

车辆服务设施可以通过采取适当的清洁、储存和最佳管理办法 (BMPs) 来阻止雨水污染，确保不让机油、防冻液、肥皂水、轮胎、刹车灰尘和其他碎屑进入街道和本地水道。帮助保持我们县城干净整洁！采取这些最佳管理办法，防止让风或雨水把污染物带到街上。

只有雨水 才能进入暴雨排水道

只有雨水才允许流入暴雨排水道，因为暴雨排水道与当地小河、旧金山湾和大海直接相连。

的存放和处置

电池、防冻液、机油滤清器、旧轮胎、新的或旧的汽车零件和车辆废物

- ☐ 将物品存放在室内，防止雨水接触物品并将污染物带入暴雨排水道。
- ☐ 如果将物品存放在室外，请执行以下所有操作来防止接触雨水和径流：
  1. 用防水布**遮盖**或置于有顶棚的地方
  2. 用支架、架子或托盘**支起**；以及
  3. 将液体或废物**盛放**在带有标签并经过适当二次包装的封闭容器中。
- ☐ 计划使用专用运输装置定期收集废物（如轮胎运输车、机油回收装置、废金属回收装置、电池回收装置、危险废物回收装置）。

妥善保存：将轮胎存放在室内和防滚翻门后

通用最佳管理办法

保护室外区域免受污染

- ☐ 在室内进行所有工作，以防液体或小碎屑溢出（例如喷漆、车辆维修、零件更换、制动器拆卸、换机油、车辆清洗、打磨、金属锉削）。
- ☐ 尽可能将物品存放在室内。如果无法将物品存放在室内，则应始终遮盖、支起并包装好材料，以防与雨水接触。
- ☐ 保持室外区域无禁止排放的物品：垃圾、机油/化学品溢出物、碎屑和软管水。
- ☐ 给所有员工进行 BMPs 培训，并在公共区域张贴告示，提醒员工遵守 BMPs（例如“始终保持垃圾桶区域附近的垃圾桶盖关闭”，并且暴雨排水道入水口附近设置“洗涤水不得流入海湾”）。

定期清洁和维护您的设施

- ☐ 切勿将洗涤水或软管从人行道排入街道、排水沟或暴雨排水道。
- ☐ 进行维护，防止暴雨排水道堵塞。
- ☐ 停车场、通道和加油区应无垃圾、油渍/液体污渍和碎屑。
- ☐ 垃圾箱不要装太满，盖子应关闭。
- ☐ 垃圾存放区应保持干净整洁，并贴好标签。
- ☐ 经常清扫或用吸尘器吸干净车间的地面。

妥善保存：将物品遮盖或支起

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最佳管理办法–

车辆服务

车辆维修 | 加油 | 清洗 | 彻底清洗 | 汽车服务设施相关信息

车辆/设备清洗

- ☐ 勿让洗车水流入暴雨排水道。
- ☐ 截留所有洗涤水。
- ☐ 在指定的有顶棚和护道的清洗区域内清洗车辆、发动机和零件，并通过油水分离装置排到生活污水管道。
- ☐ 或者，把车开到洗车店。

防溢和清理

- ☐ 切勿让液体流入暴雨排水道或积聚在表面。
- ☐ 经常检查车辆是否有滴水。立即从漏液或损坏的车辆中排出液体。
- ☐ 使用滴水盘、二次密封和吸收剂来控制漏液车辆和溢出物。
- ☐ 倒液体时，使用漏斗防止滴漏和溢出。
- ☐ 在可能发生漏液的区域附近放置一个贴有标签的防溢工具箱。防溢工具箱应包括毛巾/吸收剂和说明。
- ☐ 立即用抹布、吸收剂等清理溢出物。将用过的吸收剂/抹布放入合适的容器中处理。
- ☐ 使用干洗法（例如清扫、车间吸尘器）。

暴雨排水道与生活污水管道：

您的员工知道两者的区别吗？

所有室外排水道均为暴雨排水道。污染物流经人行道、小巷和街道排水沟，进入暴雨排水道。这些水未经处理或适当清洁就直接流入小河和旧金山湾或太平洋。

室内排水道（如水槽、马桶、拖把洗涤槽）通向与污水处理厂相连的生活污水管道系统。

正确清洁和妥善处理洗涤水，有助于防止污染。

做好防溢准备：带吸收剂、毛巾、护道、暴雨排水道盖子和说明的防溢工具箱

切勿让液体流入暴雨排水道

地方雨水管理机构：

Atherton	(650) 752-0555	Foster City	(650) 286-3270	Redwood City	(650) 780-7477
Belmont	(650) 637-2972	Half Moon Bay	(650) 726-7177	San Bruno	(650) 616-7020
Brisbane	(415) 508-2130	Hillsborough	(650) 375-7444	San Carlos	(650) 802-4212
Burlingame	(650) 342-3727	Menlo Park	(650) 330-6750	San Mateo	(650) 522-7349
Colma	(650) 757-8888	Millbrae	(650) 259-2392	San Mateo County	(650) 372-6200
Daly City	(650) 991-8208	Pacifica	(650) 738-3767	South San Francisco	(650) 877-8555
East Palo Alto	(650) 372-3189	Portola Valley	(650) 851-1700	Woodside	(650) 851-6790

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MEJORES PRÁCTICAS DE GESTIÓN PARA

SERVICIOS PARA VEHÍCULOS

Información para la reparación de vehículos | Reabastecimiento de combustible | Lavado | Limpieza a fondo | Establecimientos de servicio automotriz

Los drenajes pluviales fluyen directamente hacia los arroyos, la bahía de San Francisco y el Océano Pacífico sin ningún tratamiento. Las aguas no pluviales y otros desechos que fluyen hacia un drenaje pluvial causan contaminación.

Los establecimientos de servicio de vehículos pueden detener la contaminación de las aguas pluviales a través de las adecuadas prácticas de limpieza, almacenamiento y gestión (BMPs) que garantizan que los aceites, el anticongelante, el agua jabonosa, los neumáticos, el polvo de los frenos y otros desechos se mantengan fuera de las calles y las vías fluviales locales. ¡Ayude a mantener nuestro condado limpio! Utilice estas BMP para evitar que el viento o la lluvia lleven contaminación a la calle.

SOLO AGUA DE LLUVIA POR EL DRENAJE PLUVIAL.

Solo el agua de lluvia se permite por los drenajes pluviales porque los drenajes pluviales se conectan directamente a los arroyos locales, la bahía de San Francisco y el océano

ALMACENAMIENTO Y DESECHO

Baterías, anticongelante, filtros de aceite, neumáticos usados, piezas de automóviles nuevas o usadas y residuos de vehículos

- ☐ Almacene los artículos en el interior para evitar que el agua de lluvia entren en contacto con los artículos y lleven los contaminantes a los drenajes pluviales.
- ☐ Si almacena artículos al aire libre, evite el contacto con el agua de lluvia y vertidos mediante TODAS las siguientes acciones:
  1. **Cubra** con una lona o utilice un área cubierta;
  2. **Eleve** en una repisa, estante o palet y
  3. **Contenga** líquidos o desechos en recipientes cerrados y etiquetados con la contención adicional adecuada.
- ☐ Planifique recolecciones regulares de residuos con transportistas especiales (p. ej. transportista de neumáticos, reciclador de aceite, reciclador de chatarra, reciclador de baterías, recolección de residuos peligrosos).

Almacenamiento adecuado: *Los neumáticos se almacenan en el interior, detrás de la puerta enrollable*

MEJORES PRÁCTICAS DE GESTIÓN GENERALES

Proteja las áreas exteriores de la contaminación

- ☐ Realice todo el trabajo en interiores o es posible que los líquidos o pequeños desechos se derramen (p. ej., pintura, reparaciones de vehículos, cambio de piezas, eliminación de frenos, cambio de aceite, lavado de vehículos, lijado, limaduras de metal).
- ☐ Almacene los artículos en el interior siempre que sea posible. Si no puede almacenar los artículos en interiores, siempre CUBRA, ELEVE y CONTENGA materiales para protegerlos del contacto con la lluvia.
- ☐ Mantenga las áreas al aire libre libres de descargas prohibidas: basura, derrames de petróleo/químicos, escombros y agua de manguera.
- ☐ Capacite a todo el personal acerca de las BMPs y disponga letreros en áreas comunes para recordarle al personal las BMPs (p. ej., “Mantenga siempre las tapas de los contenedores cerradas” cerca del área del contenedor de basura y “Prohibido lavar, desagota en la bahía” cerca de una entrada de drenaje pluvial).

Limpie habitualmente y mantenga limpio su establecimiento

- ☐ No descargue el agua de lavado ni de las mangueras de las aceras en la calle, alcantarillas ni drenajes pluviales.
- ☐ Realice el mantenimiento para evitar la obstrucción del drenaje pluvial.
- ☐ Las áreas de estacionamiento, las carreteras de acceso y las áreas de combustible deben estar libres de basura, manchas de aceite/líquido y escombros.
- ☐ Los contenedores no deben llenarse en exceso y las tapas deben cerrarse.
- ☐ Las áreas de almacenamiento de residuos deben estar ordenadas y bien etiquetadas.
- ☐ Barra o aspire el piso de la tienda con frecuencia.

Almacenamiento adecuado: *Los artículos están CUBIERTOS y ELEVADOS*

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MEJORES PRÁCTICAS DE GESTIÓN PARA

SERVICIOS PARA VEHÍCULOS

Información para la reparación de vehículos | Reabastecimiento de combustible | Lavado | Limpieza a fondo | Establecimientos de servicio automotriz

LAVADO DE VEHÍCULOS/EQUIPOS

- ☐ Mantenga el agua del lavado/enjuague de vehículos fuera del drenaje pluvial.
- ☐ Contenga toda el agua de lavado.
- ☐ Lave los vehículos, motores y piezas en un área de lavado designada que esté cubierta, contenida y drene hasta el alcantarillado sanitario a través de un separador de aceite/agua.
- ☐ Como alternativa, lleve vehículos a un lavado de autos comercial.

PREVENCION DE DERRAMES Y LIMPIEZA

- ☐ Nunca permita que los fluidos desemboquen en un drenaje pluvial ni se acumulen en las superficies.
- ☐ Revise los vehículos con frecuencia en busca de goteos. Escurra los fluidos de los vehículos con fugas o rotos inmediatamente.
- ☐ Utilice bandejas de goteo, contenedores adicionales y absorbentes para controlar los vehículos con fugas y derrames.
- ☐ Cuando vierta líquidos, utilice un embudo para evitar goteos y derrames.
- ☐ Tenga un kit de derrames etiquetado cerca de áreas con posibilidad de derrames. El kit de derrames debe incluir toallas/absorbentes e instrucciones.
- ☐ Limpie los derrames inmediatamente con trapos, absorbentes, etc. Deseche los absorbentes/trapos usados en recipientes apropiados.
- ☐ Utilice las prácticas de limpieza en seco (p. ej., escoba, aspiradora de la tienda).

Buena preparación para derrames: *Kit de derrame con absorbentes, toallas, contenedores, cubiertas de drenaje de tormenta e instrucciones*

DRENAJE DE TORMENTA COMPARADO CON ALCANTARILLADO SANITARIO:

¿Conocen sus empleados la diferencia?

Todos los drenajes al aire libre son drenajes pluviales. Los contaminantes que corren por las aceras, callejones y alcantarillas de las calles fluyen hacia los drenajes pluviales. Esta agua fluye directamente a los arroyos y la Bahía de San Francisco o al Océano Pacífico, sin recibir el tratamiento o la limpieza adecuada.

Los drenajes interiores (como lavabo, inodoro, fregadero) conducen al sistema de alcantarillado sanitario que está conectado a una planta de tratamiento de aguas residuales.

Limpiar y desechar adecuadamente las aguas de lavado ayuda a prevenir la contaminación.

Nunca permita que los fluidos desemboquen en un drenaje pluvial.

AGENCIAS LOCALES DE AGUAS PLUVIALES:

Atherton	(650) 752-0555
Belmont	(650) 637-2972
Brisbane	(415) 508-2130
Burlingame	(650) 342-3727
Colma	(650) 757-8888
Daly City	(650) 991-8208
East Palo Alto	(650) 372-3189
Daly City	(650) 286-3270
Half Moon Bay	(650) 726-7177
Hillsborough	(650) 375-7444
Menlo Park	(650) 330-6750
Millbrae	(650) 259-2392
Pacifica	(650) 738-3767
Portola Valley	(650) 851-1700
Redwood City	(650) 780-7477
San Bruno	(650) 616-7020
San Carlos	(650) 802-4212
San Mateo	(650) 522-7349
San Mateo County	(650) 372-6200
South San Francisco	(650) 877-8555
Woodside	(650) 851-6790

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Appendix 5

- BMP Brochure for Mobile Businesses

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BEST MANAGEMENT PRACTICES FOR

MOBILE BUSINESSES

Carpet Cleaners | Vehicle Washers/Detailers | Power Washers | Pet Care Services | Steam Cleaners

Information about using Best Management Practices (BMPs) to prevent wash and rinse waters from entering storm drain systems and polluting local waterways, the San Francisco Bay, and the Pacific Ocean.

WHY SHOULD WE BE CONCERNED WITH WASH WATER DISPOSAL?

Wash water from mobile cleaning is NOT just dirt and water. It also may contain soaps, toxic chemicals, heavy metals, oil, and/or grease that are harmful to our creeks and waterways. Pollutants draining from mobile cleaning activities are washed into the street and into the storm drain system which then flows to our creeks, Bay, and Ocean without any cleaning or filtering.

Federal, State, and local regulations prohibit discharge of anything but rain water in the storm drain.

Implementing the proper Best Management Practices (BMPs) is easy and is required for compliance with stormwater pollution prevention regulations.

WHAT ABOUT BIODEGRADABLE & NON-TOXIC CLEANING PRODUCTS?

Cleaning products labeled “non-toxic” and “biodegradable” can still harm wildlife if they enter a storm drain system. Fish, for example, are affected by both regular and biodegradable soap! However, if disposed of in the sanitary sewer system, wastewater treatment plants prefer biodegradable products over toxic cleaners.

All soaps—even biodegradable ones—are harmful to fish!

PLAN AHEAD

- Determine where you will discharge wastewater before starting a new job.
- Be sure to have equipment on hand (i.e. long hoses, sump pump, etc.) for directing discharge to sanitary sewer access points.
- Ensure hoses are long enough to reach access points that are far from your holding tank.
- Contact your local hardware or construction material stores for available tools and materials for mobile businesses including wet/dry vacuums and sump pumps, mats, sand or gravel bags, wattles, etc.

4 STEPS TO REMEMBER BEFORE YOU CLEAN

1. **Be a BASMAA Recognized Mobile Cleaner**
   Take the online “mobile surface cleaning” training from BASMAA (Bay Area Stormwater Management Agencies Association). This program will train you on how to clean different surfaces in an environmentally acceptable way and publish your name as a trained cleaner. Visit www.basmaa.org.
2. **Identify Storm Drain Locations**
   Walk around the job site and identify where all storm drains are located. Wash water must not be allowed to flow into the storm drains.
3. **Protect Drains and Collect Water**
   Contact your local City stormwater inspector to determine specific discharge requirements. Obtain permission to discharge to the property owner’s sanitary sewer plumbing or landscaping before starting the job.
4. **Dispose Wash Water Properly**
   Contact your local wastewater treatment plant for specific discharge requirements entering the sanitary sewer system (phone numbers are listed on next page). Obtain permission from the property owner to discharge wash water at the job site or the contractor’s place of business.

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BEST MANAGEMENT PRACTICES FOR

MOBILE BUSINESSES

Carpet Cleaners | Vehicle Washers/Detailers | Power Washers | Pet Care Services | Steam Cleaners

Protect the Bay, the Ocean, and Yourself! When wash water flows into storm drains it goes straight to local creeks and the San Francisco Bay or Pacific Ocean without any cleaning or filtering.

DOING THE JOB RIGHT: CHECKLIST OF BMPS

- ☐ Walk the area to identify storm drains.
- ☐ Sweep the wash area to remove debris.
- ☐ If feasible, wash on a vegetated or gravel surface where wash water can infiltrate into the ground without runoff.
- ☐ Contain wash area so that water does not drain down streets and gutters– use sand bags, plugs, containment mats or berms.
- ☐ Block or seal off any storm drain inlets and sloping areas that release water to the gutter to prevent wash water from entering the storm drain.
- ☐ Put storm drain protection in place before starting the washing process and remove before you leave the site.
- ☐ Vacuum or shake floor mats into a trash can.
- ☐ Minimize water use; use nozzles on hoses.
- ☐ Use less-toxic cleaning products (or wash without soaps and solvents, if possible).
- ☐ Use a "wet-vac" to vacuum up the contained wash water for proper disposal.
- ☐ Remove all debris or sediment accumulated during washing activities and put in the trash, or if it is hazardous, dispose of it properly.

Wastewater Treatment Plants

Burlingame Waste Water Treatment Facility ..... (650) 342-3727
Burlingame, Burlingame Hills, and Hillsborough

Millbrae Water Pollution Control Plant ..... (650) 259-2388

North San Mateo County Sanitation District ..... (650) 991-8200
Daly City and parts of Westborough

Pacifica's Calera Creek Water Recycling Plant ..... (650) 738-4660

San Mateo Waste Water Treatment Plant ..... (650) 522-7300
Foster City, Hillsborough, and San Mateo

Sewer Authority Mid Coastside Wastewater Treatment Facility ..... (650) 726-0124
Half Moon Bay, El Granada, Miramar, Moss Beach, Montara, Princeton by the Sea

Silicon Valley Clean Water ..... (650) 832-6243
Belmont, Redwood City, San Carlos, Woodside, and service area of West Bay Sanitation District

South San Francisco/San Bruno Water Quality Control Plant ..... (650) 877-8555
Colma, San Bruno, South San Francisco, and southern Daly City

OPTIONS FOR DISPOSAL

1. **Never drain wash or rinse water into streets, gutters, parking lots, or storm drains.**
2. Wash and rinse waters can usually be discharged to the sanitary sewer through a drain at the property owner's home or business, such as a utility sink, floor drain, mop sink, cleanout or toilet. Take precautions to prevent debris, hazardous materials or anything that can clog from entering sinks, toilets or sanitary drains.
3. Direct water to landscaping or gravel surfaces. Wash water must completely soak into vegetation before you leave the site.

IF YOU DISCHARGE WASH WATER GENERATED BY MOBILE CLEANING ACTIVITIES TO THE STORM DRAIN, YOU ARE VIOLATING MUNICIPAL STORMWATER ORDINANCES AND MAY BE SUBJECT TO A FINE.

The San Mateo Countywide Water Pollution Prevention Program acknowledges the Santa Clara Valley Urban Runoff Pollution Prevention Program for developing and sharing the content this brochure.

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最佳管理办法–

流动业务

地毯清洗机 | 洗车机/清洁剂 | 电动清洗机 | 宠物护理服务 | 蒸汽清洗机

关于采用最佳管理办法 (Best Management Practices, BMPs) 来防止洗涤水进入暴雨排水系统并污染本地水道、旧金山湾和太平洋的信息。

我们为什么关心洗涤水的处理？

流动清洁洗涤水不仅仅是污垢和水。它还可能含有对我们的小河和水道有害的肥皂、有毒化学品、重金属、油和/或油脂。从流动清洁活动中排出的污染物被冲到街道和暴雨排水系统中，然后在未经清洁或过滤的情况下流向我们的小河、海湾和大海。

联邦、州和地方法规禁止
将雨水以外的任何污水排入暴雨排水道。

正确的最佳管理办法 (BMPs) 便于实施，并且我们必须遵守雨水污染防治条例。

可生物降解和无毒的清洁产品如何？

标有“无毒”和“可生物降解”字样的清洁产品如果进入到暴雨排水系统，仍然会危害野生生物。例如，鱼会受到普通肥皂和可生物降解肥皂的影响！但是，如果在生活污水系统中处理，污水处理厂会优先选用可生物降解的产品，而不是有毒的清洁剂。

所有的肥皂，即使是可生物降解的肥皂，都对鱼有害！

提前计划

- 在开始新的作业之前，先确定污水排放地点。
- 确定有现成的设备（如长软管、污水泵等）可用于将污水排放至生活污水管接入点。
- 确保软管长度足够长，能够到达远离您的收集槽的接入点。
- 联系本地的五金店或建材商店，获取可用于流动业务的工具和材料，包括湿式/干式吸尘器和污水泵、垫子、沙袋或沙砾袋、篱笆等。

4 清洁前要记住的步骤

1. **成为 BASMAA 认可的流动清洁工**
   参加 BASMAA（湾区雨水管理机构协会）提供的在线“流动表面清洁” 培训。本课程将就“如何以可接受的环保方式清洁不同的表面”为您提供培训，并以经训练清洁工这一身份发布您的姓名。访问：www.basmaa.org.
2. **确定暴雨排水道位置**查看施工现场周围，确定所有暴雨排水道的位置。洗涤水不得流入暴雨排水道。
3. **保护排水道和收集水**
   联系本地城市雨水检查员以确定具体的排放要求。在开始作业前，先获得“排入业主的生活污水管道或园林景观”的许可。
4. **正确处理洗涤水**
   联系本地污水处理厂，了解排入生活污水系统的具体排放要求（电话号码见下页）。向业主获取“在作业现场或承包商的营业场所排放洗涤水”的许可。

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最佳管理办法–

流动业务

地毯清洗机 | 洗车机/清洁剂 | 电动清洗机 | 宠物护理服务 | 蒸汽清洗机

保护海湾，保护海洋，保护你自己！洗涤水流入暴雨排水道时，它不经过清洗或过滤，直接流入当地的小河和旧金山湾或太平洋。

做好本职工作：BMP一览表

- ☐ 到该区域走一走，确定是否有暴雨排水道。
- ☐ 清扫清洗区域，清除碎屑。
- ☐ 如果可行，在有植被或砾石的表面冲洗，洗涤水可以渗透到地表而不产生径流。
- ☐ 使用沙袋、塞子、围堵垫或护堤，控制清洗区域，不让洗涤水顺着街道和排水沟流走。
- ☐ 堵塞或密封防洪排水道入水口以及向排水沟排水的斜坡区域，防止洗涤水进入防洪排水道。
- ☐ 在开始清洗前，设置暴雨排水道保护装置，并在离开洗涤区前将其移除。
- ☐ 用吸尘器或抖动地垫，将垃圾收入垃圾桶里。
- ☐ 尽量减少用水；在软管上使用喷嘴。
- ☐ 使用毒性较低的清洁产品（或如果可能的话，不要用肥皂和洗涤剂来清洗）。
- ☐ 使用“湿式真空吸尘器”将其中的洗涤水吸干，以便正确处理。
- ☐ 清除清洗过程中积聚的所有碎屑或沉淀物，并将其置于垃圾桶中；如果是有害物质，则妥善处理。

污水处理厂

Burlingame 污水处理设施 ..... (650) 342-3727
Burlingame, Burlingame Hills 和 Hillsborough

Millbrae 污水处理厂 ..... (650) 259-2388

San Mateo 县环卫区 ..... (650) 991-8200
Daly City 和 Westborough 一些地区

Pacifica's Calera 溪水回收站 ..... (650) 738-4660

San Mateo 县污水处理厂 ..... (650) 522-7300
Foster City, Hillsborough 和 San Mateo

Mid Coastside 污水管理局 ..... (650) 726-0124
Half Moon Bay, El Granada, Miramar, Moss Beach, Montara, Princeton by the Sea

Silicon Valley 净水厂 ..... (650) 832-6243
Belmont, Redwood City, San Carlos, Woodside, 和 West Bay 环卫服务区

South San Francisco/San Bruno 水质控制厂 ..... (650) 877-8555
Colma, San Bruno, South San Francisco 和 Daly City 南部

处理方案

1. **切勿将清洗或洗涤水排入街道、排水沟、停车场或暴雨排水道。**
2. 清洗和洗涤水通常可以通过业主家或企业的排水管排放到生活污水管道，如公用水槽、地漏、拖把洗涤槽、清理孔或卫生间。采取预防措施，防止碎屑、危险物质或任何可能引起堵塞的物体进入水槽、厕所或生活污水管道。
3. 将水引至园林景观或砾石表面。离开洗涤区前，洗涤水必须完全被植被吸收。

如果您将流动清洁活动产生的洗涤水排放到暴雨排水道，则违反了市政雨水管理条例，可能会被处以罚款。

San Mateo 县水污染防治计划认可“Santa Clara 河谷城市径流污染防治计划”，并制定本手册，以及与本手册共享[illegible]内容。

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SAN MATEO COUNTYWIDE
WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

MEJORES PRÁCTICAS DE GESTIÓN PARA

NEGOCIOS MÓVILES

Limpiadores de alfombras | Lavadoras/elementos de limpieza de vehículos | Lavadoras de energía | Servicios de cuidado de mascotas | Limpiadores de vapor

Información sobre el uso de las mejores prácticas de gestión (Best Management Practices, BMPs) para evitar que las aguas de lavado y enjuague entren en los sistemas de drenaje pluvial y contaminen las vías fluviales locales, la bahía de San Francisco y el Océano Pacífico.

¿POR QUÉ DEBERÍAMOS PREOCUPARNOS POR LOS DESECHOS DE AGUA DE LAVADO?

El agua de lavado de la limpieza móvil NO es solo suciedad y agua. También puede contener jabones, productos químicos tóxicos, metales pesados, aceite o grasa que son perjudiciales para nuestros arroyos y vías fluviales. Los contaminantes que drenan de las actividades de limpieza móvil se lavan en la calle y en el sistema de drenaje pluvial que luego fluye a nuestros arroyos, bahía y océano sin ninguna limpieza ni filtrado.

Las regulaciones federales, estatales y locales prohíben la descarga de cualquier cosa que no sea agua de lluvia en el drenaje pluvial.

La implementación de las mejores prácticas de gestión (BMPs) adecuadas es fácil y es necesaria para el cumplimiento de las regulaciones de prevención de la contaminación de aguas pluviales.

¿QUÉ PASA CON LOS PRODUCTOS DE LIMPIEZA BIODEGRADABLES Y NO TÓXICOS?

Los productos de limpieza etiquetados como “no tóxicos” y “biodegradables” todavía pueden dañar la vida silvestre si entran en un sistema de drenaje pluvial. ¡Los peces, por ejemplo, se ven afectados por el jabón común y biodegradable! Sin embargo, si se eliminan en el sistema de alcantarillado sanitario, las plantas de tratamiento de aguas residuales prefieren productos biodegradables antes que limpiadores tóxicos.

¡Todos los jabones, incluso los biodegradables, son dañinos para los peces!

PLANIFIQUE CON ANTICIPACIÓN

- Determine dónde descargará las aguas residuales antes de comenzar un nuevo trabajo.
- Asegúrese de tener el equipo a mano (es decir, mangueras largas, bomba de sumidero, etc.) para dirigir la descarga a los puntos de acceso de alcantarillado sanitario.
- Asegúrese de que las mangueras sean lo suficientemente largas como para llegar a los puntos de acceso que estén lejos de su tanque de retención.
- Póngase en contacto con sus ferreterías locales o tiendas de materiales de construcción para conocer las herramientas y materiales disponibles para empresas móviles, incluidas aspiradoras húmedas/secas y bombas de sumidero, esteras, bolsas de arena o grava, cañas, etc.

4 PASOS PARA TENER EN CUENTA ANTES DE LIMPIAR

1. **Sea un limpiador móvil reconocido por BASMAA**
   Realice la capacitación en línea de “limpieza de superficie móvil” de BASMAA (Bay Area Stormwater Management Agencies Association). Este programa lo capacitará sobre cómo limpiar diferentes superficies de una manera aceptable en términos ambientales y publicar su nombre como un limpiador entrenado. Visite www.basmaa.org.
2. **Identificar ubicaciones de drenaje de tormentas**
   Recorra el lugar de trabajo e identifique dónde se encuentran todos los drenajes pluviales. No se debe permitir que el agua de lavado fluya hacia los drenajes pluviales.
3. **Proteja drenajes y recoja agua**
   Póngase en contacto con su inspector de aguas pluviales de la ciudad local para determinar los requisitos específicos de descarga. Obtenga permiso para descargar a la tubería de alcantarillado sanitario o paisajismo del propietario antes de comenzar el trabajo.
4. **Deseche el agua de lavado**
   Póngase en contacto con su planta local de tratamiento de aguas residuales para conocer los requisitos de descarga específicos que ingresan al sistema de alcantarillado sanitario (los números de teléfono se enumeran en la página siguiente). Obtenga permiso del propietario de la propiedad para descargar agua de lavado en el lugar de trabajo o en el lugar de trabajo del contratista.

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WATER POLLUTION PREVENTION PROGRAM
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MEJORES PRÁCTICAS DE GESTIÓN PARA

NEGOCIOS MÓVILES

Limpiadores de alfombras | Lavadoras/elementos de limpieza de vehículos | Lavadoras de energía | Servicios de cuidado de mascotas | Limpiadores de vapor

¡Proteja la bahía, el océano y a usted! Cuando el agua de lavado fluye hacia los drenajes pluviales, va directamente a los arroyos locales y a la bahía de San Francisco o al Océano Pacífico sin ninguna limpieza ni filtrado.

HACER BIEN EL TRABAJO: LISTA DE VERIFICACIÓN DE LOS BMP

- ☐ Recorra el área para identificar los drenajes pluviales.
- ☐ Barra el área de lavado para eliminar los residuos.
- ☐ Si es posible, lave sobre una superficie con vegetación o de grava donde el agua de lavado pueda infiltrarse en el suelo sin vertidos.
- ☐ Contenga el área de lavado para que el agua no desagote en las calles ni canaletas; utilice bolsas de arena, tapones, alfombras o barreras de contención.
- ☐ Bloquee o cierre las entradas de drenaje pluvial y las áreas inclinadas que liberan agua a la canaleta para evitar que el agua de lavado entre en el drenaje pluvial.
- ☐ Coloque la protección contra drenaje pluvial antes de iniciar el proceso de lavado y retírela antes de salir del lugar.
- ☐ Aspire o sacuda las alfombras de piso en un bote de basura.
- ☐ Minimice el uso de agua; utilice boquillas en las mangueras.
- ☐ Utilice productos de limpieza menos tóxicos (o lave sin jabones ni disolventes, si es posible).
- ☐ Utilice una “aspiradora industrial para líquidos” para aspirar el agua de lavado contenida para su eliminación adecuada.
- ☐ Retire todos los desechos o sedimentos acumulados durante las actividades de lavado y colóquelos en la basura, o si son peligrosos, deséchelos correctamente.

Plantas de tratamiento de aguas residuales

Centro de tratamiento de aguas residuales de Burlingame ..... (650) 342-3727
Burlingame, Burlingame Hills, y Hillsborough

Planta de Control de Contaminación del Agua de Millbrae ..... (650) 259-2388

Distrito de Saneamiento del Condado de North San Mateo ..... (650) 991-8200
Daly City y zonas de Westborough

Planta de Reciclaje de Agua Calera Creek de Pacifica..... (650) 738-4660

Centro de tratamiento de aguas residuales de San Mateo ..... (650) 522-7300
Foster City, Hillsborough y San Mateo

Autoridad de alcantarillado de Mid Coastside ..... (650) 726-0124
Half Moon Bay, El Granada, Miramar, Moss Beach, Montara, Princeton by the Sea

Silicon Valley Clean Water ..... (650) 832-6243
Belmont, Redwood City, San Carlos, Woodside, y zonas de servicio de West Bay Sanitation District

Planta de Control de Calidad del Agua de South San Francisco/San Bruno .... (650) 877-8555
Colma, San Bruno, South San Francisco, y sur de la Daly City

OPCIONES DE DESECHO

1. **Nunca escurra el agua de lavado o enjuague en calles, alcantarillas, estacionamientos ni drenajes pluviales.**
2. Las aguas de lavado y enjuague generalmente se pueden descargar a la alcantarilla sanitaria a través de un drenaje en la casa o negocio del propietario, como un fregadero de servicio, drenaje del piso, fregadero, limpieza o inodoro. Tome precauciones para evitar que los desechos, materiales peligrosos o cualquier cosa que pueda obstruir entren en fregaderos, inodoros o drenajes sanitarios.
3. Dirija el agua hacia las superficies con pasto o grava. El agua de lavado debe absorberse completamente en la vegetación antes de salir del lugar de trabajo.

SI DESCARGA AGUA DE LAVADO GENERADA POR ACTIVIDADES DE LIMPIEZA MÓVIL AL DRENAJE PLUVIAL, ESTÁ VIOLANDO LAS ORDENANZAS MUNICIPALES DE AGUAS PLUVIALES Y PUEDE ESTAR SUJETO A UNA MULTA.

El Programa de prevención de la contaminación del agua del Condado de San Mateo reconoce el Programa de prevención de la contaminación del Valle de Santa Clara para desarrollar y compartir el contenido de este folleto.

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Appendix 6

- CALBIG Meeting: Construction Site Stormwater Compliance – November 13, 2019
    - Announcement flyer and Agenda
    - Attendance List

CALBIG MEETING ANNOUNCEMENT

"Stormwater Requirements for Construction Sites"

ICC Preferred Provider Program # 22057

(See Below)

This month's CALBIG meeting will be held on Wednesday, November 13th, 2019 from 11:30am to 1pm at the "EOC" Training Room, of the Foster City Fire Station; 1040-East Hillsdale Blvd.

For directions, see map below.

Directions: Take US 101 to Hwy 92 East. Exit Hwy 92 at Foster City Blvd.. Turn left to Metro Center Blvd. & to Foster City Blvd. Turn right & proceed one block & thru the traffic light @ East Hillsdale Blvd.. Continue on Foster City Blvd. & turn right into the City Hall (600-FC Blvd.) parking lot. The Fire Station's Training Room is on the ground floor, around to the right side, as you face City Hall.

Fee: $20 in cash or check payable to CALBIG … College of San Mateo Students: NO CHARGE!!!

Lunch: A catered lunch will be provided by: "Bay Area Corporate Catering"

Please send your RSVP to the following: Leonard Matchniff (lmatchniff@fostercity.org) & Michael Gorman (thegormanfamily@earthlink.net) by 5-PM; Friday, November 8th. Out of consideration for the catering order, we need an accurate head count.

Thank you!

Hosted By: Peter Schultze-Allen (CPSWQ) at EOA, Inc.

Topic: "Stormwater Requirements for Construction / Demolition Sites"

- **Review of stormwater requirements**
- **Documenting & tracking daily / weekly inspections**
- **Enforcement actions & when to escalate enforcement**
- **PCBs and building demolition**
- **Tips for stormwater program compliance**
- **SMCWPPP guidelines and updates**

"EOC" Training Room
Foster City's Fire Station
1040-East Hillsdale Blvd.
Foster City, CA
November 13th, 2019

Agenda

Registration/Seating	**11:30 - 11:45**
Leonard Matchniff, President – Welcome and Pledge of Allegiance	**11:45 - 11:50**
Joe Rossbach, Secretary - Approval of October 9thth Minutes	**11:50 - 11:51**
Acting Treasurer - Union Bank Balance: October 31st, 2019	**11:51 - 11:52**
Will Racanelli, Vice-President – CALBIG Website Update - 2019	**11:52 - 11:53**
Michael Gorman, Board Director – Upcoming Training Dates - 2019	**11:53 - 11:54**
Leigh Simpson, Bay Area Electric – Electrical Field Inspections	**11:54 – 11:59**
Peter Schultze-Allen (CPSWQ), EOA Inc.	**12:00 - 1:00**
Leonard Matchniff, President - Closing	**1:00**

Please RSVP to following: Leonard Matchniff (lmatchniff@fostercity.org) & Michael Gorman (thegormanfamily@earthlink.net) by 5:00 PM; Friday, November 8th. Out of consideration for the catering order, we need an accurate head count. Thank you for supporting CALBIG.

COMING ATTRACTIONS
(Venue: See Updates @ www.CALBIG.org)
SAVE THESE DATES

2019 – CALBIG's FUTURE EVENTS … COMING TO A VENUE NEAR YOU!!!

CALBIG requests your individual input, as members, in choosing the speakers & topics & venues. If applicable, upcoming dates with your specific suggestions:

- January 9, 2019 / CA Energy Commission (Daniel Wong; Efficiency Division Appliances& Outreach & Education / Daniel.Wong@energy.ca.gov / 1-916-654-4664 … Venue @ Millbrae Main Library
- February 13, 2019 / Energy Code Ace (www.energycodeAce.com) ... Venue @ the Fire Station's "EOC" Training Room; 1040-East Hillsdale Blvd.; Foster City
- March 13, 2019 / Open Forum – Open Board Meeting ... Venue @ the Redwood Shores Branch Library; Conference Room "A"; 399 – Marine Parkway; Redwood City
- April 10, 2019 / HERS Rater Now (Adam Guzman; Home Energy Rater / Duct Tester / Hersraternow@gmail.com / 1-408-500-7798 … Venue @ the Millbrae Library; 1 – Library Avenue.
- May 8, 2019 / SAFTIFIRST Fire-Rated Glazing / Tim Nass; VP – National Sales (timn@safti.com) … Venue @ the F.C. Fire Station's EOC Training Room; 1040 – East Hillsdale Blvd.; Foster City
- June 12, 2019 / State of California Dept. of Housing & Community Development / "ADU" & Emergency Housing / Stoyan Bumbalov (stoyan.bumbalov@hcd.ca.gov), Div. of Codes & Standards … Venue @ the Fire Station's "EOC" Training Room; 1040-East Hillsdale Blvd.; Foster City
- July 10, 2019 / Architectural Inspection (Patrick Burger, CALBIG Member) / Code Violations @ Decks … Venue @ the RWC Main Library; Second Floor Conference Room; 1044-Middlefield Road; Redwood City
- August 14, 2019 / Michael Stone, NEMA & IAEI / Changes to the 2018-IBC to the 2019-CEC … Venue @ Redwood City Main Library; 2nd Floor Conference Room; 1040 – Middlefield Road; RWC
- September 11, 2019 / Hoover Treated Wood Products, Inc. / Rich Geary; Marketing Consultant / rgeary@frtw.com / 1-706-755-5339 … Venue @ Millbrae Public Library; Conference Room; 1 – Library Ave.; Millbrae
- October 9, 2019 / MiTek / Hardy Frame Moment Frame / Retrofit Guide / David Lopp & Keith Brinkman, Engineering Representatives / 1-800-754-3030 … Venue @ the RWC Main Library; Second Floor Conference Room; 1044-Middlefield Road; Redwood City
- November 13, 2019 / Peter Schultze-Allen (CPSWQ), EOA, Inc. / Stormwater Requirements / pschultze-allen@eoainc.com … Venue @ the Fire Station's "OEC" Training Room; 1040-East Hillsdale Blvd.; Foster City
- December 11, 2019 / Smoke Guard / David A. Howell; Regional Sales Manager-Western US / david.howell@smokeguard.com / 1-208-912-3002 … Venue @ Millbrae Public Library; 1-Library Ave.; Conference Room; Millbrae, CA

As CALBIG celebrates its Twenty-Sixth Anniversary; thank you for the timely participation and continued support.

CALBIG C.6 TRAINING - ATTENDANCE 2019		
	Name	Organization
1	Ferris Hix	4-Leaf
2	Fred Cullum	4-Leaf
3	Leigh Simpson	Bay Area Electric
4	Michael Gorman	CALBIG
5	Chai Lor	CSG Consultants
6	Guest	CSG Consultants
7	Guest	CSG Consultants
8	Guest	CSG Consultants
9	Kelly Carroll	CSG Consultants
10	Rjohn123	CSM Student
11	Gianlorn Camello	Daly City
12	Guest	Daly City
13	Guest	Daly City
14	Joe Travers	Daly City
15	David Hirzel	Designer
16	Juan Martinez	East Palo Alto
17	Francine Magno	Foster City
18	Glen March	Foster City
19	Laura Galli	Foster City
20	Lawrence Tam	Foster City
21	Len Matchniff	Foster City
22	Stephanie MacDonald	Foster City
23	Vivian Ma	Foster City
24	Moreen McCann	Hillsborough
25	Will Racanelli	Hillsborough
26	Andrew Yang	Millbrae
27	Keith Voong	Millbrae
28	Michael Cully	Millbrae
29	David Lynch	Pacifica
30	Joe Rossbach	Redwood City
31	Ahmed Muneer	Woodside
32	Sean Rose	Woodside
33	Sindhi Mekala	Woodside

Appendix 7

- Public Information and Participation Subcommittee – Attendance List– FY 2019/20
- Blog Posts Examples and Metric Analytics
- Rain Barrel Workshop
    - Facebook Event Online Media
    - Facebook Ad
    - Eventbrite page – Bayside - San Carlos
    - Eventbrite page – Ocean side – Half Moon Bay
    - Workshop surveys
- Stormwater & Green Infrastructure Community Survey: Full Survey Report
- Flows to Bay Newsletter Examples
- Flows to Bay Web Page Examples

FY 2019/20 PIP Subcommittee Attendance List

Public Information and Participation Subcommittee						FY 19-20	
AGENCY	NAME	ALTERNATE	ALTERNATE	ALTERNATE	PHONE	10/15/2019	3/11/20
C/CAG	Matt Fabry						
C/CAG	Reid Bogert					X	X
Atherton	Nestor Delgado	Stephanie Bertollo-Davis			650-752-0544		
Atherton	Jacob Garcia					X	
Belmont	Diane Lynn				650-595-7425		
Belmont	Julie Freitas						
Brisbane	Shelley Romriell	Keegan Black			415-508-2130		
Burlingame	Jennifer Lee	Carolyn Critz			650-558-7381	X	
Colma	Katherine Sheehan				650-522-2506		
Colma	Muneer Ahmed	Jason Chen			650-757-8888		
Colma	Kelly Carroll						
Daly City	Ward Donnelly				650-991-8200		
Daly City	Sibely Calles						X
Daly City	Stephen Stolte						
East Palo Alto	Michelle Daher				650-853-3197		
East Palo Alto	Jorge Luna					X	
East Palo Alto	June Canter					X	
Foster City	Jack Shulze	Norm Dorais	Jack S. LL		650-286-3543		
Half Moon Bay	Katherine Sheehan				650-522-2506		
Half Moon Bay	Mark Lander				650-522-2562		
Half Moon Bay	Kelly Carroll						
Hillsborough	Sara Bachmann					X	
Menlo Park	Candice Almendral	Rebecca Lucky			650.330.6768		
Menlo Park	Alexandria Skoch						
Menlo Park	Clarence Li					X	X
Millbrae	Shelly Reider				650-259-2444	X	X
Pacifica	Yessika Dominguez	Raymond Donquines			650-738-3767		
Pacifica	Michelle Trayer					X	X
Pacifica	Kevin Sandberg (intern)						
Portola Valley	Ali Taghari				650-851-1700		
Portola Valley	Brandi de Garmeaux	Howard Young	Adrienne Smith		650-851-1700		
Redwood City	Vicki Sherman				650-780-7472		X
Redwood City	Christopher Fajkos						
Redwood City	Adrian Lee						
San Bruno	Jim Burch	Ted Chapman	William Li				
San Carlos	Kathryn Robertson					X	
San Carlos	Vatsal Patel						X
San Mateo City	Sarah Schedit				650-522-7296		
San Mateo City	Sven Edlund						X
San Mateo City	Mark Swenson					X	
San Mateo City	Kellie Benz (Public Works)					X	
San Mateo Co	Aaron Francis				650-599-1457		X
San Mateo Co	Andrea Chow						
San Mateo Co	Breann Liebermann				650-599-1514	X	
San Mateo Co	Edelzar Garcia						
San Mateo Co	Susan Wright					X	
San Mateo Co	John Allan						X
San Mateo County	Kathryn Cooke						X
So. San Francisco	Daniel Garza				650-829-3880		
So. San Francisco	Andrew Wemmer						
So. San Francisco	Nelson Yuk					X	X
So. San Francisco	Christina Tai						
Woodside	Dong Nguyen				650-851-6790		
SGA	Suzi Sennia				415-606-5080	X	
SGA	Sacha Pfeufer				510-224-5086	X	
EOA	Peter Schultz-Allen	Kristin Kerr	Jon Konnan		510-832-2852 x 128		X
CSG Committee	Paramjit Uppal						
CSG Committee	Kelly Carroll						X
CSG Committee (representing Colma & Half Moon Bay)	Catherine Chan					X	
ReScape California	Geneva Gordak					X	

SMCWPPP Blog Analytics

Blog Post Title	Page Views	Page Views (Unique)	Average Time on Page	Bounce Rate
Do SMC Beaches Make The Grade In 2019?	99	87	0:01:21	66.67%
Tips For Responsible (And Eco-Friendly) Car Washing	384	355	0:03:19	71.58%
Clean Waterways Depends on What You Choose to Doo!	251	224	0:03:11	84.97%
Butts, Bottles & Buckets — Coastal Cleanup Day 2019	36	36	0:01:41	80.00%
Oct. 12 Rain Barrel Workshop In Half Moon Bay	100	93	0:03:41	66.67%
Nov. 2 Rain Barrel Installation Workshop In San Carlos	179	173	0:06:10	72.86%
4 Tips to have an Eco-Tastic Halloween!	26	22	0:02:33	66.67%
Rain Rain, Adopt A Drain!	101	87	0:04:54	66.67%
San Mateo County's Rain Barrel Rebate Program	343	328	0:06:10	68.92%
Mastering The Art Of Gardening	66	57	0:02:36	74.29%
How To Get Your Pests To Stop Bugging You	74	72	0:02:00	87.18%
King Tides: What They Are & Why They Matter	73	69	0:02:35	83.33%
Stormwater 101	64	59	0:01:17	75.00%
Don't Keep Rainwater at Bay - Use it!	41	39	0:03:28	78.57%
Storage Do's and Don'ts for Household Hazardous Waste	93	87	0:03:30	68.63%
Sustainable Watersheds Paid Teacher Fellowships – Deadline 6/1/20	252	222	0:03:28	84.21%
5 Water Wise Activities You Can Do from Home	108	101	0:03:32	63.75%
Educational Resources for Learners of All Ages	33	29	0:08:21	84.62%
New Flows To Bay Website & Features	24	22	0:00:26	42.86%
Reusable Bag Ordinance Suspension	10	10	0:13:42	85.71%

Rain Barrel Workshop Facebook Event Pages (4)

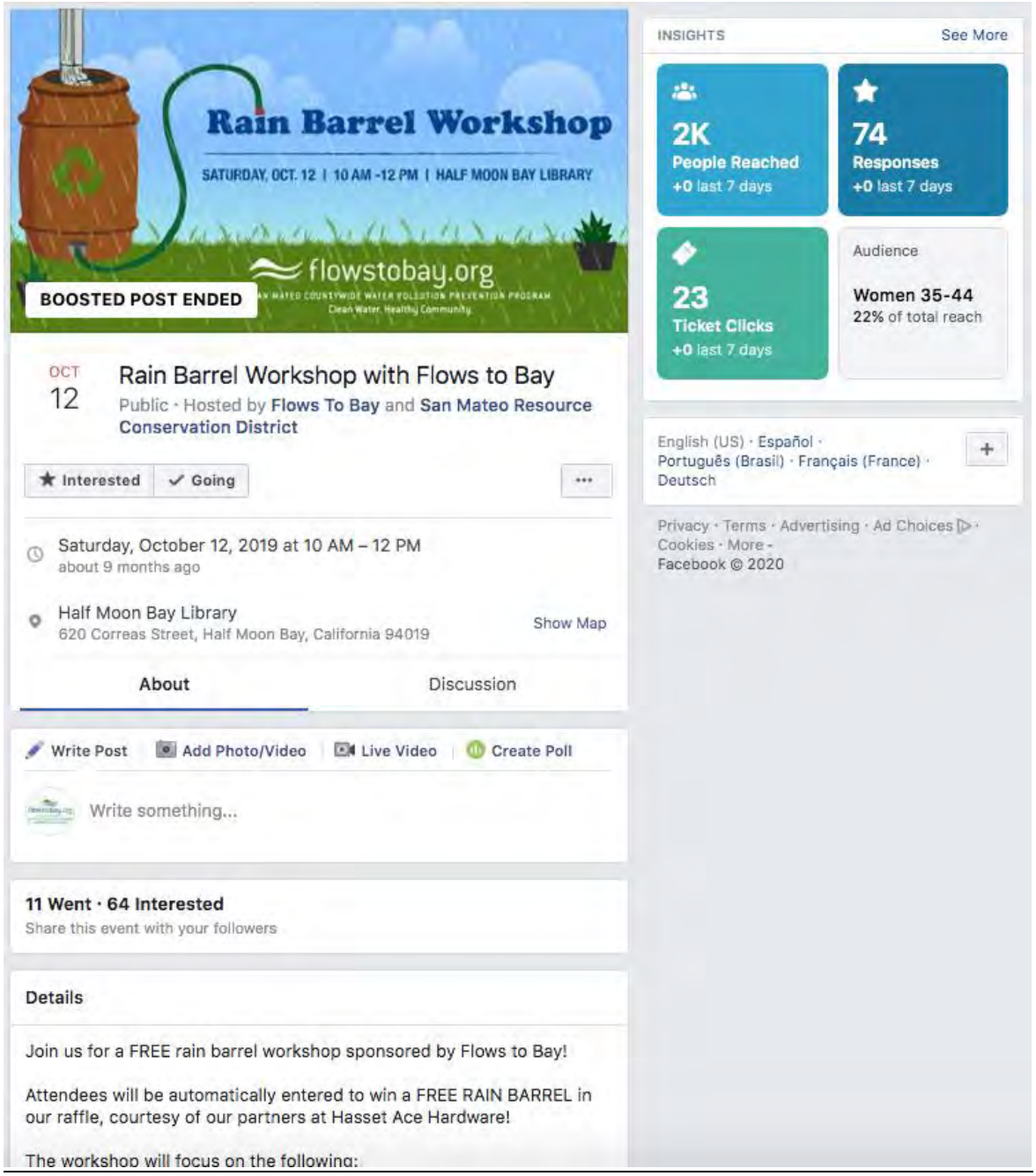

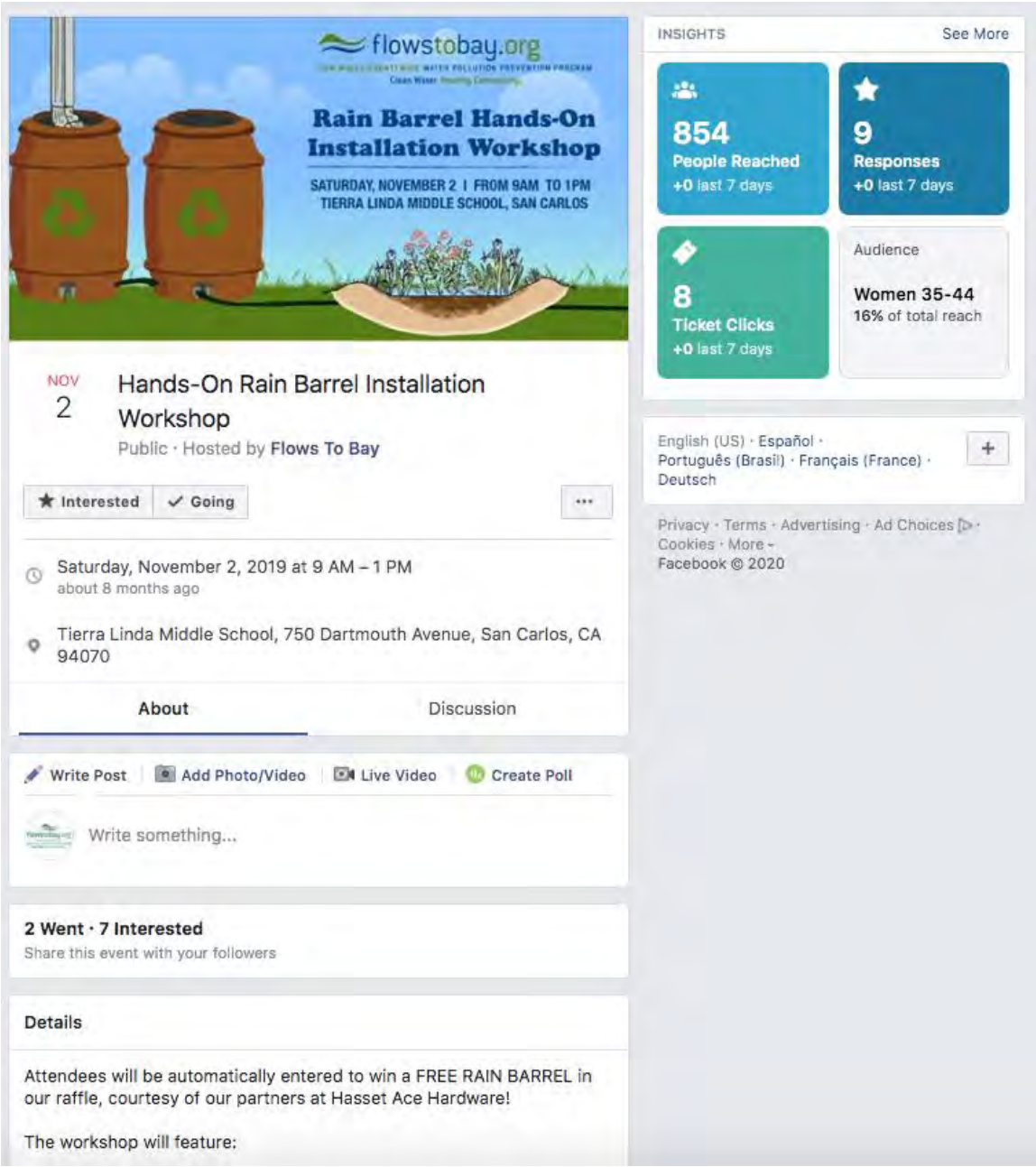
flowstobay.org
Rain Barrel Hands-On Installation Workshop
SATURDAY, NOVEMBER 2 | FROM 9AM TO 1PM
TIERRA LINDA MIDDLE SCHOOL, SAN CARLOS
NOV
2
Hands-On Rain Barrel Installation Workshop
Public · Hosted by Flows To Bay
Interested
Going
Saturday, November 2, 2019 at 9 AM – 1 PM
about 8 months ago
Tierra Linda Middle School, 750 Dartmouth Avenue, San Carlos, CA 94070
About
Discussion
Write Post
Add Photo/Video
Live Video
Create Poll
Write something...
2 Went · 7 Interested
Share this event with your followers
Details
Attendees will be automatically entered to win a FREE RAIN BARREL in our raffle, courtesy of our partners at Hasset Ace Hardware!
The workshop will feature:
INSIGHTS
See More
854
People Reached
+0 last 7 days
9
Responses
+0 last 7 days
8
Ticket Clicks
+0 last 7 days
Audience
Women 35-44
16% of total reach
English (US) · Español · Português (Brasil) · Français (France) · Deutsch
Privacy · Terms · Advertising · Ad Choices · Cookies · More
Facebook © 2020

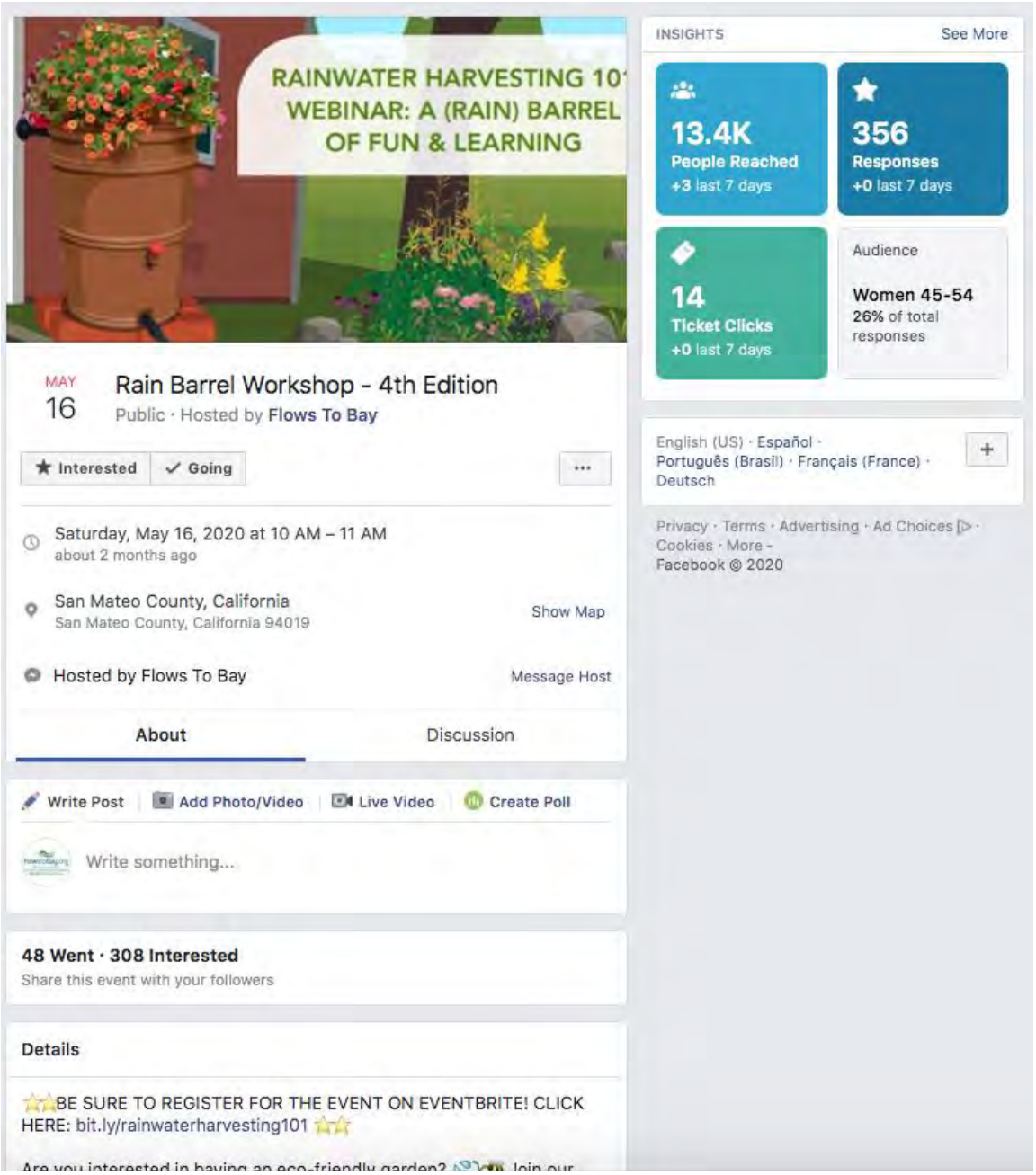
RAINWATER HARVESTING 101
WEBINAR: A (RAIN) BARREL
OF FUN & LEARNING
MAY
16
Rain Barrel Workshop - 4th Edition
Public · Hosted by Flows To Bay
Interested
Going
Saturday, May 16, 2020 at 10 AM – 11 AM
about 2 months ago
San Mateo County, California
San Mateo County, California 94019
Show Map
Hosted by Flows To Bay
Message Host
About
Discussion
Write Post
Add Photo/Video
Live Video
Create Poll
Write something...
48 Went · 308 Interested
Share this event with your followers
Details
BE SURE TO REGISTER FOR THE EVENT ON EVENTBRITE! CLICK HERE: bit.ly/rainwaterharvesting101
INSIGHTS
See More
13.4K
People Reached
+3 last 7 days
356
Responses
+0 last 7 days
14
Ticket Clicks
+0 last 7 days
Audience
Women 45-54
26% of total responses
English (US) · Español · Português (Brasil) · Français (France) · Deutsch
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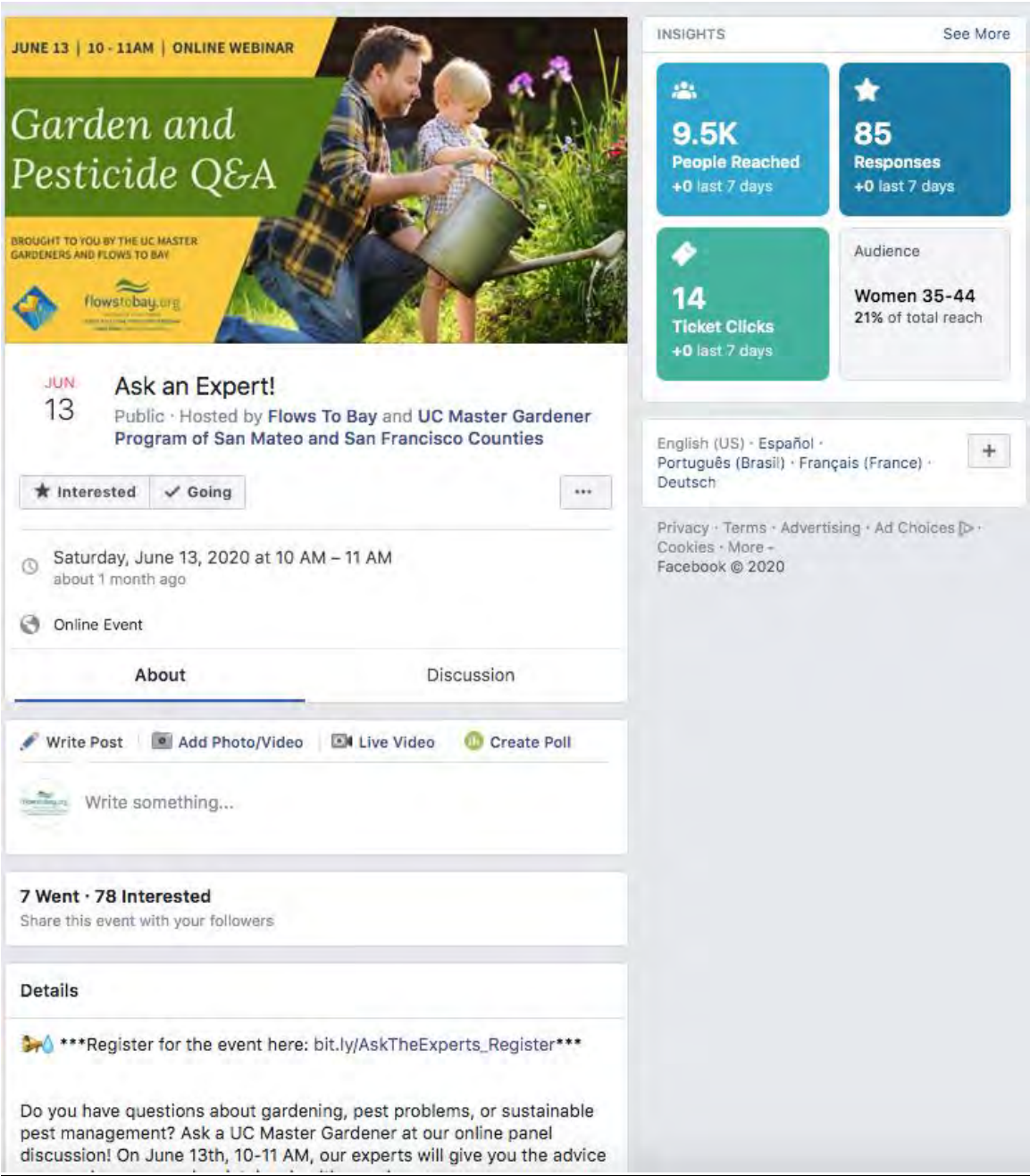
JUNE 13 | 10 - 11AM | ONLINE WEBINAR
Garden and Pesticide Q&A
BROUGHT TO YOU BY THE UC MASTER GARDENERS AND FLOWS TO BAY
flowstobay.org
JUN 13
Ask an Expert!
Public · Hosted by Flows To Bay and UC Master Gardener Program of San Mateo and San Francisco Counties
Interested
Going
Saturday, June 13, 2020 at 10 AM – 11 AM
about 1 month ago
Online Event
About
Discussion
Write Post
Add Photo/Video
Live Video
Create Poll
Write something...
7 Went · 78 Interested
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Register for the event here: bit.ly/AskTheExperts_Register
Do you have questions about gardening, pest problems, or sustainable pest management? Ask a UC Master Gardener at our online panel discussion! On June 13th, 10-11 AM, our experts will give you the advice
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Rain Barrel Workshop Facebook Promotional Posts

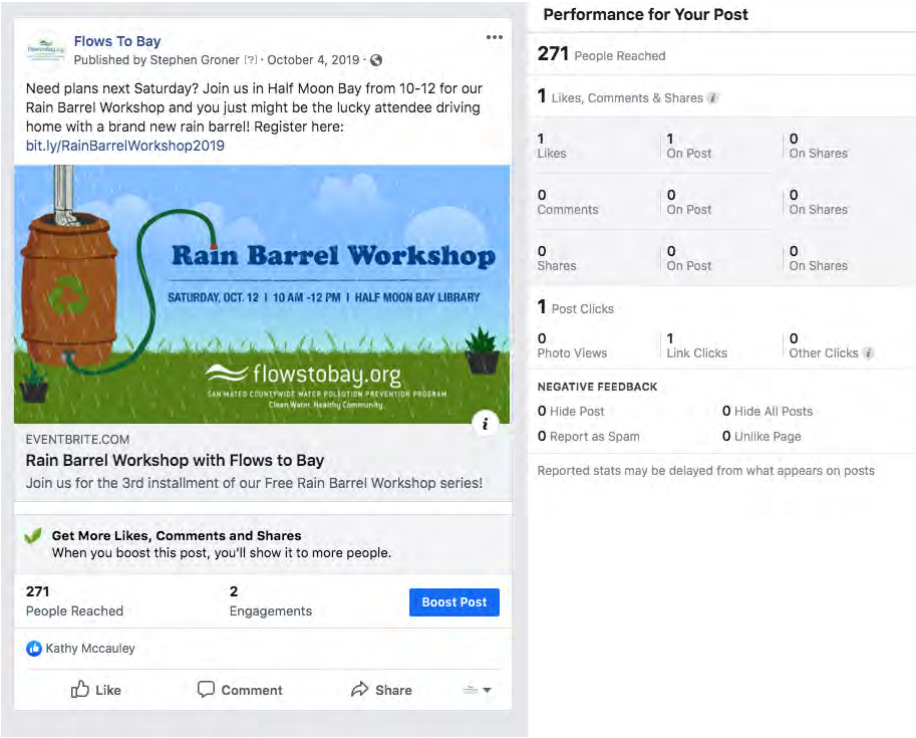

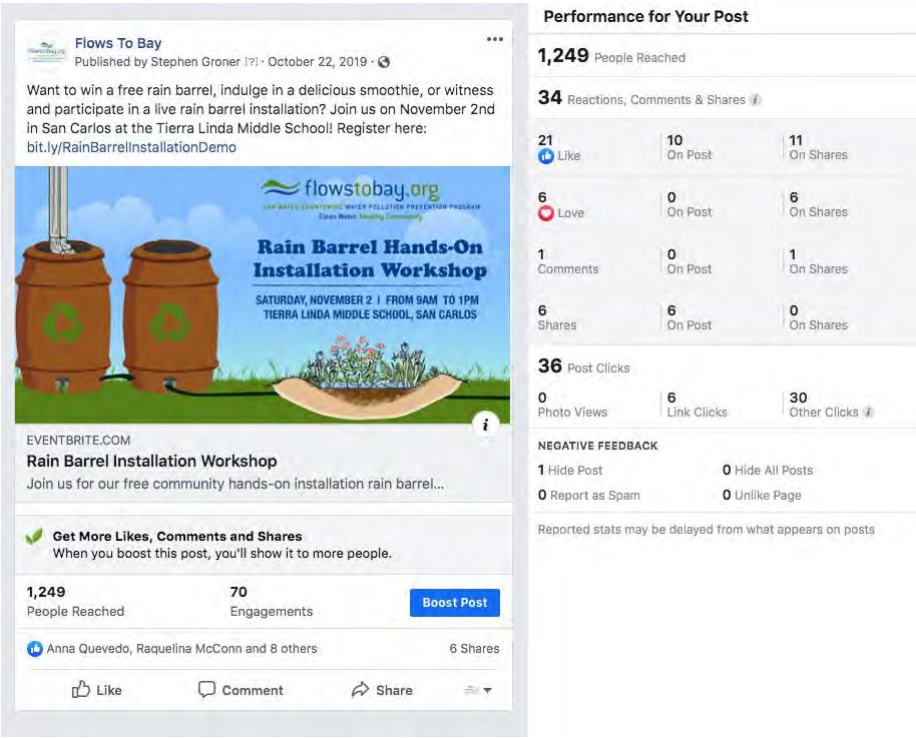

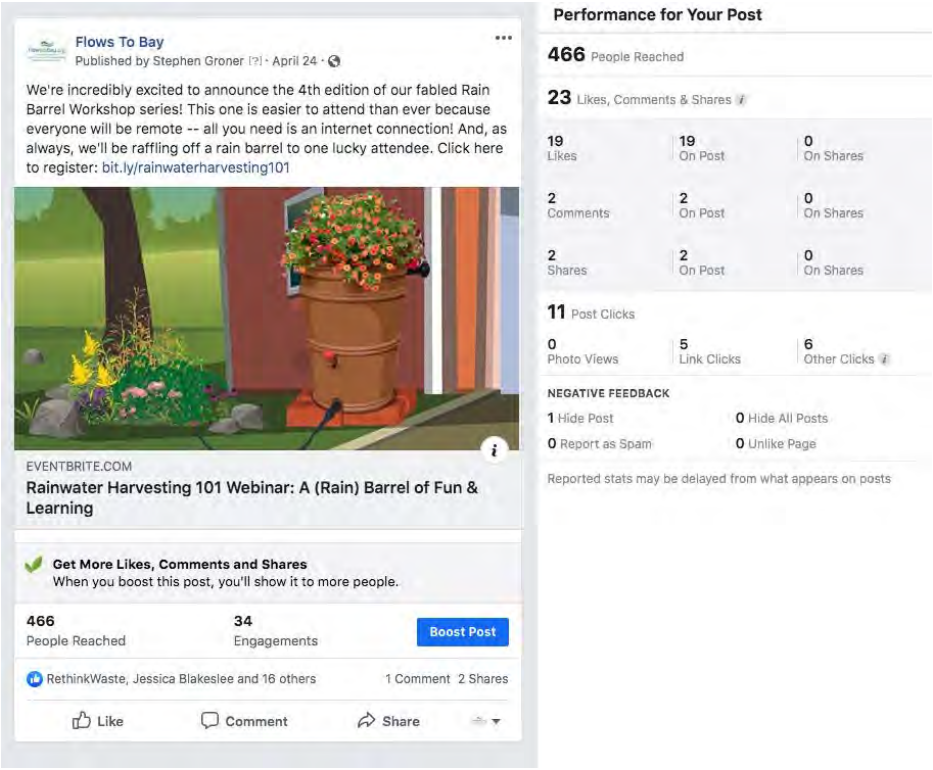
Flows To Bay
Published by Stephen Groner [?] · April 24 ·
We're incredibly excited to announce the 4th edition of our fabled Rain Barrel Workshop series! This one is easier to attend than ever because everyone will be remote -- all you need is an internet connection! And, as always, we'll be raffling off a rain barrel to one lucky attendee. Click here to register: bit.ly/rainwaterharvesting101
EVENTBRITE.COM
Rainwater Harvesting 101 Webinar: A (Rain) Barrel of Fun & Learning
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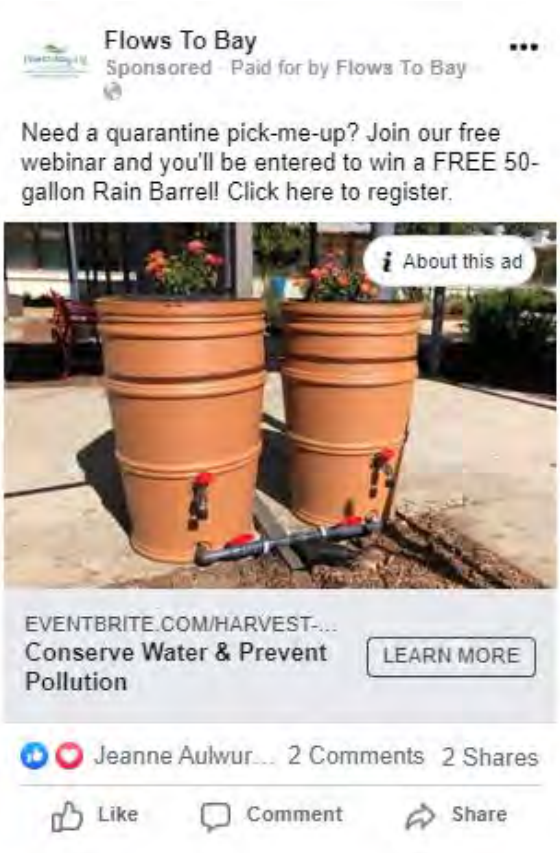
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Rain Barrel Workshop Eventbrite Event Page, San Carlos (Bayside)

NOV
02

Rain Barrel Installation Workshop

by Flows to Bay Follow

Free

Sales Ended

Details

Join us for our free community hands-on installation rain barrel workshop!

About this Event

Date: Saturday, November 2nd

Time: 9:00am-1:00pm with a Q&A session to follow

Location: Tierra Linda Middle School, Learning Commons in the Administration Building

Presenter/Installer: Chris Corvetti, Rain Barrel Specialist

Join us for a FREE rain barrel installation workshop sponsored by Flows to Bay! Learn the skills needed to install your own rain barrel system in your home! All ages are welcome to participate in the learning and the FUN!

Attendees will be automatically entered to win a FREE RAIN BARREL in our raffle, courtesy of our partners at Hasset Ace Hardware!

The workshop will feature:

- Discussion of the San Mateo County rain barrel rebate program
- Hands-on instruction and installation of a daisy-chained two-barrel system AND drip irrigation system
- Smoothies made by a machine bike blender (by Rock the Bike) and other light refreshments
- The raffle of 1 rain barrel to a lucky attendee

Space is limited, so get your FREE tickets today!

FAQs :

Where can I learn more about the rain barrel rebate?

- The rain barrel rebate program information and online application can be found here: http://www.flowstobay.org/rainbarrel

How can I contact the organizer with any questions?

- Email questions or concerns to info@flowstobay.org.

How can I enter to win the free rain barrel?

- Attendees of the rain barrel workshop will be automatically entered to win a FREE rain barrel provided by Hassett Ace Hardware. Must be present to win.

Tags

United States Events | California Events | Things To Do In San Carlos, CA | San Carlos Classes | San Carlos Home & Lifestyle Classes | #Sustainability | #Home_improvement | #San_mateo | #San_carlos | #Rain_barrel | #Water_capture | #Rainwater_harvesting

Date And Time

Sat, November 2, 2019
9:00 AM - 1:00 PM PDT
Add to Calendar

Location

Tierra Linda Middle School
750 Dartmouth Avenue
Administration Building
San Carlos, CA 94070
View Map

Rain Barrel Workshop Eventbrite Event Page, Half Moon Bay (Ocean Side)

OCT
12

Rain Barrel Workshop with Flows to Bay

by Flows to Bay Follow

Free

Sales Ended

Details

Join us for the 3rd installment of our Free Rain Barrel Workshop series!

About this Event

Date: Saturday, October 12th

Time: 10:00am-12:00pm with a Q&A session to follow

Location: Half Moon Bay Library, Community Room A

Presenter: Chris Corvetti, Rain Barrel Specialist

Join us for a FREE rain barrel workshop sponsored by Flows to Bay!

Attendees will be automatically entered to win a FREE RAIN BARREL in our raffle, courtesy of our partners at Hasset Ace Hardware!

The workshop will focus on the following:

- Discussion of the San Mateo County rain barrel rebate program
- The "why" and the "how" of rainwater harvesting (high level overview and introduction for people who may be totally new to the concept of a rain barrel)
- Some overview of different rain barrel types and approaches to installation
- More detailed DIY options
- Focus on basic designs and uses around the home and garden
- Share photos and details of different barrels and attachment options

Space is limited, so get your FREE tickets today!

FAQs :

Where can I learn more about the rain barrel rebate?

- The rain barrel rebate program information and online application can be found here: http://www.flowstobay.org/rainbarrel

How can I contact the organizer with any questions?

- Email questions or concerns to info@flowstobay.org.

How can I enter to win the free rain barrel?

- Attendees of the rain barrel workshop will be automatically entered to win a FREE rain barrel provided by Hassett Ace Hardware. The winner will receive a certificate for the rain barrel and can pick it up any time from the Hassett Hardware Half Moon Bay location.

Date And Time

Sat, October 12, 2019
10:00 AM - 12:00 PM PDT
Add to Calendar

Location

Half Moon Bay Library, Community Room A
620 Correas St
Half Moon Bay, CA 94019
View Map

Tags

United States Events | California Events | Things To Do In Half Moon Bay, CA | Half Moon Bay Seminars | Half Moon Bay Home & Lifestyle Seminars | #Free_workshop | #Half_moon_bay | #Water_wise_gardening | #Rain_barrel_workshop | #Grassroots_ecology | #Rcd | #Pollution_prevention | #San_mateo_county | #Eco_friendly_gardening

Rain Barrel Workshop Survey (October 12th and November 2nd)

Questions Key:

1. What were you hoping to learn at the workshop today?
2. What was your level of knowledge of rain barrels *prior* to the workshop (circle one)
3. Did the workshop's content help you with the following? (circle all that apply)
4. How would you rate the workshop on the following subjects (1=poor, 5=great)
5. What are areas of improvement or topics you would like to see covered in our next event?
6. What is/was the biggest obstacle you faced when deciding to install a rain barrel? (circle one)
7. Were you aware of the San Mateo County rain barrel rebate before today? (circle one)
8. On a scale from 1 to 5 (1 = not at all likely, 5 = very likely), how likely are you to purchase/use a rain barrel <u>within the next 12 months?</u>

Half Moon Bay Workshop – October 12, 2019

Note: Responses are typed out how they're written (capitalization, spelling, grammar, punctuation)

Question Number	Response	Amount of Respondents who Answered
Q1	*What were you hoping to learn at the workshop today?* • What kind of rain barrel can I use to prevent flooding in my rose garden and by the home • More water conservation info • Will a rain barrel water for me • I know nothing about rain barrels! • Overview; best H2O storage for human consumption • Varieties of rain storage • How to set up a rain barrel • Basics of rainwater harvesting • Exactly what was presented! Thank you all! • Finding out all of the necessary components • How to get a rain barrel in our yard • Benefits of rain barrels + how to set up • Anything about the subject. Trying to figure out if it works for my home. • Basic info • About rain barrels • Basic info about rain barrels • How to install a rain barrel • How to install & use rain barrel • Basic criteria re: rain H2O collection • This workshop answered the questions I've had about rainbarrel systems. • What's involved in setting up a rainbarrel • Everything about rain barrels	26

Question Number	Response	Amount of Respondents who Answered
	• About rain water collection • All about rainbarrels! • Learn about rain gathering, whether it was doable for our house • Though we have a rain barrel, I learned much more about additional equipment	
Q2	*What was your level of knowledge of rain barrels prior to the workshop (circle one)* • No knowledge = 15 • Some knowledge = 9 • Well informed, but haven't installed yet = 1 • Good, I have a rain barrel installed = 2	27
Q3	*Did the workshop's content help you with the following? (circle all that apply)* • Understanding of the functionality of a rain barrel = 23 • Preparing you to install your own rain barrel = 23 • Environmental benefits of utilizing a rain barrel = 21 • Knowledge of local rain barrel rebates = 21	27
Q4	*How would you rate the workshop on the following subjects (1=poor, 5=great)* Environmental information provided: 1 = 0 2 = 0 3 = 1 4 = 5 5 = 20 **Someone didn't answer this but answered the other metrics in this question* Rain barrel installation instructions: 1 = 0 2 = 0 3 = 0 4 = 12 5 = 15 Rain barrel rebate information provided: 1 = 1 *Comment: "Came late"* 2 = 0 3 = 1 4 = 2 5 = 22 **Someone didn't answer this but answered the other metrics in this question* Information was presented in an interesting/fun format:	27

Question Number	Response	Amount of Respondents who Answered
	1 = 0 2 = 0 3 = 0 4 = 5 5 = 22	
Q5	*What are areas of improvement or topics you would like to see covered in our next event?* • X phone number/card for Chris to get an estimate/consult; disregard - I spoke to her • More on rain barrel use on vegetation • Where and when is the next event - interesting workshop • Sources of barrels • Total set up of a rainbarrel with spouts • None • All good. Poeple might benefit from a drawing/sketch of how to install • Show photos of installations • More diagrams of setup • Actual mockup of wall, drain, connections • Rebates • Installation - jumped to topc without intro of a next chapter. Talked too fast at times • This way very thorough! • I understood, thank you • Good info - thanks! • Everything was covered • Great work! • Hands on practice setting up • N/A • Can't think of any additional material	20
Q6	*What is/was the biggest obstacle you faced when deciding to install a rain barrel? (circle one)* • No interest in owning a rain barrel = 0 • The cost of a rain barrel was too high = 2 *Comment: "per quantity"* • I didn't have the room for it in my home = 3 • I didn't want to deal with maintenance/upkeep = 4 Other (please write in answer below): • Need a consult to best evaluate my vision/goals • This is all new to me • None • Just understanding the concept • Just figuring out all of the logistics/materials	23 **1 person selected two responses*

Question Number	Response	Amount of Respondents who Answered
	• Mechanics of setting it up. Where. How to get the water to garden etc. It's cool, but complicated • Deciding to do it - understanding how to set up optimally • How I will use it in my area • Justify use case • I will need to hire someone to install it. Do not hsve the skills myself • None - needed info from other than salesperson • I didn't know where/how to start • NONE • Have not installed one yet, don't know • We have a top-feed 100 gallon barrel. Racoons have taken a liking to leaving scat. Nice to learn about closed feed systems.	
Q7	*Were you aware of the San Mateo County rain barrel rebate before today? (circle one)* • Yes = 5 *Comment: "from this workshop"* • No = 22	27
Q8	*On a scale from 1 to 5 (1 = not at all likely, 5 = very likely), how likely are you to purchase/use a rain barrel <u>within the next 12 months?</u>* • 1 = 1 • 2 = 1 • 3 = 4 • 4 = 9 • 5 = 12	27

Comment at end: "Thanks for coffee + eats!"

San Carlos Installation Workshop – November 2, 2019

Note: Responses are typed out how they're written (capitalization, spelling, grammar, punctuation)

Question Number	Response	Amount of Respondents who Answered
Q1	*What were you hoping to learn at the workshop today?* • How to get started • Basics of rain barrel installation • All about rain barrels • How to install a rain barrel • Rain barrel installation and drip irrigation • How to install a rain barrel - how difficult?	28

Question Number	Response	Amount of Respondents who Answered
	• How to install • How to install and buy a rain barrel • Benefits + how to install rain barrel • Installation how to + tips • All about rain barrels - interested in Grey water reclamation • Rebate information • How to install myself • How to install a rain barrel • How to use a Rain Barrel + drip system • Easy way to install rain barrels • Importance of rain barrel usage and how to install • Ins and outs of installing a rain barrel • How to build/install a rain barrel • How to set up and manage rain collection systems. • To learn about the benefits of rain barrels and how to install a system • To learn about installing rain barrel • Collection techniques, general info • How the rain barrel works • How to install a rain barrel • How to install • How to build a rain barrel and if it makes sense at our home • Hands-on installation - confidence to do it <3	
Q2	*What was your level of knowledge of rain barrels prior to the workshop (circle one)* • No knowledge = 10 • Some knowledge = 13 • Well informed, but haven't installed yet = 4 • Good, I have a rain barrel installed = 1	28
Q3	*Did the workshop's content help you with the following? (circle all that apply)* • Understanding of the functionality of a rain barrel = 24 • Preparing you to install your own rain barrel = 26 • Environmental benefits of utilizing a rain barrel = 24 • Knowledge of local rain barrel rebates = 24	28
Q4	*How would you rate the workshop on the following subjects (1=poor, 5=great)* Environmental information provided: 1 = 0 2 = 0 3 = 0 4 = 7 5 = 22	28 **1 respondent chose two options for the first metric*

Question Number	Response	Amount of Respondents who Answered
	Rain barrel installation instructions: 1 = 0 2 = 0 3 = 0 4 = 5 5 = 23 Rain barrel rebate information provided: 1 = 0 2 = 0 3 = 0 4 = 5 5 = 23 Information was presented in an interesting/fun format: 1 = 0 2 = 0 3 = 0 4 = 7 5 = 21	
Q5	*What are areas of improvement or topics you would like to see covered in our next event?* • More ecologically sound practices • A little chaotic with Rido installing garden and side conversations • Rain gardens • Maybe consider installation instructions ahead of time so notes can be taken • Raingarden • Rain garden • How to estimate size of rain barrel according to water usage • Rain capture irrigation • Laundry water recycling • Info on photos required for rebate • None • Putting a drip system timer • Rain garden installation incorporating permeable paving/products in the landscape • Presenters need to speak loudly and clearly - speak to the back how can hear them. Appropriate clothing • Nothing - just great • Little more about water garden • literature/pictures (diagrams) of info PPT slides? • It was great • None! • ??? • Saving water for dry season	21

Question Number	Response	Amount of Respondents who Answered
Q6	*What is/was the biggest obstacle you faced when deciding to install a rain barrel? (circle one)* • No interest in owning a rain barrel = 0 • The cost of a rain barrel was too high = 5 *Comment: "so rebates are great!"* • I didn't have the room for it in my home = 0 • I didn't want to deal with maintenance/upkeep = 6 Other (please write in answer below): • N/A - just didn't know about them • Physical limits • I didn't know/understand where to put/install the rain barrel • Didn't know how to install • None • **Circled but didn't write a response** • Learning how to do it • Wasn't sure I could do it • Not sure if I can do. Not sure about creating a level area. • Foundation • Knowledge and updated products that are easier than years ago • Renting - working on buying my own place • Basic knowledge on how to install a sys. • Wasn't ready • I am still a kid • No obstacle a same-day project • The installation know how	26 **2 people selected two responses*
Q7	*Were you aware of the San Mateo County rain barrel rebate before today? (circle one)* • Yes = 11 *Comment: "from last workshop"* • No = 17	28
Q8	*On a scale from 1 to 5 (1 = not at all likely, 5 = very likely), how likely are you to purchase/use a rain barrel <u>within the next 12 months?</u>* • 1 = 0 • 2 = 2 *One respondent is the same person who answered the biggest obstacle as "I am still a kid"* • 3 = 2 • 4 = 4 • 5 = 19 *Comment: "the rebates sure help! :)"*	28 **1 respondent circled the phrase "within the next 12 months" instead of a answer choice*

Someone left a comment to collaborate with MRCC

Rain Barrel Webinar Survey (May 16th)

Questions Key:

1. What were your goals for attending this class?
2. The Zoom platform was easy to use: 5 = strongly agree 1 = strongly disagree
3. The instructor demonstrated knowledge of the topic and presented practical information you can use: 5 = strongly agree 1 = strongly disagree
4. The workshop was what you expected: Yes / No
    a. If "No," Why?
5. What did you find most useful about the workshop?
6. What is the biggest obstacle you face when deciding to install a rain barrel?
7. How likely are you to purchase/use a rain barrel in the next 12 months? 5 = very likely 1 = not at all likely
8. What topics would you suggest in the future?
9. What days and times work best for you?
10. Your overall rating of the class: 5 = very satisfied 1 = not at all satisfied
11. How did you learn of the class?
12. Likelihood of attending another webinar: 5 = very likely 1 = not at all likely
13. Your city of residence:
14. Would you like to be considered for the raffle drawing of a 50 gallon rain barrel?
15. Please provide your name for the raffle drawing: (First)
16. Please provide your name for the raffle drawing: (Last)
17. Email

Rain Barrel Webinar – May 16, 2020

Note: Responses are typed out how they're written (capitalization, spelling, grammar, punctuation)

Question Number	Response	Amount of Respondents who Answered
Q1	*What were your goals for attending this class? (circle all that apply)* • To learn how to save money by reducing my water use = 68 • To learn about water efficient practices to protect the environment = 72 • To be better prepared for drought = 43 • To improve my landscaping = 35 Other (please specify below) = • Thinking of buying a rain barrel and wanted to learn more. • to hopefully win the barrel advertised • To learn how to use free rainwater to water my veggies and plants on my apartment balcony. • Work on my GS bronze award	72

Question Number	Response	Amount of Respondents who Answered
Q2	*The Zoom platform was easy to use: (5 = strongly agree 1 = strongly disagree)* • 1 = 4 • 2 = 2 • 3 = 6 • 4 = 20 • 5 = 64	96
Q3	*The instructor demonstrated knowledge of the topic and presented practical information you can use: 5 = strongly agree 1 = strongly disagree* • 1 = 7 • 2 = 1 • 3 = 3 • 4 = 13 • 5 = 72	96
Q4	*The workshop was what you expected:* • Yes = 95 • No = 1 *If "No," Why?* • need a simpler and cheaper method	96
Q5	*What did you find most useful about the workshop?* • Actual photos of rain garden and rain barrel set-ups. • actually better than I expected. I have wanted to do this for some time and now feel more confident in making it happen! • All good • All great. Will research for my house. • all the information is good • Assemble the kit Regulations • barrel options and uses • being able to still attend with sip • Comprehensive • Detailed guidance and Q&A • Detailed slides showing construction/installation ideas • Details about installation of rain water barrel • details on barrels and storage options • Diverter parts needed to collect water and using window screen. • End of class that discussed installation details • everything • Everything • Everything ! • Everything was useful I am completely new at this so super useful!	81

Question Number	Response	Amount of Respondents who Answered
	• everything... except this survey! It kicked me out. • explanation on the different parts and care for a rain barrel • explication of different components • General knowledge • good info about the idea, tips & details about how to install, Q & A • Good starting point • Great information to get me thinking about doing this • Great, practical suggestions and easy to understand. Thank you! • Handouts • Helpful to learn how to install and use the collected water • How to assemble the water barrel from gutter to unit, gauge, filter, and motorized pump. • How to choose the right rain barrel. How to install rain barrel. Brief idea for landscape design • How to connect a rain barrel, specifically the various connectors, valves, gravity flow, etc. • how to get started • How to install a rain barrel • How to keep the bugs away from the water • How to put together a rain barrel • How to put together a rain barrel • how to save natural water • How to setup a system • how to use a rain barrel to water landscaping • I liked the info on the pump. • I've learned additional information through the webinar. The cardboard for mulch layer was great info! • Info on rain garden and rain barrel. • Info on types and options for rain barrels. • Installation guide • Installing and the different kinds of rain barrels. • instructions • Learning about the different rain barrel systems • Learning about the rebate program. • Learning about water catchment in bay area • Learning how to install a rain barrel • Learning that I can not only doing a rain barrel but also having a garden that allows water to drain/soak in to help alleviate moisture near foundation and help ground d water levels. • Need to use time better • photos and labels and arrows used during talk • Practical examples and thorough explanations. I feel like I know a bit about how I could do this small scale at home or a larger scale at work. • Practical installation of rain barrel. Learn the different types of rain barrel • practical tips on set up of barrels • Presenter was knowledgeable.	

Question Number	Response	Amount of Respondents who Answered
	• Q and A, handouts • Rain barrel info was great • Rain barrel options and installation • rain barrels info and installation info • Rain garden • rain garden and barrels • Rain garden info • rain garden info! Pumps to get all the water out of the barrel! • Rebate info • reccos • Slides and the presenter and host did a fantastic job! u guys are pros • speaker was great and gave us a lot of really good information • specific information on rain barrels • The accessories and other types of barrels • The discussion on drip irrigation for gravity systems was very useful to me. Many thanks for this webinar! • The introduction of different types of rain barrel, and how to install the rain barrel • The presentation encouraged me to actually realize this project. A lot of detailed info. • The rain barrel system parts explained • the talk about installation • types of rain barrels..that the kit will have everything • Very informative • Visuals • What to buy •	
Q6	*What is the biggest obstacle you face when deciding to install a rain barrel?* • The cost of a rain barrel was too high = 34 • I didn't have the room for it in my home = 9 • I didn't want to deal with maintenance/upkeep = 17 Other (please write in answer below): • Aesthetics • choosing a rain barrel. There are so many choices • deciding where to locate the rain barrel • Didn't really understand how they work!! • didn't understand the process • Didn't know how to install • Didn't know how to use it • Don't have room and not handy to install • Downspouts flow to pathways and no room for rain barrel unless I can have the barrel around a corner	96

Question Number	Response	Amount of Respondents who Answered
	• Felt I needed more knowledge • Figuring out installation and placement • Having a skilled individual help us with a large size barrel. We have a drain pipe coming off a large, flat roof and water pours out of a roof height pipe • I am not the homeowner and convincing the homeowner to have this system is difficult. • I didn't know enough about it • I haven't yet that's why I took this class • I live in an apartment and can't necessarily tap into the downspout. I'll collect rain in some other manner to fill my rain barrel. • I'll need help! • I'm renting so there are selection area to place the barrel is narrow. I have one spot I think will work well. • installation • installation seems a bit complicated! • Installing • It will be hard to integrate it into my situation • my rain barrels are breaking • Need help installing it • None • none • Not esthetic, fitting modern house • Placement and input routing • Planning so that it works and looks great • Plumbing knowledge • set up of the rain garden • setting it up • the setup effort, especially related to a rain garden • time to get to it • want to re landscape my garden so its a bigger project • Workshop was excellent, will do a rain barrel	
Q7	*How likely are you to purchase/use a rain barrel in the next 12 months? 5 = very likely 1 = not at all likely* • 1 = 1 • 2 = 7 • 3 = 22 • 4 = 20 • 5 = 45	95
Q8	*What topics would you suggest in the future?* • ? • All covered • can't think of any • Design of rain garden • drought tolerant planting	43

Question Number	Response	Amount of Respondents who Answered
	• Edible gardening • gardening • gray water collection and use (in home) • How can I get the barrels for free • I am always interested in better ways to ensure materials I try to recycle are recycled properly. • I would like more information on specific plumbing options for my rain barrels. • IDK • Irrigation options • Local conservation topics and activities we can try at home • Long-term water storage • Low flow water for vegetable garden etc... • Maintenance for barrel options • maybe upkeep • More dry creek ideas to incorporate into a garden plan • more info on connect rain barrel to drip irrigation for landscape / veggie garden • More on gardening aspect • more on materials on rain garden, type of stones etc • More types of barrel installations • More water saving and avoid pollutants to drain • na • Native plant selections and also referrals to link local providers to help install systems • native plants • native plants to use a rain garden • Native plants, low water plants • Not sure • Other water saving devices for your home. • Planning what to plant for raingarden on peninsula • Plant selection based on water volume • same topics but more often. • select Plants for use less water • sheet mulching • Slightly more advanced irrigation system designs would be helpful. Such as, how to set up rainwater irrigation in conjunction with a pressurized drip system in the same vegetable garden, if possible. • Suggestion for the class: Please spend more time on how to set up the rain barrel. Too much time spend on the intro. • This was great. • what type of plants to use in rain gardens • which plants don't need much water for sun and shade areas • worm composting • worm farming	

Question Number	Response	Amount of Respondents who Answered
Q9	*What days and times work best for you?* • Weekdays – Morning = 18 • Weekdays – Afternoon = 12 • Weekdays – Evening = 37 • Saturday – Morning = 73	At least 73
Q10	*Your overall rating of the class: 5 = very satisfied 1 = not at all satisfied* • 1 = 1 • 2 = 2 • 3 = 4 • 4 = 18 • 5 = 71	96
Q8	*How did you learn of the class?* • BAWSCA Newsletter = 10 • Email = 24 • Flows To Bay Website or Social Media Post = 9 • Social Media = 37 • Through a Friend = 5 Other (please write in answer below): • Burlingame newsletter • can't remember • city email • don't remember. maybe an email from Redwood City? • Foothill College Class • Hillsborough Together or NextDoor • IDK Mom just told me to take this. • Nextdoor • public works employee from Belmont • San Mateo RCD • search on rainbarrels	96
Q9	*Likelihood of attending another webinar: 5 = very likely 1 = not at all likely* • 1 = 2 • 2 = 3 • 3 = 5 • 4 = 27 • 5 = 59	96
Q10	*Your city of residence:* • Atherton = 2 • Belmont = 4 • Brisbane = 1 • Burlingame = 7 • Daly City = 9	95

Question Number	Response	Amount of Respondents who Answered
	• East Palo Alto = 1 • Foster City = 1 • Half Moon Bay = 3 • Hillsborough = 5 • Milbrae = 5 • Moss Beach = 1 • Pacifica = 4 • Pittsburg = 1 • Redwood City = 12 • San Bruno = 6 • San Carlos = 1 • San Mateo = 8 • South San Francisco = 6 Non-SMC: • Alameda = 1 • El Granada = 1 • Emerald Hills = 1 • Fremont = 2 • Hayward = 1 • Menlo Park = 1 • Milpitas = 1 • Mountain View = 1 • Palo Alto = 3 • San Francisco = 2 • San Jose = 2 • San Leandro = 1 • Santa Clara = 1 • Sunnyvale = 1	
Q11	*Would you like to be considered for the raffle drawing of a 50 gallon rain barrel?* • *Yes, indeed! = 94* • *No, thank you. = 2*	96

Stormwater & Green Infrastructure Community Survey: Full Survey Report

S.GRONER ASSOCIATES, INC.

Community Stormwater Survey Findings 2019

A survey was conducted among San Mateo County residents in order to better understand (a) how important water pollution is to residents of the County, (b) which types of potential stormwater activities residents engage with the most, (c) which types of events/activities residents engage with the most, and finally (d) to get a sense residents' knowledge of and support for green infrastructure in the County. Overall, 1214 individuals participated in the survey; 208 participated in the intercept survey and 1006 participated in the online survey. Table A provides a detailed summary of the demographic characteristics of these participants.

Participant Demographics

Participants in the intercept survey had a more equal distribution across gender and age and were more likely to live in households that used languages other than English. Online participants tended to be more female (61.9% online v. 42.8% intercept) and older: 61.9% of online participants were female and nearly half (47.6%) of online participants were over age 56.

Overall, 77.1% of households spoke English only, however participants in the intercept survey were more than twice as likely to speak a language other than English at home.

Interestingly, the overall homeownership rate among participants was similar to that of the County's (58.2%).

The most common city of residence among intercept and online participants was Daly City and San Mateo, respectively. Overall, 19.5% of participants lived in San Mateo. The cities of Hillsborough, East Palo Alto and Colma each comprised less than 1% of the total sample and were therefore included in the "Other" category.

One question, "Which race or ethnicity do you associate with?" had a high refusal rate (n=407 or 33.5% of total sample) among survey participants and as such, meaningful insights regarding participants' race could not be made. For this reason, participants' race was omitted from Table A.

Table A. Demographics by survey type

	Intercept n=208	Online n=1006	Combined* n=1214
Gender			
Male	57.2%	29.4%	34.2%
Female	42.8%	62.1%	58.8%
Non-binary	0.0%	0.4%	0.3%
Declined	0.0%	7.2%	5.9%
Age			
18-25	13.5%	1.2%	1.0%
26-35	26.4%	10.1%	8.4%
36-45	16.3%	17.0%	14.1%
46-55	16.3%	17.9%	14.8%
56-65	14.9%	21.7%	18.0%
66+	12.0%	26.1%	21.7%
Declined	0.5%	6.4%	5.3%
Household languages			
English	47.1%	83.3%	77.1%
Bilingual English + Other	39.9%	8.7%	14.1%
Monolingual (non-English)	13.0%	2.3%	4.1%
Declined	0.0%	1.5%	1.2%
Single-family homeowner			
Yes	38.9%	70.3%	58.2%
No	61.1%	25.0%	20.7%
Declined	0.0%	5.2%	4.3%
City of residence			
San Mateo	11.5%	23.6%	19.5%
Redwood City	10.6%	11.9%	9.9%
Pacifica	9.6%	10.2%	8.5%
Half Moon Bay	0.5%	6.7%	5.5%
Daly City	26.0%	5.9%	4.9%
Menlo Park	4.8%	4.6%	3.8%
Belmont	1.0%	4.5%	3.7%
South San Francisco	3.4%	4.1%	3.4%
San Bruno	6.7%	3.7%	3.0%
Burlingame	2.9%	3.5%	2.9%
Foster City	2.9%	2.7%	2.2%
Millbrae	1.9%	2.7%	2.2%
Other	18.3%	7.5%	6.2%

***Combined rates represent the total average across all survey participants (n=1214).**

Table B. Participants' sources for environmental information and social media engagement

	Intercept n=208	Online n=1006	Combined* n=1214
Most used social networking platform			
Facebook	56.7%	48.4%	49.8%
Instagram	24.5%	21.9%	22.3%
LinkedIn	10.6%	15.6%	14.7%
Twitter	12.0%	11.4%	11.5%
Do not use social media	0.0%	5.7%	4.7%
Nextdoor	0.0%	3.8%	3.1%
Other	24.5%	4.6%	8.0%
Declined	10.6%	18.3%	17.0%
Internet search	63.0%	82.0%	78.7%
Government agency	14.4%	7.3%	8.5%
Social network platform	6.3%	3.3%	3.8%
Friend/family	12.0%	2.0%	3.7%
Radio/newspaper	2.4%	1.5%	1.6%
Don't know	11.1%	1.3%	3.0%
Other	13.0%	2.5%	4.3%
Declined	1.4%	0.6%	0.7%

The most commonly used social networking platform was Facebook (49.8%), followed by Instagram (22.3%) and LinkedIn (14.7%). Notably, 17.0% of online participants declined to respond to the question regarding use of social media platforms. It's possible that this is because they don't use social media and therefore felt the question didn't apply to them (the question didn't have a "Don't use social media" response option). Some stated this by indicating "other" and then explaining that they don't use social media (8.0%).

When asked, "Where would you go if you wanted more information about good environmental practices?" most participants stated that they would use an internet search (68.0%) followed by a government agency (6.0%).

How important is water pollution is to residents of the County?

Most participants expressed concern over water pollution. Overall, 76.3% of participants stated that they were 'moderately' or 'very' concerned'. Concern over water pollution was more prevalent among online participants (79.8%) than intercept participants (59.1%). Water pollution ranked fourth overall among a list of eight environmental concerns (third among online and fifth among intercept participants).

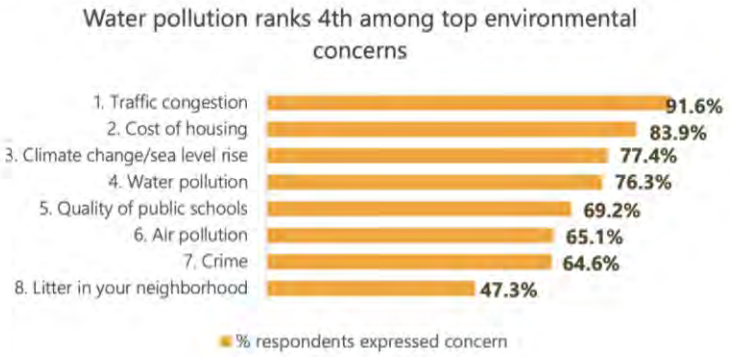

What types of potential stormwater activities residents engage with most?

Overall, most participants (72.7%) have heard, read or seen information about how to minimize or dispose of stormwater pollutants. Participants in the online survey were much more likely than intercept participants to have encountered this information (75.6% versus 58.7%).

Participants were most likely to have spent time working on their lawns (67.8%) or gardening (64.7%) in the past three months. However, online participants were more likely to engage in these activities than intercept participants; 70.0% of online participants worked on their lawns compared to only 54.8% of intercept participants and 66.5% of online participants gardened compared to 56.3% of intercept participants. Overall, about half of participants stated that they had picked up litter (55.6%). Participants were least likely to have spent time walking a dog (43.0%) or working on a vehicle (38.4%) in the past three months.

Regarding car washing behaviors, most participants take their cars to a car wash to get washed (67.2%); the remainder either wash their car at home (24.9%) or don't own a car (4.1%). 4.2% declined to respond to the question or were unsure.

Only 11% of participants use pesticides

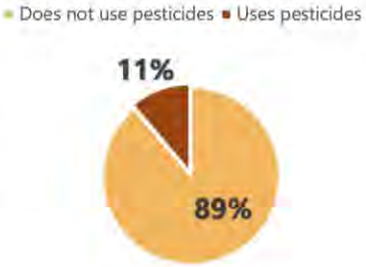

Table C. Participants' engagement in potential stormwater activities

	Intercept n=208	Online n=1006	Combined* n=1214
Have you seen, read or heard about how to dispose of pollutants or minimize what goes into the Bay?			
Have seen	58.7%	75.6%	72.7%
Have not seen	36.5%	11.8%	16.1%
Unsure	4.8%	11.6%	10.5%
Declined	0.0%	0.9%	0.7%
Which of the following have you or someone in your household done in the last 3 months?			
Worked on lawn/yard	54.8%	70.0%	67.4%
Gardened	56.3%	66.5%	64.7%
Picked up litter	61.1%	54.5%	55.6%
Walked a dog	44.7%	42.6%	43.0%
Worked on vehicle	45.7%	36.9%	38.4%
Declined	5.3%	2.5%	3.0%
Do you wash your car yourself or take it to a car wash?			
Take to car wash	53.4%	70.1%	67.2%
Wash at home	28.4%	24.2%	24.9%
Do not own a car	13.5%	2.2%	4.1%
Unsure	1.9%	2.7%	2.6%
Declined	4.8%	0.9%	1.6%

Regarding pesticide use, most participants reported not using pesticides in their home and garden; only 11% of participants stated used pesticides. Pesticide use was equal across intercept and online survey types (11.1% and 11.2%, respectively).

What types of events and activities do residents engage with most?

Table D. Participant engagement in community organizations and events

	Intercept n=206	Online n=1006	Combined* n=1214
Participation by organization type			
Environmental organization	5.8%	21.8%	19.0%
Sierra Club	2.9%	7.7%	6.8%
Greenpeace	1.0%	0.9%	0.9%
Audubon	0.0%	0.9%	0.7%
Nature Conservancy	0.5%	2.0%	1.7%
Other	1.4%	12.0%	10.2%
Religious organization	21.2%	19.7%	19.6%
Christian	9.6%	8.4%	8.6%
Catholic	4.8%	5.1%	5.0%
Jewish	0.0%	1.0%	0.8%
Other	4.8%	5.2%	5.1%
Business group	8.2%	8.7%	8.1%
Chamber of Commerce	1.4%	1.3%	1.3%
Other organization type	6.7%	6.8%	6.8%
Local civic organization	5.3%	13.3%	11.9%
Other organization type	16.8%	25.0%	23.6%
Participation by event type			
Outdoor recreation	71.2%	83.5%	81.4%
Music event	55.8%	54.5%	54.7%
Sporting event	49.0%	39.4%	41.0%
City Council, County Board or other govt. mtg.	17.8%	27.7%	26.0%
Neighborhood, homeowner or resident's mtg.	16.8%	27.9%	26.0%
Parent-Teacher Organization mtg.	24.5%	20.5%	21.2%
Community stakeholder mtg.	17.3%	21.7%	20.9%
Community workshop	20.7%	20.5%	20.5%

Engagement in community organizations and events was similar across survey types. As such, only the combined totals are shown. Participants were equally as likely to participate in a religious organization in the past year as they were to participate in an environmental one (19.6% and 19.0%, respectively).

Most participants had engaged in some type of outdoor recreation in the past year (81.4%). Approximately half of participants also attended music events (54.7%) and sporting events (41.0%). Participants were least likely to have attended a community stakeholder meeting (20.9%) or community workshop (20.5%).

Do residents understand what is meant by "green infrastructure"? To what extent do they support government investment in green infrastructure?

Most participants recognized the term "green infrastructure" (60.6%) and showed strong support for spending on green infrastructure if it cost 0-25% more than traditional infrastructure (88.8%). Intercept participants were less likely than online participants to support green infrastructure if it cost 75-100% more than conventional infrastructure (13.0% intercept versus 21.7% online).

There was not a significant difference in support for green infrastructure across survey groups and, in fact, intercept survey participants were slightly more likely than online participants to support green infrastructure if they know that it reduces pollution in neighborhoods (+6.7%) and makes communities greener (+10.0%) and safer (+12.1%).

As cost increases, support for green infrastructure declines

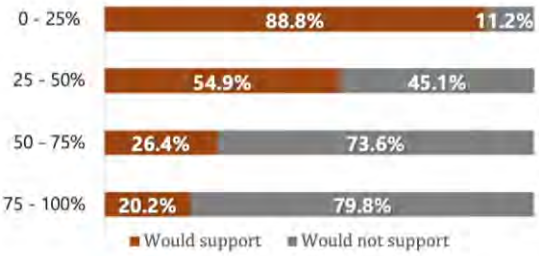

Participants are most likely to support green infrastructure if they know that it reduces pollution

INTERCEPT

1. Reduces **pollution** in waterways and ocean (83.7%)
2. Makes communities greener (81.7%)
3. Reduces **pollution** in neighborhood (81.3%)
4. Makes communities safer (80.8%)
5. More resilience to climate change/sea level rise (68.8%)
6. Less prone to flooding (64.9%)

ONLINE

1. Reduces **pollution** in waterways and ocean (79.8%)
2. Reduces **pollution** in neighborhood (74.6%)
3. Makes communities greener (71.8%)
4. Less prone to flooding (71.6%)
5. More resilience to climate change/sea level rise (69.7%)
6. Makes communities safer (68.7%)

Limitations

Given that participants in the online survey were recruited via member agency and agency partner social media accounts or email newsletters, and that they opted to participate (as opposed to being randomly selected), there is an inherent degree of selection bias which resulted in a higher rates of pro-environmental responses among this sample. Specifically, online survey participants expressed greater familiarity with the subject matter and reported higher levels of concern over water pollution and water quality. Online survey participants were also more likely to belong to environmental organizations like the Sierra Club and Nature Conservancy. Additionally, because the intercept surveys were conducted in-person, it's possible that favorable responses are slightly inflated due to social desirability bias – or the tendency of some participants to report and answer in a way they deem to be more socially acceptable than would be their "true" answer.

Key Takeaways

- ✓ Most residents are concerned about water pollution; it ranked as the fourth greatest concern among participants, just after "climate change/sea level rise".
- ✓ Most participants (72.7%) have heard, read or seen information about how to minimize or dispose of stormwater pollutants.
- ✓ Pesticide use has declined in the last 10 years based on the 2009 "Attitudes Towards Stormwater Pollution", from 15% in 2009 to 11% in 2019.
- ✓ There appears to be somewhat strong support for green infrastructure, especially when it addresses residents' concerns about pollution. It should be noted that climate change was listed as a top environmental concern but was not indicated as a popular reason for supporting G.I., suggesting that while residents may be concerned about climate change from a broad/global point of view, they do not necessarily support or believe that local green infrastructure is the answer.

Recommendations

- ✓ Residents of San Mateo County are engaged in their community and active in environmental organizations. It is likely that residents would be receptive a community-wide call to action or community goals around stormwater. When possible, provide feedback to the community about the impact of their behavior or progress towards a community-goal.
- ✓ Facebook Ads and Google Ads may be an effective outreach tactic given that Facebook was the most popular social networking platform (49.8% engagement overall) and 78.7% of respondents were most likely to use an internet search to learn about good environmental practices.
- ✓ With a 24.5% usage of Instagram among residents, ramping up posts and advertisements on that platform should be an area of focus for internet-based education for the upcoming fiscal year.
- ✓ Residents report high levels of engagement in outdoor recreation and gardening. Partnerships with local outdoor recreation retailers such as R.E.I. and/or nurseries may be an effective way to reach residents likely to engage in potential stormwater activities.
- ✓ Residents are about equally as concerned about water pollution as they are about climate change. Messaging that includes climate change is likely to engage residents.

- ✓ Efforts should be made to spread awareness of green infrastructure and its benefits. Even with only 60.6% of respondents saying they've heard the term, there was still strong support for it. This suggests that if residents know that green infrastructure can effectively address their concerns about pollution and improving communities (i.e. making them more "green" and safer), they are likely to support it. Additionally, GI messaging that includes reducing pollution in waterways, ocean, and neighborhoods seems to be the one that resonates most with residents.

CCAG Survey Questionnaire

Introduction: Hello! My name is _____. I'm conducting a brief 5-7 minute survey on behalf of the County. We're interested in hearing residents' opinions about issues that we're facing. In exchange for your time, you can choose 1 of 3 items which include a reusable tote bag, a reusable metal straw, or a pet waste canister. Are you 18 years or older and willing to take this survey?
(If not 18 years or older, please thank them for their time and move on)

1. If yes, which city within San Mateo County do you reside in? *(Circle one)*

Atherton	Belmont	Brisbane	Burlingame
Colma	Daly City	East Palo Alto	Foster City
Half Moon Bay	Hillsborough	Menlo Park	Millbrae
Pacifica	Portola Valley	Redwood City	San Bruno
San Carlos	San Mateo	South San Francisco	Woodside

Other unincorporated area:_____

If not a resident of San Mateo County, please thank them for their time and move on.

2. I'm going to read a list of issues that some people say we are facing in San Mateo County. From a scale from 1 to 4, 1 being "not at all concerned" and 4 being "very concerned," how would you rate your concern about *{ insert issue here}*? The next issue is _____(INSERT ISSUE)...

(ROTATE ORDER ASKED)

	Not at all Concerned			Very Concerned
	1	2	3	4
Air pollution				
Traffic congestion				
Crime				
Water pollution (Ocean, Bay, creeks, etc)				
Quality of public schools				
Litter in your neighborhood				
Cost of housing				
Climate change/sea level rise				

3. Which of the following have you or someone in your household done in the last **3 months**? *(Read list, record all that apply)*

A. Worked on your vehicle (for example washing your car at home, changing oil, etc.)

B. Worked on your lawn or yard

C. Planted or maintained a garden

D. Walked a dog

E. Picked up litter in your neighborhood or community

4. In the last year, have you participated or attended any of the following:

	Yes	No
Community stakeholder meeting?		
Music event		
Neighborhood/homeowner/resident's meeting?		
Parent/Teacher Organization meeting?		
Sporting event		
City Council, County Board or another official government meeting?		
Community workshop?		
Outdoor recreation		

5. Have you heard of the term Green Infrastructure?

A. Yes

B. No

6. Green infrastructure is a way of building traditional infrastructure (such as roads, buildings, schools, and parks) that reduces the negative impacts those facilities have on our natural environment.

With that definition would you support your local government building green infrastructure if it costs... *(Read each percentage range)*:

	Yes	No
0 - 25% more than traditional infrastructure		
25 - 50% more		
50 - 75% more		
75 - 100% more		

7. If I told you that Green Infrastructure helps the following issues, how likely would that further increase your support on a scale from 1 to 4—1 being not all likely and 4 being very likely?

	Not at all Likely			Very likely
	1	2	3	4
Makes San Mateo more resilient to the effects of climate change/sea level rise				
Makes San Mateo less prone to flooding				
Reduces the pollution that enters our creeks, Bay and Ocean				
Reduces pollution in our neighborhoods				
Making communities safer (such as protected bike lanes)				
Making communities greener				

8. Are you a part of one of the following groups:
   A. Member of an environmental organization
      a. No
      b. If so, name _____
   B. Member of a local civic organization
      a. No
      b. If so, name _____
   C. Member of a religious organization
      a. No
      b. If so, name _____
   D. Member of a business group
      a. No
      b. If so, name _____
   E. Member of another type of organization (not mentioned above)
      a. No
      b. If so, name _____

9. Have you seen, read, or heard about how to dispose of pollutants or minimize what gets into the Bay, Oceans, or creeks?
   A. Have seen
   B. Have not seen
   C. Unsure

10. Do you use pesticides in your home or garden?
    A. Yes
    B. No

11. Do you wash your car yourself or take it to a car wash?
    A. Wash at home
    B. Take to car wash
    C. Do not own a car
    D. Unsure

Demographic Information

I'd like to ask you a few final questions for research purposes only. Again, all your answers are confidential. You can decline to answer any of these questions by saying "decline."

12. Where would you go if you wanted more information about good environmental practices?
    A. Internet search B. Social network platform C. Radio/newspaper
    D. Friend or Family E. Government agency F. Don't know
    G. Other answer not listed:_____ H. Declined to answer

13. What social networking platform do you use most? (select all that apply)
    A. Facebook B. Twitter C. Instagram
    D. LinkedIn E. Other_____
    F. Declined to answer

14. What languages are spoken are home? (select all that apply)
    A . English B. Spanish
    C. Chinese (Manderin & Cantonese) D. Tagalog
    E. Other_____ F. Declined to answer

15. Which age category do you belong to?
    A. 18-24 B. 25-34 C. 35-44
    D. 45-54 E. 55-65 F. 65 and over
    G. Declined to answer

16. Which race or ethnicity do you associate with?
    A. Specify_____ B. Declined to answer

17. Do you own a detached, single-family home?
    A. Yes B. No C. Declined to answer

18. Perceived gender expression (self-report, do not ask out loud)
    A. Male
    B. Female

e-Newsletter: Master Gardener Webinar Announcement

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Do you have questions about gardening, pest problems, or sustainable pest management? Ask a UC Master Gardener at our online panel discussion this Saturday, June 13th from 10-11AM!

Register for the free webinar

If you have any questions you know you'll want to ask, submit them in advance to have them answered FIRST, **click here**!

All San Mateo County residents who take a short 3-minute survey after the webinar will be entered into our raffle. You'll have a chance to win a $100 gift card to your choice of either Hassett Ace Hardware, Home Depot, or Lyngso Garden Materials!

Learn more about the webinar

We look forward to hearing your questions and having you in attendance at this insightful and free webinar!

e-Newsletter: Rain Barrel Webinar and SMELC Fellowship

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Educational Opportunities for Water Pollution Prevention

Are you interested in having an eco-friendly garden? Join the City of Burlingame, the Bay Area Water Supply & Conservation Agency, and Flows To Bay for a one hour **webinar** as we learn how to capture and harvest rainwater from rooftops with the help of rain barrels and rain gardens. **One lucky attendee will win a FREE 50-gallon rain barrel!**

LEARN MORE & REGISTER HERE!

Paid Fellowship for Enhancing Students' Environmental Literacy

Are you, or do you know, a teacher who might be interested in learning, designing and delivering curriculum about sustainable watersheds? The **San Mateo Environmental Learning Collaborative** offers a fellowship for teachers looking to bolster the environmental literacy of their students!

San Mateo County teachers who complete the 6-month fellowship program are awarded a $500 stipend funded by Flows To Bay. Teachers from any K-12 grade level in all subject areas are invited to apply today. **Applications are due by June 1.**

Click here to learn more

eNewsletter: New Website and T-Shirt Design Contest

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Two Exciting Announcements

Our New Website | T-Shirt Design Contest

We've been hard at work at revamping the **flowstobay.org** website to provide you more content and resources!

Some of the many features include a filterable **events calendar** (search by event category, city, and event organizer) and webpages to **nominate a Community Champion**, find **water wise home projects**, learn how to **prevent stormwater pollution**, and view new **stormwater related data & resources** and **educational materials**.

That's just a sample of what's new—there's plenty more to see!

Learn more about our new website here

Announcing our First-Ever T-Shirt Design Contest

Calling artists of all ages! We're launching a T-Shirt Design Contest and we're looking for ideas on what clean water and water pollution prevention look like to you! With a t-shirt as your canvas, Flows To Bay wants to see you express yourself. The winner will receive:

- 55-gallon rain barrel
- 100 gift card of their choice to either Hassett ACE Hardware, Home Depot, Amazon, or Grubhub
- T-shirt with your winning design

Deadline: May 25, 2020 by 11:59PM PST

Read the contest rules, how to submit, and additional information here

eNewsletter: Water Wise Activities from Home

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Preventing Stormwater Pollution at Home

5 Water Wise Activities | Household Hazardous Waste Facility Closure | Online Events

Happy Earth Day, San Mateo County residents! As we all continue to do our part to prevent the spread of COVID-19, there are still plenty of ways to celebrate Earth Day from home and make a difference to protect our local creeks, the San Francisco Bay, and the Pacific Ocean. We have 5 pollution prevention suggestions that include individual and family activities both inside and outside your home.

Read 5 Water Wise Activities You Can Do From Home

Household Hazardous Waste Facility Closure and Safe Storage

Household Hazardous Waste (HHW), which are common household items such as automotive fluids, batteries, cooking oil, cosmetics, e-waste, fertilizers, pesticides, household cleaners, and medicines, CAN'T be disposed of in the landfill —they must be given to HHW collection services to protect public health and the environment. Currently, all HHW collection events have been canceled for the duration of the **Health Officer's Order**. For now, **it is critical that we safely store HHW** we're no longer using until we can properly dispose of these items.

Learn About HHW Storage DO's & DON'Ts

Online Event Opportunities

Although in-person events have been postponed for the time being, there are plenty of events happening online! Learning is a powerful tool to prevent stormwater pollution and you can do this right from the comfort of your home.

View Our Events Calendar To Find Online Events

eNewsletter: Community Champion E-Newsletter

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Are You a Community Champion?

Nomination Form | 3 Featured Community Champions

Do you pick up trash on the sidewalk? Have a drought-tolerant yard? Use a rain barrel at home? Pick up after your pet?

Congratulations! You're a San Mateo County Community Champion and we want to celebrate YOU!

Flows to Bay Community Champions are residents who care enough to take big and little actions at home or in the community to prevent water pollution. Every action makes a difference for our local creeks, the San Francisco Bay, and the Pacific Ocean!

Nominate a community champion you know (or self-nominate!) by clicking the button below and filling out a short form so we can spotlight our county's water pollution prevention actions. All nominations will get a Flows to Bay goodie bag with a reusable tote, reusable stainless steel straw, and a dog waste bag canister.

Nominate A Community Champion Today!

Looking for inspiration?
Read below about 3 different community champions who have gone above and beyond for our waterways! You'll also learn tips from them on different actions you can do to prevent stormwater pollution.

Hendrick Wong uses natural and effective alternatives to conventional pest control methods

Erika Richer takes action through sustainable gardening and shares her knowledge

Dee Harley conserves water by collecting rainwater for Harley Farms Goat Dairy in Pescadero

eNewsletter: Q2 Winter E-Newsletter

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Building Eco-Resilience During the Rains

Join the Rain Barrel Movement | Adopt a Drain

The rain is here and our local waterways need your help to ensure that they are not impacted by everything that washes off of the urban landscape. When the rainy season starts, the rainwater washes off anything that it comes into contact with, including roofs, driveways, sidewalks and lawns. As the water flows off these surfaces, it can pick up and carry various pollutants such as bacteria from animal waste, automobile fluids, trash, fertilizers and pesticides. This water then flows into storm drains and, ultimately, into our local waterways.

Since stormwater goes untreated into local waterways, it can adversely affect water quality and aquatic life once it gets into the creeks, the San Francisco Bay, and Pacific Ocean.

San Mateo County residents can become empowered to build resilience against water pollution to maintain the beauty of our waterways. Read below to learn two actions we can take.

San Mateo County's Rain Barrel Movement

As we head into the rainy season, we'll be getting opportunities to harvest the bounty of rainwater. Although the average rain barrel may only be able to store a fraction of the water that runs off your roof in a heavy storm, they are part of a movement that we see as critical to make San Mateo County resilient in the face of climate change.

CLAIM MY WATER SAVING REBATE

Rain, Rain, Adopt a Drain!

Rain can bring us a sense of relief and revitalization throughout our California landscape. Rain can also bring up feelings of concern over the risk of flooding and water pollution. Luckily for residents of San Mateo County, one of the easiest actions we can take is just around the corner.

LET'S STOP WATER POLLUTION

eNewsletter: November 2nd Rain Barrel Workshop

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water Healthy Community.

Saturday, November 2, 2019 | 9AM - 1PM

Hands-On Rain Barrel Installation Workshop

Tierra Linda Middle School, San Carlos

Are you interested in rainwater harvesting to conserve water and prevent stormwater pollution, but not sure how or where to start? Join our rain barrel expert on Nov. 2 as she takes you through the steps needed to install your own system at home. All ages are welcome to participate in the learning and the fun!

This FREE workshop will feature:

- Hands-on instruction and installation of a daisy-chained two-barrel system AND drip irrigation system
- Smoothies made by a Machine Bike Blender (by Rock the Bike) and other light refreshments
- Information on our ongoing Rain Barrel Rebate Program for San Mateo County residents
- PRIZE DRAWING: One lucky attendee will take home a FREE 50 gallon rain barrel (the same which will be used for the workshop installation)

WHEN:
November 2, 2019
9:00AM - 1:00PM
Light refreshments will be provided

WHERE:
Tierra Linda Middle School
Administration Building
750 Dartmouth Ave

SPACE IS LIMITED - RESERVE YOUR SPOT TODAY!

WHY SHOULD YOU INSTALL AND OWN A RAIN BARREL?

- Rain barrels aid in protecting local creeks and waterways, like the San Francisco Bay and Pacific Ocean, by reducing runoff that transports litter, chemicals, and other pollutants from entering storm drains.
- During the rainy winter season, rain barrels can help capture and store water. They can also prevent excessive moisture from effecting your home's foundation.
- 1,000 square feet of roof surface can capture over 600 gallons of water for every 1" of rainfall! Just think of the different ways you can use that water.

eNewsletter: October 12th Rain Barrel Workshop

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water Healthy Community

Oct. 12 Rain Barrel Workshop in Half Moon Bay

Half Moon Bay Library, Community Room A | 10am - 12pm

WHY SHOULD YOU INSTALL AND OWN A RAIN BARREL?

- Rain barrels aid in protecting local creeks and waterways, like the San Francisco Bay and Pacific Ocean, by reducing runoff that transports litter, chemicals, and other pollutants from entering storm drains.
- During the rainy winter season, rain barrels can help capture and store water. They can also prevent excessive moisture from effecting your home's foundation.
- 1,000 square feet of roof surface can capture over 600 gallons of water for every 1" of rainfall! Just think of the different ways you can use that water.

In our workshop you will learn about:

- The rain barrel rebate program in San Mateo County
- The "why" and "how" of rainwater harvesting including a demonstration
- Different types of rain barrels
- Uses around the home and garden

PRIZE DRAWING: One lucky participant will go home with a FREE 50-gallon rain barrel!

WHEN:
October 12, 2019
10:00AM - 12:00PM
Light refreshments will be provided

WHERE:
Half Moon Bay Library
Community Room A
620 Correas Street

SPACE IS LIMITED - RESERVE YOUR SPOT TODAY!

eNewsletter: September Volunteer Opportunities

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

September Volunteer Opportunities

First Flush Training (9/10) | Coastal & Bay Cleanup Day (9/21)

BE A LOCAL WATER PROTECTOR!

ONE-TIME COMMITMENT | NO EXPERIENCE REQUIRED

SEPTEMBER 10 | 6:30PM

Join the San Mateo Resource Conservation District as they gear up for their biggest volunteer and water quality sampling event — First Flush!

First Flush is the first big rain of the year where runoff enters the creeks and storm drains and flows into the ocean. During this event, volunteers collect data and water samples between Montara and Half Moon Bay to help us better understand pollution that can negatively impact humans and wildlife.

TRAINING:
September 10, 2019 | 6:30 PM
80 Stone Pine Road, Suite 100
Half Moon Bay, CA 94019

TO SIGN UP:
Contact Noah Katz
noah@sanmateoRCD.org
(650) 712-7765 x119

CLEAN WATER CHAMPIONS NEEDED!

SEPTEMBER 21 | 9AM TO NOON

It's almost time for the annual California Coastal Cleanup Day! This event not only removes huge amounts of trash from our creeks and waterfronts, but it also empowers YOU to become a part of the solution. Families are encouraged to bring their children, as this family-friendly event is a great opportunity to learn about litter and how to prevent pollution from ending up in our local streets and waterways.

This year there are over 40 sites throughout San Mateo County. Click below for a list of locations and to find out how you can volunteer!

CLICK TO LEARN MORE

eNewsletter: Pet Waste E-Blast Summer

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

The Truth About Pet Waste!

Reasons Why Picking Up After Your Pet Matters | DoodyCalls Coupon

Clean Waters Depends On What You Choose To Doo!

Dogs are undeniably great: they're cute, they love us unconditionally, and they get us out of the house. And while some dogs are smart enough to learn remarkable commands and do amazing tricks, they rely on responsible pet owners to make sure their waste gets properly cleaned up and disposed of.

Read about the top 3 problems stemming from leaving pet poop unscooped and what you can do to be part of the solution!

CLICK TO LEARN MORE

Exclusive Flows To Bay Email Subscriber Discount

As thanks for being a subscriber, here is your exclusive Flows To Bay discount for services with DoodyCalls San Mateo County. Click below to download a PDF of the coupon.

When things start piling up...

DoodyCalls saves you time by checking poop scooping off your to-do list! Schedule your pet waste pickup today. Prices start at just $18.

50% OFF

DoodyCalls

We scoop poop so you don't have to.

DoodyCalls.com

1-800-366-3922

flowstobay.org

eNewsletter: July Survey

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Which issues in San Mateo County matter most to you?

Take this 5-minute survey and tell us what's on your mind

We want to hear from you! Share your thoughts and opinions in this quick, 5-minute survey and let your voice be heard. All people who complete this survey by August 31 will be entered to win a $50 Amazon gift card.

If you're a San Mateo County resident 18 years or older, please click below to get started.

SHARE YOUR THOUGHTS

This survey is open only to San Mateo County residents, 18 years or older. Survey closes at 11:50PM on August 31, 2019. Amazon gift card winner will be notified by September 6, 2019.

eNewsletter: Car Wash - Summer 2019

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Car Washing Season in San Mateo County

Responsible (And Eco-Friendly) Car Washing | Ducky's Car Wash Coupon

Tips For Responsible (And Eco-Friendly) Car Washing

Sometimes doing things ourselves means we can be more creative, efficient, and smarter with our resources. For example, making food at home rather than getting takeout can reduce waste by eliminating unnecessary driving and the need for single-use packaging. But when it comes to washing your car at home, this weekend chore can actually become a huge source of water waste and contribute to water pollution. What's the wiser choice?

CLICK TO SEE THE ANSWER

Flows to Bay Subscriber Coupon

As thanks for being a subscriber, here is your exclusive Flows To Bay discount with Ducky's Car Wash. Click below to download a PDF of the coupon.

Exclusive Discount for Friends of

flowstobay.org

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

Clean Water. Healthy Community.

Examples of Webpages from the Updated SMCWPPP Website

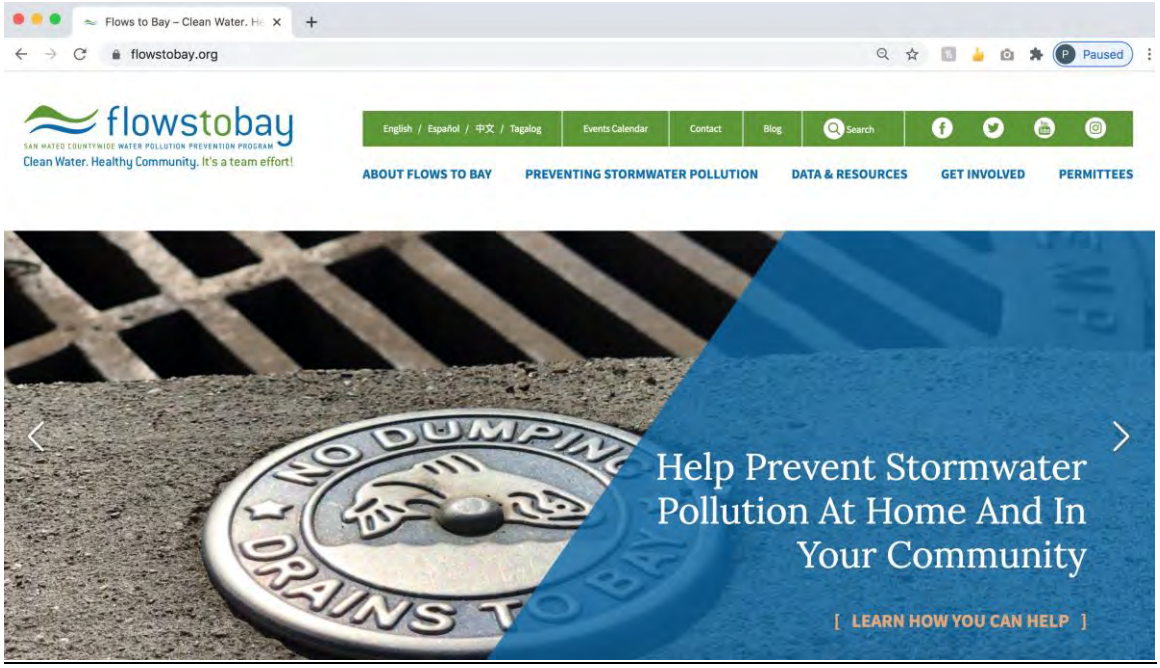

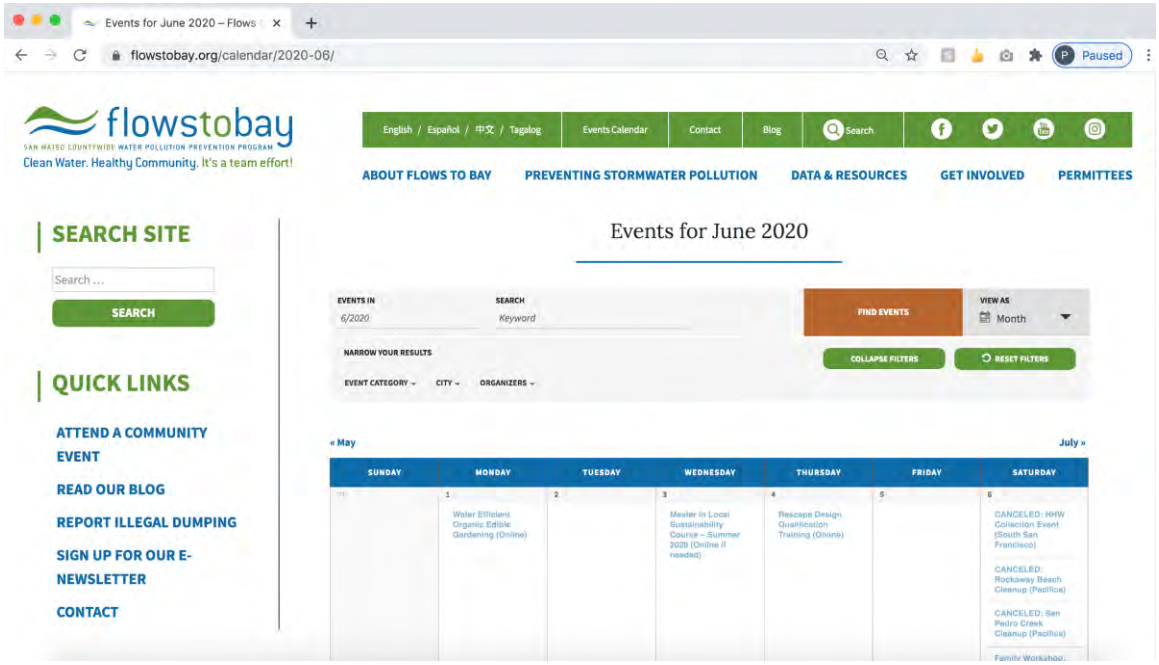

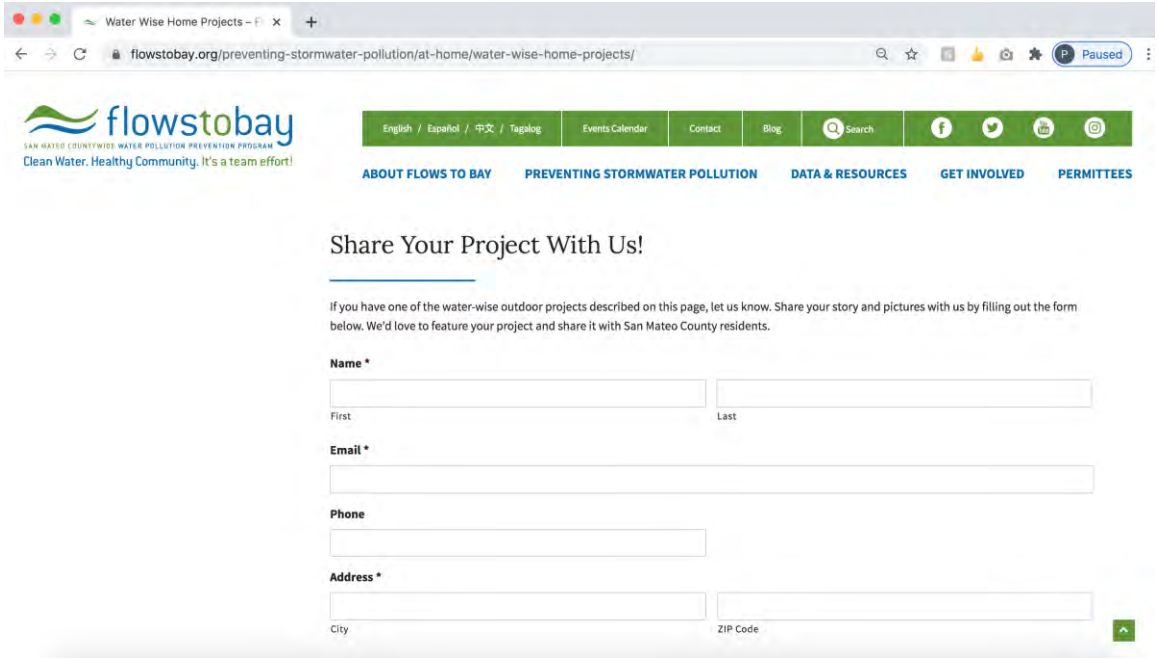
Water Wise Home Projects – F
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Share Your Project With Us!
If you have one of the water-wise outdoor projects described on this page, let us know. Share your story and pictures with us by filling out the form below. We'd love to feature your project and share it with San Mateo County residents.
Name *
First
Last
Email *
Phone
Address *
City
ZIP Code

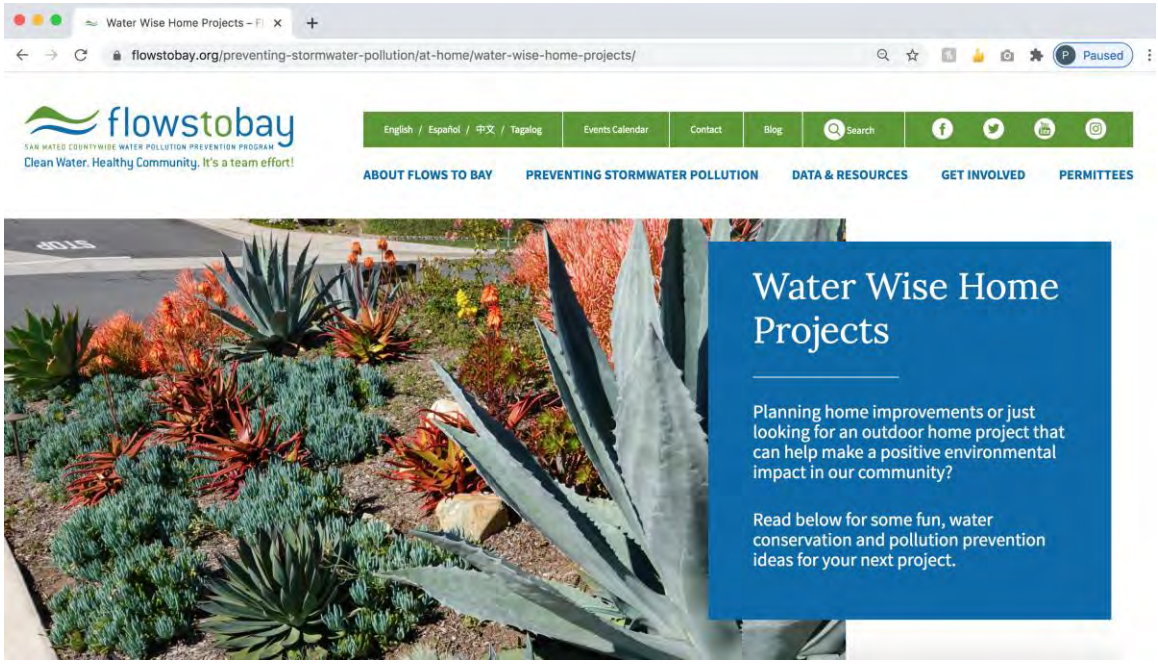
Water Wise Home Projects – F
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Water Wise Home Projects
Planning home improvements or just looking for an outdoor home project that can help make a positive environmental impact in our community?
Read below for some fun, water conservation and pollution prevention ideas for your next project.

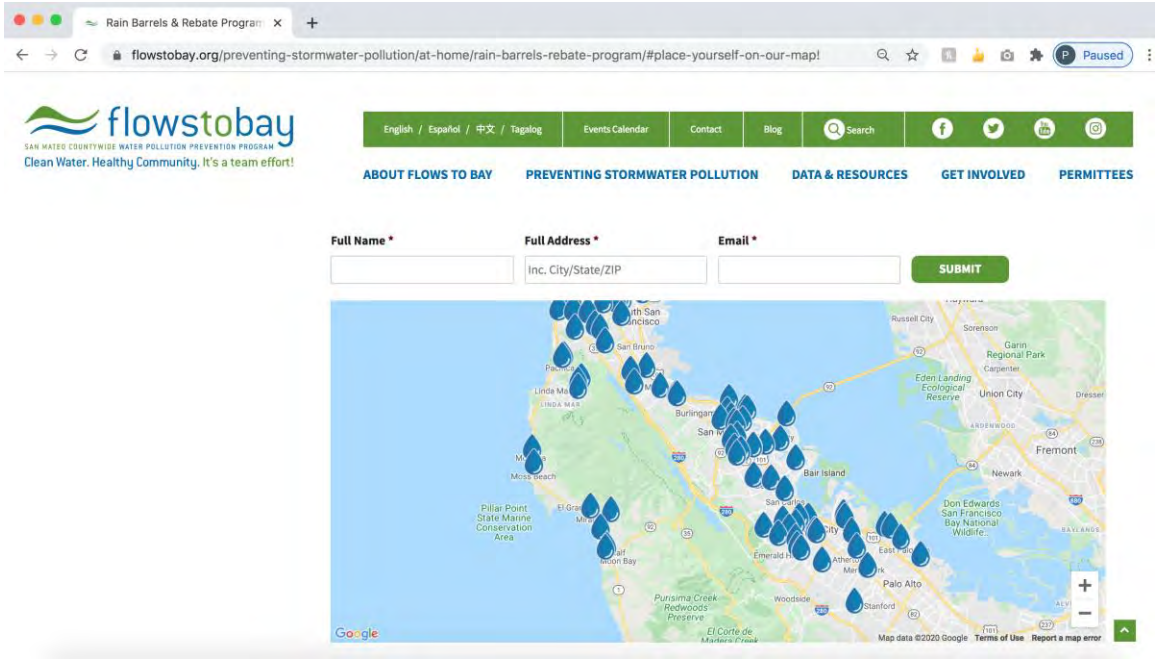
Rain Barrels & Rebate Program
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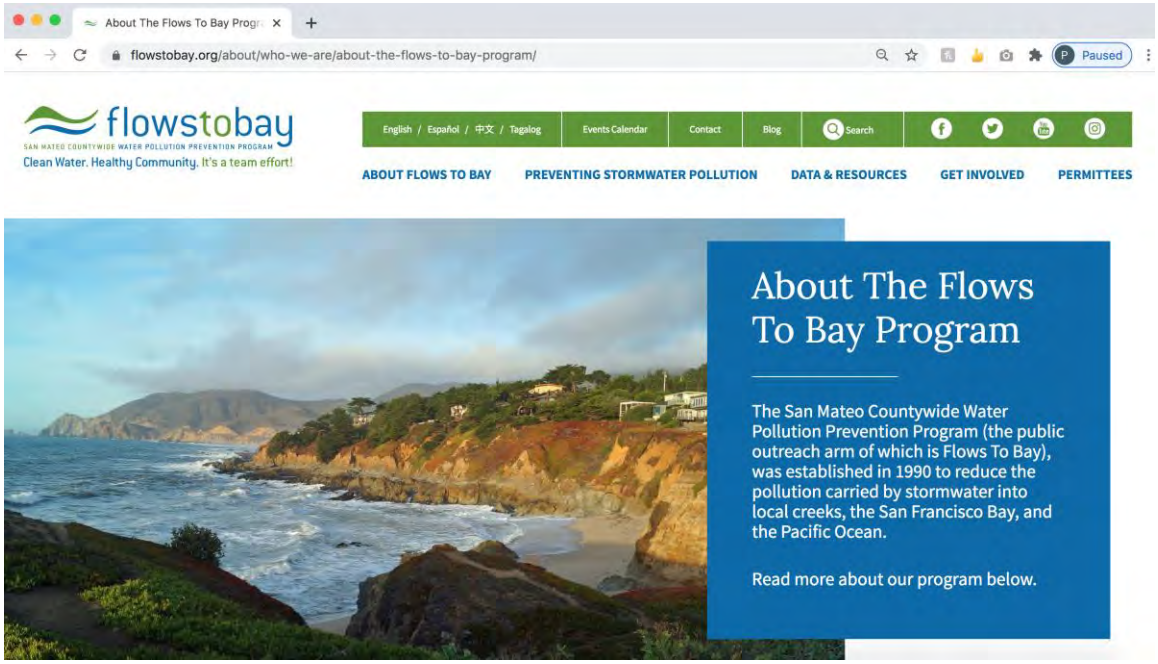
About The Flows To Bay Program
flowstobay.org/about/who-we-are/about-the-flows-to-bay-program/
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About The Flows To Bay Program
The San Mateo Countywide Water Pollution Prevention Program (the public outreach arm of which is Flows To Bay), was established in 1990 to reduce the pollution carried by stormwater into local creeks, the San Francisco Bay, and the Pacific Ocean.
Read more about our program below.

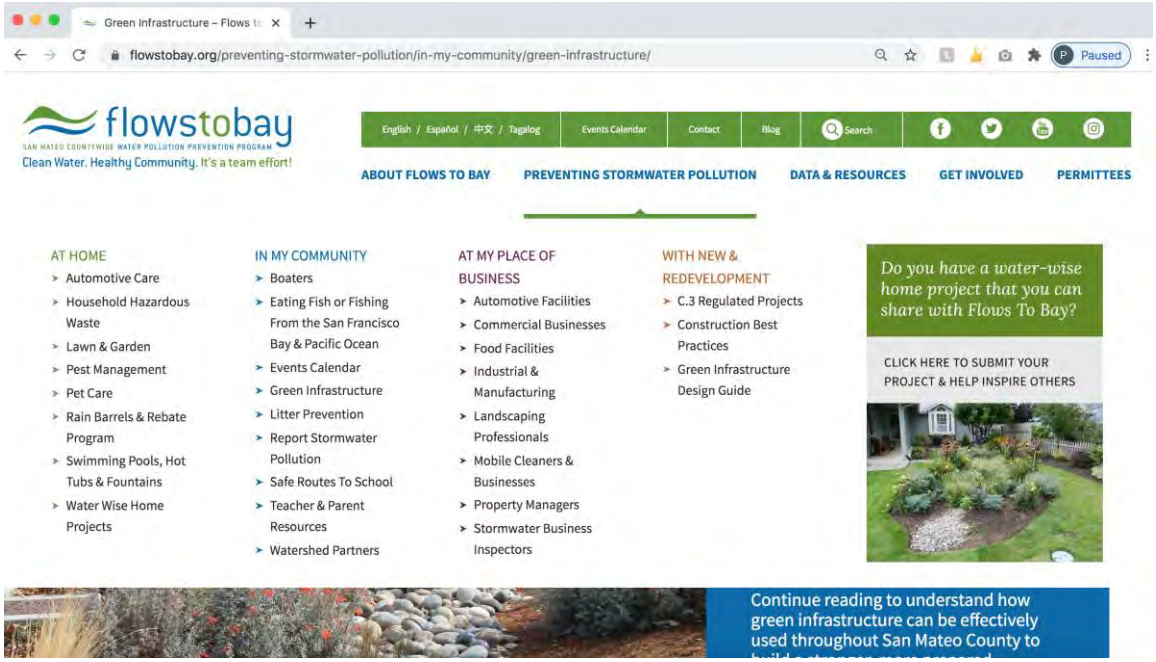
Green Infrastructure – Flows to
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Lawn & Garden
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Swimming Pools, Hot Tubs & Fountains
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Eating Fish or Fishing From the San Francisco Bay & Pacific Ocean
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Safe Routes To School
Teacher & Parent Resources
Watershed Partners
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Commercial Businesses
Food Facilities
Industrial & Manufacturing
Landscaping Professionals
Mobile Cleaners & Businesses
Property Managers
Stormwater Business Inspectors
WITH NEW & REDEVELOPMENT
C.3 Regulated Projects
Construction Best Practices
Green Infrastructure Design Guide
Do you have a water-wise home project that you can share with Flows To Bay?
CLICK HERE TO SUBMIT YOUR PROJECT & HELP INSPIRE OTHERS
Continue reading to understand how green infrastructure can be effectively used throughout San Mateo County to

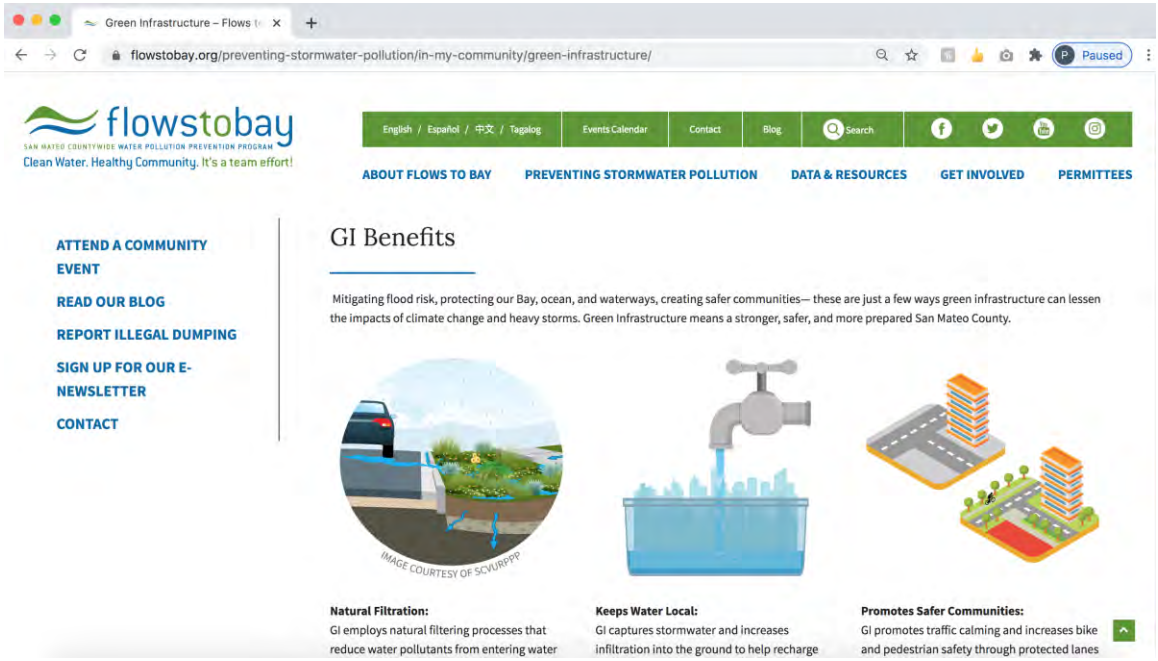
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GI Benefits
Mitigating flood risk, protecting our Bay, ocean, and waterways, creating safer communities— these are just a few ways green infrastructure can lessen the impacts of climate change and heavy storms. Green Infrastructure means a stronger, safer, and more prepared San Mateo County.
IMAGE COURTESY OF SCVURPPP
Natural Filtration:
GI employs natural filtering processes that reduce water pollutants from entering water
Keeps Water Local:
GI captures stormwater and increases infiltration into the ground to help recharge
Promotes Safer Communities:
GI promotes traffic calming and increases bike and pedestrian safety through protected lanes

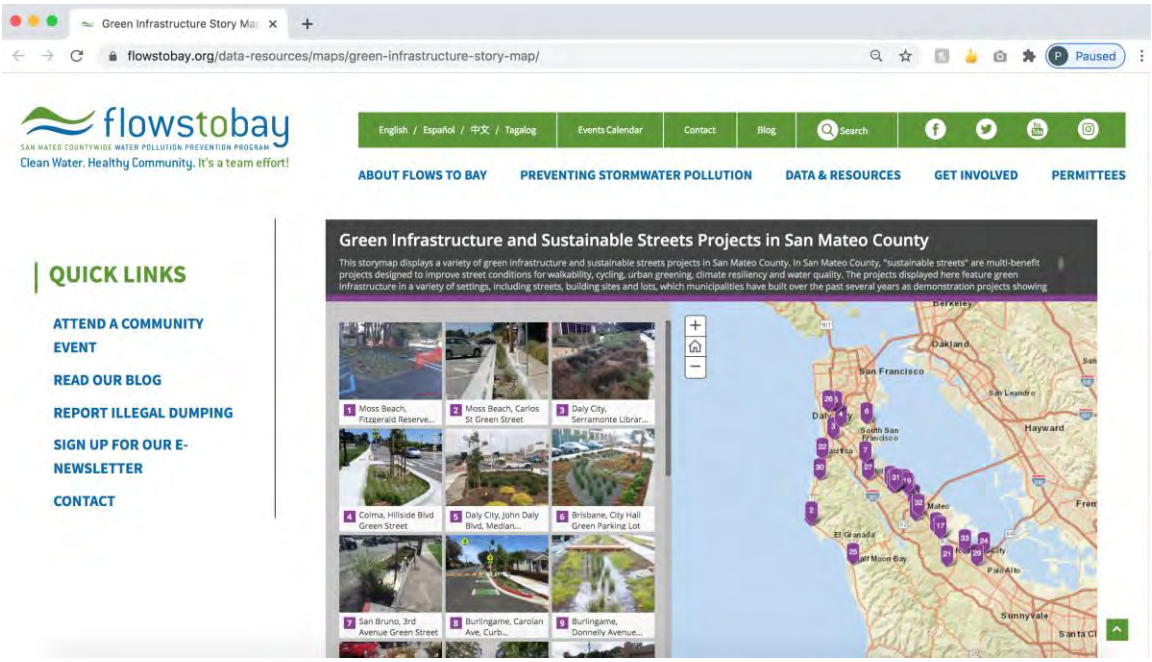
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Green Infrastructure and Sustainable Streets Projects in San Mateo County
This storymap displays a variety of green infrastructure and sustainable streets projects in San Mateo County. In San Mateo County, "sustainable streets" are multi-benefit projects designed to improve street conditions for walkability, cycling, urban greening, climate resiliency and water quality. The projects displayed here feature green infrastructure in a variety of settings, including streets, building sites and lots, which municipalities have built over the past several years as demonstration projects showing
1 Moss Beach, Fitzgerald Reserve...
2 Moss Beach, Carlos St Green Street
3 Daly City, Serramonte Librar...
4 Colma, Hillside Blvd Green Street
5 Daly City, John Daly Blvd, Median...
6 Brisbane, City Hall Green Parking Lot
7 San Bruno, 3rd Avenue Green Street
8 Burlingame, Carolan Ave, Curb...
9 Burlingame, Donnelly Avenue...
Berkeley
Oakland
San Francisco
San Leandro
Hayward
South San Francisco
Daly City
Colma
Mateo
El Granada
Half Moon Bay
Palo Alto
Sunnyvale

Appendix 9

- Parks Maintenance & IPM Work Group Attendance List FY 2019/20
- Landscape Integrated Pest Management (IPM) Workshop – March 3, 2020
    - Workshop Agenda
    - Attendance List
    - Evaluations Summary
- Pest Control Contracting Outreach

San Mateo Countywide Water Pollution Prevention Program
Parks Maintenance IPM Work Group Attendance List - FY 2019/20

Contact Information			Attendance
MUNICIPALITY	**REPRESENTATIVE**	**EMAIL**	**11/19/2019**
Atherton	Sally Bentz-Dalton	sbentz@ci.atherton.ca.us	
Belmont	Daniel Ourtiague	dourtiague@belmont.gov	
	Matt Ward	mward@belmont.gov	
Brisbane	Keegan Black	kblack@ci.brisbane.ca.us	
Burlingame	Rich Holtz	Rholtz@burlingame.org	X
	Bob Disco	bdisco@burlingame.org	
Colma	Louis Gotelli	Louis.Gotelli@colma.ca.gov	
	Brian Dossey	brian.dossey@colma.ca.gov	
Daly City	Chris Caliendo	ccaliendo@dalycity.org	X
	Jeff Fornesi	jfornesi@dalycity.org	
	Sibely Calles	scalles@dalycity.org	X
	Dennis Bray	dbray@dalycity.org	
	Nicholas Crescenzi	ncrescenzi@dalycity.org	
	Jeff Templin	jtemplin@dalycity.org	X
	Fernando Barron		
East Palo Alto	Jay Farr	jfarr@cityofepa.org	
	Lenin Mecgar	lmelgar@cityofepa.org	
	Mario Pulido	pulidomario@sbcglobal.net	
	Michelle Daher	mdaher@cityofepa.org	
Foster City	P Chiamos	pchiamos@fostercity.org	
	Frank Fanara	Ffanara@fostercity.org	
Half Moon Bay	Katherine Sheehan	katherines@csgengr.com	
	Maziar Bozorginia	MBozorginia@hmbcity.com	
Hillsborough	Garry Francis	gfrancis@hillsca.org	
	Natalie Asai	nasai@HILLSBOROUGH.NET	
Menlo Park	Sheena Ignacio	smignacio@menlopark.org	
Millbrae	Ken Crosetti	kcrosetti@ci.millbrae.ca.us	
	John Gianoli	jgianoli@ci.millbrae.ca.us	
Pacifica	A. Clark	clarka@ci.pacifica.ca.us	
	Estevan Renteria	Lavorinip@ci.pacifica.ca.us	
	Raymond Donguines	donguinesr@ci.pacifica.ca.us	
Portola Valley	Howard Young	hyoung@portolavalley.net	
Redwood City	Lucas Wilder	LWilder@redwoodcity.org	X
	Terence Kyaw	TKyaw@redwoodcity.org	
	Francisco Espinoza	fespinoza@redwoodcity.org	
San Bruno	Rene Walsh	rwalsh@ci.sanbruno.ca.us	
	Danielle Brewer	DBrewer@sanbruno.ca.gov	
	Dan Venezia	Dvenezia@sanbruno.ca.gov	

San Mateo Countywide Water Pollution Prevention Program
Parks Maintenance IPM Work Group Attendance List - FY 2019/20

Contact Information			Attendance
MUNICIPALITY	**REPRESENTATIVE**	**EMAIL**	**11/19/2019**
San Carlos	Arturo Burgueno	aburgueno@cityofsancarlos.org	
	Chris Zanoni	czanoni@cityofsancarlos.org	
	Jean St. Martin	jsaintmartin@cityofsancarlos.org	
	Luis Estrada	lestrada@cityofsancarlos.org	
	Kathryn Robertson	krobertson@cityofsancarlos.org	
City of San Mateo	Mark Hulett	mhulett@cityofsanmateo.org	
	Sarah Scheidt	sscheidt@cityofsanmateo.org	
	Jim Burch	JBurch@sanbruno.ca.gov	
	Dennis Pawl	dpawl@cityofsanmateo.org	
	Sven Edlund	sedlund@cityofsanmateo.org	X
San Mateo Co. Parks	Sam Herzberg	SHerzberg@co.sanmateo.ca.us	
	Scott Lombardi	slombardi@co.sanmateo.ca.us	
	Julie Casagrande	jcasagrande@co.sanmateo.ca.us	
	Kim Springer	kspringer@smcgov.org	
	John Allan		
	Dan Krug	dkrug@smcgov.org	
San Mateo Co. Office of Sustainability	John Allan	jallan@smcgov.org	X
SM County PW	Jeff Pacini	JPacini@co.sanmateo.ca.us	
	Kevin Lu	khlu@smcgov.org	
County Agriculture Weights and Measures	Richard Garcia	rgarcia@co.sanmateo.ca.us	
	Jeremy Wagner	JWagner@smcgov.org	
	M Marelich	mmarelich@smcgov.org	
	Fred Crowder	fcrowder@co.sanmateo.ca.us	
	Ione Yuen	IYuen@smcgov.org	X
	Jenny Gossett		
	Avneet Kakkar	akakkar@smcgov.org	
SSF	Donald Louie	donald.louie@ssf.net	X
	Greg Mediati	Greg.Mediati@ssf.net	
Woodside	Dong Nguyen		
	Sean Rose	srose@woodsidetown.org	
UCCE/UC IPM	Andrew Sutherland	amsutherland@ucanr.edu	
EOA	Jon Konnan	jkonnan@eoainc.com	
	Vishakha Atre	vatre@eoainc.com	
SMCWPPP	Matt Fabry	mfabry@smcgov.org	
	Reid Bogert	rbogert@smcgov.org	
Other Attendees			
	Dorte Drastrup	dortedrastrup@gmail.com	
Kelly Carrol	CSG/Half Moon Bay/Colma	kellyc@csgengr.com	X

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

AGENDA

Landscape Integrated Pest Management (IPM) Workshop

(Sponsored by SMCWPPP Parks Maintenance and IPM Workgroup)
Wind Room, Library Community Center
1000 E. Hillsdale Blvd.
Foster City, CA 94404
Tuesday, March 3, 2020
10:30 a.m. – 3:00 p.m.

Registration and Lunch	10:30 am – 11:00 am
Welcoming Remarks Richard Holtz, *City of Burlingame*	11:00 am – 11:05 am
Pesticides Toxicity Control Requirements in the Municipal Stormwater Regional Permit Vishakha Atre*, EOA*	11:05 am – 11:20 am
Soil Management for Weed Control Dr. Igor Lacan*, UC Cooperative Extension*	11:20 am – 12:20 pm
Using Goats for Vegetation Management in Urban Landscapes Kirk Gharda, *City of Redwood City*	12:20 pm – 12:50 pm
Break	12:50 pm – 1:00 pm
Spring Applications for Landscape & Tree Care Eric Carlson**,** *Target Specialty*	1:00 pm – 2:00 pm
Regulatory Update, Common Violations Joseph Hannen, *San Mateo County Agriculture/Weights and Measures*	2:00 pm – 3:00 pm
Adjourn	3:00 pm

SMCWPPP Landscape IPM Workshop
Attendance List
March 3, 2020

	LAST NAME	FIRST NAME	AGENCY
1	Mayeda	Walter	SMC - Dept of Ag
2	Acevedo	Salvador	Foster City
3	Aizawa	Brian	Redwood City
4	Allan	John	County of San Mateo
5	Barron	Fernando	Daly City
6	Bentz-Dalton	Sally	Atherton
7	Bergstrom	Paul	Loral Landscaping
8	Bixby	Justin	Portola Valley
9	Bravo	Tony	Redwood City
10	Brosnan	Cornelius	Burlingame
11	Caliendo	Chris	Daly City
12	Caravalho	Nate	Half Moon Bay
13	Cardenas	Jorge	Loral Landscaping
14	Carroll	Kelly	Redwood City
15	Castro	Carlos	Hillsborough
16	Chiamos	Peter	Foster City
17	Coldrick	James	Burlingame
18	Cooney	Edmund	Hillsborough
19	Correa	Sean	County of San Mateo
20	Delaney	James	Burlingame
21	Deraz	Miguel	Redwood City
22	Diaz	Jose	Redwood City
23	Echeverria	James	Foster City
24	Espinoza	Jesus	Redwood City
25	Friars	Joe	Brisbane
26	Fukudome	Glenn	Redwood City
27	Garcia	Manuel	Foster City
28	Garcia	Luis	Redwood City
29	Garcia	Richard	SMC - Dept of Ag
30	Gonzales	Rosalia	Redwood City

SMCWPPP Landscape IPM Workshop
Attendance List
March 3, 2020

	LAST NAME	FIRST NAME	AGENCY
31	Gossett	Jenny	SMC - Dept of Ag
32	Gotthardt	Garrett	Foster City
33	Hannen	Joseph	SMC - Dept of Ag
34	Herbert	Dominique	Redwood City
35	Holtz	Richard	Burlingame
36	Jimenez	Abel	Foster City
37	Jimenez	Miguel	Redwood City
38	Kakkar	Avneet	SMC - Dept of Ag
39	Krug	Daniel	County of San Mateo
40	Louie	Donald	South San Francisco
41	Moreno	Leopnardo	Redwood City
42	Mungia	Carlos	Foster City
43	Munguia	Armando	Half Moon Bay
44	Munoz	Genaro	Foster City
45	Orlando	Daniel	East Palo Alto
46	Padilla	Lydia	Rudy's Greenhouses
47	Pappas	Stephen	Burlingame
48	Pedalino	Michael	Half Moon Bay
49	Penisini	Sharona	Redwood City
50	Pulido	Mario	East Palo Alto
51	Rancatore	Michael	Burlingame
52	Renteria	Estevan	Pacifica
53	Ryan	Matthew	Foster City
54	Salazar	Raul	Foster City
55	Schroder	Nazmeen	Foster City
56	Tagle	Jason	Hillsborough
57	Templin	Jeffrey	Daly City
58	Thomas	Randy	Brisbane
59	Tschierschky	Zack	Burlingame
60	Valencia	Alex	East Palo Alto

SMCWPPP Landscape IPM Workshop
Attendance List
March 3, 2020

	LAST NAME	FIRST NAME	AGENCY
61	Ventura	Wilber	Foster City
62	Weber	Daniel	Foster City
63	Wheeler	Howard	Loral Landscaping
64	Wilder	Lucas	Redwood City

64 Attendees
23 Evaluations

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

Evaluation Form

Landscape Integrated Pest Management (IPM) Workshop
(Sponsored by SMCWPPP Parks Maintenance and IPM Workgroup)
Wind Room, Library Community Center
1000 E. Hillsdale Blvd.
Foster City, CA 94404
Tuesday, March 3, 2020
10:30 a.m. – 3:00 p.m.

What Did You Think of the Following Presentations?

1. **Pesticides Toxicity Control Requirements in the Municipal Regional Permit -** Vishakha Atre, *EOA*

   14 very helpful **9** somewhat helpful **0** not helpful

2. **Soil Management for Weed Control -** Dr. Igor Lacan, *UC Cooperative Extension*

   20 very helpful **3** somewhat helpful **0** not helpful

3. **Using Goats for Vegetation Management in Urban Landscapes -** Kirk Gharda, *Redwood City*

   13 very helpful **7** somewhat helpful **0** not helpful

4. **Spring Applications for Landscape & Tree Care -** Eric Carlson, *Target Specialty*

   17 very helpful **3** somewhat helpful **1** not helpful

5. **Regulatory Update, Common Violations –** Joseph Hannen, *San Mateo County Agriculture/Weights and Measures*

   14 very helpful **5** somewhat helpful **0** not helpful

Did this workshop meet your expectations? **20** Yes **0** No

Suggestions for future workshop topics:

- More specific info on techniques for weed control
- All day for more hours (8:00am-3:00pm)
- Microbial science of soil
- How treated drinking water and recycled water affects soil health, compared to rainwater and well water
- More detail of making mulch - what type of wood chips or leaf species.
- Fire safe landscaping
- Roadside applications for fire control
- More topics on wildland applications
- Bring examples of personal protective equipment - gloves, overalls, etc.

Please submit at the end of the workshop. ***Thank You for Your Comments!***

07699
7740

General Comments:

- Great (5)
- Very Good (1)
- Thank you (1)
- Thanks for providing tables
- You ran a great event
- The course was great at providing up to date information on recent changes to local regulations

Pest Control Contracting Outreach

Pledge

flowstobay.org
SAN MATEO COUNTYWIDE
WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

I pledge to reduce pesticide usage to protect the health of my community and our waterways.

Business: _____

Name: _____

Signature: _____

Date: _____

Partial Database of Pest Control Operators

Name	License #	License Status	Issuance Date	Expiration Date	Business Name	Address	City
CHUNG, JOHN	13395 and 12432	Clear	8/14/2018	6/30/2021	BLUEBIRD TERMITE	533 AIRPORT BLVD #400 BURLINGAME CA 94010 SAN MATEO COUNTY	Burlingame
DIODATI, ARMANDO G	5237	Clear	1/1/1976	6/30/2021	GOLDEN GATE TERMITE CONTROL INC	328 LANG ROAD BURLINGAME CA 94010 SAN MATEO COUNTY	Burlingame
COURTEMANCHE, CARL OVIDE	10108	Clear	11/12/1999	6/30/2020	CAM AM PEST CONTROL	332 POPLAR AVENUE REDWOOD CITY CA 94061 SAN MATEO COUNTY	Redwood City
CRUMPTON, RICHARD EARL	8946	Clear	4/21/1992	6/30/2021	POWER PEST CONTROL	P O BOX 451 BELMONT CA 94002 SAN MATEO COUNTY	Belmont
FUSON, KENNETH JACOB	9794	Clear	12/3/1997	6/30/2021	KEN FUSON PEST MANAGEMENT SERVICES	111 ELM STREET MENLO PARK CA 94025 SAN MATEO COUNTY	Menlo Park

Name	License #	License Status	Issuance Date	Expiration Date	Business Name	Address	City
HASTIE, HARRY H JR	4704	Clear	1/1/1973	6/30/2022	HASTIE TERMITE COMPANY THE	701 CHESTER WAY HILLSBOROUGH CA 94010 SAN MATEO COUNTY	Hillsborough
HUSTED, BRET DENNING	11737	Clear	8/4/2008	6/30/2020	PREVENTION INSPECTION SERVICES	1748 SWEETWOOD DRIVE DALY CITY CA 94015 SAN MATEO COUNTY	Daly City
DONOVAN, JAMES EDWARD	9728	Clear	7/7/1997	6/30/2021	DONOVANS PEST CONTROL INC	PO BOX 6910 SAN MATEO CA 94403 SAN MATEO COUNTY	San Mateo
GOSS, JEFFREY R	12632	Clear	12/27/2013	6/30/2022	DONOVANS PEST CONTROL INC	PO BOX 6910 SAN MATEO CA 94403 SAN MATEO COUNTY	San Mateo
IACOPI, PETER MICHAEL	9433	Clear	7/31/1995	6/30/2022	COASTSIDE TERMITE	P O BOX 116 HALF MOON BAY CA 94019 SAN MATEO COUNTY	Half Moon Bay
JAURIGUI, DAVID JOSEPH	10739	Clear	6/6/2003	6/30/2020	ALERT PEST CONTROL CO INC	182 SCHOOL STREET DALY CITY CA 94014 SAN MATEO COUNTY	Daly City
JAURIGUI, JOHN J	6999	Clear	1/1/1984	6/30/2022	ALERT PEST CONTROL CO INC	182 SCHOOL STREET DALY CITY CA 94014 SAN MATEO COUNTY	Daly City
JAURIGUI, MICHAEL JOHN	10723	Clear	5/9/2003	6/30/2020	ALERT PEST CONTROL CO INC PICK A PRO NOW	182 SCHOOL STREET DALY CITY CA 94014 SAN MATEO COUNTY 950 COMMERCIAL AVE SOUTH SAN FRANCISCO CA 94080 SAN MATEO COUNTY	Daly City South San Francisco
NG, PUI KWONG	9355	Clear	1/11/1995	6/30/2021	TERMITE EXTERMINATOR	1602 ROBERTA DRIVE SAN MATEO CA 94403 SAN MATEO COUNTY	San Mateo
O'HARA, TIMOTHY DAVID	8185	Clear	1/1/1988	6/30/2021	O HARAS PEST CONTROL	P O BOX 6 SAN GREGORIO CA 94074 SAN MATEO COUNTY	San Gregorio
OUTMAN, MATTHEW ROBERT	9048	Clear	10/29/1992	6/30/2022	MATT OUTMAN	108 SCENIC DRIVE REDWOOD CITY CA 94062 SAN MATEO COUNTY	Redwood City
PALMER, KEVIN JAMES	8400	Clear	7/10/1989	6/30/2022	PREMIER TERMITE INC	PO BOX 266/ 116 N CABRILLO HWY HALF MOON BAY CA 94019 SAN MATEO COUNTY	Half Moon Bay
POWELL, BRIAN K	11765	Clear	10/20/2008	6/30/2020	BEST PEST SERVICE INC	218 SHAW ROAD STE G SOUTH SAN FRANCISCO CA 94080 SAN MATEO COUNTY	South San Francisco

Name	License #	License Status	Issuance Date	Expiration Date	Business Name	Address	City
SILVA, ARMANDO	11539	Clear	7/3/2007	6/30/2022	MARINA PEST CONTROL CORPORATION	150 S SPRUCE S SAN FRANCISCO CA 94080 SAN MATEO COUNTY	South San Francisco
SU, DAN NOEL	12289	Clear	12/7/2011	6/30/2020	PACIFIC PEST MANAGEMENT	3917 BERESFORD ST #5 SAN MATEO CA 94403 SAN MATEO COUNTY	San Mateo
WONG, HENDRICK	8468	Clear	11/22/1989	6/30/2022	ONE SOURCE TERMITE CONTROL TEAM PEST SOLUTIONS	8 WESTPARK DRIVE DALY CITY CA 94015 SAN MATEO COUNTY	Daly City
RETTKE, MONTE JOSEPH	9419	Clear	7/1/1995	6/30/2022	J K CONTROL INC	200 VALLEY DRIVE #35 BRISBANE CA 94005 SAN MATEO COUNTY	Brisbane
HOWLETT, STEVEN JEFFERY	8194	Clear	1/1/1988	6/30/2021	EVEN STEVENS PEST CONTROL	1612 EL VERANO WAY BELMONT CA 94002 SAN MATEO COUNTY	Belmont
BOYNTON, WILLIAM R	13234	Clear	9/20/2017	6/30/2020	Cook and Associates - Cookton Enterprises Inc DBA	1101 JUDSON STREET BELMONT CA 94002 SAN MATEO COUNTY	Belmont
NEUMANN, ROBERT HEINZ	7622	Clear	1/1/1986	6/30/2022	KAPTO TERMITE CONTROL	1530 ARROYO AVENUE SAN CARLOS CA 94070 SAN MATEO COUNTY	San Carlos
FLETCHER, JAMES ROBERT	10634	Clear	9/23/2002	6/30/2020	COMPLETE PEST CONTROL	PO BOX 315 REDWOOD CITY CA 94064-0315 SAN MATEO COUNTY	Redwood City
PALMIERI, JOSEPH	9912	Clear	7/29/1998	6/30/2022	PALMIERI PEST CONTROL	208 FIRST AVENUE REDWOOD CITY CA 94063 SAN MATEO COUNTY	Redwood City
RUBINA, JOSE LUIS	5734	Clear	1/1/1978	6/30/2020	X PEST EXTERMINATORS	100 NORTH HILL DRIVE #40 BRISBANE CA 94005 SAN MATEO COUNTY	Brisbane
RUSH, MARK STEVEN	10066	Clear	7/28/1999	6/30/2020	ON SITE INSPECTIONS INC	461 ALTA VISTA DRIVE SOUTH SAN FRANCISCO CA 94080 SAN MATEO COUNTY	South San Francisco
SANCHEZ, ANDY WILLIAMS	13416	Clear	9/13/2018	6/30/2021	GENESIS BUILDING SERVICES INC	P O BOX 25360 SAN MATEO CA 94402 SAN MATEO COUNTY	San Mateo
STEWART, RICHARD NORMAN	8381	Clear	1/1/1989	6/30/2021	CHIEF STEWARTS PEST CONTROL INC	139 SANTIAGO AVENUE REDWOOD CITY CA 94061 SAN MATEO COUNTY	Redwood City
WALKER, KEVIN T	13316	Clear	3/12/2018	6/30/2020	CRANE PEST CONTROL	2700 GEARY BOULEVARD SAN FRANCISCO CA 94118 SAN FRANCISCO COUNTY	San Francisco

Name	License #	License Status	Issuance Date	Expiration Date	Business Name	Address	City
DIODATI, GIOVACCHINO	5272	Clear	1/1/1976	6/30/2021	GOLDEN GATE TERMITE CONTROL INC	328 LANG ROAD BURLINGAME CA 94010 SAN MATEO COUNTY	Burlingame
CARR, JAMES PATRICK	10446	Clear	6/13/2001	6/30/2021	EUREKA VALLEY PEST EXCLUSION INC	P O BOX 1896 PACIFICA CA 94044-6896 SAN MATEO COUNTY	Pacifica
MARKOFF, PAUL LINDEN	4739	Clear	1/1/1973	6/30/2022	MARKOFF STRUCTURAL PEST CONTROL CO	6018 MISSION STREET DALY CITY CA 94014 SAN MATEO COUNTY	Daly City
CHU, ZON K	11614	Clear	11/28/2007	6/30/2022	ZC & ASSOCIATES PEST CONTROL	235 WESTLAKE CENTER #381 DALY CITY CA 94015 SAN MATEO COUNTY	Daly City
GAVARRETE, CHESTER R	9505	Clear	3/15/1996	6/30/2022	WEST VALLEY STRUCTURAL CO	PO BOX 2 SOUTH SAN FRANCISCO CA 94083 SAN MATEO COUNTY	South San Francisco
GIORGI, DAVID JOHN	9288	Clear	7/7/1994	6/30/2021	ECOTECH PEST ELIMINATION	P O BOX 1418 MILLBRAE CA 94030 SAN MATEO COUNTY	Millbrae
GURNEY, CHARLES LEE	5315	Clear	9/15/1976	6/30/2021	A & R TERMITE CONTROL INC	1118 EAST 5TH AVE SAN MATEO CA 94402 SAN MATEO COUNTY	San Mateo
HA, QUANG N	11762	Clear	10/17/2008	6/30/2020	BAY AREA PEST CONTROL	110 GLENN WAY #13 SAN CARLOS CA 94070 SAN MATEO COUNTY	San Carlos

Appendix 10

- Trash Subcommittee Attendance List – FY 2019/20
- Litter Work Group – Attendance List – FY 2019/20
- Litter Work Group – Litter Reduction Fact Sheet
- Litter Work Group – FY 2020/21 Work Plan

Trash Subcommittee Meeting Attendance – FY 2019/20

Name	Agency	Phone	E-Mail	07/22/19	10/03/19	12/05/19	03/25/20	06/04/20
Tim Murray	City of Belmont	(650) 222-6460	tmurray@belmont.gov	X		X		
Rick Locke	City of Belmont	(650) 222-6401	rlocke@belmont.gov					
Marcus Escobedo	City of Belmont	(650) 222- 6459	mescobedo@belmont.gov	X	X	X		
Matt Fabry	SMCWPPP Program Manager	(650) 599-1410	mfabry@co.sanmateo.ca.us					
Reid Bogert	C/CAG	(650) 599-1433	rbogert@smcgov.org	X	X	X		X
Keegan Black	City of Brisbane	(415) 728-7986	kblack@ci.brisbane.ca.us		X	X	X	X
Randy Breault	City of Brisbane	(415) 508-2131	rbreault@ci.brisbane.ca.us					
Rob Mallick	City of Burlingame	(650) 558-7673	rmallick@burlingame.org					
Rick Horne	City of Burlingame	(650) 558-7672	rhorne@burlingame.org					
Mike Heathcote	City of Burlingame	(650) 558-7679	mheathcote@burlingame.org				X	
Jennifer Lee	City of Burlingame	(650) 558-7381	jlee@burlingame.org	X	X	X	X	X
Louis Gotelli	Town of Colma	(650) 333-0295	louis.gotelli@colma.ca.gov					
Muneer Ahmed	Town of Colma	(650) 757-8894	Muneer.ahmed@colma.ca.gov					X
Kelly Carroll	Town of Colma	(408) 921-4480	kellyc@csgengr.com	X			X	X
Jeff Fornesi	City of Daly City	(650) 991-5752	jfornesi@dalycity.org					
John Sanchez	City of Daly City	(650) 991-8265	jsanchez@dalycity.org	X		X	X	X
Sibely Calles	City of Daly City	(650) 991-8054	scalles@dalycity.org		X	X		
Michelle Daher	City of East Palo Alto	(650) 853-3197	mdaher@cityofepa.org	X				
Norm Dorais	City of Foster City	(650) 286-3279	ndorais@fostercity.org			X		
Vivian Ma	City of Foster City	(650) 286-3270	vma@fostercity.org	X	X		X	X
Mark Lander	City of Half Moon Bay	(650) 522-2500	markl@csgengr.com	X	X	X	X	
Nick Zigler	City of Half Moon Bay	(650) 522-2500	nickz@csgengr.com					X
Brian Henry	City of Menlo Park	(650) 330-6799	bphenry@menlopark.org					
Hugo Tores	City of Menlo Park		hatorres@menlopark.org	X			X	
Clarence Li	City of Menlo Park		clli@menlopark.org	X	X		X	X
Mike Killigrew	City of Millbrae	(650) 259-2374	mkilligrew@ci.millbrae.ca.us				X	X
Raymund Donguines	City of Pacifica	(650) 738-3767	donguinesr@ci.pacifica.ca.us					
Bernie Mau	City of Pacifica	(650) 438-5416	Maub@ci.pacifica.ca.us					
Howard Young	Town of Portola Valley	(650) 851-1700 X214	hyoung@portolavalley.net					
Terrance Kyaw	City of Redwood City	(650) 780-7466	TKyaw@redwoodcity.org					
Vicki Sherman	City of Redwood City	(650) 780-7472	vsherman@redwoodcity.org	X	X		X	X
Dennis Bosch	City of San Bruno		dbosch@sanbruno.ca.gov	X				

Trash Subcommittee Meeting Attendance – FY 2019/20

Name	Agency	Phone	E-Mail	07/22/19	10/03/19	12/05/19	03/25/20	06/04/20
Robert Wood	City of San Bruno	(650) 616-7046	rwood@sanbruno.ca.gov					
Ted Chapman	City of San Bruno	(650) 616-7169	TChapman@sanbruno.ca.gov		X	X	X	X
Sean Morris	City of San Bruno	(650) 616-7160	smorris@sanbruno.ca.gov	X				
Kathryn Robertson	City of San Carlos	(650) 802-4212	KRobertson@cityofsancarlos.org		X	X		
Vatsal Patel	City of San Carlos		vpatel@cityofsancarlos.org				X	X
Sarah Scheidt	City of San Mateo	(650) 522-7385	sscheidt@cityofsanmateo.org	X	X			X
Roxanne Murray	City of San Mateo	(650) 522-7346	rmurray@cityofsanmateo.org	X				
Rick Pina	City of San Mateo	(650) 522-7373	rpina@cityofsanmateo.org					
Sven Edlund	City of San Mateo	(650) 522-7342	sedlund@cityofsanmateo.org			X	X	X
Mark Swenson	City of San Mateo	(650) 522-7349	mswenson@cityofsanmateo.org		X			
Richard Kraft	City of San Mateo							X
Andrew Wemmer	City of So. San Francisco	(650) 829-3883	andrew.wemmer@ssf.net	X		X	X	X
Thomas Siphongsay	City of So. San Francisco	(650) 829-3882	thomas.siphongsay@ssf.net		X			
Daniel Garza	City of So. San Francisco	(650) 829-3880	daniel.garza@ssf.net					
Julie Casagrande	County of San Mateo - DPW	(650) 599-1457	jcasagrande@co.sanmateo.ca.us	X	X			X
Breann Liebermann	County of San Mateo		bliebermann@smcgov.org	X	X			
John Allan	County of San Mateo	(650) 363-4071	jallan@smcgov.org			X	X	
Diana Shu	County of San Mateo		dshu@co.sanmateo.ca.us					
Lillian Clark	County of San Mateo		lclark@co.sanmateo.ca.us					X
Kim Springer	County of San Mateo		kspringer@smcgov.org					X
Kevin Lu	County of San Mateo	(650) 363-4698	khlu@smcgov.org					X
Katherine Sheehan	CSG Consultants	(650) 522-2506	katherines@csgengr.com		X		X	
Peniel Ng	CSG Consultants	(650) 522-2500	penieln@csgengr.com	X				
Ian Hull	ERM	(925) 708-0650	hulli@samtrans.com		X			
Chris Sommers	EOA, Inc.	(510) 832-2852 X109	csommers@eoainc.com	X	X	X	X	X
John Fusco	EOA, Inc.	(510) 832-2852 X130	jrfusco@eoainc.com	X	X	X	X	X
Peter Schultze-Allen	EOA, Inc.	(510) 832-2852 X128	pschultze-allen@eoainc.com				X	
No. Attending				**22**	**20**	**16**	**20**	**23**

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) Litter Work Group - 2019/20 - Attendance Record			
Name (e-mail)	**Phone**	**Agency**	**4/27/20**
Matt Fabry mfabry@smcgov.org	650-599-1419	CCAG/SMCWPP	X
Reid Bogert rbogert@smcgov.org			X
Diane Lynn dlynn@belmont.gov	650-595-7425	City of Belmont	
Julie Freitas jfreitas@belmont.gov	650-595-7425	City of Belmont	
Keegan Black kblack@ci.brisbane.ca.gov	415-508-2131	City of Brisbane	X
Jennifer Lee jlee@burlingame.org	650-558-7381	City of Burlingame	X
Rick Horne rhorne@burlingame.org	650-558-7672		
Michael Heathcote mheathcote@burlingame.org			X
Louis Gotelli lgotelli@colma.ca.gov		Town of Colma	
Nick Zigler ziglern@csgengr.com	650-522-2538	Half Moon Bay and Colma	X
Kelly Carroll kellyc@csgengr.com	408-921-4480	Half Moon Bay and Colma	X
Stephen Stolte sstolte@dalycity.org	650-991-8126	City of Daly City	
Michelle Daher mdaher@cityofepa.org	650-853-3197	City of East Palo Alto	
Norm Dorais ndorais@fostercity.org		City of Foster City	
Gary Francis gfrancis@hillsborough.net		Town of Hillsborough	
Clarence Li clli@menlopark.org	650-330-6797	City of Menlo Park	X
Shelly Reider sreider@ci.millbrae.ca.us	650-259-2444	City of Millbrae	X
Vicki Sherman vsherman@redwoodcity.ca.us		City of Redwood City	X
Ted Chapman tchapman@sanbruno.ca.gov		City of San Bruno	X
Vatsal Patel VPatel@cityofsancarlos.org		City of San Carlos	X
Roxanne Murray rmurray@cityofsanmateo.org	650-522-7346	City of San Mateo	X
Sarah Scheidt sscheidt@cityofsanmateo.org			X

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) Litter Work Group - 2019/20 - Attendance Record			
Name (e-mail)	**Phone**	**Agency**	**4/27/20**
Andrew Wemmer Andrew.Wemmer@ssf.net Daniel Garza Daniel.Garza@ssf.net	650-829-3883	City of South SF	X
John Allan jallan@smcgov.org Eun-Soo Lim eulim@smcgov.org Kevin Lu klu@smcgov.org		County of San Mateo Office of Sustainability	X
Lillian Clark lclark@smcgov.org Prabhyot Khangura pkhangura@smcgov.org	650-599-1447	County of San Mateo	X
Ying Sham ysham@smchousing.org		County of San Mateo Department of Housing	
Julie Casagrande jcasagrande@smcgov.org	650-599-1457	County of San Mateo Public Works	
Julia Au jau@rethinkwaste.org Shirley Ng Joanna Rosales Joe La Mariana jlamariana@rethinkwaste.org	650-802-3509	Rethink Waste	X
Mia Rossi mrossi@recology.com		Recology-SM County	
Yvette Madera ymadera@recology.com	650-598-8242		X
Monica Devincenzi MDevincenzi@republicservices.com	650-756-1130 x224	Republic Services	
Nicole Lee nlee@republicservices.com			
Jessica Chen jchen@republicservices.com	415-604-9015	RS - Daly City	
Susan Kennedy susan@ssfscavenger.com	925-437-2510	South SF Scavenger	
Teresa Montgomery teresa@ssfscavenger.com	650-589-4020		X
Chris Sommers csommers@eoainc.com	510-832-2852 x 109	EOA Inc.	X
Peter Schultze-Allen pschultze-allen@eoainc.com	510-832-2852 x 128		X

flowstobay.org
SAN MATEO COUNTYWIDE
WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

NEW DEVELOPMENT PROJECTS
LITTER REDUCTION FACT SHEET

■ Architects ■ Engineers ■ Developers

Learn how to incorporate litter reduction design concepts into your project to help protect our local creeks, the San Francisco Bay and the Ocean.

WHY CONSIDER LITTER IN YOUR BUILDING DESIGN?

Neighborhoods and streets are connected to creeks, the San Francisco Bay and the Ocean via surface flow and storm drain systems. Improperly managed waste from new buildings can litter the street and flow to our waterways without any cleaning or filtering. Municipalities in San Mateo County are required to significantly reduce the amount of litter entering the Bay and Ocean.

Incorporating the design concepts in this factsheet will help you meet local and State litter reduction goals. This includes considering different types of waste materials (i.e. compost, recycling and special materials) and building operations during the design phase of new buildings.

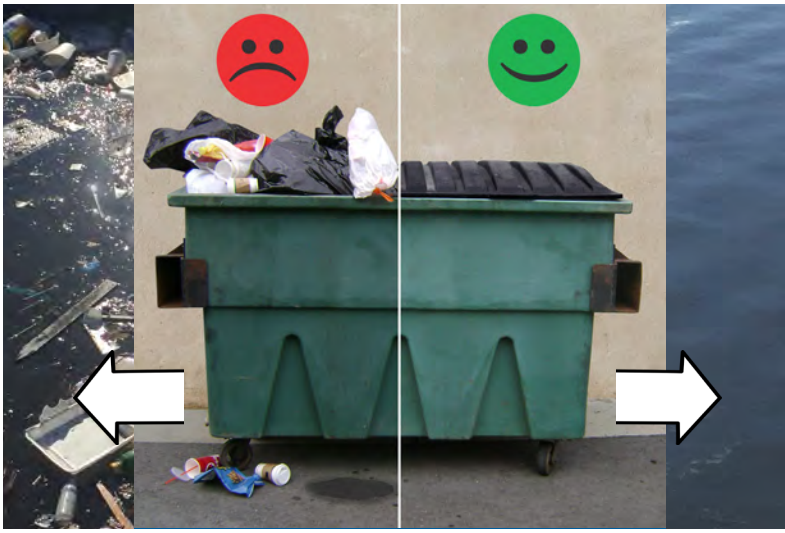

To protect our waterways and beaches, State and local water quality regulations require a significant reduction in litter.

HOW CAN YOUR BUILDING DESIGN INCORPORATE LITTER MANAGEMENT?

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) has created guidance to assist architects, engineers, and developers with incorporating litter management practices into their designs.

Follow these Steps for Reducing Litter and Waste in Your Building Design and Operation

1. Comply with litter-related *Conditions of Approval* issued by your municipality.
2. Create a Discard Collection Plan (See back for details). Review Plan with *hauler and municipal staff.*
3. Work with municipality and hauler at occupancy stage, to achieve *"Right Size, Right Service."*

Litter Reduction Toolkit
SMCWPPP | flowstobay.org/node/1974
Example design scenarios and other resources for Multi-Family Dwellings and new development projects.

- ***Conditions of Approval***
  Both the design phase and occupancy phase of a new development project should meet Conditions of Approval. For instance: trash, recycling and compost facilities should be large enough for building activities; and discard storage and collection areas should be accessible and convenient for building users, as well as collection vehicles.

- ***Work with Hauler and Municipal Staff***
  Go to Collection Services Map to find your Hauler
  San Mateo County, Office of Sustainability
  smcsustainability.org/waste-reduction/curbside-collection
  To reduce litter when designing your building, coordinate early and often with hauler and municipal staff. Staff can inform you of access needs, zoning and other requirements.

- ***"Right Size, Right Service"***
  Building owners and designers must work together with municipal staff and haulers to determine the right size, type, and number of containers, as well as the right service frequency, to meet litter and waste reduction goals.

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WHAT ARE THE KEY ELEMENTS OF A DISCARD COLLECTION PLAN?

- ☐ Property map and hauler access
- ☐ Indoor collection system (in-unit areas, chutes/rooms)
- ☐ Special material collection areas
- ☐ Discard area enclosure design

Litter Reduction Toolkit

See the Toolkit for more details on Discard Collection Plans, example design scenarios, and litter management practices for Multi-Family Dwellings and other new development projects.

Internal Operations

- Chutes can be used to collect materials internally.
- Staff can collect discards from private, common and public spaces.
- On service day(s), materials are brought out.

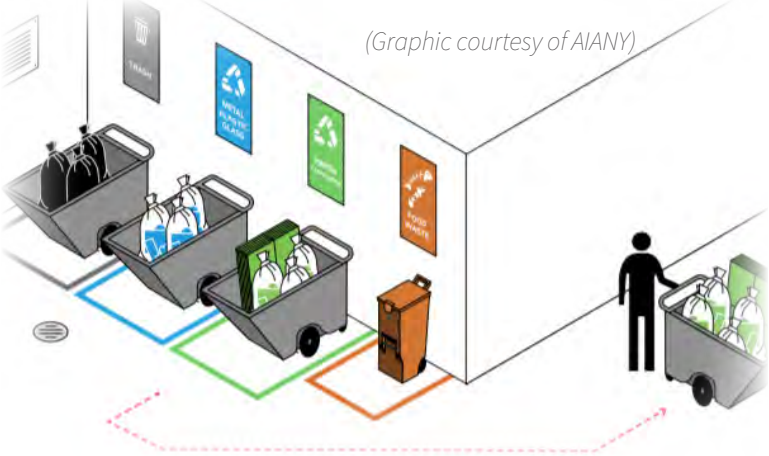

External Collection Service

- Staging area must be set-up to reduce litter (e.g. enclosed, away from storm drains, accessible to hauler vehicles).
- Plan for different vehicle and container types.

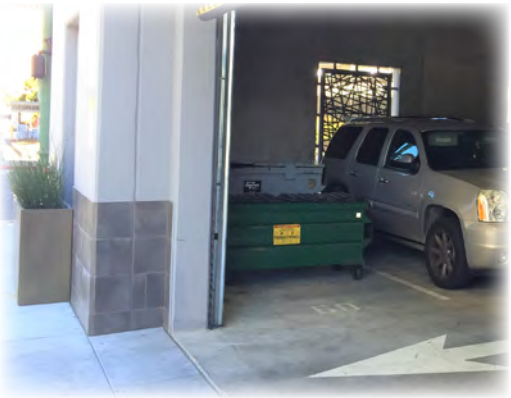

ADDITIONAL RESOURCES AND GUIDANCE DOCUMENTS

AIANY Zero Waste Design Guidelines | *Center for Architecture* | zerowastedesign.org
Franchise Agreement Litter Practices Recommendations | *SMCWPPP* | flowstobay.org/studiesresearch
New Development Guidelines | *Recology San Mateo County* | recology.com/recology-san-mateo-county/new-development-projects
Waste Enclosure Guidelines | *South San Francisco Scavenger* | ssfscavenger.com/guidelines
Space Guidelines for Refuse Services | *StopWaste* | stopwaste.org/resource/space-guidelines-recycling-organics-and-refuse-services
Waste Handling Guidelines | *City of Fremont* | fremont.gov/DocumentCenter/View/1528

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SAN MATEO COUNTYWIDE
Water Pollution Prevention Program
Clean Water. Healthy Community.

SMCWPPP
Litter Work Group

FY 2020–21 Work Plan

Final

April 23, 2020

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INTRODUCTION AND BACKGROUND

Trash Impacts on Water Bodies and Regulatory Responses

Trash (i.e., litter, floatables, gross pollutants, or solid waste) is a serious problem for watersheds where it presents an aesthetic nuisance, and a serious threat to aquatic life in creeks and the oceans. Data suggest that plastic trash in particular persists for hundreds of years in the environment and can pose a threat to wildlife through ingestion, entrapment, as well as harboring chemicals potentially harmful to the aquatic environment. Types of trash commonly observed in watersheds and water bodies include food and beverage containers (e.g., plastic bags and bottles) and packaging, cigarette butts, food waste, construction and landscaping materials, furniture, electronics, tires, and hazardous materials (e.g., paint and batteries). The San Francisco Bay Regional Water Quality Control Board (Water Board) has listed multiple tributaries and shorelines as being impaired for trash.

In response to concerns about urban trash impacts on receiving water bodies in the San Francisco Bay area, in 2009 the Water Board included trash reduction requirements in the Municipal Regional Stormwater (MRP) National Pollutant Discharge Elimination System (NPDES) Permit for Phase I communities in the Bay area (Order R2-2009-0074.) These provisions require applicable Bay Area municipalities (Permittees) to reduce trash from their Municipal Separate Storm Sewer Systems (MS4s) by, 70% by 2017, 80% by 2019, and to a point of “no adverse impacts” to water bodies by 2022.

Trash Sources and Pathways

Trash in San Francisco Bay Area creeks and shorelines originates from a variety of sources: pedestrian litter, waste containers, illegal dumping on land areas, and litter from vehicles. Pedestrian litter includes trash sources from high traffic areas near businesses and schools, transitional areas where food/drinks are not permitted (e.g. bus stops), and from public or private special events with high volumes of people. Inadequate waste container management includes sources such as overflowing or uncovered containers and dumpsters as well as the dispersion of household and business-related trash and recycling materials before, during, and after collection. On-land illegal dumping of trash is related to a variety of societal issues including construction activity, inadequate collection services and homeless encampments. Trash from vehicles occurs due to littering from automobiles and uncovered loads of material being transported to transfer stations, processing facilities and landfills.

Types of Trash Control Measures

SMCWPPP Permittees are attempting to address trash load reduction requirements outlined in the MRP by implementing a number of control measures designed to significantly reduce trash in local creeks and the Bay. Control measures implemented to-date include:

- Installation and maintenance of trash capture devices that intercept trash once in the storm drain system;
- Adoption and enforcement of product-related ordinances, such as single-use plastic bag bans;
- Enhanced street sweeping;
- Strategic placement and selection of public trash containers;
- Improvements to inadequately-sized or serviced private containers/bins;
- Public outreach and education campaigns;
- On-land cleanups and illegal dumping prevention;
- Enhanced storm drain inlet maintenance; and,
- Creek and shoreline cleanups and prevention programs.
- Improved review of new and redevelopment projects for litter-reduction design and operation
- Enhanced franchised waste hauler contract language and coordination
- Enforcement of existing and new trash and litter related municipal codes

SMCWPPP Trash Subcommittee and Litter Work Group

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) was established in 1990 to reduce the pollution carried by stormwater into local creeks, the San Francisco Bay, and the Pacific Ocean. The program is a partnership of the City/County Association of Governments (C/CAG), each

incorporated city and town in the county, and the County of San Mateo, which share a common municipal stormwater NPDES permit. The SMCWPPP Technical Advisory Committee (TAC) functions as the decision-making body for routine program activities and provides oversight and guidance to five subcommittees.

The SMCWPPP Trash Subcommittee assists member agencies with the implementation of new or enhanced trash control measures and actions required by the MRP. The Trash Subcommittee generally meets four to six times a year. In FY 2013-14, the Subcommittee recommended that a work group be formed to enhance coordination between representatives from the local hauling community and municipal staff focused on stormwater and trash management.

In response, the SMCWPPP Litter Work Group began meeting on regular basis in March of 2014. The meetings are attended by representatives from: Recology San Mateo, South San Francisco Scavenger Company; Rethink Waste (the South Bayside Waste Management Authority); and stormwater and trash program municipal staff from jurisdictions in San Mateo County. The goals of the Litter Work Group are to collectively identify opportunities to reduce the contributions of litter generated from disposal, collection-associated sources and illegal dumping; educate the public and those involved with litter control efforts; and to coordinate and share information with the Zero Litter Initiative (ZLI) in Santa Clara County.

This Work Plan was developed through the SMCWPPP Litter Work Group. The Work Group provided input on the highest priority tasks included in this Work Plan and commented on the Draft version.

Work Group Tasks from 2014 through June of 2020

The Litter Work Group has completed many tasks in previous fiscal years including the following:

- Roundtable events on:
  - "Right Size – Right Service" campaign for businesses
  - Container overage and illegal dumping data and mapping
  - Illegal dumping and enforcement strategies
  - Improving development project design review to reduce litter and waste
  - Coordination with Transportation Agencies
- Products and reports such as:
  - Litter Practices Recommendations for Solid Waste Franchise Agreements
  - Recommendations to Rethink Waste for the Recology San Mateo Contract Extension
  - Litter Reduction Toolkit for Multi-Family Dwellings
  - New Development Projects Litter Reduction Fact Sheet
- Maps on:
  - Illegal dumping and container overages
- Coordination with:
  - The Zero Litter Initiative in Santa Clara County
  - Caltrans and Caltrain
  - The San Mateo Countywide Recycling Committee
  - The Santa Clara County Waste Reduction Commission

WORK PLAN OBJECTIVES

To assist municipalities with achieving future trash/litter reduction goals outlined the MRP, the SMCWPPP Trash Committee and Litter Work Group developed this work plan to achieve the following objectives:

- **Continue to Work with the California Department of Transportation (Caltrans) and other transportation agencies to coordinate trash control measure implementation, including the siting and installation of trash full capture systems** – Litter in San Mateo County can be generated on city/county jurisdictional areas or within the right-of-way (ROW) of transportation agencies that transverse through these areas. Regardless of where litter is generated, it can affect adjacent areas and therefore collaboration on trash control actions between San Mateo cities/county and transportation agencies can have mutually-beneficial litter reduction outcomes. Similar to San Mateo MRP Permittees, Caltrans is required by the Water Board to implement

trash controls actions to address specific area targets outline in their NDPES permit. Additionally, Caltrain, BART and other transportation agencies in San Mateo County are required to address the trash reduction requirements in the statewide Trash Amendments, which will be incorporated into the statewide Phase II NPDES permit that these agencies must comply with. This task will support the collaboration between San Mateo MRP Permittees, and Caltrans and other transportation agencies on educating the public about litter reduction, enhancing street sweeping, conducting litter removal (on-land cleanups), improving trash bin/container management programs, and siting, designing, installing and maintaining trash full capture systems.

Objective: *Enhance coordination with Caltrans and other transportation agencies in San Mateo County to improve litter prevention and reduction actions, including the siting, design, installation and maintenance of trash full capture systems within the County in prioritized locations.*

- **Evaluate the Effectiveness of Source Control Actions and Characterize the Types of Trash in San Mateo County stormwater** – Source controls are effective actions to prevent the generation of litter. Source control actions have been implemented by many Permittees in San Mateo County for specific litter-prone items (i.e., single use plastic carryout bags and expanded polystyrene carryout food-ware) via local ordinances and policies. The effectiveness of these actions has not been fully evaluated in San Mateo County. Additionally, there are remaining information gaps on the dominant types of trash in stormwater in San Mateo. Filling these information gaps could assist San Mateo Permittees by developing information that will support the continuation of load reduction credits for source control actions in MRP 3.0 and identify the dominant litter-prone items found in stormwater that should be considered for further local regulatory actions as was done with previous efforts related to plastic shopping bags and expanded polystyrene food-ware.

  Objective*: Provide additional information on the effectiveness of existing source control actions and identify litter-prone items in stormwater that should be considered for future actions.*

- **Educate Targeted Sectors of the Community on these Issues** – The SMCWPPP Public Information and Participation (PIP) Subcommittee is conducting outreach of various types to the community in San Mateo County. In the past the Litter Work Group has coordinated with the PIP Subcommittee on efforts related to litter reduction, such as Adopt-a-Block and School outreach efforts. The Work Group can contribute knowledge and resources from municipal staff who coordinate waste reduction and recycling efforts within their jurisdictions and from waste hauler staff operating in the jurisdiction. Leveraging the efforts and resources of multiple programs and franchised companies can increase effectiveness.

  Objective*: Continue to coordinate with the SMCWPPP PIP Subcommittee on the investigation of potential enhanced outreach efforts at schools, multi-family homes, and business communities.*

- **Share Information with the Countywide Recycling Committee Members on these Issues** – The San Mateo Countywide Recycling Committee (CWRC) meets quarterly and is conducting outreach of various types to the community in San Mateo County. In the past the Litter Work Group has coordinated with the CWRC on efforts related to litter reduction and reducing waste. Leveraging the efforts and resources of multiple programs and franchised companies can increase effectiveness.

  Objective*: Continue to coordinate with the Countywide Recycling Committee.*

- **Coordinate with Litter Reduction Partners –** The Santa Clara Valley Zero Litter Initiative (ZLI) was formed in 2010 to bring together stakeholders interested in eliminating litter and its impacts throughout the Santa Clara Valley. The ZLI combats this multi-faceted problem by bringing stakeholders together to identify collaborative solutions. Since forming, ZLI has conducted roundtables about litter associated with garbage/recycling collection including a Right-Size Right-Service campaign for locations where dumpsters are contributing litter to the storm drain, transport and disposal pathways. Other topics of interest identified by ZLI stakeholders include litter reduction solutions via business engagement, law/code enforcement and highway/freeway

controls. SMCWPPP agencies can increase the effectiveness of their litter reduction efforts by sharing resources with Caltrans and the ZLI.

Objective: *Continue to coordinate efforts and share information with the Zero Litter Initiative in Santa Clara County to further reduce litter.*

PROPOSED TASKS FOR FY 2020-21

For FY 2020-21, the Litter Work Group proposes to conduct the following tasks:

1. **Phase II of the San Mateo Stormwater Trash Characterization Study** – In Phase I, the Litter Work Group developed a sampling and analysis plan (SAP) for conducting the trash characterization study, which focused on evaluating the effectiveness of existing trash source control actions and filling information gaps on the dominant types of trash in stormwater in San Mateo to inform future source control measures in San Mateo County. The Trash Characterization Study (TCS) will use the SAP to sample, characterize and measure trash types and volumes in stormwater. The anticipated outcome of this task is a completed study with recommended Permittee actions steps.
2. **Plan and Coordinate a 5th Roundtable Event Focusing on the Results of the San Mateo Stormwater Trash Characterization Study and Potential Next Steps on Source Controls -** The Litter Work Group will develop and hold one roundtable event for San Mateo Permittees, waste haulers and transportation agencies. The roundtable event will be conducted to present and discuss the results of the trash characterization study and discuss potential coordinated actions on source controls. The roundtable will include discussions on the identified trash types and sources, potential mutually-beneficial projects, cost-sharing mechanisms, and on-going collaboration. The anticipated outcome of the roundtable is a list of potential action steps for San Mateo Permittees and stakeholders. All communications and outreach regarding the roundtable event will be handled through this task, including agenda preparation, speaker identification and coordination, and facility and food/beverage coordination.
3. **Education, Communication and Outreach**

   A. **Coordinate with the PIP Subcommittee –** The Program will continue to coordinate with the PIP Subcommittee on a campaign focusing on the commercial building sector in FY 2020-21. As requested and within the budget allotted, the Program will attend meetings/calls, provide feedback on draft materials, and respond to inquiries from PIP consultants.

   B. **Coordinate with the San Mateo Countywide Recycling Committee -** The Program will continue to share information with the CWRC in FY 2020-21. As requested and within the budget allotted, the Program will attend quarterly meetings, provide feedback on draft outreach materials, and coordinate with the County Office of Sustainability.

   C. **Coordinate with ZLI –** The Program will continue to share information and best practices with the Santa Clara Valley Zero Litter Initiative (ZLI) during FY 2020-21. As requested and within the budget allotted, the Program will attend ZLI meetings and webinars.
4. **Litter Work Group Facilitation -** To support Tasks 1, 2 and 3, the Program will convene up to two meetings of the Litter Work Group. Meeting material preparation, including agendas, and follow up activities (e.g., summaries and action items) will be conducted as part of this task.

Estimated Costs and Schedule

The proposed work plan schedule and associated cost estimates for FY 2020-21 are included in Table 1. Depending on the complexities and challenges associated with implementation of the tasks described in the work plan, the proposed schedule may be revised. Costs associated with each task are estimates. More definition of each task will be necessary once the work plan or a portion thereof is approved by the SMCWPPP TAC.

Table 1. SMCWPPP Trash Committee and Litter Work Group Proposed FY 19-20 Tasks, Schedule and Estimated Costs.

Task #	Task	Description	Start Date	Complete Date	Estimated Program Cost
1.	Stormwater Trash Characterization Study	Phase 2 – Implement the Sampling and Analysis Plan and complete the study at the determined monitoring sites.	July 2020	June 2021	$35,000
2.	Roundtable Event #5	Coordinate and facilitate a 5th Litter Roundtable on the results of the trash characterization study and coordination with franchised waste haulers and transportation agencies.	March 2021	June 2021	$7,000
3.A	Coordinate with the PIP Subcommittee	Attend meetings/calls, provide feedback on draft materials, and respond to inquiries from PIP consultants.	July 2020	June 2021	$1,000
3.B	Coordinate with the San Mateo Countywide Recycling Committee	Share information and best practices at the quarterly San Mateo Countywide Recycling Committee via CWRC meetings.	July 2020	June 2021	$1,000
3.C	Coordinate with Santa Clara ZLI	Share information and best practices with the Santa Clara Valley Zero Litter Initiative (ZLI) via ZLI meetings and webinars.	July 2020	June 2021	$1,000
4.	Litter Work Group Facilitation	Convene two Litter Work Group meetings/calls, provide agendas and summaries.	July 2020	June 2021	$7,000
			Total Cost	$52,000	

Appendix 11

- Maps for each San Mateo County Permittee showing WMAs and GI/LID facilities
- PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee
- PCBs and Mercury Regional Loads Reduced during MRP 2.0
- Pollutant Control Measures Implementation Plan and Reasonable Assurance Analysis for San Mateo County, California, Scenarios to Achieve PCBs and Mercury San Francisco Bay TMDL Wasteload Allocations, September 30, 2020

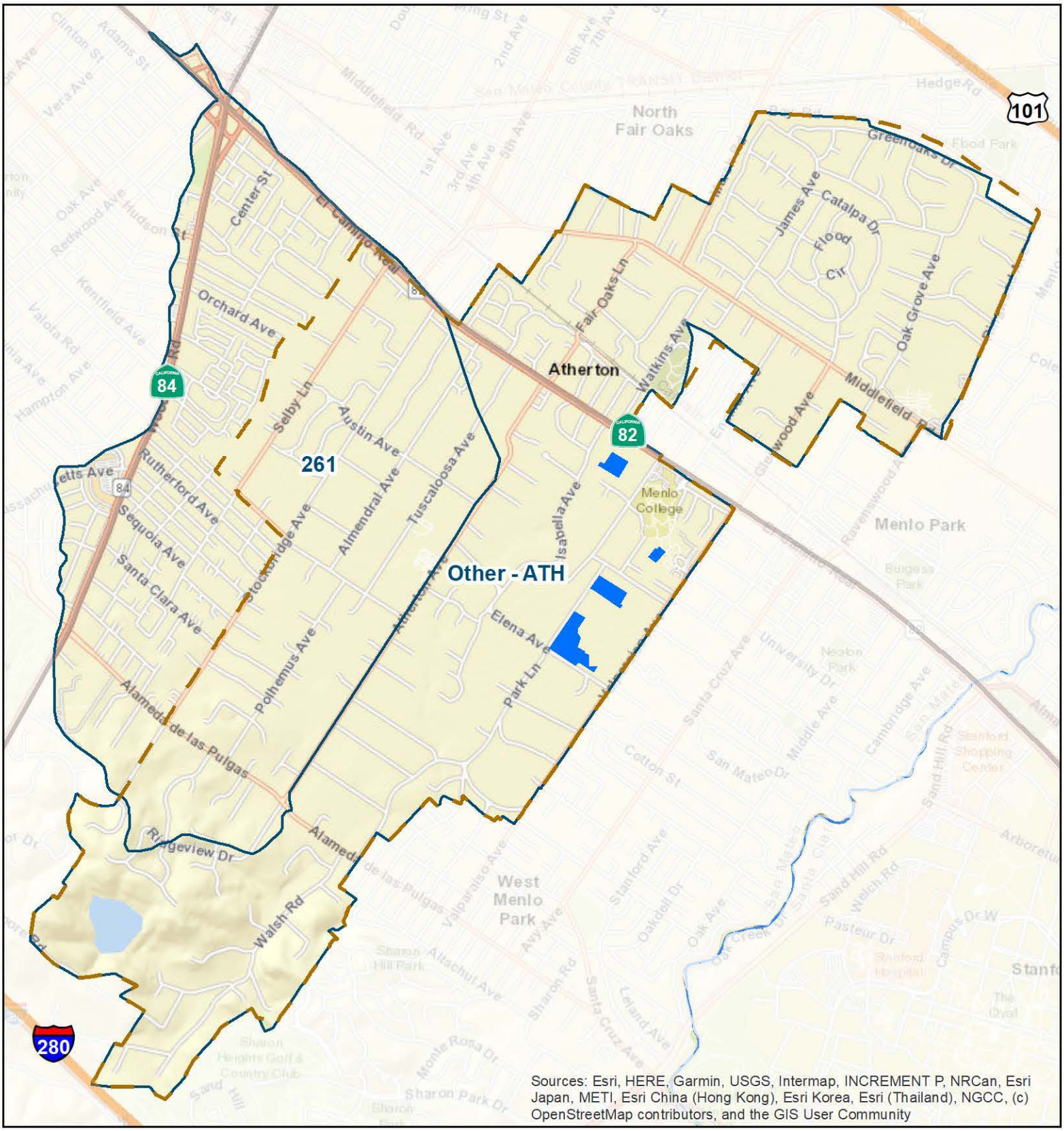

Figure App11-1. WMAs and GI/LID in Atherton

Atherton Watershed Management Area Map

- Green Street Project
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Committee Boundary

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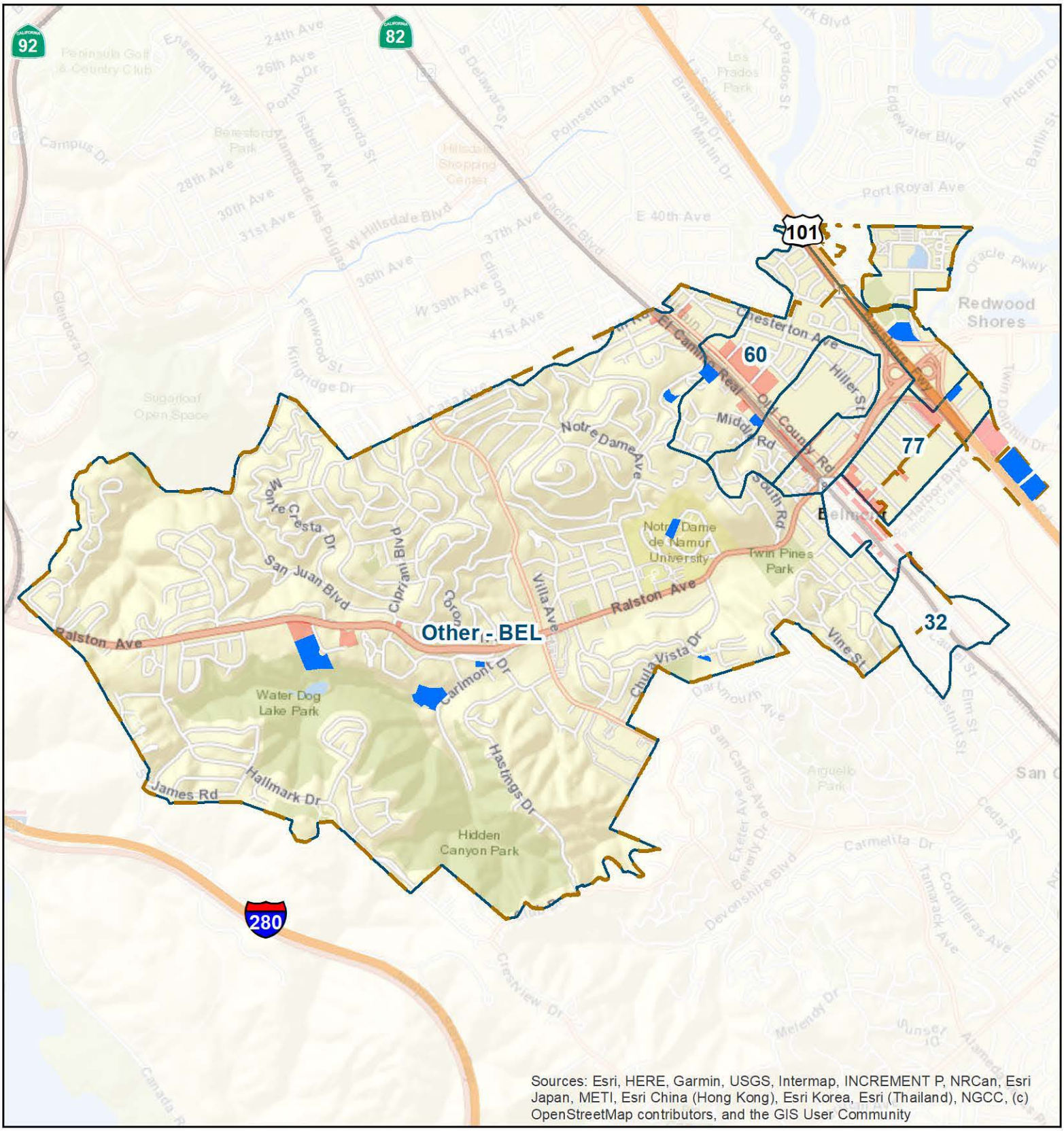

Figure App11-2. WMAs and GI/LID in Belmont

Belmont Watershed Management Area Map

Green Street Project

Old Industrial Land Use

GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)

Watershed Management Area (WMA)

Committee Boundary

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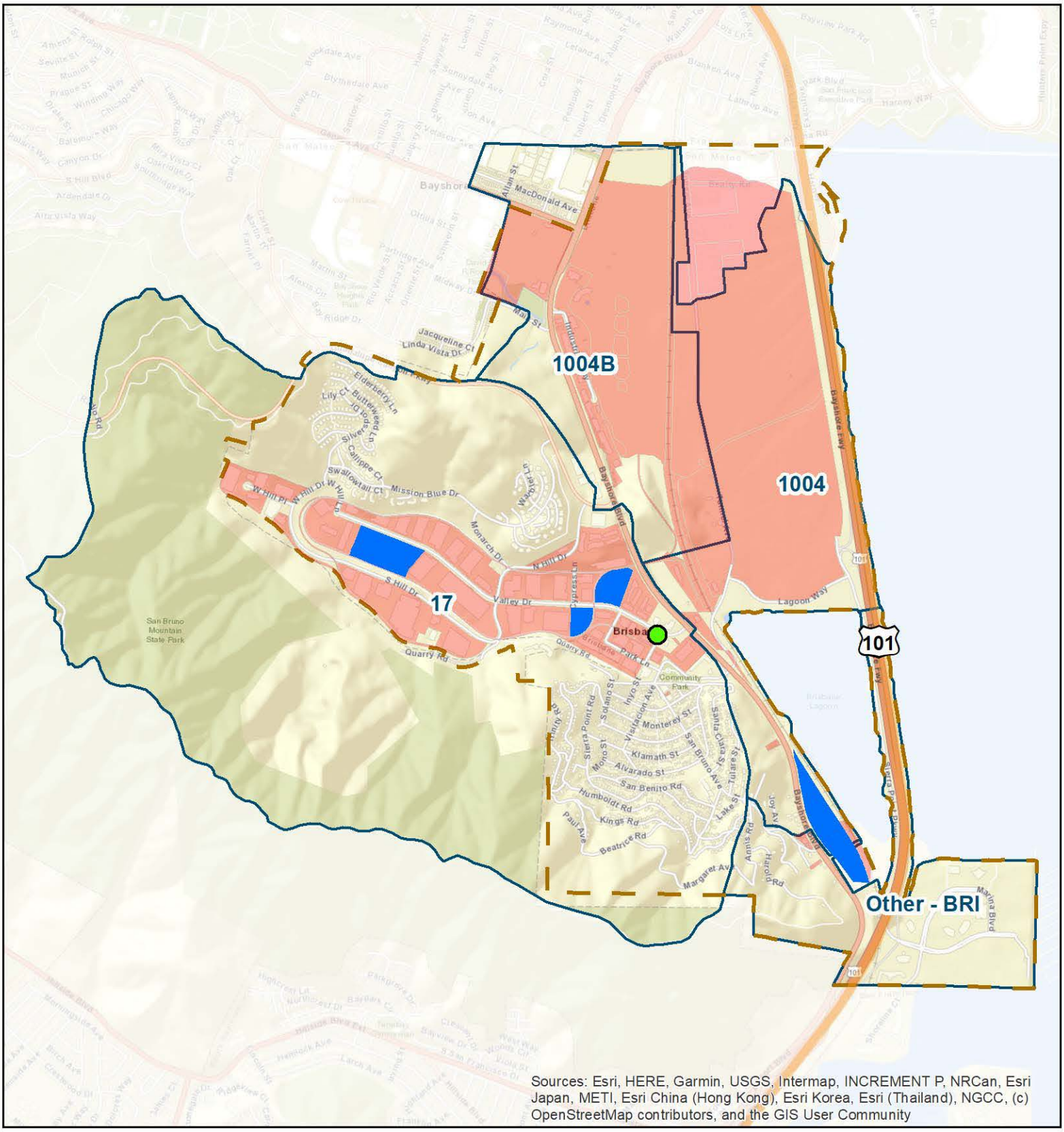

Figure App11-3. WMAs and GI/LID in Brisbane

Brisbane Watershed Management Area Map

- Green Street Project
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Permittee Boundary

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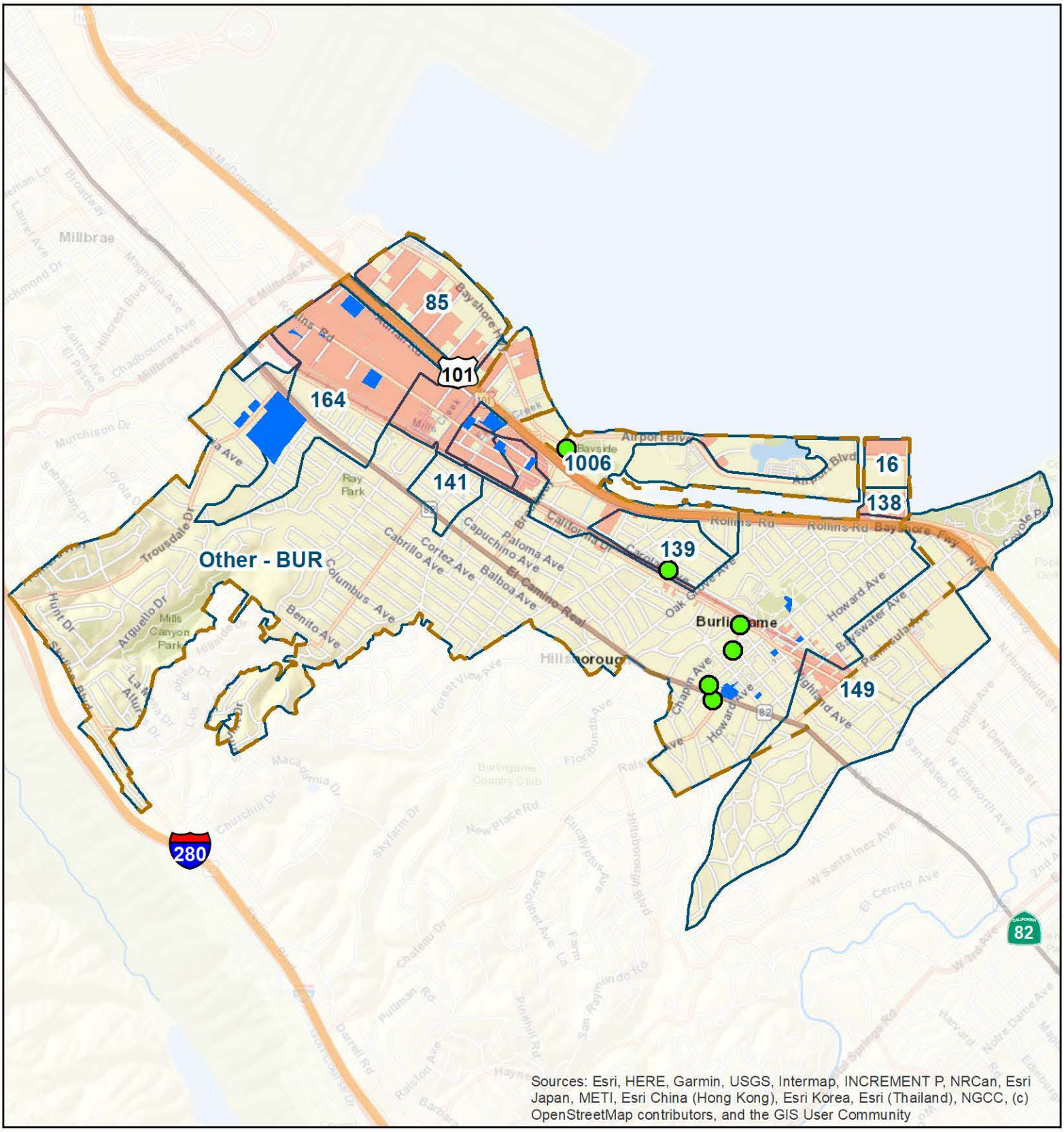

Figure App11-4. WMAs and GI/LID in Burlingame

Burlingame Watershed Management Area Map

Green Street Project

Old Industrial Land Use

GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)

Watershed Management Area (WMA)

Permittee Boundary

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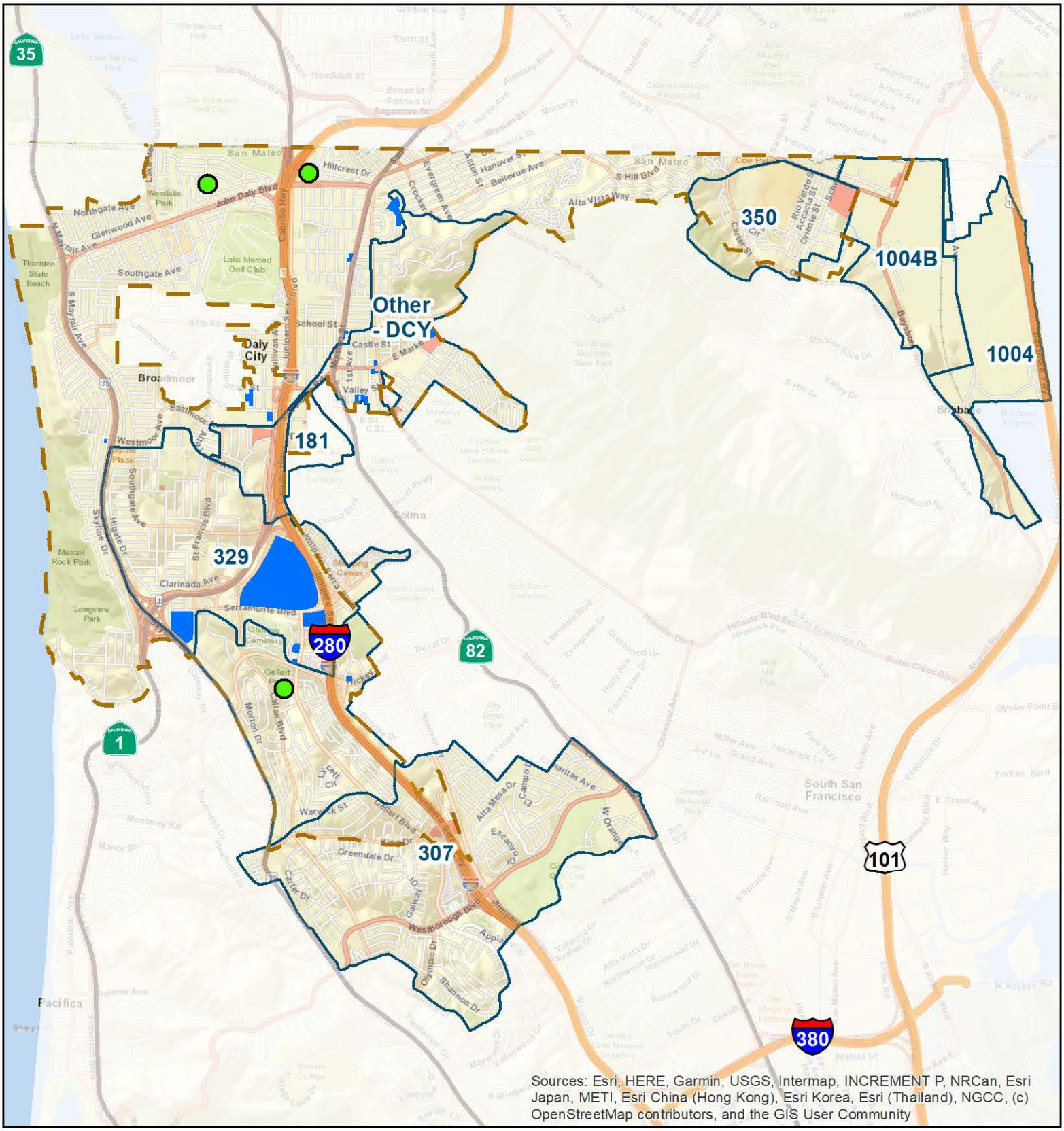

Figure App11-6. WMAs and GI/LID in Daly City

Daly City Watershed Management Area Map

- Green Street Project
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Permittee Boundary

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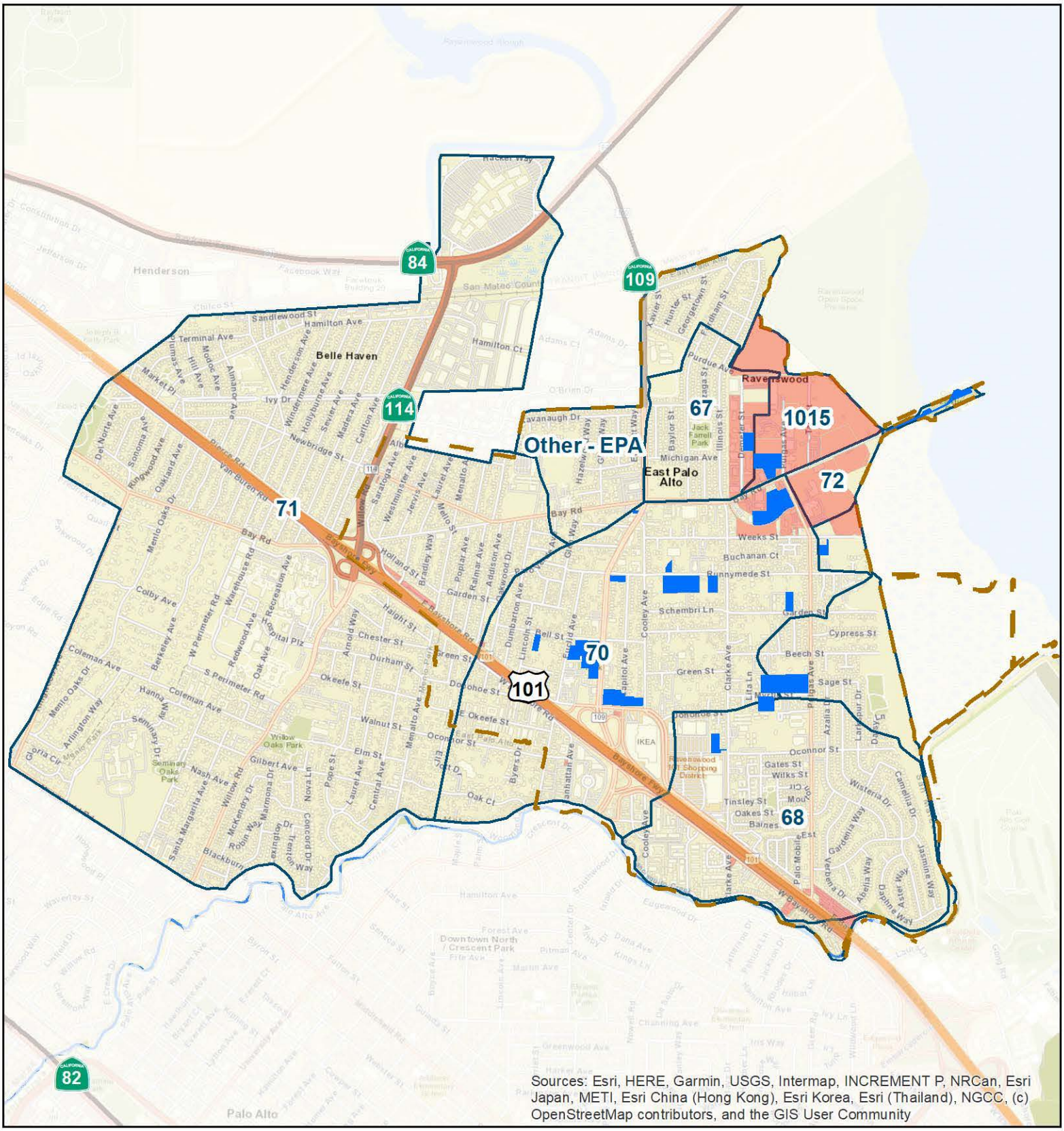

Figure App11-7. WMAs and GI/LID in East Palo Alto

East Palo Alto Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Committee Boundary

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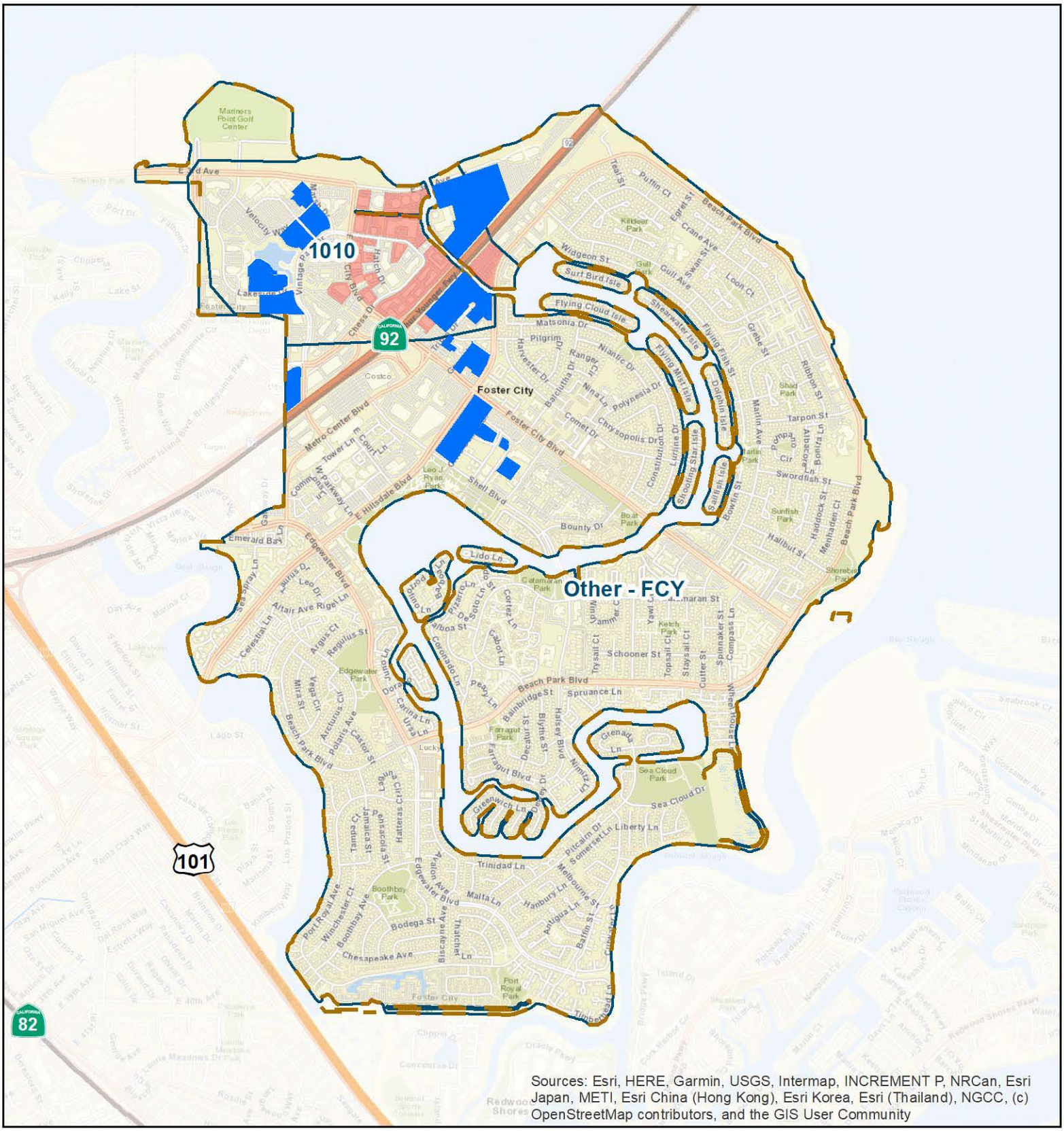

Figure App11-8. WMAs and GI/LID in Foster City

Foster City Watershed Management Area Map

- Green Street Project
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Permittee Boundary

N

0 0.2 0.4 0.8 Miles

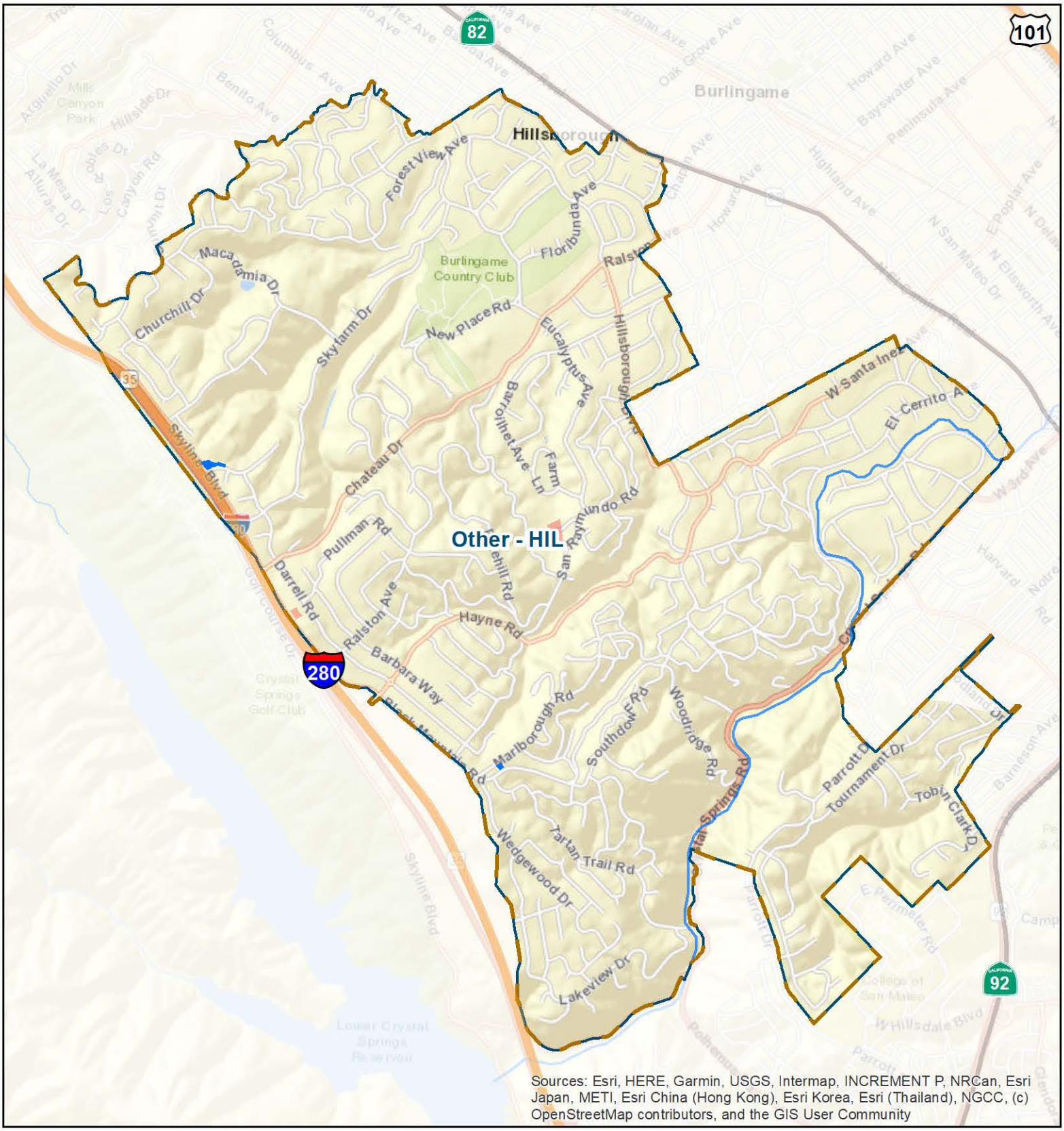

Figure App11-9. WMAs and GI/LID in Hillsborough

Hillsborough Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Permittee Boundary

N

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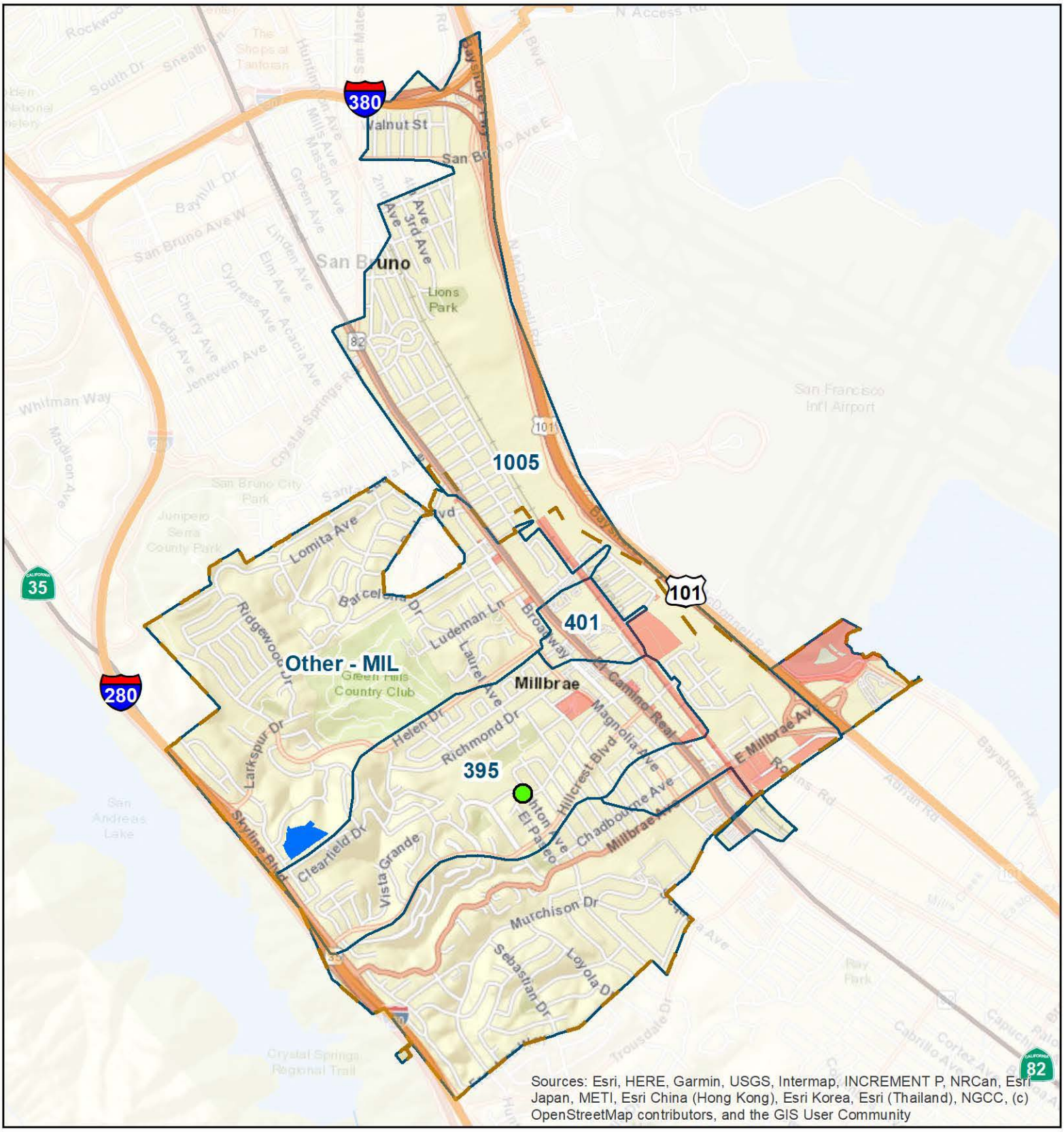

Figure App11-11. WMAs and GI/LID in Millbrae

Millbrae Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Permittee Boundary

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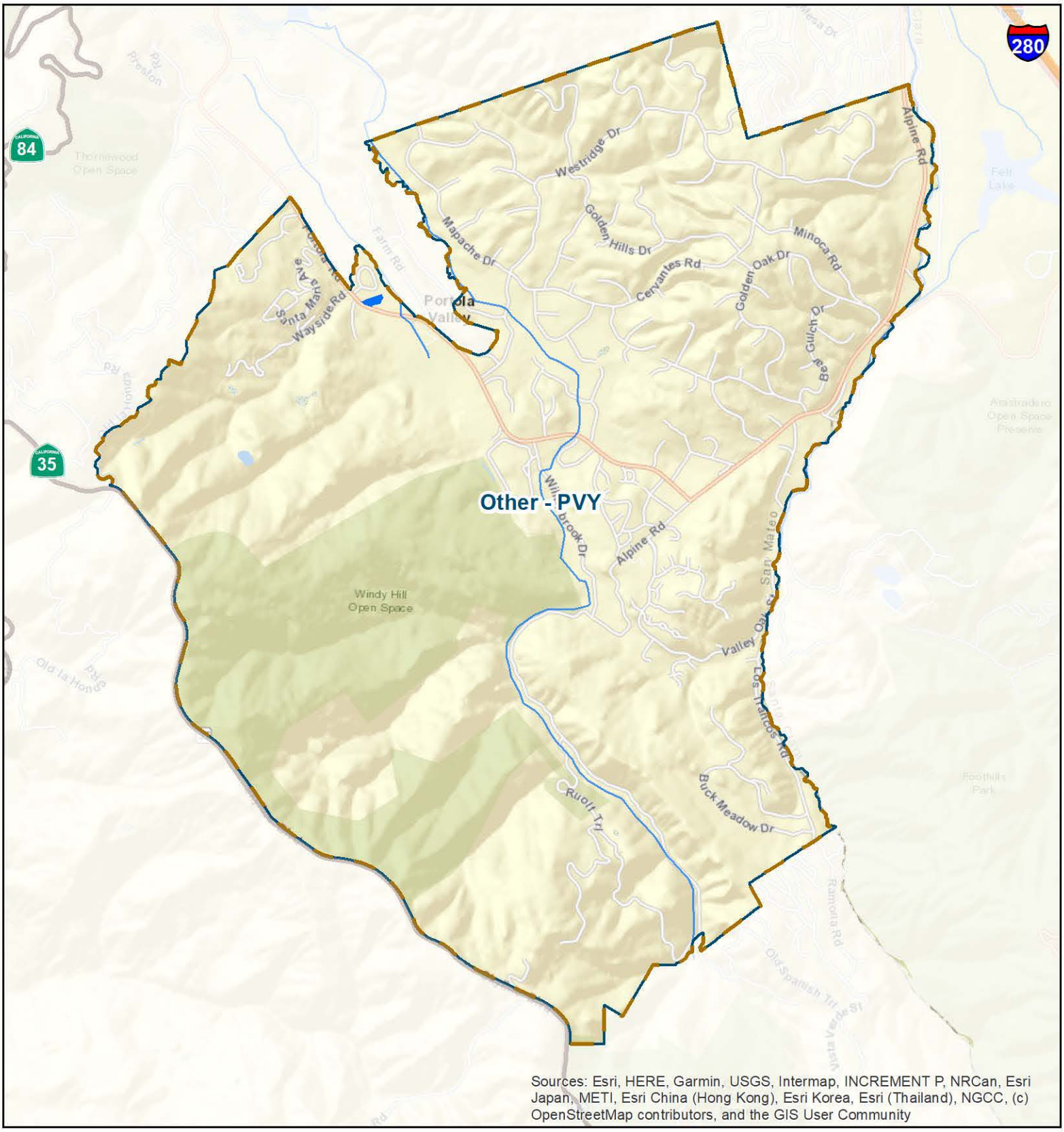

Figure App11-12. WMAs and GI/LID in Portola Valley

Portola Valley Watershed Management Area Map

- Green Street Project
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Committee Boundary

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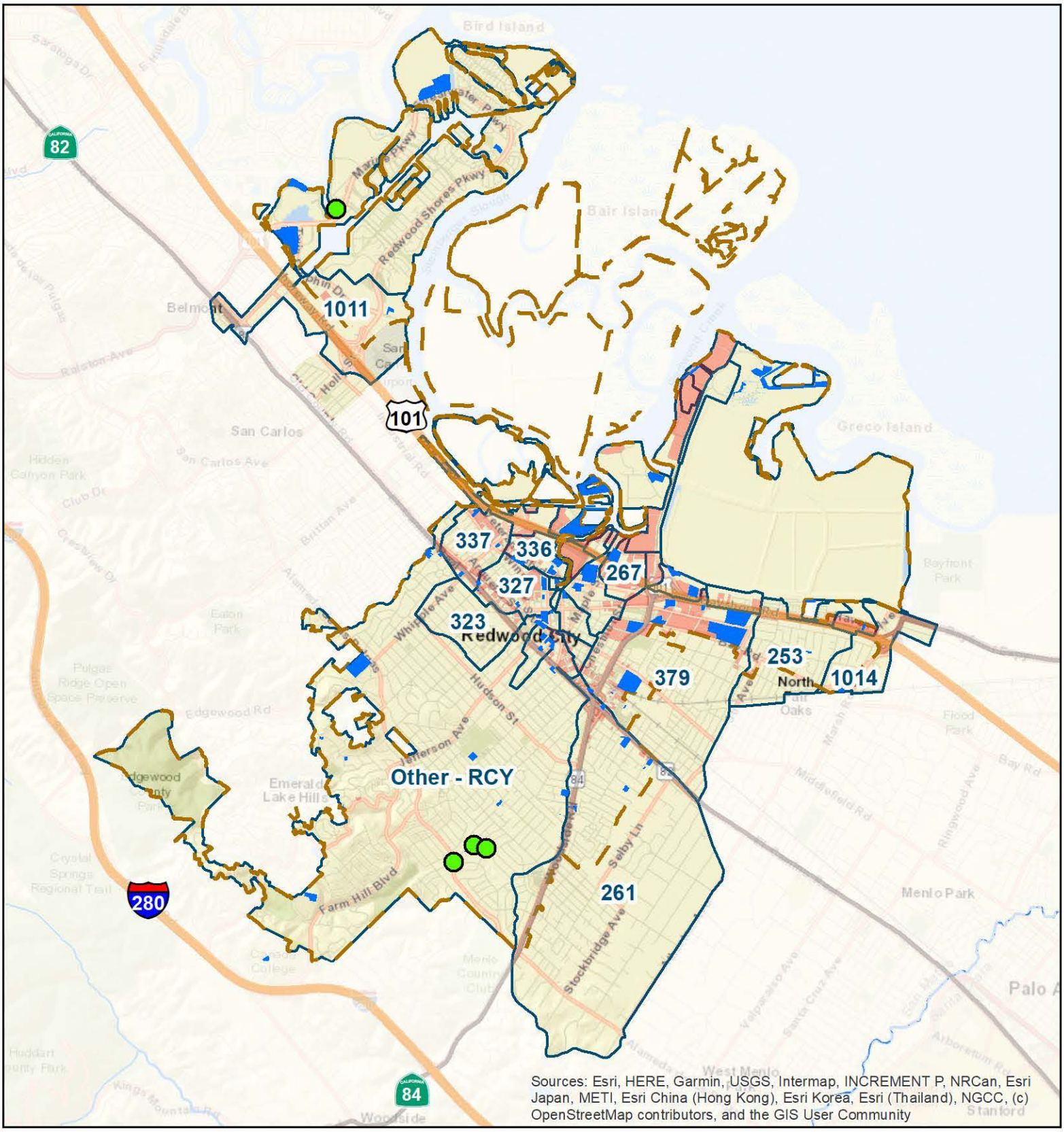

Figure App11-13. WMAs and GI/LID in Redwood City

Redwood City Watershed Management Area Map

Green Street Project

Old Industrial Land Use

GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)

Watershed Management Area (WMA)

Permittee Boundary

N

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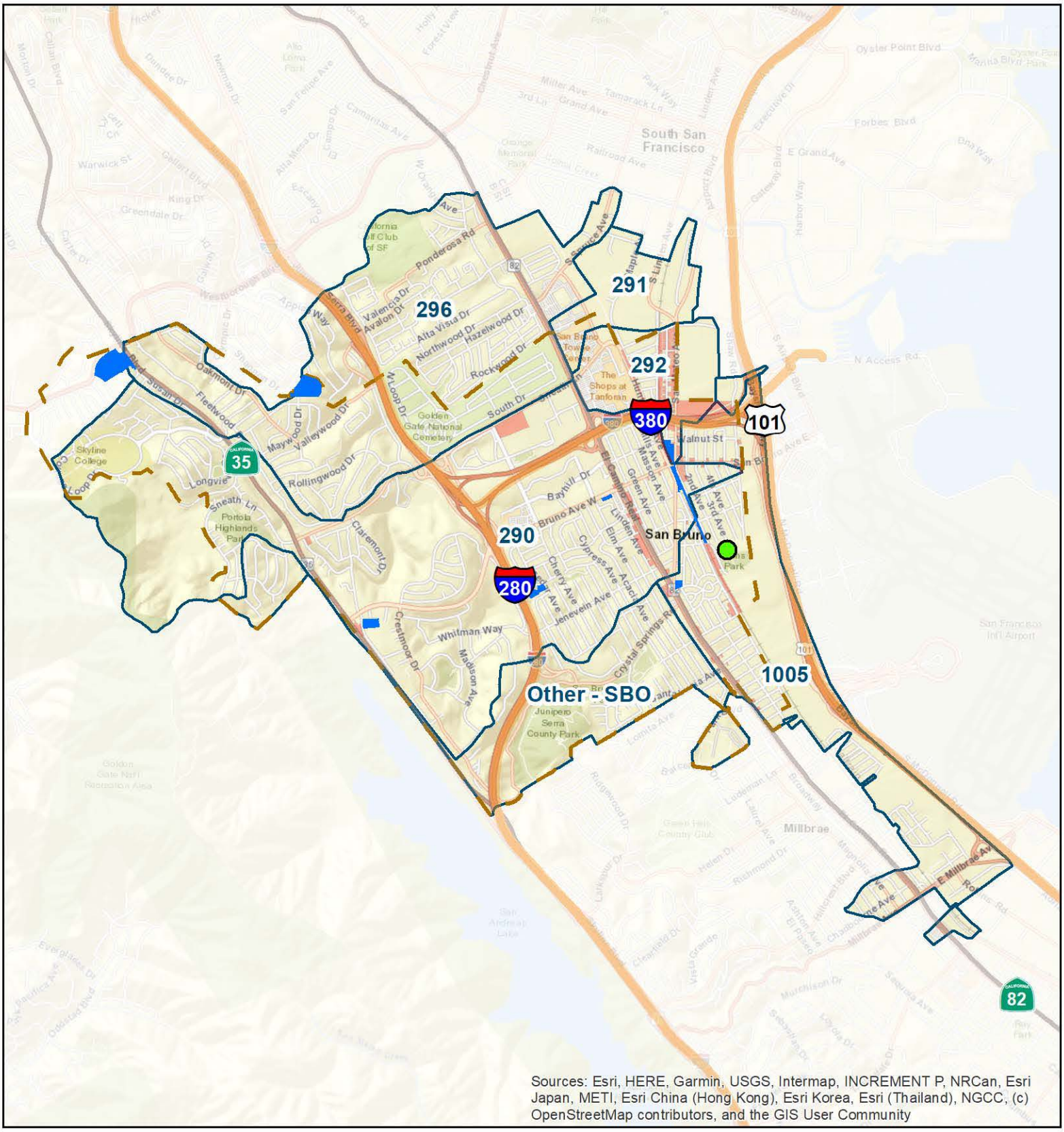

Figure App11-14. WMAs and GI/LID in San Bruno

San Bruno Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Committee Boundary

N

0 0.25 0.5 1 Miles

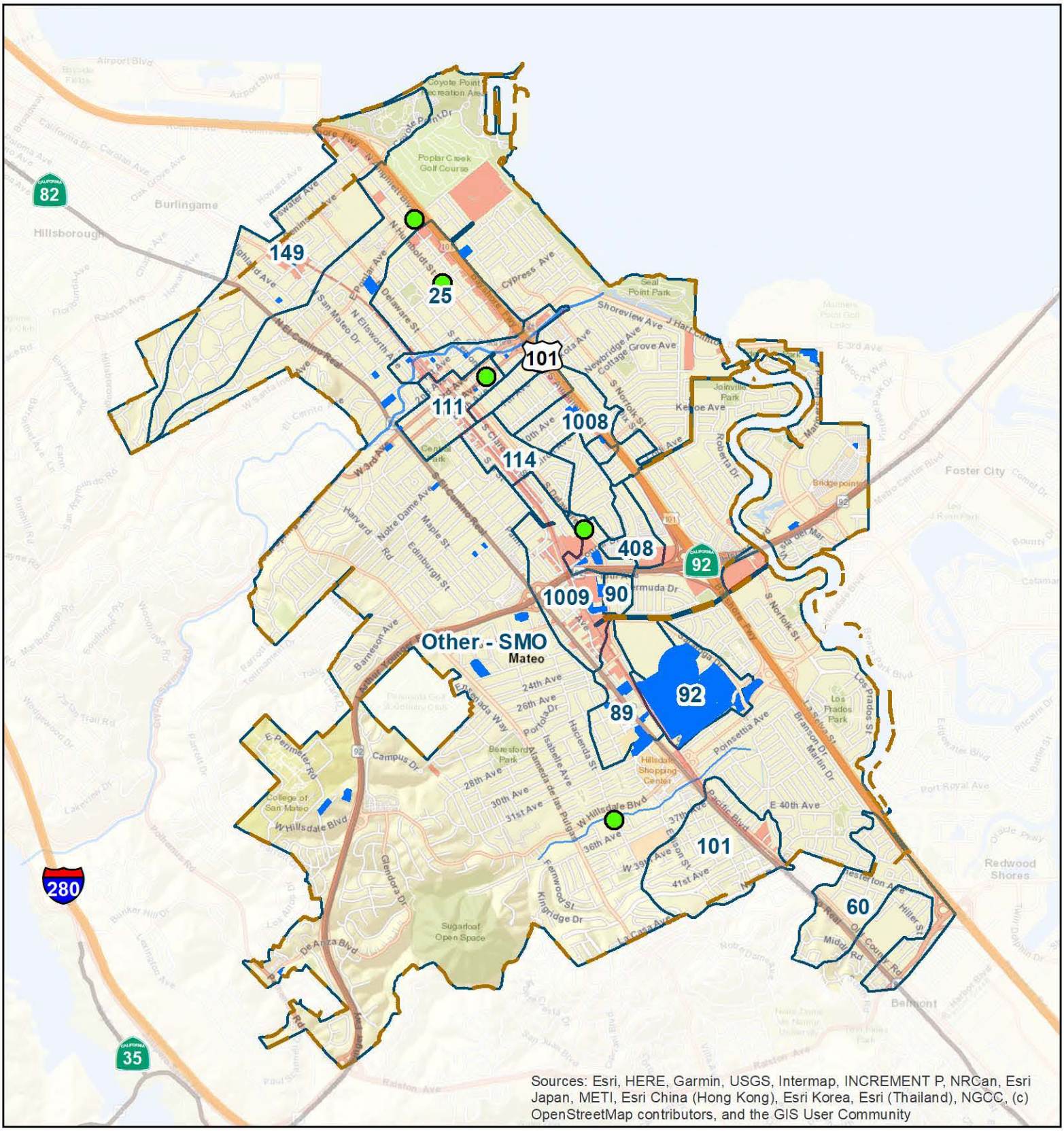

Figure App11-16. WMAs and GI/LID in San Mateo

San Mateo City Watershed Management Area Map

Green Street Projects

Old Industrial Land Use

GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)

Watershed Management Area (WMA)

Permittee Boundary

N

0 0.25 0.5 1 Miles

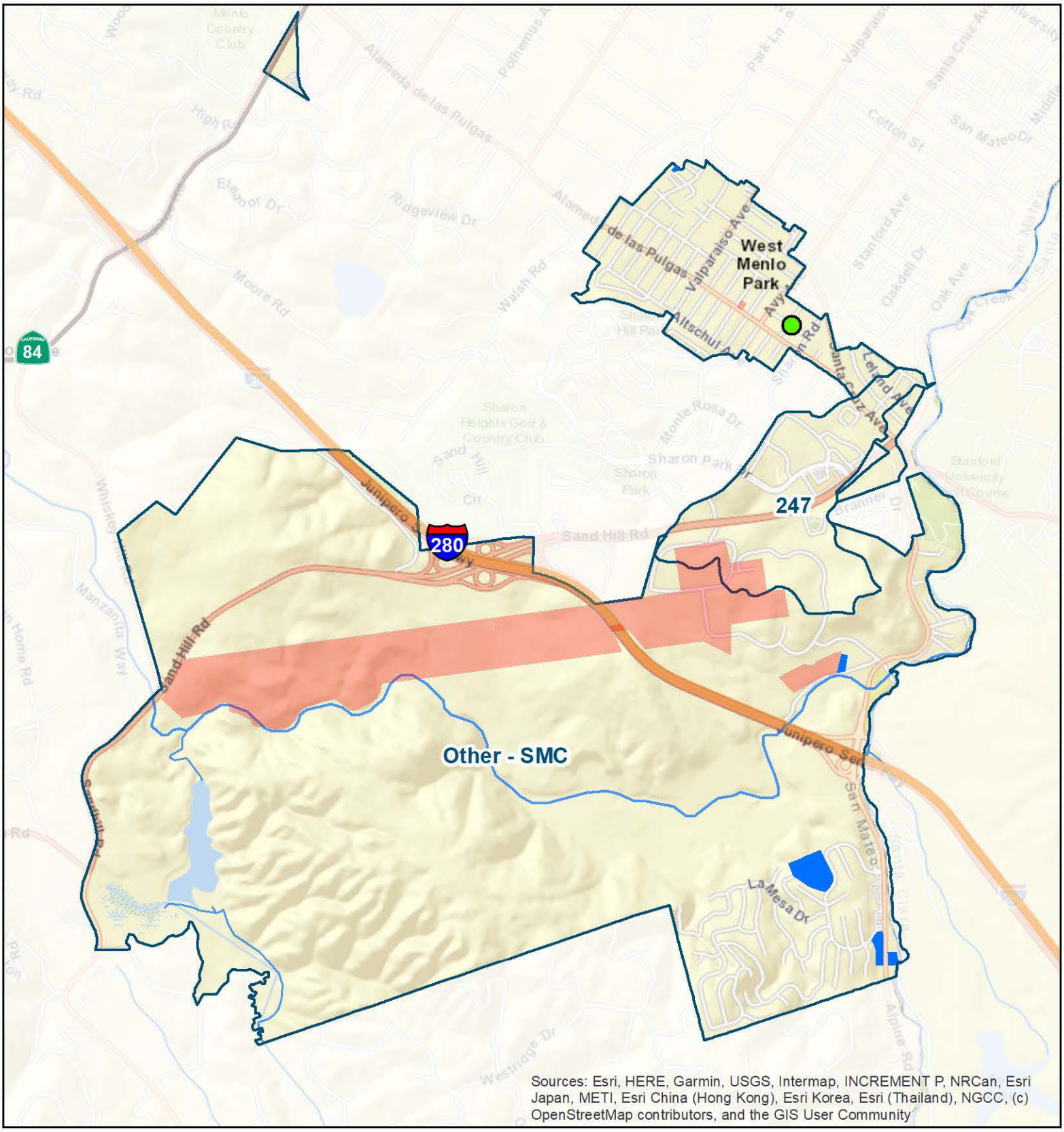

Figure App11-17a. WMAs and GI/LID in Unincorporated San Mateo County

Unincorporated San Mateo County Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Committee Boundary

N

0 0.25 0.5 1 Miles

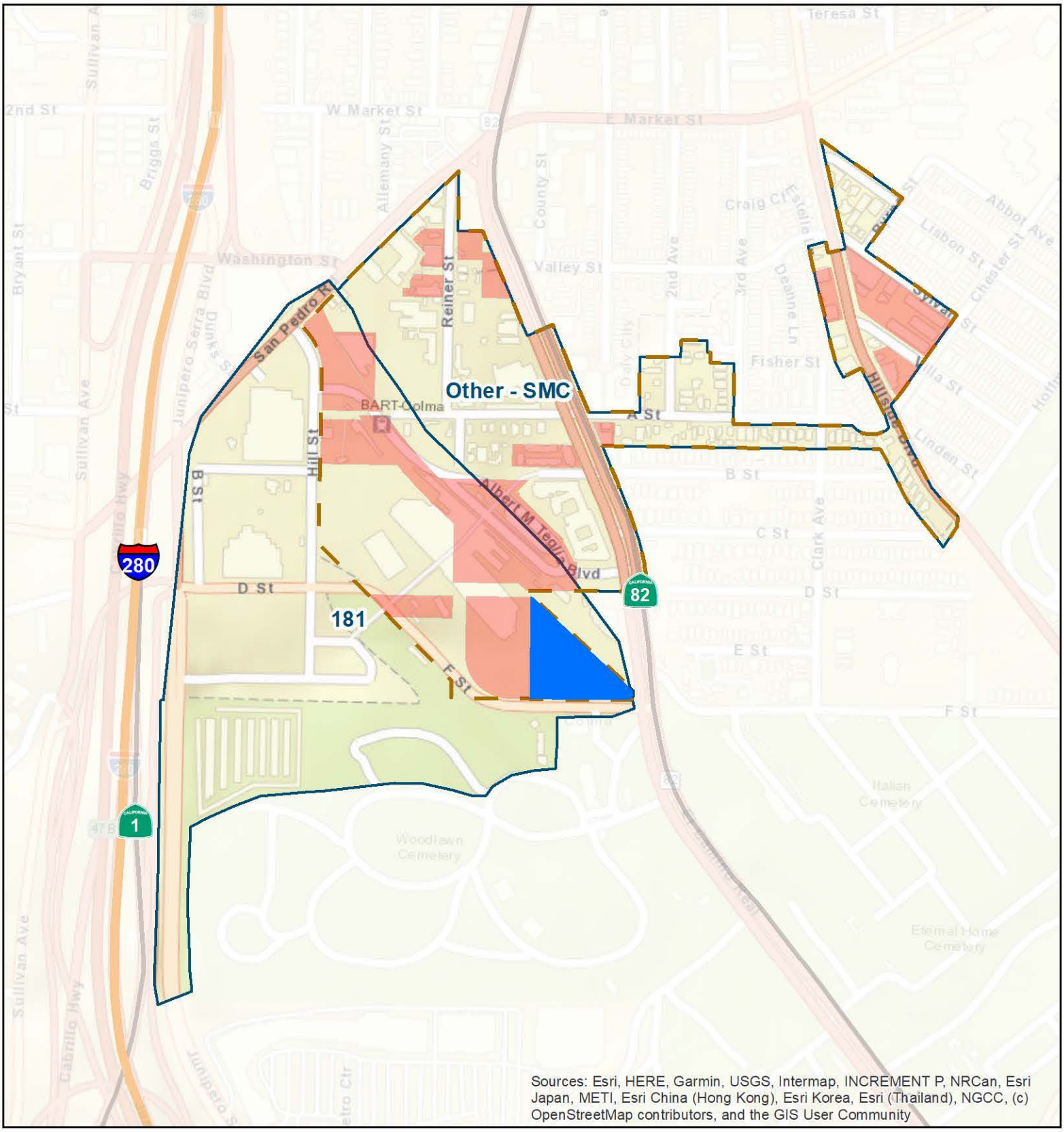

Figure App11-17b. WMAs and GI/LID in Unincorporated San Mateo County

Unincorporated San Mateo County Watershed Management Area Map

Green Street Projects

Old Industrial Land Use

GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)

Watershed Management Area (WMA)

Committee Boundary

N

0 0.05 0.1 0.2 Miles

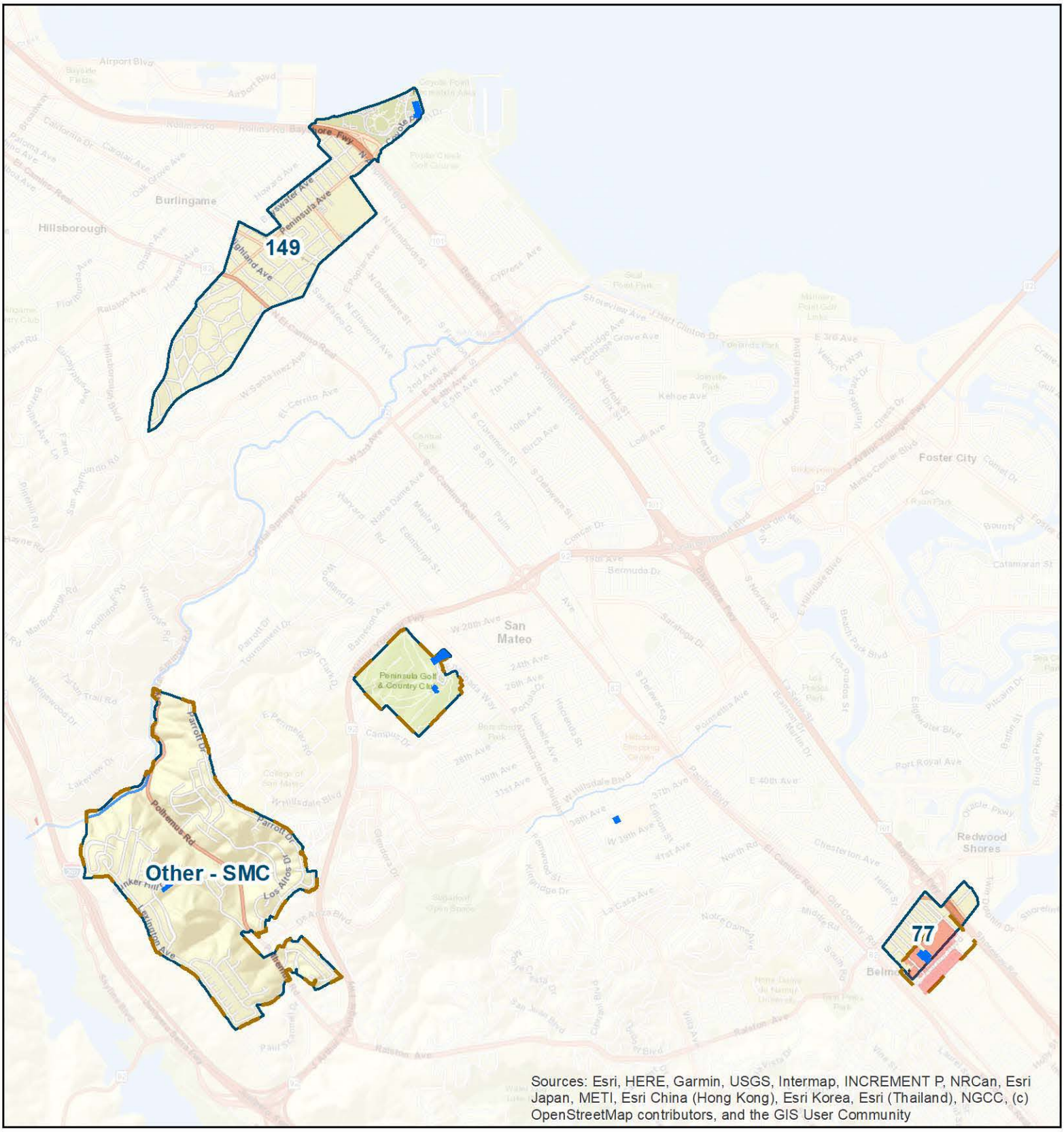

Figure App11-17c. WMAs and GI/LID in Unincorporated San Mateo County

Unincorporated San Mateo County Watershed Management Area Map

Green Street Projects

Old Industrial Land Use

GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)

Watershed Management Area (WMA)

Committee Boundary

N

0 0.375 0.75 1.5 Miles

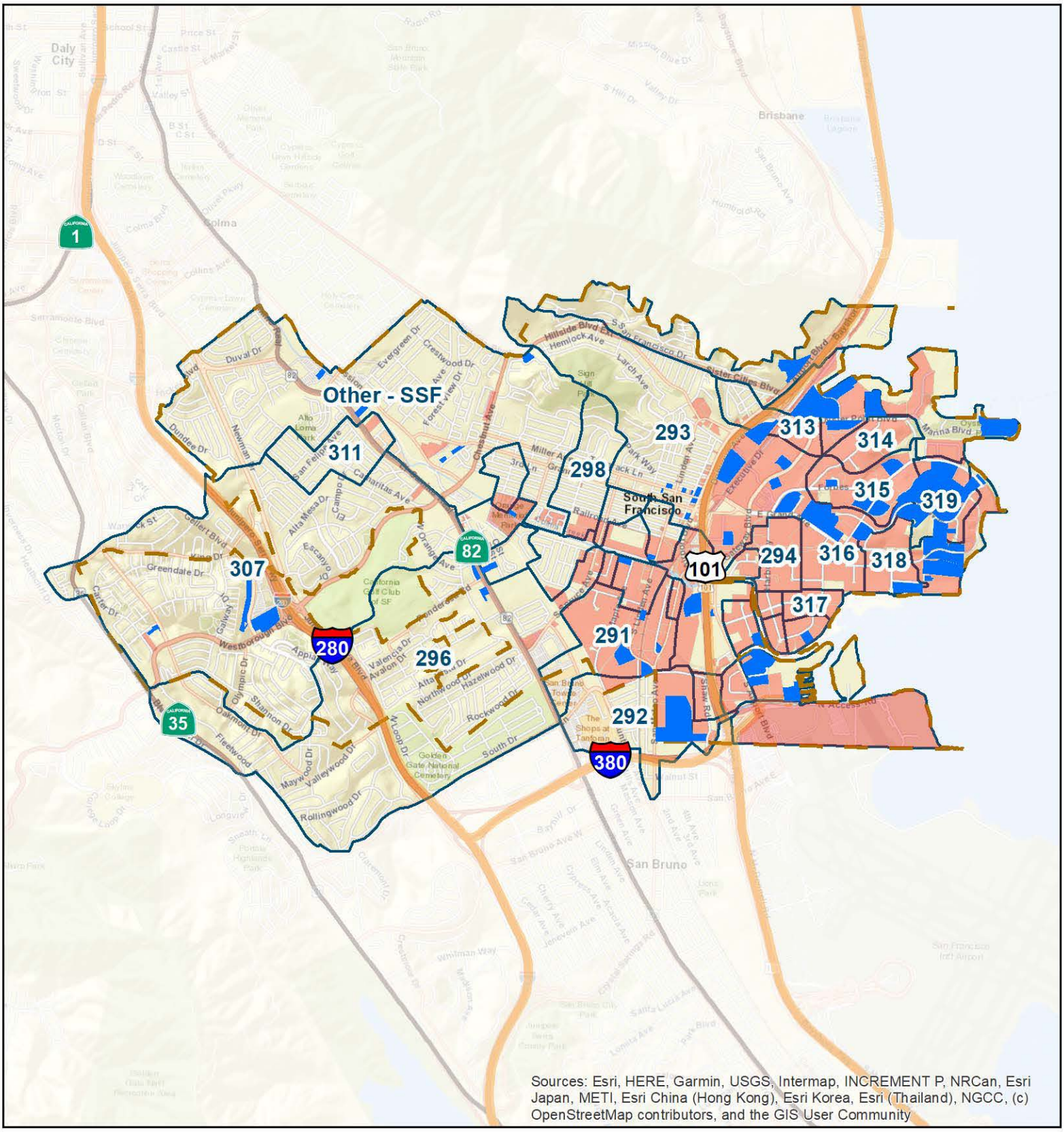

Figure App11-18. WMAs and GI/LID in South San Francisco

South San Francisco Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Committee Boundary

N

0 0.375 0.75 1.5 Miles

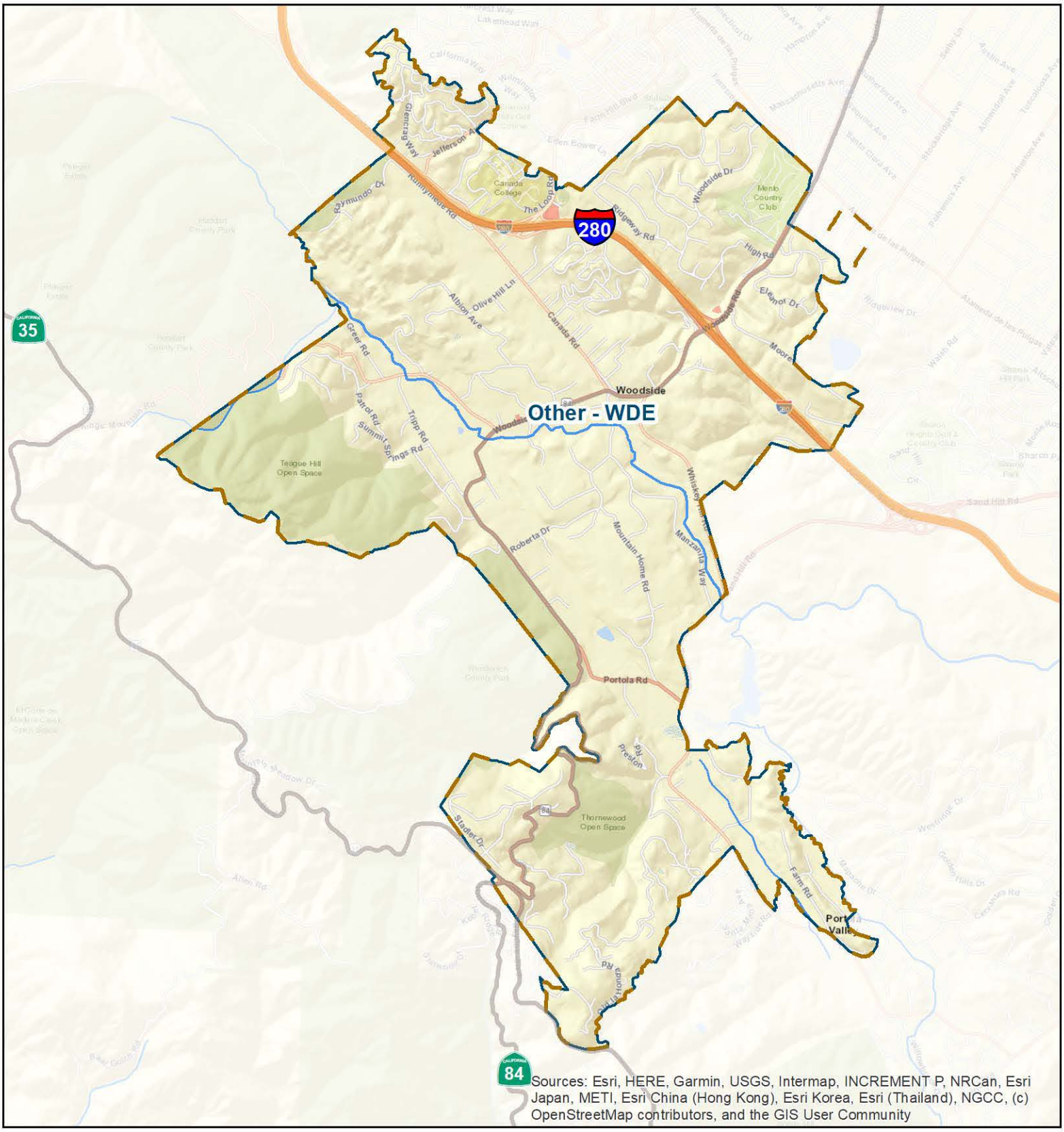

Figure App11-19. WMAs and GI/LID in Woodside

Woodside Watershed Management Area Map

- Green Street Projects
- Old Industrial Land Use
- GI/LID in Parcel-based New and Redevelopment Projects (Parcel Area)
- Watershed Management Area (WMA)
- Permittee Boundary

N

0 0.375 0.75 1.5 Miles

Table App11-1. PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee. **9-30-2020**

Permittee	Control Measure	Project Type or Device Type	WMA ID	Total Area (Acres)	Land Use Category (Acres)				
					Old Industrial	Old Urban - Commercial	Old Residentail	New Urban	Ag/Open Space
Atherton	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	ATH	5.07	--	0.01	5.06	--	--
			Subtotal	**5.07**	--	**0.01**	**5.06**	--	--
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	261	0.09	--	--	0.09	--	--
			Other - ATH	0.42	--	0.42	--	--	--
			Subtotal	**0.51**	**--**	**0.42**	**0.09**	**--**	**--**
	Total - All Controls			**5.58**	**--**	**0.42**	**5.15**	**--**	**--**
Belmont	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	60	2.74	--	0.25	2.11	--	0.38
			77	1.00	1.00	--	0.002	--	--
			1011	3.39	0.0003	--	0.002	0.0005	3.39
			BEL	12.12	1.47	0.96	9.69	--	--
			Subtotal	**19.25**	**2.52**	**1.21**	**11.80**	**0.0005**	**3.72**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	101	2.89	--	0.13	2.76	--	--
			1011	19.82	8.59	3.75	0.75	3.93	2.81
			32	24.60	--	6.17	18.19	--	0.24
			60	102.22	12.77	38.86	50.19	--	0.41
			60B	41.30	0.77	15.04	25.48	--	--
			77	17.91	4.20	6.05	7.65	0.01	--
			Other - BEL	365.97	7.14	71.46	282.96	--	4.41
			Subtotal	**574.70**	**33.47**	**141.46**	**387.97**	**3.93**	**7.86**
	Total - All Controls			**593.95**	**35.99**	**142.67**	**399.77**	**3.93**	**11.58**
Brisbane	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	17	21.02	21.02	--	--	--	--
			1004	17.41	17.37	--	0.04	--	--
			Subtotal	**38.43**	**38.39**	--	**0.04**	--	--
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1004	48.30	6.10	5.82	11.58	--	24.79
			1004B	59.11	22.72	11.88	--	--	24.50
			17	289.55	129.07	62.09	52.48	--	45.90
			Other - BRI	122.07	1.12	3.30	14.55	31.20	71.91
			Subtotal	**519.01**	**159.02**	**83.09**	**78.61**	**31.20**	**167.10**
	Total - All Controls			**557.44**	**197.41**	**83.09**	**78.65**	**31.20**	**167.10**
Burlingame	Green Stromwater Infrastructure	Green Street or Regional Retrofit	139	0.04	0.001	0.03	0.01	--	--
			164	0.81	--	0.01	0.80	--	0.01
			BUR	1.52	--	0.06	1.46	--	--
			Subtotal	**2.37**	**0.02**	**1.02**	**1.33**	--	**0.005**
		Parcel-based New & Redevelopment or Retrofit	164	4.70	2.75	--	1.95	--	--
			1006	2.79	--	--	2.79	--	--
			BUR	3.59	--	--	3.59	--	--
			Other - BUR	1.05	--	1.05	--	--	--
			Subtotal	**12.13**	**3.32**	**0.85**	**7.96**	--	--
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1005	5.46	0.16	5.30	--	--	0.00
			1006	96.62	38.86	43.97	13.35	--	0.44
			1006A	4.96	1.97	2.99	--	--	--
			139	11.44	4.15	0.34	6.95	--	--
			141	21.53	15.25	6.01	--	--	0.27
			142	13.44	10.21	3.23	--	--	--
			149	14.97	5.23	4.69	5.05	--	--
			164	97.47	83.09	13.27	1.11	--	--
			85	93.90	53.87	39.63	--	--	0.40
			Other - BUR	150.07	4.93	97.09	46.35	--	1.70
			Subtotal	**509.85**	**217.71**	**216.52**	**72.81**	--	**2.81**
	Total - All Controls			**524.35**	**221.05**	**218.39**	**82.10**	--	**2.81**
Colma	Green Stromwater Infrastructure	Green Street or Regional Retrofit	COL	0.93	--	--	0.01	--	0.92
			Subtotal	**0.93**	--	--	**0.01**	--	**0.92**
		Parcel-based New & Redevelopment or Retrofit	COL	21.35	--	0.76	9.50	--	11.08
			Other - COL	0.17	--	--	--	--	0.17
			Other - DCY	0.25	--	--	--	--	0.25
			Subtotal	**21.77**	--	**0.75**	**9.35**	--	**11.67**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	181	0.19	--	0.09	--	--	0.10
			329	46.36	--	46.36	--	--	0.00
			Other - COL	58.26	0.005	55.52	0.10	--	2.63
			Subtotal	**104.80**	**0.005**	**101.97**	**0.10**	--	**2.73**
	Total - All Controls			**127.50**	**0.005**	**102.72**	**9.46**	--	**15.32**

Table App11-1. PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee. **9-30-2020**

Permittee	Control Measure	Project Type or Device Type	WMA ID	Total Area (Acres)	Land Use Category (Acres)				
					Old Industrial	Old Urban - Commercial	Old Residentail	New Urban	Ag/Open Space
Daly City	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	329	103.24	--	0.005	103.24	--	--
			DCY	4.52	0.34	2.45	1.73	--	--
			Subtotal	**107.76**	**0.33**	**2.34**	**105.09**	--	--
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1004B	0.03	0.0004	0.00	0.02	--	0.00
			181	0.32	--	0.20	--	--	0.11
			307	6.23	--	3.20	2.57	--	0.46
			329	94.45	0.25	36.26	28.24	--	29.70
			Other - DCY	135.53	2.14	24.80	103.45	--	5.14
			Subtotal	**236.56**	**2.38**	**64.46**	**134.29**	--	**35.42**
	Total - All Controls			**344.32**	**2.71**	**66.81**	**239.38**	--	**35.42**
East Palo Alto	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	67	1.20	1.20	--	--	--	--
			68	1.77	--	1.19	--	--	0.58
			70	9.48	3.89	0.76	0.90	--	3.94
			1015	2.70	2.70	--	--	--	--
			EPA	2.62	--	0.64	--	--	1.98
			Subtotal	**17.77**	**8.16**	**2.36**	**0.89**	--	**6.35**
	Stormwater Treatment - Trash Controls	Large Full Trash Capture	1015	3.93	3.30	0.61	--	--	0.02
			67	5.11	2.23	0.43	1.44	--	1.02
			68	307.14	4.23	76.52	222.14	--	4.24
			70	433.79	18.90	105.93	294.98	--	13.97
			71	2.51	--	0.07	2.44	--	--
			72	14.27	13.61	0.59	0.04	--	0.03
			Other - EPA	103.33	4.53	15.05	61.88	--	21.86
			Subtotal	**870.08**	**46.81**	**199.20**	**582.93**	--	**41.14**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	71	0.86	--	0.74	0.12	--	--
			Subtotal	**0.86**	--	**0.74**	**0.12**	--	--
	Total - All Controls			**888.71**	**54.98**	**202.30**	**583.94**	--	**47.49**
Foster City	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	1010	43.89	7.61	--	2.07	34.21	0.002
			FCY	11.46	--	--	6.06	3.36	2.04
			Subtotal	**55.35**	**7.81**	--	**7.58**	**38.13**	**1.84**
	Stormwater Treatment - Trash Controls	Large Full Trash Capture	1010	156.80	14.39	16.13	--	117.00	9.28
			Other - FCY	31.05	--	7.13	0.08	23.84	--
			Subtotal	**187.85**	**14.39**	**23.26**	**0.08**	**140.85**	**9.28**
	Total - All Controls			**243.20**	**22.20**	**23.26**	**7.65**	**178.97**	**11.11**
Hillsborough	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	HIL	0.12	--	0.0004	0.12	--	--
			Total	**0.12**	--	**0.0004**	**0.12**	--	--
Menlo Park	Green Stromwater Infrastructure	Green Street or Regional Retrofit	238	2.44	1.95	0.49	--	--	--
			MPK	1.62	--	0.37	1.25	--	--
			Subtotal	**4.06**	**1.91**	**0.86**	**1.30**	--	--
		Parcel-based New & Redevelopment or Retrofit	66	15.06	3.70	--	--	11.36	--
			71	10.96	6.48	2.95	1.53	--	--
			238	20.30	16.19	--	4.11	--	--
			239	9.69	9.69	--	--	--	--
			247	12.99	--	1.57	11.42	--	--
			252	3.80	1.54	--	2.26	--	--
			1012	47.35	47.19	--	0.16	--	--
			1014	9.12	4.90	--	4.22	--	--
			MPK	8.21	--	0.70	4.89	2.63	--
			Other - MPK	2.09	2.08	--	0.01	--	--
			Other - SMC	0.66	--	--	0.66	--	--
			Subtotal	**140.23**	**93.41**	**5.17**	**30.19**	**11.46**	--
	Stormwater Treatment - Trash Controls	Large Full Trash Capture	70	43.58	--	6.36	36.79	--	0.43
			71	0.01	--	--	0.01	--	--
			Other - MPK	2.40	--	--	2.37	--	0.03
			Subtotal	**45.99**	--	**6.36**	**39.17**	--	**0.46**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	252	21.65	2.45	11.42	7.41	--	0.38
			378	12.77	--	--	12.74	--	0.03
			71	65.22	--	5.47	59.61	--	0.14
			Other - MPK	165.86	5.45	75.12	85.29	--	--
			Subtotal	**265.50**	**7.90**	**92.00**	**165.05**	--	**0.55**
	Total - All Controls			**455.78**	**103.22**	**104.39**	**235.70**	**11.46**	**1.01**

Table App11-1. PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee. **9-30-2020**

Permittee	Control Measure	Project Type or Device Type	WMA ID	Total Area (Acres)	Land Use Category (Acres)				
					Old Industrial	Old Urban - Commercial	Old Residentail	New Urban	Ag/Open Space
Millbrae	Green Stromwater Infrastructure	Green Street or Regional Retrofit	238	0.50	--	0.48	0.02	--	--
			Subtotal	**0.50**	--	**0.48**	**0.02**	--	--
	Stormwater Treatment - Trash Controls	Large Full Trash Capture	1005	29.19	0.08	8.96	19.32	--	0.83
			395	434.04	7.84	64.89	341.63	--	19.68
			401	18.68	0.25	16.78	1.65	--	--
			Other - MIL	115.05	1.27	33.01	78.13	--	2.64
			Subtotal	**596.96**	**9.45**	**123.64**	**440.73**	--	**23.15**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1005	19.68	7.96	11.08	0.20	--	0.44
			395	15.08	1.23	3.55	10.08	--	0.22
			401	12.85	0.19	5.30	6.25	--	1.11
			Other - MIL	16.84	0.003	13.87	2.72	--	0.25
			Subtotal	**64.45**	**9.39**	**33.80**	**19.24**	--	**2.02**
	Total - All Controls			**661.91**	**18.84**	**157.91**	**459.99**	--	**25.17**
Portola Valley	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	PVY	1.67	--	--	1.67	--	--
			Total	**1.67**	--	--	**1.67**	--	--
Redwood City	Green Stromwater Infrastructure	Green Street or Regional Retrofit	RCY	1.17	--	0.94	0.23	--	--
			Subtotal	**1.17**	--	**0.94**	**0.23**	--	--
		Parcel-based New & Redevelopment or Retrofit	239	0.70	0.70	--	0.001	--	--
			253	0.50	--	0.50	--	--	--
			254	3.91	3.91	--	--	--	--
			261	7.04	0.49	1.51	4.79	--	0.25
			266	7.17	3.87	--	2.43	0.87	--
			324	4.10	1.78	0.74	1.27	--	0.31
			327	11.05	--	1.03	3.91	5.67	0.43
			336	7.02	--	5.87	1.15	--	--
			337	0.61	--	--	0.61	--	--
			379	28.55	18.46	0.005	10.09	--	--
			388	1.19	0.55	--	0.64	--	--
			1000	1.66	1.66	--	--	--	--
			1009	0.14	--	--	0.14	--	--
			1014	1.09	0.12	--	0.97	--	--
			RCY	33.36	0.94	4.40	6.13	19.59	2.31
			Subtotal	**108.10**	**27.89**	**13.69**	**29.93**	**32.57**	**4.02**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1000	9.50	9.50	--	--	--	--
			1011	0.01	--	--	--	--	0.01
			253	12.62	1.58	4.15	6.88	--	--
			261	67.95	1.47	24.70	40.65	--	1.13
			266	43.13	4.49	19.53	18.33	0.79	--
			267	23.15	10.17	8.17	2.70	2.08	0.04
			323	12.25	0.001	9.64	2.61	--	--
			324	12.74	0.99	4.83	6.93	--	--
			325	11.40	1.22	2.68	7.50	--	--
			327	83.68	16.49	42.14	24.68	--	0.37
			336	49.34	13.86	32.38	2.67	--	0.44
			337	38.03	8.38	15.96	13.69	--	--
			379	145.71	45.09	57.93	42.34	--	0.35
			388	27.66	0.62	15.08	11.94	--	0.03
			407	0.64	0.44	--	--	0.20	--
			77	0.00	--	--	--	--	0.00
			Other - RCY	241.17	8.07	32.41	198.83	--	1.87
			Subtotal	**779.00**	**122.38**	**269.59**	**379.74**	**3.06**	**4.23**
	Total - All Controls			**888.27**	**150.27**	**284.22**	**409.90**	**35.63**	**8.25**
San Bruno	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	290	12.25	5.32	2.99	2.89	--	1.04
			1005	0.95	--	--	0.95	--	--
			Subtotal	**13.20**	**5.30**	**2.98**	**3.88**	--	**1.04**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1005	170.85	5.54	20.36	142.84	--	2.10
			290	71.35	2.16	33.00	35.19	--	1.00
			291	0.40	--	0.40	--	--	--
			292	74.92	20.94	22.87	31.11	--	--
			296	0.35	--	--	0.35	--	--
			Subtotal	**317.88**	**28.64**	**76.64**	**209.49**	--	**3.10**
	Total - All Controls			**331.07**	**33.94**	**79.62**	**213.37**	--	**4.14**

Table App11-1. PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee. **9-30-2020**

Permittee	Control Measure	Project Type or Device Type	WMA ID	Total Area (Acres)	Land Use Category (Acres)				
					Old Industrial	Old Urban - Commercial	Old Residentail	New Urban	Ag/Open Space
San Carlos	Green Stromwater Infrastructure	Green Street or Regional Retrofit	31	0.54	--	--	0.54	--	--
			Subtotal	**0.54**	--	--	**0.54**	--	--
		Parcel-based New & Redevelopment or Retrofit	57	2.51	--	0.46	2.05	--	--
			59	18.22	18.22	--	--	--	--
			1011	13.39	13.39	0.0002	--	--	--
			1016	2.62	2.62	--	--	--	--
			SCS	11.50	--	8.95	2.30	--	0.25
			Subtotal	**48.24**	**34.83**	**9.23**	**3.94**	--	**0.25**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1011	5.17	2.63	2.54	--	--	--
			1011C	2.02	0.06	1.96	--	--	--
			1011D	31.29	5.38	4.93	20.98	--	--
			1016	19.15	6.95	11.84	0.31	--	0.05
			207	42.05	2.05	16.41	23.02	--	0.57
			210	91.21	59.57	31.58	0.07	--	--
			31	71.30	41.10	14.00	15.89	--	0.31
			32	21.13	5.77	13.19	2.17	--	--
			57	57.52	0.85	35.80	19.98	--	0.89
			59	6.04	3.06	2.98	--	--	--
			75	38.81	31.17	7.63	--	--	--
			80	15.48	0.49	12.95	2.04	--	--
			Other - SCS	75.53	2.14	29.36	44.01	--	0.02
			Subtotal	**476.69**	**161.21**	**185.16**	**128.48**	--	**1.84**
	Total - All Controls			**525.47**	**196.04**	**194.39**	**132.96**	**--**	**2.08**
San Mateo City	Green Stromwater Infrastructure	Green Street or Regional Retrofit	111	0.44	--	0.29	0.15	--	--
			156	2.11	--	1.35	0.66	--	0.10
			SMO	5.06	--	2.25	2.81	--	--
			Subtotal	**7.61**	--	**4.14**	**3.33**	--	**0.13**
		Parcel-based New & Redevelopment or Retrofit	90	1.12	1.12	--	--	--	--
			92	83.00	0.003	66.93	15.87	--	0.20
			111	0.28	--	--	--	--	0.28
			149	3.08	3.08	--	--	--	--
			156	3.31	--	--	3.31	--	--
			379	0.37	0.37	--	--	--	--
			395	3.21	--	--	3.21	--	--
			1007	0.29	0.29	--	--	--	--
			1008	3.20	3.20	0.0001	--	--	--
			1009	3.35	3.35	--	--	--	--
			Other - RCY	0.51	0.51	--	--	--	--
			Other - SMO	10.00	--	0.11	9.89	--	--
			SMO	22.92	0.42	4.28	14.28	3.95	0.001
			Subtotal	**134.64**	**11.39**	**68.23**	**50.98**	**3.58**	**0.47**
	Stormwater Treatment - Trash Controls	Large Full Trash Capture	1007	8.58	0.39	2.43	5.76	--	--
			1010	0.04	--	--	--	0.04	--
			25	187.34	13.13	29.69	144.51	--	--
			Other - SMO	94.63	3.10	26.04	65.37	0.11	--
			Subtotal	**290.58**	**16.62**	**58.16**	**215.65**	**0.15**	--
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1007	9.55	2.49	3.59	3.48	--	--
			1008	42.89	5.12	2.22	35.54	--	--
			1009	5.02	2.18	2.38	0.47	--	--
			101	2.51	--	2.51	0.00	--	--
			111	61.26	5.19	45.81	9.37	--	0.89
			114	6.49	1.57	0.70	4.22	--	--
			120	7.50	0.58	0.71	6.21	--	--
			149	5.67	1.00	1.59	3.08	--	--
			156	1.65	0.29	1.29	0.00	--	0.07
			25	1.29	0.01	0.18	1.11	--	--
			399	19.84	1.64	1.73	16.42	--	0.04
			403	40.36	1.26	1.74	37.36	--	--
			408	0.86	--	0.55	--	--	0.31
			Other - SMO	50.57	--	17.69	32.58	--	0.30
			Subtotal	**255.47**	**21.32**	**82.69**	**149.85**	--	**1.61**
	Total - All Controls			**688.30**	**49.32**	**213.23**	**419.80**	**3.73**	**2.21**

Table App11-1. PCBs and Mercury Control Measures and Land Use Areas Treated for Each San Mateo County Permittee. **9-30-2020**

Permittee	Control Measure	Project Type or Device Type	WMA ID	Total Area (Acres)	Land Use Category (Acres)				
					Old Industrial	Old Urban - Commercial	Old Residentail	New Urban	Ag/Open Space
San Mateo County	Green Stromwater Infrastructure	Green Street or Regional Retrofit	1007	2.07	--	1.88	0.11	--	0.08
			SMC	3.30	--	3.22	0.08	--	--
			Subtotal	**5.37**	--	**5.07**	**0.20**	--	**0.10**
		Parcel-based New & Redevelopment or Retrofit	71	9.46	--	2.72	6.74	--	--
			77	2.19	2.19	--	--	--	--
			92	1.26	--	1.26	--	--	--
			111	1.20	1.02	--	0.17	--	0.01
			149	2.00	--	2.00	--	--	--
			181	0.99	--	--	0.99	--	--
			379	8.22	2.91	0.001	5.13	--	0.18
			SMC	118.87	0.11	22.04	79.94	0.11	16.67
			SMO	0.81	--	--	0.81	--	--
			Subtotal	**145.00**	**18.65**	**30.00**	**86.41**	**0.06**	**9.87**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1005	2.75	0.31	0.03	--	--	2.40
			1011	0.73	0.03	0.70	--	--	--
			17	26.80	--	--	--	--	26.80
			181	0.12	0.01	0.12	--	--	--
			253	6.63	2.71	0.36	3.53	--	0.03
			261	3.41	0.12	3.06	0.23	--	--
			296	0.39	--	--	--	--	0.39
			307	0.06	--	--	--	--	0.06
			379	273.81	59.14	54.40	156.41	--	3.85
			77	0.01	0.01	0.00	--	--	--
			Other - SMC	94.62	3.29	35.63	51.44	--	4.25
			Other - SSF	0.00	--	--	--	--	0.00
			Subtotal	**409.33**	**65.62**	**94.30**	**211.62**	--	**37.79**
	Total - All Controls			**559.70**	**84.27**	**129.38**	**298.23**	**0.06**	**47.76**

Permittee	Control Measure	Project Type or Device Type	WMA ID	Total Area (Acres)	Land Use Category (Acres)				
					Old Industrial	Old Urban - Commercial	Old Residentail	New Urban	Ag/Open Space
South San Francisco	Green Stromwater Infrastructure	Parcel-based New & Redevelopment or Retrofit	291	5.32	5.32	--	--	--	--
			292	26.49	26.49	--	--	--	--
			293	15.28	13.21	0.17	1.90	--	--
			307	10.02	--	--	10.02	--	--
			313	27.63	27.63	--	--	--	--
			314	3.63	--	3.63	--	--	--
			316	14.03	14.02	--	0.01	--	--
			318	4.80	4.80	--	0.002	--	--
			319	5.00	5.00	--	--	--	--
			359	3.36	3.35	--	0.01	--	--
			1001	15.11	9.82	--	5.24	--	0.05
			1002	0.85	0.85	--	--	--	--
			SSF	4.09	--	2.05	2.04	--	--
			Subtotal	**135.61**	**111.83**	**5.18**	**18.56**	--	**0.04**
	Enhanced O&M - Increased Storm Drain Inlet Cleanouts	Small Full Trash Capture (Inlet-based devices)	1001	81.48	45.55	30.37	5.48	--	0.08
			1001B	9.57	6.39	3.19	--	--	--
			1001C	12.00	10.37	1.62	--	--	0.01
			1001D	28.44	22.57	5.85	--	--	0.02
			1002	5.58	4.28	0.95	--	--	0.35
			291	97.76	79.58	17.76	--	--	0.42
			292	12.04	10.32	1.29	--	--	0.43
			293	229.09	87.02	78.85	59.57	--	3.66
			294	39.63	34.75	4.84	--	--	0.05
			295	18.00	13.48	4.31	--	--	0.21
			296	84.14	4.45	16.85	62.75	--	0.09
			297	25.81	0.63	4.19	20.99	--	--
			298	79.64	5.71	9.53	64.21	--	0.20
			306	24.97	4.43	6.74	13.80	--	--
			307	156.81	--	10.52	146.20	--	0.09
			311	59.03	--	2.94	56.09	--	--
			313	34.33	4.14	3.25	26.10	--	0.85
			314	9.16	6.86	2.29	--	--	--
			315	9.38	6.47	2.91	--	--	--
			316	58.07	46.47	11.58	--	--	0.02
			317	31.23	27.78	3.44	--	--	0.01
			318	12.18	9.88	2.30	--	--	--
			319	3.36	2.74	0.62	--	--	--
			352	0.23	--	0.01	0.22	--	--
			354	5.23	4.42	0.80	--	--	0
			356	10.22	8.17	2.04	--	--	0.01
			357	14.87	9.17	5.45	--	--	0.25
			358	19.71	16.29	3.36	--	--	0.06
			359	16.42	15.00	1.41	--	--	0.004
			Other - SMC	0.00	--	--	0.002	--	--
			Other - SSF	139.98	0.51	7.15	128.51	0.001	3.82
			Subtotal	**1328.38**	**487.44**	**246.42**	**583.90**	**0.001**	**10.63**
	Total - All Controls			**1463.99**	**599.26**	**251.59**	**602.47**	**0.00**	**10.67**

1 – Preliminary - may not include all acres currently treated by GI and treatment controls.

2 – GI includes (1) parcel-based new development, redevelopment, or retrofit projects; and (2) green street projects or regional retrofit projects.

3 – GI and treatment controls may include proprietary vault-based systems.

4 - Large Full Trash Capture devices include: Hydrodynamic Separator Units (HDS); Gross Solids Removal Devices (GSRD); and Debris Separating Baffle Boxes (DSBB).

PCBs and Mercury Regional Loads Reduced during MRP 2.0

Introduction

MRP 2.0 requires Permittees to develop and implement control measures to reduce PCBs and mercury in stormwater runoff to the San Francisco Bay throughout the permit area (Table 1). For PCBs, Permittees are collectively required to reduce loads by a minimum of 500 grams per year (g/yr) by June 30, 2018, and 3,000 g/yr by June 30, 2020. At least 120 g/yr of PCBs load reduction must be achieved through implementation of green stormwater infrastructure (GSI) projects on public and private lands. The June 30, 2020 date may be extended to December 31, 2020 if Permittees provide documentation that control measures that will attain the load reduction will be implemented by that date. For mercury, Permittees are collectively required to reduce stormwater loads by 48 g/yr by June 30, 2020 through implementation of GSI projects on public and private lands. These load reduction performance criteria may be met regionally. However, should regional load reductions not be achieved, MRP 2.0 requires each Permittee to achieve load reductions on a county-wide basis.

Table 1. PCBs and Mercury Load Reductions Required by MRP 2.0 in 2018 and 2020.

PCBs (g/year)			Mercury (g/yr)
By July 2018	By July 2020		By July 2020
All Control Measures	All Control Measures	Green Stormwater Infrastructure	Green Stormwater Infrastructure
500	3,000	120	48

The PCBs and mercury performance criteria in Table 1 can be achieved through implementation of the following control measures:

1. Source property ID and Abatement
2. Green Stormwater Infrastructure and Treatment Controls, including:
    - Parcel-based new/re-development/Green Streets/Regional Retrofits
    - Public hydrodynamic separator Units (trash full capture)
3. Enhanced Operation and Maintenance (O&M) Measures, including:
    - Street Sweeping or Flushing
    - Inlet-based trash full capture devices
    - Other MS4 Cleaning
4. Managing PCBs in Building Materials
5. Managing PCBs in Infrastructure
6. Diversions to Publicly Owned Treatment Works (POTWs)

The control measures implemented to-date are described in more detail in “Control Measures Plans” prepared by individual Bay Area countywide stormwater programs or Permittees. The PCBs and mercury

load reductions that have been achieved to date were calculated using the methodologies presented in the *Interim Accounting Methodology for PCBs and Mercury Loads Reduced Report* (BASMAA 2017), which was developed by BASMAA and approved by the Regional Water Board's Executive Officer in March 2017. The data reported here on regional PCBs and mercury loads reduced by all Permittees were provided by the following countywide stormwater programs and municipal agencies:

- Alameda Countywide Clean Water Program
- Contra Costa Clean Water Program
- Santa Clara Valley Urban Runoff Pollution Prevention Program
- San Mateo Countywide Water Pollution Prevention Program
- Fairfield-Suisun Urban Runoff Management Program
- City of Vallejo and the Vallejo Flood and Wastewater District

The load reductions reported here are based on the best available information at the time this report was written and may not reflect the most up-to-date accounting of all reductions achieved through all control measures that have been implemented in the region.

Regional PCBs Loads Reduced

The cumulative PCBs loads reduced to date by all Permittees during the MRP compliance period (FY 13-14 through FY 19-20) are presented in Table 2. A total of 3,017 g/yr of PCBs were reduced across the permit area over that time period, demonstrating that the MRP performance criterion of 3,000 g/yr of PCBs loads reduced by July 2020 has been achieved at the regional level.

Table 2. PCBs loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	PCB Load Reductions (g/yr)
Source Property Identification and Abatement	610
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	231
Large Full Trash Capture (i.e. HDS Units)	157
Enhanced O&M Measures	18
PCBs in Building Materials	2,000
Stormwater Diversion to Sanitary Sewer	1
TOTAL - All Control Measures	**3,017**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

The PCBs loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 1. The PCBs in building materials program achieved the MRP-stipulated 2,000 g/yr (66%) because all Permittees successfully implemented the program by July 1, 2019. This load reduction accounts for 66%of the total PCBs loads reduced during MRP 2.0. The remaining 1,017 g/yr was achieved through all other control measures. Of these, source property identification and abatement accounts for 20% of the total PCBs load reduction during MRP 2.0. Next to managing PCBs in building materials, source property identification and abatement remains the most effective control measure currently available for reducing PCBs loads to the Bay (BASMAA 2017). GSI has been the third largest contributor to load reductions, providing 231 g/yr of PCBs loads reduced and accounting for 8% of the total PCBs loads reduced to-date. These data demonstrate the MRP performance criterion of 120 g/yr of PCBs loads reduced through GSI has been met across the region. An additional 157 g/yr have been reduced by large, full trash capture devices (i.e., HDS Units), accounting for 5% of the total PCBs loads reduced. The remaining < 1% of the regional PCBs loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

Regional Mercury Loads Reduced

The cumulative mercury loads reduced by MRP Permittees from FY13-14 through FY 19-20 are presented in Table 3. An estimated total of 4,394 g/yr of mercury were reduced across the permit area over that time period. The mercury loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 2. GSI has been the largest contributor to mercury load reductions during the permit term. Total mercury loads have been reduced by 2,759 g/yr through GSI, accounting for 63% of the total loads reduced. These data demonstrate the MRP performance criterion of 48 g/yr of mercury loads reduced through GSI by 2020 has been met across the region. An additional 1,348 g/yr of mercury have been reduced by large, full trash capture devices (i.e., HDS Units), accounting for 31% of the total loads reduced. Source property identification and abatement has reduced mercury loads by 120 g/yr, accounting for only 4% of the total mercury loads reduced to date. The remaining 4% of the regional mercury loads reduced during the permit have come from enhanced operation and maintenance practices and stormwater diversions.

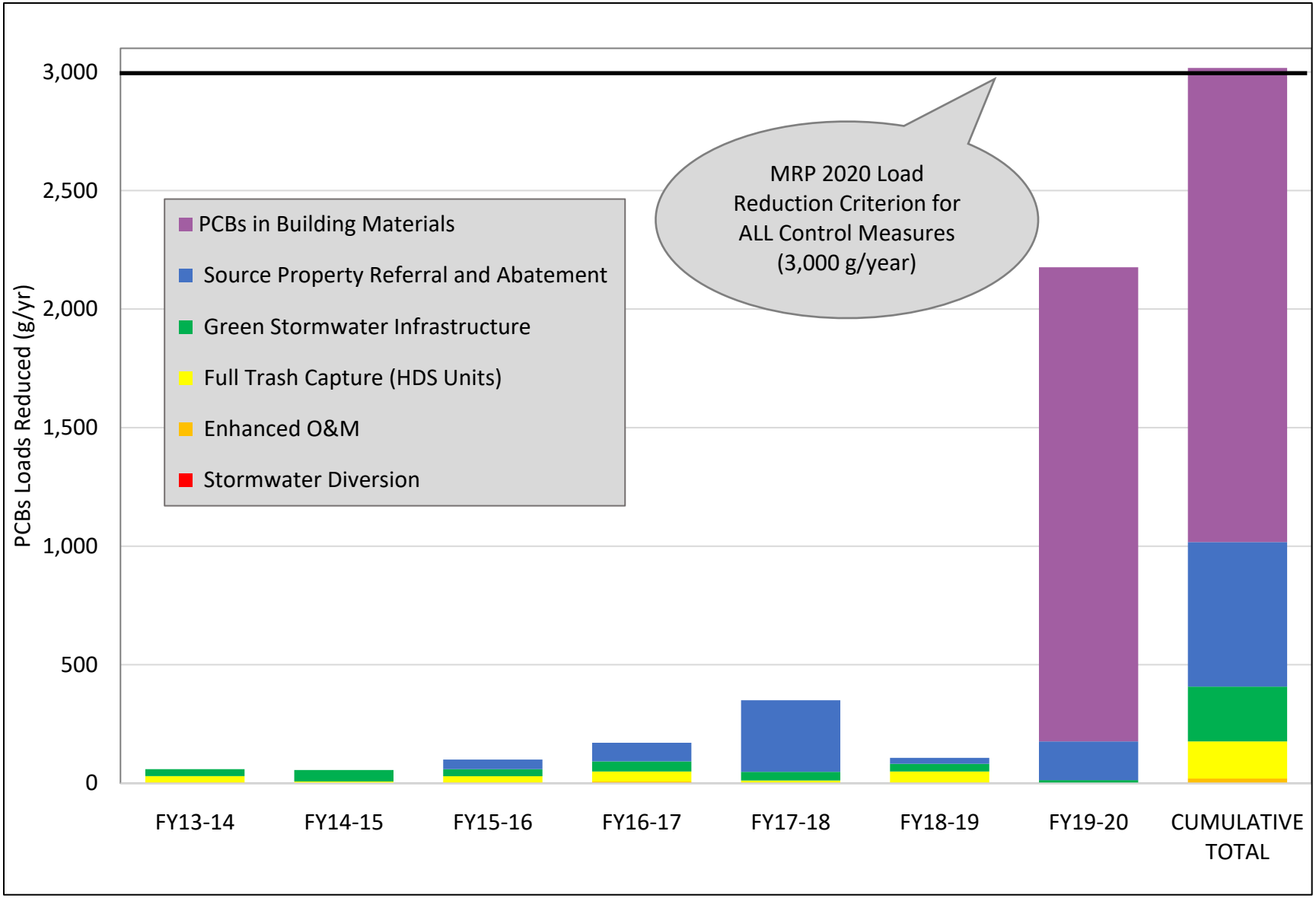

Figure 1. PCBs loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

Table 3. Mercury loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	Mercury Load Reductions (g/yr)
Source Property Identification and Abatement	120
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	2,759
Large Full Trash Capture (i.e. HDS Units)	1,348
Enhanced O&M Measures	163
Stormwater Diversion to Sanitary Sewer	3
TOTAL - All Control Measures	**4,394**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

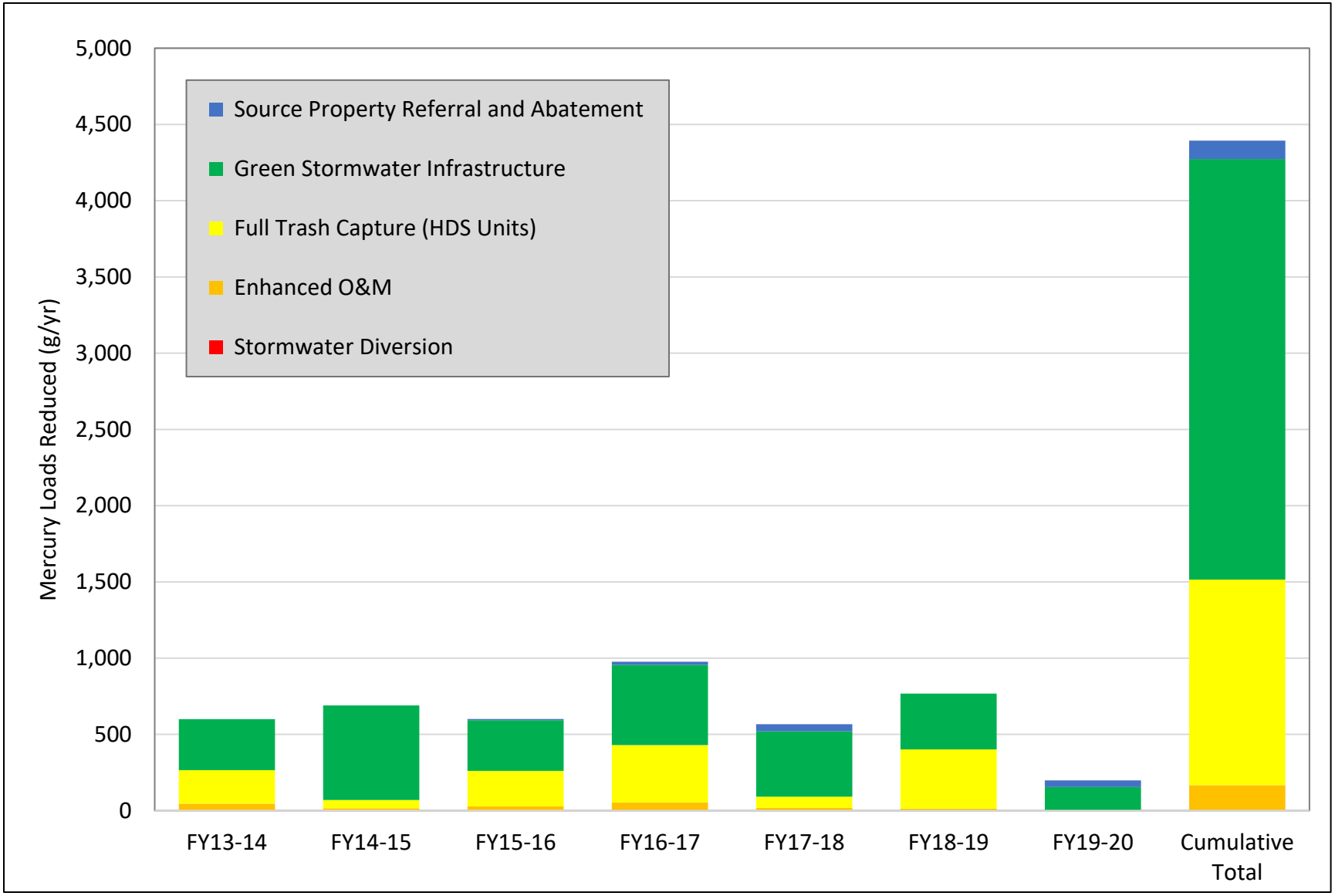

Figure 2. Mercury loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

SAN MATEO COUNTYWIDE
Water Pollution Prevention Program

POLLUTANT CONTROL MEASURES IMPLEMENTATION PLAN AND REASONABLE ASSURANCE ANALYSIS FOR SAN MATEO COUNTY, CALIFORNIA

SCENARIOS TO ACHIEVE PCBs AND MERCURY SAN FRANCISCO BAY TMDL WASTELOAD ALLOCATIONS

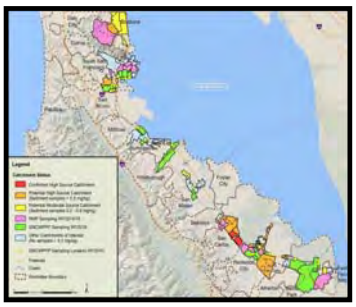

Submitted by the San Mateo Countywide Water Pollution Prevention Program in compliance with NPDES Permit No. CAS612008 (Order No. R2 2015-0049) Provisions C.11/12.c.ii(2) and C.11/12.d.iii

SEPTEMBER 30, 2020

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CREDITS

This report is submitted by the participating agencies in the

SAN MATEO COUNTYWIDE
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Town of Atherton	**City of Foster City**	**City of San Bruno**
City of Belmont	**City of Half Moon Bay**	**City of San Carlos**
City of Brisbane	**Town of Hillsborough**	**City of San Mateo**
City of Burlingame	**City of Menlo Park**	**City of South San Francisco**
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City of Daly City	**City of Pacifica**	**County of San Mateo**
City of East Palo Alto	**Town of Portola Valley**	**SM County Flood Control District**
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APPENDICES

A - Phase I RAA – Baseline Modeling Report

B - Phase II RAA – Green Stormwater Infrastructure Modeling Report

C - Phase III RAA – Source Control Load Reduction Accounting for RAA Report

LIST OF ABBREVIATIONS

ABAG	Association of Bay Area Governments
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practice
CW4CB	Clean Watersheds for a Clean Bay
CWA	Clean Water Act
FTC	Full Trash Capture
FY	Fiscal Year
GE	General Electric
GIS	Geographic Information System
GI	Green Stormwater Infrastructure
GSRD	Gross Solids Removal Device
HDS	Hydrodynamic Separator Unit
HHW	Household Hazardous Waste
HRU	Hydrologic Response Unit
HSPF	Hydrologic Simulation Program FORTRAN
LID	Low Impact Development
LSPC	Loading Simulation Program in C++
MIP	Model Implementation Process
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NLDAS2	North American Land Data Assimilation System
NPDES	National Pollution Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PPM	Parts Per Million
PRISM	Parameter-elevation Regressions on Independent Slopes Model
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric
POC	Pollutant of Concern
POTW	Publicly Owned Treatment Works
Program	San Mateo Countywide Water Pollution Prevention Program
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
RWSM	Regional Watershed Spreadsheet Model
SAP	Sampling and Analysis Plan
SFEP	San Francisco Estuary Partnership
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SSID	Stressor/Source Identification
SUSTAIN	System for Urban Stormwater Treatment & Analysis Integration
SWRP	Stormwater Resource Plan
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	Wasteload Allocation
WMA	Watershed Management Area

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1 INTRODUCTION

This Control Measure Implementation Plan (Control Measures Plan) and Reasonable Assurance Analysis (RAA) describes implementation actions and associated potential schedules for achieving the Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for polychlorinated biphenyls (PCBs) and mercury in San Mateo County stormwater runoff. This Control Measures Plan was developed by San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) in compliance with Provisions C.11/12.c. and C.11/12.d. of the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order No. R2-2015-004; Permit No. CAS612008), also known as the Municipal Regional Permit (MRP). It was developed by SMCWPPP on behalf of all San Mateo County MRP Permittees. It builds upon the foundational program of actions to address PCBs and mercury that have been implemented by SMCWPPP and San Mateo County Permittees over the past two decades. These actions include both the collection and analysis of hundreds of sediment and stormwater runoff samples, the investigation of sources and source areas, and the development and implementation of control measures to reduce the level of PCBs and mercury in urban stormwater runoff in San Mateo County (BASMAA 2014, BASMAA 2017b, SMSTOPPP 2002, 2003, and 2004, Yee and McKee 2010, SMCWPPP 2014, SMCWPPP 2015, and CW4CB 2017a, SMCWPPP 2016a and b, SMCWPPP 2017a and b, SMCWPPP 2018a and b, SMCWPPP 2019b, SMCWPPP 2020).

This document is organized as follows:

- **Control Measures Plan and RAA (Main Report)** – Describes implementation actions to address PCBs and mercury TMDL WLAs assigned to San Mateo County. In compliance with MRP provisions C.11/12.d., quantitatively demonstrates implementation actions that would achieve TMDL WLAs, based on modeling and load reduction quantification methods described in Appendices A, B and C.
- **Phase I RAA - Baseline Modeling Report (Appendix A)** – Describes the baseline pollutant modeling used to establish the starting point for measuring progress towards TMDL WLAs.
- **Phase II RAA - Green Infrastructure (GI) Modeling Report (Appendix B)** – Describes the modeling conducted to identify the extent of GI needed to achieve PCBs/mercury load reductions that are required to be met by 2040 by MRP Provisions C.11/12.c.ii(2).
- **Phase III RAA - Source Control Load Reduction Accounting Report (Appendix C)** – Describes the revised methods used to account for PCBs/mercury load reductions associated with the implementation of source controls and non-GI stormwater runoff treatment.

SMCWPPP has previously provided descriptions of PCBs and mercury control measures at San Mateo County Permittee and Watershed Management Area (WMA) scales (SMCWPPP 2014, SMCWPPP 2016a and b, SMCWPPP 2017b, SMCWPPP 2018b, SMCWPPP 2019b). For the purpose of this Control Measures Plan, controls are presented at the countywide scale. Tracking and reporting of control measure implementation will continue to be conducted at the appropriate geographical scales needed to demonstrate progress towards the TMDL WLAs.

1.1 Regulatory Background

Fish tissue monitoring in San Francisco Bay (Bay) has revealed the bioaccumulation of PCBs, mercury, and other pollutants in Bay sportfish. The levels found are thought to pose a health risk to people consuming these fish and as a result, an interim advisory has been issued on the consumption of

sportfish from the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs and mercury. In response, the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) has developed TMDL water quality restoration programs targeting PCBs and mercury in the Bay. The general goals of the TMDLs are to identify sources of PCBs and mercury to the Bay and implement actions to control the sources of these pollutants in order to achieve water quality standards and restore beneficial uses (SFBRWQCB 2006, 2008).

The stormwater runoff requirements of the mercury and PCBs TMDLs are being implemented through Provisions C.11. and C.12. of the MRP, respectively. The mercury TMDL requires a regionwide stormwater runoff WLA of 82 kg/yr to be achieved by February 2028. The PCBs TMDL requires a regionwide stormwater runoff WLA of 2 kg/yr, with 1.6 kg/yr allocated to MRP Permittees, to be achieved by March 2030. San Mateo County Permittee's population-based proportions of the TMDL WLAs are 8.4 kg/yr for mercury and 0.2 kg/yr for PCBs. The primary goal for this Control Measures Plan is to identify scenarios for a program of actions that would result in the achievement of these WLAs.

The first MRP issued in 2009 (MRP 1.0; Order R2-2009-0074) required Permittees to implement pilot-scale control measures during the permit term to reduce PCBs and mercury discharges from Municipal Separate Storm Sewer Systems (MS4s). These pilot studies were intended to enhance our collective knowledge about the costs and benefits of different control measures to reduce the levels of PCBs and mercury in urban stormwater runoff. The reissued MRP (MRP 2.0, Order R2-2015-0049) requires Permittees to move from pilot-scale work to focused implementation in areas where benefits are most likely to occur, and to achieve a regionwide interim PCBs load reduction goal of 3 kg/year by 2020. Progress made by San Mateo County Permittees towards this interim load reduction goal is described in the SMCWPPP FY 2019/20 Annual Report.

In addition to the interim load reduction goal for PCBs, MRP 2.0 also requires the following:

- <u>Provisions C.11/12.c. - Plan and Implement Green Infrastructure to Reduce Mercury/PCBs Loads</u>:

  ii(2). Permittees shall prepare a reasonable assurance analysis of future mercury/PCBs load reductions by doing the following:

  a. Quantify the relationship between areal extent of green infrastructure implementation and mercury/PCBs load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies.

  b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040.

  c. Estimate the amount of mercury/PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.

  d. Quantitatively demonstrate that mercury reductions of at least 10 kg/yr and PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects.

  e. Ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill C.11.c.ii(2)(a.-d.) have been validated through a peer review process.

- Provisions C.11/12.d. - Prepare Implementation Plan and Schedule to Achieve TMDL Allocations:
    i. Permittees shall prepare a plan and schedule for mercury/PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the TMDL wasteload allocations by 2028 (mercury) and 2030 (PCBs).
    ii. The plan must:
        (1) Identify all technically and economically feasible mercury/PCBs control measures (including green infrastructure projects) to be implemented;
        (2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and
        (3) Provide an evaluation and quantification of the mercury/PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

1.2 Types of Control Measures

San Mateo County Permittees have implemented a variety of pollutant control measures since the development and adoption of PCBs and mercury TMDLs by the Regional Water Board. Control measures are implemented to reduce PCBs and/or mercury in urban stormwater runoff and improve the overall quality of stormwater runoff in San Mateo County. These control measures have a direct benefit in reducing PCBs and mercury impacts to the Bay.

The types of control measures implemented to control PCBs and mercury in stormwater runoff generally fall into two categories:

- **Source Controls (Load Avoidance and Reduction)** – Source controls is a broad term used to describe actions designed to reduce the potential for pollutants to enter the environment (load avoidance) or actions that intercept pollutants once available for transport to waterways via stormwater runoff (load reduction). For the purpose of this Control Measure Plan, source controls include stormwater treatment systems except Green Infrastructure (GI).
- **Green Infrastructure (Load Reduction)** – GI is engineered infrastructure that uses natural processes in vegetation and soils to remove pollutants from stormwater runoff. Other benefits include reducing runoff peak flows and volumes and providing flood protection. GI systems mimic nature by soaking up, storing, and infiltrating stormwater runoff into the ground.

The selection of stormwater runoff control measures needed to achieve the PCBs and mercury TMDL WLAs is informed by ongoing evaluations of sources of these pollutants and estimated load reduction benefits. Source controls and GI implemented to-date and planned for future implementation within San Mateo County are summarized in Sections 3 and 4 of this Control Measures Plan.

1.3 Approach to Control Measure Planning and Organization of Control Measures Plan

A stepwise approach was used to develop this Control Measures Plan. The approach builds upon successful implementation of control measures to-date by SMCWPPP and San Mateo County Permittees. It incorporates the lessons learned over the past two decades about both the sources of PCBs and mercury and the most cost-effective approaches to managing and reducing these pollutants in

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stormwater runoff. The approach maximizes the use of source controls to manage these pollutants, and then evaluates the costs and benefits of further implementing GI to address the remaining load reductions needed to achieve TMDL WLAs.

The approach follows the guidance provided in the Bay Area RAA Guidance Document (BASMAA 2017c), which established a regional framework for conducting Bay Area RAAs. The RAA Guidance Document describes the types of modeling and data inputs that may be used by Permittees to calculate baseline loading and load reduction targets and estimate loads reduced by current and projected future GI. It states that load reductions by non-GI source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology (BASMAA 2017a), which was developed by BASMAA and approved by the Regional Water Board's Executive Officer in 2017. The refined source control measures load reduction quantification methods are fully described in Appendix C. The remaining sections of this Control Measures Plan are organized as follows:

- **Section 2. Refinements to Baseline PCBs & Mercury Loading Estimates and Establishing Load Reduction Targets.** This section presents the modeled baseline loads of PCBs and mercury in San Mateo County stormwater runoff discharged to the Bay[1] that were modeled as part of the RAA process. The modeled baseline loads define the starting point for quantifying PCBs and mercury load reductions needed to attain TMDL WLAs. The modeled baseline loads of PCBs and mercury presented in this section are based on the modeling presented in SMCWPPP's Phase I RAA Report (Appendix A).
- **Section 3. Control Measure Implementation.** This section describes existing and potential future control measures to achieve San Mateo County PCBs and mercury TMDL WLAs. Estimated PCBs and mercury load reductions achieved to-date and associated with the implementation of future potential source controls and GI by San Mateo County Permittees (or other permitted entities with land areas contributing PCBs to stormwater runoff in San Mateo County such as Caltrans) are included. The evaluation includes implementation scenarios for achieving the PCBs TMDL WLA based on three different timelines (by 2030, 2040, and 2080).
- **Section 4. Economic and Technical Feasibility Evaluation.** This section discusses the economic and technical feasibility of each implementation scenario included in Section 3. Potential environmental impacts associated with the implementation scenarios are also described.
- **Section 5. Tracking and Reporting Control Measure Implementation and Progress Towards Load Reduction Goals.** This section describes the tracking and reporting methods and tools that will be used by San Mateo County Permittees to demonstrate the extent and magnitude of control measure implementation, and the associated pollutant load reductions.
- **Section 6. Conclusions and Planned Next Steps.** This section describes the conclusions from the evaluation, and next steps that San Mateo County Permittees plan to conduct to continue attempting to identify additional pollutant sources and implementing and enhancing cost-effective PCBs and mercury control measures. This includes describing the current countywide focus on collaborative efforts to advance GI projects in San Mateo County, including green streets and regional stormwater capture projects. Also discussed is the role in control measure implementation of other permitted entities with land areas that contribute PCBs to stormwater runoff in San Mateo County.

[1] Discharges to the Pacific Ocean are not relevant to these Bay TMDLs and are not included.

2 REFINEMENTS TO BASELINE PCBS AND MERCURY LOADING ESTIMATES AND ESTABLISHING LOAD REDUCTION TARGETS

This section presents the modeled baseline loading estimates of PCBs and mercury in San Mateo County stormwater runoff discharging to the Bay. The modeled baseline loads were developed via modeling conducted as part of SMCWPPP's RAA process, which is described in full detail in the Phase I RAA Report (Appendix A). The modeled baseline loads define the starting point for load reduction accounting towards attainment of the TMDL WLAs. Load reduction targets for PCBs and mercury based on a comparison of the baseline loads and the WLAs are also discussed.

2.1 RAA Process and Modeling Results

Hydrologic, sediment and pollutant modeling was conducted as part of the RAA process to refine the 2002 baseline loads of PCBs and mercury in urban stormwater runoff from San Mateo County. Baseline loads were modeled for all areas within San Mateo County that drain to the Bay, including land areas not subject to MRP requirements but contributing pollutant loads to stormwater in the County (e.g., Caltrans properties, Industrial General Permit facilities). Refinement of baseline loading was the first step in the RAA process. The modeled baseline loads are the starting point for calculating the total load reduction that is needed to achieve TMDL WLAs. The load reduction targets described in this section are the basis for the control measures implementation plan presented in Section 3.

2.1.1 Regional RAA Guidance Document

In order to ensure comparable results across the region, MRP Permittees participated in a regional project to establish criteria for RAA modeling. The Bay Area RAA Guidance Document (BASMAA 2017c) was developed out of this project and establishes specific methodologies to calculate baseline PCBs and mercury loading and load reduction targets. It also recommends methods for evaluating the type, size, number, location, and phasing of GI measures needed to comply with the GI load reduction targets defined in MRP 2.0 (see Appendix B). The Bay Area RAA Guidance Document was built upon guidance from the Los Angeles Regional Water Quality Control Board (LARWQCB 2014) and the United States Environmental Protection Agency (USEPA 2017), particularly in terms of the mechanics of the analysis, control measure identification, critical condition selection, choice of models, model calibration criteria, modeling inputs, and model outputs. San Mateo County RAA process was conducted according to the Bay Area RAA Guidance Document.

2.1.2 Regional Watershed Spreadsheet Model

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the San Francisco Bay Regional Monitoring Program's Small Tributaries Loading Strategy. The RWSM was developed as a planning tool, primarily for the purpose of estimating long-term average annual loads from the small tributaries draining to the Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al. 2017). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant model(s). The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land use to simulate suspended sediment transport in the landscape while adjusting

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for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[2] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[3] and the model was released in 2018.

2.1.3 RAA Baseline Model Summary

The RAA Phase I Report (Appendix A) documents the development and calibration of the hydrologic and water quality model that was used to refine San Mateo County baseline loads of PCBs and mercury discharged to the Bay. For the purpose of the model, baseline conditions were defined as the average water year (2002) conditions. The baseline hydrology and pollutant loading model achieved the criteria established in the Bay Area RAA Guidance Document (BASMAA 2017c) for acceptable calibration and validation sufficient to estimate existing loads of mercury and PCBs, to compare to TMDL WLAs, and to determine necessary load reductions to support control measure planning. The model and the model results are summarized in the following sections. A full description of the model and model results are described in Appendix A.

Modeling System

The watershed modeling system selected by SMCWPPP was the Loading Simulation Program in C++ (LSPC), a watershed modeling system that includes Hydrologic Simulation Program FORTRAN (HSPF) algorithms to simulate watershed hydrology, erosion, water quality processes, and in-stream fate and transport processes. The model simulated upland loading and transport of sediment, in combination with methods developed for the RWSM for assigning PCBs and mercury runoff concentrations, to estimate PCBs and mercury loads associated with various land uses. Model inputs included available spatial and monitoring datasets to represent the land, meteorological, hydrological, and pollutant loading characteristics of San Mateo County watersheds.

Land Use Characteristics

The model relies on hydrologic response units (HRUs) to represent areas of similar physical characteristics and processes. HRUs are typically defined by soils, slope, land cover, and land use. Various data sets were layered in order to create HRUs in the model, including:

- Slope (USGS)
- Soil Groups (USDA SSURGO 2016)
- Imperviousness (NLCD 2011)
- Land Cover (NLCD 2011)
- Land Use (ABAG 2005, modified by SFEI for the RWSM)

Within the model, the Association of Bay Area Governments (ABAG) land use layer (modified by the San Francisco Estuary Institute as part of the RWSM development) was the main source of information for representing land areas associated with PCBs and mercury (Table 2-1). This GIS layer includes five land uses categories that are consistent with those used in the RWSM. Although hydrology and sediment were initially modeled at higher HRU resolution (using a different land use data set), the ABAG/SFEI layer was intersected during water quality model development. This allowed for PCBs and mercury

[2] Particle ratio is pollutant concentration in water divided by suspended sediment concentration in water.
[3] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et. al. 2017).

sediment concentrations to be assigned spatially, under the assumption that the ABAG/SFEI land use categories reflect the spatial distribution of pollutant contributions from San Mateo County watersheds, which includes contributions from land areas upstream and downstream of impoundments (e.g., reservoirs). Based on the data inputs described above, a set of representative HRUs were developed for use in the watershed model to reflect key land characteristics of San Mateo County watersheds draining to the Bay.

Table 2-1. San Mateo County land use areas that drain to the Bay established through the RWSM and used for modeling PCBs and mercury loads to the Bay from stormwater runoff.

Land Use Category	Area (acres)
Agriculture/Open	37,203
New (post-1980) Urban	13,807
Old (pre-1980) Industrial/Source Areas	3,913
Old (pre-1980) Urban - Other	23,833
Old (pre-1980) Urban – Residential	33,261
Total	**112,017**

Meteorological Conditions

Hydrologic models are highly dependent on the quantity and quality of meteorological forcing data, such as precipitation. Actual rainfall gauge data in San Mateo County has a number of common issues, such as intervals of missing data. Furthermore, the network of local gauges does not represent the full range of conditions in San Mateo County which are heavily influenced by orographic effects. Therefore, the model used monthly precipitation totals from the Parameter-elevation Regressions on Independent Slopes Model (PRISM) and hourly precipitation distributions and potential evapotranspiration (ET) estimates from the North American Land Data Assimilation System (NLDAS2). The resultant meteorological timeseries covered the period between 1981 and 2015 at an hourly timestep (i.e., inclusive of the baseline year of 2002). Meteorological data were assigned to each model subwatershed based on location, elevation, and hillslope aspect.

Hydrology Model Calibration

A two-phase weight-of-evidence approach was used for hydrology calibration. The Bay Area RAA Guidance Document (BASMAA 2017c) specifies annual percent difference calibration metrics, which aligns with the spatial and temporal scales of the Bay TMDLs. For additional resolution regarding the timing of flow and pollutant loads, monthly and seasonal model hydrology performance were also evaluated as part of the calibration effort. Model output was compared to local flow monitoring gages. When model results diverged from observed data, Google Earth was used to investigate and identify unrepresented hydraulic features which were then added to the model whenever possible. Model parameters were fine-tuned so that the calculated error statistics fell within the targeted model performance ranges.

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Baseline Sediment Loading/Calibration

Because of the close association of PCBs and mercury with suspended sediment, the Phase I RAA model simulated erosion and suspended sediment mobilization as the next step in the weight of evidence-based approach for hydrology model calibration. A soil erodibility K-factor was assigned to each HRU based on soil type, slope, and meteorological conditions to estimate the amount of sediment generated from land. Modeled sediment loads from the land surface were partitioned into sand, silt, and clay (i.e., suspended sediment) before being routed to stream segments and "transported" downstream using the LSPC sediment transport processes. To calibrate and validate suspended sediment transport, modeled results were compared to suspended sediment concentration and discharge data measured at the United States Geological Survey (USGS) gaging station on Guadalupe River at Highway 101 (USGS Station 11169025).[4]

PCBs and Mercury Loading

Land-used based runoff concentrations from the RWSM (Wu et. al. 2017, Table 2-2) were used in combination with the HRU-based LSPC hydrology model to estimate baseline PCBs and mercury loads for San Mateo County. This method is consistent with the Bay Area RAA Guidance Document (BASMAA 2017c).

Table 2-2. Average runoff concentrations for PCBs and mercury land use categories as established through the RWSM and used for modeling pollutant loads to the Bay from stormwater runoff.[a]

Land Use Category	PCBs (ng/L)	Mercury (ng/L)
Agriculture/Open	0.2	80.0
New (post-1980) Urban	0.2	3.0
Old (pre-1980) Industrial/Source Areas	204.0	40.0
Old (pre-1980) Urban - Other	40.0	63.0
Old (pre-1980) Urban – Residential	4.0	63.0

[a]Land use based PCBs and mercury concentration data modeled by the RWSM (Wu et. al. 2017).

2.1.4 Modeled Baseline Loads

The RAA quantitatively demonstrates that implementation of hypothetical control measure programs would achieve the PCBs and mercury TMDL WLAs for stormwater runoff. The first step in preparation of an RAA is to establish the baseline loads of PCBs and mercury in stormwater runoff to the Bay. Baseline load estimates are used to determine the load reductions that are needed to achieve TMDL WLAs. The difference between the baseline loads and the TMDL WLA is the load reduction target, or the amount of load reduction that must be achieved to attain the TMDL WLAs. This section presents the modeled

[4] Long-term suspended sediment monitoring datasets were not available for San Mateo County watersheds. Therefore, the model was configured for the Guadalupe River watershed to enable calibration of modeling parameters that were applied to San Mateo County watersheds.

baseline loads for PCBs and mercury in stormwater runoff from San Mateo County watersheds draining to the Bay, and the associated load reduction targets that need to be achieved.

The Phase I RAA model estimated a total baseline annual PCBs load of 1.7 kg/yr from stormwater runoff in San Mateo County watersheds draining to the Bay (Table 2-3). Of this PCBs load, approximately 1.3 kg/yr (76.5%) is associated with the land areas within San Mateo County that are under the jurisdiction of San Mateo County MRP Permittees. The remaining 0.4 kg/yr (23.5%) is associated with stormwater runoff from land areas associated with other entities that are currently or expected to be subject to NPDES permits and/or Waste Discharge Requirements (WDRs) issued by the Regional or State Water Boards. These entities include the California Department of Transportation (Caltrans) and facilities subject to individual NPDES permits (e.g., the San Francisco International Airport) or the State of California's Industrial General Permit (IGP). These areas are generally considered outside the jurisdiction of San Mateo County Permittees. Although stormwater runoff pollutant control measures implemented by Permittees may address a portion of any PCBs and mercury in stormwater runoff discharged from these areas, the property owners/operators themselves are ultimately responsible for pollutants from these areas.

The Phase I RAA model also estimated a baseline annual mercury load of 2.4 kg/yr from stormwater runoff in San Mateo County watersheds draining to the Bay (Table 2-3). Of this mercury load, approximately 1.6 kg/yr is associated with the land areas within San Mateo County that are associated with MRP Permittees. The remaining 0.7 kg/yr is associated with stormwater runoff from open space or covered by separate NPDES permits.

Table 2-3. Summary of modeled baseline annual PCBs and mercury loading from Phase I RAA model (Appendix A) by entity.

Entity/Area	PCBs (kg/yr)	Mercury (kg/yr)
San Mateo County MRP Permittees	**1.3**	**1.63**
Other NPDES Permitted and Open Space	**0.4**	**0.73**
Open Space	0.001	0.56
Caltrans NPDES	0.08	0.08
Individual NPDES Permittees	0.225	0.07
Industrial General Permittees	0.09	0.02
Total	**1.7**	**2.4**

Figure 2-1 shows the proportion of the baseline PCBs stormwater runoff load associated with each land use category presented in Section 2.1.3 and Table 2-1. Roughly 95% of the load is associated with two land use categories – Old (pre-1980) Industrial and Old (pre-1980) Urban – Other (the latter includes older commercial and transportation land uses). This suggests that PCBs are found mostly and widely distributed in non-residential older urban areas.

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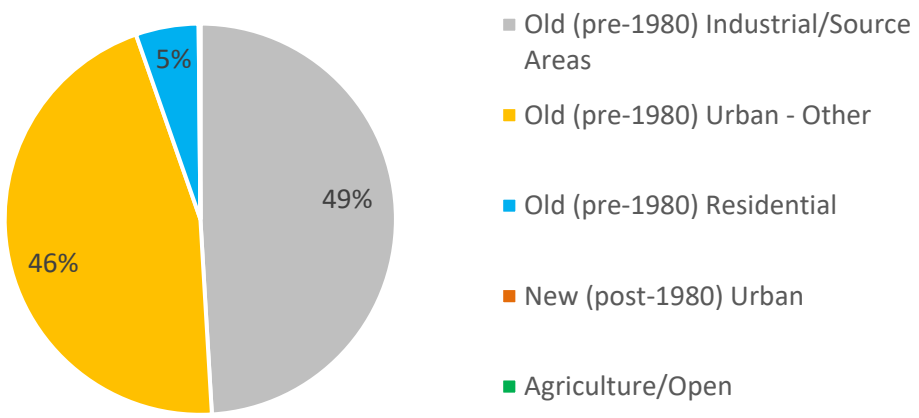

Figure 2-1. Proportion of San Mateo County PCBs and mercury baseline load associated with each land use category established through the RWSM and used for modeling pollutant loads to the Bay from stormwater runoff.

2.1.5 PCBs and Mercury Load Reduction Targets

Mercury and PCBs load reduction targets were developed by comparing the modeled baseline loads for San Mateo County to the County's WLAs established by the TMDLs (SFBRWQCB 2006, 2008). The WLAs and the calculated load reduction targets for PCBs and mercury are listed in Table 2-4. These load reduction targets form the goals for control measure implementation described in Section 3.

The calculated target for reduction of PCBs in stormwater runoff discharged from San Mateo County to the Bay is 1.5 kg/yr. For mercury, the modeled baseline load for San Mateo County is less than the mercury WLA established through the mercury TMDL, suggesting that the mercury WLA for stormwater in San Mateo County has already been achieved. That said, there is uncertainty in mercury baseline loads due to a relatively low level of confidence in the average stormwater runoff mercury concentrations developed via the RWSM (Wu et. al. 2017). Until more data are available, SMCWPPP and San Mateo County Permittees will continue to assume that control measures implemented to address PCBs in stormwater runoff are also sufficient to address mercury.

Table 2-4. PCB and Mercury Load Reduction Targets for San Mateo County.

	PCBs (kg/yr)	Mercury (kg/yr)
A. Baseline Load for San Mateo County (2002)	1.7	2.4
B. TMDL Waste Load Allocation	0.2	8.4
C. Load Reduction Target (A – B)	**1.5**	**NA**

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3 CONTROL MEASURE IMPLEMENTATION

This section describes existing and potential future control measures that would achieve San Mateo County PCBs and mercury TMDL WLAs. Estimated PCBs and mercury load reductions achieved to-date and associated with the implementation of future potential source controls and GI by San Mateo County Permittees (or other permitted entities with land areas contributing PCBs to stormwater runoff in San Mateo County such as Caltrans) are included. The evaluation includes implementation scenarios for achieving the PCBs TMDL WLA based on three different timelines (through 2030, 2040, and 2080). Methods used to quantify load reductions for GI and source controls are described in detail in Appendix B and Appendix C, respectively.

Future actions that are assumed to be implemented by other entities are included in this Control Measures Plan because (as described in both the PCBs and mercury TMDLs) baseline loads and TMDL WLAs implicitly include loads and required load reductions from all permitted and non-permitted stormwater dischargers in the geographic area covered by the TMDL. Some, but not all, entities discharging stormwater in San Mateo County currently have NPDES permits or WDRs. Permits and WDRs other than the MRP, however, may not currently include specific PCBs and/or mercury control measure implementation requirements. Because land areas managed by these permitted and unpermitted entities contribute significant loads of PCBs to the Bay (see Section 2), load reductions in stormwater runoff associated with land areas owned, managed or impacted by these entities will be necessary to achieve the PCBs TMDL WLA for San Mateo County in an equitable manner. As such, these other entities that should participate in the implementation of PCBs control measures in San Mateo County are important partners in implementing the PCBs TMDL. Therefore, additional regulatory actions will likely be needed from the State and Regional Water Boards to mandate specific load reductions from all relevant entities in the County.

As described in Section 2, the baseline load for mercury appears to be lower than the TMDL WLA for San Mateo County. Therefore, control measures described in this section primarily focus on PCBs. To achieve the PCBs TMDL WLA, the overall target for reduction in the load of PCBs in stormwater runoff discharged from San Mateo County to the Bay is 1.5 kg/yr (Table 2-4). Estimated load reductions for each type of control measure and progress towards this overall PCBs load reduction goal are described below. The levels of control measure implementation described in this section are consistent with recent discussions with Regional Water Board staff regarding future MRP requirements.

3.1 Control Measure Categories and Overall Implementation Approach

As described in Section 1 and illustrated in Figure 2-1, PCBs are legacy pollutants that are largely associated with older (pre-1980) non-residential urban areas. Control measures that reduce PCBs in urban stormwater runoff that San Mateo County MRP Permittees have implemented to-date and plan to continue implementing can be organized into the following broad categories:

1) **Source Identification** - Identify PCBs sources (e.g., oil-filled electrical equipment) and source areas (e.g., historically contaminated old industrial properties) that release PCBs to urban stormwater runoff;
2) **Source Controls** - Implement source control measures focused on addressing PCBs from high priority sources (e.g., demolition of certain buildings) and source areas to prevent the release of PCBs to urban stormwater runoff;

07767
7808

3) **Treatment Controls** - Implement stormwater treatment controls (e.g., trash full capture systems). Track and account for the PCBs load reductions associated with the implementation of these measures and other treatment measures implemented as a result of new and redevelopment requirements in MRP Provision C.3; and

4) **GI Projects in the Public Right-of-Way (ROW)** - Where appropriate and cost-effective, use public resources to implement GI projects (i.e., regional stormwater capture, green streets) that generally have multiple benefits including addressing PCBs that are more widely distributed throughout the urban environment at relatively moderate levels and other pollutants.

Following this strategy, San Mateo County Permittees have made substantial progress to-date in reducing PCBs (and mercury) in stormwater runoff. The approach is consistent with the findings of the *Clean Watersheds for a Clean Bay* project (BASMAA 2017b), which was funded by the USEPA and MRP Permittees and documented the costs and benefits of implementing several different types of PCBs control measures.

3.2 Control Measure Implementation Overview

The remainder of Section 3 describes the suite of control measures included in each of this Control Measure Plan's three scenarios. The scenarios present actions for achieving the TMDL target by reducing the PCBs load in stormwater runoff from San Mateo County by 1.5 kg/yr by 2030, 2040, or 2080. Existing and planned PCBs source control measures, including non-GI treatment controls, are described in Section 3.3. Included are source control actions that will be implemented by San Mateo County Permittees and other entities that directly manage PCBs sources or source areas. It is important to note that San Mateo County Permittees do not have the authority to require implementation of control measures by these entities. PCBs load reduction estimates are included for each source control, along with a summary of the method used to quantify the load reduction (the methods are described in detail in Appendix C).

Section 3.4 describes the extent of GI that has been implemented to-date in San Mateo County and the level of GI that is anticipated to be implemented via new and redevelopment requirements in the future. Section 3.4 also includes associated PCBs load reductions via GI that were derived via methods described in the Phase II RAA Report (Appendix B).

Section 3.5 provides a summary of the progress made to-date and the anticipated PCBs load reductions through the implementation of the control measures described in Sections 3.3 and 3.4. For each of the three implementation scenarios, Section 4 discusses the economic and technical feasibility of implementing sufficient additional GI projects in the public ROW to achieve the PCBs TMDL WLA. As described in Section 4, source controls, including non-GI treatment controls, are the most cost-effective control measure that Permittees implement to reduce PCBs in urban stormwater runoff.

3.3 Source Controls Including Non-GI Treatment Controls

This section describes each type of source control measure, including non-GI treatment controls, that San Mateo County Permittees currently implement and/or plan to implement in the future to reduce PCBs (and mercury) in San Mateo County stormwater runoff. The extent of implementation and associated load reductions are also provided. The source control programs include the following:

1. Source Area Identification and Abatement
2. Management of PCBs during Building Demolition
3. Management of PCBs in Electrical Utilities
4. Management of PCBs in Roadway and Storm Drain Infrastructure Caulk
5. High Flow Capacity (Large) Trash Full Capture Systems
6. Enhanced Municipal Operation and Maintenance (O&M)
7. Mercury Load Avoidance

These controls may be implemented directly by San Mateo County Permittees and/or by other entities. Future Permittee actions include those included in current Permittee planning efforts and/or expectations about likely requirements in future iterations of the MRP. The estimated load reductions assume each program is fully implemented as described with the maximum load reductions realized.

Accounting methodologies were developed for each source control program to calculate the PCBs and mercury load reductions achieved for a given unit of implementation. The basis for a number of the source control load reduction accounting methodologies is the mercury and PCBs land use pollutant yields derived via the RWSM. As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Yields vary among land uses for a number of reasons, including because land uses differ in their degree of contamination resulting from varying intensities of historic or ongoing use and/or release of pollutants to the environment. Because PCBs were used more heavily in older industrial areas, old industrial land use areas yield a relatively high mass of PCBs per unit area compared to other old urban areas and newer urban land use areas.

The average PCBs and mercury land use-based yields used to calculate load reductions for some source controls presented in this section are provided in Table 3-1 (Wu et. al. 2017). Details on the derivation of the yields are provided in Appendix C. The yield values presented in Table 3-1 were developed using the best readily available data and technical approach at this time. Permittees may re-evaluate these yields in the future as more information becomes available.

Table 3-1. Average PCBs and mercury land use yields established through the RWSM.[a]

Land Use Category	PCBs Yield (mg/ac-yr)[b]	Mercury Yield (mg/ac-yr)
Source Property	5,031	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

[a]Source: Wu et. al. (2017), RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.

[b]mg/ac-yr – milligrams per acre per year

3.3.1 Source Area Identification and Abatement

Control Measure Description

The Source Area Identification and Abatement control measure focuses on old industrial land use areas or individual properties that contribute relatively high loads of PCBs to MS4s. Identification and subsequent abatement of these properties and/or focused control measure implementation in the public ROW adjacent to these source areas/properties can provide significant PCBs load reductions. Reductions mainly occur through the abatement of these areas/properties via referrals to the Regional Water Board leading to enforcement actions brought against property owners by the Regional Water Board or other regulatory agencies (e.g., USEPA).

To identify PCBs source areas, investigations are typically conducted in areas with historical (pre-1980) industrial land uses (i.e., old industrial land use) or other areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are elevated above urban background levels.[5] The source area investigation process includes the following steps:

1) **Screening to Identify High-Priority Catchments or Areas** (e.g., catchments that have elevated MS4 sediment and/or stormwater concentrations). Screening may involve visual inspections and review of land-use classifications and aerial photography followed up with surface soil/sediment sampling or stormwater sampling in public ROWs or from catchment outfalls.
2) **Targeted Investigation of High-Priority Catchments**. to identify specific source areas and/or individual properties. Targeted investigations generally include records review, public ROW surveys, property inspections, and sampling in public ROW areas and on private properties.

[5] See Appendix C for a statistical summary of urban sediment concentrations.

3) **Confirm source areas or properties**. Sources are confirmed if significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg, a sediment PCBs concentration equal to or greater than 0.5 mg/kg and other lines of evidence, or a particle concentration in stormwater greater than 0.5 mg/kg) are present in soil/sediment or stormwater from a property or adjacent public ROW.
4) **Determine next steps for confirmed source areas or properties**. Once a source area or property is confirmed, the Permittee may take actions to cause the property to be abated or may refer that property to the Regional Water Board to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (O&M) measures in the street or storm drain infrastructure adjacent to the source area during the abatement process, or will implement a stormwater treatment system downstream of the source area to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system.

Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another NPDES permit.

Load Reduction Accounting Method

The amount of PCBs loads (i.e., annual mass or mg/yr) reduced for source property identification and abatement is calculated as the difference between the source property yield of 5,031 mg/ac/yr and the old commercial/old transportation land use yield of 49 mg/acre/yr multiplied by the source property acres. (i.e., 5,031 – 49 mg/ac/yr). This method assumes that upon full abatement of the source property, the PCBs yield for that property will be reduced to the average old commercial/old transportation land use yield. In other words, abatement will reduce the PCBs yield by nearly 5,000 mg/yr for every acre that is abated.

Fifty percent (50%) of this load reduction will be credited to the Permittee for properties that are referred to the Regional Water Board for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The Regional Water Board will notify the Permittee when the abatement process is complete.

If a source property has been abated without referral to the Regional Water Board, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete.

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated mercury yield values for source property, old industrial, old residential, and old commercial/old transportation land use classes.

Estimated Load Reductions

Since about 2012, SMCWPPP and Permittees have identified and referred about 10 acres of source properties to the Regional Water Board for further investigation and abatement (Figure 3-1, Table 3-2). Fifty percent (50%) of the load reduction associated with abatement of these properties is currently reported as credited by San Mateo County Permittees. For all of these properties, the remaining 50% of the load reduction credit will be realized by 2030.

Areas in the City of San Carlos referred to as the Pulgas Creek pump station north and south drainages have been a particular focus for source property investigation work over the past 15 years. These primarily old industrial catchments have the most elevated concentrations of PCBs in MS4 sediment and stormwater runoff samples collected to-date in San Mateo County. Collectively they were designated as a "pilot watershed" for the grant funded Clean Watershed for a Clean Bay (CW4CB) project (CW4CB 2017a). Two potential source properties that have been identified in these drainages to-date are: (1) 977 and 1007/1011 Bransten Road and (2) 1411 Industrial Road. SMCWPPP and the City of San Carlos have referred the 977 and 1007/1011 Bransten Road Bransten Road property to the Regional Water Board and are working with the property owner on next steps at the 1411 Industrial Road property. The property owner is working with Regional Water Board staff and has retained a consultant to investigate potential sources of PCBs associated with the property.

Table 3-2. PCBs load reductions to-date in San Mateo County and potential future load reductions based on planned implementation.

Status of Source Areas	Source Area Identified (acres)	Cumulative PCBs Load Reduction (g/yr)			
		By 2020	By 2030	By 2040	By 2080
Referred by 2020; abated by 2030	10.1	25	50	50	50
Referred by 2030; abated by 2040	4.8	--	12	24	24
Referred by 2040; abated by 2050	5.3	--	--	13	26
Totals	**20.2**	**25**	**62**	**88**	**101**

Prior to WY 2017, PCBs were found in sediments from inlets and manholes in the vicinity of Center, Washington and Varian Streets and Bayport Avenue in the Pulgas Creek pump station south drainage in San Carlos. The PCBs in these samples could have originated from any of about 20 small industrial properties in the area. During WY 2017, seven additional samples were collected in this area. The results suggested that three small properties could be PCBs sources. Two samples collected from the driveways of 1030 Washington Street, a construction business, had elevated PCBs (1.29 and 3.73 mg/kg). A sample from the driveway of 1029 Washington Street was also elevated with a concentration of 5.64 mg/kg. In addition, samples from the driveway of 1030 Varian Street, an unpaved lot used for storage, had an elevated PCBs concentration of 1.84 mg/kg. It should be noted that all of the buildings in this area appear to be of the type and age that may have PCBs in building materials. SMCWPPP plans to collect additional sediment samples in the vicinity of these properties during September 2020.

Another source property identified through SMCWPPP's investigations is located at 270 Industrial Road / 495 Bragato Road in San Carlos. 270 Industrial Road is occupied by the Delta Star facility where transformers are manufactured, including transformers with PCBs historically (from 1961 to 1974). Adjacent to 270 Industrial Road is 495 Bragato Road (Tiegel Manufacturing), a roughly three-acre site that is largely unpaved. PCBs appear to have migrated to this property from the Delta Star property.

In October 2018, SMCWPPP and the City of San Carlos worked together to submit two source property referrals (both in San Carlos) to the Regional Water Board:

- 270 Industrial Road / 495 Bragato Road, San Carlos (Delta Star / Tiegel)
- 977 and 1007/1011 Bransten Road, San Carlos

It should be noted that the PCBs load reduction credited when a source property is referred to the Regional Water Board is directly proportional to the area of the referred property (acres is the unit used in the load reduction calculation). In September 2018, SMCWPPP conducted an analysis of total industrial area and average industrial parcel size among the four most populous counties in the MRP area, based on county assessor parcel data. Table 3-3 and Figure 3-2 show the results (it is important to note that the y-axis of Figure 3-2 is on a log scale). The total industrial acreage and average industrial parcel size are much lower in San Mateo County relative to the other counties, illustrating the challenge for San Mateo County Permittees to achieve PCBs load reductions via source property referrals compared to the other counties. In particular, even though the total population of Contra Costa County is roughly only 50% greater than San Mateo County, the total industrial acreage and average industrial parcel size in Contra Costa County exceeds San Mateo County by roughly a factor of four and six, respectively.

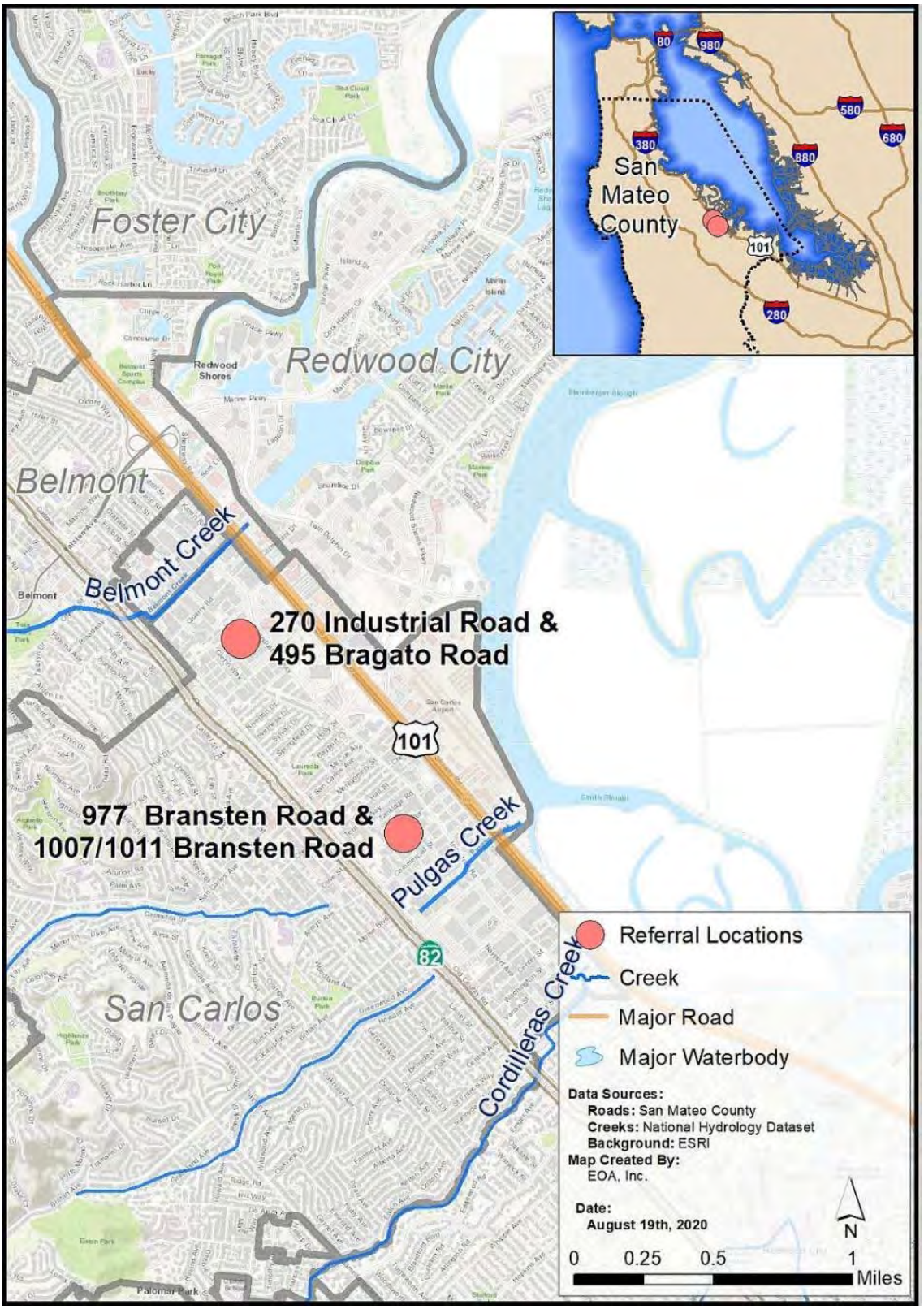

Figure 3-1. Locations of source properties referred to-date to the Regional Water Board for follow-up investigation and abatement.

Table 3-3. Total Industrial Acreage and Average Industrial Parcel Size in Most Populous MRP Counties

	San Mateo County	Alameda County	Contra Costa County	Santa Clara County
Total Industrial Area (acres)	3,043	14,034	12,833	16,039
Average Industrial Parcel Size (acres)	1.25	2.03	7.55	3.00

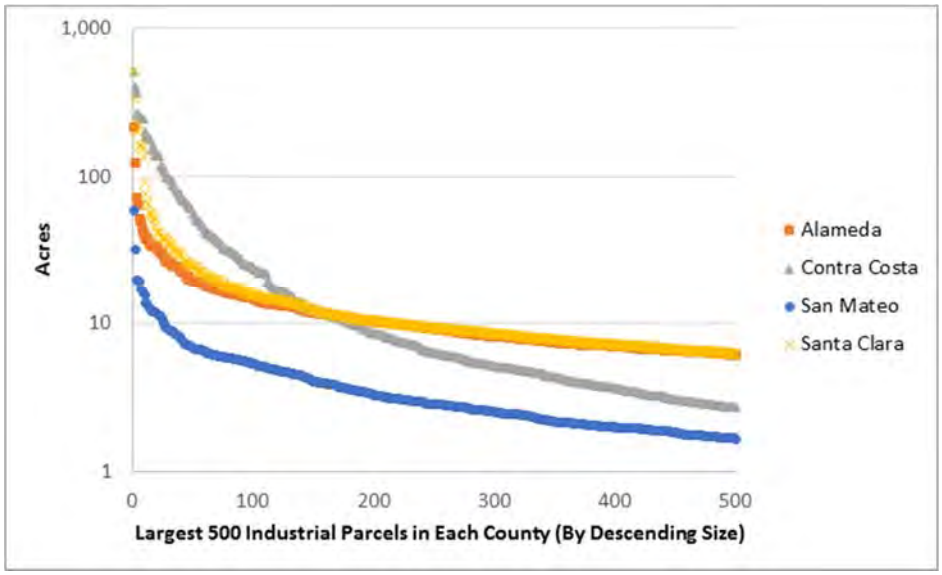

Figure 3-2. Area of 500 Largest Industrial Parcels in Most Populous MRP Counties

San Mateo County Permittees are planning to continue investigating old industrial land-use areas to identify additional source areas. Full implementation of this control measure entails investigation of all remaining old industrial areas that have not yet been investigated, and identification, referral and abatement of any source properties or source areas identified through these investigations. The potential future load reductions based on full implementation of this control measure were estimated using the following assumptions:

- Based on the rate of investigation to-date, SMCWPPP estimates it could take 10 to 20 years to investigate all of the remaining old-industrial areas that have not yet been screened or investigated.
- Assumed rates of source area identification per acre of old industrial land use area investigated were developed to estimate the potential future source area acres identified and abated through this program. The rate of acres of source property identified per acre of old-industrial land-use investigated to date is approximately 2.5%. Acknowledging that the efforts conducted to-date have focused on the most likely candidates for containing source areas, the rate of source area identification may go down in the future. A 1% source area identification rate for 25% of the remaining old industrial area and a 0.5% source area identification rate for the rest of the remaining old industrial area was assumed.

Based on these assumptions, SMCWPPP estimates that an additional 10 acres of source areas will be identified once investigations of the remaining old-industrial areas that have not yet been screened or investigated are complete. This value is equal to acreage that has been identified to-date (Table 3-2). The timing of when the full load reduction credit will be granted depends on when the investigations are completed and when all referrals are submitted to the Regional Water Board. The anticipated cumulative load reduction associated with this control measure by 2030, 2040 and 2080 is presented in Table 3-2. All source properties are assumed to be abated within 10 years of referral.

3.3.2 Management of PCBs during Building Demolition

Control Measure Description

MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition (Figure 3-3). Single-family residential and wood frame structures are exempt.

Figure 3-3. Demolition of a concrete slab building.

San Mateo County Permittees participated in a BASMAA regional project conducted over the past several years that developed regionally consistent model tools and guidance in order to assist Permittees in developing and implementing programs to control PCBs in building materials. All San Mateo County Permittees implemented this new program by July 1, 2019, as required by MRP Provision C.12.f. The programs generally follow the following process:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Load Reduction Accounting Method

Per the MRP 2.0 Fact Sheet, the regional load of PCBs reduced through implementation of the new program to manage PCBs during building demolition is 2 kg/yr beginning in July 2019. This value is based on assumptions about the number of applicable buildings demolished each year, the mass of PCBs per building, the fraction of PCBs that enters the MS4 during demolition without controls, and the fraction of PCBs prevented from entering the MS4 as a result of the program. The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will initially be retained during the MRP 3.0 permit term. As new data are generated by the new management program, the value of this load reduction will be evaluated and potentially revised.

Estimated Load Reductions

The PCBs load reductions due to implementation of the building materials management program beginning in July 2019 are based on a population-based proportion of the 2 kg/yr stipulated by MRP 2.0. This amounts to 247 g/yr of PCBs load reduction in San Mateo County.

3.3.3 PCBs in Electrical Utilities Management

Control Measure Description

PCBs are present in some electrical equipment still in service in San Mateo County and through on-going efforts the equipment and/or PCBs are being replaced. For example, Figure 3-4 shows pole-mounted electrical transformers with PCBs-containing oils that should be replaced. San Mateo County Permittees plan to participate in a PCBs in Electrical Utilities Management Program that will include improved practices and procedures for documenting removal and disposal of PCBs-containing oil-filled electrical equipment (OFEE). As part of this program, Permittee operated electrical utilities plan to document the removal of PCBs-containing OFEE since the start of the TMDL and in the future continue to remove PCBs in OFEE and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that larger regional electrical utility (i.e., Pacific Gas and Electric Company) that is not currently subject to PCBs load reduction requirements will also remove PCBs in OFEE and document these efforts, consistent with methods used by applicable MRP Permittees. Because there are no Permittee-operated electrical utilities in San Mateo County, San Mateo County Permittee actions under this control measure will be limited to documenting anticipated load reductions due to an assumed level of effort implemented by PG&E to remove PCBs-containing OFEE in the County.

Figure 3-4. Pole-mounted electrical transformers with PCBs-containing oils.

Load Reduction Accounting Method

PCBs load reductions documented through implementation of this program will be calculated based on an assumed

equipment removal rate (based on information provided by municipal electrical utilities in the Bay Area on equipment removals since 2002), and an assumed PCBs load to stormwater from electrical utility equipment at the start of the PCBs TMDL. These methods are fully described in the Phase III RAA Report (Appendix C).

Estimated Load Reductions

Electrical utilities in the Bay Area have removed PCBs-containing OFEE from active service since 2002, as documented in the Regional Stressor/Source Identification (SSID) project report that is included as an appendix to the Phase III RAA Report (Appendix C). Removal of PCBs-containing equipment stops any active PCBs releases and prevents future PCBs releases from occurring. Therefore, each piece of PCBs-containing OFEE that is removed from service and disposed of property represents an additional mass of PCBs that is prevented from potential future release to the MS4. Based on the equipment removal rates documented in Appendix C, approximately 26 g/yr of PCBs have been prevented from release to the MS4 in San Mateo County through 2020 (Table 3-4). All of these load reductions are assumed to result from PCBs-containing OFEE removal by PG&E.

Electrical utility equipment removals are expected to continue at a similar rate in the future, providing an additional 136 g/yr of potential future load reductions within San Mateo County once all PCBs-containing OFEE have been removed from active service. Equipment removals are expected to occur gradually over time. The resultant estimated load reductions are shown in Table 3-4. Based on current removal rates, all PCBs-containing OFEE will be removed from active service by approximately 2080.

Table 3-4. Estimated PCBs load reductions in San Mateo County via the implementation of the electrical utilities' management program.[1]

Control Measure	Cumulative PCBs Load Reduced (g/yr)			
	By 2020	By 2030	By 2040	By 2080
PCBs-Containing OFEE Removal	26	44	62	136

[1]All PCBs loads reduced in San Mateo County due to the PCBs in Electrical Utilities Management Program are assumed to result from past and future equipment removal activities conducted by PG&E.

3.3.4 PCBs in Roadway and Storm Drain Infrastructure Caulk Management

Control Measure Description

The PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program was developed to reduce the release of PCBs during demolition of bridges and overpasses. For this control measure, Permittees will track the development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges and roadway overpasses during bridge replacement or joint maintenance (Figure 3-5). The new Caltrans standard specification for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to stormwater. Applicable structures include those built between 1950 and 1980 when PCBs-containing joint sealants and caulk were available. As part of this program, Permittees

will maintain lists of applicable bridges and overpasses within their jurisdiction that are scheduled for replacement or joint maintenance, and track and report on the use of the new Caltrans specification. Additional details about the PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program are provided in Appendix C.

Figure 3-5. PCBs-containing black caulk materials on a roadway overpass structure.

Load Reduction Accounting Method

In order to estimate the load reduction that will be realized through implementation of the PCBs in Roadway and Infrastructure Caulk Management Program, Permittees identified the number of applicable bridges and overpasses within their jurisdictions that are expected to undergo replacement or joint maintenance. Estimates were made to quantify the average mass of PCBs potentially contained in these structures, combined with estimates of the ongoing PCBs release rate from bridge joints that would be prevented during replacement or joint maintenance due to implementation of the new Caltrans specification. The load reduction estimate is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual load is also removed. This is based on the assumption that ongoing leaching of PCBs from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

An average annual release rate (i.e., average over the life of the seal) of 0.5% was assumed to calculate the estimated load reduction from removing the joint seal. This average annual release rate was applied to the estimated mass for all bridges in San Mateo County that meet the identified age criteria. These releases would be eliminated through joint or bridge replacement.

Estimated Load Reductions

This control measure program has not yet been implemented in San Mateo County. The potential PCBs load reduction that can be achieved through full implementation of the PCBs in Roadway and Storm Drain Infrastructure Caulk Management Program in San Mateo County is 36 g/yr. This is the total amount of PCBs load reduction that is assumed to be realized once the program has been fully implemented by Permittees and other non-MRP entities, and all applicable structures have been replaced and/or maintained. This load reduction is expected to occur gradually over the next 60 years under the assumption that all older joints will be removed or replaced within 100 years of installation (i.e., by 2080). Table 3-5 identifies the assumed future load reductions to be realized by 2030, 2040, and 2080.

Table 3-5. Estimated PCBs load reductions in San Mateo County via the implementation of the PCBs in roadway and storm drain infrastructure caulk management program post-2020.

Control Measure	Cumulative PCBs Load Reduction (g/yr)		
	By 2030	By 2040	By 2080
Use of Caltrans specification during applicable bridge replacement or joint maintenance	6	12	36

3.3.5 High Flow Capacity (Large) Trash Full Capture Systems

Control Measure Description

This control measure includes the implementation of high flow capacity (large) trash full capture systems, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes (Figure 3-6). These types of systems have been installed in urban areas for the purposes of MRP Provision C.10 compliance. These devices trap all particles retained by a 5 mm mesh screen and have a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm. Large full trash capture devices typically treat large drainage areas (tens to hundreds of acres).

Load Reduction Accounting Method

The load of PCBs or mercury in stormwater that is reduced by High Flow Capacity Trash Full Capture Systems is calculated by multiplying the drainage area treated by the system by the PCBs or mercury yield of the drainage area, and an assumed load reduction efficiency factor for the system. The drainage area PCBs and mercury yields are calculated as an area-weighted yield based on the acres of each land use class within the drainage area. Load reduction efficiency factors for each type of device were developed using the best available data, as reported in detail in Appendix C. For both HDS units and baffle boxes, the assumed load reduction efficiency factor is 20%. For GSRDs, the assumed load reduction efficiency factor is 14%. This methodology indicates that these systems reduce the PCBs and mercury loads from the drainage area by 14% to 20%.

Estimated Load Reductions

A total of 75 High Flow Capacity Trash Full Capture Systems have been installed to-date in San Mateo County. These devices treat about 1,836 acres of land area, including 80

Figure 3-6. Two types of high-capacity trash full capture systems (HDS above, baffle box below).

acres of old industrial and 406 acres of old urban – other (commercial/transportation) land uses (Table 3-6). The land-use classifications of the drainage areas treated by these systems that have been installed since 2002 are shown in Table 3-6, along with the count of each system type and the total PCBs load reductions achieved through 2020. In total, these systems have reduced 7 g/yr of PCBs. For PCBs and mercury control measures planning purposes, no additional High Flow Capacity Trash Full Capture Systems are included in load reduction estimates post-2020; however, additional systems may be implemented to further address trash load reduction requirements.

Table 3-6. Summary of High Flow Capacity (Large) Trash Full Capture Systems in San Mateo County that drain to the Bay and associated load reductions by 2020.

Device Type	Number of Devices	Area Treated (acres)	Area Treated by Land Use (acres)					PCBs Loads Reduced by 2020 (g/yr)
			Old Industrial	Old Urban-Other	Old Urban - Residential	New Urban	Ag/ Open	
Baffle Boxes	1	290	17	58	216	--	--	1.6
GSRD	3	1,521	56	330	1,064	--	71	4.7
HDS	1	25	7	18	--	--	--	0.5
Totals	**5**	**1,836**	**80**	**406**	**1,280**	**0**	**71**	**7**

3.3.6 Enhanced Operations and Maintenance Controls

Control Measure Description

All San Mateo County Permittees conduct routine O&M activities to ensure the proper functioning of their stormwater conveyance systems. Operation and maintenance activities include street sweeping, storm drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are maintained (e.g., desilted) as needed. Through these efforts, sediment and organic material (and associated pollutants) are removed from the stormwater conveyance system. This control measure includes any enhancements to routine O&M and new actions such as storm drain line and street flushing.

Figure 3-7. Operation and maintenance of an inlet-based trash control measure.

Inlet-based (small) trash full capture systems are devices or series of devices that trap all particles retained by a 5 mm mesh screen and have a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area. Inlet-based systems typically treat one acre or less and generally consist of screens or

baskets that are installed in storm drain inlets. These devices may be installed in series to cumulatively treat larger areas. In recent years, many San Mateo County Permittees have increased cleaning frequencies due to additional maintenance requirements for newly installed inlet-based devices (Figure 3-7).

Other types of enhanced O&M are not discussed further in this report because no other enhancements are ongoing in the County and none is currently planned for future implementation on a regular basis. However, if other types of enhanced O&M occur in the future, they will be tracked and load reductions will be calculated per the methods described in Appendix C.

Load Reduction Accounting Method

To account for PCBs and mercury load reductions from enhanced cleaning of inlet-based devices, the area-weighted PCBs or mercury land-use based yield is calculated for the appropriate drainage area and multiplied by an assumed efficiency factor of 18%. This efficiency factor was developed based on available data on sediment removal efficiencies for twice annual cleanout of inlets that have devices. Additional details on the accounting methodology and the data used to develop the efficiency factor is provided in Appendix C.

Estimated Load Reductions

To date, 3,571 inlet-based devices that are treating almost 5,800 acres have been installed within San Mateo County. Enhanced cleaning combined with the additional sediment removal associated with these devices is currently providing 76 g/yr of PCBs load reductions (Table 3-7).

Table 3-7. Summary of enhanced operations and maintenance program implementation in San Mateo County and associated load reductions by 2020 and 2030.

Status	Number of Devices	Total Acres Treated	Area Treated by Land Use (acres)					PCBs Loads Reduced (g/yr)
			Old Industrial	Old Urban-Other	Old Urban - Residential	New Urban	Ag/ Open	
Existing (2020)	2,247	5,754	1,299	1,656	2,481	38	278	76

3.3.7 Mercury Load Avoidance and Reduction Program

Control Measure Description

Mercury load avoidance and reduction includes a number of true source control measures listed in the California Mercury Reduction Act which was adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and requirements for mercury-containing device recycling (Figure 3-8). The following source control bans are included:

- Sale of cars that have light switches containing mercury;

- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamp manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED bulbs.

Figure 3-8. Fluorescent lightbulbs recycled via the countywide Household Hazardous Waste (HHW) Program.

Mercury device recycling programs resulting in mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

Load Reduction Accounting Method

To account for the current level of load reduction achieved through recycling of mercury-containing lamps, switches and thermostats, data collected by the San Mateo County Environmental Health HHW Program are compiled annually. These data provide the total mass of mercury that is collected through the program each year. To estimate the load avoided by collection and proper recycling, it is assumed that 4.8% of the mercury contained in these devices would have been transported to the Bay via urban stormwater if improperly discarded. Appendix C provides additional details on the methodology and data inputs used to calculate the mercury load avoided due to the HHW recycling program.

Estimated Loads Avoided

Based on the annual average mass of mercury collected by the San Mateo HHW program during recent years, the total annual load of mercury avoided is estimated to be about 50 g/yr. The mass of mercury recycled each year is expected to decrease over time as less mercury is used in household products.

3.4 Green Infrastructure

This section provides an overview of the different types of GI projects that remove pollutants in stormwater runoff from San Mateo County watersheds draining to the Bay, and documents the magnitude and extent of implementation and the associated load reductions achieved to date (2002 to 2020). GI implementation projected to occur in the future as a result of MRP Provision C.3 new and redevelopment requirements and associated load reductions over time are also summarized.

The construction of GI facilities in San Mateo County has and will continue to provide significant benefits to stormwater quality and support reductions of PCBs and mercury loads to the Bay. GI facilities include infrastructure that uses vegetation, soils, and natural processes to improve water quality.

There are three main categories of GI facilities, which are largely based on their location and extent of upstream catchment area:

1. **Parcel-based New and Redevelopment Projects**. These projects include Low Impact Development (LID) treatment measures that are designed to capture/treat runoff generated on a parcel. LID measures are implemented during development or re-development of a parcel and are currently required by the MRP for any project creating or replacing greater than 10,000 square feet[6] of impervious area. These projects can be located on either publicly- or privately-owned parcels.
2. **Green Street Projects in the Public ROW**. These projects include GI facilities that are located along or within a street or public ROW. They are typically designed to capture and treat runoff from the street and possibly portions of adjacent parcels.
3. **Regional Stormwater Capture Projects**. These projects include GI measures that capture runoff from off-site areas. Typically located on publicly owned lands, development and implementation of regional stormwater capture projects may involve collaboration among multiple municipalities and/or public agencies to construct large facilities that capture and treat stormwater from large drainage areas. Collaboration among multiple jurisdictions may allow for larger projects with greater economies of scale, specifically cost-sharing opportunities and greater flood control and pollutant reduction capacity.

The most common types of GI facilities that are constructed in urban areas include bioretention, tree well filters, pervious pavement, infiltration facilities, green roofs, and rainwater harvesting and use facilities.

3.4.1 Existing GI Projects

As described in previous Control Measure Plans submitted during MRP 2.0 and Section 5, numerous GI facilities treating thousands of acres of land in San Mateo County have been implemented on public and private properties as a result of new and redevelopment stormwater requirements in MRP Provision C.3 (C.3 requirements). Permittees have little control over the pace and extent to which private redevelopment occurs, however, as redevelopment projects are permitted, Permittees ensure that stormwater treatment controls are incorporated into those projects per C.3 requirements. Permittees currently track the installation of these projects to ensure proper maintenance and operation and to demonstrate pollutant load reductions and will continue to do so in the future.

Figure 3-9. Hillside Boulevard green street project, Colma, CA.

In addition to parcel-based new and redevelopment GI projects, a number of other GI facilities have been implemented by San Mateo County Permittees on public property or within the public ROW (Figure 3-9). Similar to GI facilities on

[6] Per MRP Provision C.3 requirements.

private property, Permittees currently track the installation of public GI facilities to ensure proper operation and maintenance, and to assist with demonstrating pollutant load reductions.

The Phase II RAA model (Appendix B) estimates the PCBs and mercury load reductions that have been achieved since the start of the TMDLs (i.e. between 2002 and 2020) due to all existing GI projects in San Mateo County.

3.4.2 Projected Future GI Associated with New and Redevelopment

Based on projected levels of redevelopment in San Mateo County, SMCWPPP anticipates that the number of parcel-based GI facilities will continue to grow in San Mateo County in future decades. The load reduction predicted for San Mateo County by 2030 and by 2040 through future parcel-based new and redevelopment projects is based on an analysis of projected development rates across the county that is described in Appendix B. The average rate of redevelopment from 2020-2040 was used to estimate future PCBs load reductions through 2080 as a result of GI implementation (Table 3-8).

Table 3-8. PCBs loads reduced due to GI implementation to-date and projected future GI implementation associated with new and redevelopment in San Mateo County.[1]

Pollutant	GI Type	Cumulative Load Reduction (g/yr)			
		By 2020	By 2030	By 2040	By 2080
PCBs	Existing GI Projects (includes both public and private projects)	65	65	65	65
	Anticipated Future Parcel-based GI via New and Redevelopment Projects (includes both public and private projects)	--	40	69	208

[1] Load reductions due to anticipated future parcel-based GI facilities occurring via new and redevelopment projects are based on projected development rates San Mateo County described in Appendix B.

3.5 Summary of PCBs Load Reductions via Existing and Planned Control Measures

As presented in this section under each control measure, San Mateo County Permittees have made substantial progress in reducing the loads of PCBs and mercury in stormwater since the TMDLs were established in the early 2000s. Table 3-9 summarizes all PCBs load reductions achieved to-date (through 2020) and the load reductions anticipated to occur over time as a result of future GI and source control measure implementation documented in Sections 3.3 and 3.4. Load reductions associated with future GI (i.e., beyond 2020) in the public ROW (e.g., green streets and regional stormwater capture projects) are not included in Table 3-9. Through the implementation of source control programs and GI, about 30% of the load reduction needed to achieve PCBs TMDL WLA for San Mateo County stormwater has been achieved to-date. For mercury, the modeled baseline load in San Mateo County is less than the TMDL WLA, suggesting that the WLA for mercury has been achieved, though there are uncertainties around this conclusion. GI and many of the source controls documented in Sections 3.3 and 3.4 and those discussed later in Section 4 have (or will have) further mercury load benefits.

Permittees anticipate continuing and expanding the implementation of mercury and PCBs controls measures over time, consistent with requirements included in future iterations of the MRP. These Permittee actions, in concert with actions taken by other entities in San Mateo County, are anticipated to address a portion of the PCBs load reduction target of 1.5 kg/yr. Based on load reductions anticipated to occur over time, a load reduction gap will likely remain for the 2030, 2040, and 2080 implementation timelines, once existing and planned control measure are accounted for. These predicted load reduction gaps are further described in Section 4 along with the technical and economic feasibility of three control measure implementation scenarios designed to address these gaps.

Table 3-9. Summary of existing (2002-2020) and projected future PCBs load reductions as a result of stormwater control measure implementation (excluding future GI in the public ROW) in San Mateo County over three implementation timeframes (through 2030, 2040 and 2080).

Control Measure		Estimated PCBs Load Reduction (g/yr)			
		By 2020	By 2030	By 2040	By 2080
Source Area Identification, Referral, and Abatement		25	62	88	101
PCBs Management during Building Demolition		247	247	247	247
High Flow Capacity (Large) Trash Capture Systems		7	7	7	7
Enhanced O& M - Enhanced Cleaning of Inlet-based Trash Full Capture Systems		76	76	76	76
PCBs in Electrical Utilities Management		26	44	62	136
PCBs in Roadway and Storm Drain Infrastructure Caulk Management		--	6	12	36
Green Stormwater Infrastructure (GI)[1]	Existing Projects (public and private)	65	65	65	65
	Future Parcel-based GI via New and Redevelopment (public and private)	--	40	69	208
Totals		**447**	**548**	**625**	**875**
Load Reduction Needed to Achieve TMDL WLA		***1,500***			
Percent of Load Reduction Needed to Achieve TMDL WLA		**30%**	**37%**	**42%**	**58%**

[1]Load reductions associated with future anticipated GI (i.e., beyond 2020) in the public ROW (i.e., numerous green streets and regional stormwater capture projects currently under various stages of planning or development, see Section 6.2) are not included in this table.

4 ECONOMIC AND TECHNICAL FEASIBILITY OF ACHIEVING THE PCBs TMDL LOAD REDUCTION TARGET

This section evaluates the economic and technical feasibility of attaining the PCBs TMDL load reduction target for San Mateo County (i.e., 1.5 kg/yr), including the load reduction gap anticipated to occur after the existing and projected control measures in Section 3 are implemented (Table 4-1). Three control measure implementation scenario timelines (i.e., 2030, 2040 and 2080) are evaluated. Including three implementation scenarios, rather than just the current PCBs TMDL timeline (i.e., achieve PCBs TMDL WLA by 2030), allowed for a consideration of a range of implementation timeframes. In addition, including the 2080 scenario allowed for a better evaluation of certain source controls that are mainly implemented by entities other than San Mateo County Permittees: (1) Management of PCBs in Electrical Utilities, and (2) Management of PCBs in Roadway and Storm Drain Infrastructure Caulk. These measures are outside of Permittees' control and their timelines for implementation are anticipated to occur beyond the current TMDL target date. It is anticipated that complete implementation of these measures will take many decades, as detailed Appendix C. All PCBs-containing OFEE will be removed from active service and PCBs caulks will be removed from bridges/overpasses infrastructure by approximately 2080. Thus, the approximate date by which these source controls will achieve their maximum load reduction potential is 2080 and this timeline was included in an implementation scenario.

Table 4-1. Summary of existing (2002-2020) and future estimated PCBs load reductions as a result of stormwater control measure implementation in San Mateo County and the resulting load reduction gaps for three implementation scenarios timeframes (through 2030, 2040 and 2080).

	Estimated Cumulative PCBs Load Reduction (g/yr)			
	By 2020	By 2030	By 2040	By 2080
Existing and Planned Control Measures	**447**	**548**	**625**	**875**
Load Reduction Needed to Achieve TMDL WLA	***1,500***			
Load Reduction Gap	***1,053***	***952***	***875***	***625***

Each implementation scenario described in this section largely relies on the expanded implementation of GI projects in the public ROW. The economic feasibility of each scenario was evaluated based on a comparison of current and estimated future costs to San Mateo County Permittees to implement sufficient source controls and GI to address the PCBs load reduction gap. Technical feasibility was primarily evaluated based on the feasibility of planning, siting, designing, and constructing sufficient GI projects in the public ROW to bridge the PCBs load reduction gap within the scenario timeframes. Potential environmental impacts associated with this plan and the implementation timelines are also described.

4.1 Potential Additional Load Reductions via GI Projects in the Public ROW

The PCBs load reduction scenarios were developed in part to evaluate the feasibility of filling the load reduction gaps identified in Table 4-1 via public GI projects. The number of additional GI projects are anticipated to increase in the future in San Mateo County as a result of the development of Permittee GI plans under MRP 2.0. Project prioritization will likely be based on a number of factors, which may include PCBs and mercury load reduction potential. Modeling conducted as part of the Phase II RAA for GI (see Appendix B) was utilized to identify the extent of GI projects that would be needed to address the load reduction gaps listed in Table 4-1. The GI model builds on the baseline RAA model summarized in Section 2 and detailed in the Phase I RAA Report (Appendix A) to estimate loads reduced by current and potential future GI and demonstrate the amount of GI needed to achieve MRP 2.0 load reduction targets. The GI load reduction targets under MRP 2.0 and the model and model outputs are summarized below and detailed in the Phase II RAA Report (Appendix B). See Section 6.2 for a summary of C/CAG and San Mateo County Permittee efforts to advance GI projects in the County.

4.1.1 GI Load Reduction Targets in MRP 2.0

MRP 2.0 identifies a regionwide load reduction target via GI of 3.0 kg/yr PCBs by 2040. This represents approximately 20.8% of the total PCBs TMDL stormwater load reduction target of 14.4 kg/yr. The San Mateo County Permittee portion of the GI load reduction goal was calculated to be 0.23 kg/yr (Appendix A). Thus, San Mateo County Permittees have identified the level of GI implementation that would collectively need to be implemented to demonstrate a PCBs load reduction of 0.23 kg/yr by 2040. A GI model was developed to estimate the type and amount of GI projects that would provide this level of PCBs load reduction by 2040, as required by the MRP 2.0 (Appendix B).

4.1.2 GI Model Methods and Outputs

As described in Section 2, the refined baseline model uses LSPC to provide hourly simulation of historical hydrology and pollutant loads for San Mateo County watersheds discharging to the Bay. The GI modeling approach for conducting the RAA builds on the baseline model to quantify the load reductions associated with existing, planned, and potential future GI projects. The RAA model for GI links the baseline model with a GI performance model based on the System for Urban Stormwater Treatment & Analysis Integration (SUSTAIN). SUSTAIN simulates flow and pollutant transport routing through various types of GI projects and includes a cost-benefit optimization model to quantify the implementation costs associated with various types of GI projects (USEPA 2009, Riverson et al. 2014).

GI projects were represented in the model based on the best available information about existing, planned, and potential future GI implementation in San Mateo County at the time of model development (2017-2018). Each type of project included in the model and the source of information for that project type are identified here:

- **Existing Projects.** SMCWPPP compiled a dataset of GI projects that were constructed in San Mateo County between 2002 and 2018 (see Section 5.2). These projects include both public green street projects and GI associated with new/redevelopment projects.
- **Future New and Redevelopment.** SMCWPPP conducted an analysis that projected acres addressed by future new and redevelopment on private parcels in San Mateo County subject to MRP Provision C.3 regulations between 2018 and 2040.

- **Regional Projects.** SMCWPPP's Stormwater Resources Plan (SWRP) (SMCWPPP 2017c) and subsequent planning efforts by SMCWPPP identified five initial opportunities for regional stormwater capture projects in San Mateo County. Conceptual designs were developed for each project, which aided in model setup to represent the stormwater capture and treatment processes unique to each project. All five of these initial regional project opportunities were included in the GI RAA model. Due to various project-specific barriers, some of these projects may be substantially modified or never built. However, as discussed later, SMCWPPP and San Mateo County Permittees are exploring many other opportunities to advance GI in the County, including potential additional regional stormwater capture projects (see Section 5).
- **Green Streets.** The SWRP prioritized green street opportunities in San Mateo County as "Low," "Medium," and "High." Each of these categories of prioritized green street opportunities were included separately in the GI RAA model.
- **Other GI Projects.** This category is a placeholder in case the above projects are inadequate to achieve needed load reductions. This category can include all of the GI project types and other project opportunities that have not yet been identified.

For each project category (e.g., parcel-based, green streets, regional stormwater capture projects), the GI RAA model applied a set of assumptions to evaluate treatment and stormwater management effectiveness. Both parcel-based new and re-development projects (i.e., LID) and green streets were represented in the model as bioretention (with and without underdrains as appropriate). For the five Regional Projects, the modeling assumptions were based on configurations outlined in each project's conceptual design.

The GI RAA model estimated the most cost-effective amount and types of GI that will need to be implemented by 2020, 2030, and 2040 to achieve the MRP 2.0 GI load reduction goal of 0.23 kg/yr by 2040 (Figure 4-1). The model-predicted sediment load reductions were used as a surrogate for PCBs load reductions associated with GI implementation.

The relative amount of GI needed spatially to meet the PCBs load reduction required by 2040 is discussed in the RAA Phase II Report included in Appendix B. That report includes maps for each municipal jurisdiction that shows the capacity of GI needed within each model subwatershed, with corresponding tables that outline the amount of each type of GI needed to cost-effectively meet those capacities.

Additional information on the GI RAA model development and results, including the Permittee specific load reduction targets for the amount and type of GI, are detailed in the Phase II RAA Report (Appendix B).

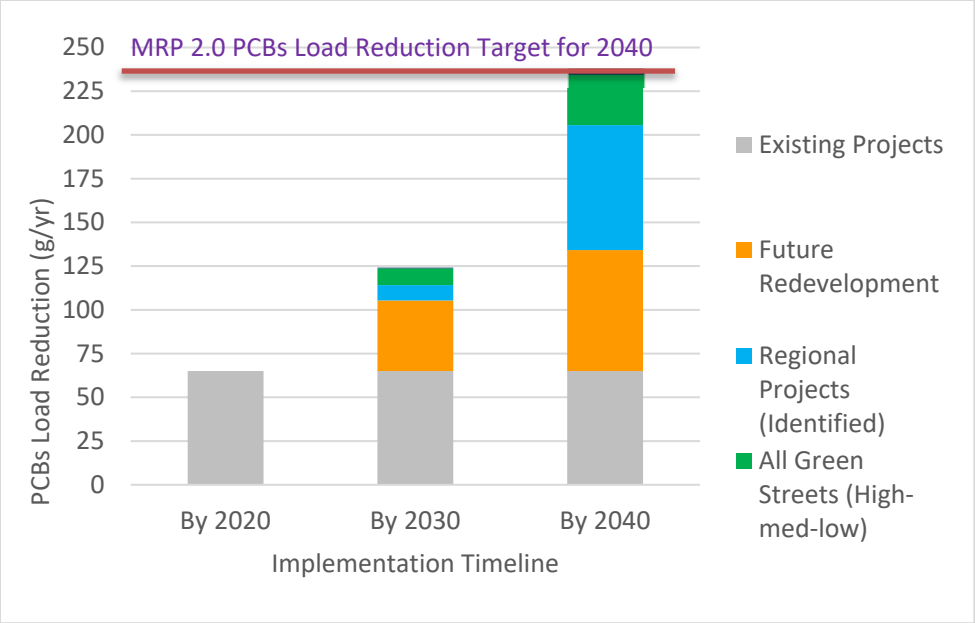

Figure 4-1. Combination of GI project types predicted to address the MRP 2.0 GI load reduction target (0.23 kg/yr) for San Mateo County.

4.2 Implementation Scenarios for Additional Control Measures

The GI RAA modeling described in Section 4.1 was primarily conducted to identify the level of GI implementation that would be needed to achieve the MRP 2.0 GI load reduction target for San Mateo County (i.e., 0.23 kg/yr). The GI modeling was extended beyond the MRP 2.0 target to estimate the extent of additional public GI projects that would be needed to address the load reduction gaps shown in Table 4-1, which would address the overall PCBs load reduction target (i.e., 1.5 kg/yr) within the 2030, 2040 and 2080 implementation timelines. The results of the extended modeling are presented below within the context of three conceptual public GI implementation scenarios. The control measure implementation for the three scenarios and the associated load reductions for each type of control measure are shown in Figure 4-2 and discussed in the following sections.

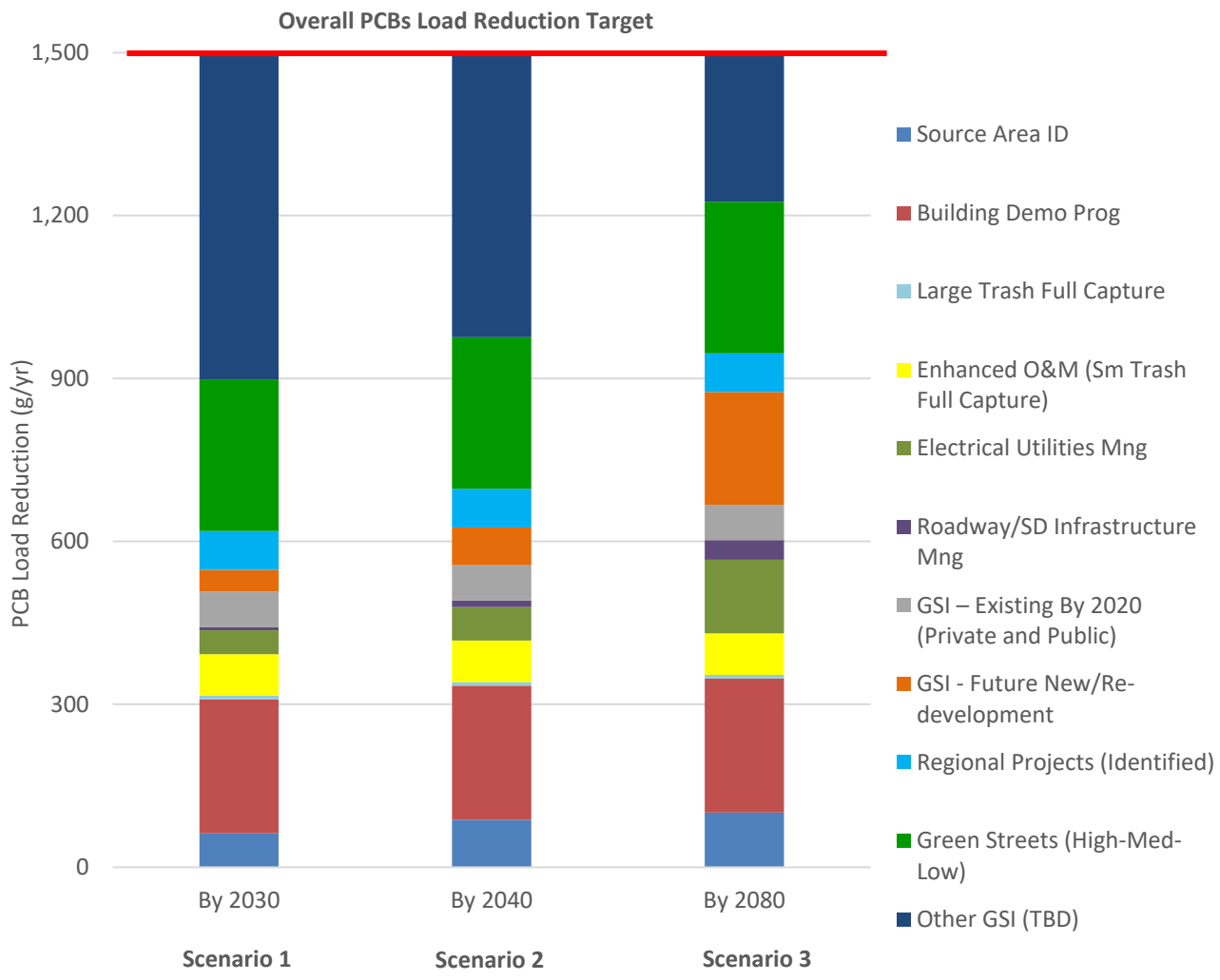

Figure 4-2. Scenarios for combinations of control measures projected to achieve San Mateo County PCBs TMDL load reduction target (i.e., 1.5 kg/yr) by 2030, 2040 and 2080.

4.2.1 Scenario No. 1 – Achieve TMDL Load Reduction Target by 2030

For this implementation scenario (Table 4-4), the PCBs TMDL WLA would conceptually be achieved by 2030 under the following assumptions regarding the implementation of control measures in San Mateo County:

1. All source control measures are implemented, and load reductions are realized as described in Section 3. Only the source controls that are scheduled for implementation by 2030 are included.
2. The construction of GI facilities due to new and redevelopment by 2030 will occur as projected in the Phase II RAA Report (Appendix B) and the load reductions described in Section 3.4, Table 3-8 will be realized.
3. After accounting for all load reductions described in No. 1 and No. 2 above, the remaining load reduction gap will be addressed via public GI projects projected by the GI RAA model.

The control measure implementation for this scenario and the associated load reductions for each type of control measure are presented in Table 3-9. Under this scenario, the total PCBs load reduction achieved by 2030 through source controls that could be implemented within that timeframe, existing GI, and future new and redevelopment, is 0.5 g/yr. The remaining PCBs load reduction gap of 1 kg/yr would need to be addressed by some combination of public green streets and public regional projects that would treat stormwater from 8,341 acres of impervious surface. This level of GI implementation between 2020 and 2030 (10 years) would be roughly 9X the amount of GI implementation that occurred in San Mateo County between 2002 and 2020 (19 years), which was nearly all a result of new/redevelopment.

4.2.2 Scenario No. 2 – Achieve TMDL Load Reduction Target by 2040

For this implementation scenario (Table 4-5), the PCBs TMDL WLA is conceptually achieved by 2040 under the following assumptions regarding the implementation of control measures in San Mateo County:

1. All source control measures are implemented, and load reductions are realized as described in Section 3. Only the source controls that are scheduled for implementation by 2040 are included.
2. The construction of GI facilities due to new and redevelopment by 2040 will occur as projected in the Phase II RAA Report (Appendix B) and the load reductions described in Section 3.4, Table 3-8 will be realized.
3. After accounting for all load reductions described in No. 1 and No. 2 above, the remaining load reduction gap will be addressed via public GI projects estimated by the GI RAA model.

The control measure implementation for this scenario and the associated load reductions for each type of control measure are presented in Table 3-9. Under this scenario, the total PCBs load reduction achieved by 2040 through source controls, existing GI, and future new and redevelopment is 0.6 kg/yr. The remaining PCBs load reduction gap is 0.9 kg/yr. The total amount of public GI that would be needed by 2040 to fill this load reduction gap would involve the treatment of 7,930 acres of impervious surfaces via some combination of public green streets and regional projects. This level of GI implementation that would need to occur between 2020 and 2040 would be roughly 9X the amount of GI implementation

that occurred between 2002 and 2020 in San Mateo County. As in Scenario 1, most of the existing GI is due to LID on private parcels, not GI projects in the public ROW.

4.2.3 Scenario No. 3 – Achieve TMDL Load Reduction Target by 2080

For this implementation scenario (Table 4-6), the PCBs TMDL WLA is achieved by 2080 under the following assumptions regarding the implementation of control measures in San Mateo County:

1. All source control measures are implemented, and load reductions are realized as described in Section 3. Only the source controls that can be implemented by 2080 are included in this scenario.
2. GI due to new and redevelopment by 2080 occurs as projected in the Phase II RAA Report (Appendix B) and load reductions described in Section 3.4, Table 3-7 are realized.
3. After accounting for all load reductions described in No. 1 and No. 2 above, the remaining load reduction gap would be addressed via public GI projects estimated by the GI RAA model (Appendix B), extended through 2080.

The control measure implementation for this scenario and the associated load reductions for each type of control measure are presented in Table 3-9. Under this scenario, the total PCBs load reduction achieved by 2080 through source controls, existing GI, and future new and redevelopment is 0.9 kg/yr. The remaining load reduction gap is 0.6 kg/yr. The total amount of public GI that would be needed by 2080 to address this load reduction gap would involve the treatment of 4,563 acres of impervious surfaces via some combination of public green streets and regional projects. This level of GI implementation that would need to occur between 2020 and 2080 is roughly 5x the amount of GI implementation that occurred between 2002 and 2020 in San Mateo County. As in Scenarios 1 and 2, most of the existing GI is due to LID on private parcels, not public GI projects.

4.2.4 Economic and Technical Feasibility of 2030, 2040 and 2080 Scenarios

The MRP requires that Permittees identify all technically and economically feasible control measures (including GI) to attain the TMDL WLAs for stormwater runoff. The technical and economic feasibility of the three implementation scenarios is discussed below, primarily by evaluating key features of each scenario, including the total acres treated or addressed by different types of control measures, the timeline for control measure implementation, and the costs associated with the projected level of implementation.

Approach to Cost Estimating

Preliminary cost estimates were developed for each of the control measure scenarios presented in Section 4.2.3. The primary data inputs used include unit costs for each type of control measure presented in Table 4-2, which were based on Bay Area-wide regional averages that were developed collaboratively by SMCWPPP and other Bay Area countywide stormwater management programs. These average unit costs were used to estimate the costs for all control measures, with the exception of regional stormwater capture projects identified through SMCWPPP's SWRP. For those regional projects, cost estimates were provided in conceptual plans that were developed as part of the SWRP or via Permittees' GI Plans. Regional stormwater capture project cost assumptions are provided in Table 4-3.

A number of assumptions were applied to the unit and regional project-specific costs for each type of PCBs control measure. First, the capital or initial costs for all GI projects and source controls are calculated as upfront costs in current (2020) dollars. In reality, these projects will be constructed

gradually, over the timeframe specified by each scenario for achievement of the TMDL WLA (i.e., by 2030, 2040 or 2080). Therefore, the total initial/capital costs to construct all GI projects within a given scenario can be divided by the number of years in each scenario's timeframe to provide the rough annual average cost for GI project construction for each scenario. The current (2020) annual cost for the O&M that will be required once all GI projects are fully constructed and operational is also provided for comparison across scenarios. These costs do not account for future inflation or replacement costs for capital projects that have finite lifespans of approximately 20 to 30 years. The average regional unit costs (see Table 4-2) do not necessarily represent the actual costs of implementing PCBs control measures. Finally, these estimates do not include any administrative costs associated with municipal staff time for tracking and reporting control measure implementation and associated load reduction accounting. In summary, the cost estimates provided in this section are preliminary, approximate, and planning level.

Table 4-2. Regional Average Unit Implementation Costs by Control Measure.

Control Measure Category	Control Measure	Unit of Implementation	Estimated Unit Costs[1]				Reference
			Initial/Capital[2]		Annual Ongoing[3]		
			Cost	Unit	Cost	Unit	
Source Area Identification and Referral	Identify and Refer Source Properties	Acres of old industrial land use area investigated	$382	$/acre	NA	NA	BASMAA 2017b
Green Stormwater Infrastructure (GI)	GI - Private/Parcel-based Redevelopment	Acres treated	$153,000	$/acre	$6,120	$ per acre treated per year	Average value for parcel-based (distributed GI) from Geosyntec 2018
	GI - Public ROW Retrofits (Green Streets)	Acres treated	$213,000	$/acre	$8,520	$ per acre treated per year	Geosyntec 2018
	GI - Regional Projects	Acres treated	$101,000	$/acre	$4,040	$ per project per year	Geosyntec 2018
Full Trash Capture (FTC)	FTC Implementation - Large Devices	Acres treated	$4,500	$/acre	$6,000	$ per device per year	CASQA 2020, City of San Mateo 2019, City of Oakland 2018
	FTC Implementation - Small Devices	Acres treated	$1,000	$/acre	$400	$ per device per year	CASQA 2020, City of San Mateo 2019, City of Oakland 2018
Managing PCBs-containing Materials during Building Demolition		Annual cost			$400	$ per application	BASMAA 2018. Costs are likely recovered through permit fees
PCBs in Infrastructure Management Program		Annual cost	Annual costs to municipalities assumed to be negligible compared with other control measure costs.				
Management of PCBs in Electrical Utility Equipment		Annual cost					

[1]The unit costs are rough planning level estimates that do not consider net present worth cost adjustments or other complexities.

[2]Initial costs generally include planning, design, capital, and other initial one-time costs.

[3]Ongoing costs include operation & maintenance and other ongoing costs.

Table 4-3. Estimated regional stormwater capture project costs.

Regional Project Description	Effective Impervious Area (acres)	Estimated Costs[1]		
		Initial/Capital[2]		Annual Ongoing[3]
		$/acre treated	Total Initial	
Orange Memorial Park (Project 1 & 2), South San Francisco CA	2,394	$14,500	$34,712,000	$1,388,480
Holbrook-Palmer Park, Atherton CA[4]	546	$34,069	$18,610,000	$744,400
Twin Pines Park, Belmont CA	8	$96,049	$778,000	$31,120
Caltrans I-280 @ I-380, San Bruno CA	254	$77,121	$19,615,000	$784,600
Red Morton Park (Phase I & II), Redwood City CA	561	$73,312	$41,128,000	$1,645,120

[1]The projects identified in this table are potential projects. The information provided in this table is based on preliminary designs presented in the SWRP (SMCWPPP 2017c). These projects may not have been approved and may not be implemented as described in the SWRP. All project costs are provided in 2020 dollars and do not account for future inflation.

[2]Initial costs include planning level costs for design and construction.

[3]O&M costs were calculated based on 4% of initial costs.

[4]This project concept for a regional project in Atherton was replaced with an alternative regional project in Atherton located at Cartan Field.

Scenario No. 1 – Achievement of Load Reduction Target by 2030

Table 4-4 summarizes the extent of land area in San Mateo County addressed by the combination of control measures and the associated costs for implementation of Scenario No. 1. Of the three conceptual scenarios evaluated, Scenario No. 1 would require the largest expenditure of public resources over the shortest implementation timeframe (10 years). Stormwater runoff from more than 8,000 acres of impervious surfaces would need to be treated via new public GI projects. The initial capital cost associated with this level of new public GI over the next ten years would be approximately $1.14 billion (in 2020 dollars). This equates to roughly $114 million dollars per year over the 10-year timeframe. In addition to capital costs, this level of public GI implementation would also require the additional expenditure of approximately $46 million annually for the ongoing O&M of these GI facilities, once fully implemented.

Planning, siting, designing, and constructing this additional level of GI in the public ROW within this scenario's 10-year timeframe would be technically infeasible. In addition, the initial capital expenditure of an estimated $1.14 billion, or the equivalent of $114 million dollars each year for the next 10 years, along with the projected $46 million annual O&M costs, make this scenario economically infeasible to implement.

Table 4-4. Scenario No. 1 - Estimated SMCWPPP Permittee costs to achieve PCBs TMDL WLA by 2030.[1]

Control Measure	Area[2] (acres)	PCBs Loads Reduced by 2030 (kg/yr)	Cost Estimates			
			Initial/Capital		Annual Ongoing	
			Existing (pre-2020)	Future	Existing (pre-2020)	Future
Source Controls	14,252	0.44	$16 Million	$0.5 Million	$2.3 Million	$2.3 Million
Existing (pre-2020) GI[3]	916	0.03	$7.5 Million		$0.3 Million	$0.3 Million
Anticipated GI via New and Redevelopment[3]	203	0.04				
Additional Public GI[4]	8,341	0.95		$1.14 Billion		$46 Million
TOTAL	**23,712**	**1.5**	**$24 Million**	**$1.14 Billion**	**$2.6 Million**	**$49 Million**

[1]The costs presented are based on average unit costs presented in Tables 4-2 and 4-3 and may not represent actual implementation costs expended by San Mateo County Permittees.

[2]Source controls include all measures projected in Section 3.3 and GI includes actions described in Section 3.4. The area addressed by 1) source area investigations includes the total area of old industrial land use that was investigated; 2) trash full capture area treated includes the entire area that drains to a system; 3) GI projects only includes the impervious area treated.

[3]Costs to San Mateo County Permittees associated with the development or redevelopment of private parcels are assumed to be relatively small and are therefore not included.

[4]Cost estimates include future projected green streets and regional projects in the public ROW.

Scenario No. 2 – Achievement of Load Reduction Target by 2040

Table 4-5 summarizes the extent of land area in San Mateo County addressed by the combination of control measures and the associated costs for implementation of Scenario No. 2., which has a 20-year implementation timeframe. Stormwater runoff from almost 8,000 acres of impervious surfaces would

need to be treated via new public GI projects. The initial capital cost associated with this level of new public GI over the next 20 years would be roughly $1.1 billion (in 2020 dollars). This equates to approximately $55 million dollars per year over the 20-year timeframe. In addition to capital costs, this level of public GI implementation would also require the additional expenditure of approximately $46 million annually for the ongoing O&M of these GI facilities.

Planning, siting, designing, and constructing this additional level of GI in the public ROW within this scenario's 20-year timeframe would be technically infeasible. In addition, the initial capital expenditure of an estimated $1.1 billion, or the equivalent of $55 million dollars each year for the next 20 years, along with the projected $44 million annual O&M costs, make this scenario economically infeasible to implement.

Table 4-5. Scenario No. 2 - Estimated SMCWPPP Permittee costs to achieve PCBs TMDL WLA by 2040.[1]

Control Measure	Area[2] (acres)	PCBs Loads Reduced by 2040 (kg/yr)	Cost Estimates			
			Initial/Capital		Annual Ongoing	
			Existing (pre-2020)	Future	Existing (pre-2020)	Future
Source Controls	14,252	0.49	$16 Million	$0.5 Million	$2.3 Million	$2.3 Million
Existing (pre-2020) GI[3]	916	0.065	$7.5 Million		$0.3 Million	$0.3 Million
Anticipated GI via New and Redevelopment[3]	668	0.07				
Additional Public GI[4]	7,930	0.87		$1.1 Billion		$44 Million
TOTAL	**23,766**	**1.5**	**$24 Million**	**$1.1 Billion**	**$2.6 Million**	**$47 Million**

[1]The costs presented are based on average unit costs presented in Tables 4-2 and 4-3 and may not represent actual implementation costs expended by San Mateo County Permittees.

[2]Source controls include all measures projected in Section 3.3 and GI includes actions described in Section 3.4. The area addressed by 1) source area investigations includes the total area of old industrial land use that was investigated; 2) trash full capture area treated includes the entire area that drains to a system; 3) GI projects only includes the impervious area treated.

[3]Costs to San Mateo County Permittees associated with the development or redevelopment of private parcels are assumed to be relatively small and are therefore not included.

[4]Cost estimates include future projected green streets and regional projects in the public ROW.

Scenario No. 3 – Achievement of Load Reduction Target by 2080

Table 4-6 summarizes the extent of land area in San Mateo County addressed by the combination of control measures and the associated costs for implementation of Scenario No. 3., which has the longest implementation timeframe (60 years) among the scenarios considered. As described previously, including this scenario allowed for a better evaluation of certain source controls that are mainly implemented by entities other than San Mateo County Permittees and are anticipated to achieve their

maximum load reduction potential by roughly 2080: (1) Management of PCBs in Electrical Utilities, and (2) Management of PCBs in Roadway and Storm Drain Infrastructure Caulk.

Stormwater runoff from about 4,600 acres of impervious surfaces would need to be treated via new public GI projects under this scenario. The initial capital cost associated with this level of new public GI over the next 60 years would be roughly $760 million (in 2020 dollars). This equates to approximately $13 million dollars per year over the 60-year timeframe. In addition to capital costs, this level of public GI implementation would also require the additional expenditure of approximately $30 million annually for the ongoing O&M of these GI facilities.

The technical feasibility of planning, siting, designing, and constructing this additional level of GI in the public ROW within this scenario's 60-year timeframe would need further evaluation. However, the initial capital expenditure of an estimated $760 million, or the equivalent of $13 million dollars each year for the next 60 years, along with the projected $30 million annual O&M costs, likely make this scenario economically infeasible to implement. However, additional control measures not currently identified could be developed and implemented over the course of this longer timeframe.

Table 4-6. Scenario No. 3 - Estimated SMCWPPP Permittee costs to achieve PCBs TMDL WLA by 2080.[1]

Control Measure	Area[2] (acres)	PCBs Loads Reduced by 2080 (kg/yr)	Cost Estimates			
			Initial/Capital		Annual Ongoing	
			Existing (pre-2020)	Future	Existing (pre-2020)	Future
Source Controls	14,252	0.60	$16 Million	$0.5 Million	$2.3 Million	$2.3 Million
Existing (pre-2020) GI[3]	916	0.065	$7.5 Million		$0.3 Million	$0.3 Million
Anticipated GI via New and Redevelopment[3]	2,081	0.21				
Additional Public GI[4]	4,563	0.62		$760 Million		$30 Million
TOTAL	**21,812**	**1.5**	**$24 Million**	**$760 Million**	**$2.6 Million**	**$33 Million**

[1]The costs presented are based on average unit costs presented in Tables 4-2 and 4-3 and may not represent actual implementation costs expended by San Mateo County Permittees.

[2]Source controls include all measures projected in Section 3.3 and GI includes actions described in Section 3.4. The area addressed by 1) source area investigations includes the total area of old industrial land use that was investigated; 2) trash full capture area treated includes the entire area that drains to a system; 3) GI projects only includes the impervious area treated.

[3]Costs to San Mateo County Permittees associated with the development or redevelopment of private parcels are assumed to be relatively small and are therefore not included.

[4]Cost estimates include future projected green streets and regional projects in the public ROW.

Comparison of 2030, 2040 and 2080 Implementation Scenarios

Each implementation scenario described in this section would conceptually address the PCBs load reduction gap to achieve the PCBs TMDL WLA for San Mateo County, but would require a substantial increase to current funding levels to support the construction and O&M of public GI in San Mateo County.

Scenario No. 1 has the shortest implementation timeframe (10 years) among the three scenarios, resulting in the largest PCBs load reduction gap (0.95 kg/yr) and highest associated implementation costs. To fill the load reduction gap under Scenario No. 1 with GI projects in the public ROW, more than 8,000 acres of impervious land area would need to be treated, which is more than three orders-of-magnitude greater than the area currently treated by public GI in San Mateo County (about 35 acres). Planning, siting, designing, and constructing this additional level of GI in the public ROW within this scenario's 10-year timeframe would be technically infeasible. In addition, the initial capital expenditure of an estimated $1.14 billion, or the equivalent of $114 million dollars each year for the next ten years, along with the projected $46 million annual O&M costs, make this scenario economically infeasible to implement. In summary, Scenario No. 1 is neither technically nor economically feasible.

Compared with scenario No. 1, scenario No. 2 has a slightly smaller load reduction gap of 0.87 kg/yr due to the additional load reduction achieved via source controls and an additional 10 years of GI implementation through private redevelopment. That said, stormwater runoff from almost 8,000 acres of impervious surfaces would need to be treated via new public GI projects. The initial capital cost associated with this level of new public GI over the next 20 years would be roughly $1.1 billion (in 2020 dollars). This equates to approximately $55 million dollars per year over the 20-year timeframe. In addition to capital costs, this level of public GI implementation would also require the additional expenditure of approximately $46 million annually for the ongoing O&M of these GI facilities. Planning, siting, designing, and constructing this additional level of GI in the public ROW within this scenario's 20-year timeframe would be technically infeasible. In addition, the initial capital expenditure of an estimated $1.1 billion, or the equivalent of $55 million dollars each year for the next 20 years, along with the projected $44 million annual O&M costs, make this scenario economically infeasible to implement.

Scenario No. 3 has the smallest load reduction gap across the three (3) scenarios, at 0.45 kg/yr. The main advantages of this scenario are that (1) all of the source control programs identified in Section 3.3 are expected to reach their full maturity (i.e., maximum load reduction potential) by 2080; (2) 60 years of GI implemented via private redevelopment contributes substantial load reduction; and (3) the extended timeline provides additional time needed to further identify PCB source areas and identify, plan, design and construct multi-beneficial public GI projects that are not only focused on PCBs (and mercury) but provide other environmental benefits as well. Stormwater runoff from about 4,600 acres of impervious surfaces would need to be treated via new public GI projects under this scenario. The initial capital cost associated with this level of new public GI over the next 60 years would be roughly $760 million (in 2020 dollars). This equates to approximately $13 million dollars per year over the 60-year timeframe. In addition to capital costs, this level of public GI implementation would also require the additional expenditure of approximately $30 million annually for the ongoing O&M of these GI facilities. The technical feasibility of planning, siting, designing, and constructing this additional level of GI in the public ROW within this scenario's 60-year timeframe would need further evaluation. However, the initial capital expenditure of an estimated $760 million, or the equivalent of $13 million dollars each year for the next 60 years, along with the projected $30 million annual O&M costs, likely make this scenario economically infeasible to implement.

Projections for a time period that extends so far into the future are inherently highly uncertain. However, the additional decades of time under the 2080 scenario compared to the 2030 and 2040 scenarios could lead to increased overall feasibility. Additional control measures not currently identified could be developed and implemented over the course of this longer timeframe. In addition, the longer period of time potentially aligns better with integrating pollutant control efforts with future efforts to increase San Mateo County's resiliency to climate change and sea level rise. For example, green infrastructure will likely play an important role in these long-term resiliency efforts.

It should also be noted that under any of the three scenarios, there are many other technical barriers to extensive implementation of GI in the urbanized areas of San Mateo County and other parts of the Bay Area, even if the needed funding was available. These include high groundwater levels near the Bay, periodic flooding, conflicts with existing underground utilities, and a lack of physical space to construct GI in some highly urbanized areas. In the future, climate change and associated sea level rise may exacerbate some of these issues.

4.3 Potential Significant Environmental Impacts of Control Measure Implementation

The California Environmental Quality Act (CEQA) establishes requirements and procedures for state and local agency review of the environmental effects of projects proposed within their jurisdictions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of their decisions. The applicable statutes are contained in California Public Resources Code, Sections 21000 - 21189, and Title 14 CCR, Division 6, Chapter 3, Sections 15000 – 15387.

CEQA applies to all California public agencies that carry out or approve projects. CEQA compliance is only required if a lead agency is considering approval of a proposed "project." The distinction between the normal and the specific CEQA meaning of "project" is very important, as it can determine whether an action is subject to CEQA compliance or not. Section 15378 of the State CEQA Guidelines provides the following definition of a project:

- "Project" means the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is any of the following:
    a. An activity directly undertaken by a public agency including but not limited to public works construction and related activities clearing or grading of land, improvement to existing public structures, enactment and amendment of zoning ordinances, and the adoption and amendment of local General Plans or elements thereof pursuant to Government Code Sections 65100-65700.
    b. An activity undertaken by a person which is supported in whole or in part through public agency contacts, grants subsidies, or other forms of assistance from one or more public agencies.
    c. An activity involving the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

CEQA requires the preparation of an Initial Study to determine if a project may result in significant effects on the environment. If there is substantial evidence in the record that supports a fair argument that significant effects may occur, an Environmental Impact Report will be prepared. A Negative Declaration or Mitigated Negative Declaration must be prepared if there is no substantial evidence that

the project may have a significant effect on the environment, or if revisions to the project would avoid or mitigate the effects that would result in no significant effects.

The CEQA Guidelines stipulate that a public agency shall prepare or have prepared a proposed Negative Declaration or Mitigated Negative Declaration for a project subject to CEQA when:

- The initial study shows that there is no substantial evidence, in light of the whole record before the agency, that the project may have a significant effect on the environment, or
- The initial study identifies potentially significant effects, but:
    - Revisions in the project plans or proposals made by, or agreed to by the applicant before a proposed mitigated negative declaration and initial study are released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and
    - There is no substantial evidence, in light of the whole record before the agency, that the project as revised may have a significant effect on the environment.

CEQA requires that reasonable alternatives to implement a proposed project should be considered during the planning process and potential environmental effects should be included in the evaluation of the project. CEQA also requires state and local agencies to disclose and consider the environmental impacts of their actions. It further requires that agencies, when feasible, avoid or reduce the significant environmental impacts of the implementation of their action.

This Control Measure Plan is statutorily exempted under Public Resources Code (California Administrative Code Sec. 15262 et seq.) because it involves feasibility or planning studies for possible future actions that the Permittees have not approved or adopted. Any future projects that are to be constructed as recommended by this plan will either be determined to be exempt from CEQA or an initial study to determine potential environmental impacts will be prepared. In general, this Control Measure Plan has been determined to have no potential to generate significant adverse impacts to the environment, but instead will lessen adverse water quality impacts through reducing loads of PCBs and mercury into the Bay.

5 CONTROL MEASURE TRACKING AND REPORTING

Tracking and reporting on PCBs and mercury control measure implementation in San Mateo County is an important component of demonstrating progress towards the achievement of TMDL WLAs over time. SMCWPPP has developed a tracking and reporting process which is updated and refined at least annually. Annual updates are provided by San Mateo County Permittees on control measures that began or were enhanced starting from 2002 onward (i.e., the baseline year for the mercury and PCBs TMDLs) and are compiled at the countywide level, via spreadsheets. SMCWPPP used this information to geo-locate any GI projects or location-specific controls (e.g., trash full capture systems) and created geographic information system (GIS) files to display the GI projects and/or locations of other control measures on maps. SMCWPPP also used this information to calculate PCBs and mercury load reductions, consistent with the Interim Accounting Methodology for TMDL Loads Reduced, per MRP 2.0 requirements (BASMAA 2017a).

5.1 Previous PCBs and Mercury Control Measures Plans

Beginning with the FY 2016/17 Annual Report and continuing through FY 2018/19, SMCWPPP prepared a PCBs and mercury Control Measures Plan that was submitted each year as an attachment to SMCWPPP's Annual Report (SMCWPPP 2016b, SMCWPPP 2017b, SMCWPPP 2018b, SMCWPPP 2019b). The Control Measures Plans reported information on the extent of implementation throughout the County and the associated PCBs and mercury load reductions achieved to-date during the permit term. The information reported included the extent of current and planned GI facilities and other PCBs and mercury control measures in San Mateo County and the associated load reductions achieved to-date.

5.2 GI Spreadsheet Database

For the purposes of tracking and crediting pollutant load reductions achieved through GI and stormwater treatment, During FY 2015/16, SMCWPPP staff worked with San Mateo County MRP Permittee staff to develop a spreadsheet database of existing and planned public and private GI and stormwater treatment projects in San Mateo County, including GI/LID measures at redevelopment sites and GI installed in the public ROW during infrastructure projects (SMCWPPP 2016b). The database includes existing and planned GI and treatment facilities constructed in 2005 or later since these facilities are assumed to reduce stormwater runoff pollutant loads relative to the PCBs TMDL target. In addition, 2005 was the year that San Mateo County's municipal stormwater permit was amended to include more stringent Provision C. 3 requirements; thus, most new or redevelopment projects constructed in 2005 or later include stormwater treatment.

The types of information in the database of existing and planned public and private GI and stormwater treatment projects in San Mateo County include the following:

- Project name
- Description of GI and stormwater treatment system(s)
- Location - street address or location description and coordinates
- Whether the facility is located on private property or in public ROW
- Area treated by facility (acres)
    - For GI/LID at redevelopment or new developments sites, this is generally assumed to be the project area

  - For Green Street or other retrofits in public ROW, estimated drainage area to facility
- Hydraulic sizing criteria
- Date of construction
  - Existing facilities: date of construction completion (e.g., initial inspection sign-off)
  - Planned facilities: estimated construction completion date

From FY 2016/17 until the present, SMCWPPP staff has worked with municipal staff to update the GI database with available new or revised information.

5.3 Green Infrastructure Story Map

SMCWPPP has developed a web-based Story Map that displays a variety of GI and Sustainable Streets projects located in San Mateo County (www.flowstobay.org/data-resources/maps/green-infrastructure-story-map/). Sustainable Streets are multi-benefit projects designed to improve street conditions for walkability, cycling, urban greening, climate resiliency and water quality. The projects displayed feature green infrastructure in a variety of settings, including streets, building sites and lots. Many are demonstration projects built by Permittees to show progress toward integrating infrastructure enhancements and shifting stormwater infrastructure from "gray" to "green." Included are Safe Routes to School (SRTS) and Green Streets Infrastructure Pilot Projects, which were developed through a pilot program funded by the San Mateo County City/County Association of Governments (C/CAG). These projects help show the cost efficiencies and multiple community benefits of integrating bike and pedestrian improvements with green stormwater infrastructure. Figure 5-1 shows an example screenshot of the story map on the SMCWPPP website.

Figure 5-1. Example screenshot of the Story Map on the SMCWPPP website (www.flowstobay.org/data-resources/maps/green-infrastructure-story-map/).

5.4 San Mateo Countywide Sustainable Streets Master Plan

SMCWPPP is also working with San Mateo County Permittees to develop a more comprehensive mechanism for tracking and mapping existing GI facilities and other stormwater treatment measures in San Mateo County. This work is one task under the San Mateo Countywide Sustainable Streets Master Plan project, which is funded via a Caltrans Adaptation Planning Grant (see Section 6.2 for more details about this project). Overall, this project will provide an implementation-level approach to achieving water quality goals in the MRP and other community benefits associated with green infrastructure. It will include a web-based data management system that is connected to GIS platforms for tracking and mapping the extent of GI and other stormwater treatment implementation in San Mateo County. The GI tracking system will provide a centralized, accessible platform for Permittee staff to efficiently collect, upload, and store data associated with GI and other stormwater treatment facilities, assist with the tracking and mapping of all completed GI projects in San Mateo County, and allow information about GI facilities and other stormwater treatment controls to be publicly available in a more user-friendly manner. The project will also support local GI Plans by providing enhanced detail on green street priorities, higher-resolution drainage mapping, and an updated tracking tool consistent with the requirements in MRP Provision C.3.j.

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6 SUMMARY OF FINDINGS AND ADAPTIVE MANAGEMENT

6.1 Summary of Planned Control Measure Implementation

In compliance with MRP Provisions C.11/12.c. and C.11/12.d., this Control Measures Plan and RAA describes implementation actions and schedules for achieving the PCBs and mercury TMDL WLAs for stormwater runoff in San Mateo County. The control measures described build upon the foundational program of actions that have been implemented by SMCWPPP and San Mateo County Permittees over the past two decades to reduce the impacts of these legacy pollutants on the Bay.

Baseline modeling described in Section 2 and Appendix A indicates that a PCBs load reduction of 1.5 kg/yr in stormwater runoff discharged from San Mateo County to the Bay is needed to achieve the PCBs TMDL WLA. The modeled mercury baseline load for San Mateo County is less than the mercury WLA established through the mercury TMDL, suggesting that the mercury WLA for stormwater in San Mateo County has already been achieved. However, there is uncertainty in mercury baseline loads due to a relatively low level of confidence in the average stormwater runoff mercury concentrations developed via the RWSM.

San Mateo County Permittees are committed to implementing a program of scientifically sound and technically and economically feasible control measures to address PCBs and mercury in San Mateo County stormwater runoff. The source control measures (which mostly focus on PCBs) that San Mateo County Permittees have implemented and/or will continue to implement in the future to address the PCBs and mercury TMDLs include:

- Source Area Identification and Abatement
- Management of PCBs during Building Demolition
- PCBs in Electrical Utilities Management
- PCBs in Roadway and Storm Drain Infrastructure Caulk Management
- High Flow Capacity (Large) Trash Full Capture Systems
- Enhanced Operation and Maintenance Controls
- Mercury Load Avoidance

This set of source controls is consistent with the expectations recently discussed with Regional Water Board staff for source control implementation via the MRP when reissued in 2021. The source controls will be coupled with the implementation of GI via requirements for new/redevelopment projects described in MRP Provision C.3, and the ongoing implementation of each Permittee's GI Plan, which were submitted to the Regional Water Board in 2019 and are intended to guide public GI implementation in San Mateo County over time. Together, source controls and GI have and will continue to significantly reduce the levels of PCBs (and mercury) entering the Bay from stormwater runoff in San Mateo County. Although there is inherent uncertainty in predicting load reductions, the level and pace of progress towards reaching the PCBs load reduction target (i.e., 1.5 kg/yr) as a result of implementing a comprehensive set of source control measures, existing GI (as of 2020), and future GI associated with

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new and redevelopment, was estimated in Section 3.5 (Table 3-9). Load reductions associated with future GI (i.e., beyond 2020) in the public ROW (e.g., green streets and regional stormwater capture projects) are not included. The projected percent of PCBs TMDL WLA achieved is as follows:

- 37% by 2030
- 42% by 2040
- 58% by 2080

Thus, based on the modeling and control measure scenarios described in this Control Measures Plan, additional actions to reduce PCBs will be needed to achieve the WLA. Such actions may include the construction of additional green infrastructure facilities in the public ROW, since alternative additional control measures that are practicable and cost-effective have not been identified at this time. However, planning level cost estimation of the scenarios evaluated (Section 4), reveals that solely relying on green infrastructure facilities in the public ROW to address the remaining load reduction needed to achieve the PCBs WLA by 2030, 2040, or 2080 is neither technically nor economically feasible.

6.2 Advancing Green Infrastructure in San Mateo County

Meeting the PCBs TMDL WLA for San Mateo County will be extremely challenging, as described above. However, San Mateo County Permittees remain committed to the continued identification and implementation of cost-effective GI projects in the public ROW that are focused on achieving multiple benefits, including improving stormwater quality. As demonstrated in the San Mateo County SWRP developed by C/CAG and the GI plans developed by San Mateo County Permittees, C/CAG and the local jurisdictions are working diligently towards “greening” the urban landscape across the County over time. These efforts will supplement the PCBs and mercury load reductions as a result of the implementation of source controls and the construction of GI facilities via MRP Provision C.3 new/redevelopment requirements. The pollutant control measures planning is integrated with ongoing efforts by C/CAG to assist San Mateo County municipalities to obtain grant funding for planning and building public GI projects, and to coordinate and track GI countywide. Such efforts include the SWRP, the San Mateo Countywide Sustainable Streets Master Plan project, the Safe Routes to School / Green Streets Infrastructure Pilot Projects, and several regional stormwater capture projects. In addition, the control measures plan could help inform GI investment planning through the new Flood and Sea Level Rise Resiliency District in San Mateo County. All of these efforts are described further below.

6.2.1 Conceptual Approaches to Broader GI Implementation

Figure 6-1 conceptually illustrates the different approaches C/CAG and San Mateo County MRP Permittees are taking to achieve broader green infrastructure implementation, with an overall goal of reducing the overall implementation and O&M costs to municipalities for public features. The approaches, moving left to right, include 1) shifting from proportional implementation where each Permittee achieves load reductions proportional to its population to a countywide approach under which jurisdictional boundaries are disregarded and the most cost-effective solutions are implemented in optimal locations, 2) building more regional-scale stormwater runoff capture projects in conjunction with the new Flood and Sea Level Rise Resiliency District, 3) requiring that more development projects implement stormwater runoff treatment requirements beyond MRP Provision C.3 mandates, and 4) requiring development projects to build and maintain green infrastructure in the adjacent public ROW, thereby increasing the footprint of treated areas associated with new and redevelopment. Efforts

underway by C/CAG and San Mateo County MRP Permittees to implement each of these approaches are discussed in the following subsections.

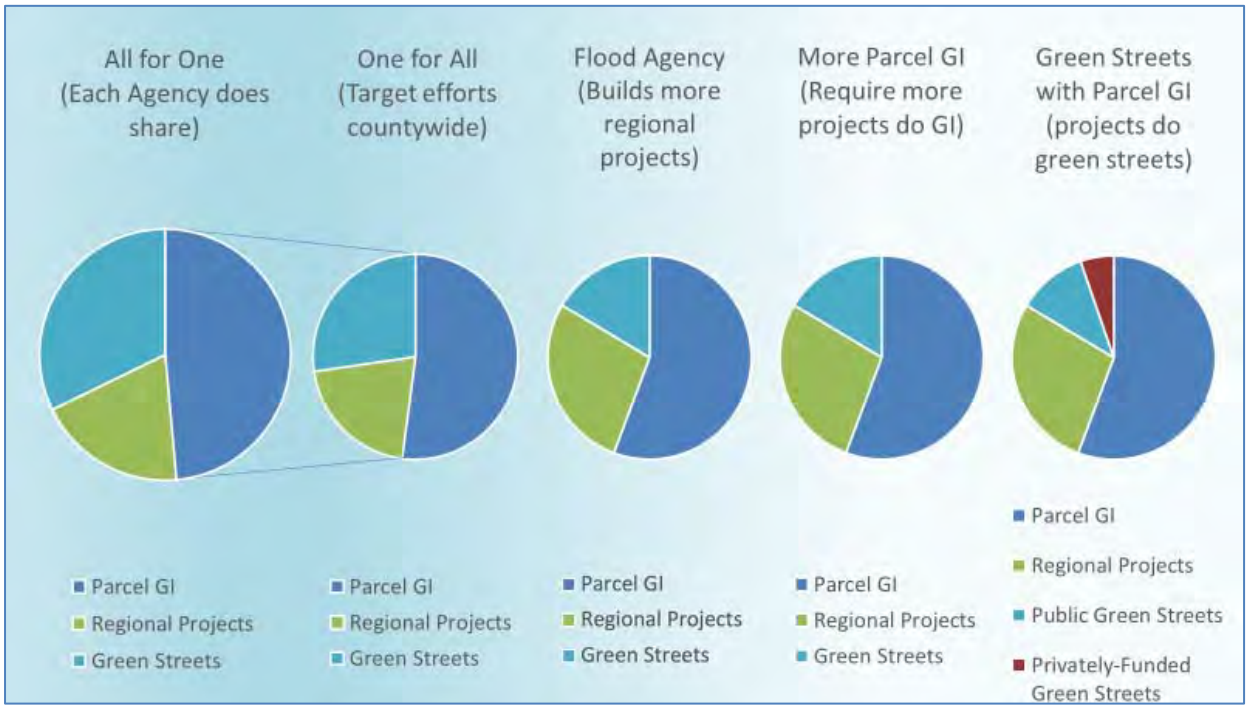

Figure 6-1. Conceptual Approaches to Broader GI Implementation

<u>Jurisdictional vs. Countywide Implementation</u>

C/CAG's RAA modeling was performed at both the jurisdictional and countywide scales to show potential reductions in modeled costs if Permittees were able to work together to implement GI at a countywide scale to meet target pollutant load reductions. The results of the modeling included in the RAA Phase II report (Appendix B) show that such a countywide approach would result in 34% savings in modeled costs (when applying the reduction target to cohesive sediment), resulting from the overall reduction in the amount of GI that would need to be implemented to achieve the PCBs load reductions mandated by 2040 in MRP 2.0. It essentially decreases the size of the total "pie" in Figure 6-1. This is due, in part, to modeled pollutant reduction benefits of regional projects being shared beyond just the upstream jurisdictions, as well as the model being able to select more cost-effective green street opportunities, even if that leads to greater effort in one jurisdiction and less in another. Existing GI projects and projected new/redevelopment GI implementation via Provision C.3 requirements don't change under these scenarios.

To support San Mateo County Permittees in pursuing a countywide implementation approach, C/CAG is collaborating with the Flood and Sea Level Rise Resiliency District to develop a "business case" for countywide collaboration on stormwater management, both for water quality outcomes and resiliency purposes. C/CAG allocated $100K from a $2.94M state budget allocation for advancing regional stormwater management in San Mateo County toward developing supporting materials to help San Mateo County Permittees work collaboratively across jurisdictional lines to achieve more cost-effective

pollutant load reduction. This work will include an evaluation of whether the grant-funded Contra Costa County alternative compliance framework can be brought to San Mateo County, development of model documents such as cost-sharing agreements or Memoranda of Agreement/Understanding, and further quantification of potential benefits of countywide collaboration. This work is scheduled to occur during calendar year 2021.

Building More Regional Projects

C/CAG's RAA modeled five regional-scale stormwater runoff capture projects. Three of the five originally were conceptualized in the countywide SWRP. All five projects have secured some level of funding and are at different stages of progress. Details on each of these projects are provided below:

- **South San Francisco (Orange Memorial Park):** This project will provide water quality improvements to help meet the MRP requirements related to mercury, PCBs, and trash. The project includes an instream diversion and pre-treatment structure (trash screen and sediment removal chamber) in the upper end of the Colma Creek flood control channel within Orange Memorial Park. Pretreated water gravity drains to an underground stormwater reservoir where it is stored until either infiltrating or being further treated for non-potable reuse. When storage capacity is exceeded, treated overflow is discharged back into the channel. The Project would capture and treat approximately 16 percent of the annual drainage from approximately 6,500 acres of land in the City of South San Francisco, Town of Colma, the City of Daly City, and a portion of unincorporated San Mateo County. The project is funded through a $15.5M cooperation implementation agreement with Caltrans to help satisfy its pollutant load reduction and construction is anticipated to begin early 2021.
- **Atherton Project (Menlo College):** The Atherton project, as conceptualized in the SWRP, was to be sited at Holbrook-Palmer Park. However, the Town faced strong public opposition to that location as the one public park in Atherton, leading to the project being moved upstream within the watershed to the athletic fields at Menlo College. Unfortunately, after doing preliminary design and environmental review, the College recently canceled the project due revised financial priorities resulting from the coronavirus pandemic. The project had received $13.5 million in cooperative implementation grant funding from Caltrans for design and construction.
- **Belmont Project (Twin Pines Park):** The Belmont project was originally conceptualized and modeled in the RAA as a small-scale regional facility capturing runoff from a small neighborhood. Since the RAA was completed, the Cities of Belmont and San Carlos and the County of San Mateo, through its Flood Resilience Program, jointly developed a Watershed Management Plan for Belmont Creek. In this plan, the Twin Pines Park project was increased in scale to be comparable to the other regional projects (~20 acre-feet of storage capacity), with an underground storage/infiltration gallery conceptualized beneath the Twin Pines Park parking lot. C/CAG, in conjunction with the California Natural Resources Agency, allocated $913K of a $2.94M State budget allocation to advance regional stormwater projects in San Mateo County to the Belmont project for preliminary design and environmental review. Currently, the project is being combined with a separate $1M grant from the Department of Water Resources to restore Belmont Creek within Twin Pines Park. The project partners, which now include as lead the Flood and Sea Level Rise Resiliency District, are currently finalizing a Request for Proposals for design services to advance both the stormwater runoff capture project and creek restoration.

- **San Bruno Project (I-280/380 Interchange):** Subsequent to the project concepts developed for the SWRP, C/CAG worked with San Mateo County Permittees to develop additional regional project concepts to help reduce the potential green streets burden on cities indicated as needed by the RAA modeling to meet water quality goals. San Bruno had identified the need for retention within the Crestmoor Canyon watershed to address storm drain system capacity deficiencies. Ultimately, C/CAG and the City collaborated to conceptualize an approximately 20-acre-foot regional underground stormwater capture facility on Caltrans property within the large vacant land area within the I-280/380 interchange. Preliminary discussions with Caltrans indicated that the site was a possible location in terms of lack of any conflicting future uses for the property. Similar to the Belmont project, C/CAG worked with the Natural Resources Agency to provide $913K to San Bruno for preliminary design and environmental review for the project. San Bruno participated in a joint Request for Proposals process with C/CAG, Redwood City, and the County of San Mateo and at the time of drafting this report, are finalizing their selection of a design consultant and working with Caltrans to establish the proper project review and oversight process. In addition, the County of San Mateo received a US EPA Water Quality Improvement Fund grant under which $200K is provided to the San Bruno project for preliminary design, for a total of $1.13M between the two funding sources.
- **Redwood City Project (Red Morton Park):** Similar to the San Bruno project, C/CAG worked with Redwood City staff to identify a regional project opportunity to help the City reduce its potential green streets burden identified through the RAA modeling. A two-phase project was conceptualized for Red Morton Park, with underground storage systems proposed beneath two playing fields, with a combined storage capacity of ~43 acre-feet. As with the San Bruno and Belmont projects, C/CAG worked with the Natural Resources Agency to provide $913K to conduct preliminary design and environmental review. Redwood City also participated in the joint Request for Proposals process and is selecting a consultant and negotiating a scope of work at the time this report was drafted. Like San Bruno, the County of San Mateo is providing an additional $200K from its US EPA grant for preliminary design, for a total of $1.13M between the two funding sources.

C/CAG and the County Office of Sustainability are collaborating on a joint regional project planning effort to find additional regional project opportunities and develop five more project concepts. The County is providing $100K from its US EPA grant described above, and C/CAG is matching that with $100K from its State budget allocation administered by the Natural Resources Agency. Also, as part of the joint Request for Proposals process described above, C/CAG and the County are selecting consultants and negotiating a scope of work at the time this report was drafted. In addition to finding opportunities and developing concepts, the project will connect to the collaborative efforts described above with the Flood and Sea Level Rise Resiliency District to develop the business case for countywide collaboration on stormwater management, including looking at further developing alternative compliance and/or credit trading programs that can support Permittee efforts to meet mandatory levels of GI implementation under the MRP, as well as potentially the development community in meeting onsite treatment obligations. This will include evaluating whether additional stormwater management requirements may be needed to help address climate change resiliency needs.

Requiring More Parcel-Based GI

C/CAG and San Mateo County Permittees are also implementing approaches to pursue additional parcel-based GI beyond what is currently required under Provision C.3 of the MRP. The RAA modeling informed member agencies on the potential significant green streets burden needed to meet water quality goals

in MRP 2.0, leading to some agencies requiring additional project categories to be subject to stormwater treatment requirements. It is important to note expanded C.3 treatment requirements have not been modeled by C/CAG, so it is unclear how much additional GI is likely to be implemented as a result. However, jurisdictions that have chosen to require additional project categories be subject to stormwater treatment have not simply reduced the regulated project threshold to 5,000 square feet, as being proposed by Water Board staff for MRP 3.0. For instance, the City of Redwood City is now requiring any new commercial or residential building and substantial commercial remodels to incorporate permanent stormwater controls, regardless of whether they trigger C.3 thresholds. The City of San Mateo is requiring green infrastructure implementation for all projects except single family homes under the 10,000-square foot C.3 threshold.

C/CAG is also implementing efforts to support small-scale parcel-based stormwater management through its ongoing partnership with the Bay Area Water Supply and Conservation Agency (BAWSCA) to provide rain barrel rebates. The program has been in place since 2014 and has resulted in over 1,000 rain barrels installed to-date in San Mateo County. For Fiscal Year 2020/21, C/CAG is piloting increased financial incentives for storage larger than rain barrels (e.g., larger barrels or cisterns), as well as incentives for installing rain gardens as part of BAWSCA's lawn replacement rebate program. To-date, C/CAG has invested $75K in the rebate program.

As part of developing a business case for countywide stormwater management as described above, C/CAG will be investigating whether expanded design standards may be necessary to achieve long-term climate resiliency for precipitation management. While the need for a retention-based standard is unknown with great uncertainty regarding the future need in relation to potential climate impacts, imposition of additional design standards on new and redevelopment for resiliency purposes would likely have increased benefits for water quality. C/CAG will also be evaluating the potential for creating a credit trading marketplace, which may be necessary to allow developers to meet increased retention standards if it becomes less feasible to meet stormwater runoff management standards on site. While there is much that needs to be investigated and discussed at a countywide level with C/CAG member agencies and the Flood and Sea Level Rise Resiliency District, C/CAG is taking the first step by conducting initial evaluations as part of the business case study described above.

Development-Based Green Streets

The final approach shown in Figure 6-1 is to require green street implementation and O&M by developers. This shifts the burden of having to fund costly retrofits and commit to long-term maintenance from local agencies to developers. This approach is more cost-effective in many cases, since developers are often already required to demolish curbs and gutters to build new sidewalks, install street trees or utilities, or to make required Complete Streets improvements. C/CAG is working to support such approaches as part of the Sustainable Streets Master Plan described below, wherein a specific development-based typology of Sustainable Streets was created and model policy documents developed to support member agencies that wish to consider making developers responsible for retrofitting the adjacent public ROW (and potentially making them responsible for long-term operations and maintenance, whether through up front one-time payments to the jurisdiction, or as part of ongoing maintenance of street trees or other public appurtenances installed as part of the development project). Model policy materials included in the forthcoming Sustainable Streets Master Plan include model Sustainable Streets resolutions, visions statements, policies, and development-based conditions of approval. Several C/CAG member agencies have already started requiring development to implement public ROW GI improvements, including Menlo Park, Redwood City, San Mateo, and South San Francisco.

Overall, creation of the Sustainable Streets Master Plan will further support C/CAG member agencies in requiring private development to implement and maintain green street facilities by identifying the priority roadway segments for which Sustainable Streets are prioritized. Identifying the projects in an adopted countywide plan, in conjunction with C/CAG's new Green Infrastructure Design Guide (including typical details and specifications), provide cities with robust tools to advance green and sustainable street projects within their jurisdictions as part of new and redevelopment.

In addition to facilitating approaches whereby green streets are built during private development projects, C/CAG staff has long advocated for integration of transportation and water quality goals as a means of reducing the overall cost of retrofitting roadways to achieve pollutant load reduction. As a demonstration of this, C/CAG funded a $2 million pilot program for 10 San Mateo County Permittees to implement integrated Safe Routes to School / Green Stormwater Infrastructure projects using equal shares of transportation and stormwater funds. To-date, eight of 10 projects have been constructed and can be viewed on the Green Infrastructure Story Map discussed in Section 5.3.

6.2.2 San Mateo Countywide Sustainable Streets Master Plan

C/CAG and San Mateo County Permittees have taken a proactive approach to managing stormwater runoff on streets and roads via green streets, and what are referred to as "Sustainable Streets," which expands the Complete Streets definition to include green stormwater infrastructure. Recognizing the many additional benefits of building green streets, including water quality improvement, reduced urban heat island effects, localized flood mitigation, aesthetic value, and improved safety for bicyclists and pedestrians, C/CAG initiated the San Mateo Countywide Sustainable Streets Master Plan (SSMP) in fall 2019 with funding from a Caltrans Adaptation Planning Grant to identify and prioritize opportunities to integrate green infrastructure with planned and newly identified public ROW projects.

The plan spans the entire county and builds on prior work at the countywide level completed with C/CAG's SWRP, which was the first effort to begin screening and prioritizing opportunities for green infrastructure throughout the county. The SSMP expands on the SWRP primarily by updating and refining the prioritization criteria used in the SWRP and by linking the countywide hydrology and pollutant model for streets and roads and the green infrastructure model (SUSTAIN) outputs to quantify the volume capture and pollutant load reduction benefits from planned and newly identified sustainable streets infrastructure projects. The SSMP also includes a climate change adaptation analysis to model future storm conditions at the county scale and associated changes in predicted stormwater runoff depths as well as the potential benefits of modeled green infrastructure scenarios derived from the green infrastructure RAA. To support future analysis of green infrastructure benefit and planning for sustainable streets that links green stormwater management with bike, pedestrian and streetscape improvements, the project also included a countywide GIS analysis of catch-basin-level drainage areas via updated infrastructure data and new countywide LiDAR data to model flowlines and drainage areas for every catch basin in the county.

The SSMP employs a categorization of sustainable streets typologies based on the type of improvements identified: intersection, linear connectivity, or streetscape improvements. These transportation projects are then prioritized for inclusion of green infrastructure, taking into account a synthesis of performance metrics and co-benefits (such as whether there is a benefit to disadvantaged communities, reduced heat island impacts, ability to manage predicted increases in runoff depth with climate change and whether there is a benefit of adding vegetation to fill gaps in urban tree canopy). The SSMP also includes a fourth typology of sustainable streets opportunities linking green infrastructure in the public ROW via new and redevelopment frontage improvements. The plan will include model Sustainable Streets policy

documents for cities to consider adopting as well as model conditions of approval and resolution documents to support advancing local planning policies with respect to green infrastructure and sustainable streets implementation. Eleven project concepts and several new green infrastructure/sustainable streets typical details will be developed to support moving projects into implementation. Lastly, as described in Section 5.4, the SSMP includes an online tracking and mapping tool, which will support C/CAG's permittees in tracking progress towards water quality goals and resiliency with green infrastructure implementation, as well as to provide a visual tool for the public to interact with and learn more about countywide and jurisdiction progress with transforming to a more sustainable approach to stormwater management.

6.2.3 Green Infrastructure at Schools

C/CAG has built relationships with the County Office of Education over the past several years to begin seeking opportunities for collaboration with schools to more sustainably manage stormwater runoff on school sites, which historically have not been addressed via the MRP. C/CAG has developed a three-pronged approach to partnering with schools on green infrastructure, with each prong addressing a different scale of implementation.

At the site scale, C/CAG has leveraged its ongoing rain barrel rebate program in partnership with BAWSCA and its public involvement and participation program to focus on rain barrel installations at schools. In 2019, C/CAG provided two rain barrels and technical support for its first rain barrel installation at the Tierra Middle School in San Carlos. The project included a coordinated effort led by students and teachers to build a connected rain garden. Building from this project, C/CAG was recently awarded a California Resilience Challenge Grant, administered by the Bay Area Council, to develop schoolyard greening concept plans for three sites (including Tierra Linda Middle School) and up to six schools also in San Carlos. The intention of this project is to create concept plans that integrate schoolyard greening and green stormwater infrastructure at schools with climate adaptation goals (like reducing urban heat island impacts and addressing flooding and drought) and that will create the foundation for fundraising and implementation. Another goal is to scale the strategy used in the Resilient San Carlos Schoolyards Project countywide for broader school engagement.

At the street scale, C/CAG has worked with schools through its Safe Routes to School bike and pedestrian safety program in coordination with the countywide stormwater program. Leveraging local vehicle registration funds, C/CAG funded 10 pilot integrated Safe Routes to School and Green Streets Infrastructure Projects across the county, eight of which have been completed between fall 2018 and fall 2020. C/CAG worked with the local jurisdictions and the Safe Routes to School program coordinators at the County Office of Education to identify priority locations to improve walking and biking safety, while also building green stormwater infrastructure for water quality, flood resilience and community benefits.

At the regional scale, C/CAG continues to engage schools on opportunities for larger-scale subsurface stormwater retention projects. With state funds administered through the California Natural Resources Agency, C/CAG, in partnership with the County Office of Education, is procuring technical support to further screen and prioritize regional stormwater capture projects throughout the county. This effort will include evaluating school sites as key opportunities to partner on large stormwater retention projects, where schools may be interested in partnering for additional schoolyard/campus improvements (such as new fields and water supply augmentation), while also building community resiliency and flood protection benefits. The Resilient San Carlos Schoolyards Project will also evaluate opportunities at schools in San Carlos as part of the concept planning effort.

6.2.4 Summary of Funding of Green Infrastructure in San Mateo County

Table 6-1 provides a summary of funding dedicated to furthering GI implementation in San Mateo County. To-date, this funding totals approximately $35M, reflecting C/CAG's extensive efforts to assist Permittees identify GI funding.

Table 6-1. Summary of Funding Dedicated to Furthering GI Implementation in San Mateo County.

Amount of Funding	Description
$28.5M	From Caltrans for South San Francisco / Atherton.
$913K	From California Natural Resources Agency (CNRA) to Belmont regional project.
$1.13M	From CNRA/OOS to San Bruno project.
$1.13M	From CNRA/OOS to Redwood City project.
$200K	From C/CAG/OOS to find more regional projects, new concepts.
$100K	From C/CAG for countywide business case/alternative compliance study.
$1.18M	From Caltrans to C/CAG on SSMP.
$100K	From CA Resilience Challenge Grant for schoolyard greening concepts.
$2M	From C/CAG toward 10 SRTS/GI projects.
$35M	**Approximate Total**

6.3 Uncertainties and Adaptive Implementation

The modeled baseline stormwater loading estimates and estimated load reductions associated with source controls and GI presented in this Control Measures Plan are based on readily available data on pollutant sources and pathways and the pollutant removal effectiveness of the control measures. Although significant resources have been spent collectively over the course of the past two decades on collecting and interpreting these data, significant information gaps continue to create uncertainties in our collective ability to track progress towards pollutant load reduction goals and attainment of TMDL WLAs. These uncertainties should be acknowledged and over time be reduced to the extent feasible, so that reasonable decisions on investments in control measure implementation can be made.

To support the reasonable and cost-effective implementation of control measures to address PCBs (and mercury) in stormwater runoff, investments in control measures by local public agencies should be informed by the level of uncertainty associated with the effectiveness of the actions being proposed. In addition, control measure implementation will be adaptively managed by San Mateo County Permittees over time, based on new information regarding PCBs sources and source areas, and the costs and effectiveness of controls. This adaptive management approach is consistent with the PCBs and mercury TMDLs, which discuss the expectation that information on the technically feasibility, effectiveness and cost efficiency of control measures will evolve over time (SFBRWQCB 2006, 2008). As such, San Mateo

County Permittees intend to continue collecting and evaluating information on the PCBs and mercury levels in stormwater runoff, and the technical feasibility and cost-effectiveness of stormwater controls. Based on this information, Permittees plan to update this Control Measures Plan on a timeframe consistent with MRP requirements.

6.4 Participation in PCBs Control Measure Implementation by Other Entities

New public GI projects, as demonstrated in each of the control measure implementation scenarios presented in this plan, represent scenarios to achieve the PCBs load reduction target in San Mateo County over time. Other scenarios may include the implementation of control measures by other entities (e.g., Caltrans, facilities subject to individual NPDES permits, and Industrial General Permittees) in San Mateo County that are subject to existing and future NPDES permits or WDRs. As shown in Table 2-3, land areas associated with these entities contribute a substantial portion (23.5%) of the PCBs load to the Bay from San Mateo County stormwater runoff.

Many of the existing and planned control measures described in this Control Measures Plan overlap into land areas owned or operated by these entities. Therefore, the PCBs load from the portion of these areas under jurisdiction of other entities is addressed through the expenditure of San Mateo County Permittee resources. This is especially true for stormwater treatment systems that address PCBs from hundreds of acres of land (e.g., high capacity trash full capture systems and proposed regional stormwater capture projects), and include acreage associated with both Permittees and non-MRP entities. That said, PCBs loads from these and other land areas that are currently not addressed via NPDES stormwater permits or WDRs (e.g., railroads) continue to be an important source of PCBs to the Bay.

The need for San Mateo County Permittees to plan, construct and maintain GI projects in the public ROW could be reduced through actions by these entities to reduce PCBs discharges in stormwater runoff from their areas. The Regional Water Board should engage these entities to clarify their responsibilities under the TMDLs and require such PCBs load reduction actions, which would reduce the burden on MRP Permittees. The improved management of PCBs-containing equipment/materials and the enhanced management of sediment/soils on properties owned and operated by these entities could result in significant cost-savings compared to addressing PCBs further “downstream” through GI constructed in the public ROW and maintained in perpetuity by MRP Permittees.

6.5 Request for Review and Revision of the TMDLs

Many uncertainties remain regarding various aspects of the PCBs and mercury TMDLs and the information used to model baseline stormwater loads and calculate load reductions to-date and those predicted to occur in the future. However, as a result the development of this Control Measures Plan and RAA, it is clear that attaining the San Mateo County stormwater runoff PCBs TMDL WLA by 2030 (or decades later) cannot be achieved through the implementation of the currently available technically and economically feasible control measures.

Based on this result, San Mateo County MRP Permittees request that the Regional Water Board review and revise the schedule for attainment of the WLA for stormwater runoff in the PCBs TMDL (SFBRWQCB 2008). This request is consistent with the adaptive management strategy described in the TMDL, which explicitly states that a review and revision of the load reduction expectations for stormwater runoff will be conducted during the term of the third implementing NPDES permit (i.e., MRP 3.0, tentatively scheduled to begin in 2021). Thus, this Control Measures Plan and RAA (and similar plans/RAAs from the other MRP counties) should provide the Regional Water Board with a basis for extending the PCBs TMDL

deadline, if Permittees have demonstrated that all technically and economically feasible PCBs/mercury control measures will be implemented within the original timeline. SMCWPPP and San Mateo County Permittees plan to work with other MRP Permittees and Regional Water Board staff to participate in this review and revision process.

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Appendix A

Phase I RAA – Baseline Modeling Report

SEPTEMBER 2020

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

San Mateo County-Wide Reasonable Assurance Analysis Addressing PCBs and Mercury:

Phase I Baseline Modeling Report

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SAN MATEO COUNTYWIDE
WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

A Program of the City/County Association of Governments of San Mateo County (C/CAG)

Prepared by
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EXECUTIVE SUMMARY

This report provides a summary of the methods and modeling approaches used to represent baseline hydrology and sediment, Polychlorinated Biphenyls (PCBs), and mercury loads resulting from municipal stormwater discharges within San Mateo County to San Francisco Bay. This baseline model supports the first step in preparation of a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates how proposed green infrastructure (GI) control measures will result in sufficient load reductions of PCBs and mercury to meet Total Maximum Daily Load (TMDL) wasteload allocations assigned to municipal stormwater discharges to San Francisco Bay. The report documents the major steps, decisions, and assumptions made in the model development process. The report also provides documentation of model performance and calibration results based on local data. This documented calibration is critical to ensuring that the baseline model reliably captures the watershed characteristics and conditions and is sufficient for estimating pollutant loads and calculating pollutant reduction goals assigned to GI to support implementation of TMDLs.

The hydrologic and water quality model selected for the baseline model of San Mateo County watersheds was the Loading Simulation Program in C++ (LSPC), a watershed modeling system that includes Hydrologic Simulation Program FORTRAN (HSPF) algorithms for simulating watershed hydrology, erosion, water quality processes, and in-stream fate and transport processes. The model can simulate upland loading and transport of sediment, mercury, and PCBs. The model was configured based on the best available spatial and monitoring datasets to represent the land, meteorological, hydrological, and pollutant loading characteristics of San Mateo County watersheds. Based on criteria established by the *Bay Area Reasonable Assurance Analysis Guidance Document* (BASMAA 2017), the baseline hydrology and pollutant loading model was demonstrated to be sufficiently calibrated and validated and acceptable for estimation of existing loads of mercury and PCBs, comparison to TMDL wasteload allocations, and determination of necessary load reductions to support the planning of GI implementation.

The Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049) requires a portion of the TMDL wasteload allocations for PCBs and mercury to be met through the implementation of GI by 2040. Through comparison of modeled baseline PCB loads and the wasteload allocation assigned to municipal stormwater discharges, this study estimates that a 17.6% of annual PCB loads (0.23 kg/year) is to be reduced through GI implementation. For mercury, baseline loads were less than the TMDL wasteload allocation, resulting in no required mercury load reductions for San Mateo County municipalities.

The next phase of the RAA will provide a quantitative approach to establish relationships between GI implementation and required reductions of PCB loads. Model output will estimate the amount of GI needed to achieve the 17.6% PCB load reduction target for C/CAG member agencies. These estimates will serve as GI implementation goals that will support the development of GI plans by each agency.

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Acronyms

ABAG	Association of Bay Area Governments
AGWO	Active Groundwater Outflow
BAHM	Bay Area Hydrology Model
BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
BMP	Best Management Practice
Caltrans	California Department of Transportation
C/CAG	City/County Association of Governments of San Mateo County
CIMIS	California Irrigation Management Information System
DCIA	Directly Connected Impervious Area
DEM	Digital Elevation Model
ECHO	Enforcement and Compliance History Online
EIA	Effective Impervious Area
EMC	Event-Mean Concentration
EPA	Environmental Protection Agency
ET	Evapotranspiration
FTABLE	Functional Table (Model Rating Curve)
GHCN	Global Historical Climatology Network
GI	Green Infrastructure
GIS	Geographic Information Systems
HgT	Total Mercury
HRU	Hydrologic Response Units
HSG	Hydrologic Soil Group
HSPF	Hydrologic Simulation Program–FORTRAN
IFWO	Interflow Outflow
IGP	Industrial General Permit
LSM	Land Surface Models
LSPC	Loading Simulation Program in C++
MIA	Mapped Impervious Area
MRP	Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
NED	National Elevation Dataset
NHD	National Hydrography Database
NLCD	National Land Cover Database
NLDAS2	North American Land Data Assimilation System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NOAA	National Oceanic and Atmospheric Administration
PCBs	Polychlorinated Biphenyls
PEVT	Potential Evapotranspiration

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POI	Points of Interest
PRISM	Parameter-elevation Regressions on Independent Slopes Model
QAPP	Quality Assurance Project Plans
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
SCVWD	Santa Clara Valley Water District
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSURGO	Soil Survey Geographic Database
STATSGO	State Soil Geographic Database
STLS	Small Tributaries Loading Strategy
SWRCB	State Water Resources Control Board
TAET	Total Actual Evapotranspiration
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WLA	Waste Load Allocation
WMMS	Watershed Management Modeling System
WY	Water Year

1 INTRODUCTION

The Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049) requires Bay Area cities and counties to develop Green Infrastructure (GI) Plans (Provision C.3) and PCBs and Mercury Control Measure Implementation Plans (Provisions C.11 and C.12) that provide the necessary pollutant load reductions to meet Total Maximum Daily Load (TMDL) wasteload allocations (WLA) over specified compliance periods. A key component of these plans is a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed control measures will result in sufficient load reductions of Polychlorinated Biphenyls (PCBs) and mercury to meet WLAs for municipal stormwater discharges to San Francisco Bay. The City/County Association of Governments (C/CAG) of San Mateo County has initiated a county-wide effort to develop an RAA to estimate the baseline PCB and mercury loads to the Bay, determine load reductions to meet WLAs, and set goals for the amount of GI needed to meet the portion of PCB and mercury load reduction the MRP assigns to GI (SFBRWQCB 2015).

In 2017, the U.S. Environmental Protection Agency (EPA) Region 9 released *Developing Reasonable Assurance: A Guide to Performing Model-Based Analysis to Support Municipal Stormwater Program Planning* (EPA RAA Guide) (USEPA 2017), which provides guidance on the technical needs of the RAA and considerations for model selection. Building upon the EPA RAA Guide, the Bay Area Stormwater Management Agencies Association (BASMAA) prepared the *Bay Area Reasonable Assurance Analysis Guidance Document* (Bay Area RAA Guidance) (BASMAA 2017) to provide specific guidance on modeling to support RAAs performed in the Bay Area to meet MRP requirements, address TMDLs for PCBs and mercury, and support GI planning. The EPA RAA Guide and Bay Area RAA Guidance both outline essential steps for performing an RAA, as depicted in Figure 1-1. The purpose of this report is to document the first phase of the RAA, which includes the development of a baseline model to address the first 3 steps of the RAA outlined in the EPA RAA Guide and Bay Area RAA Guidance. These steps include:

1. **Designation of Area Addressed by Analysis**: As the RAA associated with GI plans is developed in the context of the MRP and WLAs assigned to municipal stormwater discharges to the Bay, the area where it is applied is typically specific to urban areas within municipal jurisdictions addressed by the MRP.
2. **Characterization of Existing Conditions**: Critical to the RAA is careful characterization of stormwater pollutant loads or flows under existing baseline conditions (average water year 2002). This understanding serves as the foundation of the RAA and identifies the starting point for planning management actions.
3. **Determination of Stormwater Improvement Goals**: Based on the existing conditions characterized above, and in combination with pollutant reduction goals assigned to GI based on TMDL WLAs and the MRP, goals can be determined in terms of the amount of pollutant load reduction to be achieved by GI.

This report provides a summary of the methods and modeling approaches used to represent baseline hydrology and sediment, PCB, and mercury loads in San Mateo County (RAA Step 2). The report provides necessary documentation of model performance and calibration results based on local data. As stated in the Bay Area RAA Guidance, the documented calibration is critical to ensuring that the baseline model reliably captures the watershed characteristics and condition. The report also documents the use of the baseline model for simulation of pollutant loads from the area addressed by the analysis (RAA Step 1), and the comparison to WLAs for calculation of pollutant reduction goals assigned to GI (RAA Step 3). The report documents the major steps, decisions, and assumptions made in the model development process.

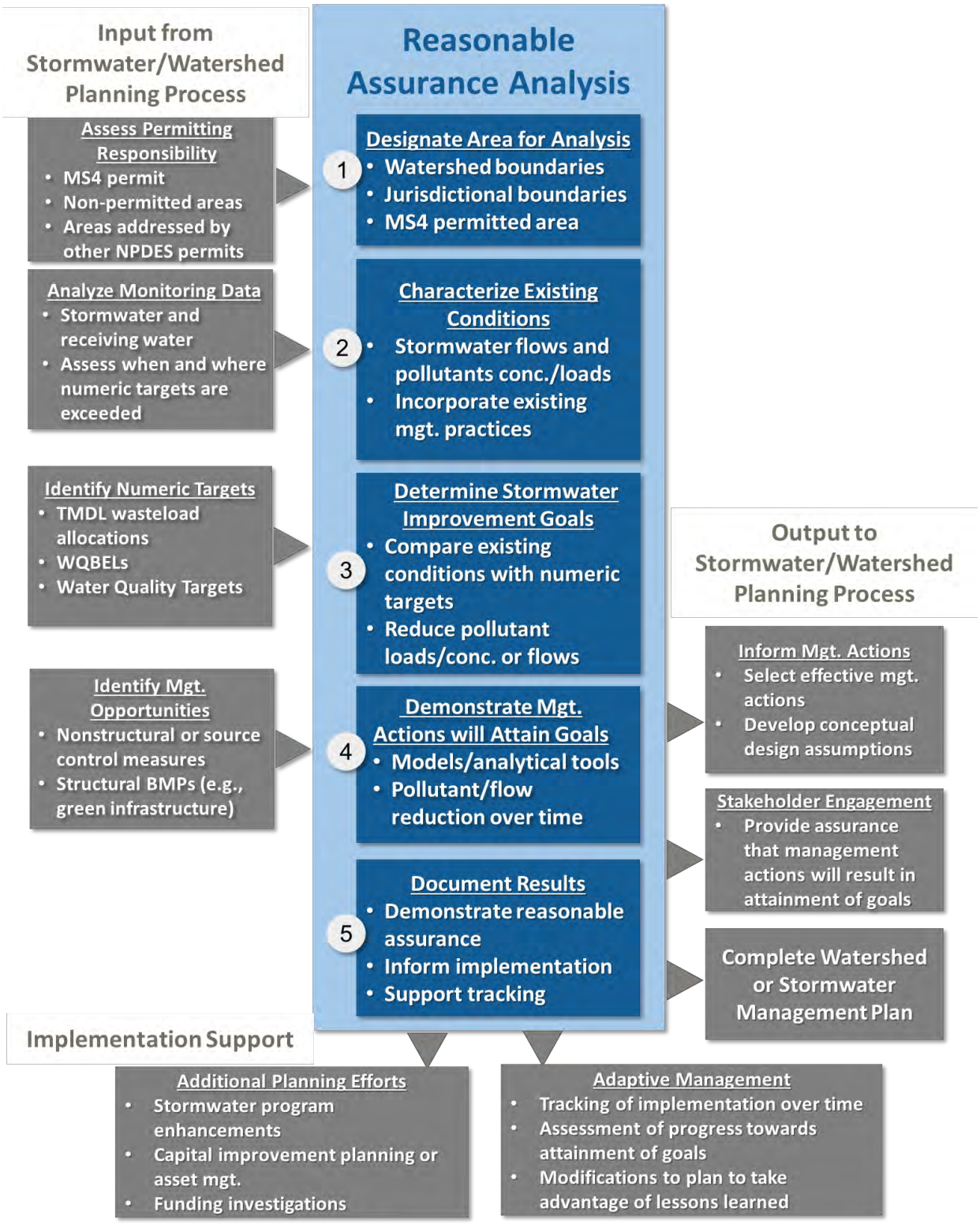

Figure 1-1. RAA Process Flow Chart (USEPA 2017).

1.1 Summary of Previous Studies Considered for Model Approach Development

There were previous and ongoing regional studies and resources available to draw from and build upon for this study. The following provides a summary of each study:

1. **Bay Area Hydrology Model (BAHM):** BAHM is a tool for analyzing the effects of hydromodifications in a watershed (including stormwater and runoff management practices) on hydrology. BAHM uses Hydrologic Simulation Program – FORTRAN (HSPF) (Bicknell et al., 1997) as the underlying watershed model and includes some locally derived hydrology parameters for San Mateo, Santa Clara, and Alameda Counties. BAHM is available for download at: http://www.bayareahydrologymodel.org/.
2. **Guadalupe River HSPF model:** Local monitoring and analysis identified the Guadalupe River as a large contributor of mercury and PCBs to the Bay. The Guadalupe River HSPF watershed model was used to extrapolate sediment, total mercury and PCB loads to the Bay. Model documentation noted that data limitations hindered water quality calibration performance but suggested that future data collection efforts could improve model performance and forecasting potential (Lent and McKee 2011).
3. **Regional Watershed Spreadsheet Model (RWSM):** RWSM was developed by the San Francisco Estuary Institute (SFEI). SFEI monitored several small urban tributaries around the Bay as part of the Small Tributary Loading Study and those data were used to estimate potential sediment, total mercury, and PCB loading rates by land use source categories.

The Bay Area RAA Guidance specified three methods for identifying the baseline condition: (1) utilizing the TMDL Staff Report baseline loading (SFBRWQCB 2006; SFBRWQCB 2008b); (2) utilizing the RWSM loading; and (3) recalculating the baseline using a calibrated computational model. For the San Mateo County-wide RAA, a computation model was selected for simulating baseline conditions and re-evaluating the mercury and PCB load reductions to achieve the WLAs. Model development draws upon elements of the referenced resources above to build robust modeling assumptions and support model calibration. The first two studies provided directly applicable reference material for hydrology model parameterization and calibration. The third study provided guidance about relative magnitude of loads from various sources to help parameterize water quality inputs. By focusing on small urban tributaries, RWSM includes locally derived model coefficients and estimated source loading information for benchmark comparison of simulated model results.

1.2 Overview of Baseline Model Approach

The model development process can be a good platform for gaining valuable information and insight about the system. If well-designed, the model development process is an iterative and adaptive cycle that improves understanding of the system over time as better information becomes available. Ultimately a model can inform future data acquisition efforts and management decisions by highlighting factors that have the most impact on the behavior of a natural system. Figure 1-2 is a conceptual schematic of a model development cycle, which is conceptually represented as circular as opposed to linear. That cycle can be summarized in six interrelated steps:

1. **Assess Available Data**: These data are used for source characterization, trends analysis, and defining modeling objectives.
2. **Delineate Project Extent**: Model segmentation and discretization needed to simulate stream flows at temporal and scale scales appropriate for defining instream flow needs at specified Points of Interest (POIs).

3. **Set Boundary Conditions**: Spatial and temporal model inputs defining the appropriate hydrologic inputs and outputs.
4. **Model Calibration**: Adjustment of model rates and constants to mimic observed physical processes of the natural system.
5. **Model Validation**: Confirmation of model processes and patterns over space and time to assess if the model is a robust predictive tool.
6. **Assess Data Gaps**: Sometimes the nature of modeled responses can indicate the influence of unrepresented physical processes in the modeled system. A well-designed model can be adapted for future applications as new information about the system becomes available. Depending on the study objectives, data gaps sometimes provide a sound basis for further data collection efforts to refine the model, which cycles back to Step 1.

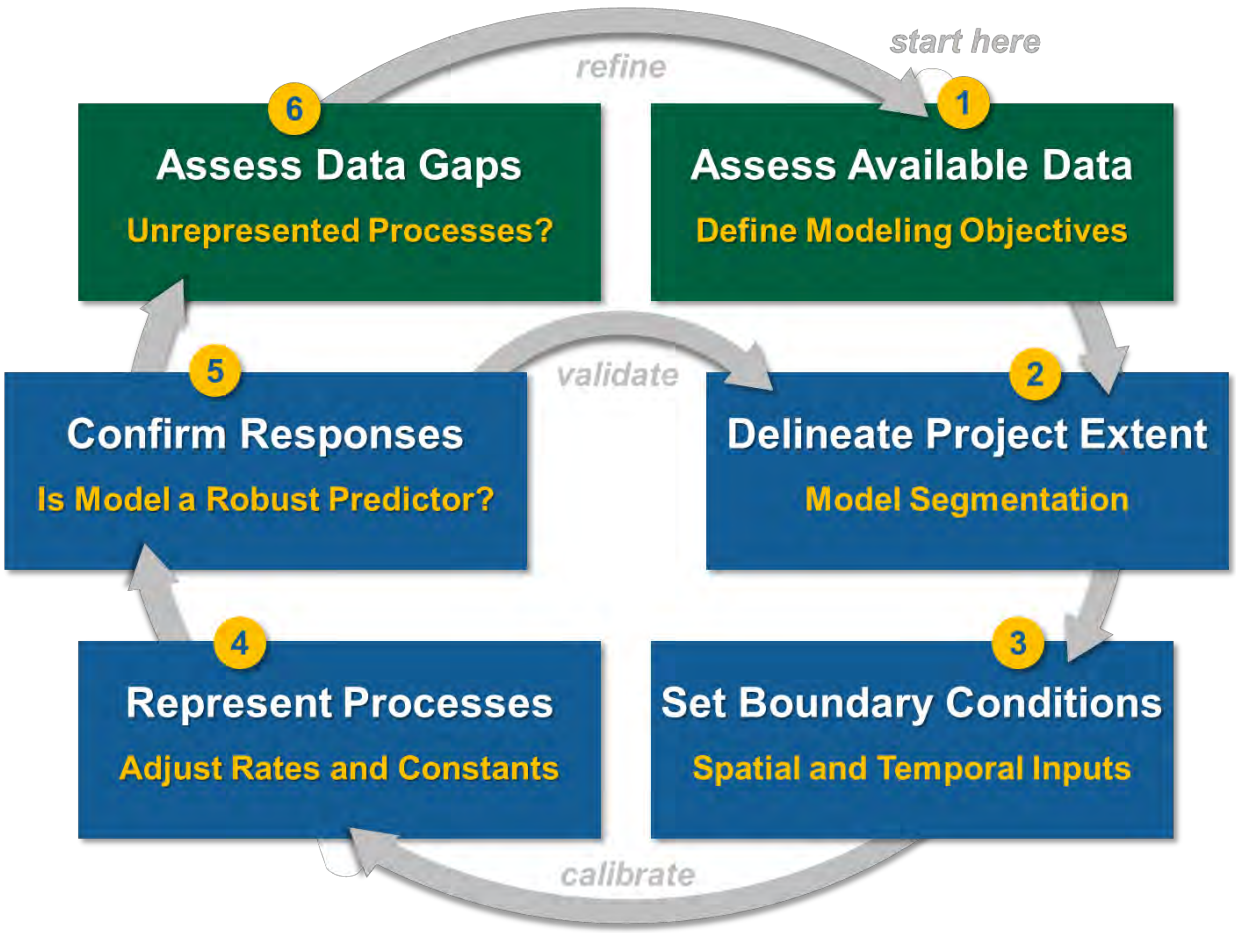

Figure 1-2. Conceptual schematic of a model development cycle.

The hydrologic and water quality model selected for the baseline model of San Mateo County watersheds was the Loading Simulation Program in C++ (LSPC) (Shen et al. 2004, LACDPW and USEPA 2009), a watershed modeling system that includes HSPF algorithms for simulating watershed hydrology, erosion, water quality processes, and in-stream fate and transport processes. The model can simulate upland loading and transport of sediment, mercury, and PCBs.

LSPC is built upon a relational database platform, making it easier to collate diverse datasets to produce robust representations of natural systems. LSPC integrates GIS outputs, comprehensive data storage and management capabilities, the original HSPF algorithms, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the HSPF model with selected additions, such as algorithms to address land use change over time. LSPC is an open-source public-domain watershed model available from EPA. A recent user's manual for LSPC is available with the Watershed Management Modeling System (WMMS), a large-scale application of LSPC in the Los Angeles, CA Region (http://dpw.lacounty.gov/wmd/wmms/) (LACDPW 2010, LACDPW and USEPA 2009). Figure 1-3 is a generalized schematic of the underlying hydrology model (Stanford Watershed Model) used in HSPF and LSPC. The schematic represents land-based processes for a single land unit in the model.

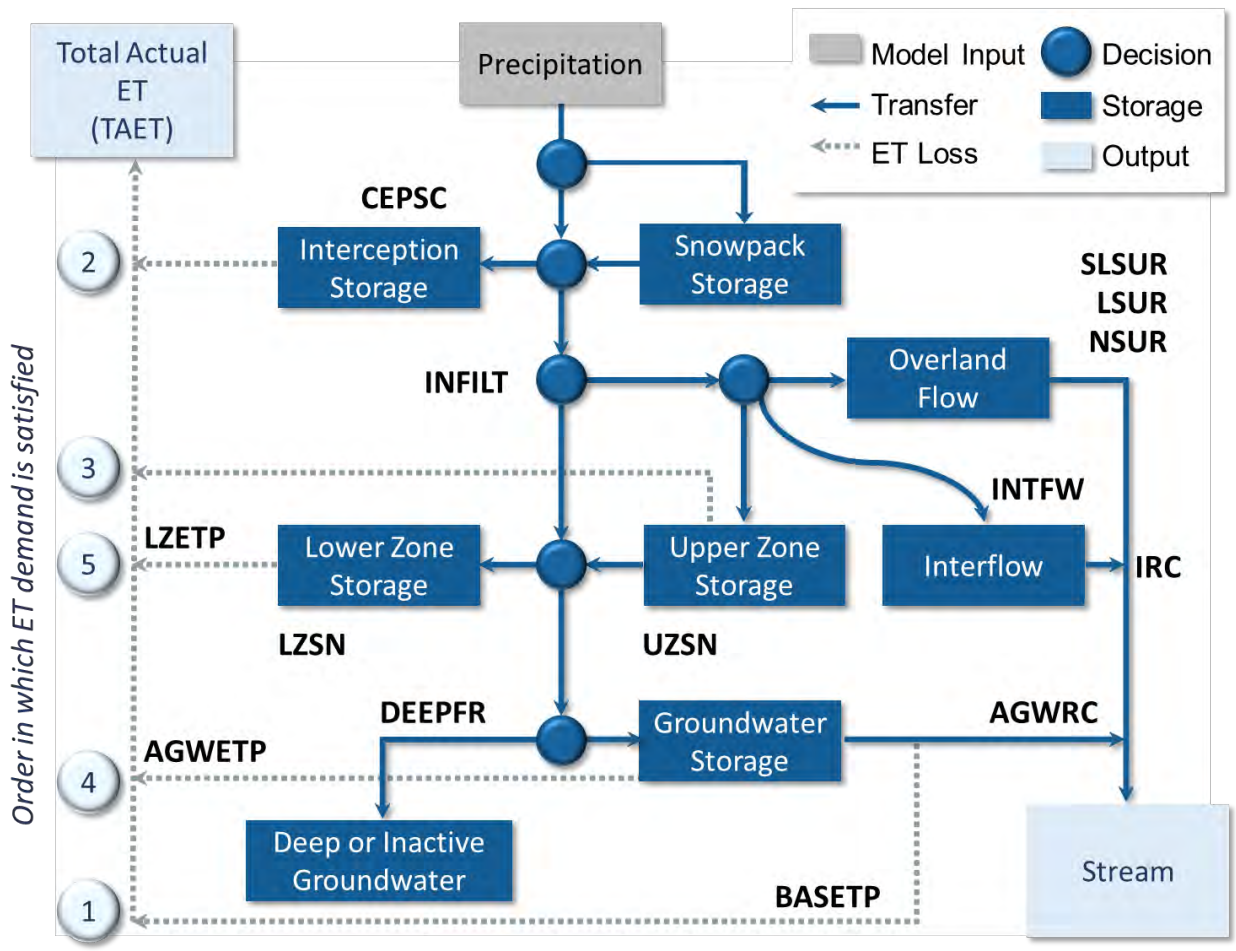

Figure 1-3. Hydrology model schematic (based on Stanford Watershed Model).

Meteorological data are the driver for the modeled hydrologic processes. As shown in the schematic, precipitation is the primary input, while total actual evapotranspiration (TAET) and streamflow are the primary outputs in the water budget. Potential evapotranspiration (PEVT; not explicitly shown in the schematic) is another key meteorological boundary condition for the model. The interaction of model parameters shown above in Figure 1-3 will ultimately determine how much PEVT becomes TAET. There are several pathways that water can take as it makes its way through the network. For each land unit, process-based parameters that reflect differences in geology, soils, vegetation, and land cover will govern the rates and volumes of water at each stage throughout the schematic (Figure 1-3).

Water quality representation in the model builds upon the calibrated hydrology model. The approach considers available data for model parameterization, model calibration and validation, regulatory requirements, and practical considerations. The approach developed for this RAA combines these important considerations and is consistent with the Bay Area RAA Guidance and EPA RAA Guide. The resulting model, in combination with the Phase II modeling effort described in a companion report, will provide a means for identifying and quantifying the load reduction benefits of GI implementation options in all locations but will also identify certain locations or activities for prioritized efforts based on benefits versus costs. GI investment is most cost-effective when costs of implementation are relatively low and pollutant load reduction is relatively high. A three-step approach was developed that leverages RWSM methods for representing PCB and mercury concentrations with the LSPC process-based modeling approach (Figure 1-4):

1. The first step entailed applying the calibrated, land-use-based PCB and mercury runoff concentrations from RWSM to estimate long-term average PCB and mercury loads from LSPC. The product of Step 1 is the total load of PCBs and mercury by source. Using EMCs alone would result in a constant concentration during storm events, which would not be representative of natural processes like first-flush responses.
2. In the second step, the ratio of LSPC modeled PCB and mercury loads to LSPC modeled sediment load was used to estimate an average contaminant sediment concentration, expressed as the mass of contaminant per mass of sediment, for both PCBs and mercury. This process is conducted for each land use component, or hydrologic response unit (HRU; defined in Section 2.2). The resulting PCB and mercury sediment concentrations (i.e., potency factors) were then used to simulate contaminant loadings as a function of sediment rather than runoff. Simulating contaminants as a function of sediment allows the model to capture the first-flush effect, dilution of subsequent events, and non-linear variability of loads with storm intensity.
3. Finally, simulated concentrations are calculated in Step 3, which were then compared to observations from the Small Tributaries Loading Strategy (STLS) as validation.

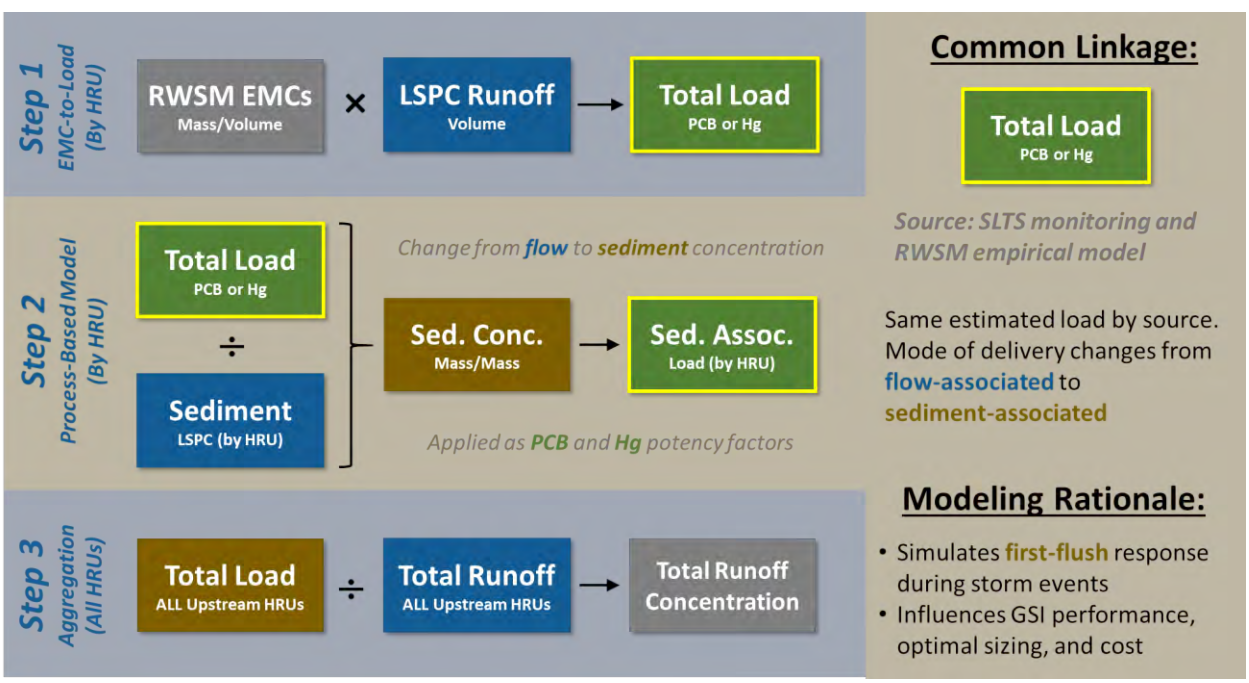

Figure 1-4. Schematic for deriving a process-based, sediment-associated modeling approach for PCBs and mercury.

2 MODEL SEGMENTATION

The organizational framework for LSPC is a relational database. By their very nature, both GIS and timeseries elements of watershed data are organized in a relational database structure (i.e. spatial objects with tabular attributes). In the organizational hierarchy, certain watershed attributes are logically associated with delineated subwatersheds, while other associations are better expressed at a finer spatial scale. It may be suitable to assign climate timeseries to individual subwatersheds; however, process-based parameters (see Figure 1-3) are associated with individual land segments. Irrigation application is one example of an activity that is logically associated at the land-segment level. An important part of the model development process was to determine the acceptable level of resolution to express different parameters. Processes associated with smaller spatial elements of the model provide more degrees of freedom for expressing the spatial resolution of its hydrologic impact; however, more resolution increases computational time and model complexity. Therefore, model configuration involves finding a representative balance between spatial resolution and model complexity. Key elements of model configuration include: (1) subwatershed delineation, (2) hydrologic response units, and (3) parameterization of model processes.

2.1 Subwatershed Delineation

Subwatershed delineation was based primarily on the National Hydrography Dataset (NHD) Plus v2 catchments. This layer provided a good starting point because the subwatersheds were at a relatively fine resolution that captured orographic changes and stream connectivity. For segments where orographic variability was relatively small and stream connectivity was minimally impacted, smaller subwatersheds were aggregated into larger ones. Where necessary, subwatersheds were also adjusted to reflect the locations of streamflow monitoring gages used for calibration. Table 2-1 shows United States Geological Survey (USGS) streamflow gages corresponding to modeled calibration and validation subwatersheds. Figure 2-1 shows delineated subwatersheds for all San Mateo County watersheds and those used for model calibration. For flow and water quality model calibration, some delineated subwatersheds included areas outside of the county to ensure mass balance when compared to observed data. The Guadalupe River watershed in nearby Santa Clara County was included in the model development because those water quality data were the basis for extrapolating total sediment and PCB loads for the Bay Area TMDL (SFBRWQCB 2008b). Modeling the Guadalupe River watershed alongside San Mateo County watersheds draining to the Bay allows for comparison of modeled results to the San Mateo County WLAs.

Table 2-1. Modeled calibration/validation subwatersheds by respective calibration gage (with gage status).

Gage Status[1]	USGS Gage ID	LSPC Model Outlet	Subwatershed Name
Recent Gage Data	11169025	104	Guadalupe River Above Hwy 101 (San Jose, CA)[2]
	11162630	701	Pilarcitos Creek (Half Moon Bay, CA)
	11162620	721	Pilarcitos Creek Below Stone Dam (Hillsborough, CA)
Discontinued Gages	11169500	201	Saratoga Creek (Saratoga, CA)[2]
	11166000	301	Matadero Creek (Palo Alto, CA)[2]
	11162570	501	San Gregorio Creek (San Gregorio, CA)
	11162720	801	Colma Creek (South San Francisco, CA)
Long-Term Gages	11162500	401	Pescadero Creek (Pescadero, CA)
	11164500	601	San Francisquito Creek (Stanford University, CA)

1: Calibration: Recent (primary) and discontinued (secondary) gages; Validation: Long-term gages (used 35 years of record)
2: These gages are outside of San Mateo County. Included for reference in hydrology calibration.

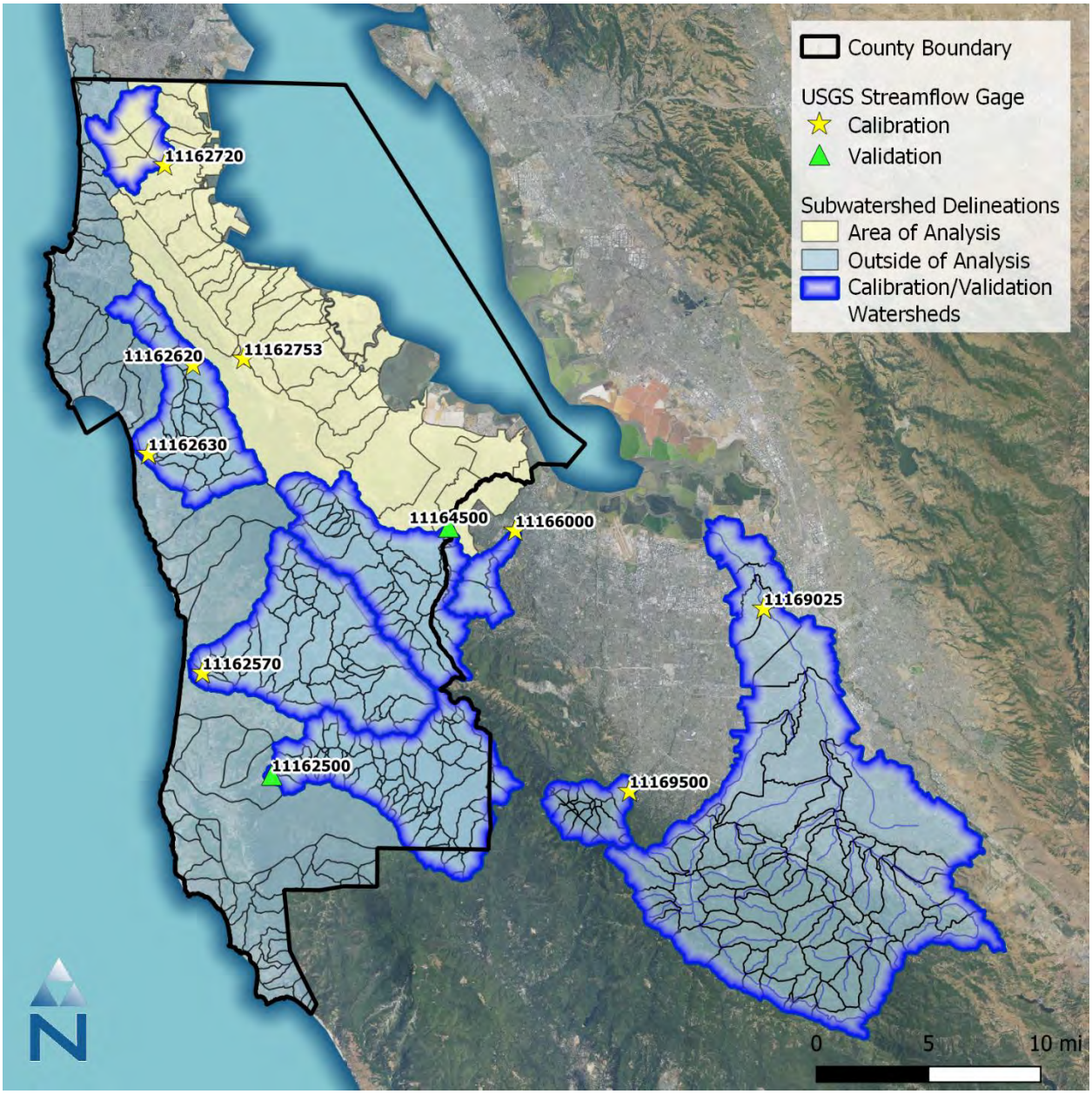

Figure 2-1. Subwatershed delineation for hydrology calibration.

2.2 Hydrologic Response Units

Hydrologic Response Units (HRUs) are the core hydrologic modeling land units in the watershed model. Each HRU represents areas of similar physical characteristics attributable to certain processes. Spatial or geological characteristics, such as soils, slope or steepness, land cover, and land use, are typically used to define HRUs. These four datasets were the primary attributes used in San Mateo County for classifying HRUs. The areal combination of primary characteristics ultimately determines the number of meaningful HRU categories considered for the model. Some consolidation of HRUs is required to balance the need for spatial resolution with model simulation efficiency. Figure 2-2 shows the organizational relationship of HRUs, subwatersheds, and model parameterization. Secondary attributes are properties (e.g., impervious cover) that are summarized by HRU to estimate numerical values for the model.

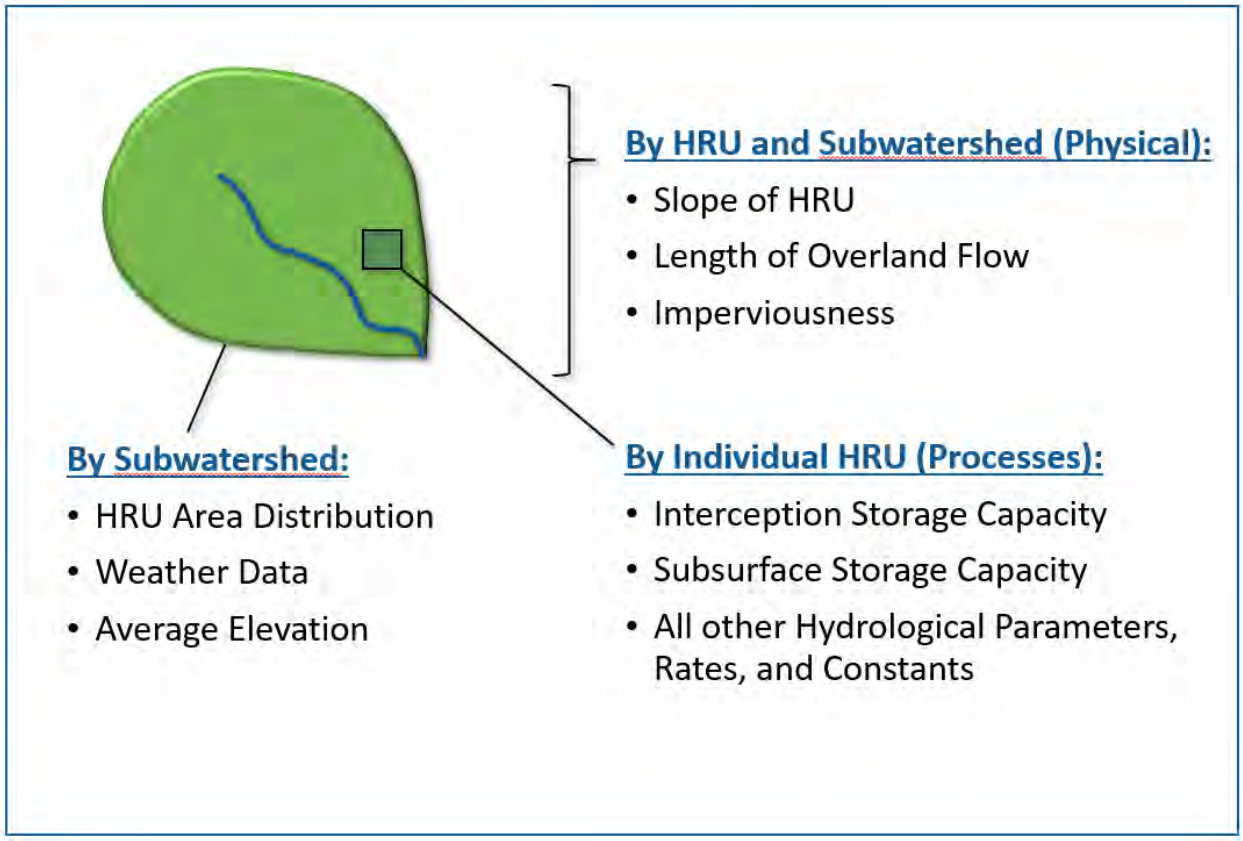

Figure 2-2. Organizational relationship of HRUs, subwatersheds, and model parameterization.

Table 2-2 summarizes the GIS datasets and the corresponding data sources used in HRU processing. All data layers were downloaded from publicly available data sources. The following subsections provide detailed descriptions of each HRU component dataset.

Table 2-2. Summary of input datasets detailing data source and type

GIS Layer	Data Source	Description
Soil Survey Geographic Database (SSURGO)	United States Department of Agriculture (NRCS 2016a)	2016 - polygon layer
State Soil Geographic Database (STATSGO)	United States Department of Agriculture (NRCS 2016b)	2016 - polygon layer
Slope	Generated from DEM	30m raster
Land Use	Association of Bay Area Governments	C. 2005
Land Cover	NLCD (Xian et al. 2011)	c. 2011 – 30m raster
Imperviousness Cover	NLCD (Xian et al. 2011)	c. 2011 – 30m raster

2.2.1 Hydrologic Soil Group

Soils data were obtained from the Soil Survey Geographic Database (SSURGO) and State Soil Geographic Database (STATSGO), both published by the Natural Resource Conservation Service (NRCS). There are four primary hydrologic soil groups (HSG) used to characterize soil runoff potential. Group A generally has the lowest runoff potential whereas Group D has the highest runoff potential. Both SSURGO and STATSGO soils databases are composed of a GIS polygon layer of map units and a linked database with multiple layers of soil property. Soil characteristics of each hydrologic soil group are described in Table 2-3.

Table 2-3. NRCS Hydrologic soil group descriptions.

Hydrologic Soil Group	Description
A	Sand, Loamy Sand, or Sandy Loam
B	Silt, Silt Loam or Loam
C	Sandy Clay Loam
D	Clay Loam, Silty Clay Loam, Sandy Clay, Silty Clay, or Clay

Data Source: Natural Resource Conservation Service (NRCS), Technical Release 55 (TR-55)

Figure 2-3 presents the spatial distribution of the SSURGO hydrologic soil groups for the watershed. The dominant soil group in the watershed is Group C, containing sandy clay loam with relatively low infiltration rates. Group D is the next most common soil group in the watershed, containing clay loam, and silty clay loam that typically have lowest infiltration rates, compared to other hydrologic soil groups. A small portion of the watershed areas had mixed soils, which were grouped with the nearest primary group as follows: A/D → B, B/D → C, and C/D → D. Approximately 2 percent of the watershed HSG area was unknown in the SSURGO database. For those areas, the corresponding HSG from the STATSGO dataset was used to supplement the data gaps.

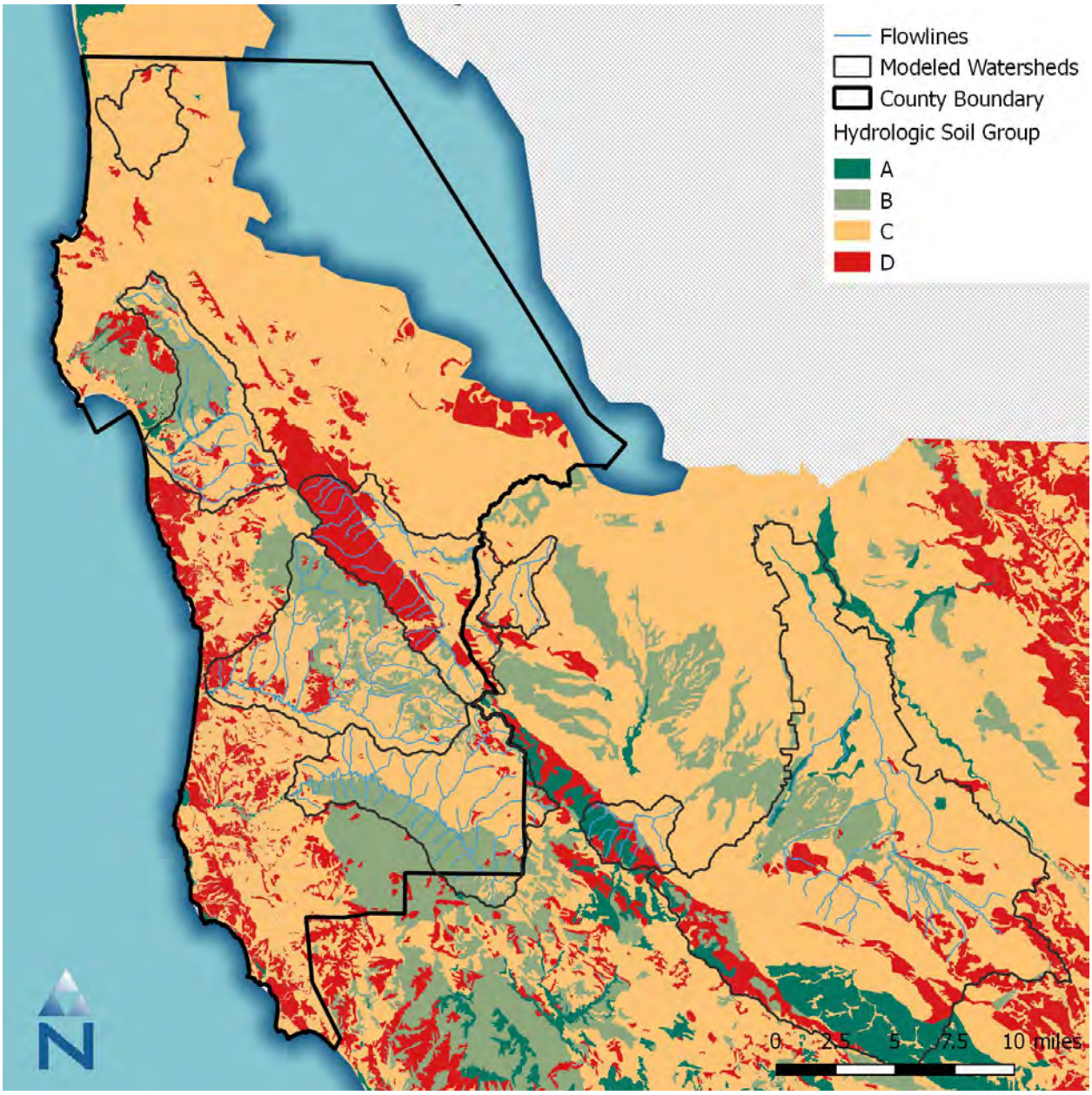

Figure 2-3. Hydrologic soil group classification (Source: USDA SSURGO).

2.2.2 Slope

The DEM grid was used to develop a percent slope raster, which was then reclassified into two groups (i.e., ≤5 percent and >5 percent) corresponding to *low* and *medium* slope areas, respectively. The *low* slope threshold of 5 percent was selected primarily as a threshold for representing urban areas the majority of the total developed area lies below the 5 percent slope threshold. The slope threshold between *low* and *medium* was selected based on a natural breakpoint identified in the distribution of slopes across the total watershed area.

2.2.3 Impervious Cover

Within a given subwatershed, HRU segments are modeled as being parallel to one another. Each segment flows directly to the routing segment without any interaction with neighboring segments. However, in the physical environment, sometimes the lines between impervious and pervious land are not as clearly distinguished—impervious land may flow downhill over pervious land on route to a storm drain or watercourse. For modeling purposes, Effective Impervious Area (EIA) represents the portion of total, or Mapped Impervious Area (MIA), that routes directly to the stream segments. It is derived as a function of Directly Connected Impervious Area (DCIA), with other adjustments as needed to account for other structural and non-structural management practices in the flow network. Figure 2-4**Error! Reference source not found.** illustrates the transitional sequence from MIA to DCIA. For example, impervious areas that are not connected to the drainage network can potentially flow onto pervious surfaces, infiltrate, and become part of pervious subsurface and overland flow; however, because segments are modeled as being parallel to one another in LSPC, this process can be approximated using a conversion of a portion of impervious land to pervious land. During large storm events, both impervious and saturated pervious land can respond like impervious land. Finding the right balance between MIA and EIA can be an important part of the hydrology calibration effort. EIA can be further refined to represent features such as rooftops, driveways, and sidewalks. Some site-scale stormwater management practices that are part of the existing-condition baseline can also be represented using an EIA adjustment.

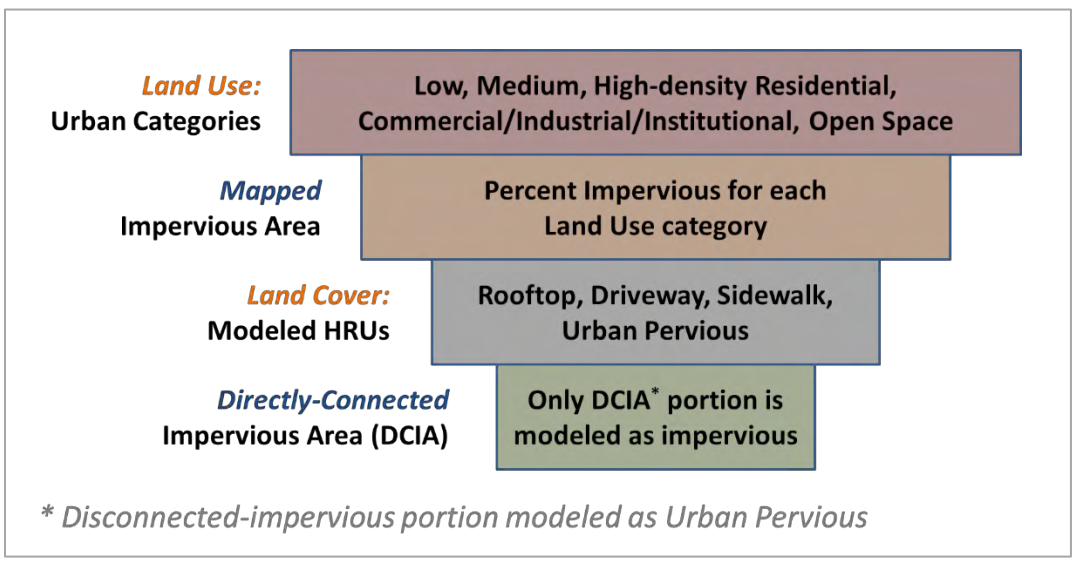

Figure 2-4. Translation sequence from MIA to DCIA.

Empirical relationships like the Sutherland Equations (2000) presented in **Error! Reference source n ot found.** show a strong correlation between the *density* of developed area and DCIA. The curve for high-density developed land trends closer to the line of equal value than the curve for less developed areas. Similarly, as the density of mapped impervious area approaches 1, the translation to DCIA also approaches 1. An initial estimate of EIA (acres) for each land use type in each subcatchment is determined by: (1) extracting the DCIA (%) corresponding to the MIA (%) in **Error! Reference source n ot found.** and (2) multiplying that DCIA (%) by the total area for that land use type. This empirical approximation can be further refined during model calibration to account for other flow disconnections resulting from structural or non-structural BMP or other inline hydraulic routing features. Table 2-4 is a summary of the modeled HRU distributions for each calibration subwatershed.

The color gradient shows the relative distribution of each HRU intersect among all the calibration watersheds.

07843
7884

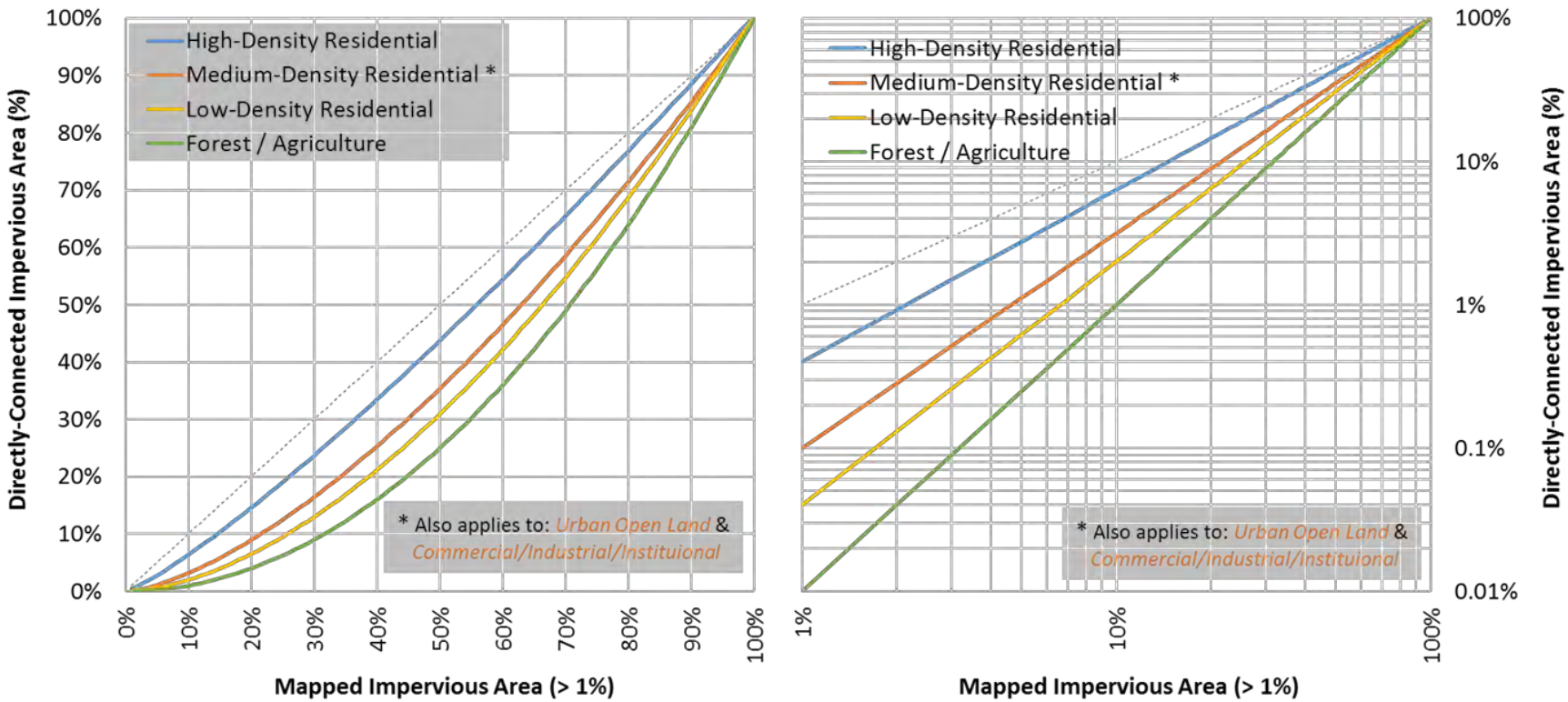

Figure 2-5. Numerical relationships between MIA and DCIA (Sutherland 2000).

2.2.4 Land Cover and Land Use

Land cover and land use data are the primary base layers for HRUs. Land cover describes the physical characteristics that cover the landscape (e.g., forest, wetlands, development) while land use describes the programmatic nature of land cover (e.g., type of development, functional use of open space, zoning etc.). The sources of land use and land cover data used in developing the LSPC watershed model were the Association of Bay Area Governments (ABAG) land use layer and the 2011 National Land Cover Database (NLCD), respectively. The ABAG layer, modified by SFEI to identify old and new urban land uses, was used as the main source of information for representing PCB and mercury source areas. This GIS layer includes the five land use source categories consistent with those used by RWSM. While hydrology and sediment were initially modeled at a higher HRU resolution using the NLCD landuse data, the ABAG layer was intersected during water quality model development, allowing for PCB and mercury sediment concentrations to be assigned spatially. Further descriptions of each dataset are as follows:

- The SFEI-modified ABAG land use source categories are shown in Figure 2-6**Error! Reference source not found.**. These source categories were incorporated as the basis for assignment of water quality parameters (i.e., PCBs and mercury) to appropriately reflect the spatial distribution of pollutant contributions from the San Mateo County watersheds.
- The NLCD is maintained by the Multi-Resolution Land Consortium (MRLC), a joint effort between multiple federal agencies. The primary objective of the MRLC NLCD is to provide a current data product in the public-domain which provides a consistent characterization of land cover across the United States. The first iteration of the NLCD dataset was 1992. Since the 2001 NLCD version, a consistent 16-class land cover classification scheme has been adopted nationwide. The 2011 NLCD adopted this 16-class scheme at a 30-meter grid resolution. The minimum mapping unit is 5 30-m pixels (1.1 acres) for most land cover classes, except urban (1 pixel, 0.2 acres) and cropland and hay/pasture (12 pixels, 2.7 acres) (Homer et al. 2015).
- The NLCD 2011 Imperviousness layer is maintained by MRLC (MRLC) and is published as a companion to the National land Cover Dataset (NLCD). This imperviousness dataset is provided as a raster with a 30-meter grid resolution. Impervious cover is expressed in each raster pixel as a percentage of total area ranging from 0 to 100 percent.

Figure 2-7 shows the organizational relationship of the various datasets used to create HRUs.

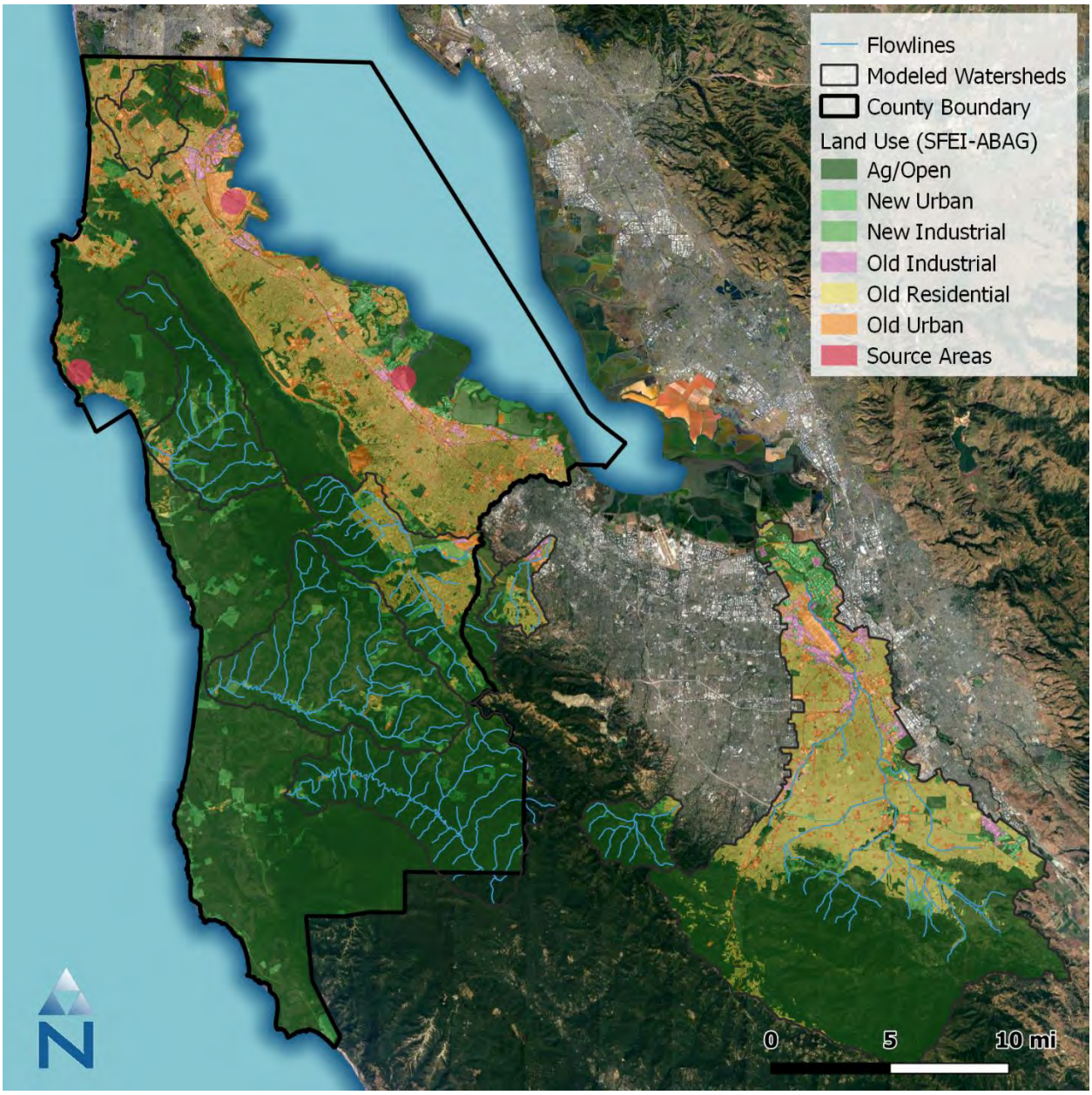

Figure 2-6. ABAG land use data modified by SFEI to represent PCB source categories.

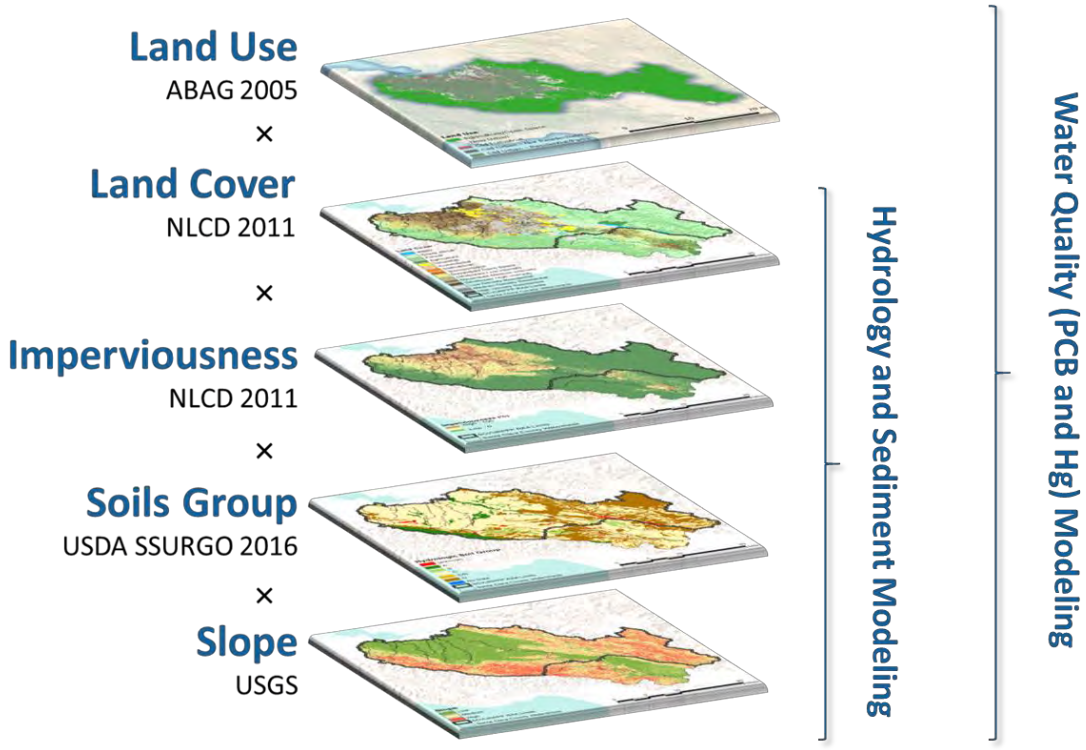

Figure 2-7. Key land characteristic datasets used to create HRUs.

2.2.5 HRU Distribution

Using the reclassified datasets discussed in the previous sections, a set of representative HRUs was developed to reflect key land characteristics of the modeled watersheds. These HRUs serve as the functional pervious and impervious land segment units in the watershed model. The following steps were performed to develop HRU categories:

- Re-project all GIS layers into USA Contiguous Albers Equal Area Conic projected coordinate system (EPSG-102003) to ensure proper overlay and accurate area calculations
- Clip all GIS layers to watershed extent to ensure data overlay to the same spatial extent
- Convert all vector GIS layers into raster grids, resampled to a 30-meter resolution (i.e., 30-meter pixel width by 30-meter pixel height)
- Intersect all input spatial layers and tabulate area distribution for unique combinations of "primary attributes," including land use/land cover, imperviousness, soil, and slope
- Using the final set of HRUs, summarize "secondary attributes" by HRU. Secondary attributes include characteristics such as canopy cover, which can be used to inform the parameterization of model processes.

To illustrate the designation of HRUs in the model, Table 2-4 provides a summary of the modeled HRU distributions for subwatersheds used for the calibration of hydrology (Section 5) and sediment (Section 6). The color gradient shows the relative distribution of each HRU intersect among all the calibration watersheds. Table 2-4 summarizes the percent area by soil and slope HRU groups by each land cover HRU category.

Table 2-4. HRU distribution upstream of each modeled calibration watershed.

Characteristics		Model Calibration Outlet								
		Recent Gages			Discontinued Gages				Long-Term Gages	
USGS Gage ID:		11169025	11162630	11162620	11169500	11166000	11162570	11162720	11162500	11164500
Model Outlet		104	701	721	201	301	501	801	401	601
Drainage Area (Acres)		102,181	18,343	4,202	6,117	4,187	33,063	6,723	28,997	24,133
No. Subcatchments		72	33	7	17	5	54	6	81	44
Average size (acres)		1,419	556	600	360	847	612	1,121	358	548
Size Range (acres)		147-11,862	35-1,481	328-852	41-936	367-1,656	25-2,491	659-1,735	8-2,211	49-2,010
Land Cover	Impervious[1]	17%	2%	0%	1%	8%	0%	26%	0%	2%
	Developed	32%	8%	0%	12%	53%	7%	57%	6%	30%
	Forest	39%	65%	96%	80%	11%	64%	8%	89%	54%
	Shrub/Grass	12%	25%	4%	7%	28%	29%	9%	5%	14%
Slope	Low (≤5%)	58%	37%	44%	19%	62%	48%	90%	40%	69%
	Medium (>5%)	42%	63%	56%	81%	38%	52%	10%	60%	31%
Soils	A	9%	2%	1%	27%	0%	0%	0%	1%	0%
	B	7%	27%	43%	7%	0%	31%	0%	35%	5%
	C	55%	58%	48%	44%	59%	60%	71%	60%	49%
	D	12%	11%	8%	21%	33%	9%	2%	5%	44%
	Impervious[1]	17%	2%	0%	1%	8%	0%	26%	0%	2%

1: Effective Impervious Area (calibrated)

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3 METEOROLOGICAL BOUNDARY CONDITIONS

Meteorological data such as precipitation, evapotranspiration, temperature, and other climate timeseries are the primary forcing functions of the model—analytical considerations include data quantity and quality. Primary meteorological data products compiled and reviewed for this effort included two observed precipitation data products from the National Climatic Dataset Center (Global Historical Climatology Network – GHNC Daily and Local Climatic Data). Secondary meteorological data, which are derived or interpolated from primary sources, included monthly precipitation totals from the Parameter-elevation Regressions on Independent Slopes Model (PRISM), hourly precipitation distributions and potential evapotranspiration (ET) estimates from the North American Land Data Assimilation System (NLDAS2), a quality-controlled spatiotemporal dataset supported by the National Aeronautics and Space Administration (NASA), and reference ET rates from the California Irrigation Management Information System (CIMIS).

Because hydrologic models are highly dependent on the quantity and quality of meteorological forcing data, sometimes challenges arise when trying to associate point-sampled weather gauge data over complex terrain (Henn et al. 2018). The development and application of high-resolution gridded data products, or land surface models (LSM), to support continuous-simulation modeling and other geophysical applications has increased with advancements in computing capability and resources. Research related to those products focuses on methodology refinements, assessment of differences between products, and identification of primary drivers and geophysical conditions that affect the robustness of their application in different settings (Henn et al 2018; Behnke et al. 2016). All seven of the gridded products reviewed by Behnke et al. (2016) use the PRISM methodology to interpolate spatially because it considers orographic influence on rainfall variability.

The use of products like NLDAS2 and PRISM also helps to overcome some of the common issues encountered when working with rainfall gauge data, which sometimes contain impaired intervals of missing, deleted, or accumulated data. Missing or deleted intervals are periods during which either the gauge malfunctioned, or the data records were lost. Accumulated intervals contain cumulative precipitation reported over several hours or days, but the exact temporal distribution of the data is unknown due to a gauge malfunction. The LSM uses observed gauge data to guide the meteorological data extrapolation at fixed spatial intervals. LSM extrapolation considers orographic influence on the spatial variation, which can capture the influence of weather movements like those depicted in Figure 3-1. Topographic properties like elevation, aspect, and the windward/leeward location of the prediction point are considered when modeling rainfall variability (both timing and volume) across the landscape. As a result, LSMs extrapolate conditions for ungauged areas and interpolate spatial variability between gauged areas in a non-linear way. Gridded meteorological data representations can capture localized impacts such as rain shadow over the landscape. The quality-control and increased spatiotemporal resolution of meteorological boundary conditions improves the predictions of continuous simulation watershed models and benefits water balance calculations in large-scale continuous-simulation applications. NLDAS2 and PRISM are both updated in real-time in a consistent format, making it easier to periodically update boundary conditions for the watershed model as new information becomes available.

Figure 3-1. Orographic influence on weather movement.

Table 3-1 is a summary of available meteorological data by source that were reviewed as part of model development. Table icons indicate the temporal resolution of the data by source. NLDAS2 also includes the full suite of hourly meteorological timeseries that the model uses, except for dewpoint temperature, which is a function of air temperature, station pressure, and specific humidity and was computed from those NLDAS2 timeseries. The approach used was to intersect NLDAS2 and PRISM and scale the NLDAS2 hourly rainfall timeseries distributions with PRISM monthly precipitation totals. The resulting intersect is an hourly 4-km spatial distribution of PRISM timeseries (based on NLDAS2 rainfall distributions) for the San Mateo County watersheds—there are 94 unique sets of meteorological timeseries available for assignment to the modeled subwatersheds. The sets of meteorological timeseries covered the period between water years 1981 through 2015 at an hourly timestep, covering the periods of record from the USGS streamflow stations used for calibration and validation (Table 5-1). These timeseries include the representative water year 2002, which is suggested by the Bay Area RAA Guidance for simulation of baseline loading and is used as the evaluation period in this RAA.

Table 3-1. Summary of the climate parameters evaluated during the initial inventory.

Meteorological Data	Temporal Resolution of Meteorological Data by Source			
	(Timestep: ● Hourly, ○ Daily, ☐ Monthly)			
	(a) GHCN	(b) LCD	(c) PRISM-M	(d) NLDAS2
Precipitation	○	●	☐	●
Potential Evapotranspiration	--	--	--	●
Daily Air Temperature (Min/Max)	○	--	☐	--
Hourly Air Temperature	--	●	--	●
Solar Radiation	--	●	--	●
Cloud Cover	--	●	--	●
Wind Speed	--	●	--	●
Wind Direction	--	●	--	●
Station Pressure	--	--	--	●
Specific Humidity	--	--	--	●[1]
Dewpoint Temperature	--	●	--	●[2]

Acronyms: (a) Global Historical Climatology Network, (b) Local Climatic Data, (c) Parameter-elevation Regressions on Independent Slopes Model-Monthly aggregated timeseries, (d) North American Land Data Assimilation System.
1: *Specific Humidity* converted to *Relative Humidity* as a function of *Air Temperature* and *Station Pressure*
2: *Dewpoint Temperature* calculated as a function of *Air Temperature* and *Relative Humidity*

3.1 Subwatershed Assignment

In the LSPC model, one set of meteorological timeseries are assigned to each of the delineated model subwatersheds—it is also assumed that the associated precipitation falls uniformly within each subwatershed. To better manage the rigidity of that assumption, subwatersheds were delineated at a finer resolution in portions of the watershed where rainfall variability was relatively high over short distances. Data analysis from other modeling studies have shown notable differences in observed rainfall data collected at different locations at the same facility (e.g., opposite ends of an airport runway). Henn et al. (2018) also describe paired comparisons of observed rainfall gauges located within the extent of a single grid, which report different rainfall volumes and distributions. Ultimately, the predicted hydrologic response of higher-resolution meteorological boundary conditions validates how representative they are of weather conditions upstream of the modeled assessment point.

Figure 3-2 shows long-term historical average distribution of annual average PRISM rainfall for the region overlaid with modeled subwatersheds, PRISM, and NLDAS2 data centroids. Meteorological boundary conditions were associated with subwatersheds by assigning the grid that covered most of the subwatershed area.

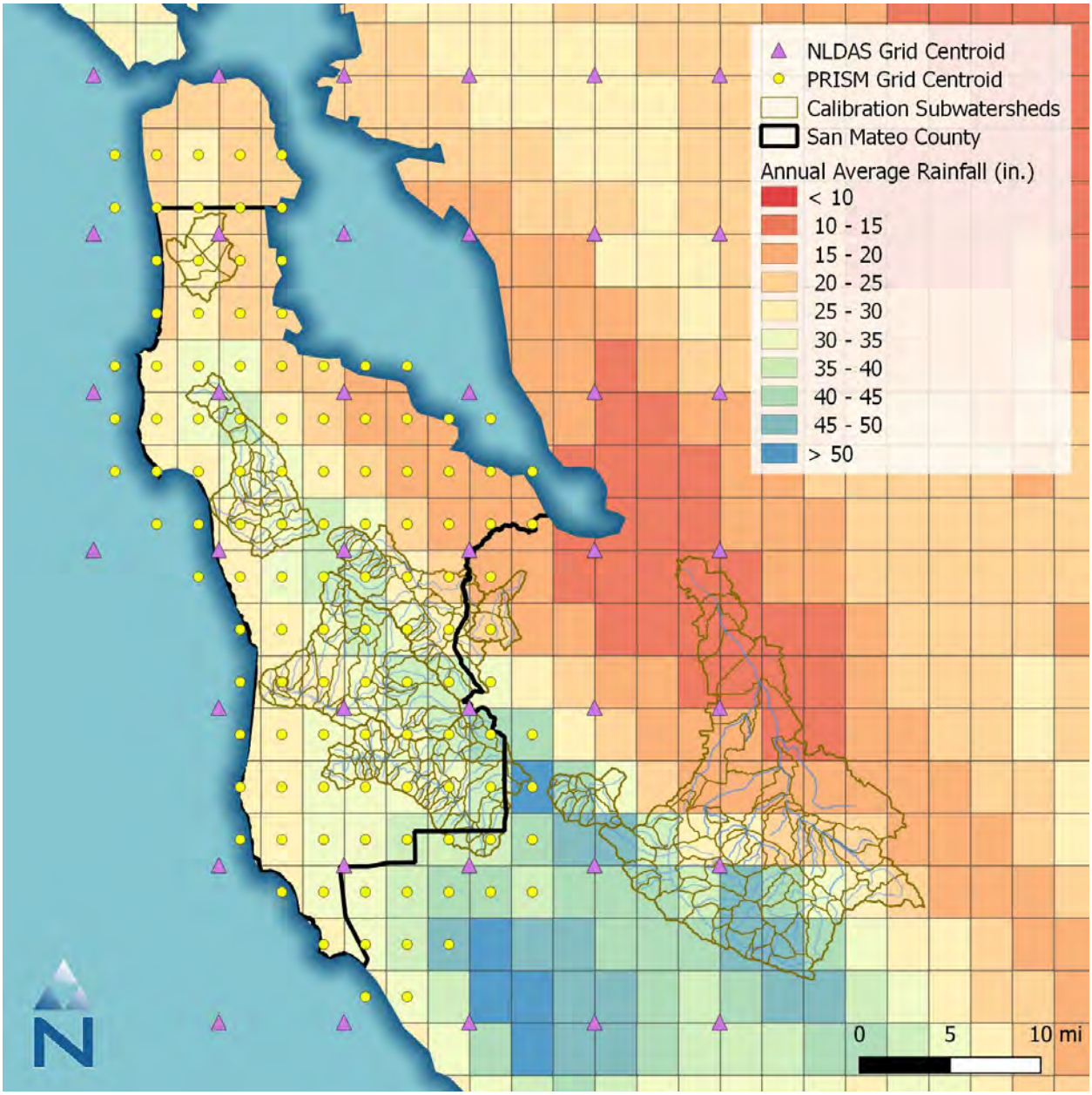

Figure 3-2. Annual average PRISM rainfall depths with associated PRISM and NLDAS2 data centroids.

3.2 Elevation and Aspect Analysis

The PRISM data were analyzed against topographic data to better understand the implications of orographic influences reflected in the PRISM annual average rainfall totals. The elevation of each PRISM centroid was extracted from an overlay with National Elevation Dataset (NED) Digital Elevation Model (DEM). Hillslope aspect was also derived from the DEM and extracted for each PRISM centroid. Aspect was categorized into north-, east-, south-, and west-facing quadrants using the degrees scale shown in the legend of Figure 3-3. Of the available PRISM grid centroids, 137 centroids were within the clipped NED-watershed boundary.

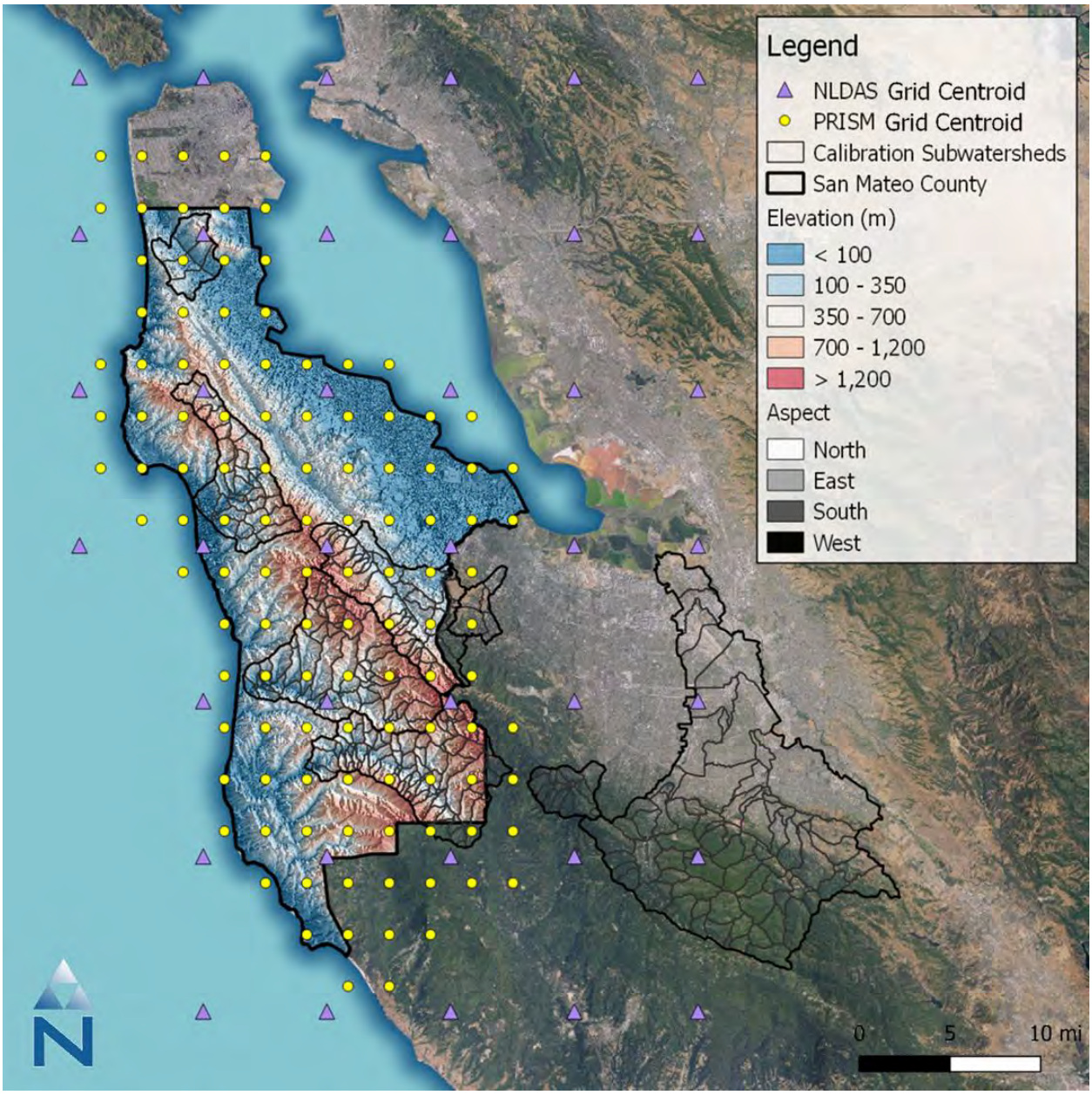

Figure 3-3. Overlay of PRISM centroids with NED-derived elevation and aspect.

The influence of elevation on precipitation was first evaluated. PRISM centroids were sorted by increasing elevation and associated average annual rainfall was plotted. The data were grouped into 5 equal elevation bins for analysis (low, medium-low, medium, medium-high, and high)—the median elevation of each bin was plotted for reference, as shown in Figure 3-4. The graph shows a gradual increase in rainfall with elevation; however, the variability suggests that other factors besides elevation also have an influence on annual average rainfall. The data were also binned and analyzed by aspect. Figure 3-5 shows how average rainfall varies by both elevation and aspect.

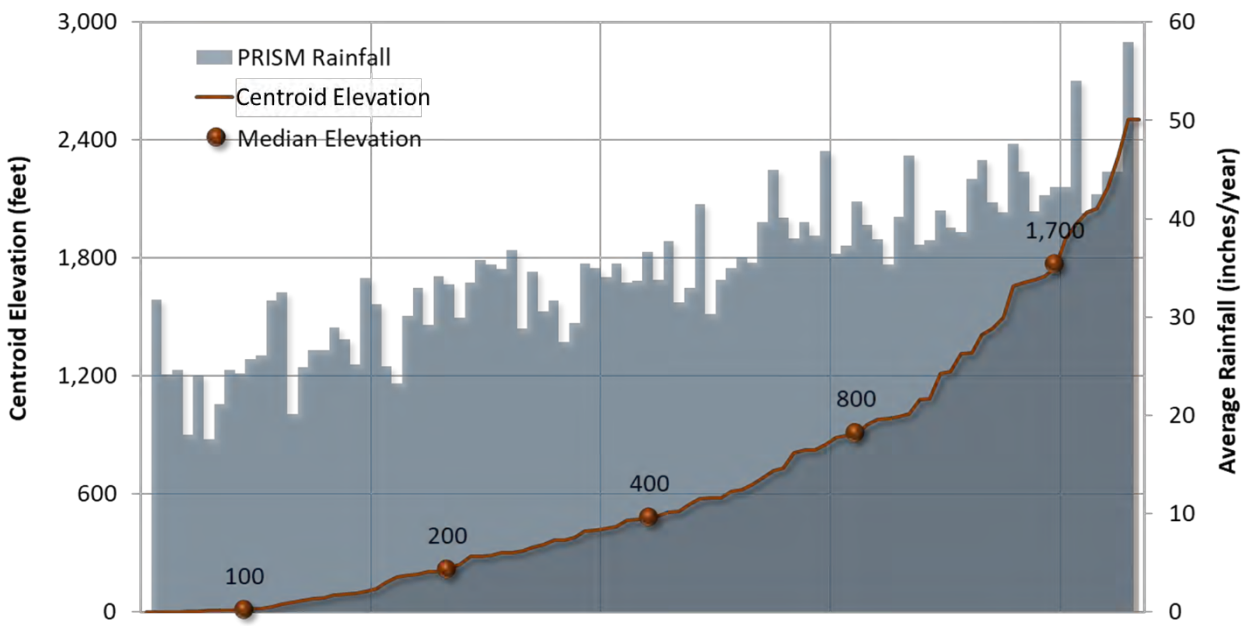

Figure 3-4. Average annual PRISM rainfall vs. centroid elevation (with median elevation of 5 bins).

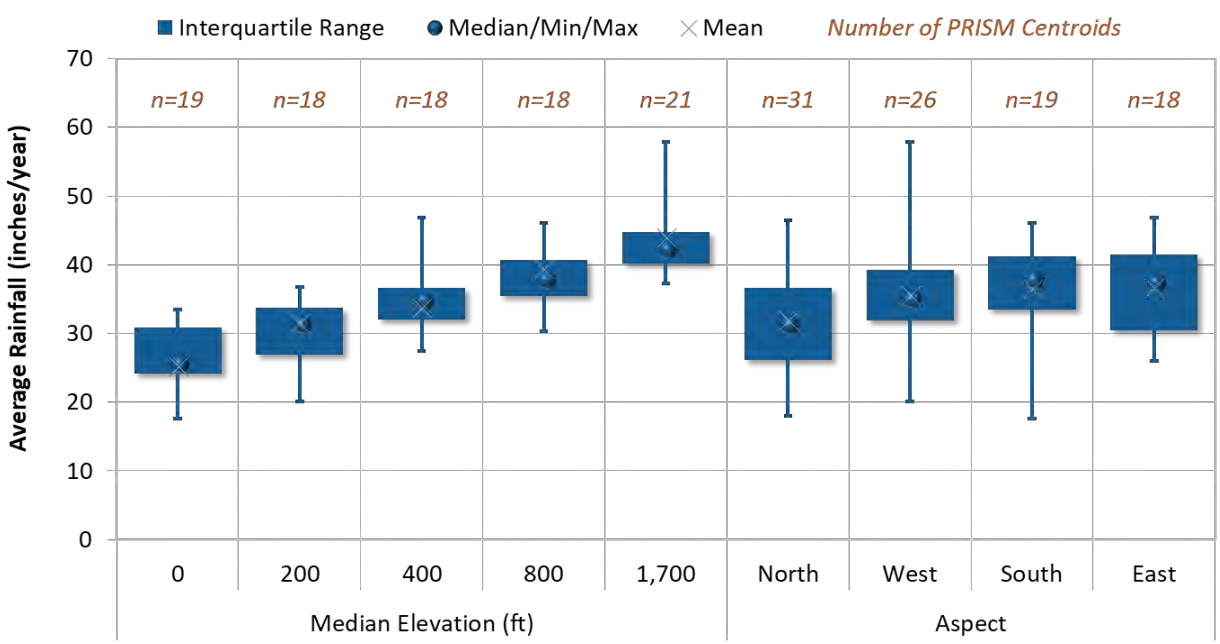

Figure 3-5. Box plots of average annual rainfall variability by elevation and aspect.

To assess the combined impact of elevation and aspect in San Mateo County PRISM average annual rainfall, the 94 centroids were grouped into 20 bins of elevation and aspect (5 elevation × 4 aspect groups). Because of the variable terrain, there were between 3 to 7 centroids within each of the 20 bins. The median rainfall was calculated for each bin, as summarized in Table 3-2. Figure 3-6 is a surface plot of the median rainfall (vertical axis) versus elevation and aspect (horizontal plane)—the surface illustrates the central tendency of the combined impact of elevation and aspect on average annual rainfall. The right panel of Figure 3-6 is the birds-eye view from the top of the surface shown in the left panel—it shows horizontal and vertical surface transects for aspect and elevation, respectively.

Table 3-2. Median rainfall (and distribution of PRISM centroids) by elevation and aspect.

Elevation		Hillslope Aspect (No. Centroids)				Total
Bin	Median (ft)	North	West	South	East	
1	0	6	5	4	4	**19**
2	200	6	5	4	3	**18**
3	400	6	5	3	4	**18**
4	800	6	5	4	3	**18**
5	1,700	7	6	4	4	**21**
Total		**31**	**26**	**19**	**18**	**94**
Elevation		**Hillslope Aspect (Median Rainfall, in./yr)**				**Median**
Bin	**Median (ft)**	**North**	**West**	**South**	**East**	
1	0	25	25	29	29	**25**
2	200	26	34	33	30	**33**
3	400	30	35	40	37	**34**
4	800	35	38	41	41	**38**
5	1,700	40	45	42	44	**43**
Median		**31**	**35**	**38**	**38**	**35**

Color gradient shows relative rainfall depth. Darker is higher.

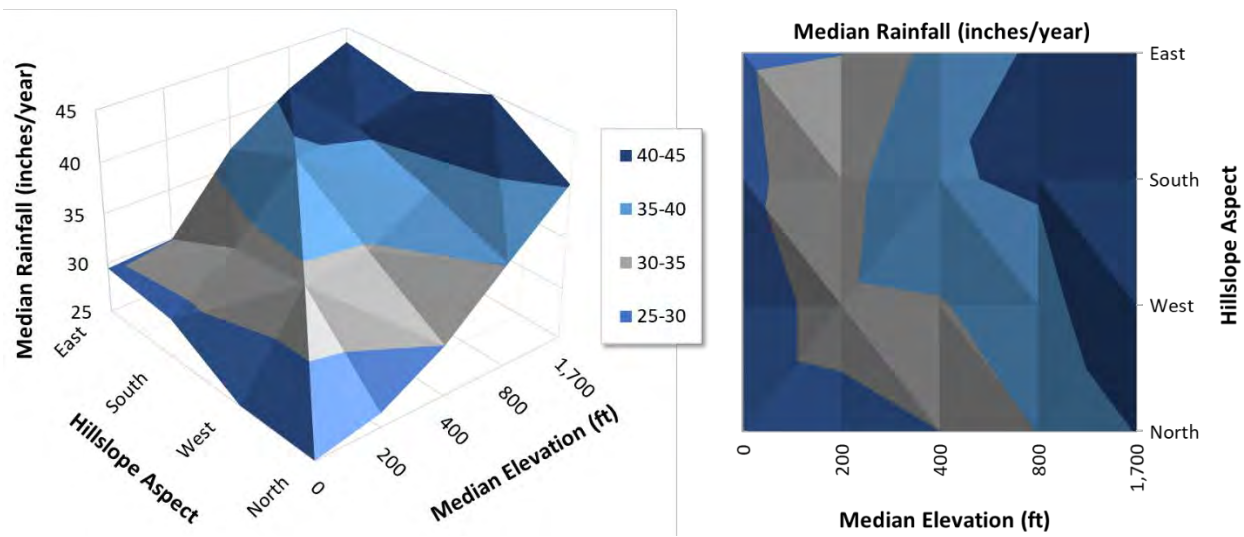

Figure 3-6. Surface plot of median rainfall (vertical axis) vs. elevation and aspect (horizontal plane).

Figure 3-6 shows that the driest areas of the study area are the lowest-elevation areas, regardless of aspect; however, the wettest are highest-elevation west-facing slopes. In general, above 1,700 feet, the impact of aspect on annual average rainfall volume is diminished. The 800-feet elevation transect has the least variability in median rainfall. There is a lot of variability along the aspect transects, with the west-facing slopes having the widest range of variability across the range of elevations. Sometimes this insight can guide the selection/assignment of representative gages to subwatersheds and help with understanding modeled responses; however, the default assignments used for model calibration were sufficiently reflective of the spatial variability and resolution.

3.3 Evapotranspiration (CIMIS)

Evapotranspiration (ET), the combined loss of water to the atmosphere from soil evaporation, plant surfaces, and plant transpiration, accounts for a large portion of a hydrologic water budget. The model requires potential ET (PEVT) as an input, but the actual ET varies depending on vegetative cover (type, density, height) and soil conditions, making it virtually impossible to measure precisely for all environmental conditions. Nevertheless, having approximate estimates for ET is beneficial for simulating flux of soil moisture in the watershed model. The CIMIS was established to help irrigators efficiently manage water resources. CIMIS was developed in 1982 by the California Department of Water Resources and the University of California, Davis. The network is composed of over 145 automated weather stations throughout California where primary weather data including temperature, relative humidity, wind speed, and solar radiation are monitored and quality-controlled. Those data are measured over standardized reference surfaces (e.g. well-watered grass or alfalfa) and are used to estimate reference evapotranspiration (ETo) using the customized Penman and Penman-Monteith equations. CIMIS has divided California into 18 zones based on long-term monthly average ETo values calculated using data from CIMIS weather stations. Figure 3-7 is a map of CIMIS zones for San Mateo County with a plot of monthly average ETo for the mapped zones.

The western portion of San Mateo County closest to the coast falls in the Coastal Plains Heavy Fog Belt (CIMIS Zone 1); however, those areas drain to the ocean. The coastal marine cloud layer reduces PEVT by limiting solar radiation exposure. As shown in Figure 3-7, this results in lower PEVT per unit area in the Heavy-Fog belt compared to the rest of the county. Watersheds draining to the Bay are part of the Upland Central Coast and Inland San Francisco Bay CIMIS Zones, which have higher PEVT than the portions of San Mateo county closer to the ocean.

CIMIS provides relative macro-scale differences in PEVT; however actual ET varies in magnitude as a function of vegetative cover. There are smaller-scale changes to instream flows due to changes in activities like agriculture and irrigation demand. For water budget calculations, ET coefficients are applied to PEVT data as a function of land cover to reflect the stratification of vegetative density and impacts. Example ET coefficients from literature are shown in Table 3-3, along with the range of calibrated values used in the model. This approach adds spatial resolution by allowing ET to vary as a function of land cover, which also varies by subwatershed. Stratification by land cover, using coefficients like those presented in Table 3-3, adds more texture and spatial variability when calculating the ET component of the water balance.

Table 3-3. Literature vs. calibrated stratification of PEVT multipliers by land cover type.

Cover Type	Land Cover	PEVT Multipliers		Rationale [1]
		Literature	Model	
Urban	Impervious	1.2	1.0	Above average PEVT (warm exposed surfaces)
	Pervious	0.9	0.7	Grass or shrub vegetation
	Construction	1.0	1.0	No vegetation; use standard PEVT rate
Rural [2]	Agriculture	0.9	0.8 - 0.9	Grass or shrub vegetation
	Barren	0.9	0.8 - 0.9	Grass or shrub vegetation
	Forest/Wetland	0.85	1.2 – 1.3	Light wind, high relative humidity
	Grass-Shrub	0.9	0.8 – 1.2	Grass or shrub vegetation
Water	Water	1.0	1.0	Use evaporation rate for open water

1 Reference: Bedient and Huber, 2002. Table 1.2, Page 47.

2 Rural Land Cover categories and PEVT coefficients were further refined to account for soil type, slope, and irrigation activity. Areas with steeper slopes generally had taller vegetation with deeper root systems and therefore, more PEVT. Forest also tended to be spatially mixed with grass/shrub areas.

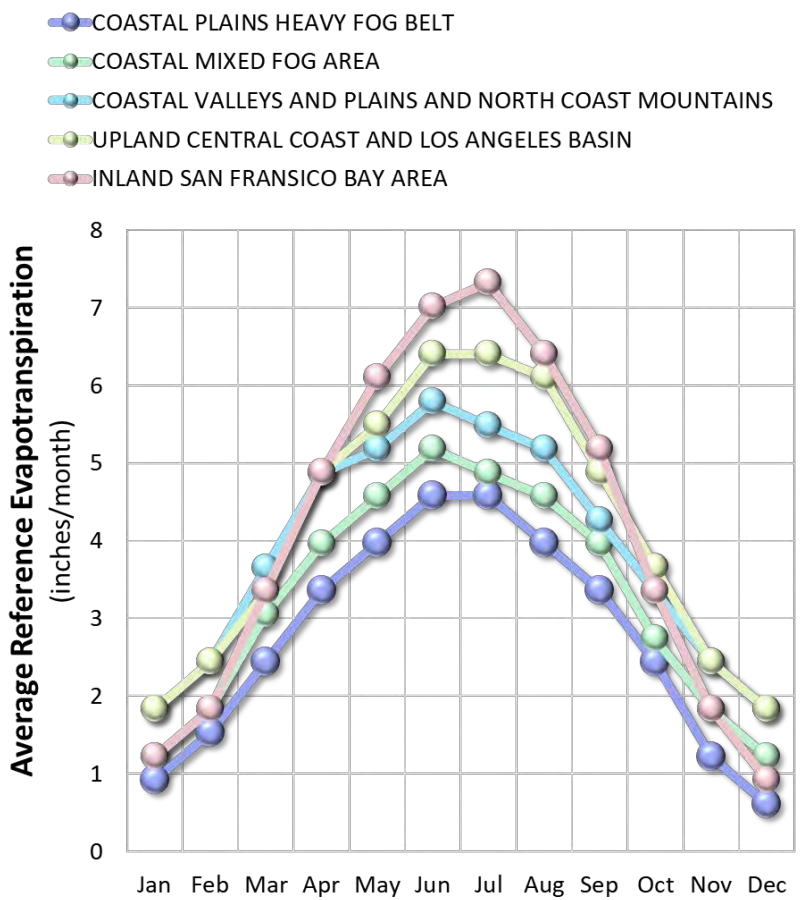

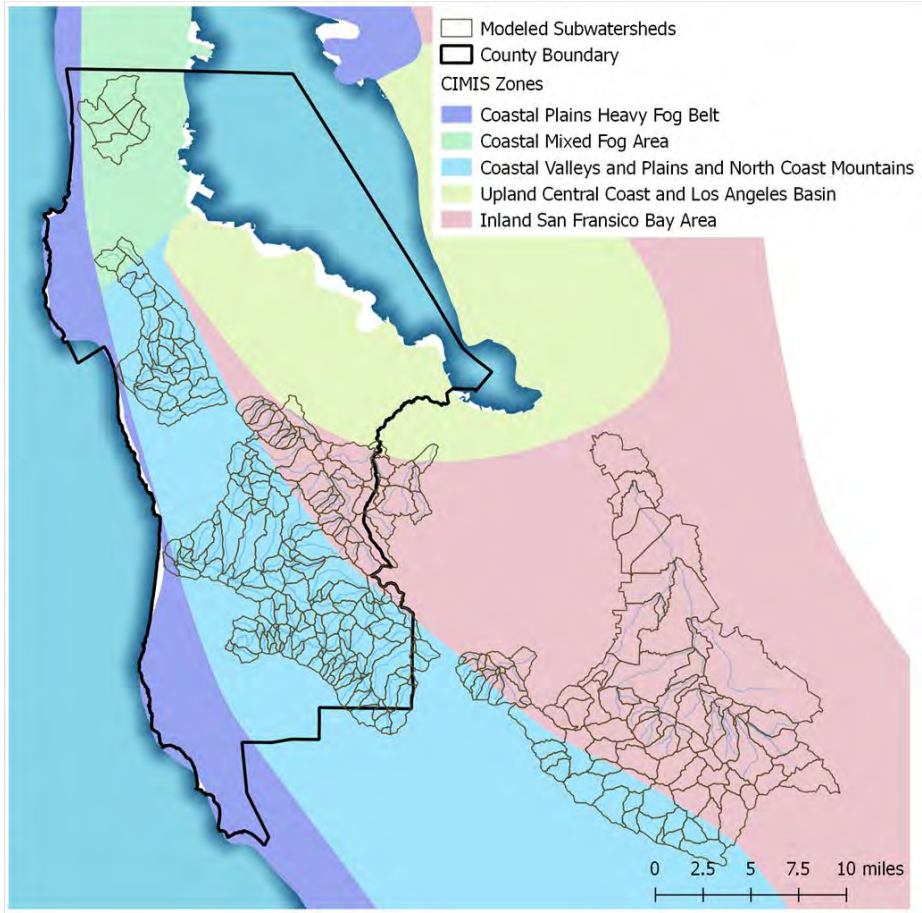

Figure 3-7. Average monthly reference evaporation for CIMIS zones in the region near San Mateo County.

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4 MODEL CALIBRATION PROCESS

The approach described here follows modeling recommendations from both the EPA RAA Guide and the Bay Area RAA Guidance while incorporating internationally recognized modeling protocols and conventions. For example, the 2002 EPA guidance document on developing Quality Assurance Project Plans (QAPP) for modeling refers to calibration as the configuration and refinement of the analytical instruments that will be used to generate analytical data. The "instrument" is the predictive tool (i.e. the model) that is to be developed and/or applied. Figure 4-1 is a generalized schematic describing the process for model calibration that aims to minimize the propagation of uncertainty. This process builds upon the model development cycle and elements of data quality control previously shown in Figure 1-2. The previous section provided a comprehensive discussion of the analysis and processing of weather data to ensure quality of input data that drives the overall accuracy of the model. The following sections summarize the remaining model calibration processes depicted in Figure 4-1.

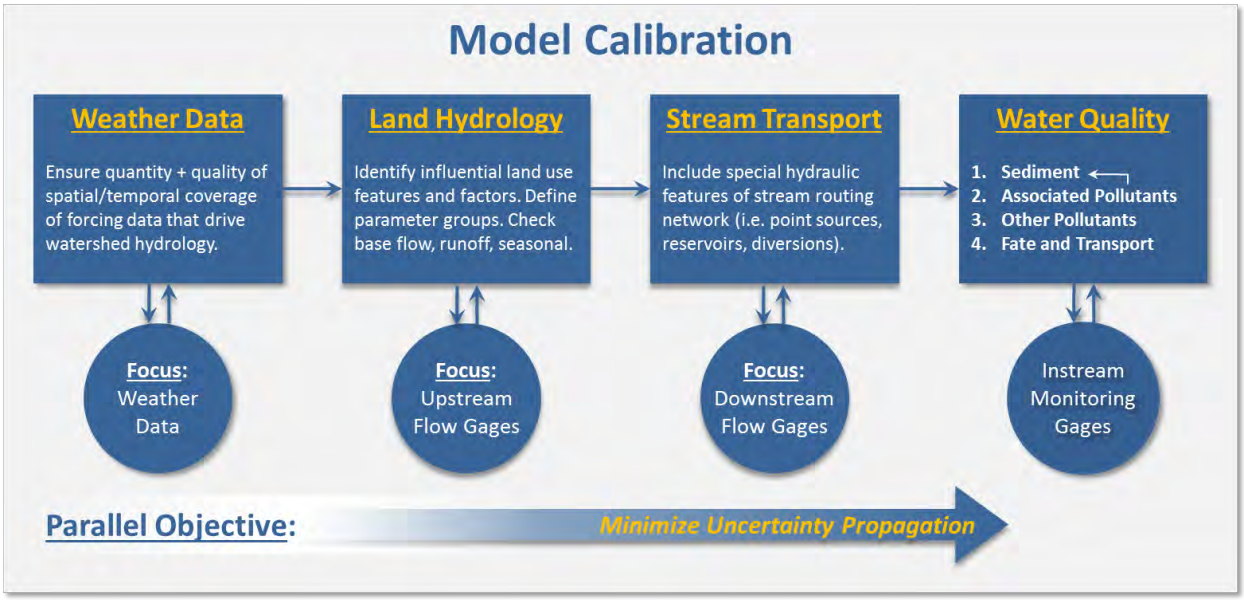

Figure 4-1. Process for model calibration to minimize propagation of uncertainty.

4.1 Land Hydrology

Demonstrating model calibration is key to the model development process, as it forms the basis for establishing the degree of uncertainty in model predictions and the reliability of the model for making management decisions. Models are deemed acceptable when they can simulate field data within predetermined statistical measures provided in the Bay Area RAA Guidance. After weather data and meteorological boundary conditions are well established, a top-down weight of evidence approach progresses as follows: (1) calibrate undeveloped background conditions, (2) add intermediate mixed land use areas, and (3) aggregate all sources via routing to a downstream location for comparison with co-located flow data. Figure 4-2 is a schematic showing the parameterization and calibration sequence for land hydrology. Unit-area results from this step were summarized and compared relative to each other and against representative published literature values. This step provides an early opportunity to identify possible errors, anomalies, or other unrepresentative behavior prior to aggregation, instream routing, and transport.

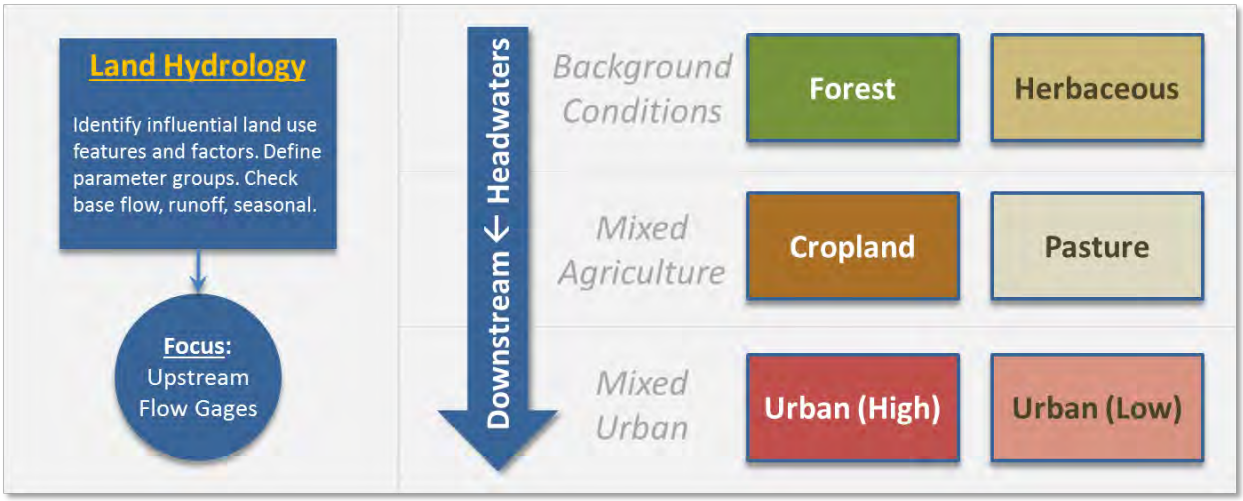

Figure 4-2. Model parameterization and calibration sequence for land hydrology.

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4.2 Stream Transport

Outputs from land hydrology were aggregated and routed to the stream transport model. In some cases, other features such as impoundments, diversions, withdrawals, and point sources influence the water balance. Figure 4-3 is a schematic of stream transport model parameterization and calibration sequence. Results for Colma Creek and the Guadalupe River watershed, which respectively represent urbanized and mixed urban/natural watersheds with multiple hydraulic controls (e.g., spreading grounds, impoundments), are presented here. Among the calibration watersheds, Guadalupe River watershed was most heavily influenced by hydraulic controls. Daily streamflow data immediately downstream of reservoir releases and in diversion channels from the Santa Clara Valley Water District were requested and used to characterize reservoir operations and stream transport elements during model calibration.

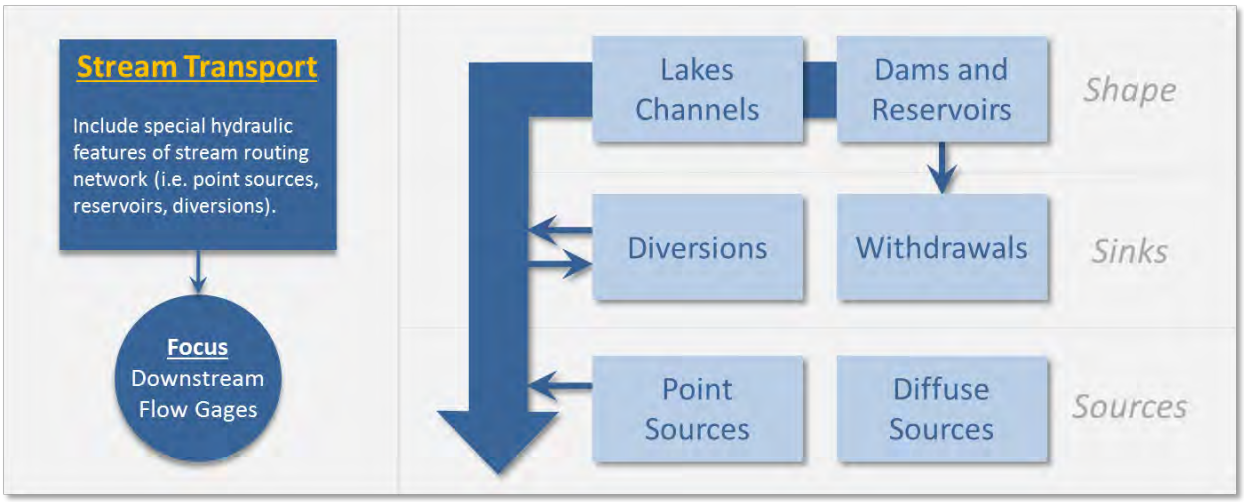

Figure 4-3. Model parameterization and calibration sequence for waterbodies and stream transport.

4.3 Performance Metrics

Table 4-1 presents recommended model performance metrics for hydrology, sediment, and PCBs (BASMAA 2017). The Bay Area RAA Guidance specifies annual percent difference calibration metrics, which align with the spatial and temporal scales of the Bay TMDLs. For additional resolution regarding the timing of flow and pollutant loads, monthly and seasonal model hydrology performance were also evaluated as part of the calibration effort.

Table 4-1. Model calibration performance targets (Bay Area RAA Guidance document, Table 4-2).

Model Parameters	%-Difference (Annual Simulated vs. Observed)		
	Very Good	Good	Fair
Hydrology/Flow[1]	< 10%	10-15%	15-25%
Sediment[1]	< 20%	20-30%	30-45%

1: Reference: Donigian 2000 as cited in LARWQCB 2014.

5 HYDROLOGY

A phased weight-of-evidence approach was used for hydrology calibration. First, an initial set of model parameters were selected from the BAHM (Clear Creek Solutions 2014) and refined and stratified by HRU with guidance from the BASINS Technical Note 6: *Estimating Hydrology and Hydraulic Runoff Parameters* (USEPA 2000). The goal was to characterize the relative hydrological response of the various HRU combinations of land cover, soil type, and slope such that the routed aggregate response of the model was representative of observed trends at the flow monitoring gages. A regional model development approach was used, meaning that the same HRU in different parts of the watershed had the same parameterization. Identically parameterized HRUs can produce a different result because of changes in meteorological conditions. Parameters like the infiltration index (INFILT) were varied by soil type, while others like interception storage (CEPSC) varied seasonally as a function of estimated vegetation cover. The spatial texture provided by HRU combinations of land cover, soil type, and slope provided a physical basis for assigning parameters during calibration, which resulted in robust model validation as they were spatially aggregated by the model.

When model results diverged from observed data, Google Earth was used to further investigate and identify unrepresented features such as impoundments, concrete-lined channels, or other hydraulic features that may be attributable to the divergent model results. Finally, wherever it was possible to represent those notable features, model parameters were fine-tuned so that the calculated error statistics fell within the targeted model performance ranges.

A weight-of-evidence based modeling approach is strengthened by evaluating model performance against observed streamflow across different sized watersheds and time periods that capture a range of hydrologic conditions. Table 5-1 presents a temporal summary of nine of the best-quality USGS streamflow gages in the San Mateo County region. The USGS streamflow records were flagged to differentiate periods of "good" data from "missing" or "estimated" records, which were derived using non-standard methods. The gages selected for calibration had at least 7 continuous years of "good" data records. Smaller watersheds with shorter periods of record were used for calibration, while the larger watersheds with longer continuous data were used for validation. The primary calibration stations are the three outlined in yellow, which all had at least 10 continuous years of data between 2006 and 2015; the secondary calibration stations were the four outlined in red with continuous consecutive years of data ranging from 7 to 21 years for earlier periods (between 1981 and 2001). Two stations in the watershed had 35 years of continuous streamflow records and represented a drainage area with a mix of modeled HRUs. Those two stations were used for model validation.

Table 5-1. Summary of USGS gage data quantity and quality for calibration watersheds between 10/1/1980 and 9/30/2015.

Outlet	Gage ID	Water Years (October 1, 1980 – September 30, 2015)																																	
		1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
104	11169025																						●	●	●	●	●	●	●	●	●	●	●	●	●	●
201	11169500	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◕	●	●	◕												
301	11166000	●	●	●	●	●	●	●	●	●	●	●																							
401	11162500	●	●	●	●	●	●	●	●	●	●	●	●	●	●	◕	●	◕	◕	●	●	●	●	◕	●	●	●	●	●	●	●	●	●	●	●	●
501	11162570	●	●	●	●	●	●	●	●	●	●	●	●	●	●																				
601	11164500	●	●	●	●	●	●	●	●	●	◕	●	●	●	◕	●	●	●	◕	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
701	11162630	●	●	●	●	●	●	●	●	●	●	●	●	◕	◕	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
721	11162620																		●	●	◕	●	◕	◕	●	●	●	●	●	●	●	●	●	●	●	●
801	11162720	●	●	●	●	●	●	●	◕	◕	●	◕	●	◕	◑	○	◕	●												○	○	○	○	○	○	○

Legend:

Data Quality (Percent Estimated):

	○	◔	◑	◕	●
No Data	90-100%	65-90%	35-65%	10-35%	0-10%

Monitoring time period:

Older	*Recent*	*Long Term*
Calibration	*Calibration*	*Validation*

Data Quantity (Percent Complete, **Calibration** watersheds)

0%	25%	50%	75%	100%

Data Quantity (Percent Complete, **Validation** watersheds):

0%	25%	50%	75%	100%

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Table 5-2 and Table 5-3 present quantitative and qualitative assessments of modeled vs. observed comparisons respectively, at the selected calibration/validation gages. The Bay Area RAA guidance (BASMAA 2017) recommends attaining model performance of ≤10% error in total annual volume, which corresponds to the first column in Table 5-2. Three additional metrics that are commonly evaluated for hydrology were also assessed to test the robustness of model predictions during critical conditions for the TMDLs. The following subsections present additional details about model configuration and comparisons for a selected subset of the gages presented below.

Table 5-2. Modeled vs. observed calibration/validation statistics at selected locations.

Gage Status	USGS Gage ID	LSPC Model Outlet	Relative Error Model Statistics			
			Total Annual Volume	10% Highest Flow	Total Winter Volume	Seasonal R^2
Recent Gage Data[1]	11169025	104	-6.8%	-12.5%	-4.7%	0.954
	11162630	701	-1.6%	0.3%	-0.7%	0.977
	11162620	721	-3.7%	-7.4%	0.9%	0.979
Discontinued Gages[1]	11169500	201	2.6%	-3.6%	7.8%	0.967
	11166000	301	-1.7%	-7.1%	-7.6%	0.981
	11162570	501	2.0%	-10.2%	3.0%	0.978
	11162720	801	5.9%	8.6%	14.3%	0.965
Long-Term Gages[2]	11162500	401	6.8%	-11.5%	3.9%	0.984
	11164500	601	5.0%	-10.1%	-2.5%	0.969

1: Calibration gages: Recent (primary) and discontinued (secondary) gages
2: Validation gages: Long-term streamflow data (35 consecutive/continuous recorded years)

Table 5-3. Qualitative assessment of modeled vs. observed calibration/validation statistics.

Gage Status	USGS Gage ID	LSPC Model Outlet	Relative Error Model Statistics			
			Total Annual Volume	10% Highest Flow	Total Winter Volume	Seasonal R^2
Recent Gage Data[1]	11169025	104	Good	Good	Very Good	Very Good
	11162630	701	Very Good	Very Good	Very Good	Very Good
	11162620	721	Very Good	Very Good	Very Good	Very Good
Discontinued Gages[1]	11169500	201	Very Good	Very Good	Good	Very Good
	11166000	301	Very Good	Very Good	Very Good	Very Good
	11162570	501	Very Good	Good	Very Good	Very Good
	11162720	801	Good	Very Good	Good	Very Good
Long-Term Gages[2]	11162500	401	Good	Good	Very Good	Very Good
	11164500	601	Good	Good	Very Good	Very Good

1: Calibration gages: Recent (primary) and discontinued (secondary) gages
2: Validation gages: Long-term streamflow data (35 consecutive/continuous recorded years)

5.1 Calibration: Colma Creek

Colma Creek was the only primarily urban tributary with multiple years of flow monitoring data. As summarized in Table 5-1, the quality of recent data was poor; however, there were 7 years of continuous USGS monitoring between water years 1981 and 1987 that were both complete and of high-quality. As shown in Figure 5-1, the lower portion of Colma Creek is surrounded by flood-control walls, and some parts are buried. The upper portion of the watershed has more green space, some of which is irrigated. The flow gage is in the concrete-lined portion of the creek.

Specific adjustments were made to the model to account for known physical features or anthropogenic activities in the watershed. To represent concrete lined channels, all active groundwater outflow (AGWO) and 50 percent of interflow outflow (IFWO) from the lower four subwatersheds was restricted from entering the stream channel. These adjustments reduced low-flow streamflow to mimic the resulting impact of flood control walls, which restrict baseflow from entering the stream channel. Irrigation was also represented in the model, assuming that 20 percent of the urban pervious areas was irrigated at an Irrigation Demand rate of (0.7 × PEVT). The actual amount of water irrigated on any given day is the difference between computed demand and precipitation.

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Figure 5-1. Colma Creek land characteristics and special features modeled.

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The model calibrated very well after accounting for the influence of concrete-lined channels. Figure 5-2 shows comparison of monthly observed vs. modeled flow in the top panel, calibration statistics in the middle panel, and a seasonal aggregate comparison in the lower panel. The model captures year-to-year variability as well as seasonal hydrograph swings.

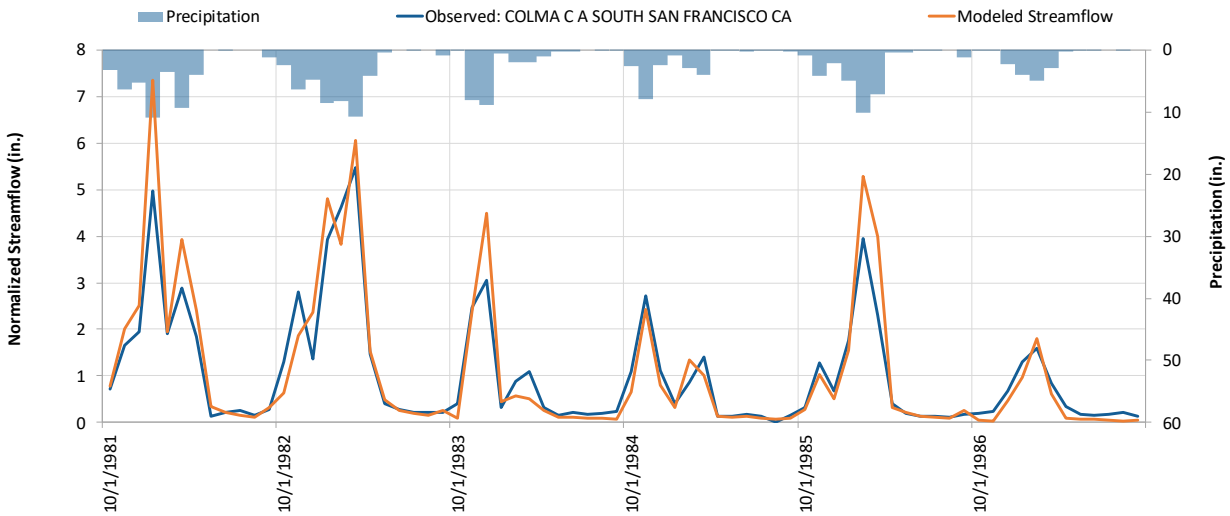

Calibration Metrics (10/01/1981 - 09/30/1987)	Relative Mean Error	Recommended Error Criteria			
		Very Good	Good	Fair	Poor
Total Annual Volume	5.9%	≤ 5%	5 - 10%	10 - 15%	>15%
Highest 10% of Flows	8.6%	≤ 10%	10 - 15%	15 - 25%	>25%
Lowest 50% of Flows	9.2%	≤ 10%	10 - 15%	15 - 25%	>25%
Annual Storm Volume	12.2%	≤ 10%	10 - 15%	15 - 25%	>25%

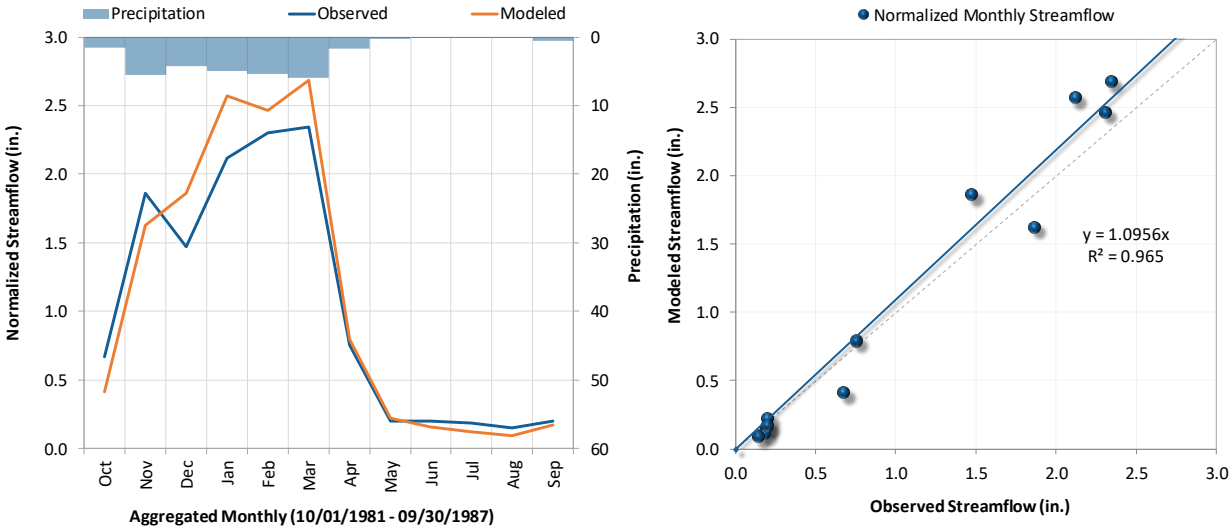

Figure 5-2. Hydrology calibration monthly summary for Colma Creek.

5.2 Calibration: Guadalupe River

The Guadalupe River watershed has been previously modeled for hydrology, PCBs, and mercury loading using HSPF (Lent and McKee 2011). Prior to that study, the Guadalupe River was identified as supplying a disproportionately large load of mercury and PCBs to the Bay. The watershed has a history of known water quality issues, such as historic mining activities decommissioned in the 1970s, and large amounts of supporting data. The results of that model served as the basis for regional extrapolation of PCB and mercury loads for the Bay TMDLs.

The Guadalupe River watershed has a mix of urban and non-urban features. There are some reservoirs in the undeveloped/natural headwaters. The Santa Clara Valley Water District maintains some long-term streamflow gages immediately downstream of those reservoirs and at other streams in the watershed. The previous HSPF modeling effort used gage data downstream of the reservoirs as boundary conditions because the modeling focus was primarily the lower urbanized portion of the watershed. An objective of this effort was to better characterize the water balance and understand the mobility of sediment and associated pollutants during transport. There were a few ungaged reservoirs in the San Mateo watersheds as well; therefore, having a calibrated response at gaged watersheds supported the extrapolation of generalized methods and assumptions to ungaged watersheds.

Figure 5-3 shows the schematic for a generalized reservoir segment used to represent to represent reservoirs in this model. Locking down the known and estimated properties shown in the schematic makes it possible to predict the volume-discharge rating curve (or FTABLE), which is used by the model to simulate the reservoir. Other unique features in the watershed, as shown in Figure 5-4, include the Almaden-Calero diversion channel, an inflatable dam for low flow recharge (Kirk Dam), and managed low-flow releases from upstream reservoirs to the Los Alamitos percolation ponds. The downstream portion of the watershed is developed. In contrast to the other mixed or non-urban reservoir-impacted calibration gages, Canoas Creek is an urbanized tributary to the Guadalupe River with a flatter terrain, as is typical of the downstream portion of the watershed and other coastal Bay subwatersheds. As shown in Figure 5-5 calibration summary, the model predicted flow well in Canoas Creek for 2006 to 2015.

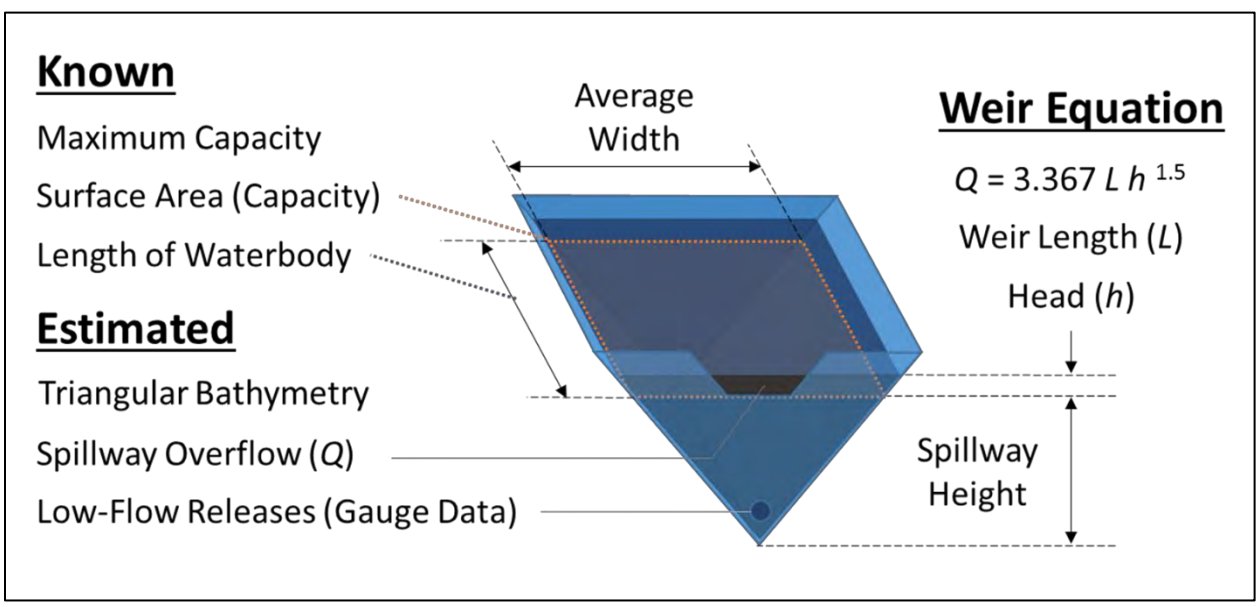

Figure 5-3. Generalized representation of reservoir segments in the model.

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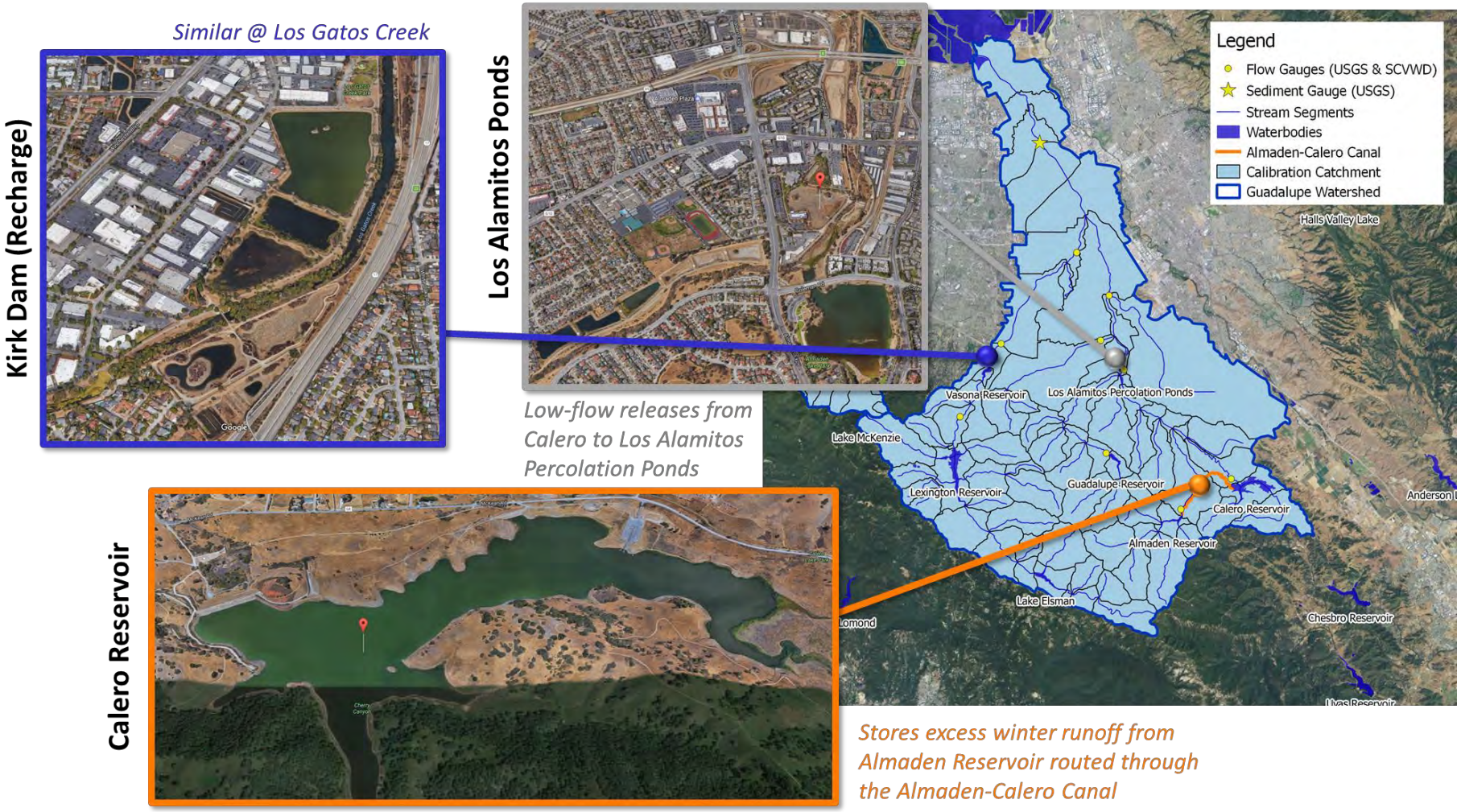

Figure 5-4. Guadalupe River watershed delineation, reservoir segments, and special features modeled.

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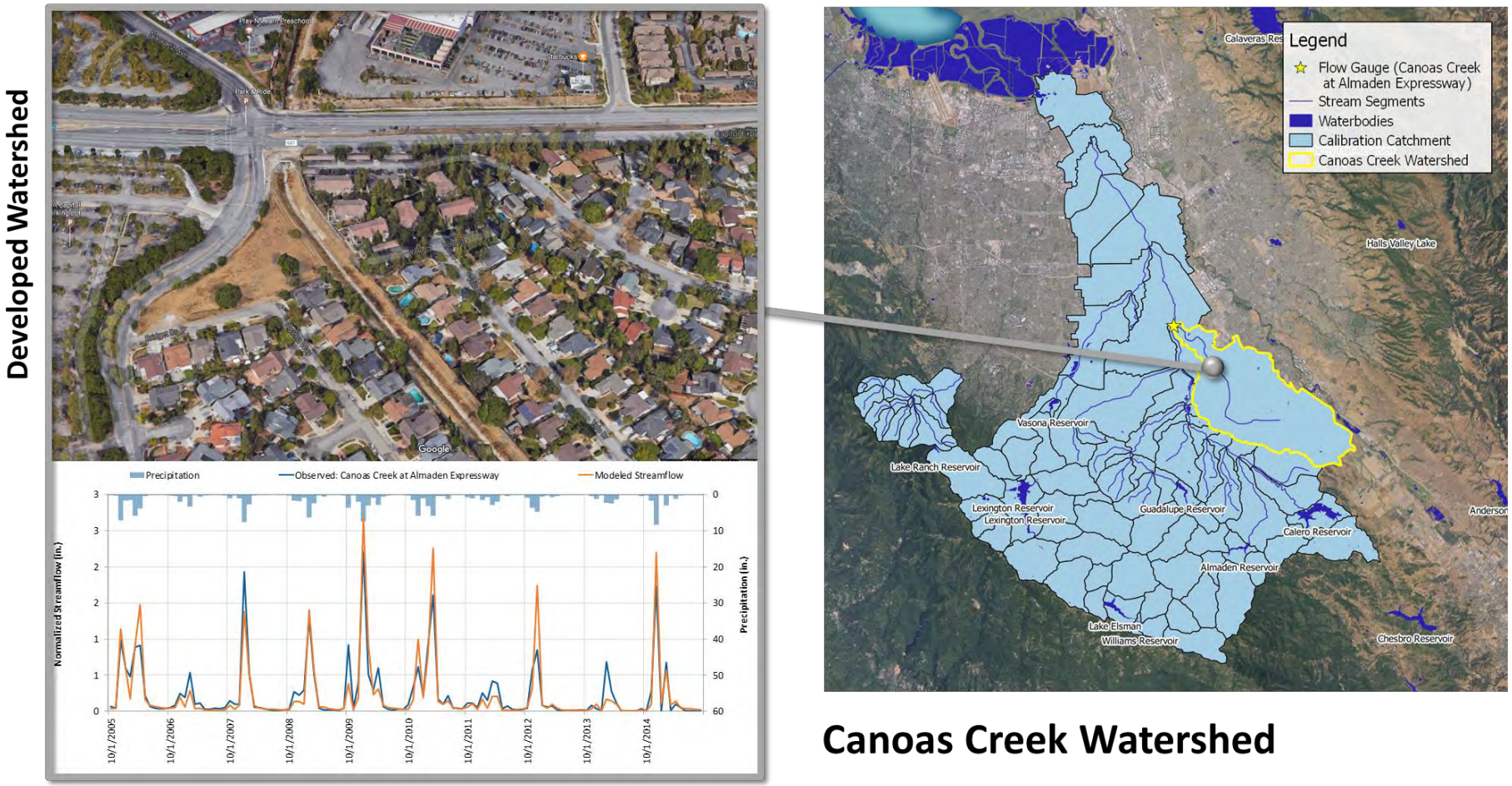

Figure 5-5. Canoas Creek (developed watershed) calibration summary.

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Model performance was evaluated at several intermediate gages to check water balance throughout the network. Low-flow reservoir releases to percolation ponds were represented using hydrograph separation approaches on the Santa Clara Valley Water District data downstream of each reservoir and represented as point source withdrawal/discharges from the reservoirs to the downstream segments—high flows could overflow the spillway weirs when applicable. Figure 5-7 shows comparison of observed versus modeled seasonally aggregated flow comparison in the lower panel, interquartile seasonal ranges in the lower left, and monthly 1-to-1 over the same period in the lower right. Figure 5-7 shows the associated monthly timeseries comparison and Table 5-4 shows calibration statistics at the downstream Guadalupe River gage. Across all calibration metrics and evaluation windows, the model is a robust predictor of observed flow and captures year-to-year variability as well as seasonal hydrograph fluctuations.

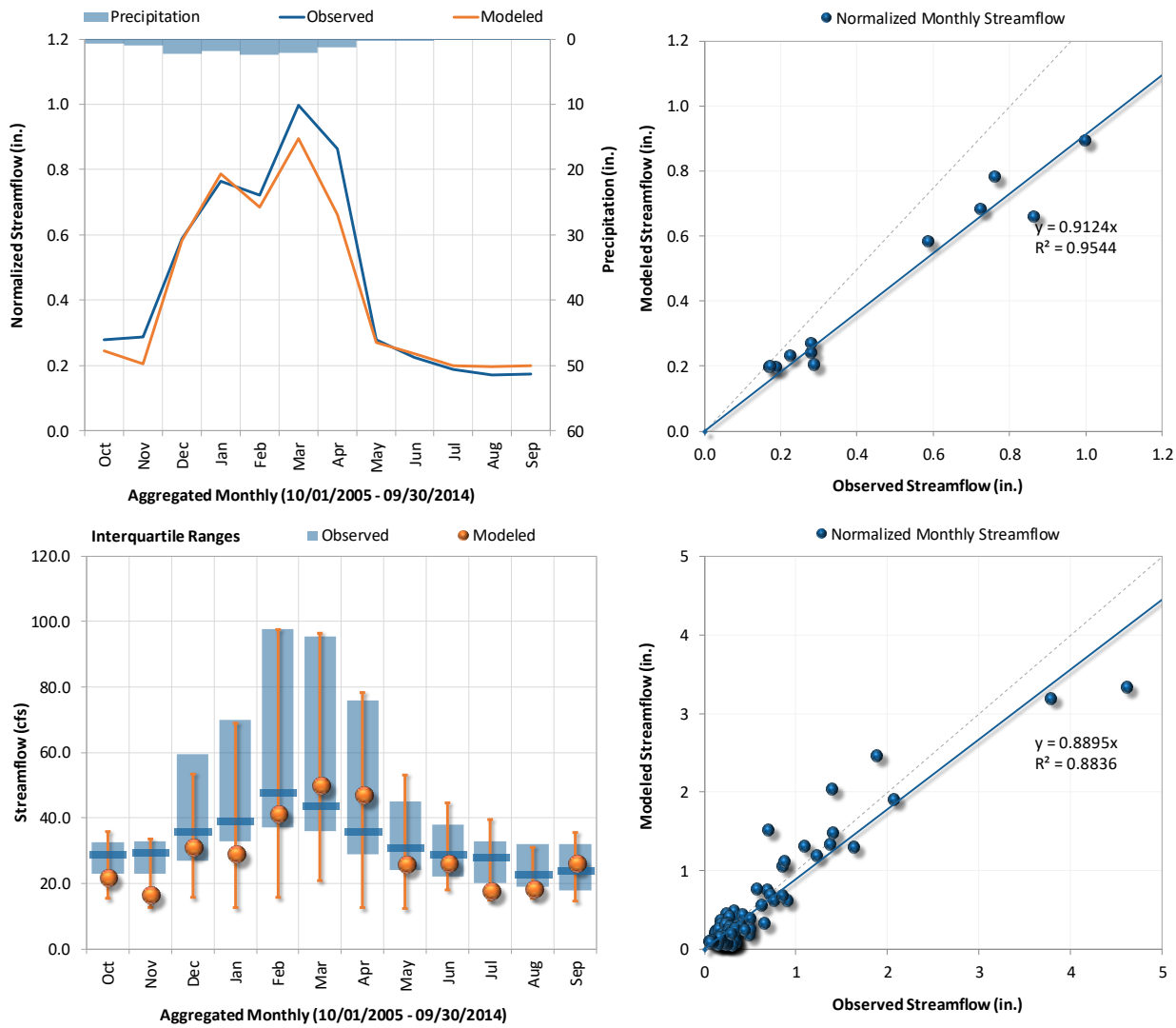

Figure 5-6. Hydrology calibration summary for Guadalupe River Watershed above Highway 101, San Jose.

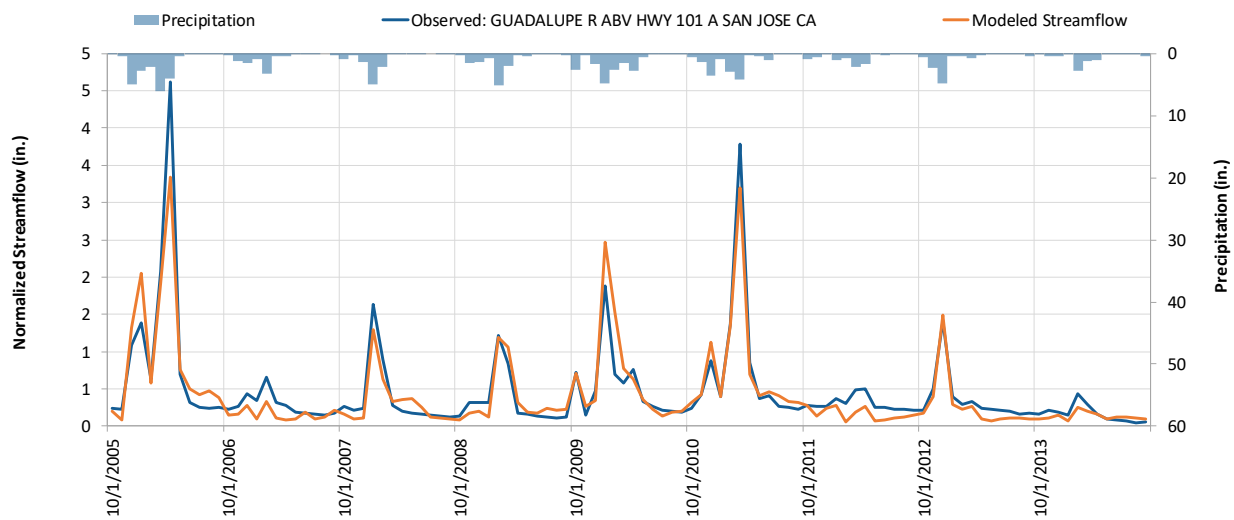

Figure 5-7. Seasonal hydrology calibration for Guadalupe River Watershed above Highway 101, San Jose.

Table 5-4. Relative-error calibration statistics for Guadalupe River Watershed above Highway 101, San Jose.

Calibration Metrics (10/01/2005 - 09/30/2014)	Relative Mean Error	Recommended Error Criteria			
		Very Good	Good	Fair	Poor
Total Annual Volume	-6.8%	≤ 5%	5 - 10%	10 - 15%	>15%
Highest 10% of Flows	-12.5%	≤ 10%	10 - 15%	15 - 25%	>25%
Lowest 50% of Flows	-3.9%	≤ 10%	10 - 15%	15 - 25%	>25%
Annual Storm Volume	-6.3%	≤ 10%	10 - 15%	15 - 25%	>25%
Summer Storm Volume	5.5%	≤ 15%	15 - 30%	30 - 50%	>50%
Annual Baseflow Volume	-7.1%	≤ 10%	10 - 15%	15 - 25%	>25%
Baseflow Recession	1.4%	≤ 3%	3 - 5%	5 - 10%	>10%

5.3 Validation: San Francisquito Creek and Pescadero Creek

The model was validated at two locations with 35 years of continuous streamflow data. Validation is defined as testing the model through application to a set of data not used to develop the calibration. Model validation is an extension of the calibration process. Its purpose is to test the predictive ability of the calibrated model, identify aspects of the calibration that might need further refinement, and provide information on prediction uncertainty.

Several approaches can be used to validate a model, but perhaps the most effective way is to use only a portion of the available observed values for calibration and use the rest for validation. As previously described, a subset of gages were used for model calibration. For model validation, calibrated parameters were applied to the San Francisquito Creek watershed at Stanford University (Station ID: 11164500) and Pescadero Creek, which are two larger watersheds with long-term continuous flow records. San Francisquito Creek on the eastern side of the ridge flows toward the Bay, while

Pescadero, which is on the western side of the ridge, flows toward the Pacific Ocean. The purpose of this exercise was to validate the model response both spatially (for mixed HRU areas) and temporally across wet and dry hydrologic conditions. Figure 5-8 and Figure 5-9 show monthly timeseries and seasonal average flow for a 35-year simulation period at San Francisquito Creek and Pescadero Creek, respectively. The model performed generally well, matching observed data over the 35-years evaluated. The Searsville Dam is also located along San Francisquito Creek upstream of the USGS flow gage. Only 10 percent of the original capacity of Searsville Reservoir was represented in the model because over 90 percent of that capacity is known to have been lost to sedimentation.

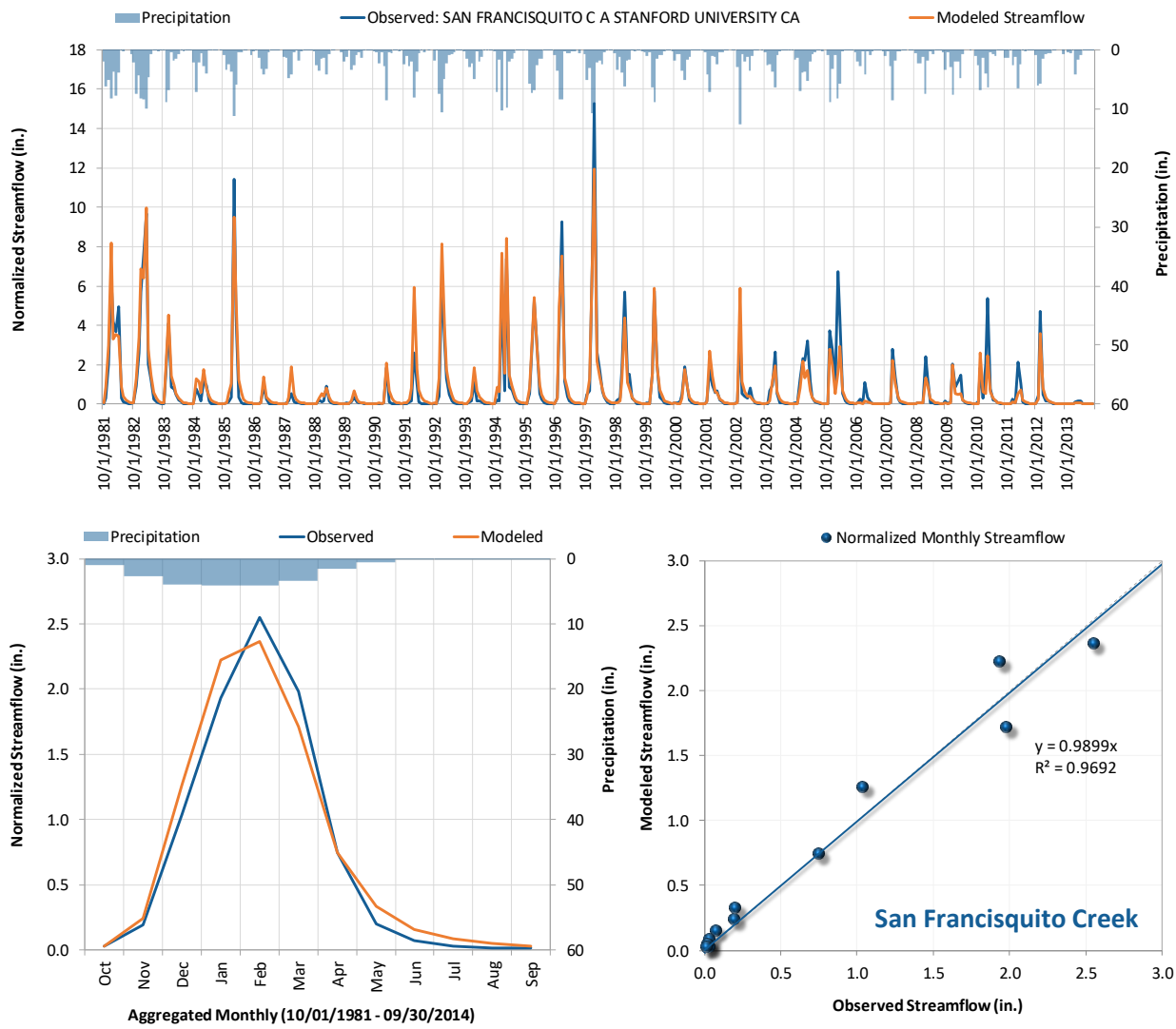

Figure 5-8. Monthly timeseries and seasonal model validation assessment for San Francisquito Creek.

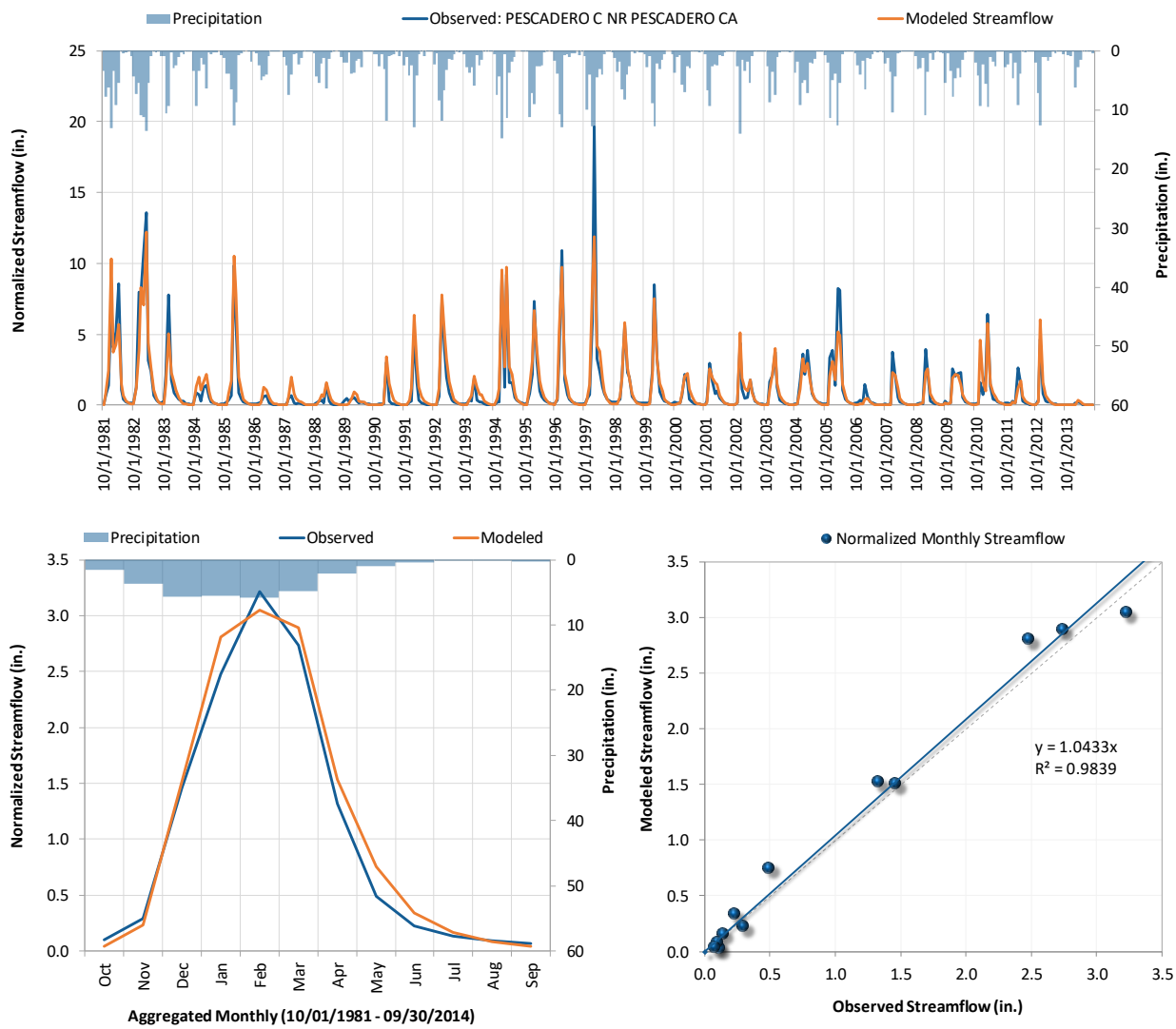

Figure 5-9. Monthly timeseries and seasonal model validation assessment for Pescadero Creek.

6 SEDIMENT

Regional studies conducted in the Bay Area have assessed monitoring data and quantified mercury and PCB loading rates with sediment as the primary mode of delivery (Gilbreath et al. 2018; McKee 2017). Those studies show that the relative distribution of mercury and PCB yield varies spatially as a function of contributing land use, sediment, and pollutant sources. Figure 6-1 shows regression-based pollutant yield estimate at two locations in the Guadalupe River watershed. The watershed upstream of the Almaden Expressway is largely undeveloped; however, there is an urbanized portion between the Expressway and Highway 101. Yield estimates show relatively comparable sediment yield at both locations; however, PCB and mercury are notably different and inverted in relative magnitudes. Findings from those datasets provide meaningful insight for source characterization and model parameterization. It suggests that in the Guadalupe River, PCBs are predominantly associated with urban sediment, while mercury is predominantly associated with loads from natural areas.

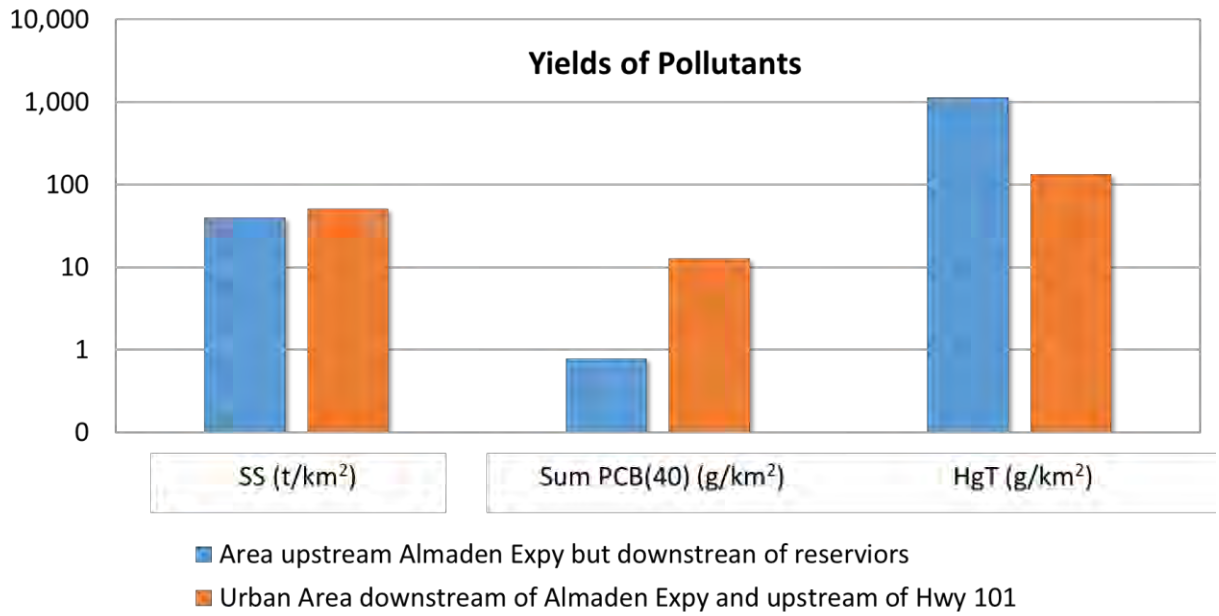

Figure 6-1. Regression-based pollutant yield estimates derived from instream monitoring data in the Guadalupe River (McKee et. al 2017).

Model representation of sediment builds upon the hydrology calibration and is considered the primary mode of delivery for PCBs and mercury in this study; therefore, modeling erosion and sediment mobilization is the next step in the top-down weight of evidence-based approach. Once that primary mode of pollutant delivery has been established, sediment-associated mercury and PCBs are simulated. Throughout the water quality calibration process, intermediate checks, data sources, and references are consulted to ensure that assumptions are reasonable and error propagation is minimized. This section first describes sediment calibration.

Sediment sources and mobilization processes vary with land cover (pervious/impervious) and soil type. PCBs and some mercury are associated with urban runoff; but, when calibrating to mixed instream sediment samples, it is helpful to characterize relative loadings from all sources. The advantage of an HRU-based approach is that it retains much of the resolution of spatial variability for model parameterization at the level of the smallest modeling unit (land unit). This minimizes the need to specify diverse combinations of model parameter groups at the subwatershed level. Sediment calibration was performed in two steps: (1) edge-of-field yield estimation and (2) instream transport.

6.1 Edge-of-Field Sediment Yield Estimation

One of the key attributes of the STATSGO/SSURGO soil layer is the K-factor, which is a measure of soil erodibility (detachment and runoff). K-factor was estimated as an area-weighted average value of the top soil layer for each HRU raster pixel. In the model, soil erodibility is a calibrated process by HRU. Clay soils, which are more resistant than sand and silt to detachment, tend to have relatively low K values (0.05 to 0.15). Likewise, coarse-textured sandy soils that are easily detached, but are not easily mobilized by runoff, also have low K values (0.05 to 0.2). Soils with moderate silt and loam content have moderate K values (0.2-0.4) because they are moderately susceptible to both detachment and runoff. Soils with high silt content are the most erodible of all soils (K > 0.4) because they are easily detached and are associated with high rates of runoff. K-factor was cross-tabulated for areas

having the same hydrologic soil group, as summarized in Table 6-1. Soil erodibility metrics in San Mateo County and the Guadalupe River watershed differ notably. The K-factor percentile distribution was computed across all modeled watersheds. The STATSGO/SSURGO spatial layers were intersected with the model subwatersheds. Areas were binned by hydrologic soil group into 10 percentile bins of K-factor magnitude. Table 6-1 shows a composition consisting of more erodible soils in San Mateo County than in the Guadalupe River watershed. Table 6-1 showed that D soils were moderately erodible, while C soils were generally more erodible in both areas. This suggests that C soils should be parameterized as more erodible than D soils, even though D soils produce more runoff than C soils. This finding was used to inform default parameters for each HRU associated with hydrologic soil groups.

Table 6-1. K-Factor vs. hydrologic soil group and associated soil textures (Source Data: STATSGO/SSURGO).

K-Factor (Soil Erodibility)					Hydrologic Soil Group (% of Area)			
Percentile			Min	Max	A	B	C	D
Guadalupe Watershed	← High Moderate Low →	0-10%	0.00	0.03	11.2%	1.2%	9.7%	7.7%
		10-20%	0.03	0.05	0.8%	7.1%	14.8%	1.3%
		20-30%	0.05	0.07	--	0.0%	37.7%	0.0%
		30-40%	0.07	0.10	--	--	4.4%	0.6%
		40-50%	0.10	0.13	--	--	0.2%	--
		50-60%	0.13	0.17	--	--	0.1%	--
		60-70%	0.17	0.20	--	--	--	--
		70-80%	0.20	0.21	--	--	1.2%	--
		80-90%	0.21	0.24	0.1%	--	1.9%	--
		90-100%	0.24	0.44	--	--	--	--
San Mateo County	← High Moderate Low →	0-10%	0.00	0.03	2.0%	0.2%	2.2%	2.5%
		10-20%	0.03	0.05	--	0.3%	1.1%	0.9%
		20-30%	0.05	0.07	0.1%	5.2%	0.6%	0.2%
		30-40%	0.07	0.10	0.1%	10.0%	1.6%	0.2%
		40-50%	0.10	0.13	0.3%	5.3%	10.0%	0.1%
		50-60%	0.13	0.17	0.1%	0.9%	10.1%	2.2%
		60-70%	0.17	0.20	--	0.9%	8.2%	7.1%
		70-80%	0.20	0.21	0.1%	0.7%	11.1%	1.3%
		80-90%	0.21	0.24	0.0%	0.1%	13.6%	0.9%
		90-100%	0.24	0.44	--	--	--	0.0%

Erodibility	HSG	Soils Composition
Low	A	Sand, Loamy Sand, or Sandy Loam
Moderate	B	Silt, Silt Loam or Loam
High	C	Sandy Clay Loam
Moderate	D	Clay Loam, Silty Clay Loam, Sandy Clay, Silty Clay, or Clay

1. Color Gradient: Relative area distribution within model calibration watersheds (0.0% indicates <0.1% of area)

07875
7916

As shown in Table 6-1 and illustrated in Figure 6-2, soil texture and soil erodibility are both associated with hydrologic soil group. Most San Mateo County watersheds that drain to the Bay do not have any soil classification because of the density of urban land cover—PCB-contaminated sediment originates from aging and deterioration of old urban infrastructure, building demolition, and build-up/deposition on associated urban surfaces. The coastal pervious land areas in the County have relatively low K-factor values, but the headwater regions and western portion of the County draining to the ocean are where natural soil erosion primarily occurs. Within a given soil group, K-factor varies with soil texture. About 65 percent of the soils are C and 10 percent are D soils. The spatial variability of K-factor within the region is shown in Figure 6-3.

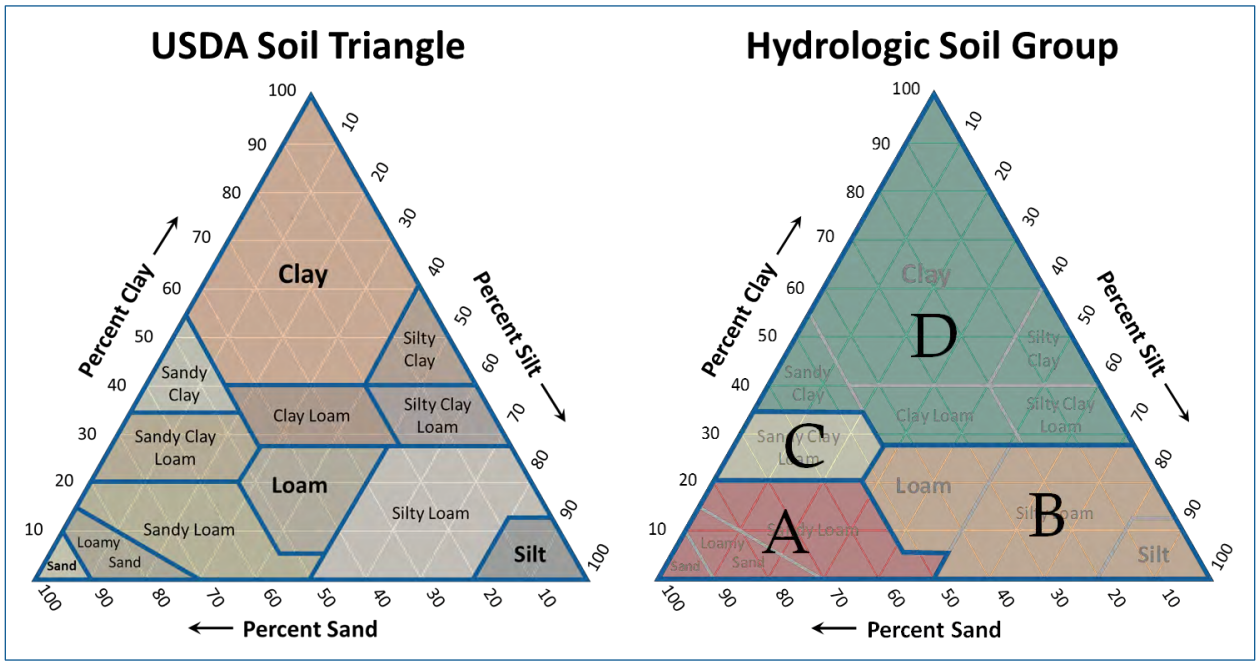

Figure 6-2. Standard USDA soil triangle with hydrologic soil group mapping.

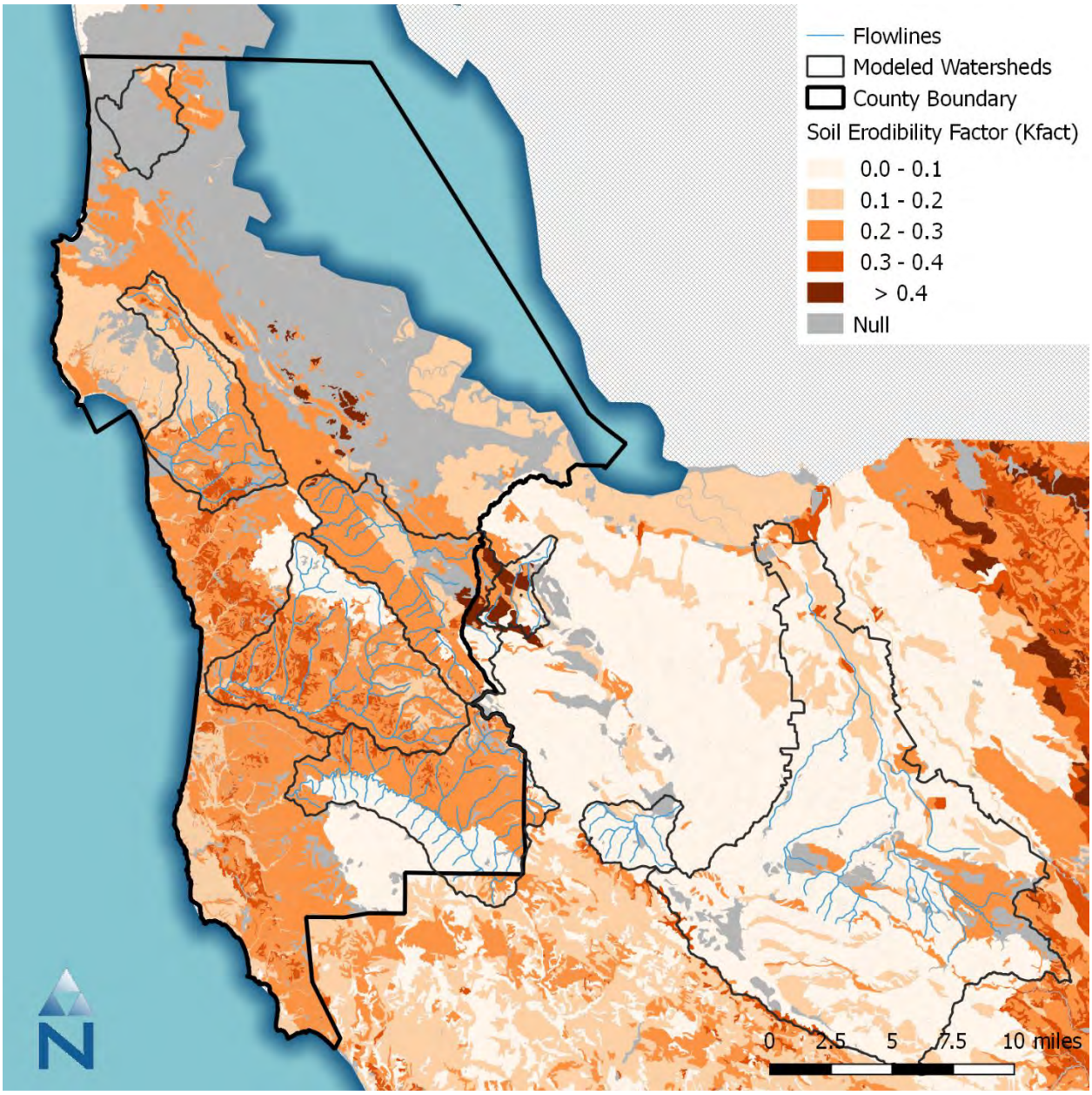

Figure 6-3. Soil erodibility K-factor (Source: USDA SSURGO).

A literature review of local and natural sediment yields and event-mean concentrations by land use type was conducted to summarize documented ranges of variability by source. Because the model configuration reflects physical characteristics of the land surface, such as slope and soil type, and spatial variability of meteorological conditions, the goal of model calibration is to parameterize sediment properties that capture the relative range of variability between sources observed in literature. Table 6-2 summarizes yield estimates from literature and Figure 6-4 shows the range of variability in the modeled response across different watersheds. Table 6-3 and Figure 6-5 show similar literature and modeled response summaries for flow-weighted event mean concentrations.

Table 6-2. Summary of regional sediment yield estimates by land use.

Land Use	Load ($t/km^2/year$)			Data Sources and Locations
	Min	Mean	Max	
Natural		72.0		San Francisco Bay Region[1]
Agriculture		2,461.0		San Francisco Bay Region[1]
Low Density Urban		450.0		San Francisco Bay Region[1]
High Density Urban		996.0		San Francisco Bay Region[1]
Industrial		1,836.0		San Francisco Bay Region[1]
Urban Watersheds ALL	44.0		788.0	San Francisco Bay Region[1]
Urban		24.9		Hayward, CA. San Francisco Bay Region[2]
Combined		36.0		Guadalupe River Watershed, Santa Clara, CA[2]
Combined	11.9		28.2	Guadalupe River Watershed, Santa Clara, CA[3]
Combined	10.3		473.1	San Francisquito Creek, at Stanford[3]
Combined	414.1		4,300.9	Colma Creek at South San Francisco[3]

1. Watershed specific and regional scale suspended sediment loads for Bay Area small tributaries. (McKee et al. 2009)
2. Concentrations and loads of trace contaminants in the Zone 4 Line A small tributary, Hayward, California: Water Year 2007. (McKee et al.2009)
3. Watershed specific and regional scale suspended sediment loads for Bay Area small tributaries. (McKee et al.2009)

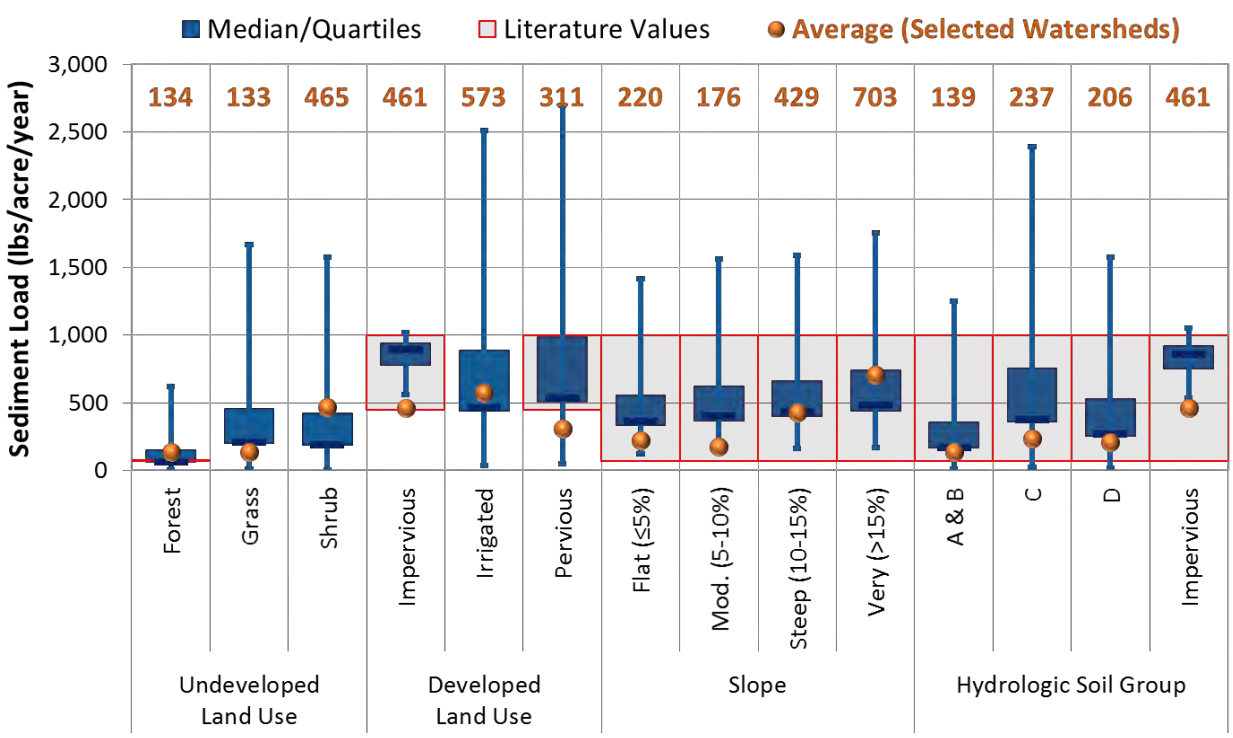

Figure 6-4. Modeled vs. literature ranges for sediment yield by land use.

Table 6-3. Summary of national sediment event-mean concentrations by land use.

Land Use	Event-Mean Concentration (mg/L)			Data Sources and Locations
	Min	Mean	Max	
Forest	11.10	238.23	487.00	Los Angeles, CA[1]; FL[2], NC[2]
Pervious Irrigated	202.00	202.00	202.00	NC[2]
Roads	50.30	64.05	77.80	Los Angeles, CA[1]; FL[2]
Shrub	94.30	122.65	151.00	NC[2], FL[2]
Urban	19.10	173.45	786.50	Los Angeles, CA[1], NC[2], CO[2], FL[2], MN[2]

1. Reference: LARWQCB 2014
2. Reference: Lin 2004

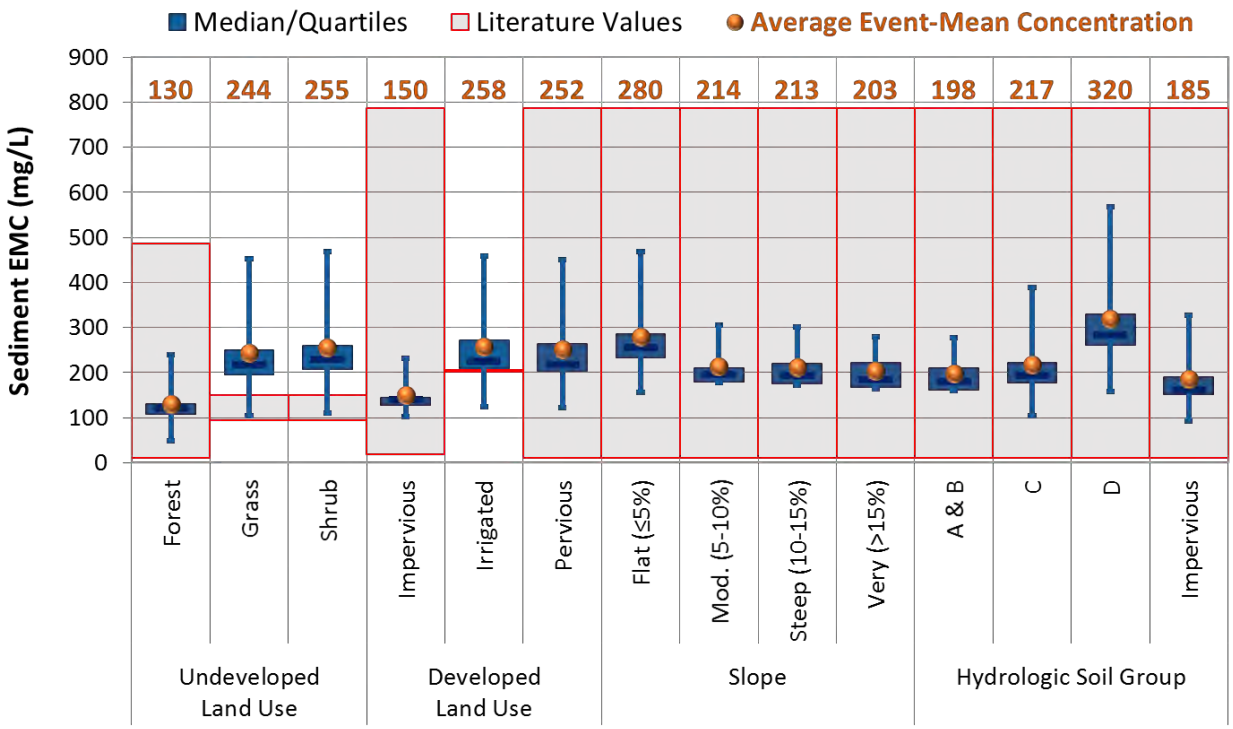

Figure 6-5. Modeled vs. literature ranges for sediment event-mean concentrations by land use.

6.2 Instream Sediment Transport

Sediment generated from the land is partitioned into sand, silt, and clay using fractions by land use before getting routed to stream segments associated with each subwatershed. LSPC represents sediment transport processes (i.e., settling and resuspension) as a function of modeled shear stress, the lateral force of the water imposed on the channel cross-section (USEPA 2006). For cohesive sediment (silt and clay), critical shear stress was estimated for each reach segment as summarized in Table 6-4. Sand movement is modeled using a user-specified power function of velocity. Both shear stress and velocity are derivative values computed as a function of flow volume and channel geometry; however, using reach-specific percentile ranges helps to normalize uncertainty in channel geometry by making settling and resuspension relative. For lake segments, critical shear stress for deposition and resuspension were not applicable—sediment settled at the user-specified particle settling rate in still water.

Table 6-4. Calibrated critical sheer stress percentiles by sediment class.

Sediment Class	Deposition	Resuspension
Sand	Power Function[1]	Power Function[1]
Silt	15th Percentile	90th Percentile
Clay	10th Percentile	85th Percentile

1: Sand transport is modeled using a power function on velocity (coefficient and exponent)

With sediment transport being closely tied to flow simulation, high-flow years with the closest overall match in modeled hydrology were the primary focus for sediment calibration. Data from the three years highlighted in Figure 6-6 were used to calibrate sediment transport at the downstream Guadalupe River gage, as shown in Figure 6-7. The left panel shows both observed and modeled sediment concentration versus flow for sampled days. The right panel shows both observed and modeled sediment load versus flow for sampled days. Figure 6-7 shows that the model predicts both the slope and relative spread of the data. Data from all years were used for model validation as shown in Figure 6-8. Regression metrics show a slightly better match in the calibration years versus the validation years but demonstrate that the model is a robust predictor of sediment variability and transport. Table 6-5 shows modeled vs. observed sediment load for different water years.

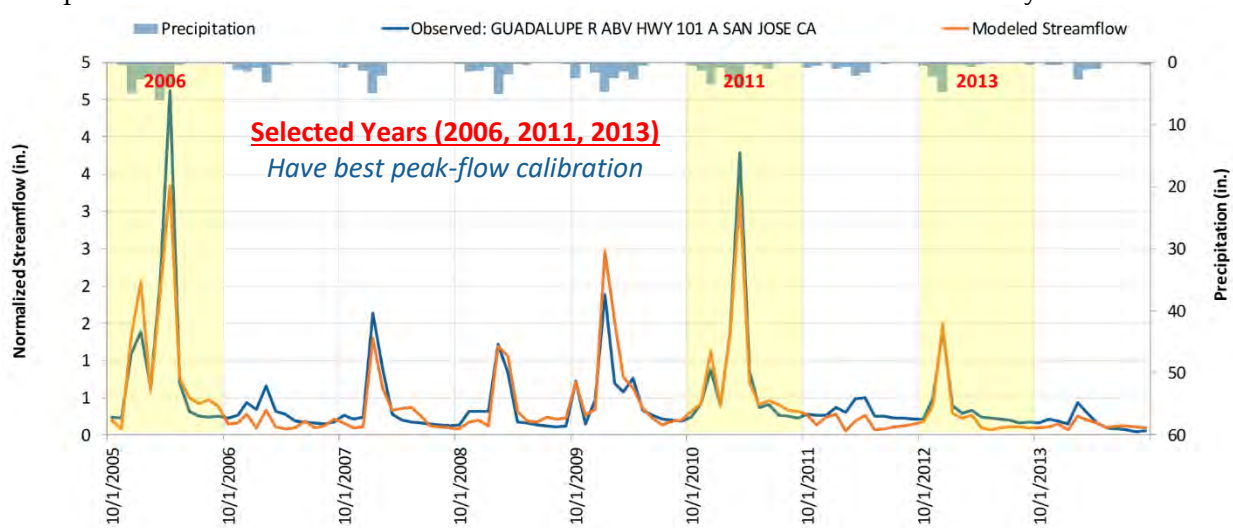

Figure 6-6. Hydrology calibration summary with selected years for sediment calibration.

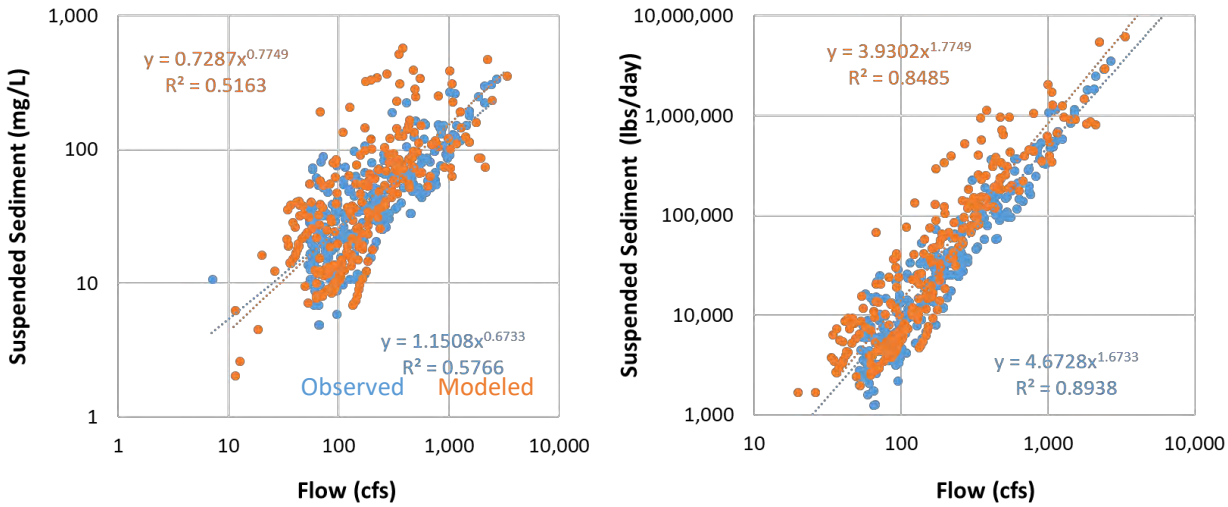

Figure 6-7. Model calibration for sediment concentration and load vs. flow in the Guadalupe River for water years 2006, 2011, and 2013.

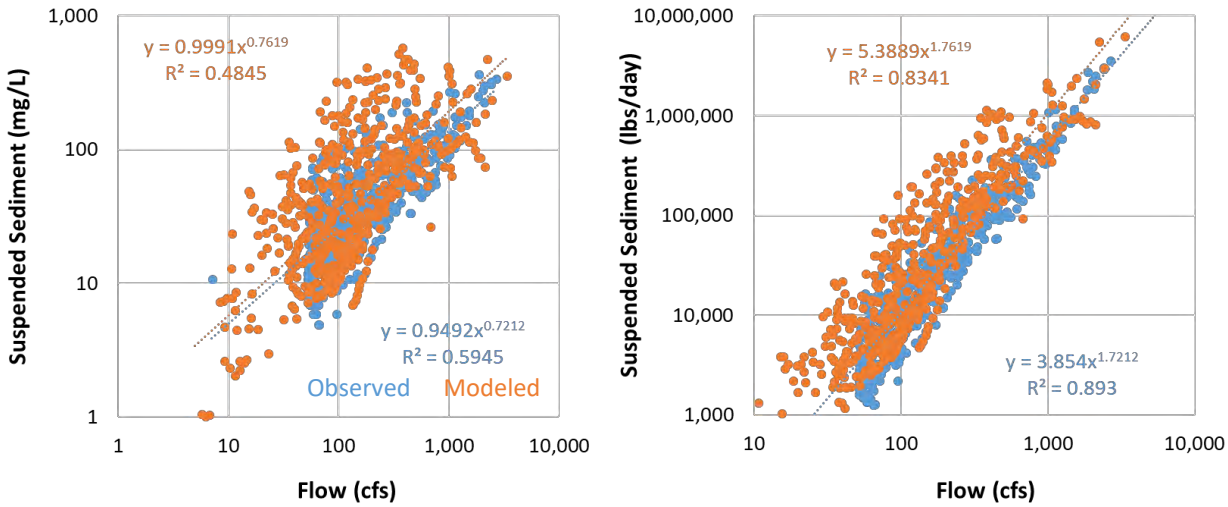

Figure 6-8. Multi-year validation of sediment concentration and load vs. flow in the Guadalupe River for water years 2006-2014.

Table 6-5. Modeled vs. observed sediment loads for selected water years.

Water Years	Sediment Load (kg/day)		Modeled:Observed Ratio
	Observed	Modeled	
3 years: 2006, 2011, 2013	63,088	92,414	1.465
9 years: 2006-2014	49,700	78,301	1.575

7 POLYCHLORINATED BIPHENYL (PCB)

During development of the Bay Area RAA Guidance, it was acknowledged through multiple discussions between permittees, EPA, the Water Board, and researchers (e.g., SFEI) that limited local water quality data may impact the robustness of any new computational method developed by an individual Bay Area permittee or stormwater program to represent PCB or mercury loading. Although Bay-wide tools such as RWSM are deemed acceptable through model calibration utilizing monitoring data collected throughout Bay watersheds, there is often not enough data within a single County jurisdiction to provide the same level of resolution needed for calibration of a model within that jurisdiction. As demonstrated in the previous sections, sufficient data is available for calibration of a model for simulation of hydrology and sediment loading for San Mateo County watersheds. The modeling approach used for the RAA combines this LSPC hydrology and sediment loading model with RWSM, using RWSM values for pollutant concentrations representative of various land use and PCB source categories. The Bay Area RAA Guidance states that "if RWSM is used to represent pollutant concentrations or loads, this calibration is assumed to be conducted as part of the RWSM process," and "if sufficient concentration and loading data are available, these data should be used as part of model validation." This section describes the approach for using RWSM in combination with LSPC for simulating PCB loads, summarizes the local PCB monitoring data available for validation, and presents results of the calibration.

A two-step process was used for simulating PCB fate and transport in the model. First, the calibrated PCB runoff concentrations from RWSM (BASMAA 2017, Wu et al. 2017) were applied to modeled LSPC runoff volumes to estimate PCB mass and approximate timing and delivery. From the results of that model run, simulated long-term PCB and sediment loads were calculated for the model simulation period. Second, the ratio of modeled PCB mass to sediment mass from the first model run was used to estimate an average sediment concentration for each HRU. The model was run a second time, substituting the estimated sediment concentration for the runoff concentration so that PCBs would be delivered with sediment instead of only runoff volume. Although the long-term estimated load is unchanged between the two runs, associating PCBs with sediment spreads the range of modeled instream concentrations because sediment loading is nonlinearly correlated with runoff volume. Larger storms will mobilize more sediment than smaller storms; therefore, PCB concentrations in runoff will also vary accordingly. This is relevant to the second phase of the RAA for modeling the benefits of GI, where the timing of pollutant loading affects the performance of GI.

As part of the Small Tributaries Loading Strategy (STLS) conducted by SFEI, nine storm events were sampled for PCBs at the Pulgas Creek Pump Station North and South Gages between 2011 and 2014. Figure 7-1 shows drainage area boundaries and flow direction for the Pulgas Pump North and South monitoring stations. For both catchment boundaries, Table 7-1 summarizes land use distribution, computed NLCD percent imperviousness, and presents RWSM-calibrated PCB runoff concentrations by land use. The land use distribution was derived for RWSM by SFEI using Association of Bay Area Governments (ABAG) land use data with modifications to represent PCB source area categories (Wu et al. 2017) (Figure 2-6).

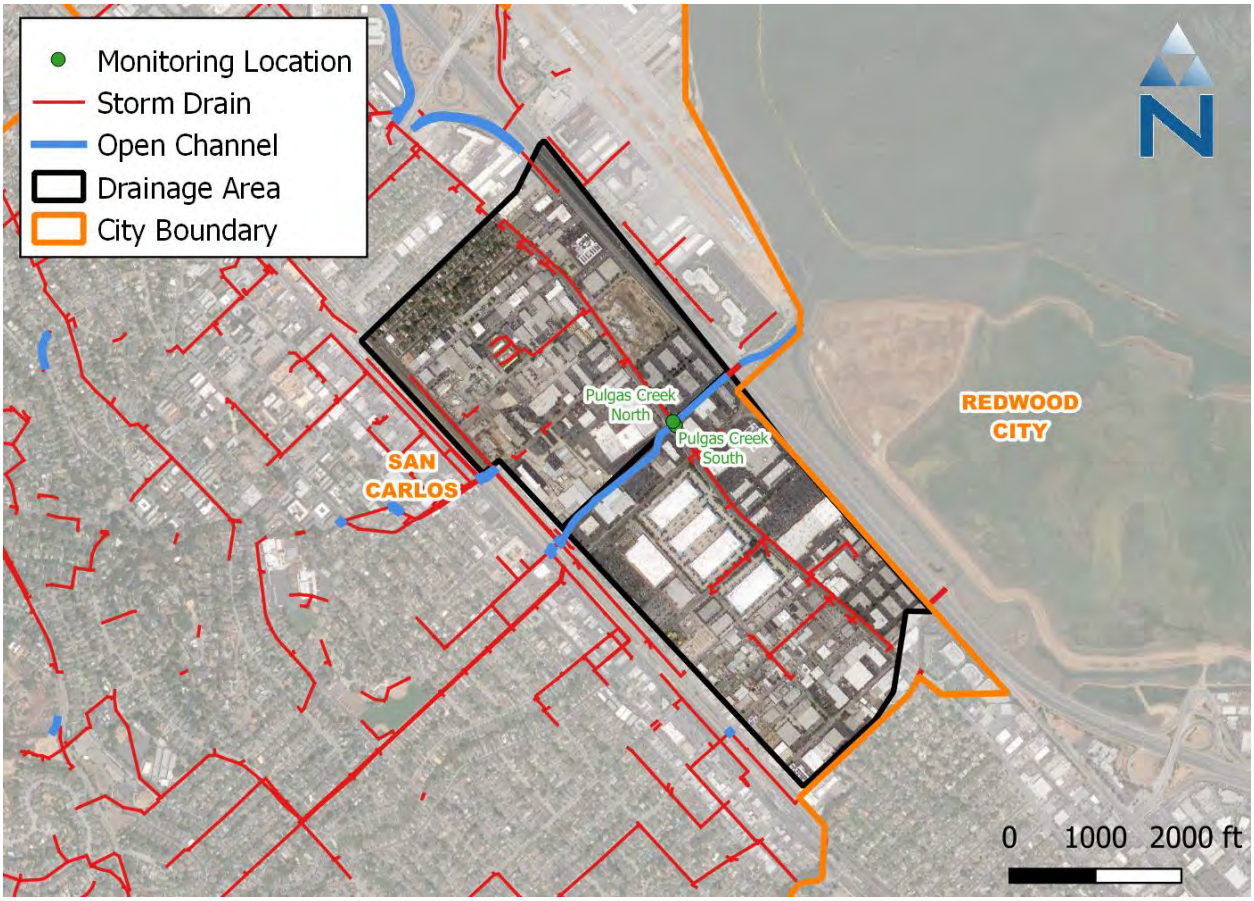

Figure 7-1. Drainage area boundaries for Pulgas Creek North and South monitoring gages.

Table 7-1. Drainage area land use distribution, estimated percent impervious cover, and recommended PCB runoff concentrations by land use category.

SFEI-ABAG Category[1]	Area (acres)		Percent of Area		PCB[3] Runoff Conc. (ng/L)
	PulPumpN	PulPumpS	PulPumpN	PulPumpS	
0_Ag_Open	0.2	0.2	0.1%	0.1%	0.2
1_New_Industrial	11.8	2.8	8.7%	1.9%	0.2
2_New_Urban	--	0.1	--	0.1%	0.2
3_Old_Industrial	54.8	77.5	40.2%	53.7%	204
4_Old_Residential	8.9	0.02	6.5%	0.02%	4
5_Old_Urban	21.5	62.9	15.8%	43.6%	40
6_Source_Areas	39.1	0.7	28.7%	0.5%	204
Total	**136.3**	**144.2**	**100%**	**100%**	--
% Impervious (NLCD)[2]	--	--	**83.5%**	**87.0%**	--

1: Wu et al. 2017. Land use layer derived for RWSM by SFEI using ABAG and modified to identify key source areas.
2: NLCD impervious cover raster summary
3: Wu et al. 2017

A parallel small-scale LSPC model was configured for the Pulgas Creek pump station drainage areas using the same HRUs and model parameters as the County-scale LSPC model. Average slope and soil

composition were computed for the drainage areas to determine representative HRUs to use for that model. The slopes of both drainage areas were less than 5 percent and hydrologic soil group was a mix of C and D. Average percent impervious cover for both drainage areas was about 85 percent, all of which was assumed to be directly connected given the relatively small size and drainage area composition of the watershed. The total combined drainage area of both catchments is 280 acres. The drainage areas are characterized as mostly old industrial and old urban, with about 40 acres of PCB source areas designated by SFEI (Wu et al. 2017). The best, most representative hourly rainfall gage was San Francisco International Airport (SFO, WBAN: 23234). Although the San Carlos Airport gage (WBAN: 93231) is adjacent to the modeled catchment, the hourly rainfall data there was found to be incomplete for the time period corresponding to when the samples were taken.

To maintain consistency with regional reporting conventions, the PCB samples used for this comparison were the ones labeled as "Sum of 40 PCBs (SFEI)." Of the 40 samples collected, two samples had PCB concentrations that were significantly higher than the other 38 samples. Five samples collected on 11/19/2013 included both of those samples. The two unusually high samples were the first and last samples collected on that date—they were dramatically higher than the other three samples, which were collected in the middle of the sampling window. After excluding those two samples, the range of the remaining 38 samples was better aligned with the range of modeled runoff concentrations, suggesting that the first and last sampled concentrations collected during that event may have been skewed. Those two samples were among a subset annotated "some blank contamination issues" in the laboratory analysis remarks. Because they were the first and last samples collected, another potential cause may be that those samples were collected during relatively low-flow periods that may have impacted mixing at the time of collection, although this cannot be verified because instantaneous flows were not reported with the PCB concentrations.

Figure 7-2 presents a summary of observed versus modeled PCB concentrations at the Pulgas Creek South station, where most of the data were collected. Matching concentrations can be challenging because of factors including: (1) flashiness of the system, (2) a mismatch in the timing of a localized storm event that was not reflected in the rainfall gage used in the model, or (3) obstructions or inefficiencies in the collection system upstream of the sampling location. For this reason, modeled concentrations that coincided with ±1 day of the sampling date were summarized and paired for comparison with the samples. Figure 7-2 shows five summaries for comparison: (1) all observed samples, (2) observed samples excluding 2 potential outliers, (3) modeled results using runoff concentrations for ±1 day of the sampling date, (4) modeled results using sediment concentrations for ±1 day of the sampling date, and (5) modeled results using sediment concentrations for the 2011-2014 simulation period.

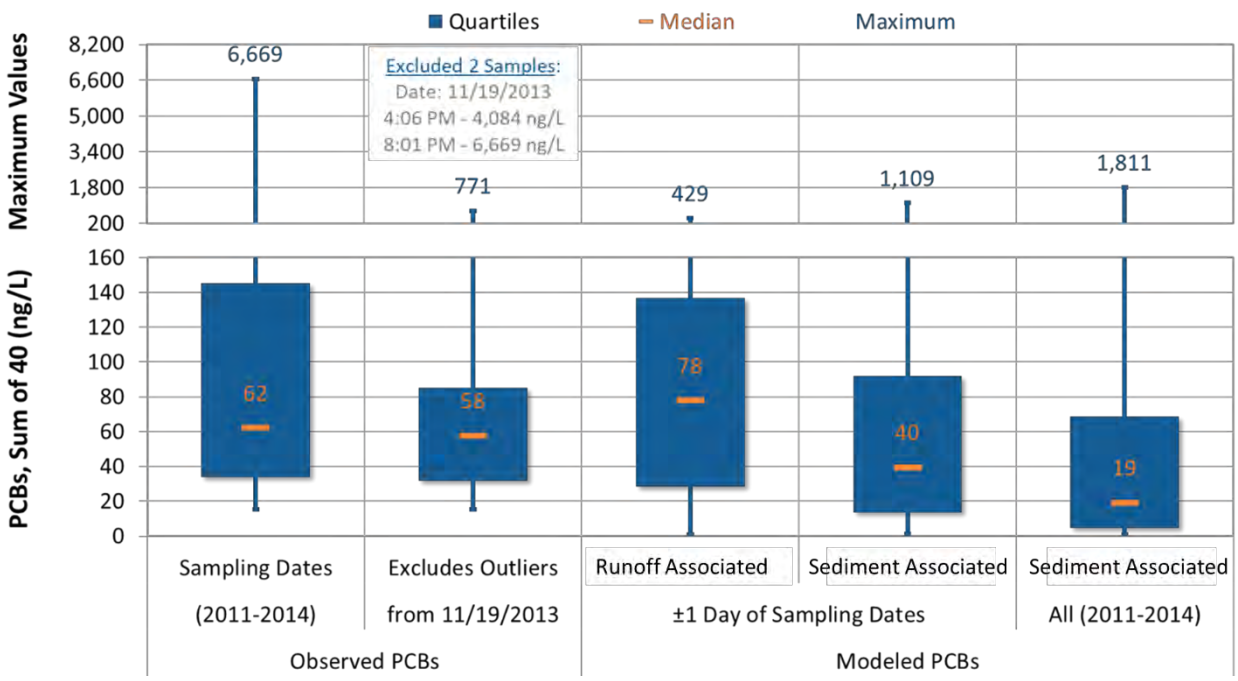

Figure 7-2. Observed vs. modeled PCB concentrations at the Pulgas Creek monitoring stations.

The top panel of Figure 7-3 shows the relative magnitude of the two outlier samples mentioned above and illustrated in Figure 7-2. The bottom panel zooms into the y-axis below 1,000 ng/L and shows that the model distribution follows observed concentrations. The shift in timing may have been because the intensity of the localized event that occurred on 11/19/2013 differed from what was reported at SFO; however, the SFO event from 11/20/2013, which was not monitored, resembles the shape and magnitude of the 11/19/2013 event. Figure 7-4 and Figure 7-5 show modeled vs. observed concentrations for two of the other sampled storm events. In both figures, the top panel shows modeled results using runoff concentrations, while the bottom panel shows results using sediment concentration. Although total PCB load is unchanged over the entire simulation period for both runs, the delivery mechanism changes the shape of the concentration timeseries graphs. In general, using sediment concentrations tends to produce runoff concentration curves that better resemble the sampled pollutographs; however, for some samples the results seemed to match more closely for the simulation using runoff concentrations. This suggests that the PCB delivery mechanism and process is probably a combination of both sediment and runoff association.

07885
7926

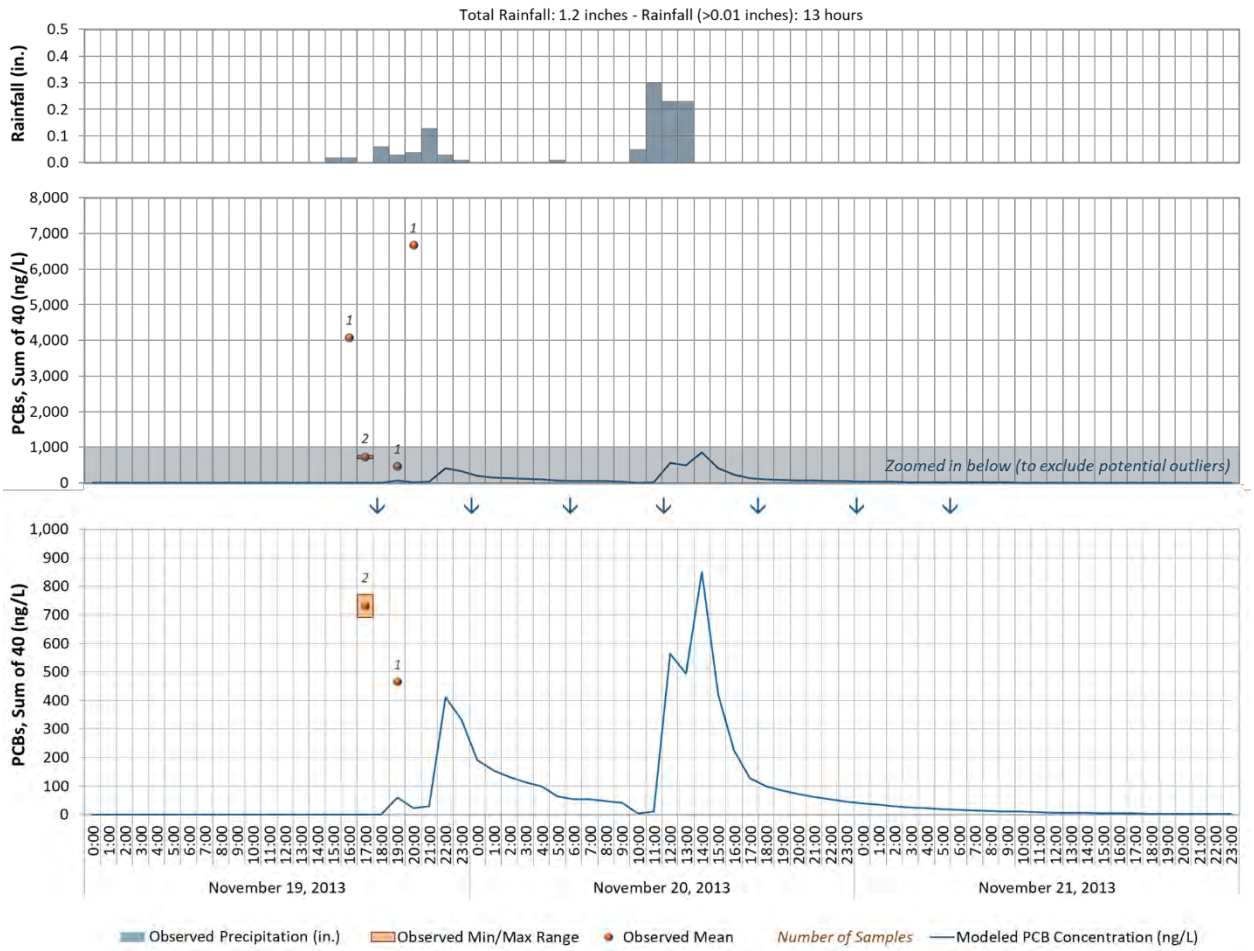

Figure 7-3. Modeled vs. Observed PCBs for the 11/19/2013 sampling event at Pulgas Creek South Gage. Top: Rainfall; middle: all samples (including 2 potential outliers) bottom: excluding 2 potential outliers.

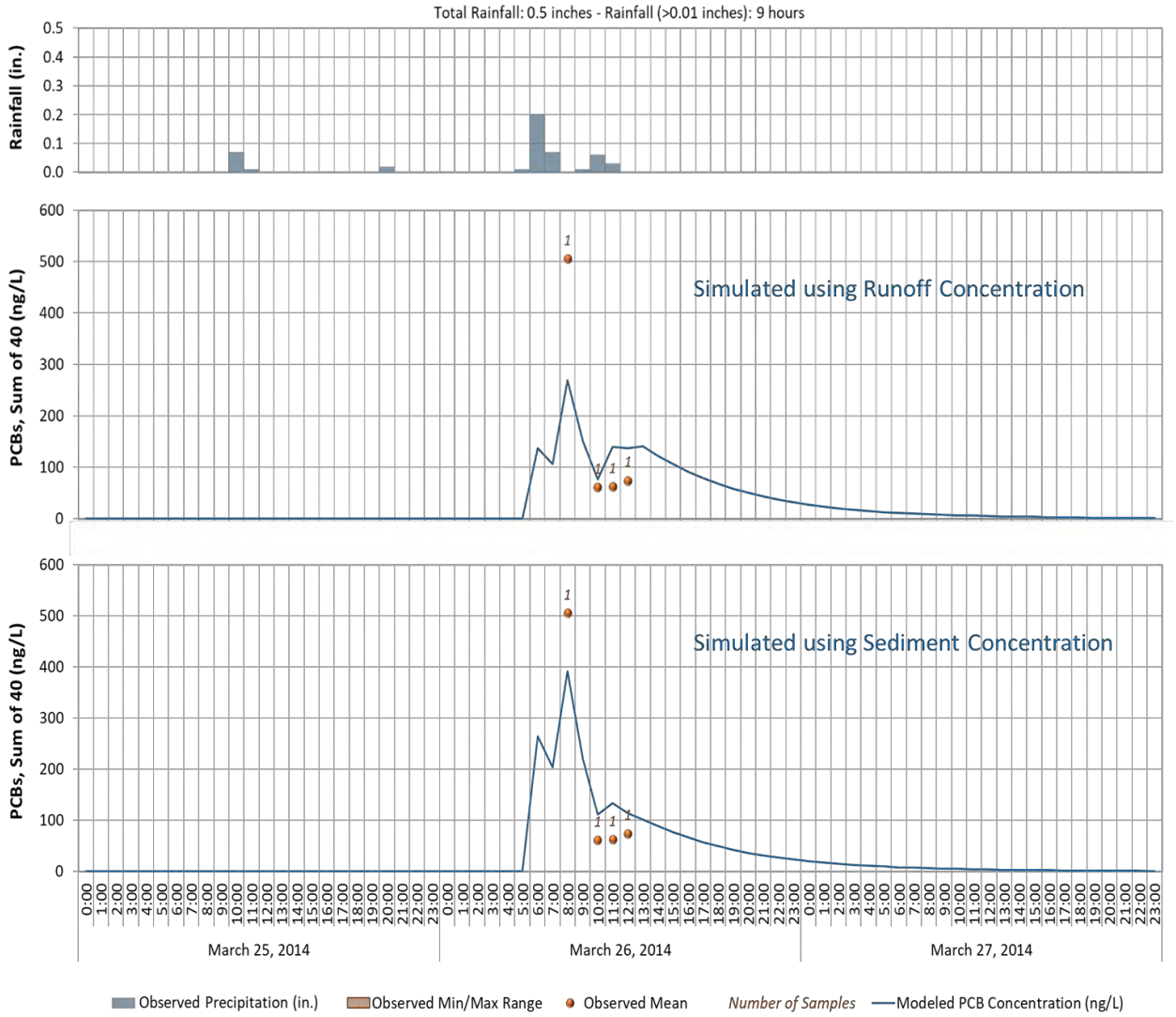

Figure 7-4. Modeled vs. observed PCBs at Pulgas Ck South Gage for a selected storm (3/25/2014 - 3/27/2014). Top panel: rainfall; middle panel: runoff concentration; bottom panel: sediment concentration.

Figure 7-5 through Figure 7-8 show modeled vs. observed PCBs concentrations for four of the other sampled storm events using the sediment-based RWSM concentration values as an assessment of model performance at the Pulgas Creek South gage. Some of the storm events presented contain non-detect values which are notated as "ND" in place of the sample count above the observed value.

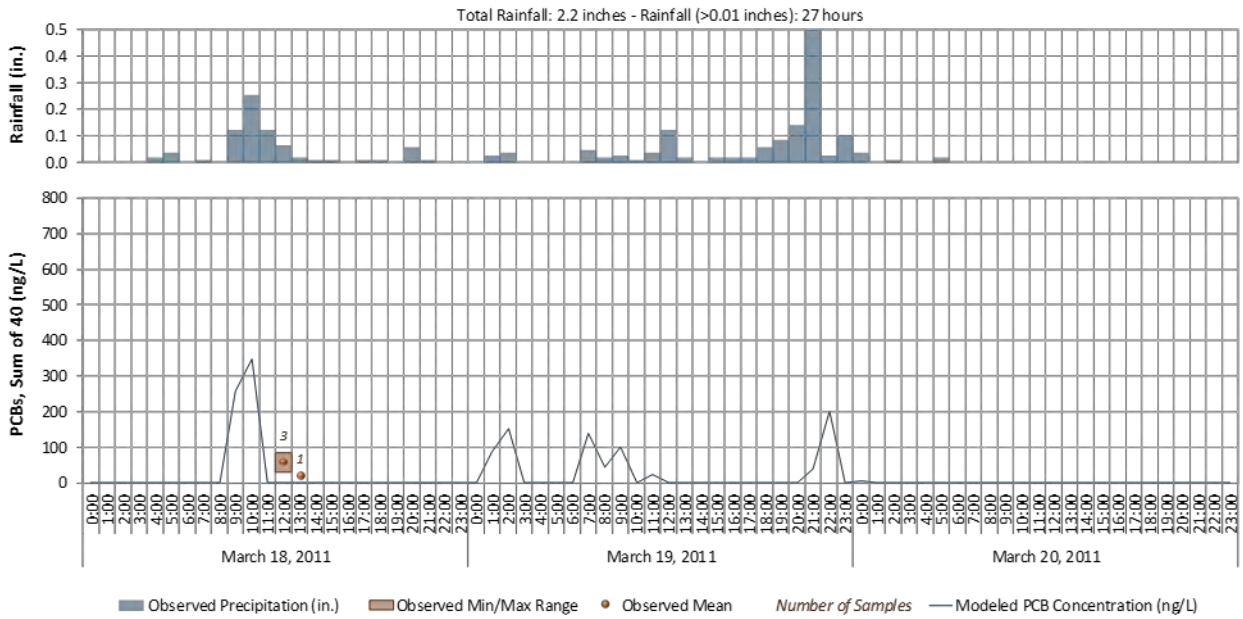

Figure 7-5. Modeled vs. observed PCBs for a selected storm at Pulgas Ck South Gage (3/18/2011 - 3/20/2011).

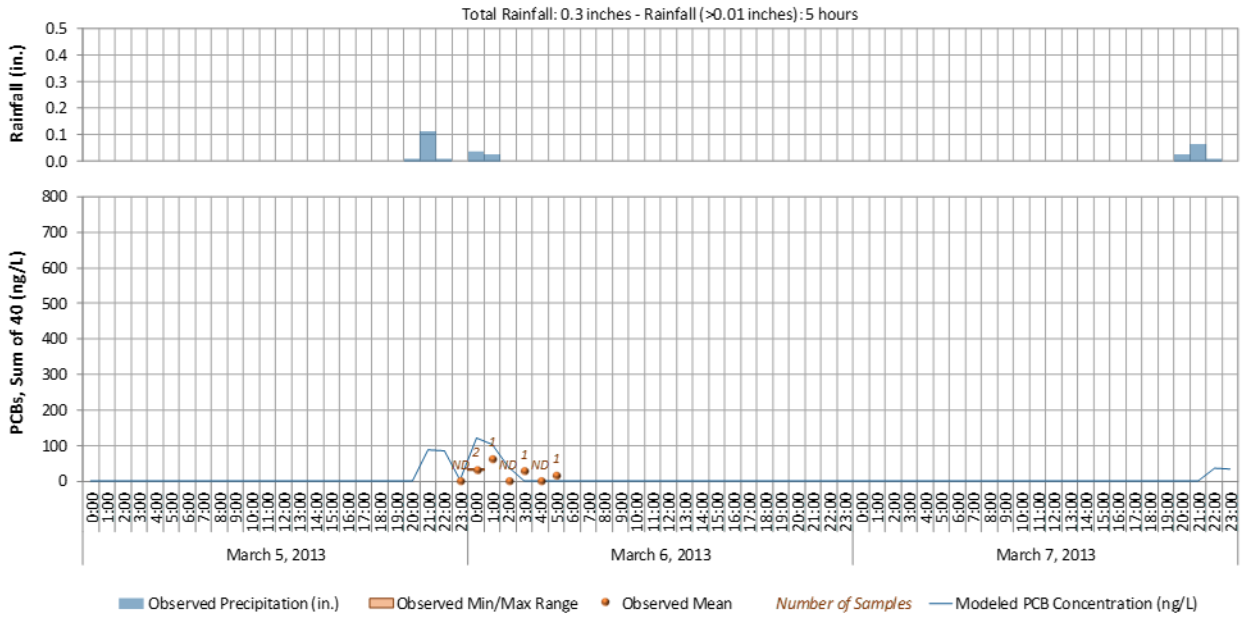

Figure 7-6. Modeled vs. observed PCBs for a selected storm at Pulgas Ck South Gage (3/5/2013 - 3/7/2013).

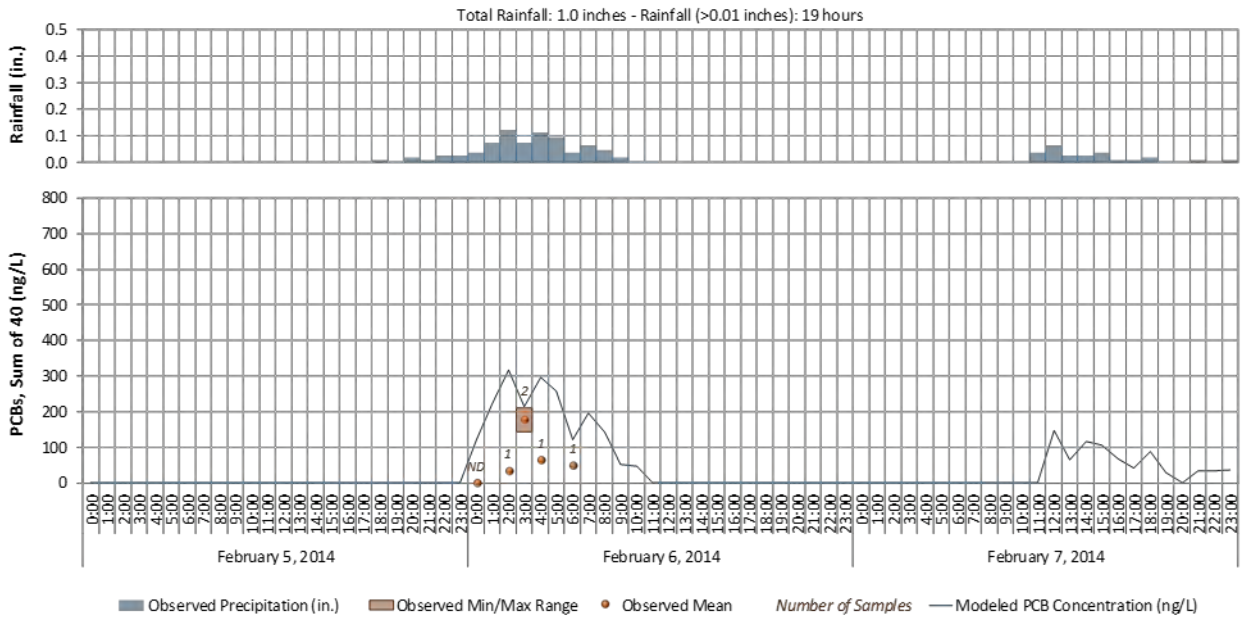

Figure 7-7. Modeled vs. observed PCBs for a selected storm at Pulgas Ck South Gage (2/5/2014 - 2/7/2014).

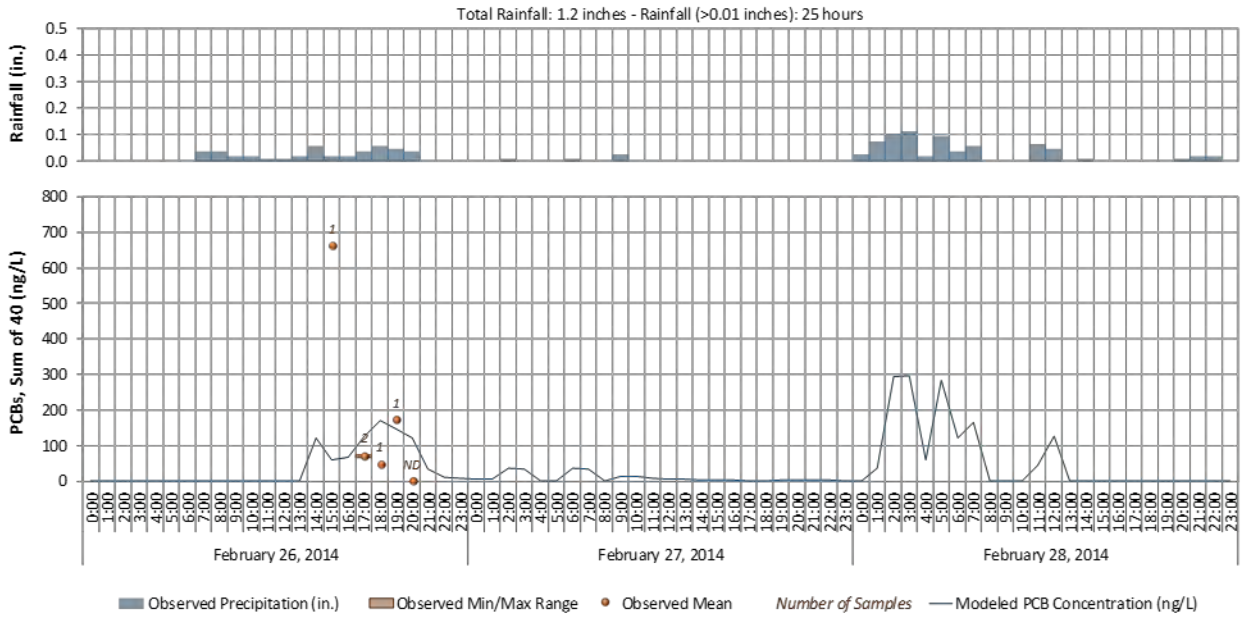

Figure 7-8. Modeled vs. observed PCBs for a selected storm at Pulgas Ck South Gage (2/26/2014 - 2/28/2014).

Similar to the analysis for Pulgas Creek above, the RWSM land use concentrations were combined with the countywide LSPC model to provide an estimate of PCB loads throughout the county. The ABAG-SFEI land use layer was intersected with the modeled HRU layer to estimate land use distribution for PCB source areas at the modeled subwatershed-level. Countywide PCB loads were estimated for water year 2002[1] (10/1/2001 to 9/30/2002). Figure 7-9 shows PCB source area land use distribution and modeled PCB loads for water year 2002. The top left panel shows area distribution for the portion of the county draining to the Ocean, while the top right panel shows the distribution for area draining to the Bay. The bottom two panels show estimated Bayside PCB loads at the source (left) and delivered to the Bay (right). Many of the source areas are located near the shoreline of the Bay; therefore, there transport losses are lower for those areas than for others that are more inland-located. Figure 7-10 is a map of unit-area sediment loads at the source (left) and PCB loads from each subwatershed that are ultimately delivered to the Bay (right).

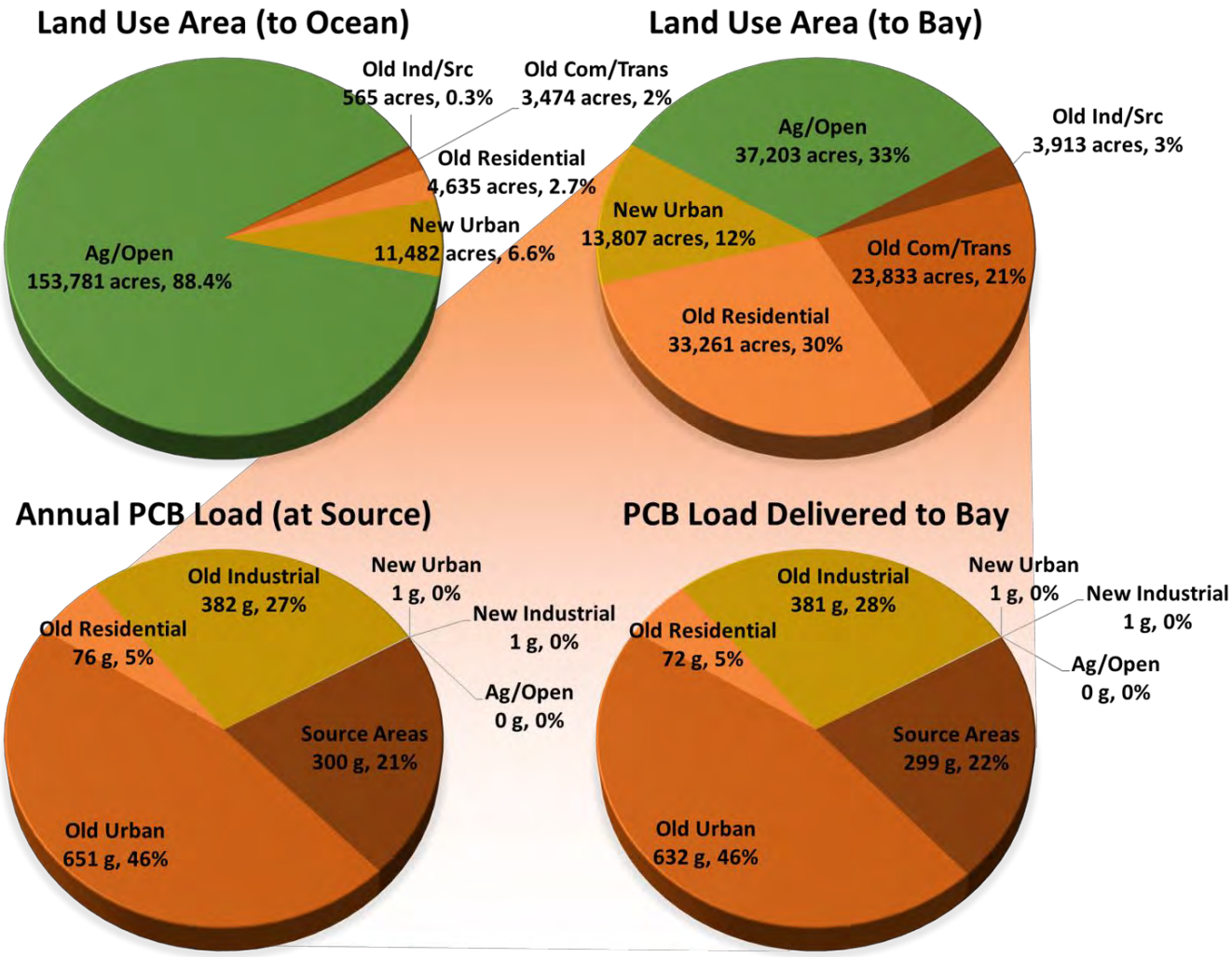

Figure 7-9. PCB source area land use distribution and modeled PCB load estimates for water year 2002.

[1] For the RAA analysis and direct comparison to TMDL WLAs based on average annual loading conditions, the Bay Area RAA Guidance recommends two options for simulation of baseline loading: (1) water years 2000-2009 (for long-term continuous simulation), or (2) water year 2002 (for representative water year).

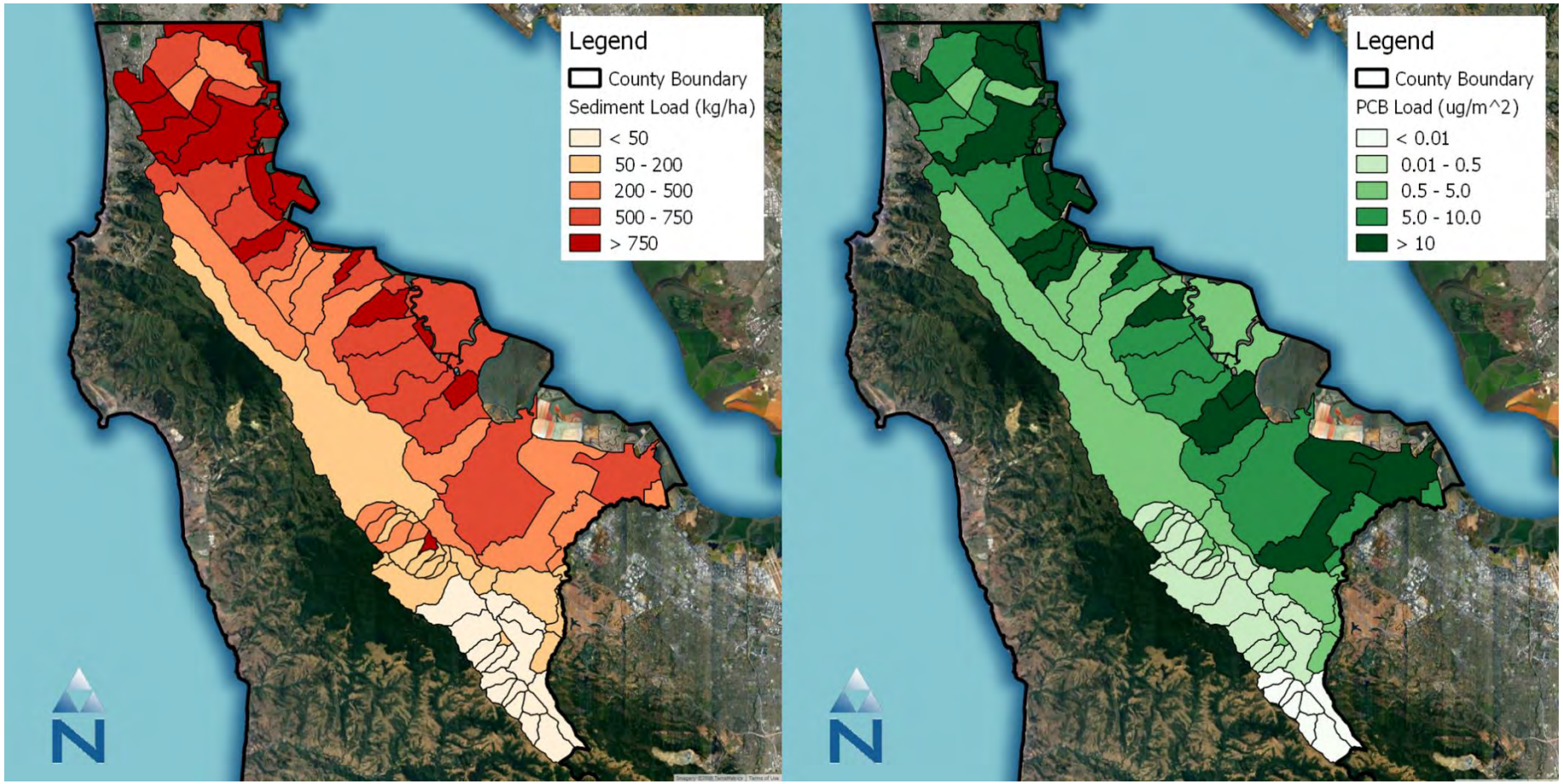

Figure 7-10. Modeled sediment and PCB unit-area loads (at source) by subwatershed in San Mateo County for 2002.

8 TOTAL MERCURY

The SLTS sampled sediment and mercury at three locations within San Mateo County: (1) Borel Creek, (2) Belmont Creek, and (3) Pulgas Creek. Figure 8-1 shows the location of the sampling site and the drainage area boundary for the most representative model subwatershed.

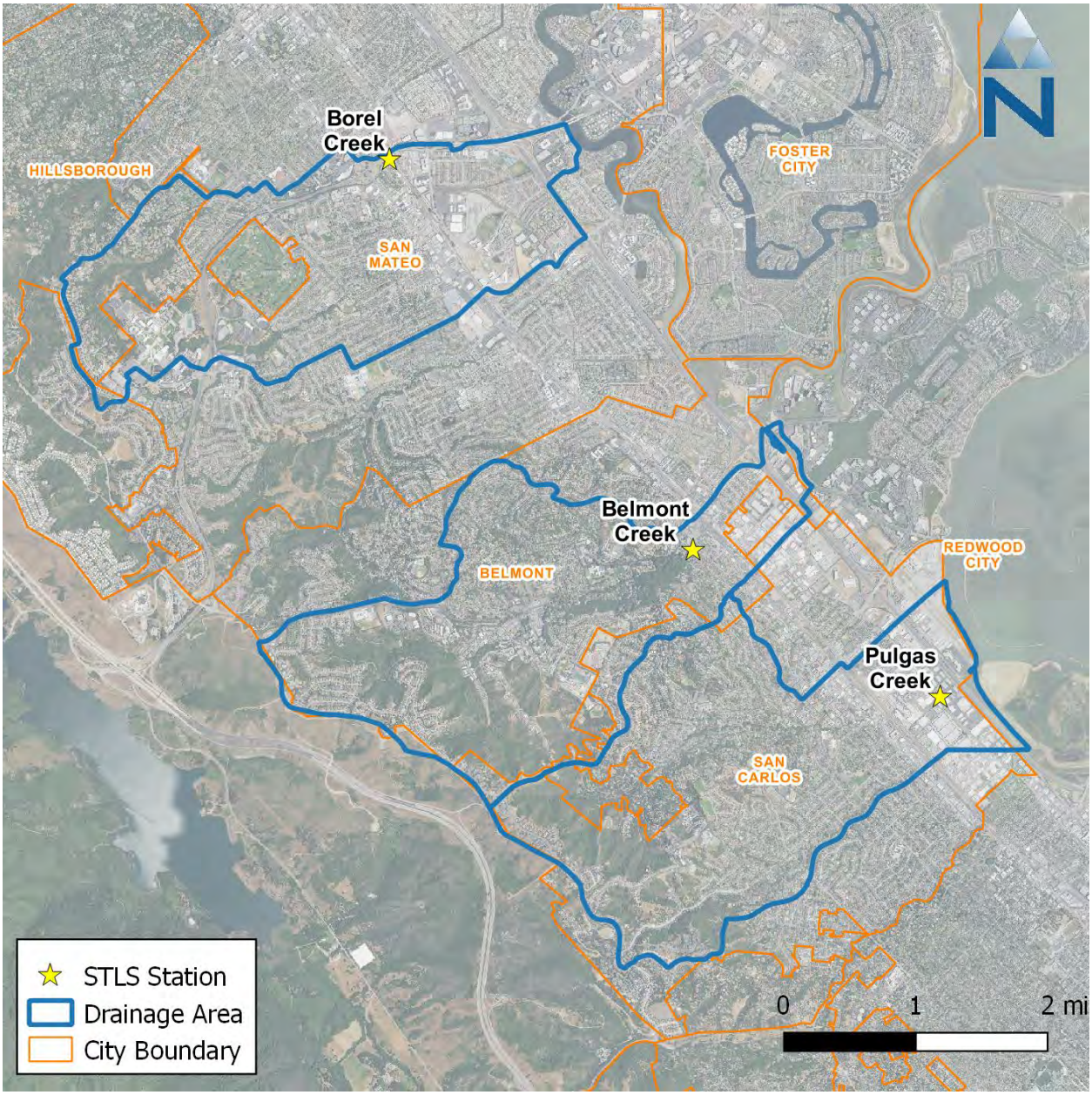

Figure 8-1. SLTS sampling locations in San Mateo County.

Previous SFEI studies of sediment and mercury in other regional tributaries have demonstrated a positive relationship between instream sediment and mercury concentrations. Results from a mercury monitoring study conducted in an urban tributary in Hayward, CA are plotted in black in the upper-left panel of Figure 8-2 (McKee et al. 2009). Consolidated data from the three San Mateo County stations are superimposed in blue on the Hayward samples, showing how those levels trend slightly higher than the Hayward levels, although the slopes are similar. The slope of the line provides a rough estimate of mercury concentration relative to sediment concentrations; however, because the trend line does not intersect at zero, it is reasonable to expect some level of background mercury concentration in the water column, presumably from background sources, when sediment concentrations are near zero.

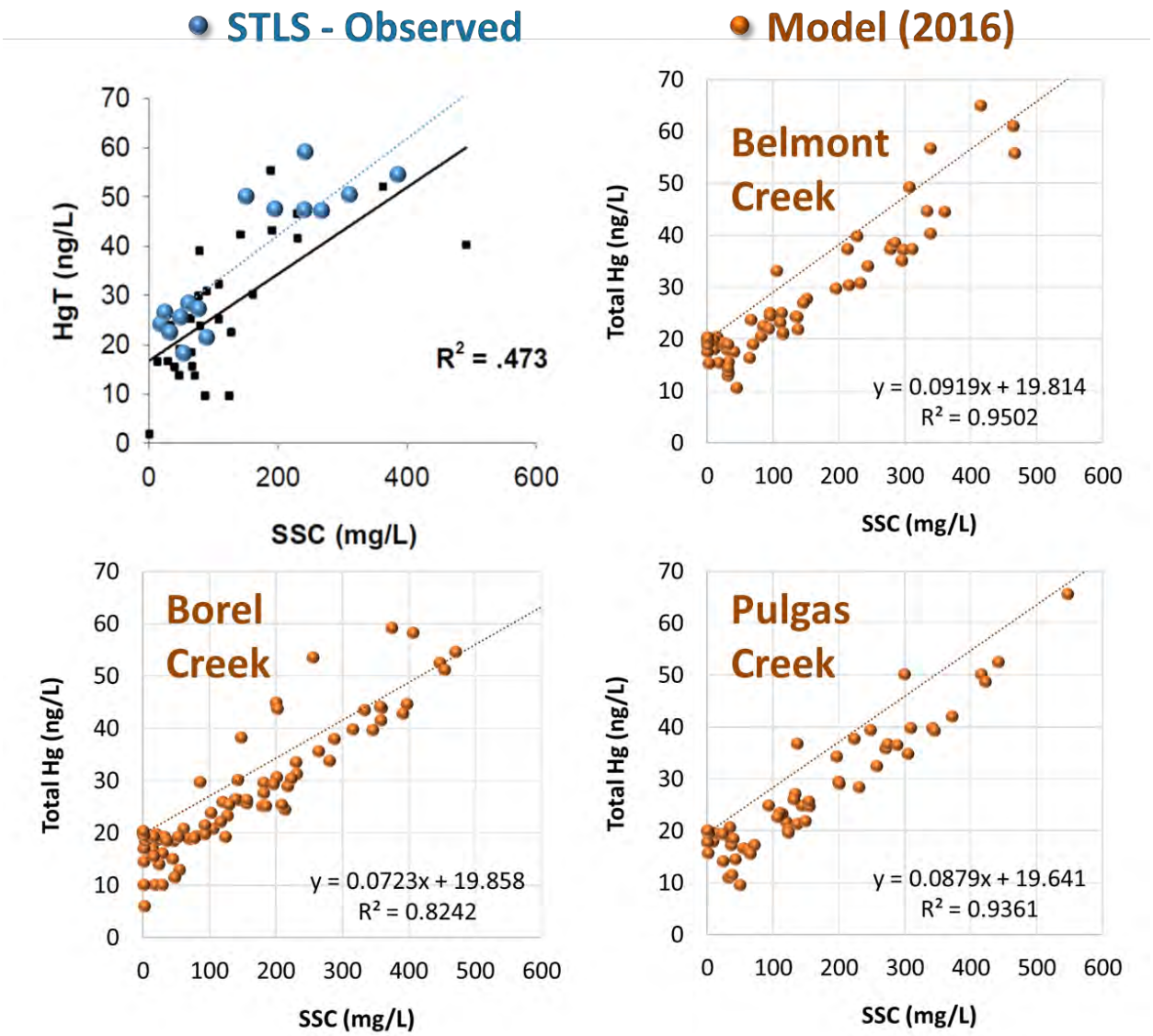

Figure 8-2. Modeled (orange) vs. observed (blue) mercury trends for SLTS sampling sites in San Mateo County.

Runoff concentrations from RWSM (based on SFEI-ABAG categories) were combined with LSPC-modeled hydrology to estimate total long-term loads at tributary outlets. When applied to the timeseries output, this approach by itself produces a linear relationship that intersects the y-axis of

Figure 8-2 at the zero point; however, the observed STLS relationships (McKee et al. 2009) suggest that the intersect is not zero. To better reflect this trend, a background mercury concentration of 20 ng/L was assigned to modeled baseflows as shown Figure 8-2. The model also assumes atmospheric wet-deposition concentration of 9.7 ng/L and a dry-deposition rate of 19 $\mu g/m^2$/year; however, studies also indicated that only about 5 percent of the atmospheric deposition load is exported from land into waters (SFBRWQCB 2008a). The model was parameterized to reflect net mercury delivery to waterbodies from atmospheric deposition (0.485 ng/L wet deposition and 0.95 $\mu g/m^2$/year for dry deposition) (SFBRWQCB 2008a). With those two mercury loading signatures added to represent contributions from natural sources, the RWSM land-based mercury sediment estimates were proportionally adjusted (maintaining the same relative distributions by source) to match the slope of the curve in the calibration panels shown in Figure 8-2.

Figure 8-3 through Figure 8-8 show modeled versus observed mercury concentrations for six sampled storm events using the sediment-based RWSM concentration values as an assessment of model performance at the Pulgas Creek South gage. The selected storm events are consistent with the events presented in Section 7 showing PCB concentrations. Some of the storm events presented contain non-detect values which are notated as "ND" in place of the sample count above the observed value.

Figure 8-9 is a map of unit-area sediment loads at the source (left) and mercury loads from each subwatershed that are ultimately delivered to the Bay (right). Countywide mercury loads were estimated for water year 2002[1] (10/1/2001 to 9/30/2002).

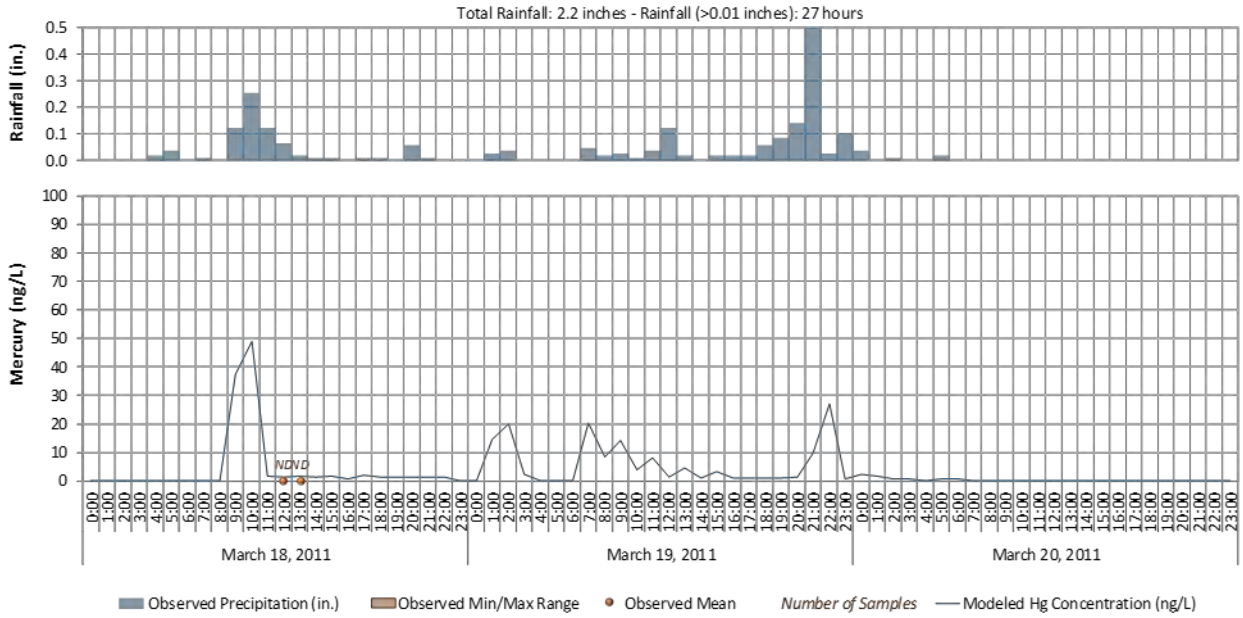

Figure 8-3. Modeled vs. observed total mercury for a selected storm at Pulgas Ck South Gage (3/18/2011 - 3/20/2011).

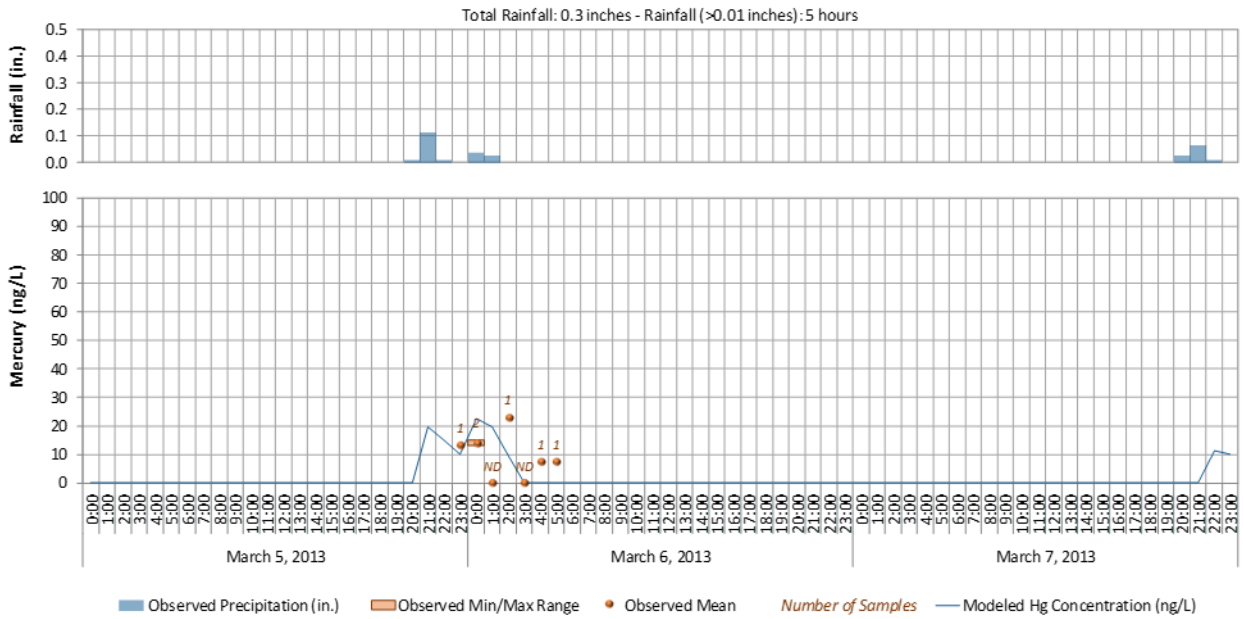

Figure 8-4. Modeled vs. observed total mercury for a selected storm at Pulgas Ck South Gage (3/5/2013 - 3/7/2013).

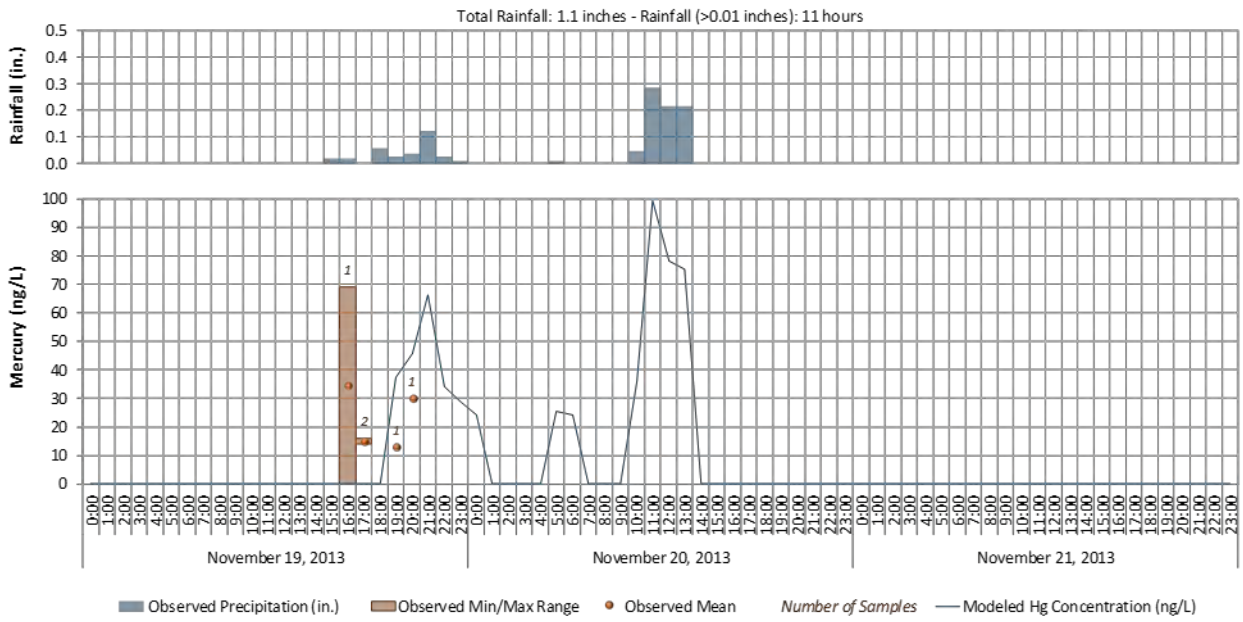

Figure 8-5. Modeled vs. observed total mercury for a selected storm at Pulgas Ck South Gage (11/19/2013 - 11/21/2013).

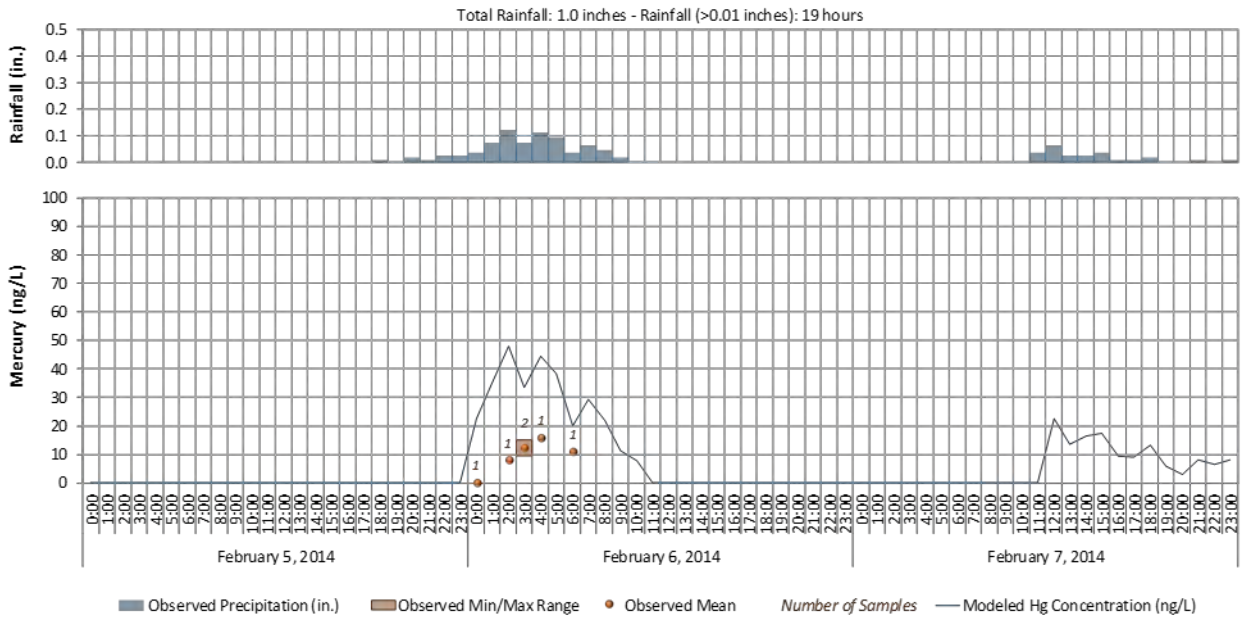

Figure 8-6. Modeled vs. observed total mercury for a selected storm at Pulgas Ck South Gage (2/5/2014 - 2/7/2014).

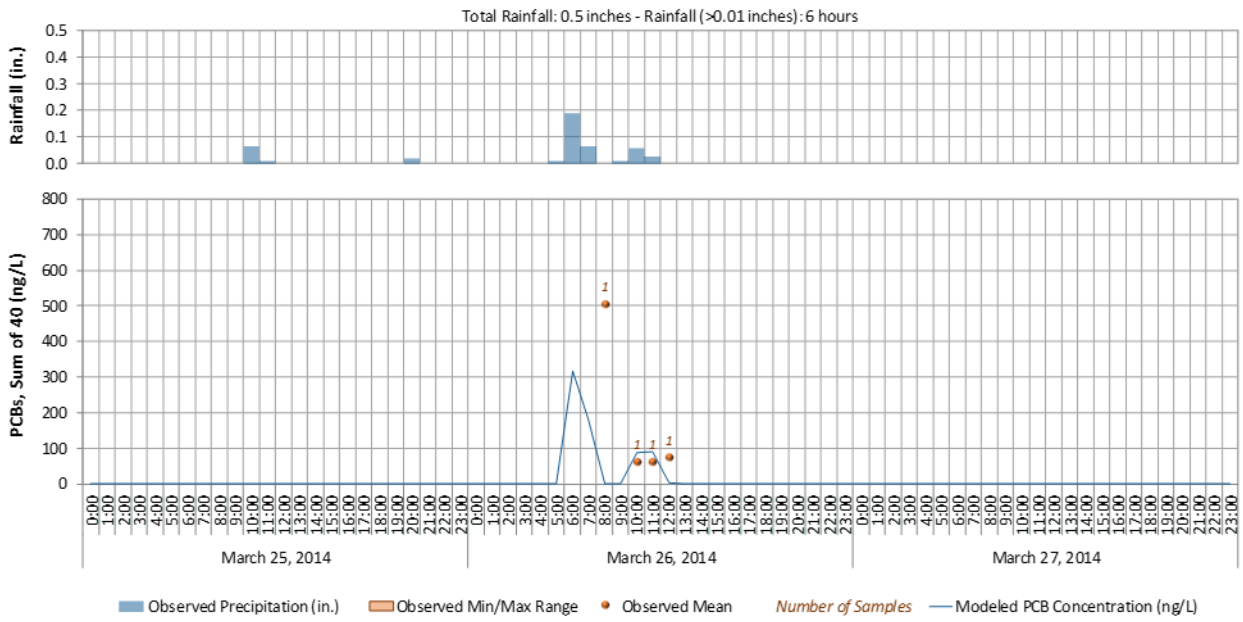

Figure 8-7. Modeled vs. observed Total Hg for a selected storm at Pulgas Ck South Gage (2/26/2014 - 2/28/2014).

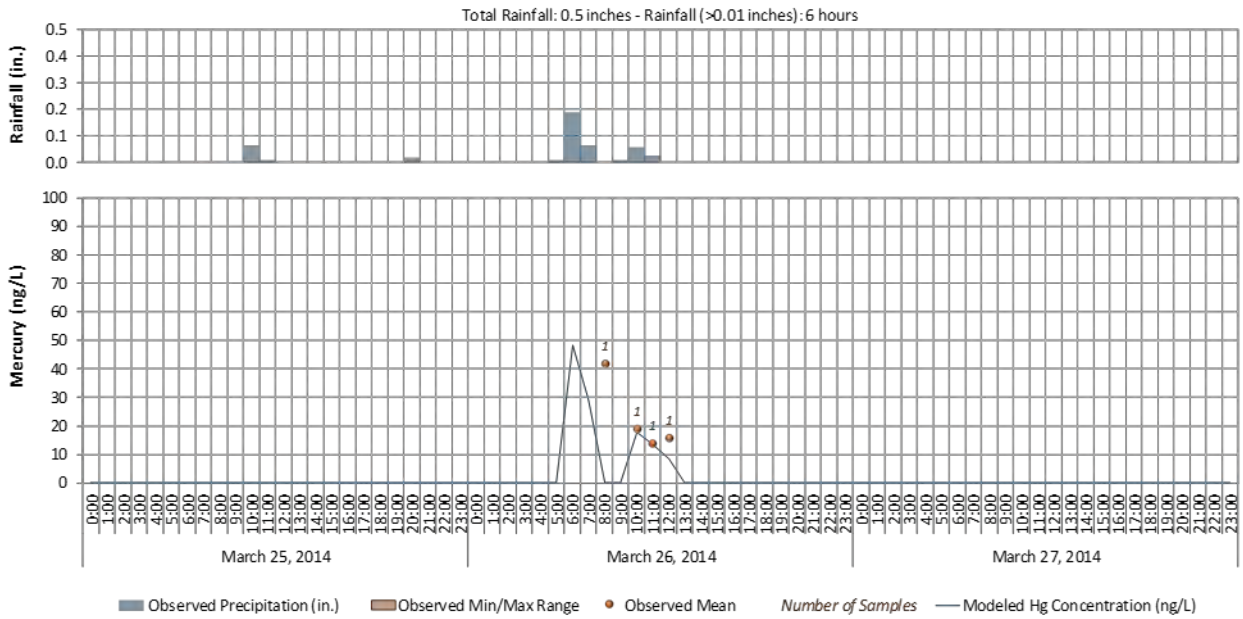

Figure 8-8. Modeled vs. observed total mercury for a selected storm at Pulgas Ck South Gage (3/25/2014 - 3/27/2014).

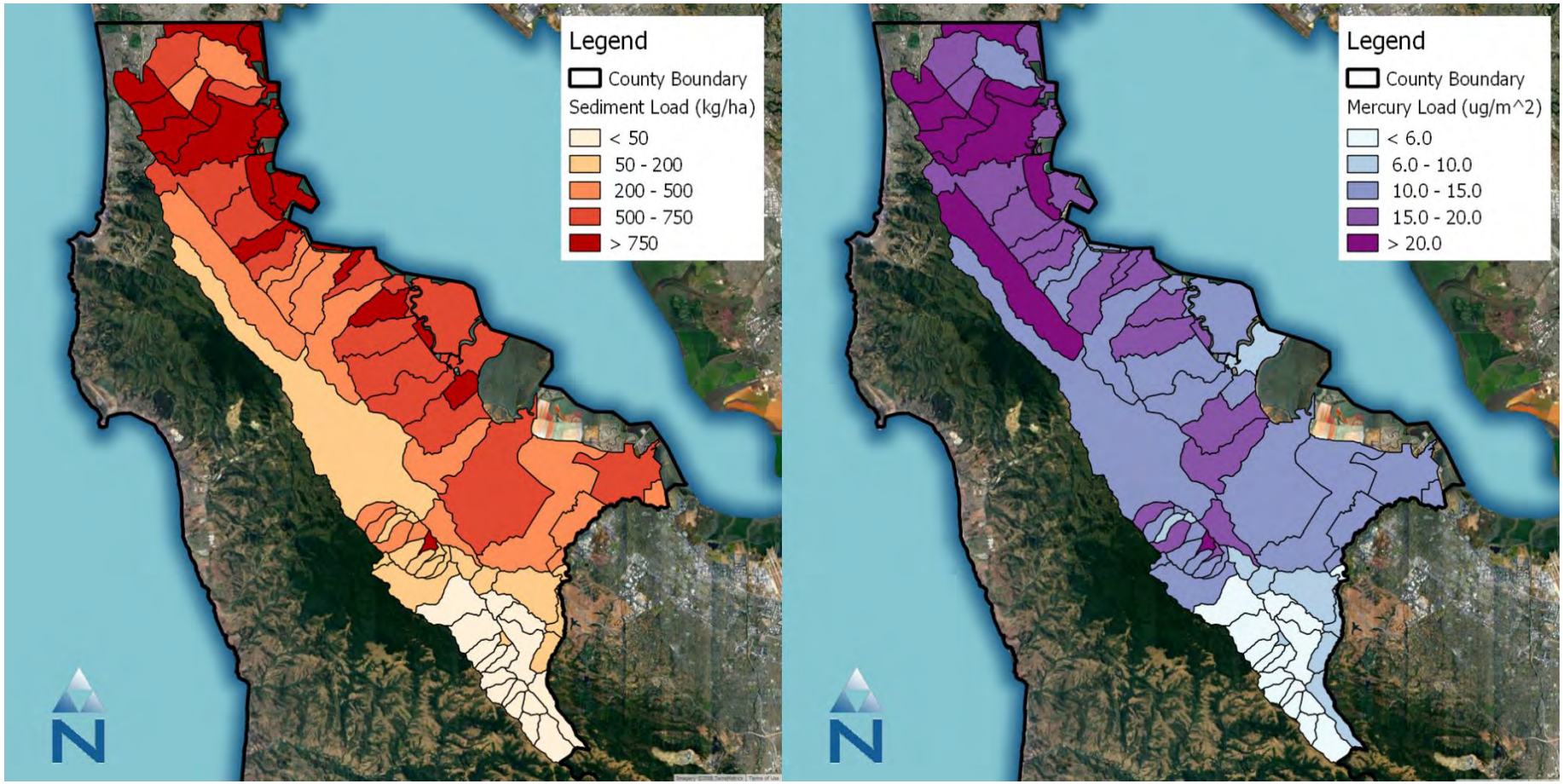

Figure 8-9. Modeled sediment and mercury unit-area loads (at source) by subwatershed in San Mateo County.

9 IDENTIFICATION OF AREA FOR ANALYSIS

The modeling system reported in the previous sections was developed for all areas within County watersheds and provides a complete estimate of all PCB loads delivered to the Bay via stormwater. However, the RAA is performed to estimate baseline pollutant loads from areas covered by the TMDL and MRP. This is performed to provide direct comparison to TMDL WLAs designated for permitted municipal stormwater discharges (SFBRWQCB 2008b). The Bay Area RAA Guidance states that "consistent with TMDL accounting, areas within the boundaries of the Permittee's jurisdiction that do not need to be incorporated into the area of analysis include non-urban land areas, including non-urban areas upstream from dams, which are not needed for calibration or validation of the RAA model." The EPA RAA Guide and Bay Area RAA Guidance also both outline the following factors for consideration in defining the area for analysis:

- If multiple municipal jurisdictions are addressed by the RAA, the analysis should be capable of distinguishing among jurisdictions in terms of relative contributions of wet weather flow and pollutant loads.
- If areas not subject to municipal jurisdiction are included, their flows and loads should be distinguishable.
- The area of analysis should make sense in terms of hydrologic function and connectivity, and for some approaches, flows and loads may require routing through the modeled area of analysis.

The following subsections describe the processes for separating and allowing modeling of distinguishable flows and pollutant loads from areas addressed by the TMDL and MRP, non-urban open space, Caltrans rights-of-way, Industrial NPDES permitted facilities, and Industrial General Permitted (IGP) from the Municipal Separate Storm Sewer System (MS4) jurisdiction.

9.1 Non-Urban Open Space

The Bay PCB and mercury TMDLs present WLAs specific to urban stormwater runoff. Consequently, non-urban open space within San Mateo County was categorized as non-MRP and separated into distinguishable modeled areas for the RAA. These areas were identified by separating all the land designated as *Ag/Open* in the SFEI ABAG land use layer from the other categories.

9.2 Caltrans

The California Department of Transportation (Caltrans) operates with a statewide National Pollutant Discharge Elimination System (NPDES) MS4 permit that regulates the discharge of stormwater associated with the operation and management of the State's highway system. Since the State's highways are permitted separately, these areas are classified as non-MRP. Caltrans right-of-way was estimated through an analysis of road classifications. Using the San Mateo County Department of Public Works (DPW) street centerline dataset, all road designated as state, federal, or interstate highways were selected. A representative buffer width varying between 60 and 100 feet was estimated based on a review of aerial imagery and applied to the centerline to create a buffered right-of-way polygon. Finally, geometric holes created by this buffering technique at interchanges were filled. This analysis resulted in over 4,500 acres of land attributed to Caltrans. Figure 9-1 presents a map of the estimated Caltrans right-of-way developed through this approach.

9.3 Industrial Stormwater Permits

Industrial facilities with industrial stormwater permits must meet requirements outlined in their permit for managing and treating stormwater at the parcel or site level. Active industrial stormwater permits within San Mateo County were identified using EPA's Enforcement and Compliance History Online (ECHO) database. Permitted facilities included two categories (1) those facilities operating under individual NPDES permits, and (2) those facilities operating under the IGP. Individual permits are typically issued for larger facilities or those with unique requirements that deviate from those outlined under the IGP. In San Mateo County, the San Francisco International Airport and the Corinda Los Trancos Landfill were identified as the only two individual NPDES permits. The remaining 112 facilities identified through the EPA ECHO database search were included in the IGP, which included various industrial operations including warehouses, quarries, port facilities, and the SLAC National Accelerator Laboratory which totaled over 200 acres.

Both individual NPDES permits IGPs are regulated under a program separate from MS4 permits and are not considered a direct contribution from MS4 drainage areas. Therefore, these industrial parcel areas area were separated from the MS4 area within the model to distinguish MS4 load contributions from other those covered by other permits. While these parcels encompass a relatively small area compared to the size of the County, some of these facilities are located within areas of higher pollutant loading. Figure 9-2 presents a map of the industrial stormwater facilities identified through this search.

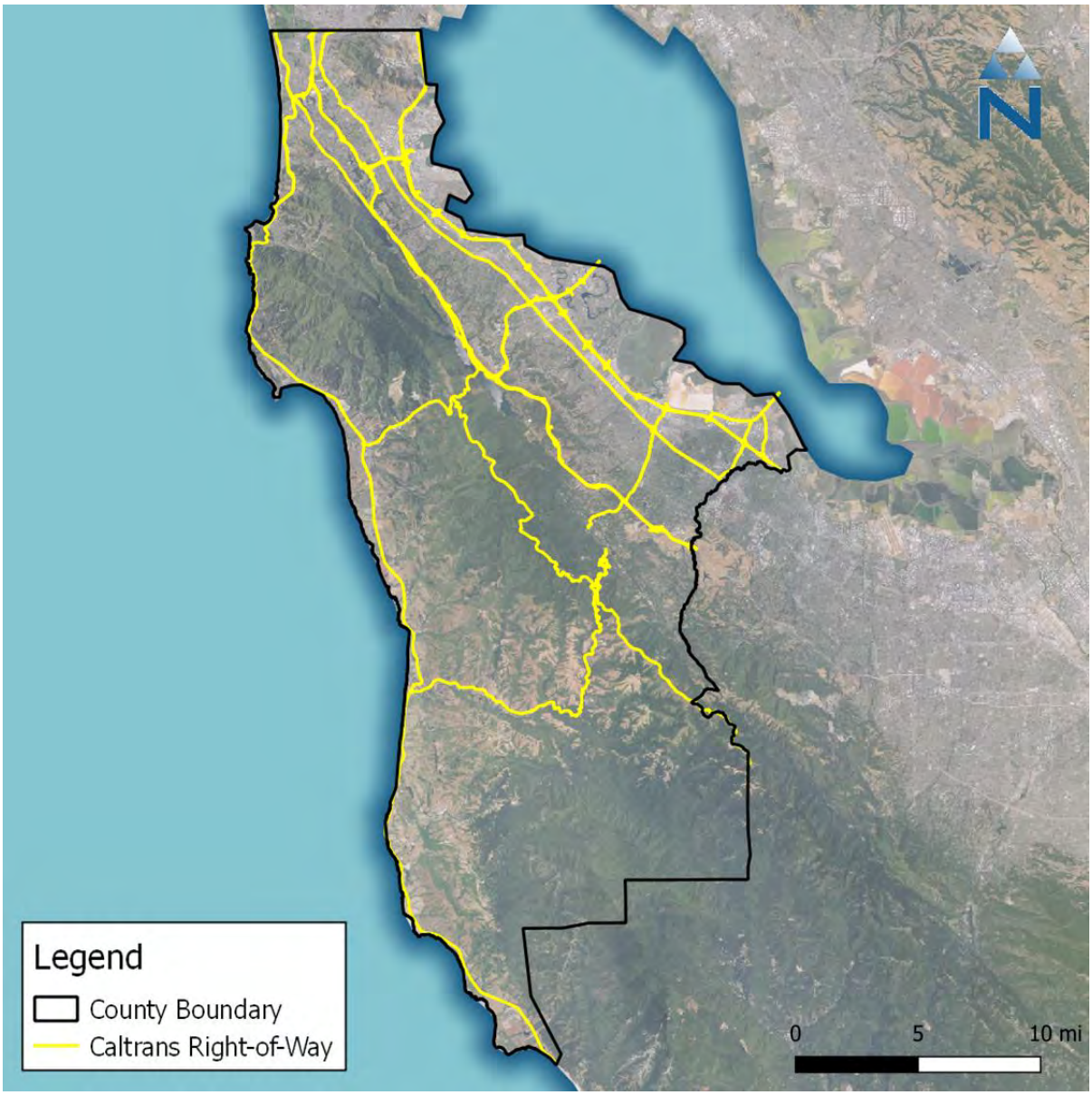

Figure 9-1. Location of estimated Caltrans right-of-way.

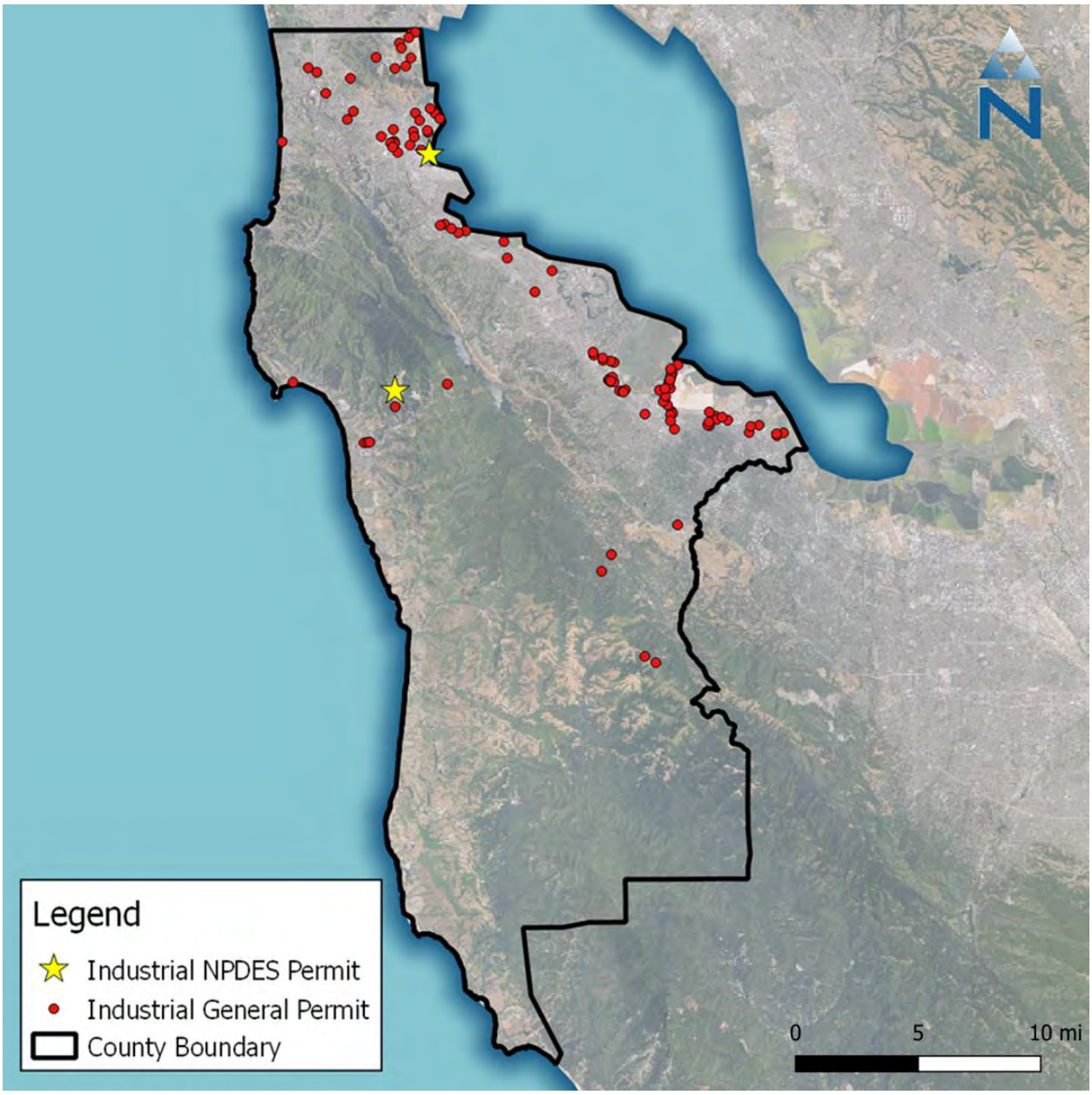

Figure 9-2. Locations of identified NPDES (individual) and facilities included in the IGP.

10 IDENTIFICATION OF BASELINE POLLUTANT LOADS AND STORMWATER IMPROVEMENT GOALS

To provide a direct comparison to WLAs assigned to municipal stormwater discharges to the Bay, the pollutant loadings associated with land areas identified in Section 9 were separated from loads addressed by the MRP. Table 10-1 summarizes the MRP and non-MRP land areas and their pollutant loads. The MRP pollutant loads in Table 10-1 can be directly compared to respective TMDL WLAs for the determination of necessary stormwater improvement goals. Figure 10-1 depicts the area of analysis addressed by the MRP.

Table 10-1. Summary of total area and pollutant loading by watershed and type of area.

Permitted and Other Areas		Area (acres)	PCB (kg/year)	Hg (kg/year)
MRP		56,943	1.3	1.63
Non-MRP	*Open Space*	44,958	0.001	0.56
	Caltrans	2,992	0.08	0.08
	Industrial (NPDES)	1,796	0.225	0.07
	Industrial (General)	828	0.09	0.02

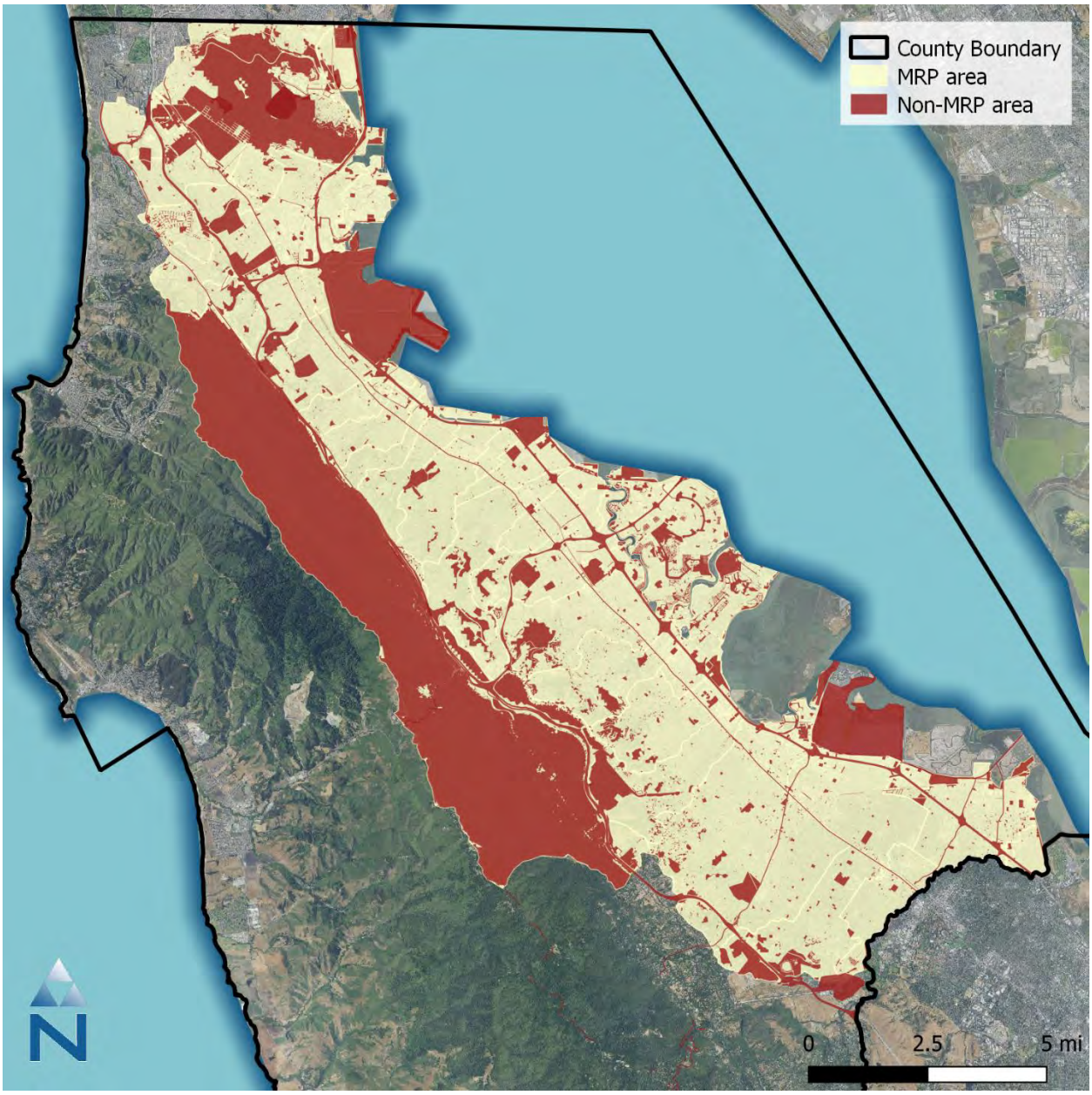

Figure 10-1. Area of analysis covered by the Municipal Regional Stormwater NPDES Permit (MRP).

Table 10-2 and Table 10-3 provide a summary of the calculation of stormwater improvement goals, or pollutant load reductions, to meet WLAs for PCBs and mercury, respectively. The tables summarize values reported in the TMDLs for existing pollutant and sediment loads for all stormwater loads to the Bay, sediment targets, and WLAs and pollutant reductions assigned to all municipal stormwater discharges to the Bay; the San Mateo County portion of the WLAs; and the existing pollutant and sediment loads and load reductions estimated by the RAA model for MRP areas designated in Table 10-1. For PCBs, an 84.6% reduction in annual loads is estimated for municipal discharges within San Mateo County to meet the San Mateo County portion of the TMDL wasteload allocation. For mercury, the baseline annual load is estimated to be less than the San Mateo County portion of the wasteload allocation, requiring no load reduction. The model is not determined to be under-predicting mercury load, as can be demonstrated by the validation of modeled mercury

concentrations presented in Section 8 and sediment loads (basis for mercury load predictions) presented in Section 6.

Table 10-2. Calculation of stormwater improvement goals to address PCBs TMDL.

TMDL Component		PCB Loads	
		Bay-wide	San Mateo County
1	Existing PCB Load (kg/year)	20[1]	1.3[2]
2	Existing Sediment Load (t/year)	2,000,000[1]	8,107[2]
3	Target Sediment Concentration (µg/kg)	1[1]	n/a
4	Wasteload Allocation for Municipal Stormwater Discharges(kg/year)	2[1]	0.2[1]
5 = 1 - 4	Load Reduction for Municipal Stormwater Discharges (kg/year)	18[1]	1.1[3]
6 = 5 / 1	Percent Reduction	90[1]%	84.6[3]%

1: Reference: SFBRWQCB 2008b
2: Determined using the RAA model based on simulation of Water Year 2002, defined by the Bay Area RAA Guidance to be representative of average annual loading conditions for comparison to TMDL WLAs.
3: Calculated based on the difference between the RAA modeled Existing PCB Load (blue = 1.3 kg/yr) and the TMDL WLA (green = 0.2 kg/yr).

Table 10-3. Calculation of stormwater improvement goals to address mercury TMDL.

TMDL Component		Hg Loads	
		Bay-wide	San Mateo County
1	Existing Mercury Load (kg/year)	160[1]	1.6[2]
2	Existing Sediment Load (t/year)	410,000[1]	8,107[2]
3	Target Sediment Concentration (mg/kg)	0.2[1]	n/a
4	Wasteload Allocation for Municipal Stormwater Discharges(kg/year)	82[1]	8.4[1]
5 = 1 - 4	Load Reduction for Municipal Stormwater Discharges (kg/year)	78[1]	0[3]
6 = 5 / 1	Percent Reduction	48.8[1]%	0[3]%

1: Reference: SFBRWQCB 2006
2: Determined using the RAA model based on simulation of Water Year 2002, defined by the Bay Area RAA Guidance to be representative of average annual loading conditions for comparison to TMDL WLAs.
3: Calculated based on the difference between the RAA modeled Existing PCB Load (blue = 1.6 kg/yr) and the TMDL WLA (green = 8.4 kg/yr). Since the existing load is estimated to be less than the TMDL WLA, zero reduction is required.

The MRP assigns required mercury (62 kg/yr) and PCB (14.4 kg/yr) load reductions to be achieved through the implementation of GI. Through the development of the Bay Area RAA Guidance, it was agreed that if a new baseline model is developed that results in a revised calculation of the load reduction required to meet WLAs, the percent of the permittee load reduction can be used as the stormwater improvement goal to guide GI planning. Table 10-4 provides a summary of the MRP required PCB and mercury load reductions and the interpretation of percent of permittee load reductions reported by the Bay Area RAA Guidance.

Table 10-4. MRP required pollutant load reductions achieved through GI Bay-wide.

Pollutant	MRP Required Load Reduction (kg/yr)	Percent of Permittee Load Reduction
PCBs	3.0	20.8%
Mercury	10.0	16.1%

Based on the total load reductions calculated for PCBs and mercury (Table 10-2 and Table 10-3, respectively), and the percentage of these load reductions to be achieved through GI (Table 10-4), a new totals for PCB and mercury load reductions can be calculated as goals for GI. Summarized in Table 10-5 and Table 10-6, these load reductions serve as goals for GI plans to be achieved by 2040.

Table 10-5. Calculation of San Mateo County PCB load reduction by 2040 through GI.

Achieved Through GI Implementation by 2040	San Mateo Co. (Based on RAA Model)
Load Reduction (kg/yr)	0.23[1]
Percent Reduction	17.6[2]%

1: Bay Area RAA Guidance reports 20.8% of the permittee load reduction associated with the MRP GI requirements. Calculated based on 20.8% of the PCB Load Reduction (Table 10-2).
2: Calculated based on difference of Load Reduction reported above (0.23 kg/yr) and Existing PCB Load (1.3 kg/yr).

Table 10-6. Calculation of mercury load reduction by 2040 through GI.

Achieved Through GI Implementation by 2020	San Mateo Co. (Based on RAA Model)
Load Reduction (kg/yr)	0[1]
Percent Reduction	0[2]%

1: Bay Area RAA Guidance reports 16.1% of the permittee load reduction associated with the MRP GI requirements. Calculated based on 16.1% of the Mercury Load Reduction (Table 10-3).
2: Calculated based on difference of Load Reduction reported above (8.6 kg/yr) and Existing Mercury Load (1.6 kg/yr). Because the existing Load is less than the required load reduction, no reduction is required.

11 SUMMARY AND NEXT STEPS

Based on criteria established by the Bay Area RAA Guidance, the baseline hydrology and pollutant loading model is considered calibrated and validated and sufficient for estimation of existing loads of mercury and PCBs, comparison to TMDL wasteload allocations, and determination of necessary load reductions to support the planning of GI implementation. Based on requirements of the MRP and results of the baseline model, Table 10-5 and Table 10-6 provide a summary of the PCB and mercury load reduction goals, respectively, to be attained by 2040 through the implementation of GI.

The next Phase II of the RAA will provide modeling and cost-optimization of GI projects to determine the amount GI needed over time to meet pollutant load reduction goals by 2040. C/CAG has started identifying opportunities for GI projects opportunities through development of the San Mateo County Stormwater Resource Plan (SRP) (SMCWPPP 2017). The SRP categorized GI project opportunities in three primary categories:

- Parcel-based or Low Impact Development (LID), where stormwater is managed at parcel level;
- Green streets, where stormwater is managed in the public rights-of-way at the block scale; and,
- Regional projects, where stormwater is managed at the neighborhood or watershed scale.

For the RAA, these primary categories are further grouped or broken down as follows:

1. **Existing Projects**: Stormwater treatment and GI projects that have been implemented since FY-2004/05. This is primarily all of the Regulated Projects that were mandated to treat runoff via Provision C.3 of the MMRP, but also includes any public green street or other demonstration projects that were not subject to Provision C.3 requirements. For Regulated Projects in the early years of C.3 implementation, stormwater treatment may have been achieved through non-GI means, such as underground vault systems or media filters.
2. **Future New and Redevelopment:** This is all the regulated projects that will be subject to Provision C.3 requirements to treat runoff via GI and is based on spatial projections of future new and redevelopment tied to regional models for population and employment growth.
3. **Regional Projects (identified)**: The SRP identified three projects within public parks to provide regional capture and infiltration/treatment of stormwater, and included conceptual designs to support further planning and designs. C/CAG is currently working with agencies to identify additional regional project opportunities for conceptual design and inclusion in the RAA.
4. **Green Streets**: The SRP identified and prioritized opportunities throughout San Mateo County for retrofitting existing streets with GI in public rights-of-way. Green streets were ranked as high, medium, and low priority based on a multiple-benefit prioritization process developed for the SRP.
5. **Other GI Projects (to be determined)**: Other types of GI projects on publicly owned parcels, representing a combination of either additional parcel-based GI or other Regional Projects. The SRP screened and prioritized public parcels for opportunities for onsite LID and Regional Projects. These opportunities need further investigation to determine the best potential projects.

Phase II of the RAA will provide a quantitative approach to establish relationships between GI implementation and pollutant load reduction. Model output will estimate the amount of GI, or capacity expressed in acre-feet of treatment area, needed to achieve pollutant load reduction targets for C/CAG member agencies, and the resultant amount of impervious area treated. During development of the SRP, C/CAG developed a street- and parcel-level project identification and prioritization process to identify and rank potential locations suitable for implementation of GI. This list will be used to develop assumptions for GI project opportunities used as input to the RAA model,

and to provide a head start in the development of GI Plans. Figure 11-1 presents an example GI implementation scenario showing the distribution of selected GI categories versus incremental reductions in pollutant loading and increasing cost.

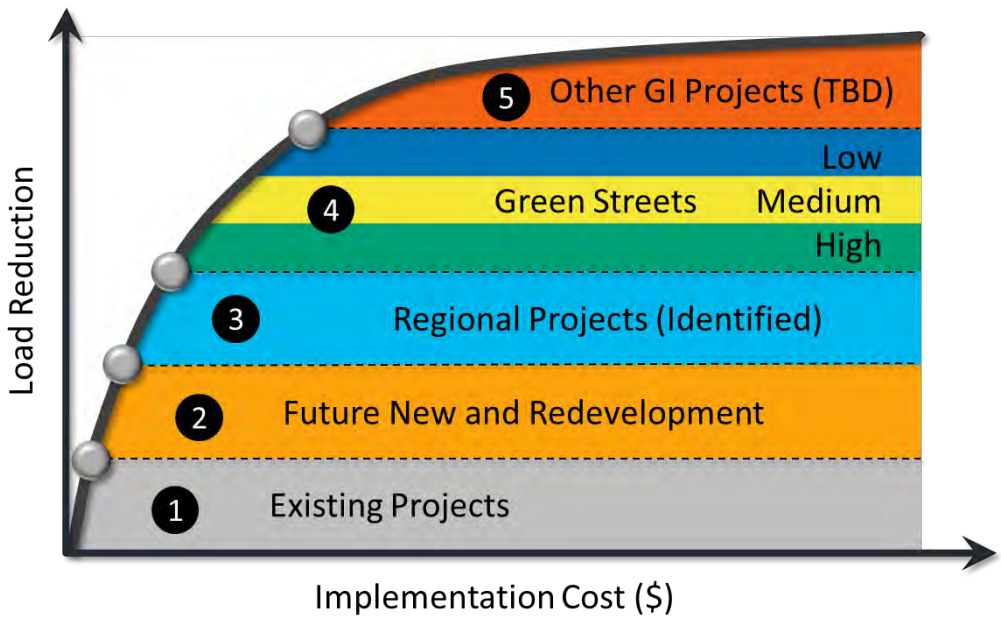

Figure 11-1. Example implementation recipe showing the general sequencing of GI categories.

Phase II of the RAA will provide a useful tool for investigation of alternative implementation scenarios through cost-benefit optimization that can inform cost-effective GI implementation within each city/unincorporated jurisdiction. After modeling and cost-optimization has been performed for each city and unincorporated county area, the GI types presented in Figure 11-1 will be summarized by jurisdiction in a single implementation "recipe" capable of meeting the required pollutant load reduction. A unique GI recipe will be developed for each jurisdiction representing the distribution of GI categories recommended through the RAA. The results of the RAA will be presented as tables and maps for each jurisdiction, and will set the goals for GI planning efforts for each agency.

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Appendix B

Phase II RAA – Green Stormwater Infrastructure Modeling Report

SEPTEMBER 2020

SAN MATEO COUNTYWIDE WATER POLLUTION PREVENTION PROGRAM

San Mateo County-Wide Reasonable Assurance Analysis Addressing PCBs and Mercury:

Phase II Green Infrastructure Modeling Report

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SAN MATEO COUNTYWIDE
WATER POLLUTION PREVENTION PROGRAM
Clean Water. Healthy Community.

A Program of the City/County Association of Governments of San Mateo County (C/CAG)

Prepared by
PARADIGM ENVIRONMENTAL
LARRY WALKER ASSOCIATES, INC.

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EXECUTIVE SUMMARY

To support member agencies of the City/County Association of Governments of San Mateo County (C/CAG) with development of Green Infrastructure (GI) Plans and to address requirements of the Municipal Regional Stormwater Permit (Order No. R2-2015-0049) (SFBRWQCB 2015), the San Mateo Countywide Pollution Prevention Program performed a study to quantify baseline hydrology and loadings of Polychlorinated Biphenyls (PCBs) and mercury loads to San Francisco Bay, and evaluate the benefits of proposed GI projects to reduce these loads through the capture, infiltration, and/or treatment of stormwater. The previous *San Mateo County-Wide Reasonable Assurance Analysis Addressing PCBs and Mercury: Phase I Baseline Modeling Report* RAA (RAA Phase I Report) provided documentation of the methods and modeling approaches used to represent baseline hydrology and sediment, PCBs, and mercury loads resulting from municipal stormwater discharges within San Mateo County to San Francisco Bay (SMCWPPP 2018a). This RAA Phase II Report builds upon the previous effort and provides a summary of the modeling approaches used to simulate hydraulic and pollutant removal processes associated with GI project opportunities within each of the cities and unincorporated areas throughout San Mateo County, determine the amount of GI needed within each municipal jurisdiction to address pollutant load reduction goals, and quantify metrics that can support GI planning, implementation, and tracking. Results from this report can be considered by each city and San Mateo County to set goals for GI implementation, which will be addressed through separate plans developed by each agency.

The baseline model documented in the RAA Phase I Report provided the first step in preparation of a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed GI control measures will result in sufficient load reductions of PCBs and mercury to meet Total Maximum Daily Load (TMDL) wasteload allocations (WLAs) assigned to municipal stormwater discharges to San Francisco Bay. Based on the Loading Simulation Program C++ (LSPC), the baseline model was calibrated and validated using available historic monitoring data and was demonstrated to meet performance criteria specified in the *Bay Area Reasonable Assurance Analysis Guidance Document* (Bay Area RAA Guidance) (BASMAA 2017). The LSPC model provides hourly simulation of historical hydrology and pollutant loads for multiple watersheds discharging to San Francisco Bay.

Phase II of the RAA includes linkage of the LSPC baseline model with a GI performance model based on the System for Urban Stormwater Treatment & Analysis Integration (SUSTAIN). Developed by the U.S. Environmental Protection Agency's (EPA) Office of Research and Development, SUSTAIN was primarily designed as a decision-support system for selection and placement of GI projects at strategic locations in urban watersheds. It includes a process-based continuous project simulation module for representing flow and pollutant transport routing through various types of GI projects. A distinguishing feature of SUSTAIN is a robust cost-benefit optimization model that incorporates dynamic, user-specified project unit-cost functions to quantify the implementation costs associated with various types of GI projects (USEPA 2009, Riverson et al. 2014). The cost-benefit optimization model was run iteratively to generate cost-effectiveness curves representing different combinations of projects within each municipal jurisdiction. Those results were used to evaluate cost-effective goals for GI implementation by evaluating the trade-offs between different scenarios.

The output from the RAA needs to consider multiple perspectives and strike the right balance between detail and specificity while still leaving ample opportunity for future adaptive management. The following are key considerations for the RAA output:

- **Demonstrate PCBs and Mercury Load Reductions** – The primary goal of the RAA is to quantitatively demonstrate that GI implementation will result in load reductions of PCBs and mercury sufficient to attain their respective TMDL WLAs and the component of stormwater improvement goals to be achieved with GI outlined in the MRP. Based on the baseline hydrology and water quality model (SMCWPPP 2018a), the RAA determined that a 17.6% reduction in PCB loads is needed to meet the GI implementation goals established by the MRP. Zero reduction in mercury loads was determined to be needed because baseline loads were demonstrated to be below the TMDL WLA for San Mateo County. As a result, a 17.6% reduction in PCB loads is established as the primary pollutant reduction target for the RAA.
- **Develop Metrics to Support Implementation Tracking** – The MRP (Provision C.3.j) requires tracking methods to provide reasonable assurance that TMDL WLAs are being met. Provision C.3.j states that the GI Plan "shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area." C/CAG is currently leading the development of a tracking tool that will allow for the calculation of metrics consistent with the results of the RAA.
- **Support Adaptive Management** – Given the relatively small scale of most GI projects (e.g., low impact development [LID] on an individual parcel or a single street block converted to green street), numerous individual GI projects will be needed to address the pollutant reduction target at the countywide scale. All the GI projects will require site investigations to assess feasibility and costs. As a result, the RAA provides a preliminary investigation of the amount of GI needed spatially (e.g., by subwatershed and municipal jurisdiction) to achieve the countywide pollutant load reduction goal. The RAA sets the GI planning goals in terms of the amount of GI implementation required over time to address pollutant load reductions. As GI Plans are implemented and more comprehensive municipal engineering analyses (e.g., masterplans, capital improvement plans) are performed, the adaptive management process will be key to ensuring that goals are met. In summary, the RAA informs GI implementation goals, but the pathway to meeting those goals is subject to adaptive management and can potentially change based on new information or engineering analyses performed over time.

This RAA Phase II Report provides necessary documentation of the methods and assumptions for modeling GI and selecting implementation goals to meet the 17.6% countywide reduction of PCB loads to San Francisco Bay. The RAA predicts the most cost-effective GI implementation plan for each municipal jurisdiction and subwatershed throughout San Mateo County and sets implementation goals for the amount of stormwater volumes to be managed and impervious area to be retrofitted that can serve as metrics for implementation tracking. Through the adaptive management process, future implementation of GI may vary from results of the RAA based on further engineering analysis and evaluation of GI project opportunities. However, the RAA provides goals for GI planning that can be adapted over time as lessons are learned through GI implementation.

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Acronyms

ABAG	Association of Bay Area Governments
AGWO	Active Groundwater Outflow
BAHM	Bay Area Hydrology Model
BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
BMP	Best Management Practice
Caltrans	California Department of Transportation
C/CAG	City/County Association of Governments of San Mateo County
CIMIS	California Irrigation Management Information System
DCIA	Directly Connected Impervious Area
DEM	Digital Elevation Model
ECHO	Enforcement and Compliance History Online
EIA	Effective Impervious Area
EMC	Event-Mean Concentration
EPA	Environmental Protection Agency
ET	Evapotranspiration
FTABLE	Functional Table (Model Rating Curve)
GHCN	Global Historical Climatology Network
GI	Green Infrastructure
GIS	Geographic Information Systems
HgT	Total Mercury
HRU	Hydrologic Response Units
HSG	Hydrologic Soil Group
HSPF	Hydrologic Simulation Program–FORTRAN
IFWO	Interflow Outflow
IGP	Industrial General Permit
LSM	Land Surface Models
LSPC	Loading Simulation Program in C++
MIA	Mapped Impervious Area
MRP	Municipal Regional Stormwater Permit
MS4	Municipal Separate Storm Sewer System
NED	National Elevation Dataset
NHD	National Hydrography Database
NLCD	National Land Cover Database
NLDAS2	North American Land Data Assimilation System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NOAA	National Oceanic and Atmospheric Administration
PCBs	Polychlorinated Biphenyls
PEVT	Potential Evapotranspiration

POI	Points of Interest
PRISM	Parameter-elevation Regressions on Independent Slopes Model
QAPP	Quality Assurance Project Plans
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
SCVWD	Santa Clara Valley Water District
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SFEI	San Francisco Estuary Institute
SSURGO	Soil Survey Geographic Database
STATSGO	State Soil Geographic Database
STLS	Small Tributaries Loading Strategy
SWRCB	State Water Resources Control Board
TAET	Total Actual Evapotranspiration
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WLA	Waste Load Allocation
WMMS	Watershed Management Modeling System
WY	Water Year

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1 INTRODUCTION

The Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049) requires Bay Area cities and counties to develop Green Infrastructure (GI) Plans (Provision C.3) and Polychlorinated Biphenyls (PCBs) and Mercury Control Measure Implementation Plans (Provisions C.11 and C.12) that provide pollutant load reductions to attain Total Maximum Daily Load (TMDL) wasteload allocations (WLA) over specified compliance periods. A key component of these plans is a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed control measures will result in sufficient load reductions of Polychlorinated Biphenyls (PCBs) and mercury to meet WLAs for municipal stormwater discharges to San Francisco Bay. The San Mateo Countywide Pollution Prevention Program (SMCWPPP), a program of the City/County Association of Governments (C/CAG) of San Mateo County, has initiated a countywide effort to develop an RAA to estimate the baseline PCB and mercury loads to the Bay, determine load reductions to meet WLAs, and set goals for the amount of GI needed to meet the portion of PCB and mercury load reduction the MRP assigns to GI (SFBRWQCB 2015).

In 2017, the U.S. Environmental Protection Agency (EPA) Region 9 released *Developing Reasonable Assurance: A Guide to Performing Model-Based Analysis to Support Municipal Stormwater Program Planning* (EPA RAA Guide) (USEPA 2017), which provides guidance on the technical needs of the RAA and considerations for model selection. Building upon the EPA RAA Guide, the Bay Area Stormwater Management Agencies Association (BASMAA) prepared the *Bay Area Reasonable Assurance Analysis Guidance Document* (Bay Area RAA Guidance) (BASMAA 2017) to provide specific guidance on modeling to support RAAs performed in the Bay Area to meet MRP requirements, address TMDLs for PCBs and mercury, and support GI planning. The EPA RAA Guide and Bay Area RAA Guidance both outline essential steps for performing an RAA, as depicted in Figure 1-1. In 2018, C/CAG completed the *San Mateo County-Wide Reasonable Assurance Analysis Addressing PCBs and Mercury: Phase I Baseline Modeling Report* (RAA Phase I Report), which includes development of a baseline model to address the first three steps of the RAA outlined in the EPA RAA Guide and Bay Area RAA Guidance. These steps included: (1) Designation of Area Addressed by Analysis, (2) Characterization of Existing Conditions, and (3) Determination of Stormwater Improvement Goals (SMCWPPP 2018a). This RAA Phase II Report builds upon the RAA Phase 1 Report to address the following final steps of the RAA:

1. **Estimating Load Reduction Achieved by Controls (Demonstrating Management Actions Will Attain Goals)** – The RAA includes methods for estimating pollutant load reductions[1] associated with GI. Load reductions from GI can include: (1) land use change associated with redevelopment, (2) low impact development (LID) and non-LID treatment controls on land development projects as required by MRP Provision C.3, and (3) retrofit of existing streets and developed sites with GI features and LID treatment controls (e.g., green streets and regional projects). The Bay Area RAA Guidance states that "GI performance should be simulated directly using a process-based model, or simulated using a combination of continuous simulation-based volume performance and empirically based concentration performance to estimate load reductions."

[1] The source control component of the RAA will be performed through a separate coordinated effort based on regionally acceptable methods and assumptions for an accounting methodology and will be reported as part of the PCBs and Mercury Control Measure Implementation Plans for San Mateo County due for completion in 2020.

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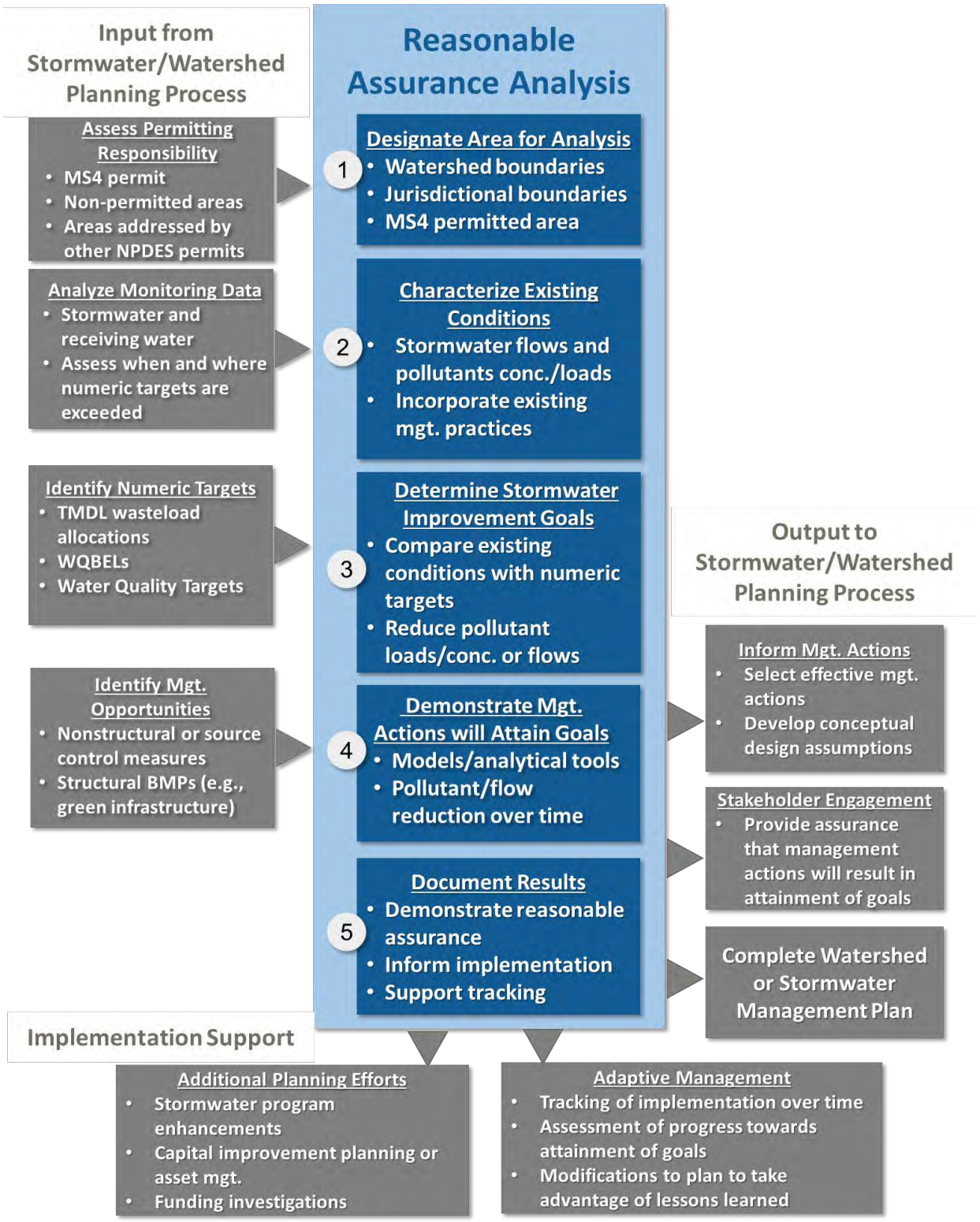

Figure 1-1. RAA Process Flow Chart (USEPA 2017).

2. **Documentation** – Documentation of RAA results is critical to the demonstration that GI Plans and Control Measure Implementation Plans will result in attainment of pollutant load reduction goals. The documentation can serve various purposes, including providing: (1) reasonable assurance to stakeholders and regulators that the plans will lead to effective implementation, (2) information to support next steps for implementation (e.g., capital improvement planning, investigation of funding options), and (3) quantitative results to support an adaptive management process, tracking of implementation over time, and/or assessment of progress towards attainment of pollutant reduction goals (USEPA 2017). The Bay Area RAA Guidance provides recommendations for minimum requirements for RAA documentation, including summaries of model input (e.g., model parameters, data sources, or other assumptions), calibration results, model processes and procedures, key model outputs (e.g., baseline loads, load reduction goals), modeled GI and source control measures, and modeled load reductions by control measure category. The combination of the RAA Phase I Report (SMCWPPP 2018a) and this RAA Phase II Report fulfill all required documentation for the San Mateo Countywide RAA addressing the GI portion of PCBs and mercury load reductions specified in the MRP.

This RAA Phase II Report provides a summary of the methods and modeling approaches used to simulate hydraulic and pollutant removal processes associated with GI project opportunities, determine the amount of GI needed within each city and unincorporated County jurisdiction to address pollutant load reduction goals, and quantify metrics that can support GI planning, implementation, and tracking. Results from the RAA Phase II Report can be considered by each city and San Mateo County to set goals for GI implementation, which will be addressed through separate GI Plans developed by each agency.

The Phase I RAA effort included the use of the baseline hydrologic and pollutant loading model to calculate San Mateo Countywide PCB and mercury load reduction goals to be addressed through the implementation of GI. Table 1-1 provides a summary of the total PCB load reductions determined by Phase I of the RAA to be addressed by GI by 2040 to meet the TMDL WLA (SFBRWQCB 2008b and 2015). Phase I of the RAA determined that for mercury, the baseline annual load is estimated to be less than the San Mateo County portion of the TMDL WLA for mercury (SFBRWQCB 2006), requiring no load reduction through implementation of GI. See the RAA Phase I Report for additional details regarding methods and assumptions for calculating load reduction goals (SMCWPPP 2018a).

Table 1-1. Calculation of PCB Load Reduction by 2040 Through Green Infrastructure (SMCWPPP 2018a).

Achieved Through GI Implementation by 2040	San Mateo Co. (Based on RAA Model)
Load Reduction (kg/yr)	0.23[1]
Percent Reduction (%)	17.6[2]

1: Bay Area RAA Guidance reports 20.8% of the permittee load reduction associated with the MRP GI requirements. Calculated based on 20.8% of the PCB Load Reduction of 1.1 kg/yr, determined through comparison of the modeled baseline pollutant load (1.3 kg/yr) with the TMDL WLA for San Mateo County (0.2 kg/yr).
2: Calculated based on difference of Load Reduction reported above (0.23 kg/yr) and Existing PCB Load (1.3 kg/yr).

This report provides documentation of the methods and assumptions for modeling GI and selecting implementation goals to meet the 17.6% (Table 1-1) countywide reduction of PCB loads to San Francisco Bay. The RAA predicts the most cost-effective GI implementation plan for each municipal jurisdiction and subwatershed throughout San Mateo County, and sets implementation goals for the amount of stormwater volumes to be managed and impervious area to be retrofitted. Through the

adaptive management process, future implementation of GI may vary from results of the RAA based on further engineering analysis and evaluation of GI project opportunities. However, the RAA provides goals for GI planning that can be adapted over time as lessons are learned through GI implementation.

2 PURPOSE OF THE RAA

Depending on the audience, the purpose of the RAA can vary in terms of what constitutes reasonable assurance. The EPA RAA Guide provides an example of three differing perspectives for defining reasonable assurance (USEPA 2017):

- **Regulator Perspective** - Reasonable assurance is a demonstration that the implementation of a GI Plan will result in sufficient pollutant reductions over time to meet TMDL WLAs or other targets specified in the MRP.
- **Stakeholder Perspective** - Reasonable assurance is a demonstration that specific management practices are identified with sufficient detail and implemented on a schedule to ensure that necessary improvements in water quality will occur.
- **Permittee Perspective** - Reasonable assurance is based on a detailed analysis of the TMDL WLAs and associated MRP targets themselves, and a determination of the feasibility of those requirements. The RAA may also assist in evaluating the financial resources needed to meet pollutant reductions based on schedules identified in the MRP.

The output from the RAA must consider multiple perspectives and strike the right balance between detail and specificity while still leaving ample opportunity to allow for future adaptive management. The following are key considerations for the RAA output:

- **Demonstrate PCBs and Mercury Load Reductions** – The primary goal of the RAA is to quantitatively demonstrate that GI Plans and Control Measure Implementation Plans will result in load reductions of PCBs and mercury sufficient to attain their respective TMDL WLAs and the component stormwater improvement goals to be achieved with GI. Based on the baseline hydrology and water quality model (SMCWPPP 2018a), the RAA determined that a 17.6% reduction in PCB loads is needed to meet the GI implementation goals established by the MRP. Zero reduction in mercury loads was determined to be needed from MRP areas because baseline loads were predicted to be below the TMDL WLA for San Mateo County. As a result, a 17.6% reduction in PCB loads is established as the primary pollutant reduction goal for the RAA. However, there is some uncertainty in terms of how PCB source areas are represented in the model, which will require more monitoring and analysis in the future to gain an improved understanding of PCB source areas and the ability to target these areas with GI. Because PCBs are generally understood to be transported with cohesive sediment (e.g., silt and clay), cohesive sediment load can serve as a surrogate on which to base a load reduction target. The RAA considers a 17.6% reduction of cohesive sediment load as a more conservative surrogate until a better understanding is reached in terms of specific PCB source areas within the County. If additional PCB source areas are confirmed, these areas could be targeted for source control measures or additional GI implementation, likely resulting in greater effectiveness for GI to reduce PCB loads in those areas, and thus redistributing or reducing the overall amount of GI needed to meet the load reduction target based on sediment loading estimates.
- **Develop Metrics to Support Implementation Tracking** – The MRP (Provision C.3.j) also requires tracking methods to provide reasonable assurance that TMDL WLAs are being met. Provision C.3.j states that the GI Plan "shall include means and methods to track the area

within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area." Through C/CAG's current effort preparing a Sustainable Streets Master Plan for San Mateo County, a tracking tool will be developed that will enable calculation of metrics consistent with the results of the RAA and additional metrics relevant to sustainable street implementation. The tracking tool is planned for completion in 2020.

- **Support Adaptive Management** – Given the relatively small scale of most GI projects (e.g., LID on an individual parcel or a single street block converted to green street), numerous individual GI projects will be needed to address the pollutant reduction goals. All the GI projects will require site investigations to assess feasibility and costs. As a result, the RAA provides a preliminary investigation of the amount of GI needed spatially (e.g., by subwatershed and municipal jurisdiction) to achieve the countywide pollutant load reduction target. The RAA sets the GI Plan "goals" in terms of the amount of GI implementation over time to address pollutant load reductions. As GI Plans are implemented and more comprehensive municipal engineering analyses (e.g., masterplans, capital improvement plans) are performed, the adaptive management process will be key to ensuring that goals are met. In summary, the RAA informs GI implementation goals, but the pathway to meeting those goals is subject to adaptive management and can potentially change based on new information or engineering analyses performed over time.

The RAA output, or goals for GI implementation, attempt to identify the appropriate balance in terms of detail and specificity needed to address the above considerations.

3 OVERVIEW OF GI PERFORMANCE MODEL

The GI Performance Model selected for the RAA is EPA's System of Urban Stormwater Treatment & Analysis Integration (SUSTAIN). Developed by EPA's Office of Research and Development, SUSTAIN was primarily designed as a decision-support system for selection and placement of GI projects at strategic locations in urban watersheds (Figure 3-1). It includes a process-based continuous project simulation module for representing flow and pollutant transport routing through various types of GI projects. A distinguishing feature of SUSTAIN is a robust cost-benefit optimization model that incorporates dynamic, user-specified project unit-cost functions to quantify the implementation costs associated with various types of GI projects. The cost-benefit optimization model runs iteratively to generate a cost-effectiveness curve that is sometimes comprised of millions of GI project scenarios representing different combinations of projects throughout a watershed. Those results are used to make cost-effective management recommendations by evaluating the trade-offs between different scenarios. The "benefit" component can be represented in several ways: (1) reduction in flow volume (2) reduction in load of a specific pollutant or (3) other conditions including numeric water quality targets, frequency of exceedances of numeric water quality targets, or minimizing the difference between developed and pre-developed flow-duration curves (USEPA 2009, Riverson et al. 2014).

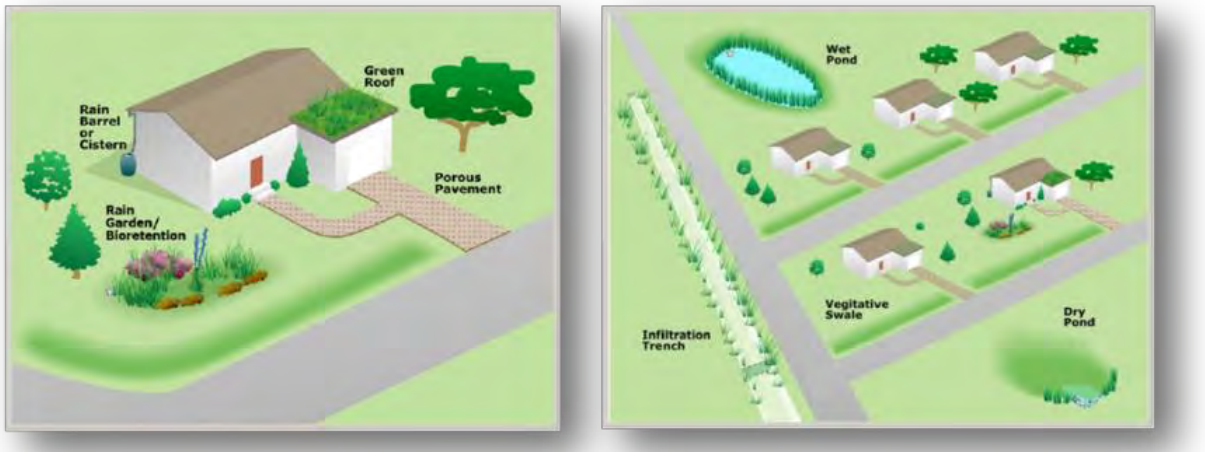

Figure 3-1. SUSTAIN figure illustrating GI opportunities in watershed settings (USEPA 2009).

The SUSTAIN model was linked to the baseline hydrology and pollutant loading model developed as part of the RAA Phase I (SMCWPPP 2018a), based on the Loading Simulation Program C++ (LSPC) (Shen et al. 2004), to simulate the combination of hydrology and the processes associated with GI. The LSPC model was used to simulate the continuous flow and PCB concentrations as inputs to the SUSTAIN model. SUSTAIN was then used to simulate the GI response in terms of stormwater capture, infiltration, routing through the GI project designs (e.g., underdrain or overflow), and removal of sediment and PCBs. SUSTAIN was used to perform the analysis of alternative implementation scenarios and costs to determine cost-optimal solutions for countywide management of stormwater and associated sediment and PCB loads. Figure 3-2 provides an overview of the linked LSPC-SUSTAIN modeling system.

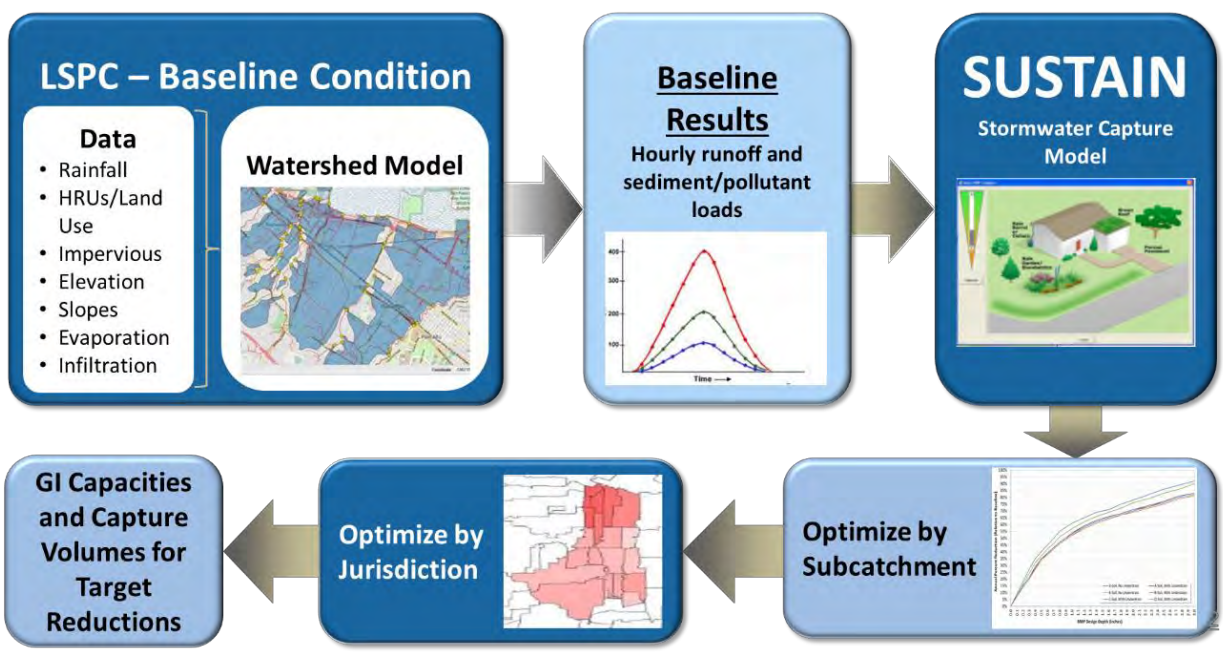

Figure 3-2. Linked modeling system supporting the RAA.[2]

[2] For further description of the baseline LSPC model, see the RAA Phase I Report (SMCWPPP 2018a).

4 GI MODELING ASSUMPTIONS

The representation of GI projects in the model is an important element of the RAA, as it provides the link between future GI implementation, model-predicted water quality improvement, and, ultimately, determine the necessary amount of GI projects to meet the PCB load reduction goal. Since the GI modeling parameters will greatly influence the outcome of the RAA, it is imperative that the suite of GI assumptions is based on the best available data and represent the latest understanding in GI project designs and effectiveness. Further, the technical rigor of the analysis must be appropriately balanced with the resolution of the modeling system and the accuracy of the key datasets.

As depicted in Figure 4-1, the SUSTAIN optimization approach provides estimates of GI effectiveness and costs to select the most cost-optimal combination of GI projects to meet the PCB load reduction target. This section presents and reviews the following three primary elements for representing GI projects in the RAA model:

- **Opportunity** – Where can the GI projects be located and how many can be accommodated?
- **System Configuration** – How is the runoff routed to and through the GI projects and what is the maximum GI project size?
- **Cost Functions** – What is the relationship between GI project volume/footprint/design elements and costs?

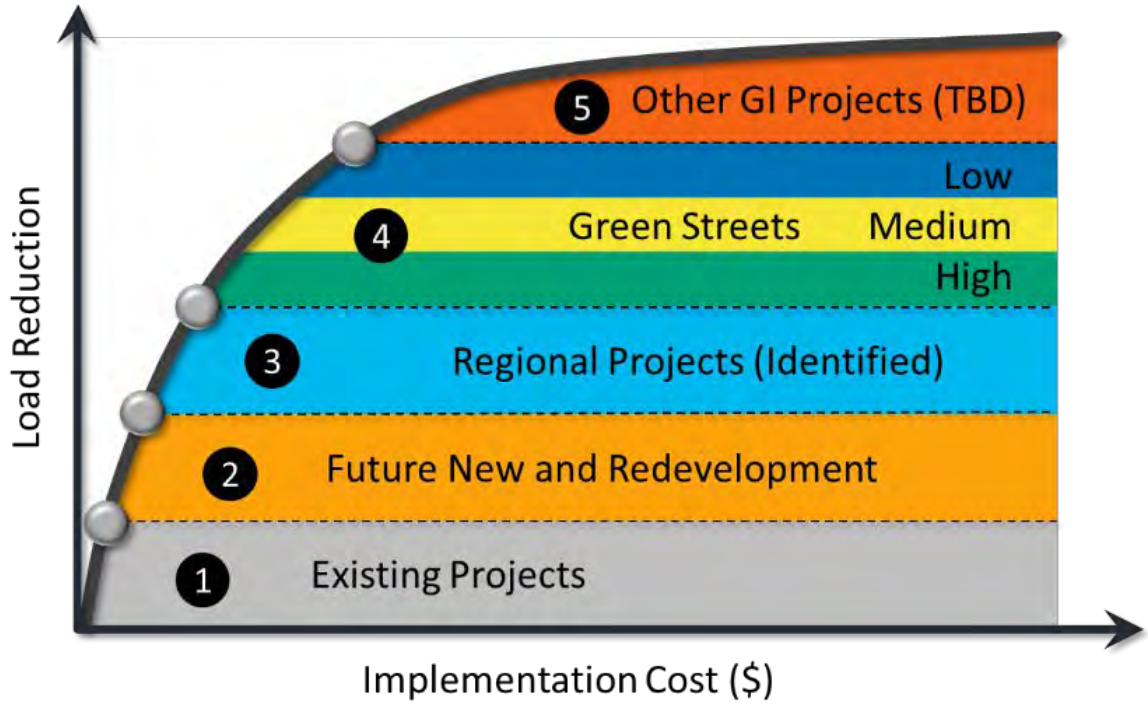

Figure 4-1. Overview of cost-optimization approach and selection of GI projects.

4.1 GI Project Opportunities

To support the RAA and GI Plans, the SMCWPPP has initiated a number of planning efforts that identify opportunities for GI implementation. The following is a summary of those efforts:

- **LID for New Development and Redevelopment** – The MRP includes a Provision (C.3) for the integration of LID within new development and redevelopment. As LID techniques are implemented as new development and redevelopment occurs throughout the County, the benefits of such practices in terms of reducing urban runoff flows and associated pollutant loads can be considered as part of the pollutant load reductions attributed to implementation of GI. To support the preparation of annual reports to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), the SMCWPPP (2018b) has worked with San Mateo County Permittees to compile information on LID practices that have been implemented within new development and redevelopment since water year 2003 (baseline year for the TMDL). The SMCWPPP (2019) has also performed analysis to project the number of acres of future new development and redevelopment to be addressed by the Provision C.3 regulated development by 2040. Appendix A includes the results of the SMCWPPP (2019) analysis of projected new development and redevelopment. The RAA considers existing LID practices and projections of LID in future new development and redevelopment areas to estimate anticipated PCBs and mercury load reductions from 2003 to 2040.
- **Countywide Stormwater Resource Plan (SRP)** – The SRP is a comprehensive plan that identifies and prioritizes thousands of GI project opportunities throughout San Mateo County and within each municipal jurisdiction. Prioritized project opportunities include: (1) large regional projects within publicly owned parcels (e.g., public parks) that infiltrate or treat stormwater runoff generated from surrounding areas (e.g., diversion from neighborhood storm drain system; diversions from creeks draining large urban areas); (2) retrofit of publicly owned parcels with GI that provide demonstration of onsite LID designs; and (3) retrofit of public street rights-of-way with GI, or "green streets." The SRP included a multi-benefit scoring and prioritization process that ranks GI project opportunities based on multiple factors beyond pollutant load reduction (e.g., proximity to flood prone channels, potential groundwater basin recharge). Figure 4-2 shows green street opportunities identified, scored, and prioritized by the SRP throughout San Mateo County (SMCWPPP 2017). For three high-priority opportunities for regional projects located within Atherton (Holbrook-Palmer Park), South San Francisco (Orange Memorial Park), and Belmont (Twin Pines Park), the SRP includes conceptual designs to support future GI planning and implementation.

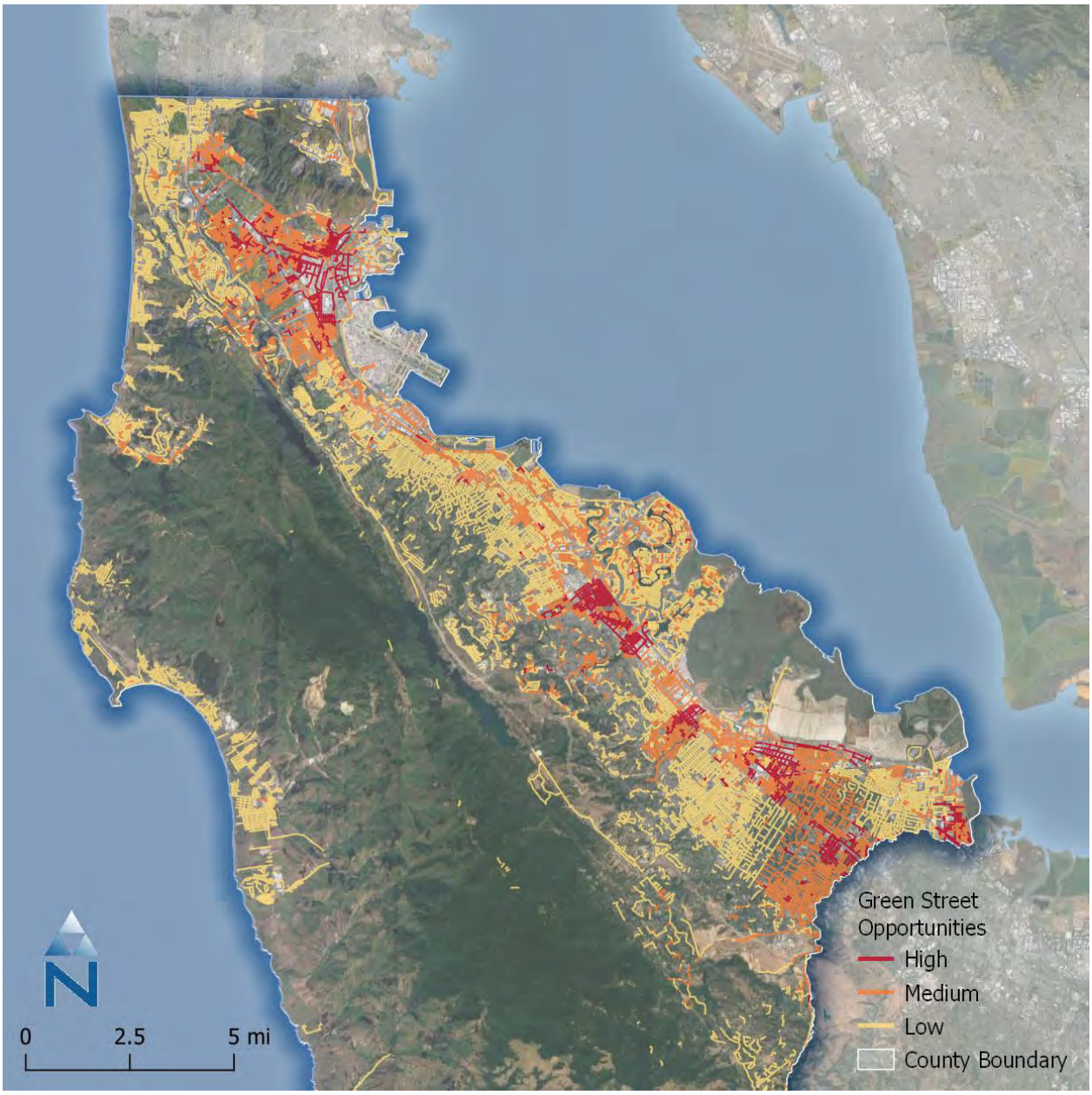

Figure 4-2. SRP Prioritized Green Street Opportunities.

Following completion of the SRP, the SMCWPPP and San Mateo County Permittees continued efforts to identify new regional project opportunities and initiate engineering designs that resulted in refinements of project concepts identified in the SRP. The following is a summary of these efforts:

- The SMCWPPP worked with the San Bruno and Redwood City to identify one regional project opportunity within each city (I-280/I-380 interchange in San Bruno; Red Morton Mark in Redwood City) and develop conceptual designs (Appendix B).
- South San Francisco partnered with Caltrans to prepare engineering designs for the regional project concept identified in the SRP at Orange Memorial Park. Further engineering analysis and planning efforts have resulted in modifications to the original conceptual design.

- Atherton also partnered with Caltrans to prepare engineering designs of a regional project, however, the location of the regional project changed from Holbrook-Palmer Park to Cartan Field. Atherton is in the process of developing a new conceptual design for the project.

The SRP and subsequent planning and engineering work of the SMCWPPP and cities have resulted in the identification of five regional project opportunities that are considered for GI planning efforts and included in the RAA. Figure 4-3 shows regional project locations and their associated drainage areas.

Figure 4-3. Regional Project Opportunities and Associated Drainage Areas.

The above planning efforts and resulting technical products provide preliminary identification of opportunities for GI projects. These GI project opportunities serve as the foundation for the RAA and GI Plans as strategies are developed for implementation plans to meet the PCBs and mercury load

reduction goals. Table 4-1 provides a summary of the categories of GI project opportunities included in the RAA.

Table 4-1. Summary of GI project opportunities included in the RAA.

GI Project Category	GI Type	Opportunity Identified
Existing Projects	LID and Green Streets	SMCWPPP worked with San Mateo County Permittees to identify GI projects implemented since 2003, including LID within new development and redevelopment and retrofit projects, green streets, and regional retrofit projects, and report progress in annual reports to the SFBRWQCB (SMCWPPP 2018b). The combination of these projects represents the "Existing Projects" category in the RAA model (Figure 4-1).
Future New and Redevelopment	LID	Provision C.3 of the MRP requires new development and redevelopment projects that create and/or replace defined amounts of impervious surface to implement post-construction control measures to address stormwater runoff generated on-site and comply with other applicable elements of the provision. The SMCWPPP (2019) developed and applied a methodology to predict the amount of land area that will be redeveloped throughout San Mateo County and for which stormwater runoff will be addressed via GI installed on privately owned parcels from 2018 to 2040 (see Appendix A for more detail). For model configuration, these areas are assumed to include LID to capture stormwater runoff onsite.
Regional Projects (Identified)	Regional Projects	The RAA considers implementation of the five priority regional projects for which concept designs have been developed (Figure 4-3). These projects were configured in the RAA model to match their concept designs.
Green Streets	Green Streets	The SRP identified and prioritized green street opportunities throughout the San Mateo County (Figure 4-2). These opportunities are subject to further investigations regarding the feasibility of GI integration into streetscape improvement projects. The green street opportunities identified and prioritized in the SRP as "Low," "Medium," and "High" were included and represented separately in the RAA.
Other GI Projects (TBD)	LID, Green Streets, or Regional Projects	In the case that the above projects are insufficient to provide necessary load reductions within each municipal jurisdiction, or are determined to not be cost-efficient through the model optimization, an additional category of "Other GI Projects (TBD)" was considered. This category serves as a placeholder to set goals in terms of needed storage capacity of GI projects within each municipal jurisdiction, in addition to the above identified project opportunities. Further investigation can determine how these goals can be met, either through: (1) increased incentives for LID on private land or increased future development resulting in more C.3 Regulated Projects; (2) additional regional projects for which concept designs can be developed; and/or (3) additional green streets or onsite LID on publicly owned land.

4.2 GI Model Configuration

For each of the GI type of projects outlined in Table 4-1 (i.e., LID, green streets, regional projects), design and modeling assumptions were developed to represent the projects in SUSTAIN and simulate their effectiveness in terms of managing stormwater. The following provides a summary of the design and modeling assumptions for each GI type.

4.2.1 Regional Projects

Regional projects can consist of both subsurface and above-ground systems that manage stormwater runoff through any combination of infiltration, filtration, and reuse. In the SUSTAIN model, both subsurface and above-ground systems were represented with similar hydraulic configurations for water storage and infiltration, with variations in modeling assumptions specific to each project's design. Depending on specific site constraints, these facilities can capture stormwater diverted from adjacent channels or storm drains, which often results in greater captured drainage area compared to other GI measures. Regional projects typically require a diversion structure and may require pumping, increasing capital and operation and maintenance (O&M) costs. Modeling assumptions for the five identified regional projects were based on configurations outlined in each project's conceptual design or based on discussions with agencies regarding the current status of further investigations and engineering analyses. Table 4-2 summarizes design assumptions for each of the regional projects included in the RAA.

Table 4-2. Modeling Assumptions for regional projects.

Project	City	Footprint (acres)	Capacity (acre-feet)	Pump Rate (cfs)	Estimated Infiltration Rate (in/hr)	Filtration/ Discharge Rate (cfs)
Orange Memorial Park	South San Francisco	1.2	3	10	0.5	--
Cartan Field	Atherton	0.545	6	40	--	2.88[2]
Twin Pines Park	Belmont	0.15	0.45	--[1]	0.5	--
Caltrans I-280 @ I-380	San Bruno	2.5	21	20	0.5	--
Red Morton Park	Redwood City	2.31	43.2	41.2	0.5	--

1: Twin Pines Park regional project includes a direct diversion of a storm drain, and therefore does not require pumping.
2: Cartan Field regional project assumes a discharge of treated water back to Atherton Channel.

Most of the regional projects capture runoff from drainage areas that include multiple Permittee jurisdictions. To utilize model output to report the benefits of the regional projects in terms of stormwater volume captured and treated, the RAA required assumptions for assigning these benefits to the Permittees. Because the predominant source of stormwater produced in each project's drainage area is associated with impervious runoff, the amount of impervious area within each Permittee jurisdiction and project drainage area was used to allocate the "credit" associated with amount of stormwater that is captured and treated by each regional project. Table 4-3 provides a summary of the percentage of each Permittees impervious area within each project's upstream drainage area.

Table 4-3. Amount of impervious areas for Permittees within each regional project drainage area.

Permittee	Upstream Impervious Area (acres)	Cartan Field		Caltrans I-280 @ I-380		Orange Memorial Park		Red Morton Park		Twin Pines Park	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Atherton	210	210	32%	--	--	--	--	--	--	--	--
Belmont	8	--	--	--	--	--	--	--	--	8	100%
Colma	130	--	--	--	--	130	9%	--	--	--	--
Daly City	601	--	--	--	--	601	40%	--	--	--	--
Menlo Park	169	169	26%	--	--	--	--	--	--	--	--
Pacifica	4	--	--	--	--	4	<1%	--	--	--	--
Redwood City	462	--	--	--	--	--	--	462	77%	--	--
San Bruno	184	--	--	177	79%	7	<1%	--	--	--	--
South San Francisco	637	--	--	--	--	637	42%	--	--	--	--
Woodside	89	82	13%	--	--	--	--	7	1%	--	--
Unincorporated County	513	192	29%	46	21%	141	9%	134	22%	--	--
Total	**3,007**	**652**	**100%**	**224**	**100%**	**1,520**	**100%**	**603**	**100%**	**8**	**100%**

4.2.2 Green Streets

Green streets are implemented in public rights-of-way and typically capture runoff from the street and adjacent parcels. Green streets were represented in the model using bioretention either with or without an underdrain, depending on infiltration rates. The modeling assumptions for both the bioretention components of green streets are listed in Table 4-4.

The footprint for green street bioretention is estimated by assuming available length and width for GI improvements. Fifty percent of the street segment length is assumed to be available for bioretention. The other 50 percent of length is assumed to be unavailable due to constraints like driveways, fire hydrants, and utilities. The available width for bioretention is assumed to be 8 feet (4 feet on each side of the street).

Bioretention consists of three components: a surface layer, a media layer, and an aggregate underdrain layer. The surface layer is typically vegetated and provides storage through ponding and removal of runoff volume through evapotranspiration. The media layer typically consists of an engineered soil mixture designed to support plant growth and promote adequate infiltration. The media layer provides storage in pore space and pollutant reduction through filtration, plant root uptake, adsorption, or other physical processes. The media layer was assumed to be a minimum of 18 inches for bioretention (SMCWPPP 2016).

Underdrains are typically required for bioretention when the underlying soils have low infiltration below a specific threshold. In most of San Mateo County, underdrains will generally be required unless exempted by the local jurisdiction on a case-by-case basis depending on soil permeability (SMCWPPP 2016). According to several regional design resources across the United States, underdrains should be included when underlying soils have an infiltration rate below 0.5 inches per hour (DOEE 2013; VA DEQ 2011; SF DPW Order No. 178,493). This value was used in the model to determine which projects include underdrains. The aggregate underdrain layer was assumed to be 12 inches for bioretention (SMCWPPP 2016; SFPUC 2016). Underdrains are typically placed at the top of the aggregate underdrain layer to maximize infiltration (BASMAA 2015; SMCWPPP 2016) and is the default configuration used by SUSTAIN. The underdrain pollutant removal estimate for sediment, which is associated with PCBs and mercury, is based on studies of bioretention performance reported by the *California Best Management Practice Handbook: New Development and Redevelopment* (CASQA 2003). BASMAA's white paper on Provision C.3 cites a reduction in PCBs of 98% through the bioretention underdrain. Therefore, an assumed sediment removal of 90% (as a surrogate for reduction in PCBs) provides a conservative assumption for bioretention performance. During model simulation, the sediment reduction is only applied to the portion of flow that exits the underdrain outlet, which is a relatively constant outflow rate. Overall green streets performance diminishes during larger events with bypass flow because that portion is untreated.

07933
7974

Table 4-4. Modeling assumptions for green streets (bioretention).

Groups	Item Description	Value	Units	Source [1] [2] [3] [4]
Surface	Design Drainage Area	*Sized using WEF method (~85th percentile, 24-hour storm)*		[1] C.3.d.i.(1).(a) pg.22
	Project Footprint	*50% of street length x 8 ft width*		
	Ponding Depth	6	in	[2] Section 6.1 pg.6-4
Media	Depth	1.5	ft	[2] Section 6.1 pg.6-5
	Soil Porosity	0.35	-	[3] Appendix A
	Soil Infiltration Rate	5	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
Underdrain	Use if soil infiltration rate is less than	0.5	in/hr	
	Depth	1	ft	[2] Section 6.1 pg.6-5, [3]
	Media Porosity	0.4	-	[3] Appendix A
	Pollutant Filtration	*90% sediment reduction*		[4] CA BMP Handbook, TC-32 pg.3
	Background Infiltration	*Match underlying soils*		

[1] Reference: SFBRWQCB 2015
[2] Reference: SMCWPPP 2016
[3] Reference: ULAR WMG 2016
[4] Reference: CASQA 2003 (only applied to underdrain outflow)

4.2.3 Low Impact Development

LID generally treats runoff generated onsite so the drainage area for LID is typically no larger than the parcel area. Although LID includes various design options for a given site, in order to develop a process for modeling of countywide LID implementation (as a function of new and redevelopment), all LID features were represented in SUSTAIN as bioretention. The components for bioretention are discussed in Section 4.2.2. The modeling assumptions for LID are the same as bioretention for green streets with the exception of project footprint. The project footprint for LID is estimated using 4 percent of the parcel's impervious area, specified in the SMCWPPP C.3 Stormwater Technical Guidance (SMCWPPP 2016). Modeling assumptions for LID are presented in Table 4-5.

Table 4-5. Modeling assumptions for LID (bioretention).

Groups	Item Description	Value	Units	Source [1] [2]
Surface	Design Drainage Area	*Sized using WEF method (~85th percentile, 24-hour storm)*		[1] C.3.d.i.(1).(a) pg.22
	Project Footprint	*Volume determined by WEF method ÷ effective storage depth (determined from assumptions below)*		
	Ponding Depth	6	in	[2] Section 6.1 pg.6-4
Media	Depth	1.5	ft	[2] Section 6.1 pg.6-5
	Soil Porosity	0.35	-	[3] Appendix A
	Soil Infiltration Rate	5	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
Underdrain	Use if soil infiltration rate is less than	0.5	in/hr	
	Depth	1	ft	[2] Section 6.1 pg.6-5
	Media Porosity	0.4	-	[3] Appendix A
	Pollutant Filtration	*90% sediment reduction*		[4] CA BMP Handbook, TC-32 pg.3
	Background Infiltration	*Match underlying soils*		

[1] Reference: SFBRWQCB 2015
[2] Reference: SMCWPPP 2016
[3] Reference: ULAR WMG 2016
[4] Reference: CASQA 2003 (only applied to underdrain outflow)

As mentioned in Section 4.1, the MRP requires new and redevelopment projects to incorporate stormwater control measures that mitigate the impact of runoff generated from impervious surfaces (Provision C.3). The SMCWPPP (2019) performed a study to identify future areas subject to new development and redevelopment (described in detail in Appendix A). For the RAA, the C.3-regulated projects were modeled using the LID assumptions described above with the projections of new and redevelopment. Due to the uncertainty of projecting development initiated by third-party developers, a methodology was developed that can be updated over time using Traffic Analysis Zones (TAZ) from the *San Mateo Countywide Transportation Plan 2040* as the functional planning unit. The rates of new and redevelopment were estimated for three land use classes: (1) Single-Family Residential, (2) Multi-Family Residential (MFR), or (3) Employer (represents an aggregate of retail, service/office, manufacturing, warehousing, and industrial land uses) and aggregated by total land use area in each TAZ. The TAZs were then intersected with the RAA subwatershed boundaries to distribute the redevelopment projections across the model domain for incorporation into the RAA. The Water Environment Foundation (WEF) method (1998), one of the methods specified in the MRP for sizing GI, was used to estimate the total storage capacity from C.3 regulated projects in each subwatershed. The WEF method is based on an equation accounting for drainage area, imperviousness, and the 85th percentile, 24-hour rainfall depth, which accounts for spatially variable rainfall across San Mateo County.

4.3 GI Cost Functions

To support GI project optimization, cost functions were developed for each GI type to relate capital costs to physical GI project characteristics such as depth, footprint, and configuration. The cost functions are primarily based on Enhanced Watershed Management Plans (EWMPs) developed in

the Los Angeles Region (ULAR WMG 2016), which were derived through extensive review of GI construction projects and literature, and were subject to peer review and stakeholder input. They are 20-year lifecycle costs that include both construction and O&M costs. O&M is assumed to maintain consistent performance of the GI throughout its life cycle. There will be some uncertainty regarding the true costs pertaining to GI projects implemented in San Mateo County, but the relative costs between project types are well represented for the optimization of project types in the RAA. In other words, although it would not be recommended to use these cost functions for projections of countywide implementation costs, these functions are sufficient for optimization and comparison of alternative implementation scenarios that can be used to select the most cost-effective strategy and combination of GI to meet necessary pollutant reductions. The cost functions used for the SUSTAIN optimization analysis are listed in Table 4-6.

Table 4-6. GI project cost functions for SUSTAIN cost-optimization.

Project Type	Project Subtype	Cost Estimate Formula ($)	User inputs
Regional Project	Infiltration basin w/o pump station	10.01 (A_f) + 100,013.76 (S) + 2.8 (V_m)	S - Capacity A_f - Footprint area V_m - Media volume
	Infiltration basin w/ pump station	10.01 (A_f) + 100,013.76 (S) + 2.8 (V_m) + 56,227 (P) + 1,207,736	S - Capacity A_f - Footprint area V_m - Media volume P - Pumping rate
Green Streets	Bioretention w/ underdrain	17.688 (A_f) + 94,307.4 (S) + 2.64 (V_m) + 10.367 $(R)^2$ (U)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume R - Underdrain radius U - Underdrain length
	Bioretention w/o underdrain	9.438 (A_f) + 94,307.4 (S) + 2.64 (V_m)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume
Low Impact Development	Bioretention retrofit w/ underdrain	17.688 (A_f) + 94,307.4 (S) + 2.64 (V_m) + 10.367 $(R)^2$ (U)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume R - Underdrain radius U - Underdrain length
	Bioretention retrofit w/o underdrain	9.438 (A_f) + 94,307.4 (S) + 2.64 (V_m)	S - Bioretention capacity A_f - Bioretention area V_m - Media volume

Units: S [ac-ft], V_m [ft^3], A_f [ft^2], P [cfs], R [ft], U [ft]

5 ESTIMATING LOAD REDUCTION ACHIEVED BY CONTROLS

The SUSTAIN model provides a powerful tool for considering millions of scenarios for alternative combinations of GI projects throughout San Mateo County and recommending cost-effective solutions to serve as implementation goals supporting GI planning by each Permittee. The cost functions described in the previous subsection were used to weigh the cost of different GI implementation scenarios with benefits of management of stormwater and the reduction of pollutant loads. The primary scenario for the RAA (Scenario 1) assumes that all Permittees equally address the goal for 17.6% reduction of PCB loads within their jurisdictions. However, since the 17.6% reduction in PCBs is a countywide goal, there are alternative pathways for addressing the load reduction that do

not necessarily require proportional reductions within each jurisdiction. Alternative modeling scenarios are presented in Section 7, which may be considered for future GI planning through the adaptive management process.

The optimization modeling is conducted stepwise to determine the GI projects located throughout each Permittee jurisdiction for cost-effective stormwater management, as follows:

1. **Determine the cost-effective GI solutions <u>for each subwatershed</u>**: an example set of "GI solutions" is shown in Figure 5-1, which shows thousands of scenarios considered for an individual subwatershed. The scenarios are based on the available opportunity (*e.g.*, the available footprints for regional projects and length of right-of-way for green streets) and the predicted performance of managing stormwater and reducing pollutant loads. The most cost-effective GI solutions for each of the subwatersheds provide the basis for cost optimization for each Permittee jurisdiction.[3] Based on GI project categories and modeling assumptions defined in Section 4, SUSTAIN was used to simulate effectiveness/load reductions and estimate planning-level costs for various combinations of GI projects within each Permittee's jurisdiction (along the x-axis, from low pollutant reduction/effectiveness to high reduction/effectiveness). For the purposes of estimating PCB load reductions associated with GI implementation, model-predicted cohesive sediment load reductions were used as a surrogate for estimating reductions in PCBs[4].

2. **Determine the cost-effective scenario for each Permittee jurisdiction:** by rolling up the GI solutions from the subwatershed level to the jurisdictional level, the most cost-effective scenario can be determined for increasing levels of pollutant reduction for each Permittee. Figure 5-2 shows an example cost optimization curve for Unincorporated County areas. The optimization curve demonstrates the capacity of each type of GI project (colored layers corresponding to "Structural BMP Capacity [acre-ft]" for the primary y-axis) and resulting model-estimated capital costs (black line corresponding to the secondary y-axis). As noted in Section 4.3, caution should be exercised in interpreting model-predicted capital costs, as those cost functions are meant for comparison of model scenarios and are not meant for projections of capital improvement costs for GI implementation. For this reason, costs shown in Figure 5-2 are reported as the percent of the countywide capital costs for GI implementation, based on GI projects selected within Unincorporated County areas. Cost optimization curves for each Permittee jurisdiction are provided in Appendix C.

3. **Extract the cost-effective scenario to meet stormwater improvement goal:** Figure 5-3 illustrates the process for extracting the cost effective GI Implementation Strategy, providing 17.6% reduction in PCB loads (via cohesive sediment reduction), from the cost optimization

[3] Subwatershed boundaries will continue to be refined and improved in the future, potentially resulting in updates of the RAA over time as part of the adaptive management process. For example, portions of subwatersheds in Daly City are known to drain to the combined stormwater-wastewater system managed by the San Francisco Public Utilities Commission. C/CAG is also currently performing a high-resolution drainage area delineation as part of development of the countywide Sustainable Streets Master Plan, which will result in a better understanding of stormwater runoff and routing through the storm drain network.
[4] As the San Francisco Bay TMDL for PCBs is focused on sediment toxicity, and wasteload allocations were calculated based on sediment loads to the Bay (SFBRWQCB 2008b), a 17.6% reduction in cohesive sediment load to the Bay can be assumed to have an equivalent reduction in PCBs that are transported with that sediment.

curve. SUSTAIN is used to provide cost-optimization and selection of the most cost-effective combination of GI projects to attain the target reduction. This solution is depicted in Figure 5-3 as the vertical slice that intersects the point on the x-axis at 17.6% reduction. The combination of GI structural capacities in that slice at the 17.6% load reduction represents the proposed GI Implementation Strategy for Unincorporated County. The table to the right provides details on that implementation strategy for the multiple subwatersheds within Unincorporated County jurisdiction (represented by each row in table). Optimization results recommend that varying amounts of GI capacity in different subwatersheds (different rows) are needed to achieve the most cost-effective solution, but the overall PCBs load (via cohesive sediment) reduction exceeds the 17.6% goal (bottom row of table). The extracted GI Implementation Strategy comprises a detailed "implementation recipe" with the cost-optimized amount of each GI type within each Permittee jurisdiction. The resulting GI Implementation Strategy to address the PCB load reduction goal is presented in Section 6.

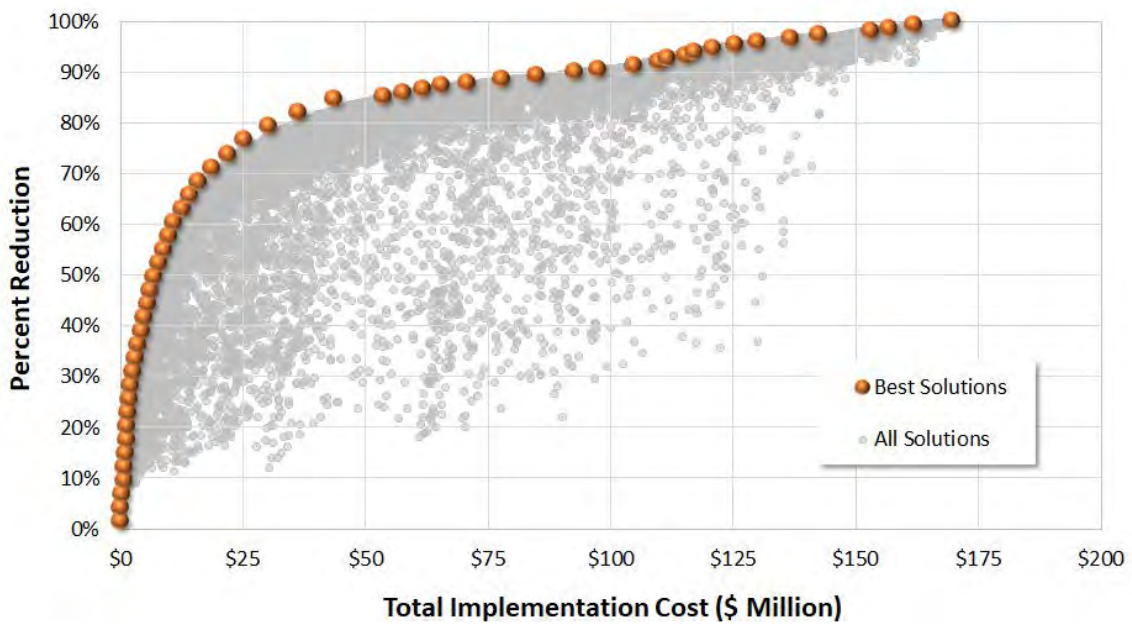

Figure 5-1. Example GI solutions for a single subwatershed and the advantage of cost-benefit optimization.

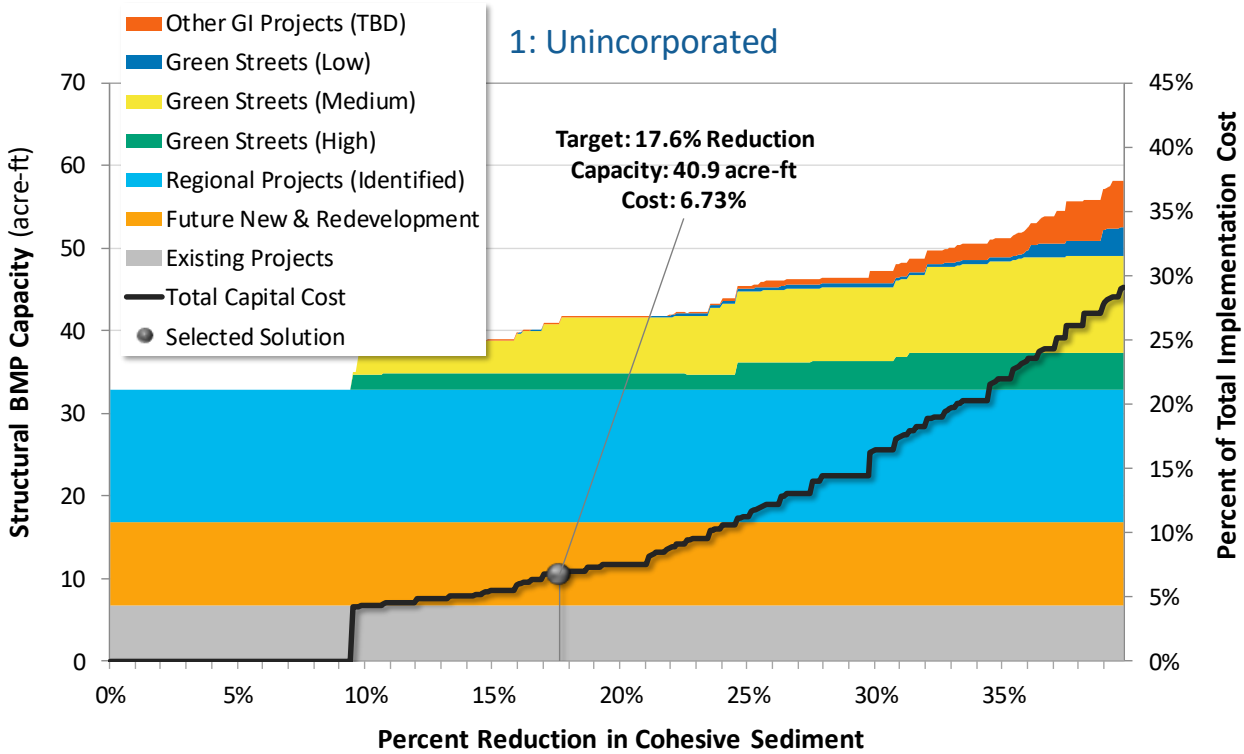

Figure 5-2. Example GI optimization curve for Unincorporated County.[5]

[5] SUSTAIN model was configured to incorporate "Existing Projects," "Future New & Redevelopment," "and Regional Projects (Identified)" based on assumptions listed in Table 4-1 and Section 4.2, and therefore were not subject to cost optimization (i.e., these projects were "locked in the model). SUSTAIN was then used to provide cost optimization of the additional GI needed to meet the load reduction goal.

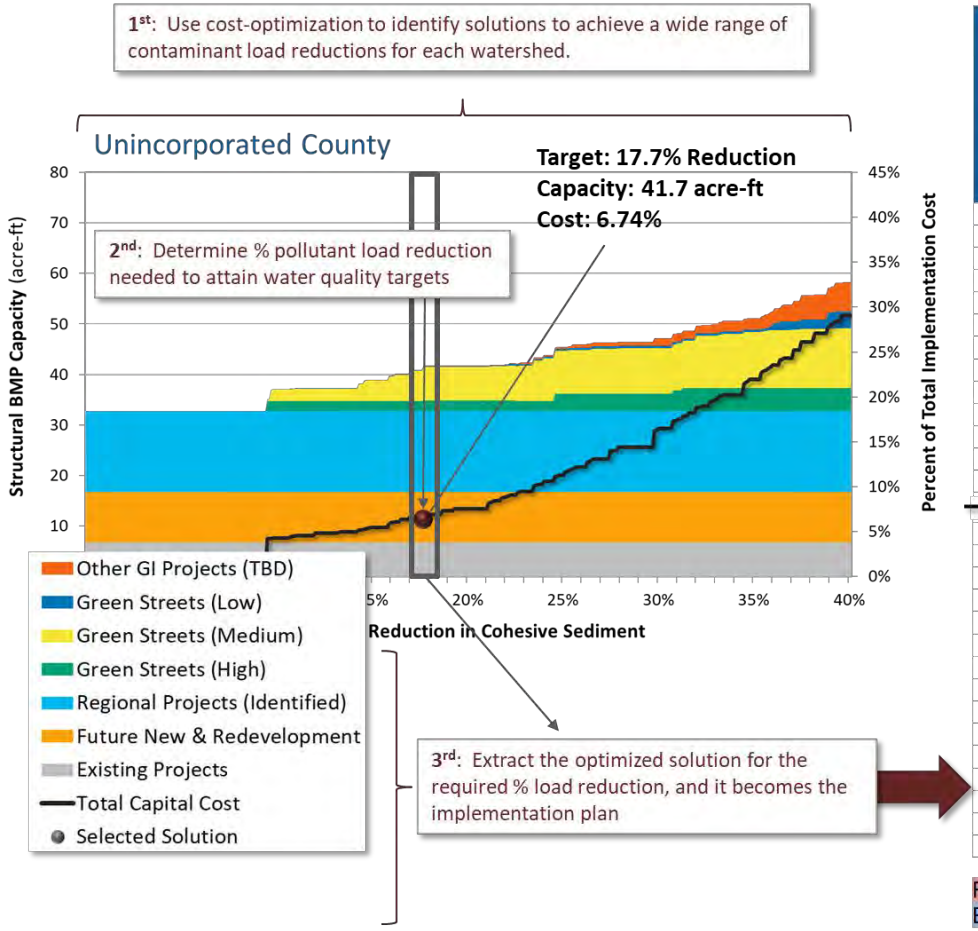

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
220121	17%	0.18	0.39	0.00	--	0.01	--	--	--	--	**0.0**
220321	0%	0.00	--	--	--	--	--	--	--	--	**0.0**
220421	12%	0.21	0.05	--	0.01	--	--	0.01	--	--	**0.0**
220821	5%	1.62	0.49	0.22	0.07	--	0.01	--	--	--	**0.3**
221121	2%	0.10	0.00	--	0.01	--	--	--	--	0.00	**0.0**
221221	17%	0.15	9.35	5.17	1.14	0.01	--	--	--	--	**6.3**
221321	15%	0.37	0.92	--	0.04	0.02	--	--	--	--	**0.1**
221421	49%	0.01	0.02	--	0.01	0.00	--	0.01	--	0.00	**0.0**
221821	6%	0.00	0.00	--	0.00	--	--	--	--	--	**0.0**
222221	22%	4.54	0.04	--	0.11	--	--	0.10	--	--	**0.2**
222321	27%	0.89	0.00	--	0.10	--	--	0.00	--	0.02	**0.1**
222521	16%	1.14	0.00	--	0.14	--	--	--	--	0.03	**0.2**
222621	4%	0.63	0.00	--	0.08	--	--	--	--	--	**0.1**
232521	20%	50.03	30.96	--	0.53	4.35	0.00	--	--	--	**4.9**
232621	0%	0.01	0.02	--	0.00	--	--	--	--	--	**0.0**
232721	7%	0.76	0.21	--	--	--	--	--	--	0.03	**0.0**
232821	42%	0.71	18.35	--	0.17	0.04	--	2.40	--	--	**2.6**
232921	3%	4.00	0.21	--	0.06	--	--	0.08	--	--	**0.1**
240121	12%	2.16	1.80	--	0.07	0.01	0.07	--	--	--	**0.1**
240221	12%	9.44	1.74	--	0.01	0.05	--	--	--	--	**0.1**
240321	8%	1.15	0.30	--	0.07	0.01	--	--	--	--	**0.1**
240421	12%	9.09	1.67	--	0.05	0.04	--	--	--	--	**0.1**
240621	12%	2.38	2.72	0.20	0.03	0.01	--	--	--	--	**0.2**
240721	12%	33.25	6.12	--	0.14	0.16	0.02	--	--	--	**0.3**
250221	0%	0.00	0.04	--	0.07	--	--	--	--	--	**0.1**
250421	12%	0.03	0.16	--	0.06	0.00	--	--	--	--	**0.1**
250521	13%	0.36	0.05	--	0.01	0.00	--	--	--	--	**0.0**
Total	**17.7%**	**306.7**	**242.2**	**6.7**	**10.0**	**16.0**	**2.0**	**6.7**	**0.1**	**0.1**	**41.7**

RED = Subwatersheds with highest required % load reductions
BLUE = Subwatersheds with highest BMP capacities within a BMP category

Figure 5-3. Example extraction of the cost-effective GI Implementation Strategy for Unincorporated County.

6 GI IMPLEMENTATION STRATEGY

The GI Implementation Strategy for each Permittee is expressed as (1) the percent load reduction of PCBs, (2) the volumes of stormwater to be managed spatially by GI to address the PCB load reduction goal, (3) amount of impervious area from which GI is planned to capture stormwater runoff, and (4) the amount of GI that will be needed spatially to manage the stormwater volumes The two primary elements of the GI Implementation Strategy are as follows:

- **Implementation Goals**: to track implementation progress[6] over time, the primary metrics serving as goals for GI implementation are (1) the volume[7] of stormwater managed by implemented GI projects, and (2) the amount of impervious area treated with GI. To support future implementation and adaptive management, the performance metrics are reported along with the capacities of GI to be implemented based on the GI Implementation Strategy.
- **Implementation Recipe**: the network of GI opportunities and associated capacities that provides reasonable assurance of reducing PCBs to meet the countywide load reduction goal of 17.6% is referred to as the Implementation Recipe. The identified GI capacities (and GI preferences) of the Implementation Recipe will likely evolve over the course of the implementation of each Permittee's GI Plan through an adaptive management process and in response to lessons learned. As such, it is anticipated the capacities specific to the various types of GI will not be tracked explicitly. As GI projects are substituted over the course of GI Plan implementation (e.g., replace green street capacity in a subwatershed with additional regional project capacity), Permittees will show equivalency for achieving the corresponding Implementation Goals.

For each of the RAA results for the primary Scenario 1, Appendix C also includes corresponding GI Implementation Strategies for each Permittee. These results demonstrate the cost-optimization favored implementation of different combinations and amounts of GI projects within each subwatershed. These combinations were based on: (1) number and type of GI project opportunities identified within each subwatershed, and (2) cost-effectiveness given various characteristics associated with GI control measure efficiency (typically governed by infiltration rates), higher cohesive sediment (or PCBs) generation in upstream areas, etc. During implementation, it is almost certain that the actual implementation of GI will not follow the RAA output exactly; however, the recipe provides "management metrics" by subwatershed (described below) to guide the adaptive management process. Dimensions and location of GI projects will vary based on on-the-ground feasibility and site-specific constraints. GI performance will vary based on factors like the physical properties of the facility and upstream drainage area managed. For these reasons, it is not recommended that *GI capacity* serve as the focus for stormwater improvement goals for the GI Plan.

The RAA recommends management metrics to support GI planning and implementation that are based on metrics that can be easily measured and tracked throughout implementation. At the left side of the table in Figure 5-3 are columns under the header "Management Metrics for GI," which include

[6] The MRP requires the tracking of the implementation of GI for GI Plans addressing PCB and mercury load reductions.

[7] The reported volume is determined by estimating the amount of water that is be retained (and/or infiltrated) by GI over the course of the average annual period (Water Year 2002) used for simulating the baseline load and comparing to the TMDL WLA for PCBs (BASMAA 2017). Additional volume would be *treated* by these GI projects, but that additional treatment is *implicit* to the reported volume. For the purposes of future tracking of GI implementation, volumes metrics can be tracked in terms of the stormwater volumes that are either retained and/or treated to reduce PCB concentrations.

performance metrics for "% Load Reduction PCBs (Annual)," "Annual Volume Managed (acre-ft)," and "Impervious Area Treated (acres)." The "% Load Reduction PCBs (Annual)" and "Annual Volume Managed (acre-ft)" metrics are based on annualized model results that are directly comparable to TMDL WLAs. The "% Load Reduction PCBs (Annual)" provides a relative comparison of the load reduction to be achieved within each subwatershed. The "Annual Volume Managed (acre-ft)" shows the acre-feet of water captured and infiltrated and/or treated within each subwatershed, resulting in a total annual volume for each Permittee jurisdiction. This total stormwater managed by each Permittee could serve as the primary metric to be tracked for GI implementation. In other words, stormwater volume managed can serve as a unifying metric to evaluate GI effectiveness. "Impervious Area Treated (acres)" is an additional metric suggested by the MRP for implementation tracking. As a result of adaptive management, the implementation plan may change over time and alternative GI projects can be substituted without having to re-run the RAA model, as long as the "Management Metrics for GI," representing the goals for the GI Plan, remain on track.

7 ALTERNATIVE GI IMPLEMENTATION STRATEGIES TO INFORM ADAPATIVE MANAGEMENT

To further inform GI implementation and the adaptive management process, the RAA also considered multiple alternative scenarios that tested the underlining assumptions for GI implementation, and demonstrate the need for further research, collaboration among multiple Permittees, and incorporation of lessons learned to gain efficiencies and maximize the cost-effectiveness of GI to reduce pollutant loads over time. Four modeling scenarios were configured for this analysis, as summarized in Table 7-1. Scenario 1 represents the primary scenario for the RAA reported in the previous sections. The following provides a description of the additional scenarios and considerations for comparison of model results:

- **Jurisdictional versus Countywide** - There are many possible ways to achieve a 17.6% load reduction for all of San Mateo County. The "Jurisdictional" approach (utilized in Scenario 1) stipulates that each jurisdiction must individually achieve at least a 17.6% load reduction of PCBs. Alternatively, the "Countywide" approach achieves the 17.6% load reduction by allowing the model to allocate the wasteload reduction via GI countywide, regardless of jurisdictional boundary. The countywide approach can provide significant cost savings over the jurisdictional approach, especially where pollutant sources are spatially concentrated or better infiltration results in more cost-effective GI. Figure 7-1 conceptually illustrates the jurisdictional versus countywide optimization approaches. Where there is cooperation among jurisdictions, results from these two scenarios can provide a useful analytical framework for future cost-sharing and implementation of the most cost-effective management scenarios.
- **Load Reduction Objective** - With a cohesive sediment load reduction objective, Scenarios 1 and 2 represent the most conservative approaches. Those scenarios assume that given the uncertainties about PCB source areas, targeting an overall 17.6% load reduction of cohesive sediment (silts and clays) in general achieves the PCB load reduction objective for GI. Scenarios 3 and 4 assume that PCB sources are spatially distributed based on analysis of land use types[8]. The cost-benefit optimization process targets those areas as having the highest

[8] The RAA Phase I Report (SMCWPPP 2018a) summarized results of baseline modeling of PCB loading that considered concentrations of PCBs representative of various land use and PCB source categories developed by the San Francisco Estuary Institute as part of Regional Watershed Spreadsheet Model (BASMAA 2017, Wu et al. 2017). Although this approach was determined appropriate for estimation of baseline PCB loads and comparison to the TMDL WLA, these assumptions for sources of PCBs were not determined sufficient for detailed planning of site-scale GI projects that potentially treat runoff from these source areas.

likelihood of being PCB sources. Scenarios 3 and 4 highlight the potential cost savings (relative to Scenarios 1 and 2) that could be realized if PCB sources are identified and targeted for GI implementation.

Table 7-1. Model scenarios objectives and cost-benefit evaluation.

Load Reduction Objective	Percent of Total GI Cost to Achieve Reduction Objective		
	Jurisdictional	Countywide	*Total Savings (Jurisdictional vs. Countywide)*
Cohesive Sediment 17.6% Reduction	**Scenario 1**	**Scenario 2**	→ *Savings*
Total PCBs 17.6% Reduction	**Scenario 3**	**Scenario 4**	→ *Savings*
Total Savings (Sediment vs. PCBs)	↓ *Savings*	↓ *Savings*	↘ *Overall Savings*

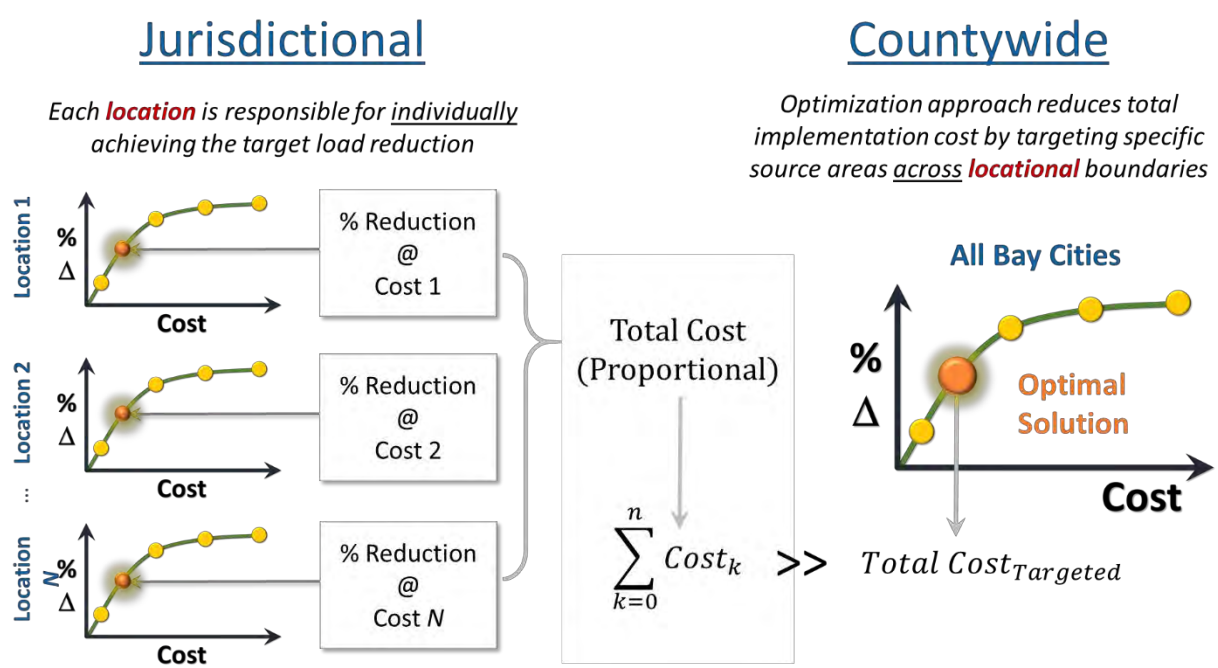

Figure 7-1. Jurisdictional vs. countywide approaches for cost-benefit optimization

7.1 Comparison of Jurisdictional versus Countywide Scenarios

To compare results of Scenario 1 (jurisdictional) and Scenario 2 (countywide), Figure 7-2 and Figure 7-3 show stacked optimization curves that present county summation of results (GI capacity and

implementation cost vs. load reduction benefit) for each Permittee jurisdiction, respectively. Like the optimization curves provided for each individual jurisdiction (Appendix C), Figure 7-2 presents the proportion of the countywide cost for GI implementation. Because these results are presented as a summation of individual Permittee results throughout the County, the selected solution for Scenario 1 is presented as 100% of countywide implementation costs in Figure 7-2. To provide relative comparison of Scenarios 1 and 2, costs for Scenario 2 in Figure 7-3 are normalized relative to the total cost of Scenario 1. Scenario 2 is 66.2% of the cost of Scenario 1. This suggests that if GI were implemented throughout the County where projects are most cost-effective, independent of Permittee jurisdiction (resulting in disproportional implementation of GI), countywide costs for GI could be significantly reduced.

For each scenario, Table 7-2 and Table 7-3 provide tabular summaries of the optimized GI Implementation Strategies for each jurisdiction. Those summaries correspond to the point on the curve that meets the load reduction objective. In some jurisdictions, identified regional project reductions exceed the 17.6% load reduction objective for the jurisdictional scenario. The countywide Scenario 2 adjusts for the extra reduction provided by those facilities and redistributes the remaining management burden, concentrating on areas where it is the most cost-effective to achieve cohesive sediment load reduction.

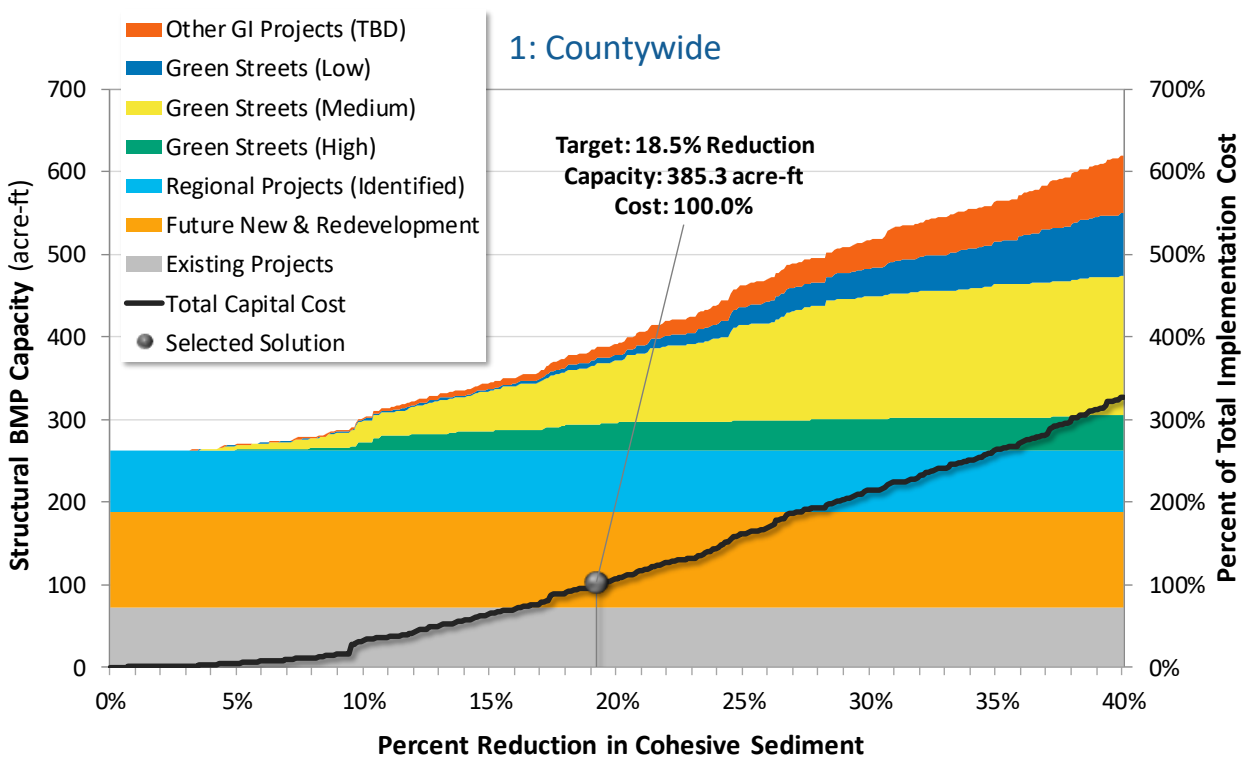

Figure 7-2. County summation of optimization results for Scenario 1 (cohesive sediment target, proportional by jurisdiction).

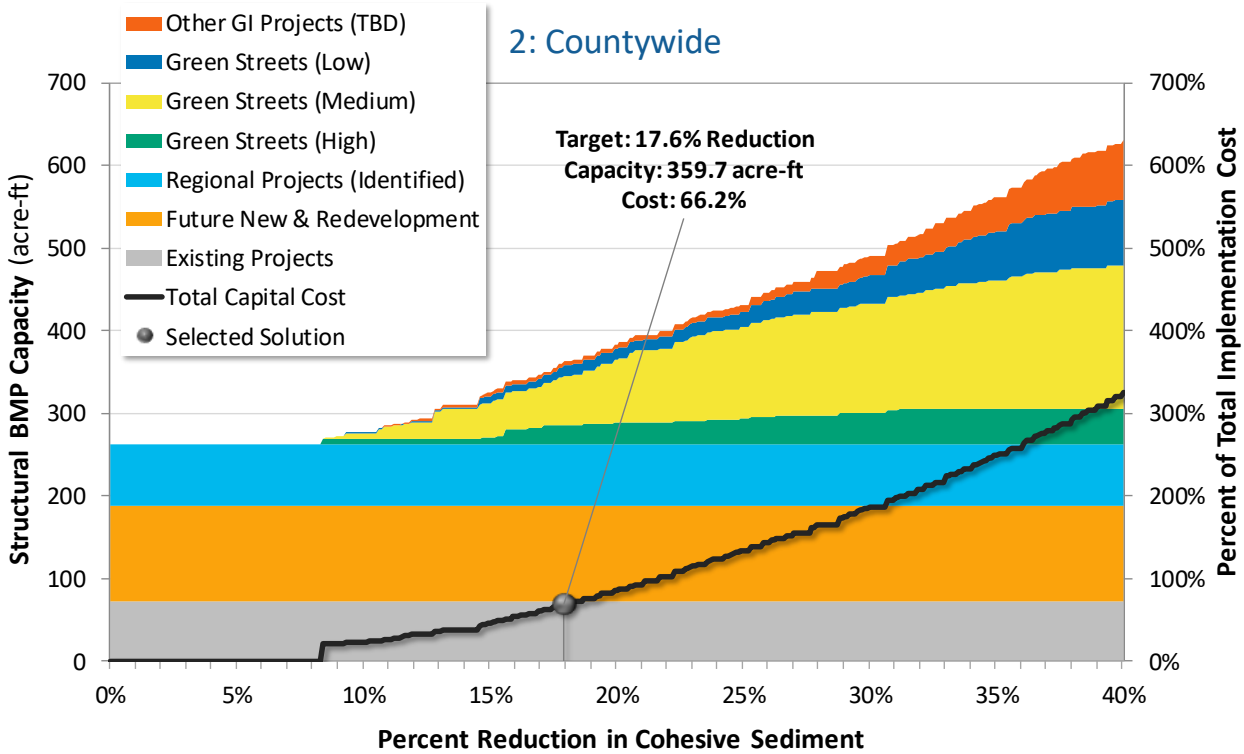

Figure 7-3. County summation of optimization results for Scenario 2 (cohesive sediment target, countywide).

Table 7-2. Summary of GI Implementation Strategy for Scenario 1 (cohesive sediment target, proportional by jurisdiction).[1]

Jurisdiction	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
Atherton	20%	63.64	110.25	0.36	0.19	1.93	0.16	2.53	0.11	0.75	**6.0**
Belmont	19%	145.24	107.87	0.65	2.12	0.45	3.04	1.02	0.46	0.29	**8.0**
Brisbane	24%	199.30	163.61	0.50	16.82	--	--	--	--	--	**17.3**
Burlingame	18%	281.20	190.90	2.84	7.53	--	0.22	7.11	0.07	0.08	**17.9**
Colma	18%	116.53	68.98	1.39	0.30	0.26	0.80	0.00	0.54	0.16	**3.5**
Daly City	18%	380.34	170.74	8.99	2.37	1.19	0.06	3.67	0.56	0.00	**16.8**
East Palo Alto	24%	105.77	110.74	1.46	5.00	--	1.57	2.00	--	--	**10.0**
Foster City	19%	173.71	134.79	3.16	3.49	--	0.27	4.61	--	--	**11.5**
Hillsborough	19%	118.09	47.71	0.00	0.16	--	--	5.85	--	0.10	**6.1**
Menlo Park	18%	110.62	204.99	8.88	13.95	1.55	3.10	0.11	0.05	--	**27.6**
Millbrae	21%	192.01	120.81	0.51	3.49	--	0.09	6.23	0.00	0.09	**10.4**
Pacifica	19%	2.52	0.33	--	0.18	0.01	--	--	--	0.00	**0.2**
Portola Valley	19%	129.91	16.19	--	0.57	--	--	2.60	0.10	3.69	**7.0**
Redwood City	18%	388.40	272.91	9.15	13.35	33.13	0.51	0.75	0.82	0.30	**58.0**
San Bruno	18%	202.38	168.65	1.23	5.52	16.66	1.77	0.08	--	--	**25.3**
San Carlos	18%	308.40	236.31	2.69	3.22	--	2.16	8.48	1.85	0.44	**18.8**
San Mateo	18%	583.75	457.05	5.61	16.51	--	3.41	14.11	--	0.00	**39.6**
South San Francisco	18%	528.17	576.89	17.87	8.46	1.26	13.40	2.35	0.50	0.00	**43.8**
Unincorporated	18%	306.75	242.20	6.74	10.04	15.99	2.00	6.73	0.09	0.09	**41.7**
Woodside	18%	156.45	87.13	0.05	2.51	1.23	--	5.32	0.74	5.79	**15.6**
Total	**18.5%[2]**	**4,493.2**	**3,489.1**	**72.1**	**115.8**	**73.6**	**32.6**	**73.6**	**5.9**	**11.8**	**385.3**

1: The color gradient provides a visual comparison of higher levels of PCB load reduction and GI capacity (darker colors indicate higher values).
2: Projected Future New & Redevelopment and Regional Projects achieves more than the target reduction in certain jurisdictions

Table 7-3. Summary of GI Implementation Strategy for Scenario 2 (cohesive sediment target, countywide).[1]

Jurisdiction	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
Atherton	15%	41.92	103.06	0.36	0.19	1.93	0.04	--	--	--	**2.5**
Belmont	4%	32.95	26.57	0.65	2.12	0.45	--	--	--	--	**3.2**
Brisbane	52%	380.83	309.93	0.50	16.82	--	--	3.54	0.58	1.51	**23.0**
Burlingame	7%	110.25	103.44	2.84	7.53	--	--	--	--	--	**10.4**
Colma	18%	116.53	68.98	1.39	0.30	0.26	0.80	0.00	0.54	0.16	**3.5**
Daly City	15%	307.12	170.72	8.99	2.37	1.19	0.04	2.78	0.56	0.00	**15.9**
East Palo Alto	24%	105.77	110.74	1.46	5.00	--	1.57	2.00	--	--	**10.0**
Foster City	8%	72.84	82.72	3.16	3.49	--	--	--	--	--	**6.7**
Hillsborough	0%	0.39	0.36	0.00	0.16	--	--	--	--	--	**0.2**
Menlo Park	29%	185.69	260.21	8.88	13.95	1.55	3.59	3.72	2.94	0.04	**34.7**
Millbrae	4%	45.53	40.24	0.51	3.49	--	0.09	0.55	0.00	0.03	**4.7**
Pacifica	22%	3.04	0.51	--	0.18	0.01	--	0.01	--	0.00	**0.2**
Portola Valley	3%	14.89	1.94	--	0.57	--	--	0.31	0.05	0.11	**1.0**
Redwood City	37%	732.06	651.97	9.15	13.35	33.13	0.56	27.11	6.48	0.99	**90.8**
San Bruno	18%	202.38	168.65	1.23	5.52	16.66	1.77	0.08	--	--	**25.3**
San Carlos	4%	61.04	79.91	2.69	3.22	--	0.03	0.16	--	--	**6.1**
San Mateo	9%	299.93	298.04	5.61	16.51	--	0.18	3.67	--	0.00	**26.0**
South San Francisco	19%	554.62	594.65	17.87	8.46	1.26	13.40	2.37	0.99	0.00	**44.4**
Unincorporated	23%	379.28	246.41	6.74	10.04	15.99	1.92	6.96	0.33	0.15	**42.1**
Woodside	8%	54.23	76.69	0.05	2.51	1.23	--	3.89	0.31	1.28	**9.3**
Total	**17.6%[2]**	**3,701.3**	**3,395.7**	**72.1**	**115.8**	**73.6**	**24.0**	**57.1**	**12.8**	**4.3**	**359.7**

1: The color gradient provides a visual comparison of higher levels of PCB load reduction and GI capacity (darker colors indicate higher values).
2: Scenario 2 targets opportunities throughout the county that provide the greatest cost-benefit for achieving the target load reduction.

7.2 Comparison of Scenarios for Cohesive Sediment versus PCB Load Reduction Objectives

As previously discussed, cohesive sediment (silt and clay) was used in Scenario 1 to serve as primary RAA results for each Permittee (Appendix C). Cohesive sediment was used as a surrogate in the RAA to estimate load reductions that can be achieved through GI implementation. This was due to the uncertainty associated with preliminary efforts to identify PCB source areas and associated concentrations in stormwater runoff. As part of the baseline PCB loading analysis performed in the RAA and reported in the Phase I RAA Report, the watershed model (LSPC) was used to simulate PCBs based on assumptions for PCB concentrations associated with various land uses and PCB source areas (Figure 7-4) identified by the San Francisco Estuary Institute (SFEI) during development of the Regional Watershed Spreadsheet Model (RWSM) (BASMAA 2017, Wu et al. 2017). The Phase I RAA Report provides a complete description of these assumptions and how they were integrated in the RAA model, with results validated based on local monitoring data (SMCWPPP 2018a). Phase I of the RAA utilized the baseline watershed model to estimate PCB loads to San Francisco Bay, and determine the load reduction to meet San Mateo County's portion of the TMDL WLA. Although determined sufficient for the countywide estimate of PCB loads, the PCB source categories were determined to be too uncertain for estimating GI performance in reducing PCB loads and optimizing the selection of GI projects for cost-effective implementation. More study is recommended to further understand the locations of PCB source areas and their associated concentrations of PCBs transported via stormwater. However, the RAA modeling system can be used to test the potential cost savings if PCB source areas are better understood and targeted for GI implementation. Utilizing the assumptions for PCB source areas identified by SFEI (Figure 7-4) the RAA modeling system simulated PCBs originating from the various source areas, estimated the load reductions associated with GI implementation, and optimized the selection of GI projects for cost-effective implementation.

Scenarios 3 and 4 provide an assessment of alternative, cost-optimized GI Implementation Strategies using modeled PCBs, which correspond to the jurisdictional and countywide RAA results for Scenarios 1 and 2 based on cohesive sediment, respectively. Table 7-4 and Figure 7-5 provide a summary and comparison of the results of all scenarios, demonstrating the cost savings if PCB source areas can be strategically focused for GI implementation. All costs are normalized to the total cost of Scenario 1 to simplify comparison across scenarios; therefore, the percentages can be treated like currency for comparison with the understanding that costs and cost savings are relative to the total implementation cost of Scenario 1. As expected, strategically locating GI to capture and treat runoff with higher PCB concentrations can potentially reduce countywide costs for GI implementation.

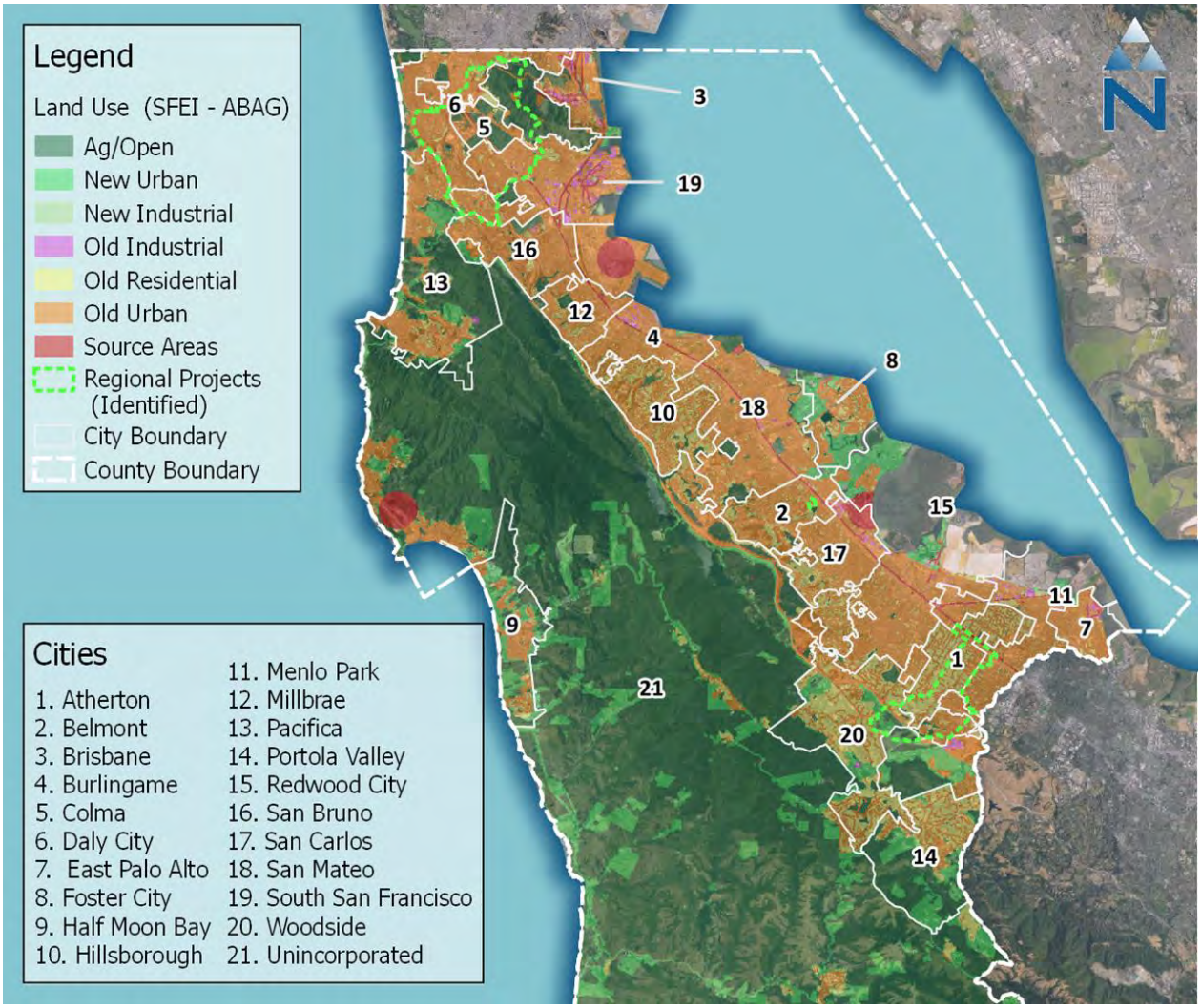

Figure 7-4. PCB source categories identified by SFEI.

Table 7-4. Comparison of relative GI implementation costs by scenario.[9]

Load Reduction Objective	Percent of Total GI Cost to Achieve Reduction Objective		
	Jurisdictional	Countywide	*Total Savings (Jurisdictional vs. Countywide)*
Cohesive Sediment 17.6% Reduction	**Scenario 1: 100%**	**Scenario 2: 66%**	34%
Total PCBs 17.6% Reduction	**Scenario 3: 77%**	**Scenario 4: 48%**	29%
Total Savings (Sediment vs. PCBs)	23%	18%	52%

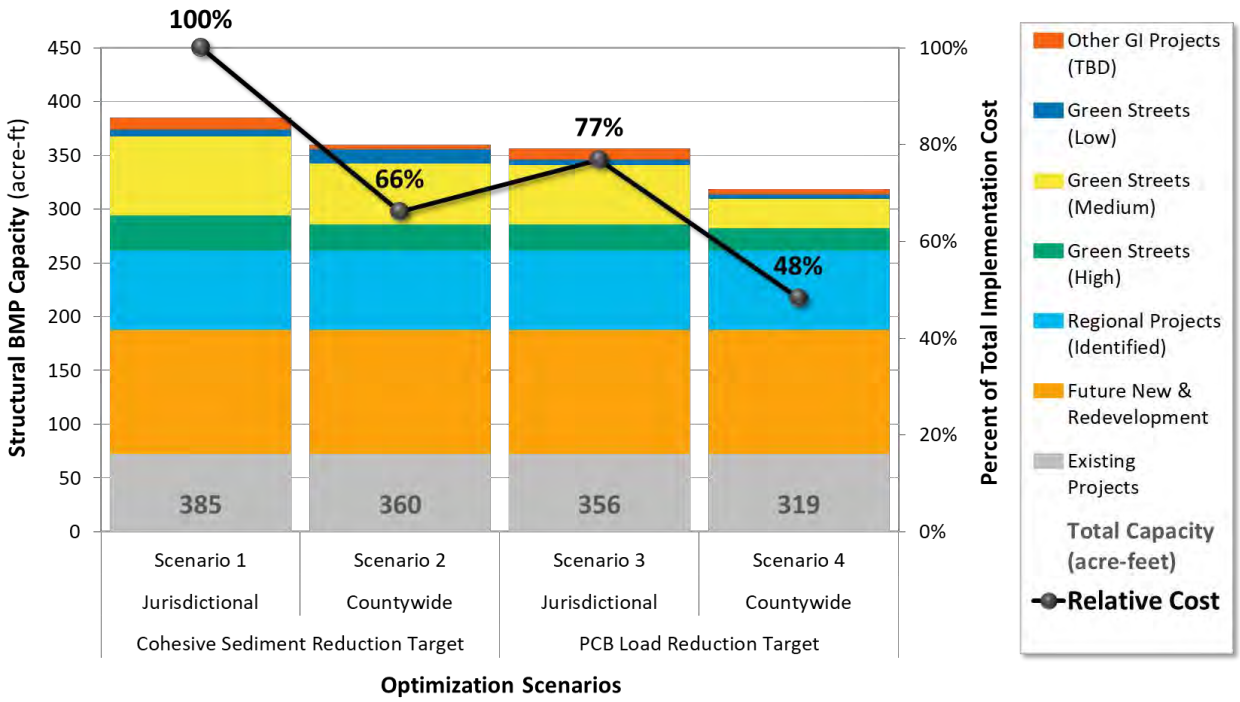

Figure 7-5. Summary of GI storage capacity and relative implementation cost by scenario.[8]

8 EVALUATION OF BENEFITS OF REGIONAL PROJECTS

Section 4.1 and 4.2.1 identify five regional projects that have been conceptualized and are in various stages of planning and engineering design. With the increased cost efficiencies associated with these larger projects over more distributed and numerous green streets and LID retrofits, it is likely that more agencies will identify additional regional projects in the future. To support further planning of

[9] Cost for Scenarios 2, 3, and 4 are reported as percentages of total costs for Scenario 1, illustrating the amount of savings if these scenarios are pursued in the future as part of the adaptive management process.

regional project opportunities, an evaluation was performed to determine the cost benefits of regional projects over distributed GI projects. The RAA model was used to compare implementation costs with and without the five regional projects included in Scenarios 1 and 2. Table 8-1 and Figure 8-1 present countywide GI capacity and cost summaries for Scenarios 1 and 2 with regional projects, relative to corresponding reference scenarios without regional projects. All the solutions in the table achieve a 17.6% reduction in cohesive sediment load (silts and clays). The scenarios without regional projects present the optimized solutions using other screened GI opportunity with cohesive sediment as the management objective.

Table 8-1. Projected savings provided by regional projects (jurisdictional vs. countywide).[10]

Scenarios	Percent of Total GI Cost to Achieve Reduction Objective		
	Jurisdictional	Countywide	*Total Savings (Jurisdictional vs. Countywide)*
Without Regional Projects	**111%**	**83%**	28%
With Regional Projects	**Scenario 1: 100%**	**Scenario 2: 66%**	34%
Total Savings (With vs. Without Regional Projects)	11%	17%	45%

[10] Cost for Scenario 2 and reference scenarios without regional projects are reported as percentages of total costs for Scenario 1, illustrating the savings provided by regional projects over alternative distributed GI projects.

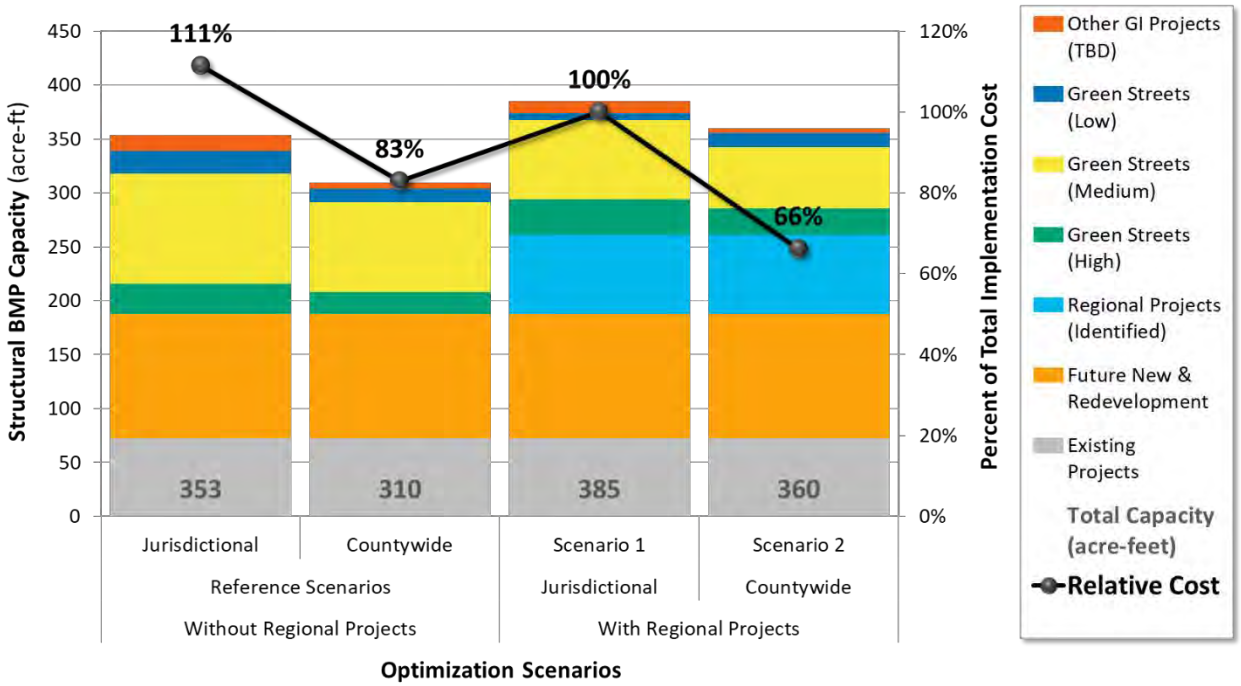

Figure 8-1. Summary of GI storage capacity and cost to achieve 17.6% target reduction.[9]

Results of analysis indicate that regional projects provide an 11% cost savings for Scenario 1 that assumes that all Permittees proportionally meet the 17.6% load reduction goal. For Scenario 2, the cost saving is higher at 17% due to the full capture of regional project benefits if the load reduction goal is achieved at the countywide rather than jurisdictional scale, as demonstrated in the comparison of Scenarios 1 and 2 discussed in Section 7.1.

9 GI IMPLEMENTATION SCHEDULES

Throughout the adaptive management process for GI implementation, each Permittee will continue to identify and test feasible opportunities for GI projects to meet the final PCB load reduction goal of 17.6% for 2040. The process will include the tracking of management metrics and continued re-evaluation of GI project opportunities considered for the RAA. For instance, the RAA assumed projected amounts of LID associated with new and redevelopment, which are subject to change based on factors that are outside the control of the Permittees. If less development occurs over time, more green streets or regional projects on public land may be needed to provide equivalent stormwater volume management. To support the GI plans, preliminary schedules were developed to chart a potential course for GI implementation, which considered the various project opportunities.

The MRP requires reporting of goals for implementation of GI for interim milestones 2020 and 2030, in addition to the final milestone of 2040. Various assumptions were made about the order and pace of implementation for various GI project types to estimate the amount of GI to be implemented at each of these milestones. Separate analyses performed by the SMCWPPP (2019) and included in Appendix A determined the projected amount of LID associated with new development and redevelopment by 2020, 2030, and 2040. The regional projects with current funding (Cartan Field in Atherton, Orange Memorial Park in South San Francisco) were assumed to be built and operational by 2030. Finally, for each Permittee, it is assumed that 33% of green streets required by 2040 will be

implemented by 2030. The resulting schedule presented in Figure 9-1 demonstrates anticipated interim and final milestones for GI implementation in terms of structural capacity (corresponding to the capacities presented right side of Table 7-2). Table 9-1shows milestones for both structural capacities and management metrics (e.g., volume managed, treated imperviousness). These interim and final GI capacities are subject to adaptive management; however, the 2040 Management Metrics for GI (left side of Table 7-2 and top of Table 9-1) set the ultimate goals for GI planning efforts and tracking. Individual Permittee implementation schedules are provided in Appendix D.

The countywide implementation schedule (Figure 9-1 and Table 9-1) and individual Permittee schedules (Appendix D) also provide comparisons of the amount of required GI capacities estimated to address 2040 goals for Scenario 1 (jurisdictional) and Scenario 2 (countywide) (see Table 7-3). The countywide scenario offers notable cost savings; however, in light of existing jurisdictional autonomies, there would need to be significant additional discussions among Permittees to establish cost-share agreements that would result in more GI implementation within some Permittee jurisdictions resulting in less GI implemented in other jurisdictions. Comparison of these scenarios further demonstrates the need for an adaptive management framework to further investigate the most cost-effective approach to countywide GI implementation.

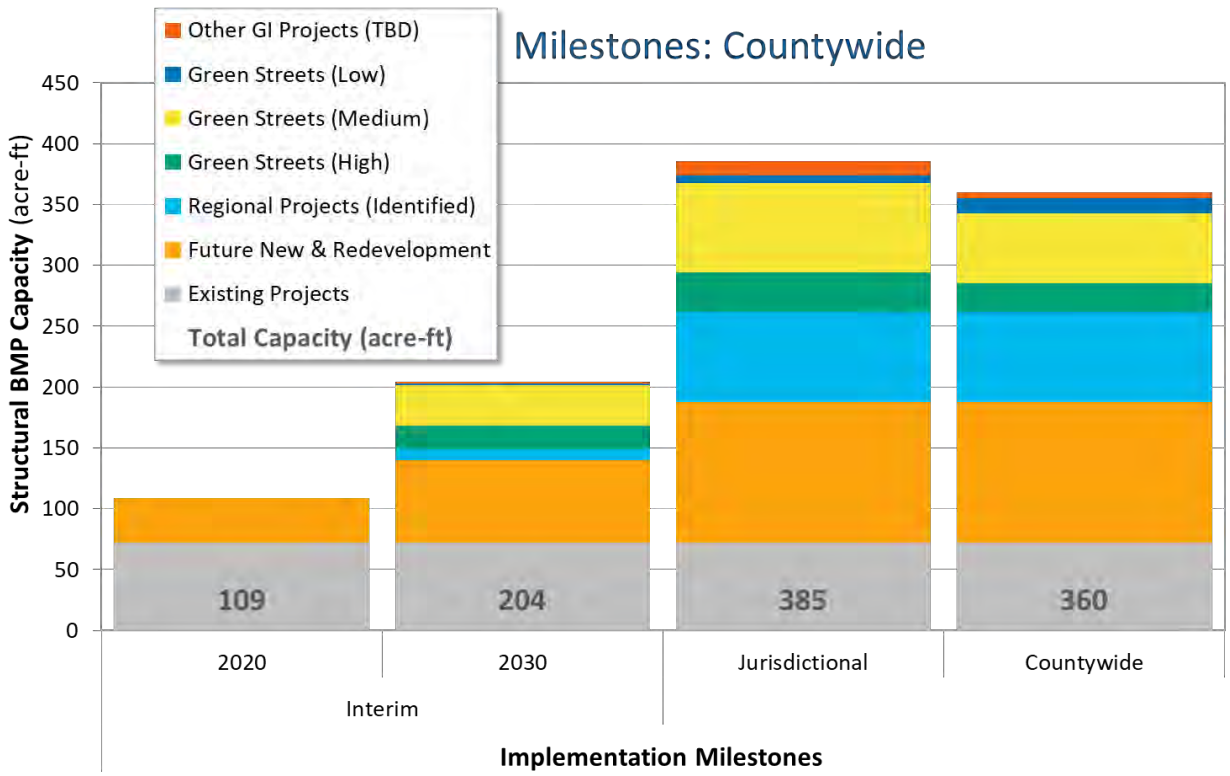

Figure 9-1. Summary of GI storage capacity by implementation milestone.

Table 9-1. Implementation Milestones: Countywide

Implementation Metrics		Implementation Milestones: Countywide					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	6.0%	7.5%	5.0%	11.0%	18.5%	17.6%
	Volume Managed (acre-ft/yr)	1,313.0	1,655.5	1,524.7	2,837.6	4,493.2	3,701.3
	Treated Impervious (acres)	627.0	1,945.8	916.3	1,543.2	3,489.1	3,395.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	72.1	72.1	72.1	72.1
	Future New & Redevelopment	30.9	48.3	36.6	67.5	115.8	115.8
	Regional Projects (Identified)	9.0	64.6	--	9.0	73.6	73.6
	Green Streets (High)	20.0	12.6	--	20.0	32.6	24.0
	Green Streets (Medium)	32.9	40.7	--	32.9	73.6	57.1
	Green Streets (Low)	1.4	4.5	--	1.4	5.9	12.8
	Other GI Projects (TBD)	1.2	10.6	--	1.2	11.8	4.3
	Total	**95.3**	**181.3**	**108.7**	**204.0**	**385.3**	**359.7**

10 CONCLUSIONS

The RAA provides assessment of multiple implementation scenarios that can support the adaptive management process for GI implementation, help garner support for collaborative efforts for GI implementation, and inform further research of PCB source areas that will allow Permittees to seek more cost-effective implementation strategies over time. To set goals for GI Plans, results of Scenario 1 (Appendix C) provide a conservative assessment of the amount of GI needed to address the 17.6% reduction in PCBs, using cohesive sediment reduction as a surrogate for PCB load reduction. Alternative scenarios were evaluated to better understand the sensitivity of modeling assumptions and help guide future decisions on data collection (e.g., improve understanding of sources of PCBs that can be addressed with GI), project selection (e.g., regional projects or green streets), or collaboration of Permittees to jointly meet the countywide load reduction goal.

The adaptive management process will utilize a GI tracking tool that will enable agencies to continuously quantify and evaluate progress towards meeting the 2040 goal for PCB load reduction. As demonstrated in the GI Implementation Strategies presented in Appendix C, these management metrics can include percent load reduction, stormwater volumes managed, or impervious area treated. The SMCWPPP is currently leading the development of a GI tracking tool, which will enable Permittees to enter GI project information and calculate these management metrics. The tool will also allow Permittees to evaluate alternative GI projects prior to implementation, providing a mechanism to inform cost-effective decisions that maximize progress towards addressing management goals. The tracking tool can also serve as a future repository of GI project information as projects are implemented, which can be used to support future updates of the RAA over time.

As Permittees initiate implementation of GI Plans and future studies are implemented to better understand GI processes to capture and treat stormwater, the Permittees will continue to gain more understanding of the water quality benefits of various GI projects that can inform the adaptive management process. For example, Section 4 documented a number of assumptions on the potential locations for GI project opportunities and their associated effectiveness at capturing, infiltrating, or treating stormwater. Future more-detailed field reconnaissance performed by each Permittee can result in improved understanding of these GI project opportunities, identification of new opportunities not identified in the SRP, or identification of impediments to potential projects (e.g., multiple driveways or other obstructions for bioretention in streets rights-of-way). As projects are implemented, additional studies performed within San Mateo County or throughout the San Francisco Bay region can provide an improved understanding of infiltration and treatment processes associated with GI project designs. As a result, it is anticipated that the RAA will be periodically updated in the future to reassess GI project opportunities and GI Implementation Strategies for each Permittee, likely resulting in fine-tuning of management metrics over time. This adaptive management process will provide continued assurance that GI project implementation is on track to meet 2040 goals for PCB reduction, while seeking to maximize cost-efficiency associated with project prioritization and selection.

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APPENDIX A: PROJECTIONS OF FUTURE NEW DEVELOPMENT AND REDEVELOPMENT

ATTACHMENT #2

MEMORANDUM

COMMUNITY DESIGN + ARCHITECTURE

Philip Erickson, Architect, AIA

Date: January 3, 2019

To: Green Infrastructure Committee

Cc: Matt Fabry and Reid Bogert, City/County Association of Governments

From: Phil Erickson and Bharat Singh, Community Design + Architecture, Inc.

Re: SMCWPPP Green Infrastructure Plan Development Support – UPDATED estimate of land area for new and redevelopment from 2015 to 2020, 2020 to 2030, and 2030 to 2040

In support of the Reasonable Assurance Analysis (RAA) to model pollutant load reductions, Community Design + Architecture (CD+A) developed an estimate of the land area and location of new and redevelopment within San Mateo County that would be required to implement MRP targeted C.3 regulated green infrastructure stormwater management improvements by 2040. The methodology and numbers were finalized with the GI Committee in December 2017. Following that, some revisions were made in response to comments from Foster City. A memorandum with the initial 2015 to 2020, 2020 to 2030, and 2030 to 2040 estimates was distributed to member agencies for comment on October 24, 2018 and it was discussed with the agencies at the October 31, 2018 GI Committee.

Comments where received from Brisbane, Burlingame, Redwood City, and San Mateo County. **Table 1** on the following page is the revised final estimate for 2015 to 2040. Green numbers in the tables indicate that agency requested revisions increased the number, and red means the changes reduced the number.

The MRP also asks that the Green Infrastructure Plans (GI Plans) include estimates for the land area of new and redevelopment by 2020 and 2030. The updated estimates for the time periods of 2015 to 2020, 2020 to 2030, and 2030 to 2040; this information is provided in **Tables 2 through 4**.

2015 to 2020 Land Development Estimate

The C/CAG and MTC demographic dataset that was used in developing the 2040 land area estimate included a projection to 2020 as well as 2040. CD+A used this information to make an estimate of the growth rate for the three land use categories that have been included in making the land area estimates – single family homes, multi-family homes, and employment. These growth rates were applied to estimate the acreage of each land use category that is anticipated to be developed between 2015 and 2020. **Table 2** presents these numbers and what percentage of the 2040 total growth estimate the 2015 to 2020 increment represents.

The percentage of 2040 total growth that would be achieved by 2020 varies significantly between communities and land use types. The progression of growth towards the 2040 growth projection is illustrated in **Chart 1**, for the county as a whole (Countywide) and for a sampling of communities, and a linear growth line is also provided for comparison purposes;

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these were chosen as examples of communities that are projected to see more near-term growth, a growth rate similar to the county as a whole, and some that are projected to see a higher rate of growth towards the end of the 2040 time period.

More specifically, the 2015-2020 time period, 5 years, is 20% of the time period from 2015 to 2040. So, if growth were linear, one would expect roughly 20% of the total projected land area to be developed by 2020. Countywide, the estimate is 30%, which is 60% more than would be expected with a linear growth. As illustrated in **Chart 1**, on page 3 of the memorandum, Portola Valley is projected to achieve all its growth by 2020. Burlingame, San Bruno, and total Countywide growth are projected to achieve more growth than a linear progression; and Foster City is projected to achieve a lower percentage than a linear progression.

TABLE 1
REVISED ESTIMATE OF LAND AREA FOR NEW AND REDEVELOPMENT
THAT MUST COMPLY WITH C.3 GREEN INFRASTRUCTURE REQUIREMENTS
(2015 TO 2040 growth in acres)

Jurisdiction	Housing		Employment	Total New and Redevelopment
	Single-family	Multi-family		
Atherton	0	0	0	0
Belmont	8	9.5	23.5	41
Brisbane	8.5	69.5	206	284
Burlingame	4	26.5	95	125.5
Colma	0	1.5	2.5	4
Daly City	13.5	23.5	26	63
East Palo Alto	11	8.5	63	82.5
Foster City	0	30	83	113
Half Moon Bay	30	7	13	50
Hillsborough	0	0	0	0
Menlo Park	7	14.5	300	321.5
Millbrae	13.5	19	14.5	47
Pacifica	22.5	1.5	10.5	34.5
Portola Valley	0.	0	0.5	0.5
Redwood City	10	115.5	129.5	255
San Bruno	4.5	39	24	67.5
San Carlos	10	14	34	58
San Mateo, City of	18.5	122	128	268.5
South San Francisco	17.	39.5	67	123.5
Woodside	5.5	0.	4.5	10
San Mateo County	6	62.5	61.5	186
Total all Jurisdictions	**245.5**	**603.5**	**1,286.0**	**2,135**

2020 to 2030 Land Development Estimate

MTC's most recent Plan Bay Area efforts included development of jurisdiction specific growth rates for the 2020 to 2030 time period. CD+A applied these growth rates to derive the land area estimates for 2030. **Table 3** presents these numbers and what percentage of the 2040 total growth estimate the 2020 to 2030 increment represents.

The percentage of 2040 total growth that would be achieved between 2015 and 2030 also varies significantly between communities and land use types. If growth were linear, one would expect roughly 60% of the total projected land area to be developed from 2015 to 2030. But, given the projected slowdown in growth between 2020 and 2030, the overall countywide growth is projected to be about 54%, generally in alignment with linear growth, see **Chart 1**. San Bruno is projected to maintain a higher rate of growth up to 2030, Burlingame and Foster City follow the countywide trend of slowing growth.

Chart 1
PERCENT OF 2040 GROWTH PROJECTION ACHIEVED INTERIM TIME POINTS

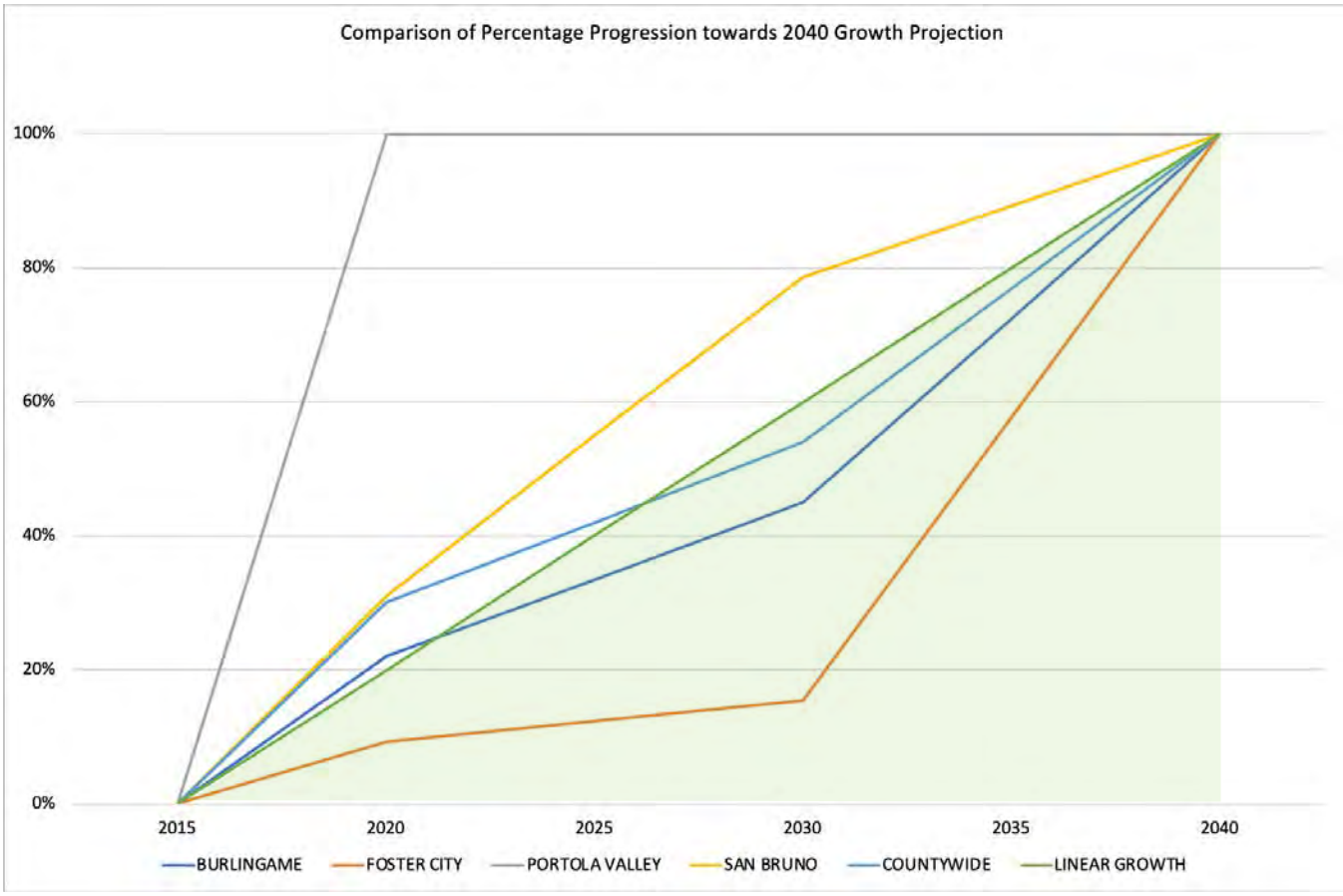

2030 to 2040 Land Development Estimate

The 2030 to 2040 land use estimate is simply the remainder of the 2040 land area estimate that is not expected to have been developed by 2030. **Table 4** presents these numbers and what percentage of the 2040 total growth estimate the 2030 to 2040 increment represents.

The percentage of 2040 total growth that would be achieved between 2030 and 2040 also varies significantly between communities and land use types. The 2030-2040 time period, 10 years, is 40% of the time period from 2015 to 2040. Again, if growth were linear, one would expect roughly 40% of the total projected land area to be developed during the 2030 to 2040 time period. Countywide, the estimate is roughly equal to this amount. So, regionally performed demographic and economic analysis estimates that development activity would be increasing following 2030, but not to the extent that development activity has and is expected to occur between 2015 and 2020.

TABLE 2
2020 INCREMENT
ESTIMATE OF LAND AREA FOR NEW AND REDEVELOPMENT
THAT MUST COMPLY WITH C.3 GREEN INFRASTRUCTURE REQUIREMENTS
(2015 TO 2020 growth in acres)

Jurisdiction	Housing				Employment		Total New and Redevelopment	
	Single-family		Multi-family					
	Acres	% of 2040	Acres	% of 2040	Acres	% of 2040	Acres	% of 2040
Atherton	0	—	0	—	0	—	0	—
Belmont	3.5	44%	2	21%	11	27%	16.5	40%
Brisbane	2	24%	0.5	1%	3	1%	5.5	2%
Burlingame	0.5	13%	5	19%	22	18%	27.5	22%
Colma	0	—	0.5	33%	1	25%	1.5	38%
Daly City	2.5	19%	4.5	19%	9.5	15%	16.5	26%
East Palo Alto	1	9%	0.5	6%	23.5	28%	25	30%
Foster City	0	—	3.5	12%	7	6%	10.5	9%
Half Moon Bay	7.5	25%	4	57%	4.5	9%	16	32%
Hillsborough	0	—	0	—	0	—	0	—
Menlo Park	7	100%	3	21%	59.5	19%	69.5	22%
Millbrae	4	30%	4.5	24%	5.5	12%	14	30%
Pacifica	4.5	20%	0.5	33%	4	12%	9	26%
Portola Valley		—	0	—	0.5	100%	0.5	100%
Redwood City	6.5	65%	21.5	19%	81	32%	109	43%
San Bruno	4.5	100%	8	21%	8.5	13%	21	31%
San Carlos	4.	40%	2.5	18%	16	28%	22.5	39%
San Mateo, City of	12	65%	111	91%	44	16%	167	62%
South San Francisco	7	41%	7.5	19%	35	28%	49.5	40%
Woodside	1	18%	0	—	1	10%	2	20%
San Mateo County	21	34%	12.5	20%	22.5	12%	56	30%
Total all Jurisdictions	**88.5**	**36%**	**191.5**	**32%**	**359**	**17%**	**639**	**30%**

TABLE 3
2030 INCREMENT
ESTIMATE OF LAND AREA FOR NEW AND REDEVELOPMENT
THAT MUST COMPLY WITH C.3 GREEN INFRASTRUCTURE REQUIREMENTS
(2020 TO 2030 growth in acres)

Jurisdiction	Housing				Employment		Total New and Redevelopment	
	Single-family		Multi-family					
	Acres	% of 2040	Acres	% of 2040	Acres	% of 2040	Acres	% of 2040
Atherton	0	—	0	—	0	—	0	—
Belmont	4.5	56%	3.5	37%	1	47%	19	46%
Brisbane	0	0%	67	96%	39.5	19%	106.5	38%
Burlingame	2.5	63%	19	72%	7.	7%	28.5	23%
Colma	0	—	1	67%	0.5	20%	1.5	38%
Daly City	1.0	7%	1.5	6%	0	0%	2.5	4%
East Palo Alto	0	0%	1	12%	0	0%	1	1%
Foster City	0	—	5	17%	2	2%	7	6%
Half Moon Bay	9	30%	0.5	7%	4	31%	13.5	27%
Hillsborough	0.	—	0	—		—	0	—
Menlo Park	0	0%	2	14%	16.5	6%	18.5	6%
Millbrae	6	44%	14.5	76%	0.5	3%	21	45%
Pacifica	7.	31%	0.5	33%	2.5	24%	10	29%
Portola Valley	0	—	0	—	0.	0%	0	0%
Redwood City	2	20%	26	23%	12	9%	40	16%
San Bruno	0	0%	20.5	53%	11.5	48%	32	47%
San Carlos	2	20%	6	43%	16	47%	24	41%
San Mateo, City of	5	27%	7.5	6%	74.5	58%	87	32%
South San Francisco	1	6%	4	10%	14.5	22%	19.5	16%
Woodside	1	18%	0	—	2.5	56%	3.5	35%
San Mateo County	27.5	44%	28	45%	14.5	24%	70.	38%
Total all Jurisdictions	**68.5**	**28%**	**207.5**	**34%**	**229**	**18%**	**50**	**24%**

TABLE 4
2040 INCREMENT
ESTIMATE OF LAND AREA FOR NEW AND REDEVELOPMENT
THAT MUST COMPLY WITH C.3 GREEN INFRASTRUCTURE REQUIREMENTS
(2030 TO 2040 growth in acres)

Jurisdiction	Housing				Employment		Total New and Redevelopment	
	Single-family		Multi-family					
	Acres	% of 2040	Acres	% of 2040	Acres	% of 2040	Acres	% of 2040
Atherton	0	—	0	—	0	—	0	—
Belmont	0	0%	4	42%	1.5	6%	5.5	13%
Brisbane	6.5	76%	2	3%	163.5	79%	172	61%
Burlingame	1	25%	2.5	9%	66	69%	69.5	55%
Colma	0	—	0	0%	1	40%	1	25%
Daly City	10	74%	17.5	74%	16.5	63%	44	70%
East Palo Alto	10	91%	7	82%	39.5	63%	56.5	68%
Foster City	0	—	21.5	72%	74	89%	95.5	85%
Half Moon Bay	13.5	45%	2.5	36%	4.5	35%	20.5	41%
Hillsborough	0	—	0	—	0	—	0	—
Menlo Park	0	0%	9.5	66%	224	75%	233.5	73%
Millbrae	3.5	26%	0	0%	8.5	59%	12	26%
Pacifica	11	49%	0.5	33%	4	38%	15.5	45%
Portola Valley	0	—	0	—	0	0%	0	0%
Redwood City	1.5	15%	68	59%	36.5	28%	106	42%
San Bruno	0	0%	10.5	27%	4	17%	14.5	21%
San Carlos	4.	40%	5.5	39%	2	6%	11.5	20%
San Mateo, City of	1.5	8%	3.5	3%	9.5	7%	14.5	5%
South San Francisco	9	53%	28	71%	17.5	26%	54.5	44%
Woodside	3.5	64%	0	—	1	22%	4.5	45%
San Mateo County	13.5	22%	22	35%	24.5	40%	60	32%
Total all Jurisdictions	**88.5**	**36%**	**204.5**	**34%**	**698**	**54%**	**991**	**46%**

Relationship of Interim Land Use Area Estimates to Green Infrastructure Plan Development

For the vast majority of SMCWPPP member agencies, the high development rates experienced through 2020 will be beneficial by providing a more GI in the near term, as communities begin to focus on the planning and design of regional and public green infrastructure projects that will be needed to achieve the TMDL targets of the MRP.

There are policies and strategies that can be considered to define a reasonable path within a GI Plan to achieve the 2040 TMDL targets. These could include:

- Setting interim year targets for public GI projects that account for likely variable growth rates over time.
- Identifying ways to increase GI that is constructed and maintained by private development. This could position permittees for more flexible load reduction requirements in future stormwater permits.
- Identifying a local, countywide, or regional funding stream for implementation, operations, and maintenance of public GI.

Also, the significant variation in projected growth rates for individual communities highlights the importance to consider a countywide GI implementation strategy.

APPENDIX B: ADDITIONAL REGIONAL PROJECT CONCEPTS (COMPLETED AFTER THE STORMWATER RESOURCE PLAN)

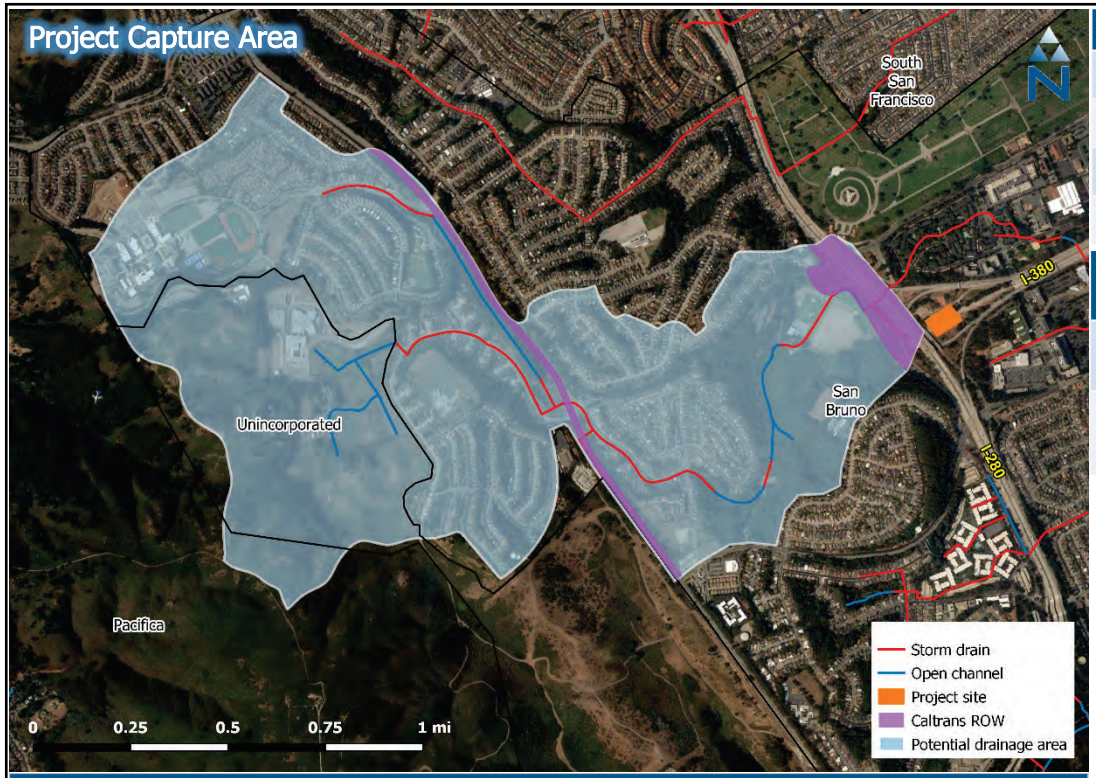

Site Information

Project Lead	San Bruno
Location	Caltrans Right-of-Way @ I-280 and I-380
Land Owner	Caltrans
Receiving Water	San Bruno Creek

Jurisdiction	San Bruno	San Mateo County	Pacifica	Caltrans ROW
Capture Area (acres)	660	220	22	40
Percent of Capture Area	70.0%	23.4%	2.3%	4.3%

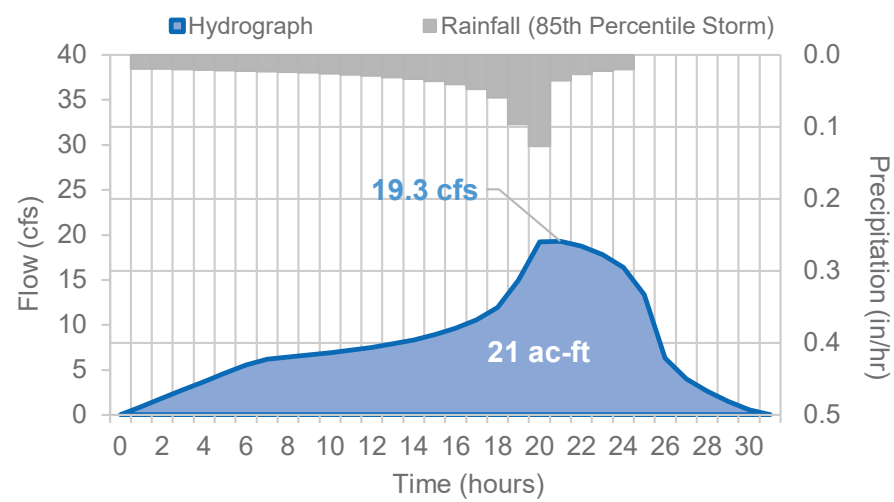

Project Overview

This concept describes a regional stormwater capture project for San Bruno. The project is designed to be a subsurface infiltration gallery located at open space in the Caltrans right-of-way between the I-280/I-380 interchange (see map above). This project has the potential to supplement groundwater supplies, alleviate downstream flooding, and improve water quality in San Bruno Creek. The project will treat runoff from a total of 942 acres. Approximately 700 acres is in San Bruno (40 acres in Caltrans right-of-way), 220 acres is in unincorporated county, and 22 acres is in Pacifica. Residential impervious area in western San Bruno is the largest contributor of runoff. The project is sized to capture 21 ac-ft, 100% of the 85th percentile, 24-hour runoff volume that is typically used to meet water quality targets. This volume reduces the detention capacity needed in the Crestmoor Canyon to address flooding from the 25-year storm, according to the 2014 San Bruno Storm Drain Master Plan, by one-third. The project can reduce the PCBs load in the drainage area by 69%. This benefit may offset the amount of green streets that would otherwise need to be implemented to meet permit and TMDL requirements, reducing San Bruno's green street requirement by 84%. Project details and costs are outlined in the subsequent pages.

Wet Weather Drainage Characteristics

Sizing Criteria		85th percentile, 24-hour storm
Total Capture Area		942 acres
Imperviousness		27%
Design Conditions for 85th %-ile storm	***Rainfall Depth:***	0.85 inches
	Total Runoff Volume:	21.0 ac-ft
	Peak Flow Rate:	19.3 cfs

Regional Stormwater Capture Project at I-280 and I-380

Project Overview and Drainage Area Map

(Sheet 1 of 3)

SAN MATEO COUNTYWIDE Water Pollution Prevention Program

PARADIGM ENVIRONMENTAL

Site Plan Description

The project consists of a subsurface concrete gallery that will be located beneath vacant space in the Caltrans right-of-way between the I-280 and I-380 interchange. The project would divert from a storm drain that serves portions of the Rollingwood, Crestmoor, Portola Highlands, and Pacific Heights neighborhoods of San Bruno. The storm drain eventually discharges to San Bruno Creek, which flows to the Bay. The drain runs underneath I-280 and crosses the frontage road along the northbound side of the freeway. The diversion structure will be constructed in the section of the drain that runs beneath the frontage road to minimize disruption to highway traffic while providing accessibility. A 650-foot length of diversion pipe will be required to route runoff to the facility. Captured runoff will be routed through a pretreatment system, such as a hydrodynamic separator, to remove solids and sediment, then routed to the facility. Due to the length of the required diversion line, a pump structure will likely be necessary to move captured runoff to the facility. However, a geotechnical analysis may show that a gravity-flow diversion alternative is feasible. A gravity diversion may increase excavation costs but will eliminate capital and O&M costs associated with operating a pump station. A pump system may also be beneficial for flood control downstream since diversions can be timed to manage the peak of storms. A passive system may potentially fill the facility before the peak occurs, effectively eliminating potential flood control benefits. Cost-benefit analysis should be performed to select a diversion alternative. The subsurface concrete gallery is designed to capture 21 ac-ft and will be 8.4-ft deep with a 2.5-acre footprint. Captured runoff will be removed from the storm drain system and treated through infiltration. Soil testing will need to confirm infiltration rates greater than 1.4 inches per hour in order to drain the facility within 72-hours, in compliance with local design standards. A shallower structure with greater footprint may be needed if a lower infiltration rate is found. All conceptual design details should be explored in greater detail during a feasibility analysis.

Disclaimer: Utilities were evaluated through GIS analysis using best available data. A utilities survey should be performed prior to construction to confirm the location of all utilities on site.

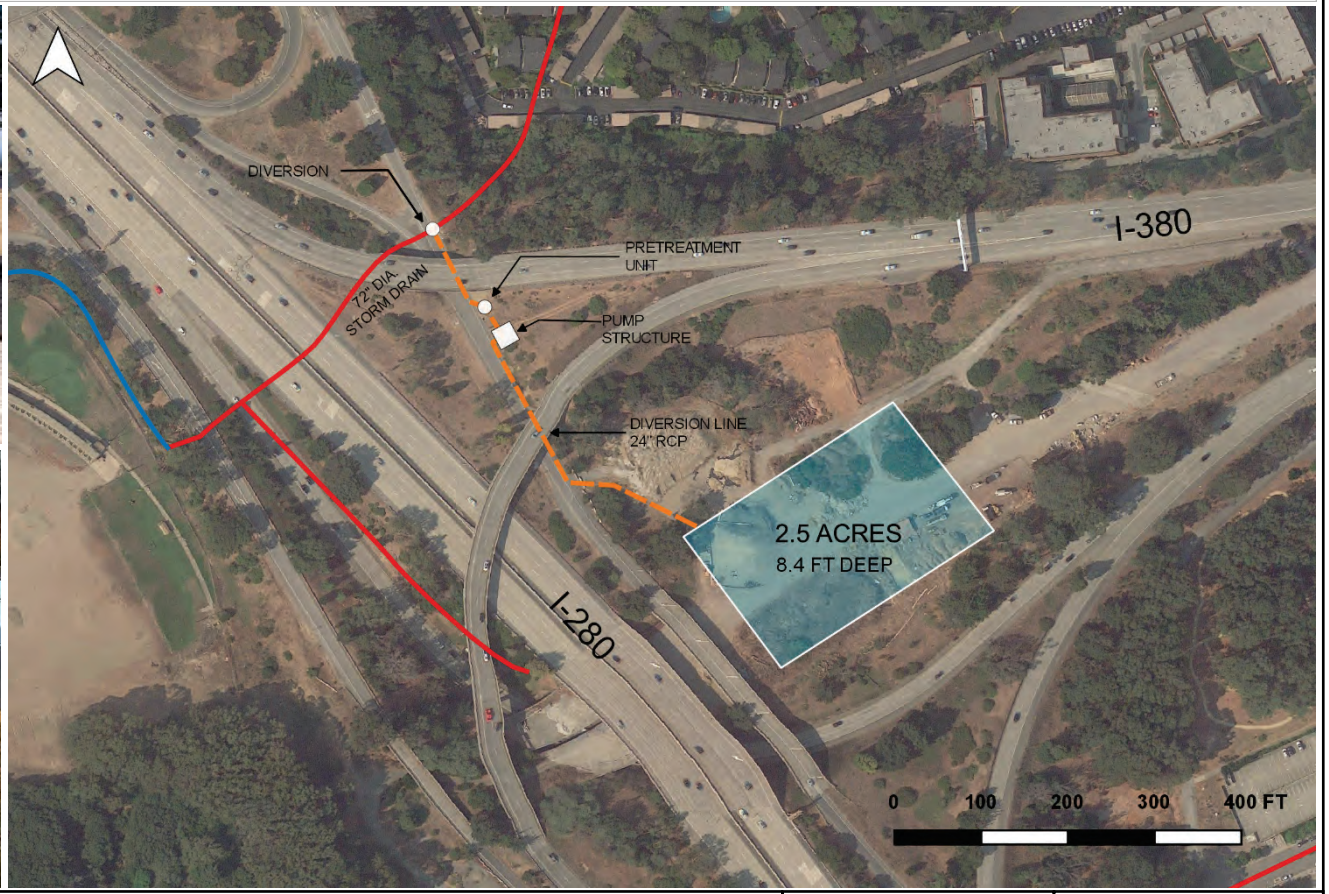

Regional Stormwater Capture Project at I-280 and I-380

Site Plan and Description

(Sheet 2 of 3)

SAN MATEO COUNTYWIDE Water Pollution Prevention Program

PARADIGM ENVIRONMENTAL

Budget-level Cost Estimates

DESCRIPTION	UNIT COST	UNIT	QUANTITY	SUBTOTAL
Excavation/Removal	$50	CY	40,000	$2,000,000
Diversion Structure	-	LS	1	$150,000
Pretreatment	$6,000	CFS	20	$120,000
Diversion Pump Structure	$56,000	CFS	20	$1,120,000
Diversion Pipe (24" RCP)	$200	LF	650	$130,000
Subsurface Gallery	$300	CY	34,000	$10,200,000
Restoration	$5	SF	109,000	$545,000
CONSTRUCTION SUBTOTAL				$14,265,000
Mobilization (10% construction)				$1,427,000
Contingency (15% construction)				$2,140,000
Design (10% total)				$1,783,000
TOTAL COST				**$19,615,000**

Subsurface Structure Design Values

Item Description	Value	Units
Footprint	2.5	acres
Design Height	8.4	ft
Depth of Excavation	10	ft
Pumping Requirements	20	cfs
Infiltration Rate	Needs further investigation	
Drawdown Time	Needs further investigation	
Infiltration Rate Needed for 72-hr Drawdown Time*	1.4	in/hr
Capacity	**21**	**ac-ft**
Annual Capture Volume	**226**	**ac-ft**
% Design Storm Managed	**100**	**%**

*Maximum 72-hr drawdown time is recommended in the SMCWPPP C.3 Stormwater Technical Guidance. Using a larger footprint and a smaller design height, while keeping storage capacity constant, will lower the infiltration requirement for 72-hr drawdown.

Proposed Schedule	FY 21/22				FY 22/23				FY 23/24			
	2021		2022		2022		2023		2023		2024	
	JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ
Design		X	X	X	X	X	X					
Environmental Documentation								X				
Bid & Award								X				
Construction									X	X	X	X

Additional Considerations

This project concept is planning-level and subject to review and revision during project design. A variety of confounding factors, including geotechnical and environmental considerations, will need to be further investigated to inform project design. Factors to be considered include but are not limited to the following:

- **Drainage delineation**: the drainage was delineated using best available data in GIS analysis. Field examinations of the upstream storm drain network should be performed to confirm drainage area.
- **Utilities**: a utilities survey along the frontage road should be performed to minimize the disruption of utilities during construction.
- **Groundwater levels**: the distance between the bottom of the infiltrating structure and the seasonal high groundwater level should be at least 10 feet apart to allow for adequate infiltration. This should be confirmed during a feasibility study.
- **Pumping Requirements:** pumping is generally assumed for large-scale regional projects. However, gravity-flow diversion alternatives may be possible, reducing capital and O&M costs associated with pumping. Gravity diversions would require the structure to be placed below the storm drain invert, increasing the required excavation depth. As-builts for the storm drain will need to be examined to determine this depth. A break-even analysis should be performed to determine if a gravity-flow alternative is more cost-effective. All cost estimates are preliminary and will need to be reevaluated during a feasibility analysis when project details are developed further.
- **Infiltration rates**: the NRCS Soil Survey did not contain an infiltration rate estimate for the project area. Infiltration tests should be performed during a feasibility study to ensure the structure is sized appropriately. It is recommended that infiltrating structures drain within 72 hours. The infiltration rate may determine design components, such as structure depth and capacity.
- **Environmental factors**: with the exception of a voluntary cleanup at The Crossings over 0.5 miles away, the California Envirostor database shows no active cleanup sites near the project site. Additional investigation should be performed at the project site to assess the possibility of existing contamination interfering with stormwater infiltration.

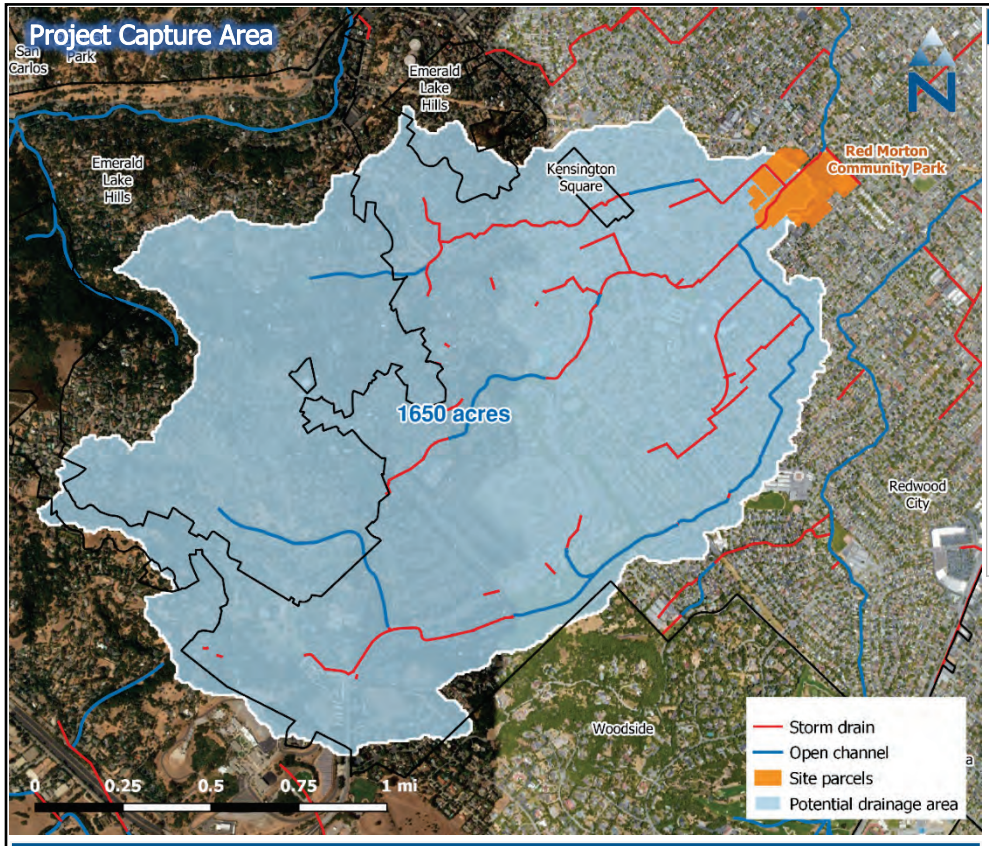

Project Overview

This concept describes a regional stormwater capture project for Redwood City. The project, which would serve as the cornerstone for the City's MRP compliance and water resiliency efforts, is envisioned as a subsurface infiltration gallery located at Red Morton Park (see map to left). This project has the potential to supplement groundwater supplies, alleviate flooding, offset water use at the park, and improve downstream water quality in the Arroyo Ojo and downstream Redwood Creek. The project has potential to treat runoff from a total of 1,650 acres, approximately 70% of which is in Redwood City. The remaining 30% of the potential drainage area is from Woodside and the unincorporated communities, Emerald Lake Hills and Kensington Square. This may present an opportunity to explore co-funding options with Woodside and the County. The project is envisioned as a single subsurface gallery with potential for additional phases to be considered in the future. A multi-phase approach will allow for flexibility in procuring funding and coordinating with scheduled park improvements (e.g. resurfacing of turf fields). The first phase of the project has potential to capture and treat approximately 31.2 ac-ft, 72% of the 85th percentile, 24-hour runoff volume (43.2 ac-ft). The project can potentially reduce PCBs load by 16.7%. This benefit may offset the amount of green streets that would otherwise need to be implemented to meet permit and TMDL requirements, reducing Redwood City's green street requirement by 92.6%. Project details and costs are outlined in further detail in the subsequent pages.

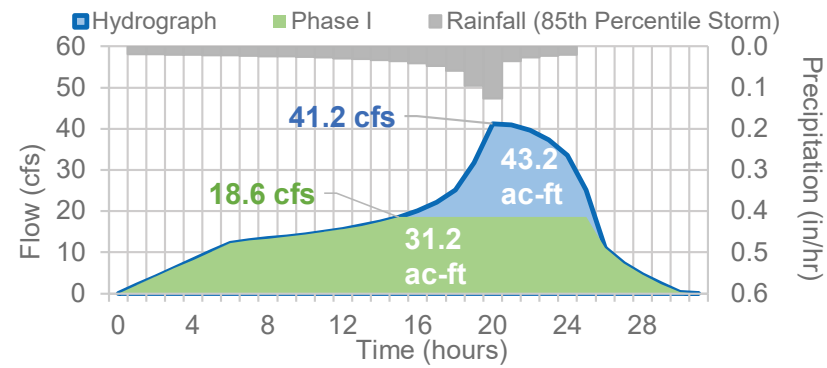

Site Information

Project Lead	Redwood City
Location	Red Morton Community Park – McGarvey Field
Land Owner	Redwood City
Receiving Water	Arroyo Ojo (tributary to Redwood Creek)

Jurisdiction	Redwood City	San Mateo County	Woodside
Capture Area (acres)	1,142	467	41
Percent of Capture Area	69.2%	28.3%	2.5%

Wet Weather Drainage Characteristics

Sizing Criteria		85th percentile, 24-hour storm
Total Capture Area		1,650 acres
Imperviousness		34%
Design Conditions for 85th %-ile storm	***Rainfall Depth:***	0.85 inches
	Total Runoff Volume:	43.2 ac-ft
	Peak Flow Rate:	41 cfs

Regional Stormwater Capture Project at Red Morton Community Park

Project Overview and Drainage Area Map

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(Sheet 1 of 3)

SAN MATEO COUNTYWIDE Water Pollution Prevention Program

PARADIGM ENVIRONMENTAL

Site Plan Description

The project consists of a subsurface concrete gallery that will be located beneath McGarvey Field at Red Morton Community Park. The structure has potential to capture 31.2 acre-feet of runoff from Arroyo Ojo, a tributary of Redwood Creek that flows to the Bay. Storage capacity is capped at 31.2 acre-feet due to available area at McGarvey Field and a reasonable structure depth of 12 feet. The section of Arroyo Ojo just west of the park is an open channel that is routed underneath the park through a large reinforced concrete drain before daylighting to an open channel east of the park. The project will divert from the 5-ft 2-in by 12-ft drain using a rubber dam system and intake basin. Runoff will be routed through a pretreatment system, such as a hydrodynamic separator, to remove solids and sediment, then pumped to the gallery. The total storage (31.2 ac-ft) will account for approximately 72% of the 85th percentile, 24-hour runoff volume (43.2 ac-ft). Captured runoff will be treated through infiltration. Stormwater reuse elements (irrigation, greywater, etc.) may be incorporated if infiltration rates are deemed too low at the site.

A second phase may be considered to capture the remaining 12 ac-ft of the design volume uncaptured by the McGarvey Field structure (Phase I). Phase II would likely be located on Griffin and Bechet Fields just west of the Phase I structure to minimize disruption of utilities on the northern half of the park. The Phase II facility can be constructed at a later date but may still be able to utilize some of the diversion infrastructure from Phase I. For example, it may be possible for the diversion components to be built in parallel to make use of the same pump housing and intake structure. These design aspects should be explored in greater detail during a feasibility analysis.

Disclaimer: Utilities were evaluated through GIS analysis using best available data. A utilities survey should be performed prior to construction to confirm the location of all utilities on site.

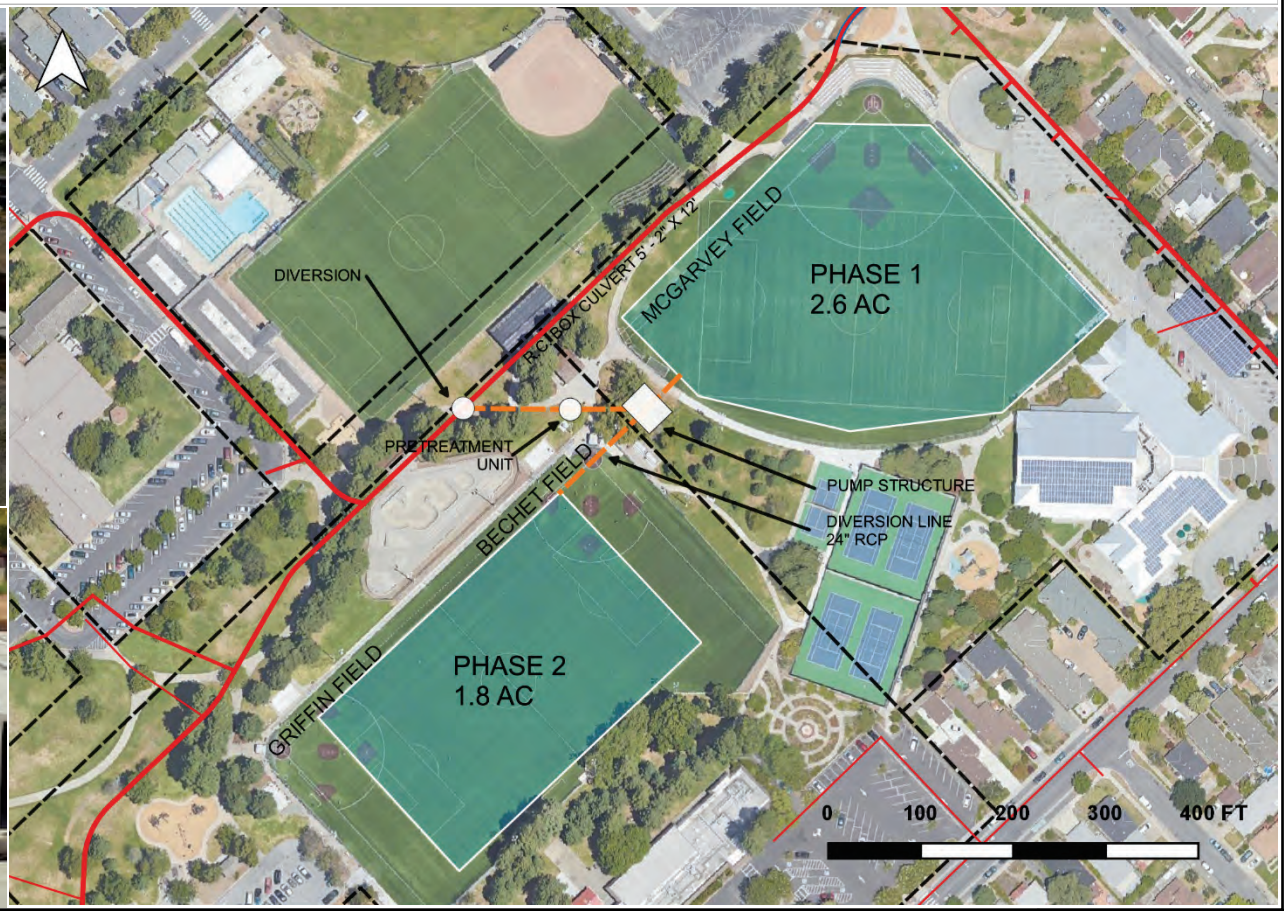

Regional Stormwater Capture Project at Red Morton Community Park

Site Plan and Description

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(Sheet 2 of 3)

SAN MATEO COUNTYWIDE Water Pollution Prevention Program

PARADIGM ENVIRONMENTAL

Budget-level Cost Estimates			Phase I (McGarvey Field)		Phase II (Griffin-Bechet Fields)	
DESCRIPTION	UNIT COST	UNIT	QUANTITY	SUBTOTAL	QUANTITY	SUBTOTAL
Excavation/Removal	$50	CY	63,000	$3,150,000	29,000	$1,450,000
Rubber Dam System	-	LS	1	$80,000	-	-
Diversion Structure	-	LS	1	$150,000	1	$150,000
Pretreatment	$6,000	CFS	20	$120,000	23	$138,000
Diversion Pump Structure	$56,000	CFS	20	$1,120,000	23	$1,288,000
Diversion Pipe (24" RCP)	$200	LF	100	$20,000	100	$20,000
Subsurface Gallery	$300	CY	50,000	$15,000,000	20,000	$6,000,000
Restoration	$5	SF	113,000	$565,000	78,000	$390,000
CONSTRUCTION SUBTOTAL				$20,475,000		$9,436,000
Mobilization (10% construction)				$2,048,000		$944,000
Contingency (15% construction)				$3,071,000		$1,415,000
Design (10% total)				$2,559,000		$1,180,000
TOTAL COST				**$28,153,000**		**$12,975,000**

Additional Considerations

This project concept is planning-level and subject to review and revision during project design. A variety of confounding factors, including geotechnical and environmental considerations, will need to be further investigated to inform project design. Factors to be considered include but are not limited to the following:

- **Drainage delineation**: the drainage was delineated using best available data in GIS analysis. Field examinations of the upstream storm drain network should be performed to confirm drainage area.
- **Utilities**: a utilities survey at the park should be performed to minimize the disruption of utilities during construction.
- **Groundwater levels**: the distance between the bottom of the infiltrating structure and the seasonal high groundwater level should be at least 10 feet apart to allow for adequate infiltration.
- **Pumping Requirements:** pumping is generally assumed for large-scale regional projects. However, gravity-flow diversion alternatives may be possible, reducing O&M costs associated with pumping. Gravity diversions would require the structure to be placed below the storm drain invert, increasing the required excavation depth. As-builts for the storm drain will need to be obtained from the City to determine this depth. For a 2.6-acre footprint, capital cost may increase $300,000 per foot of additional excavation. In comparison, the O&M associated with a pump diversion may be around $50,000 annually ($1.4 million projected over 20 years with 2.5% inflation). A break-even analysis should be performed to determine if a gravity-flow alternative is more cost-effective. All cost estimates are preliminary and will need to be reevaluated during a feasibility analysis when project details are developed further.
- **Infiltration rates**: the NRCS Soil Survey did not contain an infiltration rate estimate for the Red Morton Community Park area. Infiltration tests should be performed during a feasibility study to ensure the structure is sized appropriately. It is recommended that infiltrating structures drain within 72 hours. The infiltration rate may determine design components, such as structure depth and capacity. Additional uses of captured runoff, such as irrigation or greywater, may contribute to 72-hr drawdown requirement.
- **Environmental factors**: with the exception of an active environmental investigation from renovations/redevelopment at nearby John Gill Elementary School, the California Envirostor database shows no active cleanup sites near the project site. Additional investigation should be performed at the project site to assess the possibility of existing contamination interfering with stormwater infiltration.

Phase I – McGarvey Field design values

Item Description	Value	Units
Footprint	2.6	acres
Design Height	12	ft
Depth of Excavation	15	ft
Pumping Requirements	18.6	cfs
Infiltration Rate	Needs further investigation	
Drawdown Time	Needs further investigation	
Infiltration Rate Needed for 72-hr Drawdown Time*	2	in/hr
Phase I Capacity	**31.2**	**ac-ft**
% Design Storm Managed	**72**	**%**

Phase II – Griffin-Bechet Fields design values

Item Description	Value	Units
Footprint	1.8	acres
Design Height	6.67	ft
Depth of Excavation	10	ft
Pumping Requirements	22.6	cfs
Infiltration Rate	Needs further investigation	
Drawdown Time	Needs further investigation	
Infiltration Rate Needed for 72-hr Drawdown Time*	1.10	in/hr
Phase II Capacity	**12**	**ac-ft**
% Design Storm Managed	**28**	**%**

*Maximum 72-hr drawdown time is recommended in the SMCWPPP C.3 Stormwater Technical Guidance. Using a larger footprint and a smaller design height, while keeping storage capacity constant, will lower the infiltration requirement for 72-hr drawdown.

APPENDIX C: RAA RESULTS FOR SCENARIO 1

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Atherton

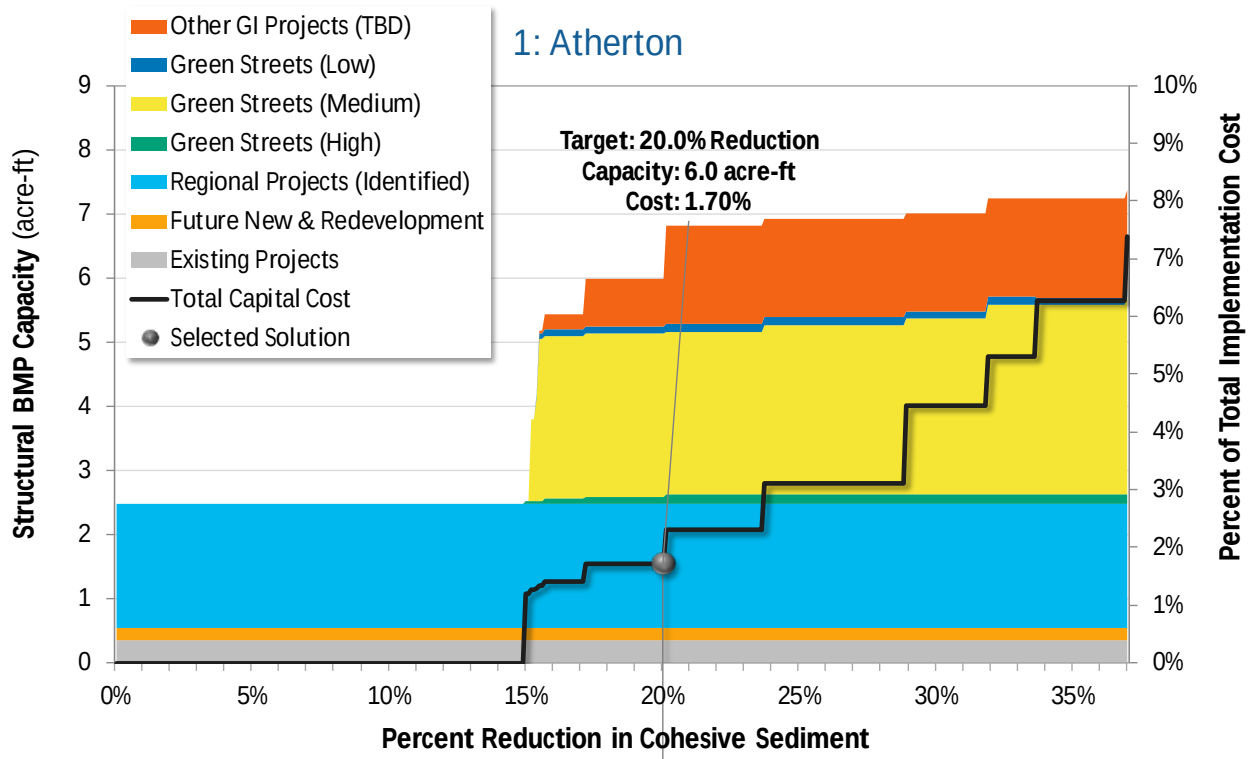

Figure C-1. Optimization summary for Atherton - Scenario 1.

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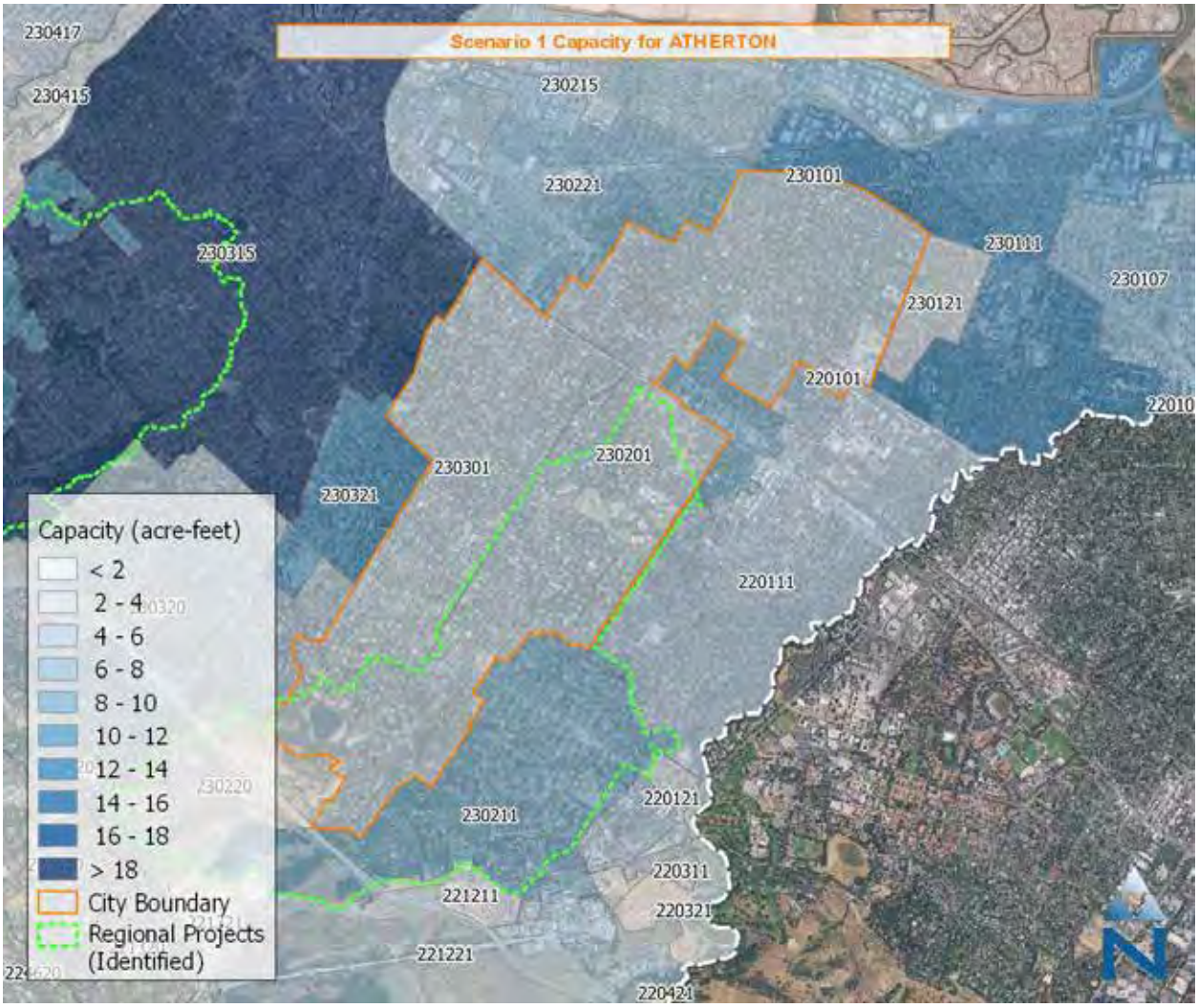

Figure C-2. Map of GI capacities by subwatershed in Atherton - Scenario 1.

Table C-1. GI Implementation Strategy for Atherton - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
220101	62%	0.82	0.15	--	0.01	--	0.00	--	0.04	0.02	**0.1**
230101	23%	0.00	0.00	--	--	--	--	--	--	0.00	**0.0**
230201	19%	60.20	101.77	0.36	0.14	1.90	0.16	--	--	--	**2.6**
230301	58%	2.62	8.33	--	0.03	0.02	--	2.53	0.07	0.72	**3.4**
Total	**20.0%**	**63.6**	**110.3**	**0.4**	**0.2**	**1.9**	**0.2**	**2.5**	**0.1**	**0.7**	**6.0**

Belmont

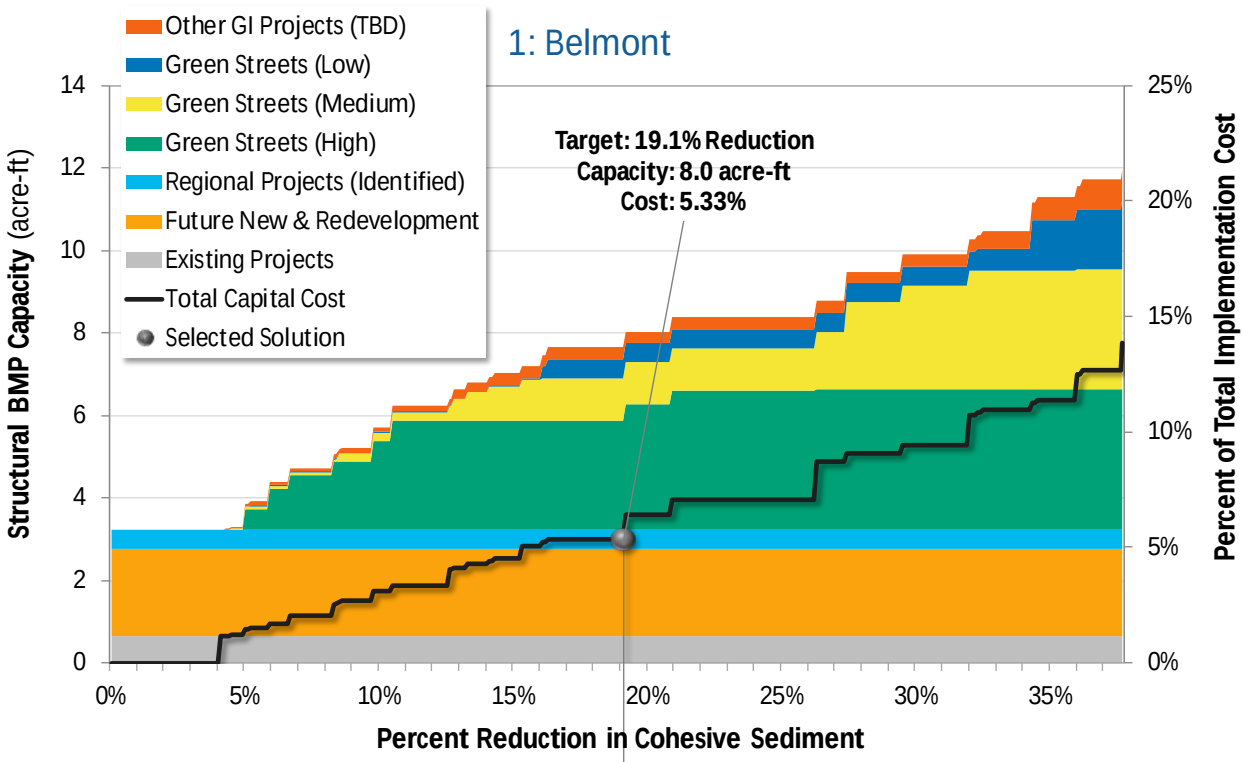

Figure C-3. Optimization summary for Belmont - Scenario 1.

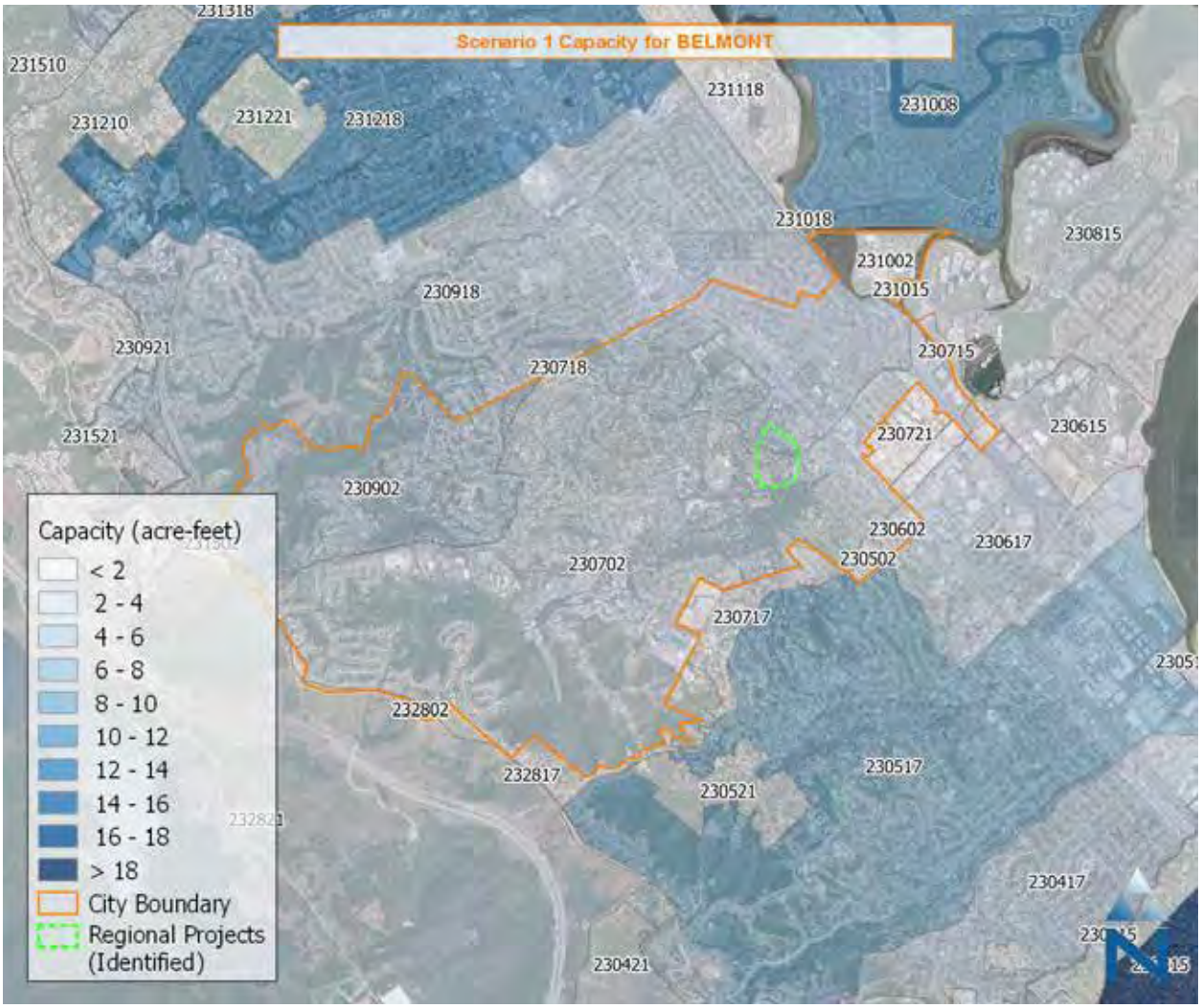

Figure C-4. Map of GI capacities by subwatershed in Belmont - Scenario 1.

Table C-2. GI Implementation Strategy for Belmont - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
230502	42%	1.42	1.13	--	0.01	--	--	0.03	--	0.05	**0.1**
230602	59%	5.73	6.29	0.19	0.07	--	0.00	0.03	0.03	0.19	**0.5**
230702	12%	67.76	25.57	0.33	0.61	0.32	1.02	--	--	--	**2.3**
230902	33%	64.73	68.50	0.13	1.23	0.13	2.01	0.78	0.25	--	**4.5**
231002	33%	4.73	6.13	--	0.20	--	--	0.19	0.18	--	**0.6**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
231502	69%	0.04	0.01	--	--	--	--	--	--	0.00	**0.0**
232802	30%	0.82	0.24	--	--	--	--	--	--	0.05	**0.0**
Total	**19.1%**	**145.2**	**107.9**	**0.7**	**2.1**	**0.5**	**3.0**	**1.0**	**0.5**	**0.3**	**8.0**

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Brisbane

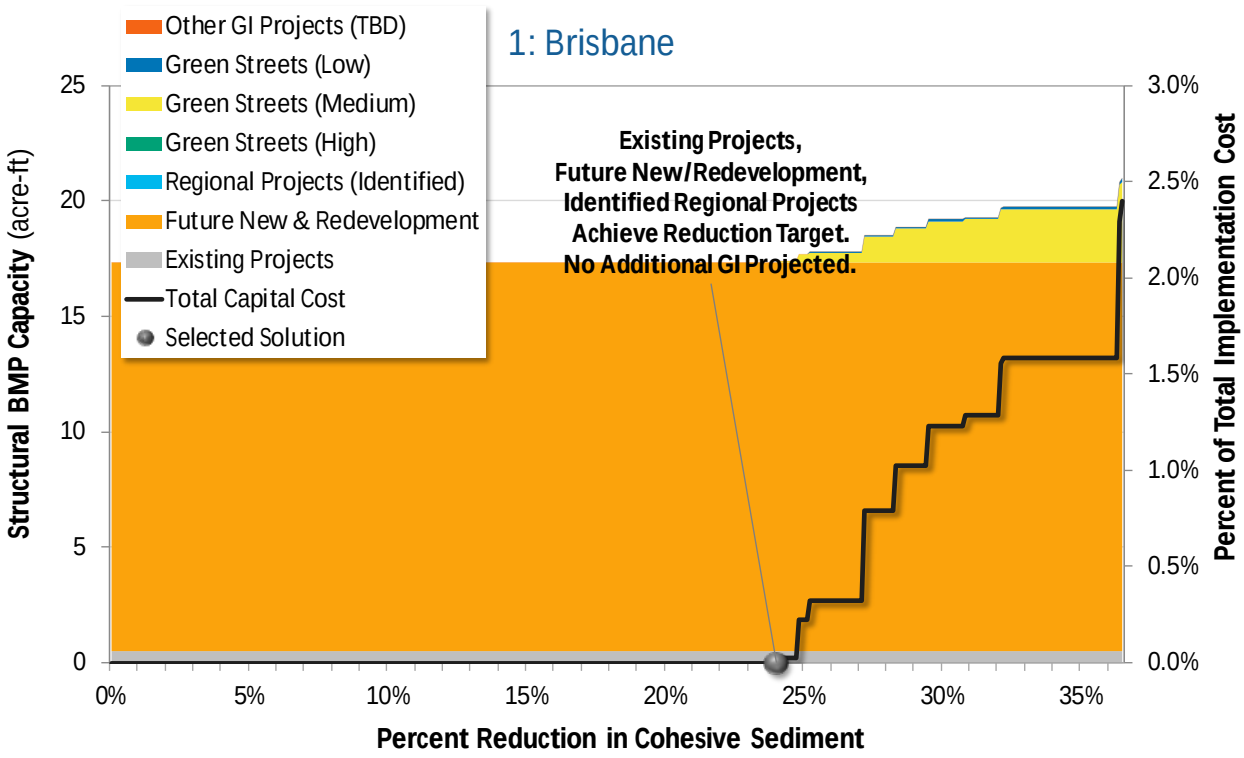

Figure C-5. Optimization summary for Brisbane - Scenario 1.

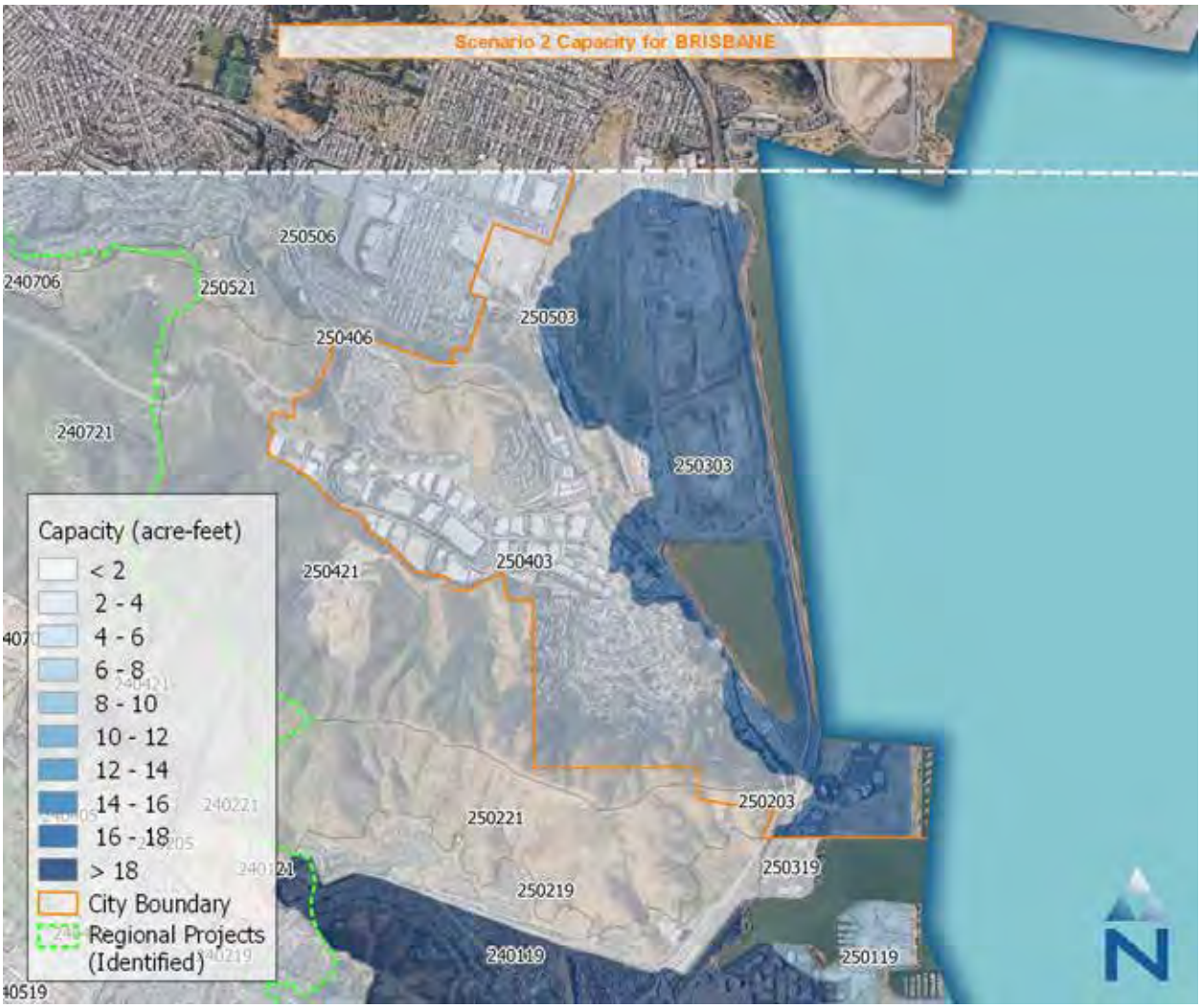

Figure C-6. Map of GI capacities by subwatershed in Brisbane - Scenario 1.

Table C-3. GI Implementation Strategy for Brisbane - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
250203	35%	0.77	0.50	--	0.15	--	--	--	--	--	**0.2**
250303	42%	150.20	122.82	--	13.28	--	--	--	--	--	**13.3**
250403	5%	18.37	13.67	0.50	1.16	--	--	--	--	--	**1.7**
250503	29%	29.96	26.63	--	2.23	--	--	--	--	--	**2.2**
Total	**24.0%**	**199.3**	**163.6**	**0.5**	**16.8**	**--**	**--**	**--**	**--**	**--**	**17.3**

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Burlingame

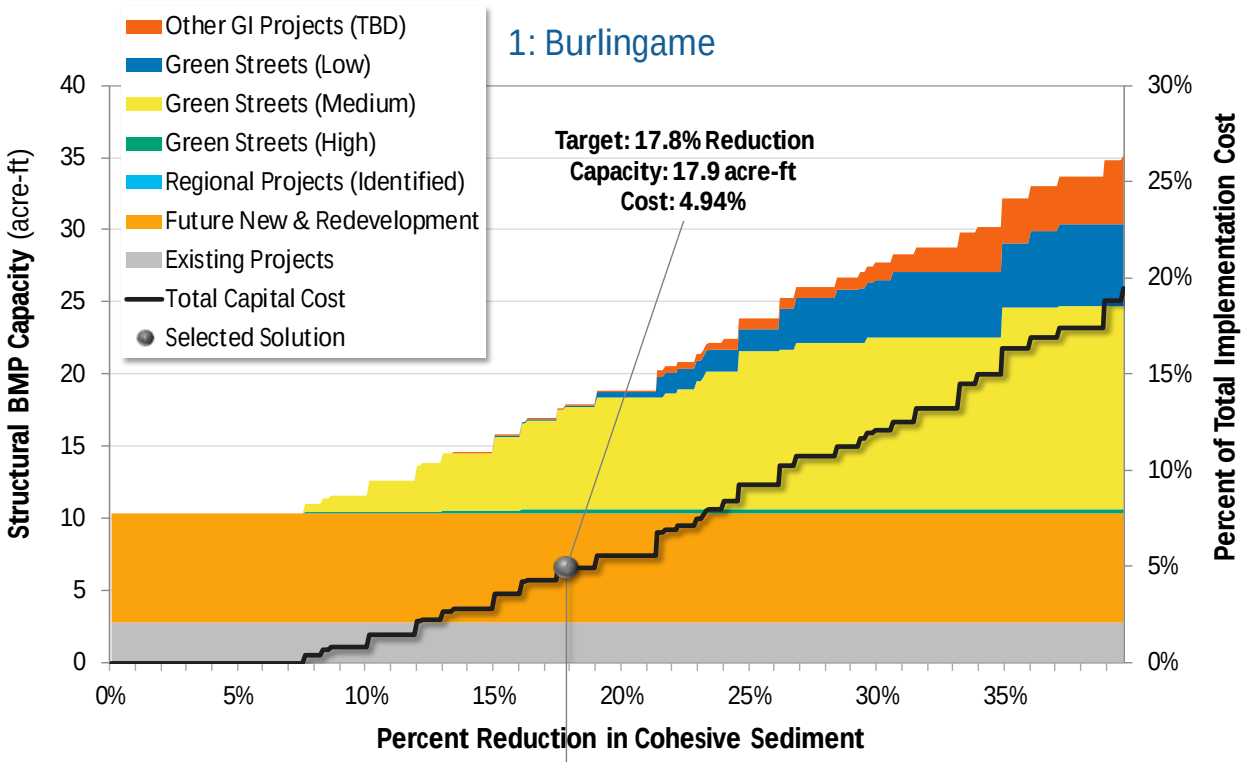

Figure C-7. Optimization summary for Burlingame - Scenario 1.

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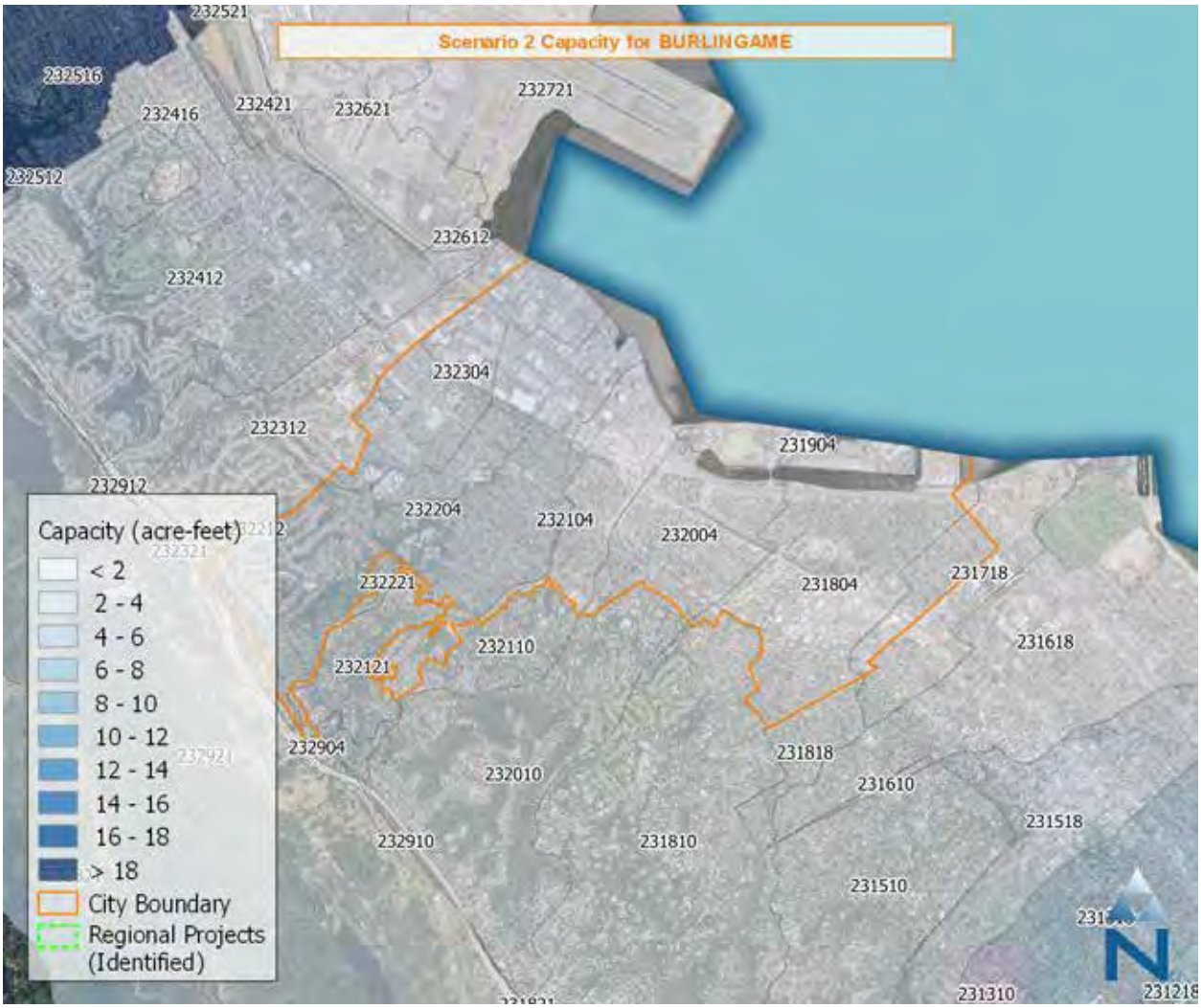

Figure C-8. Map of GI capacities by subwatershed in Burlingame - Scenario 1.

Table C-4. GI Implementation Strategy for Burlingame - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
231704	18%	10.79	7.25	0.03	0.10	--	--	0.53	--	--	**0.7**
231804	13%	48.88	23.42	0.40	0.78	--	0.17	1.39	--	--	**2.7**
231904	37%	22.86	19.87	0.80	0.02	--	--	0.76	0.07	0.08	**1.7**
232004	15%	26.14	12.56	0.30	0.48	--	--	0.79	--	--	**1.6**
232104	12%	20.31	17.97	0.44	1.52	--	0.04	--	--	--	**2.0**

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Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232204	23%	97.01	59.46	0.09	2.30	--	--	3.24	--	--	**5.6**
232304	16%	55.16	50.36	0.78	2.34	--	0.01	0.41	--	--	**3.6**
232904	38%	0.05	0.01	--	--	--	--	--	--	0.00	**0.0**
Total	**17.7%**	**281.2**	**190.9**	**2.8**	**7.5**	**--**	**0.2**	**7.1**	**0.1**	**0.1**	**17.9**

Colma

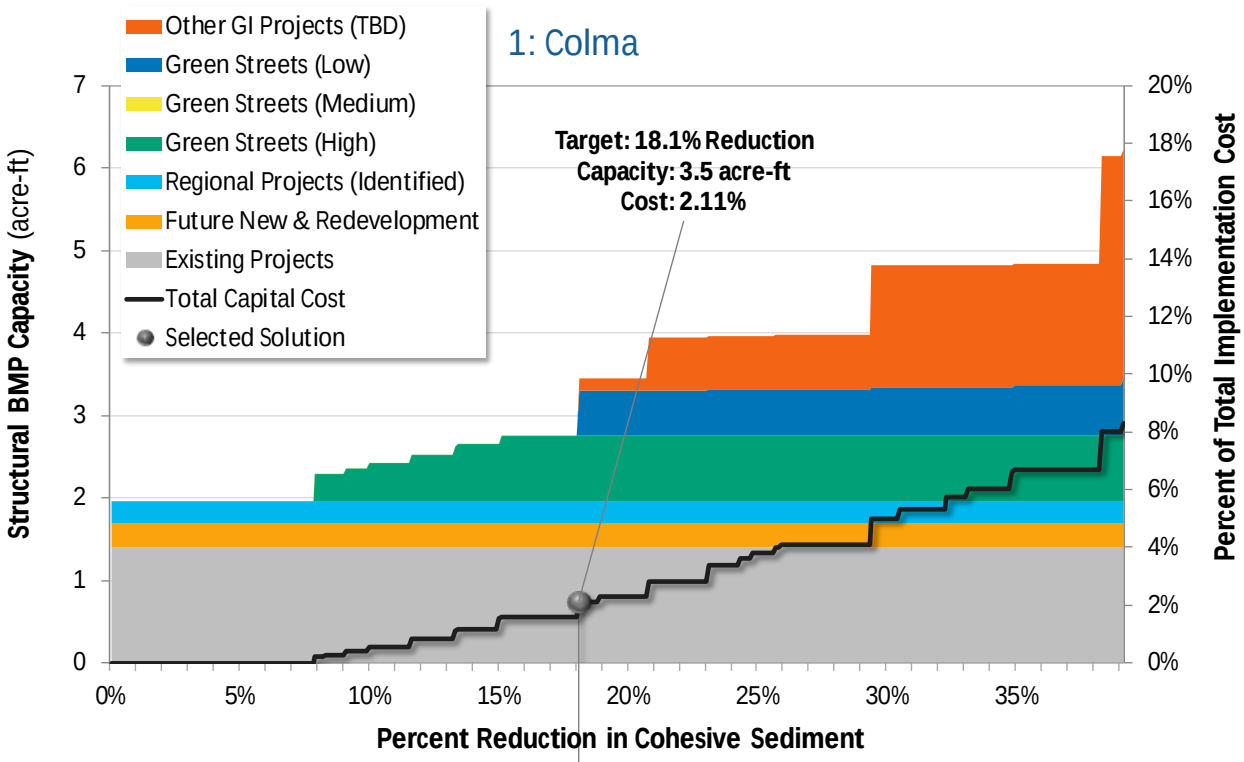

Figure C-9. Optimization summary for Colma - Scenario 1.

Figure C-10. Map of GI capacities by subwatershed in Colma - Scenario 1.

Table C-5. GI Implementation Strategy for Colma - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
240205	38%	0.66	0.04	--	0.00	0.00	--	--	0.00	--	**0.0**
240405	16%	22.76	4.36	0.10	0.09	0.08	0.28	--	--	--	**0.5**
240505	27%	4.37	0.35	0.01	0.01	0.01	--	0.00	--	--	**0.0**
240605	17%	33.26	50.95	0.70	0.09	--	0.12	--	0.54	0.16	**1.6**
240705	19%	55.48	13.27	0.58	0.12	0.16	0.40	--	--	--	**1.3**
Total	**18.1%**	**116.5**	**69.0**	**1.4**	**0.3**	**0.3**	**0.8**	**0.0**	**0.5**	**0.2**	**3.5**

Daly City

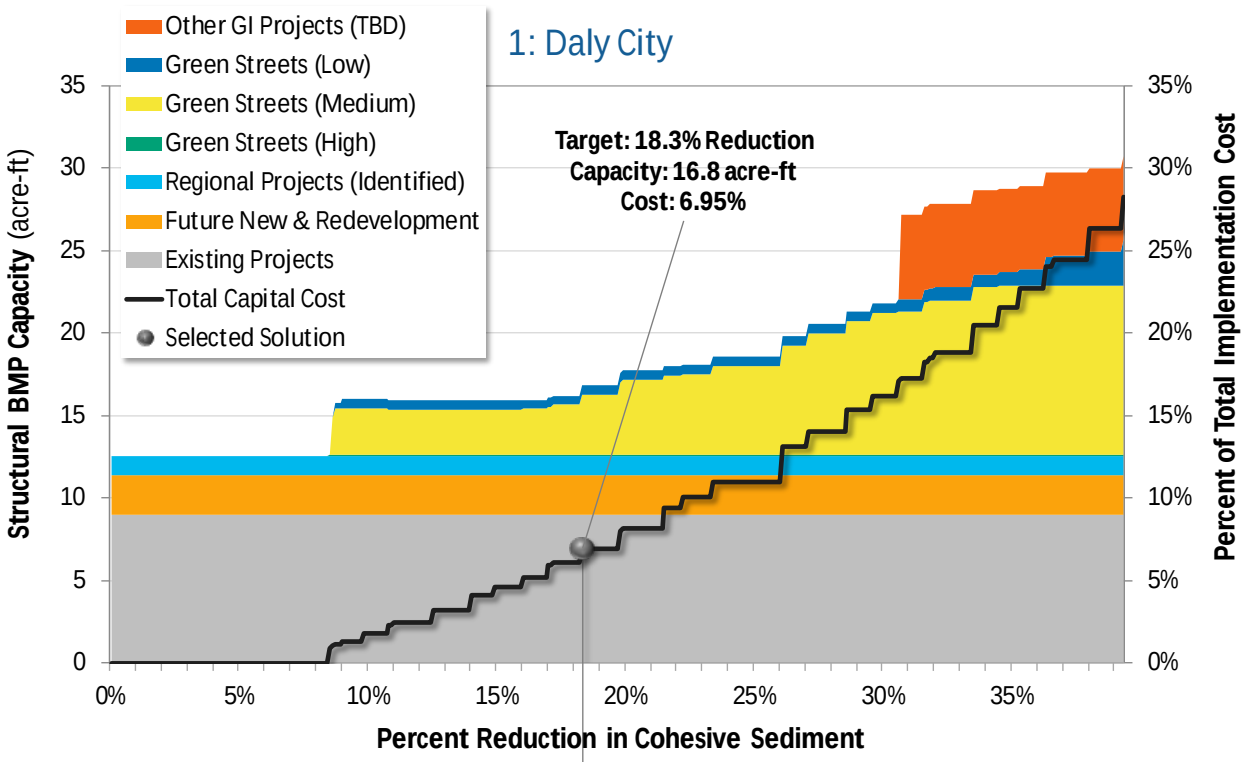

Figure C-11. Optimization summary for Daly City - Scenario 1.

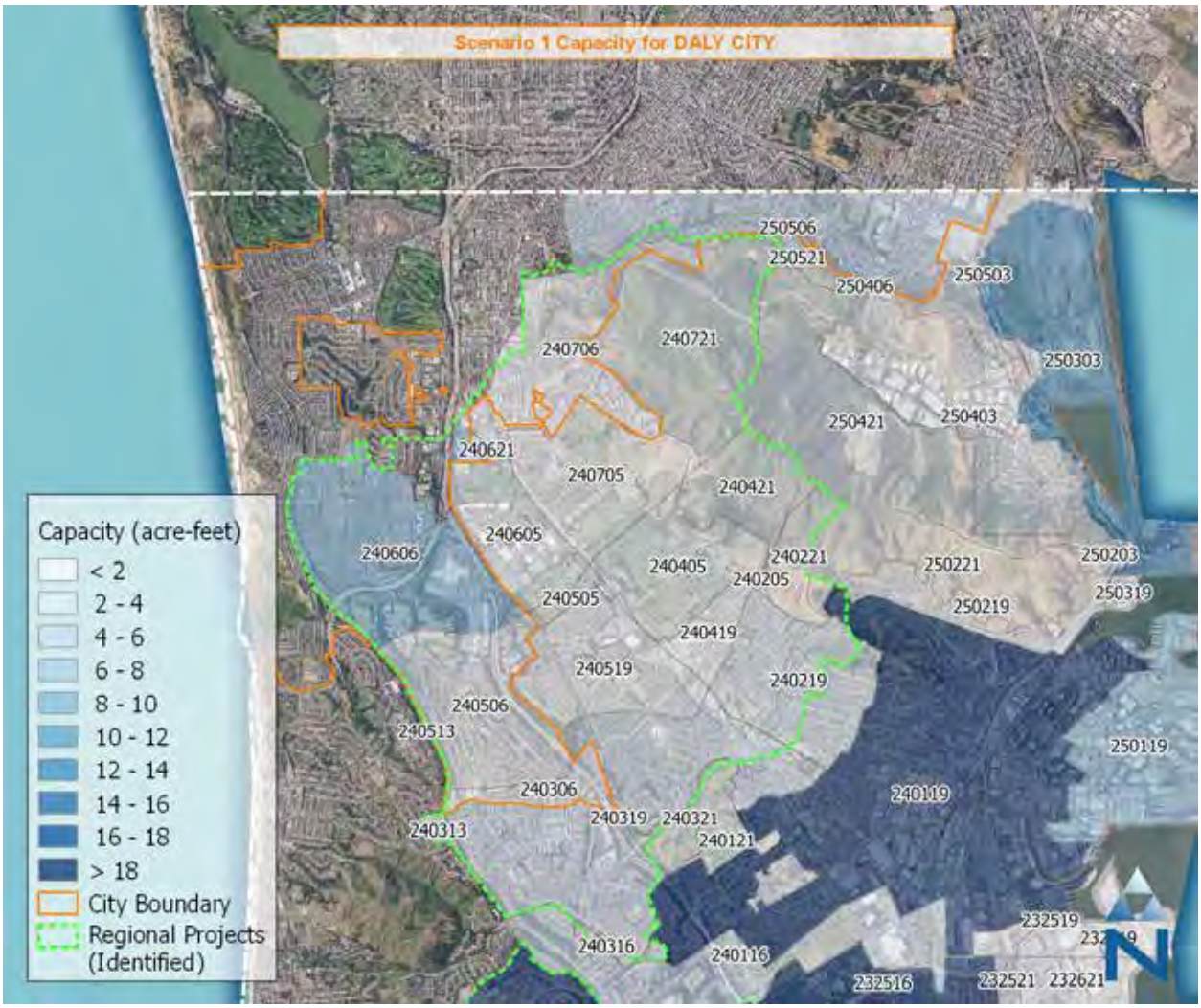

Figure C-12. Map of GI capacities by subwatershed in Daly City - Scenario 1.

Table C-6. GI Implementation Strategy for Daly City - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
240306	24%	30.97	2.80	--	0.05	0.07	--	0.28	--	--	**0.4**
240506	19%	98.89	11.24	0.83	0.00	0.29	--	0.50	--	--	**1.6**
240606	16%	132.12	48.08	7.67	0.30	0.48	--	--	--	--	**8.5**
240706	19%	112.03	12.74	0.24	0.27	0.33	0.06	0.12	--	--	**1.0**
250406	7%	0.00	0.00	--	0.00	--	--	--	--	0.00	**0.0**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
250506	47%	6.33	95.89	0.25	1.75	0.01	--	2.78	0.56	--	**5.3**
Total	**18.3%**	**380.3**	**170.7**	**9.0**	**2.4**	**1.2**	**0.1**	**3.7**	**0.6**	**0.0**	**16.8**

07988
8029

East Palo Alto

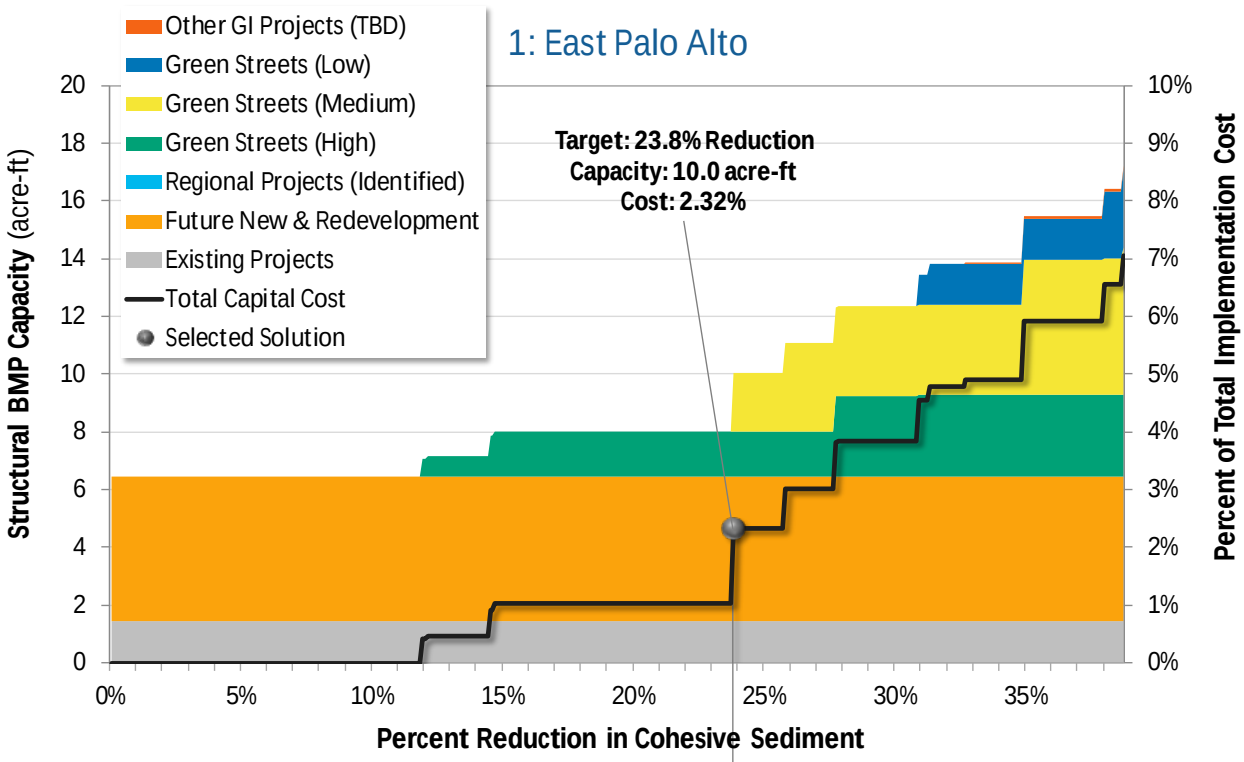

Figure C-13. Optimization summary for East Palo Alto - Scenario 1.

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8030

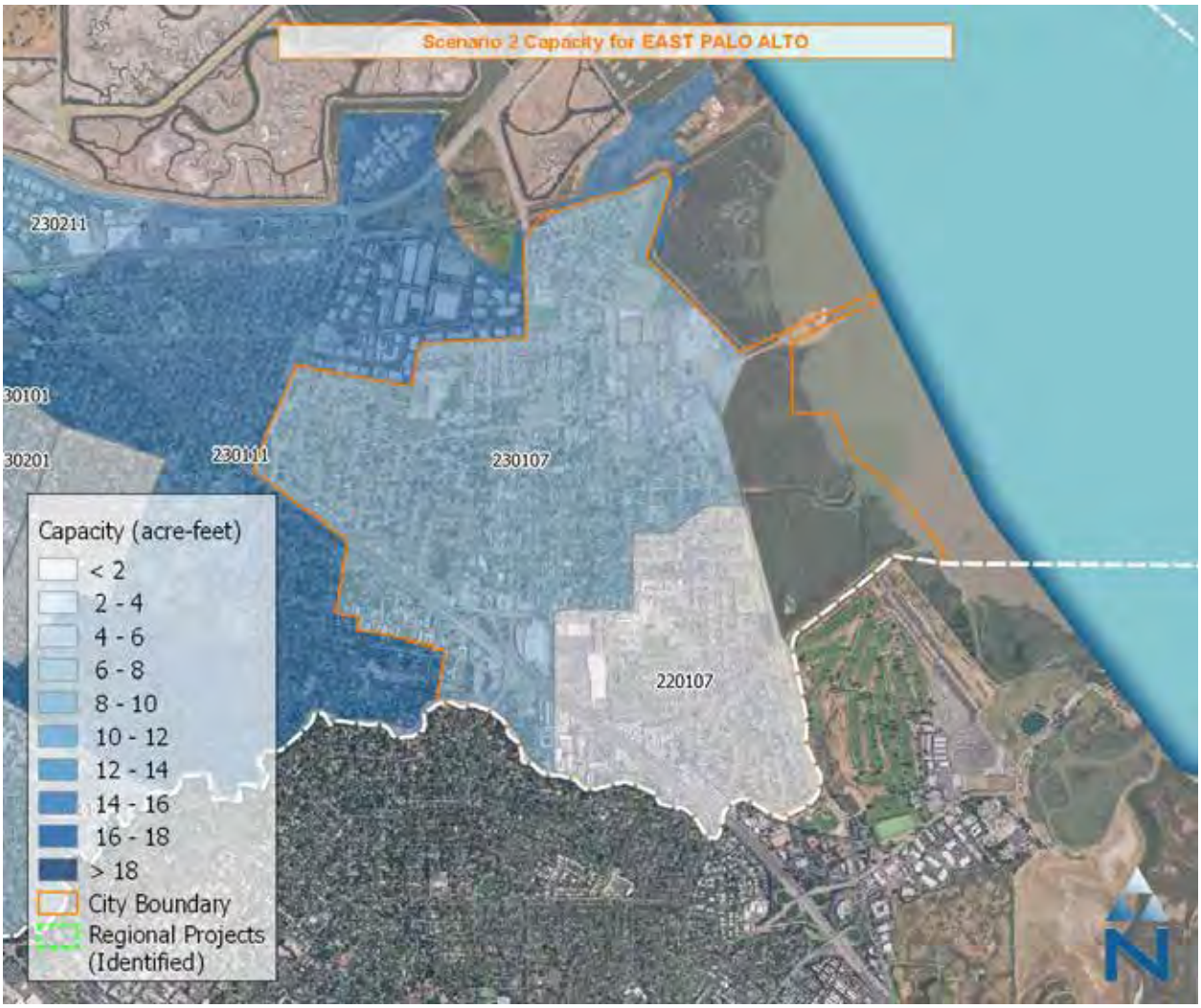

Figure C-14. Map of GI capacities by subwatershed in East Palo Alto - Scenario 1.

Table C-7. GI Implementation Strategy for East Palo Alto - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
220107	15%	22.86	22.61	0.23	0.33	--	1.24	--	--	--	**1.8**
230107	28%	82.90	88.13	1.23	4.67	--	0.33	2.00	--	--	**8.2**
Total	**23.7%**	**105.8**	**110.7**	**1.5**	**5.0**	**--**	**1.6**	**2.0**	**--**	**--**	**10.0**

Foster City

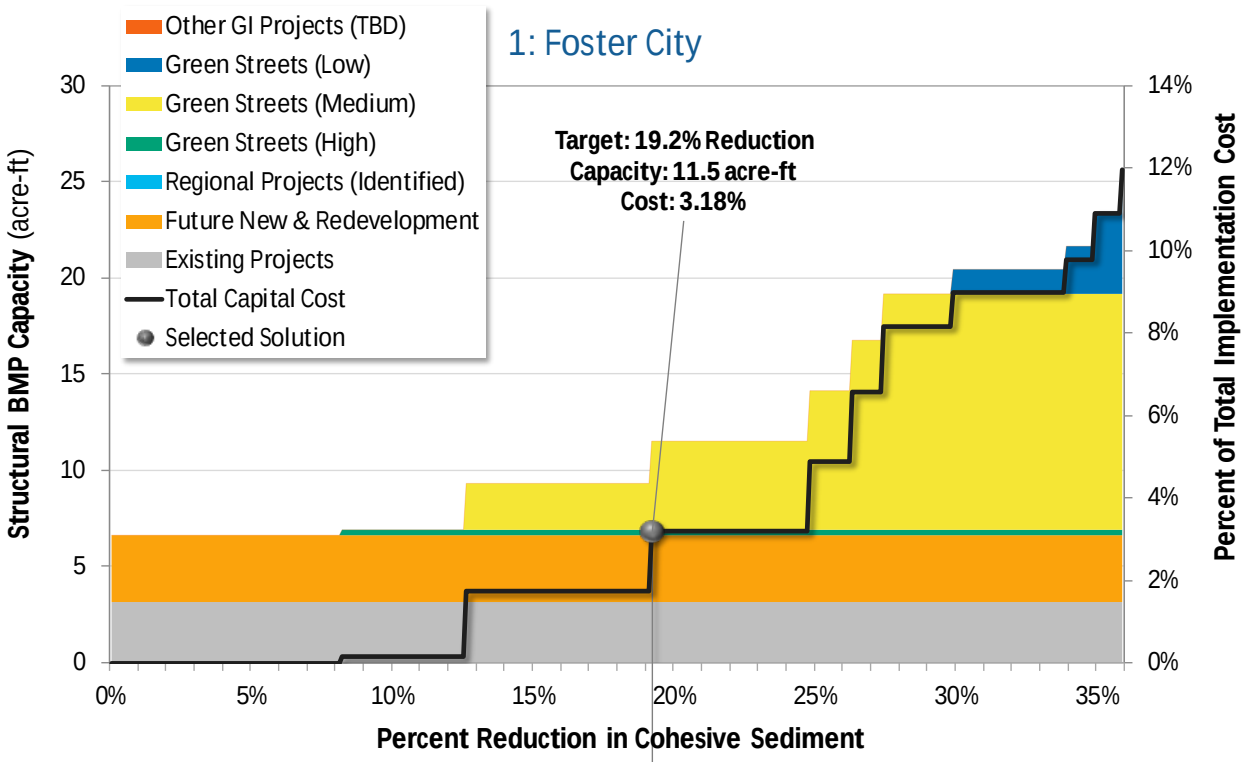

Figure C-15. Optimization summary for Foster City - Scenario 1.

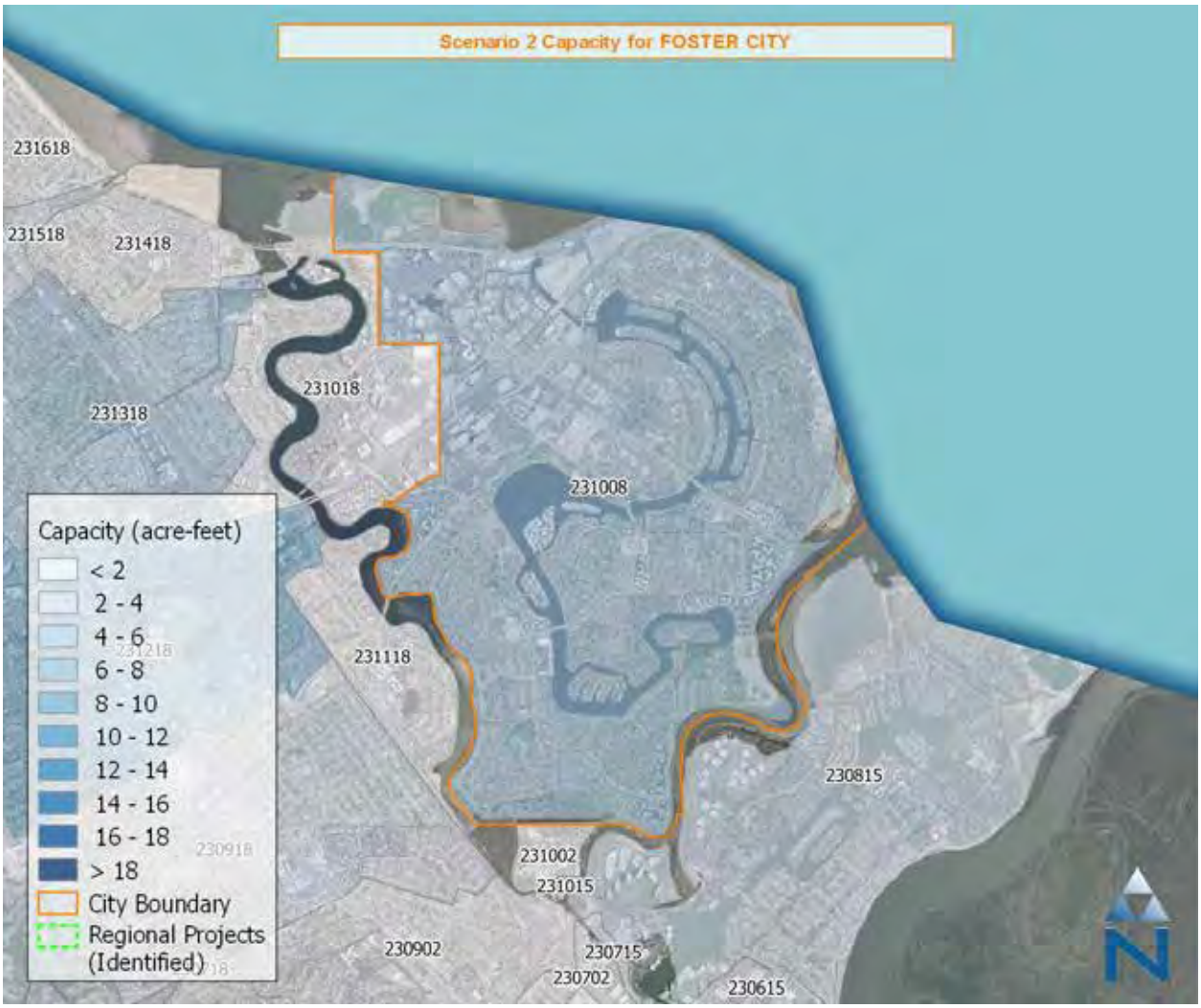

Figure C-16. Map of GI capacities by subwatershed in Foster City - Scenario 1.

Table C-8. GI Implementation Strategy for Foster City - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
231008	19%	173.71	134.79	3.16	3.49	--	0.27	4.61	--	--	**11.5**
Total	**19.1%**	**173.7**	**134.8**	**3.2**	**3.5**	**--**	**0.3**	**4.6**	**--**	**--**	**11.5**

Hillsborough

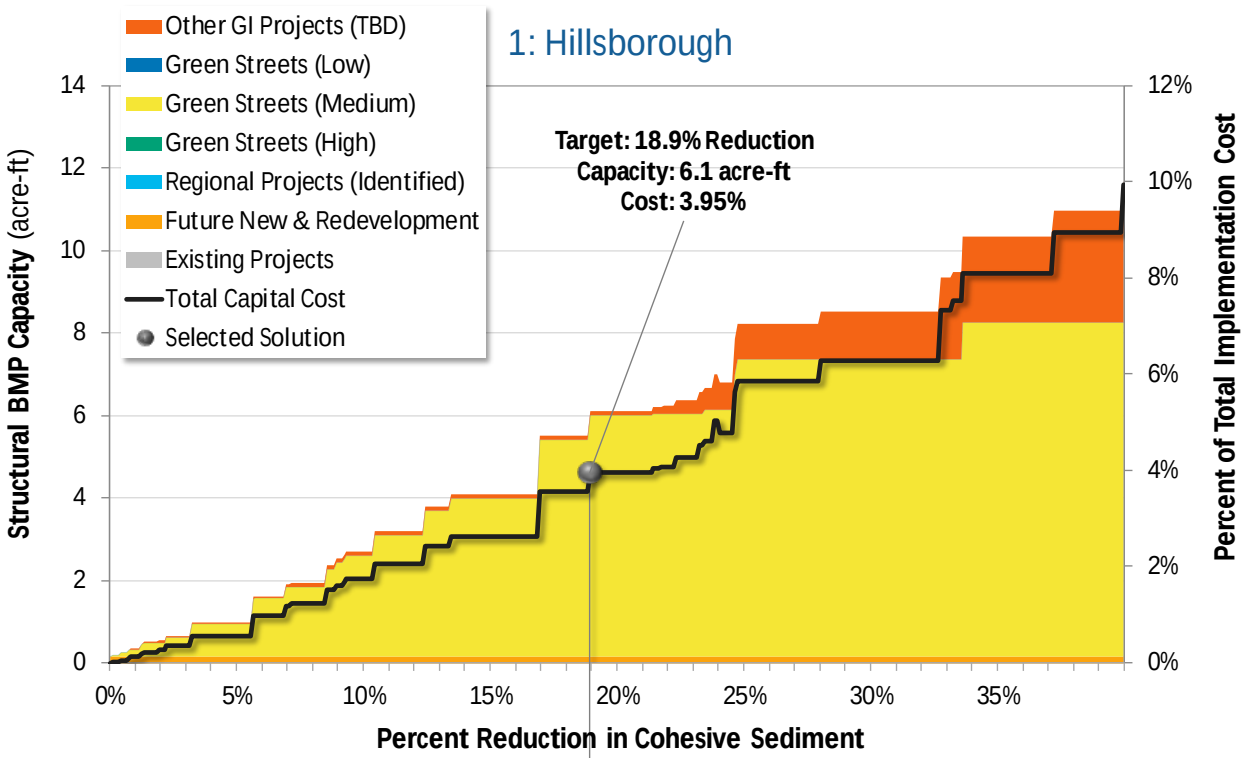

Figure C-17. Optimization summary for Hillsborough - Scenario 1.

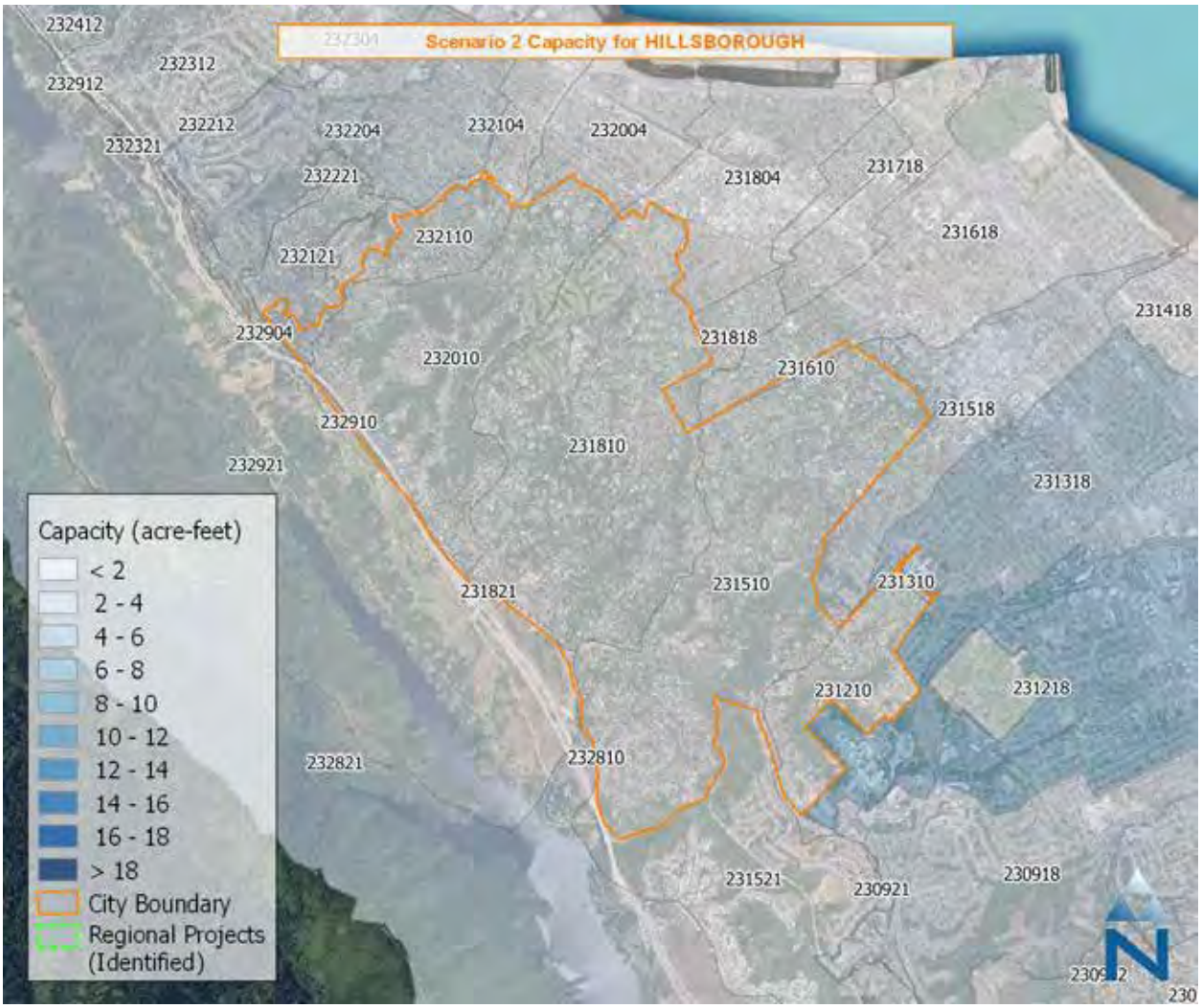

Figure C-18. Map of GI capacities by subwatershed in Hillsborough - Scenario 1.

Table C-9. GI Implementation Strategy for Hillsborough - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
231210	25%	5.97	7.79	--	0.02	--	--	0.21	--	0.04	**0.3**
231310	29%	0.48	0.30	--	0.00	--	--	0.05	--	--	**0.0**
231510	23%	25.43	8.93	--	0.07	--	--	1.33	--	--	**1.4**
231610	44%	0.34	0.29	--	0.00	--	--	0.01	--	0.00	**0.0**
231810	15%	61.79	23.42	0.00	0.06	--	--	3.07	--	--	**3.1**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232010	23%	17.15	4.68	0.00	0.01	--	--	0.76	--	--	**0.8**
232110	25%	5.42	2.01	--	0.01	--	--	0.39	--	--	**0.4**
232810	36%	0.06	0.03	--	0.00	--	--	0.00	--	0.00	**0.0**
232910	43%	1.45	0.25	--	0.00	--	--	0.03	--	0.05	**0.1**
Total	**18.9%**	**118.1**	**47.7**	**0.0**	**0.2**	**--**	**--**	**5.8**	**--**	**0.1**	**6.1**

Menlo Park

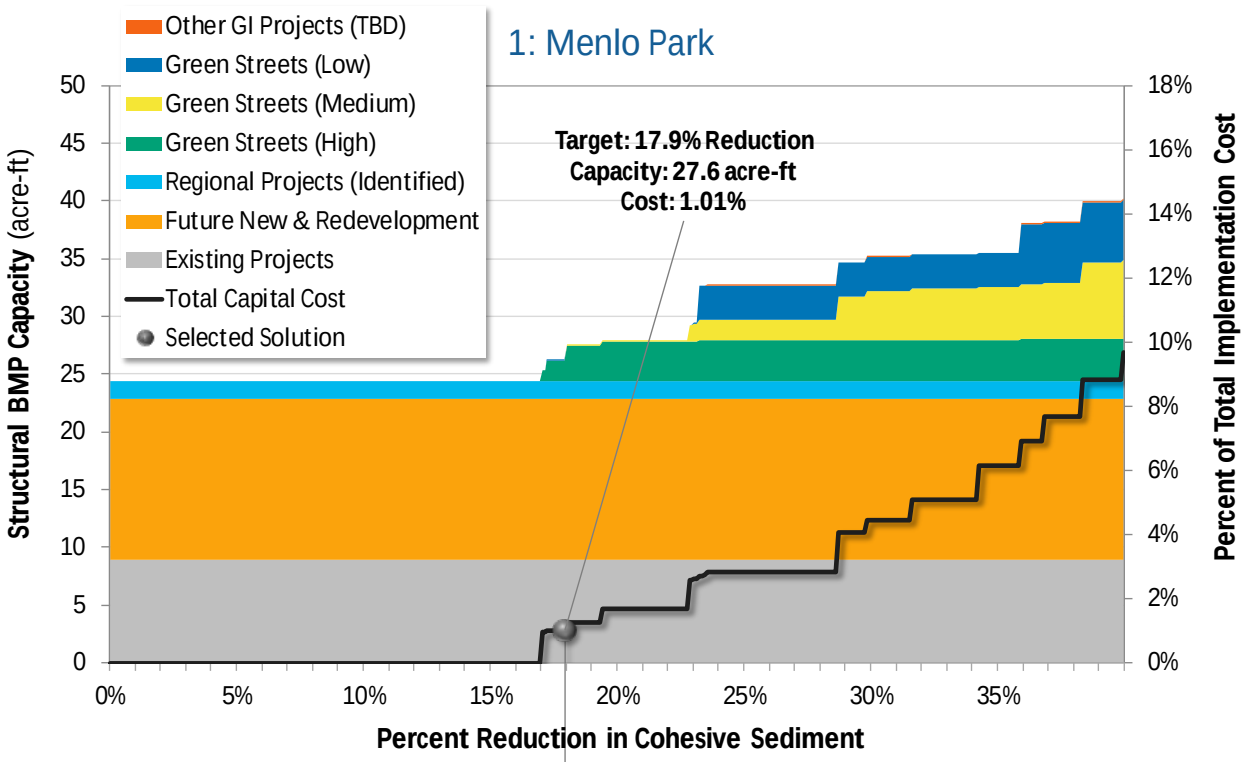

Figure C-19. Optimization summary for Menlo Park - Scenario 1.

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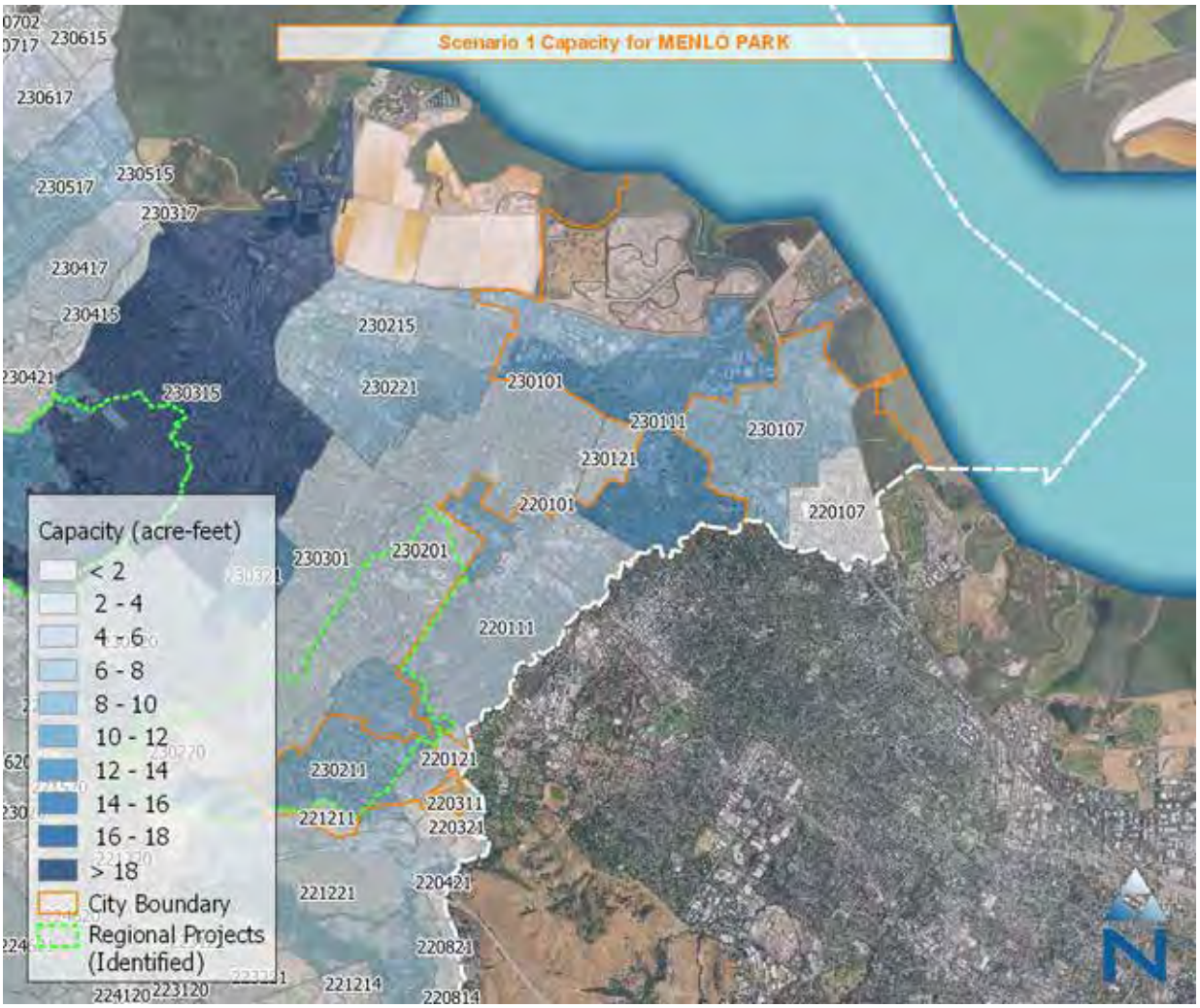

Figure C-20. Map of GI capacities by subwatershed in Menlo Park - Scenario 1.

Table C-10. GI Implementation Strategy for Menlo Park - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
220111	23%	1.26	26.11	1.12	1.12	0.03	2.19	0.08	--	--	**4.5**
220311	13%	1.10	0.27	--	--	--	--	0.03	0.05	--	**0.1**
221211	15%	0.50	4.22	0.86	0.10	0.02	--	--	--	--	**1.0**
230111	19%	69.81	94.39	4.81	7.32	--	--	--	--	--	**12.1**
230211	17%	37.95	80.00	2.10	5.41	1.50	0.91	--	--	--	**9.9**
Total	**17.9%**	**110.6**	**205.0**	**8.9**	**13.9**	**1.6**	**3.1**	**0.1**	**0.0**	**--**	**27.6**

Millbrae

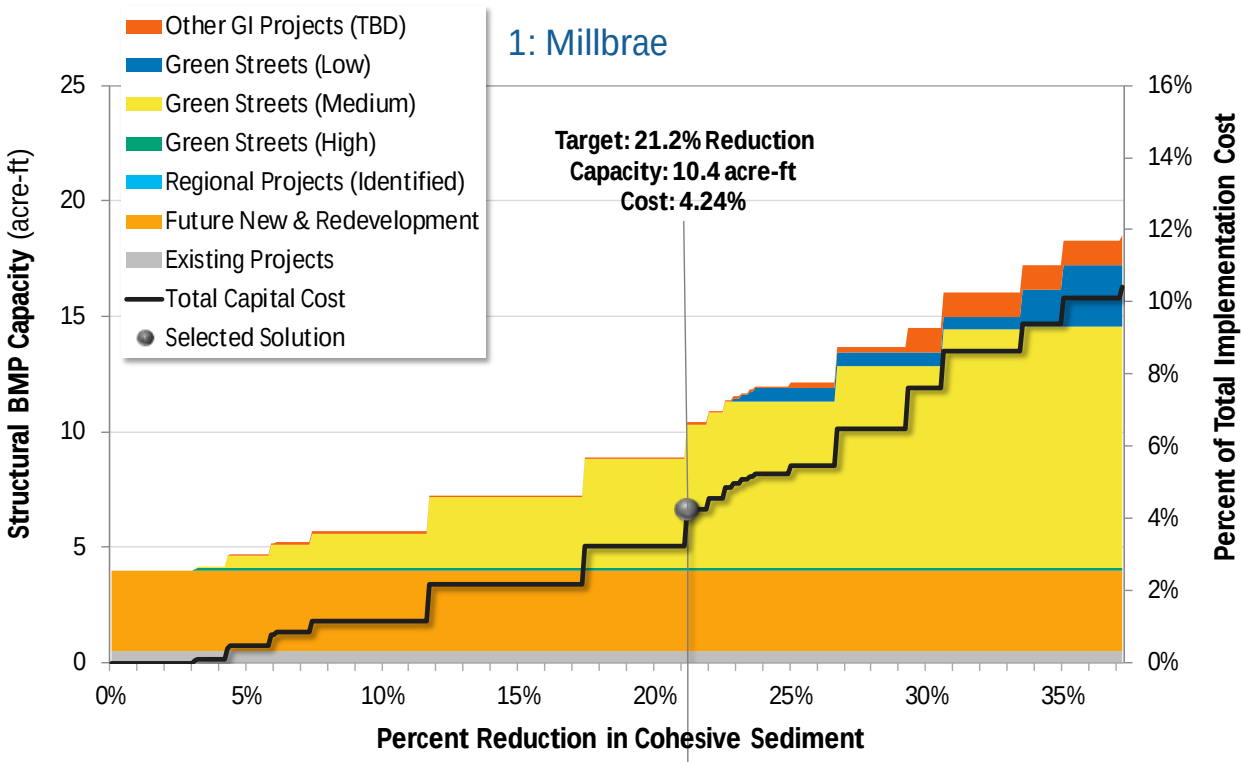

Figure C-21. Optimization summary for Millbrae - Scenario 1.

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8039

Figure C-22. Map of GI capacities by subwatershed in Millbrae - Scenario 1.

Table C-11. GI Implementation Strategy for Millbrae - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232212	75%	1.55	0.66	--	0.00	--	--	0.06	--	0.05	**0.1**
232312	16%	42.40	27.21	0.23	0.68	--	--	1.44	--	--	**2.4**
232412	23%	146.83	92.11	0.28	2.76	--	0.09	4.72	--	--	**7.8**
232512	46%	0.09	0.02	--	0.00	--	--	--	0.00	0.00	**0.0**
232612	59%	0.99	0.76	--	0.04	--	--	0.01	--	0.03	**0.1**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232912	53%	0.15	0.04	--	0.00	--	--	--	--	0.01	**0.0**
Total	**21.2%**	**192.0**	**120.8**	**0.5**	**3.5**	**--**	**0.1**	**6.2**	**0.0**	**0.1**	**10.4**

Pacifica

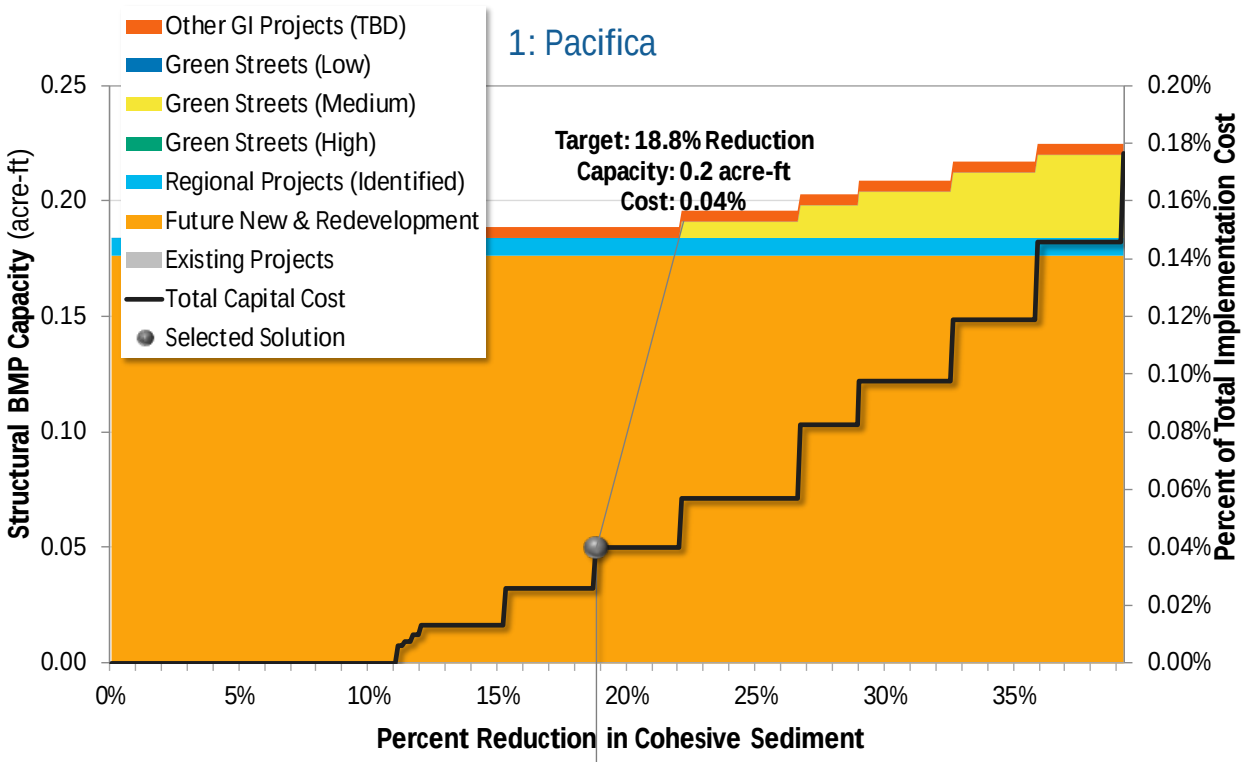

Figure C-23. Optimization summary for Pacifica - Scenario 1.

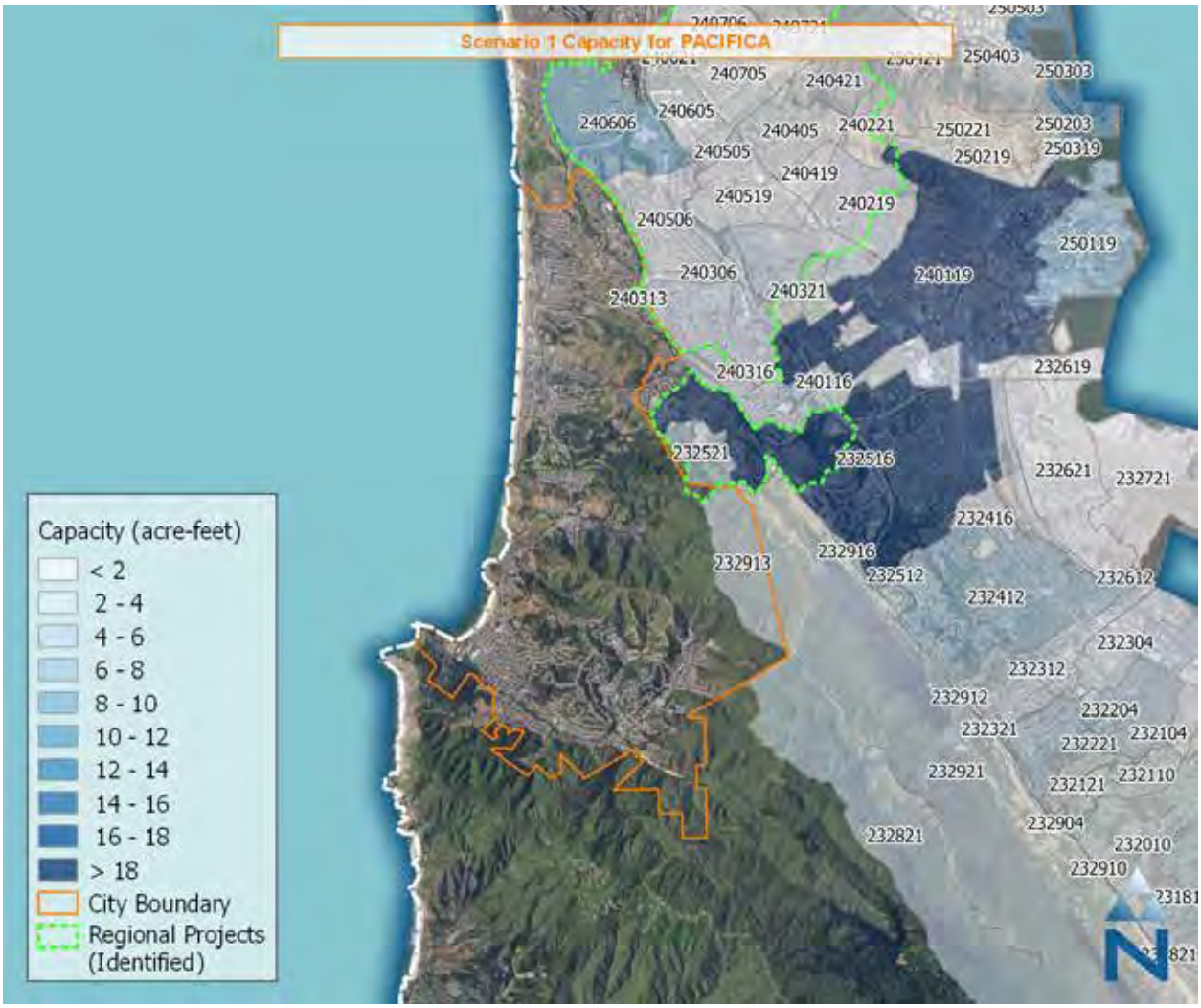

Figure C-24. Map of GI capacities by subwatershed in Pacifica - Scenario 1.

Table C-12. GI Implementation Strategy for Pacifica - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232913	90%	0.26	0.01	--	0.14	--	--	--	--	--	**0.1**
240313	16%	2.14	0.30	--	0.03	0.01	--	--	--	--	**0.0**
240513	34%	0.12	0.02	--	0.01	--	--	--	--	0.00	**0.0**
Total	**18.8%**	**2.5**	**0.3**	**--**	**0.2**	**0.0**	**--**	**--**	**--**	**0.0**	**0.2**

Portola Valley

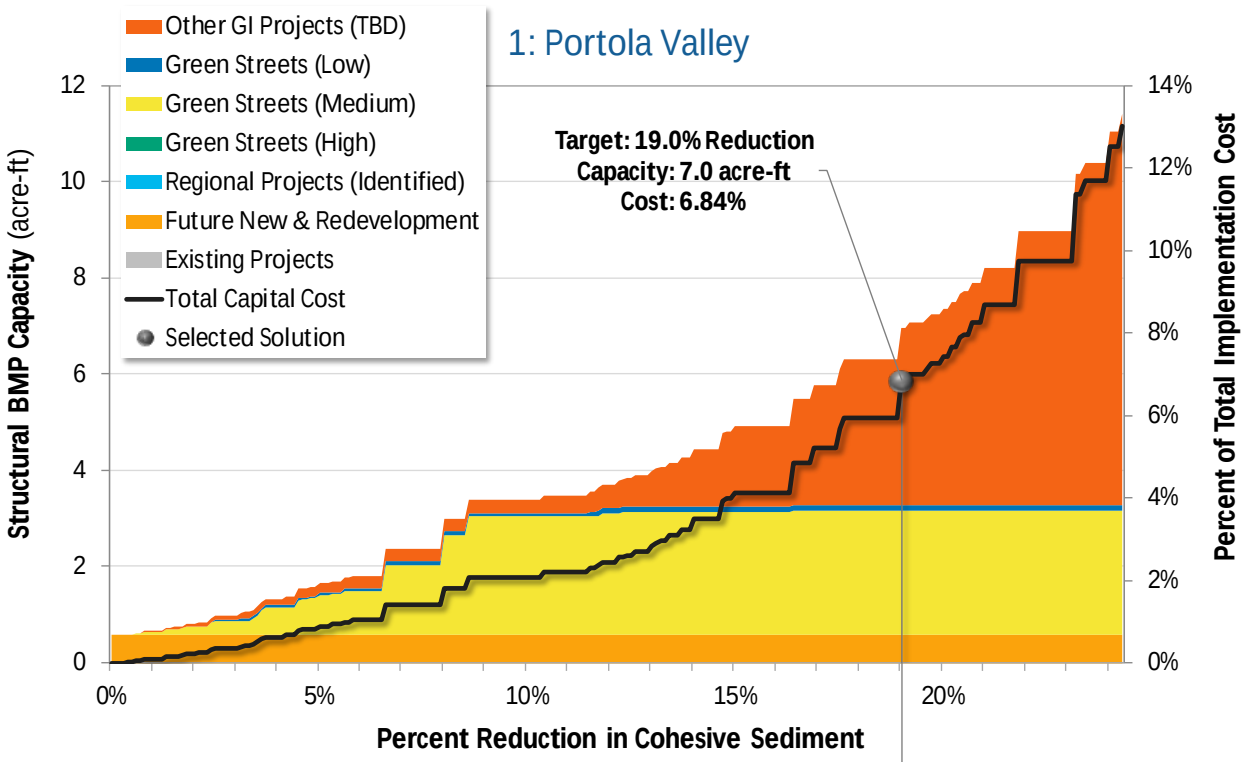

Figure C-25. Optimization summary for Portola Valley - Scenario 1.

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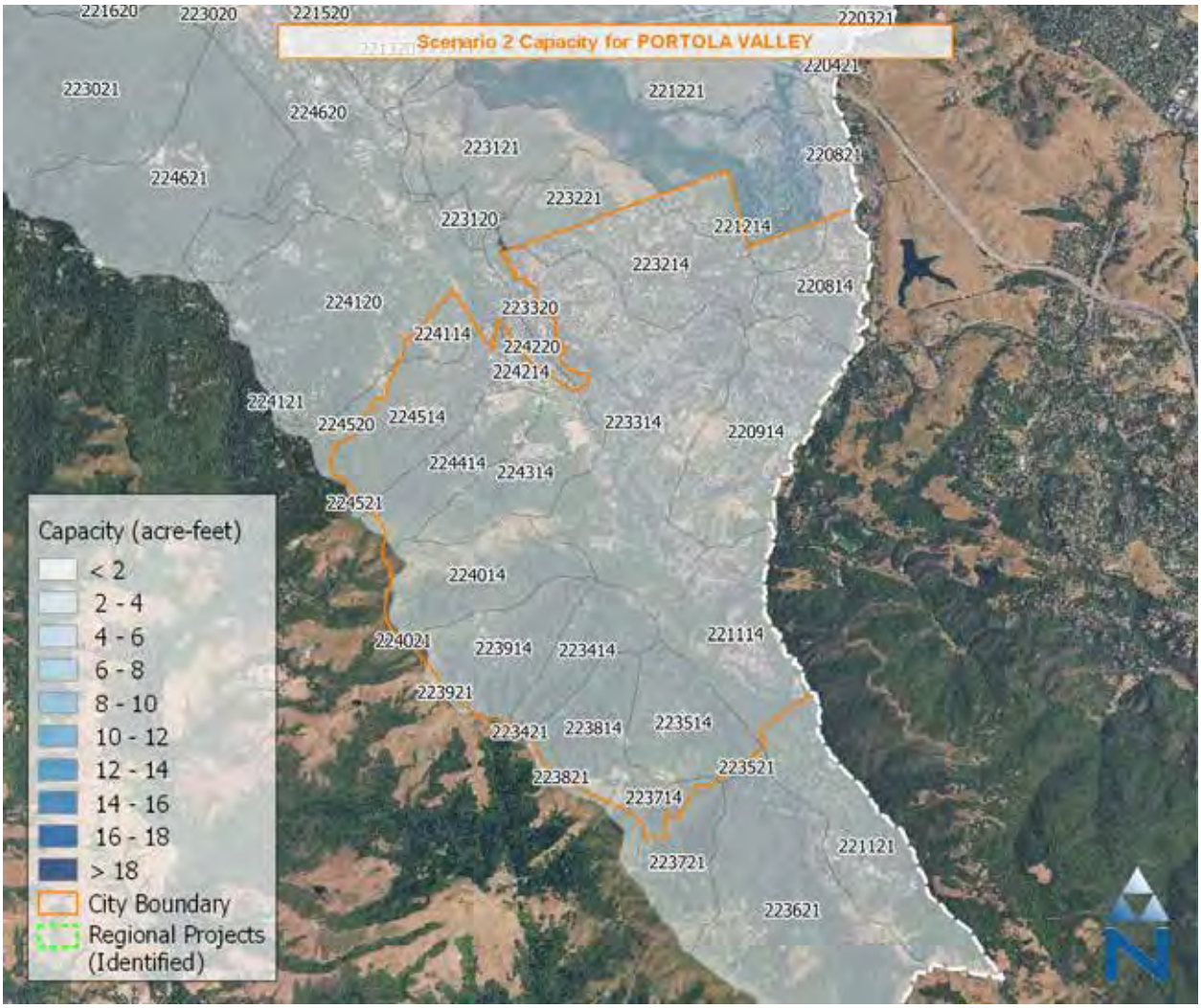

Figure C-26. Map of GI capacities by subwatershed in Portola Valley - Scenario 1.

Table C-13. GI Implementation Strategy for Portola Valley - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
220814	14%	7.21	0.64	--	0.05	--	--	0.11	0.05	0.24	**0.4**
220914	32%	34.57	4.85	--	0.01	--	--	0.77	0.05	0.91	**1.7**
221114	20%	5.77	0.20	--	0.01	--	--	0.05	0.00	0.22	**0.3**
221214	6%	2.38	0.30	--	0.13	--	--	0.04	--	0.05	**0.2**
223214	10%	8.61	1.56	--	0.13	--	--	0.16	--	0.29	**0.6**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
223314	22%	44.10	5.06	--	0.16	--	--	1.03	--	0.98	**2.2**
223414	15%	0.16	0.00	--	0.01	--	--	--	--	0.01	**0.0**
223514	10%	0.19	0.00	--	0.01	--	--	0.00	--	0.00	**0.0**
223714	11%	0.02	0.00	--	0.00	--	--	--	--	0.00	**0.0**
223814	10%	0.08	0.00	--	0.01	--	--	--	--	0.00	**0.0**
223914	28%	0.53	0.00	--	0.01	--	--	--	--	0.07	**0.1**
224014	99%	0.02	0.00	--	0.01	--	--	--	--	--	**0.0**
224114	6%	0.23	0.00	--	0.00	--	--	--	--	0.02	**0.0**
224214	41%	9.43	1.35	--	0.00	--	--	0.15	--	0.49	**0.6**
224314	32%	9.87	1.89	--	0.01	--	--	0.16	--	0.33	**0.5**
224414	21%	0.61	0.09	--	0.01	--	--	--	--	0.06	**0.1**
224514	9%	6.15	0.24	--	0.01	--	--	0.12	--	0.02	**0.2**
Total	**19.0%**	**129.9**	**16.2**	**--**	**0.6**	**--**	**--**	**2.6**	**0.1**	**3.7**	**7.0**

Redwood City

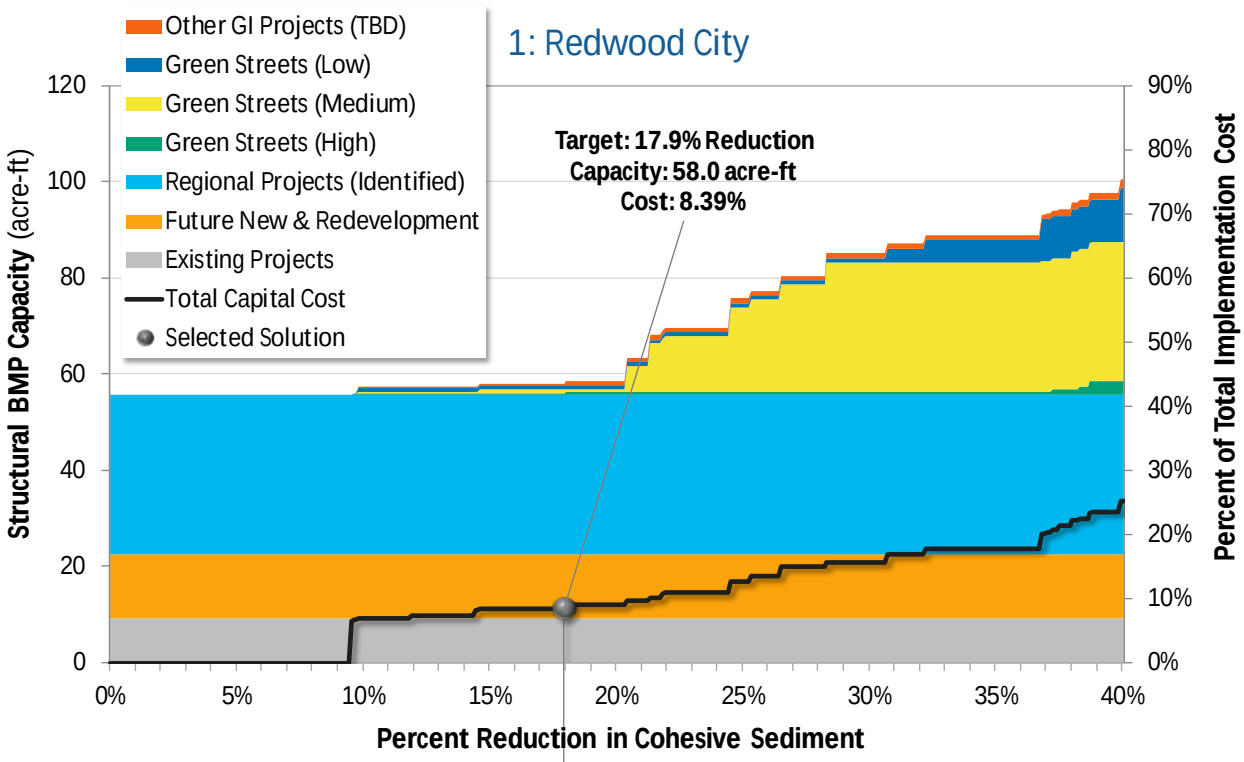

Figure C-27. Optimization summary for Redwood City - Scenario 1.

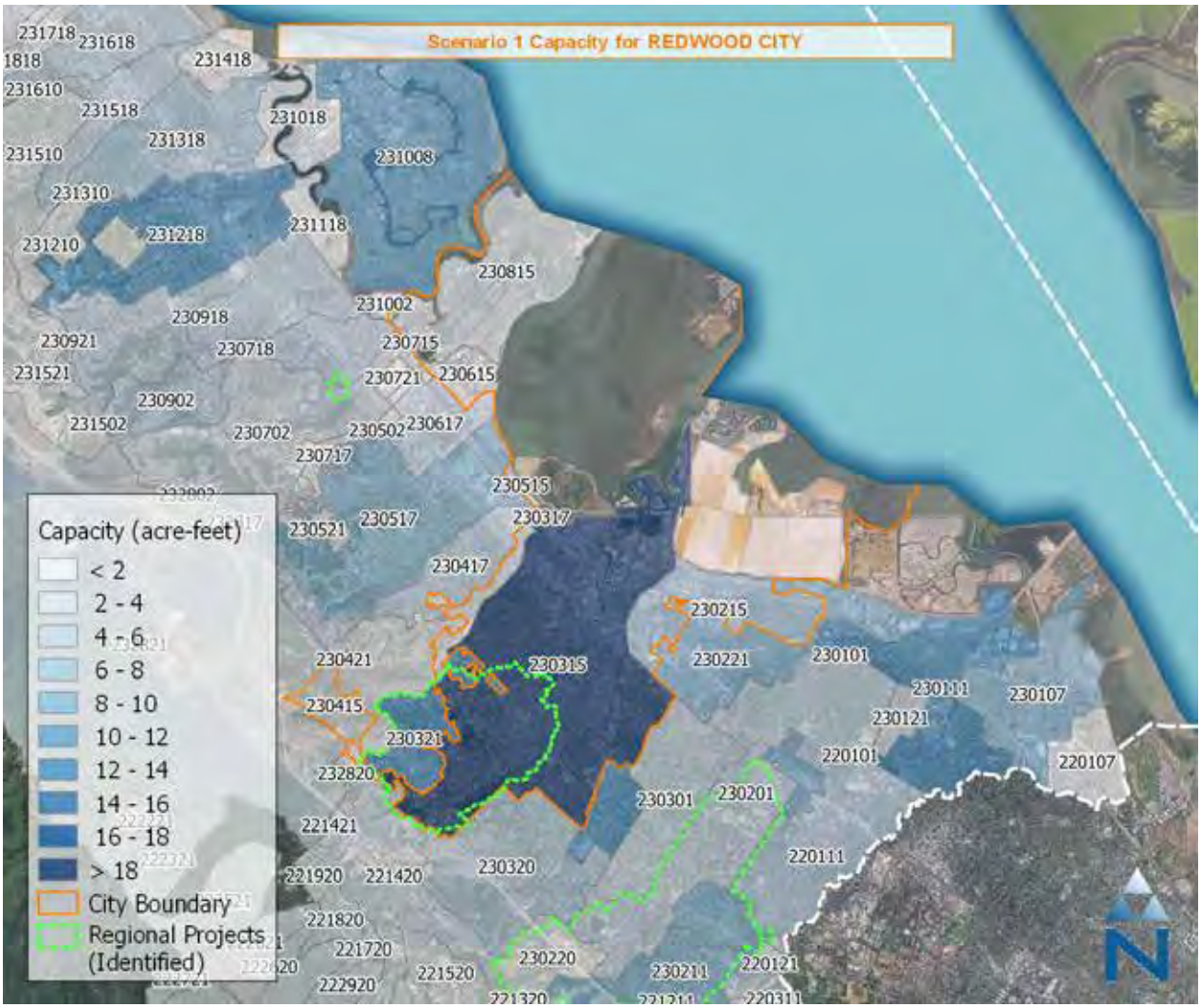

Figure C-28. Map of GI capacities by subwatershed in Redwood City - Scenario 1.

Table C-14. GI Implementation Strategy for Redwood City - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
221415	52%	0.03	0.00	--	--	0.00	--	--	--	0.00	**0.0**
230215	15%	64.02	98.10	3.15	4.12	--	--	--	--	--	**7.3**
230315	20%	295.42	135.21	4.76	8.25	32.97	0.26	--	--	--	**46.2**
230415	49%	1.23	8.46	0.45	0.14	0.06	0.23	0.06	0.82	0.24	**2.0**
230515	15%	0.25	0.13	--	0.01	--	--	--	--	0.01	**0.0**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
230615	13%	13.33	16.72	0.04	0.29	--	--	0.61	--	--	**0.9**
230715	9%	0.49	0.27	--	0.02	--	0.02	0.00	--	--	**0.0**
230815	3%	11.28	12.79	0.76	0.52	--	0.01	--	--	--	**1.3**
231015	21%	0.21	0.31	--	0.01	--	--	--	--	0.01	**0.0**
232815	52%	2.14	0.92	--	0.00	0.09	--	0.08	--	0.05	**0.2**
Total	**17.9%**	**388.4**	**272.9**	**9.2**	**13.4**	**33.1**	**0.5**	**0.8**	**0.8**	**0.3**	**58.0**

San Bruno

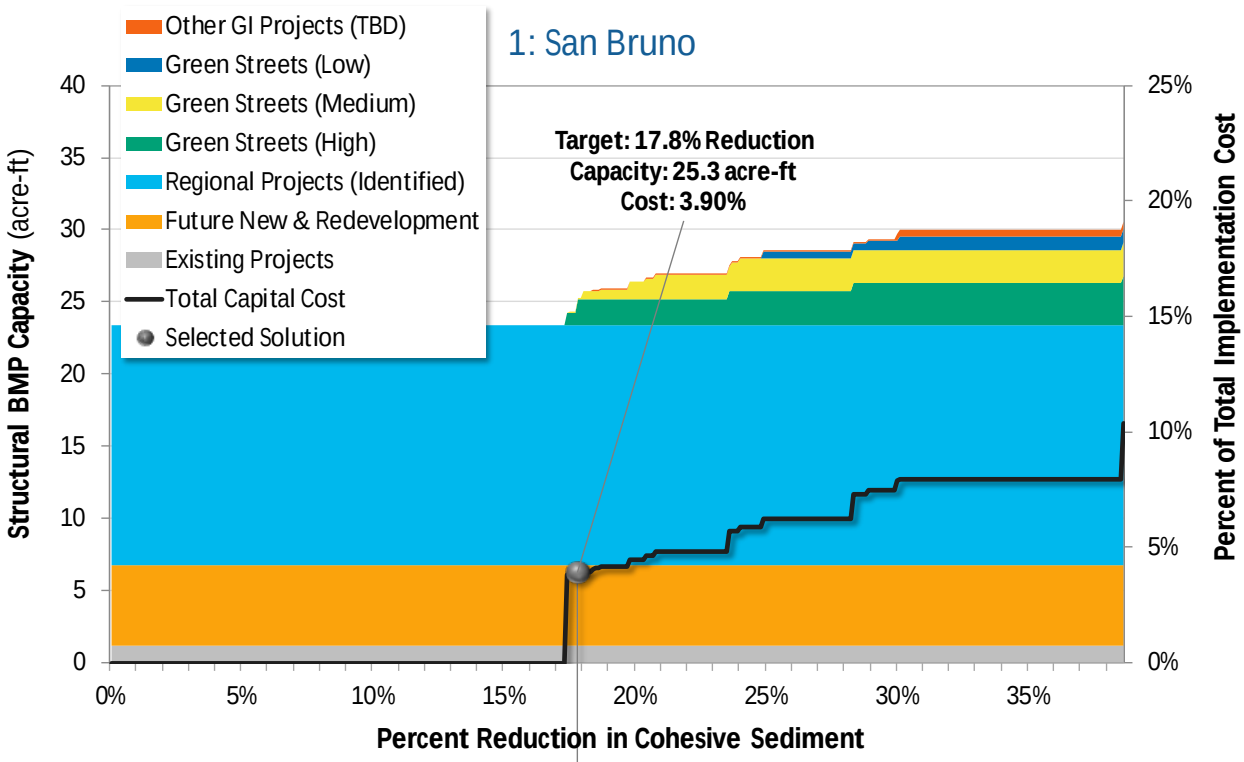

Figure C-29. Optimization summary for San Bruno - Scenario 1.

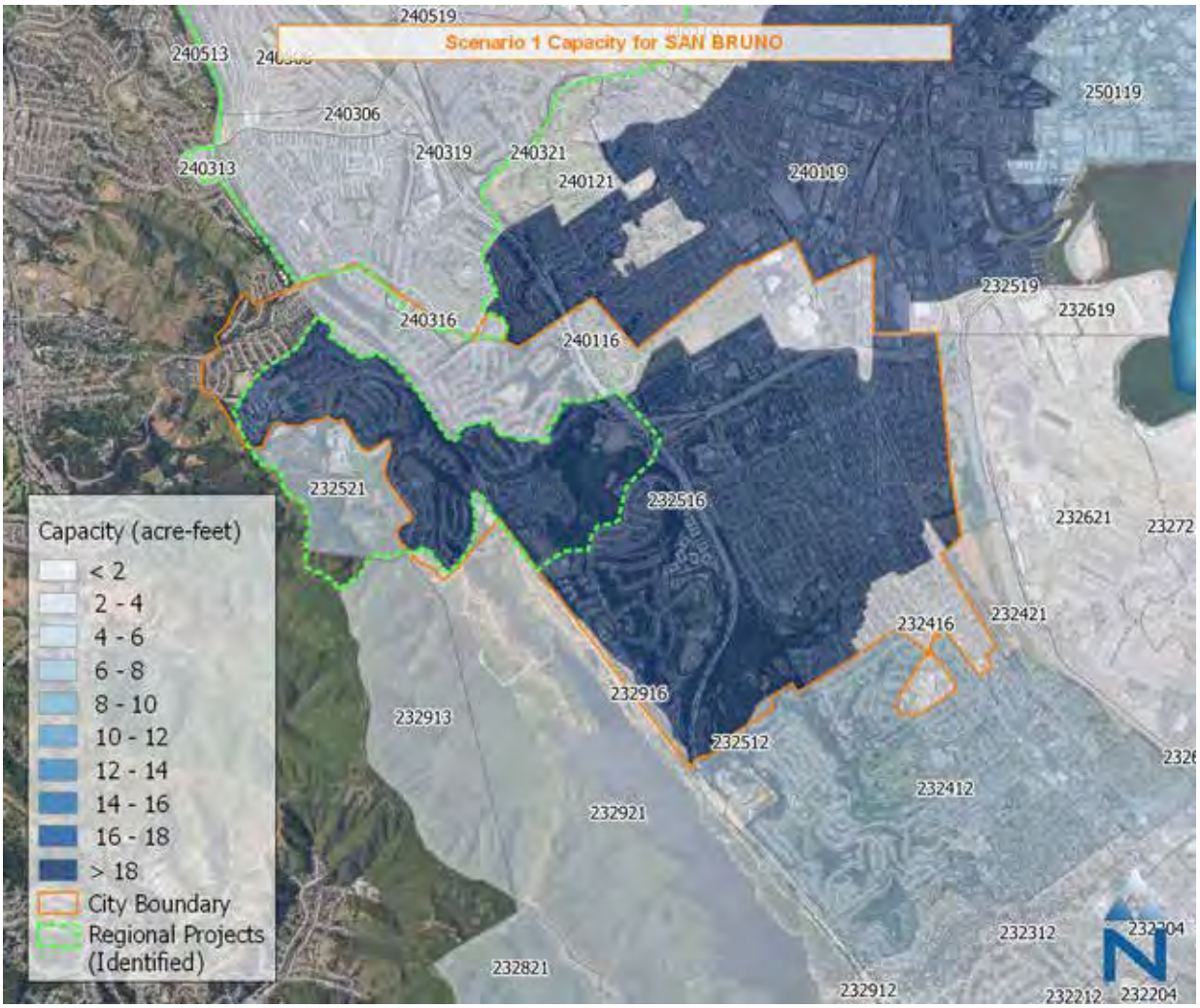

Figure C-30. Map of GI capacities by subwatershed in San Bruno - Scenario 1.

Table C-15. GI Implementation Strategy for San Bruno - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232416	4%	5.10	6.56	--	0.62	--	--	--	--	--	**0.6**
232516	20%	191.40	118.47	0.84	4.08	16.65	0.55	--	--	--	**22.1**
232916	5%	1.67	1.60	--	0.00	--	--	0.07	--	--	**0.1**
240116	16%	1.53	40.32	--	0.82	0.01	1.22	--	--	--	**2.0**
240316	19%	2.68	1.72	0.40	0.00	0.01	--	0.02	--	--	**0.4**
Total	**17.8%**	**202.4**	**168.7**	**1.2**	**5.5**	**16.7**	**1.8**	**0.1**	**--**	**--**	**25.3**

San Carlos

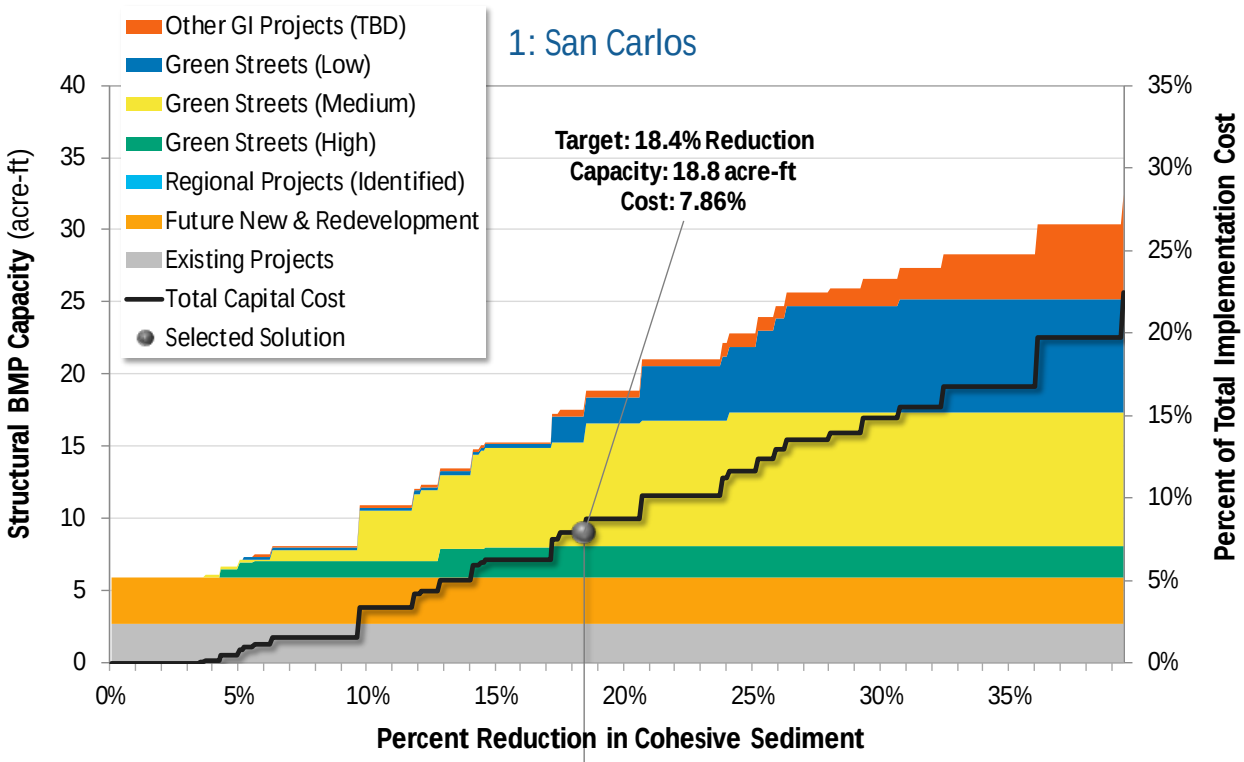

Figure C-31. Optimization summary for San Carlos - Scenario 1.

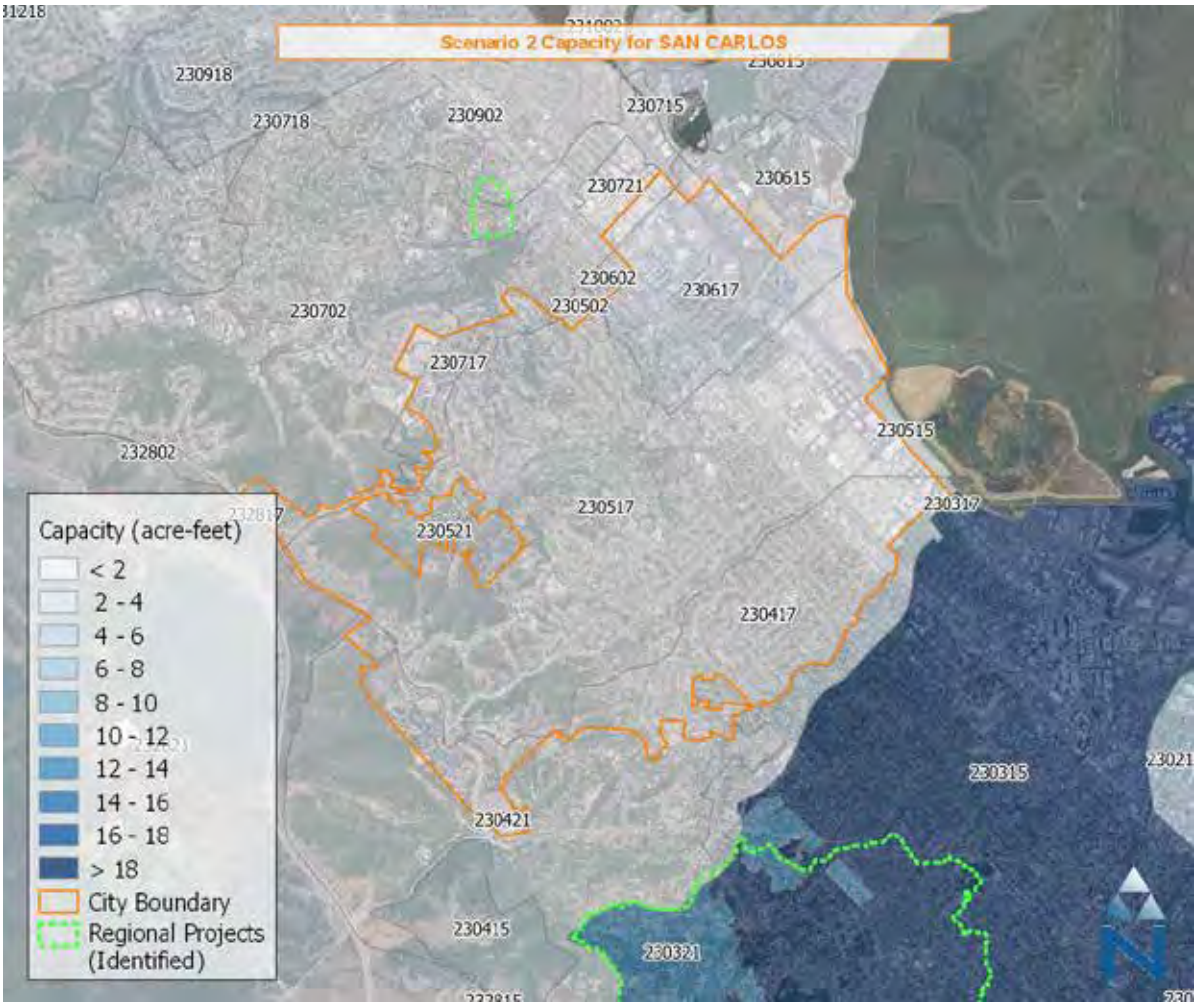

Figure C-32. Map of GI capacities by subwatershed in San Carlos - Scenario 1.

Table C-16. GI Implementation Strategy for San Carlos - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
230317	50%	0.57	0.64	--	0.00	--	--	--	--	0.03	**0.0**
230417	18%	96.09	45.38	0.14	0.66	--	2.10	0.77	1.65	--	**5.3**
230517	18%	148.34	113.07	0.44	1.33	--	0.01	6.67	--	--	**8.4**
230617	19%	46.58	57.92	2.01	1.11	--	0.03	0.87	--	--	**4.0**
230717	24%	16.43	19.16	0.10	0.11	--	0.03	0.17	0.20	0.39	**1.0**
232817	36%	0.39	0.13	--	--	--	--	--	--	0.02	**0.0**
Total	**18.4%**	**308.4**	**236.3**	**2.7**	**3.2**	**--**	**2.2**	**8.5**	**1.9**	**0.4**	**18.8**

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San Mateo

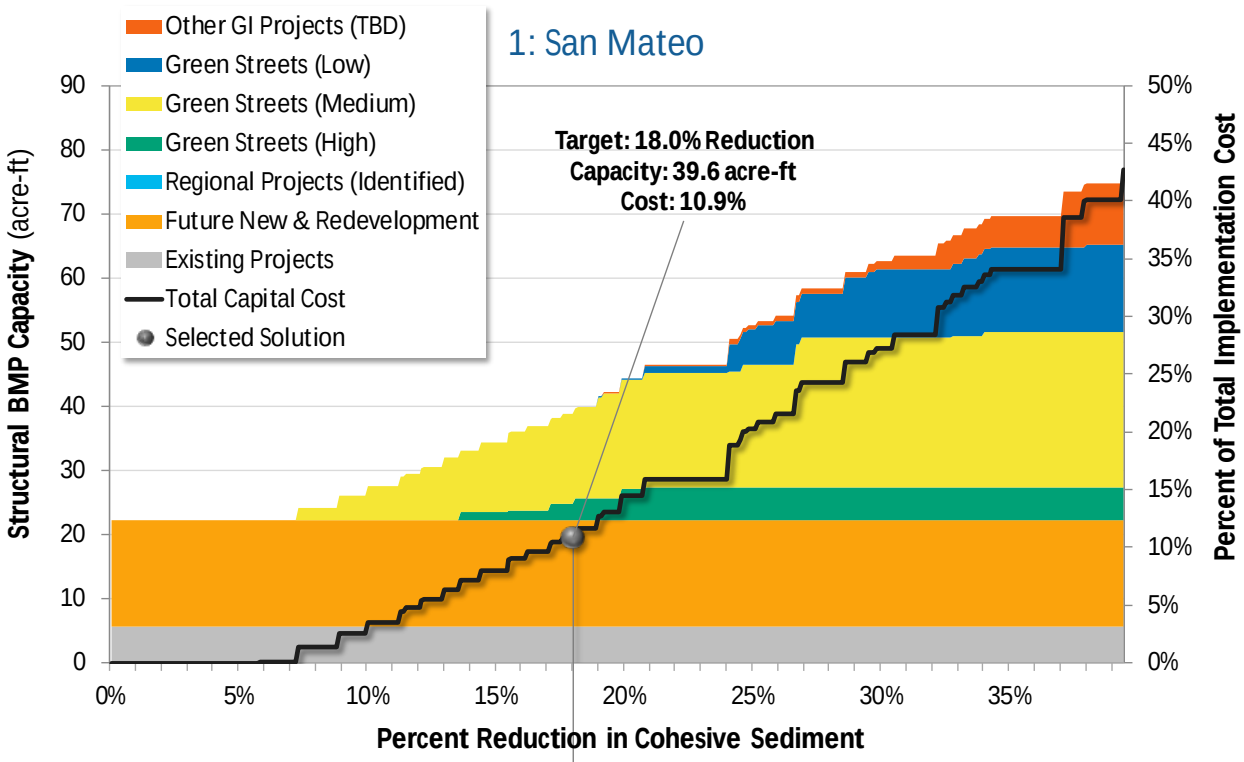

Figure C-33. Optimization summary for San Mateo - Scenario 1.

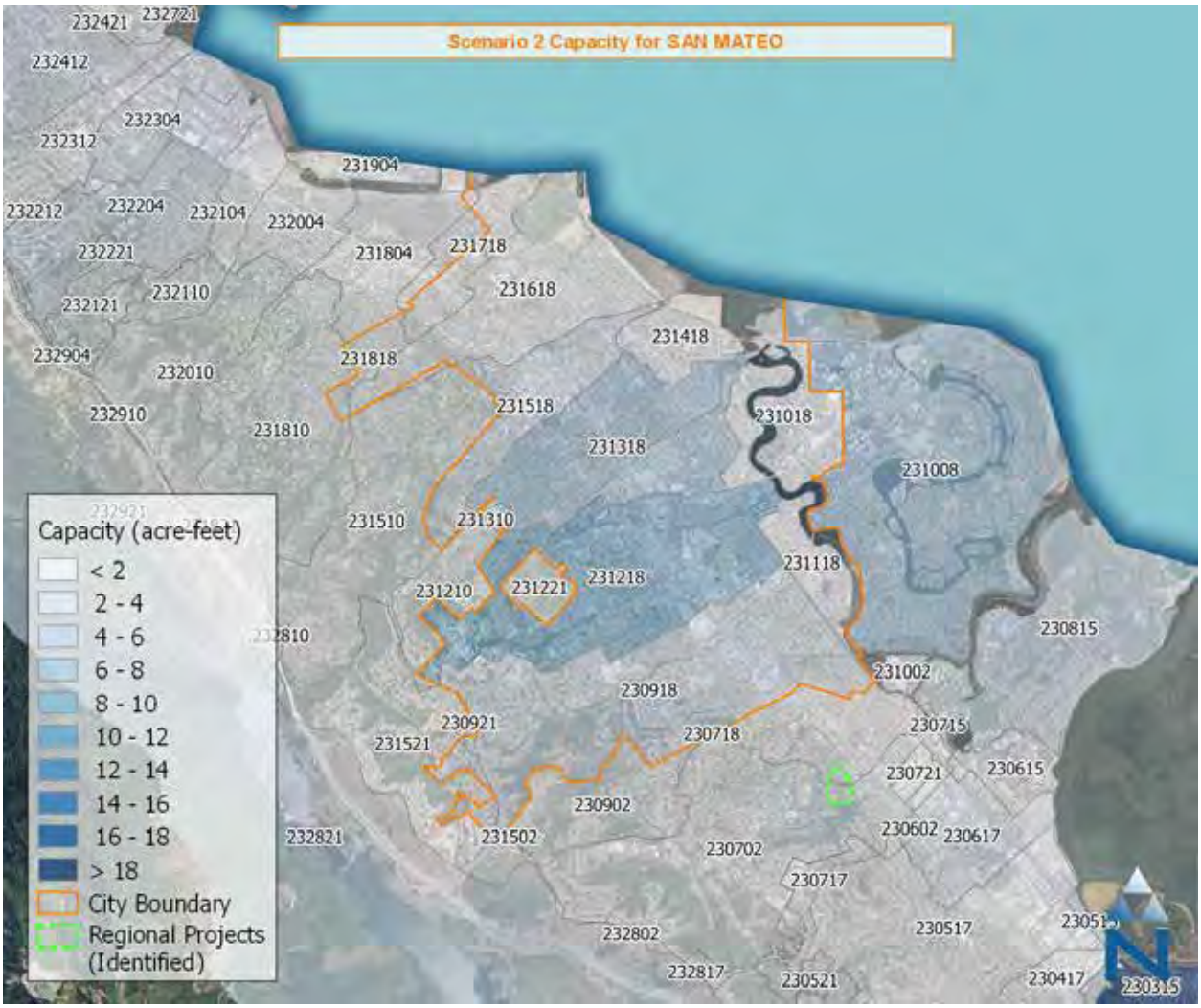

Figure C-34. Map of GI capacities by subwatershed in San Mateo - Scenario 1.

Table C-17. GI Implementation Strategy for San Mateo - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
230718	44%	0.03	0.01	--	--	--	--	--	--	0.00	**0.0**
230918	12%	71.11	67.38	0.21	1.89	--	3.18	--	--	--	**5.3**
231018	10%	21.68	20.07	0.07	0.55	--	--	0.88	--	--	**1.5**
231118	7%	7.15	5.48	--	0.10	--	--	0.37	--	--	**0.5**
231218	24%	171.55	153.18	3.76	6.04	--	0.00	2.86	--	--	**12.7**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
231318	19%	116.56	80.36	1.08	3.54	--	0.12	2.48	--	--	**7.2**
231418	21%	20.59	13.26	--	0.17	--	--	1.01	--	--	**1.2**
231518	19%	62.34	46.54	0.21	2.30	--	--	1.95	--	--	**4.5**
231618	24%	88.54	56.51	0.09	1.34	--	0.11	3.51	--	--	**5.1**
231718	16%	16.34	11.99	0.19	0.44	--	--	0.61	--	--	**1.2**
231818	14%	7.86	2.28	--	0.15	--	--	0.43	--	--	**0.6**
Total	**18.0%**	**583.8**	**457.0**	**5.6**	**16.5**	**--**	**3.4**	**14.1**	**--**	**0.0**	**39.6**

South San Francisco

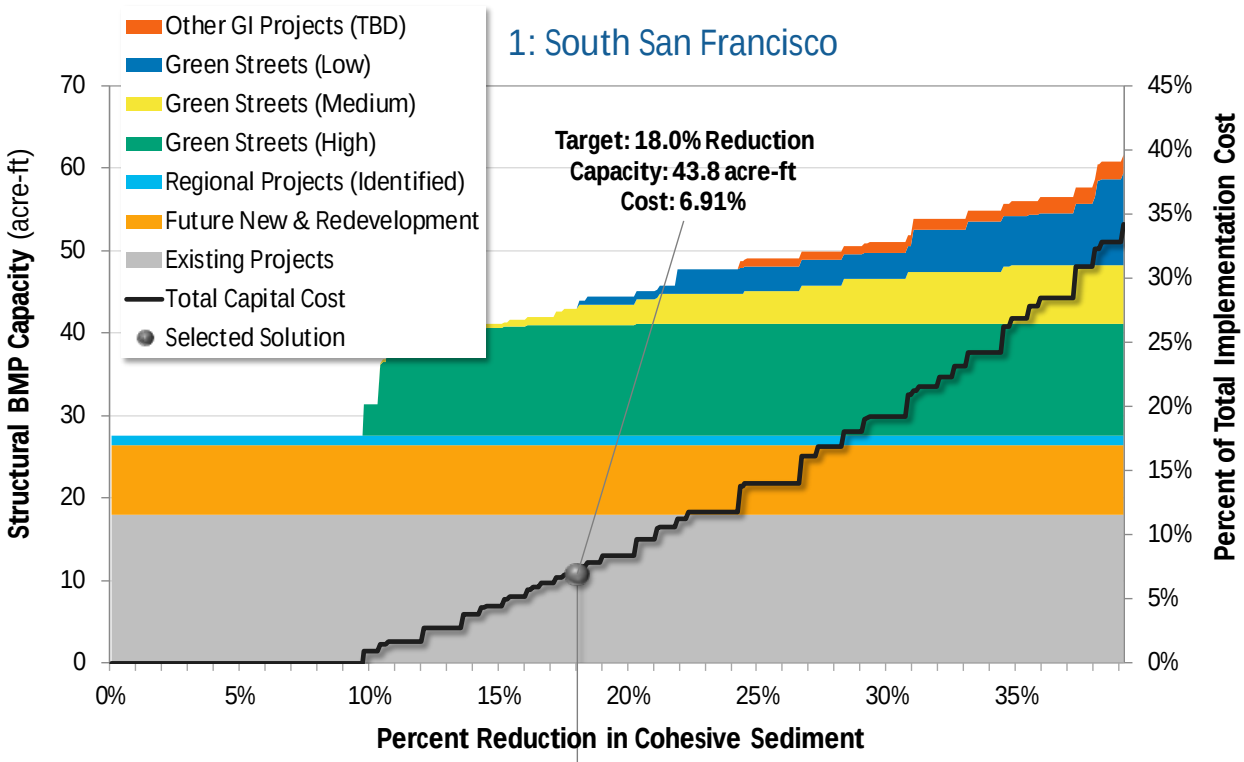

Figure C-35. Optimization summary for South San Francisco - Scenario 1.

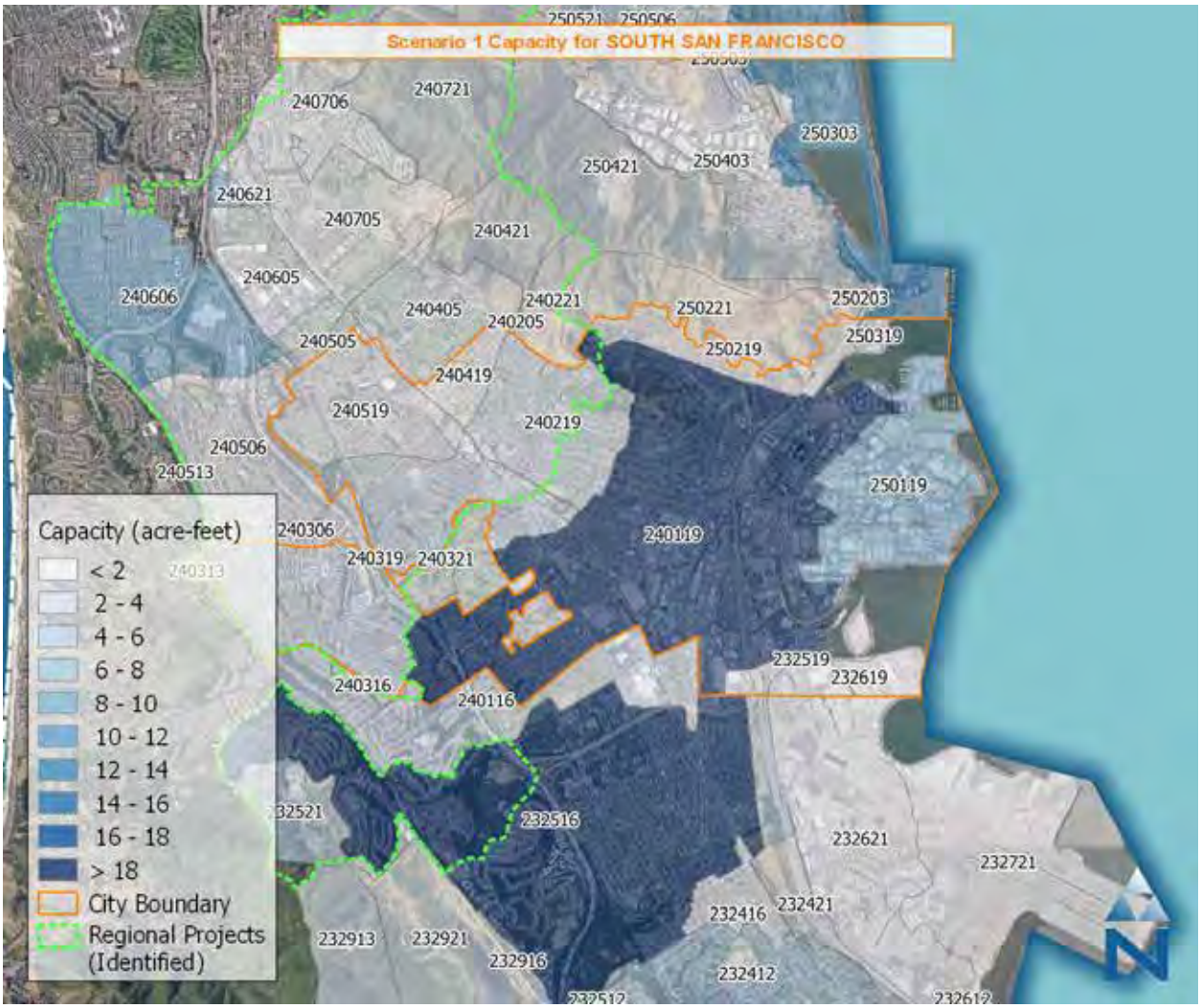

Figure C-36. Map of GI capacities by subwatershed in South San Francisco - Scenario 1.

Table C-18. GI Implementation Strategy for South San Francisco - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232519	24%	4.67	4.55	0.15	0.10	--	0.08	0.00	--	--	**0.3**
232619	31%	0.29	0.07	--	0.01	--	--	0.01	0.01	0.00	**0.0**
240119	24%	3.67	321.35	10.40	4.09	0.01	9.43	0.30	--	--	**24.2**
240219	16%	68.00	25.93	0.18	0.80	0.25	1.26	--	--	--	**2.5**
240319	16%	165.61	28.27	0.74	1.07	0.61	1.38	--	--	--	**3.8**
240419	24%	37.28	9.66	0.05	0.14	0.09	0.38	--	--	--	**0.7**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
240519	16%	83.65	14.14	0.14	0.38	0.31	0.87	--	--	--	**1.7**
250119	27%	150.75	161.72	5.91	1.21	--	0.00	1.84	0.49	--	**9.5**
250219	16%	13.46	9.87	0.30	0.58	--	0.00	0.19	--	--	**1.1**
250319	3%	0.79	1.32	--	0.08	--	--	--	--	--	**0.1**
Total	**18.0%**	**528.2**	**576.9**	**17.9**	**8.5**	**1.3**	**13.4**	**2.3**	**0.5**	**0.0**	**43.8**

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Unincorporated County

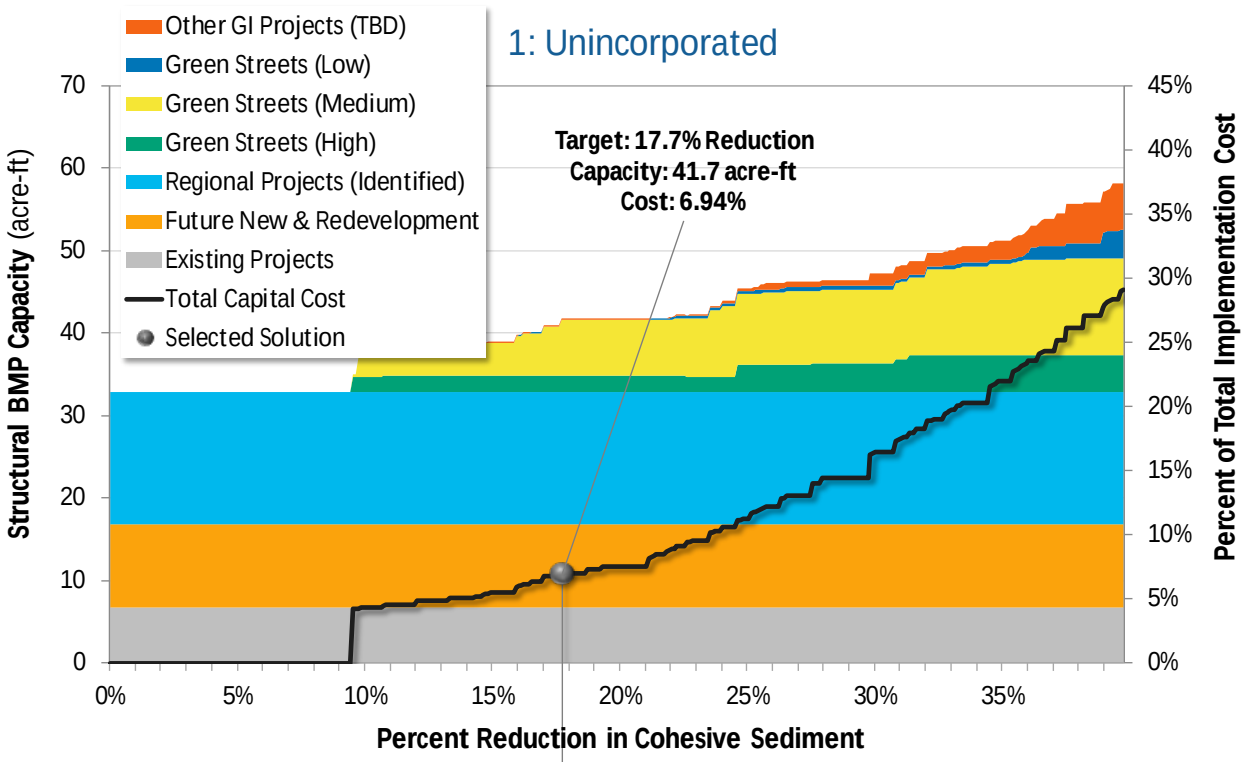

Figure C-37. Optimization summary for Unincorporated County - Scenario 1.

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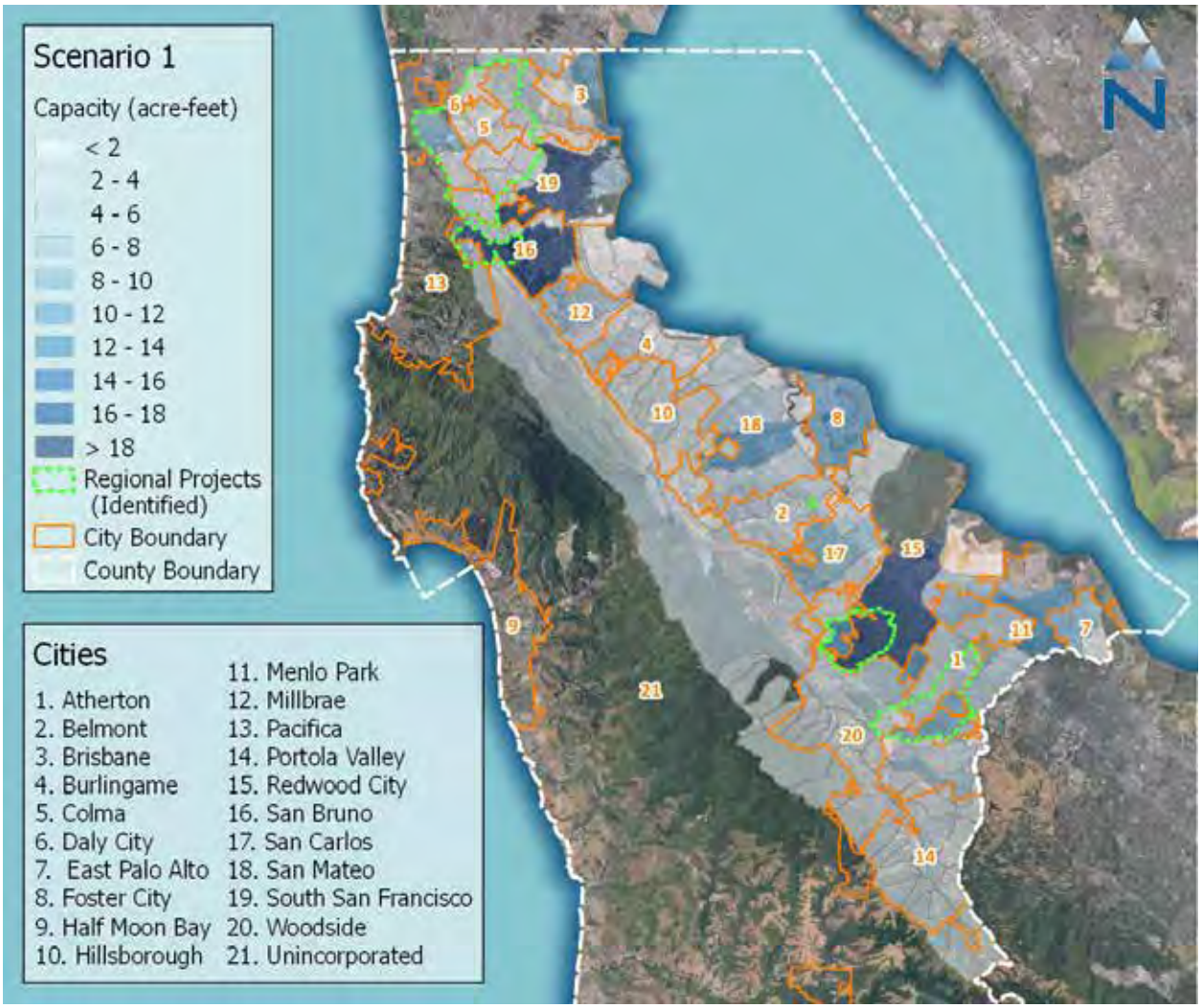

Figure C-38. Map of GI capacities by subwatershed in Unincorporated County - Scenario 1.

Table C-19. GI Implementation Strategy for Unincorporated County - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
220121	17%	0.18	0.39	0.00	--	0.01	--	--	--	--	**0.0**
220321	0%	0.00	--	--	--	--	--	--	--	--	**0.0**
220421	12%	0.21	0.05	--	0.01	--	--	0.01	--	--	**0.0**
220821	5%	1.62	0.49	0.22	0.07	--	0.01	--	--	--	**0.3**
221121	2%	0.10	0.00	--	0.01	--	--	--	--	0.00	**0.0**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
221221	17%	0.15	9.35	5.17	1.14	0.01	--	--	--	--	**6.3**
221321	15%	0.37	0.92	--	0.04	0.02	--	--	--	--	**0.1**
221421	49%	0.01	0.02	--	0.01	0.00	--	0.01	--	0.00	**0.0**
221821	6%	0.00	0.00	--	0.00	--	--	--	--	--	**0.0**
222221	22%	4.54	0.04	--	0.11	--	--	0.10	--	--	**0.2**
222321	27%	0.89	0.00	--	0.10	--	--	0.00	--	0.02	**0.1**
222521	16%	1.14	0.00	--	0.14	--	--	--	--	0.03	**0.2**
222621	4%	0.63	0.00	--	0.08	--	--	--	--	--	**0.1**
222721	1%	0.22	0.00	--	0.03	--	--	--	--	--	**0.0**
223021	7%	2.29	0.01	--	0.42	--	--	--	--	--	**0.4**
223121	5%	0.98	0.05	--	0.30	--	--	--	--	--	**0.3**
223221	86%	0.22	0.02	--	0.16	--	--	--	--	--	**0.2**
223421	0%	0.00	0.00	--	0.00	--	--	--	--	--	**0.0**
223521	7%	0.03	0.00	--	0.00	--	--	--	--	0.00	**0.0**
223621	1%	0.14	0.00	--	0.02	--	--	--	--	0.00	**0.0**
223721	4%	0.05	0.00	--	0.01	--	--	--	--	0.00	**0.0**
223821	8%	0.01	--	--	0.00	--	--	--	--	0.00	**0.0**
223921	9%	0.00	--	--	0.00	--	--	--	--	0.00	**0.0**
224021	7%	0.00	0.00	--	0.00	--	--	--	--	0.00	**0.0**
224121	11%	0.19	0.00	--	0.01	--	--	--	--	--	**0.0**
224421	10%	0.00	--	--	0.00	--	--	--	--	0.00	**0.0**
224521	10%	0.00	--	--	0.00	--	--	--	--	0.00	**0.0**
224621	3%	0.78	0.05	--	0.23	--	--	--	--	--	**0.2**
230121	1%	0.07	0.08	0.10	0.00	--	--	--	--	--	**0.1**
230221	15%	37.75	92.83	0.51	4.61	1.74	1.89	--	--	--	**8.8**
230321	31%	125.87	46.24	0.04	0.18	9.26	0.01	3.86	--	--	**13.3**
230421	42%	5.13	15.80	0.11	0.17	0.29	--	0.16	0.09	--	**0.8**
230521	2%	0.27	0.15	--	0.08	--	--	--	--	--	**0.1**
230721	5%	3.59	5.88	0.11	0.23	--	--	--	--	--	**0.3**
230921	1%	0.02	0.03	--	0.01	--	--	--	--	--	**0.0**
231221	34%	0.60	0.31	0.04	0.03	--	--	0.01	--	--	**0.1**
231521	1%	2.61	2.73	0.22	0.29	--	--	--	--	--	**0.5**
231821	12%	0.00	0.00	--	0.00	--	--	--	--	0.00	**0.0**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
232121	9%	1.96	1.70	--	0.00	--	--	0.08	--	--	**0.1**
232221	0%	0.01	0.01	--	0.01	--	--	--	--	--	**0.0**
232321	0%	0.00	0.00	--	0.00	--	--	--	--	--	**0.0**
232421	4%	0.72	0.70	--	0.27	--	--	--	--	--	**0.3**
232521	20%	50.03	30.96	--	0.53	4.35	0.00	--	--	--	**4.9**
232621	0%	0.01	0.02	--	0.00	--	--	--	--	--	**0.0**
232721	7%	0.76	0.21	--	--	--	--	--	--	0.03	**0.0**
232821	42%	0.71	18.35	--	0.17	0.04	--	2.40	--	--	**2.6**
232921	3%	4.00	0.21	--	0.06	--	--	0.08	--	--	**0.1**
240121	12%	2.16	1.80	--	0.07	0.01	0.07	--	--	--	**0.1**
240221	12%	9.44	1.74	--	0.01	0.05	--	--	--	--	**0.1**
240321	8%	1.15	0.30	--	0.07	0.01	--	--	--	--	**0.1**
240421	12%	9.09	1.67	--	0.05	0.04	--	--	--	--	**0.1**
240621	12%	2.38	2.72	0.20	0.03	0.01	--	--	--	--	**0.2**
240721	12%	33.25	6.12	--	0.14	0.16	0.02	--	--	--	**0.3**
250221	0%	0.00	0.04	--	0.07	--	--	--	--	--	**0.1**
250421	12%	0.03	0.16	--	0.06	0.00	--	--	--	--	**0.1**
250521	16%	0.36	0.05	--	0.01	0.00	--	--	--	--	**0.0**
Total	**17.7%**	**306.7**	**242.2**	**6.7**	**10.0**	**16.0**	**2.0**	**6.7**	**0.1**	**0.1**	**41.7**

Woodside

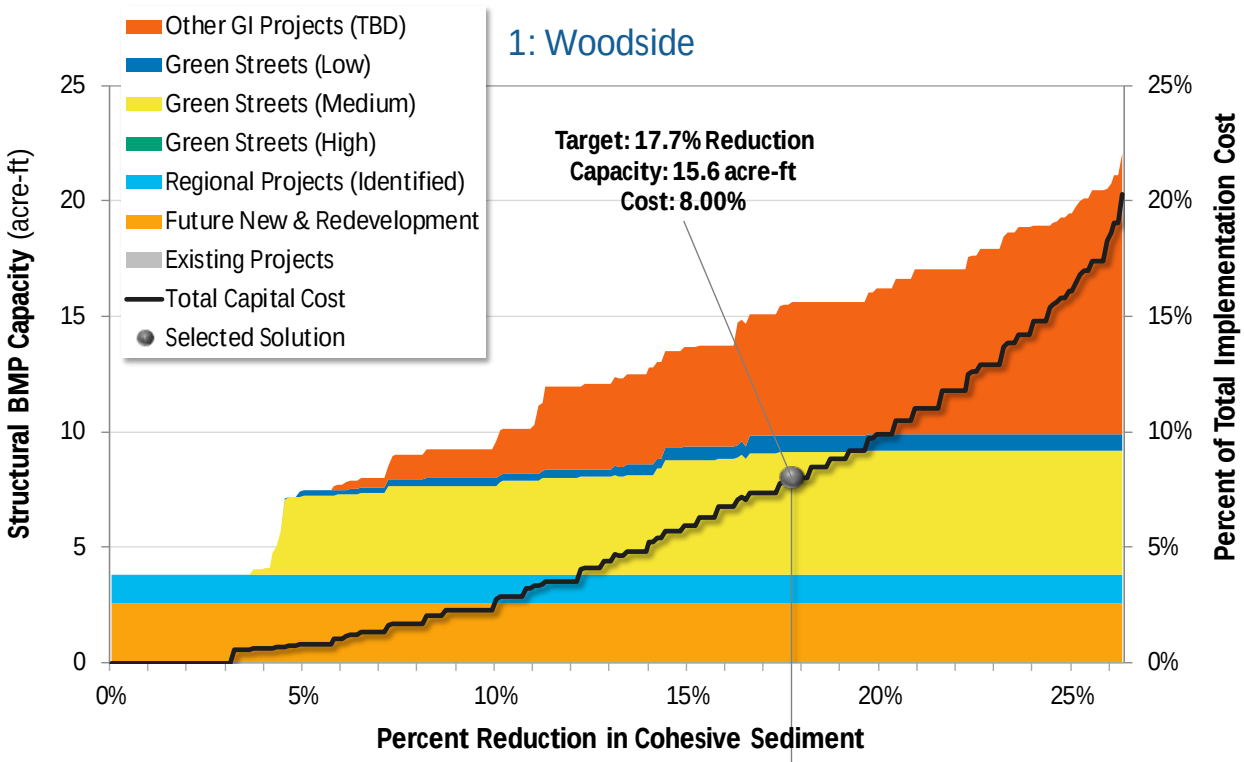

Figure C-39. Optimization summary for Woodside - Scenario 1.

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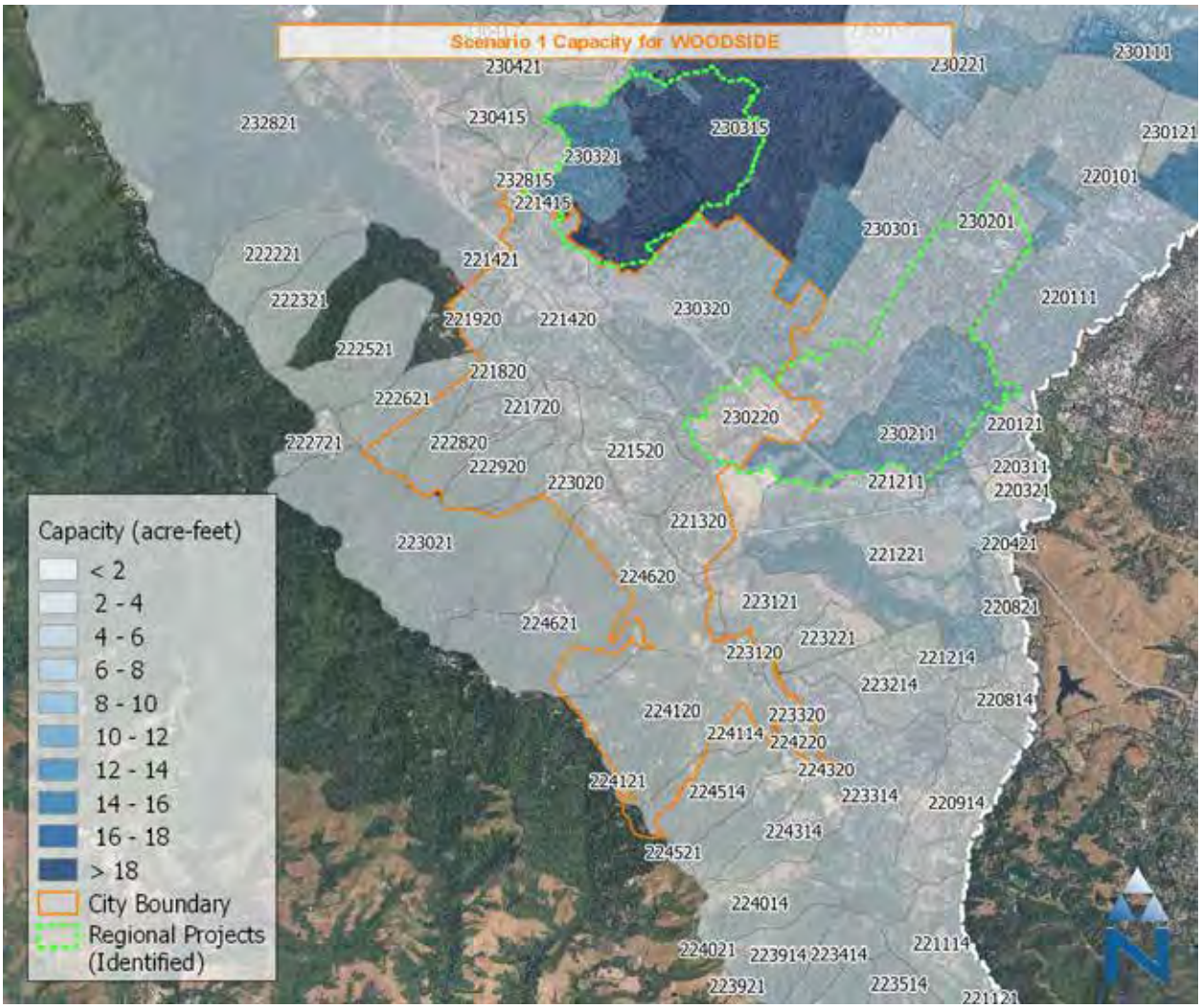

Figure C-40. Map of GI capacities by subwatershed in Woodside - Scenario 1.

Table C-20. GI Implementation Strategy for Woodside - Scenario 1

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
221320	60%	0.02	1.53	--	0.08	0.00	--	0.47	0.09	0.31	**1.0**
221420	52%	0.42	12.07	0.05	0.34	0.02	--	1.34	0.22	1.17	**3.1**
221520	7%	18.57	2.11	--	0.12	--	--	0.61	0.16	0.16	**1.0**
221620	11%	8.70	0.72	--	0.06	--	--	0.17	--	0.32	**0.5**
221720	7%	6.49	0.37	--	0.03	--	--	0.10	--	0.07	**0.2**

Subwatershed ID	Management Metrics for GI			Green Infrastructure Capacity to Achieve 17.6% Reduction Target (Capacity expressed in units of acre-feet)							
				Existing/Planned			Green Streets				
	% Load Reduction PCBs (Annual)	Annual Volume Managed (acre-ft)	Impervious Area Treated (acres)	Existing Projects	Future New & Redevelopment	Regional Projects (Identified)	High	Medium	Low	Other GI Projects (TBD)	Total BMP Capacity (acre-ft)
221820	25%	7.22	0.20	--	0.04	--	--	0.01	--	0.95	**1.0**
221920	9%	0.33	0.00	--	0.02	--	--	--	--	0.03	**0.0**
222620	6%	0.53	0.00	--	0.05	--	--	--	--	0.01	**0.1**
222820	9%	4.91	0.13	--	0.07	--	--	0.07	--	0.04	**0.2**
222920	9%	5.22	0.25	--	0.07	--	--	0.07	--	0.05	**0.2**
223020	12%	9.00	0.77	--	0.05	--	--	0.17	--	0.36	**0.6**
223120	5%	0.72	0.02	--	0.01	--	--	0.01	--	--	**0.0**
223320	6%	0.68	0.02	--	0.03	--	--	0.02	--	0.01	**0.1**
224120	4%	11.36	0.80	--	0.27	--	--	0.04	0.11	0.11	**0.5**
224220	12%	0.79	0.01	--	0.01	--	--	--	--	0.04	**0.1**
224320	14%	0.03	0.00	--	0.00	--	--	--	--	0.00	**0.0**
224520	6%	0.74	0.01	--	0.02	--	--	0.01	--	0.01	**0.0**
224620	8%	12.35	2.41	--	0.20	--	--	0.28	0.15	0.19	**0.8**
230220	40%	57.97	40.27	--	0.25	0.75	--	0.08	--	--	**1.1**
230320	52%	10.07	24.93	--	0.77	0.44	--	1.83	0.00	1.87	**4.9**
232820	52%	0.31	0.49	--	0.01	0.01	--	0.04	--	0.09	**0.2**
Total	**17.6%**	**156.5**	**87.1**	**0.1**	**2.5**	**1.2**	**--**	**5.3**	**0.7**	**5.8**	**15.6**

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APPENDIX D: IMPLEMENTATION SCHEDULES

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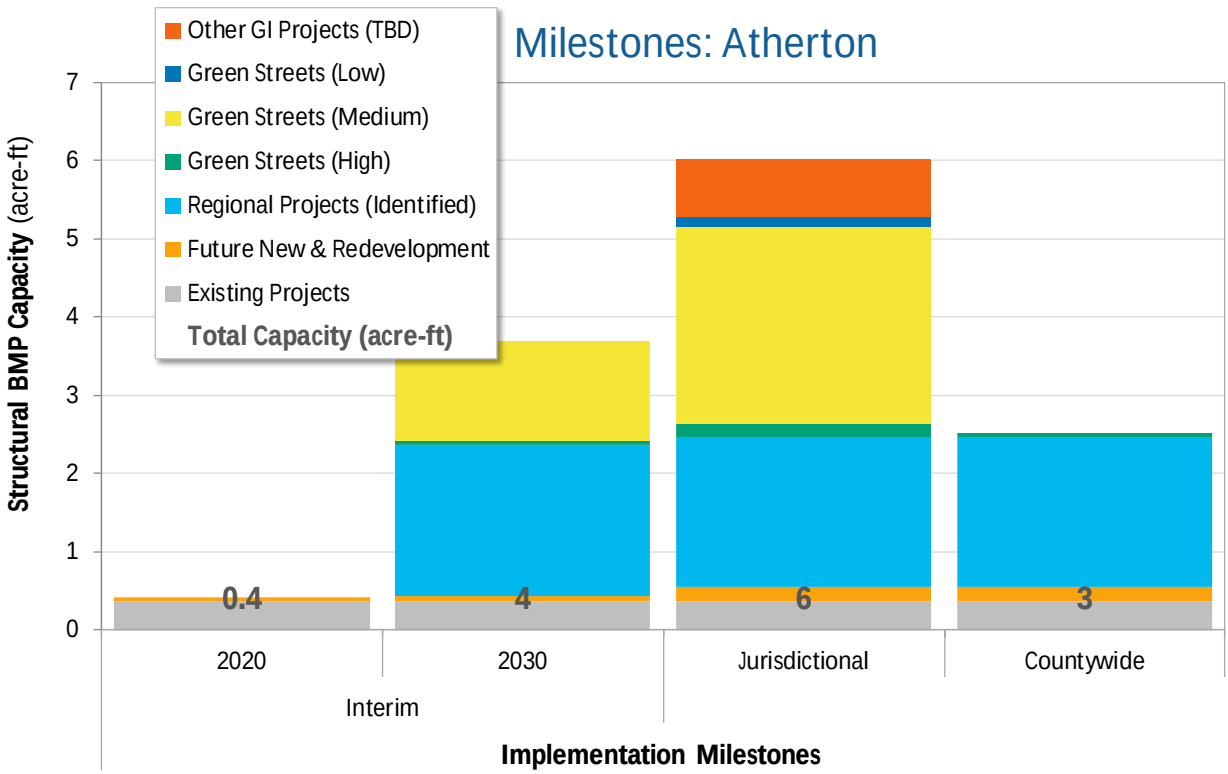

Figure D-1. Implementation Milestones: Atherton.

Table D-1. Implementation Milestones: Atherton

Implementation Metrics		Implementation Milestones: Atherton					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	18.5%	1.3%	0.2%	18.7%	20.0%	15.0%
	Volume Managed (acre-ft/yr)	58.9	4.1	0.7	59.5	63.6	41.9
	Treated Impervious (acres)	102.6	7.2	0.4	103.0	110.3	103.1
Capacities (acre-ft)	Existing Projects	0.0	0.0	0.4	0.4	0.4	0.4
	Future New & Redevelopment	0.0	0.1	0.1	0.1	0.2	0.2
	Regional Projects (Identified)	1.9	0.0	--	1.9	1.9	1.9
	Green Streets (High)	0.0	0.1	--	0.0	0.2	0.0
	Green Streets (Medium)	1.3	1.2	--	1.3	2.5	--
	Green Streets (Low)	--	0.1	--	--	0.1	--
	Other GI Projects (TBD)	--	0.7	--	--	0.7	--
	Total	**3.3**	**2.3**	**0.4**	**3.7**	**6.0**	**2.5**

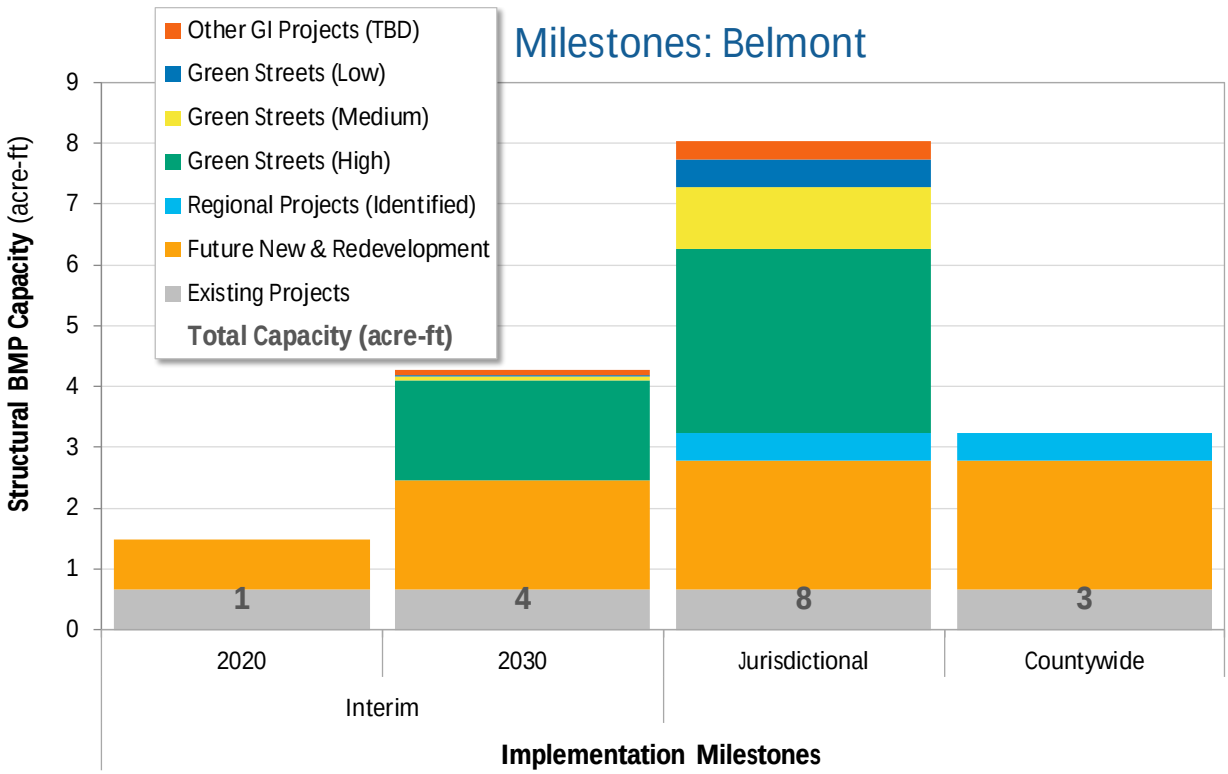

Figure D-2. Implementation Milestones: Belmont.

Table D-2. Implementation Milestones: Belmont

Implementation Metrics		Implementation Milestones: Belmont					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	3.7%	13.5%	1.9%	5.7%	19.1%	4.1%
	Volume Managed (acre-ft/yr)	27.1	98.7	19.4	46.6	145.2	33.0
	Treated Impervious (acres)	10.1	84.6	13.1	23.3	107.9	26.6
Capacities (acre-ft)	Existing Projects	0.0	0.0	0.7	0.7	0.7	0.7
	Future New & Redevelopment	1.0	0.3	0.8	1.8	2.1	2.1
	Regional Projects (Identified)	--	0.5	--	--	0.5	0.5
	Green Streets (High)	1.6	1.4	--	1.6	3.0	--
	Green Streets (Medium)	0.1	1.0	--	0.1	1.0	--
	Green Streets (Low)	0.0	0.4	--	0.0	0.5	--
	Other GI Projects (TBD)	0.1	0.2	--	0.1	0.3	--
	Total	**2.8**	**3.8**	**1.5**	**4.3**	**8.0**	**3.2**

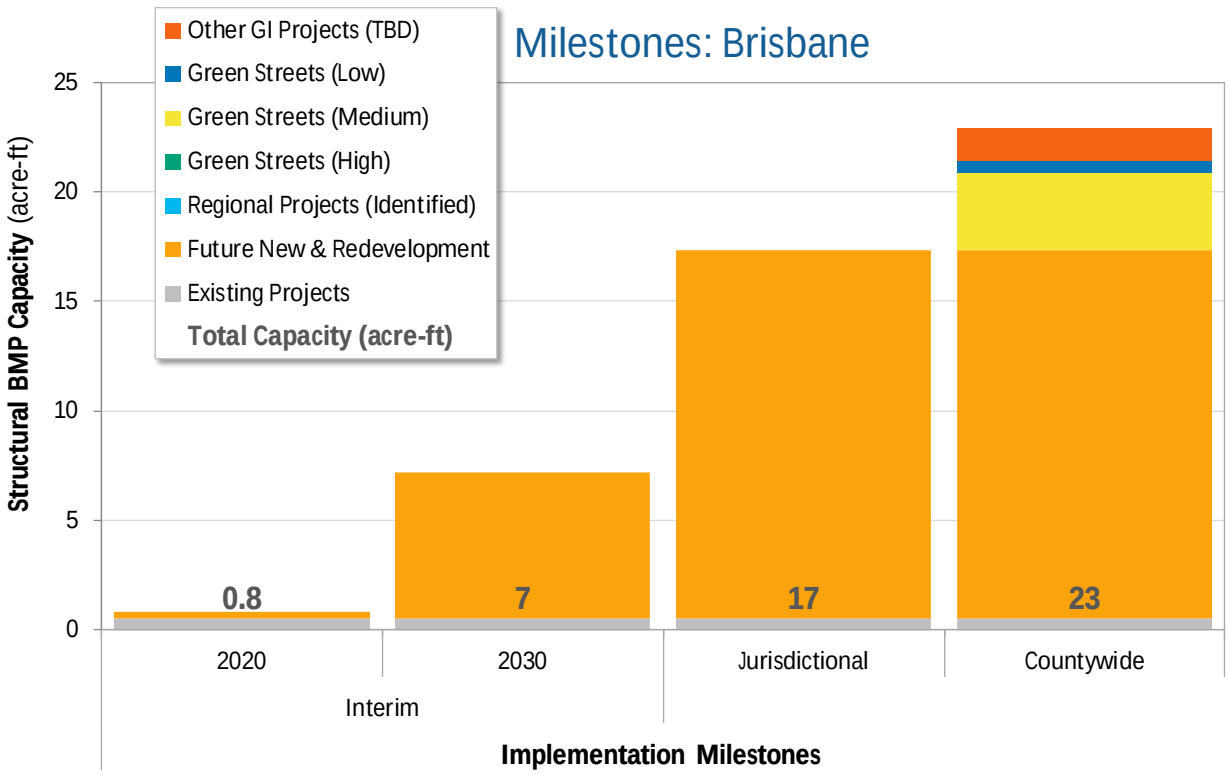

Figure D-3. Implementation Milestones: Brisbane.

Table D-3. Implementation Milestones: Brisbane

Implementation Metrics		Implementation Milestones: Brisbane					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	9.1%	13.4%	1.5%	10.6%	24.0%	51.7%
	Volume Managed (acre-ft/yr)	74.4	109.3	15.6	90.0	199.3	380.8
	Treated Impervious (acres)	60.1	97.3	6.1	66.3	163.6	309.9
Capacities (acre-ft)	Existing Projects	0.0	0.0	0.5	0.5	0.5	0.5
	Future New & Redevelopment	6.3	10.1	0.3	6.7	16.8	16.8
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	--	--	--	--	--	--
	Green Streets (Medium)	--	--	--	--	--	3.5
	Green Streets (Low)	--	--	--	--	--	0.6
	Other GI Projects (TBD)	--	--	--	--	--	1.5
	Total	**6.3**	**10.1**	**0.8**	**7.2**	**17.3**	**23.0**

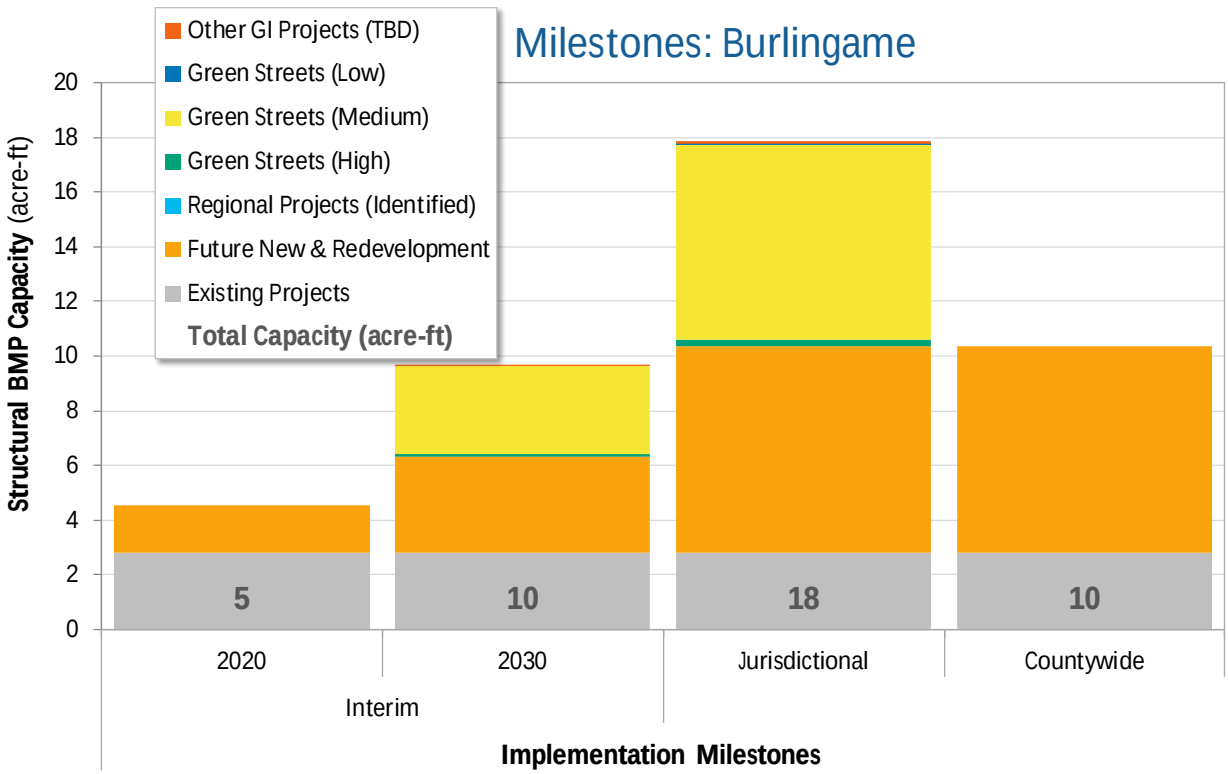

Figure D-4. Implementation Milestones: Burlingame.

Table D-4. Implementation Milestones: Burlingame

Implementation Metrics		Implementation Milestones: Burlingame					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	4.2%	9.4%	4.1%	8.3%	17.7%	6.7%
	Volume Managed (acre-ft/yr)	63.2	141.7	76.4	139.5	281.2	110.3
	Treated Impervious (acres)	19.3	132.0	39.6	58.9	190.9	103.4
Capacities (acre-ft)	Existing Projects	0.0	0.0	2.8	2.8	2.8	2.8
	Future New & Redevelopment	1.8	4.0	1.7	3.5	7.5	7.5
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	0.1	0.2	--	0.1	0.2	--
	Green Streets (Medium)	3.2	3.9	--	3.2	7.1	--
	Green Streets (Low)	--	0.1	--	--	0.1	--
	Other GI Projects (TBD)	0.0	0.1	--	0.0	0.1	--
	Total	**5.1**	**8.2**	**4.5**	**9.6**	**17.9**	**10.4**

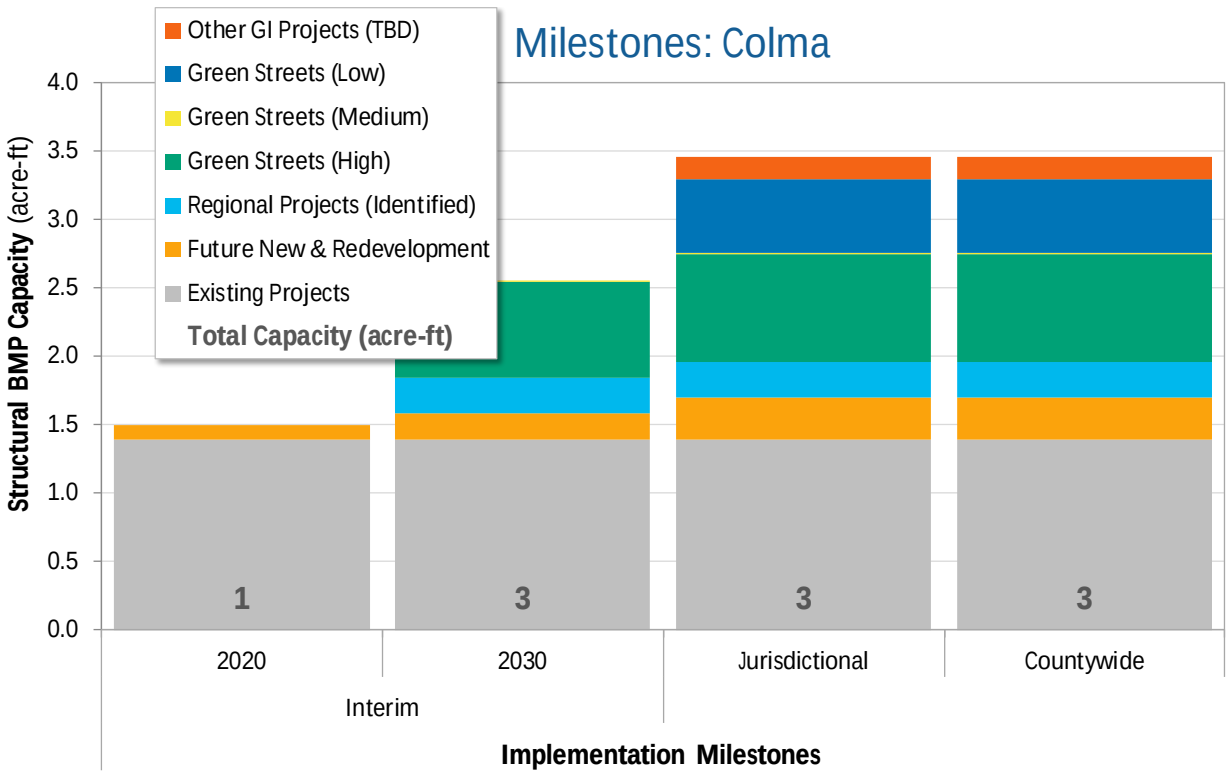

Figure D-5. Implementation Milestones: Colma.

Table D-5. Implementation Milestones: Colma

Implementation Metrics		Implementation Milestones: Colma					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	2.7%	8.8%	6.6%	9.3%	18.1%	18.1%
	Volume Managed (acre-ft/yr)	22.2	72.1	22.3	44.5	116.5	116.5
	Treated Impervious (acres)	5.7	52.8	10.5	16.2	69.0	69.0
Capacities (acre-ft)	Existing Projects	0.0	0.0	1.4	1.4	1.4	1.4
	Future New & Redevelopment	0.1	0.1	0.1	0.2	0.3	0.3
	Regional Projects (Identified)	0.3	0.0	--	0.3	0.3	0.3
	Green Streets (High)	0.7	0.1	--	0.7	0.8	0.8
	Green Streets (Medium)	0.0	0.0	--	0.0	0.0	0.0
	Green Streets (Low)	--	0.5	--	--	0.5	0.5
	Other GI Projects (TBD)	--	0.2	--	--	0.2	0.2
	Total	**1.1**	**0.9**	**1.5**	**2.5**	**3.5**	**3.5**

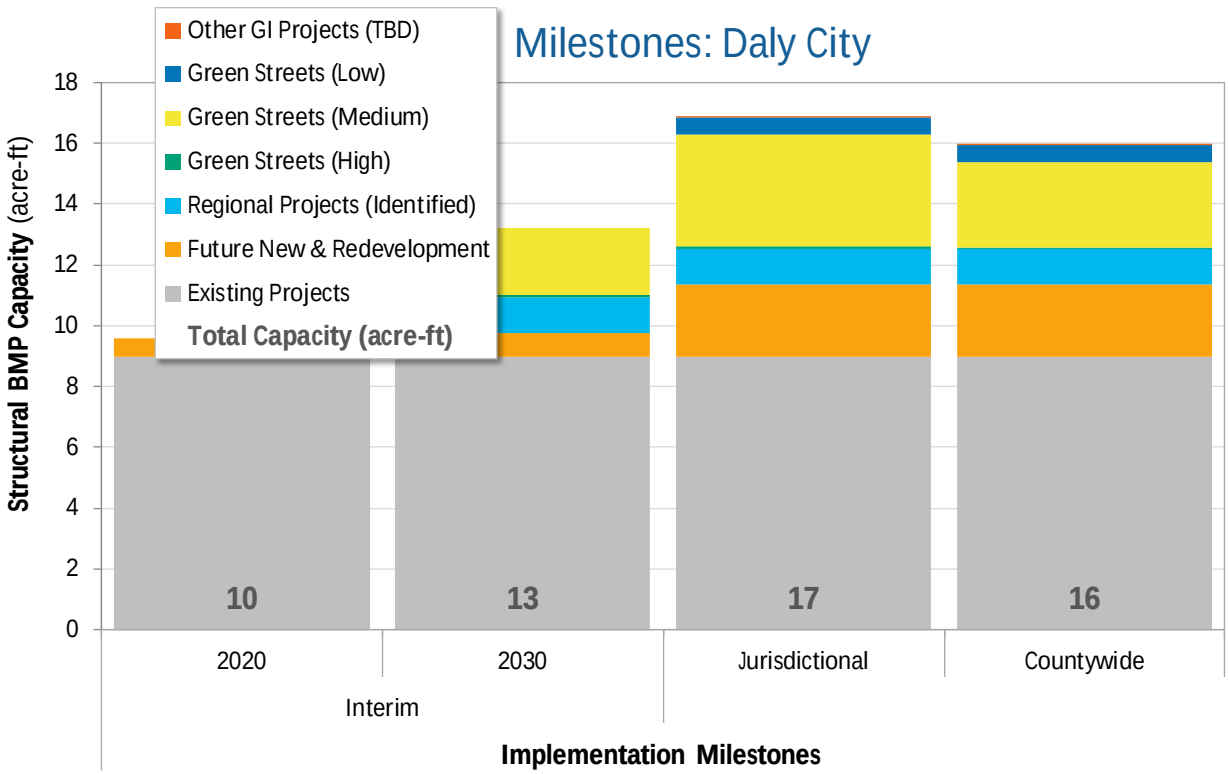

Figure D-6. Implementation Milestones: Daly City.

Table D-6. Implementation Milestones: Daly City

Implementation Metrics		Implementation Milestones: Daly City					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	5.3%	5.9%	7.1%	12.4%	18.3%	14.9%
	Volume Managed (acre-ft/yr)	111.5	124.5	144.3	255.8	380.3	307.1
	Treated Impervious (acres)	21.1	90.1	59.5	80.7	170.7	170.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	9.0	9.0	9.0	9.0
	Future New & Redevelopment	0.1	1.6	0.6	0.8	2.4	2.4
	Regional Projects (Identified)	1.2	0.0	--	1.2	1.2	1.2
	Green Streets (High)	0.1	0.0	--	0.1	0.1	0.0
	Green Streets (Medium)	2.2	1.5	--	2.2	3.7	2.8
	Green Streets (Low)	--	0.6	--	--	0.6	0.6
	Other GI Projects (TBD)	--	0.0	--	--	0.0	0.0
	Total	**3.6**	**3.6**	**9.6**	**13.2**	**16.8**	**15.9**

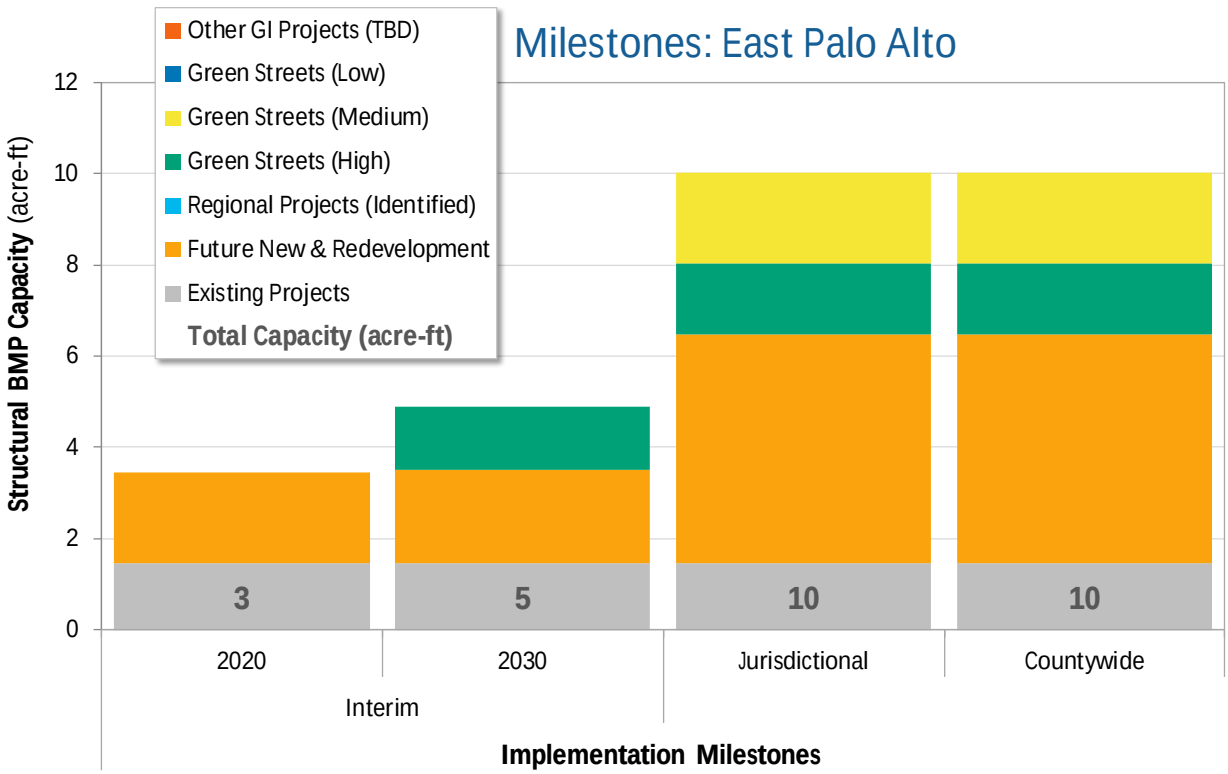

Figure D-7. Implementation Milestones: East Palo Alto.

Table D-7. Implementation Milestones: East Palo Alto

Implementation Metrics		Implementation Milestones: East Palo Alto					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	4.7%	9.9%	9.2%	13.9%	23.7%	23.7%
	Volume Managed (acre-ft/yr)	20.5	43.3	42.0	62.5	105.8	105.8
	Treated Impervious (acres)	0.7	75.2	34.9	35.6	110.7	110.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	1.5	1.5	1.5	1.5
	Future New & Redevelopment	0.1	3.0	2.0	2.0	5.0	5.0
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	1.4	0.2	--	1.4	1.6	1.6
	Green Streets (Medium)	--	2.0	--	--	2.0	2.0
	Green Streets (Low)	--	--	--	--	--	--
	Other GI Projects (TBD)	--	--	--	--	--	--
	Total	**1.5**	**5.1**	**3.4**	**4.9**	**10.0**	**10.0**

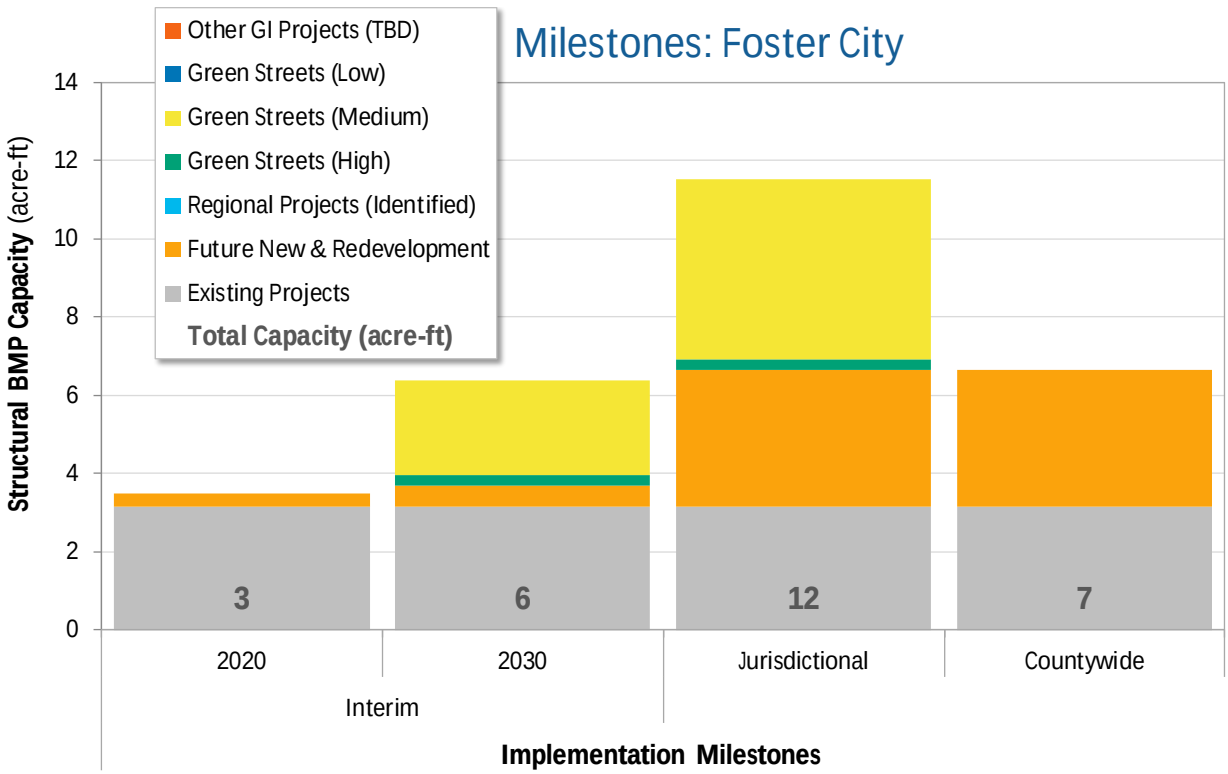

Figure D-8. Implementation Milestones: Foster City.

Table D-8. Implementation Milestones: Foster City

Implementation Metrics		Implementation Milestones: Foster City					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	4.0%	11.7%	3.4%	7.4%	19.1%	8.1%
	Volume Managed (acre-ft/yr)	35.5	104.0	34.2	69.7	173.7	72.8
	Treated Impervious (acres)	3.3	100.5	31.0	34.3	134.8	82.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	3.2	3.2	3.2	3.2
	Future New & Redevelopment	0.2	3.0	0.3	0.5	3.5	3.5
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	0.3	0.0	--	0.3	0.3	--
	Green Streets (Medium)	2.4	2.2	--	2.4	4.6	--
	Green Streets (Low)	--	--	--	--	--	--
	Other GI Projects (TBD)	--	--	--	--	--	--
	Total	**2.9**	**5.1**	**3.5**	**6.4**	**11.5**	**6.7**

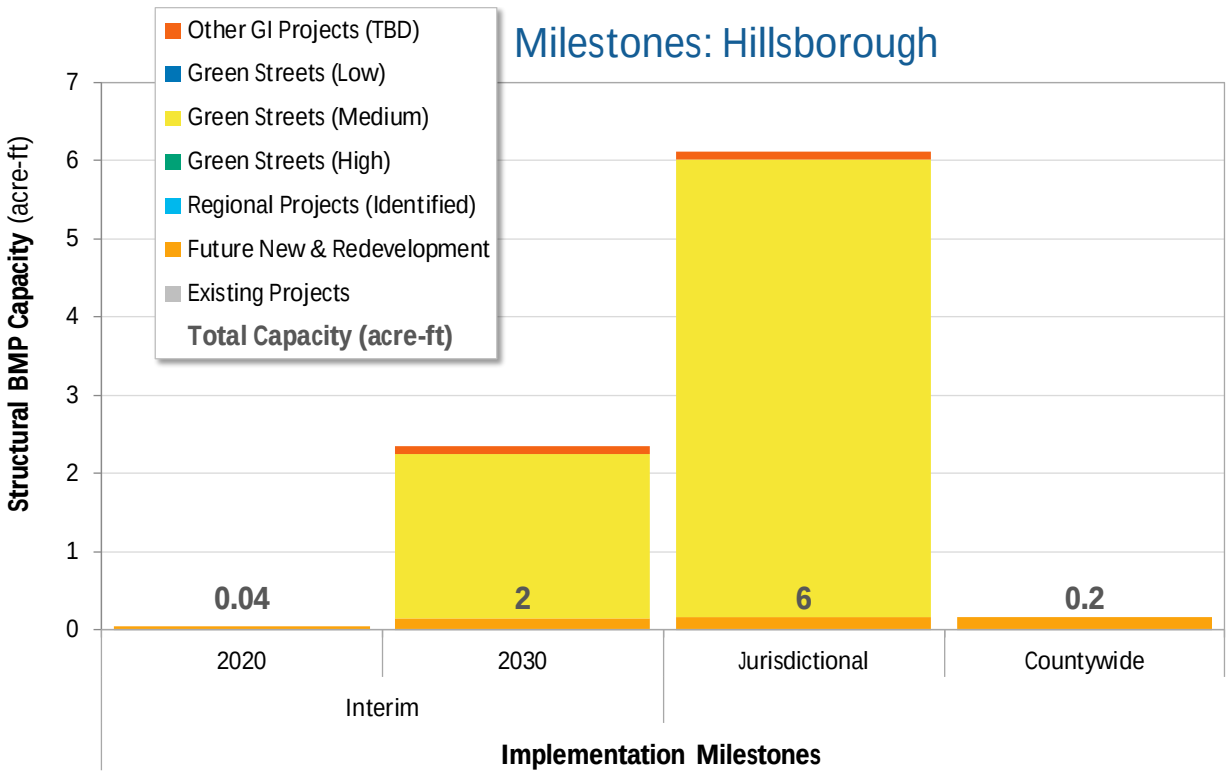

Figure D-9. Implementation Milestones: Hillsborough.

Table D-9. Implementation Milestones: Hillsborough

Implementation Metrics		Implementation Milestones: Hillsborough					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	0.1%	18.7%	0.1%	0.2%	18.9%	0.1%
	Volume Managed (acre-ft/yr)	0.8	116.7	0.6	1.4	118.1	0.4
	Treated Impervious (acres)	0.2	47.4	0.1	0.3	47.7	0.4
Capacities (acre-ft)	Existing Projects	0.0	0.0	0.0	0.0	0.0	0.0
	Future New & Redevelopment	0.1	0.0	0.0	0.1	0.2	0.2
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	--	--	--	--	--	--
	Green Streets (Medium)	2.1	3.7	--	2.1	5.8	--
	Green Streets (Low)	--	--	--	--	--	--
	Other GI Projects (TBD)	0.1	0.0	--	0.1	0.1	--
	Total	**2.3**	**3.8**	**0.0**	**2.3**	**6.1**	**0.2**

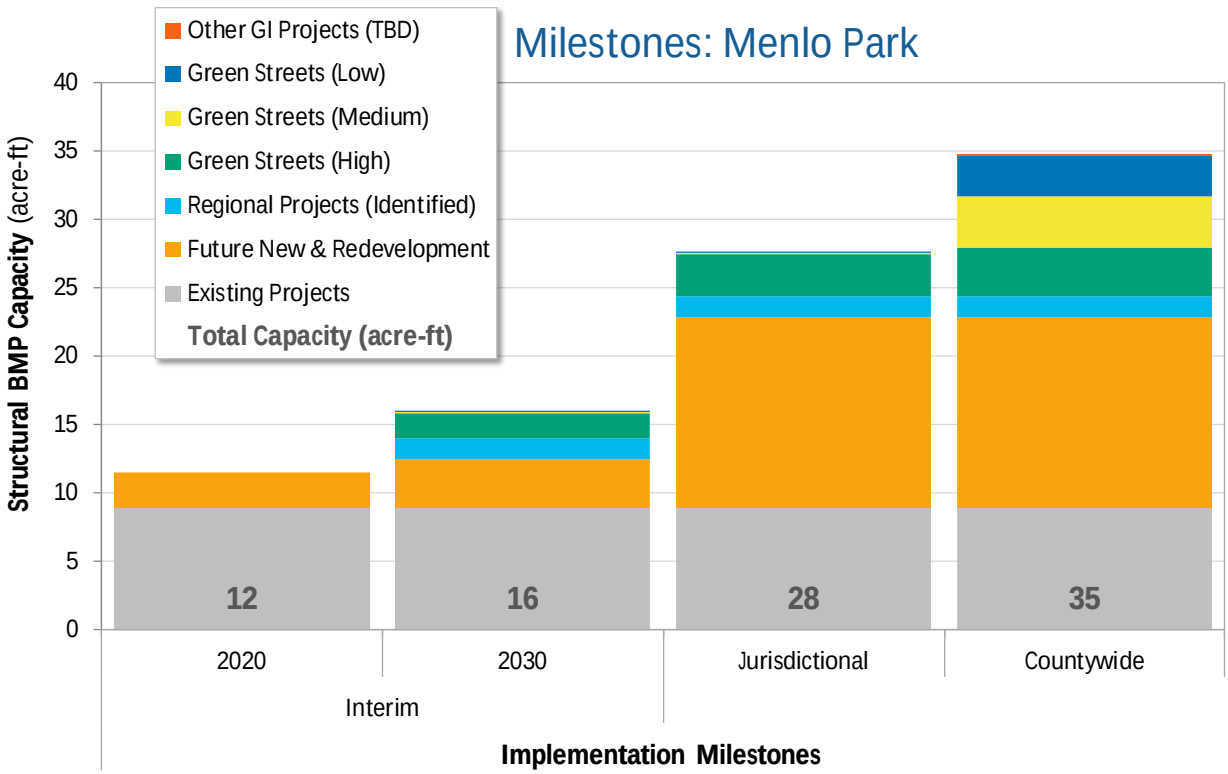

Figure D-10. Implementation Milestones: Menlo Park.

Table D-10. Implementation Milestones: Menlo Park

Implementation Metrics		Implementation Milestones: Menlo Park					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	5.8%	3.4%	8.8%	14.6%	17.9%	28.6%
	Volume Managed (acre-ft/yr)	11.2	6.6	92.8	104.1	110.6	185.7
	Treated Impervious (acres)	65.2	75.6	64.2	129.4	205.0	260.2
Capacities (acre-ft)	Existing Projects	0.0	0.0	8.9	8.9	8.9	8.9
	Future New & Redevelopment	1.0	10.3	2.7	3.6	13.9	13.9
	Regional Projects (Identified)	1.6	0.0	--	1.6	1.6	1.6
	Green Streets (High)	1.8	1.3	--	1.8	3.1	3.6
	Green Streets (Medium)	0.0	0.1	--	0.0	0.1	3.7
	Green Streets (Low)	0.0	0.0	--	0.0	0.0	2.9
	Other GI Projects (TBD)	--	--	--	--	--	0.0
	Total	**4.4**	**11.7**	**11.5**	**15.9**	**27.6**	**34.7**

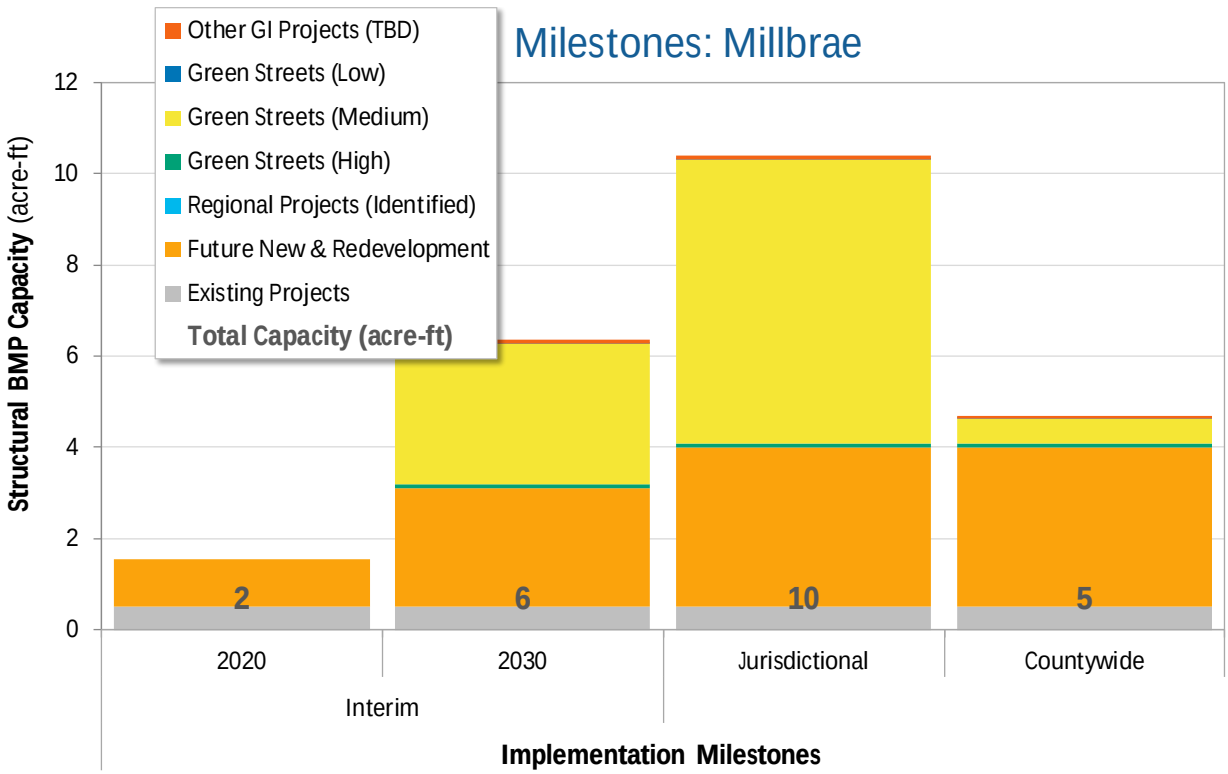

Figure D-11. Implementation Milestones: Millbrae.

Table D-11. Implementation Milestones: Millbrae

Implementation Metrics		Implementation Milestones: Millbrae					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	3.6%	14.7%	3.0%	6.5%	21.2%	4.4%
	Volume Managed (acre-ft/yr)	32.1	131.0	28.9	61.0	192.0	45.5
	Treated Impervious (acres)	12.8	97.1	10.9	23.7	120.8	40.2
Capacities (acre-ft)	Existing Projects	0.0	0.0	0.5	0.5	0.5	0.5
	Future New & Redevelopment	1.6	0.9	1.0	2.6	3.5	3.5
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	0.1	0.0	--	0.1	0.1	0.1
	Green Streets (Medium)	3.1	3.2	--	3.1	6.2	0.5
	Green Streets (Low)	0.0	0.0	--	0.0	0.0	0.0
	Other GI Projects (TBD)	0.1	0.0	--	0.1	0.1	0.0
	Total	**4.8**	**4.1**	**1.5**	**6.4**	**10.4**	**4.7**

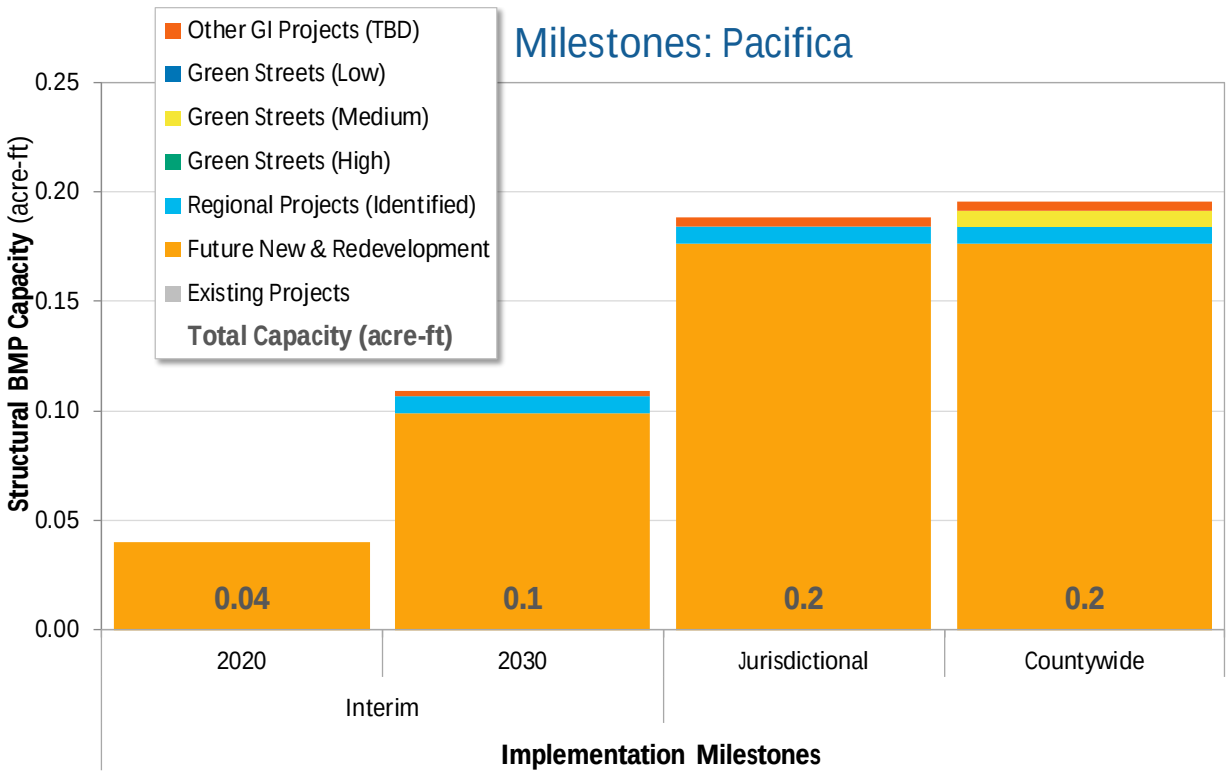

Figure D-12. Implementation Milestones: Pacifica.

Table D-12. Implementation Milestones: Pacifica

Implementation Metrics		Implementation Milestones: Pacifica					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	14.6%	0.6%	3.6%	18.2%	18.8%	22.1%
	Volume Managed (acre-ft/yr)	2.05	0.09	0.38	2.43	2.52	3.04
	Treated Impervious (acres)	0.25	0.01	0.06	0.31	0.33	0.51
Capacities (acre-ft)	Existing Projects	--	--	--	--	--	--
	Future New & Redevelopment	0.06	0.08	0.04	0.10	0.18	0.18
	Regional Projects (Identified)	0.01	0.00	--	0.01	0.01	0.01
	Green Streets (High)	--	--	--	--	--	--
	Green Streets (Medium)	--	--	--	--	--	0.01
	Green Streets (Low)	--	--	--	--	--	--
	Other GI Projects (TBD)	0.00	0.00	--	0.00	0.00	0.00
	Total	**0.07**	**0.08**	**0.04**	**0.11**	**0.19**	**0.20**

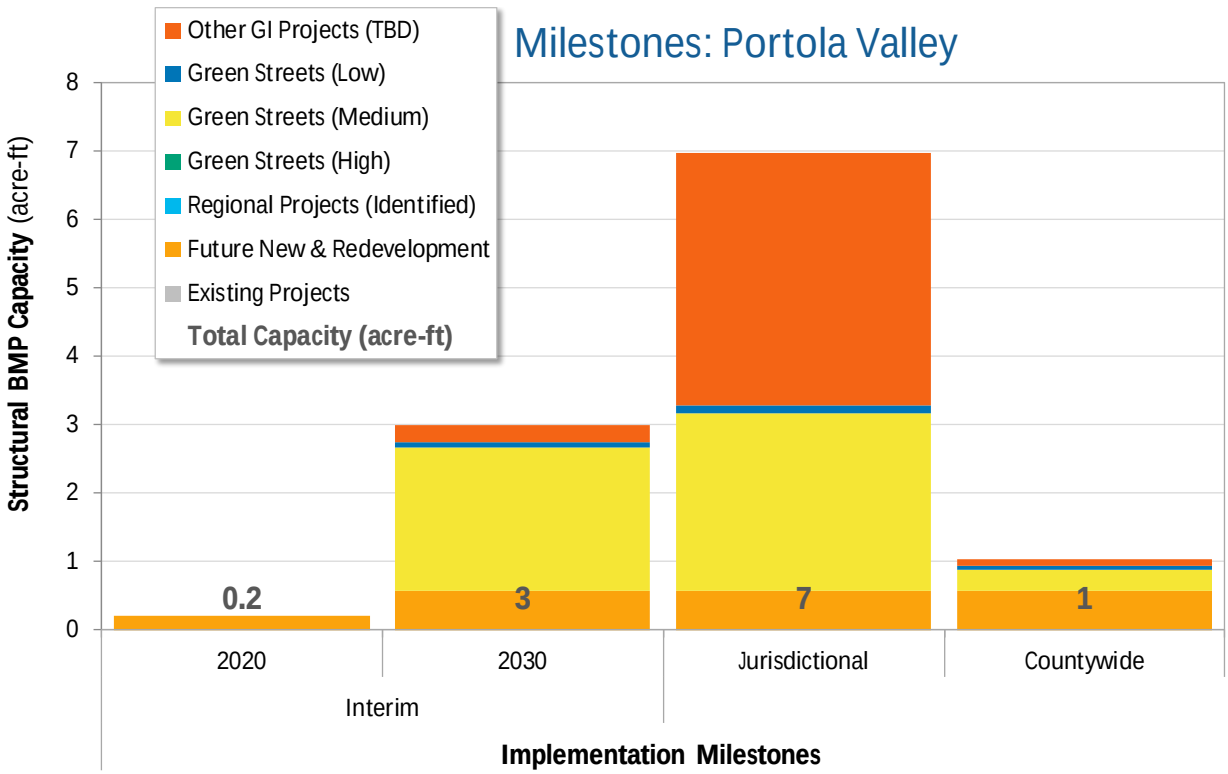

Figure D-13. Implementation Milestones: Portola Valley.

Table D-13. Implementation Milestones: Portola Valley

Implementation Metrics		Implementation Milestones: Portola Valley					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	0.2%	18.6%	0.2%	0.4%	19.0%	3.0%
	Volume Managed (acre-ft/yr)	1.0	127.3	1.5	2.6	129.9	14.9
	Treated Impervious (acres)	0.1	16.1	0.0	0.1	16.2	1.9
Capacities (acre-ft)	Existing Projects	--	--	--	--	--	--
	Future New & Redevelopment	0.4	0.0	0.2	0.6	0.6	0.6
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	--	--	--	--	--	--
	Green Streets (Medium)	2.1	0.5	--	2.1	2.6	0.3
	Green Streets (Low)	0.1	0.0	--	0.1	0.1	0.0
	Other GI Projects (TBD)	0.3	3.4	--	0.3	3.7	0.1
	Total	**2.8**	**4.0**	**0.2**	**3.0**	**7.0**	**1.0**

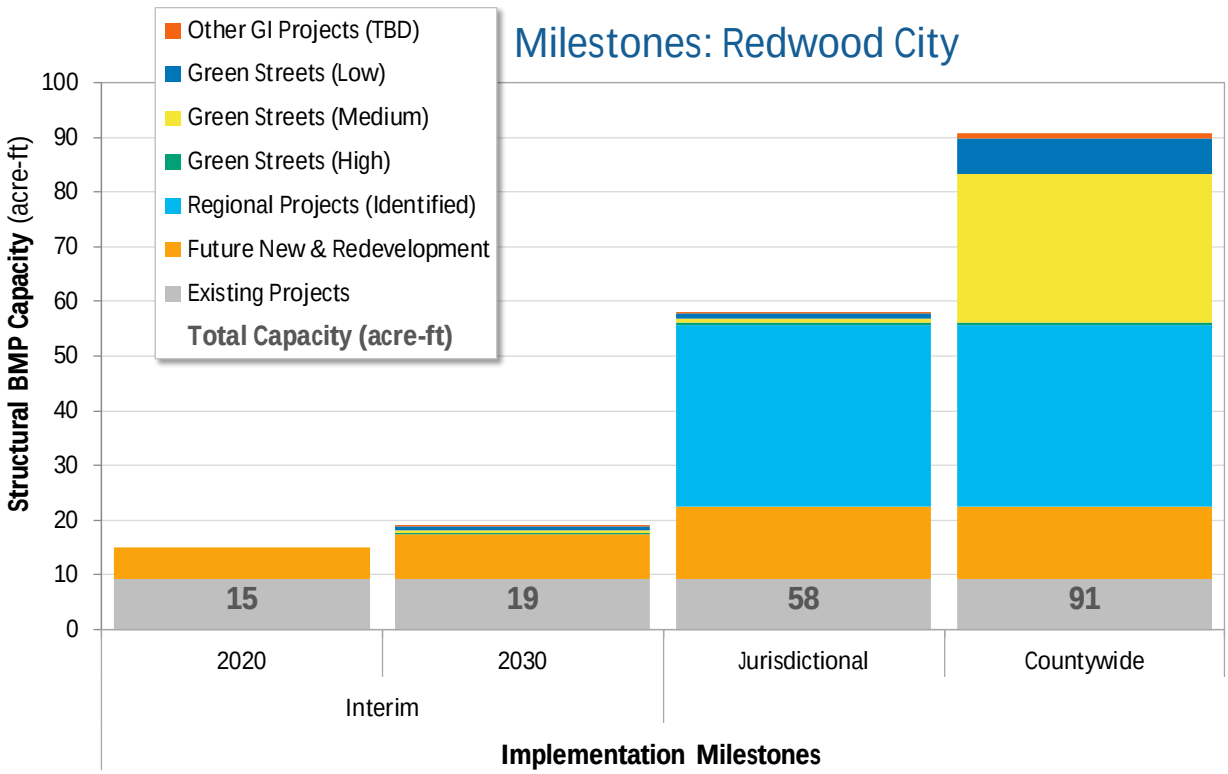

Figure D-14. Implementation Milestones: Redwood City.

Table D-14. Implementation Milestones: Redwood City

Implementation Metrics		Implementation Milestones: Redwood City					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	7.9%	3.8%	6.2%	14.1%	17.9%	36.7%
	Volume Managed (acre-ft/yr)	121.9	59.3	207.2	329.1	388.4	732.1
	Treated Impervious (acres)	33.1	89.3	150.5	183.6	272.9	652.0
Capacities (acre-ft)	Existing Projects	0.0	0.0	9.2	9.2	9.2	9.2
	Future New & Redevelopment	2.4	5.1	5.8	8.2	13.4	13.4
	Regional Projects (Identified)	--	33.1	--	--	33.1	33.1
	Green Streets (High)	0.4	0.1	--	0.4	0.5	0.6
	Green Streets (Medium)	0.3	0.4	--	0.3	0.8	27.1
	Green Streets (Low)	0.8	0.0	--	0.8	0.8	6.5
	Other GI Projects (TBD)	0.1	0.2	--	0.1	0.3	1.0
	Total	**4.0**	**39.0**	**15.0**	**19.0**	**58.0**	**90.8**

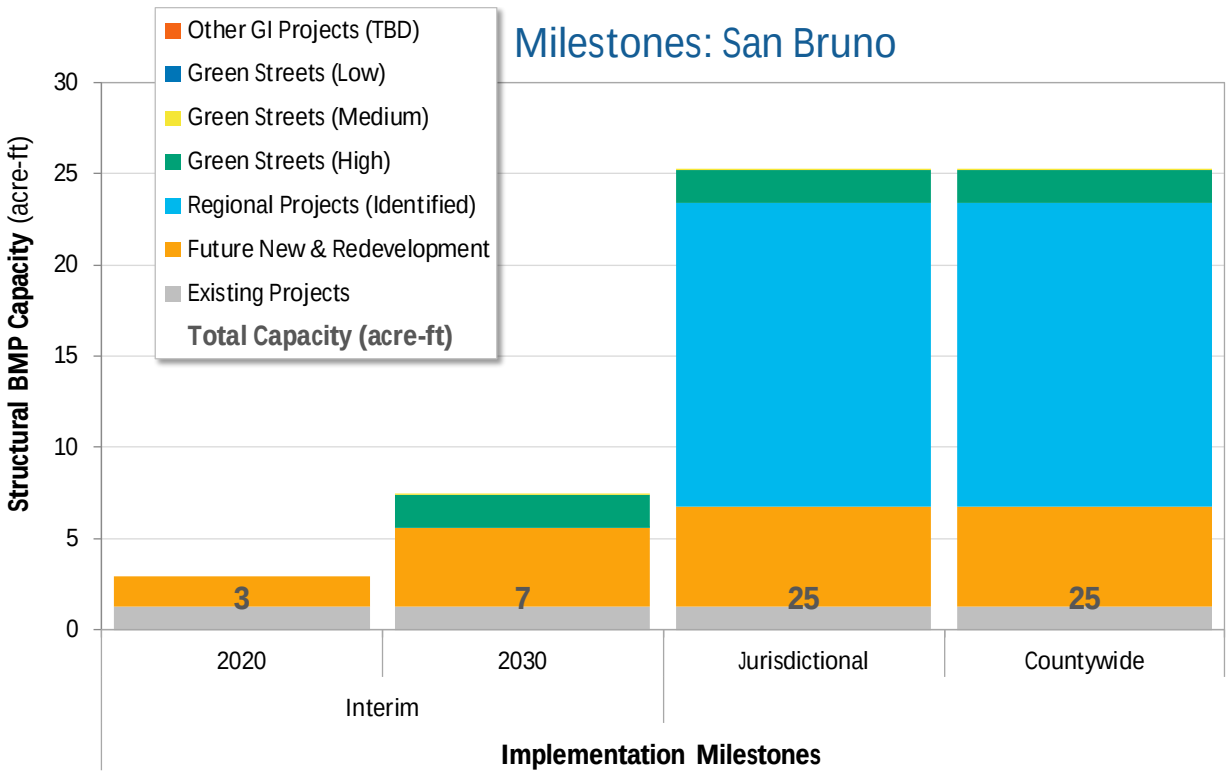

Figure D-15. Implementation Milestones: San Bruno.

Table D-15. Implementation Milestones: San Bruno

Implementation Metrics		Implementation Milestones: San Bruno					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	3.8%	10.8%	3.1%	7.0%	17.8%	17.8%
	Volume Managed (acre-ft/yr)	39.1	110.5	52.7	91.8	202.4	202.4
	Treated Impervious (acres)	23.2	124.6	20.9	44.1	168.7	168.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	1.2	1.2	1.2	1.2
	Future New & Redevelopment	2.6	1.2	1.7	4.4	5.5	5.5
	Regional Projects (Identified)	0.0	16.6	--	0.0	16.7	16.7
	Green Streets (High)	1.8	0.0	--	1.8	1.8	1.8
	Green Streets (Medium)	0.1	0.0	--	0.1	0.1	0.1
	Green Streets (Low)	--	--	--	--	--	--
	Other GI Projects (TBD)	--	--	--	--	--	--
	Total	**4.5**	**17.8**	**3.0**	**7.4**	**25.3**	**25.3**

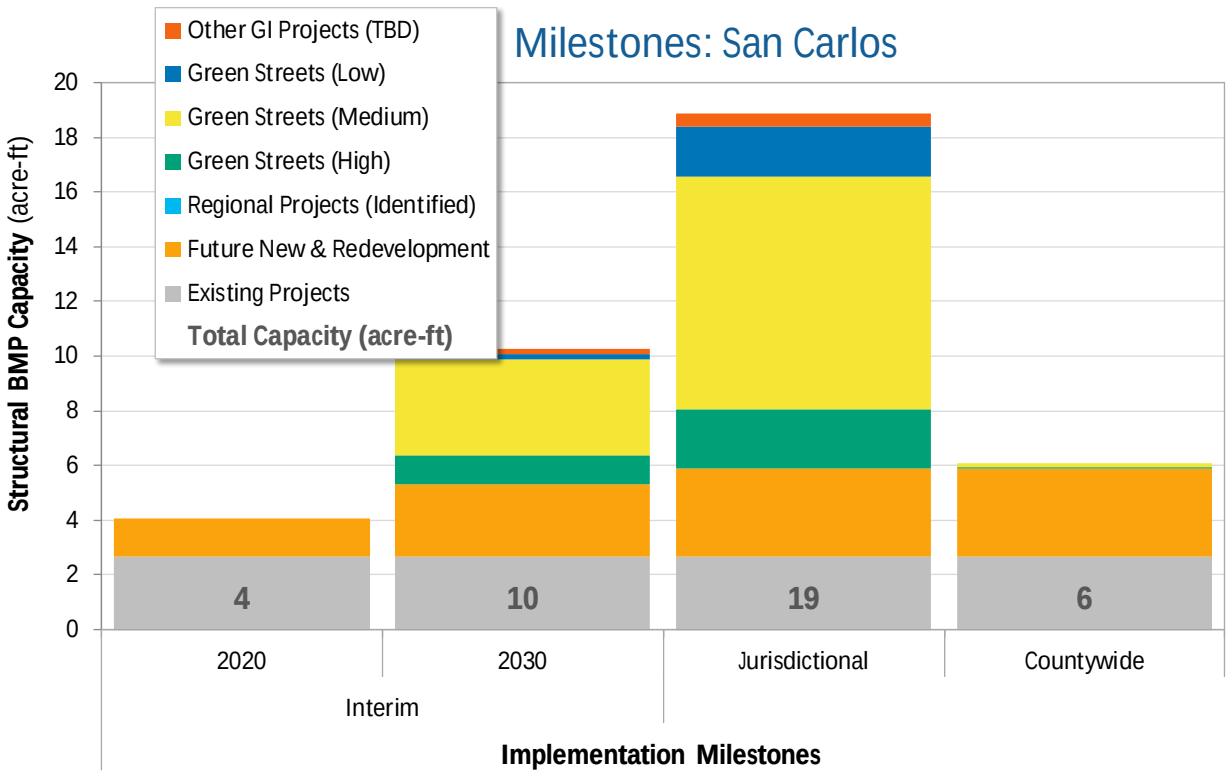

Figure D-16. Implementation Milestones: San Carlos.

Table D-16. Implementation Milestones: San Carlos

Implementation Metrics		Implementation Milestones: San Carlos					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	4.1%	11.1%	3.2%	7.3%	18.4%	3.6%
	Volume Managed (acre-ft/yr)	67.7	183.5	57.1	124.9	308.4	61.0
	Treated Impervious (acres)	18.8	172.6	44.9	63.7	236.3	79.9
Capacities (acre-ft)	Existing Projects	0.0	0.0	2.7	2.7	2.7	2.7
	Future New & Redevelopment	1.2	0.6	1.4	2.6	3.2	3.2
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	1.1	1.1	--	1.1	2.2	0.0
	Green Streets (Medium)	3.5	5.0	--	3.5	8.5	0.2
	Green Streets (Low)	0.2	1.7	--	0.2	1.9	--
	Other GI Projects (TBD)	0.2	0.3	--	0.2	0.4	--
	Total	**6.2**	**8.6**	**4.1**	**10.3**	**18.8**	**6.1**

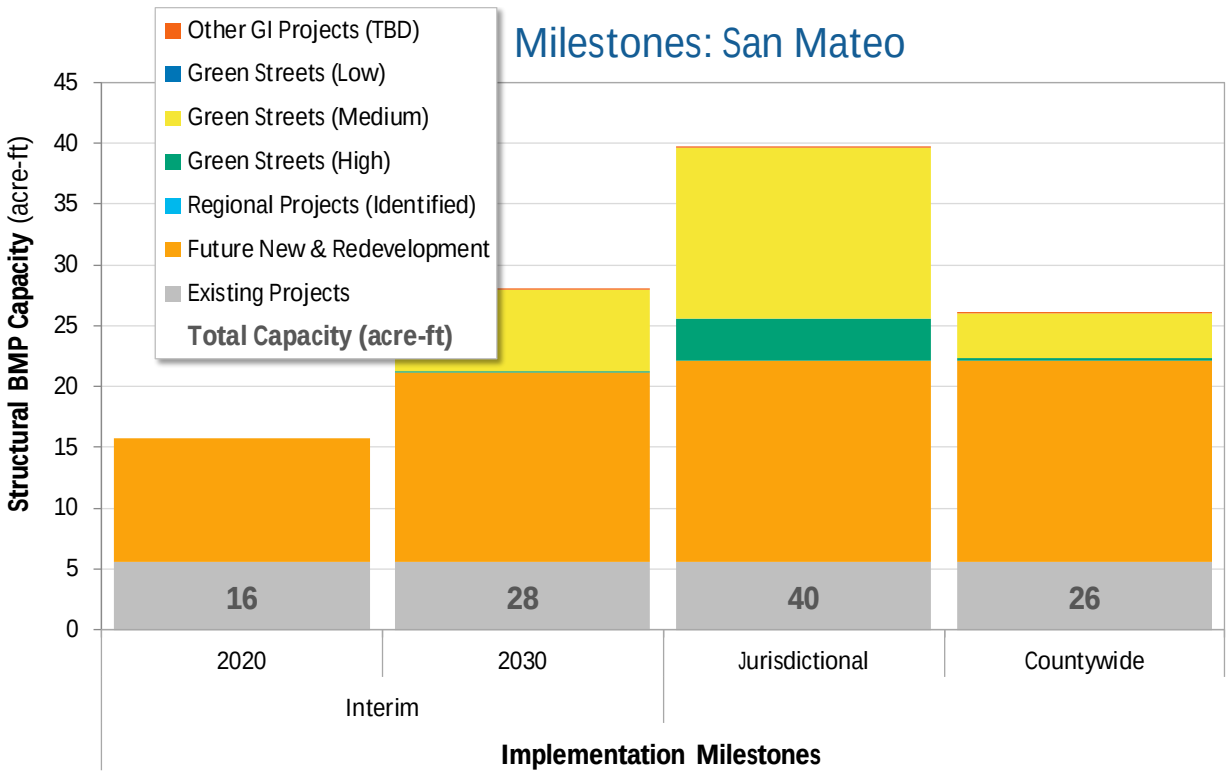

Figure D-17. Implementation Milestones: San Mateo.

Table D-17. Implementation Milestones: San Mateo

Implementation Metrics		Implementation Milestones: San Mateo					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	5.3%	4.4%	8.3%	13.6%	18.0%	8.9%
	Volume Managed (acre-ft/yr)	169.9	141.6	272.3	442.2	583.8	299.9
	Treated Impervious (acres)	71.3	207.8	178.0	249.3	457.0	298.0
Capacities (acre-ft)	Existing Projects	0.0	0.0	5.6	5.6	5.6	5.6
	Future New & Redevelopment	5.3	1.0	10.2	15.5	16.5	16.5
	Regional Projects (Identified)	--	--	--	--	--	--
	Green Streets (High)	0.2	3.2	--	0.2	3.4	0.2
	Green Streets (Medium)	6.7	7.5	--	6.7	14.1	3.7
	Green Streets (Low)	--	--	--	--	--	--
	Other GI Projects (TBD)	0.0	0.0	--	0.0	0.0	0.0
	Total	**12.2**	**11.7**	**15.8**	**27.9**	**39.6**	**26.0**

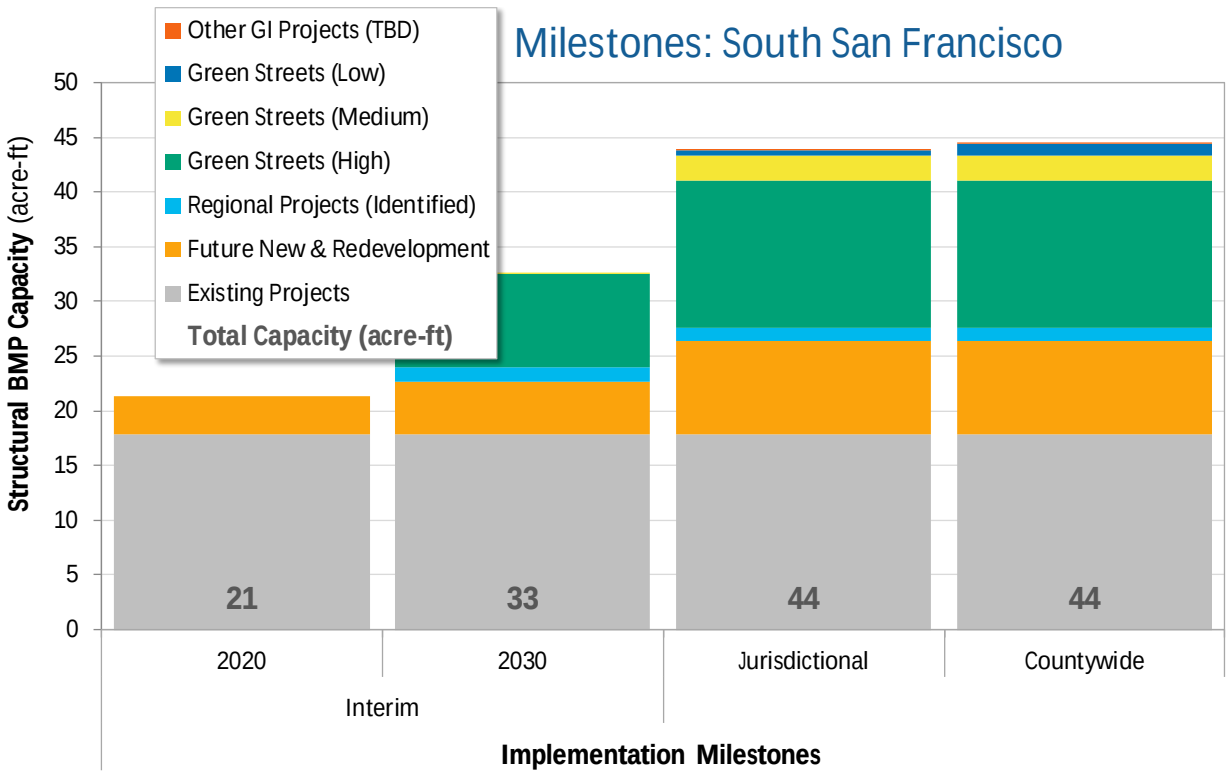

Figure D-18. Implementation Milestones: South San Francisco.

Table D-18. Implementation Milestones: South San Francisco

Implementation Metrics		Implementation Milestones: South San Francisco					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	4.7%	5.7%	7.6%	12.3%	18.0%	18.9%
	Volume Managed (acre-ft/yr)	81.9	99.1	347.1	429.0	528.2	554.6
	Treated Impervious (acres)	50.1	315.8	210.9	261.1	576.9	594.6
Capacities (acre-ft)	Existing Projects	0.0	0.0	17.9	17.9	17.9	17.9
	Future New & Redevelopment	1.4	3.6	3.5	4.8	8.5	8.5
	Regional Projects (Identified)	1.3	0.0	--	1.3	1.3	1.3
	Green Streets (High)	8.6	4.9	--	8.6	13.4	13.4
	Green Streets (Medium)	0.0	2.3	--	0.0	2.3	2.4
	Green Streets (Low)	--	0.5	--	--	0.5	1.0
	Other GI Projects (TBD)	--	0.0	--	--	0.0	0.0
	Total	**11.2**	**11.3**	**21.3**	**32.5**	**43.8**	**44.4**

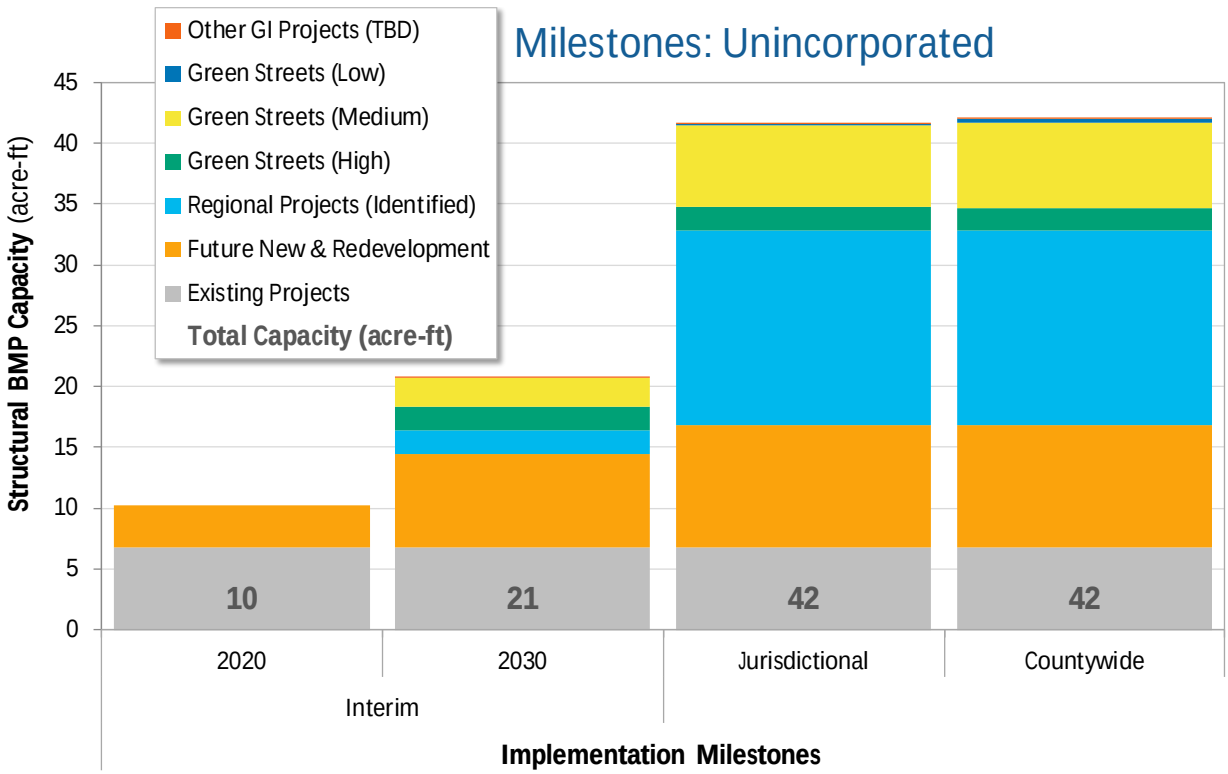

Figure D-19. Implementation Milestones: Unincorporated.

Table D-19. Implementation Milestones: Unincorporated

Implementation Metrics		Implementation Milestones: Unincorporated					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	7.4%	6.6%	3.6%	11.1%	17.7%	22.6%
	Volume Managed (acre-ft/yr)	110.7	98.2	97.8	208.5	306.7	379.3
	Treated Impervious (acres)	88.0	113.9	40.3	128.3	242.2	246.4
Capacities (acre-ft)	Existing Projects	0.0	0.0	6.7	6.7	6.7	6.7
	Future New & Redevelopment	4.1	2.4	3.5	7.7	10.0	10.0
	Regional Projects (Identified)	2.0	13.9	--	2.0	16.0	16.0
	Green Streets (High)	1.9	0.1	--	1.9	2.0	1.9
	Green Streets (Medium)	2.3	4.4	--	2.3	6.7	7.0
	Green Streets (Low)	--	0.1	--	--	0.1	0.3
	Other GI Projects (TBD)	0.0	0.1	--	0.0	0.1	0.1
	Total	**10.4**	**21.0**	**10.3**	**20.7**	**41.7**	**42.1**

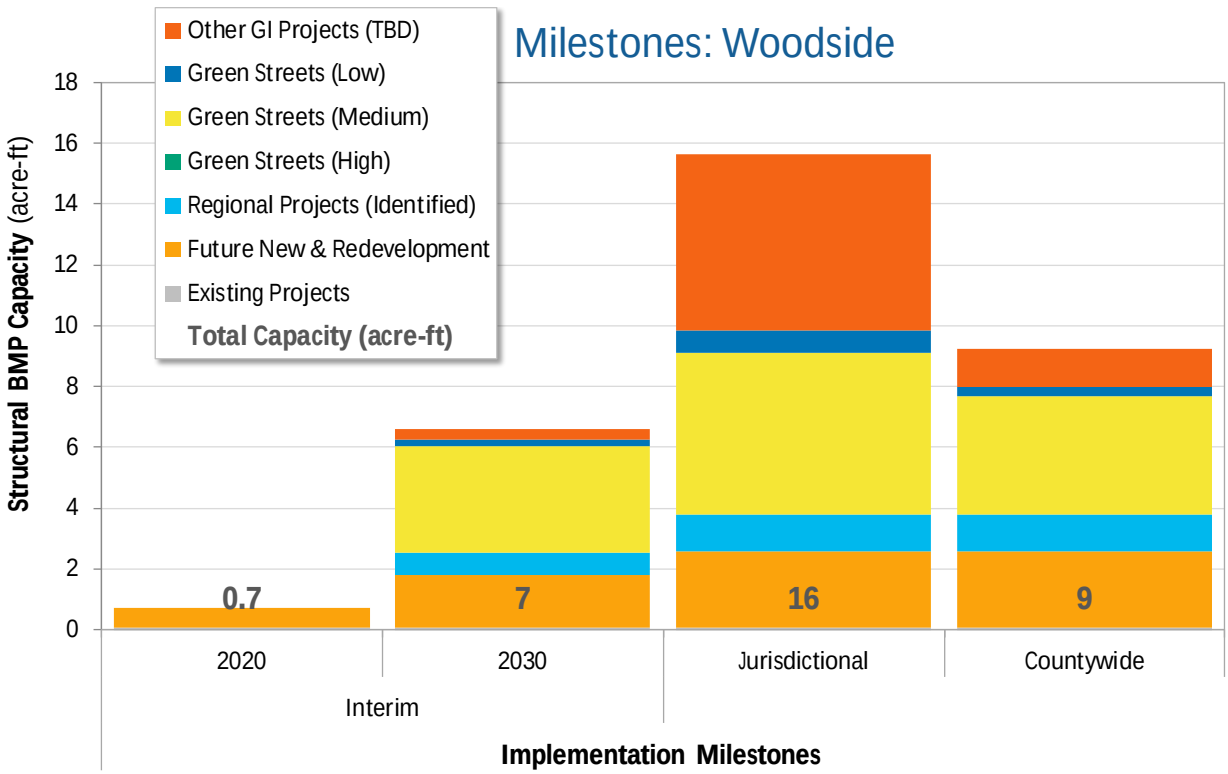

Figure D-20. Implementation Milestones: Woodside.

Table D-20. Implementation Milestones: Woodside

Implementation Metrics		Implementation Milestones: Woodside					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	8.1%	9.2%	0.3%	8.5%	17.6%	8.1%
	Volume Managed (acre-ft/yr)	68.3	76.8	11.4	79.6	156.5	54.2
	Treated Impervious (acres)	40.7	46.1	0.3	41.0	87.1	76.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	0.1	0.1	0.1	0.1
	Future New & Redevelopment	1.1	0.8	0.6	1.7	2.5	2.5
	Regional Projects (Identified)	0.8	0.5	--	0.8	1.2	1.2
	Green Streets (High)	--	--	--	--	--	--
	Green Streets (Medium)	3.5	1.8	--	3.5	5.3	3.9
	Green Streets (Low)	0.2	0.5	--	0.2	0.7	0.3
	Other GI Projects (TBD)	0.3	5.5	--	0.3	5.8	1.3
	Total	**5.9**	**9.0**	**0.7**	**6.6**	**15.6**	**9.3**

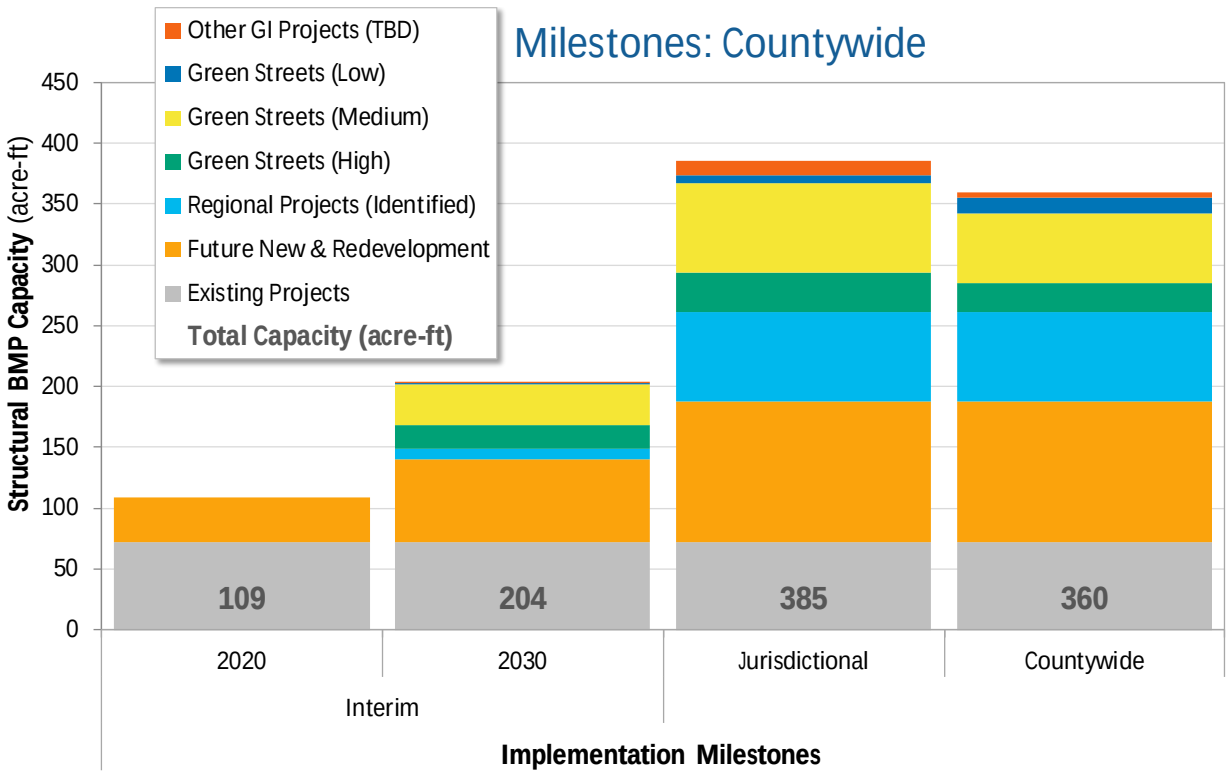

Figure D-21. Implementation Milestones: Countywide.

Table D-21. Implementation Milestones: Countywide

Implementation Metrics		Implementation Milestones: Countywide					
		Incremental		Cumulative		Final 2040	
		2020-2030	2030-2040	2020	2030	Jurisdictional	Countywide
Management Metrics	% Load Reduction	6.0%	7.5%	5.0%	11.0%	18.5%	17.6%
	Volume Managed (acre-ft/yr)	1,313.0	1,655.5	1,524.7	2,837.6	4,493.2	3,701.3
	Treated Impervious (acres)	627.0	1,945.8	916.3	1,543.2	3,489.1	3,395.7
Capacities (acre-ft)	Existing Projects	0.0	0.0	72.1	72.1	72.1	72.1
	Future New & Redevelopment	30.9	48.3	36.6	67.5	115.8	115.8
	Regional Projects (Identified)	9.0	64.6	--	9.0	73.6	73.6
	Green Streets (High)	20.0	12.6	--	20.0	32.6	24.0
	Green Streets (Medium)	32.9	40.7	--	32.9	73.6	57.1
	Green Streets (Low)	1.4	4.5	--	1.4	5.9	12.8
	Other GI Projects (TBD)	1.2	10.6	--	1.2	11.8	4.3
	Total	**95.3**	**181.3**	**108.7**	**204.0**	**385.3**	**359.7**

Appendix C

Phase III RAA – Source Control Load Reduction Accounting for RAA Report

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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Project Number: LA0499

August 31, 2020

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

---

[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

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1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

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mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

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E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

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- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

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LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

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5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

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$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

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9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

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$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

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Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

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10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

11. REFERENCES

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San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), 2014. Integrated Monitoring Report – Part C Pollutants of Concern Load Reduction Opportunities. March 2014.

SMCWPPP, 2018. Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reduction. Prepared by Paradigm Environmental for SMCWPPP. September 2018.

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), 2014. Watershed Monitoring and Assessment Program Integrated Monitoring Report – Part C Pollutants of Concern Load Reduction Opportunities. March 2014.

SCVURPPP, 2018. Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reduction. Prepared by Paradigm Environmental for SCVURPPP. September 2018.

Wu, J., Gilbreath, A.N., McKee, L.J., 2016. Regional Watershed Spreadsheet Model (RWSM): Year 5 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 788. San Francisco Estuary Institute, Richmond, California.

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APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

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was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

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A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

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Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

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Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

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APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

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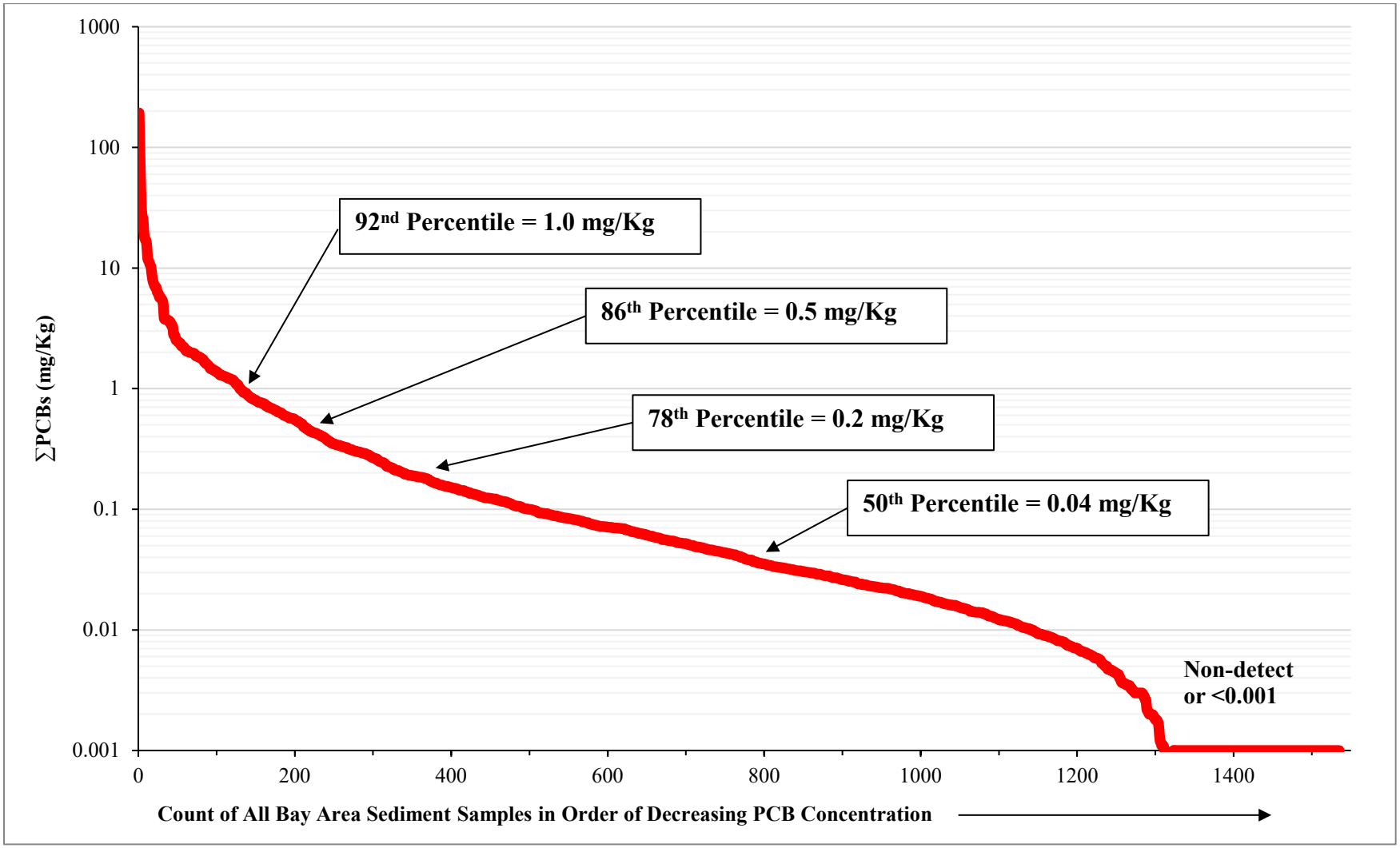

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

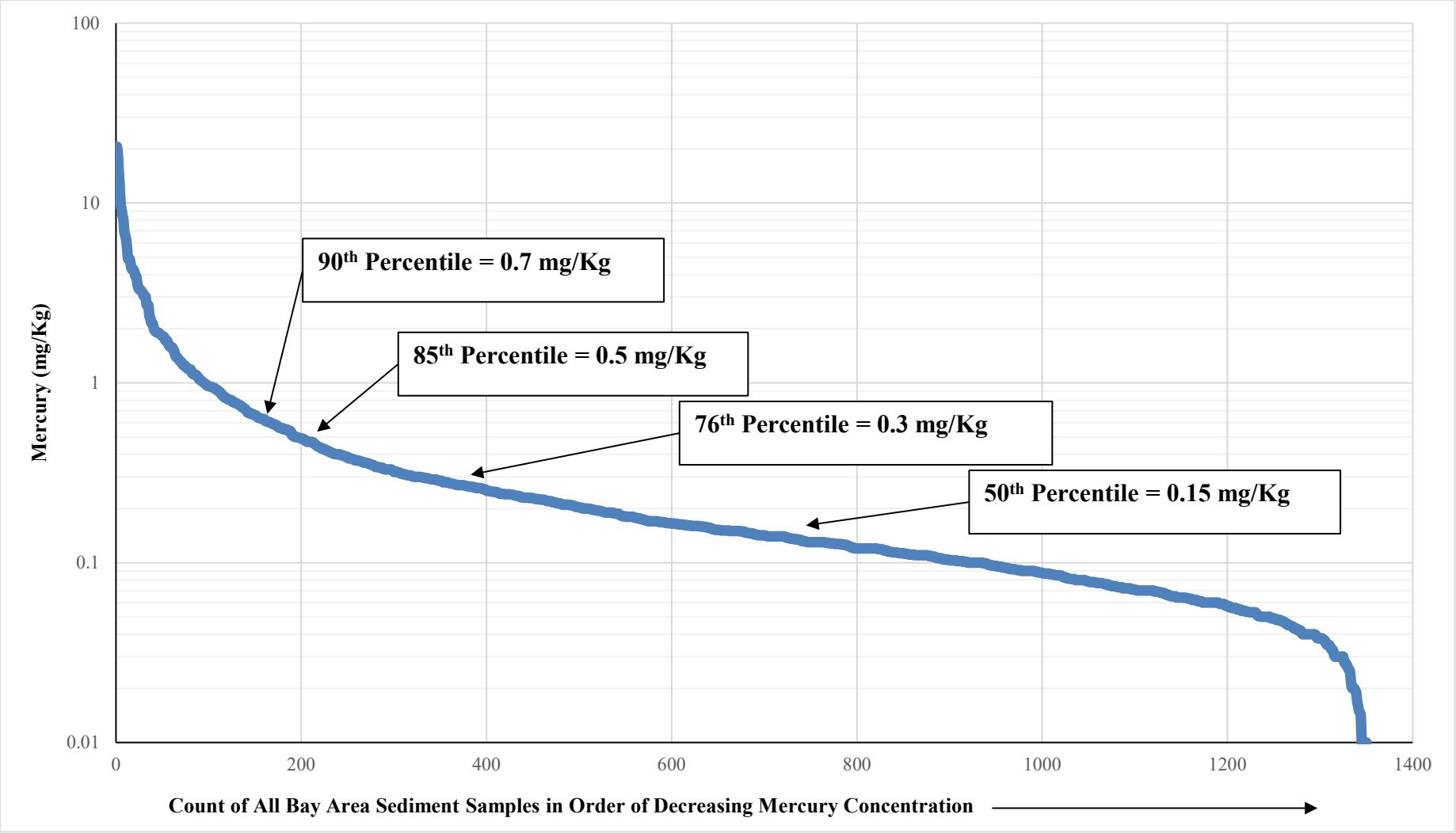

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C
Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

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E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

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APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

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11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

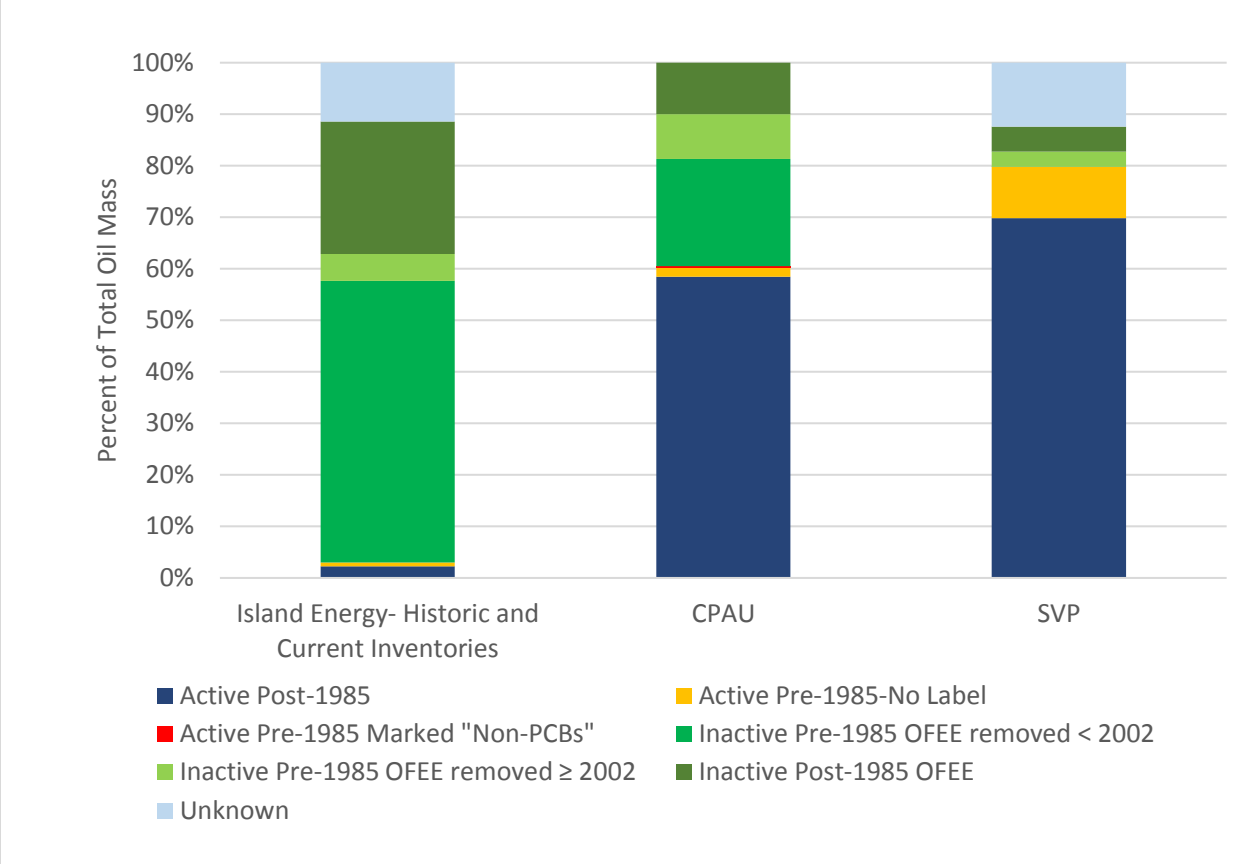

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

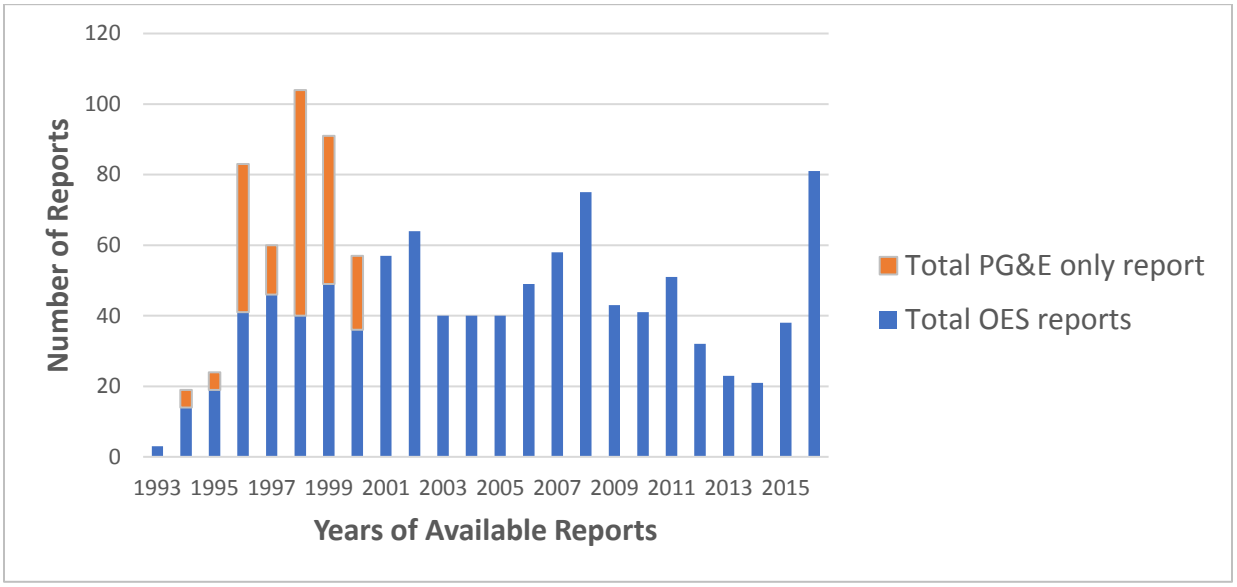

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

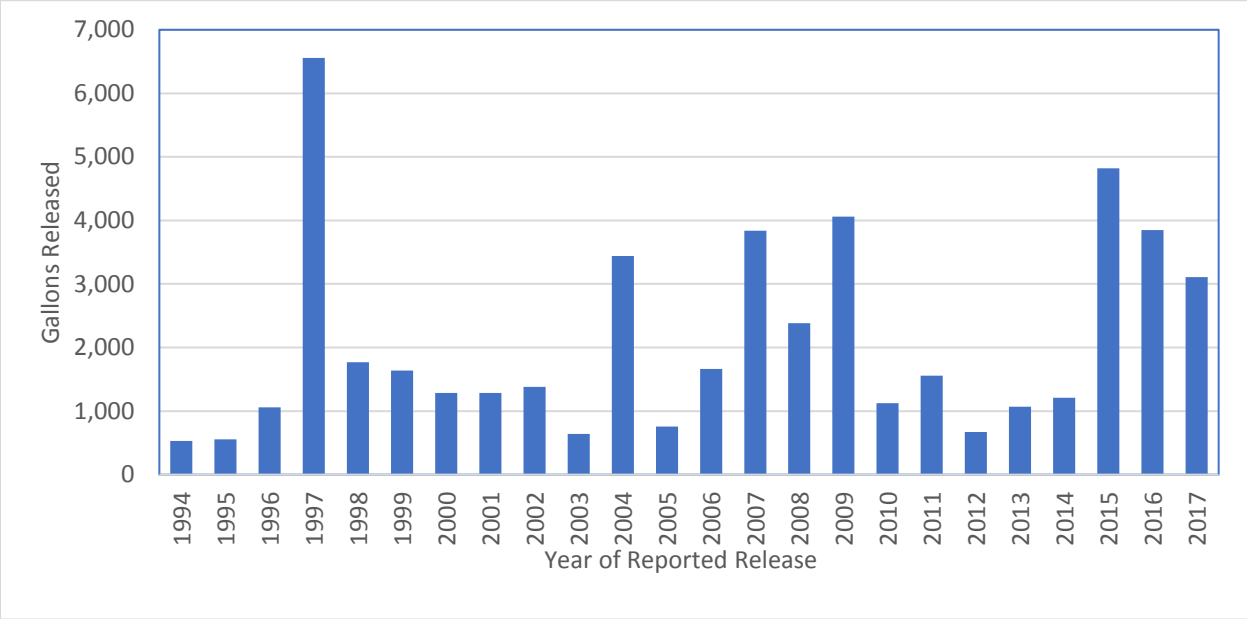

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

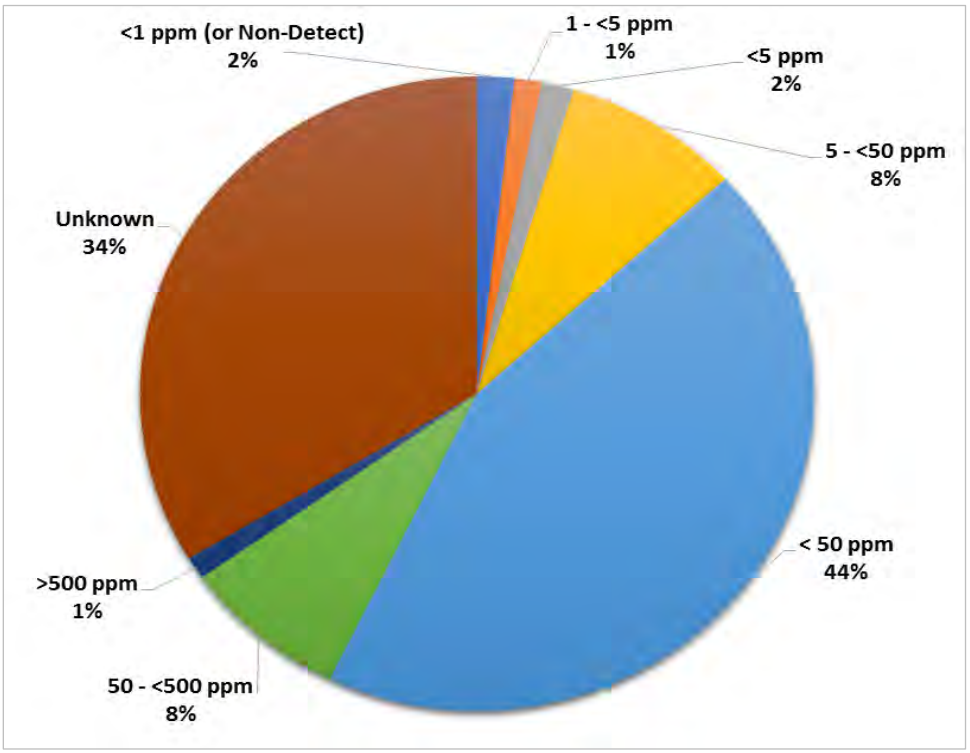

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

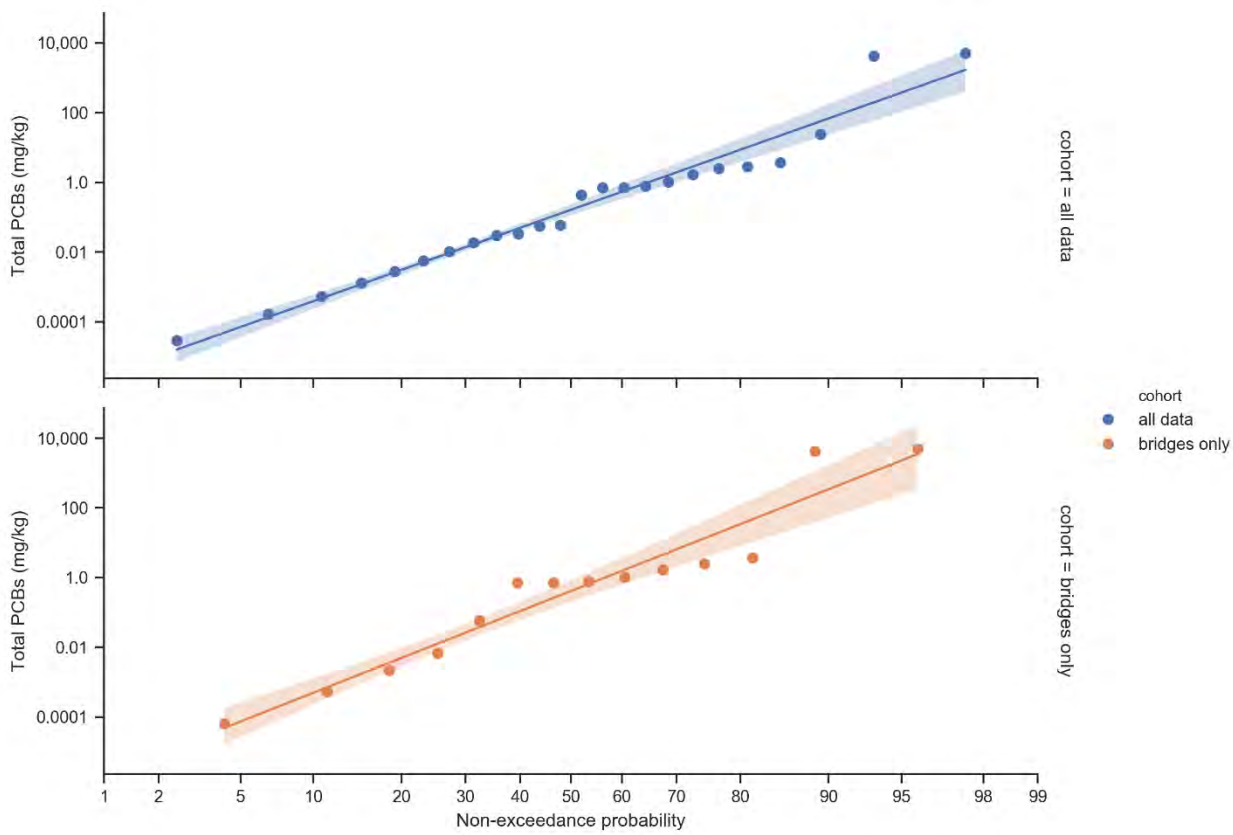

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

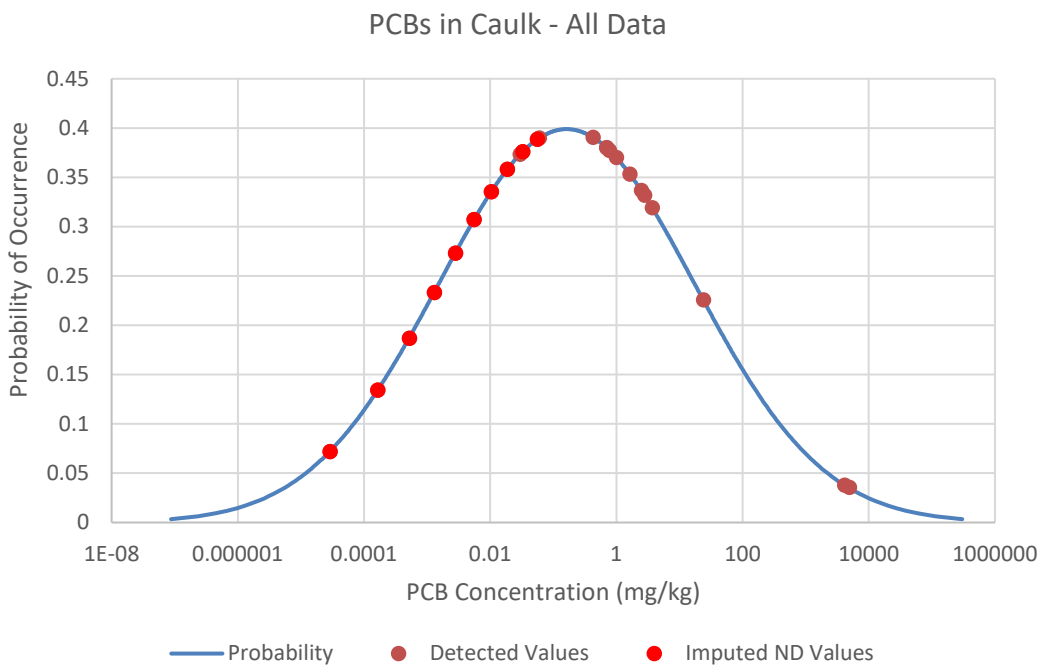

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

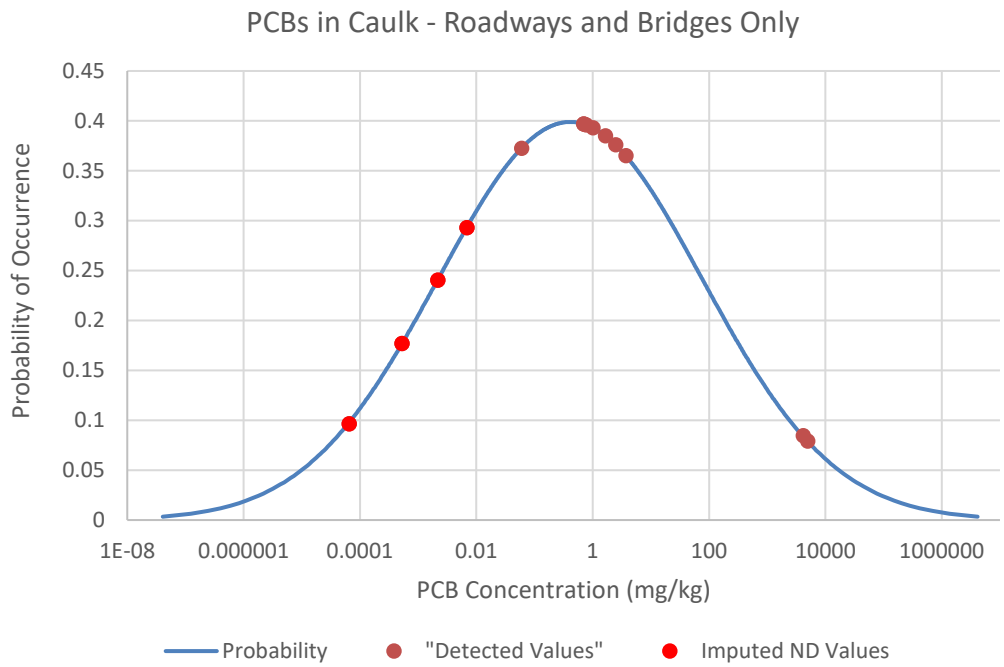

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

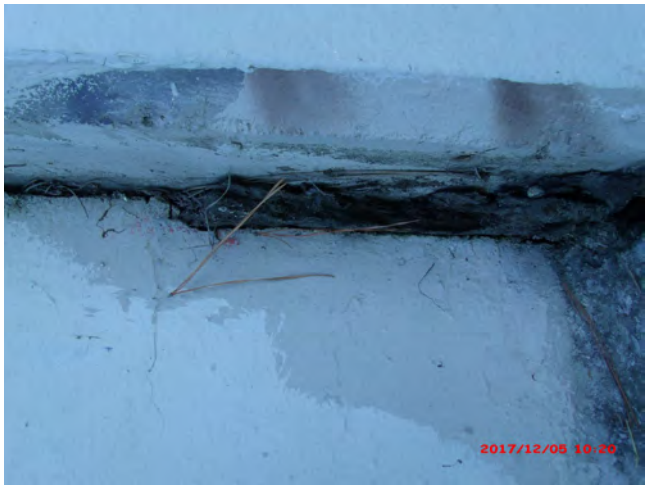

Composite D

Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

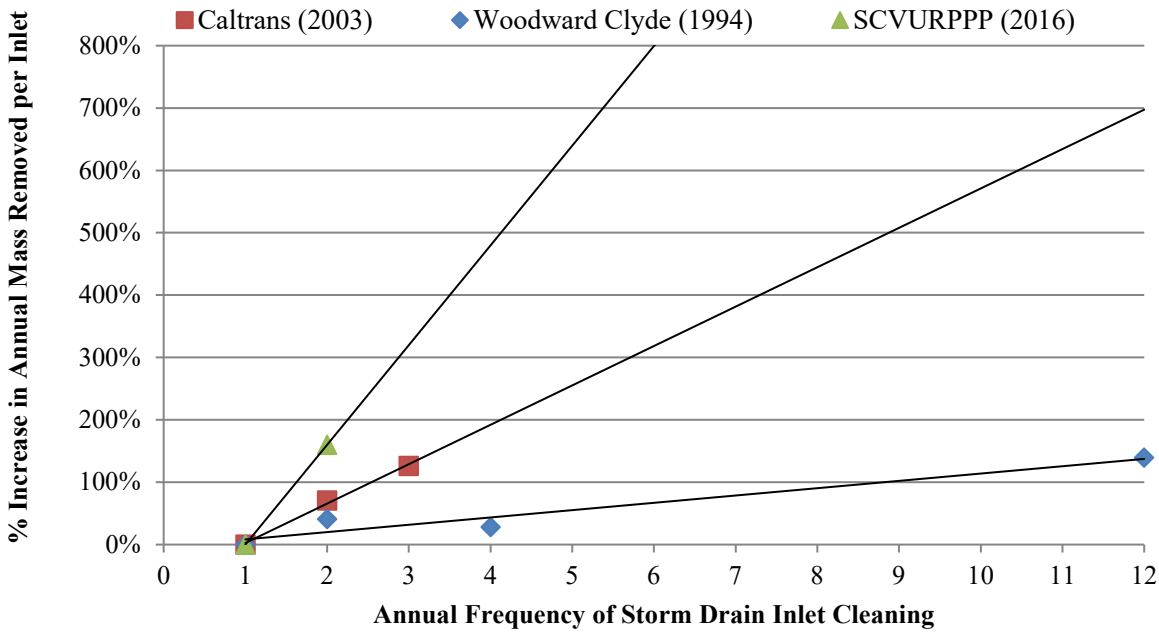

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:
1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:
Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

I.5 References

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Appendix 12

- Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program
- PCBS in Building Materials Management Program – Regional Data Summary

MEMORANDUM

TO: **BASMAA MPC Committee**

FROM: **Lisa Sabin and Jon Konnan, EOA, Inc.**

DATE: **September 23, 2020**

SUBJECT: **Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program**

1. BACKGROUND

The San Francisco Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. Provision C.12.f.ii(3) requires development of a data collection and assessment methodology program by July 1, 2019 to quantify PCBs loads reduced through implementation of the new program for controlling PCBs during building demolition, which began implementation on that date. Provision C.12.f.iii requires Permittees to submit the data collection and assessment methodology with their Fiscal Year (FY) 2019/20 Annual Reports, and states that this reporting should be at the regional level on behalf of all Permittees.

This technical memorandum provides administrative and technical support at the regional level for ongoing efforts by MRP Permittees to comply with data collection, evaluation, and reporting requirements under MRP Provision C.12.f. by:

- Documenting the regional process to collect data from the new program for controlling PCBs during building demolition;
- Presenting the assessment methodology to calculate PCBs loads reduced via the building demolition program;
- Documenting the results of additional literature searches and data gathering efforts conducted to set the stage for refining and reducing uncertainty in the parameters of the assessment methodology equation;
- Describing how data generated from the new demolition control program will be incorporated into the assessment methodology, including providing conversion factors needed for the load reduction calculations; and
- Addressing the MRP Provision C.12.f.iii requirement to submit the data collection and assessment methodology with their FY 2019/20 Annual Reports.

This technical memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration). The information provided builds upon a previous BASMAA effort that outlined a conceptual approach for the regional data collection process and assessment methodology (BASMAA 2018).

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2. REGIONAL DATA COLLECTION PROCESS

This section documents the regional data collection process for the new programs to manage PCBs-containing building materials during demolition that began on July 1, 2019. This process was developed through a collaborative effort by municipalities subject to the MRP, the associated countywide stormwater management programs, and BASMAA. The regional data collection process focuses on collecting, compiling, and evaluating the data generated by the new programs on a regional basis. In addition, when sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program.
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

The regional data collection process involves collection of data from individual permit applicants at the municipal level, followed by compilation of data for applicable structures[1] at the countywide level, and data evaluation and reporting at the regional level. The process is described below.

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality. For non-applicable buildings, applicants simply check the boxes, certify, and submit to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and estimated demolition dates, with their FY 2019/20 Annual Reports.

The regional data management system is an Excel spreadsheet-based tool for storing and managing the data from each Permittee. The tool also calculates the estimated loads avoided throughout the region via implementation of the new management program, using the assessment methodology and data inputs described below.

3. ASSESSMENT METHODOLOGY

This section describes the assessment methodology and refined data inputs for estimating the loads of PCBs to municipal separate storm sewer systems (MS4s) that are avoided due to implementation of new controls to manage PCBs in building materials during demolition activities. To-date, the load of PCBs reduced through management of PCBs during demolition has been calculated using Equation 1:

Equation 1. $$Load\ of\ PCBs\ Reduced = N \bullet M \bullet SW \bullet E_f$$

Where:

N = Number of applicable structures with PCBs concentrations ≥ 50 ppm demolished each year (structures/yr)

M = Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm (kg/structure)

SW = Average fraction of PCBs that enters the MS4 due to demolition without new demolition program controls (dimensionless fraction)

E_f = Average fraction of PCBs prevented by new demolition program controls from entering MS4 (dimensionless fraction)

The MRP 2.0 Factsheet (SFBRWQCB 2015) provides values for each of the four terms in Equation 1 that were used to stipulate the load reduction for implementing the new demolition control program across the MRP area, which was a total of 2 kg/yr. Table 1 presents the values used for each of the four terms in the Factsheet to derive the 2 kg/yr PCBs load reduction credit. The Factsheet notes that each of the terms could be represented by a range of values and the information available to estimate the values of these terms shown in Table 1 was limited.

BASMAA (2018) summarized the above MRP 2.0 Factsheet approach and other previous efforts to estimate PCBs loads from demolition and potential loads reduced by control programs. It also presented a conceptual approach to refining the 2 kg/year PCBs load reduction estimate by describing methods to potentially refine the values of each of the four Equation 1 parameters shown in Table 1. Building upon the approach described in that document, additional literature searches and data gathering efforts were conducted to set the stage for refining and reducing uncertainty in the values of the four terms. For the first two parameters, data will be incorporated as they are generated from the new demolition control programs. The results of these efforts are presented below.

Table 1. Terms in MRP 2.0 Factsheet (SFBRWQCB 2015) equation used to stipulate the loading of PCBs to MS4s avoided by implementing demolition control measures.

Term	Symbol	Term Definition	Value	Units
1	*N*	Number of applicable structures demolished per year with PCBs concentrations ≥ 50 ppm	50	structures/year
2	*M*	Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm	5	kg/structure
3	*SW*	Average fraction of PCBs that enters MS4s due to demolition without controls[1]	0.01	dimensionless fraction
4	E_f	Average fraction of PCBs prevented by controls[1] from entering MS4 (i.e., assumed effectiveness of controls)	0.8	dimensionless fraction

1. The term "controls" refers to the proposed new demolition management program, not existing construction controls.

Term 1: Number of Applicable Structures Demolished Per Year

Current Basis

A study conducted by the San Francisco Estuary Institute (SFEI) reported a medium estimate of 521 building demolitions per year in commercial and industrial land uses in the study area, based on Bay Area Air Quality Management District (BAAQMD) asbestos abatement permitting data.[2] The SFEI study also reported the following medium estimates: 46% of the demolished buildings were built between 1950 and 1980 and 36% had PCBs concentration in caulks/sealants greater than 50 ppm (Klosterhaus et al. 2011). Multiplying (521) x (0.46) x (0.36) results in an estimated 86 commercial and industrial buildings demolished per year that were built between 1950 and 1980 and had PCBs concentration in caulks/sealants greater than 50 ppm.

Based upon information in the SFEI study and considering that the scope of the program to manage PCBs during demolition is limited to exclude wood frame buildings, the MRP Factsheet assumed 50 applicable structures with PCBs concentrations ≥ 50 ppm are demolished per year in the Bay Area (SFBRWQCB 2015).

Basis for Refinement

Data gathered during the new demolition control programs will be used to document the number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year throughout the MRP area. These data will be used to calculate a regional annual average number of applicable

[2] The BAAQMD regulations require that a "J Number" be applied for and obtained before applying for a building permit for demolition of an existing structure or renovations removing greater than 100 square feet of asbestos material within the San Francisco Bay air basin.

structures with PCBs concentrations ≥ 50 ppm that are demolished. This regional annual average value will be used for Term 1 in Equation 1 (see Table 1).

As part of implementing the new demolition controls that began in July 2019, applicants for demolition permits are required to submit a Screening Form to the municipality with jurisdiction for each applicable structure. Permittees will submit these forms to their countywide stormwater programs, which will document the number of applicable structures with PCBs concentrations ≥ 50 ppm within each jurisdiction that are demolished each year. This information will be compiled in the regional database described previously (Section 2) and used to calculate an annual average number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year in the region. Use of these real-world data collected in the MRP area will substantially reduce the uncertainty that is currently associated with the estimated value for Term 1 that was used in the MRP 2.0 Factsheet.

Term 2: Average Mass of PCBs per Applicable Structure

Current Basis

The SFEI study included estimating the mass of PCBs in caulks in Bay Area buildings and releases to stormwater runoff during renovation and demolition (Klosterhaus et al. 2011). Using a blind sampling approach, the SFEI study collected 25 caulk samples from the exterior of ten commercial and industrial buildings constructed in the study area between 1950 and 1980. The study area was the portion of the San Francisco Bay Area covered by the MRP: Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and the cities of Fairfield, Suisun, and Vallejo. The caulk samples were analyzed for PCBs, which were detected in 88% of the samples, with 40% exceeding 50 ppm, the concentration at which caulk falls under U.S. Environmental Protection Agency (USEPA) regulations (Federal Register 2010). Detectable PCBs concentrations ranged over six orders of magnitude, from 1 to 220,000 ppm. These data were consistent with previous studies in other cities (Klosterhaus et al. 2011).

A geographic information system (GIS)–based approach was then used to estimate the number, area, and volume of currently standing buildings in the study area that were built during the era of greatest PCBs use in caulk. The approach used historical imagery and contemporary land use and involved characterization of randomly selected buildings within the study area, with the result scaled up to extrapolate total building counts and areas in the MRP footprint. Various assumptions, including the frequency of anticipated PCBs detection and PCBs concentrations in the caulk, average mass of caulk per unit building volume, and average building volume, were then applied to calculate an estimate of the total PCBs mass in building caulk in the study area. The evaluation resulted in a mid–range estimate of 10,500 kg PCBs in caulk in buildings located in the study area (low and high estimates were 767 and 46,000 kg, respectively), which equated to an average of 4.7 kg PCBs per building (low and high estimates were 0.6 and 16 kg per building, respectively). The estimate included caulk located on both the interior and exterior of buildings (Klosterhaus et al. 2011). Based upon the information in the SFEI study, the MRP Factsheet assumed an average applicable structure with PCBs concentrations ≥ 50 ppm in the Bay Area contains 5 kg of PCBs (SFBRWQCB 2015).

Basis for Refinement

Data gathered as part of the new demolition control programs will be used to document the quantities and associated PCBs concentrations of priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm. These data will be used to calculate a regional average mass of PCBs per

applicable structure with PCBs concentrations ≥ 50 ppm in priority materials. This calculated regional average mass will be used for the value of Term 2 in Equation 1 (see Table 1).

Because of the new program to manage PCBs in building materials during demolition activities, Permittees have the opportunity to gather real-world data to estimate the mass of PCBs in priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm that is demolished in the region. Over time, these data will be compiled into a dataset that can be used to calculate a regional average mass. This calculated average will account for five priority building materials that potentially contain PCBs previously identified for the program (caulk, rubber window gaskets, thermal insulation, fiberglass insulation, and mastic adhesives), while the estimate in the MRP Factsheet (Table 1) is based upon caulk only.

The information provided in the Screening Form includes two types of data that are needed to calculate the mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm: (1) the quantity of each priority material in the structure, and (2) the concentration of PCBs in each priority material in the structure. These data will be used as inputs in Equation 2 to calculate the total mass of PCBs in the five priority materials for each applicable structure with PCBs concentrations ≥ 50 ppm that undergoes demolition beginning July 1, 2019.

Equation 2. $$Mass\ of\ PCBs\ per\ Structure\ (mg) = [\sum_{i=1}^{n}(C_i \bullet Q_i \bullet F_i)]$$

Where:

C_i = Concentration of PCBs in priority material i (mg/kg)

Q_i = Quantity of priority material i (linear feet or square feet)

F_i = Conversion factor – mass of priority material per linear foot of priority material i (kg/ft) or mass of priority material i per square foot of priority material i (kg/ft^2)

Equation 2 only accounts for the PCBs mass associated with the five priority building materials, so may represent an underestimate of the total PCBs mass in a given building. However, the extent of the underestimate would be small if the five priority materials contain most of the PCBs mass in a building.

The PCBs concentrations in each priority material (C_i) that will be used in Equation 2 is provided on the Screening Form for each applicable structure in units of mg of PCBs per kg of priority material (mg/kg).[3]

[3] Please note that this memorandum does not provide guidance on determining a representative PCBs concentration when multiple samples are collected from a single homogeneous area of a building material, per the sampling protocol (e.g., applying average vs. geomean vs. median to determine central tendency when multiple sample results are available). This type of determination should be made once sufficient data are available about PCBs concentration distributions in building material samples (e.g., after two or three years of data have been collected).

The quantity of each priority material (Q_i) that will be used in Equation 2 is provided on the Screening Form in units of linear feet (ft) for caulk and rubber window gaskets, and square feet (ft^2) for thermal or fiberglass insulation and mastic adhesives. Conversion factors (F_i) for each priority material i were developed to provide the mass of priority material per linear foot or per square foot using Equation 3.

Equation 3. $$\boldsymbol{F_i = (D_i \times \rho_i)}$$

Where:

F_i = mass of priority material i per linear foot (of caulk or rubber window gaskets) of i (kg/ft) or mass of priority material i per square foot (of insulation or mastic) of i (kg/ft^2)

D_i = Assumed dimensions of priority material i (ft^2 or ft)

- For caulk and rubber window gaskets, this represents the assumed cross-sectional area of the caulk bead or the gasket in square feet.
- For insulation and mastic, this represents the thickness of the layer of material in feet.

ρ_i = Assumed density of priority material i (kg/ft^3)

Conversion factors that were developed for each priority building material are shown in Table 2. For caulk and rubber window gaskets, the conversion factors estimate the mass of material per linear foot (kg/ft). For thermal or fiberglass insulation and mastic adhesives, the conversion factors estimate the mass of material per square foot (kg/ft^2). Table 2 identifies typical applications for each priority material and the associated conversion factors that were developed for that application. The conversion factors are presented as a range of values and a "Best" value based on the average or mid-range value.

To develop the conversion factors shown in Table 2, data on common priority material dimensions and densities used in typical building construction were gathered through literature review, product technical specifications, building construction guidelines, and other relevant resources (Panke and Cook 1992, Scheffler and Connolly 1996, Jester 1995). The ranges of assumed dimensions and densities that were used to develop the conversion factors are shown in Table 3. Additional information on the assumptions and data used to populate Table 3 and develop the conversion factors shown in Table 2 is presented below.

Product Dimensions

Multiple construction guides were consulted to identify typical dimensions for common applications of priority materials in building construction. For caulk or rubber gaskets, Table 3 provides a range of typical heights and widths of applications around windows and doorframes, and for caulk, also between concrete expansion joints. For fiberglass or thermal insulation, Table 3 provides a range of typical thicknesses for applications used around HVAC systems, heathers, boilers, and pipes, and inside walls or crawl spaces. For mastic adhesives, Table 3 provides typical thicknesses of the material used under or between roofing material and flashing or used on surfaces between carpet and floor tiles. These dimensions apply to newly applied or installed products and may not reflect the dimensions of an aged/weathered product but represent the best information currently readily available.

Table 2. Conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Descriptions of typical application	Material[1,2,3]	Conversion Factors				
			Range			Best (Average or mid-range value)	Units
Caulk	Around windows or window frames; around door frames	polysulfide caulk	0.009	-	0.04	0.02	kg/ft
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.01	-	0.15	0.04	kg/ft
Rubber Window Gaskets	Around windows or window frames	Butyl Rubber	0.02	-	0.06	0.03	kg/ft
Thermal or Fiberglass Insulation	Around HVAC systems/ heaters/boilers	Felt Insulation	0.09	-	2.3	0.82	kg/ft^2
		Unfaced Blanket Fiberglass	0.03	-	0.28	0.16	kg/ft^2
	Around heated transfer piping	Fiberglass Pipe Insulation	0.06	-	0.62	0.26	kg/ft^2
	Inside walls or crawl spaces	Loose Fiberglass Fill/Batting	0.17	-	0.24	0.21	kg/ft^2
		Rigid Fiberglass Foam Board	0.03	-	0.45	0.17	kg/ft^2
Adhesive Mastics	Below carpet and floor tiles	Floor Mastic	0.06	-	0.13	0.10	kg/ft^2
	On, under or between roofing materials and flashing	Roof Mastic	0.30	-	0.74	0.50	kg/ft^2

1. Panke and Cook, 1992.
2. Scheffler, M. and Connolly, J. 1996.
3. Jester, T.C. 1995.

Product Densities

The density information reported in Table 3 was gathered from readily available commercial literature on a range of reported densities for the five priority materials. Where possible, information on products that were used in the 1950s to 1980s time period and that were known to contain PCBs were used. However, because this type of product-specific information was not readily available, much of the information used to estimate typical product densities (and dimensions) was based on commercially available products that are currently in use for similar types of building and construction applications. For example, prior to 1980, polysulfide caulks and sealants were frequently formulated with PCBs and are commonly found in buildings constructed between 1950 and 1980. Although currently available polysulfide sealants do not contain PCBs, the densities of these types of sealants were used in Table 3 as reasonable approximations of the densities of polysulfide sealants used in the past. Similarly, the densities for other priority materials shown in Table 3 are primarily based on current use products that are similar to products used in the past.

In addition to the lack of technical data on products in use during the 1950s – 1980s, there is a lack of data about the impact of age and weathering on priority material densities. Loss of volatile material will reduce product densities over time, while other weathering factors, such as compression or stretching, may increase or decrease densities over time. In an attempt to better account for age and weathering, available literature was reviewed to identify information on the densities of priority materials in construction and demolition debris and wastes. This type of information was not found on the specific priority materials of interest. However, US EPA (2016) provides estimates for the weight to volume ratios (i.e., densities) of a number of construction and demolition (C&D) waste categories. These categories include concrete, asphalt paving, roofing, wood, gypsum board, metal, rock/gravel/dirt and sand, and bulk waste. The bulk waste category is a generic catchall grouping for the remainder of C&D debris that does not fit into one of the other categories. Although the materials that are included in this generic category are not specified, the priority materials would likely all fall into the generic bulk waste category when disposed.

Therefore, in the absence of other data, the density for C&D bulk waste may be somewhat comparable to the densities of aged/weathered priority materials and can be compared to the densities of new products provided in Table 3. The average priority material densities in Table 3 range from about 1 kg/ft^3 to 40 kg/ft^3, with an average of 12 kg/ ft^3 across all priority materials. The C&D bulk waste density of 8 kg/ft^3 fits within the range of the priority material densities reported in Table 3 and is about 30% less than the average density across all priority materials. This comparison is limited because of the unknown composition of C&D bulk waste but suggests the densities in Table 3 are reasonable approximations for aged/weathered materials.

Average Conversion Factors

Use of the conversion factors shown in Table 2 requires information on the application and material type of the priority building material. It is anticipated that in some cases the available data may be incomplete or may not match the categories in Table 2. Conversion factors that are not specific to the priority building material's application or material type were therefore developed by averaging across applications/types (Table 4). When calculating the mass of PCBs removed from a demolition site, conversion factors from Tables 2 and/or 4 should be selected as appropriate given the level of information available about the associated sample(s).

Table 3. Dimensions and densities for typical construction applications of priority materials used to develop conversion factors.

Priority Material Category	Descriptions of typical application	Material	Typical Product Dimensions (Inches)						Typical Product Density (kg/ft^3)		
			Width			Depth/Thickness					
			Low	Mid	High	Low	Mid	High	Low	Mid	High
Caulk[1,2,3,4,5]	Around windows or window frames; around door frames	polysulfide caulk	0.25	0.38	0.50	0.13	0.19	0.25		42	
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.25	0.5	1	0.125	0.25	0.5		42	
Rubber Window Gaskets[5]	Around windows or window frames	butyl rubber	0.30	0.40	0.50	0.20	0.30	0.40		41	
Thermal/Fiberglass Insulation[5]	Around HVAC systems/ heaters/boilers	felt insulation[6]	n/a			1.0	3.0	5.0	1.1	3.3	5.4
		unfaced blanket fiberglass[7]				0.5	2.8	5		0.68	
	Around heated transfer piping	fiberglass pipe insulation[8]				1.0	2.0	3.0	0.68	1.6	2.5
	Inside walls or crawl spaces	loose fiberglass fill/batting[9]					3.5		0.59	0.70	0.82
		rigid fiberglass foam board[10]				1.0	2.5	4.0	0.32	0.84	1.4
Adhesive Mastics[5]	Below carpet and floor tiles	floor mastic[11]	n/a			0.13	0.19	0.25		6.2	
	On, under or between roofing materials and flashing	roof mastic[12]				0.13	0.19	0.25	29	32	36

1 Pfeiffer M.J., Darwin, D., 1987.
2 Panke, J.R. and John P. Cook. 1992.
3 Hammer & Hand. 2016.
4 M. Scheffler, M. and J. Connolly, J. 1996.
5 Jester, T.C. 1995.
6 Owens-Corning Thermafiber Industrial Felt
7 Owens-Corning unfaced fiber glass blanket
8 Owens-Corning fiberglass pipe insulation
9 Owens-Corning Loose fill insulation and NIST Fiberglass Batt (wall and ceiling insulation)
10 Owens-Corning Foamular Products - rigid polyurethane foam (PUR/PIR)
11 Latricrete Premium Mastic
12 Henry Company Pro-Grade Flashing Cement, Pro-Grade Plastic Cement and Pro-Grade Repair Cement

Table 4. Average conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Conversion Factor	Units
Caulk	0.03	kg/ft
Rubber Window Gaskets	0.03	kg/ft
Thermal/Fiberglass Insulation	0.32	kg/ft^2
Adhesive Mastics	0.30	kg/ft^2

Term 3: Average fraction of PCBs that enters MS4 due to demolition without controls

Current Basis

The average fraction of PCBs that enters the MS4 due to demolition without controls has been estimated at 0.01, based upon professional judgment (i.e., 1% of PCBs in building materials enter MS4s due to demolition without additional controls beyond standard construction site controls). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 3 (see Table 1).

The one percent value presumably incorporates losses to the environment both at the site and during disposal and recycling. Conceptually, this approach assumes that without controls, the transport and fate of the PCBs–containing materials that were in the demolished building fall within three general categories:

1. Released during the demolition (e.g., as part of an initially airborne plume of small particles) and settled in a "halo" around the site. Any wash waters used during the demolition (e.g., during cleaning of equipment, onsite or offsite) that are not fully contained and treated or disposed of could also transport PCBs–containing materials to the MS4.
2. Removed from the site and disposed of as part of the general waste stream (e.g., at a landfill), with some fraction potentially released to the environment during the handling, transport, and disposal process (e.g., during transportation of waste materials by truck to a landfill).
3. Removed from the site with recycled materials, with some fraction potentially released to the environment during the handling, transport, and recycling process (e.g., during transportation of waste materials by truck to a transfer station or recycling facility) or returned to the environment with recycled materials.

This methodology assumes that all PCBs–containing materials released into the environment via any of the above three categories eventually enter the MS4. For example, permanent storage in onsite or offsite pervious areas is assumed to be negligible. All three transport and fate categories are presumably

incorporated into the third term of Equation 1, the average fraction of PCBs that enters MS4s due to demolition without controls.

This methodology also assumes that the effectiveness of any existing controls (e.g., proper offsite disposal of PCBs–containing materials, erosion and sediment controls, and other routine construction site controls) is incorporated into the third term of Equation 1.

Basis for Refinement

BASMAA (2018) summarized the readily available information and studies on the release of PCBs to stormwater from building materials during demolition activities. Building upon those efforts, a follow-up literature review was conducted in 2019 to identify any additional information that could be used to refine the assumed fraction of PCBs that enters MS4s due to demolition without controls in Equation 1, Term 3 (see Table 1). This literature review was also conducted to identify new information that could be used to refine Term 4 (i.e., the fraction of PCBs prevented by controls from entering MS4s). This section summarizes the literature review efforts and identifies the outcomes for Term 3. The literature review outcomes for Term 4 are presented in the next section.

Literature Review

The literature review conducted in 2019 built upon the information summarized in BASMAA (2018). The Google search engine as well as specific scientific literature databases and government websites were searched, including:

- Google Scholar
- Google Books
- SpringerLink
- Wiley Online Library
- American Chemical Society
- ScienceDirect.com
- Elsevier
- US EPA Website

Major search terms (and similar variations or combinations of these terms) that were used included the following:

- PCBs transport and fate
- PCBs in soils/stormwater/demolition/building materials/building demolition/building renovation
- PCBs in caulk/rubber window gaskets/thermal insulation/fiberglass insulation/mastic
- PCBs contaminated sites/cleanup sites/remediation sites
- PCBs in school buildings
- Remediation of PCBs in buildings/building materials
- Construction and Demolition Debris/Waste

- Demolition dust and stormwater impacts
- Soil contamination from PCB-containing caulk/materials/buildings
- PCBs in soil after demolition
- PCB contamination from polysulfide sealants
- PCB-contaminated soil/demolition dust
- Mass of PCBs in Building materials
- Fate of PCBs in the environment/urban environment/caulk/building materials
- PCBs Source apportionment
- PCBs Waste characterization
- Accumulation rates of PCBs in soils
- PCB cleanup and disposal programs
- Managing remediation waste from PCB cleanups
- Handling and disposal of PCBs waste
- Improved recycling practices/BMP effectiveness and stormwater impacts
- PCBs sources/emissions/releases from caulk/buildings/schools
- PCBs emissions during demolition/renovation/abatement/replacement/removal of caulk
- Dust from demolition and construction sites

In addition, online searches were performed to identify any new research that had cited one or more of the studies previously described in BASMAA (2018). These citations were reviewed to identify any relevant studies that may have occurred more recently and relied upon these earlier studies.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs entering MS4s due to demolition activity without controls in Equation 1, Term 3 (see Table 1). To date, the vast majority of research on the release of PCBs contained in building materials has focused on human health risks and quantifying human exposures via air, ingestion, and/or dermal pathways. It appears the release of PCBs to stormwater from building materials in general, and specifically during demolition or renovation activities has not been quantitatively studied, outside of the limited studies reported previously in BASMAA (2018). These earlier studies developed conceptual models and thought experiments to estimate the fraction of PCBs released based on the limited measurement data available. Without new measurement data, however, further attempts to improve upon these efforts and reduce uncertainty in the current estimate of Term 3 are not warranted.

BASMAA (2018) recommends exploring whether disposal and/or recycling practices have improved in recent years such that less PCBs would be lost to the environment via these pathways. Evidence was not found during the literature review of improved recycling or disposal practices implemented in the Bay Area in recent years that would result in reduced releases of PCBs to MS4s from demolition materials.

This finding is further supported by anecdotal information about recycling facilities in the South Bay Area. Over the past 5+ years Santa Clara Valley MRP Permittees have been investigating sources of PCBs to public ROWs in industrial areas and have frequently targeted facilities where demolition materials are brought on site for recycling. These investigations have documented poor housekeeping practices, visible scrap material and soils tracking off sites, and general lack of appropriate stormwater BMPs at many of these types of facilities which have resulted in citations during municipal stormwater inspections. Overall, these investigations have found large inconsistencies in materials handling practices across facilities, and even at the same facility over time. Although not a quantitative assessment, this information suggests that it is unlikely consistent improvements in recycling practices across facilities have occurred in recent years.

Term 4: Average fraction of PCBs prevented by new controls from entering MS4

Current Basis

The estimated fraction of PCBs prevented by new controls from entering MS4s has been estimated at 0.8, based mainly upon professional judgment (i.e., 80% of PCBs are prevented from entering MS4s due to the new programs to manage PCBs during building demolition). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 4 (see Table 1).

Basis for Refinement

As described above, a review of readily available literature was conducted in 2019 to identify any new information that could be used to refine the assumed effectiveness of controls to prevent PCBs from entering MS4s (Term 4). The literature review efforts are summarized in the above section on Term 3. This section presents the outcomes of the literature review for Term 4.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs prevented by new controls from entering MS4s. However, BASMAA (2018) identified two earlier studies that estimated 99% capture of PCBs contained in caulk removed from buildings using appropriate abatement measures (high power vacuums and power washing during removal). Based on these data, a reasonable assumption is that the new control programs will be similarly effective at capturing PCBs in priority materials that, prior to demolition, are removed from a building using appropriate abatement methods. Given the new programs are focused on controlling PCBs in priority materials only, the use of a lower (80%) value for the overall effectiveness of the controls at preventing PCBs from entering MS4s (Term 4) appears reasonable.

Using Data from New Program on PCBs Mass in Priority Building Materials

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs presumably removed from the building before demolition. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0

Factsheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Equation 1 and Table 1 may be set to 1 when evaluating the PCBs load avoided using PCBs mass in priority building materials data from the new program, since it may be assumed that the program removes 100% of the priority materials with PCBs ≥ 50 ppm that were identified by the sampling protocol.

4. POTENTIAL FUTURE REFINEMENTS TO THIS METHODOLOGY

It should be noted that the new program for controlling PCBs during building demolition is in its early stages, having begun implementation only recently (i.e., on July 1, 2019). The data generated during the first fiscal year of the program have not yet been compiled and evaluated. As experience is gained in implementing the program and the associated data are collected and evaluated, and/or new information becomes available from any other source, the need may arise to revise the data collection and assessment methodology presented in this memorandum. As needed, staff from the countywide programs in the MRP area will work with MRP Permittee and Regional Water Board staff to make any future refinements to the program and methodology.

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Memorandum

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To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

*****

Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	Unknown	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

08228

8269

This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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DISCLAIMER

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

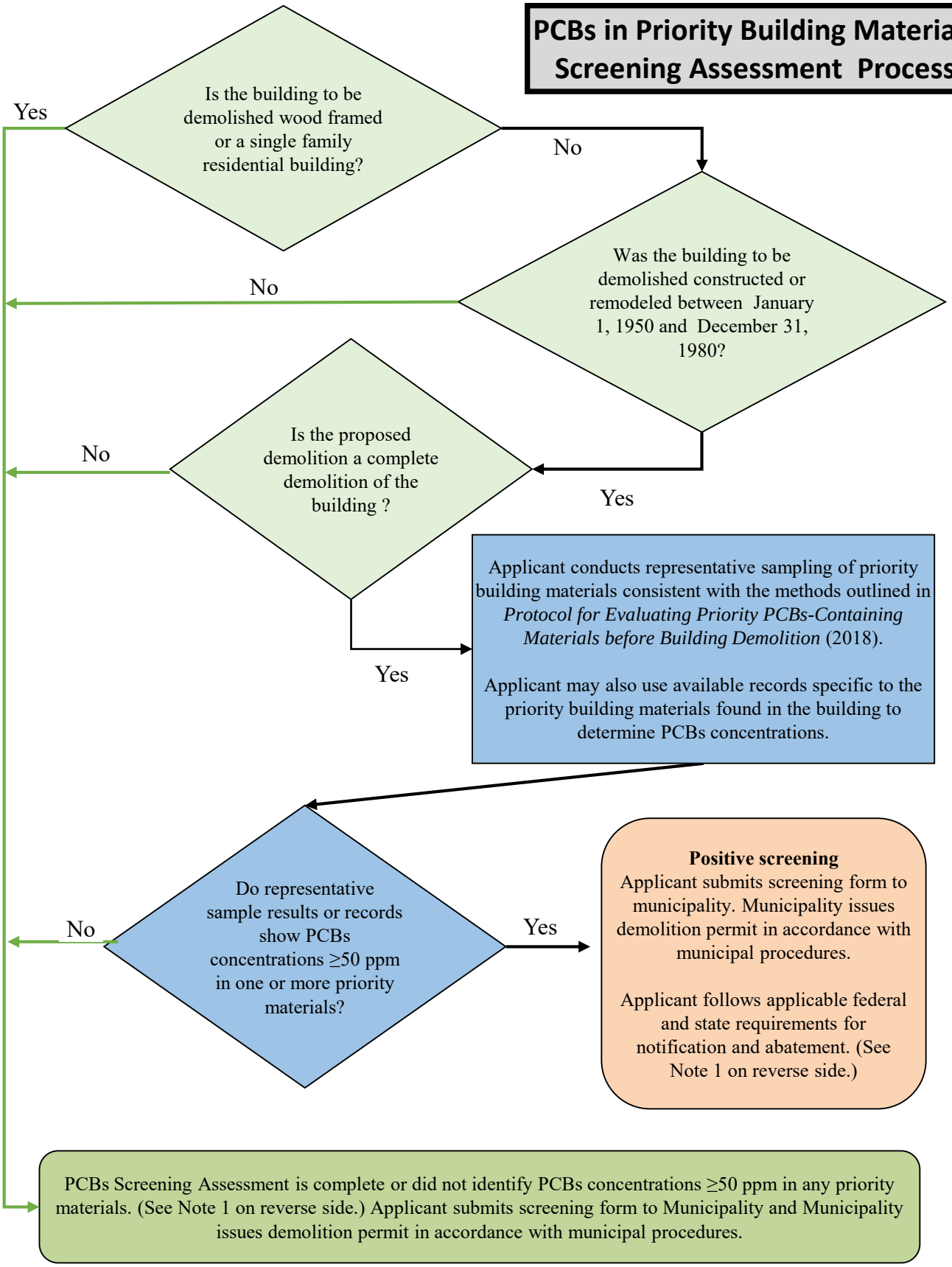

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

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Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

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- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

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Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

---

[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

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Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

---

[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

---

[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1	
<u>Window Caulking</u>: **Damaged caulking around a window.**	
Photograph 2	
<u>Window Caulking</u>: **Worn and cracked caulking around a window.**	

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	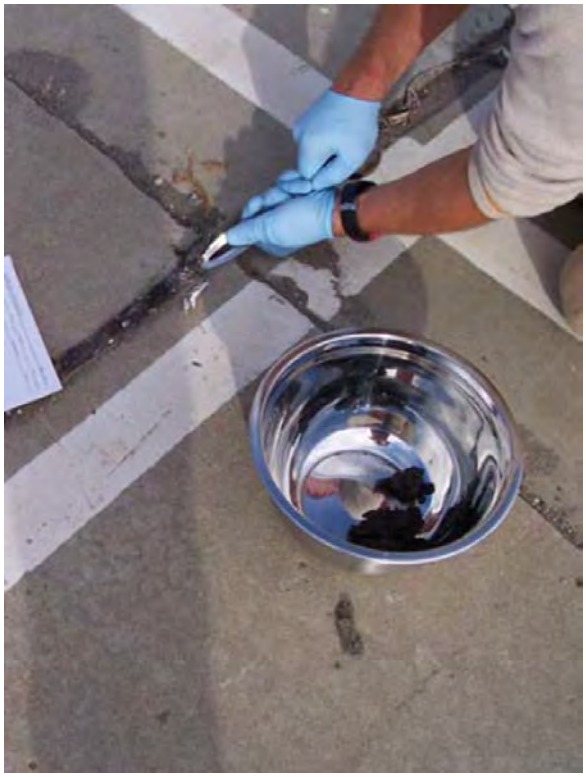
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7	
<u>Thermal Insulation</u>: **Damaged felt-style thermal insulation.**	
Photograph 8	
<u>Thermal Insulation</u>: **Exposed/damaged fiberglass insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	

Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13

<u>Adhesive / Mastic:</u>

Adhesive remnants on flooring.

Photograph 14

<u>Adhesive / Mastic:</u>

Exposed adhesive on roofing.

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	

Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

Appendix 13

- Annual Reporting for FY 2019-2020, Regional Supplement for Training and Outreach
- Pesticides Subcommittee Annual Report and Effectiveness Assessment - 2019-2020, California Stormwater Quality Association, Final Report
- Annual Reporting for FY 2019-2020, New Development and Redevelopment

Annual Reporting for FY 2019-2020

Regional Supplement for Training and Outreach

San Francisco Bay Area Municipal Regional Stormwater Permit

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Bay Area Stormwater Management Agencies Association

September 2020

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Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

To Whom It May Concern:

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James Scanlin

James Scanlin, Alameda Countywide Clean Water Program

Karin Graves

Courtney Riddle, Contra Costa Clean Water Program

Kevin A. Cullen

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matthew Fabry

Matt Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam W. Olivieri

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

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C.9.e.ii.(1) Point of Purchase Outreach

Home Depot Letter of Support
Our Water, Our World Consultant's Summary Report

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INTRODUCTION

This Regional Supplement has been prepared to report on regionally implemented activities complying with portions of the Municipal Regional Stormwater Permit (MRP), issued to 76 municipalities and special districts (Permittees) by the San Francisco Bay Regional Water Quality Control Board (Water Board). The Regional Supplement covers training and outreach activities related to the following MRP provisions:

- Provision C.5.e., Control of Mobile Sources,
- Provision C.7.c.ii.(1), Stormwater Point of Contact, and
- Provision C.9.e.ii.(1), Point of Purchase Outreach.

These regionally implemented activities are conducted under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA), a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Most of the 2019-2020 annual reporting requirements of the specific MRP Provisions covered in this Supplement are completely met by BASMAA Regional Project activities, except where otherwise noted herein or by Permittees in their reports. Scopes, budgets, and contracting or in-kind project implementation mechanisms for BASMAA Regional Projects follow BASMAA's operational Policies and Procedures as approved by the BASMAA Board of Directors. MRP Permittees, through their program representatives on the Board of Directors and its committees, collaboratively authorize and participate in BASMAA Regional Projects or Regional Tasks. Depending on the Regional Project or Task, either all BASMAA members or Phase I programs that are subject to the MRP share regional costs.

Training

C.5.e. Control of Mobile Sources

This provision requires:

Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.

(b) Implementation of an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.

(c) Regularly updating mobile business inventories.

(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.

(e) Inspection of mobile businesses, as needed.

(2) Permittees may cooperate county-wide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

BASMAA's long-standing Surface Cleaner Training and Recognition Program addresses

the BMP and training aspects of the provision by focusing on the most common type of outdoor cleaning – cleaning of flat surfaces like sidewalks, plazas, parking areas, and buildings. Individual Permittees address the inspection and enforcement aspects of the provision.

Cleaners that take the web-based training and a self-quiz are designated by BASMAA as Recognized Surface Cleaners. BASMAA also created and provides marketing materials for use by Recognized Surface Cleaners. Cleaners can use the website to get trained and recognized for the first time or renew their training and recognition, as required annually. Recognized cleaners can also download marketing materials from the website. Potential customers, including Permittees can use the site to verify the recognition status of any cleaner, as can municipal inspectors.

In July 2014, the State Water Board adopted a temporary Emergency Regulation for Statewide Urban Water Conservation that directly affected some of the surface cleaning activities and best management practices of the Surface Cleaner Training and Recognition Program. Among other actions, the emergency regulations "prohibited, except where necessary to address an immediate health and safety need:...

2) The use of a hose that dispenses potable water to wash a motor vehicle, except where the hose is fitted with a shut-off nozzle or device attached to it that causes it to cease dispensing water immediately when not in use;

3) The application of potable water to driveways and sidewalks;"

The regulation was to remain in effect for 270 days, unless extended by the State Water Board due to ongoing drought conditions.

Of particular concern was item 3), which prohibited many of the activities conducted by surface cleaners if an immediate health and safety need could not be demonstrated and would require significant changes in the Surface Cleaner Training and Recognition Program. However, both the term and content of the emergency regulations were temporary, and the State Water Board might need to change either with minimal notice. Given the uncertain long-term future of the emergency regulations, BASMAA adopted a two-part strategy:

1) track the status of the emergency regulations with a plan to make the necessary changes to the Surface Cleaner Training and Recognition Program if the regulations became permanent, and

2) alert the cleaners that are in the Surface Cleaner Training and Recognition Program to the emergency regulations.

To effect part 2), in August 2014, BASMAA sent a notice to all the Recognized Cleaners alerting them to the emergency regulations. Part 1) progressed along the following chronology of events:

- May 2015, the State Water Board amended and readopted the emergency regulation extending its effectiveness to February 2016.
- February 2016, the State Water Board extended the emergency regulation through October 2016 (into FY 16-17).
- May 2016, the State Water Board replaced the emergency regulation adopted in

February 2016 and extended the regulation through February 2017.

- February 2017, the State Water Board extended the emergency regulation for 270 days until November 25, 2017.
- April 2017, the Governor issued Executive Order B-40-17, which builds on actions taken in Executive Order B-37-16, including the State Water Board maintaining prohibitions on wasteful practices such as hosing off sidewalks. And as directed by the Governor in Executive Order B-37-16, the State Water Board is to separately take action to make wasteful water practices permanent.
- February 2018, the State Water Board attempted to make wasteful water practices permanent but after receiving significant opposition from water agencies before the adoption meeting, postponed adoption to allow more time to address comments.

In discussions with BASMAA, State Water Board staff have indicated that the regulations would regulate water use and not the discharge, and the regulations would regulate the use of potable water. BASMAA continues to track any developments and will work with the State Water Board as they develop and adopt a permanent regulation to try to ensure that necessary outdoor surface cleaning activities can be conducted in accordance with both stormwater regulations and urban water conservation regulations.

Public Information and Outreach

C.7.c.ii.(1) Stormwater Point of Contact

This provision requires:

> *Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively and Permittees may combine this function with the spill and dumping complaint central contact point required in C.5.*

BASMAA assists with this provision by using the regional website: BayWise.org to list or link to member programs' lists of points of contact and contact information for the stormwater agencies in the Bay Area (https://baywise.org/about/).

Pesticides Toxicity Control

C.9.e.ii.(1) Point of Purchase Outreach

This provision requires Permittees to:

- *Conduct outreach to consumers at the point of purchase;*
- *Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and*
- *Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.*

The Annual Reporting provision requires:

> *Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted…, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f. [Ed. C.9.g]).*

Below is a report of activities and accomplishments of the *Our Water, Our World* program for FY 2019-2020. For a detailed report of activities, see the attached Consultant's Final Report.

- Coordinated program implementation with major chains Home Depot and Ace Hardware National.
    - Home Depot Corporate (Atlanta) directed support of the program with their stores (see letter attached).
- Completed the development and creation of two new fact sheets for Bed Bugs (in English and Spanish) and Moles, Voles, and Gophers. There are now 22 fact sheets – 18 in English and 4 in Spanish.
- Maintained an inventory of the following: fact sheets, shelf tags, literature rack display signage, *10 Most Wanted* brochures, *Pest or Pal Activity Guide for Kids*, custom-designed product guide dispensers, and two versions of product guides (Home Depot and generic), from which participating agencies could purchase materials.
- Recruited for, developed, planned, and conducted an IPM Advocates training course to qualify 5 new Advocates, almost doubling the IPM Advocates corps to 12 individuals.
- Conducted monthly seasonal pests meetings with IPM Advocates for month / season ahead.
- Updated less-toxic Product List by-manufacturer.
- Coordinated employee trainings and tabling events at *Our Water, Our World* stores.
- Maintained *Our Water, Our World* website.
- Provided Ask-the-Expert service—in which the Bio-Integral Resource Center (BIRC) provides 24-hour turnaround on answers to pest management questions. BIRC researched and provided answers to about 28 questions in FY 19-20.
- Provided and staffed exhibitor booths and made presentations to attendees:

- Central Trade Show, Las Vegas (August 2019)
- L&L Dealer Show, Reno (October 2019)
- NorCal trade show, San Mateo (February 2020)

- Participated in UCIPM Continuing Education for IPM Advocates.

Below are some outputs and outcomes for FY 19-20:

- 36 *Our Water, Our World* Store Trainings[1]
- 301 employees trained at *Our Water, Our World* stores[2]
- 54 outreach events at *Our Water, Our World* stores[3]
- 3,146 customers contacted by Advocates at tabling events at stores and virtual events[4]
- 28 questions researched and answered by technical expert
- Over 30% increase in sales of eco-pesticide categories and an overall 8% increase in sales of eco-products over the previous year (Home Depot Corporate)
- Doubling of Sluggo sales over the previous year
- Over 29% growth in sales of Ortho Ground Clear, a newer eco-herbicide (Scotts Miracle-Gro)
- Over 22% growth in sales of Ortho 3-in-1, pyrethrin and sulfur combination

[1,2,3,4] Funded by permittees at local level.

Attachments

Point of Purchase Outreach

Home Depot Letter of Support

Interoffice
MEMORANDUM

DATE: **January 1, 2020**

TO: **California Store Managers, D28 ASMs and Department Heads**

FROM: **Ron Jarvis**

CC: **Steve Knott, Scott Jacobson**

SUBJECT: **Our Water Our World training**

OUR WATER, OUR WORLD is a coalition of organizations whose purpose is to encourage consumers to use less toxic pest controls in and around their homes. They specialize in retail friendly education. Their goal is not to alienate consumers by telling them what they can't use, but instead their information focuses on less toxic pest management and ties into products currently on our shelves.

An Our Water, Our World (OWOW) representative will be in your store to help train employees and label less-toxic products with shelf-talkers. The representative may also schedule a tabling event to educate consumers. This ties in well with "How-to" weekend events. The representative will display a sampling of excellent less toxic and Eco Options products off our shelves. They will provide free informational literature and a wealth of knowledge and experience. Please enjoy this additional help in your store.

A representative will contact you before the training or demonstration date to arrange details. Please contact Suzanne Bontempo at (415) 317-0475 if you have any questions.

Thank you

Ron Jarvis

from the desk of.....
Ron Jarvis
Merchandising Vice President – Sustainability
THE HOME DEPOT USA, INC.
2455 Paces Ferry Road
Atlanta, GA 30339
(770) 384-4835
Fax (770) 384-4411

Attachments

Point of Purchase Outreach

Our Water, Our World Consultant's Summary Report

OUR WATER - OUR WORLD

BASMAA

Our Water Our World Retail Partners Summary Report
July 2019 – June 2020

prepared by Suzanne Bontempo, Plant Harmony - July 2020

Program Annual Overview:

The fiscal year started off by attending the Central Trade Show in August, then the L&L show in October, where we saw some changes among the vendors. Safer Brand is rebranding many of their products, transitioning both the Concern and some Havahart branding to Safer branding. I saw that Ferti-lome has OMRI certification for its eco-pesticide line. Miracle-Gro has expanded the Performance Organics fertilizer line and the EcoSmart line has new labeling and branding image.

The focus during August – December was preparing for the IPM Advocate training I conducted in January. This involved many hours of collaboration with Debi Tidd and Karey Windbiel-Rojas. I gave my full attention to recruiting, following up with these new recruits, preparing the curriculum, finding a location for the training, scheduling the dates and times of our classes to meet.

As October came, PG&E began exercising the power shut offs, that impacted many residences as well as the retailers throughout the Bay Area. Then the Kincade Fire ignited on October 23rd, halting OWOW services throughout the North Bay Area for the weeks that followed. As soon as the fire was behind us, the retail holiday season was in full swing, which meant OWOW services didn't resume until mid-December.

In January the new IPM Advocates attended and completed their training. This was a wonderful accomplishment. The new Advocates bring wonderful support to the OWOW program and are open to moving the program forward where possible. They come with insightful ideas and dynamic energy.

In February I began working with the new Advocates, having them shadow me with each store visit and OWOW task. I also joined the NorCal Trade Show with the help of IPM Advocate Lisa Ratusz. The NorCal show invited me to give a presentation on IPM to the garden industry professionals. The Department of Pesticide Regulations qualified my class for one continuing education unit for the garden industry professionals. The new IPM Advocates were invited to come experience the show which Charlotte Caner, Sherri Sunahara, and Emily Holly were each available to do.

Then March arrived and life as we knew it went sideways. I cannot express enough how challenging this spring season became because of the Covid-19 pandemic. The retailers were

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stressed beyond measure. I, and all of the IPM Advocates servicing the OWOW program did our best to provide OWOW services while sheltering in place. Many of the retailers, including the Home Depot Corporate, requested that we pause our services during that time, which we did. I certainly did what I could to provide the retailers relevant pest problem solving support remotely.

Though these challenges have been significant, this has been a year of transitions. With more IPM Advocates retiring last year, I am happy to include our new, recently training IPM Advocates to the group this year. Next I am finding ways to offer public education to the public remotely. I have been able to transition OWOW public education and outreach to virtual platforms through Zoom.[1] And I am happy to say that I have been able to navigate this new approach to public outreach with success. Two incredible triumphs for the 2019-2020 contract year.

Moving forward, I am currently working with Debi Tidd to develop virtual OWOW trainings that are best suited for the retailers and OWOW. I am also supporting the IPM Advocates with OWOW Pest of the Month social media posts, IPM educational videos, and written articles that expand the OWOW message to a broader reach[2]. I am extremely inspired looking forward to what is possible for delivering the OWOW message to the public in new ways.

We, the IPM Advocates have continued our focus on problem pesticide reduction by educating and mentoring the associates and consumers about alternative approaches to pest problem solving.

- Throughout the year, we continue to provide educational support and resources for the Asian Citrus Psyllid. We share the message of "Inspect, detect and then report'" to the CDFA or local agricultural department.
- The public's concerns around Roundup and glyphosate continues, however with the influence of the IPM Advocates, every retailer has at least one eco-herbicide alternative for sale.
- Rats and mice continue to be the most prevalent pest problem that people are battling. Working with exclusion and trapping is the message for success the we encourage.
- Then with the recent Sheltering in Place gardening trend, we have heard from most retailers that the sales of eco-pesticides and "organics" is up. This is wonderful to see during such a challenging time.
- Other pests that have been in the focus this year are; yellowjackets, spiders and fleas. We have provided additional education and support with eco-management solutions.

Educational retail trainings and public outreach[3]:

- **Total number of OWOW retailer trainings in the 2019-2020 fiscal year = 36**
  - Out of this total, 16 were at the Home Depot Stores
- **Total number of associates trained at these OWOW trainings = 301**
  - Out of this total, 148 were Home Depot associates
- **Total number of OWOW public outreach events in the 2019-2020 fy = 54**
  - Out of this total, 9 were at the Home Depot Stores

[1, 2, 3] Funded by permittees at local level.

- **Total number of people reaches at both in-people + virtual OWOW events = 3,146**
  - Out of this total, 351 were reached at the Home Depot store
  - Out of this total, 943 were reached through virtual classes

These numbers reflect a 220% decrease in trainings conducted over the previous year and a 192% decrease in the number of public outreach events.

Most of the OWOW events are scheduled during the spring retail season, per the request of the retailer and to capture the larger crowds that the spring retail season brings. Unfortunately, the pandemic paused these services with all trainings and in-person outreach events during this time subsequently canceled. I can also add that I didn't receive the Sacramento OWOW contract NTP until January 1st, which was 3 months of opportunities lost.

The encouraging piece we are seeing is with the virtual education webinars. The OWOW IPM educational webinar events were created in lieu of in-person public outreach. Due to the health measures related to Covid, lower staffing levels left customers unsupported in the aisle at the point of purchase. These webinars are intended to introduce the OWOW program, the OWOW & UCIPM websites, and how to use these websites as a tool to properly identify pest problems with less toxic solutions.

Each webinar shares the common goal of introducing IPM Practices and over all healthy garden practices, to pre-educate consumers for their instore purchase decisions. Each participating agency assisted by promoting these events. The attendance rate for these no fee webinars averages 50%, which are encouraging numbers since 20% is the average for no fee webinars. Moving forward I plan to expand this remote outreach education.

Retailer support and sales overview:

- Home Depot Corporate provided a letter of 'Thanks' and "Support" for the OWOW program partnership in October, which Geoff sent to the agencies
- Home Depot Corporate provided a letter to BASMAA for the IPM Advocates outlining this program partnership and participation
- Home Depot Corporate, the sales of the eco-pesticide categories have increased over 30% with an overall increase of 8% of eco-products over the previous year.
- Sluggo sales is reported to have doubled over the previous year. This is a reflection of the recent gardening trend due to the pandemic, working from home and sheltering in place and the efforts of the IPM Advocates
- Ortho Ground Clear, a newer eco-herbicide Scotts Miracle-Gro was showcasing for 2020, has seen a growth of over 29%
- Ortho 3-in-1, pyrethrin and sulfur combination, has seen a growth in sales of over 22%

Throughout the 2020 year, Scott's Miracle Gro's newest organic fertilizer under the name of 'Performance Organics' continues to sell at an amazing rate.

Final comments:

As I mentioned in my review of the 2019-2020 fiscal year, this may have been the most challenging year we will ever see. With the fires and power shutoffs in the fall, the hardware and home improvement stores were faced with many retail stresses. Then, as March arrived, I cannot express enough how challenging this season became because of the pandemic. The

immediate challenge I was then faced with was how to reach the public when we were restricted to Sheltering in Place. How do I transition a public outreach program virtually? With the wonderful support and encouragement of a few agencies, I dove into the virtual training world through Zoom. Moving forward I see the value of providing OWOW education to the public through Webinar style classes. Also, to develop a virtual training platform that is best suited for the retailers and OWOW, this will only broaden our reach with OWOW education. Though it is very disappointing to me to end the year on this note, I am inspired looking forward to what is possible for delivering the OWOW message to the public in a new way.

The other encouraging discovery we witnessed once we began again to provide in-person OWOW services to the retailers is that many of the retailer's shelves were emptied of product from sell through, primarily the eco-products. This was from the supplier's inability to keep up with the consumer's demand. Retail teams also reported that their customers were asking for organic alternatives over the traditional products. A remarkable transition for the marketplace.

In addition, I am encouraged to hear that upgrading OWOW website is currently being discussed. This seems to be more relevant than ever before given the current state of affairs. As I have shared before, the OWOW website has the potential to be a valuable vital tool for the IPM Advocates, the retailers, and the public.

Alameda Countywide
Clean Water Program

Contra Costa
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Urban Runoff
Management Program

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Prevention Program

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Stormwater Pollution
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San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

B A S M A A

September 30, 2020

Michael Montgomery, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: FY 2019-20 Annual Report: MRP Provision C.9.f - Track and Participate in Relevant Regulatory Processes

Dear Mr. Montgomery:

This letter and attachments are submitted on behalf of all 76 municipalities subject to the requirements of the Municipal Regional Stormwater NPDES Permit (MRP).

The essential requirements of provision C.9.f (text attached) are to track U.S. Environmental Protection Agency (USEPA) and California Department of Pesticide Regulation (DPR) actions related to urban-uses of pesticides and actively participate in the shaping of regulatory efforts currently underway. This provision allows for cooperation among Permittees through the California Stormwater Quality Association (CASQA), BASMAA, and/or the Urban Pesticide Pollution Prevention Project (UP3 Project) – an approach the Permittees have engaged in for a number of years. Recognizing this approach is the most likely to result in meaningful changes in the regulatory environment, Permittees elected to continue on this course in FY 2019-20 to achieve compliance with this provision. Oversight of this provision is the purview of the BASMAA Board of Directors.

The actual work of tracking and participating in the ongoing regulatory efforts related to pesticides was accomplished through CASQA. CASQA conducted its activities on behalf of members and coordinated funding contributions and activities through its Pesticides Subcommittee, a group of stormwater quality agencies affected by pesticides or pesticides-related toxicity listings, TMDLs, or permit requirements, as well as others knowledgeable about pesticide-related stormwater issues. FY 2019-20 was another productive year for the Subcommittee. The CASQA Pesticides Subcommittee's annual report for FY 2019-20 (attached) provides a comprehensive and detailed accounting of efforts to track and participate in relevant regulatory processes as well as accomplishments related to pesticides and stormwater quality.

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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Attachments

MRP Provision C.9.f

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020; California Stormwater Quality Association; August 2020

MRP Provision C.9.f states:

C.9.f. Track and Participate in Relevant Regulatory Processes

i. **Task Description –** The Permittees shall conduct the following activities, which may be done at a county, regional, or statewide level:

   (1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

   (2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

   (3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and

   (4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. **Reporting –** In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or statewide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.

Pesticides Subcommittee Annual Report and Effectiveness Assessment 2019-2020

California Stormwater Quality Association

Final Report

August 2020

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

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Pesticides Subcommittee Annual Report and Effectiveness Assessment

2019-2020

California Stormwater Quality Association

August 2020

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Preface

The California Stormwater Quality Association (CASQA) is comprised of stormwater quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout California. CASQA's membership provides stormwater quality management services to more than 22 million people in California. This report provides CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. It is a component of CASQA's Source Control Initiative, which seeks to address stormwater and urban runoff pollutants at their sources. This report was funded by CASQA, BASMAA, the Sacramento Stormwater Quality Partnership, and Alameda Countywide Clean Water Program.

This report was prepared by Stephanie Hughes under the direction of the CASQA Pesticides Subcommittee Co-Chair Dave Tamayo, with input from Dr. Kelly Moran and Tammy Qualls of Qualls Environmental Consulting.

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Abbreviations Used in this Report

BACWA – Bay Area Clean Water Agencies

BE – Biological Evaluation

CASQA – California Stormwater Quality Association

CEQA – California Environmental Quality Act

CCRWQCB – Central Coast Regional Water Quality Control Board

CVRWQCB – Central Valley Regional Water Quality Control Board

CWA – Clean Water Act

DPR – California Department of Pesticide Regulation

EPA – United States Environmental Protection Agency

ESA – Endangered Species Act

FWS – U.S. Fish and Wildlife Service

FY – Fiscal Year (July 1 through June 30)

IPM – Integrated Pest Management

MAA – Management Agency Agreement between DPR and the Water Boards

MS4 – Municipal Separate Storm Sewer System

NACWA – National Association of Clean Water Agencies

NPDES – National Pollutant Discharge Elimination System

OPP – U.S. EPA Office of Pesticide Programs

OW – U.S. EPA Office of Water

PAH – Polycyclic aromatic hydrocarbon

PEAIP – Program Effectiveness Assessment and Improvement Plan

PMAC – Pest Management Advisory Committee

PPI – Pests, Pesticides, and Integrated Pest Management DPR initiative

PMP – Pesticides-specific Management Practice

PSC – CASQA Pesticides Subcommittee

SPCB – Structural Pest Control Board

SFBRWQCB – San Francisco Bay Regional Water Quality Control Board

STORMS – Strategy to Optimize Resource Management of Storm Water (a program of the State Water Board)

SWAMP – California Water Boards Surface Water Ambient Monitoring Program

SWRCB – State Water Resources Control Board or State Water Board

TMDL – Total Maximum Daily Load (regulatory plan for solving a water pollution problem)

UP3 – Urban Pesticides Pollution Prevention Partnership

UPA – Urban Pesticide Amendments

UPCMP – Urban Pesticides Coordinated Monitoring Program

USGS – U.S. Geological Survey

Water Boards – California State Water Resources Control Board together with the California Regional Water Quality Control Boards

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Executive Summary

This report by the Pesticides Subcommittee (PSC) of the California Stormwater Quality Association (CASQA) describes CASQA's activities related to the goal of preventing pesticide pollution in urban waterways from July 2019 through June 2020.

To address the problems caused by pesticides in California's urban waterways, CASQA collaborates with the California State Water Resources Control Board and the California Regional Water Quality Control Boards (Water Boards). By working with the Water Boards and other water quality organizations, we address the impacts of pesticides efficiently and proactively through the statutory authority of the California Department of Pesticide Regulation (DPR) and EPA's Office of Pesticide Programs (OPP). More than 17 years of collaboration with Urban Pesticides Pollution Prevention (UP3) Partnership, as well as EPA and DPR staff, has resulted in significant changes in pesticide regulation. CASQA's activities and outcomes are described in Section 2. This year's highlights include continued progress on the State Water Board's Urban Pesticides Amendments (UPA) project as well the pesticide regulator actions described below.

Near term/Current problems – Are actions being taken by State and Federal pesticides regulators and stakeholders expected to end pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

- In Fall 2019, DPR finalized regulations to restrict carbaryl use and end sale of carbaryl consumer products. This action makes all carbaryl products in California restricted materials, except for baits labeled only for agricultural use. This regulation was filed with the Secretary of State this spring and will become effective on August 1st.
- CASQA identified a product registration application containing novaluron and successfully requested this product be routed by DPR for surface water review. The subsequent evaluation did not support registration. DPR subsequently issued a Notice of Proposed Decision to Deny the product.
- CASQA shared its urban runoff expertise with pesticide regulators by preparing comment letters to EPA for seven pesticide reviews, providing the Water Boards and other Partners with information that triggered additional letters on two more pesticide reviews, and participating in meetings and conference calls focused on priority pesticides and long-term regulatory structure improvements. *(See Tables 3, 4 and 5 and the Appendix.)*
- CASQA provided feedback to EPA regarding their Framework for Pesticides Risk Assessments Incorporating Endangered Species Act Biological Evaluations (and eventually all pesticides risk evaluations for conventional pesticides) requesting that outdoor impervious surfaces be included in the list of areas that receive pesticide treatment.
- In response to continued requests from CASQA and Partners, EPA has begun following a precedent for improved label language for pool, spa, and fountain chemicals that was established by the decisions for lithium hypochlorite and copper.
- CASQA/UP3 reviewed scientific literature in order to update and prioritize the Pesticide Watch List, which it shared with pesticides regulators and with government agency and university scientists to stimulate generation of surface water monitoring and aquatic toxicity data for the highest priority pesticides. *(See Table 2.)*

Long term/Prevent future problems – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

- DPR continues to demonstrate its commitment to addressing pesticide impacts on receiving waters through timely mitigation and implementation of improved evaluation procedures.
- The State Water Board continued to work toward adoption of the UPA. These amendments would institutionalize the State's strategy of utilizing pesticide regulations as the primary mechanism for addressing pesticide water quality problems associated with urban runoff, serving as a TMDL

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alternative. Implementation will be supported by a new statewide urban runoff pesticides monitoring program intended to coordinate with existing Water Board and DPR urban pesticides and toxicity monitoring programs.

- In concert with the development of UPA, the Urban Pesticides Coordinated Monitoring Program (UPCMP) continued progress to establish the initial framework of the monitoring program via the Steering Committee and Technical Committee.
- CASQA continued to be an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. CASQA organized a meeting of DPR, Water Board, and CASQA representatives for July 24th for DPR to provide details to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.
- A paper was published that was co-authored by Dr. Kelly Moran, and staff from DPR, the State Water Board, and UC Davis, describing many of the key elements of the coordination between DPR and the State Water Board.
- Although many improvements have been made by OPP since the early 2000s, improvement in scientific evaluations supporting OPP's regulatory efforts and better understanding of urban runoff management systems are still necessary to adequately protect urban surface waters from pesticide impairments. In recent years, the regulatory climate has changed, limiting support of progress by OPP in addressing these concerns.

In FY 2020-2021, CASQA plans to continue to address near-term pesticide concerns and seek long-term regulatory change. Future near-term and long-term tasks are identified in Section 3, Tables 5 and 6. Key topics include:

- Continued support of the eventual completion and adoption of the UPA by the State Water Board
- Continued development of the UPCMP in partnership with the Water Boards, DPR, and EPA Region 9
- Registration review-related activities at EPA for pyrethroids and fipronil (the only such opportunity for the next 15 years)
- DPR registration applications and proposed decisions for new products

Section 1. Introduction

1.1 IMPORTANCE OF CASQA'S EFFORTS TO IMPROVE PESTICIDE REGULATION

For decades now, the uses of certain pesticides in urban areas – even when applied in compliance with pesticide regulations – have adversely impacted urban water bodies. Currently used pesticides are the primary cause of toxicity in California surface waters, including urban water bodies.[1] Under the Clean Water Act (CWA), when pesticides impact water bodies, local agencies may be held responsible for costly monitoring and mitigation efforts. To date, some California municipalities[2] have incurred substantial costs to comply with pesticides-related Total Maximum Daily Loads (TMDLs) and additional permit requirements. In some cases (e.g., diazinon, chlorpyrifos), municipal compliance costs have continued more than a decade after termination of virtually all urban use. In the future, more municipalities throughout the state could be subject to similar requirements, as additional TMDLs and Basin Plan amendments are adopted (Table 1). Meanwhile local agencies have no authority to restrict or regulate when or how pesticides are used[3] in order to proactively prevent pesticide pollution and avoid these costs.

Under federal and state statutes, EPA and DPR have the authority and responsibility to regulate pesticides and protect water bodies from adverse effects (including impacts from pesticides in urban runoff). Unfortunately, until the relatively recent past these agencies did not recognize the need, nor did they possess the institutional capacity to exercise their authority to protect urban water quality. As a result, past registration actions have allowed a number of pesticides (such as pyrethroids and fipronil) to be used legally in ways that have resulted in widespread pollution in urban water bodies. This situation is depicted in Figure 1.

To change this situation CASQA is actively engaged with state and federal regulators in an effort to develop an effective pesticide regulatory system, based primarily on existing statutes, that includes timely identification and mitigation of urban water quality impacts, and proactively prevents additional problems through the registration and registration review processes (Figure 2).

Table 1. California TMDLs, Statewide Water Quality Control Plans, and Basin Plan Amendments Addressing Currently Registered Pesticides and/or Toxicity in Urban Watersheds[4]

Water Board Region	Water Body	Pesticide	Status
Statewide	All MS4s/All Urban Waterways: Statewide Water Quality Control Plan amendments for urban pesticides reduction ["Urban Pesticides Amendments"] (Inland Surface Waters, Enclosed Bays & Estuaries, and Ocean)	All Pesticides/All pesticide-related toxicity	In preparation
	Sediment Quality Objectives (Enclosed Bays & Estuaries)	Sediment Toxicity [5]	Approved
	Toxicity Provisions (Inland Surface Waters and Enclosed Bays & Estuaries)	Toxicity [5]	In preparation

[1] See reports from the California Surface Water Ambient Monitoring Program Sediment Pollution Trends Program including Anderson, B.S., Hunt, J.W., Markewicz, D., Larsen, K., 2011. Toxicity in California Waters, Surface Water Ambient Monitoring Program. California Water Resources Control Board. Sacramento, CA.
[2] For example, Sacramento-area municipalities spent more than $75,000 in the 2008-2013 permit term on pyrethroid pesticide monitoring alone; Riverside-area municipalities spent $617,000 from 2007 to 2013 on pyrethroid pesticide chemical and toxicity monitoring.
[3] Local agencies in California have authority over their own use of pesticides but are pre-empted by state law from regulating pesticide use by consumers and businesses.
[4] Excludes pesticides that are not currently registered in California, such as organochlorine pesticides.
[5] These TMDLs/Plan provisions can trigger toxicity testing stressor source identification studies, and additional follow up, even when toxicity is linked to current pesticides.

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Water Board Region	Water Body	Pesticide	Status
San Francisco Bay (2)	All Bay Area Urban Creeks	All Pesticide-Related Toxicity	Approved
Central Coast (3)	Santa Maria River Watershed	Pyrethroids, Toxicity	Approved
	Lower Salinas River Watershed	Pyrethroids, Toxicity	Approved
		Malathion, Chlorpyrifos, Diazinon [6]	In development
	San Lorenzo River Watershed (Santa Cruz)	Chlorpyrifos [6]	Approved
Los Angeles (4)	Marina del Rey Harbor	Copper (Marine antifouling paint) [7]	Approved
	Oxnard Drain 3 (Ventura County)	Bifenthrin, Toxicity	EPA-Adopted Technical TMDL
	Calleguas Creek, its Tributaries and Mugu Lagoon	Water & Sediment Toxicity [5]	Approved
	McGrath Lake (Ventura County)	Diazinon & Chlorpyrifos [6]	Approved
	Colorado Lagoon (Long Beach)	Sediment Toxicity [5]	Approved
	Dominguez Channel and Greater Los Angeles and Long Beach Harbors Waters	Sediment Toxicity [5]	Approved
	Ballona Creek Estuary	Sediment Toxicity [5]	Approved
Central Valley (5)	Sacramento River and San Joaquin River Basins	Pyrethroids	Approved
	Sacramento-San Joaquin River Delta Waterways	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento & Feather Rivers	Diazinon & Chlorpyrifos [6]	Approved
	Sacramento County Urban Creeks	Diazinon & Chlorpyrifos [6]	Approved
	Lower San Joaquin River	Diazinon & Chlorpyrifos [6]	Approved
Lahontan (6)	Pesticide Discharge Prohibition	All Pesticides	Approved
Santa Ana (8)	Newport Bay	Copper (Marine antifouling paint) [7]	In preparation
	San Diego Creek, and Upper and Lower Newport Bay	Toxicity (Diazinon & Chlorpyrifos) [6]	EPA-Adopted Technical TMDL
San Diego (9)	Shelter Island Yacht Basin (San Diego Bay)	Copper (Marine antifouling paint) [7]	Approved
	Chollas Creek	Diazinon [6]	Approved

[6] Use prohibited in urban areas (diazinon) or no meaningful use due to use limitations (chlorpyrifos).
[7] Primarily addresses pesticides that are directly discharged and should not ordinarily appear in stormwater (marine antifouling paint).

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Figure 1. Current Pesticide Regulatory System.[8]

[8] Photos in Figures 1 and 2 of spraying pesticide along a garage was taken by Les Greenberg, UC Riverside

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Figure 2. Proactive Use of the Pesticide Regulatory Structure to Restrict Pesticide Uses that have the Potential to Cause Urban Water Quality Problems.

1.2 CASQA'S GOALS AND APPLICATION TO PROGRAM EFFECTIVENESS ASSESSMENT

CASQA's Vision for Stormwater, first approved by the Board of Directors in 2015, is periodically updated to reflect developments in stormwater management. In August 2019, CASQA released an interim update to support the development of priorities for 2020.[9] CASQA's Vision, Action 1.3, is to "provide effective and efficient solutions through true source control." Among the three objectives described within Action 1.3 is "control toxicity in receiving waters from pesticide application." In support of this objective, the Vision identifies the following scope:

Anticipated Scope:

- Develop a regulatory system implemented by EPA OPP and California DPR to identify whether use of a pesticide poses a threat to water quality, and then restrict or disallow those uses proactively so that water quality impacts are avoided.
- Respond to the immediate need to participate in EPA pyrethroids, fipronil, and imidacloprid reviews (the only such opportunity for the next 15 years) and to support and encourage DPR steps toward expanded pyrethroids and new fipronil mitigation measures.
- Seek EPA risk mitigation for malathion and carbaryl in urban runoff and the continuation of traditional water quality risk assessments in tandem with Endangered Species Act (ESA) evaluations.
- Continue to leverage successes at the state level as a key stakeholder in the development of statewide Water Quality Control Plan Amendments for urban pesticides reduction.

The effectiveness of CASQA's efforts toward this scope can be expressed in relation to management questions established as part of Municipal Separate Storm Sewer Systems' (MS4s') program effectiveness assessments that are required in some MS4 permits. With respect to addressing urban pesticide impacts on water quality, the following two management questions, derived from the proposed scope for CASQA Vision Action 1.3, are suggested for inclusion in MS4s' program effectiveness assessment:

Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Question 2: (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

This report is organized to answer these management questions and is intended to serve as an annual compliance submittal for both Phase I and Phase II MS4s. It describes the year's status and progress, provides detail on stakeholder actions (by CASQA and others), and provides a roadmap/timeline showing the context of prior actions as well as anticipated end goal of these activities. This report may also be used as an element of future effectiveness assessment annual reporting.

[9] https://www.casqa.org/about/strategic-plan-vision

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Section 2. Results of CASQA 2019-2020 Efforts

At any given time, there are dozens of pesticides with current or pending actions from the EPA or DPR. Addressing near term regulatory concerns is important because some pesticides may pose immediate threat to water quality that can lead to compliance liability for MS4s, and because some of the regulatory decisions made by EPA and DPR will last many years. For example, pesticide registration decisions are intended to be revisited on a fifteen-year cycle. To inform its engagement on near-term regulatory concerns, CASQA uses the pesticide "Watch List" created by the PSC and the UP3 Partnership. The Watch List aids CASQA and the UP3 Partnership in their prioritization of near-term efforts (Section 2.1).

Meanwhile, CASQA and the UP3 Partnership are also working on a parallel effort to effect long-term systemic changes in the regulatory process itself. By identifying inadequacies and inefficiencies in the pesticide regulatory process, and persistently working with EPA and DPR to improve the overall system of regulating pesticides, CASQA and the UP3 are gradually achieving results (Section 2.2).

2.1 NEAR-TERM REGULATORY CONCERNS

CASQA seeks to ensure that the Water Boards and EPA's Office of Water (OW) work with DPR and the EPA's OPP to manage problem pesticides that are creating near-term water quality impairments. These efforts address CASQA Vision Action 1.3 as well as Phase II MS4 Program Effectiveness Assessment and Improvement Plan (PEAIP) Management Question 1 regarding observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff.

Assessment Question 1: (Near term/Current problems) – Are actions being taken by State and Federal pesticides regulators and stakeholders that are expected to end recently observed pesticide-caused toxicity or exceedances of pesticide water quality objectives in surface waters receiving urban runoff?

Answer: As detailed below, at the State level, significant progress has been made by DPR in addressing near-term and current problems with pesticides in surface waters receiving urban runoff. DPR continues to implement improved registration processes and responses to observed water quality problems. DPR also continues to implement and evaluate mitigation measures for observed problems with pyrethroids and fipronil.

At the Federal level, less progress has been made at addressing near term problems. Some early actions were taken to address pyrethroid and fipronil problems at the urging of CASQA and DPR However, EPA does not show a clear understanding of key urban uses in its analyses, and it is still unclear if its upcoming risk management decisions for pyrethroids, fipronil, and imidacloprid and other neonicotinoids will provide any additional protection of urban water bodies.

2.1.1 Updated Pesticide Watch List

A key tool for identifying near-term regulatory concerns is our pesticide "Watch List." CASQA, working through the UP3 Partnership, reviews scientific literature, government reports, and monitoring studies as they are published. This information is used to prioritize pesticides based on the most up-to-date understanding of urban uses, pesticide characteristics, monitoring, and surface water quality toxicity (for pesticides and their degradates). The PSC uses these insights to update the Watch List each year (Table 2), which serves as a management tool to help us focus our efforts on the most important pesticides from the perspective of MS4 agencies.[10] Comparing the current Watch List to the version published in the 2018/19 PSC Annual Report, we see that the insecticides fipronil, imidacloprid, malathion, and pyrethroids remain as the Priority 1.

[10] The first Watch List was published by the UP3 in 2005.

Table 2. Current Pesticide Watch List (June 2020)

Priority	Basis for Priority Assignment	Pesticides		
1	Monitoring data exceeding benchmarks; linked to toxicity in surface waters; urban 303(d) listings	Pyrethroids (20 chemicals[11])	Fipronil	Imidacloprid (neonic) Malathion
2	Monitoring data approaching benchmarks; modeling predicts benchmark exceedances; very high toxicity and broadcast application on impervious surfaces; urban 303(d) listing for pesticide, degradate, or contaminant that also has non-pesticide sources	Carbendazim (Thiophanate methyl)[12] Chlorantraniliprole Copper pesticides	Creosote (PAHs) Indoxacarb Neonics (other than Imidacloprid)[13] Pendimethalin	Pesticides with dioxins impurity[14] Polyhexamethylenebiguanide Zinc pesticides (including Ziram)
3	Pesticide contains a Clean Water Act Priority Pollutant; 303(d) listing for pesticide, degradate, or contaminant in watershed that is not exclusively urban	Arsenic pesticides Chromium pesticides	Diuron Naphthenates	Simazine Silver pesticides Trifluralin
4	High or unknown toxicity (parent or degradate) and urban use pattern associated with water pollution; synergist for higher tier pesticide; on DPR priority list	Abamectin ADBAC pesticides[15] Azoxystrobin Bacillus sphaericus Bacillus thuringiensis (Bti) Bromacil N-Bromosulfamates Busan-77 Carbaryl Chlorinated isocyanurates Chlorine Chlorine dioxide Chlorfenapyr Chlorsulfuron DCOIT DDAC	Dichlobenil Dichlorvos (DDVP) Dithiopyr Halohydantoins Hydramethylnon Hypochlorites Imazapyr Isoxaben Mancozeb Methomyl Methoprene Methyl anthranilate Mineral bases, weak Mineral oil (aliphatic) MGK-264 Novaluron Oryzalin Oxadiazon Oxyfluorfen PCNB	Peroxyacetic acid Phenoxy herbicides[16] Piperonyl butoxide (PBO) Prodiamine Propiconazole Pyrethrins Pyriproxyfen Sodium bromide Sodium chlorite Sodium percarbonate Sodium tetraborate Spinosad/ Spinetoram Sulfometuron-methyl Tebuconazole Terbuthylazine Triclopyr Triclosan Trimethoxysilyl quats

[11] Allethrins, Bifenthrin, Cyfluthrin, Cyhalothrin, Cypermethrin, Cyphenothrin, Deltamethrin, Esfenvalerate, Etofenprox, Flumethrin, Imiprothrin, Metofluthrin, Momfluothrin, Permethrin, Prallethrin, Resmethrin, Sumethrin [d-Phenothrin], Tau-Fluvalinate, Tetramethrin, Tralomethrin.
[12] Carbendazim is a registered pesticide, and also a degradate of thiophanate-methyl
[13] Acetamiprid, Clothianidin, Dinotefuran, Thiamethoxam (degrades into Clothianidin)
[14] 2,4,-D, Chlorothalonil, Dacthal, Pentachlorophenol
[15] Alkyl Dimethyl Benzyl Ammonium Chlorides (ADBAC) includes a family of 21 different quaternary ammonium pesticides.
[16] MCPA and salts, 2,4-D, 2,4-DP, MCPP, dicamba

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Priority	Basis for Priority Assignment	Pesticides		
5	Frequent questions from UP3 Partners	Chlorpyrifos (near zero urban use)	Diazinon (no urban use) Glyphosate	Metaldehyde
New	Priority determined on the basis of proposed urban use, aquatic toxicity, and other information in registration application.	Not known but may include the following:	Cyantraniliprole Cyclaniliprole Flupyradifurone	Nitenpyram (Neonic) Nithiazine (Neonic) Sulfoxaflor (Neonic)
None	Based on review of available data, no approved urban use or no tracking trigger as yet identified.	Most of the >1,000 existing pesticides		
Unknown	Lack of information. No systematic screening has been completed by UP3 for the complete suite of urban pesticides.	Unknown		

2.1.2 Description of Near-Term Regulatory Processes

Immediate pesticide concerns may arise from regulatory processes undertaken at DPR or EPA's OPP. For example, when EPA receives an application to register a new pesticide, there may be two opportunities for public comment that are noticed in the Federal Register, as depicted in green in Figure 3. EPA's process usually takes less than a year while DPR typically evaluates new pesticides or major new uses of active ingredients within 120 days. Now that DPR implements relatively robust surface water quality review procedures for new pesticide registrations, there is reduced need for CASQA to provide input to EPA on new pesticides.

Figure 3. EPA's Registration Process for New Pesticides

Another regulatory process, "Registration Review," depicted in Figure 4, is meant to evaluate currently registered pesticides about every 15 years, to account for new data available since initial registration. In general, it takes EPA five to eight years to complete the entire process. In addition to this process, pesticides are typically evaluated based on Endangered Species Act criteria. EPA regularly updates its schedule for approximately 50 pesticides that will begin the review process in a given year.[17]

Figure 4. EPA's Registration Review – Process to Review Registered Pesticides at a Minimum of Every 15 Years.

[17] See https://www.epa.gov/pesticide-reevaluation/registration-review-schedules for schedule information.

DPR also has an ongoing, but informal review process (called continuous evaluation) that can address pesticides water pollution. If it needs to obtain data from manufacturers, DPR can initiate a formal action, called "Reevaluation." These evaluations, mitigation measure development, and mitigation effectiveness evaluation have involved ongoing communication with CASQA and the UP3 Partnership.

While EPA must consider water quality in all of its pesticide registration decisions, at DPR this step is not yet fully established as standard (most outdoor urban pesticide registration applications are routinely routed by DPR for surface water review, but a few – notably antimicrobial products used in storm drains – do not automatically receive this review). CASQA monitors registration applications, to identify those relevant to urban runoff, based on the pesticide watch list in Table 2 and use pattern/toxicity analysis for pesticides that have not previously been reviewed.

2.1.3 Key Near-Term Regulatory Activities and Progress in 2019-20

Table 3 presents a summary of recent UP3 activities to address near-term regulatory concerns and their 2019-2020 results; for additional insight regarding on-going pesticide registrations, see the Appendix. The positive outcomes in Table 3 reflect the success of CASQA's teamwork in the UP3 Partnership. Some of this work occurs during formal public comment periods. To accomplish this, CASQA monitors the Federal Register and DPR's website for notices of regulatory actions related to new pesticide registrations and registration reviews. Since the Watch List is not based on a comprehensive review of all pesticides, CASQA watches for additional pesticides that appear to have any of the following characteristics: proposed urban, outdoor uses with direct pathways for discharge to storm drains, high aquatic toxicity, or containing a priority pollutant. Participating in these regulatory processes can take many years to complete.

In addition, the EPA OPP strives to update their Aquatic Life Benchmarks table on an annual basis.[18] Their 2019 update included two pesticides of interest to urban surface water (see inset at right).

EPA Aquatic Life Benchmarks – 2019 Update

In September 2019, US EPA's Office of Pesticide Programs, Environmental Fate and Effects Division updated its pesticides Aquatic Life Benchmarks table.[18] From the urban surface water quality perspective, this update included two minor changes for pesticides on the Watch List:

- The category "Copper compounds" was added to clarify the applicability of EPA's Office of Water (OW) copper water quality criteria (developed independent from OPP) to all copper-containing pesticides
- The OPP benchmarks for pendimethalin were updated based on the updated toxicity data used to support its 2018 Registration Review decision

Pesticides still awaiting benchmark updates include the many pyrethroids (other than new transfluthrin, which is not yet registered in California) and fipronil and its degradates. These are currently in EPA's Registration Review process.

[18] https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk

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Table 3. Latest Results of Efforts Communicating Near-Term Regulatory Concerns[19]

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
DPR					
New product registration application for a rubber product containing zinc, thiabendazole and 2-pyridinethiol-1-oxide (potential tire use)				Sacramento County	*Pending.* In response to a letter from Sacramento County, DPR stated that the product would not be allowed in rubber, correcting an error in the public notice. This correction was, unfortunately, not reflected in subsequent paperwork. DPR is requesting that the manufacturer correct the label to indicate that it may not be used in rubber in California.
New product registration for an indoxacarb product (Doxem Precise)	✓				*Pending.* CASQA requested that DPR perform an evaluation of this product. Results pending.
New product registration for a novaluron product (TEKKO 0.2G)	✓				*Success!* CASQA requested that DPR perform an evaluation of this product. The subsequent DPR evaluation (including modeling) did not support registration. DPR subsequently issued a Notice of Proposed Decision to deny registration.
EPA					
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals [Request for Extension of Comment Period]	✓			BACWA CCWQCB SFBRWQCB CVWQCB NACWA Cities of Cotati, Elk Grove, San Diego, Sacramento, Santa Barbara. County of Los Angeles, Marin County Stormwater PPP, Napa County FCWCD, Alameda	*Success.* CASQA and Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing, and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.

[19] Color coding in this table is meant to reflect the "Watch List" prioritization color coding in Table 2.

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
				Countywide Clean Water Program, County of Orange, County of Sacramento, County of Santa Barbara, SCVURPPP	
Pyrethroids Ecological Risk Mitigation Proposal for 23 Chemicals	✓		✓	BACWA SFBRWQCB NACWA City of Salinas	*Limited Success.* Following significant efforts by CASQA and Partners in prior fiscal years, including meeting with new EPA pyrethroid chemical managers, and substantial feedback on the Preliminary Risk Assessment, EPA released the Risk Mitigation Proposal. EPA used CASQA comments to counter arguments by others suggesting that there is not a significant ecological risk. EPA acknowledged the existence of monitoring data that appears to conflict with modeled runoff exposure results. EPA virtually omitted urban runoff from its CWA compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications nor did it distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts. EPA did not concur with CASQA regarding the need for urban runoff mitigation. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. No resolution in CASQA's request for California-specific labels.
Bifenthrin Proposed Interim Decision	✓			SFBRWQCB BACWA NACWA	*Pending.* CASQA concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. CASQA continues to request that EPA terminate urban outdoor use of bifenthrin. Letter prepared this FY for 2020-2021 submittal.

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Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pyrethroid Pesticides Cyfluthrin, Deltamethrin, Esfenvalerate, Permenthrin, Phenothrin, Prallethrin, and Tau-fluvalinate - Proposed Interim Decision	✓			BACWA NACWA SFBRWQCB	*Pending.* Prior to the release of this Proposed Interim Decision, CASQA commented on the EPA's Ecological Risk Mitigation Proposal (above). CASQA continues to request that EPA's risk / benefit finding be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals. CASQA also requests that EPA's benefits assessment include urban runoff-related costs to municipalities. Letter prepared this FY for 2020-2021 submittal.
Fipronil Risk Assessment	✓			BACWA SFBRWQCB (anticipated) SWQCB (anticipated) NACWA (anticipated)	*Pending.* Letter prepared this FY for 2020-2021 submittal. CASQA requested that EPA included updated California monitoring data and improvements to the urban risk assessment modeling methods. Also recommended additional mitigation to prevent urban surface water quality degradation.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision [Request for Extension of Comment Period]				BACWA, SFBWQCB City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County FCWCD, SCVURPPP	*Success.* Partners requested extension of comment period to provide adequate time for review in light of the complexity of the proposed decision and its timing during the winter rainy season, when member agencies take on substantial extra duties in association with rain events. EPA granted the extension.
Neonicotinoid Insecticides (Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam) Proposed Interim Decision	✓			BACWA SFBRWQCB SWRCB	*Pending.* In the Proposed Interim Decision released this year, EPA proposed label improvements but did not include significant label language requests. EPA also did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff and expand modeling to include runoff from all outdoor uses including impervious surfaces. CASQA followed up to address unresolved issues.
Endangered Species Risk Assessment Process for Biological Evaluations of	✓			BACWA SFBRWQCB NACWA	*Partial Success.* EPA acknowledged CASQA's comments and incorporated a significant request by CASQA- that they address pesticides that are applied on outdoor impervious surfaces in Biological Evaluations (BE). EPA also acknowledged CASQA's comment that Bes

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
Pesticides - Draft Revised Method					must include invertebrate toxicity data. EPA partially incorporated other comments from CASQA and ignored one of the comments.
Zinc registration review Final Interim Decision	✓			SFBRWQCB BACWA NACWA	*Success!* CASQA and its Partners sought that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Further, for all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, CASQA and Partners recommended that the "Environmental Hazards" label statements be applied on the basis of product use (end-use products vs technical grade and manufacturing use) rather than product size to avoid potential conflicting language on product labels. EPA fully incorporated both comments.
Methoprene Registration Review Work Plan				SFBRWQCB BACWA Sacramento County NACWA	***Pending.*** Due to uses for mosquito control that are made directly to neglected swimming pools, catch basins, and other elements of stormwater drainage systems, CASQA Partners called for the collection of data to inform reasonable mitigation measures that would minimize environmental impacts while maintaining the public health benefits of methoprene applications. Asked EPA to consider label language for mitigation measures, including label language for uses with abandoned pools that is consistent with language across pool, spa, and hot tub chemicals that would indicate minimum post-application holding times or other objective criteria that local and state authorities could use in their approval process for discharges to their systems. Further, Partners asked EPA to re-evaluate the aquatic ecological risk associated with discharges of methoprene to aquatic environments by utilizing data for aquatic Dipteran insect species that are more sensitive than the species used for the aquatic risk evaluations in the Preliminary Work Plan.
Chlorine gas/swimming pools Draft Risk Assessment	✓			SFBRWQCB BACWA NACWA	*Pending.* The Proposed Interim Decision correctly identified potential impacts associated with emptying treated pools into storm drains and acknowledged that a requirement to contact local governments for direction prior to discharge would mitigate this risk (this reflects success of prior CASQA educational efforts related to other pool chemicals). Letters prepared this FY for 2020/2021 submittal supporting EPA's

Regulatory Action or Concern	CASQA Efforts			Partner Support (Letters)	Outcomes and notes
	Letter(s)	Call(s) or emails	Mtg(s)		
					acknowledgement and recommending that the Registration Review decision follows the precedent for improved labels for pool, spa, hot tub, and fountain products that was established by the decisions for similar end use chemicals.
Halohydantoins/pools, fountains, spas – Draft Risk Assessment	✓			BACWA SFBRWQCB NACWA	*Pending.* The Draft Risk Assessment did not examine risks associated with discharges of swimming pool, spa, hot tub, and fountain water treated with halohydantoins. Letter prepared this FY for 2020-2021 submittal to request that the halohydantoins decision follow the precedent for improved labels for swimming pool, spa, hot tub, and fountain products that was established by the decisions for other antimicrobials with these uses.
Terbuthylazine/fountains Draft Risk Assessment	✓			Sacramento County SFBRWQCB	*Success.* In January, CASQA Partners formally requested that language to address pool, spa, and fountain emptying be required to be placed on all such product labels. EPA acknowledged the importance of such communication and will be revising future label language on these products, which will require that the sewer/storm agency be notified prior to any discharge of terbuthylazine. Follow-up letter prepared by CASQA this FY for 2020-2021 submittal.
Inorganic Halides (Sodium Bromide) Draft Risk Assessment				BACWA Sacramento County	*Pending.* Partners requested that the Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. Such label language mitigates possible aquatic impacts from discharge of treated water while also providing consistency for label language across pool, spa, hot tub, and fountain chemicals.

2.2 LONG-TERM CHANGE IN THE PESTICIDES REGULATORY STRUCTURE

Since the mid-1990s, CASQA (and its predecessor organization the Storm Water Quality Task Force), have worked toward a future in which the pesticide regulatory structure at the state and federal level proactively restricts pesticide uses that have the potential to cause urban water quality problems. These efforts directly relate to Phase II MS4 PEAIP Management Question 2.

Assessment Question 2. (Long term/Prevent future problems) – Do pesticides regulators have an effective system in place to exercise their regulatory authorities to prevent pesticide toxicity in urban water bodies?

Answer: Improvements in processes at EPA and especially at DPR have moved us closer to that future. Many of these improvements are linked to the persistent work of CASQA and the UP3 Partnership to educate regulators on how previous process deficiencies did not adequately address urban pesticide problems.

As detailed below, at the State level, significant progress has been made by DPR and the Water Boards in establishing a comprehensive statewide approach to utilizing pesticide regulatory authorities to prevent pesticide toxicity in urban water bodies. Overall, DPR has a system in place that is reasonably effective at addressing pesticide toxicity in urban water bodies, although improvement is needed to better coordinate this with the requirements of the Clean Water Act and NPDES MS4 permits. DPR and the Water Board, along with CASQA and other stakeholders, are working diligently to strengthen this system and to institutionalize it. This is primarily embodied in the State's effort to establish the UPA and the Management Agency Agreement (MAA) between DPR and the State Water Board.

At the Federal level, OPP has implemented some improvements in how it evaluates and responds to water quality problems associated with pesticides, but it does not do this reliably and does not have a system in place to ensure that this will happen consistently and adequately. Meanwhile, scientific studies are being conducted by USGS and the EPA's Office of Research and Development to better understand the complexities of pollution in urban stormwater (see inset at right).

National Urban Stormwater Study Included Many Priority 1 and 2 Pesticides

In 2019, USGS and EPA scientists published a major scientific paper examining pollutants in urban runoff, entitled "*Urban Stormwater: An Overlooked Pathway of Extensive Mixed Contaminants to Surface and Groundwaters in the United States*." The authors indicate that this study "provides the most comprehensive representative snapshot of the urban stormwater-contaminant profile derived from randomly sampled sites and sampling days from across the U.S. to date." The study involved low-detection limit measurements of multiple pollutant classes (e.g., pesticides, pharmaceuticals, inorganics, PAHs, PCBs and other organochlorines) in undiluted urban runoff. Pesticides were the most frequently detected pollutant type. Further, organic chemical concentrations and loads were positively correlated with impervious surfaces and highly developed urban catchments.

The study involved 50 storm event urban runoff samples from 21 locations in 17 states, including 2 unnamed locations in California (the 2 largest watersheds sampled). Samples were collected primarily from highly urbanized watersheds, primarily from base-of-watershed discharge pipes and concrete-lined channels.

For current-use pesticides, these nationwide results were generally consistent with other scientific work published in the last decade (much of which is from California), indicating that current use pesticides like pyrethroids, fipronil (and its degradates), imidacloprid, and the fungicide carbendazim are common in urban runoff often at concentrations greater than aquatic life reference values. Multi-pesticide and multi-pollutant mixtures were the norm, raising questions about potential aquatic life effects from cumulative exposures.

While the study measured many Priority 1 and 2 pesticides on the Watch List, most other pesticides on the Watch List were omitted (due, in part, to the absence of standard or convenient low-detection limit analytical methods). For some current-use pesticides (like some pyrethroids and some fipronil degradates), reporting limits were higher than the lowest aquatic life reference values. Most pesticides samples were filtered, which affects reported concentrations of hydrophobic pesticides like pyrethroids that tend to be removed with the suspended solids filtered out of the sample; sediment was not analyzed.

Environ. Sci. Technol. 2019, 53, 17, 10070–10081. Publication Date: August 21, 2019. https://pubs.acs.org/doi/10.1021/acs.est.9b02867

Although more effective regulation of pesticides by EPA is still an important goal for CASQA,[20] due to the current regulatory climate at federal agencies, CASQA does not expect OPP to be very responsive to requests for additional improvements. Specific examples include the current administration's orders for a blanket reduction in regulations, chronic under-staffing at OPP, and lack of accessibility to OPP staff to share scientific information and stormwater expertise.

As a result, CASQA has decided for the time being to limit its efforts to affect long-term systemic change by EPA and other federal agencies. Instead, CASQA has focused more on solidifying advances made at the state level, which will leverage the considerable authority held by the State of California for regulating the use of pesticides.

2.2.1 Focus on MAA Between DPR and State Water Board

In 1997, just as pesticides were first discovered to be an important pollutant in urban waterways, DPR and the State Water Board adopted their first formal agreement to collaborate to address pesticides water pollution. That agreement focused on agricultural areas; the processes it envisioned did not work well in the urban context. CASQA (and its predecessor organization the Storm Water Quality Task Force) worked with DPR and the Water Boards for the next 20 years toward establishing pesticides water quality protection systems that would work in the urban context. During this time, DPR substantially updated its science-based pesticide registration procedures to include a "surface water protection program" review process, it initiated an urban watershed monitoring program, and it developed approaches to implementing mitigation measures addressing urban water pollution, as evidenced by its actions on pyrethroids and fipronil. The Water Boards engaged with DPR, providing scientific and regulatory information, receiving and using information from DPR to inform design of its regulatory programs (particularly TMDLs), and cooperating in monitoring programs. In mid-2019, DPR and the State Water Board received approval to sign a major update to their formal MAA that memorializes their existing systems and growing cooperation and lays out the steps they are taking toward a "unified and cooperative program to protect water quality related to the use of pesticides." The two agencies agree "to work cooperatively to address the discharge of pesticides that may cause or contribute to surface water or groundwater pollution, including surface water toxicity."

For example, DPR will evaluate surface water quality risks and consider these risks when making registration decisions; promote environmentally sound pest management; and respond to water quality concerns that pose significant adverse effects to aquatic organisms. Meanwhile, Water Boards will confer with DPR when developing regulatory programs related to pesticides; ensure waters are monitored (in coordination with DPR's monitoring and including permittee and State Water Board's own monitoring participation); and require and support use of best management practices relating to pesticides (structural management practices are not intended to be required in urban areas).

The Implementation Plan that accompanies the MAA describes opportunities for coordination and mutual enrichment (including cross-training), expectations for both staff and executive level communication (including an annual management-level meeting between the agencies), and current agency organization and interactions. Excerpts from the Implementation Plan:

> *"In the urban environment, pesticides are transported by the municipal wastewater collection system and the municipal separate storm sewer system (MS4). PMPs [pesticides-specific management practices] focus primarily on prevention through responsible use according to the pesticide label and DPR regulations and as a part of a holistic IPM [Integrated Pest Management] strategy. DPR conducts education and outreach efforts to ensure professional applicators are up to date on regulatory actions and label changes. Wastewater treatment plants and multi-benefit storm water treatment practices such as low impact development, runoff infiltration, constructed wetlands, and restoration of riparian buffers around waterways can provide some reductions. However, they are not designed for, nor implemented to address, complex mixtures of pesticides and the effectiveness of these practices to remove various pesticides from these systems is not well understood.*

[20] Long-term regulatory goals at the state and federal level are described in detail in Section 1.2.

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DPR will work with the Water Boards to inform pesticide users on urban PMPs. The Water Boards, through their storm water permits, will continue to require PMPs from storm water permittees. Permittees must also include, as appropriate, education and outreach to inform residential and commercial pesticide users on responsible pesticide use and encourage municipal storm water permittees to provide local expertise into DPR's pesticide regulatory process.

The Water Boards and DPR will collaborate to assess the impacts of pesticides in the urban environment through collective and comprehensive monitoring efforts, which optimize the use of monitoring resources of Water Boards, dischargers, and DPR."

2.2.2 Focus on California's UPA

At the urging of CASQA, in 2014 the State Water Board made a strategically important decision to institutionalize its commitment to work closely with DPR and EPA to utilize pesticide regulatory authority as the primary mechanism for preventing and responding to impairments of receiving waters linked to current use pesticides in urban runoff. To accomplish this, it established an urban pesticides reduction project (now titled the Urban Pesticides Amendments or UPA) as a top priority project under the comprehensive stormwater strategy it adopted in December 2015, known as "Strategy to Optimize Resource Management of Storm Water" or STORMS.[21] In 2018/19, the State Water Board continued working towards developing the Urban Pesticides Amendments which will be changes to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries, and the Water Quality Control Plan for Ocean Waters of California. It is important to note that a critical factor in the State Water Board's decision to move in this direction was DPR's demonstrated commitment and significant progress in addressing urban water quality issues caused by pesticides.[22] A 2020 paper co-authored by Dr. Kelly Moran and staff of DPR, State Water Board, and UC Davis, describes many of the key elements of this progress.[23] The abstract for that paper is presented on the following page.

CASQA representatives have been participating actively in the development of the Urban Pesticide Amendments since their inception, as members of the projects Core Team and various work groups, to ensure that they are consistent with CASQA's vision for pesticide control.[24] The key elements that we anticipate being in the amendments are listed below.

- Element 1: Establishment of a framework for the Water Boards to work with DPR and U.S. EPA to utilize pesticide regulatory authority as the primary means for addressing pesticides in urban runoff.
- Element 2: Adopt a program of implementation addressing urban pesticides water pollution that serves as a TMDL alternative and integrates a feasible compliance pathway for MS4s.

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[21] STORMS' overall mission is to "lead the evolution of storm water management in California by advancing the perspective that storm water is a valuable resource, supporting policies for collaborative watershed-level storm water management and pollution prevention, removing obstacles to funding, developing resources, and integrating regulatory and non-regulatory interests." (http://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/)

[22] As reported in previous CASQA Pesticide Subcommittee Annual Reports, DPR's accomplishments include improved modeling, active ingredient screening for urban water quality issues, monitoring, and regulatory mitigation of pyrethroids and fipronil.

[23] Moran, et al., 2020. Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA. Environmental Toxicology and Chemistry—Volume 39, Number 5—pp. 953–966, 2020

[24] These goals have been adapted from the CASQA document, "End Goals for Pesticide Regulatory Activities," 2014. Goal 3, above, is directly tied to Goals 2, 4, and 5 of that document.

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Water Quality Impairments Due to Aquatic Life Pesticide Toxicity: Prevention and Mitigation in California, USA

Kelly Moran, Brian Anderson, Bryn Phillips, Yuzhou Luo, Nan Singhasemanon, Richard Breuer, Dawit Tadesse, *Environ Toxicol Chem* 2020;39:953–966.
https://setac.onlinelibrary.wiley.com/doi/abs/10.1002/etc.4699.

This paper published in 2020 describes key elements of the current State water quality effort.

Abstract

The management of pesticides to protect water quality remains a significant global challenge. Historically, despite regulatory frameworks intended to prevent, minimize, and manage off-site movement of pesticides, multiple generations of pesticide active ingredients have created a seemingly unending cycle of pesticide water pollution in both agricultural and urban watersheds. In California, the most populous and most agricultural US state, pesticide and water quality regulators realized in the 1990s that working independently of each other was not an effective approach to address pesticide water pollution. Over the years, these California agencies have developed a joint vision and have continued to develop a unified approach that has the potential to minimize pesticide risks to aquatic life through a combination of prevention, monitoring, and management actions, while maintaining pesticide availability for effective pest control. Key elements of the current California pesticide/water quality effort include: 1) pesticide and toxicity monitoring, coupled with watershed modeling, to maximize information obtained from monitoring; 2) predictive fate and exposure modeling to identify potential risks to aquatic life for new pesticide products when used as allowed by the label or to identify effective mitigation measures; and 3) management approaches tailored to the different pesticide uses, discharge sources, physical environments, and regulatory environments that exist for agricultural runoff, urban runoff, and municipal wastewater. Lessons from this effort may inform pesticide management elsewhere in the world as well as other chemical regulatory programs, such as the recently reformed US Toxic Substances Control Act and California's Safer Consumer Products regulatory program. © 2020 SETAC

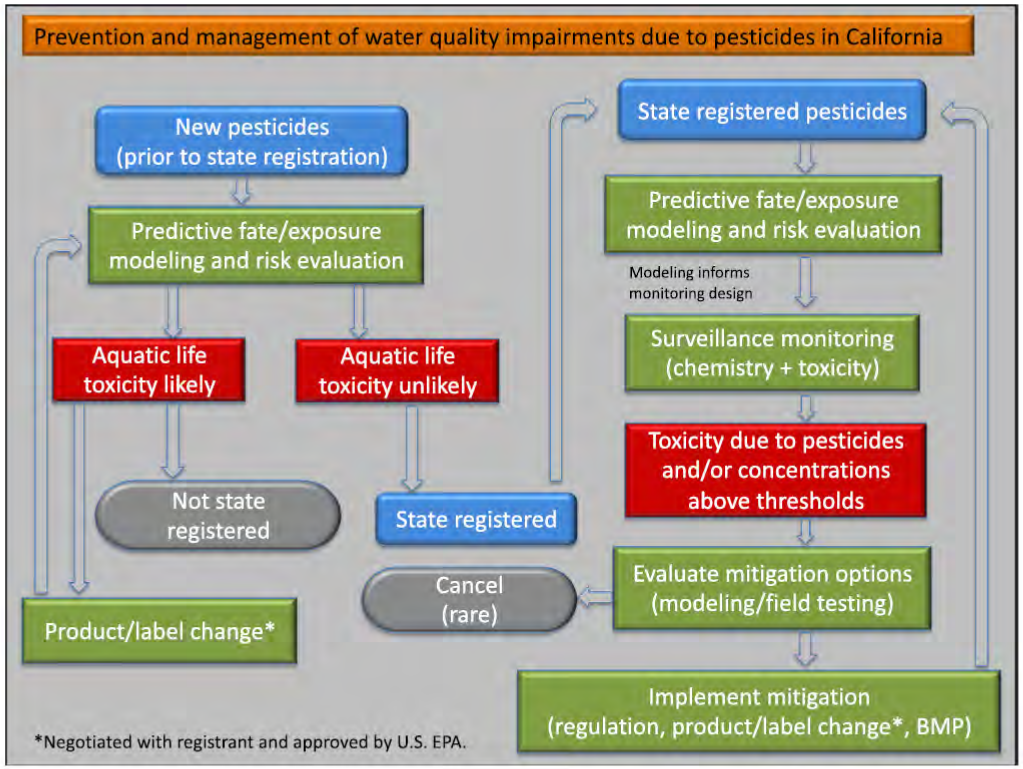

- Element 3: MS4 Monitoring program designed to coordinate with existing DPR and State Water Board pesticides and toxicity monitoring to support effective implementation of Elements 1 and 2.
- Element 4: Requirements for MS4s to support Elements 1 and 3 by contributing expertise on how pollutants present in urban environments enter and behave in urban runoff and water bodies.
- Element 5: Other actions that can reasonably be implemented by MS4s, such as IPM outreach, in support of pesticides reductions.

CASQA supports the State Water Board's stated goal of implementing the UPA "as an alternative to TMDL development to address pesticide and pesticide-related toxicity impairments in individual water bodies." Achievement of this goal would provide substantial savings of state and MS4 agency resources as compared to establishment of multiple TMDLs throughout the state.

Elements 1-4 are consistent with CASQA Vision Action 1.3. Water Board staff have indicated their intent that the Urban Pesticides Amendments, as shown in Element 5 should also establish a consistent set of "*minimum pesticides source control measures for MS4 dischargers.*"

CASQA representatives have worked with the Water Boards to ensure that such requirements are reasonable and consistent with similar measures already in place in some regions. At this time, the list of potential minimum measures includes use of IPM, education of and outreach to residents and professional pesticide applicators, providing urban runoff scientific and management expertise to support pesticide regulatory processes, non-stormwater discharge prohibitions, and pesticide and toxicity monitoring.

CASQA supports the stated goal to "create a comprehensive, coordinated statewide monitoring framework for pesticides and toxicity in urban runoff and receiving water that improves resource efficiency, usefulness of data, and coordination of data collection to support management decisions."[25] A well-designed and managed monitoring framework that is properly representative of urban areas can simultaneously provide more useful information and improve the utilization of resources by eliminating unnecessary MS4 monitoring requirements that do not contribute to effective management of pesticides and pesticide-caused toxicity.

Monitoring. In the previous FY, agreement was reached regarding decision-making channels and membership for the UPCMP. CASQA is an active participant in the UPCMP and recruited members to serve on both the Steering Committee and Technical Committee. These committees have been convened by the Aquatic Science Center using grant funding from the State Water Board. The Steering Committee and Technical Committee are tasked with establishing the initial framework of the monitoring program, including a work plan for its first year of operation. It is intended to have the work plan in place upon adoption of the UPA. However, progress in this direction has been slowed this year by changes in staffing at the State Water Board, and by complications caused by COVID-19. One subsequent meeting of the Technical Group was held in June.

Key joint activities for the UPCMP this FY included:

- Initial meeting of UPCMP Steering committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[26].
- Initial meeting of UPCMP Technical Committee, including 3 MS4 representatives recruited by CASQA. Each of these representatives are MS4 staff or consultants funded by CASQA municipal members[27].

[25] Informational Document, CEQA Public Scoping Meeting, State Water Resources Control Board, January 25, 2017
[26] MS4 representatives on the Steering Committee are from the Alameda Countywide Clean Water Program, Orange County, and Sacramento County.
[27] MS4 representatives on the Technical Group are from the Santa Clara Valley Urban Runoff Pollution Prevention Program, Orange County, and Sacramento County (jointly funded by the Sacramento Stormwater Quality Partnership).

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Technical Support. CASQA continues to provide technical support to the Water Boards on numerous crucial and highly detailed items related to the UPA, Staff Report, CEQA Document, monitoring program, model permit language, and the relationship of these to the MAA. During June, CASQA organized a meeting of DPR, Water Board, and CASQA representatives on July 24th for DPR to provide detailed information to senior Water Board management on DPR's capacity and progress for addressing urban pesticide issues.

MS4 Input. CASQA Pesticides Subcommittee continued briefings for the MS4 community to explain, gather input, and obtain support for the Urban Pesticide Amendments in advance of their public release for comment. Briefings were provided to representatives of the following MS4 groups:

- Los Angeles County Permittee Group
- Central Valley MS4 Coordinating Committee
- Sacramento Stormwater Quality Partnership
- CASQA Watershed Management and Impaired Waterbodies Subcommittee
- CASQA Policy and Permitting Subcommittee
- CASQA Science and Monitoring Subcommittee
- Sonoma County MS4 Permittee Group

2.2.3 CASQA Participation in Other State Efforts

As presented in Table 4, CASQA has been actively involved with various State agencies and advisory groups that affect pesticide use and pest management in urban areas.

Table 4. Participation in Other State Efforts to Support CASQA's Goals

Agency or Conference	Latest Outcomes
DPR's Pest Management Advisory Committee (PMAC)	Participation on the PMAC has resulted in expanded focus by DPR on urban pest management and water quality issues and generated funding for urban IPM programs. This year the PMAC recommended funding for two IPM research projects that would address pesticides in urban runoff, and one project that would address copper antifouling pesticide impacts of water bodies that are receiving waters of interest to many MS4 agencies. The amount of funding recommended was approximately $570,000. The projects are listed below. • IPM for local Sacramento farmers. [addresses commercial urban farms with high pesticide uses] • Training for pest management professionals. [upgraded facilities and mass media channels for statewide structural pest control licensees] • Training for hull cleaners and boaters. [addresses copper pollution in marinas]
California Structural Pest Control Board (SPCB)	A PSC member is an appointed member of the SPCB. The SPCB recognizes the potential for excessive pesticide application to impact water quality. The SPCB is in the process of adopting regulations to increase continuing education hours required in the IPM category. Finalization of these regulations has been slowed due to the need for California to reconcile its structural licensing requirements with newly adopted Federal regulations for this industry. Five proposals were selected and collectively awarded $1.02 million to be funded by the SPCB Research Fund. Progress reports were provided at the February 2020 board meeting for five research projects funded in the previous FY by the SPCB The research topics are listed below, and detailed project updates are available online at https://www.pestboard.ca.gov/about/agenda/20200312_materials.pdf • "Diet and Colony Structure of Two Emerging Invasive Pest Ants" • "Investigation of Rodenticide Pathways in an Urban System Through the Use of Isotopically Labelled Bait" • "Evaluation of bait station system efficacy for reduced-risk subterranean termite management in California" • "Development and Evaluation of Baiting Strategies for Control of Pest Yellowjackets in California" • "Improving Urban Pest Ants Management by Low-Impact IPM Strategies" The SPCB is in the process of allocating funding for the 2021 FY.

Section 3. CASQA's Approach Looking Ahead

At any given time, EPA and DPR may be in the process of evaluating and registering various pesticides for urban use. CASQA will continue to track and engage in EPA and DPR activities, with a focus on top priority active ingredients (as identified in the annual Pesticide Watch List) and sharing relevant urban runoff information and CASQA's water-quality specific expertise with pesticides regulators. Key documents to be reviewed will include risk assessments and risk management proposals with an eye toward ensuring that pesticide regulators have and consider accurate information on relevant factors in urban areas such as pesticide use patterns, urban pollutant transport mechanisms, and receiving water conditions. CASQA strives to ensure that pesticide regulators have access to relevant information such as monitoring data, water quality regulatory requirements, and urban runoff agency compliance liabilities and cost information. As necessary, CASQA will continue to recommend changes in an individual pesticide's allowable uses or use instructions, request consideration of impacts on water bodies receiving urban runoff, or ask that regulators fill critical data gaps by obtaining more data from manufacturers. As resources allow and circumstances warrant, CASQA will collaborate with wastewater organizations (such as BACWA), other water quality stakeholders, and the Water Boards in commenting on EPA and DPR actions.

In the coming year, CASQA will continue to address near-term pesticide concerns and seek long-term regulatory change. Although changes at the federal level are important for fully achieving CASQA's goal of protecting water quality through the effective use of pesticide regulations, until there is a more favorable situation at that level, we will continue to focus our efforts on solidifying progress at the state level. In FY 2020-2021, we will continue engagement on specific regulatory actions for priority pesticides at the federal level, while continuing our strategic focus on supporting State adoption of the UPA. CASQA's current priority activities are as follows:

(1) Continue collaboration with DPR to address near-term regulatory concerns, while seeking OPP and OW actions to reduce inconsistencies:

- Ensure DPR action on fipronil water pollution is completed, including effective professional user education about restrictions on its outdoor urban use.
- Ensure DPR enforces mitigation measures for pyrethroids and fipronil, and adopts additional measures as necessary.
- Ensure the state continues to conduct surveillance monitoring to evaluate pyrethroids and fipronil mitigation effectiveness and to evaluate occurrence of new threats like imidacloprid and other neonicotinoid insecticides.
- Continue to encourage EPA to complete scientific groundwork and to identify and implement pyrethroids, fipronil, malathion, and imidacloprid mitigation measures, recognizing that it is likely that necessary mitigation cannot readily be implemented entirely by DPR.

(2) Seek long-term changes in the pesticide regulatory structure:

- Leverage our success at the state level and continue to be a key stakeholder in the STORMS project to adopt the statewide UPA. Through this process, CASQA will work with other stakeholders to implement the planned restructuring of California's urban surface water pesticides monitoring to increase its effectiveness and improve coordination.
- Seek procedure changes such that DPR continues to refine its registration procedures to address remaining gaps in water quality protection.
- Seek increased transparency of DPR regulatory activities, including timely access to scientific evaluation reports that are the basis of registration decisions.

CASQA will continue to seek opportunities to coordinate on high priority regulatory actions, with the Water Boards and other water quality stakeholders such as POTWs and non-profits, to take advantage of efficiencies, increase effectiveness, and ensure that the water quality community has a consistent message. Table 5 presents CASQA's activities and level of engagement anticipated for FY 2020-2021; CASQA will conduct these activities as priorities indicate and resources allow. Table 6 summarizes upcoming regulatory action items that are likely to proceed and may require CASQA attention in FY 2020-2021.

Table 5. CASQA Pesticide Subcommittee Activities

Activity		Purpose
Regulatory Tracking	Track Federal Register notices	Identify regulatory actions for high priority active ingredients that may require review.
	Track DPR notices of registration applications and decisions	Identify pesticides meriting surface water review that are not within DPR's automatic routing procedures, identify gaps or potential urban runoff-related problems with current DPR evaluation or registration plans other regulations, procedures & policies.
	Track activities at the Water Boards	Identify opportunities for improvements in TMDLs, Basin Plan Amendments, and permits.
	Review regulatory actions, guidance documents, and work plans	Identify potential urban runoff-related problems with current EPA evaluation or registration plans, other regulations, procedures, and policies.
Regulatory Communications	Briefing phone calls, informal in-person meetings, teleconference meetings, and emails with EPA and DPR	Information sharing about immediate issues or ongoing efforts; educate EPA and DPR about issues confronting water quality community. Provide early communication on upcoming proceedings that help reduce the need for time-intensive letters.
	Convene formal meetings, write letters and track responses to letters	Ensure current pesticide evaluation or registration process accurately addresses urban runoff and urban pesticide use and management contexts and take advantage of opportunities to formally provide information suggest more robust approaches to that could be used in future regulatory process. Request and maintain communication on mitigation actions addressing highest priority pesticides.
Advisory	Serve on EPA, DPR, and Water Board policy and scientific advisory committees	Provide information and identify data needs and collaboration opportunities toward development of constructive approaches for managing pesticides.
Educational	Presentations to and informal discussions with EPA, DPR, Water Board, CASQA members,	Educate EPA, DPR, Water Board, and CASQA members about the urban runoff-related shortcomings of existing pesticide regulatory process, educational efforts to support process improvements, and report on achievements. Encourage research and monitoring programs to address urban runoff data needs and priorities. Stimulate academic, government, or private development of analytical and toxicity identification methods to address anticipated urban runoff monitoring needs. Inform development of new pesticides by manufacturers and selection of pesticides by professional users.
	Developing and delivering public testimony	Educate Water Board members about the problems with existing pesticide regulatory process, encourage change, and report on achievements.

Activity		Purpose
Monitoring and Science	Update Pesticide Watch List based on new scientific and regulatory information	The Pesticide Watch List (Table 2) serves as a management tool to prioritize and track pesticides used outdoors in urban areas.
	Data analysis of DPR/SWAMP/USGS/MS4 monitoring, pesticide use data, and information from scientific literature	Summarize data to educate CASQA members and water quality community, Water Boards, DPR, and EPA.
Reporting	Prepare Monthly Action Plans	Coordinate CASQA's regulatory actions with Partners
	Prepare PSC Annual Report to describe the year's status and progress, provide detail on stakeholder actions, and the context of prior actions as well as anticipated end goal of these activities.	Provide CASQA's members with focused information on its efforts to prevent pesticide pollution in urban waterways. The document serves annual compliance submittal for both Phase I and Phase II MS4s. It may also be used as an element of PEAIPs and future effectiveness assessment annual reporting.

Table 6. Anticipated Opportunities for Pesticides Regulatory Engagement in 2020-2021

EPA Pesticide Registration Review (15-year cycle)
Environmental Risk Assessments • Priority 2-4 pesticides: Busan 77, Chlorothalonil, Irgarol, Diuron, Dichlorvos (DDVP), Isothiazolinones (DCOIT, BIT, BBIT, MIT, OIT). o-Phenyl phenol, Peroxy Compounds (includes Peroxyoctanoic Acid; Sodium Percarbonate), Propiconazole, Tebuconazole, Ziram; others (schedule unknown)
Proposed Interim Decisions • Priority 1 pesticides: Fipronil, Pyrethroids: Cyhalothrins, Cypermethrins, Allethrin, Etofenprox, Metofluthrin • Priority 2-4 pesticides: Carbaryl, Chromated Arsenicals, Creosote, Dichromic acid, DBNPA, Dithiopyr, (phenoxy herbicide), MCPA, MGK-264 (synergist), Methomyl Novaluron, Oxyfluorfen, Pentachlorophenol (Pentachlorophenol, Dioxins), Piperonyl butoxide (PBO) (pyrethroids synergist), Pyrethrins, Simazine, Sodium bromide, Thiophanate methyl, Triclopyr; others (schedule unknown)
Other EPA-related Items
• U.S. EPA "Increasing Consistency and Transparency in Considering Costs and Benefits in the Rulemaking Process" affects how the U.S. EPA uses cost and benefit analysis in setting pollution standards. Rule proposal was expected in 5/19. • Proposed rule to eliminate some OPP Federal Register Notices (was anticipated September 2018 according to U.S. EPA semi-annual regulatory agenda) • U.S. EPA Update to Guidelines for Deriving Aquatic Life Water Quality Criteria. Draft scoping document external peer review is next step. Seeking OPP engagement.
DPR New Pesticide Registration Decisions
• Proposed new urban pyrethroids (momfluorothrin, alpha-cypermethrin, phenothrin and transfluthrin products) • Proposed expansion of bifenthrin use in non-residential urban locations • Proposed new fipronil products: fipronil-bifenthrin landscaping product, termite product, product for yellow jackets • Proposed new aerated indoxacarb powder • Proposed ant and termite product containing the proposed new pesticide broflanilide. • Others (schedule unknown)
Other DPR-related Items
• Registration Application Surface Water Reviews – continue to follow up on communications requesting review of all storm drain products and outdoor antimicrobials
Water Boards
• State Water Board Provisions for Toxicity Assessment and Control, which include statewide numeric water quality objectives and implementation program • STORMS Urban Pesticides Amendments • Pesticides 303(d) listings • Pesticide TMDL implementation requirements for permittees

Appendix

Regulatory Participation Outcomes and Effectiveness Assessment Summary Tables

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Abemectin (September 2019)

Endangered Species Act Outcomes Evaluation (June 2020)

Imidacloprid (April 2020)

Neonics Extension (April 2020)

Pyrethroids (January 2020)

Pyrethroids Extension (April 2020)

Pyrethroids Update (June 2020)

Terbuthylazine (May 2020)

Zinc and Salts (September 2019 and April 2020)

Pesticide:	Abamectin; Docket: EPA–HQ–OPP–2013–0360
Use:	Insecticide used for ants, mites, and spiders (among other uses).
Why we care:	Highly toxic to aquatic invertebrates. Outdoor uses in urban environments have high potential impact MS4 and surface waters.
Actions taken:	CASQA has been tracking this pesticide since 2013.
Status:	EPA released the Final Interim Registration Review Decision in August 2019.

Next steps:	ESA Consultation is required but unlikely to begin before 2022.
Recommendation:	No action is needed at this time. Keep on tracking list.

From EPA's Final Interim Decision:	Response from CASQA's Perspective:
EPA is adding a standard Runoff Prevention Advisory Statement to the label: *"RUNOFF PREVENTION* *To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems."*	The standard runoff prevention language that EPA has proposed could be further strengthened. For example, CASQA typically recommends not allowing pesticide use if rain is predicted in the next 48 hours (instead of 24 hours as is proposed by EPA). We should consider impact of "rinsing application over the treated area" which would be highly problematic on impervious surfaces hydraulically connected to MS4 and surface waters.
From EPA's response to comments in the "Abamectin. Response to Comments Regarding HED's [EPA OPP Health Effects Division] Human Health Risk Assessment in Support of Registration Review, it appears that new crack and crevice usages are being evaluated through a different process: HED notes that the human health draft risk assessment also included a separate new use action for a proposed use on crack and crevice and spot treatment for abamectin. Mitigation measures associated with the proposed new use are separate from the registration review action and are being addressed by the registrant petitioning for that particular use pattern.	To better assess the risks from a pesticide, EPA should evaluate pesticide uses in a comprehensive manner that includes the use patterns and mitigation measures proposed and/or approved after the initiation of Registration Review.

Action:	Method for National Level Endangered Species Risk Assessment Process for Biological Evaluations of Pesticides; Docket: EPA–HQ–OPP–2019–0185
Use:	Defines procedures for assessing pesticides risks to endangered species
Why we care:	EPA intends to use these procedures to replace its current ecological risk assessment procedures
Actions taken:	CASQA submitted a comment letter in 2019. CASQA's comments were echoed by UP3 partners including BACWA, NACWA, the SF Bay Water Board, Xerces Society, Northwest Center for Alternatives to Pesticides (and 8 other groups) and Center for Biological Diversity. DPR made comments similar to CASQA's.
Status:	EPA released its revised method in March 2020
Next steps:	EPA will be using the revised procedures to conduct ecological risk assessments for pesticides in its ESA pilot program.
Recommendation:	Review ecological risk assessments for ESA pilot pesticides and comment on procedural shortcomings as warranted.

CASQA 08/15/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticides Are Applied on Outdoor Impervious Surfaces and Must Be Addressed in BEs	"EPA has corrected its discussion of applications to impervious surfaces in the Revised Method. The discussion was not meant to indicate that EPA would not evaluate applications to impervious surfaces. Rather, it was intended to generate a footprint for developed areas that was more realistic. In the Revised Method, for applications that are not intended to be made directly to impervious surfaces (e.g., to lawns), EPA will make a treated area assumption for the developed land cover class based on the percent of a typical lot that is not represented by impervious surfaces (e.g., footprints of houses, driveways are assumed to not be treated). In these cases, EPA acknowledges that overspray to impervious surfaces can occur, and, as such, the treated area will include a small percent of the impervious surface. For applications designed for impervious surfaces, EPA will model the application using the impervious PWC scenario, along with appropriate adjustments to account for the area treated." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 41.	Yes.
Clean Water Act Compliance Assessment Must Be an Integral Part of BEs and the Pesticide Endangered Species Act Consultation Process	"Office of Pesticide Programs and Office of Water work together on water issues to address issues under each of their statutes." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	No.
BEs must evaluate all uses of a pesticide that EPA is approving – not just uses that have occurred historically. When EPA reviews a pesticide, it licenses each individual use of that pesticide as described on	"EPA will consider all uses allowed on product labels for the assessed pesticide that are registered under Sections 3, 24(c), and 18 of the Federal Insecticide Fungicide Rodenticide Act (FIFRA) when developing BEs. As stated above, the proposed Revised Method included usage data in the derivation of the Action Area. EPA has changed the	Partially. EPA will consider all legal uses in its first phase, but the actual risk assessment

product labels. If EPA restricts its analysis only to uses that have occurred historically, or to select geographic areas, EPA is effectively licensing uses that it is not evaluating, which is inconsistent with the ESA. This would be the effect of the usage data methodology proposal.	Revised Method so that usage data are no longer incorporated into Step 1. Therefore, all registered uses, even those without demonstrated usage are included in Step 1, definition of the Action Area. EPA incorporates usage data into Step 2 of the Revised Method. When usage data (i.e., PCT [Percent Crop Treated], average rate, application timings, etc...) are incorporated into the risk assessment, the best available, scientifically valid data are used. EPA believes that data on pesticide usage represent critical information for determining whether an individual of a listed species is likely to be exposed and adversely impacted, which is the goal of Step 2." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 14.	will leave out any allowed pesticide uses for which there are no usage data.
BEs must use chronic invertebrate toxicity data. The proposal to use only lethal toxicity (LC50) data for aquatic invertebrates deviates from the CWA regulation of aquatic ecosystems to protect food supplies for endangered species.	"EPA will consider effects to mortality, growth or reproduction and other sublethal endpoints linked to survival or reproduction of taxa relevant to a listed species' prey, pollination, habitat and/or dispersal." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 50.	Yes.
Urban pesticide use estimates could be greatly improved with use of reported urban use and sales data collected annually by California Department of Pesticide Regulation (CDPR). Each year, CDPR mandates reporting of pesticide product-specific sales and all professional pesticide use (including urban use). These data provide the quantity of active ingredients. The sales data are collected for every product brand-label combination. Reported use and total annual sales data are freely available and readily accessed from CDPR's online database at https://www.cdpr.ca.gov/dprdatabase.htm While CDPR considers its product-specific sales data as confidential, these data can be obtained upon request by EPA and consolidated (e.g., by use category) before publishing in risk assessments.	"EPA considers California Pesticide Use Reporting data in assessments, as appropriate. EPA agrees with CBD [Center for Biological Diversity] that pesticide sales data, including those available from California Department of Pesticide Regulation, are of limited use in characterizing the timing and location of pesticide usage. Pesticide sales data can provide some information regarding the scale of usage for a pesticide. For example, historical sales for an established pesticide may be useful in ground truthing the reasonableness of estimated usage that rely on multiple conservative assumptions. One example could be comparing sales data to usage modeled for a year and finding that the single year modelled exceeds the 20-year sales total for the AI. Such an outcome suggests that the model is highly conservative overall. Of course, at a local level, the model may be less conservative than indicated by the disparity between the sales and modelled usage estimates." Response to Public Comments Received on Proposed Revised Method for National Level Endangered Species Risk Assessments for Biological Evaluations of Conventional Pesticides, p. 11.	Partially.

Pesticide:	Imidacloprid; Docket: EPA–HQ–OPP–2008–0844
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California. Sales data show that use is increasing.
Actions taken:	CASQA submitted a comment letter in 2017 on the Preliminary Aquatic Risk Assessment.
Status:	EPA released the Proposed Interim Registration Review Decision (PID) per Fed. Reg. notice Feb. 3, 2020. Comments are due May 4, 2020.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Proposed Interim Decision to address unresolved issues and concerns.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
CASQA Concurs with EPA's Finding of Significant Risk.	As in the Preliminary Aquatic Risk Assessment. The EPA found significant risk to aquatic life in the Proposed Interim Decision.	Yes.
CASQA Requests EPA Identify Major Sources of Imidacloprid in Urban Runoff. CASQA noted that EPA's PARA model omits most outdoor urban imidacloprid uses. CASQA Suggested Refinements to Imidacloprid Preliminary Risk Assessment: • Include modeling of runoff from impervious surfaces for both residential and commercial models. • Evaluate and then model the runoff from all permitted outdoor uses of imidacloprid • Include leaching of impregnated materials in the model. • Perform an urban-specific analysis, including analysis of monitoring results specific to urban areas.	"EFED's risk assessment indicated, using modeling and monitoring data, that neonicotinoids can potentially enter surface water and groundwater and affect aquatic invertebrates. Although EFED did not explicitly model urban runoff sources, EFED believes the concentrations would not exceed those modeled via agricultural sources. While field and monitoring data provide supporting evidence that neonicotinoids are present in surface waters, supporting metadata for the sampling (i.e., sampling frequency, vicinity of applications to monitoring sites, timing of sample collection relative to timing of applications, etc.) are not available, precluding the quantitative use of monitoring data. While monitoring data from habitats not designed to harbor aquatic organisms may not be directly relevant for ecological risk assessment, they may be indicative of sources that may discharge into aquatic organism habitats. Likewise, while monitoring data from other countries may not be indicative of uses or	No. Although EPA acknowledged that there is a pathway to the storm drain, they did not respond to CASQA's request to identify major sources of imidacloprid in urban runoff or improve modeling of sources.

	products in the United States, they provide a line of evidence that neonicotinoids can contaminate water sources." (PID p.14)	
CASQA Recommends Further Evaluation of Product Labels and Use Restrictions. (see specific requests below)	Although EPA made some small improvements to imidacloprid labels, they did not incorporate the majority of CASQA's label requests.	Partially.
1) Pre-construction termiticide label improvements: "…we request that EPA add a requirement that after a pre-construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured, and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would bridge a gap between the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits."	EPA did not respond to this comment.	No.
2) Require that no applications be made when rainfall is forecast within 48 hours.	EPA partially incorporated CASQA's suggested idea, but only for 24 hours of forecasted rainfall and only for spray (not granular) products.	Partially.
3) Reduce size of perimeter treatment bands around structures for treating for termites and other structural pests to the smallest treated area that will achieve target pest control. Prohibit application on impervious surfaces.	EPA reduced the perimeter treatment area to up to seven feet (on permeable surfaces), up to two feet up a structure, and up to one inch on pervious surfaces.	Partially. A reduced treatment band is an improvement, but the suggested treatment bands do not appear to be based on scientific study. Use on impervious surfaces is still allowed.
4) Prohibit application of granular products to any impervious (non-soil or unvegetated) surface and prohibit application to any area where the product may contact any surface water, storm drain, or urban runoff conveyance system (e.g., gutter).	EPA did not respond to this comment.	No.
5) Reduce target area for granular fly bait, instead of allowing the quantity to be spread over "1,000 square feet".	EPA did not respond to this comment.	No.
6) Disallow all outdoor "paint-on" applications of imidacloprid, especially if painted surface is above impervious area that drains to storm drain system or surface	EPA did not respond to this comment.	No.

water body. If any outdoor uses continue to be allowed, consider reducing application frequency (currently every 4-6 weeks), setting a maximum allowable outdoor treated area, and establishing a total annual application rate.		
7) Disallow product application in cracks and crevices along surfaces that drain into the storm drain system. If allowed, request that EPA and registrants utilize efficacy data to determine the smallest treated area that will achieve target pest control. This will enable labels to limit the spot treatments and crack and crevice treatments – to only the amount necessary – instead of the current 2' x 2' dimensions for spot treatment, and unspecified dimensions for crack and crevice treatments.	EPA updated label requirements to not limit to a 2' x 1' areas as well as limit application to 10% of the treatment area.	Partially.
8) Disallow all usage inside sanitary sewers, storm drains, or inside or around manholes.	Although manholes are not mentioned, it appears that EPA is prohibiting use in sanitary sewers, manholes etc. as they are not in the list of permitted areas.	Yes, but label would be clearer if it explicitly prohibited these uses.
9) Impregnated Materials: (1) Require end use product labels for all products bearing pesticide claims consistent with the recently adopted California guidance for labeling pesticide-impregnated materials (California Notice 2017-08). (2) Consider limiting concentration and/or use locations for materials that show high washoff potential.	EPA did not respond to this comment.	No.

Pesticide:	Neonicotinoid insecticides; Dockets EPA–HQ–OPP–2012–0329, EPA–HQ–OPP–2011–0865, EPA–HQ–OPP–2011–0920, EPA–HQ–OPP–2008–0844, EPA–HQ–OPP–2011–0581
Use:	Outdoor treatments (impervious and pervious surfaces), impregnated materials (wood, siding, etc.), pet treatments, etc.
Why we care:	Highly toxic to aquatic invertebrates. Monitoring data exceeds aquatic benchmark in many areas of California
Actions taken:	In March 2020, the County of Sacramento sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: BACWA, City of Elk Grove, City of Sacramento, Orange County, Marin County Stormwater PPP, Riverside County Flood Control and Water Conservation District, SCVURPPP, and the SF Bay Water Board.
Status:	EPA released Proposed Interim Decisions for Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, and Thiamethoxam.

Next steps:	EPA will analyze comments and issue a Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Imidacloprid Proposed Interim Decision to address unresolved issues and concerns.

County of Sacramento Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the County of Sacramento Department of Water Resources, I request that EPA extend the comment period for the Proposed Interim Registration Decisions (PIDs) for the subject neonicotinoids for one additional month, to May 4, 2020. This will provide adequate time for review in light of the complexity of the proposed interim decisions, the number of chemicals under consideration, and the occurrence of this comment period during our winter rainy season, when staff from our agency and the organizations we collaborate with take on substantial extra duties in association with monitoring of rainfall/runoff events.	EPA extended the review period from April 3, 2020 to May 4, 2020.	Yes.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	CASQA commented on the Preliminary Ecological Risk Assessment for Pyrethroids in 2017.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

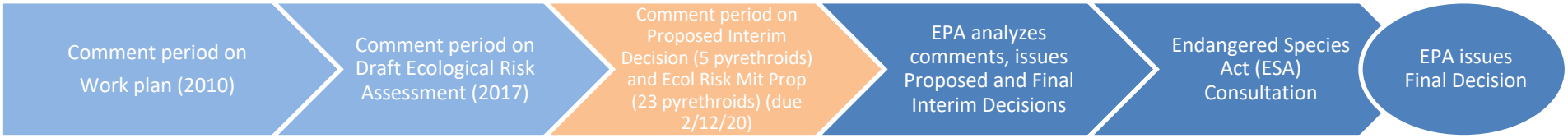

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 7/7/2017 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
Pesticide Discharges to storm drains can be costly and disruptive. Currently, EPA has listed 622 California water bodies as impaired by pesticides under Section 303(d) of the Clean Water Act; of those, 16 are listed for pyrethroids.	EPA discussed impacts, including Clean Water Act compliance challenges and costs for indoor discharges, but did not even mention these for stormwater, except a passing reference to TMDL compliance. Based primarily on market share, EPA asserted that the benefits of pyrethroids use are high.	No. It virtually omitted urban runoff from its Clean Water Act compliance discussion. EPA's benefits assessment did not distinguish between outdoor impervious surface applications and other types of applications (including underground It did not correctly identify alternatives for outdoor structural pest control.). It relied on an industry-supplied report on lawns/landscaping treatments as the data source for its outdoor urban benefits analysis. EPA also does not distinguish among the 22 pyrethroids and pyrethrins, which have very different environmental fates and toxicity, and thus very different potential for aquatic impacts.

CASQA Concurs with EPA's Finding of Significant Ecological Risk and Need for Mitigation	None. EPA used CASQAs comments to counter arguments by others suggesting that there is not a significant ecological risk.	Yes.
Mitigation addressing urban runoff is needed. To minimize ecological impacts and reduce the number of watersheds impacted by pyrethroid TMDLs and subsequent costs to state and local government agencies, we request that EPA implement mitigation measures as requested above. If these mitigation approaches are not deemed appropriate nationwide, please consider providing clear mechanisms for California-specific labels and sales restrictions.	"Outdoor urban uses of pyrethroids and pyrethrins are expected to result in potential risks of concern, primarily to aquatic invertebrates and fish. This potential risk is often a result of urban runoff, but may also be a result of spray drift or improper disposal of pyrethroid products. The potential for this risk to occur in the environment is supported by pyrethroid monitoring data from urban settings at levels that would be expected to result in potential risk to aquatic invertebrates. There has been a substantial concern from municipalities and states, particularly California, that urban pyrethroid usage adversely impacts water quality and, in the case of California, contributes to TMDL exceedances. As a result, the EPA is proposing measures to reduce to the urban footprint of the pyrethroid group while still allowing flexibility for the user community and retaining the benefits of efficacious pest control." "The potential ecological risks, which are expected to be reduced with the proposed mitigation, are outweighed by the high benefits associated with the use of pyrethroids for the control of pests with public health significance." EPA Proposed mitigation: (1) Indoor and Outdoor Use Site Clarification (2) Reduction in distance from building foundations that can be treated with pyrethroids from 10 feet to 7 feet. [California regulations prohibit applications >3 feet from building foundations] (3) Reduction in height above ground level of building treatments from 3 feet to 2 feet [this would make EPA labels consistent with this element of California regulations] (4) Prohibition on applications during rain. [California regulations already prohibit] (5) Unenforceable advisory statement to avoid applications if rain is forecast within 24 hours. [new] (6) Definition of spot treatment (2 sq. ft.)	No. Proposed mitigations are nice and might reduce slug discharges, but for California, they have no expected benefits for ongoing discharges. Proposed label language changes would continue (and in some cases exacerbate) conflicts between product labels and California's surface water protection regulations for pyrethroids. Text includes two useful mitigations are proposed for indoor products that are <u>not</u> proposed for outdoor products in the enforceable part of the proposal (the "label table in the appendix"): (a) Pictogram and new enforceable label statement: "Do not pour down the drain or sewer. Call your local solid waste agency for local disposal options." (b) New advisory label statements (English & <u>Spanish</u>): "Do not allow to enter indoor or outdoor drains" and "Follow proper disposal procedures on this label" EPA's proposal allows some impervious surface applications prohibited by California regulations: (a) Within 25 feet of an aquatic habitat located down gradient from an application site (b) Preconstruction termite site within 10 feet of a storm drain located down gradient (c) aquatic habitat protection excludes intermittent streams (which are included in California regulations) EPA mitigations cover all users (not just professional applicators) and include etofenprox, which is currently not covered by California regulations.

	(7) New requirement: "Do not allow the product to enter any drain during or after application." [No methods are specified as to how to prevent post-application washoff into storm drains] (8)Various other label clarifications.	
EPA's runoff modeling seems to underestimate some exposures as shown by the risk quotients (RQs) calculated from monitored concentrations that are generally higher than the RQs calculated from modeled concentrations (PRA, Part II, pp. 165-167).	EPA acknowledged the monitoring data and noted that it "did not agree with the PWG that it is inappropriate to compare modeled and monitored concentrations". EPA acknowledged the concerns from commenters from California concerning what is required under the Clean Water Act.	Yes.
CASQA agrees with EPA's use of all available aquatic toxicity data including those for sensitive organisms like Hyalella azteca and Americamysis bahia. The San Francisco Bay Regional Water Quality Control Board also commented on this in their 7/6/17 Letter to EPA, "It should be noted that H. azteca are not uniquely sensitive to pyrethroids. Of the few aquatic invertebrate species that have been tested for pyrethroids toxicity, several are similar to the sensitivity to H. azteca."	EPA considered arguments from both CASQA/SF Water Board and the registrant's lobbying group (Pyrethroid Working Group [PWG]) and ultimately agreed with the comments from CASQA/Water Board on this issue. EPA relied not only on these comments, but also on scientific papers submitted with the comments	Yes.
CASQA Recommends Additional Use Restrictions and Product Label Enhancements.		No, except for improvements to label readability.
1. Reducing overuse of active ingredient. We request that the EPA and registrants review such studies of application sites, applicator methods, and associated residual pesticides in runoff and coordinate with CDPR to develop additional mitigations and associated label restrictions to reduce over-application from creating regulatory and consequent financial burdens that must be borne by state and local governments.	"The EPA has worked extensively with registrants…to develop proposed mitigation to reflect what is practical while also maintaining the efficacy of these uses. The proposed mitigation is designed to reduce the pathway for these chemicals to get into surface waters and storm drainage systems. The language also informs consumers on how to prevent pyrethroids products from ending up in wastewater facilities."	No. EPA's proposal would not meaningfully expand the current California mitigations, which are proving insufficient to resolve pyrethroids water impairments.
2. Adding a minor label requirement for pre-construction (under foundation) termiticide treatments to bridge the gap between FIFRA and	"In following up on the labeling recommendations from CASQA, the EPA consulted with construction experts with specific experience with termiticide applications, regarding	No. EPA did not implement any changes to bridge the gap between FIFRA and the Clean Water act on termiticide treatments.

Clean Water Act regulatory programs. CASQA requests that EPA refine labels for pre-construction termiticide applications with the overall goal of preventing the discharge to water bodies of any water that contacts pesticide treated soil. Specifically, we request that EPA add a requirement that after a pre- construction termiticide treatment the applicator must post signage identifying sites that have been treated, stating the need to maintain the plastic cover until the foundation is poured and to manage in accordance with water quality and hazardous waste laws any water that collects in the treated area before the foundation is poured. Such a requirement would address a gap between FIFRA and Clean Water Act water quality control programs associated with the NPDES stormwater construction permits. CASQA would appreciate the opportunity to discuss the specifics of this recommendation with EPA and registrants and professional applicators as appropriate. We perceive this as a relatively minor change that would address an existing gap between FIFRA and Clean Water Act construction site regulatory programs.	the suggestion that a signage requirement on pyrethroid labels could reduce the amount of pesticides running off into the drainage system. The EPA also met with Dave Tamayo, an environmental specialist from CASQA, on February 25, 2019, to discuss these comments and recommendations. The EPA officials also attended the 2019 Termite Tour, organized by the Association of Structural Pest Control Regulatory Officials, which included discussions on pre- and post-construction termite application practices. There wasn't consensus on the potential effectiveness additional posting and covering of these pre-construction termite applications could be in reducing pesticides in surface water. Therefore, the EPA is not proposing these changes in the ecological risk mitigation proposal. However, the EPA welcomes additional comments on this topic during the public comment period."	
3. Enhancing overall readability and enforceability of label language. CASQA requests that EPA seek to eliminate all conflicting and unclear language by coordinating with CDPR and registrants in the development of label language that more clearly provide instructions that result in protection of water quality. If EPA does not concur that label enhancement is necessary on a nationwide basis, CASQA requests that EPA provide clear mechanisms for establishing California-specific label instructions. CDPR is unable to take this action on its own because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA.	"The EPA has made a significant effort to propose changes to pyrethroid labels to improve consistency and help users find adequate directions."	Partially. Proposed label language includes a few useful clarifications but maintains some language that is confusing and includes many statements that are unenforceable. No changes were made to bifenthrin labels, which have additional mitigation that has confusing wording.

4. California-Specific Labels. If EPA does not find it appropriate to make these changes on a nationwide basis, we request that EPA provide CDPR the ability to work with registrants to establish California specific instructions on product labels. Since EPA controls product labels – the most effective means of controlling product usage – EPA's explicit approval of state-specific label language is essential.	"The EPA has worked closely with CDPR in the past on adding state-specific labeling restrictions to many pesticide products, including products containing pyrethroids. The EPA will continue to discuss implementation options with states and stakeholders when geographic-specific restrictions may be needed."	**No resolution.** EPA's proposal differs significantly from California regulations, in ways that will further confuse applicators who tend to focus on product labels (in their hands) instead of regulations (not in their hands). EPA does not explicitly state whether it will allow or support California-specific labels.
CASQA Requests EPA Terminate Urban ("Residential") Use of Bifenthrin Due to Its Persistence in Aquatic Ecosystems. CASQA has concluded that special measures to address bifenthrin are an important part of a pyrethroids mitigation strategy because, from the urban water quality standpoint, bifenthrin is far more problematic than other pyrethroid pesticides. • Bifenthrin Exceeds EPA Aquatic Life Benchmarks More Often Than Any Other Pyrethroid • Bifenthrin Is Substantially More Persistent in Aquatic Environments Than Other Pyrethroids • Bifenthrin is among the most highly toxic pyrethroids • Bifenthrin is One of Multiple Insecticides Commonly Used in Urban Environments • Due to Bifenthrin's Unique Persistence, It Is Too Hazardous to Use in Urban Settings CASQA further requests that if EPA does not concur that this measure is appropriate on a nationwide basis, that EPA implement such a measure for California by adding California-specific statements to all residential bifenthrin product labels (e.g., "not for use in California"). CDPR is unable to take this action because CDPR does not have the authority to establish pesticide label language, which is under the sole authority of EPA. While the discussion above focuses on bifenthrin, CASQA requests that EPA provide similar controls to ensure that	"With regard to aquatic risk, bifenthrin is not so unique when compared to other pyrethroids that it warrants additional bifenthrin-specific mitigation… bifenthrin does not consistently have the highest RQ exceedances for aquatic invertebrates. The agency disagrees with CASQA that bifenthrin is more toxic to aquatic invertebrates than other pyrethroids. All pyrethroids are very highly toxic to aquatic invertebrates." "The EPA is not proposing ecological mitigation for bifenthrin beyond what is outlined for all pyrethroids in the Pyrethroids and Pyrethrins: Ecological Risk Mitigation Proposal For 23 Chemicals due to the benefits of its use (USEPA 2016), and the agency's expectation that greater detection frequencies and concentrations of alternative insecticides (including other pyrethroids and fipronil) would occur if bifenthrin were removed from the market, because these alternative insecticides would likely take its place in the market."	**No.** EPA is using a scientifically questionable basis for its assertion that bifenthrin is no more problematic than other pyrethroids. The datasets EPA is using and EPA's modeling have scientific errors that have been enumerated in other studies. Bifenthrin may not be the most toxic pyrethroid, but based on monitoring data it appears to be the most persistent pyrethroid in urban watersheds. The combination of toxicity and persistence is the issue (it does not need to be the "top ranked" in either category to merit removal from the market). EPA's RQs are admittedly scientifically incorrect, so they should not be cited as the basis of any decision. Other data sources – particularly DPR's environmental monitoring data - lead to the conclusion that bifenthrin is the main contributor to ecological risks from pyrethroids and that this contribution is high relative to its usage. This indicates that substitution by another pyrethroid would improve water quality. Interestingly, despite the assertion that there should be no difference in risk mitigation among the pyrethroids, EPA notes "Bifenthrin, cypermethrin, deltamethrin, and esfenvalerate had particularly high chronic RQs."

there is adequate mitigation for any other pyrethroid that has similar or greater persistence in aquatic environments.		
Pyrethroids Have Been Identified as a Contributor to the Decline of Important Delta Fish Because of their presence and toxic effects, both directly and through food-web impacts, pyrethroids have been identified as potentially playing a significant role in the decline of important fish species in the Sacramento-San Joaquin Delta Estuary (Delta)…As a result of concerns about pyrethroid impacts in the Delta, establishing control programs for the pyrethroid discharges to the Delta was prioritized in the Delta Stewardship Council's Delta Plan and the Central Valley Regional Water Quality Control Board's Delta Strategic Workplan (CRWCB-CVR 2014). (San Francisco Bay Regional Water Quality Control Board's 7/6/17 Letter to EPA)	EPA acknowledged the SF Water Board's concerns and noted that "pyrethroids are expected to result in risks to aquatic biota in many situations. EPA has considered water quality issues in developing its ecological risk mitigation proposal for the pyrethroids/pyrethrins."	Partially. Although EPA acknowledged the SF Water Board's concerns, the mitigations proposed by EPA are not enough to address the risk. EPA stated that it will address endangered species in individual risk management decisions. This seems to conflict with the concept of the single ecological risk management decision to cover all 23 chemicals, but what it will likely be is a description of next steps for Endangered Species Act Compliance, not a set of mitigation measures for aquatic endangered species.

Pesticide:	Pyrethroids; Docket: EPA-HQ-OPP-2008-0331
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In November 2019, CASQA sent a letter to EPA requesting a comment period extension. Other agencies also requested an extension including: NACWA, BACWA, SF Bay Water Board, Central Coast Water Board, Central Valley Water Board, SCVURPPP, Sacramento County, Santa Barbara County, City of Santa Barbara, Alameda County, Napa County Flood & Water Conservation District, Orange County, City of Cotati, City of Sacramento, City of San Diego, LA County Public Works, Marin County Stormwater PPP, and City of Elk Grove.
Status:	EPA released the "Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals" in November 2019. EPA also released Proposed Interim Decisions for cyphenothrin, flumethrin, imiprothrin, momflurorthrin, and tetramethrin; decisions for the other 18 pyrethroids are forthcoming.

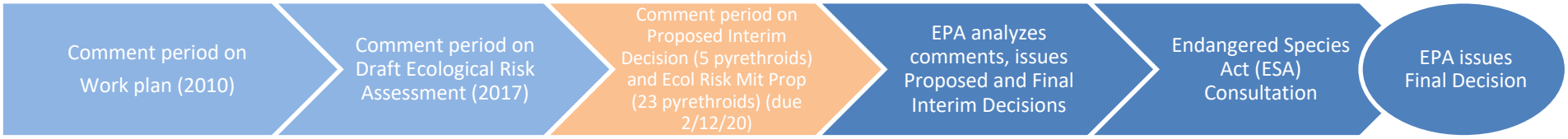

Next steps:	EPA will analyze comments and issue Proposed and Final Interim Decision.
Recommendation:	Send comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal for 23 Chemicals to address unresolved issues and concerns. Do not comment on the non-water quality topics covered by the 5 current proposed decision; evaluate the remaining 18 for potential comments.

CASQA 11/25/2019 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
On behalf of the California Stormwater Quality Association (CASQA1), we request that the comment period for the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal be extended to February 28, 2020 to provide adequate time for review in light of the complexity of the proposal, the year-end holiday timing of the review period, and its timing during the winter rainy season, when staff from our member agencies and the organizations we collaborate with take on substantial extra duties in association with rain events.	EPA extended the review period from January 13, 2020 to February 12, 2020.	Yes.

Pesticide:	Several pyrethroids; Dockets: EPA-HQ-OPP-2008-0331. Docket includes: bifenthrin (EPA–HQ–OPP–2010–0384), cyfluthrin (EPA–HQ–OPP–2010–0684), deltamethrin (EPA–HQ–OPP–2009-0637), esfenvalerate (EPA–HQ–OPP–2009–0301), permenthrin (EPA–HQ–OPP–2011–0039), phenothrin (EPA–HQ–OPP–2011–0539), prallethrin (EPA–HQ–OPP–2011–1009), and tau-fluvalinate (EPA–HQ–OPP–2010–0915).
Use:	Insecticides
Why we care:	Priority pesticide due to toxicity, use, and monitoring data. Multiple 303(d) listings as well as adopted and pending TMDLs.
Actions taken:	In February 2020, CASQA sent a comment letter to EPA on the Pyrethroids and Pyrethrins Ecological Risk Mitigation Proposal.
Status:	EPA released Proposed Interim Decisions for bifenthrin, cyfluthrin, deltamethrin, esfenvalerate, permenthrin, phenothrin, prallethrin, and tau-fluvalinate.

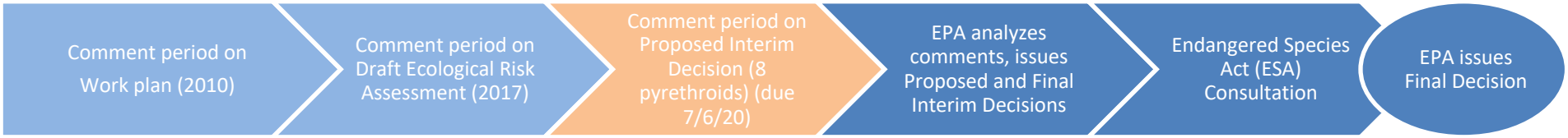

Next steps:	EPA will analyze comments and issue Final Interim Decision on these eight pyrethroids.
Recommendation:	Send comment letter to EPA on these eight Proposed Interim Decisions.

CASQA 2/12/2020 Comments to EPA	EPA Response	Did EPA incorporate CASQA's comment?
EPA's benefits assessment should include urban runoff-related costs to municipalities	No response. In the March 2020 PIDs EPA noted that they "had addressed" comments in a Joint Response issued on 11/12/2019, months before CASQA submitted its 2/12/20 comment letter.	No.
EPA's risk / benefit finding should be revised to differentiate among the 23 pyrethroids and pyrethrins and among the various outdoor urban uses of the 23 chemicals	EPA issued a single risk mitigation proposal with only one set of measures covering all 23 pyrethroids and pyrethrins, despite finding large differences in aquatic risks among the pyrethroids and pyrethrins.	No.
EPA should end outdoor urban use of bifenthrin	No response.	No.
EPA should provide California-specific labels for outdoor structural pest control products that are consistent with California regulations	No response.	No.
CASQA supports EPA-proposed label changes, with modifications	EPA kept the anti- dumping product label improvements but did not consider CASQA's suggested refinements from the February 2020 comment letter.	Partially.

Prepared by Tammy Qualls 6/14/20

Pesticide:	Terbuthylazine; Docket: EPA-HQ-OPP-2010-0453
Use:	Fountain algaecide / microbiocide / microbiostat.
Why we care:	Highly toxic to aquatic invertebrates.
Actions taken:	County of Sacramento (a CASQA member) sent EPA comments on the Draft Risk Assessment in January 2020, respectively.
Status:	EPA released the Proposed Interim Decision in May 2020.

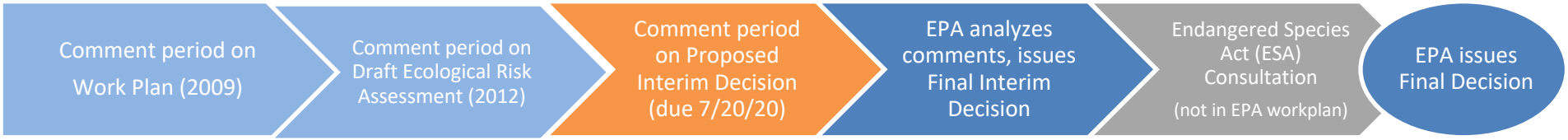

Next steps:	EPA will review comments on the Proposed Interim Decision and issue a Final Interim Decision
Recommendation:	Write a response letter, supporting the Sacramento County comments that EPA included in the Proposed Interim Decision.

Sacramento County comments to EPA (Jan. 2020):	EPA Response:	Did EPA incorporate member comments?
Our primary concern with the subject pesticides is that the Draft Risk Assessment neglected to consider storm drain discharges of terbuthylazine-containing fountain water and the ensuing risk to aquatic life. The Draft Risk Assessment assumed that there would be "*no significant exposure to aquatic organisms…from the decorative/ornamental fountain uses given that the label prohibits discharge of this product into lakes, streams, ponds, estuaries, oceans, or other waters, unless in accordance with the National Pollutant Discharge Eliminations Systems (NPDES) permit.*"	EPA made label changes (see below) that will help reduce the amount of terbuthylazine that is discharged into the storm drain by requiring notification to local sanitary sewer/ storm drain authorities.	Yes.
Sacramento County requests that the current language be changed to match the copper label, which would also provide consistency for label language across pool, spa, hot tub, and fountain chemicals, which follows: "Before draining a treated pool, spa, hot tub, or fountain, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool, spa, hot tub, or fountain water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."	"The agency agrees with the requested label changes and is proposing additional label changes to address the potential ecological risks by reducing exposure and clarifying the appropriate use methods, as described in Appendix B."	Yes.

Sacramento County also notes that the following language exists on several terbuthylazine labels: "*Experience will demonstrate the level of (product) is required."* We are concerned that this vague label language could lead to overuse these products. We are also concerned that label language states that users should maintain a concentration of product, cited in ppm, to get adequate algae control, but does not specify a practical, low-cost method for determining terbuthalyazine concentrations in treated fountain water. We respectfully request that EPA provide a dosing table, based on the size range (in volume of water) for fountains, to guide consumers in the application amount and frequency of application of the product.	EPA did not address this comment.	No.
For all fountain products, including those containing terbuthylazine, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size. This would mimic EPA's decision for lithium hypochlorite products. As explained in our attached lithium hypochlorite comments, this approach avoids potential conflicting language on product labels.	EPA did not address this comment.	No.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively.
Status:	EPA released the Proposed Interim Registration Review Decision in July 2019. Comments are due September 30, 2019.

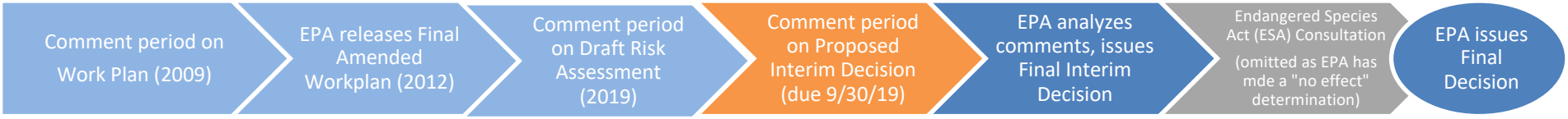

Next steps:	EPA will analyze comments and issue a Proposed Interim Decision. No ESA consultation is planned as EPA made a "no effect" determination.
Recommendation:	Send comments to EPA to declare support of the improved product label language.

CASQA Members comments to EPA:	EPA Response:	Did EPA incorporate member comments?
We are writing to request that the zinc and zinc salts Registration Review decision follows the precedent for improved labels that was established by the decisions for other pool, spa, and fountain chemicals, such as lithium hypochlorite and copper. In those Registration Review decisions, EPA worked carefully through the various issues to develop practical label language that mitigates possible aquatic impacts from discharge of treated pool, spa, and hot tub water, while preventing excess flows into sewer collection systems. Sacramento County requests that the current language be changed to match the lithium hypochlorite label, which would also provide consistency for label language across pool, spa, and hot tub chemicals, which follows: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	"Due to the scenarios outlined in these public comments, the requested label language has been added as a proposed requirement." (p. 6)	Yes.
For all swimming pool, spa, and hot tub products including those containing zinc and zinc salts, we also recommend that the "Environmental Hazards" label statements be applied on the basis of product end use rather than product size… this approach avoids potential conflicting language on product labels.	"The requested changes to the uses triggering NPDES permit language have been considered by the Agency and are included as a proposed requirement. Both of the proposed changes are addressed in Appendix A of this document. The Agency thanks the submitters for their comments."	Yes.

Pesticide:	Zinc and Zinc Salts; Docket: EPA–HQ–OPP–2009–0011
Use:	Swimming pool algicide, herbicide for moss, material preservative, wood preservative.
Why we care:	Highly toxic to aquatic invertebrates. High potential for significant discharges to MS4 and surface waters. 303(d) listings, TMDLs, CWA Priority Pollutant.
Actions taken:	County of Sacramento (a CASQA member) and NACWA sent EPA comments on the Draft Risk Assessment in March and January 2019, respectively. CASQA commented on the Proposed Interim Decision in September 2019.
Status:	EPA released the Interim Decision in February 2020.

Next steps:	No ESA consultation is planned. EPA will likely proceed to issuing a Final Decision.
Recommendation:	No action is needed at this time.

CASQA Members comments to EPA (September 2019):	EPA Response:	Did EPA incorporate member comments?
CASQA supports the following proposed label language for swimming pool, spa, and hot tub products: *"Before draining a treated pool, spa, or hot tub, contact your local sanitary sewer and storm drain authorities and follow their discharge instructions. Do not discharge treated pool or spa water to any location that flows to a gutter or storm drain or natural water body unless discharge is allowed by state and local authorities."*	The language in the Interim Decision exactly matches what was proposed in the Proposed Interim Decision. (p. 12)	Yes.
CASQA also supports EPA's clarification that Office of Pesticide Programs' standard NPDES permit label language is only for manufacturing-use products and is not suitable for end use products.	-For end-use products: NPDES permit language for pool, spa, or hot tub use is not required and must be removed if currently on the label associated with these uses. -For technical grade and manufacturing use products, the following NPDES statement must be included: "Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA." (p. 12)	Yes.

Annual Reporting for FY 2019-2020

Regional Supplement for New Development and Redevelopment

San Francisco Bay Area Municipal Regional Stormwater Permit

B A S M A A

Bay Area Stormwater Management Agencies Association

September 2020

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B A S M A A

Alameda Countywide
Clean Water Program

Contra Costa
Clean Water Program

Fairfield-Suisun
Urban Runoff
Management Program

Marin County
Stormwater Pollution
Prevention Program

Napa Countywide
Stormwater Pollution
Prevention Program

San Mateo Countywide
Water Pollution
Prevention Program

Santa Clara Valley
Urban Runoff Pollution
Prevention Program

Sonoma County
Water Agency

Vallejo Flood &
Wastewater District

To Whom It May Concern:

We certify under penalty of law that this document was prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James Scanlin

James Scanlin, Alameda Countywide Clean Water Program

Karin Graves

Courtney Riddle, Contra Costa Clean Water Program

Kevin A. Cullen

Kevin Cullen, Fairfield-Suisun Urban Runoff Management Program

Matthew Fabry

Matt Fabry, San Mateo Countywide Water Pollution Prevention Program

Adam W. Olivieri

Adam Olivieri, Santa Clara Valley Urban Runoff Pollution Prevention Program

Jennifer Harrington, Vallejo Flood & Wastewater District

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INTRODUCTION

This Regional Supplement has been prepared to report on regionally implemented activities complying with portions of the Municipal Regional Stormwater Permit (MRP), issued to 76 municipalities and special districts (Permittees) by the San Francisco Bay Regional Water Quality Control Board (Water Board). The Regional Supplement covers new development and redevelopment activities related to the following MRP provision:

- C.3.j.iii. Participate in Processes to Promote Green Infrastructure.

These regionally implemented activities are conducted under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA), a 501(c)(3) non-profit organization comprised of the municipal stormwater programs in the San Francisco Bay Area. Most of the 2019-20 annual reporting requirements of the specific MRP Provisions covered in this Supplement are completely met by BASMAA Regional Project activities, except where otherwise noted herein or by Permittees in their reports. Scopes, budgets and contracting or in-kind project implementation mechanisms for BASMAA Regional Projects follow BASMAA's Operational Policies and Procedures as approved by the BASMAA Board of Directors. MRP Permittees, through their program representatives on the Board of Directors and its committees, collaboratively authorize and participate in BASMAA Regional Projects or Regional Tasks. Depending on the Regional Project or Task, either all BASMAA members or Phase I programs that are subject to the MRP share regional costs.

GREEN INFRASTRUCTURE PLANNING AND IMPLEMENTATION

C.3.j.iii. Participation in Processes to Promote Green Infrastructure

This provision requires:

> *(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.*

The BASMAA activities described in this section provide compliance for MRP Permittees with this provision. This section describes: 1) activities and accomplishments during FY 19-20; and 2) a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure (GI).

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Activities and Accomplishments during FY 19-20

Grant – Urban Greening Bay Area

Urban Greening Bay Area is a large-scale, grant-funded effort to re-envision Bay Area urban landscapes to develop stormwater-friendly dense, green urban infrastructure that addresses challenges associated with climate change, infiltrates or captures stormwater and pollutants near their sources, and in turn, promotes improved water quality in San Francisco Bay. *Urban Greening Bay Area* is funded by an EPA Water Quality Improvement Fund grant awarded to the Association of Bay Area Governments (ABAG), a joint powers agency acting on behalf of the San Francisco Estuary Partnership (SFEP), a program of ABAG. The term of the *Urban Greening Bay Area* grant project was July 1, 2015 to June 30, 2018, but the term was extended to December 31, 2020 and additional funding provided to support follow-up implementation.

BASMAA is one of the subrecipients of the grant and took the lead on two of the grant project tasks – a Regional Green Infrastructure Roundtable process and a Design Charrette, both of which were implemented between May 2016 and May 2018.

The Regional Roundtable was a two-year process, with work groups as needed, to identify and develop a list of recommendations for integrating GI and stormwater management funding and investments with future climate change and transportation investments within the region. The Roundtable included convening meetings with local, regional, and state stakeholders, agencies, elected officials, and staff to produce draft and final task reports that identified and recommended possible legislative fixes, agency agreements, consolidated funding mechanisms, and other means and actions as appropriate. The Roundtable used innovative participatory processes that included key experts, regulators, decision-makers, and other stakeholders to share information, solicit and discuss ideas and solutions, and to identify next steps (i.e., develop a "roadmap"). The Final Roadmap of Funding Solutions for Sustainable Streets was completed in April 2018. Following completion of the Roadmap, BASMAA and SFEP formed a Roadmap Committee to guide future implementation of the Roadmap.

The Design Charrette task involved coordinating with the cities of San Mateo and Sunnyvale to conduct a Bay Area design charrette to develop cost-effective and innovative "typical" designs for integrating GI with bicycle and pedestrian improvements at roadway intersections. The overall goal of developing standardized, transferable designs was to make progress in addressing the high cost of design, implementation, operations, and maintenance that inhibits the widespread use of GI and LID features.

Work products of the Urban Greening Bay Area grant are posted at: http://www.sfestuary.org/urban-greening-bay-area/#planning . The Planning section includes documents related to the Regional Roundtable and the Implementation section includes documents related to the Design Charrette.

During FY 19-20, BASMAA's participation in activities to implement the Roadmap of Funding Solutions for Sustainable Streets included:

- Continued coordination with transportation agencies – including the Metropolitan Transportation Commission (MTC), the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Federal Highway Administration (FHWA) – to clarify GI eligibility in federal, regional, and state transportation grant programs (Roadmap Specific Actions 1-1, 1-2, and 1-3).

- In November 2019, BASMAA transmitted a memorandum to the above-listed regional and state agencies, documenting the eligibility of GI in applicable regional, state and federal transportation funding programs and requesting the agencies' participation in developing fact sheets that clarify eligibility for sustainable streets in two federal transportation funding programs – the Surface Transportation Block Grant Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) – as well as the California Senate Bill 1 (SB 1) Road Maintenance and Rehabilitation Program.

- On February 4, 2020, BASMAA representatives met with staff from MTC and Caltrans District 4 (the Caltrans District for the nine-county Bay Area), to develop an approach for a regional fact sheet that focuses on the eligibility of GI in projects funded by the STP and CMAQ through the One Bay Area Grant (OBAG) program administered by MTC. The draft regional fact sheet was reviewed by MTC staff and is scheduled to be finalized by September 2020.

- On February 10, 2020, BASMAA held a conference call with CTC staff to develop an approach for a statewide fact sheet that focuses on the eligibility of GI in projects funded by Senate Bill 1. CTC staff provided comments on the draft statewide fact sheet but deferred further action pending documentation that there is interest in this topic beyond the San Francisco Bay Area. To address that information need, BASMAA drafted an online survey initially intended for distribution to stormwater programs within California. However, before it was distributed, BASMAA worked with the U.S. Environmental Protection Agency (USEPA) staff liaison to the Federal Highway Administration (FHWA) to have FHWA staff review BASMAA's November 2019 research memorandum. Similar to the CTC, FHWA questioned whether this issue is of interest beyond the San Francisco Bay Area and California. Accordingly, BASMAA is updating the draft online survey for national distribution through the Green Infrastructure Leadership Exchange. The SB 1 fact sheet is scheduled to be finalized by December 2020.

Other Participation and Comments

In addition to the *Urban Greening Bay Area* grant efforts described above, Countywide Program representatives participated in the following forums related to GI promotion:

- Matthew Fabry (C/CAG, representing SMCWPPP and BASMAA) continued to attend a series of meetings with RWQCB, BAFPAA, SFEP, and MTC to discuss ways to integrate stormwater issues into MTC efforts, including Plan Bay Area. To-date, five meetings have been conducted (March 19, 2019; June 12, 2019; July 16, 2019; October 15, 2019; and January 21, 2020). A meeting scheduled for early April 2020 was postponed due to the COVID-19 pandemic.

- Matthew Fabry (C/CAG, representing SMCWPPP) participated in the ReNUWIt "Stormwater for Water Supply" workshop on July 25-26, 2019, and presented information on efforts to manage stormwater via GI, including larger regional facilities that can help recharge groundwater. This workshop was part of a larger effort by ReNUWIt to create a "Bay Area One Water Network." He also participated as a panelist during a follow-on one-hour webinar on July 6, 2020. Relevant information can be found at www.bayareawater.org.

- Matthew Fabry (C/CAG, representing SMCWPPP) and Jill Bicknell (EOA, representing SCVURPPP) participated in ongoing meetings of the organization Transportation Choices for Sustainable Communities, a research and policy institute whose mission is to "advance understanding and support for sustainable transportation as an essential component of livable communities and cities," to plan a "Green Streets for Sustainable Communities" symposium. The event was originally scheduled for March 2020, and has now been rescheduled as a three-day virtual series of seminars on September and October 2020. The symposium will focus on multi-benefit approaches to rethinking streets, including Complete Streets, Green Streets, creating eco-corridors, and as people habitat for public gathering and interaction. Details can be found at http://transportchoice.org/events/.

- Matthew Fabry (C/CAG, representing SMCWPPP) participated in USEPA's Environmental Finance Advisory Board (EFAB) Stormwater Finance Workgroup to respond to a request from Congress in accordance with Section 4101 of the America's Water Infrastructure Act (AWIA) for a report looking at funding sources for stormwater and the adequacy of those sources to support the needs of stormwater management programs. The workgroup met twice – in April and October 2019 and held two public teleconferences in December 2019. On March 30, 2020, EFAB submitted its report, "Evaluating Stormwater Infrastructure Funding and Financing", to USEPA, which accepted the report on July 16, 2020 as satisfying the requirements of Section 4101 of AWIA.

Plan for New and Ongoing Efforts

The plan provided below shows how BASMAA will support its member agencies to collectively and regionally implement the requirements of MRP Provision C.3.j.iii during FY 20-21 and through the remainder of the current permit term. The requirements of Provision C.3.j.iii may change in the reissued MRP and may affect the planning and scheduling of participation in the promotion of GI during the next permit term.

Continue Ongoing Efforts to Participate in Processes to Promote GI

During FY 20-21 and through the end of the permit term for the current MRP (December 31, 2020 or later if extended), BASMAA will continue ongoing efforts to participate in processes to promote GI as described below.

Urban Greening Bay Area. BASMAA will continue to participate in the Urban Greening Bay Area Project's ongoing activities with regard to the implementation of prioritized specific actions in the 2018 Roadmap of Funding Solutions for Sustainable Streets (Roadmap). The Roadmap identifies specific actions to improve the funding of projects that include both complete streets improvements and GI, and is intended to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects. Various specific actions included in the Roadmap address coordinating the timing of funding from different sources, GI designs and design criteria, potential modifications of processes to evaluate projects for funding, and coordination regarding the potential development of cooperative in-lieu programs. The following ongoing activities are anticipated to continue during the period of July 2019 through December 2020:

O-1. Complete the ongoing coordination with the Metropolitan Transportation Commission (MTC) and Caltrans to clarify GI eligibility in federal transportation grants (Roadmap Specific Action 1-1).

O-2. Complete the preparation of a Roadmap fact sheet (Roadmap Specific Action 3-7). The fact sheet is anticipated to advise municipalities on how GI may be included in One Bay Area Grants (OBAG)-funded projects

O-5. Continue to participate in ongoing meetings with RWQCB, BAFPAA, SFEP, and MTC to discuss ways to integrate stormwater issues into MTC efforts, including Plan Bay Area.

O-X. Complete the ongoing coordination with the California Transportation Commission (CTC) to clarify GI eligibility in the Senate Bill 1 Local Streets and Roads Program (Roadmap Specific Action 1-3).

O-X Conduct an online survey for national distribution through the Green Infrastructure Leadership Exchange and continue coordinating with the FHWA liaison to EPA regarding the eligibility of GI in federal surface transportation programs (Roadmap Specific Action 1-1)

New Efforts to Participate in Processes to Promote GI

Between July and December 31, 2020, BASMAA may initiate the following new activities to further implement the Roadmap and participate in other ways to promote GI:

N-X: Coordinate with MTC to develop an approach for including information about the eligibility of GI in federally funded in guidance materials that MTC will

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provide to counties for OBAG's third round of funding (Roadmap Specific Action 1-2).

N-X: Coordinate with MTC to include a discussion of GI and green streets implementation in the anticipated update of Plan Bay Area (Roadmap Specific Action 3-8, Incorporate Roadmap specific actions in funding agencies' planning documents).

N-X: Coordinate with MTC regarding opportunities to present information about Sustainable Streets at statewide meetings of officials from Metropolitan Planning Organizations throughout California, in support of the ongoing coordination with MTC to clarify GI eligibility in federal transportation grants (Roadmap Specific Action 1-1), and ongoing coordination with the CTC to clarify GI eligibility in the SB 1 Local Streets and Roads Program (Roadmap Specific Action 1-3).

CITY OF UNION CITY

FISCAL YEAR 2019-2020

ANNUAL REPORT OF STORMWATER PROGRAM IMPLEMENTATION

Submitted to:
California Regional Water Quality Control Board, San Francisco Bay Region

September 30, 2020

MEMBER AGENCIES:

Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

Protecting Alameda County Creeks, Wetlands & the Bay

UNION CITY
california

September 30, 2020

Mr. Bruce Wolfe
Executive Officer
California Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, California 94612

Subject: Clean Water Program – Annual Report Fiscal Year 2019-2020
NPDES Permit No. CAS612008

Dear Mr. Wolfe,

Attached for your review, please find a copy of the subject Annual Report for the City of Union City Clean Water Program.

I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions or need further information regarding this submittal, please contact me at (510) 675-5368.

Sincerely,

Farooq Azim, PE
City Engineer

CITY OF UNION CITY
34009 Alvarado-Niles Rd • Union City • CA • 94587
unioncity.org

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Attachments

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Section 1 – Permittee Information

Background Information					
Permittee Name:	City of Union City				
Population:	74,107*				
NPDES Permit No.:	CAS612008				
Order Number:	R2-2015-0049				
Reporting Time Period (month/year):	July 2019 through June 2020				
Name of the Responsible Authority:	Farooq Azim			Title:	City Engineer
Mailing Address:	34009 Alvarado-Niles Road				
City:	Union City	Zip Code:	94587	County:	Alameda
Telephone Number:	510-675-5368		Fax Number:		510-489-9468
E-mail Address:	farooqa@unioncity.org				
Name of the Designated Stormwater Management Program Contact (if different from above):				Title:	
Department:					
Mailing Address:					
City:		Zip Code:		County:	
Telephone Number:			Fax Number:		
E-mail Address:					

*Source – US Census Bureau – 2019 estimate

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Section 2 - Provision C.2 Reporting Municipal Operations

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Summary:

The City of Union City is a member of the Alameda County Water Program. Please refer to the C.2 Municipal Operations section of the section of the countrywide Program's FY 19-20 Annual Report for a description of activities implemented at the countywide or regional level.

The City of Union City continue to prioritize clean water improvements in municipal operations through collaborative efforts amongst departments. Public Works engineers, City planners, and senior management in the City Manager's team continue to make strides towards implementing clean water improvements.

A focus FY19-20 were efforts to get in touch with the homeless community and address waste generated by their community. Public Works crews and staff worked to tackle homeless encampments to abate potential stormwater threats. During one homeless clean-up, 80 cubic yards of debris was collected by a contracted cleaner. Park maintenance crews are also tasked with cleaning up debris on an ongoing basis at parks where homeless reside nearby.

C.2.a. ►Street and Road Repair and Maintenance

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of debris and waste materials during road and parking lot installation, repaving or repair maintenance activities from polluting stormwater
Y	Control of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater from discharging to storm drains from work sites.
Y	Sweeping and/or vacuuming and other dry methods to remove debris, concrete, or sediment residues from work sites upon completion of work.

Comments:

All street repair companies contracted by the City are required to protect storm drain inlets. City inspectors and staff verify in-field that contractors are complying with appropriate and adequate storm drain protection and pollution control methods. By City policy, contractors found in violation of these protection protocols must stop work until appropriate measures are implemented.

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C.2.b. ►Sidewalk/Plaza Maintenance and Pavement Washing

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of wash water from pavement washing, mobile cleaning, pressure wash operations at parking lots, garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning activities from polluting stormwater
Y	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs

Comments:

All Street Division employees are instructed on using proper methods to prevent pollution from surface discharge and are provided with the BASMAA manual.

C.2.c. ►Bridge and Structure Maintenance and Graffiti Removal

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of discharges from bridge and structural maintenance activities directly over water or into storm drains
Y	Control of discharges from graffiti removal activities
Y	Proper disposal for wastes generated from bridge and structure maintenance and graffiti removal activities
Y	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs for graffiti removal
Y	Employee training on proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.
Y	Contract specifications requiring proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.

Comments:

Graffiti removal staff continue to be trained and are well versed with the latest proper removal techniques. Majority of graffiti removal does not utilize liquids and thus no wastewater discharge.

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C.2.e. ►Rural Public Works Construction and Maintenance

Does your municipality own/maintain rural[1] roads:		Yes	X	No
If your answer is No then skip to C.2.f.				

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

NA	Control of road-related erosion and sediment transport from road design, construction, maintenance, and repairs in rural areas
NA	Identification and prioritization of rural road maintenance based on soil erosion potential, slope steepness, and stream habitat resources
NA	No impact to creek functions including migratory fish passage during construction of roads and culverts
NA	Inspection of rural roads for structural integrity and prevention of impact on water quality
NA	Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion
NA	Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate
NA	Inclusion of measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology when replacing culverts or design of new culverts or bridge crossings

Comments including listing increased maintenance in priority areas: N/A

[1]Rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses.

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C.2.f. ►Corporation Yard BMP Implementation

Place an X in the boxes below that apply to your corporations yard(s):

	We do not have a corporation yard
	Our corporation yard is a filed NOI facility and regulated by the California State Industrial Stormwater NPDES General Permit
X	We have a Stormwater Pollution Prevention Plan (SWPPP) for the Corporation Yard(s)

Place an X in the boxes below next to implemented SWPPP BMPs to indicate that these BMPs were implemented in applicable instances. If not applicable, type NA in the box. If one or more of the BMPs were not adequately implemented during the reporting fiscal year then indicate so and explain in the comments section below:

X	Control of pollutant discharges to storm drains such as wash waters from cleaning vehicles and equipment
X	Routine inspection prior to the rainy seasons of corporation yard(s) to ensure non-stormwater discharges have not entered the storm drain system
X	Containment of all vehicle and equipment wash areas through plumbing to sanitary or another collection method
X	Use of dry cleanup methods when cleaning debris and spills from corporation yard(s) or collection of all wash water and disposing of wash water to sanitary or other location where it does not impact surface or groundwater when wet cleanup methods are used
X	Cover and/or berm outdoor storage areas containing waste pollutants

Comments:
None

If you have a corporation yard(s) that is not an NOI facility, complete the following table for inspection results for your corporation yard(s) or attach a summary including the following information:

Corporation Yard Name	Corp Yard Activities w/ site-specific SWPPP BMPs	Inspection Date[2]	Inspection Findings/Results	Date and Description of Follow-up and/or Corrective Actions
Public Works Maintenance Facility	Municipal Vehicle/Equipment Parking	8/10/2020	In Compliance	N/A

[2] Minimum inspection frequency is once a year during September.

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Section 3 - Provision C.3 Reporting New Development and Redevelopment

C.3.b.iv.(2) ►Regulated Projects Reporting

Fill in attached table C.3.b.iv.(2) or attach your own table including the same information.

C.3.e.iv. ►Alternative or In-Lieu Compliance with Provision C.3.c.

Is your agency choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e.?		Yes	X	No
Comments (optional):				

C.3.e.v ► Special Projects Reporting

1. In FY 2019-20, has your agency received, but not yet granted final discretionary approval of, a development permit application for a project that has been identified as a potential Special Project based on criteria listed in MRP Provision C.3.e.ii(2) for any of the three categories of Special Projects (Categories A, B or C)?		Yes	X	No
2. In FY 2019-20, has your agency granted final discretionary approval to a Special Project? If yes, include the project in both the C.3.b.iv.(2) Table, and the C.3.e.v. Table.		Yes	X	No

C.3.h.v.(2) ► Reporting Newly Installed Stormwater Treatment Systems and HM Controls (Optional)

On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting year) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. The list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

See attached Table C.3.h.v.(2) for list of newly installed Stormwater Treatment Systems/HM Controls.

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C.3.h.v.(3)(a) –(c) and (f) ► Installed Stormwater Treatment Systems Operation and Maintenance Verification Inspection Program Reporting

Site Inspections Data	Number/Percentage
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the previous fiscal year (FY18-19)	29
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the reporting period (FY 19-20)	29
Total number of Regulated Projects (including offsite projects, and Regional Projects) for which O&M verification inspections were conducted during the reporting period (FY 19-20)	29
Percentage of the total number of Regulated Projects (including offsite projects, and Regional Projects) inspected during the reporting period (FY 19-20)	100%[1]

C.3.h.v.(3)(d)-(e) ► Installed Stormwater Treatment Systems Operation and Maintenance Verification Inspection Program Reporting

Provide a discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

Summary:

The City continues to conduct regular inspections as well as perform cleanouts at all stormwater treatment systems when necessary. All treatment systems are functioning well and there are no recorded issues encountered.

Additionally, all regulated project owners are notified by the City to submit their requisite reports per their O&M Agreement annually to confirm that stormwater treatment systems are well maintained and inspected. These reports are generally submitted to the City from the owners through a specialized 3rd party inspection firm for agreement compliance. Currently, this program is working effectively for the City and there are no issues encountered.

[1] Based on the number of Regulated Projects in the database or tabular format at the end of the previous fiscal year, per MRP Provision C.3.h.ii.(6)(b).

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Provide a discussion of the effectiveness of the O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness program).
Summary: The O&M Program is working effectively and there are no proposed changed to improve it at this time.

C.3.i. ►Required Site Design Measures for Small Projects and Detached Single Family Home Projects

On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.
Summary: A completed Stormwater Requirement Checklist (C.3 and C.6) for all projects are submitted to the City for review. The checklist allows the City to identify the size of the project, the types of impervious surfaces involved, and whether the project is a regulated project. Additionally, the checklist also provides identification of any proposed site design and source control measures for the proposed project. Additionally, BASMAA prepared standard specifications in four fact sheets regarding the site design measures listed in Provision C.3.i, as a resource for Permittees. We have modified local ordinances/policies/procedures and forms/checklists to require all applicable projects approved after December 1, 2012 to implement at least one of the site design measures listed in Provision C.3.i. We are using the following Program and BASMAA products for C.3.i implementation: • BASMAA's site design fact sheets • The ACCWP C.3 Technical Guidance Manual Appendix L

C.3.j.i.(5)(d) ► Green Infrastructure Outreach

On an annual basis, provide a summary of your agency's outreach and education efforts pertaining to Green Infrastructure planning and implementation.
Summary: The Public Works Department continues to raise awareness and develop better understanding of the Green Infrastructure Plan by providing internal seminars and meetings to staff. Staffs are knowledgeable about the importance of Green Infrastructure planning and implementation and continues to be green infrastructure-oriented during project plan reviews and approvals. Please refer to the Countywide Program's FY 19-20 Annual Report for a summary of outreach efforts implemented at the Countywide level.

C.3.j.ii.(2) ► Early Implementation of Green Infrastructure Projects

On an annual basis, submit a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures. Include the following information:

- A summary of planning or implementation status for each public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. (see C.3.j.ii.(2) Table B - Planned Green Infrastructure Projects).
- A summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement (see C.3.j.ii.(2) Table A - Public Projects Reviewed for Green Infrastructure).

Background Information:

The City evaluates the feasibility for Green Infrastructure regardless if the project is public or private. Applicants for private projects fill out the Stormwater Requirements Checklist to determine the total new impervious surface being added. The checklist guides the applicant through the Stormwater requirements that need to be met and the stormwater treatment measures that need to be implemented. For public projects, the city evaluates the right-of-way and funds available to install green infrastructure that could treat additional stormwater runoff from the newly created impervious areas.

Summary of Planning or Implementation Status of Identified Projects:

Please see status of projects in the following tables below.

C.3.j.iii.(2) and (3) ► Participate in Processes to Promote Green Infrastructure

On an annual basis, report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

Union City continues to incorporate GI into projects where possible or feasible. Please refer to Countywide Program's FY 19-20 Annual Report for a summary of efforts conducted to help regional, State, and federal agencies plan, design and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects.

C.3.j.iv.(2) and (3) ► Tracking and Reporting Progress
On an annual basis, report progress on development and implementation of methods to track and report implementation of green infrastructure measures and provide reasonable assurance that waste load allocations for TMDLs are being met.
Please refer to the Countywide Program's FY 19-20 Annual Report for a summary of methods being developed to track and report implementation of green infrastructure measures.

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C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 1) – Projects Approved During the Fiscal Year Reporting Period

Project Name Project No.	Project Location[2], Street Address	Name of Developer	Project Phase No.[3]	Project Type & Description[4]	Project Watershed[5]	Total Site Area (Acres)	Total Area of Land Disturbed (Acres)	Total New Impervious Surface Area (ft^2)[6]	Total Replaced Impervious Surface Area (ft^2)[7]	Total Pre-Project Impervious Surface Area[8](ft^2)	Total Post-Project Impervious Surface Area[9](ft^2)
Private Projects											
None											
Public Projects											
None											

Comments:
None

[2]Include cross streets
[3]If a project is being constructed in phases, indicate the phase number and use a separate row entry for each phase. If not, enter "NA".
[4]Project Type is the type of development (i.e., new and/or redevelopment). Example descriptions of development are: 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse.
[5]State the watershed(s) in which the Regulated Project is located. Downstream watershed(s) may be included, but this is optional.
[6]All impervious surfaces added to any area of the site that was previously existing pervious surface.
[7]All impervious surfaces added to any area of the site that was previously existing impervious surface.
[8]For redevelopment projects, state the pre-project impervious surface area.
[9]For redevelopment projects, state the post-project impervious surface area.

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (private projects)

Project Name Project No.	Application Deemed Complete Date[10]	Application Final Approval Date[11]	Source Control Measures[12]	Site Design Measures[13]	Treatment Systems Approved[14]	Type of Operation & Maintenance Responsibility Mechanism[15]	Hydraulic Sizing Criteria[16]	Alternative Compliance Measures[17/18]	Alternative Certification[19]	HM Controls[20/21]
Private Projects										
None										

[10]For private projects, state project application deemed complete date. If the project did not go through discretionary review, report the building permit issuance date.
[11]For private projects, state project application final discretionary approval date. If the project did not go through discretionary review, report the building permit issuance date.
[12]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[13]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[14]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[15]List the legal mechanism(s) (e.g., O&M agreement with private landowner; O&M agreement with homeowners' association; O&M by public entity, etc…) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[16]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[17]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[18]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[19]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[20]If HM control is not required, state why not.
[21]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

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C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (public projects)

Project Name Project No.	Approval Date[22]	Date Construction Scheduled to Begin	Source Control Measures[23]	Site Design Measures[24]	Treatment Systems Approved[25]	Operation & Maintenance Responsibility Mechanism[26]	Hydraulic Sizing Criteria[27]	Alternative Compliance Measures[28/29]	Alternative Certification[30]	HM Controls[31/32]
Public Projects										
None										

Comments:
None

[22]For public projects, enter the plans and specifications approval date.
[23]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[24]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[25]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[26]List the legal mechanism(s) (e.g., maintenance plan for O&M by public entity, etc.) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[27]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[28]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[29]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[30]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[31]If HM control is not required, state why not.
[32]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

C.3.h.v.(2). ►Table of Newly Installed[33] Stormwater Treatment Systems and Hydromodification Management (HM) Controls (Optional)

Fill in table below or attach your own table including the same information.

Name of Facility	Address of Facility	Party Responsible[34] For Maintenance	Type of Treatment/HM Control(s)
None			

[33] "Newly Installed" includes those facilities for which the final installation inspection was performed during this reporting year.
[34] State the responsible operator for installed stormwater treatment systems and HM controls.

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C.3.e.v.Special Projects Reporting Table

Reporting Period – July 1 2019 - June 30, 2020

Project Name & No.	Permittee	Address	Application Submittal Date[35]	Status[36]	Description[37]	Site Total Acreage	Gross Density DU/Acre	Density FAR	Special Project Category[38]	LID Treatment Reduction Credit Available[39]	List of LID Stormwater Treatment Systems[40]	List of Non-LID Stormwater Treatment Systems[41]
No Special Projects to report for this FY												

[35]Date that a planning application for the Special Project was submitted.
[36] Indicate whether final discretionary approval is still pending or has been granted, and provide the date or version of the project plans upon which reporting is based.
[37]Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.
[38] For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.
[39]For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.
[40]**:** List all LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area.
[41]List all non-LID stormwater treatment systems proposed. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

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C.3.j.ii.(2) ► Table A - Public Projects Reviewed for Green Infrastructure

Project Name and Location[42]	Project Description	Status[43]	GI Included?[44]	Description of GI Measures Considered and/or Proposed or Why GI is Impracticable to Implement[45]
Misc. Overlay, slurry seal, traffic signal and sidewalk replacement projects	Perform routine rehabilitation work on existing impervious areas.	Various projects are in different phases, such as concept, design, upcoming construction, etc.	NO	The typical maintenance or replacement projects do not increase impervious area and the opportunities, including the budget, to add GI is limited.
Decoto Road Overlay Project (Bridge at City limits to Union Square)	Repave Street	In design	NO	Paving project consists of repairing any failed pavement areas and funding constraints won't allow GI installation.
Integrate Passenger Rail into the Intermodal Station (At-Grade Pedestrian Crossing)	Install concrete panels across the existing railroad tracks to enable pedestrian crossing	Design complete and ready to bid – awaiting agreement	NO	The project is not increasing imperviousness since the drainage from the railroad panels will be infiltrated I the adjacent pervious areas. GI was considered but was not found to be feasible.
Dyer St. Rehabilitation	Repave Street	In design	NO	Paving project consists of repairing any failed pavement areas and funding constraints won't allow GI installation.

[42] List each public project that is going through your agency's process for identifying projects with green infrastructure potential.
[43] Indicate status of project, such as: beginning design, under design (or X% design), projected completion date, completed final design date, etc.
[44] Enter "Yes" if project will include GI measures, "No" if GI measures are impracticable to implement, or "TBD" if this has not yet been determined.
[45] Provide a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. If review of the project indicates that implementation of green infrastructure measures is not practicable, provide the reasons why green infrastructure measures are impracticable to implement.

C.3.j.ii.(2) ► Table B - Planned and/or Completed Green Infrastructure Projects

Project Name and Location[46]	Project Description	Planning or Implementation Status	Green Infrastructure Measures Included
H Street Green Streets Improvements Project	Installed green infrastructure along ten (10) blocks of H Street, including Bioretention planters and permeable paving.	Construction Completed in December 2018.	The project replaced concrete pavement at the project with Bioretention areas (rain gardens) to street stormwater. The project also installed pervious pavement.
Union City Blvd. Right-turn lane	Install right-turn lane on existing pavement as part of UCB bike lane project	December 2022	Bioretention area(s)

[46] List each planned (and expected to be funded) public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Note that funding for green infrastructure components may be anticipated but is not guaranteed to be available or sufficient.

Section 4 – Provision C.4 Industrial and Commercial Site Controls

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Summary:

In addition to the difficulties in implementing the Clean Water program during the coronavirus shelter-in-place period, from mid-March through the end of the reporting period, Union City's program also underwent significant changes in personnel during this year. Our new commercial/industrial facility inspector was brought onboard and trained-up. And we also hired a new Public Works engineer to expand our program capabilities. Facility inspection numbers declined due to the staff turnover and time required for training and on-the-job experience.

We continue to participate actively in the Illicit and Industrial/Commercial Discharge subcommittee of the Countywide Clean Water Program. Both our facility inspectors and both our Public Works Inspectors attended the one annual inspector training that was presented by the countywide program during this reporting period.

We are in the process of scheduling a formal industrial/commercial and illicit discharge control training event for later in the reporting year and all inspectors and support staff involved in the Union City Clean Water Program, and selected senior management staff, would be invited to participate, for the purpose of sharing ideas, reviewing successes and failures, and re-iterating basic Clean Water program requirements. Topics inspected to be a focus include a review of the relevant MRP sections, the Business Inspection Plan, Enforcement Response Plan, reporting and recordkeeping, City policies and procedures, successes and areas for improvement, and safety. Training will be documented with sign-in sheets and syllabus.

Again, this year, we realize that the Potential Facilities List is not fully current. We have engaged our Finance Department and will work in the coming year to better track opening and closing businesses. During this reporting period, our Union City Finance Department implemented a new software program to track business licenses, including those associated with SB205 compliance, for NOI-required industries.

Our inspection numbers declined from previous years, due to staff turnover and the effects of the shutdown on city operations. We reviewed but did not significantly modify our inspection or enforcement plans, and we did not modify any inspection frequencies for businesses.

Our inspections this year confirm, again, that we have one near-universal problem across businesses that we need to address: failure to close lids of trash and recycling containers. Outdoor grease storage at restaurants also pose continuing challenges and are a common source of our observed illicit discharges. We are working on a citywide solution, perhaps involving an ordinance and designation of the condition as a nuisance, allowing code enforcement prosecution. We are conferring with fire department, recycling division, public works and environmental staff to develop a workable solution. We may also consider a fee to cover the cost of commercial/industrial clean water inspections. And we still hope to bring on additional staff to support, improve and expand the Clean Water program.

Please refer to the C.4. Industrial and Commercial Site Controls section of the countywide Program's FY 18-19 Annual Report for a description of activities of the countywide program and/or the BASMAA Municipal Operations Committee.

C.4.b.iii ► Potential Facilities List (i.e., List of All Facilities Requiring Stormwater Inspections)

List below or attach your list of industrial and commercial facilities in your Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff.

Please see Attachment C.4.b.iii for the Potential Facilities List.

Note: We recognize that the list needs to be updated with current information from the Finance Department's Business License Division and the Environmental Programs CUPA Division. We expect to do a full review and update in the next reporting period.

C.4.d.iii.(2)(a) & (c) ►Facility Inspections

Fill out the following table or attach a summary of the following information. Indicate your reporting methodology below.

	X	Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
		Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Total number of inspections conducted (C.4.d.iii.(2)(a))	59
Violations, enforcement actions, or discreet number of potential and actual discharges resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner (C.4.d.iii.(2)(c))	9

Comments:

The one notice of violation issued and not resolved at the end of this reporting period was for oil spillage on the ground surface at Lally Truck Repair on Horner Street. The case was referred to Union City Code Enforcement for resolution on numerous violations of City codes and standards. The case was not resolved as of the end of this current reporting period, but it is expected to be satisfactorily resolved through code enforcement proceedings, including issuance of a building permit upon review of plans currently in development. This violation is expected to be resolved after issuance of the building permit - significantly longer than 10 days, but leading to a much-improved site condition. Initial and follow-up inspections after construction will focus on BMPs and personnel training.

C.4.d.iii.(2)(b) ► Frequency and Type of Enforcement Conducted

Fill out the following table or attach a summary of the following information.

	Enforcement Action (as listed in ERP)[1]	Number of Enforcement Actions Taken
Level 1	Verbal Warning/ Education	0
Level 2	Written Warning/Notice of Violation	9
Level 3	Administrative Penalty/Cost Recovery	0
Level 4	Administrative Order – Cease and Desist	0
Level 5	Administrative Order – Notice to Clean	0
Level 6	Administrative Order – Abatement Order	0
Level 7	Administrative Order – Stop Work Order	0
Level 8	Legal Action/Referral to State, Federal Agency	0
Total		9

C.4.d.iii.(2)(d) ► Frequency of Potential and Actual Non-stormwater Discharges by Business Category

Fill out the following table or attach a summary of the following information.

Business Category[2]	Number of Actual Discharges	Number of Potential Discharges
Auto dismantlers	0	0
Cement and asphalt batch plants	1	0
Community/commercial pools	0	0
Corporation yards	0	0
Food service facilities	0	3
Golf courses	0	0
Horse boarding facilities	0	0
Hospitals/Medical Offices	0	1

[1]Agencies to list specific enforcement actions as defined in their ERPs.
[2]List your Program's standard business categories.

Manufacturing facilities	0	1
Plant nurseries	0	0
Pre-treatment permitted facilities	0	0
Retail gas outlets	1	0
Vehicle service facilities	1	0
Warehouse and storage facilities	0	0
Commercial retail facilities	1	0

C.4.d.iii.(2)(e) ►Non-Filers

List below or attach a list of the facilities required to have coverage under the Industrial General Permit but have not filed for coverage:

No facilities were identified as non-filers during inspections this year.

C.4.e.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Industrial/ Commercial Site Inspectors in Attendance	Percent of Industrial/ Commercial Site Inspectors in Attendance	No. of IDDE Inspectors in Attendance	Percent of IDDE Inspectors in Attendance
Stormwater Business Inspectors Workshop: Sharing Successful Strategies	11/6/2019	Inspecting Restaurants: The Basics Strategies for Enforcement Health of Alameda County Creeks Strategies for Overcoming Language Barriers Fire and Environmental Protection Division	2	100	2	100

Comments:
None

Section 5 – Provision C.5 Illicit Discharge Detection and Elimination

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Provide background information, highlights, trends, etc.

Summary:

This year Union City increased staffing in a few key areas that are expected to improve overall Clean Water Program implementation including illicit discharge and elimination. We hired a new Public Works engineer and our Environmental Programs clean water inspector was made a permanent employee. We also have a new website coordinator and we expect to improve our complaint/spill reporting web portal and to make it more prominent on the website. Knowledge of the program is increasing, and a transfer of institutional knowledge among staff is well underway.

We reviewed our Enforcement Response Plan and are in the process of updating it as of the end of this reporting period, with minor changes.

Environmental Programs clean water inspectors participated in the IIDC subcommittee activities throughout the year, including in the updating and issuance of BMP materials. Staff participated in the one inspector workshop presented through the countywide program.

The Union City program also focused this year on methods to prevent litter and grease discharge issues at commercial retail and food facilities, in collaboration with our colleagues the countywide subcommittee members – the upshot is that enforcement with monetary penalties is the most-effective process. We intend to start formal enforcement using our ERP and City citation process.

One discharge incident was not resolved at the end of the reporting period. This was a reported incidence of a storage/moving business draining used motor oil from commercial trucks directly onto a railroad track spur line. The property owner was notified. The responsible party has not been identified. The investigation is continuing.

C.5.c.iii ►Complaint and Spill Response Phone Number

(For the FY 2019-20 Annual Report only)

Provide the following information:

List below or attach your complaint and spill response phone number

(510) 675-5308

Provide your complaint and spill response web address, if used

https://www.unioncity.org/formcenter/environmental-programs-5/report-illegal-dumping-and-clean-water-i-44

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Is a screen shot of your website showing the central contact point attached?	X	Yes		No

If No, explain:

Provide a discussion of how the central contact point (complaint and spill response phone number and, if used, web address) is being publicized to your staff and the public.

The central contact point for reporting spills, discharges, dumping and hazardous materials releases in Union City is publicized on the City's home webpage and promoted through the countywide program website and published materials. The website and reporting phone number allows us to respond promptly to all emergencies and imminent Clean Water issues. We have staff that are on a 24/7 standby basis to address these issues.

We have experienced some recent changes, in particular a new website manager and new website technology in the works. We expect additional changes to the spill/discharge/dumping/reporting portal as the overall website architecture is updated. One significant change is that the reporting link is no longer on the front 'landing' page for the Union City website, as it was from 2016 and a few years thereafter; with limited space on the landing page other priorities such as voting information superseded that highlighted website location. The reporting page is of course still available by searching the website.

A screen shot showing a portion of the website reporting form is included in this report as Attachment C.5.c.iii.

Use of the centralized website has clearly increased spill/discharge reports to the city since it was introduced in 2016 and has improved the data on these incidents. However, we recognize the need for improvement in expanding awareness and willingness to report discharge and spill issues in both our staff and the public. Internally, we know that many more spills and releases are cleaned up by our own staff than we in fact record and report; the field crews are prompt in clean up but do not generally record or report these abatements. We'll work to improve the internal communication.

The code enforcement, environmental programs, public works and website/communications teams in Union City work together and share resources on complaint and discharge response. We've experienced some significant changes, including key new staff during 2019-2020: a new Environmental Programs Clean Water inspector, a new website manager, and a new Public Works engineer with a Clean Water focus. We recognize the need to educate and bring together this new team, including an expansion of our public reporting outreach and capabilities.

Our social media outreach uses top sites such as Facebook, Instagram and Twitter and all of these are used for clean water outreach.

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C.5.d.iii.(1), (2), (3) ►Spill and Discharge Complaint Tracking

Spill and Discharge Complaint Tracking (fill out the following table or include an attachment of the following information)

	Number
Discharges reported (C.5.d.iii.(1))	16
Discharges reaching storm drains and/or receiving waters (C.5.d.iii.(2))	3
Discharges resolved in a timely manner (C.5.d.iii.(3))	15

Comments:

The Public Works Department administers the overall Clean Water Program in Union City and delegates specific areas of responsibility to other City departments as appropriate. Illicit discharge complaint and response is shared by Public Works staff and Environmental Programs Division staff from the Economic and Community Development Department.

Complaints received through the website are automatically routed to staff of both departments for investigation and abatement. Public Works has an effective notification process to route routine referrals for dumping clean-ups, which represent the majority of complaints, to the Sewer and Streets Division field crews. Environmental Programs staff review the same automated reports and follow-up or inspect when there is any indication of hazardous materials or excessive litter or debris. Illicit discharges related to or suspected to be from industrial or commercial facilities also fall under the authority of Environmental Programs for investigation.

Public Works staff are available 24/7 through a rotating on-call process. Environmental Programs management staff is available 24/7 upon notification by Public Works or through California State Warning Center notifications of spills or reported incidents.

Action to abate discharges reaching storm drains or receiving waters are considered immediate response priorities.

Discharges that are reported are recorded regardless of whether or not they are substantiated in the field. Discharges reaching storm drain inlets or receiving waters are reported in C.5.d.iii.(2), excluding those involving building materials in the street gutters. Our standard for 'resolved in a timely manner' is resolution/abatement within 10 days of notification and before the next rain event even if less than 10 days.

One incident was not resolved at the end of the reporting period. This was a reported incidence of a storage/moving business draining used motor oil from commercial trucks directly onto a railroad track spur line. The property owner was notified. The responsible party has not been identified. The investigation is continuing.

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Section 6 – Provision C.6 Construction Site Controls

C.6.e.iii.(3)(a), (b), (c), (d) ►**Site/Inspection Totals**			
Number of active Hillside Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii.3.a)	Number of High Priority Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii. 3.c)	Number of sites **disturbing ≥** 1 acre of soil (C.6.e.iii.3.b)	Total number of storm water runoff quality inspections conducted (include only Hillside Sites, High Priority Sites and sites disturbing 1 acre or more) (C.6.e.iii. 3.d)
# 0	# 0	# 2 CLMP 1&2 Masonic PAD B	# 9

Comments:

CLMP 1&2 and Pad B are projects by Masonic Homes. Masonic Homes is located on a hillside site at 34400 Mission Blvd, Union City, CA 94587.

Provide the number of inspections that are conducted at sites not within the above categories as part of your agency's inspection program and a general description of those sites, if available or applicable.

Does not apply

C.6.e.iii.(3)(e) ►Construction Related Storm Water Enforcement Actions

	Enforcement Action (as listed in ERP)[1]	Number Enforcement Actions Issued
Level 1[2]	Verbal Notice/Warning	0
Level 2	Notice of Violation (Written)	0
Level 3	Formal Enforcement (Penalties, cost recovery)	0
Level 4	Legal Action or Referral to State and Federal Agmts	0
Total		0

C.6.e.iii.(3)(f), ►Illicit Discharges

	Number
Number of illicit discharges, actual and those inferred through evidence at hillside sites, high priority sites and sites that disturb 1 acre or more of land (C.6.e.iii. 3.f)	0

C.6.e.iii.(3)(g) ► Corrective Actions

Indicate your reporting methodology below.

☐	Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
X	Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Enforcement actions or discrete potential and actual discharges fully corrected within 10 business days after violations are discovered or otherwise considered corrected in a timely period (C.6.e.iii. .3.g)	0

Comments:
No enforcement actions were taken due to no discovered violations.

[1]Agencies should list the specific enforcement actions as defined in their ERPs.
[2]For example, Enforcement Level 1 may be Verbal Warning.

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C.6.e.iii.(4) ►Evaluation of Inspection Data

Describe your evaluation of the tracking data and data summaries and provide information on the evaluation results (e.g., data trends, typical BMP performance issues, comparisons to previous years, etc.).

Description: No major trends were noticed. The contractor addressed any non-compliant issues rapidly – usually by the end of the day.

C.6.e.iii.(4) ►Evaluation of Inspection Program Effectiveness

Describe what appear to be your program's strengths and weaknesses, and identify needed improvements, including education and outreach.

Description:

No enforcement actions were issued by the city in FY19-20. Due to fewer construction projects, inspectors were able to make frequent visits to the sites which help build and maintain a good relationship with developers and contractors. These visits were not always logged as inspections but allowed for inspectors to ensure BMPs are installed correctly and to voice any concerns to prevent any potential violations before they happen.

Staff did not find a need to revise the stormwater construction inspection forms and inspection data tracking tools. However, due to the occurrence of COVID-19, using hard copy forms to conduct inspections which requires signatures, became a health concern. In addition, due to shelter-in-place, completed inspection forms may not be turned in to staff for record keeping until weeks later. The city considers moving to a digital medium to complete and digitally store construction inspections via the cloud.

C.6.f.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Inspectors in Attendance
I&IDC Inspector Workshop	11/6/2019	Restaurant inspections, overcoming language barriers, enforcement, health of creeks, etc.	5

Section 7 – Provision C.7. Public Information and Outreach

C.7.a.iii ►Storm Drain Inlet Marking

(For the FY 2019-20 Annual Report only) Provide the following information:

State the number of municipally-maintained storm drain inlets in your jurisdiction	2,540			
Are at least 80 percent of municipality-maintained storm drain inlets legibly labeled with an appropriate stormwater pollution prevention message?	X	Yes		No
Is a picture of a labeled municipality-maintained inlet attached?	X	Yes		No
Did all newly approved privately-maintained streets have storm drain inlet markings verified prior to acceptance of the project?	X	Yes		No
Were the storm drain inlet markings on privately-maintained streets required to be maintained through the development maintenance entity?	X	Yes		No

C.7.b.i.1 ►Outreach Campaign

Summarize outreach campaign. Include details such as messages, creative developed, and outreach media used. The detailed outreach campaign report may be included as an attachment. If outreach campaign is being done by participation in a countywide or regional program, refer to the separate countywide or regional Annual Report.

Summary:

This year, Union City participated in the Earth Day Event and the Stormwater Exhibit at the Alameda County Fair as part of the outreach effort to reach the public to educate them about Union City's Water Program. Union City also contributed funds as well as input to the countywide regional campaign program to educate the public about Clean Water Pollution and Prevention.

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C.7.b.iii.2 ►Post-Campaign Effectiveness Assessment/Evaluation

(For the Annual Report following the post-campaign effectiveness assessment/evaluation*)* Submit a report of the effectiveness assessment/evaluation completed, which, at a minimum, should include the following information:

1) A description of the outreach campaign
2) A summary of how the effectiveness assessment/evaluation was implemented
3) An analysis of the effectiveness assessment/evaluation results
4) A discussion of the measurable changes in awareness and behavior achieved
5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages

If campaign implementation and effectiveness assessment were done Countywide or regionally, refer to a Countywide or regional submittal that contains the information described above.

	See attached effectiveness assessment/evaluation report
X	See Countywide or regional submittal (reference document)

C.7.c. Stormwater Pollution Prevention Education

No changes

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C.7.d ►**Public** Outreach and Citizen Involvement Events

Describe general approach to event selection. Provide a list of outreach materials and giveaways distributed.
Use the following table for reporting and evaluating public outreach events

Event Details	Description (messages, audience)	Evaluation of Effectiveness
Earth Day Event April 20th, 2019 2000 Mowry Ave Fremont, CA 94538	Earth Day Event and the theme of the event is, **"Let's Go Green Together"**. The audiences are composed of adults and children of all ages. The message that was being conveyed to the audience was, waste reduction and recycling, water pollution prevention, energy and resource conservation, and alternative transportations.	The event was a success. Message reached a wide spectrum of audiences as there were about 1009 attendees which is about average on a yearly basis. There were various items that were collected and given out such as the followings: 80 lbs of sharps (used needles) 14 thermometers, 126 lbs of medications, 9000 lbs of shredded paper, 75 pairs of eyeglasses. 940 plants/seeds were given out. Activity books, pencils made of recycled jeans and informational pamphlets were distributed (roughly 300 all together).
Stormwater Exhibit at the Alameda County Fair: The Fair is ran through July 7, 2019. Setting up the exhibit and producing the outreach materials are Countywide Program efforts. Staffing the exhibit is an effort conducted by individual Permittees.	The County Fair is attended by a wide range of residents from throughout the County. The primary message of this year's exhibit is proper waste disposal. The exhibit highlights the Program's mascots, Fred and Izzy, and incorporates the Program's videos that discourage littering, residential car washing, and hosing of driveways and sidewalks.	Several hundred thousand residents attend the fair each year. A detailed description of the exhibit is included in Section C.7 Public Information and Outreach of the ACCWP FY 19/20 Annual Report.

C.7.e. ►Watershed Stewardship Collaborative Efforts

Summarize watershed stewardship collaborative efforts and/or refer to a regional report that provides details. Describe the level of effort and support given (e.g., funding only, active participation etc.). State efforts undertaken and the results of these efforts. If this activity is done regionally refer to a regional report.

Evaluate effectiveness by describing the following:

- Efforts undertaken
- Major accomplishments

Summary:
Continued efforts of the City's stormwater stewardship efforts involve cooperation between multiple Regional Departments. For details regarding these regional efforts, please refer to Section C.7 of the Countywide Program's Annual Report.

C.7.f. ►School-Age Children Outreach

Summarize school-age children outreach programs implemented. A detailed report may be included as an attachment.
Use the following table for reporting school-age children outreach efforts.

Program Details	Focus & Short Description	Number of Students/Teachers reached	Evaluation of Effectiveness
Refer to C.7 Section of the countywide program's FY 18-19 Annual Report for a description of School-age Children Outreach efforts conducted at the countywide level.			

C.7.g. ►Outreach to Municipal Officials

(For FY 19-20 Annual Report only) Summarize outreach conducted to increase the overall awareness of stormwater and/or watershed messages among municipal officials.

Summary:
Union City's City Manager's office collaborates with StopWaste.org to minimize waste in the city with goals to improve stormwater and waste management. The City Manager is kept aware of the tasks related to stormwater pollution prevention including effective street sweeping being an ongoing topic. Currently, Public Works Streets Division continues to sweep all streets twice per week with crews visiting hotspots once per week to pick up trash by hand.
Green Infrastructure and its efforts are continuously supported by City Council.

Section 9 – Provision C.9 Pesticides Toxicity Controls

C.9.a. ►Implement IPM Policy or Ordinance

Is your municipality implementing its IPM Policy/Ordinance and Standard Operating Procedures? [X] Yes [ ] No

Report implementation of IPM BMPs by showing trends in quantities and types of pesticides used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphates, pyrethroids, carbamates fipronil, indoxacarb, diuron, and diamides. A separate report can be attached as evidence of your implementation.

Trends in Quantities and Types of Pesticide Active Ingredients Used[1]

Pesticide Category and Specific Pesticide Active Ingredient Used	Amount[2]					
	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Active Ingredient Potassium glyphosate (Roundup Pro Max)	1546.88	2422.04 lbs	1780.92 lbs	371.11oz	676.5 lbs	
Active Ingredient Isopropylamine glyphosate (Aquamaster)	N/A	4.05 lbs	-	-	-	
Active Ingredient (Evade 4 FL)	52.24 lbs	113.48 lbs	69.67 lbs	856.5 gal	-	
Active Ingredient Dinotefuran (Safari 20 SG)	0.45 lbs	0.675 lbs	-	-	0.54 lbs	
Active Ingredient Iron phosphate (First Choice Sluggo)	0.5 lbs	-	-	-	-	
Active Ingredient Prodiamine (Barricade & Resolute)	-	-	-	869 oz	848.80 oz	
Active Ingredient glyphosate (Ranger Pro)	-	-	-	-	1066.16 lb	

Reasons for increases in use of pesticides that threaten water quality:

Due to pumping difficulty, Evade 4 FL is no longer being used. The change from using Roundup Pro Max to Ranger Pro was made due to cost effectiveness. An increase in weed activity led to an increase in Ranger Pro dosage.

IPM Tactics and Strategies Used:

Landscaping crews continue to practice weed control through wood chip and recycled mulch applications in areas. Weeds continues to be physically removed as needed to reduce pesticide usage.

[1]Includes all municipal structural and landscape pesticide usage by employees and contractors.
[2]Weight or volume of the active ingredient, using same units for the product each year. Please specify units used. The active ingredients in any pesticide are listed on the label. The list of active ingredients that need to be reported in the pyrethroids class includes: metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambdacyhalothrin, and permethrin.

C.9.b ►Train Municipal Employees

Enter the number of employees that applied or used pesticides (including herbicides) within the scope of their duties this reporting year.	9
Enter the number of these employees who received training on your IPM policy and IPM standard operating procedures within this reporting year.	9
Enter the percentage of municipal employees who apply pesticides who have received training in the IPM policy and IPM standard operating procedures within this reporting year.	100

Type of Training:
All employees utilizing pesticide/herbicide attended annual pesticide safety training.

C.9.c ►Require Contractors to Implement IPM

Did your municipality contract with any pesticide service provider in the reporting year, for either landscaping or structural pest control?		Yes	X	No

If your municipality contracted with any pesticide service provider, briefly describe how contractor compliance with IPM Policy/Ordinance and SOPs was monitored
Our municipality did not contract with any pesticide service provider.

C.9.d ►Interface with County Agricultural Commissioners

Did your municipality communicate with the County Agricultural Commissioner to: (a) get input and assistance on urban pest management practices and use of pesticides or (b) inform them of water quality issues related to pesticides,		Yes	X	No
Did your municipality report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire.		Yes	X	No

C.9.e.ii (1) ►Public Outreach: Point of Purchase

Provide a summary of public outreach at point of purchase, and any measurable awareness and behavior changes resulting from outreach (here or in a separate report); OR reference a report of a regional effort for public outreach in which your agency participates.

Summary:

See the C.9 Pesticides Toxicity Control section of Countywide Program's FY 19-20 Annual Report for information on point of purchase public outreach conducted countywide and regionally.

C.9.e.ii (2) ►Public Outreach: Pest Control Contracting Outreach

Provide a summary of outreach to residents who use or contract for structural pest control and landscape professionals); AND/OR reference a report of a regional effort for outreach to residents who hire pest control and landscape professionals in which your agency participates.

Summary:

See the C.9 Pesticides Toxicity Control section of Countywide Program's FY 19-20 Annual Report for information on point of purchase public outreach conducted countywide and regionally.

C.9.e.ii.(3) ►Public Outreach: Pest Control Operators

Provide a summary of public outreach to pest control operators and landscapers and reduced pesticide use (here or in a separate report); AND/OR reference a report of a regional effort for outreach to pest control operators and landscapers in which your agency participates.

Summary:

See the C.9 Pesticides Toxicity Control section of Program's FY 19-20 Annual Report for a summary of our participation in and contributions towards countywide and regional public outreach to pest control operators and landscapers to reduce pesticide use.

C.9.f ►Track and Participate in Relevant Regulatory Processes

Summarize participation efforts, information submitted, and how regulatory actions were affected; AND/OR reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected.

Summary:

During FY 19-20, we participated in regulatory processes related to pesticides through contributions to the countywide Program, BASMAA and CASQA. For additional information, see the Regional Report submitted by BASMAA on behalf of all MRP Permittees.

Section 10 - Provision C.10 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to Trash Full Capture Systems (as reported C.10.b.i)	71.8
Percent Trash Reduction in all TMAs due to Control Measures Other than Trash Full Capture Systems (as reported in C.10.b.ii)[1]	0
Percent Trash Reduction due to Jurisdictional-wide Source Control Actions (as reported in C.10.b.iv)	10
SubTotal for Above Actions	81.8
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	0
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	0
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2019-20	81.8

Discussion of Trash Load Reduction Calculation:
No additional TCDs were installed during the 19-20 FY.
Latest Baseline Trash Generation Map can be viewed here: https://cityofunioncitycalifornia.box.com/v/TrashGen Password: uctrashgen

[1] See Appendix 10-1 for changes between 2009 and FY 19-20 in trash generation by TMA as a result of Full Capture Systems and Other Measures.

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C.10.a.iii ► Mandatory Trash Full Capture Systems

Provide the following:

1) Total number and types of full capture systems (publicly and privately-owned) installed prior to FY 19-20, during FY 19-20, and to-date, including inlet-based and large flow-through or end-of-pipe systems, and qualifying low impact development (LID) required by permit provision C.3.
2) Total land area (acres) treated by full capture systems for population-based Permittees and total number of systems for non-population based Permittees compared to the total required by the permit.

Type of System	# of Systems	Areas Treated (Acres)
Installed in FY 19-20		
Connector Pipe Screens	0	0
HDS and LID Facilities	0	0
Installed Prior to FY 19-20		
Connector Pipe Screens	562	1238
Baskets	0	1
HDS and LID Facilities	0	232
Other	1	71
Total for all Systems Installed To-date	563	1543
Treatment Acreage Required by Permit (Population-based Permittees)		
Total # of Systems Required by Permit (Non-population-based Permittees)		

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C.10.b.i ► Trash Reduction - Full Capture Systems

Provide the following:

1) Jurisdictional-wide trash reduction in FY 19-20 attributable to trash full capture systems implemented in each TMA;
2) The total number of full capture systems installed to-date in your jurisdiction;
3) The percentage of systems in FY 19-20 that exhibited significant plugged/blinded screens or were >50% full when inspected or maintained;
4) A narrative summary of any maintenance issues and the corrective actions taken to avoid future full capture system performance issues; and
5) A certification that each full capture system is operated and maintained to meet the full capture system requirements in the permit.

TMA	Jurisdiction-wide Reduction (%)	Total # of Full Capture Systems	% of Systems Exhibiting Plugged/Blinded Screens or >50% full in FY 19-20	Summary of Maintenance Issues and Corrective Actions
1	17.9	563	40%	No maintenance issues reported by maintenance staff. Lower % of systems exhibiting >50% full due to drier season.
2	0.2			
3	3.3			
4	2.5			
5	2.9			
6	1.4			
7	8.7			
8	20.3			
9	9.2			
10	0.3			
11	2.9			
12	0.8			
13	0.3			
14	0.4			
15	0.4			
Total	71.8			

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Certification Statement:

City of Union City certifies that a full capture system maintenance and operation program is currently being implemented to maintain all applicable systems in manner that meets the full capture system requirements included in the Permit.

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C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART A)

Provide a summary of trash control actions other than full capture systems or jurisdictional source controls that were implemented within each TMA, including the types of actions, levels and areal extent of implementation, and whether actions are new, including initiation date.

TMA	Summary of Trash Control Actions Other than Full Capture Systems
1	No new actions
2	No new actions. City continues to work and collaborate with private property owners to install bioswales or TCDs on-site.
3	No new actions
4	No new actions
5	No new actions
6	No new actions
7	No new actions
8	No new actions
9	No new actions
10	No new actions
11	No new actions
12	No new actions. (Schools)
13	No new actions
14	No new actions
15	No new actions. (Green TMA Areas)

Summary of Trash Control Measures Other than Full Capture Devices:

- Street Sweeping: Include a description of any enhancements or new actions implemented after the MRP 1.0 effective date (i.e., December 2009). Identify portions of the TMA where enhanced street sweeping (i.e., increased sweeping frequency) and parking enforcement above 2009 levels was implemented.
- On-land Cleanup: Include a description of on-land cleanup activities that began after the MRP 1.0 effective date (i.e., December 2009) and continued into FY 19-20, including any enhancements or new actions implemented in FY 19-20. Describe if these actions are Permittee or volunteer-led.
- Partial Capture Devices: Provide a description of devices installed after the MRP 1.0 effective date (i.e., December 2009). Describe the level of maintenance conducted per device types.
- Storm Drain Inlet Cleaning: Describe storm drain inlet maintenance activities implemented after the MRP 1.0 effective date (i.e., December 2009) and continued in FY 19-20, including any enhancements or new maintenance activities implemented in FY 19-20. For new/enhanced actions, include the number of inlets where enhanced maintenance occurred, and the increased frequency of maintenance.
- Uncovered Loads: Describe activities designed to reduce trash from uncovered loads that began after the MRP 1.0 effective date (i.e., December 2009) and continued in FY 19-20, including any enhancements or new actions implemented in FY 19-20. Describe the types of actions implemented including new or redirected enforcement efforts to increase the focus towards new or enhanced actions.
- Anti-littering and illegal dumping enforcement activities: Describe anti-littering and illegal dumping enforcement activities began after to the MRP 1.0 effective date (i.e., December 2009) and continued in FY 19-20, and any enhancements or new actions implemented in FY 19-20. Include any new or redirected enforcement efforts to increase the focus towards new or enhanced actions. Describe the number of citations or other correction actions accomplished this year, and compare with previous years. Indicate how anti-littering and illegal dumping enforcement records are kept, and how they may be retrieved for audit.
- Improved Trash Bin/Container Management: Describe activities designed to improve trash bin/container management that began after the MRP1.0 effective date (i.e., December 2009) and continued in FY 19-20, and any enhancements or new actions implemented in FY 19-20. Include any new or redirected efforts to increase the focus towards these new or enhanced actions.
- Other Types of Actions: Describe activities designed after the MRP effective date (i.e., December 2009) and continued in FY 19-20, and any enhancements or new (post December 2009 effective date) actions implemented in FY 19-20.

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C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART B)

Provide the following:

1) A summary of the on-land visual assessments in each TMA (or control measure area), including the street miles or acres available for assessment (i.e., those associated with VH, H, or M trash generation areas not treated by full capture systems), the street miles or acres assessed, the % of available street miles or acres assessed, and the average number of assessments conducted per site within the TMA; and
2) Percent jurisdictional-wide trash reduction in FY 19-20 attributable to trash management actions other than full capture systems implemented in each TMA; OR
3) Indicate that no on-land visual assessments were performed.

If no on-land visual assessments were performed, check here and state why:	X	Explanation: Nearly all designated visual assessment areas were covered by installed TCDs.

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8459

C.10.b.iv ► Trash Reduction – Source Controls

Provide a description of each jurisdictional-wide trash source control action implemented to-date. For each control action, identify the trash reduction evaluation method(s) used to demonstrate on-going reductions, summarize the results of the evaluation(s), and estimate the associated reduction of trash within your jurisdictional area. Note: There is a maximum of 10% total credit for source controls.

Source Control Action	Summary Description & Dominant Trash Sources and Types Targeted	Evaluation/Enforcement Method(s)	Summary of Evaluation/Enforcement Results To-date	% Reduction
Single-use Plastic Bag Ordinance or Policy	The Alameda County Waste Management Authority adopted the expanded Single-Use Bag Ban. As of May 1, 2017 all retail stores were covered by the ban, and all restaurants were covered by the ban as of November 1, 2017. A copy of the Ordinance is available on the Alameda County Waste Management Authority's website: http://www.reusablebagsac.org/acwma-ordinance-2012-2-amended-ordinance-2016-2	See Section C.10 of the ACCWP FY 19/20 Annual Report.	See Section C.10 of the ACCWP FY 19/20 Annual Report.	6%
Expanded Polystyrene Food Service Ware Ordinance or Policy		For those with Polystyrene Food Service Ware bans, insert: "See Section C.10 of the ACCWP FY 19/20 Annual Report." Add text regarding any additional assessment as appropriate. If you do not have a ban in place, delete this row.	For those with Polystyrene Food Service Ware bans, insert: "See Section C.10 of the ACCWP FY 19/20 Annual Report." Add text regarding any additional assessment results as appropriate. If you do not have a ban in place, delete this row.	4%
Union City Food Ware Ordinance	On 6/14/16, the City adopted Ordinance #821-16 adding Chapter 7.06 "City of Union City Food Ware Ordinance" to the Union City Municipal Code. The ordinance, which became enforceable on 1/1/17, prohibits food vendors doing business in the City from providing prepared food and beverages to customers in disposable food ware made from expanded polystyrene (EPS). As part of an aggressive implementation and educational outreach campaign,	Enforcement of the ordinance is ongoing and complaint based. The City also tracks and monitors compliance by way of biannual site visits, assessments and awareness trainings at Union City food establishments. Hundreds of in-person solid waste and recycling evaluations are performed each year by recycling specialists with the City	On 9/24/19, the City approved and adopted Ordinance #860-19 amending Chapter 7.06 of the Union City Municipal Code to regulate single-use plastic straws and disposable food ware accessory items.	

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C.10.b.iv ► Trash Reduction – Source Controls

Provide a description of each jurisdictional-wide trash source control action implemented to-date. For each control action, identify the trash reduction evaluation method(s) used to demonstrate on-going reductions, summarize the results of the evaluation(s), and estimate the associated reduction of trash within your jurisdictional area. Note: There is a maximum of 10% total credit for source controls.

	City staff visited every business in Union City covered by the new law and met with restaurant owners and employees to explain the requirements of the food ware ordinance and potential penalties.	and our two (2) franchise haulers.		

C.10.b.v ► Trash Reduction – Receiving Water Monitoring

Report on the progress of developing and testing your agency's trash receiving water monitoring program.

Guidance:

Development and testing of the trash receiving water monitoring program occurred through a regional project coordinated through the Bay Area Stormwater Management Agencies Association (BASMAA) and in coordination with the Trash Monitoring Methods Project, California Ocean Protection Council and State Water Board project that is being administered via the Southern California Coastal Water Research Project (SCCWRP) and San Francisco Bay Estuary Institute (SFEI). Consistent with MRP requirements, the final report for the development and testing of the Bay Area trash receiving water monitoring program was submitted by BASMAA by July 1, 2020, consistent with the MRP requirements, following peer review.

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C.10.c ► Trash Hot Spot Cleanups

Provide the FY 19-20 cleanup date and volume of trash removed during each MRP-required Trash Hot Spot cleanup during each fiscal year listed. Indicate whether the site was a new site in FY 19-20.

Trash Hot Spot	New Site in FY 19-20 (Y/N)	FY 19-20 Cleanup Date(s)	Volume of Trash Removed (cubic yards)				
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
Alvarado-Niles / Dyer St	N	1x/week	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time
Hall Ranch Park /Dyer St	N	1x/week	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time
Union Landing Shopping Center	N	1x/week	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time
Union Square Ave	N	1x/week	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time
Alvarado-Niles Rd / Decoto St	N	1x/week	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time
Dyer St / Alvarado Blvd	N	1x/week	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time	~ 1 CY each time

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C.10.d ►Long-Term Trash Load Reduction Plan

Provide descriptions of significant revisions made to your Long-term Trash Load Reduction Plan submitted to the Water Board in February 2014. Describe significant changes made to primary or secondary trash management areas (TMA), baseline trash generation maps, control measures, or time schedules identified in your plan. Indicate whether your baseline trash generation map was revised and if so what information was collected to support the revision. If your baseline trash generation map was revised, attach it to your Annual Report.

Description of Significant Revision	Associated TMA
No Changes to Long Term Trash Load Reduction Plan	

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C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 19-20. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

Offset Program	Summary Description of Actions and Assessment Results	Volume of Trash (CY) Removed/Controlled in FY 19-20	Offset (% Jurisdiction-wide Reduction)
Additional Creek and Shoreline Cleanups (Max 10% Offset)	N/A		
Direct Trash Discharge Controls (Max 15% Offset)	N/A		

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Appendix 10-1. Baseline trash generation and areas addressed by full capture systems and other control measures in Fiscal Year 19-20.

TMA	2009 Baseline Trash Generation (Acres)					Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems					Jurisdiction-wide Reduction via Full Capture Systems (%)	Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems and Other Control Measures					Jurisdiction-wide Reduction via Other Control Measures (%)	Jurisdiction-wide Reduction via Full Capture AND Other Control Measures (%)
	L	M	H	VH	Total	L	M	H	VH	Total		L	M	H	VH	Total		
1	1	13	106	0	120	115	3	2	0	120	17.9	115	3	2	0	120	0.0	17.9
2	0	3	17	0	20	1	3	16	0	20	0.2	1	3	16	0	20	0.0	0.2
3	29	7	48	0	85	50	6	29	0	85	3.3	50	6	29	0	85	0.0	3.3
4	0	10	28	0	39	20	4	15	0	39	2.5	20	4	15	0	39	0.0	2.5
5	130	115	1	0	245	199	46	0	0	245	2.9	199	46	0	0	245	0.0	2.9
6	0	48	2	0	49	29	20	0	0	49	1.4	29	20	0	0	49	0.0	1.4
7	64	222	4	0	289	265	23	2	0	289	8.7	265	23	2	0	289	0.0	8.7
8	158	488	5	0	651	635	13	3	0	651	20.3	635	13	3	0	651	0.0	20.3
9	14	312	0	0	327	233	93	0	0	327	9.2	233	93	0	0	327	0.0	9.2
10	0	60	0	0	60	7	53	0	0	60	0.3	7	53	0	0	60	0.0	0.3
11	4	138	0	0	142	73	69	0	0	142	2.9	73	69	0	0	142	0.0	2.9
12	0	52	2	0	54	17	36	1	0	54	0.8	17	36	1	0	54	0.0	0.8
13	1	20	0	0	21	9	13	0	0	21	0.3	9	13	0	0	21	0.0	0.3
14	0	13	2	0	15	8	6	1	0	15	0.4	8	6	1	0	15	0.0	0.4
15	9833	12	1	0	9846	9841	4	1	0	9,846	0.4	9841	4	1	0	9846	0.0	0.4
Totals	10234	1514	216	0	11964	**11502**	**392**	**70**	**0**	**11964**	71.8	11502	**392**	**70**	**0**	11964	**0.0**	**71.8**

Note: "NA" indicates that the TMA has no moderate, high or very high trash generating areas (i.e., all low trash generation and/or non-jurisdictional) and therefore no additional trash control measures are needed.

Section 11 - Provision C.11 Mercury Controls

C.11.a ► **Implement Control Measures to Achieve** Mercury Load Reductions
C.11.b ► **Assess** Mercury Load Reductions from Stormwater

See the Countywide Program's FY 2019-20 Annual Report for updated information on:

- Documentation of mercury control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the mercury load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated mercury load reduced by each control measure);
- Supporting data and information necessary to substantiate the load reduction estimates; and
- For Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions in the subsequent permit.

C.11.c ► Plan and Implement Green Infrastructure to Reduce Mercury Loads

See the Countywide Program's FY 2019-20 Annual Report for:

- An estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate; and
- A reasonable assurance analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis,

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., March 23, 2017.

C.11.d ► Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

See the Countywide Program's FY 2019-20 Annual Report for a mercury control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028. The plan:

1. Identifies all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented;
2. Includes a schedule according to which these technically and economically feasible control measures will be fully implemented; and
3. Provides an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

C.11.e ► Implement a Risk Reduction Program

A summary of Program and regional accomplishments for this sub-provision, including a brief description of actions taken, an estimate of the number of people reached, why these people are deemed likely to consume Bay fish, and the findings of an effectiveness evaluation of the risk reduction program, are included in the Countywide Program's FY 2019-20 Annual Report.

Section 12 - Provision C.12 PCBs Controls

C.12.a ► Implement Control Measures to Achieve PCBs Load Reductions
C.12.b ► Assess PCBs Load Reductions from Stormwater

See the Countywide Program's FY 2019-20 Annual Report for:

- Documentation of PCBs control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the PCBs load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated PCBs load reduced by each control measure);
- Supporting data and information necessary to substantiate the load reduction estimates; and
- For Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions in the subsequent permit.

C.12.c. ► Plan and Implement Green Infrastructure to Reduce PCBs Loads

See the Countywide Program's FY 2019-20 Annual Report for:

- An estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate;
- A reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects, including all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonably assurance analysis.; and
- An estimate of the amount of PCBs load reductions resulting from green infrastructure implementation during the term of the Permit, including all data used and a full description of models and model inputs relied on to generate the estimate.

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., September 19, 2017.

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C.12.d ► Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

See the Countywide Program's FY 2019-20 Annual Report for a PCBs control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan:

1. Identifies all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented;
2. Includes a schedule according to which these technically and economically feasible control measures will be fully implemented; and
3. Provides an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

C.12.f. ► Manage PCB-Containing Materials During Building Demolition

See the Countywide Program's FY 2019-20 Annual Report for:

- Documentation demonstrating each Permittee's compliance with each of the minimum requirements in C.12.f.ii(1)(a)-(c);
- Documentation of the number of applicable structures in each Permittee's jurisdiction for which a demolition permit was applied for during the reporting year;
- A running list of the applicable structures in each Permittee's jurisdiction for which a demolition permit was applied for (since the date the PCBs control program was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used; and
- A description of an assessment methodology and data collection program developed and implemented by the Permittees to quantify PCBs loads reduced through the program for controlling PCBs during building demolition.

C.12.h ►Implement a Risk Reduction Program

A summary of Countywide Program and regional accomplishments for this sub-provision, including a brief description of actions taken, an estimate of the number of people reached, why these people are deemed likely to consume Bay fish, and the findings of an effectiveness evaluation of the risk reduction program, are included in the Countywide Program's FY 2019-20 Annual Report.

Section 13 - Provision C.13 Copper Controls

C.13.a.iii.(3) ►Manage Waste Generated from Cleaning and Treating of Copper Architectural Features

Provide summaries of permitting and enforcement activities to manage waste generated from cleaning and treating of copper architectural features, including copper roofs, during construction and post-construction.

Summary:

Union City did not issue any permits or take enforcement activities related to copper. The City has very few, if any, architectural copper features due to the age and nature of our building stock and likely also due to the expense of such installations. Also, our planning/zoning division generally prohibits copper roofs.

Many of our commercial and industrial businesses conduct warehouse and distribution activities with unobtrusive architectural features, not conducive to copper appurtenances or features. Our Environmental Programs and Public Works Inspectors are trained to observe, engage contractors, and report any such construction or post-construction cleaning or treatment of architectural copper.

The field inspectors convene periodically throughout the year to compare notes and architectural copper features have not been identified. The weekly Development Review Committee, which provides pre-development feedback on requirements, addresses architectural copper and cleaning requirements using Best Management Practices.

C.13.b.iii.(3) ►Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

Provide summaries of any enforcement activities related to copper-containing discharges from pools, spas, and fountains.

Summary:

During the reporting period we did not record any copper-containing discharges from pools, spas, or fountains, or conduct any related enforcement activities.

We make available in our City Hall lobby, and through our website, the BMP handout Pools, Spas and Fountains BMP handout, included in this report as Attachment C.13.b.iii.(3) provides access to this and related materials.

We recognize that the City has incomplete information about the location of permitted or known residential pools, spas and fountains and we intend in the coming year to compile a list of such infrastructure and to conduct targeted outreach to those owners. We would also consider general outreach to contractors identified as performing maintenance on pools, spas and fountains, perhaps through the business license process. We also recognize the advisability of outreach to our commercial pools and would intend some outreach after coronavirus shelter-in-place requirements are lifted.

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C.13.c.iii ►Industrial Sources Copper Reduction Results

Based upon inspection activities conducted under Provision C.4, highlight copper reduction results achieved among the facilities identified as potential users or sources of copper, facilities inspected, and BMPs addressed.

Summary:

During this reporting period, neither our routine C.4 inspections nor our C.13 focus on potential users/sources of copper revealed any concerns regarding improper storage, handling or usage, or discharges of copper-containing products. We believe our baseline potential for copper-related discharges is low, with no changes during this reporting period.

Union City staff members previously identified only three facilities that are significant users of copper, Electrochem Solutions, and electroplating shop at 32500 Central Avenue, and a manufacturing business, GCM, with two locations, at 1350 Atlantic Street and 33233 Central Avenue. There is no exposure or runoff potential because all copper or copper waste is stored inside the building and away from any storm drains.

The two GCM facilities were inspected on February 20, 2019; no discharge potential discharge conditions were observed. Electrochem is scheduled for inspection later in 2020; as a heavy user of previous metals, a strict inventory control system is in place at Electrochem. Other routine facility stormwater inspections also did not identify any copper BMP or discharge issues during this reporting period. Our inspectors maintain awareness of copper discharge issues through annual training and participation in the IIDC committee of the Alameda Countywide Clean Water Program.

In reviewing BASMAA and other guidance on copper and pollutants of concern, we realize that a larger subset of businesses could potentially be included in the list of sites with the potential for copper discharge. These would include a handful of auto repair businesses, sources of potable water discharges, and fountain, pool and spa sites. We will make the effort to expand our list of potential sites, and to conduct inspections, outreach and education on the environmental effects of these releases, in coordination with the countywide program.

Best Management Practices for these facilities are emphasize awareness that copper containing liquids are sources of pollution and may be present at the facilities, and that routine maintenance activities are a common source of copper pollution in the environment.

Section 15 -Provision C.15 Exempted and Conditionally Exempted Discharges

C.15.b.vi.(2) ► Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

Provide implementation summaries of the required BMPs to promote measures that minimize runoff and pollutant loading from excess irrigation. Generally the categories are:

- Promote conservation programs
- Promote outreach for less toxic pest control and landscape management
- Promote use of drought tolerant and native vegetation
- Promote outreach messages to encourage appropriate watering/irrigation practices
- Implement Illicit Discharge Enforcement Response Plan for ongoing, large volume landscape irrigation runoff.

Summary:

Established policies and practices in the Economic and Community Development Department and the Public Works Department related to minimizing and controlling exempt and conditionally exempt discharges appears to be effective. Union City's development and redevelopment requirements serve to promote compliance with the best management practices related to water, landscape irrigation, drought tolerant and native vegetation, and lawn or garden watering. We have materials available to the public in our City Hall lobby and through our web page.

The departments convene weekly at the Development Review Committee to discuss these and other issues to provide feedback before projects are planned or implemented. Landscape Conditions are placed on projects in accordance with the Union City Municipal Code section 18.112, 'Water Efficient Landscape.' If irrigation calculations or a landscape plan is required, the City utilizes specialist consultants at the applicant's cost. Internal policies and procedures for operation and maintenance at City properties, parks and landscape areas, including use of less toxic pest control methods seem to be effective in limiting runoff d pollutant loading from excess irrigation.

Public Works, Environmental Programs and building inspector staff share training and have open communication on problem sites, including excessive irrigation runoff. The following handout on general clean water development requirements is available on our website: https://www.unioncity.org/DocumentCenter/View/663/Stormwater-Quality-Control-Requirements---Information-for-Developers-Buildersand-Project-Applicant?bidId=

We provide BMP and other handouts on many of the C.15 elements in the lobby of our City Hall, for irrigation, watering, pest management and drought tolerant plantings, and on our website, typically including BMP materials produced in collaboration with the Alameda Countywide Clean Water Program, such as many found on the Countywide site, here: https://www.cleanwaterprogram.org/residents/yards-and-gardens.html.

Union City supports the Union Sanitary District (USD) efforts and outreach with the Our Water Our World Program, which promotes the use of integrated pest management: http://ourwaterourworld.org/. In addition, Union City utilizes its city website to share and inform residents and

contractors of stormwater awareness and best practices. The webpage promotes various fact sheets regarding landscape runoff, pervious paving, rain barrels and rain gardens, storm drains, pest control and other topics, in multiple languages.

The City participates in related subcommittees of the Alameda Countywide Clean Water Program. Please refer to the Countywide Program's FY 19-20 Annual Report for a summary of this year's outreach and analysis.

ATTACHMENT 1

C.4.b.iii - POTENTIAL FACILITIES LIST

Attachment C.4.b.iii.

UNION CITY CLEAN WATER PROGRAM

LIST OF COMMERCIAL AND INDUSTRIAL FACITIES WITH POTENTIAL TO CAUSE STORMWATER RUNOFF POLLUTION (FY 2019-2020)

NOTE: please refer to the ACCWP stormwater facilities database maintained by Public Works for the complete C.4.b.iii. recordkeeping data for facilities reasonably considered to cause or contribute to pollution of stormwater runoff.

Name	Site Address
10 Minute Speed Oil Change Center 6	2601 Decoto RD
3PD Inc.	1600 Atlantic ST
7 Eleven #16824	2609 Decoto RD
7 HILLS FOOD STORE	101 Appian WAY
7-Eleven Inc. Store # 16104	32215 Alvarado-Niles RD
7-Eleven Inc. Store # 21427	915 Whipple RD
A TOWN PIZZA	1830 Whipple RD
85C Bakery Café	30079 Ahern AVE
A&H Truck Repair	30319 Union City BLVD
A.S.I Cyber Concepts LLC	33548 Central AVE
AAA Fire Protection Services	30113 Union City BLVD
Abaxis	30411 Whipple RD
Abaxis	3240 Whipple RD
Abaxis Building 4	3280 Whipple RD
ABE Petroleum	33090 Mission BLVD
Acacia Creek	34400A Mission BLVD
Airgas USA	700 Decoto RD
Ajax United Patterns & Molds	34585 7th ST
AK Scientific	30023 Ahern AVE
Alameda County Pump Station J-3	32000 Union City BLVD
Alamillo Rebar	33353 Lewis ST
Alco Pump Station - Westview	32110 Alvarado-Niles RD
AlCo Pump Station J-2	4588 Delores DR

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AlCo Pump Station J-3	32000 Union City BLVD
AlCo Pump Station-Eden Shores	2690 Eden Park PL
Alpine Awards	32400 Central AVE
Alvarado 76	31909 Alvarado BLVD
Alvarado Business Park	30336 B Whipple RD
Alvarado Business Park (Fire Pump House)	4100 Whipple RD B
Alvarado Dye & Knitting Mill	30542 Union City BLVD
Alvarado Flood Control Pump Station	31269 Veasy ST
Alvarado Niles Shell	32187 Alvarado-Niles RD
Alvarado Resource Center	31880 Alvarado BLVD
Alvarado Valero	31890 Alvarado BLVD
Amazing Skin Wellness Centre Med Spa	30673 Union City BLVD
Amber Kinetics	32920 Alvarado-Niles RD
Amcor Packaging Distribution dba Manufactured Packaging Products	33463 Western AVE
American Licorice Company	2477 Liston WY
AMY'S DONUT SHOP	1818 Whipple RD
ANDERSEN BAKERY & CAFE	31075 Courthouse DR
Anixter	30061 Ahern AVE
Applied Industrial Technologies	30077 Ahern AVE
Arktos Incorporated	33460 Western AVE
Asbury Environmental Services	1220 Whipple RD
Arrow Trucking Company of California	30078 Eigenbrodt WY
Asbury Environmental Services	1220 Whipple RD
ASIA EXPRESS CHINESE FOOD	1710 Decoto RD
AT&T Mobility (24198)	32600 Carmel WY
AT&T Mobility (47438)	1295 Whipple RD
AT&T California	118 "E" ST P 5006
AT&T Mobility (13243)	2931 Faber ST
AU/ Shell #002	2001 Decoto RD
Auto Parts Source	1689 Atlantic ST
Autowise Automotive	35194 Alvarado-Niles RD

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AutoZone #3338	32100 Alvarado BLVD
Avalon Union City	24 Union Square
Axygen	33210 Central AVE
AZ Auto Repair Parts LLC	33090 Mission BLVD
Azimuth Semiconducting	30593 Union City BLVD
BABY NUTRITIONAL CARE #101	32970 Alvarado-Niles RD
Backyard Bayou	32280 Dyer ST
Bakemark	32621 Central AVE
BAKERY LA MEJOR	34572 Alvarado-Niles RD
BAKERY-TAQUERIA UNO	1854 Whipple RD
Baldie's Cafe	2649 Decoto RD
Bank Of America - Lockbox	3180 Whipple RD
Bar Bay Grill	1784 Decoto RD
BART Union City Substation (AUC)	10 Union Square
BASKIN ROBBINS	32232 Dyer ST
Bay Star Auto	1275 Atlantic ST
Best Contracting Services, Inc.	4301 Bettencourt WY
Best Label	2900 Faber ST #1
BHARAT BAZAR	34301 Alvarado-Niles Rd
BHJ Products, Inc.	1651 Atlantic ST
Blackball Dessert House	34563 Alvarado-Niles RD
Blommer Chocolate	1515 Pacific ST
Blommer Chocolate	33377 Transit AVE
Boba Fitt Drinks	31877 Alvarado BLVD
BOB'S DISCOUNT LIQUOR #7	32154 Alvarado BLVD
Bronco Billy's Pizza	3940 Smith ST
Buckhorn Grill	32165 Union landing Blvd.
Buffalo Wild Wings	32135 Union Landing Blvd.
Burger King	1801 Decoto RD
Burger King #13768	31361 Alvarado-Niles RD
Byron Conn Design LLC	33376 Dowe AVE

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C.R. Laurence	33200 Dowe AVE
Cal West Concrete Cutting	3000 Tara CT
California Supply North, Inc.	29987 Ahern AVE
CAM HUONG SANDWICHES	32124 Alvarado BLVD
Cam Image, Mfg., Inc.	33360 Dowe AVE
Caravan Bakery	33300 Western AVE
Cascade Scientific, Inc.	32910 Alvarado-Niles RD
CEMEX Construction Materials Pacific, LLC	900 Whipple RD
Century Theaters, Inc.	32100 Union Landing BLVD
Chapel of the Chimes	32992 Mission BLVD
Chaplin's Sports Bistro	29200 Kohoutek WY
Chef’s Warehouse West Coast, LLC	1250 Whipple Road
Chetak, Inc.	4000 Whipple RD
Chevron Station # 91166	1990 Decoto RD
Chili's #624 Union City	32120 Dyer ST
Chipotle Mexican Grill	30920 Dyer ST
CHOWKING RESTAURANT	31838 Alvarado BLVD
City of Union City Corp Yard	34650 7th ST
Civic Center Shell	2001 Decoto RD
CMM Service	33580 Central AVE
Coconut Hill	343720 Alvarado-Niles RD
COLD STONE CREAMERY	30985 Courthouse DR
Cold Storage	740 Bradford ST
Complete Cleaners	31864 Alvarado BLVD
Concentra Urgent Care	33560 Alvarado-Niles RD
Concepts Bath and Interiors	30120 Ahern AVE
Conklin & Conklin Inc.	34201 7th ST
Container Consulting Service Inc.	1795 Atlantic CT
Custom Logistics	1500 Whipple RD
Criterion Brock	2913 Whipple RD
Crown Plaza	32083 Alvarado-Niles RD

Crown Worldwide Moving Storage	32001 Dowe AVE
Da Vita Union City Dialysis Center	32930 Alvarado-Niles RD # 300
Dan Oden Swim Center	33901 Syracuse AVE
Dawn Food Products Inc.	2845 Faber ST
Decoto Family Dentist	2701 Decoto RD Ste 4
DELAINE EASTIN SCHOOL	34901 Eastin CT
Delta Pacific Products, Inc.	33170 Central AVE
Deol Shell #136198	31301 Alvarado-Niles RD
Dollar Tree Stores, Inc. (#1233)	1720 Decoto RD
DOMINO'S PIZZA	33600 Alvarado-Niles Rd
DONUT DELIGHT	34554 Alvarado-Niles RD
DRAGON HOUSE CHINESE RESTAURANT	31870 Alvarado BLVD
Dream Spa	32152 Alvarado BLVD
Dynatech Machining	29530 Kohoutek WY
East Bay Landscaping	1147 Atlantic ST
Eden Foods, Inc.	30451 Whipple RD
Electrochem Solutions, LLC	32500 Central AVE
Elegant Marble & Granite	33100 Transit AVE
ELITE BAKERY	4123 Dyer ST
Emerald Packaging Inc.	33050 Western AVE
Empire Today, LLC	2900 Faber ST #2
Enersys	30073 Ahern AVE
Enersys Inc.	30069 Ahern AVE
Envirocheck	2845 Whipple RD
Eoff Manufacturing	32410 Central AVE
ERNIE'S WINE & LIQUORS	31846 Alvarado BLVD
Escutia's Auto	967 H ST
Euro Style, Inc.	33001 Dowe AVE
Excelsior Analytical Laboratory, Inc.	30099 Ahern AVE
Favorite Indian Restaurant	1706 Decoto RD
Fibralign Corp	32930 Alvarado-Niles RD Ste. 350

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Finelite	30500 Whipple RD
Fish Day	33592 Alvarado-Niles RD
FOOD MAXX #463	30073 Industrial PKWY
FRESH & NATURAL CAFE	3555 Whipple RD
FreshPoint San Francisco	30340 Whipple RD
Fricke-Parks Press Inc.	33250 Transit AVE
Fuddrucker's	32175 Union Landing
Garland-White & Co.	4500 Tara CT
GCM Medical and OEM Division, Inc.	1350 Atlantic ST Bldg. 1
GCM Medical and OEM Division, Inc.	33233 Central AVE Bldg. 3
Gerry's Grill	31005 Courthouse DR
Gexpro	32940 Alvarado-Niles RD, #400
Golden Apple Corp	30049 Ahern AVE
GOLDILOCKS BAKESHOP	4126 Dyer ST
Grand J & K Corp	30118 Eigenbrodt WY
Graybar Electric	3089 Whipple RD
Great India Restaurant	1706 Decoto RD
HK Top	1771 Decoto RD
H & E Equipment Services	4381 Bettencourt WY
Harjas Petroleum Inc.	31889 Alvarado BLVD
Hartter 144 Inc. (KFC)	32004 Alvarado BLVD
Hartung Glass	700 Bradford ST
HD Supply Waterworks	34151 Zwissig WY
Heco - Pacific Mfg.	1510 Pacific
Hertz Equipment Rental	1333 Atlantic ST
Penske	33400 Dowe AVE
Hillyard	1673 Atlantic
Holiday Inn Express	31140 Alvarado-Niles RD
HONG KONG RESTAURANT	4100 Dyer ST
Hoshizaki Western DC, Inc.	29330 Union City BLVD
Hot Pot Union City Corp	34396 Alvarado-Niles RD

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HOUSE OF DUMPLINGS	109 Appian WAY
IHop Restaurant #1724	32010 Dyer ST
In-N-Out Burger	32060 Union Landing BLVD
Iron Mountain	29555 Kohoutek WY
Island Pacific Supermarket	4122 Dyer ST
JAMBA JUICE #420	32358 Dyer ST
James Logan High School	1800 H ST
Jasper Engines & Transmissions Exchange	1699 Atlantic ST Bldg 4
Jatco, Inc.	34343 Zwissig WY
Jatco, Inc.	725 Zwissig WY
JENJON'S CAFÉ	1704 Decoto RD
Jenson Mechanical	32420 Central
JIM'S COCKTAIL LOUNGE	34696 Alvarado-Niles RD
JOJOLI	31866 Alvarado BLVD
Jollibee Restaurant	32460 Dyer ST
Jon-Don	30461 Whipple RD
Joy 4 Tea	32148 Alvarado BLVD
K & A Gas and Auto Repair Inc.	33365 Mission BLVD
KABILA	29286 Union City BLVD
Kaffa Coffee	3900 Smith ST
Kaiser Permanente	30116 Eigenbrodt WY
Kaiser Permanente	3553 Whipple RD
Kaiser Permanente	3555 Whipple RD
KALINDA'S RESTAURANT/CATERING	31834 Alvarado BLVD
KBA Docusys, Inc.	32900 Alvarado-Niles RD
Kerrock Counter Top	33220 Western AVE
Kerry Ingredients	33063 Western AVE
Keystone Automotive Industries, Inc.	30336 Whipple RD ste B
KFC	32004 Alvarado BLVD
Kimura Dental	33408 Alvarado-Niles RD
King Calimari	32130 Alvarado BLVD

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KING LIQUORS	30063 Industrial PKWY
King Wai Trading Co.	30098 Eigenbrodt WY
Knorr Brake System	29471 Kohoutek WY
Krispy Kreme	32450 Dyer ST
L & L HAWAIIAN BARBECUE	1668 Decoto RD
L'Aziz Pizza	3834 Smith ST
La Terra Fina	1300 Atlantic ST
LagasseSweet Inc.	4100 Whipple RD # A
Lally Truck Trailer Repair & Paint Service	4600 Horner ST
Lehigh Heidelberg Cement Group	30101 Industrial PKWY
Leo's Finishing and Refinishing	33238 Central AVE
Le's Alvarado Dental	31820 Alvarado BLVD
Lian Hwa Foods (USA) Inc.	1500 Atlantic ST
LIQUOR BARREL	2641 Decoto RD
LKQ Corp	30336 Whipple RD
LOS DOS GALLOS	34704 Alvarado-Niles RD
Love's King Eggroll	32248 Dyer ST
Lowe's #1132	32040 Union Landing BLVD
LSI / Ingredients International	1610 Whipple RD
Lucky Store #782	32300 Dyer ST
Macy's Logistics, Inc.	1200 Whipple RD
MAGAT'S ASIAN GROCERY AND TRADING	31873 Alvarado BLVD
Mai's Kitchen	34587 Alvarado-Niles RD
MANDAVI BAZAAR	31804 Alvarado BLVD
MANEKI SUSHI	31810 Alvarado BLVD
Manila Dental Center	31210 Alvarado Niles RD
MANILA GOOD-HA SA UNION CITY	4130 Dyer ST
MANILA SUNRISE RESTAURANT	4122 Dyer ST
Marble 2000	33453 Western AVE
Marina Foods	1791 Decoto RD
MAS Metals	32410 Central AVE

Masonic Homes	34400 Mission BLVD
Mathews Mechanical	33480 Western AVE
Matsuri	34308 Alvarado-Niles RD
MAYFLOWER SEAFOOD RESTAURANT	34338 Alvarado-Niles RD
Maypearl	31300 Alvarado Niles RD
McDonald’s	30600 Dyer ST
McDonald's	27 Union Square
Mendoza Cutting Service	30550 Union City BLVD
Mercado Latino, Inc.	33430 Western AVE
MET Laboratories	33439 Western AVE
Mexico Lindo	33306 Alvarado-Niles RD
Mexico Tipico	33121 Alvarado-Niles RD
Michaels #2076	31080 Dyer ST
MISSION FOOD & LIQUOR	101 Decoto RD
Mitsu Auto Repair	1277 Atlantic ST
Mizuho Orthopedic System	30031 Ahern AVE A
mOasis, Inc.	32930 Alvarado-Niles RD
Monarch Leasing	29899 Union City BLVD
Mountain Mike’s Pizza	34553 Alvarado-Niles RD
Mountain Mike’s Pizza	32170 Dyer ST
Mr. Green Bubble	1644 Decoto RD
MR KEBAB	1760 Decoto RD
Mr. Pickles	33354 Alvarado-Niles RD
MV Transportation	1283 Atlantic ST
Nail Spa Boutique	31080 Union City BLVD, #109
NAYONG FILIPINO	1796 Whipple RD
New Age Linen	2930 Faber ST
NEW CHINA	1743 Decoto RD
New Haven Unified School District Corp. Yard	3636 Smith ST
New Horizon Foods	33440 Western AVE
NEW INDIA MARKET	31885 Alvarado BLVD

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NEW LUK YUEN RESTAURANT	31802 Alvarado BLVD
New World Van Lines	33373 Lewis AVE
New York Pizza and Pasta	32106 Alvarado BLVD
NHUSD Central Kitchen	2831 Faber ST
NILES LIQUORS & MINI MART	34359 Alvarado-Niles Rd
Northwood Design Partners	1528 Atlantic ST
Oakridge Industries	1130 Pacific ST
OEC Graphics	33288 Central AVE
Omni Logistic LLC	33215 Dowe AVE
One-Stop Auto Service	1279 Atlantic ST
OO LIQUORS	1800 Whipple RD
O'Reilly Auto Parts #2571	1601 Decoto RD
O'Rite International	30100 Ahern AVE
Pacific Materials Handling	30361 Whipple RD
Pacific Pour House	32216 Dyer ST
Pacific Rain Gutter Supply, Inc.	1420 Whipple RD
Pacifica Senior Living	33883 Alvarado-Niles RD
Parilya	1680 Decoto RD
Party City	30761 Dyer ST
Perceptive Robots LLC	1320 Decoto RD, #200
Pep Boys #816	30085 Industrial PKWY
PEPPER TREE LOUNGE	1848 Whipple RD
Peshwari Kebabs	33330 Alvarado-Niles RD
Petco #309	31090 Dyer ST
PG & E Jarvis Substation	900 Decoto RD
Pho Mama	1640 Decoto RD
Pho Vn	31860 Alvarado BLVD
Pine Garden	3821 Smith ST
Pinoy Handaan	31014 Union City BLVD
Pizza Hut	31858 Alvarado BLVD
PIZZA HUT	2617 Decoto RD

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Poke One	1672 Decoto RD
Poki Bowl	30971 Courthouse DR
Popeye's Louisiana Kitchen	31816 Alvarado BLVD
Pottastic	30065 Industrial PKWY
ProSpectra Contract Flooring	4017 Whipple RD
PTR Manufacturing Inc.	33390 Transit AVE
Pure Juice and Smoothie Lounge	3902 Smith ST
Quality Distributing	2850 Volpey WY
QUICK SHOP MARKET	31887 Alvarado BLVD
Quik Stop Market # 29	1824 Whipple RD
R & S Manufacturing, Inc.	33955 7th ST
R.B. DELI	2813 Whipple RD
R.J. Chase Co.	4000 Tara CT
Raja Sweets & Indian Cuisine	31853 Alvarado BLVD
Rapak Inc.	29959 Ahern AVE
Rapid Displays	33195 Lewis AVE
RED RIBBON BAKESHOP INC	31840 Alvarado BLVD
Reliance Metal Center	33201 Western AVE
R.E. Michel Company, LLC	2921 Whipple RD
Ricardo & Olga Morales Dental	4138 Dyer ST
Rich Products	1600 Whipple RD
Riddell	32920 Alvarado-Niles RD Ste. 240
Right Away Redy Mix	30100 Union City BLVD
Rite Aid #5942	31836 Alvarado BLVD
Rite Aid #5943	1650 Decoto RD
RKI Instruments	33248 Central AVE
Rose Garden Restaurant	33348 Alvarado-Niles RD
ROSHNI MARKET	2633 Decoto RD
ROUND TABLE PIZZA	1744 Decoto RD
Ross Dress for Less	31200 Courthouse DR
Royal Truck Body	930 Whipple RD

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RUGGIERI SENIOR CENTER	33997 Alvarado-Niles RD
Ryss Lab, Inc.	29540 Kohoutek WY
Safelite Auto Glass	30410 Whipple RD
Safety Environmental Control	1480 Whipple RD
Safeway #1197	1790 Decoto RD
Sally Beauty Supply	32272 Dyer Street
Sama Uyghur Cuisine	1719 Decoto RD
Sangha Wellness Center	32112 Alvarado BLVD
SANGRAM'S PALACE	30063 Industrial PKWY
Save On Cleaners	34375 Alvarado-Niles RD
Savory Creations	32611 Central AVE
Sayweee.com	30210 Whipple RD
Scott's Mobile Trailer Repair	1220 Whipple RD # B
Screen Printing Apparel	33441 Western AVE
Seafood City	31840 Alvarado BLVD
SEKO Worldwide LLC	33300 Dowe AVE
Selway Machine & Tool	29250 Union City BLVD
Serenity Home Health, Inc.	2608 Central AVE, #7
SHALIMAR INDIAN GROCERIES	32118 Alvarado BLVD
Share Tea	34291 Alvarado-Niles RD
Shaw Industries Inc.	4025 Whipple RD
Sheedy Hoist dba Cabrillo Hoist	34301 7th ST
Shell Oil	31889 Alvarado Blvd
Shell Station (136197)	2001 Decoto RD
Shell Station (136198)	31301 Alvarado Niles RD
Shell Station (136199)	31889 Alvarado BLVD
Shell Station (136201)	32187 Alvarado Niles RD
SHENG KEE BAKERY #10	34332 Alvarado-Niles Rd
Shred City	29552 Whipple RD
Sigmatron	30000 Eigenbrodt WY
Sitton Flooring	29360 Union City BLVD

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Smart & Final	31070 Dyer ST
Smart Wires, Inc.	3292 Whipple RD
SMITH CONVENIENT MARKET	3834 Smith ST
Sno-Crave Tea House	1788 Decoto RD
Southern Wine & Spirits	33321 Dowe AVE
Southern Wine & Spirits #326718	1555 Atlantic ST
Southland Industries	33225 Western AVE
Spacesonic, Inc.	30300 Union City Blvd.
Spanish Tradition	33949 10th ST A
Sparkle Dental Care	32631 Alvarado BLVD
Specialized Laundry	33483 Western AVE
SS Trucking	33371 Croatian WAY
Spicers Paper, Inc.	30108 Eigenbrodt WY
Star Limousine Service	32116 Alvarado BLVD
STARBUCKS #5887	1752 Decoto RD
STARBUCKS #5887	1752 Decoto RD
STARBUCKS COFFEE #11167	32340 Alvarado BLVD
STARBUCKS COFFEE #5653	32240 Dyer ST
Starbread	31859 Alvarado BLVD
Station Center Apartments	34888 11th ST
Strapack	33508 Central AVE
Studio 1204, Inc.	34485 7th ST
SUBWAY #5476	34367 Alvarado-Niles Rd
SUBWAY SANDWICHES & SALADS #18968	30057 Industrial PKWY
Sugar Foods Corporation – aka Musso's Gourmet Bakery	33378 Transit AVE
SUBWAY SANDWICHES & SALADS #29141	32144 Alvarado BLVD
Summit Plastering	33363 Lewis AVE
Sunnyvale Seafood	2910 Faber ST
Super Cleaners	34708 Alvarado-Niles RD
SUSHI BOAT	32200 Dyer ST
Sweet Mex	34697 Alvarado-Niles RD

T & L Muffler	1007 Decoto RD
T.G.I. Fridays Restaurant #1946	31900 Dyer ST
Taco Bell	34525 Alvarado-Niles RD
Taco Bell #15798	30075 Industrial PKWY
Taco Bell #2194	32002 Alvarado BLVD
TADAMASA RAMEN	34672 Alvarado-Niles RD
Tandoori Pizza	31871 Alvarado BLVD
TAPIOCA EXPRESS	1707 Decoto RD
Tellworks	30067 Eigenbrodt WY
Temco Logistics	2855 Volpey WY, Ste. A
Texas Roadhouse	32115 Union Landing BLVD
THAI BBQ	4116 Dyer ST
THAI KITCHEN RESTAURANT	31845 Alvarado BLVD
THAI VILLAGE CUISINE	34571 Alvarado-Niles RD
The Home Depot #635	30065 Industrial PKWY
THE MARY CORDOZA CENTER	2831 Faber ST
The Printer Works, Inc.	33300 Dowe AVE
The Source Group	30315 Union City BLVD
The Tropics	33000 Almaden BLVD
THE VITAMIN SHOPPE	32109 Union Landing BLVD
Tissue Diagnostics, Inc.	2839 Whipple Rd, #A
Tire & Wheel Master	4005 Whipple RD
Tires Warehouse LLC	33375 Central AVE
TOGOS	32220 Dyer ST
Tomatina	32155 Union Landing Blvd.
Tomi Sushi Buffet	1604 Decoto RD
TOPPINGS TOO!! RESTAURANT	3910 Smith ST
Toshiba Business Solutions	30083 Ahern AVE
Tournesol Siteworks	2930 Faber Street
TRIBU GRILL	32208 Dyer ST
Tri-CED	33377 Western AVE

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U.S. Cleaners	34584 Alvarado-Niles RD
UMO Steel Inc.	4700 Horner ST
Union 76	31300 Alvarado-Niles RD
Union City Auto Body	1250 Pacific ST
Union City Brake & Clutch	1281 Atlantic ST
Union City Civic Center	34009 Alvarado-Niles RD
UNION CITY DONUTS & DELI	31080 Union City BLVD
Union City Fire Station # 32	31600 Alvarado BLVD
Union City Fire Station # 33	33942 7th ST
Union City Fire Station # 31	33555 Central AVE
UNION CITY KOREAN MARKET	34555 Alvarado-Niles RD
Union City Public Works Maintenance Facility	34650 7th ST
Union City Shell	31301 Alvarado-Niles RD
UNION CITY SPORTS CENTER	31224 Union City BLVD
Union City Teen Workshop	33623 Mission BLVD
Union Dental Center	34608 Alvarado-Niles RD
Union Int'l Food Co.	33035 Transit AVE
Union Landing Dental Center	32364 Dyer ST
Union Sanitary District	5072 Benson RD
Union Sanitary District	5072 Benson RD
Unistrut International Corporation	1679 Atlantic ST
United Building Maintenance	3261 Whipple RD
UNITED FOOD AND LIQUOR	31090 Union City BLVD
United States Pipe & Foundry	1295 Whipple RD
University of the Pacific Dental	1203 J ST
Urima, Inc.	33201 Dowe AVE
US Cleaners	34584 Alvarado-Niles RD
US Pipe & Foundry	1295 Whipple RD
US Spices Corp	2801 Faber ST
USK Manufacturing, Inc.	720 Zwissig WY
V TROPICAL BAKESHOP	4128 Dyer ST

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V.E.M. Engineering	35218 Alvarado-Niles RD
V TROPICAL BAKESHOP	31844 Alvarado BLVD
VCA All About Pets Animal Hospital	34664 Alvarado-Niles RD
Venta Medical, LLC	33170 Central AVE
Verizon Wireless	2931 Faber ST
Verizon Wireless	32600 Carmel WY B
Verizon Wireless	33467 Western AVE B
Verizon Wireless - Mission Appian	34860 Mission Blvd
Vert, Inc	33428 Central AVE
Volochem, Inc.	29540 Kohoutek WAY
VS.'s Auto & Performance / Auto Repair	33365 Mission BLVD 2
Wal*Mart Store #2031	30600 Dyer ST
Welcome Market, Inc.	2931 Faber ST
West Logistics LLC	30300 Whipple RD
West Coast Cleaners	33366 Alvarado-Niles RD
Westland Giftware	30180 Ahern AVE
WHC Plumbing Supply Co.	2900 Volpey WY
Whipple Road Family Dental care	1794 Whipple RD
WHIPPLE TAQUERIA	1790 Whipple RD
WINGSTOP	1648 Decoto RD
Yokohama Lekei Ramen	32136 Alvarado BLVD
Young's Market Co	1701 Atlantic CT
Zuo Modern Contemporary	1285 Atlantic ST

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ATTACHMENT 2

C.5.c.iii - COMPLAINT AND SPILL

RESPONSE PHONE NUMBER

Attachment C.5.c.iii.

UNION CITY CLEAN WATER PROGRAM

COMPLIANT AND SPILL RESPONSE WEBSITE REPORTING FORM (FY 2019-2020)

Form Center

By signing in or creating an account, some fields will auto-populate with your information and your submitted forms will be saved and accessible to you.

Report Illegal Dumping and Clean Water Issues

To report any clean water or storm water issues please fill out the form below or call 510-675-5301. All reports are anonymous.

Optional Contact Info

If you would like to be contacted by City staff regarding this report, please provide your contact information below.

First Name

Last Name

Phone Number

Ext.

Email Address

Please select the type of issue you are reporting:

-- Select One --

ATTACHMENT 3

C.7.a.iii - STORM DRAIN INLET MARKING

Attachment C.7.a.iii.

UNION CITY CLEAN WATER PROGRAM

STORM DRAIN INLET MARKING – LABELED MUNICIPALITY-MAINTAINED INLET (FY 2019-2020)

ATTACHMENT 4

C.13.b.iii - BEST MANAGEMENT PRACTICE

POOLS AND SPAS

PROPER DISPOSAL OF WASTEWATER

Don't Drain Pools, Spas and Fountains to Storm Drains

When pools are drained into streets, the water flows into storm drains and then straight to local creeks and the San Francisco Bay. It does not go to a wastewater treatment plant first. Water from pools, spas and fountains contain chemicals harmful to fish and aquatic plants living and growing in our watersheds, creeks and Bay. Help contribute to preserving a healthy watershed by using these recommended practices to maintain your pools, spas and fountains.

Drain Properly

- ✓ Drain pool, spa or fountain water to a sanitary sewer cleanout.
- ✓ Don't drain water into a street, gutter or storm drain.
- ✓ Draining water that contains copper algaecide or residual chlorine to a storm drain is prohibited.
- ✓ Contact your local stormwater agency for assistance with locating the sanitary sewer.

General Maintenance

- ✓ Keep your pool, spa or fountain well-maintained with a balanced pH to reduce the need for chemicals or drainage.
- ✓ Avoid using copper based algaecides. Ask your pool maintenance service or store for help resolving persistent algae problems without using copper algaecides.
- ✓ Select pool products with reduced phosphate. Without phosphate, algae cannot thrive.

Cleaning

- ✓ If you need to clean your pool filters, rinse over landscaped areas.
- ✓ Fresh water will dilute the chlorine so it won't harm plants or grass.
- ✓ Never clean filters in the street, gutter or storm drain.
- ✓ Keep backwash out of the street and storm drain.
- ✓ Backwash sand and diatomaceous earth filters onto a dirt area.
- ✓ Dispose of spent filter materials in the trash.

cleanwater PROGRAM

Protecting Alameda County Creeks, Wetlands & the Bay

cleanwaterprogram.org

Keep pool, spa and fountain water out of gutters, streets and storm drains. *Only Rain to the Storm Drain*

Reduce draining by maintaining your pool.

Draining pools, spas, and fountains to storm drains can pollute our creeks and the Bay. Discharge should be directed to sanitary sewer drains.

Learn more about preventing water pollution and the Clean Water Program at www.cleanwaterprogram.org.

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Did You Know…?

Chlorine is an effective sterilizer that kills bacteria in pool water. Chlorinated water similarly kills sensitive fish and animals essential to healthy creeks and watersheds.

Even small amounts of chlorine are harmful to fish. Dozens of fish were killed after a drinking water pipe burst sending thousands of gallons of chlorinated water into a San Francisco Bay area creek in 2013.

Copper is used to destroy algae in pools, spas and fountains. When copper-treated water enters our creeks and waterways it has a similar effect on the plants and organisms in these environments. Copper additives are highly toxic to most aquatic species even in small amounts.

Most wastewater treatment plants can remove some, but not all copper. It is essential to reduce or eliminate the use of copper in pools, spas and fountains to protect our waterways.

Phosphate is an effective plant nutrient that promotes algae growth in creeks. Algae blooms in creeks reduce the amount of oxygen in the water and cause warming of creeks to levels that damage fish and plant life dependent upon a clean water to survive.

KEY DEFINITIONS

A ***Sanitary Sewer Cleanout*** is a pipe fitting with a removable plug for inspecting and cleaning out sewer drain pipes. It is most often found along the sewer, which is usually aligned with the sewer lines for the house.

The ***Storm Drain System*** was built to collect and transport rain to prevent flooding in urban areas. Anything that flows or is discharged into the storm drain system goes directly into local creeks or San Francisco Bay without any treatment.

The ***Sanitary Sewer System*** collects and transports sanitary wastes from interior building plumbing systems to the wastewater treatment plant where the wastewater is treated.

cleanwater PROGRAM

cleanwaterprogram.org

CLEAN WATER PROGRAM

Learn more about preventing water pollution and the Clean Water Program at www.cleanwaterprogram.org.

For More Help

For advice and approval on draining water to the sanitary sewer system, contact:

Cities of Alameda, Albany, Berkeley, Emeryville, Oakland or Piedmont
East Bay Municipal Utility District (EBMUD) ..... (510) 287-1651

Castro Valley
Castro Valley Sanitary District..... (510) 537-0757

Cities of Dublin or Pleasanton
Dublin-San Ramon Services District ..... (925) 828-0515

Cities of Fremont, Newark or Union City
Union Sanitary District..... (510) 477-7500

City of Hayward
City of Hayward..... (510) 881-7900

City of Livermore
City of Livermore ..... (925) 960-8100

Cities of San Lorenzo, unincorporated portions of San Leandro and Hayward
Oro Loma Sanitary District ..... (510) 481-6971

City of San Leandro
City of San Leandro..... (510) 577-3401

Local Stormwater Agencies

For advice on avoiding disposal to the storm drain system, contact:

Alameda.....(510) 747-7930
Albany.....(510) 528-5770
Berkeley..... (510) 981-7460
Dublin.....(925) 833-6650
Emeryville .....(510) 596-3728
Fremont.....(510) 494-4570
Hayward.....(510) 881-7900
Livermore.....(925) 960-8100
Newark.....(510) 578-4286
Oakland.....(510) 238-6544
Piedmont .....(510) 420-3050
Pleasanton .....(925) 931-5511
San Leandro.....(510) 577-3401
Unincorporated Alameda County .....(510) 567-6700
Union City ..... (510) 675-5301
Clean Water Program .....(510) 670-5543

June 2013

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8497

City of VALLEJO California

Public Works Department · 555 Santa Clara Street · Vallejo · CA · 94590 · 707.648.4316

September 28, 2020

Michael Montgomery, Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Montgomery:

Enclosed is the 2019-20 Annual Report for the City of Vallejo, which is required by and in accordance with Provision C.16 in National Pollutant Discharge Elimination System (NPDES) Permit Number CAS612008 issued by the San Francisco Bay Regional Water Quality Control Board.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Very truly yours,

Terrance Davis
Public Works Director

Enclosure

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Section 1 – Permittee Information

Background Information					
Permittee Name:	City of Vallejo				
Population:	121,913				
NPDES Permit No.:	CAS612008				
Order Number:	R2-2015-0049				
Reporting Time Period (month/year):	July 2019 through June 2020				
Name of the Responsible Authority:	Terrance Davis			Title:	Public Works Director
Mailing Address:	555 Santa Clara St				
City: Vallejo		Zip Code:	94590	County:	Solano
Telephone Number:	707-648-4301		Fax Number:		707-648-4691
E-mail Address:	Terrance.davis@cityofvllejo.net				
Name of the Designated Stormwater Management Program Contact (if different from above):	Robert Newman			Title:	Environmental Services Manager
Department:	Public Works				
Mailing Address:	555 Santa Clara ST				
City: Vallejo		Zip Code:	94590	County:	Solano
Telephone Number:	707-648-5410		Fax Number:		707-648-4691
E-mail Address:	Robert.newman@cityofvallejo.net				

May 27, 2020

Mr. Michael Montgomery
Executive Officer
San Francisco Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

sent via email

Subject: Stormwater Program Compliance with Water Board Requirements during the Coronavirus 2019 (COVID-19) Emergency

The City of Vallejo (City) and the Vallejo Flood and Wastewater District (District) are jointly responsible for the protection of stormwater quality in Vallejo under the Municipal Regional Stormwater Permit, Order No. R2-2015-0049 (MRP). This letter is in response to the State Water Board directive of March 20, 2020 regarding compliance with Water Board requirements during the Coronavirus 2019 (COVID-19) emergency. The attached summary lists provisions in the MRP that have been impacted by compliance with public heath orders and some responsibilities that may not be met within this reporting period. The City and District will provide detailed descriptions in their respective annual reports for 2019-2020, which will be submitted by September 30, 2020. The City and District remain committed to improving stormwater quality in Vallejo.

Robert Newman

JENNIFER HARRINGTON
Environmental Services Director
Vallejo Flood & Wastewater District

ROBERT NEWMAN
Environmental Services Manager
City of Vallejo

MRP PROVISIONS THAT MAY BE IMPACTED BY COVID-19 RESPONSE

as of May 27, 2020

C.2

Potential impacts to staff training; no in-person trainings are being held.

C.4

Routine business inspections are not being conducted. Inspections may restart dependent on County Health Orders.

C.5

Illicit discharge response is more limited; the ability to respond to spills and complaints is periodically impacted by reduced staff presence. Incidents may have to be prioritized based on availability of limited essential personnel.

C.7

Spring outreach events were cancelled. All school tours were cancelled; limited virtual sessions are now available through the Solano Resource Conservation District. Ongoing outreach to volunteers continued, with encouragement for individual cleanups since regular volunteer activities were not possible.

C.9

Planned staff trainings have been cancelled. Alternative training through webinars is being researched, but may not be completed before the end of the reporting period.

C.10

Inspection and maintenance of trash full capture devices may be reduced due to staff and contract staff constraints. All volunteer creek and shoreline cleanups have been cancelled and may not be rescheduled within the reporting period. Trash hot spots may not be cleaned due to availability of contract staff. OTVAs may not be completed on schedule and data may not be comparable to previous OTVAs.

C.11/C.12

Staff may not be able to follow PCB/Hg plans due to decreases in staffing.

Section 2 - Provision C.2 Reporting Municipal Operations

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Summary:

The City of Vallejo (City) and Vallejo Flood & Wastewater District (formerly known as Vallejo Sanitation & Flood Control District) (District) both have responsibilities under C.2. The City and District executed a Memorandum of Understanding on June 20, 2017. The City and the District are co-Permittees with the same reporting responsibilities under the California Regional Water Quality Control Board San Francisco Bay Region ("Regional Board") Municipal Regional Stormwater NPDES Permit Order No. R2-2015-0049 NPDES No. CAS612008 (MRP). The "Vallejo Permittees" as the two agencies are referenced in the MRP, cover the same geographic and political jurisdiction. The District has ownership and responsibility for stormwater infrastructure below the storm drain inlet grates and beyond, and the City has the responsibility for control and maintenance before stormwater enters the drain inlets.

In September 2018, the District and the City of Vallejo began discussions with the San Francisco Bay Regional Water Quality Control Board regarding the locations of two proposed new trash full capture devices in the storm drain system. The devices will help the Vallejo Permittees reduce trash in Vallejo by over 80% but will cost an estimated $4 million to complete. Due to uncertainty of the ongoing discussions, the device project was delayed until April 2019, when the issues were resolved. Additional construction and device manufacturing issues have further delayed the installation. VFWD is working with both the construction contractor and the device manufacturer to resolve the issues. The expectation is to have two of the three devices installed in 2020 and the remmaining site completed in the Spring of 2021. A detailed update on the devices is included in SectionC.10.

C.2.a. ►Street and Road Repair and Maintenance

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of debris and waste materials during road and parking lot installation, repaving or repair maintenance activities from polluting stormwater
Y	Control of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater from discharging to storm drains from work sites.
Y	Sweeping and/or vacuuming and other dry methods to remove debris, concrete, or sediment residues from work sites upon completion of work.

Comments:

Section C.2.a is primarily the responsibility of the City, although the District has responsibility for a number of their own repair and maintenance practices.

Streets and roads are significant sources of pollutants in stormwater discharges, and operation and maintenance practices, if not conducted properly, can contribute to the problem. When performing O&M procedures the Maintenance Division follows the Road and Street Maintenance BMPs listed under SC-70 in the CASQA Municipal handbook.

The City of Vallejo implements the following Best Management Practices (BMPS):

- The City uses water based paint when maintaining the traffic legends on the city's 714 lane miles of roadway. The Street Department continues to use products with zero VOC's when repairing pot holes with cold patch. City of Vallejo Maintenance Division employees attend bi-annual tailgate meetings that inform each of our BMP as it relates to our SWPPP.

- The City maintains a consistent sweeping schedule and guarantees that all scheduled streets will be swept at least once a month, with twice a month as a goal. The City also performs additional sweeping of its downtown area based on high pollutant loadings due to high traffic.

- During patching, resurfacing, and surface sealing projects, street crews protect all drain inlets using absorbent wattles and implement other BMPs to prevent excess material from entering storm drain inlets.

- When paving streets the Maintenance Division protects all drain inlet using absorbent waddles to insure that no material enter the DI. The Street Department continues to use Bond X products to repair pot holes during inclement weather. With a light winter the City purchased only 50 tons this year. This material has zero VOC's and no petroleum solvents. The Bond X product is in compliance with the Bay Area Air Quality Management District (BAAQMD).

- The City performs all major equipment repairs at the Amador St. corporation yard.
- Street Sweepers are dispatched after the completion of paving jobs to clean debris and sediment created from paving and construction jobs to prevent intrusion into the storm drain system.
- The City implemented the use of a vacuum with Hepa filters when grinding paint legends and sidewalk hazards.
- The City of Vallejo trains each employee assigned to the "saw cut truck" the proper methods to insure slurry from concrete cutting does not reach the storm drain system.

C.2.b. ►Sidewalk/Plaza Maintenance and Pavement Washing

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of wash water from pavement washing, mobile cleaning, pressure wash operations at parking lots, garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning activities from polluting stormwater
Y	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs

Comments: Section C.2.b is solely the responsibility of the City.

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. When performing O&M procedures the Maintenance Division follows the Plaza and Sidewalk Cleaning BMPs listed under SC-71 in the CASQA Municipal Handbook. The City of Vallejo implements the following Good Housekeeping practices:

- **The Traffic Section (a division of Maintenance) dry sweeps the area affected before using a pressure washer. Any solids created from the pressure washer such as paint chips are collected before water from the operation is directed into a landscaped area.**
- **The Assistant Maintenance Superintendent of Streets, a Senior Maintenance Worker, and two- Maintenance Worker 1 have Certificates of Training from the BASMAA surface cleaner training program.**
- **When saw cutting, maintenance workers use as little water as possible, cover drain inlets with filter fabric, and use straw bales or sandbags to contain slurry. Then they removed any excess slurry.**
- **The Assistant Maintenance Superintendent of Streets has a Certificate of Training from the BASMAA surface cleaner training program.**

- **The City has placed Anti-Littering signs around popular illegal dumping locations.**

C.2.c. ►Bridge and Structure Maintenance and Graffiti Removal

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of discharges from bridge and structural maintenance activities directly over water or into storm drains
Y	Control of discharges from graffiti removal activities
Y	Proper disposal for wastes generated from bridge and structure maintenance and graffiti removal activities
Y	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs for graffiti removal
Y	Employee training on proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.
Y	Contract specifications requiring proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.

Comments:
Section C.2.c is solely the responsibility of the City.
The City of Vallejo implements the following Best Management Practices (BMPs):

• The Bridge Operators are part of the Traffic Division and participate in the BMP as it relates to the Bridge. A Stormwater Best Management Practice handbook and an Over Water Handbook (SC50) are posted at the control room of the lift span. The Bridge Operators are to insure the BMP and SC50 handbook are abided by contractors that do maintenance to the Bridge.

• When graffiti is present, Maintenance personnel are instructed to use provided, approved graffiti wipes that are manufactured for the purpose of removing graffiti. Thus no aerosol spray or liquids are used when removing any graffiti. All used wipes are bagged and disposed of properly.

C.2.e. ►Rural Public Works Construction and Maintenance

Does your municipality own/maintain rural[1] roads:		Yes	X	No
If your answer is No then skip to C.2.f.				
Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.				

NA	Control of road-related erosion and sediment transport from road design, construction, maintenance, and repairs in rural areas
NA	Identification and prioritization of rural road maintenance based on soil erosion potential, slope steepness, and stream habitat resources
NA	No impact to creek functions including migratory fish passage during construction of roads and culverts
NA	Inspection of rural roads for structural integrity and prevention of impact on water quality
NA	Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion
NA	Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate
NA	Inclusion of measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology when replacing culverts or design of new culverts or bridge crossings

Comments including listing increased maintenance in priority areas:
NA – There are no rural roads recognize within the City.

[1]Rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses.

C.2.f. ►Corporation Yard BMP Implementation

Place an X in the boxes below that apply to your corporations yard(s):

	We do not have a corporation yard
	Our corporation yard is a filed NOI facility and regulated by the California State Industrial Stormwater NPDES General Permit
X	We have a Stormwater Pollution Prevention Plan (SWPPP) for the Corporation Yard(s)

Place an X in the boxes below next to implemented SWPPP BMPs to indicate that these BMPs were implemented in applicable instances. If not applicable, type NA in the box. If one or more of the BMPs were not adequately implemented during the reporting fiscal year then indicate so and explain in the comments section below:

X	Control of pollutant discharges to storm drains such as wash waters from cleaning vehicles and equipment
X	Routine inspection prior to the rainy seasons of corporation yard(s) to ensure non-stormwater discharges have not entered the storm drain system
X	Containment of all vehicle and equipment wash areas through plumbing to sanitary or another collection method
X	Use of dry cleanup methods when cleaning debris and spills from corporation yard(s) or collection of all wash water and disposing of wash water to sanitary or other location where it does not impact surface or groundwater when wet cleanup methods are used
X	Cover and/or berm outdoor storage areas containing waste pollutants

Comments:

Both Vallejo Permittees have significant responsibilities in Section C.2.f. as both agencies have corporation yards. The City of Vallejo Maintenance Division Yard has two wash racks that drain to the sanitary sewer. The main wash rack catch basin is cleaned weekly.

All storm drain inlets in the Corporation Yard are inspected and cleaned before the wet season. Any deficiencies with the drain guards are noted and new guards are installed.

A dry cleanup method is used within the vehicle shop area to minimize the use of water. When water is used, a biodegradable detergent is used and drain guards are placed at floor inlets. The water is then captured, vacuumed and disposed into the sanitary sewer system.

If you have a corporation yard(s) that is not an NOI facility, complete the following table for inspection results for your corporation yard(s) or attach a summary including the following information:

Corporation Yard Name	Corp Yard Activities w/ site-specific SWPPP BMPs	Inspection Date[2]	Inspection Findings/Results	Date and Description of Follow-up and/or Corrective Actions

[2] Minimum inspection frequency is once a year during September.

COV Maintenance Corp Yard – 111 Amador St.	• General housekeeping • Vehicle and equipment washing • Vehicle and equipment maintenance and repair • Fuel dispensing • Municipal vehicle, heavy equipment, and employee parking • Waste and recycling storage • Outdoor material storage	Monthly including Annual Inspection on September 19, 2019	• Last quarterly Vacuum/sweep was August 31, 2019. • Inlet filter fabrics are maintained regularly, last changed September 14, 2019. • Fueling area under roof, paved with PCC, Spill kits available • Drip pans and absorbent materials used where necessary • Stock piles too big to cover are in separate area with erosion control BMPs and sediment control BMPs implemented at storm drain inlets	In compliance
COV Corp Yard – Lemon St.	• General housekeeping • Outdoor Material Storage • Waste and recycling storage	Annual on September 19, 2019; November 27, 2019; December 11, 2019; December 18,2019	• Raw materials are stored with use of erosion control BMPs • Storm drain has filter fabric and is maintained regularly • Drivers delivering materials are directed to stay on pavement to prevent tracking off site.	In compliance
GVRD Corp Yard – 225 Richardson Dr.	• Good housekeeping • Employee parking • Waste and recycling storage • Outdoor material storage	Annual on September 19, 2019	• Noted improvement that catch basin screens should be cleaned up monthly during wet season. • Municipal vehicle, heavy equipment, and employee parking BMPs are also being implemented; parking lots inspected weekly, drip pans in	In Compliance

			use for leaks, equipment inspected daily • Dumpsters lids kept closed when not in use; Hazardous wastes are stored in secondary containment under cover. • Material is stored in a roofed area with berming to prevent contact with stormwater • Inlets protected with wattles	
Blue Rock Springs Golf Course Corp Yard	• Good housekeeping • Vehicle and equipment maintenance and repair • Fuel dispensing • Employee parking • Waste and recycling storage • Outdoor material storage	Annual conducted on August 17, 2019	• Clean and orderly corp yard maintained with adequate Good Housekeeping BMPs • Vehicle and Equipment maintenance is conducted indoors, drip pans in use for leaks, use of absorbent materials for cleaning small spills is implemented. • Fuel dispensing area is covered, paved with PCC. Signs posted to remind employees not to top off, spill kits and plan available • Waste and Recycling storage implements adequate BMPs; hazardous waste is kept in secondary containment and under shelter • Stockpiles are in roofed area where possible, where not feasible they are covered with erosion control BMPs in place.	In compliance

Section 3 - Provision C.3 Reporting New Development and Redevelopment

C.3.b.iv.(2) ►Regulated Projects Reporting

See attached table C.3.b.iv.(2) or attach your own table including the same information. The City did not approve any Regulated Projects during this reporting period.

C.3.e.iv. ►Alternative or In-Lieu Compliance with Provision C.3.c.

Is your agency choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e.?	X	Yes		No
Comments (optional):				

C.3.e.v ► Special Projects Reporting

1. In FY 2019-20, has your agency received, but not yet granted final discretionary approval of, a development permit application for a project that has been identified as a potential Special Project based on criteria listed in MRP Provision C.3.e.ii(2) for any of the three categories of Special Projects (Categories A, B or C)?		Yes	X	No
2. In FY 2019-20, has your agency granted final discretionary approval to a Special Project? If yes, include the project in both the C.3.b.iv.(2) Table, and the C.3.e.v. Table.		Yes	X	No

If you answered "Yes" to either question,

1) Complete Table C.3.e.v.
2) Attach narrative discussion of 100% LID Feasibility or Infeasibility for each project.

NA

C.3.h.v.(2) ► Reporting Newly Installed Stormwater Treatment Systems and HM Controls (Optional)

On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting year) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. The list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

See attached Table C.3.h.v.(2) for list of newly installed Stormwater Treatment Systems/HM Controls. The CCCWP will compile this information provided by each Permittees and submit the information to the Contra Costa Mosquito and Vector Control District (CCMVCD) on behalf of all Permittees by the September 30 deadline.

C.3.h.v.(3)(a) –**(c) and (f) ► Installed Stormwater Treatment** Systems Operation and Maintenance Verification Inspection Program Reporting

Site Inspections Data	Number/Percentage
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the previous fiscal year (FY18-19)	22
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the reporting period (FY 19-20)	23
Total number of Regulated Projects (including offsite projects, and Regional Projects) for which O&M verification inspections were conducted during the reporting period (FY 19-20)	21
Percentage of the total number of Regulated Projects (including offsite projects, and Regional Projects) inspected during the reporting period (FY 19-20)	96%[1]

[1] Based on the number of Regulated Projects in the database or tabular format at the end of the previous fiscal year, per MRP Provision C.3.h.ii.(6)(b).

C.3.h.v.(3)(d)-**(e) ► Installed Stormwater Treatment Systems** Operation and Maintenance Verification Inspection Program Reporting
Provide a discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.
Summary: The majority of the 21 sites inspected during this permit term were in excellent to very good condition and all sites inspected appeared to be working as designed. The only site that was not inspected during the permit term was ALCO Metals which came online in early 2018. The top priority for inspections for next year's annual report are ALCO Metals, Smart and Final, Redwood Street Shopping Center, Yolano Plaza Shopping Center, and The Dollar Store because the sites were in fair condition are were recently added as regulated projects.
Provide a discussion of the effectiveness of the O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness program).
Summary: The program can be improved by conducting inspections during heavy rain events and inspecting sites that are in fair or poor condition annually until they meet or exceed infiltration rates. In addition to the above referenced sites, the older sites should also get inspected more frequently than every 5 years.

C.3.i. ►Required Site Design Measures for Small Projects and Detached Single Family Home Projects
On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.
Summary: BASMAA prepared standard specifications in four fact sheets regarding the site design measures listed in Provision C.3.i, as a resource for Permittees. We have modified local ordinances/policies/procedures and forms/checklists to require all applicable projects approved after December 1, 2012 to implement at least one of the site design measures listed in Provision C.3.i. We are using the following Program and BASMAA products for C.3.i implementation: • BASMAA's site design fact sheets The City of Vallejo has published a Stormwater Control C.3 Compliance Information document on the City website which provides step-by-step instructions, a template for a Stormwater Control Plan, and standard specifications for runoff reduction measures. The City's stormwater ordinance requires that every application for a development project that is subject to the development runoff requirements in accordance with thresholds and effective dates in the city's NPDES permit shall be accompanied by a stormwater control plan that meets the criteria in the most recent version of the guidebook. The City permit center has also incorporated C.3 provision requirements in permit application forms to give guidance to applicants. Applicants for development approvals for projects creating or replacing more than 2,500 square feet but less than 10,000 square feet of impervious area, and single family homes creating or replacing more than 2,500 square feet of impervious area, are required to submit a

Stormwater Control Plan for a Small Land Development Project that meets the criteria in Appendix C of the Contra Costa Clean Water Program's *Stormwater C.3 Guidebook.* Appendix C includes minimum specifications for runoff reduction measures.

C.3.j.i.(5)**(d)** ► **Green Infrastructure Outreach**

On an annual basis, provide a summary of your agency's outreach and education efforts pertaining to Green Infrastructure planning and implementation.

Summary:

The City has information available on its website and brochures available at City Hall. The GI Plan was reviewed and approved by the City of Vallejo's Planning Department and passed via a resolution by the City of Vallejo Council on October 8, 2019. The plan was posted for public review on the City of Vallejo's website and flyers providing the public with information on Green Infrastructure. Once the plan has completed the peer review process, it will be posted on the City's Stormwater website. All new development is informed of GI requirements during the permitting process. Please refer to the City of Vallejo's Green infrastructure Plan submitted with the FY18-19 Annual Report.

Please refer to the Countywide Program's FY 19-20 Annual Report for a summary of outreach efforts implemented at the Countywide level.

C.3.j.ii.(2) ► Early Implementation of Green Infrastructure Projects

On an annual basis, submit a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures. Include the following information:

- A summary of planning or implementation status for each public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. (see C.3.j.ii.(2) Table B - Planned Green Infrastructure Projects).
- A summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement (see C.3.j.ii.(2) Table A - Public Projects Reviewed for Green Infrastructure).

Background Information:

City of Vallejo staff followed the May 6, 2016 BASMAA document, "Guidance for Identifying Green Infrastructure Potential in Municipal Capital Improvement Projects" to review its CIP projects to identify projects with potential for green infrastructure.

Summary of Planning or Implementation Status of Identified Projects:

See attached Tables C.3.j.ii.(2)-A and C.3.j.ii.(2)-B for the required information.

C.3.j.ii.(2) Table A is titled "Public Projects Reviewed for Green Infrastructure" not Early Implementation of GI Projects

C.3.j.iii.(2) and (3) ► Participate in Processes to Promote Green Infrastructure

On an annual basis, report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.

Please refer to Countywide Program's FY 19-20 Annual Report for a summary of efforts conducted to help regional, State, and federal agencies plan, design and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects.

C.3.j.iv.(2) and (3) ► Tracking and Reporting Progress

On an annual basis, the City will report progress on development and implementation of methods to track and report implementation of green infrastructure measures and provide reasonable assurance that wasteload allocations for TMDLs are being met. Please refer to the attached RAA Report for more details.

Please refer to the City's attached Green Infrastructure Plan for designing and funding of green infrastructure measures into local infrastructure projects, including transportation projects and a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure.

Please refer to the BASMAA Annual Report for FY 2019-2020 Regional Supplement for New Development and Redevelopment submitted on behalf of all MRP Permittees.

C.3.b.iv.(2) ►**Regulated Projects Reporting Table (part 1)** – Projects Approved During the Fiscal Year Reporting Period

Project Name Project No.	Project Location[2], Street Address	Name of Developer	Project Phase No.[3]	Project Type & Description[4]	Project Watershed[5]	Total Site Area (Acres)	Total Area of Land Disturbed (Acres)	Total New Impervious Surface Area (ft^2)[6]	Total Replaced Impervious Surface Area (ft^2)[7]	Total Pre-Project Impervious Surface Area[8](ft^2)	Total Post-Project Impervious Surface Area[9](ft^2)
Private Projects											
NA											
Public Projects											
NA											
Comments:											

[2]Include cross streets
[3]If a project is being constructed in phases, indicate the phase number and use a separate row entry for each phase. If not, enter "NA".
[4]Project Type is the type of development (i.e., new and/or redevelopment). Example descriptions of development are: 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse.
[5]State the watershed(s) in which the Regulated Project is located. Downstream watershed(s) may be included, but this is optional.
[6]All impervious surfaces added to any area of the site that was previously existing pervious surface.
[7]All impervious surfaces added to any area of the site that was previously existing impervious surface.
[8]For redevelopment projects, state the pre-project impervious surface area.
[9]For redevelopment projects, state the post-project impervious surface area.

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (private projects)

Project Name Project No.	Application Deemed Complete Date[10]	Application Final Approval Date[11]	Source Control Measures[12]	Site Design Measures[13]	Treatment Systems Approved[14]	Type of Operation & Maintenance Responsibility Mechanism[15]	Hydraulic Sizing Criteria[16]	Alternative Compliance Measures[17/18]	Alternative Certification[19]	HM Controls[20/21]
Private Projects										
The Lodge at Glen Cove	140 Glen Cove Marina Road	Blue Mountain Construction Services	N.A.	Building & uncovered parking	Glen Cove	4.51	2.27	97601	4060	4060

[10]For private projects, state project application deemed complete date. If the project did not go through discretionary review, report the building permit issuance date.
[11]For private projects, state project application final discretionary approval date. If the project did not go through discretionary review, report the building permit issuance date.
[12]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[13]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[14]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[15]List the legal mechanism(s) (e.g., O&M agreement with private landowner; O&M agreement with homeowners' association; O&M by public entity, etc…) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[16]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[17]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[18]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[19]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[20]If HM control is not required, state why not.
[21]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (public projects)

Project Name Project No.	Approval Date[22]	Date Construction Scheduled to Begin	Source Control Measures[23]	Site Design Measures[24]	Treatment Systems Approved[25]	Operation & Maintenance Responsibility Mechanism[26]	Hydraulic Sizing Criteria[27]	Alternative Compliance Measures[28/29]	Alternative Certification[30]	HM Controls[31/32]
Public Projects										
The Lodge at Glen Cove	07/12/217	07/17/2018	Onsite SD inlets	Minimize imperv surfaces	Bioretention	O&M Agreement w/ private owner	2.c	N.A.	N.A.	Bioretention basin
Comments:										

[22]For public projects, enter the plans and specifications approval date.
[23]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[24]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[25]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[26]List the legal mechanism(s) (e.g., maintenance plan for O&M by public entity, etc.) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[27]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[28]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[29]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[30]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[31]If HM control is not required, state why not.
[32]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

C.3.h.v.(2). ►Table of Newly Installed[33] Stormwater Treatment Systems and Hydromodification Management (HM) Controls (Optional)

Fill in table below or attach your own table including the same information.

Name of Facility	Address of Facility	Party Responsible[34] For Maintenance	Type of Treatment/HM Control(s)
The Lodge at Glen Cove	140 Glen Cove Marina Road	Blue Mountain Construction Services	Bioretention

[33] "Newly Installed" includes those facilities for which the final installation inspection was performed during this reporting year.
[34] State the responsible operator for installed stormwater treatment systems and HM controls.

C.3.e.v. Special Projects Reporting Table

Reporting Period – July 1 2019 - June 30, 2020

Project Name & No.	Permittee	Address	Application Submittal Date[35]	Status[36]	Description[37]	Site Total Acreage	Gross Density DU/Acre	Density FAR	Special Project Category[38]	LID Treatment Reduction Credit Available[39]	List of LID Stormwater Treatment Systems[40]	List of Non-LID Stormwater Treatment Systems[41]
None	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

[35]Date that a planning application for the Special Project was submitted.
[36] Indicate whether final discretionary approval is still pending or has been granted, and provide the date or version of the project plans upon which reporting is based.
[37]Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.
[38] For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.
[39]For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.
[40]**:** List all LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area.
[41]List all non-LID stormwater treatment systems proposed. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

Special Projects Narrative

NA

C.3.j.ii.(2) ► Table A - Public Projects Reviewed for Green Infrastructure

Project Name and Location[42]	Project Description	Status[43]	GI Included?[44]	Description of GI Measures Considered and/or Proposed or Why GI is Impracticable to Implement[45]
PW 9802 Bay/Vine Trail	Trail Gap Closure Project. from Vallejo Wilson Ave. to American Canyon trail	Beginning Design	NO	Not Practicable: Just on existing pavement rehabilitation. No addition of lanes for the trail.
PW SR2S Lincoln Elementary School Improvement Project	Various locations including Sonoma Blvd at intersections with Capitol Street, Carolina street, and Florida street. Reconstruct intersection with bulbouts and ADA ramps for safety.	Construction	NO	Not Practicable: Work limited to replacement of existing pavement and concrete in-place. No changes to the pavement types.
PW 9819 Mare Island Bldg. Demolition project	Demolition of existing deteriorated bldgs. for development.	Completed April 2020	NO	Not Practicable: Work limited to removal of the Bldg. structures up to foundation. Foundation will remain.
PW 9745 Slurry Seal	Thin coat of asphalt slurry on the existing pavement at various locations within the City and Mare Island	Completed May 14, 2019	NO	Not Practicable: Work is limited to existing pavement. It is a thin layer application on existing pavement.
PW 9744 Rollingwood Street pavement rehabilitation	Rollingwood Street from Pope Drive to Baywood Drive Pavement rehabilitation and resurfacing with some replacement of concrete ADA curb ramps.	Completed December 2019	NO	Not Practicable: Inadequate right-of-way, busy street with residential homes on both sides of the street. No increase in lane width. Remove and replace existing pavement.
PW9403 Genius Statue Installation	Installing Genius Statue within ROW at intersection of Santa Clara St. and Georgia St.	Completed September 2019	NO	Not Practicable: Installing the statue in the plaza area within the concrete existing area.

[42] List each public project that is going through your agency's process for identifying projects with green infrastructure potential.
[43] Indicate status of project, such as: beginning design, under design (or X% design), projected completion date, completed final design date, etc.
[44] Enter "Yes" if project will include GI measures, "No" if GI measures are impracticable to implement, or "TBD" if this has not yet been determined.
[45] Provide a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. If review of the project indicates that implementation of green infrastructure measures is not practicable, provide the reasons why green infrastructure measures are impracticable to implement.

PW9741 SB1 Curb Ramps replacement project FY17-18	Various Locations: Replacement concrete work – handicap ramp upgrade sidewalk repair	Completed February 2019	No	Not Practicable: Work limited to replacement of existing deteriorated concrete.
PW9751p Florida and Carolina Pavement Rehab	Rollingwood Street from Pope Drive to Baywood Drive Pavement rehabilitation and resurfacing with some replacement of concrete ADA curb ramps.	Completed April 3, 2020	No	Not Practicable: Inadequate right-of-way, busy street with residential homes on both sides of the street. No increase in lane width. Remove and replace existing pavement.
PW9763 HSIP Sonoma Boulevard Road Diet	Pavement rehab, slurry seal and striping	Completed February 26, 2020	No	Not Practicable
PW9413 Downtown Parking Lot Rehab	Various Locations: Replacement concrete work – handicap ramp upgrade sidewalk repair	Construction	No	Not Practicable: Work limited to replacement of existing deteriorated concrete and updating ADA access.
PW9735 HSIP 5 Intersection Improvements w/RRFP	Pedestrian crossing enhancements, warnings and signs	Beginning Design	No	Not Practicable: Work limited to existing pavement for adding signs.
PW9736 HSIP 6 Pedestrian Crossing Improvements w/HAWK	Pedestrian crossing enhancements, warnings and signs	Beginning Design	No	Not Practicable: Work limited to existing pavement for adding signs.

C.3.j.ii.(2) ► Table B - Planned and/or Completed Green Infrastructure Projects

Project Name and Location[46]	Project Description	Planning or Implementation Status	Green Infrastructure Measures Included
PW 9811 Downtown Streetscape Phase 4	Replacing a standard 5 ft. sidewalk with a 13 ft.	Completed in December 2019.	Bio-swales, landscaping, and trees.

[46] List each planned (and expected to be funded) public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Note that funding for green infrastructure components may be anticipated but is not guaranteed to be available or sufficient.

	sidewalk, plant trees, pedestrian lighting, landscaping and Bio-swales at bulb-outs.		
PW 9967 Hiddenbrooke Overpass	On/off ramps from I-80 onto Hiddenbrooke Parkway improvements	Planning	
PWL001 Hiddenbrooke Parkway (LMD)	Hiddenbrooke Parkway – I-80 to Welcome Center Remove and replace landscaping and irrigation	Planning	
PWL002 Glen Cove Parkway (LMD)	Glen Cove Parkway – Robles to New Bedford Remove and replace landscaping and irrigation	Planning	
PW9729 Sacramento Street Road Diet	Replace pavement on existing street.	Planning	
PW9738 Capital Street Pavement Rehab	Replacing pavement along Capital Street.	Planning	
PW9700 VTC York Street Downtown Streetscape Phase 6	Replacing a standard 5 ft. sidewalk with a 13 ft. sidewalk, plant trees, lighting. And landscaping.	Completed June 30, 2020	Bio-swales, landscaping, and trees.

Name of Facility	Address	Responsible Party	Type of Treatment	Date of Last Insp	Yr Comp	Comment
Lowe's	Automall Pkwy & North Ascot Pkwy	Lowe's	Vegetated Swales	May-20	2011	Good Condition
Don Foley Park	East Side of N. Camino	GVRD	Vegitated Swales	Aug-19	2011	Good Condition
Smart and Final	3901 Sonoma Blvd	Smart and Final	Vegitated Swales	Jul-19	2015	Fair Condition
Starbucks	1801 Broadway St	Starbucks Corp	Vegitated Swales	Jul-19	2016	Great Condition
In-Shape Health Club	124 East Lincolin Rd	In Shape	Vegitated Swales	Jan-20	2015	Good Condition
Kaiser Parking Lot	975 Sereno Dr	Kaiser	Bioretntion Basin	May-20	2016	Great Condition
Hiddenbrook Park	7108 Alder Creek Rd	City of Vallejo	Vegitated Swales	Jul-19	2015	Good Condition
Vallejo Medic Ambulance	506 Couch St	Barber Vallejo Properties	Bioretntion Basin	Aug-19	2016	Great Condition
Solono Curtola Park and Ride	Lemon and Curtola St	Soltrans	Pervious Pavement	May-20	2016	Excellent Condition
Anchor Self Storage	1050 Sonoma Blvd	Anchor Self Storage	Bioretntion Basin	Feb-20	2017	Great Condition
Caliber Charter School	500 Oregon St	Caliber Charter School	Bioretntion Basin	Jul-19	2018	Great Condition
Chick-Fil-A	1195 Admiral Callaghan Lane	Chick-Fil-A	Cistern and Bioretention Basin	May-20	2017	Good Condition
830 Redwood Street	830 Redwood St	Barber Vallejo Properties LP	Bioretntion Basin	Aug-19	2015	Good Condition
Shell Gas Station	708 Admeral Callaghan	All Energy LLC	Bioretention basin	May-20	2017	Great Condition
The Lodge at Glen Cove	140 Glen Cove Marina Rd	Blue Mountain Construction Services	Bioretention Basin	Jun-20	2019	Still Active
In and Out Burger	720 Admiral Callagan Lane	In and Out Burger	Bioretention	Jul-19	2019	Great Condition
Shell Station	1604 Lewis Brown Drive	AU Energy LLC	Bioretention	May-20	2019	Working as Designed
ALCO Warehouse and Office	321 Azur Drive	ALCO Iron and Metal	Planters	Feb-19	2019	Working as Designed
Granite Store	460 Curtola Parkway	Paul Yuao	Bioretention	Jul-19	2019	Great Condition
Panera Bread	169 Plaza Drive	Pan Norcal LLC	Bioretention	May-20	2018	Great Condition
Yolano Plaza Shopping Center	4301 Sonoma Blvd	Property owner	Bioretention	27-Aug-19	2017	Working as Designed
Dollar General Store	920 Tuolumne St	Dollar Store	Vegigtated Swales	Aug-19	2015	Fair Condition
Virgina Street	Sacramento St	City of Vallejo	Vegigtated Swales	Mar-20	2018	Good Condition

08485
8526

Section 4 – Provision C.4 Industrial and Commercial Site Controls

Program Highlights and Evaluation
Highlight/summarize activities for reporting year:

Summary:
Please refer to the Vallejo Flood and Wastewater District (VFWD) Annual Report Section C.4 reporting. VFWD is responsible for C.4 implementation on a City-wide level.

C.4.b.iii ► Potential Facilities List (i.e., List of All Facilities Requiring Stormwater Inspections)

List below or attach your list of industrial and commercial facilities in your Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff.

Please refer to the Vallejo Flood and Wastewater District (VFWD) Annual Report Section C.4 reporting. VFWD is responsible for C.4 implementation on a City-wide level. The Solano County Environmental Health Department and VFWD conduct business inspections.

C.4.d.iii.(2)(a) & (c) ►Facility Inspections

Fill out the following table or attach a summary of the following information. Indicate your reporting methodology below.

	NA	Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
	NA	Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Total number of inspections conducted (C.4.d.iii.(2)(a))	NA
Violations, enforcement actions, or discreet number of potential and actual discharges resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner (C.4.d.iii.(2)(c))	NA

Comments:
NA – Section C.4 is solely the responsibility of the VFWD. Please see the VFWD Annual Report Section C.4.

C.4.d.iii.(2)(b) ►**Frequency and Type of Enforcement Conducted**

Fill out the following table or attach a summary of the following information.

	Enforcement Action (as listed in ERP)[1]	Number of Enforcement Actions Taken
Level 1	NA	NA
Level 2	NA	NA
Level 3	NA	NA
Level 4	NA	NA
Total	NA	NA

C.4.d.iii.(2)(d) ► **Frequency of Potential and Actual Non**-stormwater Discharges by Business Category

Fill out the following table or attach a summary of the following information.

Business Category[2]	Number of Actual Discharges	Number of Potential Discharges
NA	NA	NA
NA	NA	NA
NA	NA	NA
NA	NA	NA

C.4.d.iii.(2)(e) ►**Non**-Filers

List below or attach a list of the facilities required to have coverage under the Industrial General Permit but have not filed for coverage:

NA – Section C.4 is solely the responsibility of the VFWD. Please see the VFWD Annual Report Section C.4.

[1]Agencies to list specific enforcement actions as defined in their ERPs.
[2]List your Program's standard business categories.

C.4.e.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Industrial/ Commercial Site Inspectors in Attendance	Percent of Industrial/ Commercial Site Inspectors in Attendance	No. of IDDE Inspectors in Attendance	Percent of IDDE Inspectors in Attendance
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA

Comments:
NA – Section C.4 is solely the responsibility of the VFWD. Please see the VFWD Annual Report Section C.4.

Section 5 – Provision C.5 Illicit Discharge Detection and Elimination

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Provide background information, highlights, trends, etc.

Summary:

Section 5 is primarily the responsibility of VFWD, although the City has a support role for a number of these activities. Please refer to Vallejo Flood and Wastewater District's annual report for further information.

The City of Vallejo Code Enforcement works collaboratively with VFWD, Solano County Resource Management and various other agencies when VFEWD requires additional assistance on illicit discharge.

Although VFWD is primarily responsible for C.5, the City of Vallejo's franchise waste hauler Recology Vallejo (Recology), provides residential garbage, recycling and yard waste services. In addition, Recology operates free Household Hazardous Waste drop-off facility, and collects BOPA (Batteries, Oil, cooking oil and oil filters, latex Paint and Antifreeze). The BOPA operates year-around, Thursday-Saturday from 8AM-4PM. All of these materials had the potential to be put down the storm drain; however, due to outreach activities and programs, the City has been able to provide residents with an opportunity to properly recycle the items listed above.

The City continues to contract with the House of Acts, a local non-profit agency, which is responsible for cleaning 19 historic problem areas throughout the City which continue to have an exceptional amount of litter illegally deposited on City right of way on a consistent basis. The House of Acts works with the City's maintenance crews to ensure that this litter cleanup program operates effectively and that these areas are cleaned on a weekly basis.

During the reporting period, there were almost 2,400 illegal dumped sites and City Crews removed approximately over 860 tons of litter and debris which was illegally dumped within the City limits. The City continues to promote and use the online app See Click Fix, which allows the public to notify City when materials have been illegally dumped. Typically the City tries to get illegally dumped materials picked up in 24-48 hours. The City is also has a new illegal dumping campaign " Ideal Vallejo" that is being spearheaded by the City Neighborhood Attorney. The new campaign uses cameras to try and catch people in the act of illegally dumping and prosecuting cases when people are actually caught on camera. In addition, the campaign encourages residents to report illegal dumping incidents as they are occurring. Also, the City's Code Enforcement Division will go through illegally dumped piles looking for information to identify the culprits.

C.5.c.iii ►Complaint and Spill Response Phone Number

(For the FY 2019-20 Annual Report only) Provide the following information

List below or attach your complaint and spill response phone number
The VFWD is the lead agency for responding to spills.
Please see their annual report for more information.

Provide your complaint and spill response web address, if used

https://seeclickfix.com/vallejo

Is a screen shot of your website showing the central contact point attached? [ ] Yes [X] No

Section C.5.c is solely the responsibility of VFWD. Please refer to the VFWD report for the data and discussion for this section.

Provide a discussion of how the central contact point (complaint and spill response phone number and, if used, web address) is being publicized to your staff and the public.

Section C.5.c is solely the responsibility of VFWD. Please refer to the VFWD report for the data and discussion for this section.

C.5.d.iii.(1), (2), (3) ►Spill and Discharge Complaint Tracking

Spill and Discharge Complaint Tracking (fill out the following table or include an attachment of the following information)

	Number
Discharges reported (C.5.d.iii.(1))	NA
Discharges reaching storm drains and/or receiving waters (C.5.d.iii.(2))	NA

Discharges resolved in a timely manner (C.5.d.iii.(3))	NA
Comments: Section C.5.d is solely the responsibility of VFWD. Please refer to the VFWD report for the data and discussion for this section.	

Section 6 – Provision C.6 Construction Site Controls

C.6.e.iii.(3)(a), (b), (c), (d) ►**Site/Inspection Totals**			
Number of active Hillside Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii.3.a)	Number of High Priority Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii. 3.c)	**Number of sites disturbing ≥** 1 acre of soil (C.6.e.iii.3.b)	Total number of storm water runoff quality inspections conducted (include only Hillside Sites, High Priority Sites and sites disturbing 1 acre or more) (C.6.e.iii. 3.d)
0	0	4	26

Comments:

The City's municipal code defines hillside development areas as follows: "The hillside development guidelines district shall apply to all land with a natural slope in excess of ten percent for a distance of one hundred feet or more as it existed on January 1, 1980." Per this definition, there are no active hillside developments that required monthly stormwater inspections during the wet season.

Per the City's ERP, level one enforcement actions include verbal warnings and education. Due to the nature of these enforcements, formal documentation of the enforcement actions are difficult. For example, a compliant site may be in need of additional BMPs before the next rain event. The contractor would be notified that even though the current state of the site is acceptable, additional measures are required before the rain event. If City inspectors confirm the implementation of adequate BMPs then no violation is given. According to the City inspectors, based on their reporting, they estimate they have given fifty or more Level 1 Education Verbal Enforcement Actions.

Provide the number of inspections that are conducted at sites not within the above categories as part of your agency's inspection program and a general description of those sites, if available or applicable.

The City conducts regular inspections on street and grading projects that may not require a WDID Permit. The City conducted weekly inspections on a sanitary sewer replacement project located near the Vallejo Marina and La Clinica construction project along Georgia Street. In addition, the City conducts regular inspections on Capital Improvement projects and regulated projects throughout the City. It is estimated over 100 inspection were conducted for these projects.

C.6.e.iii.(3)(e) ►**Construction Relat**ed Storm Water Enforcement Actions

	Enforcement Action (as listed in ERP)[1]	Number Enforcement Actions Issued
Level 1[2]	Warning Notice/Education Verbal	0
Level 2	Notice of Violation (Notice to Comply)	2
Level 3	Formal Enforcement (Administrative Citation, Cost Recovery, Stop Work)	3
Level 4	Legal Action and/or Referral to State and Federal Agencies	1
Total		

C.6.e.iii.(3)(f), ►**Illicit Discharges**

	Number
Number of illicit discharges, actual and those inferred through evidence at hillside sites, high priority sites and sites that disturb 1 acre or more of land (C.6.e.iii. 3.f)	1

C.6.e.iii.(3)(g) ► Corrective Actions

Indicate your reporting methodology below.

[ ]	Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
[X]	Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Enforcement actions or discrete potential and actual discharges fully corrected within 10 business days after violations are discovered or otherwise considered corrected in a timely period (C.6.e.iii. .3.g)	1

Comments:
On October 28th the City received a complaint about grading and filling a site that was later determined to be a wetland. The work was being conducted without permits. On October 29th the City of Vallejo inspector arrived at the site and issued a NOV and Stop Work Order to cease any further activity on the site. The City conducted a joint inspection of the site with staff from the RWQCB which resulted in the attached notice from

[1]Agencies should list the specific enforcement actions as defined in their ERPs.
[2]For example, Enforcement Level 1 may be Verbal Warning.

the Board dated February 7, 2020. On November 18, 2019, a follow-up inspection was conducted at the site and land disturbance was observed. The City issues an Administrative Notice and Citation for the observed violation. A follow-up inspection in May 2020 confirmed that the fill had been removed and the site retuned to preconstruction conditions.

C.6.e.iii.(4) ►Evaluation of Inspection Data

Describe your evaluation of the tracking data and data summaries and provide information on the evaluation results (e.g., data trends, typical BMP performance issues, comparisons to previous years, etc.).

Description:

The City has found that implementation of stormwater mitigation measures has seen notable acknowledgement and acceptance. Sites typically have drain inlet protection, slope stabilization with wattles, and other "long-term" BMPs in place. There still remains a struggle with the day-to-day related BMPs such as covering dumpsters when not in use, vehicle washouts to prevent tracking, and the covering or berming of stockpiles. The use of BMPs appears to be effected by the ease and interval of implementation, and the more obvious BMPs (which would readily give the site an appearance of compliance) tend to be the ones you see in place. The culture of taking the path of least resistance depicts a fractured understanding of stormwater mitigation's overarching goal.

The City's inspection staff stresses educational outreach to contractors, so that they may understand why the stormwater measures are required. The belief is that by providing contractors with more context their desire to adhere to SWPPP will increase as they understand the impacts of their efforts.

Excluding the unpermitted grading and fill of the wetland listed above, contractors were in compliance with permit requirements. The permit term had very few projects over 1 acre which resulted in fewer inspections and subsequent violations.

C.6.e.iii.(4) ►Evaluation of Inspection Program Effectiveness

Describe what appear to be your program's strengths and weaknesses, and identify needed improvements, including education and outreach.

Description:

The City's ability to issue monetary fines in accordance with its ERP has greatly affected the effectiveness of the response plan in comparison to previous years. Whereas enforcement primarily included verbal warnings, notice of violations, and stop works, the addition of monetary fines gives the City another tool to exercise in enforcement.

The City has implemented a new green infrastructure plan and has posted materials on the City's website and will educate developers regarding the new elements in the plan as they apply for various permits from the City.

The City increased training of inspection staff during the 2019-2020 permit year on the green infrastructure program, stormwater measures, BMPs, C6 and new regulatory requirements. Staff has already attended green infrastructure training sponsored by the CASQA in October 2019. The City hired two new inspectors in 2019-20.

C.6.f.iii ►**Staff Training Summary**

Training Name	Training Dates	Topics Covered	No. of Inspectors in Attendance
C6 Inspector Training	June 8, 2020	C6 Inspection Requirements and BMPs	4
Green Infrastructure Implementation	June 9, 2020	Green Infrastructure Inspections	4
Green Infrastructure Tool Belt Training	Sept 5, 2019	Green Infrastructure Options	1
CASQA Annual Conference	Oct 7-9, 2020	Wide Variety of Stormwater Topics	4

City of Vallejo 2019-20 Annual Report

Section 6-Provision C.6 Construction Site Control Inspection Summary

Site 1
Name: 140 Glen Cove Marina Road
WDID Number: 48C383239
Address: 140 Glen Cove Marina Rd.

Inspection Date	Enforcement Action	NOVs	Comment	Return To Compliance
July 2019	None	0	In Compliance	NA
August 2019	None	0	In compliance	NA
Sept 2019	None	0	In compliance	NA
Oct 2019	None	0	In Compliance	NA
Nov 2019	None	0	In Compliance	NA
Dec 2019	None	0	In Compliance	NA
Jan 2020	None	0	In Compliance	NA
Feb 2020	None	0	In Compliance	NA
Mar-May 2020	NA	0	Work and Inspections Stopped due to Safety Concerns from Covid-19	NA
June 2020	None	0	In Compliance	NA
Total	None		9 Inspections and no Violations	NA

City of Vallejo 2018-19 Annual Report

Section 6-Provision C.6 Construction Site Control Inspection Summary

Site 2
Name: Vallejo Flood and Wastewater District – Mare Island
WDID Number: 248C384553
Address:

Inspection Date	Enforcement Action	NOVs	Comment	Return To Compliance
July 2019	None	0	In Compliance	NA
August 2020	None	0	In Compliance – Project Completed NOT	NA
Total	None	0		

Note: Project was completed in August and NOT application submitted to the RWQCB in August 2019.

Site 3
Name: Waterstone Phase 1C
WDID Number: 48C380171
Address: Saxony Ct and Sanhurst Dr

Inspection Date	Enforcement Action	NOVs	Comment	Return To Compliance
July 2019	None	0	In Compliance	NA
August 2019	None	0	In compliance	NA
Sept 2019	None	0	In compliance	NA
Oct 2019	None	0	In Compliance	NA
Nov 2019	None	0	In Compliance	NA
Dec 2019	None	0	In Compliance	NA
Total	None	0		

Note: Construction was completed in December 2019 and NOT submitted to the RWQCB in January 2020.

CALIFORNIA
Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

Sent via certified mail and email
Certified Mail No. 7019 2280 0001 8685 6816

February 7, 2020
CIWQS Place ID 862784
WDID No. 2 48CN605913

Param Dhillon and Amandeep Dhillon
2225 Ralmar Avenue
East Palo Alto, CA 94303

Subject: **Notice of Violations and 13267 Directive to Submit Technical Reports for Dhillon Property, Vallejo, Solano County, APN 0052-160-0900**

Dear Param Dhillon and Amandeep Dhillon:

We are sending you this letter because you failed to adequately respond to the notice of violation sent on November 18, 2019, for placing fill into waters of the State (November 2019 NOV, Attachment 1). In addition to the violations and requirements described in the November 2019 NOV, the subject site requires a permit for stormwater discharges. This letter is a formal notice of violation for conducting construction activities without a stormwater discharge permit. Before conducting any future construction activities, you must obtain stormwater permit coverage.

This letter is also an order for technical reports that requires you to submit the following technical reports to the Water Board, pursuant to California Water Code section 13267:

1. A description of the unauthorized activities conducted, due not later than February 21, 2020
2. A jurisdictional delineation of the extent of wetlands on the property, due not later than May 8, 2020
3. A work plan of corrective actions to restore the property, due not later than June 8, 2020
4. A monitoring and reporting plan to monitor the success of corrective actions, due not later than June 8, 2020.

The remainder of this letter provides further explanation of the alleged violations, required actions and technical reports, and your statutory liability.

Violations

On November 12, 2019, San Francisco Bay Regional Water Quality Board (Water Board) staff inspected the Dhillon Property, a 7.6-acre parcel, and observed evidence of recent construction activities, including disking, grading, and placement of fill in wetlands (see Attachment 2 for full inspection report). This NOV presents the violation for conducting construction activities without a stormwater discharge permit and summarizes the violations included in the November 2019 NOV.

Stormwater Construction General Permit

Sites disturbing one acre or more of soil are required by federal law[1] to have a construction stormwater permit. Without stormwater permit coverage, you may be subject to penalties.

The Construction Stormwater General Permit[2] applies to your site. The Construction Stormwater General Permit authorizes specified stormwater discharges. Non-stormwater discharges, such as water contaminated with commercial products, wastewater, concrete materials, concrete and other wash/rinse water, or sediment, are prohibited from being discharged unless authorized by another permit. More information on the Construction Stormwater General Permit is available at:

https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

Report of Waste Discharge

Under state law, Water Code section 13260 requires any person who discharges, or proposes to discharge, waste that could affect waters of the State to submit a report of waste discharge (ROWD). Water Code section 13264 prohibits the discharge of waste prior to filing an ROWD or obtaining waste discharge requirements. We have no record of having received an ROWD for these activities, nor has the Water Board issued Waste Discharge Requirements (WDRs) for them. Accordingly, you are violating Water Code sections 13260 and 13264. We notified you in the November 2019 NOV of the requirement to submit an ROWD.

Basin Plan Discharge Prohibitions

Basin Plan Discharge Prohibition 7 prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes" into surface waters and Discharge Prohibition 9 prohibits the discharge of "silt, sand, clay, or other earthen materials from any activity" where they unreasonably affect or threaten to affect beneficial uses of surface waters. Water from wetlands at the subject property discharges to White Slough, which has the beneficial uses listed below. By the tributary rule, a tributary to a listed water body has the beneficial uses of that water body. White Slough, and thus the site's wetlands, have the following beneficial uses: Commercial and Sport Fishing; Estuarine Habitat; Fish Migration; Preservation of Rare and Endangered Species; Fish Spawning; Wildlife Habitat; Water Contact Recreation; and Non-Contact Water Recreation. The discharge of waste material and/or earthen material into these wetlands unreasonably affects

[1] The Clean Water Act (CWA) prohibits certain discharges of stormwater containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as CWA §§ 301 and 402(p)).
[2] General Permit for Storm Water Discharges Associated with Construction Activities (Stormwater Construction General Permit), NPDES No. CAS000002, Order 2009-0009-DWQ amended by 2010-0014-DWQ and 2012-0006-DWQ.

these beneficial uses. Accordingly, you have violated and continue to violate Discharge Prohibitions 7 and 9.

Clean Water Act, Discharge of Fill Material Requirements

Under federal law, your conduct violates Clean Water Act sections 301 and 401, which prohibit the discharge of pollutants into Waters of the United States without a dredge-and-fill permit and without a water quality certification. Clean Water Act section 301 requires a permit, issued pursuant to regulations under section 404, prior to the discharge of fill material into waters of the United States. The U.S. Army Corps of Engineers (Corps) is responsible for issuing section 404 permits, and the Water Board is responsible for certifying the Corps' permits pursuant to Clean Water Act section 401. The Water Board has not issued a certification of a Corps permit for your project and we are not aware that you have sought or obtained a section 404 permit from the Corps.

Actions Required

The Water Board is requiring the following actions to achieve compliance with the regulatory and program requirements discussed above. Technical reports must be acceptable to the Executive Officer, and any extension to the deadlines listed in this letter must be confirmed in writing by Water Board staff.

Apply for Construction Stormwater General Permit Coverage

You must apply for Construction Stormwater General Permit coverage immediately.

To apply, you first need to create a user account in the online Stormwater Multiple Application and Report Tracking System (SMARTS). All permit required documents (PRDs) must be submitted in SMARTS and certified by the Legally Responsible Party (LRP). See Permit section X.I Electronic Signature and Certification Requirements, and Permit Appendix 5 Glossary, for information describing persons who may be the LRP.

The Construction Stormwater General Permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP) by a certified Qualified SWPPP Developer (QSD). A QSD lookup tool to find licensed QSDs is available through this link: https://www.owp.csus.edu/qsd-lookup.php. The Construction Stormwater General Permit explains this requirement in more detail.

Submit Technical Reports

This requirement for a technical report is made pursuant to Water Code section 13267, which allows the Water Board to require technical or monitoring program reports from any person who has discharged, discharges, proposes to discharge, or is suspected of discharging waste that could affect water quality. The burden of these reports, including costs, bears a reasonable relationship to the need for the report and the benefits to be obtained from the reports. Specifically, the reports required herein are necessary to ensure the protection of water quality.

For more information regarding the Water Board's authority to require technical reports, please refer to the attached fact sheet (Attachment 3, 13267 Fact Sheet).

The required information listed below is based on program requirements and discussions during the meeting held on January 28, 2020, among you and staff from the Water Board, Army Corps of Engineers, and the Bay Conservation and Development Commission (BCDC). Mitigation

measures may be required in addition to actions described in, and implemented in accordance with, the technical reports required below.

Technical Report 1: Description of unauthorized activities conducted

A technical report addressing items 1 through 5 shall be submitted to the Water Board by February 21, 2020:

1. Purpose and need for conducting unauthorized activities.
2. Dates that grading, disking, or placement of imported fill material occurred.
3. The estimated volume of fill material placed on-site.
4. All erosion or sediment control measures implemented during the unauthorized activities to prevent discharges of sediment or construction-related materials or wastes to waters of the State.
5. Copies of any federal, state, or local permits or other authorizations for the work obtained by you, your representatives, other property owners, or any other parties.

Technical Report 2: Delineation of the extent of wetlands

A technical report addressing items 6 and 7, prepared by a qualified professional, delineating the extent of wetlands on the property, shall be submitted to the Water Board by May 8, 2020:

6. A jurisdictional delineation of the property identifying the extent of wetlands and waters of the State and U.S. The delineation should be conducted in accordance with the 1987 Army Corps Wetland Delineation Manual and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region.
7. The extent of impacts to waters of the State (in acres) resulting from unauthorized activities.

Technical Report 3: Work plan of corrective actions

A technical report addressing item 8, a work plan of corrective actions to restore the property, shall be submitted by June 8, 2020:

8. A work plan with corrective actions that will be implemented to restore waters of the State that were impacted by the Project. The work plan shall also include an implementation schedule.

Technical Report 4: Monitoring and reporting plan

A technical report addressing item 9, a monitoring and reporting plan, shall be submitted to the Water Board by June 8, 2020.

9. A monitoring and reporting plan that will be implemented to monitor the success of the corrective actions. This plan shall include monitoring methods, performance criteria, and a reporting schedule.

Statutory Authority and Potential Administrative Civil Liability

The Water Board reserves the right to take any enforcement action authorized by law, including issuance of a cease and desist order, a cleanup and abatement order, or seeking monetary penalties pursuant to Water Code sections 13261, 13265, 13267, 13308, 13350, 13385, 13376,

and/or 13399. Collectively, these provisions authorize the Water Board to request information and/or impose penalties as described below.

The requirement for information as technical reports is made pursuant to Water Code section 13267. Failure to respond or late response to the section 13267 request for technical reports may subject the owner to a monetary penalty (administrative civil liability) imposed by the Water Board up to a maximum amount of $1,000 per day.

For failure to submit an acceptable ROWD, the Water Board may impose a penalty, pursuant to Water Code section 13261, of up to $1,000 per day you have not submitted an acceptable ROWD.

For the violation of Discharge Prohibitions 7 and 9, the Water Board may impose a penalty, pursuant to Water Code section 13350, of up to $5,000 per day or up to $10 per gallon of discharge for each violation.

The Water Board requirements related to Construction Stormwater General Permit coverage are made pursuant to California Water Code sections 13399.30 and 13376. For failure to obtain coverage under the Permit, or sufficiently demonstrate that the Permit does not apply to your facility, the Water Board may impose a penalty of not less than $5,000 per year of noncompliance or fraction thereof, pursuant to Water Code section 13399.33(a)(1). The Water Board may also impose penalties under Water Code sections 13385(a)(1) and 13385(c)(1), of up to $10,000 for each day in which each violation occurs, beginning from the date that the violation first occurred.

Alternatively, we may refer such matters to the Office of the Attorney General for prosecution and seek higher penalties.

When determining whether to pursue enforcement action for noncompliance, we will consider how promptly corrective action is taken and the effectiveness of the corrective measures.

Additional Assistance

If you have questions regarding the Construction Stormwater General Permit, please contact Elyse Heilshorn of my staff via email to elyse.heilshorn@waterboards.ca.gov or at 510-622-2329.

If you have questions regarding the 13267 technical report requirements, please contact Agnes Farres of my staff via email to agnes.farres@waterboards.ca.gov or at 510-622-2401.

Sincerely,

Keith H. Lichten,
Division Chief
2020.02.07
10:46:52 -08'00'

for Michael Montgomery
Executive Officer

Attachments:

1) November 18, 2019, Notice of Violation for Placement of Fill in Waters of the State, Dhillon Property, Solano County
2) November 12, 2019, Inspection Report
3) 13267 Fact Sheet

cc (via email):

Army Corps of Engineers, San Francisco Regulatory Branch:
William Connor, william.m.connor@usace.army.mil

City of Vallejo Public Works Department:
Dana Blatner, dblatner@ci.vallejo.ca.us
Jeanine Jackson, jeanine.jackson@cityofvallejo.net

BCDC:
Matthew Trujillo, matthew.trujillo@bcdc.ca.gov

San Francisco Bay Regional Water Board:
Agnes Farres, Agnes.Farres@waterboards.ca.gov
Elyse Heilshorn, Elyse.Heilshorn@waterboards.ca.gov
Margaret Monahan, Margaret.Monahan@waterboards.ca.gov

CALIFORNIA
Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

Sent via certified mail

November 18, 2019
CIWQS Place ID 862784

Param Dhillon and Amandeep Dhillon
2225 Ralmar Avenue
East Palo Alto, CA 94303

Subject: Notice of Violation for Placement of Fill in Waters of the State, Dhillon Property, Solano County

Dear Param Dhillon and Amandeep Dhillon:

We are sending you this letter because you are listed as property owners for the property located on the east side of Sonoma Boulevard between Yolano Drive and Sereno Drive in Vallejo, Solano County (APN 0052-160-090). This letter provides formal notice that you have violated the Federal Water Pollution Control Act (Clean Water Act), California Water Code (Water Code), and the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) by placing fill into waters of the State at the subject property.

Violation

San Francisco Bay Regional Water Quality Control Board (Water Board) staff inspected the subject property on November 12, 2019, and observed evidence of recent construction activities, including disking, grading, and placement of fill on wetlands. Enclosed is our inspection report including site photographs and Google Earth imagery. These activities have discharged waste into waters of the State and are creating or threatening to create conditions of pollution or nuisance. The discharge of fill material at the subject property violates both state and federal law.

Under state law, Water Code section 13260 requires any person who discharges, or proposes to discharge, waste that could affect waters of the State to submit a report of waste discharge (ROWD). Water Code section 13264 prohibits the discharge of waste prior to filing a ROWD or obtaining waste discharge requirements. We have no record of having received a Report of Waste Discharge (ROWD) for these activities, nor has the Water Board issued Waste Discharge Requirements (WDRs) for them. Accordingly, you are violating Water Code sections 13260 and 13264.

Basin Plan Prohibition No. 7 prohibits the discharge of "rubbish, refuse, bark, sawdust, or other solid wastes" into surface waters and Basin Plan Prohibition No. 9 prohibits the discharge of "silt, sand, clay, or other earthen materials from any activity" where they unreasonably affect or threaten to affect beneficial uses of surface waters. Water from wetlands at the subject property

discharges to White Slough, which has the beneficial uses listed below. By the tributary rule, a tributary to a listed water body has the beneficial uses of that water body. White Slough, and thus the site's wetlands, have the following beneficial uses: Commercial and Sport Fishing; Estuarine Habitat; Fish Migration; Preservation of Rare and Endangered Species; Fish Spawning: Wildlife Habitat; Water Contact Recreation; and Non-Contact Water Recreation. The discharge of waste material and/or earthen material into these wetlands unreasonably affects these beneficial uses. Accordingly, you have violated Basin Plan Prohibitions 7 and 9.

Under federal law, your conduct violates Clean Water Act sections 301 and 401, which prohibit the discharge of pollutants into Waters of the United States without a dredge-and-fill permit and without a water quality certification. Clean Water Act section 301 requires a permit, issued pursuant to regulations under section 404, prior to the discharge of fill material into waters of the United States. The U.S. Army Corps of Engineers is responsible for issuing section 404 permits, and the Water Board is responsible for certifying the Corps' permits pursuant to Clean Water Act section 401. We have not issued a certification of a Corps permit for your project and we are not aware that you have sought or obtained a section 404 permit from the Corps.

Actions Required

You must contact the Water Board immediately to discuss and obtain approval to remove the imported fill material and stabilize the site with appropriate erosion and sediment controls. Please be advised that we intend to issue a cleanup and abatement order pursuant to Water Code section 13304 that will require you to correct and mitigate for the effects of this violation. These actions are likely to require regulatory agency approvals beforehand and may require the expertise of qualified licensed professionals, where applicable. You must cease and desist all activities that cause, or threaten to cause, the discharge of waste to waters of the State or create a condition of pollution or nuisance or you risk facing significant penalties under Water Code sections 13261,13265, 13308, 13350, and 13385.

Statutory Liability

The Water Board reserves the right to take any enforcement action authorized by law, including issuance of a cease and desist order, a cleanup and abatement order, or seeking monetary penalties pursuant to Water Code sections 13261, 13265, 13308, 13350, and/or 13385(a). Collectively, these provisions authorize the Water Board Board to impose penalties of up to $10,000 per day and $10 per gallon of material discharged in excess of 1,000 gallons, and a superior court to impose penalties of up to $25,000 per day and $25 per gallon of material discharged in excess of 1,000 gallons.

Please contact Agnes Farres immediately at 510.622.2401 or agnes.farres@waterboards.ca.gov to discuss next steps to resolve this issue.

Sincerely,

for Michael Montgomery
Executive Officer

Enclosure: November 12, 2019, Inspection Report

Cc (via email):

Corps, SF Regulatory Branch:

William Connor, william.m.connor@usace.army.mil

City of Vallejo Public Works Department:

Dana Blatner, dblatner@ci.vallejo.ca.us

Jeanine Jackson, jeanine.jackson@cityofvallejo.net

Water Board:

Elyse Heilshorn, elyse.heilshorn@waterboards.ca.gov

San Francisco Bay Regional Water Quality Control Board

INSPECTION REPORT

To: Dhillon Property Case File
Place ID 862784

November 18, 2019

From: Agnes Farres, Environmental Scientist

Subject: Inspection of Dhillon Property, Solano County

On November 12, 2019, San Francisco Bay Regional Water Quality Control Board (Water Board) staff performed an inspection of the Dhillon Property, a 7.6-acre parcel located on the east side of Sonoma Boulevard with Yolano Drive to the north, Sereno Drive to the south, and White Slough to the west in Vallejo, Solano County.

Agnes Farres and Elyse Heilshorn conducted the site inspection along with City of Vallejo Public Works Department staff (Dana Blatner and Jeanine Jackson), and Army Corps of Engineers staff (William Connor). The inspection purpose was to assess site conditions after the City received a complaint on October 28, 2019 regarding unpermitted grading in an environmentally sensitive area.

Inspection Summary & Observations

We made the following observations from the roadside: (1) the entire property is below the elevation of Sonoma Boulevard; (2) most of the site had recently been disked and graded; (3) imported fill material, which included concrete rubble and other debris, was placed on-site; and (4) wetland vegetation (saltgrass, pickleweed, and tule) along the perimeter of the property. A review of Google Earth historical imagery shows that a significant portion of the site is ponded during the winter/spring season and supports aquatic habitat.

Based on the presence of wetland vegetation and evidence of hydrology from Google Earth historical imagery, we determined that a significant portion of the site is waters of the State. Further, recent activities including disking, grading, and placement of imported fill material have resulted in impacts to waters of the State. With the onset of the rainy season, additional impacts will likely occur from erosion and sedimentation.

To avoid additional impacts to waters of the State, the imported fill material should be removed from the site as soon as possible and the site should be stabilized with appropriate erosion and sediment controls.

Attachment A – Site Photographs
Attachment B – Google Earth imagery

Attachment A – Site Photographs
Dhillon Property East of Sonoma Boulevard, Vallejo, Solano County

Photo 1. Recent disking and grading on the Dhillon Property.

Photo 2. Imported fill material placed at the Dhillon Property.

Attachment B – Google Earth Imagery
Dhillon Property East of Sonoma Boulevard, Vallejo, Solano County

Location of Dhillon Property – east of Sonoma Boulevard and White Slough, with Yolano Drive to the north and Sereno Drive to the south.

Attachment B – Google Earth Imagery
Dhillon Property East of Sonoma Boulevard, Vallejo, Solano County

Google Earth image of the Dhillon Property dated March 2019, showing evidence of ponding, wetland vegetation, and wildlife use (waterfowl swimming towards the left of the photo).

Fact Sheet – Requirements for Submitting Technical Reports Under Section 13267 of the California Water Code

What does it mean when the Regional Water Board requires a technical report?

Section 13267[1] of the California Water Code provides that "...the regional board may require that any person who has discharged, discharges, or who is suspected of having discharged or discharging, or who proposes to discharge waste...that could affect the quality of waters...shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires."

This requirement for a technical report seems to mean that I am guilty of something, or at least responsible for cleaning something up. What if that is not so?

The requirement for a technical report is a tool the Regional Water Board uses to investigate water quality issues or problems. The information provided can be used by the Regional Water Board to clarify whether a given party has responsibility.

Are there limits to what the Regional Water Board can ask for?

Yes. The information required must relate to an actual or suspected or proposed discharge of waste (including discharges of waste where the initial discharge occurred many years ago), and the burden of compliance must bear a reasonable relationship to the need for the report and the benefits obtained. The Regional Water Board is required to explain the reasons for its requirement.

What if I can provide the information, but not by the date specified?

A time extension may be given for good cause. Your request should be promptly submitted in writing, giving reasons.

Are there penalties if I don't comply?

Depending on the situation, the Regional Water Board can impose a fine of up to $5,000 per day, and a court can impose fines of up to $25,000 per day as well as criminal penalties. A person who submits false information or fails to comply with a requirement to submit a technical report may be found guilty of a misdemeanor. For some reports, submission of false information may be a felony.

Do I have to use a consultant or attorney to comply?

There is no legal requirement for this, but as a practical matter, in most cases the specialized nature of the information required makes use of a consultant and/or attorney advisable.

What if I disagree with the 13267 requirements and the Regional Water Board staff will not change the requirement and/or date to comply?

You may ask that the Regional Water Board reconsider the requirement, and/or submit a petition to the State Water Resources Control Board. See California Water Code sections 13320 and 13321 for details. A request for reconsideration to the Regional Water Board does not affect the 30-day deadline within which to file a petition to the State Water Resources Control Board.

If I have more questions, whom do I ask?

Requirements for technical reports include the name, telephone number, and email address of the Regional Water Board staff contact.

Revised March 2014

[1] All code sections referenced herein can be found by going to California Legislative Code Section search at http://leginfo.legislature.ca.gov/faces/codes.xhtml

Section 7 – Provision C.7. Public Information and Outreach

C.7.a.iii ►Storm Drain Inlet Marking

(For the FY 2019-20 Annual Report only) Provide the following information:				
State the number of municipally-maintained storm drain inlets in your jurisdiction				
Are at least 80 percent of municipality-maintained storm drain inlets legibly labeled with an appropriate stormwater pollution prevention message?	X	Yes		No
Is a picture of a labeled municipality-maintained inlet attached?	X	Yes		No
Did all newly approved privately-maintained streets have storm drain inlet markings verified prior to acceptance of the project?	X	Yes		No
Were the storm drain inlet markings on privately-maintained streets required to be maintained through the development maintenance entity?	X	Yes		No

C.7.b.i.1 ►Outreach Campaign

Summarize outreach campaign. Include details such as messages, creative developed, and outreach media used. The detailed outreach campaign report may be included as an attachment. If outreach campaign is being done by participation in a countywide or regional program, refer to the separate countywide or regional Annual Report.

Summary:

1. The COVID-19 pandemic that hit the United States beginning in February 2020 significantly impacted all facets of the Vallejo Water Conservation Program in FY 19/20. The two conservation program elements impacted the most by the pandemic were water efficiency public outreach and the water school education program. Many public events had to be canceled and the majority of the program metrics/numbers contained in this FY 2019/2020 report occurred before statewide "Shelter-in-Place" instructions were issued.
2. Prior to implementing COVID-19 social distancing protocols, several public outreach events were completed that targeted reduced household indoor water use and improved outdoor landscape water efficiency. Public outreach water conservation advertisements were first published in the Greater Vallejo Recreation District (GVRD) Activity Guide in the fall season of 2019. Two subsequent planned conservation advertisements scheduled for distribution in the spring and summer of 2020 were suspended by GVRD due to the COVID-19 virus. Our GVRD advertisement campaign focused on water conservation, landscape water efficiency, water rebates and other general water customer information. Two additional water conservation flyers were successfully published in the local Grapevine Magazine that highlighted free drought tolerant landscape workshops and ongoing water conservation rebate opportunities.

3. We also published water related ads on the City's Facebook and NeXT door social media pages and in multiple City Manager's bi-weekly newsletters. In addition, we initiated a Mayoral Proclamation celebrating Drinking Water Week 2020 and placed notices in customer water bills highlighting landscape workshops and our popular home water survey program.
4. The Department also continues to sponsor and promote a popular water-efficient landscape conversion and rebate program targeted at low income and senior citizens.
5. Finally, the Water Department held 9 public outreach events throughout the year in various locations where we addressed questions and concerns related to Vallejo drinking water infrastructure and other drinking water and water conservation topics. The civic and community groups involved included; the Vallejo Unified School Board, African American Alliance, Cal Maritime Academy and others.

C.7.b.iii.2 ►Post-Campaign Effectiveness Assessment/Evaluation

(For the Annual Report following the post-campaign effectiveness assessment/evaluation*)* Submit a report of the effectiveness assessment/evaluation completed, which, at a minimum, should include the following information:

1) A description of the outreach campaign
2) A summary of how the effectiveness assessment/evaluation was implemented
3) An analysis of the effectiveness assessment/evaluation results
4) A discussion of the measurable changes in awareness and behavior achieved
5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages

If campaign implementation and effectiveness assessment were done Countywide or regionally, refer to a Countywide or regional submittal that contains the information described above.

	See attached effectiveness assessment/evaluation report
X	See Countywide or regional submittal (see VFWD Annual Report)

C.7.c. Stormwater Pollution Prevention Education

Water related public outreach and community events were significantly curtailed due to COVID-19, but information promoting efficient water use and outdoor irrigation practices was still distributed to the public at several events before the shelter-at-home order was initiated. Examples of where information was provided include: Vallejo Public Library, Florence Douglas Senior Center, Cal Maritime Academy, Vallejo Unified School Board meetings, professional training seminars (QWEL landscape workshops). All events primarily focused on improving water efficiency and increasing knowledge and awareness of our drinking water system infrastructure. See VFWD Annual Report for more information.

C.7.d ►Public Outreach and Citizen Involvement Events

Describe general approach to event selection. Provide a list of outreach materials and giveaways distributed.
Use the following table for reporting and evaluating public outreach events

Event Details	Description (messages, audience)	Evaluation of Effectiveness
City 4th of July Parade Float & Parade 7/4/19	Community event: target was homeowners and general public. Provided information and trust in the City's clean drinking water.	Recurring invitation by hosting agency - Event attendance estimated at 1,500 Direct customer feedback. Multi-year reduction in city-wide water use.
Water Treatment Plant Community Tours 8/22/19	Public event outlining the drinking water process and importance of water quality testing throughout the system.	Positive feedback from participants.
Cal Maritime Academy Clean Air Day Celebration 10/2/19	Public Outreach Partnership with local Educational Institutions	Positive feedback from school administrators and requests for continued participation.
Vallejo School Board Water Presentations 8/21/19 and 9/14/19	Provided Board members and general public information about the Water Department and the services we provide.	Requests by organizer to continue participation and commitment.
Vallejo Career Fair Outreach 1/24/2020	Public event at the State/local EDD office to help educate general public on water employment opportunities.	Positive feedback from community and organizers regarding continued service offerings and expanding events in the future.
Vallejo 2020 Earth Day Festival, 2020 Public Works Day, and 2020 Ag Day Events. All Events Canceled.	Public events for homeowners, students, and general public. Provide water conservation information and water saving devices.	All of these scheduled public events were cancelled in 2020 due to COVID-19 virus.

C.7.e. ►Watershed Stewardship Collaborative Efforts

Summarize watershed stewardship collaborative efforts and/or refer to a regional report that provides details. Describe the level of effort and support given (e.g., funding only, active participation etc.). State efforts undertaken and the results of these efforts. If this activity is done regionally refer to a regional report.

Evaluate effectiveness by describing the following:

- Efforts undertaken
- Major accomplishments

Summary:

- Continued partnership with the Florence Douglas Senior Center to provide a series of free water-wise landscape workshops for residential water customers. A portion of the discussion included topics associated with pest control and minimizing pesticide applications. The Water Department also provided handouts that stress reduced use of pesticides to control pests and encourage the use of "Bay Friendly", native plants which have developed natural defenses to ward off insects pests and diseases. Additionally, the Water Department co-sponsored and advertised for Vallejo Sustainable Solano Garden Tours held on Mare Island in February 2020. The Department continues to meet regularly with representative from Sustainable Solano and promote sustainable water conservation practices.

- The City Water Department continues to work closely with the Vallejo Flood and Wastewater District to educate the public regarding pollution and storm water run-off by coordinating events and passing out education materials at landscape workshops, Project WET teacher trainings, and other events.

- The City Water Department continues to coordinate drinking water conservation efforts with local environmental conservation groups and the Vallejo Unified School District. We attend and participate in water related planning meetings held by the Greater Vallejo Recreation District (GVRD). We communicate directly with GVRD and School District representatives responsible for outdoor water use. The Department continues to fund a large landscape water budgeting web-based tool for monitoring and controlling water use for large landscapes at parks and schools.

- The Water Department attended City of Vallejo Unified School Board meetings and made presentations to the board members regarding the city's water system. We continue to support the District's water education curriculum in Vallejo middle school classrooms, including visits to Loma Vista Farm. The City also provided funding for field trips and needed supplies and made watershed presentations to school classrooms.

In collaboration with Solano County Water Agency, the City Water Department administers a residential water survey program where landscape water sprinkler discharge is closely analyzed to maximize efficiency and help reduce water waste and run-off. It's estimated that the water savings from each home water survey performed saves an average of around 50 gallons per day through leak detection and/or reduced irrigation scheduling.

C.7.f. ►**School**-Age Children Outreach

Summarize school-age children outreach programs implemented. A detailed report may be included as an attachment.
Use the following table for reporting school-age children outreach efforts.

Program Details	Focus & Short Description	Number of Students/Teachers reached	Evaluation of Effectiveness
Presentations - School Water Education Program – interactive classroom presentations -SWEP -SRCD -Loma Vista Farm -Solano Land Trust	Environmental Education with focus on water conservation	99 class presentations 2,767 Student Contacts, via SWEP annual report	Teacher surveys reflect continued 100% satisfaction with program
A***ssemblies*** - Zun-Zun and Rock Steady Juggling Assemblies. -Sue Frost -Loma Vista	Student Assemblies with Water Topics and Environmental Education Focus	29 Assemblies, 8,450 student contacts – via SWEP annual report	Continued backlog in service requests and continued 100% positive feedback recorded on teacher surveys
Field Trips - Sponsorship and coordination of environmental field trips to local water reservoir/watershed	Loma Vista Farm field trips, Water Ways, Solano Land Trust, City Conservation Events	12 Field Trips 749 Student Contacts Via SWEP annual report	Teachers continued request for program services continues to exceed allocated budget
Contests - Sponsorship of High School and Middle School Water Conservation Video Contest	Sponsored the Countywide 2020 water conservation video contest	Only 19 entries in 2020 due to COVID-19 but one top scoring video was awarded to St. Patrick HS in Vallejo	Completed water videos – Winners videos are posted on SCWA website
Workshops - Project Wet for Teachers Workshops	Environmental education for teachers – Focuses on providing interactive water education training to faculty	2 Workshops – Oct 26, 2019 and Feb 22, 2020	Teacher feedback forms
Outreach – -Vallejo Career Fair Event at local EED office and planned Earth Day Activities at Cal Maritime Academy (ccx)	Public and Student Job Mentoring	100s of participants and students in attendance	Public Feedback and vocal appreciation from committee members

C.7.g. ►Outreach to Municipal Officials
(For FY 19-20 Annual Report only) Summarize outreach conducted to increase the overall awareness of stormwater and/or watershed messages among municipal officials. See VFWD Annual Report for additional information. VFWD Board Members are all on the City of Vallejo's City Council.
Summary: The City of Vallejo reviewed and passed a Resolution on September 24, 2019 which certified the City of Vallejo's Green infrastructure Plan and authorized funding for the Reasonable Assurance Analysis for 2020. By passing the attached Resolution, the City Council certified that it is familiar with the principles of the plan and supports all staff efforts to include green infrastructure and stormwater measures in both City and private developmental projects.

STORMDRAIN LABELS

City of Vallejo Annual Report Section C7

Section 9 – Provision C.9 Pesticides Toxicity Controls

C.9.a. ►Implement IPM Policy or Ordinance

Is your municipality implementing its IPM Policy/Ordinance and Standard Operating Procedures?	X	Yes		No

If no, explain:
NA

Report implementation of IPM BMPs by showing trends in quantities and types of pesticides used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphates, pyrethroids, carbamates fipronil, indoxacarb, diuron, and diamides. A separate report can be attached as evidence of your implementation.

Trends in Quantities and Types of Pesticide Active Ingredients Used[1]

Pesticide Category and Specific Pesticide Active Ingredient Used	Amount[2]					
	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Organophosphates						
Active Ingredient Chlorpyrifos	0	0	0	0	0	
Active Ingredient Diazinon	0	0	0	0	0	
Active Ingredient Malathion	0	0	0	0	0	
Pyrethroids (see footnote #57 for list of active ingredients)	0	0	0	0	0	
Active Ingredient Type X	0	0	0	0	0	
Active Ingredient Type Y	0	0	0	0	0	
Carbamates						
Active Ingredient Carbaryl	0	0	0	0	0	
Active Ingredient Aldicarb	0	0	0	0	0	
Fipronil						
	Amount					

[1]Includes all municipal structural and landscape pesticide usage by employees and contractors.
[2]Weight or volume of the active ingredient, using same units for the product each year. Please specify units used. The active ingredients in any pesticide are listed on the label. The list of active ingredients that need to be reported in the pyrethroids class includes: metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambdacyhalothrin, and permethrin.

Pesticide Category and Specific Pesticide Active Ingredient Used	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Indoxacarb	Reporting not required in FY 15-16	0	0	0	0	
Diuron	Reporting not required in FY 15-16	0	0	0	0	
Diamides	Reporting not required in FY 15-16	0	0	0	0	
Active Ingredient Chlorantraniliprole	0	0	0	0	0	
Active Ingredient Cyantraniliprole	0	0	0	0	0	

Reasons for increases in use of pesticides that threaten water quality:

NA

IPM Tactics and Strategies Used:

Contractors are required to staff or subcontract a certified Pest Control Advisor (CA Department of Pesticide Regulation) to identify pest management problems in the districts they service. They are also required to develop IPM Programs and submit monthly pesticide use reports for review by the City of Vallejo Landscape Inspectors.

The City considers employing alternative methods in lieu of pesticides, herbicides, and fertilizers whenever possible. The City's IPM Plan's core elements include focus on long-term prevention of pests, regular monitoring, utilizing cultural, biological, or physical management tools, and restriction of pesticide usage as a last resort after monitoring indicates a need. The City ensures pesticides, herbicides, and fertilizers are applied at proper rates and concentrations as recommended by the Manufacturer and the Federal Government. Mixing or loading pesticides and fertilizers in an area that would allow ready access of the chemical to any storm drain, culvert, or watercourse is not allowed.

The City leases large tracts of land to Greater Vallejo Recreation District (GVRD), the local recreation district, which has coordinated their IPM to have policies consistent for all open space landscaping and City maintained parks. GVRD uses wood chips and drip irrigation in planters to reduce herbicide usage. GVRD only permits the usage of herbicides with nothing greater than a "Caution" label.

C.9.b ►Train Municipal Employees

Enter the number of employees that applied or used pesticides (including herbicides) within the scope of their duties this reporting year.	8
Enter the number of these employees who received training on your IPM policy and IPM standard operating procedures within this reporting year.	8
Enter the percentage of municipal employees who apply pesticides who have received training in the IPM policy and IPM standard operating procedures within this reporting year.	100

Type of Training:

Solano County Pesticides Update seminars, PAPA (Pesticide Applicators Professional Association) seminars, staff meeting topics on pesticide use and monitoring. Landscape Inspectors have CA DPR certification in QAC or QAL.

GVRD employees receive training from PAPA seminars, local tailgate trainings, and vendor annual pesticide handler training. All employees undergo annual training in the safe use of pesticides and related health information. Subjects covered include product labels, protective wear, IPM, safety procedures, drift control, decontamination, and health related illness etc.

C.9.c ►Require Contractors to Implement IPM

Did your municipality contract with any pesticide service provider in the reporting year, for either landscaping or structural pest control?	X	Yes		No
If yes, did your municipality evaluate the contractor's list of pesticides and amounts of active ingredients used?	X	Yes		No,

If your municipality contracted with any pesticide service provider, briefly describe how contractor compliance with IPM Policy/Ordinance and SOPs was monitored

Each pest ecosystem is monitored to determine pest population, size, occurrence, and natural enemy population, if present. Staff identifies and considers possible cultural, physical, or biological actions and BMPs to implement. When contracting with Clark Pest Control, our LMD staff have tailgate meetings before sprays. The City's LMD staff, GVRD, and Grounds Maintenance also review labels, SDS, certificates, categories, permits, and recommendations before chemicals are applied. AS part of the IPM program, contractors are required to submit monthly pesticide use reports for review and monitoring by Landscape Inspectors. All records of pesticide and herbicide usage by the contractor are reviewed by City staff to ensure compliance with the IPM.

C.9.d ►Interface with County Agricultural Commissioners

Did your municipality communicate with the County Agricultural Commissioner to: (a) get input and assistance on urban pest management practices and use of pesticides or (b) inform them of water quality issues related to pesticides,		Yes	X	No

If yes, summarize the communication. If no, explain.

All LMD inspectors attend annual training hosted by Solano County Agriculture Commissioners office. This training covers laws and regulation, updates, and locations of ground water sensitive areas throughout the county. These updates and regulations are used when LMD staff receive the proposed chemicals to be used in contractors IPM plan.

Did your municipality report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire.		Yes	X	No

NA

C.9.e.ii (1) ►Public Outreach: Point of Purchase

Provide a summary of public outreach at point of purchase, and any measurable awareness and behavior changes resulting from outreach (here or in a separate report); OR reference a report of a regional effort for public outreach in which your agency participates.

Section C.9.e is the responsibility of VFWD. Please refer to the VFWD Annual Report for information on Point of Purchase and Public Outreach measures. See the C.9 Pesticides Toxicity Control section of BASMA's FY 19-20 Regional Pollutants of Concern Report for a summary of the program's participation.

The Our Water, Our World (OWOW) campaign is a region-wide partnership of wastewater and stormwater agencies, coordinated through the Bay Area Stormwater Management Agencies Association (BASMAA) with additional funding from BAPPG, to reduce the impact of pesticides on waterways. The District has been an active participant in the campaign since 1999, and our Public Information Officer serves as the ongoing OWOW project lead to BAPPG. She is currently the Chair of the BASMAA Public Information, Participation & Outreach Committee and serves on the work group that redesigned the new OWOW logo and continues to update the fact sheets.

The VFWD-sponsored Integrated Pest Management (IPM) Advocate visits the Vallejo Home Depot at least once a year to refresh shelf talkers, replenish fact sheet racks, educate store employees on the program and provide invasive pest updates, trainings, and tabling events. She interacts with customers in the aisle with questions they have about pest problems and guides them to less-toxic solutions whenever possible.

C.9.e.ii (2) ►Public Outreach: Pest Control Contracting Outreach

Provide a summary of outreach to residents who use or contract for structural pest control and landscape professionals); AND/OR reference a report of a regional effort for outreach to residents who hire pest control and landscape professionals in which your agency participates.

Summary:

Section C.9.e is the responsibility of VFWD. Please refer to the VFWD Annual Report for information on Point of Purchase and Public Outreach measures.

C.9.e.ii.(3) ►Public Outreach: Pest Control Operators

Provide a summary of public outreach to pest control operators and landscapers and reduced pesticide use (here or in a separate report); AND/OR reference a report of a regional effort for outreach to pest control operators and landscapers in which your agency participates.

Summary:

Section C.9.e is the responsibility of VFWD. Please refer to the VFWD Annual Report for information on Point of Purchase and Public Outreach measures.

C.9.f ►Track and Participate in Relevant Regulatory Processes

Summarize participation efforts, information submitted, and how regulatory actions were affected; AND/OR reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected.

Summary:

"During FY 19-20, we participated in regulatory processes related to pesticides through contributions to the countywide Program, BASMAA and CASQA. For additional information, see the Regional Report submitted by BASMAA on behalf of all MRP Permittees."

Section 10 - Provision C.10 Trash Load Reduction

C.10.a.i ► **Trash Load Reduction Summary**

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to Trash Full Capture Systems (as reported C.10.b.i)	6.9% (43.6%)*
Percent Trash Reduction in all TMAs due to Control Measures Other than Trash Full Capture Systems (as reported in C.10.b.ii)[1]	42.7%
Percent Trash Reduction due to Jurisdictional-wide Source Control Actions (as reported in C.10.b.iv)	5.8%
SubTotal for Above Actions	55.4%
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	0.5%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	0.0%
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2019-20	55.9%

Discussion of Trash Load Reduction Calculation:

In September 2017, the City of Vallejo (City) and the Vallejo Flood and Wastewater District (District) reported a trash load reduction less than 70%, the performance milestone that needed to be achieve by July 1, 2017 by all MRP Permittees. As a result, the Water Board issued a Cease and Desist Order (CDO) to the District and the City in June 2018. The CDO required the District and City to:

1) Implement trash load reduction control actions within all significant trash generating areas and prohibit trash discharge in a timely manner sufficient to reach 70% trash load reduction and 80% trash load reduction by July 1, 2019.
2) Submit with the FY 2017-18 Annual Report (September 30, 2018) and subsequently by March 30, 2019, a brief narrative Supplemental Report that describes the Permittees' progress toward meeting the trash load reduction requirements, and includes:
   a. For the proposed full trash capture device installations the status of the partnership agreement with Caltrans, project funding, design and contracting of new full trash capture devices, permitting, and construction
   b. The status of additional trash reduction actions that will be verified by on land visual trash assessments (OVTAs);
   c. The status of OVTAs (e.g., the trash management areas where OVTAs have been or will be completed, number of assessments completed, and schedule for completion of additional OVTAs); and

[1] See Appendix 10-1 for changes between 2009 and FY 19-20 in trash generation by TMA as a result of Full Capture Systems and Other Measures.

d. The outcome of the OVTAs, including any change in trash status for each trash management area and the resulting change in city-wide total trash load reduction associated with OVTAs.

3) Progress toward meeting the 70% and 80% trash load reduction requirement by July 1, 2019, including the resulting city-wide total trash load reduction (percent); and

4) If needed, a description of additional trash load reduction control actions, beyond those identified in the CDO, and a schedule for their implementation, sufficient to achieve the required 70% and 80% reduction by July 1, 2019.

In response to the CDO, the District and City:

- Continued to implement trash control measures described in the FY 16-17 Annual Report.
- Began planning for the construction of three large trash full capture systems, which collectively would address enough of a trash load to achieve the 80% trash load reduction milestone included in the MRP.
- Submitted supplemental reports to the Water Board in September 2018 and March 2019.
- Met with Water Board staff multiple times to discuss the status of additional control measures required to achieve the 80% trash load reduction.
- Submitted communications to Water Board staff in writing regarding the unanticipated delays in the construction schedule for the three new large full capture systems.

Because the trash full capture systems under construction are located downstream of Lake Chabot and Lake Dalwick, Water Board staff requested that the City conduct a study to evaluate the feasibility of implementing additional trash controls in areas directly upstream of the lakes, and submit the results of the study with the FY 2019-20 Annual Report. The feasibility evaluation report is included as Appendix 10-2.

As described in the District's letter to Water Board staff dated June 17, 2019, the District documented the unanticipated construction project delays that have had significant impacts on the District's/City's ability to comply with the trash load reduction milestones included in both the MRP and CDO (i.e., 80% by July 1, 2019). The District's letter dated June 17, 2019 to Water Board staff was included as Appendix 10-2 in the FY 18-19 Annual Report. The District approved the construction contract for the three systems in fall 2019. Construction preparation and construction began in spring 2020. Construction proceeded through the summer but the project has since run into delays. The precast trash capture devices have not been delivered on schedule and the devices may not be installed before the end of November 2020. If the devices cannot be installed before significant rains begin, the project may be delayed until the spring of 2021.

In FY 19-20, the Vallejo Flood Control and Wastewater District (VFWD) and the City of Vallejo (City) attained and report 55.9% trash load reduction (including trash offsets and excluding the three new full capture systems).

*Once the three trash capture systems are installed, the percent trash load reduction in all Trash Management Areas (TMAs) due to trash full Capture Systems (as reported C.10.b.i) will be 43.6%, an increase of nearly 37%.

The most recent version of the City's Baseline Trash Generation Map can be downloaded at:
https://www.vallejowastewater.org/SitePages/stormwater.aspx

C.10.a.iii ► Mandatory Trash Full Capture Systems

Provide the following:

1) Total number and types of full capture systems (publicly and privately-owned) installed prior to FY 19-20, during FY 19-20, and to-date, including inlet-based and large flow-through or end-of-pipe systems, and qualifying low impact development (LID) required by permit provision C.3.
2) Total land area (acres) treated by full capture systems for population-based Permittees and total number of systems for non-population-based Permittees compared to the total required by the permit.

Type of System	# of Systems	Areas Treated (Acres)
Installed in FY 19-20		
None	--	--
Installed Prior to FY 19-20		
Kristar Nettech Full Capture Devices (Public)	7	1,467
Planned for Installations post FY 19-20		
TrashTrap by StormTrap Technologies	3	7,992
Total for all Systems Installed To-date	7	1467* (7,992) **
Treatment Acreage Required by Permit (Population-based Permittees)		168
Total # of Systems Required by Permit (Non-population-based Permittees)		NA

* A recalculation of the areas treated (acres) by the 7 Kristar Nettech Full Capture Devices (Public) occurred in early 2019. The areas treated (acres) presented within the FY 18-19 Annual Report have decreased from 1,670 acres to 1,467 acres. The jurisdictional-wide trash reduction (%) for the 7 devices did not change since the acres removed were low trash generating.

** Once the three proposed trash capture systems are installed, the estimated treated area (acres) will be 7,992 acres.

C.10.b.i ► Trash Reduction - Full Capture Systems

Provide the following:

1) Jurisdictional-wide trash reduction in FY 19-20 attributable to trash full capture systems implemented in each TMA;
2) The total number of full capture systems installed to-date in your jurisdiction;
3) The percentage of systems in FY 19-20 that exhibited significant plugged/blinded screens or were >50% full when inspected or maintained;
4) A narrative summary of any maintenance issues and the corrective actions taken to avoid future full capture system performance issues; and
5) A certification that each full capture system is operated and maintained to meet the full capture system requirements in the permit.

TMA	Jurisdiction-wide Reduction (%)	Total # of Full Capture Systems	% of Systems Exhibiting Plugged/Blinded Screens or >50% full in FY 19-20	Summary of Maintenance Issues and Corrective Actions
1	5.4%	7	0%	The trash capture nets were inspected regularly and maintained by a VFWD contractor as needed and prior to predicted rain events. Nets are replaced as needed. Maintenance records are kept by the VFWD. No maintenance issues arose when servicing the nets in FY 2019-20.
2	0.0%			
3	0.0%			
4	0.0%			
5	0.0%			
6	0.1%			
7	0.0%			
8	0.0%			
9	0.0%			
10	0.0%			
11U*	1.4%			
Total	6.9% (43.6%) **			

Certification Statement: The Vallejo Flood & Wastewater District certifies that a full capture system maintenance and operation program is currently being implemented to maintain all applicable systems in a manner that meets the full capture system requirements included in the Permit.

* This TMA is entirely comprised of non-jurisdictional land area within the unincorporated portion of Solano County that is addressed via trash fill capture systems owned and operated by VFWD.

**Once the three proposed trash capture systems are installed, the trash load reduction associated with full capture systems will increase to 43.6%.

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART A)

Provide a summary of trash control actions other than full capture systems or jurisdictional source controls that were implemented within each TMA, including the types of actions, levels and areal extent of implementation, and whether actions are new, including initiation date.

TMA	Summary of Trash Control Actions Other than Full Capture Systems
Various	Public Education and Outreach Programs Targeted at Trash Reduction and Implemented post-MRP Adoption: The District installed no littering signs and a dog waste disposal bag dispenser at a local waterfront area. The District has also installed trash bins and educational signage at a pedestrian path near White Slough on the North end of Vallejo. Unfortunately the educational signage has been subject to frequent graffiti and has been subsequently removed.
Various	On-Land Cleanup and Illegal Dumping Abatement Actions: The City of Vallejo (Public Works Maintenance Division, Police Department, and Code Enforcement Division), Caltrans, Vallejo City Unified School District, Vallejo Flood and Wastewater District, Greater Vallejo Recreational District, Vallejo Watershed Alliance, California Maritime Academy, Six Flags Discovery Kingdom and the Vallejo Chamber of Commerce have partnered with members of the community to clean up, maintain, and landscape all highly visible entrances and major thoroughfares throughout the City of Vallejo. This interagency partnership collaborated on each phased activity to pick up trash, cut down overgrown vegetation, trim trees, remove graffiti, and perform other enhancement tasks to make the target entrances and thoroughfares attractive to citizens, businesses, and visitors. Caltrans and the Vallejo Public Works Maintenance Division primarily address significant blight on public rights-of-way and provide a thorough clean-up of these areas. Meanwhile, the City's Code Enforcement Division plays an important role by conducting educational and enforcement activity for weeds, graffiti, litter, junk, encampments, and other blight on the private properties that abut each phased entrance and thoroughfare area in order to reduce the litter and blight from reoccurring. While not captured in the trash reduction numbers, the Vallejo Permittees need to emphasize that almost 850 tons of illegally dumped materials were picked up and disposed of in an environmentally appropriate manner in FY 19-20. A fair portion of this is materials that is related to homeless encampments. Many homeless encampments are along waterways, so removing this material truly does prevent much of it from entering the receiving waters. Additionally, the City offers a free "Dump Day" for its residents to bring to a central location. This year, residents brought almost 105 tons of material which may not have been disposed of properly otherwise, including 13 tons of e-waste which is of great concern if it ends up in the waterways.
All	Enhanced Street Sweeping: In FY 16-17, City doubled its street sweeping frequency to 2x/month in residential areas. The downtown area continues to be swept at 3x/ week. These increases in frequencies is anticipated to provide significant additional removal of trash from streets in the City. Additionally, the City has contracted with a parking enforcement consultant who will be working with City staff to enhance enforcement of City parking restrictions on street sweeping days.

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART B)

Provide the following:

1) A summary of the on-land visual assessments in each TMA (or control measure area), including the street miles or acres available for assessment (i.e., those associated with VH, H, or M trash generation areas not treated by full capture systems), the street miles or acres assessed, the % of available street miles or acres assessed, and the average number of assessments conducted per site within the TMA; and
2) Percent jurisdictional-wide trash reduction in FY 19-20 attributable to trash management actions other than full capture systems implemented in each TMA; OR
3) Indicate that no on-land visual assessments were performed.

If no on-land visual assessments were performed, check here and state why:	X	Explanation: No OVTAs were conducted in TMA 9 or 11U in FY 19-20 because the land areas in these TMAs are either low trash generating or fully covered by full capture systems, as depicted on the Vallejo baseline trash generation map.

TMA ID or (*as applicable*) Control Measure Area	Total Street Miles[2] Available for Assessment	Summary of On-land Visual Assessments			Jurisdictional-wide Reduction (%)
		Street Miles Assessed	% of Available Street Miles Assessed	Avg. # of Assessments Conducted at Each Site	
1	6.1	0.8	12.9%	4.3	0.8%
2	5.5	0.6	10.9%	5.0	4.4%
3	71.3	6.6	9.3%	4.9	26.3%
4	27.1	2.8	10.4%	4.3	3.8%
5	21.1	2.0	9.6%	6.0	2.4%
6	11.2	1.1	10.1%	4.8	2.3%
7	6.6	0.8	11.6%	5.0	2.4%
8	14.9	1.6	10.5%	5.1	0.0%
9	0.0	NA	NA	NA	NA
10	0.7	0.4	54.1%	5.0	0.3%
11U	NA	NA	NA	NA	NA
	Total	16.7	--	--	42.7%

[2] Linear feet are defined as the street length and do not include street median curbs.

C.10.b.iv ► Trash Reduction – Source Controls

Provide a description of each jurisdictional-wide trash source control action implemented to-date. For each control action, identify the trash reduction evaluation method(s) used to demonstrate on-going reductions, summarize the results of the evaluation(s), and estimate the associated reduction of trash within your jurisdictional area. Note: There is a maximum of 10% total credit for source controls.

Source Control Action	Summary Description & Dominant Trash Sources and Types Targeted	Evaluation/Enforcement Method(s)	Summary of Evaluation/Enforcement Results To-date	% Reduction
Single Use Bag Ban[3]	On November 8, 2016, California voters approved Proposition 67, the statewide Single-Use Carryout Bag Ban. As a result, the new law went into effect in FY 16-17 and most grocery stores, retail stores with a pharmacy, convenience stores, food marts, and liquor stores are no longer able to provide single-use plastic carry-out bags to their customers.	The City of Vallejo and the State of California enforce the bag ban. Violations are reported to either the City or the California Attorney General's Office using its on-line reporting form. A store or producer of reusable grocery bags that violates the law may be fined $1,000 per day for the first violation, $2,000 per day for the second violation, and $5,000 per day for the third and subsequent violations. Although efforts to evaluate reductions in single use bags in Vallejo have not yet occurred, an applicable study was recently conducted in Santa Clara County to determine whether the current levels of litter-prone items (i.e., single-use bags and EPS food service ware) in stormwater have changed since local ordinances prohibiting the distribution of these items were put into effect. Because the ordinances put into place in Santa Clara County are very similar to the statewide bag ban, the results of the study are applicable to the City. For additional details on the study design, methods, and results, see Appendix 10-1 of the SCVURPPP Report at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/2016_AR/Santa_Clara/SCVURPPP_2015-16_MRP_AR.pdf	The City has received only a few complaints about stores not complying with the statewide law. As complaints occur, the City will respond to the best of its ability. According to the BASMAA "San Francisco Bay Area Stormwater Trash Generation Rates" report finalized on June 20, 2014, single use carryout bags contribute about 8% of the total litter loading to local receiving waters by municipal stormwater. Results from the Santa Clara County Study, which characterized of trash in full trash capture systems pre- and post-ordinance in the Santa Clara Valley, 72% fewer single-use bags are observed in stormwater since ordinances have gone into effect. Based on the results of the BASMAA and SCVURPPP studies, the City and District estimate an approximate 72% reduction in the number of single-use bags in stormwater, which equates to a 5.8% (i.e., 72% x 8%) reduction of trash discharged from the Vallejo's stormwater conveyance system.	5.8%

[3] In March 2020, the Solano County Public Health Officer issued a Shelter-at-Home Order due to the COVID-19 pandemic. As part of that Order, the County disallowed customers to bring reusable bags to businesses. In July 2020, the County Public Health Officer reissued a Continue to Shelter-at-Home Order, which allows customers to bring reusable bags from home. Based on the results of OVTAs conducted in the City of Vallejo in the spring 2020, the number of single-use carryout bags observed on streets and sidewalks did not appear to increase as a result of the County Public Health Officer's Order.

C.10.b.v ► Trash Reduction – Receiving Water Monitoring

Report on the progress of developing and testing your agency's trash receiving water monitoring program.

Development and testing of the trash receiving water monitoring program occurred through a regional project coordinated through the Bay Area Stormwater Management Agencies Association (BASMAA) and in coordination with the Trash Monitoring Methods Project, California Ocean Protection Council and State Water Board project that is being administered via the Southern California Coastal Water Research Project (SCCWRP) and San Francisco Bay Estuary Institute (SFEI). Consistent with MRP requirements, the final report for the development and testing of the Bay Area trash receiving water monitoring program was submitted by BASMAA on July 1, 2020, consistent with the MRP requirements, following peer review.

C.10.c ► Trash Hot Spot Cleanups

Provide the FY 19-20 cleanup date and volume of trash removed during each MRP-required Trash Hot Spot cleanup during each fiscal year listed. Indicate whether the site was a new site in FY 19-20.

Trash Hot Spot	New Site in FY 19-20 (Y/N)	FY 19-20 Cleanup Date(s)	Volume of Trash Removed (cubic yards)				
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
Central Rindler Creek	N	6/29/2020	1.00	10.0	6	0.25	0.25
South Rindler Creek	N	6/29/2020	1.00	5.0	3	2.25	1.75
Blue Rock Springs Creek	N	6/29/2020	0.00	2.85	0.33	0.25	1.0
Coral Street Ditch	N	6/29/2020	2.10	10.0	0.5	1.0	2.0
Austin Creek, 3287 Sonoma Blvd	N	6/29/2020	1.50	6.0	1	0.5	0.5

C.10.d ►Long-Term Trash Load Reduction Plan

Provide descriptions of significant revisions made to your Long-term Trash Load Reduction Plan submitted to the Water Board in February 2014. Describe significant changes made to primary or secondary trash management areas (TMA), baseline trash generation maps, control measures, or time schedules identified in your plan. Indicate whether your baseline trash generation map was revised and if so what information was collected to support the revision. If your baseline trash generation map was revised, attach it to your Annual Report.

Description of Significant Revision	Associated TMA
In FY 15-16, consistent with all MRP Permittees, all public K-12 schools, college and university parcels were made non-jurisdictional on the District's baseline trash generation maps. Under California Government Code Sections 4450 through 4461, the construction, modification, or alternation of facilities and/or structures on these parcels are under the jurisdiction of the California Division of State Architect and not the District. The public right-of-way (e.g., streets and sidewalks) surrounding these parcels remain as jurisdictional on the Vallejo Permittees' baseline trash generation maps. The Vallejo Permittees' revised baseline trash generation map was included as Attachment C.10: Vallejo Trash Reduction Compliance Plan to its FY 15-16 Annual Report.	All applicable
In FY 16-17, the Vallejo Permittees refined the Vallejo Baseline Trash Generation Map because the trash generation levels included on the map originally included in its Long-term Trash Load Reduction Plan were never fully verified by District and City staff due to a lack of resources. Google Street View applications and On-land Visual Assessments were used to reevaluate baseline trash generation. Trash generation categories were reclassified for areas where information indicated that errors had occurred during initial/preliminary trash generation category assignments. Reclassifications to trash generation categories were used for the purposes of calculating baseline (2009) trash generation included in this report (i.e., as an input parameter to the formula used to calculate load reductions reported). The Vallejo Permittees' refined baseline map is included as Attachment C.10: Vallejo Trash Reduction Compliance Plan (see FY 16-17 Annual Report).	All applicable

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 19-20. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

<table>
<tr><th>Offset Program</th><th>Summary Description of Actions and Assessment Results</th><th>Volume of Trash (CY) Removed/Controlled in FY 19-20</th><th>Offset (% Jurisdiction-wide Reduction)</th></tr>
<tr><td>Additional Creek and Shoreline Cleanups (Max 10% Offset)</td><td>The City of Vallejo and the District coordinated with and promoted Vallejo Watershed Alliance creek and shoreline cleanups in FY 2019-20. The following is a list of activities conducted in FY 2019-20, the number of participants and the amount of trash removed. A total of 15.9 CYs of trash were removed via these efforts.
<table>
<tr><th>Date</th><th>Vallejo Watershed Alliance Activities</th><th>Participants</th><th>Trash Removed/ Other Results</th></tr>
<tr><td>7/2019</td><td>Park cleanup and annual BBQ</td><td>12</td><td>132 gallons</td></tr>
<tr><td>8/2019</td><td>Annual meeting/presentation by Sarah McKibbin, RCD</td><td>11</td><td></td></tr>
<tr><td>9/2019</td><td>Coastal Cleanup Day (VWA site only)</td><td>21</td><td>375 gallons</td></tr>
<tr><td>9/2019</td><td>Cal Maritime Partner Expo</td><td>125</td><td>10 email signups</td></tr>
<tr><td>9/2019</td><td>Visions of the Wild Festival Nature Zone</td><td>200</td><td>6 email signups</td></tr>
<tr><td>10/2019</td><td>Hanns Park: Reseeding and tree replanting after fire</td><td>12</td><td>3.1 cubic yards</td></tr>
<tr><td>11/2019</td><td>Hanns Park: path refresh and cleanup</td><td>12</td><td>252 gallons</td></tr>
<tr><td>1/2020</td><td>Lake Dalwigk: Restoration planting and trash removal</td><td>15</td><td>378 gallons</td></tr>
<tr><td>1/2020</td><td>Hanns Park: bird box maintenance</td><td>2</td><td>26 gallons</td></tr>
<tr><td>2/2020</td><td>Booth at SF Bay Flyway Festival</td><td>85</td><td>4 email signups</td></tr>
<tr><td>2/2020</td><td>Lake Dalwigk: Restoration planting and trash removal</td><td>14</td><td>378 gallons</td></tr>
<tr><td>2/2020</td><td>Lake Dalwigk: 2nd grade class lesson and cleanup</td><td>48</td><td>378 gallons</td></tr>
<tr><td>4/2020</td><td>DIY Cleanups begin: Lake Chabot</td><td>3</td><td>75 gallons</td></tr>
<tr><td>5/2020</td><td>DIY Cleanup: Rindler Creek</td><td>3</td><td>60 gallons</td></tr>
<tr><td>6/2020</td><td>DIY Cleanup: Lake Dalwigk/Lake Chabot</td><td>12</td><td>540 gallons</td></tr>
</table>
Additionally, the District conducted quarterly cleanups in FY 19-20 (9/6/19; 12/18/19; 2/24/20; 5/30/20) as part of the agreement with Water Board staff regarding the location of planned trash full capture systems downstream of Lake Chabot and Lake Dalwigk. A total of 7.75 CYs of trash was removed during these quarterly cleanups.</td><td>23.65 CY
(4793 gallons)</td><td>0.5%</td></tr>
</table>

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 19-20. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

Direct Trash Discharge Controls (Max 15% Offset)	NA	NA	NA

Permittee Name: **City of Vallejo**

Appendix 10-1. Baseline trash generation and areas addressed by full capture systems and other control measures in Fiscal Year 19-20.[1]

TMA	2009 Baseline Trash Generation (Acres)					Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems					Jurisdiction-wide Reduction via Full Capture Systems (%)	Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems and Other Control Measures					Jurisdiction-wide Reduction via Other Control Measures (%)	Jurisdiction-wide Reduction via Full Capture AND Other Control Measures (%)
	L	M	H	VH	Total	L	M	H	VH	Total		L	M	H	VH	Total		
1	1,362	596	236	0	2,194	1,655	445	94	0	2,194	5.4%	1,877	184	133	0	2,194	0.8%	6.2%
2	52	193	186	9	439	52	193	186	9	439	0.0%	87	319	33	0	439	4.4%	4.4%
3	737	735	1,026	104	2,601	737	735	1,026	104	2,601	0.0%	1,153	1,152	269	28	2,601	26.3%	26.3%
4	578	550	261	0	1,389	578	550	261	0	1,389	0.0%	638	649	98	3	1,389	3.8%	3.8%
5	394	523	147	3	1,068	394	523	147	3	1,068	0.0%	550	427	86	4	1,068	2.4%	2.4%
6	105	247	129	0	482	121	232	129	0	482	0.1%	192	237	52	0	482	2.3%	2.4%
7	250	80	138	0	468	250	80	138	0	468	0.0%	280	146	41	0	468	2.4%	2.4%
8	440	441	18	0	898	440	441	18	0	898	0.0%	529	320	49	0	898	0.0%	0.0%
9	71	0	0	0	71	71	0	0	0	71	0.0%	71	0	0	0	71	0.0%	0.0%
10	7,746	7	15	0	7,768	7,746	7	15	0	7,768	0.0%	7,747	19	2	0	7,768	0.3%	0.3%
11U*	0	0	49	0	49	49	0	0	0	49	1.4%	49	0	0	0	49	NA	1.4%
Totals	11,734	3,373	2,204	115	17,427	12,092	3,206	2,013	115	17,427	6.9%	13,175	3,453	764	36	17,427	42.7%	49.6%

Note: "NA" indicates that the TMA has no moderate, high or very high trash generating areas (i.e., all low trash generation and/or non-jurisdictional) and therefore no additional trash control measures are needed.

*This TMA is entirely comprised of non-jurisdictional land area within the unincorporated portion of Solano County that is addressed via trash full capture systems owned and operated by VFWD.

[1] Due to rounding, total acres and percentages presented in this table may be slightly different than the sum of the acres/percentages in the corresponding rows/columns (e.g., differ by 1 acre or 0.1%).

Supplemental Report on Trash Control Actions
In compliance with Cease and Desist Order No. R2-2018-0033

As required in Cease and Desist Order (CDO) No. R2-2018-0033, the Vallejo Flood and Wastewater District (VFWD) is submitting this brief narrative report that describes the Vallejo Permittees' (VFWD and City of Vallejo's) progress toward meeting the 70% and 80% trash load reduction requirements required by the Municipal Regional Stormwater NPDES Permit (MRP) and the CDO. The CDO states that the narrative report shall include the following:

a) For the proposed full trash capture device installations:
    i. The status of the partnership agreement with Caltrans;
    ii. The status of project funding;
    iii. The status of design and contracting of new full trash capture devices;
    iv. The status of permitting; and
    v. The status of construction

b) The status of additional trash reduction actions that will be verified by on land visual trash assessments (OVTAs) in accordance with Permit Provision C.10.b.ii.b.;
    i. The status of OVTAs (e.g., the trash management areas where OVTAs have been or will be completed, number of assessments completed, and schedule for completion of additional OVTAs); and
    ii. The outcome of the OVTAs, including any change in trash status for each trash management area and the resulting change in city-wide total trash load reduction associated with OVTAs;

c) Progress toward meeting the 70% and 80% trash load reduction requirement by July 1, 2019, including the resulting city-wide total trash load reduction (percent); and

d) If needed, a description of additional trash load reduction control actions, beyond those identified in this Order, and a schedule for their implementation, sufficient to achieve the required 70% and 80% reduction by July 1, 2019.

Narrative Report

On September 18, 2018 the VFWD received notice indirectly that the San Francisco Bay Regional Water Control Board (RWQCB) was concerned about the location of two of the trash full capture devices planned in Vallejo. These concerns stemmed from siting the devices downstream of receiving waters and the RWQCB initially stated that the devices would only receive partial trash removal credit for the drainage area protected by the devices. The VFWD contacted the RWQCB and held a series of meetings to provide the RWQCB with more information regarding the projects. In these meetings, the VFWD and the RWQCB agreed that the devices could receive full trash removal credit if perimeter shoreline cleanups and other actions were taken to mitigate the possibility of trash impacting the receiving waters upstream of the devices. The RWQCB did not, however, conclusively state the device removal credit would be as shown in the Vallejo Trash Capture Feasibility Study.

Due to the uncertainty of the amount of trash removal credit the devices would generate, the possibility the devices would still need to be relocated and the amount of funds VFWD had already

committed to the project, the VFWD reluctantly determined that the most conservative course of action would be to place the project on hold, pending a decision in writing from the RWQCB regarding the trash removal credit the devices would generate. On February 14, 2019 the VFWD submitted a letter to the RWQCB listing the proposed actions that would be undertaken; a written response from the RWQCB was received on April 18, 2019. The VFWD had received authorization from its Board of Trustees for the District Manager to authorize restarting the project without the need to bring the item to the Board for further approvals and notice was given to the contractors to resume the project on April 19, 2019. The design phase was completed, a construction contract was awarded and a Notice to Proceed was issued to the contractor on March 11, 2020. Construction began on May 14, 2020. Construction proceeded through the spring and summer. At the end of August, the construction contractor reported delays which have put the project behind schedule. The trash full capture devices have not been delivered on schedule and completion of construction is now waiting upon delivery of the devices. The District is working with both the construction contractor and the device manufacturer to attempt to resolve the issues; the most likely outcome is two of the three sites will be completed by the end of 2020 and the remaining site will have to be completed after the rainy season in spring of 2021.

a.i. Status of the partnership agreement with Caltrans:

The VFWD is very close to submitting a Cooperative Implementation Agreement (CIA) to Caltrans. VFWD staff have been in close communication with Caltrans and are completing the final requirements in order to execute a CIA. The VFWD continues to move forward with implementation of the project, even without an agreement in place with Caltrans.

a.ii. Status of project funding:

To date, the VFWD is still pursuing a funding agreement from Caltrans, but is very close to submitting a CIA to Caltrans. VFWD staff have been in close communication with Caltrans and are completing the final requirements to execute a CIA. If the VFWD is unable to secure a reimbursement agreement from Caltrans, funds may have to be drawn from VFWD reserves. Another possibility is to delay or reschedule other storm and flood control projects and re-appropriate those funds toward trash full capture device construction costs.

a.iii. Status of design and contracting of new full trash capture devices:

Design is complete and contracts for construction, engineering services during construction and construction management and inspection have been issued.

a.iv. Status of permitting:

VFWD's construction contractor has obtained its Encroachment Permit from the City of Vallejo. Caltrans issued an entry permit for the BW Williams site on April 16, 2020. The VFWD filed a Notice of Exemption (NOE) on October 9, 2018. A NOE is consistent with RWQCB guidance for projects sited entirely in existing storm drain systems.

a.v. Status of construction:

Construction is underway at the sites. A construction contract was awarded, a Notice to Proceed was issued on March 11, 2020 and ground was broken on May 14, 2020. The project is experiencing delays; the most likely outcome is two of the three sites will be completed by the end of 2020 and the remaining site will have to be completed after the rainy season in spring of 2021.

b.i. Status of OVTAs:

The VFWD contracted with EOA, Inc. to perform OVTAs in Vallejo. A total of 87 street/sidewalk OTVA sites have been established in Vallejo and a total of 202 assessments were conducted in FY 20198-20 as part of the Vallejo OVTA Program. With the exception of TMAs 9 and 11U, which are either entirely addressed via full capture devices or are low trash generating as depicted on the Vallejo baseline trash generation map, all TMAs were assessed in FY 2019-20 and are currently being assessed in FY 2020-21. Over the course of the two FYs, each of the 88 sites will be assessed roughly 5 to 6 times.

b.ii. Outcome of OVTAs:

In general, the OVTAs conducted in FY 2019-20 showed a decrease in the levels of trash observed, compared to the Vallejo baseline trash generation map, which is intended to depict 2009 levels of trash generated in jurisdictional land areas within the boundaries of the City. In the VFWD/City 2019-20 annual report, the trash load reduction demonstrated by OTVAs was 42.7%, a slight improvement from the 40.7% reduction reported in the VFWD's/City's FY 2018-19 annual report. VFWD anticipates similar reductions will be reported with our FY 2020-21 Annual Report, based on preliminary data collected to-date this FY.

c. Progress toward meeting the 70 percent and 80 percent trash load reduction requirement by July 1, 2019:

The Vallejo Permittees have made progress toward meeting the 70% and 80% trash load reduction requirement on two fronts: 1) by enhancing trash removal activities on-land, which have successfully improved OVTA scores, and 2) by moving forward with the design of three large full trash capture devices. When the three large devices are complete and operational, they will provide an estimated additional 40% trash reduction, which when combined with enhanced trash removal actions, will enable the Vallejo Permittees to meet the 80% trash load reduction requirement. The delays to design and construction of the large devices previously discussed have prevented the Vallejo Permittees from meeting the July 1, 2019 requirement.

d. If needed, a description of additional trash load reduction control actions:

The VFWD and the City of Vallejo have begun to engage with Six Flags Discovery Kingdom in an effort to control trash from the amusement park grounds and parking lots. Currently these efforts have been halted due to the ongoing public health crisis; Six Flags Discovery Kingdom is currently only allowing limited attendance. The VFWD and the City of Vallejo plan to re-engage once the park has resumed normal operations. The VFWD contracted with EOA to complete an assessment of trash reduction options upstream of Lakes Chabot and Dalwigk. As a result of the study findings, VFWD staff will be enhancing their trash reduction efforts during stormwater inspections throughout the city, as specified in the report.

Section 11 - Provision C.11 Mercury Controls

C.11.a ► **Implement Control Measures to Achieve** Mercury Load Reductions
C.11.b ► **Assess** Mercury Load Reductions from Stormwater

See the attached *Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement* for updated information on:

- Documentation of mercury control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the mercury load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated mercury load reduced by each control measure); and
- Supporting data and information necessary to substantiate the load reduction estimates.

C.11.c ► **Plan and Implement** Green Infrastructure to Reduce Mercury Loads

See the attached Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* Appendix A *Green Stormwater Infrastructure Reasonable Assurance Analysis Modeling Report for PCBs and Mercury* for:

- An estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate; and
- A reasonable assurance analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis.

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., March 23, 2017.

C.11.d ► Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

See the attached 2019-20 Mercury and PDB Control Measures Plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028. The plan:

1. Identifies all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented;
2. Includes a schedule according to which these technically and economically feasible control measures will be fully implemented; and
3. Provides an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

C.11.e ► Implement a Risk Reduction Program

A summary of Program and regional accomplishments for this sub-provision are included in the *Sections C.11 Mercury Controls* and *C.12 PCBs Controls Annual Report Supplement* attached.

Section 12 - Provision C.12 PCBs Controls

C.12.a ► Implement Control Measures to Achieve PCBs Load Reductions
C.12.b ► Assess PCBs Load Reductions from Stormwater

See the attached 2019-20 Mercury and PDB Control Measures Plan for updated information on:

- Documentation of PCBs control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the PCBs load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated PCBs load reduced by each control measure);
- Supporting data and information necessary to substantiate the load reduction estimates.

C.12.c. ► Plan and Implement Green Infrastructure to Reduce PCBs Loads

See the attached 2019-20 Mercury and PDB Control Measures Plan, the Updated RAA and Updated Green Infrastructure Plan for updated information on:

- An estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate;
- A reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects, including all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonably assurance analysis.; and
- An estimate of the amount of PCBs load reductions resulting from green infrastructure implementation during the term of the Permit, including all data used and a full description of models and model inputs relied on to generate the estimate."

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., September 19, 2017.

C.12.d ► Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

See the attached Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* for a PCBs control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan:

1. Identifies all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented;
2. Includes a schedule according to which these technically and economically feasible control measures will be fully implemented; and
3. Provides an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation."

C.12.f. ► Manage PCB-Containing Materials During Building Demolition

See *Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement, Project Summary Table, and the attached BASMAA Summary Memo.*

C.12.h ►Implement a Risk Reduction Program

A summary of Program and regional accomplishments for this sub-provision are included in the *Sections C.11 Mercury Controls* and *C.12 PCBs Controls Annual Report Supplement* attached.

Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement

The Water Board adopted water quality attainment strategies for the San Francisco Bay for mercury and PCBs called Total Maximum Daily Loads (TMDLs). MRP Provisions C.11 Mercury Controls and C.12 PCBs Controls require permittees to implement control programs to reduce stormwater runoff-related impacts of these pollutants on the Bay. The City of Vallejo and Vallejo Flood and Wastewater District (VFWD) perform a variety of activities to address mercury and PCBs in stormwater runoff in compliance with Provisions C.11 and C.12. Some of this work has been accomplished through participation in BASMAA regional projects. Below describes the implementation of the MRP Provisions.

C.11/12.a Implement Control Measures to Achieve Mercury/PCBs Load Reductions and C.11/12.b Assess Mercury/PCBs Load Reductions from Stormwater

This section provides summaries of PCBs and mercury control measures implemented during the permit term consistent with MRP provisions C.11 and C.12. Full detail on the control measures and the associated load reductions for the VFWD are fully documented in the Vallejo Flood and Wastewater District and the City of Vallejo *Mercury and PCBs Control Measures Plan FY18-19 Update (September 2019)*, which was included as an attachment of the VFWD FY 18-19 Annual Report. The FY18-19 Update provides documentation of all current and planned control measures during the current permit term in the City of Vallejo and provides all supporting data and information necessary to substantiate load reduction estimates presented in this section in order to demonstrate achievement of load reductions consistent with MRP 2.0 load reduction requirements.

The Vallejo Permittees have reduced PCBs by 63 g/year and mercury by 8.75 g/year during the MRP 2.0 compliance period (i.e. FY13-14 to present). For PCBs, this includes the 62 g/yr load reduction for implementing the PCBs in Building Materials Program by July 1, 2019, and the additional 0.89 g/yr of load reduction due to all other controls implemented during the permit term. For details on the Building Materials Program see Section C.12.f below. For details on all other controls implemented during the permit term see the *Mercury and PCBs Control Measures Plan FY18-19 Update (September 2019).*

PCBs and Mercury Regional Loads Reduced During MRP 2.0

MRP 2.0 requires Permittees to develop and implement control measures to reduce PCBs and mercury in stormwater runoff to the San Francisco Bay throughout the permit area (Table 1). For PCBs, Permittees are collectively required to reduce loads by a minimum of 500 grams per year (g/yr) by June 30, 2018, and 3,000 g/yr by June 30, 2020. At least 120 g/yr of PCBs load reduction must be achieved through implementation of green stormwater infrastructure (GSI) projects on public and private lands. The June 30, 2020 date may be extended to December 31, 2020 if Permittees provide documentation that control measures that will attain the load reduction will be implemented by that date. For mercury, Permittees are collectively required to reduce stormwater loads by 48 g/yr by June 30, 2020 through implementation of GSI projects on public and private lands. These load reduction performance criteria may be met regionally. However, should regional load reductions not be achieved, MRP 2.0 requires each Permittee to achieve load reductions on a county-wide basis.

Table 1 PCBs and Mercury Load Reduction Performance Criteria Required by MRP 2.0 in 2018 and 2020.

PCBs (g/year)			Mercury (g/yr)
By July 2018	**By July 2020**		**By July 2020**
All Control Measures	**All Control Measures**	**Green Stormwater Infrastructure**	**Green Stormwater Infrastructure**
500	3,000	120	48

The PCBs and mercury performance criteria in Table 1 can be achieved through implementation of the following control measures:

1. Source property ID and Abatement
2. Green Stormwater Infrastructure and Treatment Controls, including:
   - Parcel-based new/re-development/Green Streets/Regional Retrofits
   - Public hydrodynamic separator Units (trash full capture)
3. Enhanced Operation and Maintenance (O&M) Measures, including:
   - Street Sweeping or Flushing
   - Inlet-based trash full capture devices
   - Other MS4 Cleaning
4. Managing PCBs in Building Materials
5. Managing PCBs in Infrastructure
6. Diversions to Publicly Owned Treatment Works (POTWs)

The control measures implemented to-date are described in more detail in "Control Measures Plans" prepared by individual Bay Area countywide stormwater programs or Permittees. The PCBs and mercury load reductions that have been achieved to date were calculated using the methodologies presented in the *Interim Accounting Methodology for PCBs and Mercury Loads Reduced Report* (BASMAA 2017), which was developed by BASMAA and approved by the Regional Water Board's Executive Officer in March 2017. The data reported here on regional PCBs and mercury loads reduced by all Permittees were provided by the following countywide stormwater programs and municipal agencies:

- Alameda Countywide Clean Water Program
- Contra Costa Clean Water Program
- Santa Clara Valley Urban Runoff Pollution Prevention Program
- San Mateo Countywide Water Pollution Prevention Program
- Fairfield-Suisun Urban Runoff Management Program
- City of Vallejo and the Vallejo Flood and Wastewater District

The load reductions reported here are based on the best available information at the time this report was written and may not reflect the most up-to-date accounting of all reductions achieved through all control measures that have been implemented in the region.

Regional PCBs Loads Reduced

The cumulative PCBs loads reduced to date by all Permittees during the MRP compliance period (FY 13-14 through FY 19-20) are presented in Table 2. A total of 3,017 g/yr of PCBs were reduced across the

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permit area over that time period, demonstrating that the MRP performance criterion of 3,000 g/yr of PCBs loads reduced by July 2020 has been achieved at the regional level.

Table 2 PCBs loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	PCB Load Reductions (g/yr)
Source Property Identification and Abatement	610
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	231
Large Full Trash Capture (i.e. HDS Units)	157
Enhanced O&M Measures	18
PCBs in Building Materials	2,000
Stormwater Diversion to Sanitary Sewer	1
TOTAL - All Control Measures	**3,017**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

The PCBs loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 1. The PCBs in building materials program achieved the MRP-stipulated 2,000 g/yr (66%) because all Permittees successfully implemented the program by July 1, 2019. This load reduction accounts for 66%of the total PCBs loads reduced during MRP 2.0. The remaining 1,017 g/yr was achieved through all other control measures. Of these, source property identification and abatement accounts for 20% of the total PCBs load reduction during MRP 2.0. Next to managing PCBs in building materials, source property identification and abatement remains the most effective control measure currently available for reducing PCBs loads to the Bay (BASMAA 2017). GSI has been the third largest contributor to load reductions, providing 231 g/yr of PCBs loads reduced and accounting for 8% of the total PCBs loads reduced to-date. These data demonstrate the MRP performance criterion of 120 g/yr of PCBs loads reduced through GSI has been met across the region. An additional 157 g/yr have been reduced by large, full trash capture devices (i.e., HDS Units), accounting for 5% of the total PCBs loads reduced. The remaining < 1% of the regional PCBs loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

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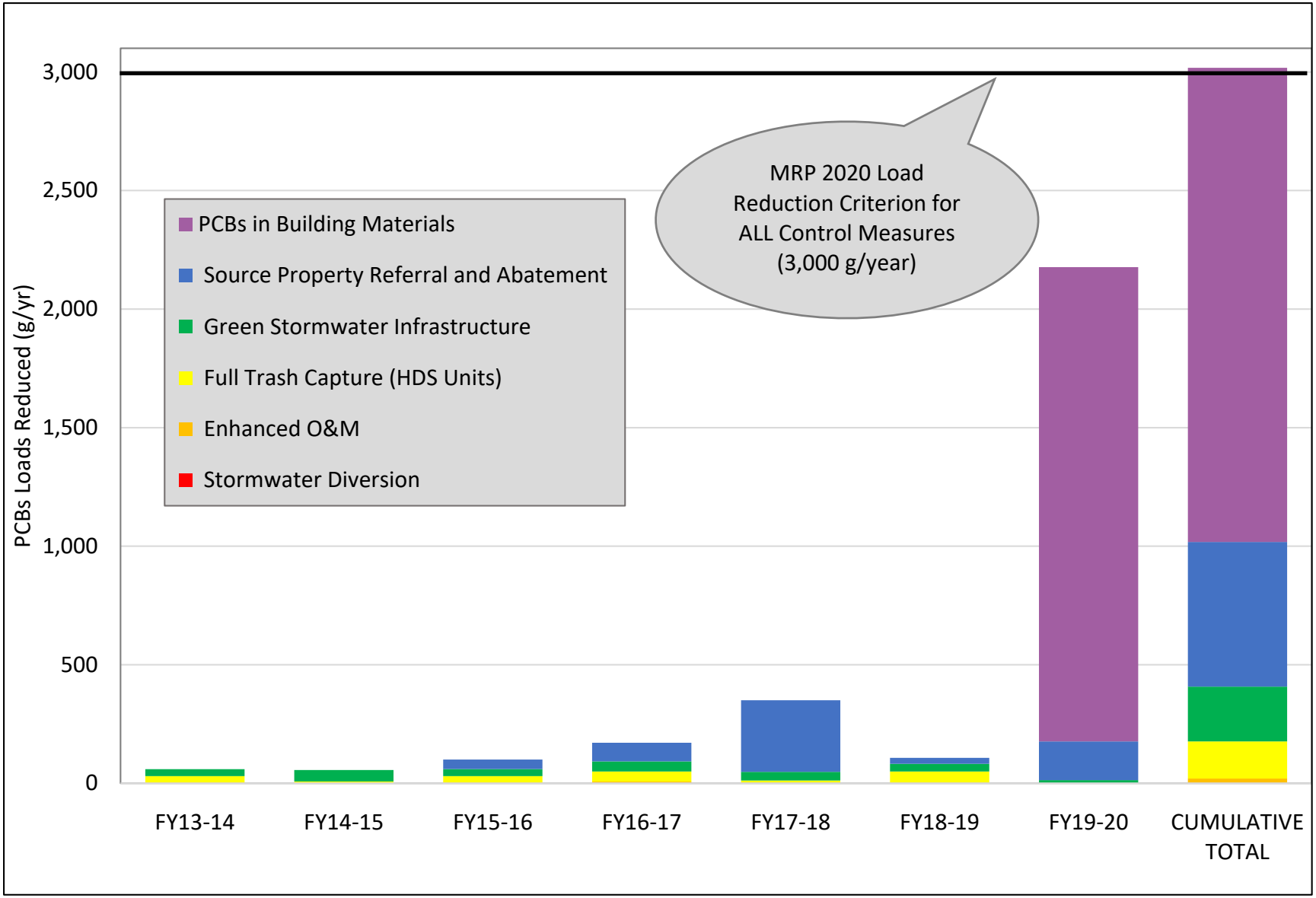

Figure 1. PCBs loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

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Regional Mercury Loads Reduced

The cumulative mercury loads reduced by MRP Permittees from FY13-14 through FY 19-20 are presented in Table 3. An estimated total of 4,394 g/yr of mercury were reduced across the permit area over that time period. The mercury loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 2. GSI has been the largest contributor to mercury load reductions during the permit term. Total mercury loads have been reduced by 2,759 g/yr through GSI, accounting for 63% of the total loads reduced. These data demonstrate the MRP performance criterion of 48 g/yr of mercury loads reduced through GSI by 2020 has been met across the region. An additional 1,348 g/yr of mercury have been reduced by large, full trash capture devices (i.e., HDS Units), accounting for 31% of the total loads reduced. Source property identification and abatement has reduced mercury loads by 120 g/yr, accounting for only 4% of the total mercury loads reduced to date. The remaining 4% of the regional mercury loads reduced during the permit have come from enhanced operation and maintenance practices and stormwater diversions.

Table 3 Mercury loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	Mercury Load Reductions (g/yr)
Source Property Identification and Abatement	120
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	2,759
Large Full Trash Capture (i.e. HDS Units)	1,348
Enhanced O&M Measures	163
Stormwater Diversion to Sanitary Sewer	3
TOTAL - All Control Measures	**4,394**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

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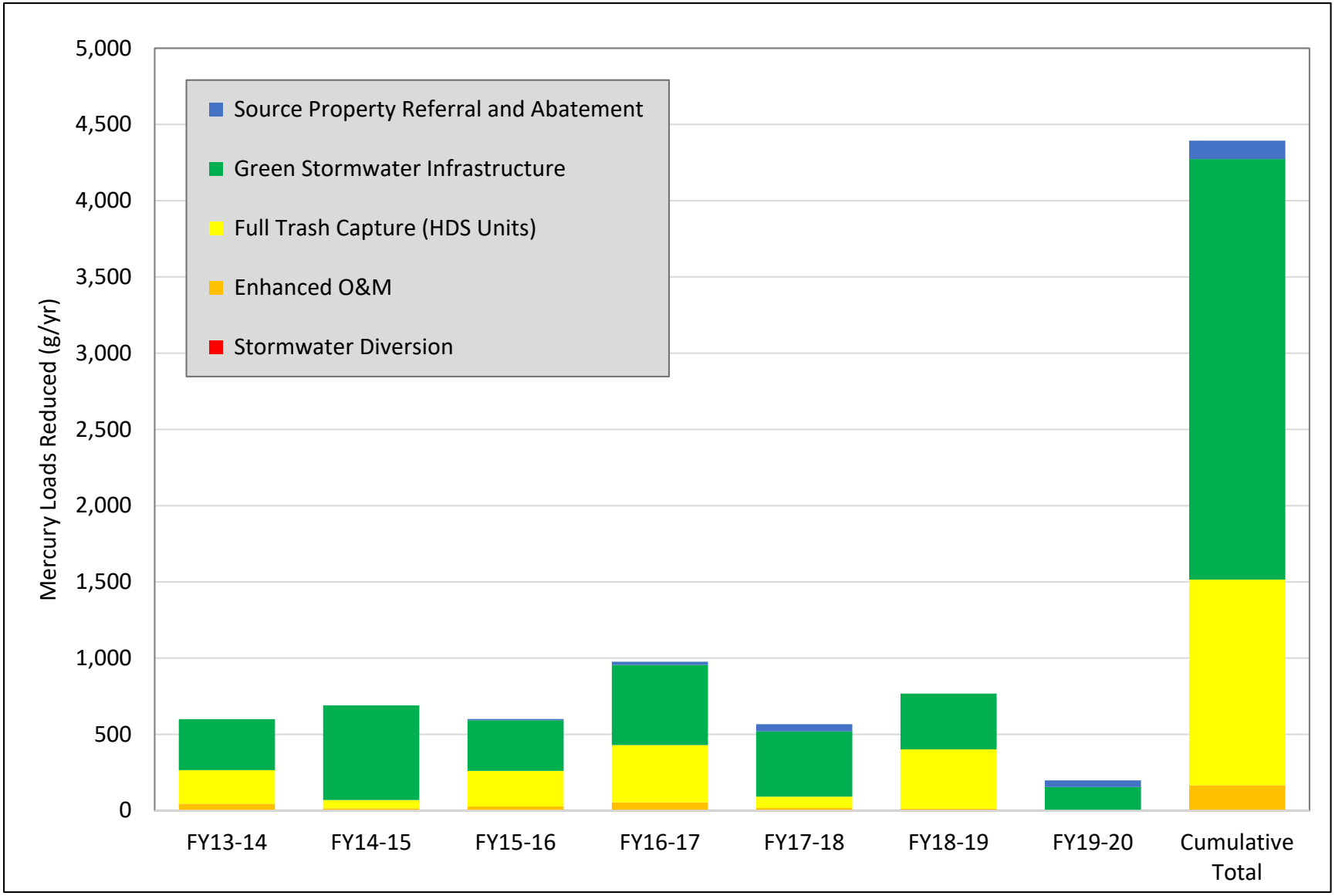

Figure 2. Mercury loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

C.11/12.c Plan and Implement Green Infrastructure to Reduce Mercury/PCBs Loads

Permittees are required to conduct a Reasonable Assurance Analysis (RAA) to demonstrate quantitatively that mercury and PCBs load reductions specified in the MRP will be achieved by 2040 through implementation of green infrastructure. BASMAA conducted a regional project to develop the *Bay Area Reasonable Assurance Analysis Guidance Document* which establishes a regional framework and provides guidance for conducting PCBs and mercury RAAs in the San Francisco Bay Area. The RAAs will demonstrate that the control measures proposed in the Permittees' Green Infrastructure Plans and PCBs and Mercury Control Measure Implementation Plans, as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury TMDL wasteload allocations for urban stormwater runoff. Additionally, the RAAs will provide a method for evaluating the type, size, number, location, and phasing of green infrastructure measures needed to most cost-effectively comply with the green infrastructure load reduction goals stated in MRP Provisions C.3.j and C.11.c/C.12.c. The MRP requires that both the green infrastructure RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. A regionally-representative project management team, consisting of countywide program representatives, and a Technical Advisory Committee (TAC) were convened for the development of the RAA Guidance Document. The TAC was comprised of Regional Water Board Staff, USEPA Region 9 staff, and industry experts and served to provide "technical peer review" for the document from an objective regulatory and/or technical perspective. The *Bay Area Reasonable Assurance Analysis Guidance Document* was finalized on June 30, 2017.

The City of Vallejo, Fairfield-Suisun Urban Runoff Program and the Vallejo Flood and Wastewater District worked with Fall Creek Engineering to develop a RAA model for Solano County to determine expected pollutant load reductions. The Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* Appendix A *Green Stormwater Infrastructure Reasonable Assurance Analysis Modeling Report for PCBs and Mercury* is provided as an attachment to this Annual Report.

C.11/12.d Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

MRP Provisions C.11/12.d requires Permittees to submit a PCBs and Mercury Control Measures Implementation Plan and corresponding Reasonable Assurance Analysis (RAA) that demonstrates quantitatively that the plan will result in PCBs and mercury load reductions sufficient to attain TMDL wasteload allocations by 2030 and 2028, respectively. The plan must include the following:

- Identify all technically and economically feasible PCBs control measures to be implemented (including green infrastructure projects); and
- Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and
- Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Solano County permittees developed the *Implementation Plan & Schedule to Achieve TMDL Allocations* that is included in this Annual Report as an Attachment.

C.12.f. - Manage PCB-Containing Materials and Wastes during Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains

MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 parts per million or greater in applicable structures[1] at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. A Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its FY 2016/17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.[2]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

- The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
- A method for identifying applicable structures prior to their demolition; and,
- Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff; and,
- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, BASMAA conducted a multi-year regional project to assist MRP Permittees to address Provision C.12.f. The BASMAA project, which began in FY 2016/17 and was completed in March 2019, assisted Permittees in developing local programs to manage PCBs-containing materials during building demolition. It developed guidance materials, tools and training materials and conducted outreach.

At the outset of the project, a BASMAA Steering Committee was convened to provide project oversight and guidance during the project. The Steering Committee included BASMAA Directors, countywide stormwater program staff, and Permittee staff from various relevant municipal departments. The Steering Committee met periodically throughout the project. In addition, a project TAG, a small balanced advisory group formed from industry, regulatory, and Permittee representatives to provide review and input on selected project work products, was convened. The TAG was comprised of representatives from industry and state/federal regulatory agencies, and Permittees. Other efforts to engage key stakeholders included an industry stakeholder roundtable meeting (August 2017) and two larger stakeholder group meetings (December 2017 and May 2018) that included industry, regulatory and municipal representatives. During FY 2018/19, Permittees tailored the BASMAA products for local use, adopted the program (e.g., via local policy or ordinance), and trained local staff to implement the new program starting July 1, 2019.

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[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

[2] The City of Clayton provided acceptable evidence and is exempt from this provision.

Key BASMAA project deliverables provided to each Permittee to use as appropriate given local procedures and needs included:

- A protocol for pre-demolition building survey for priority PCBs-containing building materials;
- Model language for municipal adoption (e.g., ordinance) of the new program to manage PCBs materials during building demolition and model supporting staff report and resolution;
- CEQA strategy and model notice of exemption;
- Supplemental demolition permit model application materials, including forms, process flow charts, and applicant instructions; and
- An analysis to assist municipalities that pursue cost recovery.

Other project deliverables included:

- A coordination/communication strategy for the project;
- A technical memorandum summarizing any new information & decisions needed by BASMAA at outset, including an annotated table of regulatory drivers and relevant requirements;
- A technical memorandum with the state of the practice for identifying PCBs-containing building materials (developed to inform development of the pre-demolition building survey protocol listed below);
- Industry stakeholder outreach materials and a fact sheet for municipal staff;
- A spreadsheet tool used to develop the prioritized list of potential PCBs-containing building materials that the demolition program will focus on;
- A conceptual approach for an assessment methodology and data collection program to quantify PCBs loads reduced through managing PCBs-containing materials during building demolition.

During FY 2018/19, the BASMAA project concluded by conducting the following outreach and training tasks:

- Prepared training materials for municipal staff on adoption and implementation of the new program;
- Developed outreach materials and a standard presentation to inform industry stakeholders including developers, planning firms, urban planning non-governmental organizations, demolition firms, property owners, property managers, and realtors about the new program to manage PCBs in building materials during demolition;
- Using the above training materials, conducted training workshops (in-person and a webinar) for key municipal and countywide stormwater program staff;
- Conducted a webinar for industry stakeholders; and
- Developed a list of Bay Area opportunities, including contact information and dates, for municipal and/or stormwater program staff to conduct additional outreach to industry stakeholders using the above industry outreach materials.

In addition, during FY 2018/19 MRP Permittees worked together through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) to begin developing a framework to comply with data collection/evaluation and reporting requirements under Provision C.12.f. As mentioned previously, these requirements include developing an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the new program. The preliminary regional process developed to-date includes the following steps:

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.[3]
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Permittees began implementing the program on July 1, 2019. Attached are two documents prepared collaboratively by the District and other MRP Permittees in compliance with MRP reporting requirements:

1. *PCBS in Building Materials Management Program – Regional Data Summary, September 18, 2020* provides documentation of (a) the number of applicable structures that applied for a demolition permit during the reporting year, and (b) a running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.
2. *Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program, September 23, 2020* provides an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition.

C.11.e/12.h Risk Reduction Program

MRP Provisions C.11.e and C.12.h require Permittees to conduct an ongoing risk reduction program to address public health impacts of mercury and PCBs in San Francisco Bay fish. The fish risk reduction program is required to include actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families.

A partnership composed of the Bay Area Clean Water Agencies (BACWA), Western States Petroleum Association, and BASMAA was formed to develop a regional approach to raise public awareness

[3] Municipalities should require that applicants fill out and certify a Screening Form for every demolition. For non-Applicable Structures, applicants simply check the boxes, certify, and submit to municipality. Then the municipality can authorize the demolition (e.g., issue a demolition permit). In general, municipalities should have a completed and certified Screening Form before authorizing a demolition, unless they are a small community that is exempt or has some other arrangement with Regional Water Board staff. But there is no need to track non-Applicable Structures otherwise.

regarding fish contamination issues in San Francisco Bay and to encourage fish-consuming populations to reduce their exposure to mercury in contaminated fish. The partnership engaged the services of the SFEI/Aquatic Sciences Center and the California Department of Public Health (CDPH), Office of Environmental Health Hazard Assessment to manage and develop the project entitled San Francisco Bay Fish Project (SFBFP).

The SFBFP was a two-year project (October 2010 to October 2012) implemented by the CDPH. Project oversight was provided by the Bay Area Risk Communication and Exposure Reduction Work Group that included representatives from BASMAA, CDPH, BACWA, Regional Water Board, EPA, and County Health Departments. CDPH developed several educational materials under this project. These included a four-panel brochure, a kiosk flyer, a coloring book for kids, a warning sign, and an educational video. The brochures were produced in English and 10 other languages.

On April 16, 2017, District staff submitted a work plan to address the implementation of a Risk Reduction Program on behalf of the City and District. The following tasks were implemented to carry out the Risk Reduction Program:

- Point-of-purchase outreach at fishing supply stores - Program staff contacted five local fishing supply stores to find out if they would be interested in making the CDPH brochure titled *Guide to Eating Fish and Shellfish from San Francisco Bay* available to customers and they all agreed. Brochures were distributed to the bait shops in the City. The brochures were distributed to bait shops in FY18-19. The brochures were not refilled this reporting period. Typically the brochures are restocked in the spring. The Shelter-in-Place orders disrupted this schedule. There are often brochures still in stock when staff refreshes them, so it is very likely there are brochures still available for customers. Staff will restock the brochures in the bait shops during FY 19-20.
- Website Posting - The brochures and fish consumption warning signs are posted in the stormwater section on the Phase 1 Solano County cities' and Vallejo Flood & Wastewater District's websites.
- Distribution at Outreach Events - The brochures are distributed at Solano County community outreach events.
- Kiosks and Pier Postings - Local fishing piers and kiosks have fish consumption warnings, posted, inspected and maintained on an annual basis.
- Distribution to Fish Markets – A Permittee representative from FSSD communicated the goals of the Fish Risk Reduction Program to Solano County Health Inspectors and requested distribution of the brochure to local fish markets during their routine inspections. The brochures were again provided to the Solano County Health Inspectors in FY19-20, specifically on January 14, 2020.

Sample Information

Building ID Must Link to Correct Building in Tab 1

Building ID	Part 3. Report Concentrations of PCBs in Priority Building Materials - Details							Material Density (kg/linear-feet) or (kg/ft^2)	PCBs Mass (g)	Comments
		Applications Tables								
	Select Option for PCBs Concentration	Priority Building Material Application	Application Sample Description	Concentration (mg/kg)	Concentration ≥ 50 mg/kg (Y/N)	Estimated Amount of Material (only if ≥ 50 mg/kg)	Material Units (linear-ft or ft^2)			
793	Conduct Representative Sampling	Thermal Insulation		0	N				0.000	
793	Conduct Representative Sampling	Adhesive Mastic		0	N				0.000	
793	Conduct Representative Sampling	Other Materials		0	N				0.000	
791	Conduct Representative Sampling	Adhesive Mastic		34	N				0.000	
641	Conduct Representative Sampling	Fiberglass Insulation		0.67	N				0.000	
641	Conduct Representative Sampling	Adhesive Mastic		0	N				0.000	
641	Conduct Representative Sampling	Other Materials		0.42	N				0.000	
571	Conduct Representative Sampling	Adhesive Mastic		0.57	N				0.000	
1001	Conduct Representative Sampling	Adhesive Mastic		0.19	N				0.000	
1001	Conduct Representative Sampling	Other Materials		0	N				0.000	
					N				0.000	
					N				0.000	
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Geosyntec consultants

1111 Broadway, 6th Floor
Oakland, California 94607
PH 510.836.3034
www.geosyntec.com

Memorandum

Date:	September 18, 2020
To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

*****

Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	Unknown	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

08568

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

Attachment B PCBs in Priority Building Materials Screening Assessment Form B-1

Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

The mention of commercial products, their source, or their use in connection with information in BASMAA products is not to be construed as an actual or implied approval, endorsement, recommendation, or warranty of such product or its use in connection with the information provided by BASMAA.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Attachment A
Process Flow Chart

PCBs in Priority Building Materials Screening Assessment Process

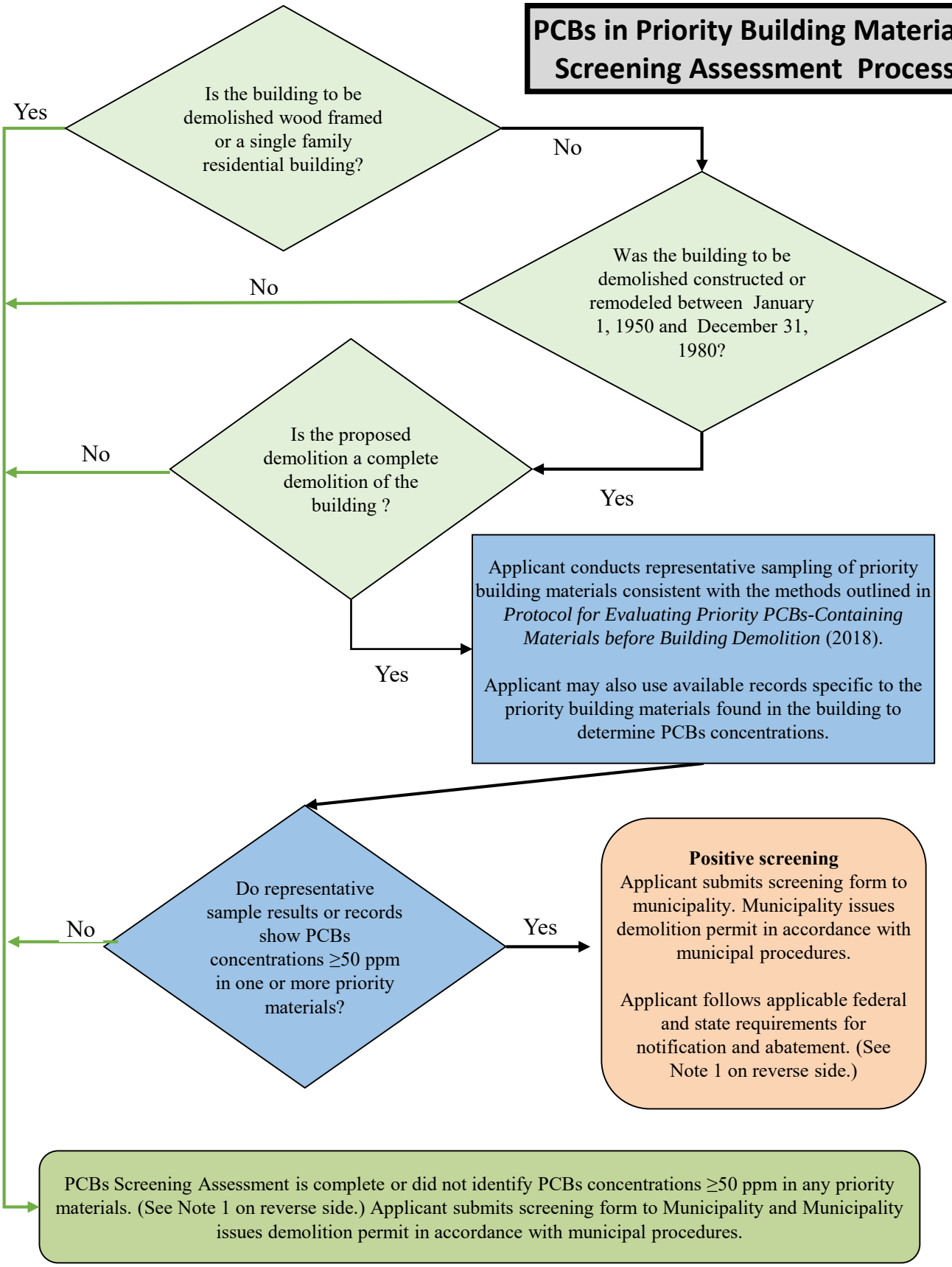

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

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Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
(Revised November 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

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Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
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Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
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DISCLAIMER

Information contained in BASMAA products is to be considered general guidance and is not to be construed as specific recommendations for specific cases. BASMAA is not responsible for the use of any such information for a specific case or for any damages, costs, liabilities or claims resulting from such use. Users of BASMAA products assume all liability directly or indirectly arising from use of the products.

The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

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Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

---

[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

---

[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

---

[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	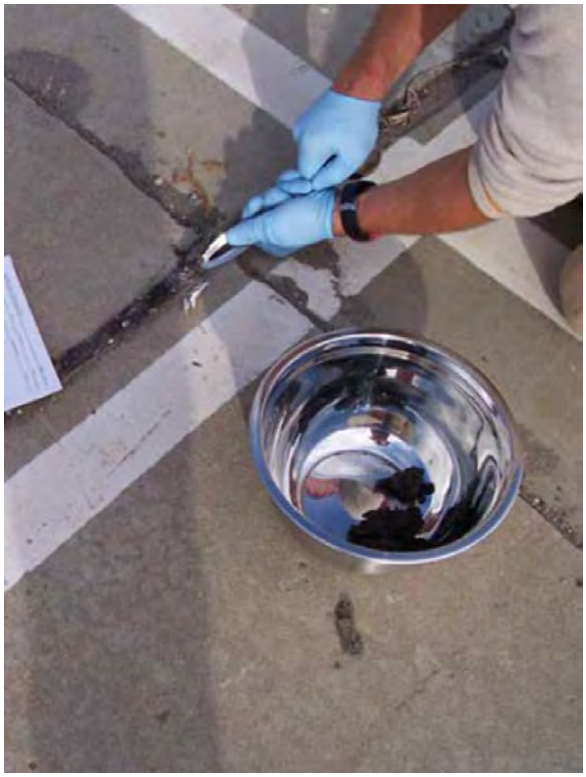
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7

<u>Thermal Insulation</u>:

Damaged felt-style thermal insulation.

Photograph 8

<u>Thermal Insulation</u>:

Exposed/damaged fiberglass insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	

Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

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APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

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[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

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[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

MEMORANDUM

TO: **BASMAA MPC Committee**

FROM: **Lisa Sabin and Jon Konnan, EOA, Inc.**

DATE: **September 23, 2020**

SUBJECT: **Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program**

1. BACKGROUND

The San Francisco Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. Provision C.12.f.ii(3) requires development of a data collection and assessment methodology program by July 1, 2019 to quantify PCBs loads reduced through implementation of the new program for controlling PCBs during building demolition, which began implementation on that date. Provision C.12.f.iii requires Permittees to submit the data collection and assessment methodology with their Fiscal Year (FY) 2019/20 Annual Reports, and states that this reporting should be at the regional level on behalf of all Permittees.

This technical memorandum provides administrative and technical support at the regional level for ongoing efforts by MRP Permittees to comply with data collection, evaluation, and reporting requirements under MRP Provision C.12.f. by:

- Documenting the regional process to collect data from the new program for controlling PCBs during building demolition;
- Presenting the assessment methodology to calculate PCBs loads reduced via the building demolition program;
- Documenting the results of additional literature searches and data gathering efforts conducted to set the stage for refining and reducing uncertainty in the parameters of the assessment methodology equation;
- Describing how data generated from the new demolition control program will be incorporated into the assessment methodology, including providing conversion factors needed for the load reduction calculations; and
- Addressing the MRP Provision C.12.f.iii requirement to submit the data collection and assessment methodology with their FY 2019/20 Annual Reports.

This technical memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration). The information provided builds upon a previous BASMAA effort that outlined a conceptual approach for the regional data collection process and assessment methodology (BASMAA 2018).

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2. REGIONAL DATA COLLECTION PROCESS

This section documents the regional data collection process for the new programs to manage PCBs-containing building materials during demolition that began on July 1, 2019. This process was developed through a collaborative effort by municipalities subject to the MRP, the associated countywide stormwater management programs, and BASMAA. The regional data collection process focuses on collecting, compiling, and evaluating the data generated by the new programs on a regional basis. In addition, when sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program.
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

The regional data collection process involves collection of data from individual permit applicants at the municipal level, followed by compilation of data for applicable structures[1] at the countywide level, and data evaluation and reporting at the regional level. The process is described below.

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality. For non-applicable buildings, applicants simply check the boxes, certify, and submit to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and estimated demolition dates, with their FY 2019/20 Annual Reports.

The regional data management system is an Excel spreadsheet-based tool for storing and managing the data from each Permittee. The tool also calculates the estimated loads avoided throughout the region via implementation of the new management program, using the assessment methodology and data inputs described below.

3. ASSESSMENT METHODOLOGY

This section describes the assessment methodology and refined data inputs for estimating the loads of PCBs to municipal separate storm sewer systems (MS4s) that are avoided due to implementation of new controls to manage PCBs in building materials during demolition activities. To-date, the load of PCBs reduced through management of PCBs during demolition has been calculated using Equation 1:

Equation 1. $$Load\ of\ PCBs\ Reduced = N \bullet M \bullet SW \bullet E_f$$

Where:

N = Number of applicable structures with PCBs concentrations ≥ 50 ppm demolished each year (structures/yr)

M = Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm (kg/structure)

SW = Average fraction of PCBs that enters the MS4 due to demolition without new demolition program controls (dimensionless fraction)

E_f = Average fraction of PCBs prevented by new demolition program controls from entering MS4 (dimensionless fraction)

The MRP 2.0 Factsheet (SFBRWQCB 2015) provides values for each of the four terms in Equation 1 that were used to stipulate the load reduction for implementing the new demolition control program across the MRP area, which was a total of 2 kg/yr. Table 1 presents the values used for each of the four terms in the Factsheet to derive the 2 kg/yr PCBs load reduction credit. The Factsheet notes that each of the terms could be represented by a range of values and the information available to estimate the values of these terms shown in Table 1 was limited.

BASMAA (2018) summarized the above MRP 2.0 Factsheet approach and other previous efforts to estimate PCBs loads from demolition and potential loads reduced by control programs. It also presented a conceptual approach to refining the 2 kg/year PCBs load reduction estimate by describing methods to potentially refine the values of each of the four Equation 1 parameters shown in Table 1. Building upon the approach described in that document, additional literature searches and data gathering efforts were conducted to set the stage for refining and reducing uncertainty in the values of the four terms. For the first two parameters, data will be incorporated as they are generated from the new demolition control programs. The results of these efforts are presented below.

Table 1. Terms in MRP 2.0 Factsheet (SFBRWQCB 2015) equation used to stipulate the loading of PCBs to MS4s avoided by implementing demolition control measures.

Term	Symbol	Term Definition	Value	Units
1	*N*	Number of applicable structures demolished per year with PCBs concentrations ≥ 50 ppm	50	structures/year
2	*M*	Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm	5	kg/structure
3	*SW*	Average fraction of PCBs that enters MS4s due to demolition without controls[1]	0.01	dimensionless fraction
4	E_f	Average fraction of PCBs prevented by controls[1] from entering MS4 (i.e., assumed effectiveness of controls)	0.8	dimensionless fraction

1. The term "controls" refers to the proposed new demolition management program, not existing construction controls.

Term 1: Number of Applicable Structures Demolished Per Year

Current Basis

A study conducted by the San Francisco Estuary Institute (SFEI) reported a medium estimate of 521 building demolitions per year in commercial and industrial land uses in the study area, based on Bay Area Air Quality Management District (BAAQMD) asbestos abatement permitting data.[2] The SFEI study also reported the following medium estimates: 46% of the demolished buildings were built between 1950 and 1980 and 36% had PCBs concentration in caulks/sealants greater than 50 ppm (Klosterhaus et al. 2011). Multiplying (521) x (0.46) x (0.36) results in an estimated 86 commercial and industrial buildings demolished per year that were built between 1950 and 1980 and had PCBs concentration in caulks/sealants greater than 50 ppm.

Based upon information in the SFEI study and considering that the scope of the program to manage PCBs during demolition is limited to exclude wood frame buildings, the MRP Factsheet assumed 50 applicable structures with PCBs concentrations ≥ 50 ppm are demolished per year in the Bay Area (SFBRWQCB 2015).

Basis for Refinement

Data gathered during the new demolition control programs will be used to document the number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year throughout the MRP area. These data will be used to calculate a regional annual average number of applicable

[2] The BAAQMD regulations require that a "J Number" be applied for and obtained before applying for a building permit for demolition of an existing structure or renovations removing greater than 100 square feet of asbestos material within the San Francisco Bay air basin.

structures with PCBs concentrations ≥ 50 ppm that are demolished. This regional annual average value will be used for Term 1 in Equation 1 (see Table 1).

As part of implementing the new demolition controls that began in July 2019, applicants for demolition permits are required to submit a Screening Form to the municipality with jurisdiction for each applicable structure. Permittees will submit these forms to their countywide stormwater programs, which will document the number of applicable structures with PCBs concentrations ≥ 50 ppm within each jurisdiction that are demolished each year. This information will be compiled in the regional database described previously (Section 2) and used to calculate an annual average number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year in the region. Use of these real-world data collected in the MRP area will substantially reduce the uncertainty that is currently associated with the estimated value for Term 1 that was used in the MRP 2.0 Factsheet.

Term 2: Average Mass of PCBs per Applicable Structure

Current Basis

The SFEI study included estimating the mass of PCBs in caulks in Bay Area buildings and releases to stormwater runoff during renovation and demolition (Klosterhaus et al. 2011). Using a blind sampling approach, the SFEI study collected 25 caulk samples from the exterior of ten commercial and industrial buildings constructed in the study area between 1950 and 1980. The study area was the portion of the San Francisco Bay Area covered by the MRP: Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and the cities of Fairfield, Suisun, and Vallejo. The caulk samples were analyzed for PCBs, which were detected in 88% of the samples, with 40% exceeding 50 ppm, the concentration at which caulk falls under U.S. Environmental Protection Agency (USEPA) regulations (Federal Register 2010). Detectable PCBs concentrations ranged over six orders of magnitude, from 1 to 220,000 ppm. These data were consistent with previous studies in other cities (Klosterhaus et al. 2011).

A geographic information system (GIS)–based approach was then used to estimate the number, area, and volume of currently standing buildings in the study area that were built during the era of greatest PCBs use in caulk. The approach used historical imagery and contemporary land use and involved characterization of randomly selected buildings within the study area, with the result scaled up to extrapolate total building counts and areas in the MRP footprint. Various assumptions, including the frequency of anticipated PCBs detection and PCBs concentrations in the caulk, average mass of caulk per unit building volume, and average building volume, were then applied to calculate an estimate of the total PCBs mass in building caulk in the study area. The evaluation resulted in a mid–range estimate of 10,500 kg PCBs in caulk in buildings located in the study area (low and high estimates were 767 and 46,000 kg, respectively), which equated to an average of 4.7 kg PCBs per building (low and high estimates were 0.6 and 16 kg per building, respectively). The estimate included caulk located on both the interior and exterior of buildings (Klosterhaus et al. 2011). Based upon the information in the SFEI study, the MRP Factsheet assumed an average applicable structure with PCBs concentrations ≥ 50 ppm in the Bay Area contains 5 kg of PCBs (SFBRWQCB 2015).

Basis for Refinement

Data gathered as part of the new demolition control programs will be used to document the quantities and associated PCBs concentrations of priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm. These data will be used to calculate a regional average mass of PCBs per

applicable structure with PCBs concentrations ≥ 50 ppm in priority materials. This calculated regional average mass will be used for the value of Term 2 in Equation 1 (see Table 1).

Because of the new program to manage PCBs in building materials during demolition activities, Permittees have the opportunity to gather real-world data to estimate the mass of PCBs in priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm that is demolished in the region. Over time, these data will be compiled into a dataset that can be used to calculate a regional average mass. This calculated average will account for five priority building materials that potentially contain PCBs previously identified for the program (caulk, rubber window gaskets, thermal insulation, fiberglass insulation, and mastic adhesives), while the estimate in the MRP Factsheet (Table 1) is based upon caulk only.

The information provided in the Screening Form includes two types of data that are needed to calculate the mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm: (1) the quantity of each priority material in the structure, and (2) the concentration of PCBs in each priority material in the structure. These data will be used as inputs in Equation 2 to calculate the total mass of PCBs in the five priority materials for each applicable structure with PCBs concentrations ≥ 50 ppm that undergoes demolition beginning July 1, 2019.

Equation 2. $$Mass\ of\ PCBs\ per\ Structure\ (mg) = [\sum_{i=1}^{n}(C_i \bullet Q_i \bullet F_i)]$$

Where:

C_i = Concentration of PCBs in priority material i (mg/kg)

Q_i = Quantity of priority material i (linear feet or square feet)

F_i = Conversion factor – mass of priority material per linear foot of priority material i (kg/ft) or mass of priority material i per square foot of priority material i (kg/ft^2)

Equation 2 only accounts for the PCBs mass associated with the five priority building materials, so may represent an underestimate of the total PCBs mass in a given building. However, the extent of the underestimate would be small if the five priority materials contain most of the PCBs mass in a building.

The PCBs concentrations in each priority material (C_i) that will be used in Equation 2 is provided on the Screening Form for each applicable structure in units of mg of PCBs per kg of priority material (mg/kg).[3]

[3] Please note that this memorandum does not provide guidance on determining a representative PCBs concentration when multiple samples are collected from a single homogeneous area of a building material, per the sampling protocol (e.g., applying average vs. geomean vs. median to determine central tendency when multiple sample results are available). This type of determination should be made once sufficient data are available about PCBs concentration distributions in building material samples (e.g., after two or three years of data have been collected).

The quantity of each priority material (Q_i) that will be used in Equation 2 is provided on the Screening Form in units of linear feet (ft) for caulk and rubber window gaskets, and square feet (ft^2) for thermal or fiberglass insulation and mastic adhesives. Conversion factors (F_i) for each priority material i were developed to provide the mass of priority material per linear foot or per square foot using Equation 3.

Equation 3. $$\boldsymbol{F_i = (D_i \times \rho_i)}$$

Where:

F_i = mass of priority material i per linear foot (of caulk or rubber window gaskets) of i (kg/ft) or mass of priority material i per square foot (of insulation or mastic) of i (kg/ft^2)

D_i = Assumed dimensions of priority material i (ft^2 or ft)

- For caulk and rubber window gaskets, this represents the assumed cross-sectional area of the caulk bead or the gasket in square feet.
- For insulation and mastic, this represents the thickness of the layer of material in feet.

ρ_i = Assumed density of priority material i (kg/ft^3)

Conversion factors that were developed for each priority building material are shown in Table 2. For caulk and rubber window gaskets, the conversion factors estimate the mass of material per linear foot (kg/ft). For thermal or fiberglass insulation and mastic adhesives, the conversion factors estimate the mass of material per square foot (kg/ft^2). Table 2 identifies typical applications for each priority material and the associated conversion factors that were developed for that application. The conversion factors are presented as a range of values and a "Best" value based on the average or mid-range value.

To develop the conversion factors shown in Table 2, data on common priority material dimensions and densities used in typical building construction were gathered through literature review, product technical specifications, building construction guidelines, and other relevant resources (Panke and Cook 1992, Scheffler and Connolly 1996, Jester 1995). The ranges of assumed dimensions and densities that were used to develop the conversion factors are shown in Table 3. Additional information on the assumptions and data used to populate Table 3 and develop the conversion factors shown in Table 2 is presented below.

Product Dimensions

Multiple construction guides were consulted to identify typical dimensions for common applications of priority materials in building construction. For caulk or rubber gaskets, Table 3 provides a range of typical heights and widths of applications around windows and doorframes, and for caulk, also between concrete expansion joints. For fiberglass or thermal insulation, Table 3 provides a range of typical thicknesses for applications used around HVAC systems, heathers, boilers, and pipes, and inside walls or crawl spaces. For mastic adhesives, Table 3 provides typical thicknesses of the material used under or between roofing material and flashing or used on surfaces between carpet and floor tiles. These dimensions apply to newly applied or installed products and may not reflect the dimensions of an aged/weathered product but represent the best information currently readily available.

Table 2. Conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Descriptions of typical application	Material[1,2,3]	Conversion Factors				
			Range			Best (Average or mid-range value)	Units
Caulk	Around windows or window frames; around door frames	polysulfide caulk	0.009	-	0.04	0.02	kg/ft
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.01	-	0.15	0.04	kg/ft
Rubber Window Gaskets	Around windows or window frames	Butyl Rubber	0.02	-	0.06	0.03	kg/ft
Thermal or Fiberglass Insulation	Around HVAC systems/ heaters/boilers	Felt Insulation	0.09	-	2.3	0.82	kg/ft^2
		Unfaced Blanket Fiberglass	0.03	-	0.28	0.16	kg/ft^2
	Around heated transfer piping	Fiberglass Pipe Insulation	0.06	-	0.62	0.26	kg/ft^2
	Inside walls or crawl spaces	Loose Fiberglass Fill/Batting	0.17	-	0.24	0.21	kg/ft^2
		Rigid Fiberglass Foam Board	0.03	-	0.45	0.17	kg/ft^2
Adhesive Mastics	Below carpet and floor tiles	Floor Mastic	0.06	-	0.13	0.10	kg/ft^2
	On, under or between roofing materials and flashing	Roof Mastic	0.30	-	0.74	0.50	kg/ft^2

1. Panke and Cook, 1992.
2. Scheffler, M. and Connolly, J. 1996.
3. Jester, T.C. 1995.

Product Densities

The density information reported in Table 3 was gathered from readily available commercial literature on a range of reported densities for the five priority materials. Where possible, information on products that were used in the 1950s to 1980s time period and that were known to contain PCBs were used. However, because this type of product-specific information was not readily available, much of the information used to estimate typical product densities (and dimensions) was based on commercially available products that are currently in use for similar types of building and construction applications. For example, prior to 1980, polysulfide caulks and sealants were frequently formulated with PCBs and are commonly found in buildings constructed between 1950 and 1980. Although currently available polysulfide sealants do not contain PCBs, the densities of these types of sealants were used in Table 3 as reasonable approximations of the densities of polysulfide sealants used in the past. Similarly, the densities for other priority materials shown in Table 3 are primarily based on current use products that are similar to products used in the past.

In addition to the lack of technical data on products in use during the 1950s – 1980s, there is a lack of data about the impact of age and weathering on priority material densities. Loss of volatile material will reduce product densities over time, while other weathering factors, such as compression or stretching, may increase or decrease densities over time. In an attempt to better account for age and weathering, available literature was reviewed to identify information on the densities of priority materials in construction and demolition debris and wastes. This type of information was not found on the specific priority materials of interest. However, US EPA (2016) provides estimates for the weight to volume ratios (i.e., densities) of a number of construction and demolition (C&D) waste categories. These categories include concrete, asphalt paving, roofing, wood, gypsum board, metal, rock/gravel/dirt and sand, and bulk waste. The bulk waste category is a generic catchall grouping for the remainder of C&D debris that does not fit into one of the other categories. Although the materials that are included in this generic category are not specified, the priority materials would likely all fall into the generic bulk waste category when disposed.

Therefore, in the absence of other data, the density for C&D bulk waste may be somewhat comparable to the densities of aged/weathered priority materials and can be compared to the densities of new products provided in Table 3. The average priority material densities in Table 3 range from about 1 kg/ft^3 to 40 kg/ft^3, with an average of 12 kg/ ft^3 across all priority materials. The C&D bulk waste density of 8 kg/ft^3 fits within the range of the priority material densities reported in Table 3 and is about 30% less than the average density across all priority materials. This comparison is limited because of the unknown composition of C&D bulk waste but suggests the densities in Table 3 are reasonable approximations for aged/weathered materials.

Average Conversion Factors

Use of the conversion factors shown in Table 2 requires information on the application and material type of the priority building material. It is anticipated that in some cases the available data may be incomplete or may not match the categories in Table 2. Conversion factors that are not specific to the priority building material's application or material type were therefore developed by averaging across applications/types (Table 4). When calculating the mass of PCBs removed from a demolition site, conversion factors from Tables 2 and/or 4 should be selected as appropriate given the level of information available about the associated sample(s).

Table 3. Dimensions and densities for typical construction applications of priority materials used to develop conversion factors.

Priority Material Category	Descriptions of typical application	Material	Typical Product Dimensions (Inches)						Typical Product Density (kg/ft^3)		
			Width			Depth/Thickness					
			Low	Mid	High	Low	Mid	High	Low	Mid	High
Caulk[1,2,3,4,5]	Around windows or window frames; around door frames	polysulfide caulk	0.25	0.38	0.50	0.13	0.19	0.25		42	
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.25	0.5	1	0.125	0.25	0.5		42	
Rubber Window Gaskets[5]	Around windows or window frames	butyl rubber	0.30	0.40	0.50	0.20	0.30	0.40		41	
Thermal/Fiberglass Insulation[5]	Around HVAC systems/ heaters/boilers	felt insulation[6]	n/a			1.0	3.0	5.0	1.1	3.3	5.4
		unfaced blanket fiberglass[7]				0.5	2.8	5		0.68	
	Around heated transfer piping	fiberglass pipe insulation[8]				1.0	2.0	3.0	0.68	1.6	2.5
	Inside walls or crawl spaces	loose fiberglass fill/batting[9]					3.5		0.59	0.70	0.82
		rigid fiberglass foam board[10]				1.0	2.5	4.0	0.32	0.84	1.4
Adhesive Mastics[5]	Below carpet and floor tiles	floor mastic[11]	n/a			0.13	0.19	0.25		6.2	
	On, under or between roofing materials and flashing	roof mastic[12]				0.13	0.19	0.25	29	32	36

1 Pfeiffer M.J., Darwin, D., 1987.
2 Panke, J.R. and John P. Cook. 1992.
3 Hammer & Hand. 2016.
4 M. Scheffler, M. and J. Connolly, J. 1996.
5 Jester, T.C. 1995.
6 Owens-Corning Thermafiber Industrial Felt
7 Owens-Corning unfaced fiber glass blanket
8 Owens-Corning fiberglass pipe insulation
9 Owens-Corning Loose fill insulation and NIST Fiberglass Batt (wall and ceiling insulation)
10 Owens-Corning Foamular Products - rigid polyurethane foam (PUR/PIR)
11 Latricrete Premium Mastic
12 Henry Company Pro-Grade Flashing Cement, Pro-Grade Plastic Cement and Pro-Grade Repair Cement

Table 4. Average conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Conversion Factor	Units
Caulk	0.03	kg/ft
Rubber Window Gaskets	0.03	kg/ft
Thermal/Fiberglass Insulation	0.32	kg/ft^2
Adhesive Mastics	0.30	kg/ft^2

Term 3: Average fraction of PCBs that enters MS4 due to demolition without controls

Current Basis

The average fraction of PCBs that enters the MS4 due to demolition without controls has been estimated at 0.01, based upon professional judgment (i.e., 1% of PCBs in building materials enter MS4s due to demolition without additional controls beyond standard construction site controls). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 3 (see Table 1).

The one percent value presumably incorporates losses to the environment both at the site and during disposal and recycling. Conceptually, this approach assumes that without controls, the transport and fate of the PCBs–containing materials that were in the demolished building fall within three general categories:

1. Released during the demolition (e.g., as part of an initially airborne plume of small particles) and settled in a "halo" around the site. Any wash waters used during the demolition (e.g., during cleaning of equipment, onsite or offsite) that are not fully contained and treated or disposed of could also transport PCBs–containing materials to the MS4.
2. Removed from the site and disposed of as part of the general waste stream (e.g., at a landfill), with some fraction potentially released to the environment during the handling, transport, and disposal process (e.g., during transportation of waste materials by truck to a landfill).
3. Removed from the site with recycled materials, with some fraction potentially released to the environment during the handling, transport, and recycling process (e.g., during transportation of waste materials by truck to a transfer station or recycling facility) or returned to the environment with recycled materials.

This methodology assumes that all PCBs–containing materials released into the environment via any of the above three categories eventually enter the MS4. For example, permanent storage in onsite or offsite pervious areas is assumed to be negligible. All three transport and fate categories are presumably

incorporated into the third term of Equation 1, the average fraction of PCBs that enters MS4s due to demolition without controls.

This methodology also assumes that the effectiveness of any existing controls (e.g., proper offsite disposal of PCBs–containing materials, erosion and sediment controls, and other routine construction site controls) is incorporated into the third term of Equation 1.

Basis for Refinement

BASMAA (2018) summarized the readily available information and studies on the release of PCBs to stormwater from building materials during demolition activities. Building upon those efforts, a follow-up literature review was conducted in 2019 to identify any additional information that could be used to refine the assumed fraction of PCBs that enters MS4s due to demolition without controls in Equation 1, Term 3 (see Table 1). This literature review was also conducted to identify new information that could be used to refine Term 4 (i.e., the fraction of PCBs prevented by controls from entering MS4s). This section summarizes the literature review efforts and identifies the outcomes for Term 3. The literature review outcomes for Term 4 are presented in the next section.

Literature Review

The literature review conducted in 2019 built upon the information summarized in BASMAA (2018). The Google search engine as well as specific scientific literature databases and government websites were searched, including:

- Google Scholar
- Google Books
- SpringerLink
- Wiley Online Library
- American Chemical Society
- ScienceDirect.com
- Elsevier
- US EPA Website

Major search terms (and similar variations or combinations of these terms) that were used included the following:

- PCBs transport and fate
- PCBs in soils/stormwater/demolition/building materials/building demolition/building renovation
- PCBs in caulk/rubber window gaskets/thermal insulation/fiberglass insulation/mastic
- PCBs contaminated sites/cleanup sites/remediation sites
- PCBs in school buildings
- Remediation of PCBs in buildings/building materials
- Construction and Demolition Debris/Waste

- Demolition dust and stormwater impacts
- Soil contamination from PCB-containing caulk/materials/buildings
- PCBs in soil after demolition
- PCB contamination from polysulfide sealants
- PCB-contaminated soil/demolition dust
- Mass of PCBs in Building materials
- Fate of PCBs in the environment/urban environment/caulk/building materials
- PCBs Source apportionment
- PCBs Waste characterization
- Accumulation rates of PCBs in soils
- PCB cleanup and disposal programs
- Managing remediation waste from PCB cleanups
- Handling and disposal of PCBs waste
- Improved recycling practices/BMP effectiveness and stormwater impacts
- PCBs sources/emissions/releases from caulk/buildings/schools
- PCBs emissions during demolition/renovation/abatement/replacement/removal of caulk
- Dust from demolition and construction sites

In addition, online searches were performed to identify any new research that had cited one or more of the studies previously described in BASMAA (2018). These citations were reviewed to identify any relevant studies that may have occurred more recently and relied upon these earlier studies.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs entering MS4s due to demolition activity without controls in Equation 1, Term 3 (see Table 1). To date, the vast majority of research on the release of PCBs contained in building materials has focused on human health risks and quantifying human exposures via air, ingestion, and/or dermal pathways. It appears the release of PCBs to stormwater from building materials in general, and specifically during demolition or renovation activities has not been quantitatively studied, outside of the limited studies reported previously in BASMAA (2018). These earlier studies developed conceptual models and thought experiments to estimate the fraction of PCBs released based on the limited measurement data available. Without new measurement data, however, further attempts to improve upon these efforts and reduce uncertainty in the current estimate of Term 3 are not warranted.

BASMAA (2018) recommends exploring whether disposal and/or recycling practices have improved in recent years such that less PCBs would be lost to the environment via these pathways. Evidence was not found during the literature review of improved recycling or disposal practices implemented in the Bay Area in recent years that would result in reduced releases of PCBs to MS4s from demolition materials.

This finding is further supported by anecdotal information about recycling facilities in the South Bay Area. Over the past 5+ years Santa Clara Valley MRP Permittees have been investigating sources of PCBs to public ROWs in industrial areas and have frequently targeted facilities where demolition materials are brought on site for recycling. These investigations have documented poor housekeeping practices, visible scrap material and soils tracking off sites, and general lack of appropriate stormwater BMPs at many of these types of facilities which have resulted in citations during municipal stormwater inspections. Overall, these investigations have found large inconsistencies in materials handling practices across facilities, and even at the same facility over time. Although not a quantitative assessment, this information suggests that it is unlikely consistent improvements in recycling practices across facilities have occurred in recent years.

Term 4: Average fraction of PCBs prevented by new controls from entering MS4

Current Basis

The estimated fraction of PCBs prevented by new controls from entering MS4s has been estimated at 0.8, based mainly upon professional judgment (i.e., 80% of PCBs are prevented from entering MS4s due to the new programs to manage PCBs during building demolition). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 4 (see Table 1).

Basis for Refinement

As described above, a review of readily available literature was conducted in 2019 to identify any new information that could be used to refine the assumed effectiveness of controls to prevent PCBs from entering MS4s (Term 4). The literature review efforts are summarized in the above section on Term 3. This section presents the outcomes of the literature review for Term 4.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs prevented by new controls from entering MS4s. However, BASMAA (2018) identified two earlier studies that estimated 99% capture of PCBs contained in caulk removed from buildings using appropriate abatement measures (high power vacuums and power washing during removal). Based on these data, a reasonable assumption is that the new control programs will be similarly effective at capturing PCBs in priority materials that, prior to demolition, are removed from a building using appropriate abatement methods. Given the new programs are focused on controlling PCBs in priority materials only, the use of a lower (80%) value for the overall effectiveness of the controls at preventing PCBs from entering MS4s (Term 4) appears reasonable.

Using Data from New Program on PCBs Mass in Priority Building Materials

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs presumably removed from the building before demolition. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0

Factsheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Equation 1 and Table 1 may be set to 1 when evaluating the PCBs load avoided using PCBs mass in priority building materials data from the new program, since it may be assumed that the program removes 100% of the priority materials with PCBs ≥ 50 ppm that were identified by the sampling protocol.

4. POTENTIAL FUTURE REFINEMENTS TO THIS METHODOLOGY

It should be noted that the new program for controlling PCBs during building demolition is in its early stages, having begun implementation only recently (i.e., on July 1, 2019). The data generated during the first fiscal year of the program have not yet been compiled and evaluated. As experience is gained in implementing the program and the associated data are collected and evaluated, and/or new information becomes available from any other source, the need may arise to revise the data collection and assessment methodology presented in this memorandum. As needed, staff from the countywide programs in the MRP area will work with MRP Permittee and Regional Water Board staff to make any future refinements to the program and methodology.

5. REFERENCES

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Section 13 - Provision C.13 Copper Controls

C.13.a.iii.(3) ►Manage Waste Generated from Cleaning and Treating of Copper Architectural Features

Provide summaries of permitting and enforcement activities to manage waste generated from cleaning and treating of copper architectural features, including copper roofs, during construction and post-construction.

Summary:

The City building inspectors enforce BMP implementation during inspections of construction sites while the District enforces copper related requirements in conjunction with its Industrial Pretreatment Program. Both agencies possess adequate legal authority to enforce requirements.

C.13.b.iii.(3) ►Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

Provide summaries of any enforcement activities related to copper-containing discharges from pools, spas, and fountains.

Summary:

When an applicant applies for pool or spa building permit with the City, the City's Building Division distributes the District's pool and spa brochure, which details BMPs for pool and spa discharges. If the District becomes aware of illicit pool/spa discharges the District's ERP is followed; requirements may include discharge to the sanitary sewer system through a temporary discharge permit or diversion of discharge for use in landscaping or irrigation if conditions allow.

C.13.c.iii ►Industrial Sources Copper Reduction Results

Based upon inspection activities conducted under Provision C.4, highlight copper reduction results achieved among the facilities identified as potential users or sources of copper, facilities inspected, and BMPs addressed.

Summary:

Section C.13.c is the responsibility of VFWD. Please refer to the VFWD Annual Report for information on industrial inspections regarding copper reduction. The VFWD conducted inspections at businesses during the report period largely in conjunction with the District's Pretreatment Program. Business categories included vehicle maintenance facilities, food service facilities, Stormwater General Industrial Permittees, six Significant Industrial Users, and one categorical zero discharger. Only one of these businesses, a boat yard with on-land maintenance, is considered a potential copper source. Inspectors are trained using BASMAA POC training materials to identify and eliminate potential sources of copper. Prohibited activities include commercial vehicle washing and boiler blowdown discharges to the storm drain system. No copper-related stormwater violations were found during the report period.

January 20, 2020

Mr. Michael Montgomery, Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, 14th Floor
Oakland, CA 94612

Subject: NPDES Permit Requirements for Receiving Water Quality Monitoring, TMDL/SSO Support, Mercury and PCBs Watershed Permit Support, and Implementation of Copper Action Plans

Dear Mr. Montgomery:

I am writing on behalf of the Bay Area Clean Water Agencies (BACWA) and its members that own and operate publicly-owned treatment works (POTWs) and that have National Pollutant Discharge Elimination System (NPDES) permits to discharge to San Francisco Bay Area waters. The NPDES permits issued to these agencies impose some requirements that are most efficiently fulfilled as a group. The purpose of this letter is to report on behalf of BACWA members that those requirements are being met, including permit provisions related to: (A) Receiving Water Quality Monitoring; (B) Support for the RMP through the Alternate Monitoring Requirements (AMR); (C) Mercury and PCBs Watershed Permit Support; (D) Cyanide Action Plan; (E) Copper Action Plan Support; (F) Nutrient Watershed Permit Support; and (G) Total Maximum Daily Load Support.

A. Receiving Water Quality Monitoring

Various NPDES permits require that the permittees support the Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP), administered by the San Francisco Estuary Institute (SFEI), and established by San Francisco Bay Regional Water Quality Control Board (Regional Water Board) Resolution 92-043, adopted April 15, 1992. BACWA members have and continue to fulfill this requirement by participating in and providing funding to the RMP. A letter from SFEI, dated December 20, 2019, confirming BACWA member agencies' contributions to the RMP, is attached for reference.

B. Participation in the Alternate Monitoring Plan

In March 2016, the Regional Water Board adopted the Alternate Monitoring Requirements (AMR)[1], an Order that allows POTWs to reduce monitoring frequencies for specific pollutants in exchange for increased funding to the RMP. The Order calculates the additional fee for each agency to opt into the AMR based on its estimated cost savings associated with reduced monitoring requirements. The agencies who have opted into the AMR are listed in the attached December 20, 2019 letter from SFEI.

In 2019, AMR funds were used as described below:

- AMR funds fully or partially funded the following projects in 2019:
    - 2019 Ethoxylated Surfactants in Ambient Water, Margin Sediment, and Wastewater
    - 2019 Emerging Contaminants in Urban Stormwater (first year of a three-year study)
    - 2019 Microplastics in Sport Fish Tissue Archive
- The RMP published an updated strategy for Microplastics to guide future studies[2].
- The microplastics report, funded in large part by the Gordon and Betty Moore Foundation, with support from the RMP, was published[3].

C. Mercury and PCBs Watershed Permit Support

The Mercury and PCBs Watershed Permit was reissued in 2017, and became effective on January 1, 2018[4]. The Mercury/PCB Watershed Permit required source control and risk reduction activities by the permittees.

In 2019, BACWA's Bay Area Pollution Prevention Group (BAPPG) continued to reach out to dental assistant and dental hygienist students to educate them about proper amalgam management and disposal. This campaign reached a total of 172 students and instructors from January 1, 2019 – December 31, 2019 at the following site visits:

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[1] Order No. R2-2016-0008 Alternate Monitoring and Reporting Requirements for Municipal Wastewater Dischargers for the Purpose of Adding Support to the San Francisco Bay Regional Monitoring Program (RMP).

[2] Sedlak, M.; Sutton, R.; Miller, L.; Lin, D. 2019. Microplastic Strategy Update. SFEI Contribution No. 951. San Francisco Estuary Institute: Richmond, CA.

[3] Sutton, R.; Lin, D.; Sedlak, M.; Box, C.; Gilbreath, A.; Holleman, R.; Miller, L.; Wong, A.; Munno, K.; Zhu, X.; Rochman, C. 2019. Understanding Microplastic Levels, Pathways, and Transport in the San Francisco Bay Region. SFEI Contribution No. 950. San Francisco Estuary Institute: Richmond, CA. Available at: https://www.sfei.org/sites/default/files/biblio_files/Microplastic%20Levels%20in%20SF%20Bay%20-%20Final%20Report.pdf

[4] Waste Discharge Requirements for Municipal and Industrial Wastewater Discharges of Mercury to San Francisco Bay, Order No. R2-2017-0041; NPDES No. CA0038849

- San Jose City College (two classes)
- College of Marin, Novato (one class)
- Foothill College, Los Altos (one class)
- Santa Rosa Junior College (one class)
- Mt Diablo Adult Ed, Concord (two classes)

The instructors have come to rely on these annual visits and have incorporated BAPPG's program into their instructional calendar. Further, this is a very relevant audience for other messages, such as wipes, microplastics, and flea control.

The Mercury and PCB Watershed permit requires that permittees conduct or participate in programs to reduce mercury-related risks to humans from the consumption of Bay fish. In 2019, BACWA continued to fund contracts worth $25,000 each to the California Indian Environmental Alliance, and APA Family Support Services, to conduct activities related to reducing risk from fish consumption in vulnerable populations. Materials generated with support from BACWA's previous grants are available on BACWA's website[5].

D. Cyanide Action Plan

As part of the site-specific objective (SSO) for cyanide, NPDES dischargers are required to calculate the 3-event rolling average of total cyanide concentrations in each segment of the Bay, based on RMP data. In 2019, the RMP published updated results from the cyanide sampling during the 2017 Water Cruise[6]. Results indicate that ambient cyanide concentrations are below triggers but the rolling average increased in three of five regions.

E. Copper Action Plan

The copper action plan contained in many Bay Area POTW permits requires permittees to implement a plan to reduce copper discharges, conduct studies to reduce copper pollutant impact uncertainties, and implement additional measures should the three-year rolling mean in various parts of the Bay exceed site-specific concentration triggers.

The RMP collected samples for copper during the 2017 Water Cruise. The method Brooks Analytical Laboratories used changed in 2017 so a report was delayed while they investigated how the results from the two methods differ. Results on copper concentrations from the 2017 Water Cruise have been updated based on the original

[5] https://bacwa.org/mercurypcb-risk-reduction-materials/
[6]Shimabuku, I. 2019. 2017 Update to Cyanide Rolling Average. San Francisco Estuary Institute: Richmond, CA: Available online at: https://www.sfei.org/sites/default/files/biblio_files/CN%20Slides%20for%20Website%20%28Through%202017%29.pdf

method, reductive precipitate[7]. The data show that ambient concentrations of copper remained below trigger levels, decreased in four areas of the Bay, and increased slightly in one region (Central Bay).

In 2019, BACWA discontinued its presentations to plumbing classes at local colleges since it was found that the messaging was being ignored. Baywise.org hosts resources for plumbers that focus on the key messages pertaining to copper control. BAPPG plans to renew discussions regarding whether to update plumbing messages. In 2020, BAPPG will also provide information on copper plumbing mitigation and BMPs to City Building departments around the Region.

F. Nutrient Watershed Permit Compliance

The 2nd Nutrient Watershed Permit[8] was adopted on May 8, 2019, with an effective date of July 1, 2019. Through the nutrient surcharge levied on permittees, BACWA is funding compliance with the following provisions of the Nutrient Watershed Permit on behalf of its members:

- Group Annual Reporting – BACWA submitted the fourth Group Annual Report on October 1, 2018, which was the last Group Annual Report required under the 1st Nutrient Watershed Permit. All the permittees under the Nutrient Watershed Permit participated in the Group Annual Report. Because of the change in reporting schedule from a permit-year basis to a water-year basis under the 2nd Nutrient Watershed Permit, there was no Group Annual Report due in 2019. The next Group Annual Report will be submitted by the February 1, 2020 deadline.
- Nutrient Reduction by Recycled Water and Nature Based Systems Special Studies – The Scoping and Evaluation Plans for the two Special Studies[9,10] required under the 2nd Watershed Permit were submitted by the December 1, 2019 deadline.
- Support of scientific studies as part of the Nutrient Management Strategy (NMS) – BACWA is providing a total of $2,4000,000 to SFEI in Fiscal Year 2020, in excess of the $2,200,000 required by the Permit. The intention is to "frontload" the required funding to accelerate the pace of the science to more quickly yield data that will be used for management decisions in the 3rd Watershed Permit. The additional $200,000 will count against payments in future permit years.

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[7] https://www.sfei.org/sites/default/files/biblio_files/Cu%20Slides%20for%20Website%20%28Through%202017%29.pdf

[8] Waste Discharge Requirements for Municipal Wastewater Discharges of Nutrients to San Francisco Bay, Order No. R2-2014-0014; NPDES No. CA0038873

[9] Recycled Water Scoping and Evaluation Plan - https://bacwa.org/wp-content/uploads/2019/12/BACWA_RW_ScopingEvalPlan_20191126.pdf

[10] Nutrient Reduction by Nature Based Systems Scoping and Evaluation Plan - https://bacwa.org/wp-content/uploads/2019/12/Final-NBS-Draft-Scoping-and-Evaluation-Plan-med.pdf

- An update on the science plan reflecting the 2019 calendar year will be submitted by the February 1, 2020 deadline.

G. Total Maximum Daily Load Support

Some POTW permits previously included a requirement that permittees report to the Regional Water Board any actions taken in support of Total Maximum Daily Loads (TMDLs) for 303(d) listed pollutants. Support for these efforts has been provided largely through support of the RMP.

In 2014, the RMP convened a Selenium Strategy Team and developed a Selenium Strategy in the Multi-Year Plan. In 2019, the RMP conducted the following activities implementing the Strategy:

- Started a pilot monitoring program for selenium in clams and water to support the North Bay selenium TMDL.
- Published the results of the 2015-2017 Sturgeon Derby Study on selenium concentration in white sturgeon in North San Francisco Bay[11].

Please contact me if you have any questions about the information contained in this letter.

Respectfully,

David R. Williams

David R. Williams, P.E.
BACWA Executive Director

Encl:
SFEI Letter regarding RMP Participation, December 20, 2019.

CC: Mr. Thomas Mumley, Assistant Executive Officer, Regional Water board
Mr. William Johnson, NPDES Permitting Division Chief, Regional Water Board
Mr. Xavier Fernandez, Planning and TMDL Division Chief, Regional Water Board
BACWA Executive Board
Ms. Samantha Engelage, BACWA Permits Committee Chair

[11] Sun, J.; Davis, J.A.; Stewart, R.; Palace, V. 2019. Selenium in White Sturgeon from North San Francisco Bay: The 2015-2017 Sturgeon Derby Study. SFEI Contribution No. 897. San Francisco Estuary Institute: Richmond, CA.

SFEI AQUATIC SCIENCE CENTER
4911 Central Ave, Richmond, CA 94804, p: (510) 746-7334, f: (510) 746-7300 www.sfei.org

December 20, 2019

David Williams
Executive Director
Bay Area Clean Water Agencies
PO Box 24055, MS 59
Oakland, CA 94623

Dear Mr. Williams:

The Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) is the only comprehensive environmental monitoring program to measure pollutants and trends in the Bay. The RMP, which began in 1993, is a successful partnership of scientists, government, municipalities, and industry to understand and improve the health of the Bay.

The goal of the RMP is to collect data and communicate information about water quality in the San Francisco Estuary in support of management decisions. The accomplishments of the RMP are summarized in the RMP Update and the Pulse. The Pulse of the Bay was published in October 2019. Current and past Pulses can be downloaded here; past RMP Updates can be found here.

In 2019, 38 wastewater treatment facilities collectively contributed the full amount of the core RMP program costs assigned to publicly owned treatment works ($1,691,449, see Table 1 for a complete list of agencies). The process used to determine the core fees for each participant group are outlined in the Program Charter: http://www.sfei.org/documents/charter-regional-monitoring-program-water-quality-san-francisco-bay.

In March 2016, the Water Board adopted Order R2-2016-0008, establishing an alternative monitoring requirement (AMR) for municipal wastewater discharges to San Francisco Bay and its tributaries, in exchange for a set schedule of increased payments to the RMP. Participating wastewater treatment facilities who opt-in to this alternative are able to reduce their effluent monitoring costs for most organic priority pollutants and chronic toxicity sensitive species rescreening. In exchange for the reduced monitoring requirements, facilities make supplemental payments to the RMP for regional studies to inform management decisions about water quality in the Bay. In 2019, 36 wastewater treatment facilities made supplemental contributions to the Program under Order R2-2016-0008 ($279,301 see Table 1).

This support is essential to the Program. Through these financial contributions, the RMP is able to conduct regional monitoring to assess the cumulative impact of multiple sources of pollutants to the Bay. We thank you and your members for the support and look forward to serving you in 2020.

Sincerely,

Melissa Foley, PhD
RMP Manager

Table 1

Wastewater Treatment Facilities Contributing to the RMP in 2019 and AMR for FY19

POTW Dischargers	Core RMP Fees	AMR Order Fees
American Canyon, City of		YES
Benicia, City of	YES	YES
Burlingame, City of	YES	YES
Calistoga, City of	YES	YES
Central Contra Costa Sanitary District	YES	YES
Central Marin Sanitation Agency	YES	YES
Crockett Community Services District, Port Costa Sanitary Department		YES
Delta Diablo	YES	YES
East Bay Dischargers Authority	YES	YES
East Bay Municipal Utilities District WWTP	YES	YES
Fairfield-Suisun Sewer District	YES	YES
Las Gallinas Valley Sanitary District	YES	YES
Marin County (Paradise Cove), Sanitary District No. 5 of		YES
Marin County (Tiburon), Sanitary District No. 5 of	YES	YES
Millbrae, City of	YES	YES
Mt. View Sanitary District	YES	YES
Napa Sanitation District	YES	YES
Novato Sanitary District	YES	YES
Palo Alto, City of	YES	YES
Petaluma, City of	YES	YES
Pinole, City of	YES	YES
Rodeo Sanitary District	YES	YES
San Francisco, City and County Of, San Francisco International Airport	YES	YES
San Francisco (Southeast Plant), City and County of	YES	
San José-Santa Clara Regional Wastewater Facility	YES	YES
San Mateo, City of	YES	YES
Sausalito - Marin City Sanitary District	YES	YES
Sewerage Agency of Southern Marin	YES	YES
Silicon Valley Clean Water	YES	YES
Sonoma Valley County Sanitary District	YES	YES

South San Francisco and San Bruno, Cities of	YES	YES
St. Helena, City of	YES	YES
Sunnyvale, City of	YES	YES
Union Sanitary District	YES	
US Department of Navy (Treasure Island)	YES	YES
Vallejo Flood and Wastewater District	YES	YES
West County Agency	YES	YES
Yountville, Town of	YES	YES

Section 15 -Provision C.15 Exempted and Conditionally Exempted Discharges

C.15.b.vi.(2) ► Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

Provide implementation summaries of the required BMPs to promote measures that minimize runoff and pollutant loading from excess irrigation. Generally the categories are:

- Promote conservation programs
- Promote outreach for less toxic pest control and landscape management
- Promote use of drought tolerant and native vegetation
- Promote outreach messages to encourage appropriate watering/irrigation practices
- Implement Illicit Discharge Enforcement Response Plan for ongoing, large volume landscape irrigation runoff.

Summary:

1. Sponsored a total of six Sustainable Garden Tours provided by members of Sustainable Solano.
2. Within the residential water survey program, landscape water sprinkler discharge is closely analyzed to maximize efficiency to help reduce water waste and run-off. In FY 2019-2020, a total of 18 residential water surveys were performed. The water savings from each home water survey is estimated to continue to save an average of 50 gallons per day in water through leak detection and/or reduction in irrigation scheduling.
3. Information packets promoting efficient watering and irrigation practices were distributed to the public at outreach events throughout the year. Note, beginning in early 2020 nearly all of the 2020 conservation outreach events were canceled due to the COVID-19 Pandemic.
4. Our School Water Education Program promotes wise water use and includes water pollution components demonstrating how urban development can degrade the water quality of the San Pablo Bay and other California waterways. A total of 99 classroom presentations were given in FY 2019/2020 despite restrictions imposed as a result of the COVID-19 virus, and a total of 2,764 student contacts were made citywide.
5. Large landscape water surveys continue to be offered to Home Owner Associations in the city and to other large area landscape property owners, however, the COVID-19 Pandemic severely impacted participation in the program. The City Water Conservation Coordinator continues to meet regularly with Greater Vallejo Recreational staff and Landscape Maintenance Managers to discuss water use practices at all city parks and large landscape properties.
6. In FY 2019-2020 a total of 9 public wasteful water complaints were recorded and investigated. Each event was logged and investigated to determine if local water restrictions were being violated. The reporting was accomplished utilizing local water waste hot-lines and internet based reporting tools.
7. Two popular and normally well attended residential water-wise landscape workshops were canceled in March 2020 due to COVID-19. Topics that were scheduled to be covered included drip irrigation components and efficiencies and plant selection and soil preparation.

8. Staff distributed over 400 outdoor water saving devices to the public to help households reduce their water consumption. Items distributed included Hose Nozzles, Shower Heads, Shower Timers and faucet aerators. The total number of devices distributed was cut in half this year due to the shelter-in-place restrictions imposed as a result of the COVID-19 Pandemic.

Vallejo Water Division Information In Support of
Annual Regional Water Quality Control Board FY 2019-2020

C.7.b.i.1 – Outreach Campaign

1. ***The COVID-19 pandemic that hit the United States beginning in February 2020 significantly impacted all facets of the Vallejo Water Conservation Program in FY 19/20. The two conservation program elements impacted the most by the pandemic were water efficiency public outreach and the water school education program. Many public events had to be canceled and the majority of the program metrics/numbers contained in this FY 2019/2020 report occurred before statewide "Shelter-in-Place" instructions were issued.***
2. Prior to implementing COVID-19 social distancing protocols, several public outreach events were completed that targeted reduced household indoor water use and improved outdoor landscape water efficiency. Public outreach water conservation advertisements were first published in the Greater Vallejo Recreation District (GVRD) Activity Guide in the fall season of 2019. Two subsequent planned conservation advertisements scheduled for distribution in the spring and summer of 2020 were suspended by GVRD due to the COVID-19 virus. Our GVRD advertisement campaign focused on water conservation, landscape water efficiency, water rebates and other general water customer information. Two additional water conservation flyers were successfully published in the local Grapevine Magazine that highlighted free drought tolerant landscape workshops and ongoing water conservation rebate opportunities.
3. We also published water related ads on the City's Facebook and NeXT door social media pages and in multiple City Manager's bi-weekly newsletters. In addition, we initiated a Mayoral Proclamation celebrating Drinking Water Week 2020 and placed notices in customer water bills highlighting landscape workshops and our popular home water survey program.
4. The Department also continues to sponsor and promote a popular water-efficient landscape conversion and rebate program targeted at low income and senior citizens.
5. Finally, the Water Department held 9 public outreach events throughout the year in various locations where we addressed questions and concerns related to Vallejo drinking water infrastructure and other drinking water and water conservation topics. The civic and community groups involved included; the Vallejo Unified School Board, African American Alliance, Cal Maritime Academy and others.

C.7.d Public Outreach and Citizen Involvement Events

1. Water related public outreach and community events were significantly curtailed due to COVID-19, but information promoting efficient water use and outdoor irrigation practices was still distributed to the public at several events before the shelter-at-home order was initiated. Examples of where information was provided include: Vallejo Public Library, Florence Douglas Senior Center, Cal Maritime Academy, Vallejo Unified School Board meetings, professional training seminars (QWEL landscape workshops). All events primarily focused on improving water efficiency and increasing knowledge and awareness of our drinking water system infrastructure.

Event Details	Description	Evaluation of Effectiveness
City 4th of July Parade Float & Parade 7/4/19	Community event: target was homeowners and general public. Provided information and trust in the City's clean drinking water.	Recurring invitation by hosting agency - Event attendance estimated at 1,500 Direct customer feedback. Multi-year reduction in city-wide water use.
Water Treatment Plant Community Tours 8/22/19	Public event outlining the drinking water process and importance of water quality testing throughout the system.	Positive feedback from participants.
Cal Maritime Academy Clean Air Day Celebration 10/2/19	Public Outreach Partnership with local Educational Institutions	Positive feedback from school administrators and requests for continued participation.
Vallejo School Board Water Presentations 8/21/19 and 9/14/19	Provided Board members and general public information about the Water Department and the services we provide.	Requests by organizer to continue participation and commitment.
Vallejo Career Fair Outreach 1/24/2020	Public event at the State/local EDD office to help educate general public on water employment opportunities.	Positive feedback from community and organizers regarding continued service offerings and expanding events in the future.
Vallejo 2020 Earth Day Festival, 2020 Public Works Day, and 2020 Ag Day Events. **All Events Canceled.**	Public events for homeowners, students, and general public. Provide water conservation information and water saving devices.	All of these scheduled public events were **cancelled** in 2020 due to COVID-19 virus.

C.7.e Watershed Stewardship Collaborative Efforts

1. The Water Department continues its partnership with the Florence Douglas Senior Center to provide a series of free water-wise landscape workshops for residential water customers. Two workshops were scheduled to be held in March 2020, however due to COVID-19 both events had to be cancelled. Portions of the planned discussion included topics associated with pest control and minimizing pesticide applications. During these annual events, the Water Department provides educational handout material that stress reduced use of pesticides to control pests and encourage the use of "Bay Friendly" native plants which utilize their natural defenses to ward off insects pests and diseases.
2. The Department co-sponsored and advertised a number of water conservation public events provided by the Vallejo Sustainable Solano organization. A total of six Garden Tour events were held at locations throughout Vallejo to promote sustainable water conservation practices.
3. Our Water Conservation Program also continues to work closely with the Vallejo Flood and Wastewater District and the Vallejo Watershed Alliance Organization to educate the public regarding pollution and storm water run-off by coordinating events and passing out education materials. In the spring of 2020 we met on multiple occasions to discus and plan the rollout of a new Clean & Green Boating program for the Vallejo Marina.
4. The Water Department continues to coordinate drinking water conservation efforts with local environmental conservation groups and the Vallejo Unified School District. We attended and

participated in water related planning meetings held by the Greater Vallejo Recreation District (GVRD) and the Vallejo Unified School District. We communicate routinely with GVRD staff and School District representatives responsible for outdoor water use. The Department continues to fund a large landscape water budgeting web-based tool for monitoring and controlling water use for large landscapes at parks, schools and HOAs in the City.

5. Departmental leaders championed public meetings with the Vallejo Unified School Board and made formal presentations regarding the city's aging water system and ongoing efforts to maintain the water system. The Department also continues to support the District's water education curriculum by providing K-12 classrooms with a total of 99 interactive watershed classroom presentations and 2 free Project WET teacher training workshops during the year. Our Water Conservation program also provided transportation funding for 12 environmental education field trips and delivered hundreds of water saving devices and other classroom supplies directly to teachers in the City.
6. In collaboration with Solano County Water Agency, the City Water Department administers a residential water survey program where landscape water sprinkler discharge is closely analyzed to maximize efficiency and help reduce water waste and run-off. In FY 2019-2020, a total of 18 surveys were performed. It's estimated that the water savings from each home water survey performed saves an average of around 50 gallons per day through leak detection and/or reduced irrigation scheduling.

C.7.f School-Age Children Outreach

Program Details	Focus/Short Description	# Students/Teachers	Eval Effectiveness
Presentations - School Water Education Program – interactive classroom presentations -SWEP -SRCD -Loma Vista Farm -Solano Land Trust	Environmental Education with focus on water conservation	99 class presentations 2,767 Student Contacts, via SWEP annual report	Teacher surveys reflect continued 100% satisfaction with program
Assemblies - Zun-Zun and Rock Steady Juggling Assemblies. -Sue Frost -Loma Vista	Student Assemblies with Water Topics and Environmental Education Focus	29 Assemblies, 8,450 student contacts – via SWEP annual report	Continued backlog in service requests and continued 100% positive feedback recorded on teacher surveys
Field Trips - Sponsorship and coordination of environmental field trips to local water reservoir/watershed	Loma Vista Farm field trips, Water Ways, Solano Land Trust, City Conservation Events	12 Field Trips 749 Student Contacts Via SWEP annual report	Teachers continued request for program services continues to exceed allocated budget
Contests - Sponsorship of High School and Middle School Water Conservation Video Contest	Sponsored the Countywide 2020 water conservation video contest	Only 19 entries in 2020 due to COVID-19 but one top scoring video was awarded to St. Patrick HS in Vallejo	Completed water videos – Winners videos are posted on SCWA website
Workshops - Project	Environmental	2 Workshops – Oct 26,	Teacher feedback forms

Wet for Teachers Workshops	education for teachers – Focuses on providing interactive water education training to faculty	2019 and Feb 22, 2020	
Outreach – -Vallejo Career Fair Event at local EED office and planned Earth Day Activities at Cal Maritime Academy **(ccx)**	Public and Student Job Mentoring	100s of participants and students in attendance	Public Feedback and vocal appreciation from committee members

C.15.b.vi(2) Irrigation Water, Landscape Irrigation & Lawn or Garden Watering

1. Sponsored a total of six Sustainable Garden Tours provided by members of Sustainable Solano.
2. Within the residential water survey program, landscape water sprinkler discharge is closely analyzed to maximize efficiency to help reduce water waste and run-off. In FY 2019-2020, a total of 18 residential water surveys were performed. The water savings from each home water survey is estimated to continue to save an average of 50 gallons per day in water through leak detection and/or reduction in irrigation scheduling.
3. Information packets promoting efficient watering and irrigation practices were distributed to the public at outreach events throughout the year. Note, beginning in early 2020 nearly all of the 2020 conservation outreach events were canceled due to the COVID-19 Pandemic.
4. Our School Water Education Program promotes wise water use and includes water pollution components demonstrating how urban development can degrade the water quality of the San Pablo Bay and other California waterways. A total of 99 classroom presentations were given in FY 2019/2020 despite restrictions imposed as a result of the COVID-19 virus, and a total of 2,764 student contacts were made citywide.
5. Large landscape water surveys continue to be offered to Home Owner Associations in the city and to other large area landscape property owners, however, the COVID-19 Pandemic severely impacted participation in the program. The City Water Conservation Coordinator continues to meet regularly with Greater Vallejo Recreational staff and Landscape Maintenance Managers to discuss water use practices at all city parks and large landscape properties.
6. In FY 2019-2020 a total of 9 public wasteful water complaints were recorded and investigated. Each event was logged and investigated to determine if local water restrictions were being violated. The reporting was accomplished utilizing local water waste hot-lines and internet based reporting tools.
7. Two popular and normally well attended residential water-wise landscape workshops were canceled in March 2020 due to COVID-19. Topics that were scheduled to be covered included drip irrigation components and efficiencies and plant selection and soil preparation.
8. Staff distributed over 400 outdoor water saving devices to the public to help households reduce their water consumption. Items distributed included Hose Nozzles, Shower Heads, Shower Timers and faucet aerators. The total number of devices distributed was cut in half this year due to the shelter-in-place restrictions imposed as a result of the COVID-19 Pandemic.

Samples of Water Conservation Outreach & Customer Feedback

FY 2019/2020

2019-2020 School Water Education Program
Teacher Feedback

Name: Ms. Sato School: Pennycook

Grade Level Taught: 1 Number of Students: 27

1. What aspects of the lesson were interesting for your students?
They found the map, the 3-D representation of the map, and the simulated rain storm very engaging.

2. Was any part of the lesson not engaging for your students?
None! Very well-designed lesson for this age group.

3. In what ways was the program educator (please provide their name) successful at engaging the students?
Ms. Morgan elicited ideas from the class. The excitement level was high, but the students were focused and well-behaved. They didn't want to miss out!

4. What suggestions would you make to the program educator to improve their interaction and teachings with the students in the future? If time permitted, perhaps students could learn about the animals affected by the oil and trash going into waterways. When we clean up the playground, we call ourselves "animal champions."

5. Please inform us of your overall thoughts of the program and include any suggestions for future years.
We've been talking about the problem of student trash blowing into the storm drain for a few months. It was great to see a visual representation of this.

Thank you for taking your time to complete this evaluation. Your feedback is very important to us.
Once completed, please give to the program educator or scan and send to Laura.Morgan@solanorcd.org

2019-2020 School Water Education Program
Teacher Feedback

Name: Miriam Dizon School: Annie Pennycook Elementary School

Grade Level Taught: Assembly Coordinator Number of Students: TK- 2nd Grade Students

1. What aspects of the lesson were interesting for your students?

the hands on experience where students participated in engaging her lesson.

2. Was any part of the lesson not engaging for your students?

The lesson are very engaging for most of the students.

3. In what ways was the program educator (please provide their name) successful at engaging the students?

Ms-Laura Morgan has a very engaging activities for the students where students can actual touch her model/maps.

4. What suggestions would you make to the program educator to improve their interaction and teachings with the students in the future?

I think her teaching techniques are successful in engaging students w/ her lesson.

5. Please inform us of your overall thoughts of the program and include any suggestions for future years.

Excellent program and we always look forward to invite her again next year.

Thank you for taking your time to complete this evaluation. Your feedback is very important to us.
Once completed, please give to the program educator or scan and send to Laura.Morgan@solanorcd.org

2019-2020 School Water Education Program
Teacher Feedback

Name: JACQUELINE STORNETTA School: WARDLAW

Grade Level Taught: 4th Number of Students: 31

1. What aspects of the lesson were interesting for your students?

   All, but the model was a landslide winner.

2. Was any part of the lesson not engaging for your students?

   Not that I saw.

3. In what ways was the program educator (please provide their name) successful at engaging the students?

   Used great hands-on and visuals. Used great tone w/students.

4. What suggestions would you make to the program educator to improve their interaction and teachings with the students in the future?

   She was a pleasure. No suggestions.

   :)

5. Please inform us of your overall thoughts of the program and include any suggestions for future years.

   The kids were engaged and learning. Five students picked up trash on the way back to the classroom. So keep it up!

Thank you for taking your time to complete this evaluation. Your feedback is very important to us.
Once completed, please give to the program educator or scan and send to Laura.Morgan@solanorcd.org

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Terry Tigh, Liz Cardoza, & Rocky the Squirrel

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Grapevine Update ** CA Dept of Insurance Comparison Profile 7D - Revised Feb 2016

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The City of Vallejo Presents

Spring 2020
Water-Wise Landscaping
Workshops

6:00-8:00 PM - 2 Wednesday Night Sessions

Florence Douglas Senior Center
333 Amador St., Vallejo

DRIP IRRIGATION BASICS
Wednesday - March 18, 2020
Learn the characteristics of a water efficient drip irrigation system and become familiar with key components. Focus is on drip irrigation design, component identification, and best installation practices. Learn proven strategies for using water wisely and have your irrigation questions answered by a landscape professional.

WATER-WISE PLANT SELECTION
Wednesday - March 25, 2020
Knowledgeable plant specialists will be on hand to provide helpful information regarding the selection, placement, planting, and care of drought tolerant plants and groundcovers.

Workshops are Absolutely Free.
Reserve your seat today!
Water-saving devices, literature, door prizes!
Visit us at www.vallejowater.org
To reserve your space call the
Vallejo Water Department (707) 648-5299

Sponsored by the Vallejo Water Conservation Program

Spring 2020
Water-Wise Landscaping
Workshops

Grapevine Feb/March 2020

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is EXPENSIVE & Limited!

THINK YOU HAVE A LEAK?

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A **HOME WATER SURVEY** costs you nothing and can uncover hidden water wasters that cost you money. This program is sponsored by the Vallejo Water Department & Solano County Water Agency.

An on-site water survey visit includes:

- **Instruction on reading your water meter**
- **A household water pressure check**
- **A comprehensive 3-year water use historical report**
- **Tutoring on leak detection techniques**
- **Irrigation system testing & evaluation**
- **Recommendations for improving water efficiency**
- **Literature & water saving devices**
- **Water rebate information**

To schedule a Survey call the Residential Survey Team Supervisor directly at **707-455-1113**

$$$ Money Saving Rebates Are Available $$$

- **Washers**
- **Rain Barrels**
- **Water Timers**
- **Rain Sensors**
- **Pool Covers**
- **Hot Water Recirculating Devices**
- **Lawn Removal.....And More!**

WATER City of VALLEJO California

SOLANO WATER GO GREEN SAVE BLUE

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Visit **www.gvrd.org** for information on current job openings & how to apply!

Activities that don't meet minimum registration requirements, may be cancelled 5 business days in advance of the start date.

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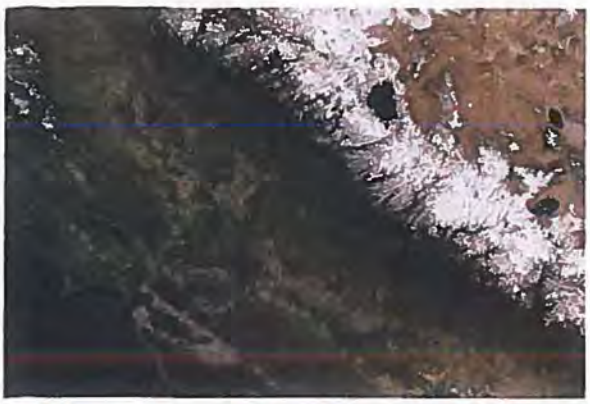

DWR Climate Change Team and Project WET present

'Understanding Climate Change in California'

Climate change is having a profound impact on California water resources, as evidenced by long-term changes in snowpack, sea level, river flows and annual temperatures. Join the Department of Water Resources (DWR) Climate Change team for a day learning about the science of climate change, how local to Federal water managers are applying the science to safeguard California's water supply and help develop climate resilient communities – and how the interdisciplinary activities of Project WET can help you integrate climate change science knowledge, concepts and skills back in the classroom!

Project WET (Water Education for Teachers) activities are designed to engage students of all ages - in formal and non-formal education settings - in the study of water through interactive simulations, use of models and reality-based scenarios. Interdisciplinary Project WET activities supplement existing curriculum and are *correlated to and reinforce practices integrated within Common Core and Next Generation Science Standards* - provide strong foundations for STEAM, Project-Based and Service Learning programs.

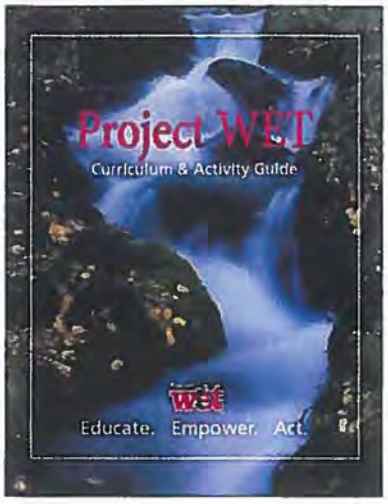

Participants attending this training will receive great information on current climate science, how the science is being applied to increase the resiliency of California water systems, a copy of Project WET Guide 2.0, an opportunity to receive 0.8 CEU credit a $50 stipend - AND refund of your $25 registration fee following completion of the training! A light breakfast, coffee and lunch provided courtesy of the Solano Resource Conservation District.

Saturday, October 26, 2019 (8:00 am to 4:00 pm)

Dunnell Education Center
3351 Hillridge Dr, Fairfield, CA 94534

To reserve your spot, please click here or contact Brian Brown, California Project WET Coordinator at projectwet@watereducation.org or (916) 444-6240 if you have questions.

REGISTRATION WILL CLOSE MONDAY, OCTOBER 21, 2019!

WATER EDUCATION FOUNDATION

Solano RCD

Department of Water Resources State of California

Project WET Water Education for Teachers

Solano County School Water Education Program

Low Water Landscape Assistance Program

Assistance Available for **Seniors** with Limited Incomes and **Residents with Disabilities**

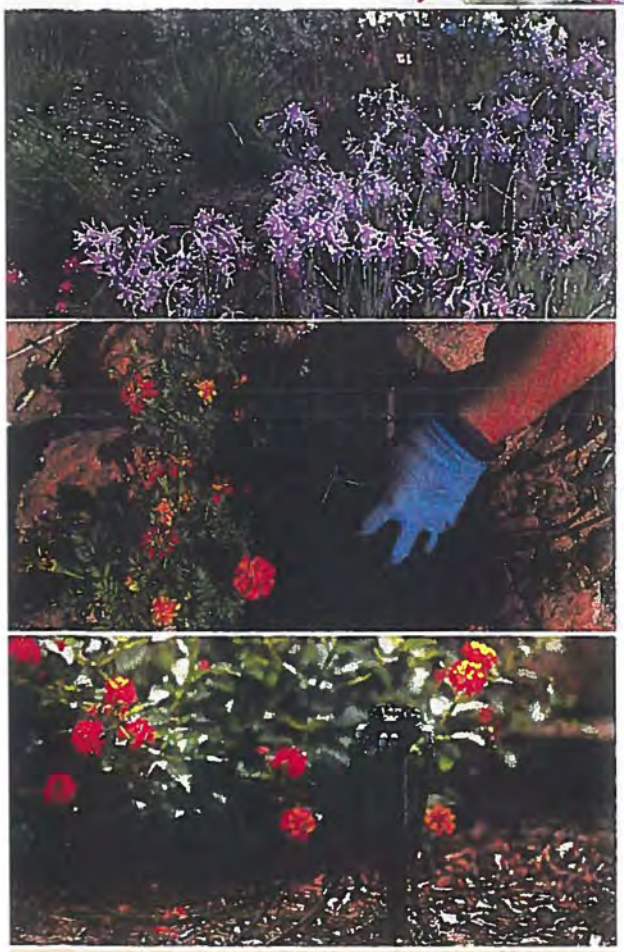

Solano County Water Agency (SCWA) is pleased to offer a program that provides extra assistance for seniors with limited incomes and residents with disabilities who wish to replace lawn with a beautiful, low-water landscape. Qualifying residents can receive:

- Free landscape design of low-water native plants for your yard
- Help with eliminating lawn
- Direct installation of your low water landscape

This Program is provided by Solano County Water Agency with A2Z Landscaping.

To qualify, seniors must be enrolled in PG&E's CARE Program and Residents with disabilities should show supporitve documentation. This program is open on a first-come, first-served basis until funds are depleted.

For more information and to apply visit:
http://www.scwa2.com/water-conservation/rebates-and-programs/landscape-assistance or call (707) 451-6090

St. Patrick/Vincent Student Awarded Top Honors

High school student Stephanie Tuck took home third place honors in this year's countywide Water Video Contest co-sponsorded by the Solano County Water Agency and the Valleo Water Department Water Conservation Program. This popular school education activity challenges middle school and high school students to create compelling 60-second public service videos that focus on specific water efficiency themes. The 2020 theme entitled "H2O Tunes" encouraged students to combine their water conservation message with an entertaining musical arrangement of their choosing.

Stephanie's innovative third place entry titled "Easy as H2O" earned her $500 in prize money to be split 50/50 between herself and her St. Patrick/Vincent classroom teacher Summer Rogosta.

The number of contest entries were down significantly in 2020 because of the COVID-19 virus but program sponsors voted to follow through and evaluate all entries as normal. A total of 19 videos were submitted this year and each entry was evaluated and scored based on entertainment value and originality, videography, style and organization, audio/sound, and movie content and accuracy. A team of water efficiency experts selected the top finalists, and then a panel of community leaders including Vallejo/Solano Film Commission's Jim Reikowsky and Pixar Animation Studio's Daniel Holland made the final selections.

All of the top scoring videos can be viewed on the Solano Saves Water YouTube channel at http://tinyurl.com/scwavideo

Local Teachers Get WET

On February 22, teachers from the City of Vallejo and other school districts in Solano County participated in a 6-hour **Water Education for Teacher** (WET) workshop presented by the **Solano Resource Conservation District** and co-sponsored by the **Vallejo Water Department's Water Conservation Program**. For over a decade, these popular K-12 teacher training sessions have been provided to educators free of charge in an effort to help teachers and ultimately students learn how drinking water, storm water, and water conservation is interconnected. During the training, teachers were introduced to interactive classroom lessons and water resources specific to the local watersheds. One highlights of the session was a talk by Alex Rabidoux, Supervising Water Resources Engineer from the **Solano County Water Agency**, where he explained the many options and complexities associated with local drinking water treatment and delivery systems.

Project Wet®

Water Education for Teachers

FREE ONE DAY PROJECT WET WORKSHOP

Solano County School Water Education Program

SOLANO TO THE SEA

connecting K-12 students to their watershed resources

Saturday, February 22, 2020 | 8am to 3:30pm

Dunnell Nature Park & Education Center, Fairfield, CA

What is Project WET?

- Project WET works to empower community action to resolve complex water issues worldwide.
- Project WET's hands-on curriculum is designed for K-12 classrooms.

Project WET® Water Education for Teachers

Why Attend?

- Learn how to integrate the study of land-based watershed challenges to ocean and coastal impacts in the classroom.
- Engage students with local citizen science and stewardship opportunities.
- Water resource education materials are STEM friendly and support California Common Core and NGSS.
- Includes a free lunch and prizes!

Who Should Participate?

- Solano County Teachers
- S.T.E.A.M./S.T.E.M. Coordinators
- Learning Academy Teams
- Grade Level or Department Teams
- Curriculum Coaches
- Department Chairs
- School Administrators

How to Participate:

- Register online at solanorcd.org under Projects & Programs > Education
- Contact Solano RCD at 707.678.1655 or education@solanorcd.org

Solano RCD

WHALE TAIL LICENSE PLATE

PROTECT OUR COAST AND OCEANS FUND

Funding for the Solano County School Water Education Program and Project WET is provided by the cities of Vacaville, Fairfield, Suisun City, Vallejo, Benicia, Fairfield-Suisun Sewer District and Solano Irrigation District

Vallejo Times Herald

WEDNESDAY, FEBRUARY 5, 2020

VALLEJO 2/5/2020

Water department co-sponsoring teacher workshop

Times-Herald staff report

A popular six-hour Project WET (Water Education for Teachers) school water education training workshop is once again being offered to Vallejo teachers on Feb. 22, the city of Vallejo said in a news release.

For over a decade, the Vallejo Water Department has co-sponsored the no-cost, interactive, environmentally educational teacher workshop. The program educates a wide range of ages as it is designed for kindergarten through 12th grade classrooms, officials said.

Educators are introduced to new water resource instruction materials and are taught how to integrate interactive drinking water and watershed related curricula into their classrooms.

These workshops are typically held twice during the school year at various locations throughout Solano County.

The spring 2020 session will take place from 8 a.m. to 3:30 p.m., Feb. 22 at the Dunnell Nature Park & Education Center, 3351 Hillridge Drive, Fairfield.

For more information, visit the Vallejo Water Department website at www.vallejowater.org or call (707) 648-5299.

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ATTACHMENT 1

Implementation Plan and Schedule to Achieve TMDL Allocation

SOLANO PERMITTEES'

Implementation Plan & Schedule to Achieve TMDL Allocations

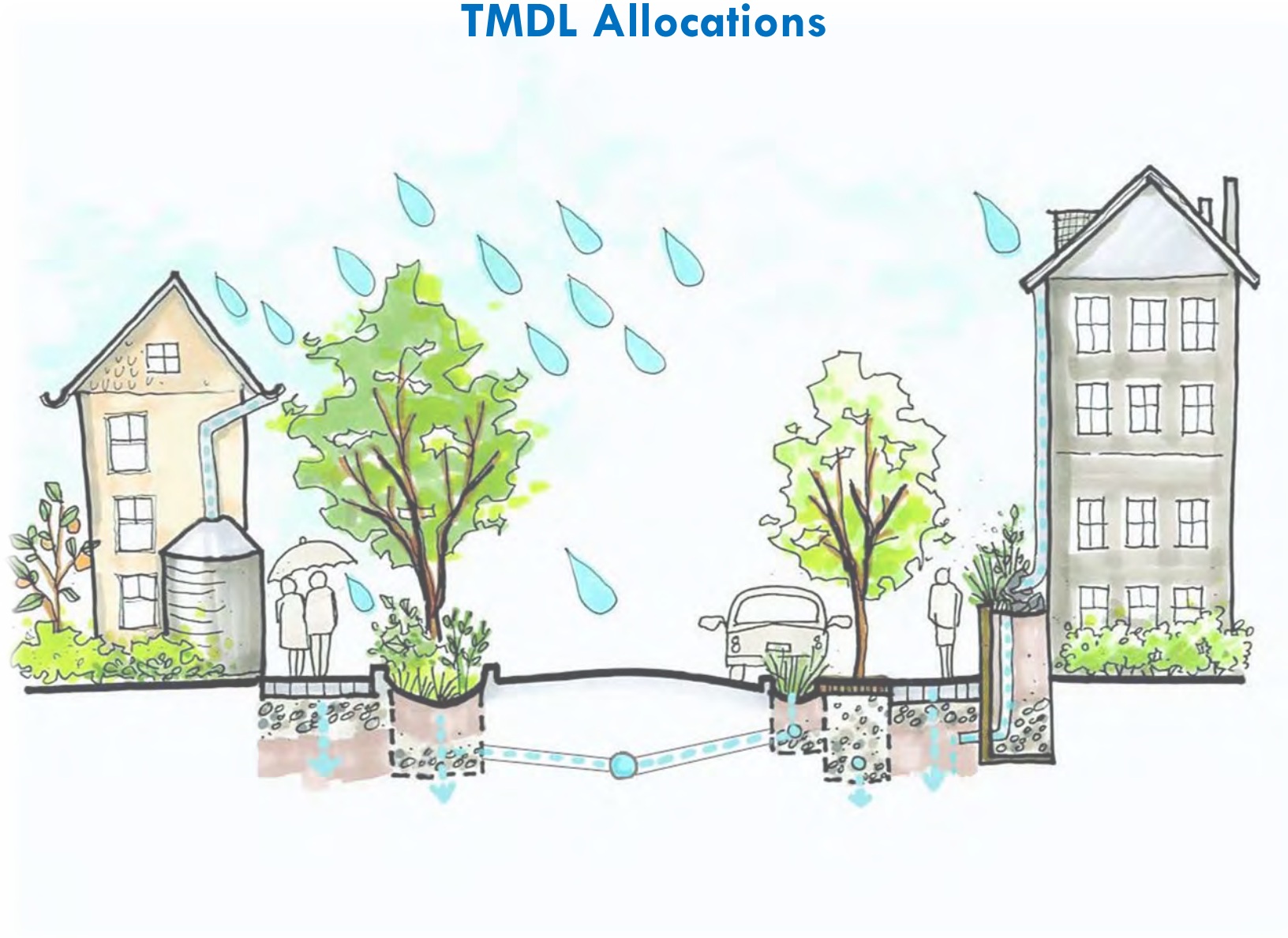

September 2020

In compliance with Provision C.11.d & C.12.d of Order R2-2015-00

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1 Executive Summary

Along with other municipalities and agencies in the Bay Area, the Solano Permittees are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP), which became effective on January 1, 2016. A section of the MRP requires Permittees to prepare a plan and schedule for PCBs and mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030 and mercury TMDL wasteload allocations by 2028 (C.11.d for mercury and C.12.d for PCBs).

This document serves to meet the MRP requirement and outlines how the cities aim to achieve the TMDL wasteload allocations. Consistent with the MRP requirements, the plan:

1. Identifies all proposed mercury and PCBs control measures to be implemented (Sections 3 and 4);
2. Includes a schedule of when mercury and PCBs control measures will be implemented (Section 4); and
3. Estimates the mercury and PCBs load reduction of the measures, as estimated through the reasonable assurance analysis (RAA) modeling, along with an evaluation of the costs, control measure efficiency and resulting significant environmental impacts (Sections 3 and 4).

Primary findings are that the Solano Permittees' estimated PCBs and mercury reductions meet wasteload allocation reduction targets specified in the MRP for 2028/2030 and 2040. While smaller than reductions associated with green stormwater infrastructure and land use redevelopment, source control reductions play an important role in attaining wasteload allocations for Solano Permittees. Source control reductions are usually largest when implemented in areas with the highest typical land use pollutant concentrations such as Mare Island in Vallejo for PCBs or Old Residential areas in Fairfield. Source control measure PCBs reduction estimates from the City of Vallejo are disproportionately large, primarily due to Old Industrial land use areas on Mare Island.

2 Introduction and Overview

2.1 Regulatory Mandate

The Solano Permittees include the Cities of Fairfield, Suisun, and Vallejo; and the Vallejo Flood and Wastewater District. The Permittees are among 76 local government entities subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1]. The MRP mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay.

Water quality in San Francisco Bay is impaired by mercury and by polychlorinated biphenyls (PCBs). Controlling sources of these pollutants and reducing and treating stormwater flows before these pollutants enter the Bay will hasten the Bay's recovery.

2.1.1 Further Background on Mercury and PCBs in San Francisco Bay

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay from identified sources, including from urban stormwater.

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue[2]. The second objective, established to protect aquatic organisms and wildlife, applies to small fish[3] commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish[4]. To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.[5]

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[1] San Francisco Bay Regional Water Quality Control Board. 2015. Municipal Regional Stormwater Permit, Order No. R2-2015-0049. www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf.

[2] The average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans.

[3] 3-5 centimeters in length

[4] average wet weight concentration

[5] A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional

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The PCBs TMDL was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue.[6] A food web model was developed by San Francisco Estuary Institute (SFEI) to identify the sediment target concentration that would yield the fish tissue target; this sediment target was found to be 1 microgram (µg) of PCBs per kg of sediment. Twenty percent of the estimated allowable PCB external load was allocated to urban stormwater runoff. The Bay Area-wide allocation for PCBs for urban stormwater is 2 kg/yr by 2030.[7]

2.2 PCBs Sources to Urban Runoff

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame-retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to the Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

2.3 Mercury Sources to Urban Runoff

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal

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reduction in the total amount of mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations.

[6] This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day).

[7] This value was developed based on applying the required sediment concentration (1 µg/kg) to the estimated annual sediment load discharged from local tributaries.

mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to San Francisco Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

2.4 PCBs and Mercury Potential Source Identification in Solano County

Since the early 1990's, several locations within the San Francisco Bay nearby to Solano County have been sampled by regional monitoring programs such as the San Francisco Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3) 6 system, administered by SFEI, provides access to these data which are useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. Maps presented in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. Six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire San Francisco Bay.

3 PCBs and Mercury Source Control Measures

Qualified PCBs and Mercury source control measures are summarized below, and more complete descriptions and calculation methods are documented in BASMAA's Source Control Load Reduction Accounting for RAA (Final Draft 6-9-20), which is included as Appendix B to this plan.

Source Property Identification and Abatement. Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs or mercury were used, released, or disposed of or where sediment concentrations of PCBs or mercury are significantly elevated above urban background levels. Once a source property is identified, the source of PCBs or mercury on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the Regional Water Board or another appropriate agency for investigation and abatement.

PCBs in Building Materials Management Program. The MRP Permittees have developed a protocol for managing building materials and wastes with PCBs concentrations of 50 parts per million (ppm) or greater in applicable structures at the time demolition occurs so that PCBs do not enter the municipal storm drain system. Implementation of the protocol began July 1, 2019.

PCBs in electrical utilities management program. During the first three years of the permit term, the Permittees will develop and implement a program to manage PCBs-containing electrical utility equipment to prevent or reduce PCBs from entering the MS4. The Electrical Utilities Management Program will include improved practices and procedures for documenting removal and disposal of PCBs-containing electrical equipment, responding to unplanned PCBs releases, and monitoring and reporting requirements.

Managing PCBs in storm drain infrastructure caulk management program. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4.

Enhanced Operation and Maintenance Control Measures. Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line flushing may enhance the Permittees' ability to reduce PCBs and mercury loads in stormwater.

Trash Capture Systems. This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices

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(GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

Diversion to Publicly Owned Treatment Works. This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

Mercury load avoidance and reduction program. Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling.

Not all these control measures have been implemented by the Solano Permittees due to either limited resources or lack of evidence of source contributions. The following sections describe actions by the Solano Permittees with respect to each source control measure and provide an accounting of pollutant reductions associated with each applicable control measure.

3.1 Source Control Identification and Abatement

Solano Permittees have made no referrals of potential source properties to the Regional Water Board for abatement. During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD, 2016). The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an Old Industrial area based on historic land use. Waterfront sections of Vallejo are also considered Old Industrial and may be examined more closely in the future.

In 2016, four sites within the City of Fairfield and Suisun were investigated as part of a BMP retrofit study and showed that sediments did not contain elevated levels of PCBs (City of Fairfield, 2016). Remediation of two sites that comprised the Vallejo Manufactured Gas Plan Site PG&E in 2019 showed elevated levels of several contaminants but elevated levels of PCBs were not reported.

3.2 PCBs in electrical utilities management program

During MRP 3.0, Permittees propose to implement a new control measure program to manage the release of PCBs from oil filled electrical equipment (OFEE). Under this new program, load reductions will be credited for the following actions:

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Action 1: Permittee operated electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and during the five-year permit term, and provide data to support calculations of the associated stormwater load reductions due to these efforts;

Action 2: Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE.

In order to estimate the loads reduced since the start of the TMDL and the current (2020) PCBs loads to stormwater from PCBs-containing OFEE, the overall 65% load reduction rate shown in the McKee et al. (2006) mass balance models for the fifteen-year period between 1990 and 2005 was used as the high estimate for the load reduction rate. Reductions will be allocated regionally according to the timeframes established in the BASMAA Source Control Load Reduction Accounting for RAA Report (Appendix B).

3.3 PCBs in Building Materials Management Program

Beginning in July 2019, the MRP Permittees have developed and implemented a process for managing materials with PCBs concentrations > 50 ppm during demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled from 1950 to 1980 that undergo full-building demolition. The Solano Permittees have adopted this process and since July 2019, there have been 5 building applications, none of which had PCBs concentrations > 50 ppm. Several buildings already demolished and planned for future demolition are located on Mare Island (see Figure 3-1) which is mostly classified as Old Industrial land use, with typically high PCB concentrations.

The PCBs load reduction resulting from building materials management (R_b) is calculated as the product of the number of applicable buildings demolished each year (n), the average mass of PCBs per applicable building in kg (5), the average fraction of PCBs that enters the MS4 due to demolition without controls (0.01), and the average fraction of PCBs prevented by controls from entering the MS4 (0.8) (following methods from Appendix B).

$$R_b = n * 5 * 0.01 * 0.8$$

For calculating catchment-level reductions associated with this control measure, locations of the applicable buildings should be mapped and intersected with the previously delineated urban catchments to produce summary statistics of total PCBs reduced by catchment. As data collection on building demolition improves, Solano Permittees will use the specified BASMAA calculation method to estimate PCBs reductions from building materials management. However, to maintain consistency with other jurisdictions in this reporting period, they will rely on their fraction of the regional reduction allocation for building materials management of 2 kg, which is 100 g.

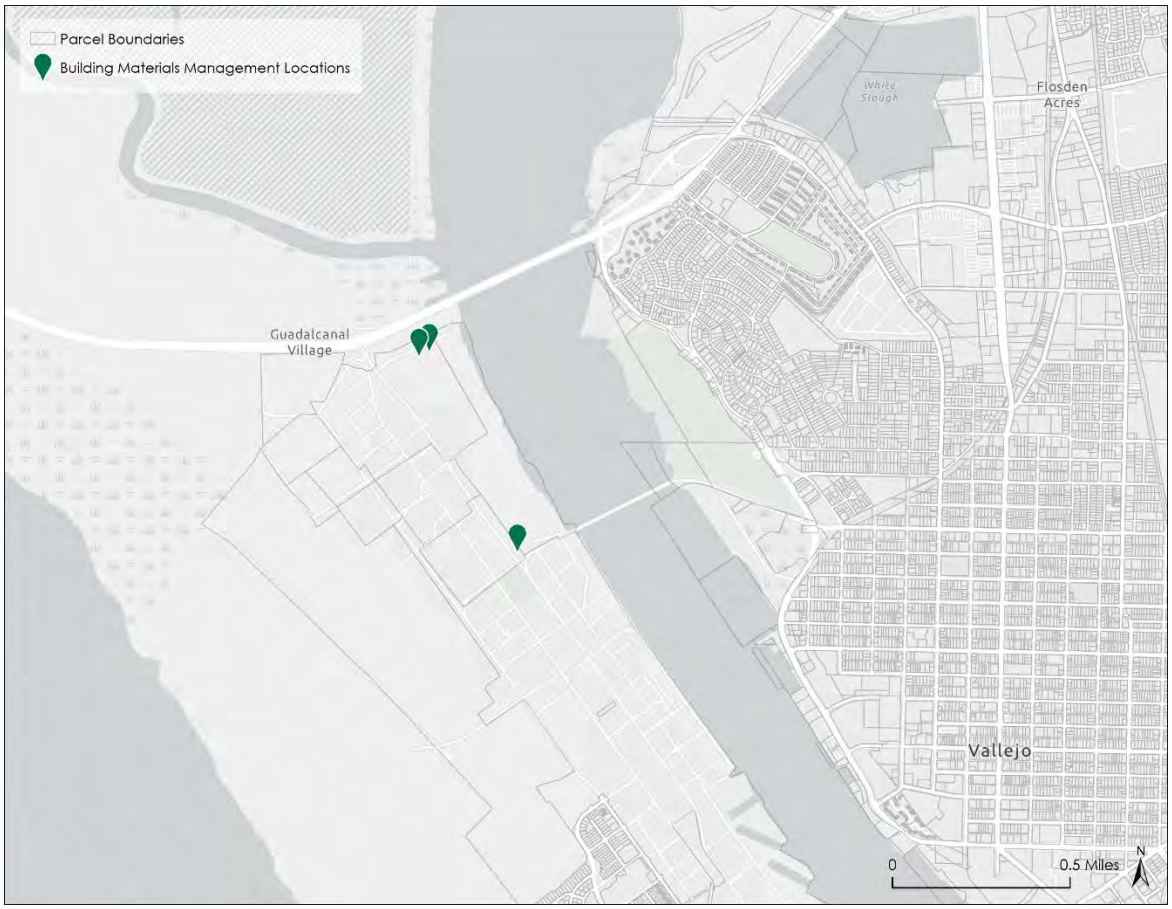

Figure 3-1. Buildings recently demolished on Mare Island with PCBs in Building Materials Management Program in effect.

3.4 Managing PCBs in storm drain infrastructure caulk management program

Solano Permittees reported the results of an investigation into PCBs in infrastructure in their 2018 Annual Report in an attached report entitled: Evaluation of PCBs in Public Roadway and Storm Drain Infrastructure Caulk and Sealants.

3.5 Enhanced Operation and Maintenance Control Measures

Solano Permittees have implemented enhanced operations and maintenance with regard to street sweeping and storm drain inlet cleaning. Both enhanced street sweeping and enhanced inlet cleaning are calculated in a similar manner with the annual load of PCBs reduced (R_s) expressed as the product of the catchment drainage area (A), area weighted PCB yield (Y), and an enhanced efficiency factor (E) (following methods from Appendix B).

$$R_s = A * Y * E$$

Each factor in the reductions accounting was specified according to the relevant GIS data and city maintenance records. Efficiency factors for street sweeping and inlet cleaning were specified based on a combination of factors specified in the methods detailed by BASMAA (Appendix B).

3.5.1 Street Sweeping

Drainage areas (A) were specified as the area of each urban catchment and the yield was specified based on baseline PCBs and Mercury loads calculated for each catchment (see Appendix A). In this way, the sweeping reductions match the level of spatial granularity of both the baseline modeling and reductions calculated as part of the Green Stormwater Infrastructure (GSI) RAA (Appendix A). Enhanced efficiency factors for catchments associated with sweeping were specified using outputs from the Windows Source Loading Management Model (WinSLAMM) to evaluate various scenarios associated with street roughness and sweeping frequencies. The efficiency factor varies as a function of these two factors. We combined GIS layers of municipal sweeping schedules, pavement condition index, and sweeper types to estimate sweeping efficiency levels for each catchment throughout the MS4 area per tables provided by BASMAA (Appendix B). PCBs and mercury yields used in the calculations were specific to each catchment per baseline modeling reported per GSI RAA (Appendix A). The most common combination of factors used in Solano County was intermediate street roughness with monthly sweeping frequency (see Figure 3-2). All sweepers used throughout Fairfield, Vallejo, and Suisun are either vacuum assist or regenerative air types, which aligns with the efficiency factors calculated by BASMAA (Appendix B).

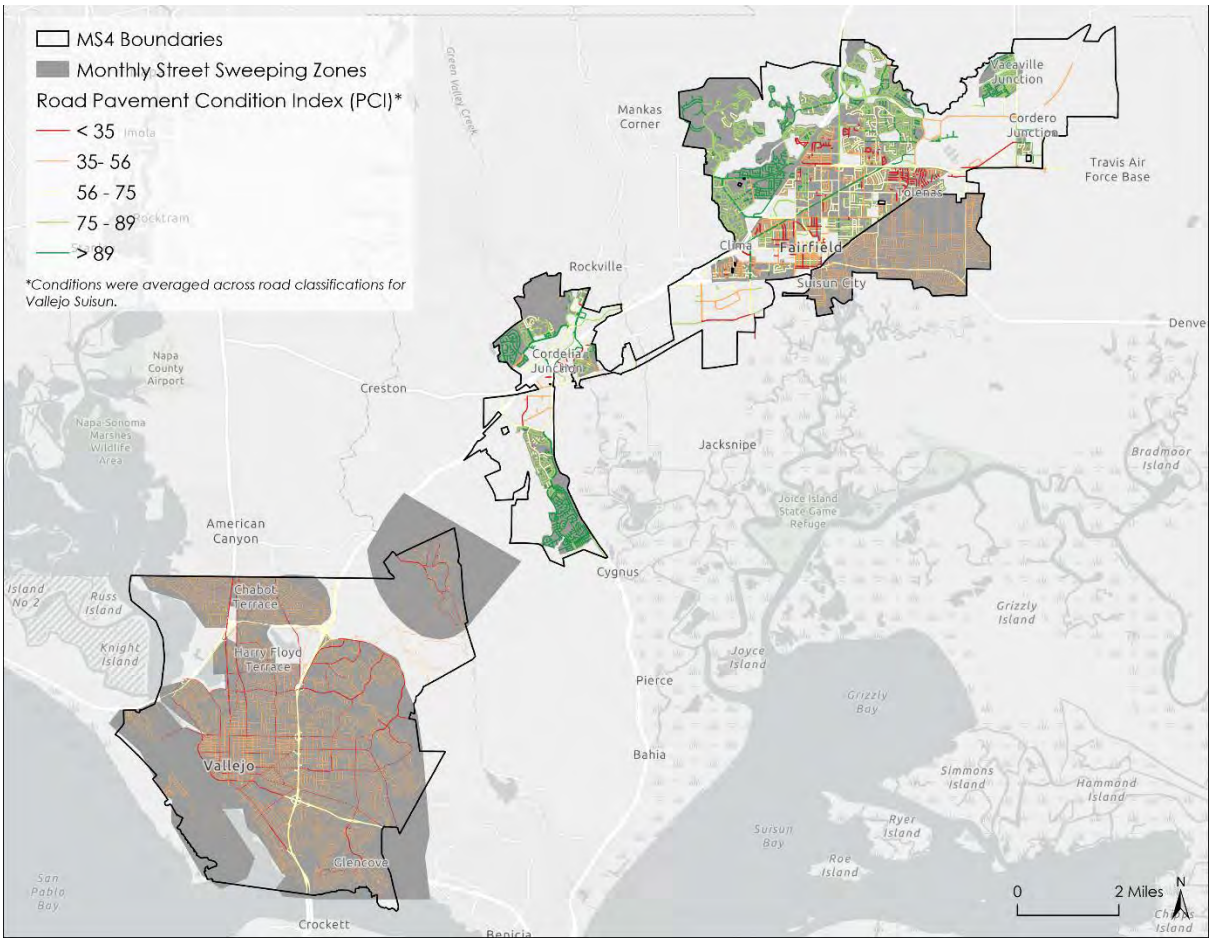

Figure 3-2. Sweeping schedules and pavement condition for Solano Permittee MS4 area.

For vacuum-assisted sweepers, based on the sweeping frequencies evaluated by BASMAA (2017b), increasing the frequency from monthly to weekly did not yield any benefits for mercury mass removal, and did not yield significant benefits for PCBs (i.e., less than 10% improvement in mass removal). A monthly sweeping frequency was therefore recommended for reducing PCBs and mercury mass (BASMAA, 2017b).

The efficiency enhancement ratio specified is relative to a no sweeping scenario since prior to the baseline year of 2005 used for this RAA, Solano Permittees did not use vacuum assist or regenerative air sweepers. While BASMAA 2017b did not evaluate the difference between mechanical broom sweepers and vacuum assist/regenerative air, these differences have been quantified in both the Lake Tahoe Basin (2NDNATURE and NHC, 2009) and the Chesapeake Bay (TetraTech, 2015), who also used WinSLAMM simulations to estimate reductions. Results show that mechanical broom sweepers provide close to zero sediment reduction benefits regardless of sweeping frequency, curb access, or pavement condition. Reductions for PCBs and Mercury calculated for each Solano Permittee cities using the appropriate parameters are shown in Table 3-1.

Table 3-1. Estimated reductions from enhance street sweeping practices

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
52.5	63.6	15.1	66.6	2.3	8.5

3.5.2 Storm Drain Inlet Cleaning

Like sweeping reductions, catch basin drainage areas were defined by catchments, and since drainage areas to individual inlets are not mapped, the PCBs and mercury yields were assumed to be uniform throughout the catchment and that each inlet drained an equal proportion of the catchment area for purposes of spatial allocation of reductions. The enhanced efficiency factor was specified based on the frequency of inlet cleaning documented by Solano Permittees and estimated reductions reported form the literature that were summarized by BASMAA (Appendix B). A baseline control measure efficiency of 11% was estimated based on annual inlet cleaning schedules (Appendix B). We assumed this baseline efficiency to align with the 2005 baseline scenario and increases above this level to contribute to enhanced efficiency of this control measure. Biannual and quarterly cleanings are estimated to provide an enhanced efficiency of 5% above the baseline scenario of annual cleaning. The City of Vallejo provided records of additional inlet cleaning that comprised approximately 2% of their storm drain inlets. The City of Suisun cleans their inlets biannually, and the City of Fairfield cleans approximately 15% at greater than annual frequency in response to storm events. Inlet density and inspection schedules are combined in Figure 3-3 to illustrate the density of inspection frequency throughout all three cities.

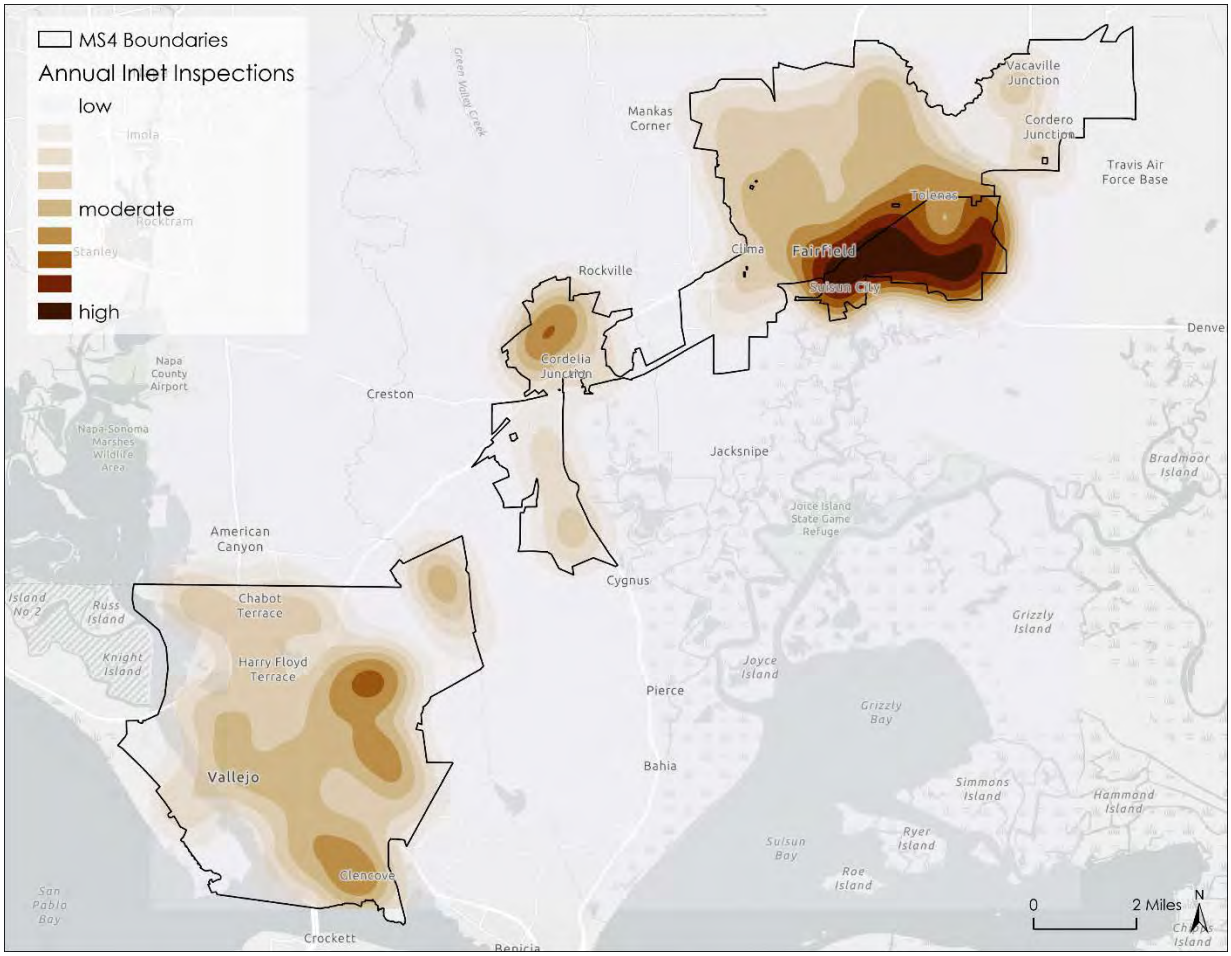

Figure 3-3. Annual inspection density based on number of inlets and inspection frequency

Storm drain inlet cleaning reductions are summarized for each city in Table 3-2. Estimated PCBs and mercury reductions resulting from the enhanced inlet cleaning efficiency show relatively small reductions due to only a small proportion of inlets being cleaned above the baseline annual frequency in Fairfield and Vallejo, which provide the largest contributing areas.

Table 3-2. Estimated reductions from enhanced storm drain inlet cleaning

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
0.5	1.0	1.0	5.2	0.8	0.1

3.6 Trash Capture Systems

Large trash full capture devices collect sediment and debris along with trash, so they are considered a source control measure for the PCBs and mercury associated with the captured sediment. These include hydrodynamic separator units (HDS), gross solids removal devices (GSRDs), and baffle boxes. Load reductions associated with large trash capture devices (R_t) are quantified as the product of treatment drainage area (A), area-weighted yield (Y), and an efficiency factor (E).

$$R_t = P * Y * E$$

Drainage areas to large trash capture devices were joined to modeled catchment scale pollutant loads for PCBs to specify yields. Both Fairfield and Suisun include MS4 areas that drain to these large trash full capture devices (see Figure 3-4). The efficiency factor was specified at 0.20 based on CDS unit sampling data of TSS recorded in the International Stormwater BMP Database (http://bmpdatabase.org/) and independent analysis of associated PCBs and mercury fractional removal rates (Appendix B).

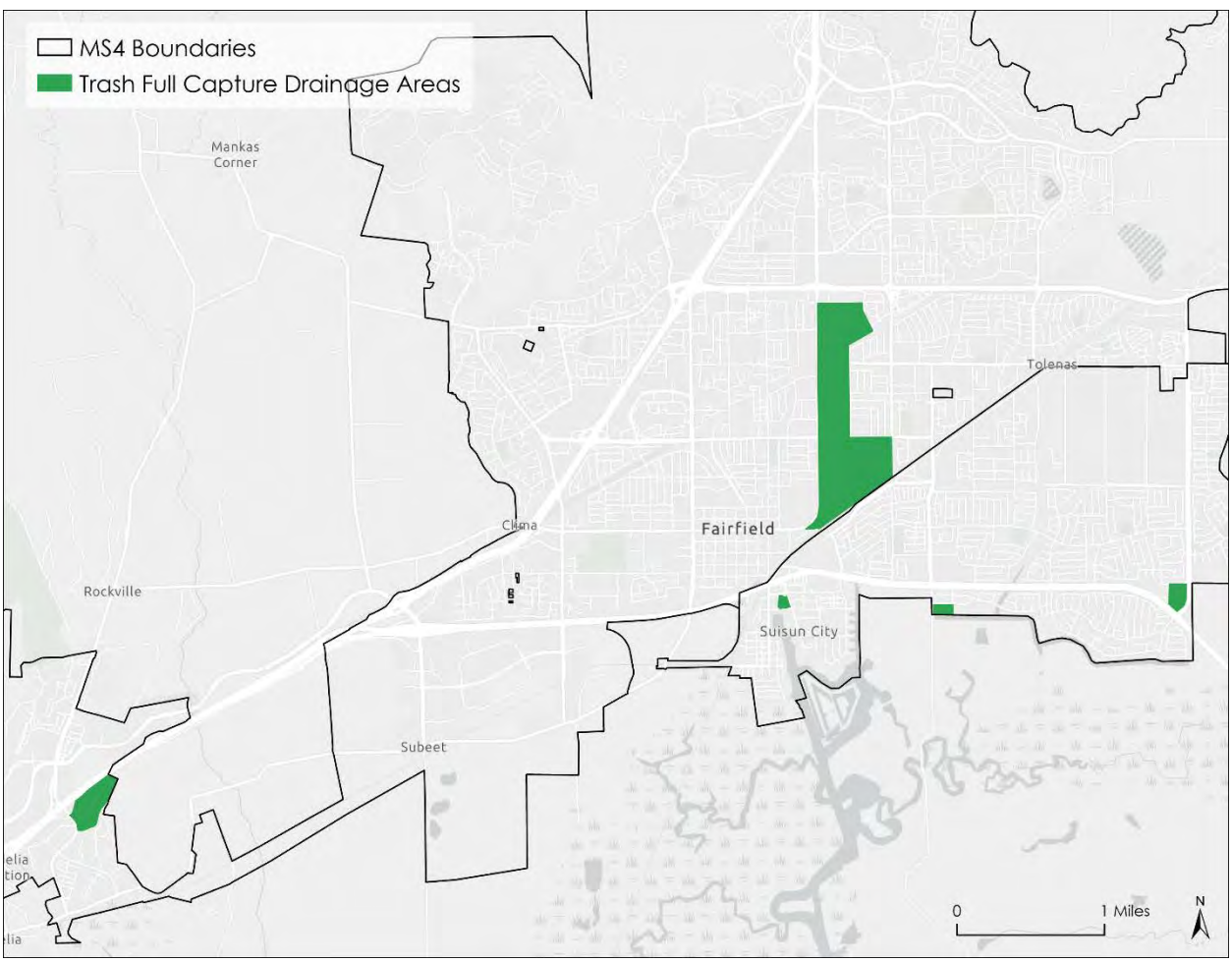

Figure 3-4. Areas draining to large full trash capture devices

Estimated load reductions are shown in Table 3-3, with the greatest reductions for the City of Fairfield, which has the largest drainage areas routed to full capture devices.

Table 3-3. Estimated reductions from large full trash capture devices

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
0.0	0.0	1.0	3.8	0.3	0.1

3.7 Diversion to Public Owned Treatment Works (POTWs)

In Solano County, the Fairfield Suisun Sewer District completed a pilot project to divert dry weather and first flush flows to POTWs. The project involved changing the operation of an existing pump station to divert stormwater from the station to the Fairfield Suisun Sewer District wastewater treatment plant. The pump station is located in the City of Fairfield just upstream from Suisun City. It serves a watershed area of approximately 6 acres all of which is zoned commercial, of which a significant portion is automotive repair. The goal of the pilot project was to comply with provision C.11/12f of the MRP by better understanding the applicability, costs, and benefits associated with this and similar projects.

Normal discharges from the State Street Pump Station were terminated in mid –June 2018. The contents of the pump stations' wet well were removed by Vactor truck and then discharged to the Fairfield Suisun Sewer District treatment plant. As dry weather runoff accumulates in the pump station, the water is removed and disposed of at the POTW. The pump station resumed its normal discharge operation settings in late September 2018. The annual reduction in loads, assuming an average volume of 2,000 gallons per year and a combined concentration of 28.3 grams per liter (based on water samples taken). The amount of PCBs being removed from the system is only 0.0002 mg. A potential added benefit of the diversion is preventing the initial flush of 2,000 gallons of water from the wet well into sloughs that ultimately reach Suisun Bay. Reducing and avoiding release of potentially stagnant water is a BMP that benefits dissolved oxygen in receiving waters. Benefits to dissolved oxygen in receiving waters can also translate to reduced mercury methylation, because the bacteria that methylate mercury thrive under low oxygen conditions. Thus, the Program continues to divert during the dry season to show good effort toward compliance with the PCBs wasteload reduction requirements in MRP-2, and because of the multiple water quality benefits achieved

3.8 Mercury Load Avoidance and Reduction Program

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and

mercury device recycling. The Permittees coordinate local household hazardous waste (HHW) collection facilities to implement mercury collection and recycling in accordance with MRP Provisions C.11.a.i and C.11.a.ii. FSURMP Permittees collect HHW at the same regional facility in Fairfield, Solano County: Republic Services at 2901 Industrial Court, Fairfield, CA Republic Services serves the communities of Fairfield, Suisun City and parts of unincorporated Solano County. The types of data collected at this facility includes the standard Cal Recycle 303a form. However, these efforts are no longer required to be reported, but will be tracked for mercury loads reduced through implementation of mercury avoidance and reduction control measures. Reductions associated with this source control measure were not calculated in this analysis due to a lack data to reliably estimate mercury reductions.

3.9 Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) is a treatment control measure that includes new development and redevelopment projects on private and public properties regulated by Provision C.3, as well as treatment control retrofit of existing infrastructure in public right-of-way (ROW) areas and on public and private properties not subject to Provision C.3. Results of the GSI RAA analysis (Appendix A) and the Permittees' GSI Plans (2019) are summarized in Section 4, and combined with source control measures to estimate cumulative wasteload reductions.

4 Source Control Measure Reasonable Assurance Analysis (RAA)

This goal of RAA is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet WLA targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to wasteload allocation targets.

The Solano Permittees have implemented a comprehensive approach to assessing PCBs and mercury load reductions associated with current and planned source control actions that provides articulation with the regional approach, is fully consistent with GSI RAA modeling already completed, and is amenable to ongoing tracking to assess compliance progress. Each PCB and mercury source control measure follows regionally standardized calculation methods specified by BASMAA which have been defined via various data collection and scientific efforts and documented in BASMAA (Appendix B). The modeling process is consistent with the methods defined in the BASMAA RAA Guidance (BASMAA, 2017a).

Data on control measure implementation programs was compiled and verified and control measure implementation data were incorporated into a geodatabase which uses the same spatial architecture as the GSI RAA modeling. BASMAA calculation measures were applied according to the methods described in BASMAA (Appendix B) within the GIS whenever control measure implementation included locational information to ensure that reductions associated with source controls, GSI, and land use redevelopment changes were locally consistent on a granular spatial scale. This often included using parcel-scale inputs to drive load reduction calculations. Source control measure reduction results were summarized at the urban catchment scale in maps for the Solano Permittee area and broken out by city in tables. These results were combined with the GSI reductions (reported in Appendix A) for the specified RAA future scenarios (2020, 2028/2030, 2040) to assess expected compliance with wasteload allocations for the Solano Permittees.

4.1 Study Area

The study area for the Source Control Measure RAA analysis is defined by the Solano Permittee MS4 area, which includes the cities of Fairfield, Suisun, and Vallejo only, and no outside drainage to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 4-1) since source control modeling is discrete to the MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Unlike GSI and land use redevelopment modeling, source control measures do not affect the hydrologic transport of pollutants downstream. As such, the catchment-scale hydrologic conditions represented in the baseline and GSI future scenarios (see Appendix A) are also reflected in the reduced loading calculations for comparison with wasteload allocations.

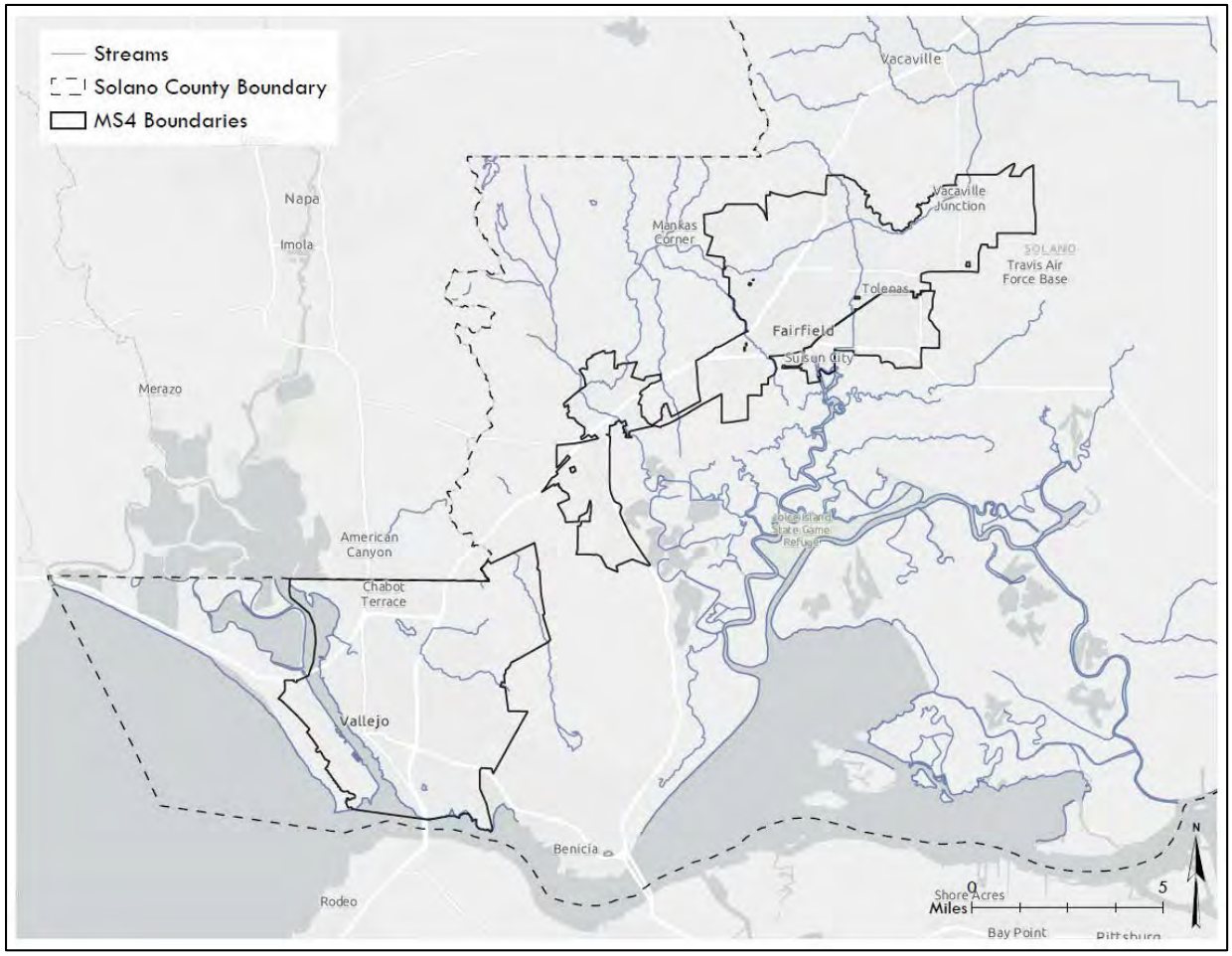

Figure 4-1. Solano Permittee MS4 Area

4.2 Refined Baseline PCB and Mercury Baseline Loads

Baseline modeling corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, they represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting wasteload allocation targets in the future. Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from the Permittes' model (swTELR) were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate was below the wasteload allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between

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swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the updated baseline loading estimates (see Appendix A).

The refined or adjusted baseline approach is common among all BASMAA program RAA modeling efforts. The approach is a technical refinement only. This aligns with the intent of the TMDL policy which directs 90% reductions in urban stormwater PCB loads and 50% reductions in urban stormwater mercury loads compared to adjusted baselines where adjustments to the original TMDL baselines are made.

4.3 Green Stormwater Infrastructure Reductions Summary

Solano Permittees have completed a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. to quantify the degree to which they expect to meet future PCBs and mercury reduction targets by implementation of GSI (Appendix A). This study was coordinated with other San Francisco Bay Area Permittees via BASMAA to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo, the Fairfield Suisun Sewer District, and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of GSI Plans, so that the outputs may inform future GSI implementation. These efforts represent a concerted, collaborative effort on the part of the Solano Permittees to determine PCBs and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

4.4 Baseline and GSI RAA Summary

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2028/2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural best management practices (BMPs) that infiltrate and treat stormwater runoff. These scenarios did not include the source control measures, summarized in Section 3. Baseline loading and reductions are summarized for each future scenario for Solano Permittees in Table 4-1, with a 61% reduction from the refined baseline load for PCBs and a 20% reduction for mercury. Reductions represent 72% of the load reduction required to meet the Solano Permittees wasteload allocation for PCBs of 110 g/yr. The GSI Plans completed by Solano Permittees outline opportunities for GSI implementation to realize the projected load reductions from GSI.

Table 4-1. Load reduction estimate from GSI, including land use redevelopment for all Solano Permittees.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

4.5 Wasteload Allocation Compliance Demonstration

4.5.1 Combined Source Control Measure Reductions

Source control measure reductions were combined for each catchment with the Solano Permittee MS4 area using the same geospatial framework used for calculating baseline loading of PCBs and mercury as well as reductions associated with GSI. This alignment ensures that reduction estimates are internally consistent throughout the RAA process for meaningful comparisons with wasteload allocations. Spatial patterns of source control measure load reductions for PCBs throughout the Solano Permittee MS4 area are shown in Figure 4-2. The largest reductions are largely concentrated in intensively developed areas and on Mare Island, which is strongly influenced by the high degree of Old Industrial land use and associated high PCB concentrations which serve as an input to several source control measures.

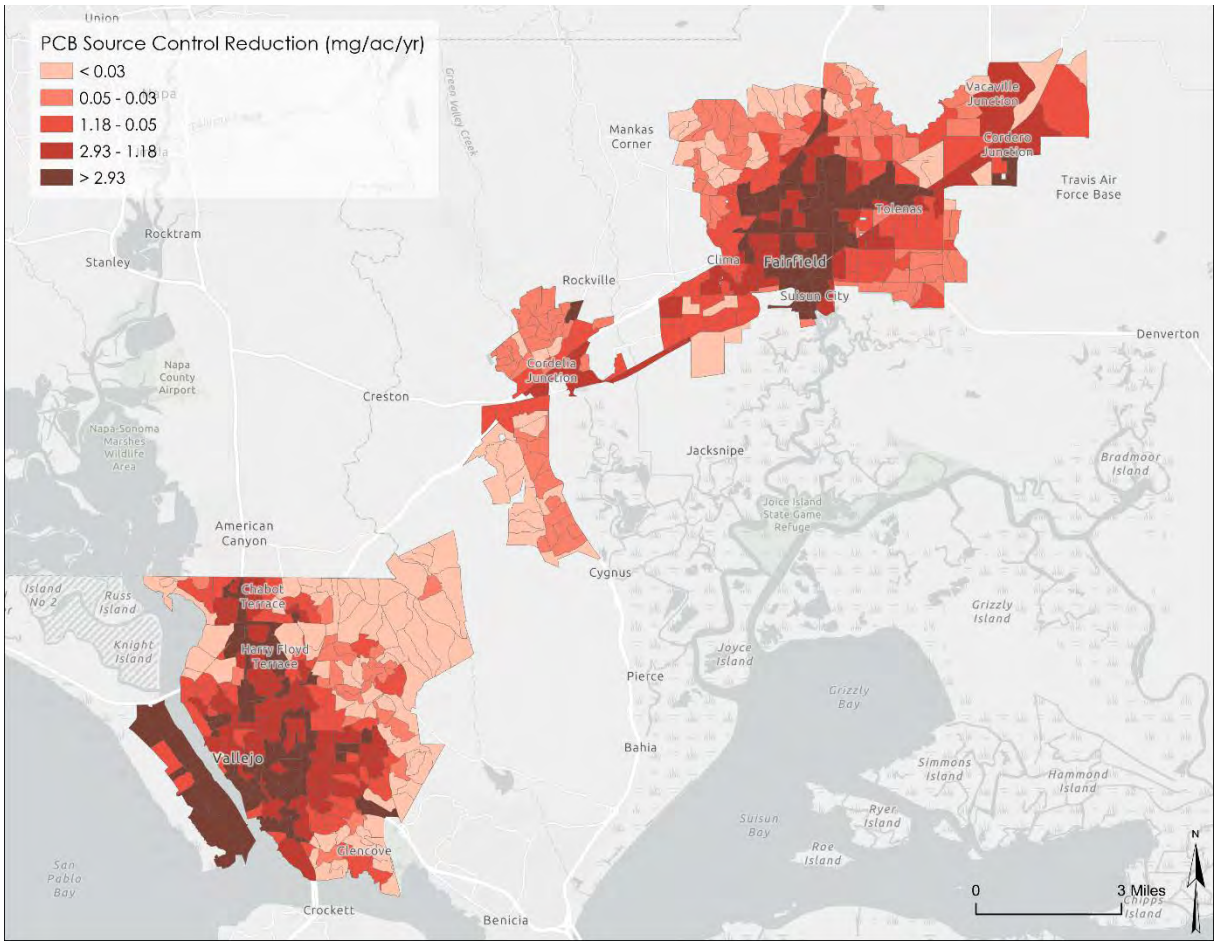

Figure 4-2. Source Control Reductions for PCBs

Mercury reductions from source control measures show a somewhat similar pattern to PCBs, with higher reductions concentrated in catchments near city centers (Figure 4-3). A notable difference is that lower relative reductions on Mare Island, which largely reflects lower variance in mercury concentrations across the land use based yields, compared to PCBs. Thus, mercury reductions more closely reflect variables associated with the control measure implementation itself, rather than levels of baseline loading.

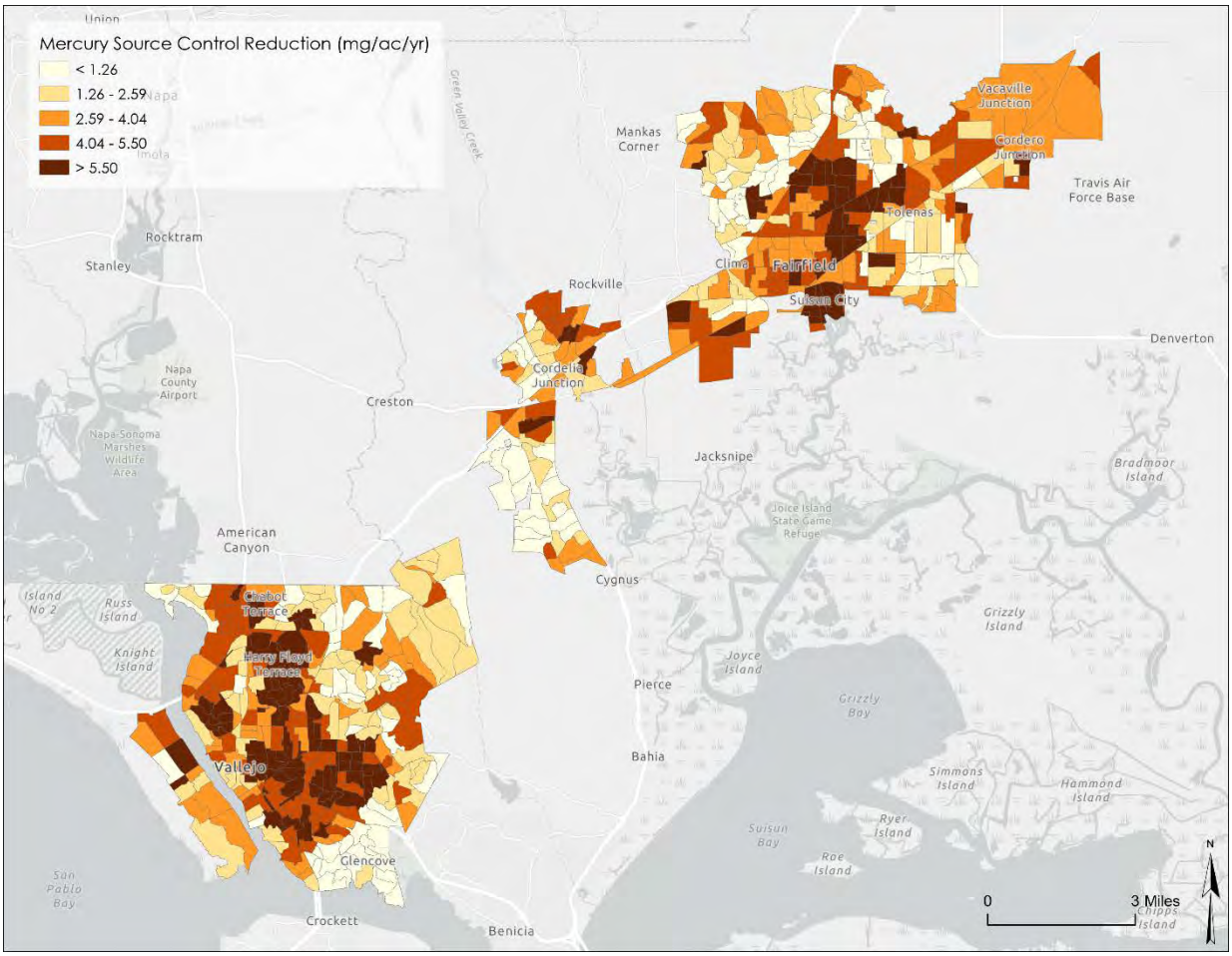

Figure 4-3. Source Control Reductions for Mercury

Source control measure reductions are summarized by city in Table 4-2. The largest reductions across all three cities for PCBs is due to building materials management (100 g/yr). For mercury, street sweeping provides the largest reductions (138.7 g/yr), while the greatest PCBs reductions are in Vallejo from and come from building materials management (120 g/yr), with street sweeping also making substantial reductions (52.5 g/yr).

Table 4-2. Source control measure reductions summary

	Vallejo		Fairfield		Suisun		Total PCBs Reduced (g/yr)	Total Mercury Reduced (g/yr)
	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)		
Sweeping	52.5	63.6	15.1	66.6	2.3	8.5	69.9	138.7
Inlet Cleaning	0.5	1.0	1.0	5.2	0.8	0.1	2.3	6.3
Trash Capture	0.0	0.0	1.0	3.8	0.3	0.1	1.4	3.9
Building Mat.							100	0.0
Totals	53	65	17	76	3	9	174	149

4.5.2 Projected Loading Scenarios and Comparison for Wasteload Allocation Attainment

The GSI RAA established that estimated reductions from GSI and redevelopment provided 72% of the reductions required to reach the Solano Permittees' PCBs wasteload allocation of 110g/yr by the year 2040, and that the remainder reductions would be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment (see Appendix A). Similar to the GSI RAA, reductions achieved from source control measures were applied to future loading scenarios. Per the RAA Guidance (BASMAA, 2017a), source control measure load reductions were not applied to the 2020 scenario and no new source controls were applied to the 2040 scenario. While no additional source control reductions were applied, it is reasonable to assume that source control measures implemented by 2030 will continue to 2040. The total control measure reductions were calculated as the sum of reductions resulting from projected GSI implementation, land use redevelopment, and source control measure implementation.

The spatial distribution of total PCBs loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 4-4. Note that the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A). Note that the catchment classification is unchanged from the maps presented in the GSI RAA to facilitate comparisons. In most areas, source controls provide additional PCB reductions throughout the Solano Permittee MS4 area above what were realized by GSI and land use redevelopment. City centers and Vallejo's Mare Island particularly benefit from street sweeping practices. PCB reduction benefits are disproportionately represented on Mare Island, due to the high proportion of Old Industrial land use which provides relatively high PCB yields. These outputs indicate that by 2040 all catchments on Mare Island have moved out of the highest loading category with the addition of source control measures (Figure 4-4, 2040 panel).

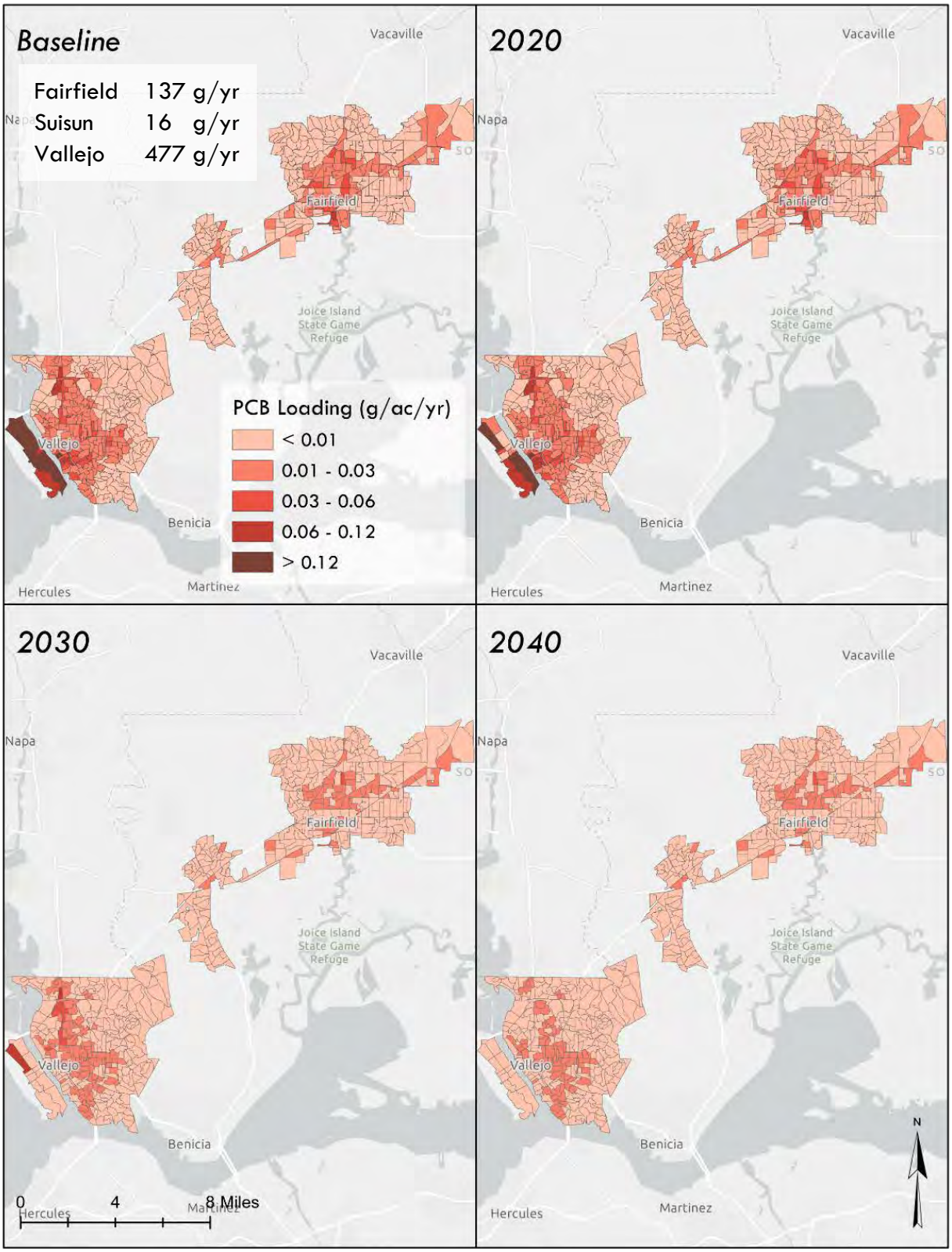

Figure 4-4. Total PCB Reductions for GSI and Source Control Measures for Future Scenarios.

The spatial distribution of total mercury loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 4-5. Like the PCBs maps, the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A), and catchment classifications are unchanged from those presented in the GSI RAA scenarios. Source control measures provide additional mercury reductions throughout the Solano Permittee MS4 area above what were realized by GSI and redevelopment, with larger relative reductions due to source control measures versus GSI or redevelopment when compared to PCBs. This is because the calculated mercury yields are generally less sensitive to land use conversion than PCBs. The most evident change is in the 2030 and 2040 scenarios, compared to what was estimated in the GSI RAA (see Appendix A). The outputs show that several catchments in the city centers of Vallejo, Fairfield, and Suisun shift out of the highest loading categories with the implementation of control measures (Figure 4-5). In Vallejo this is largely due to building materials management, while Fairfield and Suisun benefit mostly from street sweeping in these areas but also from inlet cleaning and pollutant removal by large trash capture devices.

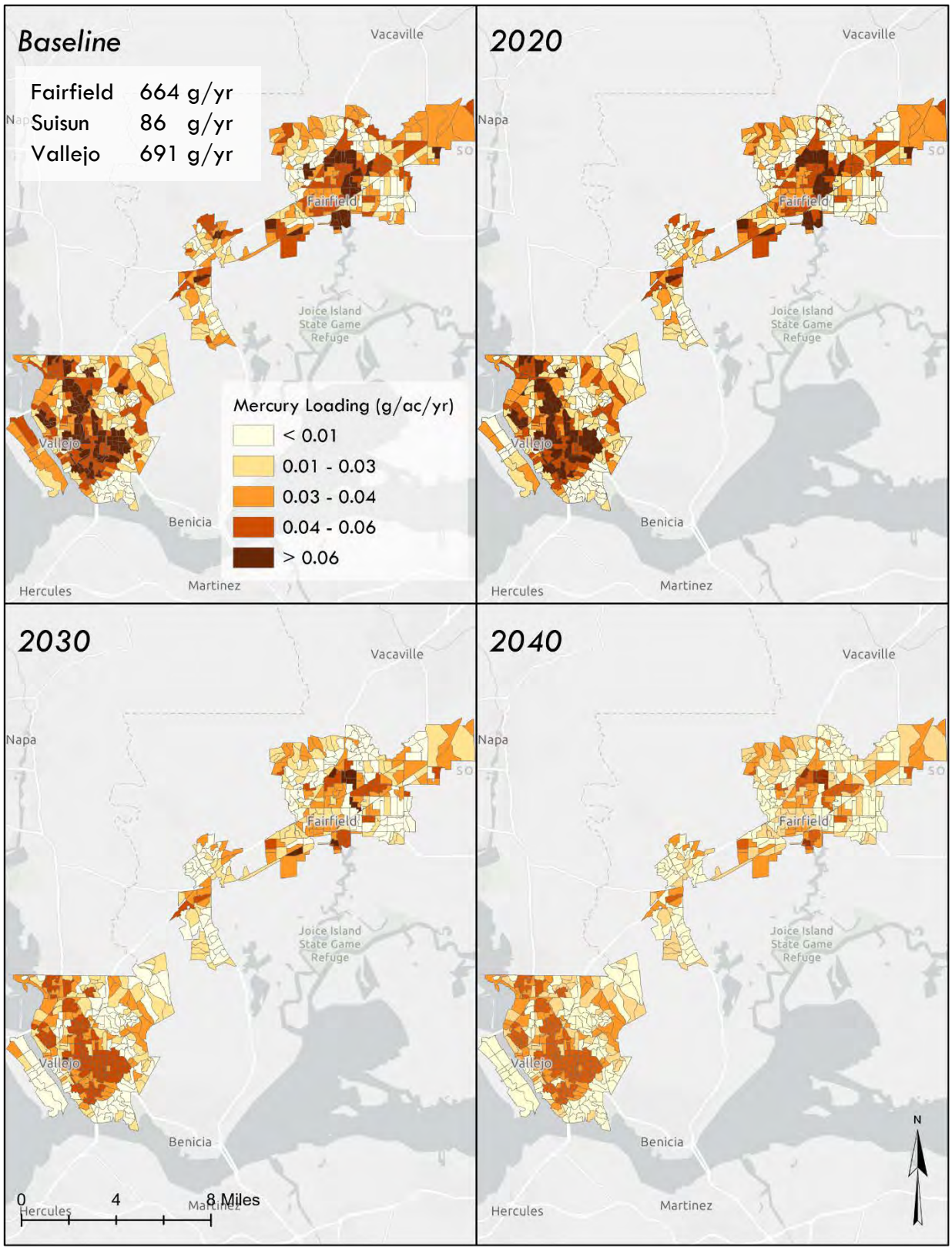

Figure 4-5. Total Mercury Reductions for GSI and Source Control Measures for Future Scenarios

The MRP (sections C.11.d, C.12.d) requires that demonstration of wasteload allocation attainment via reasonable assurance analysis (RAA) is documented in the 2020 Annual Report. The total PCBs and mercury loading after reductions from GSI, associated land-use redevelopment, and source control measure implementation are compared to the Solano County wasteload allocation in Table 4-3. The 2040 estimated PCB GSI reductions (382 g/yr) provide Solano Permittees with a 61% reduction below baseline loading estimates, which is 72% of the required reduction to meet the Solano Permittee's wasteload allocation of 110g/yr. Table 4-3 shows that the remainder of the required PCBs reductions are projected to be achieved by source control measures by the year 2040.

Table 4-3. Wasteload allocation attainment summary.

Scenario	Baseline Loading (g/yr)		GSI Reductions (g/yr)		Source Control Reductions (g/yr)		Reduction from Baseline (%)		Waste Load Allocation (g/yr)		Allocation Attainment (%)	
	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg
2020			137	166			22%	12%				
2030	630	1,441	289	204	174	149	73%	24%		1600		100%
2040			382	295	174	149	89%	31%	110		100%	

Estimated baseline loads for mercury (1441 g/yr) were below the 2028/2030 wasteload allocation (1600 g/yr), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. It does however indicate that the Solano Permittees will meet the wasteload allocation for mercury established in the TMDL. If instead we appeal to a relative reduction metric using the refined baseline estimates, combined GSI implementation and continued source control measures result a 31% reduction from current mercury loading levels by 2040. While this appears to be short of the overall regional 50% reduction in mercury loads from urban stormwater specified in the TMDL, the shortfall is likely within the modeling error and planning uncertainties. The discrepancy between the refined baseline loads and those derived from the TMDL are likely related to population-based load allocation methods used for the TMDL, which are discussed in Appendix A.

5 Schedule and Costs

The Solano Permitees' GSI Plan (2019) identified public and private priority projects with green stormwater infrastructure potential for future implementation in 2020, 2030, and 2040. These

projects are listed in Table 5-1 along with their pollutant removal potential, status, and planning level capital and maintenance costs.

The RAA model results predict 100% attainment of the wasteload allocations, with the existing and already planned GSI and source control measures, therefore no additional source control or GSI measures are proposed.

Conceptual-level design of several GSI projects are included in Appendix C. Pollutant load reductions from these GSI projects would provide additional pollutant load removal, above the RAA model results summarized in Table 4-3.

Table 5-1. Public and private projects with green stormwater infrastructure potential identified for future implementation in 2020, 2030, and 2040, along with their pollutant removal potential, status, and planning level capital and maintenance costs. For future scenarios, estimated PCB and mercury reductions are after land use changes have already been applied in the model, so that these reductions only reflect a small portion of the total redevelopment reductions.

Vallejo								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Vallejo Station Phase B	2020	2.3	0.0005	0.0944	$24,000	$200,000	$36,000	$3,000
Public Safety Building Rehab and Design	2020	1.0	0.0566	0.0839	$12,000	$100,000	$18,000	$2,000
Marina Sea Wall	2020	26.7	0.0001	0.0022	$138,000	$1,150,000	$207,000	$13,000
Admiral Callaghan Widening	2020	1.7	0.0096	0.0158	$24,000	$195,000	$36,000	$3,000
Admiral Callaghan Middle Lane	2020	4.0	0.1414	0.2834	$47,000	$385,000	$70,000	$5,000
Lennar Mare Island B4	2020	25.9	0.0537	0.2447	$252,000	$2,100,000	$377,000	$24,000
Downtown Streetscape Phase 4	2030	1.2	0.0003	0.0042	$15,000	$125,000	$23,000	$2,000
Downtown Streetscape Phase 5 & 6	2030	1.2	0.0003	0.0045	$6,000	$45,000	$9,000	$1,000
Downtown Streetscape Phase 7, 8 & 9	2030	1.6	0.0004	0.0053	$18,000	$150,000	$27,000	$2,000
Sonoma Boulevard Streetscape Phase 1-3	2030	10.3	0.0025	0.0377	$89,000	$735,000	$132,000	$9,000
Sonoma Boulevard Streetscape Phase 4	2030	7.7	0.0020	0.0293	$69,000	$575,000	$104,000	$7,000
Sacramento Street Streetscape Phase 1	2030	5.1	0.0258	0.2829	$60,000	$500,000	$90,000	$6,000
Sacramento Street Streetscape Phase 2	2030	2.9	0.1213	0.2178	$30,000	$250,000	$45,000	$3,000
Sacramento Street Streetscape Phase 3	2030	7.1	0.1107	0.1797	$65,000	$540,000	$97,000	$7,000
Turner Parkway Overcrossing	2030	0.5	0.0001	0.0015	$10,000	$80,000	$15,000	$1,000
Benicia Road Bridge Replacement Project	2030	0.4	0.0001	0.0012	$11,000	$85,000	$16,000	$1,000
Fairgrounds Drive Improvements	2030	6.1	0.0374	0.0743	$65,000	$540,000	$97,000	$7,000
Sonoma Boulevard Streetscape Phase 5 & 6	2040	79.4	0.1680	0.4909	$54,000	$450,000	$81,000	$6,000

Fairfield								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Discovery @ Gold Ridge	2030	7.5	0.0212	0.3454	$35,000	$285,000	$52,000	$4,000
Gold Hill Village 2	2019	7.9	0.0048	0.6510	$26,000	$216,000	$39,000	$3,000
Ivy Wreath/Strawberry Fields	2030	7.5	0.7714	0.2944	$32,000	$265,000	$48,000	$3,000
Paradise 360	2030	5.5	0.0060	0.0358	$24,000	$195,000	$36,000	$3,000
Villages at Fairfield- Village 1	2030	51.7	0.0018	0.0056	$161,000	$1,335,000	$240,000	$15,000
Villages at Fairfield- Village 2	2030	32.8	0.0111	0.3678	$90,000	$750,000	$135,000	$9,000
Caliber Collision	2030	1.5	0.0699	0.0897	$14,000	$115,000	$21,000	$2,000
Clorox	2030	1.0	0.0001	0.0114	$11,000	$90,000	$17,000	$2,000
Denny's Restaurant	2030	0.8	0.0002	0.0025	$8,000	$60,000	$11,000	$1,000
E&P Properties	2030	9.9	0.0018	0.0269	$49,000	$405,000	$73,000	$5,000
Fairfield/Vacaville Train Station	2030	1.0	0.0001	0.0016	$11,000	$86,000	$16,000	$1,000
Gateway 80, Buildings A & B	2030	35.9	0.1994	0.9208	$247,000	$2,055,000	$369,000	$24,000
Innova Maxwell	2030	2.6	0.0002	0.0036	$22,000	$180,000	$33,000	$3,000
Jayo Subdivision	2019	4.1	0.0002	0.0559	$32,000	$260,000	$47,000	$3,000
Jelly Belly Warehouse Expansion	2030	4.1	0.0010	0.0810	$32,000	$260,000	$47,000	$3,000
Jepson Parkway 2A	2030	1.0	0.0001	0.0189	$11,000	$87,000	$16,000	$1,000
Partnership Health 2	2030	4.4	0.0005	0.0527	$34,000	$280,000	$51,000	$4,000
Senior Manor Parking Lot	2030	1.0	0.0141	0.0178	$11,000	$87,000	$16,000	$1,000
Sheldon Oil Company	2030	1.0	0.0002	0.0493	$11,000	$87,000	$16,000	$1,000
Solano Logistics D	2030	3.5	0.0004	0.0938	$28,000	$230,000	$42,000	$3,000
Texas Corners	2030	0.7	0.0161	0.0210	$9,000	$70,000	$13,000	$1,000
Cordelia Community Park	2030	2.3	0.0006	0.2174	$51,000	$425,000	$77,000	$5,000
Fire Department Training Tower	2030	1.3	0.0958	0.1206	$17,000	$140,000	$26,000	$2,000

Suisun								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Railroad Avenue Extension	2030	1.7	0.0003	0.0726	$15,000	$125,000	$23,000	$2,000

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8 Appendices

Appendix A – Final GSI RAA Modeling Report

Appendix B – Source Control Load Reduction Accounting for RAA (Final 8-31-20)

Appendix C – Solano Permittees' GSI Design Concepts

SOLANO PERMITTEES

Green Stormwater Infrastructure

Reasonable Assurance Analysis Modeling Report for PCBs and Mercury

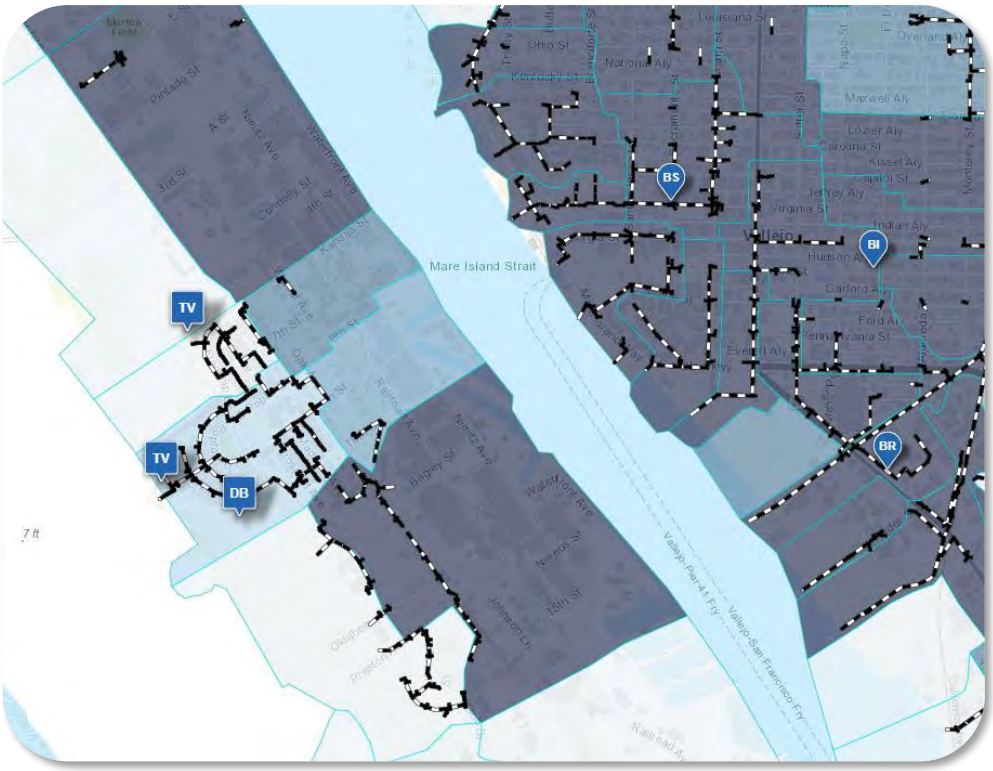

FINAL REPORT

SEPTEMBER, 2020

In compliance with Provision C.11 and C12.c of Order R2-2015

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APPENDICES

Appendix A. swTELR article published in Journal of Environmental Management

Appendix B. swTELR BMP type definitions

Appendix C. Catchment routing and attributes

Appendix D. Decentralized BMPs implemented and planned by Solano Permittees

ACRONYMS

BASMAA	Bay Area Stormwater Management Agency
BMP	Best Management Practice
C3	Refers to Provision C3 in the MRP
cBMP	Centralized BMP. Also called regional treatment measures
CN	Curve number
CRC	Characteristic runoff concentration
dBMP	Decentralized BMP, also called distributed BMPs
FSSD	Fairfield Suisun Sewer District
GI	Green Infrastructure
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
HSG	Hydrologic soil. group
LID	Low Impact Development
MRP	Municipal Regional Stormwater Permit
NLDC	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
RWQCB	Regional Water Quality Control Board
PCBs	Polychlorinated Biphenyls
SCS	Soil Conservation Service
SFEI	San Francisco Estuary Institute
swTELR	Stormwater Tool to Estimate Load Reductions
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
WLA	Waste load allocation
VFWD	Vallejo Flood and Wastewater District

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EXECUTIVE SUMMARY

This report communicates the methods and results of a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. Those provisions require Solano Permittees to quantify the degree to which they expect to meet future Polychlorinated biphenyls (PCBs) and mercury reduction targets by implementation of Green Stormwater Infrastructure (GSI). This study was coordinated with other SF Bay Area Permittees via the Bay Area Stormwater Management Agencies Association (BASMAA) to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo; the Fairfield Suisun Sewer District; and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of a Green Stormwater Infrastructure Workplan, so that the outputs may inform future GSI implementation. Thus, this report represents the result of a concerted, collaborative effort on the part of the Solano Permittees to determine PCB and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

The Solano permittees have employed a practical and proven approach for quantifying load reductions that reflects both a need to be efficient with limited resources and a commitment to transparent linkages between planned improvements and expected water quality benefits. This approach is based on outputs from the purpose-built stormwater hydrologic and pollutant loading model Stormwater Tool to Estimate Load Reductions (swTELR) reported in Beck et al. (2017), Conley et al. (2019); and Conley et al. (2020). swTELR is a scalable computational approach to quantify urban catchment-scale stormwater runoff, pollutant loading to receiving waters, and reductions from BMPs. The model provides spatially-explicit accounting of stormwater and pollutant reductions to inform more strategic stormwater management decisions with a parsimonious structure that relies strongly on the input data. This approach also makes the model easier to use and understand, lower cost, and more amenable to both field verification and updating with new information as it becomes available.

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural BMPs that infiltrate and treat stormwater runoff. These scenarios do not include source control measures, which will also contribute to TMDL wasteload allocation reductions, as these will be handled in a separate RAA study pending the completion of a regionally adopted accounting method by BASMAA scheduled to be completed in April of 2020.

Baseline modeling (no BMPs) corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, these areas represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting WLA targets in the future (see maps below). Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from swTELR were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate from swTELR was below the wasteland allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the veracity of swTELR outputs.

Future modeling scenarios showed that the Solano Permittees are expected to meet target GSI reductions for both PCB and mercury in the coming decades. Reductions calculated for the years 2020, 2030, and 2040 surpass the required GSI reductions by several multiples for both PCBs and mercury, primarily due to the conversion of Old Industrial/Source Area land uses to New Urban land use on Mare Island. The GSI reductions represent substantial progress towards WLA targets specified in the TMDL (SFRWQCB, 2006; SFRWQCB, 2008), with the PCB GSI reductions accounting for 72% of reductions required to achieve the Solano Permittee's 2040 PCBs WLA target (100 grams). Mercury reductions represent a 14% reduction from baseline estimates by 2028 which are already below the Solano Permittee WLA target. Large tracts of land have been acquired by private development firms and demolition, grading, and/or construction is already underway throughout Mare Island. If these redevelopment projects proceed as planned over the next two years, load reductions are expected to accelerate towards the modeled 2020 estimates. A spatial prioritization analysis was completed to identify the best parcels and road segment opportunities for additional GSI implementation, that may provide additional benefits, which will be addressed in the GSI Workplan. However, it is anticipated that already planned redevelopment projects will meet the GSI reduction targets and that source control measures will make up most of the remaining required reductions to meet WLA targets.

While the Solano Permittees are on track to achieve the pollutant reduction expectations for GSI implementation, as GSI and source control measures are implemented, new opportunities and challenges will inevitably arise, causing changes to the planned scenarios. It will be critical for Solano permittees to adopt a cost-effective and updateable tracking and accounting system so that iterative quantification of reductions can ensure that progress aligns with estimated projections. Integration of pollutant load reduction accounting with GSI data management and reporting can improve Solano Permittee stormwater program efficiency, and provide interim progress verification for ongoing assurance that pollution reduction expectations are indeed reasonable.

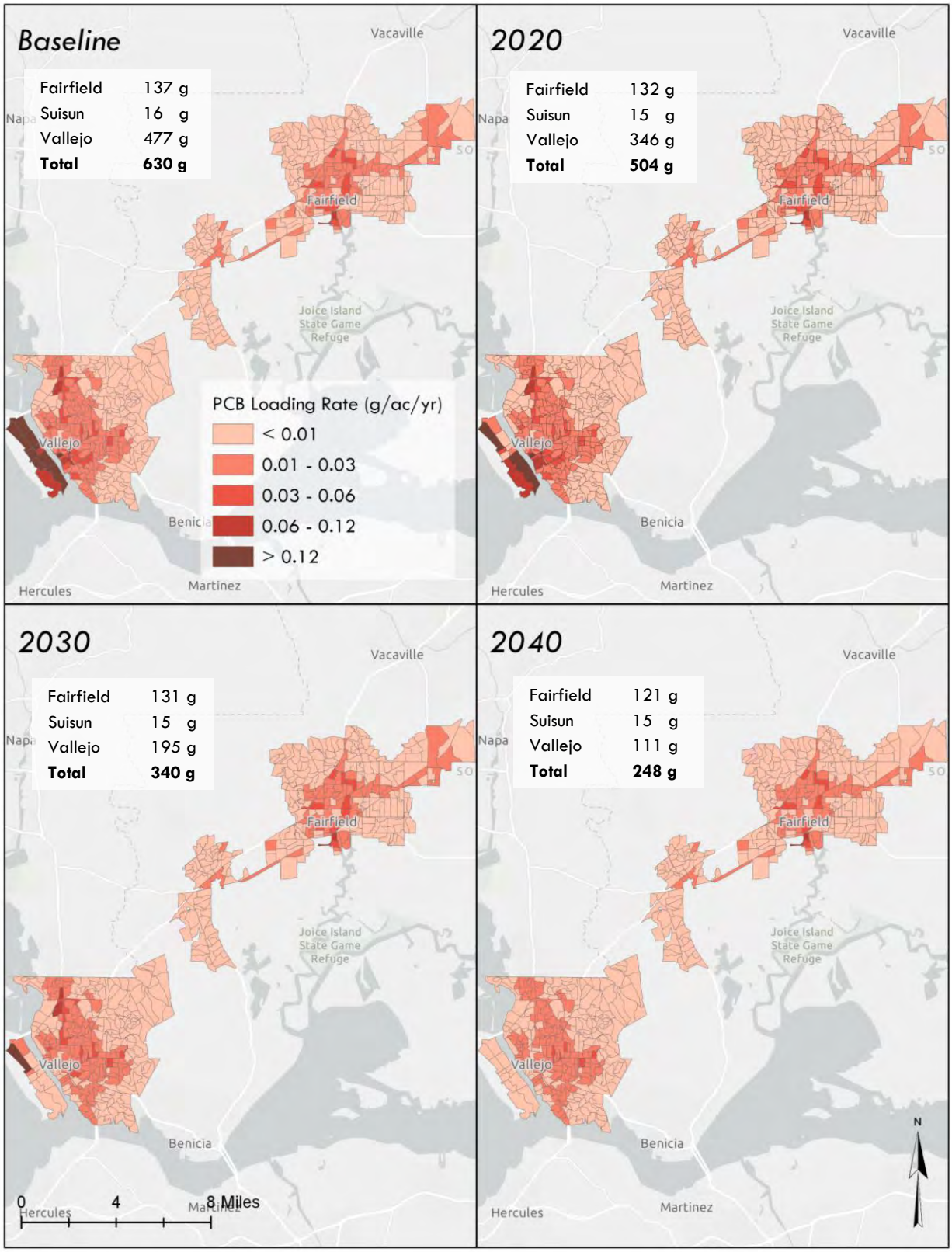

Spatial distribution of annual PCB load estimates for baseline and future scenarios

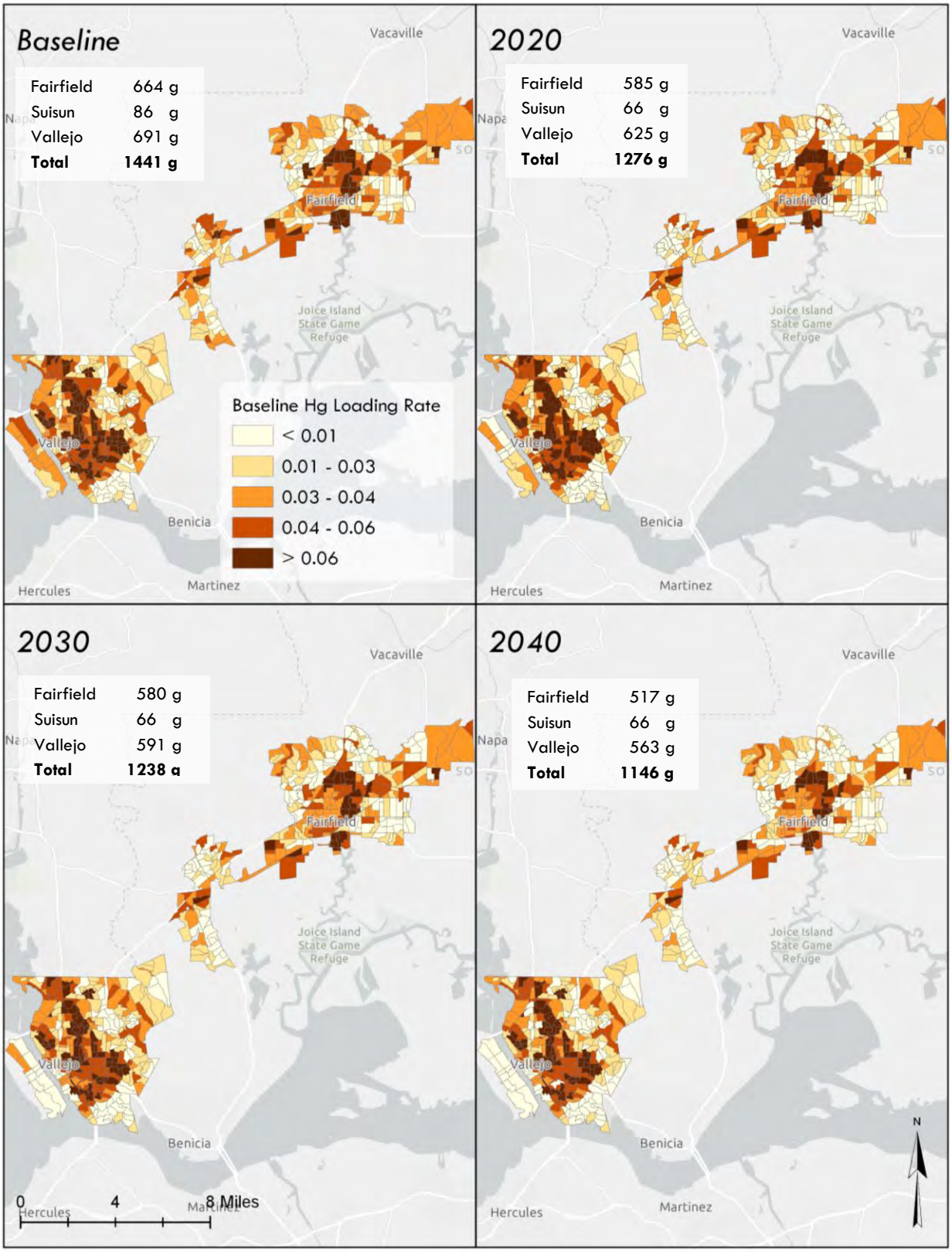

Spatial distribution of annual mercury load estimates for baseline and future scenarios

1 Introduction

1.1 Regulatory Mandate

The Solano Permittees (City of Fairfield, City of Vallejo, and Suisun City) are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1], and mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay. MRP Provision C.11and C.12.c requires the Solano Permittees to prepare a Reasonable Assurance Analysis, to be submitted with its Annual Report to the RWQCB due September 30, 2020.

"Green Infrastructure" (GI), also known as "Green Stormwater Infrastructure" (GSI[2]), refers to the construction and retrofit of storm drainage to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural systems to detain and treat runoff before it reaches receiving waters. Green stormwater infrastructure can be incorporated into construction on new and previously developed parcels, as well as new and rebuilt streets, roads, and other infrastructure within the public right-of-way.

Water quality in San Francisco Bay is impaired by polychlorinated biphenyls (PCBs) and mercury. Sources of these pollutants to the Bay include urban stormwater. By reducing and treating stormwater flows, GSI reduces the quantity of these pollutants entering the Bay and will hasten the Bay's recovery.

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, all Bay Area Permittees must also project the load reductions achieved via GSI by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040[3]. Of these regional 2040 reduction targets, the Solano Permittees are responsible for reductions of approximately 110 grams/year

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[1] Order R2-2015-0049

[2] Although the MRP uses the term green infrastructure (GI), the Solano Permittees prefer to use the term green *stormwater* infrastructure (GSI) for clarity. Henceforward, the term GSI will be used.

[3] Permittees shall "quantitatively demonstrate that PCBs load reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects" (C.12.c.ii.2.d) Percent of Solano Permittee load reduction is 20.8% PCBs and 16.1% mercury from BASMAA RAA Guidance Document (6/30/17).

PCBs and 48 grams/year mercury based on current baseline estimates (Table 1.1) (see Section 4.2.4 Compliance Demonstration for details.

Table 1.1 Future GSI reduction targets for Solano Permittees from modeled baseline loading

	Scenario	GSI Reduction Target (g)*
PCBs	2020	8
	2030	58
	2040	110
Mercury	2020	2
	2028	33
	2040	48

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury)

1.2 Scope and Purpose

This RAA provides a demonstration that GSI control measures included in the Solano Permittees' GSI Plan as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury Total Maximum Daily Load (TMDL) MRP required green infrastructure reductions for urban stormwater runoff. This RAA quantifies PCB and Mercury reductions, given the type, size, number, location, and time frame of GSI control measures needed to comply with load reduction goals stated in MRP Provisions C.3.j and C.11/C.12.c. This report fulfills the MRP requirement of quantifying reductions achieved via GSI (C.11.c/C.12.c) which will be documented in the 2020 Annual Report for the Solano Permittees.

The vision for this RAA is to map a path towards achieving TMDL wasteload allocation targets (WLA) and also provide a structure for ongoing compliance demonstration. A modeling approach has been developed that is amenable to iteratively verifying runoff and pollutant load reductions as new stormwater BMPs are implemented over time. The outputs provide timely information at spatial scales that can inform implementation decisions. It creates a practical means for quantifying load reductions over time that is also amenable to direct monitoring verification at individual BMPs and urban stormwater drainage scales. This RAA analysis has been performed in conjunction with development of a Green Stormwater Infrastructure Workplan to ensure that load reduction requirements dynamically informed the identification of sites and types of green infrastructure planned in the future.

1.3 Background and Understanding

1.3.1 PCBs and mercury Total Maximum Daily Loads

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay (a Waste Load Allocation, or WLA) from identified sources, including from urban stormwater. The urban stormwater WLA, in turn, is apportioned among MRP Permitees in proportion to population, based on the naïve assumption that PCB loadings vary in proportion to population[4]. The Solano Permittees constitute approximately 4.7% of the population total for all cities named in the MRP.

The Bay Area-wide WLA for PCBs for urban stormwater is 2 kg/yr by 2030, which is a ninety percent reduction from baseline urban stormwater loads estimated in the TMDL. The overall reduction in all external loads, including urban stormwater, was developed based on multiplying the target final sediment PCB concentration (1 µg/kg) by the estimated annual sediment load discharged from local tributaries. The target final PCB concentration in sediment was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day). The fish tissue target (10 ng/g) is translated to the sediment target (1 µg/kg) using a food web model developed by San Francisco Estuary Institute (SFEI).

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment (0.4 mg/kg or 200 µg/kg). A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of

[4] Monitoring data demonstrates that this is an oversimplified assumption, because PCB yields per unit land area are higher in some land uses (e.g., "old industrial") compared to others (e.g., "new urban"). The PCBs TMDL and resulting permit provisions allow permittees to provide alternate formulae for allocating load reduction requirements among permittees.

mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations. These receiving water goals are translated by the TMDL into a roughly 50% mercury load reduction requirement from urban stormwater.

Because the ninety percent reduction for PCBs is more stringent than the fifty percent reduction for mercury, current implementation strategies for Bay Area stormwater programs are based on the assumption that achieving PCB WLAs will result in achieving mercury WLAs. This assumption is intended to be revisited through periodic review of progress on attainment of TMDL goals.

1.3.2 PCBs and mercury sources, transport, and distribution

1.3.2.1 *PCBs sources to urban runoff*

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers (Abbot 1993, Binational Toxics Strategy 1998 and 1999, EIP Associates 1997)[5]. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

1.3.2.2 *Mercury sources to urban runoff*

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal

[5] Review of Potential Measures to Reduce Urban Runoff Loads of PCBs to San Francisco Bay, by EOA, Inc. for Santa Clara Valley Urban Runoff Pollution Prevention Program, March2004.

mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to SF Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

1.3.2.3 *PCBs and mercury transport*

Conceptual model development by Mangarella et al (2010) defined the principle pathways of PCBs and mercury transport. Wind dispersal, vehicle tracking and road deposits and surface runoff from source areas were defined as the primary transport vectors for sediment-bound pollutant transport throughout the SF Bay Area. Sediments transported into the MS4 accumulate on roadways (including curbs and gutters), storm drain inlets/catch basins, stormwater pipelines, and other structures (e.g., stormwater pump stations).

1.3.2.4 *PCBs and mercury spatial patterns in the SF Bay*

McKee et al. (2015) produced multi-year synthesis of PCBs and mercury data collected by numerous researchers as part of the SF Bay Regional Monitoring Program (RMP) to directly address management questions and identify patterns across the SF Bay Area. Sediment studies in the SF Bay Area and its watersheds have consistently measured higher PCB concentrations in areas of urban development compared to regions of open space or non-urban land uses (McKee et al, 2015, Hunt et al., 1998; Daum et al., 2000; KLI, 2002; Gunther et al., 2001). Maps included in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Watersheds that have ongoing disturbances through human development or that have legacy point sources show higher water column concentrations of total mercury than other less impacted watersheds. Elevated mercury concentrations are mostly caused by a combination of mercury stored in source areas and available for transport, and greater sediment (and perhaps organic carbon) loading rates (McKee et al., 2015). Concentrations of mercury in small fish have also been investigated by the RMP (Greenfield and Jahn, 2010). In contrast to PCBs, the small fish mercury data do not strongly indicate specific areas within the SF Bay Area of particular concern.

Sequential rounds of conceptual and mass balance model development have resulted in land-use based estimates of PCB and mercury production throughout the Bay Area (McKee et al. 2006,

Mangarella et al. 2006; 2010). These initial efforts were built upon by information extracted from BASMAA integrated monitoring reports, which used a unique land-use grouping that relied primarily on the identification of 'Old' and 'New' urban land uses. They were later used to develop the land use layer for the Regional Watershed Spreadsheet Model (RWSM), designed to estimate relative watershed-scale yields (Lent and McKee, 2011; Lent et al., 2012; McKee et al., 2014; Wu et al. 2016). McKee et al 2015 point out that a primary challenge faced in RWSM development was poor quality of the underlying land use layer and cautions that it may hamper the use of the model to smaller areas or at higher resolution.

Since the early1990's, several locations within the SF Bay nearby to Solano County have been sampled by regional monitoring programs such as the SF Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3)[6] system, administered by SFEI, provides access to these data and tools for viewing metadata. Given the nature of the sampling schedules, the mercury and PCBs data available are primarily useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. These data provide a snapshot of conditions for both PCBs and mercury at specific locations in the Bay, allow probabilistic inference over wider areas, and fulfill the objectives of specific scientific studies.

From 1993-2001 there are 28 recorded sampling sites for PCBs and mercury collected within Grizzly Bay, Suisun Bay, Carquinez Straight, nearly all of which record a single sample for each constituent. There have been 19 samples for both mercury and PCBs in water collected at one site in the Mare Island Straight as part of the RMP. There were 3 samples for PCBs in water collected at a site on Austin Creek in the NW corner of Vallejo in 2017. There are also 9 sediment sampling sites, with 1 sample at each site for both PCBs and mercury distributed throughout Vallejo Waterfront and Mare island collected in 2008. Two sites along Suisun Creek had both mercury and PCBs samples collected once in 2005 as part of the Portable Remote Sensing Image SectroMeter (PRISM) study, and one site within Suisun City had 1 mercury sample collected in 2013 as part of the Surface Waters Ambient Monitoring Program (SWAMP).

1.3.2.5 *PCBs source identification in Solano Permittee MS4s*

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis

[6] https://cd3.sfei.org/

Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD and City of Vallejo, 2016.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. More than six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire SF Bay.

The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an old industrial area based on historic land use. Some old waterfront sections of Vallejo are also considered old industrial and may be examined more closely in the future.

1.3.3 Reasonable Assurance Analysis

Given the risk of PCB and mercury delivery to local waterways, Solano Permittees are required to an analysis to provide 'reasonable assurance' that planned GSI implementation actions are expected to result in reductions that meet MRP 2.0 targets and the TMDL. Reasonable assurance can be defined as the demonstration that the implementation of control measures will, in combination with existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet TMDL waste load allocations or other water quality targets specified in a municipal separate storm sewer system (MS4) permit (USEPA, 2017). RAAs can provide MS4 permittees with a feasibility pollutant reduction roadmap to meeting their future waste load allocations and achieve receiving water limitations. If RAAs are conducted in a way that is well aligned with long-term stormwater planning information needs, they can also be used to support tracking, evaluation, and on-going reporting of the actual progress achieved enroute to the defined regulatory milestones.

2 Reasonable Assurance Analysis (RAA)

2.1 Approach Overview

2.1.1 RAA process

This goal of the Reasonable Assurance Analysis (RAA) is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet waste load allocation targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the green infrastructure RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to waste load allocation targets. This analysis includes only the RAA for green infrastructure, as the wasteload allocation attainment RAA will be documented in a separate report. By performing this RAA in parallel to development of the Green Stormwater Infrastructure Workplan, information from the RAA results were iteratively used to inform Plan development. This approach allows the Solano Permittees to efficiently integrate science-based tools with their stormwater planning processes and provide them with the power to iteratively verify outcomes and track progress over time.

The primary hypothesis addressed in this RAA can be stated as:

> The current level of GSI control measure implementation planned will result in PCBs and mercury load reductions that are sufficient to meet the reduction targets for the Solano Permittees specified in the MRP.

The experimental design is defined by a sequence of future scenarios during which the Permittee urban landscape is modified via changes in land use and impervious coverage, and implementation of GSI. If the expected changes are large enough to overwhelm the uncertainty associated with input data and the modeling process, then the primary hypothesis can be validated or rejected with a reasonable level of confidence.

The structure of this RAA draws substantially from the RAA already completed in Los Angeles County (Geosyntec, 2015). This analysis informed development of the RAA Guidance (BASMAA, 2017) that provides a process and structure for RAA in the SF Bay Area, which is reflected in the current analysis.

The RAA process involved compiling spatial data from various sources and information form Solano Permittees on levels of current and planned redevelopment, new development, and GSI implementation as inputs to several modeling scenarios. The basic steps in the RAA process were the following:

1. Define the modeling problem and identify an appropriate model structure and scale
2. Create a geodatabase to define urban catchment characteristics and drainage
3. Estimate baseline loading conditions and current levels of GSI implementation
4. Verify baseline modeling scenario results
5. Develop future modeling scenarios that reflect the level of projected land use changes and GSI implementation.
6. Compare the estimated reductions to GSI reduction targets for each relevant time horizon
7. Use the modeling scenarios to inform a parcel-scale spatial prioritization analysis for GI implantation site identification
8. Integrate additional planned GSI projects to update modeling scenarios

2.1.2 Correspondence with RAA Guidance Document recommendations

This RAA was coordinated with other Bay Area Permittees via the Bay Area Stormwater Management Association (BASMAA). This included participation in BASMAA workgroups, document review, and aligning the methods of analysis with recommendations included in the BASMAA RAA Guidance (BASMAA, 2017). The intent of the BASMAA RAA Guidance is to maintain a degree of consistency in the way that model analyses for PCBs and mercury are performed throughout the throughout the SF Bay region.

The RAA Guidance creates a useful structure in terms of specifying the scope of the analysis, input data sets, recommended modeling approaches, and allocation of control measures to various future scenarios. Modeling natural systems always requires several subjective decisions whose appropriateness depends on the data available to support the model and the information needs required from the outputs and the model structure. The RAA Guidance attempts to standardize several of these decisions. Sparse comment is provided on others, such as spatial resolution, aligning process representation complexity to the data available, or impacts of various sources of modeling uncertainty. For example, calibration and parameter set non-uniqueness has long been widely acknowledged as one of the most important sources of output uncertainty in hydrology (see Beven, 2001, 2006), and more recently in applied stormwater quality modeling (Wijesiri and Liu, 2018).

Modeling methods for pollutant load reduction estimation employed by the Solano Permittees is generally consistent with the RAA Guidance and aligns directly with recommendations whenever appropriate. Computational methods to modelling urban stormwater hydrology and pollutant loading continue to evolve to meet the needs of stormwater programs and regulators. Modeling decisions included in this analysis are grounded in commitment to create planning tools that are practical and useful for both short and long term stormwater decisions, responsive to evolving regulatory requirements, and readily updatable with new information to empower stormwater managers to implement effective and adaptable programs.

2.1.3 Study area

2.1.3.1 *Solano Permittee MS4 Area*

The study area for the RAA analysis includes the Solano Permittee MS4 area, that includes the cities of Fairfield, Suisun, and Vallejo only, and no areas draining to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 2.1) As such, the runoff and pollutant load modeling is discrete to these MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Since there are no long-term streamflow gauging stations downstream from the cities of Vallejo, Fairfield, and Suisun, the Permittee setting precludes calibration to observed flows. This precludes the need to incorporate additional drainage areas upstream of the Solano Permittee MS4 area in the modeling.

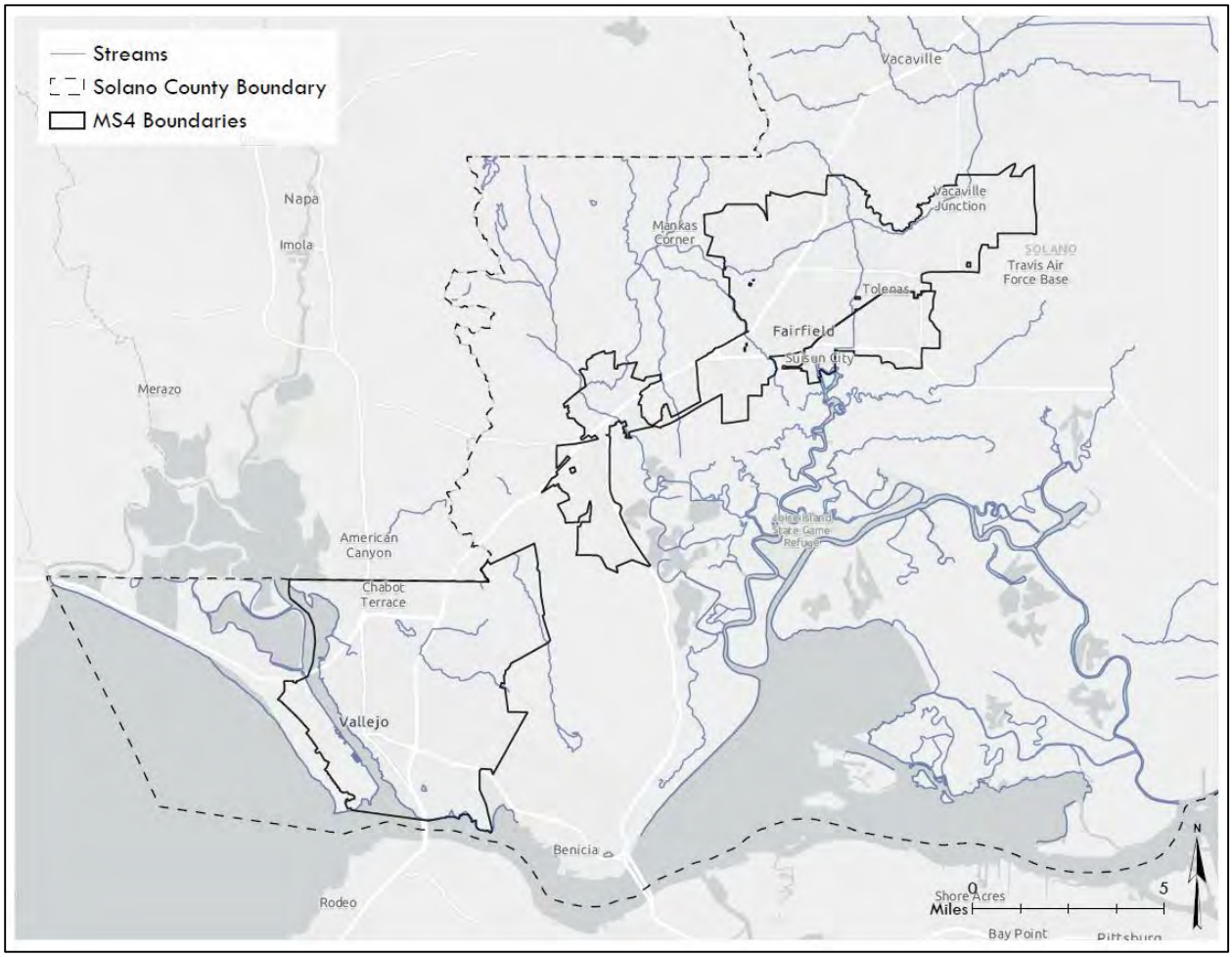

Figure 2.1. Solano Permittee MS4 Area

2.1.3.2 *Municipal Geographies*

The City of Fairfield is located along the Interstate-80 corridor between the major metropolitan areas of San Francisco and Sacramento. Fairfield is surrounded by undeveloped grazing and grasslands, hills to the north, and wetlands to the south beyond Suisun City. Fairfield is the county seat for Solano County and consists of three main areas: Central Fairfield, Cordelia, and the Travis Air Force Base.

The City of Suisun City is in the northern San Francisco Bay Area just south of the City of Fairfield. The Suisun Marsh and additional waterways lie along the southern extent of the city. The area surrounding the city includes hills and mountains. Suisun City has a downtown historic waterfront area that is its distinguishing characteristic.

The City of Vallejo is in the northern San Francisco Bay Area between San Pablo Bay and the Carquinez Strait. The city is surrounded by waterways, wetlands, rolling hills, and open space areas. Vallejo served as the California state capital in the state's infancy, before the state seat was permanently established in Sacramento. Additionally, Mare Island was the first Naval shipyard on the West Coast. Due to the historic context of the city, Vallejo has many historic buildings. Vallejo is in a desirable development location with because of transportation links via road, rail and water. The waterfront area, Mare Island, and downtown are focal points of community development.

2.1.3.3 *Climate and Physical Geography*

Solano County is the easternmost county of the North Bay has a mild coastal Mediterranean climate, with average temperatures increasing by about 10°F from the cooler coast to hotter inland cities. The coastal city of Vallejo is influenced by its position on the northeastern shore of San Pablo Bay, but less sheltered from heatwaves than areas directly on or nearer the Pacific Ocean/Golden Gate such as San Francisco and Oakland. Nearly all the precipitation is delivered between October and May, with an average annual precipitation totals of 21 inches for Vallejo and 24.9 inches for Fairfield/Suisun.

Runoff from the City of Vallejo primarily drains to the Napa River, the Mare Island Straight, and the Carquinez straight, all of which flow to San Pablo Bay. Other receiving waters for urban runoff include American Canyon Creek, Blue Rock Springs Creek, Lake Chabot, Lake Dalwigk, Rindler Creed, Southampton Bay, Sulphur Springs Creek, and White Slough. Fairfield and Suisun both drain to a complex series to tidal marshes and Sloughs that ultimately flow to Grizzly Bay and Suisun Bay. Runoff from Northern Fairfield and Suisun flows creeks and branches of the Suisun Slough, while Southern Fairfield flows primarily to Cordelia Slough. Receiving waters include Alonzo Creek, American Canyon Creek, Dan Wilson Creek, Freeborn Creek, Green Valley Creek, Jameson Creek, Laurel Creek, Ledgewood Creek, McCoy Creek, Soda Springs Creek, and Union Creek.

2.1.4 Conceptual Understanding of Pollutant Load Reduction Mechanisms

The computational model used in this RAA analysis follows from our conceptual understanding of urban drainage hydrology and redevelopment that includes pollutant fate and transport through the stormwater system. To represent these processes, a sequential accounting of runoff and pollutant load reductions is followed:

1. New development and redevelopment alter impervious cover, which affects runoff generation
2. Land use changes alter pollutant characteristic runoff concentrations
3. Source controls reduce pollutants available for transport
4. Rainfall is converted to runoff based on site-specific factors and mobilizes pollutants
5. Areas treated by non-structural LID measures produce less runoff, reducing on-site pollutant mobilization.
6. Decentralized BMPs infiltrate runoff near its source, reducing storm flows via infiltration and retention of pollutants.
7. Excess runoff leaves sites, moving downstream to centralized BMPs where runoff and pollutants are further reduced via infiltration, particle capture, filtration, and/or biogeochemical cycling.
8. Runoff and pollutants not infiltrated or treated by centralized BMPs flow downstream to other catchments or receiving waters.

In this model, water movement follows urban catchments delineations (approximately 100 acres) which define the hydrography of the urban landscape and serves as the primary unit of analysis for routing and connectivity to receiving waters. Urban drainages are aggregations urban catchments that represent the smallest non-arbitrary hydrographic divisions of the MS4.

While this RAA focuses only on GSI implementation, the computational model can easily be extended for the WLA RAA to include source control measure reductions in a subsequent modeling study. By separating the GSI RAA from the WLA RAA, care must be taken not to double count reductions since several source control and GSI components interact with each other. Inconsistencies would probably only become apparent when source control implementation can be defined in specific locations and modeling is performed in a spatially explicit manner as in swTELR. The modeling sequence defined above ensures a consistent accounting of reductions so that results are logically coherent.

2.1.5 Green Stormwater Infrastructure Definition

Green stormwater infrastructure are pollution control measures broadly defined in the MRP (as green infrastructure') (p.147) as:

> *"Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner*

water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water."

This corresponds roughly with the definition provided by the EPA, which overlaps substantially with a traditional definition of Low Impact Development (LID). One difference between the two is that LID usually includes the provision that runoff is managed as close to its source as possible. The definition used in the MRP covers most structural BMPs whether they are small decentralized/distributed BMPs that receive sub-parcel scale drainage or larger centralized/regional BMPs which typically receive neighborhood-scale stormwater drainage.

2.2 Model Selection Rationale

2.2.1 Key modeling considerations and trade-offs

Since all environmental models are simplifications of much more complex systems, an important initial step is to identify the compromises that will be required. These choices are often driven by resource availability and the purpose of the model. The most salient question is: *What do we need to use the model to do?* The answer to this question can dictate much of what gets left in and what gets left out of the model, and there are costs on both sides of that proposition. The problem is often framed as a trade-off between the degree of model complexity and the data required to support that complexity to obtain outputs with a reasonable degree of certainty. Figure 2.2 shows the problem as framed by EPA in their *Guidance on the Development, Evaluation, and Application of Environmental Models* (EPA, 2009). As structural complexity increases, the framework uncertainty decreases, since more of the system detail is represented. However, complex structures require higher order parameterizations, which rely on more data to specify and verify the model, so the additional complexity tends to produce greater uncertainty associated with the underlying data. A key modeling task is to identify the best balance these two sources of uncertainty for the specific modeling purpose.

Figure 2.2 conveys the concept that if we select a relatively simple model (e.g, computing peak flows using the rational method instead of continuous simulation), then we are left wondering if over-simplification leads to false conclusions. If we adopt a more complex model (e.g, continuous simulation at fine-scale spatial resolution), we are challenged with gathering enough real world monitoring data to supply all needed model inputs, or left wondering whether assumptions about model inputs leads to false conclusions. Thus, we seek to achieve just the level of model complexity needed to reach the point of minimum overall uncertainty resulting from the combination of model framework uncertainty and data uncertainty.

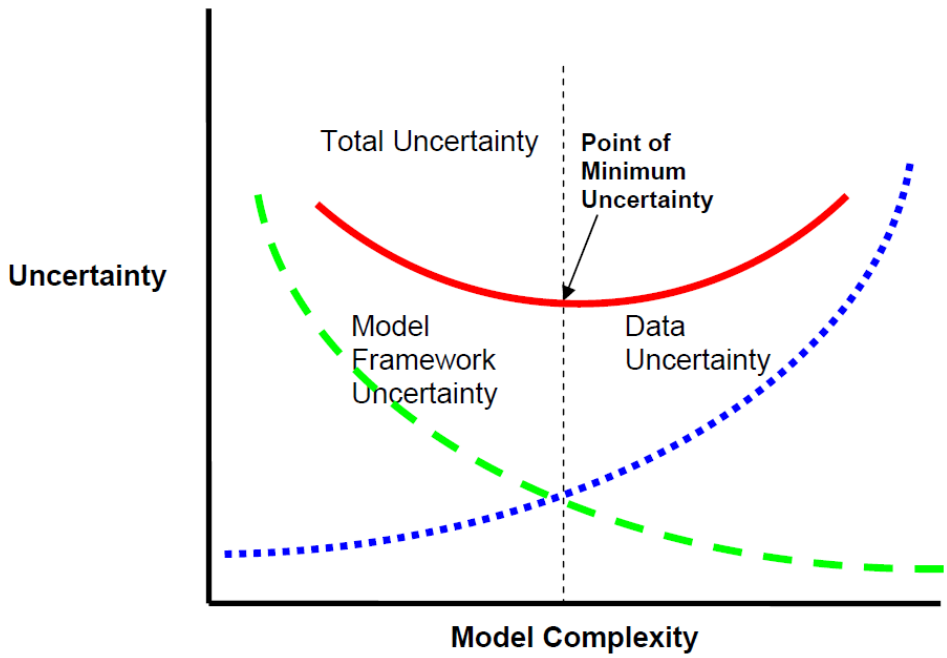

Figure 2.2. Relationship between model framework uncertainty and data uncertainty, and their combined effect on total model uncertainty (Adapted from Hanna, 1988, as presented in EPA, 2009, p.13).

In relatively complex model alternatives, there are numerous free parameters that usually require calibration, but there may be only a few input variables that contribute significantly to the outputs (Li et al. 2014). Over-parameterization, which is exceedingly common, results in a high degree of uncertainty in the model outputs due to subjective decisions required during the calibration process (Beven 1989, Beven 2001). Moreover, parameter values can vary substantially over time and space (Hossain and Imteaz 2016). Even where good hydrological data are available, they are probably only sufficient to support reliable calibration of models of very limited complexity (Jakeman and Hornberger 1993, Gaume et al. 1998). The inability to discern water quality changes over time or spatial patterns in hydrologic models is often due to poorly defined model parameters and resulting output uncertainty (Freni et al., 2011; Beven 2001, Nandakumar and Mein 1997). If the model cannot resolve the effects of management actions outside of predictive uncertainty, it is not a useful tool for estimating the water quality benefits of stormwater BMP implementation, and therefore less value to inform stormwater management decisions.

2.2.2 Aligning model specifications with management information needs

The intended use of model results should ultimately guide model selection and the necessary degree of model complexity (Leavesley et al. 2002). The least complex model that reliably meets the application at the relevant scale is often the best alternative (Chandler 1994, Rauch et al. 2002, Dotto et al. 2012). The goal of this RAA is to quantify pollutant load reductions over time associated with implantation of GSI. For stormwater planning, model selection often boils down to choice

between a greater degree of granularity across space or detail of process representation in time. Attempting to do both is computationally expensive, resource intensive, and provides more detail than required. While detailed process representation used in continuous simulation models may improve performance over short time steps, it comes at the expense of greater structural complexity (Snowling and Kramer 2001), without necessarily increasing the usefulness of outputs (Lindenschmidt 2006).

Since stormwater impact mitigation problems invariably have an important spatial component and are typically less concerned with short-term outcomes, modeling approaches that employ parsimonious process-representation in favor of greater spatial granularity make intuitive sense. While continuous simulation models provide a better way to understand dynamics of runoff generation and timing, simpler computational approaches provide a more practical alternative for stormwater managers due to lower costs and fewer data requirements. Indeed, it was recognized long ago by the earliest developers of continuous simulation stormwater models that they would be too detailed for many users and that there is a need for a wide range of procedures for assessment of stormwater pollution control costs and priorities (Heaney et al. 1976). This is especially true when resources are limited and one primary use of the outputs is to track changes over time (e.g. Schueler 1987, Chandler 1993;1994). Simpler approaches may even provide comparable performance to more complex ones (e.g., Kokkonen and Jakeman 2001, Perrin et al. 2001, Bormann and Diekkruger 2003, Reed et al. 2004; Petrucci and Bonhomme 2014), particularly when high time resolution outputs are not required.

2.2.3 RAA modeling approach

A pragmatic approach to model development was taken that eliminates elements that do not serve the purpose of ongoing stormwater load reduction quantification. The intent was to increase model transparency, usability, and updatability, to lower costs, and limit data uncertainty. Most available stormwater modeling tools are either intended exclusively for expert users (Atchison et al. 2012), or do not provide an efficient method for modeling multiple catchments or generating spatial outputs (e.g., Rossman 2013, Tetra Tech 2011).

This RAA uses the Stormwater Tool to Estimate Load Reductions (swTELR) (Beck et al 2017), a purpose-built model with an economical structure, that provides spatially explicit outputs designed to track stormwater BMP implementation over time. Identifying the best trade-offs between complexity and data requirements were a primary driver of the model structural design. These factors were considered within the context of data and resources that are likely available to stormwater managers in the long term. A computationally efficient approach can run via the web and may be used for ongoing quantification of pollutant load reductions and iterative verification of results by non-modeling experts. In this way, it can provide a dynamic alternative for ongoing planning and compliance decades after this RAA has been completed.

2.3 The swTELR Model

In this section we present the primary concepts and calculations used in the swTELR to perform this RAA. Additional documentation is available in Appendix A, contain sensitivity analyses, results of validation experiments, discussion of model limitations.

2.3.1 Model structure overview

swTELR is designed to have lower data input requirements than existing alternatives. Hydrologic computations combine a set of metrics that describe a 35-year rainfall distribution with well-tested algorithms from the National Resources Conservation District (NRCS Curve Number) for rainfall-runoff transformation and routing to generate average annual runoff estimates. Key inputs include spatially distributed rainfall, hydrography, soil types, land use, and impervious cover, along with BMP data. Pollutant generation is modelled via land-use based characteristic runoff concentrations (CRCs) to represent the generation, fate and transport of urban-derived pollutants. In effect, swTELR includes two parameters (CN and CRC), both of which are specified by the spatial data. The Curve Number method for runoff generation has been widely used in several watershed and stormwater models including the current iteration of EPA's Stormwater Management Model (SWMM 5).

A spatially explicit mass balance accounting method is used to quantify the runoff and pollutant reductions achieved with control measures. A hydrograph separation approach is used to quantify the water quality benefits of centralized, large-scale structural BMPs, and a simpler approach is used for small decentralized BMPs that omits accounting for flow timing. Validation experiments have shown that runoff estimation aligns closely with high-resolution monitoring data as well as results generated from more complex, well-accepted continuous simulation models (Beck et al., 2017), providing confidence that the swTELR computational approach is technically well-suited to inform stormwater planning applications.

2.3.2 Spatial and temporal scales of representation

Stormwater models vary widely in terms of how urban catchments are delineated and how landscape characteristics are discretized. swTELR employs a semi-distributed approach where runoff, loading and decentralized BMP reduction calculations happen on 30-meter grid scale (Figure 2.3), and hydrologic routing is performed at the urban catchment scale (approximately100 ac). Accounting of reductions from BMPs are spatially explicit so that the site-specific runoff generation and pollutant loading characteristics specific to the BMP drainage are preserved. Explicit of flows across grid cells features is not represented as it would be in fully distributed models (e.g. Bicknell et al. 1997, Lee et al. 2012), rather this is handled at the catchment scale.

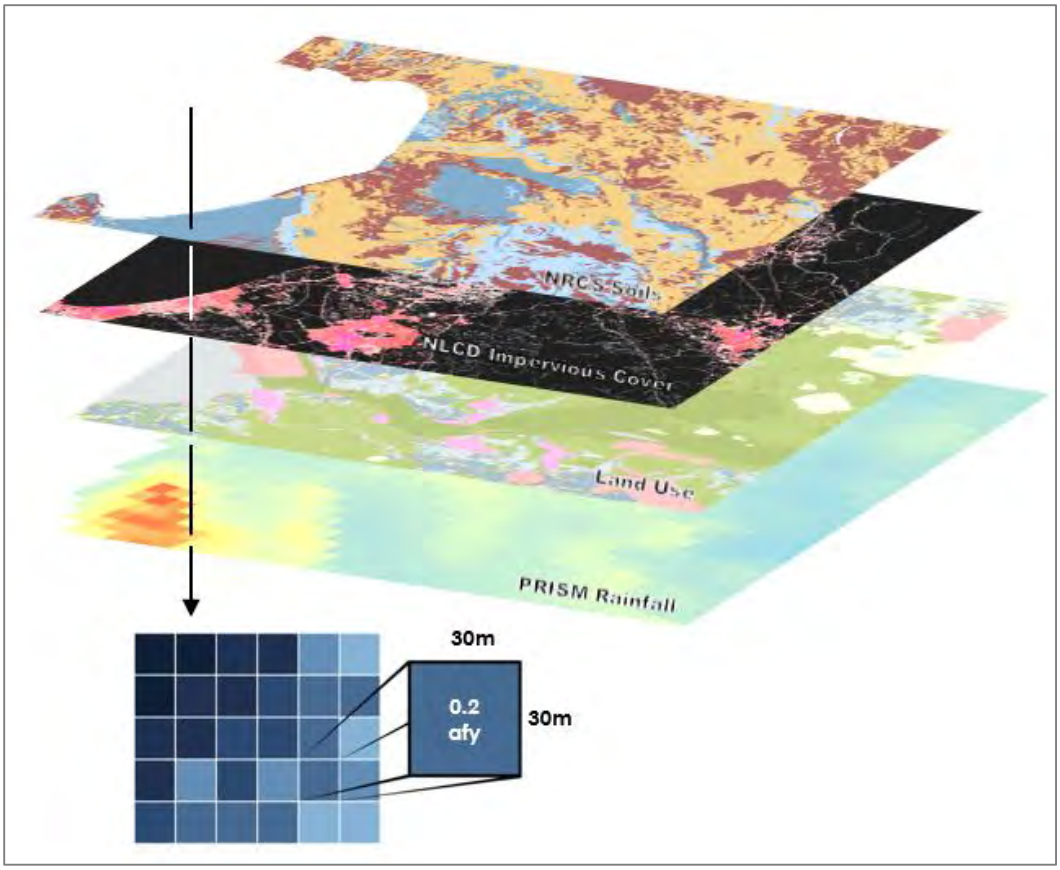

Figure 2.3. Graphical representation of raster calculations performed in swTELR to generate gridded runoff estimates.

Typically, stormwater runoff is modeled using 1 of 2 approaches: a single storm event methodology or a multi-year, high-resolution (daily or sub-daily) continuous simulation. Event-based approaches are programmatically simple but were originally designed to simulate runoff for a single storm event size (USDA 1986). Continuous simulations are generally better able to capture the dynamic range of rainfall-runoff responses by accounting for antecedent catchment moisture conditions (Harbor 1994, Bicknell 1997, Rossman 2008). swTELR employs a hybrid event-based approach that combines a set of events drawn from a long-term regional precipitation distribution to provide average annual runoff estimates. In effect, swTELR brackets the range of rainfall and runoff responses with a probabilistic approach, rather than a sequential, time-explicit approach (described in section 2.3.3).

This swTELR approach allows substantially simplified computation compared to continuous simulation, allowing substantially more spatially granular outputs that indicate precisely locations within the urban landscape that hold the greatest opportunities for runoff and pollutant load reductions. In addition, this approach avoids the model outputs being tied to a short time period, which may not capture a long-term representation of the range of event magnitudes. Given the lifespan of stormwater infrastructure is typically several decades, and the simulations included in this RAA will

span 20 years, using a multi-decadal period to characterize rainfall seems prudent. In short, we believe that a probabilistic treatment of rainfall provides the best compromise for generating outputs that most closely align with the purpose of RAA.

2.3.2.1 *Precipitation data*

Raster-based rainfall estimates are from the PRISM Climate Group[7] at Oregon State University are used for runoff generation in swTELR, typically covering a 35-year time span. These data provide spatially distributed precipitation at 800m resolution and are processed in swTELR to provide a probabilistic description of rainfall. The extracted raster-based precipitation estimates from PRISM have been independently validated using Western Regional Climate Center (WRCC) rain gauges for 15 cities located on the California Coast.

2.3.2.2 *Soils*

The USDA Natural Resource Conservation Service (NRCS) defines four hydrologic soil groups (HSGs): A, B, C, and D. A has the largest infiltration potential and is associated with the least amount of runoff whereas HSG D has the lowest infiltration potential and is associated with the most amount of runoff. The NRCS HSGs are based on soil composition and textural properties and align with NRCS curve number values for pervious surfaces. The classification of soils is determined by the soil layer with the lowest saturated hydraulic conductivity and the depth to any layer that is impermeable or depth to a water table (if present). HSGs reflect infiltration in the subsurface at depths of up to 2 feet or greater. Bay Area soils predominantly belong to groups C and D, making infiltration slower than more permeable soils in many locations. swTELR uses spatial soils data from two sources, the NRCS SSURGO database, which offers higher resolution, and the STATSGO2 database, which provides greater coverage in some areas.

2.3.2.3 *Impervious cover*

A key input for runoff generation in swTELR is satellite-derived impervious cover derived from the Landsat satellite series (https://viewer.nationalmap.gov/launch/) and available from the USGS at 30-meter resolution. Impervious cover dramatically reduces runoff infiltration to soils and thus transforms incident rainfall to runoff at substantially higher proportions than undeveloped lands. Use of satellite imagery to estimate impervious cover has several important benefits to estimate urban runoff. Satellite impervious coverage data is widely available, regularly updated, and can be easily accessed by any municipality. The use of satellite imagery rather than on-the-ground mapping of impervious cover incorporates the urban tree canopy to estimate overall impervious area. Extensive research has documented the reductions that urban trees provide to the rainfall-runoff transformation in urban drainages (Dwyer et al., 1992; Roy et al., 2012). The 30m resolution

[7] http://prism.oregonstate.edu/

of the Landsat data align with the other swTELR spatial inputs, making the data compilation and processing efficient.

2.3.2.4 *Catchment connectivity*

Catchment connectivity is a critical element of generating reliable estimates of average annual runoff and loading derived from an urban catchment and delivered to a receiving water. Catchment connectivity is defined as the proportion of stormwater discharging from a catchment discharge point that reaches the receiving water and is not diverted in some way. All catchment runoff and loading estimates reported from swTELR are adjusted based on the relative hydrologic connectivity of each catchment to the receiving water. MS4 mapping guidance (2NDNATURE, 2018) includes a systematic process for a user to determine the relative hydrologic connectivity of a catchment to receiving waters based on the distance, substrate and visual characteristics of the flow path that physically connect the discharge point of a specific catchment to the receiving water. Working inland from the receiving waters, all catchments that drain into another catchment inherit the same connectivity as the downstream catchment, unless there is evidence suggests that some surface volume loss occurs between the two catchments. Catchment delineation and connectivity is typically completed in coordination with city stormwater staff.

2.3.2.5 *Stormwater BMPs*

Stormwater TELR was developed to easily incorporate both structural and non-structural stormwater BMPs of various types, sizes, and applications. Stormwater BMP locations, types, and specifications are documented and typically communicated to 2NDNATURE via spreadsheets or uploaded to the swTELR web interface. An iterative process is performed to verify BMP attributes and recommend field verification where necessary. BMPs are stored within an asset management system that includes tracking, field protocols, and mobile apps for performance verification that are integrated to the stormwater model.

2.3.3 Precipitation data processing

Precipitation inputs are designed to bracket the seasonal and inter-annual variability demonstrated by historic data, defined using the PRISM dataset published by Oregon State University. We used the historic distribution of 24-hr rainfall depths (24-hr event frequencies) and the average annual number of days with measured rainfall to drive runoff generation. The 35-year (1981-2016) precipitation cumulative distribution function for each precipitation region was broken into a set of percentile values. This approach provides a way to bracket the likely event magnitudes in each region, incorporates extreme events in a manner proportional to their likelihood of occurrence, and serves to standardize the inputs from one modeling scenario to another using a small number of representative metrics.

Stormwater TELR calculates various 24-hr precipitation depths and the average annual number of days with measurable precipitation to represent the overall distribution and accurately estimate

total average annual depths. We calculated, d, the average number of rain days per water year when daily rainfall exceeds 0.01 inches (0.25 cm) and, P(x), various 24-hr event frequency estimates, where P is the 24-hr rainfall depth for the xth percentile event. On a water year basis, we selected 24-hr event rainfall frequencies and applied the trapezoid rule to estimate the integral of the 24-hr event cumulative distribution function to obtain a long-term average 24-hr runoff volume for days when it rains. We approximated the integral using the following equation for non-uniform intervals of x:

$$\int_0^{100} P(x)\,dx \approx$$

$$\frac{1}{2}\sum_{k=1}^{N}(x_{k+1} - x_k) * (P(x_{k+1}) + P(x_k)) \qquad (2.1)$$

where x is a number between 0 and 100, and k is number in the sequence of total, N, percentile events used to estimate the integral. To obtain a long-term average annual runoff volume, P365, we multiplied the 24-hr average by the number of rain days per year, d:

$$P_{365} = d * \int P(x)dx \qquad (2.2)$$

The average annual 24-hr rainfall for days when it rains is calculated using a set of 4 percentile events that correspond with common post-construction permit requirements and structural BMP design criteria (85th and 95th percentile storm events), which also include the median and the lower quartile. Figure 2.4 shows the historic 24-hr event frequency distribution for a typical precipitation distribution and a graphical representation of how the trapezoid rule is used to estimate the long-term average 24-hr rain events. This approach has been compared with several other approaches to characterizing the long-term precipitation distributions (Beck et al. 2017).

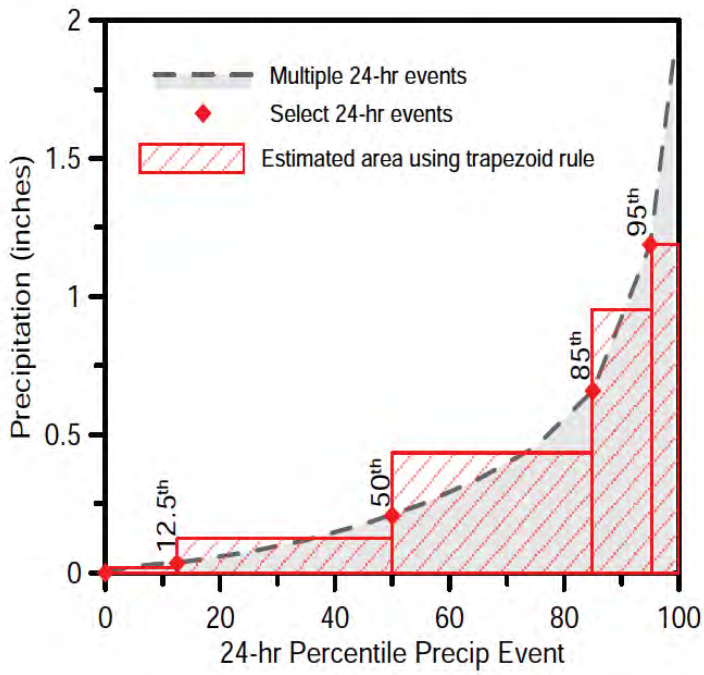

Figure 2.4. Illustration of the trapezoid method used to sum the area below the curve of the precipitation cumulative distribution function.

2.3.4 Rainfall-runoff transformation

For a given storm magnitude and duration, the runoff generation module defines the fraction of flow that infiltrates over pervious surfaces and the fraction of overland runoff that is eventually discharged to the receiving waters. Stormwater TELR relies on the Soil Conservation Service (SCS) curve number (CN) method and the approach detailed in Technical Release 55 (TR-55) to estimate runoff from small urban catchments (USDA 1986). The SCS runoff equation is:

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \tag{2.3}$$

where Q is the runoff depth, P is the 24-hr rainfall depth, S is the potential maximum retention after runoff begins, and I_a is the initial abstraction depth. The initial abstraction incorporates all losses before runoff begins, including water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. Runoff does not begin until the initial abstraction has been met. I_a is variable across the landscape but is highly correlated to the curve number. The initial abstraction is 20% of the storage,

$$I_a = 0.2S \tag{2.4}$$

and

$$S = \frac{1000}{CN} - 10 \tag{2.5}$$

More recent data suggest that 0.20*S might be too high and that 0.05*S is more appropriate (Woodward et al. 2003, Lim et al. 2006, Shi et al. 2009) especially for hydrologic soil groups C and D (Jiang 2001). If 5%, rather than 20%, is used, S must also be modified. The relationship between $S_{0.05}$ and $S_{0.20}$ obtained from model fitting results is (Lim et al. 2006, Hawkins et al. 2002)

$$S_{0.05} = 1.33 * {S_{0.20}}^{1.15} \tag{2.6}$$

We used the adjusted initial abstraction ratio (equation 6) and by substituting equation 4, modified for 5% of storage, into equation 3, we obtain

$$Q = \frac{(P - 0.05S_{0.05})^2}{P + 0.95S_{0.05}} \tag{2.7}$$

Curve numbers range from 30 to 98 and lower numbers indicate low potential runoff whereas higher numbers indicate increasing runoff potential. The major factors that determine SCS curve numbers are the soil type, the land use (specifically, the percent impervious of the land use), the hydrologic condition and soil infiltration capability. To simply account for variations in soil permeability and infiltration, the NRCS has classified soils into 4 hydrologic soil groups (HSGs). A curve number for a given land use with impervious area can be estimated by the following (USDA 1986):

$$CN_c = CN_p + \frac{P_{imp}}{100}(98 - CN_p) \tag{2.8}$$

where CN_c is the runoff curve number for the entire land use, CN_p is the pervious runoff curve number and P_{imp} is the percent imperviousness. The pervious curve numbers used are those defined for open space in poor condition (grass cover < 50%) (USDA, 1986), since urban soils are often disturbed or compacted, and are listed in Table 2.1.

Table 2.1. Urban pervious curve numbers used in swTELR (USDA, 1986)

Soil Type	A	B	C	D
Curve Number	68	79	86	89

The model generates discrete runoff outputs which mirror the 24-hr event percentile precipitation inputs. Using equations 1 and 2, we replaced the rainfall $P(x)$ with runoff $R(x)$, where R is the runoff calculated by the approach described above for a set of 24-hr rainfall events. Similar to the calculation described for the rainfall, the trapezoid rule is applied to the xth percentile event which

are summed to approximate the area under the probability distribution function and obtain the average annual runoff.

Antecedent runoff conditions are a critical component to accurately determining runoff and the SCS curve numbers originally incorporated average antecedent runoff conditions (USDA 1986). The ability of continuous models to represent varying catchment moisture condition is a distinct advantage over event-based models. Recent studies have shown the importance of adjusting CNs based on antecedent runoff conditions (Bhaduri et al. 2000, Michel et al. 2005). Because swTELR was developed to estimate long-term average annual runoff conditions, we do not adjust the CNs and assume average antecedent runoff conditions for all simulations.

2.3.5 Pollutant loading

Urban pollutant modeling approaches commonly estimate pollutant loading at the land use spatial scale and use a variety of approaches to determine the associated land use characteristic pollutant concentrations. Algorithms to represent pollutant build-up and wash-off over time are common in continuous simulation models (Freni et al., 2009; 2011; Mannina and Viviani, 2010; Hossain and Imteaz, 2016), which has been shown to improve pollutant modeling performance in some cases (Wang et al., 2011). However, optimal parameters for these calculations are difficult to identify with precision or validate with sampling (Freni et al., 2009). While Monte Carlo sampling of the parameter space can improve parameter identifiability (Strecker et al., 1990; Wagener and Kollat 2007; Freni et al., 2011), high degrees of uncertainty in model outputs remain (Petrucci and Bonhomme, 2014). Further, other researchers have found that pollutant accumulation and generation on event time scales is extremely difficult to predict and that similar seasonal or annual results could be obtained using constant concentrations (Sage et al., 2015).

Since pollutant loads are strongly dependent upon runoff volumes at longer time scales, attempting to capture the short-term variability in pollutant concentrations is less important for swTELR's application. Using static runoff concentrations for different land-uses was identified as the best approach. Stormwater TELR calculates pollutant loads as the product the stormwater volume and a pollutant concentration. This approach ignores the event-specific dynamics that depend on rainfall duration and intensity that have been linked to variations in pollutant concentrations throughout an event. However, at the average annual scale, these effects are substantially less important on catchment loads than the catchment inputs and runoff volumes for explaining pollutant loads (Lee and Bang, 2000; Brezonik and Statelmann, 2002).

Annual pollutant loading (L) is calculated for each grid cell, (Lg) as the product of the average annual land use runoff Qa, and the land use specific characteristic pollutant runoff concentration [p] (mg/L) for that grid cell, with proper unit conversions.

$$L_g = Q_a * [p]_{LU} \quad (2.9)$$

Annual catchment pollutant load (L) is the sum of the grid cells within that catchment,

$$L_c = L_{g1} + L_{g2} \ldots + L_{gi} \quad (2.10)$$

where i is the total number of grid cells in the catchment. Pollutant load estimates can be compared within and across municipalities by normalizing by the catchment size, A, to obtain an average annual loading rate, $\{La\}$,

$$\{L_a\} = L_c/A \quad (2.11)$$

2.3.6 Pollutant association with sediments

Urban pollutant load reductions calculated in swTELR for PCBs and mercury correspond to BMP reduction efficiencies associated with sediment removal, often measured as total suspended solids (TSS) or Suspended Sediment Concentration (SSC) reductions. Like many other uban pollutants, PCBs and mercury are both strongly hydrophobic and have a tendency to adsorb to particulates. Pollutants such as metals are often bound to particulate matter in runoff (Loganathan et al., 2013; Chen and Chang, 2014; Herngren et al., 2005; Sartor et al., 1972; Kayhanian et al., 2012). Strong correlations have been observed between particulates measures and total organic carbon, nutrients, heavy metals, oil and grease (Kayhanian et al., 2012; Nasrabadi et al., 2016) polycyclic aromatic hydrocarbons (PAHs) (Rugner et al., 2013), and Bacteria (Stein et al., 2007).

We expect sediment reduction in BMPs to be a useful proxy for most conservative constituents such as PCBs and mercury. PCBs are mostly found in a particulate phase, are associated with coarse-grained particles, and behave like sediment particles. Previous studies in heavily urbanized watersheds have found more than 75% to 100% of the total PCB load was associated with the particulate phase (Ko and Baker, 2004; Bressy et al. 2012). In the SF Bay Area, Gilbreath et al (2012) also noted a strong association of high turbidity levels and elevated PCB concentrations.

Yee and Mckee (2010) found that 55% of PCB particles in stormwater settled out within 30 minutes, and concluded that PCB behaved very much like a sediment particle, and that effective settling of moderate to larger sediment particles was capable of achieving a minimum 50% PCB removal. A European study found that urban tree pits and their associated bacteria have the capability to degrade PCBs in the soil (Leigh et al, 2006). This finding suggests that practices such as bioretention which have aerobic media conditions may also promote the growth of PCB-reducing bacteria.

Monitoring studies have shown that mercury levels in storm flow are strongly correlated with turbidity (Gilbreath et al, 2012), suspended particulate matter and particulate organic matter

(Mason et al, 1999). David et al (2009) reported a strong correlation between mercury concentrations and suspended sediment in urban and agricultural rivers in California. Settling column experiments by Yee and Mckee (2010) using stormwater runoff and sediment samples from urban watersheds in the San Francisco Bay area found that 10 to 30% of mercury entrained in stormwater settled out within 20 minutes, and 90% of mercury re-suspended from creek sediments settled out within 10 minutes. Based on these experiments, Yee and McKee concluded that mercury behaved very much like a sediment particle, and that any urban BMP that promoted settling of fine sediment particles or captured fine-grained street solids should be effective at reducing mercury loads in urban watersheds.

2.3.7 Decentralized BMPs

Decentralized BMPs types either reduce volume, treat pollutants, or do both (Table 2.2). Runoff volume reductions are achieved via infiltration and net exfiltration and these reductions in volume as a result of BMP interactions could be measured. Pollutant concentration reductions can be measured due to retention, filtration or capture that prevents some fraction of the particulate load delivered to structural BMP from exiting. Detailed descriptions of decentralized BMP types represented in swTELR are listed in Appendix D.

Table 2.2. Decentralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Biofiltration		✓
Bioretention	✓	✓
Bioswale	✓	✓
Filtration Device		✓
Infiltration Feature	✓	
Pervious Pavement	✓	
Sediment Trap		✓
Settling Basin		✓

Runoff and pollutant load reductions from decentralized BMPs are calculated as the difference of model outputs. Baseline flows and loads are first calculated, then decentralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.7.1 *Decentralized BMP runoff reductions*

Decentralized BMP runoff reductions are calculated based on their design storm specifications and impervious drainage areas. All runoff generated up to the design storm depth is either infiltrated or treated and flows generated above the design capacity are bypassed and routed downstream. For example, if a BMP is designed to the 85th percentile rainfall event, all runoff generated from events up to and including the 85th percentile event will be infiltrated or treated. Reduced flows from decentralized BMPs that are intended to infiltrate stormwater (see table 2.2) are calculated for each 30-meter grid cell proportional to the impervious drainage area treated for each BMP, per Equation 2.12

$$QR_g = \int_0^{85} Q_g(x)\, dx \approx \tag{2.12}$$

where QR_g is the treated runoff volume (ac-ft) for the 85th percentile design storm from a single grid cell. In this instance, events larger than the 85th percentile storm would remain untreated. The total runoff volume treated by decentralized BMPs is the sum of each cell within a decentralized BMPs drainage area,

$$QR_d = QR_{g1} + QR_{g2} \ldots + QR_{gi} \tag{2.13}$$

Based on Equation 2.13, the volume reduction realized from decentralized BMPs has a commensurate pollutant load reduction even without any reduction in pollutant concentration. In this example, the grid cell pollutant load is reduced solely due to the reduction of stormwater runoff volumes,

$$PR_g = QR_g * [p]_{LU} \tag{2.14}$$

where PR_g is the pollutant load that includes the respective runoff volume reduction (QR_g) multiplied by the is the characteristic runoff concentration ($[p]_{LU}$, mg/L) for the land use associated with that grid cell. Pollutant load reductions (PR_d) for each catchment after treatment by decentralized BMPs is the sum of all grid cells within that catchment.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.15}$$

2.3.7.2 *Decentralized BMP pollutant concentration reductions*

As already discussed (section 2.3.6), swTELR provides decentralized BMP pollutant concentration reductions commensurate with expected BMP sediment reductions. This approach mirrors that taken in the Chesapeake Bay to simplify reduction accounting for the range of urban BMP types using curves that reflect sediment removal since it closely corresponds closely with removal of particulate bound urban pollutants of concern (see Scheuler and Youngk, 2015).

To estimate pollutant concentration benefits from decentralized BMPs, we assume decentralized BMPs that capture pollutants are 80% effective at reducing pollutant concentrations up to the 85th percentile 24-hr storm event at benchmark or optimal condition (CASQA, 2003; Water Environment Federation, 1998). For example, a grid cell treated by decentralized BMPs that reduces pollutant concentrations has a treated pollutant concentration, $[p]Tr_g$ (mg/L) calculated as:

$$[p]Tr_g = [p]_g * (1 - 0.8) \tag{2.16}$$

where $[p]_g$ (mg/L) is the original grid cell land use CRC. The pollutant load reduction (PR_g) from a grid cell draining to a decentralized BMPs that only reduces pollutant concentrations is,

$$PR_g = QTr_g * [p]Tr_g \tag{2.17}$$

If a grid cell is treated by a decentralized BMP that reduces both runoff volumes and pollutant loads (e.g., bioretention), then there is an indirect and direct pollutant load reduction as a result of infiltration and pollutant retention. Following equations 2.13, the load reduction from a grid cell with both a volume and pollutant concentration reducing BMP is

$$PR_g = QR_g * [p] + (Q_g - QR_g) * [p]Tr_g \tag{2.18}$$

where QR_g is the flow reduction from the grid cell as a result of infiltration, as calculated by equation 2.12. While flows above the design level are not infiltrated by the decentralized BMP, particles are still captured via particle settling and interaction with vegetation and flows are slowed by pooling. The total catchment pollutant load after reductions from decentralized BMPs is the sum of grid cells treated by decentralized BMPs within their respective drainages.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.19}$$

2.3.8 Centralized BMPs

Large scale centralized structural BMPs (e.g., treatment vaults, infiltration basins, dry basins) typically treat stormwater runoff from mixed land use catchments and have treatment capacities on the order of an acre-foot or more (approximately 1,200 m^3). Stormwater can exit a centralized BMP in 1 of 3 ways: loss through infiltration, discharge via treatment aperture, or via bypass where no treatment or detention has occurred. Some models also include evaporative losses, but given proper functioning, structural BMPs should have drawdown times on the order of hours and we assume this term is negligible. The relative components of volume loss depend on the BMP type and design specifics. For example, an infiltration BMP has only infiltrated and bypassed volumes, while a treatment vault has only treated and bypassed volumes. Figure 2.5 provides schematics of centralized BMPs represented in swTELR, from which swTELR assumes volume loss via 3 potential critical pathways: infiltration, treated outflow, and bypass. BMP types represented in swTELR are listed in Table 2.3 with their relevant pollutant and runoff reductions.

Table 2.3. Centralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Bed Filter		✓
Detention Basin		✓
Dry Basin	✓	✓
Infiltration Basin	✓	
Media Filter		✓
Treatment Vault		✓
Wet Basin		✓
Retention Basin	✓	✓

Calculation of runoff flow and pollutant load reductions from centralized BMPs are calculated as the difference of model outuputs. Baseline flows and loads are first calculated, then centralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.8.1 *Centralized BMP runoff reductions*

Stormwater TELR derives each volume loss term from the outflow hydrograph using a hydrograph separation approach to estimate the fraction of volume infiltrated, treated, and bypassed flow based on 4 key user inputs: treatment capacity, basin footprint, and, if applicable, the infiltration rate and drawdown time (Table 2.4). Infiltrated volumes are net volume reduction as a result of BMP interaction. Stormwater discharges through a treatment aperture are termed treated volumes and assumed to have experienced pollutant retention via particle settling, filtration or biogeochemical process. Bypass volumes are those where no treatment has occurred due to unacceptable residence times within the BMPs. Other volume loss terms, such as evapotranspiration, are assumed insignificant on an average annual basis and ignored. The volume routing pathways by BMP type are graphically summarized in Figure 2.5.

Table 2.4. Centralized BMP types and attributes

BMP Type	Treatment Capacity	Footprint	Infiltration Rate	Treatment Rate	Drawdown Time	Wet Pool Capacity
Bed Filter	✓	✓		✓		
Detention Basin	✓	✓			✓	
Dry Basin	✓	✓	✓		✓	
Infiltration Basin	✓	✓	✓			
Media Filter	✓	✓		✓		
Treatment Vault	✓	✓		✓		
Wet Basin	✓	✓			✓	✓
Retention Basin	✓	✓	✓		✓	

The corresponding volumes are calculated using graphical methods (Figure 2.6). Separation of the infiltration volume is determined by drawing a flat line across the hydrograph at the infiltration flow rate, calculated as the product of the infiltration rate and the basin footprint with proper unit conversion). Separation of the treated volume is defined by drawing a flat line across the hydrograph at the treatment flow rate, estimated as quotient of the treatment capacity and the drawdown time with proper unit conversion. Both the infiltration volume and the treated volume are calculated as the area of the outflow hydrograph under the respective flow rates down to a zero flow rate. If the sum of the infiltrated and treated volumes is less than the total outflow volume, then the remaining volume is allocated to bypass. If the sum of the infiltrated and treated volumes is greater than the total outflow volume, then the treatment volume is reduced to accommodate the difference and the volumetric balance between inflow and outflow is retained.

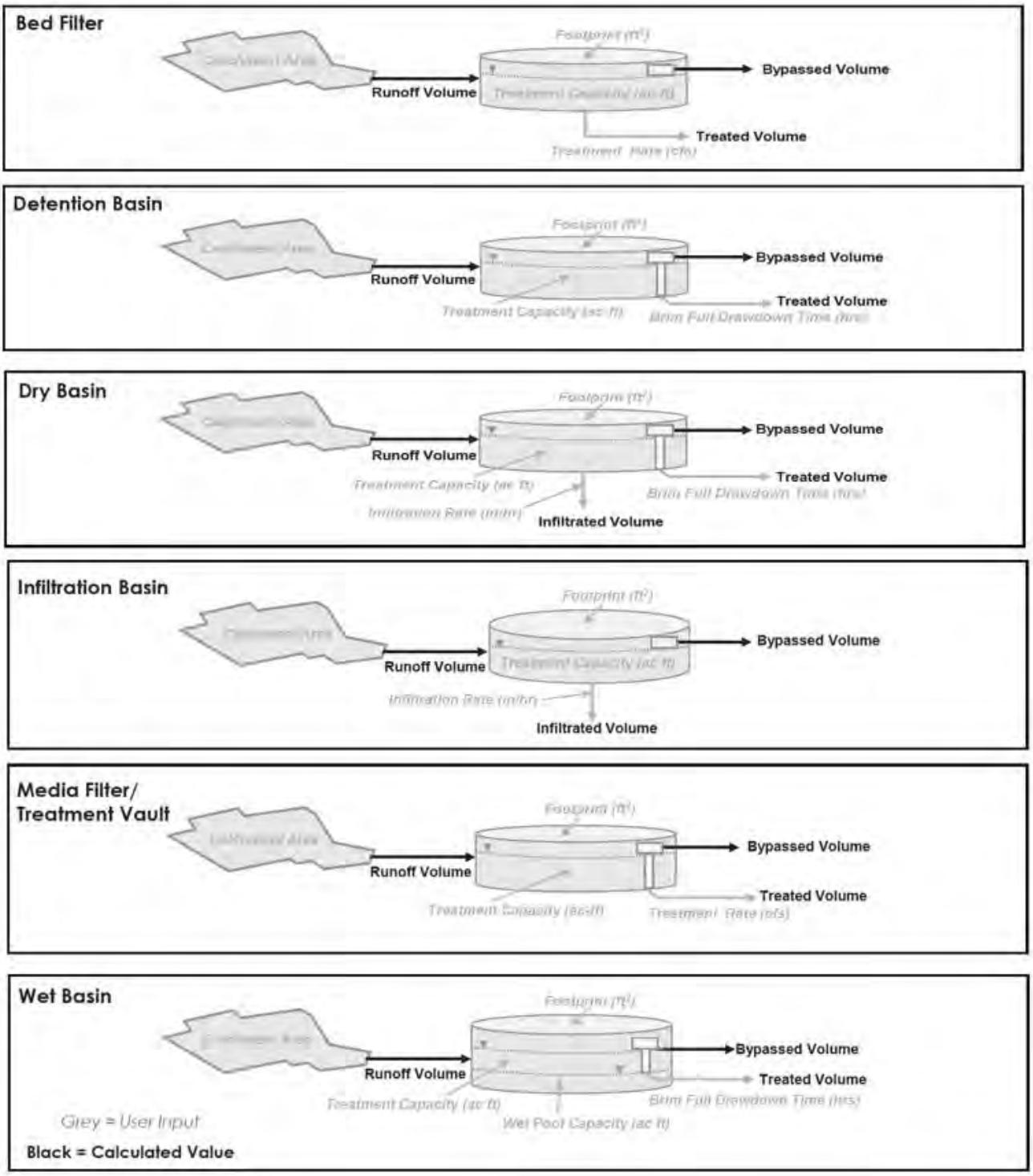

Figure 2.5. Centralized BMP types, inputs and calculated values as implemented in swTELR.

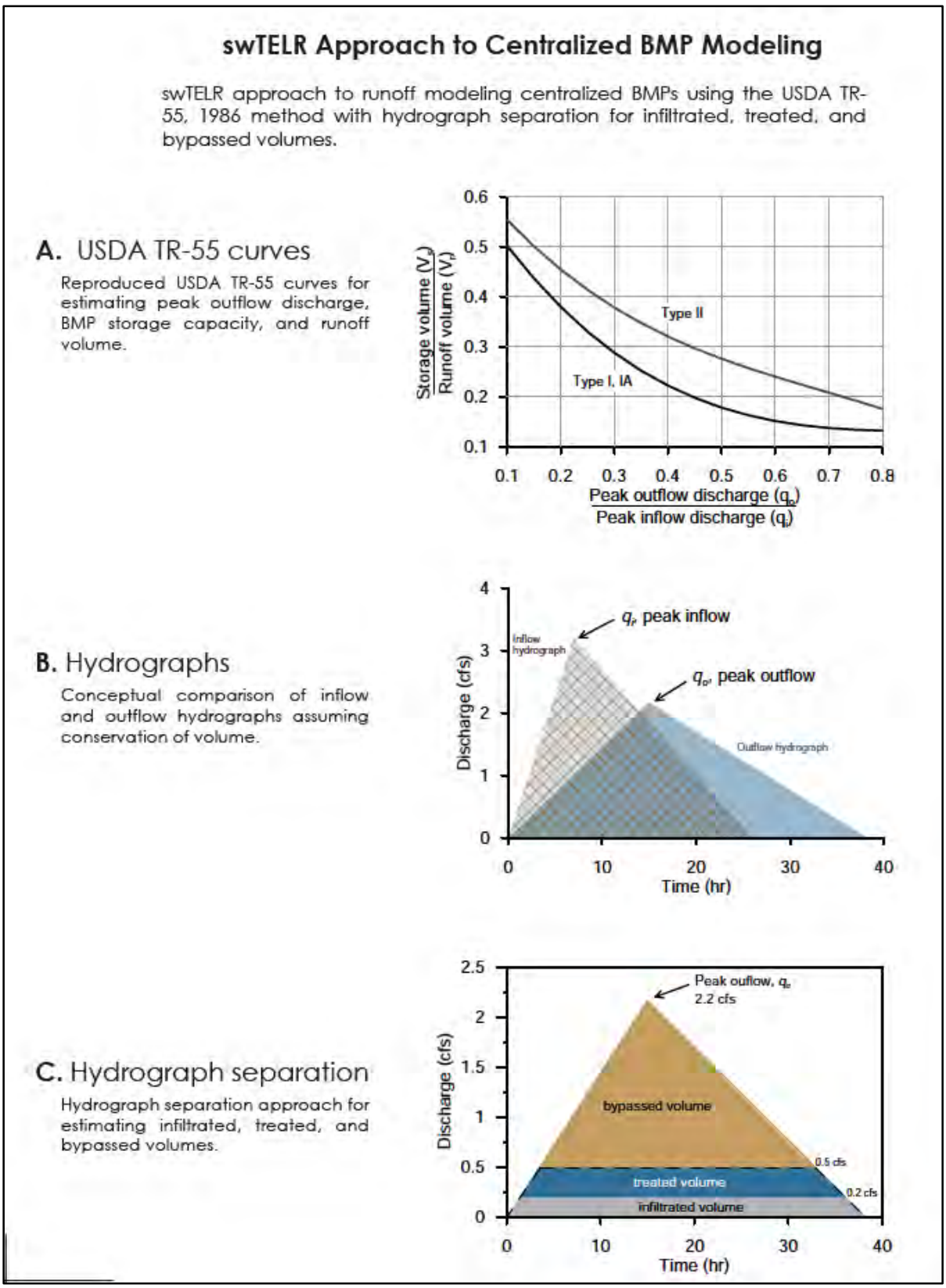

Figure 2.6. Centralized BMP flow partitioning

Average 24-hr and 365-day stormwater runoff volumes from large scale centralized BMPs are modeled using the same approach to estimate baseline runoff from selected 24-hr precipitation events (12.5, 50, 85, 95) that describe the precipitation distribution. The TR-55 (USDA, 1986) approach to estimate peak outflow and the hydrograph separation approach to estimate infiltrated, treated, and bypassed volumes is conducted for each 24-hr percentile precipitation event. Average 24-hr infiltrated, treated, and bypassed volumes for days when it rains are estimated using the trapezoid rule. Average 365-day infiltrated, treated, and bypassed volumes from catchments with large-scale centralized BMPs is estimated by the product between volume and the average number of days per year with measurable rain. When the infiltrated, treated, and bypassed volumes (Q_{infil}, Q_{CEC}, and Q_{BY}, respectively) are properly allocated, the total inflow is equal to the total outflow, Q_{OUT}

$$Q_{OUT} = Q_{infil} + Q_{CEC} + Q_{BY} \tag{2.20}$$

2.3.8.2 *Centralized BMP pollutant concentration reductions*

The pollutant load after interaction with a centralized BMP is the sum of the bypassed and treated loads. Each of these components is the product of the pollutant concentration and associated volume. The concentration of the water infiltrated and bypassed is equal to the incoming concentration of runoff prior to treatment by the centralized BMP. A characteristic effluent concentration (CEC) is assigned to the treated volumes (Table 2.5), $[p]_{CEC}$ (mg/L) that are dependent on the BMP type to calculate *reduced* pollutant loads (PT_r) associated with volumes treated (not infiltrated) by centralized BMPs (Q_{cec}) according to equation 2.21:

$$PTr_c = Q_{CEC} * [p]_{CEC} \tag{2.21}$$

The total outgoing pollutant load from a centralized BMP (PT_c) is the sum of the load from the treated load (PTr_c) and the bypassed load (PBy_c)

$$PT_c = PTr_c + PBy_c \tag{2.22}$$

Where the bypassed volumes are calculated as the product of the bypassed volume Q_{BY} and the inflow pollutant concentration for the centralized BMP drainage $[p]_C$

$$PBy_c = Q_{BY} * [p]_C \tag{2.23}$$

Based on strong evidence for association of PCBs and mercury with particulates (see section 2.3.6), we assumed different centralized BMP types to have proportional pollutant reduction efficiency to that of sediments. Therefore, PCB and mercury reductions (PR_c) are calculated as the product of the pollutant load delivered to the centralized BMP (PTr_d) for pollutants (PCB/Hg) and the percent TSS load reduction.

$$PR_{c\,PCB/Hg} = PTr_{d\,PCB/Hg} * (PTr_{d\,TSS} - PTr_{c\,TSS})/PTr_{d\,TSS} \quad (2.24)$$

Using TSS as a proxy for particulate pollutant reductions has the advantage of substantially greater BMP performance data availability compared to similar data specifically associated with mercury or PCBs. Assignment of sediment CEC values to BMPs included a substantial data compilation effort that included data directly compiled and/or analyzed by 2NDNATURE (2NDNATURE, 2006a; 2006b; 2007; 2008; 2NDNATURE and nhc, 2012a; 2013; 2014; LRWQCB and NDEP, 2007), or obtained from the National Stormwater Quality Database[8]. BMP type definitions in the NSQD are loosely defined and therefore likely include substantial variation within the same specified BMP type. To support this analysis, we also reviewed results documented in available NSQD annual data analysis reports (Geosyntec Consultants and Wright Water Engineers, 2012; 2013; 2014), as well as select marketing and design literature available online for a variety of proprietary centralized structural BMPs.

TABLE 2.5 Characteristic sediments effluent concentration (CEC) values for centralized BMP types

BMP Type	CEC TSS (mg/L)
Wet Basin	5
Dry Basin	6
Infiltration Basin	92
Treatment Vault	20
Media Filter	6
Bed Filter	3
Detention Basin	40
Retention Basin	5

The use of CEC values is preferred over percent load reduction estimates that are commonly used in structural BMP models for two key reasons. First, the use of percent reduction requires a consistent reduction across the range of event magnitudes, including very large events which often provide substantial bypassed flow (Strecker *et al.*, 2001). Secondly, since most devices have an upper limit on performance, when pollutant concentrations are very low, the percent load reduction method tends to overestimate benefits. These observations are based on specific BMP types, within a limited range of conditions, and the difference between these two methods may be less pronounced given a wider range of facility types and pollutant concentrations.

[8] http://www.bmpdatabase.org/nsqd.html

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2.3.9 Runoff routing

2.3.9.1 *Routing to centralized BMPs*

swTELR models centralized BMPs using the USDA TR-55 (1986) methodology for estimating peak inflow and peak outflow. Calculations for infiltrated, treated, and bypassed stormwater runoff volumes are completed for each prescribed 24-hr percentile storm event. Estimating of peak inflow discharge requires reasonable representation of the time of concentration, the time it takes from water to flow from the most remote part of the watershed to the watershed outlet. There are several different ways to estimate time of concentration (USDA 1986 and 2010). We selected a relatively simple formula (equation 15-4b; USDA 2010) that could be easily implemented for a variety of urban catchments and required minimal additional inputs by the user. Time of concentration is estimated by the NRCS lag method as

$$T_c = \frac{l^{0.8} * (S+1)^{0.7}}{1140 * Y^{0.5}} \tag{2.25}$$

where T_c is time of concentration (hr) for average natural watershed conditions, l is the flow length (ft), Y is the average watershed slope (%), and S is the maximum potential retention from equation 5. Because the lag equation was developed for rural areas, it can overestimate the time of concentration for urban areas which have higher proportion of impervious area and channelized flow that allow water to through the catchment at a faster rate than under natural conditions. The following equation was applied to adjust the T_c calculated by the NRCS lag method (FHWA HEC-19, 1984)

$$T_c' = T_c * CF * IF \tag{2.26}$$

where T_c' is the adjusted time of concentration, T_c is the time of concentration in hours from Eq. 9, CF is the channel improvement factor, and IF is the impervious area factor, both of which are estimated from the impervious area of the catchment.

Next, unit peak discharge, q_u, is computed based on T_c and SCS rainfall distribution type

$$\log(q_u) = C_0 + C_1 \log(T_c) + C_2[\log(T_c)]^2 \tag{2.27}$$

where C_0, C_1, and C_2 are the coefficients from Table F-I (USDA 1986) based on the SCS rainfall distribution type. Rainfall distribution Type I pertains to all examples presented herein. Peak inflow discharge, q_i is estimated as

$$q_i = q_u A Q F_p \tag{2.28}$$

where A is drainage area, Q is runoff depth, and F_p is a ponding factor. Finally, estimation of the peak outflow discharge is

$$\frac{V_s}{V_r} = C_0 + C_1\frac{q_o}{q_i} + C_2(\frac{q_o}{q_i})^2 + C_3(\frac{q_o}{q_i})^3 \quad (2.29)$$

where V_s/V_r is the ratio of storage volume to runoff volume of the BMP, q_o/q_i is the ratio of peak outflow to peak inflow, and C_0, C_1, C_2, and C_3 are the coefficients from Table F-2 (USDA 1986) based on the SCS rainfall distribution type. Figure 3A shows the relationship between the storage-runoff volume ratio and the outflow-inflow discharge ratio. Figure 3B shows the shape of the inflow and outflow hydrographs where peak flows are estimated from equations 11 and 12, respectively. The inflow and outflow duration is estimated from peak flow (q_i or q_o) and Q, using graphical methods and assuming conservation of volume.

Note that because swTELR models a range of 24-hr storm events, it is likely that the storage to runoff volume ratio is outside the range ($0.14 < V_s/V_r < 0.5$) presented in Figure 2.6A for a given 24-hr storm event. In the cases where V_s/V_r is outside the range, the low or high endmember of the range is applied. For example, if the measured V_s/V_r is 0.08, swTELR assumes a V_s/V_r of 0.14. If the measured V_s/V_r is 0.56, swTELR assumes a V_s/V_r of 0.50.

2.3.9.2 *Routing between catchments*

Runoff is routed between catchments so that runoff and pollutant load reductions cumulate as flows move downslope towards centralized BMPs or receiving waters. Volumes and pollutant loads delivered to centralized BMPs include reductions achieved by other structural and non-structural BMPs within its contributing drainage. This sequential accounting ensures runoff and pollutant reduction benefits are not double counted. The runoff volume and pollutant concentration introduced at the inlet of each centralized BMP is computed based on the contributing drainage characteristics and level of BMP implementation upstream within the centralized BMP drainage. Travel lengths and slopes to a centralized BMP are calculated based on the configuration of catchments or sub-catchments and different routing configurations will result in different flow timing (see Figure 2.7).

The total runoff for a series of catchments within the same drainage (QTr_{series}) is defined by the summation off the current catchment runoff (QTr) and runoff contributions from a series of upstream catchments that contribute to the downstream centralized BMP. Contributions from upstream catchments without a centralized BMP are defined as the total catchment runoff (QTr) and those with a centralized BMP are defined as sum of the treated (Q_{CEC}) and bypassed (Q_{BY}) volumes as Q_{UBMP}.

$$Q_{UBMP} = Qu_{BY} + Qu_{CEC} \quad (2.30)$$

Variables used for calculating peak inflow discharge ($q1$) and time of concentration (Tc) for a centralized BMP with contributions from upstream catchments are defined based the combined attributes of the catchment series. Slope for a series of catchments is calculated as the average of

the contributing catchments. The contributing area is summed for all contributing catchments without centralized BMPs and with centralized BMPs such that the total area contributions are accounted for downstream. Pollutant concentrations for downstream catchments are calculated as the average concentration of the current catchment and contributing catchments. Catchments can be subdivided for routing portions to more than one centralized BMP, and these subcatchments can also receive water from upstream catchments, as in Configuration 1 in figure 2.7.

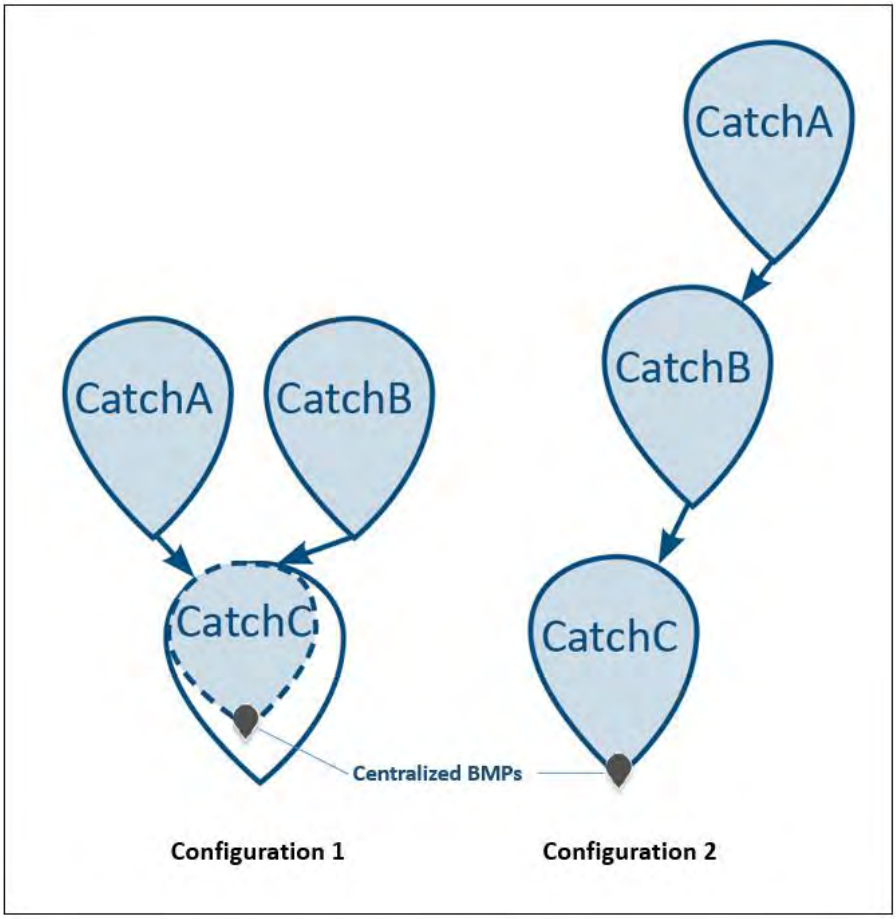

Figure 2.7. Two example catchment routing configurations.

2.3.9.3 *Runoff and pollutant load reductions reporting*

Within a catchment series, centralized BMPs receiving water from upstream catchments provide runoff reductions or pollutant treatment benefits to those upstream catchments. These reductions are allocated to upstream catchments based on their proportional contribution to the downstream centralized BMP after reductions from structural and non-structural BMPS within the catchment. Each catchment is run through the full calculations twice: once to calculate its initial within-catchment reductions and then a second time to account for the catchment series contributions. The initial flow

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out of a series of the catchments ($QTrI$) is the sum of the initial flows from the current ($QTrI_{current}$) and upstream catchments ($QTrI_{current}$):

$$QTrI_{series} = QTrI_{current} + QTrI_{UC1} \ldots .. QTrI_{UCi} \quad (2.31)$$

Runoff reductions from a centralized BMP receiving contributions from upstream catchments Q_{cr} are defined as the difference between the initial runoff ($QTrI_{series}$) and the total runoff from the catchment series after reductions from that centralized BMP (QTr_{series}).

$$Q_{cr} = QTrI_{series} - QTr_{series} \quad (2.32)$$

Reductions are distributed upstream to catchments based on their proportional contribution, so that for individual catchments (i), the reduction applied to them is defined by

$$Q_{cr}D_i = Q_{cr} * QTrI_i / QTrI_{series} \quad (2.33)$$

On the second run through the runoff calculations after calculating the initial contributions, the model iterates downstream so that all BMP reductions are cumulated as runoff moves downstream. The same reporting scheme is used in pollutant load reductions reporting so that the pollutant load from a series of the catchments is the sum of the initial load from the current catchment ($PI_{current}$) and all upstream catchments PI_{uc} as:

$$PI_{series} = PI_{current} + PI_{UC1} \ldots PI_{UCi} \quad (2.34)$$

The difference between the initial pollutant load and the final load after the final centralized BMP reductions is

$$Pr = PI_{series} - P_{series} \quad (2.35)$$

Like runoff reductions, pollutant load reductions are assigned upstream to individual catchments (i) proportional to their initial loading contributions.

$$PD_i = Pcr * P_i / PI_{series} \quad (2.36)$$

3 Modeling Scenarios

Baseline and future Solano Permittee landscape scenarios were completed to fulfill the RAA modeling compliance requirements using a combination of functions automated within the swTELR model and manual GIS processing to implement each future scenario. In this section, the modeling scenario components are described, and there is some overlap with section 2.3 that is retained for clarity.

Time periods modeled include the baseline period (approximately 2005), and future scenarios estimated for the years 2020, 2028/2030, and 2040. Each of these scenarios was modeled in sequence so that land use and BMP implementation changes that occurred in the preceding scenario were preserved in each subsequent scenario. The modeling scenarios include only those stormwater treatment components that are considered part the Green Stormwater Infrastructure (GSI) Scenarios per the BASMAA RAA Guidance Document (BASMAA, 2017). These scenarios therefore do not include source control measures, such as street sweeping or source property abatements[9].

3.1 3.1 Baseline Modeling

3.1.1 Scenario Inputs

3.1.1.1 *Precipitation input data*

Daily raster rainfall data from PRISM were used form the years 1981-2016 using the procedure described in Section 2.3, so that so that the precipitation distribution bracketed the range of likely rainfall conditions across the Solano Permittee MS4 Area. Raster-based rainfall estimates from the PRISM Climate Group[10] at Oregon State University were used to describe the distribution of 24-hour event depths were used to drive runoff generation. 2NDNATURE created a raster data processing program using the R statistical programming language[11] to acquire the appropriate historical raster layers for Solano County between 1981-2016 and perform a series of raster data processing steps. After the 35-year sequence was acquired (12,775 raster layers), a time series of precipitation values was created for each 800 m^2 pixel and the swTELR required percentile rainfall values (12.5, 50, 85, 95) and average days of rain were extracted for each pixel for the entire time series. The 85th percentile precipitation values are shown for the Solano Permittee area in

[9] Since source control measure accounting methods are still under development via a current BASMAA study. Source control actions will be included in the wasteload allocation (WLA) modeling scenarios, which will be communicated in a separate report.

[10] http://prism.oregonstate.edu/
[11] https://www.r-project.org/about.html

Figure 3.1. The 800m PRISM spatial precipitation data were resampled to align with the 30m US Landsat grid used by swTELR.

While the time extent used differs from the range recommended in the RAA Guidance of 2000-2009 (BASMAA, 2017), the greater temporal coverage provides a more representative description of the 24-hour rainfall distributions.

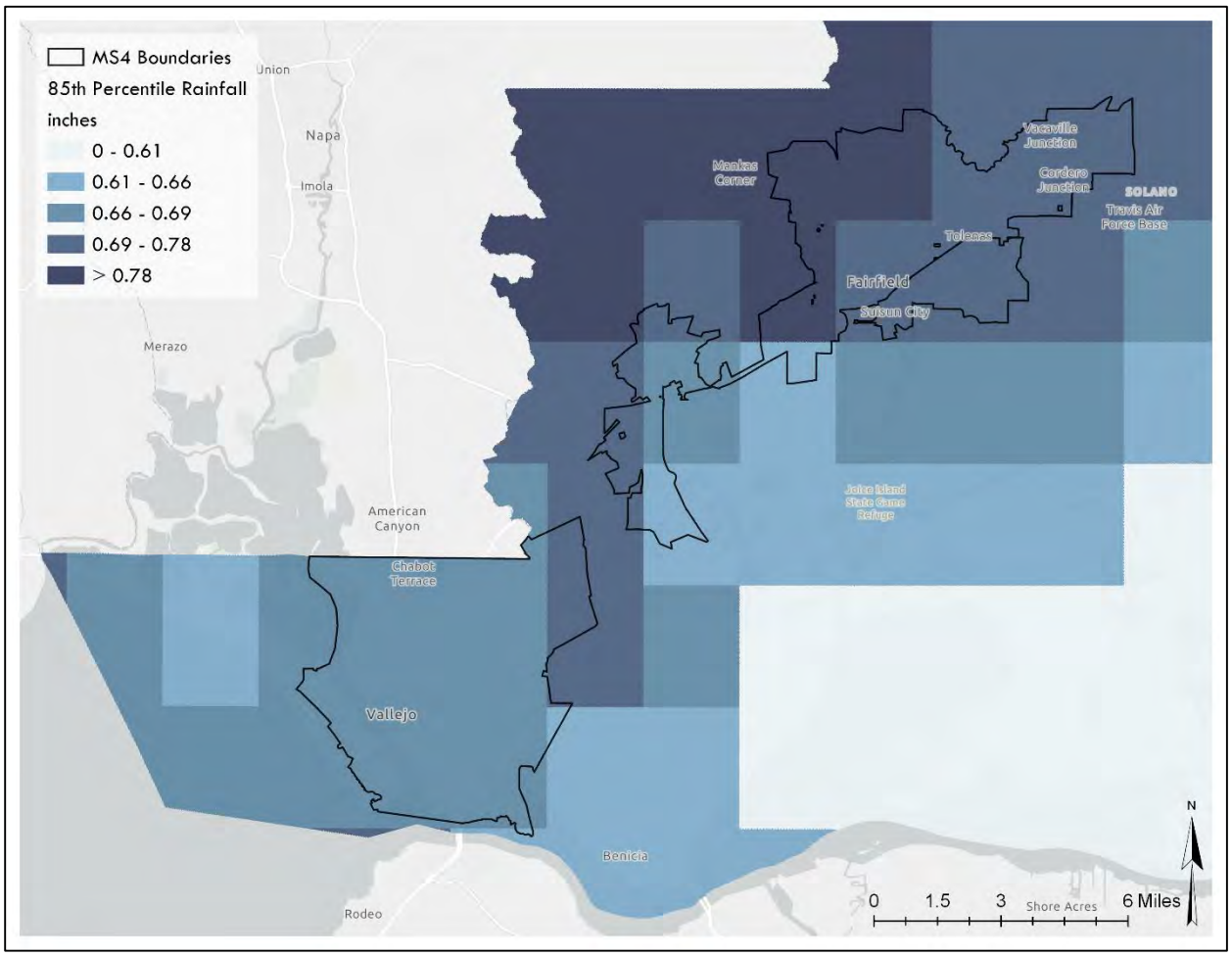

Figure 3.1. Example rainfall data used in swTELR.

3.1.1.2 *Soils*

Soils data from NRCS was used to specify soil types throughout Solano County MS4 boundaries. These data were used in their rasterized form, discretized to 30m pixels, down loaded from the NRCS website (Figure 3.2). The data were clipped to the Solano Permittee MS4 boundary and individual catchment boundaries for use swTELR. The NRCS SSURGO database was used as the primary data source, and the STATSGO2 database (which provides coarser resolution), was used to fill in spatial gaps in coverage that occurred in the SSURFO data.

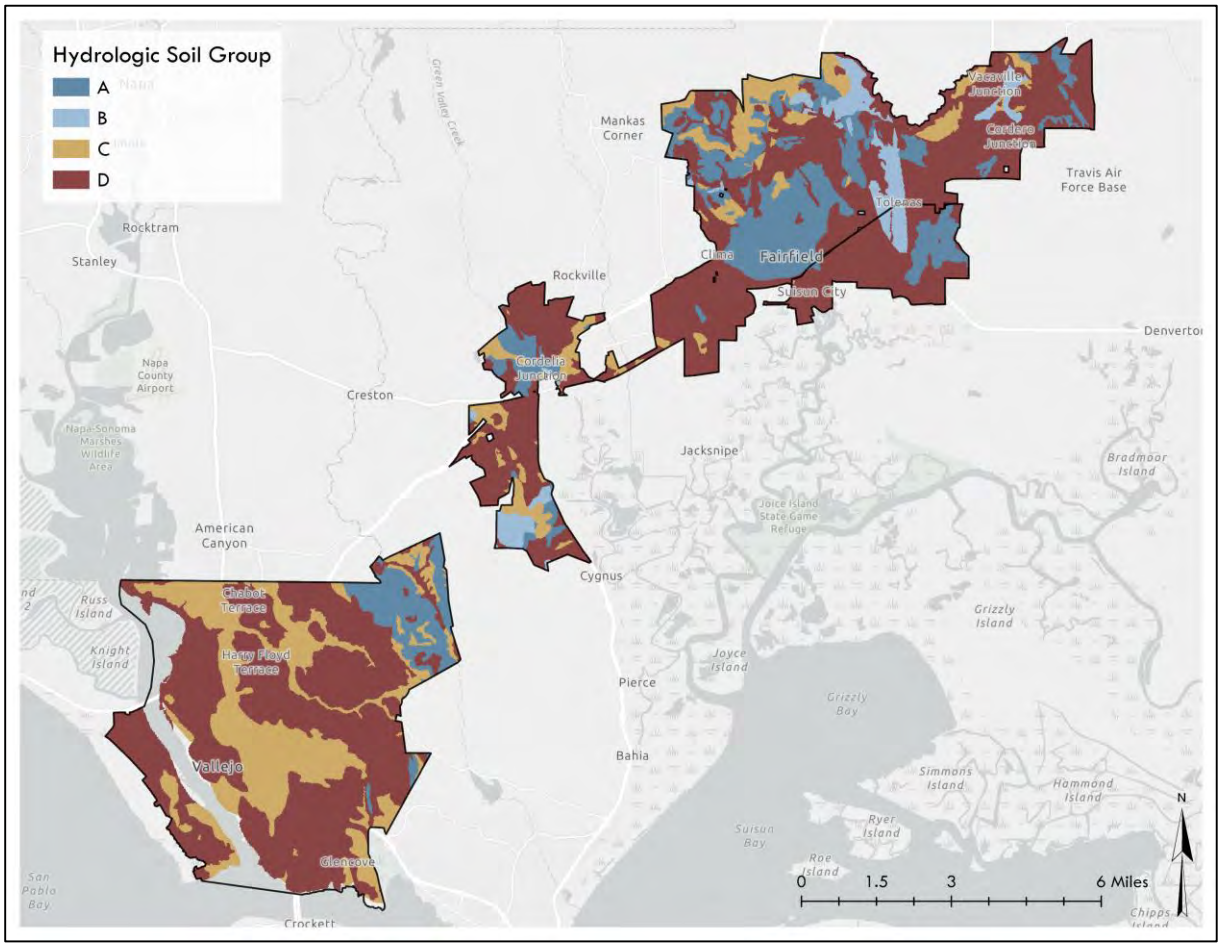

Figure 3.2. Soils data used in swTELR

3.1.1.3 *Impervious cover*

Impervious cover was specified using data from the National Land Cover Dataset[12] that represents the year 2006, provided at 30-meter grid cell resolution, which matches the spatial scale of modeling in swTELR. These data were clipped to the Solano Permittee MS4 boundaries and individual catchment boundaries for use in swTELR (Figure 3.3)

[12] https://www.mrlc.gov/data?f%5B0%5D=category%3Aurban%20imperviousness

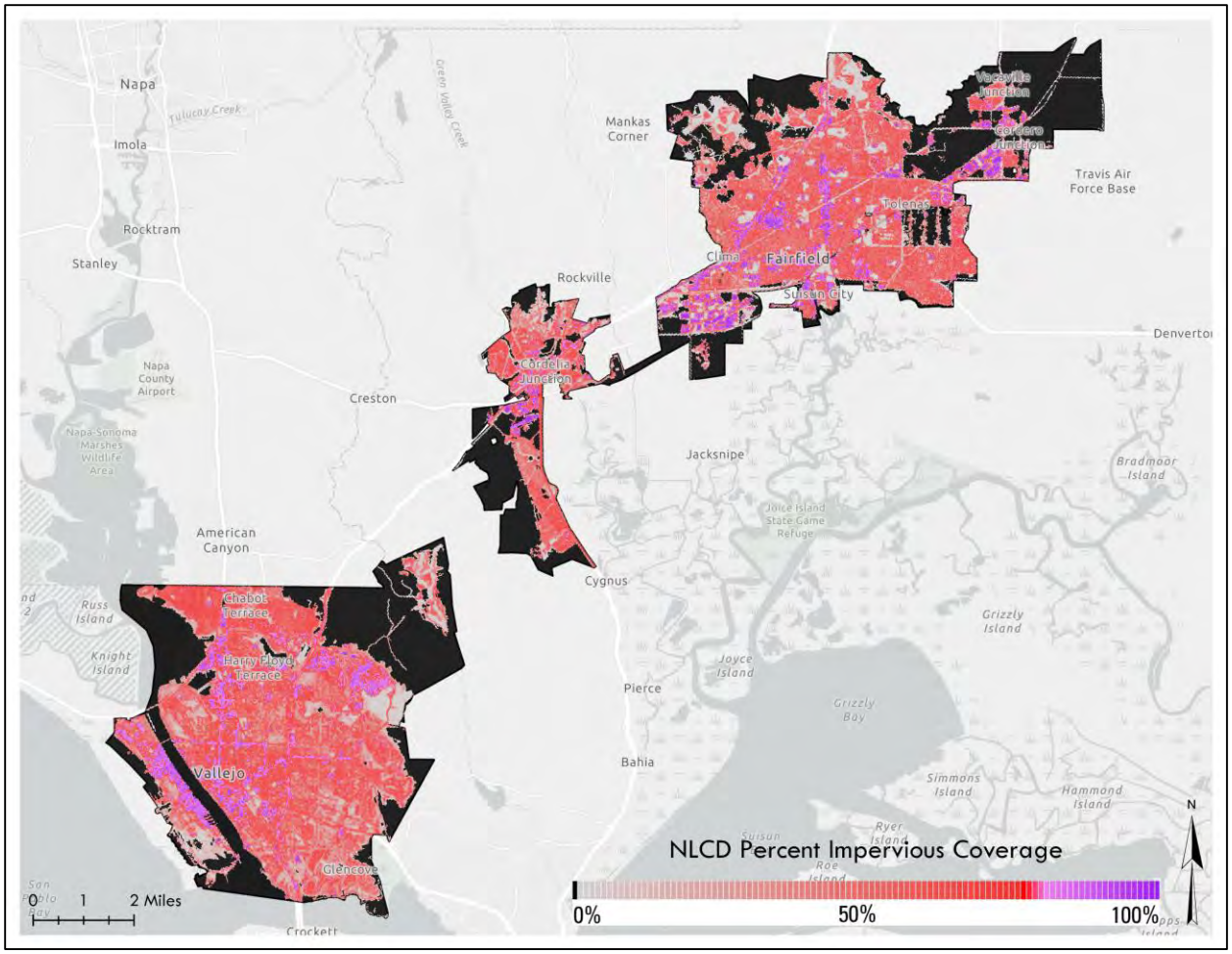

Figure 3.3. Impervious cover data used in swTELR.

3.1.1.4 *Land use*

Land-use data were developed by San Francisco Estuary Institute (SFEI) to specify characteristic PCBs and Mercury runoff concentrations for each land use developed for the Regional Watershed Spreadsheet Model (RWSM)[13]. The land-used runoff concentrations used are those contained in the current version of the RWSM, which differ slightly from those reported by SFEI in the last RWSM progress report (Wu et al, 2016). Land use designations used in RWSM are reflect categories relevant the specific pollutants of concern, PCBs and mercury, and are listed in Table 3.1. Figure 3.4 shows the distribution of difference land use types throughout the Solano MS4 Permittee Area.

[13] https://www.sfei.org/projects/regional-watershed-spreadsheet-model

Table. 3.1 Land-use based pollutant concentrations from RWSM used in swTELR. Note that these concentrations are slightly different than those reported in Wu et al. (2016).

	Land Use	Concentration (ng/L)
PCBs (ng/L)	Ag/Open/New Urban	0.2
	Old Industrial + Source Areas	204
	Old Residential	4
	Old Commercial + Old Transportation	40
Hg (ng/L)	Ag/Open	80
	Old Industrial + Source Areas	40
	New Urban	3
	Old Urban	63

This SFEI land use layer does not appear to account for historic mining activities as a mercury source area within Solano County. For example, Saint John mine that was identified in the Mercury Mines Inventory and Prioritization Report (SWRCB, 2009). This site has tailing piles and mine waste with risk of erosion into Rindler Creek. The mine is within the Vallejo MS4 boundary, located in the northeast corner, but appears to be classified as Agriculture (Figure 3.4). As a practical matter, this classification seems perfectly appropriate, since Agriculture is the highest mercury concentration specified in the dataset.

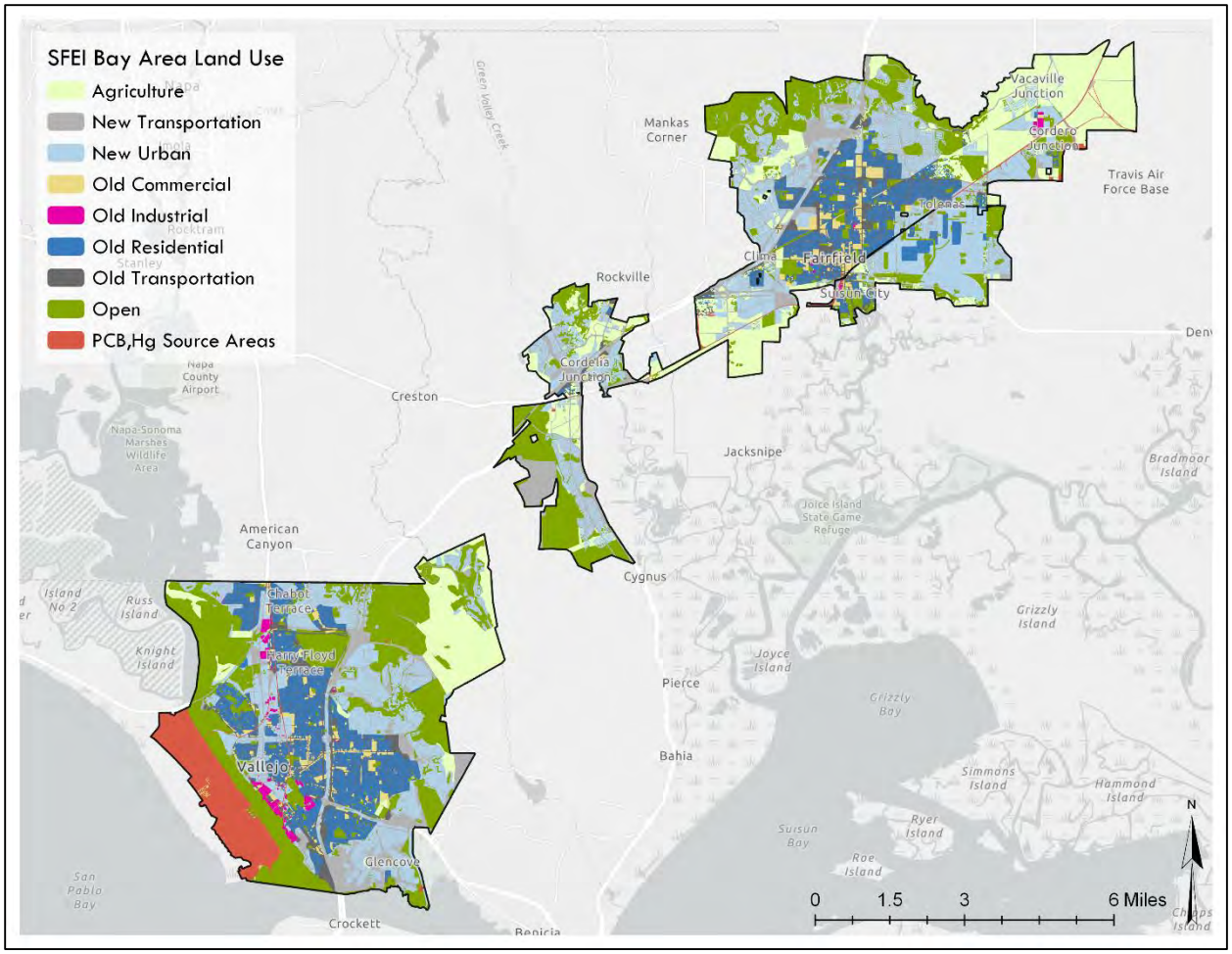

Figure 3.4. Land use map from RWSM used in swTELR.

Although some BMPs may have been implemented before 2005, baseline condition modeling assumed no existing GSI and or land-use changes that occurred after the year 2005. As such, the baseline condition model outputs essentially represent the unmitigated runoff and pollutant loading from Solano Permittees as of 2005. Existing BMPs, land-use, and impervious cover changes identified since 2005 are included in all of the future modeling scenarios.

3.1.1.5 *Drainage and routing*

The delineation of the Solano Permittee MS4 areas into urban catchments was an iterative process with verification by Solano Permittee city staff. Catchments are approximately 100 acres in size and define routing to either a discrete (single point) or distributed outlet (multiple point). Catchment boundaries and routing to receiving waters are defined by surface elevation, surface barriers, stromdrain infrastructure, and connectivity to receiving waters (Appendix C). Figure 3.5 provides an example of a catchment delineation in Fairfield based on the stormdrain network showing routing to receiving water outfalls. Beginning with catchments that had already been delineated by the City of Vallejo, City of Fairfield, and City of Suisun, catchment boundaries were refined, and

verified by city staff. The full catchment delineation process used for swTELR is documented in a *Catchment Delineation and Mapping Guidance* (2NDNATURE, 2018). This process involves using the municipal stormdrain infrastructure spatial data in concert with a 10-meter spatial resolution Digital Elevation Model (DEM)[14] to define drainage boundaries. Catchments are nested inside stormwater drainages that all flow to a common receiving water. The final catchment and stormwater drainages delineated for Fairfield/Suisun and Vallejo are shown in Figures 3.6 and 3.7 respectively.

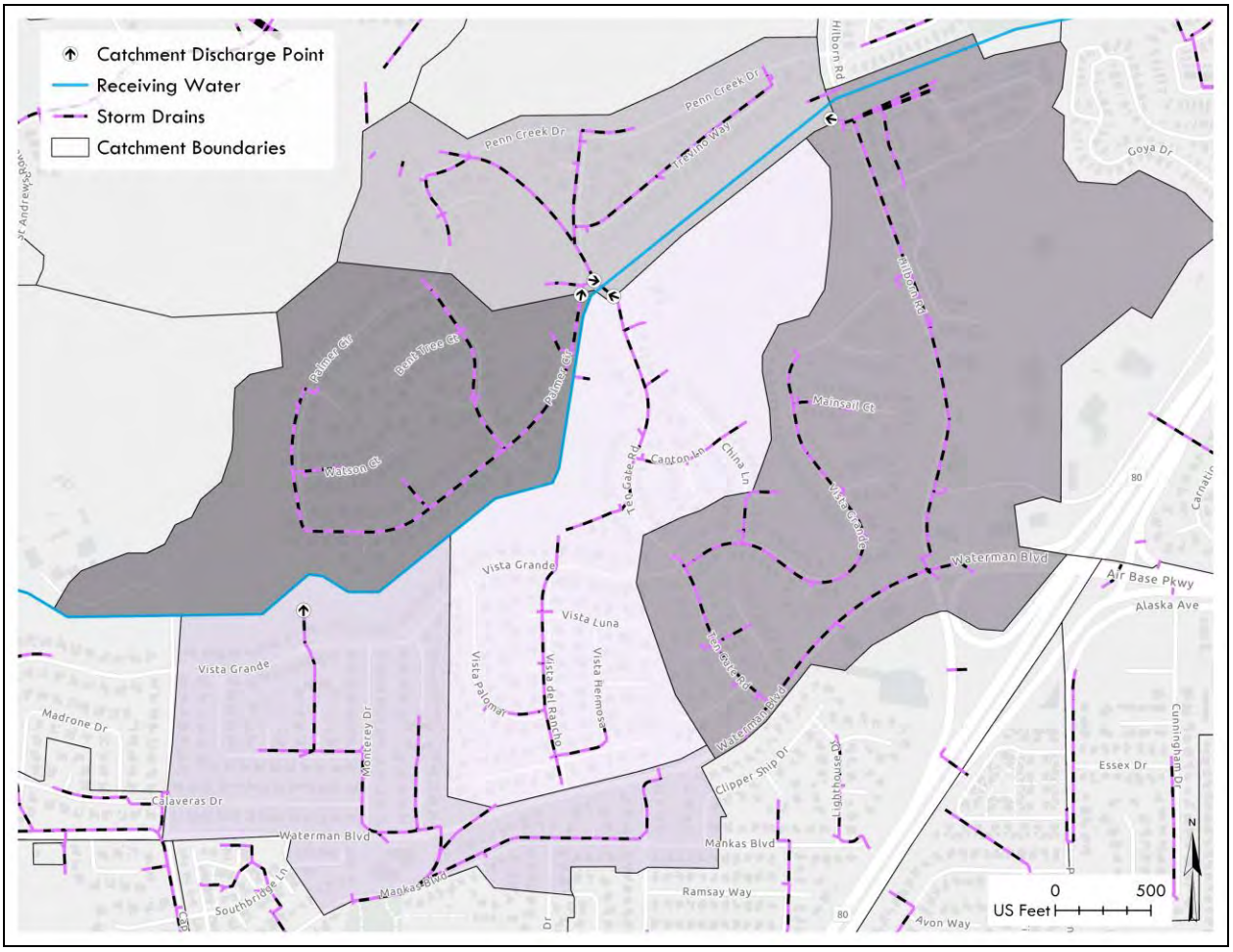

Figure 3.5. Example of catchments delineated via the stormdrain network in Fairfield.

[14] https://catalog.data.gov/dataset/usgs-national-elevation-dataset-ned

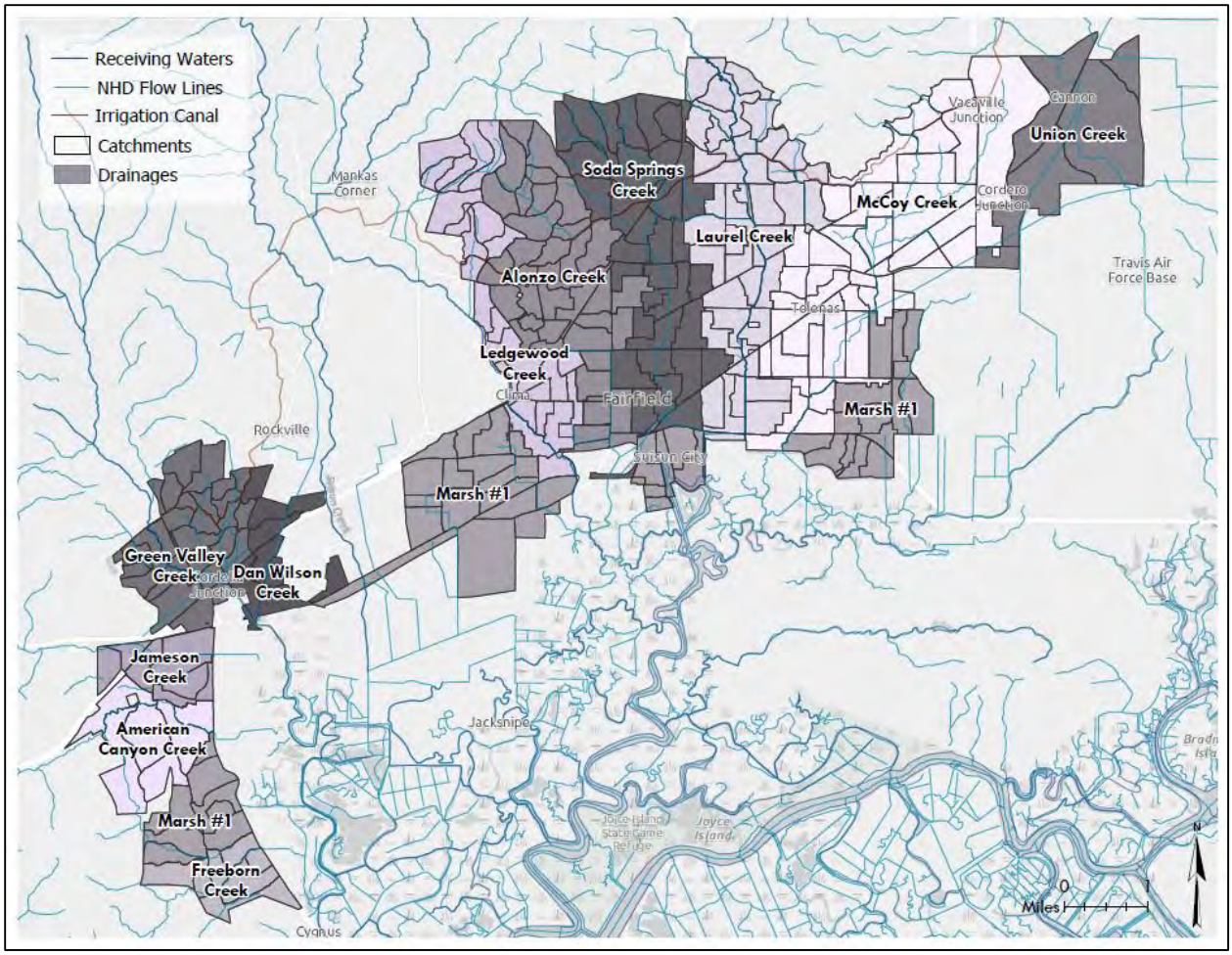

Figure 3.6. Fairfield-Suisun catchments, drainages, and receiving waters.

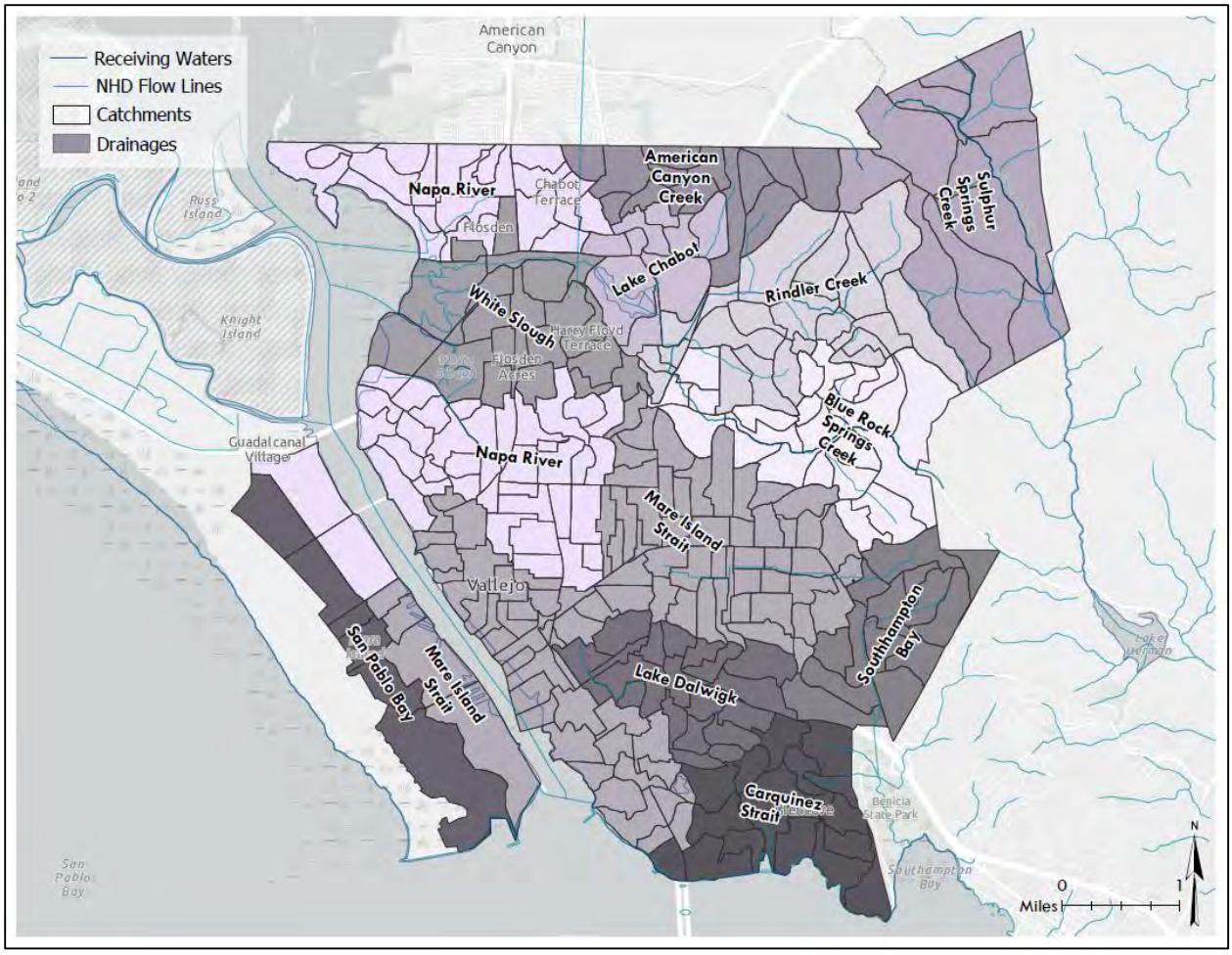

Figure 3.7. Vallejo catchments, drainages, and receiving waters

3.1.2 Model calibration

There are no long-term flow datasets available for watersheds that include the cities of Fairfield, Suisun or Vallejo. So, while the RAA Guidance from BASMAA (BASMAA, 2017) specifies that baseline model runoff estimates should employ a hydrologic calibration procedure, this is not possible for the Solano Permittee MS4 Area. Similarly, there are no concentration data for PCBs and mercury available that are amenable calibration of an urban stormwater model. The historic concentration data available have been described in detail in section in Section 1.3.2.4, and are primarily targeted to short-term study objectives, probabilistic inference over space, and characterizing spatial patterns within the receiving waters of the Bay. As such, measurements are sparse and do not capture the unique response of the urbanized areas, such as monitoring data at the outfalls of the urban drainages would. This means that the estimates from swTELR must rely wholly on the input data without adjustment of numeric quantities to tune the fit of the model to observations, which provides both advantages and shortcomings.

Contrary to the idea that uncertainty associated with model parameterization can be avoided with a careful or sophisticated calibration procedure, the process of fitting parameter values during calibration invariably injects substantial uncertainty to model outputs. This issue has been widely recognized and documented in the hydrologic literature for more than two decades (see Beven, 2001 p. 217). While lack of data with which to compare estimates clearly presents a challenge for direct verification of accuracy, it also avoids the inherent addition of uncertainty that is incurred any time model outputs depend strongly on model calibration. This is particularly true when a model is over-parameterized to a degree that is not supported by the data available, which is exceedingly commonplace (Beven, 2005). Since calibration often involves either complex optimization algorithms and/or several subjective decisions on the part of the modeler, avoiding it adds transparency to the modeling process, since relationships between model inputs and outputs are much more straightforward.

3.1.3 Baseline comparison with the Regional Watershed Spreadsheet Model (RWSM)

In place of a validation experiment via comparison with measured flow values, swTELR results were compared to outputs from the Regional Watershed Spreadsheet Model (RWSM), developed by SFEI. The RWSM is an empirical model developed to estimate average annual regional and sub-regional scale pollutant loads for the San Francisco Bay Area. Since the RWSM is an empirical model, the outputs depend strongly on an extensive dataset of flow and pollutant concentrations collected over more than a decade by regional monitoring programs. The RWSM is the most suitable tool available to extend existing measurements to estimate sub-regional scale pollutant loading in areas of the San Francisco Bay area that lack measurements. swTELR used the same land use layer employed by RWSM to specify PCBs and Mercury characteristic runoff concentrations for each land. Correspondence between swTELR and RWSM was performed using outputs provided on the SFEI RWSM website[15] by clipping raster-based RWSM runoff and pollutant load estimates from the full dataset using the MS4 boundary for each city in Solano County.

3.1.3 Key baseline modeling assumptions and limitations

The baseline modeling employs several assumptions for the purposes of either practicality or data limitations, which include:

- A spatially explicit, probabilistic approach can adequately bracket the range of rainfall-runoff responses via an uncalibrated model.
- PCBs and mercury concentrations are responsive to land use type and the concentrations used are representative of the actual values.

[15] https://www.sfei.org/projects/regional-watershed-spreadsheet-model#sthash.3ZhPRNxw.dpbs

- Uncertainties associated with the input data and model structure are not greater in magnitude than spatially varying factors that drive runoff generation and pollutant loading

These assumptions are primarily based on previously reported studies and were not tested as part of this study. Rather, they served as a practical point of departure for the work reported herein. A true validation of these assumptions and swTELR outputs require monitoring data at the urban drainage scale, which is not commonly available. However, since control measure implementation will proceed over a period of decades, this type of validation should be considered to both inform decision making, test RAA model assumptions, and provide additional information to shore up their limitations. Since swTELR operates at a granular spatial scale, the outputs are amendable to understanding the distinct runoff and pollutant loading response from urbanized drainages and changes that result from GSI implementation over time.

3.2 Model Scenarios for Compliance Demonstration

Baseline and future modeling scenarios were run for the Solano Permittee MS4 Area to demonstrate expected progress towards compliance for meeting GSI pollutant reductions. For each scenario, the rainfall input data and other spatial data that describe urban catchment characteristics remained unchanged, while other factors were altered according to documentation of expected changes (e.g. land use, BMP implementation). New development, redevelopment, and BMP implementation timing and locations were verified by Solano Permittees via a web-mapping application[16]. Three future scenarios were modelled, with a slightly different milestone schedule required for PCBs and mercury (Table 3.2).

The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the WLA RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. The scenarios reported herein include only reductions associated with GSI. Source control actions will be handled as part of the wasteload attainment (WLA) RAA analysis to be completed in 2020. Modeling scenarios for the GSI and WLA RAA's overlap substantially, with GI comprising a subset of the WLA reductions. Per the BASMAA RAA Guidance (BASMAA, 2017), pollutant load reduction measures included in the GSI RAA include GSI BMP implementation along with land use changes that accompany redevelopment. Reductions included in the WLA RAA analysis are the sum of reductions that result from GSI, land use changes, and source controls such as street sweeping and demolition controls. GSI treatment BMPs include both decentralized BMPs that are often included as part of Low Impact Development (LID) and treat stormwater on site at the parcel scale, as well as centralized BMPs, which route stormwater from several parcels to a regional treatment structure. Source controls will only be included in the 2028/2030 modeling analysis per the BASMAA RAA Guidance Document (BASMAA, 2017).

Table 3.2. RAA model scenarios

	Green Stormwater Infrastructure RAA	Waste load Allocation Attainment RAA
2020	GSI + land use changes	GSI + land use changes
2028/2030		GSI + land use changes + source control
2040		GSI + land use changes

Modeling GSI and WLA scenarios separately requires that GSI and source control reductions can be treated independently, even though there are overlapping components. This presents some conflicts with the most logical reduction sequencing that corresponds with our conceptual understanding of the urban stormwater system, in which source control reductions occur before other types of reductions that require transport of pollutants away from their source and subsequent treatment. The BASMAA source control accounting approach will not be finalized until January 2020. Any such pollutant reduction sequencing issues or assumptions will be documented in WLA RAA modeling report in 2020.

3.3 Redevelopment and new development land use changes

3.3.1 Planned and projected land use changes

Completed and projected land use changes were drawn from several different sources and compiled into a geodatabase to support the future modeling scenarios. Development and redevelopment projects were identified from city general plans, specific redevelopment area planning documents, examination of current and historical aerial imagery, and interpreted outputs from the UrbanSim[17] urban planning model. With the exception of the UrbanSim outputs, land use change data were not available in GIS formats and were translated from PDF documents and manually digitized in GIS. While the UrbanSim outputs provide a regionally standardized way to estimate redevelopment rates, using them in isolation would require ignoring the vast majority of documentation of parcels that are already planned for redevelopment

All land use changes employed in the future scenario modeling simulations are mapped in Figure 3.8 symbolized by the scenario year, and whether the changes will be redevelopment or new development. The GIS database created contains the specific information source used to determine land use change and associated time of conversion for each parcel.

[17] http://www.urbansim.com/urbansim

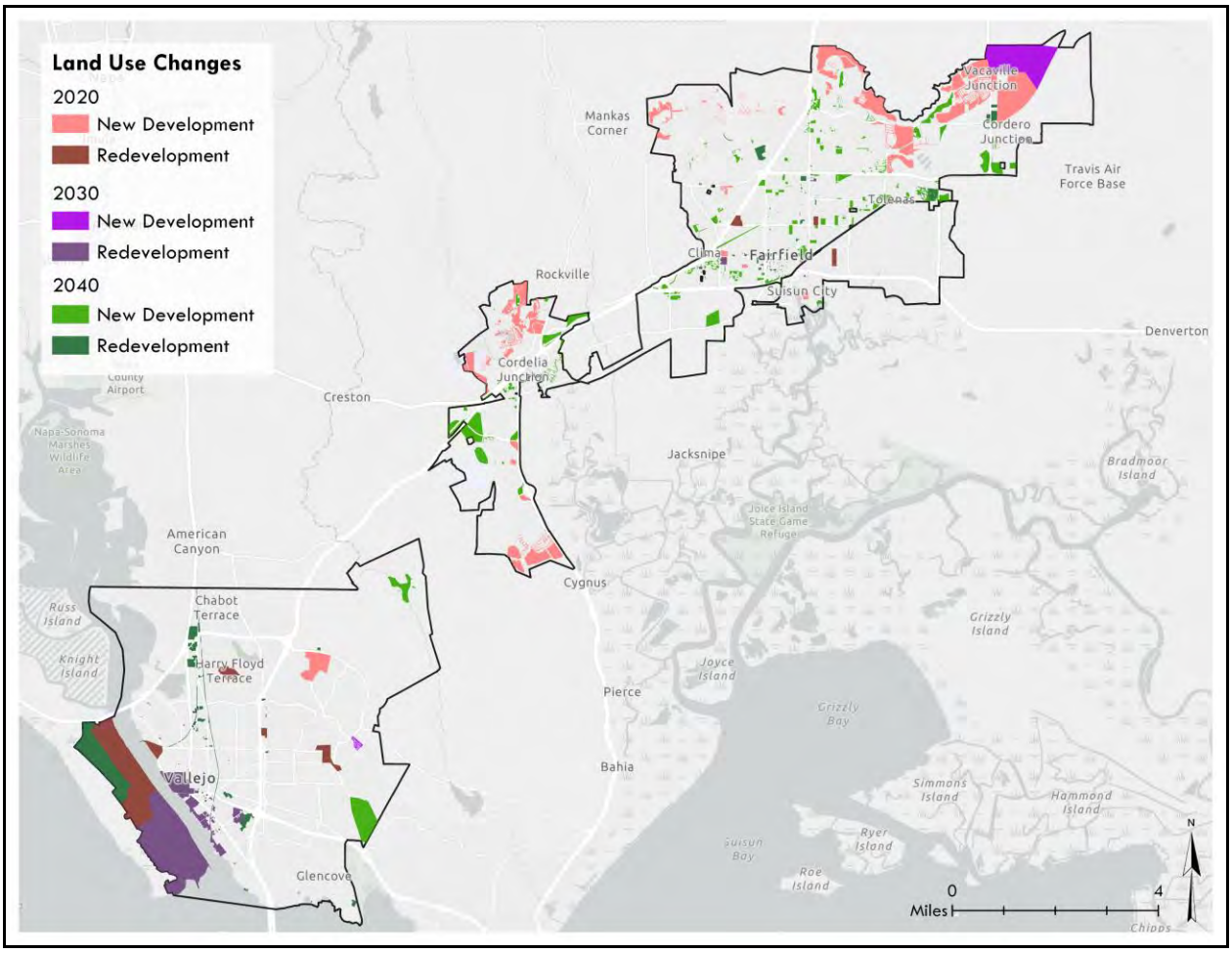

Figure 3.8. Land use changes used in future scenarios.

3.3.2 Land use corrections

Best available satellite time series imagery from Google Earth was used to identify and correct inaccuracies in the SFEI 2005 land use layer (SFEI, 2005). These changes include improper classification of open space that had been developed by 2005 or misclassification of old urban areas that had been redeveloped. Figure 3.9 shows an example of one of the areas within the City of Vallejo that was classified as Open land use and changed to New Urban land use, which was typical of these instances. Other issues identified in the land use layer were related to areas incorrectly classified as Old Transportation land uses (also previously recognized by McKee et al. 2014, p. 90). Examination of historical satellite imagery via Google Earth showed that several of these areas had been redeveloped are recently as 2004, and were therefore changed from 'Old Transportation' to New Urban land use in the 2020 and all subsequent model scenarios.

Figure 3.9. Example of a correction made in a Fairfield neighborhood to the land use layer used as input to the pollutant loading model.

3.3.3 Projected land use changes from UrbanSim

The UrbanSim model was used to project parcel-level land use changes for future scenarios. UrbanSim is an open source simulation system created by Paul Waddell and University of California, supported by grants from National Science Foundation designed to support urban planning. Spatial outputs reflect changes in residential housing units were used to infer redevelopment land use change over time. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Governments (ABAG) Committees for use in transportation projections and the regional Plan Bay Area development process.

The general workflow to extract new development and redevelopment parcels from the UrbanSim model mirrored that employed by the Contra Costa County Clean Water Program RAA analysis:

1. Intersect the parcel dataset with Solano County MS4 areas
2. Export UrbanSim model runs for the years 2010 through 2040 that includes fields that quantify total job spaces, total residential units, and year built.
3. Use an if-then statement to flag parcel differences for these metrics between 2010 and 2040 and query the year built output to determine which parcels are estimated to change during each scenario timeframe (2010-2020, 2020-2030, 2030-2040)

It was assumed that new development and redevelopment of multifamily residential and commercial/industrial parcels will incorporate GSI in accordance with MRP Provisions C.3.b., C.3.c., and C.3.d. Because of high land values, it is expected that more than 50% of the existing impervious area in each parcel will be replaced if a parcel is developed, and therefore the entire parcel will be subject to Provision C.3 requirements (that is, will be retrofit with Green Stormwater Infrastructure), consistent with the "50% rule" requirements of MRP Provision C.3.b. Land Use changes predicted via the UrbanSim[18] model were incorporated into swTELR for each scenario year according to the output time period.

3.3.4 Planned land use changes

Allocation of planned land use changes to each scenario was based on documented development plans or verification of new development initiation or completion via use of best available satellite imagery up to land use conditions as of 2018. For example, the Callahan Property Company's development in the City of Vallejo Northern Waterfront (52 acres) at Mariners Cove was allocated to the 2020 scenario as development plans have been approved by the City of Vallejo along with a schedule of parcel development[19] and satellite imagery indicates site grading has begun. The Central Waterfront area was instead allocated to the 2030 scenario (see Figure 3.8). Likewise, the 157-acre area located on the northern portion of Mare Island currently owned and under redevelopment by the Nimitz Group was allocated to the 2020 scenario. The 250 acres that Nimitz Group recently acquired from the Lennar Corporation, which is still in the scoping stages, were included as redevelopment areas in the 2030 scenario. The residential developments that have already been completed by Lennar Corporation, such as Farragut Village (completed 2007), or are in progress Coral Sea Circle, Kirkland Isle II were also allocated to the 2020 scenario. The remaining area on Mare Island still owned by Lennar Corporation (approximately 350 acres) is slated for redevelopment, but with no specific plans identified, it was allocated to the 2030 scenario. The remaining areas identified in City of Vallejo General Plans for land use change that

[18] http://www.urbansim.com/urbansim

[19] http://www.ci.vallejo.ca.us/city_hall/departments___divisions/city_manager/economic_development_division/waterfront_project

did not have any specific redevelopment planning documentation available were allocated to the 2040 scenario (Figure 3.8).

All GSI implementation within redevelopment and new development projects was assumed to be bioretention features, which are decentralized BMP types that reduce both stormwater volumes and pollutant concentrations. The sizing of planned bioretention features align with the MRP section C.3.d requirement to reduce and treat the contributing stormwater volume generated up to the 85th percentile 24-hour rainfall depth (SWRCB, 2015).

Relative to the baseline simulation scenarios, areas of new development identified typically produce additional runoff resulting from increased impervious coverage. While these increases will be mitigated with GSI implementation, conversion from Open Space land use to New Urban still usually results in net increases of runoff and pollutant loading. For these scenarios, the impervious coverage layer was changed manually in the GIS so that areas which typically had zero impervious coverage values before new development (e.g. Open Spaces land use) would reflect the typical impervious coverage of the New Urban land use. Exceptions to this rule were in areas that the impervious coverage layer accurately reflected the land use changes that had occurred since 2005, which is when the land use layer was created.

3.3.4.1 *Key land use change assumptions and limitations*

The reliability of the modelling results relies heavily on the following land use data assumptions:

- Past and future land use changes have been adequately captured via automatically classified land-use maps, planning documents, and inspection of historical satellite imagery
- UrbanSim model outputs reasonably reflect the rates and locations of land use change anticipated in the future.
- Land use changes result in reductions of characteristic pollutant runoff concentrations as defined by the PCB and mercury land use layer (SFEI, 2005).

The assumption that land use changes will result in the specified pollutant concentration changes is a substantial source of uncertainty in this analysis. It includes the implicit assumption that all remediation actions and new development standards prescribed in the MRP are closely followed and in perpetuity. While this assumption relies on the best sampling data available to date, which has already been discussed, these data are limited, especially in Solano County.

Comparison of the SFEI 2005 land use data layer to available imagery indicated misclassification of several areas. It is unlikely all errors were identified and corrected. Manual inspection of historical satellite imagery is tedious and only useful for identifying new development or areas that were incorrectly classified as open space. Historical redevelopment is not obvious and would have required a much more detailed study of the area and available data that was beyond the scope

of this effort. The options for spatially explicit land-use change estimates are few, and UrbanSim at least provides a more detailed option than applying a uniform rate across each city. However, using model outputs to drive another model holds the substantial disadvantage of compounding uncertainty through different model layers.

3.4 Reductions from Green Stormwater Infrastructure (GSI)

3.4.1 Parcel/Green Street LID

Planned and completed LID projects were mostly green streets within the City of Vallejo that were identified via capital improvement projects and are listed in Table 3.3. Since these projects did not have defined locations or types of structural BMPs yet specified, bioretention feature application for the entire drainage areas was again assumed to the 85th percentile 24-hr design storm as specified in MRP C.3 requirements. Each project area was defined by its outline that was delivered to 2NDNATURE via the City of Vallejo as a GIS shapefile.

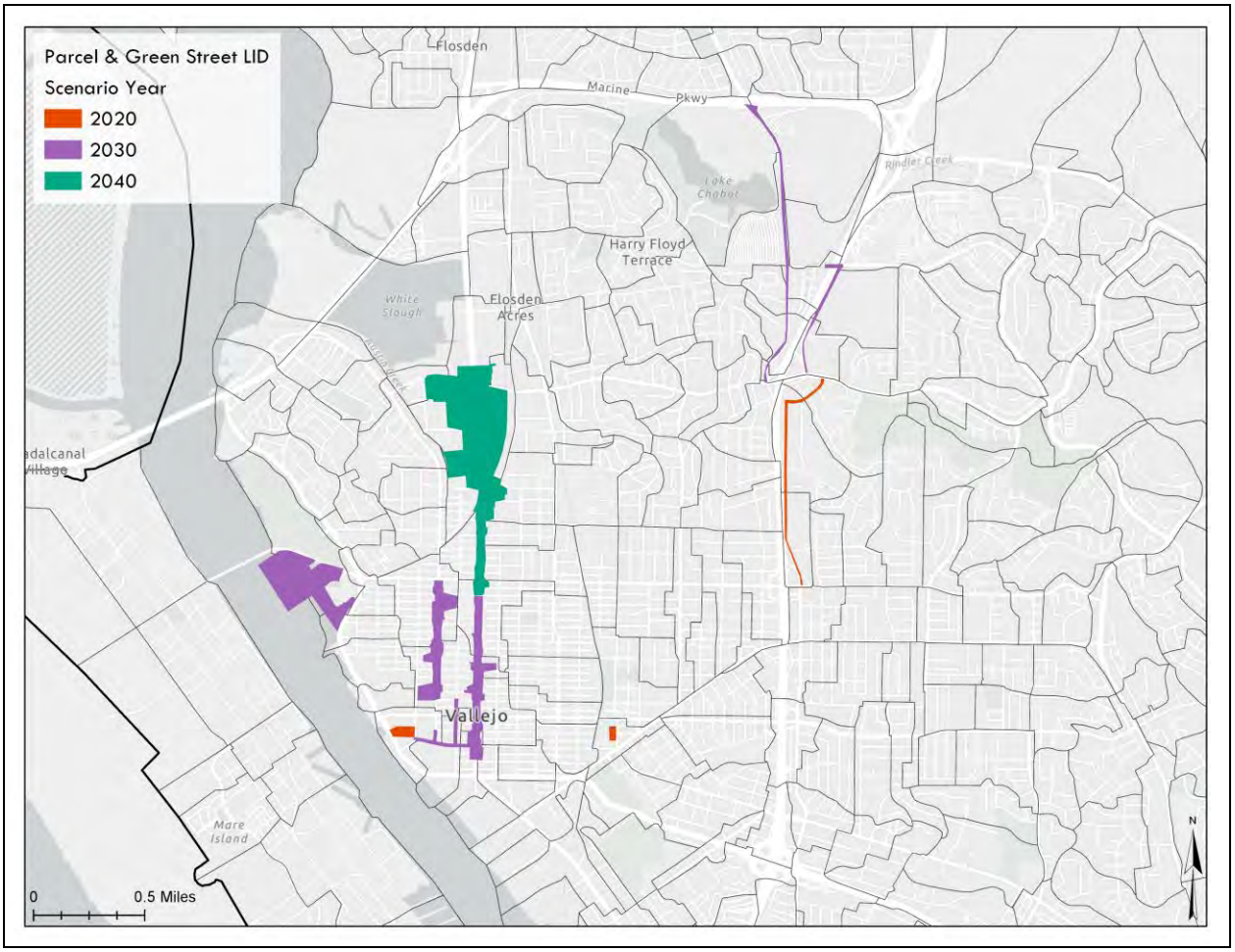

Figure 3.10. Future parcel and Green Street LID projects identified in Vallejo.

Table. 3.3. Future LID projects planned in Vallejo.

City	BMP ID	Status	Scenario	Area (ac)	Catchments	Primary Receiving Water
Vallejo	Sonoma Boulevard Streetscape Phase 5 & 6	Planned	2040	105.94	AC12, CA14, AC15, AC20, AC35, AC37, AC38, AC39, AC41, AC52, AC53	Napa River
Vallejo	Sonoma Boulevard Streetscape Phase 4	Planned	2030	9.69	AC12, DT5	Mare Island Strait
Vallejo	Benicia Road Bridge Replacement Project	Planned	2030	0.87	CP11, CP12	Southhampton Bay
Vallejo	Sonoma Boulevard Streetscape Phase 1-3	Planned	2030	12.53	DT1, DT2, DT5, SA59, DT2, DT5	Mare Island Strait
Vallejo	Marina Sea Wall	Planned	2020	44.58	DT10, DT11, MI22	Napa River
Vallejo	Sacramento Street Streetscape Phase 1	Planned	2030	8.32	DT12	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 2	Planned	2030	3.89	DT12, DT 5	Mare Island Strait
Vallejo	Downtown Streetscape Phase 4	Planned	2030	1.61	DT3, DT4	Mare Island Strait
Vallejo	Downtown Streetscape Phase 5 & 6	Planned	2030	1.44	DT3, DT4, DT2	Mare Island Strait
Vallejo	Downtown Streetscape Phase 7, 8 & 9	Planned	2030	2.07	DT3, DT5	Mare Island Strait
Vallejo	Vallejo Station Phase B	Planned	2020	3.04	DT4	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 3	Planned	2030	9.06	DT5	Mare Island Strait
Vallejo	Admiral Callaghan Widening	Planned	2020	2.85	LC10, LC11, LC13, LC15A, LC8	Blue Rock Springs Creek
Vallejo	Fairgrounds Drive Improvements	Planned	2030	9.05	LC10, LC11, LC27, LC37A, LC8, LC9, SA44, LC37B	Lake Chabot
Vallejo	Turner Parkway Overcrossing	Planned	2030	0.83	LC11, LC15A	Rindler Creek
Vallejo	Admiral Callaghan Middle Lane	Planned	2020	6.29	LC6, SA39, SA 40	Mare Island Strait
Vallejo	Public Safety Building Rehab and Design	Planned	2020	1.16	SA52	Mare Island Strait

3.4.2 Decentralized BMP implementation

Existing and planned decentralized BMP implementation was modeled in swTELR in a spatially explicit manner, with raster-based calculations for runoff and pollutant load reductions performed at the 30-meter pixel scale for each of the future scenarios (2020, 2030, 2040). Existing GSI BMP specifications were documented by Solano Permittee city staff and provided to 2NDNATURE via spreadsheets and uploaded to the 2Nform spatial platform. The city staff confirmed the locations and attributes of each BMP and GSI project via a web-based mapping interface[20] prior to finalizing the dataset.

For each modeling scenario, GSI benefits are accounted for *after* land use changes are applied. This sequencing of pollutant reduction accounting is important to avoid double counting of benefits, since where redevelopment occurs, pollutant loads delivered to GSI will be lower due to the transformation of Old Industrial to New Urban land uses within the contributing drainages. In areas were new development occurs, the land use changes typically result in additional runoff available for infiltration by BMPs due to increased impervious coverage. All structural BMP types modelled reduce either runoff through infiltration or pollutant concentration through particle capture and filtration, and several GSI types do both. The pollutant reduction processes represented depend on the BMP type as detailed in Table 2.3.

For most existing and several planned BMPs, exact locations and BMP types were available from Solano Permittees, so that benefits were calculated according to the type and location of each BMP and included in the 2020 scenario (and carried over into all subsequent scenarios). In this way, the modeling outputs preserved the uniqueness of each location in terms of runoff production and pollutant loading from each of their specified drainage areas which were explicitly accounted for in the calculations. The locations of all existing or planned decentralized BMPs are shown in Figure 3.11 and each BMP is listed in Appendix D with their relevant attributes.

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20 http://2ndnature.maps.arcgis.com/apps/webappviewer/index.html?id=839c43995b64448cb0da6b4d38c5a6b6

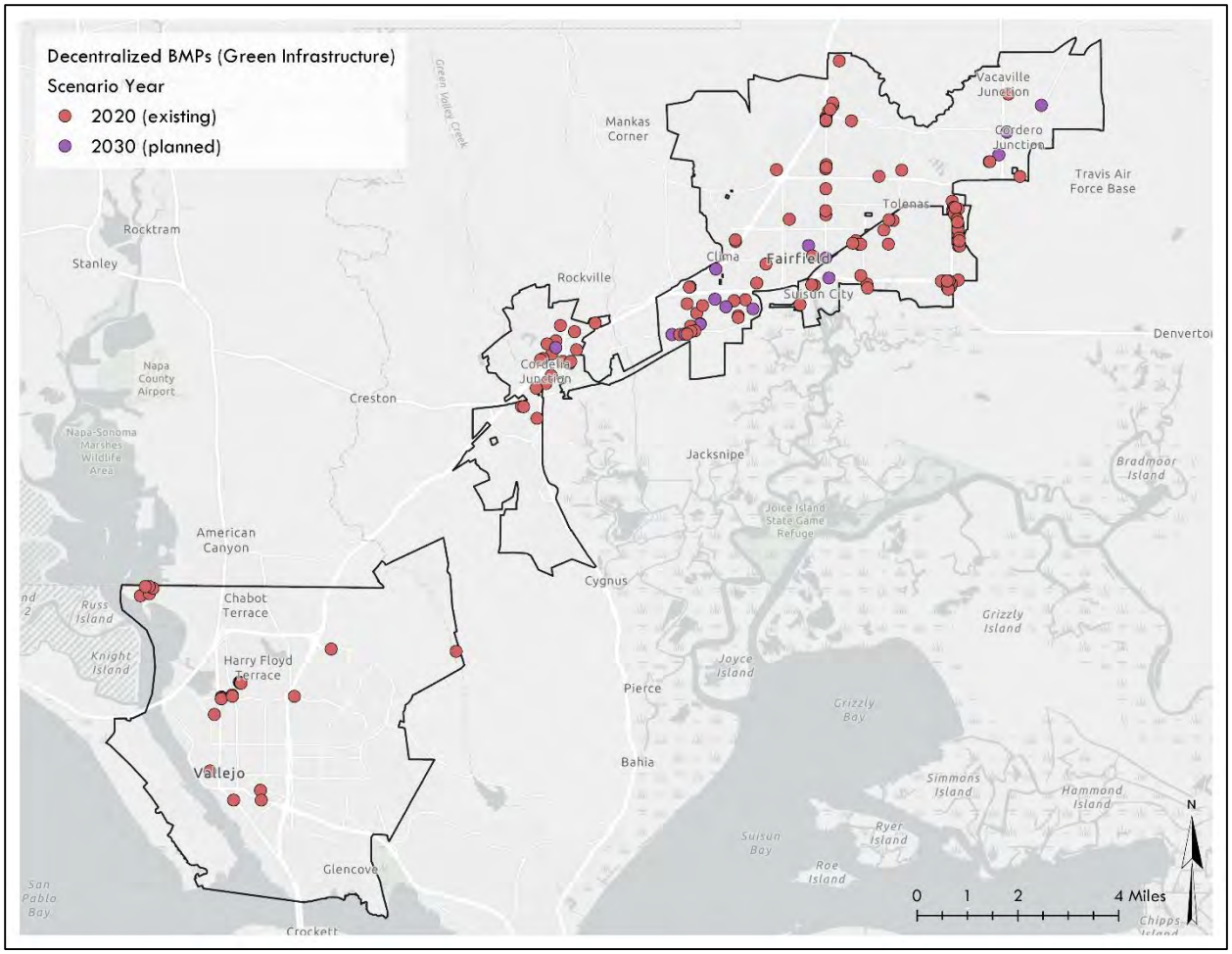

Figure 3.11. Existing and Planned Decentralized BMPs implemented throughout the Solano Permittee MS4 Area.

Current and future reductions from decentralized BMPs were modeled assuming that they were built according to MRP, section C.3d requirements, so that volume-based designs would infiltrate runoff generated by rainfall up to the 85th percentile 24-hour rainfall depth. Since swTELR generates runoff for a several percentile slices of the rainfall distribution, raster outputs of runoff were generated for each percentile rainfall depth. For decentralized BMPs, reductions were calculated as the runoff generated after land use changes minus the volume generated up to the 85th percentile rainfall event for each of the grid cells that comprised the respective BMP drainage area. For calculating pollutant load reductions, the remaining volume was multiplied by either the untreated land-use concentration or a reduced concentration, depending on whether the BMP type provides pollutant treatment in addition to runoff reductions. Since these BMPs generally receive runoff infiltration and treatment close to the site where it was generated, delivery to the BMP is assumed to be instantaneous.

3.4.3 Decentralized BMP performance efficiency

Since the decentralized BMP calculations were performed on raster datasets with coverage throughout the Solano Permittee MS4 area, we can examine the potential for pollutant reductions by sampling grid cells and calculating runoff and pollutant reduction for different BMP types. Figure 3.12 shows the range of location specific potential reductions for BMPs that perform runoff infiltration or treatment and those that do both (e.g. bioretention features). Again, all decentralized BMPs were assumed to be sized and performing in perpetuity to capture runoff generated from the 85th percentile 24-hour storm depths per MRP section C.3.d. Since there is different runoff and loading potential throughout the Permittee MS4 area, there is a range of potential runoff capture and associated BMP load reduction. Given that both PCBs and mercury are hydrophobic and have a strong tendency to adsorb to particulates, we assume similar pollutant reduction capture efficiency for both pollutants. Note that the shape of the curves in the right panels of Figure 3.12 reflect the non-linearity between rainfall and runoff production. Runoff infiltration generally provides somewhat greater benefit than runoff treatment at this design level, and BMPs that do both infiltration and treatment provide substantially greater benefits within a narrower performance range (Figure 3.12).

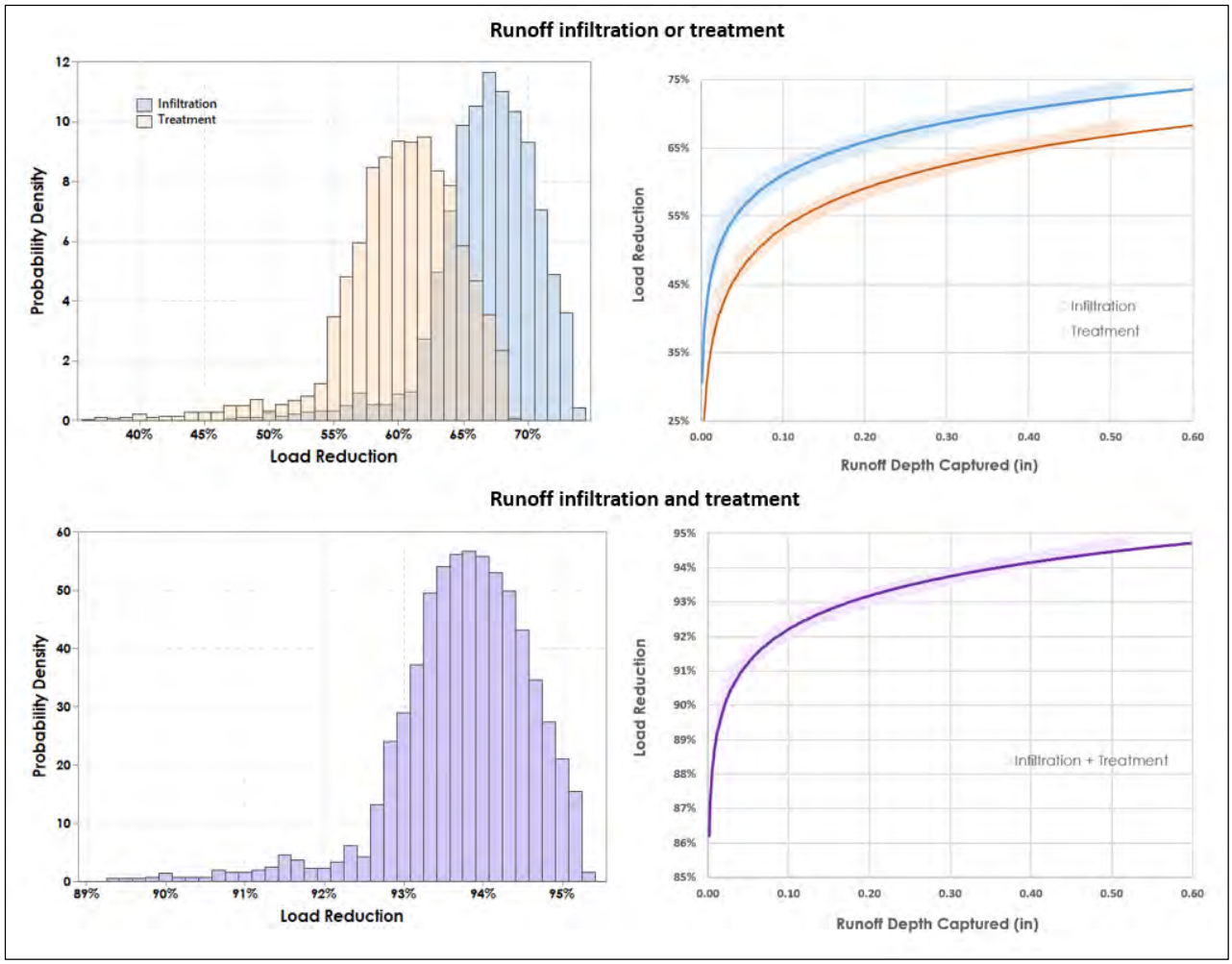

Figure 3.12. BMP performance efficiency. Histograms in panels on the left show load reduction distributions and curves in panels on the right show load reductions per runoff depth captured. Depth capture shown in the range of flows generated by the 85th percentile rainfall event.

The performance curves shown in Figure 3.12 are specific to Solano County, since they incorporate annual rainfall distribution characteristics and site-specific runoff and pollutant generation. As such, they are quasi-empirical in nature. These curves are very similar to those calculated from observed data for the purpose of standardizing load reduction accounting throughout the Chesapeake Bay to support TMDL compliance (Scheuler and Youngk, 2015). Given the sheer number of decentralized BMPs that will need to be accounted for in the SF Bay Area, ongoing accounting of their benefits will likely require a similarly simple accounting system as they have implemented in the Chesapeake Bay Region. For example, there are more than 6,000 BMPs currently catalogued in Prince George County, MD (population 900,000) alone that require ongoing pollutant reduction benefit quantification. Within the decade, the SF Bay Area will likely have tens of thousands of structural BMPs catalogued that require a practical method for accounting for reductions and ongoing verification of performance.

3.4.4 Centralized BMPs

Runoff and pollutant load reduction performance from existing and planned centralized BMPs (also called regional treatment projects) employed the methods described in Section 2.3 to determine routing, timing, and partitioning of infiltrated, treated and bypassed flows for calculating reductions for future scenarios. A primary difference from decentralized BMPs is that with centralized BMPs, stormwater is typically transported a substantial distance away from where runoff was initially generated, so that runoff timing is important for estimating centralized BMP reductions.

Centralized BMP and drainage specifications were documented by city staff and transferred to 2NDNATURE, where they were uploaded to a web-based mapping platform for verification by city staff before inclusion in the modeling scenarios. Centralized BMPs included in the modeling scenarios are listed in Table 3.4 and shown on Figure 3.13. The predominance of dry basins as a centralized BMP in Fairfield vs treatment vaults as the predominant choice for centralized BMPs in Vallejo reflects the difference in soil types: Fairfield has a much greater amount of Type A and B soils (higher infiltration rates) compared to Vallejo (see Figure 3.2).

The hydrologic and pollutant loading to each centralized BMP is calculated based on the land use changes and decentralized BMP reductions within each centralized BMP contributing drainage areas. The performance of each centralized BMP is estimated based on the computational approach outlined in Section 2. While there may be additional centralized BMPs installed with future new development, inclusion in this RAA analysis required that cities had documentation of locations, types, and capacity of future BMPs. Centralized BMPs, both planned and already installed, are listed by Solano Permittee city in Table 3.4 along with location, drainage association, and corresponding modeling scenario.

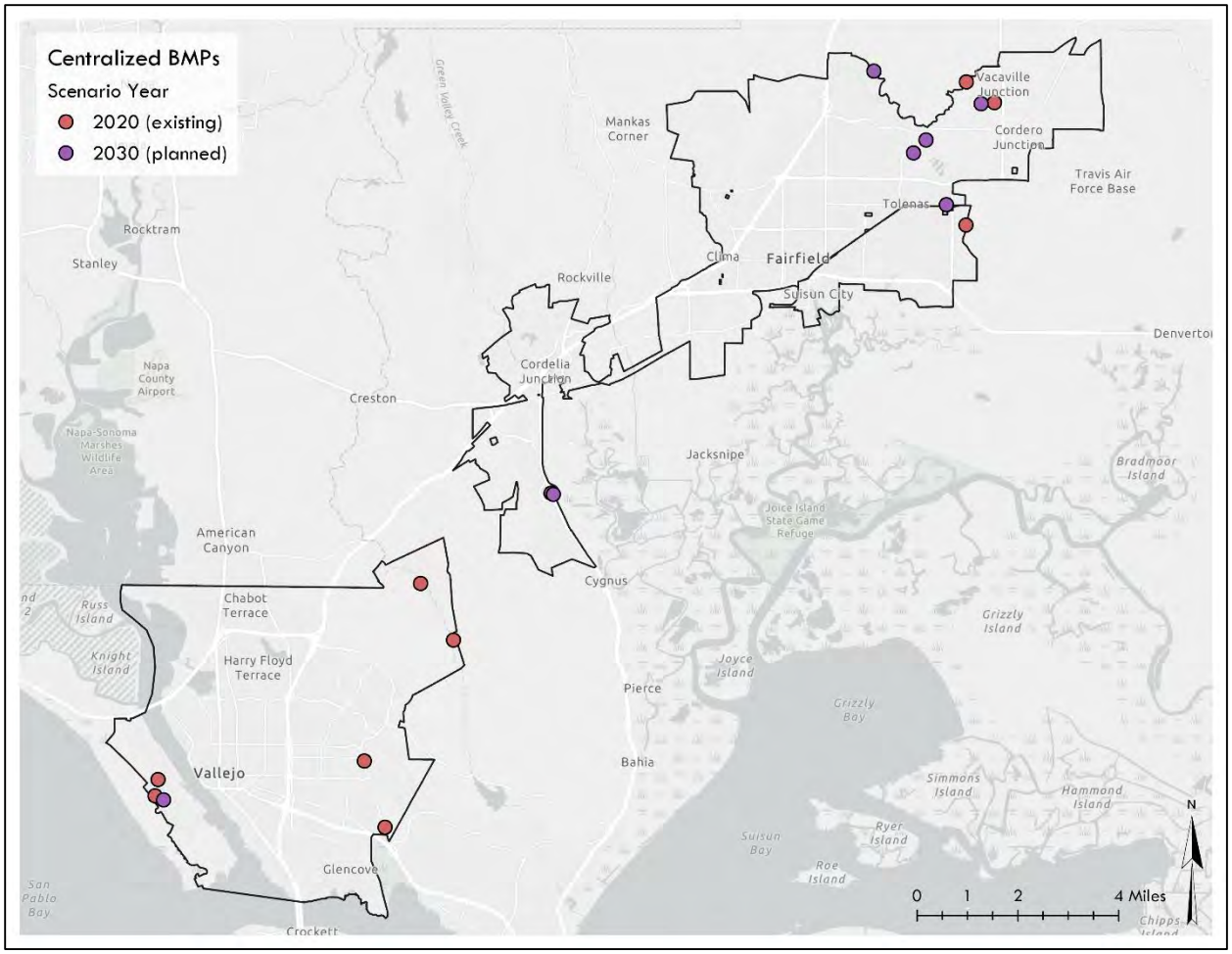

Figure 3.13. Centralized BMPs used in future modeling scenarios.

Table 3.4. Centralized BMPs and attributes.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Gold Hill Village 1	Installed	2020	Dry Basin	11	Marsh 1	MAR-2	38.18047928	-122.1342695
Fairfield	Gold Ridge-so. of Putah So. Canal	Installed	2020	Dry Basin	124	McCoy Creek	COY-26	38.2928207	-121.9726825
Fairfield	Gold Ridge-no. of Putah So. Canal	Installed	2020	Dry Basin	120	McCoy Creek	COY-30	38.29886642	-121.9829339
Fairfield	Paradise 360	Planned	2030	Dry Basin	9.7	Laurel Creek	LAU-12	38.30187014	-122.0165929
Fairfield	Gold Hill Village 2	Planned	2030	Dry Basin	11	Marsh 1	MAR-2	38.18016302	-122.1334273
Fairfield	Ivy Wreath/Strawberry Fields	Planned	2030	Dry Basin	13.8	McCoy Creek	COY-10	38.26349435	-121.9902188
Fairfield	Villages at Fairfield- Village 2	Planned	2030	Dry Basin	42	McCoy Creek	COY-19	38.27843273	-122.0021546
Fairfield	Discovery @ Gold Ridge	Planned	2030	Dry Basin	15	McCoy Creek	COY-24	38.29252809	-121.9774729
Fairfield	Villages at Fairfield- Village 1	Planned	2030	Dry Basin	76	McCoy Creek	COY-6	38.28212579	-121.9975519
Fairfield	2900 Cordelia	Installed	2020	Bioretention	38.085	Marsh 1	MAR-11	38.22804606	-122.0847827
Fairfield	Gateway 80, Buildings A & B	Planned	2030	Bioretention	35.93	Marsh 1	MAR-11	38.2280516	-122.0856715
Suisun	PR Detention Basin	Installed	2020	Dry Basin	64.7	Marsh #1	MAR-47	38.257646	-121.982987
Vallejo	SA10062T	Installed	2020	Treatment Vault	108	Mare Island Strait	SA10	38.10333666	-122.2021727
Vallejo	2183GT318	Installed	2020	Treatment Vault	35	San Pablo Bay	SP3B	38.0978149	-122.277309
Vallejo	2184GT027	Installed	2020	Treatment Vault	40	San Pablo Bay	SP4	38.09313091	-122.2783658
Vallejo	SV1401T	Installed	2020	Treatment Vault	108	Sulphur Springs Creek	SV1B	38.1381688	-122.1697917
Vallejo	SV1203T	Installed	2020	Treatment Vault	135	Sulphur Springs Creek	SV1C	38.15438193	-122.181801
Vallejo	Lennar Mare Island B3	Planned	2030	Dry Basin	37	San Pablo Bay	SP4	38.09204167	-122.275241
Vallejo	BeniciaRd_Basin	Installed	2020	Dry Basin	600	Southhampton Bay	CP12	38.08431517	-122.1944904

3.4.5 Key GSI modeling assumptions

Calculation of GSI reductions depended upon several assumptions:

- All redevelopment since the 2005 baseline year and future redevelopment complies with MRP C3 requirements to capture and/or treat runoff up to the 85th percentile 24-hr rainfall event.
- Bioretention features or comparable decentralized BMPs that reduce both volumes and pollutant concentrations will be make up a substantial proportion of future GSI implemented.
- Decentralized BMPs that reduce PCB/Hg concentrations in stormwater do so at 80% efficiency when functioning as designed. While there is some evidence to support this assumption, it is very limited. As such, this should be considered an important source of uncertainty in the outputs.
- Centralized BMPs that reduce PCB/Hg concentrations in treated outflow have characteristic effluent concentrations with correspond with sediment reductions.
- All structural BMPs will perform to their design standard in perpetuity, requiring a proactive commitment to maintenance Permittee's are encouraged to adopt a tracking and accounting system that includes field verification of GSI performance and provide permittees with useful asset management information on GSI.

4 RAA Modeling Results and Compliance Demonstration

This section presents the results of modeling experiments using the structure, methods, inputs and assumptions that have been described in sections 1-3. The results presented include baseline modeling, comparison with the Regional Watershed Spreadsheet Model (RWSM), and GSI reductions modeling.

4.1 Baseline Modeling Results

4.1.1 Baseline conditions

Baseline runoff was calculated for each Solano County Permittee MS4 Areas (Fairfield, Suisun, and Vallejo) according to the methods described in section 2.3, with the results summarized for each city in Figure 4.1. Runoff volumes are much higher in Fairfield (13,268 afy) and Vallejo (13,391) since these cities are much larger than Suisun, which only produced 2,091 afy of runoff. PCB loading is particularly high in the City of Vallejo (477 g) compared to Fairfield (137 g), and Suisun (16 g), owing to the high proportion of source area and old industrial land use in Vallejo.

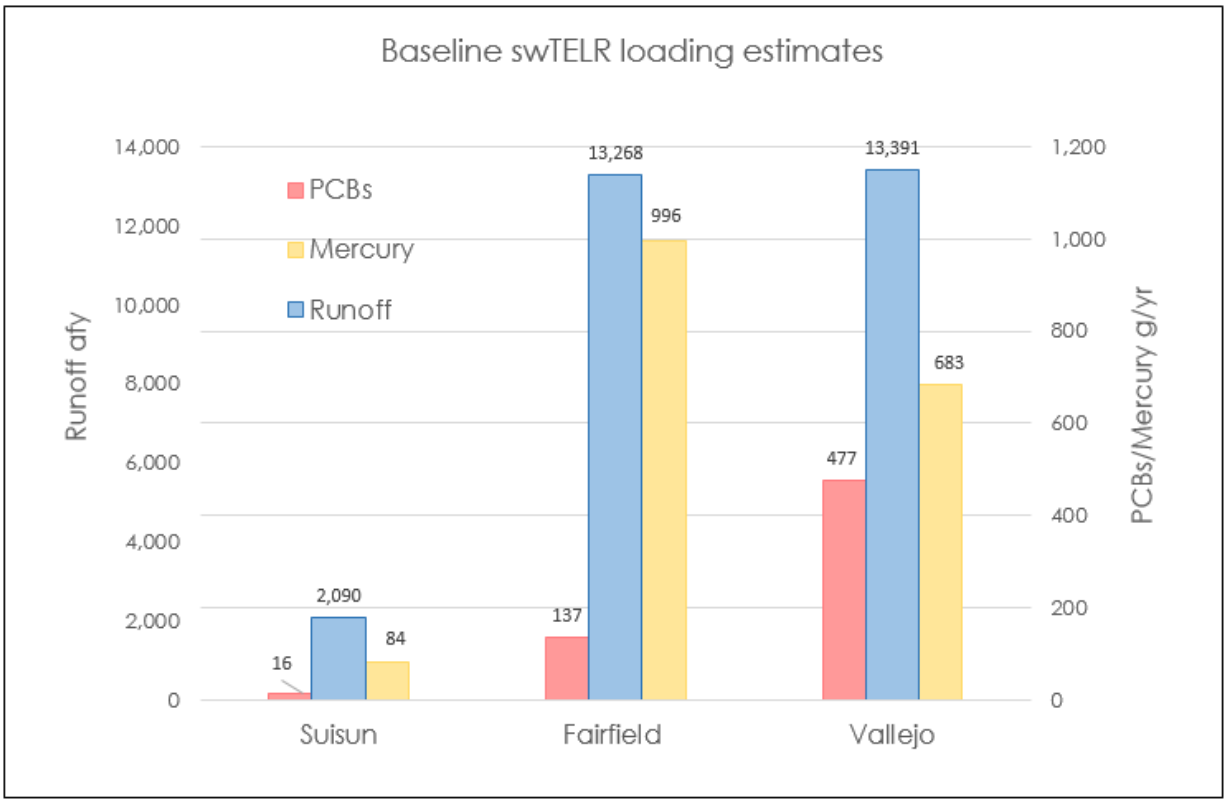

Figure 4.1. Runoff, PCBs, and mercury baseline loading estimates from swTELR.

Baseline runoff estimates were aggregated to the urban catchment scale from calculations performed at the 30-meter grid scale (Figure 4.2). As we would expect, runoff generation is generally highest in areas with high impervious cover and poorly draining soils. These include the urban centers of Vallejo and Suisun City. Baseline runoff is an important driver of spatial patterns of pollutant loading across Solano County; area-normalized runoff ranged from 0.01 ac-ft/ac/yr to 1.2 ac-ft/ac/yr, with an average value of 0.67 ac-ft/ac/yr.

Baseline pollutant loading for PCBs and mercury were calculated using the methods described in sections 2.3 and 3.1and aggregated to the urban catchment scale (Figures 4.3 and 4.4). The runoff estimates shown in Figure 4.2 were used for calculating both PCB and mercury loads. Average baseline loading values for catchments ranged from 0.01 g/ac/year to up to 0.18 g/ac/yr throughout the Solano Permittee MS4 Area (Figure 4.3). High PCB loading catchments are strongly associated with the relative proportion of Source Area or Old Industrial land use coverage within catchments. This is an intuitive result, since runoff concentration values for these land uses are substantially higher than the other land uses (Table 3.1). The greatest concentration of high loading areas is in Vallejo on Mare Island, which is classified almost entirely as Old Industrial land use. Other areas of relatively high PCB loading are the southern part of the Vallejo Waterfront, Vallejo downtown, and Central Fairfield. As we would expect, upland areas on the outskirts of both cities, which are largely undeveloped have very low PCB loading values.

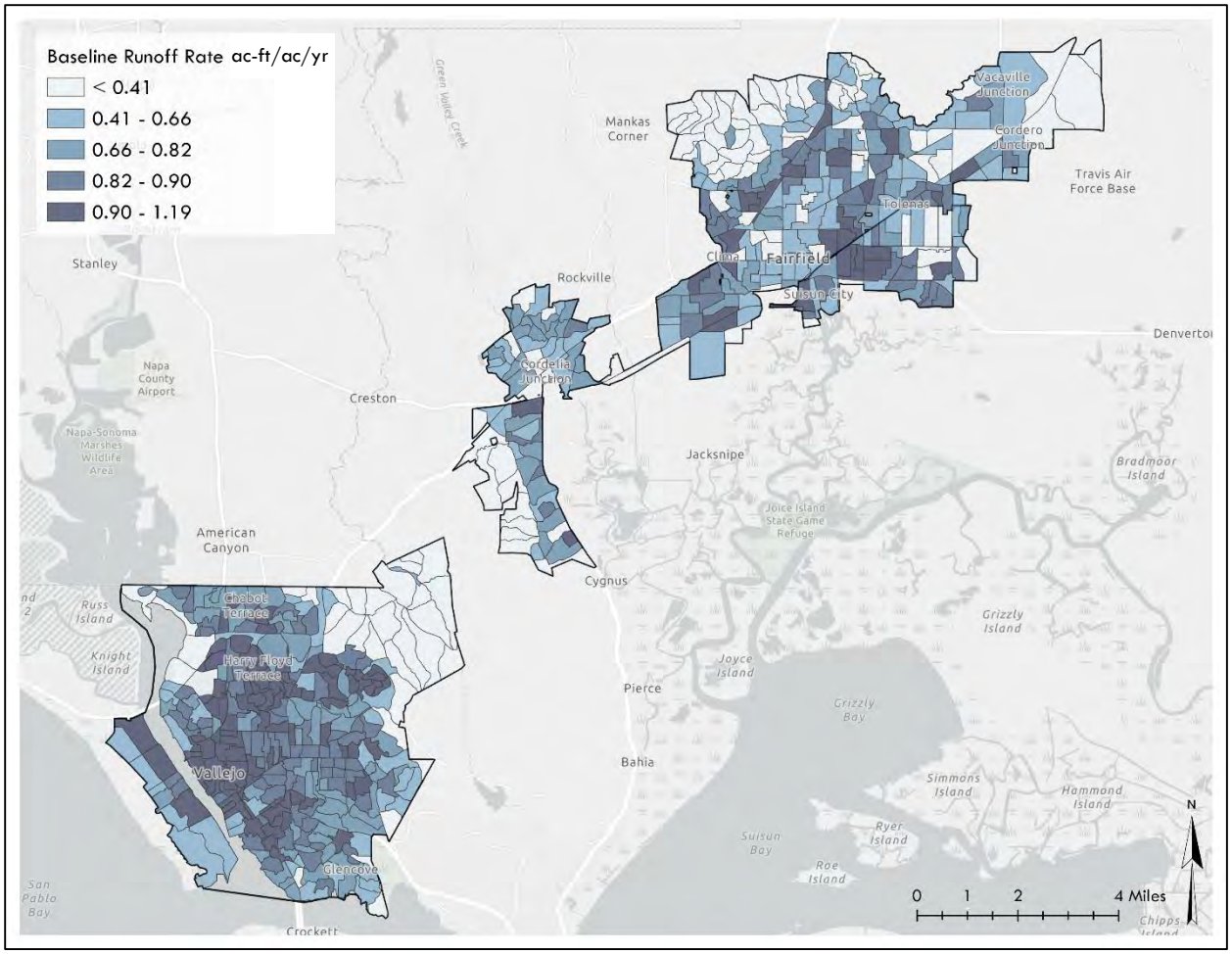

Figure 4.2. Baseline runoff estimates for Solano Permittee MS4 Area

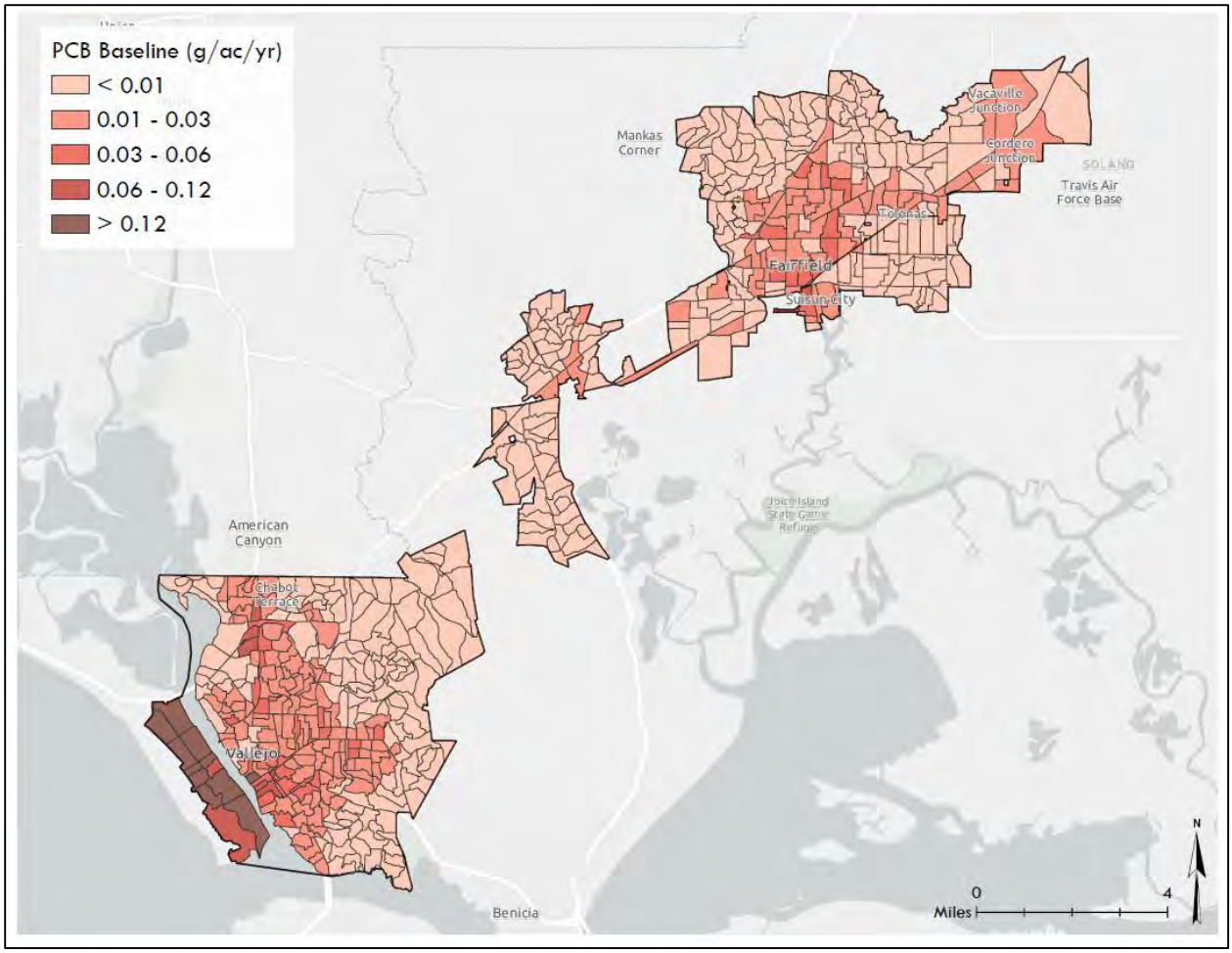

Figure 4.3. Baseline PCB loading estimates for the Solano Permittee MS4 Area

Mercury baseline loading outputs are shown in Figure 4.4. With less difference between land use characteristic runoff concentrations for mercury, loading outputs are more responsive to spatial patterns of runoff compared to PCBs. Loading values range from 0.009 to 0.125 g/acre/year throughout Solano County. Like with PCBs, the most heavily developed areas in downtown Fairfield and Vallejo both show relatively high mercury loading but areas such as Mare Island and the Vallejo waterfront show relatively lower mercury loading values compared to PCBs, primarily due the difference the high characteristic PCB runoff concentrations for Old Industrial and Source Area land uses present in those areas. Industrial areas along Highway 12 also show relatively high mercury loading, which did not show high PCB loading. Undeveloped upland areas in the northern portions of Fairfield and Vallejo show mostly low loading as with PCBs due to low runoff generation in these areas that have substantial open space coverage.

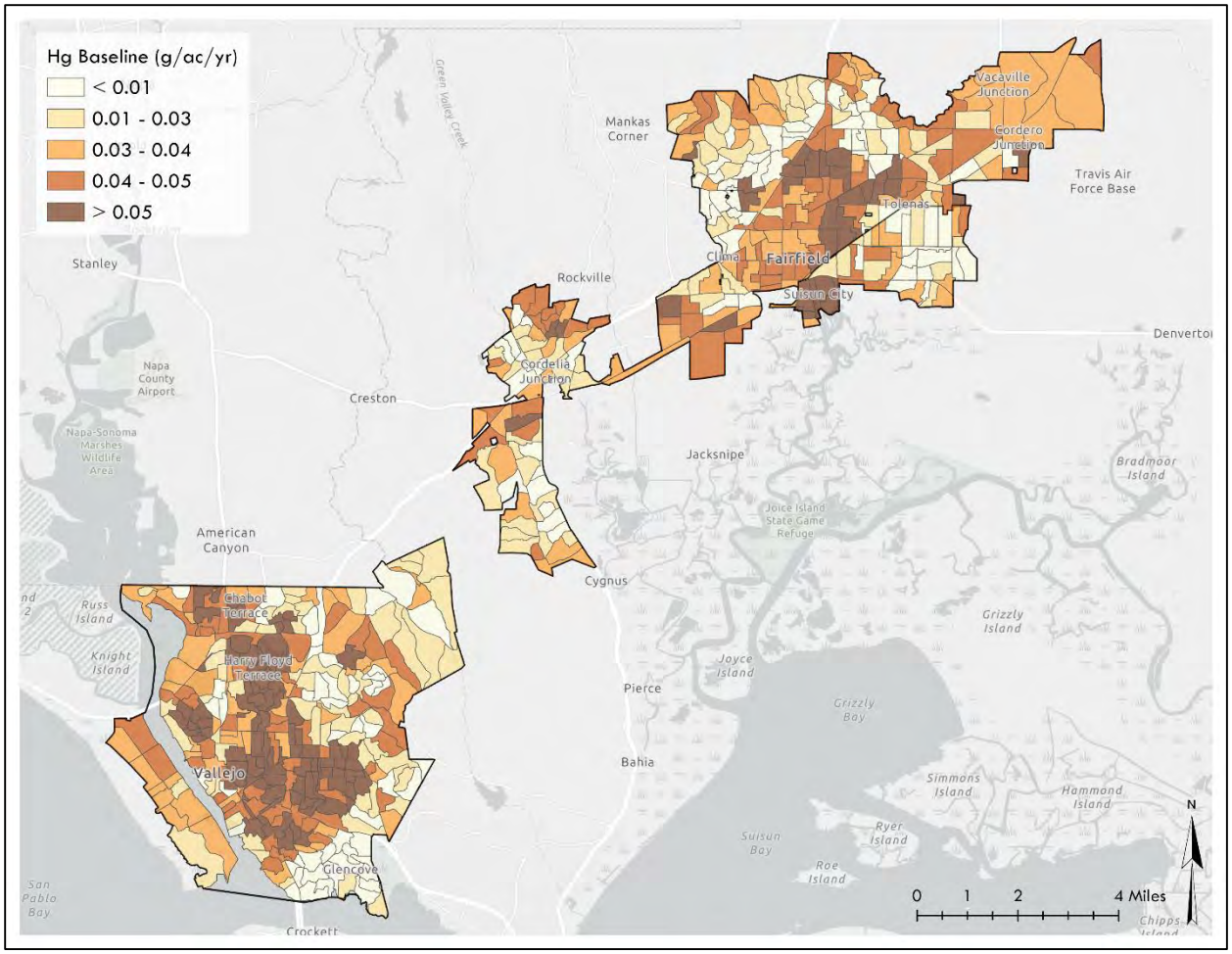

Figure 4.4. Baseline mercury loading estimates for the Solano Permittee MS4 Area

4.1.2 Comparison with Regional Watershed Spreadsheet Model (RWSM)

Comparison between outputs from swTELR and RWSM shows close correspondence between outputs from the two models (Table 4.1). Overall, there was little difference in estimates between swTELR and RWSM runoff estimates (-4%), PCB loads (-16%), or mercury loads (9%), with swTELR providing the lower estimates for runoff and PCBs, and higher estimates for mercury compared to RWSM. Discrepancies between the two models are due almost entirely to the differences in the spatial pattern of runoff estimates, since land use concentrations used in swTELR are identical to those used in RWSM. Even though Solano county is technically part of the North Bay, runoff coefficients used for the RWSM outputs are the same as those used for the East Bay, because rainfall gauges in the East Bay more closely reflect the Solano County rainfall regime. There were no calibration sites for RWSM located in the vicinity of Solano County (McKee et al., 2014); some of the North Bay calibration sites used in RWSM had nearly double the annual rainfall of Fairfield. The decision to use East Bay runoff coefficients was confirmed appropriate by SFEI staff (A. Gilbreath, pers. com., Oct 2018).

Table 4.1. Comparison of average annual loading to SF Bay from RWSM and swTELR.

	RWSM			swTELR			% Difference		
	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB	Hg	Runoff
Fairfield	131	607	13,244	137	696	12,120	-16%	-12%	-8%
Suisun	15	68	1,655	16	84	2,116	-7%	26%	28%
Vallejo	569	657	13,765	477	683	13,450	-16%	5%	-2%
Totals	**715**	**1,333**	**28,664**	**630**	**1,462**	**27,616**	**-16%**	**9%**	**-4%**

Hydrologic algorithms in swTELR are very sensitive to impervious cover and soil type - runoff generation directly reflects the local impervious cover. Since RWSM outputs are regionally calibrated, they do not appear to reflect the same degree of sensitivity to these factors at more granular scales, which probably accounts for a substantial proportion of the runoff differences between the two models at the individual city level. This is not unexpected, since RWSM was developed as a regional tool and necessarily reflects spatial factors specified at larger spatial scales (McKee et al. 2015) compared to the MS4 and urban catchment-scale estimates provided by swTELR.

To better understand the differences between swTELR and RWSM a multivariate general linear model was constructed at the urban catchment scale for both model outputs using impervious cover as a continuous independent variable and soil type as a categorical independent variable. Soils and impervious cover summarized for each urban catchment delineated in Solano County (n= 596) explained approximately 93% of runoff variance in swTELR (the expected outcome), but only 3.5% in RWSM (an initially surprising outcome). From these findings, we can conclude that: 1) use of TELR baseline estimates will not substantially affect calculations for progress towards overall waste load allocations for Solano Permittees compared to estimates from the RWSM model, 2) RWSM runoff volumes at the catchment scale strongly reflect calibrated parameters, which aligns with its purpose as a tool to estimate loading at the regional or sub-regional scale, 3) spatially explicit estimates from swTELR align more with widely held conceptualizations of how spatial factors such as impervious cover influence urban runoff generation.

4.2 Model Scenario Results

4.2.1 Spatial patterns of pollutant load reductions over time

For each modeling scenario, swTELR and the methods described in Section 3 were applied to generate outputs that incorporated runoff and pollutant loading reductions for different types of GSI. These included land-use redevelopment, decentralized BMPs, and centralized BMPs (regional treatment). These scenarios also included runoff and loading increases projected to result from

new development within the Permittee MS4 Area. Overall estimated relative (%) PCB reductions from baseline are greater than those for mercury, which primarily reflects the relatively larger PCB reduction opportunities in Old Industrial and Source Areas that are planned for redevelopment.

Spatial loading outputs for all Solano Permittees are summarized at the urban-catchment level in Figures 4.5 and 4.6, with reductions expressed as grams per acre. The maps illustrate that PCB reductions are focused on Mare Island and within the urban centers of Vallejo and Fairfield for 2020, 2030, and 2040, with less intense clustering of reductions in 2030 and 2040 compared to 2020. Over the course of implementation from the baseline scenarios to 2040, catchments shift from higher to lower loading categories. Outputs from the 2040 scenario show that all catchments that were classified in the highest percentile category in the Baseline Scenario have been eliminated on Mare Island. There are substantially fewer of these relatively high loading catchments on the Vallejo Waterfront, Vallejo and Fairfield downtown areas. Catchments that show the largest relative reductions in the scenarios were usually those which started in the baseline scenario with substantial Source Area or Old Industrial land use. Outlying areas remained virtually unchanged from the baseline scenario due to low redevelopment rates in these catchments, low proportion of high pollutant producing land uses, and new development that generates additional runoff which can create small local pollutant loading increases over time compared to the undeveloped conditions.

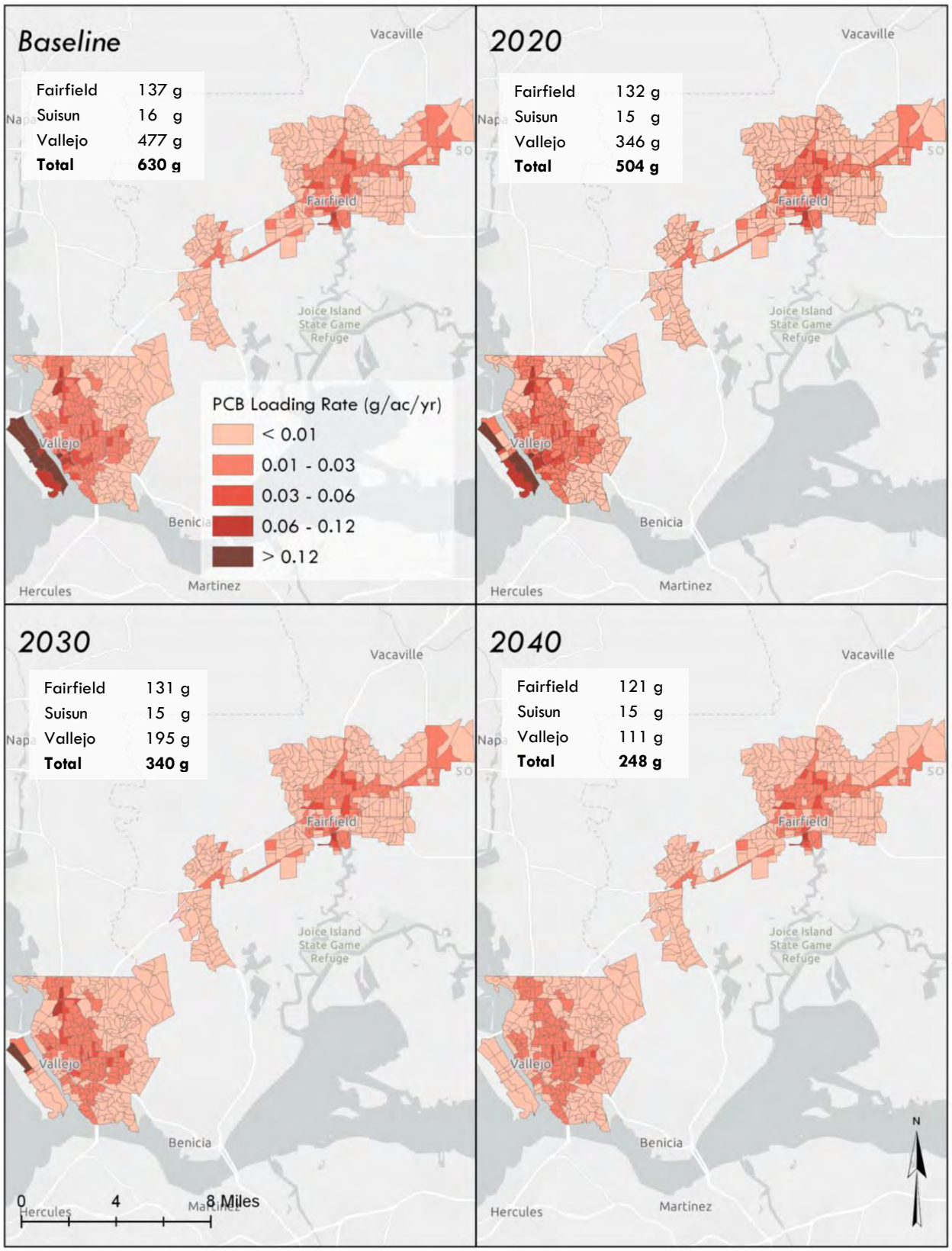

Figure 4.5. Spatial distribution of annual PCB load estimates for baseline and future scenarios

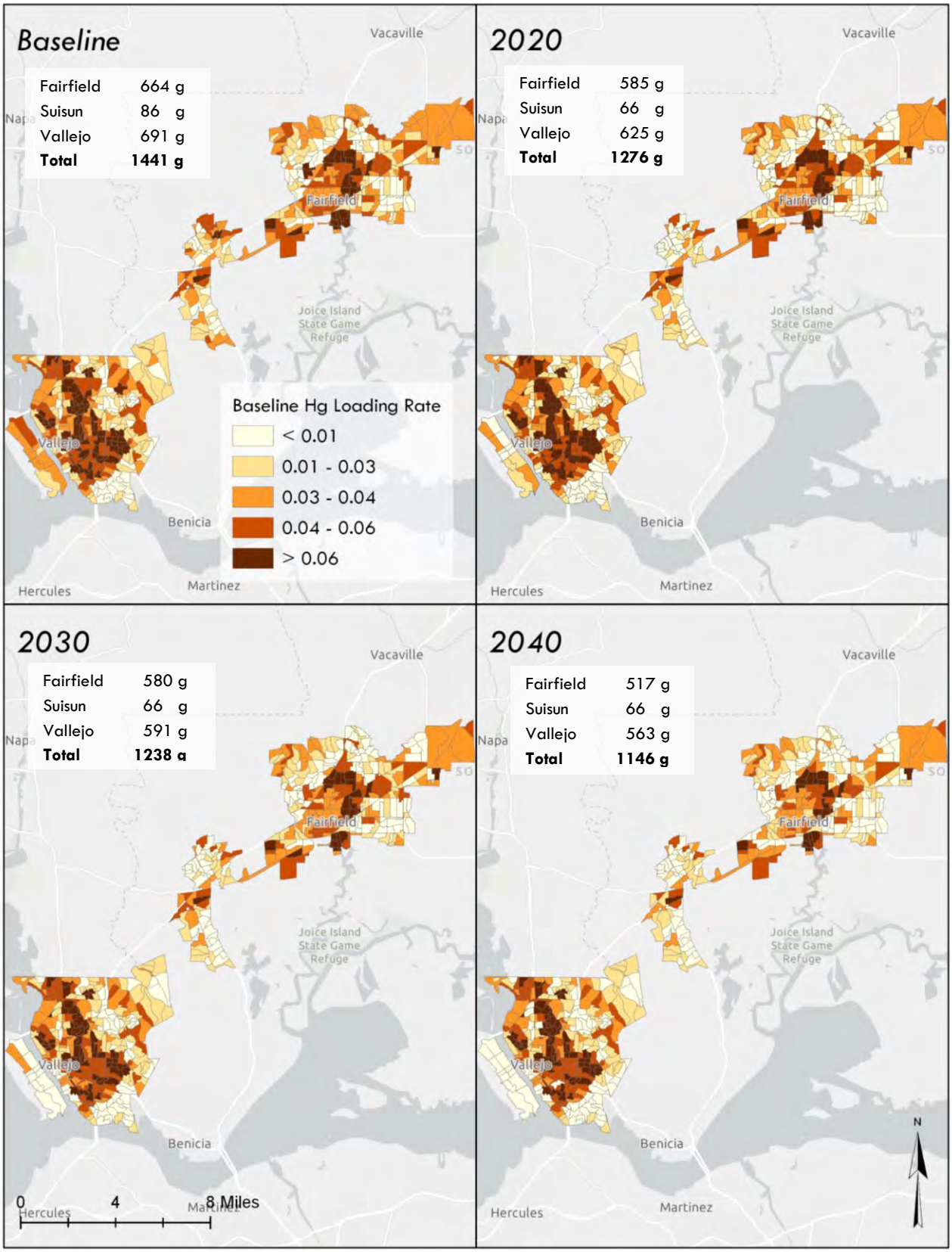

Figure 4.6 Spatial distribution of annual mercury load estimates for baseline and future scenarios

GSI load reductions summary

Total estimated GSI reductions by the year 2040 are 382 grams of PCBs, and 295 grams of Mercury Table 4.2. These reductions constitute a reduction of 61% reduction from baseline for PCBs and a 20% reduction from baseline for mercury. GSI implementation and land use changes can be lumped together compliance demonstration, since they often occur at the same time during redevelopment and both contribute to the GSI reductions targets. However, it is instructive to examine the relative contributions from each component to form a clear picture of expected reductions. For both PCBs and mercury, the primary source of reductions is land use changes that result from redevelopment, making up 98.5% of total PCB reductions and 87% of mercury reductions by 2040 (Figure 4.7). In contrast, reductions from decentralized BMPs and parcel LID make up just 0.5% of PCB load reductions and 9% of mercury load reductions. Routing to centralized BMPs for runoff infiltration and treatment accounts for 1% of PCB load reductions and 9% of mercury load reductions (Figure 4.7). The projected rate of reductions over time for both PCBs and mercury are fairly steady throughout the simulation period (see graphs in Figure 4.7).

Table 4.2. Summary of future scenario loading estimates for PCBs and mercury for the Solano Permittee MS4 Area.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCB (g)	Hg (g)	PCB (g)	Hg (g)	PCB (g)	Hg (g)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

Most planned GSI implementation is associated with redevelopment, resulting in land use conversion to New Urban, which has the lowest associated pollutant concentration values. Per Table 3.1, PCB concentrations span 3 orders of magnitude from Old Industrial/Source Areas (up to 204 ng/L) to New Urban land uses (3 ng/L); mercury concentrations span one order of magnitude (from 3 to 40 ng/L). Since GSI BMPs can only reduce pollutants that are generated by the associated land use, and since the PCB and mercury loads generated are much smaller after parcels are converted to the New Urban land use, there are simply less pollutants to reduce on redeveloped parcels. Therefore, while GSI implementation will accompany redevelopment land use conversions, the amount of pollutant load reduction that can be attributed directly to BMP capture and treatment of runoff is relatively small. This result corresponds to previous research, which showed that relatively small areas of Old Industrial and Source Area sites have a disproportionate contribution to PCBs loading (McKee et al., 2015).

The disproportionate allocation of reductions to land use conversion is strongly dependent on land use changes actually resulting in dramatic reductions of pollutants in the sediments that they generate, which may not be realistic. Legacy sediments that contain higher levels of pollutants are likely to persist after land-use conversion and GSI installation provides a viable way to mitigate those impacts. While the current inventory of GSI BMPs for Solano Permittees number 185, and their aggregate drainage area is more than 1700 acres, overall this represents only 3% of the Solano Permittee MS4 Area drainage. Specific, planned BMPs will increase total drainage coverage to 4% (2,773 acres) by 2020. With inclusion of redevelopment and new development areas that will be covered under C3 requirements, GSI coverage is projected to increase to 6% (4,414 acres) by 2020 and to 14% (6,503 acres) by 2040.

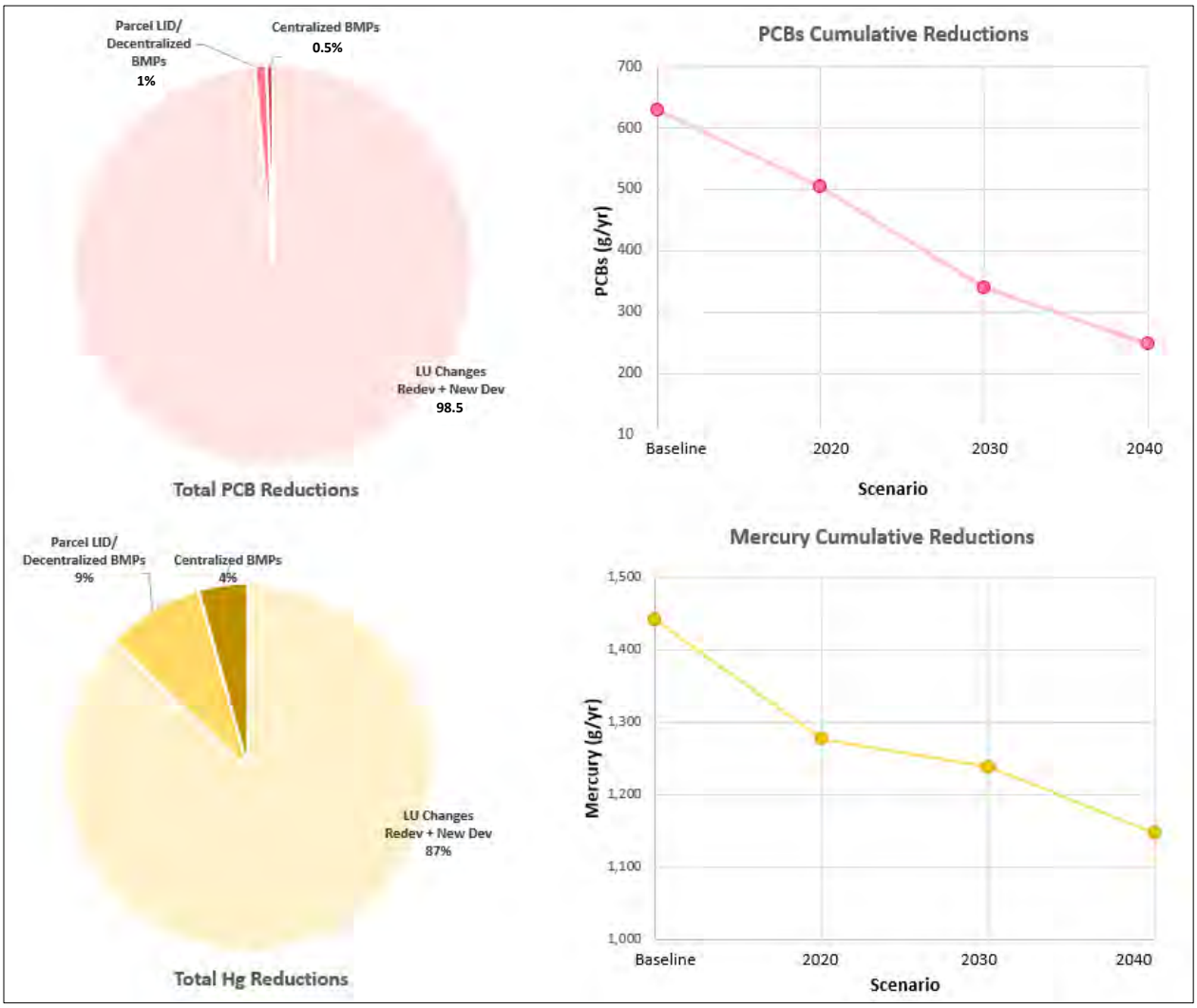

Figure 4.7. Reduction types and trajectory summary for Solano Permittees.

4.2.2 GSI load reductions detail

Examining the modeled reductions by type for each city illustrates pollutant reduction sources in greater detail. Table 4.3 lists the cumulative reductions for each scenario year for each of the Solano Permittee Cities, so that each scenario also includes the reductions from the previous decade scenario. By far, the largest PCB reductions associated with land use changes occurred in Vallejo (377 grams by 2040), compared to the other cities, since Vallejo had the greatest amount of high PCB producing land uses planned for redevelopment. Vallejo and Fairfield had comparable land use change reductions for mercury, at 112 grams and 127 grams respectively by 2040 (Table 4.4). Suisun had the smallest reductions, mostly because the drainage area is very small relative to Vallejo and Fairfield. All cities show comparatively small reductions for GSI relative to the land use changes.

Load reductions resulting from land use changes listed in tables Table 4.3 and 4.4 are the net reductions that include both redevelopment as well as new development. New development results in more pollutant loading due to additional stormwater runoff generation, but in each scenario and for each city, there a there are still net loading reductions. The runoff increases that resulted from the additional impervious coverage are shown as negative values in the reductions column for runoff. These increases are pronounced for Fairfield, where substantial areas of open space have recently been developed as new residential subdivisions. These recent changes were included in the 2020 scenario, and additional new development included in planning documents was allocated to the 2040 scenario. A smaller amount of new development was indicated in the Vallejo 2040 general plan that was allocated to the 2040 scenario and resulted in additional runoff increases. Overall, each city showed net runoff reductions due to implementation of GSU for each scenario year after accounting for new development runoff increases.

Regional treatment via routing of stormwater runoff to centralized BMPs produced similar reductions in Fairfield and Vallejo (Table 4.3). These reductions are due to centralized BMPs that have already been implemented or had detailed specifications available (2020 scenario) or were planned further out into the future (2030 scenario). No additional load reductions were calculated for centralized BMPs for the 2040 scenario, since there is no documentation of planned structures available, although new development areas will likely have adequate space for centralized treatment.

Table 4.3. Future scenarios estimated PCB reductions detail

PCBs		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Total Cumulative Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	137	-178	1.4	831.8	1.3	212.7	1.8	866	5	12,402	132
	2030			-178	1.9	864.1	1.5	419.2	2.9	1,105	6	12,163	131
	2040			-354	13.1	1,522.6	1.7	419.2	1.1	1,588	16	11,681	121
Suisun	**2020**	2,090	16	0	0.0	168.7	0.7	36.4	0.0	205	1	1,885	15
	2030			0	0.0	170.0	0.7	36.4	0.0	206	1	1,884	15
	2040			0	0.1	174.5	0.7	36.4	0.0	211	1	1,879	15
Vallejo	**2020**	13,391	477	0	128.9	642.7	0.6	83.1	2.0	726	131	12,665	346
	2030			0	278.7	1,176.4	1.0	132.8	2.0	1,309	282	12,081	195
	2040			-81	363.5	1,638.8	1.3	132.8	0.8	1,691	366	11,700	111
Solano Permittee Totals			**630**		**377**		**4**		**2**		**382**		**248**

Table 4.4. Future scenarios estimated mercury reductions detail

Mercury		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	664	-178	63.7	831.8	9.8	212.7	6.0	866	79	12,402	585
	2030			-178	65.7	864.1	10.6	419.2	7.6	1,105	84	12,163	580
	2040			-354	127.4	1,522.6	13.1	419.2	6.7	1,588	147	11,681	517
Suisun	**2020**	2,090	86	0	16.5	168.7	2.6	36.4	1.1	205	20	1,885	66
	2030			0	16.6	170.0	2.7	36.4	0.0	206	19	1,884	67
	2040			0	17.1	170.0	2.7	36.4	0.0	206	20	1,884	66
Vallejo	**2020**	13,391	691	0	54.8	642.7	4.1	83.1	7.3	726	66	12,665	625
	2030			0	85.8	1,176.4	7.4	132.8	7.4	1,309	101	12,081	591
	2040			-81	112.4	1,638.8	9.9	132.8	6.1	1,691	128	11,700	563
Solano Permittee Totals			**1,441**		**257**		**26**		**13**		**295**		**1,146**

4.2.3 Compliance demonstration

4.2.3.1 *MRP GSI reductions compliance*

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, Permittees must also project the load reductions achieved via green stormwater infrastructure by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040.

Estimated pollutant load reductions for the Solano Permittees are listed in Table 4.5 illustrate that reductions far exceed the 2020 and 2040 reduction targets. The estimated GSI reductions for each scenario correspond to totals for all cities listed in Tables 4.3 and 4.4. While the 2020 reduction targets listed in Table 4.5 for the Solano Permittees are absolute values listed in the MRP, the 2040 GSI targets have been rescaled based on new calculated baseline values per recommendations in the RAA Guidance (BASMAA, 2017, section 3.5). This calculation uses the proportions of the total estimated reductions for each pollutant to determine GSI targets: 20.8% of the total reductions for PCBs, and 16.1% for mercury. In both cases, GSI reductions are the vast majority of the total reductions. As already discussed, this is because the GSI RAA reductions include those result from redevelopment land-use conversion (BASMAA, 2017).

Table 4.5. Green stormwater infrastructure load reduction estimates and target reductions

	Scenario	Estimated Loading (g)	Estimated GSI Reduction (g)	WLA Reduction Target (g)**	GSI Reduction Target (g)*	Projected GSI % Attainment	% Reduction from Baseline	% Progress to WLA
PCBs	Baseline	630						
	2020	504	126	-	8	100%	20%	-
	2030	340	290	-	58	100%	46%	-
	2040	248	382	530	110	100%	61%	72%
Mercury	Baseline	1441						
	2020	1276	166	-	2	100%	12%	-
	2028	1238	204	0	33	100%	14%	-
	2040	1146	295	-	48	100%	21%	100%

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury). Since mercury estimates are already below WLA, they are calculated as a proportion of estimated reductions.

**Based on WLA target of 100g for PCBs, baseline estimate for mercury is below 2028 WLA target for mercury of 1600 g.

4.2.3.2 *Progress towards WLA targets*

The 2040 estimated PCB reductions (382 g) provide Solano Permittees with a 61% reduction below baseline loading estimates, which provides 72% of the reductions that will be required to reach the Solano Permittee's WLA of 100g. It is anticipated that the remainder of the required reductions will

be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment. A separate WLA RAA will be performed that includes reductions from source control measures, along with any additional GSI projects that are identified as part of the GSI Workplan that have not already been included in this the current analysis.

Estimated baseline loads for mercury (1441 g) were below the 2028 WLA (1600 g), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. If instead we appeal to a relative reduction metric, GSI reductions of 295 g are 14% below the baseline estimates, which may be compared with the regional relative mercury reduction target of 50% by 2028. Regardless of the target metric applied, additional GSI projects identified in the GSI Workplan along with source control measures will provide additional mercury reductions.

Modeled baseline estimates from swTELR may present a better alternative for tracking future progress towards mercury reductions compared to those from the TMDL. While the SF Bay regional mercury loading estimates employed extensive data analysis and modeling, allocations to individual communities relied only on population sizes. The close correspondence between swTELR and RWSM mercury load estimates provides a degree of confidence in the swTELR results.

One source of the discrepancy between the two models may be the incongruity between using population as a metric for distributing mercury loads, as in the TMDL, compared to land use, as in the SFEI mercury concentration layer used in this study. Higher populations generally correspond with a greater proportion of urbanized area. The land use layer employed in this study uses a mercury concentration of 80 ng/L for Ag/Open land use, and 3 ng for New Urban land use. So, more populated areas with greater urbanized area can actually result in relatively lower estimated mercury loading in any model using the RWSM land use layer compared to more populous areas. This is the inverse of the logic applied in the TMDL population-based model for estimating load allocations to individual communities.

4.2.4 Spatial prioritization analysis for additional GSI implementation

We explored the potential for additional reductions via GSI throughout the Solano Permittee MS4 Area. A metrics-based spatial prioritization analysis was performed to identify additional parcels and road segments that will be most suitable for GSI implementation, given logistical constraints and additional pollutant load reductions needed to meet future permit requirements. Both parcels and road segments were considered with the spatial metrics adjusted accordingly. The final scoring rubric and metrics were developed collaboratively with Solano Permittees and included and equal weighting of the following factors:

- Soil type

- Slope
- Land ownership
- Land use
- Source parcel status
- Parcel size
- Estimated catchment pollutant loading
- Redevelopment schedule
- Proximity to stormwater structures
- Proximity to Caltrans right of way

The spatial prioritization analysis provides a way to combine implementation feasibility, benefit magnitude, and other logistical factors. A geodatabase was constructed to house all of the GIS data and an automated spreadsheet was created for easy adjustments of metrics and weightings. Outputs from the spatial prioritization analysis serves two purposes: 1) provide some real practical and immediately actionable alternatives for GI implementation and 2) identification of additional means to meet GSI and WLA reduction target requirements. The full process for developing the spatial prioritization analysis is documented in the Green Infrastructure Workplan and here we focus on the outputs and how the outputs can be used to supplement the modeling results already presented to achieve additional future pollutant reductions.

Outputs from the spatial prioritization analysis are presented as maps in Figure 4.8 which shows the scores for each parcel and road segment (approximately 89,000 features total) throughout the Solano County MS4 Permittee Area. Green parcels and road segments indicate that they were in the top 20% of the priority scores and that they were not already treated in one of the modeling scenarios. Most of the parcels or road segments identified in Figure 4.8 are either Old Industrial, Old Transportation or Old Commercial land uses, which corresponds with the highest PCB concentration land uses (see Table 3.1). These parcels indicate the greatest potential for additional GSI implementation to achieve additional pollutant load reductions. GSI Projects identified using this spatial prioritization process can be incorporated for to subsequent modeling efforts to provide updated load reductions. Given that current GSI reductions exceed the GSI reduction requirements, Solano Permittees may also consider identifying synergistic opportunities within areas that have already been slated for redevelopment in the near future.

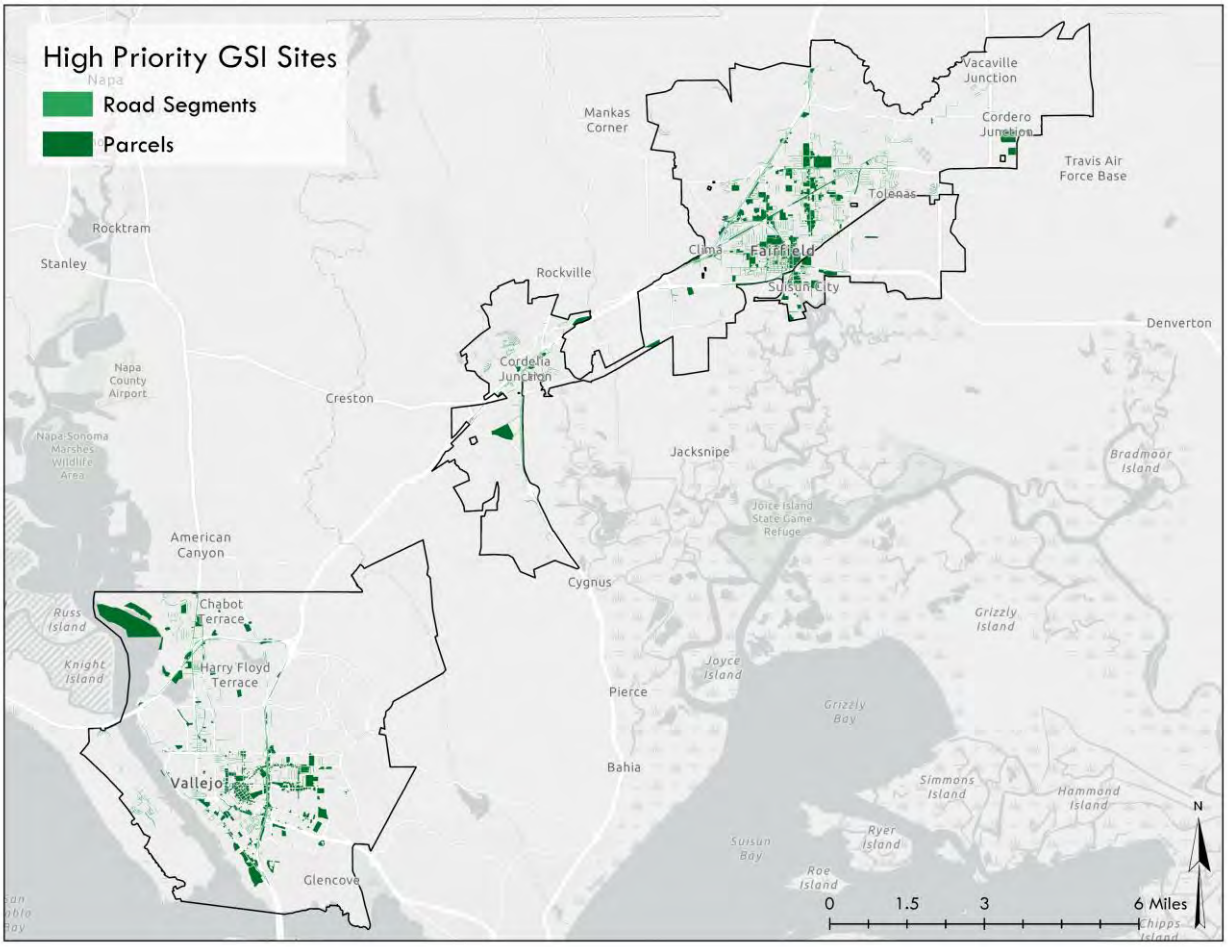

Figure 4.8. High priority parcels and road segments for GSI redevelopment

5 Conclusions

5.1 Results Summary

This data compilation and modeling effort quantifies the water quality benefits of current and planned GSI implementation for Solano County MS4 Permittees. This report satisfies MRP Provisions C.3.j and C.11/C.12.c to demonstrate that GSI implementation will meet specified targets. It also provides information to guide future implementation and development of the GSI Workplan. The modeling results clearly indicate that that if the Solano Permittee redevelopment land use changes proceed along their currently projected trajectory and continue to conform to MRP C3 GSI implementation requirements, they will exceed their GSI reductions targets for PCBs and mercury and make substantial progress towards wasteload allocation targets. Of course, there are limitations to the interpretation the model outputs imposed by various source of uncertainty (discussed in detail below), but the magnitude of exceedance of the GSI reduction targets is strong evidence that the signal of expected changes is probably beyond the boundaries of such uncertainty. Thus, the report provides reasonable assurance that PCB and mercury reduction performance standards established for GSI in MRP 2.0 will be met.

Key findings include:

- Baseline modeling showed that PCB contributions from the City of Vallejo were disproportionately large, primarily due to substantial coverage of Old Industrial land use areas on Mare Island.
- Baseline runoff, PCBs, and mercury estimates corresponded closely with outputs from RWSM at the regional scale.
- Baseline modeling results showed substantial deviations from those estimated for the Solano Permittees in the TMDL wasteload allocations, particularly for mercury. The discrepancy with the TMDL estimates may due to the TMDLs reliance on population to specify load allocations.
- Estimated PCB and mercury reductions meet the GSI reduction targets specified in the MRP for 2020, 2030, and 2040.
- Estimated reductions represent substantial progress towards WLA targets, with the PCB GSI reductions accounting for 72% of reductions required to achieve the 2040 WLA target.
- Reductions are primarily driven by land use conversion, particularly in the case of PCBs, and land use conversions on Mare Island and the Vallejo Waterfront account for most of the PCB reductions.
- A spatial prioritization analysis indicates additional opportunities throughout the Solano Permittees MS4 area for additional GSI implementation that will be further considered in the GSI Workplan.

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5.2 RAA Limitations

RAA is a modeling exercise, so it is subject to all of the usual limitations associated with using model outputs to make decisions. Chief among these is the uncertainty associated with the model inputs and the model structure that includes several simplifying assumptions employed for the sake of practicality (see Wijesiri and Liu, 2018, for a recent discussion). We have taken care to communicate those assumptions and identify uncertainties associated with the modeling process throughout this report to support a transparent RAA process. Regardless of the level of rigor employed, the limitations of RAA modeling should be taken into consideration when the outputs are used as the basis for prioritizing action.

Any model is a trade-off for characterizing a system that requires decisions about which elements to simplify and which elements to represent in greater detail. In this RAA we chose to favor spatial granularity above fine scale time resolution. In other words, BMP locations were represented spatially explicitly, but rainfall inputs were represented probabilistically rather than via sequential simulation. As has already been discussed, this choice is based on alignment of the model with the purpose of RAA and the ongoing need to track BMP performance. An important limitation of this approach is that the time-sequencing of events is not preserved, which can produce unique runoff responses. But since continuous simulation model outputs are aggregated to average annual values for RAA, the fine temporal resolution of continuous model outputs are not used any differently than those driven with probabilistic inputs. Moreover, average outputs have previously been judged generally acceptable for stormwater management planning (Lent et al., 2011).

This RAA employed an uncalibrated approach that relied strongly on the input data. Fitting model parameters to observed hydrologic data can improve model performance substantially and most continuous simulation models rely heavily on a calibration of some sort. No relevant long-term hydrologic calibration data were available for the Solano County Permittee MS4 Area. Even if these data were available, the calibration process comes with several limitations related to the ambiguity of identifying optimal parameter sets (see Beven, 2001). Additionally, for several Bay Area communities, the MS4 area may be small relative to the contributing watershed that flows to a gauge. When the MS4 occupies only a small amount of the watershed, fitting a model to the flow response at the bottom of that watershed results in a parameterization that primarily reflects the non-MS4 area. Alternatively, translation of parameterizations from gauged to ungauged basins is a non-trivial task, that has prompted a decade of academic level study via the International Association of Hydrologic Sciences[21].

A key source of modeling uncertainty in this RAA is the characterization of pollutant concentrations on the basis of land-use. Since there is wide variation of PCB and mercury concentrations within

[21] https://iahs.info/pub/index.php

individual land uses it provides an imprecise way to estimate pollutant land surface concentrations. High model sensitivity to pollutant concentration parameters means that model predictions can diverge substantially if these parameters are specified differently (e.g. Park, et al, 2009). Land-use based pollutant concentrations used in this study were based on sampling work conducted by SFEI throughout the SF Bay Area (Wu et al, 2003, McKee et al 2003, McKee, et al, 2015), but this regional dataset may not be representative of the land use pollutant relationships in Solano County, particularly since recent sampling efforts do not include sites in the north side of Suisun Bay (McKee et al. 2015). Representativeness of these data have been acknowledged as a potential source of uncertainty by McKee et al., 2015.

Finally, the structure of the RAA reporting provides some limitations to the interpretation of GSI benefits. Land use changes associated with redevelopment and GSI implementation often happen at the same time. Since land use changes have such a dramatic effect on modeled outputs, and land use changes are lumped in with the GSI reduction estimates, land use changes dominate the calculated GSI reductions. Actual GSI implementation provides a much smaller role in estimated pollutant load reductions once the land use has been changed to one that has characteristically low associated pollutant concentrations. The reality is probably a much less dramatic split between land use change and GSI implementation. An unintended consequence may be that parcels classified as high pollutant concentration land uses may be disproportionately selected for redevelopment even when other factors may weigh in favor of other parcels.

5.3 Recommendations for Ongoing Compliance

Meeting MRP pollutant load reduction targets will require ongoing tracking of BMP implementation and quantification of pollutant load reductions. RAA is a valuable initial step, but it will soon be just another report sitting on a shelf, rather than a tool to direct actions. Implementation will occur over a period of decades and in that time we will learn more than we know now. New BMPs will be created, knowledge of pollutant removal efficiency will grow, and the resources of cities and their priorities will shift. A more dynamic approach to quantifying benefits that can incorporate new information as it becomes available and provide outputs at scales and in formats that are relevant to stormwater managers will be needed. As an alternative to one-off modeling studies, such an approach can provide an iterative verification of progress, reducing risk of failure and tempering expectations of success.

As the capacity of cities grows to provide quantitative estimates of reductions, regulators should consider the value of becoming more flexible on prescriptive requirements to deliver other information that is comparatively less essential. Updatable modeling approaches that focus on the most critical information needs of both stormwater managers and regulators can probably provide more useful information than excessive prescriptive reporting requirements. Such focus will become more important as cities begin to require tracking not hundreds, but thousands of BMPs and GSI projects as implementation proceeds over the coming decades. At the same time, cities will need to

move towards a more efficient programs with the capacity to demonstrate compelling evidence of success. To do that, they will need access to the right tools and a strong vision from regulators that helps permittees focus their efforts on the greatest pollutant load reduction opportunities.

The RAA modeling study has clarified a number of recommendations to improve ongoing tracking and verification of pollutant reductions:

1. **Solano permittees should adopt a comprehensive data management approach to track implementation of GSI, such as outlined in the GSI Workplan.** This will help them provide ongoing verification to regulators that the estimates contained in this modeling report are proceeding as planned and avoid accounting errors.

2. **Integrate implementation tracking with a stormwater modeling tool.** This will create efficiencies for ongoing PCB and mercury load reduction quantification as implementation proceeds and also provide ongoing support for heuristic management scenarios to optimize implementation locations and BMP types. It will also serve as a key technical node for integration of GIS datasets relevant to stormwater reporting that are currently stored in disparate manner that makes reporting inefficient.

3. **Use the spatial prioritization approach to identify additional GSI implementation opportunities.** The GIS-based approach developed as part of this study and the GSI Workplan can be used to evaluate high priority areas within privately owned areas already planned for redevelopment or within the public right of way via synergistic implementation opportunities with Caltrans.

4. **Continue to coordinate with BASMAA for quantifying source reduction control measure quantification.** The methods employed should be closely integrated with GSI reduction quantification to ensure that overall WLA accounting is coherent.

5. **Work with regulators to craft requirements for MRP3 that are focused on outcomes and reporting efficiencies.** Negotiations with regional board staff via the BASMAA MRP3 Workgroup should endeavor to reduce reporting requirements for non-essential information that overlaps with performance-based requirements whenever appropriate.

These recommendations are intended to help the Solano Permittees be efficient in demonstrating MRP compliance progress and to help them craft permit requirements and implementation strategies that are conducive to their own community development goals

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Appendix A

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Appendix B

BMP type definitions used in swTELR

CENTRALIZED BMPS – TYPICALLY PUBLICLY OWNED & MAINTAINED BMPS, TREATING A LARGE (>20 ACRES) URBAN DRAINAGE WITH MULTIPLE LAND USES AND OWNERSHIP			
STRUCTURAL BMP TYPE	**OTHER NAMES**	**DESCRIPTION**	**TREATMENT PROCESSES**
Bed Filter	*Underground Sand Filter* *Surface Sand Filter* *Perimeter Sand Filter* *Organic Media Filter*	A flow-through structure that uses granular media (e.g. sand or activated alumina) to actively filter stormwater to remove stormwater pollutants. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	MEDIA FILTRATION
Detention Basin	*Detention Pond (impervious)* *Dry Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin, though generally these BMPs do not allow for adequate settling. Little to no volume loss via infiltration due to impervious or highly impermeable base. Vegetation may or may not be present. If treating a smaller area (<20 impervious acres), it is likely a **settling basin**.	PARTICLE CAPTURE

Structural BMP Type	Other Names	Description	Treatment Processes
Dry Basin	*Extended Detention Basin* *Dry Pond* *Pervious Detention Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin. Footprint is pervious and infiltration capacity of base maintained to consistently infiltrate some fraction of volumes detained to unsaturated zone. Wetland and riparian vegetation species distribution is minimal to absent. Moderate distribution of grass and/or tree species likely and acceptable. If treating a smaller area (<20 impervious acres), it is likely a **bioretention**.	INFILTRATION PARTICLE CAPTURE
Infiltration Basin	*Large-Scale Infiltration Feature*	A flow-through BMP with highly permeable substrate (aggregate or rock) designed to store and infiltrate significant volumes of stormwater into unsaturated zone. Little to no surface detainment storage. Vegetation distribution should be minimal and preferably absent. May be confined space but not usually. If treating a smaller area (<20 impervious acres), it is likely an **infiltration feature**.	INFILTRATION
Media Filter	*Proprietary Subsurface Filtration Systems:* *Stormfilter®* *Perk Filter™* *Jellyfish®*	A proprietary subsurface flow-through structure that uses a membrane or other media to actively filter stormwater to remove stormwater pollutants. Proprietary models include media or membranes that may be selected to target the specific removal of the pollutants of concern, resulting in downgradient stormwater concentration reductions. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs.	MEDIA FILTRATION

		May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	
Treatment Vault	*Hydrodynamic Separator (e.g. Vortechs, CDS®, DVS)* *Wet Vault* *Detention Vault* *Flow Separation Vault* *Gross Solids Retention Devices* *Large Scale Settling Basins*	A subsurface flow-through structure that physically separates sediment, trash, leaf litter, debris and other particulate pollutants from stormwater via various separation or settling techniques. No volume reduction occurs due to impervious base. May be confined space but not always. Accumulation of material at base of BMP can be observed and measured via manhole access. If no access points exist, the BMP can be inventoried as Confined Space and assessed based on a set maintenance interval. If treating a smaller area (<20 impervious acres), it is likely a **sediment trap**.	PARTICLE CAPTURE

Wet Basin	*Wet Pond* *Retention Pond* *Wetland Swale* *Wet Extended Retention Pond* *Stormwater Wetlands* *Constructed Wetlands*	A flow-through basin with discrete inlets and outlets designed to retain some volume stormwater runoff in a persistent pool of surface water. Designs may include additional detainment storage of stormwater for some minimum time to reduce peak flows. Wet pool capacity, treatment capacity and draw down time of treated volumes will vary across specific BMPs. One or more outflow offices may exist at different elevations. Lowest outlet elevation sets wet pool capacity. Dense vegetation is common. Dominant vegetation is wetland species and can be supplemented with riparian species with very high densities. Substrate is typically fine organic matter and silt, making volume reductions via infiltration negligible. Volume reductions, if any, occur primarily by evapotranspiration. If treating a smaller area (<20 impervious acres), it is likely a **biofiltration**.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

DECENTRALIZED BMPS – TYPICALLY TREATING < 1 ACRE OF IMPERVIOUS AREA BUT UP TO 20 ACRES, TYPICALLY ACCEPTS RUNOFF FROM A SINGLE LAND USE DRAINAGE AREA, ASSOCIATED WITH NEW / RE-DEVELOPMENT AND ROADSIDE PROJECTS,

STRUCTURAL BMP TYPE	OTHER NAMES	DESCRIPTION	TREATMENT PROCESSES
Bio-filtration	*Lined rain garden with no infiltration* *Urban Biofilter* *Tree Box Biofilter (TreePod, Filterra)*	A vegetated BMP where stormwater is filtered through a specialized soil media and discharged via an underdrain. BMP may be lined with membrane or concrete. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Site designed biofiltration systems use specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Proprietary designs vary and may or may be confined space and difficult to access for inspection.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

		If treating a larger area (>20 impervious acres), it is likely a **wet basin**.	
Bio-retention	*Biofilter* *Rain garden with infiltration* *Self-Retaining Areas*	A vegetated retention structure where the base of the BMP is not lined and must infiltrate volumes and allow infiltration to unsaturated zone. Designs may or may not include an underdrain. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Outlet design either passive surface outlet (e.g., curb cut) or piped overflow (e.g., overflow inlet and underdrain) used to allow retention and ponding. Constructed with specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Typically includes rock or aggregate subsurface reservoir under the soil media to enhance storage/infiltration. Designs may include settling forebay at inlet(s) to remove sediment. Vegetation types include species that can tolerate stormwater ponding and drought conditions. If treating a larger area (>20 impervious acres), it is likely a **dry basin**.	INFILTRATION BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

Structural BMP Type	Other Names	Description	Treatment Processes
Bioswale	*Grass Swale* *Grass Filter Strips* *Vegetated Buffer Strips* *Bioslopes*	A flow-through area with dense vegetation coverage (>80%). Flow surface topography allows inundation of adjacent vegetated areas during storm runoff. Design includes gentle sloped flow paths and dense vegetation to promote primary stormwater surface filtration, adsorption to vegetation and settling. Biological processes include geochemical transformation and plant uptake. Infiltration performance and volume reductions may vary. These are not highly engineered systems. Size and application of bioswales can vary.	BIO-GEOCHEMICAL CYCLING INFILTRATION
Filtration Device	*Filtration Device* *Proprietary Inserts* *Catch Basin Inserts* *Drain inserts* *Inlet filters* *Decentralized Media Filter*	A proprietary flow-through structure that uses a membrane or other media to actively filter stormwater to target the specific removal of stormwater pollutants of concern, resulting in downgradient stormwater concentration reductions. Design may include the installation of an insert within the sediment trap or drop inlet structure to treat various pollutants. Examples include REM Triton Filter, CULTEC StormFilter, FlexStorm Inlet Filters, Kristar FloGard, etc. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a larger area (>20 impervious acres), it is likely a **media filter**.	MEDIA FILTRATION
Infiltration Feature	*Infiltration Trench* *Dry Well* *Exfiltration Trench* *Percolation Trench* *French Drain* *Roof Drip-Line*	A small-scale structure designed to retain stormwater from small impervious drainage area and infiltrate into unsaturated zone. Land surface modified to sustain maximum infiltration rates, typically consisting of vertical excavation of native soils and filling with coarse drain rock or other highly permeable material. Vegetation is absent. May be confined space but not usually. If treating a larger area (>20 impervious acres), it is likely an **infiltration basin**.	INFILTRATION

Structural BMP Type	Other Names	Description	Treatment Processes
Pervious Pavement	*Permeable Pavement* *Porous Asphalt* *Pervious Concrete* *Porous Aggregate* *Pervious Pavers* *Permeable Pavers*	Use of sustainable materials to create a durable, pervious surface overlaying a crushed stone base that allow stormwater to percolate and infiltrate into the underlying soil. Porous pavement can include an underlying reservoir to increase infiltration rates. Footprint of structural BMP type can vary greatly, typically used for parking lots, sidewalks, driveways or other hardscaped surfaces. When stormwater is routed to pervious pavement for treatment through infiltration, the pervious pavement is considered a structural BMP and should be inventoried in BMP RAM. When pervious pavement is solely treating the precipitation falling on the pavement, it is considered part of LID design and should be included in Parcel RAM condition observations.	INFILTRATION
Sediment Trap	*Catch Basin with sump,* *Sediment Chamber,* *Vertical CMP,* *Small Hydrodynamic Separators,* *Bubble Up*	A small decentralized BMP designed to capture and retain sediment, leaf litter, trash, coarse particles and/or other stormwater pollutants. Capture of material may occur through variable flow modifications or passive settling, but result is vertical accumulation of material at base of BMP reservoir with regular material cleanout required. Minimal to no stormwater volume reduction occurs. Water quality improvement downgradient expected as result of concentration reduction due to material capture within BMP. May be confined space but not always. Typically accepts runoff from road or a parking lot. If treating a larger area (>20 impervious acres), it is likely a **treatment vault**.	PARTICLE CAPTURE
Settling Basin	*Settling Pond,* *Sediment Basin* *Decant Pond* *Concrete Forebay* *Forebay*	Open flow-through structures used to detain stormwater volumes and settle particulate pollutants prior to outflow. Pollutant load reductions are realized by concentration reductions with no volume reduction via infiltration due to impervious or highly impermeable base. May be confined space but not usually. Size and application of settling basins can vary: • Large scale settling basin draining a mixed land use area can be classified and assessed as a **treatment vault.** • Smaller sized settling basins draining a single land use area can be classified and assessed as a **sediment trap**. • If treating a larger area (>20 impervious acres), it is likely a **detention basin**.	PARTICLE CAPTURE

Appendix C

Catchment attributes and routing.

Catchment ID	Area (acres)	Discharge Point Type	Receiving Water	Terminal Catchment	Connectivity (%)	Impervious (%)	Primary Soil Group	Average Slope
Vallejo								
DT5	62.6	Discrete	Mare Island Strait	DT6	100	76.9	D	5.2
LC13	70.7	Distributed	Blue Rock Springs Creek		100	42.1	D	4.4
GC8	104.4	Distributed	Carquinez Strait		100	28.1	C	19.7
LC43	59.6	Discrete	Napa River	LC44	100	47.2	D	6.3
SA41	35.8	Distributed	Mare Island Strait	SA55	100	66.8	C	1
SP9	30.6	Distributed	White Slough		100	57.5	D	0.9
WC4	31	Discrete	American Canyon Creek	WC7	100	13.4	D	22.1
LC15B	34.7	Distributed	Rindler Creek		100	64	C	3.6
MI24	41	Distributed	Mare Island Strait		100	59.8	C	1.5
DT4	39.4	Distributed	Mare Island Strait		100	73.1	D	4.2
LC17	67.7	Discrete	Rindler Creek	LC19B	100	33.6	D	31.5
MI11	22.7	Distributed	Napa River		100	58.9	D	15.5
SA19	50.4	Discrete	Mare Island Strait	SA55	100	60.6	C	6.2
SA51	57.8	Discrete	Mare Island Strait	SA55	100	65.6	C	2.1
LC59	130.9	Distributed	Sulphur Springs Creek		100	0.1	A	24.8
SP14	30.2	Distributed	Napa River		100	54.1	C	1.5
CP13	51.1	Distributed	Southhampton Bay		100	0	D	26.5
MI23	206.3	Distributed	Napa River		100	60.8	D	0.4
LC19B	41.1	Discrete	Rindler Creek	LC19B	100	73.7	D	19.1
AC27B	10.6	Distributed	Napa River	AC5	100	56.9	C	6.1
SP5B	102.1	Distributed	San Pablo Bay		100	48	C	4.2
AC14	55.8	Distributed	Napa River	AC5	100	71.3	C	1.3
AC15	23.1	Discrete	Napa River	AC5	100	72.3	C	0.5
AC16	48	Distributed	Napa River	AC5	100	52.7	D	7.2
AC17	29.5	Discrete	Napa River	AC5	100	52.1	D	9.1
AC18	65.4	Discrete	Napa River	AC5	100	55.3	C	5.4
AC20	54.6	Discrete	Napa River	AC5	100	71	C	1.1
AC31	31.2	Discrete	White Slough	AC31	100	70.7	C	1.7
AC21	51.4	Discrete	White Slough	AC31	100	62.7	D	9.6
DT3	37	Discrete	Mare Island Strait		100	68.9	D	4.9
CP11	97.4	Distributed	Southhampton Bay	CP12	100	3.2	C	17.2
LS18	25.6	Distributed	Lake Dalwigk	LS31	100	71.7	C	4.6
SA3	25.8	Distributed	Mare Island Strait	SA55	100	51.5	C	3.5
SA56	24.1	Discrete	Mare Island Strait	SA55	100	71.2	D	6.1
AC10B	47.6	Discrete	Napa River		100	68.5	D	6.4
DT6	16.2	Discrete	Mare Island Strait	DT6	100	59.1	D	1.5
DT7	42.1	Discrete	Mare Island Strait		100	60.1	D	9.6
SA25	20.4	Distributed	Mare Island Strait		100	60.8	C	0.8
GC1A	99.7	Discrete	Carquinez Strait		100	40.6	D	25.7
GC10	79.5	Distributed	Carquinez Strait		100	28.3	D	16.8
GC11	48.9	Discrete	Carquinez Strait	GC4A	100	46.4	D	14.9
GC12	47.7	Distributed	Carquinez Strait		100	54.9	D	20.9
LC58	17.2	Discrete	Rindler Creek	LC20B	100	76.2	D	17.3
AC41	52.9	Discrete	Napa River	AC5	100	71.1	D	0.3
LC4B	61.3	Distributed	Blue Rock Springs Creek		100	54.2	D	12.6
LC37B	54	Distributed	Lake Chabot		100	72.9	D	8.6

GC1B	77.8	Discrete	Carquinez Strait	GC1C	100	48.8	D	17.1
GC1C	51	Discrete	Carquinez Strait	GC1C	100	58.4	D	19.3
LC20B	102.7	Discrete	Rindler Creek	LC20B	100	57.8	D	13.9
CP4B	94.1	Discrete	Southhampton Bay	CP5	100	25.1	D	21.8
SA14	31.2	Discrete	Mare Island Strait	SA55	100	66.5	C	1.3
SA16	42.9	Discrete	Mare Island Strait	SA55	100	63.7	D	16.4
LS7	34.6	Distributed	Mare Island Strait		100	56	D	16.2
LS8	66.5	Distributed	Mare Island Strait		100	55.4	D	13
MI10	35.7	Distributed	Mare Island Strait		100	28	D	26.8
SA50	45.9	Discrete	Mare Island Strait	SA55	100	68.6	C	1.5
SA52	25.5	Discrete	Mare Island Strait	SA55	100	72.5	C	1.9
SA53	27.7	Distributed	Mare Island Strait		100	69.5	D	6.2
SA54	31.5	Distributed	Mare Island Strait		100	71.7	D	5.3
SA55	42.3	Discrete	Mare Island Strait	SA55	100	72.2	C	1.8
SA59	30.2	Discrete	Mare Island Strait	SA55	100	77.9	C	1.3
SA62	33.9	Discrete	Mare Island Strait	SA55	100	55.6	D	16.1
SA63	28.4	Distributed	Mare Island Strait		100	71.5	C	1
SA64	21.3	Discrete	Mare Island Strait		100	73.7	C	0.8
SA7	36	Distributed	Mare Island Strait		100	62.1	D	14.5
SA8	45.8	Discrete	Mare Island Strait	SA55	100	57.5	D	10.5
AC53	51.6	Distributed	White Slough		100	79.9	D	0.4
AC36	27.8	Distributed	Napa River		100	57.9	D	12.6
AC37	24	Distributed	Napa River	AC5	100	71.9	C	2.6
AC38	28.2	Distributed	Napa River	AC5	100	57.7	C	1.9
AC39	35.5	Discrete	Napa River	AC5	100	53.1	D	14
AC5	42.9	Discrete	Napa River	AC5	100	34.3	D	0.9
AC55	23.3	Discrete	Napa River	AC5	100	67.4	C	0.7
AC7	61.4	Discrete	Napa River	AC5	100	69.2	C	1.2
MI20	51.4	Distributed	Mare Island Strait		100	44.6	C	3.7
DT11	26.6	Discrete	Mare Island Strait	DT11	100	62.9	D	6.9
AC50	70.9	Distributed	White Slough	AC51	100	78.6	D	0.4
AC51	15.6	Discrete	White Slough	AC51	100	86.2	D	0.5
AC52	21.1	Distributed	Napa River	AC5	100	67.6	D	0.5
DT2	23	Discrete	Mare Island Strait	DT2	100	74.8	D	1.6
AC13	46.2	Distributed	Napa River	AC5	100	61.3	C	2
AC1	26.7	Discrete	Mare Island Strait	SA55	100	67.8	C	1
AC10A	70.3	Discrete	Napa River	AC5	100	66.9	C	4
AC12	53.7	Distributed	Napa River	AC5	100	75.5	D	4.5
AC22	75.9	Discrete	White Slough	AC31	100	63.1	D	9.3
AC23	27.6	Distributed	White Slough	AC31	100	58.1	D	9.3
AC24	47.6	Distributed	Napa River		100	61.9	D	5.4
AC25	45.9	Distributed	Napa River		100	55.1	D	8.6
AC26	85	Discrete	Napa River		100	61.8	D	8.6
AC27A	56.8	Discrete	Napa River	AC5	100	67.6	C	2.7
AC28	63.3	Discrete	White Slough	AC31	100	60.7	D	11.2
AC29	72.7	Discrete	White Slough	AC31	100	64.8	D	11.6
AC3	47.8	Discrete	Mare Island Strait	SA55	100	64.2	C	1.3
AC30	63	Discrete	White Slough	AC31	100	59.1	C	4.9
AC32	60.8	Discrete	White Slough	AC31	100	67.8	C	2.7
AC34	59.7	Distributed	White Slough	AC31	100	70.4	C	4.7
AC35	52.8	Distributed	Napa River	AC5	100	80.6	C	0.4
AC40	66.6	Distributed	Napa River	AC5	100	39.4	D	9.7
AC42	45.9	Distributed	Napa River		100	50.4	D	9.9
AC44	42	Distributed	Napa River	AC5	100	36	D	3.6
AC8	78.7	Distributed	Napa River	AC5	100	59.7	C	1.7

AC45	48	Discrete	Napa River	AC5	100	57.5	D	2.5
AC46	49	Distributed	White Slough		100	79.2	D	1
AC47	38.8	Discrete	White Slough	AC31	100	58.4	C	0.8
AC48A	148.3	Distributed	White Slough		100	15.9	D	0.4
CP1	124.4	Discrete	Southhampton Bay		100	38.2	D	20.2
CP10	85.8	Discrete	Southhampton Bay	CP12	100	42.8	D	13.2
CP12	125.7	Discrete	Southhampton Bay	CP12	100	43.6	D	11.2
CP2	41.3	Distributed	Southhampton Bay		100	56.1	D	11.8
CP3	65.3	Distributed	Southhampton Bay	CP12	100	45.6	D	17.1
CP4A	70.4	Discrete	Southhampton Bay	CP5	100	41	D	20.6
DT12	67.8	Discrete	Mare Island Strait	DT11	100	69.3	D	4.8
CP5	76	Discrete	Southhampton Bay	CP5	100	55	D	15
CP7	64.6	Distributed	Southhampton Bay	CP5	100	15.3	D	16.9
CP8	66.7	Discrete	Southhampton Bay	CP5	100	18.3	D	15.9
CP9	63.4	Discrete	Southhampton Bay	CP12	100	57	D	12.6
DT1	46	Discrete	Mare Island Strait	DT2	100	74.6	D	9.5
GC2A	84	Discrete	Carquinez Strait		100	57.7	D	13.5
GC3	87.2	Discrete	Carquinez Strait	GC1C	100	35.2	D	24.1
GC4A	95.3	Discrete	Carquinez Strait	GC4A	100	42.2	D	17.5
GC6	55.8	Discrete	Carquinez Strait		100	36.6	C	18
GC7	36.5	Distributed	Carquinez Strait	GC4A	100	2.5	C	26.8
LC12A	81	Discrete	Rindler Creek		100	61.9	D	10.4
LC1A	199.9	Distributed	Blue Rock Springs Creek		100	8.7	D	18.2
LC10	25.4	Distributed	Rindler Creek		100	62.5	D	5.5
LC11	23.7	Distributed	Rindler Creek		100	70.2	C	7.2
LC18	200.8	Distributed	Rindler Creek		100	1.7	A	27.4
LC19A	121.3	Distributed	Rindler Creek		100	3.5	D	26.9
LC20A	105.8	Distributed	Rindler Creek		100	4.7	D	22.9
LC21	249.9	Distributed	Rindler Creek		100	11.2	D	20.7
LC22	98.9	Distributed	American Canyon Creek		100	1.3	D	22.3
LC24	113.7	Distributed	American Canyon Creek		100	35.7	D	16.7
LC26A	108.4	Discrete	Blue Rock Springs Creek	LC34A	100	49.6	D	18.8
LC35	19.8	Discrete	Lake Chabot	LC34	100	63.6	D	4.6
LC36	62.3	Discrete	Rindler Creek		100	63.1	D	17.1
LC27	144.7	Distributed	Lake Chabot		100	47.8	C	2.1
LC3A	61.8	Discrete	Blue Rock Springs Creek	LC34A	100	57.5	D	16
LC31	85.8	Discrete	Lake Chabot	LC34	100	59.7	D	12.3
LC32	46.9	Discrete	Lake Chabot	LC34	100	66.5	C	10.7
LC33	29.3	Discrete	Lake Chabot	LC34	100	60.8	C	4.4
LC34	54.2	Discrete	Lake Chabot	LC34	100	60.3	C	3.2
LC44	90.2	Distributed	Napa River	LC44	100	57.5	C	3
LC45	53.4	Discrete	Napa River	LC44	100	65.9	D	5.8
LC56	38.3	Discrete	Blue Rock Springs Creek	LC50	100	80.9	D	16.1
LC46	83.3	Distributed	White Slough	LC38	100	60.2	D	14
LC47	54	Discrete	White Slough	LC38	100	73.9	C	1.2
LC48	33	Discrete	Rindler Creek	LC19B	100	75.5	D	20.3
LC49	31.7	Discrete	Rindler Creek	LC19B	100	71.4	D	14.7
LC5	50.5	Distributed	Blue Rock Springs Creek		100	57.6	D	14.2
LC50	53.5	Discrete	Blue Rock Springs Creek	LC50	100	77.2	D	19.3
LC51	38.9	Discrete	Blue Rock Springs Creek	LC51	100	82	D	20.5
LC52	34.3	Discrete	Blue Rock Springs Creek	LC51	100	74.1	D	20.1
LC6	86.1	Distributed	Blue Rock Springs Creek		100	42.4	D	17.5
LC8	32.4	Distributed	Blue Rock Springs Creek		100	76.8	C	3.6
LS1	66.6	Discrete	Mare Island Strait		100	55.2	D	14.4
LS10	57.5	Discrete	Mare Island Strait		100	66.6	D	6.5

LS11	30.6	Discrete	Lake Dalwigk		100	51	D	9.1
LS12	24.2	Discrete	Lake Dalwigk		100	47.4	D	12.9
LS13	41.1	Discrete	Lake Dalwigk	LS31	100	51.8	D	11.2
LS14	52.1	Discrete	Lake Dalwigk	LS31	100	44	D	10
LS15	35.3	Discrete	Lake Dalwigk	LS31	100	44.6	D	12.2
LS16	39.1	Discrete	Lake Dalwigk	LS31	100	59.1	D	7
LS23	97.5	Distributed	Lake Dalwigk	LS31	100	44.1	D	5.6
MI12	23.5	Discrete	Mare Island Strait	DT11	100	63.3	D	11
LS19	70.6	Distributed	Carquinez Strait		100	56.9	D	11.7
LS20	55.6	Distributed	Lake Dalwigk	LS31	100	38.8	D	8.4
LS21	50.6	Discrete	Lake Dalwigk	LS31	100	53.3	D	8.1
LS22	85.8	Discrete	Lake Dalwigk	LS31	100	49	D	8
LS24	42.4	Distributed	Lake Dalwigk	LS31	100	55	D	6.7
LS25	34.2	Discrete	Lake Dalwigk	LS31	100	61.4	D	6.6
LS26	53.8	Discrete	Lake Dalwigk	LS31	100	57.1	D	5.8
LS27	38.8	Distributed	Lake Dalwigk	LS31	100	58.3	D	6
LS29	34.7	Distributed	Lake Dalwigk	LS31	100	70	C	3.8
LS3	37.7	Discrete	Mare Island Strait		100	61.4	D	9.8
LS4	45.4	Distributed	Mare Island Strait		100	55.3	D	6.2
LS30	64.7	Distributed	Lake Dalwigk	LS31	100	71.7	C	1.7
LS31	24.5	Discrete	Lake Dalwigk	LS31	100	72.1	C	2.6
LS32	18.5	Distributed	Lake Dalwigk	LS31	100	52.4	D	9.2
LS33	79.4	Discrete	Lake Dalwigk		100	65.2	C	2.9
LS34	21.7	Distributed	Mare Island Strait		100	70.1	D	5
LS36	59.4	Distributed	Lake Dalwigk		100	40.5	C	3.3
LS37	35.5	Distributed	Mare Island Strait		100	66.6	C	1.2
SA13	29.5	Discrete	Mare Island Strait	SA55	100	64.9	C	1.9
MI4	26.7	Discrete	Mare Island Strait	MI4	100	45.8	D	18.6
MI17	50.5	Distributed	Napa River		100	52.1	D	14.6
MI13	20.5	Distributed	Napa River		100	49.4	D	16.8
MI15	47.6	Distributed	Napa River		100	57.2	D	7.7
MI16	47.1	Distributed	Napa River		100	49.7	D	4
MI18	37.9	Discrete	Mare Island Strait	MI18	100	31	D	4.7
MI2	29.5	Distributed	Mare Island Strait		100	32.9	D	24.1
MI3	75.3	Discrete	Mare Island Strait	MI4	100	44.4	D	22.3
SA18	20.5	Discrete	Mare Island Strait	SA55	100	68.4	C	6.4
MI6	76.9	Discrete	Mare Island Strait		100	52.3	D	12.7
MI7	76.7	Discrete	Mare Island Strait	MI18	100	60.6	D	8.5
MI8	68.2	Discrete	Mare Island Strait		100	68.4	C	2.7
SA10	67.2	Discrete	Mare Island Strait	SA55	100	39.3	D	15
SA11	26.2	Discrete	Mare Island Strait	SA55	100	53.5	D	12.3
SA12	46.6	Discrete	Mare Island Strait	SA55	100	61.4	C	3.8
SA17	68.7	Discrete	Mare Island Strait	SA55	100	57.1	D	17.5
SA2	53.4	Discrete	Mare Island Strait	SA55	100	41.8	D	12.1
SA21	52.2	Discrete	Mare Island Strait	SA55	100	55.4	D	11.9
SA22	90.9	Discrete	Mare Island Strait	SA55	100	48.4	D	12.5
SA23	31	Distributed	Mare Island Strait	SA55	100	53.1	C	2.5
SA24	37	Distributed	Mare Island Strait	SA55	100	52.9	C	5.3
SA26	56.8	Distributed	Mare Island Strait	SA55	100	54.1	C	4.9
SA27	47	Discrete	Mare Island Strait	SA55	100	51.9	D	5.6
SA29	58.7	Discrete	Mare Island Strait	SA55	100	61.2	C	1.1
SA31	48.4	Discrete	Mare Island Strait	SA55	100	70.5	C	1
SA32	41.9	Discrete	Mare Island Strait	SA55	100	63.7	C	3.5
SA37	59.1	Discrete	Mare Island Strait	SA55	100	56.6	D	11.7
SA38	30.3	Discrete	Mare Island Strait	SA55	100	58.2	C	5.7

SA39	70.1	Distributed	Mare Island Strait	SA55	100	60.2	D	13.2
SA4	22.9	Distributed	Mare Island Strait	SA55	100	59.1	C	2.3
SA40	34.4	Distributed	Mare Island Strait	SA55	100	71.7	C	6.5
SA42	65.1	Distributed	Mare Island Strait	SA55	100	57	C	1.4
SA43	36.6	Discrete	Mare Island Strait	SA55	100	57.6	D	6
SA44	43.4	Discrete	Mare Island Strait	SA55	100	45.4	D	4.4
SA6	29.6	Discrete	Mare Island Strait	SA55	100	64	C	2.2
SA45	37.1	Distributed	Mare Island Strait	SA55	100	47.7	D	4.5
SA46	50.3	Distributed	Mare Island Strait	SA55	100	59.3	D	4.4
SA48	14.6	Discrete	Mare Island Strait	SA55	100	70.8	C	0.8
SA49	51.9	Discrete	Mare Island Strait	SA55	100	51.7	C	1.2
SA5	62.1	Distributed	Mare Island Strait	SA55	100	61.1	C	5.1
SA9	73.6	Discrete	Mare Island Strait	SA55	100	55.8	D	8
SP1A	54.8	Discrete	Napa River		100	37.1	D	7
SP11	48.1	Distributed	Napa River		100	71.7	C	1.5
SP12	53.6	Distributed	Napa River		100	71.6	C	0.6
SP13	84.8	Distributed	Napa River		100	63.8	C	0.9
SP2A	73.8	Distributed	Napa River	SP7	100	33.4	D	1.4
SP3A	29.5	Discrete	Napa River	SP7	100	42.4	C	0.6
SP5A	78.2	Discrete	Napa River	SP7	100	48	C	0.6
SP6A	78.1	Discrete	Napa River	SP7	100	20.8	D	1.2
SP7	58.7	Discrete	Napa River	SP7	100	63.6	C	0.7
SV1A	247.6	Distributed	Sulphur Springs Creek		100	11.6	A	19
SWANZY	20.4	Distributed	Mare Island Strait		100	53.4	D	13.5
WC1	49.3	Discrete	American Canyon Creek	WC7	100	61.6	D	7.4
GC13	79.5	Distributed	Carquinez Strait		100	4.1	C	20.1
WC2	29.1	Discrete	American Canyon Creek	WC7	100	60.6	D	4.5
WC3	50.9	Discrete	American Canyon Creek	WC7	100	36.2	D	14.2
WC5	52.4	Distributed	American Canyon Creek		100	1.3	D	21
SV4	142.1	Distributed	Sulphur Springs Creek		100	0	A	26.1
WC6	101.1	Distributed	American Canyon Creek	WC7	100	54.6	C	7.4
WC8	51.2	Distributed	American Canyon Creek	WC7	100	0.7	D	26.4
SV3	310.4	Distributed	Sulphur Springs Creek		100	0	A	26.6
SP6B	395.8	Distributed	San Pablo Bay		100	20.8	D	10.6
AC56	213.2	Distributed	White Slough		100	6.7	D	0.3
SP15	93.5	Distributed	Napa River		100	12.9	D	0.6
MI22	105.5	Distributed	Napa River		100	39	C	1.2
LC63	163.5	Distributed	Rindler Creek		100	1.4	D	20.4
SP16	140.4	Distributed	Napa River		100	7.8	D	0.7
LC60	273.7	Distributed	Sulphur Springs Creek		100	0	A	23
MI25	51.3	Distributed	Mare Island Strait		100	61	C	2.1
MI26	195.7	Distributed	Mare Island Strait		100	70.1	D	2.3
SV2C	271.7	Distributed	Sulphur Springs Creek		100	1.9	A	25.5
SV2A	75	Discrete	Sulphur Springs Creek		100	24.3	C	14.6
SV2D	50.4	Distributed	Sulphur Springs Creek		100	17.1	C	19.2
SV1B	255.7	Distributed	Sulphur Springs Creek		100	11.5	A	20.2
SV1C	83.9	Distributed	Sulphur Springs Creek		100	16.9	A	19.7
LC1B	135.9	Distributed	Blue Rock Springs Creek		100	9.7	D	16.6
LC1C	119.4	Distributed	Blue Rock Springs Creek		100	19	D	10.4
LC61	66	Distributed	American Canyon Creek		100	2.4	C	27.5
LC62	109.1	Distributed	American Canyon Creek		100	0	A	23.1
AC48B	137.9	Distributed	White Slough		100	6.1	D	0.3
CP4C	31.9	Distributed	Southhampton Bay	CP5	100	47.8	D	21.1
GC4B	79.6	Distributed	Carquinez Strait		100	48.6	D	14.5
LC26B	63	Discrete	Blue Rock Springs Creek	LC34A	100	65.4	D	13.8

LC12B	79.5	Discrete	Rindler Creek		100	51.7	D	7.2
LC3B	35.8	Discrete	Blue Rock Springs Creek	LC34A	100	54.6	D	17.3
LC4C	52	Distributed	Blue Rock Springs Creek		100	45.3	D	20.8
GC2B	48.5	Discrete	Carquinez Strait		100	46.5	D	13.8
LC4D	48.4	Distributed	Blue Rock Springs Creek		100	47.4	D	16.9
SP1B	161	Distributed	San Pablo Bay		100	37.1	D	0.3
M121	275.7	Distributed	Mare Island Strait		100	30.4	D	11.7
SP3B	35.5	Distributed	San Pablo Bay		100	42.4	C	1.3
LC16	58.3	Discrete	Rindler Creek		100	76.8	D	13.3
LC14	46.7	Distributed	Rindler Creek		100	37	C	2
LC15A	109.5	Discrete	Rindler Creek		100	71.6	D	8
LC23	62	Distributed	American Canyon Creek		100	25.6	D	21.8
LC37A	189.6	Distributed	Lake Chabot		100	37	D	8.1
LC39	44.9	Distributed	Lake Chabot		100	71.2	D	12.2
LC4A	82	Distributed	Blue Rock Springs Creek		100	44.6	D	17.3
LC38	72.3	Discrete	White Slough	LC38	100	49.9	C	9.3
LC40	53	Distributed	Napa River	LC44	100	64.1	D	10.5
LC42	47.1	Distributed	Napa River	LC44	100	69	D	7.3
LC7	33.4	Distributed	Blue Rock Springs Creek		100	68.1	D	8.2
LS35	54.4	Distributed	Mare Island Strait		100	57.7	C	3.1
LC55	25	Discrete	Blue Rock Springs Creek		100	64.7	D	17.5
LC9	28.6	Distributed	Rindler Creek		100	69.4	D	13.7
MI5	35.4	Discrete	Mare Island Strait		100	47.2	D	20.5
SA1	20.1	Distributed	Mare Island Strait		100	47	D	9.7
SA35	56.4	Discrete	Mare Island Strait	SA55	100	60.7	C	1.6
SP10	21.1	Distributed	Napa River		100	56.8	C	1.1
MI27	166.8	Distributed	Napa River		100	79.3	D	1.1
LC3C	57.9	Discrete	Blue Rock Springs Creek	LC34A	100	42.6	D	22.7
DT10	23.9	Discrete	Mare Island Strait	DT11	100	63.1	D	6.6
GC5	55.5	Discrete	Carquinez Strait		100	41.4	C	14.9
SA15	30.6	Distributed	Mare Island Strait	SA55	100	65.7	C	1.5
SV2B	239.6	Distributed	Sulphur Springs Creek		100	15.5	A	18.7
WC7	56.5	Discrete	American Canyon Creek	WC7	100	43.9	C	7
SV2E	26.1	Distributed	Sulphur Springs Creek		100	5.6	D	10.9
SP4	73.2	Discrete	San Pablo Bay		100	36.6	D	1.1
SP2B	128	Distributed	San Pablo Bay		100	33.4	D	0.5
Fairfield								
JAM-1	50.8	distributed	Jameson Creek		100	28	C	5.1
AMER-1	107.6	discrete	American Canyon Creek		100	38.1	D	3.3
DAN-1	76.2	distributed	Dan Wilson Creek		100	45.2	D	1.3
ALZ-1	54.5	distributed	Alonzo Creek	ALZ-1	100	58.7	A	0.4
FREE-2	63.5	discrete	Freeborn Creek		100	55.6	A	2.3
AMER-3	81.9	discrete	American Canyon Creek		100	39.2	D	1.2
GRN-25	46.3	discrete	Green Valley Creek	GRN-11	100	47.4	D	9.6
GRN-26	51.4	distributed	Green Valley Creek		100	10	D	1
ALZ-4	31.5	distributed	Alonzo Creek		100	5.9	D	0.3
LED-7	45.7	discrete	Ledgewood Creek	LED-5	100	58.3	A	0.6
LED-4	47.8	discrete	Ledgewood Creek	LED-4	100	72.5	D	1
GRN-20	27.1	discrete	Green Valley Creek	GRN-21	100	33.4	D	13.3
AMER-5	122.2	distributed	American Canyon Creek		100	0.1	D	17.3
COY-22	94.5	distributed	McCoy Creek		100	69.2	A	0.6
ALZ-18	124.5	discrete	Alonzo Creek		100	43.5	D	13.1
COY-8	29.3	discrete	McCoy Creek	COY-3	100	54.8	D	1.2
COY-12	93.6	distributed	McCoy Creek		100	60.7	D	0.3
MAR-16	83.8	distributed	Marsh 1		100	0.4	D	0.5

LED-19	86.3	discrete	Ledgewood Creek	LED-22	100	11.8	A	20
COY-21	97.6	distributed	McCoy Creek		100	14.9	D	0.9
ALZ-29	39.7	distributed	Alonzo Creek		100	9.4	D	13.4
DAN-9	61	distributed	Dan Wilson Creek		100	18.4	C	4.6
COY-29	159.6	distributed	McCoy Creek		100	0.8	D	12.7
GRN-27	29.7	distributed	Green Valley Creek		100	51.5	A	1
JAM-6	76	distributed	Jameson Creek		100	1.2	C	17.3
SODA-34	54.3	distributed	Soda Springs Creek		100	59.7	C	3.2
UNI-5	354.9	distributed	Union Creek		100	1.6	D	4.4
COY-2	104.8	distributed	McCoy Creek		100	51.3	D	0.7
LED-1	80	discrete	Ledgewood Creek	LED-5	100	63.5	A	0.6
SODA-1	92.6	distributed	Soda Springs Creek		100	72.5	A	0.4
LAU-25	49.5	distributed	Laurel Creek	LED-23	100	51.9	D	5.8
AMER-4	37.6	distributed	American Canyon Creek		100	29.3	D	3.8
COY-3	46.4	discrete	McCoy Creek	COY-3	100	55.4	D	1.4
LED-2	103	discrete	Ledgewood Creek	LED-4	100	65.6	D	0.5
LAU-19	43.4	discrete	Laurel Creek		100	52.3	D	2.2
LAU-1	93.9	discrete	Laurel Creek	LED-23	100	54.9	D	0.8
SODA-2	80.1	discrete	Soda Springs Creek	SODA-25	100	55.7	A	0.8
COY-1	68.2	discrete	McCoy Creek	COY-3	100	56.1	D	1.2
LED-3	56.6	distributed	Ledgewood Creek	LED-22	100	28.2	A	16.6
LAU-2	75.4	discrete	Laurel Creek		100	24.9	C	5.6
COY-4	36	distributed	McCoy Creek		100	27.9	D	1.3
LAU-3	80.1	distributed	Laurel Creek		100	44.2	D	0.7
LAU-4	94.5	discrete	Laurel Creek		100	61.6	D	0.6
LAU-35	52.7	discrete	Laurel Creek	LED-23	100	57.8	A	0.7
ALZ-2	89.5	discrete	Alonzo Creek	ALZ-8	100	58.7	A	2.8
COY-20	72.8	distributed	McCoy Creek		100	18.8	C	2.1
LAU-5	108.5	discrete	Laurel Creek	LED-23	100	61.4	D	1
SODA-3	75.6	discrete	Soda Springs Creek	SODA-25	100	63.8	D	5.3
COY-5	125.4	distributed	McCoy Creek		100	1.2	D	0.7
LAU-6	106.7	distributed	Laurel Creek		100	60.1	D	1.2
SODA-4	88.7	distributed	Soda Springs Creek	LED-23	100	37.2	D	8.4
LAU-7	58.8	discrete	Laurel Creek		100	47.9	B	9.2
ALZ-3	111.5	discrete	Alonzo Creek		100	6.8	C	25.1
SODA-5	64.5	discrete	Soda Springs Creek		100	26.9	D	18.6
ALZ-23	42.3	discrete	Alonzo Creek		100	12	C	21.2
LAU-8	58.4	discrete	Laurel Creek		100	41.2	D	6
LAU-9	66.7	discrete	Laurel Creek		100	13.7	D	7.3
AMER-2	237.5	distributed	American Canyon Creek		100	0	D	25
GRN-1	110.7	distributed	Green Valley Creek		100	12.9	D	15.2
GRN-13	76.1	discrete	Green Valley Creek	GRN-11	100	57.8	A	1
GRN-2	70.3	distributed	Green Valley Creek		100	40.6	C	1.5
SODA-6	130	distributed	Soda Springs Creek		100	18.5	C	18.6
GRN-18	97.8	distributed	Green Valley Creek		100	0.2	D	32.5
GRN-6	46.6	discrete	Green Valley Creek	GRN-6	100	47	D	0.9
MAR-3	126.7	distributed	Marsh 1		100	39.2	D	0.6
SODA-7	50.8	distributed	Soda Springs Creek		100	34.2	A	3.5
FREE-1	128.3	discrete	Freeborn Creek		100	24	D	3.5
FREE-3	58.4	discrete	Freeborn Creek		100	36.7	D	6.8
FREE-4	43.2	discrete	Freeborn Creek		100	20.6	D	5.2
GRN-14	23.8	distributed	Green Valley Creek		100	13.5	D	13.7
ALZ-6	59	discrete	Alonzo Creek	ALZ-1	100	70.6	A	0.6
JAM-2	82.5	distributed	Jameson Creek	JAM-3	100	19.6	D	1.1
UNI-2	76.4	distributed	Union Creek		100	24.9	D	0.7

JAM-3	93.9	discrete	Jameson Creek	JAM-3	100	44.9	D	1.9
DAN-2	71.9	distributed	Dan Wilson Creek		100	53.2	C	1
GRN-3	90.8	distributed	Green Valley Creek		100	61.7	A	0.9
GRN-4	129.3	distributed	Green Valley Creek		100	53.9	D	1.2
GRN-5	49.4	discrete	Green Valley Creek	GRN-6	100	60	C	1.1
GRN-7	52.4	discrete	Green Valley Creek	GRN-6	100	57.5	A	2
GRN-8	29.3	discrete	Green Valley Creek	GRN-6	100	62.4	A	2.5
GRN-19	41.3	distributed	Green Valley Creek		100	34	D	16.6
GRN-9	53	distributed	Green Valley Creek		100	52	A	0.8
GRN-10	52.3	distributed	Green Valley Creek		100	46.3	A	0.6
GRN-11	28.9	discrete	Green Valley Creek	GRN-11	100	45.8	C	0.7
GRN-12	30.8	distributed	Green Valley Creek		100	39.4	A	0.1
GRN-15	54.1	discrete	Green Valley Creek		100	34.7	D	12.1
GRN-16	23.8	discrete	Green Valley Creek		100	33	D	11.6
GRN-17	35.6	distributed	Green Valley Creek		100	5.1	D	27.8
GRN-21	34.5	discrete	Green Valley Creek	GRN-21	100	22.2	D	20
DAN-3	61	discrete	Dan Wilson Creek		100	41.4	D	10.8
DAN-4	69.3	distributed	Dan Wilson Creek		100	53.6	D	0.9
GRN-22	36.7	distributed	Green Valley Creek		100	46.1	D	3.3
DAN-5	51.2	distributed	Dan Wilson Creek		100	26.5	C	1.2
GRN-23	50.8	discrete	Green Valley Creek		100	48.6	D	5.1
GRN-24	34	discrete	Green Valley Creek		100	46.5	D	9.5
LED-5	94.7	discrete	Ledgewood Creek	LED-5	100	40.2	D	0.5
LED-6	39.4	distributed	Ledgewood Creek		100	64.2	A	0.6
COY-17	83.5	discrete	McCoy Creek		100	52.1	D	0.5
ALZ-5	90.3	distributed	Alonzo Creek		100	55.2	A	0.5
ALZ-10	72.6	distributed	Alonzo Creek	ALZ-8	100	65.4	A	2.4
LED-8	66.6	distributed	Ledgewood Creek	LED-5	100	65.4	A	0.5
ALZ-7	101	distributed	Alonzo Creek	ALZ-8	100	66.4	D	2.8
ALZ-8	99.9	discrete	Alonzo Creek	ALZ-8	100	85	A	0.9
ALZ-9	25.5	discrete	Alonzo Creek	ALZ-8	100	73.2	A	0.8
ALZ-11	48.4	discrete	Alonzo Creek	ALZ-8	100	78.5	A	1
ALZ-12	68.8	discrete	Alonzo Creek	ALZ-8	100	62.8	A	2.6
ALZ-16	102.8	distributed	Alonzo Creek		100	0.6	C	25.8
LED-9	69.2	discrete	Ledgewood Creek		100	44.8	D	0.8
LAU-20	67	discrete	Laurel Creek	LED-23	100	61.3	A	0.6
ALZ-13	69.1	distributed	Alonzo Creek		100	7.6	A	13.4
LED-10	107.3	distributed	Ledgewood Creek		100	7	D	25
COY-6	85.6	distributed	McCoy Creek		100	1.6	A	3
SODA-8	89.9	distributed	Soda Springs Creek		100	0	C	27.2
SODA-9	109.5	discrete	Soda Springs Creek		100	33.3	D	13.5
SODA-10	74.8	discrete	Soda Springs Creek		100	45.3	D	7.5
LAU-13	66.9	distributed	Laurel Creek		100	55	D	1.4
LAU-10	76.4	discrete	Laurel Creek		100	33	A	8.7
SODA-14	117.5	distributed	Soda Springs Creek		100	56.4	A	0.6
COY-7	69.3	discrete	McCoy Creek	COY-3	100	62.1	B	0.5
LAU-11	94.8	discrete	Laurel Creek	LAU-14	100	46.1	B	4.3
LAU-12	73.3	distributed	Laurel Creek		100	5.6	B	7.4
LAU-18	104	distributed	Laurel Creek		100	39	D	1.1
LAU-14	38.6	discrete	Laurel Creek	LAU-14	100	34.9	B	1.8
LED-14	35.5	distributed	Ledgewood Creek		100	0.9	D	33.3
LAU-15	76.9	distributed	Laurel Creek		100	54	A	2.9
LAU-16	31	distributed	Laurel Creek		100	44.8	B	7.7
LAU-17	76.1	distributed	Laurel Creek		100	49.4	A	1.1
LAU-21	56.9	distributed	Laurel Creek		100	60.2	D	0.9

LAU-22	84.8	distributed	Laurel Creek		100	61.3	D	0.6
LAU-23	85	discrete	Laurel Creek	LED-23	100	66.3	D	0.6
LED-12	100.3	discrete	Ledgewood Creek		100	5.9	C	24.1
SODA-11	111.2	discrete	Soda Springs Creek	SODA-11	100	66.6	D	0.7
SODA-12	66.7	discrete	Soda Springs Creek	SODA-11	100	58.2	A	0.6
UNI-1	89.7	distributed	Union Creek		100	31.9	D	0.4
SODA-13	107.6	discrete	Soda Springs Creek	SODA-11	100	72.1	A	0.9
ALZ-14	36.5	distributed	Alonzo Creek		100	35	D	0.3
MAR-14	92.6	discrete	Marsh 1	MAR-14	100	70.7	D	0.6
SODA-15	96.3	discrete	Soda Springs Creek	SODA-25	100	66.4	A	1.3
FREE-5	119	distributed	Freeborn Creek		100	0	B	18.9
AMER-6	199.7	distributed	American Canyon Creek		100	0.1	D	15.7
ALZ-15	110.9	distributed	Alonzo Creek		100	12.5	C	22.4
ALZ-17	113.9	discrete	Alonzo Creek		100	23.2	A	16.8
LED-11	124.6	discrete	Ledgewood Creek		100	7.8	A	27.1
LED-13	106.9	distributed	Ledgewood Creek		100	5.7	D	23.7
ALZ-19	77	discrete	Alonzo Creek		100	35.6	D	8.5
ALZ-20	48.3	distributed	Alonzo Creek	ALZ-8	100	23.9	A	1
SODA-20	39.5	discrete	Soda Springs Creek	SODA-25	100	39.9	A	11.7
COY-9	31	distributed	McCoy Creek		100	64.2	D	3.4
COY-10	72	distributed	McCoy Creek		100	54.7	D	0.9
COY-11	31.8	distributed	McCoy Creek		100	58.9	D	2.5
SODA-16	122.8	distributed	Soda Springs Creek		100	0.1	C	26.4
SODA-18	97.7	distributed	Soda Springs Creek	SODA-25	100	62.1	D	5.6
LED-15	71.5	distributed	Ledgewood Creek		100	24.2	D	0.6
ALZ-21	80.6	discrete	Alonzo Creek	ALZ-28	100	39.5	A	10.4
SODA-17	89.9	distributed	Soda Springs Creek		100	4.5	C	21.8
LAU-24	52.3	distributed	Laurel Creek		100	57.9	A	1
SODA-19	72.7	distributed	Soda Springs Creek	SODA-25	100	49.6	D	6.3
LED-16	73.1	discrete	Ledgewood Creek	LED-16	100	54.2	D	0.6
SODA-22	89	distributed	Soda Springs Creek	SODA-25	100	53	D	2.5
LED-17	34.3	distributed	Ledgewood Creek		100	53.9	D	0.8
LED-18	41.7	discrete	Ledgewood Creek	LED-16	100	49.9	D	0.7
COY-13	84.9	distributed	McCoy Creek		100	8.1	D	1
SODA-21	60.6	discrete	Soda Springs Creek	SODA-25	100	50.1	D	5
SODA-23	111.3	distributed	Soda Springs Creek		100	0	C	28.6
ALZ-22	64.1	distributed	Alonzo Creek		100	10.3	C	19.9
ALZ-24	54.7	distributed	Alonzo Creek		100	3.1	D	26.5
DAN-7	40.1	distributed	Dan Wilson Creek		100	45.5	C	7.8
LAU-27	93.6	distributed	Laurel Creek		100	26.1	C	2.3
LAU-28	47	distributed	Laurel Creek		100	9.7	C	2.9
ALZ-37	50.4	discrete	Alonzo Creek		100	55.9	A	0.9
DAN-8	113	distributed	Dan Wilson Creek		100	53.2	C	0.5
LAU-26	92.2	distributed	Laurel Creek		100	7.8	B	3
FREE-7	41.3	distributed	Freeborn Creek		100	64.6	D	2.2
DAN-6	86.6	distributed	Dan Wilson Creek		100	49.1	D	2
COY-14	60.9	distributed	McCoy Creek		100	48.4	B	0.5
FREE-6	118	distributed	Freeborn Creek		100	7.2	D	12.3
SODA-24	103.8	discrete	Soda Springs Creek	SODA-25	100	61.9	A	1.4
SODA-25	32.7	discrete	Soda Springs Creek	SODA-25	100	72.6	A	0.6
ALZ-35	43.3	distributed	Alonzo Creek		100	37.4	D	10.9
SODA-26	84.9	discrete	Soda Springs Creek		100	39.5	C	12
SODA-27	69.8	distributed	Soda Springs Creek		100	35.4	C	8.3
SODA-28	45.8	distributed	Soda Springs Creek		100	1.2	D	28.1
COY-15	72.5	discrete	McCoy Creek	COY-3	100	64.1	B	0.5

COY-16	48	discrete	McCoy Creek	COY-3	100	50.8	B	0.4
SODA-29	54.1	distributed	Soda Springs Creek	SODA-25	100	76.2	A	1
LAU-29	89.3	discrete	Laurel Creek	LED-23	100	53.7	D	0.9
COY-18	67.5	distributed	McCoy Creek		100	31.9	D	0.7
COY-19	99.4	distributed	McCoy Creek		100	1.4	D	1.9
LAU-30	85.1	distributed	Laurel Creek		100	36.9	D	2.5
LED-20	56.5	discrete	Ledgewood Creek	LED-22	100	25.6	D	16.2
ALZ-25	33.4	distributed	Alonzo Creek		100	0.6	A	15.5
ALZ-27	76.9	distributed	Alonzo Creek	ALZ-8	100	54.6	D	1.3
UNI-6	338.1	distributed	Union Creek		100	2.2	D	3.1
LED-21	78.7	distributed	Ledgewood Creek		100	39.5	D	0.9
SODA-31	35.8	discrete	Soda Springs Creek	SODA-25	100	54.2	A	3.3
JAM-4	93.5	distributed	Jameson Creek		100	20.9	D	5.4
ALZ-26	42.4	distributed	Alonzo Creek		100	39	D	6.2
ALZ-28	41.4	discrete	Alonzo Creek	ALZ-28	100	59.1	C	2.4
SODA-35	61.5	discrete	Soda Springs Creek	SODA-25	100	57.1	D	3.4
LED-22	39.9	discrete	Ledgewood Creek	LED-22	100	37.9	D	5.6
LED-23	55	distributed	Ledgewood Creek		100	9.4	A	20.8
SODA-30	69.5	discrete	Soda Springs Creek	SODA-25	100	62	A	1.1
ALZ-30	95.9	discrete	Alonzo Creek		100	17.1	C	18.8
SODA-32	74.9	discrete	Soda Springs Creek		100	60.3	D	0.6
ALZ-31	98.7	distributed	Alonzo Creek		100	70.8	A	0.4
LAU-31	87.8	discrete	Laurel Creek	LED-23	100	56.7	D	0.7
ALZ-32	46.4	discrete	Alonzo Creek		100	24.5	A	16.8
SODA-33	79.7	distributed	Soda Springs Creek		100	0	C	23
LAU-33	47.6	discrete	Laurel Creek		100	29.9	D	8.8
MAR-22	39.9	distributed	Marsh 1		100	2.4	D	0.2
JAM-5	73.5	discrete	Jameson Creek	JAM-3	100	45.3	D	1.3
LAU-32	40.7	discrete	Laurel Creek		100	21.7	B	17.8
LED-24	50	distributed	Ledgewood Creek		100	14.7	A	18.7
GRN-28	63.9	distributed	Green Valley Creek		100	38	D	0.5
ALZ-33	63.2	discrete	Alonzo Creek		100	37.1	A	11.9
ALZ-34	64.3	discrete	Alonzo Creek		100	52.8	D	3.4
SODA-36	55.7	discrete	Soda Springs Creek	SODA-25	100	49.7	A	0.5
LAU-34	14.4	discrete	Laurel Creek	LED-23	100	53.1	D	1.5
COY-23	63.2	discrete	McCoy Creek	COY-3	100	58.3	B	1
ALZ-36	55.7	discrete	Alonzo Creek		100	41.5	C	9.4
JAM-7	113.6	distributed	Jameson Creek		100	65.9	D	1.2
LED-25	38.3	discrete	Ledgewood Creek	LED-5	100	65.5	A	0.5
MAR-10	109.4	distributed	Marsh 1		100	0.3	B	19.5
ALZ-38	37.2	distributed	Alonzo Creek		100	52	C	5.2
AMER-7	146.8	distributed	American Canyon Creek		100	3.1	D	11.7
UNI-3	722.4	distributed	Union Creek		100	0.2	D	3.4
COY-24	98.3	distributed	McCoy Creek		100	50.2	D	1.7
COY-25	318.6	distributed	McCoy Creek		100	2.4	D	1
COY-26	186.7	discrete	McCoy Creek		100	42.4	D	1.3
COY-27	658.9	distributed	McCoy Creek		100	11.1	D	3.1
COY-28	157.9	discrete	McCoy Creek		100	18.9	D	1.4
COY-30	90.3	distributed	McCoy Creek		100	0.1	C	8.6
COY-31	106.2	distributed	McCoy Creek		100	1.7	D	4.3
UNI-4	109.7	distributed	Union Creek		100	0.1	D	2.6
MAR-7	131.5	distributed	Marsh 1		100	0.7	D	2.8
GRN-29	35	distributed	Green Valley Creek		100	61.6	A	0.8
MAR-1	94.5	discrete	Marsh 1	MAR-14	100	41.5	D	0.5
MAR-17	36.7	distributed	Marsh 1		100	44.9	D	0.5

MAR-8	116.6	discrete	Marsh 1		100	51.6	D	0.5
MAR-9	79.6	distributed	Marsh 1		100	67.5	D	0.6
MAR-2	90.7	discrete	Marsh 1		100	37.7	B	3.5
MAR-4	94.8	discrete	Marsh 1		100	57.8	C	3.2
MAR-5	120.6	distributed	Marsh 1		100	47.4	D	2.4
MAR-6	392.5	distributed	Marsh 1		100	7.7	D	0.6
MAR-20	81.5	discrete	Marsh 1	MAR-14	100	65.2	D	0.5
MAR-11	125.6	discrete	Marsh 1	MAR-11	100	53.2	D	0.5
MAR-12	65.1	discrete	Marsh 1	MAR-11	100	39.6	D	0.8
MAR-13	113.8	distributed	Marsh 1		100	1.3	D	0.4
MAR-15	96.7	distributed	Marsh 1		100	57.4	D	0.7
MAR-18	69.2	distributed	Marsh 1		100	45.2	D	0.8
MAR-21	77.9	distributed	Marsh 1		100	0	B	19.8
MAR-25	127.7	distributed	Marsh 1		100	0	C	16.6
MAR-19	85.4	discrete	Marsh 1	MAR-14	100	16.4	D	0.5
MAR-23	46.8	discrete	Marsh 1		100	60.7	C	2.7
MAR-24	30.1	distributed	Marsh 1		100	49.4	D	1.2
Suisun								
MAR-26	81.9	distributed	Marsh #1		100	43.5	D	1.2
MAR-27	125.8	distributed	Marsh #1		100	47.9	A	3.2
COY-40	70.4	distributed	McCoy Creek		100	12.5	B	1.9
COY-32	143.4	distributed	McCoy Creek		100	11	A	2.6
MAR-28	78.3	discrete	Marsh #1	COY-35	100	57.6	D	1.1
SODA-37	92.4	distributed	Soda Springs Creek		100	41.1	D	1.7
LAU-43	117.5	discrete	Laurel Creek	LAU-43	100	62.1	D	1
LAU-42	96.6	discrete	Laurel Creek	LAU-43	100	59.1	D	2.1
MAR-29	31.9	distributed	Marsh #1		100	55.5	D	0.5
MAR-30	88.9	distributed	Marsh #1		100	28.5	D	2.5
LAU-41	96.7	discrete	Laurel Creek		100	61.8	D	1.7
MAR-42	29.4	distributed	Marsh #1		100	63.3	A	5.3
LAU-40	48	discrete	Laurel Creek	LAU-43	100	72.5	D	1.7
COY-33	67.6	distributed	McCoy Creek		100	53.7	D	2.4
COY-34	50.6	distributed	McCoy Creek		100	59.4	D	3.1
COY-35	74.7	discrete	McCoy Creek	COY-35	100	58.9	D	2.1
MAR-31	122	discrete	Marsh #1	COY-35	100	56.5	A	1.3
LAU-39	76	distributed	Laurel Creek		100	67.7	D	1.4
MAR-32	71.4	distributed	Marsh #1		100	50.6	D	1.5
MAR-33	49.8	distributed	Marsh #1		100	22.9	D	1.4
MAR-37	127.2	distributed	Marsh #1		100	10.9	A	2
COY-36	59.3	discrete	McCoy Creek		100	46.1	A	3
COY-37	37	distributed	McCoy Creek		100	47	D	2.7
MAR-39	51.9	discrete	Marsh #1		100	71	D	0.5
COY-38	137.7	distributed	McCoy Creek		100	10.6	D	3.1
COY-39	99.2	distributed	McCoy Creek		100	53.7	B	2
MAR-34	80.1	distributed	Marsh #1		100	51.4	D	1
MAR-35	56.1	distributed	Marsh #1		100	50.2	D	0.9
MAR-36	32.6	distributed	Marsh #1		100	55.2	D	1
MAR-38	60.7	distributed	Marsh #1		100	32.4	D	5.1
SODA-38	20.7	distributed	Soda Springs Creek		100	47.2	D	0.2
MAR-40	29.8	distributed	Marsh #1		100	3.9	D	0.9
MAR-41	95.8	discrete	Marsh #1		100	60.2	D	0.5
LAU-38	34.4	distributed	Laurel Creek		100	8.5	D	1.5
MAR-43	61.5	discrete	Marsh #1	MAR-44	100	60.9	A	3.9
MAR-44	67.3	discrete	Marsh #1	MAR-44	100	50.5	D	2
COY-41	94.1	distributed	McCoy Creek		100	42.4	D	2.2

LAU-37	30.6	distributed	Laurel Creek		100	13	D	4.8
MAR-45	51.9	discrete	Marsh #1	COY-35	100	57.5	A	1
COY-42	60	distributed	McCoy Creek		100	39.5	D	1.2
MAR-46	47.2	discrete	Marsh #1		100	66.1	D	0.6
COY-43	28.7	discrete	McCoy Creek		100	42.6	D	2.6
LAU-36	19.2	distributed	Laurel Creek		100	35.9	D	2.1
MAR-47	64.7	distributed	Marsh #1		100	43.6	D	6.9

Appendix D

Solano Permittee decentralized BMPs.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2455 Huntington	Installed	2020	Biofiltration	11.247	McCoy Creek	COY-2	38.27765067	-121.97435
Fairfield	1200 B Gale Wilson B	Installed	2020	Bioretention	0.241	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	Denny's Restaurant	Planned	2030	Bioretention	0.77	Dan Wilson Creek	DAN-2	38.21955338	-122.127658
Fairfield	3950 Business Center	Installed	2020	Bioretention	2.296	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	Jayo Subdivision	Planned	2030	Bioretention	4.05	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	3900 Business Center	Installed	2020	Bioretention	8.533	Dan Wilson Creek	DAN-5	38.23116717	-122.1182872
Fairfield	4475 Central	Installed	2020	Bioretention	0.509	Dan Wilson Creek	DAN-8	38.22014694	-122.1300926
Fairfield	4500 Business Center	Installed	2020	Bioretention	2.551	Green Valley Creek	GRN-26	38.22604915	-122.1326145
Fairfield	4625 Mangels	Installed	2020	Bioretention	3.688	Green Valley Creek	GRN-26	38.2251654	-122.1358266
Fairfield	Partnership Health 2	Planned	2030	Bioretention	4.43	Green Valley Creek	GRN-28	38.22411267	-122.1326464
Fairfield	3630 Ritchie	Installed	2020	Bioretention	3.295	Green Valley Creek	GRN-29	38.21379883	-122.1362455
Fairfield	2600 Estates	Installed	2020	Bioretention	0.406	Laurel Creek	LAU-27	38.30664231	-122.029309
Fairfield	3201 Hartford	Installed	2020	Bioretention	0.326	Ledgewood Creek	LED-2	38.25466074	-122.0670856
Fairfield	Caliber Collision	Planned	2030	Bioretention	1.46	Marsh 1	MAR-8	38.24675285	-122.0743114
Fairfield	2600 Maxwell	Installed	2020	Bioretention	1.737	Marsh 1	MAR-11	38.23099408	-122.0799684
Fairfield	770 Chadbourne	Installed	2020	Bioretention	4.635	Marsh 1	MAR-11	38.23034689	-122.0835006
Fairfield	800 Chadbourne	Installed	2020	Bioretention	6.313	Marsh 1	MAR-11	38.22897736	-122.0819342
Fairfield	Innova Maxwell	Planned	2030	Bioretention	2.63	Marsh 1	MAR-11	38.23087887	-122.0800178
Fairfield	2487 Courage	Installed	2020	Bioretention	1	Marsh 1	MAR-12	38.23405747	-122.081283
Fairfield	2901 Cordelia	Installed	2020	Bioretention	8.189	Marsh 1	MAR-13	38.2279119	-122.0874744
Fairfield	Solano Logistics D	Planned	2030	Bioretention	3.5	Marsh 1	MAR-13	38.22789676	-122.0903076
Fairfield	Jelly Belly Warehouse Expansion	Planned	2030	Bioretention	4.09	Marsh 1	MAR-15	38.23809914	-122.0746228
Fairfield	360 Beck A	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.2333092	-122.066136
Fairfield	360 Beck B	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.23279513	-122.0661494
Fairfield	E&P Properties	Planned	2030	Bioretention	9.92	Marsh 1	MAR-20	38.23590326	-122.0706416
Fairfield	2051 Walters	Installed	2020	Bioretention	0.981	McCoy Creek	COY-10	38.26628535	-121.9880675

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2400 Huntington	Installed	2020	Bioretention	1	McCoy Creek	COY-2	38.27764825	-121.9745453
Fairfield	Fairfield/Vacaville Train Station	Planned	2030	Bioretention	1	McCoy Creek	COY-27	38.28614529	-121.9680942
Fairfield	1800 North Texas	Installed	2020	Bioretention	0.065	Soda Springs Creek	SODA-13	38.26235658	-122.0341855
Fairfield	3329 North Texas	Installed	2020	Bioretention	0.358	Soda Springs Creek	SODA-18	38.289267	-122.0341714
Fairfield	3345 North Texas	Installed	2020	Bioretention	0.988	Soda Springs Creek	SODA-18	38.2905095	-122.0341275
Fairfield	2525 North Texas	Installed	2020	Bioretention	0.475	Soda Springs Creek	SODA-29	38.27556882	-122.0342614
Fairfield	2590 North Texas	Installed	2020	Bioretention	0.76	Soda Springs Creek	SODA-29	38.27600953	-122.0340355
Fairfield	2700 North Texas	Installed	2020	Bioretention	0.289	Soda Springs Creek	SODA-29	38.27675262	-122.0340485
Fairfield	2470 Hilborn	Installed	2020	Bioswale	0.381	Alonzo Creek	ALZ-18	38.27532514	-122.0522109
Fairfield	600 Gregory	Installed	2020	Bioswale	0.448	Alonzo Creek	ALZ-6	38.24820883	-122.0560475
Fairfield	201 Pittman	Installed	2020	Bioswale	1.071	Dan Wilson Creek	DAN-2	38.22012023	-122.1272167
Fairfield	200 Business Center	Installed	2020	Bioswale	4.295	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	4755 Business Center	Installed	2020	Bioswale	1.846	Green Valley Creek	GRN-12	38.22096842	-122.1373021
Fairfield	4775 Business Center	Installed	2020	Bioswale	2.46	Green Valley Creek	GRN-12	38.22060358	-122.1382177
Fairfield	4650 Business Center	Installed	2020	Bioswale	1.693	Green Valley Creek	GRN-26	38.22225683	-122.1340899
Fairfield	167 Grobric	Installed	2020	Bioswale	1.162	Green Valley Creek	GRN-29	38.21607168	-122.1343305
Fairfield	4856 Auto Plaza	Installed	2020	Bioswale	2.298	Green Valley Creek	GRN-3	38.21258775	-122.1396229
Fairfield	4865 Auto Plaza	Installed	2020	Bioswale	4.591	Green Valley Creek	GRN-3	38.21244225	-122.1397805
Fairfield	5001 Fermi	Installed	2020	Bioswale	5.818	Jameson Creek	JAM-3	38.2037402	-122.139484
Fairfield	5133 Fulton	Installed	2020	Bioswale	4.053	Jameson Creek	JAM-7	38.20708849	-122.144373
Fairfield	5160 Fulton	Installed	2020	Bioswale	2.388	Jameson Creek	JAM-7	38.20714647	-122.145164
Fairfield	1057 Horizon	Installed	2020	Bioswale	3.452	Laurel Creek	LAU-22	38.27342649	-122.0147834
Fairfield	2001 Meyer	Installed	2020	Bioswale	1.426	Ledgewood Creek	LED-15	38.2379282	-122.0635347
Fairfield	1200 Oliver	Installed	2020	Bioswale	2.345	Ledgewood Creek	LED-2	38.25516097	-122.0671784
Fairfield	1717 Clift	Installed	2020	Bioswale	1.033	Ledgewood Creek	LED-5	38.24272299	-122.0593736
Fairfield	Courage Dr Beck Ave	Installed	2020	Bioswale	1.5	Marsh 1	MAR-1	38.23765765	-122.0676488
Fairfield	2950 Auto Mall	Installed	2020	Bioswale	2.909	Marsh 1	MAR-9	38.24153261	-122.0839885
Fairfield	2955 Automall	Installed	2020	Bioswale	2.296	Marsh 1	MAR-9	38.24164932	-122.0836312
Fairfield	801 Chadbourne	Installed	2020	Bioswale	7.92	Marsh 1	MAR-11	38.22874137	-122.0832968
Fairfield	2700 Low	Installed	2020	Bioswale	5.016	Marsh 1	MAR-12	38.23676132	-122.0847769
Fairfield	2525 N Watney	Installed	2020	Bioswale	2.5	Marsh 1	MAR-15	38.23624603	-122.0791156
Fairfield	Sheldon Oil Company	Planned	2030	Bioswale	1	Marsh 1	MAR-19	38.23528702	-122.0607524
Fairfield	2510 Clay Bank	Installed	2020	Bioswale	0.982	McCoy Creek	COY-15	38.2752175	-122.0064988
Fairfield	Clorox	Planned	2030	Bioswale	1	McCoy Creek	COY-2	38.27960416	-121.9710685

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Peabody Road	Installed	2020	Bioswale	16.368	McCoy Creek	COY-27	38.29709076	-121.9675707
Fairfield	Texas Corners	Planned	2030	Bioswale	0.72	Soda Springs Creek	SODA-11	38.24997707	-122.0341621
Fairfield	1833 N Texas	Installed	2020	Bioswale	2.778	Soda Springs Creek	SODA-13	38.26356253	-122.0342475
Fairfield	3333 North Texas	Installed	2020	Bioswale	1.832	Soda Springs Creek	SODA-18	38.28960861	-122.0341365
Fairfield	3400 North Texas	Installed	2020	Bioswale	9.507	Soda Springs Creek	SODA-18	38.2927325	-122.0326218
Fairfield	824 Washington	Installed	2020	Bioswale	2.17	Soda Springs Creek	SODA-25	38.25055608	-122.0390686
Fairfield	Senior Manor Parking Lot	Planned	2030	Bioswale	1	Soda Springs Creek	SODA-36	38.2535156	-122.0404984
Fairfield	2910 Industrial	Installed	2020	Bioswale	0.696	Union Creek	UNI-2	38.27338698	-121.9633523
Fairfield	Jepson Parkway 2A	Planned	2030	Bioswale	1	Union Creek	UNI-5	38.2938595	-121.9554919
Fairfield	1200 B Gale Wilson A	Installed	2020	Filtration Device	3.656	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	3650 Nelson	Installed	2020	Filtration Device	1	Laurel Creek	LAU-10	38.29454858	-122.0317184
Fairfield	3500 Nelson	Installed	2020	Filtration Device	2.025	Laurel Creek	LAU-7	38.29380211	-122.0316656
Fairfield	2263 N Texas	Installed	2020	Filtration Device	0.013	Soda Springs Creek	SODA-15	38.26986308	-122.034208
Fairfield	3340 N Texas	Installed	2020	Filtration Device	2.941	Soda Springs Creek	SODA-18	38.29215565	-122.0332795
Fairfield	4350 Central	Installed	2020	Sediment Trap	3.194	Dan Wilson Creek	DAN-2	38.22350691	-122.1251014
Fairfield	4610 West America	Installed	2020	Sediment Trap	1	Green Valley Creek	GRN-22	38.23045612	-122.1309696
Fairfield	3330 Dover	Installed	2020	Sediment Trap	0.028	Laurel Creek	LAU-15	38.28939339	-122.024848
Fairfield	3355 North Texas	Installed	2020	Sediment Trap	1.015	Soda Springs Creek	SODA-18	38.28987196	-122.0341651
Suisun	Cottonwood_DB	Installed	2020	Bioretention	3.2	Laurel Creek	LAU-36	38.253919	-122.021465
Suisun	Summerwood_DB	Installed	2020	Bioretention	2.5	Laurel Creek	LAU-36	38.253905	-122.022136
Suisun	Walmart_BR_1	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24175304	-121.9886363
Suisun	Walmart_BR_2	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24255777	-121.9884485
Suisun	Walmart_BR_3	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332878	-121.9892102
Suisun	Walmart_BR_4	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332035	-121.9911978
Suisun	Walmart_BR_5	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24329929	-121.9920561
Suisun	Walmart_BR_6	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24142651	-121.9898674
Suisun	Walmart_DB	Installed	2020	Bioretention	15.8	Marsh #1	MAR-33	38.240915	-121.989429
Suisun	Holiday Inn Express	Installed	2020	Bioretention	1.6	Marsh #1	MAR-38	38.24209415	-122.0383736
Suisun	Crystal Middle School Site	Installed	2020	Bioretention	7.1	Marsh #1	MAR-39	38.23657066	-122.0436108
Suisun	Railroad Avenue Extension	Planned	2030	Bioretention	1.7	Marsh #1	MAR-41	38.24420303	-122.0330427
Suisun	Jubilee Commercial	Installed	2020	Bioretention	1.2	Marsh #1	MAR-43	38.26456217	-121.9873755
Suisun	ZE_BT_01	Installed	2020	Bioretention	1.6	Marsh #1	MAR-43	38.263235	-121.9877
Suisun	ZE_BT_03	Installed	2020	Bioretention	2.5	Marsh #1	MAR-43	38.264415	-121.986915
Suisun	ZE_BT_04	Installed	2020	Bioretention	0.7	Marsh #1	MAR-43	38.264101	-121.985862

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Suisun	ZE_BT02	Installed	2020	Bioretention	0.4	Marsh #1	MAR-43	38.264158	-121.987761
Suisun	McCoy Creek Trail	Installed	2020	Bioretention	1	McCoy Creek	COY-41	38.25395217	-122.0113701
Suisun	Caterpillar Club House	Installed	2020	Bioretention	0.5	McCoy Creek	COY-42	38.24250196	-122.0191968
Suisun	Summerwood_GS 01	Installed	2020	Bioswale	0.5	Laurel Creek	LAU-36	38.254922	-122.023184
Suisun	Summerwood_GS 02	Installed	2020	Bioswale	0.2	Laurel Creek	LAU-36	38.254427	-122.022624
Suisun	HSC_FI	Installed	2020	Filtration Device	12.8	Laurel Creek	LAU-39	38.244877	-122.021441
Suisun	RR_Storage_Filters	Installed	2020	Filtration Device	1.1	McCoy Creek	COY-39	38.260923	-122.011153
Suisun	Summerwood_CDS	Installed	2020	Sediment Trap	2.5	Laurel Creek	LAU-36	38.254196	-122.024351
Suisun	Walmart_City CDS	Installed	2020	Sediment Trap	7.5	Marsh #1	MAR-33	38.243349	-121.989895
Suisun	Hampton_CDS	Installed	2020	Sediment Trap	0.9	Marsh #1	MAR-38	38.242237	-122.039346
Suisun	Andrews_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.254194	-121.985953
Suisun	Andrews_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-42	38.253443	-121.985822
Suisun	Beale_N_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.255578	-121.986025
Suisun	Beale_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.254878	-121.986035
Suisun	Hickam_N_SC	Installed	2020	Sediment Trap	3	Marsh #1	MAR-42	38.254255	-121.985453
Suisun	Hickam_S_SC	Installed	2020	Sediment Trap	3.7	Marsh #1	MAR-42	38.253438	-121.985359
Suisun	Vandenberg_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.255659	-121.985495
Suisun	Vandenberg_S_SC	Installed	2020	Sediment Trap	2.9	Marsh #1	MAR-42	38.254884	-121.985516
Suisun	Carswell Ct_SC	Installed	2020	Sediment Trap	7	Marsh #1	MAR-43	38.262615	-121.987286
Suisun	Dover_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.257337	-121.985992
Suisun	Dover_S_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.25671	-121.985995
Suisun	Ford Ord_SC	Installed	2020	Sediment Trap	1.6	Marsh #1	MAR-43	38.259527	-121.985967
Suisun	Keesler_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.258861	-121.985965
Suisun	Keesler_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-43	38.258068	-121.985987
Suisun	Neward_N_SC	Installed	2020	Sediment Trap	5.1	Marsh #1	MAR-43	38.261022	-121.986269
Suisun	Newark_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-43	38.260269	-121.986128
Suisun	Four Seasons_CDS	Installed	2020	Sediment Trap	4.3	Marsh #1	MAR-44	38.243597	-121.985876
Suisun	Breezewood_CDS	Installed	2020	Sediment Trap	3.9	McCoy Creek	COY-39	38.260753	-122.009642
Suisun	Amberwood_CDS	Installed	2020	Sediment Trap	3.5	McCoy Creek	COY-41	38.257989	-122.012995
Suisun	McCoy_CDS	Installed	2020	Sediment Trap	3.3	McCoy Creek	COY-42	38.241326	-122.01897
Vallejo	Sonoma_Blvd_BR	Installed	2020	Bioretention	3.5	Mare Island Strait	SA55	38.0937663	-122.2497144
Vallejo	850_Redwood_BR3	Installed	2020	Bioretention	0.25	Napa River	AC35	38.1228762	-122.2543064
Vallejo	Automall_Basin	Installed	2020	Bioretention	2.7	Rindler Creek	LC21	38.13728229	-122.2143281
Vallejo	Couch_St_BR1	Installed	2020	Bioretention	0.75	White Slough	AC34	38.12397765	-122.2503421

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Vallejo	Couch_St_BR2	Installed	2020	Bioretention	0.75	White Slough	AC34	38.1236316	-122.2502697
Vallejo	850_Redwood_BR1	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12342271	-122.2542527
Vallejo	850_Redwood_BR2	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12313152	-122.2540945
Vallejo	AdmiralCallaghan_Bioswale	Installed	2020	Bioswale	1	Blue Rock Springs Creek	LC8	38.12364848	-122.2277015
Vallejo	9832_Vallejo_Streetscape	Installed	2020	Bioswale	0.05	Mare Island Strait	DT5	38.10213344	-122.2583216
Vallejo	AustinCk_Bioswale	Installed	2020	Bioswale	1	Napa River	AC41	38.11837319	-122.2568035
Vallejo	Kaiser_Broadway_2	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12756672	-122.2471529
Vallejo	Kaiser_Broadway_3	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12754984	-122.2474506
Vallejo	Kaiser_Broadway_4	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12737894	-122.2474158
Vallejo	Kaiser_Broadway_5	Installed	2020	Bioswale	0.24	White Slough	AC34	38.1273916	-122.2471368
Vallejo	HiddenbrookPark	Installed	2020	Infiltration Feature	1	Sulphur Springs Creek	SV4	38.1366937	-122.1687949
Vallejo	Kaiser_Broadway_1	Installed	2020	Infiltration Feature	0.24	White Slough	AC34	38.12769121	-122.2477591
Vallejo	9810_Curtola_Pkwy	Installed	2020	Pervious Pavement	1	Lake Dalwigk	LS33	38.09378108	-122.2396427
Vallejo	Chase_St_PP	Installed	2020	Pervious Pavement	0.4	Mare Island Strait	LS35	38.09659274	-122.2399378
Vallejo	SP14101B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15244205	-122.2838573
Vallejo	SP14201B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15302772	-122.2806181
Vallejo	SP14401B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1546249	-122.2792984
Vallejo	SP14501B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1551305	-122.2807271
Vallejo	SP14601B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15512579	-122.2820948

SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

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1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

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[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

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1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

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As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

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Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

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2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

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3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

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E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

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- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

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LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

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5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

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$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

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9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

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$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

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Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

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10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

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APPENDIX A
Land Use-Based Yield Analysis

A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

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was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

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A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

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Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

A.5 REFERENCES

Gilbreath, Alicia, 2019. Personal communication via email, 2/26/2019.

McKee, L.J., Gilbreath, A.N., Wu, J., Kunze, M.S., Hunt, J.A., 2014. Estimating Regional Pollutant Loads for San Francisco Bay Area Tributaries using the Regional Watershed Spreadsheet Model (RWSM): Year's 3 and 4 Progress Report. A technical report prepared for the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), Sources, Pathways and Loadings Workgroup (SPLWG), Small Tributaries Loading Strategy (STLS). Contribution No. 737. San Francisco Estuary Institute, Richmond, California.

San Francisco Estuary Institute (SFEI), 2018. Regional Watershed Spreadsheet Model (RWSM) Toolbox v1.0 User Manual and Pollutant Model. Available here: https://www.sfei.org/projects/regional-watershed-spreadsheet-model#sthash.kOKnKvF2.dpbs.

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APPENDIX B
Urban Sediment Concentration Statistics

B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

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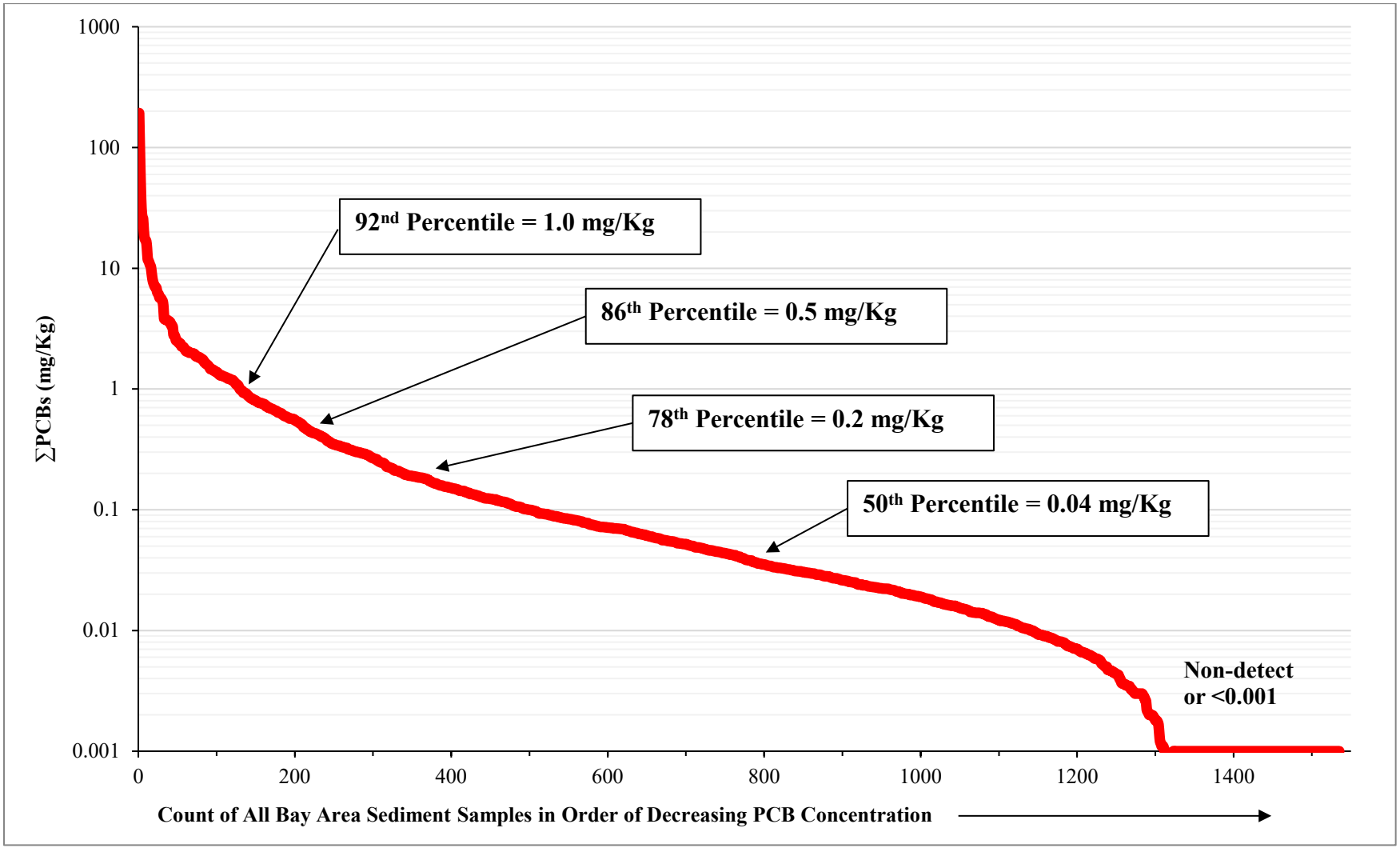

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

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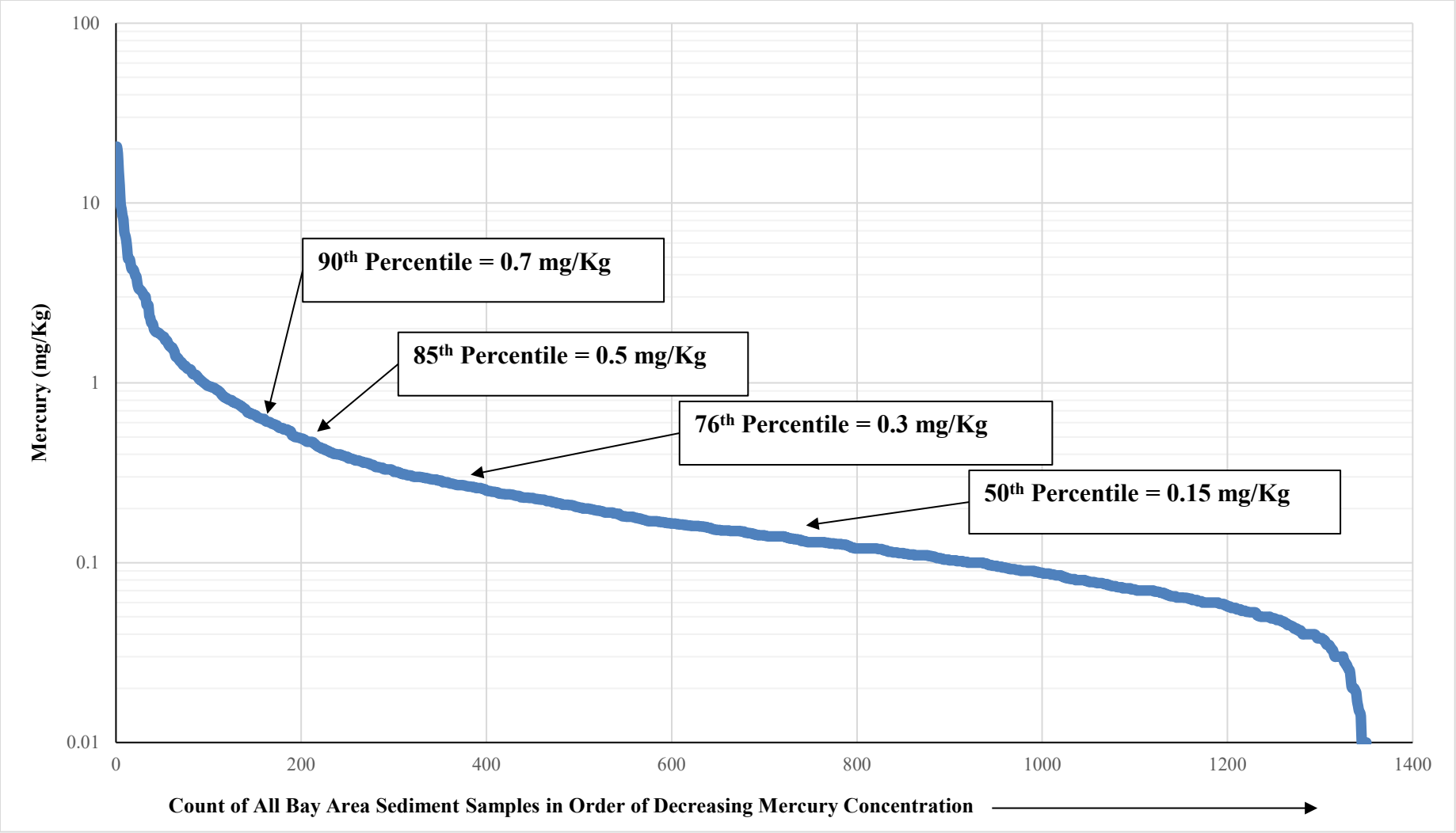

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

APPENDIX C
Source Area Investigation and Abatement Guidance

C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

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E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

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6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

Investor-Owned Utilities (IOUs)

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)

2. Alameda Municipal Power
   2000 Grand Street

Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive "Aroclor" method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

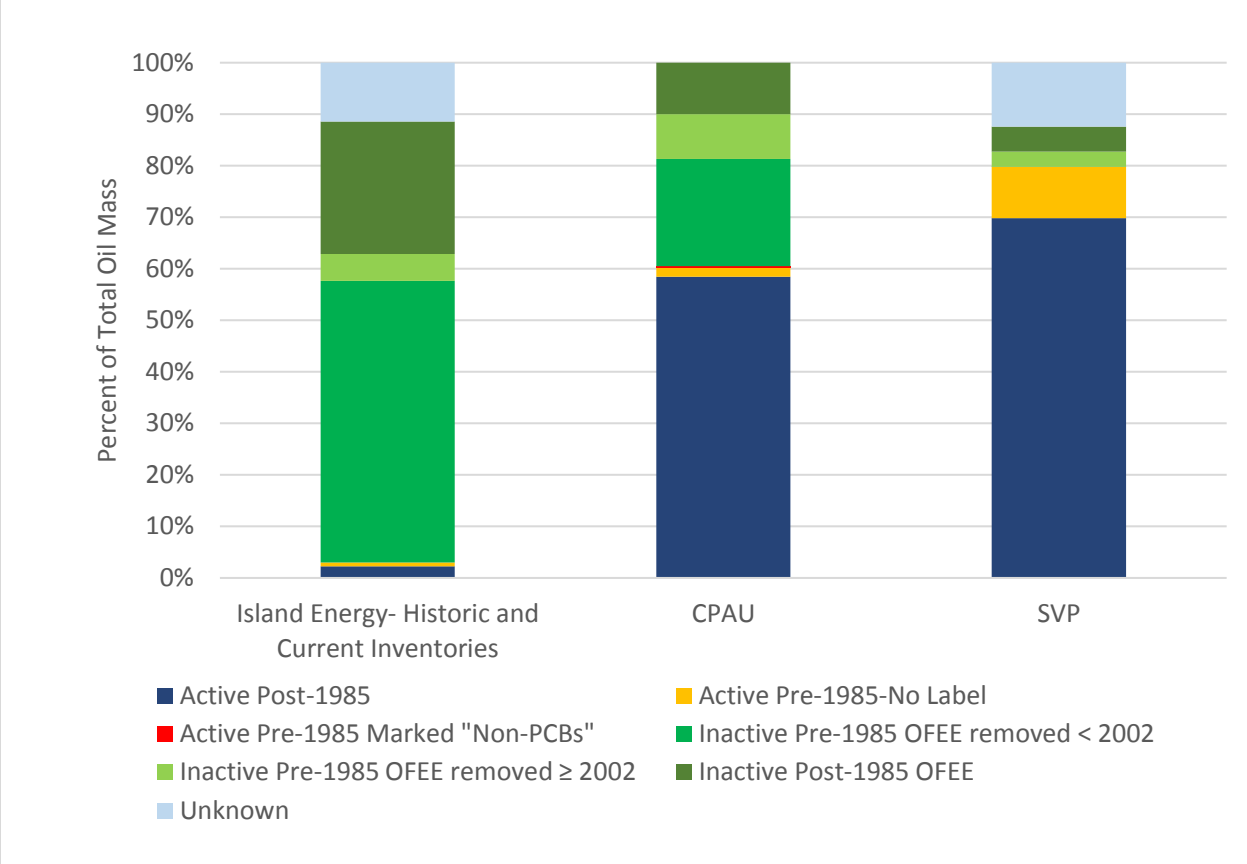

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

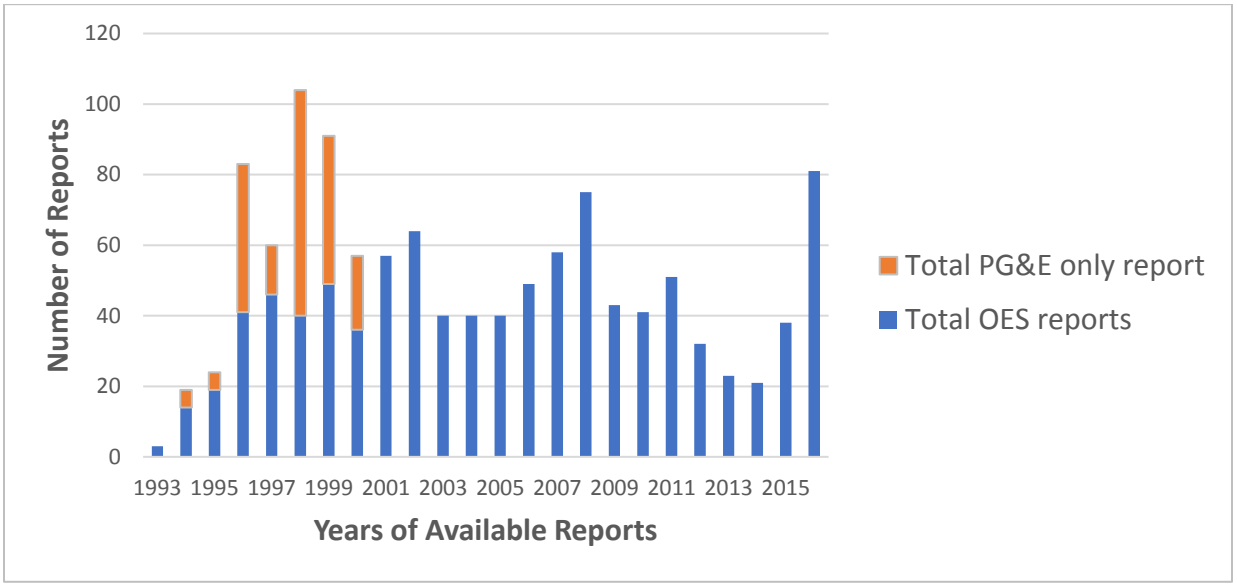

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

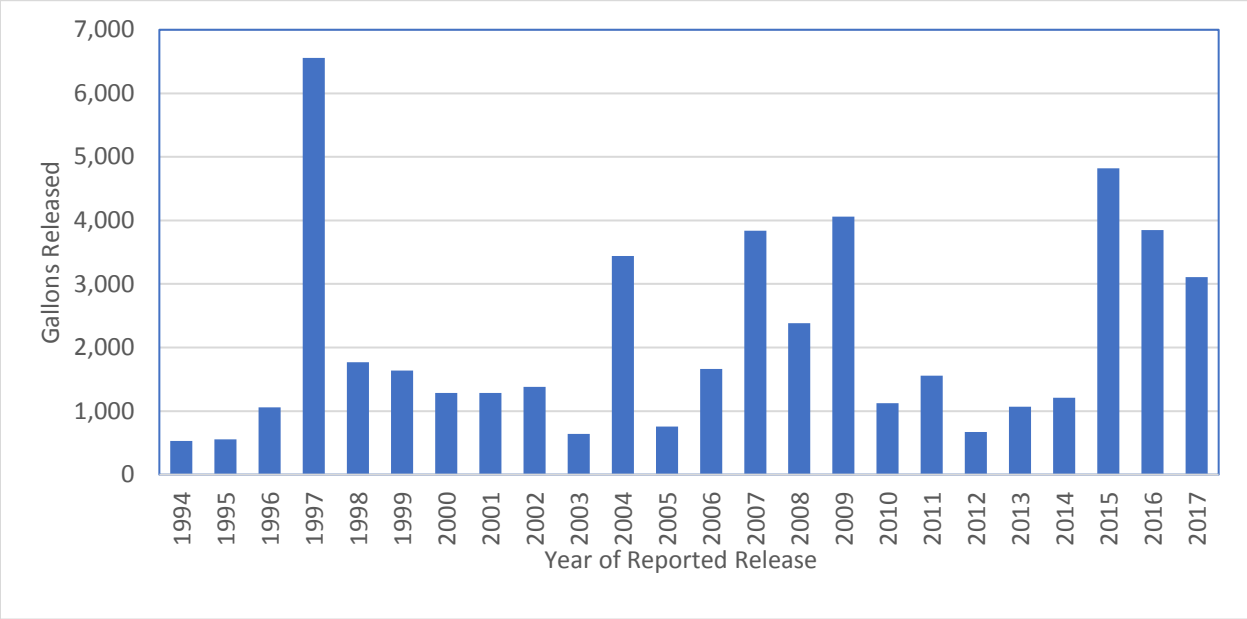

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

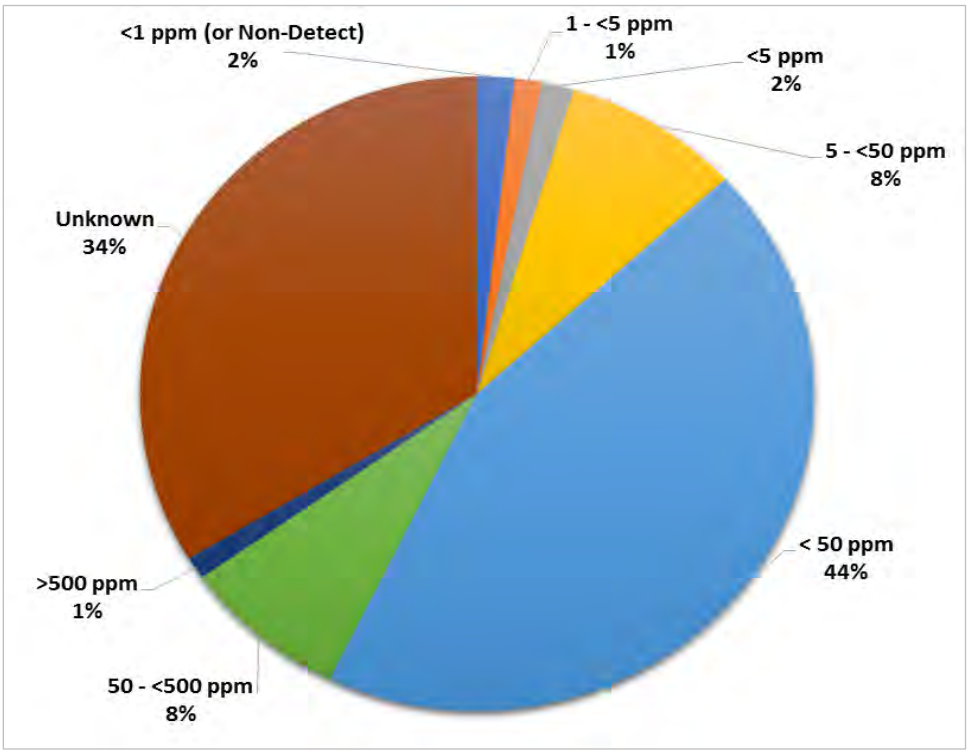

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

6.0 References

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

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F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

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F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

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Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

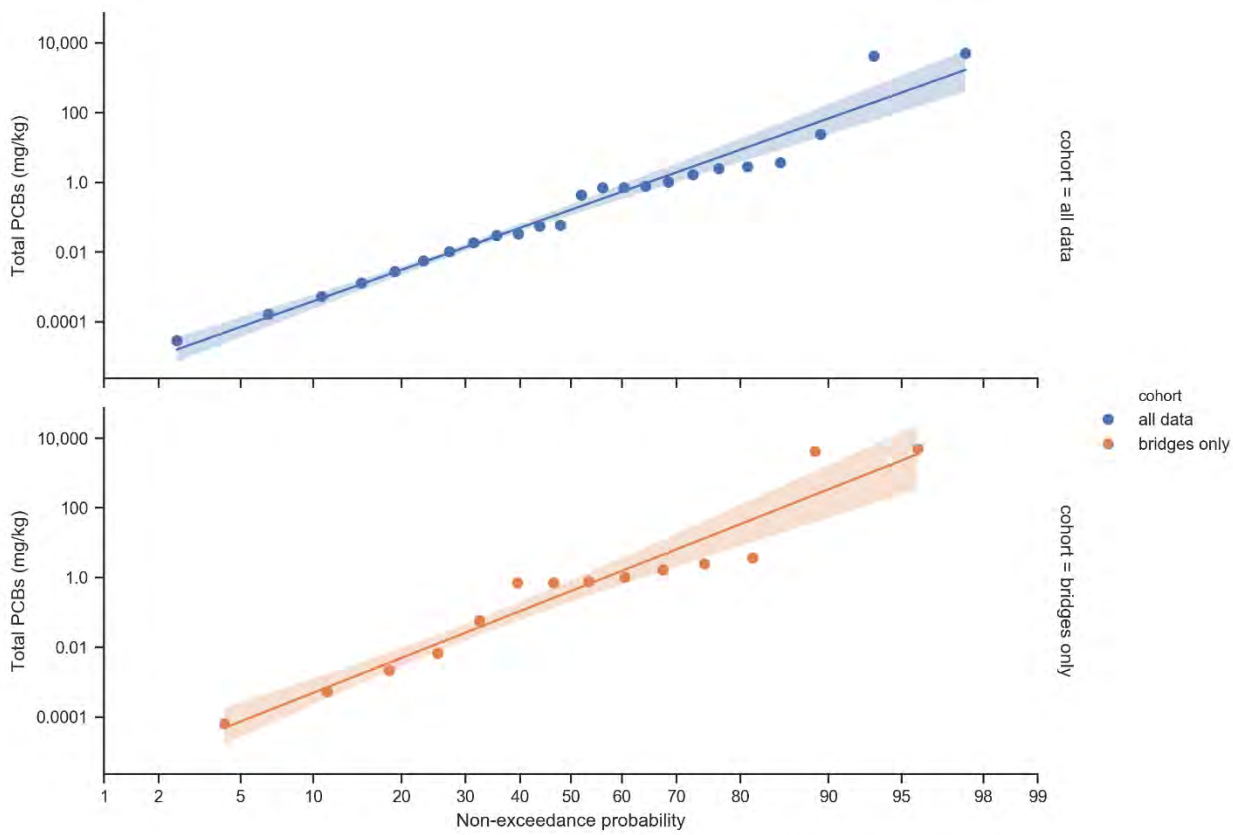

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

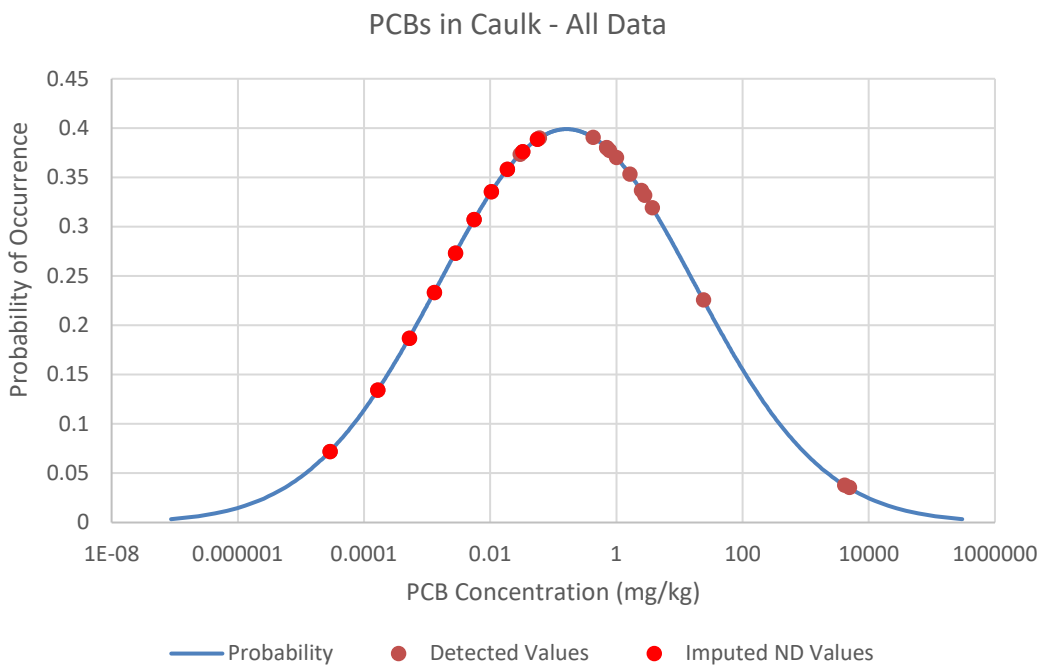

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

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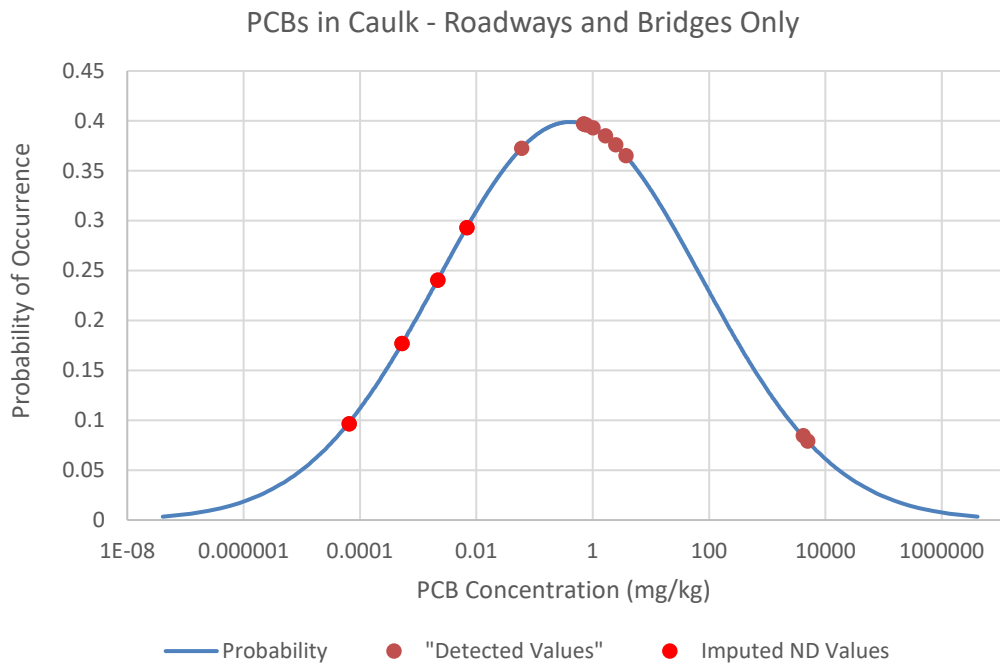

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

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Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

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Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

Composite S

Composite C

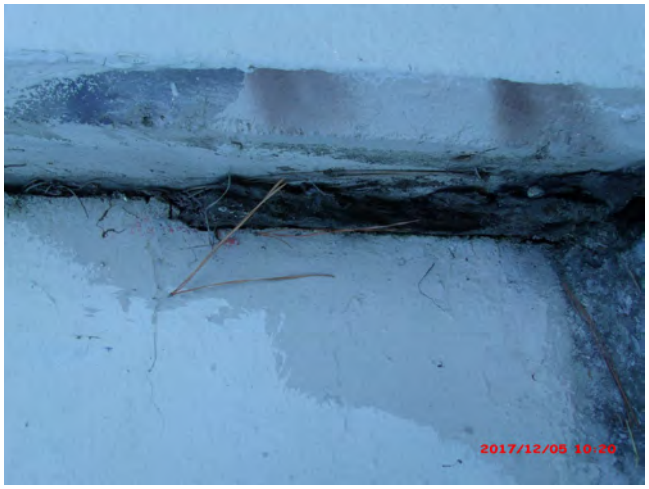

Composite D

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Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

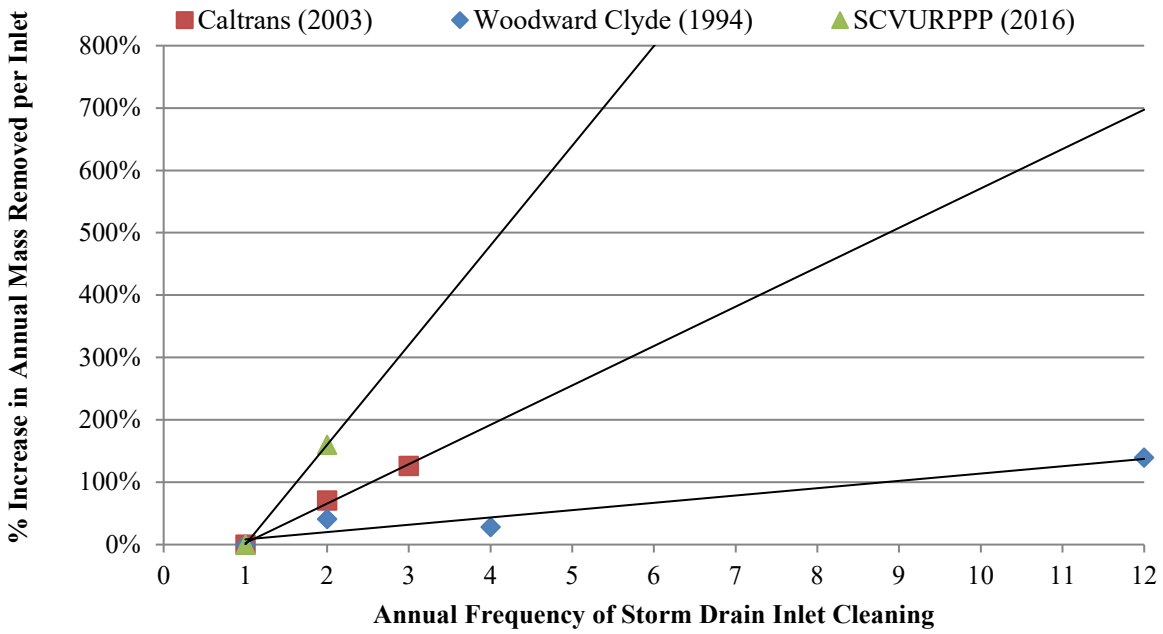

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

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Caltrans (2003). Drain Inlet Cleaning Efficacy Study. California Department of Transportation. CTSW-RT-03-057.36.1. June.

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Paradigm Environmental (2020). Technical Memorandum: Modeled Yield Estimates from SCVURPPP (all ABAG HRUs). January 7, 2020.

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

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Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:

1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:

Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

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APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

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The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

I.5 References

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09006
9047

SOLANO PERMITTEES'

GREEN STORMWATER INFRASTRUCTURE

DESIGN CONCEPTS

09007

9048

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Green Street Inspiration

Green Stormwater Infrastructure (GSI) Concept Plans

GSI Standard Specification and Design Details

Green Street Inspiration

Ideas for incorporating green stormwater infrastructure into downtown right-of-ways

Green Streets use green stormwater infrastructure to improve safety for all users while also introducing a host of environmental multi-benefits.

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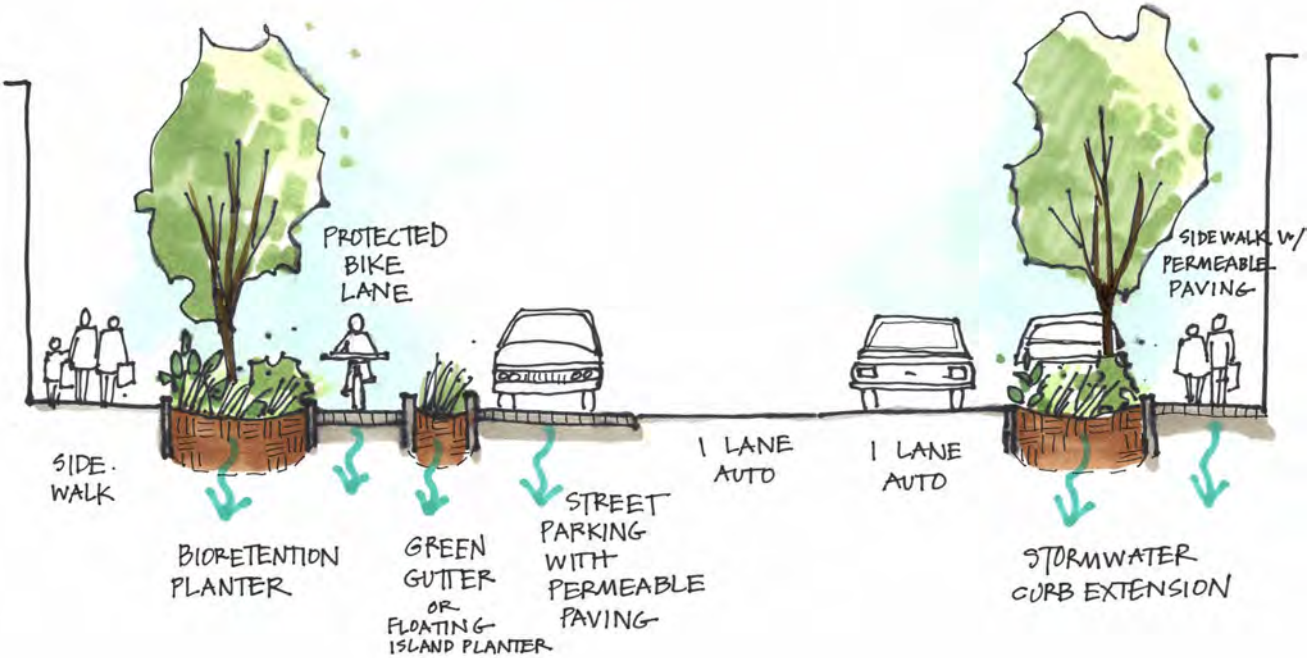
PROTECTED BIKE LANE
SIDEWALK W/ PERMEABLE PAVING
SIDE-WALK
BIORETENTION PLANTER
GREEN GUTTER OR FLOATING ISLAND PLANTER
STREET PARKING WITH PERMEABLE PAVING
1 LANE AUTO
1 LANE AUTO
STORMWATER CURB EXTENSION

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9051

Green Streets

Green stormwater infrastructure (GSI) can be integrated into many, if not all, of the streets located within the Solano Permittees' jurisdictions. For example, through a series of retrofits, ideally coinciding with upcoming capital projects, West Texas Street in Fairfield and Sonoma Boulevard in Vallejo have the potential to transform into Green Streets. The following examples, photos and details provide ideas for how to achieve this transformation from other Cities in northern California incorporating GSI into street right-of-way retrofit projects.

"Green Streets are designed to capture, slow, and treat stormwater runoff. This approach stands in contrast to the traditional approach to stormwater management that uses "gray" infrastructure, designed to expediently collect stormwater runoff from streets through a system of storm drain inlets, pipes, culverts, and storage facilities that eventually dispose of the collected runoff in waterways or treatment facilities." - Sustainable Streets City of San Mateo, February 2015

We can transition the management of stormwater as a nuisance to a resource in the Solano Permitees' arterial, commercial and residential streets by using GSI tools like the ones described in this booklet; stormwater curb extensions, stormwater transit stops, floating island planters and stormwater medians.

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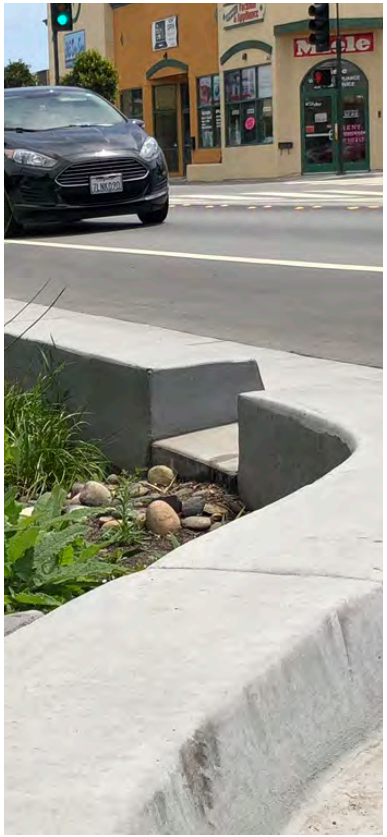

Broadway Avenue
Seaside, CA

The City of Seaside retrofitted Broadway Avenue from a 4-lane arterial street to a Green Street with two vehicle lanes, bike lanes and green stormwater infrastructure. Stormwater curb extensions integrate bioretention cells that provide traffic calming benefits, are combined with pedestrian crossings, and intercept and infiltrate stormwater runoff from the right-of-way.

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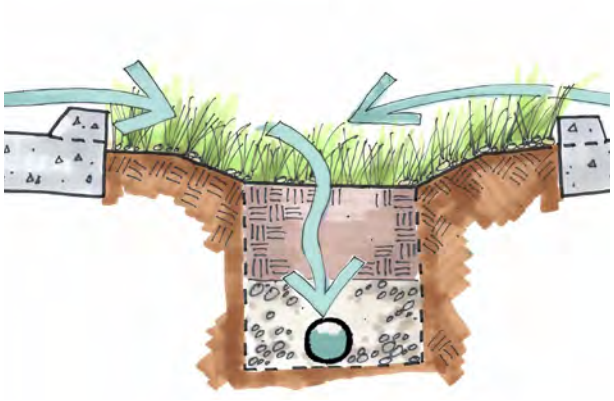

BIORETENTION

An inlet pipe, curb cuts, or sheet flow over an impervious area conveys water into the bioretention feature, where it is filtered prior to infiltration or outflowing via the storm drain system.

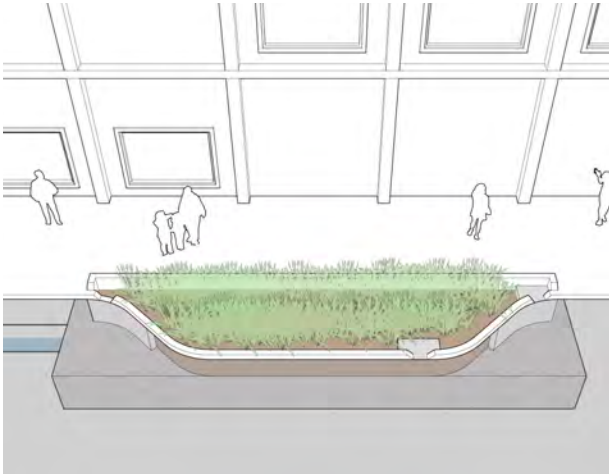

STORMWATER CURB EXTENSIONS

They visually and physically narrow the roadway width, creating safer and shorter crossings for pedestrians and providing traffic calming on low-speed neighborhood streets and commercial corridors. The available space generated by curb extensions can be used for bioretention or biofiltration GSI, plantings, street furniture, benches and street trees.

BIORETENTION BASIN

Roadside Section, Detail 1.1

Bioretention basins allows for infiltration into subsurface soils and can be constructed with or without side walls. Other common terms used to refer to bioretention features include rain gardens, self-retaining areas or biofilters.

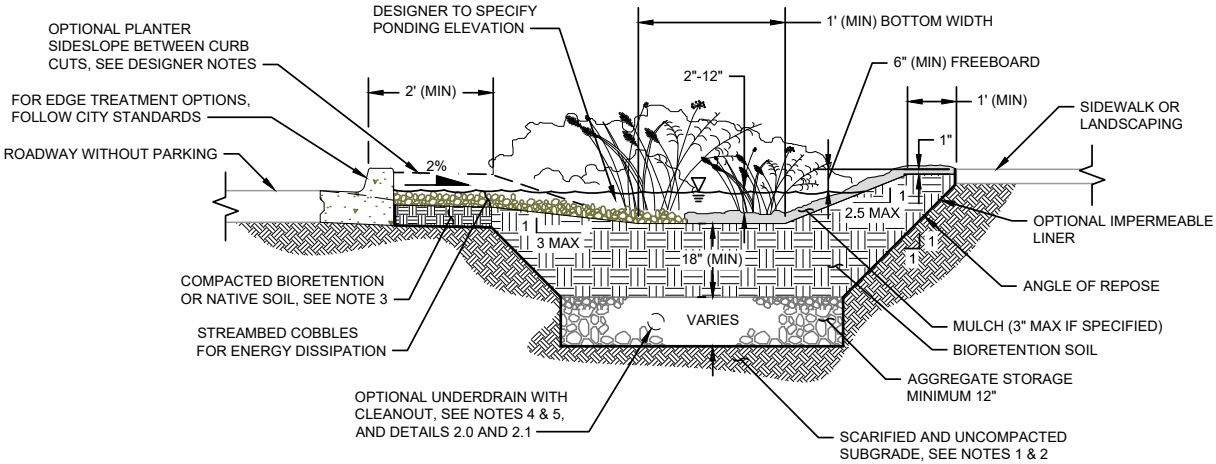

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Shellmound Street
Emeryville, CA

This Green Street retrofit includes stormwater curb extensions, stormwater transit stops, floating island planters and permeable pavement.

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STORMWATER TRANSIT STOP

Incorporating GSI into bulb outs around transit stops reduces runoff, improves water quality and is more efficient compared to bus pull-outs.

09018
9059

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CURB CUTS

Curb cuts can be associated with many different green stormwater infrastructure types. Runoff from impervious surfaces like roads, sidewalks, and trails can be directed into GSI through curb cuts and/or trench drains.

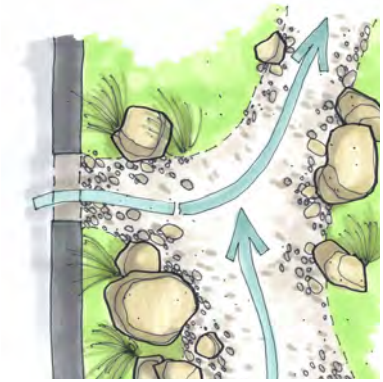

Stormwater enters a bioretention area using curb cuts. Design curb cuts and inflow areas to manage adequate flow.

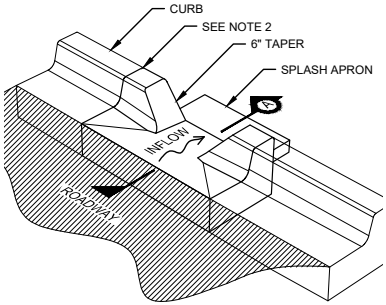

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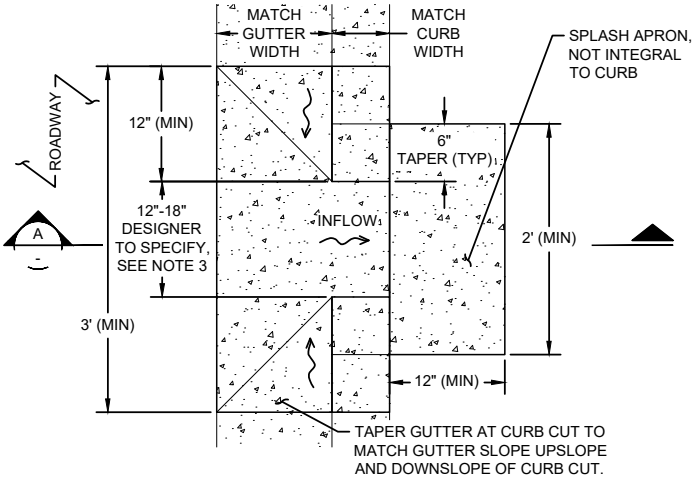

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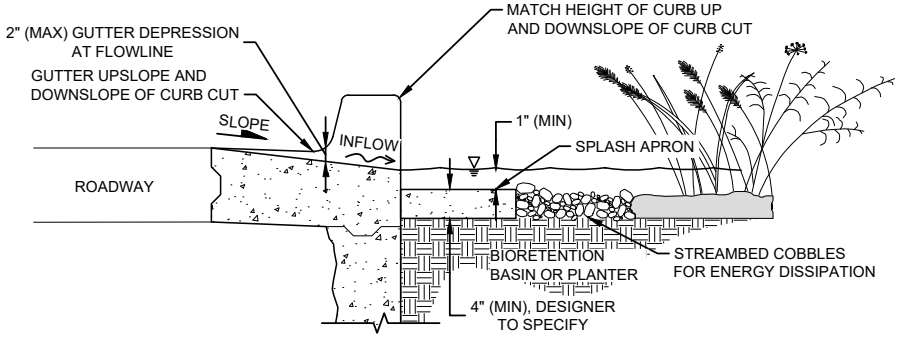

SECTION A

CURB CUT INLET

Typical Detail 3.1

09021
9062

21st Street
Paso Robles, CA

This Green Street was designed with bikes in mind. Striped bike lanes are included where lane widths allow, with "sharrows" or shared bike/care lanes marked at the narrow lower portion. Bike racks located near businesses make bike errands more convenient.

09022
9063

STORMWATER MEDIAN

Wide medians used to separate traffic directions can convey and infiltrate large amounts of water. On very wide streets and parkways, green stormwater infrastructure can be coupled with greenways for bicycling and walking, providing attractive public space adjacent to stormwater management.

Runoff from upstream and/or the adjacent roadways and impervious areas can be directed into a bioswale, bioretention, or biofiltration facility located in the median.

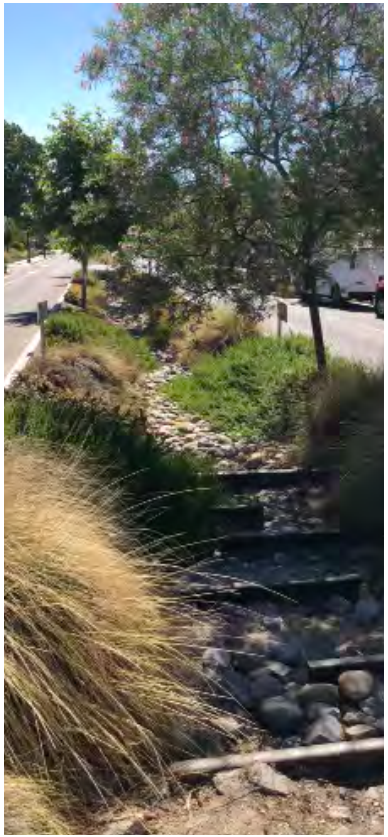

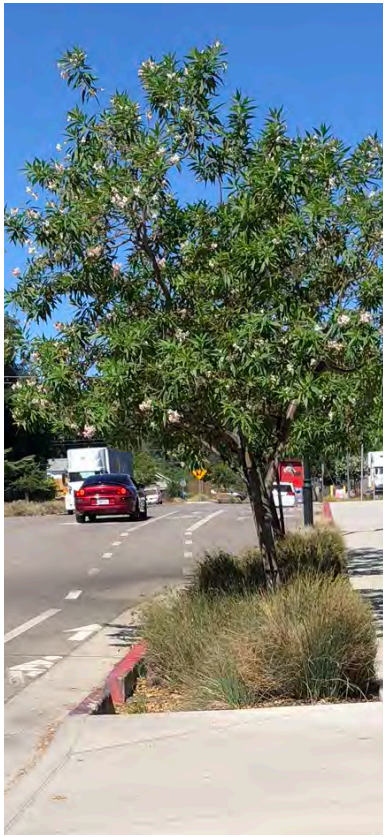

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STORMWATER MEDIANS

Stormwater medians transform a typically unused space in the right-of-way into a multi-functional GSI element that can provide a visual cue to drivers to reduce vehicle speeds. On wide parkways or boulevards, stormwater medians can provide distinctive walkways and inviting public spaces.

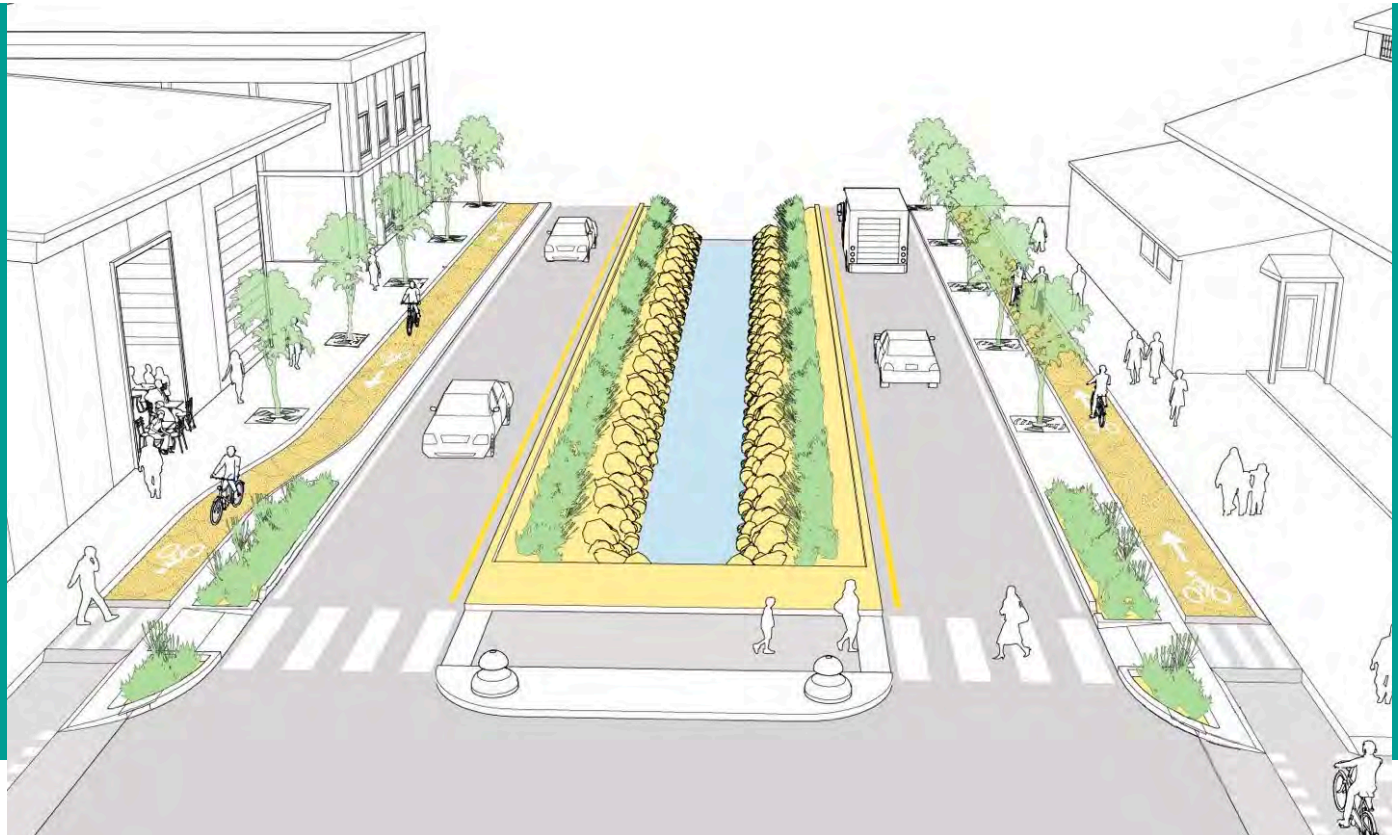

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GSI OUTLETS

Due to the predominance of soils with low infiltration capacity within the Solano Permittees area, most GSI features won't infiltrate to a significant degree and in most cases will require an underdrain and overflow connected to the existing storm drain system.

OVERFLOW STRUCTURE

Typical Detail 4.3

Stormwater typically is designed to pond up to 6 inches prior to outflow via a surface outlet (e.g., curb cut) or a piped overflow (e.g., overflow inlet and/or underdrain). Safe overflow during large storm events is critical to minimize flooding into the roadway, which can create hazards for street users.

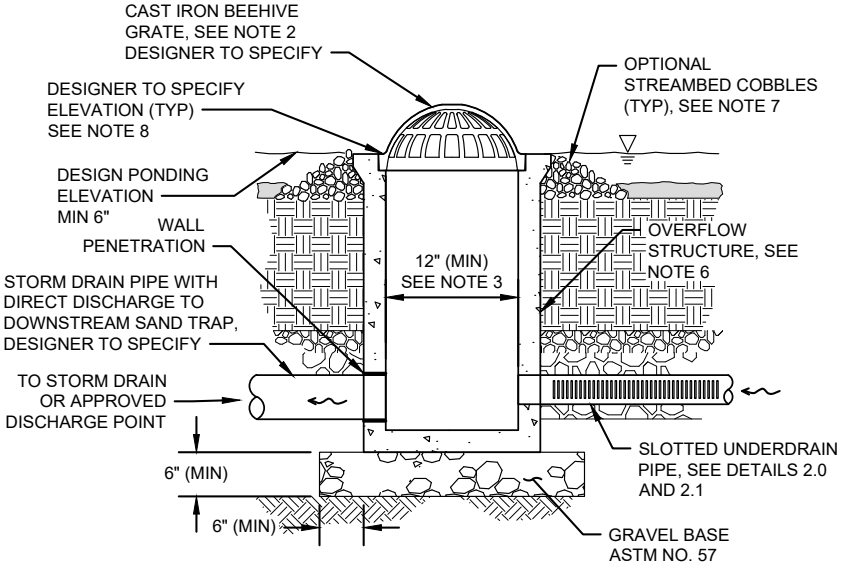

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BIG 5

San Pablo Avenue
El Cerrito, CA

Instead of sending polluted water from the street directly into the storm drain that flows into the San Francisco Bay, openings in the curb let water flow into the bioretention features first. The bioretention cells are lower than the surrounding sidewalk which helps them to catch, retain and clean water.

A challenge when identifying GSI opportunities in street retrofits is finding low points where it is also practical to incorporate GSI. Factors to consider include identifying existing and future gradient and drainage patterns.

A cost effective GSI retrofit in a right-of-way will work with existing and/or proposed gradients and drainage patterns, the storm drain system and utility locations.

09029
9070

TRENCH DRAINS

Runoff from impervious surfaces like roads, sidewalks, and trails can be directed into GSI features through curb cuts and/or trench drains. Trench drains have the benefit of conveying runoff while still allowing the passage of pedestrians and wheeled vehicles.

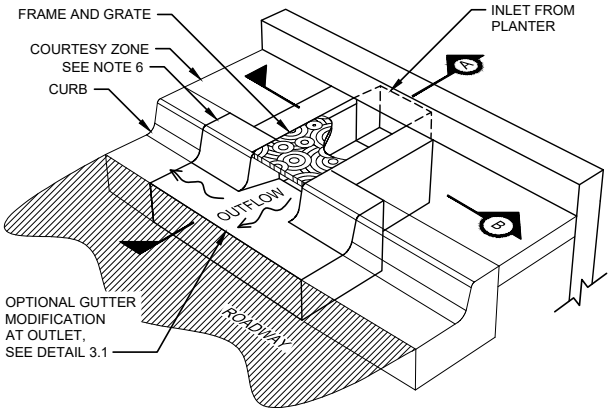

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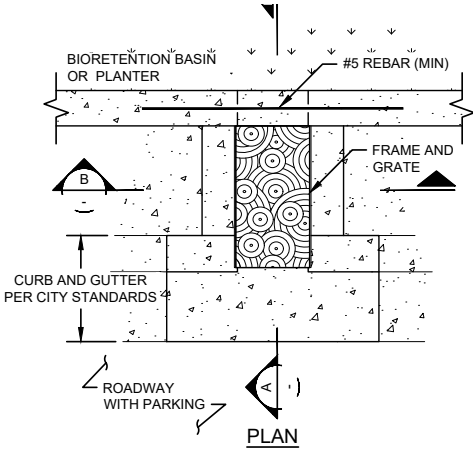

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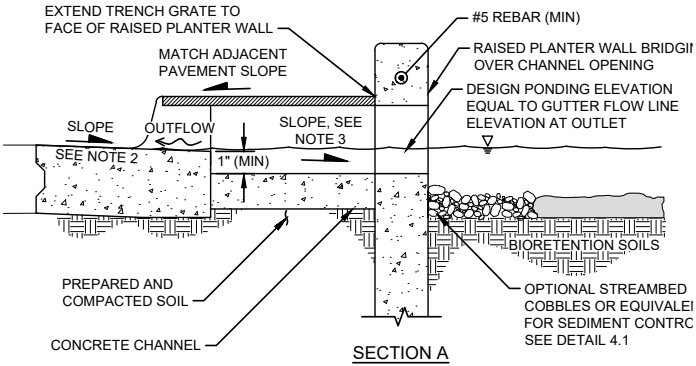

SECTION A

CURB CUT WITH TRENCH

Typical Detail 4.2

Trench drains can be designed as inlets or outlets to a GSI feature.

09031
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WEST TEXAS ST, FAIRFIELD GREEN STREET RETROFIT

CONCEPT SKETCHES

09032
9073

80 ± ROW
32'
32'
7.5' SIDEWALK
8' LANDSCAPE
5' BIKE LANE
3' BUFFER
10' TRAVEL LANE
12' RAISED MEDIAN
10' TRAVEL LANE
8' LANDSCAPE
3' BUFFER
5' BIKE LANE
7.5' SIDEWALK

09033
9074

Can I retrofit this street with Green Stormwater Infrastructure (GSI)?

Are lane widths greater than 10 feet?

- Y → Is it a truck or transit route?
  - Y → Reduce lane width to 11' in each direction
  - N → Reduce lane width to 10' to reduce vehicle speeds, making streets safer while making space available for GSI

Are all vehicle lanes used at capacity?

- N → Convert one lane in each direction to GSI, bicycle lanes, and/or bike lane buffered by floating island planter
- Y → Is the street crowned?
  - N → Evaluate for stormwater median
  - Y → Look to the edge of the right-of-way to site floating island planters and stormwater curb extensions at midblock or intersections

Site GSI close to existing drain inlets to facilitate connection to the existing storm drain network

Are the roads and/or sidewalks in need of repair or resurfacing?

- N → Program into CIP pervious pavement replacement of sidewalk, parking strip, crosswalk and/or roadway
- Y → Retrofit with pervious pavement instead of replacing or resurfacing in-kind

Is roadway safety a concern?

- Y → Identify opportunities to plant street trees
- Y → Locate stormwater curb extensions at crosswalks to increase pedestrian visibility and reduce crossing distance

Is it a residential street?

- Y → Site GSI in planting strip between sidewalk and roadway
  - Consult an Arborist if new GSI is proposed near existing mature trees
  - Alternate midblock stormwater curb extensions to create a serpentine driving lane to reduce vehicle speeds
  - Direct runoff, where feasible, from adjacent arterial or commercial streets to new GSI in the right-of-way

Is parking angled?

- Y → Convert to parallel parking to make space for: wider pervious pavement walkways, bike lanes and/or... Green stormwater infrastructure (stormwater curb extensions and floating island planters

Use walled or planter style bioretention if space is constrained and incorporate walls into seating or other placemaking elements

WATERISTAS
URBAN WATER DESIGN • ENGINEERING COLLABORATIVE

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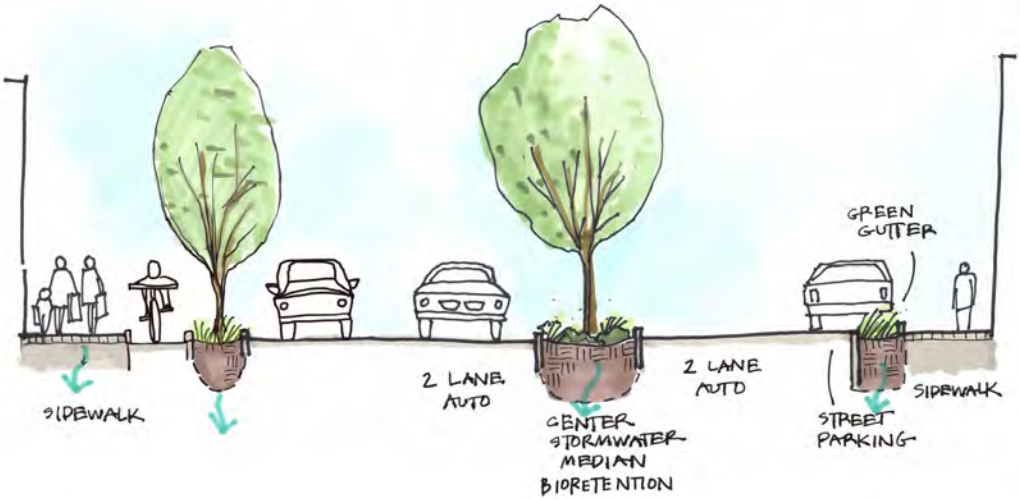

RESILIENT URBAN SPACES

To build more resilient urban spaces we need to reimagine our asphalt and concrete sidewalks and streets as sites for sustainable stormwater management. Every realm in the public right-of-way is an opportunity to incorporate green stormwater infrastructure that also can calm traffic and make way for walking, biking and public space.

Green Streets will allow projects to provide a range of functions and benefits, such as stormwater management, bicycle and pedestrian mobility and safety, public green space and urban forestry.

09035
9076

GSI Concept Plans

09036
9077

VALLEJO CONCEPT #1 - CITY HALL/ LIBRARY PARKING LOT GSI RETROFIT

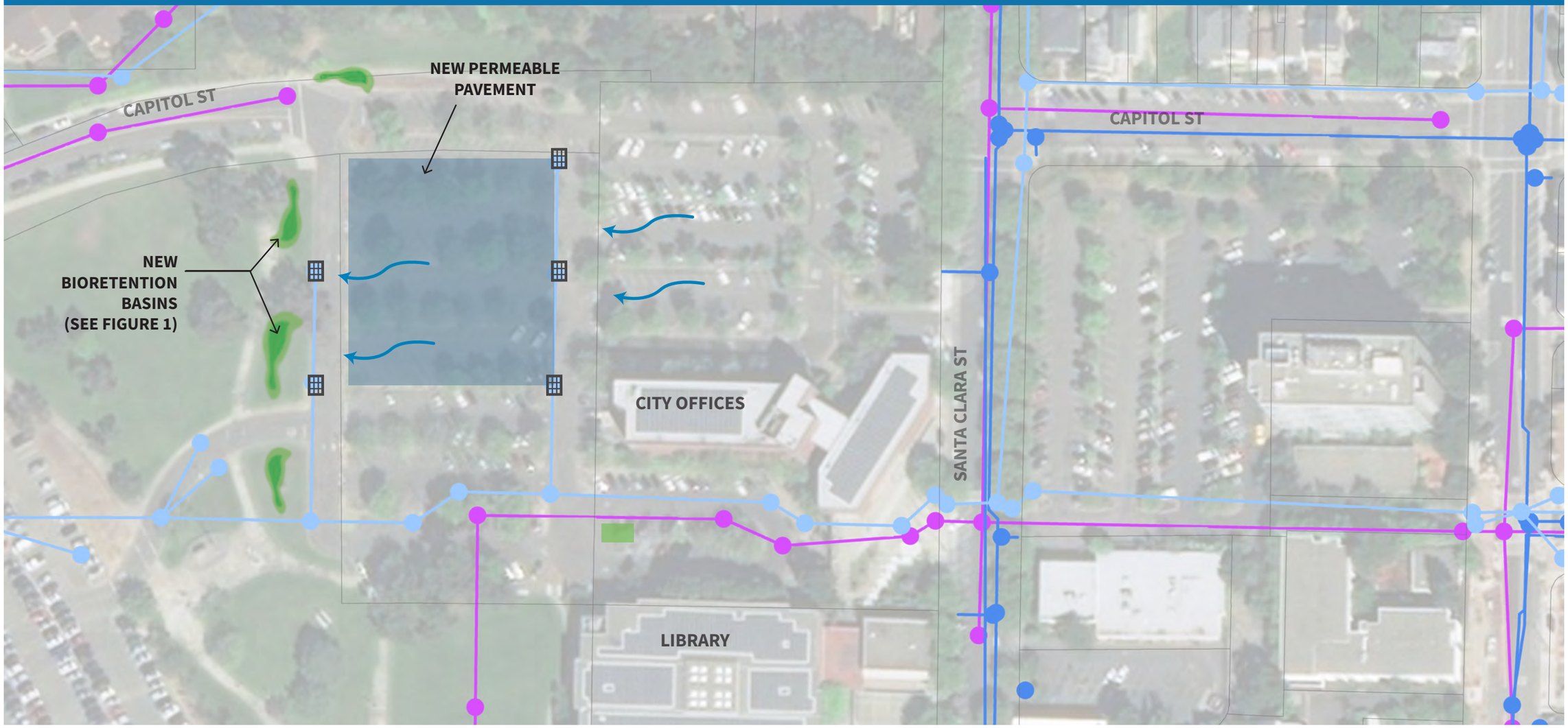

Legend

- Flow of Water
- Permeable Pavement
- Bioretention & Bioinfiltration Basin
- Parking Lot Bioretention & Biofiltration
- Stormwater Inlet
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 60 120 240 Feet

N

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9078

Vallejo Concept #1 - City Hall/ Library Parking Lot GSI Retrofit

FIGURE 1. Bioretention Basin

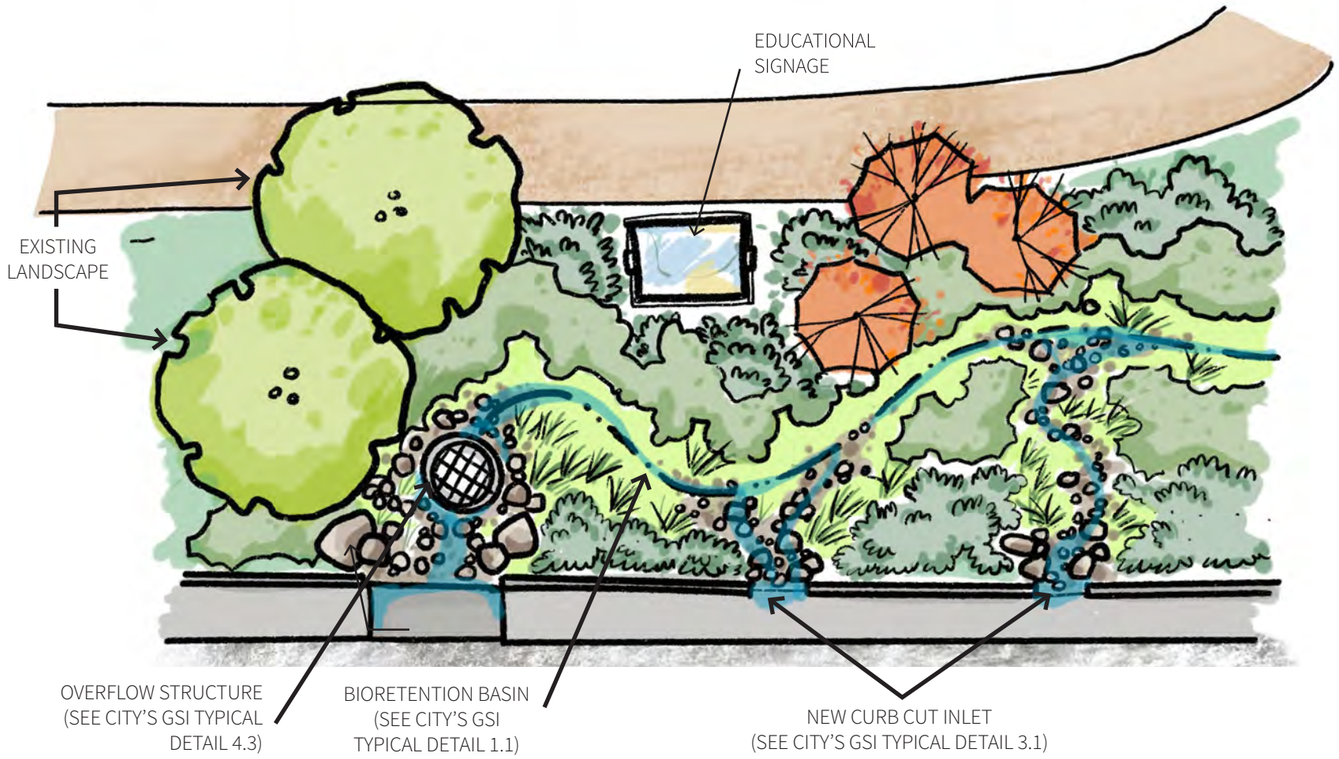

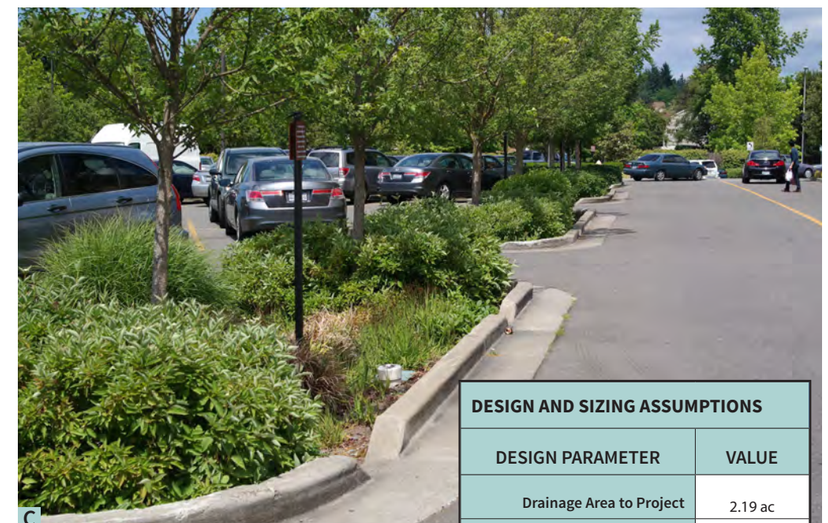

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure. These improvements will reduce the amount of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The existing parking lot proposed for replacement with permeable pavement is approximately 1 acre, in poor condition, and rarely used. The parking lot slopes towards an irrigated turf area to the west, that is well suited for conversion to a series of bioretention basins to slow and treat runoff from the parking area and educate City residents about the value and multiple benefits of green stormwater infrastructure.

The proposed project would add curb cuts along the western edge of the parking lot to direct the runoff into new bioretention basins that would replace the irrigated turf.

Stormwater Management Strategy

The bioretention areas have been designed to provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The bioswales will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswales are designed to manage in excess of the 1.5-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches. The stormwater will be treated through the bioretention soil bed media, and then allowed to infiltrate through the native soils to the underlying groundwater.

Future evaluation of this concept should consider cost effective permeable pavement alternatives, appropriate for low use sections of the parking lot.

Photos:

A. Native grass lined swale allows for treatment and infiltration of stormwater. **B.** Gravel lined swales provide an infiltration and conveyance path. **C.** New tree plantings and green stormwater infrastructure plant mixes provide infiltration areas, erosion control, and habitat in parking areas.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	2.19 ac
Bioswale Area	4,445 sq-ft
Treatment Area / Drainage Area	4.7%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.71
Area-weighted Abstraction	0.11 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	3,120 ft^3
Approximate Impervious Area Disconnection	1.9 ac

VALLEJO CONCEPT #2 - CITY PARKING LOT H

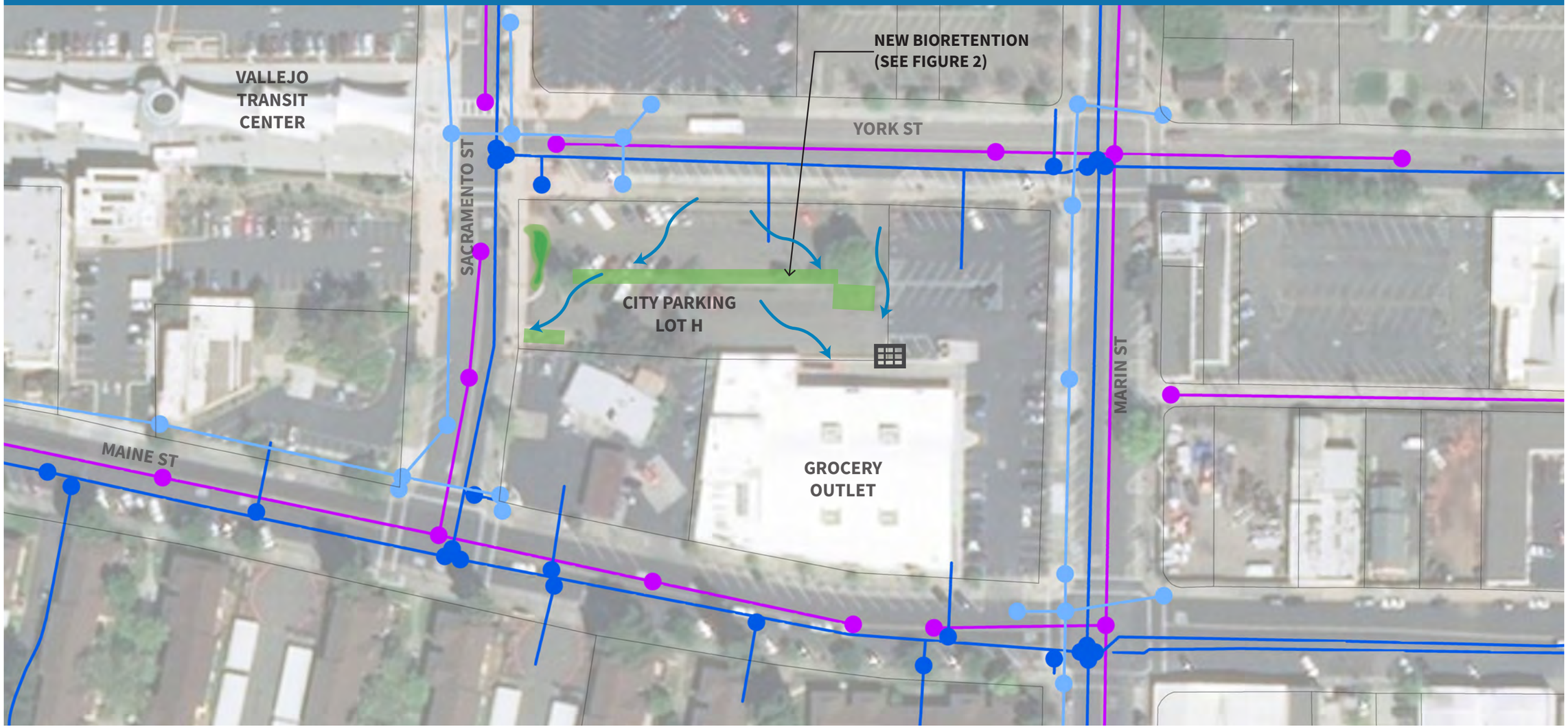

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Parking Lot Bioretention & Biofiltration
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 50 100 200 Feet

N

09039
9080

Vallejo Concept #2 - City Parking Lot H

FIGURE 2. Parking Lot Bioretention

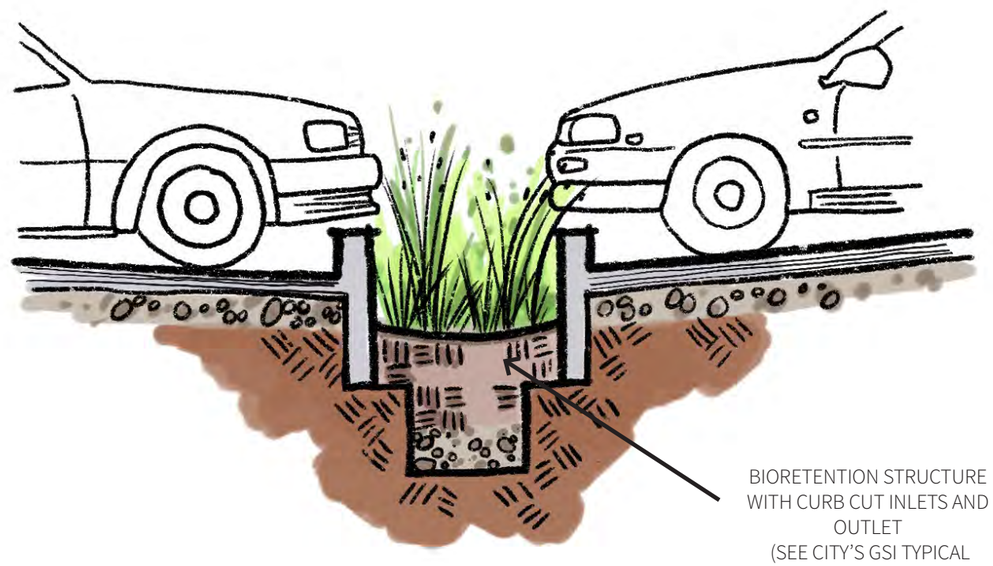

DESIGN AND SIZING ASSUMPTIONS	
DESIGN PARAMETER	**VALUE**
Drainage Area to Project	0.72 ac
Bioretention Area	3,030 sq-ft
Treatment Area / Drainage Area	9.7%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.75
Area-weighted Abstraction	0.11 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	1,100 ft^3
Approximate Impervious Area Disconnection	0.7 ac

Photos:

A. Parking lot bioretention providing stormwater treatment and shade trees.
B/C. Before and after example of a parking lot retrofit to provide stormwater treatment using bioretention located between parking stalls.

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The existing parking lot is approximately 0.72 acres with a narrow island between the parking bays and standard drainage infrastructure including curbs and gutters that allow the runoff to flow off the site and into the storm drain system. This area is well suited to be converted to bioretention to slow and treat runoff from the parking area.

The proposed project would add bioretention features between parking stalls and within unused areas by using curb cuts and removing existing impervious surfaces.

Stormwater Management Strategy

The green stormwater infrastructure features have been designed to provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The features will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswales are designed to manage in excess of the 2.75-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches. The stormwater will be treated through the bioretention soil bed media, and then allowed to infiltrate through the native soils to the underlying groundwater or overflow into the existing storm drain system.

09040
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VALLEJO CONCEPT #3 - MONO STREET CORPS YARD

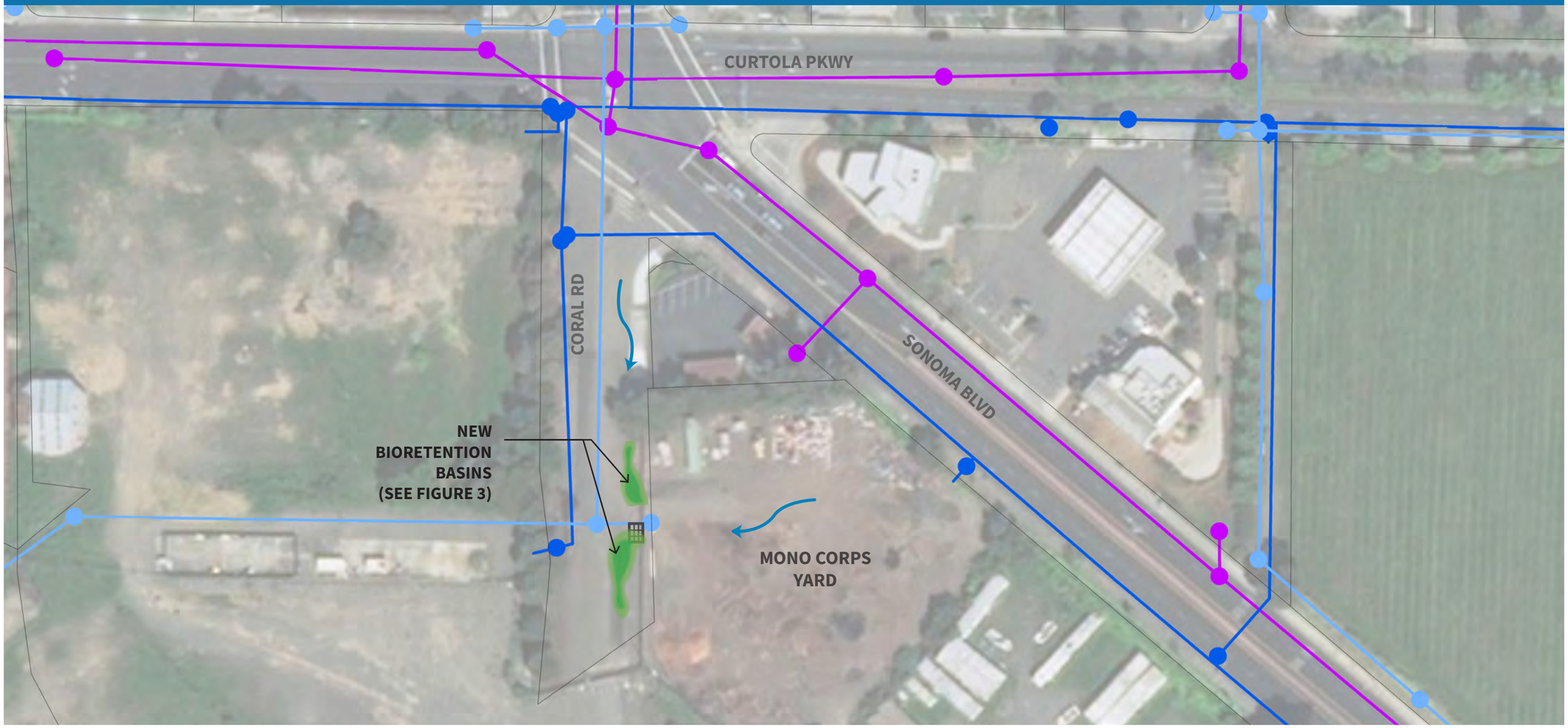

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

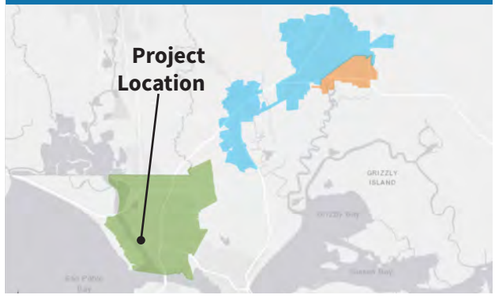

0 50 100 200 Feet

N

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Vallejo Concept #3 - Mono Street Corps Yard

FIGURE 3. Bioretention Basins Adjacent to Roadway

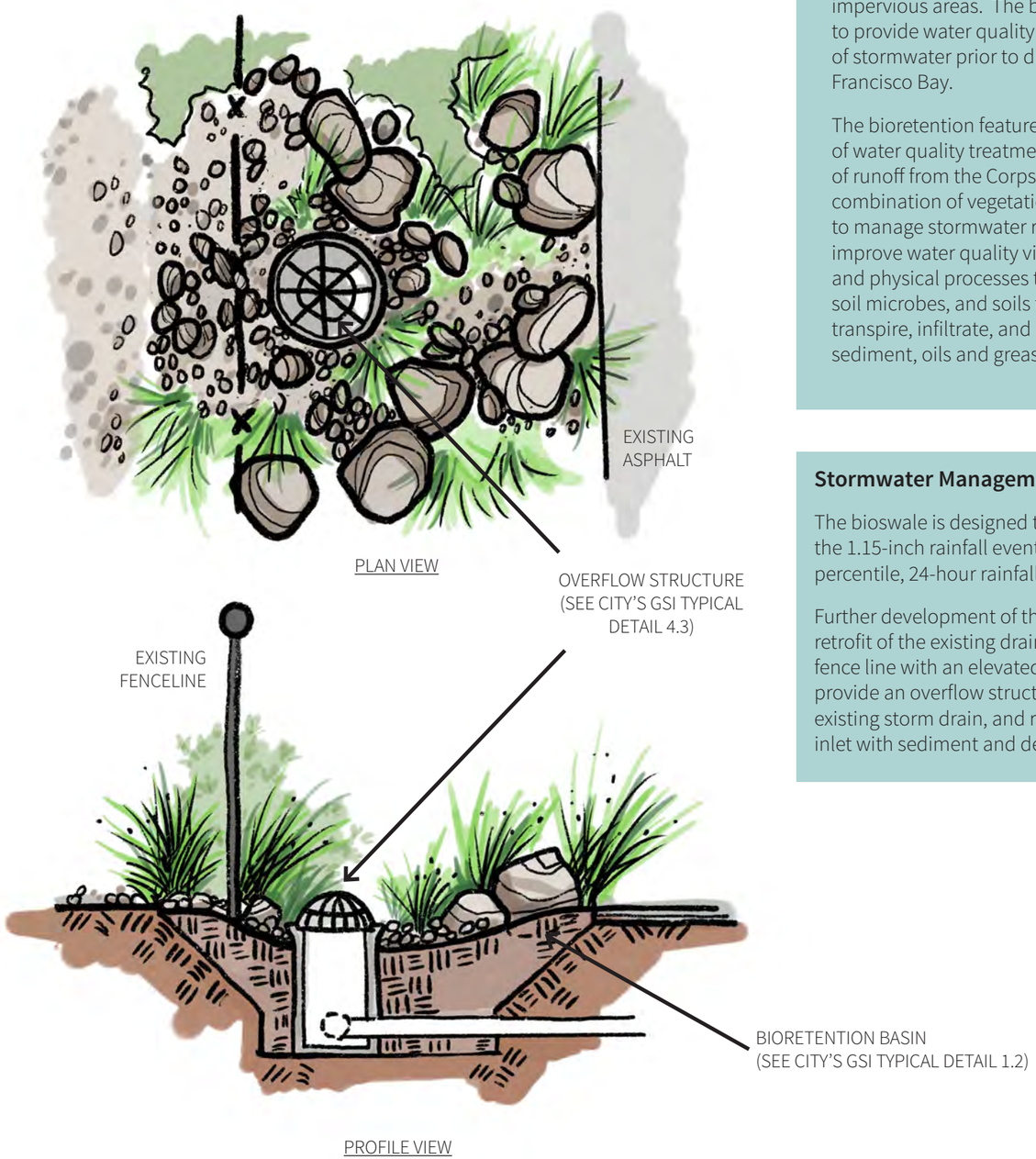

Project Description

The proposed green stormwater infrastructure area is located to collect and treat runoff from the City's Mono Street Corps Yard and adjacent impervious areas. The bioretention area is sized to provide water quality treatment and retention of stormwater prior to discharge into the San Francisco Bay.

The bioretention features will provide a high level of water quality treatment and on-site retention of runoff from the Corps Yard. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The project will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

Stormwater Management Strategy

The bioswale is designed to manage in excess of the 1.15-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches.

Further development of this GSI concept will include retrofit of the existing drain inlet along the corps yard fence line with an elevated cast iron beehive grate, to provide an overflow structure with connection to the existing storm drain, and reduce clogging of the drain inlet with sediment and debris.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	1.54 ac
Bioretention Area	1,250 sq-ft
Treatment Area / Drainage Area	1.9%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.40
Area-weighted Abstraction	0.16 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	1,150 ft^3
Approximate Impervious Area Disconnection	0.6 ac

Photos:

A/B. Riparian and native flowering plants adjacent to bioretention features.

09042
9083

SUISUN CITY CONCEPT #1 - AMTRAK PARK & RIDE

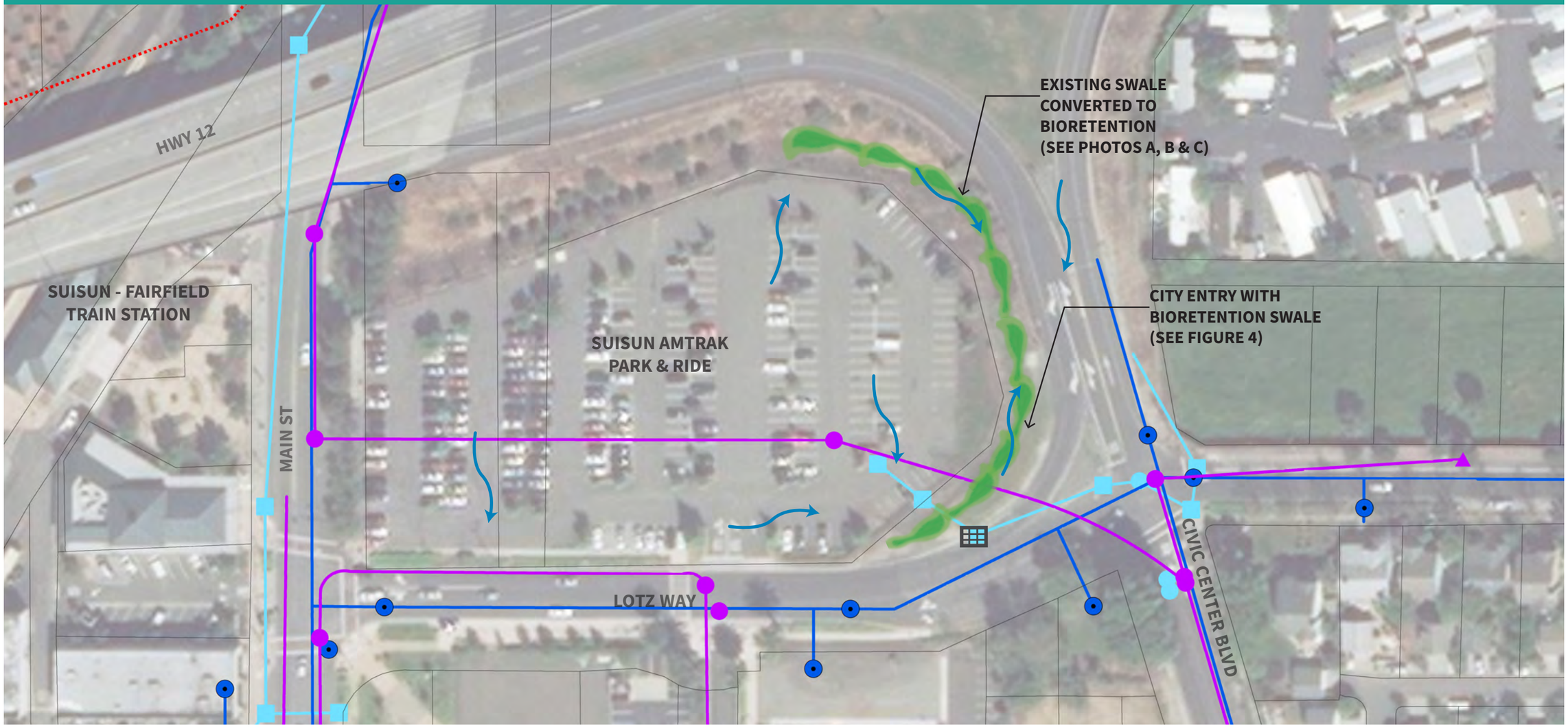

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

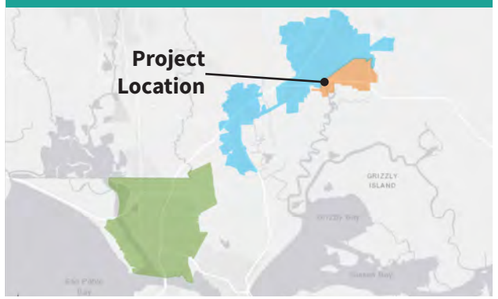

0 50 100 200 Feet

N

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Suisun City Concept #1 - Amtrak Park & Ride

FIGURE 4. City Entry with Bioretention Swale

NEW CURB CUTS TO CREATE POSITIVE DRAINAGE TOWARDS SWALE (SEE CITY'S GSI TYPICAL DETAIL 3.1)

BIORETENTION BASIN (SEE CITY'S GSI TYPICAL DETAIL 1.2)

DESIGN AND SIZING ASSUMPTIONS	
DESIGN PARAMETER	VALUE
Drainage Area to Project	3.65 ac
Bioswale Area	4,740 sq-ft
Treatment Area / Drainage Area	3%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.56
Area-weighted Abstraction	0.14 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	4,275 ft^3
Approximate Impervious Area Disconnection	2.3 ac

Photos:

A. Native grasses and boulders provide transition to existing landscape and convey stormwater.
B/C. Native grass lined bioretention swales convey stormwater and allow for treatment and infiltration.

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure, while creating a welcoming entry into the City. The improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff.

The existing drainage area is approximately 3.65 acres with narrow landscaped islands between the parking bays and standard drainage infrastructure including curbs, gutters, and curb inlets that allow the runoff to flow into the storm drain system. The parking lot slopes towards a grass swale on the eastern perimeter of the parking lot, that is well suited for conversion into a bioretention swale to slow and treat runoff from the parking area.

Stormwater Management Strategy

The bioretention features will provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The bioswale will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswale is designed to manage in excess of the 1.25-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.71-inches.

Further development of this GSI concept can evaluate potential to:

1. Re-orient parking aisles and spaces to increase the number of parking spaces while also accommodating additional bioretention features;
2. Include curb cuts from State Route 12 off-ramp to increase treatment potential;
3. Remove asphalt in low-use areas of the parking lot; and
4. Convey runoff from high flow events.

SUISUN CITY CONCEPT #2 - CIVIC CENTER / DRIFTWOOD DRIVE PARKING LOT

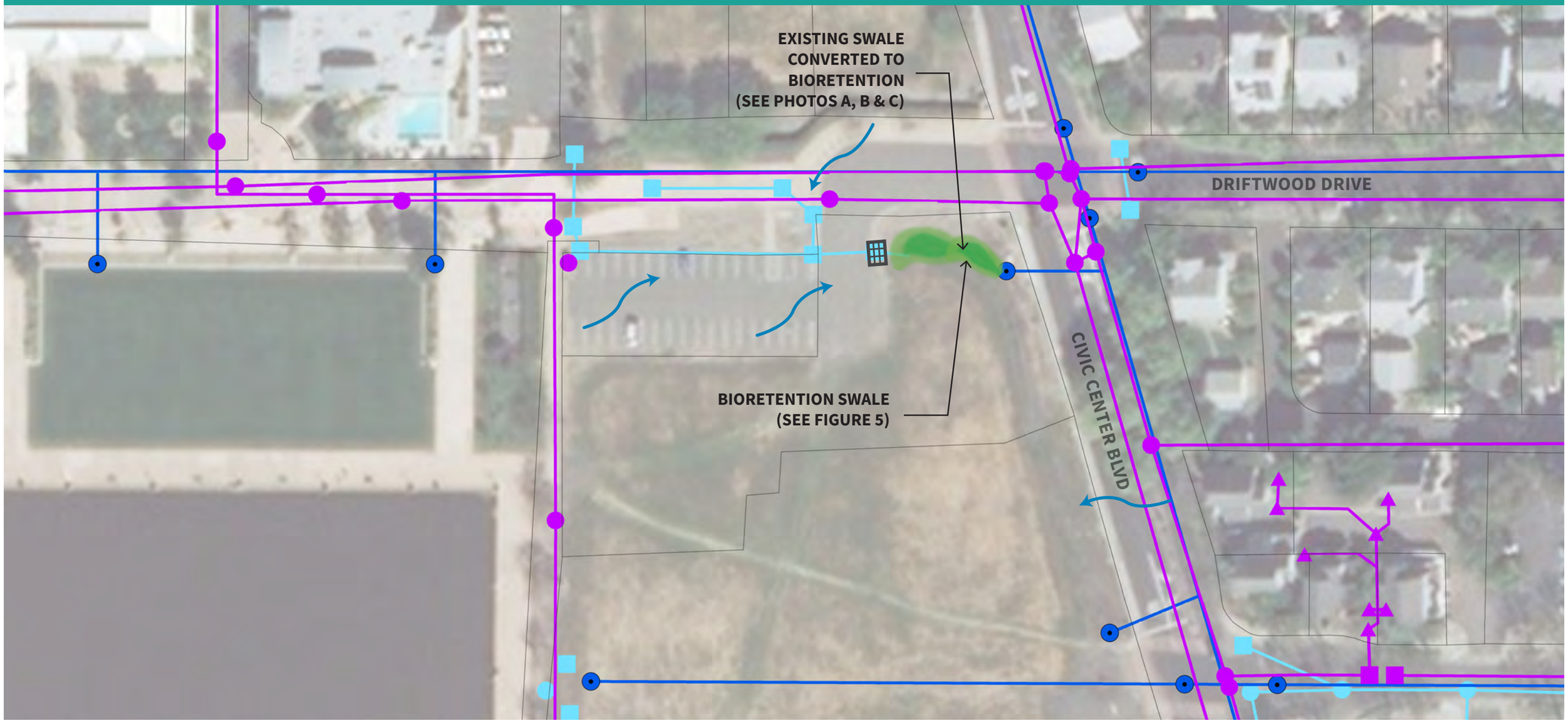

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

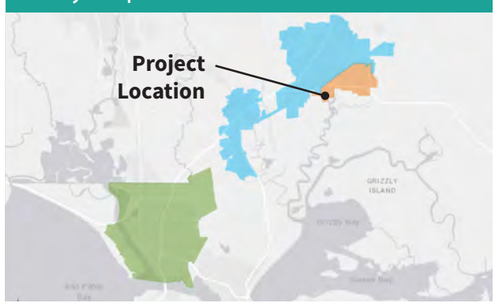

0 40 80 160 Feet

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Suisun City Concept #2 - Civic Center / Driftwood Drive Parking Lot

FIGURE 5. Entryway with Bioretention Swale

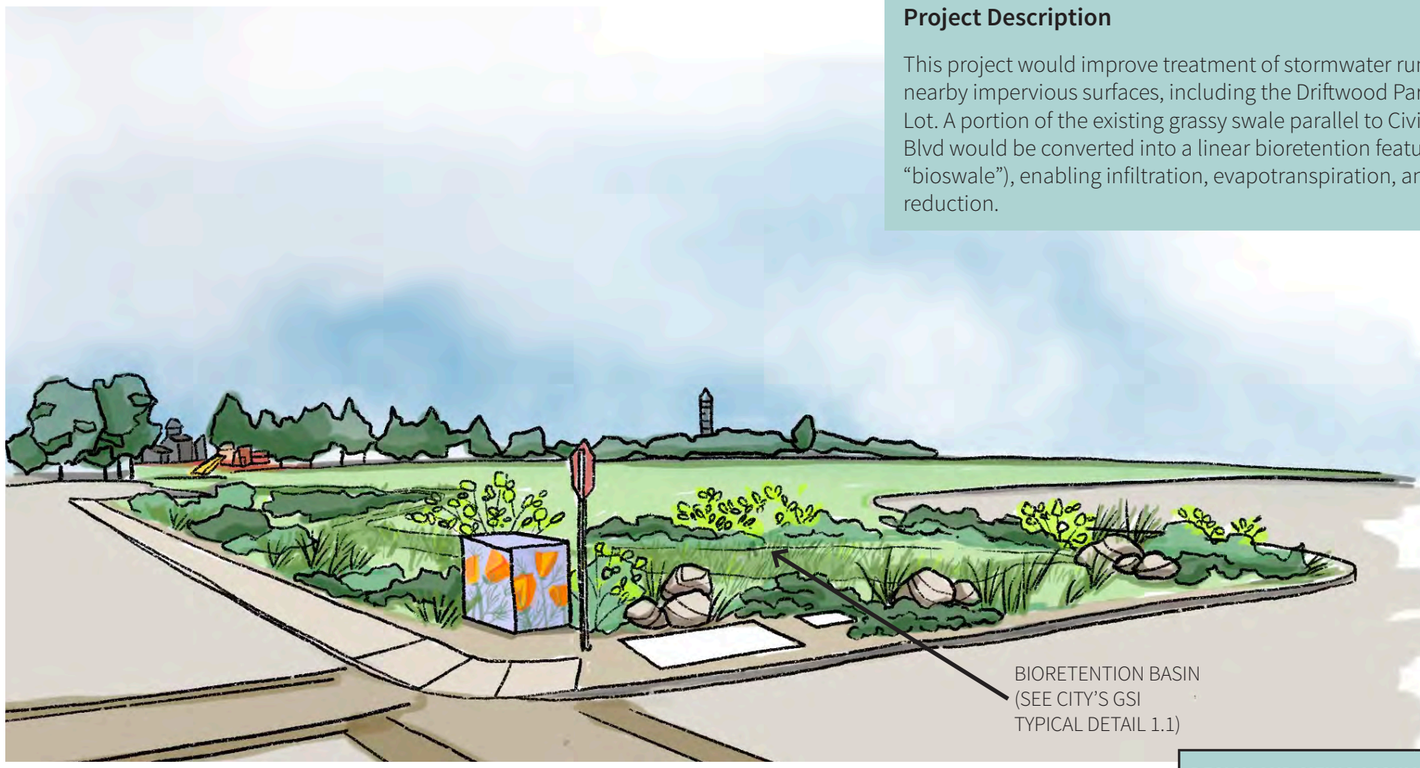

Project Description

This project would improve treatment of stormwater runoff from nearby impervious surfaces, including the Driftwood Parking Lot. A portion of the existing grassy swale parallel to Civic Center Blvd would be converted into a linear bioretention feature (aka "bioswale"), enabling infiltration, evapotranspiration, and runoff reduction.

Photos:

A. Native grasses planted at perimeters of bioretention features.

B. Natural plantings and boulders provide erosion control and provide habitat at basin edges.

C. Native grass lined swale and basin allow for infiltration and treatment of stormwater.

Stormwater Management Strategy

The drainage area is approximately 0.75 acres with an average runoff coefficient of 0.49. Assuming the bioswale inundation area is sized to be 5% of the drainage area with a soil profile of 24 inches available for water storage, the system would be capable of treating up to a design storm of 2.4 inches (greater than the 85th percentile 24 hour design storm depth of 0.71 inches).

Overflow from the bioswale would be directed back to the existing storm drain and designed to prevent ponding in the bioswale for more than 24 hours.

Further development of this GSI concept will need to be coordinated with any future plans for the property.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	0.75 acres
Bioswale Area	1,715 sq-ft
Treatment Area / Drainage Area	5.3%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.49
Area-weighted Abstraction	0.15 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	750 ft^3
Approximate Impervious Area Disconnection	0.4 ac

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Concept Plan Cost Estimates

METHODOLOGY

A planning level cost estimate was prepared for each of the five (5) individual Concept Plans. The cost estimate includes necessary planning, design, permits, construction, and operation and maintenance, energy, and post construction performance monitoring. A Complexity cost multiplier was applied to each project to capture additional costs associated with known project constraints related to biologic, resource, and/or geologic constraints.

Table 1 summarizes the preliminary planning level cost estimates that will be further evaluated and updated as the project concepts are further developed.

Table 1. Preliminary Planning Level Cost Estimates

Cost Estimates			Project									
			Vallejo Concept #1		Vallejo Concept #2		Vallejo Concept #3		Suisun City Concept #1		Suisun City Concept #2	
Capital Costs			City Hall/ Library Parking Lot GSI Retrofit		City Parking Lot H		Mono Street Corps Yard		Amtrack Park & Ride		Civic Center / Driftwood Drive Parking Lot	
Description	Unit	Unit Price	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost
Mobilization/Demobilization	LS	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000
Excavation	CY	$20	3000	$60,000	400	$8,000	200	$4,000	0	$0	0	$0
Offhaul and Disposal	CY	$20	3000	$60,000	400	$8,000	200	$4,000	0	$0	0	$0
Inlet/Outlet	EA	$15,000	3	$45,000	2	$30,000	1	$15,000	2	$30,000	1	$15,000
Pipeline	LF	$100	0	$0	0	$0	0	$0	0	$0	0	$0
Manhole	LS	$5,000	0	$0	0	$0	0	$0	0	$0	0	$0
Staging and Demolition	SF	$5	2300	$11,500	1600	$8,000	200	$1,000	1800	$9,000	700	$3,500
Erosion Control	SF	$1	4500	$4,500	3100	$3,100	400	$400	7110	$7,110	2580	$2,580
Landscaping	SF	$15	4500	$67,500	3100	$46,500	1260	$18,900	7110	$106,650	2580	$38,700
Hardscape Improvements	LF	$25	200	$5,000	500	$12,500	0	$0	400	$10,000	0	$0
Permeable Pavement	SF	$10	21780	$217,800	0	$0	0	$0	0	$0	0	$0
Subtotal Costs				**$476,300**		**$121,100**		**$48,300**		**$167,760**		**$64,780**
Contingency	20%			$95,260		$24,220		$9,660		$33,552		$12,956
Complexity			20%	$95,260	20%	$24,220	15%	$7,245	15%	$25,164	5%	$3,239
Engineering Design	15%			$71,445		$18,165		$7,245		$25,164		$9,717
Construction Management	10%			$47,630		$12,110		$4,830		$16,776		$6,478
Administrative, Permitting, and Legal	10%			$47,630		$12,110		$4,830		$16,776		$6,478
		TOTAL		**$833,525**		**$211,925**		**$82,110**		**$285,192**		**$103,648**
Planning Level Cost Estimate Range	(+)	50%		$1,250,288		$317,888		$123,165		$427,788		$155,472
	(-)	35%		$541,791		$137,751		$53,372		$185,375		$67,371
O&M Costs												
Labor	hr	$50	96	$4,800	96	$4,800	48	$2,400	96	$4,800	96	$4,800
Material	EA	$500	1	$500	1	$500	1	$500	1	$500	1	$500
Monitoring and Reporting	hr	$100	4	$400	4	$400	4	$400	4	$400	4	$400
		TOTAL		**$5,700**		**$5,700**		**$3,300**		**$5,700**		**$5,700**
Equivalent Annual Cost												
Interest	i	0.05	$72,590		$22,710		$9,890		$28,590		$14,020	
Years	n	20										

FAIRFIELD CONCEPT #1 - WATERMAN BLVD GREEN STREET.

Project Description

The proposed project will retrofit an existing sidewalk and landscape strip along the north side of Waterman Blvd. with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The length of sidewalk proposed for retrofit is approximately 4,250 feet long and currently includes standard drainage infrastructure; curbs and gutters that allow runoff to flow into the storm drain system. This area is well suited for retrofit because of the need for sidewalk repairs.

The proposed project would add bioretention features between the existing roadway and sidewalk, at strategic locations along the retrofit corridor. Stormwater would enter the bioretention areas via curb cuts and overflow would be directed back into the storm drain system.

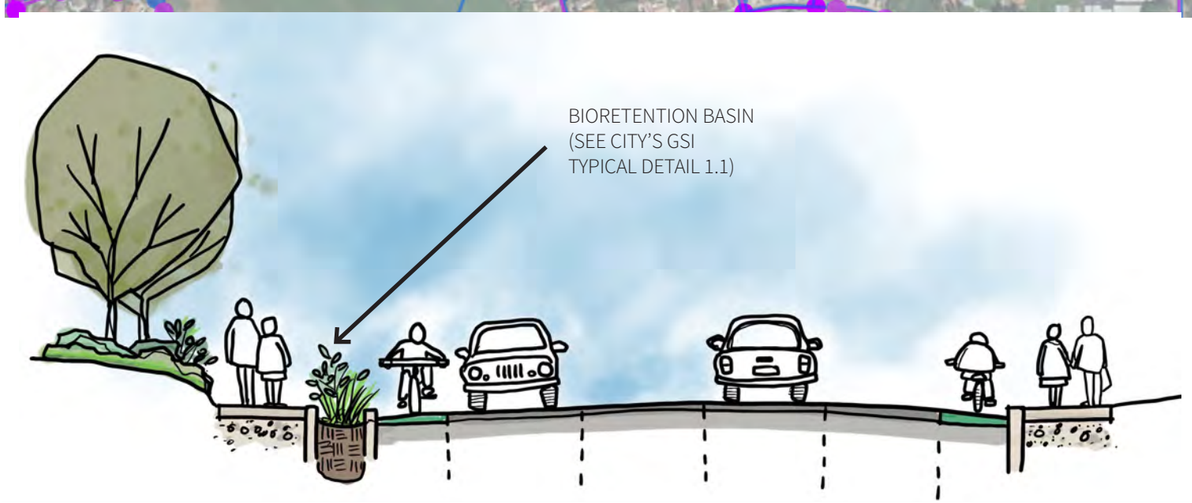

0 300 600 1,200 Feet

N

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water
- Green Street Retrofit

Key Map

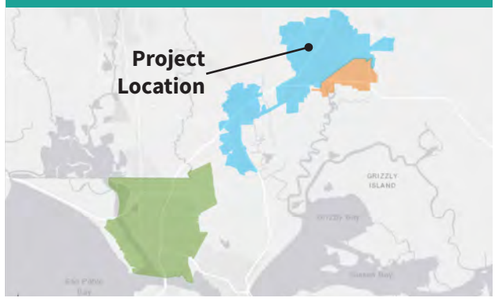

Photo:
From this example green street in Seaside, CA, curb cuts (see City detail 3.1) direct road runoff into the new brioretention area for infiltration and treatment of stormwater.

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9089

FAIRFIELD CONCEPT #2 - CEMENT HILL RD GREEN STREET

Photo: Existing sidewalk condition on north/northwest side of Cement Hill Road, proposed for retrofit with GSI.

Project Description

The proposed project will retrofit an existing sidewalk and landscape strip along the north / northwest side of Cement Hill Road with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The length of sidewalk proposed for retrofit is approximately 4,000 feet long and currently includes standard drainage infrastructure; curbs and gutters that allow runoff to flow into the storm drain system. This area is well suited for retrofit because of the need for sidewalk repairs and to provide safe access to Fairfield High School. The proposed project would add bioretention features between the existing roadway and sidewalk.

Existing street tress along Cement Hill Road are not well suited to the available space or climate, and at many locations roots are causing sidewalk upheaval and uneven surfaces. Based on an initial evaluation, if not removed and replaced the existing trees will likely continue to obstruct the path of travel, their health decline, and require significant additional maintenance in the next 10 years.

Assessment by a qualified arborist is recommended as a next step to identify those trees unsuitable for long-term survival, that should removed and replaced with appropriate species. New bioretention features would be constructed within newly available spaces and replacing damaged sidewalk areas. Stormwater would enter the bioretention areas via curb cuts and overflow would be directed back into the storm drain system.

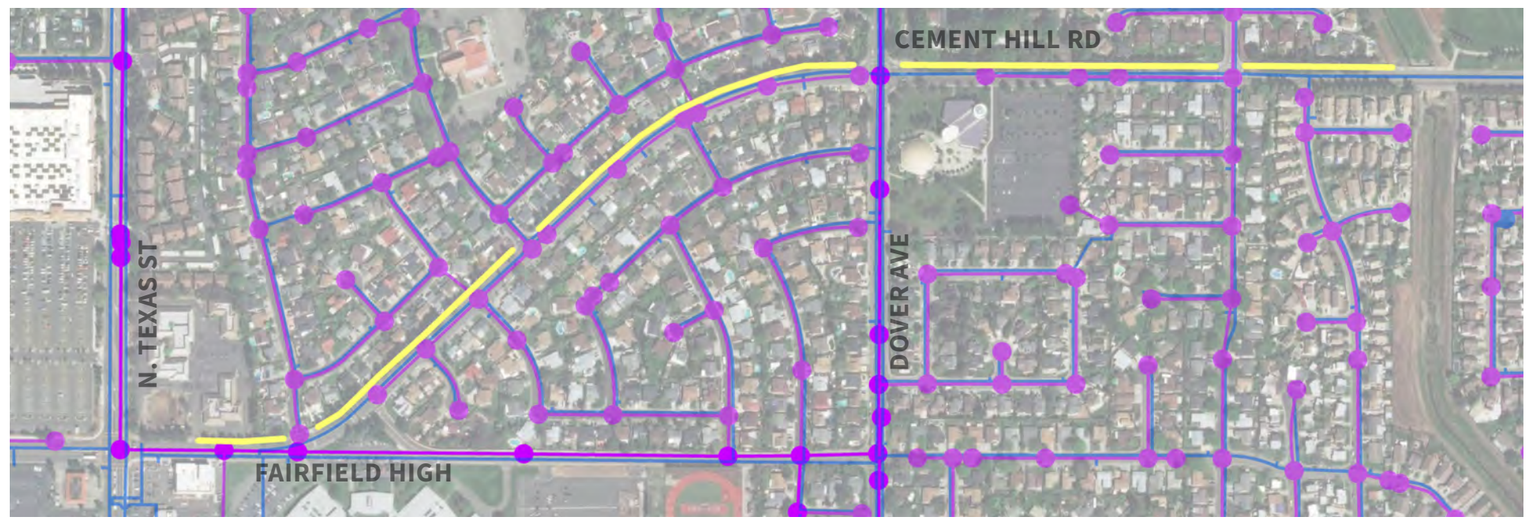

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water
- Green Street Retrofit

Key Map

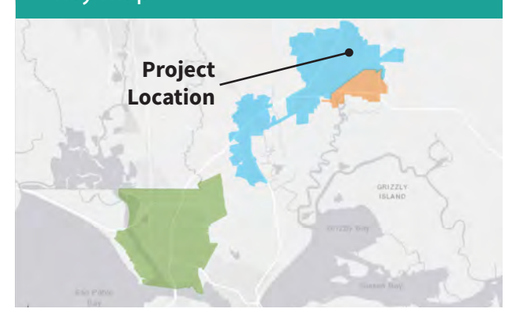

0 250 500 1,000 Feet

N

FAIRFIELD CONCEPT #3 - PG&E SUBSTATION

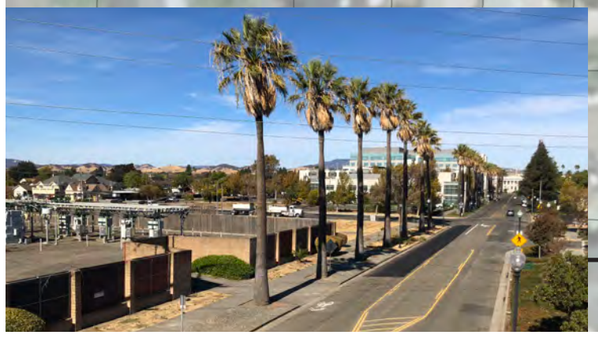

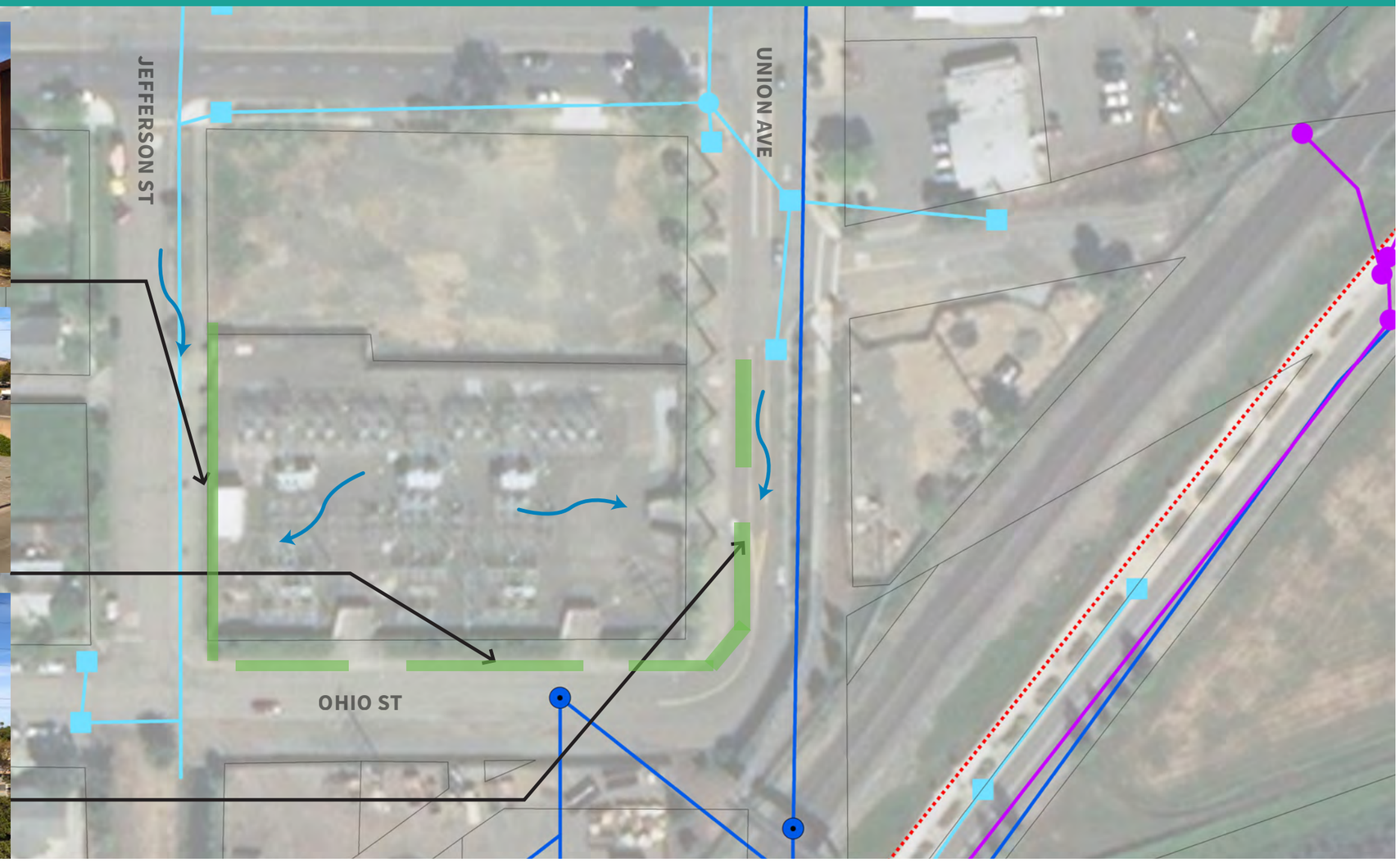

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

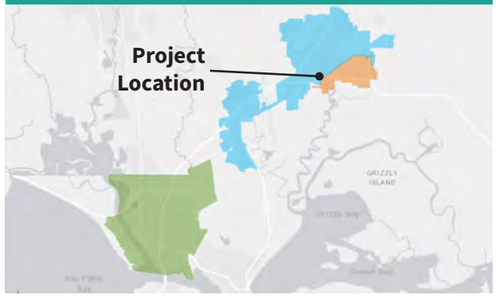

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GSI Standard Specification and Design Details

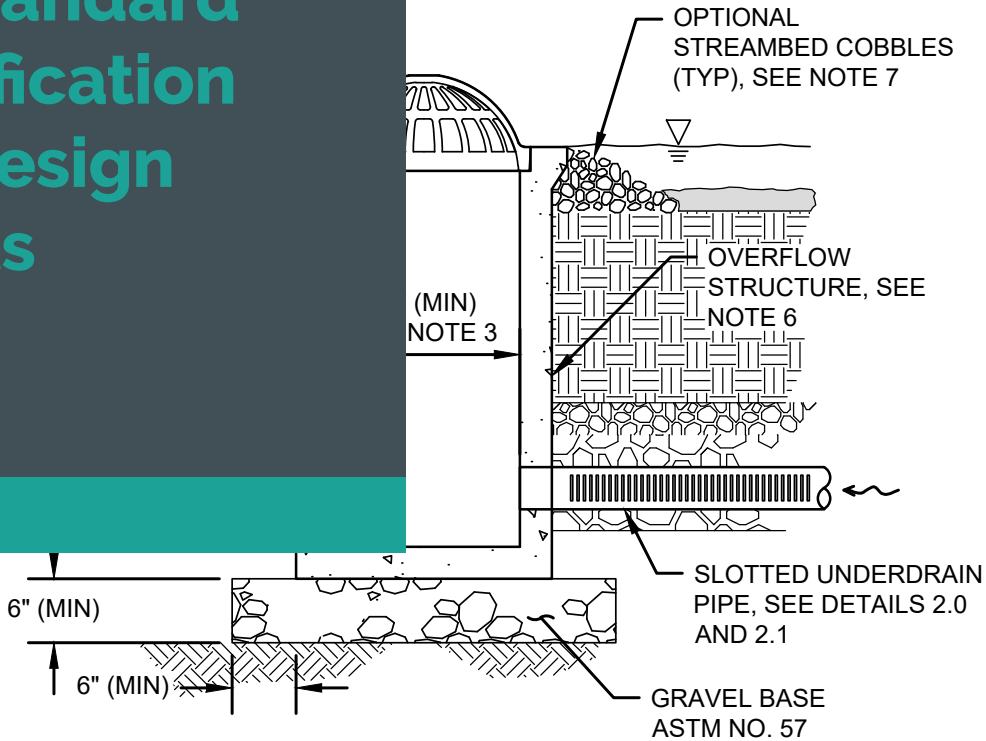

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GREEN STORMWATER INFRASTRUCTURE STANDARD SPECIFICATION AND DESIGN DETAILS

These green stormwater infrastructure details and specifications have been selected to support integration of GSI into standard practices, for example in street design, municipal capital projects, and to support private development review. Implementation of a GSI strategy will require cross departmental coordination with planning, operations and maintenance. These details and specifications can support the design and construction of GSI practices in the Permittees jurisdictions.

How to use these GSI typical details[20]

These typical details and specifications were developed to be revised and customized as needed for each individual project by design professionals. They show typical configurations, rather than a required city standard configuration. This distinction is deliberate. We recognize that to create functional, contextual, and aesthetic green infrastructure projects, design professionals must use their professional judgment and creative thinking to be responsive to each site-specific condition.

AutoCAD drawings of these typical details are provided so that design professionals must modify the plan, sections, call-outs, and/or construction notes to address the projects site-specific conditions.

These typical details are formatted, organized, and developed with the necessary informational tools to guide the design professional through the proper selection, layout, and design of GSI best management practices (BMPs) and the selection of appropriate site-specific BMP component details (i.e., inlets, outlets, and edge treatments, etc.).

Design professionals using the AutoCAD drawings must review and adjust the details and construction notes to address their site-specific conditions . To allow for site-specific design adjustments the typical details are developed as "not for construction" drawings. Title blocks are provided for document organization and reference only.

Design Detail	Detail Number
Bioretention & Biofiltration Basins	
Designer Notes	1.0
Roadside Section	1.1
Parcel Section	1.2
Bioretention & Biofiltration Components - Underdrains	
Designer Notes	2.0
Underdrains	2.1
Bioretention & Biofiltration Components - Inlets	
Designer Notes	3.0
Curb Cut Inlet	3.1
Bioretention & Biofiltration Components - Outlets	
Designer Notes	4.0
Curb Cut Outlet	4.1
Outlet Curb Cut with Trench Drain	4.2
Overflow Structure	4.3
Permeable Plavement	
Designer Notes (1/2)	5.0
Designer Notes (2/2)	5.1
Key Map	5.2
Paver Section	5.3
Pervious Concrete Section	5.4
Porous Asphalt Section	5.5

SPECIFICATIONS

Specifications for Bioretention, Pervious Concrete, Porous Asphalt, and Permeable Pavers are located in Appendix A.

20 Adapted from Green Infrastructure Typical Details, SFPUC Stormwater Management Requirements and Design Guidelines, September 2016, Version 2.0

PURPOSE:

BIORETENTION BASINS CONTROL PEAK FLOWS AND VOLUMES OF STORMWATER RUNOFF BY PROVIDING SURFACE, SUBSURFACE STORAGE AND INFILTRATION INTO NATIVE SOIL. WATER IS ALSO TREATED AS IT FILTERS THROUGH THE BIORETENTION SOIL.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT PLAN AND SECTION DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. FACILITY AREA, PONDING DEPTH, BIORETENTION SOIL DEPTH, AND AGGREGATE STORAGE DEPTH MUST BE SIZED TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS.
3. PONDING AND BIORETENTION SOIL DRAWDOWN TIME (I.E., TIME FOR MAXIMUM SURFACE PONDING TO DRAIN THROUGH THE BIORETENTION SOIL AFTER THE END OF A STORM) RECOMMENDATIONS:
   - 3 - 12 HOUR PONDING AND BIORETENTION SOIL DRAWDOWN (TYPICAL)
   - 24 HOUR MAXIMUM PONDING AND BIORETENTION SOIL DRAWDOWN
4. FACILITY DRAWDOWN TIME (I.E. TIME FOR SURFACE PONDING TO DRAIN THROUGH THE ENTIRE SECTION INCLUDING AGGREGATE STORAGE AFTER THE END OF A STORM) REQUIREMENTS:
   - 48 HOUR MAXIMUM FACILITY DRAWDOWN (I.E. ORFICE CONTROLLED SYSTEM OR EXTENDED STORAGE DEPTH WITHIN INFILTRATION SYSTEM).
5. THE FOLLOWING GUIDELINES APPLY TO RIGHT-OF-WAY APPLICATIONS:
   - BULB OUT CURB TRANSITIONS SHALL CONFORM TO CITY STANDARDS.
   - WHEN FACILITY CONSTRUCTION IMPACTS EXISTING SIDEWALK, ALL SAW CUTS MUST ADHERE TO CITY REQUIREMENTS. SAW CUTS SHOULD BE ALONG SCORE LINES AND ANY DISTURBED SIDEWALK FLAGS SHOULD BE REPLACED IN THEIR ENTIRETY.
   - DESIGNER TO SPECIFY TRANSITION OF PLANTER TO TOP OF CURB ELEVATION BETWEEN CURB CUTS OR CONTINUOUS 6 INCH REVEAL AT CURB EDGE.
6. UP TO TWO PLANTERS MAY BE CONNECTED IN SERIES, IN LIEU OF MULTIPLE INLETS, PROVIDED THE CONNECTION IS A TRENCH DRAIN OR EQUAL SURFACE CONVEYANCE AND IS ADEQUATELY SIZED TO CONVEY FLOWS.
7. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY ASSET PROTECTION STANDARDS AND OTHER UTILITY PROVIDERS REQUIREMENTS.

RELATED SPECIFICATIONS	CSI NO.
BIORETENTION: - BIORETENTION SOIL MIX - AGGREGATE STORAGE - MULCH - STREAMBED COBBLES	33 47 27

RELATED COMPONENTS	
UNDERDRAINS:	2.0 - 2.1
INLETS:	3.0 - 3.2
OUTLETS:	4.0 - 4.3

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ FACILITY WIDTH, LENGTH, SLOPES (INCLUDING SIDE, CROSS, AND LONGITUDINAL), AND SHAPE
- ☐ DEPTH OF BIORETENTION SOIL
- ☐ DEPTH AND TYPE OF GRAVEL STORAGE, IF ANY
- ☐ PLANTER SURFACE ELEVATION (TOP OF BIORETENTION SOIL) AT UPSLOPE AND DOWNSLOPE ENDS OF FACILITY
- ☐ CONTROL POINTS AT EVERY CORNER OF FACILITY AND POINT OF TANGENCY
- ☐ DIMENSIONS AND DISTANCE TO EVERY INLET, OUTLET, SIDEWALK NOTCH, ETC.
- ☐ ELEVATIONS OF EVERY INLET, OUTLET, STRUCTURE RIM AND INVERT, AND SIDEWALK NOTCH
- ☐ TYPE AND DESIGN OF FACILITY COMPONENTS (E.G., EDGE TREATMENTS, INLETS/GUTTER MODIFICATIONS, UTILITY CROSSINGS, LINER, AND PLANTING DETAILS)

LAYOUT REQUIREMENTS:

1. FOR RIGHT-OF-WAY APPLICATIONS, REFER TO THE CITY STANDARD ACCESSIBILITY REQUIREMENTS FOR CONSTRUCTION OF COURTESY STRIP, THROUGHWAY, PARKING SPACE AND ACCESSIBLE PATH REQUIREMENTS.
2. LOCATE CURB CUTS AND GUTTER MODIFICATIONS TO AVOID CONFLICTS WITH ACCESSIBILITY REQUIREMENTS (E.G., LOCATE OUTSIDE OF CROSSWALKS).

NOT FOR CONSTRUCTION

BIORETENTION & BIOINFILTRATION BASINS DESIGNER NOTES	1.0

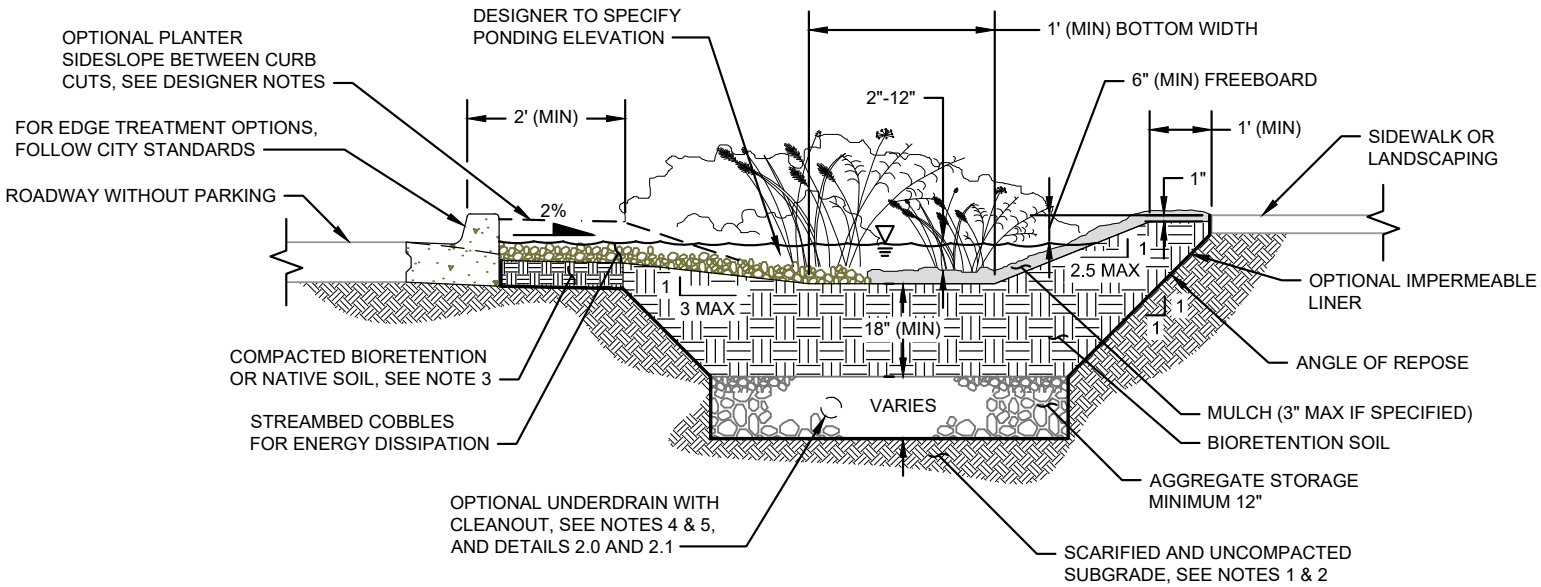

CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. COMPACT BIORETENTION SOIL IMMEDIATELY BEHIND CURB TO 90% OF MAXIMUM DENSITY PER STANDARD PROCTOR TEST (ASTM D698).
4. UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.
5. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
6. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

BIORETENTION & BIOINFILTRATION BASINS ROADSIDE SECTION	1.1

NOT FOR CONSTRUCTION

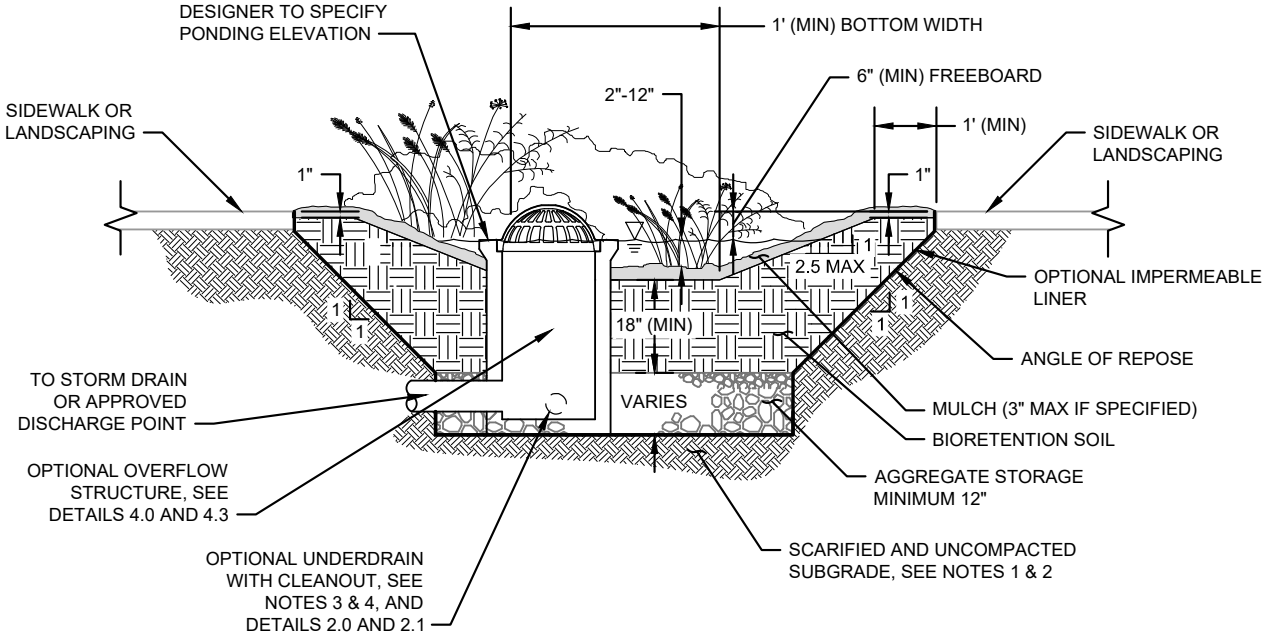

CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.
4. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
5. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

BIORETENTION & BIOINFILTRATION BASINS PARCEL SECTION	1.2

NOT FOR CONSTRUCTION

PURPOSE:

UNDERDRAINS ARE USED TO COLLECT STORMWATER THAT HAS BEEN FILTERED THROUGH BIORETENTION SOIL AND CONVEY THAT TREATED STORMWATER TO A DESIGNATED OUTLET (E.G., PLANTER OVERFLOW STRUCTURE).

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER SHOULD INCLUDE UNDERDRAINS IN FACILITY DESIGN IN THE FOLLOWING SCENARIOS:
   - INFILTRATION IS PROHIBITED OR IMPRUDENT (E.G., FACILITY NEAR SENSITIVE INFRASTRUCTURE OR STEEP SLOPES, RISK OF CONTAMINATION IS HIGH OR SITE GROUNDWATER/SOILS ARE CONTAMINATED, THERE IS POOR INFILTRATION CAPACITY DUE TO SOILS OR HIGH GROUNDWATER).
   - SUBGRADE MEASURED (I.E., UNCORRECTED) INFILTRATION RATE IS LESS THAN 0.5 INCHES PER HOUR.
   - MAXIMUM SURFACE POOL DRAWDOWN PERIOD CANNOT BE ACHIEVED.
2. AN OUTLET STRUCTURE AND/OR CLEANOUT(S) TO ALLOW MAINTENANCE ACCESS TO ALL PIPES IS REQUIRED FOR FACILITIES WITH UNDERDRAINS.
3. UNDERDRAIN PIPE SHALL HAVE A SMOOTH INTERIOR WALL TO FACILITATE MAINTENANCE WITH PRESSURIZED WATER OR ROOT CUTTING EQUIPMENT.
4. DESIGNER SHOULD CONSIDER THE INSTALLED ELEVATION OF THE UNDERDRAIN PIPE WITHIN THE BIORETENTION FACILITIES AGGREGATE STORAGE LAYER TO PROMOTE INFILTRATION, BELOW THE UNDERDRAIN, WHEN FEASIBLE. DESIGNER SHOULD ALSO CONSIDER THE USE OF ORIFICES OR OTHER CONTROL STRUCTURES TO PROVIDE ADDITIONAL INFILTRATION AND FLOW CONTROL BENEFITS WHERE APPLICABLE.
5. PIPE MATERIAL SHALL BE DESIGNED PER CITY STANDARDS.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ UNDERDRAIN MATERIAL TYPE AND SIZE
- ☐ UNDERDRAIN ELEVATION, SLOPE, AND LOCATION WITHIN BASIN OR PLANTER
- ☐ PIPE BEDDING MATERIAL SPECIFICATION (I.E. AGGREGATE STORAGE LAYER)
- ☐ DISCHARGE LOCATION TO OVERFLOW STRUCTURE
- ☐ CLEANOUT LOCATIONS AND MAINTENANCE ACCESS
- ☐ ORIFICE FLOW CONTROL STRUCTURE(S), AS APPLICABLE

BIORETENTION & BIOINFILTRATION COMPONENTS UNDERDRAINS - DESIGNER NOTES	2.0

NOT FOR CONSTRUCTION

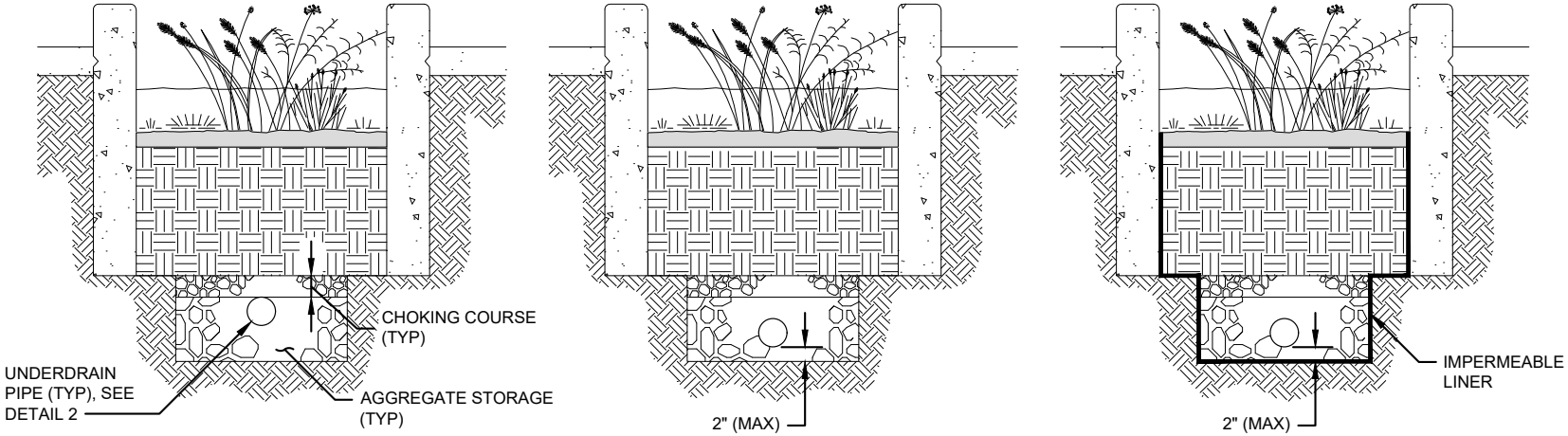

ELEVATED UNDERDRAIN
TYPE B/C SOILS (WHEN REQUIRED)

BOTTOM UNDERDRAIN
TYPE D SOILS

UNDERDRAIN WITH LINER
WHERE INFILTRATION PROHIBITED

UNDERDRAIN PLACEMENT ALTERNATIVES

CONSTRUCTION NOTES:

1. UNDERDRAIN PIPE SHALL BE SLOTTED PVC SDR 35 OR ACCEPTABLE SUBSTITUTE MATERIAL PER ENGINEERS SPECIFICATION.
2. ALL MATERIAL AND WORKMANSHIP FOR UNDERDRAINS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
3. SET CROWN OF UNDERDRAIN PIPE AT OR BELOW BOTTOM OF CHOKING COURSE. SEE DESIGNER NOTES FOR ADDITIONAL GUIDANCE ON LOCATING UNDERDRAIN PIPE IN GRAVEL STORAGE.
4. LONGITUDINAL SLOPE OF UNDERDRAIN PIPE SHALL BE 0.5% MINIMUM.
5. UNDERDRAIN PIPE SHALL BE SLOTTED PVC SDR 35 OR ACCEPTABLE SUBSTITUTE MATERIAL PER ENGINEERS SPECIFICATION. SINGLE WALL AND DUAL WALL CORRUGATED HDPE PIPE (AASHTO M252 AND M294 TYPES C, S, AND D) ARE NOT ACCEPTABLE.
6. UNDERDRAIN PIPE SHALL BE SLOTTED TYPE, MEASURING 0.032 INCH WIDE (MAX), SPACED AT 0.25 INCH (MIN), AND PROVIDING A MINIMUM INLET AREA OF 5.0 SQUARE INCH PER LINEAR FOOT OF PIPE.
7. SLOTS SHALL BE ORIENTED PERPENDICULAR TO LONG AXIS OF PIPE, AND EVENLY SPACED AROUND CIRCUMFERENCE AND LENGTH OF PIPE.

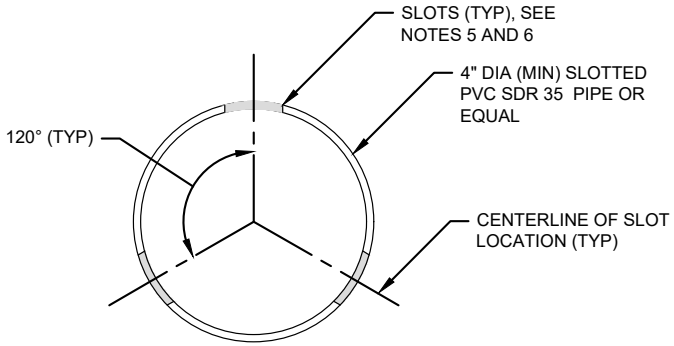

SLOTTED UNDERDRAIN PIPE 2

BIORETENTION & BIOINFILTRATION COMPONENTS UNDERDRAINS	2.1

NOT FOR CONSTRUCTION

PURPOSE:

CURB CUTS SERVE AS INLETS TO CONVEY STORMWATER RUNOFF TO A BIORETENTION FACILITY. CURB CUTS ARE TYPICALLY USED IN PLANTER APPLICATIONS WHEN THE FACILITY IS IMMEDIATELY ADJACENT TO THE ROADWAY (I.E. NO COURTESY STRIP), PROVIDING AN OPENING TO INTERCEPT AND CONVEY STORMWATER FROM THE GUTTER TO THE PLANTER. CURB CUT INLETS INCLUDE MODIFICATIONS TO THE GUTTER TO HELP DIRECT FLOW INTO THE FACILITY.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. THE DESIGNER MUST ENSURE THAT CURB CUT INLETS ARE ADEQUATELY SIZED, SPACED, AND SLOPED TO SATISFY CITY HYDRAULIC REQUIREMENTS. THE CURB CUT OPENING WIDTH MUST BE SIZED BASED ON THE CATCHMENT AREA, LONGITUDINAL SLOPE ALONG THE CURB, AND THE CROSS SLOPE OF THE GUTTER OR ADJACENT PAVEMENT AT THE INLET. SEE SIZING EQUATIONS AND NOMOGRAPHS FOR CURB OPENING INLETS IN THE U.S. DEPARTMENT OF TRANSPORTATION HYDRAULIC ENGINEERING CIRCULAR NO. 22.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ CURB CUT DIMENSIONS
- ☐ FRAME AND GRATE TYPE/MATERIAL AND DIMENSIONS
- ☐ CHANNEL DIMENSIONS
- ☐ CONTROL ELEVATIONS FOR OPENINGS AT GUTTER AND PLANTER WALL

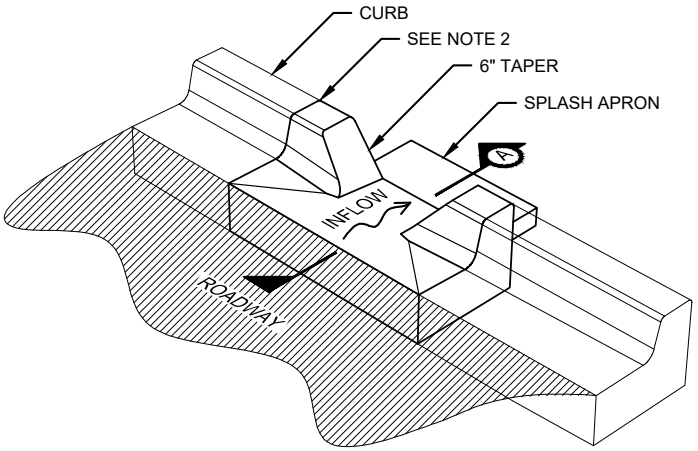

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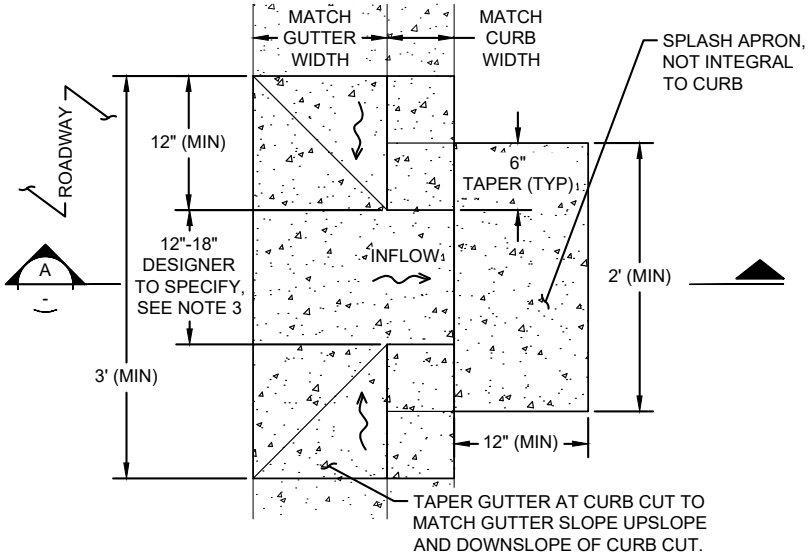

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
3. INLET CURB CUT WIDTH SHALL BE 18" ON GUTTER SLOPES ≥ 5%.

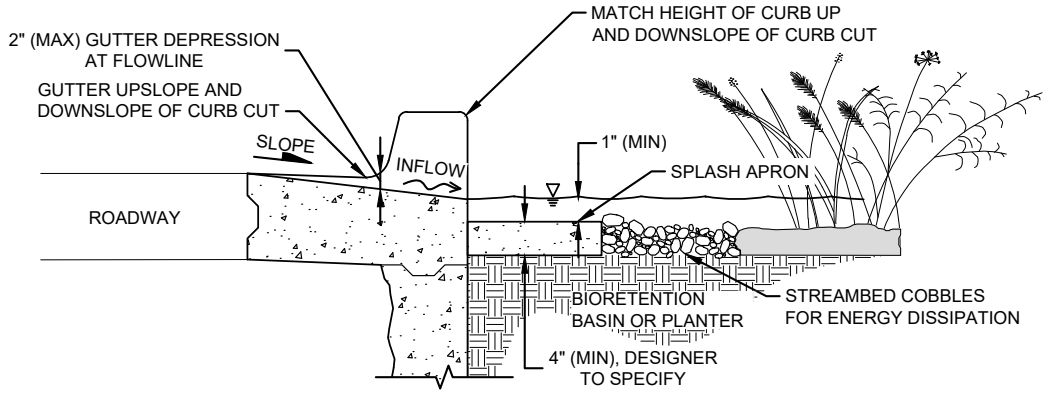

SECTION A

INLET - CURB CUT TYPE 1 (1)

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - CURB CUT INLET	3.1

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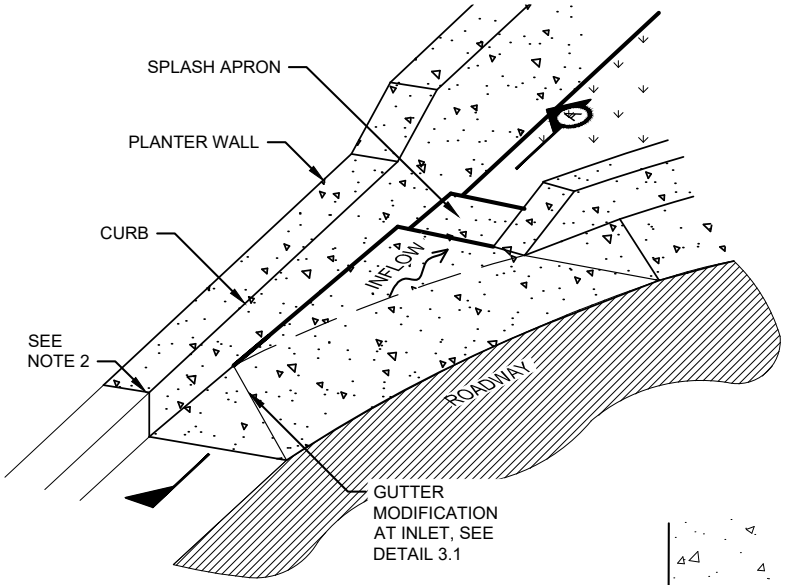

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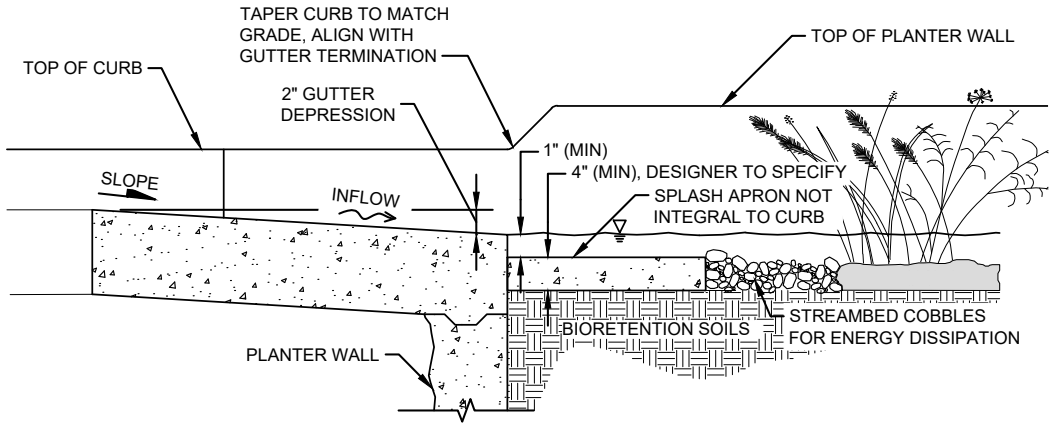

SECTION A

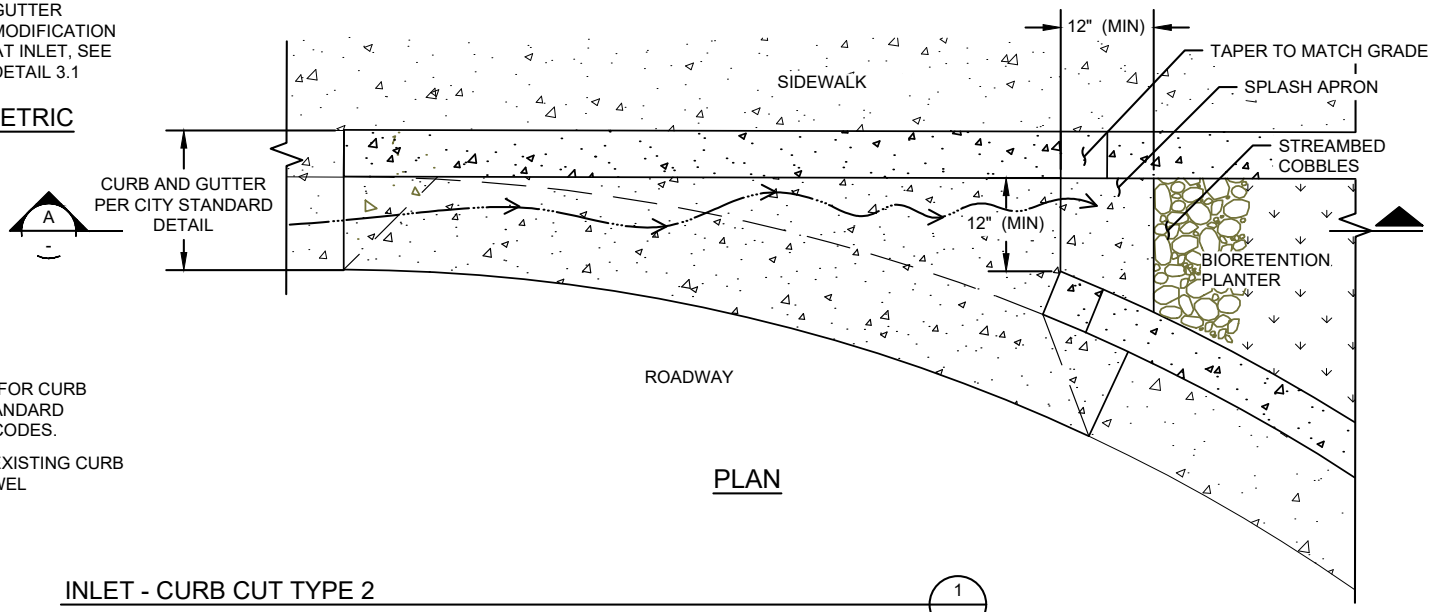

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.

INLET - CURB CUT TYPE 2 (1)

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - CURB CUT INLET AT BULB OUT	3.2

NOT FOR CONSTRUCTION

PURPOSE:

BIORETENTION OUTLET STRUCTURES CONVEY SURFACE AND/OR SUBSURFACE OUTFLOWS FROM A BIORETENTION FACILITY TO AN APPROVED DISCHARGE LOCATION.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. THE DESIGNER MUST SIZE CURB CUT, GRATE, AND OTHER OVERFLOW STRUCTURE FEATURES TO SATISFY CITY HYDRAULIC REQUIREMENTS.
3. AN OUTLET STRUCTURE OR CLEANOUT(S) THAT ALLOWS MAINTENANCE ACCESS TO ALL PIPES IS REQUIRED FOR FACILITIES WITH UNDERDRAINS.
4. IF SITE CONSTRAINTS NECESSITATE STORM DRAIN PIPE IN AN AREA SUBJECT TO VEHICULAR TRAFFIC OR OTHER LOADING, APPROPRIATE COVER DEPTH AND PIPE MATERIAL MUST BE SPECIFIED.
5. OUTLET PIPES MUST BE EQUIPPED WITH CLEANOUTS, SEE CITY STANDARD CLEANOUT DETAIL(S).
6. DESIGNER SHALL EVALUATE BUOYANCY OF STRUCTURES FOR SITE SPECIFIC APPLICATION AND SPECIFY THICKENED OR EXTENDED BASE / ANTI-FLOTATION COLLAR, AS NECESSARY.
7. SAND TRAP REQUIREMENTS (12 INCH SUMP AND CAST IRON HOOD/TRAP) MAY BE ELIMINATED WHEN OVERFLOW DIRECTLY DISCHARGES TO DOWNSTREAM (CITY) SAND TRAP.
8. LOCATE ALL OVERFLOW PIPES AT AN ELEVATION HIGHER THAN THE SEWER HYDRAULIC GRADE LINE TO PREVENT BACKFLOW INTO THE BIORETENTION FACILITY.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ OUTLET STRUCTURE TYPE/MATERIAL, DIAMETER, AND DEPTH
- ☐ ATRIUM GRATE MANUFATURER, MODEL NO., AND SIZE
- ☐ SAND TRAP COMPONENTS AND DIMENSIONS
- ☐ FRAME AND GRATE TYPE, MODEL NO., AND SIZE
- ☐ CONTROL ELEVATIONS FOR OUTLET STRUCTURE RIMS
- ☐ MATERIAL AND DIAMETER FOR ALL PIPES
- ☐ WATER TIGHT CONNECTOR TYPE FOR ALL WALL PENETRATIONS (E.G., GROUTED, COMPRESSION, BOOT)

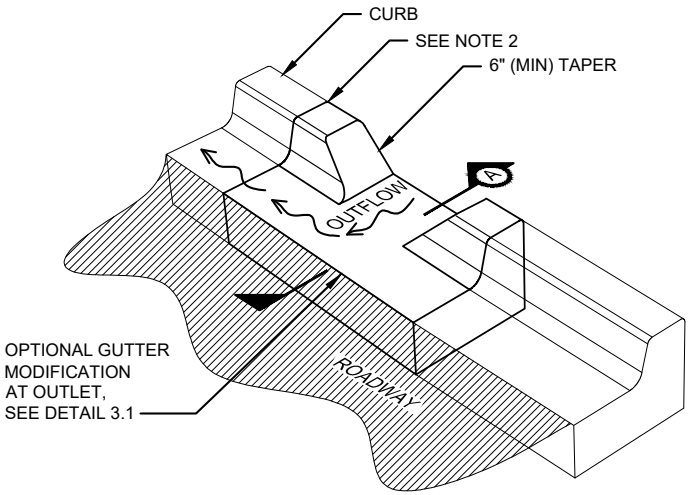

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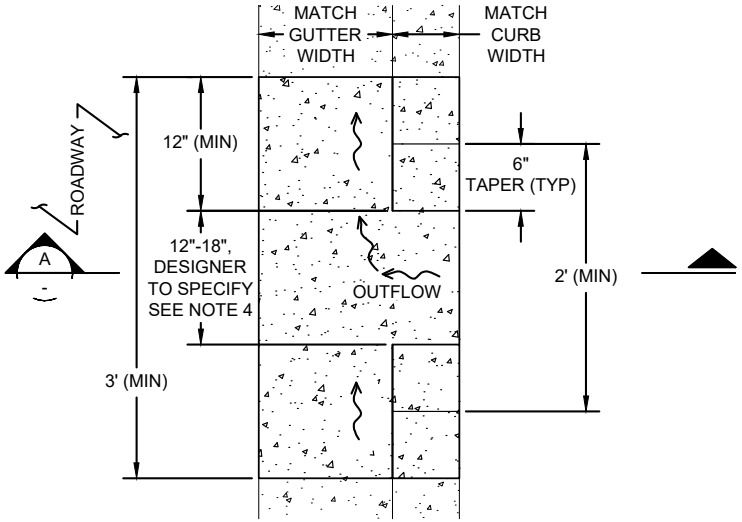

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
3. MATCH GUTTER SLOPE UP AND DOWNSLOPE OF CURB CUT SLOPE SIMILAR TO INLET DETAIL 3.1 UNLESS MODIFYING GUTTER.
4. OUTLET CURB CUT WIDTH SHALL BE 18" ON GUTTER SLOPES ≥ 5%.

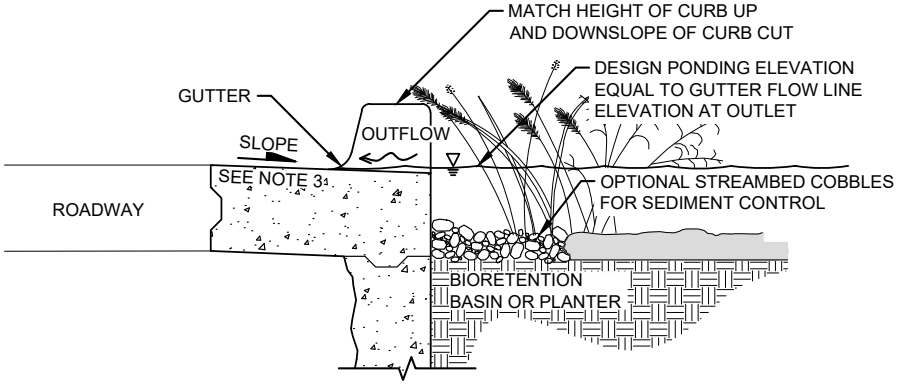

SECTION A

OUTLET - CURB CUT (1)

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - CURB CUT OUTLET	4.1

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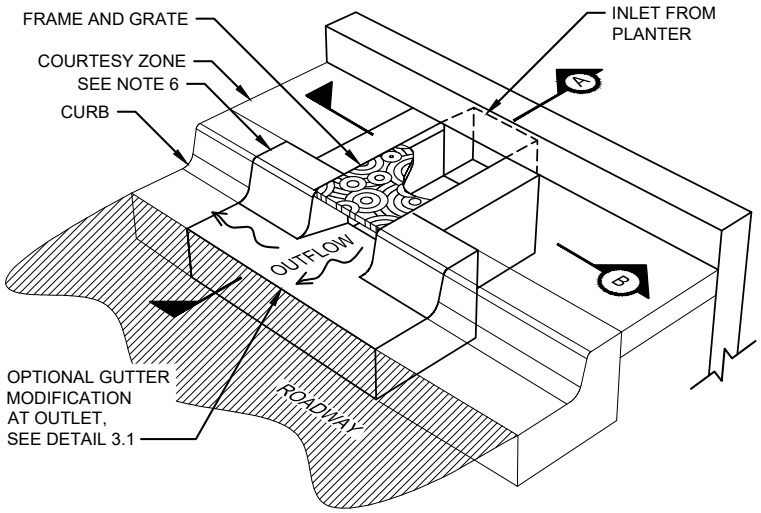

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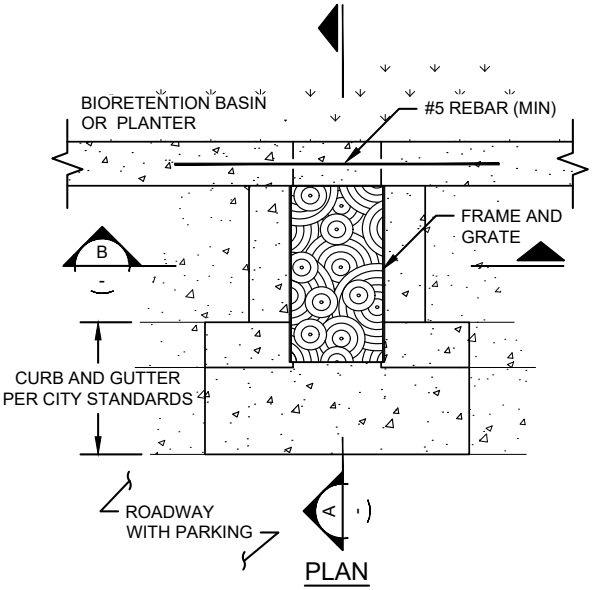

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR TRENCH DRAIN ASSEMBLY SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. MATCH GUTTER SLOPE UP AND DOWNSLOPE (UNLESS MODIFYING GUTTER SLOPE SEE INLET DETAIL 3.1).
3. SLOPE TO PROVIDE AT LEAST 1 INCH DROP OVER LENGTH OF CHANNEL OR A MINIMUM OF 2 PERCENT, WHICHEVER IS LARGER.
4. ALL TRENCH GRATES SHALL BE REMOVABLE, RATED PER THE ANTICIPATED LOADING, AND BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM, FLUSH OR RECESSED IN GRATE.
5. HORIZONTAL CONTROL JOINTS SHALL BE PROVIDED EVERY 10 LINEAR FEET, OR PER MANUFACTURER'S RECOMMENDATIONS.
6. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
7. APPLY EPOXY BONDING AGENT AT ALL TRENCH DRAIN CONSTRUCTION COLD JOINTS.
8. INLET/OUTLET CURB CUT AND CONCRETE CHANNEL WIDTH SHALL BE 16" (MIN) ON GUTTER SLOPES ≥ 5%.

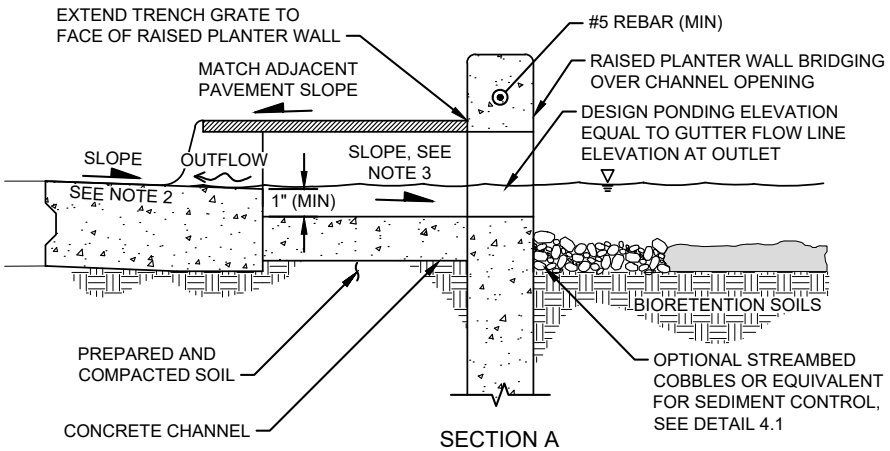

SECTION A

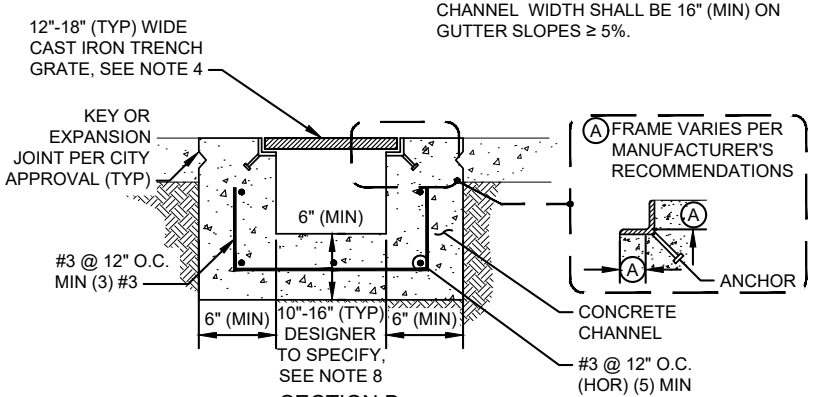

SECTION B

OUTLET - TRENCH DRAIN

1

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - OUTLET CURB CUT WITH TRENCH	4.2

NOT FOR CONSTRUCTION

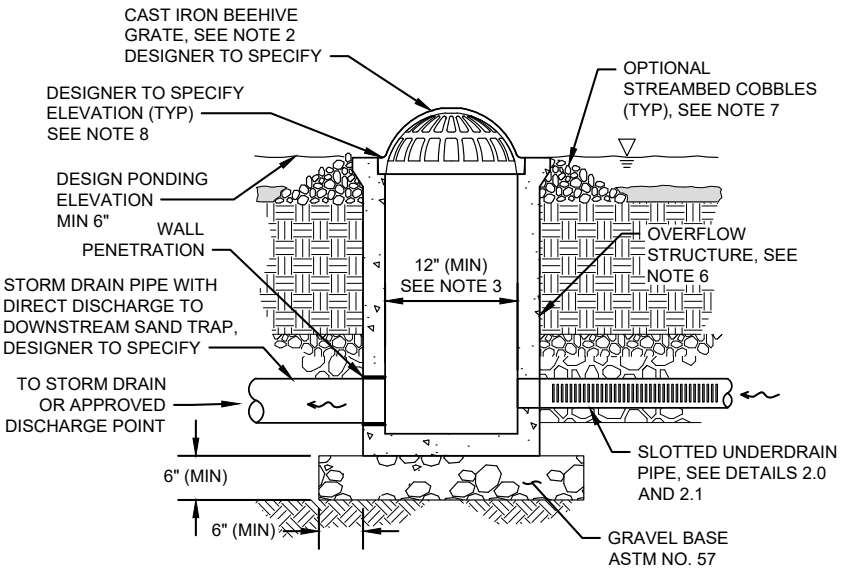

OVERFLOW STRUCTURE AREA DRAIN (1)

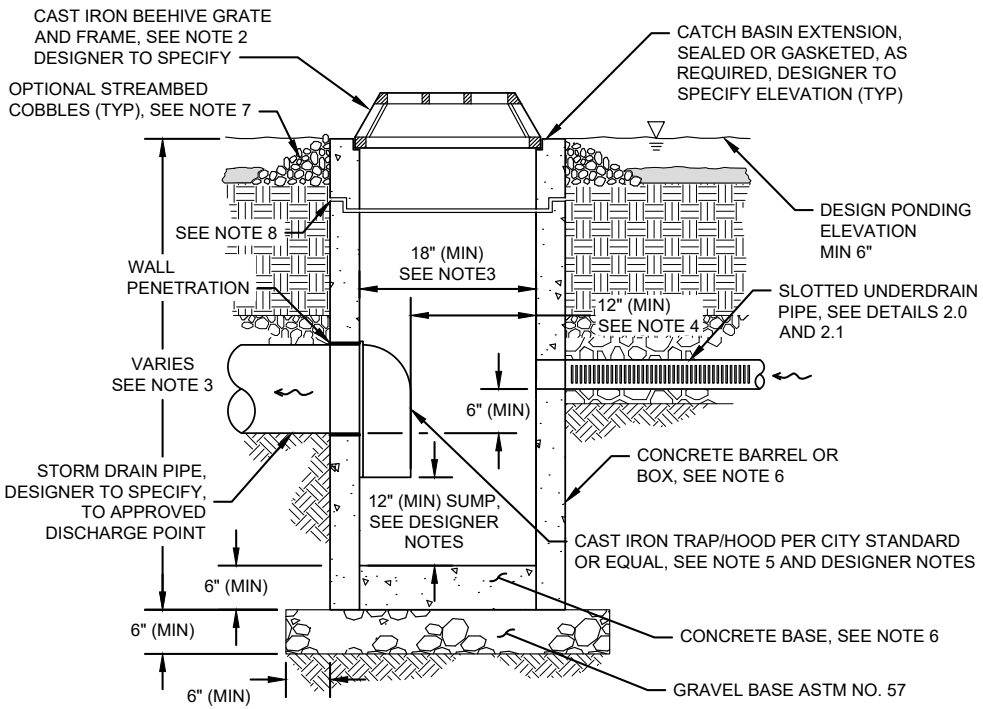

OVERFLOW STUCTURE WITH INTERGAL SAND TRAP (2)

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR OVERFLOW STRUCTURES SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. SIZE OF ATRIUM GRATE SHALL MATCH SIZE OF RISER SPECIFIED IN PLANS, SHALL BE REMOVABLE TO PROVIDE MAINTENANCE ACCESS, AND SHALL BE BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM. MAXIMUM GRATE OPENING SHALL BE 4 INCHES.
3. IF INTERIOR DEPTH OF OVERFLOW STRUCTURE EXCEEDS 5 FEET, A PERMANENT BOLTED LADDER AND MINIMUM CLEAR SPACE OF 30 INCH BY 30 INCH SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
4. 12 INCH (MIN) CLEARANCE WITHIN OVERFLOW STRUCTURE SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
5. INSTALL CAST IRON TRAP/HOOD PER MANUFACTURER'S RECOMMENDATIONS.
6. BARREL/BOX AND BASE OF CATCH BASIN MAY BE PRE-CAST WITH REINFORCING STEEL PER MANUFACTURER'S RECOMMENDATIONS, POURED IN PLACE CONCRETE WITHOUT STEEL PER CITY STANDARD PLANS AND SPECIFICATIONS, OR NYLOPLAST DRAIN BASIN (2812AG OR EQUAL). ENGINEER TO SPECIFY.
7. MINIMUM STREAMBED COBBLE DIAMETER SHALL BE LARGER THAN MAXIMUM GRATE OPENING.
8. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - OVERFLOW STRUCTURE	4.3

NOT FOR CONSTRUCTION

PURPOSE:

PERVIOUS PAVEMENT (PAVEMENT) CONTROLS PEAK FLOWS AND VOLUMES OF STORMWATER RUNOFF VIA INFILTRATION THROUGH THE PAVEMENT SURFACE, STORAGE IN THE PAVEMENT SECTION, INFILTRATION INTO NATIVE SOIL, AND OVERFLOW THROUGH OPTIONAL SUBSURFACE OUTLETS. RUNOFF IS TREATED AS IT FILTERS THROUGH THE PAVEMENT SECTION, AND INFILTRATES INTO UNDERLYING NATIVE SOIL.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT PLAN, SECTION DRAWINGS, AND CALCULATE DEPTH TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. ALL PAVEMENT SYSTEMS MUST BE DESIGNED BY A LICENSED ENGINEER IN ACCORDANCE WITH THE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES BASED ON SITE-SPECIFIC CONDITIONS INCLUDING TRAFFIC LOADS AND SUBGRADE CONDITIONS. PAVEMENT SECTIONS SET FORTH IN THESE TYPICAL DETAILS ARE PROVIDED TO REPRESENT THE ANTICIPATED RANGE OF DESIGN REQUIREMENTS, BASED ON "GOOD" AND "POOR" SOIL CHARACTERIZATIONS NORMALLY ENCOUNTERED IN THE CITY. **ACTUAL SECTION DEPTHS MUST BE DETERMINED AS DESCRIBED IN GUIDELINE #3, BELOW**. SEE TABLES BELOW FOR TRAFFIC LOADING AND EFFECTIVE ROADBED SOIL RESILIENT MODULUS ASSUMPTIONS USED IN DEVELOPING THESE TYPICAL SECTIONS.
3. TRAFFIC LOADING ASSUMPTIONS:

DESIGN ASSUMPTION	MODERATE VEHICULAR	LIGHT VEHICULAR	PEDESTRIAN
EQUIVALENT SINGLE AXLE LOADS*	2,000,000	40,000	800
TRAFFIC INDEX (TI)**	10	6.5	4
* SEE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES FOR DEFINITIONS			
** SEE CALTRANS HIGHWAY DESIGN MANUAL FOR DEFINITIONS			

SUBGRADE ASSUMPTIONS:

DESIGN ASSUMPTION	GOOD SOILS	POOR SOILS
EFFECTIVE ROADBED SOIL RESILIENT MODULUS, M_R (PSI)*	6,800	3,700
CALIFORNIA R-VALUE **	33.3	15.6
DRAINAGE COEFFICIENT, m *	1.15	0.75
LAYER COEFFICIENT, a * FOR OPEN GRADED AGGREGATE BASE	0.08	
* SEE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES FOR DEFINITIONS		
** SEE CALTRANS HIGHWAY DESIGN MANUAL FOR DEFINITIONS		

4. GEOTECHNICAL EVALUATION OF SUBGRADE SOILS TO VERIFY THEIR STRUCTURAL SUITABILITY FOR PERMEABLE PAVEMENT INSTALLATIONS IS REQUIRED. INFILTRATION TESTING REQUIREMENTS ARE SUBJECT TO DIFFERENT THRESHOLDS. REFER TO CITY STORMWATER MANAGEMENT REQUIREMENTS FOR GUIDANCE.
5. THE PERMEABLE PAVEMENT FACILITY MUST BE DESIGNED TO PROVIDE SUFFICIENT SUBSURFACE STORAGE IN THE PAVEMENT SECTION TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS. THE SECTION THICKNESS WILL BE A FUNCTION OF THE SUBGRADE INFILTRATION RATE (DRAINAGE COEFFICIENT), AND SUBGRADE SLOPE.
6. ENTIRE PAVEMENT BASE SECTION MAY BE USED TO MEET SUBSURFACE STORAGE REQUIREMENTS.
7. SUBSURFACE STORAGE DRAWDOWN TIME (I.E. TIME FOR MAXIMUM SUBSURFACE STORAGE VOLUME TO INFILTRATE INTO SUBGRADE AFTER THE END OF A STORM) SHOULD NOT EXCEED 48 HOURS. DRAWDOWN TIME IS CALCULATED AS THE MAXIMUM SUBSURFACE PONDING DEPTH DIVIDED BY THE NATIVE SOIL INFILRATION RATE.
8. THE DESIGNER MUST ENSURE THAT THE PAVEMENT EDGES ARE RESTRAINED AND THAT WATER IS CONTAINED IN THE PAVEMENT SECTION AS NEEDED TO PROTECT ADJACENT PAVEMENT SECTIONS OR STRUCTURES.
9. THE DESIGNER MUST EVALUATE UTILITY SURVEYS FOR POTENTIAL UTILITY CROSSINGS OR CONFLICTS.

RELATED SPECIFICATIONS	CSI NO.
PERMEABLE/POROUS UNIT PAVERS: - PERMEABLE /POROUS UNIT PAVERS - JOINT FILLER AGGREGATE - PAVEMENT BASE - EDGE RESTRAINTS - GEOTEXTILE FOR SOIL SEPARATION	32 14 43
PERVIOUS CONCRETE PAVEMENT: - PERVIOUS CONCRETE - PAVEMENT BASE - GEOTEXTILE FOR SOIL SEPARATION	32 13 43
POROUS ASPHALT PAVEMENT: - POROUS ASPHALT - PAVEMENT BASE - GEOTEXTILE FOR SOIL SEPARATION	32 12 43

PERMEABLE PAVEMENT DESIGNER NOTES (1/2)	5.0

NOT FOR CONSTRUCTION

LAYOUT REQUIREMENTS:

1. ALL PERMEABLE PAVEMENT APPLICATIONS SHALL CONFORM TO CITY STANDARDS. THE DESIGN MUST COMPLY WITH CITY STANDARD ACCESSIBILITY REQUIREMENTS.
2. THE PREFERRED AND ALLOWED CATCHMENT AREA CONTRIBUTING RUN-ON TO A PERMEABLE PAVEMENT FACILITY IS PROVIDED IN THE FOLLOWING TABLE:

WEARING COURSE	PREFERRED RUN-ON RATIO	MAXIMUM RUN-ON RATIO** (AREA CONTRIBUTING RUN-ON: PERMEABLE PAVEMENT AREA)
PERVIOUS CONCRETE AND POROUS ASPHALT	MINIMAL	3:1
PERMEABLE UNIT PAVERS (≥ 1/2" GAPS) [PARCEL ONLY]*	0:1	3:1
PERMEABLE UNIT PAVERS (≥ 3/8" GAPS)*	0:1	2:1
POROUS PAVERS	0:1	0:1 (NO RUN-ON)

*PAVERS WITH 3/8 INCH OR 1/2 INCH GAPS SHALL BE PERMEABLE INTERLOCKING CONCRETE PAVERS WITH INTEGRATED PRECAST INTERLOCKING SPACER.

**THE DESIGNER AND OWNER SHOULD CONSIDER THE INCREASED MAINTENANCE REQUIREMENTS ASSOCIATED WITH HIGHER RUN-ON RATIOS WHEN DESIGNING THE FACILITY.

3. WHEN DESIGNED TO ACCEPT RUN-ON FROM OTHER CATCHMENT AREAS, PERMEABLE PAVEMENT AREAS MUST BE PROTECTED FROM SEDIMENTATION WHICH CAN CAUSE CLOGGING AND DIMINISHED FACILITY PERFORMANCE. THE FOLLOWING REQUIREMENTS APPLY FOR RUN-ON CONTRIBUTIONS:
   - RUN-ON FROM LAWN, LANDSCAPE OR OTHER ERODIBLE SURFACES IS DISCOURAGED. IF MINOR RUN-ON FROM LAWN OR LANDSCAPE AREAS IS UNAVOIDABLE, THOSE ERODIBLE AREAS MUST BE FULLY STABILIZED.
   - CONCENTRATED RUN-ON (E.G., DIRECT DISCHARGE FROM A DOWNSPOUT) SHOULD BE DISPERSED PRIOR TO DISCHARGE TO A PERMEABLE PAVEMENT FACILITY. ACCEPTABLE METHODS INCLUDE SHEET FLOW OR SUBSURFACE DELIVERY TO THE STORAGE RESERVOIR. IF SUBSURFACE DELIVERY IS USED, PRIMARY SETTLING IS REQUIRED (E.G., VIA SAND TRAP) FOLLOWED BY DISTRIBUTION TO STORAGE RESERVOIR (E.G., VIA PERFORATED PIPE).
4. WEARING COURSE SHALL BE SET FLUSH (± 3/16 INCH) WITH ADJACENT WALKING SURFACES.
5. WEARING COURSE SHALL HAVE A MINIMUM SURFACE SLOPE OF 0.5% TO ALLOW FOR SURFACE OVERFLOW AND A MAXIMUM SURFACE SLOPE AS LISTED BELOW:
   a. POROUS ASPHALT SURFACE: = 5 PERCENT SLOPE
   b. PERVIOUS CONCRETE SURFACE: = 10 PERCENT SLOPE
   c. PERMEABLE UNIT PAVERS: = 12 PERCENT SLOPE (PER MANUFACTURER'S RECOMMENDATION)

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ PERMEABLE PAVEMENT SPECIFICATIONS AND/OR PAVER TYPE AND GAP WIDTH
- ☐ PERMEABLE PAVEMENT WIDTH AND LENGTH
- ☐ ELEVATIONS AND CONTROL POINTS AT EVERY CORNER OR POINT OF TANGENCY
- ☐ THICKNESS OF EACH LAYER IN THE PAVEMENT SECTION
- ☐ JOINT SPACING AND TYPE
- ☐ SUBGRADE SLOPE
- ☐ ELEVATIONS OF EACH PIPE INLET AND OUTLET INVERT
- ☐ TYPE AND DESIGN OF PERMEABLE PAVEMENT COMPONENTS (E.G., EDGE TREATMENTS, OUTLETS, UNDERDRAINS, etc.)

PERMEABLE PAVEMENT DESIGNER NOTES (2/2)	5.1

NOT FOR CONSTRUCTION

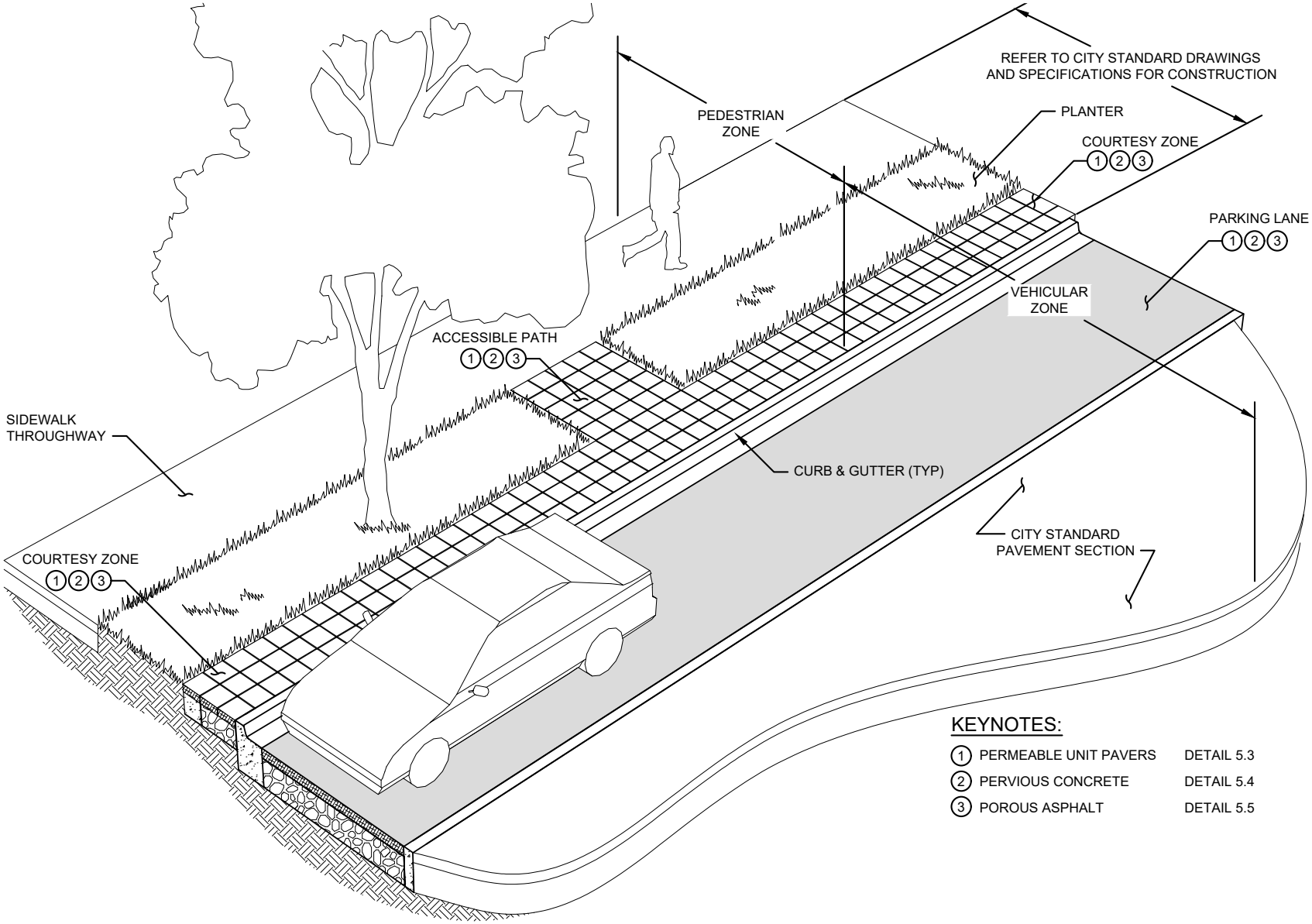

KEYNOTES:

1	PERMEABLE UNIT PAVERS	DETAIL 5.3
2	PERVIOUS CONCRETE	DETAIL 5.4
3	POROUS ASPHALT	DETAIL 5.5

PERMEABLE PAVEMENT KEY MAP	5.2

NOT FOR CONSTRUCTION

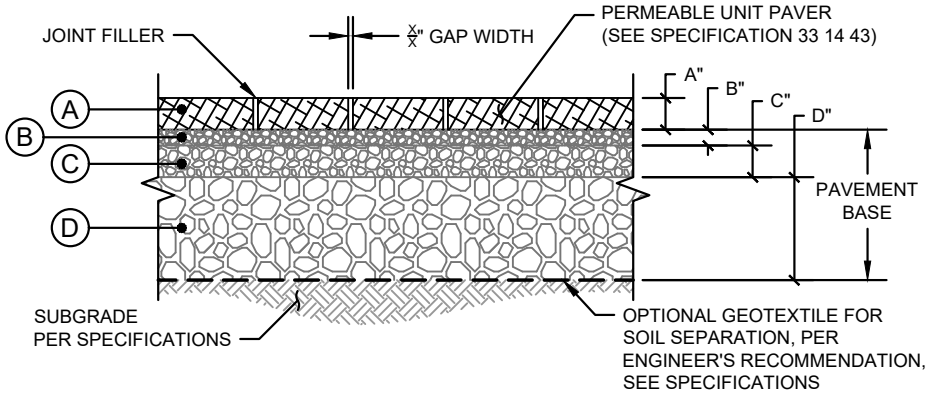

PERMEABLE UNIT PAVERS 1

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	PERMEABLE UNIT PAVERS	3 1/8	3 1/8	3 1/8	3 1/8	3 1/8	3 1/8
B	LEVELING COURSE ASTM NO. 8	2	2	2	2	2	2
C	BASE COURSE ASTM NO. 57	6	6	6	4	4	4
D	RESERVOIR COURSE ASTM NO. 2, 3, OR 57	22	28	-	10	-	-

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

TYPICAL JOINT FILLER AGGREGATE SIZE:

GAP WIDTH (IN)	JOINT FILLER AGGREGATE*
3/8 OR 1/2	ASTM NO. 8
* PROVIDED FOR REFERENCE ONLY, FOLLOW MANUFACTURER'S RECOMMENDATIONS	

CONSTRUCTION NOTES:

1. SEE PERMEABLE/POROUS UNIT PAVER SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR PERMEABLE/POROUS UNIT PAVER FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT PAVER SECTION	5.3

NOT FOR CONSTRUCTION

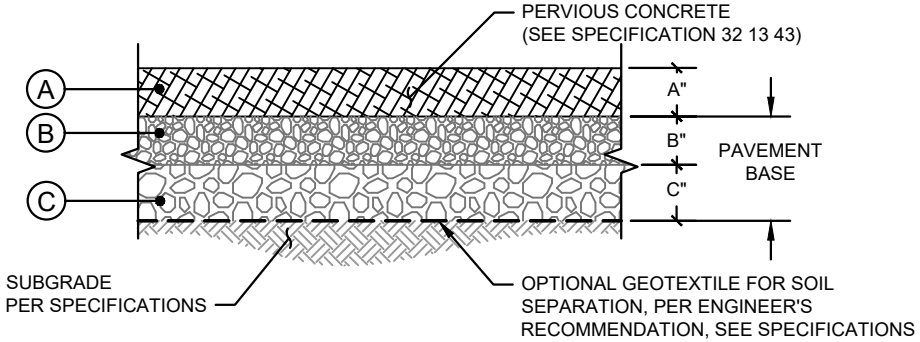

PERVIOUS CONCRETE 1

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	PERVIOUS CONCRETE	9	9.5	6.5	7	4.5	5
B	BASE COURSE ASTM NO. 3 OR 57	6	6	6	6	6	6
C	OPTIONAL RESERVOIR COURSE ASTM NO. 2, 3, OR 57	-	-	-	-	-	-

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

CONSTRUCTION NOTES:

1. SEE PERVIOUS CONCRETE SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR PERVIOUS CONCRETE FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT PERVIOUS CONCRETE SECTION	5.4

NOT FOR CONSTRUCTION

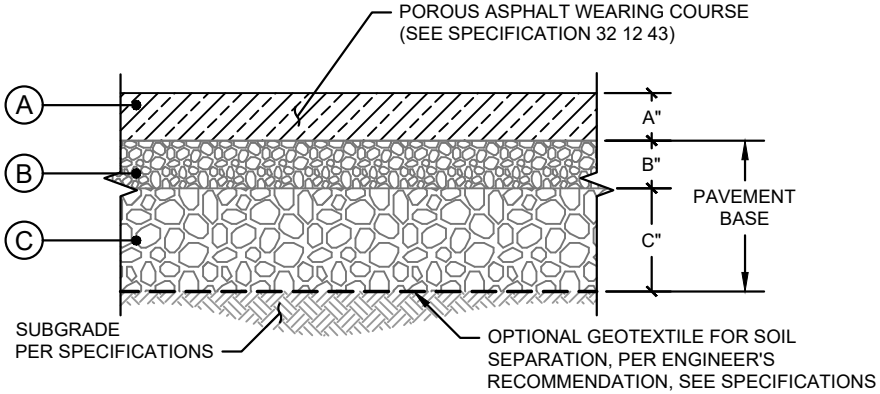

POROUS ASPHALT (1)

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	POROUS ASPHALT	6	8	4	4	3	4
B	BASE COURSE ASTM NO. 57	6	6	5	4	6	4
C	RESERVOIR COURSE ASTM NO. 2, 3, OR 57	10	19	-	11	-	8

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

CONSTRUCTION NOTES:

1. SEE POROUS ASPHALT SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR POROUS ASPHALT FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT POROUS ASPHALT SECTION	5.5

NOT FOR CONSTRUCTION

Specification of Soils for Biotreatment or Bioretention Facilities

Soils for biotreatment or bioretention areas shall meet two objectives:

- Be sufficiently permeable to infiltrate runoff at a minimum rate of 5" per hour during the life of the facility, and
- Have sufficient moisture retention to support healthy vegetation.

Achieving both objectives with an engineered soil mix requires careful specification of soil gradations and a substantial component of organic material (typically compost).

Local soil products suppliers have expressed interest in developing 'brand-name' mixes that meet these specifications. At their sole discretion, municipal construction inspectors may choose to accept test results and certification for a 'brand-name' mix from a soil supplier.

Tests must be conducted within 120 days prior to the delivery date of the bioretention soil to the project site.

Batch-specific test results and certification shall be required for projects installing more than 100 cubic yards of bioretention soil.

SOIL SPECIFICATIONS

Bioretention soils shall meet the following criteria. "Applicant" refers to the entity proposing the soil mixture for approval by a Permittee.

1. General Requirements – Bioretention soil shall:
   a. Achieve a long-term, in-place infiltration rate of at least 5 inches per hour.
   b. Support vigorous plant growth.
   c. Consist of the following mixture of fine sand and compost, measured on a volume basis:
      60%-70% Sand
      30%-40% Compost
2. Submittal Requirements – The applicant shall submit to the Permittee for approval:
   a. A minimum one-gallon size sample of mixed bioretention soil.
   b. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.
   c. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils or Caltrans Test Method (CTM) C202.
   d. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in 4.
   e. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".
   f. Grain size analysis results of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
   g. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

h. Provide the name of the testing laboratory(s) and the following information:

(1) Contact person(s)

(2) Address(s)

(3) Phone contact(s)

(4) E-mail address(s)

(5) Qualifications of laboratory(s), and personnel including date of current certification by USCC, ASTM, Caltrans, or approved equal

3. Sand for Bioretention Soil
   a. Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be nonplastic.
   b. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40 or #50, #30, #16. #8, #4, and 3/8 inch sieves (ASTM D 422, CTM 202 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40 or No.50	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

4. Composted Material

Compost shall be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

a. Compost Quality Analysis by Laboratory – Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Examination of Composting and Compost (TMECC). The lab report shall verify:
   (1) Organic Matter Content: 35% - 75% by dry wt.
   (2) Carbon and Nitrogen Ratio: C:N < 25:1 and C:N >15:1
   (3) Maturity/Stability: Any one of the following is required to indicate stability:
      (i) Oxygen Test < 1.3 O2 /unit TS /hr
      (ii) Specific oxy. Test < 1.5 O2 / unit BVS /hr
      (iii) Respiration test < 8 mg CO_2-C /g OM / day
      (iv) Dewar test < 20 Temp. rise (°C) e.
      (v) Solvita® > 5 Index value
   (4) Toxicity: Any one of the following measures is sufficient to indicate non-toxicity.
      (i) NH_4^+ : NO_3^--N < 3
      (ii) Ammonium < 500 ppm, dry basis
      (iii) Seed Germination > 80 % of control
      (iv) Plant Trials > 80% of control
      (v) Solvita® = 5 Index value
   (5) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
      (i) Total Nitrogen content 0.9% or above preferred.
      (ii) Boron: Total shall be <80 ppm;
   (6) Salinity: Must be reported; < 6.0 mmhos/cm
   (7) pH shall be between 6.2 and 8.2 May vary with plant species.

b. Compost Quality Analysis by Compost Supplier – Before delivery of the compost to the soil supplier the Compost Supplier shall verify the following:
   (1) Feedstock materials shall be specified and include one or more of the following: landscaping/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
   (2) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell or containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable.
   (3) Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

c. Compost for Bioretention Soil Texture – Compost for bioretention soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***

1 inch	99	100
1/2 inch	90	100
1/4 inch	40	90
No. 200	1	10

d. Bulk density shall be between 500 and 1100 dry lbs/cubic yard
e. Moisture content shall be between 30% - 55% of dry solids.
f. Inerts – compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.

g. Select Pathogens – Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.
h. Trace Contaminants Metals (Lead, Mercury, Etc.) – Product must meet US EPA, 40 CFR 503 regulations.
i. Compost Testing – The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

VERIFICATION OF ALTERNATIVE BIORETENTION SOIL MIXES

Bioretention soils not meeting the above criteria shall be evaluated on a case by case basis. Alternative bioretention soil shall meet the following specification: "Soils for bioretention facilities shall be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and provide sufficient retention of moisture and nutrients to support healthy vegetation."

The following steps shall be followed by municipalities to verify that alternative soil mixes meet the specification:

1. General Requirements – Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. The applicant refers to the entity proposing the soil mixture for approval.
   a. Submittals – The applicant must submit to the municipality for approval:
      (1) A minimum one-gallon size sample of mixed bioretention soil.
      (2) Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

(3) Certification from an accredited geotechnical testing laboratory that the Bioretention Soil has an infiltration rate between 5 and 12 inches per hour as tested according to Section 1.b.(2)(ii).
(4) Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".
(5) Grain size analysis results of mixed bioretention soil performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
(6) A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.
(7) The name of the testing laboratory(s) and the following information:
  (i) Contact person(s)
  (ii) Address(s)
  (iii) Phone contact(s)
  (iv) E-mail address(s)
  (v) Qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal.

b. Bioretention Soil
(1) Bioretention Soil Texture: Bioretention Soils shall be analyzed by an accredited lab using #200, and 1/2" inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
1/2 inch	97	100
No. 200	2	5

(2) Bioretention Soil Permeability testing: Bioretention Soils shall be analyzed by an accredited geotechnical lab for the following tests:
  (i) Moisture – density relationships (compaction tests) shall be conducted on bioretention soil. Bioretention soil for the permeability test shall be compacted to 85 to 90 percent of the maximum dry density (ASTM D1557).
  (ii) Constant head permeability testing in accordance with ASTM D2434 shall be conducted on a minimum of two samples with a 6-inch mold and vacuum saturation.

MULCH FOR BIORETENTION FACILITIES

Three inches of mulch is recommended for the purpose of retaining moisture, preventing erosion and minimizing weed growth. Projects subject to the State's Model Water Efficiency Landscaping Ordinance (or comparable local ordinance) will be required to provide at least three inches of mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Aged mulch can be obtained through soil suppliers or directly from commercial recycling yards. It is recommended to apply 1" to 2" of composted mulch, once a year, preferably in June following weeding.

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints.

DESIGNER NOTE: Green text corresponds to notes to the designer.

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Porous Asphalt Pavement

2. Pavement Base

3. Geotextile for Soil Separation

B. Related Sections:

DESIGNER NOTE: The designer should list any additional specification sections which relate to the porous asphalt work (i.e., traffic control, temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards: This section incorporates by reference the latest revisions of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications (published by State of California Business, Transportation, and Housing Agency, Department of Transportation)
AASHTO	Standards of the American Association of State Highway and Transportation Officials, 1998 or latest edition
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.
NAPA IS 115	Design, Construction, and Maintenance of Open-Graded Asphalt Friction Courses
NAPA IS 131	Porous Asphalt Pavements for Stormwater Management, Design, Construction, and Maintenance.

1. Caltrans Standard Specifications: Any references to Caltrans Standard Specifications invoke technical specifications in Section 39 for material, construction, and quality control and quality assurance only. Caltrans contractual requirements, general specifications, and measurement and payment do not apply.

2. Caltrans Standard Specifications Term Equivalencies

Terms Equivalencies	
Term or Clause in Caltrans Standard Specifications	**Term or Clause in These Specifications**
The Department	The Owner
OGFC	Porous Asphalt

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. Project experience and personnel qualification examples as specified in Section 1.05.B for the contractor and personnel assigned to this project.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: Submittals shall conform to the requirements of Caltrans Standard Specifications including:

1. Proposed job mix formula per Section 1.05.B of this Specification.

2. Proposed QC plan per Section 39-1.04A (General Requirements for Contractor Quality Control) and Section 39-2.02A (Quality control plan requirements for the “Standard Construction Process”). The QC Plan shall satisfactorily test the porous asphalt for compliance with Section 39-2.02B (Quality Control for Standard Construction Process) of the Caltrans Standard Specifications, with the following modifications and additions:

a. Aggregate durability index shall be tested in accordance with Caltrans Test Method 229 at least one time per each 750 tons of porous asphalt.

b. Aggregate cleanliness value shall be tested in accordance with Caltrans Test Method 227 at least one time per each 750 tons of porous asphalt.

c. Air voids shall be tested for by determining the bulk specific gravity in accordance with ASTM D6752 or AASHTO T275, the maximum theoretical specific gravity with AASHTO T209, and the voids by test ASTM D3203.

d. Draindown shall be tested in accordance with ASTM D6390.

e. Retained tensile strength shall be tested in accordance with AASHTO 283.

f. Three (3) surface infiltration tests per ASTM C1701 shall be conducted per 10,000 square feet of porous asphalt, in place and one (1) additional test per 5,000 square feet of porous asphalt, or fraction thereof, in place. Document and record the results of each field infiltration test with a designated test number. Include infiltration rate, date pavement was placed, date test was taken, and location on the site (via stationing or other means) where test was performed in each test record. If minimum required field infiltration rate is not achieved at any location as defined in this Section, re-test for field infiltration rate at a new location for each failed field infiltration test. Coordinate location with Owner's Representative.

The QC plan shall be consistent with the Caltrans Quality Control Quality Assurance Manual for Asphalt Concrete Production and Placement (latest version).

In addition to the Caltrans submittal requirements, the Contractor shall submit the following:

3. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base and reservoir course materials performed within one (1) month of product delivery to site.

4. Product data sheets for geotextiles.

5. Testing agency qualifications as specified in Section 1.05.A.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect asphalt materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

DESIGNER NOTE: This specification does not include a test panel/mockup due to the difficulty of installation and because physical properties of the material are known from the plant test. Consider whether project design objectives warrant the cost of a test panel/mockup.

1. Contractor and Personnel Qualifications

DESIGNER NOTE: The designer should adjust the required qualifications for the contractor and personnel based on the availability of qualified bidders and project size, complexity, and risk.

a. Contractor qualification: The Contractor shall provide documentation showing one of the following for the general contractor or paving subcontractor:

1) One (1) example owner-accepted porous asphalt project, similar (or greater) in extent to the proposed project, completed in the last one (1) year with reference.

   OR

2) Three (3) example owner-accepted open graded friction course projects completed in the last one (1) year with references.

Documentation shall include name and address of project, and contact information for project owner.

b. Personnel qualification: The Contractor or paving subcontractor shall provide a qualified foreman with experience installing porous asphalt and documentation showing with following:

1) One (1) example owner-accepted porous asphalt project, similar (or greater) in extent to the proposed project, completed in the last one (1) year with reference.

Documentation shall include name and address of project, and contact information for project owner.

The qualified foreman shall be onsite for the duration of asphalt work including preparation, placement, testing, and completion.

c. Testing agency qualification: Agencies that perform testing on porous asphalt materials shall meet the requirements of Caltrans Standard Specification Section 39-1.03A or be accredited by the AASHTO Accreditation Program (AAP) for the scope and standard being evaluated.

d. Plant qualification: Batch or continuous mixing plants used for porous asphalt shall meet the requirements of Caltrans Standard Specification Section 39-1.08A.

B. Authorized Job Mix Formula (JMF): The mix design process shall conform to Caltrans Specification Section 39-1.03 except as noted below.

1. The final paragraph under Section 39-1.03A is deleted and replaced with the following:

a. Submit a complete JMF submittal including identification of asphalt binder percentage in form CEM-3511 Contractor Job Mix Formula Proposal. Determine the optimum asphalt binder content using California Test 368 in a lab that meets the requirements of 1.05.A. of these specifications.

The products used in the JMF shall meet the requirements in Section 2.01 of this Specification.

The JMF shall meet the quality characteristics defined in Section 39-2.02B (Quality Control for Standard Construction Process) with the modified and additional quality characteristics listed in the table below.

Quality Characteristics	Test Method	Requirement
Aggregate Durability Index	CT 229	DI >= 35
Aggregate Cleanness Value	CT 227	CV >= 75
Air Void Content by Corelok (%)[1]	ASTM D6752 (with AASHTO T209 and ASTM D3203)	16–20%
Air Void Content by Paraffin Wax (%)[1]	AASHTO T275 (with AASHTO T209 and ASTM D3203)	18–22%
Draindown (% of total weight)	ASTM D6390	<= 3%
Retained Tensile Strength (%)	AASHTO 283	>= 80%
Infiltration Rate (Average Inches per Hour)	ASTM C1701	See Note 2.

[1] Either method of determining air void content is acceptable.

[2] The finish surface shall yield an infiltration rate that is consistent with the following: The average infiltration rate from three (3) infiltration tests conducted per ASTM C1701 shall be greater than 100 inches per hour with no single test less than 50 inches per hour. Water shall infiltrate rapidly and uniformly through the surface without formation of large puddles when applied at a rate of 5 gallons per minute (gpm).

2. Once verified and accepted by the Engineer, the JMF meeting the criteria above shall become the Authorized JMF. Acceptance of the JMF shall be per Caltrans Standard Specification Section 39-1.03G, except that verification of the JMF by the City shall be considered equivalent to verification of the JMF by Caltrans. Any adjustments or renewals of the JMF shall be per Caltrans Standard Specifications Section 39-1.03 (Hot Mix Asphalt Mix Design Requirements). Submit a letter from the asphalt supplier with the recommended temperature ranges for mixing, laying, breakdown rolling, and finished rolling, as well as the recommended maximum temperature of the finished mat before placement of subsequent lifts.

C. Responsibilities of Contractor

1. General: Conform to the requirements set forth in Section 39-1.04 (Contractor Quality Control) and Section 39-2.02 (Standard Construction Process Contractor Quality Control) of the Caltrans Standard Specifications.

2. Pre-Placement Conference: A mandatory pre-placement conference will take place, including at a minimum the Engineer, the Owner, the general Contractor, and paving subcontractor, to review preparation, placement, testing procedures, and responsibilities.

3. Quality Control: Contractor quality control inspection and testing of porous asphalt shall be conducted in accordance with the approved QC plan.

4. Load Slip: Provide a load slip certified by a licensed weightmaster showing combined mixture weight for each load of porous asphalt transported to the location.

5. Infiltration Rate Testing: Perform surface infiltration tests per ASTM C1701 as described below.

a. Three (3) test locations per 10,000 square feet of porous asphalt in place.

b. One (1) additional test location per 5,000 square feet of porous asphalt, or fraction thereof, in place.

DESIGNER NOTE: Designer to specify the number and location(s) of required post-construction infiltration tests.

6. Required Inspections: Notify the Engineer at least 5 business days prior placement of porous asphalt.

7. Failed Tests: Each test shall meet the acceptance criteria as defined in this section. For any single quality characteristic except smoothness, if two consecutive quality control test results do not comply with the action limits or specifications:

a. Stop production.

b. Notify the Engineer.

c. Take corrective action.

d. Demonstrate compliance with the specifications before resuming production and placement.

DESIGNER NOTE: The following table is a Sample Contractor Quality Control Sampling and Testing Plan; it is provided to illustrate the type and frequency of testing that may be required The Contractor will need to develop a similar table as part of their QC plan. Frequency and standard for all tests should be project specific.

Sample Contractor Quality Control Sampling and Testing Plan						
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**	
Plant Operations						
Aggregate Gradation	CT 202	1/750 tons	Plant	Plant Inspector	1/2"	TV ± 6
					3/8"	TV ± 6
					No. 4	TV ± 7
					No. 8	TV ± 5
					No. 30	TV ± 4
					No. 200	TV ± 2
Asphalt Binder Content	CT 382	Daily	Plant	Plant Inspector	Design ± 0.5%	
Percent of crushed particles coarse aggregate (%, min)	CT 205	1/project	Plant	Plant Inspector		
One fractured face					90	
Two fractured faces					75	
Fine aggregate (%, min) (Passing no. 4 sieve and retained on no. 8 sieve.)						
One fractured face					90	
Los Angeles Rattler (%, max)	CT 211	1/project	Plant	Plant Inspector		
Loss at 100 rev.					12	
Loss at 500 rev.					40	
Aggregate Durability Index	CT 229	1/750 tons	Plant	Plant Inspector	DI > 35	
Aggregate Cleanness Value	CT 227	1/750 tons	Plant	Plant Inspector	CV > 75	
Asphalt Temp.	Recorded	Continuous	Plant	Plant Inspector	120–190	
Plant Mix Temperature	Recorded	Continuous	Plant	Plant Inspector	165 Maximum	
Aggregate moisture content	CT 226	2/day	Plant	Plant Inspector	For adjusting the plant controller at the HMA plant	
Flat and elongated particles (%, max by weight @ 5:1)	CT 235	1/project	Plant	Plant Inspector	Report Only	

Sample Contractor Quality Control Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**
Street Operations					
Subgrade Preparation	Visual	Daily	Jobsite	Field Inspector	Smooth and Clean
Asphalt Paver & Hopper	Visual and Measure	Daily	Jobsite	Field Inspector	Manufacturer Standards
Compaction Equipment	Visual and Measure	Daily	Jobsite	Field Inspector	Manufacturer Standards
Compaction Process	Visual	Continuous	Jobsite	Field Inspector	Per Specifications
Pavement Temp. at Breakdown	Temperature Equipment	Hourly	Mat Behind Paver	Field Inspector	Per Specifications
Asphalt Binder Content	CT 382	Daily	Mat Behind Paver	Field Inspector/Tester	Design ± 0.5%
HMA Moisture Content (%, max)	CT 226	Daily	Mat Behind Paver	Field Inspector/Tester	1.0
Lift Thickness	Measured	Hourly	Mat Behind Paver	Field Inspector	Per Specifications
Pavement Temp. at Finish	Temperature Equipment	Daily	At Finish Roller	Field Inspector	Per Specifications
Air Void Content by Paraffin Wax (%)	AASHTO T275 (with AASHTO T209 and ASTM D3203)	Daily	Cores of Finished Surface	Field Inspector	16–20%
Tensile Strength	AASHTO 283	Daily	Cores of Finished Surface	Engineer	>= 80%
Long./Transverse Joints	Visual	Continuous	Pavement Joints	Field Inspector	Industry Standards
Smoothness	10 ft straightedge	Hourly	Finished Surface	Field Inspector	Per Specifications

Sample Contractor Quality Control Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**
Street Operations (continued)					
Infiltration Rate (average Inches per hour)	ASTM C1701	Three (3) test locations per 10,000 square feet of pervious asphalt, in place One (1) additional test location per 5,000 square feet of pervious asphalt, or fraction thereof, in place	Finished Surface	Field Inspector	Each Test: 50”/hr min Daily Avg.: 100”/hr min
Pavement Transitions	Visual	Daily	AC Transitions	Field Inspector	Per Specifications

D. Acceptance: Acceptance of porous asphalt shall be determined based on the criteria defined in Section 39-2.03A (Acceptance) of the Caltrans Standard Specifications, with the following modifications and additions:

1. Source aggregate will not be subject to acceptance testing once is has been approved as part of the JMF, unless samples are requested by the Engineer.

2. Air Voids: Air voids shall be tested for by determining the bulk specific gravity in accordance with ASTM D6752 or AASHTO T275, the maximum theoretical specific gravity with AASHTO T209, and the voids by test ASTM D3203.

3. Retained Tensile Strength: Retained tensile strength shall be tested in accordance with AASHTO 283.

Test results for air voids, draindown, and retained tensile strength shall be consistent with the characteristics of the approved JMF.

4. Infiltration Testing

a. Infiltration Rate Testing: The average of all surface infiltration tests shall be greater than 200 inches per hour with no single test less than 100 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For porous asphalt that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 200 inches per hour with no single test less than 100 inches per hour
- For porous asphalt not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 50 inches per hour

b. Infiltration Visual Testing: Visual flood testing of the surface shall be conducted by application of clean water at the rate of at least 5 gpm over the surface, using a hose or other distribution devise. Water used for the test shall be clean, free of suspended solids and deleterious liquids and will be provided at no extra cost to the Owner. All applied water shall infiltrate directly without large puddle formation or surface runoff, and shall be observed by the

Engineer. The Engineer shall mark areas where large puddles form in the field. Areas with slow infiltration shall not exceed 10 percent of the total surface.

DESIGNER NOTE: Smoothness specification should be revised as needed to reflect project design objectives (e.g., smoothness specifications from Section 212 of the City Streets and Highways specifications).

5. Smoothness: Porous asphalt smoothness shall be checked with a 10-foot straightedge. Vertical measurement shall be taken between the pavement's determined plane and straight edge in a direction perpendicular and parallel to the centerline. The finished pavement shall be uniform to a degree such that no variations greater than 3/8-inch are present between the straightedge and pavement surface.

6. Grade: Porous asphalt shall be true to designed spot elevations plus or minus ½ inch and shall not deviate from designed slope more than ¼ inch in ten (10) feet. Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the porous asphalt shall be flush.

7. Line: Porous asphalt margins shall be true to designed lines plus or minus ½ inch at any point.

8. Slope: Porous asphalt shall be sloped as shown on the Plans. Slope shall be consistent to within 1/4 inch in ten (10) feet.

9. Thickness: Each core sample shall be equal to the minimum section depth or more as specified on the Plans.

DESIGNER NOTE: Revise the load slip specification as needed to align with the measurement and payment specifications.

10. Load Slip: Each load of porous asphalt transported to the location of placement shall have a load slip delivered with the load that is certified by a licensed weightmaster and includes the combined mixture weight.

DESIGNER NOTE: Designer should specify consequences of any failed acceptance tests (e.g., reduced payment for lower infiltration rate and lower percent voids, reduced payment for failed smoothness tests) or if consequences are full replacement.

11. Reduced Payment Factors: The reduced payment factors in Caltrans Standard Specification 39-2.03A (Testing) do not apply.

DESIGNER NOTE: The following table is a Sample Owner Quality Assurance Sampling and Testing Plan is provided to illustrate the type and frequency of testing that may be required. Frequency and standard for all tests should be project specific.

Sample Owner Quality Assurance Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Responsibility**	**Attribute or Tolerance**
Plant Operations					
Street Operations					
Asphalt Binder Content	CT 382	Daily	Hopper	Engineer	Design ± 0.5%
HMA Moisture Content (%, max)	CT 226	Daily	Hopper	Engineer	1.0
Lift Thickness	Measured	Hourly	Cores of Finished Surface	Engineer	Per Specifications
Air Void Content by Paraffin Wax (%)	AASHTO T275 (with AASHTO T209 and ASTM D3203)	Daily	Cores of Finished Surface	Engineer	16–20%
Tensile Strength	AASHTO 283	Daily	Cores of Finished Surface	Engineer	>= 80%
Long./Transverse Joints	Visual	Continuous	Pavement Joints	Engineer	Per Specifications
Smoothness	10 ft straightedge	Hourly	Finished Surface	Engineer	Per Specifications
Infiltration Rate (average inches per hour)	ASTM C1701	3/day	Finished Surface	Engineer	Each Test: 50”/hr min Daily Avg.: 100”/hr min
Pavement Transitions	Visual	Daily	AC Transitions	Engineer	Per Specifications

PART 2 PRODUCTS

DESIGNER NOTE: If a product is not available, the designer needs to ensure that the desired voids and surface texture will meet the desired pavement characteristics for surface smoothness, voids, and bonding.

2.01 POROUS ASPHALT

Porous Asphalt mixture must comply with the approved Job Mix Formula (See Section 1.05 of this Specification). The components of the asphalt mixture must comply with the specifications below.

A. Asphalt Binder: Asphalt binder must comply with Caltrans Specification Section 92 except as noted below.

1. Performance Graded (PG) Asphalt Binder: PG asphalt binder must be PG 70-10 per Caltrans Specification Section 92-1.02B.

2. PG Polymer Modified Asphalt Binder:

PG polymer modified asphalt binder must be PG 76-22 PM per Caltrans Specification Section 92-1.02B for use in vehicular applications.

PG polymer modified asphalt binder must be either PG 64-28 PM or PG 76-22 PM per Caltrans Specification Section 92-1.02B for use in pedestrian applications.

B. Aggregates: Aggregates shall conform to Caltrans Specification Section 39-1.02E for Open Graded Friction Course (OGFC) with the following additions and modifications:

1. Durability Index: 35 (minimum) tested in accordance with California Test 229 at least once per 750 tons of porous asphalt.

2. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 750 tons of porous asphalt.

3. Aggregate for porous asphalt shall meet the following gradation:

Porous Asphalt Aggregate Gradation	
Sieve[1]	**Percent Passing by Weight**
3/4 inch	100
1/2 inch	85 to 100
3/8 inch	55 to 75
No. 4	10 to 25
No. 8	5 to 12
No. 30	0 to 10
No. 200	0 to 3

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

C. Materials Not to Be Used: The following materials shall not be used unless approved in advance by the Engineer.

1. Geosynthetic pavement interlayer

2. Tack Coat (except on vertical faces of curbs, edges of PCC structures, or when paving over areas with impermeable bases).

3. Asphalt Rubber Binder.

4. Crumb Rubber Modifier.

5. Reclaimed Asphalt Pavement.

6. Paint Binder per Section 212.06 of the DPW Standard Specifications

D. Job Mix Formula (JMF): The JMF shall comply with the requirements of Section 1.05.C of this Specification.

2.02 PAVEMENT BASE

A. Pavement Base Material shall consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials are not permitted. The Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than 10 Working Days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to two (2) layers as specified on the Plans and included herein:

1. "Base Course" shall be ASTM No. 3 (modified) or ASTM No. 57 (modified) stone per Section 2.02.C.

DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

2. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.02.C.

DESIGNER NOTE: This layer of the pavement base is intended to provide storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed gravel to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying coarser graded materials or reduction in permeability relative to the underlying material..

C. Pavement Base Material shall meet the following specifications for grading and quality.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

2.

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
3 inch	100	–	–	–
2 1/2 inch	90 to 100	100	–	–
2 inch	35 to 70	90 to 100	–	–
1 1/2 inch	0 to 15	35 to 70	–	100
1 inch	–	0 to 15	–	95 to 100
3/4 inch	0 to 5	–	–	–
1/2 inch	–	0 to 5	100	25 to 60
3/8 inch	–	–	85 to 100	–
No. 4	–	–	10 to 30	0 to 10
No. 8	–	–	0 to 10	0 to 5
No. 16	–	–	0 to 5	–
No. 100[2]	0 to 2	0 to 2	0 to 2	0 to 2

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 sieve.

3. R-Value: 78 (minimum) tested in accordance with California Test 301.

4. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C 131.

5. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.

6. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.

7. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.03 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The

geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%
Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer, and shall be recompacted in accordance with 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

F. After compaction and proof roll, scarify subgrade ¼ to ½ inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.
2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct the over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer, at the Contractor's expense. Overlaps of the geotextile shall be a minimum of 1 foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6)-inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10)-ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction

indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. The pavement base shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any porous asphalt.

3.03 POROUS ASPHALT PREPARATION

DESIGNER NOTE: Designer should specify where a tack coat should be applied, if at all. See 3.03.A.2 for list of potential locations.

A. Preparation for placement of porous asphalt pavement shall comply with Section 39-1.09 of the Caltrans Standard Specifications, except as noted below.

1. Pavement Base: Confirm that the completed pavement base conforms to these specifications.

2. Tack Coat: Shall not be used except on vertical faces of curbs, edges of PCC structures, or when paving over areas with impermeable bases.

3. Geosynthetic Pavement Interlay: Shall not be used.

4. Environmental Conditions: Do not place porous asphalt when the ambient temperature is less than 60 degrees Fahrenheit, on any wet surface, or when the average ground surface temperature is less than 45 degrees Fahrenheit.

5. Qualified Personnel: The qualified foreman as defined in 1.05.B.2 shall be onsite for the duration of porous asphalt preparation.

3.04 POROUS ASPHALT PLACEMENT

DESIGNER NOTE: Designer should specify where a tack coat should be applied (e.g., face of curb, structures,) if at all.

A. Porous asphalt equipment, transportation, spreading, and compacting shall comply with the Caltrans Specification applicable to Open Graded Friction Course (OGFC), except as noted below or as specified in the approved mix design.

B. Qualified Personnel: The qualified foreman as defined in 1.05.B.2 shall be onsite for the duration of porous asphalt placement.

C. Spreading and Compacting Equipment: shall conform to Section 39-1.10 of the Caltrans Standard Specifications except that pneumatic tire rollers shall not be used.

DESIGNER NOTE: The compaction could be established by the contractor rather than prescribed below depending on whether the contracting agency prefers to take a prescriptive approach or performance based approach. Prescriptive is used here because full depth porous asphalt is an emerging technology and there are limited density specifications for open graded (porous) asphalt mixtures. But care must be taken to ensure this prescriptive specification is compatible with the acceptance criteria.

D. Spreading and Compacting:

The type of rollers to be used and their relative position in the compaction sequence shall be dictated by the contractor provided the requirements below are met and the completed porous asphalt meets the required quality characteristics specified in Section 1.05. Deviation from the requirements below must be approved in advance by the Engineer.

1. The porous asphalt shall be laid in lifts of up to 4 inches in thickness using approved equipment to achieve the total thickness indicated in the Plans.

DESIGNER NOTE: Designer should consider using thinner lifts to the extent practical to ensure better compaction.

2. The temperature of the Porous HMA mix during laying, breakdown rolling, and finished rolling, shall be within the supplier-recommended temperature range.

3. Breakdown rolling shall be performed with one or two passes of a 7.5- to 10-ton vibratory roller operated in low amplitude mode when the mix temperature is within the supplier-recommended temperature range.

4. Finished rolling shall be performed with a double-drum finish roller operated in static mode when the mix temperature is within the supplier-recommended temperature range.

5. Finished paving shall be even, without pockets, and graded to elevations shown on the Plans. Finished porous asphalt shall meet the acceptance criteria for Smoothness set forth in Section 1.05.D.

DESIGNER NOTE: Designer should specify details of the straightedge test and tolerance if different than specified in Section 1.05E.

6. The Contractor shall take care to insure that the porous asphalt lifts join completely to previous lifts. The Contractor shall keep the time between lift placements to a minimum, keeping the surface of the previous lift clear from dust and moisture between lifts, and restrict traffic from initial lifts until the full depth of asphalt pavement has been placed.

7. Sufficient time shall be allowed between lifts to allow the asphalt to set and cool to at or below the supplier recommended maximum temperature for placement of subsequent lifts.

3.05 OPENING TO TRAFFIC

A. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement surface until cooling and hardening has taken place, and in no case within the first six (6) hours. Provide traffic control measures as necessary to prevent vehicular use and remove when no longer required.

3.06 PROTECTION OF PAVEMENT

A. Hardened porous asphalt pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the porous pavement voids, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If porous asphalt pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

3.07 REJECTION

A. Porous asphalt that does not meet the acceptance criteria set forth in Section 1.05.E will be rejected by the Engineer. Porous asphalt that has been rejected by the Engineer shall be removed and replaced at the Contractor's expense.

END OF SECTION

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints.

DESIGNER NOTE: Green text corresponds to notes to the designer. Blue text corresponds to requirements taken directly from ACI 522.1.

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Pervious Concrete
2. Pavement Base
3. Geotextile for Soil Separation

B. Related Sections:

DESIGNER NOTE: The designer should list any additional specification sections which relate to the pervious concrete work (i.e., temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards This section incorporates by reference the latest versions of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications
AASHTO	Standards of the American Association of State Highway and Transportation Officials, 1998 or latest edition
ACI 522.1	Specifications for Pervious Concrete Pavement
ACI 301	Specifications for Structural Concrete
ACI 305.1	Standard Specifications for Hot Weather Concreting
ACI 306.1	Standard Specifications for Cold Weather Concreting
ACI 308.1	Standard Specifications for Curing Concrete
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. National Ready Mix Concrete Association (NRMCA) Pervious Concrete Contractor Certifications and project experience as specified in Section 1.05.A for the crew assigned to this project.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: The Contractor shall submit to the Engineer the following a minimum of 20 calendar days prior to the construction of the pervious cement concrete pavement:

1. NRMCA Certifications for the batch plant to be used in the production of pervious concrete for this project.

2. Proposed mix design including the following:

a. Batch weights of all constituents.

b. Portland cement type and brand.

c. Non-Portland cement pozzolan type and source.

d. Microfiber brand and type.

e. Admixture type and brand.

f. Aggregate source(s), gradation(s), LA abrasion, and cleanness value(s).

g. Fresh density of the pervious concrete per ASTM C1688.

No concrete shall be placed until the Engineer has provided written acceptance of the mix design per Section 1.05.B.

3. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base and reservoir course materials performed within one (1) month of product delivery to site.

DESIGNER NOTE: Consider revising acceptable age of sieve test depending on scale of project. On a larger project it may be appropriate to require testing by an independent lab with samples taken at the supplier's yard from the stockpile to be used for the project.

4. Product data sheets for all proposed admixtures and geotextiles.

5. A detailed plan of the proposed paving pattern showing the location and type (saw cut or rolled in plastic concrete) of all planned joints. No deviation from the jointing pattern shown on the Plans will be allowed without written approval of the Engineer.

6. A detailed procedure for the production, transportation, placement, protection, curing, and temperature monitoring of concrete for hot

and/or cold weather, unless written approval of the Engineer waiving the requirement is received.

7. Field technician qualifications as specified in Section 1.05.A.

8. Testing agency qualifications as specified in Section 1.05.A.

9. Density of fresh pervious concrete, length of cores, and density of cores for one (1) reference panel. Reference panel shall be placed, jointed, cured, and tested as specified in Section 1.05.D.1 and be within tolerance of the required thickness defined by the Contract Documents.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect concrete materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

1. Contractor and Personnel Qualifications

a. Contractor qualification: Unless otherwise approved by Engineer, Contractor shall provide evidence of employment for one (1) NRMCA certified Pervious Concrete Installer and four (4) NRMCA certified Pervious Concrete Technicians who must be on site, working as members of each placement crew, during all concrete placement.

For all projects where the total pervious concrete pavement area exceeds 20,000 square feet (sf), the Contractor shall provide evidence of employment for at least one (1) NRMCA certified Pervious Concrete Craftsman who must be onsite, working as part of the placement crew, during all concrete placement. Additionally, for every 10,000 sf of pavement area over 20,000 sf, one (1) additional NRMCA certified Pervious Concrete Installer is required on site, working as part of the placement crew.

The Contractor shall provide documentation showing three (3) successful pervious concrete projects completed in the last three (3) years collectively totaling more than 20,000 square feet. Documentation shall include name and address of project, and contact information for project owner.

DESIGNER NOTE: The designer should adjust as required based on the availability of qualified bidders and the size of the project.

b. Field technician qualification: Field tests of concrete required in the responsibilities of the testing agency shall be performed by an individual certified as both an NRMCA Certified Pervious

Concrete Technician, or equivalent, and an ACI Concrete Field Testing Technician – Grade I, or equivalent.

DESIGNER NOTE: The designer should adjust as required based on the availability of qualified personnel and the size of the project.

c. Testing agency qualification: Agencies that perform testing on concrete materials shall meet the requirements of ASTM C1077 and provide evidence of employment for at least one (1) NRMCA Certified Pervious Concrete Technician, responsible for testing, or providing direct oversight of testing, of all concrete materials. Agencies inspecting the Work shall meet the requirements of ASTM E329. Testing agencies performing the testing shall be accepted by the Engineer before performing any Work.

d. Batch plant qualification: Batch plant used for pervious concrete shall be a semi-automatic or automatic batching plant with a current NRMCA certification.

DESIGNER NOTE: Volumetric (truck mounted) Site Mixed Mobile Mixers may be used at the designers discretion. Mixing operations should be per manufactures directions. Designer should specify certification and calibration requirements for Volumetric Mobile Mixers including, but not limited to:

- Proof of Volumetric Mixer Manufacturer Bureau (VMMB) certification, compliance with VMMB 100-01 Volumetric Mixer Standards, and associated VMMB rating plate, or equal
- Provisions for calibration of Volumetric Mobile Mixers performed with aggregate manufactured for the project and recalibrated with each restocked stock pile

Additionally, the designer should specify required quality control measures to ensure aggregates, cementitious material, and admixtures are free from contamination from deleterious material or other stockpiles/storage containers, protected from damage by equipment, vehicles, or weather, and properly batched in lieu of batch ticket (e.g., labeling of aggregate bins to ensure correct aggregate is fed into appropriate mixer material compartment.

B. Approved Mix Design: Once accepted by the Engineer, the mix design meeting the criteria specified in Section 2.01.F shall become the Approved Mix Design and shall not be modified in any way. The Approved Mix Design shall be determined from information submitted under Section 1.04 and from results of reference panel testing as described in Section 1.05.D.1.

Modifications to the Approved Mix Design will not be allowed and any modified mix placed in the Work will be rejected. Proposed modifications to

the Approved Mix Design shall be submitted as a new mix design and shall require a new reference panel to validate the proposed mix design and determine the new Approved Mix Design. If accepted by the Engineer, the new mix design shall become the Approved Mix Design. The requirement for a new reference panel may be waived at the discretion of the Engineer. Only one (1) Approved Mix Design shall be valid at any time. Admixture and water dosages may be modified as needed to maintain mix properties.

C. Responsibilities of Contractor

1. Pre-Placement Conference: A mandatory pre-placement conference will take place including at a minimum the Engineer, the Owner, general contractor, pervious concrete installer, concrete supplier, and field testing agency representative. The document Checklist for the Concrete Pre-Construction Conference (available from the National Ready Mix Concrete Association) will be used to review all materials, personnel qualifications, concrete production, delivery, maintaining moisture retention of fresh mixture, preparation, placing, curing (including timing, placement, and securing of curing cover), jointing, testing procedures, and responsibilities. Meeting emphasis will be on how pervious concrete differs from conventional concrete.

2. Reference Panel: Place reference panels on the project site, on a subgrade and base prepared as specified, using the material and construction requirements for pavement in this Specification. Each panel must have a surface area of at least 225 square feet, and a width and thickness as specified for the pavement in the Contract Documents. The Engineer shall observe and accept each element of the pervious concrete construction. Construction and evaluation of the reference panel(s) will occur as follows:

   a. Notify the Engineer at least ten (10) Working Days before installing pervious concrete reference panel.

   b. Coordinate the location of the reference panel with the Engineer.

   c. Notify the Engineer when each element of the reference panel is ready for inspection.

   d. Remove, replace, and dispose of any unsatisfactory portions of reference panel as determined by the Engineer and at no additional cost to the Owner.

   e. Retain and maintain approved reference panels during construction in an undisturbed condition as a standard for judging completed portions of the final installations.

   Approved reference panels may remain as final installations of the Work at the discretion of the Engineer. If not retained, the reference panel shall be removed and disposed of at no additional cost to the Owner.

3. Testing facilitation: Owner's use of testing services will not relieve Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents. Unless otherwise specified in the Contract Documents, Contractor shall assume the following duties and responsibilities:

   a. Furnish the materials to be tested, including concrete cores.

   b. Furnish any necessary labor to assist Owner's testing agency in obtaining and handling samples, including concrete cores, at the project site or at the source of materials.

   c. Provide measures to collect slurry and debris during coring operation in order to avoid sealing adjacent pavement.

   d. Fill core holes in accordance with Section 1.05.D.2.

   e. Advise Owner's testing agency at least 24 hours in advance of operations to allow for completion of quality tests and for assignment of personnel.

4. Pressure wash testing: Before final acceptance by the Engineer, the Contractor shall pressure wash the pervious concrete. Pressure washing shall be provided and completed by using portable washer equipment working at a minimum of 3,000 psi at 2.0 to 2.5 gpm. The nozzle shall be a zero degree nozzle and be held a maximum of three (3) inches off the concrete surface. The Contractor shall pressure test three (3) locations per lot or as determined by the Engineer. Any sections of pervious concrete that breaks up, ravels, or does not infiltrate shall be removed and replaced with acceptable pervious concrete to the nearest joints. The Engineer will reject the concrete if the pressure washing dislodges aggregate particles from more than two (2) percent of the pervious concrete in a single panel (joint to joint) or dislodges aggregates from a contiguous area of the pavement surface exceeding five times the nominal maximum aggregate size in any direction.

   The Contractor shall decide, after placing the pervious concrete, when to perform the quality assurance pressure wash testing for the acceptance.

DESIGNER NOTE: The designer should consider requiring verification of subgrade infiltration rate and provision to increase reservoir course depth based on results.

D. Testing

1. Reference Panel: Testing for the reference panel shall adhere to the requirements for testing of Pavement per Section 1.05.D.2 for approval by the Engineer. Each test shall meet the acceptance criteria for Reference Panel as defined in Section 1.05.E.1.

The Engineer shall inspect and approve the reference panel prior to the placement of additional pervious concrete.

Failure to install acceptable reference panels of pervious concrete will indicate an unqualified installer.

Production sections of this Work shall not be placed until achieving a complete reference panel that fully complies with the Plans and Specifications and has written acceptance issued by the Engineer.

The completed and accepted reference panels shall be maintained and protected throughout the duration of the Work and may not be demolished and disposed of without written permission from the Engineer. If a reference panel is incorporated into the Work, it shall remain in place and be accepted as a single lot.

Unless otherwise determined by the Engineer, density testing of fresh concrete and hardened cores will be used to validate the mix design per the design criteria set forth in Section 1.04.B and the acceptance criteria in Section 1.05.E.1.

The average fresh density and average hardened density of the cores shall be the densities used for the Approved Mix Design.

2. Pavement: The following testing shall be conducted for approval by the Engineer for each reference panel and each lot of pervious concrete placed, where a lot is defined as the lesser of one (1) day's production or 5,000 square feet of pervious concrete, in place, unless otherwise specified below:

   a. Density testing of at least one (1) cubic foot of fresh concrete in accordance with ASTM C1688.

   b. Thickness testing of three (3), four- (4)-inch hardened concrete cores in accordance with ASTM C174 and adhering to the following requirements:

      1) Removed not less than seven (7) days after placement of pervious concrete.

      2) Location selected in accordance with ASTM D3665.

      3) Cut in accordance with ASTM C42.

   c. Density and void content testing of the three (3) hardened concrete cores extracted for thickness testing and trimmed to produce flat core ends per ASTM C42 paragraph 7.4.1 and 7.4.2. Samples shall be tested in accordance with ASTM C1754.

   d. Surface infiltration tests per ASTM C1701 and at the frequency described below.

1) Three (3) test locations per 10,000 square feet of pervious concrete, in place

2) One (1) additional test location per 5,000 square feet of pervious concrete, or fraction thereof, in place

DESIGNER NOTE: Designer to specify the number and location(s) of required post construction infiltration tests.

Core holes shall be filled with solid concrete, pre-blended grout, or pervious concrete and shall match adjacent pavement color, and grade. At the Engineer's discretion, a sacrificial panel for cores may be required or allowed.

Each test shall meet the acceptance criteria for Pavement as defined in Section 1.05.E.2.

E. Acceptance

1. Reference Panel: Acceptance of the reference panel will be based on the criteria for acceptance of Pavement per Section 1.05.E.2 with the following deviations:

   a. Hardened Density: The density of each core shall be within five (5) pounds per cubic foot of the average hardened density of the three (3) cores.

   b. Fresh Density: The fresh density shall be within or equal to five (5) pounds per cubic foot of the average fresh density of the three (3) samples.

2. Pavement: Acceptance of a lot of pervious concrete will be based on the following criteria:

   a. Smoothness: Pervious concrete pavement smoothness shall be checked with a 10-foot straightedge. Vertical measurement should be taken between the pavement's determined plane and straight edge, discounting surface void and roughness irregularities, in a direction perpendicular and parallel to the centerline. The finished pavement shall be uniform to a degree such that no variations greater than 3/8-inch are present between the straight edge and pavement surface over a distance of at least 6 inches.

   b. Grade: Pervious concrete shall be true to designed spot elevations plus or minus ½ inch and shall not deviate from designed slope more than ¼ inch in ten (10) feet. Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the pervious concrete shall be flush.

   c. Line: Pervious concrete margins shall be true to designed lines plus or minus ½ inch at any point.

d. Slope: Pervious concrete shall be sloped as shown on the Plans. Slope shall be consistent to within 1/4 inch in ten (10) feet.

e. Thickness: Each core sample shall be equal to the minimum section depth or more as specified on the Plans.

f. Hardened Density: The density of the core samples for each lot shall be within five (5) pounds per cubic foot of the density as accepted in the reference panel.

g. Void Content: The total void content of the core samples for each reference panel and lot shall be twenty (20) percent, plus or minus five (5) percent, in place, as constructed.

h. Infiltration Rate: The average of all surface infiltration tests shall be greater than 250 inches per hour with no single test less than 100 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For permeable pavement that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 250 inches per hour with no single test less than 100 inches per hour
- For permeable pavement not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 75 inches per hour

i. Fresh Density: The fresh density shall be within or equal to five (5) pounds per cubic foot of the fresh density indicated by the Approved Mix Design.

j. Batch Ticket: Each load of pervious concrete transported to the location of placement shall have a Batch Ticket delivered with the load. Batch Tickets shall be provided upon request for each load and shall be in accordance with ASTM C94, with the following additions:

1) Batch weights of all constituents in the mix, including cement, aggregate, admixtures, water, and fibers

2) Signature of responsible representative of the concrete producer, affirming the accuracy of the information provided

k. Appearance: Each lot of finished pervious concrete will be inspected for appearance by the Engineer after completion of pressure wash testing per Section 1.05.C.4. The pervious concrete shall have a consistent surface texture, shall have no more than five (5) percent of the surface area within each panel (joint to joint) filled with paste, shall be free of ridges or other surface imperfections, shall have joints that are in the specified location and are constructed per specification, shall be free of cracks and shall not be raveled.

A panel will be considered raveled if aggregate is dislodged from a contiguous area of the pavement surface or longitudinally along a joint exceeding five times the nominal maximum aggregate size in any direction OR if aggregate particles are dislodged from more than two (2) percent of the pervious concrete within each panel (joint to joint).Raveling occurring during the first three (3) months after installation is subject to complete removal and replacement of affected panels with acceptable pervious concrete at the Owner's discretion and Contractor's expense. Requirement to replace affected panels shall continue until three (3) months after the date of replacement. Written notification of defects is the sole responsibility of the Owner.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

l. Conformance to Approved Mix Design: The pervious concrete used shall conform to the Approved Mix Design within the limits set forth in ASTM C94.

3. Required Inspections: Notify the Engineer at least 48 hours prior to required inspections specified in Sections 3.01, 3.02, and 3.03.B.

PART 2 PRODUCTS

DESIGNER NOTE: Designers should maximize the use of regionally available materials.

2.01 PERVIOUS CONCRETE

DESIGNER NOTE: No reinforcing bars or tie bars will be used in the installation of pervious concrete.

Pervious Concrete shall comply with ASTM C94, except sections 4.2, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 7, 8, 16, 17, 18, 19, 20 and the requirements specified herein. The volume of fresh concrete in a given batch shall be determined from the total mass of the batch divided by the design density of the concrete. The total mass

of the batch shall be determined as the net mass of the concrete in the batch as delivered, including the total mixing water as defined in ASTM C94 Paragraph 9.3.

A. Cement: Cement in the mix design shall conform to the requirements for Portland Cement or Blended Hydraulic Cement as specified herein:

1. Portland Cement: Portland Cement shall meet the requirements of ASTM C150 Type I, II, or V Portland cement.

2. Blended Hydraulic Cement: Blended Hydraulic Cement shall be Type IP or IS Cement conforming to ASTM C595. Type IP(X), Portland Pozzolan Cement, and IS(X) where (X) dictates pozzolan and slag percentage, respectively, shall be Portland Cement and Pozzolan. The pozzolan shall be limited to fly ash or ground granulated blast furnace slag.

   The fly ash or ground granulated blast furnace slag constituent content in the finished cement shall not vary more than plus or minus 5 percent by weight of the finished cement from the certified value.

3. Supplementary cementitious material shall be as specified herein:

   a. Fly Ash: Fly ash shall conform to the requirements of ASTM C618, Class F or C.

   b. Slag Cement: Slag cement shall meet the requirements of ASTM C989, Grade 100 or Grade 120.

   c. Silica Fume: Silica fume shall meet the requirements of ASTM C1240.

B. Aggregates: Aggregates shall conform to ASTM C33 except as specified herein, unless otherwise approved by the Engineer.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 300 cubic yards of concrete.

Sieve[1]	Percent Passing by Weight				
	Coarse Aggregate				Fine Aggregate
	ASTM No. 7	ASTM No. 8	ASTM No. 89	ASTM No. 9	
2 inch	–	–	–	–	–
1 1/2 inch	–	–	–	–	–
1 inch	–	–	–	–	–
3/4 inch	100	–	–	–	–
1/2 inch	90 to 100	100	100	–	–
3/8 inch	40 to 70	85 to 100	90 to 100	100	100
No. 4	0 to 15	10 to 30	22 to 55	85 to 100	95 to 100
No. 8	0 to 5	0 to 10	5 to 30	10 to 40	80 to 100
No. 16	–	0 to 5	0 to 10	0 to 10	50 to 85
No. 30	–	–	0 to 5	0 to 5	25 to 60

No. 50	–	–	–	–	5 to 30
No. 100	–	–	–	–	0 to 10
No. 200	–	–	–	–	0 to 3

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

In individual tests, a variation of 4 percent under the minimum percentages or over the maximum percentages will be allowed. The average of three successive tests shall be within the percentages stated above. Aggregate shall contain no pieces larger than two times the maximum sieve size for the specified grading measured along the line of greatest dimension.

2. Coarse Aggregate

   a. LA Abrasion: 35 percent (maximum) tested in accordance with ASTM C131 at least once per 300 cubic yards of concrete.

   b. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 300 cubic yard of concrete.

3. Acceptance of grading and quality of the aggregate may be based on samples taken from stockpiles at the concrete plant or a submitted gradation report at the discretion of the Engineer. The point of acceptance will be determined in the field by the Engineer.

C. Admixtures

1. Air Entraining Admixtures: Air entraining admixtures shall meet the requirements of ASTM C260.

2. Water Reducing Admixtures: Water reducing admixtures shall meet the requirements of ASTM C494, Type A.

3. Hydration Stabilizing Admixtures: Hydration stabilizing admixtures shall meet the requirements of ASTM C494, Type B or Type D.

4. Superplasticizers: Superplasticizers and retarders shall meet the requirements of ASTM C494, Type F or Type G and ASTM C1017, Type 1.

5. Viscosity Modifying Admixtures: Viscosity modifying admixtures may be used if approved by the Engineer.

6. Color Pigment: Color pigment shall meet the requirements of ASTM C979 for integrally colored concrete. Pigments shall be color stable, non-fading, and resistant to lime and other alkalis.

   DESIGNER NOTE: Designer to specify color, as indicated by manufacturer's designation, architect's sample, etc. with provision for approved equal color.

D. Water: Clean potable water or water conforming to ASTM C1602 shall be used in the mix design and on the jobsite. The use of hot water is not permitted.

E. Microfibers: Microfibers shall conform to the requirements of ASTM C1116, Type III and shall be monofilament and ½ inch in length.

F. Mix Design:

1. General: The Contractor shall propose a mix design for pervious concrete and shall submit the mix design to the Engineer for acceptance prior to constructing the reference panels. Pervious concrete shall not be placed in the reference panels without a mix design that has been reviewed and accepted by the Engineer.

2. Mix Design Criteria: The Contractor shall include the following elements and results of the described procedures in the proposed mix design:

   a. The cementitious content, including pozzolans if used, shall be a minimum of 480 and a maximum of 600 pounds per cubic yard.

   b. The mix may incorporate up to 5 percent fine aggregate, by weight.

   c. The mix shall incorporate a hydration stabilizing admixture.

   d. The mix may incorporate microfibers or fibers per Manufacturer's recommendations.

   e. The mix shall be designed to meet the acceptance criteria for Void Content per Section 1.05.F.2 as determined by the testing methods specified in Section 1.05.E.2.

   f. The water/cement ratio shall be between 0.27 and 0.35.

   g. Up to 50 percent of cementitious material in the mix, by weight, may be fly ash, slag cement, or a combination of silica fume and either or both of the above, with silica fume not exceeding 10 percent.

   Deviations from this mix design, such as the use of internal curing admixtures, cementitious content outside of the range specified, or finer aggregate gradations may be permitted at the sole discretion of the Engineer provided the Contractor can demonstrate the viability of the mix design through past successful installations or sound science.

2.02 PAVEMENT BASE

A. Pavement Base Material shall consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials or round river gravel are not permitted. Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than Working 10 days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take

preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to two (2) layers as specified on the Plans and included herein:

1. "Base Course" shall be ASTM No. 3 (modified) or ASTM No. 57 (modified) stone per Section 2.02.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

2. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.02.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed rock to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying courser graded materials or reduction in permeability relative to the underlying material.

C. Pavement Base Material shall meet the following specifications for grading and quality.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
3 inch	100	–	–	–
2 1/2 inch	90 to 100	100	–	–
2 inch	35 to 70	90 to 100	–	–
1 1/2 inch	0 to 15	35 to 70	–	100
1 inch	–	0 to 15	–	95 to 100
3/4 inch	0 to 5	–	–	–
1/2 inch	–	0 to 5	100	25 to 60
3/8 inch	–	–	85 to 100	–

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
No. 4	–	–	10 to 30	0 to 10
No. 8	–	–	0 to 10	0 to 5
No. 16	–	–	0 to 5	–
No. 100[2]	0 to 2	0 to 2	0 to 2	0 to 2

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 sieve.

2. R-Value: 78 (minimum) tested in accordance with California Test 301.
3. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C131.
4. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.
5. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.
6. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.03 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%

Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer and shall be recompacted in accordance with Section 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade.

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

DESIGNER NOTE: Other subgrade verification methods may be required if site conditions limit proof rolling. Consult with geotechnical engineer for acceptable methods.

F. After compaction and proof roll, scarify subgrade ¼- to ½-inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer at no additional cost to the Owner. Overlaps of the geotextile shall be a minimum of one (1) foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6) inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10) ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots, additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. The pavement base shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any pervious concrete.

DESIGNER NOTE: Consider developing a testing plan for the required testing and inspection of the pavement base. Verification of the in place density/compaction of the open graded base materials is typically not possible with the use of a nuclear densometer due to nature of these materials. Therefore other means to verify these materials are firm and unyielding (such as observation of the compaction process by a geotechnical engineer) are necessary.

DESIGNER NOTE: Consider requiring the Contractor to compact aggregates without crushing them.

3.03 MIXING, PLACEMENT & CURING OF PERVIOUS CONCRETE

A. Pervious concrete formwork

1. Forms shall be made of steel or wood and shall be in good condition, clean, and capable of being anchored in place so as to ensure pavement placement true to the grades, lines and slopes as specified on the Plans.

2. Forms that are bent, warped, unclean, or otherwise deemed inadequate by the Engineer shall not be used.

3. Existing curbs, structures, or the vertical face of previously placed pervious concrete may be used as a form.

4. Set, align, and brace forms to satisfy the lines, grades, and slopes on the Plans.

5. Apply form-release agent to the form face immediately before placing concrete.

6. No pervious concrete shall be placed until the forms are inspected and accepted by the Engineer.

7. Slip forming is an acceptable method for placement of pervious concrete.

B. Batching, mixing, and delivery

1. Pervious concrete shall be batched and centrally mixed at a batching plant meeting the requirements set forth in Section 1.06.A.4. Pervious concrete shall not be shrink mixed or transit mixed.

2. Begin mixing immediately after cement has been added to aggregates. Batch and mix concrete in compliance with ASTM C94, with the following exceptions:

   a. Placement of concrete shall occur no more than 60 minutes from the time water or aggregate is added to the cement.

   b. If a hydration-stabilizing admixture is used, up to 60 minutes may be added to the placement time, resulting in a maximum placement time of 120 minutes.

   Additional water may be added on site, but the fresh density must still meet the requirements of Section 2.01.F.2 after water addition.

C. Placing and consolidation

1. Pervious concrete shall not be placed on standing water or frozen pavement base.

2. Wet the pavement base with water before concrete placement such that the material is saturated but without any standing water on the prepared base immediately before concrete placement.

3. Place pervious concrete on the prepared pavement base as close to its final position as possible, either directly from the transporting equipment or by conveyor, unless otherwise specified. Spread the concrete using mechanized equipment or hand tools, without segregation.

4. Strike off concrete between forms using a form riding paving machine or roller screed at the appropriate height, as determined by the Contractor, to allow for compaction to finished grade. Equipment used for striking off the pervious concrete shall leave a smooth surface, free of ridges or other imperfections, without drawing excessive paste to the surface. Vibratory screeds are not permitted. Other strike-off devices may be used when accepted by the Engineer.

5. Compact pervious concrete with a purpose built pervious concrete cross roller or alternate method approved by the Engineer. Rollers shall be of sufficient weight and width to compact the fresh pervious concrete to grade, leaving a smooth surface, free of ridges or other imperfections, without drawing excessive paste to the surface.

Compacted pervious concrete shall meet the acceptance criteria for Smoothness set forth in Section 1.05.E.2.

6. Contractor's personnel shall take care to avoid foot traffic in the pervious concrete to prevent non-uniform compaction and to keep contaminated material from entering the pavement mix. Foot traffic on the fresh concrete shall not be allowed after it has been struck off.

7. Place pervious concrete continuously. Where placement has been halted for a period of 15 minutes, a header shall be placed between the forms and a construction joint formed. The construction joint shall be located at a contraction joint location, unless otherwise approved by the Engineer. The pervious concrete shall be compacted and finished to the header before placement may continue. Upon resuming placement, the header may be carefully removed and a construction joint formed at that location. Any sloughing or sagging of the previously placed pervious concrete at the header location shall be corrected prior to placing new pervious concrete against the joint.

D. Edging: Edging of the top surface shall be completed in plastic concrete to a radius of not less than 1/4 inch. Defects shall be repaired immediately.

E. Jointing: Joints shall be of three (3) types: construction, contraction, and isolation. Wherever possible, the angle between intersecting joints shall be between 80 and 100 degrees. Construct joints at the locations and to the horizontal dimensions indicated on the Plans.

1. Construction Joints: Construction joints shall be formed at the end of a day's work or when necessary to stop production for any reason.

   a. Construction joints shall be located as near as possible to the location of a planned contraction or isolation joint.

   b. Construction joints are to be formed by placing a header between the forms, at right angles, to the full depth of the finished pervious concrete, and set to the height of the forms. Pervious concrete shall be placed against the header and compacted and finished as normal, including edging.

   c. Upon resuming paving, the header shall be carefully removed and new pervious concrete placed directly against the existing pervious concrete. The new pervious concrete shall be compacted and finished against the hardened pervious concrete as if it were a form.

   d. If an isolation joint is planned at this location, then the premolded joint filler shall be placed against the existing pervious concrete and the new pervious concrete shall be placed against the premolded joint filler. The joint shall be tooled on both sides of the premolded joint filler.

2. Contraction Joints: Contraction joints shall be used to control random cracking.

   a. Contraction joints shall be placed every 15 feet unless otherwise shown on the Plans.

      DESIGNER NOTE: Designer should consider size and aspect ratio of panels when locating joints.

   b. Plastic Formed Joints: Contraction joints may be formed in the plastic concrete using a roller designed for this purpose or by other methods accepted by the Engineer.

      1) Rollers shall have sufficient weight to produce the joint and shall not otherwise damage or mar the surface.

      2) Plastic formed joints shall be a minimum depth of 1 and 3/4 inches and have a width of no more than 1/8 inch.

      3) Joints shall be tooled on both sides of the joint with a radius not less than 1/4 inch.

   c. Saw Cut Joints: At the option of the Contractor, contraction joints may be saw cut provided joints are early-entry dry-cut type.

      1) Joints shall be cut using purpose built early-entry saw cutting equipment.

      2) Saw cut joints shall be a minimum depth of 1/4 of the pervious concrete thickness, up to a maximum required depth of 1 and 1/4 inches, and have a joint width of no more than 1/8 inch.

      3) Saw cutting shall occur as soon as the concrete is sufficiently cured so that it may be cut without raveling or dislodging aggregate from the finished surface, no longer than four (4) hours after placement of pavement.

      4) Remove cuttings from surface immediately after saw cutting of joints.

      5) To minimize drying, curing materials shall be removed only as needed to make cuts and shall be replaced immediately after cutting. The exposed pervious concrete shall be kept moist for the entire duration of exposure.

3. Isolation Joints: Isolation joints shall be used where the pervious concrete abuts existing facilities or where shown on the Plans.

   a. Isolation joints shall continue through the depth of the pervious concrete using a 3/8 inch premolded joint filler.

   b. Isolation joints may be formed by inserting the premolded joint filler into the plastic concrete or by forming a construction joint

and affixing the premolded joint filler against one side of the joint and placing fresh pervious concrete against it.

c. Isolation joints and filler shall be flush with the surrounding pervious concrete and shall not deviate from the acceptance criteria for Grade as specified in Section 1.05.E.2.

d. The edges of the pervious concrete on either side of the premolded joint filler shall be hand tooled to a radius not less than 1/4 inch.

F. Curing

1. Begin curing within 20 minutes of concrete discharge from the truck, unless otherwise specified or approved by the Engineer.

2. Completely cover the pavement surface and all exposed edges with a minimum six- (6)-mil-thick white polyethylene sheet, unless otherwise specified or approved by the Engineer. No wetted burlap or cloth shall be used.

3. Thoroughly secure a polyethylene sheet at all exterior edges and interior laps without using soil. The method of securing the cover material shall prevent wind from removing the sheet and from blowing under the sheet across the surface of the concrete.

4. Curing compound shall not be used on any pervious cement concrete surface.

5. Cure pavement for a minimum of 7 uninterrupted days, unless otherwise specified or approved by the Engineer.

6. With the exception of saw cutting equipment, all traffic shall be kept off of the pervious concrete during the curing period.

7. Any testing for acceptance shall not occur until the end of the curing period.

G. Cold-weather construction

1. Protect concrete from freezing and record concrete temperature no less than twice per 24-hour period in accordance with ACI 306.1.

3.04 OPENING TO TRAFFIC

A. No traffic shall be allowed on the pervious cement concrete pavement for 10 days.

3.05 PROTECTION OF PAVEMENT

A. Cured and exposed pervious cement concrete pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the pervious pavement voids, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If

pervious cement concrete pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

3.06 REJECTION

A. Pervious concrete that does not meet the acceptance criteria set forth in Section 1.05.E.2 will be rejected by the Engineer on a lot-by-lot basis. Pervious concrete that has been rejected by the Engineer or the Contractor shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints. The City uses the term "Permeable Unit Pavers" when infiltration achieved via aggregate filled joints and "Porous Unit Pavers" when infiltration is achieved through the paver material itself.

DESIGNER NOTE: Green text corresponds to notes to the designer.

PART 1 GENERAL

1.01 SUMMARY

A. This section Includes:

1. Permeable/Porous Unit Pavers
2. Joint Filter Aggregate
3. Pavement Base
4. Edge Restraints
5. Geotextile for Soil Separation

B. Related Sections

DESIGNER NOTE: The designer should list any additional specification sections which relate to the permeable/porous unit paver work (i.e., temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards: This section incorporates by reference the latest version of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications
ASTM C67	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C13	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Method for Sieve Analysis for Fine and Coarse Aggregate
ASTM C140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM D448	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM C936	Standard Specification for Solid Interlocking Concrete Pavers

ASTM C979	Specification for Pigments for Integrally Colored Concrete
ASTM C1781	Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems
ASTM E2835	Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

A. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavement manual.

DESIGNER NOTE: The designer should consider the use of the ICPI Permeable Design Pro software for structural design and determination of adequate depth for the pavement section.

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. Paver Installation Subcontractor:

a. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute's Concrete Paver Installer Certification program.

b. Job references from three (3) projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone number, and email address.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: The Contractor shall submit to the Engineer the following a minimum of 20 calendar days prior to the construction of the permeable/porous unit pavers:

1. Paver manufacturer's/installation subcontractor's drawings and details indicating perimeter conditions, junctions with other materials, expansion and control joints, paver layout/patterns, joint spacing and/or tabs, color arrangement, and installation [and setting] procedures. Drawings and details shall also indicate layout, pattern and relationship of paving joints to fixtures and project formed details.

2. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base, reservoir course, and joint filler materials performed within one (1) month of product delivery to site.

DESIGNER NOTE: Consider revising acceptable age of sieve test depending on scale of project. On a larger project it may be appropriate to require testing by an independent lab with samples taken at the supplier's yard from the stockpile to be used for the project.

3. Product data sheets for unit pavers and geotextiles.
4. Laboratory test reports certifying compliance of the concrete pavers with ASTM C936.
5. Manufacturer's certification of concrete pavers by ICPI as having met applicable ASTM standards.

DESIGNER NOTE: Especially when using colored pavers, consider requiring submittal of full-size samples of each paver type, thickness, color, and finish. Require submittal of samples indicating the range of color expected in the finished installation. Accepted samples would become the standard of acceptance for the work of this Section.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect permeable/porous unit paver materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

1. Paver Installation Subcontractor Qualifications:
2. Installer shall provide documentation showing three (3) successful permeable/porous unit paver installations completed in the last three (3) years, collectively totaling more than 10,000 square feet. Documentation shall include name and address of project, and contact information for project owner.
3. Installer shall utilize job foremen holding a record of completion from the Interlocking Concrete Pavement Institute PICP Installer Technician Course.

DESIGNER NOTE: Consider changing these requirements to match scale and complexity of project including a minimum total amount of pavers placed.

B. Responsibilities of Contractor

1. Pre-Placement Conference: A mandatory pre-placement conference will take place, including at a minimum the Engineer, the Owner, general Contractor, and paver installer, to review the manufacturers' quality control plan, personnel qualifications, and the paver installers' Method Statement and Quality Control Plan.
2. Reference Panel: Place reference panels on the project site, on a subgrade and base prepared as specified, using the material and

construction requirements for pavement in this Specification. Each panel must have a surface area of at least 100 square feet (sf), and a width and thickness as specified for the pavement in the Contract Documents. The Engineer shall observe and accept each element of the paver construction prior to the placement of additional pavement. Failure to install acceptable reference panels of permeable/porous unit pavers will indicate an unqualified installer. Construction and evaluation of the reference panel(s) will occur as follows:

a. Notify the Engineer at least ten (10) Working Days before installing paver reference panel.

b. Coordinate the location of the reference panel with the Engineer.

c. Notify the Engineer when each element of the reference panel is ready for inspection.

d. Remove, replace, and dispose of any unsatisfactory portions of reference panel as determined by the Engineer and at no additional cost to the Owner.

e. Retain and maintain approved reference panel during construction in an undisturbed condition as a standard for judging completed portions of the final installations.

Approved reference panels may remain as final installations of the Work at the discretion of the Engineer. If not retained, the reference panel shall be removed and disposed at no additional cost to the Owner.

DESIGNER NOTE: Mechanized installations may require a larger mock up area. Consult with the paver installation (Sub) Contractor on the size of the reference panel.

DESIGNER NOTE: Use this panel to determine expected settlement (surcharge) of the leveling course, joint sizes, and lines, laying pattern, color and texture of the job.

DESIGNER NOTE: The designer should consider requiring verification of subgrade infiltration rate and provision to increase reservoir course depth based on results.

3. Infiltration Testing: Perform surface infiltration tests per ASTM C1781 as described below.

a. Three (3) test locations per 10,000 square feet of permeable/porous unit pavers, in place

b. One (1) additional test location per 5,000 square feet of permeable/porous unit pavers, or fraction thereof, in place

DESIGNER NOTE: Designer to specify the number and location(s) of required post construction infiltration tests.

C. Acceptance

1. The surface elevation of pavers shall be 1/8 to 1/4 inch (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

2. Lippage: No greater than 1/8 inch (3 mm) difference in height between adjacent pavers.

3. Bond lines for paver courses shall be within ½ inch (± 15 mm) over a 50-foot (15 m) string line.

4. The final surface tolerance of compacted pavers shall not deviate more than ± 3/8 inch (10 mm) under a 10-foot (3 m) long straightedge.

5. Infiltration Rate: The average of all tests shall be greater than 50 inches per hour with no single test less than 25 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For permeable/porous unit pavers that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 50 inches per hour
- For permeable pavement not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 50 inches per hour with no single test less than 25 inches per hour

DESIGNER NOTE: The surface of the pavers may be 1/8 to 1/4 inch (3 to 6 mm) above the final designed elevations after compaction. This helps compensate for possible minor settling normal to pavements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged container packaging with identification tags intact on each paver bundle.

1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

2. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.

D. Unload pavers at job site in such a manner that no damage occurs to the product or existing construction.

E. Storage and Protection: Store materials in a protected area such that they are kept free from mud, dirt, and other foreign materials.

1.07 MAINTENANCE

DESIGNER NOTE: Consider requiring the provision of additional pavers to be retained and stored by the Owner for future maintenance.

- Extra materials: Provide [Specify area] [Specify percentage] additional material for use by Owner for maintenance and repair.
- Extra pavers shall be from the same production run as installed materials.

PART 2 PRODUCTS

DESIGNER NOTE: Some projects may include permeable/porous and solid unit pavers. Specify each product, as required.

2.01 PERMEABLE/POROUS UNIT PAVERS

A. Manufacturer: [Specify manufacturer name.].

1. Contact: [Specify ICPI member manufacturer contact information.].

B. Permeable/Porous Unit Paver Type: [Specify name of product group, family, series, etc.].

1. Material Standard: Comply with ASTM C 936.
2. Color [and finish]: [Specify color.] [Specify finish].
3. Color Pigment Material Standard: Comply with ASTM C979.
4. Size: [Specify.] inches [({Specify.}mm)] x [Specify.] inches [({Specify}mm)] x [Specify.] inches [({Specify.} mm)] thick.
5. Joint Gap Size: [Specify.] inches
6. Joint Gap Mechanism: [Specify if integral spacer, or other paver spacer.] type
7. Bevel Size: [Specify.] inches, [Specify.] type

DESIGNER NOTE: Concrete pavers with spacers integral to each unit are recommended for mechanically installed pavers and pavers subject to vehicular traffic. Verify with manufacturer that overall dimensions do not include spacers.

2.02 JOINT FILLER AGGREGATE

A. Crushed Particles: 90 percent (minimum) tested in accordance with California Test 205.

B. LA Abrasion: Less than 40 tested in accordance with ASTM C131.

C. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.

D. Rounded river gravel may not be used.

E. Permeable Unit Paver: The following aggregate shall be used to fill joints unless manufacturer recommends otherwise. Aggregate gradations shall be per Section 2.03.C.1. If manufacturer recommendation is different from the gradations shown below the Contractor shall be notified at least 48 hours prior to placement of the joint filler.

Gap Width	Aggregate Gradation
3/8" or ½"	ASTM No. 8 (modified)

F. Porous Unit Pavers: Joint filler shall be per manufacturer's recommendation.

2.03 PAVEMENT BASE

A. Pavement Base Material shall be consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials or rounded river gravel are not permitted. Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than ten (10) Working Days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to three (3) layers as specified on the Plans and included herein:

1. "Leveling Course" shall be ASTM No. 8 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide a smooth, level surface for placement of pavers.

2. "Base Course" shall be ASTM No. 57 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

3. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide water storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed rock to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

   DESIGNER NOTE: ASTM No. 2 stone is preferred.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying courser graded materials or reduction in permeability relative to the underlying material.

C. Pavement Base Material shall meet the following specifications for grading and quality.

DESIGNER NOTE: If the designer chooses to specify materials per the procedure above, provide the required gradation the in the table below.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

Sieve[1]	Percent Passing by Weight					
	ASTM No. 10 (modified)	ASTM No. 89 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)	ASTM No. 3 (modified)	ASTM No. 2 (modified)
3 inch	–	–	–	–	–	100
2 1/2 inch	–	–	–	–	100	90 to 100
2 inch	–	–	–	–	90 to 100	35 to 70
1 1/2 inch	–	–	–	100	35 to 70	0 to 15
1 inch	–	–	–	95 to 100	0 to 15	–
3/4 inch	–	–	–	–	–	0 to 5
1/2 inch	–	100	100	25 to 60	0 to 5	–
3/8 inch	100	90 to 100	85 to 100	–	–	–
No. 4	85 to 100	20 to 55	10 to 30	0 to 10	–	–
No. 8	–	5 to 30	0 to 10	0 to 5	–	–
No. 16	–	0 to 10	0 to 5	–	–	–
No. 30	–	–	–	–	–	–
No. 50	–	0 to 5	–	–	–	–
No. 100[2]	10 to 30	–	0 to 2	0 to 2	0 to 2	0 to 2
No. 200[2]	0 to 2	0 to 2	–	–	–	–

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 and 200 sieve, as shown.

2. R-Value: 78 (minimum) tested in accordance with California Test 301.
3. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C131.
4. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.
5. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.
6. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.04 ACCESSORIES

A. Provide accessory materials as follows: Edge Restraints

1. Manufacturer: [Specify manufacturer.].
2. Material(s): [Pre-cast concrete] [Cut stone] [steel].
3. Material Standard: [Specify material standard.].
4. Configuration: [Specify geometry, manufacturer's model number, stakes or spikes, paver spacers, coatings, color, etc.]

DESIGNER NOTE: Curbs will typically be cast-in-place concrete or precast set in concrete haunches. Cast in place concrete curbs should be specified in another Section. Do not use plastic edging with steel spikes to restrain unit pavers for vehicular applications.

2.05 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: See ICPI publication, Permeable Interlocking Concrete Pavements for guidance on geotextile selection. Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%
Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer and shall be recompacted in accordance with Section 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade.

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

DESIGNER NOTE: Other subgrade verification methods may be required if site conditions limit proof rolling. Consult with geotechnical engineer for acceptable methods.

F. After compaction and proof roll, scarify subgrade ¼- to ½-inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct the over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer, at no additional cost to the Owner. Overlaps of the geotextile shall be a minimum of 1 foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6)-inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10)-ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots, additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. Pavement base materials shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Do not subject placed and compacted gravel leveling course to any pedestrian or vehicular traffic before unit paver installation begins.

3. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any pavers.

DESIGNER NOTE: Consider developing a testing plan for the required testing and inspection of the pavement base. Verification of the in place density/compaction of the open graded base materials is typically not possible with the use of a nuclear densometer due to nature of these materials. Therefore other means to verify these materials are firm and unyielding (such as observation of the compaction process by a geotechnical engineer) are necessary.

DESIGNER NOTE: Consider requiring the Contractor to compact aggregates without crushing them.

3.03 PAVERS AND JOINT/OPENING FILL MATERIAL

A. Lay the unit pavers in the pattern(s) and joint widths shown on the Plans. Maintain straight pattern lines.

B. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.

C. Cut pavers and place along the edges with a double-bladed splitter or masonry saw.

D. Fill all openings and joints with joint filler aggregate conforming to Section 2.02.

E. Remove excess aggregate on the surface by sweeping pavers clean.

F. Compact and seat the pavers into the bedding material using a low-amplitude, 75 to 90 Hz plate compactor capable of at least 5,000 lbf (22 kN). This will require at least two passes with the plate compactor.

G. Do not compact within 6 feet (2 m) of the unrestrained edges of unit pavers.

H. Apply additional joint filler aggregate to the openings and joints if needed, filling them completely. Remove excess aggregate by sweeping, then compact the pavers. This will require at least two passes with the plate compactor.

I. All pavers within 6 feet (2 m) of the laying face must be left fully compacted and joints must be filled at the completion of each working day.

J. Compacted unit pavers shall meet the acceptance criteria set forth in Section 1.05.C.

3.04 PROTECTION OF PAVEMENT

A. Pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the pavers/joints, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

B. Paver installation (Sub) Contractor shall return to the site after 6 months from the completion of the Work and provide the following as needed to fully meet the specifications described herein: fill paver joints with stones, replace broken or cracked pavers, and re-level settled pavers to initial elevations. **Any additional work shall be considered part of the original bid price and with no additional compensation.**

3.05 REJECTION

A. Pavers that do not meet the acceptance criteria set forth in Section 1.05.C will be rejected by the Engineer on a lot by lot basis. Permeable/porous unit pavers that have been rejected by the Engineer or the Contractor shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

ATTACHMENT 2

Stormwater Trash Control Measures Cost Benefit Evaluation

Stormwater Trash Control Measures Cost-Benefit Evaluation

Areas Draining to Lake Chabot and Dalwigk

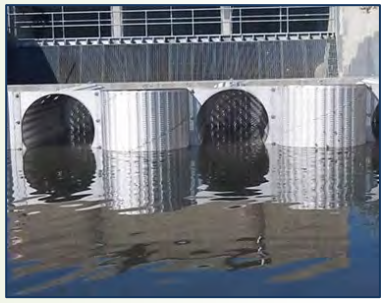

Technical Memorandum

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September 2020

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APPENDIX A – EXAMPLES OF TRASH SOURCES BY LAND USE

APPENDIX B - POTENTIAL LARGE FULL CAPTURE SITE LOCATIONS

List of Abbreviations

BASMAA	Bay Area Stormwater Management Agencies Association
BIDs	Business Improvement Districts
Caltrans	California Department of Transportation
CPSs	Connector Pipe Screens
FY	Fiscal Year
GIS	Geographic Information System
GSRD	Gross Solids Removal Systems
HDS	Hydrodynamic Separator
MRP	Municipal Regional NPDES Permit for Stormwater
NPDES	National Pollutant Discharge Elimination System
NSBB/DSBB	Nutrient Separating Baffle Boxes
O&M	Operation and Maintenance
OVTAs	On-Land Visual Assessments
ROW	Public Right-of-Way
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
TMAs	Trash Management Areas

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1. Introduction

1.1 Purpose

This report summarizes the results of an evaluation conducted to identify the feasibility (costs and benefits) of implementing additional stormwater control measures to address trash from land areas draining to Lake Chabot and Lake Dalwigk (Vallejo, CA) via the Municipal Separate Storm Sewer System (MS4).

1.2 Background

The Vallejo Flood and Wastewater District (District) and the City of Vallejo (City) are mandated by the Municipal Regional Stormwater NPDES Permit for Phase I communities (Order R2-2015-0049), also known as the Municipal Regional Permit (MRP), and a Cease and Desist Order (CDO) issued to the District and the City of Vallejo (City) by the San Francisco Bay Regional Water Quality Control Board (Water Board), to significantly reduce the levels of trash in stormwater discharges from their Municipal Separate Storm Sewer Systems (MS4s) over specific timeframes. The MRP requires the District and City to reduce trash discharges by 70% no later than July 1, 2017, and by 80% no later than July 1, 2019. The CDO was issued by the Water Board because the compliance timeframes included in the MRP were not achieved.

To comply with the MRP and CDO trash reduction mandates, the District is currently constructing trash full capture systems downstream of Lake Chabot and Lake Dalwigk[1], and between the lakes and the receiving waters of the bay. The systems being installed were selected from the Water Board's published list of full capture systems. Construction of these systems is anticipated to be completed by the end of 2020. Once operational, these systems will provide the City and District with an estimated 37% trash reduction. Because the locations of the trash full capture systems are downstream of the lakes and open channels upstream of the lakes, Water Board staff are concerned that trash generated from land areas that drain to the lakes via the MS4 could impact the lakes before reaching the new full capture systems. In response, the District and City agreed to evaluate the feasibility of implementing other trash control measures to address trash from these land areas.

This memorandum summarizes the results of the feasibility evaluation conducted by the City and the District, in response to Water Board staff's concerns. The evaluation includes the identification of trash sources in these land areas, and an analysis of the costs, benefits and feasibility of implementing additional trash controls to address trash within land areas directly upstream of the lakes that are generating moderate, high or very high levels of trash. Once the results of the feasibility evaluation are reviewed by Water Board staff, District and City staff plan to meet with Water Board staff to discuss the results and potential additional trash controls that could occur within these areas. Based on the outcomes of the discussion with Water Board staff, any new implementation actions agreed to by the District and/or City will be included in their updated Long-Term Trash Control Measures Plan with an associated implementation schedule. Implementation of these additional actions would provide assurance to the District and City that the full capture systems installed downstream of the lakes would be deemed sufficient to demonstrate 100% trash load reduction from the land areas upstream of the systems.

[1] These lakes are engineered impoundments constructed primarily for flood control.

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1.3 Areas of Interest

Existing storm drain catchment data developed as part of the *Trash Full Capture Feasibility Evaluation* conducted by the District (EOA 2018) were used to define the areas of interest for the trash control measures feasibility evaluation. The areas of interest are defined as the land areas draining to the two lakes that are not already addressed by existing trash full capture systems.[2] Three areas were identified for the area upstream of Lake Chabot (Figure 1) and four areas were identified for the area upstream of Lake Dalwigk (Figure 2). All areas were defined by hydrologic boundaries with the exception of Area 2 – Lake Chabot.[3]

A total of 4,027 acres of land area are within the seven areas of interest. Moderate and high trash generation areas, which are the only land areas of interest in this study, comprise roughly 29% (1,164 acres) of this area. Based on Vallejo baseline trash generation map, these land areas generate an estimated 17,000 gallons of trash each year that is transported to the Vallejo MS4.

Land uses for these trash generating areas were identified using existing Geographic Information System (GIS) data. A total of four (4) land use classes (i.e., residential, commercial, industrial, and open space) were used to classify the areas within each of the seven areas of interest (Table 1). All other land uses within these areas were not considered in this study,

Table 1. Land uses and trash generation associated with areas upstream of Lake Chabot and Lake Dalwigk that are not currently addressed by trash full capture systems.

Land Use Category	Areas Upstream of Lake Chabot (acres)			Areas Upstream of Lake Dalwigk (acres)				Totals (acres or gallons)
	Fairgrounds Drive (1)	Lake Chabot (2)	Blue Rock Springs (3)	Lake Dalwigk (4)	Lemon St Channel (5)	Lincoln Rd & San Luis Dr (6)	Atherton St & 6th St (7)	
Residential	150	57	52	43	94	141	129	**666**
Commercial	67	244	46	16	16	1	34	**425**
Industrial	--	--	--	30	--	--	--	**30**
Open Space	8	4	4	7	6	--	14	**42**
Totals	**225**	**305**	**102**	**96**	**116**	**142**	**177**	**1164**
Baseline Trash Generation (gallons/yr)	*4,273*	*2,308*	*2,705*	*2,046*	*1,277*	*1,064*	*3,295*	*16,968*

[2] Approximately 1,670 acres of area upstream of Lake Chabot are currently addressed by existing full capture devices and were therefore not included in the areas of interest.

[3] The Lake Chabot area (Area 2) was based on topography due to the absence of municipally owned storm drain systems. Thus, it consists of all areas not included in the other two areas upstream of the lake.

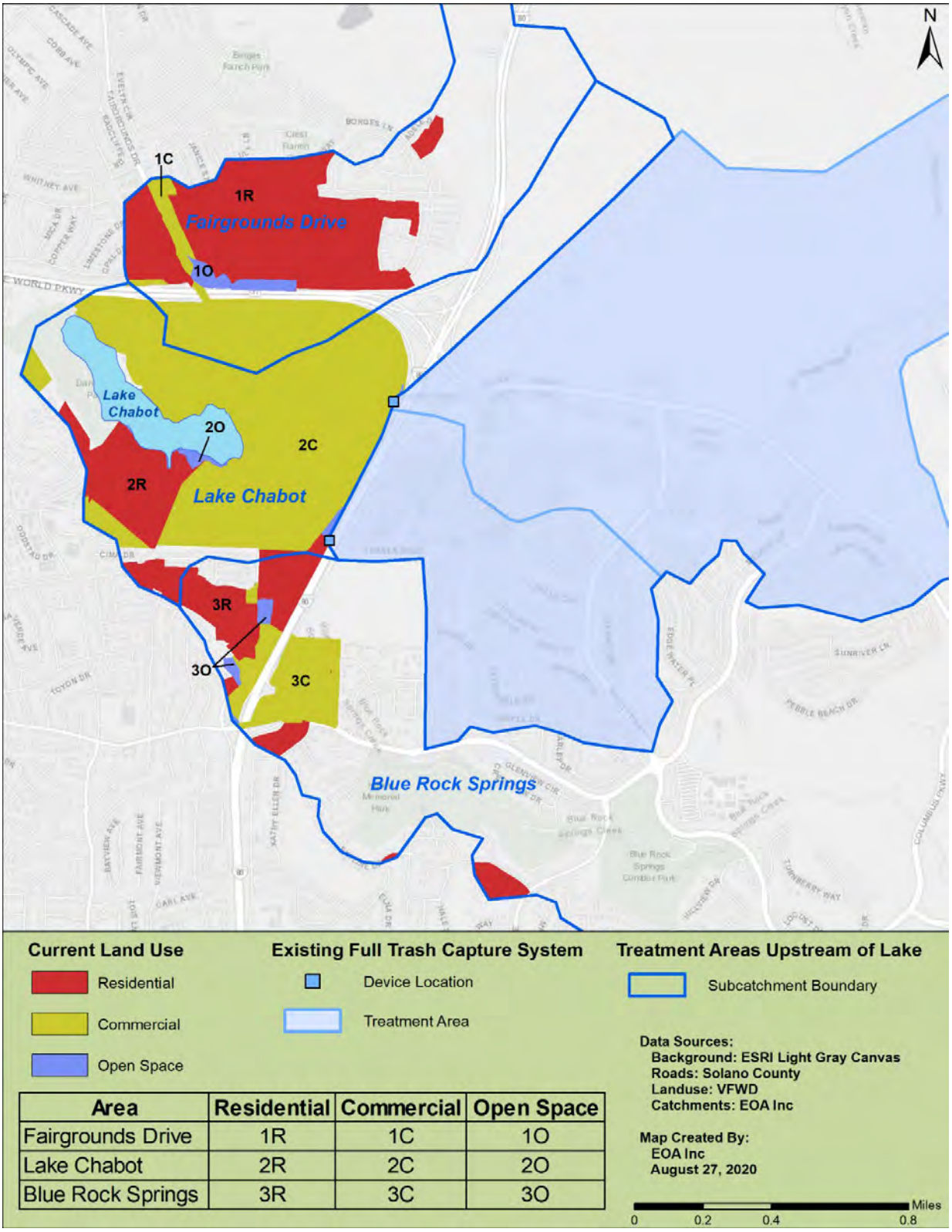

Area	Residential	Commercial	Open Space
Fairgrounds Drive	1R	1C	1O
Lake Chabot	2R	2C	2O
Blue Rock Springs	3R	3C	3O

Figure 1. Land uses for trash generating areas that are within the three land areas (Fairgrounds Drive, Lake Chabot, and Blue Rock Springs) draining to Lake Chabot. Note – only areas with moderate, high or very high trash generation are included on the map.

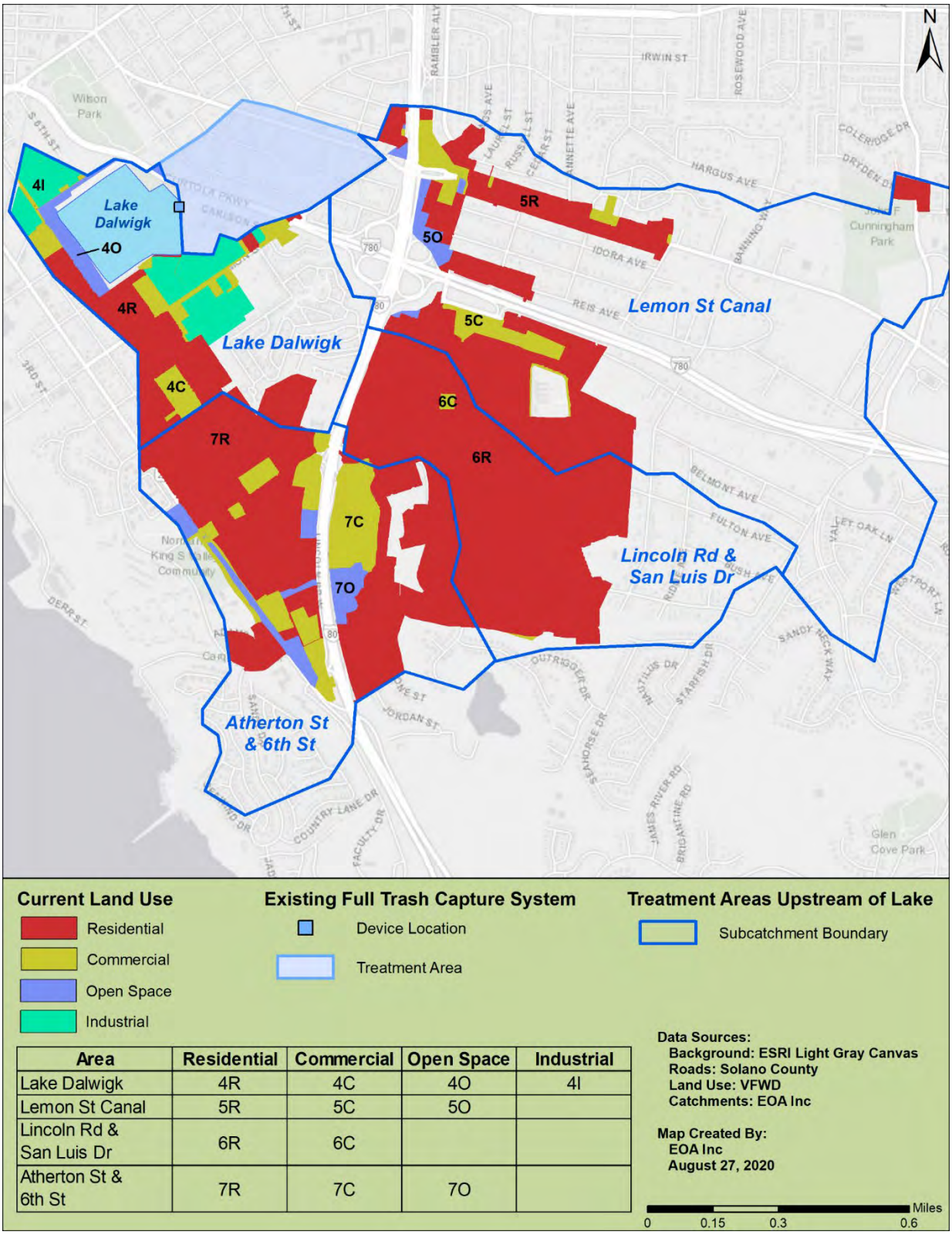

Area	Residential	Commercial	Open Space	Industrial
Lake Dalwigk	4R	4C	4O	4I
Lemon St Canal	5R	5C	5O	
Lincoln Rd & San Luis Dr	6R	6C		
Atherton St & 6th St	7R	7C	7O	

Figure 2: Land uses for trash generating areas that are within the four land areas (Lake Dalwigk, Lemon St Channel, Lincoln Rd & San Luis Dr, and Atherton St & 6th St) draining to Lake Dalwigk. Note – only areas with moderate, high or very high trash generation are included on the map.

1.4 Baseline and Current Levels of Trash Generation

Baseline trash generation for the seven land areas upstream of the two lakes are depicted on the Vallejo baseline trash generation map, which represents the levels of trash generated in 2009 (baseline year). Table 2 summarizes the extent area in each of the seven areas that generated moderate, high or very high levels of trash in 2009. The estimated levels of trash generated in each area and the associated baseline trash generation category are also presented.

Table 2. Baseline trash generation for each area upstream of Lake Chabot and Lake Dalwigk.

Land Use Category	Areas Upstream of Lake Chabot			Areas Upstream of Lake Dalwigk			
	Fairgrounds Drive (1)	Lake Chabot (2)	Blue Rock Springs (3)	Lake Dalwigk (4)	Lemon St Channel (5)	Lincoln Rd & San Luis Dr (6)	Atherton St & 6th St (7)
Moderate, High and Very High Trash Generating Area (acres)	225	305	102	96	116	142	177
Baseline Trash Generation (gallons/yr)	4,273	2,308	2,705	2,046	1,277	1,064	3,295
Trash Generation Rate (gallons/acres -yr)	19.0	7.6	26.5	21.3	11.0	7.5	18.6
Baseline Trash Generation Category	High	Moderate	High	High	Moderate/High	Moderate	High

Since 2017, the City and District have conducted On-land Visual Trash Assessments (OVTAs) to identify the current levels of trash in Vallejo, and through by comparing to baseline levels, demonstrate trash reductions to the MS4 over time in areas where trash controls other than trash full capture systems have been implemented. Currently, 87 sites are assessed at an average frequency of three times each year in Vallejo. Of these 87 sites, 17 are located in the seven areas upstream of the two lakes. Table 3 provides a summary of the current level of trash in each of the seven areas based on the most recent results of OVTAs (July 2018 – July 2020) conducted at these 17 sites. A comparison to baseline levels summarized in Table 2 is also provided. Based on the comparison illustrated in Table 3, it appears that the trash levels in nearly all of the areas upstream of the two lakes have decreased substantially since 2009.

Table 3. Current levels of trash generation as observed at OVTA sites located in each area upstream of Lake Chabot and Lake Dalwigk.

Lake	Area ID	# OVTA Sites	# OVTAs (July 2018 - July - 2020)	Trash Generation Category		Improvement Trend
				Baseline	Current	
Chabot	1	3	12	High	Moderate	↗
	2	1	5	Moderate	Moderate	→
	3	3	10	High	Moderate	↗
Dalwigk	4	2	10	High	Moderate	↗
	5	3	16	Moderate/High	Moderate	↗
	6	2	10	Moderate	Moderate	→
	7	3	15	High	Moderate	↗

2. Trash Source Evaluation

As a first step to conducting the control measure feasibility evaluation, current trash levels and sources were identified within the areas of interest. The results of this task were intended to support the identification of areas where trash levels have not significantly improved and the applicable trash control measures that could be considered as part of the feasibility evaluation, based on the sources of trash observed. Current trash levels and sources were identified for each of the seven areas of interest using a variety of information sources, including:

- On-land Visual Trash Assessment (OVTA) Data – Trash sources were identified during OVTAs conducted during recent fiscal years. Data from these assessments were compiled and evaluated.
- Interviews with City and District Staff – Interviews with City and District staff were conducted to determine known locations of the following trash sources:
    - Illegal Dumping
    - Private Trash Bin/Container Overages
    - Homeless Encampment
    - Pedestrian/Vehicle Litter
- Field Reconnaissance - Additional field inspections were conducted to identify current trash levels and confirm trash sources identified by City and District staff in specific areas.
- Google Street View – Current trash generation levels were also identified through Google street view in comparison to the Vallejo baseline trash generation map as guidance.

2.1 Observed Trash Sources by Land Use Class and Area of Interest

The results of the trash source identification task are included in this section. Results are organized by the four major land use classes. The area(s) of interest where each source was identified are described under each land use class. Photos of trash sources observed in each land use class are included in Appendix A. Table 4 summarizes trash sources that were observed in the areas draining to Lake Chabot, and Table 5 summarizes trash sources for areas draining to Lake Dalwigk.

Residential Areas

- Multiple residential areas in the City continue to generate moderate or high levels of trash.
- Field inspections of these areas show signs of pedestrian and vehicle litter on residential roadways throughout all seven areas of interest.
- Overflowing trash bins/container on properties associated with multi-family residential land uses were observed as trash sources in the Lemon Street Canal area (5R).

Commercial Areas

- Commercial areas throughout the City generate moderate or high levels of trash. Trash in these areas is generally associated with single-use packaging associated with goods sold/distributed in these areas.
- Field inspections of commercial subareas 2C, 3C, 4C and 7C show litter from pedestrians as an important source.
- Illegal dumping was observed as a source of trash in subareas 1C-4C and 7C.
- Overflowing trash bins/containers were observed as sources of trash in subareas 1C, 4C and 5C.
- Field inspections also revealed homeless encampments as a source of trash in subareas 1-3C and 7C.

Open Space Areas

- A handful open spaces (i.e. parks, empty or vacant lots) were identified as having moderate or high trash levels in the City. These areas are characterized mainly by litter from pedestrians, illegal dumping, and homeless encampments.
- Open spaces included in subarea 1O, 5O and 7O contain litter from pedestrians.
- Field inspections of subareas 1-4O show signs of illegal dumping and homeless encampments. Illegal dumping was also observed in subarea 7O.

Industrial Areas

- Only one industrial area in the City was identified as continuing to generate moderate or high levels of trash. This industrial subarea, 4I, is adjacent to an open space area near Lake Dalwigk.
- Field inspections of this area show that trash generation is mostly from pedestrian and vehicle litter.

Tables 6 and 7 identifies potential trash control measures that could be implemented to address trash sources that were observed in the areas draining to Lake Chabot and Lake Dalwigk, respectively.
An evaluation for each of these controls is provided in Section 3.

Table 4. Trash sources identified in each area of interest draining to Lake Chabot.

Area of Interest	Land Use	Map ID	Sources Identification Method			Trash Sources Observed			
			OVTAs	Interviews w/ City and District Staff	Field Reconnaissance	Pedestrian or Vehicle Litter	Illegal Dumping	Homeless Encampments	Improper Bin Management
Fairgrounds Drive (1)	Residential	1-R	X	X	X	X			
	Commercial	1-C			X		X	X	X
	Open Space	1-O	X		X	X	X	X	
Lake Chabot (2)	Residential	2-R	X	X	X	X	X		
	Commercial	2-C	X	X	X	X	X	X	
	Open Space	2-O	X	X	X		X	X	
Blue Rock Springs (3)	Residential	3-R	X	X	X	X			
	Commercial	3-C	X	X	X	X	X	X	X
	Open Space	3-O	X	X	X		X	X	

Table 5. Trash sources identified in each area of interest draining to Lake Dalwigk.

Area of Interest	Land Use	Map ID	Sources Identification Method			Trash Sources Observed			
			OVTAs	Interviews w/ City and District Staff	Field Reconnaissance	Pedestrian or Vehicle Litter	Illegal Dumping	Homeless Encampments	Improper Bin Management
Lake Dalwigk (4)	Residential	4-R	X	X	X	X			
	Commercial	4-C	X	X	X	X	X		
	Industrial	4-I	X	X	X	X			
	Open Space	4-O	X	X	X		X	X	
Lemon St Channel(5)	Residential	5-R	X		X	X			X
	Commercial	5-C	X		X	X			X
	Open Space	5-O	X	X	X	X			
Lincoln Rd & San Luis Dr (6)	Residential	6-R	X	X	X	X			
	Commercial	6-C	X		X	X			
Atherton St & 6th St (7)	Residential	7-R	X	X	X	X			
	Commercial	7-C	X	X	X	X	X	X	
	Open Space	7-O		X	X	X	X		

Table 6. Potential control measures identified for each area of interest and land use combination draining to Lake Chabot.

Area of Interest	Land Use	Map ID	Primary Trash Sources Observed	Large Full Capture	Small Full Capture	Curb Inlet Screens & Enhanced Street Sweeping	Enhanced Business Inspections
Fairgrounds Drive (1)	Residential	1-R	• Pedestrian/Vehicle Litter on Streets/Sidewalks	X	X	X	
	Commercial	1-C	• Improper Bin Management on Private Properties • Illegal Dumping • Homeless Encampments	X	X	X	X
	Open Space	1-O	• Illegal Dumping • Homeless Encampments • Pedestrian/Vehicle Litter on Streets/Sidewalks	X	X	X	
Lake Chabot (2)	Residential	2-R	• Pedestrian Litter on Streets/Sidewalks		X	X	
	Commercial	2-C	• Pedestrian Litter on Streets/Sidewalks • Illegal Dumping • Homeless Encampments		X	X	X
	Open Space	2-O	• Illegal Dumping • Homeless Encampments		X	X	
Blue Rock Springs (3)	Residential	3-R	• Pedestrian Litter on Streets/Sidewalks	X	X	X	
	Commercial	3-C	• Improper Bin Management on Private Properties • Pedestrian Litter on Streets/Sidewalks • Illegal Dumping • Homeless Encampments	X	X	X	X
	Open Space	3-O	• Illegal Dumping • Homeless Encampments	X	X	X	

Table 7. Potential control measures identified for each area of interest and land use combination draining to Lake Dalwigk.

Area of Interest	Land Use	Map ID	Primary Trash Sources Observed	Large Full Capture	Small Full Capture	Curb Inlet Screens & Enhanced Street Sweeping	Enhanced Business Inspections
Lake Dalwigk (4)	Residential	4-R	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
	Commercial	4-C	• Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	X
	Industrial	4-I	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	X
	Open Space	4-O	• Illegal Dumping • Homeless Encampments		X	X	
Lemon St Channel (5)	Residential	5-R	• Improper Bin Management on Private Properties • Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	X
	Commercial	5-C	• Improper Bin Management on Private Properties • Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	X
	Open Space	5-O	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
Lincoln Rd & San Luis Dr (6)	Residential	6-R	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
	Commercial	6-C	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	X
Atherton St & 6th St (7)	Residential	7-R	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
	Commercial	7-C	• Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping • Homeless Encampments		X	X	X
	Open Space	7-O	• Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	

3. New or Enhanced Trash Control Measures Evaluated

Below is a summary of the different types of potential trash control measures that were included in the feasibility evaluation. These controls were identified based on the current understanding of trash levels and sources as described in Section 2, the demonstrated effectiveness of specific types of controls, and the configuration of the Vallejo MS4, relative to the Lake Chabot and Lake Dalwigk. An explanation for why some types of trash control measures were not evaluated is provided at the end of this section.

3.1 Trash Full Capture Systems

Large Full Capture Systems

Large full trash capture systems are devices that can treat an entire stormwater catchment area (including storm drains on private property) and provide a single location for maintenance, saving operation and maintenance costs over time. Two disadvantages of large systems are the relatively high capital and construction costs, which require a large initial funding source, and the higher instance of subsurface utility conflicts at desired locations within highly urbanized areas.

There are three types of large full capture systems currently installed in the Bay Area - hydrodynamic separators, gross solids removal systems, and netting systems. Among many factors, the selection of large systems for reducing trash depends on the characteristics of the specific location, the potential for hydraulic impacts, the extent of environmental permitting, and the resulting trash load reduction that will occur via the system. The State Water Resources Control Board publishes a list of certified full capture systems which can be implemented by MS4 municipalities.

Small Full Capture Systems

Small trash full capture devices are alternatives to large trash full capture devices. Screening systems that are installed in stormwater catch basins (or inlets) are commonly known as catch basin inserts (CBIs). CBIs are placed inside a catch basin to prevent trash, organic material (e.g. leaves and twigs) and sediment from entering the storm drain outflow pipe within the catch basin. There are two general designs of CBIs, inlet inserts, and outlet inserts. Inlet inserts are placed inside the inlet, while outlet inserts are placed in front of the outlet pipe. A wide variety of CBI designs exist, mostly in the form of outlet inserts (e.g., connector pipe screens) that are placed in front of the outlet pipe. CBIs that use filtering walls or filter media are not applicable for trapping trash and do not meet the full trash capture standard. As a result, the term “insert” does not refer to configurations that use filter media for removing other stormwater pollutants. The State Water Resources Control Board publishes a list of certified full capture systems which can be implemented by MS4 municipalities.

3.2 Other Types of Trash Control Measures

Enhanced Municipal Trash Inspection Program

Based on source investigations conducted as part of this project, trash associated with private properties draining to storm drain inlets located on private property, remain important sources of trash in the City. To address this source, some municipalities in the Bay Area have successfully instituted a Trash Inspection Program that entails the periodic assessment of trash levels on properties of interest by City staff, and if

levels are above an "A" OVTA score, then requiring the property owners/managers to institute control measures that achieve this trash reduction goal.

Curb Inlet Screens and Enhanced Street Sweeping

Curb inlet screens are treatment devices that block trash from entering a catch basin/inlet. These devices can benefit stormwater, however, they have not been well studied and are not certified/approved as trash full capture systems by the San Francisco Bay Regional Water Board or the State Water Resources Control Board as full capture systems. Curb-inlet screens may be retractable or fixed in place, and generally have a perforated screen or evenly spaced bars that are designed to fit outside of, or immediately within the storm drain curb opening. Retractable screens open either manually or hydraulically when a stormwater runoff applies enough force on the screen. Since curb-inlet screens block trash and debris from entering the storm drain inlet or storm drain, trash remains in the street and is removed by regular street sweeping or other measures.

Public agencies and private landowners conduct street sweeping to remove litter from streets and parking lots and reduce sediment buildup on impervious surfaces. Street sweeping studies have shown that under ideal conditions (i.e., slow operator speeds, good condition of the roadway surface, and minimal/no automobiles parked along curb) a street sweeper can remove nearly all litter from the swept area. However, sweeping will not remove trash from sidewalks or roadside vegetation where trash is often observed and may be transported to the MS4 via wind or stormwater runoff. Although the City already conducts sweeping on many roadways, more frequent sweeping or improved sweeping conditions (e.g., removal of parked cars along the curb) may reduce the amount of trash observed on streets, possibly to a level of low trash generation.

Based on previous reviews of the literature on street sweeping effectiveness and recent studies conducted in the Bay Area (BASMAA 2017; SCVURPPP and Oakland, in preparation), it is estimated that a successful street sweeping program can reduce the level of trash on streets by roughly one OVTA score (e.g., "B" score to "A" score) if implemented effectively.

3.3 Trash Control Measures Not Evaluated

The following trash control measures were not included in the feasibility evaluation because they are either already implemented at a very high level, technically infeasible, or do not have predictable outcomes that are conducive for a cost benefit evaluation. Each of these controls is described below.

On-land Cleanups and Illegal Dumping Abatement

The District and City are currently implementing a number of trash control measures to address illegal dumping and trash accumulation associated with illegal encampments that will likely address the trash sources documented for this report. The City currently has four full-time staff dedicated to on-land trash cleanups that result in the removal of millions of pounds of trash each year. In FY 19-20, Vallejo Permittees picked up and disposed of 550 tons of illegally dumped material, much of which was related to homeless encampments near waterways and illegal dumping in areas upstream of the two lakes. Due to their transient nature, homeless encampments are challenging to manage and the costs of physical structures to prevent the establishment of encampments are prohibitive to implementing at a large scale.

In addition to on-land cleanups, the District and City conduct quarterly removal of trash around the perimeter of Lake Chabot and Lake Dalwigk (see Table 8), and annually at trash hot spots in channels upstream of the two lakes. Trash cleanup events are coordinated between the Vallejo Permittees and, to the extent possible, the Vallejo Watershed Alliance, Greater Vallejo Recreation District, Caltrans, Vallejo

City Unified School District, California Maritime Academy, Six Flags Discovery Kingdom, Vallejo Chamber of Commerce, Friends of Lake Chabot, Solano Sierra Club, and the Solano Resource Conservation District.

Table 8. Volumes of trash removed from Lake Chabot and Lake Dalwigk in FY 2019-20.

Water Body	Trash Volume (CY) Removed					Total Gallons
	Q1	Q2	Q3	Q4	Total	
Lake Dalwigk	1	0.5	0.5	1.75	3.75	758
Lake Chabot	1	0.5	0.5	2	4	808
Totals	**2**	**1**	**1**	**3.75**	**7.75**	**1,566**

Trash Booms

Previous evaluations of trash booms as potential trash control measure in City of Vallejo indicate that the installation and maintenance of trash booms located in Lake Chabot and Lake Dalwigk is infeasible. For Lake Chabot, infeasibility is due to lack of access to locations where booms could be installed and serviced, including confluences with major storm drain outfalls and channels, which would be primarily through privately owned lands (e.g., Six Flags Discovery Kingdom). For Lake Dalwigk, there do not appear to be any feasible locations for trash booms due to shallow channel dimensions and low flow conditions within Lemon Street Canal, the main tributary to the lake. Due to the infeasibility of installing trash booms, this control measure was not further evaluated.

Public Education and Outreach

Education and outreach programs are designed to raise citizen awareness about the impacts of littering or illegal dumping, and teach citizens how to change their behavior accordingly. Programs usually include a mixture of anti-littering advocacy, reinforced with the development of classroom curricula, storm drain signage and volunteer cleanups. Expansion of the community outreach and education program could benefit overall trash load reduction by promoting litter prevention initiatives. However, it is very difficult to estimate the percentage reduction that the Vallejo Permittees may achieve through implementing an enhanced City-wide public education and outreach program. Due to the inability to assign a quantitative trash reduction benefit to public education programs, the control measure was not further evaluated.

4. Potential New or Enhanced Trash Control Measures

This section describes each potential new or enhanced trash control measure that was evaluated as part of this feasibility study. The extent to which Vallejo Permittees have implemented the control measure to-date, the potential new or enhanced implementation of the control measure in the future, the estimated trash reduction benefits of existing and potential new/enhanced implementation, and the estimated costs of implementing the new or enhanced control measure (as described) are summarized in this section. Please note the following:

- The trash reduction benefits associated with potential new/enhanced controls that are summarized in this section should be considered preliminary estimates, as they are based on a combination of the Vallejo Permittees baseline trash generation map, the geographical extent of existing and potential trash full capture systems implemented, and best professional judgement based on the current understanding of the effectiveness of each control measure.

- Cost estimates included in this section should be considered preliminary planning-level estimates and may not include all costs associated with the design, planning, purchase, construction/installation, implementation, and operation and maintenance associated with the control measure. Assumptions associated with estimating the costs for each control measure are included.
- Costs estimates presented are based on the most readily available information at the time that this evaluation was conducted, including staffing rates (fully burdened) that were provided by the Vallejo Permittees. Comparisons of base/initial costs (e.g., design, planning, purchasing, and constructing/installing), annual ongoing costs (e.g., implementation and O&M and replacement for full capture systems), and 10-year costs were developed using this information to assist the Vallejo Permittees in evaluating the most cost-effective approaches to achieving mandated trash load reductions. More detailed cost estimates will likely be needed should the Permittees decide to move forward with the implementation of one or more of the control measures evaluated.

4.1 Publicly-Owned Large Full Capture Systems

Existing Large Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

In 2012, the District installed seven NetTech™ full capture systems treating 1,670 acres in the drainage area upstream of Lake Chabot and Lake Dalwigk. In October 2020, the District is planning to construct three new full capture systems (netting systems) downstream of both Lake Chabot and Lake Dalwigk. Together, these ten large full capture systems will treat 7,992 acres within the City, which will account for roughly a 44% trash load reduction.

Potential Additional Large Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

A Trash Capture Feasibility Study was conducted by the District in 2018 to identify potential locations and types of large and small full capture devices that could be installed to achieve the reduction requirements in the MRP (EOA 2018). The study provides a description of trash full capture devices and locations evaluated, the predicted trash reductions associated with each device and location, and the preliminary cost estimates for design, installation and maintenance of each potential device. The study identified a total of thirty-five catchment and sub-catchment drainage areas within City that could be conceptually be treated with large full capture devices. Five of the thirty-five sites were located in the drainage area upstream of open channels and shorelines of Lake Chabot and Lake Dalwigk.[4] Three of the sites/device types in the Lake Dalwigk drainage area (areas 5-7) were determined to not be feasible due to issues related to low cost-efficiency or channel alteration that would be needed for installation (refer to Table 14 of the Study). For these reasons, these sites were removed from further evaluation in this study. The remaining two potential sites are located in areas 1 and 3 in the Lake Chabot drainage area (Figure 3), and are downstream of open channels. Information on the sub-catchment area, percent area with moderate, high or very high levels of trash generating area, and percent baseline trash level within sub-catchment for these two locations are provided in Table 9.

Additional details regarding this location, type and assumptions associated with the recommend type of large full capture systems are included in Appendix B.

[4] Site VAL_LRG_01_Site_07 was located in lowest section of the Lemon Street Canal and thus, was not included in the evaluation of large full capture sites due to treatment occurring downstream of a receiving water body. The subcatchment area upstream of VAL_LRG_01_Site_07 was evaluated for small full capture sites (see next section)

Table 9. Large full capture system locations in two subcatchment drainage areas upstream of Lake Chabot.

Drainage Area	Area of Interest	Catchment/ Subcatchment Area ID	Treated Area (Acres)	% of Catchment that Generates Moderate, High, or Very High Levels of Trash	Trash Reduction Potential (%)
Lake Chabot	1	Large 6 – Site 6	451	50%	4.2%
	3	Large 6 – Site 3	1,832	5%	2.7%

Cost Estimates

Preliminary planning-level cost estimates associated with the design, installation, and operation of the two potential large trash capture systems identified for areas upstream of Lake Chabot in the are presented in Table 10. The majority of the capital/initial costs associated with the large devices are not the device itself, but with the installation/construction of the device, moving utilities due to conflicts, and permitting. Installation costs for large devices include mobilization and demobilization, traffic control, SWPPP preparation, contractor's markup, excavation, hauling, shoring, backfilling, dewatering, surface replacement, bypass pumping, diversion structure, and connections to the storm drainage system. As a result, the overall costs for designing, purchasing and constructing a large devices usually exceed $1M, not including costs associated with environmental permitting, which would likely be needed for the two devices evaluated.

Estimated on-going/maintenance costs for the two systems included in the feasibility evaluation assume that the devices are maintained by District staff at least two times per year. Newly installed large devices should be cleaned out more often during the first year to determine debris volume (i.e., maintenance frequency) and device performance.

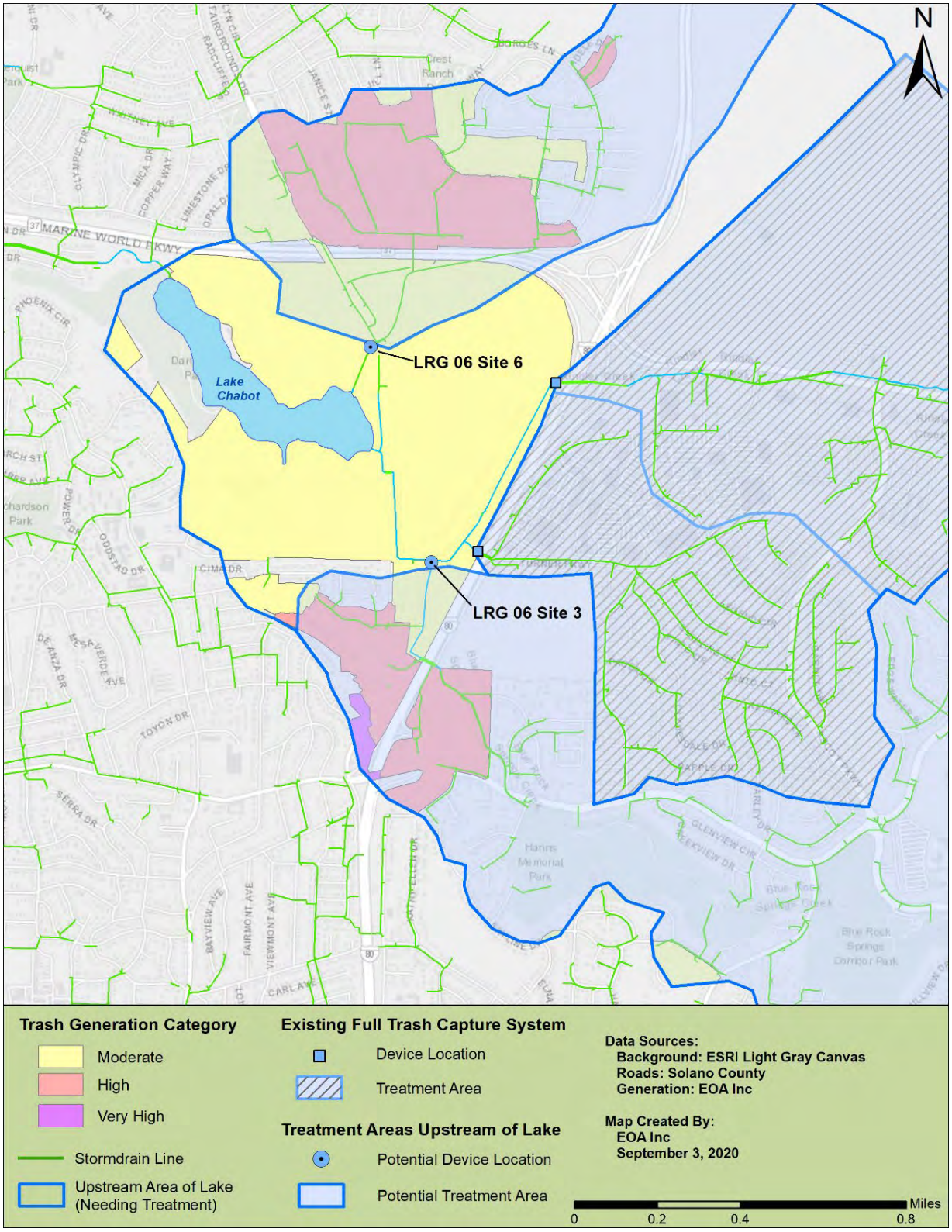

Figure 3. Locations of two potential large full capture systems upstream of Lake Chabot and the associated drainage areas.

Table 10. Preliminary Planning-Level Costs Estimates for the two Large Full Capture Systems.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks[b]				On-going/Annual Tasks			
Task	Geographical Span of Implementation	Assumptions		Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
				Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
Capital costs of system design, installation, construction, and contingency.	The two areas of interest that have a potential site for a full capture system (1,3).	Contractor installs devices, either netting or GSRD. Full capture system in area 1 costs $1,625,780 and area 3 costs $961,610.	NA	--	--	--	$2,587,390	--	--	--	--
District develops concept and releases bid/RFP for a large full capture system location and manages construction contract.		Based on feasibility evaluation, City staff has enough information to develop and release bid package for design/build of the system. City staff assist with design of system. Engineering Supervisor staff time only needed for the first two years (i.e., Base/Initial Tasks). No on-going costs associated with this task.	Engineering Supervisor	390	0.195	$224,359	$43,750	--	--	--	--
			Director of Field Operations	8	0.004	$261,335	$1,045	--	--	--	--
District develops standard operating procedure for maintenance of large system.		Collection System Supervisor with assistance from Collection Systems Technician II develops standard operating procedure for maintenance of large system.	Collection Systems Supervisor	80	0.04	$177,127	$7,085	--	--	--	--
			Collection Systems Technician II	24	0.01	$161,575	$1,616	--	--	--	--
District operates and maintains system		• 2 maintenance events each year • 1 vaccum-assisted truck operator and 3 maintenance staff per maintenance event • 4 hrs per event	Collection Systems Technician II	--	--	--	--	24	0.01	$161,575	$1,616
			Collection Systems Technician II/Vactor Operator (4 staff)	--	--	--	--	32	0.02	$161,575	$3,231
Overhead Costs		Oversight of all tasks above	District Engineer	20	0.01	$315,542	$3,155	20	0.01	$315,541	$3,155
			Totals	**522**	**0.259**	**--**	**$2,600,291**	**76**	**0.04**	**--**	**$7,699**

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.
[b] Costs associated with base/initial tasks do not include costs associated with environmental permitting.

4.2 Publicly-Owned Small Full Capture Systems

Small trash full capture devices (e.g., connector pipe screens or catch basin inserts) are alternatives to large trash full capture devices. Only publicly-owned catch basins receiving trash from moderate, high or very high trash generating areas were included in the analysis. Privately-owned catch basins were not part of the analysis because of issues related to ownership and access for maintenance oversight.

Existing Small Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

There are currently no known small full capture systems installed in stormwater catch basins within the public right-of-way (ROW) located in the areas upstream of the two lakes.

Potential Additional Small Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

As part of this study, a total of 353 publicly owned catch basins that are located within the seven drainage areas upstream of Lake Chabot and Lake Dalwigk were identified as potential locations for small trash full capture devices (Figures 4 and 5). The total number of catch basins and estimated treatment area within each of the seven areas of interest are shown in Table 11. The area that would be treated by is considerably less than subcatchment area since it does not include storm drain systems on privately owned land.

Table 11. Total number of catch basins in the public right-of-way identified for potential small full capture systems and the estimated areas upstream of Lake Chabot and Lake Dalwigk that would be addressed.

Upstream Drainage Area	Area of Interest	Total # Catch Basins in Public ROW	Area Addressed by Catch Basins (acres)	Trash Reduction Potential (%)
Lake Chabot	1	77	182	3.8%
	2	7	22	0.2%
	3	31	57	1.7%
Lake Dalwigk	4	26	43	0.9%
	5	64	105	1.2%
	6	58	132	1.0%
	7	90	162	3.0%
	Totals	**353**	**703**	**11.7%**

Cost Estimates

The preliminary, planning-level cost estimates associated with the design, installation, and operation of the potential 353 small capture full trash capture devices for each of the drainage areas upstream of Lake Chabot and Lake Dalwigk are presented in Table 12.

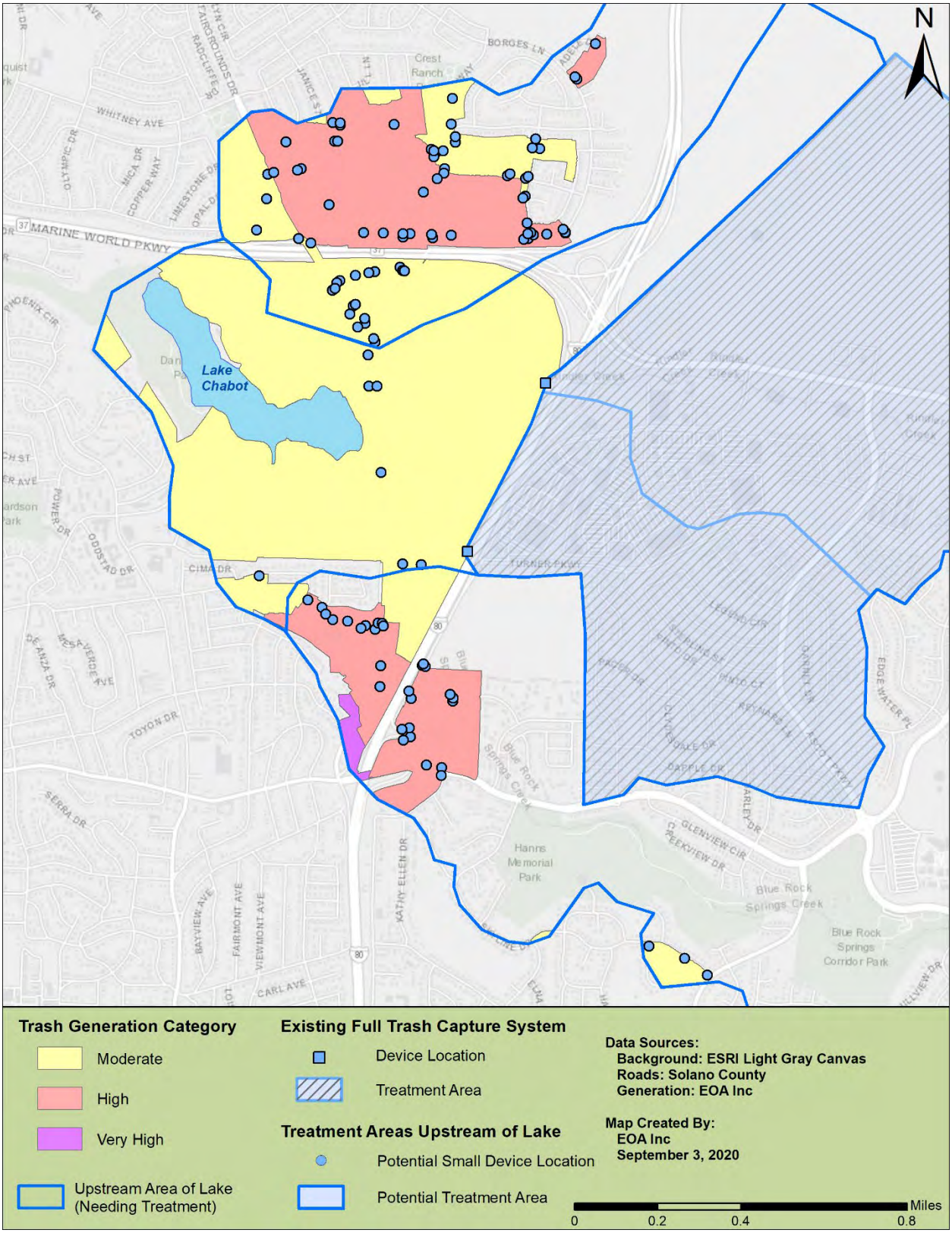

Figure 4. Catch basin locations for potential small full capture devices in drainage areas upstream of Lake Chabot.

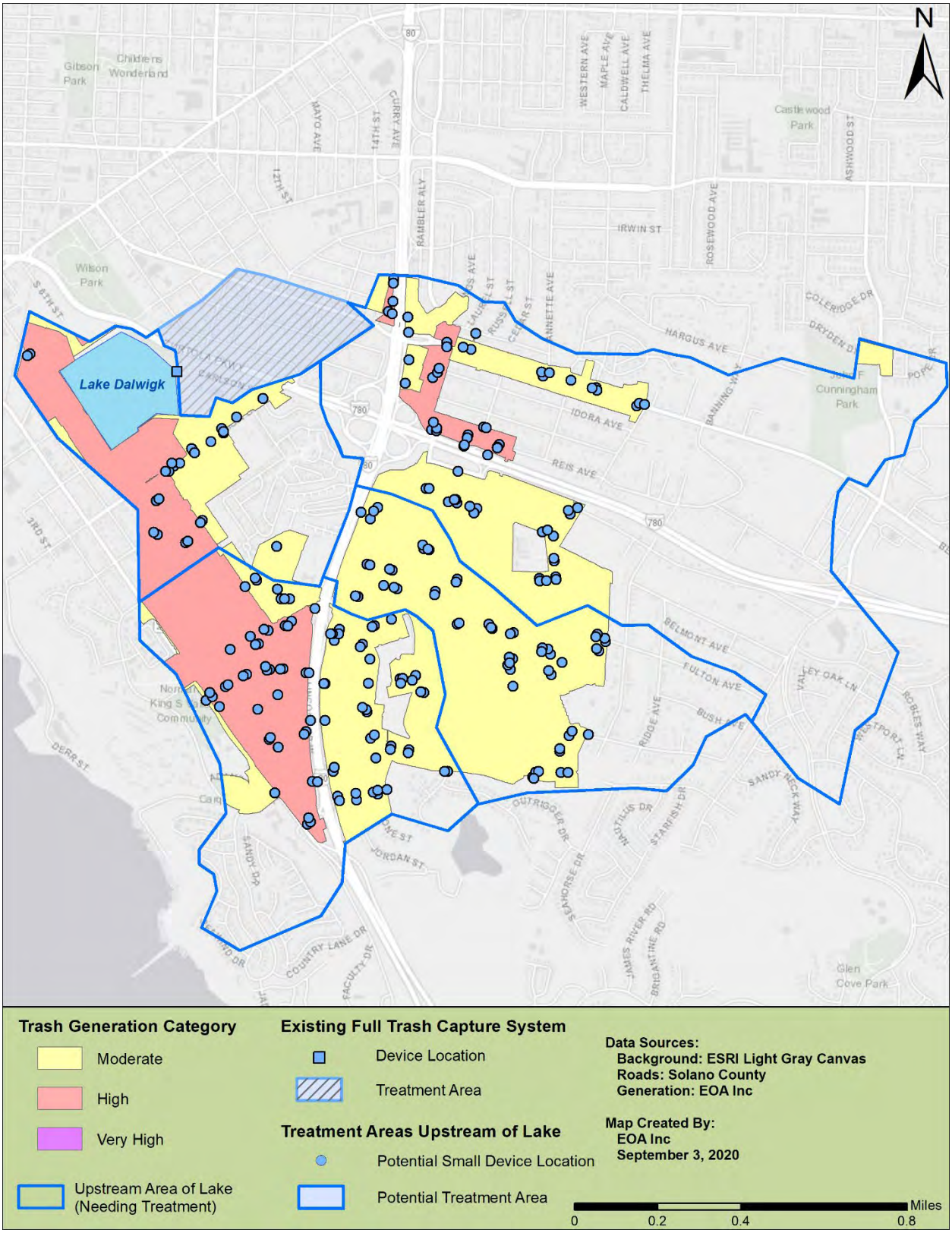

Figure 5. Catch basin locations for potential small full capture devices in drainage areas upstream of Lake Dalwigk.

Table 12. Preliminary Planning-Level Costs Estimates for Small Full Capture Systems in the City of Vallejo.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
				Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
Task	Geographical Span of Implementation	Assumptions		Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
District develops concept and releases bid/RFP for small capture systems	353 public ROW inlets in Moderate and High trash generating areas not treated by full capture systems	All planning tasks conducted by District staff	Engineering Supervisor	500	0.25	$224,359	$56,090	--	--	--	--
			Director of Field Operations	8	0.004	$261,335	$1,045	--	--	--	--
			Collection Systems Supervisor	80	0.04	$177,127	$7,085	--	--	--	--
			Collection Systems Technician II (calculations assume 2 workers)	160	0.08	$161,575	$12,926	--	--	--	--
Capital costs of system, installation, and contingency	353 Public ROW Inlets	• Contractor installs devices. • Capital costs can range from $500 to $2500 per inlet and estimated to be $1,000 per device (see Appendix C). • Replacement of each device 2x during a 50-yr timeframe (i.e., average replacement rate of 14 screens/yr) at $1,000/screen	Materials Costs	--	--	--	$353,000	--	--	--	$14,120
District develops standard operating procedure for maintenance of small capture systems.		Director of Field Operations with assistance from Collection Systems Technician II develops standard operating procedure.	Director of Field Operations	80	0.04	$261,335	$10,453	--	--	--	--
			Collection Systems Technician II	24	0.01	$161,575	$1,616	--	--	--	--
District maintains systems	All public ROW inlets where Small Capture Systems are installed	• 353 locations • 4 maintenance events per year, 0.5 hrs/event • 2 technician workers per maintenance event (1 supervisory technician II, 2 technician II staff)	Collection Systems Technician II	--	--	--	--	706	0.35	$161,575	$57,036
			Collection Systems Technician II (calculations assume 2 workers)	--	--	--	--	1412	0.71	$161,575	$114,071
Overhead Costs	NA	Oversight of all tasks above	District Engineer	20	0.01	$315,542	$3,155	20	0.01	$315,542	$3,155
			Totals	**872**	**0.44**	**--**	**$445,370**	**2138**	**1.07**	**--**	**$190,382**

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.

4.3 Enhanced Municipal Trash Inspection Program

Existing Trash Inspection Program

Stormwater inspections are currently conducted by the District at commercial and industrial facilities, consistent with MRP provision C.4. Approximately 300 pre-treatment/stormwater inspections are conducted throughout the City of Vallejo during a typical year. Based on the proportion of commercial and industrial businesses within the drainage areas upstream of the two lakes, to the total number of businesses within the entire city, it was assumed that pretreatment/stormwater inspections are conducted at approximately 30 commercial/industrial properties each year within the drainage areas upstream of the two lakes.

The City currently inspects these facilities for stormwater compliance on an annual, biannual, or once every five years frequency, based on the business type and potential to contribute pollutants to the City's MS4. Trash management activities are identified and evaluated as part of these stormwater inspections. That said, there are many businesses and other private properties that are not included as part of the existing stormwater inspection program, but still contribute moderate or high levels of trash to the City's MS4.

Potential Expansion of Trash Inspection Program

An enhanced trash inspection program implemented by the City could entail the following to address trash associated with commercial areas upstream of the two lakes:

1. More formally adding an On-Land Visual Trash Assessment (OVTA) component to existing pretreatment/stormwater inspections, and
2. Conducting targeted trash inspections that include OVTAs at additional businesses that are not currently inspected for stormwater compliance and at other private properties that generate moderate or high trash levels.

Enhanced trash inspections conducted as part of pretreatment/stormwater inspections could occur at the frequency that inspections are currently conducted, unless the property inspected achieved an OVTA score of an "A". For those properties where moderate (B) or high (C) OVTA scores were observed, enforcement and follow up inspections would be conducted at a higher frequency until an "A" score is attained. Properties not currently included in the stormwater inspection pool would be inspected once every 5-years, unless the property achieved an OVTA score of an "A". For those properties where moderate (B) or high (C) OVTA scores were observed, enforcement and follow up inspections would be conducted at a higher frequency until an "A" score is attained. If businesses consistently fail to meet an "A" score even after follow-up inspections have taken place, alternative actions will be considered, such as the requirement for the business to install a trash capture system to address trash on their property. The locations of properties where an enhanced municipal trash inspection program could be expanded to are shown in Figures 6 and 7.

The total area for moderate, high and very high trash generating areas for all private parcels in the areas upstream of Lake Chabot and Lake Dalwigk is provided in Table 13. The potential percent trash reduction associated with the inspection program is also provided. The trash reduction potential assumes that the Enhanced Municipal Trash Inspection Program will result in private properties eventually achieving an "A" score over a 10-year timeframe.

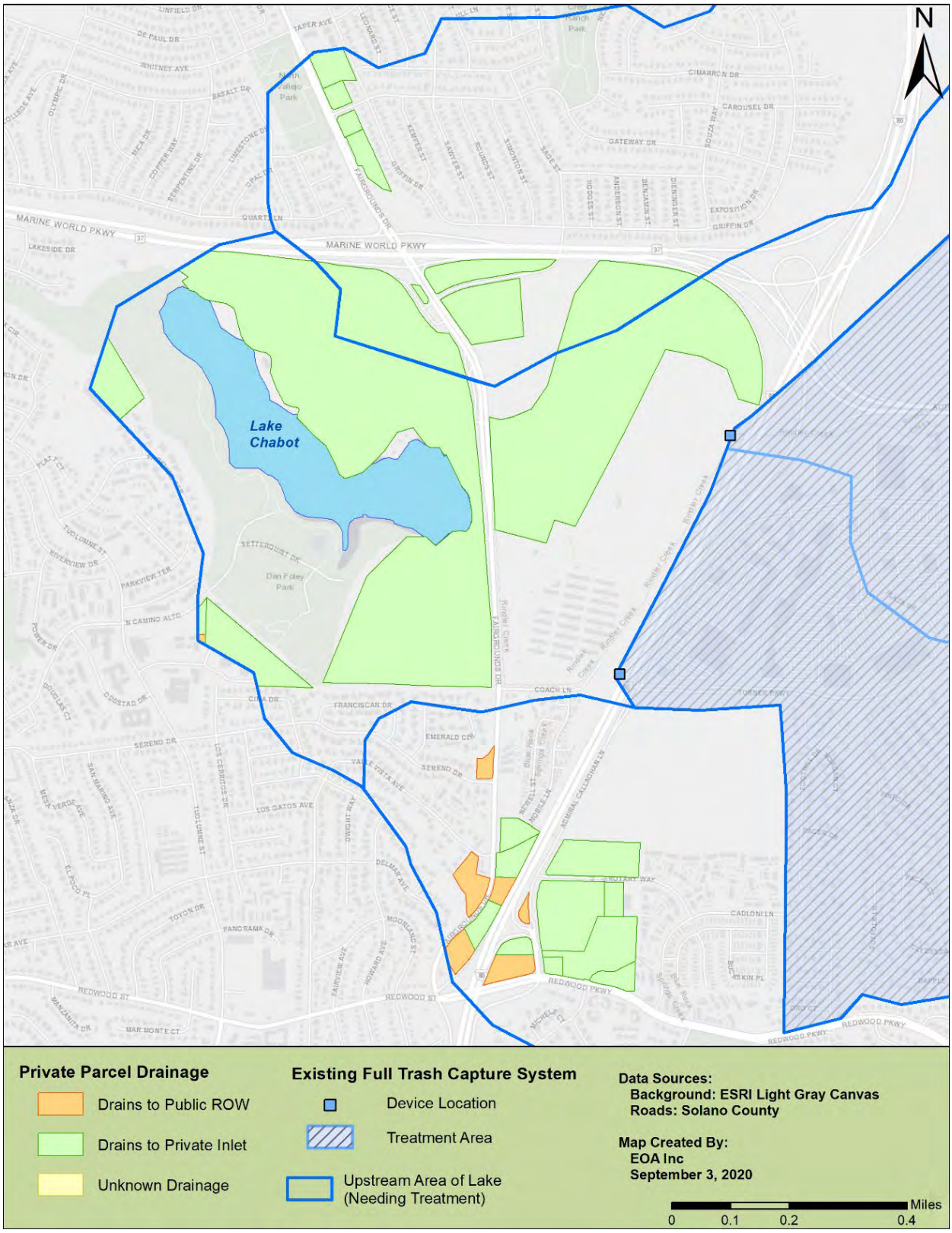

Figure 6. Private properties in the area upstream Lake Chabot that generate moderate or high trash levels and therefore could be included in a new enhanced trash inspection program in the City of Vallejo.

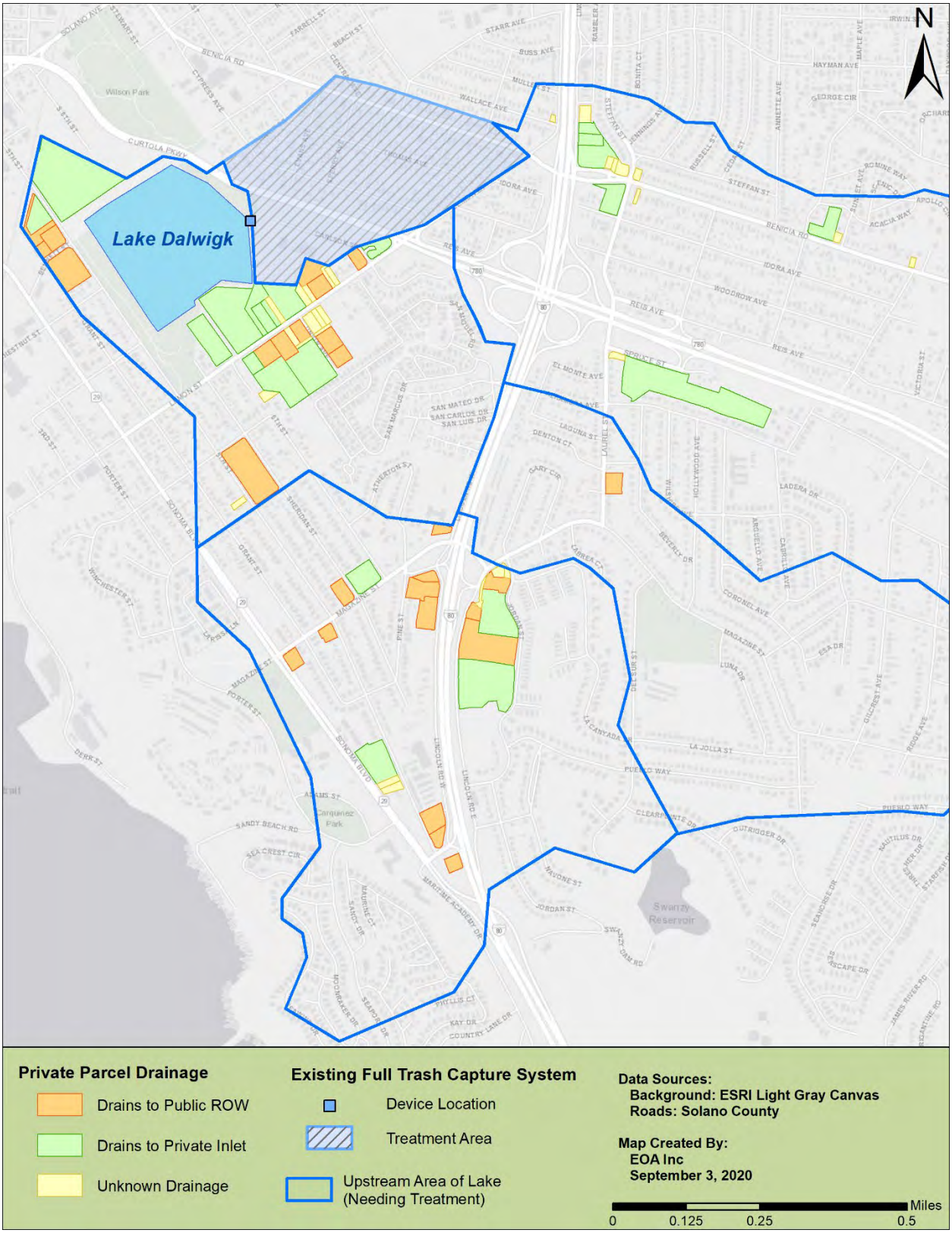

Figure 7. Private properties in the area upstream Lake Dalwigk that generate moderate or high trash levels and therefore could be included in a new enhanced trash inspection program in the City of Vallejo.

Table 13. Total areas associated with private parcels upstream of Lake Chabot and Lake Dalwigk that could be included in the trash inspection program.

Upstream Drainage Area	Area of Interest	Total Area of Private Parcels (acres)				Baseline Trash Reduction Potential (%)
		Mod	High	Very High	Total	
Lake Chabot	1	37.8	5.9	0.0	43.7	0.5%
	2	155.7	0.0	0.0	155.7	1.2%
	3	0.0	34.1	1.4	35.5	1.1%
Lake Dalwigk	4	25.4	14.3	0.0	39.7	0.6%
	5	11.3	1.7	0.0	13.0	0.1%
	6	0.7	0.0	0.0	0.7	0.0%
	7	12.2	9.4	0.0	21.6	0.4%
	Totals	**243**	**65**	**1.4**	**310**	**3.9%**

Cost Estimates for Enhanced Actions

Adding OVTAs to existing pretreatment/stormwater inspections will add additional time for each inspection, and thus would require additional inspection resources. Additionally, inspecting a larger pool of businesses and other private properties would also require new resources. These increases in the number of inspections conducted each year would also be accompanied by additional costs associated with communications to applicable property owners to discuss/require improved trash management, the management of inspection data, and overhead/oversight costs. A preliminary, planning-level cost estimate associated with the implementation of an Enhanced Trash Inspection Program is presented in Table 14.

Table 14. Preliminary Planning-Level Costs Estimates for creating and implementing an Enhanced Municipal Trash Inspection Program to address trash generating properties upstream of Lake Chabot and Lake Dalwigk.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
				Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
Task	Geographical Span of Implementation	Assumptions		Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
Add trash inspections (i.e., OVTAs) to existing commercial/industrial stormwater inspections at applicable businesses identified by the City.	All commercial and industrial facilities: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property - Are part of the City's SW inspection program	• Proposed 30 inspections per year (Vallejo inspects ~300 businesses/year, and the areas of interest have ~100 of the 1000 total Vallejo businesses, meaning ~30 inspections/year in the areas of interest.) • An additional 0.5 hours per inspection due to additional trash inspection component • 8 follow-up inspections per year (1 hour per follow up inspection)	Environmental Compliance Inspector	--	--	--	--	23	0.01	$178,550	$2,053
Conduct trash inspections (i.e., OVTAs) at applicable private properties that are NOT part of SW inspection program.	All private properties: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property - Are NOT part of the City's SW inspection program	• 14 inspections per year (70 total, 5-year time frame) • 4 follow-up inspections per year for those properties not achieving an "A" OVTA score in their last inspection • 1 hour per inspection (including travel time)	Environmental Compliance Inspector	--	--	--	--	18	0.01	$178,550	$1,607
Communications to applicable property owners to discuss/require improved trash management.	All private properties: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property - Are NOT part of the City's SW inspection program - Are NOT achieving an "A" OVTA score	• Assumes communications for properties not achieving OVTA "A" but already being inspected via SW inspections will be handled via follow-up SW inspections. No additional costs for these properties in this line item. • Estimated 25% of properties including those that are part of the City's SW inspection program and not part of the SW inspection program will NOT achieve OVTA "A" score and need to implement new controls.	Environmental Compliance Inspector	--	--	--	--	80	0.04	$178,550	$7,142
Management of inspection data. Enter all data collected via trash inspections into the Vallejo OVTA database. Flag facilities that require follow-up inspections	All private properties: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property	• 56 data entries per year • 10 minutes per data entry	Environmental Compliance Inspector	--	--	--	--	9.3	0.005	$178,550	$833

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
Task	Geographical Span of Implementation	Assumptions		Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
				Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
Overhead Costs	NA	• Provide oversight of above projects	Environmental Services Superintendent	--	--	--	--	40	0.01	$195,364	$1,954
			Environmental Compliance Supervisor	--	--	--		40	0.02	$145,580	$2,912
			Totals	--	--	--	--	210	0.10	--	$16,501

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.

4.4 Curb-Inlet Screens on Inlets in the Public ROW

Curb-inlet screens could benefit the City's trash reduction program by preventing trash from reaching catch basins and being discharged via the City's MS4. When properly maintained, curb-inlet screens in combination with street sweeping can be effective at preventing trash from entering catch basins. Although there is not currently a widely accepted value for the trash reduction benefits that curb-inlet screens offer, curb-inlet screens have the potential to reduce a trash generating area to one score below its current trash generation rate (e.g., "B" score to "A" score) (SCVURPPP and Oakland, *In preparation*). The acceptable trash reduction benefit associated with curb-inlet screens is currently under discussion with San Francisco Bay Regional Water Board staff.

Existing Curb-Inlet Screens

Currently, no curb-inlet screens are installed on storm drain inlets in the City's public ROW.

Existing Street Sweeping Program

The City's street sweeping program was enhanced in FY 16-17 to reflect the higher trash generation areas across the City, namely increasing sweeping in residential areas to two times a month. All "High" trash generating areas are swept two times a week by the City, downtown areas are swept three times a week, and residential areas are swept at least two times a month (two times a week if they are "High" trash generating residential areas). For curb inlet screens paired with street sweeping to be considered a control measure that has trash load reduction potential, "High" areas with curb inlet screens installed need to be swept at least weekly, and "Moderate" areas with curb inlet screens installed need to be swept at least two times a month. The City's existing street sweeping program would be sufficient to achieve trash load reductions where curb inlet screens are installed (i.e., moderate areas will be considered treated to a level of Full Capture System Equivalence (FCSE), and high areas will be considered treated down to a "moderate" trash generating level). Since reduction can be achieved with installation of curb screens, the City does not need to include any enhancements to their existing street sweeping program.

Potential Installation and location of Curb-Inlet Screens

There are 375 catch basin inlets in the public ROW that are in areas with moderate or high trash generation for areas upstream of the two lakes. These inlets are locations for potential installation of curb-inlet screens. The total number of inlets and estimated treated area within each of the seven areas of interest are shown in Table 15.

Table 15. Total number of catch basins in moderate and high trash generation areas upstream of Lake Chabot and Lake Dalwigk that could potentially be retrofitted to include curb inlet screens.

Upstream Drainage Area	Area of Interest	Total # Catch Basins in Public ROW		Area Addressed by Curb Inlet Screen (acres)	Trash Reduction Potential (%)
		Moderate Trash Generation	High Trash Generation		
Lake Chabot	1	46	39	182	3.0 %
	2	8	0	22	0.2 %
	3	7	33	57	1.2 %
Lake Dalwigk	4	15	11	43	0.7 %
	5	41	24	105	1.0 %
	6	58	0	132	1.0 %
	7	54	39	162	2.4 %
Totals		**229**	**146**	**703**	**9.6 %**

Cost Estimates for Enhanced Actions

For the purposes of estimating the costs of implementing a curb-inlet screen program, it is assumed that the City would purchase and have a vendor install curb-inlet screens on all 375 inlets in the public ROW. The preliminary, planning-level cost estimates associated with the fabrication, installation, and operation of the new 375 curb-inlet screen devices are presented in Table 16.

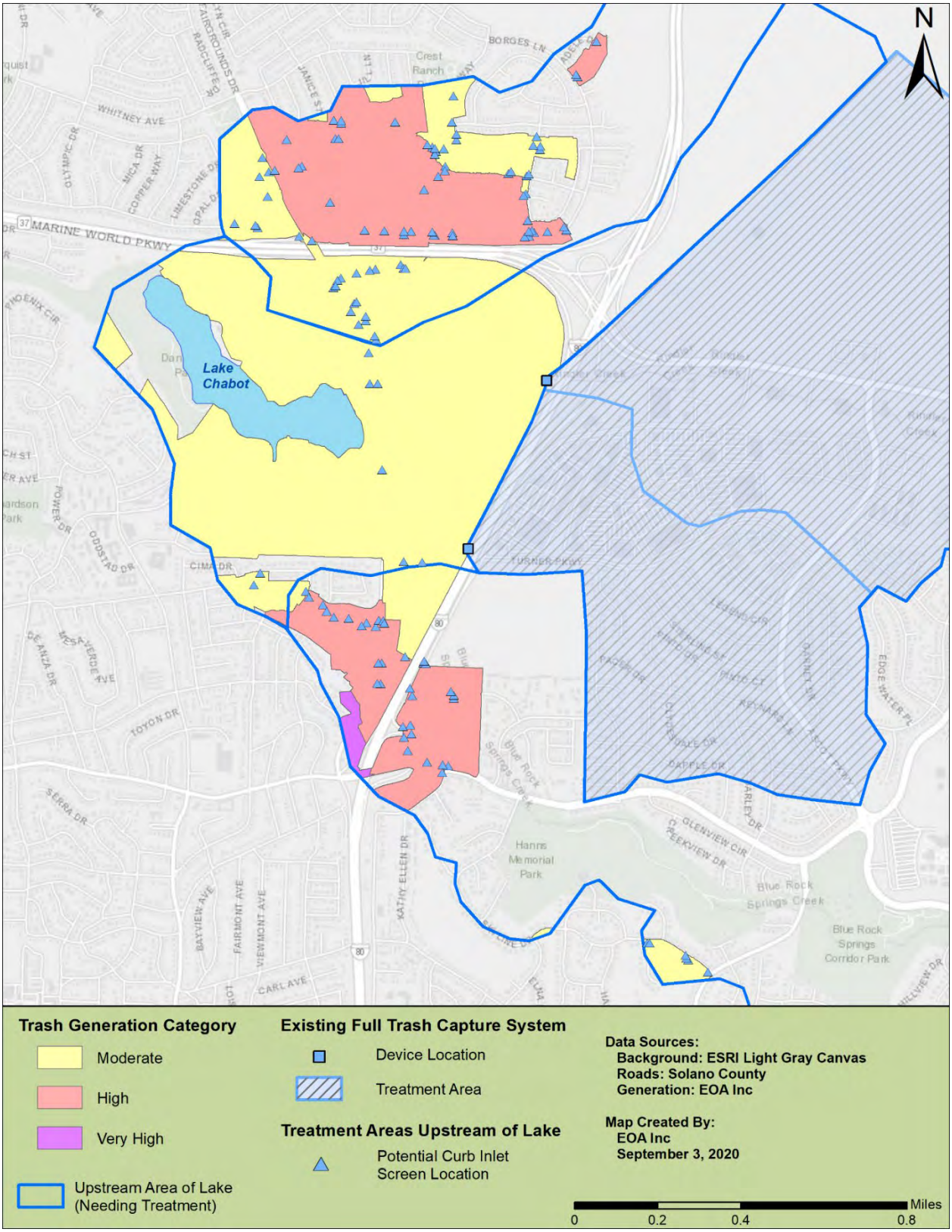

Figure 8. Locations of catch in the drainage area upstream of Lake Chabot that could potentially be retrofitted with curb inlet screens.

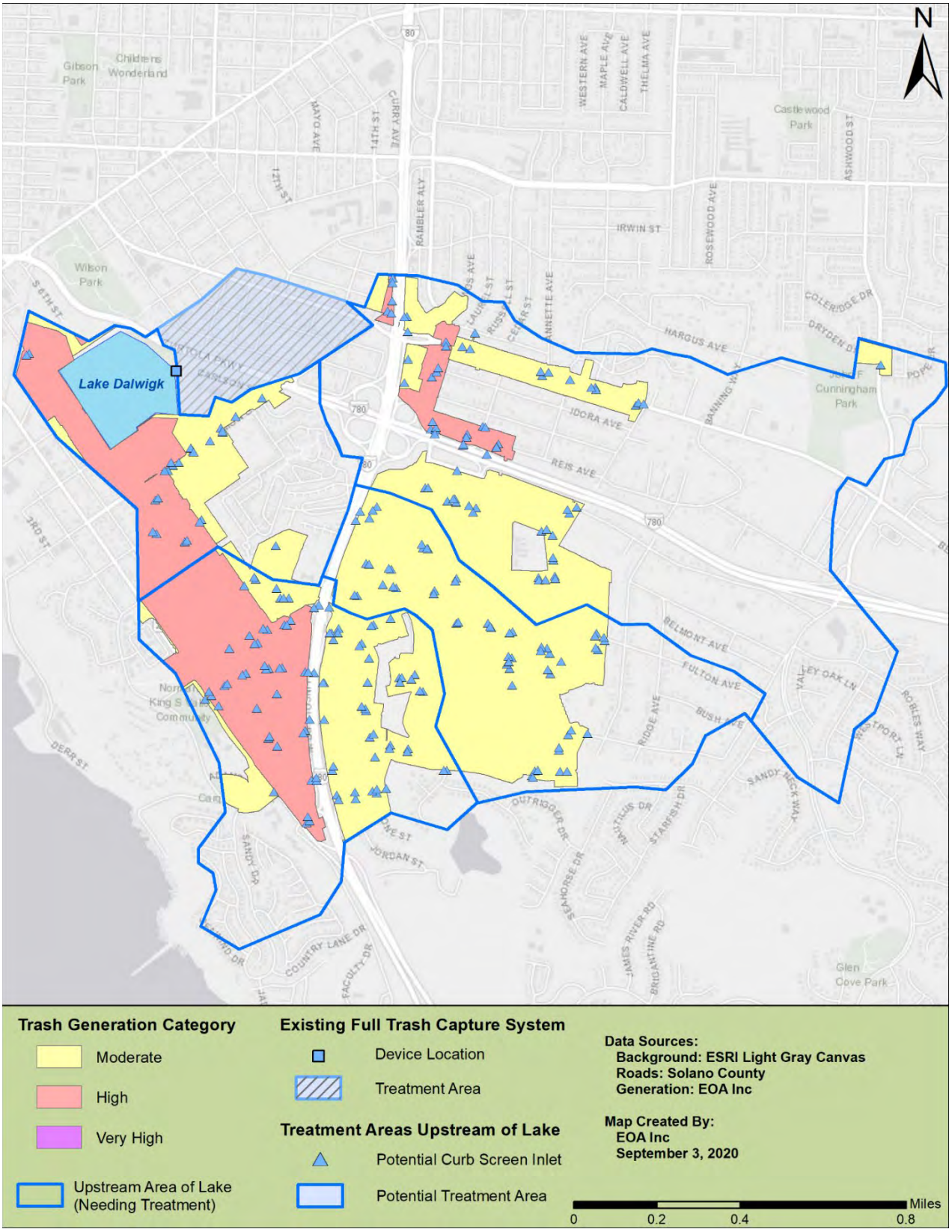

Figure 9. Locations of catch in the drainage area upstream of Lake Dalwigk that could potentially be retrofitted with curb inlet screens.

Table 16. Preliminary Planning-Level Costs Estimates for the installation and maintenance of 375 Curb-Inlet Screens.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
Task	Geographical Span of Implementation	Assumptions		Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
				Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
City develops concept and releases bid/RFP for curb-inlet screens	375 public ROW inlets in Moderate and High trash generating areas not treated by existing or planned full capture	All planning tasks conducted by District Staff	Associate Engineer	100	0.05	$185,195	$9,260	--	--	--	--
Vendor fabricates and Installs Curb-inlet Screens	375 Public Row Inlets	• Contractor installs devices • Capital costs can range from $400 to $700. Costs of each inlet screen estimated to be $500 • Replacement of each inlet devices 2x during a 50-yr timeframe (i.e., average replacement rate of 15 screens/yr) at $500/screen	Materials Cost	--	--	--	$187,500	--	--	--	$7,500
Oversight of contractor installation	Inlets installed in all public ROW inlets in Moderate and High trash generating areas not treated by existing or planned full capture systems	• Contractor fabricates and installs curb-inlet screens District staff oversight over installation, including initial inspection of devices.	Associate Engineer	80	0.04	$185,195	$7,409	--	--	--	--
On-going oversight of replacement/repair process by contractor		• 2 inspections per year of each inlet to check for damage and repairs. 10 minutes per inspection	Collection Systems Supervisor	--	--	--	--	125	0.06	$177,127	$11,070
Oversight of all tasks above	NA	Provide oversight of above District projects	District Engineer	20	0.01	$315,542	$3,155	20	0.01	$315,542	$3,155
			Totals	200	0.10	--	$207,324	145	0.07	--	$21,725

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.

4.5 Feasibility of Implementing Additional New or Enhanced Controls

The costs and trash reduction benefits of implementing new or enhanced trash control measures described in the previous sections are summarized in Table 17. Costs are presented as base/initial costs, on-going/annual costs, and 10-year costs. Base/initial costs are associated with design and capital (i.e., construction/fabrication, installation, etc.) for large and small full capture systems and curb inlet screens. On-going/annual costs are associated with the on-going costs to the City to maintain, implement, replace, and/or enforce the trash control measure. 10-year costs are based on the sum of base/initial costs and the average annual implementation costs over a 10-year timeframe. 10-year costs have not been adjusted for inflation and assume that average on-going/annual costs would remain consistent of the 10-year timeframe.

The estimated maximum trash reduction benefit for each control measure is also included in Table 17. The trash reduction potential is based on implementation of each trash control measure in all areas of interest upstream of the two lakes, with the exception of large full trash capture systems, which would only treat two of the seven areas (1 and 3). Annual costs for each percent trash reduction was calculated to compare the costs and benefits among the control measures evaluated.

The enhanced municipal trash inspection program and the installation of curb inlet screens at all stormwater catch basins in the public ROW have the greatest benefit for the least costs. The small full capture systems provided the highest trash reduction potential, but the relatively high costs associated with installation and maintenance resulted in a much lower ranking for cost-benefit.

Table 17. Summary of the estimated preliminary costs and trash reduction benefits of implementing potential new or enhanced trash control measures in areas upstream of Lake Chabot and Lake Dalwigk.

Control Measure	Base/Initial Costs	On-going/ Annual Costs	Total Costs Over 10 Years	Baseline Trash Reduction Potential (%)	Total Costs Over 10 Years Per % Trash Reduction
Large Full Capture System[a]	$2,036,855	$7,699	$2,113,845	6.9%	$306,354
Small Full Capture Systems	$445,370	$190,382	$2,349,190	11.7%	$200,785
Trash Inspection Program	NA	$16,501	$165,010	3.9%	$42,310
Curb Inlet Screens	$207,324	$21,725	$424,574	9.6%	$44,226
TOTALS	$2,670,549	$239,407	$5,064,619	--	--

[a] Large Full Capture System option only applies to drainage areas 1 and 3.

The cost estimates presented in Table 18 compare the costs normalized to the estimated percent trash reduction for four trash control measures if implemented in each of the seven areas of interest. The proportional number of devices (full capture and curb-screens) or area (private parcels) was calculated for each of the seven drainage areas and applied to the average annual cost estimates for each device (presented in Table 17). The total costs for each control measure by drainage area was normalized by dividing the estimated potential percent trash reduction by the cost per percent reduction.

Table 18. A comparison of the estimated 10-year costs for each percent trash reduction for the trash control measures evaluated. Costs per each percent of trash reduced are presented for each applicable combination of control measure and areas of interest upstream Lake Chabot and Lake Dalwgik. Total percent trash reduction is included in parenthesis.

Upstream Drainage Area	Area of Interest	Large Full Capture Systems	Small Full Capture Systems	Municipal Trash Inspection Program	Curb Inlet Screens
Lake Chabot	1	$157,104 (4.2%)	$16,699 (3.8%)	$7,396 (0.5%)	$4,245 (3.0 %)
	2	--	$29,110 (0.2%)	$10,972 (1.2%)	$5,889 (0.2 %)
	3	$149,250 (2.7%)	$14,897 (1.7%)	$2,742 (1.1%)	$5,002 (1.2 %)
Lake Dalwigk	4	--	$23,934 (0.9%)	$5,595 (0.6%)	$5,529 (0.7 %)
	5	--	$43,664 (1.2%)	$11,015 (0.1%)	$9,703 (1.0 %)
	6	--	$47,739 (1.0%)	--	$8,694 (1.0 %)
	7	--	$24,743 (3.0%)	$4,590 (0.4%)	$5,165 (2.4 %)
Feasibility Ranking		*Less*	*Less*	*More*	*More*

Red shaded - High Cost (>$20,000 per 1% trash reduction)
Yellow shaded - Moderate Cost ($20,000 - $10,000 per 1% trash reduction)
Green Shaded - Lower Cost (< $10,000 per 1% trash reduction)

5. Summary of Findings

The following conclusions were developed based on the results of the trash control measure feasibility evaluation:

1. Baseline and Current Levels of Trash

- Based on the Vallejo baseline trash generation map, the seven areas upstream of the two lakes generated moderate to high levels of trash. This equates to an estimated 16,968 gallons of trash each year generated from these areas (Table 2).
- Based on OVTA results, trash levels in five of the seven areas have decrease substantially since 2009. All seven areas currently generate moderate trash levels, based on OVTA results reported in the City/District FY 19-20 Annual Report (Table 3).

2. Dominate Trash Sources

- Trash sources identified via a combination of OVTAs, interviews with City and District staff, and field reconnaissance vary among the seven areas and land uses within these areas.
- Pedestrian/vehicle litter, Illegal dumping, and homeless encampments were identified as important sources in nearly all of the seven areas.
- Improper trash container/bin management on private properties was also identified as a dominant source of trash in commercial land use areas.

3. Existing and Potential Trash Control Measures

- Trash Booms – No trash booms are currently deployed in Vallejo. Previous evaluations of trash booms as potential trash control measure indicate that the installation and maintenance of trash booms located in Lake Chabot and Lake Dalwigk is infeasible. For Lake Chabot, infeasibility is due to lack of access to locations where booms could be installed and serviced, including confluences with major storm drain outfalls and channels, which would be primarily through privately owned lands (e.g., Six Flags Discovery Kingdom). For Lake Dalwigk, there do not appear to be any feasible locations for trash booms due to shallow channel dimensions and low flow conditions within Lemon Street Canal, the main tributary to the lake. Due to the infeasibility of installing trash booms, this control measure was not further evaluated. For these reasons, trash booms were assumed to be infeasible and were therefore not evaluated as part of these feasibility study.
- On-land & Water Body Cleanups – The City and the District spend significant resources each year implementing illegal dumping prevention measures and removing illegally dumping trash in the City. The City (Public Works Maintenance Division, Police Department, and Code Enforcement Division) partners with Caltrans, Vallejo City Unified School District, the District, Greater Vallejo Recreational District, Vallejo Watershed Alliance, California Maritime Academy, Six Flags Discovery Kingdom, the Vallejo Chamber of Commerce, and members of the community to clean up, maintain, and landscape all highly visible entrances and major thoroughfares throughout the City of Vallejo. Additionally, the City currently employs four full-time staff to remove trash from on-land areas throughout the City. The District also conducts quarterly cleanups around the perimeters of the two lakes and tracks the amount of material removed, which equates to roughly 9% of the baseline trash load associated with the areas upstream of the lakes. Because the existing level of on-land and water body cleanups is so significant, no enhancements to this control measure were evaluated as part of this feasibility evaluation.
- Public Education and Outreach - Education and outreach programs are designed to raise citizen awareness about the impacts of littering or illegal dumping, and teach citizens how to change their behavior accordingly. Programs usually include a mixture of anti-littering advocacy, reinforced with the development of classroom curricula, storm drain signage and volunteer cleanups. Expansion of the community outreach and education program could benefit overall trash load reduction by promoting litter prevention initiatives. However, it is very difficult to estimate the percentage reduction that the Vallejo Permittees may achieve through implementing an enhanced City-wide public

education and outreach program. Due to the inability to assign a quantitative trash reduction benefit to public education programs, enhancements to this control measure were not further evaluated as part of the study.

- Full Capture Systems – The District is investing over $3.5M towards the installation of large full capture system at three locations directly below the two lakes. In the seven areas upstream of the lakes, there are seven netting (full capture) devices that reduce roughly 7% of the trash in Vallejo stormwater. The cost of installing large systems at the two potential locations above the lakes identified previously (EOA 2018) are prohibitive (> $2.M) and the trash reduction benefits would be relatively minimal (< 7%). Although the trash reduction benefits for installing 353 small devices in inlets located upstream of the two lakes are greater than the two large systems (11.7%), the costs for installation of these devices is also prohibitive (>$440,000) and the maintenance costs would exceed $190,000 each year.
- Enhanced Municipal Trash Inspection Program - Stormwater inspections are currently conducted on an annual frequency by the District at approximately 300 commercial/industrial facilities. Expansion of these existing inspections to more formally add an OVTA component and expanding inspections to other high priority facilities that are generating high or very high levels of trash appears to be a relatively cost-effective approach to addressing trash from high and very high areas in Vallejo. A moderate trash reduction potential (~4%) is anticipated via the expansion of this control measure in areas upstream of the lakes.
- Curb-Inlet Screens on Inlets in the Public ROW & Street Sweeping – No curb inlet screens are currently installed on inlets in the public ROW in Vallejo. The City's street sweeping program was enhanced in FY 16-17 to reflect the higher trash generation areas across the City, namely increasing sweeping in residential areas to two times a month. All "High" trash generating areas are swept two times a week by the City, downtown areas are swept three times a week, and residential areas are swept at least two times a month and two times a week if they are "High" trash generating. Although the anticipated trash reduction associated with the installation of curb-inlet screens on 375 inlets would be modest (~9.6%), the relative costs of installing and maintaining these devices is prohibitive (>$200,000). Additionally, the trash reduction benefits for curb-inlet screens in combination with street sweeping has not been recognized by the Regional Water Board as an effective trash control measure.

The conclusions regarding the feasibility of implementing additional control measures in areas upstream of Lake Chabot and Lake Dalwigk are summarized in Table 19. The most feasible enhanced trash control measure that could be implemented by the District/City (i.e., Enhanced Municipal Trash Inspection Program) would address an important trash source identified from these areas - Improper trash container/bin management on private properties.

Table 19. Summary conclusions of the feasibility evaluation conducted on potential enhanced trash control measures in areas upstream of Lake Chabot and Lake Dalwigk.

Trash Control Measure	Feasibility Conclusion
Trash Booms	Technically Infeasible
On-land & Water Body Cleanups	Existing Controls Substantial/ Enhancement Not Evaluated
Public Education and Outreach	Existing Controls Substantial/Trash Reduction Benefits Uncertain/Enhancement Not Evaluated
Full Capture Systems	Cost Prohibitive/Infeasible
Enhanced Municipal Trash Inspection Program	Feasible
Curb-Inlet Screens on Inlets in the Public ROW & Street Sweeping	Trash Reduction Benefits Uncertain/Infeasible

6. References

EOA (2018). Vallejo Trash Capture Feasibility Study. Prepared for the Vallejo Flood and Wastewater District. March.

BASMAA (2017). Tracking California's Trash Project: Evaluation of the On-land Visual Assessment Protocol as a Method to Establish Baseline Levels of Trash and Detect Improvements in Stormwater Quality. Bay Area Stormwater Management Agencies Association. State Water Resources Control Board Grant Agreement No. 12-420-550. Prepared by EOA, Inc. http://basmaa.org/Announcements/tracking-cas-trash-on-land-visual-assessments.

SCVURPPP and Oakland. *In prep*. Trash Reduction Effectiveness of Curb Inlet Screens. In preparation by EOA, Inc. Prepared for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and the City of Oakland.

City of San Jose (2016). Street Sweeping: Significant Investment and Re-Tooling are Needed to Achieve Cleaner Streets. Prepared by Sharon W. Erickson.

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Appendix A
Examples of Trash Sources Identified in Specific Land Use Areas within the City of Vallejo

Area #1 – Residential

Figure 1. Illegal dumping, Area 1E.

Figure 2. Improper bin management and illegal dumping, Area 1B.

Figure 3. Pedestrian litter, Area 1G.

Area #2 - Commercial

Figure 1. Improper bin management, Area 2A.

Figure 2. Homeless encampment, Area 2A.

Figure 3. Illegal dumping, Area 2A.

Figure 4. Parking lot pedestrian litter, Area 2C.

Area #3 – Open Space

Figure 1. Homeless encampment. Area 3C.

Figure 2. Illegal dumping, Area 3G.

Figure 3. Vehicle litter, Area 3A.

Area #4 – Industrial

Figure 1. Pedestrian litter, illegal dumping, and homeless encampment across the street from industrial Area 4D.

Appendix B
Potential Large Full Capture Site Locations

VAL_LRG_06_SITE_3

Blue Rock Springs Creek at Coach Lane

System Data

- 2 6x10' box culvert outfall
- Drainage Area: 1,832 Acres

Hydraulics

- The netting device must remain out of the main channel
- Must not increase flooding upstream in trailer park

Constructability Concerns

- Possible concerns, this site was not visited

Recommended Location

- Place on outfall of box culvert

Recommended Devices

- GSRD
- In-line TrashTrap

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VAL_LRG_06_SITE_6

Fairgrounds Drive near bus stop

System Data

- Drainage Area: 451 Acres
- 96" Existing System (unable to access manhole, manholes in bus drop-off paved over)

Hydraulics

- Drains to lake
- Unknown system depth or flooding concerns

Constructability Concerns

- High traffic ROW on Fairgrounds Drive for construction and maintenance
- Potential conflict with adjacent Six Flags private property owner
- Need to verify public ROW
- No visible utility conflicts; need to verify

Recommended Location

- Place device within landscape median on City property between bus drop off and Fairgrounds Drive

Recommended Devices

- Off-line HDS
- In-line NSBB if existing system is deep

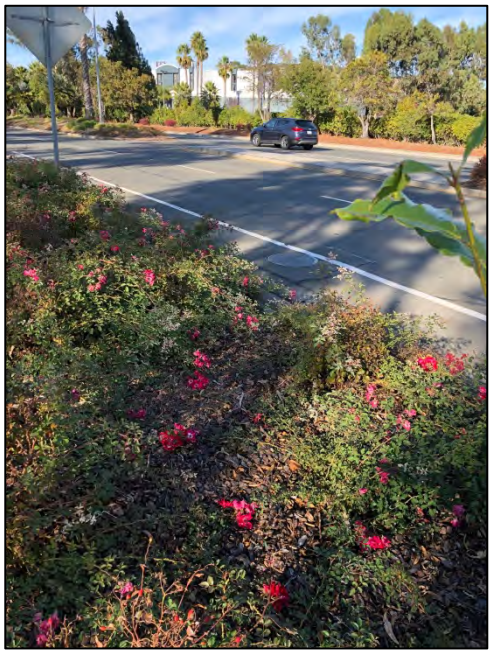

Vallejo
FLOOD & WASTEWATER DISTRICT

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Vallejo, CA 94590

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District Manager
Melissa Morton

September 29, 2020

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Attached is the FY 2019-2020 Annual Report for Vallejo Flood & Wastewater District as required by provision C.17 of the NPDES permit NO. CAS612008, as adopted on November 19, 2015 via order No. R2-2015-0049.

Following the Annual Report is a Supplemental Report, as required by Cease and Desist Order No. R2-2018-0033, which provides a brief narrative on the Vallejo Permittees' progress toward meeting the 70 percent and 80 percent trash load reduction requirements and a Trash Feasibility Study that addresses proposed enhanced trash removal options upstream of Lakes Chabot and Dalwigk. The District looks forward to engaging with the Regional Board toward the conclusion of full trash reduction credit for the new devices based on previous communications.

I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

VALLEJO FLOOD & WASTEWATER DISTRICT

Melissa Morton

MELISSA A. MORTON
District Manager

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Section 1 – Permittee Information

Background Information					
Permittee Name:	Vallejo Flood & Wastewater District				
Population:	120,000				
NPDES Permit No.:	CAS612008				
Order Number:	R2-2015-0049				
Reporting Time Period (month/year):	July 2019 through June 2020				
Name of the Responsible Authority:	Melissa A. Morton			Title:	District Manager
Mailing Address:	450 Ryder Street				
City:	Vallejo	Zip Code:	94590	County:	Solano
Telephone Number:	707-644-8949		Fax Number:		707-644-8975
E-mail Address:	mmorton@vallejowastewater.org				
Name of the Designated Stormwater Management Program Contact (if different from above):	Jennifer Harrington			Title:	Environmental Services Director
Department:	Environmental Services				
Mailing Address:	450 Ryder Street				
City:	Vallejo	Zip Code:	94590	County:	Solano
Telephone Number:	707-652-7806		Fax Number:		707-644-8975
E-mail Address:	jharrington@vallejowastewater.org				

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Section 2 - Provision C.2 Reporting Municipal Operations

Program Highlights and Evaluation

Highlight/summarize activities for reporting year:

Summary:

The City of Vallejo (City) and Vallejo Flood & Wastewater District (District) both have responsibilities under C.2. The City and District executed a Memorandum of Understanding on June 20, 2017. The City and the District are co-Permittees with the same reporting responsibilities under the California Regional Water Quality Control Board San Francisco Bay Region (Regional Board) Municipal Regional Stormwater NPDES Permit Order No. R2-2015-0049 NPDES No. CAS612008 (MRP). The "Vallejo Permittees" as the two agencies are referenced in the MRP, cover the same geographic and political jurisdiction. The District has ownership and responsibility for stormwater infrastructure below the storm drain inlet grates and beyond, and the City has the responsibility for control and maintenance before stormwater enters the drain inlets.

In April 2020, construction began to install trash full capture devices at three locations in Vallejo. When complete, the devices will provide a 37% trash reduction and help the District and City comply with the 80% trash reduction required in the MRP and the Cease and Desist Order issued to the Vallejo Permittees. An update on the device project is included in Section C.10.

C.2.a. ►Street and Road Repair and Maintenance

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of debris and waste materials during road and parking lot installation, repaving or repair maintenance activities from polluting stormwater
Y	Control of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater from discharging to storm drains from work sites.
Y	Sweeping and/or vacuuming and other dry methods to remove debris, concrete, or sediment residues from work sites upon completion of work.

Comments:

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C.2.b. ►Sidewalk/Plaza Maintenance and Pavement Washing

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of wash water from pavement washing, mobile cleaning, pressure wash operations at parking lots, garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning activities from polluting stormwater
Y	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs

Comments:
See City of Vallejo Annual Report for activities related to C.2.

C.2.c. ►Bridge and Structure Maintenance and Graffiti Removal

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

Y	Control of discharges from bridge and structural maintenance activities directly over water or into storm drains
Y	Control of discharges from graffiti removal activities
Y	Proper disposal for wastes generated from bridge and structure maintenance and graffiti removal activities
Y	Implementation of the BASMAA Mobile Surface Cleaner Program BMPs for graffiti removal
Y	Employee training on proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.
Y	Contract specifications requiring proper capture and disposal methods for wastes generated from bridge and structural maintenance and graffiti removal activities.

Comments:
See City of Vallejo Annual Report for activities related to C.2.

C.2.e. ►Rural Public Works Construction and Maintenance

Does your municipality own/maintain rural[1] roads:		Yes	X	No
If your answer is No then skip to **C.2.f**.				

Place a Y in the boxes next to activities where applicable BMPs were implemented. If not applicable, type NA in the box and provide an explanation in the comments section below. Place an N in the boxes next to activities where applicable BMPs were not implemented for one or more of these activities during the reporting fiscal year, then in the comments section below provide an explanation of when BMPs were not implemented and the corrective actions taken.

NA	Control of road-related erosion and sediment transport from road design, construction, maintenance, and repairs in rural areas
NA	Identification and prioritization of rural road maintenance based on soil erosion potential, slope steepness, and stream habitat resources
NA	No impact to creek functions including migratory fish passage during construction of roads and culverts
NA	Inspection of rural roads for structural integrity and prevention of impact on water quality
NA	Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion
NA	Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate
NA	Inclusion of measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology when replacing culverts or design of new culverts or bridge crossings

Comments including listing increased maintenance in priority areas:
NA-There are no rural roads recognized within the City.

[1]Rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses.

C.2.f. ►Corporation Yard BMP Implementation

Place an X in the boxes below that apply to your corporations yard(s):

	We do not have a corporation yard
	Our corporation yard is a filed NOI facility and regulated by the California State Industrial Stormwater NPDES General Permit
X	We have a Stormwater Pollution Prevention Plan (SWPPP) for the Corporation Yard(s)

Place an X in the boxes below next to implemented SWPPP BMPs to indicate that these BMPs were implemented in applicable instances. If not applicable, type NA in the box. If one or more of the BMPs were not adequately implemented during the reporting fiscal year then indicate so and explain in the comments section below:

X	Control of pollutant discharges to storm drains such as wash waters from cleaning vehicles and equipment
X	Routine inspection prior to the rainy seasons of corporation yard(s) to ensure non-stormwater discharges have not entered the storm drain system
X	Containment of all vehicle and equipment wash areas through plumbing to sanitary or another collection method
X	Use of dry cleanup methods when cleaning debris and spills from corporation yard(s) or collection of all wash water and disposing of wash water to sanitary or other location where it does not impact surface or groundwater when wet cleanup methods are used
X	Cover and/or berm outdoor storage areas containing waste pollutants

Comments:

All of the storm drains at the District facility are plumbed back into the wastewater treatment plant. The facility has no stormwater runoff. The District does have a SWPPP on file. In addition, the facility has an operational staff that does an overall facility inspection of the treatment plant twice per shift year-round. During these rounds, the general condition of the treatment plant is inspected, equipment is checked for leaks, etc. Any problems found are relayed back to a shift supervisor and addressed immediately or as appropriate.

If you have a corporation yard(s) that is not an NOI facility, complete the following table for inspection results for your corporation yard(s) or attach a summary including the following information:

Corporation Yard Name	**Corp Yard Activities w/ site-specific SWPPP BMPs**	**Inspection** Date[2]	**Inspection Findings/Results**	**Date and Description of** Follow-**up and/or** Corrective Actions
VFWD, 450 Ryder Street	General housekeeping BMPs, covered parking for heavy equipment. Fueling areas and materials storage	Daily	Typically minor housekeeping issues.	Addressed immediately or as appropriate.

[2] Minimum inspection frequency is once a year during September.

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	inspected. All storm drains are connected to the wastewater treatment plant.			

Section 3 - Provision C.3 Reporting New Development and Redevelopment

C.3.b.iv.(2) ►Regulated Projects Reporting

Fill in attached table C.3.b.iv.(2) or attach your own table including the same information.
See City of Vallejo Annual Report for activities related to C.3

C.3.e.iv. ►Alternative or In-Lieu Compliance with Provision C.3.c.

Is your agency choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e.?		Yes		No
Comments (optional): See City of Vallejo Annual Report for activities related to C.3				

C.3.e.v ► Special Projects Reporting

1. In FY 2019-20, has your agency received, but not yet granted final discretionary approval of, a development permit application for a project that has been identified as a potential Special Project based on criteria listed in MRP Provision C.3.e.ii(2) for any of the three categories of Special Projects (Categories A, B or C)?		Yes		No
2. In FY 2019-20, has your agency granted final discretionary approval to a Special Project? If yes, include the project in both the C.3.b.iv.(2) Table, and the C.3.e.v. Table.		Yes		No

If you answered "Yes" to either question,

1) Complete Table C.3.e.v.
2) Attach narrative discussion of 100% LID Feasibility or Infeasibility for each project.

See City of Vallejo Annual Report for activities related to C.3

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C.3.h.v.(2) ► Reporting Newly Installed Stormwater Treatment Systems and HM Controls (Optional)

On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting year) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. The list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

See City of Vallejo Annual Report for activities related to C.3

C.3.h.v.(3)(a) –**(c) and (f) ► Installed Stormwater Treatment Systems Operation and Maintenance Verification Inspection** Program Reporting

Site Inspections Data	Number/Percentage
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the previous fiscal year (FY18-19)	N/A
Total number of Regulated Projects (including offsite projects, and Regional Projects) in your agency's database or tabular format at the end of the reporting period (FY 19-20)	N/A
Total number of Regulated Projects (including offsite projects, and Regional Projects) for which O&M verification inspections were conducted during the reporting period (FY 19-20)	N/A
Percentage of the total number of Regulated Projects (including offsite projects, and Regional Projects) inspected during the reporting period (FY 19-20)	N/A

C.3.h.v.(3)(d)-**(e) ► Installed Stormwater Treatment Systems Operation and Maintenance Verification Inspection Program** Reporting

Provide a discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

Summary:
See City of Vallejo Annual Report for activities related to C.3

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Provide a discussion of the effectiveness of the O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness program).
Summary: See City of Vallejo Annual Report for activities related to C.3

C.3.i. ►Required Site Design Measures for Small Projects and Detached Single Family Home Projects

On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.
Summary: See City of Vallejo Annual Report for activities related to C.3

C.3.j.i.(5)**(d)** ► **Green Infrastructure Outreach**

On an annual basis, provide a summary of your agency's outreach and education efforts pertaining to Green Infrastructure planning and implementation.
Summary: See City of Vallejo Annual Report for activities related to C.3

C.3.j.ii.(2) ► Early Implementation of Green Infrastructure Projects

On an annual basis, submit a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures. Include the following information:

- A summary of planning or implementation status for each public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. (see C.3.j.ii.(2) Table B - Planned Green Infrastructure Projects).
- A summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement (see C.3.j.ii.(2) Table A - Public Projects Reviewed for Green Infrastructure).

Background Information:

Describe how this provision is being implemented by your agency, including the process used by your agency to identify projects with potential for green infrastructure, if applicable. See City of Vallejo Annual Report for activities related to C.3
Summary of Planning or Implementation Status of Identified Projects: See City of Vallejo Annual Report for activities related to C.3

C.3.j.iii.(2) and (3) ► Participate in Processes to Promote **Green Infrastructure**

On an annual basis, report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.
See City of Vallejo Annual Report for activities related to C.3

C.3.j.iv.(2) and (3) ► **Tracking and Reporting Progress**

On an annual basis, report progress on development and implementation of methods to track and report implementation of green infrastructure measures and provide reasonable assurance that wasteload allocations for TMDLs are being met.
See City of Vallejo Annual Report for activities related to C.3

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 1) – Projects Approved During the Fiscal Year Reporting Period

Project Name Project No.	Project Location[1], Street Address	Name of Developer	Project Phase No.[2]	**Project Type &** Description[3]	Project Watershed[4]	**Total** Site Area (Acres)	**Total** Area of Land Disturbed (Acres)	**Total New Impervious** Surface Area (ft^2)[5]	**Total** Replaced **Impervious** Surface Area (ft^2)[6]	**Total Pre-** Project **Impervious** Surface Area[7](ft^2)	**Total Post-** Project **Impervious** Surface Area[8](ft^2)
Private Projects											
Public Projects											
Comments: See City of Vallejo Annual Report for activities related to C.3											

[1]Include cross streets
[2]If a project is being constructed in phases, indicate the phase number and use a separate row entry for each phase. If not, enter "NA".
[3]Project Type is the type of development (i.e., new and/or redevelopment). Example descriptions of development are: 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse.
[4]State the watershed(s) in which the Regulated Project is located. Downstream watershed(s) may be included, but this is optional.
[5]All impervious surfaces added to any area of the site that was previously existing pervious surface.
[6]All impervious surfaces added to any area of the site that was previously existing impervious surface.
[7]For redevelopment projects, state the pre-project impervious surface area.
[8]For redevelopment projects, state the post-project impervious surface area.

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C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (private projects)

Project Name Project No.	Application Deemed Complete Date[9]	Application Final Approval Date[10]	Source Control **Measures**[11]	Site Design **Measures**[12]	**Treatment Systems** Approved[13]	**Type of Operation & Maintenance Responsibility Mechanism**[14]	**Hydraulic** Sizing Criteria[15]	Alternative Compliance **Measures**[16/17]	Alternative Certification[18]	**HM** Controls[19/20]
Private Projects										

[9]For private projects, state project application deemed complete date. If the project did not go through discretionary review, report the building permit issuance date.
[10]For private projects, state project application final discretionary approval date. If the project did not go through discretionary review, report the building permit issuance date.
[11]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[12]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[13]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[14]List the legal mechanism(s) (e.g., O&M agreement with private landowner; O&M agreement with homeowners' association; O&M by public entity, etc…) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[15]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[16]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[17]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[18]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[19]If HM control is not required, state why not.
[20]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

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C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (public projects)

Project Name Project No.	Approval Date[21]	Date Construction Scheduled to Begin	Source Control **Measures**[22]	Site Design **Measures**[23]	**Treatment Systems** Approved[24]	**Operation & Maintenance Responsibility Mechanism**[25]	**Hydraulic** Sizing Criteria[26]	Alternative Compliance **Measures**[27/28]	Alternative Certification[29]	**HM** Controls[30/31]
Public Projects										

Comments:
See City of Vallejo Annual Report for activities related to C.3

[21]For public projects, enter the plans and specifications approval date.
[22]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[23]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[24]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[25]List the legal mechanism(s) (e.g., maintenance plan for O&M by public entity, etc.) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[26]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[27]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[28]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[29]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[30]If HM control is not required, state why not.
[31]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

D-001882
9240

C.3.h.v.(2). ►Table of Newly Installed[32] Stormwater Treatment Systems and Hydromodification Management (HM) Controls (Optional)

Fill in table below or attach your own table including the same information.

Name of Facility	Address of Facility	Party Responsible[33] For Maintenance	Type of Treatment/HM Control(s)

[32] "Newly Installed" includes those facilities for which the final installation inspection was performed during this reporting year.
[33] State the responsible operator for installed stormwater treatment systems and HM controls.

D-002333
9241

C.3.e.v.**Special Projects Reporting Table**

Reporting Period – **July 1** 2019 - June 30, 2020

Project Name & No.	Permittee	Address	Application Submittal Date[34]	Status[35]	Description[36]	**Site Total** Acreage	**Gross Density DU/Acre**	**Density** FAR	Special Project **Category**[37]	**LID Treatment** Reduction Credit Available[38]	**List of LID** Stormwater **Treatment Systems**[39]	List of Non-**LID** Stormwater **Treatment Systems**[40]
									Category A: Category B: Category C: Location: Density: Parking:	Category A: Category B: Category C: Location: Density: Parking:	Indicate each type of LID treatment system and % of total runoff treated.	Indicate each type of non-LID treatment system and % of total runoff treated. Indicate whether minimum design criteria met or certification received

[34]Date that a planning application for the Special Project was submitted.
[35] Indicate whether final discretionary approval is still pending or has been granted, and provide the date or version of the project plans upon which reporting is based.
[36]Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.
[37] For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.
[38]For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.
[39]**:** List all LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area.
[40]List all non-LID stormwater treatment systems proposed. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

Special Projects Narrative

See City of Vallejo Annual Report for activities related to C.3

D-002385
9243

C.3.j.ii.(2) ► Table A - Public Projects Reviewed for Green Infrastructure

Project Name and Location[41]	Project Description	Status[42]	**GI Included?[43]**	**Description of GI Measures Considered and/or Proposed or Why GI is Impracticable to Implement[44]**

C.3.j.ii.(2) ► Table B - Planned and/or Completed Green Infrastructure Projects

Project Name and Location[45]	Project Description	Planning or **Implementation Status**	**Green Infrastructure Measures Included**

[41] List each public project that is going through your agency's process for identifying projects with green infrastructure potential.
[42] Indicate status of project, such as: beginning design, under design (or X% design), projected completion date, completed final design date, etc.
[43] Enter "Yes" if project will include GI measures, "No" if GI measures are impracticable to implement, or "TBD" if this has not yet been determined.
[44] Provide a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. If review of the project indicates that implementation of green infrastructure measures is not practicable, provide the reasons why green infrastructure measures are impracticable to implement.
[45] List each planned (and expected to be funded) public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Note that funding for green infrastructure components may be anticipated but is not guaranteed to be available or sufficient.

D-002336
9244

Section 4 – Provision C.4 Industrial and Commercial Site Controls

Program Highlights and Evaluation
Highlight/summarize activities for reporting year:

Summary:
The District continued to implement its industrial and commercial site controls alongside its pretreatment program. Stormwater focused inspections are conducted as well as pretreatment inspections that include stormwater elements. For example, the District implements a FOG program by inspecting local restaurants annually. District inspectors also check the dumpster areas and verify proper grease interceptor maintenance to ensure trash and waste oil & grease is not threatening the stormwater system. The District updates its facilities list on a continuous basis with input from a variety of sources, including annual business license updates from the City of Vallejo. The number of inspections completed in FY 19-20 was reduced due to the COVID-19 pandemic.

C.4.b.iii ► Potential Facilities List (i.e., List of All Facilities Requiring Stormwater Inspections)

List below or attach your list of industrial and commercial facilities in your Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff.

See Appendix 4-1: Potential Facilities List

C.4.d.iii.(2)(a) & (c) ►Facility Inspections

Fill out the following table or attach a summary of the following information. Indicate your reporting methodology below.

	X	Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
		Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Total number of inspections conducted (C.4.d.iii.(2)(a))	174
Violations, enforcement actions, or discreet number of potential and actual discharges resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner (C.4.d.iii.(2)(c))	6

Comments:

D-002837
9245

C.4.d.iii.(2)(b) ►Frequency and Type of Enforcement Conducted

Fill out the following table or attach a summary of the following information.

	Enforcement Action (as listed in ERP)[1]	Number of Enforcement Actions Taken
Level 1	Notice of Violation	6
Level 2	Administrative Complaint	0
Level 3	Administrative Order	0
Level 4	Permit Revocation	0
Total		6

C.4.d.iii.(2)(d) ► **Frequency of Potential and Actual Non**-stormwater Discharges by Business Category

Fill out the following table or attach a summary of the following information.

Business Category[2]	Number of Actual Discharges	Number of Potential Discharges
Group 1A – Categorical/Significant Industrial Users	0	0
Group 1B – Small commercial/industrial users	1	0
Group 2 – Food service establishments	5	0

C.4.d.iii.(2)(e) ►**Non**-Filers

List below or attach a list of the facilities required to have coverage under the Industrial General Permit but have not filed for coverage:

There were no industries identified as non-filers during inspections this fiscal year. District inspectors verify filing status during routine inspections.

[1]Agencies to list specific enforcement actions as defined in their ERPs.
[2]List your Program's standard business categories.

D-009835
9246

C.4.e.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Industrial/ Commercial Site Inspectors in Attendance	Percent of Industrial/ Commercial Site Inspectors in Attendance	No. of IDDE Inspectors in Attendance	Percent of IDDE Inspectors in Attendance
Department meetings	Weekly	Illicit discharge detection, elimination and follow up. Urban runoff pollution prevention and inspection procedures.	3	100	3	100

Comments:

D-002839
9247

Appendix 4-1

Business Name	Address	Street(Phys Location)	Suite/Unit#
1 For All Smog	320	Nebraska St	B
3 J's Oriental Market	956	Admiral Callaghan Ln	
3 J's Oriental Market	5201	Sonoma Blvd	17
3 Sistas (closed)	324	Mini Dr	
3 Star Restaurant	4380	Sonoma Blvd	357
360 Garage	4345	Sonoma Blvd	C3
7 Flags Car Wash	2020	Springs Rd	
7 Flags Car Wash	135	Valle Vista Ave	
777 Bingo	777	Sereno Dr	
7-Eleven	2255	Tennessee St	1
A 1 Smog	2707	Sonoma Blvd	
A-1 Collision	970	Broadway St	
AAMCO	3580	Sonoma Blvd	
Acapulco Mufflers & Auto Repair	36	California St	A+B
Adams Tire Service	1018	Alabama St	
AJ's Auto	451	Ryder St	
AK Auto Repair	1341	Lemon St	B
Alco Iron & Metal	321	Azuar Drive	
American Canyon Landfill	End of	Eucalyptus Dr.	
American Quality Used Cars	3268	Sonoma Blvd	
Anchor Café	201	Walnut Ave	
Andrea Foods	1109	Maple St	
Annie's Panda Garden	320	Fairgrounds Dr	
Applebee's	1041	Admiral Callaghan Ln	
Arrowhead Towing	2020	Broadway St	
AT & T	730	Carolina St	
Auto Body Ortiz	1384	Lemon St	
Auto Care (Enzo Auto Corp)	2229	Sonoma Blvd	
Auto Connection	1212	Springs Rd	
Auto Kingz	540	Tennessee St	
Autoelektrik Repair	1378	Lemon St	
Autolinx	4325	Sonoma Blvd	
Automatic Transmission Plus	1511	Sonoma Blvd	
Autosport II	2040	Ohio St	A
Autozone	730	Admiral Callaghan Ln	
Autozone	3020	Sonoma Blvd	
Avery Greene Honda	800	Admiral Callaghan Ln	
Avis Rent-A-Car	1861	Solano Ave	
AZN Motorsport	600	Lincoln Rd East	
B & G Tires	301	Couch St	
B & J Food and Liquor (closed)	1815	Sonoma Blvd	
B & L Auto Sales	918	Pennsylvania St	C
Bag o Crab	165	Plaza Dr.	
Bambino's	301	Georgia St	122
Bangkok Island Thai Fusion	153	Plaza Dr	107
Barajas Tire Shop	600	Broadway St	

Baskin Robbins	5182	Sonoma Blvd	
Baskin Robbins	1658	Tennessee St	
Bay Auto Collision Repair & Towing	515	Tennessee St	
Bayshore Materials, Inc.	512	Solano Avenue	
Bazaar Wholesale	4380	Sonoma Blvd	250
Benicia Towing	1340	Lemon St	
Bert Williams and Sons (BWS)	3032	Sonoma Blvd	
Big Italian Pizzeria	3335	Sonoma Blvd	
Black Angus	124	Plaza Dr	
Black Bear Diner	980	Admiral Callaghan Ln	
Blazin Fish and Chips	3730	Sonoma Blvd	
Blue Rock Springs Golf Course	660	Columbus Pkwy	
Bob's Mobil Repair	1081	Sonoma Blvd	
Bob's Tow Service	1112	Beach St	
Brothers Marques Auto Repair	4345	Sonoma Blvd	C2
Bucio's Auto Body	210	Commercial St	
Bud's Burgers	3849	Sonoma Blvd	
Bulacan Bakery	2143	Springs Rd	24B
Burger King	1	Mariposa St	
Burger King	3606	Sonoma Blvd	
Buttercup Grill & Bar	3288	Sonoma Blvd	
Cabalen Bakeshop & Restaurant	5201	Sonoma Blvd	3
Café 22	138	Tennessee St	
Café Rock	655	Columbus Pkwy	
Caliber Collision	3267	Sonoma Blvd	
California Best Smog	181	Couch St	
California Highway Patrol	1551	Benicia Rd	
California Maritime Academy	200	Maritime Academy Dr	
California National Guard	200	Bennett Ave	
CALTRANS, Vallejo Maint Station	1700	Lewis Brown Dr	
Car Hop Auto Sales	1401	Sonoma Blvd	
Car O Sell	1500	Solano Ave	
Cardenas Markets	2107	Solano Ave	
Carl's Jr. Restaurant	10	Sage St	
Carl's Jr. Restaurant	3897	Sonoma Blvd	
Carnitas El Rincon	818	Tennessee St	
Carnitas El Rincon (closed)	1655	Tennessee St	
CarOsell Motors	1501	Solano Ave	
Caspian Auto Center	1201	Tennessee St	
Central Auto Repair	2224	Sonoma Blvd	
Century Theatres	109	Plaza Dr	
Characters Saloon	315	Tennessee St	
Chef D by the Bay	526	Tuolumne St	
Chely's Restaurant	1030	Tennessee St	
Chevron	223	Fairgrounds Dr	
Chevron	2100	Springs Rd	
Chevy's Fresh Mex	157	Plaza Dr	

Chicken Express	1075	Redwood St	
Chick-fil-A	1191	Admiral Callaghan Ln	
Chico's Auto Repair	322	Lemon St	
China Barn	320	Tuolumne St	
China Café	414	Georgia St	
China Wok	512	Sacramento St	
Chipotle Mexican Grill	1195	Admiral Callaghan Ln	
Chowking	3495	Sonoma Blvd	
Chris's Club	656	Benicia Rd	
Christian Help Ctr	2166	Sacramento St	
Church's Chicken	1920	Solano Ave	
Chuy's Auto / R&S	407	Lemon St	
City Lights Cafe & Catering	1515	Tennessee St	
City of Vallejo Maintenance yard, MI	535	Walnut x Connolly (Bldg. 535, MI)	
CJ's BBQ and Fish	4380	Sonoma Blvd	365
Coconut Grove	905	Lincoln Rd, East	
Cold Stone Creamery	173	Plaza Dr	1007
Combo Express	42	Springstowne Ctr	
Copart	282	5th St	
Copart Insurance Pool	282	Fifth St	
Cordeiro Vault Company	281	Fifth St.	
Cordeiro Vault Company	495	Ryder St.	
Costco Wholesale and Gas Station	198	Plaza Dr	
Courtyard Marriott	1000	Fairgrounds Dr	
Crown Hill Materials	1888	Broadway	
Customized Services	2206	Springs Rd	
Cynt Sammiche'z & Mo	310	Mini Dr	
D & F Auto Body	426	Mississippi St	
Dairy Queen Freeze	2120	Springs Rd	
Denny's Restaurant	250	Fairgrounds Dr	
Denny's Restaurant	4355	Sonoma Blvd	
Dickey's BBQ	972	Admiral Callaghan Ln	F
Diverse Autoworx	4345	Sonoma Blvd	C1
Divinci Motors	1600	Sonoma Blvd	
DJ Bibingkahan Restaurant	3555	Sonoma Blvd	
Domino's Pizza	100	Robles Way	5
Domino's Pizza	1776	Tuolumne St	
Dough Boy Donuts	4380	Sonoma Blvd	128
Dulceria La Rosa	738	Sonoma Blvd	
E Auto Body	173	Couch St	
Eagle Tire	700	Broadway St	
Earl Scheib	115	Couch St	
El Emperador Restaurant	541	Benicia Rd	
El Nopal	406	Virginia St	
El Rancho Viejo	1906	Broadway St	
El Tesoro Mazatian	658	Benicia Rd	

Elk's Lodge (closed)	2850	Redwood St	
Empire Buffet	3585	Sonoma Blvd	
Englebrecht Tow	1627	Lewis Brown Dr	
Enterprise	3273	Sonoma Blvd	
Enterprise Rent-A-Car	3270	Sonoma Blvd	
Enterprise Truck Rental	3271	Sonoma Blvd	
ESV Collision Center	112	Couch St	
Expedition Imports Corporation	1335	Lemon St	
Express Auto Upholstery	850	Redwood St	E
Express Smog Station	320	Couch St	D
Express Tire Service	300	Benicia Rd	
EZ West Coast Autos	875	Nimitz Ave	5
Fairgrounds Chevron	10	Sage St	B
Farragut Inn (Touro University)	1750	Club Dr	
Filipino Community Center	611	Amador St	
Filipino Community Center (old)	820	Sonoma Blvd	
Fire Wings	137	Plaza Dr.	303
Five Star Burger	1015	Redwood St	
Flamingo Banquet Hall	910	Lincoln Rd, East	
Florence Douglas Senior Center	333	Amador St	
Food 4 Less (closed)	5184	Sonoma Blvd	
Food Basket	1694	Broadway	
Foodmaxx	1740	Tuolumne St	
Foreign Car Center	3021	Sonoma Blvd	
Forklift Mobile	1110	Railroad Ave	
Fred & Son's	1975	Broadway St	
Fresh & Natural Café (Kaiser)	975	Sereno Dr	
Front Room at the Wharf	295	Mare Island Way	
Frymazing	601	Tennessee St	
G & C Auto Body	1833	Solano Ave	
G & M Foreign Car Repair	1921	Sonoma Blvd	
G.V.R.D. (Greater Vallejo Rec District)	395	Amador St	
Gas Pedal Garage	2030	Sacramento St	
Gene's Auto Repair	37	Tennessee St	
George Beavis Machine Shop	405	Sutter St	
George's Towing	1055	Sonoma Blvd	
Ghiringhelli Specialty Foods	101	Benicia Road	
Giant New York Pizza	2564	Springs Rd	B
Gibb's Tow Service	1832	Broadway St	
Glen Cove Marina	2000	Glen Cove Rd	
Gmp Cars	850	Redwood St	D
Golden Piston Auto Center	209	Commercial St	
Golden State Auto Group	875	Nimitz Ave	3
Golden State Motorz	875	Nimitz Ave	4
Golden Tires and Wheels	4	Wilson Ave	
Goldilocks Bake Shop (closed)	3885	Sonoma Blvd	
Gonzalez' Mexican Restaurant	2164	Springs Rd	

Good Day Café	314	Georgia St	
Graceful Cookie Company	145	Valle Vista Ave	K
Gracie's	1801	Sonoma Blvd	
Green Gas	1610	Fairgrounds Dr	
Grocery Outlet	66	Admiral Callaghan Ln	
Guanajuato Grill, Deli & Bakery	1652	Fairgrounds Dr	
Guanajuato Market	18	Laurel St	
Habit Burger	118	Plaza Dr	
Hacienda De Valle (closed)	1400	Tennessee St	
Harry's H.D. Cycle Repair	420	Marin St	
Haute Dogs Boutique & Bakery	507	Georgia St	
Hertz	850	Redwood St	A
Hiddenbrooke Club House	1095	Hiddenbrooke Pkwy	
Hiddenbrooke Golf Club	1095	Hiddenbrooke Pkwy	
Home Depot	1175	Admiral Callaghan Ln	
Hop Hings	3748	Sonoma Blvd	
House of Soul	1526	Solano Ave	
Hummingbird Bakery & Desserts	2037	Springs Rd	
Hybridworks Automotive	221	Commercial St	
Icon Auto Group	1922	Broadway St	2
Ideal Body Shop	503	Maine St	
Ihaw Ihaw	40	Springstowne Ctr	
IHOP	114	Plaza Dr	
Ike's Love & Sandwiches	137	Plaza Dr	315
Impact Automotive	1717	Broadway St	
In-n-Out Burgers	720	Admiral Callaghan Ln	
Island Pacific Supermarket	2110	Springs Rd	24
J & J Motors	1920	Broadway St	
J & M Mississippi Barbeque	2909	Sonoma Blvd	
J & N Auto Body	1933	Broadway St	
J & O's Market & Deli	8340	Bennington Ct	
Jack In The Box	35	Admiral Callaghan Ln	
Jack In The Box	400	Broadway	
Jack In The Box	1610	Lewis Brown Dr	
Jalapenos Mexican Food	5201	Sonoma Blvd	27
Java Jax	1700	Sonoma Blvd	
Javie's Cakes	623	Tennessee St	
Jeffco	1260	Railroad Avenue	
Jiffy Lube	4300	Sonoma Blvd	800
JJ's Fish & Chicken	515	Fairgrounds Dr	
JN Autobahn Car Repair	1719	Broadway St	
JNJ Auto Body	1903	Broadway St	
Joana Restaurant (closed)	320	Mini Dr	
Joe's Automobile	711	Tennessee St	
Joe's Automotive	36	California St	G
Johny's Tires	500	Tuolumne St	
Jollibee	3495	Sonoma Blvd	E

Joy of Eating	1828	Springs Rd	
J'S Garden Restaurant	134	Robles Way	
Kaigan Sushi	2138	Springs Rd	
Keepin' It Island	3730	Sonoma Blvd	
Kehaulani's Café	38	Admiral Callaghan Ln	
Kentucky Fried Chicken	1300	Georgia St	
KFC/A&W	2150	Redwood St	
Kiewit	96	Solano Avenue	
King Alberts BBQ	26	Tennessee St	
King's Meat & Fish	1624	Fairgrounds Dr	
King's Tires & Wheels	1845	Springs Rd	
Klimisch's. Inc.	285	Couch St	
Krispy Krunchy Chicken	2180	Springs Rd	
Kwik Serv	2601	Springs Rd	
Kwongnan Restaurant	405	York St	
L & L Hawaiian Barbecue	4300	Sonoma Blvd	724
La Cabanita (closed)	3335	Sonoma Blvd	
La Costa Del Sol Taqueria	480	Redwood St	32
La Michoacana	504	Broadway St	
La Raza Tire Sales	205	Benicia Rd	
Lam's Auto Repair	300	Tennessee St	
Lao-Mien Automotive	33 1/2	Tennessee St	
Las Palmitas #2	301	Nebraska St	
League of Chefs	300	Virginia St	
Lee's Garden Restaurant	3335	Sonoma Blvd	10
Les Schwab	3301	Sonoma Blvd	
Lew's Brake Shop & Auto Repair	1865	Benicia Rd	
Liled's Candy Kitchen	1318	Tennessee St	
Lind Marine Inc.	1250	Nimitz Ave.	
Lipsey's Muffler & Tire	2316	Sonoma Blvd	
Little Caesar's Pizza	2813	Redwood Pkwy	
Little Maya Bakery	985	Broadway	
Lola's Market	5201	Sonoma Blvd	7
Los Amigos Auto	2136	Sacramento St	
Los Amigos Tire & Service	320	Nebraska St	C
Los Arquitos	630	Broadway	
Los Bertos	991	Redwood St	
Los Molcajetes	901	Redwood St	
Lucky Garden	860	Tuolumne St	
LV Vietmanese	2621	Springs Rd	
M F Maher - Corp Yard	490	Ryder St	
Maaco	610	Broadway St	
Mach 1 Motor Sports	510	Couch St	
Maggie's Hamburgers	700	Benicia Rd	
Main Street Auto	1515	Sonoma Blvd	
Manila Sunrise	2110	Springs Rd	
Manuel's Auto Body & Paint	11	Cypress Ave	

Mare Island - Golf Course	1800	Club Dr	
Mare Island Brewing Co.	851	Waterfront Ave.	
Mare Island Dry Dock, LLC	1180	Nimitz Ave.	
Mare Island Taproom	289	Mare Island Way	G
Margaritas Mexican Restaurant (closed)	901	Redwood St	
Marin Smog	1500	Sonoma Blvd	
Mariscos Autlan	1900	Broadway St	
Market Town Deli	1653	Tennessee St	
Mathews & Sons	37	Sheridan St	
Mathews & Sons Auto Repair	37	Sheridan	
Matsuri Sushi	480	Redwood St	20
Max's Towing	6	Canterbury Cir	
Maya Thai House	3624	Sonoma Blvd	
McDonald's Restaurant	902	Admiral Callaghan Ln	
McDonald's Restaurant	170	Lincoln Rd, East	
McDonald's Restaurant	416	Lincoln Rd, East	
McDonald's Restaurant	3289	Sonoma Blvd	
McDonald's Restaurant	5200	Sonoma Blvd	
McDonald's Restaurant	2565	Springs Rd	
Menchies Frozen Yogurt	972	Admiral Callaghan Ln	G
Meta Design & Manuracturing Inc	1172	Railroad Ave	202/204
Meyer's BBQ	306	Georgia St	
Mi Jacalito	105	Couch St	
Mi Jalisco	1400	Tennessee St	
Mi Ranchito Market	2710	Sonoma Blvd	
Michael Warring	8300	Bennington Dr	
Michael’s Transportation	140	Yolano Dr.	
Michael's Transportation Service	140	Yolano Dr	
Midori Japanese Cuisine	3440	Sonoma Blvd	
Mike Rose Auto Body	3211	Sonoma Blvd	
Mike's Magic Detailing	600	Broadway St	
Miko's (closed)	524	Tuolumne St	
Milt's Service Garage	515	Tuolumne St	
M-J Auto	1937	Solano Ave	
MOD Pizza	163	Plaza Dr	
Momo's Café	402	Georgia St	
Monument Car Parts	4287	Sonoma Blvd	
Moose Boats	1175	Nimitz Ave	
Moose Lodge	337	Nebraska St	
Morgen's Kitchen	1922	Broadway St	5
Morri's Union 76	1300	Sonoma Blvd	
Moschetti Café	925	Marin St	
Moschetti Inc	11	Sixth St	
Mountain Mike's Pizza	972	Admiral Callaghan Ln	D
My Homestyle Café	523	Marin St	
Napa Auto Parts	2999	Sonoma Blvd	
Napa Smith Brewery	101	Yolano Dr.	

Napoli Pizzeria	124	Tennessee St	
National Auto & Truck Dismantlers	38	California St	
Nations Giant Burger	2525	Sonoma Blvd	
Ned's Auto Body Supply	1615	Lewis Brown Dr	
Noonie's Place 707	301	Georgia St	
Norcal Building Materials	945	Maine St.	
Norcal Tire & Auto Service	7	Alameda St	
North Bay Operations Maint.	1050	Nimitz Ave.	
North Bay Retirement Community	2261	Tuolumne St	
Northbay Transit Group	95	Alameda St	
NY	605	Tennessee St	
OCM Auto	3291	Sonoma Blvd	
Oil Changers	794	Admiral Callaghan Ln	
Olive Garden	1176	Admiral Callaghan Ln	
Olympic Auto Repair & Muffler	225	Broadway St	
O'Reilly Auto Parts	1844	Springs Rd	
Pacific Gas & Electric	303	Carlson St	
Pacifica Pizza	1332	Lincoln Rd, East	
Pan Dulce Bakery (closed)	1749	Broadway St	
Panama Bay Coffee	289	Mare Island Way	
Panda Express	972	Admiral Callaghan Ln	B
Panera Bread	123	Plaza Dr	
Patrick's Famous Pies (closed)	1524	Sonoma Blvd	
PCSD Charter School	500	Oregon St	
Pedro's Motors	630	Tennessee St	C
Peking Express	1774	Tuolumne St	
Pep Boys	128	Plaza Dr	
Performance Motors	433	Maine St	
Phil House	2110	Springs Rd	24 A
Phillips Enterprises	275	Mini Dr	
Pho 1	3885	Sonoma Blvd	
Pho Huong Viet	5201	Sonoma Blvd	37
Pho Lee Hoa Phat 3	102	Springstowne Ctr	
Pho Lee Hoa Phat II	3495	Sonoma Blvd	H
Pho Saigon Village Noodle House	3636	Sonoma Blvd	
Pho Vallejo Noddle House	908	Admiral Callaghan Ln	
Picnicky's Sandwich Shop	3833	Sonoma Blvd	
Pinoy Fried Oriental Store	1810	Springs Rd	
Pizza Guys	2255	Tennessee St	3
Pizza Hut	905	Broadway	
Pizza Hut	2305	Springs Rd	
Pizza vs Burrito	1201	Georgia St	
Popeye's Chicken	4380	Sonoma Blvd	400
Popeye's Chicken	2631	Springs Rd	
Powersports of Vallejo	111	Tennessee St	
Precision Service Center	3424	Sonoma Blvd	B
Princess Garden	960	Admiral Callaghan Ln	

Pro Auto Care	1799	Solano Ave	
Puerto Vallarta Auto Shop	318	Lemon St	
Pupuseria Mercy	333	Tennessee St	
Q's Halal	48	Springstowne Ctr	
Quality Smog	1624	Broadway St	
Quality Used Motors & Parts	120	Stewart St	
Quickly	145	Plaza Dr	205
R & R Automobile	610	Tennessee St	
R & R Maher Const Inc. Corp. Yard	1324	Lemon St	
R & R Tire & Brake	1	Alameda St	
R & R Towing	420	Pennsylvania St	
R & S Auto Sales	1400	Lemon St	B
R&K AUTO RESORATION	1007	Branciforte	
RAD AUTOS	111	Contra Costa	
Rafael's Catering	616	Nebraska St	
Raley's Food Store (closed)	4300	Sonoma Blvd	
Reactions Sports Bar (closed)	1120	Broadway St	
Ready Refresh by Nestle	1133	Enterprise St.	
Recology	2021	Broadway	
Recycle Zone	1973	Broadway St.	
Red Lobster	1180	Admiral Callaghan Ln	
Red Ribbon Bakeshop	3595	Sonoma Blvd	I
Red's Auto Repair and Service	2030	Sonoma Blvd	
Regal Collision Repair	529	Tuolumne St	
Restaurant (closed)	1220	Monterey St	
Rickshaw Express	4300	Sonoma Blvd	716
Ride on Motorcycles	1416	Sonoma Blvd	
Rinconcito Salvadoreno	2200	Redwood St	
Rival Garage	320	Couch St	A
RL Carriers BNC	1660	Lewis Brown Dr.	
Road Star Motors	1260	Georgia St	
Rose's Collision Repair	187	Couch St	
Round Table Pizza	750	Admiral Callaghan Ln	
Round Table Pizza	2633	Springs Rd	
Route Zero	1903	Broadway St	
Royal Jelly Donuts	732	Tuolumne St	
Royal Jelly Donuts	1794	Tuolumne St	
Rubio's	173	Plaza Dr	1005
Ruthie's Caribbean Kitchen	2632	Sonoma Blvd	
RZ Autoz	710	Tuolumne St	
S G Smog Check Center	205	Couch St	A
Sac's Tasty Hot Dogs	2445	Springs Rd	
Safeway Stores	774	Admiral Callaghan Ln	
Safeway Stores	709	Lincoln Rd, West	
Safeway Stores	122	Robles Way	
Saint Basil's School	1230	Nebraska St	
Salvation Army	630	Tuolumne St	

Sardine Can	0	Harbor Way	
Save Big Auto Sales	3266	Sonoma Blvd	
Save More Tires	948	Georgia St	
Scotty's Café	1645	Tennessee St	
Seafood City Supermarket	3495	Sonoma Blvd	
Select Auto Repair	850	Redwood St	F
Selecta Market & Restaurant	58	Springstowne Ctr	
Seret Hot Rods & Customs	1400	Lemon St	A
Serg Auto repair	3430	Sonoma Blvd	A-C
Sharetea	153	Plaza Dr	103
Shell & Car Wash	1604	Lewis Brown Dr	
Shell Station	708	Admiral Callaghan Ln	
Simple Thai	907	Tennessee St	
Six Flags Discovery Kingdom	1001	Fairgrounds Dr.	
Solano Community College (Vehicle)	1687	North Ascot Pkwy	
Solano County Auto Center	1329	Virginia St	
Solano County Fairgrounds	900	Fairgrounds Dr	
Solano County Transit	1850	Broadway St	
Solano Tires & Wheels	720	Florida	
SolTrans	1850	Broadway	
Sonoma Auto Collision	3330	Sonoma Blvd	
Sonoma Auto Electric	1518	Sonoma Blvd	
Sonoma Auto Tech	1507	Sonoma Blvd	
Sonoma Meat Market	2723	Sonoma Blvd	
Sonoma Tire Center	1412	Sonoma Blvd	A
Soul Trans Seafood	651	Broadway	
SoulTran's Seafood	651	Broadway St	
Speedee Lube	1675	Tuolumne St	
Springs Rd Health Care	1527	Springs Rd	
Squeaky Clean Car wash	480	Benicia Rd	
Stara Indian Cuisine (closed)	742	Admiral Callaghan Ln	
Starbread Bakery	3718	Sonoma Blvd	
Starbucks	974	Admiral Callaghan Ln	
Starbucks	408	Lincoln Rd, East	
Steak House	1321	Springs Rd	
Stefano's (closed)	2272	Sacramento St	
Street Image Wraps	320	Nebraska St	A
Subway	879	Redwood St	
Subway	1745	Sonoma Blvd	
Subway Sandwiches	968	Admiral Callaghan Ln	
Subway Sandwiches	199	Lincoln Rd, West	
Subway Sandwiches	2089	Solano Ave	
Subway Sandwiches	2045	Springs Rd	
Subway Sandwiches	1780	Tuolumne St	B
Subway Sandwiches	170	Robles Way	
Subway Sandwiches (closed)	4380	Sonoma Blvd	114
Sunflower Bakery (closed)	1500	Sycamore Ave.	

Sunrise Hawaiian BBQ & Ramen	3570	Sonoma Blvd	
Sunshine Smoothies & Coffee	821	Wilson Ave	
Suruki's Sushi & Teriyaki Grill	145	Plaza Dr	201
Sushi Grill	5184	Sonoma Blvd	340
Sutter Solano Medical Ctr	300	Hospital Dr	
Syar Industries, Lake Herman Quarry	885	Lake Herman Road	
Szechuan Chinese Cuisine	2079	Solano Ave	
Taco Bell	2033	Solano Ave	
Taco Bell	3600	Sonoma Blvd	
Tacoholic Taqueria	249	Benicia Rd	
Taco's Jalisco	3420	Sonoma Blvd	
TAJ Auto Group	3300	Sonoma Blvd	
Taj Grill	758	Admiral Callaghan Ln	
Taqueria La Rosa (closed)	1530	Sonoma Blvd	
Taqueria Los Amigos	5184	Sonoma Blvd	
Team Chevy\Buick\Hyundai	301	Auto Mall Pkwy	
Tender Fork Market	451	Ryder St	B
Texaco (G&M Oil)	333	Curtola	
The Cheese Steak Shop	764	Admiral Callaghan Ln	
The Coffee Curb	53	Admiral Callaghan Ln	
The Galley Café (closed)	2012	Glen Cove Rd	
The Grind	402	Tuolumne St	
The Lighthouse	2000	Glen Cove Marina Rd	
The Loft Thai & Sushi Bar	8308	Bennington Ct	
Timet	403	Ryder St.	
Tire and Wheel Depot	1601	Springs Rd	
Tire Tech & Installation	1301	Georgia St	
Tires Direct	3200	Sonoma Blvd	
Togo's Eatery	3455	Sonoma Blvd	
Tommy's Auto Repair	1605	Solano Ave	
Tomra Recycling	1973	Broadway St.	
Tony's Cakes	1833	Springs Rd	A
Tony's Furniture Refinishing	345	Tennessee St	
Tortilleria Pinto	1717	Sonoma Blvd	
Toscalito Tire & Automotive	850	Redwood St	B
Toyota Vallejo	201	Auto Mall Pkwy	
Transmission Discount Center	825	Redwood St	
Transport Products Unlimited	225	Bennett Ave	
Triton Truck Repair	115	E St	757
Tuolumne Auto Repair	625	Tuolumne St	
U-Haul	400	Benicia Rd	
U-Haul	2050	Solano Ave	
U-Haul / Auto repair	1361	Lemon St	
Uncle Born Auto	4345	Sonoma Blvd	A5
Uncle Sam's Restaurant	785	Sereno Dr	
Unlimited Collision Repair	1375	Lemon St	
Upgrade Motorz	3270	Sonoma Blvd	B

Upstate Motors	1101	Tennessee St	
Urban Counter	1339	Springs Rd	
US Army Reserves 63rd RSC	120	Mini Dr	
US Coast Guard	1	Harbor Way	
Vaishnu Express Café (VEC)	4380	Sonoma Blvd	135
Val Nap	444	Broadway	
Valcore Recycling Center	38	Sheridan St.	
Vale Auto Sales	875	Nimitz Ave	2
Valerio's Tropical Bakeshop	3495	Sonoma Blvd	B
Vallejo Boat Works	1	Harbor Way	
Vallejo Broadway Auto Repair	850	Broadway St	
Vallejo Building Materials,	909	Sonoma Blvd.	
Vallejo Car Care Center	320	Mississippi St	
Vallejo Car Wash	1	Admiral Callaghan Ln	
Vallejo City Taxi	289	Fifth St	
Vallejo Detail Center	200	Tennessee St	
Vallejo Ferry Service, Berth 4, MI	477	Waterfront Ave	
Vallejo Fire Extinguisher	617	Solano Ave	
Vallejo German Car Clinic	614	Tuolumne St	
Vallejo Great Donuts	630	Tennessee St	A,B,D
Vallejo Jelly Donut	762	Admiral Callaghan Ln	
Vallejo Jelly Doughnut	2300	Sonoma Blvd	1
Vallejo Marina	42	Harbor Way	
Vallejo Motors	3002	Sonoma Blvd	
Vallejo Nissan	3287	Sonoma Blvd	
Vallejo Pizza	3720	Sonoma Blvd	
Vallejo Salvage Company	437	Pennsylvania St	
Vallejo Smog Dog	1921	Sonoma Blvd	B
Vallejo Smog Test	3424	Sonoma Blvd	C + D
Vallejo Tires and Wheels	103	Central St	
Vallejo Unified School District	211	Valle Vista Ave	
Vallejo USD Bus Maintenance	501	Oregon St.	
Vallejo Yacht Club	485	Mare Island Way	
Vallejo, City of, Maintenance yard	111	Amador St	
Valrey Auto Repair	440	Arkansas St	
Vangs Auto Sales	875	Nimitz Ave	6
Vargas Market	5201	Sonoma Blvd	
Verns Rods & Restoration	1495	Lemon St	
Vero's (closed)	2907	Sonoma Blvd	
Vibratex	1645	Lewis Brown Dr	
Vik's WheelHouse	295	Mare Island Way	
Walmart Neighborhood Market	701	Sereno Dr	
Warehouse of Cars	1341	Lemon St	A
Wendy's	1001	Redwood St	
West Coast Auto Repair	1696	Broadway St	
Weston Solutions	750	Dump Rd.	
Wheel Works	3560	Sonoma Blvd	

Wing Fling (closed)	2143	Springs Rd	
Wing Stop	972	Admiral Callaghan Ln	E
Woody's Auto	311	Tennessee St	
Yellow Cab Company	95	Alameda St.	
Yes my Sweet BBQ & Catering	2820	Sonoma Blvd	
Yo Sushi	100	Robles Way	
Zee's Quality Motors	1101	Tennessee St	
Zio Fraedo's	23	Harbor Way	

Section 5 – Provision C.5 Illicit Discharge Detection and Elimination

Program Highlights and Evaluation Highlight/summarize activities for reporting year:
Provide background information, highlights, trends, etc.
Summary: In this reporting period, 60 potential or actual illicit discharges were investigated by the District. The District continues to implement our collection system screening and cleaning program. During the reporting period, approximately 2715 storm drain catch basins were inspected and 26 required cleanings. The District works collaboratively with Solano County, the City of Vallejo and various other agencies when additional assistance is needed to address an illicit discharge.

C.5.c.iii ►Complaint and Spill Response Phone Number		
(For the FY 2019-20 Annual Report only) Provide the following information:		
List below or attach your complaint and spill response phone number		
707-644-8949 (24 hours) or 707-652-7813 (business hours)		
Provide your complaint and spill response web address, if used		
https://www.vallejowastewater.org/SitePages/report_an_overflow.aspx https://www.vallejowastewater.org/SitePages/report_a_problem.aspx		
Is a screen shot of your website showing the central contact point attached?	X Yes	No
If No, explain:		
Provide a discussion of how the central contact point (complaint and spill response phone number and, if used, web address) is being publicized to your staff and the public.		
For the public, the District places "Call us first" ads in the Yellow Pages, runs articles out lining how to report a storm drain complaint several times a year in the District newsletter and the "Report a storm drain violation" button is on the main page of the District website. The District also maintains a stormwater pollution prevention webpage which has useful general information for the public. Staff are informed during all-hands meetings and department meetings.		

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C.5.d.iii.(1), (2), (3) ►Spill and Discharge Complaint Tracking

Spill and Discharge Complaint Tracking (fill out the following table or include an attachment of the following information)

	Number
Discharges reported (C.5.d.iii.(1))	60
Discharges reaching storm drains and/or receiving waters (C.5.d.iii.(2))	16
Discharges resolved in a timely manner (C.5.d.iii.(3))	49

Comments:

Inspectors investigate reported illicit discharges as quickly as possible, often the same day. Reports are received from customer calls, referrals from other agencies and departments within the District and online reporting such as See, Click Fix. Reports are considered unsubstantiated if the inspector is unable to observe the conditions described in the report in the field. The data is recorded on an illicit discharge/incident response from used by inspectors in the field, which records the reported pollutant as well as the observed pollutant (or lack of a pollutant if the report is found to be unsubstantiated). Data is also recorded on this form to denote whether or not an actual, substantiated discharge reached storm drains/receiving waters. Of the discharges not resolved in a timely manner, several were delayed due to the need to coordinate with another agency and others took longer to resolve due to uncooperative residents.

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Vallejo Sanitation & Flood Cont

vallejowastewater.org/SitePages/report_a_problem.aspx

Apps | National Weather S... | View Document - C... | CDX Home | Centra... | California Integrate... | Sign-In CERS Busin... | eCFR :: Code of Fe... | CNRFC - Weather -... | TargetSolutions | VSFCD Plant Data | Google | PIR-101 New or Re... | Safety-Kleen | Cust...

Vallejo FLOOD & WASTEWATER DISTRICT

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WHAT WOULD YOU LIKE TO DO?

- Report a flood or sewer backup
- I am a customer and I want to:
- I want to submit a bid or proposal
- I am building or remodeling
- I have a business
- I am seeking a job
- Report a storm drain violation
- Prevent stormwater pollution
- Meetings and agendas

I want to report a problem

Sewer Overflow

Call us first, at (707) 644-8949. If you have a sewer backup or overflow, let us inspect it before you call a plumber. If the problem is in the District's part of the line, we will take care of it. If you require a plumbing repair because the problem is in your sewer lateral, we may be able to offset the cost, if you apply for and are approved in advance through our Upper Lateral Program.

Storm Drain Violation

Only rain should flow down the storm drain. If you see someone putting something else in a storm drain, please call us immediately at (707) 644-8949. To reach our stormwater program coordinator during regular business hours, call (707) 652-7813. For more information on our stormwater program and issues relating to stormwater pollution, click here.

Billing Problems

Billings problems include lost or missing bill, property ownership has changed, or you have received notice of a lien, and more. Get help here.

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Section 6 – Provision C.6 Construction Site Controls

C.6.e.iii.(3)(a), (b), (c), (d) ►**Site/Inspection Totals**			
Number of active Hillside Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii.3.a)	Number of High Priority Sites (sites disturbing < 1 acre of soil requiring storm water runoff quality inspection) (C.6.e.iii. 3.c)	**Number of sites disturbing ≥** 1 acre of soil (C.6.e.iii.3.b)	**Total number of storm water runoff quality** inspections conducted (include only Hillside Sites, High Priority Sites and sites disturbing 1 acre or more) (C.6.e.iii. 3.d)
Comments: See City of Vallejo Annual Report for activities related to C.6			
Provide the number of inspections that are conducted at sites not within the above categories as part of your agency's inspection program and a general description of those sites, if available or applicable. See City of Vallejo Annual Report for activities related to C.6			

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C.6.e.iii.(3)(e) ►**Construction Related Storm Water Enforcement** Actions

	Enforcement Action (as listed in ERP)[1]	**Number Enforcement Actions Issued**
Level 1[2]		See City of Vallejo Annual Report for activities related to C.6
Level 2		
Level 3		
Level 4		
Total		

C.6.e.iii.(3)(f), ►**Illicit Discharges**

	Number
Number of illicit discharges, actual and those inferred through evidence at hillside sites, high priority sites and sites that disturb 1 acre or more of land (C.6.e.iii. 3.f)	N/A

C.6.e.iii.(3)(g) ► Corrective Actions

Indicate your reporting methodology below.

- ☐ Permittee reports multiple discrete potential and actual discharges at a site as one enforcement action.
- ☐ Permittee reports the total number of discrete potential and actual discharges on each site.

	Number
Enforcement actions or discrete potential and actual discharges fully corrected within 10 business days after violations are discovered or otherwise considered corrected in a timely period (C.6.e.iii. .3.g)	

Comments: See City of Vallejo Annual Report for activities related to C.6

[1]Agencies should list the specific enforcement actions as defined in their ERPs.
[2]For example, Enforcement Level 1 may be Verbal Warning.

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C.6.e.iii.(4) ►Evaluation of Inspection Data

Describe your evaluation of the tracking data and data summaries and provide information on the evaluation results (e.g., data trends, typical BMP performance issues, comparisons to previous years, etc.).

Description:
See City of Vallejo Annual Report for activities related to C.6

C.6.e.iii.(4) ►Evaluation of Inspection Program Effectiveness

Describe what appear to be your program's strengths and weaknesses, and identify needed improvements, including education and outreach.

Description:
See City of Vallejo Annual Report for activities related to C.6

C.6.f.iii ►Staff Training Summary

Training Name	Training Dates	Topics Covered	No. of Inspectors in Attendance
See City of Vallejo Annual Report for activities related to C.6			

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Section 7 – Provision C.7. Public Information and Outreach

C.7.a.iii ►Storm Drain Inlet Marking

(For the FY 2019-20 Annual Report only) Provide the following information:

Please see City of Vallejo Annual Report for activities related to C.7.a.iii

State the number of municipally-maintained storm drain inlets in your jurisdiction				
Are at least 80 percent of municipality-maintained storm drain inlets legibly labeled with an appropriate stormwater pollution prevention message?		Yes		No
Is a picture of a labeled municipality-maintained inlet attached?		Yes		No
Did all newly approved privately-maintained streets have storm drain inlet markings verified prior to acceptance of the project?		Yes		No
Were the storm drain inlet markings on privately-maintained streets required to be maintained through the development maintenance entity?		Yes		No

C.7.b.i.1 ►Outreach Campaign

Summarize outreach campaign. Include details such as messages, creative developed, and outreach media used. The detailed outreach campaign report may be included as an attachment. If outreach campaign is being done by participation in a countywide or regional program, refer to the separate countywide or regional Annual Report.

The District's Stormwater Outreach Campaign focuses on two primary pollutants: trash and pesticides.
For trash, we host a number of creek cleanup events with citizens throughout the year. The largest event is Coastal Cleanup Day. The District is the lead organizer of Vallejo's CCD, which occurs on 20+ sites and over multiple days. The event has grown significantly and is well recognized throughout the city. Promotion is extensive and includes ads and press releases in the Vallejo Times-Herald, articles in neighborhood newsletters, a large electronic billboard on Interstate-80, postings on the District and City's websites as well as NextDoor, Vallejo News, District newsletter, outreach to all parents of school age students through Peachjar, posters around town and at the Vallejo campus of Solano Community College, regional radio advertising on KUIC, and through the many partnerships with other public agencies, businesses, and groups.
Other District cleanup days are held under the auspices of the Vallejo Watershed Alliance (VWA), a community-based volunteer group that the District founded and continues to support financially and with substantial staff time. The activities of the Alliance are detailed in C.7.d. The Alliance staffs a booth at outreach events such as the SF Bay Flyway Festival, the Cal Maritime Community Partner Expo, Visions of the Wild festival, and more. These events introduce the work of the Alliance to members of the community. The Alliance has a stand-alone website and an email list of nearly 900 people who receive monthly announcements of volunteer opportunities. This year, the pandemic dramatically impacted our ability to host cleanup events. We responded by creating DIY Cleanups: we told volunteers where our cleanup focus was each

month, provided cleanup kits that included trash bags, waivers, safety-focused instructions, disposable gloves, hand sanitizer, and loaned trash pickers. Volunteers reported their results via email and some sent photos of their activity. We were very pleased with the response, which grew over time.

Pesticides are addressed through the Our Water Our World program, and through the District's newsletter and website. Our Public Information Officer serves as the Chair of BASMAA's Public Information committee, and on the sub-committee that has redesigned and updated the OWOW fact sheets and collateral materials.

District customers are mailed a quarterly newsletter that covers a variety of stormwater-related issues; these newsletters are also posted on our public website. Additionally, the website hosts ongoing pages related to the stormwater program, how to prevent or report a spill, less toxic gardening, how to participate in watershed activities, etc.

The following separate report, developed by BASMAA, summarizes our regional efforts:

- Regional Supplement for Training and Outreach FY 2019-20

Further details on our outreach programs can be found herein as well as:

- Vallejo Flood & Wastewater District's Pollution Prevention Report FY 2019-20

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C.7.b.iii.2 ►Post-Campaign Effectiveness Assessment/Evaluation

Public education is critical to encouraging the changes in behavior needed to succeed at stormwater pollution reductions. VFWD's Stormwater Outreach Campaign is focused on two critical pollutants: trash and pesticides. Both pollutants are significantly impacted by public behavior and thus education and engagement are necessary in order to effect change.

The District actively educates and engages Vallejo residents throughout the year, using outreach tools such as social media, newsletter, and advertising, as well as hosting trash cleanup events as described above, and working with our local Home Depot through our IPM Advocate to reach consumers at the point of their pesticide purchases.

While behavior change is difficult to quantify, we evaluate the trash side of the campaign by tracking number of participants and amount of trash removed, and we evaluate the pesticide outreach through the feedback of our IPM Advocate, store experience, and customer comments.

We also work on a regional level with the BASMAA Public Information/Participation committee to provide consistent messaging across the Bay, and maximize the effectiveness of our outreach efforts, in both financial and staff time. Future outreach will build on current success; we will continue to drive the work of the Vallejo Watershed Alliance to engage our community in trash issues, and use the Our Water Our World partnerships to reach consumers when they are making their pesticide-buying decisions.

Description of Campaign: Advertising in the Vallejo Times-Herald and online for Coastal Cleanup Day, jumbotron advertising for Coastal Cleanup Day on I-80 at the Solano County Fairgrounds, articles in our newsletter mailed to 29,000 customers, announcements on NextDoor, enhanced regional advertising (print and social media) with others in Solano County, enhanced radio outreach on KUIC 95.3 FM, website presence for Coastal Cleanup and all volunteer cleanups, outreach to schools, scouts, churches, and other local groups.

How Effectiveness Evaluation is Implemented: We evaluate the effectiveness of the campaign by tracking the number of participants, the amount of trash and recyclables removed, and miles of creek/shorelines cleaned.

Analysis of Effectiveness Evaluation Results/Discussion of Measurable Changes in Awareness and Behavior Achieved: For Coastal Cleanup Day, we are very pleased that the number of volunteers increase, and the amount of trash decreases annually. Participation in monthly cleanups varies, but we average 12-14 volunteers per workday (see C.7.d for details). For pesticides, the IPM Advocate reports significantly increased sales of less-toxic products each year, along with increasingly better educated store staff and customers. Retailers do not like to share sales numbers, so we do not report them, but our Advocate reported a 400% increase in less-toxic products during the COVID-19 pandemic.

Coastal Cleanup Day Participants by Year:

2019 (802 volunteers)

2018 (706 volunteers)

2017 (935 volunteers)

2016 (590 volunteers)

Like many programs, we have found that trying to gather information from volunteers during cleanup events is challenging and distracting. The more we ask from them, the less likely they are to return and volunteer. Our events have many returning site captains, and many individuals and groups return to participate year after year, which is the best indication of success for these types of programs. Our task is to continue to provide meaningful ways for volunteers to contribute to a healthier Vallejo, and we do that throughout the year with a variety of activities, moving locations and tasks to keep volunteers engaged and interested. Vallejo Flood & Wastewater District, the City of Vallejo, and the Fairfield Suisun Urban Runoff Management Program are continuing to explore the potential working even more closely together during MRP 3.0 as the Solano Stormwater Program. We believe that combining resources and ideas will make the excellent programs even stronger.

C.7.c. Stormwater Pollution Prevention Education
No change.

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9271

C.7.d ►Public Outreach and Citizen Involvement Events

Describe general approach to event selection. Provide a list of outreach materials and giveaways distributed.
Use the following table for reporting and evaluating public outreach events

Event Details	Description	Evaluation of Effectiveness	
		# of Participants	Amt of Trash Removed or other result
7/2019 Park and Lake Cleanup Blue Rock Springs Park	Trash removed from lake and park; annual volunteer BBQ	12	132 gallons
8/2019 Vallejo Watershed Alliance Planning Meeting Dan Foley Park	Sarah McKibbin, Solano Resource Conservation District, worked with VWA to determine volunteer needs for second year of major habitat restoration project and trash needs at Lake Dalwigk	11	
9/2019 Visions of the Wild Festival Downtown Vallejo	Vallejo Watershed Alliance (VWA) table	200	7 signups for VWA mailing list
9/2019 Coastal Cleanup Day Various sites around Vallejo	District is lead organizer for this community event on 20+ sites throughout the city.	802	93 cubic yards (9,800 lbs.)
10/2019 Trash Removal and Post-Fire Reseeding Hanns Park	An arson fire occurred on one of our habitat restoration sites; this event removed trash and melted irrigation lines as well as reseeding with native grasses.	12	3.1 cubic yards
11/2019 Path Improvement and Creek Cleanup Hanns Park	A nature path through a VWA restoration area was improved, followed by a cleanup along Blue Rock Springs Creek.	12	252 gallons
1/2020 Restoration Planting and Cleanup Lake Dalwigk	This is the second year of the 3-year habitat restoration project at Lake Dalwigk.	15	378 gallons
1/2020 Bird Boxes Hanns Park	Maintenance of VWA-installed bird boxes and cleanup	2	26 gallons
2/2020 SF Bay Flyway Festival Vallejo Veterans Hall	VWA table at annual birding festival	85	4 email signups
2/2020 Restoration Planting and Cleanup Lake Dalwigk	More planting and cleanup along the lake.	14	378 gallons
4/2020 Second Grade Class Visit Lake Dalwigk	Two 2nd grade classes from Vallejo Charter School received a history of Lake Dalwigk lesson and did a park cleanup.	48	378 gallons

4/2020 DIY Cleanup Lake Chabot	Due to the COVID-19 pandemic, monthly cleanups were re-designed. The District provided supplies and instructions for residents to do their own cleanups and provide results.	3	75 gallons
5/2020 DIY Cleanup Rindler Creek	(see above)	3	60 gallons
6/2020 DIY Cleanups Lake Dalwigk and Lake Chabot	(see above)	12	540 gallons

C.7.e. ►Watershed Stewardship Collaborative Efforts

Summarize watershed stewardship collaborative efforts and/or refer to a regional report that provides details. Describe the level of effort and support given (e.g., funding only, active participation etc.). State efforts undertaken and the results of these efforts. If this activity is done regionally refer to a regional report.

The District continued its role as the lead agency in the Vallejo Watershed Alliance, a community-based volunteer group formed to enhance local waterways throughout the Vallejo watershed, providing support and resources for citizen and group involvement. Establishing and supporting this group helps the District fulfill its mission and adhere to regulations. It provides a form for dealing with urban water problems. The Alliance is made up of public agencies, nonprofits, and interested residents. In this report period, we have:

- Partnered with key local agencies and groups including the Greater Vallejo Recreation District, Solano Resource Conservation District, City of Vallejo, and more;
- Hosted outreach activities: tables at Visions of the Wild and the SF Bay Flyway Festival; informed elected officials, invited public participation;
- Held monthly planning meetings open to the public;
- Expanded habitat enhancement efforts;
- Hosted cleanups and/or restoration efforts on Rindler Creek, Blue Rock Springs Creek, and Lake Chabot; participated in and promoted Coastal Cleanup Day;
- Hosted an annual planning workshop to brainstorm and prioritize workday focus for the major habitat restoration effort at Lake Dalwigk with the Solano Resource Conservation District;
- Maintained the path in the Alliance's native grass meadow to protect native plants and reduce erosion;
- Worked with third graders in the Watershed Explorers program;
- Worked with District and RCD staff to support high school biomonitoring assessments;
- Created new ways to engage the public in cleaning natural areas during the COVID-19 pandemic.

Looking ahead, the Alliance will continue to engage the public in enhancing Vallejo's waterways with the help of other local groups and the RCD. Photographs and further details about the Vallejo Watershed Alliance can be found in the District's Pollution Prevention Report FY 2019-20.

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C.7.f. ►**School**-Age Children Outreach

Summarize school-age children outreach programs implemented. A detailed report may be included as an attachment.
Use the following table for reporting school-age children outreach efforts.

Program Details	Focus & Short Description	Number of Students/Teachers reached	Evaluation of Effectiveness
Watershed Explorers Grade 3	The District supported the Solano RCD's Watershed Explorers Program, which emphasizes science, hands-on and place-based learning to build understanding of local creeks and watersheds.	0	14 classes (329 students) were scheduled to attend the field trips. Unfortunately, due to COVID-19, trips were not able to take place.
Wastewater Treatment Plant Tours Grades 4 and 5	The District brings Vallejo students in grades 4-5 to the treatment plant. After a detailed wastewater tour, students learn about stormwater and their watershed using an Enviroscape and a District-developed local watershed map.	416 students and 36 adults	Students score 90% or higher on post-tour quiz. Many of our teachers are returning from prior years. Due to the pandemic, no classes were toured from March through June.
Creek Biomonitoring High School	District-funded program for high school biology students to form a bioassessment and learning program at Blue Rock Springs and Rindler Creeks.	306 students and 24 adults	
		Final Note: Annual kindergarten class visits and in-class presentations for grades 4-5 were not able to occur due to school closures. Full details about our extensive environmental programs and the ways we connected during COVID can be found in the District's Pollution Prevention Report.	

C.7.g. ►Outreach to Municipal Officials

(For FY 19-20 Annual Report only) Summarize outreach conducted to increase the overall awareness of stormwater and/or watershed messages among municipal officials.

Summary:

The District's Board of Trustees are comprised of the Vallejo City Council and one County Supervisor. During monthly meetings, stormwater messages, outreach activities, funding challenges and significant stormwater improvements are discussed.

Section 9 – Provision C.9 Pesticides Toxicity Controls

C.9.a. ►Implement IPM Policy or Ordinance

Is your municipality implementing its IPM Policy/Ordinance and Standard Operating Procedures?	X	Yes		No
If no, explain:				

Report implementation of IPM BMPs by showing trends in quantities and types of pesticides used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphates, pyrethroids, carbamates fipronil, indoxacarb, diuron, and diamides. A separate report can be attached as evidence of your implementation.

Trends in Quantities and Types of Pesticide **Active Ingredients** Used[1]

Pesticide Category and Specific Pesticide **Active Ingredient** Used	Amount[2]					
	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Organophosphates						
Active Ingredient Chlorpyrifos	0	0	0	0	0	
Active Ingredient Diazinon	0	0	0	0	0	
Active Ingredient Malathion	0	0	0	0	0	
Pyrethroids (see footnote #57 for list of active ingredients)						
Active Ingredient Type X	0	0	0	0	0	
Active Ingredient Type Y	0	0	0	0	0	
Carbamates						
Active Ingredient Carbaryl	0	0	0	0	0	
Active Ingredient Aldicarb	0	0	0	0	0	
Fipronil	0	0	0	0	0	
	Amount					

[1]Includes all municipal structural and landscape pesticide usage by employees and contractors.
[2]Weight or volume of the active ingredient, using same units for the product each year. Please specify units used. The active ingredients in any pesticide are listed on the label. The list of active ingredients that need to be reported in the pyrethroids class includes: metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambdacyhalothrin, and permethrin.

Pesticide Category and Specific Pesticide **Active Ingredient** Used	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Indoxacarb	Reporting not required in FY 15-16	0	0	0	0	
Diuron	Reporting not required in FY 15-16	0	0	0	0	
Diamides	Reporting not required in FY 15-16	0	0	0	0	
Active Ingredient Chlorantraniliprole		0	0	0	0	
Active Ingredient Cyantraniliprole		0	0	0	0	

Reasons for increases in use of pesticides that threaten water quality:

NA

IPM Tactics and Strategies Used:
The District follows IPM tactics by requiring contracted pest services to follow the District's IPM policy, which does not allow the use of specific pesticides, and by requiring all staff that apply pesticides to complete annual IPM training.

C.9.b ►Train Municipal Employees

Enter the number of employees that applied or used pesticides (including herbicides) within the scope of their duties this reporting year.	11
Enter the number of these employees who received training on your IPM policy and IPM standard operating procedures within this reporting year.	1
Enter the percentage of municipal employees who apply pesticides who have received training in the IPM policy and IPM standard operating procedures within this reporting year.	9%

Type of Training:
Due to a software error, only the Maintenance Mechanic Supervisor's training was documented during the reporting period. The local tailgate training was assigned via a software platform that did not record training completions for the rest of the staff responsible for pesticide/herbicide application. The tailgate training has been reassigned and should be completed by October 31, 2020.

C.9.c ►Require Contractors to Implement IPM				
Did your municipality contract with any pesticide service provider in the reporting year, for either landscaping or structural pest control?	X	Yes		No
If yes, did your municipality evaluate the contractor's list of pesticides and amounts of active ingredients used?	X	Yes		No,

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If your municipality contracted with any pesticide service provider, briefly describe how contractor compliance with IPM Policy/Ordinance and SOPs was monitored:

The District's PCO is a certified member of Eco Wise. Our contract with them requires that they employ IPM strategies for all work performed. Prior to the application of pesticides, (with the exception of containerized baits) the contractor performs a site assessment and must notify a District manager or supervisor prior to treatment. The following language is found in the "Scope of Work" section of the contract:

It is the Policy of Vallejo Flood & Wastewater District (District) to ensure that Integrated Pest Management (IPM) practices are employed during pest control activities to minimize human exposure to pesticides, avoid secondary poisoning to non-target animals and prevent pesticide related pollution of local waterways and the San Francisco Bay. IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices to eliminate or substantially reduce the use of chemical pesticides. Contractors performing pest control services for the District shall comply with the following IPM standards:

1. The following products shall not be used for insect control:

a) Organophosphate products (e.g., diazinon or chlopyrifos)
b) Carbamate products (e.g. carbaryl)
c) Pyrethroid products, containerized pyrethroid products or pyrethroid products whose application method prevents pyrethroid release to the environment may be used

2. Contractors shall use containerized baits for ant control, unless conditions require a different form of bait to be employed.

3. Spray pesticides are discouraged except insecticidal soaps and plant based products (pyrethrins, mint oil, rosemary oil, etc.). When a spray pesticide is required, it shall be applied precisely in the smallest amount to achieve control.

4. Pesticides should only be applied as follows:

Directed treatments to a void or other inaccessible area or to other areas humans would not normally contact; spot treatment of outdoor areas where IPM practices have failed; crack and crevice treatment; or as a self-contained bait station.

5. Trapping and exclusion shall be the primary rodent control methods. To prevent bait resistance and secondary poisoning, rodent baits shall only be used when trapping and exclusion are unsuccessful.

6. No pesticides of any kind shall be applied outdoors on impervious surfaces when a 40% chance or greater chance of rain is forecast within three days, unless the pesticides are containerized baits that will not contribute to runoff pollution.

If your agency did not evaluate the contractor's list of pesticides and amounts of active ingredients used, provide an explanation.

C.9.d ►Interface with County Agricultural Commissioners

Did your municipality communicate with the County Agricultural Commissioner to: (a) get input and assistance on urban pest management practices and use of pesticides or (b) inform them of water quality issues related to pesticides,		Yes	X	No
If yes, summarize the communication. If no, explain. See City of Vallejo Annual Report for activities related to C.9.d				
Did your municipality report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire.		Yes	X	No
If yes, provide a summary of improper pesticide usage reported to the County Agricultural Commissioner and follow-up actions taken to correct any violations. A separate report can be attached as your summary.				

C.9.e.ii (1) ►Public Outreach: Point of Purchase

Provide a summary of public outreach at point of purchase, and any measurable awareness and behavior changes resulting from outreach (here or in a separate report); **OR** reference a report of a regional effort for public outreach in which your agency participates.

Summary:

The Our Water, Our World (OWOW) campaign is a region-wide partnership of wastewater and stormwater agencies, coordinated through the Bay Area Stormwater Management Agencies Association (BASMAA) with additional funding from BAPPG, to reduce the impact of pesticides on waterways. The District has been an active participant in the campaign since 1999, and our Public Information Officer serves as the ongoing OWOW project champion to BAPPG. She is currently the Chair of the BASMAA Public Information, Participation & Outreach Committee and serves on the work group that redesigned the new OWOW logo and continues to update the fact sheets.

The District-sponsored IPM Advocate visits the Vallejo Home Depot at least once a month to refresh shelf talkers, replenish fact sheet racks, educate store employees on the program, provide invasive pest updates, and schedule training and outreach events. She interacts with customers in the aisle with questions they have about pest problems and guides them to less-toxic solutions whenever possible. Our IPM Advocate led a store training in October for 10 employees, conducted several mentor visits to staff and spoke with customers on such topics as rats and mice, cockroaches, weed control, peach leaf curl, powdery mildew, snails, aphids, and IPM practices. While two tabling events were cancelled due to the COVID-19 pandemic, working with customers in the aisles as they made purchase decisions was possible.

See the BASMAA *MRP Regional Supplement for Training and Outreach Annual Report FY 2019-2020* for more information related to Point of Purchase Outreach.

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C.9.e.ii (2) ►Public Outreach: Pest Control Contracting Outreach

Provide a summary of outreach to residents who use or contract for structural pest control and landscape professionals); **AND/OR** reference a report of a regional effort for outreach to residents who hire pest control and landscape professionals in which your agency participates.

Summary:

Pest Control Contracting Outreach is addressed via the Our Water Our World fact sheet: Finding a Company that can Prevent Pest Problems. This is displayed in the Vallejo Home Depot store, referred to in newsletters, and the OWOW website where all fact sheets are available is linked to from our website.

Pest Control Contracting outreach is part of the Our Water Our World program (see above and the BASMAA *MRP Regional Supplement for Training and Outreach Annual Report FY 2019-2020*.)

C.9.e.ii.(3) ►Public Outreach: Pest Control Operators

Provide a summary of public outreach to pest control operators and landscapers and reduced pesticide use (here or in a separate report); **AND/OR** reference a report of a regional effort for outreach to pest control operators and landscapers in which your agency participates.

Summary:

See the BASMAA *MRP Regional Supplement for Training and Outreach Annual Report FY 2019-2020.*

C.9.f ►Track and Participate in Relevant Regulatory Processes

Summarize participation efforts, information submitted, and how regulatory actions were affected; AND/**OR** reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected.

Summary:

During FY 19-20, we participated in regulatory processes related to pesticides through contributions to BASMAA and CASQA. For additional information, see the Regional Report submitted by BASMAA on behalf of all MRP Permittees *BASMAA MRP Provision C.9.f. – Track and Participate in Relevant Regulatory Processes FY 2019-20*.

Section 10 - Provision C.10 Trash Load Reduction

C.10.a.i ► **Trash Load Reduction Summary**

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to Trash Full Capture Systems (as reported C.10.b.i)	6.9% (43.6%)*
Percent Trash Reduction in all TMAs due to Control Measures Other than Trash Full Capture Systems (as reported in C.10.b.ii)[1]	42.7%
Percent Trash Reduction due to Jurisdictional-wide Source Control Actions (as reported in C.10.b.iv)	5.8%
SubTotal for Above Actions	55.4%
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	0.5%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	0.0%
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2019-20	55.9%

Discussion of Trash Load Reduction Calculation:

In September 2017, the City of Vallejo (City) and the Vallejo Flood and Wastewater District (District) reported a trash load reduction less than 70%, the performance milestone that needed to be achieve by July 1, 2017 by all MRP Permittees. As a result, the Water Board issued a Cease and Desist Order (CDO) to the District and the City in June 2018. The CDO required the District and City to:

1) Implement trash load reduction control actions within all significant trash generating areas and prohibit trash discharge in a timely manner sufficient to reach 70% trash load reduction and 80% trash load reduction by July 1, 2019.
2) Submit with the FY 2017-18 Annual Report (September 30, 2018) and subsequently by March 30, 2019, a brief narrative Supplemental Report that describes the Permittees' progress toward meeting the trash load reduction requirements, and includes:
   a. For the proposed full trash capture device installations the status of the partnership agreement with Caltrans, project funding, design and contracting of new full trash capture devices, permitting, and construction
   b. The status of additional trash reduction actions that will be verified by on land visual trash assessments (OVTAs);
   c. The status of OVTAs (e.g., the trash management areas where OVTAs have been or will be completed, number of assessments completed, and schedule for completion of additional OVTAs); and

[1] See Appendix 10-1 for changes between 2009 and FY 19-20 in trash generation by TMA as a result of Full Capture Systems and Other Measures.

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d. The outcome of the OVTAs, including any change in trash status for each trash management area and the resulting change in city-wide total trash load reduction associated with OVTAs.

3) Progress toward meeting the 70% and 80% trash load reduction requirement by July 1, 2019, including the resulting city-wide total trash load reduction (percent); and

4) If needed, a description of additional trash load reduction control actions, beyond those identified in the CDO, and a schedule for their implementation, sufficient to achieve the required 70% and 80% reduction by July 1, 2019.

In response to the CDO, the District and City:

- Continued to implement trash control measures described in the FY 16-17 Annual Report.
- Began planning for the construction of three large trash full capture systems, which collectively would address enough of a trash load to achieve the 80% trash load reduction milestone included in the MRP.
- Submitted supplemental reports to the Water Board in September 2018 and March 2019.
- Met with Water Board staff multiple times to discuss the status of additional control measures required to achieve the 80% trash load reduction.
- Submitted communications to Water Board staff in writing regarding the unanticipated delays in the construction schedule for the three new large full capture systems.

Because the trash full capture systems under construction are located downstream of Lake Chabot and Lake Dalwick, Water Board staff requested that the City conduct a study to evaluate the feasibility of implementing additional trash controls in areas directly upstream of the lakes, and submit the results of the study with the FY 2019-20 Annual Report. The feasibility evaluation report is included as Appendix 10-2.

As described in the District's letter to Water Board staff dated June 17, 2019, the District documented the unanticipated construction project delays that have had significant impacts on the District's/City's ability to comply with the trash load reduction milestones included in both the MRP and CDO (i.e., 80% by July 1, 2019). The District's letter dated June 17, 2019 to Water Board staff was included as Appendix 10-2 in the FY 18-19 Annual Report. The District approved the construction contract for the three systems in fall 2019. Construction preparation and construction began in spring 2020. Construction proceeded through the summer but the project has since run into delays. The precast trash capture devices have not been delivered on schedule and the devices may not be installed before the end of November 2020. If the devices cannot be installed before significant rains begin, the project may be delayed until the spring of 2021.

In FY 19-20, the Vallejo Flood Control and Wastewater District (VFWD) and the City of Vallejo (City) attained and report 55.9% trash load reduction (including trash offsets and excluding the three new full capture systems).

*Once the three trash capture systems are installed, the percent trash load reduction in all Trash Management Areas (TMAs) due to trash full Capture Systems (as reported C.10.b.i) will be 43.6%, an increase of nearly 37%.

The most recent version of the City's Baseline Trash Generation Map can be downloaded at:
https://www.vallejowastewater.org/SitePages/stormwater.aspx

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C.10.a.iii ► Mandatory Trash Full Capture Systems

Provide the following:

1) Total number and types of full capture systems (publicly and privately-owned) installed prior to FY 19-20, during FY 19-20, and to-date, including inlet-based and large flow-through or end-of-pipe systems, and qualifying low impact development (LID) required by permit provision C.3.
2) Total land area (acres) treated by full capture systems for population-based Permittees and total number of systems for non-population-based Permittees compared to the total required by the permit.

Type of System	# of Systems	Areas Treated (Acres)
Installed in FY 19-20		
None	--	--
Installed Prior to FY 19-20		
Kristar Nettech Full Capture Devices (Public)	7	1,467
Planned for Installations post FY 19-20		
TrashTrap by StormTrap Technologies	3	7,992
Total for all Systems Installed To-date	7	1467* (7,992) **
Treatment Acreage Required by Permit (Population-based Permittees)		168
Total # of Systems Required by Permit (Non-population-based Permittees)		NA

* A recalculation of the areas treated (acres) by the 7 Kristar Nettech Full Capture Devices (Public) occurred in early 2019. The areas treated (acres) presented within the FY 18-19 Annual Report have decreased from 1,670 acres to 1,467 acres. The jurisdictional-wide trash reduction (%) for the 7 devices did not change since the acres removed were low trash generating.

** Once the three proposed trash capture systems are installed, the estimated treated area (acres) will be 7,992 acres.

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C.10.b.i ► Trash Reduction - Full Capture Systems

Provide the following:

1) Jurisdictional-wide trash reduction in FY 19-20 attributable to trash full capture systems implemented in each TMA;
2) The total number of full capture systems installed to-date in your jurisdiction;
3) The percentage of systems in FY 19-20 that exhibited significant plugged/blinded screens or were >50% full when inspected or maintained;
4) A narrative summary of any maintenance issues and the corrective actions taken to avoid future full capture system performance issues; and
5) A certification that each full capture system is operated and maintained to meet the full capture system requirements in the permit.

TMA	Jurisdiction-wide Reduction (%)	Total # of Full Capture Systems	% of Systems Exhibiting Plugged/Blinded Screens or >50% full in FY 19-20	Summary of Maintenance Issues and Corrective Actions
1	5.4%	7	0%	The trash capture nets were inspected regularly and maintained by a VFWD contractor as needed and prior to predicted rain events. Nets are replaced as needed. Maintenance records are kept by the VFWD. No maintenance issues arose when servicing the nets in FY 2019-20.
2	0.0%			
3	0.0%			
4	0.0%			
5	0.0%			
6	0.1%			
7	0.0%			
8	0.0%			
9	0.0%			
10	0.0%			
11U*	1.4%			
Total	6.9% (43.6%) **			

Certification Statement: The Vallejo Flood & Wastewater District certifies that a full capture system maintenance and operation program is currently being implemented to maintain all applicable systems in a manner that meets the full capture system requirements included in the Permit.

* This TMA is entirely comprised of non-jurisdictional land area within the unincorporated portion of Solano County that is addressed via trash fill capture systems owned and operated by VFWD.

**Once the three proposed trash capture systems are installed, the trash load reduction associated with full capture systems will increase to 43.6%.

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART A)

Provide a summary of trash control actions other than full capture systems or jurisdictional source controls that were implemented within each TMA, including the types of actions, levels and areal extent of implementation, and whether actions are new, including initiation date.

TMA	Summary of Trash Control Actions Other than Full Capture Systems
Various	Public Education and Outreach Programs Targeted at Trash Reduction and Implemented post-MRP Adoption: The District installed no littering signs and a dog waste disposal bag dispenser at a local waterfront area. The District has also installed trash bins and educational signage at a pedestrian path near White Slough on the North end of Vallejo. Unfortunately the educational signage has been subject to frequent graffiti and has been subsequently removed.
Various	On-Land Cleanup and Illegal Dumping Abatement Actions: The City of Vallejo (Public Works Maintenance Division, Police Department, and Code Enforcement Division), Caltrans, Vallejo City Unified School District, Vallejo Flood and Wastewater District, Greater Vallejo Recreational District, Vallejo Watershed Alliance, California Maritime Academy, Six Flags Discovery Kingdom and the Vallejo Chamber of Commerce have partnered with members of the community to clean up, maintain, and landscape all highly visible entrances and major thoroughfares throughout the City of Vallejo. This interagency partnership collaborated on each phased activity to pick up trash, cut down overgrown vegetation, trim trees, remove graffiti, and perform other enhancement tasks to make the target entrances and thoroughfares attractive to citizens, businesses, and visitors. Caltrans and the Vallejo Public Works Maintenance Division primarily address significant blight on public rights-of-way and provide a thorough clean-up of these areas. Meanwhile, the City's Code Enforcement Division plays an important role by conducting educational and enforcement activity for weeds, graffiti, litter, junk, encampments, and other blight on the private properties that abut each phased entrance and thoroughfare area in order to reduce the litter and blight from reoccurring. While not captured in the trash reduction numbers, the Vallejo Permittees need to emphasize that almost 850 tons of illegally dumped materials were picked up and disposed of in an environmentally appropriate manner in FY 19-20. A fair portion of this is materials that is related to homeless encampments. Many homeless encampments are along waterways, so removing this material truly does prevent much of it from entering the receiving waters. Additionally, the City offers a free "Dump Day" for its residents to bring to a central location. This year, residents brought almost 105 tons of material which may not have been disposed of properly otherwise, including 13 tons of e-waste which is of great concern if it ends up in the waterways.
All	Enhanced Street Sweeping: In FY 16-17, City doubled its street sweeping frequency to 2x/month in residential areas. The downtown area continues to be swept at 3x/ week. These increases in frequencies is anticipated to provide significant additional removal of trash from streets in the City. Additionally, the City has contracted with a parking enforcement consultant who will be working with City staff to enhance enforcement of City parking restrictions on street sweeping days.

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C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART B)

Provide the following:

1) A summary of the on-land visual assessments in each TMA (or control measure area), including the street miles or acres available for assessment (i.e., those associated with VH, H, or M trash generation areas not treated by full capture systems), the street miles or acres assessed, the % of available street miles or acres assessed, and the average number of assessments conducted per site within the TMA; and
2) Percent jurisdictional-wide trash reduction in FY 19-20 attributable to trash management actions other than full capture systems implemented in each TMA; OR
3) Indicate that no on-land visual assessments were performed.

If no on-land visual assessments were performed, check here and state why: X

Explanation: No OVTAs were conducted in TMA 9 or 11U in FY 19-20 because the land areas in these TMAs are either low trash generating or fully covered by full capture systems, as depicted on the Vallejo baseline trash generation map.

TMA ID or (*as applicable*) Control Measure Area	Total Street Miles[2] Available for Assessment	Summary of On-land Visual Assessments			Jurisdictional-wide Reduction (%)
		Street Miles Assessed	% of Available Street Miles Assessed	Avg. # of Assessments Conducted at Each Site	
1	6.1	0.8	12.9%	4.3	0.8%
2	5.5	0.6	10.9%	5.0	4.4%
3	71.3	6.6	9.3%	4.9	26.3%
4	27.1	2.8	10.4%	4.3	3.8%
5	21.1	2.0	9.6%	6.0	2.4%
6	11.2	1.1	10.1%	4.8	2.3%
7	6.6	0.8	11.6%	5.0	2.4%
8	14.9	1.6	10.5%	5.1	0.0%
9	0.0	NA	NA	NA	NA
10	0.7	0.4	54.1%	5.0	0.3%
11U	NA	NA	NA	NA	NA
	Total	16.7	--	--	42.7%

[2] Linear feet are defined as the street length and do not include street median curbs.

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C.10.b.iv ► Trash Reduction – Source Controls

Provide a description of each jurisdictional-wide trash source control action implemented to-date. For each control action, identify the trash reduction evaluation method(s) used to demonstrate on-going reductions, summarize the results of the evaluation(s), and estimate the associated reduction of trash within your jurisdictional area. Note: There is a maximum of 10% total credit for source controls.

Source Control Action	Summary Description & Dominant Trash Sources and Types Targeted	Evaluation/Enforcement Method(s)	Summary of Evaluation/Enforcement Results To-date	% Reduction
Single Use Bag Ban[3]	On November 8, 2016, California voters approved Proposition 67, the statewide Single-Use Carryout Bag Ban. As a result, the new law went into effect in FY 16-17 and most grocery stores, retail stores with a pharmacy, convenience stores, food marts, and liquor stores are no longer able to provide single-use plastic carry-out bags to their customers.	The City of Vallejo and the State of California enforce the bag ban. Violations are reported to either the City or the California Attorney General's Office using its on-line reporting form. A store or producer of reusable grocery bags that violates the law may be fined $1,000 per day for the first violation, $2,000 per day for the second violation, and $5,000 per day for the third and subsequent violations. Although efforts to evaluate reductions in single use bags in Vallejo have not yet occurred, an applicable study was recently conducted in Santa Clara County to determine whether the current levels of litter-prone items (i.e., single-use bags and EPS food service ware) in stormwater have changed since local ordinances prohibiting the distribution of these items were put into effect. Because the ordinances put into place in Santa Clara County are very similar to the statewide bag ban, the results of the study are applicable to the City. For additional details on the study design, methods, and results, see Appendix 10-1 of the SCVURPPP Report at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/2016_AR/Santa_Clara/SCVURPPP_2015-16_MRP_AR.pdf	The City has received only a few complaints about stores not complying with the statewide law. As complaints occur, the City will respond to the best of its ability. According to the BASMAA "San Francisco Bay Area Stormwater Trash Generation Rates" report finalized on June 20, 2014, single use carryout bags contribute about 8% of the total litter loading to local receiving waters by municipal stormwater. Results from the Santa Clara County Study, which characterized of trash in full trash capture systems pre- and post-ordinance in the Santa Clara Valley, 72% fewer single-use bags are observed in stormwater since ordinances have gone into effect. Based on the results of the BASMAA and SCVURPPP studies, the City and District estimate an approximate 72% reduction in the number of single-use bags in stormwater, which equates to a 5.8% (i.e., 72% x 8%) reduction of trash discharged from the Vallejo's stormwater conveyance system.	5.8%

[3] In March 2020, the Solano County Public Health Officer issued a Shelter-at-Home Order due to the COVID-19 pandemic. As part of that Order, the County disallowed customers to bring reusable bags to businesses. In July 2020, the County Public Health Officer reissued a Continue to Shelter-at-Home Order, which allows customers to bring reusable bags from home. Based on the results of OVTAs conducted in the City of Vallejo in the spring 2020, the number of single-use carryout bags observed on streets and sidewalks did not appear to increase as a result of the County Public Health Officer's Order.

C.10.b.v ► Trash Reduction – Receiving Water Monitoring

Report on the progress of developing and testing your agency's trash receiving water monitoring program.

Development and testing of the trash receiving water monitoring program occurred through a regional project coordinated through the Bay Area Stormwater Management Agencies Association (BASMAA) and in coordination with the Trash Monitoring Methods Project, California Ocean Protection Council and State Water Board project that is being administered via the Southern California Coastal Water Research Project (SCCWRP) and San Francisco Bay Estuary Institute (SFEI). Consistent with MRP requirements, the final report for the development and testing of the Bay Area trash receiving water monitoring program was submitted by BASMAA on July 1, 2020, consistent with the MRP requirements, following peer review.

C.10.c ► Trash Hot Spot Cleanups

Provide the FY 19-20 cleanup date and volume of trash removed during each MRP-required Trash Hot Spot cleanup during each fiscal year listed. Indicate whether the site was a new site in FY 19-20.

Trash Hot Spot	New Site in FY 19-20 (Y/N)	FY 19-20 Cleanup Date(s)	Volume of Trash Removed (cubic yards)				
			FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20
Central Rindler Creek	N	6/29/2020	1.00	10.0	6	0.25	0.25
South Rindler Creek	N	6/29/2020	1.00	5.0	3	2.25	1.75
Blue Rock Springs Creek	N	6/29/2020	0.00	2.85	0.33	0.25	1.0
Coral Street Ditch	N	6/29/2020	2.10	10.0	0.5	1.0	2.0
Austin Creek, 3287 Sonoma Blvd	N	6/29/2020	1.50	6.0	1	0.5	0.5

C.10.d ►Long-Term Trash Load Reduction Plan

Provide descriptions of significant revisions made to your Long-term Trash Load Reduction Plan submitted to the Water Board in February 2014. Describe significant changes made to primary or secondary trash management areas (TMA), baseline trash generation maps, control measures, or time schedules identified in your plan. Indicate whether your baseline trash generation map was revised and if so what information was collected to support the revision. If your baseline trash generation map was revised, attach it to your Annual Report.

Description of Significant Revision	Associated TMA
In FY 15-16, consistent with all MRP Permittees, all public K-12 schools, college and university parcels were made non-jurisdictional on the District's baseline trash generation maps. Under California Government Code Sections 4450 through 4461, the construction, modification, or alternation of facilities and/or structures on these parcels are under the jurisdiction of the California Division of State Architect and not the District. The public right-of-way (e.g., streets and sidewalks) surrounding these parcels remain as jurisdictional on the Vallejo Permittees' baseline trash generation maps. The Vallejo Permittees' revised baseline trash generation map was included as Attachment C.10: Vallejo Trash Reduction Compliance Plan to its FY 15-16 Annual Report.	All applicable
In FY 16-17, the Vallejo Permittees refined the Vallejo Baseline Trash Generation Map because the trash generation levels included on the map originally included in its Long-term Trash Load Reduction Plan were never fully verified by District and City staff due to a lack of resources. Google Street View applications and On-land Visual Assessments were used to reevaluate baseline trash generation. Trash generation categories were reclassified for areas where information indicated that errors had occurred during initial/preliminary trash generation category assignments. Reclassifications to trash generation categories were used for the purposes of calculating baseline (2009) trash generation included in this report (i.e., as an input parameter to the formula used to calculate load reductions reported). The Vallejo Permittees' refined baseline map is included as Attachment C.10: Vallejo Trash Reduction Compliance Plan (see FY 16-17 Annual Report).	All applicable

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 19-20. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

<table>
<tr><th>Offset Program</th><th>Summary Description of Actions and Assessment Results</th><th>Volume of Trash (CY) Removed/Controlled in FY 19-20</th><th>Offset (% Jurisdiction-wide Reduction)</th></tr>
<tr><td>Additional Creek and Shoreline Cleanups (Max 10% Offset)</td><td>The City of Vallejo and the District coordinated with and promoted Vallejo Watershed Alliance creek and shoreline cleanups in FY 2019-20. The following is a list of activities conducted in FY 2019-20, the number of participants and the amount of trash removed. A total of 15.9 CYs of trash were removed via these efforts.
<table>
<tr><th>Date</th><th>Vallejo Watershed Alliance Activities</th><th>Participants</th><th>Trash Removed/ Other Results</th></tr>
<tr><td>7/2019</td><td>Park cleanup and annual BBQ</td><td>12</td><td>132 gallons</td></tr>
<tr><td>8/2019</td><td>Annual meeting/presentation by Sarah McKibbin, RCD</td><td>11</td><td></td></tr>
<tr><td>9/2019</td><td>Coastal Cleanup Day (VWA site only)</td><td>21</td><td>375 gallons</td></tr>
<tr><td>9/2019</td><td>Cal Maritime Partner Expo</td><td>125</td><td>10 email signups</td></tr>
<tr><td>9/2019</td><td>Visions of the Wild Festival Nature Zone</td><td>200</td><td>6 email signups</td></tr>
<tr><td>10/2019</td><td>Hanns Park: Reseeding and tree replanting after fire</td><td>12</td><td>3.1 cubic yards</td></tr>
<tr><td>11/2019</td><td>Hanns Park: path refresh and cleanup</td><td>12</td><td>252 gallons</td></tr>
<tr><td>1/2020</td><td>Lake Dalwigk: Restoration planting and trash removal</td><td>15</td><td>378 gallons</td></tr>
<tr><td>1/2020</td><td>Hanns Park: bird box maintenance</td><td>2</td><td>26 gallons</td></tr>
<tr><td>2/2020</td><td>Booth at SF Bay Flyway Festival</td><td>85</td><td>4 email signups</td></tr>
<tr><td>2/2020</td><td>Lake Dalwigk: Restoration planting and trash removal</td><td>14</td><td>378 gallons</td></tr>
<tr><td>2/2020</td><td>Lake Dalwigk: 2nd grade class lesson and cleanup</td><td>48</td><td>378 gallons</td></tr>
<tr><td>4/2020</td><td>DIY Cleanups begin: Lake Chabot</td><td>3</td><td>75 gallons</td></tr>
<tr><td>5/2020</td><td>DIY Cleanup: Rindler Creek</td><td>3</td><td>60 gallons</td></tr>
<tr><td>6/2020</td><td>DIY Cleanup: Lake Dalwigk/Lake Chabot</td><td>12</td><td>540 gallons</td></tr>
</table>
Additionally, the District conducted quarterly cleanups in FY 19-20 (9/6/19; 12/18/19; 2/24/20; 5/30/20) as part of the agreement with Water Board staff regarding the location of planned trash full capture systems downstream of Lake Chabot and Lake Dalwigk. A total of 7.75 CYs of trash was removed during these quarterly cleanups.</td><td>23.65 CY
(4793 gallons)</td><td>0.5%</td></tr>
</table>

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 19-20. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

Direct Trash Discharge Controls (Max 15% Offset)	NA	NA	NA

Appendix 10-1. Baseline trash generation and areas addressed by full capture systems and other control measures in Fiscal Year 19-20.[1]

TMA	2009 Baseline Trash Generation (Acres)					Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems					Jurisdiction-wide Reduction via Full Capture Systems (%)	Trash Generation (Acres) in FY 19-20 After Accounting for Full Capture Systems and Other Control Measures					Jurisdiction-wide Reduction via Other Control Measures (%)	Jurisdiction-wide Reduction via Full Capture AND Other Control Measures (%)
	L	M	H	VH	Total	L	M	H	VH	Total		L	M	H	VH	Total		
1	1,362	596	236	0	2,194	1,655	445	94	0	2,194	5.4%	1,877	184	133	0	2,194	0.8%	6.2%
2	52	193	186	9	439	52	193	186	9	439	0.0%	87	319	33	0	439	4.4%	4.4%
3	737	735	1,026	104	2,601	737	735	1,026	104	2,601	0.0%	1,153	1,152	269	28	2,601	26.3%	26.3%
4	578	550	261	0	1,389	578	550	261	0	1,389	0.0%	638	649	98	3	1,389	3.8%	3.8%
5	394	523	147	3	1,068	394	523	147	3	1,068	0.0%	550	427	86	4	1,068	2.4%	2.4%
6	105	247	129	0	482	121	232	129	0	482	0.1%	192	237	52	0	482	2.3%	2.4%
7	250	80	138	0	468	250	80	138	0	468	0.0%	280	146	41	0	468	2.4%	2.4%
8	440	441	18	0	898	440	441	18	0	898	0.0%	529	320	49	0	898	0.0%	0.0%
9	71	0	0	0	71	71	0	0	0	71	0.0%	71	0	0	0	71	0.0%	0.0%
10	7,746	7	15	0	7,768	7,746	7	15	0	7,768	0.0%	7,747	19	2	0	7,768	0.3%	0.3%
11U*	0	0	49	0	49	49	0	0	0	49	1.4%	49	0	0	0	49	NA	1.4%
Totals	11,734	3,373	2,204	115	17,427	12,092	3,206	2,013	115	17,427	6.9%	13,175	3,453	764	36	17,427	42.7%	49.6%

Note: "NA" indicates that the TMA has no moderate, high or very high trash generating areas (i.e., all low trash generation and/or non-jurisdictional) and therefore no additional trash control measures are needed.

*This TMA is entirely comprised of non-jurisdictional land area within the unincorporated portion of Solano County that is addressed via trash full capture systems owned and operated by VFWD.

[1] Due to rounding, total acres and percentages presented in this table may be slightly different than the sum of the acres/percentages in the corresponding rows/columns (e.g., differ by 1 acre or 0.1%).

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Supplemental Report on Trash Control Actions
In compliance with Cease and Desist Order No. R2-2018-0033

As required in Cease and Desist Order (CDO) No. R2-2018-0033, the Vallejo Flood and Wastewater District (VFWD) is submitting this brief narrative report that describes the Vallejo Permittees' (VFWD and City of Vallejo's) progress toward meeting the 70% and 80% trash load reduction requirements required by the Municipal Regional Stormwater NPDES Permit (MRP) and the CDO. The CDO states that the narrative report shall include the following:

a) For the proposed full trash capture device installations:
   i. The status of the partnership agreement with Caltrans;
   ii. The status of project funding;
   iii. The status of design and contracting of new full trash capture devices;
   iv. The status of permitting; and
   v. The status of construction

b) The status of additional trash reduction actions that will be verified by on land visual trash assessments (OVTAs) in accordance with Permit Provision C.10.b.ii.b.;
   i. The status of OVTAs (e.g., the trash management areas where OVTAs have been or will be completed, number of assessments completed, and schedule for completion of additional OVTAs); and
   ii. The outcome of the OVTAs, including any change in trash status for each trash management area and the resulting change in city-wide total trash load reduction associated with OVTAs;

c) Progress toward meeting the 70% and 80% trash load reduction requirement by July 1, 2019, including the resulting city-wide total trash load reduction (percent); and

d) If needed, a description of additional trash load reduction control actions, beyond those identified in this Order, and a schedule for their implementation, sufficient to achieve the required 70% and 80% reduction by July 1, 2019.

Narrative Report

On September 18, 2018 the VFWD received notice indirectly that the San Francisco Bay Regional Water Control Board (RWQCB) was concerned about the location of two of the trash full capture devices planned in Vallejo. These concerns stemmed from siting the devices downstream of receiving waters and the RWQCB initially stated that the devices would only receive partial trash removal credit for the drainage area protected by the devices. The VFWD contacted the RWQCB and held a series of meetings to provide the RWQCB with more information regarding the projects. In these meetings, the VFWD and the RWQCB agreed that the devices could receive full trash removal credit if perimeter shoreline cleanups and other actions were taken to mitigate the possibility of trash impacting the receiving waters upstream of the devices. The RWQCB did not, however, conclusively state the device removal credit would be as shown in the Vallejo Trash Capture Feasibility Study.

Due to the uncertainty of the amount of trash removal credit the devices would generate, the possibility the devices would still need to be relocated and the amount of funds VFWD had already

committed to the project, the VFWD reluctantly determined that the most conservative course of action would be to place the project on hold, pending a decision in writing from the RWQCB regarding the trash removal credit the devices would generate. On February 14, 2019 the VFWD submitted a letter to the RWQCB listing the proposed actions that would be undertaken; a written response from the RWQCB was received on April 18, 2019. The VFWD had received authorization from its Board of Trustees for the District Manager to authorize restarting the project without the need to bring the item to the Board for further approvals and notice was given to the contractors to resume the project on April 19, 2019. The design phase was completed, a construction contract was awarded and a Notice to Proceed was issued to the contractor on March 11, 2020. Construction began on May 14, 2020. Construction proceeded through the spring and summer. At the end of August, the construction contractor reported delays which have put the project behind schedule. The trash full capture devices have not been delivered on schedule and completion of construction is now waiting upon delivery of the devices. The District is working with both the construction contractor and the device manufacturer to attempt to resolve the issues; the most likely outcome is two of the three sites will be completed by the end of 2020 and the remaining site will have to be completed after the rainy season in spring of 2021.

a.i. Status of the partnership agreement with Caltrans:

The VFWD is very close to submitting a Cooperative Implementation Agreement (CIA) to Caltrans. VFWD staff have been in close communication with Caltrans and are completing the final requirements in order to execute a CIA. The VFWD continues to move forward with implementation of the project, even without an agreement in place with Caltrans.

a.ii. Status of project funding:

To date, the VFWD is still pursuing a funding agreement from Caltrans, but is very close to submitting a CIA to Caltrans. VFWD staff have been in close communication with Caltrans and are completing the final requirements to execute a CIA. If the VFWD is unable to secure a reimbursement agreement from Caltrans, funds may have to be drawn from VFWD reserves. Another possibility is to delay or reschedule other storm and flood control projects and re-appropriate those funds toward trash full capture device construction costs.

a.iii. Status of design and contracting of new full trash capture devices:

Design is complete and contracts for construction, engineering services during construction and construction management and inspection have been issued.

a.iv. Status of permitting:

VFWD's construction contractor has obtained its Encroachment Permit from the City of Vallejo. Caltrans issued an entry permit for the BW Williams site on April 16, 2020. The VFWD filed a Notice of Exemption (NOE) on October 9, 2018. A NOE is consistent with RWQCB guidance for projects sited entirely in existing storm drain systems.

a.v. Status of construction:

Construction is underway at the sites. A construction contract was awarded, a Notice to Proceed was issued on March 11, 2020 and ground was broken on May 14, 2020. The project is experiencing delays; the most likely outcome is two of the three sites will be completed by the end of 2020 and the remaining site will have to be completed after the rainy season in spring of 2021.

b.i. Status of OVTAs:

The VFWD contracted with EOA, Inc. to perform OVTAs in Vallejo. A total of 87 street/sidewalk OTVA sites have been established in Vallejo and a total of 202 assessments were conducted in FY 20198-20 as part of the Vallejo OVTA Program. With the exception of TMAs 9 and 11U, which are either entirely addressed via full capture devices or are low trash generating as depicted on the Vallejo baseline trash generation map, all TMAs were assessed in FY 2019-20 and are currently being assessed in FY 2020-21. Over the course of the two FYs, each of the 88 sites will be assessed roughly 5 to 6 times.

b.ii. Outcome of OVTAs:

In general, the OVTAs conducted in FY 2019-20 showed a decrease in the levels of trash observed, compared to the Vallejo baseline trash generation map, which is intended to depict 2009 levels of trash generated in jurisdictional land areas within the boundaries of the City. In the VFWD/City 2019-20 annual report, the trash load reduction demonstrated by OTVAs was 42.7%, a slight improvement from the 40.7% reduction reported in the VFWD's/City's FY 2018-19 annual report. VFWD anticipates similar reductions will be reported with our FY 2020-21 Annual Report, based on preliminary data collected to-date this FY.

c. Progress toward meeting the 70 percent and 80 percent trash load reduction requirement by July 1, 2019:

The Vallejo Permittees have made progress toward meeting the 70% and 80% trash load reduction requirement on two fronts: 1) by enhancing trash removal activities on-land, which have successfully improved OVTA scores, and 2) by moving forward with the design of three large full trash capture devices. When the three large devices are complete and operational, they will provide an estimated additional 40% trash reduction, which when combined with enhanced trash removal actions, will enable the Vallejo Permittees to meet the 80% trash load reduction requirement. The delays to design and construction of the large devices previously discussed have prevented the Vallejo Permittees from meeting the July 1, 2019 requirement.

d. If needed, a description of additional trash load reduction control actions:

The VFWD and the City of Vallejo have begun to engage with Six Flags Discovery Kingdom in an effort to control trash from the amusement park grounds and parking lots. Currently these efforts have been halted due to the ongoing public health crisis; Six Flags Discovery Kingdom is currently only allowing limited attendance. The VFWD and the City of Vallejo plan to re-engage once the park has resumed normal operations. The VFWD contracted with EOA to complete an assessment of trash reduction options upstream of Lakes Chabot and Dalwigk. As a result of the study findings, VFWD staff will be enhancing their trash reduction efforts during stormwater inspections throughout the city, as specified in the report.

Stormwater Trash Control Measures Cost-Benefit Evaluation

Areas Draining to Lake Chabot and Dalwigk

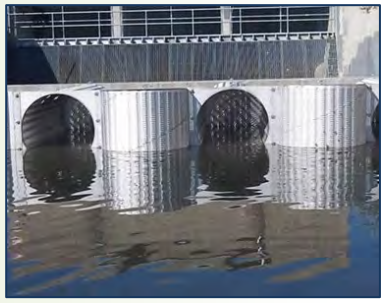

Technical Memorandum

Prepared for:

Vallejo Flood & Wastewater District

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September 2020

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List of Abbreviations

BASMAA	Bay Area Stormwater Management Agencies Association
BIDs	Business Improvement Districts
Caltrans	California Department of Transportation
CPSs	Connector Pipe Screens
FY	Fiscal Year
GIS	Geographic Information System
GSRD	Gross Solids Removal Systems
HDS	Hydrodynamic Separator
MRP	Municipal Regional NPDES Permit for Stormwater
NPDES	National Pollutant Discharge Elimination System
NSBB/DSBB	Nutrient Separating Baffle Boxes
O&M	Operation and Maintenance
OVTAs	On-Land Visual Assessments
ROW	Public Right-of-Way
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
TMAs	Trash Management Areas

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1. Introduction

1.1 Purpose

This report summarizes the results of an evaluation conducted to identify the feasibility (costs and benefits) of implementing additional stormwater control measures to address trash from land areas draining to Lake Chabot and Lake Dalwigk (Vallejo, CA) via the Municipal Separate Storm Sewer System (MS4).

1.2 Background

The Vallejo Flood and Wastewater District (District) and the City of Vallejo (City) are mandated by the Municipal Regional Stormwater NPDES Permit for Phase I communities (Order R2-2015-0049), also known as the Municipal Regional Permit (MRP), and a Cease and Desist Order (CDO) issued to the District and the City of Vallejo (City) by the San Francisco Bay Regional Water Quality Control Board (Water Board), to significantly reduce the levels of trash in stormwater discharges from their Municipal Separate Storm Sewer Systems (MS4s) over specific timeframes. The MRP requires the District and City to reduce trash discharges by 70% no later than July 1, 2017, and by 80% no later than July 1, 2019. The CDO was issued by the Water Board because the compliance timeframes included in the MRP were not achieved.

To comply with the MRP and CDO trash reduction mandates, the District is currently constructing trash full capture systems downstream of Lake Chabot and Lake Dalwigk[1], and between the lakes and the receiving waters of the bay. The systems being installed were selected from the Water Board's published list of full capture systems. Construction of these systems is anticipated to be completed by the end of 2020. Once operational, these systems will provide the City and District with an estimated 37% trash reduction. Because the locations of the trash full capture systems are downstream of the lakes and open channels upstream of the lakes, Water Board staff are concerned that trash generated from land areas that drain to the lakes via the MS4 could impact the lakes before reaching the new full capture systems. In response, the District and City agreed to evaluate the feasibility of implementing other trash control measures to address trash from these land areas.

This memorandum summarizes the results of the feasibility evaluation conducted by the City and the District, in response to Water Board staff's concerns. The evaluation includes the identification of trash sources in these land areas, and an analysis of the costs, benefits and feasibility of implementing additional trash controls to address trash within land areas directly upstream of the lakes that are generating moderate, high or very high levels of trash. Once the results of the feasibility evaluation are reviewed by Water Board staff, District and City staff plan to meet with Water Board staff to discuss the results and potential additional trash controls that could occur within these areas. Based on the outcomes of the discussion with Water Board staff, any new implementation actions agreed to by the District and/or City will be included in their updated Long-Term Trash Control Measures Plan with an associated implementation schedule. Implementation of these additional actions would provide assurance to the District and City that the full capture systems installed downstream of the lakes would be deemed sufficient to demonstrate 100% trash load reduction from the land areas upstream of the systems.

[1] These lakes are engineered impoundments constructed primarily for flood control.

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1.3 Areas of Interest

Existing storm drain catchment data developed as part of the *Trash Full Capture Feasibility Evaluation* conducted by the District (EOA 2018) were used to define the areas of interest for the trash control measures feasibility evaluation. The areas of interest are defined as the land areas draining to the two lakes that are not already addressed by existing trash full capture systems.[2] Three areas were identified for the area upstream of Lake Chabot (Figure 1) and four areas were identified for the area upstream of Lake Dalwigk (Figure 2). All areas were defined by hydrologic boundaries with the exception of Area 2 – Lake Chabot.[3]

A total of 4,027 acres of land area are within the seven areas of interest. Moderate and high trash generation areas, which are the only land areas of interest in this study, comprise roughly 29% (1,164 acres) of this area. Based on Vallejo baseline trash generation map, these land areas generate an estimated 17,000 gallons of trash each year that is transported to the Vallejo MS4.

Land uses for these trash generating areas were identified using existing Geographic Information System (GIS) data. A total of four (4) land use classes (i.e., residential, commercial, industrial, and open space) were used to classify the areas within each of the seven areas of interest (Table 1). All other land uses within these areas were not considered in this study,

Table 1. Land uses and trash generation associated with areas upstream of Lake Chabot and Lake Dalwigk that are not currently addressed by trash full capture systems.

Land Use Category	Areas Upstream of Lake Chabot (acres)			Areas Upstream of Lake Dalwigk (acres)				Totals (acres or gallons)
	Fairgrounds Drive (1)	Lake Chabot (2)	Blue Rock Springs (3)	Lake Dalwigk (4)	Lemon St Channel (5)	Lincoln Rd & San Luis Dr (6)	Atherton St & 6th St (7)	
Residential	150	57	52	43	94	141	129	**666**
Commercial	67	244	46	16	16	1	34	**425**
Industrial	--	--	--	30	--	--	--	**30**
Open Space	8	4	4	7	6	--	14	**42**
Totals	**225**	**305**	**102**	**96**	**116**	**142**	**177**	**1164**
Baseline Trash Generation (gallons/yr)	*4,273*	*2,308*	*2,705*	*2,046*	*1,277*	*1,064*	*3,295*	*16,968*

[2] Approximately 1,670 acres of area upstream of Lake Chabot are currently addressed by existing full capture devices and were therefore not included in the areas of interest.

[3] The Lake Chabot area (Area 2) was based on topography due to the absence of municipally owned storm drain systems. Thus, it consists of all areas not included in the other two areas upstream of the lake.

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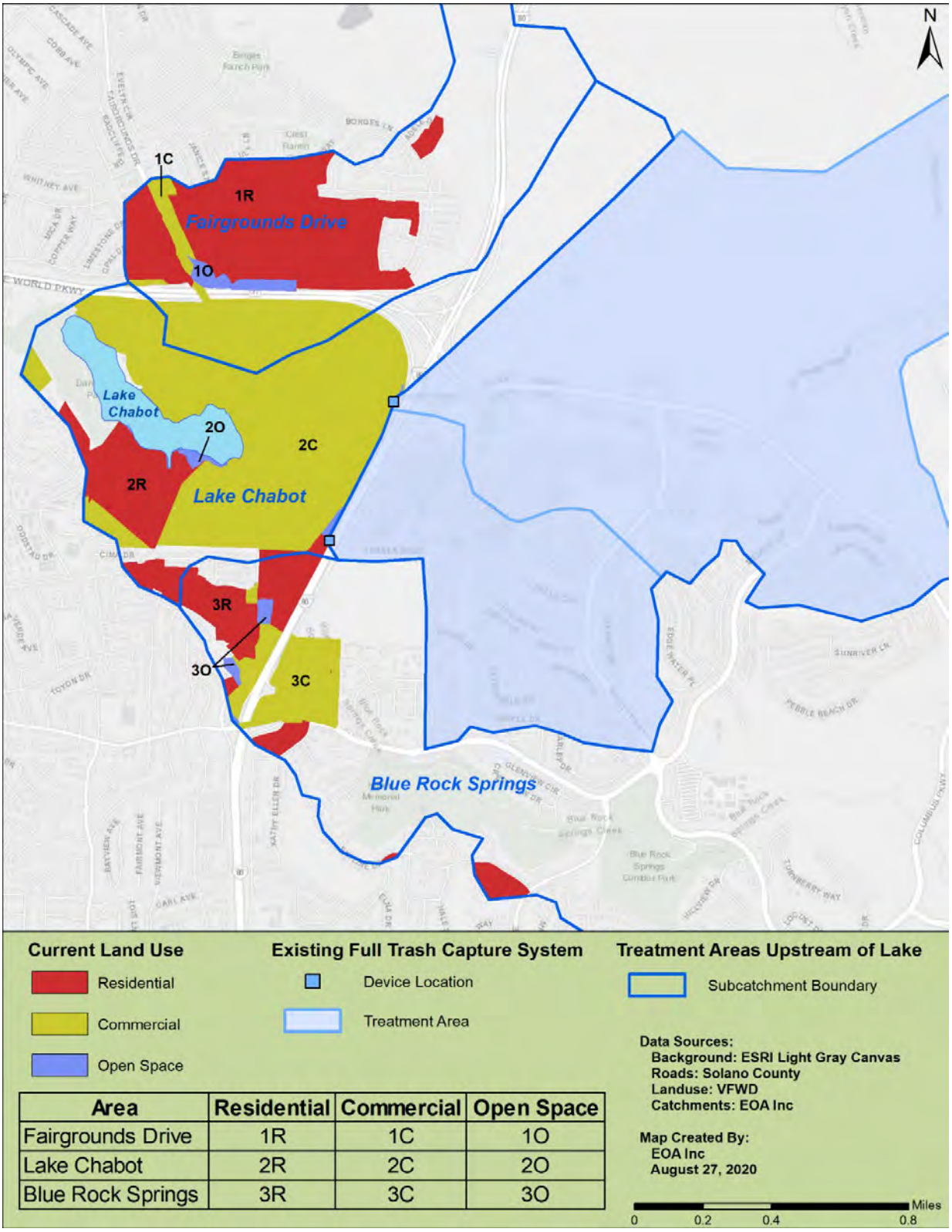

Area	Residential	Commercial	Open Space
Fairgrounds Drive	1R	1C	1O
Lake Chabot	2R	2C	2O
Blue Rock Springs	3R	3C	3O

Figure 1. Land uses for trash generating areas that are within the three land areas (Fairgrounds Drive, Lake Chabot, and Blue Rock Springs) draining to Lake Chabot. Note – only areas with moderate, high or very high trash generation are included on the map.

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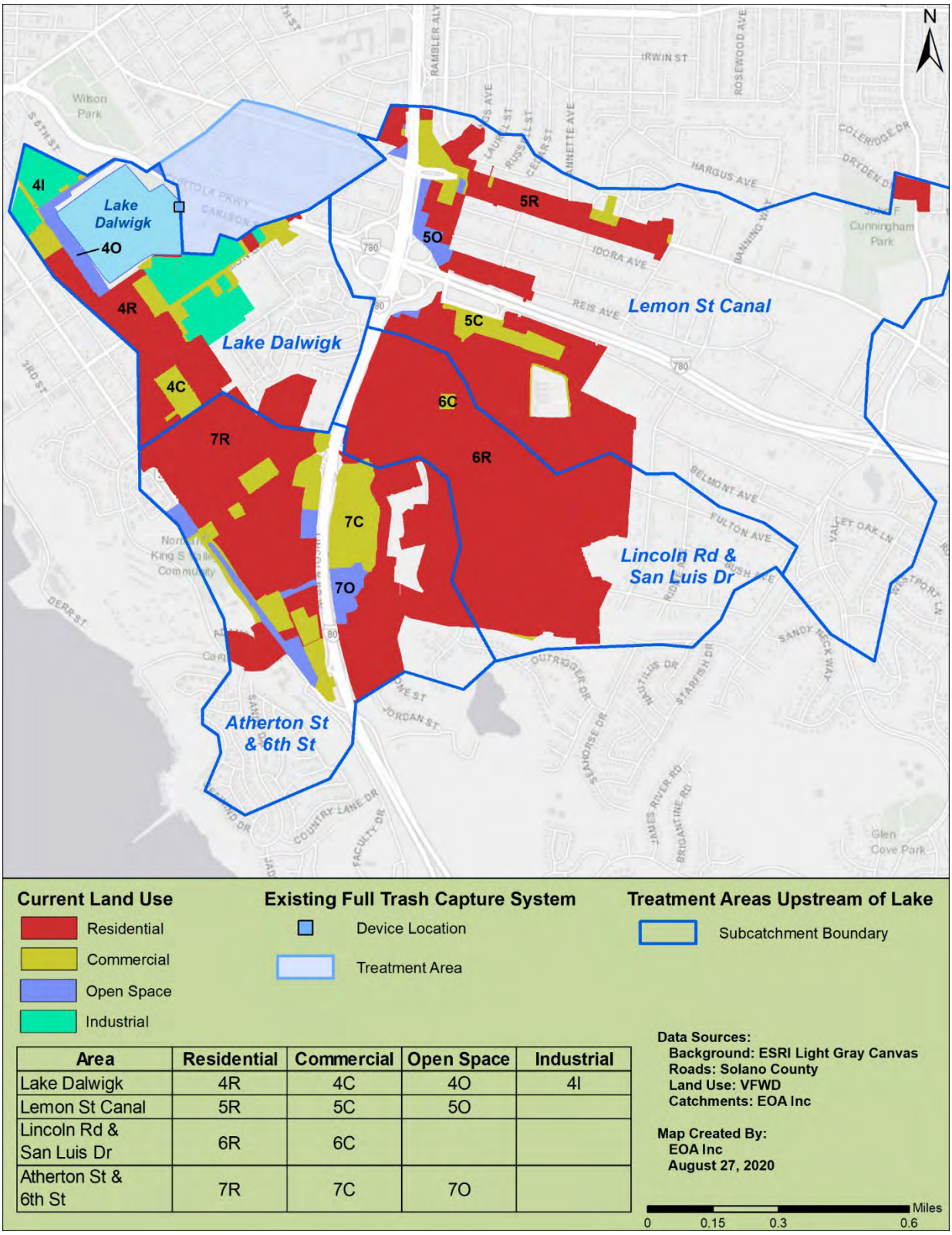

Area	Residential	Commercial	Open Space	Industrial
Lake Dalwigk	4R	4C	4O	4I
Lemon St Canal	5R	5C	5O	
Lincoln Rd & San Luis Dr	6R	6C		
Atherton St & 6th St	7R	7C	7O	

Figure 2: Land uses for trash generating areas that are within the four land areas (Lake Dalwigk, Lemon St Channel, Lincoln Rd & San Luis Dr, and Atherton St & 6th St) draining to Lake Dalwigk. Note – only areas with moderate, high or very high trash generation are included on the map.

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1.4 Baseline and Current Levels of Trash Generation

Baseline trash generation for the seven land areas upstream of the two lakes are depicted on the Vallejo baseline trash generation map, which represents the levels of trash generated in 2009 (baseline year). Table 2 summarizes the extent area in each of the seven areas that generated moderate, high or very high levels of trash in 2009. The estimated levels of trash generated in each area and the associated baseline trash generation category are also presented.

Table 2. Baseline trash generation for each area upstream of Lake Chabot and Lake Dalwigk.

Land Use Category	Areas Upstream of Lake Chabot			Areas Upstream of Lake Dalwigk			
	Fairgrounds Drive (1)	Lake Chabot (2)	Blue Rock Springs (3)	Lake Dalwigk (4)	Lemon St Channel (5)	Lincoln Rd & San Luis Dr (6)	Atherton St & 6th St (7)
Moderate, High and Very High Trash Generating Area (acres)	225	305	102	96	116	142	177
Baseline Trash Generation (gallons/yr)	4,273	2,308	2,705	2,046	1,277	1,064	3,295
Trash Generation Rate (gallons/acres -yr)	19.0	7.6	26.5	21.3	11.0	7.5	18.6
Baseline Trash Generation Category	High	Moderate	High	High	Moderate/High	Moderate	High

Since 2017, the City and District have conducted On-land Visual Trash Assessments (OVTAs) to identify the current levels of trash in Vallejo, and through by comparing to baseline levels, demonstrate trash reductions to the MS4 over time in areas where trash controls other than trash full capture systems have been implemented. Currently, 87 sites are assessed at an average frequency of three times each year in Vallejo. Of these 87 sites, 17 are located in the seven areas upstream of the two lakes. Table 3 provides a summary of the current level of trash in each of the seven areas based on the most recent results of OVTAs (July 2018 – July 2020) conducted at these 17 sites. A comparison to baseline levels summarized in Table 2 is also provided. Based on the comparison illustrated in Table 3, it appears that the trash levels in nearly all of the areas upstream of the two lakes have decreased substantially since 2009.

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Table 3. Current levels of trash generation as observed at OVTA sites located in each area upstream of Lake Chabot and Lake Dalwigk.

Lake	Area ID	# OVTA Sites	# OVTAs (July 2018 - July - 2020)	Trash Generation Category		Improvement Trend
				Baseline	Current	
Chabot	1	3	12	High	Moderate	↗
	2	1	5	Moderate	Moderate	→
	3	3	10	High	Moderate	↗
Dalwigk	4	2	10	High	Moderate	↗
	5	3	16	Moderate/High	Moderate	↗
	6	2	10	Moderate	Moderate	→
	7	3	15	High	Moderate	↗

2. Trash Source Evaluation

As a first step to conducting the control measure feasibility evaluation, current trash levels and sources were identified within the areas of interest. The results of this task were intended to support the identification of areas where trash levels have not significantly improved and the applicable trash control measures that could be considered as part of the feasibility evaluation, based on the sources of trash observed. Current trash levels and sources were identified for each of the seven areas of interest using a variety of information sources, including:

- On-land Visual Trash Assessment (OVTA) Data – Trash sources were identified during OVTAs conducted during recent fiscal years. Data from these assessments were compiled and evaluated.
- Interviews with City and District Staff – Interviews with City and District staff were conducted to determine known locations of the following trash sources:
    - Illegal Dumping
    - Private Trash Bin/Container Overages
    - Homeless Encampment
    - Pedestrian/Vehicle Litter
- Field Reconnaissance - Additional field inspections were conducted to identify current trash levels and confirm trash sources identified by City and District staff in specific areas.
- Google Street View – Current trash generation levels were also identified through Google street view in comparison to the Vallejo baseline trash generation map as guidance.

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2.1 Observed Trash Sources by Land Use Class and Area of Interest

The results of the trash source identification task are included in this section. Results are organized by the four major land use classes. The area(s) of interest where each source was identified are described under each land use class. Photos of trash sources observed in each land use class are included in Appendix A. Table 4 summarizes trash sources that were observed in the areas draining to Lake Chabot, and Table 5 summarizes trash sources for areas draining to Lake Dalwigk.

Residential Areas

- Multiple residential areas in the City continue to generate moderate or high levels of trash.
- Field inspections of these areas show signs of pedestrian and vehicle litter on residential roadways throughout all seven areas of interest.
- Overflowing trash bins/container on properties associated with multi-family residential land uses were observed as trash sources in the Lemon Street Canal area (5R).

Commercial Areas

- Commercial areas throughout the City generate moderate or high levels of trash. Trash in these areas is generally associated with single-use packaging associated with goods sold/distributed in these areas.
- Field inspections of commercial subareas 2C, 3C, 4C and 7C show litter from pedestrians as an important source.
- Illegal dumping was observed as a source of trash in subareas 1C-4C and 7C.
- Overflowing trash bins/containers were observed as sources of trash in subareas 1C, 4C and 5C.
- Field inspections also revealed homeless encampments as a source of trash in subareas 1-3C and 7C.

Open Space Areas

- A handful open spaces (i.e. parks, empty or vacant lots) were identified as having moderate or high trash levels in the City. These areas are characterized mainly by litter from pedestrians, illegal dumping, and homeless encampments.
- Open spaces included in subarea 1O, 5O and 7O contain litter from pedestrians.
- Field inspections of subareas 1-4O show signs of illegal dumping and homeless encampments. Illegal dumping was also observed in subarea 7O.

Industrial Areas

- Only one industrial area in the City was identified as continuing to generate moderate or high levels of trash. This industrial subarea, 4I, is adjacent to an open space area near Lake Dalwigk.
- Field inspections of this area show that trash generation is mostly from pedestrian and vehicle litter.

Tables 6 and 7 identifies potential trash control measures that could be implemented to address trash sources that were observed in the areas draining to Lake Chabot and Lake Dalwigk, respectively.
An evaluation for each of these controls is provided in Section 3.

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Table 4. Trash sources identified in each area of interest draining to Lake Chabot.

Area of Interest	Land Use	Map ID	Sources Identification Method			Trash Sources Observed			
			OVTAs	Interviews w/ City and District Staff	Field Reconnaissance	Pedestrian or Vehicle Litter	Illegal Dumping	Homeless Encampments	Improper Bin Management
Fairgrounds Drive (1)	Residential	1-R	X	X	X	X			
	Commercial	1-C			X		X	X	X
	Open Space	1-O	X		X	X	X	X	
Lake Chabot (2)	Residential	2-R	X	X	X	X	X		
	Commercial	2-C	X	X	X	X	X	X	
	Open Space	2-O	X	X	X		X	X	
Blue Rock Springs (3)	Residential	3-R	X	X	X	X			
	Commercial	3-C	X	X	X	X	X	X	X
	Open Space	3-O	X	X	X		X	X	

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Table 5. Trash sources identified in each area of interest draining to Lake Dalwigk.

Area of Interest	Land Use	Map ID	Sources Identification Method			Trash Sources Observed			
			OVTAs	Interviews w/ City and District Staff	Field Reconnaissance	Pedestrian or Vehicle Litter	Illegal Dumping	Homeless Encampments	Improper Bin Management
Lake Dalwigk (4)	Residential	4-R	X	X	X	X			
	Commercial	4-C	X	X	X	X	X		
	Industrial	4-I	X	X	X	X			
	Open Space	4-O	X	X	X		X	X	
Lemon St Channel(5)	Residential	5-R	X		X	X			X
	Commercial	5-C	X		X	X			X
	Open Space	5-O	X	X	X	X			
Lincoln Rd & San Luis Dr (6)	Residential	6-R	X	X	X	X			
	Commercial	6-C	X		X	X			
Atherton St & 6th St (7)	Residential	7-R	X	X	X	X			
	Commercial	7-C	X	X	X	X	X	X	
	Open Space	7-O		X	X	X	X		

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Table 6. Potential control measures identified for each area of interest and land use combination draining to Lake Chabot.

Area of Interest	Land Use	Map ID	Primary Trash Sources Observed	Large Full Capture	Small Full Capture	Curb Inlet Screens & Enhanced Street Sweeping	Enhanced Business Inspections
Fairgrounds Drive (1)	Residential	1-R	• Pedestrian/Vehicle Litter on Streets/Sidewalks	X	X	X	
	Commercial	1-C	• Improper Bin Management on Private Properties • Illegal Dumping • Homeless Encampments	X	X	X	X
	Open Space	1-O	• Illegal Dumping • Homeless Encampments • Pedestrian/Vehicle Litter on Streets/Sidewalks	X	X	X	
Lake Chabot (2)	Residential	2-R	• Pedestrian Litter on Streets/Sidewalks		X	X	
	Commercial	2-C	• Pedestrian Litter on Streets/Sidewalks • Illegal Dumping • Homeless Encampments		X	X	X
	Open Space	2-O	• Illegal Dumping • Homeless Encampments		X	X	
Blue Rock Springs (3)	Residential	3-R	• Pedestrian Litter on Streets/Sidewalks	X	X	X	
	Commercial	3-C	• Improper Bin Management on Private Properties • Pedestrian Litter on Streets/Sidewalks • Illegal Dumping • Homeless Encampments	X	X	X	X
	Open Space	3-O	• Illegal Dumping • Homeless Encampments	X	X	X	

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Table 7. Potential control measures identified for each area of interest and land use combination draining to Lake Dalwigk.

Area of Interest	Land Use	Map ID	Primary Trash Sources Observed	Large Full Capture	Small Full Capture	Curb Inlet Screens & Enhanced Street Sweeping	Enhanced Business Inspections
Lake Dalwigk (4)	Residential	4-R	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
	Commercial	4-C	• Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	X
	Industrial	4-I	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	X
	Open Space	4-O	• Illegal Dumping • Homeless Encampments		X	X	
Lemon St Channel (5)	Residential	5-R	• Improper Bin Management on Private Properties • Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	X
	Commercial	5-C	• Improper Bin Management on Private Properties • Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	X
	Open Space	5-O	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
Lincoln Rd & San Luis Dr (6)	Residential	6-R	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
	Commercial	6-C	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	X
Atherton St & 6th St (7)	Residential	7-R	• Pedestrian/Vehicle litter on Streets/Sidewalks		X	X	
	Commercial	7-C	• Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping • Homeless Encampments		X	X	X
	Open Space	7-O	• Pedestrian/Vehicle litter on Streets/Sidewalks • Illegal Dumping		X	X	

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3. New or Enhanced Trash Control Measures Evaluated

Below is a summary of the different types of potential trash control measures that were included in the feasibility evaluation. These controls were identified based on the current understanding of trash levels and sources as described in Section 2, the demonstrated effectiveness of specific types of controls, and the configuration of the Vallejo MS4, relative to the Lake Chabot and Lake Dalwigk. An explanation for why some types of trash control measures were not evaluated is provided at the end of this section.

3.1 Trash Full Capture Systems

Large Full Capture Systems

Large full trash capture systems are devices that can treat an entire stormwater catchment area (including storm drains on private property) and provide a single location for maintenance, saving operation and maintenance costs over time. Two disadvantages of large systems are the relatively high capital and construction costs, which require a large initial funding source, and the higher instance of subsurface utility conflicts at desired locations within highly urbanized areas.

There are three types of large full capture systems currently installed in the Bay Area - hydrodynamic separators, gross solids removal systems, and netting systems. Among many factors, the selection of large systems for reducing trash depends on the characteristics of the specific location, the potential for hydraulic impacts, the extent of environmental permitting, and the resulting trash load reduction that will occur via the system. The State Water Resources Control Board publishes a list of certified full capture systems which can be implemented by MS4 municipalities.

Small Full Capture Systems

Small trash full capture devices are alternatives to large trash full capture devices. Screening systems that are installed in stormwater catch basins (or inlets) are commonly known as catch basin inserts (CBIs). CBIs are placed inside a catch basin to prevent trash, organic material (e.g. leaves and twigs) and sediment from entering the storm drain outflow pipe within the catch basin. There are two general designs of CBIs, inlet inserts, and outlet inserts. Inlet inserts are placed inside the inlet, while outlet inserts are placed in front of the outlet pipe. A wide variety of CBI designs exist, mostly in the form of outlet inserts (e.g., connector pipe screens) that are placed in front of the outlet pipe. CBIs that use filtering walls or filter media are not applicable for trapping trash and do not meet the full trash capture standard. As a result, the term “insert” does not refer to configurations that use filter media for removing other stormwater pollutants. The State Water Resources Control Board publishes a list of certified full capture systems which can be implemented by MS4 municipalities.

3.2 Other Types of Trash Control Measures

Enhanced Municipal Trash Inspection Program

Based on source investigations conducted as part of this project, trash associated with private properties draining to storm drain inlets located on private property, remain important sources of trash in the City. To address this source, some municipalities in the Bay Area have successfully instituted a Trash Inspection Program that entails the periodic assessment of trash levels on properties of interest by City staff, and if

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levels are above an "A" OVTA score, then requiring the property owners/managers to institute control measures that achieve this trash reduction goal.

Curb Inlet Screens and Enhanced Street Sweeping

Curb inlet screens are treatment devices that block trash from entering a catch basin/inlet. These devices can benefit stormwater, however, they have not been well studied and are not certified/approved as trash full capture systems by the San Francisco Bay Regional Water Board or the State Water Resources Control Board as full capture systems. Curb-inlet screens may be retractable or fixed in place, and generally have a perforated screen or evenly spaced bars that are designed to fit outside of, or immediately within the storm drain curb opening. Retractable screens open either manually or hydraulically when a stormwater runoff applies enough force on the screen. Since curb-inlet screens block trash and debris from entering the storm drain inlet or storm drain, trash remains in the street and is removed by regular street sweeping or other measures.

Public agencies and private landowners conduct street sweeping to remove litter from streets and parking lots and reduce sediment buildup on impervious surfaces. Street sweeping studies have shown that under ideal conditions (i.e., slow operator speeds, good condition of the roadway surface, and minimal/no automobiles parked along curb) a street sweeper can remove nearly all litter from the swept area. However, sweeping will not remove trash from sidewalks or roadside vegetation where trash is often observed and may be transported to the MS4 via wind or stormwater runoff. Although the City already conducts sweeping on many roadways, more frequent sweeping or improved sweeping conditions (e.g., removal of parked cars along the curb) may reduce the amount of trash observed on streets, possibly to a level of low trash generation.

Based on previous reviews of the literature on street sweeping effectiveness and recent studies conducted in the Bay Area (BASMAA 2017; SCVURPPP and Oakland, in preparation), it is estimated that a successful street sweeping program can reduce the level of trash on streets by roughly one OVTA score (e.g., "B" score to "A" score) if implemented effectively.

3.3 Trash Control Measures Not Evaluated

The following trash control measures were not included in the feasibility evaluation because they are either already implemented at a very high level, technically infeasible, or do not have predictable outcomes that are conducive for a cost benefit evaluation. Each of these controls is described below.

On-land Cleanups and Illegal Dumping Abatement

The District and City are currently implementing a number of trash control measures to address illegal dumping and trash accumulation associated with illegal encampments that will likely address the trash sources documented for this report. The City currently has four full-time staff dedicated to on-land trash cleanups that result in the removal of millions of pounds of trash each year. In FY 19-20, Vallejo Permittees picked up and disposed of 550 tons of illegally dumped material, much of which was related to homeless encampments near waterways and illegal dumping in areas upstream of the two lakes. Due to their transient nature, homeless encampments are challenging to manage and the costs of physical structures to prevent the establishment of encampments are prohibitive to implementing at a large scale.

In addition to on-land cleanups, the District and City conduct quarterly removal of trash around the perimeter of Lake Chabot and Lake Dalwigk (see Table 8), and annually at trash hot spots in channels upstream of the two lakes. Trash cleanup events are coordinated between the Vallejo Permittees and, to the extent possible, the Vallejo Watershed Alliance, Greater Vallejo Recreation District, Caltrans, Vallejo

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City Unified School District, California Maritime Academy, Six Flags Discovery Kingdom, Vallejo Chamber of Commerce, Friends of Lake Chabot, Solano Sierra Club, and the Solano Resource Conservation District.

Table 8. Volumes of trash removed from Lake Chabot and Lake Dalwigk in FY 2019-20.

Water Body	Trash Volume (CY) Removed					Total Gallons
	Q1	Q2	Q3	Q4	Total	
Lake Dalwigk	1	0.5	0.5	1.75	3.75	758
Lake Chabot	1	0.5	0.5	2	4	808
Totals	**2**	**1**	**1**	**3.75**	**7.75**	**1,566**

Trash Booms

Previous evaluations of trash booms as potential trash control measure in City of Vallejo indicate that the installation and maintenance of trash booms located in Lake Chabot and Lake Dalwigk is infeasible. For Lake Chabot, infeasibility is due to lack of access to locations where booms could be installed and serviced, including confluences with major storm drain outfalls and channels, which would be primarily through privately owned lands (e.g., Six Flags Discovery Kingdom). For Lake Dalwigk, there do not appear to be any feasible locations for trash booms due to shallow channel dimensions and low flow conditions within Lemon Street Canal, the main tributary to the lake. Due to the infeasibility of installing trash booms, this control measure was not further evaluated.

Public Education and Outreach

Education and outreach programs are designed to raise citizen awareness about the impacts of littering or illegal dumping, and teach citizens how to change their behavior accordingly. Programs usually include a mixture of anti-littering advocacy, reinforced with the development of classroom curricula, storm drain signage and volunteer cleanups. Expansion of the community outreach and education program could benefit overall trash load reduction by promoting litter prevention initiatives. However, it is very difficult to estimate the percentage reduction that the Vallejo Permittees may achieve through implementing an enhanced City-wide public education and outreach program. Due to the inability to assign a quantitative trash reduction benefit to public education programs, the control measure was not further evaluated.

4. Potential New or Enhanced Trash Control Measures

This section describes each potential new or enhanced trash control measure that was evaluated as part of this feasibility study. The extent to which Vallejo Permittees have implemented the control measure to-date, the potential new or enhanced implementation of the control measure in the future, the estimated trash reduction benefits of existing and potential new/enhanced implementation, and the estimated costs of implementing the new or enhanced control measure (as described) are summarized in this section. Please note the following:

- The trash reduction benefits associated with potential new/enhanced controls that are summarized in this section should be considered preliminary estimates, as they are based on a combination of the Vallejo Permittees baseline trash generation map, the geographical extent of existing and potential trash full capture systems implemented, and best professional judgement based on the current understanding of the effectiveness of each control measure.

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- Cost estimates included in this section should be considered preliminary planning-level estimates and may not include all costs associated with the design, planning, purchase, construction/installation, implementation, and operation and maintenance associated with the control measure. Assumptions associated with estimating the costs for each control measure are included.
- Costs estimates presented are based on the most readily available information at the time that this evaluation was conducted, including staffing rates (fully burdened) that were provided by the Vallejo Permittees. Comparisons of base/initial costs (e.g., design, planning, purchasing, and constructing/installing), annual ongoing costs (e.g., implementation and O&M and replacement for full capture systems), and 10-year costs were developed using this information to assist the Vallejo Permittees in evaluating the most cost-effective approaches to achieving mandated trash load reductions. More detailed cost estimates will likely be needed should the Permittees decide to move forward with the implementation of one or more of the control measures evaluated.

4.1 Publicly-Owned Large Full Capture Systems

Existing Large Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

In 2012, the District installed seven NetTech™ full capture systems treating 1,670 acres in the drainage area upstream of Lake Chabot and Lake Dalwigk. In October 2020, the District is planning to construct three new full capture systems (netting systems) downstream of both Lake Chabot and Lake Dalwigk. Together, these ten large full capture systems will treat 7,992 acres within the City, which will account for roughly a 44% trash load reduction.

Potential Additional Large Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

A Trash Capture Feasibility Study was conducted by the District in 2018 to identify potential locations and types of large and small full capture devices that could be installed to achieve the reduction requirements in the MRP (EOA 2018). The study provides a description of trash full capture devices and locations evaluated, the predicted trash reductions associated with each device and location, and the preliminary cost estimates for design, installation and maintenance of each potential device. The study identified a total of thirty-five catchment and sub-catchment drainage areas within City that could be conceptually be treated with large full capture devices. Five of the thirty-five sites were located in the drainage area upstream of open channels and shorelines of Lake Chabot and Lake Dalwigk.[4] Three of the sites/device types in the Lake Dalwigk drainage area (areas 5-7) were determined to not be feasible due to issues related to low cost-efficiency or channel alteration that would be needed for installation (refer to Table 14 of the Study). For these reasons, these sites were removed from further evaluation in this study. The remaining two potential sites are located in areas 1 and 3 in the Lake Chabot drainage area (Figure 3), and are downstream of open channels. Information on the sub-catchment area, percent area with moderate, high or very high levels of trash generating area, and percent baseline trash level within sub-catchment for these two locations are provided in Table 9.

Additional details regarding this location, type and assumptions associated with the recommend type of large full capture systems are included in Appendix B.

[4] Site VAL_LRG_01_Site_07 was located in lowest section of the Lemon Street Canal and thus, was not included in the evaluation of large full capture sites due to treatment occurring downstream of a receiving water body. The subcatchment area upstream of VAL_LRG_01_Site_07 was evaluated for small full capture sites (see next section)

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9318

Table 9. Large full capture system locations in two subcatchment drainage areas upstream of Lake Chabot.

Drainage Area	Area of Interest	Catchment/ Subcatchment Area ID	Treated Area (Acres)	% of Catchment that Generates Moderate, High, or Very High Levels of Trash	Trash Reduction Potential (%)
Lake Chabot	1	Large 6 – Site 6	451	50%	4.2%
	3	Large 6 – Site 3	1,832	5%	2.7%

Cost Estimates

Preliminary planning-level cost estimates associated with the design, installation, and operation of the two potential large trash capture systems identified for areas upstream of Lake Chabot in the are presented in Table 10. The majority of the capital/initial costs associated with the large devices are not the device itself, but with the installation/construction of the device, moving utilities due to conflicts, and permitting. Installation costs for large devices include mobilization and demobilization, traffic control, SWPPP preparation, contractor's markup, excavation, hauling, shoring, backfilling, dewatering, surface replacement, bypass pumping, diversion structure, and connections to the storm drainage system. As a result, the overall costs for designing, purchasing and constructing a large devices usually exceed $1M, not including costs associated with environmental permitting, which would likely be needed for the two devices evaluated.

Estimated on-going/maintenance costs for the two systems included in the feasibility evaluation assume that the devices are maintained by District staff at least two times per year. Newly installed large devices should be cleaned out more often during the first year to determine debris volume (i.e., maintenance frequency) and device performance.

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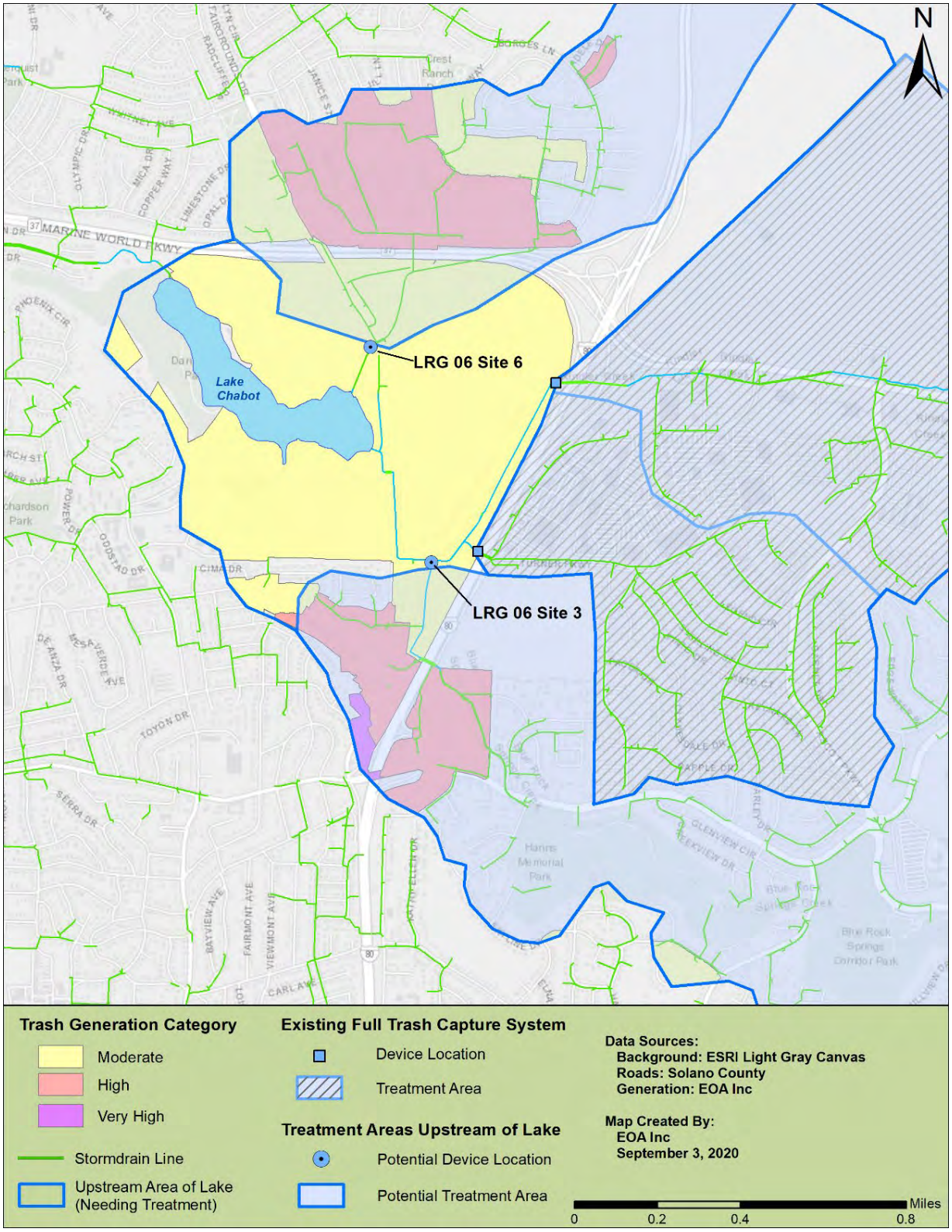

Figure 3. Locations of two potential large full capture systems upstream of Lake Chabot and the associated drainage areas.

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Table 10. Preliminary Planning-Level Costs Estimates for the two Large Full Capture Systems.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks[b]				On-going/Annual Tasks			
Task	Geographical Span of Implementation	Assumptions		Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
				Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
Capital costs of system design, installation, construction, and contingency.	The two areas of interest that have a potential site for a full capture system (1,3).	Contractor installs devices, either netting or GSRD. Full capture system in area 1 costs $1,625,780 and area 3 costs $961,610.	NA	--	--	--	$2,587,390	--	--	--	--
District develops concept and releases bid/RFP for a large full capture system location and manages construction contract.		Based on feasibility evaluation, City staff has enough information to develop and release bid package for design/build of the system. City staff assist with design of system. Engineering Supervisor staff time only needed for the first two years (i.e., Base/Initial Tasks). No on-going costs associated with this task.	Engineering Supervisor	390	0.195	$224,359	$43,750	--	--	--	--
			Director of Field Operations	8	0.004	$261,335	$1,045	--	--	--	--
District develops standard operating procedure for maintenance of large system.		Collection System Supervisor with assistance from Collection Systems Technician II develops standard operating procedure for maintenance of large system.	Collection Systems Supervisor	80	0.04	$177,127	$7,085	--	--	--	--
			Collection Systems Technician II	24	0.01	$161,575	$1,616	--	--	--	--
District operates and maintains system		• 2 maintenance events each year • 1 vaccum-assisted truck operator and 3 maintenance staff per maintenance event • 4 hrs per event	Collection Systems Technician II	--	--	--	--	24	0.01	$161,575	$1,616
			Collection Systems Technician II/Vactor Operator (4 staff)	--	--	--	--	32	0.02	$161,575	$3,231
Overhead Costs		Oversight of all tasks above	District Engineer	20	0.01	$315,542	$3,155	20	0.01	$315,541	$3,155
			Totals	522	0.259	--	$2,600,291	76	0.04	--	$7,699

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.
[b] Costs associated with base/initial tasks do not include costs associated with environmental permitting.

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4.2 Publicly-Owned Small Full Capture Systems

Small trash full capture devices (e.g., connector pipe screens or catch basin inserts) are alternatives to large trash full capture devices. Only publicly-owned catch basins receiving trash from moderate, high or very high trash generating areas were included in the analysis. Privately-owned catch basins were not part of the analysis because of issues related to ownership and access for maintenance oversight.

Existing Small Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

There are currently no known small full capture systems installed in stormwater catch basins within the public right-of-way (ROW) located in the areas upstream of the two lakes.

Potential Additional Small Full Capture Systems Upstream of Lake Dalwigk and Lake Chabot

As part of this study, a total of 353 publicly owned catch basins that are located within the seven drainage areas upstream of Lake Chabot and Lake Dalwigk were identified as potential locations for small trash full capture devices (Figures 4 and 5). The total number of catch basins and estimated treatment area within each of the seven areas of interest are shown in Table 11. The area that would be treated by is considerably less than subcatchment area since it does not include storm drain systems on privately owned land.

Table 11. Total number of catch basins in the public right-of-way identified for potential small full capture systems and the estimated areas upstream of Lake Chabot and Lake Dalwigk that would be addressed.

Upstream Drainage Area	Area of Interest	Total # Catch Basins in Public ROW	Area Addressed by Catch Basins (acres)	Trash Reduction Potential (%)
Lake Chabot	1	77	182	3.8%
	2	7	22	0.2%
	3	31	57	1.7%
Lake Dalwigk	4	26	43	0.9%
	5	64	105	1.2%
	6	58	132	1.0%
	7	90	162	3.0%
	Totals	**353**	**703**	**11.7%**

Cost Estimates

The preliminary, planning-level cost estimates associated with the design, installation, and operation of the potential 353 small capture full trash capture devices for each of the drainage areas upstream of Lake Chabot and Lake Dalwigk are presented in Table 12.

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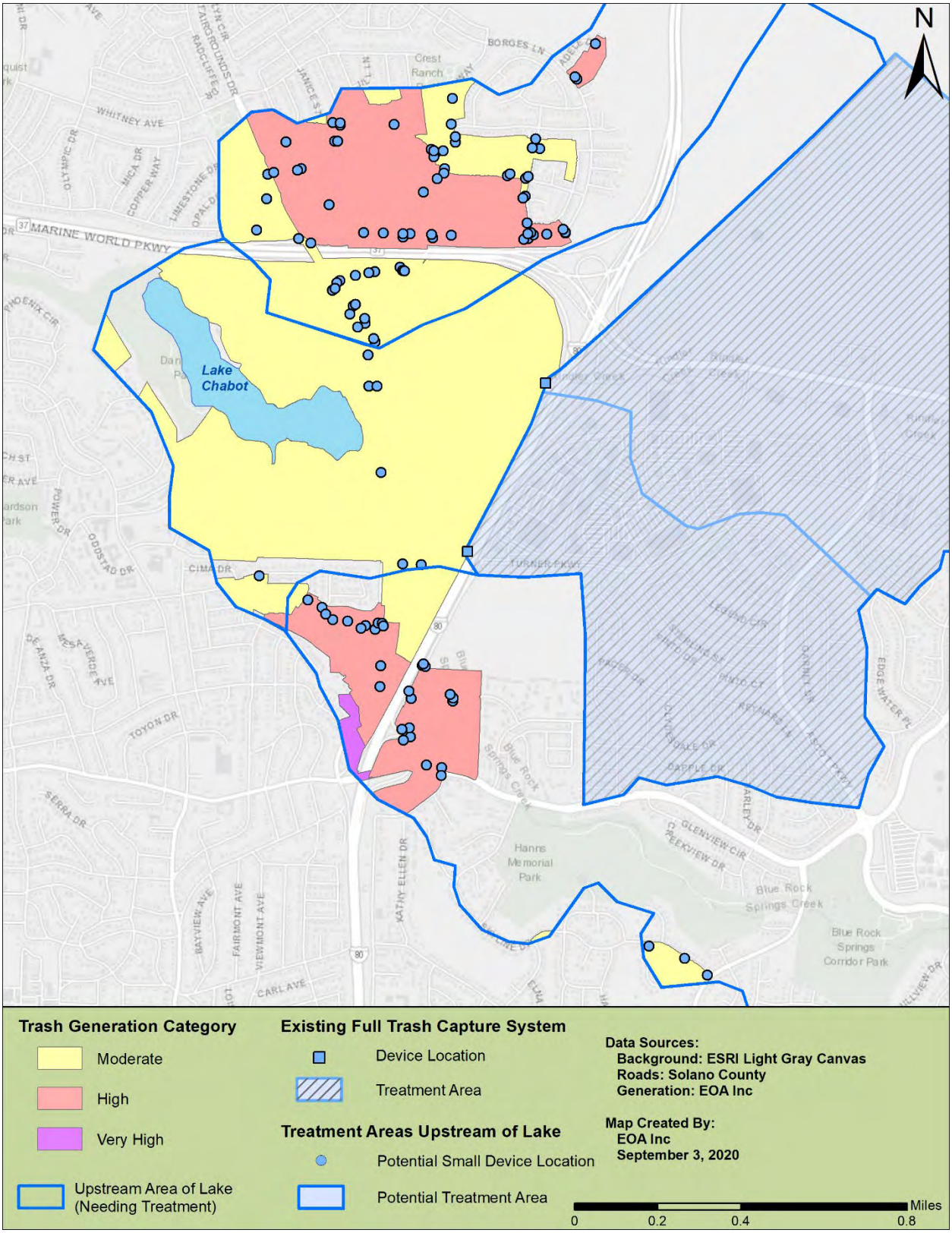

Figure 4. Catch basin locations for potential small full capture devices in drainage areas upstream of Lake Chabot.

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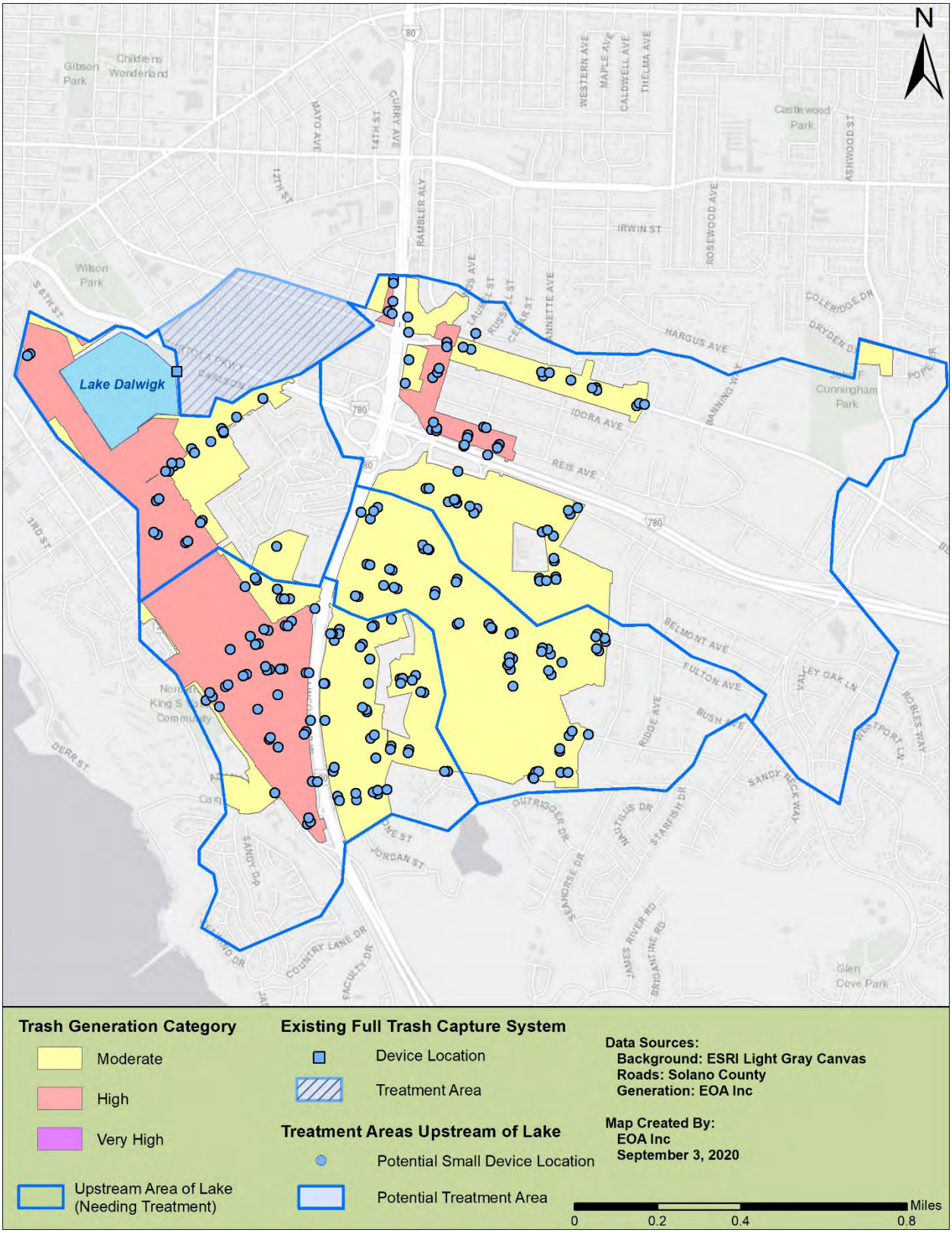

Figure 5. Catch basin locations for potential small full capture devices in drainage areas upstream of Lake Dalwigk.

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Table 12. Preliminary Planning-Level Costs Estimates for Small Full Capture Systems in the City of Vallejo.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
				Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
Task	Geographical Span of Implementation	Assumptions		Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
District develops concept and releases bid/RFP for small capture systems	353 public ROW inlets in Moderate and High trash generating areas not treated by full capture systems	All planning tasks conducted by District staff	Engineering Supervisor	500	0.25	$224,359	$56,090	--	--	--	--
			Director of Field Operations	8	0.004	$261,335	$1,045	--	--	--	--
			Collection Systems Supervisor	80	0.04	$177,127	$7,085	--	--	--	--
			Collection Systems Technician II (calculations assume 2 workers)	160	0.08	$161,575	$12,926	--	--	--	--
Capital costs of system, installation, and contingency	353 Public ROW Inlets	• Contractor installs devices. • Capital costs can range from $500 to $2500 per inlet and estimated to be $1,000 per device (see Appendix C). • Replacement of each device 2x during a 50-yr timeframe (i.e., average replacement rate of 14 screens/yr) at $1,000/screen	Materials Costs	--	--	--	$353,000	--	--	--	$14,120
District develops standard operating procedure for maintenance of small capture systems.		Director of Field Operations with assistance from Collection Systems Technician II develops standard operating procedure.	Director of Field Operations	80	0.04	$261,335	$10,453	--	--	--	--
			Collection Systems Technician II	24	0.01	$161,575	$1,616	--	--	--	--
District maintains systems	All public ROW inlets where Small Capture Systems are installed	• 353 locations • 4 maintenance events per year, 0.5 hrs/event • 2 technician workers per maintenance event (1 supervisory technician II, 2 technician II staff)	Collection Systems Technician II	--	--	--	--	706	0.35	$161,575	$57,036
			Collection Systems Technician II (calculations assume 2 workers)	--	--	--	--	1412	0.71	$161,575	$114,071
Overhead Costs	NA	Oversight of all tasks above	District Engineer	20	0.01	$315,542	$3,155	20	0.01	$315,542	$3,155
			Totals	**872**	**0.44**	**--**	**$445,370**	**2138**	**1.07**	**--**	**$190,382**

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.

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4.3 Enhanced Municipal Trash Inspection Program

Existing Trash Inspection Program

Stormwater inspections are currently conducted by the District at commercial and industrial facilities, consistent with MRP provision C.4. Approximately 300 pre-treatment/stormwater inspections are conducted throughout the City of Vallejo during a typical year. Based on the proportion of commercial and industrial businesses within the drainage areas upstream of the two lakes, to the total number of businesses within the entire city, it was assumed that pretreatment/stormwater inspections are conducted at approximately 30 commercial/industrial properties each year within the drainage areas upstream of the two lakes.

The City currently inspects these facilities for stormwater compliance on an annual, biannual, or once every five years frequency, based on the business type and potential to contribute pollutants to the City's MS4. Trash management activities are identified and evaluated as part of these stormwater inspections. That said, there are many businesses and other private properties that are not included as part of the existing stormwater inspection program, but still contribute moderate or high levels of trash to the City's MS4.

Potential Expansion of Trash Inspection Program

An enhanced trash inspection program implemented by the City could entail the following to address trash associated with commercial areas upstream of the two lakes:

1. More formally adding an On-Land Visual Trash Assessment (OVTA) component to existing pretreatment/stormwater inspections, and
2. Conducting targeted trash inspections that include OVTAs at additional businesses that are not currently inspected for stormwater compliance and at other private properties that generate moderate or high trash levels.

Enhanced trash inspections conducted as part of pretreatment/stormwater inspections could occur at the frequency that inspections are currently conducted, unless the property inspected achieved an OVTA score of an "A". For those properties where moderate (B) or high (C) OVTA scores were observed, enforcement and follow up inspections would be conducted at a higher frequency until an "A" score is attained. Properties not currently included in the stormwater inspection pool would be inspected once every 5-years, unless the property achieved an OVTA score of an "A". For those properties where moderate (B) or high (C) OVTA scores were observed, enforcement and follow up inspections would be conducted at a higher frequency until an "A" score is attained. If businesses consistently fail to meet an "A" score even after follow-up inspections have taken place, alternative actions will be considered, such as the requirement for the business to install a trash capture system to address trash on their property. The locations of properties where an enhanced municipal trash inspection program could be expanded to are shown in Figures 6 and 7.

The total area for moderate, high and very high trash generating areas for all private parcels in the areas upstream of Lake Chabot and Lake Dalwigk is provided in Table 13. The potential percent trash reduction associated with the inspection program is also provided. The trash reduction potential assumes that the Enhanced Municipal Trash Inspection Program will result in private properties eventually achieving an "A" score over a 10-year timeframe.

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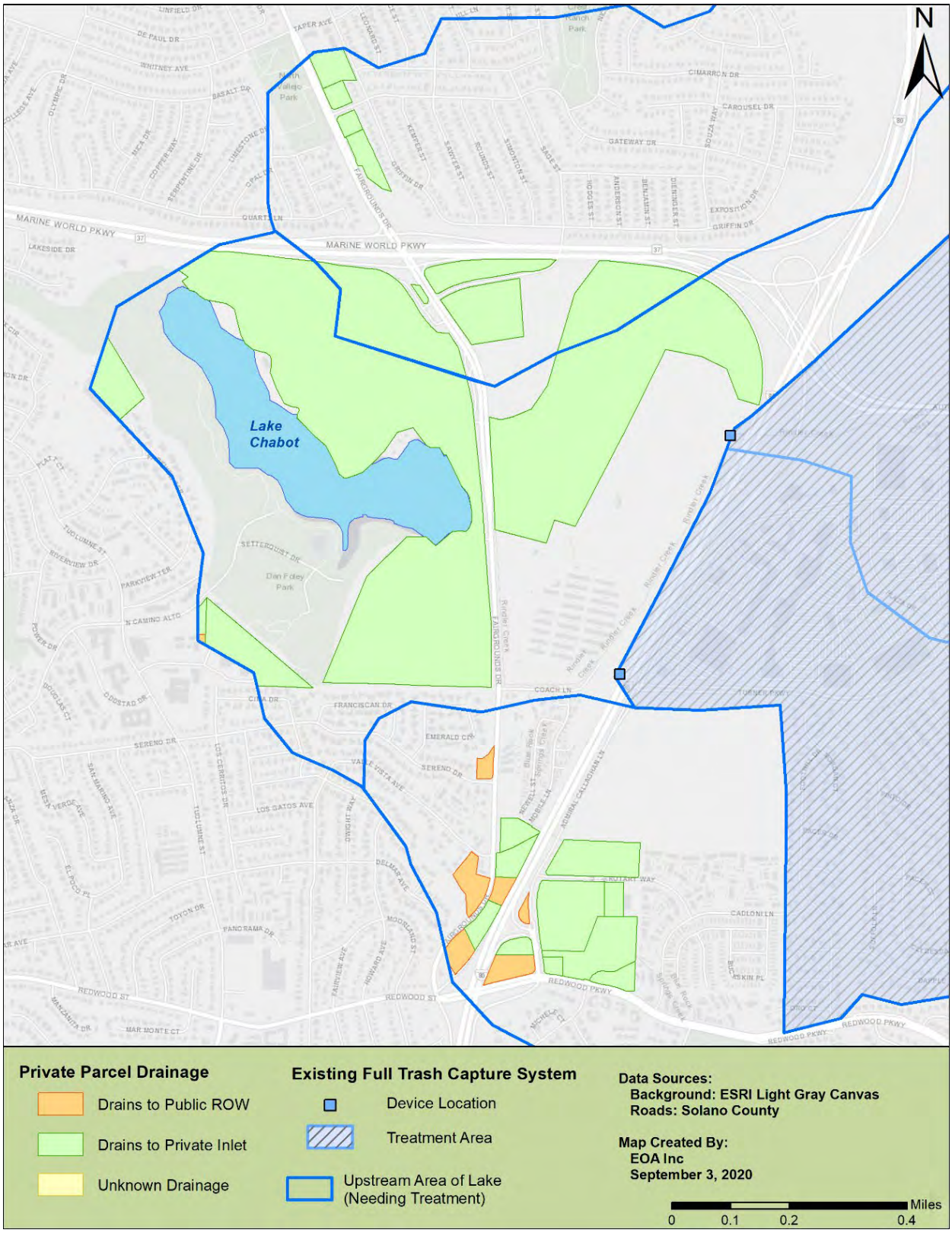

Figure 6. Private properties in the area upstream Lake Chabot that generate moderate or high trash levels and therefore could be included in a new enhanced trash inspection program in the City of Vallejo.

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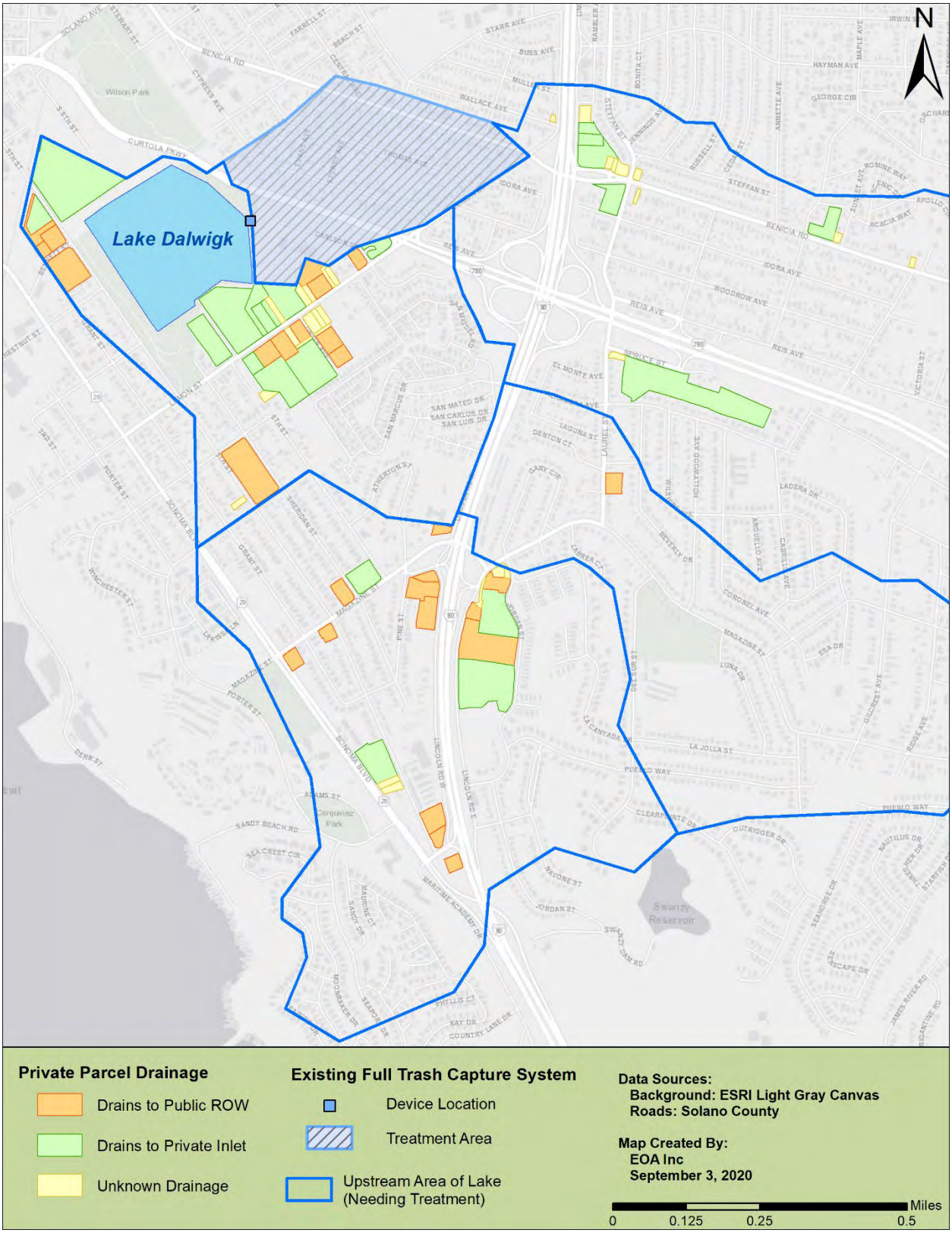

Figure 7. Private properties in the area upstream Lake Dalwigk that generate moderate or high trash levels and therefore could be included in a new enhanced trash inspection program in the City of Vallejo.

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9328

Table 13. Total areas associated with private parcels upstream of Lake Chabot and Lake Dalwigk that could be included in the trash inspection program.

Upstream Drainage Area	Area of Interest	Total Area of Private Parcels (acres)				Baseline Trash Reduction Potential (%)
		Mod	High	Very High	Total	
Lake Chabot	1	37.8	5.9	0.0	43.7	0.5%
	2	155.7	0.0	0.0	155.7	1.2%
	3	0.0	34.1	1.4	35.5	1.1%
Lake Dalwigk	4	25.4	14.3	0.0	39.7	0.6%
	5	11.3	1.7	0.0	13.0	0.1%
	6	0.7	0.0	0.0	0.7	0.0%
	7	12.2	9.4	0.0	21.6	0.4%
	Totals	243	65	1.4	310	3.9%

Cost Estimates for Enhanced Actions

Adding OVTAs to existing pretreatment/stormwater inspections will add additional time for each inspection, and thus would require additional inspection resources. Additionally, inspecting a larger pool of businesses and other private properties would also require new resources. These increases in the number of inspections conducted each year would also be accompanied by additional costs associated with communications to applicable property owners to discuss/require improved trash management, the management of inspection data, and overhead/oversight costs. A preliminary, planning-level cost estimate associated with the implementation of an Enhanced Trash Inspection Program is presented in Table 14.

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9329

Table 14. Preliminary Planning-Level Costs Estimates for creating and implementing an Enhanced Municipal Trash Inspection Program to address trash generating properties upstream of Lake Chabot and Lake Dalwigk.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
				Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
Task	Geographical Span of Implementation	Assumptions		Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
Add trash inspections (i.e., OVTAs) to existing commercial/industrial stormwater inspections at applicable businesses identified by the City.	All commercial and industrial facilities: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property - Are part of the City's SW inspection program	• Proposed 30 inspections per year (Vallejo inspects ~300 businesses/year, and the areas of interest have ~100 of the 1000 total Vallejo businesses, meaning ~30 inspections/year in the areas of interest.) • An additional 0.5 hours per inspection due to additional trash inspection component • 8 follow-up inspections per year (1 hour per follow up inspection)	Environmental Compliance Inspector	--	--	--	--	23	0.01	$178,550	$2,053
Conduct trash inspections (i.e., OVTAs) at applicable private properties that are NOT part of SW inspection program.	All private properties: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property - Are NOT part of the City's SW inspection program	• 14 inspections per year (70 total, 5-year time frame) • 4 follow-up inspections per year for those properties not achieving an "A" OVTA score in their last inspection • 1 hour per inspection (including travel time)	Environmental Compliance Inspector	--	--	--	--	18	0.01	$178,550	$1,607
Communications to applicable property owners to discuss/require improved trash management.	All private properties: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property - Are NOT part of the City's SW inspection program - Are NOT achieving an "A" OVTA score	• Assumes communications for properties not achieving OVTA "A" but already being inspected via SW inspections will be handled via follow-up SW inspections. No additional costs for these properties in this line item. • Estimated 25% of properties including those that are part of the City's SW inspection program and not part of the SW inspection program will NOT achieve OVTA "A" score and need to implement new controls.	Environmental Compliance Inspector	--	--	--	--	80	0.04	$178,550	$7,142
Management of inspection data. Enter all data collected via trash inspections into the Vallejo OVTA database. Flag facilities that require follow-up inspections	All private properties: - in Moderate and High trash generating areas - have privately owned and operated storm drains on their property	• 56 data entries per year • 10 minutes per data entry	Environmental Compliance Inspector	--	--	--	--	9.3	0.005	$178,550	$833

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Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
Task	Geographical Span of Implementation	Assumptions		Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
				Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
Overhead Costs	NA	• Provide oversight of above projects	Environmental Services Superintendent	--	--	--	--	40	0.01	$195,364	$1,954
			Environmental Compliance Supervisor	--	--	--		40	0.02	$145,580	$2,912
			Totals	--	--	--	--	210	0.10	--	$16,501

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.

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9331

4.4 Curb-Inlet Screens on Inlets in the Public ROW

Curb-inlet screens could benefit the City's trash reduction program by preventing trash from reaching catch basins and being discharged via the City's MS4. When properly maintained, curb-inlet screens in combination with street sweeping can be effective at preventing trash from entering catch basins. Although there is not currently a widely accepted value for the trash reduction benefits that curb-inlet screens offer, curb-inlet screens have the potential to reduce a trash generating area to one score below its current trash generation rate (e.g., "B" score to "A" score) (SCVURPPP and Oakland, *In preparation*). The acceptable trash reduction benefit associated with curb-inlet screens is currently under discussion with San Francisco Bay Regional Water Board staff.

Existing Curb-Inlet Screens

Currently, no curb-inlet screens are installed on storm drain inlets in the City's public ROW.

Existing Street Sweeping Program

The City's street sweeping program was enhanced in FY 16-17 to reflect the higher trash generation areas across the City, namely increasing sweeping in residential areas to two times a month. All "High" trash generating areas are swept two times a week by the City, downtown areas are swept three times a week, and residential areas are swept at least two times a month (two times a week if they are "High" trash generating residential areas). For curb inlet screens paired with street sweeping to be considered a control measure that has trash load reduction potential, "High" areas with curb inlet screens installed need to be swept at least weekly, and "Moderate" areas with curb inlet screens installed need to be swept at least two times a month. The City's existing street sweeping program would be sufficient to achieve trash load reductions where curb inlet screens are installed (i.e., moderate areas will be considered treated to a level of Full Capture System Equivalence (FCSE), and high areas will be considered treated down to a "moderate" trash generating level). Since reduction can be achieved with installation of curb screens, the City does not need to include any enhancements to their existing street sweeping program.

Potential Installation and location of Curb-Inlet Screens

There are 375 catch basin inlets in the public ROW that are in areas with moderate or high trash generation for areas upstream of the two lakes. These inlets are locations for potential installation of curb-inlet screens. The total number of inlets and estimated treated area within each of the seven areas of interest are shown in Table 15.

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9332

Table 15. Total number of catch basins in moderate and high trash generation areas upstream of Lake Chabot and Lake Dalwigk that could potentially be retrofitted to include curb inlet screens.

Upstream Drainage Area	Area of Interest	Total # Catch Basins in Public ROW		Area Addressed by Curb Inlet Screen (acres)	Trash Reduction Potential (%)
		Moderate Trash Generation	High Trash Generation		
Lake Chabot	1	46	39	182	3.0 %
	2	8	0	22	0.2 %
	3	7	33	57	1.2 %
Lake Dalwigk	4	15	11	43	0.7 %
	5	41	24	105	1.0 %
	6	58	0	132	1.0 %
	7	54	39	162	2.4 %
Totals		**229**	**146**	**703**	**9.6 %**

Cost Estimates for Enhanced Actions

For the purposes of estimating the costs of implementing a curb-inlet screen program, it is assumed that the City would purchase and have a vendor install curb-inlet screens on all 375 inlets in the public ROW. The preliminary, planning-level cost estimates associated with the fabrication, installation, and operation of the new 375 curb-inlet screen devices are presented in Table 16.

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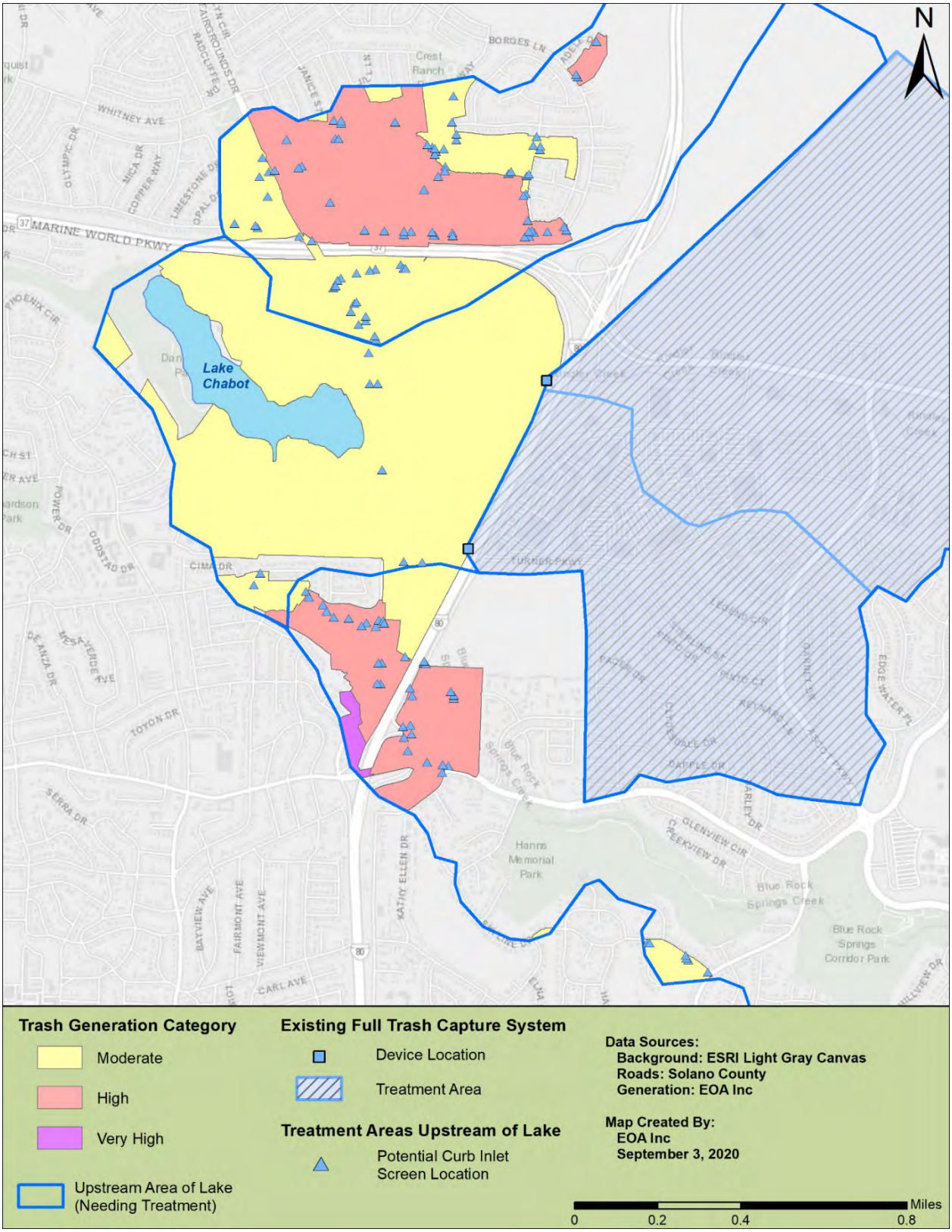

Figure 8. Locations of catch in the drainage area upstream of Lake Chabot that could potentially be retrofitted with curb inlet screens.

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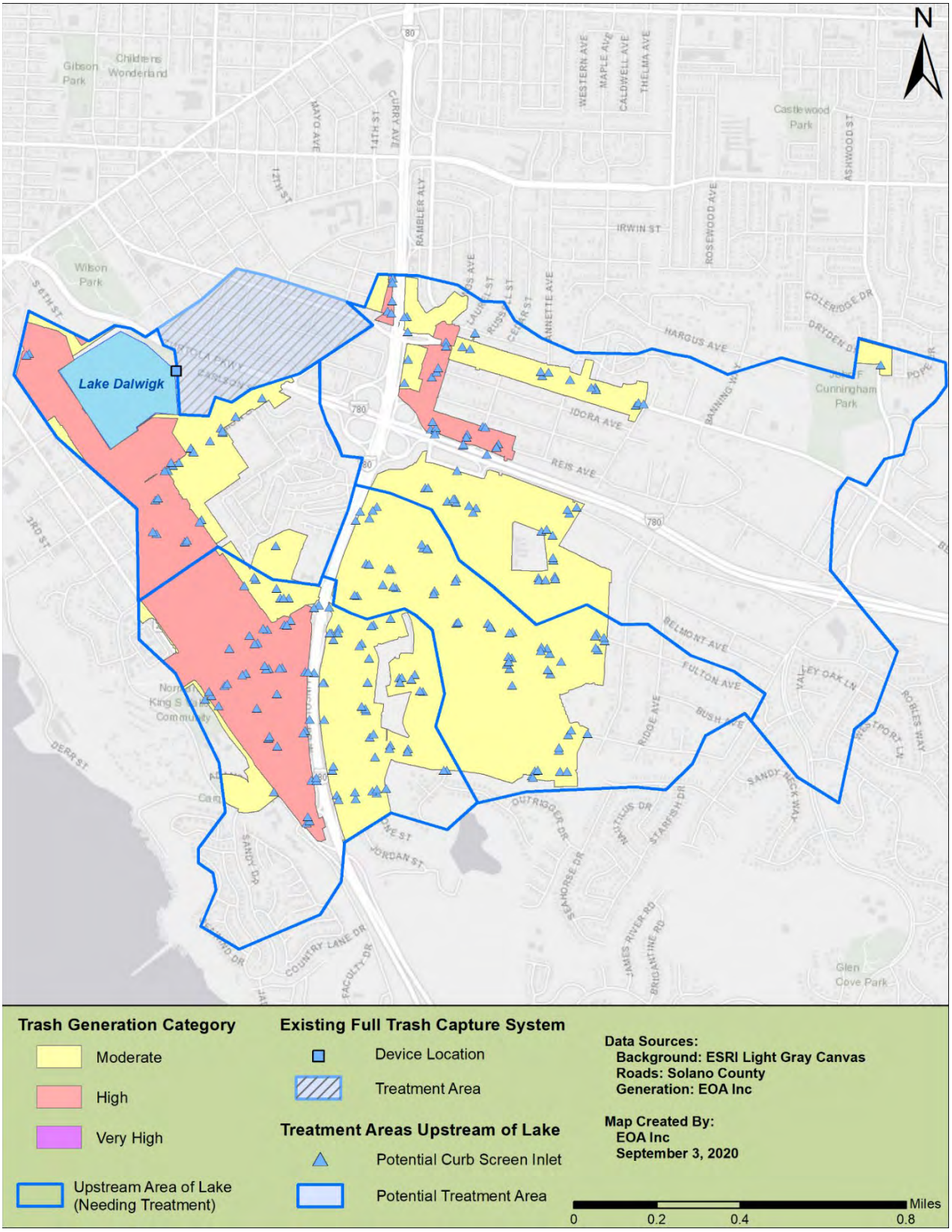

Figure 9. Locations of catch in the drainage area upstream of Lake Dalwigk that could potentially be retrofitted with curb inlet screens.

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Table 16. Preliminary Planning-Level Costs Estimates for the installation and maintenance of 375 Curb-Inlet Screens.

Summary of Enhancement			District Staff Implementing Task	Base/Initial Tasks				On-going/Annual Tasks			
Task	Geographical Span of Implementation	Assumptions		Estimated Staffing		Annual FTE Rate (Fully Burdened)	Estimated Costs	Estimated Staffing (Annual)		Annual FTE Rate (Fully Burdened)	Estimated Costs
				Hours	Portion of FTE[a]			Hours	Portion of FTE[a]		
City develops concept and releases bid/RFP for curb-inlet screens	375 public ROW inlets in Moderate and High trash generating areas not treated by existing or planned full capture	All planning tasks conducted by District Staff	Associate Engineer	100	0.05	$185,195	$9,260	--	--	--	--
Vendor fabricates and Installs Curb-inlet Screens	375 Public Row Inlets	• Contractor installs devices • Capital costs can range from $400 to $700. Costs of each inlet screen estimated to be $500 • Replacement of each inlet devices 2x during a 50-yr timeframe (i.e., average replacement rate of 15 screens/yr) at $500/screen	Materials Cost	--	--	--	$187,500	--	--	--	$7,500
Oversight of contractor installation	Inlets installed in all public ROW inlets in Moderate and High trash generating areas not treated by existing or planned full capture systems	• Contractor fabricates and installs curb-inlet screens District staff oversight over installation, including initial inspection of devices.	Associate Engineer	80	0.04	$185,195	$7,409	--	--	--	--
On-going oversight of replacement/repair process by contractor		• 2 inspections per year of each inlet to check for damage and repairs. 10 minutes per inspection	Collection Systems Supervisor	--	--	--	--	125	0.06	$177,127	$11,070
Oversight of all tasks above	NA	Provide oversight of above District projects	District Engineer	20	0.01	$315,542	$3,155	20	0.01	$315,542	$3,155
			Totals	200	0.10	--	$207,324	145	0.07	--	$21,725

[a] One Full Time Equivalent (FTE) position is assumed to be 2,000 staff hours in a given year.

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4.5 Feasibility of Implementing Additional New or Enhanced Controls

The costs and trash reduction benefits of implementing new or enhanced trash control measures described in the previous sections are summarized in Table 17. Costs are presented as base/initial costs, on-going/annual costs, and 10-year costs. Base/initial costs are associated with design and capital (i.e., construction/fabrication, installation, etc.) for large and small full capture systems and curb inlet screens. On-going/annual costs are associated with the on-going costs to the City to maintain, implement, replace, and/or enforce the trash control measure. 10-year costs are based on the sum of base/initial costs and the average annual implementation costs over a 10-year timeframe. 10-year costs have not been adjusted for inflation and assume that average on-going/annual costs would remain consistent of the 10-year timeframe.

The estimated maximum trash reduction benefit for each control measure is also included in Table 17. The trash reduction potential is based on implementation of each trash control measure in all areas of interest upstream of the two lakes, with the exception of large full trash capture systems, which would only treat two of the seven areas (1 and 3). Annual costs for each percent trash reduction was calculated to compare the costs and benefits among the control measures evaluated.

The enhanced municipal trash inspection program and the installation of curb inlet screens at all stormwater catch basins in the public ROW have the greatest benefit for the least costs. The small full capture systems provided the highest trash reduction potential, but the relatively high costs associated with installation and maintenance resulted in a much lower ranking for cost-benefit.

Table 17. Summary of the estimated preliminary costs and trash reduction benefits of implementing potential new or enhanced trash control measures in areas upstream of Lake Chabot and Lake Dalwigk.

Control Measure	Base/Initial Costs	On-going/ Annual Costs	Total Costs Over 10 Years	Baseline Trash Reduction Potential (%)	Total Costs Over 10 Years Per % Trash Reduction
Large Full Capture System[a]	$2,036,855	$7,699	$2,113,845	6.9%	$306,354
Small Full Capture Systems	$445,370	$190,382	$2,349,190	11.7%	$200,785
Trash Inspection Program	NA	$16,501	$165,010	3.9%	$42,310
Curb Inlet Screens	$207,324	$21,725	$424,574	9.6%	$44,226
TOTALS	$2,670,549	$239,407	$5,064,619	--	--

[a] Large Full Capture System option only applies to drainage areas 1 and 3.

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The cost estimates presented in Table 18 compare the costs normalized to the estimated percent trash reduction for four trash control measures if implemented in each of the seven areas of interest. The proportional number of devices (full capture and curb-screens) or area (private parcels) was calculated for each of the seven drainage areas and applied to the average annual cost estimates for each device (presented in Table 17). The total costs for each control measure by drainage area was normalized by dividing the estimated potential percent trash reduction by the cost per percent reduction.

Table 18. A comparison of the estimated 10-year costs for each percent trash reduction for the trash control measures evaluated. Costs per each percent of trash reduced are presented for each applicable combination of control measure and areas of interest upstream Lake Chabot and Lake Dalwgik. Total percent trash reduction is included in parenthesis.

Upstream Drainage Area	Area of Interest	Large Full Capture Systems	Small Full Capture Systems	Municipal Trash Inspection Program	Curb Inlet Screens
Lake Chabot	1	$157,104 (4.2%)	$16,699 (3.8%)	$7,396 (0.5%)	$4,245 (3.0 %)
	2	--	$29,110 (0.2%)	$10,972 (1.2%)	$5,889 (0.2 %)
	3	$149,250 (2.7%)	$14,897 (1.7%)	$2,742 (1.1%)	$5,002 (1.2 %)
Lake Dalwigk	4	--	$23,934 (0.9%)	$5,595 (0.6%)	$5,529 (0.7 %)
	5	--	$43,664 (1.2%)	$11,015 (0.1%)	$9,703 (1.0 %)
	6	--	$47,739 (1.0%)	--	$8,694 (1.0 %)
	7	--	$24,743 (3.0%)	$4,590 (0.4%)	$5,165 (2.4 %)
Feasibility Ranking		*Less*	*Less*	*More*	*More*

Red shaded - High Cost (>$20,000 per 1% trash reduction)
Yellow shaded - Moderate Cost ($20,000 - $10,000 per 1% trash reduction)
Green Shaded - Lower Cost (< $10,000 per 1% trash reduction)

5. Summary of Findings

The following conclusions were developed based on the results of the trash control measure feasibility evaluation:

1. Baseline and Current Levels of Trash

- Based on the Vallejo baseline trash generation map, the seven areas upstream of the two lakes generated moderate to high levels of trash. This equates to an estimated 16,968 gallons of trash each year generated from these areas (Table 2).
- Based on OVTA results, trash levels in five of the seven areas have decrease substantially since 2009. All seven areas currently generate moderate trash levels, based on OVTA results reported in the City/District FY 19-20 Annual Report (Table 3).

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2. Dominate Trash Sources

- Trash sources identified via a combination of OVTAs, interviews with City and District staff, and field reconnaissance vary among the seven areas and land uses within these areas.
- Pedestrian/vehicle litter, Illegal dumping, and homeless encampments were identified as important sources in nearly all of the seven areas.
- Improper trash container/bin management on private properties was also identified as a dominant source of trash in commercial land use areas.

3. Existing and Potential Trash Control Measures

- Trash Booms – No trash booms are currently deployed in Vallejo. Previous evaluations of trash booms as potential trash control measure indicate that the installation and maintenance of trash booms located in Lake Chabot and Lake Dalwigk is infeasible. For Lake Chabot, infeasibility is due to lack of access to locations where booms could be installed and serviced, including confluences with major storm drain outfalls and channels, which would be primarily through privately owned lands (e.g., Six Flags Discovery Kingdom). For Lake Dalwigk, there do not appear to be any feasible locations for trash booms due to shallow channel dimensions and low flow conditions within Lemon Street Canal, the main tributary to the lake. Due to the infeasibility of installing trash booms, this control measure was not further evaluated. For these reasons, trash booms were assumed to be infeasible and were therefore not evaluated as part of these feasibility study.
- On-land & Water Body Cleanups – The City and the District spend significant resources each year implementing illegal dumping prevention measures and removing illegally dumping trash in the City. The City (Public Works Maintenance Division, Police Department, and Code Enforcement Division) partners with Caltrans, Vallejo City Unified School District, the District, Greater Vallejo Recreational District, Vallejo Watershed Alliance, California Maritime Academy, Six Flags Discovery Kingdom, the Vallejo Chamber of Commerce, and members of the community to clean up, maintain, and landscape all highly visible entrances and major thoroughfares throughout the City of Vallejo. Additionally, the City currently employs four full-time staff to remove trash from on-land areas throughout the City. The District also conducts quarterly cleanups around the perimeters of the two lakes and tracks the amount of material removed, which equates to roughly 9% of the baseline trash load associated with the areas upstream of the lakes. Because the existing level of on-land and water body cleanups is so significant, no enhancements to this control measure were evaluated as part of this feasibility evaluation.
- Public Education and Outreach - Education and outreach programs are designed to raise citizen awareness about the impacts of littering or illegal dumping, and teach citizens how to change their behavior accordingly. Programs usually include a mixture of anti-littering advocacy, reinforced with the development of classroom curricula, storm drain signage and volunteer cleanups. Expansion of the community outreach and education program could benefit overall trash load reduction by promoting litter prevention initiatives. However, it is very difficult to estimate the percentage reduction that the Vallejo Permittees may achieve through implementing an enhanced City-wide public

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education and outreach program. Due to the inability to assign a quantitative trash reduction benefit to public education programs, enhancements to this control measure were not further evaluated as part of the study.

- Full Capture Systems – The District is investing over $3.5M towards the installation of large full capture system at three locations directly below the two lakes. In the seven areas upstream of the lakes, there are seven netting (full capture) devices that reduce roughly 7% of the trash in Vallejo stormwater. The cost of installing large systems at the two potential locations above the lakes identified previously (EOA 2018) are prohibitive (> $2.M) and the trash reduction benefits would be relatively minimal (< 7%). Although the trash reduction benefits for installing 353 small devices in inlets located upstream of the two lakes are greater than the two large systems (11.7%), the costs for installation of these devices is also prohibitive (>$440,000) and the maintenance costs would exceed $190,000 each year.
- Enhanced Municipal Trash Inspection Program - Stormwater inspections are currently conducted on an annual frequency by the District at approximately 300 commercial/industrial facilities. Expansion of these existing inspections to more formally add an OVTA component and expanding inspections to other high priority facilities that are generating high or very high levels of trash appears to be a relatively cost-effective approach to addressing trash from high and very high areas in Vallejo. A moderate trash reduction potential (~4%) is anticipated via the expansion of this control measure in areas upstream of the lakes.
- Curb-Inlet Screens on Inlets in the Public ROW & Street Sweeping – No curb inlet screens are currently installed on inlets in the public ROW in Vallejo. The City's street sweeping program was enhanced in FY 16-17 to reflect the higher trash generation areas across the City, namely increasing sweeping in residential areas to two times a month. All "High" trash generating areas are swept two times a week by the City, downtown areas are swept three times a week, and residential areas are swept at least two times a month and two times a week if they are "High" trash generating. Although the anticipated trash reduction associated with the installation of curb-inlet screens on 375 inlets would be modest (~9.6%), the relative costs of installing and maintaining these devices is prohibitive (>$200,000). Additionally, the trash reduction benefits for curb-inlet screens in combination with street sweeping has not been recognized by the Regional Water Board as an effective trash control measure.

The conclusions regarding the feasibility of implementing additional control measures in areas upstream of Lake Chabot and Lake Dalwigk are summarized in Table 19. The most feasible enhanced trash control measure that could be implemented by the District/City (i.e., Enhanced Municipal Trash Inspection Program) would address an important trash source identified from these areas - Improper trash container/bin management on private properties.

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Table 19. Summary conclusions of the feasibility evaluation conducted on potential enhanced trash control measures in areas upstream of Lake Chabot and Lake Dalwigk.

Trash Control Measure	Feasibility Conclusion
Trash Booms	Technically Infeasible
On-land & Water Body Cleanups	Existing Controls Substantial/ Enhancement Not Evaluated
Public Education and Outreach	Existing Controls Substantial/Trash Reduction Benefits Uncertain/Enhancement Not Evaluated
Full Capture Systems	Cost Prohibitive/Infeasible
Enhanced Municipal Trash Inspection Program	Feasible
Curb-Inlet Screens on Inlets in the Public ROW & Street Sweeping	Trash Reduction Benefits Uncertain/Infeasible

6. References

EOA (2018). Vallejo Trash Capture Feasibility Study. Prepared for the Vallejo Flood and Wastewater District. March.

BASMAA (2017). Tracking California's Trash Project: Evaluation of the On-land Visual Assessment Protocol as a Method to Establish Baseline Levels of Trash and Detect Improvements in Stormwater Quality. Bay Area Stormwater Management Agencies Association. State Water Resources Control Board Grant Agreement No. 12-420-550. Prepared by EOA, Inc. http://basmaa.org/Announcements/tracking-cas-trash-on-land-visual-assessments.

SCVURPPP and Oakland. *In prep*. Trash Reduction Effectiveness of Curb Inlet Screens. In preparation by EOA, Inc. Prepared for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and the City of Oakland.

City of San Jose (2016). Street Sweeping: Significant Investment and Re-Tooling are Needed to Achieve Cleaner Streets. Prepared by Sharon W. Erickson.

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Appendix A
Examples of Trash Sources Identified in Specific Land Use Areas within the City of Vallejo

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Area #1 – Residential

Figure 1. Illegal dumping, Area 1E.

Figure 2. Improper bin management and illegal dumping, Area 1B.

Figure 3. Pedestrian litter, Area 1G.

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Area #2 - Commercial

Figure 1. Improper bin management, Area 2A.

Figure 2. Homeless encampment, Area 2A.

Figure 3. Illegal dumping, Area 2A.

Figure 4. Parking lot pedestrian litter, Area 2C.

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Area #3 – Open Space

Figure 1. Homeless encampment. Area 3C.

Figure 2. Illegal dumping, Area 3G.

Figure 3. Vehicle litter, Area 3A.

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Area #4 – Industrial

Figure 1. Pedestrian litter, illegal dumping, and homeless encampment across the street from industrial Area 4D.

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Appendix B
Potential Large Full Capture Site Locations

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VAL_LRG_06_SITE_3

Blue Rock Springs Creek at Coach Lane

System Data

- 2 6x10' box culvert outfall
- Drainage Area: 1,832 Acres

Hydraulics

- The netting device must remain out of the main channel
- Must not increase flooding upstream in trailer park

Constructability Concerns

- Possible concerns, this site was not visited

Recommended Location

- Place on outfall of box culvert

Recommended Devices

- GSRD
- In-line TrashTrap

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VAL_LRG_06_SITE_6

Fairgrounds Drive near bus stop

System Data

- Drainage Area: 451 Acres
- 96" Existing System (unable to access manhole, manholes in bus drop-off paved over)

Hydraulics

- Drains to lake
- Unknown system depth or flooding concerns

Constructability Concerns

- High traffic ROW on Fairgrounds Drive for construction and maintenance
- Potential conflict with adjacent Six Flags private property owner
- Need to verify public ROW
- No visible utility conflicts; need to verify

Recommended Location

- Place device within landscape median on City property between bus drop off and Fairgrounds Drive

Recommended Devices

- Off-line HDS
- In-line NSBB if existing system is deep

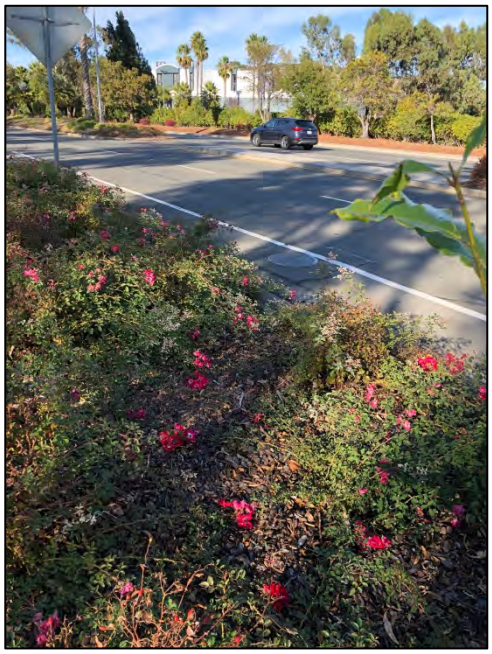

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Section 11 - Provision C.11 Mercury Controls

C.11.a ► **Implement Control Measures to Achieve** Mercury Load Reductions
C.11.b ► **Assess** Mercury Load Reductions from Stormwater

See the attached *Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement* for updated information on:

- Documentation of mercury control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the mercury load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated mercury load reduced by each control measure); and
- Supporting data and information necessary to substantiate the load reduction estimates.

C.11.c ► Plan and Implement Green Infrastructure to Reduce Mercury Loads

See the attached Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* Appendix A *Green Stormwater Infrastructure Reasonable Assurance Analysis Modeling Report for PCBs and Mercury* for:

- An estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate; and
- A reasonable assurance analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis.

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., March 23, 2017.

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C.11.d ► **Prepare Implementation Plan and Schedule to Achieve TMDL** Allocations

See the Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* for a mercury control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028. The plan:

1. Identifies all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented;
2. Includes a schedule according to which these technically and economically feasible control measures will be fully implemented; and
3. Provides an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

C.11.e ► Implement a Risk Reduction Program

A summary of Program and regional accomplishments for this sub-provision are included in the *Sections C.11 Mercury Controls* and *C.12 PCBs Controls Annual Report Supplement* attached.

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Section 12 - Provision C.12 PCBs Controls

C.12.a ► Implement Control Measures to Achieve PCBs Load Reductions
C.12.b ► Assess PCBs Load Reductions from Stormwater

See the attached *Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement* for updated information on:

- Documentation of PCBs control measures implemented in our agency's jurisdictional area for which load reductions will be reported and the associated management areas;
- A description of how the BASMAA Interim Accounting Methodology[1] was used to calculate the PCBs load reduced by each control measure implemented in our agency's jurisdictional area and the calculation results (i.e., the estimated PCBs load reduced by each control measure); and
- Supporting data and information necessary to substantiate the load reduction estimates.

C.12.c. ► Plan and Implement Green Infrastructure to Reduce PCBs Loads

See the attached Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* Appendix A *Green Stormwater Infrastructure Reasonable Assurance Analysis Modeling Report for PCBs and Mercury* for:

- An estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040, including all data used and a full description of models and model inputs relied on to generate this estimate;
- A reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects, including all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonably assurance analysis.; and
- An estimate of the amount of PCBs load reductions resulting from green infrastructure implementation during the term of the Permit, including all data used and a full description of models and model inputs relied on to generate the estimate.

[1]BASMAA 2017. Interim Accounting Methodology for TMDL Loads Reduced, Version 1.1. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc., September 19, 2017.

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C.12.d ► Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

See the attached Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* for a PCBs control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan:

1. Identifies all technically and economically feasible PCBs control measures (including green infrastructure projects) to be implemented;
2. Includes a schedule according to which these technically and economically feasible control measures will be fully implemented; and
3. Provides an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation."

C.12.f. ► Manage PCB-Containing Materials During Building Demolition

See *Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement*.

C.12.h ►Implement a Risk Reduction Program

A summary of Program and regional accomplishments for this sub-provision are included in the *Sections C.11 Mercury Controls* and *C.12 PCBs Controls Annual Report Supplement* attached.

Section 13 - Provision C.13 Copper Controls

C.13.a.iii.(3) ►Manage Waste Generated from Cleaning and Treating of Copper Architectural Features

Provide summaries of permitting and enforcement activities to manage waste generated from cleaning and treating of copper architectural features, including copper roofs, during construction and post-construction.

Summary:

The City of Vallejo currently requires copper control BMPs to be identified in conjunction with the building permit review and approval process. The District provides a brochure on Proper Copper Pipe Installation to be given out during the review process. The District also provides these brochures in the planning department front lobby and on our website. See City of Vallejo Annual Report for more information on C.13 activities.

C.13.b.iii.(3) ►Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

Provide summaries of any enforcement activities related to copper-containing discharges from pools, spas, and fountains.

Summary:

When an applicant applies for a pool or spa building permit with the City, the City's Building Division provides a pool and spa brochure, which details BMPs for pool and spa discharges. If the District becomes aware of illicit pool or spa discharges, the District's ERP is followed; requirements may include discharge to the sanitary sewer system through a temporary discharge permit or diversion of discharge for use in landscaping or irrigation if conditions allow. There were no enforcement actions related to copper-containing discharges from pools, spas or fountains. Articles about proper discharges from pools, spas and fountains have appeared in our District newsletter and are available on our website.

C.13.c.iii ►Industrial Sources Copper Reduction Results

Based upon inspection activities conducted under Provision C.4, highlight copper reduction results achieved among the facilities identified as potential users or sources of copper, facilities inspected, and BMPs addressed.

Summary:

As stated in section C.4.d.iii.(1)(a), the District conducted inspections at businesses during the report period largely in conjunction with the District's Pretreatment Program. Business categories included vehicle maintenance facilities, food service facilities, Stormwater General Industrial Permittees, six Significant Industrial Users, and one categorical zero discharger. Only one of these businesses, a boat yard with on-land maintenance is considered a potential copper source. Inspectors are trained using BASMAA POC training materials t identify and eliminate potential sources of copper. Prohibited activities include commercial vehicle washing and boiler blowdown discharges to the storm drain system. No copper-related stormwater violations were found during the reporting period.

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Section 15 -Provision C.15 Exempted and Conditionally Exempted Discharges

C.15.b.vi.(2) ► Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering
Provide implementation summaries of the required BMPs to promote measures that minimize runoff and pollutant loading from excess irrigation. Generally the categories are: • Promote conservation programs • Promote outreach for less toxic pest control and landscape management • Promote use of drought tolerant and native vegetation • Promote outreach messages to encourage appropriate watering/irrigation practices • Implement Illicit Discharge Enforcement Response Plan for ongoing, large volume landscape irrigation runoff.
Summary: See sections C.7, and C.9 for information regarding District outreach efforts for C.15. During industrial facility inspections, District staff encourage less toxic pest control practices. See the City of Vallejo Annual Report C.15 for additional activities performed.

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Sections C.11 Mercury Controls and C.12 PCBs Controls Annual Report Supplement

The Water Board adopted water quality attainment strategies for the San Francisco Bay for mercury and PCBs called Total Maximum Daily Loads (TMDLs). MRP Provisions C.11 Mercury Controls and C.12 PCBs Controls require permittees to implement control programs to reduce stormwater runoff-related impacts of these pollutants on the Bay. The City of Vallejo and Vallejo Flood and Wastewater District (VFWD) perform a variety of activities to address mercury and PCBs in stormwater runoff in compliance with Provisions C.11 and C.12. Some of this work has been accomplished through participation in BASMAA regional projects. Below describes the implementation of the MRP Provisions.

C.11/12.a Implement Control Measures to Achieve Mercury/PCBs Load Reductions and C.11/12.b Assess Mercury/PCBs Load Reductions from Stormwater

This section provides summaries of PCBs and mercury control measures implemented during the permit term consistent with MRP provisions C.11 and C.12. Full detail on the control measures and the associated load reductions for the VFWD are fully documented in the Vallejo Flood and Wastewater District and the City of Vallejo *Mercury and PCBs Control Measures Plan FY18-19 Update (September 2019)*, which was included as an attachment of the VFWD FY 18-19 Annual Report. The FY18-19 Update provides documentation of all current and planned control measures during the current permit term in the City of Vallejo and provides all supporting data and information necessary to substantiate load reduction estimates presented in this section in order to demonstrate achievement of load reductions consistent with MRP 2.0 load reduction requirements.

The Vallejo Permittees have reduced PCBs by 63 g/year and mercury by 8.75 g/year during the MRP 2.0 compliance period (i.e. FY13-14 to present). For PCBs, this includes the 62 g/yr load reduction for implementing the PCBs in Building Materials Program by July 1, 2019, and the additional 0.89 g/yr of load reduction due to all other controls implemented during the permit term. For details on the Building Materials Program see Section C.12.f below. For details on all other controls implemented during the permit term see the *Mercury and PCBs Control Measures Plan FY18-19 Update (September 2019).*

PCBs and Mercury Regional Loads Reduced During MRP 2.0

MRP 2.0 requires Permittees to develop and implement control measures to reduce PCBs and mercury in stormwater runoff to the San Francisco Bay throughout the permit area (Table 1). For PCBs, Permittees are collectively required to reduce loads by a minimum of 500 grams per year (g/yr) by June 30, 2018, and 3,000 g/yr by June 30, 2020. At least 120 g/yr of PCBs load reduction must be achieved through implementation of green stormwater infrastructure (GSI) projects on public and private lands. The June 30, 2020 date may be extended to December 31, 2020 if Permittees provide documentation that control measures that will attain the load reduction will be implemented by that date. For mercury, Permittees are collectively required to reduce stormwater loads by 48 g/yr by June 30, 2020 through implementation of GSI projects on public and private lands. These load reduction performance criteria may be met regionally. However, should regional load reductions not be achieved, MRP 2.0 requires each Permittee to achieve load reductions on a county-wide basis.

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Table 1 PCBs and Mercury Load Reduction Performance Criteria Required by MRP 2.0 in 2018 and 2020.

PCBs (g/year)			Mercury (g/yr)
By July 2018	**By July 2020**		**By July 2020**
All Control Measures	**All Control Measures**	**Green Stormwater Infrastructure**	**Green Stormwater Infrastructure**
500	3,000	120	48

The PCBs and mercury performance criteria in Table 1 can be achieved through implementation of the following control measures:

1. Source property ID and Abatement
2. Green Stormwater Infrastructure and Treatment Controls, including:
   - Parcel-based new/re-development/Green Streets/Regional Retrofits
   - Public hydrodynamic separator Units (trash full capture)
3. Enhanced Operation and Maintenance (O&M) Measures, including:
   - Street Sweeping or Flushing
   - Inlet-based trash full capture devices
   - Other MS4 Cleaning
4. Managing PCBs in Building Materials
5. Managing PCBs in Infrastructure
6. Diversions to Publicly Owned Treatment Works (POTWs)

The control measures implemented to-date are described in more detail in "Control Measures Plans" prepared by individual Bay Area countywide stormwater programs or Permittees. The PCBs and mercury load reductions that have been achieved to date were calculated using the methodologies presented in the *Interim Accounting Methodology for PCBs and Mercury Loads Reduced Report* (BASMAA 2017), which was developed by BASMAA and approved by the Regional Water Board's Executive Officer in March 2017. The data reported here on regional PCBs and mercury loads reduced by all Permittees were provided by the following countywide stormwater programs and municipal agencies:

- Alameda Countywide Clean Water Program
- Contra Costa Clean Water Program
- Santa Clara Valley Urban Runoff Pollution Prevention Program
- San Mateo Countywide Water Pollution Prevention Program
- Fairfield-Suisun Urban Runoff Management Program
- City of Vallejo and the Vallejo Flood and Wastewater District

The load reductions reported here are based on the best available information at the time this report was written and may not reflect the most up-to-date accounting of all reductions achieved through all control measures that have been implemented in the region.

Regional PCBs Loads Reduced

The cumulative PCBs loads reduced to date by all Permittees during the MRP compliance period (FY 13-14 through FY 19-20) are presented in Table 2. A total of 3,017 g/yr of PCBs were reduced across the

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permit area over that time period, demonstrating that the MRP performance criterion of 3,000 g/yr of PCBs loads reduced by July 2020 has been achieved at the regional level.

Table 2 PCBs loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	PCB Load Reductions (g/yr)
Source Property Identification and Abatement	610
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	231
Large Full Trash Capture (i.e. HDS Units)	157
Enhanced O&M Measures	18
PCBs in Building Materials	2,000
Stormwater Diversion to Sanitary Sewer	1
TOTAL - All Control Measures	**3,017**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

The PCBs loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 1. The PCBs in building materials program achieved the MRP-stipulated 2,000 g/yr (66%) because all Permittees successfully implemented the program by July 1, 2019. This load reduction accounts for 66%of the total PCBs loads reduced during MRP 2.0. The remaining 1,017 g/yr was achieved through all other control measures. Of these, source property identification and abatement accounts for 20% of the total PCBs load reduction during MRP 2.0. Next to managing PCBs in building materials, source property identification and abatement remains the most effective control measure currently available for reducing PCBs loads to the Bay (BASMAA 2017). GSI has been the third largest contributor to load reductions, providing 231 g/yr of PCBs loads reduced and accounting for 8% of the total PCBs loads reduced to-date. These data demonstrate the MRP performance criterion of 120 g/yr of PCBs loads reduced through GSI has been met across the region. An additional 157 g/yr have been reduced by large, full trash capture devices (i.e., HDS Units), accounting for 5% of the total PCBs loads reduced. The remaining < 1% of the regional PCBs loads reduced during the permit have come from enhanced O&M practices and stormwater diversions.

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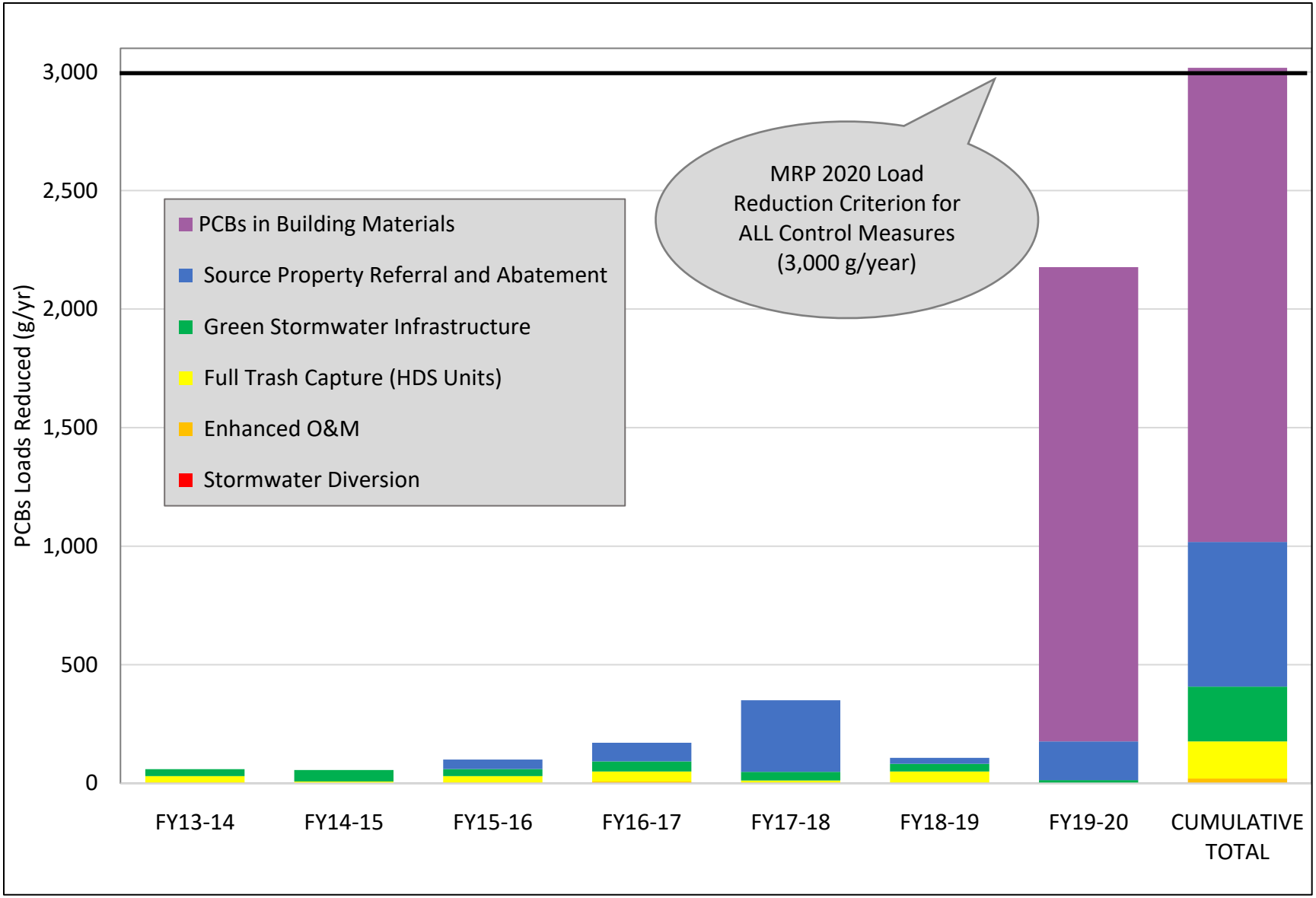

Figure 1. PCBs loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

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Regional Mercury Loads Reduced

The cumulative mercury loads reduced by MRP Permittees from FY13-14 through FY 19-20 are presented in Table 3. An estimated total of 4,394 g/yr of mercury were reduced across the permit area over that time period. The mercury loads reduced by control measure category each fiscal year and the cumulative total for the region are presented in Figure 2. GSI has been the largest contributor to mercury load reductions during the permit term. Total mercury loads have been reduced by 2,759 g/yr through GSI, accounting for 63% of the total loads reduced. These data demonstrate the MRP performance criterion of 48 g/yr of mercury loads reduced through GSI by 2020 has been met across the region. An additional 1,348 g/yr of mercury have been reduced by large, full trash capture devices (i.e., HDS Units), accounting for 31% of the total loads reduced. Source property identification and abatement has reduced mercury loads by 120 g/yr, accounting for only 4% of the total mercury loads reduced to date. The remaining 4% of the regional mercury loads reduced during the permit have come from enhanced operation and maintenance practices and stormwater diversions.

Table 3 Mercury loads reduced by MRP Permittees (FY13-14 – FY19-20).[1]

Control Measure Category	Mercury Load Reductions (g/yr)
Source Property Identification and Abatement	120
Green Stormwater Infrastructure (i.e., Parcel-Based New/Re-Development or Green Street/Regional Retrofit)	2,759
Large Full Trash Capture (i.e. HDS Units)	1,348
Enhanced O&M Measures	163
Stormwater Diversion to Sanitary Sewer	3
TOTAL - All Control Measures	**4,394**

1 - Loads reduced reported for each control measure are based on the available information provided by the stormwater programs and municipal agencies at the time this report was written; updates and corrections (if needed) will be provided in future annual reports.

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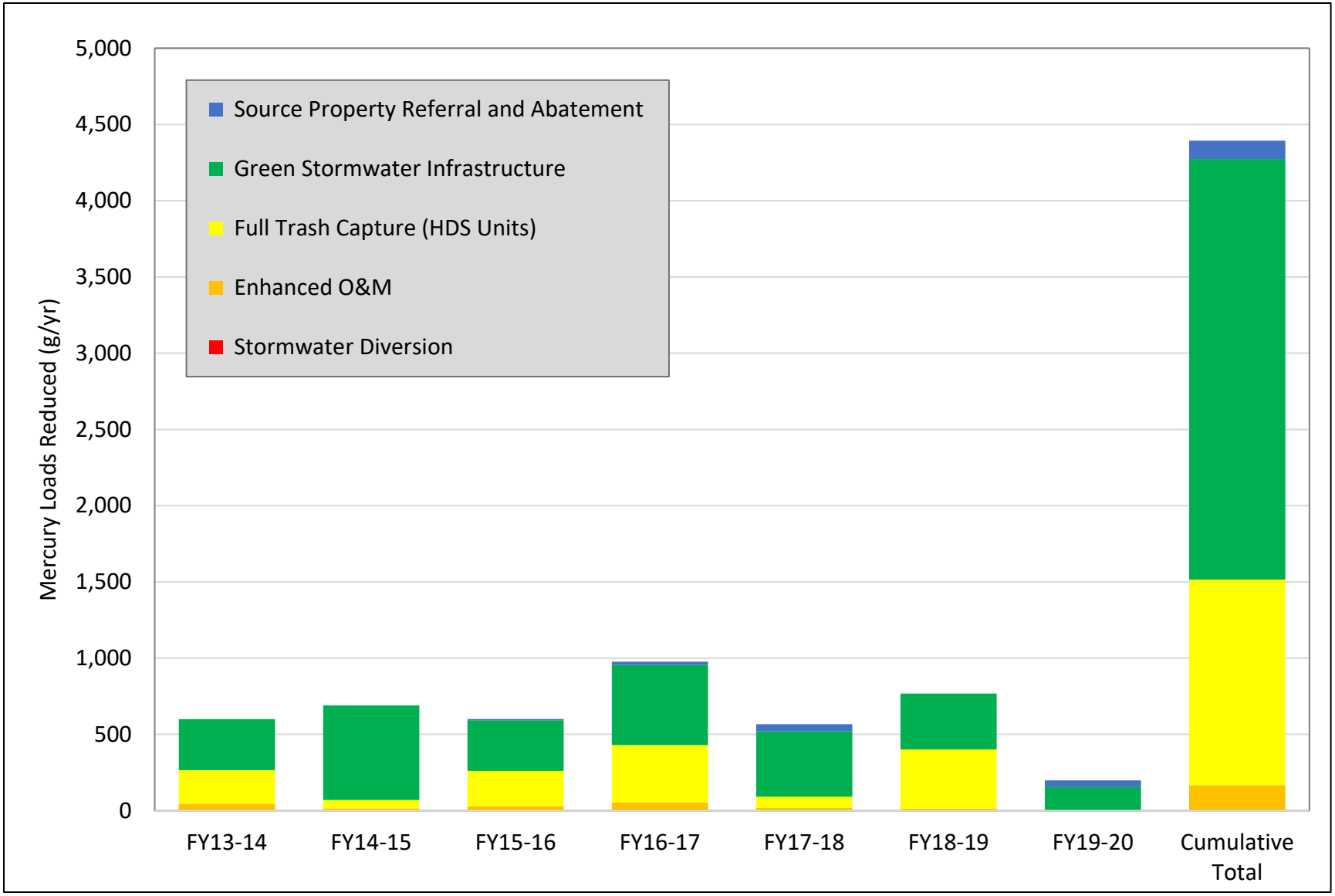

Figure 2. Mercury loads reduced by MRP Permittees by fiscal year and the cumulative totals (FY13-14 through FY19-20).

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C.11/12.c Plan and Implement Green Infrastructure to Reduce Mercury/PCBs Loads

Permittees are required to conduct a Reasonable Assurance Analysis (RAA) to demonstrate quantitatively that mercury and PCBs load reductions specified in the MRP will be achieved by 2040 through implementation of green infrastructure. BASMAA conducted a regional project to develop the *Bay Area Reasonable Assurance Analysis Guidance Document* which establishes a regional framework and provides guidance for conducting PCBs and mercury RAAs in the San Francisco Bay Area. The RAAs will demonstrate that the control measures proposed in the Permittees' Green Infrastructure Plans and PCBs and Mercury Control Measure Implementation Plans, as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury TMDL wasteload allocations for urban stormwater runoff. Additionally, the RAAs will provide a method for evaluating the type, size, number, location, and phasing of green infrastructure measures needed to most cost-effectively comply with the green infrastructure load reduction goals stated in MRP Provisions C.3.j and C.11.c/C.12.c. The MRP requires that both the green infrastructure RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. A regionally-representative project management team, consisting of countywide program representatives, and a Technical Advisory Committee (TAC) were convened for the development of the RAA Guidance Document. The TAC was comprised of Regional Water Board Staff, USEPA Region 9 staff, and industry experts and served to provide "technical peer review" for the document from an objective regulatory and/or technical perspective. The *Bay Area Reasonable Assurance Analysis Guidance Document* was finalized on June 30, 2017.

The City of Vallejo, Fairfield-Suisun Urban Runoff Program and the Vallejo Flood and Wastewater District worked with Fall Creek Engineering to develop a RAA model for Solano County to determine expected pollutant load reductions. The Solano Permittees' *Implementation Plan & Schedule to Achieve TMDL Allocations* Appendix A *Green Stormwater Infrastructure Reasonable Assurance Analysis Modeling Report for PCBs and Mercury* is provided as an attachment to this Annual Report.

C.11/12.d Prepare Implementation Plan and Schedule to Achieve TMDL Allocations

MRP Provisions C.11/12.d requires Permittees to submit a PCBs and Mercury Control Measures Implementation Plan and corresponding Reasonable Assurance Analysis (RAA) that demonstrates quantitatively that the plan will result in PCBs and mercury load reductions sufficient to attain TMDL wasteload allocations by 2030 and 2028, respectively. The plan must include the following:

- Identify all technically and economically feasible PCBs control measures to be implemented (including green infrastructure projects); and
- Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and
- Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.

Solano County permittees developed the *Implementation Plan & Schedule to Achieve TMDL Allocations* that is included in this Annual Report as an Attachment.

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C.12.f. - Manage PCB-Containing Materials and Wastes during Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains

MRP Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 parts per million or greater in applicable structures[1] at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. A Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its FY 2016/17 Annual Report that the only buildings that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame buildings.[2]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

- The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
- A method for identifying applicable structures prior to their demolition; and,
- Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff; and,
- Develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, BASMAA conducted a multi-year regional project to assist MRP Permittees to address Provision C.12.f. The BASMAA project, which began in FY 2016/17 and was completed in March 2019, assisted Permittees in developing local programs to manage PCBs-containing materials during building demolition. It developed guidance materials, tools and training materials and conducted outreach.

At the outset of the project, a BASMAA Steering Committee was convened to provide project oversight and guidance during the project. The Steering Committee included BASMAA Directors, countywide stormwater program staff, and Permittee staff from various relevant municipal departments. The Steering Committee met periodically throughout the project. In addition, a project TAG, a small balanced advisory group formed from industry, regulatory, and Permittee representatives to provide review and input on selected project work products, was convened. The TAG was comprised of representatives from industry and state/federal regulatory agencies, and Permittees. Other efforts to engage key stakeholders included an industry stakeholder roundtable meeting (August 2017) and two larger stakeholder group meetings (December 2017 and May 2018) that included industry, regulatory and municipal representatives. During FY 2018/19, Permittees tailored the BASMAA products for local

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

[2] The City of Clayton provided acceptable evidence and is exempt from this provision.

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use, adopted the program (e.g., via local policy or ordinance), and trained local staff to implement the new program starting July 1, 2019.

Key BASMAA project deliverables provided to each Permittee to use as appropriate given local procedures and needs included:

- A protocol for pre-demolition building survey for priority PCBs-containing building materials;
- Model language for municipal adoption (e.g., ordinance) of the new program to manage PCBs materials during building demolition and model supporting staff report and resolution;
- CEQA strategy and model notice of exemption;
- Supplemental demolition permit model application materials, including forms, process flow charts, and applicant instructions; and
- An analysis to assist municipalities that pursue cost recovery.

Other project deliverables included:

- A coordination/communication strategy for the project;
- A technical memorandum summarizing any new information & decisions needed by BASMAA at outset, including an annotated table of regulatory drivers and relevant requirements;
- A technical memorandum with the state of the practice for identifying PCBs-containing building materials (developed to inform development of the pre-demolition building survey protocol listed below);
- Industry stakeholder outreach materials and a fact sheet for municipal staff;
- A spreadsheet tool used to develop the prioritized list of potential PCBs-containing building materials that the demolition program will focus on;
- A conceptual approach for an assessment methodology and data collection program to quantify PCBs loads reduced through managing PCBs-containing materials during building demolition.

During FY 2018/19, the BASMAA project concluded by conducting the following outreach and training tasks:

- Prepared training materials for municipal staff on adoption and implementation of the new program;
- Developed outreach materials and a standard presentation to inform industry stakeholders including developers, planning firms, urban planning non-governmental organizations, demolition firms, property owners, property managers, and realtors about the new program to manage PCBs in building materials during demolition;
- Using the above training materials, conducted training workshops (in-person and a webinar) for key municipal and countywide stormwater program staff;
- Conducted a webinar for industry stakeholders; and
- Developed a list of Bay Area opportunities, including contact information and dates, for municipal and/or stormwater program staff to conduct additional outreach to industry stakeholders using the above industry outreach materials.

In addition, during FY 2018/19 MRP Permittees worked together through the BASMAA Monitoring and Pollutants of Concern Committee (MPC) to begin developing a framework to comply with data collection/evaluation and reporting requirements under Provision C.12.f. As mentioned previously, these requirements include developing an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the new program. The preliminary regional process developed to-date includes the following steps:

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1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.[3]
5. For Applicable Structures only, the municipality submits completed Screening Forms and any supporting documents (consultant's report from PCBs building survey, QA/QC checklist, and lab reports) to its countywide program; forms for exempt sites need not be submitted. Forms should be submitted to the countywide programs electronically if feasible, and at a minimum annually, but quarterly is preferred.
6. The countywide programs compile the completed Screening Forms and any supporting documents. The countywide program then works with the other MRP countywide programs through BASMAA to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Permittees began implementing the program on July 1, 2019. Attached are two documents prepared collaboratively by the District and other MRP Permittees in compliance with MRP reporting requirements:

1. *PCBS in Building Materials Management Program – Regional Data Summary, September 18, 2020* provides documentation of (a) the number of applicable structures that applied for a demolition permit during the reporting year, and (b) a running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.
2. *Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program, September 23, 2020* provides an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition.

C.11.e/12.h Risk Reduction Program

MRP Provisions C.11.e and C.12.h require Permittees to conduct an ongoing risk reduction program to address public health impacts of mercury and PCBs in San Francisco Bay fish. The fish risk reduction program is required to include actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families.

[3] Municipalities should require that applicants fill out and certify a Screening Form for every demolition. For non-Applicable Structures, applicants simply check the boxes, certify, and submit to municipality. Then the municipality can authorize the demolition (e.g., issue a demolition permit). In general, municipalities should have a completed and certified Screening Form before authorizing a demolition, unless they are a small community that is exempt or has some other arrangement with Regional Water Board staff. But there is no need to track non-Applicable Structures otherwise.

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A partnership composed of the Bay Area Clean Water Agencies (BACWA), Western States Petroleum Association, and BASMAA was formed to develop a regional approach to raise public awareness regarding fish contamination issues in San Francisco Bay and to encourage fish-consuming populations to reduce their exposure to mercury in contaminated fish. The partnership engaged the services of the SFEI/Aquatic Sciences Center and the California Department of Public Health (CDPH), Office of Environmental Health Hazard Assessment to manage and develop the project entitled San Francisco Bay Fish Project (SFBFP).

The SFBFP was a two-year project (October 2010 to October 2012) implemented by the CDPH. Project oversight was provided by the Bay Area Risk Communication and Exposure Reduction Work Group that included representatives from BASMAA, CDPH, BACWA, Regional Water Board, EPA, and County Health Departments. CDPH developed several educational materials under this project. These included a four-panel brochure, a kiosk flyer, a coloring book for kids, a warning sign, and an educational video. The brochures were produced in English and 10 other languages.

On April 16, 2017, District staff submitted a work plan to address the implementation of a Risk Reduction Program on behalf of the City and District. The following tasks were implemented to carry out the Risk Reduction Program:

- Point-of-purchase outreach at fishing supply stores - Program staff contacted five local fishing supply stores to find out if they would be interested in making the CDPH brochure titled *Guide to Eating Fish and Shellfish from San Francisco Bay* available to customers and they all agreed. Brochures were distributed to the bait shops in the City. The brochures were distributed to bait shops in FY18-19. The brochures were not refilled this reporting period. Typically the brochures are restocked in the spring. The Shelter-in-Place orders disrupted this schedule. There are often brochures still in stock when staff refreshes them, so it is very likely there are brochures still available for customers. Staff will restock the brochures in the bait shops during FY 19-20.
- Website Posting - The brochures and fish consumption warning signs are posted in the stormwater section on the Phase 1 Solano County cities' and Vallejo Flood & Wastewater District's websites.
- Distribution at Outreach Events - The brochures are distributed at Solano County community outreach events.
- Kiosks and Pier Postings - Local fishing piers and kiosks have fish consumption warnings, posted, inspected and maintained on an annual basis.
- Distribution to Fish Markets – A Permittee representative from FSSD communicated the goals of the Fish Risk Reduction Program to Solano County Health Inspectors and requested distribution of the brochure to local fish markets during their routine inspections. The brochures were again provided to the Solano County Health Inspectors in FY19-20, specifically on January 14, 2020.

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Memorandum

Date:	September 18, 2020
To:	BASMAA Monitoring and Pollutants of Concern Committee
From:	Lisa Austin, Principal, and Kelly Havens, Senior Engineer
Subject:	PCBS in Building Materials Management Program – Regional Data Summary Geosyntec Project Number: LA0597/CWR0609

1. BACKGROUND

Municipal Regional Stormwater Permit (MRP; Order No. R2-2015-0049) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time applicable structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

This technical memorandum documents the following items as required by MRP Provision C.12.f.iii.(4):

a. The number of applicable structures that applied for a demolition permit during the reporting year; and

b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used.

This memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration).

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2. NUMBER OF APPLICABLE STRUCTURE APPLICATIONS

The number of applicable structures that applied for a demolition permit during Fiscal Year 2019/20 (i.e., from July 1, 2019 – June 30, 2020), as well as the number of samples in those buildings that were equal to or greater than 50 ppm, is summarized in Table 1 below.

A list providing the same information, but for each Permittee, is provided in Attachment 1.

Table 1: Number of Applicable Structure Applications Received in FY 2019/20

County	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	26	23
Contra Costa	3	6
San Mateo	12	3
Santa Clara	37	8
Solano	5	0
Total	**83**	**40**

3. LIST OF APPLICABLE STRUCTURES

A running list of the applicable structures that applied for a demolition permit since July 1, 2019 that had materials with PCBs at 50 ppm or greater, with the address and estimated demolition date, is provided in Attachment 2.

4. DESCRIPTION OF PCBS CONTROL METHOD

4.1 Permittee Control Method

On behalf of MRP Permittees, the BASMAA conducted a Regional Project that developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition; these materials are provided in Attachment 3. The Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project.

Permittees have implemented the following process for this control measure:

- The municipality informs applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.

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- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm or greater and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

4.2 Building Demolition Applicant Control Method

Applicants that determine, through implementation of the BASMAA protocol, that PCBs exist in priority building materials must follow applicable federal and state laws for handling and disposal. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, the applicant may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA). For example, TSCA requires manifesting the waste for transportation and disposal. (See 40 Code of Federal Regulations (CFR) 761 and 40 CFR 761, Subpart K.) TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. (See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).). 40 CFR 761.3 provides information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Further information is provided in a memorandum "PCB Bulk Product Waste Reinterpretation" from the Office of Resource Conservation and Recovery, EPA[1].

[1] Located here: https://www.epa.gov/sites/production/files/2016-01/documents/wste-memo_102412.pdf.

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Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

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Attachment 1
Number of Applicable Structure Applications by Permittee

Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Alameda	0	0
Albany	0	0
Berkeley	0	0
Dublin	0	0
Emeryville	0	0
Fremont	2	1
Hayward	2	3
Livermore	0	0
Newark	0	0
Oakland	21	19
Piedmont	0	0
Pleasanton	0	0
San Leandro	1	0
Union City	0	0
Alameda County	0	0
Alameda County Total	**26**	**23**
Clayton	Exempt	Exempt
Concord	1	6
Danville	0	0
El Cerrito	0	0
Hercules	0	0
Lafayette	0	0
Martinez	0	0
Moraga	0	0
Orinda	0	0
Pinole	0	0
Pittsburg	0	0
Pleasant Hill	0	0
Richmond	2	0
San Pablo	0	0
San Ramon	0	0
Contra Costa County	0	0
Walnut Creek	0	0
Contra Costa County Total	**3**	**6**
Campbell	0	0
Cupertino	0	0
Los Altos	0	0

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Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Los Altos Hills	0	0
Los Gatos	0	0
Milpitas	0	0
Monte Sereno	0	0
Mountain View	2	0
Palo Alto	2	4
San Jose	4	0
Santa Clara	1	0
Santa Clara County	0	0
Saratoga	0	0
Sunnyvale	28	4
Santa Clara County Total	**37**	**8**
Atherton	0	0
Belmont	0	0
Brisbane	0	0
Burlingame	1	0
Colma	0	0
Daly City	0	0
East Palo Alto	0	0
Foster City	0	0
Half Moon Bay	0	0
Hillsborough	0	0
Menlo Park	1	1
Millbrae	0	0
Pacifica	0	0
Portola Valley	0	0
Redwood City	1	0
San Bruno	0	0
San Carlos	1	0
San Mateo	0	0
San Mateo County	1	0
South San Francisco	6	2
Woodside	1	0
San Mateo County Total	**12**	**3**
City of Vallejo	5	0
City of Fairfield	0	0
Suisun City	0	0

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Permittee	# Applicable Applications	# Samples ≥ 50 ppm PCBs
Solano County Total	5	0
MRP Permittee Regional Total	83	40

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Attachment 2
Number of Applicable Structure Applications by Permittee with PCBs at 50 ppm or Greater

Program	Permittee	Building ID	Address	Estimated Demo Date	# Samples ≥ 50 ppm PCBs	PCBs Concentration Range (mg/kg)
ACCWP	Oakland	AC - 14	5441 International Boulevard, Oakland, CA, 94601	June 2020	5	54 - 174
ACCWP	Oakland	AC - 15	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	139.4
ACCWP	Oakland	AC - 16	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	66.1 - 85
ACCWP	Oakland	AC - 17	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	56
ACCWP	Oakland	AC - 18	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	53 - 64
ACCWP	Oakland	AC - 19	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	61
ACCWP	Oakland	AC - 21	5441 International Boulevard, Oakland, CA, 94601	June 2020	2	58 - 104
ACCWP	Oakland	AC - 26	5441 International Boulevard, Oakland, CA, 94601	June 2020	1	125
ACCWP	Oakland	AC - 31	7200 Earhart Rd, Oakland, CA, 94621	November 2019	4	190 - 537,000
ACCWP	Fremont	AC -32	39150 Fremont Bank, Fremont, CA, 94539	Jan 2020	1	50
ACCWP	Hayward	AC -34	22300 City Center Drive, Hayward, CA, 94541	April 2020	3	66 - 9,600
CCCWP	Concord	CCC-01	2292 Concord Blvd, Concord, CA, 94520	May 2020	6	140-550
SCVURPPP	Palo Alto	SC-005	180 El Camino Real, Palo Alto, CA, 94304	March 2020	4	676 - 14,250
SCVURPPP	Sunnyvale	SC-028	650 Vaqueros Ave, Sunnyvale, CA, 94085	July 2020	1	1,100
SCVURPPP	Sunnyvale	SC-031	525 Del Rey Ave, Sunnyvale, CA, 94085	July 2020	2	490 - 630
SCVURPPP	Sunnyvale	SC-043	390 Caribbean Dr., Sunnyvale, CA 94089	Unknown	1	91
SMCWPPP	Menlo Park	SMC-2	305 Constitution Dr., Menlo Park, CA, 94025	Jan 2020	1	54.5
SMCWPPP	South San Francisco	SMC-6	1 Chestnut Avenue, South San Francisco, CA, 94080	Jan 2020	2	247

Attachment 3
PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018 (Revised July 2, 2019)

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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

- Reid Bogert, Stormwater Program Specialist, San Mateo Countywide Water Pollution Prevention Program (BASMAA Project Manager)
- Amanda Booth, Environmental Program Analyst, City of San Pablo
- Kevin Cullen, Program Manager, Fairfield-Suisun Urban Runoff Management Program
- Matt Fabry, Program Manager, San Mateo Countywide Water Pollution Prevention Program
- Gary Faria, Supervisor, Inspection Services, Building Inspection Division, Contra Costa County
- Napp Fukuda, Deputy Director - Watershed Protection Division, City of San José
- Ryan Pursley, Chief Building Official, Building Division, City of Concord
- Pam Boyle Rodriguez, Manager, Environmental Control Programs – Stormwater, City of Palo Alto
- Jim Scanlin, Program Manager, Alameda Countywide Clean Water Program
- Melody Tovar, Regulatory Programs Division Manager, City of Sunnyvale

We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

Stakeholder Group	Representative(s)
Regulatory – stormwater/PCBs	Luisa Valiela and Carmen Santos, U.S. EPA Region 9
Regulatory – stormwater/TMDL	Jan O'Hara, San Francisco Bay Regional Water Quality Control Board
Regulatory – experience with related program (asbestos management)	Ron Carey and Richard Lew, Bay Area Air Quality Management District
Industry – demolition contractors	Avery Brown, Ferma Corporation
Industry – remediation consultants	John Martinelli, Forensic Analytical Consulting John Trenev, Bayview Environmental Services, Inc.
MRP Permittee – large municipality	Patrick Hayes, City of Oakland
MRP Permittee – medium municipality	Kim Springer, San Mateo County Office of Sustainability
MRP Permittee – small municipality	Amanda Booth, City of San Pablo

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PCBs in Priority Building Materials: Model Screening Assessment Applicant Package

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Attachment A Process Flow Chart A-1

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Attachment C Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition C-1

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DISCLAIMER

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

The mention of commercial products, their source, or their use in connection with information in BASMAA products is not to be construed as an actual or implied approval, endorsement, recommendation, or warranty of such product or its use in connection with the information provided by BASMAA.

This disclaimer is applicable to all BASMAA products, whether information from the BASMAA products is obtained in hard copy form, electronically, or downloaded from the Internet.

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Process Overview

This document provides a model PCBs in Priority Building Materials Screening Assessment process to be conducted by demolition project proponents (applicants). A flow chart illustrating the above processes is provided in **Attachment A**.

Applicants proposing to demolish buildings must conduct the PCBs screening assessment. Through the PCBs screening assessment applicants will:

1) Determine whether the building proposed for demolition is likely to have PCBs-containing building materials (see discussion of applicable structure); and
2) Determine whether PCBs are present at a concentration equal to or greater than 50 parts per million (ppm) in building materials.

Use the *PCBs Screening Assessment Form* (**Attachment B**) to summarize and certify the information required by the municipality to issue the demolition permit. The form is divided into four parts:

- **Part 1** provide applicant information and project location.
- **Part 2** complete the questions to identify whether the project involves an *applicable structure.* If the demolition does not involve an applicable structure, the form may be certified and submitted without completing Part 3.
- **Part 3** complete the questions to provide the concentrations of PCBs in any *priority building materials*.
- **Part 4** certify the information being submitted.

Water quality within the San Francisco Bay Region is regulated by the San Francisco Bay Area Regional Water Quality Control Board (Regional Water Board).

In 2015, the Regional Water Board reissued the Municipal Regional Permit (MRP)[1] that regulates discharges of stormwater runoff. The MRP includes provisions for reducing discharges of polychlorinated biphenyls (PCBs) in stormwater runoff and requires municipalities to develop a program to manage priority PCBs–containing building materials during demolition and implement the program by July 1, 2019.

Existing federal and state regulations create the framework for managing PCBs in building materials once those PCBs are identified through this program and for disposing of wastes containing PCBs.

Note that fluorescent light ballasts, polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this process it is assumed that those materials will be evaluated and managed under those existing programs.

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the MRP. [1] It does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs (or other contaminants). **The applicant is responsible for complying with all relevant laws and regulations. See the Notices to Applicants section for additional information.**

[1] A National Pollutant Discharge Elimination System (NPDES) permit, Order No. R2-2015-0049, issued to municipalities in the counties of Alameda, Contra Costa, San Mateo, and Santa Clara, and the Cities of Fairfield, Suisun City, and Vallejo.

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Applicant Instructions for Completing the PCBs Screening Assessment Form

Applicants for demolition permits or other permits that involve the complete demolition of a building must conduct an assessment to screen for PCBs in *priority building materials*. *Use the PCBs Screening Assessment Form*, to summarize and certify the information needed by the municipality to issue a demolition permit. The form is provided in **Attachment B**. If the project includes the demolition of multiple buildings complete one form for each building to be demolished.

Key Definitions

Demolition means the wrecking, razing, or tearing down of any building. The definition is intended to be consistent with the demolition activities undertaken by contractors with a C-21 Building Moving/Demolition Contractor's License.

Priority Building Materials are:

1. Caulk;
2. Thermal insulation;
3. Fiberglass insulation;
4. Adhesive mastics; and
5. Rubber window gaskets.

Buildings are structures with a roof and walls standing more or less permanently in one place. Buildings are intended for human habitation or occupancy.

Applicable Structures are defined as buildings constructed or remodeled between January 1, 1950 and December 31, 1980. Wood framed buildings and single-family residential buildings are not applicable structure regardless of the age of the building.

Part 1. Owner and project information

Complete the owner and consultant information and the project location information.

For the Type of Construction select one of the following options:

- **Wood Frame** (Buildings constructed with lumber or timbers, which make up the studs, plates, joists, and rafters.)
- **Masonry Construction** (Buildings constructed with concrete blocks or bricks as the load bearing walls typically with the floors and ceilings constructed with wooden joists.)
- **Steel Frame Construction** (Buildings constructed with steel studs or steel columns and steel joists or trusses to support floors and roofs. Includes light gauge steel construction and high-rise steel construction.)
- **Concrete Frame** (Buildings constructed with reinforced concrete columns, concrete beams, and concrete slabs.)
- **Pre-Engineered** (Buildings constructed with pre-engineered parts bolted together.)

Part 2. Is building subject to the screening requirement based on type, use, and age of the building?

Part 2 documents the determination of whether the proposed demolition will affect an *applicable structure*. If the demolition does not affect an *applicable structure*, then the assessment is complete, and the form can be certified.

This determination screens out buildings that are a lower priority with regard PCBs-containing materials and provides an off-ramp from the rest of the screening process.

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Question 2.a: Is the building to be demolished wood framed and/or single family residential?

- If YES the PCBs Screening Assessment is complete, skip to the certification in Part 4.
- If NO, continue to Question 2.b.

Question 2.b: Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?

- If YES continue to Question 2.c.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

Question 2.c: Is the proposed demolition a complete demolition of the building (as defined in key definitions of this document)?

- If YES continue to Part 3.
- If NO, the PCBs Screening Assessment is complete, skip to the certification in Part 4.

> Studies have found the highest concentrations of PCBs in building materials in buildings that were built or remodeled from 1950 to 1980.
>
> For this process, the date that the building permit was issued will be used to determine applicability.

Part 3. Report concentrations of PCBs in priority building materials

Part 3 documents the results of the assessment of PCBs concentrations in *priority building materials*. Part 3 is only required for proposed demolition of an *applicable structure*, as determined in Part 2. Check the option used.

- **Option 1** Conduct representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) provided in **Attachment C**.
- **Option 2** Use existing sampling results of the *priority building materials.* Applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol (e.g., analytical methods, sample collection frequency, QA/QC). It is anticipated that prior sampling results will rarely be available and that most Applicants will need to use Option1.

3.a Option 1 – Conduct representative sampling

Check this box if you conducted representative sampling and analysis of the *priority building materials* per the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition* (August 2018) (**Attachment C**).

- Complete the applicable tables for each priority building material.
- Attach the contractor's report[2] documenting the evaluation results.
- Attach (or include in the contractor's report) the QA/QC checklist (see **Attachment C**, Section 3.2.4).
- Attach copies of the analytical data reports.

[2] The contractor's report of the findings of the PCBs building material evaluation. See section 3 of Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (Attachment C).

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3.a Option 2 – Use existing sampling records

In some cases, a property owner may have conducted sampling of the *priority building materials* for PCBS. If such data exist, you may use these data to demonstrate the concentration of PCBs in the *priority building materials* for the PCBs screening. However, if the sampling must be consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.*

- Complete the applicable tables for each priority building material.
- Attach the contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition*.
- Attach copies of the analytical data reports.

Part 3 Tables Summarize concentrations of PCBs in priority building materials

Use these tables to summarize the concentrations of PCBs in the *priority building materials*.

- Each page of the table is for a different material. Duplicate the pages as needed to report all concentration data.
- A blank page is provided. Applicants have the option of submitting PCBs concentration data on other materials in addition to the *priority building materials*.

Column 1: required for all priority building material PCBs concentrations

- Use column 1 to report all PCBs concentrations in the *priority building materials*. Provide short description of the sample location, concentration.

Column 2: only required for PCBs concentrations ≥50 ppm

- Use column 2 to estimate the amount of material associated with each sample.

Part 4. Certification

- Complete the certification. The certification must be signed by the property owner or the owner's agent or legal representatives and the consultant who complete the application form.

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Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.

Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under Toxic Substances Control Act (TSCA).

Additionally, the disposal of PCBs waste is subject to California Code of Regulations (CCR) California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

Federal and State Regulations

See 40 Code of Federal Regulations (CFR) 761.3 for important information relative to disposal of PCBs-containing building materials, including definitions of PCBs bulk product wastes and PCBs remediation wastes. Also see the memorandum dated October 24, 2012 “PCB Bulk Product Waste Reinterpretation” from Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery, EPA.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

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Agency Contacts

Applicants should contact the appropriate agencies and review the relevant guidance and information about PCBs in building materials. Municipal staff are not able to advise you on the requirements of the applicable federal and state laws.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCB website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (known as Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

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Attachment A
Process Flow Chart

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PCBs in Priority Building Materials Screening Assessment Process

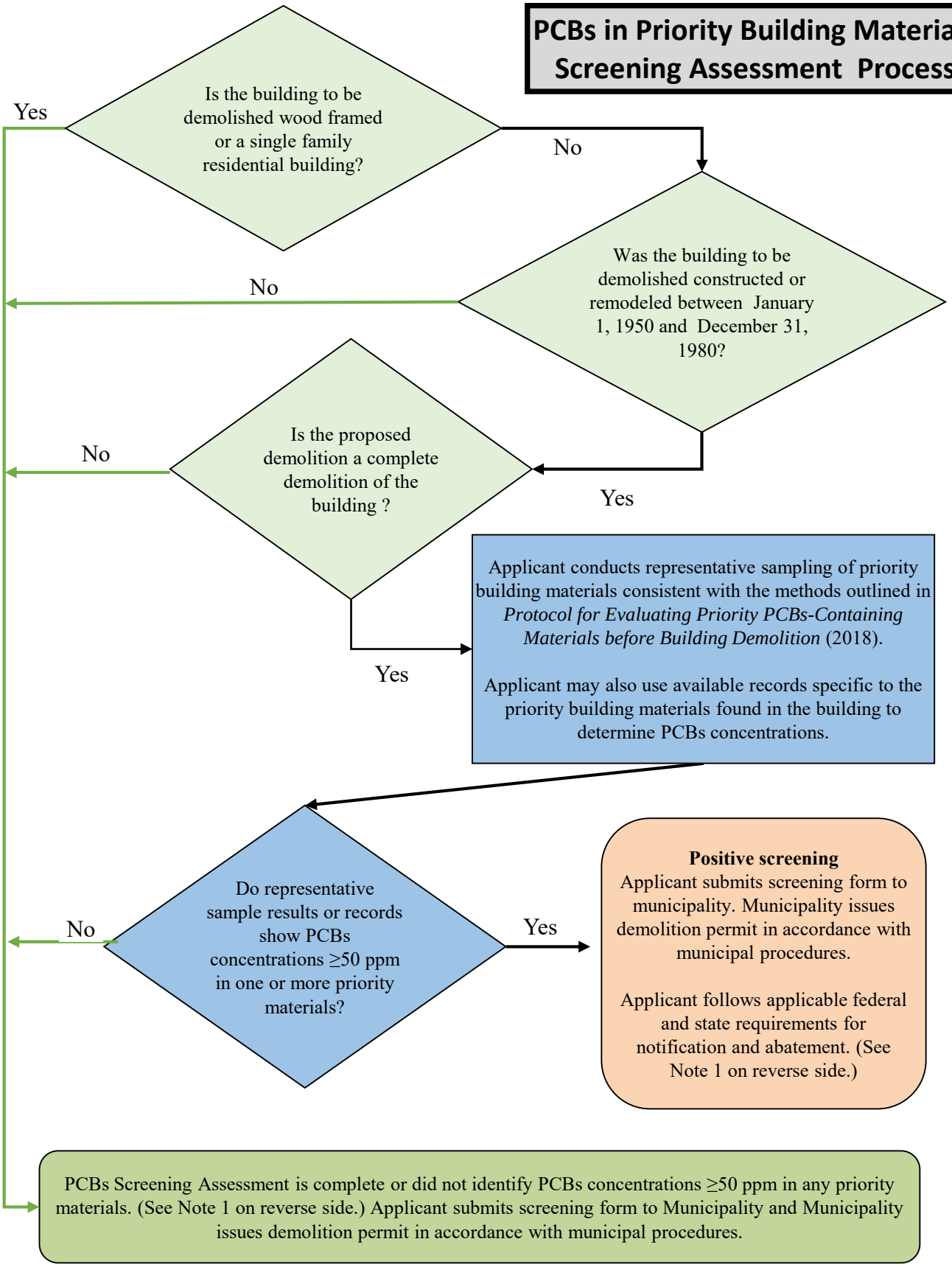

Note 1

- Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

- Building materials such as concrete, brick or metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

- Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

- TSCA-regulated does not equate solely to "materials containing PCBs at or above "50 mg/kg." There are circumstances in which materials containing PCBs below 50 mg/kg are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

- Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

- California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Attachment B
PCBs in Priority Building Materials Screening Assessment Form

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PCBs Screening Assessment Form

For Municipality Use Only	
Date Received	
File #	

This screening process is part of a program for water quality protection and was designed in accordance with requirements in the Bay Area regional municipal stormwater NPDES permit (referred to as the Municipal Regional Permit). This process **does not** address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; or abatement at sites with PCBs or other contaminants). **The applicant is responsible for knowing and complying with all relevant laws and regulations. See Notices to Applicants section in the Applicant Instructions and at the end of this form.**

Complete all applicable parts of the PCBs Screening Assessment Form and submit with your demolition permit application.

All Applicants must complete Part 1 and Part 2.

Part 1. Owner/Consultant and project information		
Owner Information		
Name		
Address		
City	State	Zip
Contact (Agent)		
Phone	Email	
Consultant Information		
Firm Name		
Address		
City	State	Zip
Contact Person		
Phone	Email	
Project Location		
Address		
City	State CA	Zip
APN (s)		
Year Building was Built	Type of Construction Select	
Estimated Demolition Date		

Part 2. Is building subject to the PCBs screening requirement based on type, use, and age of the building?		
2.a	Is the building to be demolished wood framed and/or single family residential?	☐ Yes ☐ No
If the answer to question 2.a is **Yes**, the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **No**, continue to Question 2.b.		
2.b	Was the building to be demolished constructed or remodeled between January 1, 1950 and December 31, 1980?	☐ Yes ☐ No
➢	If the answer to Question 2.b is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, continue to Question 2.c.	
2.c	Is the proposed demolition a complete demolition of the building?	☐ Yes ☐ No
➢	If the answer to Question 2.c is **No** the PCBs Screening Assessment is complete, skip to Part 4. If the answer is **Yes**, complete Part 3.	

All applications affecting applicable structures and demolitions must complete Part 3 and the Part 3 Tables.

Part 3. Report concentrations of PCBs in priority building materials	
Option 1. *Applicants conducted representative sampling and analysis of the priority building materials per the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).* ***Option 2.*** *Applicants possess existing sample results that are that are consistent with the Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition (2018) (Attachment C).*	
3.a Select option and report PCBs concentrations in the priority building materials and the source of data for each of the priority building materials. Provide the required supporting information	
☐ Option 1 Conduct Representative Sampling • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report documenting the assessment results; ☐ *QA/QC checklist (see Attachment C, section 3.2.4); and* ☐ Copies of the analytical data reports.	☐ Option 2 Use Existing Sampling Records • Summarize results on Part 3 Tables; and • Provide the following supporting information: ☐ Contractor's report/statement that the results are consistent with the *Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition.* ☐ Copies of the analytical data reports.

All Applicants must complete Part 4.

Part 4. Certification
I certify that the information provided in this form is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that I understand my responsibility for knowing and complying with all relevant laws and regulations related to reporting, abating, and handing and disposing of PCBs materials and wastes. I understand there are significant penalties for submitting false information. I will retain a copy of this form and the supporting documentation for at least 5 years. Signature:_____ Date: _____ (Property Owner//Agent/Legal Representative) Print/Type:_____ (Property Owner/Agent/Legal Representative Name)
Signature:_____ Date: _____ (Consultant Completing Application Form) Print/Type:_____ (Consultant Completing Application Form)

Notices to Applicants Regarding Federal and State PCBs Regulations

Applicants that determine PCBs exist in building materials must follow applicable federal and state laws. This may include reporting to U.S. Environmental Protection Agency (USEPA), the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs. Depending on the approach for sampling and removing building materials containing PCBs, you may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA and the California Code of Regulations. (See Note 1)

Note 1 - Federal and State Regulations

Building materials containing PCBs at or above 50 ppm that were manufactured with PCBs (e.g., caulk, joint sealants, paint) fall under the category of PCBs bulk product wastes. See 40 Code of Federal Regulations (CFR) 761.3 for a definition of PCBs bulk product wastes.

Building materials such as concrete, brick, metal contaminated with PCBs are PCBs remediation wastes (e.g., concrete contaminated with PCBs from caulk that contains PCBs). 40 CFR 761.3 defines PCBs remediation wastes.

Disposal of PCBs wastes are subject to TSCA requirements such as manifesting of the waste for transportation and disposal. See 40 CFR 761 and 40 CFR 761, Subpart K.

TSCA-regulated does not equate solely to materials containing PCBs at or above 50 ppm. There are circumstances in which materials containing PCBs below 50 ppm are subject to regulation under TSCA. See 40 CFR 761.61(a)(5)(i)(B)(2)(ii).

Disposal of PCBs wastes are subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.

California hazardous waste regulatory levels for PCBs are 5 ppm based on the Soluble Threshold Limit Concentration test and 50 ppm based on the Total Threshold Limit Concentration test, see CCR, Title 22, Section 66261.24, Table III.

Agency	Contact	Useful Links
US Environmental Protection Agency	Steve Armann (415) 972-3352 armann.steve@epa.gov	https://www.epa.gov/pcbs (EPA PCBs website) https://www.epa.gov/pcbs/questions-and-answers-about-polychlorinated-biphenyls-pcbs-building-materials (PCBs in Building Materials Fact Sheet and Q/A Document) https://www.epa.gov/pcbs/pcb-facility-approval-streamlining-toolbox-fast-streamlining-cleanup-approval-process (USEPA PCB Facility Approval Streamlining Toolbox (PCB FAST)) https://www.epa.gov/pcbs/polychlorinated-biphenyls-pcbs-building-materials#Test-Methods (See Information for Contractors Working in Older Buildings that May Contain PCBs)
San Francisco Bay Regional Water Quality Control Board	Jan O'Hara (510) 622-5681 Janet.O'Hara@waterboards.ca.gov Cheryl Prowell (510) 622-2408 Cheryl.Prowell@waterboards.ca.gov	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmdl.shtml https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/sitecleanupprogram.html
Department of Toxic Substances Control	Regulatory Assistance Office 1-800-72TOXIC RAO@dtsc.ca.gov	http://www.dtsc.ca.gov/SiteCleanup/Brownfields/upload/PUB_SMP_Guide-to-Selecting-a-Consultant.pdf
California Division of Occupational Safety and Health (Cal/OSHA)	CalOSHA Consultations Services 1-800-963-9424	https://www.dir.ca.gov/dosh/consultation.html

Part 3 Caulk Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of caulking area (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 ppm*	
Caulk Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Caulk Sample 1	*320*	*48*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Fiberglass Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of fiberglass insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Fiberglass Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Fiberglass Insulation Sample 1	*78*	*86*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Square Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh; where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Thermal Insulation Applications Table			
Column 1. *Report all PCBs concentrations for each homogenous area of thermal insulation (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Thermal Insulation Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Thermal Insulation Sample 1	*20*		*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

The area of of insulation wrapped around a pipe may be estimated using the following formula:
Area (square feet) = 2Πrh, where r is the pipe radius (feet) and h is the pipe length (feet).

Duplicate page if additional space is needed.

Part 3 Adhesive Mastic Applications Table			
Column 1. *Report PCBs concentrations for each homogenous area of mastic (see Attachment C, Section 3.2.2. Use sample designators/descriptions from laboratory report.)*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Adhesive Mastic Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Adhesive Mastic Sample 1	*87.4*	*800*	*Square Feet*
1.			Square Feet
2.			Square Feet
3.			Square Feet
4.			Square Feet
5.			Square Feet
6.			Square Feet
7.			Linear Feet
8.			Square Feet
9.			Square Feet
10.			Square Feet

Duplicate page if additional space is needed.

Part 3 Rubber Window Gasket Applications Table			
Column 1. *Report PCBs concentrations for each gasket (see Attachment C, Section 3.2.2). Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Rubber Window Gasket Application Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Window Gasket Sample 1	*70*	*75*	*Linear Feet*
1.			Linear Feet
2.			Linear Feet
3.			Linear Feet
4.			Linear Feet
5.			Linear Feet
6.			Linear Feet
7.			Linear Feet
8.			Linear Feet
9.			Linear Feet
10.			Linear Feet

Duplicate page if additional space is needed.

Part 3 Other Materials Table			
Column 1. *Optional: Use this form to report PCBs concentration data from materials other than priority building materials. Report PCBs concentrations for each material and homogeneous area. Use sample designators/descriptions from laboratory report.*		***Column 2.*** *Complete for each concentration ≥ 50 mg/kg*	
Material Sample Description	**Concentration (mg/kg)**	**Estimate Amount of Material**	**Units**
Example:			
Wall paint Sample 1	*228*	*1500*	*Square Feet*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Duplicate page if additional space is needed.

Attachment C
Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Managing PCBs–Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training

Bay Area Stormwater Management Agencies Association

August 2018
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This document is a deliverable of the Bay Area Stormwater Management Agencies Association (BASMAA) project *Managing PCBs−Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training*. BASMAA developed guidance, tools, and outreach and training materials to assist with San Francisco Bay Area municipal agencies' efforts to address the requirements of Provision C.12.f. of the Bay Area Municipal Regional Stormwater Permit (referred to as the MRP). Provision C.12.f of the MRP requires Permittees to manage PCBs–containing building materials during demolition.

We gratefully acknowledge the BASMAA Steering Committee for this project, which provided overall project oversight, including during the development of this and other project deliverables:

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We also gratefully acknowledge the project Technical Advisory Group, which provided feedback from a variety of project stakeholders during development of selected project deliverables:

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The material presented in this document is intended solely for the implementation of a municipal regulatory program required by the San Francisco Bay Area Regional Water Quality Control Board Municipal Regional Stormwater Permit for the protection of water quality under the Clean Water Act.

BASMAA prepared the tools and guidance herein to assist MRP Permittees' efforts to address the requirements of Provision C.12.f. of the MRP. The project team received input from a variety of stakeholders during development of the tools and guidance, including regulators (San Francisco Bay Regional Water Quality Control Board, U.S. EPA, and Bay Area Air Quality Management District staff), Bay Area municipal agency staff, and industry representatives.

This document does not address other environmental programs or regulations (e.g., PCBs regulations under the Toxic Substances Control Act (TSCA); federal, state, or local regulations for hazardous material handling and hazardous waste disposal; health and safety practices to mitigate human exposure to PCBs or other hazardous materials; recycling mandates; and abatement at sites with PCBs (or other contaminants). The applicant is responsible for knowing and complying with all relevant laws and regulations.

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Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

1. INTRODUCTION

The San Francisco Bay Region Municipal Regional Stormwater NPDES permit, referred to as the Municipal Regional Permit (MRP)[1], includes provisions that implement stormwater-related aspects of the Total Maximum Daily Load (TMDL) for polychlorinated biphenyls (PCBs) in the Bay. Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 milligrams per kilogram (mg/kg) (equivalent to parts-per-million, or ppm), the target management level, or greater in applicable structures at the time such structures undergo demolition[2], so that PCBs do not enter municipal storm drain systems. Applicable structures include, at a minimum, non-residential structures constructed or remodeled between the years 1950 and 1980 with building materials such as caulking and thermal insulation with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. Also, a Permittee is exempt from this requirement if it provided evidence acceptable to the Executive Officer in its 2016/17 Annual Report that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.[3]

Permittees were required to develop a protocol by June 30, 2019 that includes each of the following components, at a minimum:

1. The necessary authority to ensure that PCBs do not enter municipal storm drains from PCBs-containing materials in applicable structures at the time such structures undergo demolition;
2. A method for identifying applicable structures prior to their demolition; and
3. Method(s) for ensuring PCBs are not discharged to the municipal storm drain from demolition of applicable structures.

By July 1, 2019 and thereafter, Permittees are required to:

- Implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to municipal storm drains from demolition of applicable structures via vehicle track-out, airborne releases, soil erosion, or stormwater runoff.
- Develop an evaluation methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.

On behalf of MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) conducted a regional project to assist MRP Permittees to achieve compliance with

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[1] The Municipal Regional Stormwater Permit, Order No. R2-2015-0049, was adopted November 19, 2015.
[2] Demolition means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations (40 CFR., Part 61, Subpart M).
[3] The City of Clayton provided evidence to support an exemption from the requirement.

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Provision C.12.f. The regional project developed guidance materials, tools, protocols and training materials and conducted outreach. The goal was to assist Permittees to develop local programs to prevent PCBs from being discharged to municipal storm drains due to demolition of applicable buildings. Local agencies will need to tailor the BASMAA products for local use and train local staff to implement the new program.

This document is the deliverable for Task 3 of the regional project, which is to develop a protocol for the assessment of prioritized PCBs-containing building materials prior to demolition. The full scope of work for the regional project is presented in the Project team's *Proposal for Tools, Protocol, Outreach & Training Work Plan: PCBs Materials Management during Building Demolition Project* (dated January 31, 2017; revised March 2017). If materials are found or known to contain PCBs, those materials must be managed appropriately and according to all applicable local, state, and federal requirements. Guidance on the management of PCBs-containing materials is beyond the scope of this document.

To establish the PCBs protocol, currently established protocols were evaluated that are widely accepted in the building demolition industry for other Federal- and State-regulated constituents of concern. This document provides applicable examples of sampling and evaluation procedures for building materials potentially contaminated with asbestos-containing material (ACM)[4] and lead-based paint (LBP)[5], which are summarized and referenced in Appendix C. These components include guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures, and reporting.

[4] Asbestos-containing material (ACM) means any material or product which contains more than one percent asbestos.

[5] Lead-based paint (LBP) is any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF device or laboratory analysis, or 0.5 percent by weight (5,000 ppm or 5,000 mg/kg) as measured by laboratory analysis.

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2. PCBS BUILDING MATERIAL EVALUATION PROTOCOL

This section presents the evaluation protocol for identifying building materials in structures constructed or remodeled between the years 1950 and 1980[6] that may contain a significant mass of PCBs. Once identified as containing PCBs at concentrations exceeding 50 ppm, these materials should be properly managed prior to building demolition, to ensure PCBs are not discharged to the municipal storm drain system.

This protocol is not intended to address all PCBs-containing materials that may be disturbed during building demolition. Additional sampling is likely to be required to comply with USEPA and Cal/OSHA regulations pertaining to the management, removal and disposal of PCBs-containing materials.

For this program, it is assumed that organizations and staff qualified to sample, test, remediate, and dispose of PCBs at the building site will coordinate processes for other hazardous building materials at the building site, to ensure proper sampling, testing, remediation, and disposal or all statutorily required hazardous materials handling.

2.1 Priority Building Materials to be Tested

A prioritized list of PCBs-containing materials is provided in Appendix A. Building materials were evaluated based upon the following criteria:

- **Source Material** – Does the building material contain PCBs through the original product manufacturing process or was the building material contaminated (impregnated) with PCBs from an adjacent building material that already contained PCBs? For the evaluation, building materials originally manufactured with PCBs at or above 50 mg/kg were prioritized.
- **Concentration** – Building materials were evaluated based on readily available existing data regarding ranges of PCBs concentrations identified in the materials.
- **Prevalence** – A prevalence factor was assigned based upon best professional judgement of the prevalence of occurrence of the PCBs-containing materials in buildings, which ranged from highly prevalent to low prevalence.
- **Ease of Removal –** Building materials were evaluated based on their attachment to the building, which ranged from "very easily removed" to "difficult to remove," under the assumption that higher ease of removal results in higher feasibility and lower costs for removing a material before demolition.

[6] Single-family residential and wood frame structures are exempt.

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- **Flaking/Crumbling** – Building materials were evaluated based on their tendency to flake or crumble during disturbance or demolition, which could lead to a higher likelihood of entering stormwater as a result of building demolition.

- **PCBs Removed by Other Waste Program –** This factor addresses materials that are removed from buildings because of other waste management programs (e.g., Universal Waste Rule). Fluorescent light ballasts[7], polyurethane foam furniture, and Askarel fluid used in transformers, all of which may contain PCBs, are typically managed during pre-demolition activities under current regulations and programs that require removal of universal waste and outdated transformers. For this program it is assumed that those materials will be evaluated and managed under those existing programs.

Material prioritization was conducted by assigning a score on a scale of 1 to 5 (low to high) for each criterion. The final score for each material type was calculated as the average of the scores assigned to the six criteria. The materials given the highest scores through the prioritization analysis are shown below, along with their typical locations in a building. For this evaluation, thermal insulation and fiberglass insulation were grouped together as they tend to be co-located and are typically managed together.

Many building materials may contain PCBs. The building owner is responsible for identifying and handling all hazardous materials in accordance with all applicable laws, including all materials with 50 ppm or more PCBs. For purposes of obtaining a demolition permit, the building owner must sample at least the limited number of priority building materials listed below[8] (along with typical locations where they are found) using the protocols described in Section 2.2. This protocol is only for sampling of priority building materials. Building materials coming into contact with priority building materials are not the focus of this protocol.

1. Caulks and Sealants:
   a. Around windows or window frames (e.g., window glazing putty, window caulking, etc.);
   b. Around door frames; and
   c. Expansion joints between concrete sections (e.g., floor segments).
2. Thermal/Fiberglass Insulation and Other Insulating Materials:
   a. Around HVAC systems,

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[7] Fluorescent light ballasts that contain PCBs are not required to be managed under the Universal Waste Rule Program but are recommended by the EPA to be identified in a pre-demolition survey of a structure and to be managed with the removal of other required wastes in the abatement process.

[8] Applicants may use existing sampling results of the priority building materials. Applicants who have conducted sampling prior to the publication of this protocol may use that data provided it is consistent with this protocol (e.g., analytical methods, sample collection frequency, and QA/QC).

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   b. Around heaters,
   c. Around boilers,
   d. Around heated transfer piping, and
   e. Inside walls or crawls spaces.

3. Adhesive/Mastic:
   a. Below carpet and floor tiles;
   b. On, under, or between roofing materials and flashing.

4. Rubber Window Seals/Gaskets:
   a. Around windows or window frames.

Examples of the prioritized PCBs-containing building materials and what they may look like in a building planned for demolition are provided in Appendix B.

It should be noted that some materials that are being evaluated for PCBs in this protocol may also be associated with asbestos, lead, or other hazardous substances. Since this protocol follows pre-established asbestos management program guidelines and procedures, the sampling frequency, types of building materials, and surveying techniques overlap with the PCBs survey protocol. If a material has been determined to contain asbestos, lead or other hazardous substances and will be abated under an associated waste program, that material need not be sampled for PCBs under this program.

2.2 PCBs Sampling Procedures

2.2.1 Sampling Equipment

Building materials that are planned to be collected for laboratory analysis should be placed in laboratory-supplied glass jars with Teflon-sealed lids following procedures established in USEPA Method 8082 / 8082A. Samples should be collected with either factory-sealed or decontaminated equipment that will be used to remove a representative building material sample (i.e., scissors, tweezers, pliers, spoons, or putty knife).

For sampling equipment (i.e., scissors, tweezers, pliers, spoons, putty knife, etc.) that will be decontaminated, the following three bucket wash procedure should be performed, which is in general accordance with standard decontamination procedures defined in SESDPROC-205-R3 (USEPA, 2015):

- In the first bucket, mix a residue free cleaning detergent (e.g., Alconox®), with distilled water to generate the recommended detergent concentration specified in the product directions;

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- Fill the second bucket with distilled water;
- Fill the third bucket with distilled water;
- Clean the equipment in the first bucket with the cleaning detergent, then rinse in the second and then the third bucket. If the second bucket becomes slightly discolored during the rinse, change the contents of the second bucket with distilled water. Change the third bucket, if any dirt or material is observed in the water, since the third bucket needs to stay clean as it is the final rinse; and
- At the end of cleaning, let the equipment air dry in a clean area before use in sample collection. The rinse water should then be drummed and sampled for disposal. The planned disposal facility should be contacted to determine the required sample analysis for the rinse water characterization and profiling and that the disposal procedures comply with state and federal regulations.

If disposable sampling tools are used, the above decontamination procedures do not apply. Additionally, decon with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances, followed with the standard decontamination procedures listed above. It is recommended that equipment is air-dried per the procedure above, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying is prohibitive.

2.2.2 Sample Collection Frequency

For the four prioritized building materials, the following collection techniques and frequency should be followed.

Caulking

Three different types of caulking should be evaluated:

1. Window caulking;
2. Door frame caulking; and
3. Floor and expansion joint caulking.

For each type of caulking material identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking;
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

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- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous caulking material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. In addition, the width or cross-sectional area of the caulking bead is not relevant for determining the linear footage to be sampled. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Thermal/Fiberglass Insulation

For thermal/fiberglass insulation:

- Collect at least one bulk sample from each homogeneous area.

Adhesive/Mastic

For each type of adhesive/mastic material identified, the following number of samples should be collected:

- Collect at least three samples from each homogenous area less than 1,000 square feet;
- Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
- Collect at least seven samples from each homogenous area greater than 5,000 square feet.

If homogenous adhesive/mastic material is found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

Rubber Window Seals/Gaskets

For rubber window seals/gaskets identified, the following number of samples should be collected:

- Collect at least one sample from each homogenous area that contains less than 50 linear feet of caulking (of any width or cross-sectional are of bead);
- Collect at least three samples from each homogenous area that contains between 50 and 250 linear feet of caulking;
- Collect at least five samples from each homogenous area that contains between 250 and 1,000 linear feet of caulking;

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- Collect at least seven samples from each homogenous area that contains between 1,000 and 2,500 linear feet of caulking; and
- Collect at least nine samples from each homogenous area that contains greater than 2,500 linear feet of caulking.

If homogenous rubber window seals/gaskets are found throughout the building, samples should be spatially distributed so as to not collect the required number of samples from one area. It is also recommended that the sampler performing the evaluation inspect the entire building prior to sample collection to insure proper distribution is performed.

2.2.3 Sample Analysis and Preservation

Samples collected to evaluate building materials for PCBs should be analyzed for Aroclors by EPA Method 8082/8082A[9] by an accredited analytical laboratory. The reporting limit goal should be 500 micrograms per kilogram (µg/kg).[10] The laboratory should be contacted before sampling to confirm that it can meet the reporting limit objectives.

Samples should be chilled and then kept cool between 0 and 6 degrees Celsius (32 and 42.8 degrees Fahrenheit) during storage and transportation to the laboratory following procedures established in USEPA Method 8082/8082A. Proper chain-of-custody[11] procedures should be followed from the time the samples are collected until they are delivered to the laboratory for analysis. Holding times for EPA Method 8082/8082A are sample extraction within 14 days of sample collection and analysis of the extract within 40 days of extraction. <u>However, PCBs are very stable in a variety of matrices and holding times may be extended to as long as one year. Once extracted, analysis of the extract should take place within 40 days.</u>

2.2.4 Quality Assurance and Quality Control

For this program, general quality assurance and quality control (QA/QC) procedures will be utilized. The following checklist should be used by the contractor performing the evaluation:

- QA/QC Checklist:
    - Proper specified sampling equipment was used (pre-cleaned or other, stainless steel);

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[9] Provision C.12.f. requires that Permittees develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm. EPA Method 8082/8082A is an acceptable method to quantify PCBs. Analysis of PCBs congeners is not required to meet the permit requirement.

[10] The reporting limit can be modified to account for necessary dilutions or interferences, as determined by the laboratory. This reporting limit, which is below the target management level of 50 mg/kg, was selected to allow for data to be collected on the concentration of PCBs in building materials.

[11] Chain-of-custody is the procedure to document, label, store, and transfer samples to personnel and laboratories. For a detailed list of procedures, refer to the *Sample and Evidence Management,* Operating Procedure (SESDPROC-005-R2), January 29, 2013

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- Proper decontamination procedures were followed;
- Sampling collection spatial frequency was met;
- A National Environmental Laboratory Accreditation Program (NELAP) laboratory or a California-ELAP (CA-ELAP) were utilized;
- Samples were received by the laboratory within proper temperature range;
- Samples were extracted and analyzed within the method holding time for EPA Method 8082/8082A; and
- Sample reporting limit met data quality objectives.

2.3 Reporting and Notifications

The following considerations are applicable to reporting and notification:

- Assessment results must be submitted to the applicable Permitting Authority by the project applicant;
- Applicants that determine PCBs exist in priority building materials must follow applicable federal and state laws. This may include reporting to USEPA, the San Francisco Bay Regional Water Quality Control Board, and the California Department of Toxic Substances Control (DTSC). These agencies may require additional sampling and abatement of PCBs.
- Depending on the approach for sampling and removing building materials containing PCBs, applicants may need to notify or seek advance approval from USEPA before building demolition. Even in circumstances where advance notification to or approval from USEPA is not required before the demolition activity, the disposal of PCBs waste is regulated under TSCA.
- The disposal of PCBs waste is subject to California Code of Regulations (CCR) Title 22, Section Division 4.5, Chapter 12, Standards Applicable to Hazardous Waste Generators.
- Building owners and employers need to consider worker and public safety during work involving hazardous materials and wastes including PCBs.

For further information, applicants should refer to the *PCBs in Priority Building Materials Screening Assessment Applicant Package*, BASMAA, July 2018.

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3. REFERENCES

Guidelines for Asbestos Sampling:

- https://www.epa.gov/asbestos/asbestos-laws-and-regulations

Guidelines for Lead-Based Paint Evaluations:

- Environmental Protection Agency (EPA) - Created the Renovation, Repair, and Painting (RRP) Rule which requires training and certification for anyone working for compensation in pre-1978 residential structures, day care centers, and schools where known or assumed lead-based paint is impacted. The EPA website with complete information on this regulation is https://www.epa.gov/lead/renovation-repair-and-painting-program.
- California Department of Public Health (CDPH) - Created "Title 17" which includes lead testing and abatement provisions in residential and public structures in California. Several important definitions are contained in Title 17 including Abatement, Clearance Inspection, Containment, Lead-Based Paint.
- Lead Contaminated Dust and Soil, Lead Hazard, and Lead Hazard Evaluation. Title 17 establishes that lead testing be performed using XRF equipment or by paint chip sample analysis in California. Lead test kits are not accepted. It also establishes testing in California be performed by a State certified lead inspector/assessor if the testing is related to a project involving compensation.
- Department of Housing and Urban Development (HUD) - Created the HUD Guidelines which contain protocols for lead testing and abatement.

EPA Method 8082A – Polychlorinated Biphenyls (PCBs) by Gas Chromatography

- https://www.epa.gov/sites/production/files/2015-07/documents/8082a.pdf

SESDPROC-205-R3, *Field Equipment Cleaning and Decontamination*, replaces SESDPROC-205-R2. December 18, 2015

- https://www.epa.gov/sites/production/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf

SESDPROC-005-R2, *Sample and Evidence Management*, Operating Procedure, January 29, 2013

- https://www.epa.gov/sites/production/files/2015-06/documents/Sample-and-Evidence-Management.pdf

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APPENDIX A

PCBs Building Material Prioritization Worksheet

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Caulking (sealant, plaster)	**Caulk/sealant/tape/glue**		**0.001**	**752,000**	**5**	**5**	**5**	**3**	**5**	**5**	**4.67**
Thermal insulation	**Insulation**			**73,000**	**5**	**5**	**5**	**4**	**4**	**5**	**4.67**
Fiberglass insulation	**Insulation**			**39,158**	**5**	**4**	**5**	**4**	**4**	**5**	**4.50**
Adhesives/mastic	**Caulk/sealant/tape/glue**			**3,100**	**5**	**3**	**5**	**3**	**5**	**5**	**4.33**
Rubber gaskets	**Gaskets/Rubber**			**84,000**	**5**	**5**	**3**	**3**	**4**	**5**	**4.17**
Wool felt gaskets	Gaskets/Rubber			688,498	5	5	3	3	4	5	4.17
Cloth/paper insulating material	Insulation			12,000	5	4	3	4	4	5	4.17
Foam rubber insulation	Insulation			13,100	5	4	3	4	4	5	4.17
Ceiling tiles coated w/flame resistant sealant	Internal nonstructural surface		53	110,000	5	5	5	3	2	5	4.17
Backer rod	Caulk/sealant/tape/glue			99,000	1	5	5	3	5	5	4.00
Roofing/siding material	External nonstructural surface		0	30,000	5	4	5	3	2	5	4.00
Paint (complete removal)	Paint/pigment/coatings		0.001	97,000	5	5	5	1	3	5	4.00
Insulating materials in electric cable	Electrical		0	280,000	5	5	3	4	1	5	3.83
Adhesive tape	Caulk/sealant/tape/glue			1,400	5	3	1	3	5	5	3.67
Surface coating	Paint/pigment/coatings			255	5	3	5	1	3	5	3.67
Coal-tar enamel coatings	Paint/pigment/coatings			1,264	5	3	5	1	3	5	3.67
Grout	Caulk/sealant/tape/glue			9,100	5	4	1	2	5	5	3.67
Cove base	Internal nonstructural surface			170	5	3	3	4	2	5	3.67
Plastics/plasticizers	Electrical			13,000	5	4	3	3	1	5	3.50
GE silicones	Caulk/sealant/tape/glue	<1.9	0	1.8	5	1	3	2	5	5	3.50
Glazing	Caulk/sealant/tape/glue	Up to 100% liquid PCBs		51	5	2	3	3	3	5	3.50
Flooring and floor wax/sealant	Internal nonstructural surface	Maximum likely >50		51	5	2	3	3	2	5	3.33
Light ballast	Light ballasts	Minimum likely <50	49	1,200,000	5	5	3	5	1	1	3.33
Anti-fouling compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Polyurethane foam (furniture)	Caulk/sealant/tape/glue			50	5	2	1	5	5	1	3.17
Askarel fluid/cutting oils/hydraulic fluid	Oils/dielectric fluids			450,000	5	5	1	5	2	1	3.17
Fire retardant coatings	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Waterproofing compounds	Paint/pigment/coatings			59,000	5	4	1	1	3	5	3.17
Electrical wiring	Electrical			14	5	1	3	4	1	5	3.17
Concrete	Concrete/stone	2.5	0.001	17,000	1	4	3	1	4	5	3.00
Foam rubber	Gaskets/Rubber			1,092	1	3	1	3	4	5	2.83
Soil/sediment/sand	Soil/dust	0.15	0.001	581	1	3	1	2	5	5	2.83
Brick/mortar/cinder block	Concrete/stone			1,100	1	3	3	1	4	5	2.83
Wood	Wood			380	1	3	3	3	2	5	2.83
Door frame	Internal nonstructural surface			102	1	2	3	4	2	5	2.83
Metals surfaces in contact with caulk/sealant	Metal surfaces	448	51	448	1	3	1	2	4	5	2.67

Appendix A - PCBs Building Materials Prioritization

Material	Material Class	Median/Average/Single Reported Concentration (ppm)	Minimum (ppm)	Maximum (ppm)	PCBs Source Material? (Rating values: source = 5, or not source = 1)	Concentration (Rating values: 1 to 5, higher value means higher concentration)	Prevalence of PCBs Containing Material in Buildings (Rating values: high = 5, medium = 3, or low = 1)	Ease of Removal (Rating values: 1 to 5, higher value means easier to remove)	Flaking/ Crumbling (Rating values: 1 to 5, higher value means more likely to flake/crumble)	PCBs Removed by Other Waste Program? (Rating values: not removed by other = 5, or removed = 1)	Prioritization Score
Asphalt	Concrete/stone			140	1	2	1	2	4	5	2.50
Carpet	Internal nonstructural surface		0.46	9.7	1	1	1	5	2	5	2.50
Stone (granite, limestone, marble, etc.)	Concrete/stone			130	1	2	1	1	4	5	2.33
Air handling system	Air system		0.46	9.7	1	1	1	3	1	5	2.00

APPENDIX B

Priority Building Materials

Photographic Log

Appendix B

Priority Building Materials to be Tested for PCBs

Photograph 1

<u>Window Caulking</u>:

Damaged caulking around a window.

Photograph 2

<u>Window Caulking</u>:

Worn and cracked caulking around a window.

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Priority Building Materials to be Tested for PCBs

Photograph 3	
<u>Door Frame Caulking</u>: **Caulking on an interior door or window frame.**	
Photograph 4	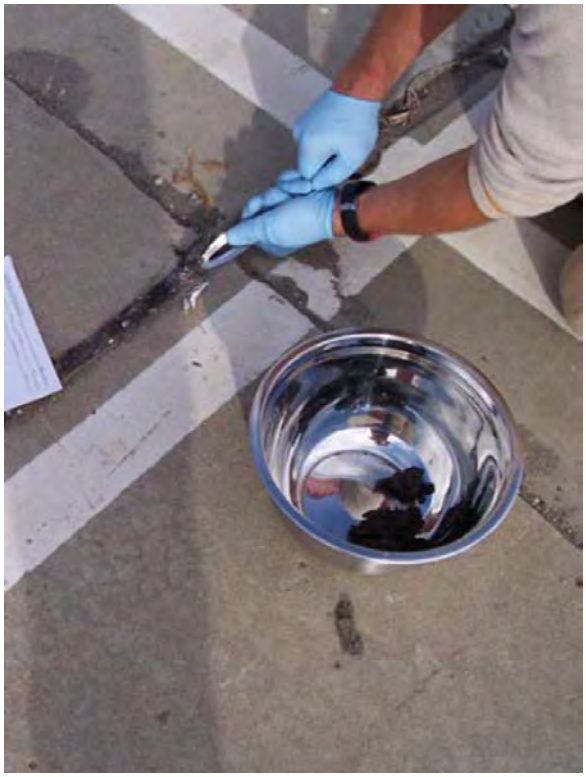
<u>Floor and Expansion Joint Caulking</u>: **Caulking material placed in concrete expansion joints.**	

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Priority Building Materials to be Tested for PCBs

Photograph 5	
<u>Thermal Insulation</u>: **Foam-style thermal insulation material along wall.**	

Photograph 6	
<u>Thermal Insulation</u>: **Damaged floor foam insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 7	
<u>Thermal Insulation</u>: **Damaged felt-style thermal insulation.**	

Photograph 8	
<u>Thermal Insulation</u>: **Exposed/damaged fiberglass insulation.**	

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Priority Building Materials to be Tested for PCBs

Photograph 9

<u>Thermal Insulation</u>:

Exposed and damaged pipe insulation.

Photograph 10

<u>Thermal Insulation</u>:

Pipe insulation.

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Priority Building Materials to be Tested for PCBs

Photograph 11	
<u>Adhesive / Mastic</u>: **Adhesive/mastic on a roof surface.**	
Photograph 12	
<u>Adhesive / Mastic</u>: **Adhesive beneath a carpet.**	

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Priority Building Materials to be Tested for PCBs

Photograph 13	
<u>Adhesive / Mastic:</u> **Adhesive remnants on flooring.**	
Photograph 14	
<u>Adhesive / Mastic:</u> **Exposed adhesive on roofing.**	

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Priority Building Materials to be Tested for PCBs

Photograph 15	
<u>Rubber Window Seal/Gasket:</u> **Grey rubber window seal/gasket in a wood type frame.**	

Photograph 16	
<u>Rubber Window Seal/Gasket:</u> **Off white rubber window seal/gasket in an aluminum type frame.**	

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APPENDIX C

Currently Established Building Material Evaluation Protocols

1. CURRENTLY ESTABLISHED BUILDING MATERIAL EVALUATION PROTOCOLS

This section presents evaluation protocols for ACM and LBP, which provide a foundation for the PCBs protocol summarized in Section 3. This section includes guidance on sampling frequencies, laboratory sample analysis, quality assurance and quality control procedures derived from regulatory procedures for ACM and LBP.

1.1 Asbestos Containing Material Evaluation Procedures

Asbestos bulk sampling procedures are specified in several Federal regulations, implemented primarily by the United States Environmental Protection Agency (EPA) as well as the Occupational Safety and Health Administration (OSHA). The Consumer Product Safety Commission (CPSC) and the Mine Safety and Health Administration (MSHA) specify additional regulations and procedures, but these are generally less applicable to evaluation procedures.

The foundational regulations pertaining to asbestos sampling in buildings are the Asbestos Hazard Emergency Response Act (AHERA; Toxic Substances Control Act [TSCA] Title II) (15 U.S.C. § 2641-2656) as well as the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). EPA promulgated regulations under AHERA to require inspection of schools for asbestos-containing building materials, and to perform resultant corrective actions. Furthermore, AHERA tasked the EPA with developing a plan for accreditation of asbestos inspectors. ASHARA extended funding for asbestos programs at schools and expanded accreditation requirements to cover asbestos abatement at commercial buildings other than schools.

Pursuant to AHERA, the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E) details specific requirements for building material inspections at schools, preparation of asbestos management plans, and implementation of response actions. EPA regulation on asbestos related to structure demolition is specified in subpart M of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR Part 61, Subpart M).

The following sections summarize the evaluation procedures specified in the Asbestos-Containing Materials in Schools rule as well as the Asbestos NESHAP regulations. Both OSHA and EPA worker protection requirements are also discussed.

1.1.1 Asbestos-Containing Materials in Schools Rule

The following sections summarize the inspection, re-inspection, sampling, analysis, and evaluation procedures specified in the Asbestos-Containing Materials in Schools rule (40 CFR Part 763, Subpart E).

Evaluation

For each inspection and re-inspection of asbestos-containing building material (ACBM)[12], the local education agency shall have an accredited inspector provide a written evaluation of all friable known or assumed ACBM. The evaluation shall consider the following:

- Location and amount of material, both in total quantity and as a percentage of the functional space;
- Condition of the material, specifying:
  - Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage);
  - Severity of damage (e.g., major flaking, severely torn protective jackets, as opposed to occasional flaking, minor tears to jackets);
  - Extent or spread of damage over large areas or large percentages of the homogeneous[13] area;
- Whether the material is accessible;
- The material's potential for disturbance;
- Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water); and
- Preventive measures that could potentially eliminate the reasonable likelihood of undamaged ACBM from becoming significantly damaged.

The inspector shall classify and give reasons in the written evaluation for classifying the ACBM and suspected ACBM assumed to be ACM into one of the following categories:

---

[12] Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

[13] Homogenous refers to a substance or area that is uniform in texture, color, and general physical appearance and properties.

1. Damaged or significantly damaged thermal system insulation ACM;
2. Damaged friable surfacing ACM;
3. Significantly damaged friable surfacing ACM;
4. Damaged or significantly damaged friable miscellaneous ACM;
5. ACBM with potential for damage;
6. ACBM with potential for significant damage; and
7. Any remaining friable ACBM or friable suspected ACBM.

Inspection and Re-inspection

Inspect any building that is to be used as a school, prior to such use, by an accredited inspector. In emergency situations, inspect the building within 30 days of commencement of such use.

For each area of the building, complete the following inspection procedure:

- Visually inspect the area to identify suspected ACBM;
- Touch suspected ACBM to determine friability (Friable material is material that may be crumbled or pulverized by hand pressure alone. Note that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as non-friable.);
- Categorize all areas into homogenous areas of friable suspected ACBM and non-friable suspected ACBM;
- Assume that some or all the homogeneous areas are ACBM, and for each homogeneous area that is not assumed to be ACBM, collect and submit samples for bulk analysis. Do not sample areas that an accredited inspector assumes to contain ACBM. For uncertain areas, collect and bulk samples and submit for analysis (see Sampling below);
- Assess friable material in areas where samples are collected, in areas where samples are not collected but ACBM is assumed to be present, and in areas identified in previous inspections;
- Record the following information and submit a copy for inclusion in an asbestos management plan, within 30 days of the inspection:

- An inspection report including the signature, state of accreditation, and accreditation number of each inspector, as well as the date of the inspection;
- A comprehensive inspection inventory, including the date and locations of samples, locations of areas assumed to contain friable ACBM, and locations of areas assumed to contain non-friable ACBM;
- A description of the manner used to determine sampling locations;
- A list of all categorized and identified homogenous areas into surfacing material, thermal system insulation, or miscellaneous material; and
- Evaluations made of friable material.

Repeat this process as a re-inspection at least once every 3 years after a management plan is in effect. Reassess the condition of friable known or assumed ACBM previously identified. Identify any homogenous areas with material that has become friable since the last inspection or re-inspection and collect and submit samples of the material.

Sampling

Collect samples in a statistically random manner that is representative of each homogeneous area.

- For surfacing material, the number of samples to be collected is as follows:
  - Collect at least three samples from each homogenous area less than 1,000 square feet;
  - Collect at least five samples from each homogenous area between 1,000 and 5,000 square feet; and
  - Collect at least seven samples from each homogenous area greater than 5,000 square feet.
- For thermal system insulation:
  - Collect at least one bulk sample from each homogeneous area that is not assumed to be ACM;
  - Collect at least one bulk sample from each homogeneous area of patched insulation that is not assumed to be ACM, if the patched section is less than six linear or square feet;

- Where cement or plaster is used on fittings such as tees, elbows or valves, collect samples to determine if material is ACM or not;
- If the accredited inspector determines that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM, samples are not required to be collected;

- For miscellaneous material, collect bulk samples from each homogeneous area of friable material that is not assumed to be ACM.

Analysis

Samples should be analyzed by laboratories accredited by the National Bureau of Standards (NBS). The laboratories must have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

Samples should be analyzed for asbestos content by PLM using the "Interim Method for the Bulk Determination of Asbestos in Bulk Insulation Samples", found at Appendix E to Subpart E of 40 CFR Part 763. Samples should not be composited.

A homogenous area is considered not to contain ACM only if the results of all samples from that area show asbestos in concentrations of 1 percent or less. An area is considered to contain ACM if at least one sample from the area shows asbestos in concentrations greater than 1 percent.

Submit the name and address of each laboratory performing the analysis, the date of the analysis, and the person performing the analysis for inclusion into the management plan within 30 days of the analysis.

1.2 Lead-Based Paint (LBP) Evaluation Procedures

Lead-Based Paint (LBP) evaluation procedures are codified in various federal and state regulations.

Title IV of the Toxic Substances Control Act (TSCA) as well as other authorities in the Residential Lead-Based Paint Hazard Reduction Act of 1992 directs the EPA to regulate lead-based paint hazards. The primary Federal regulations and guidelines related to LBP evaluation procedures include:

- The Lead Renovation, Repair and Painting Program (RRP) Rule (40 CFR 745, Subpart E);
- The National Lead Laboratory Accreditation Program (TSCA Section 405(b)); and
- The Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (2012 Edition) (pursuant to Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992, A.K.A. "Title X")

Furthermore, the California Department of Public Health (CDPH) Title 17, California Code of Regulations, Division 1, Chapter 8 "Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards," specifies some LBP evaluation procedures as part of the accreditation program.

The HUD Guidelines provide the most comprehensive procedures for LBP evaluations and are referenced by many other regulations.

There are three primary methods of performing LBP evaluation: test kits, X-ray Fluorescence (XRF) devices, and laboratory testing of paint chips. Sampling procedures for each method are detailed in the following sections.

Under CDPH Title 17, certified Lead Inspector/Assessors are required to use XRF devices or laboratory analysis, and not test kits.

1.2.1 LBP Sampling Procedures: Test Kits

In 2008, the EPA published the RRP rule, which, among other things, established criteria for lead test kits for use in LBP evaluation. Lead test kits recognized by EPA before September 1, 2010, must meet only the negative response criterion outlined in 40 CFR 745.88(c)(1):

> *For paint containing lead at or above the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a negative response less than or equal to 5% of the time must be met.*

Lead test kits recognized after September 1, 2010, must meet both the negative response and positive response criteria outlined in 40 CFR 745.88(c)(1) and (2). The positive-response criterion states:

For paint containing lead below the regulated level, 1.0 mg/cm^2 or 0.5% by weight, a demonstrated probability (with 95% confidence) of a positive response less than or equal to 10% of the time must be met.

To date, no lead test kit has met both criteria[14]. However, three lead test kits recognized before September 1, 2010, exist and are recognized by EPA:

- 3M™ LeadCheck™, manufactured by the 3M Company, for use on wood, ferrous metal, drywall, and plaster surfaces;
- D-Lead®, manufactured by ESCA Tech, Inc., for use on wood, ferrous metal, drywall, and plaster surfaces; and
- The Commonwealth of Massachusetts lead test kit, for use only on drywall and plaster surfaces.

Test kits cannot determine the concentration of lead, only presence or absence at best. For this reason, test kits are best used by homeowners or other non-professionals as a preliminary evaluation before using an XRF device or laboratory analysis of paint chips.

In California, test kits are not utilized as XRF is shown to be more reliable for testing of lead concentrations in paint.

There are currently no detailed sampling procedures for test kits that would be applicable to PCBs evaluation. However, test kit technology may be a useful paradigm for PCBs evaluation if a kit can be developed to test PCBs at an acceptable concentration that uses a repeatable methodology to meet the data quality objectives.

1.2.2 LBP Sampling Procedures: XRF Devices

The following sections summarize LBP evaluation procedures for XRF devices, including description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

LBP Analyzers

According to the HUD Guidelines, portable XRF devices are the most common primary analytical method for inspections in housing because of their versatility in analyzing a

[14] US EPA, Lead Test Kits, https://www.epa.gov/lead/lead-test-kits, accessed September 19, 2017.

wide variety of surface types, non-destructive measurement, high speed, and low cost per sample. Each XRF device must have a HUD-issued XRF Performance Characteristic Sheet (PCS), which contains information about XRF readings taken on specific surface types, calibration check tolerances, and interpretation of XRF readings.

Collection Techniques and Frequency

HUD Guidelines provide separate sampling techniques for single- and multi-family housing. However, the general approach to sampling is the following seven-step procedure:

- List all testing combinations of building components and substrates (e.g., wood doors, metal doors, plaster walls, concrete walls);
- Select testing combinations. A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested;
- Perform XRF testing, including calibration;
- Collect and analyze paint-chip samples as needed;
- Classify XRF and paint-chip results;
- Evaluate the work and results to ensure the quality of the inspection; and
- Document the findings in a summary and in a complete technical report.

Because of the large surfaces and quantities of paint involved, and the potential for spatial variation, HUD Guidelines recommend taking at least four readings per room, with special attention paid to surfaces that clearly have different painting history. The selection of test locations should be representative of locations most likely to be coated with old paint or other lead-based coatings, such as areas with thick paint; areas with worn or scraped off paint should be avoided.

For large buildings with many similar units, HUD Guidelines recommend testing a designated sample of units to provide 95% confidence that most units are below the lead standard. The sample size should be carefully chosen using statistical techniques (see HUD Guidelines, Table 7.3).

Sample Analysis

Portable XRF devices expose a surface to X-ray or gamma radiation and measure the emission of characteristic X-rays from each element in the analyzed surface. The XRF

reading is compared with a range specified in the PCS for the specific XRF device being used and the specific substrate beneath the painted surface.

When discrepancies exist between the PCS, HUD Guidelines, and the XRF device's manufacturer's instructions, the most stringent guideline should be followed.

Quality Assurance

HUD Guidelines provide several techniques for evaluation of inspection quality.

A knowledgeable observer independent of the inspection firm should be present for as much XRF testing as possible, especially if they have knowledge of LBP evaluation and/or the paint history of the facility.

The client should ask the inspector to provide copies of the results as soon as possible, or daily, allowing for immediate review.

Data from HUD's private housing lead-based paint hazard control program show that it is possible to successfully retest painted surfaces without knowing the exact spot which was tested. Therefore, the client may consider selecting 10 testing combinations for retesting at random from the already compiled list of all testing combinations, using the XRF device used for the original measurements, if possible. The average of the 10 repeat XRF results should not differ from the 10 original XRF results by more than the retest tolerance limit. The procedure for calculating the retest tolerance limit is specified in the PCS. If the limit is exceeded, the procedure should be repeated using 10 different testing combinations. If the retest tolerance limit is exceeded again, the original inspection is considered deficient.

Currently XRF technology and methods are not applicable to PCBs building material evaluation, as the precision is not adequate to provide a concentration that could be relied upon for this program.

1.2.3 LBP Sampling Procedures: Laboratory Testing of Paint Chips

The following sections summarize LBP evaluation procedures for XRF devices, including the description of sampling equipment, collection techniques and frequency, sample analysis, and quality assurance.

Laboratory analysis of paint chip samples is only recommended by HUD for inaccessible areas or building components with irregular (non-flat) surfaces that cannot be tested using

XRF devices, for confirmation of inconclusive XRF results, or for additional confirmation of conclusive XRF results.

Unlike XRF analysis, paint chip collection techniques may be more directly applicable to potential PCBs collection techniques.

Sampling Equipment

Common hand tools can be used to scrape paint chips from a surface; specialized equipment is not necessary. However, HUD Guidelines recommend that samples should be collected in sealable rigid containers rather than plastic bags, which generate static electricity and make laboratory transfer difficult.

Collection Techniques

HUD Guidelines, which are consistent with ASTM E1729, Standard Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination, recommend that only one paint chip needs to be taken for each testing combination, although additional samples are recommended for quality control.

The paint chip sample should be taken from a representative area that is at least 4 square inches in size. The dimensions of the surface area must be accurately measured to the nearest $1/16^{th}$ of an inch so that laboratory results can be reported in units of mg/cm^2. Paint chip collection should include collection of all the paint layers from the substrate, but collection of actual substrate should be minimized. Any amount of substrate included in the sample may cause imprecise results.

Sample Analysis

A laboratory used for LBP analysis must be recognized under EPA's National Lead Laboratory Accreditation Program (NLLAP) for the analysis of lead paint; however, States or Tribes may operate an EPA-authorized lead-based paint inspection certification program with different requirements.

There are several standard laboratory techniques to quantify lead in paint chip samples, including Atomic Absorption Spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES), Anodic Stripping Voltammetry, and Potentiometric Stripping Analysis.

For analytical methods that require sample digestion, samples should be pulverized so there is adequate surface area to dissolve the sample before laboratory instrument

measurement. In some cases, the amount of paint collected from a 4-square-inch area may exceed the amount of paint that can be analyzed successfully. It is important that the actual sample mass analyzed not exceed the maximum mass the laboratory has successfully tested using the specified method. If subsampling is required to meet analytical method specifications, the laboratory must homogenize the paint chip sample (unless the entire sample will eventually be analyzed, and the results of the subsamples combined). Without homogenization, subsampling would likely result in biased, inaccurate lead results. If the sample is properly homogenized and substrate inclusion is negligible, the result can be reported as a loading, in milligrams per square centimeter (mg/cm^2), the preferred unit, or as percent by weight, or both.

Quality Assurance

Laboratory reference materials processed with the paint chip samples for quality assurance purposes should have close to the same mass as those used for paint-chip samples (refer to ASTM methods E1645, E1613, E2051, and E1775).

Reporting

The laboratory report for analysis of paint chip samples should include at a minimum, the information outlined in the EPA National Lead Laboratory Accreditation Program Laboratory Quality System Requirements, Revision 3.0, section 5.10.2, Test Reports[15]. In addition to those minimum requirements, test reports containing the results of sampling must include specified sampling information, if available.

[15] National Lead Laboratory Accreditation Program: Laboratory Quality System Requirements https://www.epa.gov/sites/production/files/documents/lqsr3.pdf, accessed September 20, 2017.

APPENDIX D

Document Revision History

Protocol for Evaluating Priority PCBs-Containing Materials before Building Demolition

Summary of Revisions November 2019

1. The description of currently established building material evaluation protocols for asbestos and lead-based paint were moved from Section 2 to Appendix C.
2. Both window glazing putty and window caulking were added as examples within the "Caulks and Sealants" category to the list of priority materials to sample in Section 2.1.
3. Added clarification in Section 2.1 that sampling of the priority building materials listed in the protocol is required at a minimum. Sampling of building materials coming into contact with priority building materials is not required specifically by this protocol, but may or may not be part of any subsequent remediation. Also clarified that applicants who have conducted sampling prior to the publication of the protocol may use that data provided it is consistent with the protocol.
4. California-ELAP was added to Section 2.2.4 as an acceptable accreditation for a laboratory used to analyze priority building materials for PCBs (in addition to the national NELAP accreditation).
5. Added a clarification to Section 2.2.1 that decontamination with certain solvents (e.g., hexane) may be utilized for cleaning of tar-like substances off of sampling tools, followed with the standard decontamination procedures listed in the protocol. It is recommended that equipment is air-dried, but it is up to the discretion of the environmental professional to use alternative drying methods if time constraints for air-drying are prohibitive.
6. Section 2.2.3 was revised to increase the reporting limit from 50 to 500 micrograms per kilogram and to allow for the reporting limit to be modified to account for necessary dilutions or interferences, as determined by the laboratory.
7. Minor edits were made to the text throughout to correct typographical errors and improve clarity. In addition, clarifying edits to nomenclature were made to the photo log in Appendix B.

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MEMORANDUM

TO: BASMAA MPC Committee

FROM: Lisa Sabin and Jon Konnan, EOA, Inc.

DATE: September 23, 2020

SUBJECT: Managing PCBs in Building Demolition – Regional Collaboration for a Data Collection and Assessment Program

1. BACKGROUND

The San Francisco Bay Area Municipal Regional Stormwater Permit (SFBRWQCB 2015, referred to as the MRP) Provision C.12.f requires Permittees to manage PCBs-containing materials and wastes during building demolition activities. Provision C.12.f.ii(3) requires development of a data collection and assessment methodology program by July 1, 2019 to quantify PCBs loads reduced through implementation of the new program for controlling PCBs during building demolition, which began implementation on that date. Provision C.12.f.iii requires Permittees to submit the data collection and assessment methodology with their Fiscal Year (FY) 2019/20 Annual Reports, and states that this reporting should be at the regional level on behalf of all Permittees.

This technical memorandum provides administrative and technical support at the regional level for ongoing efforts by MRP Permittees to comply with data collection, evaluation, and reporting requirements under MRP Provision C.12.f. by:

- Documenting the regional process to collect data from the new program for controlling PCBs during building demolition;
- Presenting the assessment methodology to calculate PCBs loads reduced via the building demolition program;
- Documenting the results of additional literature searches and data gathering efforts conducted to set the stage for refining and reducing uncertainty in the parameters of the assessment methodology equation;
- Describing how data generated from the new demolition control program will be incorporated into the assessment methodology, including providing conversion factors needed for the load reduction calculations; and
- Addressing the MRP Provision C.12.f.iii requirement to submit the data collection and assessment methodology with their FY 2019/20 Annual Reports.

This technical memorandum was developed by the countywide stormwater management programs in the MRP area working together through the Bay Area Stormwater Management Agencies Association (BASMAA) Monitoring and Pollutants of Concern (MPC) Committee (via an informal regional collaboration). The information provided builds upon a previous BASMAA effort that outlined a conceptual approach for the regional data collection process and assessment methodology (BASMAA 2018).

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2. REGIONAL DATA COLLECTION PROCESS

This section documents the regional data collection process for the new programs to manage PCBs-containing building materials during demolition that began on July 1, 2019. This process was developed through a collaborative effort by municipalities subject to the MRP, the associated countywide stormwater management programs, and BASMAA. The regional data collection process focuses on collecting, compiling, and evaluating the data generated by the new programs on a regional basis. In addition, when sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program.
- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

The regional data collection process involves collection of data from individual permit applicants at the municipal level, followed by compilation of data for applicable structures[1] at the countywide level, and data evaluation and reporting at the regional level. The process is described below.

1. The municipality informs demolition permit applicants that their projects are subject to the MRP Provision C.12.f requirements, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
2. For every demolition project, applicants complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality. For non-applicable buildings, applicants simply check the boxes, certify, and submit to the municipality.
3. The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
4. The municipality then issues the demolition permit or equivalent, according to its procedures.
5. The countywide programs compile the completed Screening Forms and any supporting documents (at a minimum annually, but quarterly is preferred). Municipalities submit forms for applicable structures only to the countywide program; forms for exempt sites need not be submitted. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

To facilitate a regional approach, the countywide programs developed a regional data management system to compile and evaluate all the data generated by the new programs to manage PCBs during building demolition. The data management system also provides a mechanism for Permittees to gather

[1] Applicable structures are buildings built or remodeled from January 1, 1950 through December 31, 1980, with the following exemptions: single-family residential buildings, wood-framed buildings, and partial building demolitions.

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and store the data needed for other closely related reporting requirements, such as submitting the number of applicable structures that applied for a demolition permit that reporting year and a running list of those structures that had materials with PCBs concentrations ≥ 50 ppm, including addresses and estimated demolition dates, with their FY 2019/20 Annual Reports.

The regional data management system is an Excel spreadsheet-based tool for storing and managing the data from each Permittee. The tool also calculates the estimated loads avoided throughout the region via implementation of the new management program, using the assessment methodology and data inputs described below.

3. ASSESSMENT METHODOLOGY

This section describes the assessment methodology and refined data inputs for estimating the loads of PCBs to municipal separate storm sewer systems (MS4s) that are avoided due to implementation of new controls to manage PCBs in building materials during demolition activities. To-date, the load of PCBs reduced through management of PCBs during demolition has been calculated using Equation 1:

Equation 1. $$Load\ of\ PCBs\ Reduced = N \bullet M \bullet SW \bullet E_f$$

Where:

- N = Number of applicable structures with PCBs concentrations ≥ 50 ppm demolished each year (structures/yr)
- M = Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm (kg/structure)
- SW = Average fraction of PCBs that enters the MS4 due to demolition without new demolition program controls (dimensionless fraction)
- E_f = Average fraction of PCBs prevented by new demolition program controls from entering MS4 (dimensionless fraction)

The MRP 2.0 Factsheet (SFBRWQCB 2015) provides values for each of the four terms in Equation 1 that were used to stipulate the load reduction for implementing the new demolition control program across the MRP area, which was a total of 2 kg/yr. Table 1 presents the values used for each of the four terms in the Factsheet to derive the 2 kg/yr PCBs load reduction credit. The Factsheet notes that each of the terms could be represented by a range of values and the information available to estimate the values of these terms shown in Table 1 was limited.

BASMAA (2018) summarized the above MRP 2.0 Factsheet approach and other previous efforts to estimate PCBs loads from demolition and potential loads reduced by control programs. It also presented a conceptual approach to refining the 2 kg/year PCBs load reduction estimate by describing methods to potentially refine the values of each of the four Equation 1 parameters shown in Table 1. Building upon the approach described in that document, additional literature searches and data gathering efforts were conducted to set the stage for refining and reducing uncertainty in the values of the four terms. For the first two parameters, data will be incorporated as they are generated from the new demolition control programs. The results of these efforts are presented below.

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Table 1. Terms in MRP 2.0 Factsheet (SFBRWQCB 2015) equation used to stipulate the loading of PCBs to MS4s avoided by implementing demolition control measures.

Term	Symbol	Term Definition	Value	Units
1	*N*	Number of applicable structures demolished per year with PCBs concentrations ≥ 50 ppm	50	structures/year
2	*M*	Average mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm	5	kg/structure
3	*SW*	Average fraction of PCBs that enters MS4s due to demolition without controls[1]	0.01	dimensionless fraction
4	E_f	Average fraction of PCBs prevented by controls[1] from entering MS4 (i.e., assumed effectiveness of controls)	0.8	dimensionless fraction

1. The term "controls" refers to the proposed new demolition management program, not existing construction controls.

Term 1: Number of Applicable Structures Demolished Per Year

Current Basis

A study conducted by the San Francisco Estuary Institute (SFEI) reported a medium estimate of 521 building demolitions per year in commercial and industrial land uses in the study area, based on Bay Area Air Quality Management District (BAAQMD) asbestos abatement permitting data.[2] The SFEI study also reported the following medium estimates: 46% of the demolished buildings were built between 1950 and 1980 and 36% had PCBs concentration in caulks/sealants greater than 50 ppm (Klosterhaus et al. 2011). Multiplying (521) x (0.46) x (0.36) results in an estimated 86 commercial and industrial buildings demolished per year that were built between 1950 and 1980 and had PCBs concentration in caulks/sealants greater than 50 ppm.

Based upon information in the SFEI study and considering that the scope of the program to manage PCBs during demolition is limited to exclude wood frame buildings, the MRP Factsheet assumed 50 applicable structures with PCBs concentrations ≥ 50 ppm are demolished per year in the Bay Area (SFBRWQCB 2015).

Basis for Refinement

Data gathered during the new demolition control programs will be used to document the number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year throughout the MRP area. These data will be used to calculate a regional annual average number of applicable

[2] The BAAQMD regulations require that a "J Number" be applied for and obtained before applying for a building permit for demolition of an existing structure or renovations removing greater than 100 square feet of asbestos material within the San Francisco Bay air basin.

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structures with PCBs concentrations ≥ 50 ppm that are demolished. This regional annual average value will be used for Term 1 in Equation 1 (see Table 1).

As part of implementing the new demolition controls that began in July 2019, applicants for demolition permits are required to submit a Screening Form to the municipality with jurisdiction for each applicable structure. Permittees will submit these forms to their countywide stormwater programs, which will document the number of applicable structures with PCBs concentrations ≥ 50 ppm within each jurisdiction that are demolished each year. This information will be compiled in the regional database described previously (Section 2) and used to calculate an annual average number of applicable structures with PCBs concentrations ≥ 50 ppm that are demolished each year in the region. Use of these real-world data collected in the MRP area will substantially reduce the uncertainty that is currently associated with the estimated value for Term 1 that was used in the MRP 2.0 Factsheet.

Term 2: Average Mass of PCBs per Applicable Structure

Current Basis

The SFEI study included estimating the mass of PCBs in caulks in Bay Area buildings and releases to stormwater runoff during renovation and demolition (Klosterhaus et al. 2011). Using a blind sampling approach, the SFEI study collected 25 caulk samples from the exterior of ten commercial and industrial buildings constructed in the study area between 1950 and 1980. The study area was the portion of the San Francisco Bay Area covered by the MRP: Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and the cities of Fairfield, Suisun, and Vallejo. The caulk samples were analyzed for PCBs, which were detected in 88% of the samples, with 40% exceeding 50 ppm, the concentration at which caulk falls under U.S. Environmental Protection Agency (USEPA) regulations (Federal Register 2010). Detectable PCBs concentrations ranged over six orders of magnitude, from 1 to 220,000 ppm. These data were consistent with previous studies in other cities (Klosterhaus et al. 2011).

A geographic information system (GIS)–based approach was then used to estimate the number, area, and volume of currently standing buildings in the study area that were built during the era of greatest PCBs use in caulk. The approach used historical imagery and contemporary land use and involved characterization of randomly selected buildings within the study area, with the result scaled up to extrapolate total building counts and areas in the MRP footprint. Various assumptions, including the frequency of anticipated PCBs detection and PCBs concentrations in the caulk, average mass of caulk per unit building volume, and average building volume, were then applied to calculate an estimate of the total PCBs mass in building caulk in the study area. The evaluation resulted in a mid–range estimate of 10,500 kg PCBs in caulk in buildings located in the study area (low and high estimates were 767 and 46,000 kg, respectively), which equated to an average of 4.7 kg PCBs per building (low and high estimates were 0.6 and 16 kg per building, respectively). The estimate included caulk located on both the interior and exterior of buildings (Klosterhaus et al. 2011). Based upon the information in the SFEI study, the MRP Factsheet assumed an average applicable structure with PCBs concentrations ≥ 50 ppm in the Bay Area contains 5 kg of PCBs (SFBRWQCB 2015).

Basis for Refinement

Data gathered as part of the new demolition control programs will be used to document the quantities and associated PCBs concentrations of priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm. These data will be used to calculate a regional average mass of PCBs per

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applicable structure with PCBs concentrations ≥ 50 ppm in priority materials. This calculated regional average mass will be used for the value of Term 2 in Equation 1 (see Table 1).

Because of the new program to manage PCBs in building materials during demolition activities, Permittees have the opportunity to gather real-world data to estimate the mass of PCBs in priority materials in each applicable structure with PCBs concentrations ≥ 50 ppm that is demolished in the region. Over time, these data will be compiled into a dataset that can be used to calculate a regional average mass. This calculated average will account for five priority building materials that potentially contain PCBs previously identified for the program (caulk, rubber window gaskets, thermal insulation, fiberglass insulation, and mastic adhesives), while the estimate in the MRP Factsheet (Table 1) is based upon caulk only.

The information provided in the Screening Form includes two types of data that are needed to calculate the mass of PCBs per applicable structure with PCBs concentrations ≥ 50 ppm: (1) the quantity of each priority material in the structure, and (2) the concentration of PCBs in each priority material in the structure. These data will be used as inputs in Equation 2 to calculate the total mass of PCBs in the five priority materials for each applicable structure with PCBs concentrations ≥ 50 ppm that undergoes demolition beginning July 1, 2019.

Equation 2. $$Mass\ of\ PCBs\ per\ Structure\ (mg) = [\sum_{i=1}^{n}(C_i \bullet Q_i \bullet F_i)]$$

Where:

C_i = Concentration of PCBs in priority material i (mg/kg)

Q_i = Quantity of priority material i (linear feet or square feet)

F_i = Conversion factor – mass of priority material per linear foot of priority material i (kg/ft) or mass of priority material i per square foot of priority material i (kg/ft^2)

Equation 2 only accounts for the PCBs mass associated with the five priority building materials, so may represent an underestimate of the total PCBs mass in a given building. However, the extent of the underestimate would be small if the five priority materials contain most of the PCBs mass in a building.

The PCBs concentrations in each priority material (C_i) that will be used in Equation 2 is provided on the Screening Form for each applicable structure in units of mg of PCBs per kg of priority material (mg/kg).[3]

[3] Please note that this memorandum does not provide guidance on determining a representative PCBs concentration when multiple samples are collected from a single homogeneous area of a building material, per the sampling protocol (e.g., applying average vs. geomean vs. median to determine central tendency when multiple sample results are available). This type of determination should be made once sufficient data are available about PCBs concentration distributions in building material samples (e.g., after two or three years of data have been collected).

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The quantity of each priority material (Q_i) that will be used in Equation 2 is provided on the Screening Form in units of linear feet (ft) for caulk and rubber window gaskets, and square feet (ft^2) for thermal or fiberglass insulation and mastic adhesives. Conversion factors (F_i) for each priority material i were developed to provide the mass of priority material per linear foot or per square foot using Equation 3.

Equation 3. $$\boldsymbol{F_i = (D_i \times \rho_i)}$$

Where:

F_i = mass of priority material i per linear foot (of caulk or rubber window gaskets) of i (kg/ft) or mass of priority material i per square foot (of insulation or mastic) of i (kg/ft^2)

D_i = Assumed dimensions of priority material i (ft^2 or ft)

- For caulk and rubber window gaskets, this represents the assumed cross-sectional area of the caulk bead or the gasket in square feet.
- For insulation and mastic, this represents the thickness of the layer of material in feet.

ρ_i = Assumed density of priority material i (kg/ft^3)

Conversion factors that were developed for each priority building material are shown in Table 2. For caulk and rubber window gaskets, the conversion factors estimate the mass of material per linear foot (kg/ft). For thermal or fiberglass insulation and mastic adhesives, the conversion factors estimate the mass of material per square foot (kg/ft^2). Table 2 identifies typical applications for each priority material and the associated conversion factors that were developed for that application. The conversion factors are presented as a range of values and a "Best" value based on the average or mid-range value.

To develop the conversion factors shown in Table 2, data on common priority material dimensions and densities used in typical building construction were gathered through literature review, product technical specifications, building construction guidelines, and other relevant resources (Panke and Cook 1992, Scheffler and Connolly 1996, Jester 1995). The ranges of assumed dimensions and densities that were used to develop the conversion factors are shown in Table 3. Additional information on the assumptions and data used to populate Table 3 and develop the conversion factors shown in Table 2 is presented below.

Product Dimensions

Multiple construction guides were consulted to identify typical dimensions for common applications of priority materials in building construction. For caulk or rubber gaskets, Table 3 provides a range of typical heights and widths of applications around windows and doorframes, and for caulk, also between concrete expansion joints. For fiberglass or thermal insulation, Table 3 provides a range of typical thicknesses for applications used around HVAC systems, heathers, boilers, and pipes, and inside walls or crawl spaces. For mastic adhesives, Table 3 provides typical thicknesses of the material used under or between roofing material and flashing or used on surfaces between carpet and floor tiles. These dimensions apply to newly applied or installed products and may not reflect the dimensions of an aged/weathered product but represent the best information currently readily available.

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Table 2. Conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Descriptions of typical application	Material[1,2,3]	Conversion Factors				
			Range			Best (Average or mid-range value)	Units
Caulk	Around windows or window frames; around door frames	polysulfide caulk	0.009	-	0.04	0.02	kg/ft
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.01	-	0.15	0.04	kg/ft
Rubber Window Gaskets	Around windows or window frames	Butyl Rubber	0.02	-	0.06	0.03	kg/ft
Thermal or Fiberglass Insulation	Around HVAC systems/ heaters/boilers	Felt Insulation	0.09	-	2.3	0.82	kg/ft^2
		Unfaced Blanket Fiberglass	0.03	-	0.28	0.16	kg/ft^2
	Around heated transfer piping	Fiberglass Pipe Insulation	0.06	-	0.62	0.26	kg/ft^2
	Inside walls or crawl spaces	Loose Fiberglass Fill/Batting	0.17	-	0.24	0.21	kg/ft^2
		Rigid Fiberglass Foam Board	0.03	-	0.45	0.17	kg/ft^2
Adhesive Mastics	Below carpet and floor tiles	Floor Mastic	0.06	-	0.13	0.10	kg/ft^2
	On, under or between roofing materials and flashing	Roof Mastic	0.30	-	0.74	0.50	kg/ft^2

1. Panke and Cook, 1992.
2. Scheffler, M. and Connolly, J. 1996.
3. Jester, T.C. 1995.

Product Densities

The density information reported in Table 3 was gathered from readily available commercial literature on a range of reported densities for the five priority materials. Where possible, information on products that were used in the 1950s to 1980s time period and that were known to contain PCBs were used. However, because this type of product-specific information was not readily available, much of the information used to estimate typical product densities (and dimensions) was based on commercially available products that are currently in use for similar types of building and construction applications. For example, prior to 1980, polysulfide caulks and sealants were frequently formulated with PCBs and are commonly found in buildings constructed between 1950 and 1980. Although currently available polysulfide sealants do not contain PCBs, the densities of these types of sealants were used in Table 3 as reasonable approximations of the densities of polysulfide sealants used in the past. Similarly, the densities for other priority materials shown in Table 3 are primarily based on current use products that are similar to products used in the past.

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In addition to the lack of technical data on products in use during the 1950s – 1980s, there is a lack of data about the impact of age and weathering on priority material densities. Loss of volatile material will reduce product densities over time, while other weathering factors, such as compression or stretching, may increase or decrease densities over time. In an attempt to better account for age and weathering, available literature was reviewed to identify information on the densities of priority materials in construction and demolition debris and wastes. This type of information was not found on the specific priority materials of interest. However, US EPA (2016) provides estimates for the weight to volume ratios (i.e., densities) of a number of construction and demolition (C&D) waste categories. These categories include concrete, asphalt paving, roofing, wood, gypsum board, metal, rock/gravel/dirt and sand, and bulk waste. The bulk waste category is a generic catchall grouping for the remainder of C&D debris that does not fit into one of the other categories. Although the materials that are included in this generic category are not specified, the priority materials would likely all fall into the generic bulk waste category when disposed.

Therefore, in the absence of other data, the density for C&D bulk waste may be somewhat comparable to the densities of aged/weathered priority materials and can be compared to the densities of new products provided in Table 3. The average priority material densities in Table 3 range from about 1 kg/ft^3 to 40 kg/ft^3, with an average of 12 kg/ ft^3 across all priority materials. The C&D bulk waste density of 8 kg/ft^3 fits within the range of the priority material densities reported in Table 3 and is about 30% less than the average density across all priority materials. This comparison is limited because of the unknown composition of C&D bulk waste but suggests the densities in Table 3 are reasonable approximations for aged/weathered materials.

Average Conversion Factors

Use of the conversion factors shown in Table 2 requires information on the application and material type of the priority building material. It is anticipated that in some cases the available data may be incomplete or may not match the categories in Table 2. Conversion factors that are not specific to the priority building material's application or material type were therefore developed by averaging across applications/types (Table 4). When calculating the mass of PCBs removed from a demolition site, conversion factors from Tables 2 and/or 4 should be selected as appropriate given the level of information available about the associated sample(s).

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Table 3. Dimensions and densities for typical construction applications of priority materials used to develop conversion factors.

Priority Material Category	Descriptions of typical application	Material	Typical Product Dimensions (Inches)						Typical Product Density (kg/ft^3)		
			Width			Depth/Thickness					
			Low	Mid	High	Low	Mid	High	Low	Mid	High
Caulk[1,2,3,4,5]	Around windows or window frames; around door frames	polysulfide caulk	0.25	0.38	0.50	0.13	0.19	0.25		42	
	Expansion joints between concrete sections (e.g., floor segments)	polysulfide caulk	0.25	0.5	1	0.125	0.25	0.5		42	
Rubber Window Gaskets[5]	Around windows or window frames	butyl rubber	0.30	0.40	0.50	0.20	0.30	0.40		41	
Thermal/Fiberglass Insulation[5]	Around HVAC systems/ heaters/boilers	felt insulation[6]	n/a			1.0	3.0	5.0	1.1	3.3	5.4
		unfaced blanket fiberglass[7]				0.5	2.8	5		0.68	
	Around heated transfer piping	fiberglass pipe insulation[8]				1.0	2.0	3.0	0.68	1.6	2.5
	Inside walls or crawl spaces	loose fiberglass fill/batting[9]					3.5		0.59	0.70	0.82
		rigid fiberglass foam board[10]				1.0	2.5	4.0	0.32	0.84	1.4
Adhesive Mastics[5]	Below carpet and floor tiles	floor mastic[11]	n/a			0.13	0.19	0.25		6.2	
	On, under or between roofing materials and flashing	roof mastic[12]				0.13	0.19	0.25	29	32	36

1 Pfeiffer M.J., Darwin, D., 1987.
2 Panke, J.R. and John P. Cook. 1992.
3 Hammer & Hand. 2016.
4 M. Scheffler, M. and J. Connolly, J. 1996.
5 Jester, T.C. 1995.
6 Owens-Corning Thermafiber Industrial Felt
7 Owens-Corning unfaced fiber glass blanket
8 Owens-Corning fiberglass pipe insulation
9 Owens-Corning Loose fill insulation and NIST Fiberglass Batt (wall and ceiling insulation)
10 Owens-Corning Foamular Products - rigid polyurethane foam (PUR/PIR)
11 Latricrete Premium Mastic
12 Henry Company Pro-Grade Flashing Cement, Pro-Grade Plastic Cement and Pro-Grade Repair Cement

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Table 4. Average conversion factors developed to calculate the mass of each priority material per building.

Priority Material Category	Conversion Factor	Units
Caulk	0.03	kg/ft
Rubber Window Gaskets	0.03	kg/ft
Thermal/Fiberglass Insulation	0.32	kg/ft^2
Adhesive Mastics	0.30	kg/ft^2

Term 3: Average fraction of PCBs that enters MS4 due to demolition without controls

Current Basis

The average fraction of PCBs that enters the MS4 due to demolition without controls has been estimated at 0.01, based upon professional judgment (i.e., 1% of PCBs in building materials enter MS4s due to demolition without additional controls beyond standard construction site controls). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 3 (see Table 1).

The one percent value presumably incorporates losses to the environment both at the site and during disposal and recycling. Conceptually, this approach assumes that without controls, the transport and fate of the PCBs–containing materials that were in the demolished building fall within three general categories:

1. Released during the demolition (e.g., as part of an initially airborne plume of small particles) and settled in a "halo" around the site. Any wash waters used during the demolition (e.g., during cleaning of equipment, onsite or offsite) that are not fully contained and treated or disposed of could also transport PCBs–containing materials to the MS4.
2. Removed from the site and disposed of as part of the general waste stream (e.g., at a landfill), with some fraction potentially released to the environment during the handling, transport, and disposal process (e.g., during transportation of waste materials by truck to a landfill).
3. Removed from the site with recycled materials, with some fraction potentially released to the environment during the handling, transport, and recycling process (e.g., during transportation of waste materials by truck to a transfer station or recycling facility) or returned to the environment with recycled materials.

This methodology assumes that all PCBs–containing materials released into the environment via any of the above three categories eventually enter the MS4. For example, permanent storage in onsite or offsite pervious areas is assumed to be negligible. All three transport and fate categories are presumably

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incorporated into the third term of Equation 1, the average fraction of PCBs that enters MS4s due to demolition without controls.

This methodology also assumes that the effectiveness of any existing controls (e.g., proper offsite disposal of PCBs–containing materials, erosion and sediment controls, and other routine construction site controls) is incorporated into the third term of Equation 1.

Basis for Refinement

BASMAA (2018) summarized the readily available information and studies on the release of PCBs to stormwater from building materials during demolition activities. Building upon those efforts, a follow-up literature review was conducted in 2019 to identify any additional information that could be used to refine the assumed fraction of PCBs that enters MS4s due to demolition without controls in Equation 1, Term 3 (see Table 1). This literature review was also conducted to identify new information that could be used to refine Term 4 (i.e., the fraction of PCBs prevented by controls from entering MS4s). This section summarizes the literature review efforts and identifies the outcomes for Term 3. The literature review outcomes for Term 4 are presented in the next section.

Literature Review

The literature review conducted in 2019 built upon the information summarized in BASMAA (2018). The Google search engine as well as specific scientific literature databases and government websites were searched, including:

- Google Scholar
- Google Books
- SpringerLink
- Wiley Online Library
- American Chemical Society
- ScienceDirect.com
- Elsevier
- US EPA Website

Major search terms (and similar variations or combinations of these terms) that were used included the following:

- PCBs transport and fate
- PCBs in soils/stormwater/demolition/building materials/building demolition/building renovation
- PCBs in caulk/rubber window gaskets/thermal insulation/fiberglass insulation/mastic
- PCBs contaminated sites/cleanup sites/remediation sites
- PCBs in school buildings
- Remediation of PCBs in buildings/building materials
- Construction and Demolition Debris/Waste

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- Demolition dust and stormwater impacts
- Soil contamination from PCB-containing caulk/materials/buildings
- PCBs in soil after demolition
- PCB contamination from polysulfide sealants
- PCB-contaminated soil/demolition dust
- Mass of PCBs in Building materials
- Fate of PCBs in the environment/urban environment/caulk/building materials
- PCBs Source apportionment
- PCBs Waste characterization
- Accumulation rates of PCBs in soils
- PCB cleanup and disposal programs
- Managing remediation waste from PCB cleanups
- Handling and disposal of PCBs waste
- Improved recycling practices/BMP effectiveness and stormwater impacts
- PCBs sources/emissions/releases from caulk/buildings/schools
- PCBs emissions during demolition/renovation/abatement/replacement/removal of caulk
- Dust from demolition and construction sites

In addition, online searches were performed to identify any new research that had cited one or more of the studies previously described in BASMAA (2018). These citations were reviewed to identify any relevant studies that may have occurred more recently and relied upon these earlier studies.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs entering MS4s due to demolition activity without controls in Equation 1, Term 3 (see Table 1). To date, the vast majority of research on the release of PCBs contained in building materials has focused on human health risks and quantifying human exposures via air, ingestion, and/or dermal pathways. It appears the release of PCBs to stormwater from building materials in general, and specifically during demolition or renovation activities has not been quantitatively studied, outside of the limited studies reported previously in BASMAA (2018). These earlier studies developed conceptual models and thought experiments to estimate the fraction of PCBs released based on the limited measurement data available. Without new measurement data, however, further attempts to improve upon these efforts and reduce uncertainty in the current estimate of Term 3 are not warranted.

BASMAA (2018) recommends exploring whether disposal and/or recycling practices have improved in recent years such that less PCBs would be lost to the environment via these pathways. Evidence was not found during the literature review of improved recycling or disposal practices implemented in the Bay Area in recent years that would result in reduced releases of PCBs to MS4s from demolition materials.

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This finding is further supported by anecdotal information about recycling facilities in the South Bay Area. Over the past 5+ years Santa Clara Valley MRP Permittees have been investigating sources of PCBs to public ROWs in industrial areas and have frequently targeted facilities where demolition materials are brought on site for recycling. These investigations have documented poor housekeeping practices, visible scrap material and soils tracking off sites, and general lack of appropriate stormwater BMPs at many of these types of facilities which have resulted in citations during municipal stormwater inspections. Overall, these investigations have found large inconsistencies in materials handling practices across facilities, and even at the same facility over time. Although not a quantitative assessment, this information suggests that it is unlikely consistent improvements in recycling practices across facilities have occurred in recent years.

Term 4: Average fraction of PCBs prevented by new controls from entering MS4

Current Basis

The estimated fraction of PCBs prevented by new controls from entering MS4s has been estimated at 0.8, based mainly upon professional judgment (i.e., 80% of PCBs are prevented from entering MS4s due to the new programs to manage PCBs during building demolition). The MRP 2.0 Factsheet (SFBRWQCB 2015) used this value in Equation 1 for Term 4 (see Table 1).

Basis for Refinement

As described above, a review of readily available literature was conducted in 2019 to identify any new information that could be used to refine the assumed effectiveness of controls to prevent PCBs from entering MS4s (Term 4). The literature review efforts are summarized in the above section on Term 3. This section presents the outcomes of the literature review for Term 4.

Literature Review Outcomes

The 2019 literature review did not find any new information to validate, refine, or further reduce uncertainty in the assumed value that was used in the MRP 2.0 Factsheet for the fraction of PCBs prevented by new controls from entering MS4s. However, BASMAA (2018) identified two earlier studies that estimated 99% capture of PCBs contained in caulk removed from buildings using appropriate abatement measures (high power vacuums and power washing during removal). Based on these data, a reasonable assumption is that the new control programs will be similarly effective at capturing PCBs in priority materials that, prior to demolition, are removed from a building using appropriate abatement methods. Given the new programs are focused on controlling PCBs in priority materials only, the use of a lower (80%) value for the overall effectiveness of the controls at preventing PCBs from entering MS4s (Term 4) appears reasonable.

Using Data from New Program on PCBs Mass in Priority Building Materials

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs presumably removed from the building before demolition. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0

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Factsheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Equation 1 and Table 1 may be set to 1 when evaluating the PCBs load avoided using PCBs mass in priority building materials data from the new program, since it may be assumed that the program removes 100% of the priority materials with PCBs ≥ 50 ppm that were identified by the sampling protocol.

4. POTENTIAL FUTURE REFINEMENTS TO THIS METHODOLOGY

It should be noted that the new program for controlling PCBs during building demolition is in its early stages, having begun implementation only recently (i.e., on July 1, 2019). The data generated during the first fiscal year of the program have not yet been compiled and evaluated. As experience is gained in implementing the program and the associated data are collected and evaluated, and/or new information becomes available from any other source, the need may arise to revise the data collection and assessment methodology presented in this memorandum. As needed, staff from the countywide programs in the MRP area will work with MRP Permittee and Regional Water Board staff to make any future refinements to the program and methodology.

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SOLANO PERMITTEES'

Implementation Plan & Schedule to Achieve TMDL Allocations

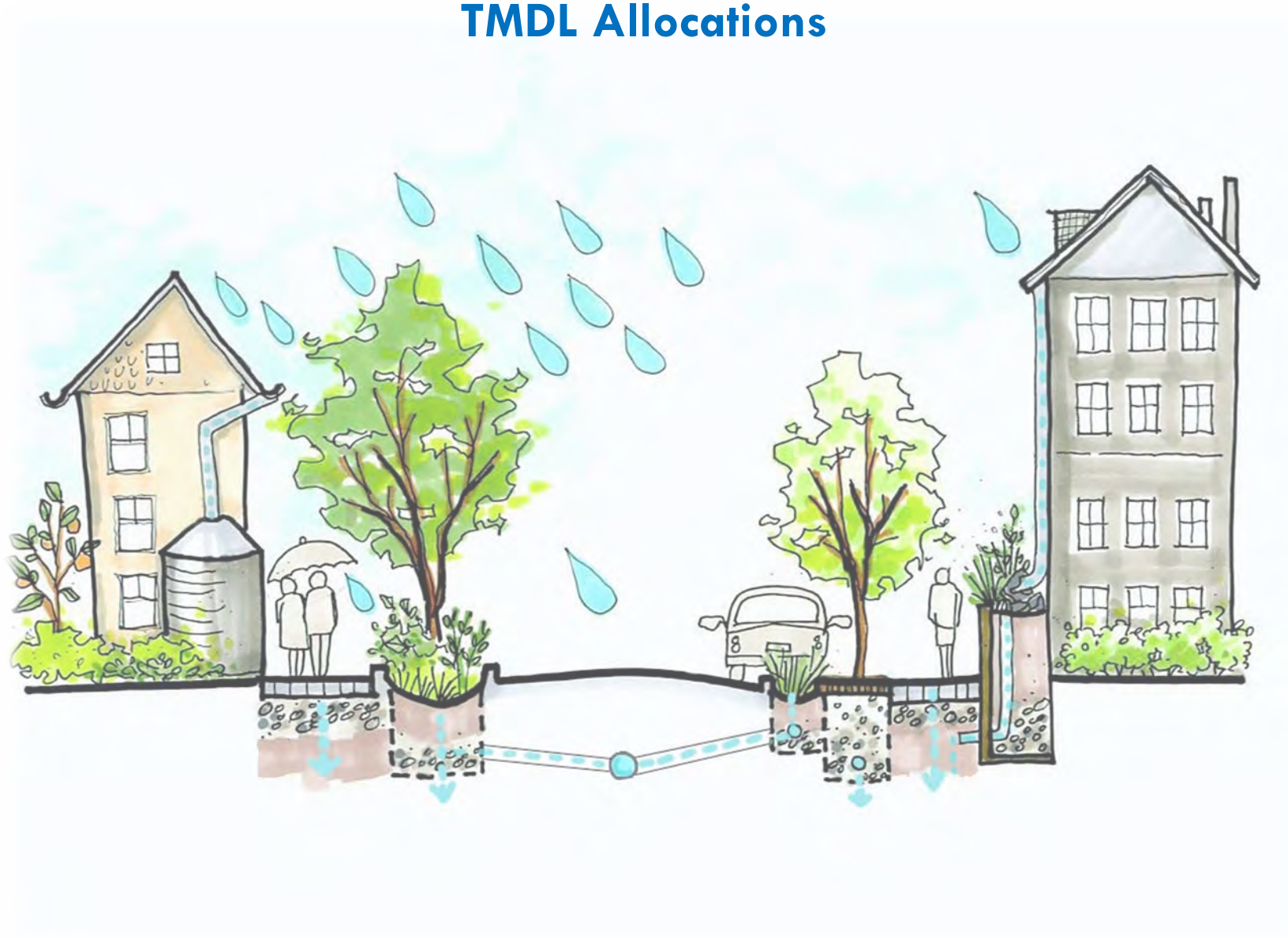

September 2020

In compliance with Provision C.11.d & C.12.d of Order R2-2015-00

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1 Executive Summary

Along with other municipalities and agencies in the Bay Area, the Solano Permittees are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP), which became effective on January 1, 2016. A section of the MRP requires Permittees to prepare a plan and schedule for PCBs and mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030 and mercury TMDL wasteload allocations by 2028 (C.11.d for mercury and C.12.d for PCBs).

This document serves to meet the MRP requirement and outlines how the cities aim to achieve the TMDL wasteload allocations. Consistent with the MRP requirements, the plan:

1. Identifies all proposed mercury and PCBs control measures to be implemented (Sections 3 and 4);
2. Includes a schedule of when mercury and PCBs control measures will be implemented (Section 4); and
3. Estimates the mercury and PCBs load reduction of the measures, as estimated through the reasonable assurance analysis (RAA) modeling, along with an evaluation of the costs, control measure efficiency and resulting significant environmental impacts (Sections 3 and 4).

Primary findings are that the Solano Permittees' estimated PCBs and mercury reductions meet wasteload allocation reduction targets specified in the MRP for 2028/2030 and 2040. While smaller than reductions associated with green stormwater infrastructure and land use redevelopment, source control reductions play an important role in attaining wasteload allocations for Solano Permittees. Source control reductions are usually largest when implemented in areas with the highest typical land use pollutant concentrations such as Mare Island in Vallejo for PCBs or Old Residential areas in Fairfield. Source control measure PCBs reduction estimates from the City of Vallejo are disproportionately large, primarily due to Old Industrial land use areas on Mare Island.

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2 Introduction and Overview

2.1 Regulatory Mandate

The Solano Permittees include the Cities of Fairfield, Suisun, and Vallejo; and the Vallejo Flood and Wastewater District. The Permittees are among 76 local government entities subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1]. The MRP mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay.

Water quality in San Francisco Bay is impaired by mercury and by polychlorinated biphenyls (PCBs). Controlling sources of these pollutants and reducing and treating stormwater flows before these pollutants enter the Bay will hasten the Bay's recovery.

2.1.1 Further Background on Mercury and PCBs in San Francisco Bay

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay from identified sources, including from urban stormwater.

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue[2]. The second objective, established to protect aquatic organisms and wildlife, applies to small fish[3] commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish[4]. To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.[5]

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[1] San Francisco Bay Regional Water Quality Control Board. 2015. Municipal Regional Stormwater Permit, Order No. R2-2015-0049. www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf.

[2] The average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans.

[3] 3-5 centimeters in length

[4] average wet weight concentration

[5] A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional

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The PCBs TMDL was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue.[6] A food web model was developed by San Francisco Estuary Institute (SFEI) to identify the sediment target concentration that would yield the fish tissue target; this sediment target was found to be 1 microgram (µg) of PCBs per kg of sediment. Twenty percent of the estimated allowable PCB external load was allocated to urban stormwater runoff. The Bay Area-wide allocation for PCBs for urban stormwater is 2 kg/yr by 2030.[7]

2.2 PCBs Sources to Urban Runoff

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame-retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to the Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

2.3 Mercury Sources to Urban Runoff

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal

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reduction in the total amount of mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations.

[6] This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day).

[7] This value was developed based on applying the required sediment concentration (1 µg/kg) to the estimated annual sediment load discharged from local tributaries.

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mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to San Francisco Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

2.4 PCBs and Mercury Potential Source Identification in Solano County

Since the early 1990's, several locations within the San Francisco Bay nearby to Solano County have been sampled by regional monitoring programs such as the San Francisco Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3) 6 system, administered by SFEI, provides access to these data which are useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. Maps presented in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. Six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire San Francisco Bay.

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3 PCBs and Mercury Source Control Measures

Qualified PCBs and Mercury source control measures are summarized below, and more complete descriptions and calculation methods are documented in BASMAA's Source Control Load Reduction Accounting for RAA (Final Draft 6-9-20), which is included as Appendix B to this plan.

Source Property Identification and Abatement. Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs or mercury were used, released, or disposed of or where sediment concentrations of PCBs or mercury are significantly elevated above urban background levels. Once a source property is identified, the source of PCBs or mercury on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the Regional Water Board or another appropriate agency for investigation and abatement.

PCBs in Building Materials Management Program. The MRP Permittees have developed a protocol for managing building materials and wastes with PCBs concentrations of 50 parts per million (ppm) or greater in applicable structures at the time demolition occurs so that PCBs do not enter the municipal storm drain system. Implementation of the protocol began July 1, 2019.

PCBs in electrical utilities management program. During the first three years of the permit term, the Permittees will develop and implement a program to manage PCBs-containing electrical utility equipment to prevent or reduce PCBs from entering the MS4. The Electrical Utilities Management Program will include improved practices and procedures for documenting removal and disposal of PCBs-containing electrical equipment, responding to unplanned PCBs releases, and monitoring and reporting requirements.

Managing PCBs in storm drain infrastructure caulk management program. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4.

Enhanced Operation and Maintenance Control Measures. Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line flushing may enhance the Permittees' ability to reduce PCBs and mercury loads in stormwater.

Trash Capture Systems. This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices

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(GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

Diversion to Publicly Owned Treatment Works. This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

Mercury load avoidance and reduction program. Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling.

Not all these control measures have been implemented by the Solano Permittees due to either limited resources or lack of evidence of source contributions. The following sections describe actions by the Solano Permittees with respect to each source control measure and provide an accounting of pollutant reductions associated with each applicable control measure.

3.1 Source Control Identification and Abatement

Solano Permittees have made no referrals of potential source properties to the Regional Water Board for abatement. During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD, 2016). The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an Old Industrial area based on historic land use. Waterfront sections of Vallejo are also considered Old Industrial and may be examined more closely in the future.

In 2016, four sites within the City of Fairfield and Suisun were investigated as part of a BMP retrofit study and showed that sediments did not contain elevated levels of PCBs (City of Fairfield, 2016). Remediation of two sites that comprised the Vallejo Manufactured Gas Plan Site PG&E in 2019 showed elevated levels of several contaminants but elevated levels of PCBs were not reported.

3.2 PCBs in electrical utilities management program

During MRP 3.0, Permittees propose to implement a new control measure program to manage the release of PCBs from oil filled electrical equipment (OFEE). Under this new program, load reductions will be credited for the following actions:

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Action 1: Permittee operated electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and during the five-year permit term, and provide data to support calculations of the associated stormwater load reductions due to these efforts;

Action 2: Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE.

In order to estimate the loads reduced since the start of the TMDL and the current (2020) PCBs loads to stormwater from PCBs-containing OFEE, the overall 65% load reduction rate shown in the McKee et al. (2006) mass balance models for the fifteen-year period between 1990 and 2005 was used as the high estimate for the load reduction rate. Reductions will be allocated regionally according to the timeframes established in the BASMAA Source Control Load Reduction Accounting for RAA Report (Appendix B).

3.3 PCBs in Building Materials Management Program

Beginning in July 2019, the MRP Permittees have developed and implemented a process for managing materials with PCBs concentrations > 50 ppm during demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled from 1950 to 1980 that undergo full-building demolition. The Solano Permittees have adopted this process and since July 2019, there have been 5 building applications, none of which had PCBs concentrations > 50 ppm. Several buildings already demolished and planned for future demolition are located on Mare Island (see Figure 3-1) which is mostly classified as Old Industrial land use, with typically high PCB concentrations.

The PCBs load reduction resulting from building materials management (R_b) is calculated as the product of the number of applicable buildings demolished each year (n), the average mass of PCBs per applicable building in kg (5), the average fraction of PCBs that enters the MS4 due to demolition without controls (0.01), and the average fraction of PCBs prevented by controls from entering the MS4 (0.8) (following methods from Appendix B).

$$R_b = n * 5 * 0.01 * 0.8$$

For calculating catchment-level reductions associated with this control measure, locations of the applicable buildings should be mapped and intersected with the previously delineated urban catchments to produce summary statistics of total PCBs reduced by catchment. As data collection on building demolition improves, Solano Permittees will use the specified BASMAA calculation method to estimate PCBs reductions from building materials management. However, to maintain consistency with other jurisdictions in this reporting period, they will rely on their fraction of the regional reduction allocation for building materials management of 2 kg, which is 100 g.

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Figure 3-1. Buildings recently demolished on Mare Island with PCBs in Building Materials Management Program in effect.

3.4 Managing PCBs in storm drain infrastructure caulk management program

Solano Permittees reported the results of an investigation into PCBs in infrastructure in their 2018 Annual Report in an attached report entitled: Evaluation of PCBs in Public Roadway and Storm Drain Infrastructure Caulk and Sealants.

3.5 Enhanced Operation and Maintenance Control Measures

Solano Permittees have implemented enhanced operations and maintenance with regard to street sweeping and storm drain inlet cleaning. Both enhanced street sweeping and enhanced inlet cleaning are calculated in a similar manner with the annual load of PCBs reduced (R_s) expressed as the product of the catchment drainage area (A), area weighted PCB yield (Y), and an enhanced efficiency factor (E) (following methods from Appendix B).

$$R_s = A * Y * E$$

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Each factor in the reductions accounting was specified according to the relevant GIS data and city maintenance records. Efficiency factors for street sweeping and inlet cleaning were specified based on a combination of factors specified in the methods detailed by BASMAA (Appendix B).

3.5.1 Street Sweeping

Drainage areas (A) were specified as the area of each urban catchment and the yield was specified based on baseline PCBs and Mercury loads calculated for each catchment (see Appendix A). In this way, the sweeping reductions match the level of spatial granularity of both the baseline modeling and reductions calculated as part of the Green Stormwater Infrastructure (GSI) RAA (Appendix A). Enhanced efficiency factors for catchments associated with sweeping were specified using outputs from the Windows Source Loading Management Model (WinSLAMM) to evaluate various scenarios associated with street roughness and sweeping frequencies. The efficiency factor varies as a function of these two factors. We combined GIS layers of municipal sweeping schedules, pavement condition index, and sweeper types to estimate sweeping efficiency levels for each catchment throughout the MS4 area per tables provided by BASMAA (Appendix B). PCBs and mercury yields used in the calculations were specific to each catchment per baseline modeling reported per GSI RAA (Appendix A). The most common combination of factors used in Solano County was intermediate street roughness with monthly sweeping frequency (see Figure 3-2). All sweepers used throughout Fairfield, Vallejo, and Suisun are either vacuum assist or regenerative air types, which aligns with the efficiency factors calculated by BASMAA (Appendix B).

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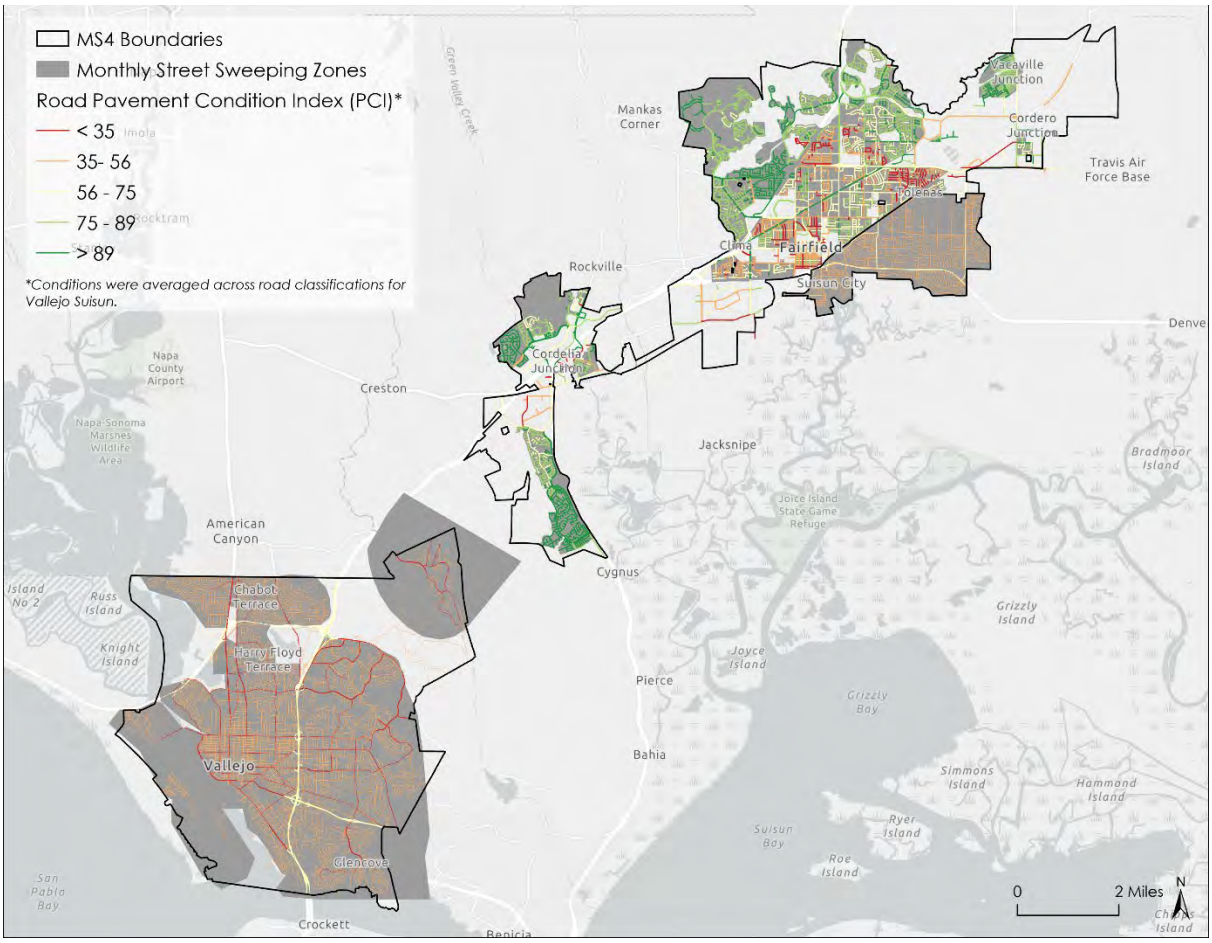

Figure 3-2. Sweeping schedules and pavement condition for Solano Permittee MS4 area.

For vacuum-assisted sweepers, based on the sweeping frequencies evaluated by BASMAA (2017b), increasing the frequency from monthly to weekly did not yield any benefits for mercury mass removal, and did not yield significant benefits for PCBs (i.e., less than 10% improvement in mass removal). A monthly sweeping frequency was therefore recommended for reducing PCBs and mercury mass (BASMAA, 2017b).

The efficiency enhancement ratio specified is relative to a no sweeping scenario since prior to the baseline year of 2005 used for this RAA, Solano Permittees did not use vacuum assist or regenerative air sweepers. While BASMAA 2017b did not evaluate the difference between mechanical broom sweepers and vacuum assist/regenerative air, these differences have been quantified in both the Lake Tahoe Basin (2NDNATURE and NHC, 2009) and the Chesapeake Bay (TetraTech, 2015), who also used WinSLAMM simulations to estimate reductions. Results show that mechanical broom sweepers provide close to zero sediment reduction benefits regardless of sweeping frequency, curb access, or pavement condition. Reductions for PCBs and Mercury calculated for each Solano Permittee cities using the appropriate parameters are shown in Table 3-1.

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Table 3-1. Estimated reductions from enhance street sweeping practices

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
52.5	63.6	15.1	66.6	2.3	8.5

3.5.2 Storm Drain Inlet Cleaning

Like sweeping reductions, catch basin drainage areas were defined by catchments, and since drainage areas to individual inlets are not mapped, the PCBs and mercury yields were assumed to be uniform throughout the catchment and that each inlet drained an equal proportion of the catchment area for purposes of spatial allocation of reductions. The enhanced efficiency factor was specified based on the frequency of inlet cleaning documented by Solano Permittees and estimated reductions reported form the literature that were summarized by BASMAA (Appendix B). A baseline control measure efficiency of 11% was estimated based on annual inlet cleaning schedules (Appendix B). We assumed this baseline efficiency to align with the 2005 baseline scenario and increases above this level to contribute to enhanced efficiency of this control measure. Biannual and quarterly cleanings are estimated to provide an enhanced efficiency of 5% above the baseline scenario of annual cleaning. The City of Vallejo provided records of additional inlet cleaning that comprised approximately 2% of their storm drain inlets. The City of Suisun cleans their inlets biannually, and the City of Fairfield cleans approximately 15% at greater than annual frequency in response to storm events. Inlet density and inspection schedules are combined in Figure 3-3 to illustrate the density of inspection frequency throughout all three cities.

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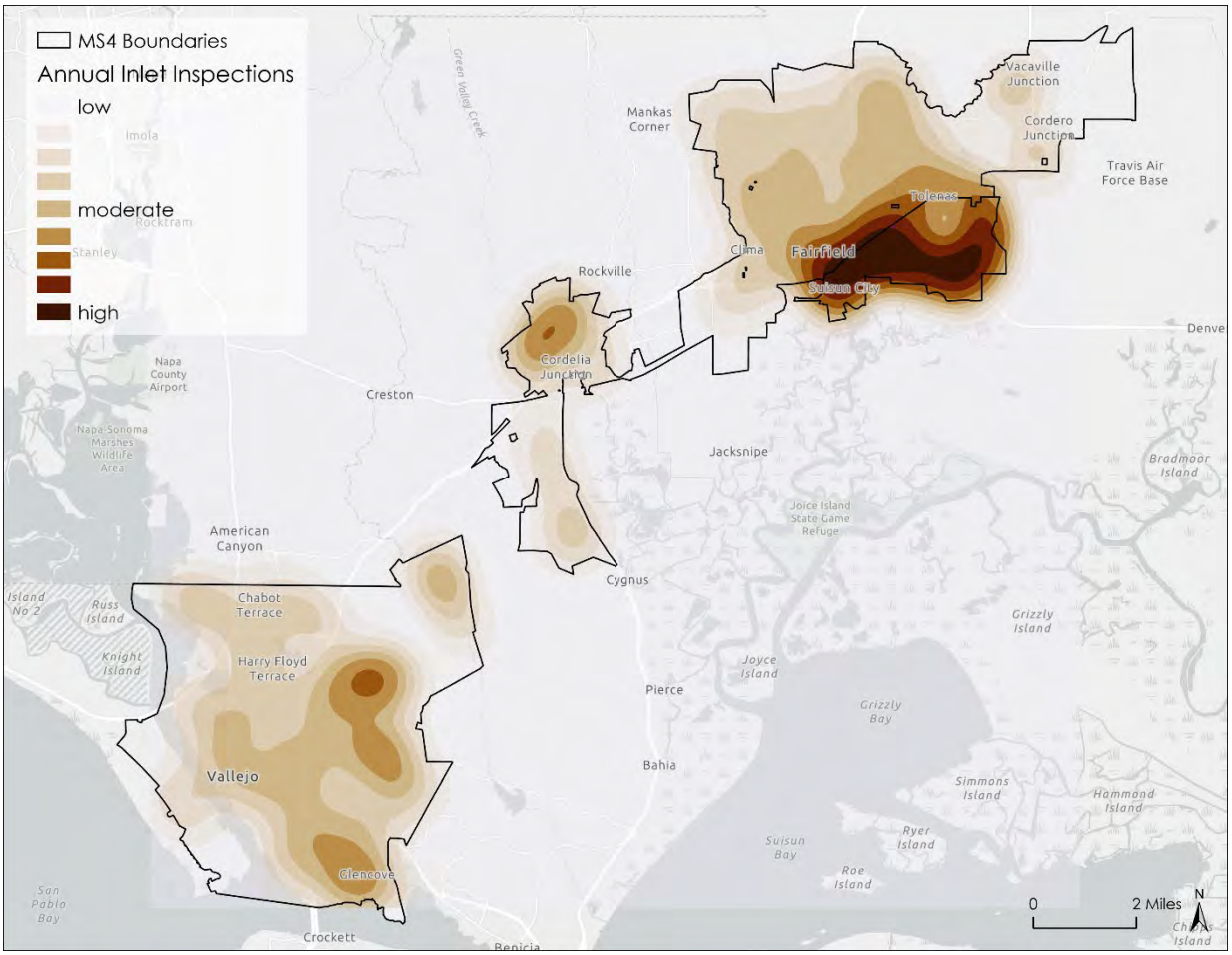

Figure 3-3. Annual inspection density based on number of inlets and inspection frequency

Storm drain inlet cleaning reductions are summarized for each city in Table 3-2. Estimated PCBs and mercury reductions resulting from the enhanced inlet cleaning efficiency show relatively small reductions due to only a small proportion of inlets being cleaned above the baseline annual frequency in Fairfield and Vallejo, which provide the largest contributing areas.

Table 3-2. Estimated reductions from enhanced storm drain inlet cleaning

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
0.5	1.0	1.0	5.2	0.8	0.1

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3.6 Trash Capture Systems

Large trash full capture devices collect sediment and debris along with trash, so they are considered a source control measure for the PCBs and mercury associated with the captured sediment. These include hydrodynamic separator units (HDS), gross solids removal devices (GSRDs), and baffle boxes. Load reductions associated with large trash capture devices (R_t) are quantified as the product of treatment drainage area (A), area-weighted yield (Y), and an efficiency factor (E).

$$R_t = P * Y * E$$

Drainage areas to large trash capture devices were joined to modeled catchment scale pollutant loads for PCBs to specify yields. Both Fairfield and Suisun include MS4 areas that drain to these large trash full capture devices (see Figure 3-4). The efficiency factor was specified at 0.20 based on CDS unit sampling data of TSS recorded in the International Stormwater BMP Database (http://bmpdatabase.org/) and independent analysis of associated PCBs and mercury fractional removal rates (Appendix B).

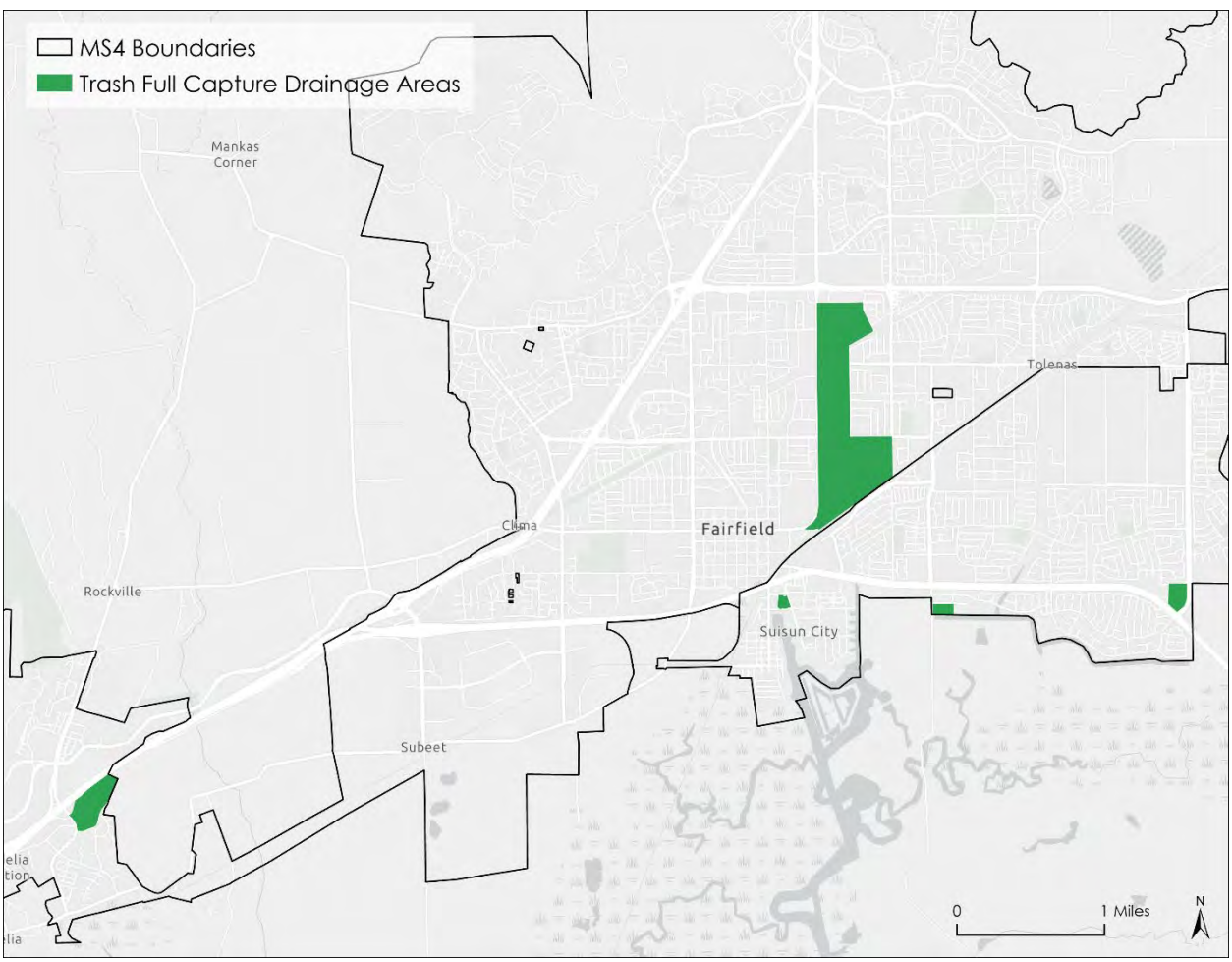

Figure 3-4. Areas draining to large full trash capture devices

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Estimated load reductions are shown in Table 3-3, with the greatest reductions for the City of Fairfield, which has the largest drainage areas routed to full capture devices.

Table 3-3. Estimated reductions from large full trash capture devices

Vallejo		Fairfield		Suisun	
PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
0.0	0.0	1.0	3.8	0.3	0.1

3.7 Diversion to Public Owned Treatment Works (POTWs)

In Solano County, the Fairfield Suisun Sewer District completed a pilot project to divert dry weather and first flush flows to POTWs. The project involved changing the operation of an existing pump station to divert stormwater from the station to the Fairfield Suisun Sewer District wastewater treatment plant. The pump station is located in the City of Fairfield just upstream from Suisun City. It serves a watershed area of approximately 6 acres all of which is zoned commercial, of which a significant portion is automotive repair. The goal of the pilot project was to comply with provision C.11/12f of the MRP by better understanding the applicability, costs, and benefits associated with this and similar projects.

Normal discharges from the State Street Pump Station were terminated in mid –June 2018. The contents of the pump stations' wet well were removed by Vactor truck and then discharged to the Fairfield Suisun Sewer District treatment plant. As dry weather runoff accumulates in the pump station, the water is removed and disposed of at the POTW. The pump station resumed its normal discharge operation settings in late September 2018. The annual reduction in loads, assuming an average volume of 2,000 gallons per year and a combined concentration of 28.3 grams per liter (based on water samples taken). The amount of PCBs being removed from the system is only 0.0002 mg. A potential added benefit of the diversion is preventing the initial flush of 2,000 gallons of water from the wet well into sloughs that ultimately reach Suisun Bay. Reducing and avoiding release of potentially stagnant water is a BMP that benefits dissolved oxygen in receiving waters. Benefits to dissolved oxygen in receiving waters can also translate to reduced mercury methylation, because the bacteria that methylate mercury thrive under low oxygen conditions. Thus, the Program continues to divert during the dry season to show good effort toward compliance with the PCBs wasteload reduction requirements in MRP-2, and because of the multiple water quality benefits achieved

3.8 Mercury Load Avoidance and Reduction Program

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and

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mercury device recycling. The Permittees coordinate local household hazardous waste (HHW) collection facilities to implement mercury collection and recycling in accordance with MRP Provisions C.11.a.i and C.11.a.ii. FSURMP Permittees collect HHW at the same regional facility in Fairfield, Solano County: Republic Services at 2901 Industrial Court, Fairfield, CA Republic Services serves the communities of Fairfield, Suisun City and parts of unincorporated Solano County. The types of data collected at this facility includes the standard Cal Recycle 303a form. However, these efforts are no longer required to be reported, but will be tracked for mercury loads reduced through implementation of mercury avoidance and reduction control measures. Reductions associated with this source control measure were not calculated in this analysis due to a lack data to reliably estimate mercury reductions.

3.9 Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) is a treatment control measure that includes new development and redevelopment projects on private and public properties regulated by Provision C.3, as well as treatment control retrofit of existing infrastructure in public right-of-way (ROW) areas and on public and private properties not subject to Provision C.3. Results of the GSI RAA analysis (Appendix A) and the Permittees' GSI Plans (2019) are summarized in Section 4, and combined with source control measures to estimate cumulative wasteload reductions.

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4 Source Control Measure Reasonable Assurance Analysis (RAA)

This goal of RAA is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet WLA targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to wasteload allocation targets.

The Solano Permittees have implemented a comprehensive approach to assessing PCBs and mercury load reductions associated with current and planned source control actions that provides articulation with the regional approach, is fully consistent with GSI RAA modeling already completed, and is amenable to ongoing tracking to assess compliance progress. Each PCB and mercury source control measure follows regionally standardized calculation methods specified by BASMAA which have been defined via various data collection and scientific efforts and documented in BASMAA (Appendix B). The modeling process is consistent with the methods defined in the BASMAA RAA Guidance (BASMAA, 2017a).

Data on control measure implementation programs was compiled and verified and control measure implementation data were incorporated into a geodatabase which uses the same spatial architecture as the GSI RAA modeling. BASMAA calculation measures were applied according to the methods described in BASMAA (Appendix B) within the GIS whenever control measure implementation included locational information to ensure that reductions associated with source controls, GSI, and land use redevelopment changes were locally consistent on a granular spatial scale. This often included using parcel-scale inputs to drive load reduction calculations. Source control measure reduction results were summarized at the urban catchment scale in maps for the Solano Permittee area and broken out by city in tables. These results were combined with the GSI reductions (reported in Appendix A) for the specified RAA future scenarios (2020, 2028/2030, 2040) to assess expected compliance with wasteload allocations for the Solano Permittees.

4.1 Study Area

The study area for the Source Control Measure RAA analysis is defined by the Solano Permittee MS4 area, which includes the cities of Fairfield, Suisun, and Vallejo only, and no outside drainage to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 4-1) since source control modeling is discrete to the MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Unlike GSI and land use redevelopment modeling, source control measures do not affect the hydrologic transport of pollutants downstream. As such, the catchment-scale hydrologic conditions represented in the baseline and GSI future scenarios (see Appendix A) are also reflected in the reduced loading calculations for comparison with wasteload allocations.

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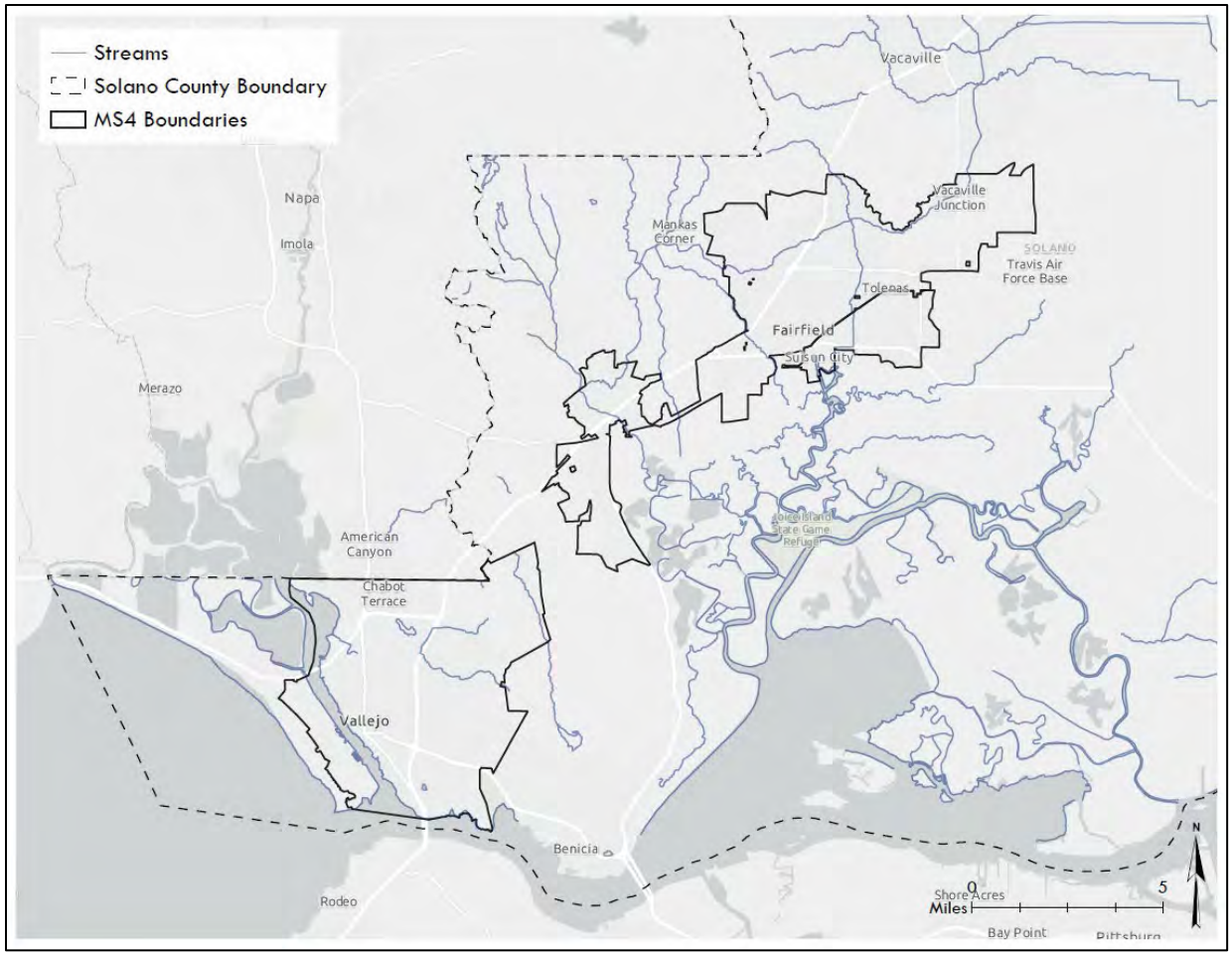

Figure 4-1. Solano Permittee MS4 Area

4.2 Refined Baseline PCB and Mercury Baseline Loads

Baseline modeling corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, they represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting wasteload allocation targets in the future. Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from the Permittes' model (swTELR) were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate was below the wasteload allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between

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swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the updated baseline loading estimates (see Appendix A).

The refined or adjusted baseline approach is common among all BASMAA program RAA modeling efforts. The approach is a technical refinement only. This aligns with the intent of the TMDL policy which directs 90% reductions in urban stormwater PCB loads and 50% reductions in urban stormwater mercury loads compared to adjusted baselines where adjustments to the original TMDL baselines are made.

4.3 Green Stormwater Infrastructure Reductions Summary

Solano Permittees have completed a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. to quantify the degree to which they expect to meet future PCBs and mercury reduction targets by implementation of GSI (Appendix A). This study was coordinated with other San Francisco Bay Area Permittees via BASMAA to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo, the Fairfield Suisun Sewer District, and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of GSI Plans, so that the outputs may inform future GSI implementation. These efforts represent a concerted, collaborative effort on the part of the Solano Permittees to determine PCBs and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

4.4 Baseline and GSI RAA Summary

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2028/2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural best management practices (BMPs) that infiltrate and treat stormwater runoff. These scenarios did not include the source control measures, summarized in Section 3. Baseline loading and reductions are summarized for each future scenario for Solano Permittees in Table 4-1, with a 61% reduction from the refined baseline load for PCBs and a 20% reduction for mercury. Reductions represent 72% of the load reduction required to meet the Solano Permittees wasteload allocation for PCBs of 110 g/yr. The GSI Plans completed by Solano Permittees outline opportunities for GSI implementation to realize the projected load reductions from GSI.

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Table 4-1. Load reduction estimate from GSI, including land use redevelopment for all Solano Permittees.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

4.5 Wasteload Allocation Compliance Demonstration

4.5.1 Combined Source Control Measure Reductions

Source control measure reductions were combined for each catchment with the Solano Permittee MS4 area using the same geospatial framework used for calculating baseline loading of PCBs and mercury as well as reductions associated with GSI. This alignment ensures that reduction estimates are internally consistent throughout the RAA process for meaningful comparisons with wasteload allocations. Spatial patterns of source control measure load reductions for PCBs throughout the Solano Permittee MS4 area are shown in Figure 4-2. The largest reductions are largely concentrated in intensively developed areas and on Mare Island, which is strongly influenced by the high degree of Old Industrial land use and associated high PCB concentrations which serve as an input to several source control measures.

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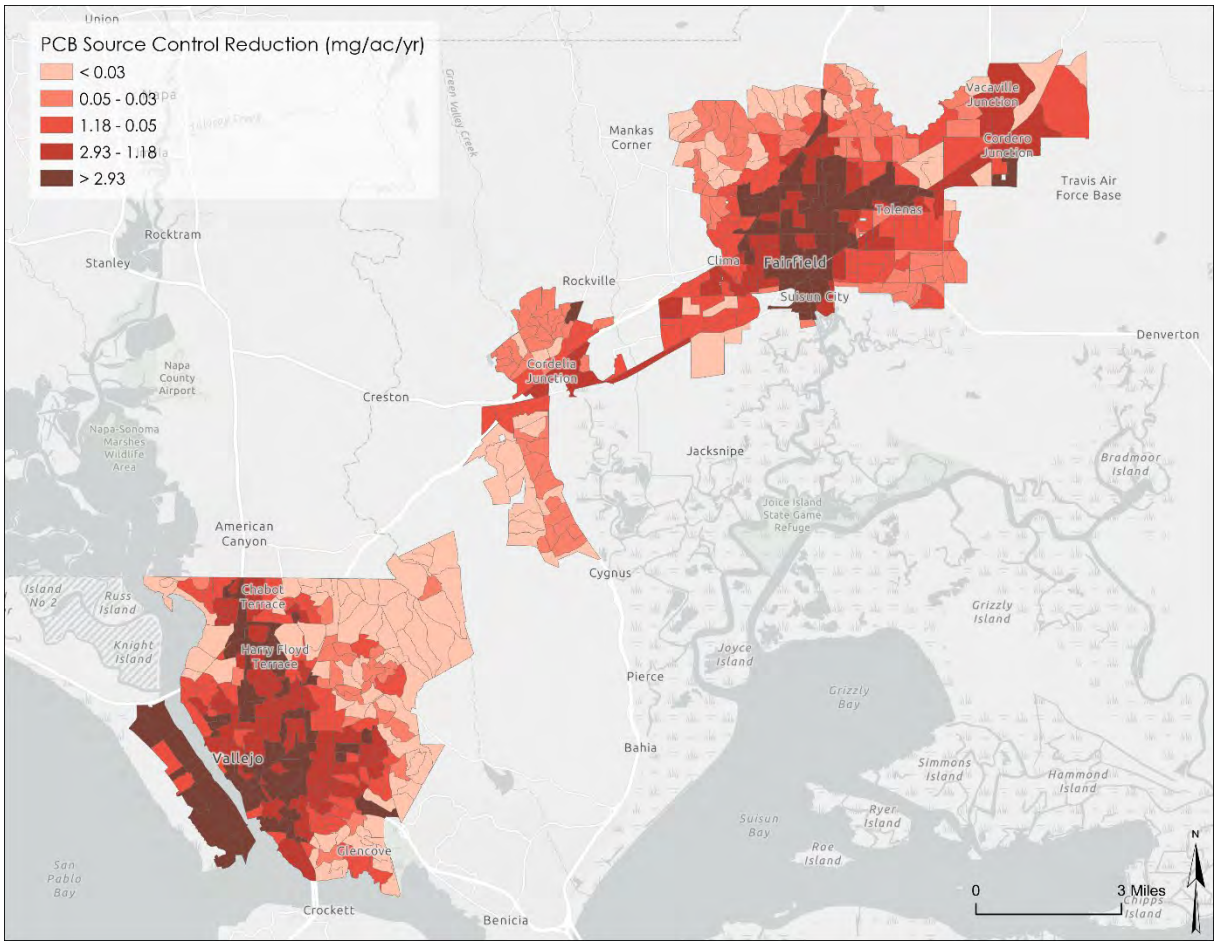

Figure 4-2. Source Control Reductions for PCBs

Mercury reductions from source control measures show a somewhat similar pattern to PCBs, with higher reductions concentrated in catchments near city centers (Figure 4-3). A notable difference is that lower relative reductions on Mare Island, which largely reflects lower variance in mercury concentrations across the land use based yields, compared to PCBs. Thus, mercury reductions more closely reflect variables associated with the control measure implementation itself, rather than levels of baseline loading.

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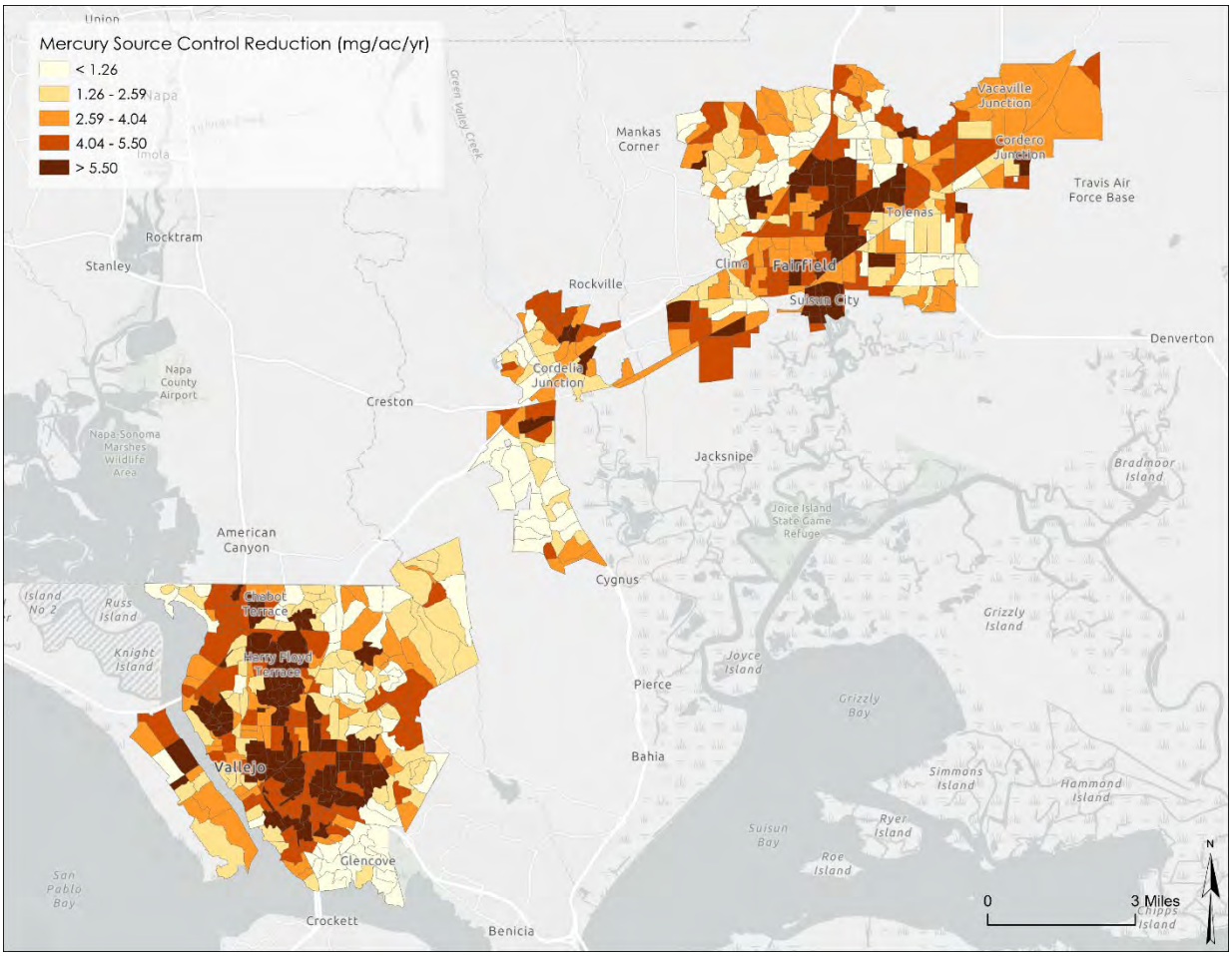

Figure 4-3. Source Control Reductions for Mercury

Source control measure reductions are summarized by city in Table 4-2. The largest reductions across all three cities for PCBs is due to building materials management (100 g/yr). For mercury, street sweeping provides the largest reductions (138.7 g/yr), while the greatest PCBs reductions are in Vallejo from and come from building materials management (120 g/yr), with street sweeping also making substantial reductions (52.5 g/yr).

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Table 4-2. Source control measure reductions summary

	Vallejo		Fairfield		Suisun		Total PCBs Reduced (g/yr)	Total Mercury Reduced (g/yr)
	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)	PCBs (g/yr)	Hg (g/yr)		
Sweeping	52.5	63.6	15.1	66.6	2.3	8.5	69.9	138.7
Inlet Cleaning	0.5	1.0	1.0	5.2	0.8	0.1	2.3	6.3
Trash Capture	0.0	0.0	1.0	3.8	0.3	0.1	1.4	3.9
Building Mat.							100	0.0
Totals	53	65	17	76	3	9	174	149

4.5.2 Projected Loading Scenarios and Comparison for Wasteload Allocation Attainment

The GSI RAA established that estimated reductions from GSI and redevelopment provided 72% of the reductions required to reach the Solano Permittees' PCBs wasteload allocation of 110g/yr by the year 2040, and that the remainder reductions would be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment (see Appendix A). Similar to the GSI RAA, reductions achieved from source control measures were applied to future loading scenarios. Per the RAA Guidance (BASMAA, 2017a), source control measure load reductions were not applied to the 2020 scenario and no new source controls were applied to the 2040 scenario. While no additional source control reductions were applied, it is reasonable to assume that source control measures implemented by 2030 will continue to 2040. The total control measure reductions were calculated as the sum of reductions resulting from projected GSI implementation, land use redevelopment, and source control measure implementation.

The spatial distribution of total PCBs loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 4-4. Note that the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A). Note that the catchment classification is unchanged from the maps presented in the GSI RAA to facilitate comparisons. In most areas, source controls provide additional PCB reductions throughout the Solano Permittee MS4 area above what were realized by GSI and land use redevelopment. City centers and Vallejo's Mare Island particularly benefit from street sweeping practices. PCB reduction benefits are disproportionately represented on Mare Island, due to the high proportion of Old Industrial land use which provides relatively high PCB yields. These outputs indicate that by 2040 all catchments on Mare Island have moved out of the highest loading category with the addition of source control measures (Figure 4-4, 2040 panel).

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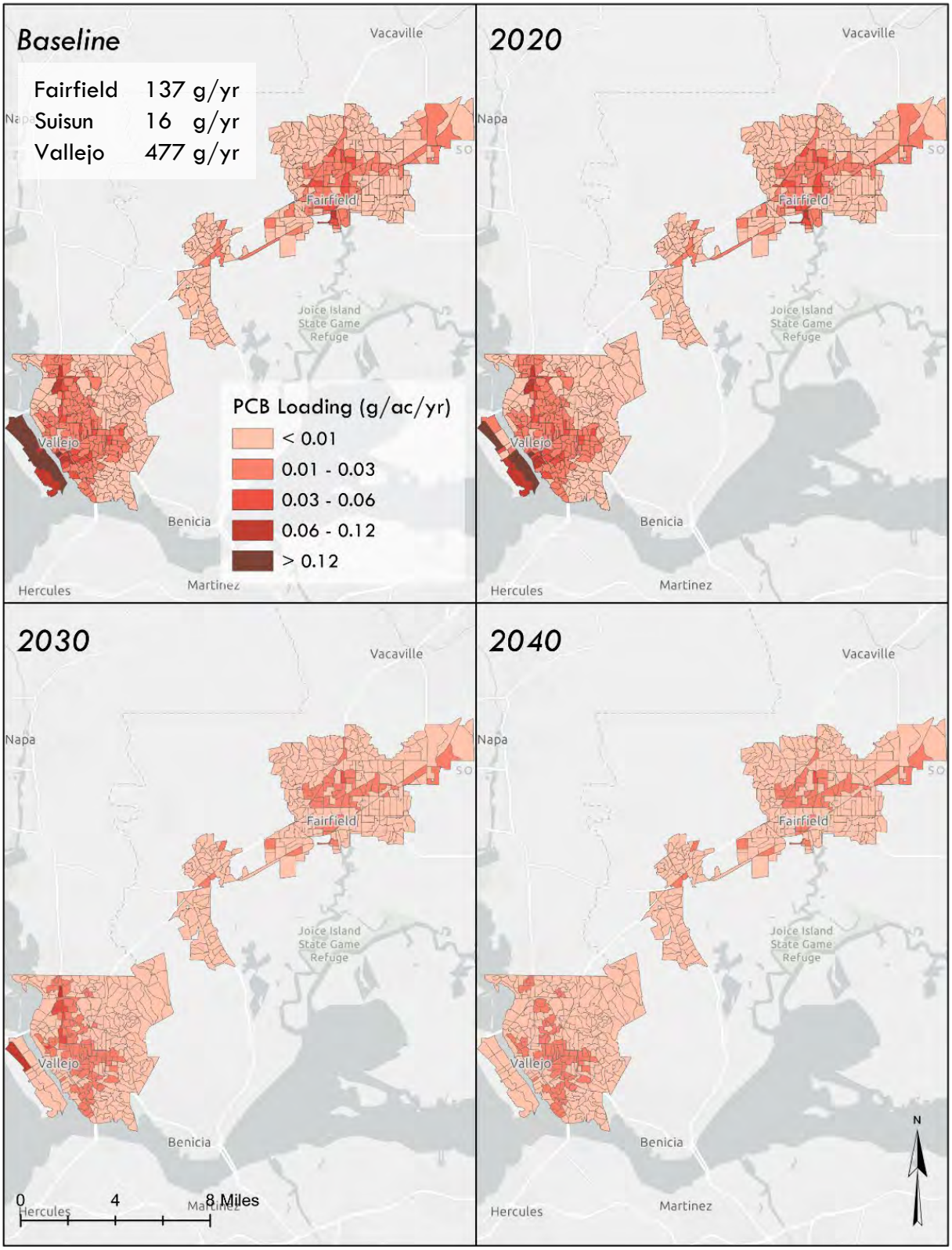

Figure 4-4. Total PCB Reductions for GSI and Source Control Measures for Future Scenarios.

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The spatial distribution of total mercury loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 4-5. Like the PCBs maps, the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A), and catchment classifications are unchanged from those presented in the GSI RAA scenarios. Source control measures provide additional mercury reductions throughout the Solano Permittee MS4 area above what were realized by GSI and redevelopment, with larger relative reductions due to source control measures versus GSI or redevelopment when compared to PCBs. This is because the calculated mercury yields are generally less sensitive to land use conversion than PCBs. The most evident change is in the 2030 and 2040 scenarios, compared to what was estimated in the GSI RAA (see Appendix A). The outputs show that several catchments in the city centers of Vallejo, Fairfield, and Suisun shift out of the highest loading categories with the implementation of control measures (Figure 4-5). In Vallejo this is largely due to building materials management, while Fairfield and Suisun benefit mostly from street sweeping in these areas but also from inlet cleaning and pollutant removal by large trash capture devices.

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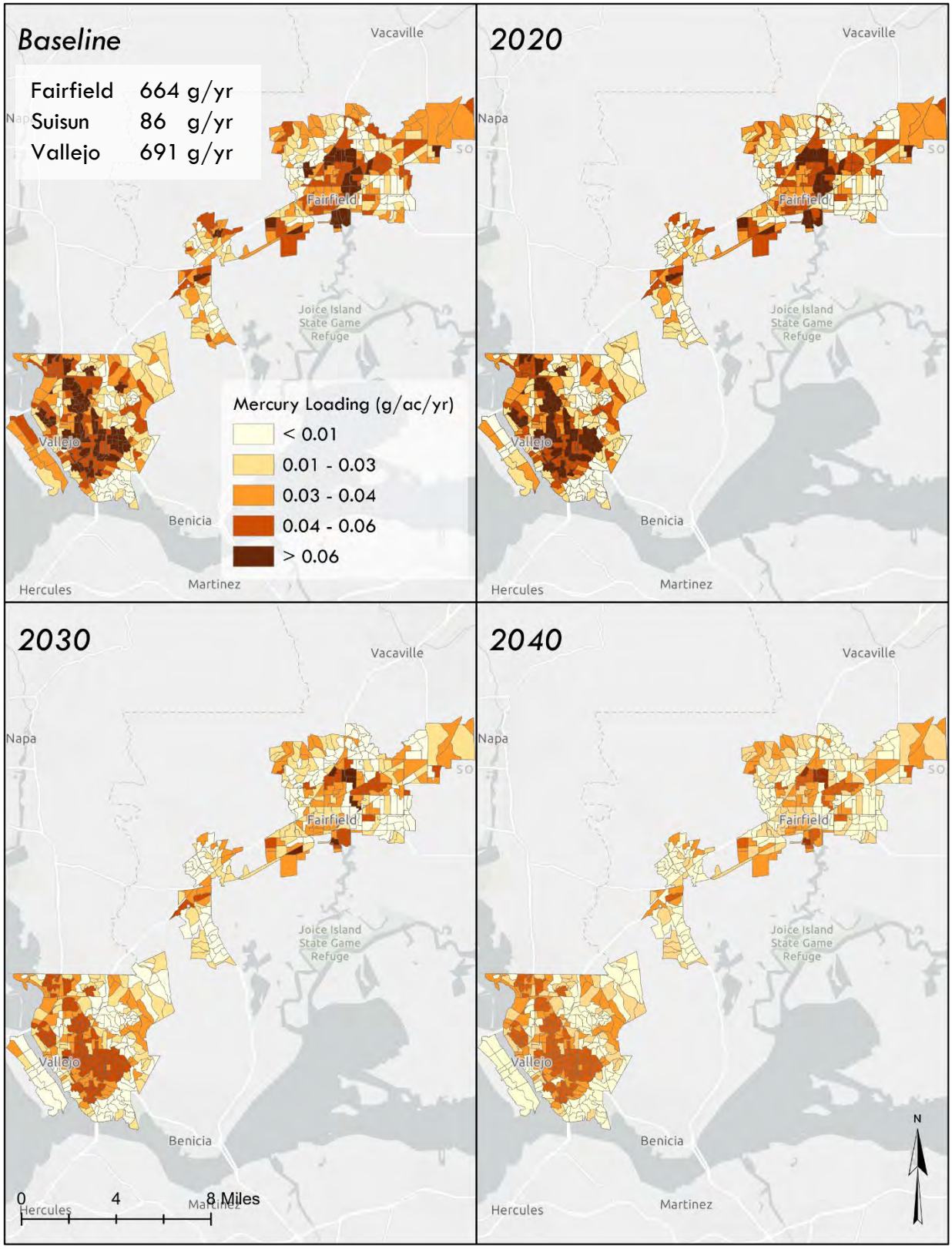

Figure 4-5. Total Mercury Reductions for GSI and Source Control Measures for Future Scenarios

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The MRP (sections C.11.d, C.12.d) requires that demonstration of wasteload allocation attainment via reasonable assurance analysis (RAA) is documented in the 2020 Annual Report. The total PCBs and mercury loading after reductions from GSI, associated land-use redevelopment, and source control measure implementation are compared to the Solano County wasteload allocation in Table 4-3. The 2040 estimated PCB GSI reductions (382 g/yr) provide Solano Permittees with a 61% reduction below baseline loading estimates, which is 72% of the required reduction to meet the Solano Permittee's wasteload allocation of 110g/yr. Table 4-3 shows that the remainder of the required PCBs reductions are projected to be achieved by source control measures by the year 2040.

Table 4-3. Wasteload allocation attainment summary.

Scenario	Baseline Loading (g/yr)		GSI Reductions (g/yr)		Source Control Reductions (g/yr)		Reduction from Baseline (%)		Waste Load Allocation (g/yr)		Allocation Attainment (%)	
	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg
2020			137	166			22%	12%				
2030	630	1,441	289	204	174	149	73%	24%		1600		100%
2040			382	295	174	149	89%	31%	110		100%	

Estimated baseline loads for mercury (1441 g/yr) were below the 2028/2030 wasteload allocation (1600 g/yr), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. It does however indicate that the Solano Permittees will meet the wasteload allocation for mercury established in the TMDL. If instead we appeal to a relative reduction metric using the refined baseline estimates, combined GSI implementation and continued source control measures result a 31% reduction from current mercury loading levels by 2040. While this appears to be short of the overall regional 50% reduction in mercury loads from urban stormwater specified in the TMDL, the shortfall is likely within the modeling error and planning uncertainties. The discrepancy between the refined baseline loads and those derived from the TMDL are likely related to population-based load allocation methods used for the TMDL, which are discussed in Appendix A.

5 Schedule and Costs

The Solano Permitees' GSI Plan (2019) identified public and private priority projects with green stormwater infrastructure potential for future implementation in 2020, 2030, and 2040. These

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projects are listed in Table 5-1 along with their pollutant removal potential, status, and planning level capital and maintenance costs.

The RAA model results predict 100% attainment of the wasteload allocations, with the existing and already planned GSI and source control measures, therefore no additional source control or GSI measures are proposed.

Conceptual-level design of several GSI projects are included in Appendix C. Pollutant load reductions from these GSI projects would provide additional pollutant load removal, above the RAA model results summarized in Table 4-3.

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Table 5-1. Public and private projects with green stormwater infrastructure potential identified for future implementation in 2020, 2030, and 2040, along with their pollutant removal potential, status, and planning level capital and maintenance costs. For future scenarios, estimated PCB and mercury reductions are after land use changes have already been applied in the model, so that these reductions only reflect a small portion of the total redevelopment reductions.

Vallejo								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Vallejo Station Phase B	2020	2.3	0.0005	0.0944	$24,000	$200,000	$36,000	$3,000
Public Safety Building Rehab and Design	2020	1.0	0.0566	0.0839	$12,000	$100,000	$18,000	$2,000
Marina Sea Wall	2020	26.7	0.0001	0.0022	$138,000	$1,150,000	$207,000	$13,000
Admiral Callaghan Widening	2020	1.7	0.0096	0.0158	$24,000	$195,000	$36,000	$3,000
Admiral Callaghan Middle Lane	2020	4.0	0.1414	0.2834	$47,000	$385,000	$70,000	$5,000
Lennar Mare Island B4	2020	25.9	0.0537	0.2447	$252,000	$2,100,000	$377,000	$24,000
Downtown Streetscape Phase 4	2030	1.2	0.0003	0.0042	$15,000	$125,000	$23,000	$2,000
Downtown Streetscape Phase 5 & 6	2030	1.2	0.0003	0.0045	$6,000	$45,000	$9,000	$1,000
Downtown Streetscape Phase 7, 8 & 9	2030	1.6	0.0004	0.0053	$18,000	$150,000	$27,000	$2,000
Sonoma Boulevard Streetscape Phase 1-3	2030	10.3	0.0025	0.0377	$89,000	$735,000	$132,000	$9,000
Sonoma Boulevard Streetscape Phase 4	2030	7.7	0.0020	0.0293	$69,000	$575,000	$104,000	$7,000
Sacramento Street Streetscape Phase 1	2030	5.1	0.0258	0.2829	$60,000	$500,000	$90,000	$6,000
Sacramento Street Streetscape Phase 2	2030	2.9	0.1213	0.2178	$30,000	$250,000	$45,000	$3,000
Sacramento Street Streetscape Phase 3	2030	7.1	0.1107	0.1797	$65,000	$540,000	$97,000	$7,000
Turner Parkway Overcrossing	2030	0.5	0.0001	0.0015	$10,000	$80,000	$15,000	$1,000
Benicia Road Bridge Replacement Project	2030	0.4	0.0001	0.0012	$11,000	$85,000	$16,000	$1,000
Fairgrounds Drive Improvements	2030	6.1	0.0374	0.0743	$65,000	$540,000	$97,000	$7,000
Sonoma Boulevard Streetscape Phase 5 & 6	2040	79.4	0.1680	0.4909	$54,000	$450,000	$81,000	$6,000

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Fairfield								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Discovery @ Gold Ridge	2030	7.5	0.0212	0.3454	$35,000	$285,000	$52,000	$4,000
Gold Hill Village 2	2019	7.9	0.0048	0.6510	$26,000	$216,000	$39,000	$3,000
Ivy Wreath/Strawberry Fields	2030	7.5	0.7714	0.2944	$32,000	$265,000	$48,000	$3,000
Paradise 360	2030	5.5	0.0060	0.0358	$24,000	$195,000	$36,000	$3,000
Villages at Fairfield- Village 1	2030	51.7	0.0018	0.0056	$161,000	$1,335,000	$240,000	$15,000
Villages at Fairfield- Village 2	2030	32.8	0.0111	0.3678	$90,000	$750,000	$135,000	$9,000
Caliber Collision	2030	1.5	0.0699	0.0897	$14,000	$115,000	$21,000	$2,000
Clorox	2030	1.0	0.0001	0.0114	$11,000	$90,000	$17,000	$2,000
Denny's Restaurant	2030	0.8	0.0002	0.0025	$8,000	$60,000	$11,000	$1,000
E&P Properties	2030	9.9	0.0018	0.0269	$49,000	$405,000	$73,000	$5,000
Fairfield/Vacaville Train Station	2030	1.0	0.0001	0.0016	$11,000	$86,000	$16,000	$1,000
Gateway 80, Buildings A & B	2030	35.9	0.1994	0.9208	$247,000	$2,055,000	$369,000	$24,000
Innova Maxwell	2030	2.6	0.0002	0.0036	$22,000	$180,000	$33,000	$3,000
Jayo Subdivision	2019	4.1	0.0002	0.0559	$32,000	$260,000	$47,000	$3,000
Jelly Belly Warehouse Expansion	2030	4.1	0.0010	0.0810	$32,000	$260,000	$47,000	$3,000
Jepson Parkway 2A	2030	1.0	0.0001	0.0189	$11,000	$87,000	$16,000	$1,000
Partnership Health 2	2030	4.4	0.0005	0.0527	$34,000	$280,000	$51,000	$4,000
Senior Manor Parking Lot	2030	1.0	0.0141	0.0178	$11,000	$87,000	$16,000	$1,000
Sheldon Oil Company	2030	1.0	0.0002	0.0493	$11,000	$87,000	$16,000	$1,000
Solano Logistics D	2030	3.5	0.0004	0.0938	$28,000	$230,000	$42,000	$3,000
Texas Corners	2030	0.7	0.0161	0.0210	$9,000	$70,000	$13,000	$1,000
Cordelia Community Park	2030	2.3	0.0006	0.2174	$51,000	$425,000	$77,000	$5,000
Fire Department Training Tower	2030	1.3	0.0958	0.1206	$17,000	$140,000	$26,000	$2,000

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Suisun								
BMP ID	RAA Model Scenario Year	Impervious Area Treated (ac)	Estimated PCB Reduction (g/yr)	Estimated Hg Reduction (g/yr)	Cost Estimate (2018, $USD)			
					Design and Permitting Fees	Construction Cost	Project Admin Costs	Annual Operation & Maintenance
Railroad Avenue Extension	2030	1.7	0.0003	0.0726	$15,000	$125,000	$23,000	$2,000

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8 Appendices

Appendix A – Final GSI RAA Modeling Report

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SOLANO PERMITTEES

Green Stormwater Infrastructure

Reasonable Assurance Analysis Modeling Report for PCBs and Mercury

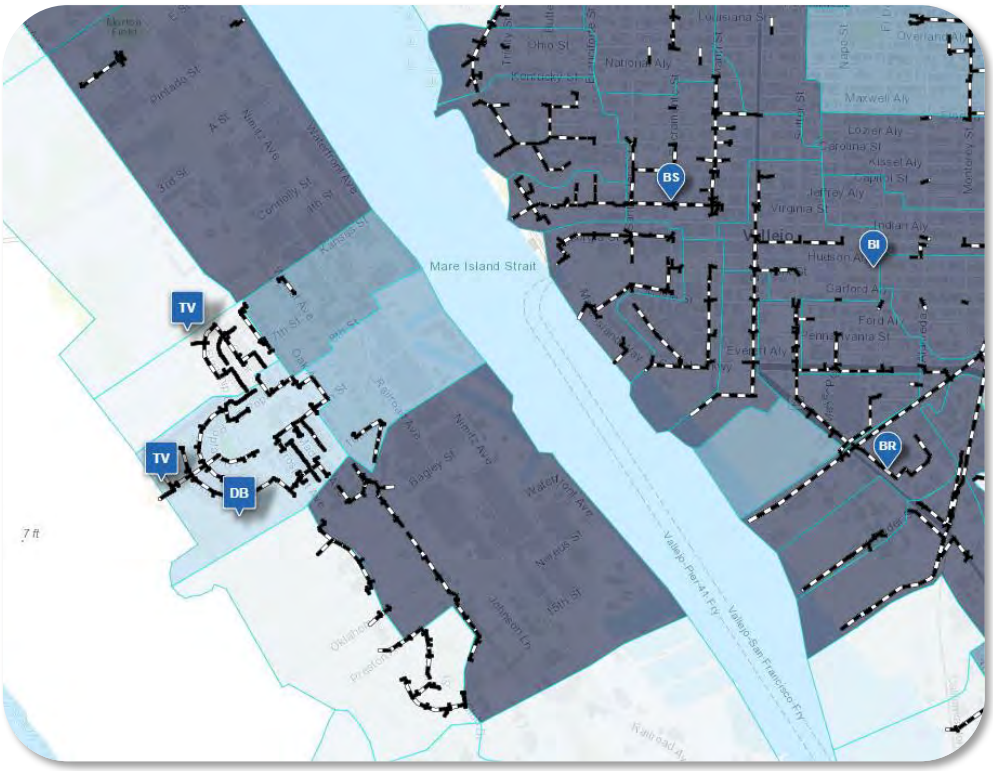

FINAL REPORT

SEPTEMBER, 2020

In compliance with Provision C.11 and C12.c of Order R2-2015

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ACRONYMS

BASMAA	Bay Area Stormwater Management Agency
BMP	Best Management Practice
C3	Refers to Provision C3 in the MRP
cBMP	Centralized BMP. Also called regional treatment measures
CN	Curve number
CRC	Characteristic runoff concentration
dBMP	Decentralized BMP, also called distributed BMPs
FSSD	Fairfield Suisun Sewer District
GI	Green Infrastructure
GIS	Geographic Information System
GSI	Green Stormwater Infrastructure
HSG	Hydrologic soil. group
LID	Low Impact Development
MRP	Municipal Regional Stormwater Permit
NLDC	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
RAA	Reasonable Assurance Analysis
RWSM	Regional Watershed Spreadsheet Model
RWQCB	Regional Water Quality Control Board
PCBs	Polychlorinated Biphenyls
SCS	Soil Conservation Service
SFEI	San Francisco Estuary Institute
swTELR	Stormwater Tool to Estimate Load Reductions
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
WLA	Waste load allocation
VFWD	Vallejo Flood and Wastewater District

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EXECUTIVE SUMMARY

This report communicates the methods and results of a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. Those provisions require Solano Permittees to quantify the degree to which they expect to meet future Polychlorinated biphenyls (PCBs) and mercury reduction targets by implementation of Green Stormwater Infrastructure (GSI). This study was coordinated with other SF Bay Area Permittees via the Bay Area Stormwater Management Agencies Association (BASMAA) to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo; the Fairfield Suisun Sewer District; and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of a Green Stormwater Infrastructure Workplan, so that the outputs may inform future GSI implementation. Thus, this report represents the result of a concerted, collaborative effort on the part of the Solano Permittees to determine PCB and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

The Solano permittees have employed a practical and proven approach for quantifying load reductions that reflects both a need to be efficient with limited resources and a commitment to transparent linkages between planned improvements and expected water quality benefits. This approach is based on outputs from the purpose-built stormwater hydrologic and pollutant loading model Stormwater Tool to Estimate Load Reductions (swTELR) reported in Beck et al. (2017), Conley et al. (2019); and Conley et al. (2020). swTELR is a scalable computational approach to quantify urban catchment-scale stormwater runoff, pollutant loading to receiving waters, and reductions from BMPs. The model provides spatially-explicit accounting of stormwater and pollutant reductions to inform more strategic stormwater management decisions with a parsimonious structure that relies strongly on the input data. This approach also makes the model easier to use and understand, lower cost, and more amenable to both field verification and updating with new information as it becomes available.

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural BMPs that infiltrate and treat stormwater runoff. These scenarios do not include source control measures, which will also contribute to TMDL wasteload allocation reductions, as these will be handled in a separate RAA study pending the completion of a regionally adopted accounting method by BASMAA scheduled to be completed in April of 2020.

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Baseline modeling (no BMPs) corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, these areas represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting WLA targets in the future (see maps below). Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from swTELR were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate from swTELR was below the wasteland allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in the veracity of swTELR outputs.

Future modeling scenarios showed that the Solano Permittees are expected to meet target GSI reductions for both PCB and mercury in the coming decades. Reductions calculated for the years 2020, 2030, and 2040 surpass the required GSI reductions by several multiples for both PCBs and mercury, primarily due to the conversion of Old Industrial/Source Area land uses to New Urban land use on Mare Island. The GSI reductions represent substantial progress towards WLA targets specified in the TMDL (SFRWQCB, 2006; SFRWQCB, 2008), with the PCB GSI reductions accounting for 72% of reductions required to achieve the Solano Permittee's 2040 PCBs WLA target (100 grams). Mercury reductions represent a 14% reduction from baseline estimates by 2028 which are already below the Solano Permittee WLA target. Large tracts of land have been acquired by private development firms and demolition, grading, and/or construction is already underway throughout Mare Island. If these redevelopment projects proceed as planned over the next two years, load reductions are expected to accelerate towards the modeled 2020 estimates. A spatial prioritization analysis was completed to identify the best parcels and road segment opportunities for additional GSI implementation, that may provide additional benefits, which will be addressed in the GSI Workplan. However, it is anticipated that already planned redevelopment projects will meet the GSI reduction targets and that source control measures will make up most of the remaining required reductions to meet WLA targets.

While the Solano Permittees are on track to achieve the pollutant reduction expectations for GSI implementation, as GSI and source control measures are implemented, new opportunities and challenges will inevitably arise, causing changes to the planned scenarios. It will be critical for Solano permittees to adopt a cost-effective and updateable tracking and accounting system so that iterative quantification of reductions can ensure that progress aligns with estimated projections. Integration of pollutant load reduction accounting with GSI data management and reporting can improve Solano Permittee stormwater program efficiency, and provide interim progress verification for ongoing assurance that pollution reduction expectations are indeed reasonable.

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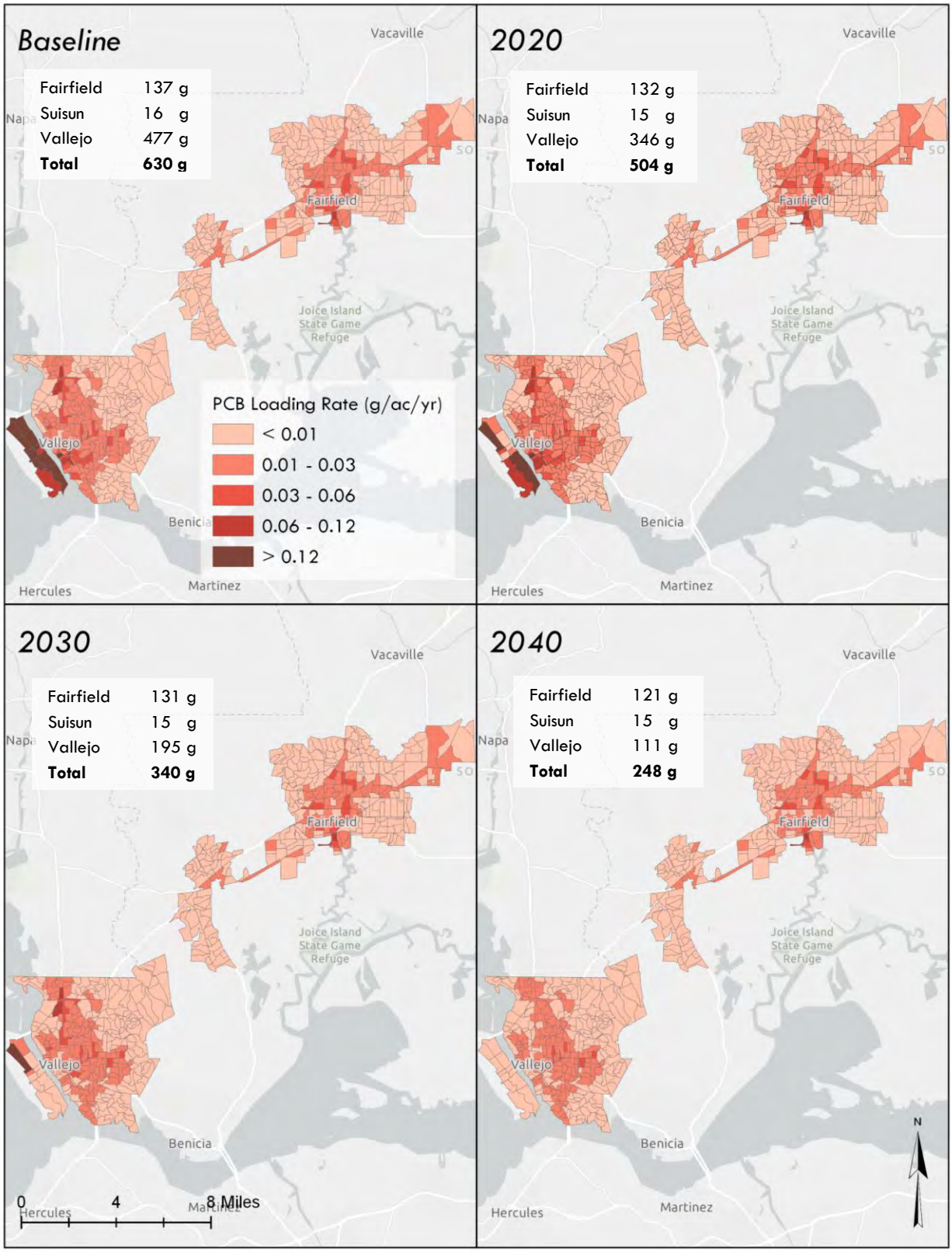

Spatial distribution of annual PCB load estimates for baseline and future scenarios

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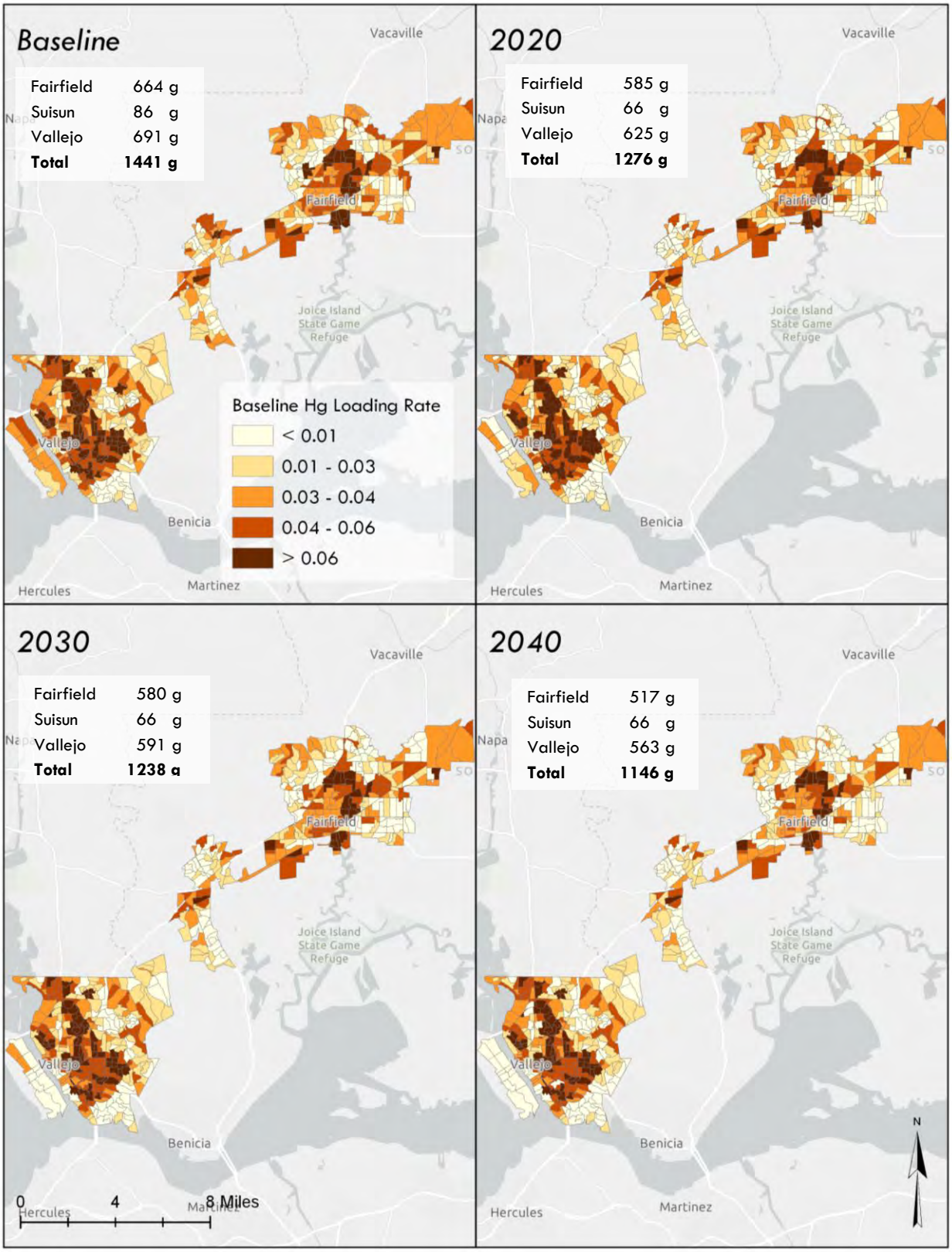

Spatial distribution of annual mercury load estimates for baseline and future scenarios

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1 Introduction

1.1 Regulatory Mandate

The Solano Permittees (City of Fairfield, City of Vallejo, and Suisun City) are subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1], and mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay. MRP Provision C.11and C.12.c requires the Solano Permittees to prepare a Reasonable Assurance Analysis, to be submitted with its Annual Report to the RWQCB due September 30, 2020.

"Green Infrastructure" (GI), also known as "Green Stormwater Infrastructure" (GSI[2]), refers to the construction and retrofit of storm drainage to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural systems to detain and treat runoff before it reaches receiving waters. Green stormwater infrastructure can be incorporated into construction on new and previously developed parcels, as well as new and rebuilt streets, roads, and other infrastructure within the public right-of-way.

Water quality in San Francisco Bay is impaired by polychlorinated biphenyls (PCBs) and mercury. Sources of these pollutants to the Bay include urban stormwater. By reducing and treating stormwater flows, GSI reduces the quantity of these pollutants entering the Bay and will hasten the Bay's recovery.

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, all Bay Area Permittees must also project the load reductions achieved via GSI by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040[3]. Of these regional 2040 reduction targets, the Solano Permittees are responsible for reductions of approximately 110 grams/year

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[1] Order R2-2015-0049

[2] Although the MRP uses the term green infrastructure (GI), the Solano Permittees prefer to use the term green *stormwater* infrastructure (GSI) for clarity. Henceforward, the term GSI will be used.

[3] Permittees shall "quantitatively demonstrate that PCBs load reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects" (C.12.c.ii.2.d) Percent of Solano Permittee load reduction is 20.8% PCBs and 16.1% mercury from BASMAA RAA Guidance Document (6/30/17).

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PCBs and 48 grams/year mercury based on current baseline estimates (Table 1.1) (see Section 4.2.4 Compliance Demonstration for details.

Table 1.1 Future GSI reduction targets for Solano Permittees from modeled baseline loading

	Scenario	GSI Reduction Target (g)*
PCBs	2020	8
	2030	58
	2040	110
Mercury	2020	2
	2028	33
	2040	48

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury)

1.2 Scope and Purpose

This RAA provides a demonstration that GSI control measures included in the Solano Permittees' GSI Plan as required by MRP Provisions C.3, C.11, and C.12, will meet the PCBs and mercury Total Maximum Daily Load (TMDL) MRP required green infrastructure reductions for urban stormwater runoff. This RAA quantifies PCB and Mercury reductions, given the type, size, number, location, and time frame of GSI control measures needed to comply with load reduction goals stated in MRP Provisions C.3.j and C.11/C.12.c. This report fulfills the MRP requirement of quantifying reductions achieved via GSI (C.11.c/C.12.c) which will be documented in the 2020 Annual Report for the Solano Permittees.

The vision for this RAA is to map a path towards achieving TMDL wasteload allocation targets (WLA) and also provide a structure for ongoing compliance demonstration. A modeling approach has been developed that is amenable to iteratively verifying runoff and pollutant load reductions as new stormwater BMPs are implemented over time. The outputs provide timely information at spatial scales that can inform implementation decisions. It creates a practical means for quantifying load reductions over time that is also amenable to direct monitoring verification at individual BMPs and urban stormwater drainage scales. This RAA analysis has been performed in conjunction with development of a Green Stormwater Infrastructure Workplan to ensure that load reduction requirements dynamically informed the identification of sites and types of green infrastructure planned in the future.

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1.3 Background and Understanding

1.3.1 PCBs and mercury Total Maximum Daily Loads

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay (a Waste Load Allocation, or WLA) from identified sources, including from urban stormwater. The urban stormwater WLA, in turn, is apportioned among MRP Permitees in proportion to population, based on the naïve assumption that PCB loadings vary in proportion to population[4]. The Solano Permittees constitute approximately 4.7% of the population total for all cities named in the MRP.

The Bay Area-wide WLA for PCBs for urban stormwater is 2 kg/yr by 2030, which is a ninety percent reduction from baseline urban stormwater loads estimated in the TMDL. The overall reduction in all external loads, including urban stormwater, was developed based on multiplying the target final sediment PCB concentration (1 µg/kg) by the estimated annual sediment load discharged from local tributaries. The target final PCB concentration in sediment was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day). The fish tissue target (10 ng/g) is translated to the sediment target (1 µg/kg) using a food web model developed by San Francisco Estuary Institute (SFEI).

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment (0.4 mg/kg or 200 µg/kg). A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of

[4] Monitoring data demonstrates that this is an oversimplified assumption, because PCB yields per unit land area are higher in some land uses (e.g., "old industrial") compared to others (e.g., "new urban"). The PCBs TMDL and resulting permit provisions allow permittees to provide alternate formulae for allocating load reduction requirements among permittees.

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mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations. These receiving water goals are translated by the TMDL into a roughly 50% mercury load reduction requirement from urban stormwater.

Because the ninety percent reduction for PCBs is more stringent than the fifty percent reduction for mercury, current implementation strategies for Bay Area stormwater programs are based on the assumption that achieving PCB WLAs will result in achieving mercury WLAs. This assumption is intended to be revisited through periodic review of progress on attainment of TMDL goals.

1.3.2 PCBs and mercury sources, transport, and distribution

1.3.2.1 *PCBs sources to urban runoff*

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers (Abbot 1993, Binational Toxics Strategy 1998 and 1999, EIP Associates 1997)[5]. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

1.3.2.2 *Mercury sources to urban runoff*

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal

[5] Review of Potential Measures to Reduce Urban Runoff Loads of PCBs to San Francisco Bay, by EOA, Inc. for Santa Clara Valley Urban Runoff Pollution Prevention Program, March2004.

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mineral product in the U.S. since about 1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to SF Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

1.3.2.3 *PCBs and mercury transport*

Conceptual model development by Mangarella et al (2010) defined the principle pathways of PCBs and mercury transport. Wind dispersal, vehicle tracking and road deposits and surface runoff from source areas were defined as the primary transport vectors for sediment-bound pollutant transport throughout the SF Bay Area. Sediments transported into the MS4 accumulate on roadways (including curbs and gutters), storm drain inlets/catch basins, stormwater pipelines, and other structures (e.g., stormwater pump stations).

1.3.2.4 *PCBs and mercury spatial patterns in the SF Bay*

McKee et al. (2015) produced multi-year synthesis of PCBs and mercury data collected by numerous researchers as part of the SF Bay Regional Monitoring Program (RMP) to directly address management questions and identify patterns across the SF Bay Area. Sediment studies in the SF Bay Area and its watersheds have consistently measured higher PCB concentrations in areas of urban development compared to regions of open space or non-urban land uses (McKee et al, 2015, Hunt et al., 1998; Daum et al., 2000; KLI, 2002; Gunther et al., 2001). Maps included in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Watersheds that have ongoing disturbances through human development or that have legacy point sources show higher water column concentrations of total mercury than other less impacted watersheds. Elevated mercury concentrations are mostly caused by a combination of mercury stored in source areas and available for transport, and greater sediment (and perhaps organic carbon) loading rates (McKee et al., 2015). Concentrations of mercury in small fish have also been investigated by the RMP (Greenfield and Jahn, 2010). In contrast to PCBs, the small fish mercury data do not strongly indicate specific areas within the SF Bay Area of particular concern.

Sequential rounds of conceptual and mass balance model development have resulted in land-use based estimates of PCB and mercury production throughout the Bay Area (McKee et al. 2006,

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Mangarella et al. 2006; 2010). These initial efforts were built upon by information extracted from BASMAA integrated monitoring reports, which used a unique land-use grouping that relied primarily on the identification of 'Old' and 'New' urban land uses. They were later used to develop the land use layer for the Regional Watershed Spreadsheet Model (RWSM), designed to estimate relative watershed-scale yields (Lent and McKee, 2011; Lent et al., 2012; McKee et al., 2014; Wu et al. 2016). McKee et al 2015 point out that a primary challenge faced in RWSM development was poor quality of the underlying land use layer and cautions that it may hamper the use of the model to smaller areas or at higher resolution.

Since the early1990's, several locations within the SF Bay nearby to Solano County have been sampled by regional monitoring programs such as the SF Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3)[6] system, administered by SFEI, provides access to these data and tools for viewing metadata. Given the nature of the sampling schedules, the mercury and PCBs data available are primarily useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. These data provide a snapshot of conditions for both PCBs and mercury at specific locations in the Bay, allow probabilistic inference over wider areas, and fulfill the objectives of specific scientific studies.

From 1993-2001 there are 28 recorded sampling sites for PCBs and mercury collected within Grizzly Bay, Suisun Bay, Carquinez Straight, nearly all of which record a single sample for each constituent. There have been 19 samples for both mercury and PCBs in water collected at one site in the Mare Island Straight as part of the RMP. There were 3 samples for PCBs in water collected at a site on Austin Creek in the NW corner of Vallejo in 2017. There are also 9 sediment sampling sites, with 1 sample at each site for both PCBs and mercury distributed throughout Vallejo Waterfront and Mare island collected in 2008. Two sites along Suisun Creek had both mercury and PCBs samples collected once in 2005 as part of the Portable Remote Sensing Image SectroMeter (PRISM) study, and one site within Suisun City had 1 mercury sample collected in 2013 as part of the Surface Waters Ambient Monitoring Program (SWAMP).

1.3.2.5 *PCBs source identification in Solano Permittee MS4s*

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis

[6] https://cd3.sfei.org/

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Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD and City of Vallejo, 2016.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. More than six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire SF Bay.

The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an old industrial area based on historic land use. Some old waterfront sections of Vallejo are also considered old industrial and may be examined more closely in the future.

1.3.3 Reasonable Assurance Analysis

Given the risk of PCB and mercury delivery to local waterways, Solano Permittees are required to an analysis to provide 'reasonable assurance' that planned GSI implementation actions are expected to result in reductions that meet MRP 2.0 targets and the TMDL. Reasonable assurance can be defined as the demonstration that the implementation of control measures will, in combination with existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet TMDL waste load allocations or other water quality targets specified in a municipal separate storm sewer system (MS4) permit (USEPA, 2017). RAAs can provide MS4 permittees with a feasibility pollutant reduction roadmap to meeting their future waste load allocations and achieve receiving water limitations. If RAAs are conducted in a way that is well aligned with long-term stormwater planning information needs, they can also be used to support tracking, evaluation, and on-going reporting of the actual progress achieved enroute to the defined regulatory milestones.

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2 Reasonable Assurance Analysis (RAA)

2.1 Approach Overview

2.1.1 RAA process

This goal of the Reasonable Assurance Analysis (RAA) is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet waste load allocation targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the green infrastructure RAA (C.11.c/C.12.c) and the wasteload allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to waste load allocation targets. This analysis includes only the RAA for green infrastructure, as the wasteload allocation attainment RAA will be documented in a separate report. By performing this RAA in parallel to development of the Green Stormwater Infrastructure Workplan, information from the RAA results were iteratively used to inform Plan development. This approach allows the Solano Permittees to efficiently integrate science-based tools with their stormwater planning processes and provide them with the power to iteratively verify outcomes and track progress over time.

The primary hypothesis addressed in this RAA can be stated as:

> The current level of GSI control measure implementation planned will result in PCBs and mercury load reductions that are sufficient to meet the reduction targets for the Solano Permittees specified in the MRP.

The experimental design is defined by a sequence of future scenarios during which the Permittee urban landscape is modified via changes in land use and impervious coverage, and implementation of GSI. If the expected changes are large enough to overwhelm the uncertainty associated with input data and the modeling process, then the primary hypothesis can be validated or rejected with a reasonable level of confidence.

The structure of this RAA draws substantially from the RAA already completed in Los Angeles County (Geosyntec, 2015). This analysis informed development of the RAA Guidance (BASMAA, 2017) that provides a process and structure for RAA in the SF Bay Area, which is reflected in the current analysis.

The RAA process involved compiling spatial data from various sources and information form Solano Permittees on levels of current and planned redevelopment, new development, and GSI implementation as inputs to several modeling scenarios. The basic steps in the RAA process were the following:

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1. Define the modeling problem and identify an appropriate model structure and scale
2. Create a geodatabase to define urban catchment characteristics and drainage
3. Estimate baseline loading conditions and current levels of GSI implementation
4. Verify baseline modeling scenario results
5. Develop future modeling scenarios that reflect the level of projected land use changes and GSI implementation.
6. Compare the estimated reductions to GSI reduction targets for each relevant time horizon
7. Use the modeling scenarios to inform a parcel-scale spatial prioritization analysis for GI implantation site identification
8. Integrate additional planned GSI projects to update modeling scenarios

2.1.2 Correspondence with RAA Guidance Document recommendations

This RAA was coordinated with other Bay Area Permittees via the Bay Area Stormwater Management Association (BASMAA). This included participation in BASMAA workgroups, document review, and aligning the methods of analysis with recommendations included in the BASMAA RAA Guidance (BASMAA, 2017). The intent of the BASMAA RAA Guidance is to maintain a degree of consistency in the way that model analyses for PCBs and mercury are performed throughout the throughout the SF Bay region.

The RAA Guidance creates a useful structure in terms of specifying the scope of the analysis, input data sets, recommended modeling approaches, and allocation of control measures to various future scenarios. Modeling natural systems always requires several subjective decisions whose appropriateness depends on the data available to support the model and the information needs required from the outputs and the model structure. The RAA Guidance attempts to standardize several of these decisions. Sparse comment is provided on others, such as spatial resolution, aligning process representation complexity to the data available, or impacts of various sources of modeling uncertainty. For example, calibration and parameter set non-uniqueness has long been widely acknowledged as one of the most important sources of output uncertainty in hydrology (see Beven, 2001, 2006), and more recently in applied stormwater quality modeling (Wijesiri and Liu, 2018).

Modeling methods for pollutant load reduction estimation employed by the Solano Permittees is generally consistent with the RAA Guidance and aligns directly with recommendations whenever appropriate. Computational methods to modelling urban stormwater hydrology and pollutant loading continue to evolve to meet the needs of stormwater programs and regulators. Modeling decisions included in this analysis are grounded in commitment to create planning tools that are practical and useful for both short and long term stormwater decisions, responsive to evolving regulatory requirements, and readily updatable with new information to empower stormwater managers to implement effective and adaptable programs.

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2.1.3 Study area

2.1.3.1 *Solano Permittee MS4 Area*

The study area for the RAA analysis includes the Solano Permittee MS4 area, that includes the cities of Fairfield, Suisun, and Vallejo only, and no areas draining to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 2.1) As such, the runoff and pollutant load modeling is discrete to these MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Since there are no long-term streamflow gauging stations downstream from the cities of Vallejo, Fairfield, and Suisun, the Permittee setting precludes calibration to observed flows. This precludes the need to incorporate additional drainage areas upstream of the Solano Permittee MS4 area in the modeling.

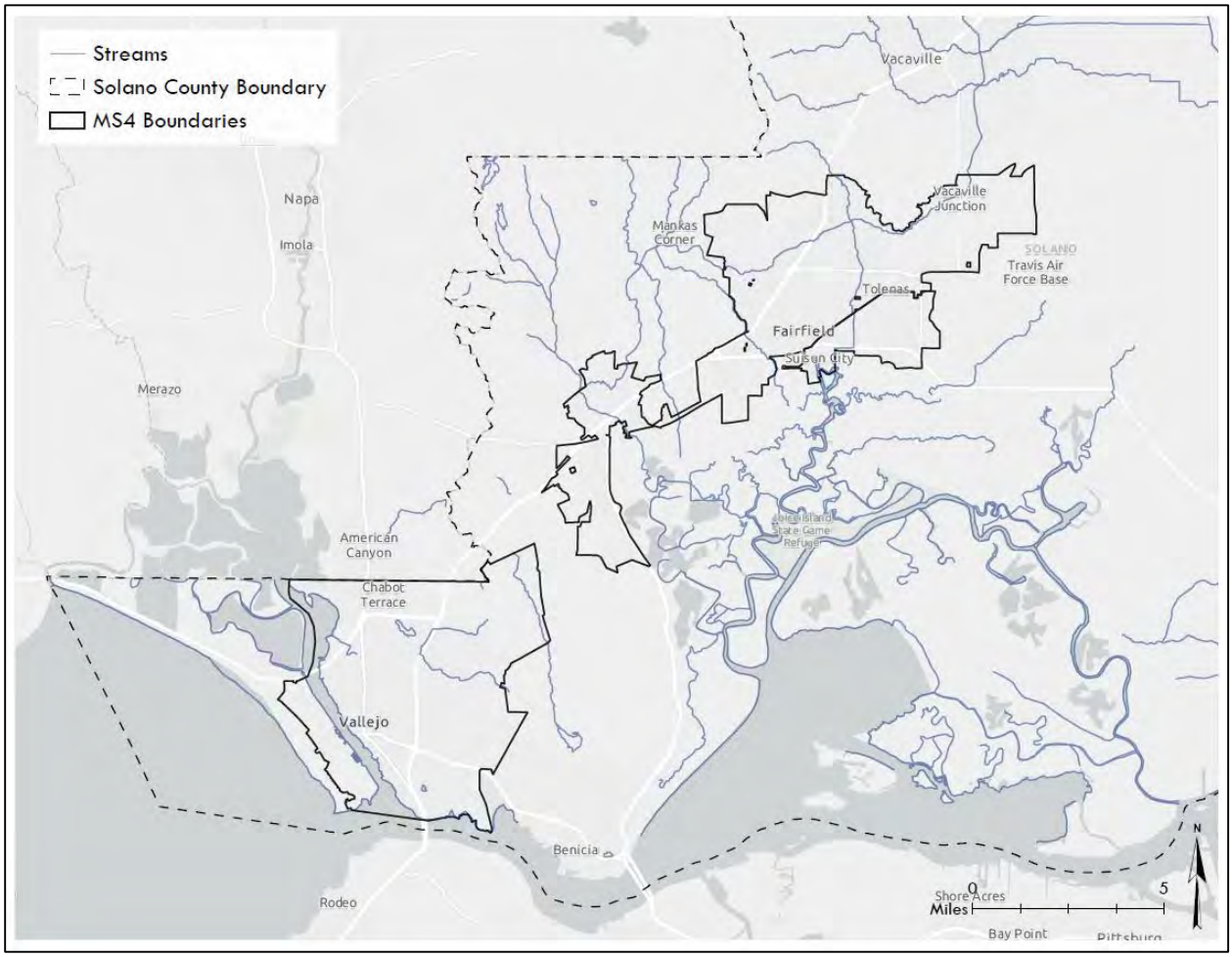

Figure 2.1. Solano Permittee MS4 Area

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2.1.3.2 *Municipal Geographies*

The City of Fairfield is located along the Interstate-80 corridor between the major metropolitan areas of San Francisco and Sacramento. Fairfield is surrounded by undeveloped grazing and grasslands, hills to the north, and wetlands to the south beyond Suisun City. Fairfield is the county seat for Solano County and consists of three main areas: Central Fairfield, Cordelia, and the Travis Air Force Base.

The City of Suisun City is in the northern San Francisco Bay Area just south of the City of Fairfield. The Suisun Marsh and additional waterways lie along the southern extent of the city. The area surrounding the city includes hills and mountains. Suisun City has a downtown historic waterfront area that is its distinguishing characteristic.

The City of Vallejo is in the northern San Francisco Bay Area between San Pablo Bay and the Carquinez Strait. The city is surrounded by waterways, wetlands, rolling hills, and open space areas. Vallejo served as the California state capital in the state's infancy, before the state seat was permanently established in Sacramento. Additionally, Mare Island was the first Naval shipyard on the West Coast. Due to the historic context of the city, Vallejo has many historic buildings. Vallejo is in a desirable development location with because of transportation links via road, rail and water. The waterfront area, Mare Island, and downtown are focal points of community development.

2.1.3.3 *Climate and Physical Geography*

Solano County is the easternmost county of the North Bay has a mild coastal Mediterranean climate, with average temperatures increasing by about 10°F from the cooler coast to hotter inland cities. The coastal city of Vallejo is influenced by its position on the northeastern shore of San Pablo Bay, but less sheltered from heatwaves than areas directly on or nearer the Pacific Ocean/Golden Gate such as San Francisco and Oakland. Nearly all the precipitation is delivered between October and May, with an average annual precipitation totals of 21 inches for Vallejo and 24.9 inches for Fairfield/Suisun.

Runoff from the City of Vallejo primarily drains to the Napa River, the Mare Island Straight, and the Carquinez straight, all of which flow to San Pablo Bay. Other receiving waters for urban runoff include American Canyon Creek, Blue Rock Springs Creek, Lake Chabot, Lake Dalwigk, Rindler Creed, Southampton Bay, Sulphur Springs Creek, and White Slough. Fairfield and Suisun both drain to a complex series to tidal marshes and Sloughs that ultimately flow to Grizzly Bay and Suisun Bay. Runoff from Northern Fairfield and Suisun flows creeks and branches of the Suisun Slough, while Southern Fairfield flows primarily to Cordelia Slough. Receiving waters include Alonzo Creek, American Canyon Creek, Dan Wilson Creek, Freeborn Creek, Green Valley Creek, Jameson Creek, Laurel Creek, Ledgewood Creek, McCoy Creek, Soda Springs Creek, and Union Creek.

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2.1.4 Conceptual Understanding of Pollutant Load Reduction Mechanisms

The computational model used in this RAA analysis follows from our conceptual understanding of urban drainage hydrology and redevelopment that includes pollutant fate and transport through the stormwater system. To represent these processes, a sequential accounting of runoff and pollutant load reductions is followed:

1. New development and redevelopment alter impervious cover, which affects runoff generation
2. Land use changes alter pollutant characteristic runoff concentrations
3. Source controls reduce pollutants available for transport
4. Rainfall is converted to runoff based on site-specific factors and mobilizes pollutants
5. Areas treated by non-structural LID measures produce less runoff, reducing on-site pollutant mobilization.
6. Decentralized BMPs infiltrate runoff near its source, reducing storm flows via infiltration and retention of pollutants.
7. Excess runoff leaves sites, moving downstream to centralized BMPs where runoff and pollutants are further reduced via infiltration, particle capture, filtration, and/or biogeochemical cycling.
8. Runoff and pollutants not infiltrated or treated by centralized BMPs flow downstream to other catchments or receiving waters.

In this model, water movement follows urban catchments delineations (approximately 100 acres) which define the hydrography of the urban landscape and serves as the primary unit of analysis for routing and connectivity to receiving waters. Urban drainages are aggregations urban catchments that represent the smallest non-arbitrary hydrographic divisions of the MS4.

While this RAA focuses only on GSI implementation, the computational model can easily be extended for the WLA RAA to include source control measure reductions in a subsequent modeling study. By separating the GSI RAA from the WLA RAA, care must be taken not to double count reductions since several source control and GSI components interact with each other. Inconsistencies would probably only become apparent when source control implementation can be defined in specific locations and modeling is performed in a spatially explicit manner as in swTELR. The modeling sequence defined above ensures a consistent accounting of reductions so that results are logically coherent.

2.1.5 Green Stormwater Infrastructure Definition

Green stormwater infrastructure are pollution control measures broadly defined in the MRP (as green infrastructure') (p.147) as:

> *"Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner*

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water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water."

This corresponds roughly with the definition provided by the EPA, which overlaps substantially with a traditional definition of Low Impact Development (LID). One difference between the two is that LID usually includes the provision that runoff is managed as close to its source as possible. The definition used in the MRP covers most structural BMPs whether they are small decentralized/distributed BMPs that receive sub-parcel scale drainage or larger centralized/regional BMPs which typically receive neighborhood-scale stormwater drainage.

2.2 Model Selection Rationale

2.2.1 Key modeling considerations and trade-offs

Since all environmental models are simplifications of much more complex systems, an important initial step is to identify the compromises that will be required. These choices are often driven by resource availability and the purpose of the model. The most salient question is: *What do we need to use the model to do?* The answer to this question can dictate much of what gets left in and what gets left out of the model, and there are costs on both sides of that proposition. The problem is often framed as a trade-off between the degree of model complexity and the data required to support that complexity to obtain outputs with a reasonable degree of certainty. Figure 2.2 shows the problem as framed by EPA in their *Guidance on the Development, Evaluation, and Application of Environmental Models* (EPA, 2009). As structural complexity increases, the framework uncertainty decreases, since more of the system detail is represented. However, complex structures require higher order parameterizations, which rely on more data to specify and verify the model, so the additional complexity tends to produce greater uncertainty associated with the underlying data. A key modeling task is to identify the best balance these two sources of uncertainty for the specific modeling purpose.

Figure 2.2 conveys the concept that if we select a relatively simple model (e.g, computing peak flows using the rational method instead of continuous simulation), then we are left wondering if over-simplification leads to false conclusions. If we adopt a more complex model (e.g, continuous simulation at fine-scale spatial resolution), we are challenged with gathering enough real world monitoring data to supply all needed model inputs, or left wondering whether assumptions about model inputs leads to false conclusions. Thus, we seek to achieve just the level of model complexity needed to reach the point of minimum overall uncertainty resulting from the combination of model framework uncertainty and data uncertainty.

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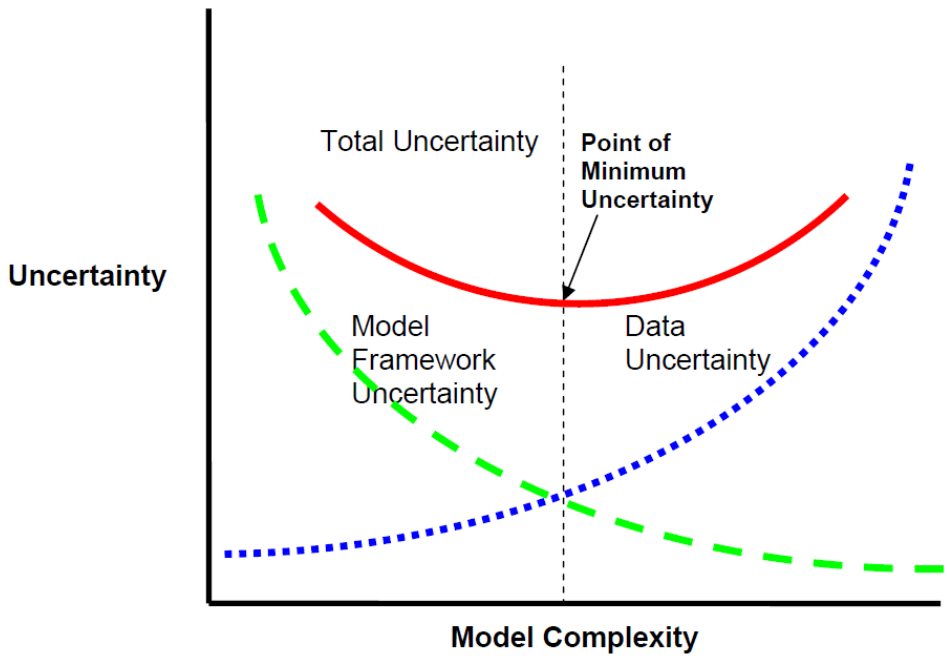

Figure 2.2. Relationship between model framework uncertainty and data uncertainty, and their combined effect on total model uncertainty (Adapted from Hanna, 1988, as presented in EPA, 2009, p.13).

In relatively complex model alternatives, there are numerous free parameters that usually require calibration, but there may be only a few input variables that contribute significantly to the outputs (Li et al. 2014). Over-parameterization, which is exceedingly common, results in a high degree of uncertainty in the model outputs due to subjective decisions required during the calibration process (Beven 1989, Beven 2001). Moreover, parameter values can vary substantially over time and space (Hossain and Imteaz 2016). Even where good hydrological data are available, they are probably only sufficient to support reliable calibration of models of very limited complexity (Jakeman and Hornberger 1993, Gaume et al. 1998). The inability to discern water quality changes over time or spatial patterns in hydrologic models is often due to poorly defined model parameters and resulting output uncertainty (Freni et al., 2011; Beven 2001, Nandakumar and Mein 1997). If the model cannot resolve the effects of management actions outside of predictive uncertainty, it is not a useful tool for estimating the water quality benefits of stormwater BMP implementation, and therefore less value to inform stormwater management decisions.

2.2.2 Aligning model specifications with management information needs

The intended use of model results should ultimately guide model selection and the necessary degree of model complexity (Leavesley et al. 2002). The least complex model that reliably meets the application at the relevant scale is often the best alternative (Chandler 1994, Rauch et al. 2002, Dotto et al. 2012). The goal of this RAA is to quantify pollutant load reductions over time associated with implantation of GSI. For stormwater planning, model selection often boils down to choice

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between a greater degree of granularity across space or detail of process representation in time. Attempting to do both is computationally expensive, resource intensive, and provides more detail than required. While detailed process representation used in continuous simulation models may improve performance over short time steps, it comes at the expense of greater structural complexity (Snowling and Kramer 2001), without necessarily increasing the usefulness of outputs (Lindenschmidt 2006).

Since stormwater impact mitigation problems invariably have an important spatial component and are typically less concerned with short-term outcomes, modeling approaches that employ parsimonious process-representation in favor of greater spatial granularity make intuitive sense. While continuous simulation models provide a better way to understand dynamics of runoff generation and timing, simpler computational approaches provide a more practical alternative for stormwater managers due to lower costs and fewer data requirements. Indeed, it was recognized long ago by the earliest developers of continuous simulation stormwater models that they would be too detailed for many users and that there is a need for a wide range of procedures for assessment of stormwater pollution control costs and priorities (Heaney et al. 1976). This is especially true when resources are limited and one primary use of the outputs is to track changes over time (e.g. Schueler 1987, Chandler 1993;1994). Simpler approaches may even provide comparable performance to more complex ones (e.g., Kokkonen and Jakeman 2001, Perrin et al. 2001, Bormann and Diekkruger 2003, Reed et al. 2004; Petrucci and Bonhomme 2014), particularly when high time resolution outputs are not required.

2.2.3 RAA modeling approach

A pragmatic approach to model development was taken that eliminates elements that do not serve the purpose of ongoing stormwater load reduction quantification. The intent was to increase model transparency, usability, and updatability, to lower costs, and limit data uncertainty. Most available stormwater modeling tools are either intended exclusively for expert users (Atchison et al. 2012), or do not provide an efficient method for modeling multiple catchments or generating spatial outputs (e.g., Rossman 2013, Tetra Tech 2011).

This RAA uses the Stormwater Tool to Estimate Load Reductions (swTELR) (Beck et al 2017), a purpose-built model with an economical structure, that provides spatially explicit outputs designed to track stormwater BMP implementation over time. Identifying the best trade-offs between complexity and data requirements were a primary driver of the model structural design. These factors were considered within the context of data and resources that are likely available to stormwater managers in the long term. A computationally efficient approach can run via the web and may be used for ongoing quantification of pollutant load reductions and iterative verification of results by non-modeling experts. In this way, it can provide a dynamic alternative for ongoing planning and compliance decades after this RAA has been completed.

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2.3 The swTELR Model

In this section we present the primary concepts and calculations used in the swTELR to perform this RAA. Additional documentation is available in Appendix A, contain sensitivity analyses, results of validation experiments, discussion of model limitations.

2.3.1 Model structure overview

swTELR is designed to have lower data input requirements than existing alternatives. Hydrologic computations combine a set of metrics that describe a 35-year rainfall distribution with well-tested algorithms from the National Resources Conservation District (NRCS Curve Number) for rainfall-runoff transformation and routing to generate average annual runoff estimates. Key inputs include spatially distributed rainfall, hydrography, soil types, land use, and impervious cover, along with BMP data. Pollutant generation is modelled via land-use based characteristic runoff concentrations (CRCs) to represent the generation, fate and transport of urban-derived pollutants. In effect, swTELR includes two parameters (CN and CRC), both of which are specified by the spatial data. The Curve Number method for runoff generation has been widely used in several watershed and stormwater models including the current iteration of EPA's Stormwater Management Model (SWMM 5).

A spatially explicit mass balance accounting method is used to quantify the runoff and pollutant reductions achieved with control measures. A hydrograph separation approach is used to quantify the water quality benefits of centralized, large-scale structural BMPs, and a simpler approach is used for small decentralized BMPs that omits accounting for flow timing. Validation experiments have shown that runoff estimation aligns closely with high-resolution monitoring data as well as results generated from more complex, well-accepted continuous simulation models (Beck et al., 2017), providing confidence that the swTELR computational approach is technically well-suited to inform stormwater planning applications.

2.3.2 Spatial and temporal scales of representation

Stormwater models vary widely in terms of how urban catchments are delineated and how landscape characteristics are discretized. swTELR employs a semi-distributed approach where runoff, loading and decentralized BMP reduction calculations happen on 30-meter grid scale (Figure 2.3), and hydrologic routing is performed at the urban catchment scale (approximately100 ac). Accounting of reductions from BMPs are spatially explicit so that the site-specific runoff generation and pollutant loading characteristics specific to the BMP drainage are preserved. Explicit of flows across grid cells features is not represented as it would be in fully distributed models (e.g. Bicknell et al. 1997, Lee et al. 2012), rather this is handled at the catchment scale.

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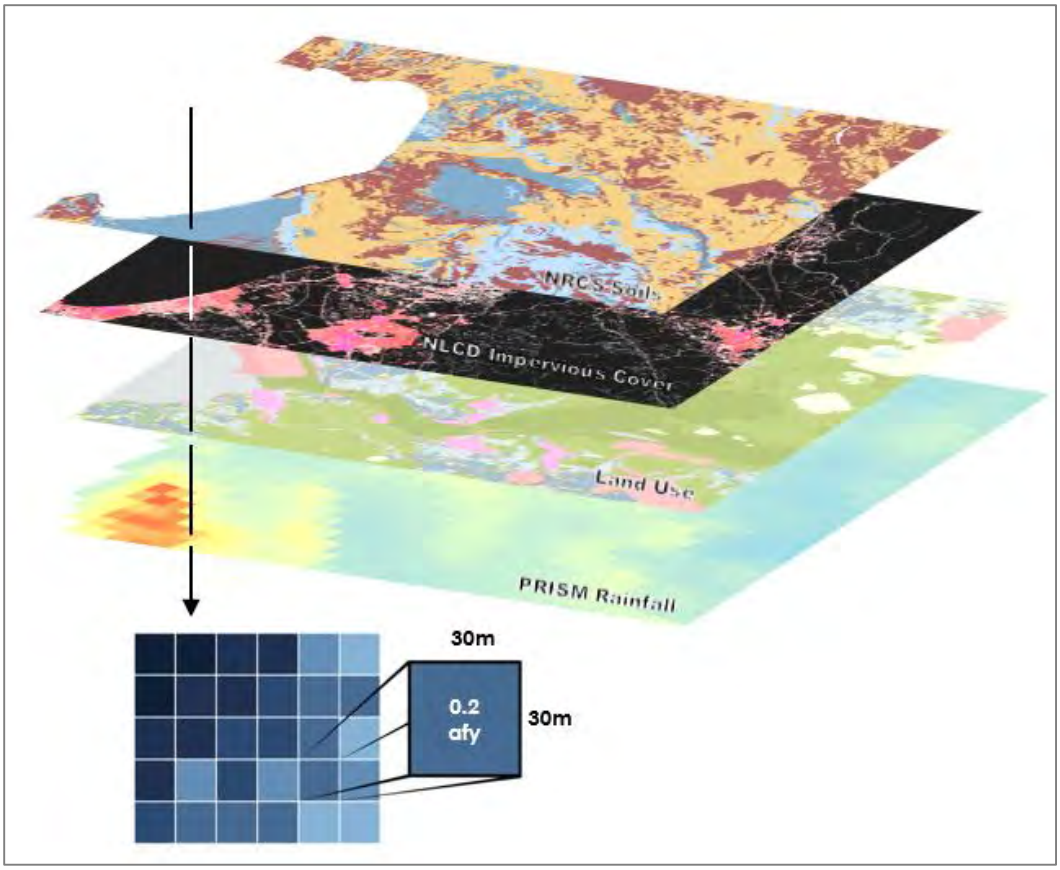

Figure 2.3. Graphical representation of raster calculations performed in swTELR to generate gridded runoff estimates.

Typically, stormwater runoff is modeled using 1 of 2 approaches: a single storm event methodology or a multi-year, high-resolution (daily or sub-daily) continuous simulation. Event-based approaches are programmatically simple but were originally designed to simulate runoff for a single storm event size (USDA 1986). Continuous simulations are generally better able to capture the dynamic range of rainfall-runoff responses by accounting for antecedent catchment moisture conditions (Harbor 1994, Bicknell 1997, Rossman 2008). swTELR employs a hybrid event-based approach that combines a set of events drawn from a long-term regional precipitation distribution to provide average annual runoff estimates. In effect, swTELR brackets the range of rainfall and runoff responses with a probabilistic approach, rather than a sequential, time-explicit approach (described in section 2.3.3).

This swTELR approach allows substantially simplified computation compared to continuous simulation, allowing substantially more spatially granular outputs that indicate precisely locations within the urban landscape that hold the greatest opportunities for runoff and pollutant load reductions. In addition, this approach avoids the model outputs being tied to a short time period, which may not capture a long-term representation of the range of event magnitudes. Given the lifespan of stormwater infrastructure is typically several decades, and the simulations included in this RAA will

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span 20 years, using a multi-decadal period to characterize rainfall seems prudent. In short, we believe that a probabilistic treatment of rainfall provides the best compromise for generating outputs that most closely align with the purpose of RAA.

2.3.2.1 *Precipitation data*

Raster-based rainfall estimates are from the PRISM Climate Group[7] at Oregon State University are used for runoff generation in swTELR, typically covering a 35-year time span. These data provide spatially distributed precipitation at 800m resolution and are processed in swTELR to provide a probabilistic description of rainfall. The extracted raster-based precipitation estimates from PRISM have been independently validated using Western Regional Climate Center (WRCC) rain gauges for 15 cities located on the California Coast.

2.3.2.2 *Soils*

The USDA Natural Resource Conservation Service (NRCS) defines four hydrologic soil groups (HSGs): A, B, C, and D. A has the largest infiltration potential and is associated with the least amount of runoff whereas HSG D has the lowest infiltration potential and is associated with the most amount of runoff. The NRCS HSGs are based on soil composition and textural properties and align with NRCS curve number values for pervious surfaces. The classification of soils is determined by the soil layer with the lowest saturated hydraulic conductivity and the depth to any layer that is impermeable or depth to a water table (if present). HSGs reflect infiltration in the subsurface at depths of up to 2 feet or greater. Bay Area soils predominantly belong to groups C and D, making infiltration slower than more permeable soils in many locations. swTELR uses spatial soils data from two sources, the NRCS SSURGO database, which offers higher resolution, and the STATSGO2 database, which provides greater coverage in some areas.

2.3.2.3 *Impervious cover*

A key input for runoff generation in swTELR is satellite-derived impervious cover derived from the Landsat satellite series (https://viewer.nationalmap.gov/launch/) and available from the USGS at 30-meter resolution. Impervious cover dramatically reduces runoff infiltration to soils and thus transforms incident rainfall to runoff at substantially higher proportions than undeveloped lands. Use of satellite imagery to estimate impervious cover has several important benefits to estimate urban runoff. Satellite impervious coverage data is widely available, regularly updated, and can be easily accessed by any municipality. The use of satellite imagery rather than on-the-ground mapping of impervious cover incorporates the urban tree canopy to estimate overall impervious area. Extensive research has documented the reductions that urban trees provide to the rainfall-runoff transformation in urban drainages (Dwyer et al., 1992; Roy et al., 2012). The 30m resolution

[7] http://prism.oregonstate.edu/

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of the Landsat data align with the other swTELR spatial inputs, making the data compilation and processing efficient.

2.3.2.4 *Catchment connectivity*

Catchment connectivity is a critical element of generating reliable estimates of average annual runoff and loading derived from an urban catchment and delivered to a receiving water. Catchment connectivity is defined as the proportion of stormwater discharging from a catchment discharge point that reaches the receiving water and is not diverted in some way. All catchment runoff and loading estimates reported from swTELR are adjusted based on the relative hydrologic connectivity of each catchment to the receiving water. MS4 mapping guidance (2NDNATURE, 2018) includes a systematic process for a user to determine the relative hydrologic connectivity of a catchment to receiving waters based on the distance, substrate and visual characteristics of the flow path that physically connect the discharge point of a specific catchment to the receiving water. Working inland from the receiving waters, all catchments that drain into another catchment inherit the same connectivity as the downstream catchment, unless there is evidence suggests that some surface volume loss occurs between the two catchments. Catchment delineation and connectivity is typically completed in coordination with city stormwater staff.

2.3.2.5 *Stormwater BMPs*

Stormwater TELR was developed to easily incorporate both structural and non-structural stormwater BMPs of various types, sizes, and applications. Stormwater BMP locations, types, and specifications are documented and typically communicated to 2NDNATURE via spreadsheets or uploaded to the swTELR web interface. An iterative process is performed to verify BMP attributes and recommend field verification where necessary. BMPs are stored within an asset management system that includes tracking, field protocols, and mobile apps for performance verification that are integrated to the stormwater model.

2.3.3 Precipitation data processing

Precipitation inputs are designed to bracket the seasonal and inter-annual variability demonstrated by historic data, defined using the PRISM dataset published by Oregon State University. We used the historic distribution of 24-hr rainfall depths (24-hr event frequencies) and the average annual number of days with measured rainfall to drive runoff generation. The 35-year (1981-2016) precipitation cumulative distribution function for each precipitation region was broken into a set of percentile values. This approach provides a way to bracket the likely event magnitudes in each region, incorporates extreme events in a manner proportional to their likelihood of occurrence, and serves to standardize the inputs from one modeling scenario to another using a small number of representative metrics.

Stormwater TELR calculates various 24-hr precipitation depths and the average annual number of days with measurable precipitation to represent the overall distribution and accurately estimate

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total average annual depths. We calculated, d, the average number of rain days per water year when daily rainfall exceeds 0.01 inches (0.25 cm) and, P(x), various 24-hr event frequency estimates, where P is the 24-hr rainfall depth for the xth percentile event. On a water year basis, we selected 24-hr event rainfall frequencies and applied the trapezoid rule to estimate the integral of the 24-hr event cumulative distribution function to obtain a long-term average 24-hr runoff volume for days when it rains. We approximated the integral using the following equation for non-uniform intervals of x:

$$\int_0^{100} P(x)\,dx \approx$$

$$\frac{1}{2}\sum_{k=1}^{N}(x_{k+1} - x_k) * (P(x_{k+1}) + P(x_k)) \qquad (2.1)$$

where x is a number between 0 and 100, and k is number in the sequence of total, N, percentile events used to estimate the integral. To obtain a long-term average annual runoff volume, P365, we multiplied the 24-hr average by the number of rain days per year, d:

$$P_{365} = d * \int P(x)dx \qquad (2.2)$$

The average annual 24-hr rainfall for days when it rains is calculated using a set of 4 percentile events that correspond with common post-construction permit requirements and structural BMP design criteria (85th and 95th percentile storm events), which also include the median and the lower quartile. Figure 2.4 shows the historic 24-hr event frequency distribution for a typical precipitation distribution and a graphical representation of how the trapezoid rule is used to estimate the long-term average 24-hr rain events. This approach has been compared with several other approaches to characterizing the long-term precipitation distributions (Beck et al. 2017).

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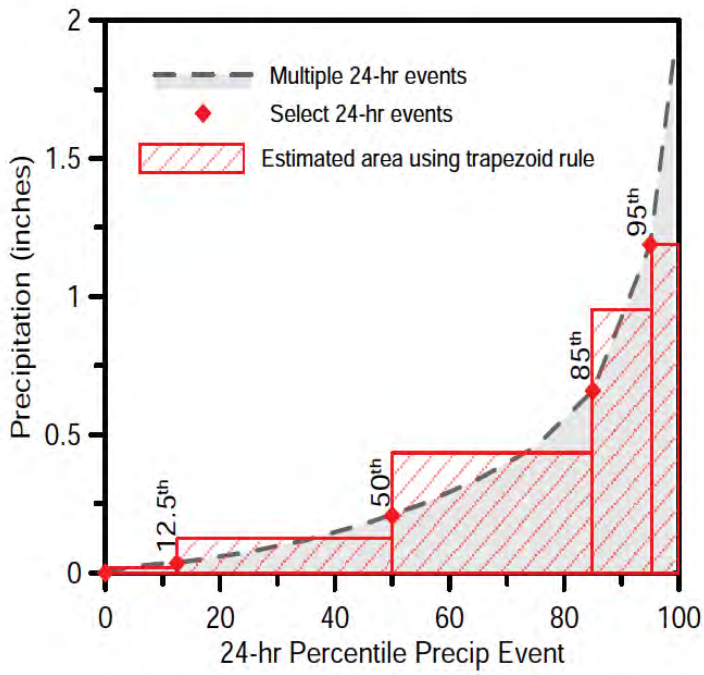

Figure 2.4. Illustration of the trapezoid method used to sum the area below the curve of the precipitation cumulative distribution function.

2.3.4 Rainfall-runoff transformation

For a given storm magnitude and duration, the runoff generation module defines the fraction of flow that infiltrates over pervious surfaces and the fraction of overland runoff that is eventually discharged to the receiving waters. Stormwater TELR relies on the Soil Conservation Service (SCS) curve number (CN) method and the approach detailed in Technical Release 55 (TR-55) to estimate runoff from small urban catchments (USDA 1986). The SCS runoff equation is:

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \tag{2.3}$$

where Q is the runoff depth, P is the 24-hr rainfall depth, S is the potential maximum retention after runoff begins, and I_a is the initial abstraction depth. The initial abstraction incorporates all losses before runoff begins, including water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. Runoff does not begin until the initial abstraction has been met. I_a is variable across the landscape but is highly correlated to the curve number. The initial abstraction is 20% of the storage,

$$I_a = 0.2S \tag{2.4}$$

and

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$$S = \frac{1000}{CN} - 10 \tag{2.5}$$

More recent data suggest that 0.20*S might be too high and that 0.05*S is more appropriate (Woodward et al. 2003, Lim et al. 2006, Shi et al. 2009) especially for hydrologic soil groups C and D (Jiang 2001). If 5%, rather than 20%, is used, S must also be modified. The relationship between $S_{0.05}$ and $S_{0.20}$ obtained from model fitting results is (Lim et al. 2006, Hawkins et al. 2002)

$$S_{0.05} = 1.33 * {S_{0.20}}^{1.15} \tag{2.6}$$

We used the adjusted initial abstraction ratio (equation 6) and by substituting equation 4, modified for 5% of storage, into equation 3, we obtain

$$Q = \frac{(P - 0.05S_{0.05})^2}{P + 0.95S_{0.05}} \tag{2.7}$$

Curve numbers range from 30 to 98 and lower numbers indicate low potential runoff whereas higher numbers indicate increasing runoff potential. The major factors that determine SCS curve numbers are the soil type, the land use (specifically, the percent impervious of the land use), the hydrologic condition and soil infiltration capability. To simply account for variations in soil permeability and infiltration, the NRCS has classified soils into 4 hydrologic soil groups (HSGs). A curve number for a given land use with impervious area can be estimated by the following (USDA 1986):

$$CN_c = CN_p + \frac{P_{imp}}{100}(98 - CN_p) \tag{2.8}$$

where CN_c is the runoff curve number for the entire land use, CN_p is the pervious runoff curve number and P_{imp} is the percent imperviousness. The pervious curve numbers used are those defined for open space in poor condition (grass cover < 50%) (USDA, 1986), since urban soils are often disturbed or compacted, and are listed in Table 2.1.

Table 2.1. Urban pervious curve numbers used in swTELR (USDA, 1986)

Soil Type	A	B	C	D
Curve Number	68	79	86	89

The model generates discrete runoff outputs which mirror the 24-hr event percentile precipitation inputs. Using equations 1 and 2, we replaced the rainfall $P(x)$ with runoff $R(x)$, where R is the runoff calculated by the approach described above for a set of 24-hr rainfall events. Similar to the calculation described for the rainfall, the trapezoid rule is applied to the xth percentile event which

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are summed to approximate the area under the probability distribution function and obtain the average annual runoff.

Antecedent runoff conditions are a critical component to accurately determining runoff and the SCS curve numbers originally incorporated average antecedent runoff conditions (USDA 1986). The ability of continuous models to represent varying catchment moisture condition is a distinct advantage over event-based models. Recent studies have shown the importance of adjusting CNs based on antecedent runoff conditions (Bhaduri et al. 2000, Michel et al. 2005). Because swTELR was developed to estimate long-term average annual runoff conditions, we do not adjust the CNs and assume average antecedent runoff conditions for all simulations.

2.3.5 Pollutant loading

Urban pollutant modeling approaches commonly estimate pollutant loading at the land use spatial scale and use a variety of approaches to determine the associated land use characteristic pollutant concentrations. Algorithms to represent pollutant build-up and wash-off over time are common in continuous simulation models (Freni et al., 2009; 2011; Mannina and Viviani, 2010; Hossain and Imteaz, 2016), which has been shown to improve pollutant modeling performance in some cases (Wang et al., 2011). However, optimal parameters for these calculations are difficult to identify with precision or validate with sampling (Freni et al., 2009). While Monte Carlo sampling of the parameter space can improve parameter identifiability (Strecker et al., 1990; Wagener and Kollat 2007; Freni et al., 2011), high degrees of uncertainty in model outputs remain (Petrucci and Bonhomme, 2014). Further, other researchers have found that pollutant accumulation and generation on event time scales is extremely difficult to predict and that similar seasonal or annual results could be obtained using constant concentrations (Sage et al., 2015).

Since pollutant loads are strongly dependent upon runoff volumes at longer time scales, attempting to capture the short-term variability in pollutant concentrations is less important for swTELR's application. Using static runoff concentrations for different land-uses was identified as the best approach. Stormwater TELR calculates pollutant loads as the product the stormwater volume and a pollutant concentration. This approach ignores the event-specific dynamics that depend on rainfall duration and intensity that have been linked to variations in pollutant concentrations throughout an event. However, at the average annual scale, these effects are substantially less important on catchment loads than the catchment inputs and runoff volumes for explaining pollutant loads (Lee and Bang, 2000; Brezonik and Statelmann, 2002).

Annual pollutant loading (L) is calculated for each grid cell, (Lg) as the product of the average annual land use runoff Qa, and the land use specific characteristic pollutant runoff concentration [p] (mg/L) for that grid cell, with proper unit conversions.

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$$L_g = Q_a * [p]_{LU} \quad (2.9)$$

Annual catchment pollutant load (L) is the sum of the grid cells within that catchment,

$$L_c = L_{g1} + L_{g2} \ldots + L_{gi} \quad (2.10)$$

where i is the total number of grid cells in the catchment. Pollutant load estimates can be compared within and across municipalities by normalizing by the catchment size, A, to obtain an average annual loading rate, $\{La\}$,

$$\{L_a\} = L_c/A \quad (2.11)$$

2.3.6 Pollutant association with sediments

Urban pollutant load reductions calculated in swTELR for PCBs and mercury correspond to BMP reduction efficiencies associated with sediment removal, often measured as total suspended solids (TSS) or Suspended Sediment Concentration (SSC) reductions. Like many other uban pollutants, PCBs and mercury are both strongly hydrophobic and have a tendency to adsorb to particulates. Pollutants such as metals are often bound to particulate matter in runoff (Loganathan et al., 2013; Chen and Chang, 2014; Herngren et al., 2005; Sartor et al., 1972; Kayhanian et al., 2012). Strong correlations have been observed between particulates measures and total organic carbon, nutrients, heavy metals, oil and grease (Kayhanian et al., 2012; Nasrabadi et al., 2016) polycyclic aromatic hydrocarbons (PAHs) (Rugner et al., 2013), and Bacteria (Stein et al., 2007).

We expect sediment reduction in BMPs to be a useful proxy for most conservative constituents such as PCBs and mercury. PCBs are mostly found in a particulate phase, are associated with coarse-grained particles, and behave like sediment particles. Previous studies in heavily urbanized watersheds have found more than 75% to 100% of the total PCB load was associated with the particulate phase (Ko and Baker, 2004; Bressy et al. 2012). In the SF Bay Area, Gilbreath et al (2012) also noted a strong association of high turbidity levels and elevated PCB concentrations.

Yee and Mckee (2010) found that 55% of PCB particles in stormwater settled out within 30 minutes, and concluded that PCB behaved very much like a sediment particle, and that effective settling of moderate to larger sediment particles was capable of achieving a minimum 50% PCB removal. A European study found that urban tree pits and their associated bacteria have the capability to degrade PCBs in the soil (Leigh et al, 2006). This finding suggests that practices such as bioretention which have aerobic media conditions may also promote the growth of PCB-reducing bacteria.

Monitoring studies have shown that mercury levels in storm flow are strongly correlated with turbidity (Gilbreath et al, 2012), suspended particulate matter and particulate organic matter

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(Mason et al, 1999). David et al (2009) reported a strong correlation between mercury concentrations and suspended sediment in urban and agricultural rivers in California. Settling column experiments by Yee and Mckee (2010) using stormwater runoff and sediment samples from urban watersheds in the San Francisco Bay area found that 10 to 30% of mercury entrained in stormwater settled out within 20 minutes, and 90% of mercury re-suspended from creek sediments settled out within 10 minutes. Based on these experiments, Yee and McKee concluded that mercury behaved very much like a sediment particle, and that any urban BMP that promoted settling of fine sediment particles or captured fine-grained street solids should be effective at reducing mercury loads in urban watersheds.

2.3.7 Decentralized BMPs

Decentralized BMPs types either reduce volume, treat pollutants, or do both (Table 2.2). Runoff volume reductions are achieved via infiltration and net exfiltration and these reductions in volume as a result of BMP interactions could be measured. Pollutant concentration reductions can be measured due to retention, filtration or capture that prevents some fraction of the particulate load delivered to structural BMP from exiting. Detailed descriptions of decentralized BMP types represented in swTELR are listed in Appendix D.

Table 2.2. Decentralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Biofiltration		✓
Bioretention	✓	✓
Bioswale	✓	✓
Filtration Device		✓
Infiltration Feature	✓	
Pervious Pavement	✓	
Sediment Trap		✓
Settling Basin		✓

Runoff and pollutant load reductions from decentralized BMPs are calculated as the difference of model outputs. Baseline flows and loads are first calculated, then decentralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

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2.3.7.1 *Decentralized BMP runoff reductions*

Decentralized BMP runoff reductions are calculated based on their design storm specifications and impervious drainage areas. All runoff generated up to the design storm depth is either infiltrated or treated and flows generated above the design capacity are bypassed and routed downstream. For example, if a BMP is designed to the 85th percentile rainfall event, all runoff generated from events up to and including the 85th percentile event will be infiltrated or treated. Reduced flows from decentralized BMPs that are intended to infiltrate stormwater (see table 2.2) are calculated for each 30-meter grid cell proportional to the impervious drainage area treated for each BMP, per Equation 2.12

$$QR_g = \int_0^{85} Q_g(x)\, dx \approx \tag{2.12}$$

where QR_g is the treated runoff volume (ac-ft) for the 85th percentile design storm from a single grid cell. In this instance, events larger than the 85th percentile storm would remain untreated. The total runoff volume treated by decentralized BMPs is the sum of each cell within a decentralized BMPs drainage area,

$$QR_d = QR_{g1} + QR_{g2} \ldots + QR_{gi} \tag{2.13}$$

Based on Equation 2.13, the volume reduction realized from decentralized BMPs has a commensurate pollutant load reduction even without any reduction in pollutant concentration. In this example, the grid cell pollutant load is reduced solely due to the reduction of stormwater runoff volumes,

$$PR_g = QR_g * [p]_{LU} \tag{2.14}$$

where PR_g is the pollutant load that includes the respective runoff volume reduction (QR_g) multiplied by the is the characteristic runoff concentration ($[p]_{LU}$, mg/L) for the land use associated with that grid cell. Pollutant load reductions (PR_d) for each catchment after treatment by decentralized BMPs is the sum of all grid cells within that catchment.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.15}$$

2.3.7.2 *Decentralized BMP pollutant concentration reductions*

As already discussed (section 2.3.6), swTELR provides decentralized BMP pollutant concentration reductions commensurate with expected BMP sediment reductions. This approach mirrors that taken in the Chesapeake Bay to simplify reduction accounting for the range of urban BMP types using curves that reflect sediment removal since it closely corresponds closely with removal of particulate bound urban pollutants of concern (see Scheuler and Youngk, 2015).

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To estimate pollutant concentration benefits from decentralized BMPs, we assume decentralized BMPs that capture pollutants are 80% effective at reducing pollutant concentrations up to the 85th percentile 24-hr storm event at benchmark or optimal condition (CASQA, 2003; Water Environment Federation, 1998). For example, a grid cell treated by decentralized BMPs that reduces pollutant concentrations has a treated pollutant concentration, $[p]Tr_g$ (mg/L) calculated as:

$$[p]Tr_g = [p]_g * (1 - 0.8) \tag{2.16}$$

where $[p]_g$ (mg/L) is the original grid cell land use CRC. The pollutant load reduction (PR_g) from a grid cell draining to a decentralized BMPs that only reduces pollutant concentrations is,

$$PR_g = QTr_g * [p]Tr_g \tag{2.17}$$

If a grid cell is treated by a decentralized BMP that reduces both runoff volumes and pollutant loads (e.g., bioretention), then there is an indirect and direct pollutant load reduction as a result of infiltration and pollutant retention. Following equations 2.13, the load reduction from a grid cell with both a volume and pollutant concentration reducing BMP is

$$PR_g = QR_g * [p] + (Q_g - QR_g) * [p]Tr_g \tag{2.18}$$

where QR_g is the flow reduction from the grid cell as a result of infiltration, as calculated by equation 2.12. While flows above the design level are not infiltrated by the decentralized BMP, particles are still captured via particle settling and interaction with vegetation and flows are slowed by pooling. The total catchment pollutant load after reductions from decentralized BMPs is the sum of grid cells treated by decentralized BMPs within their respective drainages.

$$PR_d = PR_{g1} + PR_{g2} \ldots + PR_{gi} \tag{2.19}$$

2.3.8 Centralized BMPs

Large scale centralized structural BMPs (e.g., treatment vaults, infiltration basins, dry basins) typically treat stormwater runoff from mixed land use catchments and have treatment capacities on the order of an acre-foot or more (approximately 1,200 m^3). Stormwater can exit a centralized BMP in 1 of 3 ways: loss through infiltration, discharge via treatment aperture, or via bypass where no treatment or detention has occurred. Some models also include evaporative losses, but given proper functioning, structural BMPs should have drawdown times on the order of hours and we assume this term is negligible. The relative components of volume loss depend on the BMP type and design specifics. For example, an infiltration BMP has only infiltrated and bypassed volumes, while a treatment vault has only treated and bypassed volumes. Figure 2.5 provides schematics of centralized BMPs represented in swTELR, from which swTELR assumes volume loss via 3 potential critical pathways: infiltration, treated outflow, and bypass. BMP types represented in swTELR are listed in Table 2.3 with their relevant pollutant and runoff reductions.

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Table 2.3. Centralized BMP types represented in swTELR

BMP Type	Runoff reduction	Pollutant concentration reduction
Bed Filter		✓
Detention Basin		✓
Dry Basin	✓	✓
Infiltration Basin	✓	
Media Filter		✓
Treatment Vault		✓
Wet Basin		✓
Retention Basin	✓	✓

Calculation of runoff flow and pollutant load reductions from centralized BMPs are calculated as the difference of model outuputs. Baseline flows and loads are first calculated, then centralized BMPs are added, and the model is re-run as a future scenario. The flow and load reductions are calculated as the difference between baseline and future scenario model outputs. In practice, future scenarios include both decentralized and centralized BMPs.

2.3.8.1 *Centralized BMP runoff reductions*

Stormwater TELR derives each volume loss term from the outflow hydrograph using a hydrograph separation approach to estimate the fraction of volume infiltrated, treated, and bypassed flow based on 4 key user inputs: treatment capacity, basin footprint, and, if applicable, the infiltration rate and drawdown time (Table 2.4). Infiltrated volumes are net volume reduction as a result of BMP interaction. Stormwater discharges through a treatment aperture are termed treated volumes and assumed to have experienced pollutant retention via particle settling, filtration or biogeochemical process. Bypass volumes are those where no treatment has occurred due to unacceptable residence times within the BMPs. Other volume loss terms, such as evapotranspiration, are assumed insignificant on an average annual basis and ignored. The volume routing pathways by BMP type are graphically summarized in Figure 2.5.

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Table 2.4. Centralized BMP types and attributes

BMP Type	Treatment Capacity	Footprint	Infiltration Rate	Treatment Rate	Drawdown Time	Wet Pool Capacity
Bed Filter	✓	✓		✓		
Detention Basin	✓	✓			✓	
Dry Basin	✓	✓	✓		✓	
Infiltration Basin	✓	✓	✓			
Media Filter	✓	✓		✓		
Treatment Vault	✓	✓		✓		
Wet Basin	✓	✓			✓	✓
Retention Basin	✓	✓	✓		✓	

The corresponding volumes are calculated using graphical methods (Figure 2.6). Separation of the infiltration volume is determined by drawing a flat line across the hydrograph at the infiltration flow rate, calculated as the product of the infiltration rate and the basin footprint with proper unit conversion). Separation of the treated volume is defined by drawing a flat line across the hydrograph at the treatment flow rate, estimated as quotient of the treatment capacity and the drawdown time with proper unit conversion. Both the infiltration volume and the treated volume are calculated as the area of the outflow hydrograph under the respective flow rates down to a zero flow rate. If the sum of the infiltrated and treated volumes is less than the total outflow volume, then the remaining volume is allocated to bypass. If the sum of the infiltrated and treated volumes is greater than the total outflow volume, then the treatment volume is reduced to accommodate the difference and the volumetric balance between inflow and outflow is retained.

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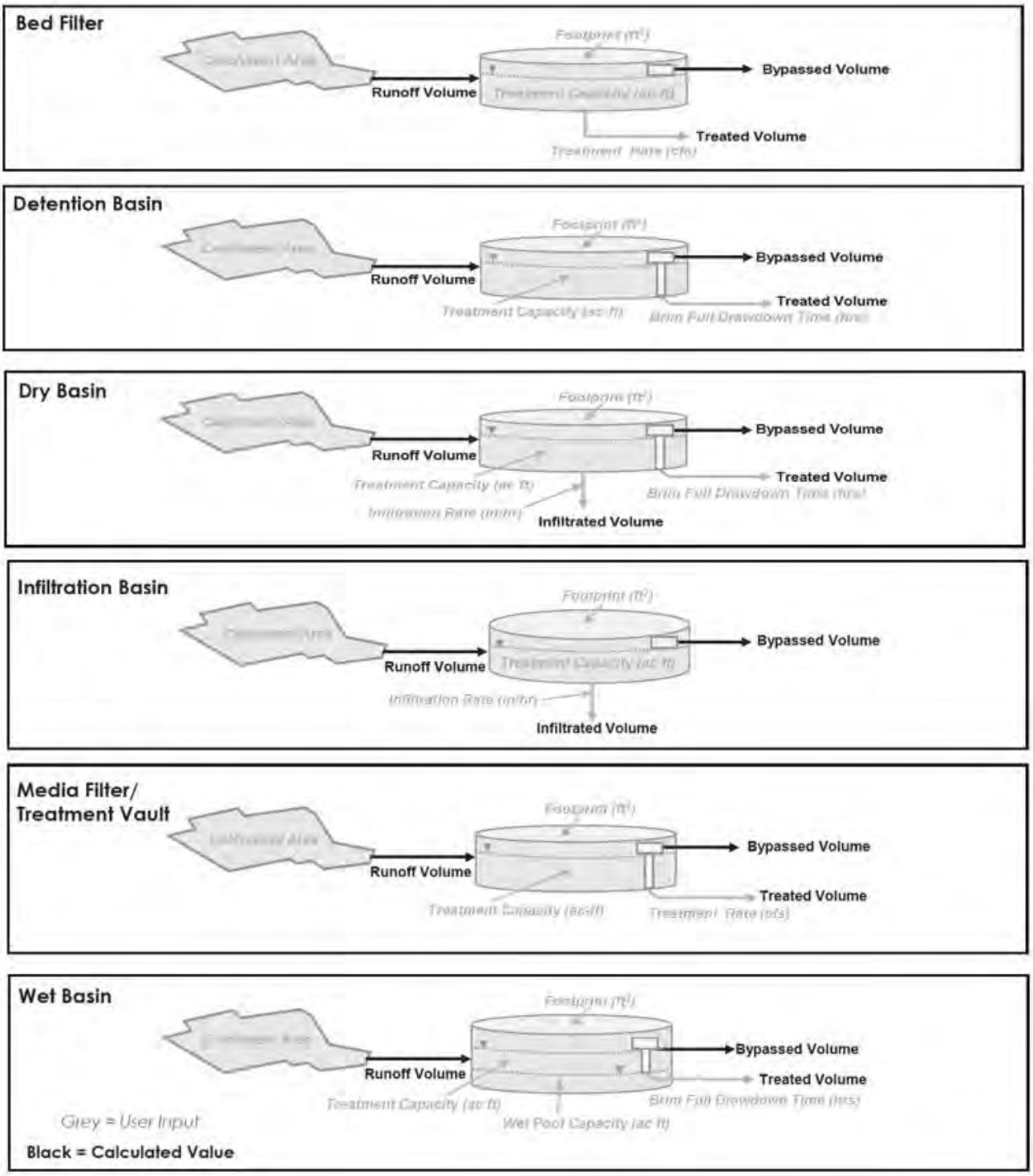

Figure 2.5. Centralized BMP types, inputs and calculated values as implemented in swTELR.

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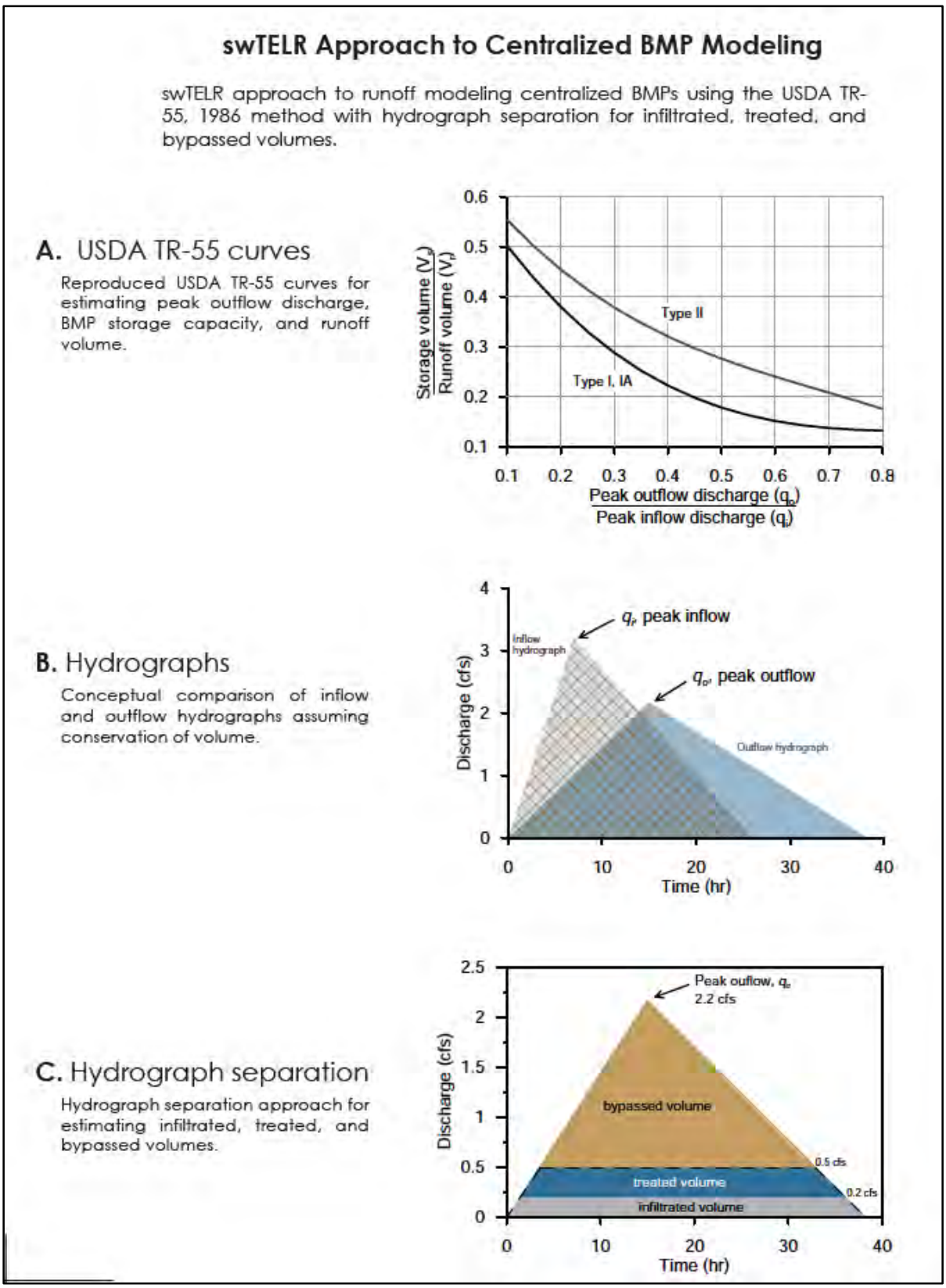

Figure 2.6. Centralized BMP flow partitioning

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Average 24-hr and 365-day stormwater runoff volumes from large scale centralized BMPs are modeled using the same approach to estimate baseline runoff from selected 24-hr precipitation events (12.5, 50, 85, 95) that describe the precipitation distribution. The TR-55 (USDA, 1986) approach to estimate peak outflow and the hydrograph separation approach to estimate infiltrated, treated, and bypassed volumes is conducted for each 24-hr percentile precipitation event. Average 24-hr infiltrated, treated, and bypassed volumes for days when it rains are estimated using the trapezoid rule. Average 365-day infiltrated, treated, and bypassed volumes from catchments with large-scale centralized BMPs is estimated by the product between volume and the average number of days per year with measurable rain. When the infiltrated, treated, and bypassed volumes (Q_{infil}, Q_{CEC}, and Q_{BY}, respectively) are properly allocated, the total inflow is equal to the total outflow, Q_{OUT}

$$Q_{OUT} = Q_{infil} + Q_{CEC} + Q_{BY} \tag{2.20}$$

2.3.8.2 *Centralized BMP pollutant concentration reductions*

The pollutant load after interaction with a centralized BMP is the sum of the bypassed and treated loads. Each of these components is the product of the pollutant concentration and associated volume. The concentration of the water infiltrated and bypassed is equal to the incoming concentration of runoff prior to treatment by the centralized BMP. A characteristic effluent concentration (CEC) is assigned to the treated volumes (Table 2.5), $[p]_{CEC}$ (mg/L) that are dependent on the BMP type to calculate *reduced* pollutant loads (PT_r) associated with volumes treated (not infiltrated) by centralized BMPs (Q_{cec}) according to equation 2.21:

$$PTr_c = Q_{CEC} * [p]_{CEC} \tag{2.21}$$

The total outgoing pollutant load from a centralized BMP (PT_c) is the sum of the load from the treated load (PTr_c) and the bypassed load (PBy_c)

$$PT_c = PTr_c + PBy_c \tag{2.22}$$

Where the bypassed volumes are calculated as the product of the bypassed volume Q_{BY} and the inflow pollutant concentration for the centralized BMP drainage $[p]_C$

$$PBy_c = Q_{BY} * [p]_C \tag{2.23}$$

Based on strong evidence for association of PCBs and mercury with particulates (see section 2.3.6), we assumed different centralized BMP types to have proportional pollutant reduction efficiency to that of sediments. Therefore, PCB and mercury reductions (PR_c) are calculated as the product of the pollutant load delivered to the centralized BMP (PTr_d) for pollutants (PCB/Hg) and the percent TSS load reduction.

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$$PR_{c\,PCB/Hg} = PTr_{d\,PCB/Hg} * \ (PTr_{d\,TSS} - PTr_{c\,TSS})/PTr_{d\,TSS} \quad (2.24)$$

Using TSS as a proxy for particulate pollutant reductions has the advantage of substantially greater BMP performance data availability compared to similar data specifically associated with mercury or PCBs. Assignment of sediment CEC values to BMPs included a substantial data compilation effort that included data directly compiled and/or analyzed by 2NDNATURE (2NDNATURE, 2006a; 2006b; 2007; 2008; 2NDNATURE and nhc, 2012a; 2013; 2014; LRWQCB and NDEP, 2007), or obtained from the National Stormwater Quality Database[8]. BMP type definitions in the NSQD are loosely defined and therefore likely include substantial variation within the same specified BMP type. To support this analysis, we also reviewed results documented in available NSQD annual data analysis reports (Geosyntec Consultants and Wright Water Engineers, 2012; 2013; 2014), as well as select marketing and design literature available online for a variety of proprietary centralized structural BMPs.

TABLE 2.5 Characteristic sediments effluent concentration (CEC) values for centralized BMP types

BMP Type	CEC TSS (mg/L)
Wet Basin	5
Dry Basin	6
Infiltration Basin	92
Treatment Vault	20
Media Filter	6
Bed Filter	3
Detention Basin	40
Retention Basin	5

The use of CEC values is preferred over percent load reduction estimates that are commonly used in structural BMP models for two key reasons. First, the use of percent reduction requires a consistent reduction across the range of event magnitudes, including very large events which often provide substantial bypassed flow (Strecker *et al.*, 2001). Secondly, since most devices have an upper limit on performance, when pollutant concentrations are very low, the percent load reduction method tends to overestimate benefits. These observations are based on specific BMP types, within a limited range of conditions, and the difference between these two methods may be less pronounced given a wider range of facility types and pollutant concentrations.

[8] http://www.bmpdatabase.org/nsqd.html

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2.3.9 Runoff routing

2.3.9.1 *Routing to centralized BMPs*

swTELR models centralized BMPs using the USDA TR-55 (1986) methodology for estimating peak inflow and peak outflow. Calculations for infiltrated, treated, and bypassed stormwater runoff volumes are completed for each prescribed 24-hr percentile storm event. Estimating of peak inflow discharge requires reasonable representation of the time of concentration, the time it takes from water to flow from the most remote part of the watershed to the watershed outlet. There are several different ways to estimate time of concentration (USDA 1986 and 2010). We selected a relatively simple formula (equation 15-4b; USDA 2010) that could be easily implemented for a variety of urban catchments and required minimal additional inputs by the user. Time of concentration is estimated by the NRCS lag method as

$$T_c = \frac{l^{0.8} * (S+1)^{0.7}}{1140 * Y^{0.5}} \tag{2.25}$$

where T_c is time of concentration (hr) for average natural watershed conditions, l is the flow length (ft), Y is the average watershed slope (%), and S is the maximum potential retention from equation 5. Because the lag equation was developed for rural areas, it can overestimate the time of concentration for urban areas which have higher proportion of impervious area and channelized flow that allow water to through the catchment at a faster rate than under natural conditions. The following equation was applied to adjust the T_c calculated by the NRCS lag method (FHWA HEC-19, 1984)

$$T_c' = T_c * CF * IF \tag{2.26}$$

where T_c' is the adjusted time of concentration, T_c is the time of concentration in hours from Eq. 9, CF is the channel improvement factor, and IF is the impervious area factor, both of which are estimated from the impervious area of the catchment.

Next, unit peak discharge, q_u, is computed based on T_c and SCS rainfall distribution type

$$\log(q_u) = C_0 + C_1 \log(T_c) + C_2[\log(T_c)]^2 \tag{2.27}$$

where C_0, C_1, and C_2 are the coefficients from Table F-I (USDA 1986) based on the SCS rainfall distribution type. Rainfall distribution Type I pertains to all examples presented herein. Peak inflow discharge, q_i is estimated as

$$q_i = q_u A Q F_p \tag{2.28}$$

where A is drainage area, Q is runoff depth, and F_p is a ponding factor. Finally, estimation of the peak outflow discharge is

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$$\frac{V_s}{V_r} = C_0 + C_1\frac{q_o}{q_i} + C_2(\frac{q_o}{q_i})^2 + C_3(\frac{q_o}{q_i})^3 \quad (2.29)$$

where V_s/V_r is the ratio of storage volume to runoff volume of the BMP, q_o/q_i is the ratio of peak outflow to peak inflow, and C_0, C_1, C_2, and C_3 are the coefficients from Table F-2 (USDA 1986) based on the SCS rainfall distribution type. Figure 3A shows the relationship between the storage-runoff volume ratio and the outflow-inflow discharge ratio. Figure 3B shows the shape of the inflow and outflow hydrographs where peak flows are estimated from equations 11 and 12, respectively. The inflow and outflow duration is estimated from peak flow (q_i or q_o) and Q, using graphical methods and assuming conservation of volume.

Note that because swTELR models a range of 24-hr storm events, it is likely that the storage to runoff volume ratio is outside the range ($0.14 < V_s/V_r < 0.5$) presented in Figure 2.6A for a given 24-hr storm event. In the cases where V_s/V_r is outside the range, the low or high endmember of the range is applied. For example, if the measured V_s/V_r is 0.08, swTELR assumes a V_s/V_r of 0.14. If the measured V_s/V_r is 0.56, swTELR assumes a V_s/V_r of 0.50.

2.3.9.2 *Routing between catchments*

Runoff is routed between catchments so that runoff and pollutant load reductions cumulate as flows move downslope towards centralized BMPs or receiving waters. Volumes and pollutant loads delivered to centralized BMPs include reductions achieved by other structural and non-structural BMPs within its contributing drainage. This sequential accounting ensures runoff and pollutant reduction benefits are not double counted. The runoff volume and pollutant concentration introduced at the inlet of each centralized BMP is computed based on the contributing drainage characteristics and level of BMP implementation upstream within the centralized BMP drainage. Travel lengths and slopes to a centralized BMP are calculated based on the configuration of catchments or sub-catchments and different routing configurations will result in different flow timing (see Figure 2.7).

The total runoff for a series of catchments within the same drainage (QTr_{series}) is defined by the summation off the current catchment runoff (QTr) and runoff contributions from a series of upstream catchments that contribute to the downstream centralized BMP. Contributions from upstream catchments without a centralized BMP are defined as the total catchment runoff (QTr) and those with a centralized BMP are defined as sum of the treated (Q_{CEC}) and bypassed (Q_{BY}) volumes as Q_{UBMP}.

$$Q_{UBMP} = Qu_{BY} + Qu_{CEC} \quad (2.30)$$

Variables used for calculating peak inflow discharge ($q1$) and time of concentration (Tc) for a centralized BMP with contributions from upstream catchments are defined based the combined attributes of the catchment series. Slope for a series of catchments is calculated as the average of

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the contributing catchments. The contributing area is summed for all contributing catchments without centralized BMPs and with centralized BMPs such that the total area contributions are accounted for downstream. Pollutant concentrations for downstream catchments are calculated as the average concentration of the current catchment and contributing catchments. Catchments can be subdivided for routing portions to more than one centralized BMP, and these subcatchments can also receive water from upstream catchments, as in Configuration 1 in figure 2.7.

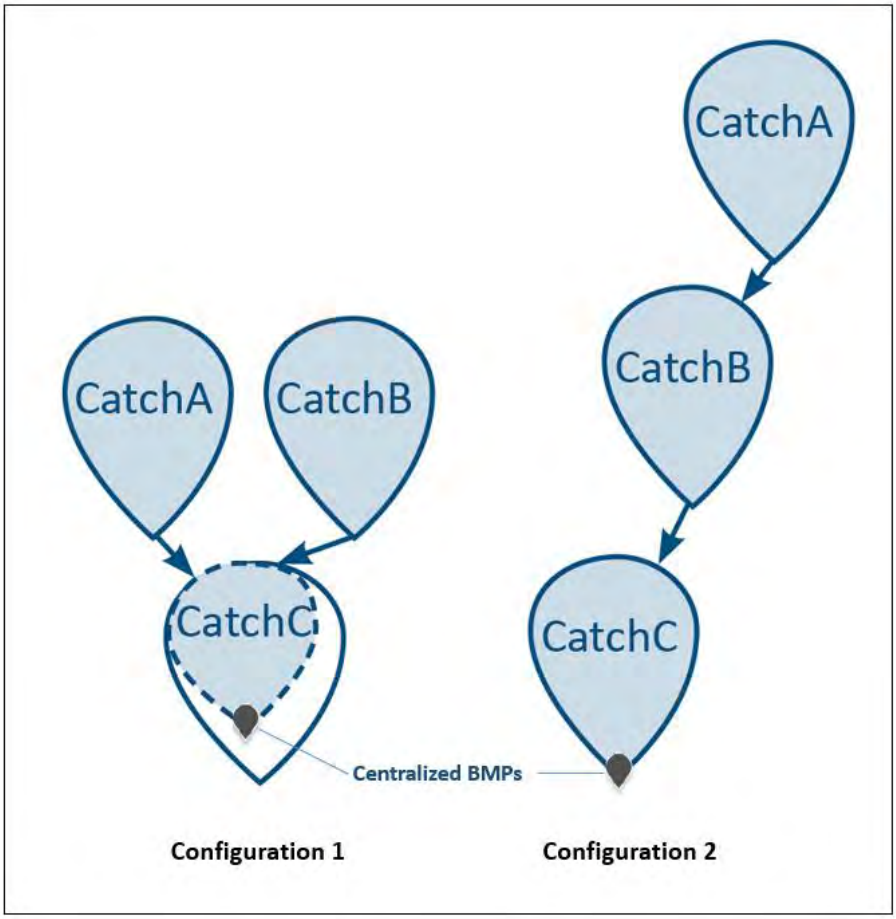

Figure 2.7. Two example catchment routing configurations.

2.3.9.3 *Runoff and pollutant load reductions reporting*

Within a catchment series, centralized BMPs receiving water from upstream catchments provide runoff reductions or pollutant treatment benefits to those upstream catchments. These reductions are allocated to upstream catchments based on their proportional contribution to the downstream centralized BMP after reductions from structural and non-structural BMPS within the catchment. Each catchment is run through the full calculations twice: once to calculate its initial within-catchment reductions and then a second time to account for the catchment series contributions. The initial flow

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out of a series of the catchments ($QTrI$) is the sum of the initial flows from the current ($QTrI_{current}$) and upstream catchments ($QTrI_{current}$):

$$QTrI_{series} = QTrI_{current} + QTrI_{UC1} \ldots .. QTrI_{UCi} \quad (2.31)$$

Runoff reductions from a centralized BMP receiving contributions from upstream catchments Q_{cr} are defined as the difference between the initial runoff ($QTrI_{series}$) and the total runoff from the catchment series after reductions from that centralized BMP (QTr_{series}).

$$Q_{cr} = QTrI_{series} - QTr_{series} \quad (2.32)$$

Reductions are distributed upstream to catchments based on their proportional contribution, so that for individual catchments (i), the reduction applied to them is defined by

$$Q_{cr}D_i = Q_{cr} * QTrI_i / QTrI_{series} \quad (2.33)$$

On the second run through the runoff calculations after calculating the initial contributions, the model iterates downstream so that all BMP reductions are cumulated as runoff moves downstream. The same reporting scheme is used in pollutant load reductions reporting so that the pollutant load from a series of the catchments is the sum of the initial load from the current catchment ($PI_{current}$) and all upstream catchments PI_{uc} as:

$$PI_{series} = PI_{current} + PI_{UC1} \ldots PI_{UCi} \quad (2.34)$$

The difference between the initial pollutant load and the final load after the final centralized BMP reductions is

$$Pr = PI_{series} - P_{series} \quad (2.35)$$

Like runoff reductions, pollutant load reductions are assigned upstream to individual catchments (i) proportional to their initial loading contributions.

$$PD_i = Pcr * P_i / PI_{series} \quad (2.36)$$

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3 Modeling Scenarios

Baseline and future Solano Permittee landscape scenarios were completed to fulfill the RAA modeling compliance requirements using a combination of functions automated within the swTELR model and manual GIS processing to implement each future scenario. In this section, the modeling scenario components are described, and there is some overlap with section 2.3 that is retained for clarity.

Time periods modeled include the baseline period (approximately 2005), and future scenarios estimated for the years 2020, 2028/2030, and 2040. Each of these scenarios was modeled in sequence so that land use and BMP implementation changes that occurred in the preceding scenario were preserved in each subsequent scenario. The modeling scenarios include only those stormwater treatment components that are considered part the Green Stormwater Infrastructure (GSI) Scenarios per the BASMAA RAA Guidance Document (BASMAA, 2017). These scenarios therefore do not include source control measures, such as street sweeping or source property abatements[9].

3.1 3.1 Baseline Modeling

3.1.1 Scenario Inputs

3.1.1.1 *Precipitation input data*

Daily raster rainfall data from PRISM were used form the years 1981-2016 using the procedure described in Section 2.3, so that so that the precipitation distribution bracketed the range of likely rainfall conditions across the Solano Permittee MS4 Area. Raster-based rainfall estimates from the PRISM Climate Group[10] at Oregon State University were used to describe the distribution of 24-hour event depths were used to drive runoff generation. 2NDNATURE created a raster data processing program using the R statistical programming language[11] to acquire the appropriate historical raster layers for Solano County between 1981-2016 and perform a series of raster data processing steps. After the 35-year sequence was acquired (12,775 raster layers), a time series of precipitation values was created for each 800 m^2 pixel and the swTELR required percentile rainfall values (12.5, 50, 85, 95) and average days of rain were extracted for each pixel for the entire time series. The 85th percentile precipitation values are shown for the Solano Permittee area in

[9] Since source control measure accounting methods are still under development via a current BASMAA study. Source control actions will be included in the wasteload allocation (WLA) modeling scenarios, which will be communicated in a separate report.

[10] http://prism.oregonstate.edu/

[11] https://www.r-project.org/about.html

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Figure 3.1. The 800m PRISM spatial precipitation data were resampled to align with the 30m US Landsat grid used by swTELR.

While the time extent used differs from the range recommended in the RAA Guidance of 2000-2009 (BASMAA, 2017), the greater temporal coverage provides a more representative description of the 24-hour rainfall distributions.

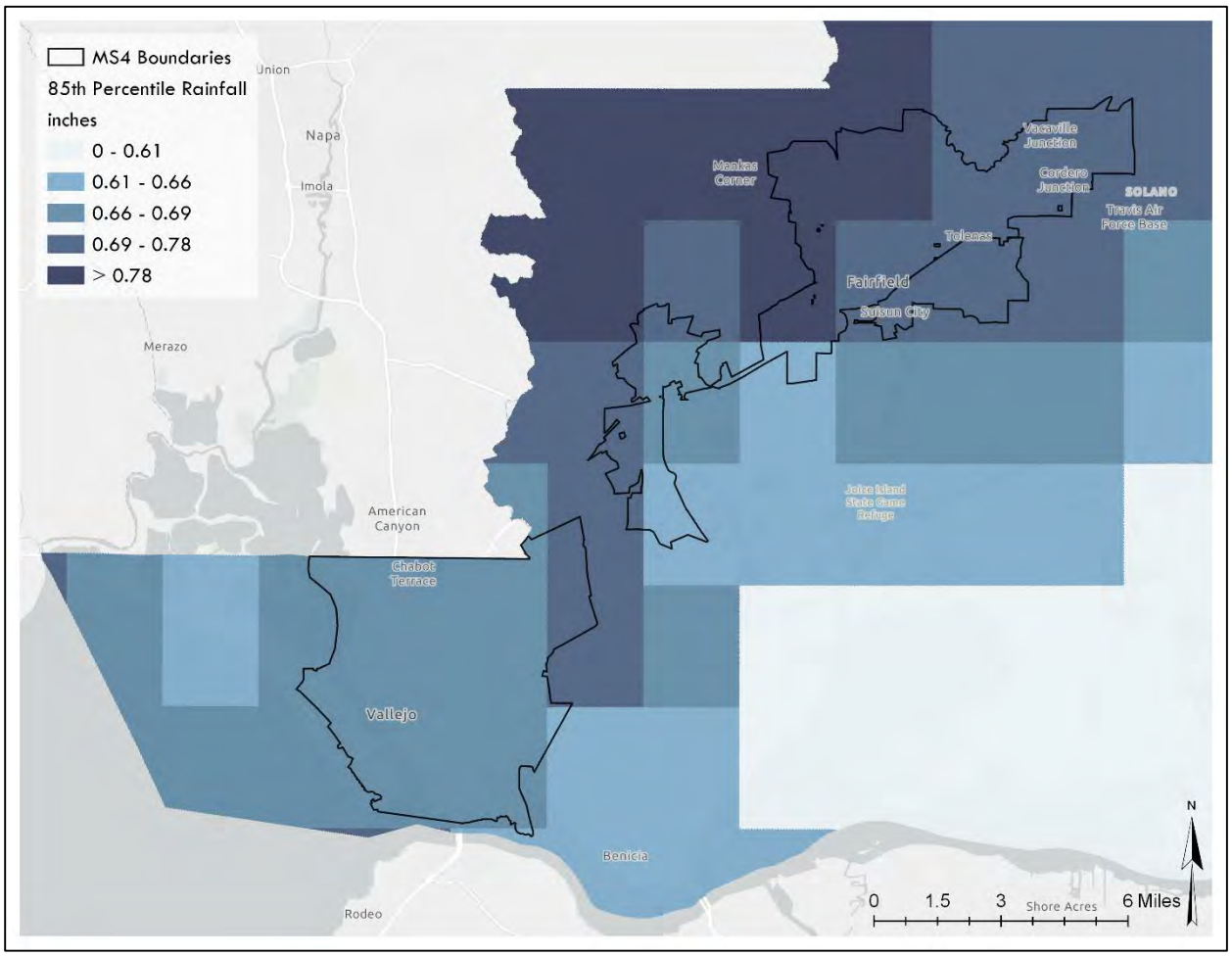

Figure 3.1. Example rainfall data used in swTELR.

3.1.1.2 *Soils*

Soils data from NRCS was used to specify soil types throughout Solano County MS4 boundaries. These data were used in their rasterized form, discretized to 30m pixels, down loaded from the NRCS website (Figure 3.2). The data were clipped to the Solano Permittee MS4 boundary and individual catchment boundaries for use swTELR. The NRCS SSURGO database was used as the primary data source, and the STATSGO2 database (which provides coarser resolution), was used to fill in spatial gaps in coverage that occurred in the SSURFO data.

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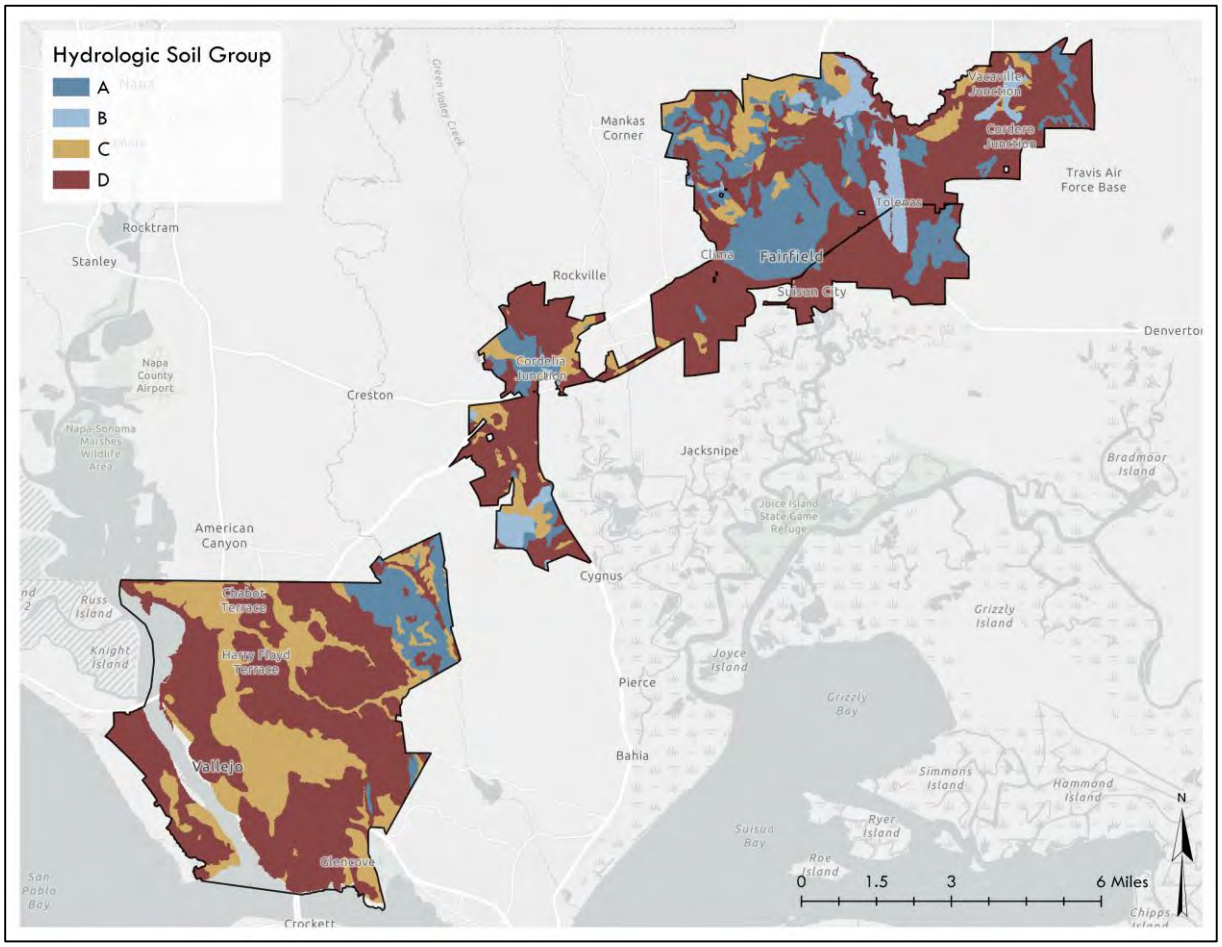

Figure 3.2. Soils data used in swTELR

3.1.1.3 *Impervious cover*

Impervious cover was specified using data from the National Land Cover Dataset[12] that represents the year 2006, provided at 30-meter grid cell resolution, which matches the spatial scale of modeling in swTELR. These data were clipped to the Solano Permittee MS4 boundaries and individual catchment boundaries for use in swTELR (Figure 3.3)

[12] https://www.mrlc.gov/data?f%5B0%5D=category%3Aurban%20imperviousness

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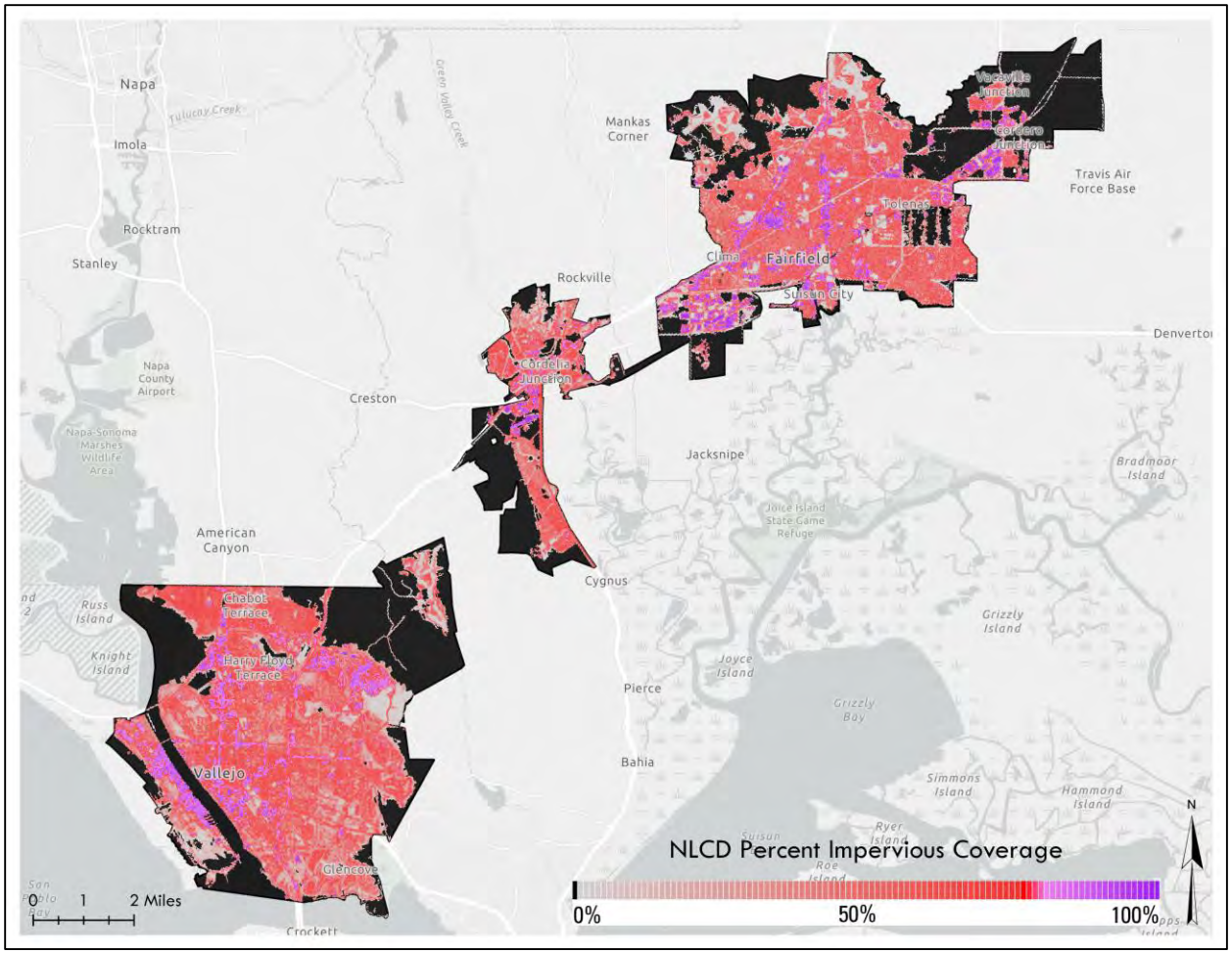

Figure 3.3. Impervious cover data used in swTELR.

3.1.1.4 *Land use*

Land-use data were developed by San Francisco Estuary Institute (SFEI) to specify characteristic PCBs and Mercury runoff concentrations for each land use developed for the Regional Watershed Spreadsheet Model (RWSM)[13]. The land-used runoff concentrations used are those contained in the current version of the RWSM, which differ slightly from those reported by SFEI in the last RWSM progress report (Wu et al, 2016). Land use designations used in RWSM are reflect categories relevant the specific pollutants of concern, PCBs and mercury, and are listed in Table 3.1. Figure 3.4 shows the distribution of difference land use types throughout the Solano MS4 Permittee Area.

[13] https://www.sfei.org/projects/regional-watershed-spreadsheet-model

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Table. 3.1 Land-use based pollutant concentrations from RWSM used in swTELR. Note that these concentrations are slightly different than those reported in Wu et al. (2016).

	Land Use	Concentration (ng/L)
PCBs (ng/L)	Ag/Open/New Urban	0.2
	Old Industrial + Source Areas	204
	Old Residential	4
	Old Commercial + Old Transportation	40
Hg (ng/L)	Ag/Open	80
	Old Industrial + Source Areas	40
	New Urban	3
	Old Urban	63

This SFEI land use layer does not appear to account for historic mining activities as a mercury source area within Solano County. For example, Saint John mine that was identified in the Mercury Mines Inventory and Prioritization Report (SWRCB, 2009). This site has tailing piles and mine waste with risk of erosion into Rindler Creek. The mine is within the Vallejo MS4 boundary, located in the northeast corner, but appears to be classified as Agriculture (Figure 3.4). As a practical matter, this classification seems perfectly appropriate, since Agriculture is the highest mercury concentration specified in the dataset.

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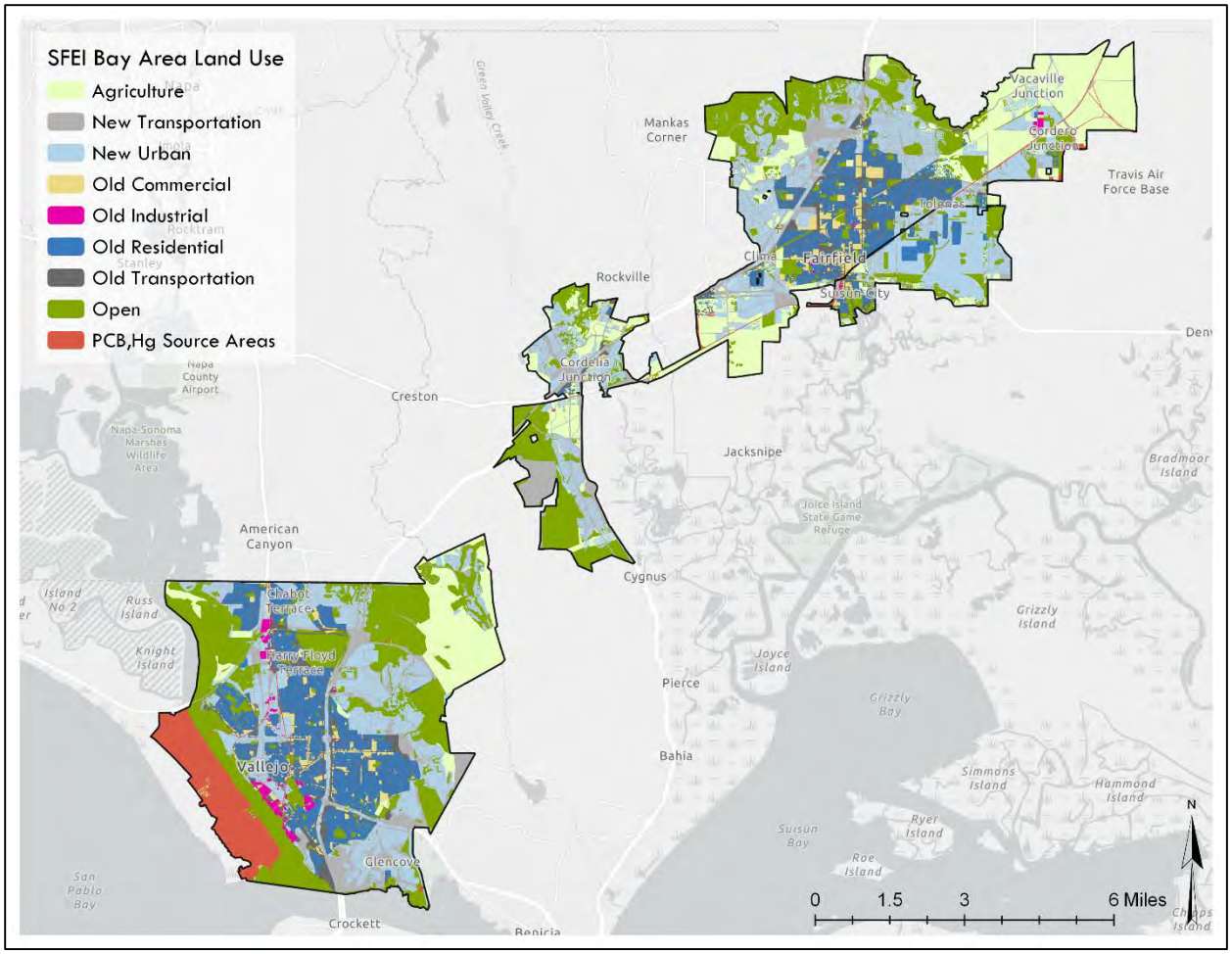

Figure 3.4. Land use map from RWSM used in swTELR.

Although some BMPs may have been implemented before 2005, baseline condition modeling assumed no existing GSI and or land-use changes that occurred after the year 2005. As such, the baseline condition model outputs essentially represent the unmitigated runoff and pollutant loading from Solano Permittees as of 2005. Existing BMPs, land-use, and impervious cover changes identified since 2005 are included in all of the future modeling scenarios.

3.1.1.5 *Drainage and routing*

The delineation of the Solano Permittee MS4 areas into urban catchments was an iterative process with verification by Solano Permittee city staff. Catchments are approximately 100 acres in size and define routing to either a discrete (single point) or distributed outlet (multiple point). Catchment boundaries and routing to receiving waters are defined by surface elevation, surface barriers, stromdrain infrastructure, and connectivity to receiving waters (Appendix C). Figure 3.5 provides an example of a catchment delineation in Fairfield based on the stormdrain network showing routing to receiving water outfalls. Beginning with catchments that had already been delineated by the City of Vallejo, City of Fairfield, and City of Suisun, catchment boundaries were refined, and

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verified by city staff. The full catchment delineation process used for swTELR is documented in a *Catchment Delineation and Mapping Guidance* (2NDNATURE, 2018). This process involves using the municipal stormdrain infrastructure spatial data in concert with a 10-meter spatial resolution Digital Elevation Model (DEM)[14] to define drainage boundaries. Catchments are nested inside stormwater drainages that all flow to a common receiving water. The final catchment and stormwater drainages delineated for Fairfield/Suisun and Vallejo are shown in Figures 3.6 and 3.7 respectively.

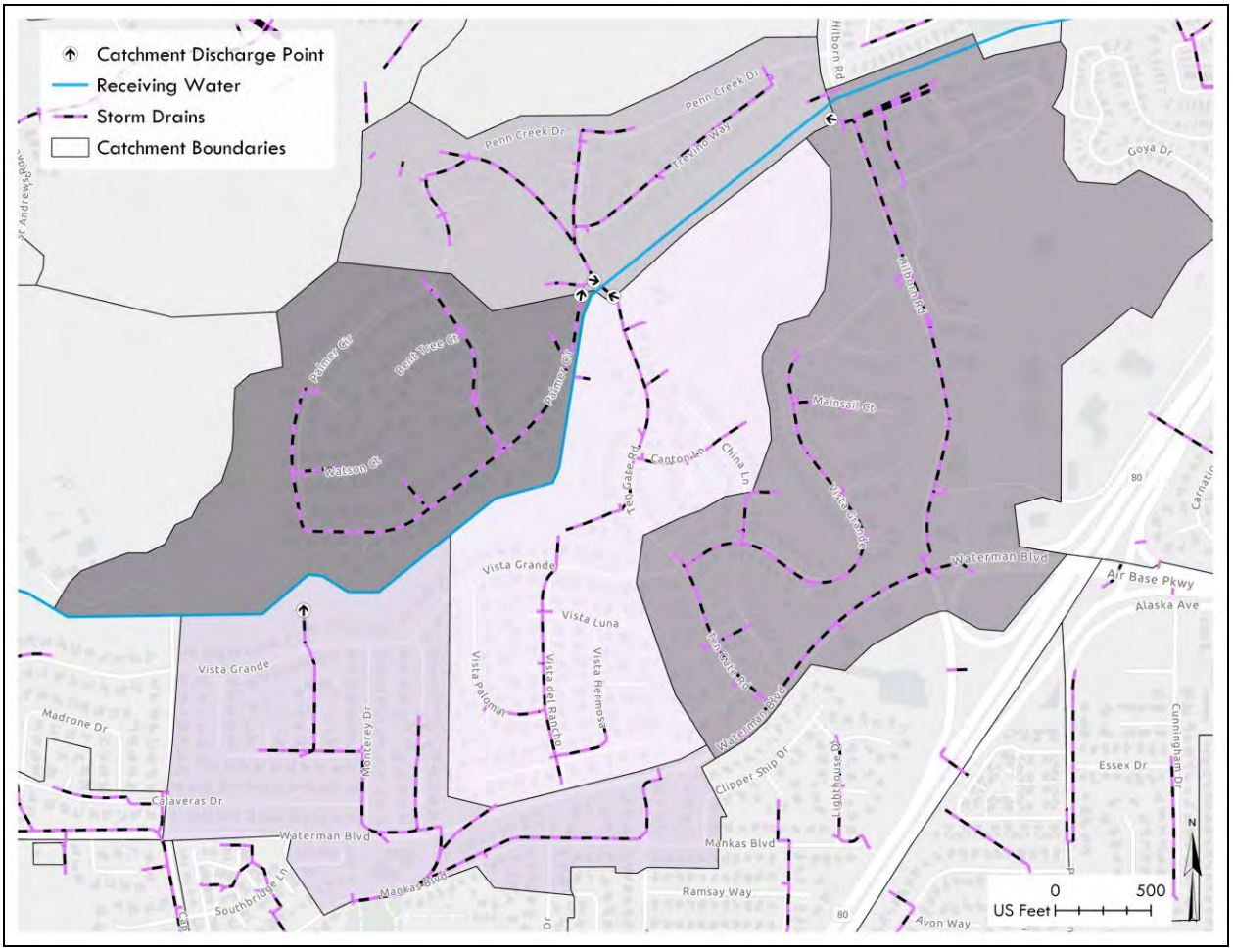

Figure 3.5. Example of catchments delineated via the stormdrain network in Fairfield.

[14] https://catalog.data.gov/dataset/usgs-national-elevation-dataset-ned

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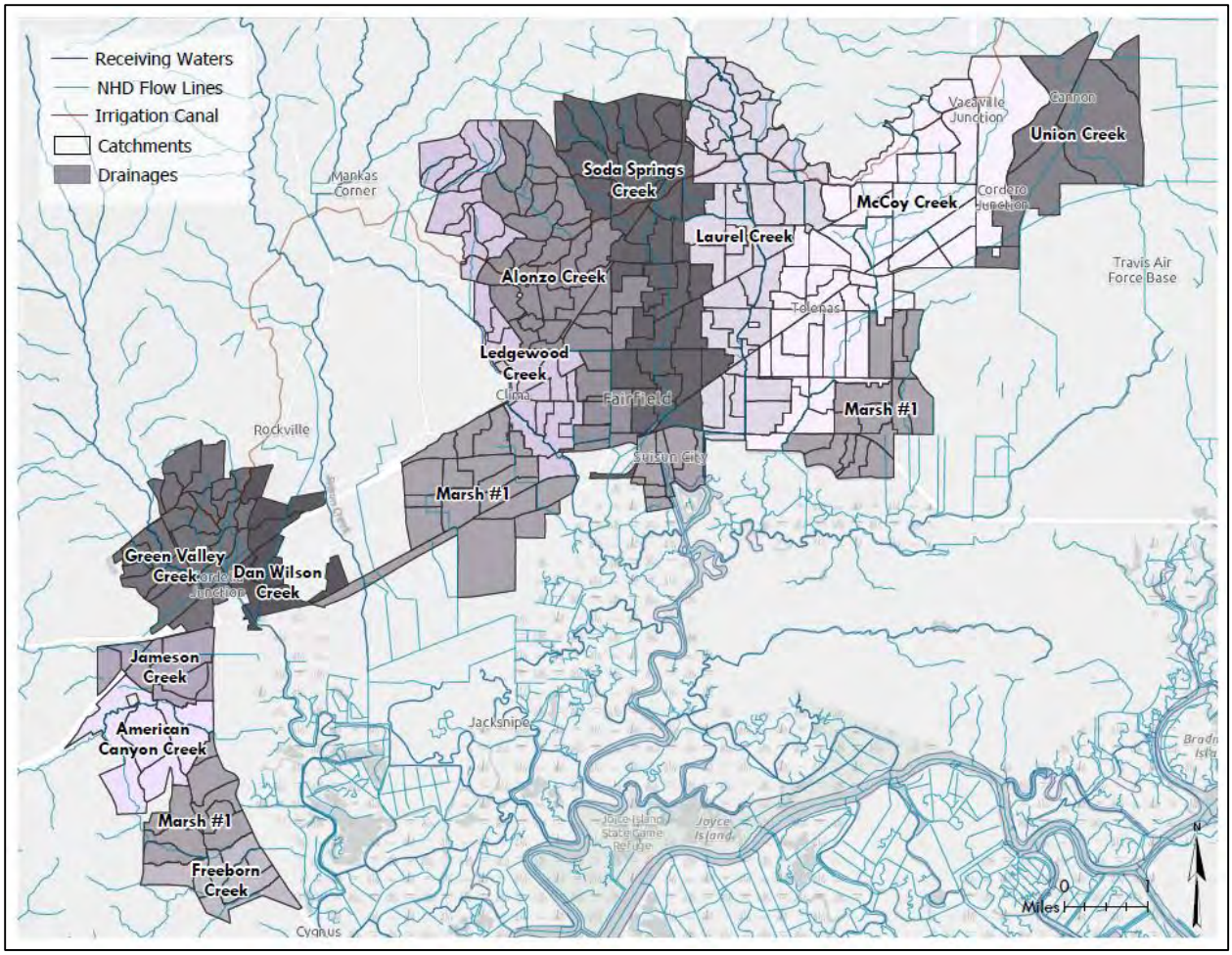

Figure 3.6. Fairfield-Suisun catchments, drainages, and receiving waters.

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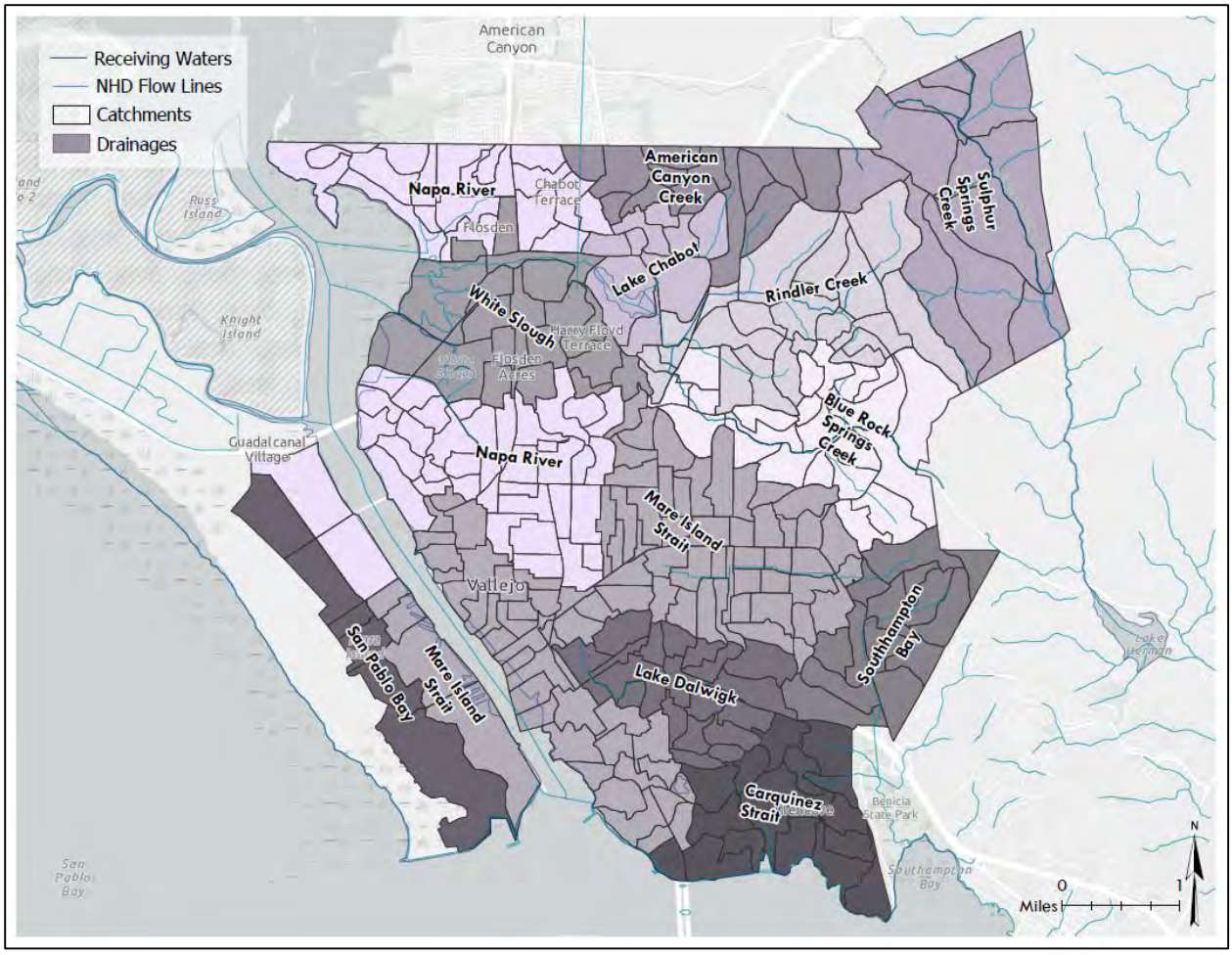

Figure 3.7. Vallejo catchments, drainages, and receiving waters

3.1.2 Model calibration

There are no long-term flow datasets available for watersheds that include the cities of Fairfield, Suisun or Vallejo. So, while the RAA Guidance from BASMAA (BASMAA, 2017) specifies that baseline model runoff estimates should employ a hydrologic calibration procedure, this is not possible for the Solano Permittee MS4 Area. Similarly, there are no concentration data for PCBs and mercury available that are amenable calibration of an urban stormwater model. The historic concentration data available have been described in detail in section in Section 1.3.2.4, and are primarily targeted to short-term study objectives, probabilistic inference over space, and characterizing spatial patterns within the receiving waters of the Bay. As such, measurements are sparse and do not capture the unique response of the urbanized areas, such as monitoring data at the outfalls of the urban drainages would. This means that the estimates from swTELR must rely wholly on the input data without adjustment of numeric quantities to tune the fit of the model to observations, which provides both advantages and shortcomings.

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Contrary to the idea that uncertainty associated with model parameterization can be avoided with a careful or sophisticated calibration procedure, the process of fitting parameter values during calibration invariably injects substantial uncertainty to model outputs. This issue has been widely recognized and documented in the hydrologic literature for more than two decades (see Beven, 2001 p. 217). While lack of data with which to compare estimates clearly presents a challenge for direct verification of accuracy, it also avoids the inherent addition of uncertainty that is incurred any time model outputs depend strongly on model calibration. This is particularly true when a model is over-parameterized to a degree that is not supported by the data available, which is exceedingly commonplace (Beven, 2005). Since calibration often involves either complex optimization algorithms and/or several subjective decisions on the part of the modeler, avoiding it adds transparency to the modeling process, since relationships between model inputs and outputs are much more straightforward.

3.1.3 Baseline comparison with the Regional Watershed Spreadsheet Model (RWSM)

In place of a validation experiment via comparison with measured flow values, swTELR results were compared to outputs from the Regional Watershed Spreadsheet Model (RWSM), developed by SFEI. The RWSM is an empirical model developed to estimate average annual regional and sub-regional scale pollutant loads for the San Francisco Bay Area. Since the RWSM is an empirical model, the outputs depend strongly on an extensive dataset of flow and pollutant concentrations collected over more than a decade by regional monitoring programs. The RWSM is the most suitable tool available to extend existing measurements to estimate sub-regional scale pollutant loading in areas of the San Francisco Bay area that lack measurements. swTELR used the same land use layer employed by RWSM to specify PCBs and Mercury characteristic runoff concentrations for each land. Correspondence between swTELR and RWSM was performed using outputs provided on the SFEI RWSM website[15] by clipping raster-based RWSM runoff and pollutant load estimates from the full dataset using the MS4 boundary for each city in Solano County.

3.1.3 Key baseline modeling assumptions and limitations

The baseline modeling employs several assumptions for the purposes of either practicality or data limitations, which include:

- A spatially explicit, probabilistic approach can adequately bracket the range of rainfall-runoff responses via an uncalibrated model.
- PCBs and mercury concentrations are responsive to land use type and the concentrations used are representative of the actual values.

[15] https://www.sfei.org/projects/regional-watershed-spreadsheet-model#sthash.3ZhPRNxw.dpbs

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- Uncertainties associated with the input data and model structure are not greater in magnitude than spatially varying factors that drive runoff generation and pollutant loading

These assumptions are primarily based on previously reported studies and were not tested as part of this study. Rather, they served as a practical point of departure for the work reported herein. A true validation of these assumptions and swTELR outputs require monitoring data at the urban drainage scale, which is not commonly available. However, since control measure implementation will proceed over a period of decades, this type of validation should be considered to both inform decision making, test RAA model assumptions, and provide additional information to shore up their limitations. Since swTELR operates at a granular spatial scale, the outputs are amendable to understanding the distinct runoff and pollutant loading response from urbanized drainages and changes that result from GSI implementation over time.

3.2 Model Scenarios for Compliance Demonstration

Baseline and future modeling scenarios were run for the Solano Permittee MS4 Area to demonstrate expected progress towards compliance for meeting GSI pollutant reductions. For each scenario, the rainfall input data and other spatial data that describe urban catchment characteristics remained unchanged, while other factors were altered according to documentation of expected changes (e.g. land use, BMP implementation). New development, redevelopment, and BMP implementation timing and locations were verified by Solano Permittees via a web-mapping application[16]. Three future scenarios were modelled, with a slightly different milestone schedule required for PCBs and mercury (Table 3.2).

The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the WLA RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. The scenarios reported herein include only reductions associated with GSI. Source control actions will be handled as part of the wasteload attainment (WLA) RAA analysis to be completed in 2020. Modeling scenarios for the GSI and WLA RAA's overlap substantially, with GI comprising a subset of the WLA reductions. Per the BASMAA RAA Guidance (BASMAA, 2017), pollutant load reduction measures included in the GSI RAA include GSI BMP implementation along with land use changes that accompany redevelopment. Reductions included in the WLA RAA analysis are the sum of reductions that result from GSI, land use changes, and source controls such as street sweeping and demolition controls. GSI treatment BMPs include both decentralized BMPs that are often included as part of Low Impact Development (LID) and treat stormwater on site at the parcel scale, as well as centralized BMPs, which route stormwater from several parcels to a regional treatment structure. Source controls will only be included in the 2028/2030 modeling analysis per the BASMAA RAA Guidance Document (BASMAA, 2017).

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Table 3.2. RAA model scenarios

	Green Stormwater Infrastructure RAA	Waste load Allocation Attainment RAA
2020	GSI + land use changes	GSI + land use changes
2028/2030		GSI + land use changes + source control
2040		GSI + land use changes

Modeling GSI and WLA scenarios separately requires that GSI and source control reductions can be treated independently, even though there are overlapping components. This presents some conflicts with the most logical reduction sequencing that corresponds with our conceptual understanding of the urban stormwater system, in which source control reductions occur before other types of reductions that require transport of pollutants away from their source and subsequent treatment. The BASMAA source control accounting approach will not be finalized until January 2020. Any such pollutant reduction sequencing issues or assumptions will be documented in WLA RAA modeling report in 2020.

3.3 Redevelopment and new development land use changes

3.3.1 Planned and projected land use changes

Completed and projected land use changes were drawn from several different sources and compiled into a geodatabase to support the future modeling scenarios. Development and redevelopment projects were identified from city general plans, specific redevelopment area planning documents, examination of current and historical aerial imagery, and interpreted outputs from the UrbanSim[17] urban planning model. With the exception of the UrbanSim outputs, land use change data were not available in GIS formats and were translated from PDF documents and manually digitized in GIS. While the UrbanSim outputs provide a regionally standardized way to estimate redevelopment rates, using them in isolation would require ignoring the vast majority of documentation of parcels that are already planned for redevelopment

All land use changes employed in the future scenario modeling simulations are mapped in Figure 3.8 symbolized by the scenario year, and whether the changes will be redevelopment or new development. The GIS database created contains the specific information source used to determine land use change and associated time of conversion for each parcel.

[17] http://www.urbansim.com/urbansim

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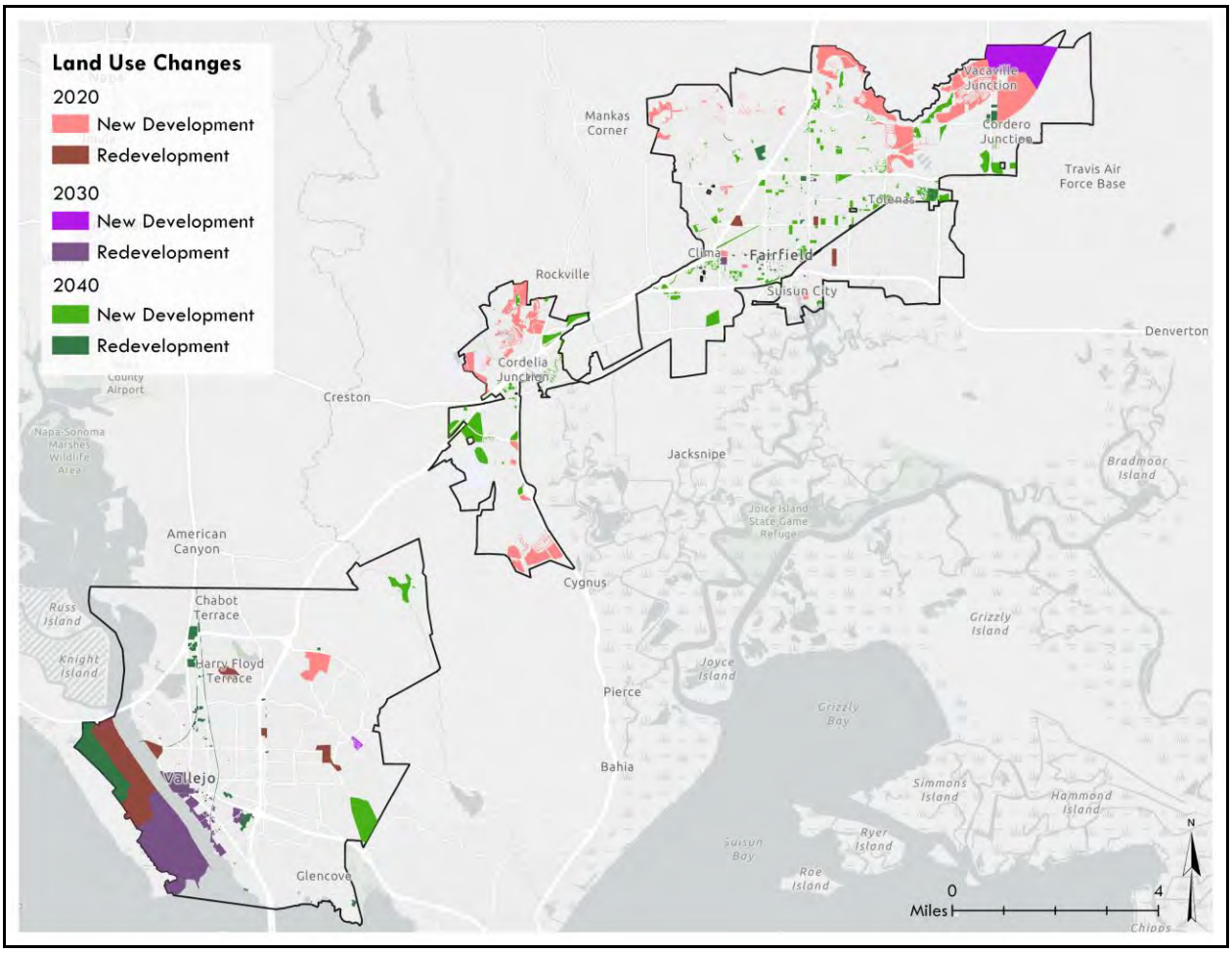

Figure 3.8. Land use changes used in future scenarios.

3.3.2 Land use corrections

Best available satellite time series imagery from Google Earth was used to identify and correct inaccuracies in the SFEI 2005 land use layer (SFEI, 2005). These changes include improper classification of open space that had been developed by 2005 or misclassification of old urban areas that had been redeveloped. Figure 3.9 shows an example of one of the areas within the City of Vallejo that was classified as Open land use and changed to New Urban land use, which was typical of these instances. Other issues identified in the land use layer were related to areas incorrectly classified as Old Transportation land uses (also previously recognized by McKee et al. 2014, p. 90). Examination of historical satellite imagery via Google Earth showed that several of these areas had been redeveloped are recently as 2004, and were therefore changed from 'Old Transportation' to New Urban land use in the 2020 and all subsequent model scenarios.

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Figure 3.9. Example of a correction made in a Fairfield neighborhood to the land use layer used as input to the pollutant loading model.

3.3.3 Projected land use changes from UrbanSim

The UrbanSim model was used to project parcel-level land use changes for future scenarios. UrbanSim is an open source simulation system created by Paul Waddell and University of California, supported by grants from National Science Foundation designed to support urban planning. Spatial outputs reflect changes in residential housing units were used to infer redevelopment land use change over time. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Governments (ABAG) Committees for use in transportation projections and the regional Plan Bay Area development process.

The general workflow to extract new development and redevelopment parcels from the UrbanSim model mirrored that employed by the Contra Costa County Clean Water Program RAA analysis:

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1. Intersect the parcel dataset with Solano County MS4 areas
2. Export UrbanSim model runs for the years 2010 through 2040 that includes fields that quantify total job spaces, total residential units, and year built.
3. Use an if-then statement to flag parcel differences for these metrics between 2010 and 2040 and query the year built output to determine which parcels are estimated to change during each scenario timeframe (2010-2020, 2020-2030, 2030-2040)

It was assumed that new development and redevelopment of multifamily residential and commercial/industrial parcels will incorporate GSI in accordance with MRP Provisions C.3.b., C.3.c., and C.3.d. Because of high land values, it is expected that more than 50% of the existing impervious area in each parcel will be replaced if a parcel is developed, and therefore the entire parcel will be subject to Provision C.3 requirements (that is, will be retrofit with Green Stormwater Infrastructure), consistent with the "50% rule" requirements of MRP Provision C.3.b. Land Use changes predicted via the UrbanSim[18] model were incorporated into swTELR for each scenario year according to the output time period.

3.3.4 Planned land use changes

Allocation of planned land use changes to each scenario was based on documented development plans or verification of new development initiation or completion via use of best available satellite imagery up to land use conditions as of 2018. For example, the Callahan Property Company's development in the City of Vallejo Northern Waterfront (52 acres) at Mariners Cove was allocated to the 2020 scenario as development plans have been approved by the City of Vallejo along with a schedule of parcel development[19] and satellite imagery indicates site grading has begun. The Central Waterfront area was instead allocated to the 2030 scenario (see Figure 3.8). Likewise, the 157-acre area located on the northern portion of Mare Island currently owned and under redevelopment by the Nimitz Group was allocated to the 2020 scenario. The 250 acres that Nimitz Group recently acquired from the Lennar Corporation, which is still in the scoping stages, were included as redevelopment areas in the 2030 scenario. The residential developments that have already been completed by Lennar Corporation, such as Farragut Village (completed 2007), or are in progress Coral Sea Circle, Kirkland Isle II were also allocated to the 2020 scenario. The remaining area on Mare Island still owned by Lennar Corporation (approximately 350 acres) is slated for redevelopment, but with no specific plans identified, it was allocated to the 2030 scenario. The remaining areas identified in City of Vallejo General Plans for land use change that

[18] http://www.urbansim.com/urbansim

[19] http://www.ci.vallejo.ca.us/city_hall/departments___divisions/city_manager/economic_development_division/waterfront_project

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did not have any specific redevelopment planning documentation available were allocated to the 2040 scenario (Figure 3.8).

All GSI implementation within redevelopment and new development projects was assumed to be bioretention features, which are decentralized BMP types that reduce both stormwater volumes and pollutant concentrations. The sizing of planned bioretention features align with the MRP section C.3.d requirement to reduce and treat the contributing stormwater volume generated up to the 85th percentile 24-hour rainfall depth (SWRCB, 2015).

Relative to the baseline simulation scenarios, areas of new development identified typically produce additional runoff resulting from increased impervious coverage. While these increases will be mitigated with GSI implementation, conversion from Open Space land use to New Urban still usually results in net increases of runoff and pollutant loading. For these scenarios, the impervious coverage layer was changed manually in the GIS so that areas which typically had zero impervious coverage values before new development (e.g. Open Spaces land use) would reflect the typical impervious coverage of the New Urban land use. Exceptions to this rule were in areas that the impervious coverage layer accurately reflected the land use changes that had occurred since 2005, which is when the land use layer was created.

3.3.4.1 *Key land use change assumptions and limitations*

The reliability of the modelling results relies heavily on the following land use data assumptions:

- Past and future land use changes have been adequately captured via automatically classified land-use maps, planning documents, and inspection of historical satellite imagery
- UrbanSim model outputs reasonably reflect the rates and locations of land use change anticipated in the future.
- Land use changes result in reductions of characteristic pollutant runoff concentrations as defined by the PCB and mercury land use layer (SFEI, 2005).

The assumption that land use changes will result in the specified pollutant concentration changes is a substantial source of uncertainty in this analysis. It includes the implicit assumption that all remediation actions and new development standards prescribed in the MRP are closely followed and in perpetuity. While this assumption relies on the best sampling data available to date, which has already been discussed, these data are limited, especially in Solano County.

Comparison of the SFEI 2005 land use data layer to available imagery indicated misclassification of several areas. It is unlikely all errors were identified and corrected. Manual inspection of historical satellite imagery is tedious and only useful for identifying new development or areas that were incorrectly classified as open space. Historical redevelopment is not obvious and would have required a much more detailed study of the area and available data that was beyond the scope

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of this effort. The options for spatially explicit land-use change estimates are few, and UrbanSim at least provides a more detailed option than applying a uniform rate across each city. However, using model outputs to drive another model holds the substantial disadvantage of compounding uncertainty through different model layers.

3.4 Reductions from Green Stormwater Infrastructure (GSI)

3.4.1 Parcel/Green Street LID

Planned and completed LID projects were mostly green streets within the City of Vallejo that were identified via capital improvement projects and are listed in Table 3.3. Since these projects did not have defined locations or types of structural BMPs yet specified, bioretention feature application for the entire drainage areas was again assumed to the 85th percentile 24-hr design storm as specified in MRP C.3 requirements. Each project area was defined by its outline that was delivered to 2NDNATURE via the City of Vallejo as a GIS shapefile.

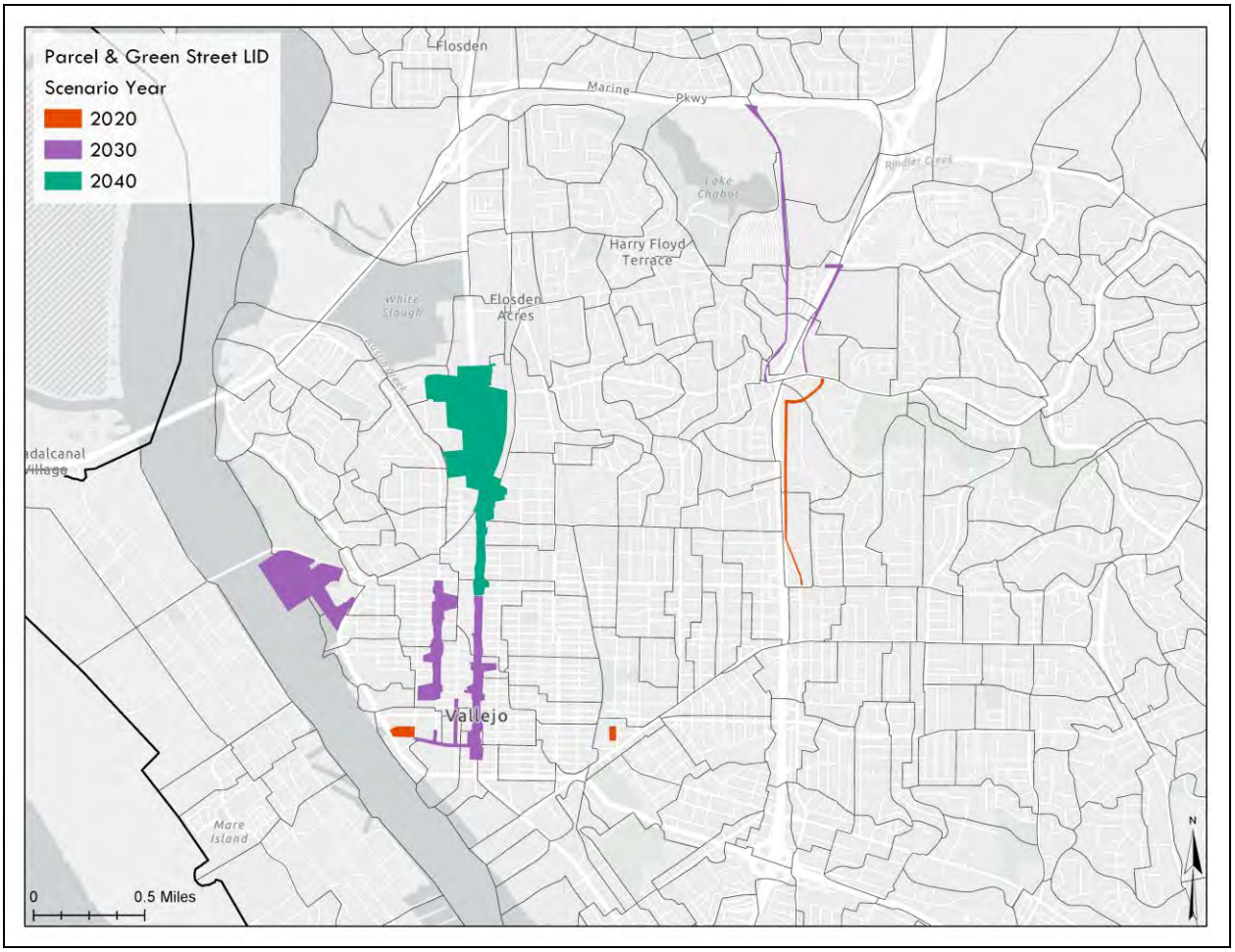

Figure 3.10. Future parcel and Green Street LID projects identified in Vallejo.

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Table. 3.3. Future LID projects planned in Vallejo.

City	BMP ID	Status	Scenario	Area (ac)	Catchments	Primary Receiving Water
Vallejo	Sonoma Boulevard Streetscape Phase 5 & 6	Planned	2040	105.94	AC12, CA14, AC15, AC20, AC35, AC37, AC38, AC39, AC41, AC52, AC53	Napa River
Vallejo	Sonoma Boulevard Streetscape Phase 4	Planned	2030	9.69	AC12, DT5	Mare Island Strait
Vallejo	Benicia Road Bridge Replacement Project	Planned	2030	0.87	CP11, CP12	Southhampton Bay
Vallejo	Sonoma Boulevard Streetscape Phase 1-3	Planned	2030	12.53	DT1, DT2, DT5, SA59, DT2, DT5	Mare Island Strait
Vallejo	Marina Sea Wall	Planned	2020	44.58	DT10, DT11, MI22	Napa River
Vallejo	Sacramento Street Streetscape Phase 1	Planned	2030	8.32	DT12	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 2	Planned	2030	3.89	DT12, DT 5	Mare Island Strait
Vallejo	Downtown Streetscape Phase 4	Planned	2030	1.61	DT3, DT4	Mare Island Strait
Vallejo	Downtown Streetscape Phase 5 & 6	Planned	2030	1.44	DT3, DT4, DT2	Mare Island Strait
Vallejo	Downtown Streetscape Phase 7, 8 & 9	Planned	2030	2.07	DT3, DT5	Mare Island Strait
Vallejo	Vallejo Station Phase B	Planned	2020	3.04	DT4	Mare Island Strait
Vallejo	Sacramento Street Streetscape Phase 3	Planned	2030	9.06	DT5	Mare Island Strait
Vallejo	Admiral Callaghan Widening	Planned	2020	2.85	LC10, LC11, LC13, LC15A, LC8	Blue Rock Springs Creek
Vallejo	Fairgrounds Drive Improvements	Planned	2030	9.05	LC10, LC11, LC27, LC37A, LC8, LC9, SA44, LC37B	Lake Chabot
Vallejo	Turner Parkway Overcrossing	Planned	2030	0.83	LC11, LC15A	Rindler Creek
Vallejo	Admiral Callaghan Middle Lane	Planned	2020	6.29	LC6, SA39, SA 40	Mare Island Strait
Vallejo	Public Safety Building Rehab and Design	Planned	2020	1.16	SA52	Mare Island Strait

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3.4.2 Decentralized BMP implementation

Existing and planned decentralized BMP implementation was modeled in swTELR in a spatially explicit manner, with raster-based calculations for runoff and pollutant load reductions performed at the 30-meter pixel scale for each of the future scenarios (2020, 2030, 2040). Existing GSI BMP specifications were documented by Solano Permittee city staff and provided to 2NDNATURE via spreadsheets and uploaded to the 2Nform spatial platform. The city staff confirmed the locations and attributes of each BMP and GSI project via a web-based mapping interface[20] prior to finalizing the dataset.

For each modeling scenario, GSI benefits are accounted for *after* land use changes are applied. This sequencing of pollutant reduction accounting is important to avoid double counting of benefits, since where redevelopment occurs, pollutant loads delivered to GSI will be lower due to the transformation of Old Industrial to New Urban land uses within the contributing drainages. In areas were new development occurs, the land use changes typically result in additional runoff available for infiltration by BMPs due to increased impervious coverage. All structural BMP types modelled reduce either runoff through infiltration or pollutant concentration through particle capture and filtration, and several GSI types do both. The pollutant reduction processes represented depend on the BMP type as detailed in Table 2.3.

For most existing and several planned BMPs, exact locations and BMP types were available from Solano Permittees, so that benefits were calculated according to the type and location of each BMP and included in the 2020 scenario (and carried over into all subsequent scenarios). In this way, the modeling outputs preserved the uniqueness of each location in terms of runoff production and pollutant loading from each of their specified drainage areas which were explicitly accounted for in the calculations. The locations of all existing or planned decentralized BMPs are shown in Figure 3.11 and each BMP is listed in Appendix D with their relevant attributes.

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20 http://2ndnature.maps.arcgis.com/apps/webappviewer/index.html?id=839c43995b64448cb0da6b4d38c5a6b6

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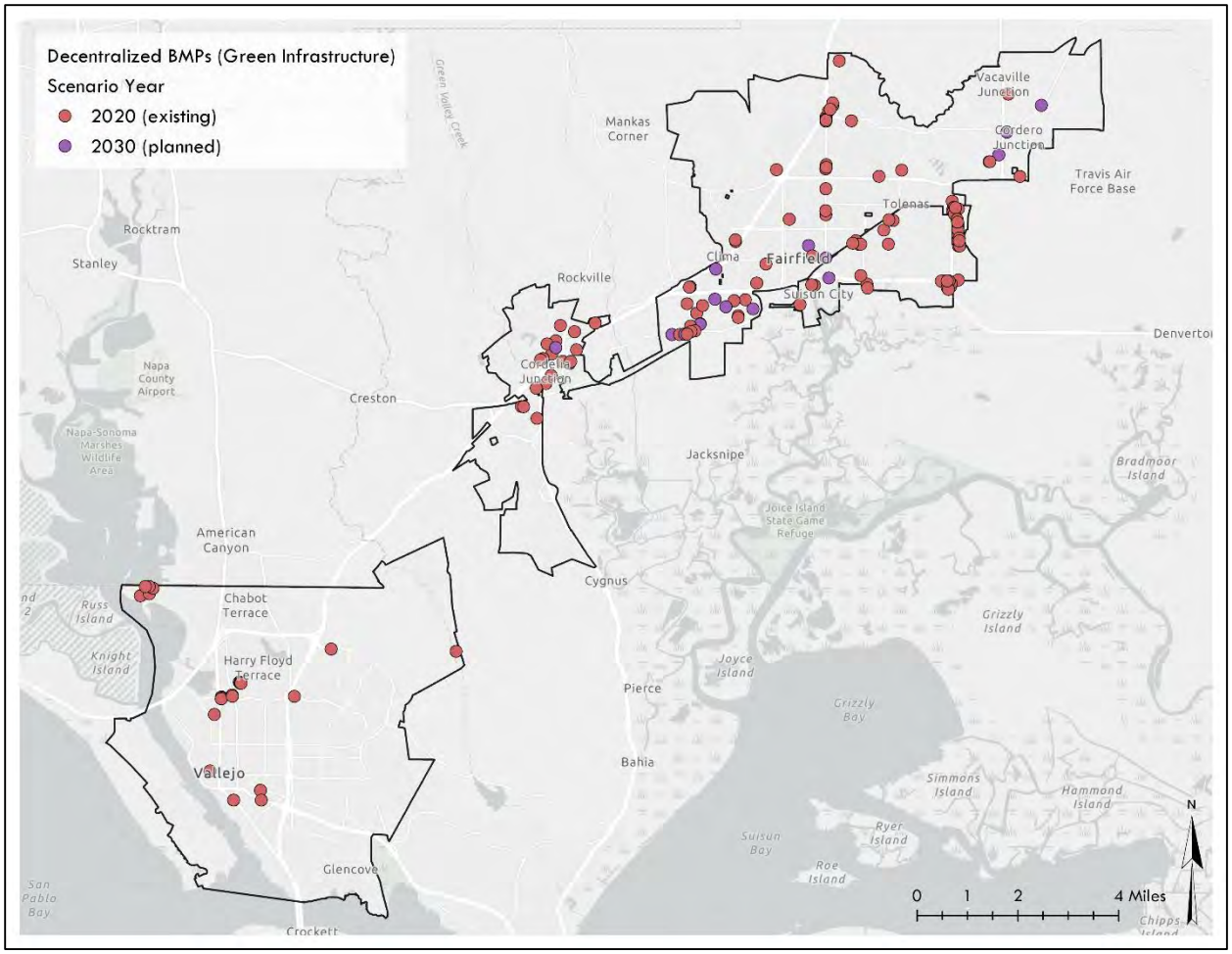

Figure 3.11. Existing and Planned Decentralized BMPs implemented throughout the Solano Permittee MS4 Area.

Current and future reductions from decentralized BMPs were modeled assuming that they were built according to MRP, section C.3d requirements, so that volume-based designs would infiltrate runoff generated by rainfall up to the 85th percentile 24-hour rainfall depth. Since swTELR generates runoff for a several percentile slices of the rainfall distribution, raster outputs of runoff were generated for each percentile rainfall depth. For decentralized BMPs, reductions were calculated as the runoff generated after land use changes minus the volume generated up to the 85th percentile rainfall event for each of the grid cells that comprised the respective BMP drainage area. For calculating pollutant load reductions, the remaining volume was multiplied by either the untreated land-use concentration or a reduced concentration, depending on whether the BMP type provides pollutant treatment in addition to runoff reductions. Since these BMPs generally receive runoff infiltration and treatment close to the site where it was generated, delivery to the BMP is assumed to be instantaneous.

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3.4.3 Decentralized BMP performance efficiency

Since the decentralized BMP calculations were performed on raster datasets with coverage throughout the Solano Permittee MS4 area, we can examine the potential for pollutant reductions by sampling grid cells and calculating runoff and pollutant reduction for different BMP types. Figure 3.12 shows the range of location specific potential reductions for BMPs that perform runoff infiltration or treatment and those that do both (e.g. bioretention features). Again, all decentralized BMPs were assumed to be sized and performing in perpetuity to capture runoff generated from the 85th percentile 24-hour storm depths per MRP section C.3.d. Since there is different runoff and loading potential throughout the Permittee MS4 area, there is a range of potential runoff capture and associated BMP load reduction. Given that both PCBs and mercury are hydrophobic and have a strong tendency to adsorb to particulates, we assume similar pollutant reduction capture efficiency for both pollutants. Note that the shape of the curves in the right panels of Figure 3.12 reflect the non-linearity between rainfall and runoff production. Runoff infiltration generally provides somewhat greater benefit than runoff treatment at this design level, and BMPs that do both infiltration and treatment provide substantially greater benefits within a narrower performance range (Figure 3.12).

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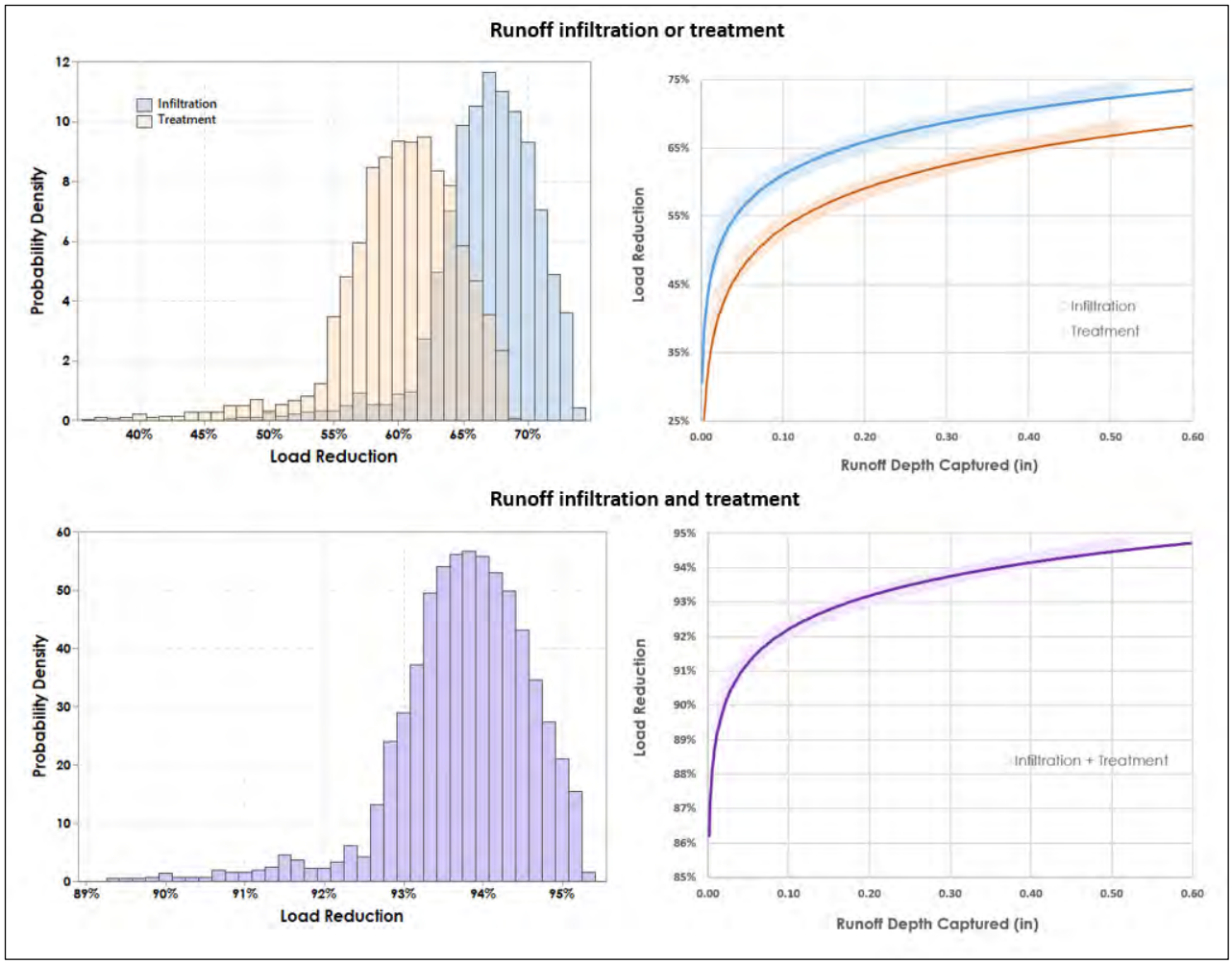

Figure 3.12. BMP performance efficiency. Histograms in panels on the left show load reduction distributions and curves in panels on the right show load reductions per runoff depth captured. Depth capture shown in the range of flows generated by the 85th percentile rainfall event.

The performance curves shown in Figure 3.12 are specific to Solano County, since they incorporate annual rainfall distribution characteristics and site-specific runoff and pollutant generation. As such, they are quasi-empirical in nature. These curves are very similar to those calculated from observed data for the purpose of standardizing load reduction accounting throughout the Chesapeake Bay to support TMDL compliance (Scheuler and Youngk, 2015). Given the sheer number of decentralized BMPs that will need to be accounted for in the SF Bay Area, ongoing accounting of their benefits will likely require a similarly simple accounting system as they have implemented in the Chesapeake Bay Region. For example, there are more than 6,000 BMPs currently catalogued in Prince George County, MD (population 900,000) alone that require ongoing pollutant reduction benefit quantification. Within the decade, the SF Bay Area will likely have tens of thousands of structural BMPs catalogued that require a practical method for accounting for reductions and ongoing verification of performance.

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3.4.4 Centralized BMPs

Runoff and pollutant load reduction performance from existing and planned centralized BMPs (also called regional treatment projects) employed the methods described in Section 2.3 to determine routing, timing, and partitioning of infiltrated, treated and bypassed flows for calculating reductions for future scenarios. A primary difference from decentralized BMPs is that with centralized BMPs, stormwater is typically transported a substantial distance away from where runoff was initially generated, so that runoff timing is important for estimating centralized BMP reductions.

Centralized BMP and drainage specifications were documented by city staff and transferred to 2NDNATURE, where they were uploaded to a web-based mapping platform for verification by city staff before inclusion in the modeling scenarios. Centralized BMPs included in the modeling scenarios are listed in Table 3.4 and shown on Figure 3.13. The predominance of dry basins as a centralized BMP in Fairfield vs treatment vaults as the predominant choice for centralized BMPs in Vallejo reflects the difference in soil types: Fairfield has a much greater amount of Type A and B soils (higher infiltration rates) compared to Vallejo (see Figure 3.2).

The hydrologic and pollutant loading to each centralized BMP is calculated based on the land use changes and decentralized BMP reductions within each centralized BMP contributing drainage areas. The performance of each centralized BMP is estimated based on the computational approach outlined in Section 2. While there may be additional centralized BMPs installed with future new development, inclusion in this RAA analysis required that cities had documentation of locations, types, and capacity of future BMPs. Centralized BMPs, both planned and already installed, are listed by Solano Permittee city in Table 3.4 along with location, drainage association, and corresponding modeling scenario.

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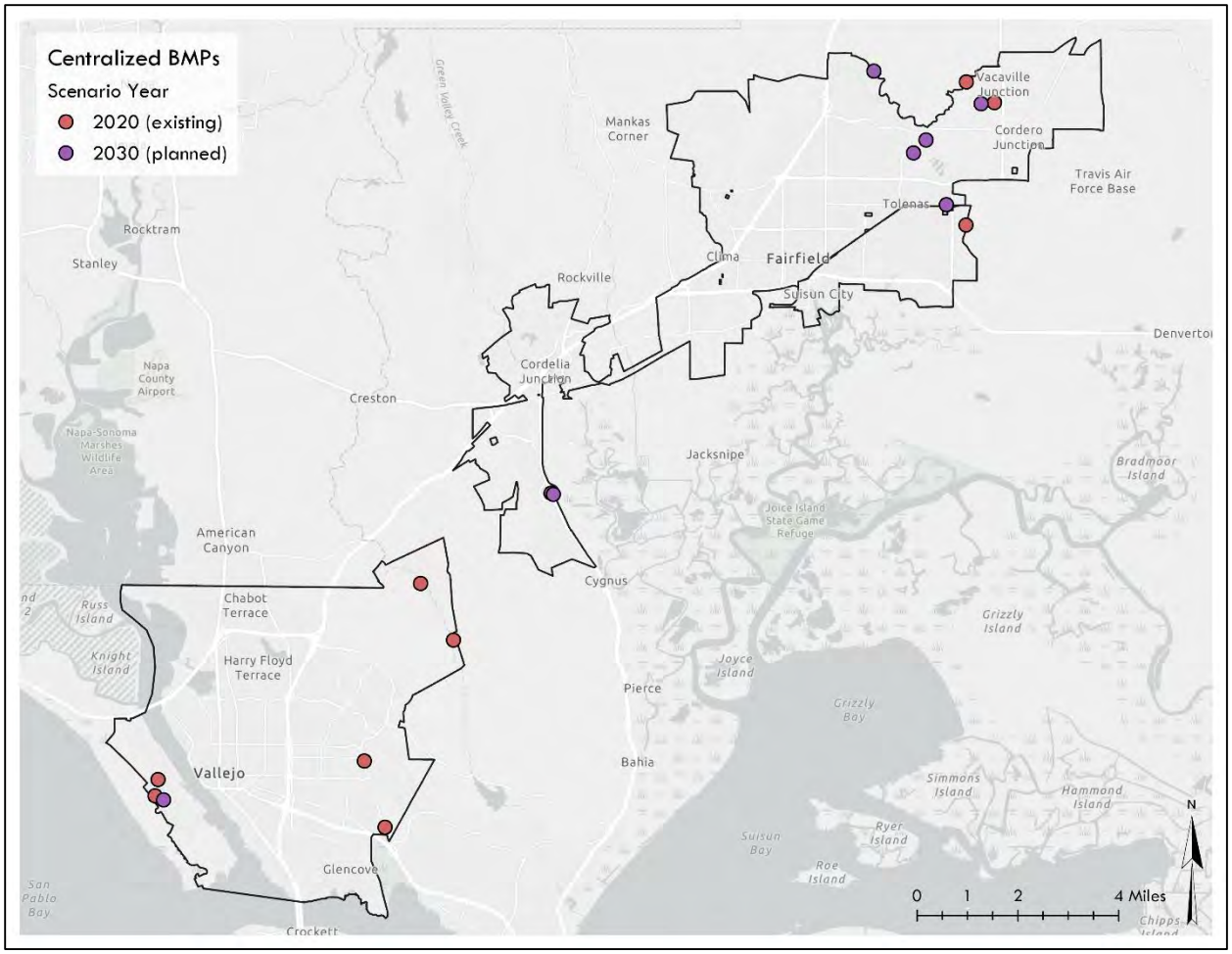

Figure 3.13. Centralized BMPs used in future modeling scenarios.

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Table 3.4. Centralized BMPs and attributes.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Gold Hill Village 1	Installed	2020	Dry Basin	11	Marsh 1	MAR-2	38.18047928	-122.1342695
Fairfield	Gold Ridge-so. of Putah So. Canal	Installed	2020	Dry Basin	124	McCoy Creek	COY-26	38.2928207	-121.9726825
Fairfield	Gold Ridge-no. of Putah So. Canal	Installed	2020	Dry Basin	120	McCoy Creek	COY-30	38.29886642	-121.9829339
Fairfield	Paradise 360	Planned	2030	Dry Basin	9.7	Laurel Creek	LAU-12	38.30187014	-122.0165929
Fairfield	Gold Hill Village 2	Planned	2030	Dry Basin	11	Marsh 1	MAR-2	38.18016302	-122.1334273
Fairfield	Ivy Wreath/Strawberry Fields	Planned	2030	Dry Basin	13.8	McCoy Creek	COY-10	38.26349435	-121.9902188
Fairfield	Villages at Fairfield- Village 2	Planned	2030	Dry Basin	42	McCoy Creek	COY-19	38.27843273	-122.0021546
Fairfield	Discovery @ Gold Ridge	Planned	2030	Dry Basin	15	McCoy Creek	COY-24	38.29252809	-121.9774729
Fairfield	Villages at Fairfield- Village 1	Planned	2030	Dry Basin	76	McCoy Creek	COY-6	38.28212579	-121.9975519
Fairfield	2900 Cordelia	Installed	2020	Bioretention	38.085	Marsh 1	MAR-11	38.22804606	-122.0847827
Fairfield	Gateway 80, Buildings A & B	Planned	2030	Bioretention	35.93	Marsh 1	MAR-11	38.2280516	-122.0856715
Suisun	PR Detention Basin	Installed	2020	Dry Basin	64.7	Marsh #1	MAR-47	38.257646	-121.982987
Vallejo	SA10062T	Installed	2020	Treatment Vault	108	Mare Island Strait	SA10	38.10333666	-122.2021727
Vallejo	2183GT318	Installed	2020	Treatment Vault	35	San Pablo Bay	SP3B	38.0978149	-122.277309
Vallejo	2184GT027	Installed	2020	Treatment Vault	40	San Pablo Bay	SP4	38.09313091	-122.2783658
Vallejo	SV1401T	Installed	2020	Treatment Vault	108	Sulphur Springs Creek	SV1B	38.1381688	-122.1697917
Vallejo	SV1203T	Installed	2020	Treatment Vault	135	Sulphur Springs Creek	SV1C	38.15438193	-122.181801
Vallejo	Lennar Mare Island B3	Planned	2030	Dry Basin	37	San Pablo Bay	SP4	38.09204167	-122.275241
Vallejo	BeniciaRd_Basin	Installed	2020	Dry Basin	600	Southhampton Bay	CP12	38.08431517	-122.1944904

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3.4.5 Key GSI modeling assumptions

Calculation of GSI reductions depended upon several assumptions:

- All redevelopment since the 2005 baseline year and future redevelopment complies with MRP C3 requirements to capture and/or treat runoff up to the 85th percentile 24-hr rainfall event.
- Bioretention features or comparable decentralized BMPs that reduce both volumes and pollutant concentrations will be make up a substantial proportion of future GSI implemented.
- Decentralized BMPs that reduce PCB/Hg concentrations in stormwater do so at 80% efficiency when functioning as designed. While there is some evidence to support this assumption, it is very limited. As such, this should be considered an important source of uncertainty in the outputs.
- Centralized BMPs that reduce PCB/Hg concentrations in treated outflow have characteristic effluent concentrations with correspond with sediment reductions.
- All structural BMPs will perform to their design standard in perpetuity, requiring a proactive commitment to maintenance Permittee's are encouraged to adopt a tracking and accounting system that includes field verification of GSI performance and provide permittees with useful asset management information on GSI.

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4 RAA Modeling Results and Compliance Demonstration

This section presents the results of modeling experiments using the structure, methods, inputs and assumptions that have been described in sections 1-3. The results presented include baseline modeling, comparison with the Regional Watershed Spreadsheet Model (RWSM), and GSI reductions modeling.

4.1 Baseline Modeling Results

4.1.1 Baseline conditions

Baseline runoff was calculated for each Solano County Permittee MS4 Areas (Fairfield, Suisun, and Vallejo) according to the methods described in section 2.3, with the results summarized for each city in Figure 4.1. Runoff volumes are much higher in Fairfield (13,268 afy) and Vallejo (13,391) since these cities are much larger than Suisun, which only produced 2,091 afy of runoff. PCB loading is particularly high in the City of Vallejo (477 g) compared to Fairfield (137 g), and Suisun (16 g), owing to the high proportion of source area and old industrial land use in Vallejo.

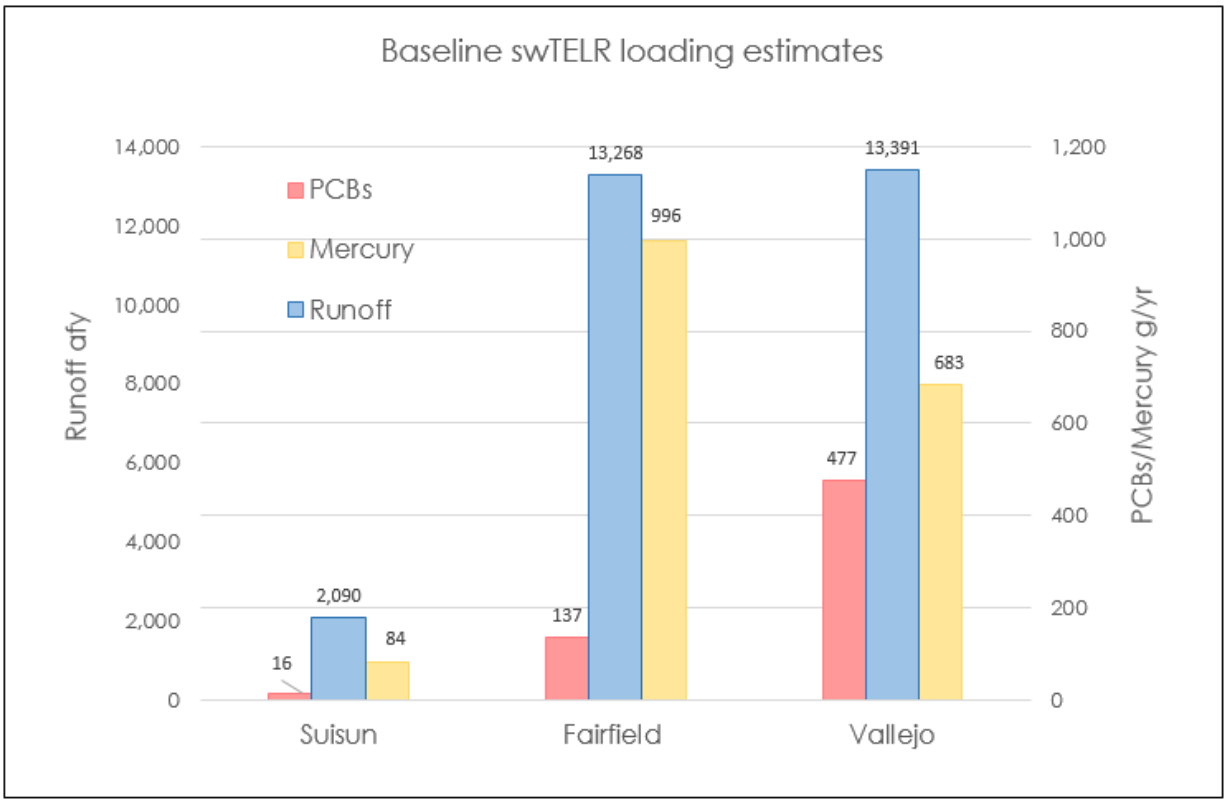

Figure 4.1. Runoff, PCBs, and mercury baseline loading estimates from swTELR.

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Baseline runoff estimates were aggregated to the urban catchment scale from calculations performed at the 30-meter grid scale (Figure 4.2). As we would expect, runoff generation is generally highest in areas with high impervious cover and poorly draining soils. These include the urban centers of Vallejo and Suisun City. Baseline runoff is an important driver of spatial patterns of pollutant loading across Solano County; area-normalized runoff ranged from 0.01 ac-ft/ac/yr to 1.2 ac-ft/ac/yr, with an average value of 0.67 ac-ft/ac/yr.

Baseline pollutant loading for PCBs and mercury were calculated using the methods described in sections 2.3 and 3.1and aggregated to the urban catchment scale (Figures 4.3 and 4.4). The runoff estimates shown in Figure 4.2 were used for calculating both PCB and mercury loads. Average baseline loading values for catchments ranged from 0.01 g/ac/year to up to 0.18 g/ac/yr throughout the Solano Permittee MS4 Area (Figure 4.3). High PCB loading catchments are strongly associated with the relative proportion of Source Area or Old Industrial land use coverage within catchments. This is an intuitive result, since runoff concentration values for these land uses are substantially higher than the other land uses (Table 3.1). The greatest concentration of high loading areas is in Vallejo on Mare Island, which is classified almost entirely as Old Industrial land use. Other areas of relatively high PCB loading are the southern part of the Vallejo Waterfront, Vallejo downtown, and Central Fairfield. As we would expect, upland areas on the outskirts of both cities, which are largely undeveloped have very low PCB loading values.

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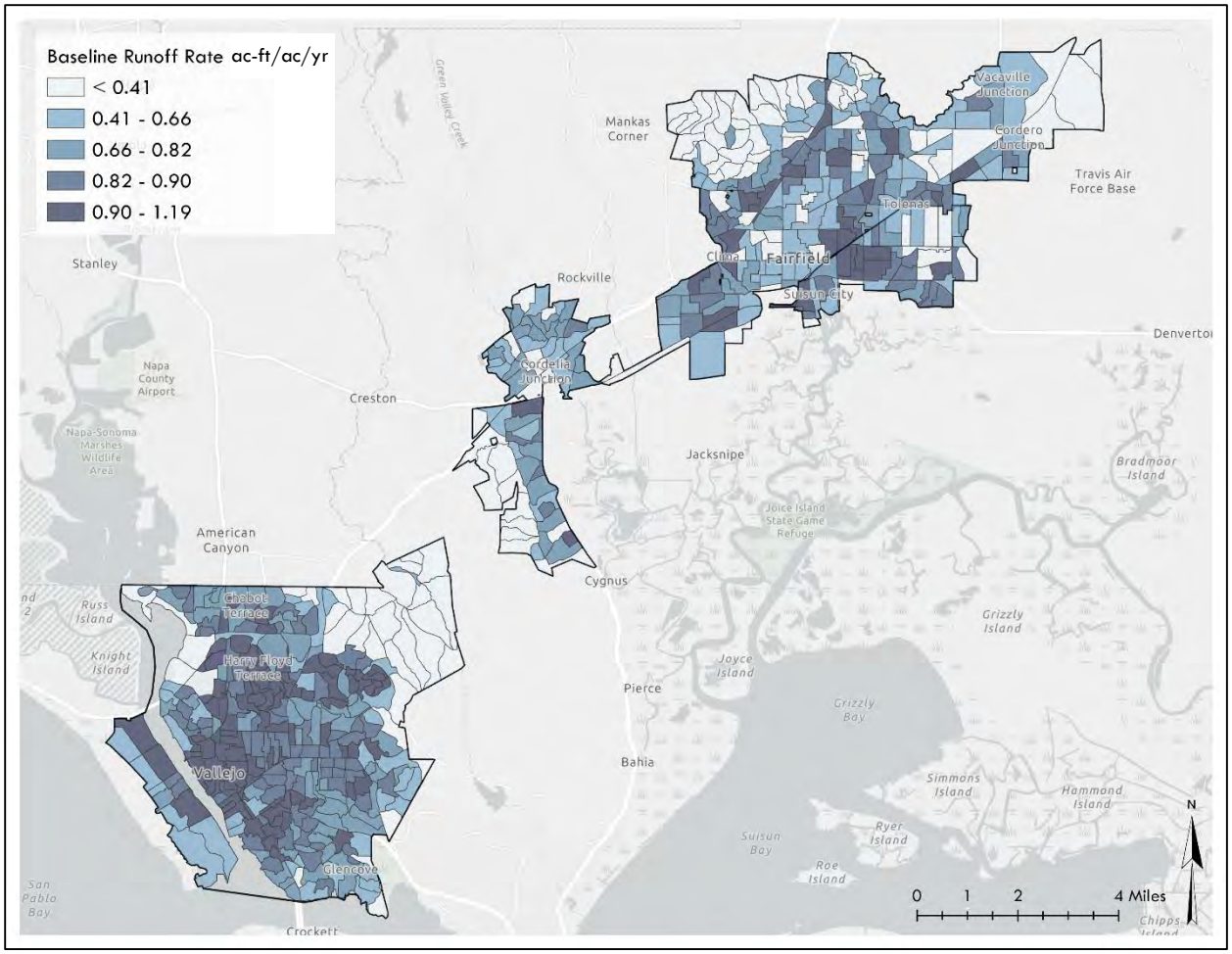

Figure 4.2. Baseline runoff estimates for Solano Permittee MS4 Area

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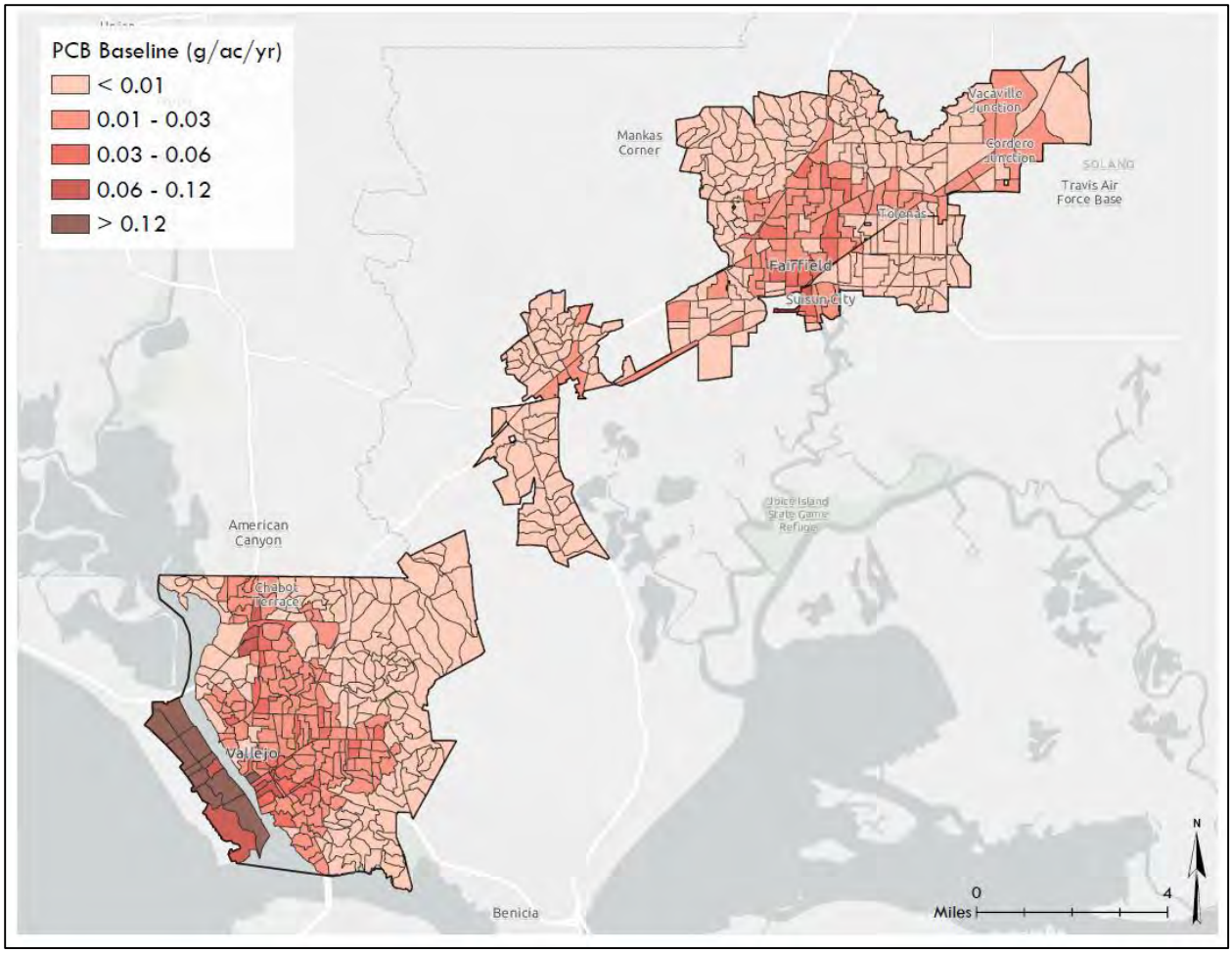

Figure 4.3. Baseline PCB loading estimates for the Solano Permittee MS4 Area

Mercury baseline loading outputs are shown in Figure 4.4. With less difference between land use characteristic runoff concentrations for mercury, loading outputs are more responsive to spatial patterns of runoff compared to PCBs. Loading values range from 0.009 to 0.125 g/acre/year throughout Solano County. Like with PCBs, the most heavily developed areas in downtown Fairfield and Vallejo both show relatively high mercury loading but areas such as Mare Island and the Vallejo waterfront show relatively lower mercury loading values compared to PCBs, primarily due the difference the high characteristic PCB runoff concentrations for Old Industrial and Source Area land uses present in those areas. Industrial areas along Highway 12 also show relatively high mercury loading, which did not show high PCB loading. Undeveloped upland areas in the northern portions of Fairfield and Vallejo show mostly low loading as with PCBs due to low runoff generation in these areas that have substantial open space coverage.

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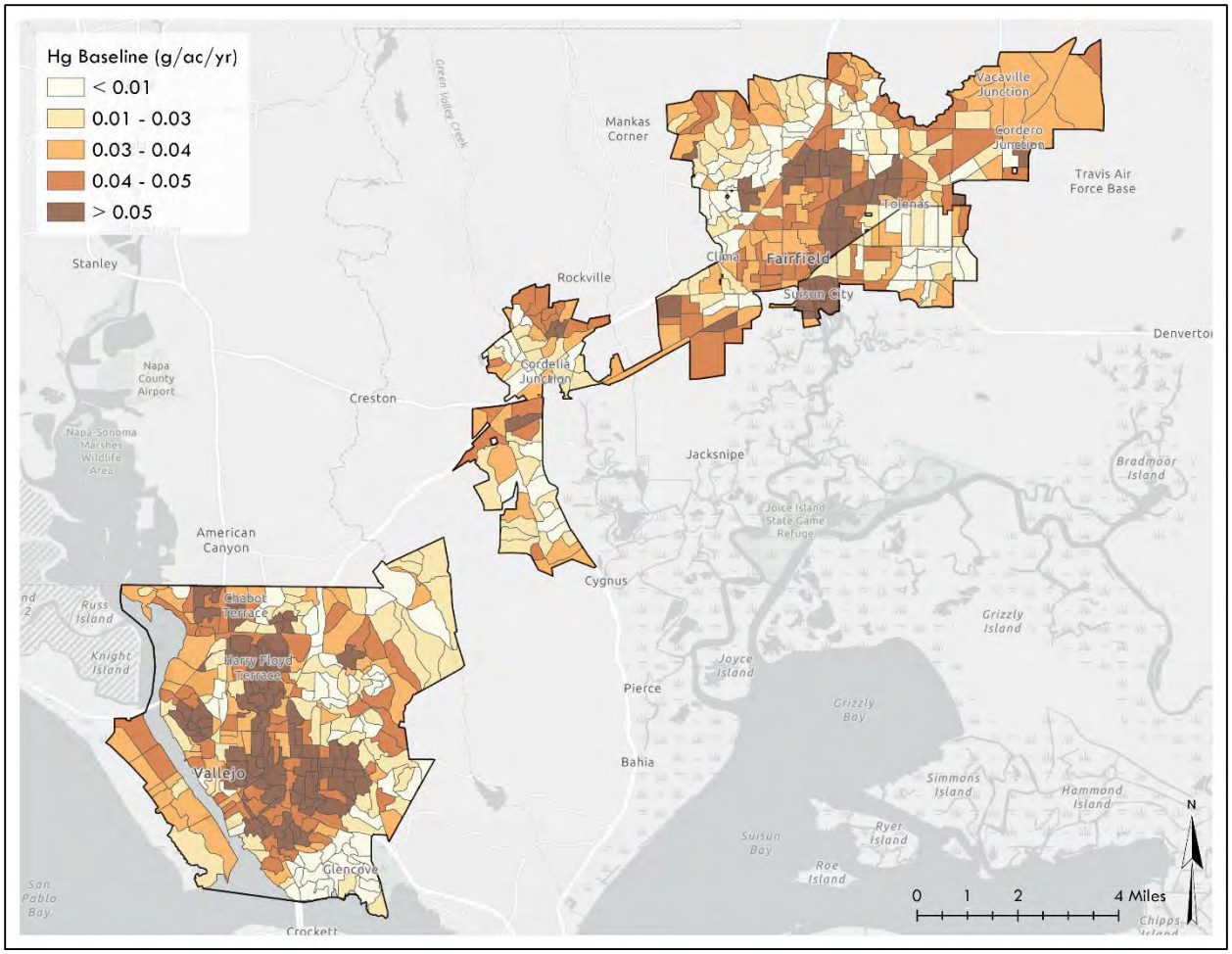

Figure 4.4. Baseline mercury loading estimates for the Solano Permittee MS4 Area

4.1.2 Comparison with Regional Watershed Spreadsheet Model (RWSM)

Comparison between outputs from swTELR and RWSM shows close correspondence between outputs from the two models (Table 4.1). Overall, there was little difference in estimates between swTELR and RWSM runoff estimates (-4%), PCB loads (-16%), or mercury loads (9%), with swTELR providing the lower estimates for runoff and PCBs, and higher estimates for mercury compared to RWSM. Discrepancies between the two models are due almost entirely to the differences in the spatial pattern of runoff estimates, since land use concentrations used in swTELR are identical to those used in RWSM. Even though Solano county is technically part of the North Bay, runoff coefficients used for the RWSM outputs are the same as those used for the East Bay, because rainfall gauges in the East Bay more closely reflect the Solano County rainfall regime. There were no calibration sites for RWSM located in the vicinity of Solano County (McKee et al., 2014); some of the North Bay calibration sites used in RWSM had nearly double the annual rainfall of Fairfield. The decision to use East Bay runoff coefficients was confirmed appropriate by SFEI staff (A. Gilbreath, pers. com., Oct 2018).

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Table 4.1. Comparison of average annual loading to SF Bay from RWSM and swTELR.

	RWSM			swTELR			% Difference		
	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB (g/yr)	Hg (g/yr)	Q (afy)	PCB	Hg	Runoff
Fairfield	131	607	13,244	137	696	12,120	-16%	-12%	-8%
Suisun	15	68	1,655	16	84	2,116	-7%	26%	28%
Vallejo	569	657	13,765	477	683	13,450	-16%	5%	-2%
Totals	**715**	**1,333**	**28,664**	**630**	**1,462**	**27,616**	**-16%**	**9%**	**-4%**

Hydrologic algorithms in swTELR are very sensitive to impervious cover and soil type - runoff generation directly reflects the local impervious cover. Since RWSM outputs are regionally calibrated, they do not appear to reflect the same degree of sensitivity to these factors at more granular scales, which probably accounts for a substantial proportion of the runoff differences between the two models at the individual city level. This is not unexpected, since RWSM was developed as a regional tool and necessarily reflects spatial factors specified at larger spatial scales (McKee et al. 2015) compared to the MS4 and urban catchment-scale estimates provided by swTELR.

To better understand the differences between swTELR and RWSM a multivariate general linear model was constructed at the urban catchment scale for both model outputs using impervious cover as a continuous independent variable and soil type as a categorical independent variable. Soils and impervious cover summarized for each urban catchment delineated in Solano County (n= 596) explained approximately 93% of runoff variance in swTELR (the expected outcome), but only 3.5% in RWSM (an initially surprising outcome). From these findings, we can conclude that: 1) use of TELR baseline estimates will not substantially affect calculations for progress towards overall waste load allocations for Solano Permittees compared to estimates from the RWSM model, 2) RWSM runoff volumes at the catchment scale strongly reflect calibrated parameters, which aligns with its purpose as a tool to estimate loading at the regional or sub-regional scale, 3) spatially explicit estimates from swTELR align more with widely held conceptualizations of how spatial factors such as impervious cover influence urban runoff generation.

4.2 Model Scenario Results

4.2.1 Spatial patterns of pollutant load reductions over time

For each modeling scenario, swTELR and the methods described in Section 3 were applied to generate outputs that incorporated runoff and pollutant loading reductions for different types of GSI. These included land-use redevelopment, decentralized BMPs, and centralized BMPs (regional treatment). These scenarios also included runoff and loading increases projected to result from

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new development within the Permittee MS4 Area. Overall estimated relative (%) PCB reductions from baseline are greater than those for mercury, which primarily reflects the relatively larger PCB reduction opportunities in Old Industrial and Source Areas that are planned for redevelopment.

Spatial loading outputs for all Solano Permittees are summarized at the urban-catchment level in Figures 4.5 and 4.6, with reductions expressed as grams per acre. The maps illustrate that PCB reductions are focused on Mare Island and within the urban centers of Vallejo and Fairfield for 2020, 2030, and 2040, with less intense clustering of reductions in 2030 and 2040 compared to 2020. Over the course of implementation from the baseline scenarios to 2040, catchments shift from higher to lower loading categories. Outputs from the 2040 scenario show that all catchments that were classified in the highest percentile category in the Baseline Scenario have been eliminated on Mare Island. There are substantially fewer of these relatively high loading catchments on the Vallejo Waterfront, Vallejo and Fairfield downtown areas. Catchments that show the largest relative reductions in the scenarios were usually those which started in the baseline scenario with substantial Source Area or Old Industrial land use. Outlying areas remained virtually unchanged from the baseline scenario due to low redevelopment rates in these catchments, low proportion of high pollutant producing land uses, and new development that generates additional runoff which can create small local pollutant loading increases over time compared to the undeveloped conditions.

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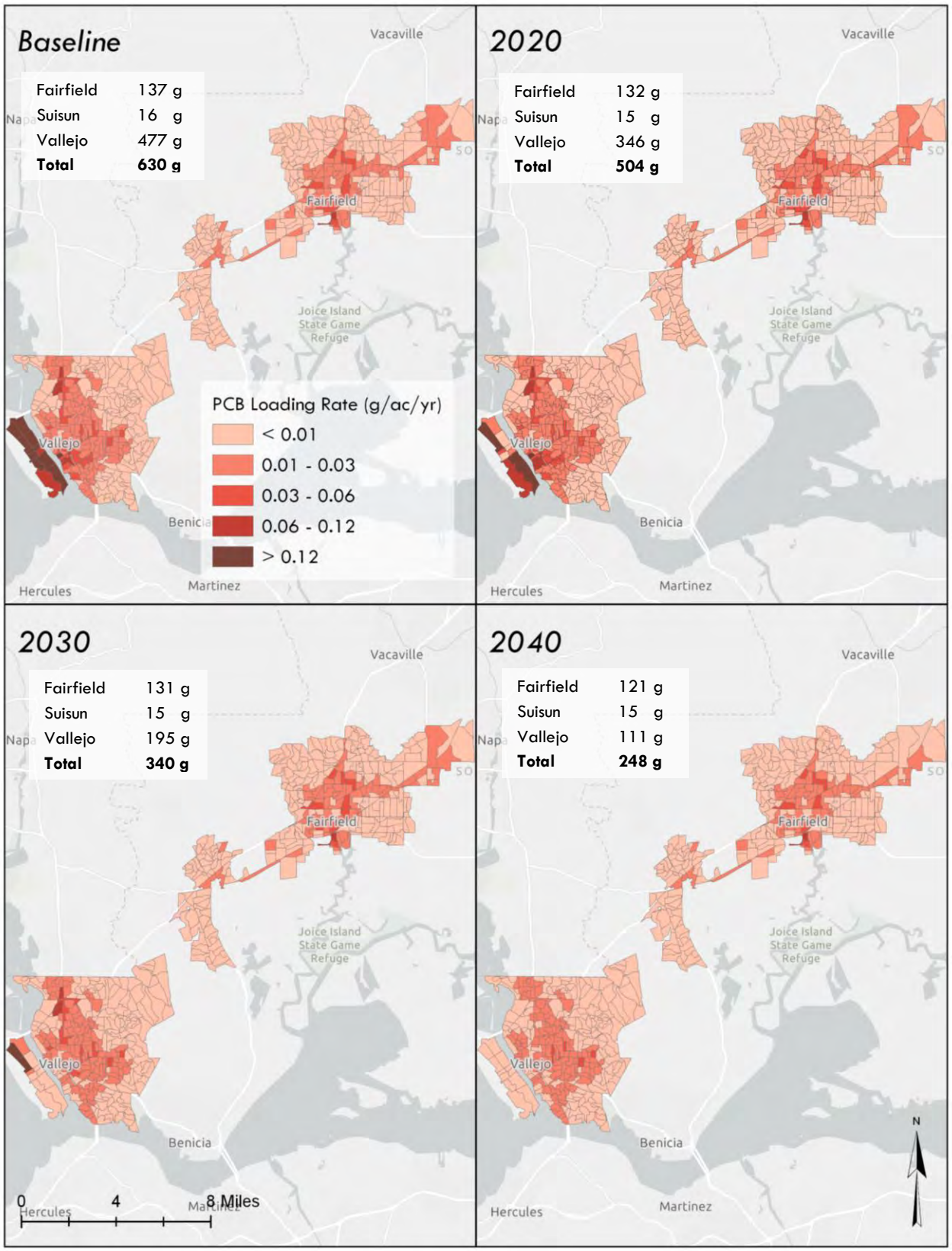

Figure 4.5. Spatial distribution of annual PCB load estimates for baseline and future scenarios

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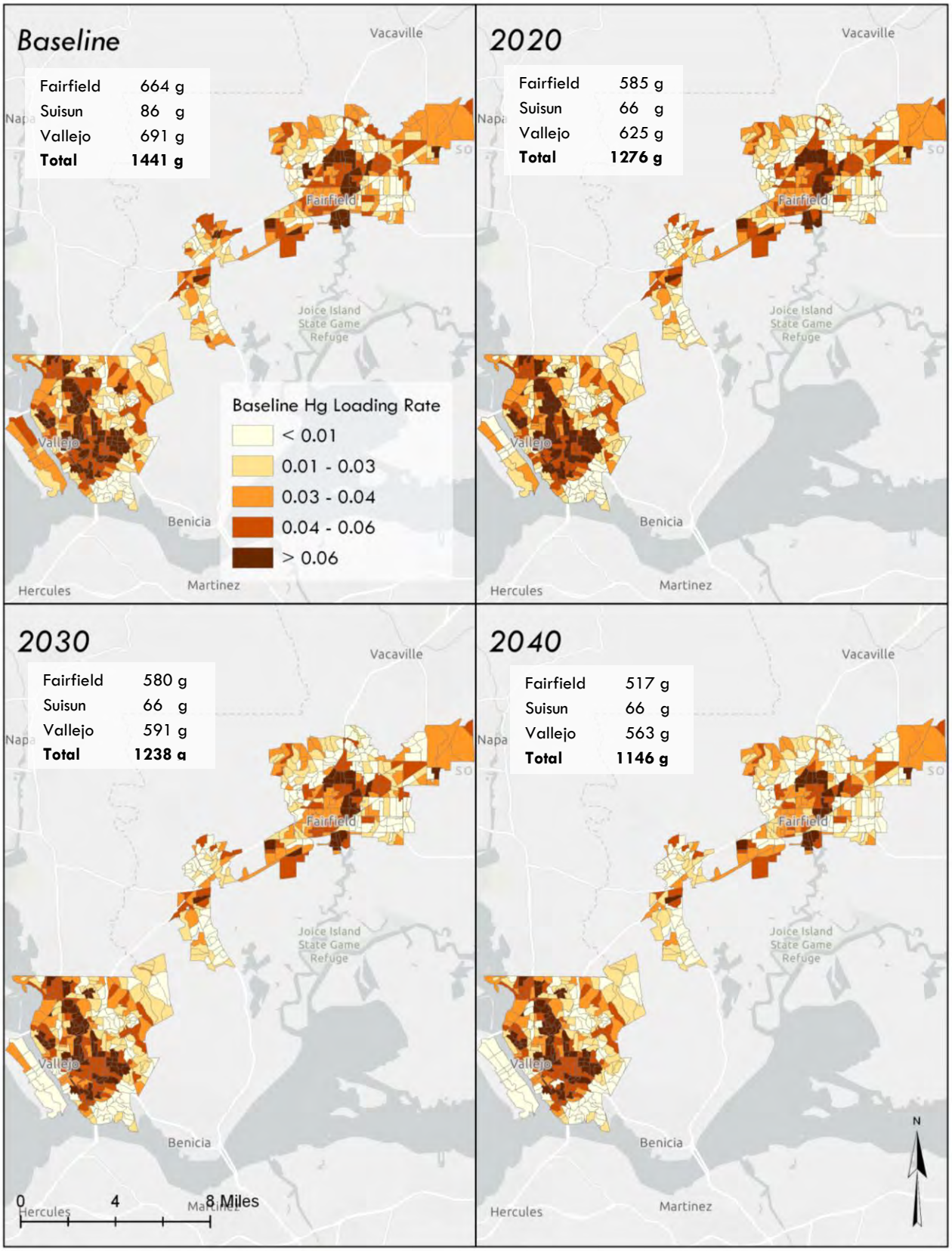

Figure 4.6 Spatial distribution of annual mercury load estimates for baseline and future scenarios

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GSI load reductions summary

Total estimated GSI reductions by the year 2040 are 382 grams of PCBs, and 295 grams of Mercury Table 4.2. These reductions constitute a reduction of 61% reduction from baseline for PCBs and a 20% reduction from baseline for mercury. GSI implementation and land use changes can be lumped together compliance demonstration, since they often occur at the same time during redevelopment and both contribute to the GSI reductions targets. However, it is instructive to examine the relative contributions from each component to form a clear picture of expected reductions. For both PCBs and mercury, the primary source of reductions is land use changes that result from redevelopment, making up 98.5% of total PCB reductions and 87% of mercury reductions by 2040 (Figure 4.7). In contrast, reductions from decentralized BMPs and parcel LID make up just 0.5% of PCB load reductions and 9% of mercury load reductions. Routing to centralized BMPs for runoff infiltration and treatment accounts for 1% of PCB load reductions and 9% of mercury load reductions (Figure 4.7). The projected rate of reductions over time for both PCBs and mercury are fairly steady throughout the simulation period (see graphs in Figure 4.7).

Table 4.2. Summary of future scenario loading estimates for PCBs and mercury for the Solano Permittee MS4 Area.

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCB (g)	Hg (g)	PCB (g)	Hg (g)	PCB (g)	Hg (g)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

Most planned GSI implementation is associated with redevelopment, resulting in land use conversion to New Urban, which has the lowest associated pollutant concentration values. Per Table 3.1, PCB concentrations span 3 orders of magnitude from Old Industrial/Source Areas (up to 204 ng/L) to New Urban land uses (3 ng/L); mercury concentrations span one order of magnitude (from 3 to 40 ng/L). Since GSI BMPs can only reduce pollutants that are generated by the associated land use, and since the PCB and mercury loads generated are much smaller after parcels are converted to the New Urban land use, there are simply less pollutants to reduce on redeveloped parcels. Therefore, while GSI implementation will accompany redevelopment land use conversions, the amount of pollutant load reduction that can be attributed directly to BMP capture and treatment of runoff is relatively small. This result corresponds to previous research, which showed that relatively small areas of Old Industrial and Source Area sites have a disproportionate contribution to PCBs loading (McKee et al., 2015).

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The disproportionate allocation of reductions to land use conversion is strongly dependent on land use changes actually resulting in dramatic reductions of pollutants in the sediments that they generate, which may not be realistic. Legacy sediments that contain higher levels of pollutants are likely to persist after land-use conversion and GSI installation provides a viable way to mitigate those impacts. While the current inventory of GSI BMPs for Solano Permittees number 185, and their aggregate drainage area is more than 1700 acres, overall this represents only 3% of the Solano Permittee MS4 Area drainage. Specific, planned BMPs will increase total drainage coverage to 4% (2,773 acres) by 2020. With inclusion of redevelopment and new development areas that will be covered under C3 requirements, GSI coverage is projected to increase to 6% (4,414 acres) by 2020 and to 14% (6,503 acres) by 2040.

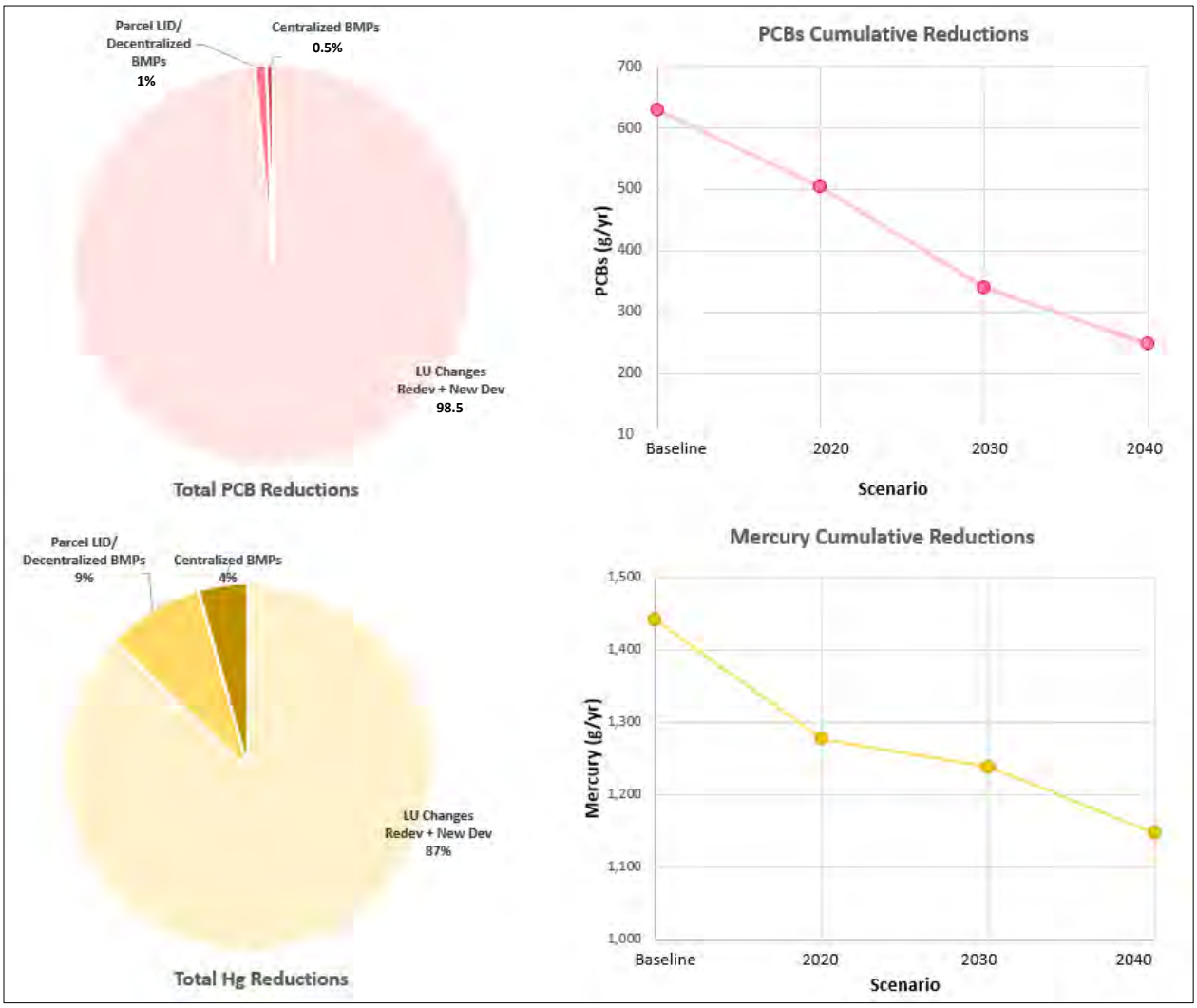

Figure 4.7. Reduction types and trajectory summary for Solano Permittees.

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4.2.2 GSI load reductions detail

Examining the modeled reductions by type for each city illustrates pollutant reduction sources in greater detail. Table 4.3 lists the cumulative reductions for each scenario year for each of the Solano Permittee Cities, so that each scenario also includes the reductions from the previous decade scenario. By far, the largest PCB reductions associated with land use changes occurred in Vallejo (377 grams by 2040), compared to the other cities, since Vallejo had the greatest amount of high PCB producing land uses planned for redevelopment. Vallejo and Fairfield had comparable land use change reductions for mercury, at 112 grams and 127 grams respectively by 2040 (Table 4.4). Suisun had the smallest reductions, mostly because the drainage area is very small relative to Vallejo and Fairfield. All cities show comparatively small reductions for GSI relative to the land use changes.

Load reductions resulting from land use changes listed in tables Table 4.3 and 4.4 are the net reductions that include both redevelopment as well as new development. New development results in more pollutant loading due to additional stormwater runoff generation, but in each scenario and for each city, there a there are still net loading reductions. The runoff increases that resulted from the additional impervious coverage are shown as negative values in the reductions column for runoff. These increases are pronounced for Fairfield, where substantial areas of open space have recently been developed as new residential subdivisions. These recent changes were included in the 2020 scenario, and additional new development included in planning documents was allocated to the 2040 scenario. A smaller amount of new development was indicated in the Vallejo 2040 general plan that was allocated to the 2040 scenario and resulted in additional runoff increases. Overall, each city showed net runoff reductions due to implementation of GSU for each scenario year after accounting for new development runoff increases.

Regional treatment via routing of stormwater runoff to centralized BMPs produced similar reductions in Fairfield and Vallejo (Table 4.3). These reductions are due to centralized BMPs that have already been implemented or had detailed specifications available (2020 scenario) or were planned further out into the future (2030 scenario). No additional load reductions were calculated for centralized BMPs for the 2040 scenario, since there is no documentation of planned structures available, although new development areas will likely have adequate space for centralized treatment.

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Table 4.3. Future scenarios estimated PCB reductions detail

PCBs		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Total Cumulative Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	137	-178	1.4	831.8	1.3	212.7	1.8	866	5	12,402	132
	2030			-178	1.9	864.1	1.5	419.2	2.9	1,105	6	12,163	131
	2040			-354	13.1	1,522.6	1.7	419.2	1.1	1,588	16	11,681	121
Suisun	**2020**	2,090	16	0	0.0	168.7	0.7	36.4	0.0	205	1	1,885	15
	2030			0	0.0	170.0	0.7	36.4	0.0	206	1	1,884	15
	2040			0	0.1	174.5	0.7	36.4	0.0	211	1	1,879	15
Vallejo	**2020**	13,391	477	0	128.9	642.7	0.6	83.1	2.0	726	131	12,665	346
	2030			0	278.7	1,176.4	1.0	132.8	2.0	1,309	282	12,081	195
	2040			-81	363.5	1,638.8	1.3	132.8	0.8	1,691	366	11,700	111
Solano Permittee Totals			**630**		**377**		**4**		**2**		**382**		**248**

Table 4.4. Future scenarios estimated mercury reductions detail

Mercury		Baseline		Cumulative GSI Reductions by Type						Total Cumulative GI Reductions		Net Loading	
				LU Changes Redev + New Dev		Decentralized BMPs /Parcel LID		Centralized BMPs					
		Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)	Runoff (afy)	Load (g)
Fairfield	**2020**	13,268	664	-178	63.7	831.8	9.8	212.7	6.0	866	79	12,402	585
	2030			-178	65.7	864.1	10.6	419.2	7.6	1,105	84	12,163	580
	2040			-354	127.4	1,522.6	13.1	419.2	6.7	1,588	147	11,681	517
Suisun	**2020**	2,090	86	0	16.5	168.7	2.6	36.4	1.1	205	20	1,885	66
	2030			0	16.6	170.0	2.7	36.4	0.0	206	19	1,884	67
	2040			0	17.1	170.0	2.7	36.4	0.0	206	20	1,884	66
Vallejo	**2020**	13,391	691	0	54.8	642.7	4.1	83.1	7.3	726	66	12,665	625
	2030			0	85.8	1,176.4	7.4	132.8	7.4	1,309	101	12,081	591
	2040			-81	112.4	1,638.8	9.9	132.8	6.1	1,691	128	11,700	563
Solano Permittee Totals			**1,441**		**257**		**26**		**13**		**295**		**1,146**

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4.2.3 Compliance demonstration

4.2.3.1 *MRP GSI reductions compliance*

Provisions C.11 and C.12 in the MRP require Solano County Permittees to reduce estimated PCBs loading by 8 grams/year and estimated mercury loading by 2 grams/year using green stormwater infrastructure by June 30, 2020. Regionally, Permittees must also project the load reductions achieved via green stormwater infrastructure by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040.

Estimated pollutant load reductions for the Solano Permittees are listed in Table 4.5 illustrate that reductions far exceed the 2020 and 2040 reduction targets. The estimated GSI reductions for each scenario correspond to totals for all cities listed in Tables 4.3 and 4.4. While the 2020 reduction targets listed in Table 4.5 for the Solano Permittees are absolute values listed in the MRP, the 2040 GSI targets have been rescaled based on new calculated baseline values per recommendations in the RAA Guidance (BASMAA, 2017, section 3.5). This calculation uses the proportions of the total estimated reductions for each pollutant to determine GSI targets: 20.8% of the total reductions for PCBs, and 16.1% for mercury. In both cases, GSI reductions are the vast majority of the total reductions. As already discussed, this is because the GSI RAA reductions include those result from redevelopment land-use conversion (BASMAA, 2017).

Table 4.5. Green stormwater infrastructure load reduction estimates and target reductions

	Scenario	Estimated Loading (g)	Estimated GSI Reduction (g)	WLA Reduction Target (g)**	GSI Reduction Target (g)*	Projected GSI % Attainment	% Reduction from Baseline	% Progress to WLA
PCBs	Baseline	630						
	2020	504	126	-	8	100%	20%	-
	2030	340	290	-	58	100%	46%	-
	2040	248	382	530	110	100%	61%	72%
Mercury	Baseline	1441						
	2020	1276	166	-	2	100%	12%	-
	2028	1238	204	0	33	100%	14%	-
	2040	1146	295	-	48	100%	21%	100%

*2020 Reduction targets are fixed values specified in the MRP, 2040 Reduction targets have been rescaled based on new calculated baseline values per RAA Guidance Section 3.5 as a proportion of total estimated reductions (20.8% for PCBs, 16.1% for mercury). Since mercury estimates are already below WLA, they are calculated as a proportion of estimated reductions.

**Based on WLA target of 100g for PCBs, baseline estimate for mercury is below 2028 WLA target for mercury of 1600 g.

4.2.3.2 *Progress towards WLA targets*

The 2040 estimated PCB reductions (382 g) provide Solano Permittees with a 61% reduction below baseline loading estimates, which provides 72% of the reductions that will be required to reach the Solano Permittee's WLA of 100g. It is anticipated that the remainder of the required reductions will

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be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment. A separate WLA RAA will be performed that includes reductions from source control measures, along with any additional GSI projects that are identified as part of the GSI Workplan that have not already been included in this the current analysis.

Estimated baseline loads for mercury (1441 g) were below the 2028 WLA (1600 g), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. If instead we appeal to a relative reduction metric, GSI reductions of 295 g are 14% below the baseline estimates, which may be compared with the regional relative mercury reduction target of 50% by 2028. Regardless of the target metric applied, additional GSI projects identified in the GSI Workplan along with source control measures will provide additional mercury reductions.

Modeled baseline estimates from swTELR may present a better alternative for tracking future progress towards mercury reductions compared to those from the TMDL. While the SF Bay regional mercury loading estimates employed extensive data analysis and modeling, allocations to individual communities relied only on population sizes. The close correspondence between swTELR and RWSM mercury load estimates provides a degree of confidence in the swTELR results.

One source of the discrepancy between the two models may be the incongruity between using population as a metric for distributing mercury loads, as in the TMDL, compared to land use, as in the SFEI mercury concentration layer used in this study. Higher populations generally correspond with a greater proportion of urbanized area. The land use layer employed in this study uses a mercury concentration of 80 ng/L for Ag/Open land use, and 3 ng for New Urban land use. So, more populated areas with greater urbanized area can actually result in relatively lower estimated mercury loading in any model using the RWSM land use layer compared to more populous areas. This is the inverse of the logic applied in the TMDL population-based model for estimating load allocations to individual communities.

4.2.4 Spatial prioritization analysis for additional GSI implementation

We explored the potential for additional reductions via GSI throughout the Solano Permittee MS4 Area. A metrics-based spatial prioritization analysis was performed to identify additional parcels and road segments that will be most suitable for GSI implementation, given logistical constraints and additional pollutant load reductions needed to meet future permit requirements. Both parcels and road segments were considered with the spatial metrics adjusted accordingly. The final scoring rubric and metrics were developed collaboratively with Solano Permittees and included and equal weighting of the following factors:

- Soil type

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- Slope
- Land ownership
- Land use
- Source parcel status
- Parcel size
- Estimated catchment pollutant loading
- Redevelopment schedule
- Proximity to stormwater structures
- Proximity to Caltrans right of way

The spatial prioritization analysis provides a way to combine implementation feasibility, benefit magnitude, and other logistical factors. A geodatabase was constructed to house all of the GIS data and an automated spreadsheet was created for easy adjustments of metrics and weightings. Outputs from the spatial prioritization analysis serves two purposes: 1) provide some real practical and immediately actionable alternatives for GI implementation and 2) identification of additional means to meet GSI and WLA reduction target requirements. The full process for developing the spatial prioritization analysis is documented in the Green Infrastructure Workplan and here we focus on the outputs and how the outputs can be used to supplement the modeling results already presented to achieve additional future pollutant reductions.

Outputs from the spatial prioritization analysis are presented as maps in Figure 4.8 which shows the scores for each parcel and road segment (approximately 89,000 features total) throughout the Solano County MS4 Permittee Area. Green parcels and road segments indicate that they were in the top 20% of the priority scores and that they were not already treated in one of the modeling scenarios. Most of the parcels or road segments identified in Figure 4.8 are either Old Industrial, Old Transportation or Old Commercial land uses, which corresponds with the highest PCB concentration land uses (see Table 3.1). These parcels indicate the greatest potential for additional GSI implementation to achieve additional pollutant load reductions. GSI Projects identified using this spatial prioritization process can be incorporated for to subsequent modeling efforts to provide updated load reductions. Given that current GSI reductions exceed the GSI reduction requirements, Solano Permittees may also consider identifying synergistic opportunities within areas that have already been slated for redevelopment in the near future.

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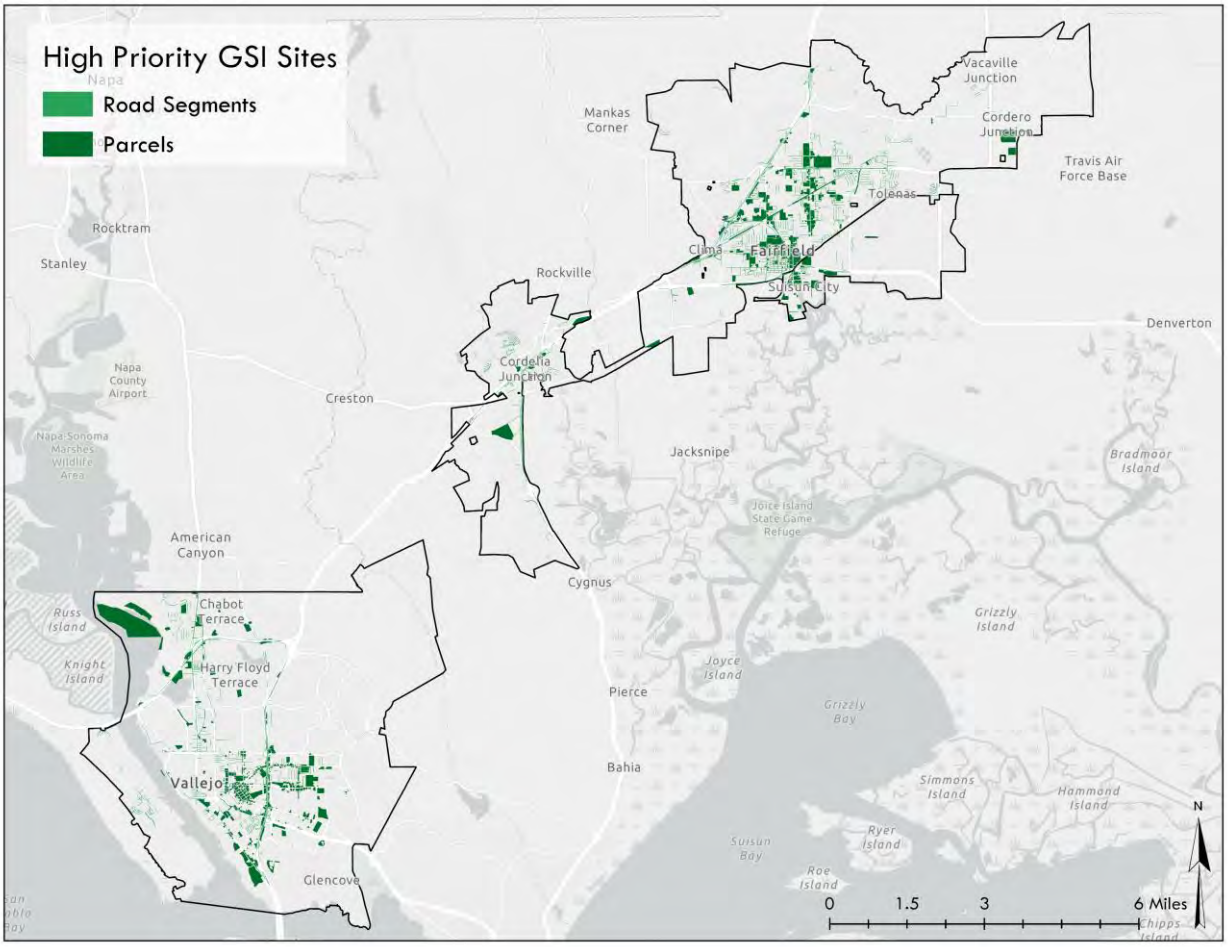

Figure 4.8. High priority parcels and road segments for GSI redevelopment

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5 Conclusions

5.1 Results Summary

This data compilation and modeling effort quantifies the water quality benefits of current and planned GSI implementation for Solano County MS4 Permittees. This report satisfies MRP Provisions C.3.j and C.11/C.12.c to demonstrate that GSI implementation will meet specified targets. It also provides information to guide future implementation and development of the GSI Workplan. The modeling results clearly indicate that that if the Solano Permittee redevelopment land use changes proceed along their currently projected trajectory and continue to conform to MRP C3 GSI implementation requirements, they will exceed their GSI reductions targets for PCBs and mercury and make substantial progress towards wasteload allocation targets. Of course, there are limitations to the interpretation the model outputs imposed by various source of uncertainty (discussed in detail below), but the magnitude of exceedance of the GSI reduction targets is strong evidence that the signal of expected changes is probably beyond the boundaries of such uncertainty. Thus, the report provides reasonable assurance that PCB and mercury reduction performance standards established for GSI in MRP 2.0 will be met.

Key findings include:

- Baseline modeling showed that PCB contributions from the City of Vallejo were disproportionately large, primarily due to substantial coverage of Old Industrial land use areas on Mare Island.
- Baseline runoff, PCBs, and mercury estimates corresponded closely with outputs from RWSM at the regional scale.
- Baseline modeling results showed substantial deviations from those estimated for the Solano Permittees in the TMDL wasteload allocations, particularly for mercury. The discrepancy with the TMDL estimates may due to the TMDLs reliance on population to specify load allocations.
- Estimated PCB and mercury reductions meet the GSI reduction targets specified in the MRP for 2020, 2030, and 2040.
- Estimated reductions represent substantial progress towards WLA targets, with the PCB GSI reductions accounting for 72% of reductions required to achieve the 2040 WLA target.
- Reductions are primarily driven by land use conversion, particularly in the case of PCBs, and land use conversions on Mare Island and the Vallejo Waterfront account for most of the PCB reductions.
- A spatial prioritization analysis indicates additional opportunities throughout the Solano Permittees MS4 area for additional GSI implementation that will be further considered in the GSI Workplan.

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5.2 RAA Limitations

RAA is a modeling exercise, so it is subject to all of the usual limitations associated with using model outputs to make decisions. Chief among these is the uncertainty associated with the model inputs and the model structure that includes several simplifying assumptions employed for the sake of practicality (see Wijesiri and Liu, 2018, for a recent discussion). We have taken care to communicate those assumptions and identify uncertainties associated with the modeling process throughout this report to support a transparent RAA process. Regardless of the level of rigor employed, the limitations of RAA modeling should be taken into consideration when the outputs are used as the basis for prioritizing action.

Any model is a trade-off for characterizing a system that requires decisions about which elements to simplify and which elements to represent in greater detail. In this RAA we chose to favor spatial granularity above fine scale time resolution. In other words, BMP locations were represented spatially explicitly, but rainfall inputs were represented probabilistically rather than via sequential simulation. As has already been discussed, this choice is based on alignment of the model with the purpose of RAA and the ongoing need to track BMP performance. An important limitation of this approach is that the time-sequencing of events is not preserved, which can produce unique runoff responses. But since continuous simulation model outputs are aggregated to average annual values for RAA, the fine temporal resolution of continuous model outputs are not used any differently than those driven with probabilistic inputs. Moreover, average outputs have previously been judged generally acceptable for stormwater management planning (Lent et al., 2011).

This RAA employed an uncalibrated approach that relied strongly on the input data. Fitting model parameters to observed hydrologic data can improve model performance substantially and most continuous simulation models rely heavily on a calibration of some sort. No relevant long-term hydrologic calibration data were available for the Solano County Permittee MS4 Area. Even if these data were available, the calibration process comes with several limitations related to the ambiguity of identifying optimal parameter sets (see Beven, 2001). Additionally, for several Bay Area communities, the MS4 area may be small relative to the contributing watershed that flows to a gauge. When the MS4 occupies only a small amount of the watershed, fitting a model to the flow response at the bottom of that watershed results in a parameterization that primarily reflects the non-MS4 area. Alternatively, translation of parameterizations from gauged to ungauged basins is a non-trivial task, that has prompted a decade of academic level study via the International Association of Hydrologic Sciences[21].

A key source of modeling uncertainty in this RAA is the characterization of pollutant concentrations on the basis of land-use. Since there is wide variation of PCB and mercury concentrations within

[21] https://iahs.info/pub/index.php

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individual land uses it provides an imprecise way to estimate pollutant land surface concentrations. High model sensitivity to pollutant concentration parameters means that model predictions can diverge substantially if these parameters are specified differently (e.g. Park, et al, 2009). Land-use based pollutant concentrations used in this study were based on sampling work conducted by SFEI throughout the SF Bay Area (Wu et al, 2003, McKee et al 2003, McKee, et al, 2015), but this regional dataset may not be representative of the land use pollutant relationships in Solano County, particularly since recent sampling efforts do not include sites in the north side of Suisun Bay (McKee et al. 2015). Representativeness of these data have been acknowledged as a potential source of uncertainty by McKee et al., 2015.

Finally, the structure of the RAA reporting provides some limitations to the interpretation of GSI benefits. Land use changes associated with redevelopment and GSI implementation often happen at the same time. Since land use changes have such a dramatic effect on modeled outputs, and land use changes are lumped in with the GSI reduction estimates, land use changes dominate the calculated GSI reductions. Actual GSI implementation provides a much smaller role in estimated pollutant load reductions once the land use has been changed to one that has characteristically low associated pollutant concentrations. The reality is probably a much less dramatic split between land use change and GSI implementation. An unintended consequence may be that parcels classified as high pollutant concentration land uses may be disproportionately selected for redevelopment even when other factors may weigh in favor of other parcels.

5.3 Recommendations for Ongoing Compliance

Meeting MRP pollutant load reduction targets will require ongoing tracking of BMP implementation and quantification of pollutant load reductions. RAA is a valuable initial step, but it will soon be just another report sitting on a shelf, rather than a tool to direct actions. Implementation will occur over a period of decades and in that time we will learn more than we know now. New BMPs will be created, knowledge of pollutant removal efficiency will grow, and the resources of cities and their priorities will shift. A more dynamic approach to quantifying benefits that can incorporate new information as it becomes available and provide outputs at scales and in formats that are relevant to stormwater managers will be needed. As an alternative to one-off modeling studies, such an approach can provide an iterative verification of progress, reducing risk of failure and tempering expectations of success.

As the capacity of cities grows to provide quantitative estimates of reductions, regulators should consider the value of becoming more flexible on prescriptive requirements to deliver other information that is comparatively less essential. Updatable modeling approaches that focus on the most critical information needs of both stormwater managers and regulators can probably provide more useful information than excessive prescriptive reporting requirements. Such focus will become more important as cities begin to require tracking not hundreds, but thousands of BMPs and GSI projects as implementation proceeds over the coming decades. At the same time, cities will need to

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move towards a more efficient programs with the capacity to demonstrate compelling evidence of success. To do that, they will need access to the right tools and a strong vision from regulators that helps permittees focus their efforts on the greatest pollutant load reduction opportunities.

The RAA modeling study has clarified a number of recommendations to improve ongoing tracking and verification of pollutant reductions:

1. **Solano permittees should adopt a comprehensive data management approach to track implementation of GSI, such as outlined in the GSI Workplan.** This will help them provide ongoing verification to regulators that the estimates contained in this modeling report are proceeding as planned and avoid accounting errors.

2. **Integrate implementation tracking with a stormwater modeling tool.** This will create efficiencies for ongoing PCB and mercury load reduction quantification as implementation proceeds and also provide ongoing support for heuristic management scenarios to optimize implementation locations and BMP types. It will also serve as a key technical node for integration of GIS datasets relevant to stormwater reporting that are currently stored in disparate manner that makes reporting inefficient.

3. **Use the spatial prioritization approach to identify additional GSI implementation opportunities.** The GIS-based approach developed as part of this study and the GSI Workplan can be used to evaluate high priority areas within privately owned areas already planned for redevelopment or within the public right of way via synergistic implementation opportunities with Caltrans.

4. **Continue to coordinate with BASMAA for quantifying source reduction control measure quantification.** The methods employed should be closely integrated with GSI reduction quantification to ensure that overall WLA accounting is coherent.

5. **Work with regulators to craft requirements for MRP3 that are focused on outcomes and reporting efficiencies.** Negotiations with regional board staff via the BASMAA MRP3 Workgroup should endeavor to reduce reporting requirements for non-essential information that overlaps with performance-based requirements whenever appropriate.

These recommendations are intended to help the Solano Permittees be efficient in demonstrating MRP compliance progress and to help them craft permit requirements and implementation strategies that are conducive to their own community development goals

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Appendix A

Beck, N. G., Conley, G., Kanner, L., & Mathias, M. (2017). An urban runoff model designed to inform stormwater management decisions. *Journal of environmental management*, *193*, 257-269.

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Appendix B

BMP type definitions used in swTELR

CENTRALIZED BMPS – TYPICALLY PUBLICLY OWNED & MAINTAINED BMPS, TREATING A LARGE (>20 ACRES) URBAN DRAINAGE WITH MULTIPLE LAND USES AND OWNERSHIP			
STRUCTURAL BMP TYPE	**OTHER NAMES**	**DESCRIPTION**	**TREATMENT PROCESSES**
Bed Filter	*Underground Sand Filter* *Surface Sand Filter* *Perimeter Sand Filter* *Organic Media Filter*	A flow-through structure that uses granular media (e.g. sand or activated alumina) to actively filter stormwater to remove stormwater pollutants. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	MEDIA FILTRATION
Detention Basin	*Detention Pond (impervious)* *Dry Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin, though generally these BMPs do not allow for adequate settling. Little to no volume loss via infiltration due to impervious or highly impermeable base. Vegetation may or may not be present. If treating a smaller area (<20 impervious acres), it is likely a **settling basin**.	PARTICLE CAPTURE

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Structural BMP Type	Other Names	Description	Treatment Processes
Dry Basin	*Extended Detention Basin* *Dry Pond* *Pervious Detention Pond*	A flow-through basin with discrete inlets and outlets designed to detain stormwater runoff for some minimum time to reduce peak flows. Design treatment capacity and draw down time will vary across specific BMPs. One or more outflow offices may exist but there is at least one at base of basin to allow complete draining between storms. Increased draw down times can increase particle capture via settling within the basin. Footprint is pervious and infiltration capacity of base maintained to consistently infiltrate some fraction of volumes detained to unsaturated zone. Wetland and riparian vegetation species distribution is minimal to absent. Moderate distribution of grass and/or tree species likely and acceptable. If treating a smaller area (<20 impervious acres), it is likely a **bioretention**.	INFILTRATION PARTICLE CAPTURE
Infiltration Basin	*Large-Scale Infiltration Feature*	A flow-through BMP with highly permeable substrate (aggregate or rock) designed to store and infiltrate significant volumes of stormwater into unsaturated zone. Little to no surface detainment storage. Vegetation distribution should be minimal and preferably absent. May be confined space but not usually. If treating a smaller area (<20 impervious acres), it is likely an **infiltration feature**.	INFILTRATION
Media Filter	*Proprietary Subsurface Filtration Systems:* *Stormfilter®* *Perk Filter™* *Jellyfish®*	A proprietary subsurface flow-through structure that uses a membrane or other media to actively filter stormwater to remove stormwater pollutants. Proprietary models include media or membranes that may be selected to target the specific removal of the pollutants of concern, resulting in downgradient stormwater concentration reductions. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs.	MEDIA FILTRATION

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		May be confined space but not always. If treating a smaller area (<20 impervious acres), it is likely a **filtration device**.	
Treatment Vault	*Hydrodynamic Separator (e.g. Vortechs, CDS®, DVS)* *Wet Vault* *Detention Vault* *Flow Separation Vault* *Gross Solids Retention Devices* *Large Scale Settling Basins*	A subsurface flow-through structure that physically separates sediment, trash, leaf litter, debris and other particulate pollutants from stormwater via various separation or settling techniques. No volume reduction occurs due to impervious base. May be confined space but not always. Accumulation of material at base of BMP can be observed and measured via manhole access. If no access points exist, the BMP can be inventoried as Confined Space and assessed based on a set maintenance interval. If treating a smaller area (<20 impervious acres), it is likely a **sediment trap**.	PARTICLE CAPTURE

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Wet Basin	*Wet Pond* *Retention Pond* *Wetland Swale* *Wet Extended Retention Pond* *Stormwater Wetlands* *Constructed Wetlands*	A flow-through basin with discrete inlets and outlets designed to retain some volume stormwater runoff in a persistent pool of surface water. Designs may include additional detainment storage of stormwater for some minimum time to reduce peak flows. Wet pool capacity, treatment capacity and draw down time of treated volumes will vary across specific BMPs. One or more outflow offices may exist at different elevations. Lowest outlet elevation sets wet pool capacity. Dense vegetation is common. Dominant vegetation is wetland species and can be supplemented with riparian species with very high densities. Substrate is typically fine organic matter and silt, making volume reductions via infiltration negligible. Volume reductions, if any, occur primarily by evapotranspiration. If treating a smaller area (<20 impervious acres), it is likely a **biofiltration**.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

DECENTRALIZED BMPS – TYPICALLY TREATING < 1 ACRE OF IMPERVIOUS AREA BUT UP TO 20 ACRES, TYPICALLY ACCEPTS RUNOFF FROM A SINGLE LAND USE DRAINAGE AREA, ASSOCIATED WITH NEW / RE-DEVELOPMENT AND ROADSIDE PROJECTS,

STRUCTURAL BMP TYPE	OTHER NAMES	DESCRIPTION	TREATMENT PROCESSES
Bio-filtration	*Lined rain garden with no infiltration* *Urban Biofilter* *Tree Box Biofilter (TreePod, Filterra)*	A vegetated BMP where stormwater is filtered through a specialized soil media and discharged via an underdrain. BMP may be lined with membrane or concrete. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Site designed biofiltration systems use specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Proprietary designs vary and may or may be confined space and difficult to access for inspection.	BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

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		If treating a larger area (>20 impervious acres), it is likely a **wet basin**.	
Bio-retention	*Biofilter* *Rain garden with infiltration* *Self-Retaining Areas*	A vegetated retention structure where the base of the BMP is not lined and must infiltrate volumes and allow infiltration to unsaturated zone. Designs may or may not include an underdrain. Outlet design requires surface ponding prior to surface outflow typically with a max ponding depth of 6". Outlet design either passive surface outlet (e.g., curb cut) or piped overflow (e.g., overflow inlet and underdrain) used to allow retention and ponding. Constructed with specialized soil media ideally 18-24 inches in depth to enhance biogeochemical processes to retain and transform pollutants. Typically includes rock or aggregate subsurface reservoir under the soil media to enhance storage/infiltration. Designs may include settling forebay at inlet(s) to remove sediment. Vegetation types include species that can tolerate stormwater ponding and drought conditions. If treating a larger area (>20 impervious acres), it is likely a **dry basin**.	INFILTRATION BIO-GEOCHEMICAL CYCLING PARTICLE CAPTURE

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Structural BMP Type	Other Names	Description	Treatment Processes
Bioswale	*Grass Swale* *Grass Filter Strips* *Vegetated Buffer Strips* *Bioslopes*	A flow-through area with dense vegetation coverage (>80%). Flow surface topography allows inundation of adjacent vegetated areas during storm runoff. Design includes gentle sloped flow paths and dense vegetation to promote primary stormwater surface filtration, adsorption to vegetation and settling. Biological processes include geochemical transformation and plant uptake. Infiltration performance and volume reductions may vary. These are not highly engineered systems. Size and application of bioswales can vary.	BIO-GEOCHEMICAL CYCLING INFILTRATION
Filtration Device	*Filtration Device* *Proprietary Inserts* *Catch Basin Inserts* *Drain inserts* *Inlet filters* *Decentralized Media Filter*	A proprietary flow-through structure that uses a membrane or other media to actively filter stormwater to target the specific removal of stormwater pollutants of concern, resulting in downgradient stormwater concentration reductions. Design may include the installation of an insert within the sediment trap or drop inlet structure to treat various pollutants. Examples include REM Triton Filter, CULTEC StormFilter, FlexStorm Inlet Filters, Kristar FloGard, etc. Filtration is controlled by the flow rate through the media and discharge via an underdrain or outlet. Little to no volume loss occurs. May be confined space but not always. If treating a larger area (>20 impervious acres), it is likely a **media filter**.	MEDIA FILTRATION
Infiltration Feature	*Infiltration Trench* *Dry Well* *Exfiltration Trench* *Percolation Trench* *French Drain* *Roof Drip-Line*	A small-scale structure designed to retain stormwater from small impervious drainage area and infiltrate into unsaturated zone. Land surface modified to sustain maximum infiltration rates, typically consisting of vertical excavation of native soils and filling with coarse drain rock or other highly permeable material. Vegetation is absent. May be confined space but not usually. If treating a larger area (>20 impervious acres), it is likely an **infiltration basin**.	INFILTRATION

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Structural BMP Type	Other Names	Description	Treatment Processes
Pervious Pavement	*Permeable Pavement* *Porous Asphalt* *Pervious Concrete* *Porous Aggregate* *Pervious Pavers* *Permeable Pavers*	Use of sustainable materials to create a durable, pervious surface overlaying a crushed stone base that allow stormwater to percolate and infiltrate into the underlying soil. Porous pavement can include an underlying reservoir to increase infiltration rates. Footprint of structural BMP type can vary greatly, typically used for parking lots, sidewalks, driveways or other hardscaped surfaces. When stormwater is routed to pervious pavement for treatment through infiltration, the pervious pavement is considered a structural BMP and should be inventoried in BMP RAM. When pervious pavement is solely treating the precipitation falling on the pavement, it is considered part of LID design and should be included in Parcel RAM condition observations.	INFILTRATION
Sediment Trap	*Catch Basin with sump,* *Sediment Chamber,* *Vertical CMP,* *Small Hydrodynamic Separators,* *Bubble Up*	A small decentralized BMP designed to capture and retain sediment, leaf litter, trash, coarse particles and/or other stormwater pollutants. Capture of material may occur through variable flow modifications or passive settling, but result is vertical accumulation of material at base of BMP reservoir with regular material cleanout required. Minimal to no stormwater volume reduction occurs. Water quality improvement downgradient expected as result of concentration reduction due to material capture within BMP. May be confined space but not always. Typically accepts runoff from road or a parking lot. If treating a larger area (>20 impervious acres), it is likely a **treatment vault**.	PARTICLE CAPTURE
Settling Basin	*Settling Pond,* *Sediment Basin* *Decant Pond* *Concrete Forebay* *Forebay*	Open flow-through structures used to detain stormwater volumes and settle particulate pollutants prior to outflow. Pollutant load reductions are realized by concentration reductions with no volume reduction via infiltration due to impervious or highly impermeable base. May be confined space but not usually. Size and application of settling basins can vary: • Large scale settling basin draining a mixed land use area can be classified and assessed as a **treatment vault.** • Smaller sized settling basins draining a single land use area can be classified and assessed as a **sediment trap**. • If treating a larger area (>20 impervious acres), it is likely a **detention basin**.	PARTICLE CAPTURE

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Appendix C

Catchment attributes and routing.

Catchment ID	Area (acres)	Discharge Point Type	Receiving Water	Terminal Catchment	Connectivity (%)	Impervious (%)	Primary Soil Group	Average Slope
Vallejo								
DT5	62.6	Discrete	Mare Island Strait	DT6	100	76.9	D	5.2
LC13	70.7	Distributed	Blue Rock Springs Creek		100	42.1	D	4.4
GC8	104.4	Distributed	Carquinez Strait		100	28.1	C	19.7
LC43	59.6	Discrete	Napa River	LC44	100	47.2	D	6.3
SA41	35.8	Distributed	Mare Island Strait	SA55	100	66.8	C	1
SP9	30.6	Distributed	White Slough		100	57.5	D	0.9
WC4	31	Discrete	American Canyon Creek	WC7	100	13.4	D	22.1
LC15B	34.7	Distributed	Rindler Creek		100	64	C	3.6
MI24	41	Distributed	Mare Island Strait		100	59.8	C	1.5
DT4	39.4	Distributed	Mare Island Strait		100	73.1	D	4.2
LC17	67.7	Discrete	Rindler Creek	LC19B	100	33.6	D	31.5
MI11	22.7	Distributed	Napa River		100	58.9	D	15.5
SA19	50.4	Discrete	Mare Island Strait	SA55	100	60.6	C	6.2
SA51	57.8	Discrete	Mare Island Strait	SA55	100	65.6	C	2.1
LC59	130.9	Distributed	Sulphur Springs Creek		100	0.1	A	24.8
SP14	30.2	Distributed	Napa River		100	54.1	C	1.5
CP13	51.1	Distributed	Southhampton Bay		100	0	D	26.5
MI23	206.3	Distributed	Napa River		100	60.8	D	0.4
LC19B	41.1	Discrete	Rindler Creek	LC19B	100	73.7	D	19.1
AC27B	10.6	Distributed	Napa River	AC5	100	56.9	C	6.1
SP5B	102.1	Distributed	San Pablo Bay		100	48	C	4.2
AC14	55.8	Distributed	Napa River	AC5	100	71.3	C	1.3
AC15	23.1	Discrete	Napa River	AC5	100	72.3	C	0.5
AC16	48	Distributed	Napa River	AC5	100	52.7	D	7.2
AC17	29.5	Discrete	Napa River	AC5	100	52.1	D	9.1
AC18	65.4	Discrete	Napa River	AC5	100	55.3	C	5.4
AC20	54.6	Discrete	Napa River	AC5	100	71	C	1.1
AC31	31.2	Discrete	White Slough	AC31	100	70.7	C	1.7
AC21	51.4	Discrete	White Slough	AC31	100	62.7	D	9.6
DT3	37	Discrete	Mare Island Strait		100	68.9	D	4.9
CP11	97.4	Distributed	Southhampton Bay	CP12	100	3.2	C	17.2
LS18	25.6	Distributed	Lake Dalwigk	LS31	100	71.7	C	4.6
SA3	25.8	Distributed	Mare Island Strait	SA55	100	51.5	C	3.5
SA56	24.1	Discrete	Mare Island Strait	SA55	100	71.2	D	6.1
AC10B	47.6	Discrete	Napa River		100	68.5	D	6.4
DT6	16.2	Discrete	Mare Island Strait	DT6	100	59.1	D	1.5
DT7	42.1	Discrete	Mare Island Strait		100	60.1	D	9.6
SA25	20.4	Distributed	Mare Island Strait		100	60.8	C	0.8
GC1A	99.7	Discrete	Carquinez Strait		100	40.6	D	25.7
GC10	79.5	Distributed	Carquinez Strait		100	28.3	D	16.8
GC11	48.9	Discrete	Carquinez Strait	GC4A	100	46.4	D	14.9
GC12	47.7	Distributed	Carquinez Strait		100	54.9	D	20.9
LC58	17.2	Discrete	Rindler Creek	LC20B	100	76.2	D	17.3
AC41	52.9	Discrete	Napa River	AC5	100	71.1	D	0.3
LC4B	61.3	Distributed	Blue Rock Springs Creek		100	54.2	D	12.6
LC37B	54	Distributed	Lake Chabot		100	72.9	D	8.6

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GC1B	77.8	Discrete	Carquinez Strait	GC1C	100	48.8	D	17.1
GC1C	51	Discrete	Carquinez Strait	GC1C	100	58.4	D	19.3
LC20B	102.7	Discrete	Rindler Creek	LC20B	100	57.8	D	13.9
CP4B	94.1	Discrete	Southhampton Bay	CP5	100	25.1	D	21.8
SA14	31.2	Discrete	Mare Island Strait	SA55	100	66.5	C	1.3
SA16	42.9	Discrete	Mare Island Strait	SA55	100	63.7	D	16.4
LS7	34.6	Distributed	Mare Island Strait		100	56	D	16.2
LS8	66.5	Distributed	Mare Island Strait		100	55.4	D	13
MI10	35.7	Distributed	Mare Island Strait		100	28	D	26.8
SA50	45.9	Discrete	Mare Island Strait	SA55	100	68.6	C	1.5
SA52	25.5	Discrete	Mare Island Strait	SA55	100	72.5	C	1.9
SA53	27.7	Distributed	Mare Island Strait		100	69.5	D	6.2
SA54	31.5	Distributed	Mare Island Strait		100	71.7	D	5.3
SA55	42.3	Discrete	Mare Island Strait	SA55	100	72.2	C	1.8
SA59	30.2	Discrete	Mare Island Strait	SA55	100	77.9	C	1.3
SA62	33.9	Discrete	Mare Island Strait	SA55	100	55.6	D	16.1
SA63	28.4	Distributed	Mare Island Strait		100	71.5	C	1
SA64	21.3	Discrete	Mare Island Strait		100	73.7	C	0.8
SA7	36	Distributed	Mare Island Strait		100	62.1	D	14.5
SA8	45.8	Discrete	Mare Island Strait	SA55	100	57.5	D	10.5
AC53	51.6	Distributed	White Slough		100	79.9	D	0.4
AC36	27.8	Distributed	Napa River		100	57.9	D	12.6
AC37	24	Distributed	Napa River	AC5	100	71.9	C	2.6
AC38	28.2	Distributed	Napa River	AC5	100	57.7	C	1.9
AC39	35.5	Discrete	Napa River	AC5	100	53.1	D	14
AC5	42.9	Discrete	Napa River	AC5	100	34.3	D	0.9
AC55	23.3	Discrete	Napa River	AC5	100	67.4	C	0.7
AC7	61.4	Discrete	Napa River	AC5	100	69.2	C	1.2
MI20	51.4	Distributed	Mare Island Strait		100	44.6	C	3.7
DT11	26.6	Discrete	Mare Island Strait	DT11	100	62.9	D	6.9
AC50	70.9	Distributed	White Slough	AC51	100	78.6	D	0.4
AC51	15.6	Discrete	White Slough	AC51	100	86.2	D	0.5
AC52	21.1	Distributed	Napa River	AC5	100	67.6	D	0.5
DT2	23	Discrete	Mare Island Strait	DT2	100	74.8	D	1.6
AC13	46.2	Distributed	Napa River	AC5	100	61.3	C	2
AC1	26.7	Discrete	Mare Island Strait	SA55	100	67.8	C	1
AC10A	70.3	Discrete	Napa River	AC5	100	66.9	C	4
AC12	53.7	Distributed	Napa River	AC5	100	75.5	D	4.5
AC22	75.9	Discrete	White Slough	AC31	100	63.1	D	9.3
AC23	27.6	Distributed	White Slough	AC31	100	58.1	D	9.3
AC24	47.6	Distributed	Napa River		100	61.9	D	5.4
AC25	45.9	Distributed	Napa River		100	55.1	D	8.6
AC26	85	Discrete	Napa River		100	61.8	D	8.6
AC27A	56.8	Discrete	Napa River	AC5	100	67.6	C	2.7
AC28	63.3	Discrete	White Slough	AC31	100	60.7	D	11.2
AC29	72.7	Discrete	White Slough	AC31	100	64.8	D	11.6
AC3	47.8	Discrete	Mare Island Strait	SA55	100	64.2	C	1.3
AC30	63	Discrete	White Slough	AC31	100	59.1	C	4.9
AC32	60.8	Discrete	White Slough	AC31	100	67.8	C	2.7
AC34	59.7	Distributed	White Slough	AC31	100	70.4	C	4.7
AC35	52.8	Distributed	Napa River	AC5	100	80.6	C	0.4
AC40	66.6	Distributed	Napa River	AC5	100	39.4	D	9.7
AC42	45.9	Distributed	Napa River		100	50.4	D	9.9
AC44	42	Distributed	Napa River	AC5	100	36	D	3.6
AC8	78.7	Distributed	Napa River	AC5	100	59.7	C	1.7

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AC45	48	Discrete	Napa River	AC5	100	57.5	D	2.5
AC46	49	Distributed	White Slough		100	79.2	D	1
AC47	38.8	Discrete	White Slough	AC31	100	58.4	C	0.8
AC48A	148.3	Distributed	White Slough		100	15.9	D	0.4
CP1	124.4	Discrete	Southhampton Bay		100	38.2	D	20.2
CP10	85.8	Discrete	Southhampton Bay	CP12	100	42.8	D	13.2
CP12	125.7	Discrete	Southhampton Bay	CP12	100	43.6	D	11.2
CP2	41.3	Distributed	Southhampton Bay		100	56.1	D	11.8
CP3	65.3	Distributed	Southhampton Bay	CP12	100	45.6	D	17.1
CP4A	70.4	Discrete	Southhampton Bay	CP5	100	41	D	20.6
DT12	67.8	Discrete	Mare Island Strait	DT11	100	69.3	D	4.8
CP5	76	Discrete	Southhampton Bay	CP5	100	55	D	15
CP7	64.6	Distributed	Southhampton Bay	CP5	100	15.3	D	16.9
CP8	66.7	Discrete	Southhampton Bay	CP5	100	18.3	D	15.9
CP9	63.4	Discrete	Southhampton Bay	CP12	100	57	D	12.6
DT1	46	Discrete	Mare Island Strait	DT2	100	74.6	D	9.5
GC2A	84	Discrete	Carquinez Strait		100	57.7	D	13.5
GC3	87.2	Discrete	Carquinez Strait	GC1C	100	35.2	D	24.1
GC4A	95.3	Discrete	Carquinez Strait	GC4A	100	42.2	D	17.5
GC6	55.8	Discrete	Carquinez Strait		100	36.6	C	18
GC7	36.5	Distributed	Carquinez Strait	GC4A	100	2.5	C	26.8
LC12A	81	Discrete	Rindler Creek		100	61.9	D	10.4
LC1A	199.9	Distributed	Blue Rock Springs Creek		100	8.7	D	18.2
LC10	25.4	Distributed	Rindler Creek		100	62.5	D	5.5
LC11	23.7	Distributed	Rindler Creek		100	70.2	C	7.2
LC18	200.8	Distributed	Rindler Creek		100	1.7	A	27.4
LC19A	121.3	Distributed	Rindler Creek		100	3.5	D	26.9
LC20A	105.8	Distributed	Rindler Creek		100	4.7	D	22.9
LC21	249.9	Distributed	Rindler Creek		100	11.2	D	20.7
LC22	98.9	Distributed	American Canyon Creek		100	1.3	D	22.3
LC24	113.7	Distributed	American Canyon Creek		100	35.7	D	16.7
LC26A	108.4	Discrete	Blue Rock Springs Creek	LC34A	100	49.6	D	18.8
LC35	19.8	Discrete	Lake Chabot	LC34	100	63.6	D	4.6
LC36	62.3	Discrete	Rindler Creek		100	63.1	D	17.1
LC27	144.7	Distributed	Lake Chabot		100	47.8	C	2.1
LC3A	61.8	Discrete	Blue Rock Springs Creek	LC34A	100	57.5	D	16
LC31	85.8	Discrete	Lake Chabot	LC34	100	59.7	D	12.3
LC32	46.9	Discrete	Lake Chabot	LC34	100	66.5	C	10.7
LC33	29.3	Discrete	Lake Chabot	LC34	100	60.8	C	4.4
LC34	54.2	Discrete	Lake Chabot	LC34	100	60.3	C	3.2
LC44	90.2	Distributed	Napa River	LC44	100	57.5	C	3
LC45	53.4	Discrete	Napa River	LC44	100	65.9	D	5.8
LC56	38.3	Discrete	Blue Rock Springs Creek	LC50	100	80.9	D	16.1
LC46	83.3	Distributed	White Slough	LC38	100	60.2	D	14
LC47	54	Discrete	White Slough	LC38	100	73.9	C	1.2
LC48	33	Discrete	Rindler Creek	LC19B	100	75.5	D	20.3
LC49	31.7	Discrete	Rindler Creek	LC19B	100	71.4	D	14.7
LC5	50.5	Distributed	Blue Rock Springs Creek		100	57.6	D	14.2
LC50	53.5	Discrete	Blue Rock Springs Creek	LC50	100	77.2	D	19.3
LC51	38.9	Discrete	Blue Rock Springs Creek	LC51	100	82	D	20.5
LC52	34.3	Discrete	Blue Rock Springs Creek	LC51	100	74.1	D	20.1
LC6	86.1	Distributed	Blue Rock Springs Creek		100	42.4	D	17.5
LC8	32.4	Distributed	Blue Rock Springs Creek		100	76.8	C	3.6
LS1	66.6	Discrete	Mare Island Strait		100	55.2	D	14.4
LS10	57.5	Discrete	Mare Island Strait		100	66.6	D	6.5

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LS11	30.6	Discrete	Lake Dalwigk		100	51	D	9.1
LS12	24.2	Discrete	Lake Dalwigk		100	47.4	D	12.9
LS13	41.1	Discrete	Lake Dalwigk	LS31	100	51.8	D	11.2
LS14	52.1	Discrete	Lake Dalwigk	LS31	100	44	D	10
LS15	35.3	Discrete	Lake Dalwigk	LS31	100	44.6	D	12.2
LS16	39.1	Discrete	Lake Dalwigk	LS31	100	59.1	D	7
LS23	97.5	Distributed	Lake Dalwigk	LS31	100	44.1	D	5.6
MI12	23.5	Discrete	Mare Island Strait	DT11	100	63.3	D	11
LS19	70.6	Distributed	Carquinez Strait		100	56.9	D	11.7
LS20	55.6	Distributed	Lake Dalwigk	LS31	100	38.8	D	8.4
LS21	50.6	Discrete	Lake Dalwigk	LS31	100	53.3	D	8.1
LS22	85.8	Discrete	Lake Dalwigk	LS31	100	49	D	8
LS24	42.4	Distributed	Lake Dalwigk	LS31	100	55	D	6.7
LS25	34.2	Discrete	Lake Dalwigk	LS31	100	61.4	D	6.6
LS26	53.8	Discrete	Lake Dalwigk	LS31	100	57.1	D	5.8
LS27	38.8	Distributed	Lake Dalwigk	LS31	100	58.3	D	6
LS29	34.7	Distributed	Lake Dalwigk	LS31	100	70	C	3.8
LS3	37.7	Discrete	Mare Island Strait		100	61.4	D	9.8
LS4	45.4	Distributed	Mare Island Strait		100	55.3	D	6.2
LS30	64.7	Distributed	Lake Dalwigk	LS31	100	71.7	C	1.7
LS31	24.5	Discrete	Lake Dalwigk	LS31	100	72.1	C	2.6
LS32	18.5	Distributed	Lake Dalwigk	LS31	100	52.4	D	9.2
LS33	79.4	Discrete	Lake Dalwigk		100	65.2	C	2.9
LS34	21.7	Distributed	Mare Island Strait		100	70.1	D	5
LS36	59.4	Distributed	Lake Dalwigk		100	40.5	C	3.3
LS37	35.5	Distributed	Mare Island Strait		100	66.6	C	1.2
SA13	29.5	Discrete	Mare Island Strait	SA55	100	64.9	C	1.9
MI4	26.7	Discrete	Mare Island Strait	MI4	100	45.8	D	18.6
MI17	50.5	Distributed	Napa River		100	52.1	D	14.6
MI13	20.5	Distributed	Napa River		100	49.4	D	16.8
MI15	47.6	Distributed	Napa River		100	57.2	D	7.7
MI16	47.1	Distributed	Napa River		100	49.7	D	4
MI18	37.9	Discrete	Mare Island Strait	MI18	100	31	D	4.7
MI2	29.5	Distributed	Mare Island Strait		100	32.9	D	24.1
MI3	75.3	Discrete	Mare Island Strait	MI4	100	44.4	D	22.3
SA18	20.5	Discrete	Mare Island Strait	SA55	100	68.4	C	6.4
MI6	76.9	Discrete	Mare Island Strait		100	52.3	D	12.7
MI7	76.7	Discrete	Mare Island Strait	MI18	100	60.6	D	8.5
MI8	68.2	Discrete	Mare Island Strait		100	68.4	C	2.7
SA10	67.2	Discrete	Mare Island Strait	SA55	100	39.3	D	15
SA11	26.2	Discrete	Mare Island Strait	SA55	100	53.5	D	12.3
SA12	46.6	Discrete	Mare Island Strait	SA55	100	61.4	C	3.8
SA17	68.7	Discrete	Mare Island Strait	SA55	100	57.1	D	17.5
SA2	53.4	Discrete	Mare Island Strait	SA55	100	41.8	D	12.1
SA21	52.2	Discrete	Mare Island Strait	SA55	100	55.4	D	11.9
SA22	90.9	Discrete	Mare Island Strait	SA55	100	48.4	D	12.5
SA23	31	Distributed	Mare Island Strait	SA55	100	53.1	C	2.5
SA24	37	Distributed	Mare Island Strait	SA55	100	52.9	C	5.3
SA26	56.8	Distributed	Mare Island Strait	SA55	100	54.1	C	4.9
SA27	47	Discrete	Mare Island Strait	SA55	100	51.9	D	5.6
SA29	58.7	Discrete	Mare Island Strait	SA55	100	61.2	C	1.1
SA31	48.4	Discrete	Mare Island Strait	SA55	100	70.5	C	1
SA32	41.9	Discrete	Mare Island Strait	SA55	100	63.7	C	3.5
SA37	59.1	Discrete	Mare Island Strait	SA55	100	56.6	D	11.7
SA38	30.3	Discrete	Mare Island Strait	SA55	100	58.2	C	5.7

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SA39	70.1	Distributed	Mare Island Strait	SA55	100	60.2	D	13.2
SA4	22.9	Distributed	Mare Island Strait	SA55	100	59.1	C	2.3
SA40	34.4	Distributed	Mare Island Strait	SA55	100	71.7	C	6.5
SA42	65.1	Distributed	Mare Island Strait	SA55	100	57	C	1.4
SA43	36.6	Discrete	Mare Island Strait	SA55	100	57.6	D	6
SA44	43.4	Discrete	Mare Island Strait	SA55	100	45.4	D	4.4
SA6	29.6	Discrete	Mare Island Strait	SA55	100	64	C	2.2
SA45	37.1	Distributed	Mare Island Strait	SA55	100	47.7	D	4.5
SA46	50.3	Distributed	Mare Island Strait	SA55	100	59.3	D	4.4
SA48	14.6	Discrete	Mare Island Strait	SA55	100	70.8	C	0.8
SA49	51.9	Discrete	Mare Island Strait	SA55	100	51.7	C	1.2
SA5	62.1	Distributed	Mare Island Strait	SA55	100	61.1	C	5.1
SA9	73.6	Discrete	Mare Island Strait	SA55	100	55.8	D	8
SP1A	54.8	Discrete	Napa River		100	37.1	D	7
SP11	48.1	Distributed	Napa River		100	71.7	C	1.5
SP12	53.6	Distributed	Napa River		100	71.6	C	0.6
SP13	84.8	Distributed	Napa River		100	63.8	C	0.9
SP2A	73.8	Distributed	Napa River	SP7	100	33.4	D	1.4
SP3A	29.5	Discrete	Napa River	SP7	100	42.4	C	0.6
SP5A	78.2	Discrete	Napa River	SP7	100	48	C	0.6
SP6A	78.1	Discrete	Napa River	SP7	100	20.8	D	1.2
SP7	58.7	Discrete	Napa River	SP7	100	63.6	C	0.7
SV1A	247.6	Distributed	Sulphur Springs Creek		100	11.6	A	19
SWANZY	20.4	Distributed	Mare Island Strait		100	53.4	D	13.5
WC1	49.3	Discrete	American Canyon Creek	WC7	100	61.6	D	7.4
GC13	79.5	Distributed	Carquinez Strait		100	4.1	C	20.1
WC2	29.1	Discrete	American Canyon Creek	WC7	100	60.6	D	4.5
WC3	50.9	Discrete	American Canyon Creek	WC7	100	36.2	D	14.2
WC5	52.4	Distributed	American Canyon Creek		100	1.3	D	21
SV4	142.1	Distributed	Sulphur Springs Creek		100	0	A	26.1
WC6	101.1	Distributed	American Canyon Creek	WC7	100	54.6	C	7.4
WC8	51.2	Distributed	American Canyon Creek	WC7	100	0.7	D	26.4
SV3	310.4	Distributed	Sulphur Springs Creek		100	0	A	26.6
SP6B	395.8	Distributed	San Pablo Bay		100	20.8	D	10.6
AC56	213.2	Distributed	White Slough		100	6.7	D	0.3
SP15	93.5	Distributed	Napa River		100	12.9	D	0.6
MI22	105.5	Distributed	Napa River		100	39	C	1.2
LC63	163.5	Distributed	Rindler Creek		100	1.4	D	20.4
SP16	140.4	Distributed	Napa River		100	7.8	D	0.7
LC60	273.7	Distributed	Sulphur Springs Creek		100	0	A	23
MI25	51.3	Distributed	Mare Island Strait		100	61	C	2.1
MI26	195.7	Distributed	Mare Island Strait		100	70.1	D	2.3
SV2C	271.7	Distributed	Sulphur Springs Creek		100	1.9	A	25.5
SV2A	75	Discrete	Sulphur Springs Creek		100	24.3	C	14.6
SV2D	50.4	Distributed	Sulphur Springs Creek		100	17.1	C	19.2
SV1B	255.7	Distributed	Sulphur Springs Creek		100	11.5	A	20.2
SV1C	83.9	Distributed	Sulphur Springs Creek		100	16.9	A	19.7
LC1B	135.9	Distributed	Blue Rock Springs Creek		100	9.7	D	16.6
LC1C	119.4	Distributed	Blue Rock Springs Creek		100	19	D	10.4
LC61	66	Distributed	American Canyon Creek		100	2.4	C	27.5
LC62	109.1	Distributed	American Canyon Creek		100	0	A	23.1
AC48B	137.9	Distributed	White Slough		100	6.1	D	0.3
CP4C	31.9	Distributed	Southhampton Bay	CP5	100	47.8	D	21.1
GC4B	79.6	Distributed	Carquinez Strait		100	48.6	D	14.5
LC26B	63	Discrete	Blue Rock Springs Creek	LC34A	100	65.4	D	13.8

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LC12B	79.5	Discrete	Rindler Creek		100	51.7	D	7.2
LC3B	35.8	Discrete	Blue Rock Springs Creek	LC34A	100	54.6	D	17.3
LC4C	52	Distributed	Blue Rock Springs Creek		100	45.3	D	20.8
GC2B	48.5	Discrete	Carquinez Strait		100	46.5	D	13.8
LC4D	48.4	Distributed	Blue Rock Springs Creek		100	47.4	D	16.9
SP1B	161	Distributed	San Pablo Bay		100	37.1	D	0.3
M121	275.7	Distributed	Mare Island Strait		100	30.4	D	11.7
SP3B	35.5	Distributed	San Pablo Bay		100	42.4	C	1.3
LC16	58.3	Discrete	Rindler Creek		100	76.8	D	13.3
LC14	46.7	Distributed	Rindler Creek		100	37	C	2
LC15A	109.5	Discrete	Rindler Creek		100	71.6	D	8
LC23	62	Distributed	American Canyon Creek		100	25.6	D	21.8
LC37A	189.6	Distributed	Lake Chabot		100	37	D	8.1
LC39	44.9	Distributed	Lake Chabot		100	71.2	D	12.2
LC4A	82	Distributed	Blue Rock Springs Creek		100	44.6	D	17.3
LC38	72.3	Discrete	White Slough	LC38	100	49.9	C	9.3
LC40	53	Distributed	Napa River	LC44	100	64.1	D	10.5
LC42	47.1	Distributed	Napa River	LC44	100	69	D	7.3
LC7	33.4	Distributed	Blue Rock Springs Creek		100	68.1	D	8.2
LS35	54.4	Distributed	Mare Island Strait		100	57.7	C	3.1
LC55	25	Discrete	Blue Rock Springs Creek		100	64.7	D	17.5
LC9	28.6	Distributed	Rindler Creek		100	69.4	D	13.7
MI5	35.4	Discrete	Mare Island Strait		100	47.2	D	20.5
SA1	20.1	Distributed	Mare Island Strait		100	47	D	9.7
SA35	56.4	Discrete	Mare Island Strait	SA55	100	60.7	C	1.6
SP10	21.1	Distributed	Napa River		100	56.8	C	1.1
MI27	166.8	Distributed	Napa River		100	79.3	D	1.1
LC3C	57.9	Discrete	Blue Rock Springs Creek	LC34A	100	42.6	D	22.7
DT10	23.9	Discrete	Mare Island Strait	DT11	100	63.1	D	6.6
GC5	55.5	Discrete	Carquinez Strait		100	41.4	C	14.9
SA15	30.6	Distributed	Mare Island Strait	SA55	100	65.7	C	1.5
SV2B	239.6	Distributed	Sulphur Springs Creek		100	15.5	A	18.7
WC7	56.5	Discrete	American Canyon Creek	WC7	100	43.9	C	7
SV2E	26.1	Distributed	Sulphur Springs Creek		100	5.6	D	10.9
SP4	73.2	Discrete	San Pablo Bay		100	36.6	D	1.1
SP2B	128	Distributed	San Pablo Bay		100	33.4	D	0.5
Fairfield								
JAM-1	50.8	distributed	Jameson Creek		100	28	C	5.1
AMER-1	107.6	discrete	American Canyon Creek		100	38.1	D	3.3
DAN-1	76.2	distributed	Dan Wilson Creek		100	45.2	D	1.3
ALZ-1	54.5	distributed	Alonzo Creek	ALZ-1	100	58.7	A	0.4
FREE-2	63.5	discrete	Freeborn Creek		100	55.6	A	2.3
AMER-3	81.9	discrete	American Canyon Creek		100	39.2	D	1.2
GRN-25	46.3	discrete	Green Valley Creek	GRN-11	100	47.4	D	9.6
GRN-26	51.4	distributed	Green Valley Creek		100	10	D	1
ALZ-4	31.5	distributed	Alonzo Creek		100	5.9	D	0.3
LED-7	45.7	discrete	Ledgewood Creek	LED-5	100	58.3	A	0.6
LED-4	47.8	discrete	Ledgewood Creek	LED-4	100	72.5	D	1
GRN-20	27.1	discrete	Green Valley Creek	GRN-21	100	33.4	D	13.3
AMER-5	122.2	distributed	American Canyon Creek		100	0.1	D	17.3
COY-22	94.5	distributed	McCoy Creek		100	69.2	A	0.6
ALZ-18	124.5	discrete	Alonzo Creek		100	43.5	D	13.1
COY-8	29.3	discrete	McCoy Creek	COY-3	100	54.8	D	1.2
COY-12	93.6	distributed	McCoy Creek		100	60.7	D	0.3
MAR-16	83.8	distributed	Marsh 1		100	0.4	D	0.5

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LED-19	86.3	discrete	Ledgewood Creek	LED-22	100	11.8	A	20
COY-21	97.6	distributed	McCoy Creek		100	14.9	D	0.9
ALZ-29	39.7	distributed	Alonzo Creek		100	9.4	D	13.4
DAN-9	61	distributed	Dan Wilson Creek		100	18.4	C	4.6
COY-29	159.6	distributed	McCoy Creek		100	0.8	D	12.7
GRN-27	29.7	distributed	Green Valley Creek		100	51.5	A	1
JAM-6	76	distributed	Jameson Creek		100	1.2	C	17.3
SODA-34	54.3	distributed	Soda Springs Creek		100	59.7	C	3.2
UNI-5	354.9	distributed	Union Creek		100	1.6	D	4.4
COY-2	104.8	distributed	McCoy Creek		100	51.3	D	0.7
LED-1	80	discrete	Ledgewood Creek	LED-5	100	63.5	A	0.6
SODA-1	92.6	distributed	Soda Springs Creek		100	72.5	A	0.4
LAU-25	49.5	distributed	Laurel Creek	LED-23	100	51.9	D	5.8
AMER-4	37.6	distributed	American Canyon Creek		100	29.3	D	3.8
COY-3	46.4	discrete	McCoy Creek	COY-3	100	55.4	D	1.4
LED-2	103	discrete	Ledgewood Creek	LED-4	100	65.6	D	0.5
LAU-19	43.4	discrete	Laurel Creek		100	52.3	D	2.2
LAU-1	93.9	discrete	Laurel Creek	LED-23	100	54.9	D	0.8
SODA-2	80.1	discrete	Soda Springs Creek	SODA-25	100	55.7	A	0.8
COY-1	68.2	discrete	McCoy Creek	COY-3	100	56.1	D	1.2
LED-3	56.6	distributed	Ledgewood Creek	LED-22	100	28.2	A	16.6
LAU-2	75.4	discrete	Laurel Creek		100	24.9	C	5.6
COY-4	36	distributed	McCoy Creek		100	27.9	D	1.3
LAU-3	80.1	distributed	Laurel Creek		100	44.2	D	0.7
LAU-4	94.5	discrete	Laurel Creek		100	61.6	D	0.6
LAU-35	52.7	discrete	Laurel Creek	LED-23	100	57.8	A	0.7
ALZ-2	89.5	discrete	Alonzo Creek	ALZ-8	100	58.7	A	2.8
COY-20	72.8	distributed	McCoy Creek		100	18.8	C	2.1
LAU-5	108.5	discrete	Laurel Creek	LED-23	100	61.4	D	1
SODA-3	75.6	discrete	Soda Springs Creek	SODA-25	100	63.8	D	5.3
COY-5	125.4	distributed	McCoy Creek		100	1.2	D	0.7
LAU-6	106.7	distributed	Laurel Creek		100	60.1	D	1.2
SODA-4	88.7	distributed	Soda Springs Creek	LED-23	100	37.2	D	8.4
LAU-7	58.8	discrete	Laurel Creek		100	47.9	B	9.2
ALZ-3	111.5	discrete	Alonzo Creek		100	6.8	C	25.1
SODA-5	64.5	discrete	Soda Springs Creek		100	26.9	D	18.6
ALZ-23	42.3	discrete	Alonzo Creek		100	12	C	21.2
LAU-8	58.4	discrete	Laurel Creek		100	41.2	D	6
LAU-9	66.7	discrete	Laurel Creek		100	13.7	D	7.3
AMER-2	237.5	distributed	American Canyon Creek		100	0	D	25
GRN-1	110.7	distributed	Green Valley Creek		100	12.9	D	15.2
GRN-13	76.1	discrete	Green Valley Creek	GRN-11	100	57.8	A	1
GRN-2	70.3	distributed	Green Valley Creek		100	40.6	C	1.5
SODA-6	130	distributed	Soda Springs Creek		100	18.5	C	18.6
GRN-18	97.8	distributed	Green Valley Creek		100	0.2	D	32.5
GRN-6	46.6	discrete	Green Valley Creek	GRN-6	100	47	D	0.9
MAR-3	126.7	distributed	Marsh 1		100	39.2	D	0.6
SODA-7	50.8	distributed	Soda Springs Creek		100	34.2	A	3.5
FREE-1	128.3	discrete	Freeborn Creek		100	24	D	3.5
FREE-3	58.4	discrete	Freeborn Creek		100	36.7	D	6.8
FREE-4	43.2	discrete	Freeborn Creek		100	20.6	D	5.2
GRN-14	23.8	distributed	Green Valley Creek		100	13.5	D	13.7
ALZ-6	59	discrete	Alonzo Creek	ALZ-1	100	70.6	A	0.6
JAM-2	82.5	distributed	Jameson Creek	JAM-3	100	19.6	D	1.1
UNI-2	76.4	distributed	Union Creek		100	24.9	D	0.7

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JAM-3	93.9	discrete	Jameson Creek	JAM-3	100	44.9	D	1.9
DAN-2	71.9	distributed	Dan Wilson Creek		100	53.2	C	1
GRN-3	90.8	distributed	Green Valley Creek		100	61.7	A	0.9
GRN-4	129.3	distributed	Green Valley Creek		100	53.9	D	1.2
GRN-5	49.4	discrete	Green Valley Creek	GRN-6	100	60	C	1.1
GRN-7	52.4	discrete	Green Valley Creek	GRN-6	100	57.5	A	2
GRN-8	29.3	discrete	Green Valley Creek	GRN-6	100	62.4	A	2.5
GRN-19	41.3	distributed	Green Valley Creek		100	34	D	16.6
GRN-9	53	distributed	Green Valley Creek		100	52	A	0.8
GRN-10	52.3	distributed	Green Valley Creek		100	46.3	A	0.6
GRN-11	28.9	discrete	Green Valley Creek	GRN-11	100	45.8	C	0.7
GRN-12	30.8	distributed	Green Valley Creek		100	39.4	A	0.1
GRN-15	54.1	discrete	Green Valley Creek		100	34.7	D	12.1
GRN-16	23.8	discrete	Green Valley Creek		100	33	D	11.6
GRN-17	35.6	distributed	Green Valley Creek		100	5.1	D	27.8
GRN-21	34.5	discrete	Green Valley Creek	GRN-21	100	22.2	D	20
DAN-3	61	discrete	Dan Wilson Creek		100	41.4	D	10.8
DAN-4	69.3	distributed	Dan Wilson Creek		100	53.6	D	0.9
GRN-22	36.7	distributed	Green Valley Creek		100	46.1	D	3.3
DAN-5	51.2	distributed	Dan Wilson Creek		100	26.5	C	1.2
GRN-23	50.8	discrete	Green Valley Creek		100	48.6	D	5.1
GRN-24	34	discrete	Green Valley Creek		100	46.5	D	9.5
LED-5	94.7	discrete	Ledgewood Creek	LED-5	100	40.2	D	0.5
LED-6	39.4	distributed	Ledgewood Creek		100	64.2	A	0.6
COY-17	83.5	discrete	McCoy Creek		100	52.1	D	0.5
ALZ-5	90.3	distributed	Alonzo Creek		100	55.2	A	0.5
ALZ-10	72.6	distributed	Alonzo Creek	ALZ-8	100	65.4	A	2.4
LED-8	66.6	distributed	Ledgewood Creek	LED-5	100	65.4	A	0.5
ALZ-7	101	distributed	Alonzo Creek	ALZ-8	100	66.4	D	2.8
ALZ-8	99.9	discrete	Alonzo Creek	ALZ-8	100	85	A	0.9
ALZ-9	25.5	discrete	Alonzo Creek	ALZ-8	100	73.2	A	0.8
ALZ-11	48.4	discrete	Alonzo Creek	ALZ-8	100	78.5	A	1
ALZ-12	68.8	discrete	Alonzo Creek	ALZ-8	100	62.8	A	2.6
ALZ-16	102.8	distributed	Alonzo Creek		100	0.6	C	25.8
LED-9	69.2	discrete	Ledgewood Creek		100	44.8	D	0.8
LAU-20	67	discrete	Laurel Creek	LED-23	100	61.3	A	0.6
ALZ-13	69.1	distributed	Alonzo Creek		100	7.6	A	13.4
LED-10	107.3	distributed	Ledgewood Creek		100	7	D	25
COY-6	85.6	distributed	McCoy Creek		100	1.6	A	3
SODA-8	89.9	distributed	Soda Springs Creek		100	0	C	27.2
SODA-9	109.5	discrete	Soda Springs Creek		100	33.3	D	13.5
SODA-10	74.8	discrete	Soda Springs Creek		100	45.3	D	7.5
LAU-13	66.9	distributed	Laurel Creek		100	55	D	1.4
LAU-10	76.4	discrete	Laurel Creek		100	33	A	8.7
SODA-14	117.5	distributed	Soda Springs Creek		100	56.4	A	0.6
COY-7	69.3	discrete	McCoy Creek	COY-3	100	62.1	B	0.5
LAU-11	94.8	discrete	Laurel Creek	LAU-14	100	46.1	B	4.3
LAU-12	73.3	distributed	Laurel Creek		100	5.6	B	7.4
LAU-18	104	distributed	Laurel Creek		100	39	D	1.1
LAU-14	38.6	discrete	Laurel Creek	LAU-14	100	34.9	B	1.8
LED-14	35.5	distributed	Ledgewood Creek		100	0.9	D	33.3
LAU-15	76.9	distributed	Laurel Creek		100	54	A	2.9
LAU-16	31	distributed	Laurel Creek		100	44.8	B	7.7
LAU-17	76.1	distributed	Laurel Creek		100	49.4	A	1.1
LAU-21	56.9	distributed	Laurel Creek		100	60.2	D	0.9

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LAU-22	84.8	distributed	Laurel Creek		100	61.3	D	0.6
LAU-23	85	discrete	Laurel Creek	LED-23	100	66.3	D	0.6
LED-12	100.3	discrete	Ledgewood Creek		100	5.9	C	24.1
SODA-11	111.2	discrete	Soda Springs Creek	SODA-11	100	66.6	D	0.7
SODA-12	66.7	discrete	Soda Springs Creek	SODA-11	100	58.2	A	0.6
UNI-1	89.7	distributed	Union Creek		100	31.9	D	0.4
SODA-13	107.6	discrete	Soda Springs Creek	SODA-11	100	72.1	A	0.9
ALZ-14	36.5	distributed	Alonzo Creek		100	35	D	0.3
MAR-14	92.6	discrete	Marsh 1	MAR-14	100	70.7	D	0.6
SODA-15	96.3	discrete	Soda Springs Creek	SODA-25	100	66.4	A	1.3
FREE-5	119	distributed	Freeborn Creek		100	0	B	18.9
AMER-6	199.7	distributed	American Canyon Creek		100	0.1	D	15.7
ALZ-15	110.9	distributed	Alonzo Creek		100	12.5	C	22.4
ALZ-17	113.9	discrete	Alonzo Creek		100	23.2	A	16.8
LED-11	124.6	discrete	Ledgewood Creek		100	7.8	A	27.1
LED-13	106.9	distributed	Ledgewood Creek		100	5.7	D	23.7
ALZ-19	77	discrete	Alonzo Creek		100	35.6	D	8.5
ALZ-20	48.3	distributed	Alonzo Creek	ALZ-8	100	23.9	A	1
SODA-20	39.5	discrete	Soda Springs Creek	SODA-25	100	39.9	A	11.7
COY-9	31	distributed	McCoy Creek		100	64.2	D	3.4
COY-10	72	distributed	McCoy Creek		100	54.7	D	0.9
COY-11	31.8	distributed	McCoy Creek		100	58.9	D	2.5
SODA-16	122.8	distributed	Soda Springs Creek		100	0.1	C	26.4
SODA-18	97.7	distributed	Soda Springs Creek	SODA-25	100	62.1	D	5.6
LED-15	71.5	distributed	Ledgewood Creek		100	24.2	D	0.6
ALZ-21	80.6	discrete	Alonzo Creek	ALZ-28	100	39.5	A	10.4
SODA-17	89.9	distributed	Soda Springs Creek		100	4.5	C	21.8
LAU-24	52.3	distributed	Laurel Creek		100	57.9	A	1
SODA-19	72.7	distributed	Soda Springs Creek	SODA-25	100	49.6	D	6.3
LED-16	73.1	discrete	Ledgewood Creek	LED-16	100	54.2	D	0.6
SODA-22	89	distributed	Soda Springs Creek	SODA-25	100	53	D	2.5
LED-17	34.3	distributed	Ledgewood Creek		100	53.9	D	0.8
LED-18	41.7	discrete	Ledgewood Creek	LED-16	100	49.9	D	0.7
COY-13	84.9	distributed	McCoy Creek		100	8.1	D	1
SODA-21	60.6	discrete	Soda Springs Creek	SODA-25	100	50.1	D	5
SODA-23	111.3	distributed	Soda Springs Creek		100	0	C	28.6
ALZ-22	64.1	distributed	Alonzo Creek		100	10.3	C	19.9
ALZ-24	54.7	distributed	Alonzo Creek		100	3.1	D	26.5
DAN-7	40.1	distributed	Dan Wilson Creek		100	45.5	C	7.8
LAU-27	93.6	distributed	Laurel Creek		100	26.1	C	2.3
LAU-28	47	distributed	Laurel Creek		100	9.7	C	2.9
ALZ-37	50.4	discrete	Alonzo Creek		100	55.9	A	0.9
DAN-8	113	distributed	Dan Wilson Creek		100	53.2	C	0.5
LAU-26	92.2	distributed	Laurel Creek		100	7.8	B	3
FREE-7	41.3	distributed	Freeborn Creek		100	64.6	D	2.2
DAN-6	86.6	distributed	Dan Wilson Creek		100	49.1	D	2
COY-14	60.9	distributed	McCoy Creek		100	48.4	B	0.5
FREE-6	118	distributed	Freeborn Creek		100	7.2	D	12.3
SODA-24	103.8	discrete	Soda Springs Creek	SODA-25	100	61.9	A	1.4
SODA-25	32.7	discrete	Soda Springs Creek	SODA-25	100	72.6	A	0.6
ALZ-35	43.3	distributed	Alonzo Creek		100	37.4	D	10.9
SODA-26	84.9	discrete	Soda Springs Creek		100	39.5	C	12
SODA-27	69.8	distributed	Soda Springs Creek		100	35.4	C	8.3
SODA-28	45.8	distributed	Soda Springs Creek		100	1.2	D	28.1
COY-15	72.5	discrete	McCoy Creek	COY-3	100	64.1	B	0.5

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COY-16	48	discrete	McCoy Creek	COY-3	100	50.8	B	0.4
SODA-29	54.1	distributed	Soda Springs Creek	SODA-25	100	76.2	A	1
LAU-29	89.3	discrete	Laurel Creek	LED-23	100	53.7	D	0.9
COY-18	67.5	distributed	McCoy Creek		100	31.9	D	0.7
COY-19	99.4	distributed	McCoy Creek		100	1.4	D	1.9
LAU-30	85.1	distributed	Laurel Creek		100	36.9	D	2.5
LED-20	56.5	discrete	Ledgewood Creek	LED-22	100	25.6	D	16.2
ALZ-25	33.4	distributed	Alonzo Creek		100	0.6	A	15.5
ALZ-27	76.9	distributed	Alonzo Creek	ALZ-8	100	54.6	D	1.3
UNI-6	338.1	distributed	Union Creek		100	2.2	D	3.1
LED-21	78.7	distributed	Ledgewood Creek		100	39.5	D	0.9
SODA-31	35.8	discrete	Soda Springs Creek	SODA-25	100	54.2	A	3.3
JAM-4	93.5	distributed	Jameson Creek		100	20.9	D	5.4
ALZ-26	42.4	distributed	Alonzo Creek		100	39	D	6.2
ALZ-28	41.4	discrete	Alonzo Creek	ALZ-28	100	59.1	C	2.4
SODA-35	61.5	discrete	Soda Springs Creek	SODA-25	100	57.1	D	3.4
LED-22	39.9	discrete	Ledgewood Creek	LED-22	100	37.9	D	5.6
LED-23	55	distributed	Ledgewood Creek		100	9.4	A	20.8
SODA-30	69.5	discrete	Soda Springs Creek	SODA-25	100	62	A	1.1
ALZ-30	95.9	discrete	Alonzo Creek		100	17.1	C	18.8
SODA-32	74.9	discrete	Soda Springs Creek		100	60.3	D	0.6
ALZ-31	98.7	distributed	Alonzo Creek		100	70.8	A	0.4
LAU-31	87.8	discrete	Laurel Creek	LED-23	100	56.7	D	0.7
ALZ-32	46.4	discrete	Alonzo Creek		100	24.5	A	16.8
SODA-33	79.7	distributed	Soda Springs Creek		100	0	C	23
LAU-33	47.6	discrete	Laurel Creek		100	29.9	D	8.8
MAR-22	39.9	distributed	Marsh 1		100	2.4	D	0.2
JAM-5	73.5	discrete	Jameson Creek	JAM-3	100	45.3	D	1.3
LAU-32	40.7	discrete	Laurel Creek		100	21.7	B	17.8
LED-24	50	distributed	Ledgewood Creek		100	14.7	A	18.7
GRN-28	63.9	distributed	Green Valley Creek		100	38	D	0.5
ALZ-33	63.2	discrete	Alonzo Creek		100	37.1	A	11.9
ALZ-34	64.3	discrete	Alonzo Creek		100	52.8	D	3.4
SODA-36	55.7	discrete	Soda Springs Creek	SODA-25	100	49.7	A	0.5
LAU-34	14.4	discrete	Laurel Creek	LED-23	100	53.1	D	1.5
COY-23	63.2	discrete	McCoy Creek	COY-3	100	58.3	B	1
ALZ-36	55.7	discrete	Alonzo Creek		100	41.5	C	9.4
JAM-7	113.6	distributed	Jameson Creek		100	65.9	D	1.2
LED-25	38.3	discrete	Ledgewood Creek	LED-5	100	65.5	A	0.5
MAR-10	109.4	distributed	Marsh 1		100	0.3	B	19.5
ALZ-38	37.2	distributed	Alonzo Creek		100	52	C	5.2
AMER-7	146.8	distributed	American Canyon Creek		100	3.1	D	11.7
UNI-3	722.4	distributed	Union Creek		100	0.2	D	3.4
COY-24	98.3	distributed	McCoy Creek		100	50.2	D	1.7
COY-25	318.6	distributed	McCoy Creek		100	2.4	D	1
COY-26	186.7	discrete	McCoy Creek		100	42.4	D	1.3
COY-27	658.9	distributed	McCoy Creek		100	11.1	D	3.1
COY-28	157.9	discrete	McCoy Creek		100	18.9	D	1.4
COY-30	90.3	distributed	McCoy Creek		100	0.1	C	8.6
COY-31	106.2	distributed	McCoy Creek		100	1.7	D	4.3
UNI-4	109.7	distributed	Union Creek		100	0.1	D	2.6
MAR-7	131.5	distributed	Marsh 1		100	0.7	D	2.8
GRN-29	35	distributed	Green Valley Creek		100	61.6	A	0.8
MAR-1	94.5	discrete	Marsh 1	MAR-14	100	41.5	D	0.5
MAR-17	36.7	distributed	Marsh 1		100	44.9	D	0.5

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MAR-8	116.6	discrete	Marsh 1		100	51.6	D	0.5
MAR-9	79.6	distributed	Marsh 1		100	67.5	D	0.6
MAR-2	90.7	discrete	Marsh 1		100	37.7	B	3.5
MAR-4	94.8	discrete	Marsh 1		100	57.8	C	3.2
MAR-5	120.6	distributed	Marsh 1		100	47.4	D	2.4
MAR-6	392.5	distributed	Marsh 1		100	7.7	D	0.6
MAR-20	81.5	discrete	Marsh 1	MAR-14	100	65.2	D	0.5
MAR-11	125.6	discrete	Marsh 1	MAR-11	100	53.2	D	0.5
MAR-12	65.1	discrete	Marsh 1	MAR-11	100	39.6	D	0.8
MAR-13	113.8	distributed	Marsh 1		100	1.3	D	0.4
MAR-15	96.7	distributed	Marsh 1		100	57.4	D	0.7
MAR-18	69.2	distributed	Marsh 1		100	45.2	D	0.8
MAR-21	77.9	distributed	Marsh 1		100	0	B	19.8
MAR-25	127.7	distributed	Marsh 1		100	0	C	16.6
MAR-19	85.4	discrete	Marsh 1	MAR-14	100	16.4	D	0.5
MAR-23	46.8	discrete	Marsh 1		100	60.7	C	2.7
MAR-24	30.1	distributed	Marsh 1		100	49.4	D	1.2
Suisun								
MAR-26	81.9	distributed	Marsh #1		100	43.5	D	1.2
MAR-27	125.8	distributed	Marsh #1		100	47.9	A	3.2
COY-40	70.4	distributed	McCoy Creek		100	12.5	B	1.9
COY-32	143.4	distributed	McCoy Creek		100	11	A	2.6
MAR-28	78.3	discrete	Marsh #1	COY-35	100	57.6	D	1.1
SODA-37	92.4	distributed	Soda Springs Creek		100	41.1	D	1.7
LAU-43	117.5	discrete	Laurel Creek	LAU-43	100	62.1	D	1
LAU-42	96.6	discrete	Laurel Creek	LAU-43	100	59.1	D	2.1
MAR-29	31.9	distributed	Marsh #1		100	55.5	D	0.5
MAR-30	88.9	distributed	Marsh #1		100	28.5	D	2.5
LAU-41	96.7	discrete	Laurel Creek		100	61.8	D	1.7
MAR-42	29.4	distributed	Marsh #1		100	63.3	A	5.3
LAU-40	48	discrete	Laurel Creek	LAU-43	100	72.5	D	1.7
COY-33	67.6	distributed	McCoy Creek		100	53.7	D	2.4
COY-34	50.6	distributed	McCoy Creek		100	59.4	D	3.1
COY-35	74.7	discrete	McCoy Creek	COY-35	100	58.9	D	2.1
MAR-31	122	discrete	Marsh #1	COY-35	100	56.5	A	1.3
LAU-39	76	distributed	Laurel Creek		100	67.7	D	1.4
MAR-32	71.4	distributed	Marsh #1		100	50.6	D	1.5
MAR-33	49.8	distributed	Marsh #1		100	22.9	D	1.4
MAR-37	127.2	distributed	Marsh #1		100	10.9	A	2
COY-36	59.3	discrete	McCoy Creek		100	46.1	A	3
COY-37	37	distributed	McCoy Creek		100	47	D	2.7
MAR-39	51.9	discrete	Marsh #1		100	71	D	0.5
COY-38	137.7	distributed	McCoy Creek		100	10.6	D	3.1
COY-39	99.2	distributed	McCoy Creek		100	53.7	B	2
MAR-34	80.1	distributed	Marsh #1		100	51.4	D	1
MAR-35	56.1	distributed	Marsh #1		100	50.2	D	0.9
MAR-36	32.6	distributed	Marsh #1		100	55.2	D	1
MAR-38	60.7	distributed	Marsh #1		100	32.4	D	5.1
SODA-38	20.7	distributed	Soda Springs Creek		100	47.2	D	0.2
MAR-40	29.8	distributed	Marsh #1		100	3.9	D	0.9
MAR-41	95.8	discrete	Marsh #1		100	60.2	D	0.5
LAU-38	34.4	distributed	Laurel Creek		100	8.5	D	1.5
MAR-43	61.5	discrete	Marsh #1	MAR-44	100	60.9	A	3.9
MAR-44	67.3	discrete	Marsh #1	MAR-44	100	50.5	D	2
COY-41	94.1	distributed	McCoy Creek		100	42.4	D	2.2

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LAU-37	30.6	distributed	Laurel Creek		100	13	D	4.8
MAR-45	51.9	discrete	Marsh #1	COY-35	100	57.5	A	1
COY-42	60	distributed	McCoy Creek		100	39.5	D	1.2
MAR-46	47.2	discrete	Marsh #1		100	66.1	D	0.6
COY-43	28.7	discrete	McCoy Creek		100	42.6	D	2.6
LAU-36	19.2	distributed	Laurel Creek		100	35.9	D	2.1
MAR-47	64.7	distributed	Marsh #1		100	43.6	D	6.9

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Appendix D

Solano Permittee decentralized BMPs.

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2455 Huntington	Installed	2020	Biofiltration	11.247	McCoy Creek	COY-2	38.27765067	-121.97435
Fairfield	1200 B Gale Wilson B	Installed	2020	Bioretention	0.241	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	Denny's Restaurant	Planned	2030	Bioretention	0.77	Dan Wilson Creek	DAN-2	38.21955338	-122.127658
Fairfield	3950 Business Center	Installed	2020	Bioretention	2.296	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	Jayo Subdivision	Planned	2030	Bioretention	4.05	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	3900 Business Center	Installed	2020	Bioretention	8.533	Dan Wilson Creek	DAN-5	38.23116717	-122.1182872
Fairfield	4475 Central	Installed	2020	Bioretention	0.509	Dan Wilson Creek	DAN-8	38.22014694	-122.1300926
Fairfield	4500 Business Center	Installed	2020	Bioretention	2.551	Green Valley Creek	GRN-26	38.22604915	-122.1326145
Fairfield	4625 Mangels	Installed	2020	Bioretention	3.688	Green Valley Creek	GRN-26	38.2251654	-122.1358266
Fairfield	Partnership Health 2	Planned	2030	Bioretention	4.43	Green Valley Creek	GRN-28	38.22411267	-122.1326464
Fairfield	3630 Ritchie	Installed	2020	Bioretention	3.295	Green Valley Creek	GRN-29	38.21379883	-122.1362455
Fairfield	2600 Estates	Installed	2020	Bioretention	0.406	Laurel Creek	LAU-27	38.30664231	-122.029309
Fairfield	3201 Hartford	Installed	2020	Bioretention	0.326	Ledgewood Creek	LED-2	38.25466074	-122.0670856
Fairfield	Caliber Collision	Planned	2030	Bioretention	1.46	Marsh 1	MAR-8	38.24675285	-122.0743114
Fairfield	2600 Maxwell	Installed	2020	Bioretention	1.737	Marsh 1	MAR-11	38.23099408	-122.0799684
Fairfield	770 Chadbourne	Installed	2020	Bioretention	4.635	Marsh 1	MAR-11	38.23034689	-122.0835006
Fairfield	800 Chadbourne	Installed	2020	Bioretention	6.313	Marsh 1	MAR-11	38.22897736	-122.0819342
Fairfield	Innova Maxwell	Planned	2030	Bioretention	2.63	Marsh 1	MAR-11	38.23087887	-122.0800178
Fairfield	2487 Courage	Installed	2020	Bioretention	1	Marsh 1	MAR-12	38.23405747	-122.081283
Fairfield	2901 Cordelia	Installed	2020	Bioretention	8.189	Marsh 1	MAR-13	38.2279119	-122.0874744
Fairfield	Solano Logistics D	Planned	2030	Bioretention	3.5	Marsh 1	MAR-13	38.22789676	-122.0903076
Fairfield	Jelly Belly Warehouse Expansion	Planned	2030	Bioretention	4.09	Marsh 1	MAR-15	38.23809914	-122.0746228
Fairfield	360 Beck A	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.2333092	-122.066136
Fairfield	360 Beck B	Installed	2020	Bioretention	1.5	Marsh 1	MAR-19	38.23279513	-122.0661494
Fairfield	E&P Properties	Planned	2030	Bioretention	9.92	Marsh 1	MAR-20	38.23590326	-122.0706416
Fairfield	2051 Walters	Installed	2020	Bioretention	0.981	McCoy Creek	COY-10	38.26628535	-121.9880675

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City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	2400 Huntington	Installed	2020	Bioretention	1	McCoy Creek	COY-2	38.27764825	-121.9745453
Fairfield	Fairfield/Vacaville Train Station	Planned	2030	Bioretention	1	McCoy Creek	COY-27	38.28614529	-121.9680942
Fairfield	1800 North Texas	Installed	2020	Bioretention	0.065	Soda Springs Creek	SODA-13	38.26235658	-122.0341855
Fairfield	3329 North Texas	Installed	2020	Bioretention	0.358	Soda Springs Creek	SODA-18	38.289267	-122.0341714
Fairfield	3345 North Texas	Installed	2020	Bioretention	0.988	Soda Springs Creek	SODA-18	38.2905095	-122.0341275
Fairfield	2525 North Texas	Installed	2020	Bioretention	0.475	Soda Springs Creek	SODA-29	38.27556882	-122.0342614
Fairfield	2590 North Texas	Installed	2020	Bioretention	0.76	Soda Springs Creek	SODA-29	38.27600953	-122.0340355
Fairfield	2700 North Texas	Installed	2020	Bioretention	0.289	Soda Springs Creek	SODA-29	38.27675262	-122.0340485
Fairfield	2470 Hilborn	Installed	2020	Bioswale	0.381	Alonzo Creek	ALZ-18	38.27532514	-122.0522109
Fairfield	600 Gregory	Installed	2020	Bioswale	0.448	Alonzo Creek	ALZ-6	38.24820883	-122.0560475
Fairfield	201 Pittman	Installed	2020	Bioswale	1.071	Dan Wilson Creek	DAN-2	38.22012023	-122.1272167
Fairfield	200 Business Center	Installed	2020	Bioswale	4.295	Dan Wilson Creek	DAN-4	38.22868832	-122.1258213
Fairfield	4755 Business Center	Installed	2020	Bioswale	1.846	Green Valley Creek	GRN-12	38.22096842	-122.1373021
Fairfield	4775 Business Center	Installed	2020	Bioswale	2.46	Green Valley Creek	GRN-12	38.22060358	-122.1382177
Fairfield	4650 Business Center	Installed	2020	Bioswale	1.693	Green Valley Creek	GRN-26	38.22225683	-122.1340899
Fairfield	167 Grobric	Installed	2020	Bioswale	1.162	Green Valley Creek	GRN-29	38.21607168	-122.1343305
Fairfield	4856 Auto Plaza	Installed	2020	Bioswale	2.298	Green Valley Creek	GRN-3	38.21258775	-122.1396229
Fairfield	4865 Auto Plaza	Installed	2020	Bioswale	4.591	Green Valley Creek	GRN-3	38.21244225	-122.1397805
Fairfield	5001 Fermi	Installed	2020	Bioswale	5.818	Jameson Creek	JAM-3	38.2037402	-122.139484
Fairfield	5133 Fulton	Installed	2020	Bioswale	4.053	Jameson Creek	JAM-7	38.20708849	-122.144373
Fairfield	5160 Fulton	Installed	2020	Bioswale	2.388	Jameson Creek	JAM-7	38.20714647	-122.145164
Fairfield	1057 Horizon	Installed	2020	Bioswale	3.452	Laurel Creek	LAU-22	38.27342649	-122.0147834
Fairfield	2001 Meyer	Installed	2020	Bioswale	1.426	Ledgewood Creek	LED-15	38.2379282	-122.0635347
Fairfield	1200 Oliver	Installed	2020	Bioswale	2.345	Ledgewood Creek	LED-2	38.25516097	-122.0671784
Fairfield	1717 Clift	Installed	2020	Bioswale	1.033	Ledgewood Creek	LED-5	38.24272299	-122.0593736
Fairfield	Courage Dr Beck Ave	Installed	2020	Bioswale	1.5	Marsh 1	MAR-1	38.23765765	-122.0676488
Fairfield	2950 Auto Mall	Installed	2020	Bioswale	2.909	Marsh 1	MAR-9	38.24153261	-122.0839885
Fairfield	2955 Automall	Installed	2020	Bioswale	2.296	Marsh 1	MAR-9	38.24164932	-122.0836312
Fairfield	801 Chadbourne	Installed	2020	Bioswale	7.92	Marsh 1	MAR-11	38.22874137	-122.0832968
Fairfield	2700 Low	Installed	2020	Bioswale	5.016	Marsh 1	MAR-12	38.23676132	-122.0847769
Fairfield	2525 N Watney	Installed	2020	Bioswale	2.5	Marsh 1	MAR-15	38.23624603	-122.0791156
Fairfield	Sheldon Oil Company	Planned	2030	Bioswale	1	Marsh 1	MAR-19	38.23528702	-122.0607524
Fairfield	2510 Clay Bank	Installed	2020	Bioswale	0.982	McCoy Creek	COY-15	38.2752175	-122.0064988
Fairfield	Clorox	Planned	2030	Bioswale	1	McCoy Creek	COY-2	38.27960416	-121.9710685

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Fairfield	Peabody Road	Installed	2020	Bioswale	16.368	McCoy Creek	COY-27	38.29709076	-121.9675707
Fairfield	Texas Corners	Planned	2030	Bioswale	0.72	Soda Springs Creek	SODA-11	38.24997707	-122.0341621
Fairfield	1833 N Texas	Installed	2020	Bioswale	2.778	Soda Springs Creek	SODA-13	38.26356253	-122.0342475
Fairfield	3333 North Texas	Installed	2020	Bioswale	1.832	Soda Springs Creek	SODA-18	38.28960861	-122.0341365
Fairfield	3400 North Texas	Installed	2020	Bioswale	9.507	Soda Springs Creek	SODA-18	38.2927325	-122.0326218
Fairfield	824 Washington	Installed	2020	Bioswale	2.17	Soda Springs Creek	SODA-25	38.25055608	-122.0390686
Fairfield	Senior Manor Parking Lot	Planned	2030	Bioswale	1	Soda Springs Creek	SODA-36	38.2535156	-122.0404984
Fairfield	2910 Industrial	Installed	2020	Bioswale	0.696	Union Creek	UNI-2	38.27338698	-121.9633523
Fairfield	Jepson Parkway 2A	Planned	2030	Bioswale	1	Union Creek	UNI-5	38.2938595	-121.9554919
Fairfield	1200 B Gale Wilson A	Installed	2020	Filtration Device	3.656	Alonzo Creek	ALZ-10	38.26109353	-122.0475298
Fairfield	3650 Nelson	Installed	2020	Filtration Device	1	Laurel Creek	LAU-10	38.29454858	-122.0317184
Fairfield	3500 Nelson	Installed	2020	Filtration Device	2.025	Laurel Creek	LAU-7	38.29380211	-122.0316656
Fairfield	2263 N Texas	Installed	2020	Filtration Device	0.013	Soda Springs Creek	SODA-15	38.26986308	-122.034208
Fairfield	3340 N Texas	Installed	2020	Filtration Device	2.941	Soda Springs Creek	SODA-18	38.29215565	-122.0332795
Fairfield	4350 Central	Installed	2020	Sediment Trap	3.194	Dan Wilson Creek	DAN-2	38.22350691	-122.1251014
Fairfield	4610 West America	Installed	2020	Sediment Trap	1	Green Valley Creek	GRN-22	38.23045612	-122.1309696
Fairfield	3330 Dover	Installed	2020	Sediment Trap	0.028	Laurel Creek	LAU-15	38.28939339	-122.024848
Fairfield	3355 North Texas	Installed	2020	Sediment Trap	1.015	Soda Springs Creek	SODA-18	38.28987196	-122.0341651
Suisun	Cottonwood_DB	Installed	2020	Bioretention	3.2	Laurel Creek	LAU-36	38.253919	-122.021465
Suisun	Summerwood_DB	Installed	2020	Bioretention	2.5	Laurel Creek	LAU-36	38.253905	-122.022136
Suisun	Walmart_BR_1	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24175304	-121.9886363
Suisun	Walmart_BR_2	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24255777	-121.9884485
Suisun	Walmart_BR_3	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332878	-121.9892102
Suisun	Walmart_BR_4	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24332035	-121.9911978
Suisun	Walmart_BR_5	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24329929	-121.9920561
Suisun	Walmart_BR_6	Installed	2020	Bioretention	2.6	Marsh #1	MAR-33	38.24142651	-121.9898674
Suisun	Walmart_DB	Installed	2020	Bioretention	15.8	Marsh #1	MAR-33	38.240915	-121.989429
Suisun	Holiday Inn Express	Installed	2020	Bioretention	1.6	Marsh #1	MAR-38	38.24209415	-122.0383736
Suisun	Crystal Middle School Site	Installed	2020	Bioretention	7.1	Marsh #1	MAR-39	38.23657066	-122.0436108
Suisun	Railroad Avenue Extension	Planned	2030	Bioretention	1.7	Marsh #1	MAR-41	38.24420303	-122.0330427
Suisun	Jubilee Commercial	Installed	2020	Bioretention	1.2	Marsh #1	MAR-43	38.26456217	-121.9873755
Suisun	ZE_BT_01	Installed	2020	Bioretention	1.6	Marsh #1	MAR-43	38.263235	-121.9877
Suisun	ZE_BT_03	Installed	2020	Bioretention	2.5	Marsh #1	MAR-43	38.264415	-121.986915
Suisun	ZE_BT_04	Installed	2020	Bioretention	0.7	Marsh #1	MAR-43	38.264101	-121.985862

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Suisun	ZE_BT02	Installed	2020	Bioretention	0.4	Marsh #1	MAR-43	38.264158	-121.987761
Suisun	McCoy Creek Trail	Installed	2020	Bioretention	1	McCoy Creek	COY-41	38.25395217	-122.0113701
Suisun	Caterpillar Club House	Installed	2020	Bioretention	0.5	McCoy Creek	COY-42	38.24250196	-122.0191968
Suisun	Summerwood_GS 01	Installed	2020	Bioswale	0.5	Laurel Creek	LAU-36	38.254922	-122.023184
Suisun	Summerwood_GS 02	Installed	2020	Bioswale	0.2	Laurel Creek	LAU-36	38.254427	-122.022624
Suisun	HSC_FI	Installed	2020	Filtration Device	12.8	Laurel Creek	LAU-39	38.244877	-122.021441
Suisun	RR_Storage_Filters	Installed	2020	Filtration Device	1.1	McCoy Creek	COY-39	38.260923	-122.011153
Suisun	Summerwood_CDS	Installed	2020	Sediment Trap	2.5	Laurel Creek	LAU-36	38.254196	-122.024351
Suisun	Walmart_City CDS	Installed	2020	Sediment Trap	7.5	Marsh #1	MAR-33	38.243349	-121.989895
Suisun	Hampton_CDS	Installed	2020	Sediment Trap	0.9	Marsh #1	MAR-38	38.242237	-122.039346
Suisun	Andrews_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.254194	-121.985953
Suisun	Andrews_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-42	38.253443	-121.985822
Suisun	Beale_N_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.255578	-121.986025
Suisun	Beale_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-42	38.254878	-121.986035
Suisun	Hickam_N_SC	Installed	2020	Sediment Trap	3	Marsh #1	MAR-42	38.254255	-121.985453
Suisun	Hickam_S_SC	Installed	2020	Sediment Trap	3.7	Marsh #1	MAR-42	38.253438	-121.985359
Suisun	Vandenberg_N_SC	Installed	2020	Sediment Trap	1.5	Marsh #1	MAR-42	38.255659	-121.985495
Suisun	Vandenberg_S_SC	Installed	2020	Sediment Trap	2.9	Marsh #1	MAR-42	38.254884	-121.985516
Suisun	Carswell Ct_SC	Installed	2020	Sediment Trap	7	Marsh #1	MAR-43	38.262615	-121.987286
Suisun	Dover_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.257337	-121.985992
Suisun	Dover_S_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.25671	-121.985995
Suisun	Ford Ord_SC	Installed	2020	Sediment Trap	1.6	Marsh #1	MAR-43	38.259527	-121.985967
Suisun	Keesler_N_SC	Installed	2020	Sediment Trap	2.6	Marsh #1	MAR-43	38.258861	-121.985965
Suisun	Keesler_S_SC	Installed	2020	Sediment Trap	2.8	Marsh #1	MAR-43	38.258068	-121.985987
Suisun	Neward_N_SC	Installed	2020	Sediment Trap	5.1	Marsh #1	MAR-43	38.261022	-121.986269
Suisun	Newark_S_SC	Installed	2020	Sediment Trap	2.5	Marsh #1	MAR-43	38.260269	-121.986128
Suisun	Four Seasons_CDS	Installed	2020	Sediment Trap	4.3	Marsh #1	MAR-44	38.243597	-121.985876
Suisun	Breezewood_CDS	Installed	2020	Sediment Trap	3.9	McCoy Creek	COY-39	38.260753	-122.009642
Suisun	Amberwood_CDS	Installed	2020	Sediment Trap	3.5	McCoy Creek	COY-41	38.257989	-122.012995
Suisun	McCoy_CDS	Installed	2020	Sediment Trap	3.3	McCoy Creek	COY-42	38.241326	-122.01897
Vallejo	Sonoma_Blvd_BR	Installed	2020	Bioretention	3.5	Mare Island Strait	SA55	38.0937663	-122.2497144
Vallejo	850_Redwood_BR3	Installed	2020	Bioretention	0.25	Napa River	AC35	38.1228762	-122.2543064
Vallejo	Automall_Basin	Installed	2020	Bioretention	2.7	Rindler Creek	LC21	38.13728229	-122.2143281
Vallejo	Couch_St_BR1	Installed	2020	Bioretention	0.75	White Slough	AC34	38.12397765	-122.2503421

City	BMP ID	Status	Scenario	BMP Type	Drainage Area (ac)	Receiving Water	Catchment	Latitude	Longitude
Vallejo	Couch_St_BR2	Installed	2020	Bioretention	0.75	White Slough	AC34	38.1236316	-122.2502697
Vallejo	850_Redwood_BR1	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12342271	-122.2542527
Vallejo	850_Redwood_BR2	Installed	2020	Bioretention	0.25	White Slough	AC53	38.12313152	-122.2540945
Vallejo	AdmiralCallaghan_Bioswale	Installed	2020	Bioswale	1	Blue Rock Springs Creek	LC8	38.12364848	-122.2277015
Vallejo	9832_Vallejo_Streetscape	Installed	2020	Bioswale	0.05	Mare Island Strait	DT5	38.10213344	-122.2583216
Vallejo	AustinCk_Bioswale	Installed	2020	Bioswale	1	Napa River	AC41	38.11837319	-122.2568035
Vallejo	Kaiser_Broadway_2	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12756672	-122.2471529
Vallejo	Kaiser_Broadway_3	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12754984	-122.2474506
Vallejo	Kaiser_Broadway_4	Installed	2020	Bioswale	0.24	White Slough	AC34	38.12737894	-122.2474158
Vallejo	Kaiser_Broadway_5	Installed	2020	Bioswale	0.24	White Slough	AC34	38.1273916	-122.2471368
Vallejo	HiddenbrookPark	Installed	2020	Infiltration Feature	1	Sulphur Springs Creek	SV4	38.1366937	-122.1687949
Vallejo	Kaiser_Broadway_1	Installed	2020	Infiltration Feature	0.24	White Slough	AC34	38.12769121	-122.2477591
Vallejo	9810_Curtola_Pkwy	Installed	2020	Pervious Pavement	1	Lake Dalwigk	LS33	38.09378108	-122.2396427
Vallejo	Chase_St_PP	Installed	2020	Pervious Pavement	0.4	Mare Island Strait	LS35	38.09659274	-122.2399378
Vallejo	SP14101B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15244205	-122.2838573
Vallejo	SP14201B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15302772	-122.2806181
Vallejo	SP14401B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1546249	-122.2792984
Vallejo	SP14501B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.1551305	-122.2807271
Vallejo	SP14601B	Installed	2020	Settling Basin	3.2	Napa River	SP14	38.15512579	-122.2820948

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Appendix B – Source Control Load Reduction Accounting for RAA (Final 8-31-20)

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SOURCE CONTROL LOAD REDUCTION ACCOUNTING

FOR REASONABLE ASSURANCE ANALYSIS

Prepared for

Bay Area Stormwater Management Agencies Association

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ACRONYMS AND ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
GSI	Green Stormwater Infrastructure
GIS	Geographic Information System
IMR	Integrated Monitoring Report
mg/ac/yr	milligram per acre per year
mg/kg	milligram per kilogram
MPC	Monitoring and Pollutants of Concern Committee
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OFEE	Oil-Filled Electrical Equipment
PCBs	Polychlorinated Biphenyls
PG&E	Pacific Gas and Electric Company
POC	Pollutants of Concern
POTW	Publically Owned Treatment Works
RAA	Reasonable Assurance Analysis
ROW	Right-of-Way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
WY	Water Year

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1. INTRODUCTION

1.1 Background

Municipal Regional Permit (MRP; SFBRWQCB, 2015[1]) Provisions C.11.b and C.12.b required the Permittees to develop and implement an assessment methodology and data collection program to quantify mercury and polychlorinated biphenyls (PCBs) loads reduced through implementation of pollution prevention, source control, and treatment control measures. BASMAA prepared the report *Interim Accounting Methodology for TMDL Loads Reduced* (BASMAA, 2017a), which was approved by the Water Board for use during MRP 2.0. The Permittees have used this assessment methodology to demonstrate progress towards achieving the load reductions required in the MRP 2.0 permit term. This report has been prepared to address the requirements of MRP Provisions C.11.b.iii.(3) and C.12.b.iii.(3), which require the Permittees to submit, for Executive Officer approval, refinements to the Interim Accounting Methodology to assess mercury and PCBs load reductions in the next permit term (i.e., MRP 3.0).

MRP Provisions C.11.d. and C.12.d. require the Permittees to prepare plans and schedules for mercury and PCBs control measure implementation and a reasonable assurance analysis (RAA) demonstrating that those control measures will be sufficient to attain the mercury total maximum daily load (TMDL) wasteload allocations by 2028 and the PCBs TMDL wasteload allocations by 2030. The *Bay Area RAA Guidance Document* (BASMAA, 2017b) establishes a regional framework and guidance for conducting RAAs in the Bay Area, including the types of modeling and data inputs that may be used by the Programs and Permittees for estimating loads reduced by green stormwater infrastructure (GSI). Section 4.2 of the *Bay Area RAA Guidance Document* states that load reductions for source control measures should be calculated based on methods provided in an approved refinement of the Interim Accounting Methodology, which was previously developed by BASMAA. This report refines the Interim Accounting Methodology for the purposes of non-green infrastructure load reduction accounting in the RAAs.

This report does not include methods used to account for the implementation of GSI and other types of stormwater treatment control measures. The RAA methodologies for GSI are preliminarily described in countywide reports submitted to the SFBRWQCB in September 2018 (ACCWP, 2018; CCCWP, 2018; FSURMP, 2018; SMCWPPP, 2018; and SCRURPPP, 2018) and will be more fully described in the countywide RAA reports that will be submitted in September 2020. The GSI RAA methodologies have undergone external peer review and the results of the countywide GSI RAA modeling for each county will be submitted to the SFBRWQCB in September 2020. Non-GSI treatment control measure[2] load reductions would be modeled similarly to GSI load reductions, so are not discussed in this report.

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[1] Reissued November 19, 2015 with effective date January 1, 2016, to 77 Phase I municipal stormwater Permittees in five Bay Area counties which are among over 90 local agencies comprising the Bay Area Stormwater Management Agencies Association (BASMAA).

[2] Non-GSI treatment control measures that are not included in this report, for example, include treatment wetlands or media filters. Full trash capture devices, enhanced operations and maintenance activities, and diversion to POTW could also be considered as treatment control measures; these measures are included in this report.

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1.2 Report Overview

A description of the source control measures, load reduction accounting methodologies, reporting requirements, and assumptions are presented in Sections 2 through 10 of this report for the following mercury and PCBs source control measure categories:

- Source Property Identification and Abatement;
- Management of PCBs in Building Materials;
- Management of PCBs in Electrical Utilities;
- Management of PCBs in Roadway and Storm Drain Infrastructure;
- Enhanced Operations and Maintenance Control Measures;
- Trash Full Capture Systems Implementation;
- Diversion to Publicly Owned Treatment Works (POTW); and
- Mercury Load Avoidance and Reduction.

The appendices present:

- A summary of how the land used-based PCBs and mercury yields were developed;
- A statistical summary of the observed urban sediment concentrations;
- Source area investigation and abatement guidance and referral/self-abatement forms;
- An estimate of load reductions for the PCBs in Electrical Utilities Management Program and the PCBs in Roadway and Storm Drain Infrastructure Program;
- Enhanced inlet cleaning efficiency factor data analysis for storm drain inlets with and without inlet-based full trash capture devices;
- Enhanced street sweeping efficiency factors; and
- Non-inlet-based trash capture device unit efficiency factor data analysis.

1.3 Source Control Load Reduction Accounting Basis

The source control load reduction accounting methodology outlined in this report is based on relative mercury and PCBs yields from different land use categories. This methodology was first outlined in the 2014 Integrated Monitoring Reports (IMRs) (ACCWP, 2014; CCCWP, 2014; SCVURPPP, 2014; SMCWPPP, 2014) and was described in the MRP 2.0 Fact Sheet. The method involves using default factors for PCBs and mercury load reduction credits resulting from foreseeable control measures. This report updates and refines the accounting system to account for new information; justifies the assumptions, analytical methods, sampling schemes, and parameters used to quantify the load reduction for each type of control measure; and indicates what information will be collected and submitted to confirm the calculated load reduction for each unit of activity for each control measure.

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As described in the MRP 2.0 Fact Sheet, a land use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to calculate land use-based yields were identified from studies conducted to identify potential POC sources and source areas, as described below.

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual pollutant loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al, 2016). The RWSM is structured with three stand-alone empirical models: the hydrology model, sediment model, and pollutant models. The hydrology model uses runoff coefficients based on land use-soil-slope combinations to estimate annual runoff from a watershed. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape while adjusting for watershed storage factors. The pollutant model is essentially a "concentration map" that can be driven by either the hydrology model (for pollutant concentrations in water) or the sediment model (for pollutant concentrations on fine sediment particles as particle ratios[3] for specific land use or source areas). Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM. Calibration was completed[4] and the model was released in 2018.

A PCBs source property yield was derived as the product of a representative PCBs concentration in shallow surface soils at known source properties and a representative soil/sediment yield for Old Industrial land use areas. The derivation of the estimated PCBs source property yield is described in Appendix A.

PCBs were more heavily used in older industrial areas so older industrial land use areas yield a much higher mass of PCBs per unit area than newer urban land use areas. The estimated average PCBs and mercury yields from the RWSM are summarized for six land use yield categories in Table 1-1 below. These yields are assigned based on land use but may also be assigned by the Permittees based on monitoring data and/or inspection results (e.g., to assign the Source Property yield to a parcel mapped as Old Industrial). These yield values have been developed using the best available data and technical approach at this time. The Permittees may re-evaluate these yields in the future as more information becomes available.

[3] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.

[4] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (SFEI, 2017).

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Table 1-1: Land Use-Based Yields for PCBs and Mercury

Land Use Category	Assumed Average PCBs Yield (mg/ac/yr)	Assumed Average Mercury Yield[1] (mg/ac/yr)
Source Property	5,078	53
Old Industrial	259	53
Old Commercial / Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Source: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations – Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Appendix B presents concentration statistics for PCBs and mercury observed in street, storm drain, and private property sediment samples collected by BASMAA from 1999 through 2019. The data are summarized by the predominant land use within the vicinity of where the sediment was collected.

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2. SOURCE AREA IDENTIFICATION AND ABATEMENT PROGRAM

2.1 Control Measure Description

Source area identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels[5] and are being transported to the municipal separate storm sewer system (MS4). The source area identification and abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources. Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) for investigation and abatement by the SFBRWQCB. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another National Pollutant Discharge Elimination System (NPDES) permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the right-of-way or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the SFBRWQCB to facilitate the issuance of orders for further investigation and remediation of the subject property.

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced operation and maintenance (enhanced O&M) measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems will be described in the source property referral form that is sent to the SFBRWQCB.

The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4. The Permittee should discuss the

[5] See Appendix B for a statistical summary of urban sediment concentrations.

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referral and achieve resolution with the SFBRWQCB prior to submitting the source property referral.

When a referred industrial facility is considered to be abated by the Permittee and the SFBRWQCB, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Source area investigation and abatement program guidance is provided in Appendix C.

2.2 Loads Reduced Accounting Methodology

The amount of PCBs loads (i.e., annual mass or milligrams per year (mg/yr)) reduced will be assessed for source properties using the following accounting method:

$$Load\ of\ PCBs\ Reduced = SP_A \bullet (SP_Y - OCOT_Y)$$

Where:

SP_A	=	Source property area (acres (ac))
SP_Y	=	Source property PCBs yield (mg/ac/yr)
$OCOT_Y$	=	Old Commercial/Old Transportation land use PCBs yield (mg/ac/yr)

Thus, the PCBs load reduced in mg/yr will be calculated as the area of the source property in acres multiplied by 5,029 mg/ac/yr (i.e., 5,078 – 49 mg/ac/yr).

There is no mercury load reduction credit given to PCBs source property referrals, as there is not a significant difference between the estimated source property, old industrial, old residential, and old commercial/old transportation mercury yield values.

Fifty percent of this load reduction will be credited to the Permittee for properties that are referred to the SFBRWQCB for abatement at the time of referral provided that enhanced O&M measures or stormwater treatment are implemented or caused to be implemented in the vicinity of the referred source property to prevent further contaminated sediment from being discharged from the storm drain system. The remaining 50% load reduction for referred properties will be credited to the Permittee upon completion of the abatement process or at ten years, whichever occurs first. The SFBRWQCB will notify the Permittee when the abatement process is complete.

Source properties that drain directly to the Bay (as opposed to the street or public storm drain infrastructure) do not allow for implementation of enhanced O&M measures or stormwater treatment by the Permittee. These properties may be submitted to the SFBRWQCB as a referral; 100% load reduction credit will be awarded upon completion of the abatement process, after ten years, or the TMDL compliance date (i.e., 2030 for PCBs), whichever occurs first.

If a source property has been abated without referral to the SFBRWQCB, either through voluntary actions by the property owner or using municipal enforcement powers, then 100% of the load reduction will be credited to the Permittee at the time that the abatement is complete. The Permittee shall provide documentation to the SFBRWQCB that abatement has effectively eliminated the transport of PCBs or mercury to the MS4 or directly to the Bay for all transport

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mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). The documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via soil removal, capping, paving, walls, plugging/removal of internal storm drains, etc.). Documentation may be from a cleanup regulatory agency such as the US Environmental Protection Agency (USEPA) or the California Department of Toxic Substances Control (DTSC). For sites with ongoing industrial activities, water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4 or to the Bay should be provided. Information that supports the determination of abatement should be submitted to the SFBRWQCB for review using the Abatement Form in Appendix D.

For source properties that include a combination of industrial area and area that is not likely to be a source of PCBs (e.g., unimpacted open space area), the source property yield will only be applied to the portion of the property that is an industrial area.

Load reduction credit for enhanced O&M measures conducted as a part of a source property referral is included in the credit afforded by the source property referral. Enhanced O&M measures conducted adjacent to a source property that has not been referred to the SFBRWQCB may receive load reduction credit under the enhanced O&M control measure category using the source property yield (see Section 6).

2.3 Reporting

Standard report forms are provided for Source Property Referral and Source Property Self Abatement in Appendix D.

For load reduction reporting associated with the source property identification and abatement control measure, the area of each property will be estimated using the County Assessor's parcel map or an equivalent method. For those source properties that are referred to the SFBRWQCB for abatement, the referral form has a space to describe any enhanced O&M control measures or downstream treatment control measures that have been implemented or are planned to be implemented at the source property. For those source properties that have been abated, the Permittee will provide a statement that the property has been abated, along with documentation on the date, type, and extent of abatement, as described above.

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3. PCBS IN BUILDING MATERIALS MANAGEMENT PROGRAM

3.1 Control Measure Description

The MRP Permittees have developed and implemented a process, beginning in July 2019, for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled between the years 1950 and 1980 undergoing full-building demolition. Single-family residential and wood frame structures are exempt.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

3.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the PCBs in Building Materials Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(N_i \bullet M_i \bullet SW_i)\right] \bullet E_f$$

Where:

N_i	=	Number of applicable buildings demolished each year (units/yr)
M_i	=	Average mass of PCBs per applicable building (mg/unit)
SW_i	=	Average fraction of PCBs that enters the MS4 due to demolition without controls (%)

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E_f = Average fraction of PCBs prevented by controls from entering MS4 (%)

Reasonable values were used to assign the load reduction for this control measure in MRP 2.0. Permittees received a total of 2,000 g/yr (2 kg/yr) PCBs load reduction value in 2019 when protocols for managing PCBs-containing materials during demolition, as required in MRP 2.0 Provision C.12.f., were developed and implemented. Table 3-1 below lists the four terms and the assumed values used to derive the 2 kg/yr credit. These values may be updated based on data gathered in the future, as described below.

Table 3-1: Terms Used to Estimate the Loading of PCBs in Building Materials for MRP 2.0

Term	Estimated Value	Units
1. Number of applicable buildings[1] demolished per year	50	buildings/year
2. Average mass of PCBs per applicable building	5	kg
3. Average fraction of PCBs that enters MS4s due to demolition without controls[2]	0.01	dimensionless fraction
4. Average fraction of PCBs prevented by controls[2] from entering MS4	0.8	dimensionless fraction

[1]Applicable buildings: constructed from 1950 through 1980 with PCBs concentration in caulks/sealants greater than 50 ppm, excluding single family residential and wood frame buildings.

[2]The term "controls" refers to the proposed new demolition management program, not existing construction controls.

The 2 kg/yr PCBs load reduction stipulated during MRP 2.0 will be retained. During the MRP 3.0 permit term, Permittees may, with the necessary supporting data, request an increase in the credit received for the current program and/or expand the scope of the program to increase loads reduced. Any proposed revision of load reduction credit and/or program expansion would be submitted to the Regional Water Board for Executive Officer approval.

The new management program implemented by Permittees as of July 1, 2019 requires that demolition project proponents identify priority materials in applicable buildings, collect representative samples for analysis, and report the concentrations of PCBs. When a sample concentration is equal to or greater than 50 ppm, the estimated amount of material in the building associated with that sample (and presumably removed and properly disposed of before the demolition occurs) is also reported. These concentration and quantity data can be combined to determine the mass of PCBs removed from the building. These data represent an estimate of the mass of PCBs removed from the building via removal of the priority materials (rather than the estimate provided in the MRP 2.0 fact sheet of the total mass of PCBs in the building in all PCBs-containing materials). Thus, the value of Term 4 in Table 3-1 may be set to 1 when evaluating the PCBs load avoided using data from the new program, since it may be assumed that the program removes 100% of the priority materials identified by the sampling.

3.3 Reporting

BASMAA is developing a regional data management system for compiling the data reported by demolition project applicants. This data for applicable structures, listed below, may be used to support a request for additional loads reduced by the existing program and/or an expansion of the program:

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- Project information (e.g., address, APN, year building built, type of construction, estimated demolition date).
- Is building subject to the PCBs screening requirement based on type, use, and age of the building?
- PCBs concentration in each sample of a priority material. Currently, the BASMAA protocol identifies priority materials as caulk, thermal insulation, fiberglass insulation, adhesive mastics, and rubber window gaskets.
- When PCBs equal to or greater than 50 ppm are measured in a priority material sample, the estimated amount of that material in the building (only required to report on sampling of priority materials but reporting any available data on other materials is encouraged).

Permittees will provide documentation of each of the following items:

- The number of applicable structures that applied for a demolition permit during the reporting year; and
- A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address and demolition date.

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4. PCBS IN ELECTRICAL UTILITIES MANAGEMENT PROGRAM

4.1 Control Measure Description

The Electrical Utilities Management Program will include improved procedures for documenting removal and disposal of PCBs-containing electrical equipment as part of ongoing equipment maintenance practices.

Electrical utility equipment in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public rights-of-way and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE that are older and/or refurbished may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. This creates a potential missed opportunity to account for past and ongoing removal of PCBs-containing OFEE which has been and continues to reduce loads of PCBs from MS4s to the Bay.

For this control measure, Permittee owned electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service, and provide data to support calculations of the associated stormwater load reductions due to these efforts. Additionally, it is anticipated that non-municipally owned regional electrical utilities that are not currently subject to PCBs load reduction requirements (i.e., PG&E) have been and will continue to remove PCBs-containing OFEE and document these efforts, past and present, consistent with methods used by applicable MRP permittees.

4.2 Loads Reduced Accounting Methodology

The load of PCBs reduced through implementation of the Electrical Utilities Management Program will be assessed using the following accounting method:

$$Load\ of\ PCBs\ Reduced = \left[\sum_{i=1}^{n}(LR_i)\right]$$

Where:

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LR_i = Load of PCBs reduced for Action i during a given time period of interest (kg/yr).

The PCBs loads reduced in mg/yr will be assessed using the following equation:

$$Load\ of\ PCBs\ Reduced\ (LR) = L_0 \bullet ER_1 \bullet Y_i$$

Where:

L_0 = Estimated annual load of PCBs that enters MS4 from OFEE at the start of the PCBs TMDL.

ER_1 = Estimated percent of PCBs load prevented from entering the MS4 each year due to equipment removal (percent per year); the percent of loads prevented each year is assumed equivalent to the annual average rate of PCBs-containing equipment removal.

Y_i = Number of Years during the time period of interest *i*.

The above equation assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate.

Reasonable values were developed for each of the terms shown in the equation above in order to calculate the total load reduction credit for implementing the Electrical Utilities Management Program (Table 3, see Appendix E for further detail). Based on equipment removal rates of 1.3% to 4.8% per year (average = 2.3% per year) for municipally-owned electrical utilities between 2005 and 2020 (calculated as described in detail in Appendix E), equipment removals since the start of the PCBs TMDL have reduced PCBs loads each year between 0.014 kg/yr to 0.053 kg/yr (average = 0.025 kg/yr). This equates to a total load reduction achieved by 2020 of between 0.210 kg/yr and 0.795 kg/yr (average = 0.375 kg/yr) due to equipment removals across the Bay Area. Assuming the same annual equipment removal rates in the future, then during the five-year term of MRP 3.0, additional load reductions will range from 0.072 kg/yr to 0.264 kg/yr (average 0.127 kg/yr) for equipment removals. Table 4-1 below identifies the assumed ranges of values for the terms in the above equation that were used to calculate the load reductions achieved since the start of the PCBs TMDL and during MRP 3.0. The derivation of each of the terms shown in Table 4-1 is presented in detail in Appendix E. These values may be updated based on data gathered during MRP 3.0.

Table 4-1: Range of Values used to Estimate the Load Reductions due to the Electrical Utilities Management Program Actions Since the Start of the PCBs TMDL and for MRP 3.0.

Term	Description	Estimated Values	Units
L_0	Annual load of PCBs to MS4 from OFEE at the start of the PCBs TMDL; this value is assumed to be the TMDL-normalized McKee et al. (2006) estimated load to stormwater from transformers and large capacitors in 2005 (see Appendix E for details on how this value was developed).	1.1	kg/yr
ER_1	Percent of PCBs prevented from entering MS4 due to ongoing equipment removals; these values are assumed equivalent to the annual equipment removal rates for municipally owned electrical utilities in the Bay Area between 2005 and 2020 (see Appendix E for details on how these values were developed).	1.3 - 4.8 (Average=2.3)	%/year

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Term	Description	Estimated Values	Units
Y_i	The time period of interest since the start of the PCBs TMDL is the fifteen years between 2005 and 2020.	15	years
Y_i	The time period of interest during MRP 3.0 is the five years of the permit term.	5	years

All Permittees will receive a share of the total PCBs load reductions achieved as a result of program implementation based on the accepted countywide apportionment method (e.g., population).

4.3 Reporting

Permittees will summarize the steps they have taken to begin implementing this control measure, either collectively or individually.

Additionally, a report will be developed and provide the following information:

- Estimates of the current annual PCBs loads released to the MS4 from OFEE, based on the best available data;
- Permittees will document efforts by municipally owned electrical utilities in the MRP area to remove PCBs-containing equipment since the TMDL baseline period (i.e., 2003). The report will include the following information:
    - Describe actions that remove PCBs-containing OFEE, including handling and disposal methods; and
    - Document loads avoided calculations, inputs, and assumptions.

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5. PCBS IN ROADWAY AND STORM DRAIN INFRASTRUCTURE CAULK MANAGEMENT PROGRAM

5.1 Control Measure Description

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the right-of-way (ROW), including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4. The Caltrans specification will be applied to all applicable public bridges or roadway overpass structures when the bridge infrastructure undergoes replacement or joint maintenance. Additionally, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

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5.2 Loads Reduced Accounting Methodology

A detailed load reduction accounting methodology is provided in Appendix F and summarized here.

Total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP was estimated using the following equation:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

A summary of the data inputs is provided in Table 5-1 below. The derivation of the values presented in Table 5-1 is described in Appendix F.

Table 5-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The estimated total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is provided in Table 5-2.

Table 5-2: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133

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County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges[1]
Total	**12.6**	**39.0**	**1,477**

1. U.S. Department of Transportation Federal Highway Administration, 2019. National Bridge Inventory. Visited 24 March 2020.

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

Lacking a literature-based release rate of sealant over time, two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal –0.5% and 1.0%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table 5-3). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

Table 5-3: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life
Alameda	19	38	56	112
Contra Costa	8	17	37	73
San Mateo	12	25	36	72
Santa Clara	19	37	50	101
Solano	5	9	16	32
Total	63	126	195	390

This load reduction would occur no later than 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation.

5.3 Reporting

Permittees will report on the development and use of the Caltrans specification during all applicable replacement activities.

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6. ENHANCED OPERATIONS AND MAINTENANCE PROGRAM

6.1 Control Measure Description

Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line and street flushing may enhance the Permittees' ability to reduce PCBs and mercury in stormwater. PCBs load reductions achieved through implementation of enhanced O&M control measures, aside from enhanced O&M control measures associated with source property referrals, may be counted as part of the overall load reductions expected during this permit term.

6.2 Loads Reduced Accounting Methodology

6.2.1 Enhanced Inlet Cleaning (With and Without Small Full Trash Capture Devices) and Street Sweeping

Load reductions for enhanced inlet cleaning and street sweeping will be calculated as follows:

$$\boldsymbol{Annual\ Load\ of\ PCB\ Reduced = P_A \bullet P_Y \bullet EE_f}$$

Where:

P_A	=	Catchment area for enhanced O&M measure (acres)
P_Y	=	Area-weighted PCBs yield (mg/acre-year) for the enhanced O&M catchment area based on land use yield (see Table 1-1)
EE_f	=	Enhancement Efficiency factor for enhanced O&M control measure (See Appendix G for enhanced inlet cleaning with and without small full trash capture devices and Appendix H for enhanced street sweeping).

6.2.2 Pump Station Cleanout, Storm Drain Line Cleanout, Street Flushing, and Culvert/Channel Desilting

Load reductions for enhanced pump station cleanout, storm drain line cleanout, street flushing, and culvert/channel desilting will be calculated as follows:

$$Enhanced_{LR} = Current_{LR} - Baseline_{LR}$$

Where:

$Current_{LR}$	=	$Vol_{Current} \bullet \%Sed \bullet \rho \bullet Conc$
$Baseline_{LR}$	=	$Vol_{Baseline} \bullet \%Sed \bullet \rho \bullet Conc$
$Vol_{Current}$	=	Average volume of material collected via the enhanced O&M control measure in current year(s) (post-Fiscal Year 2001-02) (m3/yr)

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$Vol_{Baseline}$	=	Average volume of material collected via the O&M control measure in baseline years (prior to and including Fiscal Year 2001-02) (m^3/yr) (assumed to be zero for storm drain line cleanout and street flushing)
%Sed	=	Percent of material collected (by volume) by the enhanced O&M control measure that is sediment < 2mm in diameter (measured)
ρ	=	Sediment density of the material collected by the enhanced O&M control measure (weight per unit volume) (measured)
Conc	=	Average concentration of PCBs in sediments collected by the enhanced O&M control measure (mg/kg; see Appendix B for land use-based sediment concentrations to calculate area-weighted concentrations or alternatively use project-specific measurements).

6.3 Reporting

The following information will be reported for this control measure:

- Description of O&M measure enhancement, including the location of the enhanced measure and description of the enhancement (e.g., increased frequency of implementation over the baseline frequency).
- Baseline and current volumes of material collected.
- Assumptions/data on the percent of the material that was < 2 mm
- Assumptions/data on sediment density
- The calculated loads reduced.

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7. TRASH FULL CAPTURE SYSTEMS IMPLEMENTATION PROGRAM

7.1 Control Measure Description

This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

7.2 Loads Reduced Accounting Methodology

The Permittees will quantify and report the amount of PCBs and mercury loads reduced from implementation of large full trash capture devices using the following accounting method:

$$Load\ of\ POC\ Reduced = P_A \bullet P_Y \bullet E_f$$

Where:

P_A	=	Tributary area treated by large full trash capture device (acres)
P_Y	=	Area-weighted PCBs or mercury yield (mg/acre-year) (see Table 1-1)
E_f	=	Efficiency factor for large full trash-capture devices (assumed to be 20%)[6]

7.3 Reporting

The following information will be reported for large full trash capture projects:

- Project name, type of device, and location.
- The year that project construction was completed.
- Total project tributary drainage area.
- The land use area(s) for the project and the area-weighted land use-based yield for the project area.
- POC loads reduced for each project.

[6] See Appendix I for large trash capture device unit efficiency factor data analysis.

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8. DIVERSION TO POTW PROGRAM

8.1 Control Measure Description

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.

8.2 Loads Reduced Accounting Methodology

The load reduction calculation method for this control measure is:

$$EnhancedReductionDiversion = CurReductionDiversion - BaseReductionDiversion$$

Where:

BaseReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in 2010 (assume zero for all diversions prior to MRP 1.0 except the Palo Alto Diversion Structure)
CurReductionDiversion	=	Mass of PCBs or mercury reduced via POTW diversions of urban stormwater in Year of Interest

And:

Base or Cur ReductionDiversion = ConcDiversion • VolDiversion

Where:

ConcDiversion	=	Average concentration of PCBs or mercury in sediment and/or water diverted to POTW (measured)
VolDiversion	=	Volume of sediment and/or water diverted to POTW (measured)

8.3 Reporting

For diversions, a project-specific report will be prepared that describes the diversion and project-specific load reduction calculations.

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9. MERCURY LOAD AVOIDANCE AND REDUCTION PROGRAM

9.1 Control Measure Description

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The following source controls bans are included:

- Sale of cars that have light switches containing mercury;
- Sale or distribution of fever thermometers containing mercury without a prescription;
- Sale of mercury thermostats; and,
- Manufacturing, sale, or distribution of mercury-added novelty items.

In addition, fluorescent lamps manufacturers continue to reduce the amount of mercury in lamps sold in the U.S. Manufactures have significantly reduced the amount of mercury in fluorescent linear tube lamps and streetlamps. The use of mercury containing bulbs has also decreased through replacement of these bulbs with LED lamps.

Mercury Device Recycling Programs resulting in Mercury load reduction generally include three types of programs that promote and facilitate the collection and recycling of mercury–containing devices and products:

1. Permittee-managed household hazardous waste (HHW) drop-off facilities and curbside or door-to-door pickup;
2. Private business take-back and recycling programs (e.g., Home Depot); and,
3. Private waste management services for small and large businesses.

9.2 Loads Avoided/Reduced Accounting Methodology

The load avoidance/reduction methodology for this control measure is:

$$HgReductionL/S/T = BaseLoadLST - CurLoadLST$$

Where:

BaseLoadLST	=	Baseline load of mercury in urban stormwater in 2002 from lamps (L), switches (S), and thermostats (T)
CurLoadLST	=	Current load of mercury in urban stormwater in year of interest from lamps (L), switches (S), and thermostats (T)

And:

BaseLoadLST	=	BaseMassL/S/T • BaseNumL/S/T • T
CurLoadLST	=	CurMassL/S/T • CurNumL/S/T • T

Where:

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$BaseMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) in 2002 (Assume: 93mg per kilogram of linear fluorescent lamp or Compact Fluorescent Lamp (CFL); 2.9g per switch; and 4g per thermostat).
$CurMass_{LST}$	=	Average mass of total mercury in each lamp (L), switch (S), and thermostat (T) recycled in year of interest (Assume: 35mg per kilogram of linear fluorescent lamp or CFL; 2.9g per switch; and 4g per thermostat).
$BaseNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) improperly discarded into the environment in 2002.
$CurNum_{LST}$	=	Number or weight of lamps (L), switches (S), and thermostats (T) discarded into the environment improperly in year of interest.
T	=	% of total mercury in lamps (L), switches (S), and thermostats (T) that when improperly discarded are transported to the Bay via urban stormwater (Assume 4.8%).

And:

BaseNumLST	=	BaseSpentL/S/T - BaseRecycleL/S/T
CurNumLST	=	CurSpentL/S/T - CurRecycleL/S/T

Where:

BaseSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in 2002
BaseRcyLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in 2002
CurSpentLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) that reached their end-of-life in year of interest
CurRecycleLST	=	Number or weight of lamps (L), switches (S), and thermostats (T) recycled in year of interest

Table 9-1 below provides conversion factors and references for the assumed values used in these calculations.

Table 9-1: Mercury Recycling Conversion Factors and References

Item	Conversion and Citation
Fluorescent Lamps	The average mercury content for a four-foot linear fluorescent lamp is 8.3 milligrams (mg). This is equal to 2.075 mg (2.075 X 10 -6 kilograms (kg)) per linear foot. Source: NEMA 2005. Fluorescent and Other Mercury-Containing Lamps and the Environment: Mercury Use, Environmental Benefits, Disposal Requirements. National Electrical Manufacturers Association. March 2005. 14p.

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Item	Conversion and Citation
Compact Fluorescent Lamps (CFLs)	The National Electrical Manufacturers Association (NEMA) announced that under the new voluntary commitment, effective October 1, 2010, participating manufacturers will cap the total mercury content in CFLs that are under 25 watts at 4 mg per unit, and CFLs that use 25 to 40 watts of electricity will be capped at 5 mg per unit. Each CFL recycled is assumed to have an average mass of 4.5 mg (4.5 X 10 -6 kg). New CFLs are also assumed to have 4.5 mg on average. Source: NEMA 2010. NEMA Lamp Companies Agree to Reduction in CFL Mercury Content Cap. Available at http://www.nema.org/media/pr/20101004a.cfm. Accessed April 11, 2012.
High Intensity Discharge (HID) Lamps	The average content of a HID bulb is .5 milligrams of mercury (0.5 x 10 -6 kg). Source NEMA Opposition to Ban on Mercury Containing Headlamps, 2004 http://www.nema.org/Policy/Environmental-Stewardship/Lamps/Documents/HID%20Headlamps%2010%2004.pdf
Thermostats	The amount of mercury in a thermostat is determined by the number of ampoules. There are generally one or two ampoules per thermostat (average is 1.4) and each ampoule contains an average of 2.8 grams (g) of mercury. Therefore, each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. Source: TRC 2008. Thermostat Recycling Corporation's Annual Report for the U.S. Prepared by the Thermostat Recycling Corporation. http://www.thermostat-recycle.org/files/u3/2008 TRC Annual Report.pdf. Each thermostat recycled is assumed to contain approximately 4.0 g (0.004 kg) of mercury. The average weight of one thermostat is 12 ounces. There are 1.3333 thermostats in a pound of thermostats (1 pounds/0.75 pounds = 1.33 thermostats. It is estimated that 0.005333 kg of mercury is recycled for every pound of thermostat recycled (1.333*0.004= 0.005333). Source: Average weight of thermostat obtained from retail websites - www.amazon.com.
Switches	The Recycling Corporation reports that one mercury switch contains 2.87 g (0.00287 kg) of mercury. Source: TRC 2010. Thermostat Recycling Corporation's Annual Report for California. Prepared by the Thermostat Recycling Corporation. Prepared for the State of California's Office of Pollution Prevention and Green Technology, Department of Toxic Substances Control. March 31, 2010.

9.3 Reporting

The Permittees will provide a description of their ongoing mercury recycling program and activities.

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10. PROGRAM UPDATES AND REFINEMENTS

The accounting methodology outlined in this report may be updated and refined to account for significant new information as it becomes available. If needed, the proposed updates will be submitted as an addendum to this report for Executive Office approval during the MRP 3 permit term.

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APPENDIX A
Land Use-Based Yield Analysis

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A.1 METHODOLOGY

The methodology presented in this appendix was developed to assist the MRP Permittees in identifying which watershed characteristics correlate well with areas that have high, moderate, and low rates of pollutant of concern (POC) (i.e., mercury and PCBs) loading to receiving waters via stormwater runoff. The methodology was developed using the collective local understanding of the types of land areas, facilities, and activities that generate POCs, with a focus on PCBs. The ultimate goal of the analysis was to provide first order estimates of POC loading rates from high, moderate, and low likelihood source areas and to assist Permittees in identifying areas for implementing POC load reduction measures that would have the greatest load reduction benefit.

A.1.1 Source Area Mapping

Documented uses and sources of PCBs and mercury in the urban environment and the results of PCBs source identification and abatement studies described in the 2014 Integrated Monitoring Report (IMR) Part B (BASMAA, 2014) have been used to identify PCBs source areas. Findings demonstrate that PCBs (and to a lesser extent mercury) sources are generally associated with watershed areas where equipment containing POCs were transported or used and facilities that recycle POCs or POC-containing devices and equipment. These sources include current and historic metal, automotive, and hazardous waste recycling and transfer stations; electrical properties and power plants; and rail lines. These sources are typically located in areas that were industrialized between the late 1920's and the late 1970's, the timeframe when PCBs and mercury production were the greatest in the U.S.

To assist Permittees in identifying potential POC sources and source areas, a number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968; an "Old Urban" land use layer that depicts urban areas developed by 1974, other than those depicted as Old Industrial; points depicting current facilities that have the potential to have or have had PCBs on-site; and historical and current rail lines where PCBs may have been transported.

A.1.1.1. Old Industrial Land Areas

Three sets of data layers were acquired and served as the primary sources of information used to create the Old Industrial data layer: 1) the 2005 version of the Association of Bay Area Governments (ABAG) land use data layers for the five Bay Area counties, which depicts current industrial land use areas; 2) 1968 aerial photographs for the Bay Area at 30,000 scale acquired from the United States Geological Survey's (USGS) Earth Explorer website; and 3) the most currently available County Assessor parcel data layers for Bay Area counties. Through the development of the Old Industrial layer, two data layers were created. The first depicts industrial land areas in 1968 that are not currently characterized as industrial by ABAG. This data layer was created by panning through 1968 aerial photography and identifying industrial land areas outside of the areas characterized as industrial land use in roughly 2005 by ABAG. The purpose of this layer was to identify potential industrial facilities that were present in 1968, but possibly redeveloped or incorrectly identified within the ABAG land use data. The second data layer that

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was created depicts areas characterized by ABAG in 2005 as industrial land uses that were clearly not industrial in the 1968 aerial photographs. Most of these areas were developed into industrial land uses after 1968 and are most commonly agricultural in the aerial photographs. All parcels that were identified as at least partially industrial in 1968 were visually checked in the data layer to provide greater confidence in its accuracy. Minor edits were then made based on this quality assurance check. If there was uncertainty as to whether a parcel in the 1968 photographs was industrial, then the parcel was classified based on the ABAG land use data. As a final check, the 1968 aerial photographs were also compared to current aerial photographs and each parcel that had been redeveloped was attributed with the current land use, even if that land use remained industrial.

A.1.1.2. Old and New Urban Land Areas

Old Urban and New Urban land use data layers that depict areas urbanized prior to and after 1974, respectively, were developed using an urban extents data layer from 1974, the closest year to 1968 that the data were available. All areas that were within the urban extent in 1974 were defined as Old Urban; those areas that fell outside of this definition were classified as New Urban. Old Urban areas have been further divided into residential and parks areas versus commercial areas in the current land use classification schema.

A.1.1.3 Identification of Potential POC Associated Facilities

Point data were collected for a number of facility types that may be associated with either PCBs or mercury. These facility types include those associated with electrical generation, known mercury emitters, metal manufacturing, drum recycling, metal recycling, shipping, automotive recycling, general recycling, and those known to have or historically have had PCBs in use. This information was primarily gathered by the San Francisco Estuary Institute (SFEI) as part of the Urban Stormwater Best Management Practices (BMPs) Proposition 13 Grant project and contains data from a variety of sources, including the California Air Resources Board, EnviroStor, Superfund, Department of Toxic Substances Control, and the State Water Resource Control Board.

Certain facility types for which point data were developed were mapped in greater detail to develop polygons to allow area calculations to be performed. Of particular interest for PCBs were the several hundred electrical substations in the Bay Area. Areas for these facilities were delineated using current and 1968 aerial photographs to attribute whether each facility was built prior to or after 1968. Additionally, military, port, and railroad land use areas were developed using ABAG 2005 land use data and the latest assessor's parcel data. Military parcels were further edited to only include developed areas.

Land use and facility data layers created as part of this effort were then combined to create one contiguous data layer. This data layer was attributed with additional information such as city, county, and watershed.

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A.2 Regional Watershed Spreadsheet Analysis

A.2.1 Background

The Regional Watershed Spreadsheet Model (RWSM) was developed as part of the Regional Monitoring Program's (RMP) Small Tributaries Loading Strategy as a regional-scale planning tool primarily for the purpose of estimating long-term average annual loads from the small tributaries surrounding San Francisco Bay, and secondarily to provide supporting information for prioritizing watersheds or areas within watersheds for management actions (Wu et al., 2016).

The RWSM is structured with three stand-alone empirical models: the hydrology model, the sediment model, and the pollutant model (Wu et al., 2016). The hydrology model uses runoff coefficients based on geospatially identified land use-soil-slope combinations along with rainfall based on PRISM average precipitation[7] to estimate annual runoff from a defined watershed area. The sediment model uses a function of geology, slope, and land-use to simulate suspended sediment transport in the landscape of a defined watershed while adjusting for watershed storage factors. The pollutant model is a spreadsheet model that combines land use-based pollutant concentrations (i.e., pollutant concentrations in water or pollutant concentrations on fine sediment particles as particle ratios[8] corresponding with specific land use types or source areas) with land use-based hydrology model output or sediment model output. Land use-based loading results are compiled to obtain pollutant loading across a defined watershed.

Starting in 2010, a multi-year effort was undertaken to systematically develop and calibrate the RWSM for San Francisco Bay watersheds using RMP data. Calibration was completed[9] and the model was released in 2018 (SFEI, 2018). For further detail about each component of the model, see the RWSM User Manual (SFEI, 2018).

A.2.2 RWSM Results

The estimated average PCBs and mercury yields from the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" for the modeled land use yield categories are provided in Table A-1 below. The "Region" spreadsheet results were developed using RMP data from well-sampled watersheds to calibrate pollutant concentration coefficients and applying the resulting coefficients to the region to get average pollutant yield results (Gilbreath, 2019).

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[7] 800-m grid, from PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu.
[8] Particle ratios = pollutant concentration in water (ng/L) / suspended sediment concentration (mg/L), equivalent to mg/kg.
[9] The calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

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Table A-1: RWSM Land Use-Based Yields for PCBs and Mercury

Land Use Category	Average PCBs Yield (mg/ac/yr)	Average Mercury Yield[1] (mg/ac/yr)
Old Industrial and Source Areas	259	53
Old Commercial and Old Transportation	49	57
Old Residential	2.8	57
New Urban	0.4	4
Agriculture/Open Space	0.4	81

mg/ac/yr – milligrams per acre per year
Note: RWSM Toolbox v1.0 Pollutant Model, Pollutant Spreadsheet Model Calculations - Region. Spreadsheet dated 6/9/2017.
1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

Table A-2 below presents the RWSM Toolbox v1.0 Pollutant Model, "Pollutant Spreadsheet Model Calculations – Region" results for PCBs and mercury average concentrations in runoff for the five RWSM modeled land use categories (SFEI, 2018).

Table A-2: Regional Watershed Spreadsheet Model PCBs and Mercury Concentrations in Runoff

Land Use Category	Total PCBs (ng/L)	Total Mercury[1] (ng/L)
Old Industrial and Source Areas	204	40
Old Commercial and Old Transportation	40	63
Old Residential	4	63
New Urban	0.2	3
Agriculture/Open Space	0.2	80

1. The model calibration for PCBs is "reasonable" but there remains a lower confidence in the calibration for mercury (Wu et al., 2017).

A.3 Source Area/Property PCBs Yield

The derivation of the estimated PCBs source property yield is described below. The PCBs source property yield was derived as the product of a representative PCBs concentration in surface soils at known source properties and a representative soil/sediment yield for old industrial areas.

Table A-3 and Table A-4 present descriptive statistics for measured concentrations of PCBs from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties. This dataset includes 670 PCBs surface soil samples from twelve source property locations as well as on-site source property data identified in the street and storm drain sediment dataset that has been compiled by BASMAA to-date (see Appendix B). All soil samples included in the analysis were collected from the 0 to 0.5-foot depth interval, with the exception those collected at one site, based on the assumption that the top six inches of soil would have the most potential to mobilize offsite via wind or rainfall erosion. Data collected from the 0 to 1.0-depth interval were included for the General Electric site in Oakland, as this represented the shallowest reported depth for that site. The range of PCBs concentration (mg/kg) in surface soils for individual Bay Area source properties are provided in Table A-3 and the summary statistics for all sites combined are provided in Table A-4.

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Table A-3: Site specific PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1411 Industrial Rd, San Carlos	1.66	236.31	418.00	5	EKI Environment and Water, 2018. Letter from EKI to Mark Johnson, RWQCB, October 8, 2018. Subject: PCB Storm Drain Sediment Sampling Results 1411 Industrial Road, San Carlos, CA (EKI B80090.00)
270 Industrial Road and 495 Bragato Rd, San Carlos (Delta Star Inc./Tiegel Manufacturing Co.)	3.40	28.36	122.00	14	GHD, 2016. Incremental Sampling Investigation Report. August 4.
335 Brokaw Road, Santa Clara	3.56	3.56	3.56	1	SCVURPPP POC Monitoring
1645 Old Bayshore Highway, San Jose	11.91	11.91	11.91	1	SCVURPPP POC Monitoring
1695 and 1775 Monterey Highway, San Jose	5.47	6.26	7.06	2	SCVURPPP POC Monitoring
1800 South Monterey Road, San Jose	1.79	2.70	3.61	2	SCVURPPP POC Monitoring
Union Pacific Railroad at Schallenberger Road, San Jose	2.80	2.80	2.80	1	CW4CB Final Report/database (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)
Union Pacific Railroad Leo Avenue, San Jose	0.02	12.86	127.00	45	GHD, 2017. Remedial Investigation Report. Union Pacific Railroad Property, Leo Avenue ROW, San Jose, CA. September.
ETT111, Oakland	3.70	3.70	3.70	1	Kleinfelder, 2006. Private Property Sediment Sampling Report: Ettie Street Watershed, Oakland, California. Kleinfelder West, Inc.
3430 Wood Street, Oakland (Granite Expo)	93.41	93.41	93.41	1	ibid
1797 12th St, Oakland (Cole Brothers Auto Wrecker)	1.67	1.67	1.67	1	ibid
3015 Adeline St, Oakland (California Electric)	6.08	6.08	6.08	1	ibid
1266 14th St, Oakland (Amtech Lighting)	5.70	5.70	5.70	1	ibid
3425 Ettie St, Oakland (Allied Painter)	1.75	1.75	1.75	1	ibid
2838 Hannah St, Oakland (Former Giampolini)	0.74	9.23	17.73	2	ibid
3428-3434 Helen Street, Oakland (ACM)	10.62	10.62	10.62	1	ibid

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Site Location	Minimum (mg/kg)	Average (mg/kg)	Maximum (mg/kg)	Count	Reference
1639 18th St, Oakland (Martinez Bros Trucking)	1.95	1.95	1.95	1	ibid
2601-2812 Peralta St, Oakland (Custom Alloy Scrap Sales)	1.78	7.09	14.73	4	ibid
280 West MacArthur Blvd, Oakland (Kaiser Oakland)	0.01	1.67	27.20	101	Forensic Analytical Environmental Health Consultants, 2017. PCB Soil and Sediment Waste Characterization and Disposal Plan, Kaiser Permanente Medical Center Oakland Legacy Tower Demolition Project, 280 West MacArthur Boulevard, Oakland, CA. Revised April 21, 2017.
710 73rd Avenue, Oakland (Former Aero Plating)	0.01	101.42	790.00	8	Fugro Consultants, Inc. 2016. Limited Soil Sampling Investigation, 710 73rd Avenue, Oakland, CA. January.
700 73rd Avenue, Oakland (Union Pacific Railroad)	0.92	88.16	1,100	14	CDM Smith, 2014. Report of Findings for Data Gaps Investigation Phase B - On-site Investigations, Union Pacific Railroad Company Property, 700 73rd Avenue Oakland, CA. November 14.
5441 International Boulevard, Oakland (General Electric)	0.03	248.36	11,000	134	Geosyntec Consultants, 2009. Feasibility Study Report for the GE Site at 5441 International Boulevard, Oakland, CA. June.
4560 Horton Street, Emeryville (Former South Southern Pacific Railroad)	0.03	0.40	1.91	6	EKI, 2016. Corrective Action Work Plan – Shallow Soil Excavation, Former SPRR Parcel South of 53rd Street, Emeryville, CA. June 29.
One Cyclotron Rd, Berkeley (Lawrence Berkeley National Laboratory)	0.0019	3.23	135.0	227	Lawrence Berkeley National Laboratory, 2016. Quarterly and Semiannual Progress Reports, for the LBNL Hazardous Waste Facility Permit. Environmental Restoration Program. August 1993 through February 2016.
CC-SPL-600-P	1.29	1.29	1.29	1	Contra Costa County 2015 POC Sampling
San Diego St, Richmond (San Diego St)	0.03	0.12	1.20	14	Arcadis, 2016. San Diego Street Transformer Oil Release Cleanup and Closure Report, West End of San Diego Street Richmond, CA, February.
1014 Chesley Ave, Richmond (World Oil)	0.01	0.79	6.50	70	APEX, 2018. PCB Characterization Report, World Oil Corporation Property, 1014 Chesley Avenue, Richmond, California. July 13.
1215 Willow Pass Road, Pittsburg (Molino)	0.02	1.19	5.60	10	Ground Zero Analysis, 2016. Phase II Investigation at 1215 Willow Pass Road, Pittsburg, November 11.
Average for All Properties		**31.88**			

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Table A-4: Summary of PCBs concentration in surface soil collected on-site from source properties located in Alameda, Contra Costa, Santa Clara, and San Mateo Counties.

Statistic	PCBs (mg/kg)
Maximum	11,000
90th Percentile	36.90
75th Percentile	4.80
Average	57.71
Median	0.57
25th Percentile	0.069
10th Percentile	0.0020
Minimum	0.0019
N	670

Based on the data reviewed, the Bay Area wide average of PCBs in surface soil from known source properties based on individual property averages is 31.9 mg/kg (Table A-3) and the average based on individual sample concentrations is 57.7 mg/kg (Table A-4). An average concentration is the appropriate metric to use for the yield estimate as it is representative of the total expected loading, which is affected by very high concentrations.

A sediment yield for Old Industrial land uses within the Santa Clara Basin watersheds was estimated based on a Loading Simulation Program – C++ (LPSC) watershed model developed for the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) as part of their reasonable assurance analysis (Paradigm Environmental, 2019 (attached)). The sediment yield estimated from the LPSC watershed model represents baseline hydrology and water quality, specifically sediment and solids. The median, LPSC-modeled sediment yield from Old Industrial land uses in the Santa Clara Basin is 39 grams/m^2/year or 157.8 kg/acre/year. Using the average PCBs concentration, estimated in two different approaches, of 31.9 mg/kg and 57.7 mg/kg from surface soils on Bay Area source properties presented above and the median Old Industrial sediment yield of 157.8 kg/acre, the estimated PCBs yield from source properties is 5,031 mg/acre/year and 9,108 mg/acre/year, respectively.

For mercury, the RWSM yield value for old industrial/source areas will be used for load reduction accounting.

A.4 LIMITATIONS AND UNCERTAINTY

Land use is used as a surrogate for actual PCBs and mercury sources, and although the types of potential sources have been identified, the actual locations and sizes of sources are difficult to determine at this level of analysis. While categorized the same for modeling and analysis purposes, similar land use in different locations may have very different sources and thus distinctly different PCBs and mercury concentrations in runoff.

It is difficult to quantitatively assess the implications of these limitations on the projected magnitude of loads, especially as analysis shifts from regional to more refined spatial scales. The projected loads should be considered first order approximation and reflective of the central tendency of the data for the Bay Area as a whole.

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A.5 REFERENCES

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APPENDIX B

Urban Sediment Concentration Statistics

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B.1 Descriptive Statistics

Tables B-1 and B-2, and Figures B-1 and B-2 presents descriptive statistics for the PCBs and mercury street and storm drain sediment dataset that has been compiled by BASMAA to-date. This dataset includes 1,535 PCBs samples and 1,350 mercury samples taken within the street right-of-way, storm drain conveyance system, and private properties from 1999 through 2019. Data are summarized by the predominant land use within the vicinity of where the sediment was collected.

Table B-1: PCBs concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

Statistic	Old Industrial	Old Urban (Not Residential/Parks)	Old Urban (Residential /Parks)	New Urban	Open Space	All Samples
Maximum	193	17	5.7	0.72	1.1	193
90th Percentile	1.1	0.18	0.30	0.27	0.19	0.77
75th Percentile	0.21	0.08	0.10	0.047	0.054	0.16
Mean	0.79	0.22	0.20	0.066	0.067	0.65
Geometric Mean	0.26	0.09	0.12	0.059	0.058	0.22
Median	0.05	0.03	0.023	0.016	0.009	0.041
25th Percentile	0.01	0.01	0.006	0.001	0.002	0.009
10th Percentile	ND	ND	ND	ND	ND	ND
Minimum	ND	ND	ND	ND	ND	ND
n	1,205	110	98	69	53	1,535

Table B-2: Mercury concentrations in sediment (mg/kg) collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2015.

Statistic	Old Industrial	Old Urban Not Res/Parks	Old Urban Res/Parks	New Urban	Open Space	All Samples
Maximum	21	1.7	4.5	13	4.3	21
90th Percentile	0.80	0.41	0.78	0.63	0.35	0.74
75th Percentile	0.30	0.22	0.40	0.27	0.20	0.29
Mean	0.43	0.20	0.43	0.46	0.29	0.41
Geometric Mean	0.29	0.13	0.19	0.27	0.11	0.28
Median	0.15	0.11	0.18	0.14	0.11	0.15
25th Percentile	0.088	0.071	0.082	0.100	0.046	0.086
10th Percentile	0.057	0.051	0.045	0.056	0.030	0.054
Minimum	ND	0.015	0.015	ND	0.020	ND
n	1,069	80	91	62	48	1,350

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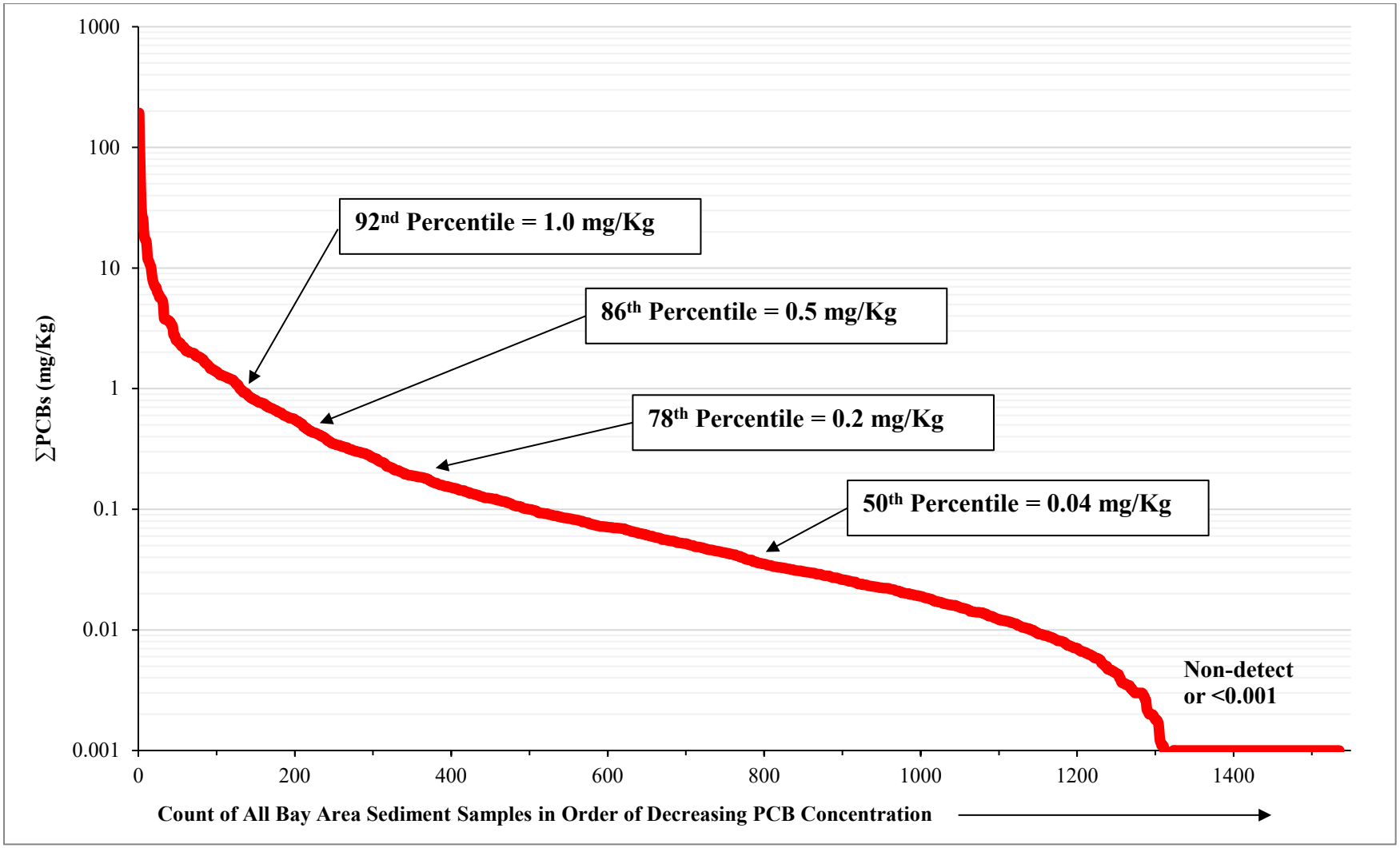

Figure B.1: Total PCB concentrations in sediment collected from streets, stormwater conveyance systems, and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

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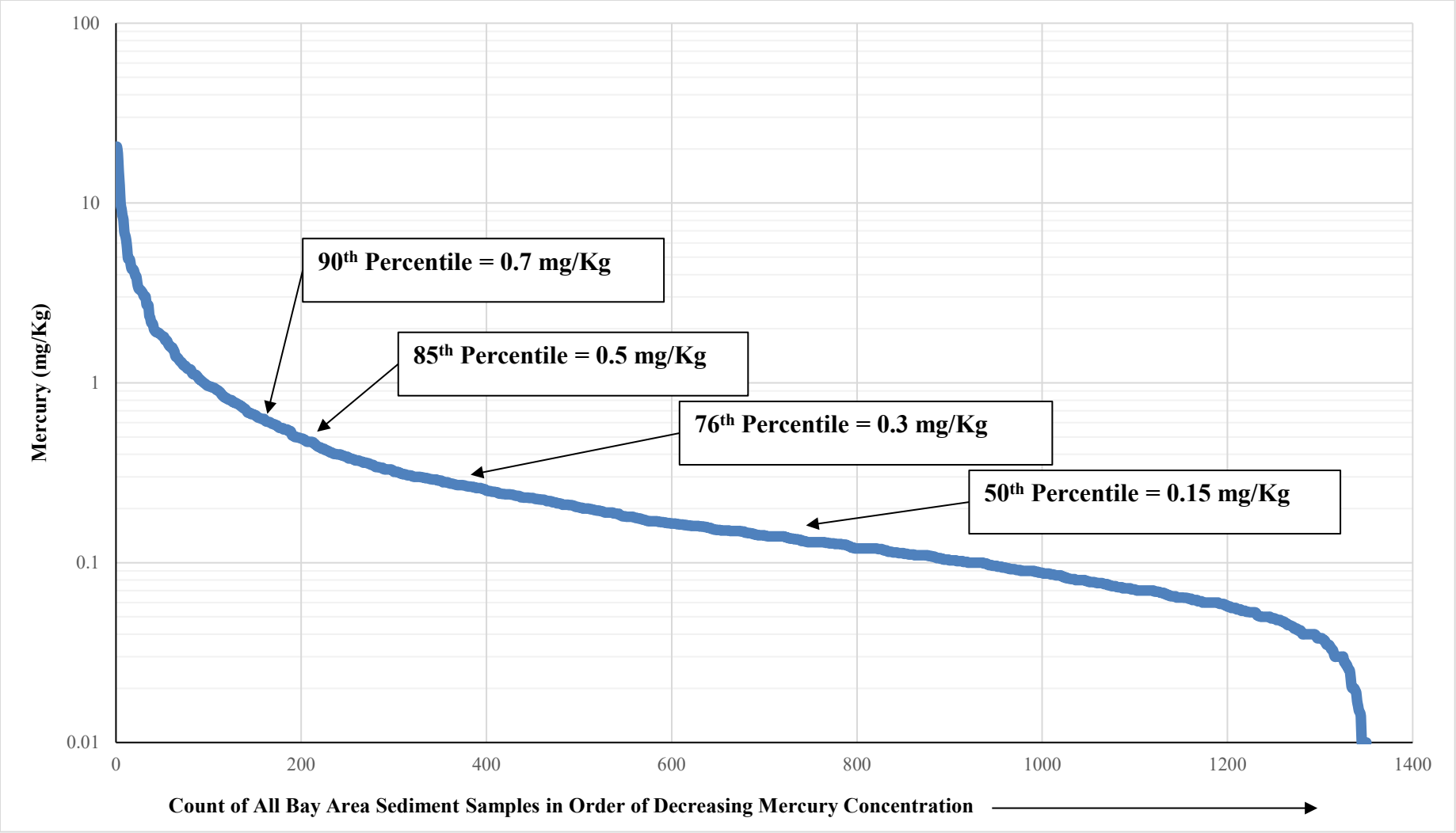

Figure B.2: Total mercury concentrations in sediment collected from streets, stormwater conveyance systems and private properties located in Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Counties between 1999 and 2019.

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APPENDIX C

Source Area Investigation and Abatement Guidance

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C.1 BACKGROUND

Since 2000, Bay Area stormwater programs have conducted investigations on behalf of MRP Permittees to identify land areas or properties that contribute substantial amounts of PCBs to Bay Area municipal separate storm sewer systems (MS4s). These investigations have largely focused on land areas where industrial land use activities occurred prior to 1980 and continue today (i.e., old industrial land use areas). The *Interim Accounting Methodology for TMDL Loads Reduced Report* (BASMAA, March 2017) described this control measure and defined the methodology that was used for PCBs load reduction accounting during the MRP 2.0 permit term.

The pollutant reduction benefits and costs of conducting source property investigations were examined, along with other stormwater control measures, via the *Clean Watersheds for Clean Bay* (CW4CB) project. The CW4CB project concluded that PCBs source property investigations are much more cost-effective at reducing loads of PCBs than retrofitting old industrial areas with green stormwater infrastructure (GSI). This finding and the pollutant reductions achieved during the MRP 2.0 permit term via this control measure provide an impetus for MRP Permittees to continue source property investigations as a viable control measure for PCBs during MRP 3.0.

The process for conducting source area investigations that would be followed by each stormwater program during MRP 3.0 is presented below.

C.2 SOURCE AREA INVESTIGATION PROCESS

The source area investigation process consists of the four steps outlined below:

1. Identify areas that should be considered for source area investigations;
2. Conduct screening-level investigations in the areas identified in (1) to prioritize these areas as high, moderate, or low-likelihood source areas;
3. Conduct targeted source area investigations in areas prioritized as high or moderate-likelihood source areas in (2) to identify and confirm source areas; and
4. Determine next steps for confirmed source areas.

Each of these steps is described in more detail below.

C.2.1 Step 1: Identify Areas Considered for Source Area Investigations

Identify areas that should be considered for source area investigations as follows:

A. Identify the extent of old industrial land use areas that were present in 2002, the starting date for accounting for POC load reductions;

B. Remove those old industrial land use areas that have already been investigated, referred, and/or abated since 2002;

C. Remove those old industrial land use areas that have undergone redevelopment or GSI retrofit since 2002;

D. Remove those old industrial land use areas that do not drain to an MS4, rather drain directly to the Bay shoreline; and

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E. Identify the remaining old industrial land use areas that should be considered for source property investigations by subtracting B, C, and D from A above.

Each countywide stormwater program has implemented this process to identify the total area that will be considered for investigation within each of the five MRP counties.

C.2.2 Step 2: Conduct Screening-level Source Area Investigations

The purpose of screening-level source area investigations is to identify both (1) areas that are likely to contain sources of PCBs, and (2) areas that are unlikely to contain sources of PCBs. This effort will assist Permittees in narrowing the focus for more in-depth, targeted source investigations to those areas that are most likely to contain sources. The screening methods described below are designed to categorize areas at the watershed, MS4 catchment, or individual parcel-scale as high-, moderate-, or low-likelihood source areas according to the following criteria:

- Low-likelihood source areas:
  - No evidence of current or historical use of PCBs; and,
  - all MS4 sediment concentrations and stormwater particle ratios are below 0.5 mg/kg.
- Moderate-likelihood source areas
  - There may be evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio between 0.5 and 1.0 mg/kg.
- High-likelihood source areas:
  - There is evidence of current or historical use of PCBs; and/or
  - At least one MS4 sediment or stormwater particle ratio is greater than 1.0 mg/kg.

Screening-level investigation methods may involve any of the following:

- Desktop Analysis. Desktop analysis conducted to gather available information on potential sources of PCBs in a given area or on a specific parcel can also be used to screen areas for further investigation or to remove them from further consideration. This type of screening may include review of current and historic land uses, historical parcel records, contaminated properties databases (e.g., Geotracker and EnviroStor), and aerial photography to identify past and current activities that may be associated with PCBs (e.g., recycling facilities, parcels with large electrical equipment, PCBs manufacturing sites, industrial activities that used PCBs, etc.). Any stormwater or MS4 sediment data collected in the past may also be used as an indicator of likely PCBs sources that warrant further investigation.
- Stormwater Monitoring. Stormwater samples collected at the outlet of a defined drainage area (watershed, MS4 catchment, or individual parcel scale) can be used to screen the entire area that drains to the sampling location; if the PCBs particle ratio in all

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stormwater samples is less than 500 ng/g[10], then the entire area draining to that sampling location can be identified as a low-likelihood source area.

- Sediment Monitoring. Suspended sediment samples collected from storm drain infrastructure or a channel that drains a defined area (e.g., a watershed, MS4 catchment, or one or more individual parcels) can be also be used to screen potential source areas. If the PCBs particle ratio in samples collected are less than 0.5 mg/kg, then the area or parcels that drain to the sampling location can be identified as low-likelihood area/parcels.

C.2.3 Step 3: Conduct Targeted Source Area Investigations

Select parcels or smaller areas within areas that are identified in Step 2 as high- and moderate-likelihood source areas may be targeted for more in-depth source investigation. The purpose of a targeted source area investigation is to identify and confirm specific source properties that contribute elevated PCBs to MS4s. Once a source property has been confirmed, Permittees may refer the property to the Regional Water Board for abatement, or the Permittee can oversee property abatement directly. The targeted source area investigation steps are modeled after the CW4CB Source Property Identification and Referral Pilot Projects (BASMAA, 2017). The targeted source area investigation process proceeds through the following four tasks:

1. Records Review. The purpose of the records review is to evaluate available information on specific parcels of interest within an investigation area to identify sources of PCBs. The types of information reviewed may include the following:

    - Site history, cleanup records, or monitoring data available through online databases (i.e., Geotracker and EnviroStor);
    - Cal OES records of PCBs releases from electrical utility equipment;
    - Changes in aerial photos from prior to 1980 and present condition;
    - Outdoor storage, suspected waste areas or ponds;
    - Available stormwater inspection history, including occurrence of PCBs, spills, and stormwater violations on prior inspection reports; and
    - Industrial General Permit (IGP) facility data.

2. Public ROW Surveys / Facility Site Visits. The purpose of public ROW surveys / facility site visits is to verify information obtained during records review, document possible sources, observe sediment migration and flow patterns from parcels of interest to the public ROW, document existing stormwater control measures, and identify potential sample locations. Information documented during public ROW surveys / site visits may include the following:

[10] This value may be adjusted in the future based on the results of the Advanced Data Analysis under development by the Regional Monitoring Program Sources, Pathways, and Loadings workgroup or equivalent analyses conducted by the Permittees.

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- Electrical equipment associated with PCBs (e.g., transformers and capacitors);
- Old equipment with hydraulic fluids;
- Outdoor hazardous material/waste storage areas (e.g., tanks, drums), especially with poor housekeeping;
- Signs related to hazardous materials and wastes;
- Recycling/scrap yards (e.g., for automobiles);
- Building demolition activities;
- Unidentified puddles or stains;
- Flow patterns and storm drain structures;
- Existing and potential stormwater control measures;
- Sediment erosion from a property and migration to the street or storm drains;
- Properties that have been redeveloped or are in the process of redevelopment; and
- Redeveloped areas where older exposed soils are available for tracking off site.

The combined results of the records reviews, public ROW surveys / facility site visits are then used to prioritize sampling and develop the sampling plan.

3. Sampling. The purpose of sampling is to confirm if the suspected source area is an actual source of elevated PCBs to the MS4 or is not. Sampling methods may include the collection of sediment in the ROW, and inlet, or the storm drain; and/or stormwater sampling.

4. Identification of Source Areas. This task will review the information gathered throughout the investigation process in order to identify and confirm any source areas. Pollutant concentrations provide the primary means of confirming the identification of source areas. Elevated soil/sediment or stormwater concentrations from samples collected onsite, at the border of a parcel, or at the junction of an onsite underground drainage pipe (lateral) and the MS4 provide the best definitive evidence of whether a property is a source of PCBs to the MS4 or is not. Parcels or areas with PCBs concentrations ≥ 1.0 mg/kg are considered *confirmed source areas* and need no further investigation.

C.2.4 Step 4: Determine Next Steps for Confirmed Source Areas

The options Permittees may pursue for confirmed source areas include the following:

- Submit a referral to the Regional Water Board (and/or other regulatory agency) for follow-up investigation and abatement. The referral process and standard referral form are more fully described in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- Abate or cause the area to be abated directly, without referral to a regulatory agency. For this option, the City will work directly with the property owner to ensure the property is fully abated and a self-abatement report will be submitted to the Regional

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Water Board according to the process outlined in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis* report (BASMAA, 2020).

- If the investigation conducted in Step 3 does not identify a specific source area for the observed elevated concentrations, then the source area will be considered for the application of other types of control measures.

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APPENDIX D

Source Property Referral Form
Source Property Self Abatement Report

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PCBs SOURCE PROPERTY REFERRAL FORM

The purpose of this form is to provide the Department of Toxic Substances Control, the United States Environmental Protection Agency (USEPA) or the Regional Water Quality Control Board with sufficient information to require site owner/operators to conduct follow-up investigations and/or PCB cleanup actions.

Referring Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features.
Parcel Area (acres):

5. Current Owner

   Name:

   Address:

   City, County & Zip Code:

   Phone:

   E-mail Address:

   Contact:

   Title:

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6. Background: Current Business Operations

   Name:

   Period of Operation:

   Type:

7. Background: Previous Business Operations (if known)

   Name:

   Period of Operation:

   Type:

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Describe the known and suspected sources of PCBs at the site.

10. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

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11. Is the site subject to the industrial general stormwater permit? Yes No

If yes, describe the findings of recent and past stormwater inspections conducted on the site, especially in regard to potential PCB sources.

12. Is there currently a potential for exposure of the community or workers to hazardous substances, pollutants, or contaminants at the site? Yes No

If yes, explain:

13. Are any Federal, State, or Local regulatory agencies involved with the site? Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Provide any other pertinent site information not covered above.

15. Describe enhanced control measures or downstream treatment control measures that will be implemented at the site. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public right-of-way and prevent additional contaminated sediment from being discharged from the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

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SOURCE PROPERTY ABATEMENT REPORT

The purpose of this form is to provide the Regional Water Quality Control Board with sufficient documentation that source property abatement has effectively eliminated the transport of PCBs or mercury offsite and from entering the municipal separate storm sewer system (MS4) infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff, wind, vehicle tracking). This documentation shall include information on the type and extent of abatement that has occurred (e.g., have the sources of PCBs to the MS4 been eliminated via capping, paving, walls, plugging/removal of internal storm drains, etc.) and any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Responsible Agency:

Staff Contact Name:

Phone:

Email Address:

Date of Report:

1. Name of Site:

2. Address City County ZIP:

3. APN(s):

4. Provide a Site Location Map and a Site Diagram showing significant features. Parcel Area (acres):

5. Current Owner

   Name:

   Address

   City, County & Zip Code:

   Phone:

   E-mail Address:

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6. Describe Current (Post-Abatement) Site Operations/Land Use.

7. Describe Previous Business Operations / Sources of PCBs or Mercury (if known).

8. Summarize any available information that may indicate hazardous substances, pollutants, or contaminants OTHER than PCBs have been associated with the site.

9. Has sampling or other investigation been conducted in the vicinity of the property to identify it as a source property? Yes No

Specify. For samples collected in the public right-of-way, show the nexus to the subject property as clearly as possible. Attach maps or pictures and coordinates (if applicable).

13. Were any Federal, State, or Local regulatory agencies involved with the site abatement?

Yes No

If yes, provide as much of the information below as known:

Agency	Involvement	Contact Name	Phone Number

14. Describe the type and extent of abatement that has occurred.

15. Describe how the property abatement has effectively eliminated the transport of PCBs offsite and from entering the MS4 infrastructure for all transport mechanisms that apply to the site (e.g., stormwater runoff via sheet flow or through a storm drain, wind, or vehicle tracking).

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16. Describe any available water or sediment monitoring data that demonstrates the effective elimination of transport of PCBs offsite into the MS4.

Attach: Site Location Map, Site Diagram, and any pertinent sampling & analyses data

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APPENDIX E

BASMAA Regional Stressor/Source Identification (SSID) Project Final Report PCBs from Electrical Utilities in San Francisco Bay Area Watersheds

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PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project

Prepared in support of provision C.8.e.iii of

NPDES Permit # CAS612008

Project Report

B A S M A A

Bay Area Stormwater Management Agencies Association

Prepared for:

Bay Area Stormwater Management Agencies Association (BASMAA)

Prepared by:

EOA inc.

FINAL June 30, 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
Basin Plan	San Francisco Bay Basin (Region 2) Water Quality Control Plan
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
BOD	BASMAA Board of Directors
Cal OES	California Office of Emergency Services
CCCWP	Contra Costa Clean Water Program
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPUC	California Public Utilities Commission
CPAU	City of Palo Alto Utilities
CWA	Clean Water Act
dba	Doing Business As
DTSC	California Department of Toxic Substances Control
FERC	Federal Energy Regulatory Commission
FSURMP	Fairfield-Suisun Urban Runoff Management Program
kg/yr	kilogram per year
lb.	Pound
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MT	Metric Tons
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System

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PCBs	Polychlorinated Biphenyls
RMC	Regional Monitoring Coalition
ROW	right-of-way
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SVP	Silicon Valley Power
OFEE	Oil-filled Electrical Equipment
PG&E	Pacifica Gas and Electric Company
ppm	parts per million
PMT	BASMAA Project Management Team
RQ	reportable quantity
RCRA	Resource Conservation and Recovery Act
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC Plan	Spill Prevention Control and Countermeasure Plan
SSID	Stressor/Source Identification
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
UCMR	Urban Creeks Monitoring Report
US EPA	United States Environmental Protection Agency
VFWD	Vallejo Flood and Wastewater District
WQOs	Water Quality Objectives
WQS	Water Quality Standard

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1.0 Introduction

This project report supports the requirement to implement a Stressor/Source Identification (SSID) Project as required by Provision C.8.e.iii of the San Francisco Bay (Bay) Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Stormwater Permit (MRP) (Order No. R2-2015-0049, SFRWQCB 2015). Per MRP Provision C.8.e.ii, the Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Coalition (RMC)[1] members are working to initiate eight SSID projects during the five-year term of the MRP (i.e., 2016 – 2020). The RMC programs have agreed that seven SSID projects will be conducted to address local needs (for Santa Clara, Alameda, San Mateo, Contra Costa, Fairfield/Suisun and Vallejo counties), and one project (this project) will be conducted regionally (on behalf of all RMC members). SSID projects follow-up on monitoring conducted in compliance with MRP Provision C.8 (or monitoring conducted through other programs) with results that exceed trigger thresholds identified in the MRP. Trigger thresholds are not necessarily equivalent to Water Quality Objectives (WQOs) established in the San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) (SFRWQCB, 2017) by the San Francisco Bay Regional Water Quality Control Board (Regional Water Board); however, sites where triggers are exceeded may indicate potential impacts to aquatic life or other beneficial uses.

BASMAA submitted a Regional SSID Work Plan to the Regional Water Board in March 2019. The SSID work plan described the steps that would be taken to investigate sources of polychlorinated biphenyls (PCBs) from electrical utility equipment in watersheds draining to the San Francisco Bay Basin. The Work Plan focused on Pacific Gas and Electric Company (PG&E), the largest electrical utility operating in the MRP area, and the only utility that is not owned by a municipality. The project team developed a letter requesting assistance from the Regional Water Board and outlining the specific data that are needed from PG&E to complete this project. The letter was ultimately approved by the BASMAA Board of Directors (BOD) and sent to the Regional Water Board in June 2019. The letter specifically asked the Regional Water Board to use their regulatory authority under Section 13267 of the Clean Water Act to compel PG&E to provide the needed data. However, PG&E is currently in bankruptcy proceedings, and the outcomes of that process have not yet been determined. As such, the Regional Water Board has delayed sending a “13267 letter” to PG&E, and is currently considering other options for moving forward with PG&E on this issue.

The BASMAA MRP 3.0 C.11/12 workgroup met with and discussed the issue of PCBs in electrical utility equipment with representatives of several municipally-owned electrical utilities in the permit area. Based on the information gained during these discussions, and given the current situation with PG&E, BASMAA requested the project team develop a revised scope of work (SOW) for Task 2 of the Regional SSID Work Plan.

BASMAA submitted a Regional SSID Revised Scope of Work to address PCBs in electrical utility applications in March 2020 to the Regional Water Board. The revised SOW would

[1] The BASMAA RMC is a consortium of San Francisco Bay Area municipal stormwater programs that joined together to coordinate and oversee water quality monitoring and several other requirements of the MRP. Participating BASMAA members include the Alameda Countywide Clean Water Program (ACCWP), Contra Costa Clean Water Program (CCCWP), Fairfield-Suisun Urban Runoff Management Program (FSURMP), San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), and City of Vallejo and Vallejo Flood and Wastewater District (VFWD).

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implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the San Francisco Bay Area (Bay Area), rather than PG&E. The Regional Water Board staff agreed[2] to a revised approach which focused on data gathering from municipally-owned electrical utilities. The Regional Water Board staff further acknowledged that revision of the work plan submitted in March 2019 is not needed to satisfy SSID project requirements. They also agreed the Regional SSID project will be considered complete based on the outcomes of the work described in this report, which focuses on data from municipally-owned electrical utilities instead of PG&E.

BASMAA retained EOA, Inc., of Oakland, CA to develop the work plan and implement the SSID project under the direction of a BASMAA Project Management Team (PMT). All work on this project is supported by funding provided by BASMAA.

1.1 Overview of SSID Project Requirements

SSID projects focus on taking action(s) to identify and reduce sources of pollutants, alleviate stressors, and address water quality problems. MRP Provision C.8.e.iii requires SSID projects to be conducted in a stepwise process, as described below.

Step 1: Develop a work plan that includes the following elements:

- Define the water quality problem (e.g., magnitude, temporal extent, and geographic extent) to the extent known;
- Describe the SSID project objectives, including the management context within which the results of the investigation will be used;
- Consider the problem within a watershed context and examine multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results);
- List potential causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors);
- Establish a schedule for investigating the cause(s) of the trigger stressor/source which begins upon completion of the work plan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data; and
- Establish the methods and plan for conducting a site-specific study (or non-site specific if the problem is widespread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source.

Step 2: Conduct SSID investigations according to the schedule in the work plan and report on the status of the SSID investigation annually in the Urban Creeks Monitoring Report (UCMR) that is submitted to the Regional Water Board on March 31 of each year.

[2] Per Jan O'Hara at the BASMAA Monitoring and Pollutants of Concern Committee meeting held on March 3, 2020

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Step 3: Follow-up actions:

- If it is determined that discharges to the municipal separate storm sewer system (MS4) contribute to an exceedance of a water quality standard (WQS) or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, submit a report in the UCMR that describes Best Management Practices (BMPs) that are currently being implemented and additional BMPs that will be implemented to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report must include an implementation schedule.
- If it is determined that MS4 discharges are not contributing to an exceedance of a WQS, the SSID project may end. The Executive Officer must concur in writing before an SSID project is determined to be completed.
- If the SSID investigation is inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable investigations do not reveal a stressor/source), the Permittee may request that the Executive Officer consider the SSID project complete.

1.2 SSID Project Report Organization

Step 1 of the SSID process described above in Section 1.1 was completed with the submittal of the BASMAA Regional SSID Work Plan in March 2019 and subsequent Revised Scope of Work (SOW) in March 2020.

The Work Plan and revised SOW identified the following tasks:

1. Conduct desktop analysis of data from Bay Area electrical utilities;
2. Develop Source Control Framework that summarizes the results of the desktop analysis and recommends approach to manage and control releases;
3. Develop data inputs that can be used to account for load reductions from new source control measures;
4. Develop Report that addresses management questions.

As described above, the revised SOW would implement the Regional SSID work plan, but would focus on municipally-owned electrical utilities in the Bay Area, rather than PG&E.

This Regional SSID Project Report provides background information, describes the work conducted in the desktop analysis, and proposes a source control framework to account for past load reductions and to further reduce ongoing loads of PCBs from electrical utility practices.

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2.0 Problem Definition, Study Objectives, and Regulatory Background

2.1 Background

PCBs are commercially synthesized oily compounds consisting of carbon, hydrogen, and chlorine atoms. There are 209 possible arrangements of the atoms in PCB compounds. These are referred to as the 209 PCB congeners. PCBs were first manufactured in the United States (US) in 1929 and US production peaked in 1970. PCBs are non-flammable, chemically stable, have a high boiling point, and have electrical insulating properties. Therefore, they were used in hundreds of industrial and commercial applications. Most PCBs were manufactured as a mixture of several individual PCB congeners. The most common name for these mixtures in the US was the Aroclor series produced by Monsanto Company. There were more than ten common Aroclor mixtures.

Due to concern about their persistence in the environment, toxicity, and potential to cause cancer, the US Environmental Protection Agency (US EPA) banned the production and new use of PCBs in 1979. However, PCBs continue to be found in water and sediment collected from the San Francisco Bay, and urban stormwater runoff has been identified as a major source of PCBs to the Bay. Thus, PCBs are considered a legacy pollutant.

2.2 Problem Definition

Fish tissue monitoring in the Bay has revealed the bioaccumulation of PCBs in Bay sportfish at levels thought to pose a health risk to people consuming these fish. As a result, in 1994, the state of California issued a sport fish consumption advisory cautioning people to limit their consumption of fish caught in the Bay. The advisory led to the Bay being designated as an impaired water body on the Clean Water Act (CWA) "Section 303(d) list" due to elevated levels of PCBs. In response, in 2008, the Regional Water Board adopted a Total Maximum Daily Load (TMDL) water quality restoration program targeting PCBs in the Bay[3]. The general goals of the TMDL are to identify sources of PCBs to the Bay, implement actions to control the sources, restore water quality, and protect beneficial uses.

The PCBs TMDL estimates baseline loads to the Bay from various source categories. The largest source category, at 20 kilograms (kg) per year, was estimated to be stormwater runoff. This category includes all sources to small tributaries draining to the Bay. The PCBs TMDL indicates that a 90% reduction in PCBs from stormwater runoff to the Bay is needed to achieve water quality standards and restore beneficial uses. The TMDL states that the wasteload allocation for stormwater runoff of 2 kg per year shall be achieved within 20 years (i.e., by March 2030). The PCBs TMDL is being implemented through NPDES permits to discharge stormwater issued to municipalities and industrial facilities in the Bay Area (e.g. the MRP).

This SSID project was triggered by monitoring conducted over the past 15+ years by BASMAA members that demonstrates municipal stormwater runoff is a source of PCBs to the Bay. PCBs were historically used in many applications, including electrical utility equipment and caulks and sealants used in building materials. However, the greatest use by far was in electrical

[3] The PCBs TMDL was approved by the US Environmental Protection Agency (US EPA) on March 29, 2010 and became effective on March 1, 2010.

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equipment such as transformers and capacitors (McKee et al. 2006). Existing electrical utility equipment, which is often located in the public right-of-way (ROW), may still contain PCBs that can be released to the MS4 when spills and leaks occur. Due to past leaks or spills of PCBs oil from electrical equipment, properties owned and operated by electrical utilities may potentially have elevated concentrations of PCBs in surrounding surface soils that can be released to the MS4. Because the cumulative releases of PCBs-laden soils from these properties, and spills or leaks of PCBs oils from electrical equipment to MS4s across the Bay Area may occur at levels that exceed the 2 kg per year TMDL waste load allocation, this potential source of PCBs may limit the ability of municipalities to meet the goals of the PCBs TMDL for the Bay. Therefore, this potential source warrants further investigation.

2.3 SSID Project Objectives

The overall goal of this SSID project is to investigate electrical utility equipment as a source of PCBs to urban stormwater runoff and identify appropriate actions and control measures to reduce this source. Building on the information presented by SCVURPPP (2018), this project is designed to achieve the following three objectives:

1. Gather information from Bay Area municipally-owned utility companies to improve estimates of current PCBs loadings to MS4s from electrical utility equipment, and document current actions conducted by utility companies to reduce or prevent release of PCBs from their equipment;

2. Identify opportunities to improve municipal spill response, cleanup protocols, or other programs designed to reduce or prevent releases of PCBs from electrical utility equipment to MS4s;

3. Develop an appropriate mechanism for municipalities to ensure adequate clean-up, reporting and control measure implementation to reduce urban stormwater loadings of PCBs from municipally-owned electrical utility equipment.

In addition, an outcome of the project was to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting Methodology and Reasonable Assurance Analysis (RAA) (BASMAA, 2020). The methodology was developed to account for PCBs load reductions that may be achieved due to source control measures implemented through a regional control measure program for electrical utilities.

2.4 Management Questions

This SSID project work plan identified a number of key management questions regarding electrical utility applications as sources of PCBs to MS4s to address, including:

1. What is the current magnitude and extent of PCBs stormwater loadings from electrical utility equipment and operations in the San Francisco Bay Area region?

2. What aspects of equipment or operational procedures should electrical utilities be required to report to the Regional Water Board?

3. Are improvements to spill and cleanup control measures needed to reduce water quality impacts from the release of PCBs in electrical utility equipment?

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4. Are additional proactive management practices needed to reduce releases of PCBs from electrical utility equipment?
5. What are the PCBs load reductions that can be achieved through implementation of a regional reporting and control measure program?

This SSID project was implemented to provide the information needed to address these management questions.

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3.0 Background

3.1 Study Area

The study area for this SSID project is the portion of the San Francisco Bay Area region subject to the MRP. This section provides an overview of electrical utility systems and companies currently operating in the study area, and describes how and where PCBs are used within those systems.

Electrical utilities produce or buy electricity from generating sources, and then distribute that electricity to users through two networks: the transmission system and the distribution system. The **transmission system** carries bulk electricity at high voltages, often across long distances, directly from generation sources to substations via high voltage power lines. Substations connect the transmission and distribution systems. Substations may increase the voltage from nearby generating facilities for more efficient transmission over long distances or lower the voltage for transfer to the distribution system. Electricity at a typical substation flows from incoming transmission lines, to circuit breakers, to transformers (which step down the voltage), to voltage regulators and cut out switches (which protect the system from overvoltage), and finally to outgoing distribution lines.

The **distribution system** delivers lower voltage electricity from substations directly to homes and businesses over shorter distances. This system includes pole-mounted equipment, equipment in underground vaults, and aboveground equipment on cement pads that are often in green boxes in the public ROW. This equipment is smaller, but more numerous in terms of the number of units.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the entire Bay Area region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as Oil-Filled Electrical Equipment (OFEE). Any OFEE that contained PCBs in the past could still potentially be in use and contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E 2000).

In the Bay Area, there are eight electric utility companies operating as of February 2015 (State Energy Commission 2015):

<u>Investor-Owned Utilities (IOUs)</u>

1. Pacific Gas and Electric Company (PG&E)
   77 Beale Street
   San Francisco, CA 94105
   (415) 973-7000 (tel)

<u>Publicly Owned Load Serving Entities (LSEs) and Publicly Owned Utilities (POUs)</u>

2. Alameda Municipal Power
   2000 Grand Street

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Alameda, CA 94501-0263
510.748.3905 (tel)

3. CCSF (also called the Power Enterprise of the San Francisco Public Utilities Commission)
   1155 Market Street, 4th Floor
   San Francisco, CA 94103
   209.989.2063 (tel)
4. City of Palo Alto, Utilities Department
   P.O. Box 10250
   Palo Alto, CA 94303
   650.329.2161 (tel)
5. Pittsburg Power Company Island Energy-City of Pittsburg,
   65 Civic Drive
   Pittsburg, CA 94565-3814
   925.252.4180 (tel)
6. Port of Oakland
   530 Water Street, Ste 3
   Oakland, CA 94607-3814
   510.627.1100 (tel)
7. Silicon Valley Power (SVP) - City of Santa Clara
   1500 Warburton Avenue
   Santa Clara, CA 95050
   408.615.2300 (tel)

Community Choice Aggregators

8. Marin Clean Energy (MCE)
   781 Lincoln Ave Ste 320
   San Rafael, CA 94901-3379
   888.632.3674 (tel)

PG&E is by far the largest electrical utility company in the Bay Area. PG&E is an investor-owned company that is not under the jurisdiction of any Bay Area municipality[4]. Three small publicly-owned utilities in the Bay Area (Alameda Municipal Power, City of Palo Alto Utilities Department, and Silicon Valley Power owned by the City of Santa Clara) maintain their own substations and distribution lines. The other public utilities partner with PG&E to deliver energy through PG&E's equipment. PG&E owns and operates several hundred electrical substations in the Bay Area, in addition to the smaller electrical utility equipment that is widely disbursed throughout urbanized areas and along rural corridors (e.g., small transformers on utility poles or in utility boxes). The total number of pieces of equipment that is in use across the Bay Area and that contains PCBs is not known but is likely in the range of tens to hundreds of thousands (see Section 3.3).

[4] PG&E is regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC).

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3.2 Regulatory Controls on PCBs in Electrical Utility Equipment

In California, both federal and state laws regulate in-use PCBs, PCB wastes, and PCB clean-up. At the federal level, the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA) are used to regulate PCBs and PCB wastes. PCB cleanup sites may also be subject to regulation by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In addition, discharges from electrical utility applications are regulated under the NPDES program authorized by the CWA and implemented through the State and Regional Water Quality Control Boards. State PCB regulations are primarily implemented under the California Health and Safety Code.

TSCA is the primary regulatory tool that addresses most aspects of PCB management and cleanup. Passed into law in 1976, TSCA banned the continued manufacture and commercial distribution of PCBs in the US after July 2, 1979, and prohibited the continued use of PCBs outside of totally enclosed systems. TSCA also governs the ongoing management of PCBs that remain in use that are present at 50 ppm or greater, including labeling, handling, distribution, storage, cleanup of contaminated properties, spill response and disposal (Title 40 CFR Part 761). The federal TSCA regulations are enforced by the US EPA.

In addition to the TSCA regulations, other federal regulations under authority of the Clean Water Act are in place to prevent oil spills from reaching navigable waters, and provide for appropriate and efficient cleanup of any oil spills that do occur (40 CFC part 112). These regulations require Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches) if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. Electrical utility substations may fall into the category of facilities that require such SPCC plans.

In California, hazardous waste regulations detailed in the California Code of Regulations (CCR) Title 22 are more stringent for PCBs than federal rules. CCR Title 22 designates oils or other liquids containing PCBs concentrations ≥ 5 ppm as non-RCRA hazardous waste requiring special handling and disposal. The California Department of Toxic Substances Control (DTSC) enforces the additional hazardous waste rules that apply to PCBs less than 50 ppm, including spill cleanup, disposal and reporting requirements. DTSC also regulates closure requirements for PCB sites under CERCLA.

3.2.1 PCB Classification and Labeling Requirements

Under both federal and state regulations, all required management of in-use PCBs and PCB-containing equipment, including labeling, disposal, site cleanup, spill response, and reporting is based on classifications of PCB concentrations. Table 3.1 defines the federal and state PCB classifications.

- TSCA regulations apply to PCBs 50 ppm or greater, while California regulations apply to PCBs between 5 and 50 ppm. Under TSCA, PCB concentrations greater than 500 ppm are classified as high PCBs, while PCB concentrations between 50 ppm and 500 ppm are classified as low PCBs. PCB concentrations below 50 ppm are classified by TSCA as non-PCB.

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- In California, PCB concentrations in liquids between 5 ppm and < 50 ppm are classified as non-RCRA hazardous waste and governed by state regulations.
- If PCB concentrations are not known, neither federal nor state regulations require testing of in-use equipment or materials for PCB concentrations to determine the appropriate classification. Instead, a number of assumptions are applied to determine the appropriate PCBs classification.

Table 3.1 Current Federal and State Regulatory Classifications of PCBs Concentrations.

PCBs Concentration (known or assumed)	Label	Classification	Regulatory Requirements
Federal Requirements			
≥ 500 ppm (in original source)	PCB	TSCA - High PCB Concentration	Waste remediation required by federal law
50 to < 500 ppm (in original source)	PCB-Contaminated	TSCA - Low PCB Concentration	Waste remediation required by federal law
> 0 to < 50 ppm	Non-PCB	Non-PCB	No waste remediation required
0 ppm	No PCBs	Contains no PCBs, and was manufactured after July 1, 1978	No waste remediation required
State Requirements			
≥ 5 ppm (liquid) ≥ 50 ppm (solids)	PCB-Contaminated	California Hazardous Waste	Waste remediation required by State Law
< 5 ppm (liquid) < 50 ppm (solid)	Non-PCB	California Non-PCB	No waste remediation required

PCB-containing equipment is required to be labeled according to its PCB classification. When removed from service, all transformers, large capacitors (high and low voltage), and voltage regulators that are known or assumed to have PCB concentrations equal to or greater than 500 ppm at the time of manufacture require a “PCB” label. Other electrical equipment known or assumed to contain PCBs between 50 and <500 ppm are labeled according to the federal regulations as “PCB-Contaminated”. In California, equipment determined to have PCBs < 5 ppm can be labeled as “Non-PCB”; however, because federal regulations were enacted prior to state regulations, some “Non-PCB” labels may have been applied to equipment that fit the non-PCB category for federal regulations (< 50 ppm). This lends uncertainty to the “Non-PCB” label if other information is not also available. Electrical equipment that was manufactured after July 1, 1978, and that does not contain any concentration of PCBs can be labeled as “No PCBs”.

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3.2.2 Spill Response and Site Cleanup

Both state and federal regulations require cleanup of releases of hazardous materials. As required under both federal and state regulations, the appropriate response to a PCB release is dictated by the known or assumed PCB classification of the equipment responsible for the release. Concentrations are determined based on the source of the release, not on the spilled concentration. For PCBs and PCB-contaminated materials that are 50 ppm PCBs or greater, federal regulations under TSCA govern spill response and cleanup. TSCA requires spill cleanup for releases from equipment or materials that are classified as low or high PCBs (i.e., ≥ 50 ppm PCBs). California hazardous waste regulations require spill cleanup and reporting for releases of PCB-contaminated liquids that fall below the federal regulations (i.e., ≥ 5 ppm but < 50 ppm). Equipment labels are used to identify PCBs and PCB-containing equipment. However, if equipment labels are not present and/or do not provide full information, assumptions about PCB concentrations are often necessary during the initial spill response. For example, any release of untested mineral oil from electrical equipment is assumed to be PCB-contaminated per federal regulations (i.e., ≥ 50 ppm but < 500 ppm).

The first step when a hazardous material release occurs is notification. Under both federal and state rules, the responsible party is required to immediately notify the California Office of Emergency Services (Cal OES) state warning center hotline, and/or 911 when a hazardous material release occurs. This initial reporting is typically a verbal notification (i.e., by telephone). Materials that are 50 ppm PCBs or greater are considered hazardous per federal regulations and liquids that are 5 ppm PCBs or greater are considered hazardous per state regulations. Therefore, any released liquids that are 5 ppm PCBs or greater should be reported to Cal OES.

TSCA hazardous materials spill cleanup requirements (i.e., for releases of PCBs ≥ 50 ppm) are summarized here:

- Low PCB Concentrations (< 500 ppm): excavate all soil within the spill area and backfill with clean soil. Double wash/rinse solid surfaces.
- High PCB Concentration (≥ 500 ppm): notify National Response Center; cordon off the area with a minimum 3-ft buffer and post warning signs; document and record area of visible contamination; excavate all soil within the spill area and backfill with clean soil. Remove all contaminated porous surfaces (e.g., wood asphalt, cement, concrete, etc.). Double wash/rinse non-porous solid surfaces; properly dispose of all PCBs or PCB-contaminated materials from the cleanup site (e.g., soils, solvents, rags, etc.);
- Soils must be remediated to background levels (i.e., detection limits) where practicable.

Federal and state regulations also restrict the allowable concentrations of PCBs remaining in any post-cleanup soils and/or materials, based on the risk categories identified in Table 3.2. For example, in low occupancy areas (i.e., restricted access areas such as electrical substations), PCBs must be below 25 ppm, or the area can have up to 50 ppm PCBs if the appropriate notification is posted at the site. In high occupancy areas (e.g., unrestricted access areas), PCBs must be below 10 ppm. Clean fill used to replace soil removed during the cleanup process must contain less than 1 ppm PCBs. (Note that all of these allowable remaining concentrations are potentially above the thresholds required to meet TMDL goals.) Post clean-

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up verification sampling is required only for high concentration spills and low-concentration spills involving 1 pound (lb.) or more of PCBs by weight (>270 gallons of untested mineral oil)[5].

Table.3.2 Federal and State Regulatory Classifications of PCB Concentrations and Cleanup Levels.

Risk Category	Allowable PCBs Concentration
PCB waste remediation required	≥ 50 ppm in original source
Low Human health risk from direct exposure	< 50 ppm
High occupancy areas (i.e., non-restricted access areas)	≤ 10 ppm in remaining material
Low occupancy areas (i.e., restricted access areas, such as electrical substations)	≤ 25 ppm in remaining material
Low occupancy areas IF the area contains a label or other visible notification of the contamination	≤ 50 ppm in remaining material
Low occupancy areas with a cap	25 to < 100 ppm in remaining material
Clean fill	< 1 ppm

In addition, as required by US EPA regulations to prevent oil pollution (40 CFR, Part 112 and 761), utilities must prepare Spill Prevention Control and Countermeasure (SPCC) Plans for facilities that could potentially discharge oils to navigable waters (including storm drains and drainage ditches). SPCC plans are prepared if the facility also meets one or more of the following criteria: aboveground oil storage > 1,230 gallons; and/or underground oil storage > 42,000 gallons; and/or storage of containerized PCB-contaminated liquid wastes for disposal between 50 and 500 ppm. The purpose of the SPCC Plan is to ensure oil spills are minimized, and if any oil spills do occur, to prevent spilled oils from leaving the property and provide maximum cleanup efficiency.

3.2.3 Spill Reporting

In addition to the initial verbal notification, both state and federal regulations may also require submission of follow-up written reports for releases of hazardous materials that are at or above the federal reportable quantities (RQs), or for discharges of oil to navigable waters. For PCBs, the federal RQ is 1 lb. (0.454 kg), while for oil spills, the federal RQ is 42 gallons. Thus, under federal regulations, a follow-up written report must be submitted for any release of 1 lb. or more of PCBs at concentrations ≥ 50 ppm, or for “Non-PCBs” mineral oil spills of 42 gallons or more.

[5] See 40 CFR 761 Subpart G PCB Spill Cleanup Policy for post cleanup verification sampling requirements. EPA provides guidance for sampling in *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 560/5-85-026 August 1987), *Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup* (EPA-560/5-86-017 May 1986), and *Wipe Sampling and Double Wash and Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill* Cleanup Policy (EPA Revised and Clarified on April 18, 1991).

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In California, state regulations only require submission of follow-up written reports if the amount of the hazardous material released is at or above the federal RQ.

Spill reporting requirements for releases of 1 lb. or more of PCBs ≥ 50 ppm are detailed here:

- Identification of the source
- Spill date and time (actual or estimated)
- Clean-up date and time completed or terminated
- Identification of spill locations and contaminated material/surfaces, including identification of restricted access or non-restricted access location
- Pre-clean-up sampling data used to establish spill boundaries, if required
- Description of solid surfaces cleaned
- Depth of soil excavation and quantity of soil removed
- Post-clean-up sampling data
- Estimated cost of clean-up (not required)

3.2.4 Regulation of Utility Vault Discharges

There are additional regulatory requirements for short-term intermittent discharges from electrical utility vaults to surface waters of the U.S. An electrical utility vault is an underground room that provides access to subterranean electrical equipment, which may include PCB transformers or other PCB-containing equipment. These are commonly found throughout the electrical system across the Bay Area. Water may collect in these vaults, requiring utility companies to dewater subsurface vaults and underground structures to protect equipment, and provide safe worker conditions for installation, maintenance, or repair of equipment. Compliance with a general NPDES permit is required for these discharges. In California, the General NPDES permit is issued by the California State Water Resources Control Board (Order WQ 2014-0174-DWQ). To be covered under the general permit, a utility company must submit an application to both the State Water Board and their Regional Water Quality Control Board. The permit application includes a Notice of Intent (NOI) and a Pollution Prevention Plan. PG&E has applied for coverage under the General Permit and PG&E's most recent Pollution Prevention Plan submitted to the San Francisco Bay Regional Water Quality Control Board (Region 2) in compliance with the general permit requirements is available on the State Water Board website (https://www.waterboards.ca.gov/water_issues/programs/npdes/docs/utilityvaults/ppplans/pger2_noi_ppp.pdf). It is estimated that approximately 150 to 200 utility vaults are dewatered in the San Francisco Bay Region each year. The State Water Board's website showing utilities that have applied for coverage under the General Permit did not identify any other electrical utilities, other than PG&E, in the San Francisco Bay Region (Region 2).

Regulation of utility vault discharges is included in this section because unplanned spills or releases from PCBs equipment within a vault may occur due to equipment failure. However, although utility vault discharges could potentially result in release of PCBs, chemical analysis of the liquid in the vault is only required at vaults discharging > 10,000 gallons. Instead, if the vault contains equipment from prior to January 1, 1985 and there is any noticeable oil or sheen, the water is containerized and hauled offsite for analysis and disposal. At all other vaults, liquid samples are collected in a jar, allowed to sit for 5 minutes, and then the appearance

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(color/opacity) of the liquid in the jar is compared to pictures of three example sample jars that vary in the levels of contamination from green (low contamination) to red (high contamination). The appropriate disposal method for the liquid from the vault is determined by the appearance of the sample. If the sample collected looks similar to the green zone samples, then the liquid from the vault can be discharged through a filter sock into the storm drain or waterway. If the sample collected looks similar to the red zone sample, then the liquid from the vault must be collected and disposed of off-site. This qualitative evaluation provides no information on PCB concentrations that may be present in the liquid.

During the first year of coverage under the general NPDES permit, in compliance with the Notice of Applicability (dated September 22, 2016), PG&E collected samples at fifteen of their utility vault dewatering projects. Samples were analyzed for PCBs using EPA Method 1668. The monitoring results were summarized in an email from Regional Water Board staff. PCBs were detected in 11 out of 15 samples. In samples with detections, PCBs concentrations ranged from 0.5 ng/L to 3.4 ng/L.

3.2.5 Chemical Analysis Methods for PCBs

For compliance purposes, TSCA regulations recommend the use of EPA Method 8082 (i.e., the "Aroclor Method") to determine PCB concentrations with a quantifiable level of detection at 2 ppm. Aroclors are the most common PCB formulations that were produced and used commercially in the US. Aroclors are composed of 1 to 7 primary congeners, plus trace levels of other congeners. EPA Method 8082 identifies and quantifies total PCB concentrations based on comparison with the gas chromatograph patterns (referred to as fingerprints) for known Aroclor formulations. Although widely used for determination of PCB concentrations since the 1970's, this method has a number of limitations.

- First, PCBs in a given sample may not match up well with the Aroclor standards that are used for comparison in the analysis. Typically, a group of five to seven Aroclors are used as technical standards. While these are selected to represent the most commonly used formulations, there were many more Aroclor formulations that were produced and used over the years, including slight variations in the formulations produced from year to year. While Aroclors represent the largest mass of PCBs used commercially in the US, they do not represent all PCB products.
- Second, samples that contain mixed Aroclors or that have undergone weathering are not expected to have the same fingerprint as Aroclor standards. Fitting these samples to a set of standard Aroclor fingerprints may not provide accurate information.
- Third, this method does not detect certain PCB congeners, including some of the most toxic.
- Finally, the Aroclor Method has relatively high method detection limits compared with concentrations of concern for water quality.

TSCA regulations allow the use of an alternative analytical method for PCB determination if it is validated as described in 40 CFR 761, Subpart Q. Alternative analytical methods for PCBs, such as EPA Method 1668, or a revised version of Method 8082 that allows for individual congener analysis provide lower detection and reporting limits, and can be used to detect all 209 individual PCB congeners. However, these methods require more specialized laboratory equipment and expertise to perform, and are therefore considerably more expensive than the "Aroclor" method. Although these improved methods are more appropriate for stormwater

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control purposes because they are not required, they are unlikely to be used in place of the easier and less expensive “Aroclor” method when responding to mineral oil spills.

3.3 PCBs Remaining in Electrical Utility Equipment

Although use of PCBs is highly restricted currently, McKee et al. (2006) estimated that 12.3 million kilograms of PCBs were used in the San Francisco Bay Area between 1950 and 1990. Roughly 65% (8 million kg) was used in electrical transformers and large capacitors (McKee et al. 2006). How much of this mass was released to the environment and how much remains in electrical equipment distributed across the Bay Area today is unknown. While the 1979 ban of PCBs did not require the immediate removal of PCBs from current applications, electrical utilities have made substantial efforts over the past 35+ years to reduce the amount of PCBs still used in their applications in the Bay Area. According to PG&E, the majority of OFEE containing PCBs in the Bay Area has already been removed or refurbished with dielectric fluids that do not contain PCBs through the following actions:

- Voluntary replacement programs;
- Ongoing removal of PCBs from OFEE as units are serviced or replaced due to routine maintenance programs; and
- OFEE replacement due to unplanned actions (e.g., transformer leaks and fires).

Voluntary actions conducted by PG&E, primarily in the mid-1980s, included the PCBs Distribution Capacitor Replacement Program and the PCBs Network Transformer Replacement Program (PG&E 2000). In addition, in the 1990s, PG&E implemented a program to remove oil-filled circuit breakers and replace them with equipment that contains sulfur hexafluoride gas (PG&E 2000). Current ongoing PG&E efforts to remove PCBs-containing equipment are conducted primarily through maintenance programs. Past maintenance of older equipment may have included draining PCBs-containing oils and refilling the equipment with oils that did not contain PCBs. These refurbished OFEE may still contain PCBs at levels of concern to municipalities due to residual contamination from the original PCB-oil. Currently, as maintenance staff identify older equipment in-use, it is scheduled for replacement. However, PG&E has provided limited documentation of their past and current PCBs removal efforts. There remains much uncertainty on where PCBs transformers, PCBs capacitors, oil-filled circuit breakers, and PCBs-containing distribution system equipment were originally located, and which ones have already been removed or replaced.

Despite the removal efforts described above, PCBs may still be found in older and refurbished OFEE, and particularly OFEE located throughout the distribution system. In a recent meeting with Regional Water Board Staff, PG&E noted that any equipment installed prior to 1985 could contain PCBs, as it would have come from equipment stockpiled prior to the 1979 ban and was installed prior to the voluntary replacement programs (*personal communication*, Sanchez 2016). Because OFEE are not typically tested for PCBs until the fluid is removed during servicing or disposal, or in the event of a spill, the total number of PCBs-containing OFEE that remain in use is unknown. However, in a letter to the Regional Water Board in 2000, PG&E provided information that can be used to make some preliminary estimates, including the following (PG&E 2000):

- There are over 900,000 pieces of OFEE in service in the distribution system;

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- In 1999, 22,000 pieces of equipment were serviced at the main PCBs-handling facilities in Emeryville;
- Approximately 10 percent of the units serviced and tested annually contain PCBs at concentrations of 50 parts per million (ppm) or greater, and fewer than 1 percent contained PCBs at concentrations of 500 ppm or greater; and
- The number of pieces of equipment containing PCBs concentrations > 50 ppm has declined over time.

The information above was used to calculate the following:

- Assuming the count of equipment processed in 1999 in Emeryville represents an average annual processing rate throughout the region and that there are at least 900,000 pieces of equipment in PG&E's distribution system it would take over 40 years at a minimum for all of this equipment to be replaced;
- Assuming the 1999 processing rate and 900,000 pieces of equipment in PG&E's distribution system in 1985, approximately 175,000 pieces would not yet have been serviced or replaced as of 2018; and
- Of the approximately 175,000 pieces of equipment remaining in-use in 2018, approximately 17,500 (10%) may contain PCBs concentrations > 50 ppm.

Although based on limited information, the above estimates demonstrate that a potentially large number of pieces of equipment containing PCBs over 50 ppm (i.e., 17,500 as of 2018) may remain in-use in PG&E's electrical utility distribution system. And the remaining 90% (roughly 157,000 pieces of equipment) may contain lower concentrations of PCBs that could still be of concern to Permittees in their efforts to meet TMDL requirements.

3.4 Estimated PCBs Loads from Electrical Utility Equipment to MS4s

McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005). The mass balance model started with the total mass of PCBs that was used in the region between 1950 and 1990 and apportioned that mass to the major source categories. The largest PCBs-use category was transformers and large capacitors (i.e., oil-filled electrical equipment, OFEE). The total mass used in transformers and large capacitors between 1950 and 1990 was estimated at 7,600 metric tons (MT). Although most of this PCBs mass remains contained within the equipment, a small percentage of PCBs are released each year due to spills and leaks. These releases are the primary source of PCBs to stormwater conveyances from OFEE. Using literature values and the assumptions outlined below, McKee et al. (2006) estimated the following:

- Between 1950 and 1990 (the peak period of production and use of PCBs in the U.S.) 120 – 520 kg of PCBs entered stormwater conveyances due to releases from transformers and large capacitors. On average, this equated to a stormwater load of 8 kg/yr to the San Francisco Bay from electrical utility equipment during that time period.
- In 2005, the mass of PCBs entering stormwater conveyances due to releases from transformers and large capacitors was 1.2 to 4.3 kg/year (average = 2.8 kg/yr). The assumptions and literature data that were used to calculate the 2005 load included the following:

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- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year over an assumed 30-year service life (Harrad 1994, EIP Associates 1997).
- When spills occur, 99% of the spilled PCBs are cleaned up and only 1% of the remaining PCBs are left on erodible surfaces and available for wash off;
- Assumed runoff coefficients based on land-use classifications were used to approximate the fraction of PCBs on erodible surfaces that can enter local storm drains each year; and
- A small fraction (0.3%) of PCBs released to the environment enter the atmosphere (Keeler et al. 1993); McKee et al. (2006) estimated 2% to 6% of these PCBs are subsequently captured in stormwater through wet deposition.

McKee et al. (2006) estimated a stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005.

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4.0 Desktop Analysis

The purpose of the desktop analysis is to better understand the extent and magnitude of municipally-owned electrical utility equipment as a source of PCBs to urban stormwater runoff, document past and current efforts to reduce PCBs releases from electrical utility equipment during spills or other accidental releases, and document measures already taken or underway to remove PCBs-containing oils and electrical equipment from active service across the Bay Area.

PG&E, the largest electric utility company in the Bay Area, was likely the largest single user of PCBs in the Bay Area, and as such, likely remains the largest current source of PCBs releases to MS4s from electrical utility equipment. However, the project was revised in early 2020 to focus the desktop analysis on information provided by municipally-owned electrical utilities in the Bay Area on their OFEE inventories, and any other readily available data, such as the data provided previously by PG&E on voluntary replacement programs for PCBs-containing OFEE and spill reporting records presented in Sections 3.3 and 3.4, respectively.

The BASMAA project team identified representatives from municipally-owned electrical utilities in the Bay Area and discussed the project information needs with those representatives. The Project team sent the identified representatives a *Request for Information from Municipal Electrical Utilities*. The requested information included a description of the agency's electrical utility transmission and distribution systems, description of OFEE in the systems and PCBs-containing OFEE in the systems, past and current replacement and maintenance programs for OFEE and current and past protocols for OFEE spill response and cleanup.

4.1 Overview of Participating Municipally-Owned Electrical Utilities

In the MRP Area, there are five municipally-owned (public) electrical utilities, including:

1. Alameda Municipal Power
2. City of Palo Alto Utilities
3. Pittsburg Power Company, doing business as (dba) Island Energy – City of Pittsburg
4. Port of Oakland
5. Silicon Valley Power - City of Santa Clara

Three of these public utilities participated in this project and submitted data on their OFEE inventories and spill response protocols for evaluation, including: City of Palo Alto Utilities (CPAU), Pittsburg Power Company dba Island Energy (Island Energy) – City of Pittsburg, and Silicon Valley Power (SVP) – City of Santa Clara.

Additional information about each of the three participating municipally-owned electrical utilities and the information provided on OFEE in their systems is presented below.

4.1.1 City of Palo Alto Utilities

The City of Palo Alto Utilities (CPAU) have been operating a municipal electric power system in that city for over 100 years. CPAU serves the City of Palo Alto with an area of approximately 16,640 acres (including ~11,000 acres of urban area and ~5,500 acres of open space) and a population of approximately 67,082 people.

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CPAU provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, CPAU provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

- All active OFEE (equipment that are currently in active service within electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

CPAU did not provide any data on measured PCBs concentrations in their OFEE inventory. However, they did identify OFEE that were labeled as “Non-PCBs” by the manufacturer.

4.1.2 Silicon Valley Power

Silicon Valley Power (SVP) has been operating in the City of Santa Clara for more than 100 years. As of December 2019, SVP includes 25 substations, 55 miles of transmissions lines, and 186 miles of overhead distribution lines. The total coverage area is 11,782 acres, and the population served is 129,488 people.

SVP provided data on their inventory of OFEE through December 2019, including counts of equipment that are currently active in the system and equipment that have been removed from the system. OFEE counts were provided by the following equipment types:

- Poletop transformers
- Padmount single phase transformers
- Padmount three phase transformers
- Padmount substation transformers
- Underground commercial and residential distribution transformers
- Regulators
- Padmount switches
- Vault/box switches

For each type of equipment, SVP provided an average volume of oil in each piece of equipment. The OFEE counts were further divided into the following categories:

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- All active OFEE (equipment that are currently in active service within the electrical transmission or distribution systems);
- Active OFEE that were purchased or installed prior to 1985 (pre-1985 OFEE);
- All inactive OFEE (equipment that have been removed from service);
- Inactive pre-1985 OFEE that were removed from service prior to 2002;
- Inactive pre-1985 OFEE that were removed from service in 2002 or later.

SVP also provided equipment counts and oil volumes for a number of OFEE that comprised approximately 12% of the oil mass in their inventory, for which no information on equipment status (active or inactive) and no information on equipment age (pre-1985 or post-1985) were available at the time this report was prepared. These data were excluded from the main analysis presented in Section 4.2. However, a sensitivity analysis was conducted in order to understand potential implications of excluding these data. The results of the sensitivity analysis are presented in Section 4.2.3. Based on those results, the unknown data were included in the estimated ranges of PCBs mass and stormwater loads as described further in Section 4.2.3 and Table 4.4.

SVP did not provide any data on measured PCBs concentrations in their OFEE inventory.

4.1.3 Pittsburg Power Company, Island Energy

Pittsburg Power Company is a joint powers authority and department within the City of Pittsburg, California. Since 1997, Pittsburg Power has been operating an electric utility distribution system at Mare Island in Vallejo under the name “Island Energy”. Mare Island was formerly the location of a US Naval shipyard that was decommissioned in 1996. Following decommissioning, the Pittsburg Power Company acquired the electrical utility distribution rights on Mare Island from the US Navy. The distribution system on Mare Island that is operated by Island Energy consists of one substation and approximately 11 miles of distribution lines that serve an area of ~1,200 acres. The Mare Island zip code has a population of approximately 900 people.

Island Energy provided detailed inventories for the transformers that were part of both the historic (US Navy) inventory and the current (Island Energy) inventory of OFEE on Mare Island. The historic inventory documents each piece of OFEE that was part of the US Naval shipyard on Mare Island until 1996. At that time, the US Navy removed the bulk of pre-1985 OFEE and sent them to hazardous waste facilities for proper disposal. However, some pre-1985 OFEE remained on the island. The current inventory identifies each piece of OFEE on Mare Island that has been operated by Island Energy since 1997 through December 2019. The data provided in both the current and historic inventories includes the volume of oil, installation date, and (if applicable) removal date for each transformer in the historic or current system on Mare Island. In addition, measured concentrations of PCBs were provided for most OFEE in these inventories. Island Energy noted that there are gaps in the historic records, and the data provided may be incomplete. The current inventory identifies all OFEE that have been or are currently active and operated by Island Energy on Mare Island between 1997 and 2019 (i.e., since Island Energy began operating the electrical distribution system on Mare Island). The data analysis focused on the PCBs-containing OFEE in the historic and current inventories.

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4.2 Analysis of Municipally-Owned Electrical Utility Data

The overall goal of the analysis of municipally-owned electrical utility OFEE inventories was to develop improved estimates of both the load of PCBs to stormwater from OFEE, and the load reductions that have been achieved over time due to ongoing equipment maintenance and replacement programs. The data analysis was also intended to provide data inputs that could be used in the accounting methodology presented in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020) to calculate the PCBs load reductions achieved since the start of the PCBs TMDL, and the expected PCBs load reductions in the future due to the ongoing removal and proper disposal of PCBs-containing OFEE. To accomplish these goals, the project evaluated the OFEE inventories provided by participating municipally-owned electrical utilities to characterize the magnitude of PCBs-containing OFEE in these systems and document the rate of removal of PCBs-containing OFEE over time. The data were used to calculate the annual average removal rates of PCBs-containing OFEE from participating municipally-owned electrical utility systems since the start of the PCBs TMDL (i.e., 2002). This information was then scaled-up to the larger MRP area in order to provide a rough, first-order estimate of the potential magnitude of the current OFEE load of PCBs to stormwater across the area.

4.2.1 OFEE Inventory Data Analysis Approach and Assumptions

The OFEE inventory data were analyzed to generate estimates of the following:

- The potential mass of PCBs in active OFEE within each municipally-owned electrical utility system at the start of the PCBs TMDL (i.e., 2002) and currently (i.e. 2020).
- The potential mass of PCBs in OFEE that has been removed from each of these systems due to ongoing maintenance and replacement programs before and after 2002.
- The annual average reduction rate achieved since the start of the PCBs TMDL due to removal of PCBs-containing OFEE from these systems.
- The potential PCBs stormwater load from OFEE in these systems at the start of the PCBs TMDL and currently.
- The expected PCBs stormwater load reductions in the future due to continued removal of PCBs-containing OFEE from these systems.

Because information on measured PCBs in these OFEE was limited, the mass of oil in OFEE was used as the primary metric to characterize OFEE within each system, to estimate the magnitude of potentially PCBs-containing OFEE in each system, and to calculate equipment removal rates. The age of the OFEE, based on the purchase or installation date provided, was used as the primary metric to identify potentially PCBs-containing equipment as follows:

- Pre-1985 OFEE. All equipment that was installed prior to 1985 (i.e., pre-1985 OFEE) were assumed to potentially contain PCBs. 1985 was selected as the appropriate cut-off date to identify equipment that may contain PCBs because the installation of PCBs-

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containing equipment that had been stockpiled prior to the 1979 PCBs ban continued for several years after the ban[6].

- Post-1985 OFEE. All equipment installed after 1985 (i.e., post-1985 OFEE) were assumed to contain zero PCBs.

The potential mass of PCBs in pre-1985 OFEE was calculated from the mass of oil in these OFEE multiplied by a range of assumed PCBs concentrations in that oil. The PCBs concentrations in all pre-1985 OFEE were based on the following assumptions:

- Measured PCBs concentrations were used, if available.
- If no PCBs measurement data were provided, the range of PCBs concentrations was estimated as follows:
    - Pre-1985 OFEE with "PCBs" labels are assumed to have PCBs concentrations ≥ 500 ppm (i.e., PCBs Transformers). However, because PCBs transformers must be registered with the US EPA transformer registry, and none of the participating municipally-owned utilities have registered any PCBs transformers in this database, all PCBs concentrations in any equipment in the current OFEE inventories were assumed to be less than 500 ppm.
    - Pre-1985 OFEE with "Non-PCBs" on the label have PCBs concentrations < 50 ppm. All OFEE with these labels were assumed to have PCBs between 1 and 49 ppm, unless otherwise noted.
    - Pre-1985 OFEE that were not labeled, or that did not have measured PCBs concentrations were assumed to contain PCBs between 50 and 499 ppm.

Because this report is focused on OFEE that contain or may contain PCBs, the data analysis focused primarily on pre-1985 OFEE.

4.2.2 Data Analysis Methods

Analysis of the OFEE inventory data proceeded through the following seven steps:

1. Calculate the total mass of oil in all active OFEE within each system and the total mass of oil in active pre-1985 OFEE. Use this information to estimate the mass of oil and current abundance of potentially PCBs-containing OFEE within each system.

The total mass of oil in all active OFEE was calculated from the volume of oil in each piece of equipment multiplied by the density of the oil. The OFEE inventories provided by the participating municipally-owned electrical utilities provided either the actual volume of oil in each piece of equipment in their inventory, or the average volume of oil per piece of equipment for each type of equipment and the total counts of active equipment of that type. The density of the

[6] Personal communication, Sanchez 2016. This assumption is based on statements made to Regional Water Board staff at a meeting with PG&E representatives that equipment stockpiled prior to the 1979 ban continued to be put into service after the ban until voluntary replacement programs were instituted around 1985.

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oil in all OFEE was based on the density of highly refined mineral oil used as a dielectric fluid in transformers of 0.9 mg/l[7].

Pre-1985 OFEE were identified based on information provided by the municipally-owned electrical utilities on either the installation date for each piece of equipment in their inventory, or the counts of all equipment within each category that were installed before 1985 and are currently active in their system.

2. Calculate the mass of oil in pre-1985 OFEE that has been removed from active service since the start of the PCBs TMDL in 2002.

Only pre-1985 OFEE were included in this calculation because this category comprises all OFEE that may contain PCBs. Each participating municipally-owned electrical utility provided slightly different data on equipment removal dates. Both CPAU and SVP provided direct counts of pre-1985 OFEE within each equipment category that were removed from service in 2002 or later. Island Energy identified all pre-1985 OFEE in their current inventory as either active or inactive as of 2019 but did not provide removal dates for inactive equipment. However, Island Energy's current OFEE inventory only includes OFEE that were active in 1997. At this step in the process, in order to simply this calculation and provide information needed for Step #3, this calculation assumed all equipment in Island Energy's current inventory were active until at least 2002 (i.e., all inactive OFEE were removed from service in 2002 or later).

3. Calculate the overall equipment removal rate and annual average equipment removal rate for pre-1985 OFEE since the start of the PCBs TMDL in 2002. Use this estimate to calculate the future date by which all pre-1985 OFEE will be removed from each participating municipally-owned electrical utility system.

The overall equipment removal rates for pre-1985 OFEE that were achieved between 2002 and 2019 were calculated based on the total mass of oil in pre-1985 OFEE that were removed from each system during that time period, divided by the total mass of oil in all pre-1985 OFEE that were active in 2002. The annual average removal rates were then calculated by dividing the overall removal rate by the number of years between 2002 and 2019 (17 years).

For CPAU and SVP, the overall removal rates since the start of the PCBs TMDL in 2002 were calculated directly from the data provided on removals between 2002 and 2019. However, because of the way the data were provided for Island Energy, an additional step was needed to estimate the overall removal rate since 2002. Island Energy identified all equipment in their current inventory, which spans the time period between 1997 and 2019, as active or inactive in 2019. However, specific removal dates for inactive equipment in the current inventory were not provided. Therefore, in order to estimate the overall removal rate since 2002, first, the annual average removal rate between 1997 and 2019 was calculated by dividing the overall removal rate for this period by the number of years between 1997 and 2019 (22 years). This annual average removal rate was then multiplied by the number of years between 2002 and 2019 (17 years) to estimate the overall removal rate since the start of the PCBs TMDL in 2002.

[7] Based on the reported density of Shell Diala Oil AX manufactured by SOPUS Products. Island Energy identified this as the dielectric oil used in the large transformers at their substation and provided a Material Safety Data Sheet (MSDS) for this product in their Spill Prevention, Control and Countermeasure (SPCC) plan.

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Both the annual average removal rates and the overall removal rates since 2002 were compared across participating municipally-owned utilities. These data were also compared with the rates proposed in the accounting methodology for calculating the load reductions due to ongoing removal of PCBs-containing OFEE since the start of the PCBs TMDL and into the future. These removal rates were also used to estimate the future date by which all pre-1985 OFEE will be removed from each system. This calculation assumes the annual average removal rate for each system that has been achieved since 2002 will continue until all pre-1985 OFEE have been removed from each system. The starting point for this calculation was the mass of oil in all pre-1985 OFEE that were active in each system in 2020 (calculated in step #1). This 2020 value was then multiplied by the annual average removal rate for each system to estimate the total mass of pre-1985 OFEE oil removed each year. The number of years to reduce this mass to zero was then estimated by dividing the total mass of oil in active pre-1985 OFEE in 2020 by the mass of oil that would be removed each year.

4. Calculate the potential range of PCBs mass in active OFEE in 2020.

The potential range of PCBs mass (kg) in currently active pre-1985 OFEE was estimated for each system based on the total mass of oil in active pre-1985 OFEE in 2020 multiplied by the measured or assumed PCBs concentrations based on previously described assumptions (see Section 4.2.1).

5. Calculate the 2002 and 2020 loads of PCBs to stormwater from OFEE in the participating municipally-owned electrical utility systems and load reductions achieved over time due to equipment removals.

The starting point for this calculation was the current PCBs mass in active OFEE (step #5 above) for each participating municipally-owned electrical utility system. The following assumptions used by McKee et al., (2006) were then applied to estimate the fraction of PCBs in OFEE that are released to MS4s annually.

- 0.05% was estimated to leak from transformers and 0.35% from large capacitors each year (Harrad 1994, EIP Associates 1997); For this analysis, the value for transformers was used for all OFEE;
- When leaks occur, 99% of the materials leaked are cleaned up and only 1% remain on erodible surfaces and available for wash off.

6. Estimate the stormwater loads from OFEE across the larger MRP area and the potential load reductions that can be achieved through continued equipment removal.

This calculation extrapolated the stormwater loads estimated for the participating municipally-owned electrical utility system OFEE (developed in step #5) to the larger Bay Area.

4.2.3 Data Analysis Results

Summary of Municipally-Owned Electrical Utility Data

Figure 4.1 presents a summary of the distribution of OFEE in each of the participating municipally-owned electrical utility systems' inventories. Additional information about these distributions is provided in the following sections.

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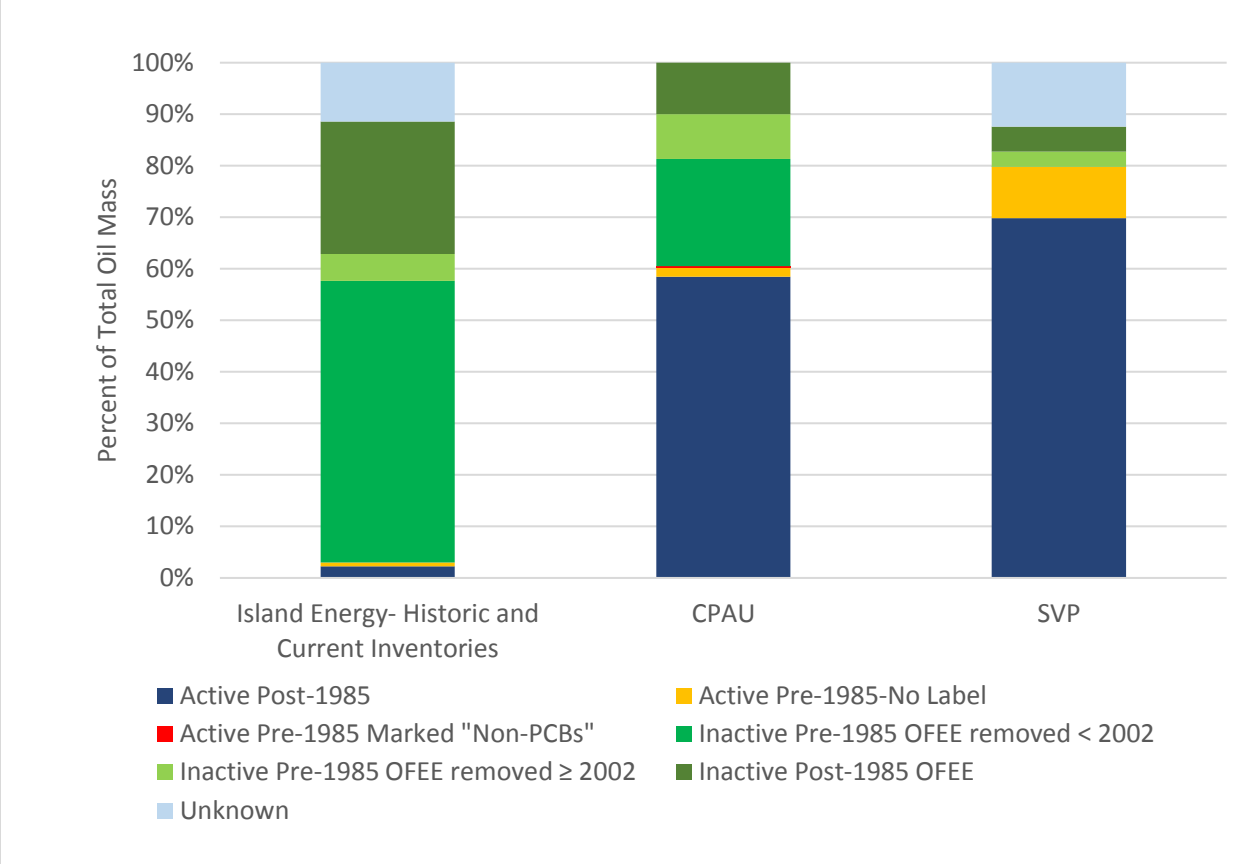

Figure 4.1 Distribution of the mass of oil in oil-filled electrical equipment (OFEE) in three municipally-owned electrical utility systems.

Active Equipment - including both Pre-1985 and Post-1985 OFEE

Table 4.1 presents the mass of oil in all OFEE that are currently active in each participating municipally-owned electrical utility system, divided between pre-1985 OFEE and post-1985 OFEE. Where available, the data are also presented by equipment type. Across all 3 systems, there are more than 4.8 million kilograms (kg) of oil in active OFEE.

Combined, there are nearly 500,000 kg of oil in active pre-1985 OFEE in these systems, which is 10% of the oil in active OFEE (Table 4.1). CPAU has the lowest abundance of active pre-1985 OFEE oil, which comprises 3.4% of their OFEE. Approximately 12% of SVP's active equipment, and 25% of Island Energy's active equipment are comprised of pre-1985 OFEE. Additional pre-1985 OFEE may be active in the system that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as "unknown status and age"). Detailed equipment type was not provided by Island Energy, but for both CPAU and SVP, 64% of the pre-1985 OFEE oil is contained in padmount transformers, and about 25% is contained within pole-top transformers. The remainder is either in underground transformers or switches.

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Table 4.1 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that are currently active in three municipally-owned electrical utility systems.

Utility System	Equipment Type	Oil in ACTIVE OFEE (kg)			Percent of Active OFEE that are pre-1985
		Pre-1985 OFEE	Post-1985 OFEE	TOTAL	
City of Palo Alto Utilities (CPAU)	Padmount Single Phase Transformer	988	57,798	58,786	1.7%
	Padmount Three Phase Transformer	33,336	609,353	642,689	5.2%
	Poletop Transformer	4,923	121,608	126,531	3.9%
	Regulator	0	920	920	0%
	Underground Commercial Distribution Transformer	0	108,560	108,560	0%
	Underground Residential Distribution Transformer	204	62,584	62,789	0.3%
	Padmount Oil Switch	0	1,090	1,090	0%
	Padmount Vacuum Switch	0	99,038	99,038	0%
	Vault/Box Oil Switch	0	0	0	0%
	Vault/Box Vacuum Switches	0	63,027	63,027	0%
	Subtotal - CPAU	**39,452**	**1,123,977**	**1,163,429**	**3.4%**
Silicon Valley Power (SVP) – City of Santa Clara[1]	Padmount Single Phase Transformer	2,044	23,201	25,245	8.1%
	Padmount Three Phase Transformer	189,333	1,147,357	1,336,690	14%
	Poletop Transformer	111,551	139,338	250,889	44%
	Underground Residential Distribution Transformer	0	1,635	1,635	0%
	Padmount Oil Switch	7,645	9,444	17,089	45%
	Padmount Vacuum Switch	51,880	154,999	206,879	25%
	Padmount Vacuum-Disconnect Switch	0	249,764	249,764	0%
	Padmount Substation Transformer	91,985	1,460,593	1,552,578	6%
	Subtotal - SVP	**454,439**	**3,186,330**	**3,640,76**	**12%**
Island Energy[2]	**Current Inventory of Transformers**	**3,669**	**10,882**	**14,551**	**25%**
	TOTAL (All Systems Combined)	**497,560**	**4,321,189**	**4,818,749**	**10%**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.

[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.

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Pre-1985 OFEE Removed from Active Service

Table 4.2 presents the total mass of oil in all pre-1985 OFEE that have been removed from service since they were originally installed, divided between the pre-1985 OFEE that were removed before 2002, and those that were removed in 2002 or later (i.e., since the start of the PCBs TMDL). Across the three systems, nearly 1 million kilograms of oil in pre-1985 OFEE have been removed from active service due to ongoing equipment removal and maintenance programs. This represents approximately 67% of the oil from all pre-1985 OFEE in these inventories.

Both CPAU and Island Energy have already removed the bulk of their pre-1985 OFEE from active service (94% and 88%, respectively). When the pre-1985 OFEE in the historic inventory on Mare Island were factored into the calculation, the removal rate on Mare Island increased to over 99% removal of all pre-1985 OFEE. SVP has removed at least 23% of their documented pre-1985 OFEE from active service. Additional removals from the SVP system may have occurred that cannot be verified at this time (see Section 4.1.2 on SVP OFEE identified as “unknown status and age”).

In addition, since the start of the PCBs TMDL in 2002, more than 320,000 kg of oil in pre-1985 OFEE have been removed from service across all three systems (Table 4.2). This represents an overall 39% removal rate, and an average removal rate of 2.3% per year. The overall removal rates for each individual system over this same time period were 81% (CPAU), 68% (Island Energy) and 23% (SVP). These overall removal rates equate to average removals of 4.8% (CPAU), 4.0% (Island Energy), and 1.3% (SVP) per year. Based on these annual average removal rates, the project estimates it will take between 21 and 75 years for all pre-1985 OFEE to be removed from these systems due to continued equipment maintenance and removal programs.

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Table 4.2 Mass of dielectric oil in oil-filled electrical equipment (OFEE) that have been removed from active service in three municipally-owned electrical utility systems.

Utility System	Equipment Type or	Pre-1985 OFEE Oil in Inactive/Removed OFEE (kg)			Pre-1985 OFEE Removed Between 2002 and 2019		Pre-1985 OFEE removed since installation	Estimated time to remove all pre-1985 OFEE (years)
		Removed prior to 2002	Removed in 2002 or Later	TOTAL REMOVED	Overall Removal Rate	Annual Average Removal Rate		
City of Palo Alto Utilities	Padmount Single Phase Transformer	2,998	3,475	6,473	81%	4.8%	94%	21
	Padmount Three Phase Transformer	98,953	79,431	178,384				
	Poletop Transformer	204,165	47,100	251,265				
	Regulator	0	0	0				
	Underground Commercial Dist.Transformer	39,162	19,879	59,041				
	Underground Residential Dist. Transformer	54,374	17,971	72,345				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Vault/Box Oil Switch	0	0	0				
	Vault/Box Vacuum Switches	0	0	0				
	Subtotal - CPAU	**399,651**	**167,856**	**567,508**				
Silicon Valley Power - City of Santa Clara[1]	Padmount Single Phase Transformer	0	1,635	1,635	23%	1.3%	23%	75
	Padmount Three Phase Transformer	944	108,642	109,585				
	Poletop Transformer	327	21,801	22,128				
	Underground Residential Dist. Transformer	0	664	664				
	Padmount Oil Switch	0	0	0				
	Padmount Vacuum Switch	0	0	0				
	Padmount Vacuum-Disconnect Switch	0	0	0				
	Padmount Substation Transformer	0	0	0				
	Subtotal - SVP	**1,271**	**132,742**	**134,013**				
Island Energy[2]	**Current Inventory**	**5,276**	**21,161**	**26,437**	**68%**	**4.0%**	**88%**	**25**
	Historic Inventory	**266,192**	**NA[3]**	**266,192**	**NA[3]**		**100%**	
	TOTALS (All Systems Combined)	**672,391**	**321,759**	**994,150**	**39%**	**2.3%**	**67%**	**43**

[1]SVP identified incomplete records for OFEE that contain approximately 566,000 kg or oil. The current status of these OFEE (active or removed) and the installation dates were unavailable at the time of this report. Therefore, these OFEE were not included in any of the totals above. See Section 4.1.2 for additional information.
[2]Since 1997, Pittsburg Power Company has been operating the electrical distribution system on Mare Island in the City of Vallejo under the name Island Energy.
[3]NA=not applicable; the historic inventory only covers the period up to 1996.

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Sensitivity Analysis – SVP Data

As described in Section 4.1.2, about 12% of the equipment in the SVP inventory did not have information on the status (active or inactive) or age (pre- or post-1985) of the OFEE. In order to evaluate the potential impact of excluding these unknown data, additional analyses were conducted to account for the following three scenarios:

1- All “unknown” OFEE are assumed to be active, pre-1985 OFEE;
2- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service after the start of the PCBs TMDL in 2002;
3- All “unknown” OFEE are assumed to be pre-1985 OFEE that were removed from service prior to 2002.

The results of the sensitivity analysis conducted under each of these three scenarios are shown in Table 4.3. The default scenario excluded all “unknown” oil from all calculations. For each alternative scenario, the mass of “unknown” oil was added to the value for the cell highlighted in blue in the table. The minimum and maximum values calculated for each of the percentage columns are bolded in the table.

This analysis indicates that under Scenario 1, the percent of active OFEE that are pre-1985 increases from 12% to 24%, and the percent of pre-1985 OFEE that have been removed since installation decrease from 23% to 12%.

Under Scenarios 2 and 3, the percent of active pre-1985 OFEE remain the same, but the percent of pre-1985 OFEE that have been removed since installation increases from 23% to 61%, which is more in line with the rates observed for the other two systems. Scenario 3 also increases the annual average removal rate since the start of the TMDL from 1.3% to 3.6% per year.

The primary impacts of these alternative scenarios include the following:

- Under Scenario 1, the pre-1985 OFEE currently in the system more than doubled, which would result in an increase in the current PCBs loads to stormwater from this source;
- Under Scenario 3, the mass of pre-1985 OFEE removed since the start of the TMDL was nearly tripled, which would result in an increase in the PCBs stormwater loads reduced during this time period accordingly. Also under Scenario 3, because of the increased annual removal rate, all pre-1985 OFEE would be removed within 28 years (compared to 75 years in the default scenario).

Because these impacts are potentially large, the results for SVP presented in the next section used the ranges presented in Table 4.3 for Scenario 1 and Scenario 2. The results for these two scenarios provide the upper and lower limits for all values across the default and alternative scenarios.

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Table 4.3 Sensitivity analysis conducted to evaluate the impacts of unknown status and age of oil-filled electrical equipment (OFEE) identified in the Silicon Valley Power (SVP) OFEE inventory on the evaluation of pre-1985 as a source of PCBs to urban stormwater.

Scenario	Oil in Active OFEE (kg)		Oil in Inactive/Removed OFEE (kg)			Oil in OFEE with Unknown Status and Age (kg)	Total Oil in OFEE Inventory (kg)	Percent of all Active OFEE that are Pre-1985	Percent of Pre-1985 OFEE Removed Since Installation	Pre-1985 OFEE Removed Between 2002 and 2019	
	Post-1985 OFEE	Pre-1985 OFEE	Pre-1985 OFEE removed before 2002	Pre-1985 OFEE removed in 2002 or later	Post-1985 OFEE					Overall Removal Rate	Annual Average Removal Rate
Default: "Unknown" not included in calculations	3,186,330	454,439	1,271	132,742	221,460	566,026	4,562,268	**12%**	23%	23%	1.3%
1. All "unknown" = Active, Pre-1985 OFEE	3,186,330	1,020,465	1,271	132,742	221,460		4,562,268	**24%**	**12%**	**12%**	**0.7%**
2. All "unknown" = Pre-1985 OFEE Removed in 2002 or Later	3,186,330	454,439	1,271	698,768	221,460		4,562,268	12%	**61%**	**61%**	**3.6%**
3. All "unknown" = Pre-1985 OFEE Removed Prior to 2002	3,186,330	454,439	567,296	132,742	221,460		4,562,268	12%	61%	23%	1.3%

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Potential PCBs Mass in Active OFEE and Estimated Stormwater Loads

Table 4.4 provides the calculated PCBs mass in the Island Energy historic and current OFEE inventories, and estimates of the potential PCBs mass in the CPAU and SVP OFEE inventories. Only Island Energy provided data on measured PCBs concentrations in their OFEE oil. Concentrations of PCBs in Island Energy's current inventory of OFEE ranged from 1 to 37 ppm. Concentrations in the historic inventory ranged from <1 up to nearly 900 ppm. About 20% of the OFEE in the historic inventory had PCBs concentrations > 500 ppm. Based on these measured PCBs concentrations and the volumes of oil in each piece of equipment, the historic inventory documents OFEE containing more than 70 kg of PCBs. By comparison, Island Energy's current inventory of both active and inactive OFEE had 0.088 kg of PCBs. Of that total, 0.040 kg of PCBs remain in active OFEE, and 0.048 kg of PCBs were from OFEE that have been removed from active service. This represents a three-order of magnitude decrease in PCBs mass from the historic inventory. One interesting detail about the PCBs concentration data was that nearly one-third of the PCBs in the current inventory were contained in post-1985 equipment. All of these equipment were from 1986 or 1987. PCBs concentrations were generally low in these OFEE, ranging from 1 to 4 ppm. However, the potential contribution from these OFEE could still be important. For example, in the Island Energy current inventory, there is one piece of equipment from 1987 that contains 600 gallons of oil at 1 ppm PCBs, or 2 g of PCBs in total. If this quantity of PCBs were released to the environment, this could have a detrimental impact on stormwater quality.

Because CPAU and SVP did not provide measured PCBs concentrations for OFEE in their inventories, the potential PCBs mass in pre-1985 OFEE was estimated based on the assumptions described in Section 4.2.1. For CPAU, these estimates suggest active pre-1985 OFEE may contain between 1.7 and 17 kg of PCBs, while pre-1985 OFEE that have been removed potentially contained between 28 kg and 284 kg. These estimates suggest an order of magnitude reduction in PCBs mass in the active OFEE inventory. For SVP, active pre-1985 OFEE may contain between 23 kg and 227 kg. If the "unknown" OFEE were assumed to be active pre-1985 OFEE, then the total estimated mass of PCBs in active OFEE doubles to 51 kg to 510 kg. PCBs in pre-1985 OFEE that have been removed were estimated to range from 6.7 to 67 kg, which would increase up to 35 kg to 350 kg if the "unknown" OFEE were assumed to be pre-1985 OFEE that have been removed from service. Across all three systems, the total potential mass of PCBs in active OFEE ranged from 24 kg up to 527 kg. The upper value assumes the "unknown" mass is contained within active, pre-1985 OFEE.

Table 4.4 Estimated potential mass of PCBs in municipally-owned electrical utilities oil-filled electrical equipment (OFEE) inventories

OFEE Category	PCBs (kg)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL (All Systems)
All Active	1.7 - 17	23 - 227	0.040		24 - 244
All Removed	28 - 284	6.7 - 67	0.048	70	105 - 421
Removed since 2002	8.4 - 84	6.6 - 66	0.048		15 - 150
Removed prior to 2002	20 - 200	0.1 - 0.6		70	90 - 271
Unknown		28 - 283			28 - 283

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Based on the approximate population of the MRP area of ~6 million people, if the active OFEE in all the participating municipally-owned electrical utility systems were representative of the PCBs contained in OFEE across the larger MRP area (i.e., 24 to 527 kg), the estimated mass of PCBs would range from roughly 730 kg up to 16,000 kg of PCBs. Based on acres, the estimated mass of PCBs across the larger MRP area of nearly 3 million acres would range from 2,400 kg up to 53,000 kg of PCBs in active OFEE.

Table 4.5 presents the estimated loads of PCBs to stormwater from active OFEE in the three participating municipally-owned electrical utility systems. Across all three systems, the estimated PCBs stormwater load in 2002 from active OFEE was between 197 mg/yr to 3,390 mg/yr. The low end of this range is the sum of the minimum values for all active OFEE and all OFEE removed since 2002. The upper end of this range is the sum of the maximum values for all active OFEE, all OFEE removed since 2002, and all unknown OFEE. In 2020, the total estimated PCBs stormwater loads from active OFEE were estimated to range from 122 mg/yr up to 2,640 mg/yr. The low end of this range is the sum of the minimum value for all active OFEE. The upper end of this range is the sum of the maximum values for all active OFEE and all unknown OFEE. Scaling these estimates up to the MRP area of roughly 3 million acres gives a stormwater load of between 20,000 mg/yr up to 340,000 mg/yr in 2002, and 12,000 mg/yr up to 260,000 mg/yr in 2020. These estimates are highly uncertain due to all the assumptions that were used in the calculations.

Table 4.5 Estimated range of PCBs loads to stormwater from oil-filled electrical equipment within three municipally-owned electrical utility systems.

OFEE Category	PCBs Stormwater Loads (mg/yr)				
	CPAU	SVP	Island Energy - Current	Island Energy - Historic	TOTAL
All Active OFEE	8.3 - 84	114 - 1,136	0.199	0	122 - 1,220
All Active OFEE - assume "unknown" = active	8.3 - 84	255 - 2,551	0.199	0	264 - 2,636
All Removed OFEE	142 - 1,419	34 - 335	0.241	352	527 - 2,106
Removed since 2002	42 - 420	33 - 332	0.241	0	75 - 752
Removed prior to 2002	100 - 999	0.3 - 3.2		352	452 - 1,354
All Removed OFEE - assume "unknown" = removed	142 - 1,419	175 - 1,750	0.241	352	317 - 3,169
Unknown		142 - 1,415			142 - 1,415

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4.3 Spill Response and Cleanup

Although the bulk of PCBs remain contained within OFEE until the equipment is removed from use and transported to proper hazardous waste disposal facilities, releases of PCBs to the environment can and do occur.

4.3.1 Summary of OFEE Release Data for Bay Area

In order to document spills, publicly available data in the California Office of Emergency Services (Cal OES) spill report database (Cal OES 2017), as well as internal spill records (PG&E 2000) supplied by PG&E to the Regional Water Board in September 2000 (that were provided pursuant to a California Water Code §13267 request for information) were reviewed. The Cal OES database and available PG&E spill records were searched for reports of spill releases related to OFEE in the Bay Area between 1994 and 2017. Over 1,200[8] reported release incidents from OFEE in the Bay Area were identified. The information provided by these records and a summary of the important issues identified for water quality concerns are summarized in the remainder of this section. It is important to note that current regulations do not require reporting of all releases from OFEE. The information provided below is based only on the reported releases for which records were available, and likely represents an underestimate of actual OFEE releases during the time period of review. However, these reports clearly demonstrate that PCBs may still be present in the electrical transmission and distribution systems in the Bay Area, and that releases from these systems can and do continue to occur.

Generally, the publicly available spill release records provide information about the spill release date, time, location, chemical, quantity released, actions taken, known or anticipated risks posed by the release, and additional comments. Other information that is sometimes reported for OFEE releases includes a description of the causes of the release and the equipment affected, and the concentrations of PCBs in that equipment (if known). Concentration information reported is likely assumed from equipment labels, as ranges are most often provided rather than specific values. Typically, the reports are limited to the information that was available at the time the spill was initially reported. In some cases, follow-up information such as the results of analytical testing of the spilled materials is also provided, but this is not typical.

Number of Reported OFEE Releases

Between 1994 and 2017, over 1,000 spills from electrical equipment were reported to Cal OES. PG&E records contain information about 200 additional releases that were not reported to Cal OES between 1994 and 2000. A count of these reports by year is presented in Figure 4.2.

[8] The records span 24 years of spill reports, and include PG&E's own record of releases from 1994 thru 1999 and a portion of 2000. The number of reports PG&E submitted in 2000 represents less than half the number of reports for that year. Records did not include all the districts in the Bay Area. District documents submitted reported releases prior to June of 2000, with the exception of one district that submitted a June report. As a result, the number of additional reports from PG&E's records are assumed to be less than half the number of incidents for 2000.

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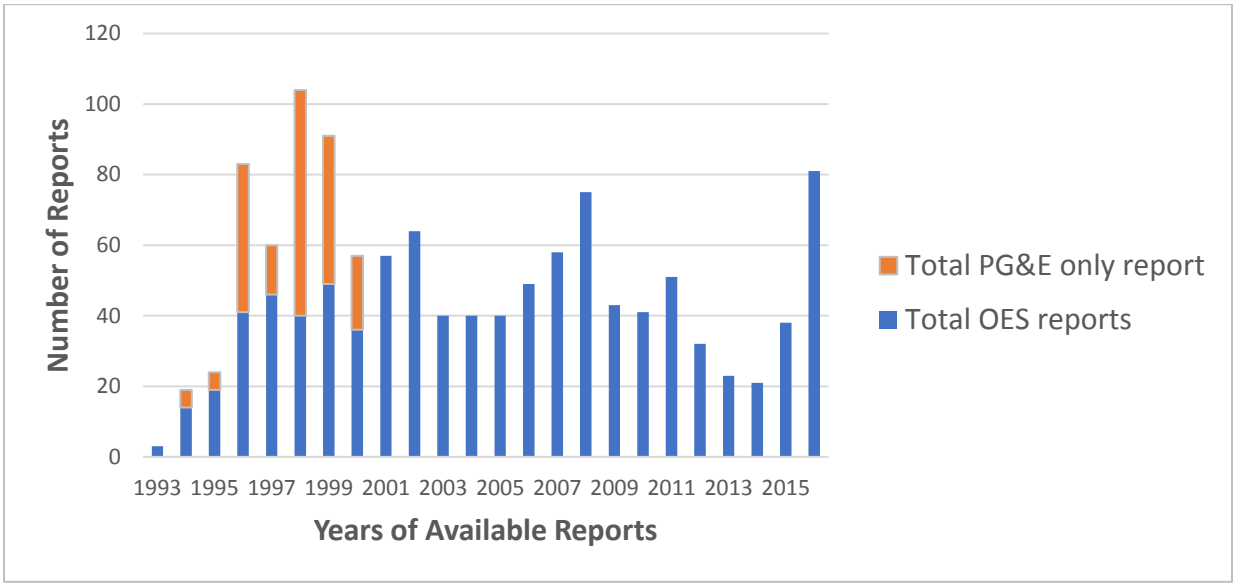

Figure 4.2 Oil-filled electric equipment spills reported to the California Office of Emergency Services (Cal OES) and/or identified through internal Pacific Gas & Electric (PG&E) reports between 1993 and 2017.

Volume of OFEE Releases

The total volume of material released from all reported OFEE spills in a given year in the Bay Area is presented in Figure 4.3. Mineral oil or transformer oil are the substances identified in over 99% of reported releases from OFEE in the Cal OES spill report database. In a phone conference with Regional Water Board staff in 2012, PG&E said they submit written reports to Cal OES for all PCBs spills that meet or exceed the mineral oil federal reportable quantities (RQ) of 42 gallons (*personal communication*, Jan O'Hara 2012). However, the reports reviewed indicate written reports are sometimes submitted for spills that are much less than 42 gallons.

The reported volumes of oil released during a single incident range from less than one gallon up to 5,000 gallons. Nearly half of all OFEE spill reports identify the volume of oil spilled as 5 gallons or less, and more than 90% of all spill reports identify the volume of fluid spilled as less than 100 gallons. Releases as large as 500 gallons from the distribution system and 5,000 gallons from the transmission system have been reported. Only five incidents reported releases that exceeded 1,000 gallons of oil. Nearly all (~99%) of reports provided information on the volume of oil released.

The reported volumes released do not necessarily equate to the volume of the oil that may have reached storm drains or local creeks. Estimates of those volumes were not available.

Location of OFEE Releases

Cal OES and PG&E records show releases occurred in all Bay Area counties. Leaks and spills of PCBs from electrical equipment have occurred onto roads, sidewalks, pervious areas, vegetation, structures, vehicles, and even people (Cal OES 2017). Most releases occurred in the distribution system, often from equipment installed in the public ROW such as pole-mounted transformers installed along roadways.

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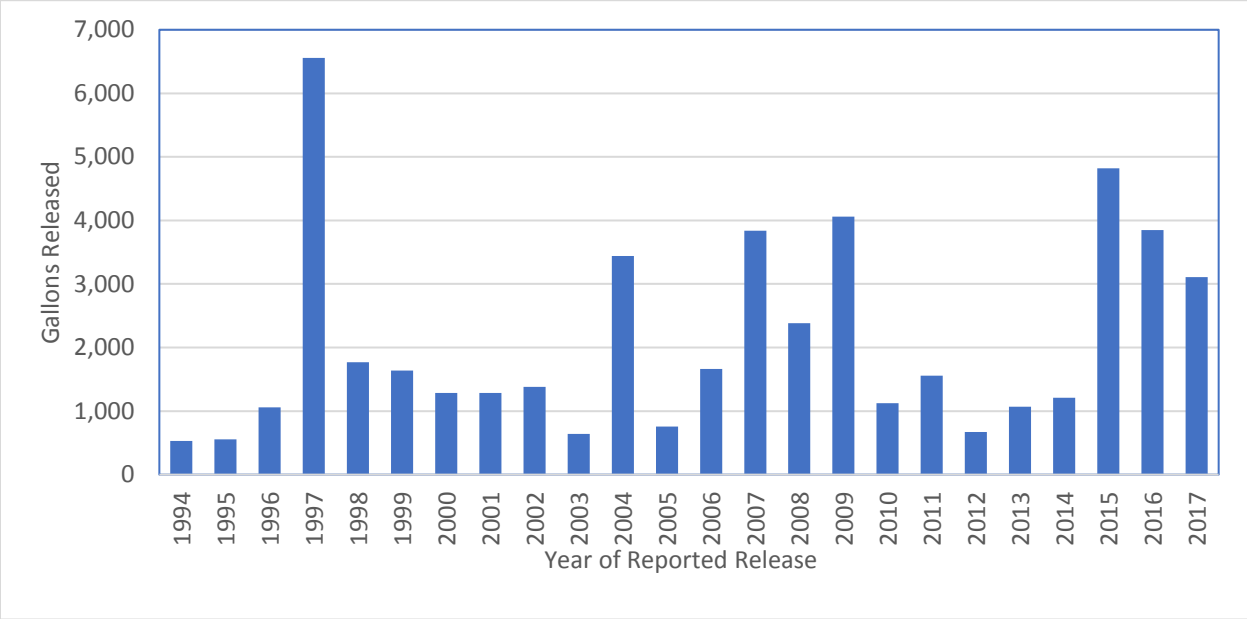

Figure 4.3 Total reported gallons of oil released each year (1994 – 2017) from spills from PG&E electrical utility equipment in the Bay Area.

A number of reports document direct releases from OFEE to the MS4, and potentially a downstream waterbody (e.g., creek). There are at least 17 incidents identified during the past 15 years that involved direct releases from OFEE directly to a waterbody or to storm drains that discharge to local creeks (Table 4.6). The majority of these releases were reported as having unknown PCBs concentrations, and no reports provide any follow-up information on the concentration of PCBs in the spilled materials based on chemical analysis.

It is important to note that in addition to the incidents identified in Table 4.6, materials spilled during any of the numerous other incidents may (or may not) have entered the MS4 and/or receiving waters such as local creeks directly or been washed into the MS4 and/or creeks by stormwater or irrigation runoff. Generally, the spill reports lack any details regarding this type of information.

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Table 4.6 Examples of Information Reported on Releases of PCBs to Bay Area Storm Drains and Creeks.

Date	Gallons	Reported Concentration	Water Body	Municipality
1/24/2016	Unknown	<50 ppm	Coyote Creek	San José
2/17/2016	Up to 18	Unknown	Los Gatos Creek	Los Gatos
3/7/2016	10	Unknown	Culvert	Concord
8/16/2016	Unknown	<50 ppm	Guadalupe River	San José
11/17/2015	Unknown	Unknown	Cerrito Creek	Richmond
10/4/2015	5	Unknown	Creek	Los Gatos
5/3/2015	30	<2 ppm	Cerrito Creek	Richmond
3/2/2011	30	Unknown	Unknown Marsh	Menlo Park
6/2/2007	40	Unknown	Pond, Marsh Area	Vallejo
2/28/2006	20	<50 ppm	Calara Creek	Pacifica
5/27/2006	1	Unknown	Unknown Creek	Orinda
10/10/2005	Unknown	Unknown	Coyote Creek	San José
7/23/2005	<15	Unknown	Nearby Creek	Walnut Creek
12/8/2004	Small amount	<50 ppm	Moraga Creek	Orinda
3/7/2004	Unknown	Unknown	Blossom Creek	Calistoga
7/14/2003	8	< 50 ppm	Coyote Creek	San José
2/16/2002	15	Unknown	Napa River	Napa

Causes of OFEE Releases

Cal OES release reports and PG&E records document a number of causes of PCBs releases from OFEE. Most releases can be attributed to one of the following:

- **Equipment Failure**. This is the cause of the majority of the reported releases. Equipment failure in utility vaults has additional potential as an important source of PCBs because OFEE in these vaults may contain more than 100 gallons of oil. More than 50 release incidents were reported for equipment contained in electrical utility vaults during the time period reviewed. A number of these reports noted the presence of water in the vaults in addition to the PCBs oil released. Releases from equipment failure in utility vaults are mostly contained, but Cal OES spill reports document releases of PCBs oil that breached containment, including discharges that reached water bodies.

- **Accidents**. Approximately 20% of reported releases resulted from equipment knocked over by accident. In the distribution system, reports document 50 to 500 gallons released from poles knocked over during car accidents, by construction equipment, and during tree trimming. On rare occasion PCBs releases have occurred during accidents while equipment is in transport.

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- **Storms, Fires, and Overheating from High Summer Temperatures**. These factors are the reported cause of more than 10% of the releases from the distribution system.
- **Field Repairs and Fluid Replacement**. The Cal OES database contains records that indicate draining fluids in the field may have been ongoing as recently as 2007, when a report documented that a valve left open from draining a transformer in the field caused a release. In 2016, Daniel Sanchez, who at the time was PG&E's Manager of Hazardous Materials and Water Quality Environmental Management Programs, informed Regional Water Board staff that PG&E does not drain and refill pole mounted PCB transformers in the field any longer; however, it is unclear when this practice ceased, and/or if it still occurs with equipment not mounted on poles.
- **Vandalism**. Between 1997 and 2015, there were at least 25 separate reported incidents of vandalism that resulted in PCBs releases. For example:
  - In 1997, gunshot damage caused the release of 5,000 gallons of oil from a substation transformer and regulators in San Mateo County;
  - In 2011, copper theft at a substation released 750 gallons of oil in Contra Costa County;
  - In 2013, vandalism of pad-mounted transformers resulted in the release of possibly 1,000s of gallons of oil before discovery in San José.

PCBs Concentrations in OFEE Releases

Of the more than 1,200 spill reports that were reviewed, approximately one-third identified the PCBs concentration as unknown or did not provide any information on the PCBs concentration of the spilled material (Figure 4.4). Releases with high PCBs concentrations (> 500 ppm) were infrequently reported, accounting for only 1% of reported spills. Concentrations above 50 ppm represent about 8% of the reported spills. As recently as 2016, failure of a pole-mounted transformer resulted in release of mineral oil with 280 ppm PCBs to surrounding soils and brick structures. For approximately 44% of the reported releases, the PCBs concentration was identified as less than 50 ppm, based primarily on assumptions associated with a "Non-PCB" label. For these 44% of reports, no additional information was provided on PCBs concentrations other than a designation of "< 50 ppm". According to labeling requirements, a "Non-PCB" label indicates the PCBs concentrations in the oil are assumed to be below hazardous waste thresholds of 50 ppm (federal regulations, see Section 3.2.1). However, in most cases, no additional information was provided in the spill reports to indicate how the "Non-PCB" category was arrived at, or whether the federal (> 50 ppm) or state (> 5 ppm in liquid) "Non-PCB" category was assumed.

For the vast majority of these reports, no follow-up chemical analysis results were provided that confirmed the "Non-PCB" designations. In a limited number of reports, follow-up PCBs analysis results were provided for materials that were identified as "Non-PCB" during initial reporting. Generally, these results found PCBs concentrations between 5 and 49 ppm, suggesting that the labels were correctly applied. However, any concentration of PCBs in electrical equipment oils is potentially significant in terms of water quality impacts and implementation of the PCBs TMDL. These results clearly demonstrate that the "Non-PCB" designation represents a threshold that is far too high to necessarily be protective of water quality.

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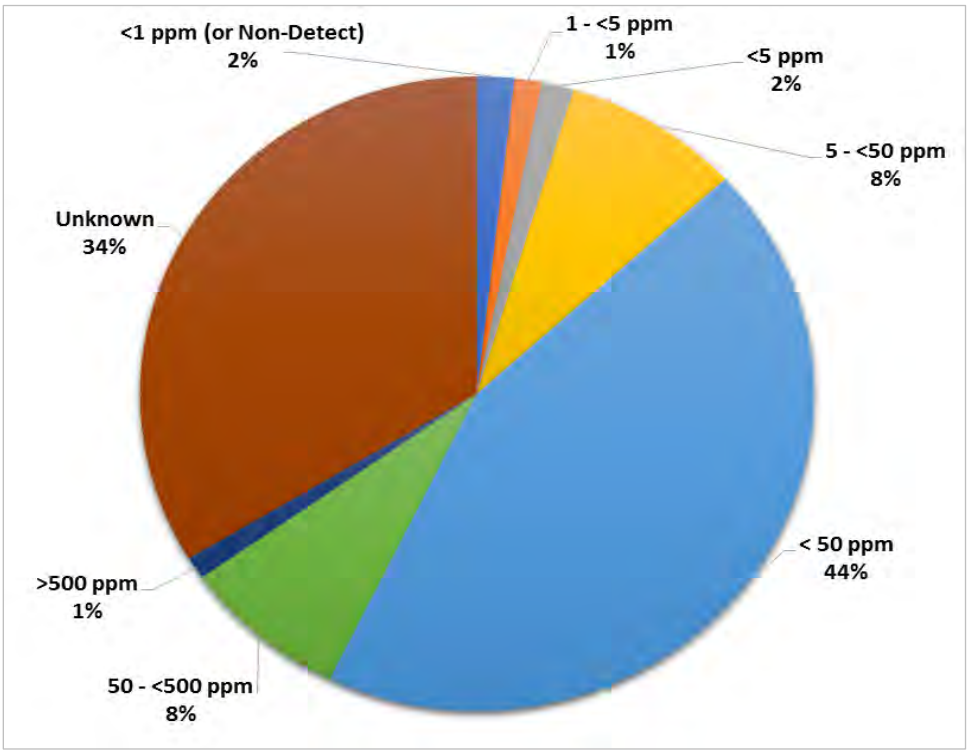

Figure 4.4 PCB Concentration data reported for releases from PG&E electrical equipment between 1993 and 2016. Each category identified above is independent (e.g., the "< 50 ppm category" does not include reports that provided more specific concentration data that was < 50 ppm).

Only 1% of the reported releases identified the PCBs concentrations as either below 1 ppm, or below detection limits. Although the quality of the PCBs concentration data in the release reports varies widely, these results clearly demonstrate that electrical equipment in the Bay Area can still contain PCBs at concentrations of concern for water quality protection programs.

Recommendations

Based on review of reports in the Cal OES database, while they meet the current regulatory notification requirements, the current spill notification and reporting procedures are not adequate to address TMDL goals, and do not provide the Regional Water Board or Bay Area MS4s with the information needed to better quantify and control releases to the MS4.

Review of two municipally-owned utilities' procedures for spill response indicates that all spills, even those of a low PCBs concentration or low volume release, are internally documented even if there is no OES notification requirements. Given that PG&E provided spill reports (pursuant to a 2000 California Water Code §13267 request for information) that were not submitted to OES indicates PG&E also internally documents spills even if they do not need to be reported. Therefore, it is likely that the municipally-owned utilities already have procedures for documenting and recording all spills.

More stringent requirements to address PCBs TMDL goals should include spill response and reporting for all spills/releases from municipally-owned utility OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that unequivocally identifies the

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equipment involved as having been installed after 1985. This more stringent requirement will ensure that all releases from equipment that could potentially contain PCBs will be reported.

In addition, the information reported in Cal OES database typically captures only the data that were available at the time the spill occurred. Although these reports may provide some preliminary information on the mass of PCBs released (i.e., volume and concentration spilled), these reports rarely provide any corroborating measurement data or any follow-up information on the effectiveness of cleanup activities. This information is needed to quantify PCBs from OFEE releases, or to track where PCBs remain in use in the system. As discussed in Section 3.2.5, any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues (SFBRWQCB 2016).

Bay Area MS4s do not receive timely notification of releases from OFEE. Even for releases that must be reported to Cal OES, electrical utilities do not typically notify local agencies directly. Instead, Bay Area MS4s are responsible for reviewing Cal OES reports in order to identify spills or releases that have occurred in their jurisdictions. This delay is problematic because clean-up actions have likely been completed by the time reports are submitted to Cal OES. Bay Area MS4s should be notified of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels. The appropriate local agency staff understand their municipal storm drain systems and how storm drain inlets connect to creeks and water bodies in their jurisdictions. Better communication between utilities and municipal stormwater programs can result in more efficient responses and less impact to waterways.

In summary, to better quantify the amount of PCBs released from OFEE spills, and to help ensure that adequate cleanup actions are being implemented, the following improvements to current reporting and notification requirements could be made:

- Notify Bay Area MS4s of releases within their jurisdiction as soon as possible so they can provide oversight during initial cleanup efforts, as well as any follow-up that is needed to ensure cleanup was completed to the desired levels.
- Respond and report to Bay Area MS4s for all spills/releases from OFEE unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985.
- Any chemical analysis methods should follow the recommendations of the Regional Water Board for congener analysis at sufficiently low reporting levels to capture all concentrations of concern and congeners of concern to address water quality issues.

4.3.2 Spill Response Protocols

Electrical utility companies typically address spills or leaks from their OFEE with Standard Operating Procedures (SOPs) that should conform to both TSCA requirements and the more stringent California hazardous waste rules. The SOPs describe the steps to be taken by field crews in the event of an OFEE leak or spill, which should generally include the following:

- Notify Supervisor or compliance Manager
- Stop and contain the leak
- Determine the spill area (i.e., the area with visible traces of oil plus 1 foot beyond)

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- Determine the PCB classification
- Notify property owner
- Notify Cal OES when required

Response to a specific release incident is determined by the PCBs classification of the responsible equipment. The state response level (5 to <50 ppm PCBs) requires immediate clean-up by next business day. The federal response level requires immediate clean-up until clean for spills of 50 to < 500 ppm, and the additional use of all resources to clean the spill immediately for spills > 500 ppm.

The disposal of all materials removed from a cleanup site or used to clean the site are handled according to the TSCA hazardous waste classifications (50 to <500 ppm; and ≥500 ppm in solids or liquids), or the state non-RCRA hazardous waste classification (5 to <50 ppm PCBs in liquids). The allowable post-cleanup concentrations of remaining soils and other surface materials typically range from 10 to 25 ppm, depending on site-specific evaluations of human health risk. As a result, current efforts to control and cleanup PCBs releases from electrical utility equipment are focused on these thresholds.

By comparison, Bay Area municipalities are concerned with much lower concentrations of PCBs. For example, currently Bay Area municipalities generally designate a site as a *potential* PCBs source to stormwater runoff if soil or sediment concentrations are ≥0.5 ppm and designate a site as a *confirmed* PCBs source to stormwater runoff if soil or sediment concentrations are ≥1.0 ppm. Control of PCBs sources at these substantially lower concentrations has been deemed necessary to make progress towards meeting the stringent stormwater runoff wasteload allocations called for in the PCBs TMDL. In addition, post cleanup verification sampling is only required for high concentration spills or high volume spills.

The Cal OES reports provide almost no information on actions taken to stop active spills, or the methods used to cleanup spilled materials from surrounding surfaces, storm drain infrastructure, or creeks. Municipalities need this type of information to better understand any potential risks that remain following initial cleanup. Because of the challenges with achieving the stormwater runoff wasteload allocation in the PCBs TMDL, additional remedial actions may be warranted in some cases.

According to information supplied to the Regional Water Board (PG&E 2000), PG&E spill response is guided by internal documents, including:

- ***Utility Operations Standard D-2320*** - for PCB spills in the distribution system;
- ***PCB Management at Substations -*** for PCB spills in the transmission system.

These documents were not available for review. However, PG&E staff presented the basic elements of their spill response protocol during a public presentation to CCCWP in 2013. PG&E's spill response protocol, as described during this presentation, is summarized here. First, PG&E's spill response is based on the following three guiding principles:

1. Personnel and public safety: isolate or barricade the area from the public; do not do anything to put yourself and others in harm's way.
2. Reporting: report the incident to electric operations.
3. Containment: prevent the spill from spreading using diking or applying absorbents.

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Two municipally-owned utilities provided spill response procedures for review. The procedures followed the general guidelines discussed above. In one procedure the cleanup activities included double wash/rinse affected area of the pole and associated equipment. The other procedure expanded this to all solid surfaces such as walls, sidewalks, streets, cars, etc. One procedure called for removing all *visibly* contaminated soil plus one foot buffer zone or to a depth where there are no detectible PCBs. The other procedure called for removing all visibly contaminated soil but only included a one foot buffer for Federal low concentration PCB spills (50-499 ppm). One procedure called for collecting a sample after cleanup activities were completed for all categories of spills but there were no guidelines provided for the sample methods or results. The other procedure only called for cleanup sampling of Federal high concentration PCBs spills (>500 ppm) for comparison with the regulatory cleanup levels. The procedures do discuss containing spills, however, there was no discussion about specific procedures when the spill enters a storm drain system.

Recommendations

Bay Area MS4s need access to all electrical utility spill cleanup procedures to review and provide suggested revisions to ensure all necessary measures and precautions are included to achieve consistency across spill cleanups. Additional spill cleanup procedures suggested by MS4s may also depend on the location and type of spill (e.g., impervious surface vs soil; public right of way vs utility property; proximity to storm drain). Clean-up investigations should not only determine the spill area but determine if soils may have migrated off-site. In addition, samples for cleanup sites should be required for all spills unless there is clear and sufficient evidence available when the spill is initially discovered that the equipment involved was installed after 1985. The samples collected should be compared to thresholds identified by MS4s for *confirmed* PCBs source to stormwater runoff (e.g., soil or sediment concentrations are ≥ 1.0 ppm) in addition to the federal and state post cleanup levels required.

Improved notification of spills/releases to Bay Area MS4s discussed in Section 4.3.1 would also allow municipal stormwater program staff to field verify appropriate spill cleanup procedures as needed.

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5.0 Source Control Framework

The overall approach for this SSID Investigation was to conduct a desktop analysis to evaluate electrical utility equipment in municipally-owned electrical utility systems in the Bay Area and propose a source control framework for electrical utility equipment to reduce ongoing PCBs loads to the Bay in stormwater runoff. The elements of the proposed source control framework include development of a new regional Electrical Utilities Management Program which identifies specific actions to reduce the release of PCBs to MS4s, estimates of PCBs loads to stormwater from electrical utility equipment, and development of data inputs that can be used to calculate the PCBs loads reduced through implementation of the new program. This section describes each element of the proposed source control framework for electrical utility equipment. This framework is consistent with MRP Provision C.8.e.iii.(3)(a) requirements for SSID project closure. Implementation of this source control framework will prevent or reduce the discharge of PCBs from electrical utility equipment in the Bay Area.

5.1 Electrical Utilities Management Program

Electrical utility applications present special challenges for source identification and abatement[9] due to the quantity of equipment and facilities, their dispersed nature, and difficulty in sampling discharges when they occur. In addition, municipalities lack control over the vast majority of these properties and equipment. Permittees have no jurisdiction over many large electrical utilities, including PG&E, and therefore no control over the cleanup of PCBs-containing spills (e.g., dielectric fluids from transformers), or prompt notification when they happen. To date, neither Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is used consistently by all electrical utilities for PCBs spills from their electrical equipment across Bay Area cities. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended by the Regional Water Board to meet the objectives of the PCBs TMDL (SFBRWQCB 2016). There are currently potential missed opportunities to account for load reductions that have been and continue to occur due to the removal of PCBs-containing OFEE through ongoing equipment removal and replacement programs. Furthermore, there are missed opportunities to cleanup spills to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay. Given these constraints and the potential opportunities to reduce PCBs loads from electrical utility equipment, a new regional control measure program is proposed to manage the release of PCBs from OFEE. The Electrical Utilities Management Program described here identifies actions that address OFEE as a source of PCBs to stormwater at a regional level. The Program includes components that can address both municipally-owned and non-municipally-owned electrical utility OFEE in the Bay Area. However, the Regional Water Board will need to use their authority to compel non-municipally-owned electrical utilities (i.e., PG&E) to participate in the Program.

[9] Source identification and abatement is one type of stormwater control measure that Permittees use to reduce loads of PCBs in urban runoff. This control measure involves investigations of properties with elevated PCBs in stormwater or sediment to identify sources that contribute a disproportionate amount of PCBs to the MS4, and cause the properties to be abated, or refer the properties to the San Francisco Bay Water Board or other regulatory authority for follow-up investigation and abatement. This control measure is described in more detail in the BASMAA Source Control Load Reduction Accounting for RAA (BASMAA 2020).

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Actions under the new Electrical Utilities Management Program would include the following:

- Action 1: Electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and in the future until all PCBs-containing OFEE have been removed from active service. The documentation should include data to support calculations of the associated stormwater load reductions due to these efforts;
- Action 2: Electrical utilities will implement enhanced spill response and reporting protocols, as needed, to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. The enhanced spill response and reporting protocols should include data gathering requirements that will support calculations of the associated stormwater load reductions due to these efforts.

Implementation of these actions would provide the following benefits: (1) document PCBs loads that have already been avoided due to removal of PCBs-containing OFEE, (2) reduce PCBs loads released to stormwater when spills do occur, and (3) provide information that can be used to determine when this potential source of PCBs to stormwater has been eliminated due to removal of all PCBs-containing equipment from service.

5.2 Estimated PCBs Loads to Stormwater from Electrical Utility Equipment

The starting point for documenting the load reductions that have been and will continue to be achieved through implementation of the new program is an estimate of the PCBs loads to stormwater from electrical utility equipment at the start of the PCBs TMDL. As described in more detail in Section 3.4, McKee et al. (2006) developed a PCBs mass balance model that estimated the total loads to stormwater from all major sources during the peak period of PCBs production and use (i.e., 1950 – 1990), and in the period of the study (i.e., 2005).

The estimated stormwater load of 2.8 kg/yr to the Bay from transformers and large capacitors in 2005, developed by McKee et al. (2006) as part of their PCBs mass balance model described in detail in Section 3.4, is the starting point for estimating load reductions that have been achieved since the PCBs TMDL was established. As shown in Table 5.1, the McKee et al. (2006) mass balance model presents the best estimate for the total PCBs stormwater load from all sources in 2005 as 52 kg/yr. The PCBs TMDL for the San Francisco Bay identifies the total stormwater load at that time as 20 kg/yr (SFBRWQCB 2008). For consistency with the TMDL, the McKee et al. (2006) best estimate for stormwater loads from various sources were normalized to a total stormwater load of 20 kg/yr (Table 5.1). As shown in Table 5.1, the TMDL-normalized PCBs load to stormwater conveyances in 2005 from electrical utility equipment is assumed to be 1.1 kg/yr. This value is one to two orders of magnitude larger than the estimated stormwater loads that were developed in this project based on extrapolation of the municipally-owned electrical utility data presented in Section 4.0 to the larger Bay Area (0.02 – 0.34 kg/yr). However, the stormwater load estimates extrapolated from the participating municipally-owned electrical utility data have some important limitations. There is currently no information available to determine if these estimates, representative of electrical utilities operating across small service areas, would be appropriate as representative of the OFEE and associated PCBs mass across the much larger MRP area. These utility systems service a population of less than 200,000 people, again a tiny fraction (about 3%) of the larger MRP area population of nearly 6 million people. These utility systems also serve an area of less than 30,000 acres, which is (1%) of the entire MRP area of nearly 3 million acres. Almost all of the remaining area is served by PG&E, a large

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private company that may not be well-represented by data from the three small municipally-owned electrical utilities that participated in this project. There are likely substantial differences between PG&E equipment, operations, and practices, especially in the past, that preclude extrapolating the municipally-owned utility data from this project to PG&E service areas across the Bay Area. The number, type and range of transmission and distribution OFEE that make up a small service area system may not be representative or scalable to the number, type and range of transmission and distribution OFEE that make up a large service area system where electricity must be delivered over larger distances.

There was also considerable variability in the quality and quantity of the OFEE inventory data provided across the three participating municipally-owned utility systems that was used to develop the load estimates in Section 4.0. Island Energy provided complete information on their current inventory but acknowledged there were gaps in the historic data and they could not verify the accuracy or completeness of those data. Neither CPAU nor SVP had information on measured PCBs concentrations in any of their OFEE. SVP, the largest among the three participating utilities, had large uncertainty in their data because of the “unknown” OFEE category. SVP indicated it may be possible in the future to resolve some of these uncertainties. However, within the time frame of this project, SVP provided the data they were able to access. One of the limitations was that compiling these data, especially during the COVID-19 pandemic and shelter-in-place orders, was extremely challenging for the utility staff. This was especially true for data that were limited to hard copies or available only on computer servers located at the electrical utility offices. Under these conditions, SVP was still able to provide useful data on a large portion of their OFEE inventory.

Given the limitations described here, the use of the municipally-owned electrical utility OFEE inventory data to represent OFEE beyond the boundaries of each of the participating systems may not be appropriate. The McKee et al. (2006) TMDL-normalized stormwater load estimate of 1.1 kg/yr remains the best currently available estimate of the PCBs load from electrical utility equipment to the Bay at the start of the PCBs TMDL.

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Table 5.1 PCBs mass input to stormwater conveyances in the San Francisco Bay Area from all sources based on the mass balance model presented in McKee et al. (2006). Transformers and Large Capacitors represent the oil-filled electrical utility equipment source.

Source	McKee et al., (2006) PCBs Load (kg/yr)	PCBs Load Normalized to TMDL Stormwater Load (kg/yr)
Watershed Surface Sediment Erosion	30	12
Building Demolition and Remodeling	4.1	1.6
PCBs Still in Use	4	1.5
Bed and Bank Erosion	2.9	1.1
Transformers and Large Capacitors	**2.8**	**1.1**
Atmospheric Deposition	2.8	1.1
Identified Industrial Contaminated Areas	2	0.77
Plasticizers	1.1	0.43
Railway Lines	1.1	0.43
Small Capacitors	0.5	0.19
Auto-Recycling	0.4	0.15
Other Dissipative Uses	0.06	0.023
Lubricants	0	0
Landfills	0	0
Total Stormwater Load (kg/yr)	**52**	**20**

5.3 Data Inputs to Calculate PCBs Loads Reduced

The proposed new Electrical Utilities Management Program identifies actions to document PCBs load reductions that have occurred since the start of the TMDL and will continue to occur in the future due to removal of PCBs-containing OFEE, until all of these equipment have been removed from active service in electrical utility systems in the Bay Area (Action 1). The new Program also identifies actions to document PCBs load reductions due to implementation of enhanced spill response and reporting procedures (Action 2). One of the objectives of the analysis of the municipally-owned electrical utility system OFEE inventory data was to provide information and data inputs that could be used to calculate PCBs loads reduced due to implementation of the Electrical Utilities Management Program. These data inputs are presented below.

5.3.1 Data Inputs to Calculate PCBs Loads Reduced for Action 1

For Action 1 (PCBs-containing equipment removal), the accounting methodology described in the BASMAA Accounting (2020) calculates the PCBs loads reduced by multiplying the PCBs load to stormwater from electric utility equipment by the assumed rate of load reduction achieved over a given period of time due to equipment removals. The data inputs needed for this calculation include the following two terms:

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Term 1.1 (L_0) = Estimated annual load of PCBs that enters MS4 from OFEE in the starting year of the time period of interest (i.e., the year that accounting begins, kg/yr).

Term 1.2 (R_1) = Estimated annual average percent of PCBs loads prevented from entering the MS4 due to OFEE removal (percent per year).

Term 1.3 (Y_i) = Number of years in the time period of interest.

The values that are recommended for each of these terms are presented in Table 5.2.

Table 5.2 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 1, removal of PCBs-containing equipment from active service, between 2005 and 2020..

Term	Description	Value	Units	Source
1.1	Annual PCBs Stormwater Load in 2005 (i.e., the assumed load at the start of the PCBs TMDL)	1.1	kg/yr	McKee et. al. (2006)
1.2	Annual average % of loads prevented from entering MS4 due to equipment removals.	1.3 to 4.8 (average = 2.3)	%	Section 4.2.3 (this report)
1.3	Number of years in the time period of interest.	varies	years	N/A

For Term 1.1 the estimated PCBs load of 1.1 kg/yr in 2005 (described in Section 5.2) is the recommended starting value for the annual load of PCBs to stormwater at the start of the PCBs TMDL. This value is currently the best available estimate of PCBs loads to the Bay from electrical utility equipment at that time.

For Term 1.2, the recommended value for the annual average percent of PCBs prevented from entering the MS4 due to OFEE removal ranges from 1.3 % to 4.8 % per year, with an average value of 2.3 % per year (Table 5.2). These values represent the annual average equipment removal rates for the participating municipally-owned electrical utilities presented in Section 4.2.3. These annual average equipment removal rates were calculated based on the mass of oil in pre-1985 OFEE that was removed from service between 2002 and 2019. Use of these values for Term 1.2 assumes the rate of load reduction achieved over the time period of interest is approximately equivalent to the equipment removal rate achieved during that same time period. Further, these values also assume the equipment removal rates for the municipally-owned electrical utilities (Section 4.2.3) reasonably represent the equipment removal rates at other Bay Area electrical utilities (i.e., PG&E). As a check on these assumptions, the load reduction rate between 1990 and 2005 based on the estimate in the McKee et al (2006) mass balance models presented in section 3.4 was compared with the equipment removal rates calculated for municipally-owned electrical utilities that were reported in Section 4.2.3.

The McKee et al. (2006) mass balance models provide PCBs stormwater load estimates for electrical utilities in 2005, and during the peak period of PCBs production and use (1950 – 1990). Based on these estimates, the PCBs load to stormwater from OFEE in 2005 was 65% lower than the average annual load in1990. That equates to a PCBs load reduction of 4.33%

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per year during the fifteen-year period between 1990 and 2005. This annual average PCBs load reduction rate compares well with the equipment removal rates at the participating municipally-owned electrical utilities reported in Section 4.2.3. This finding supports the assumption that the equipment removal rates at the participating municipally-owned electrical utilities reasonably approximate the load reduction rates over time. This finding further supports the assumption that most of this load reduction was likely the result of the removal and proper disposal of PCBs-containing OFEE. As described in Section 3.3, during the late 1980s and 1990s, electrical utilities implemented voluntary equipment replacement programs specifically designed to remove PCBs-containing OFEE. Past statements provided to the Regional Water Board by PG&E support the assertion that the majority of PCBs-filled equipment had been replaced by the early 2000's (PG&E 2000). Additional removals have continued to occur, albeit at a slower pace, due to routine maintenance programs that replace older electrical equipment that is more likely to contain PCBs with newer equipment that does not contain PCBs. Information provided to the Regional Water Board by PG&E on maintenance records from their Emeryville processing facility supports this assertion (PG&E 2000). Those data indicate that in 1999, approximately 10% of the 22,000 pieces of OFEE that were dismantled and disposed of at the Emeryville site had PCBs at concentrations at or above 50 ppm. This information further supports the assertion that a large mass of PCBs that were in use during the peak period have since been removed. However, this information also indicates there are still large numbers of equipment that contain PCBs at high concentrations in active service across the Bay Area. Although no information was provided on the percent of equipment that contained PCBs at lower concentrations (i.e., below 50 ppm), equipment with these lower concentrations are also potential sources to stormwater. Current spill reports in Cal OES records further corroborate that PCBs-containing equipment are still in use across the Bay Area, both at concentrations above and below 50 ppm (see Section 3.4.1).

The value for Term 1.3 will vary, depending on the number of years during the time period of interest. For example, to calculate the PCBs loads that have already been reduced due to equipment removals since the start of the PCBs TMDL and the current date (i.e., between 2005 and 2020), the value for Term 1.3 is 15 years.

Assuming the annual average PCBs-containing equipment removal rate remains constant over time, then the current (2020) and future stormwater loads of PCBs from electrical equipment can be estimated along with the associated timeframe to achieve removal of all PCBs-containing equipment. The results are presented in Table 5.3. The calculation starts with the assumed TMDL baseline load of 1.1 kg/yr, multiplied by the annual average load reduction rates presented in Table 5.2 and the 15-year period since the TMDL baseline load estimates in 2005. The results of this calculation demonstrate PCBs loads to stormwater have been reduced by **0.215 kg/yr to 0.792 kg/yr (average = 0.380 kg/yr)**. The resulting Bay Area PCBs stormwater loads from electrical equipment in 2020 ranges from 0.308 kg/yr to 0.886 kg/yr (average = 0.721 kg/yr). Based on these current loading estimates, it will take between 20 and 80 years before all of the PCBs-containing OFEE in the Bay Area have been removed from service.

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Table 5.3 Estimated PCBs loads to Stormwater from PCBs-containing oil-filled electrical equipment (OFEE) in the San Francisco Bay Area in 2005 and 2020, based on assumed load reduction rates, and the additional time before all PCBs-containing OFEE are removed from active service.

Equipment Removal Scenario	Estimated PCBs Load to Stormwater in 2005 (kg/yr)	Average Load Reduction Rate per Year (%/year)	Estimated PCBs Loads Reduced since 2005 (kg/yr)	Estimated PCBs Load to Stormwater in 2020 (kg/yr)	Time to Remove all PCBs-containing OFEE from active service (Years)
Low Reduction Rate	1.1	1.3%	0.215	0.886	77
Average Reduction Rate	1.1	2.3%	0.380	0.721	43
High Reduction Rate	1.1	4.8%	0.792	0.308	21

5.3.2 Data Inputs to Calculate PCBs Loads Reduced for Action 2

PCBs loads reduced due to enhanced spill cleanup and reporting (Action 2) can be calculated by multiplying the current annual mass of PCBs released to MS4s due to spills by an enhanced cleanup efficiency rate. The data inputs needed for this calculation include the following 3 terms:

Term 2.1(M_{sp}) = Average annual mass of PCBs released in spills (kg/yr).

Term 2.2 (SW_i) = Estimated percent of spilled PCBs mass that enters the MS4 without the enhanced spill cleanup and reporting protocols.

Term 2.3 (E_f) = Efficiency of the enhanced spill cleanup and reporting protocols to reduce spilled PCBs released to MS4s (percent).

The recommended values for each of the terms above are presented in Table 5.4.

Table 5.4 Recommended values for each of the terms required to account for the PCBs load reductions achieved through implementation of Action 2, enhanced spill cleanup and reporting.

Term	Value	Units	Source
2.1	2.3	kg/yr	Section 5.3.2 (this report)
2.2	1	%	McKee et. al. (2006)
2.3	10	%	Section 5.3.2 (this report)
	25		
	50		

The values in Table 5.4 were developed as described here. First, the ten most recent years of Cal OES spill reports for OFEE in the Bay Area from the 1993-2017 reports discussed in

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Section 3.4.1 were reviewed. Between 2008 and 2017, a total of 507 spills of electrical equipment oils were reported. The reports document the total volume of oil spilled as approximately 24,300 gallons. However, most of the reports provided limited or no information on PCBs concentrations. Nearly 50% of the reports identified the PCBs concentration as unknown, and 40% of the reports identified PCBs concentrations as < 50 ppm based on equipment labels. Only 9% of the reports provided information on measured PCBs concentrations in the spilled oils. The reported concentrations spanned a range from 1 ppm up to 720 ppm, with an average of 110 ppm. Given the limited data on concentrations of PCBs in the spilled oils, the mass of PCBs released in these spills is uncertain. Using the average measured PCBs concentration of 110 mg/kg, the average annual mass of PCBs released in spills was calculated as 0.9 kg/yr. However, not all spills are reported to Cal OES. Review of internal PG&E spill reports that were provided to the Regional Water Board for a 7-year period from 1994 to 2000 (PG&E 2000) showed that only 40% of the spills identified in internal records had also been reported to Cal OES during that time period. For the spills not reported to Cal OES, ~30% had measured PCBs concentrations ranging from 1 ppm to 700 ppm, with an average of 113 ppm. Based on this information, the Cal OES reports between 2008 and 2017 represent only 40% of spills, and accordingly increase the estimated total mass of PCBs released during spills to 2.3 kg/yr.

Applying the McKee et al. (2006) assumption that 99% of PCBs released during spills are successfully cleaned, and 1% remain in the environment, then 0.023 kg/yr of spilled PCBs remain in the environment and available for removal in stormwater. Enhanced cleanup protocols that increase the cleaning efficiency by 10%, 25%, and 50% would result in additional removal of between **0.002 and 0.012 kg/yr** of PCBs. These estimates are summarized in Table 5.5. This project did not identify any additional information that could be used to further refine or improve the data inputs shown in Table 5.4 that were used to calculate the potential load reductions due to implementation of enhanced cleanup protocols shown in Table 5.5.

Table 5.5 Estimated annual PCBs load reduction for implementing enhanced spill response and reporting for oil-filled electrical equipment (Action 2).

Scenario	Annual Mass of PCBs released in spills (kg/yr)	Current cleanup efficiency	Current PCBs Load to Stormwater due to spills (kg/yr)	Assumed Improved Cleanup Protocol Efficiency	Annual Load Reduction Due to Improved Cleanup Protocol (kg/yr)
Low	2.3	99%	0.023	10%	0.002
Mid	2.3	99%	0.023	25%	0.006
High	2.3	99%	0.023	50%	0.012

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APPENDIX F

Load Reduction Credit for PCBs in Roadway and Storm Drain Infrastructure Management Program

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F.1 BACKGROUND

The BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure* (BASMAA, 2018) sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The overall approach to the sampling program was to work cooperatively with multiple Bay Area municipal agencies to identify public right-of-way locations where PCBs were potentially used in caulk or sealant applications on roadway and storm drain infrastructure. These locations were identified primarily based on the time period that the infrastructure was originally constructed and/or repaired, with a focus on the 1970's - the most recent time period PCBs were still in widespread use. The project team collected 54 caulk or sealant samples from public infrastructure in these locations; 11 of these were collected from concrete bridges or overpasses. The Project Team then reviewed the information collected about each sample to determine how to group the samples for compositing prior to PCBs analysis. A total of 20 composite samples were then analyzed for PCBs concentrations. Ten of these composites were associated with concrete roadways, sidewalks, or bridges.

F.2 TOTAL ESTIMATED PCBS LOAD IN OLDER BRIDGES

The U.S. Department of Transportation Federal Highway Administration National Bridge Inventory (USDOT, 2019) was used to estimate the total potential PCBs load contained in older bridges located within the jurisdictions subject to the MRP.

F.2.1 Equations Used to Estimate PCBs Load

The equation used to estimate the total PCBs load contained in bridges built and/or reconstructed prior to 1981 within the jurisdictions subject to the MRP is as follows:

$$\text{Total Load}_{\text{PCBs, Bridges}} = \text{Density}_{\text{sealant}} * \text{Concentration}_{\text{PCBs}} * \sum \text{Volume}_{\text{sealant, bridges}}$$

Where:

$\text{Density}_{\text{sealant}}$ = average sealant density [kg/m^3]

$\text{Concentration}_{\text{PCBs}}$ = empirically derived concentration of PCBs [mg/kg]

$\sum\text{Volume}_{\text{sealant, bridges}}$ = Volume of sealant in all applicable bridges [m^3]

The volume of joint sealant was calculated using an assumed cross-section of sealant, multiplied by the assumed length of applied sealant:

$$\text{Volume}_{\text{sealant, bridges}} = \text{Cross-Section}_{\text{sealant}} * \text{Length}_{\text{sealant}}$$

Where:

$\text{Cross-Section}_{\text{sealant}}$ = Cross-section of applied sealant

$\text{Length}_{\text{sealant}}$ = Length of applied sealant

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F.2.2 Data Used to Estimate Load

Data used to estimate load were obtained from BASMAA, 2018; a study of Bay Bridge sealant summarized by Hardeep Takhar of the California Department of Transportation (Caltrans) in 2013; and bridge dimensional information available from the National Bridge Inventory (USDOT, 2019). A summary of the data inputs is provided in Table F-1 below.

Table F-1: Bridge Load Calculation Data Inputs

Input	Result	Units	Source
Density of Sealant	1,100	kg/m^3	Takhar, 2013
Cross-Section of Sealant	1	square inch	Caltrans, 2007
PCBs Concentration	184	mg/kg	See Section 2.2.1

The derivation of the representative concentration of PCBs in sealant applied to bridges is described below.

F.2.2.1 PCBs Concentration

In order to compute a reasonable estimate of the expected PCBs concentration in caulking material in bridges in the MRP area, a data set consisting of 20 composite samples from BASMAA (2018) and four grab samples from the demolition of the Bay Bridge (Takhar, 2013) was analyzed.

Of the 20 BASMAA composite samples, 10 were identified as representative of caulking used on bridges based on the location from which the samples were taken (i.e., five of the composite samples were taken from bridges and five were from concrete roadway surfaces, sidewalks, and curbs and gutters). The remaining composite samples were judged to be non-representative, as they were taken from storm drain structures, asphalt roadways, metal pipes, and electrical utility poles and boxes. Table F-2 below summarizes the BASMAA study results for the concrete roadway, sidewalk, and bridge composite samples (BASMAA, 2018). Table F-3 summarizes the Bay Bridge caulk measurements (Takhar, 2013).

Table F-2: Sample Descriptions and PCBs Concentrations for Roadway and Bridge Composite Samples from the BASMAA Regional Infrastructure Caulk and Sealant Sampling Program (BASMAA, 2018)

Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
A	4,967	Concrete Bridge	Caulk between expansion joints	Black Pliable Foam	2	10	1960-70's
						13	<1960
B	4,150	Concrete Bridge	Caulk between expansion joints	Black Pliable	3	9	1960-70's
						30	1960-70's
						31	<1960

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Composite ID	Total PCBs (mg/kg)	Type of Structure(s) Sampled	Caulk/Sealant Application	Sample Appearance (Color/ Texture)	# of samples in composite	Sample ID's in composite	Structure Construction Date
C	0.78	Concrete Bridge	Caulk between expansion joints	Brown Fibrous	2	20	1960-70's
						26	1960-70's
D	0.70	Concrete Bridge	Sealant between concrete surfaces or between concrete and wood surface	Black Hard/Brittle	3	27	<1960
						29	1960-70's
						32	<1960
E	ND	Concrete Roadway Surface	Caulk between expansion joints	Black Hard/Brittle	5	35	<1980
						36	<1980
						37	<1980
						38	<1980
						39	<1980
F	ND	Concrete Sidewalk	Caulk between expansion joints	Black Hard/Brittle	3	2	<1960
						7	<1960
						46	<1980
G	ND	Concrete Sidewalk	Caulk between joints	Brown Fibrous	2	16	1960-70's
						17	1960-70's
H	ND	Concrete Sidewalk /Curb/Gutter	Caulk between joints	White/Gray Hard/Brittle or Pliable	3	1	<1980
						8	1960-70's
						18	1960-70's
I	0.06	Concrete Sidewalk /Curb/Gutter	Crack Sealant	White Hard/Brittle or White Pliable	2	23	<1980
						24	<1980
S	2.5	Concrete Bridge	Prefabricated joint filler	Black Pliable	1	12	<1960

A photo log of the samples taken from concrete bridges is provided in Attachment 1.

Table F-3: Concentrations of PCBs in Caulks Measured from the Bay Bridge

Description	Result (mg/kg)
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.01
PCBs Concentration (Bay Bridge Upper Roadway Sample)	1.65
PCBs Concentration (Bay Bridge Upper Roadway Sample)	0.705
PCBs Concentration (Bay Bridge Roadway Barrier Wall)	3.71
Bay Bridge Average Concentration	1.77

Source: Takhar, 2013

The complete dataset (i.e., results summarized in Table F-2 and F-3 and other non-representative samples) contains 10 non-detect (all in the BASMAA (2018) dataset) and 14 detected values.

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After removing the 10 data points considered unrepresentative of bridges, the representative dataset contains 4 non-detect and 10 detected values (i.e., Table F-2 and Table F-3 summarized values). For the purposes of this analysis, both the complete and the presumed representative subset of the PCBs-in-caulk datasets were analyzed independently.

The non-detect values were imputed using a regression-on-order statistics method prior to estimating summary statistics using a maximum likelihood estimation approach as described in the sections below.

F.2.2.2 Handling Censored (Non-Detect) Results

Since estimation of common descriptive statistics of censored datasets can be heavily biased with simply substituted values, a robust regression-on-order statistics (ROS) method, as described by Helsel and Cohn (1988), was utilized to provide probabilistic estimates of non-detects (NDs). When applying the ROS method, ND values are imputed based on their plotting positions relative to the probability distribution estimated from the detected data. Imputed values are always less than their detection limits, but if the dataset includes multiple detection limits, some imputed values may be larger than some of the detected values. For the PCBs-in-caulk dataset, method detection limits (MDLs) for individual samples were not reported, but an overall MDL of 0.05 µg/kg was included in the BASMAA report and NDs are only reported for samples when every individual congener was not detected.

Maximum Likelihood Estimation

The lognormal probability distribution is often used to represent positively skewed contaminant concentrations (Singh et al., 1997). As such, the PCBs-in-caulking dataset has been assumed to arise from a population that is lognormally distributed, which implies that the standard deviation is proportional to the mean and the data are bounded by zero. A random variable, x, is said to be lognormally distributed if the distribution of $y = \ln(x)$ is normally distributed with a mean, μ_y, and variance, σ_y^2. The mathematical equation for lognormal distribution is:

$$f_x(x) = \frac{1}{\sqrt{2\pi}\sigma x} \exp\left[-\frac{1}{2}\left(\frac{lnx-\mu}{\sigma}\right)^2\right] \quad x > 0 \qquad \textbf{Equation 1}$$

Where:

- μ is mean of the untransformed random variable x,
- σ^2 is the variance of the untransformed random variable x, and
- x is the variable of interest.

The lognormal distribution parameters of x are related to the normal parameters of y with the following equations:

$$\mu_x = \exp\left(\mu_y + 0.5\sigma_y^2\right) \qquad \textbf{Equation 2}$$

$$\sigma_x{}^2 = \mu\sqrt{\exp(\sigma_y^2) - 1} \qquad \textbf{Equation 3}$$

When a dataset is a random sample from a lognormal distribution, the Maximum Likelihood Estimate (MLE) of the parameter, μ_y, is simply the sample mean of the log-transformed data

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(Singh et al., 1997). Similarly, the MLE of the parameter, σ_y^2, is the sample variance of the log-transformed data. However, for small sample datasets with a few extreme values, such as the PCB-in-caulk dataset, severe transformation bias can occur when estimating the arithmetic mean, μ_x, and arithmetic standard deviation, σ_x. Because of this, an alternative method for computing the expected value is needed as described below.

Advancing the assumption that the sample data arise from a lognormal distribution, a probability weighted mean can be computed as:

$$\hat{\mu}_x = \frac{\sum_{i=1}^{n}(x_i * w_i)}{\sum_{i=1}^{n} w_i} \qquad \textbf{Equation 4}$$

Where:

- $\hat{\mu}_x$ is probability-weighted mean of the untransformed random variable x;
- x_i is the ith sample value; and
- w_i is weight of the ith sample value, which is assumed equal to the probability of occurrence, $p(x_i)$, and can be computed by fitting the data to a lognormal probability density function (PDF).

The lognormal PDF can be constructed by computing the theoretical percentiles and plotting against the probability of a standard lognormal PDF. Any percentile, P_k, of x can be computed using the parameters of y as follows:

$$P_k = \exp(\mu_y + z_k \sigma_y) \qquad \textbf{Equation 5}$$

Where:

- z_k is the kth percentiles of the standard normal distribution.

Results and Conclusions

As stated above, the available data was evaluated in two separate dataset configurations:

1. All data including the potentially unrepresentative values (*N = 24)*
2. Roadway and bridge-only data excluding the potentially unrepresentative values (*N = 14).*

In both configurations, lognormal distributions were fit to datasets where the non-detect values had been imputed with ROS. Figure F-1 below shows lognormal probability plots along with a best-fit line demonstrating the lognormality of the data.

Table F-4 provides summary statistics after applying ROS to the datasets. As shown, the data mean and data median are significantly different, which again supports the lognormal distribution assumption. The arithmetic mean values computed from Equation 2, however, are unrealistic considering the values are larger than any of the sample values – this is a result of transformation bias. The probability weighted mean values are believed to be the most accurate representation of the central tendency of PCBs in caulk for bridges in the MRP area based on the

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two datasets because this adjusts for the likely probability of occurrence of the extreme values observed in the data while preserving all sample data in the calculation.

Figure F-2 and Figure F-3 show the PDFs of the best-fit lognormal distributions. Each observed or imputed value drawn along the PDF is used to indicate the probabilities of occurrence, which were used to determine the weights for the probability weighted mean values.

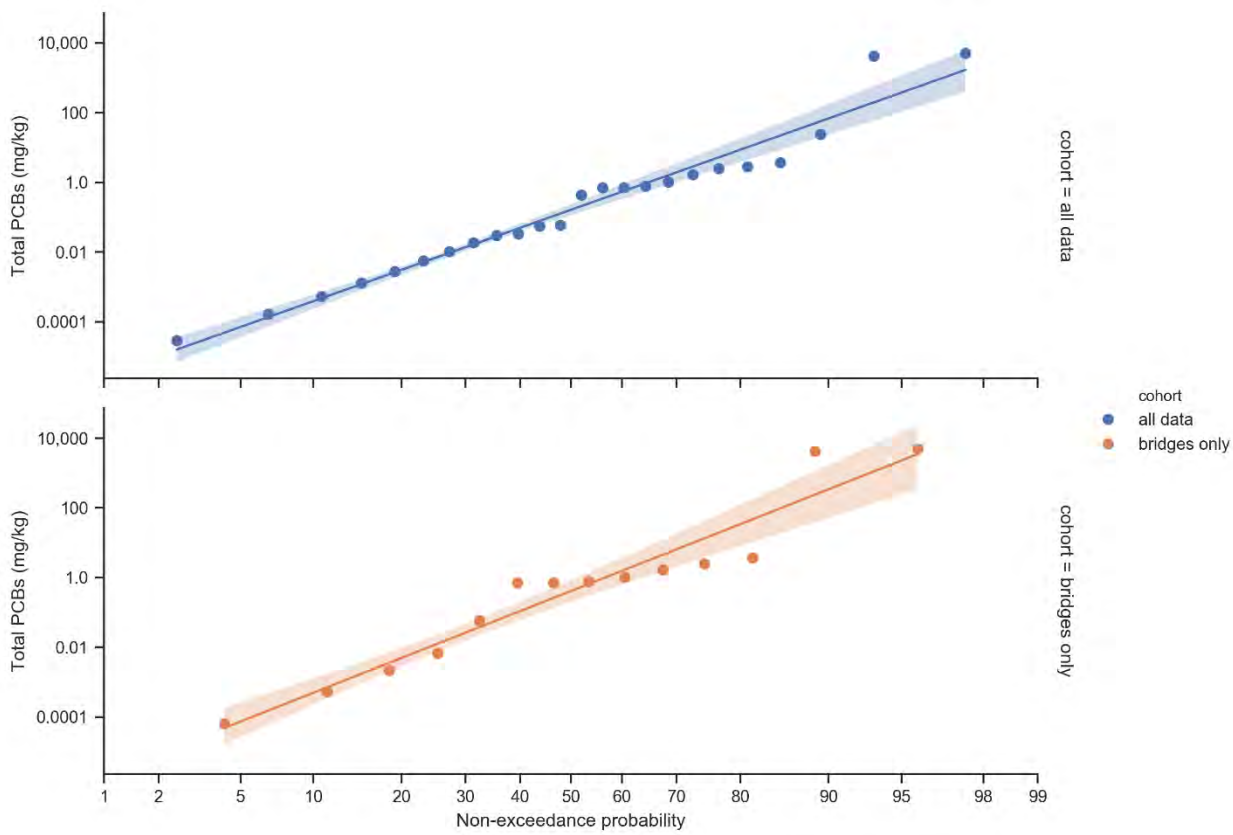

Figure F-1 - Lognormal probability plots. The shaded bands indicate the 95% confidence interval around the best-fit lines.

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Table F-4: Summary Statistics

Statistic	Dataset	
	All Data	Roadway/Bridge Only
Sample Count (Total; NDs)	24; 10	14; 4
Data Mean, mg/kg	381	652
Data Standard Deviation, mg/kg	1292	1663
Data Median, mg/kg	0.25	0.74
Lognormal Mean (μy)	-1.82	-0.891
Lognormal Standard Deviation(σy)	4.57	5.02
Arithmetic Mean (μx), mg/kg	8,927	334,514
Probability Weighted Mean ($\hat{\mu}_x$), mg/kg	49.5	184

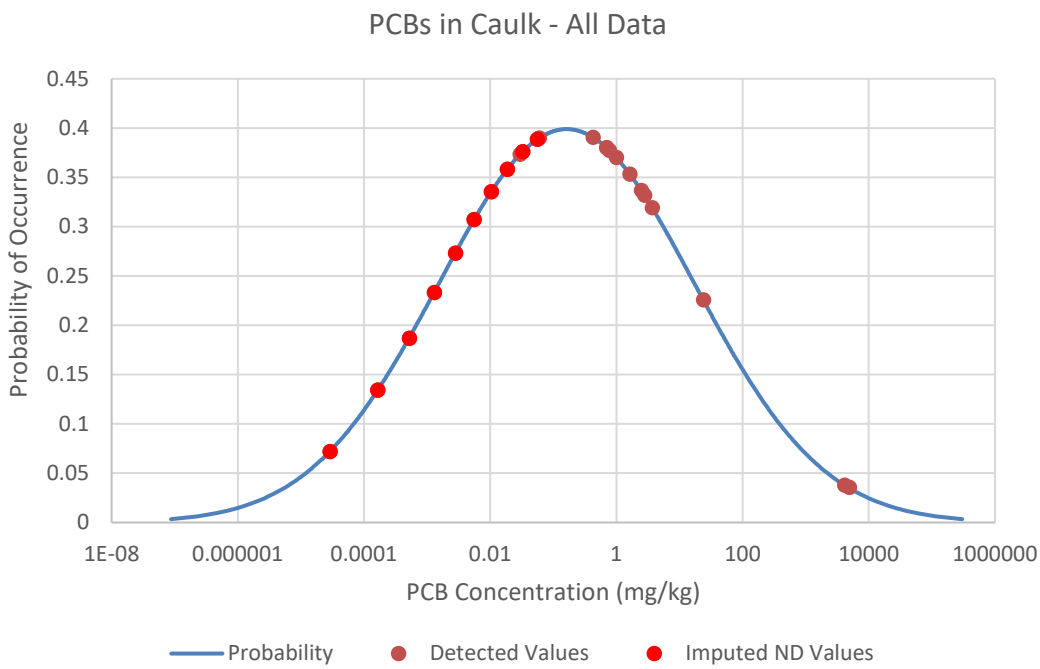

Figure F-2: Lognormal distribution plot for all available Total PCBs data, showing the weights of the detected and imputed values

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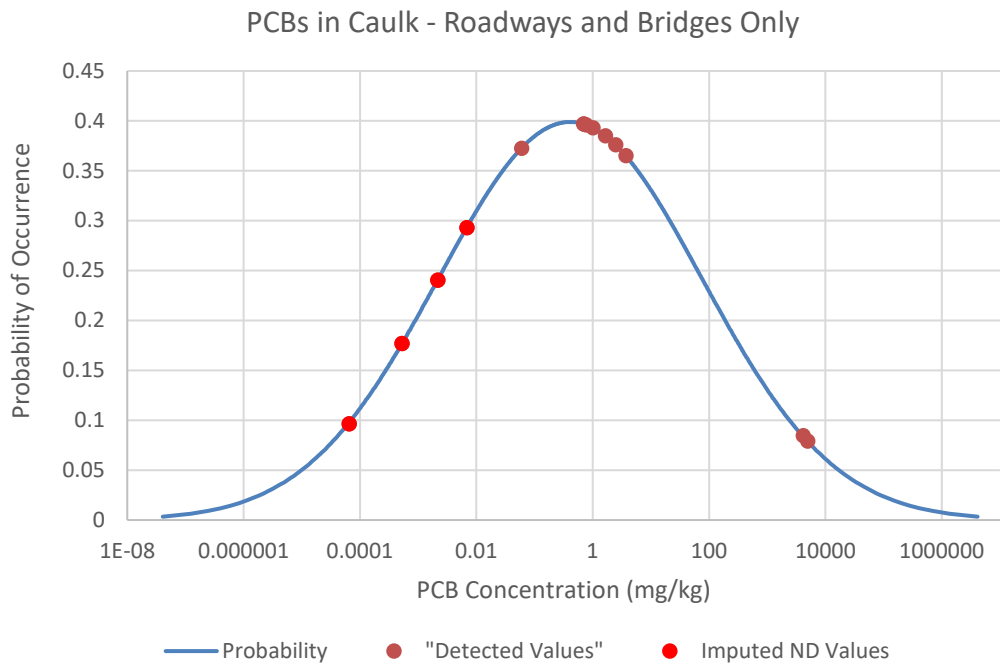

Figure 3: Lognormal distribution plot for Total PCBs data from roadways and bridges only, showing the weights of the detected and imputed values

F.2.2.2 Length of Applied Sealant

While it is evident from the BASMAA (2018) study photos that sealant may be applied to many concrete connections within any given bridge, this estimate focuses on the locations most exposed to weather and traffic and therefore most likely to leach into the environment. The sealant application locations of focus in this study include the bridge expansion joints (e.g., at connections between bridge spans), and the longitudinal seam between the bridge deck and the sidewalk and/or bridge side rail.

The federal bridge database used for this analysis contains information about dimensions of bridges located within the MRP jurisdictions. The length of sealant used to calculate total potential PCBs mass was estimated using database values as follows:

$$\text{Length}_{\text{sealant, joints}} = (N_{span} + 1) * \text{Width}_{deck}$$

Where:

N_{span} = The number of bridge spans

Width_{deck} = Bridge deck width

Assuming there are seams along either side of the bridge at the sidewalk or wall, the longitudinal seam was calculated as:

$$\text{Length}_{\text{sealant, longitudinal seam}} = 2 * \text{Length}_{bridge}$$

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F.2.3 Total Estimated PCBs Load in Bridges

A summary of the total calculated loads for bridges within the MRP coverage boundary, built and/or reconstructed prior to 1981, and specific bridge types[11], per the Nation Bridge Inventory, is provided in Table F-5.

Table F-5: Total Calculated Loads for Bridges within the MRP Area, Built and/or Reconstructed Prior to 1981

County	Total Sealant PCBs Mass - Joints Only (kg)	Total Sealant PCBs Mass - Joints and Longitudinal Seal (kg)	Number of Bridges
Alameda	3.8	11.2	340
Contra Costa	1.7	7.3	277
San Mateo	2.5	7.2	254
Santa Clara	3.7	10.1	473
Solano	0.9	3.2	133
Total	**12.6**	**39.0**	**1,477**

The average mass of PCBs in MRP bridges with the characteristics described, based on the calculation, is approximately 8.5 grams, accounting for joint sealant only, and 26 grams, accounting for both joint and longitudinal sealant.

F.3 LONG TERM LOAD REDUCTION ESTIMATE

F.3.1 Methodology

To estimate the load reduction associated with long-term bridge or expansion joint replacement, it is assumed that an ongoing PCBs release rate from bridge joints is mitigated through bridge joint maintenance and whole bridge replacement projects. The load reduction estimation is based on the assumption that PCBs in caulk are leaching from bridge joints and longitudinal seals over their lifetime. When that PCBs-containing caulk is replaced or removed through maintenance or replacement projects, the source of PCBs release is removed, and the associated annual released load is also removed. PCBs leaching from the material could occur through incremental wear or through larger damage (e.g., pieces of caulk torn out) over the lifetime of the caulk.

While volumetric or mass-based losses of joint seals over time were not found in literature, publications that describe joint maintenance and failure were reviewed to justify the assumption of leaching over time. Compression and strip seal type joints, which could potentially be expected to consist of PCBs-containing material, have an expected lifetime of 8 to 16 years, according to a survey conducted for an NCHRP study on bridge joints (NCHRP, 2016). Despite this recommended lifetime, an extrapolated rate of joint replacement in the Bay Area demonstrates that joints are being replaced at a much lower frequency. According to three

[11] 0 – Other; 01 – Slab; 02 – Stringer/Multi-beam or Girder; 03 – Girder and Floorbeam System; 04 – Tee Beam; 05 – Box Beam or Girders – Multiple; or 06 – Box Beam or Girders – Single or Spread.

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Permittee preventative maintenance plans available on Caltrans' Highway Bridge Program funding website (Caltrans, 2019), approximately 3% of bridges meeting the characteristics described above are scheduled for joint replacement over the next five-year funding period. An additional 1.5% of bridges are scheduled for replacement over the same five-year period (presumptively replacing the joints). At this rate, replacing the joints via joint maintenance or bridge replacement projects in all 1,477 bridges would take over 110 years.

The concept that older, likely PCBs-containing joints persist in the older MRP bridges is borne out through the findings of the BASMAA (2018) study, which found very high PCBs concentrations in composite samples from a random selection of representative bridge infrastructure. This outcome is also consistent with a finding from a 2003 NCHRP report (NCHRP, 2003), which found through interviews with transportation agencies that "agencies indicated that they tend not to respond to joint problems unless there is a safety hazard or when the deck is being rehabilitated or replaced. Other than reactive efforts, joint repair and rehabilitation, in most agencies, is associated with deck rehabilitation." Additionally, while guidance documents typically define joint replacement needs in terms of visual degradation of the joint, along with other factors, the NCHRP study stated that agencies often defined failure of a deck joint as leakage, physical damage, or traffic hazard. These conditions could be taken to interpret that agencies are only replacing severely damaged or degraded joints (NCHRP, 2003).

Older joints could be considered more likely to leach into the environment, as the sealant material accumulates damage over time. Typical types of joint seal damage described by the Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (2020) include: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint. These damage types are also consistent with those described in NCHRP (2016). Most of these damage types either directly refer to stripping of the sealant from the joint or create a condition in which the sealant is more likely to be released from the joint when subjected to traffic loads (i.e., conditions such as extrusion, hardening/becoming more brittle, loss of bond). Examples of damaged joint seals from this source are provided in Attachment 2.

F.3.2 Load Reduction Calculation

Lacking a literature-based release rate of sealant over time, two potential annual release rates are provided for the load reduction calculation. Based on the assumption that the joint seal may become degraded over time, it is possible that the sealant releases little during the initial operation period and more as the joint sealant ages. Another possible release pathway is through leaching into surrounding concrete and subsequent degradation of the concrete. Two potential average annual release rates (i.e., average over the life of the seal) were assumed to calculate an estimated load reduction from removing the joint seal – 1% and 0.5%. These average annual release rates were applied to the estimated mass for the 1,477 bridges meeting the identified age criteria (Table F-6). These releases would be eliminated through removal of the joint seal through joint replacement or bridge replacement.

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Table F-6: Long-Term Load Reduction (i.e., Replacement of PCBs-Containing Joints in All Older Bridges)

County	Total Sealant PCBs Load Reduced - Joints Only (g/year)		Total Sealant PCBs Load Reduced - Joints and Longitudinal Seal (g/year)	
	1% annual loss rate over life	0.5% annual loss rate over life	1% annual loss rate over life	0.5% annual loss rate over life
Alameda	38	19	112	56
Contra Costa	17	8	73	37
San Mateo	25	12	72	36
Santa Clara	37	19	101	50
Solano	9	5	32	16
Total	126	63	390	195

This is the assumed load reduction by 2080, based on the assumption that all older joints will be removed/replaced within 100 years of installation (this is consistent with recent Caltrans replacement frequency calculated above).

F.4 REFERENCES

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Attachment 1: BASMAA Bridge Sample Photos

Composite A

Composite B

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Composite S

Composite C

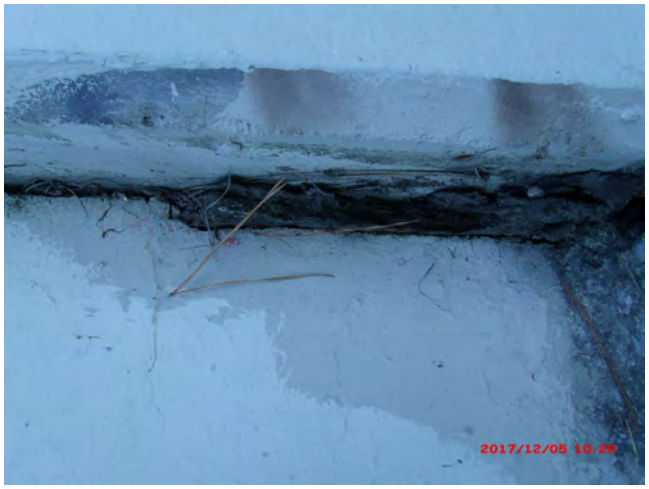

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Composite D

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Attachment 2: Images of Joint Seal Damage

Joint sealant damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack of absence of sealant in the joint..

Source: Wyoming Department of Transportation, Aeronautics Division Airport Pavement Management Program (https://www.appliedpavement.com/hosting/wyoming/pavement-inspection/pci-review/distresses-pcc/joint-sealant-damage.html)

Severity	Distress Example	Description
Low		Joint sealer is in generally good condition throughout the sample. Joint seal damage is at low severity if a few of the joints have sealer which has debonded from but is still in contact with the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.
Medium		Sealant needs replacement within two years. Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (a) joint sealer is in place, but water access is possible through visible openings no more than 1/8 in (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (b) pumping debris are evident at the joint; (c) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint openings; or (d) vegetation in the joint is obvious, but does not obscure the joint opening.

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Severity	Distress Example	Description
High		Joint sealer is in generally poor condition over the entire surveyed sample. Sealant needs immediate replacement. Joint seal damage is at high severity if 10% or more of the joint sealer exceeds limiting criteria listed above, or if 10% or more of sealer is missing.

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APPENDIX G

Enhanced Inlet Cleaning Efficiency Factor Data Analysis for Storm Drain Inlets with and without Inlet-based Full Trash Capture Devices

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G.1 PURPOSE AND APPROACH

The purpose of this appendix is to document findings of analysis conducted to determine the enhanced efficiency factors (EE_f) for sediment removal associated with enhanced storm drain inlet maintenance, including increasing the frequency of storm drain inlet cleaning, and the use of small (inlet-based) full trash-capture (FTC) devices, that are expected to capture larger amounts of trash, sediment and vegetation. First, the pollutant removal efficiency was calculated for the baseline control measure, which was assumed to be annual cleanout of storm drain inlets without FTC devices. The efficiency factors were then developed for the following enhancements: (1) increased frequency of cleanouts at inlets without FTC devices; and (2) twice yearly cleanouts at inlets with FTC devices.

Based on a review of available literature, there are limited data available on the reductions of pollutants (including sediment) associated with different storm drain inlet maintenance frequencies. No studies were found that assessed the reduction of either PCBs or mercury due to enhanced inlet cleaning frequencies. Two studies in particular, Woodward Clyde (1994) and Caltrans (2003), however evaluated the increase in the removal of material (i.e., sediment, vegetation, and trash) from inlets under different cleaning frequencies. Results from both studies indicated that the annual volume of material removed from inlets increased with cleaning frequency.

The Caltrans (2003) *Drain Inlet Cleaning Efficacy Study* was designed to measure the potential increases in material volume/mass and water quality benefits due to increased inlet cleaning frequencies on freeways. The study was conducted from 1996 through 2000. The volume and mass of material removed under annual, biannual, and three times per year cleaning frequencies at 55 to 90 inlets, depending on the year, were measured.

The Woodward Clyde (1994) *Storm Inlet Pilot Study* was conducted in Alameda County in 1993. This study was also designed to measure the potential increases in material volume and mass due to increased inlet cleaning frequencies. A total of 15 inlets draining residential, industrial, or commercial land uses were monitored. The volume and mass of material removed under annual, biannual, quarterly, and monthly cleaning frequencies were measured.

None of the inlets in the two studies identified above were equipped with FTC devices. To evaluate pollutant reductions associated with cleanouts of storm drain inlets equipped with small FTC devices, a recent study (SCVURPPP, 2016) documented cleanout volumes of materials removed from inlets equipped with FTC devices. The SCVURPPP (2016) *Storm Drain Trash Monitoring and Characterization* study focused on litter/trash, but also removed and measured other debris (defined as sediment and vegetation) from 119 inlets equipped with small FTC devices. These devices typically require cleaning frequencies of at least twice per year. Each of the 119 inlets was initially cleaned at the start of the project. The volume of trash and debris that accumulated within the inlets was removed and measured during two subsequent monitoring events. The accumulation period between each monitoring event ranged from four to five months. The data were used to estimate the annual average volumes of trash and debris captured in each inlet. The annual volume of debris removed was converted to a mass using the average density of debris removed from inlets during the Woodward Clyde (1994) study, which was 38 pounds per cubic foot.

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The percent increase of annual mass of debris removed from storm drain inlets during cleanouts, as measured in each of the three studies described above, is presented in Figure G-1. Caltrans removals for inlet cleaning without FTC devices appear to be much greater than removal efficiencies measured during the Woodward Clyde study, and therefore may not be realistic for the purposes of developing conservative efficiency factors for load reduction accounting. The Woodward Clyde study results were used to represent the enhanced efficiency due to increased cleanout frequency of storm drain inlets without FTC devices. The results of the SCVURPPP (2016) study indicate that the use of inlet-based FTC devices, combined with an increased cleaning frequency of twice annually, appears to substantially increase the annual mass of debris that is captured and removed from these storm drain inlets during cleanouts.

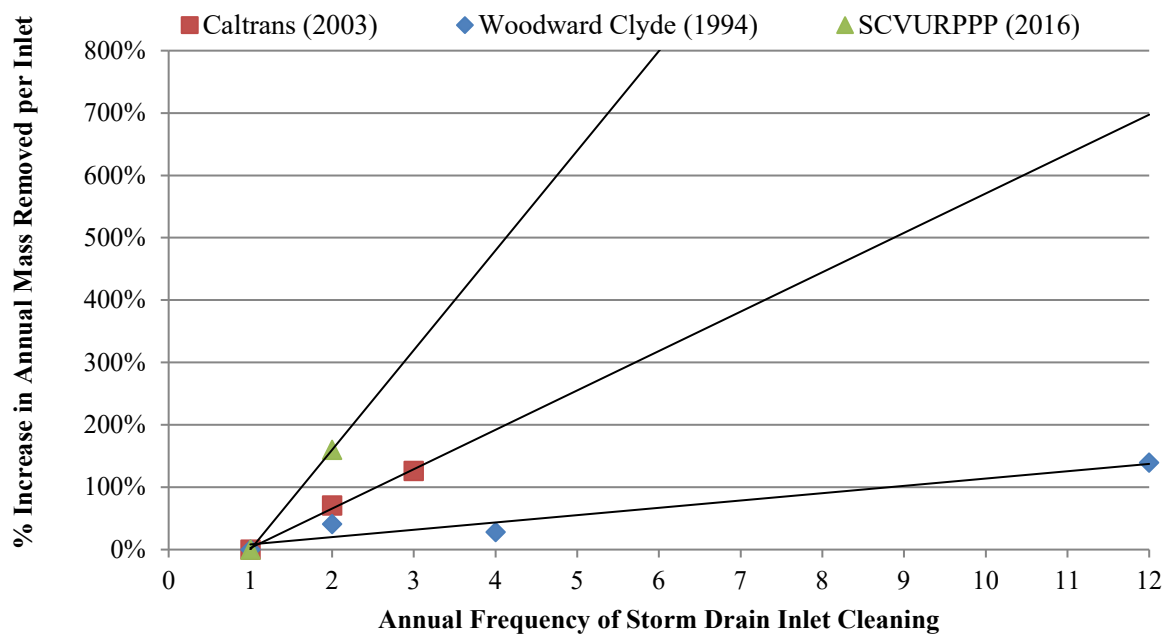

Figure G.1: Reported results of increases in annual mass of debris (e.g., sediment and vegetation) removed as a result of increased cleaning frequency for storm drain inlet with and without small full trash-capture (FTC) devices.

Based on the above findings, Table G-1 presents a conservative estimate of the enhanced efficiency factors for more frequent cleaning of storm drain inlets without FTC devices, and the enhanced efficiency factors for cleaning storm drain inlets equipped with inlet-based FTC devices at least twice per year. For the purposes of load reduction accounting, the method assumes the following:

- Based on an analysis of 36 Alameda County and San Mateo Permittee storm drain inlet cleaning datasets from 1996 through 2009, on average, municipalities clean their inlets once per year (annually);

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- Based on the same dataset, an average of 100 kg of material (sediment, vegetation, and litter) is removed from each inlet annually (see descriptive statistics below);

Statistic	Mass (Kg) of Material Removed Annually per Inlet
Maximum	4,049
90th Percentile	476
75th Percentile	284
Mean	268
Geometric Mean	100
Median	91
25th Percentile	41
10th Percentile	21
Minimum	5
# of Municipalities in Dataset	36

- Each inlet (on average) receives drainage from a catchment of 1 acre (BASMAA, 2014), equating to a unit material removal rate of 100 kg per acre per year;
- The mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63um) is approximately 15% on average (McKee et al., 2006);
- The annual suspended sediment load to each inlet is roughly 134 kg per year on average based on the modeled value for Old Urban land use (Paradigm Environmental, 2020, see attachment to Appendix A); and
- Based on the assumptions above, roughly 15 kg of sediment associated with PCBs and mercury is removed from each inlet cleaned on an annual frequency, equating to about a 11% reduction of PCBs and mercury via annual cleaning (i.e., 15 kg / 134 kg). This is the control measure effectiveness of annual cleaning of storm drain inlet without FTC devices.

Assuming the baseline control measure effectiveness for annual cleaning of 11%, data from the studies cited above were used to calculate the enhanced efficiency factors for storm drain inlet cleaning at increasing frequencies for inlets without FTC devices, and twice-yearly cleaning of inlets that have been equipped with small FTC devices, as shown in Table G-1.

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Table G-1: Enhanced efficiency factors (EE_f) for increased storm drain inlet cleaning frequencies for storm drain inlets both with and without small full trash-capture (FTC) devices.

		Enhanced Cleaning Frequency for Inlets without FTC devices				Enhanced Cleaning Frequency for Inlets with FTC Devices
		Annually	Biannually	Quarterly	Monthly	Biannually
Original Cleaning Frequency	No Cleaning or New Inlet	0.11	0.16	0.16	0.27	0.29
	Annually		0.05	0.05	0.16	0.18

E.2 References

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APPENDIX H
Enhanced Street Sweeping Efficiency Factors

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H.1 DESCRIPTION OF THE ANALYSIS

The Clean Watersheds for Clean Bay (CW4CB)[12] Task 4 pilot projects evaluated enhancements of municipal operation and maintenance activities that remove sediments and associated pollutants, including PCBs and mercury. This objective coincided with Municipal Regional Stormwater NPDES Permit (MRP, Order R2-2009-0074) Provision C.12.d, which required MRP Permittees to evaluate at the pilot scale in five drainages, ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. MRP Provision C.12.d also required Permittees to evaluate existing information on high-efficiency street sweepers, with the goal of evaluating the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads.

Appendix B-1 of the CW4CB Final Report summarizes the results of the Task 4 enhanced street sweeping pilot project that occurred in four pilot study areas (two sites in Richmond and one each in San Jose and Sunnyvale). This study entailed collecting monitoring data in each pilot study area representative of the baseline sweeping condition. The monitoring data were then used to calibrate the Windows Source Loading and Management Model (WinSLAMM) to evaluate sediment, PCBs, and mercury in the pilot study areas. Once WinSLAMM calibrated using the pilot study data, it was used to model street sweeping performance in the pilot study areas during the baseline condition for sediment, PCBs, and mercury. WINSLAMM was also used to model the effectiveness of various street sweeping scenarios for the pilot study areas for removing sediment, PCBs, and mercury. The modeled scenarios included (1) different sweeper types, (2) sweeping frequencies, and (3) street roughness values. The modeled scenarios assumed parking controls were in effect.

The results of the scenario analysis are presented in Tables H-1 and H-2 below for PCBs and mercury, respectively.

[12] For more information, see: http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project.

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Table H-1: Change in PCBs Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.9%	14%	15%	18%	19%	21%	21%	22%
	Vacuum	Intermediate	Once per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Intermediate	Once per 2 weeks	-8%	-4%	-3%	0%	1%	3%	3%	3%
		Intermediate	Once per 4 weeks	-4%	0%	1%	4%	5%	7%	7%	8%
		Intermediate	Twice per week	-11%	-7%	-6%	-3%	-2%	0%	0%	1%
		Rough	Once per week	-9%	-5%	-4%	-1%	0%	2%	2%	2%
		Rough	Once per 2 weeks	-5%	-1%	0%	3%	4%	6%	6%	6%
		Rough	Once per 4 weeks	0%	4%	5%	8%	9%	11%	11%	12%
		Rough	Twice per week	-12%	-8%	-6%	-3%	-2%	-1%	-1%	0%

Notes:
1. Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

Table H-2: Change in Mercury Mass Removal Efficiency (%) from Initial Street Sweeping Scenario to Final Scenario

				Final Scenario							
			Sweeper Type	Vacuum							
			Street Roughness	Rough	Intermediate	Rough	Intermediate	Rough	Intermediate	Intermediate	Rough
Initial Scenario	**Sweeper Type**	**Street Roughness**	**Frequency**	Once per 4 weeks	Once per 4 weeks	Once per 2 weeks	Once per 2 weeks	Once per week	Once per week	Twice per week	Twice per week
	None	None	None	9.1%	10%	10%	10%	10%	11%	11%	11%
	Vacuum	Intermediate	Once per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 2 weeks	0%	0%	0%	0%	1%	2%	2%	2%
		Intermediate	Once per 4 weeks	0%	0%	1%	1%	1%	2%	2%	2%
		Intermediate	Twice per week	-1%	0%	0%	0%	1%	2%	2%	2%
		Rough	Once per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 2 weeks	-2%	-2%	-2%	-2%	-1%	0%	0%	0%
		Rough	Once per 4 weeks	-1%	-1%	-1%	-1%	0%	1%	1%	1%
		Rough	Twice per week	-2%	-2%	-2%	-2%	-1%	0%	0%	0%

Notes:
Change in efficiency resulting from change in sweeping scenario shown in red (reduction in efficiency) and blue (increase in efficiency).

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APPENDIX I

Large Trash Capture Device Unit Efficiency Factor Data Analysis

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I.1 Purpose and Approach

The purpose of this appendix is to document findings of studies and analyses conducted to determine the effectiveness for removing total suspended solids (TSS), PCBs, and mercury by large (non-inlet-based) trash capture devices, including hydrodynamic separator (HDS) units, gross solids removal devices (GSRDs), and baffle boxes. Other types of non-inlet-based trash capture devices, such as trash netting devices and trash booms, are assumed to remove negligible amounts of sediment, PCBs, and mercury, so are not included in this appendix. Inlet-based devices, including inlet baskets and connector pipe screens, are discussed in Appendix G. For the purposes of load reduction accounting, the method assumes that HDS units, GSRDs, and baffle boxes reduce PCBs and mercury concentrations in direct proportion to TSS reduction.

I.2 HDS Units

Percent Removal of TSS. Percent removal of TSS in HDS units was calculated from the BASMAA Clean Watersheds for a Clean Bay (CW4CB) Task 5 Leo Avenue pilot project data (BASMAA 2017a). For this project, a prefabricated Contech HDS unit called the Continuous Deflective Separator (CDS) was retrofitted into the existing storm drain system in the Leo Avenue Watershed in San Jose.

Influent and effluent water quality was sampled at four events as summarized in Table I-1 below. The CDS unit removed an average of 30% of TSS coming into the unit.

Table I-1: Percent Removal of TSS at Leo Ave CDS Unit

Event	Date	Sample Location	TSS (mg/L)	% Removal
1	28-Feb-14	Inflow	110	17%
		Outflow	91	
2	29-Mar-14	Inflow	230	17%
		Outflow	190	
3	31-Oct-14	Inflow	62	88%
		Outflow	7.5	
4	02-Dec-14	Inflow	82	-3%
		Outflow	84.5	
Average				**30%**

The International Stormwater BMP Database (http://bmpdatabase.org/) was evaluated for potentially useful studies. Twenty studies of manufactured devices were identified as useful for analysis. These studies had a total of 334 paired inflow/outflow data points for TSS. Percent removal was calculated for each paired data point and then averaged for the BMP. The results for these studies along with descriptions of land use type and watershed size and imperviousness are presented in Table I-2 below. Average percent removal ranged from -85% (i.e., an increase in TSS concentration in outflow compared to inflow) to 73% and averaged 19% across all studies (including the City of San Jose's Leo Avenue unit).

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The dataset was also analyzed by removing BMPs that were treating just roads or highways, parking lots, or college campuses. In this scenario, ten studies remained that had mixed, other, or unknown land use type. The average percent removal of TSS from the BMPs evaluated in this group of studies was slightly higher at 22%.

Table I-2: Percent Removal of TSS for Studies in BMP Database

Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
OP Soccer Complex: PMSU56_40_40	Contech CDS, Model PMSU56_40_10	Parking lots adjacent to soccer fields.	90	3.98	-85%
NW Birch Place CDS unit: Continuous Deflective Separation unit	CDS Unit	Low Density Residential: 47.4% Office Commercial: 42.2% Multi-Family Residential: 10.3%	--	45.0	-14%
Broadway Outfall: CDS Unit	CDS			132	-6%
University of New Hampshire F3: Continuous Deflective Separation	CDS	College Campus: 100%	100	0.32	-5%
Lake O Sediment Demo: CDS Unit	PSW56_53		--	--	-3%
I-210 / Orcas Ave: Orcas	CDS	Roads/Highway: 100%	100	1.11	-3%
USGS_WI_HSD_DD: Hydrodynamic Settling Device	Downstream Defender®, manufactured by Hydro International.		84	1.90	-1%
I-210 / Filmore Street: Filmore CDS	CDS	Roads/Highway: 100%	100	2.50	2%
University of New Hampshire F2: Environment 21 V2B1	Environment 21 V2B1	College Campus: 100%	100	0.32	5%
University of New Hampshire F1: Vortechnics	Vortechnics	College Campus: 100%	100	0.32	13%
USGS_WI_HSD: HSD	Hydrodynamic Settling Device, Contech	The HSD treats a 0.25-acre deck section of the westbound I–794 freeway	100	0.25	26%
Harrisburg Public Works Yard: PAYardTerreKleene	Terre Kleen	--	90	3.21	28%
SC_StructBMP3: BMP3	Vortechnics	BMP3 is located along the westbound lane of S.C. Highway 802	--	--	29%

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Site and BMP	Device Model	Land Use Type	Watershed % impervious	Watershed Area (ac)	Average TSS % Removal[1]
Indian River Lagoon CDS Unit: CDS Unit	CDS	Open Space: 38% Light Industrial: 32% Office Commercial: 19%	11	61.5	30%
Leo Avenue: HDS Unit[2]	Contech CDS	--	--	--	30%
SC_StructBMP1&2: BMP2	CDS Technologies	BMP2 is located along the southbound lane of U.S. Highway 21	100	1.11	39%
University of New Hampshire E1: Aqua Swirl	Aqua Swirl	College Campus: 100%	100	0.99	40%
Timothy Edwards Middle School: Vortechs No 5000	Vortechs	--	80	1.95	45%
VC: VC	Vortcapture	Residential area with lots of organic matter/leaf litter loading	--	--	53%
Marine Village Watershed: VortechsTM Stormwater Treatment System	Vortechs	Office Commercial: 50% Medium Density Residential: 45% Unknown: 5%	95	9.34	72%
NJ Manasquan Bank: NJManasquanCDS	High Efficiency Continuous Deflective Separator (CDS), Model 20 25	--	79	0.89	73%

Notes: -- indicates information was not provided.

1. Based on analysis of paired inflow/outflow results.
2. Leo Ave CW4CB study. Not a BMPDB Study.

The manufacturer's removal efficiency claims and the tested removal efficiencies of six of the BMPs evaluated in the studies were summarized as reported in the Massachusetts Stormwater Technology Evaluation Project (MASTEP) clearinghouse database (Table I-3).

Table I-3: Percent Removal of TSS for Six Manufactured Devices from MASTEP

Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Aqua-Swirl	Aqua Shield	85%	84-87%
CDS	Contech	70%	65-95%
Vortechs	Contech	35-85%	35-64%
Downstream Defender	Hydro International	90%	70%
V2B1	Environment 21	80%	65%

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Product (BMP)	Manufacturer	Manufacturer's Removal Efficiency claim	Tested Removal Efficiency
Terre Kleen	Terre Hill	78%	17-50%
Average[1]			56%

Notes: 1. Average based on low end of reported efficiency range.

Based on the above findings, 20% is a conservative estimate of the average percent removal of TSS by HDS units.

Percent Removal of PCBs and Mercury. To further evaluate the pollutant removal performance of HDS units, BASMAA (2019) conducted a combined monitoring and modeling study in 2017 and 2018 based on the removal of solids captured within HDS unit sumps. The Project collected samples of the solids captured and removed from eight different HDS unit sumps during cleanouts. The solid samples were analyzed for PCBs and mercury concentrations. Maintenance records and construction plans for these HDS units were reviewed to develop estimates of the average volume of solids removed per cleanout and the typical number of cleanouts per year. This information was combined with the measured pollutant concentrations to calculate the annual mass of PCBs and mercury captured in the sumps and removed during cleanouts. Next, the annual pollutant loads discharged from each HDS unit catchment were estimated using two different load calculation methods. Method #1 used the land use-based pollutant yields described in the BASMAA Interim Accounting Methodology (BASMAA 2017b) to estimate catchment loads. Method #2 used the Regional Watershed Spreadsheet Model (RWSM, Wu et al. 2017) to estimate runoff volumes and stormwater concentrations and calculate catchment-specific loads. Finally, HDS unit performance was evaluated for both catchment load estimates by calculating the average annual percent removal of PCBs and mercury due to the annual mass removal of solids from the HDS unit sumps. Results are presented in Table I-4.

For catchment loads calculated using Method #1 (land use-based yields), the median percent PCBs removal across all eight units ranged from 5% to 10%, while the mean ranged from 17% to 28%. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration), the median percent PCBs removal ranged from 15% to 32%, while the mean ranged from 23% to 36%. Variability in removal rates was high between individual units, ranging from almost no removal to 100% removal of the estimated loads. For mercury, across all eight units, the median percent removal for catchment loads calculated using Method #1 (land use-based yields) ranged from 3% to 4%, while the mean ranged from 5% to 8%. For all units under Method #1, the removal rates were lower for mercury than for PCBs. For catchment loads calculated using Method #2 (RWSM runoff volume x concentration) the median removal ranged from 13% to 19%, while the mean ranged from 28% to 35%. Similar to PCBs, removal rates for mercury in individual HDS units were highly variable (Table I-4).

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Table I-4. HDS Unit Performance - Annual Percent Removal Calculated for Two Catchment Load Estimates.

HDS Unit ID	PCBs Removal				Mercury Removal			
	Method #1		Method #2		Method #1		Method #2	
	Low	High	Low	High	Low	High	Low	High
1	80%	100%	100%	100%	26%	40%	100%	100%
2	8%	18%	10%	22%	4%	6%	65%	98%
3	4%	9%	21%	45%	2%	3%	8%	12%
4	38%	83%	27%	59%	5%	7%	17%	26%
5	0.06%	0.13%	0.21%	0.46%	0.1%	0.2%	1.1%	1.6%
6	5%	11%	20%	43%	0.01%	0.02%	0.1%	0.2%
7	0.6%	1.4%	0.5%	1.1%	0.06%	0.09%	2%	3%
8	1.4%	3.1%	7%	16%	3%	4%	27%	41%
Median	5%	10%	15%	32%	3%	4%	13%	19%
Mean	17%	28%	23%	36%	5%	8%	28%	35%

The BASMAA study results were highly variable and limited by the small sample size. However, pollutant load reductions achieved by HDS units, on average, approach or even exceed 20%, the value identified as a conservative estimate of TSS removal by HDS units in the analysis presented previously. These results support the continued use of a 20% efficiency factor for calculating the annual average PCBs and mercury loads reduced by HDS units.

I.3 Gross Solids Removal Devices

Caltrans conducted the Gross Solids Removal Devices (GSRDs) Pilot Program to develop and evaluate the performance of non-proprietary, full trash capture devices that could be retrofitted into existing highway drainage systems or incorporated into new highway projects (Sobelman et al.). The GSRD Pilot Program consisted of multiple phases with each phase representing one pilot study. The pilot studies consisted of one or more devices that were developed from concept through design and installation, with two years of pilot testing of overall performance. Five phases were constructed and monitored covering eleven designs. Four general types of GSRDs were developed and studied: linear, inclined screen, baffle box, and v-screen. Of the many configurations tested, the most promising devices, based on considerations of particle capture, clogging, passing design flow, drainage, stage capacity and maintenance requirements, were the Linear Radial (louvered modular well casing), the Inclined Screen (parabolic wedgewire screen) and the Inclined Screen (sloped flat wedge-wire screen). The linear radial and inclined screen devices have been certified by the Los Angeles Regional Water Quality Control Board as being full capture devices. Standard designs were developed for these screen systems that provided the best solids removal performance in the pilot tests.

The results of the first phase of the pilot program, which tested the linear radial and inclined screen devices, are summarized in Table I-5 below.

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Table I-5. GSRD Unit Performance Observed by Caltrans (2003)

Device Type	Gross Solids Capture Efficiency by Wet Weight (%)	
	2000 – 2001	2001 – 2002
Linear Radial 1 (I-10)	100[1]	100
Linear Radial 2 (I-210)	97	87
Linear Radial 2 (I-5)	94	100
Inclined Screen 1 (SR-170)	100	100
Inclined Screen 2 (I-210)	83[2]	100
Inclined Screen 2 (US-101)	86[2]	73[2]
Average	**93%**	**93%**

Notes:

[1] Material collected in the bypass bag was presumed to be windblown.

[2] GSRD overflowed. Gross solids escaped the overflow structure and were unaccounted for. As a result, the calculated capture efficiencies are overstated.

Source: Caltrans, 2003.

Based on the above findings and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 15% on average of the captured debris (McKee et al., 2006), then the percent removal of PCBs and mercury by GSRDs is approximately 14% (93% gross solids removal x 15% of captured debris that is associated with PCBs and mercury).

I.4 Baffle Boxes

Baffle boxes are subsurface rectangular vaults that are placed inline in the stormwater system to reduce pollutant loadings by capturing sediments, gross solids, and associated pollutants. Treatment mechanisms typically include filtration, hydrodynamic separation, and adsorption. Several different types of baffle boxes are available commercially and have footprints that vary in size from approximately 10 square feet to over 200 square feet. These subsurface vaults are commonly subdivided into a series of chambers by vertical baffles that interrupt the stormwater flow and promote capture of suspended particles by sedimentation.

The treatment effectiveness of the Nutrient Separating Baffle Box ® (NSBB) by Suntree Technologies has been recently evaluated by the manufacturer to assess the suspended sediment removal efficiency under controlled conditions (Suntree Technologies, 2018). The NSBB contains an additional basket screen that is located above the top of the chamber baffles. The screen captures floating and suspended solids and holds them out of the water column during nonflow periods (Suntree Technologies, 2018). The performance evaluation was conducted on the NSBB model 3-6-72, which has an effective sedimentation area (i.e., footprint) of 18 square feet (6 feet by 3 feet). Additional details of this and other models can be found on the Suntree Technologies, Inc. website. Influent suspended sediment concentrations were measured at 200 mg/L with a median particle size of 100 µm; influent flow rates ranged from 0.35 to 1.75 cfs. Resulting annualized TSS removal efficiency ranged from approximately 51 to 68 percent, with

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a weighted annualized TSS removal efficiency of 62.9%. The annualized TSS removal efficiency for different flow rates is shown in Table I-6 below.

Table I-6: Nutrient Separating Baffle Box (Model 3-6-72) TSS Removal Efficiency

Mean Flow Rate Tested (cfs)	Measured Removal Efficiency	Annual Weighting Factor	Weighted Removal Efficiency
0.35	67.9%	0.25	16.98%
0.70	65.8%	0.3	19.74%
1.05	63.1%	0.2	12.62%
1.40	56.4%	0.15	8.46%
1.75	50.6%	0.1	5.06%
Weighted Annualized TSS Removal Efficiency			**62.9%**

Source: Suntree Technologies, Inc., 2018

A similar baffle box, the Debris Separating Baffle Box, is sold by Bio Clean. It is assumed that the unit processes in the two proprietary baffle box devices are similar, thus the expected removal efficiencies would be the same.

Based on the above study and assuming that the mass fraction of material associated with PCBs and mercury yields (i.e., sediment <63 µm) is approximately 63% of the captured sediment, then the percent removal of PCBs and mercury by baffle boxes is approximately 40% (63% TSS removal with a median particle size of 100 µm x 63% of material that is associated with PCBs and mercury). Given the limited data available on the effectiveness of baffle boxes in reducing PCBs and mercury, however, and the similarity of the baffle box to the mechanistic removal processes used in HDS systems, a conservative estimate is being used for PCB and mercury reduction for baffle boxes. The pollutant removal efficiency that will be used for baffle boxes is 20%, the same as HDS systems.

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Appendix C – Solano Permittees' GSI Design Concepts

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SOLANO PERMITTEES'

GREEN STORMWATER INFRASTRUCTURE

DESIGN CONCEPTS

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Green Street Inspiration

Green Stormwater Infrastructure (GSI) Concept Plans

GSI Standard Specification and Design Details

Green Street Inspiration

Ideas for incorporating green stormwater infrastructure into downtown right-of-ways

Green Streets use green stormwater infrastructure to improve safety for all users while also introducing a [illegible] environmental multi-benefits.

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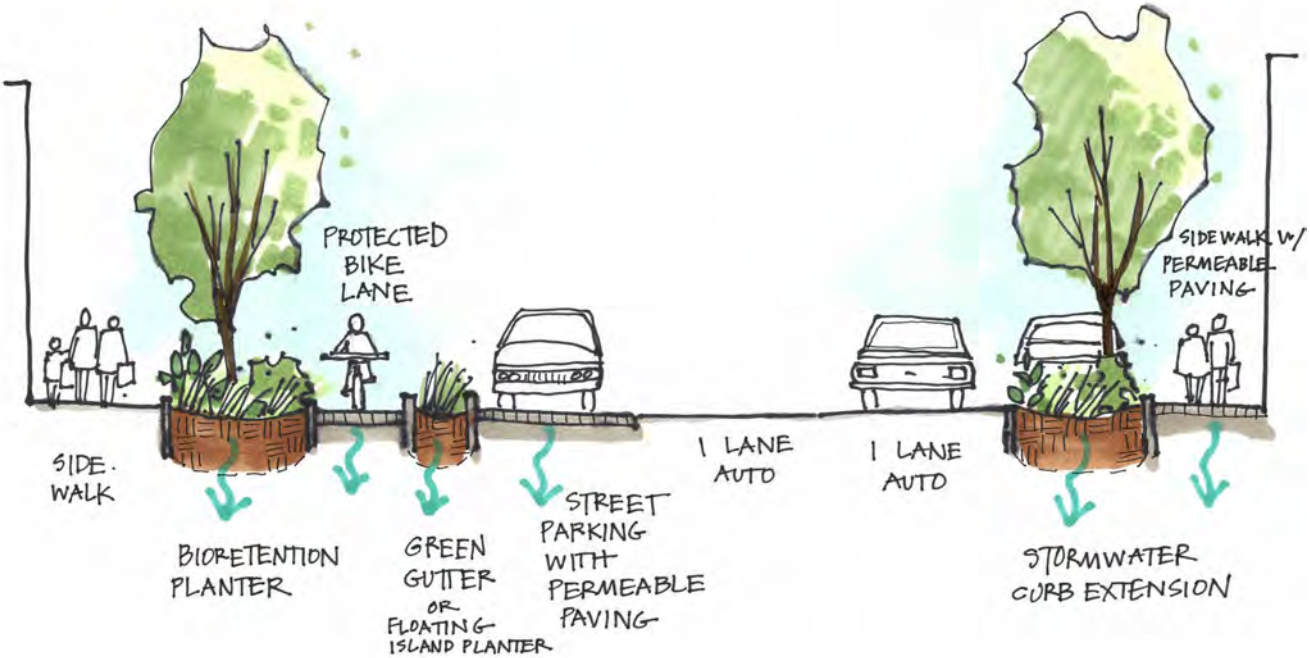

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Green Streets

Green stormwater infrastructure (GSI) can be integrated into many, if not all, of the streets located within the Solano Permittees' jurisdictions. For example, through a series of retrofits, ideally coinciding with upcoming capital projects, West Texas Street in Fairfield and Sonoma Boulevard in Vallejo have the potential to transform into Green Streets. The following examples, photos and details provide ideas for how to achieve this transformation from other Cities in northern California incorporating GSI into street right-of-way retrofit projects.

"Green Streets are designed to capture, slow, and treat stormwater runoff. This approach stands in contrast to the traditional approach to stormwater management that uses "gray" infrastructure, designed to expediently collect stormwater runoff from streets through a system of storm drain inlets, pipes, culverts, and storage facilities that eventually dispose of the collected runoff in waterways or treatment facilities." - Sustainable Streets City of San Mateo, February 2015

We can transition the management of stormwater as a nuisance to a resource in the Solano Permitees' arterial, commercial and residential streets by using GSI tools like the ones described in this booklet; stormwater curb extensions, stormwater transit stops, floating island planters and stormwater medians.

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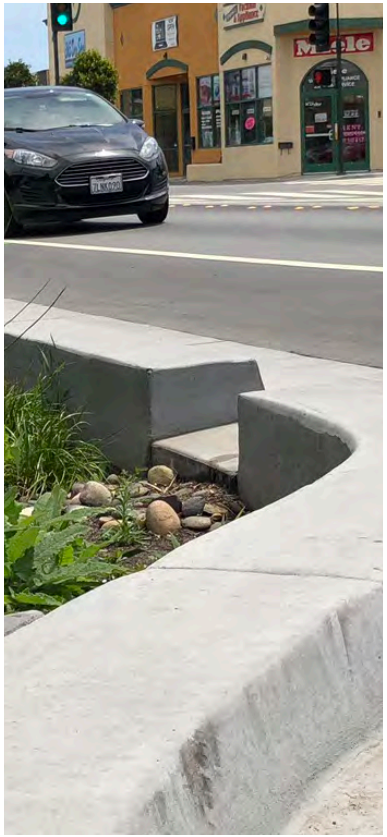

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Broadway Avenue
Seaside, CA

The City of Seaside retrofitted Broadway Avenue from a 4-lane arterial street to a Green Street with two vehicle lanes, bike lanes and green stormwater infrastructure. Stormwater curb extensions integrate bioretention cells that provide traffic calming benefits, are combined with pedestrian crossings, and intercept and infiltrate stormwater runoff from the right-of-way.

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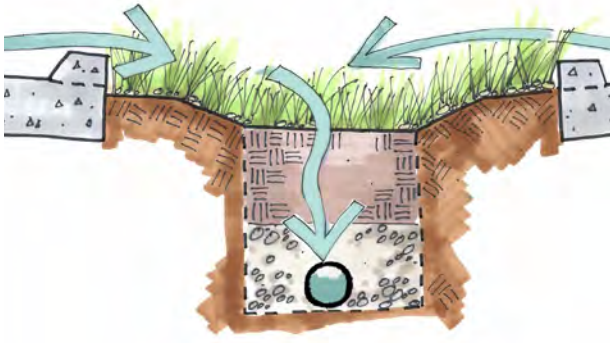

BIORETENTION

An inlet pipe, curb cuts, or sheet flow over an impervious area conveys water into the bioretention feature, where it is filtered prior to infiltration or outflowing via the storm drain system.

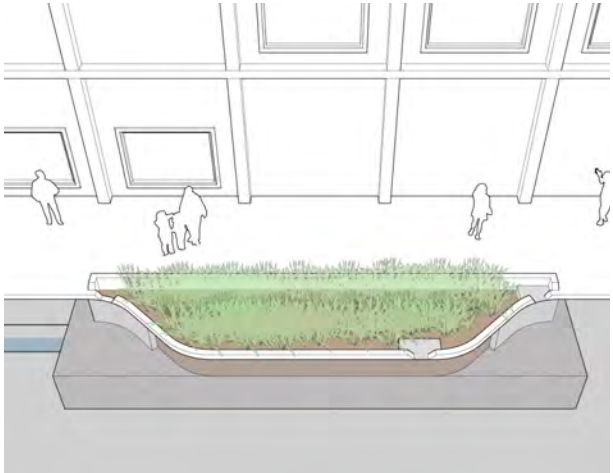

STORMWATER CURB EXTENSIONS

They visually and physically narrow the roadway width, creating safer and shorter crossings for pedestrians and providing traffic calming on low-speed neighborhood streets and commercial corridors. The available space generated by curb extensions can be used for bioretention or biofiltration GSI, plantings, street furniture, benches and street trees.

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BIORETENTION BASIN

Roadside Section, Detail 1.1

Bioretention basins allows for infiltration into subsurface soils and can be constructed with or without side walls. Other common terms used to refer to bioretention features include rain gardens, self-retaining areas or biofilters.

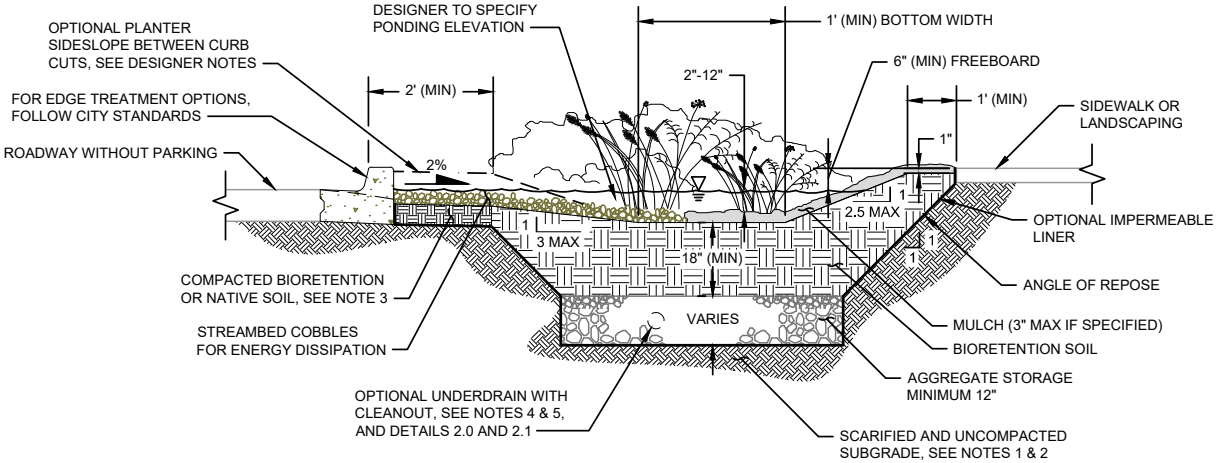

D-09765938
9796

D-097539
9797

Shellmound Street
Emeryville, CA

This Green Street retrofit includes stormwater curb extensions, stormwater transit stops, floating island planters and permeable pavement.

D-09785740
9798

STORMWATER TRANSIT STOP

Incorporating GSI into bulb outs around transit stops reduces runoff, improves water quality and is more efficient compared to bus pull-outs.

D-00765841
9799

D-09076942
9800

CURB CUTS

Curb cuts can be associated with many different green stormwater infrastructure types. Runoff from impervious surfaces like roads, sidewalks, and trails can be directed into GSI through curb cuts and/or trench drains.

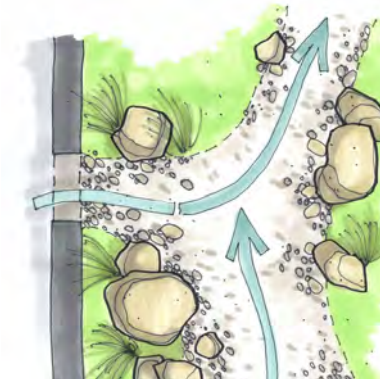

Stormwater enters a bioretention area using curb cuts. Design curb cuts and inflow areas to manage adequate flow.

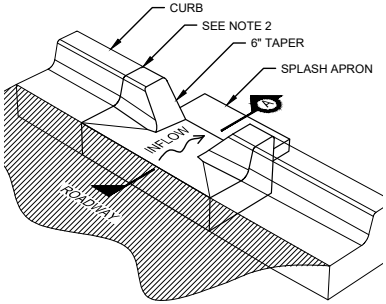

ISOMETRIC

D-09783043
9801

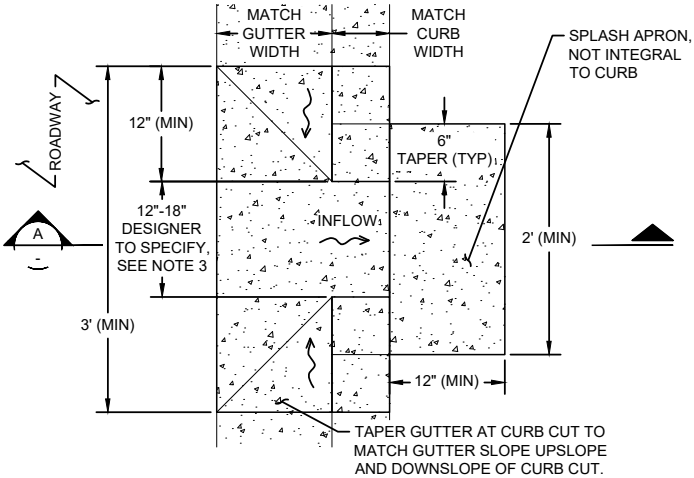

PLAN

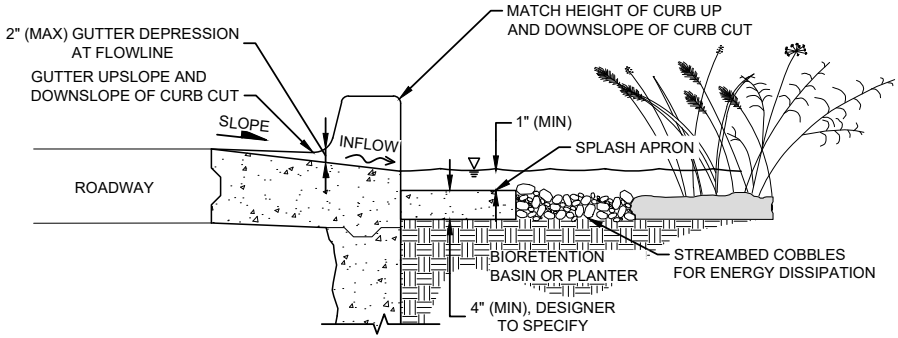

SECTION A

CURB CUT INLET

Typical Detail 3.1

D-09783944
9802

21st Street
Paso Robles, CA

This Green Street was designed with bikes in mind. Striped bike lanes are included where lane widths allow, with "sharrows" or shared bike/care lanes marked at the narrow lower portion. Bike racks located near businesses make bike errands more convenient.

D-09076245
9803

STORMWATER MEDIAN

Wide medians used to separate traffic directions can convey and infiltrate large amounts of water. On very wide streets and parkways, green stormwater infrastructure can be coupled with greenways for bicycling and walking, providing attractive public space adjacent to stormwater management.

Runoff from upstream and/or the adjacent roadways and impervious areas can be directed into a bioswale, bioretention, or biofiltration facility located in the median.

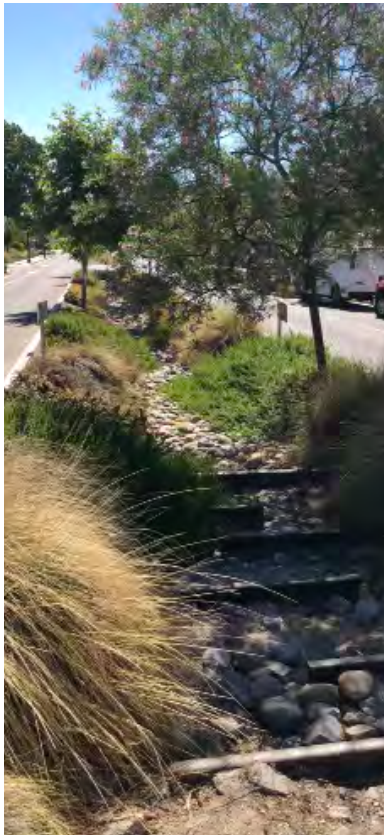

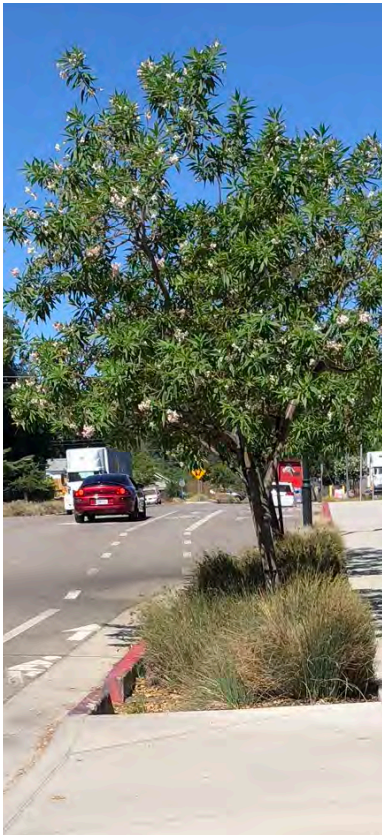

D-09076346
9804

STORMWATER MEDIANS

Stormwater medians transform a typically unused space in the right-of-way into a multi-functional GSI element that can provide a visual cue to drivers to reduce vehicle speeds. On wide parkways or boulevards, stormwater medians can provide distinctive walkways and inviting public spaces.

D-09076947
9805

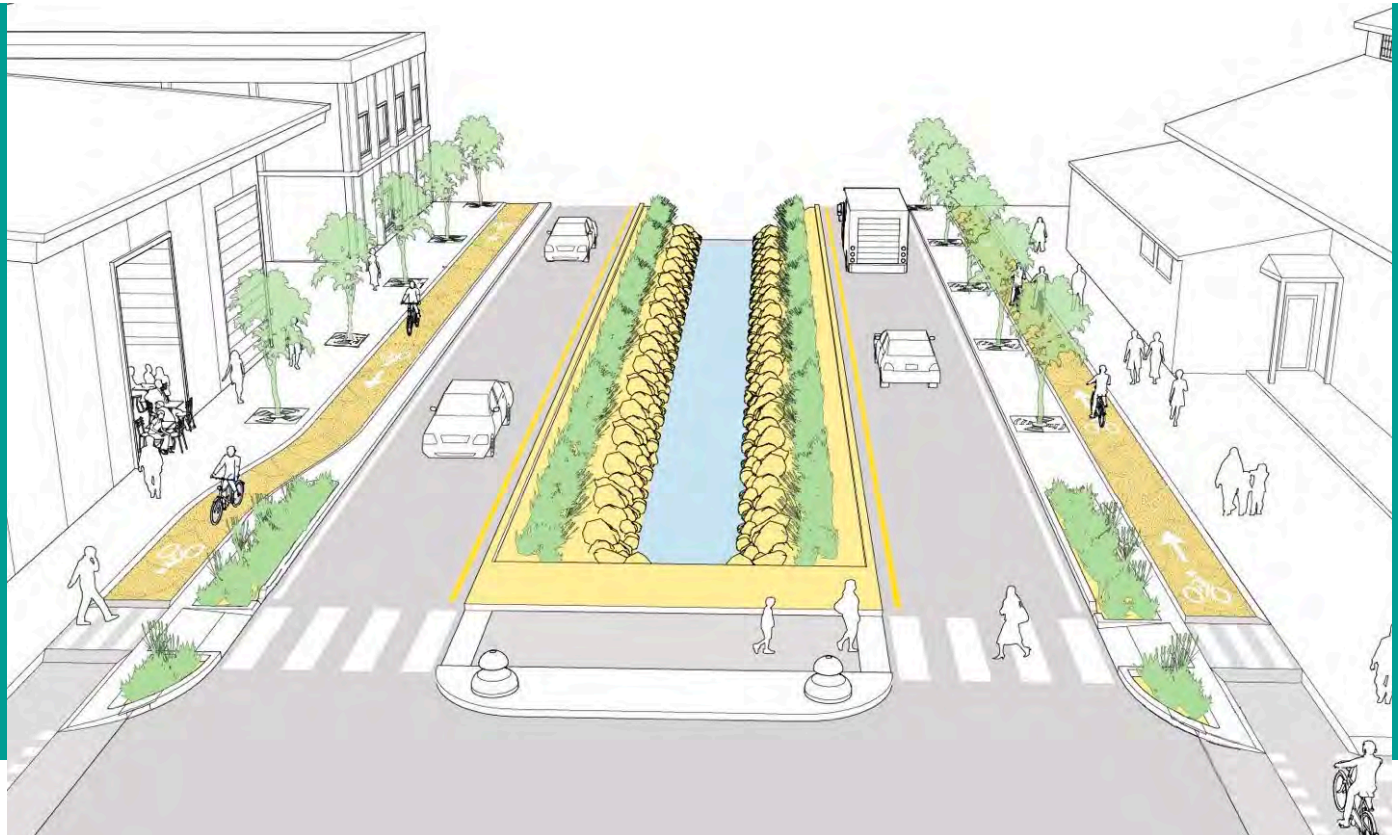

D-09076548
9806

GSI OUTLETS

Due to the predominance of soils with low infiltration capacity within the Solano Permittees area, most GSI features won't infiltrate to a significant degree and in most cases will require an underdrain and overflow connected to the existing storm drain system.

D-009783649
9807

OVERFLOW STRUCTURE

Typical Detail 4.3

Stormwater typically is designed to pond up to 6 inches prior to outflow via a surface outlet (e.g., curb cut) or a piped overflow (e.g., overflow inlet and/or underdrain). Safe overflow during large storm events is critical to minimize flooding into the roadway, which can create hazards for street users.

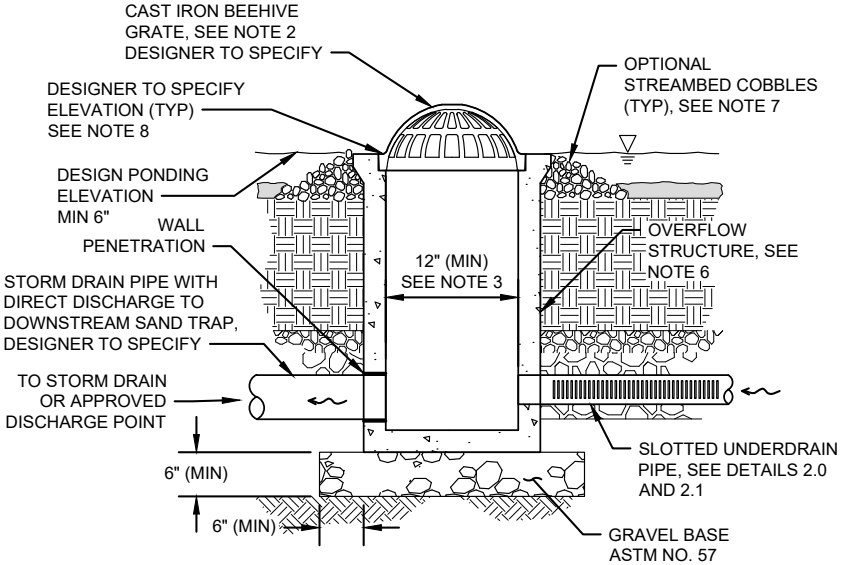

D-09783750
9808

D-097651
9809

San Pablo Avenue
El Cerrito, CA

Instead of sending polluted water from the street directly into the storm drain that flows into the San Francisco Bay, openings in the curb let water flow into the bioretention features first. The bioretention cells are lower than the surrounding sidewalk which helps them to catch, retain and clean water.

A challenge when identifying GSI opportunities in street retrofits is finding low points where it is also practical to incorporate GSI. Factors to consider include identifying existing and future gradient and drainage patterns.

A cost effective GSI retrofit in a right-of-way will work with existing and/or proposed gradients and drainage patterns, the storm drain system and utility locations.

D-09076952
9810

TRENCH DRAINS

Runoff from impervious surfaces like roads, sidewalks, and trails can be directed into GSI features through curb cuts and/or trench drains. Trench drains have the benefit of conveying runoff while still allowing the passage of pedestrians and wheeled vehicles.

D-097953
9811

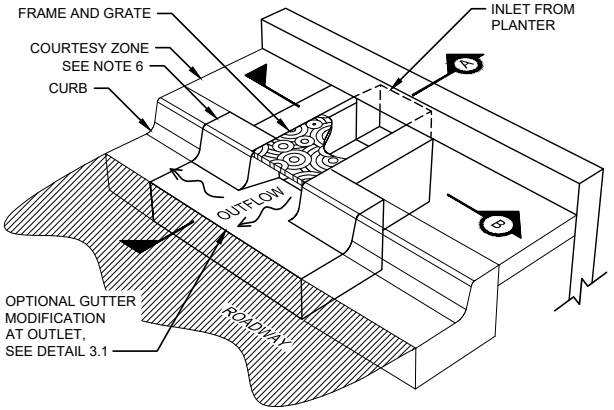

ISOMETRIC

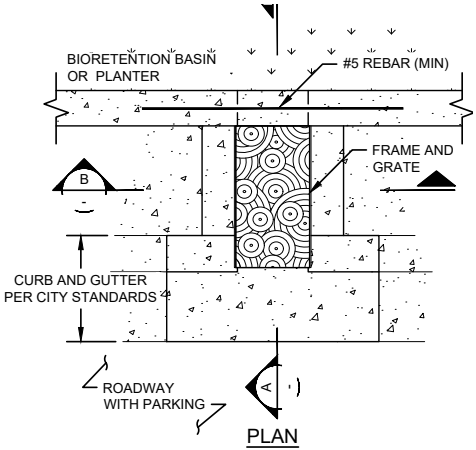

PLAN

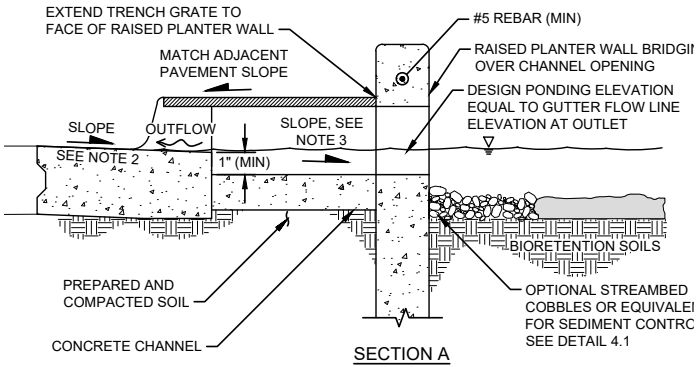

SECTION A

CURB CUT WITH TRENCH

Typical Detail 4.2

Trench drains can be designed as inlets or outlets to a GSI feature.

D-09078954
9812

WEST TEXAS ST, FAIRFIELD GREEN STREET RETROFIT

CONCEPT SKETCHES

D-09078925
9813

D-09078956
9814

Can I retrofit this street with Green Stormwater Infrastructure (GSI)?

Are lane widths greater than 10 feet?

- Y → Is it a truck or transit route?
  - Y → Reduce lane width to 11' in each direction
  - N → Reduce lane width to 10' to reduce vehicle speeds, making streets safer while making space available for GSI

Are all vehicle lanes used at capacity?

- N → Convert one lane in each direction to GSI, bicycle lanes, and/or bike lane buffered by floating island planter
- Y → Is the street crowned?
  - N → Evaluate for stormwater median
  - Y → Look to the edge of the right-of-way to site floating island planters and stormwater curb extensions at midblock or intersections

Site GSI close to existing drain inlets to facilitate connection to the existing storm drain network

Are the roads and/or sidewalks in need of repair or resurfacing?

- N → Program into CIP pervious pavement replacement of sidewalk, parking strip, crosswalk and/or roadway
- Y → Retrofit with pervious pavement instead of replacing or resurfacing in-kind

Is roadway safety a concern?

- Y → Identify opportunities to plant street trees
- Y → Locate stormwater curb extensions at crosswalks to improve pedestrian visibility and reduce crossing distance

Is it a residential street?

- Y → Site GSI in planting strip between sidewalk and roadway
  - Consult an Arborist if new GSI is proposed near existing mature trees
  - Alternate midblock stormwater curb extensions to create a serpentine driving lane to reduce vehicle speeds
  - Direct runoff, where feasible, from adjacent arterial or commercial streets to new GSI in the right-of-way

Is parking angled?

- Y → Convert to parallel parking to make space for: wider pervious pavement walkways, bike lanes and/or... Green stormwater infrastructure (stormwater curb extensions and floating island planters

Use walled or planter style bioretention if space is constrained and incorporate walls into seating or other placemaking elements

WATERISTAS
URBAN WATER DESIGN • ENGINEERING COLLABORATIVE

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9815

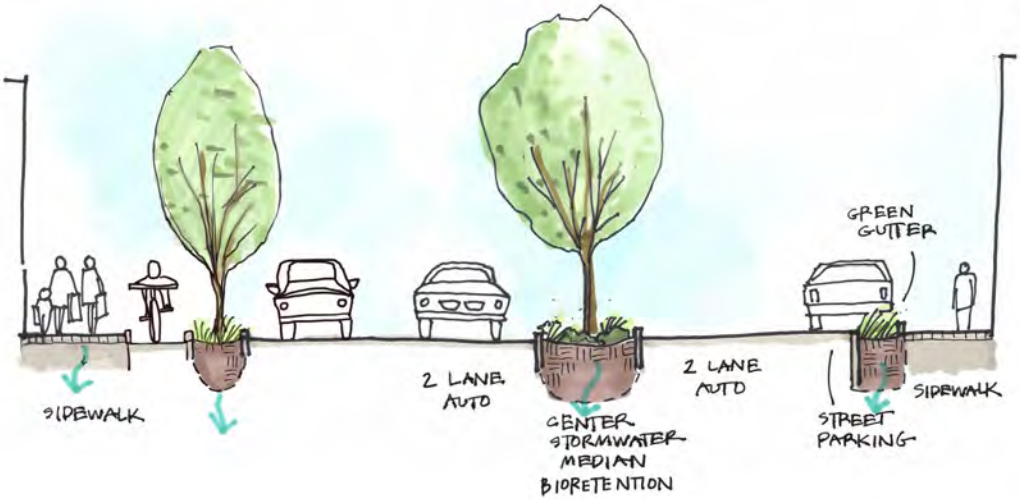

RESILIENT URBAN SPACES

To build more resilient urban spaces we need to reimagine our asphalt and concrete sidewalks and streets as sites for sustainable stormwater management. Every realm in the public right-of-way is an opportunity to incorporate green stormwater infrastructure that also can calm traffic and make way for walking, biking and public space.

Green Streets will allow projects to provide a range of functions and benefits, such as stormwater management, bicycle and pedestrian mobility and safety, public green space and urban forestry.

D-09078958
9816

GSI Concept Plans

D-097959
9817

VALLEJO CONCEPT #1 - CITY HALL/ LIBRARY PARKING LOT GSI RETROFIT

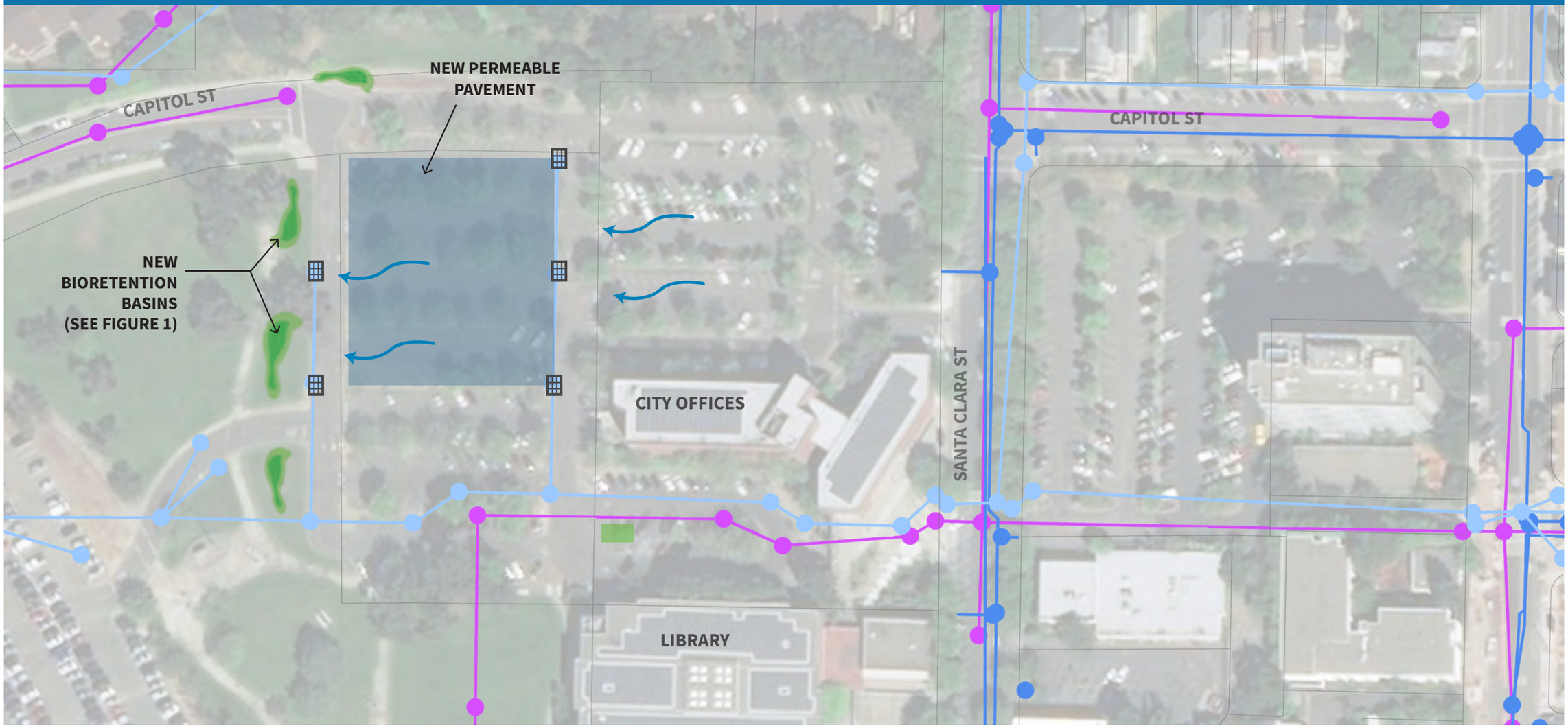

Legend

- Flow of Water
- Permeable Pavement
- Bioretention & Bioinfiltration Basin
- Parking Lot Bioretention & Biofiltration
- Stormwater Inlet
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 60 120 240 Feet

N

Vallejo Concept #1 - City Hall/ Library Parking Lot GSI Retrofit

FIGURE 1. Bioretention Basin

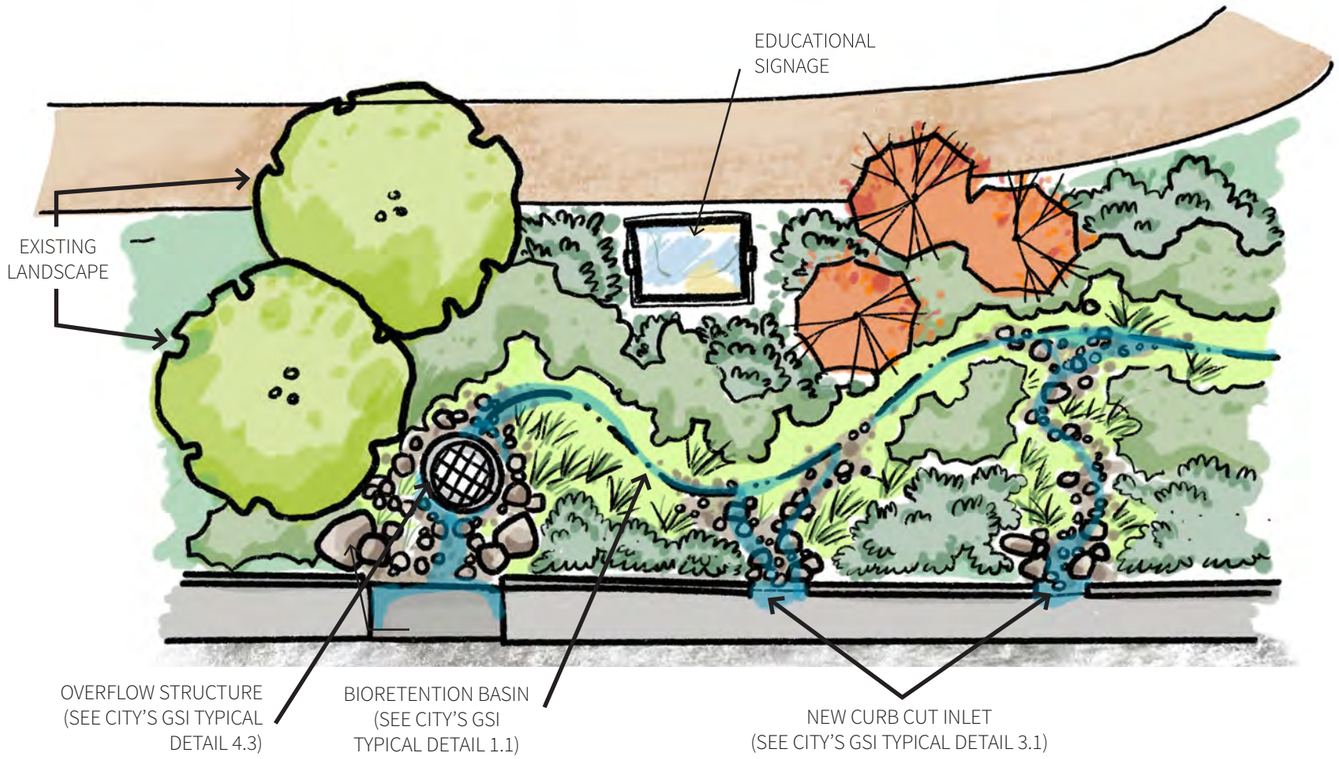

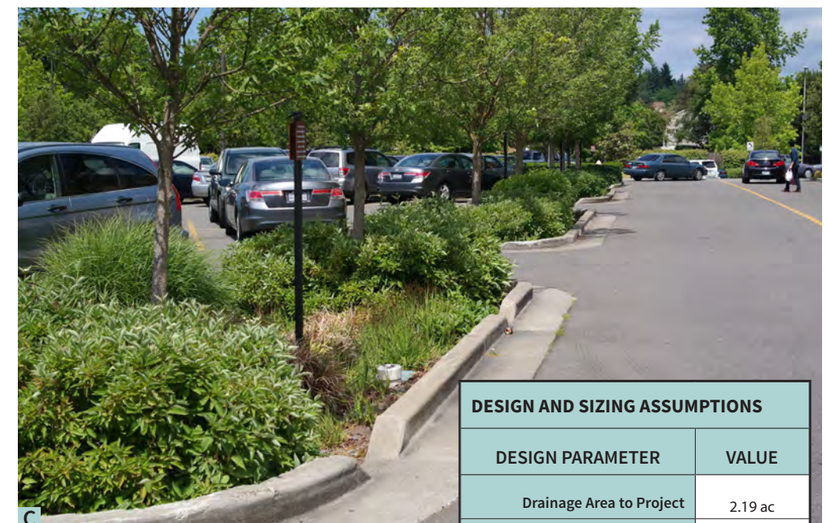

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure. These improvements will reduce the amount of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The existing parking lot proposed for replacement with permeable pavement is approximately 1 acre, in poor condition, and rarely used. The parking lot slopes towards an irrigated turf area to the west, that is well suited for conversion to a series of bioretention basins to slow and treat runoff from the parking area and educate City residents about the value and multiple benefits of green stormwater infrastructure.

The proposed project would add curb cuts along the western edge of the parking lot to direct the runoff into new bioretention basins that would replace the irrigated turf.

Stormwater Management Strategy

The bioretention areas have been designed to provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The bioswales will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswales are designed to manage in excess of the 1.5-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches. The stormwater will be treated through the bioretention soil bed media, and then allowed to infiltrate through the native soils to the underlying groundwater.

Future evaluation of this concept should consider cost effective permeable pavement alternatives, appropriate for low use sections of the parking lot.

Photos:

A. Native grass lined swale allows for treatment and infiltration of stormwater. **B.** Gravel lined swales provide an infiltration and conveyance path. **C.** New tree plantings and green stormwater infrastructure plant mixes provide infiltration areas, erosion control, and habitat in parking areas.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	2.19 ac
Bioswale Area	4,445 sq-ft
Treatment Area / Drainage Area	4.7%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.71
Area-weighted Abstraction	0.11 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	3,120 ft^3
Approximate Impervious Area Disconnection	1.9 ac

D 009861
9819

VALLEJO CONCEPT #2 - CITY PARKING LOT H

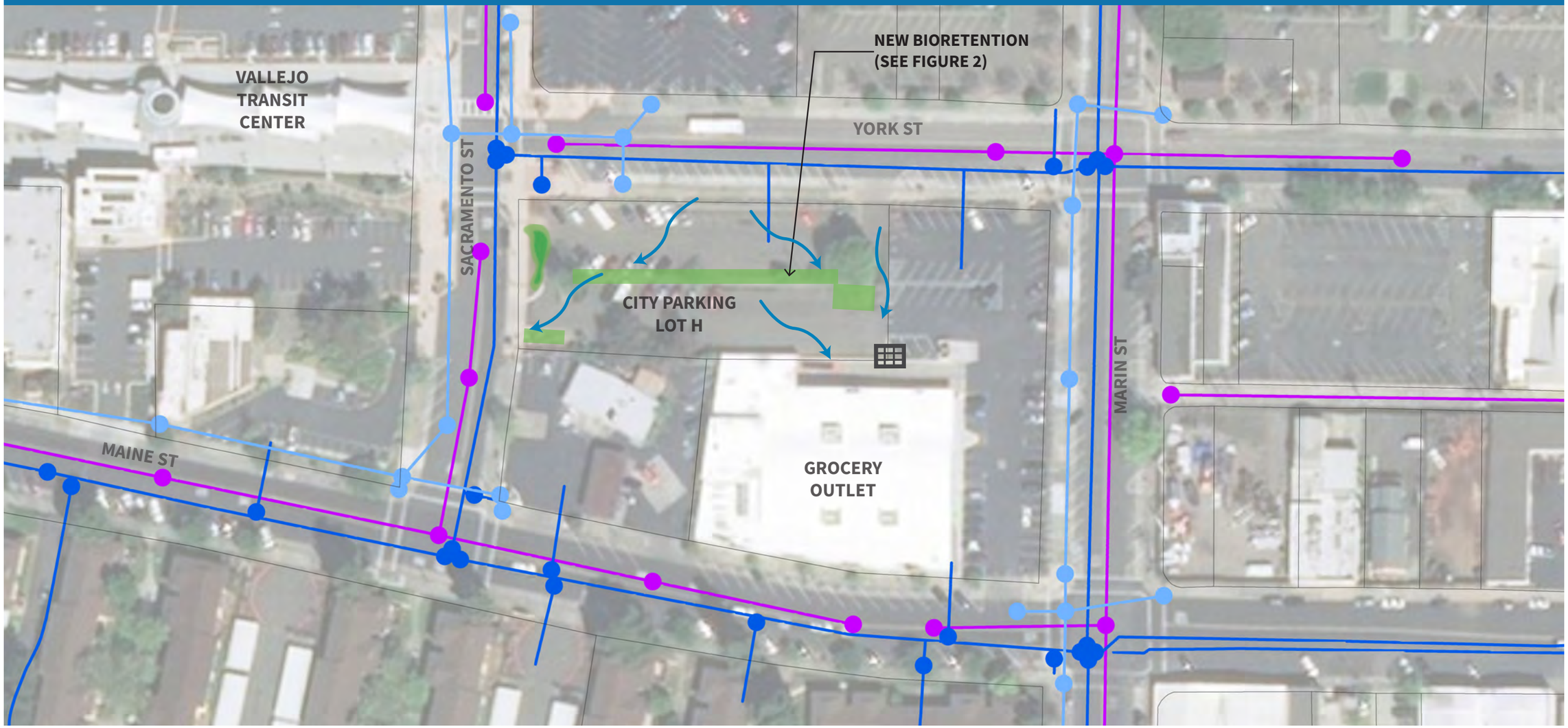

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Parking Lot Bioretention & Biofiltration
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 50 100 200 Feet

N

D 009796
9820

Vallejo Concept #2 - City Parking Lot H

FIGURE 2. Parking Lot Bioretention

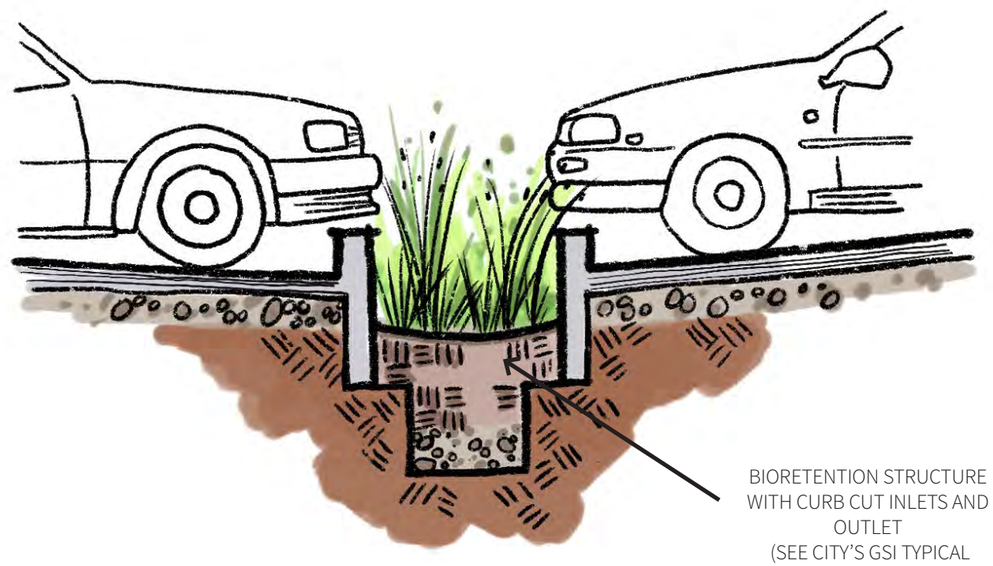

DESIGN AND SIZING ASSUMPTIONS	
DESIGN PARAMETER	**VALUE**
Drainage Area to Project	0.72 ac
Bioretention Area	3,030 sq-ft
Treatment Area / Drainage Area	9.7%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.75
Area-weighted Abstraction	0.11 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	1,100 ft^3
Approximate Impervious Area Disconnection	0.7 ac

Photos:

A. Parking lot bioretention providing stormwater treatment and shade trees.
B/C. Before and after example of a parking lot retrofit to provide stormwater treatment using bioretention located between parking stalls.

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The existing parking lot is approximately 0.72 acres with a narrow island between the parking bays and standard drainage infrastructure including curbs and gutters that allow the runoff to flow off the site and into the storm drain system. This area is well suited to be converted to bioretention to slow and treat runoff from the parking area.

The proposed project would add bioretention features between parking stalls and within unused areas by using curb cuts and removing existing impervious surfaces.

Stormwater Management Strategy

The green stormwater infrastructure features have been designed to provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The features will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswales are designed to manage in excess of the 2.75-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches. The stormwater will be treated through the bioretention soil bed media, and then allowed to infiltrate through the native soils to the underlying groundwater or overflow into the existing storm drain system.

D 097863
9821

VALLEJO CONCEPT #3 - MONO STREET CORPS YARD

CURTOLA PKWY

CORAL RD

SONOMA BLVD

NEW BIORETENTION BASINS (SEE FIGURE 3)

MONO CORPS YARD

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

0 50 100 200 Feet

N

D 00739164
9822

Vallejo Concept #3 - Mono Street Corps Yard

FIGURE 3. Bioretention Basins Adjacent to Roadway

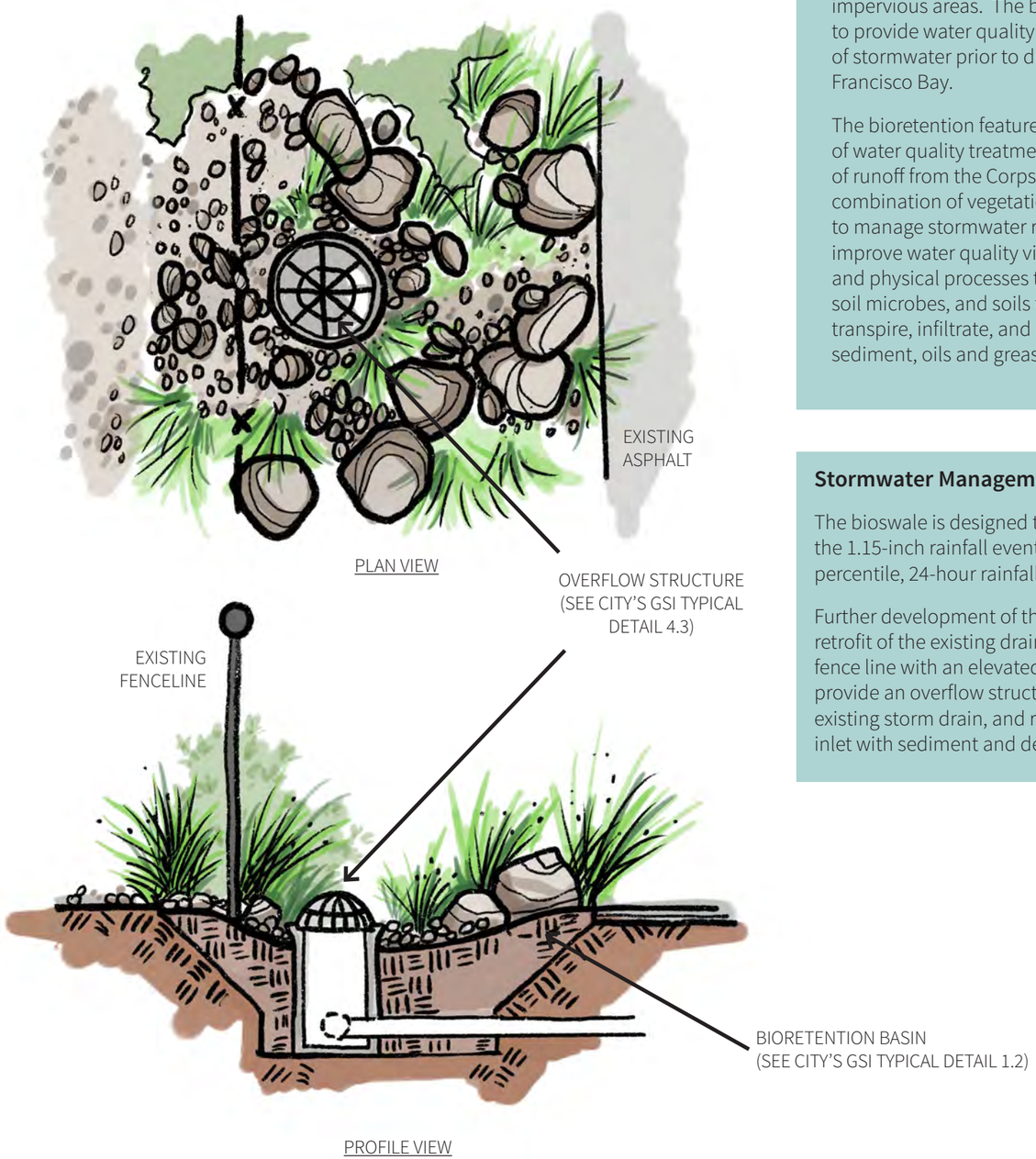

Project Description

The proposed green stormwater infrastructure area is located to collect and treat runoff from the City's Mono Street Corps Yard and adjacent impervious areas. The bioretention area is sized to provide water quality treatment and retention of stormwater prior to discharge into the San Francisco Bay.

The bioretention features will provide a high level of water quality treatment and on-site retention of runoff from the Corps Yard. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The project will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

Stormwater Management Strategy

The bioswale is designed to manage in excess of the 1.15-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.67-inches.

Further development of this GSI concept will include retrofit of the existing drain inlet along the corps yard fence line with an elevated cast iron beehive grate, to provide an overflow structure with connection to the existing storm drain, and reduce clogging of the drain inlet with sediment and debris.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	1.54 ac
Bioretention Area	1,250 sq-ft
Treatment Area / Drainage Area	1.9%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.40
Area-weighted Abstraction	0.16 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	1,150 ft^3
Approximate Impervious Area Disconnection	0.6 ac

Photos:

A/B. Riparian and native flowering plants adjacent to bioretention features.

D 00765
9823

SUISUN CITY CONCEPT #1 - AMTRAK PARK & RIDE

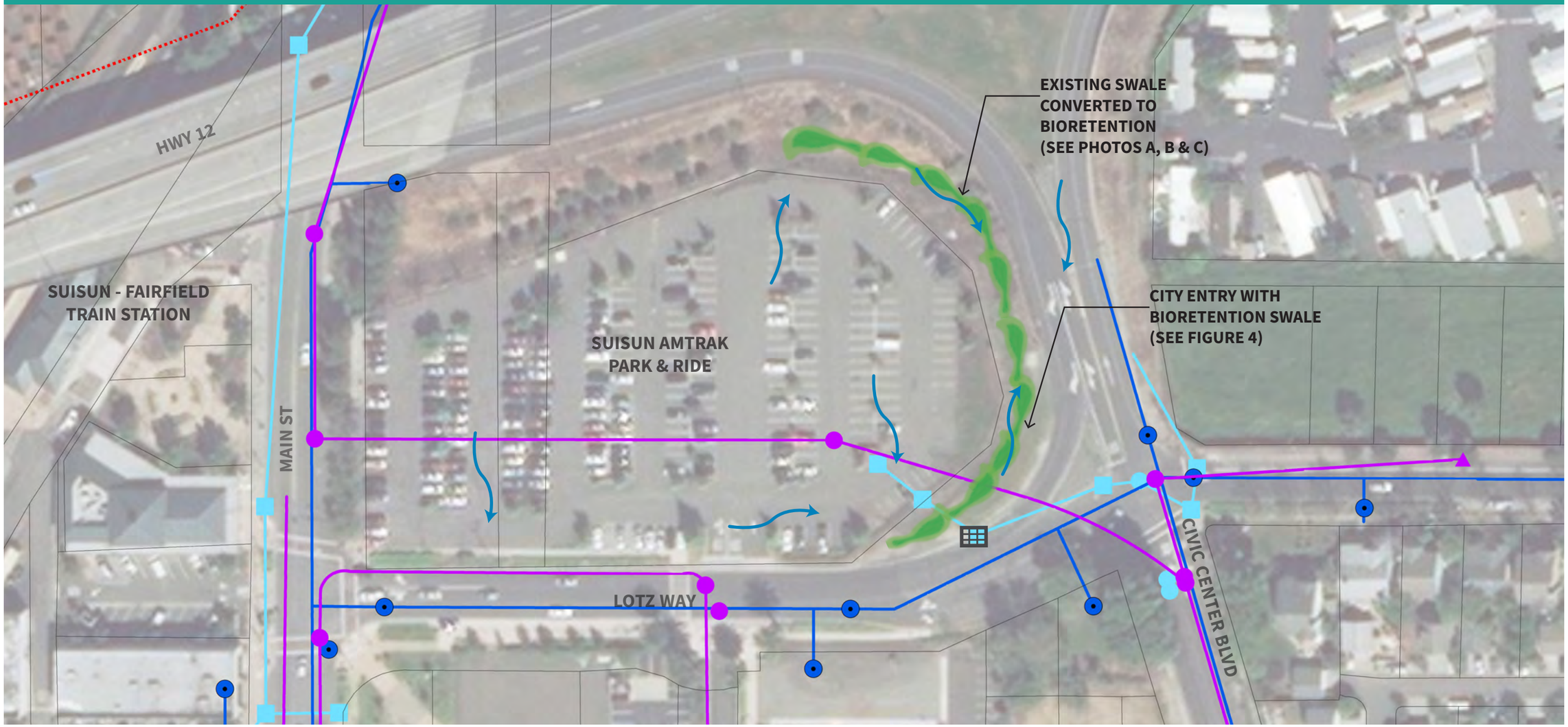

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

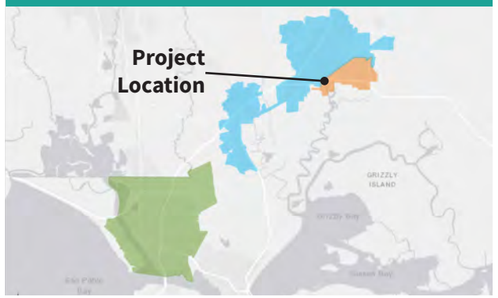

0 50 100 200 Feet

N

D 009824
9824

Suisun City Concept #1 - Amtrak Park & Ride

FIGURE 4. City Entry with Bioretention Swale

NEW CURB CUTS TO CREATE POSITIVE DRAINAGE TOWARDS SWALE (SEE CITY'S GSI TYPICAL DETAIL 3.1)

BIORETENTION BASIN (SEE CITY'S GSI TYPICAL DETAIL 1.2)

DESIGN AND SIZING ASSUMPTIONS	
DESIGN PARAMETER	VALUE
Drainage Area to Project	3.65 ac
Bioswale Area	4,740 sq-ft
Treatment Area / Drainage Area	3%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.56
Area-weighted Abstraction	0.14 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	4,275 ft^3
Approximate Impervious Area Disconnection	2.3 ac

Photos:

A. Native grasses and boulders provide transition to existing landscape and convey stormwater.
B/C. Native grass lined bioretention swales convey stormwater and allow for treatment and infiltration.

Project Description

The proposed project will retrofit an existing parking lot and landscaped area with green stormwater infrastructure, while creating a welcoming entry into the City. The improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff.

The existing drainage area is approximately 3.65 acres with narrow landscaped islands between the parking bays and standard drainage infrastructure including curbs, gutters, and curb inlets that allow the runoff to flow into the storm drain system. The parking lot slopes towards a grass swale on the eastern perimeter of the parking lot, that is well suited for conversion into a bioretention swale to slow and treat runoff from the parking area.

Stormwater Management Strategy

The bioretention features will provide a high level of water quality treatment and on-site retention of runoff from the existing parking lot. The design uses a combination of vegetation and engineered soils to manage stormwater runoff. The bioswale will improve water quality via chemical, biological, and physical processes through the use of plants, soil microbes, and soils to capture, treat, filter, transpire, infiltrate, and remove pollutants such as sediment, oils and greases, mercury and PCBs.

The bioswale is designed to manage in excess of the 1.25-inch rainfall event, which exceeds the 85th percentile, 24-hour rainfall event of 0.71-inches.

Further development of this GSI concept can evaluate potential to:

1. Re-orient parking aisles and spaces to increase the number of parking spaces while also accommodating additional bioretention features;
2. Include curb cuts from State Route 12 off-ramp to increase treatment potential;
3. Remove asphalt in low-use areas of the parking lot; and
4. Convey runoff from high flow events.

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9825

SUISUN CITY CONCEPT #2 - CIVIC CENTER / DRIFTWOOD DRIVE PARKING LOT

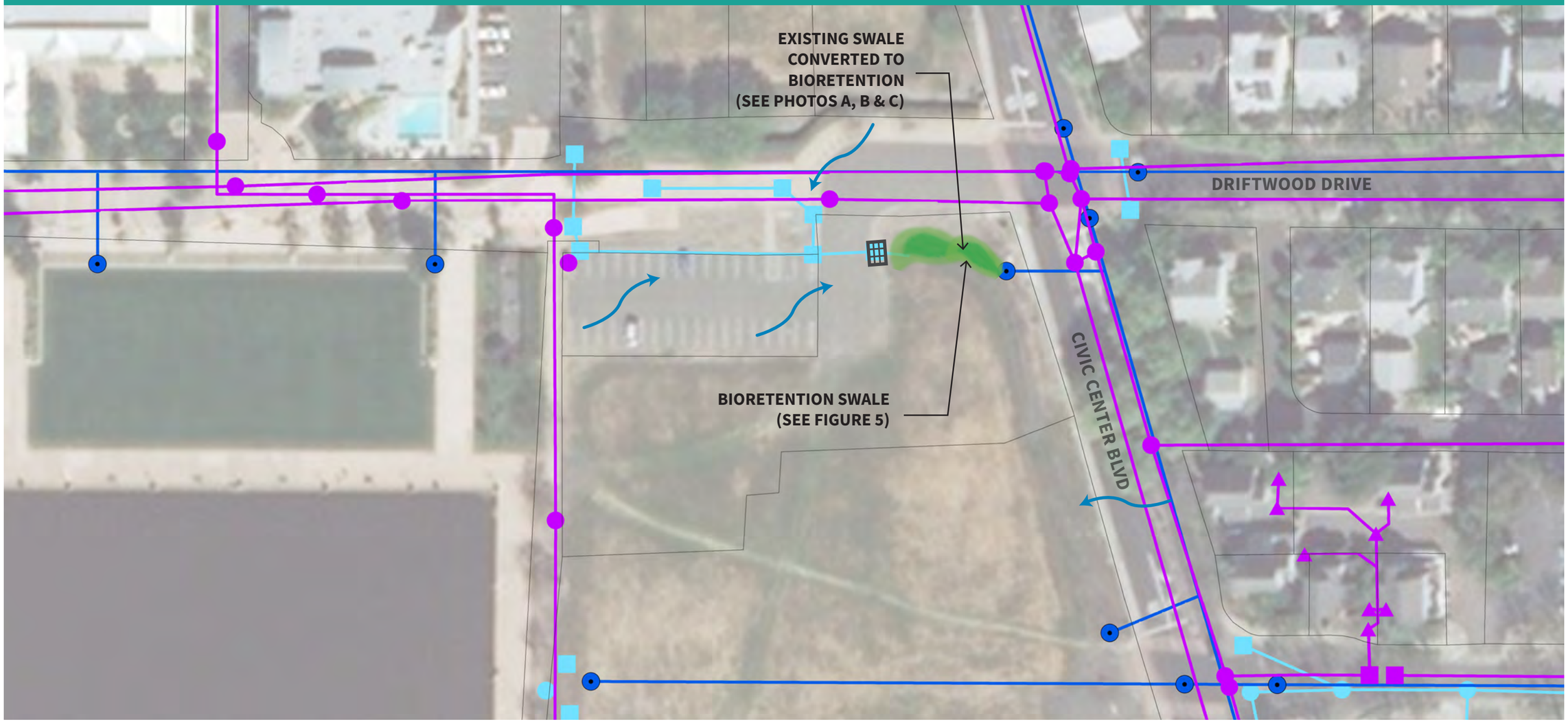

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

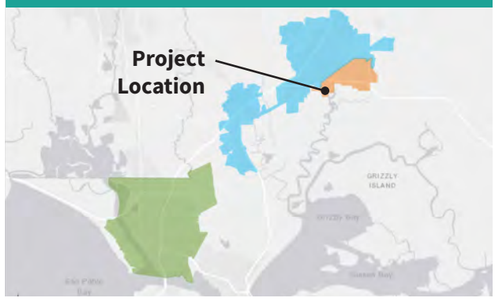

0 40 80 160 Feet

N

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Suisun City Concept #2 - Civic Center / Driftwood Drive Parking Lot

FIGURE 5. Entryway with Bioretention Swale

Project Description

This project would improve treatment of stormwater runoff from nearby impervious surfaces, including the Driftwood Parking Lot. A portion of the existing grassy swale parallel to Civic Center Blvd would be converted into a linear bioretention feature (aka "bioswale"), enabling infiltration, evapotranspiration, and runoff reduction.

Photos:

A. Native grasses planted at perimeters of bioretention features.

B. Natural plantings and boulders provide erosion control and provide habitat at basin edges.

C. Native grass lined swale and basin allow for infiltration and treatment of stormwater.

Stormwater Management Strategy

The drainage area is approximately 0.75 acres with an average runoff coefficient of 0.49. Assuming the bioswale inundation area is sized to be 5% of the drainage area with a soil profile of 24 inches available for water storage, the system would be capable of treating up to a design storm of 2.4 inches (greater than the 85th percentile 24 hour design storm depth of 0.71 inches).

Overflow from the bioswale would be directed back to the existing storm drain and designed to prevent ponding in the bioswale for more than 24 hours.

Further development of this GSI concept will need to be coordinated with any future plans for the property.

DESIGN AND SIZING ASSUMPTIONS

DESIGN PARAMETER	VALUE
Drainage Area to Project	0.75 acres
Bioswale Area	1,715 sq-ft
Treatment Area / Drainage Area	5.3%
NRCS Hydrologic Soil Group	D
Assumed Infiltration Rate	0.25 in/hr
Composite Runoff Coefficient(C)	0.49
Area-weighted Abstraction	0.15 inches
Assumed Ponding Depth	6 inches
Assumed Soil Media Depth	24 inches
85th% Design Runoff Volume	750 ft^3
Approximate Impervious Area Disconnection	0.4 ac

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Concept Plan Cost Estimates

METHODOLOGY

A planning level cost estimate was prepared for each of the five (5) individual Concept Plans. The cost estimate includes necessary planning, design, permits, construction, and operation and maintenance, energy, and post construction performance monitoring. A Complexity cost multiplier was applied to each project to capture additional costs associated with known project constraints related to biologic, resource, and/or geologic constraints.

Table 1 summarizes the preliminary planning level cost estimates that will be further evaluated and updated as the project concepts are further developed.

Table 1. Preliminary Planning Level Cost Estimates

Cost Estimates			Project									
			Vallejo Concept #1		Vallejo Concept #2		Vallejo Concept #3		Suisun City Concept #1		Suisun City Concept #2	
Capital Costs			City Hall/ Library Parking Lot GSI Retrofit		City Parking Lot H		Mono Street Corps Yard		Amtrack Park & Ride		Civic Center / Driftwood Drive Parking Lot	
Description	Unit	Unit Price	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost
Mobilization/Demobilization	LS	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000	1	$5,000
Excavation	CY	$20	3000	$60,000	400	$8,000	200	$4,000	0	$0	0	$0
Offhaul and Disposal	CY	$20	3000	$60,000	400	$8,000	200	$4,000	0	$0	0	$0
Inlet/Outlet	EA	$15,000	3	$45,000	2	$30,000	1	$15,000	2	$30,000	1	$15,000
Pipeline	LF	$100	0	$0	0	$0	0	$0	0	$0	0	$0
Manhole	LS	$5,000	0	$0	0	$0	0	$0	0	$0	0	$0
Staging and Demolition	SF	$5	2300	$11,500	1600	$8,000	200	$1,000	1800	$9,000	700	$3,500
Erosion Control	SF	$1	4500	$4,500	3100	$3,100	400	$400	7110	$7,110	2580	$2,580
Landscaping	SF	$15	4500	$67,500	3100	$46,500	1260	$18,900	7110	$106,650	2580	$38,700
Hardscape Improvements	LF	$25	200	$5,000	500	$12,500	0	$0	400	$10,000	0	$0
Permeable Pavement	SF	$10	21780	$217,800	0	$0	0	$0	0	$0	0	$0
Subtotal Costs				**$476,300**		**$121,100**		**$48,300**		**$167,760**		**$64,780**
Contingency	20%			$95,260		$24,220		$9,660		$33,552		$12,956
Complexity			20%	$95,260	20%	$24,220	15%	$7,245	15%	$25,164	5%	$3,239
Engineering Design	15%			$71,445		$18,165		$7,245		$25,164		$9,717
Construction Management	10%			$47,630		$12,110		$4,830		$16,776		$6,478
Administrative, Permitting, and Legal	10%			$47,630		$12,110		$4,830		$16,776		$6,478
		TOTAL		**$833,525**		**$211,925**		**$82,110**		**$285,192**		**$103,648**
Planning Level Cost Estimate Range	(+)	50%		$1,250,288		$317,888		$123,165		$427,788		$155,472
	(-)	35%		$541,791		$137,751		$53,372		$185,375		$67,371
O&M Costs												
Labor	hr	$50	96	$4,800	96	$4,800	48	$2,400	96	$4,800	96	$4,800
Material	EA	$500	1	$500	1	$500	1	$500	1	$500	1	$500
Monitoring and Reporting	hr	$100	4	$400	4	$400	4	$400	4	$400	4	$400
		TOTAL		**$5,700**		**$5,700**		**$3,300**		**$5,700**		**$5,700**
Equivalent Annual Cost												
Interest	i	0.05	$72,590		$22,710		$9,890		$28,590		$14,020	
Years	n	20										

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FAIRFIELD CONCEPT #1 - WATERMAN BLVD GREEN STREET.

Project Description

The proposed project will retrofit an existing sidewalk and landscape strip along the north side of Waterman Blvd. with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The length of sidewalk proposed for retrofit is approximately 4,250 feet long and currently includes standard drainage infrastructure; curbs and gutters that allow runoff to flow into the storm drain system. This area is well suited for retrofit because of the need for sidewalk repairs.

The proposed project would add bioretention features between the existing roadway and sidewalk, at strategic locations along the retrofit corridor. Stormwater would enter the bioretention areas via curb cuts and overflow would be directed back into the storm drain system.

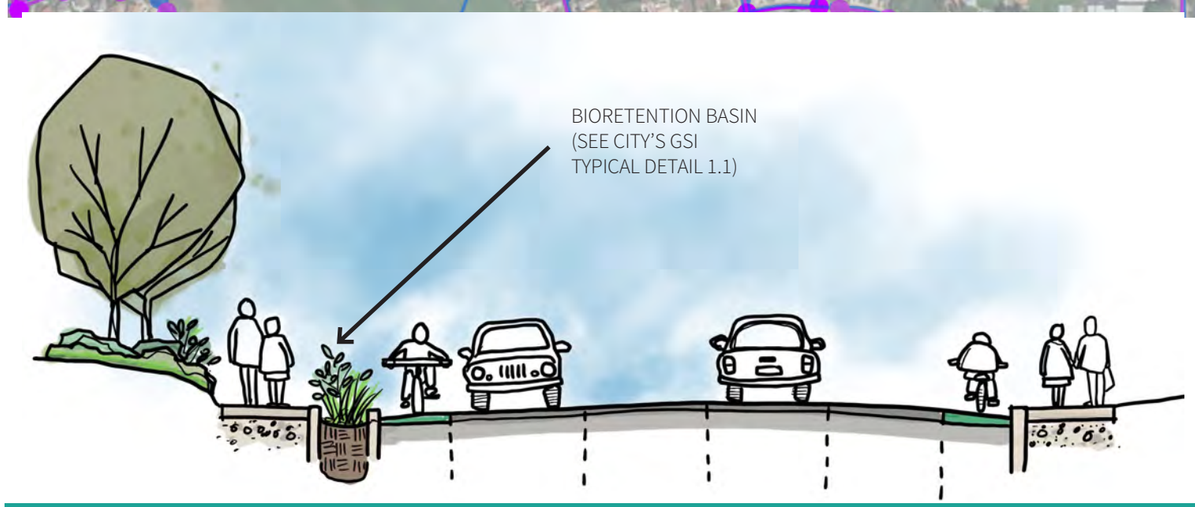

0 300 600 1,200 Feet

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Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water
- Green Street Retrofit

Key Map

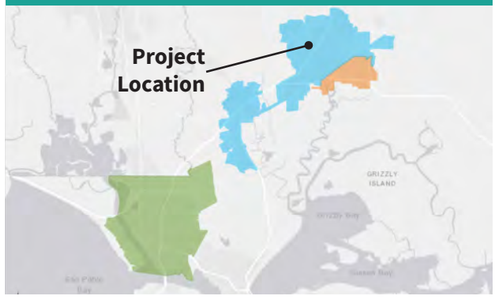

Photo:
From this example green street in Seaside, CA, curb cuts (see City detail 3.1) direct road runoff into the new brioretention area for infiltration and treatment of stormwater.

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FAIRFIELD CONCEPT #2 - CEMENT HILL RD GREEN STREET

Photo: Existing sidewalk condition on north/northwest side of Cement Hill Road, proposed for retrofit with GSI.

Project Description

The proposed project will retrofit an existing sidewalk and landscape strip along the north / northwest side of Cement Hill Road with green stormwater infrastructure. These improvements will reduce the amount and improve the quality of stormwater discharging into the San Francisco Bay by slowing and reducing runoff and allowing it to infiltrate into the soil.

The length of sidewalk proposed for retrofit is approximately 4,000 feet long and currently includes standard drainage infrastructure; curbs and gutters that allow runoff to flow into the storm drain system. This area is well suited for retrofit because of the need for sidewalk repairs and to provide safe access to Fairfield High School. The proposed project would add bioretention features between the existing roadway and sidewalk.

Existing street tress along Cement Hill Road are not well suited to the available space or climate, and at many locations roots are causing sidewalk upheaval and uneven surfaces. Based on an initial evaluation, if not removed and replaced the existing trees will likely continue to obstruct the path of travel, their health decline, and require significant additional maintenance in the next 10 years.

Assessment by a qualified arborist is recommended as a next step to identify those trees unsuitable for long-term survival, that should removed and replaced with appropriate species. New bioretention features would be constructed within newly available spaces and replacing damaged sidewalk areas. Stormwater would enter the bioretention areas via curb cuts and overflow would be directed back into the storm drain system.

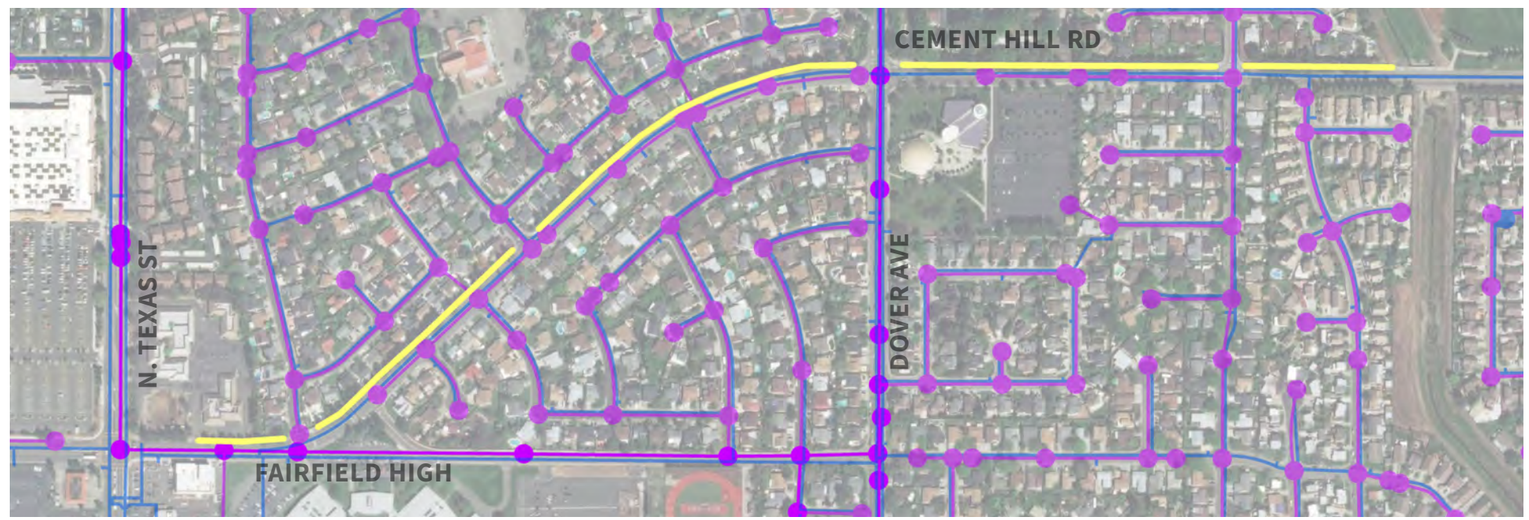

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water
- Green Street Retrofit

Key Map

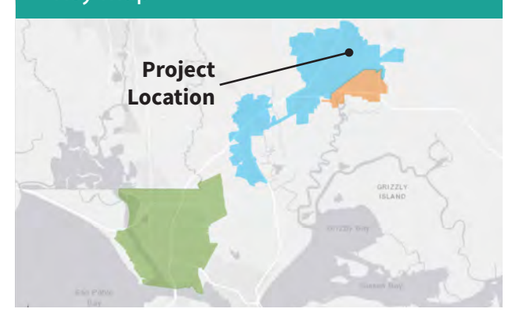

0 250 500 1,000 Feet

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FAIRFIELD CONCEPT #3 - PG&E SUBSTATION

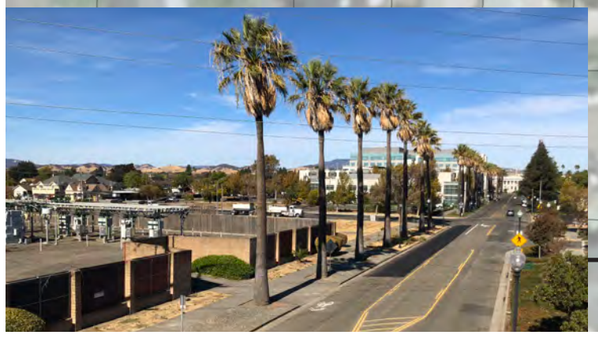

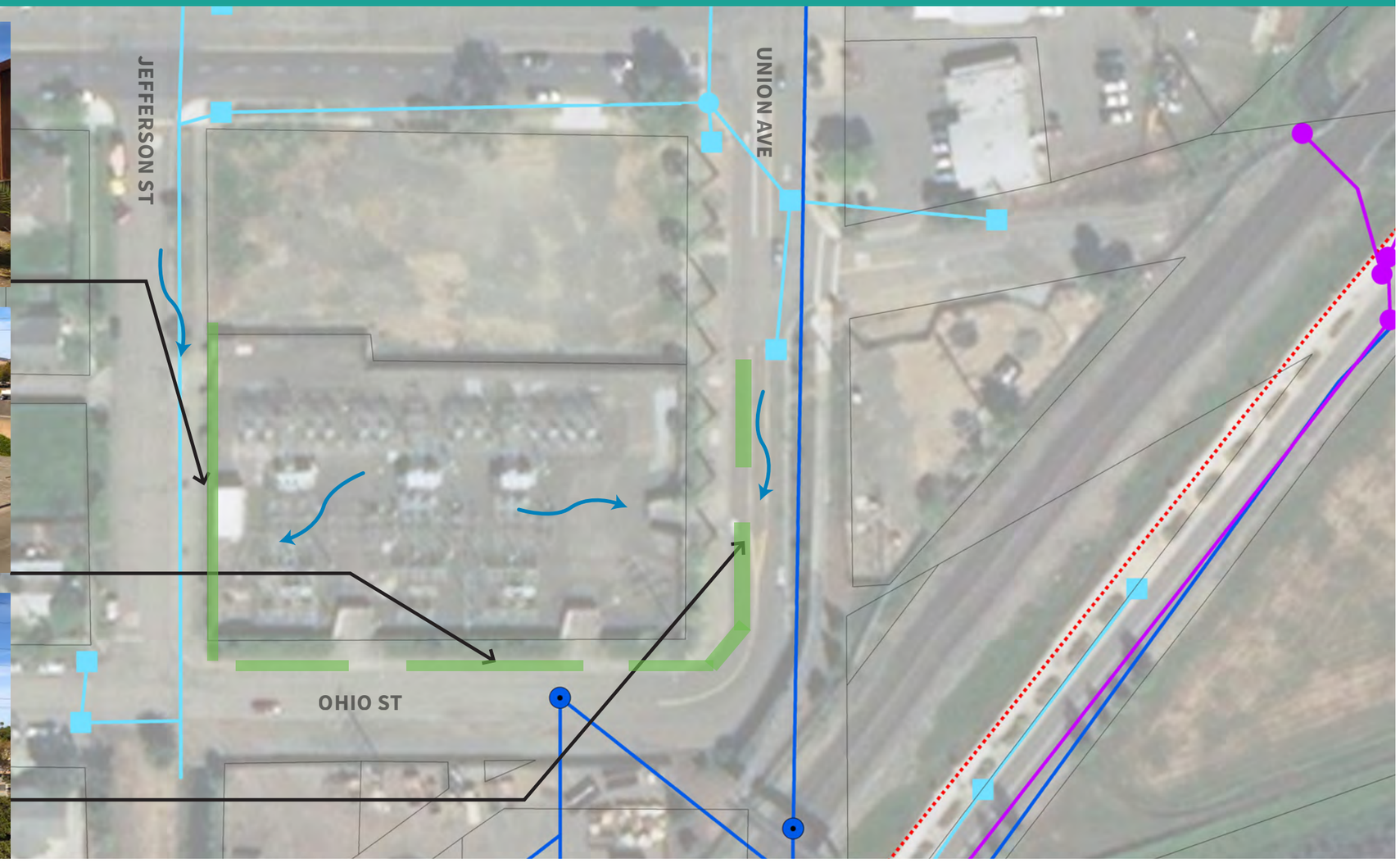

Legend

- Flow of Water
- Stormwater Inlet
- Bioretention & Bioinfiltration Basin
- Sanitary Sewer
- Storm Drain
- Drinking Water

Key Map

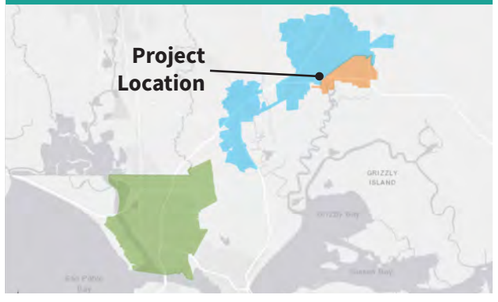

0 50 100 200 Feet

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GSI Standard Specification and Design Details

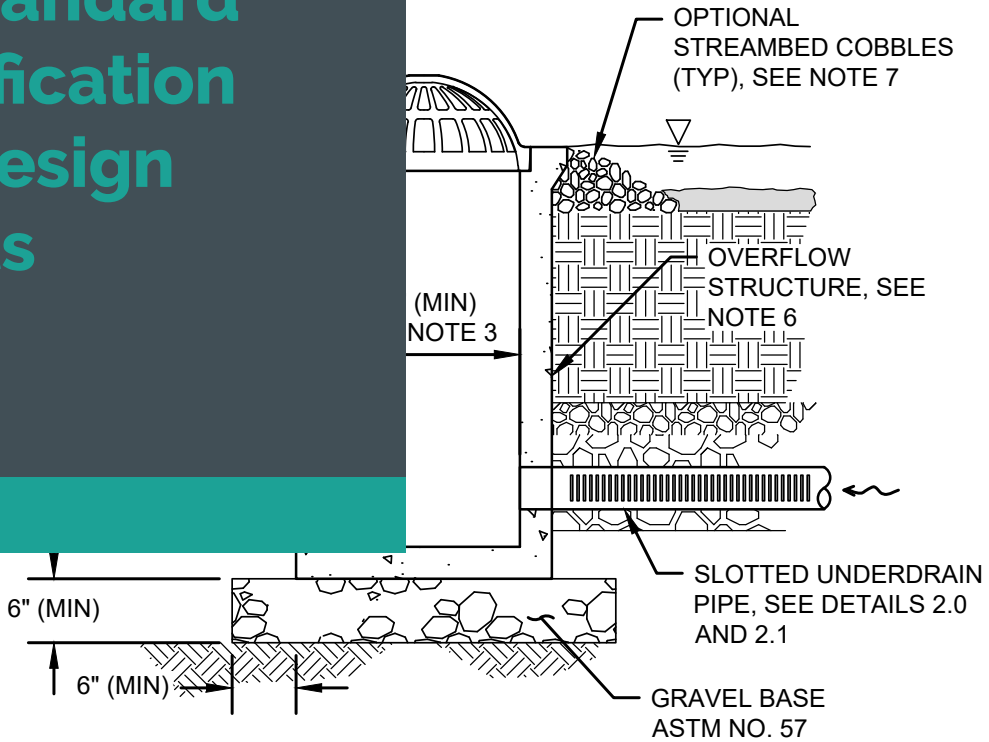

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GREEN STORMWATER INFRASTRUCTURE STANDARD SPECIFICATION AND DESIGN DETAILS

These green stormwater infrastructure details and specifications have been selected to support integration of GSI into standard practices, for example in street design, municipal capital projects, and to support private development review. Implementation of a GSI strategy will require cross departmental coordination with planning, operations and maintenance. These details and specifications can support the design and construction of GSI practices in the Permittees jurisdictions.

How to use these GSI typical details[20]

These typical details and specifications were developed to be revised and customized as needed for each individual project by design professionals. They show typical configurations, rather than a required city standard configuration. This distinction is deliberate. We recognize that to create functional, contextual, and aesthetic green infrastructure projects, design professionals must use their professional judgment and creative thinking to be responsive to each site-specific condition.

AutoCAD drawings of these typical details are provided so that design professionals must modify the plan, sections, call-outs, and/or construction notes to address the projects site-specific conditions.

These typical details are formatted, organized, and developed with the necessary informational tools to guide the design professional through the proper selection, layout, and design of GSI best management practices (BMPs) and the selection of appropriate site-specific BMP component details (i.e., inlets, outlets, and edge treatments, etc.).

Design professionals using the AutoCAD drawings must review and adjust the details and construction notes to address their site-specific conditions . To allow for site-specific design adjustments the typical details are developed as "not for construction" drawings. Title blocks are provided for document organization and reference only.

Design Detail	Detail Number
Bioretention & Biofiltration Basins	
Designer Notes	1.0
Roadside Section	1.1
Parcel Section	1.2
Bioretention & Biofiltration Components - Underdrains	
Designer Notes	2.0
Underdrains	2.1
Bioretention & Biofiltration Components - Inlets	
Designer Notes	3.0
Curb Cut Inlet	3.1
Bioretention & Biofiltration Components - Outlets	
Designer Notes	4.0
Curb Cut Outlet	4.1
Outlet Curb Cut with Trench Drain	4.2
Overflow Structure	4.3
Permeable Plavement	
Designer Notes (1/2)	5.0
Designer Notes (2/2)	5.1
Key Map	5.2
Paver Section	5.3
Pervious Concrete Section	5.4
Porous Asphalt Section	5.5

SPECIFICATIONS

Specifications for Bioretention, Pervious Concrete, Porous Asphalt, and Permeable Pavers are located in Appendix A.

20 Adapted from Green Infrastructure Typical Details, SFPUC Stormwater Management Requirements and Design Guidelines, September 2016, Version 2.0

PURPOSE:

BIORETENTION BASINS CONTROL PEAK FLOWS AND VOLUMES OF STORMWATER RUNOFF BY PROVIDING SURFACE, SUBSURFACE STORAGE AND INFILTRATION INTO NATIVE SOIL. WATER IS ALSO TREATED AS IT FILTERS THROUGH THE BIORETENTION SOIL.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT PLAN AND SECTION DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. FACILITY AREA, PONDING DEPTH, BIORETENTION SOIL DEPTH, AND AGGREGATE STORAGE DEPTH MUST BE SIZED TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS.
3. PONDING AND BIORETENTION SOIL DRAWDOWN TIME (I.E., TIME FOR MAXIMUM SURFACE PONDING TO DRAIN THROUGH THE BIORETENTION SOIL AFTER THE END OF A STORM) RECOMMENDATIONS:
   - 3 - 12 HOUR PONDING AND BIORETENTION SOIL DRAWDOWN (TYPICAL)
   - 24 HOUR MAXIMUM PONDING AND BIORETENTION SOIL DRAWDOWN
4. FACILITY DRAWDOWN TIME (I.E. TIME FOR SURFACE PONDING TO DRAIN THROUGH THE ENTIRE SECTION INCLUDING AGGREGATE STORAGE AFTER THE END OF A STORM) REQUIREMENTS:
   - 48 HOUR MAXIMUM FACILITY DRAWDOWN (I.E. ORFICE CONTROLLED SYSTEM OR EXTENDED STORAGE DEPTH WITHIN INFILTRATION SYSTEM).
5. THE FOLLOWING GUIDELINES APPLY TO RIGHT-OF-WAY APPLICATIONS:
   - BULB OUT CURB TRANSITIONS SHALL CONFORM TO CITY STANDARDS.
   - WHEN FACILITY CONSTRUCTION IMPACTS EXISTING SIDEWALK, ALL SAW CUTS MUST ADHERE TO CITY REQUIREMENTS. SAW CUTS SHOULD BE ALONG SCORE LINES AND ANY DISTURBED SIDEWALK FLAGS SHOULD BE REPLACED IN THEIR ENTIRETY.
   - DESIGNER TO SPECIFY TRANSITION OF PLANTER TO TOP OF CURB ELEVATION BETWEEN CURB CUTS OR CONTINUOUS 6 INCH REVEAL AT CURB EDGE.
6. UP TO TWO PLANTERS MAY BE CONNECTED IN SERIES, IN LIEU OF MULTIPLE INLETS, PROVIDED THE CONNECTION IS A TRENCH DRAIN OR EQUAL SURFACE CONVEYANCE AND IS ADEQUATELY SIZED TO CONVEY FLOWS.
7. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY ASSET PROTECTION STANDARDS AND OTHER UTILITY PROVIDERS REQUIREMENTS.

RELATED SPECIFICATIONS	CSI NO.
BIORETENTION: - BIORETENTION SOIL MIX - AGGREGATE STORAGE - MULCH - STREAMBED COBBLES	33 47 27

RELATED COMPONENTS	
UNDERDRAINS:	2.0 - 2.1
INLETS:	3.0 - 3.2
OUTLETS:	4.0 - 4.3

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ FACILITY WIDTH, LENGTH, SLOPES (INCLUDING SIDE, CROSS, AND LONGITUDINAL), AND SHAPE
- ☐ DEPTH OF BIORETENTION SOIL
- ☐ DEPTH AND TYPE OF GRAVEL STORAGE, IF ANY
- ☐ PLANTER SURFACE ELEVATION (TOP OF BIORETENTION SOIL) AT UPSLOPE AND DOWNSLOPE ENDS OF FACILITY
- ☐ CONTROL POINTS AT EVERY CORNER OF FACILITY AND POINT OF TANGENCY
- ☐ DIMENSIONS AND DISTANCE TO EVERY INLET, OUTLET, SIDEWALK NOTCH, ETC.
- ☐ ELEVATIONS OF EVERY INLET, OUTLET, STRUCTURE RIM AND INVERT, AND SIDEWALK NOTCH
- ☐ TYPE AND DESIGN OF FACILITY COMPONENTS (E.G., EDGE TREATMENTS, INLETS/GUTTER MODIFICATIONS, UTILITY CROSSINGS, LINER, AND PLANTING DETAILS)

LAYOUT REQUIREMENTS:

1. FOR RIGHT-OF-WAY APPLICATIONS, REFER TO THE CITY STANDARD ACCESSIBILITY REQUIREMENTS FOR CONSTRUCTION OF COURTESY STRIP, THROUGHWAY, PARKING SPACE AND ACCESSIBLE PATH REQUIREMENTS.
2. LOCATE CURB CUTS AND GUTTER MODIFICATIONS TO AVOID CONFLICTS WITH ACCESSIBILITY REQUIREMENTS (E.G., LOCATE OUTSIDE OF CROSSWALKS).

BIORETENTION & BIOINFILTRATION BASINS DESIGNER NOTES	1.0

NOT FOR CONSTRUCTION

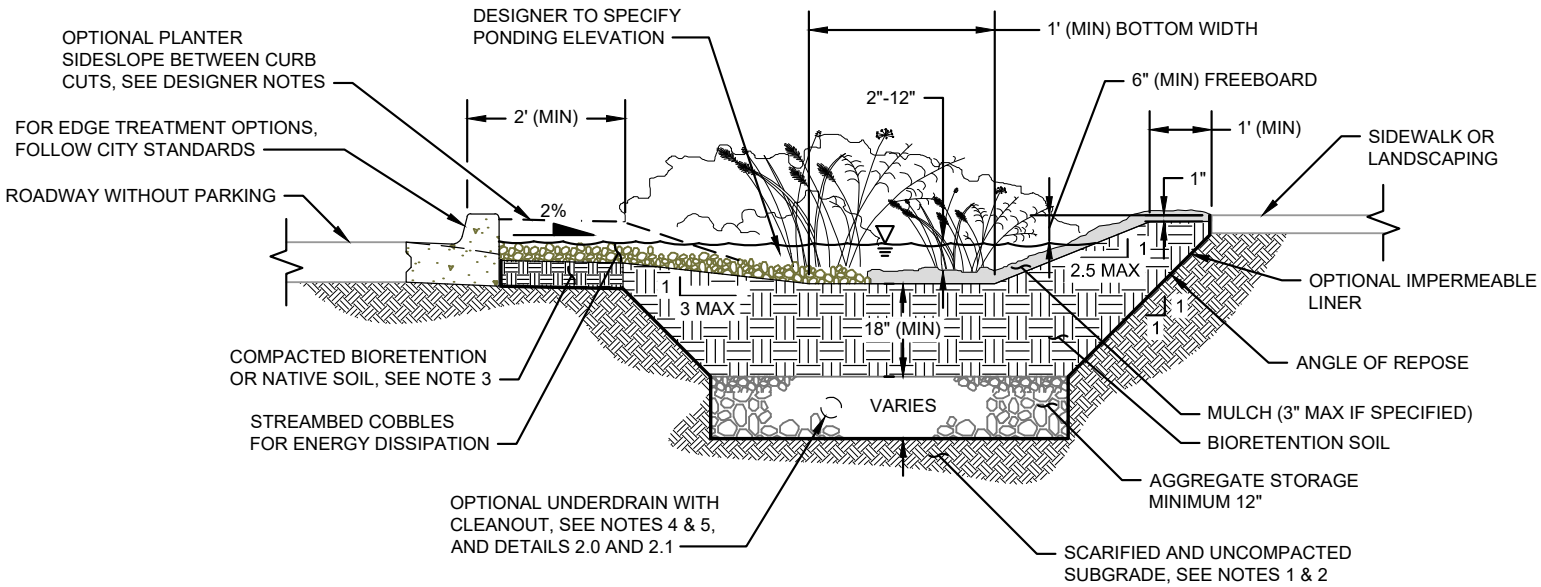

CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. COMPACT BIORETENTION SOIL IMMEDIATELY BEHIND CURB TO 90% OF MAXIMUM DENSITY PER STANDARD PROCTOR TEST (ASTM D698).
4. UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.
5. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
6. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

BIORETENTION & BIOINFILTRATION BASINS ROADSIDE SECTION	1.1

NOT FOR CONSTRUCTION

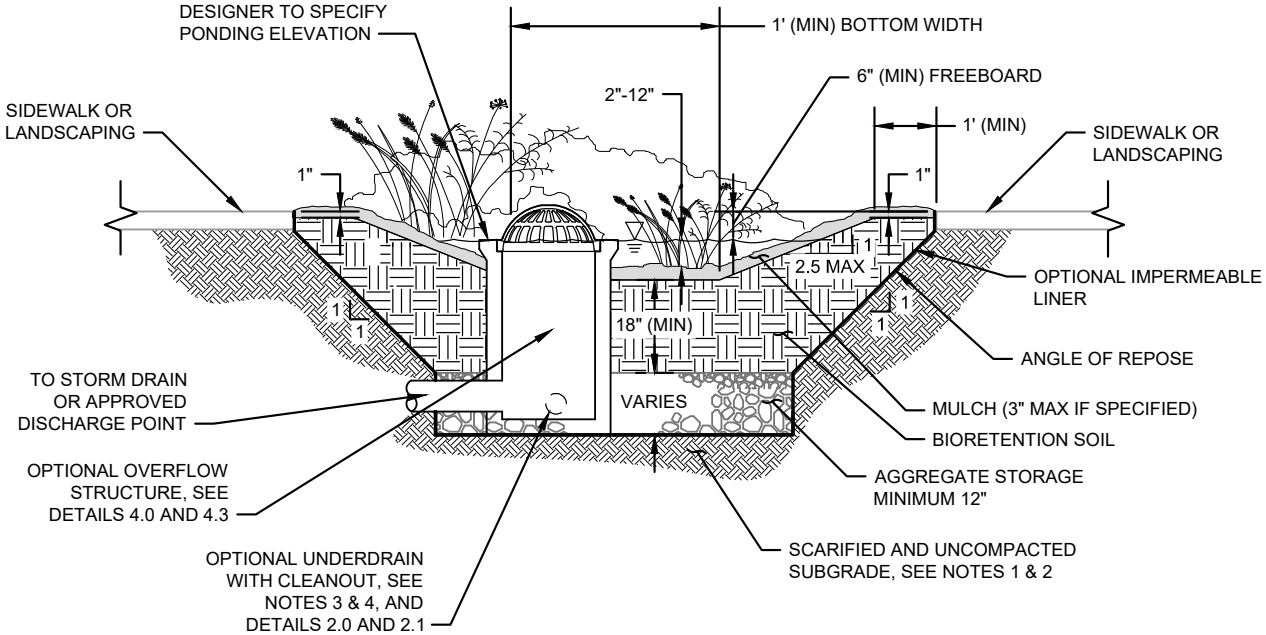

CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.
4. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
5. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

BIORETENTION & BIOINFILTRATION BASINS PARCEL SECTION	1.2

NOT FOR CONSTRUCTION

PURPOSE:

UNDERDRAINS ARE USED TO COLLECT STORMWATER THAT HAS BEEN FILTERED THROUGH BIORETENTION SOIL AND CONVEY THAT TREATED STORMWATER TO A DESIGNATED OUTLET (E.G., PLANTER OVERFLOW STRUCTURE).

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER SHOULD INCLUDE UNDERDRAINS IN FACILITY DESIGN IN THE FOLLOWING SCENARIOS:
   - INFILTRATION IS PROHIBITED OR IMPRUDENT (E.G., FACILITY NEAR SENSITIVE INFRASTRUCTURE OR STEEP SLOPES, RISK OF CONTAMINATION IS HIGH OR SITE GROUNDWATER/SOILS ARE CONTAMINATED, THERE IS POOR INFILTRATION CAPACITY DUE TO SOILS OR HIGH GROUNDWATER).
   - SUBGRADE MEASURED (I.E., UNCORRECTED) INFILTRATION RATE IS LESS THAN 0.5 INCHES PER HOUR.
   - MAXIMUM SURFACE POOL DRAWDOWN PERIOD CANNOT BE ACHIEVED.
2. AN OUTLET STRUCTURE AND/OR CLEANOUT(S) TO ALLOW MAINTENANCE ACCESS TO ALL PIPES IS REQUIRED FOR FACILITIES WITH UNDERDRAINS.
3. UNDERDRAIN PIPE SHALL HAVE A SMOOTH INTERIOR WALL TO FACILITATE MAINTENANCE WITH PRESSURIZED WATER OR ROOT CUTTING EQUIPMENT.
4. DESIGNER SHOULD CONSIDER THE INSTALLED ELEVATION OF THE UNDERDRAIN PIPE WITHIN THE BIORETENTION FACILITIES AGGREGATE STORAGE LAYER TO PROMOTE INFILTRATION, BELOW THE UNDERDRAIN, WHEN FEASIBLE. DESIGNER SHOULD ALSO CONSIDER THE USE OF ORIFICES OR OTHER CONTROL STRUCTURES TO PROVIDE ADDITIONAL INFILTRATION AND FLOW CONTROL BENEFITS WHERE APPLICABLE.
5. PIPE MATERIAL SHALL BE DESIGNED PER CITY STANDARDS.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ UNDERDRAIN MATERIAL TYPE AND SIZE
- ☐ UNDERDRAIN ELEVATION, SLOPE, AND LOCATION WITHIN BASIN OR PLANTER
- ☐ PIPE BEDDING MATERIAL SPECIFICATION (I.E. AGGREGATE STORAGE LAYER)
- ☐ DISCHARGE LOCATION TO OVERFLOW STRUCTURE
- ☐ CLEANOUT LOCATIONS AND MAINTENANCE ACCESS
- ☐ ORIFICE FLOW CONTROL STRUCTURE(S), AS APPLICABLE

BIORETENTION & BIOINFILTRATION COMPONENTS UNDERDRAINS - DESIGNER NOTES	2.0

NOT FOR CONSTRUCTION

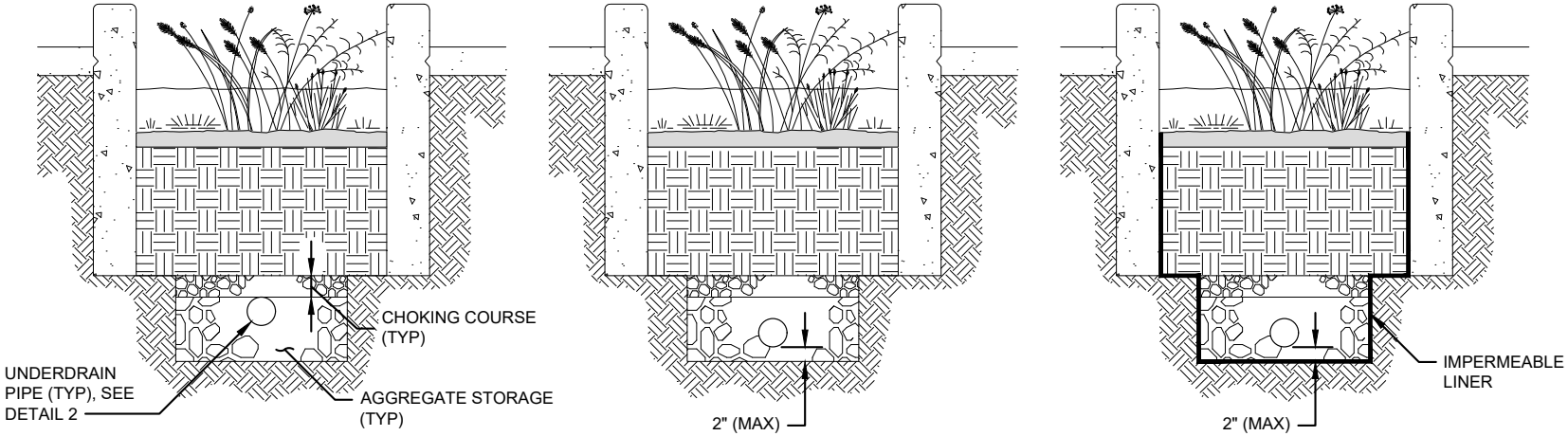

ELEVATED UNDERDRAIN
TYPE B/C SOILS (WHEN REQUIRED)

BOTTOM UNDERDRAIN
TYPE D SOILS

UNDERDRAIN WITH LINER
WHERE INFILTRATION PROHIBITED

UNDERDRAIN PLACEMENT ALTERNATIVES

CONSTRUCTION NOTES:

1. UNDERDRAIN PIPE SHALL BE SLOTTED PVC SDR 35 OR ACCEPTABLE SUBSTITUTE MATERIAL PER ENGINEERS SPECIFICATION.
2. ALL MATERIAL AND WORKMANSHIP FOR UNDERDRAINS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
3. SET CROWN OF UNDERDRAIN PIPE AT OR BELOW BOTTOM OF CHOKING COURSE. SEE DESIGNER NOTES FOR ADDITIONAL GUIDANCE ON LOCATING UNDERDRAIN PIPE IN GRAVEL STORAGE.
4. LONGITUDINAL SLOPE OF UNDERDRAIN PIPE SHALL BE 0.5% MINIMUM.
5. UNDERDRAIN PIPE SHALL BE SLOTTED PVC SDR 35 OR ACCEPTABLE SUBSTITUTE MATERIAL PER ENGINEERS SPECIFICATION. SINGLE WALL AND DUAL WALL CORRUGATED HDPE PIPE (AASHTO M252 AND M294 TYPES C, S, AND D) ARE NOT ACCEPTABLE.
6. UNDERDRAIN PIPE SHALL BE SLOTTED TYPE, MEASURING 0.032 INCH WIDE (MAX), SPACED AT 0.25 INCH (MIN), AND PROVIDING A MINIMUM INLET AREA OF 5.0 SQUARE INCH PER LINEAR FOOT OF PIPE.
7. SLOTS SHALL BE ORIENTED PERPENDICULAR TO LONG AXIS OF PIPE, AND EVENLY SPACED AROUND CIRCUMFERENCE AND LENGTH OF PIPE.

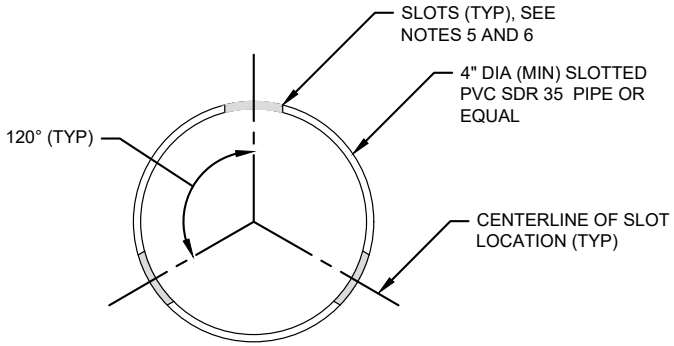

SLOTTED UNDERDRAIN PIPE 2

BIORETENTION & BIOINFILTRATION COMPONENTS UNDERDRAINS	2.1

NOT FOR CONSTRUCTION

PURPOSE:

CURB CUTS SERVE AS INLETS TO CONVEY STORMWATER RUNOFF TO A BIORETENTION FACILITY. CURB CUTS ARE TYPICALLY USED IN PLANTER APPLICATIONS WHEN THE FACILITY IS IMMEDIATELY ADJACENT TO THE ROADWAY (I.E. NO COURTESY STRIP), PROVIDING AN OPENING TO INTERCEPT AND CONVEY STORMWATER FROM THE GUTTER TO THE PLANTER. CURB CUT INLETS INCLUDE MODIFICATIONS TO THE GUTTER TO HELP DIRECT FLOW INTO THE FACILITY.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. THE DESIGNER MUST ENSURE THAT CURB CUT INLETS ARE ADEQUATELY SIZED, SPACED, AND SLOPED TO SATISFY CITY HYDRAULIC REQUIREMENTS. THE CURB CUT OPENING WIDTH MUST BE SIZED BASED ON THE CATCHMENT AREA, LONGITUDINAL SLOPE ALONG THE CURB, AND THE CROSS SLOPE OF THE GUTTER OR ADJACENT PAVEMENT AT THE INLET. SEE SIZING EQUATIONS AND NOMOGRAPHS FOR CURB OPENING INLETS IN THE U.S. DEPARTMENT OF TRANSPORTATION HYDRAULIC ENGINEERING CIRCULAR NO. 22.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ CURB CUT DIMENSIONS
- ☐ FRAME AND GRATE TYPE/MATERIAL AND DIMENSIONS
- ☐ CHANNEL DIMENSIONS
- ☐ CONTROL ELEVATIONS FOR OPENINGS AT GUTTER AND PLANTER WALL

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - DESIGNER NOTES	3.0

NOT FOR CONSTRUCTION

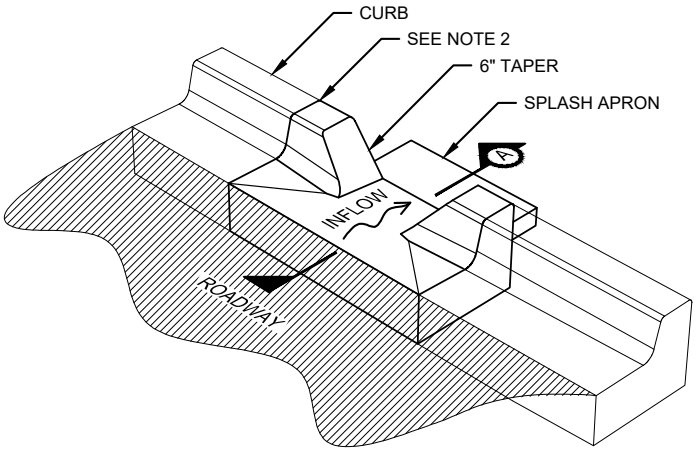

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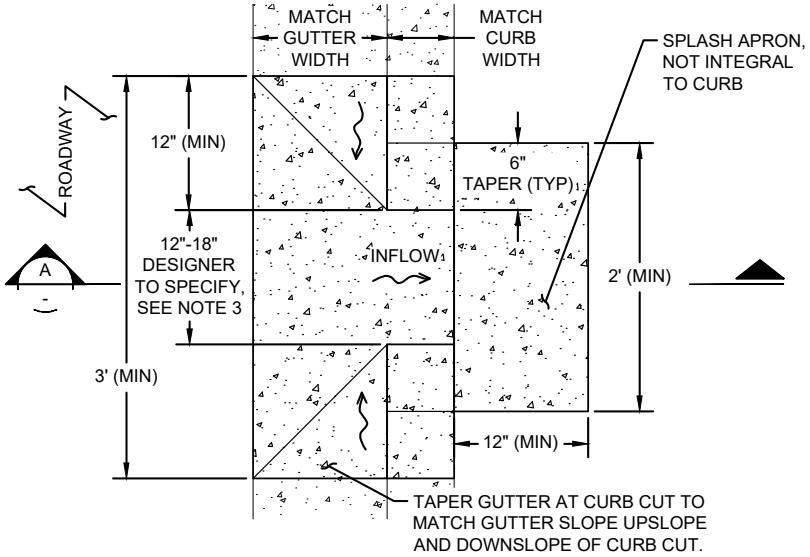

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
3. INLET CURB CUT WIDTH SHALL BE 18" ON GUTTER SLOPES ≥ 5%.

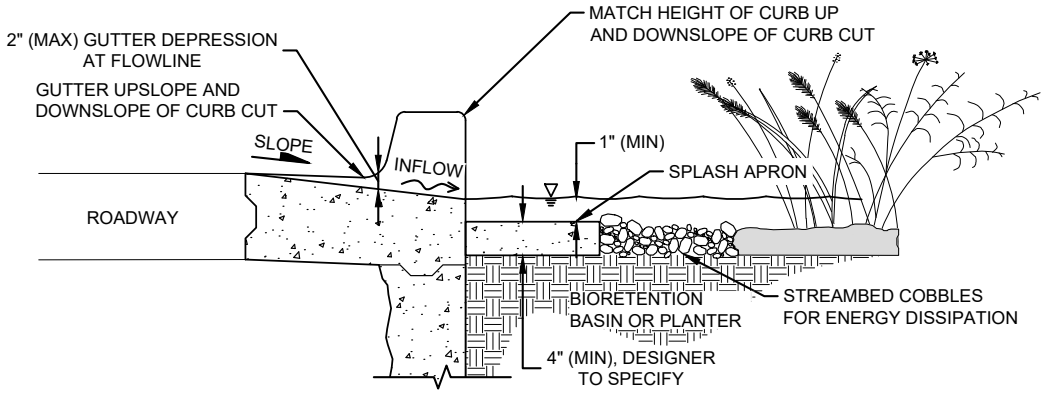

SECTION A

INLET - CURB CUT TYPE 1 (1)

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - CURB CUT INLET	3.1

NOT FOR CONSTRUCTION

D-09782
9840

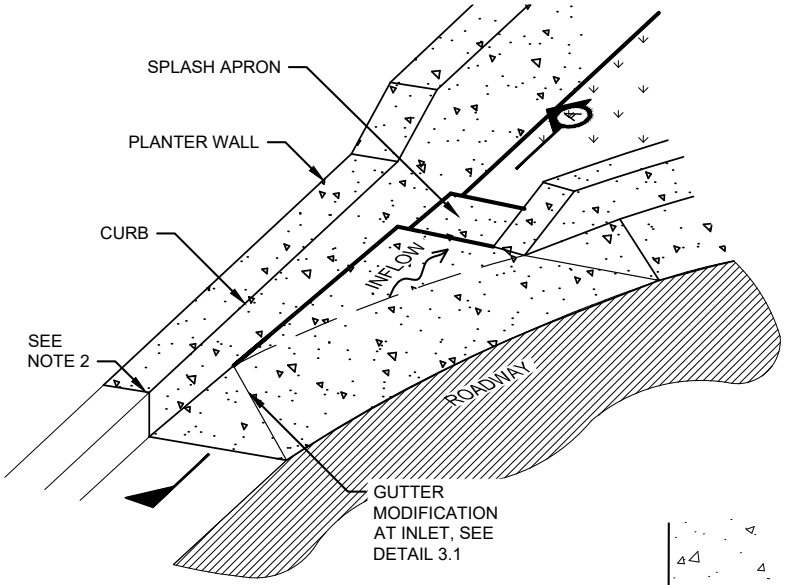

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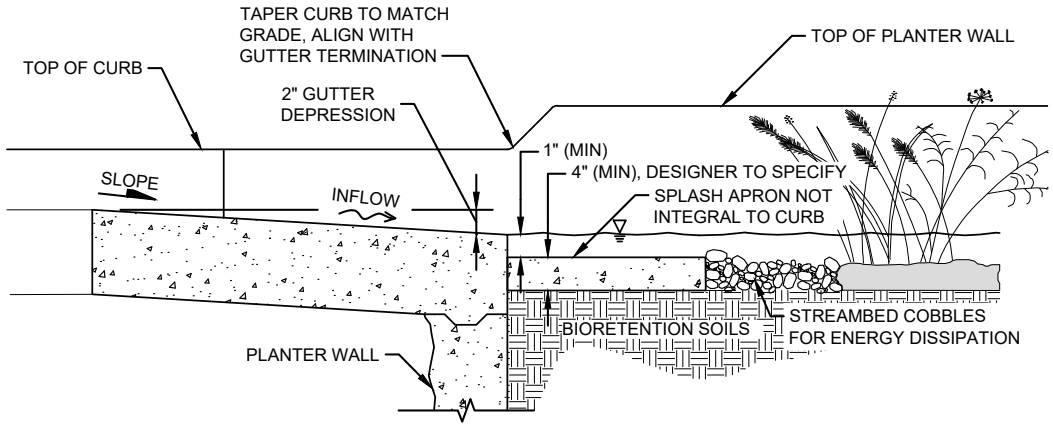

SECTION A

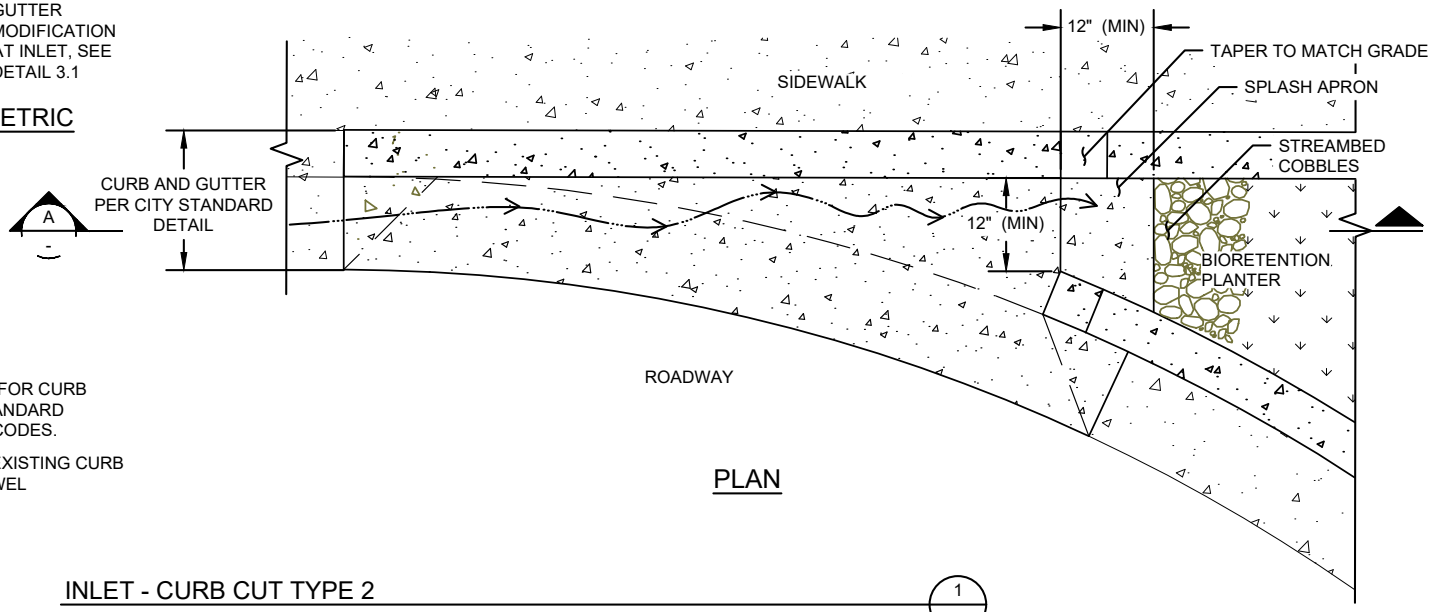

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.

INLET - CURB CUT TYPE 2 (1)

BIORETENTION & BIOINFILTRATION COMPONENTS INLETS - CURB CUT INLET AT BULB OUT	3.2

NOT FOR CONSTRUCTION

PURPOSE:

BIORETENTION OUTLET STRUCTURES CONVEY SURFACE AND/OR SUBSURFACE OUTFLOWS FROM A BIORETENTION FACILITY TO AN APPROVED DISCHARGE LOCATION.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. THE DESIGNER MUST SIZE CURB CUT, GRATE, AND OTHER OVERFLOW STRUCTURE FEATURES TO SATISFY CITY HYDRAULIC REQUIREMENTS.
3. AN OUTLET STRUCTURE OR CLEANOUT(S) THAT ALLOWS MAINTENANCE ACCESS TO ALL PIPES IS REQUIRED FOR FACILITIES WITH UNDERDRAINS.
4. IF SITE CONSTRAINTS NECESSITATE STORM DRAIN PIPE IN AN AREA SUBJECT TO VEHICULAR TRAFFIC OR OTHER LOADING, APPROPRIATE COVER DEPTH AND PIPE MATERIAL MUST BE SPECIFIED.
5. OUTLET PIPES MUST BE EQUIPPED WITH CLEANOUTS, SEE CITY STANDARD CLEANOUT DETAIL(S).
6. DESIGNER SHALL EVALUATE BUOYANCY OF STRUCTURES FOR SITE SPECIFIC APPLICATION AND SPECIFY THICKENED OR EXTENDED BASE / ANTI-FLOTATION COLLAR, AS NECESSARY.
7. SAND TRAP REQUIREMENTS (12 INCH SUMP AND CAST IRON HOOD/TRAP) MAY BE ELIMINATED WHEN OVERFLOW DIRECTLY DISCHARGES TO DOWNSTREAM (CITY) SAND TRAP.
8. LOCATE ALL OVERFLOW PIPES AT AN ELEVATION HIGHER THAN THE SEWER HYDRAULIC GRADE LINE TO PREVENT BACKFLOW INTO THE BIORETENTION FACILITY.

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ OUTLET STRUCTURE TYPE/MATERIAL, DIAMETER, AND DEPTH
- ☐ ATRIUM GRATE MANUFATURER, MODEL NO., AND SIZE
- ☐ SAND TRAP COMPONENTS AND DIMENSIONS
- ☐ FRAME AND GRATE TYPE, MODEL NO., AND SIZE
- ☐ CONTROL ELEVATIONS FOR OUTLET STRUCTURE RIMS
- ☐ MATERIAL AND DIAMETER FOR ALL PIPES
- ☐ WATER TIGHT CONNECTOR TYPE FOR ALL WALL PENETRATIONS (E.G., GROUTED, COMPRESSION, BOOT)

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - DESIGNER NOTES	4.0

NOT FOR CONSTRUCTION

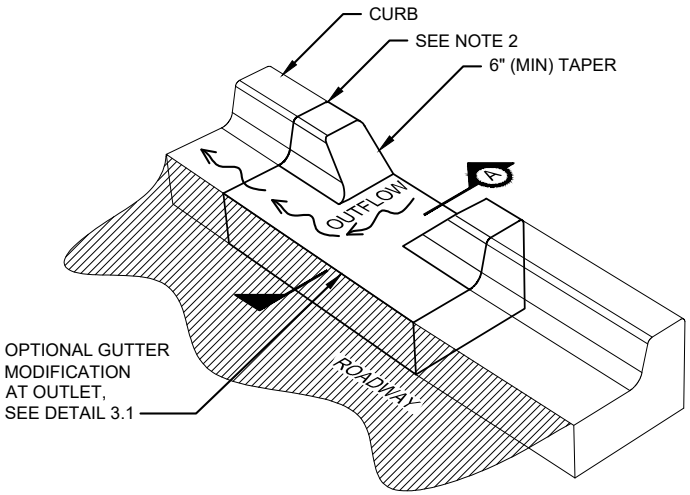

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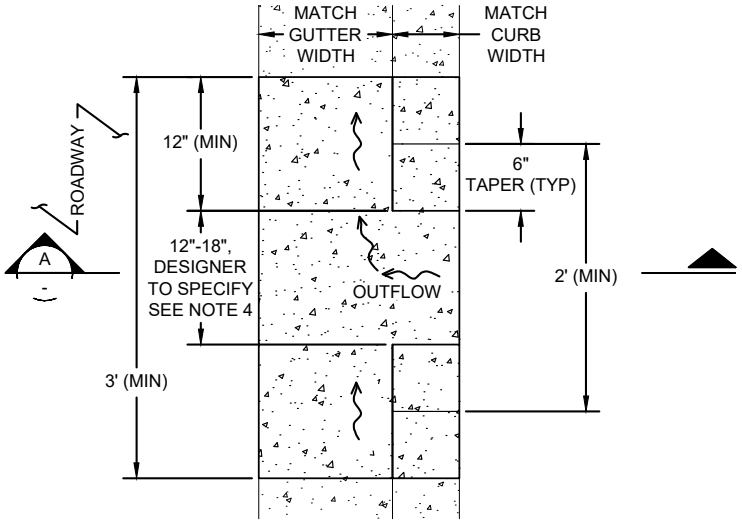

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
3. MATCH GUTTER SLOPE UP AND DOWNSLOPE OF CURB CUT SLOPE SIMILAR TO INLET DETAIL 3.1 UNLESS MODIFYING GUTTER.
4. OUTLET CURB CUT WIDTH SHALL BE 18" ON GUTTER SLOPES ≥ 5%.

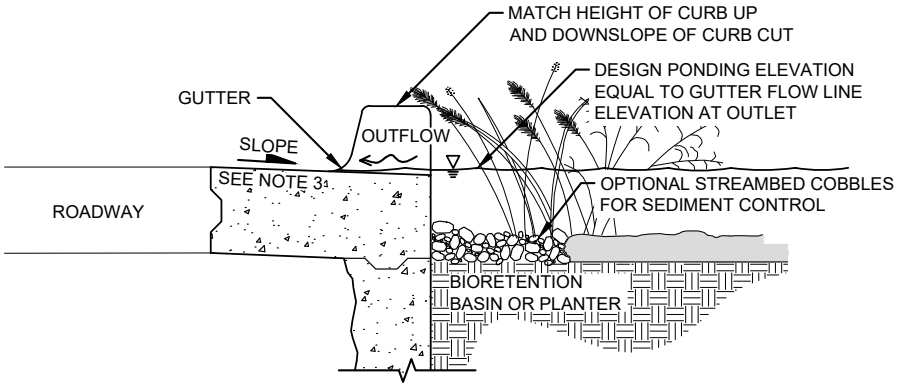

SECTION A

OUTLET - CURB CUT (1)

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - CURB CUT OUTLET	4.1

NOT FOR CONSTRUCTION

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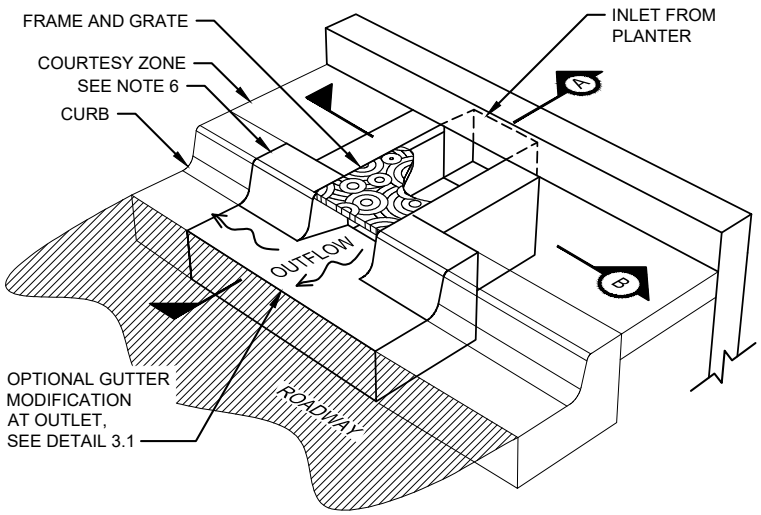

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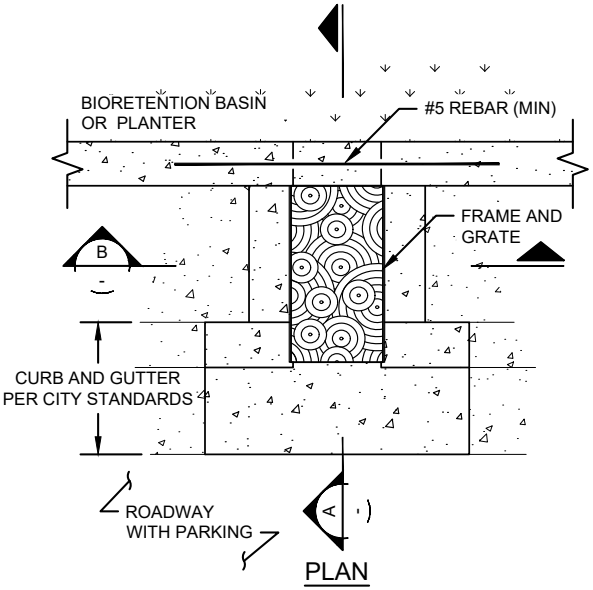

PLAN

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR TRENCH DRAIN ASSEMBLY SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. MATCH GUTTER SLOPE UP AND DOWNSLOPE (UNLESS MODIFYING GUTTER SLOPE SEE INLET DETAIL 3.1).
3. SLOPE TO PROVIDE AT LEAST 1 INCH DROP OVER LENGTH OF CHANNEL OR A MINIMUM OF 2 PERCENT, WHICHEVER IS LARGER.
4. ALL TRENCH GRATES SHALL BE REMOVABLE, RATED PER THE ANTICIPATED LOADING, AND BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM, FLUSH OR RECESSED IN GRATE.
5. HORIZONTAL CONTROL JOINTS SHALL BE PROVIDED EVERY 10 LINEAR FEET, OR PER MANUFACTURER'S RECOMMENDATIONS.
6. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
7. APPLY EPOXY BONDING AGENT AT ALL TRENCH DRAIN CONSTRUCTION COLD JOINTS.
8. INLET/OUTLET CURB CUT AND CONCRETE CHANNEL WIDTH SHALL BE 16" (MIN) ON GUTTER SLOPES ≥ 5%.

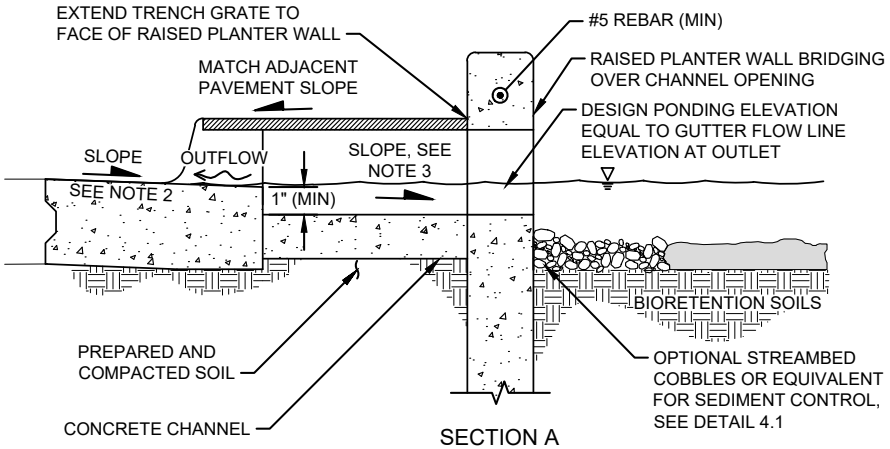

SECTION A

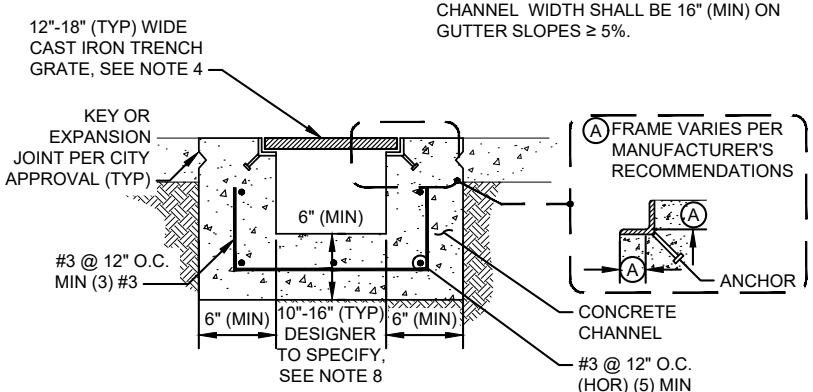

SECTION B

OUTLET - TRENCH DRAIN

1

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - OUTLET CURB CUT WITH TRENCH	4.2

NOT FOR CONSTRUCTION

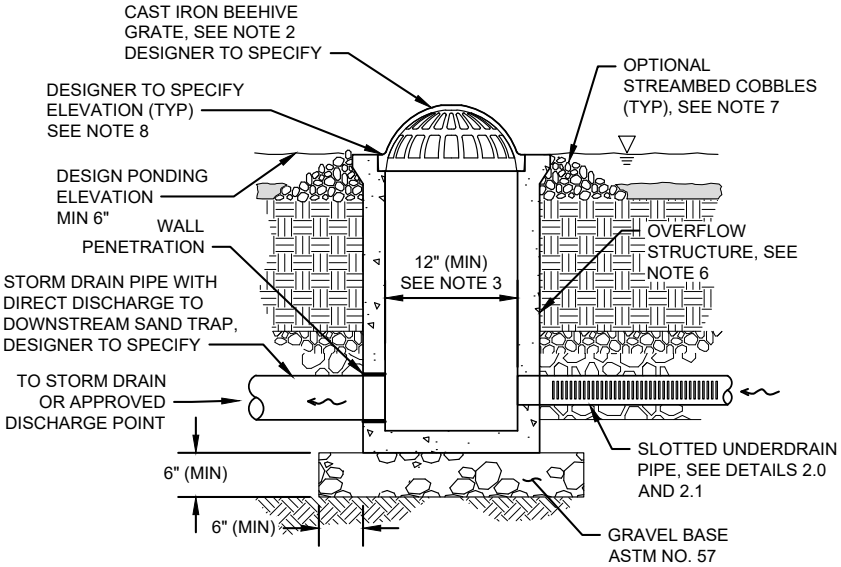

OVERFLOW STRUCTURE AREA DRAIN (1)

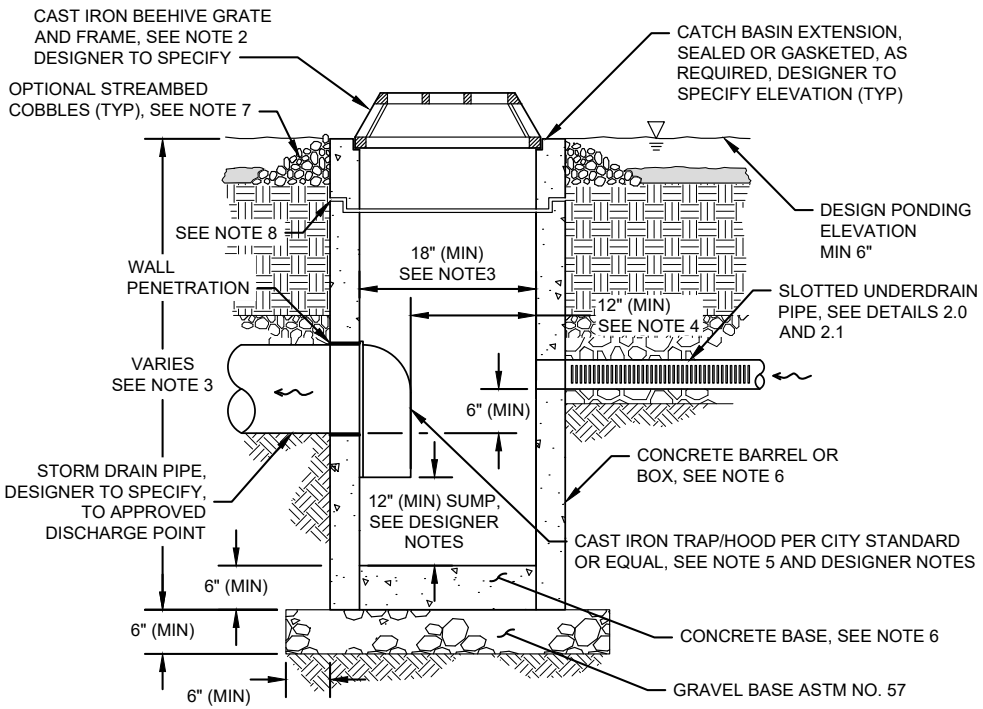

OVERFLOW STUCTURE WITH INTERGAL SAND TRAP (2)

CONSTRUCTION NOTES:

1. ALL MATERIAL AND WORKMANSHIP FOR OVERFLOW STRUCTURES SHALL CONFORM TO CITY STANDARD SPECIFICATIONS AND APPLICABLE CODES.
2. SIZE OF ATRIUM GRATE SHALL MATCH SIZE OF RISER SPECIFIED IN PLANS, SHALL BE REMOVABLE TO PROVIDE MAINTENANCE ACCESS, AND SHALL BE BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM. MAXIMUM GRATE OPENING SHALL BE 4 INCHES.
3. IF INTERIOR DEPTH OF OVERFLOW STRUCTURE EXCEEDS 5 FEET, A PERMANENT BOLTED LADDER AND MINIMUM CLEAR SPACE OF 30 INCH BY 30 INCH SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
4. 12 INCH (MIN) CLEARANCE WITHIN OVERFLOW STRUCTURE SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
5. INSTALL CAST IRON TRAP/HOOD PER MANUFACTURER'S RECOMMENDATIONS.
6. BARREL/BOX AND BASE OF CATCH BASIN MAY BE PRE-CAST WITH REINFORCING STEEL PER MANUFACTURER'S RECOMMENDATIONS, POURED IN PLACE CONCRETE WITHOUT STEEL PER CITY STANDARD PLANS AND SPECIFICATIONS, OR NYLOPLAST DRAIN BASIN (2812AG OR EQUAL). ENGINEER TO SPECIFY.
7. MINIMUM STREAMBED COBBLE DIAMETER SHALL BE LARGER THAN MAXIMUM GRATE OPENING.
8. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.

BIORETENTION & BIOINFILTRATION COMPONENTS OUTLETS - OVERFLOW STRUCTURE	4.3

NOT FOR CONSTRUCTION

PURPOSE:

PERVIOUS PAVEMENT (PAVEMENT) CONTROLS PEAK FLOWS AND VOLUMES OF STORMWATER RUNOFF VIA INFILTRATION THROUGH THE PAVEMENT SURFACE, STORAGE IN THE PAVEMENT SECTION, INFILTRATION INTO NATIVE SOIL, AND OVERFLOW THROUGH OPTIONAL SUBSURFACE OUTLETS. RUNOFF IS TREATED AS IT FILTERS THROUGH THE PAVEMENT SECTION, AND INFILTRATES INTO UNDERLYING NATIVE SOIL.

DESIGNER NOTES & GUIDELINES:

1. THE DESIGNER MUST ADAPT PLAN, SECTION DRAWINGS, AND CALCULATE DEPTH TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. ALL PAVEMENT SYSTEMS MUST BE DESIGNED BY A LICENSED ENGINEER IN ACCORDANCE WITH THE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES BASED ON SITE-SPECIFIC CONDITIONS INCLUDING TRAFFIC LOADS AND SUBGRADE CONDITIONS. PAVEMENT SECTIONS SET FORTH IN THESE TYPICAL DETAILS ARE PROVIDED TO REPRESENT THE ANTICIPATED RANGE OF DESIGN REQUIREMENTS, BASED ON "GOOD" AND "POOR" SOIL CHARACTERIZATIONS NORMALLY ENCOUNTERED IN THE CITY. **ACTUAL SECTION DEPTHS MUST BE DETERMINED AS DESCRIBED IN GUIDELINE #3, BELOW**. SEE TABLES BELOW FOR TRAFFIC LOADING AND EFFECTIVE ROADBED SOIL RESILIENT MODULUS ASSUMPTIONS USED IN DEVELOPING THESE TYPICAL SECTIONS.
3. TRAFFIC LOADING ASSUMPTIONS:

DESIGN ASSUMPTION	MODERATE VEHICULAR	LIGHT VEHICULAR	PEDESTRIAN
EQUIVALENT SINGLE AXLE LOADS*	2,000,000	40,000	800
TRAFFIC INDEX (TI)**	10	6.5	4
* SEE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES FOR DEFINITIONS			
** SEE CALTRANS HIGHWAY DESIGN MANUAL FOR DEFINITIONS			

SUBGRADE ASSUMPTIONS:

DESIGN ASSUMPTION	GOOD SOILS	POOR SOILS
EFFECTIVE ROADBED SOIL RESILIENT MODULUS, M_R (PSI)*	6,800	3,700
CALIFORNIA R-VALUE **	33.3	15.6
DRAINAGE COEFFICIENT, m *	1.15	0.75
LAYER COEFFICIENT, a * FOR OPEN GRADED AGGREGATE BASE	0.08	
* SEE AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES FOR DEFINITIONS		
** SEE CALTRANS HIGHWAY DESIGN MANUAL FOR DEFINITIONS		

4. GEOTECHNICAL EVALUATION OF SUBGRADE SOILS TO VERIFY THEIR STRUCTURAL SUITABILITY FOR PERMEABLE PAVEMENT INSTALLATIONS IS REQUIRED. INFILTRATION TESTING REQUIREMENTS ARE SUBJECT TO DIFFERENT THRESHOLDS. REFER TO CITY STORMWATER MANAGEMENT REQUIREMENTS FOR GUIDANCE.
5. THE PERMEABLE PAVEMENT FACILITY MUST BE DESIGNED TO PROVIDE SUFFICIENT SUBSURFACE STORAGE IN THE PAVEMENT SECTION TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS. THE SECTION THICKNESS WILL BE A FUNCTION OF THE SUBGRADE INFILTRATION RATE (DRAINAGE COEFFICIENT), AND SUBGRADE SLOPE.
6. ENTIRE PAVEMENT BASE SECTION MAY BE USED TO MEET SUBSURFACE STORAGE REQUIREMENTS.
7. SUBSURFACE STORAGE DRAWDOWN TIME (I.E. TIME FOR MAXIMUM SUBSURFACE STORAGE VOLUME TO INFILTRATE INTO SUBGRADE AFTER THE END OF A STORM) SHOULD NOT EXCEED 48 HOURS. DRAWDOWN TIME IS CALCULATED AS THE MAXIMUM SUBSURFACE PONDING DEPTH DIVIDED BY THE NATIVE SOIL INFILRATION RATE.
8. THE DESIGNER MUST ENSURE THAT THE PAVEMENT EDGES ARE RESTRAINED AND THAT WATER IS CONTAINED IN THE PAVEMENT SECTION AS NEEDED TO PROTECT ADJACENT PAVEMENT SECTIONS OR STRUCTURES.
9. THE DESIGNER MUST EVALUATE UTILITY SURVEYS FOR POTENTIAL UTILITY CROSSINGS OR CONFLICTS.

RELATED SPECIFICATIONS	CSI NO.
PERMEABLE/POROUS UNIT PAVERS: - PERMEABLE /POROUS UNIT PAVERS - JOINT FILLER AGGREGATE - PAVEMENT BASE - EDGE RESTRAINTS - GEOTEXTILE FOR SOIL SEPARATION	32 14 43
PERVIOUS CONCRETE PAVEMENT: - PERVIOUS CONCRETE - PAVEMENT BASE - GEOTEXTILE FOR SOIL SEPARATION	32 13 43
POROUS ASPHALT PAVEMENT: - POROUS ASPHALT - PAVEMENT BASE - GEOTEXTILE FOR SOIL SEPARATION	32 12 43

PERMEABLE PAVEMENT DESIGNER NOTES (1/2)	5.0

NOT FOR CONSTRUCTION

LAYOUT REQUIREMENTS:

1. ALL PERMEABLE PAVEMENT APPLICATIONS SHALL CONFORM TO CITY STANDARDS. THE DESIGN MUST COMPLY WITH CITY STANDARD ACCESSIBILITY REQUIREMENTS.
2. THE PREFERRED AND ALLOWED CATCHMENT AREA CONTRIBUTING RUN-ON TO A PERMEABLE PAVEMENT FACILITY IS PROVIDED IN THE FOLLOWING TABLE:

WEARING COURSE	PREFERRED RUN-ON RATIO	MAXIMUM RUN-ON RATIO** (AREA CONTRIBUTING RUN-ON: PERMEABLE PAVEMENT AREA)
PERVIOUS CONCRETE AND POROUS ASPHALT	MINIMAL	3:1
PERMEABLE UNIT PAVERS (≥ 1/2" GAPS) [PARCEL ONLY]*	0:1	3:1
PERMEABLE UNIT PAVERS (≥ 3/8" GAPS)*	0:1	2:1
POROUS PAVERS	0:1	0:1 (NO RUN-ON)

*PAVERS WITH 3/8 INCH OR 1/2 INCH GAPS SHALL BE PERMEABLE INTERLOCKING CONCRETE PAVERS WITH INTEGRATED PRECAST INTERLOCKING SPACER.

**THE DESIGNER AND OWNER SHOULD CONSIDER THE INCREASED MAINTENANCE REQUIREMENTS ASSOCIATED WITH HIGHER RUN-ON RATIOS WHEN DESIGNING THE FACILITY.

3. WHEN DESIGNED TO ACCEPT RUN-ON FROM OTHER CATCHMENT AREAS, PERMEABLE PAVEMENT AREAS MUST BE PROTECTED FROM SEDIMENTATION WHICH CAN CAUSE CLOGGING AND DIMINISHED FACILITY PERFORMANCE. THE FOLLOWING REQUIREMENTS APPLY FOR RUN-ON CONTRIBUTIONS:
   - RUN-ON FROM LAWN, LANDSCAPE OR OTHER ERODIBLE SURFACES IS DISCOURAGED. IF MINOR RUN-ON FROM LAWN OR LANDSCAPE AREAS IS UNAVOIDABLE, THOSE ERODIBLE AREAS MUST BE FULLY STABILIZED.
   - CONCENTRATED RUN-ON (E.G., DIRECT DISCHARGE FROM A DOWNSPOUT) SHOULD BE DISPERSED PRIOR TO DISCHARGE TO A PERMEABLE PAVEMENT FACILITY. ACCEPTABLE METHODS INCLUDE SHEET FLOW OR SUBSURFACE DELIVERY TO THE STORAGE RESERVOIR. IF SUBSURFACE DELIVERY IS USED, PRIMARY SETTLING IS REQUIRED (E.G., VIA SAND TRAP) FOLLOWED BY DISTRIBUTION TO STORAGE RESERVOIR (E.G., VIA PERFORATED PIPE).
4. WEARING COURSE SHALL BE SET FLUSH (± 3/16 INCH) WITH ADJACENT WALKING SURFACES.
5. WEARING COURSE SHALL HAVE A MINIMUM SURFACE SLOPE OF 0.5% TO ALLOW FOR SURFACE OVERFLOW AND A MAXIMUM SURFACE SLOPE AS LISTED BELOW:
   a. POROUS ASPHALT SURFACE: = 5 PERCENT SLOPE
   b. PERVIOUS CONCRETE SURFACE: = 10 PERCENT SLOPE
   c. PERMEABLE UNIT PAVERS: = 12 PERCENT SLOPE (PER MANUFACTURER'S RECOMMENDATION)

DESIGNER CHECKLIST (MUST SPECIFY, AS APPLICABLE):

- ☐ PERMEABLE PAVEMENT SPECIFICATIONS AND/OR PAVER TYPE AND GAP WIDTH
- ☐ PERMEABLE PAVEMENT WIDTH AND LENGTH
- ☐ ELEVATIONS AND CONTROL POINTS AT EVERY CORNER OR POINT OF TANGENCY
- ☐ THICKNESS OF EACH LAYER IN THE PAVEMENT SECTION
- ☐ JOINT SPACING AND TYPE
- ☐ SUBGRADE SLOPE
- ☐ ELEVATIONS OF EACH PIPE INLET AND OUTLET INVERT
- ☐ TYPE AND DESIGN OF PERMEABLE PAVEMENT COMPONENTS (E.G., EDGE TREATMENTS, OUTLETS, UNDERDRAINS, etc.)

PERMEABLE PAVEMENT DESIGNER NOTES (2/2)	5.1

NOT FOR CONSTRUCTION

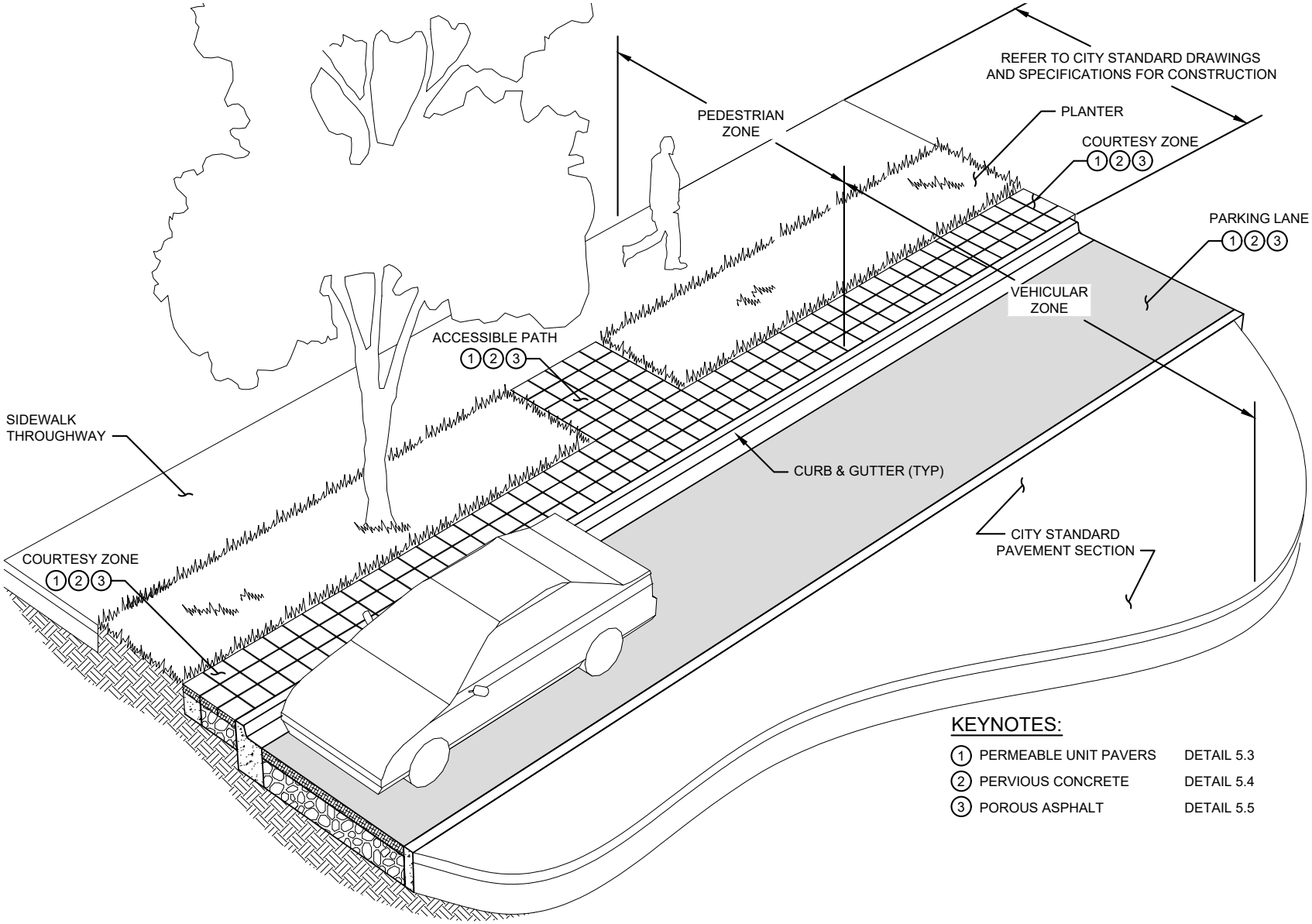

KEYNOTES:

1	PERMEABLE UNIT PAVERS	DETAIL 5.3
2	PERVIOUS CONCRETE	DETAIL 5.4
3	POROUS ASPHALT	DETAIL 5.5

PERMEABLE PAVEMENT KEY MAP	5.2

NOT FOR CONSTRUCTION

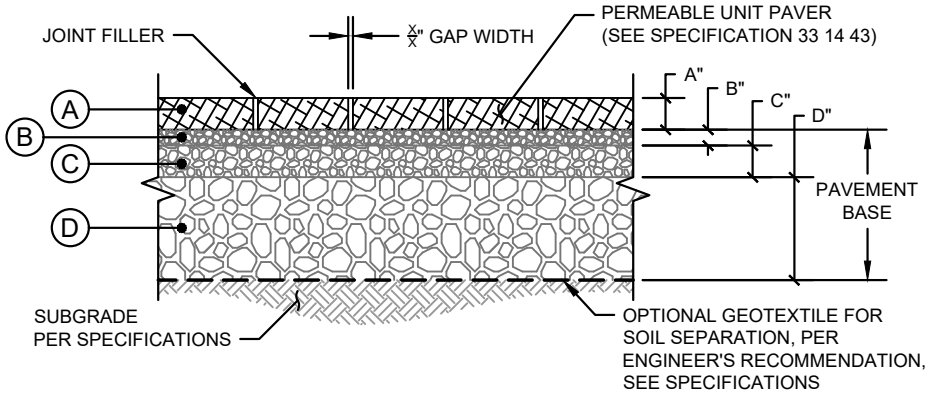

PERMEABLE UNIT PAVERS 1

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	PERMEABLE UNIT PAVERS	3 1/8	3 1/8	3 1/8	3 1/8	3 1/8	3 1/8
B	LEVELING COURSE ASTM NO. 8	2	2	2	2	2	2
C	BASE COURSE ASTM NO. 57	6	6	6	4	4	4
D	RESERVOIR COURSE ASTM NO. 2, 3, OR 57	22	28	-	10	-	-

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

TYPICAL JOINT FILLER AGGREGATE SIZE:

GAP WIDTH (IN)	JOINT FILLER AGGREGATE*
3/8 OR 1/2	ASTM NO. 8
* PROVIDED FOR REFERENCE ONLY, FOLLOW MANUFACTURER'S RECOMMENDATIONS	

CONSTRUCTION NOTES:

1. SEE PERMEABLE/POROUS UNIT PAVER SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR PERMEABLE/POROUS UNIT PAVER FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT PAVER SECTION	5.3

NOT FOR CONSTRUCTION

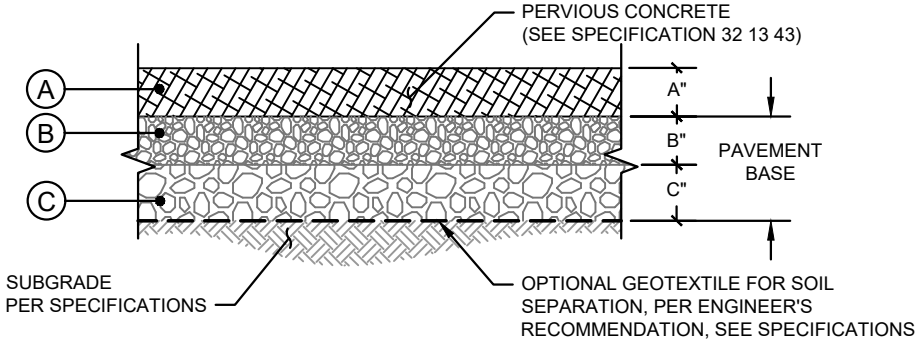

PERVIOUS CONCRETE 1

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	PERVIOUS CONCRETE	9	9.5	6.5	7	4.5	5
B	BASE COURSE ASTM NO. 3 OR 57	6	6	6	6	6	6
C	OPTIONAL RESERVOIR COURSE ASTM NO. 2, 3, OR 57	-	-	-	-	-	-

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

CONSTRUCTION NOTES:

1. SEE PERVIOUS CONCRETE SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR PERVIOUS CONCRETE FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT PERVIOUS CONCRETE SECTION	5.4

NOT FOR CONSTRUCTION

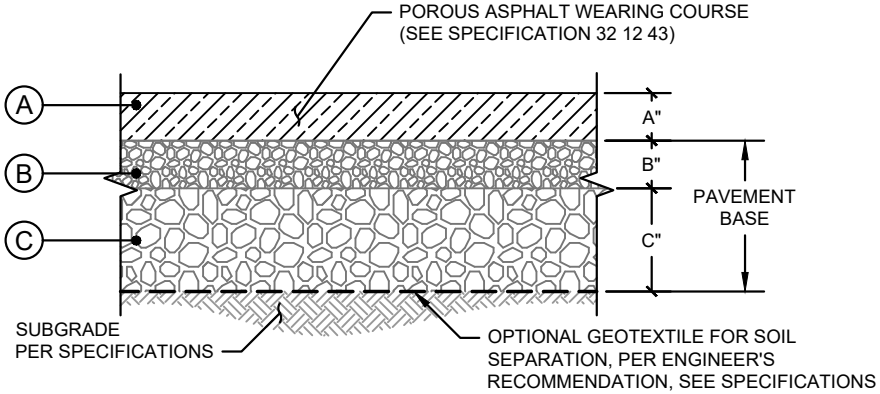

POROUS ASPHALT (1)

MINIMUM MATERIAL THICKNESS (IN):

LAYER	MATERIAL TYPE*	MODERATE VEHICULAR		LIGHT VEHICULAR		PEDESTRIAN	
		GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**	GOOD SOILS**	POOR SOILS**
A	POROUS ASPHALT	6	8	4	4	3	4
B	BASE COURSE ASTM NO. 57	6	6	5	4	6	4
C	RESERVOIR COURSE ASTM NO. 2, 3, OR 57	10	19	-	11	-	8

* MATERIAL FINER THAN NO. 100 SIEVE SHALL NOT EXCEED 2 PERCENT FOR ANY AGGREGATE LAYER (LICENSED PROFESSIONAL TO SELECT AGGREGATE).

** "GOOD" AND "POOR" SOIL CLASSIFICATIONS BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES. SEE DESIGNER NOTES FOR SUBGRADE ASSUMPTIONS. (LICENSED PROFESSIONAL MUST CALCULATE REQUIRED DEPTH BASED ON SITE CONDITIONS).

CONSTRUCTION NOTES:

1. SEE POROUS ASPHALT SPECIFICATIONS FOR WEARING COURSE, PAVEMENT BASE, SUBGRADE, AND OTHER REQUIREMENTS FOR POROUS ASPHALT FACILITIES.
2. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSINGS AND UTILITY CONFLICTS.

PERMEABLE PAVEMENT POROUS ASPHALT SECTION	5.5

NOT FOR CONSTRUCTION

Specification of Soils for Biotreatment or Bioretention Facilities

Soils for biotreatment or bioretention areas shall meet two objectives:

- Be sufficiently permeable to infiltrate runoff at a minimum rate of 5" per hour during the life of the facility, and
- Have sufficient moisture retention to support healthy vegetation.

Achieving both objectives with an engineered soil mix requires careful specification of soil gradations and a substantial component of organic material (typically compost).

Local soil products suppliers have expressed interest in developing 'brand-name' mixes that meet these specifications. At their sole discretion, municipal construction inspectors may choose to accept test results and certification for a 'brand-name' mix from a soil supplier.

Tests must be conducted within 120 days prior to the delivery date of the bioretention soil to the project site.

Batch-specific test results and certification shall be required for projects installing more than 100 cubic yards of bioretention soil.

SOIL SPECIFICATIONS

Bioretention soils shall meet the following criteria. "Applicant" refers to the entity proposing the soil mixture for approval by a Permittee.

1. General Requirements – Bioretention soil shall:
   a. Achieve a long-term, in-place infiltration rate of at least 5 inches per hour.
   b. Support vigorous plant growth.
   c. Consist of the following mixture of fine sand and compost, measured on a volume basis:
      60%-70% Sand
      30%-40% Compost
2. Submittal Requirements – The applicant shall submit to the Permittee for approval:
   a. A minimum one-gallon size sample of mixed bioretention soil.
   b. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.
   c. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils or Caltrans Test Method (CTM) C202.
   d. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in 4.
   e. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".
   f. Grain size analysis results of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
   g. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.

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h. Provide the name of the testing laboratory(s) and the following information:

(1) Contact person(s)

(2) Address(s)

(3) Phone contact(s)

(4) E-mail address(s)

(5) Qualifications of laboratory(s), and personnel including date of current certification by USCC, ASTM, Caltrans, or approved equal

3. Sand for Bioretention Soil
   a. Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be nonplastic.
   b. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40 or #50, #30, #16. #8, #4, and 3/8 inch sieves (ASTM D 422, CTM 202 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40 or No.50	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

4. Composted Material

Compost shall be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

a. Compost Quality Analysis by Laboratory – Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Examination of Composting and Compost (TMECC). The lab report shall verify:
   (1) Organic Matter Content: 35% - 75% by dry wt.
   (2) Carbon and Nitrogen Ratio: C:N < 25:1 and C:N >15:1
   (3) Maturity/Stability: Any one of the following is required to indicate stability:
      (i) Oxygen Test < 1.3 O2 /unit TS /hr
      (ii) Specific oxy. Test < 1.5 O2 / unit BVS /hr
      (iii) Respiration test < 8 mg CO_2-C /g OM / day
      (iv) Dewar test < 20 Temp. rise (°C) e.
      (v) Solvita® > 5 Index value
   (4) Toxicity: Any one of the following measures is sufficient to indicate non-toxicity.
      (i) NH_4^+ : NO_3^--N < 3
      (ii) Ammonium < 500 ppm, dry basis
      (iii) Seed Germination > 80 % of control
      (iv) Plant Trials > 80% of control
      (v) Solvita® = 5 Index value
   (5) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
      (i) Total Nitrogen content 0.9% or above preferred.
      (ii) Boron: Total shall be <80 ppm;
   (6) Salinity: Must be reported; < 6.0 mmhos/cm
   (7) pH shall be between 6.2 and 8.2 May vary with plant species.

b. Compost Quality Analysis by Compost Supplier – Before delivery of the compost to the soil supplier the Compost Supplier shall verify the following:
   (1) Feedstock materials shall be specified and include one or more of the following: landscaping/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
   (2) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell or containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable.
   (3) Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

c. Compost for Bioretention Soil Texture – Compost for bioretention soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***

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1 inch	99	100
1/2 inch	90	100
1/4 inch	40	90
No. 200	1	10

d. Bulk density shall be between 500 and 1100 dry lbs/cubic yard
e. Moisture content shall be between 30% - 55% of dry solids.
f. Inerts – compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.

g. Select Pathogens – Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.
h. Trace Contaminants Metals (Lead, Mercury, Etc.) – Product must meet US EPA, 40 CFR 503 regulations.
i. Compost Testing – The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

VERIFICATION OF ALTERNATIVE BIORETENTION SOIL MIXES

Bioretention soils not meeting the above criteria shall be evaluated on a case by case basis. Alternative bioretention soil shall meet the following specification: "Soils for bioretention facilities shall be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and provide sufficient retention of moisture and nutrients to support healthy vegetation."

The following steps shall be followed by municipalities to verify that alternative soil mixes meet the specification:

1. General Requirements – Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. The applicant refers to the entity proposing the soil mixture for approval.
   a. Submittals – The applicant must submit to the municipality for approval:
      (1) A minimum one-gallon size sample of mixed bioretention soil.
      (2) Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.

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(3) Certification from an accredited geotechnical testing laboratory that the Bioretention Soil has an infiltration rate between 5 and 12 inches per hour as tested according to Section 1.b.(2)(ii).
(4) Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, "Loss-On-Ignition Organic Matter Method".
(5) Grain size analysis results of mixed bioretention soil performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
(6) A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.
(7) The name of the testing laboratory(s) and the following information:
  (i) Contact person(s)
  (ii) Address(s)
  (iii) Phone contact(s)
  (iv) E-mail address(s)
  (v) Qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal.

b. Bioretention Soil
(1) Bioretention Soil Texture: Bioretention Soils shall be analyzed by an accredited lab using #200, and 1/2" inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
1/2 inch	97	100
No. 200	2	5

(2) Bioretention Soil Permeability testing: Bioretention Soils shall be analyzed by an accredited geotechnical lab for the following tests:
  (i) Moisture – density relationships (compaction tests) shall be conducted on bioretention soil. Bioretention soil for the permeability test shall be compacted to 85 to 90 percent of the maximum dry density (ASTM D1557).
  (ii) Constant head permeability testing in accordance with ASTM D2434 shall be conducted on a minimum of two samples with a 6-inch mold and vacuum saturation.

MULCH FOR BIORETENTION FACILITIES

Three inches of mulch is recommended for the purpose of retaining moisture, preventing erosion and minimizing weed growth. Projects subject to the State's Model Water Efficiency Landscaping Ordinance (or comparable local ordinance) will be required to provide at least three inches of mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Aged mulch can be obtained through soil suppliers or directly from commercial recycling yards. It is recommended to apply 1" to 2" of composted mulch, once a year, preferably in June following weeding.

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DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints.

DESIGNER NOTE: Green text corresponds to notes to the designer.

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Porous Asphalt Pavement

2. Pavement Base

3. Geotextile for Soil Separation

B. Related Sections:

DESIGNER NOTE: The designer should list any additional specification sections which relate to the porous asphalt work (i.e., traffic control, temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards: This section incorporates by reference the latest revisions of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications (published by State of California Business, Transportation, and Housing Agency, Department of Transportation)
AASHTO	Standards of the American Association of State Highway and Transportation Officials, 1998 or latest edition
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.
NAPA IS 115	Design, Construction, and Maintenance of Open-Graded Asphalt Friction Courses
NAPA IS 131	Porous Asphalt Pavements for Stormwater Management, Design, Construction, and Maintenance.

1. Caltrans Standard Specifications: Any references to Caltrans Standard Specifications invoke technical specifications in Section 39 for material, construction, and quality control and quality assurance only. Caltrans contractual requirements, general specifications, and measurement and payment do not apply.

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2. Caltrans Standard Specifications Term Equivalencies

Terms Equivalencies	
Term or Clause in Caltrans Standard Specifications	**Term or Clause in These Specifications**
The Department	The Owner
OGFC	Porous Asphalt

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. Project experience and personnel qualification examples as specified in Section 1.05.B for the contractor and personnel assigned to this project.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: Submittals shall conform to the requirements of Caltrans Standard Specifications including:

1. Proposed job mix formula per Section 1.05.B of this Specification.

2. Proposed QC plan per Section 39-1.04A (General Requirements for Contractor Quality Control) and Section 39-2.02A (Quality control plan requirements for the “Standard Construction Process”). The QC Plan shall satisfactorily test the porous asphalt for compliance with Section 39-2.02B (Quality Control for Standard Construction Process) of the Caltrans Standard Specifications, with the following modifications and additions:

a. Aggregate durability index shall be tested in accordance with Caltrans Test Method 229 at least one time per each 750 tons of porous asphalt.

b. Aggregate cleanliness value shall be tested in accordance with Caltrans Test Method 227 at least one time per each 750 tons of porous asphalt.

c. Air voids shall be tested for by determining the bulk specific gravity in accordance with ASTM D6752 or AASHTO T275, the maximum theoretical specific gravity with AASHTO T209, and the voids by test ASTM D3203.

d. Draindown shall be tested in accordance with ASTM D6390.

e. Retained tensile strength shall be tested in accordance with AASHTO 283.

f. Three (3) surface infiltration tests per ASTM C1701 shall be conducted per 10,000 square feet of porous asphalt, in place and one (1) additional test per 5,000 square feet of porous asphalt, or fraction thereof, in place. Document and record the results of each field infiltration test with a designated test number. Include infiltration rate, date pavement was placed, date test was taken, and location on the site (via stationing or other means) where test was performed in each test record. If minimum required field infiltration rate is not achieved at any location as defined in this Section, re-test for field infiltration rate at a new location for each failed field infiltration test. Coordinate location with Owner's Representative.

The QC plan shall be consistent with the Caltrans Quality Control Quality Assurance Manual for Asphalt Concrete Production and Placement (latest version).

In addition to the Caltrans submittal requirements, the Contractor shall submit the following:

3. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base and reservoir course materials performed within one (1) month of product delivery to site.

4. Product data sheets for geotextiles.

5. Testing agency qualifications as specified in Section 1.05.A.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect asphalt materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

DESIGNER NOTE: This specification does not include a test panel/mockup due to the difficulty of installation and because physical properties of the material are known from the plant test. Consider whether project design objectives warrant the cost of a test panel/mockup.

1. Contractor and Personnel Qualifications

DESIGNER NOTE: The designer should adjust the required qualifications for the contractor and personnel based on the availability of qualified bidders and project size, complexity, and risk.

a. Contractor qualification: The Contractor shall provide documentation showing one of the following for the general contractor or paving subcontractor:

1) One (1) example owner-accepted porous asphalt project, similar (or greater) in extent to the proposed project, completed in the last one (1) year with reference.

   OR

2) Three (3) example owner-accepted open graded friction course projects completed in the last one (1) year with references.

Documentation shall include name and address of project, and contact information for project owner.

b. Personnel qualification: The Contractor or paving subcontractor shall provide a qualified foreman with experience installing porous asphalt and documentation showing with following:

1) One (1) example owner-accepted porous asphalt project, similar (or greater) in extent to the proposed project, completed in the last one (1) year with reference.

Documentation shall include name and address of project, and contact information for project owner.

The qualified foreman shall be onsite for the duration of asphalt work including preparation, placement, testing, and completion.

c. Testing agency qualification: Agencies that perform testing on porous asphalt materials shall meet the requirements of Caltrans Standard Specification Section 39-1.03A or be accredited by the AASHTO Accreditation Program (AAP) for the scope and standard being evaluated.

d. Plant qualification: Batch or continuous mixing plants used for porous asphalt shall meet the requirements of Caltrans Standard Specification Section 39-1.08A.

B. Authorized Job Mix Formula (JMF): The mix design process shall conform to Caltrans Specification Section 39-1.03 except as noted below.

1. The final paragraph under Section 39-1.03A is deleted and replaced with the following:

a. Submit a complete JMF submittal including identification of asphalt binder percentage in form CEM-3511 Contractor Job Mix Formula Proposal. Determine the optimum asphalt binder content using California Test 368 in a lab that meets the requirements of 1.05.A. of these specifications.

The products used in the JMF shall meet the requirements in Section 2.01 of this Specification.

The JMF shall meet the quality characteristics defined in Section 39-2.02B (Quality Control for Standard Construction Process) with the modified and additional quality characteristics listed in the table below.

Quality Characteristics	Test Method	Requirement
Aggregate Durability Index	CT 229	DI >= 35
Aggregate Cleanness Value	CT 227	CV >= 75
Air Void Content by Corelok (%)[1]	ASTM D6752 (with AASHTO T209 and ASTM D3203)	16–20%
Air Void Content by Paraffin Wax (%)[1]	AASHTO T275 (with AASHTO T209 and ASTM D3203)	18–22%
Draindown (% of total weight)	ASTM D6390	<= 3%
Retained Tensile Strength (%)	AASHTO 283	>= 80%
Infiltration Rate (Average Inches per Hour)	ASTM C1701	See Note 2.

[1] Either method of determining air void content is acceptable.

[2] The finish surface shall yield an infiltration rate that is consistent with the following: The average infiltration rate from three (3) infiltration tests conducted per ASTM C1701 shall be greater than 100 inches per hour with no single test less than 50 inches per hour. Water shall infiltrate rapidly and uniformly through the surface without formation of large puddles when applied at a rate of 5 gallons per minute (gpm).

2. Once verified and accepted by the Engineer, the JMF meeting the criteria above shall become the Authorized JMF. Acceptance of the JMF shall be per Caltrans Standard Specification Section 39-1.03G, except that verification of the JMF by the City shall be considered equivalent to verification of the JMF by Caltrans. Any adjustments or renewals of the JMF shall be per Caltrans Standard Specifications Section 39-1.03 (Hot Mix Asphalt Mix Design Requirements). Submit a letter from the asphalt supplier with the recommended temperature ranges for mixing, laying, breakdown rolling, and finished rolling, as well as the recommended maximum temperature of the finished mat before placement of subsequent lifts.

C. Responsibilities of Contractor

1. General: Conform to the requirements set forth in Section 39-1.04 (Contractor Quality Control) and Section 39-2.02 (Standard Construction Process Contractor Quality Control) of the Caltrans Standard Specifications.

2. Pre-Placement Conference: A mandatory pre-placement conference will take place, including at a minimum the Engineer, the Owner, the general Contractor, and paving subcontractor, to review preparation, placement, testing procedures, and responsibilities.

3. Quality Control: Contractor quality control inspection and testing of porous asphalt shall be conducted in accordance with the approved QC plan.

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4. Load Slip: Provide a load slip certified by a licensed weightmaster showing combined mixture weight for each load of porous asphalt transported to the location.

5. Infiltration Rate Testing: Perform surface infiltration tests per ASTM C1701 as described below.

a. Three (3) test locations per 10,000 square feet of porous asphalt in place.

b. One (1) additional test location per 5,000 square feet of porous asphalt, or fraction thereof, in place.

DESIGNER NOTE: Designer to specify the number and location(s) of required post-construction infiltration tests.

6. Required Inspections: Notify the Engineer at least 5 business days prior placement of porous asphalt.

7. Failed Tests: Each test shall meet the acceptance criteria as defined in this section. For any single quality characteristic except smoothness, if two consecutive quality control test results do not comply with the action limits or specifications:

a. Stop production.

b. Notify the Engineer.

c. Take corrective action.

d. Demonstrate compliance with the specifications before resuming production and placement.

DESIGNER NOTE: The following table is a Sample Contractor Quality Control Sampling and Testing Plan; it is provided to illustrate the type and frequency of testing that may be required The Contractor will need to develop a similar table as part of their QC plan. Frequency and standard for all tests should be project specific.

Sample Contractor Quality Control Sampling and Testing Plan						
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**	
Plant Operations						
Aggregate Gradation	CT 202	1/750 tons	Plant	Plant Inspector	1/2"	TV ± 6
					3/8"	TV ± 6
					No. 4	TV ± 7
					No. 8	TV ± 5
					No. 30	TV ± 4
					No. 200	TV ± 2
Asphalt Binder Content	CT 382	Daily	Plant	Plant Inspector	Design ± 0.5%	
Percent of crushed particles coarse aggregate (%, min)	CT 205	1/project	Plant	Plant Inspector		
One fractured face					90	
Two fractured faces					75	
Fine aggregate (%, min) (Passing no. 4 sieve and retained on no. 8 sieve.)						
One fractured face					90	
Los Angeles Rattler (%, max)	CT 211	1/project	Plant	Plant Inspector		
Loss at 100 rev.					12	
Loss at 500 rev.					40	
Aggregate Durability Index	CT 229	1/750 tons	Plant	Plant Inspector	DI > 35	
Aggregate Cleanness Value	CT 227	1/750 tons	Plant	Plant Inspector	CV > 75	
Asphalt Temp.	Recorded	Continuous	Plant	Plant Inspector	120–190	
Plant Mix Temperature	Recorded	Continuous	Plant	Plant Inspector	165 Maximum	
Aggregate moisture content	CT 226	2/day	Plant	Plant Inspector	For adjusting the plant controller at the HMA plant	
Flat and elongated particles (%, max by weight @ 5:1)	CT 235	1/project	Plant	Plant Inspector	Report Only	

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Sample Contractor Quality Control Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**
Street Operations					
Subgrade Preparation	Visual	Daily	Jobsite	Field Inspector	Smooth and Clean
Asphalt Paver & Hopper	Visual and Measure	Daily	Jobsite	Field Inspector	Manufacturer Standards
Compaction Equipment	Visual and Measure	Daily	Jobsite	Field Inspector	Manufacturer Standards
Compaction Process	Visual	Continuous	Jobsite	Field Inspector	Per Specifications
Pavement Temp. at Breakdown	Temperature Equipment	Hourly	Mat Behind Paver	Field Inspector	Per Specifications
Asphalt Binder Content	CT 382	Daily	Mat Behind Paver	Field Inspector/Tester	Design ± 0.5%
HMA Moisture Content (%, max)	CT 226	Daily	Mat Behind Paver	Field Inspector/Tester	1.0
Lift Thickness	Measured	Hourly	Mat Behind Paver	Field Inspector	Per Specifications
Pavement Temp. at Finish	Temperature Equipment	Daily	At Finish Roller	Field Inspector	Per Specifications
Air Void Content by Paraffin Wax (%)	AASHTO T275 (with AASHTO T209 and ASTM D3203)	Daily	Cores of Finished Surface	Field Inspector	16–20%
Tensile Strength	AASHTO 283	Daily	Cores of Finished Surface	Engineer	>= 80%
Long./Transverse Joints	Visual	Continuous	Pavement Joints	Field Inspector	Industry Standards
Smoothness	10 ft straightedge	Hourly	Finished Surface	Field Inspector	Per Specifications

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Sample Contractor Quality Control Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Contractor Responsibility**	**Attribute or Tolerance**
Street Operations (continued)					
Infiltration Rate (average Inches per hour)	ASTM C1701	Three (3) test locations per 10,000 square feet of pervious asphalt, in place One (1) additional test location per 5,000 square feet of pervious asphalt, or fraction thereof, in place	Finished Surface	Field Inspector	Each Test: 50”/hr min Daily Avg.: 100”/hr min
Pavement Transitions	Visual	Daily	AC Transitions	Field Inspector	Per Specifications

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D. Acceptance: Acceptance of porous asphalt shall be determined based on the criteria defined in Section 39-2.03A (Acceptance) of the Caltrans Standard Specifications, with the following modifications and additions:

1. Source aggregate will not be subject to acceptance testing once is has been approved as part of the JMF, unless samples are requested by the Engineer.

2. Air Voids: Air voids shall be tested for by determining the bulk specific gravity in accordance with ASTM D6752 or AASHTO T275, the maximum theoretical specific gravity with AASHTO T209, and the voids by test ASTM D3203.

3. Retained Tensile Strength: Retained tensile strength shall be tested in accordance with AASHTO 283.

Test results for air voids, draindown, and retained tensile strength shall be consistent with the characteristics of the approved JMF.

4. Infiltration Testing

a. Infiltration Rate Testing: The average of all surface infiltration tests shall be greater than 200 inches per hour with no single test less than 100 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For porous asphalt that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 200 inches per hour with no single test less than 100 inches per hour
- For porous asphalt not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 50 inches per hour

b. Infiltration Visual Testing: Visual flood testing of the surface shall be conducted by application of clean water at the rate of at least 5 gpm over the surface, using a hose or other distribution devise. Water used for the test shall be clean, free of suspended solids and deleterious liquids and will be provided at no extra cost to the Owner. All applied water shall infiltrate directly without large puddle formation or surface runoff, and shall be observed by the

Engineer. The Engineer shall mark areas where large puddles form in the field. Areas with slow infiltration shall not exceed 10 percent of the total surface.

DESIGNER NOTE: Smoothness specification should be revised as needed to reflect project design objectives (e.g., smoothness specifications from Section 212 of the City Streets and Highways specifications).

5. Smoothness: Porous asphalt smoothness shall be checked with a 10-foot straightedge. Vertical measurement shall be taken between the pavement's determined plane and straight edge in a direction perpendicular and parallel to the centerline. The finished pavement shall be uniform to a degree such that no variations greater than 3/8-inch are present between the straightedge and pavement surface.

6. Grade: Porous asphalt shall be true to designed spot elevations plus or minus ½ inch and shall not deviate from designed slope more than ¼ inch in ten (10) feet. Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the porous asphalt shall be flush.

7. Line: Porous asphalt margins shall be true to designed lines plus or minus ½ inch at any point.

8. Slope: Porous asphalt shall be sloped as shown on the Plans. Slope shall be consistent to within 1/4 inch in ten (10) feet.

9. Thickness: Each core sample shall be equal to the minimum section depth or more as specified on the Plans.

DESIGNER NOTE: Revise the load slip specification as needed to align with the measurement and payment specifications.

10. Load Slip: Each load of porous asphalt transported to the location of placement shall have a load slip delivered with the load that is certified by a licensed weightmaster and includes the combined mixture weight.

DESIGNER NOTE: Designer should specify consequences of any failed acceptance tests (e.g., reduced payment for lower infiltration rate and lower percent voids, reduced payment for failed smoothness tests) or if consequences are full replacement.

11. Reduced Payment Factors: The reduced payment factors in Caltrans Standard Specification 39-2.03A (Testing) do not apply.

DESIGNER NOTE: The following table is a Sample Owner Quality Assurance Sampling and Testing Plan is provided to illustrate the type and frequency of testing that may be required. Frequency and standard for all tests should be project specific.

Sample Owner Quality Assurance Sampling and Testing Plan					
Quality Characteristic	**Test Standard**	**Frequency**	**Sample Location**	**Responsibility**	**Attribute or Tolerance**
Plant Operations					
Street Operations					
Asphalt Binder Content	CT 382	Daily	Hopper	Engineer	Design ± 0.5%
HMA Moisture Content (%, max)	CT 226	Daily	Hopper	Engineer	1.0
Lift Thickness	Measured	Hourly	Cores of Finished Surface	Engineer	Per Specifications
Air Void Content by Paraffin Wax (%)	AASHTO T275 (with AASHTO T209 and ASTM D3203)	Daily	Cores of Finished Surface	Engineer	16–20%
Tensile Strength	AASHTO 283	Daily	Cores of Finished Surface	Engineer	>= 80%
Long./Transverse Joints	Visual	Continuous	Pavement Joints	Engineer	Per Specifications
Smoothness	10 ft straightedge	Hourly	Finished Surface	Engineer	Per Specifications
Infiltration Rate (average inches per hour)	ASTM C1701	3/day	Finished Surface	Engineer	Each Test: 50”/hr min Daily Avg.: 100”/hr min
Pavement Transitions	Visual	Daily	AC Transitions	Engineer	Per Specifications

PART 2 PRODUCTS

DESIGNER NOTE: If a product is not available, the designer needs to ensure that the desired voids and surface texture will meet the desired pavement characteristics for surface smoothness, voids, and bonding.

2.01 POROUS ASPHALT

Porous Asphalt mixture must comply with the approved Job Mix Formula (See Section 1.05 of this Specification). The components of the asphalt mixture must comply with the specifications below.

A. Asphalt Binder: Asphalt binder must comply with Caltrans Specification Section 92 except as noted below.

1. Performance Graded (PG) Asphalt Binder: PG asphalt binder must be PG 70-10 per Caltrans Specification Section 92-1.02B.

2. PG Polymer Modified Asphalt Binder:

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PG polymer modified asphalt binder must be PG 76-22 PM per Caltrans Specification Section 92-1.02B for use in vehicular applications.

PG polymer modified asphalt binder must be either PG 64-28 PM or PG 76-22 PM per Caltrans Specification Section 92-1.02B for use in pedestrian applications.

B. Aggregates: Aggregates shall conform to Caltrans Specification Section 39-1.02E for Open Graded Friction Course (OGFC) with the following additions and modifications:

1. Durability Index: 35 (minimum) tested in accordance with California Test 229 at least once per 750 tons of porous asphalt.

2. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 750 tons of porous asphalt.

3. Aggregate for porous asphalt shall meet the following gradation:

Porous Asphalt Aggregate Gradation	
Sieve[1]	**Percent Passing by Weight**
3/4 inch	100
1/2 inch	85 to 100
3/8 inch	55 to 75
No. 4	10 to 25
No. 8	5 to 12
No. 30	0 to 10
No. 200	0 to 3

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

C. Materials Not to Be Used: The following materials shall not be used unless approved in advance by the Engineer.

1. Geosynthetic pavement interlayer

2. Tack Coat (except on vertical faces of curbs, edges of PCC structures, or when paving over areas with impermeable bases).

3. Asphalt Rubber Binder.

4. Crumb Rubber Modifier.

5. Reclaimed Asphalt Pavement.

6. Paint Binder per Section 212.06 of the DPW Standard Specifications

D. Job Mix Formula (JMF): The JMF shall comply with the requirements of Section 1.05.C of this Specification.

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2.02 PAVEMENT BASE

A. Pavement Base Material shall consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials are not permitted. The Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than 10 Working Days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to two (2) layers as specified on the Plans and included herein:

1. "Base Course" shall be ASTM No. 3 (modified) or ASTM No. 57 (modified) stone per Section 2.02.C.

DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

2. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.02.C.

DESIGNER NOTE: This layer of the pavement base is intended to provide storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed gravel to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying coarser graded materials or reduction in permeability relative to the underlying material..

C. Pavement Base Material shall meet the following specifications for grading and quality.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

2.

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
3 inch	100	–	–	–
2 1/2 inch	90 to 100	100	–	–
2 inch	35 to 70	90 to 100	–	–
1 1/2 inch	0 to 15	35 to 70	–	100
1 inch	–	0 to 15	–	95 to 100
3/4 inch	0 to 5	–	–	–
1/2 inch	–	0 to 5	100	25 to 60
3/8 inch	–	–	85 to 100	–
No. 4	–	–	10 to 30	0 to 10
No. 8	–	–	0 to 10	0 to 5
No. 16	–	–	0 to 5	–
No. 100[2]	0 to 2	0 to 2	0 to 2	0 to 2

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 sieve.

3. R-Value: 78 (minimum) tested in accordance with California Test 301.

4. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C 131.

5. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.

6. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.

7. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.03 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The

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geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%
Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer, and shall be recompacted in accordance with 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

F. After compaction and proof roll, scarify subgrade ¼ to ½ inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

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1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.
2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct the over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer, at the Contractor's expense. Overlaps of the geotextile shall be a minimum of 1 foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6)-inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10)-ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction

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indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. The pavement base shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any porous asphalt.

3.03 POROUS ASPHALT PREPARATION

DESIGNER NOTE: Designer should specify where a tack coat should be applied, if at all. See 3.03.A.2 for list of potential locations.

A. Preparation for placement of porous asphalt pavement shall comply with Section 39-1.09 of the Caltrans Standard Specifications, except as noted below.

1. Pavement Base: Confirm that the completed pavement base conforms to these specifications.

2. Tack Coat: Shall not be used except on vertical faces of curbs, edges of PCC structures, or when paving over areas with impermeable bases.

3. Geosynthetic Pavement Interlay: Shall not be used.

4. Environmental Conditions: Do not place porous asphalt when the ambient temperature is less than 60 degrees Fahrenheit, on any wet surface, or when the average ground surface temperature is less than 45 degrees Fahrenheit.

5. Qualified Personnel: The qualified foreman as defined in 1.05.B.2 shall be onsite for the duration of porous asphalt preparation.

3.04 POROUS ASPHALT PLACEMENT

DESIGNER NOTE: Designer should specify where a tack coat should be applied (e.g., face of curb, structures,) if at all.

A. Porous asphalt equipment, transportation, spreading, and compacting shall comply with the Caltrans Specification applicable to Open Graded Friction Course (OGFC), except as noted below or as specified in the approved mix design.

B. Qualified Personnel: The qualified foreman as defined in 1.05.B.2 shall be onsite for the duration of porous asphalt placement.

C. Spreading and Compacting Equipment: shall conform to Section 39-1.10 of the Caltrans Standard Specifications except that pneumatic tire rollers shall not be used.

DESIGNER NOTE: The compaction could be established by the contractor rather than prescribed below depending on whether the contracting agency prefers to take a prescriptive approach or performance based approach. Prescriptive is used here because full depth porous asphalt is an emerging technology and there are limited density specifications for open graded (porous) asphalt mixtures. But care must be taken to ensure this prescriptive specification is compatible with the acceptance criteria.

D. Spreading and Compacting:

The type of rollers to be used and their relative position in the compaction sequence shall be dictated by the contractor provided the requirements below are met and the completed porous asphalt meets the required quality characteristics specified in Section 1.05. Deviation from the requirements below must be approved in advance by the Engineer.

1. The porous asphalt shall be laid in lifts of up to 4 inches in thickness using approved equipment to achieve the total thickness indicated in the Plans.

DESIGNER NOTE: Designer should consider using thinner lifts to the extent practical to ensure better compaction.

2. The temperature of the Porous HMA mix during laying, breakdown rolling, and finished rolling, shall be within the supplier-recommended temperature range.

3. Breakdown rolling shall be performed with one or two passes of a 7.5- to 10-ton vibratory roller operated in low amplitude mode when the mix temperature is within the supplier-recommended temperature range.

4. Finished rolling shall be performed with a double-drum finish roller operated in static mode when the mix temperature is within the supplier-recommended temperature range.

5. Finished paving shall be even, without pockets, and graded to elevations shown on the Plans. Finished porous asphalt shall meet the acceptance criteria for Smoothness set forth in Section 1.05.D.

DESIGNER NOTE: Designer should specify details of the straightedge test and tolerance if different than specified in Section 1.05E.

6. The Contractor shall take care to insure that the porous asphalt lifts join completely to previous lifts. The Contractor shall keep the time between lift placements to a minimum, keeping the surface of the previous lift clear from dust and moisture between lifts, and restrict traffic from initial lifts until the full depth of asphalt pavement has been placed.

7. Sufficient time shall be allowed between lifts to allow the asphalt to set and cool to at or below the supplier recommended maximum temperature for placement of subsequent lifts.

3.05 OPENING TO TRAFFIC

A. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement surface until cooling and hardening has taken place, and in no case within the first six (6) hours. Provide traffic control measures as necessary to prevent vehicular use and remove when no longer required.

3.06 PROTECTION OF PAVEMENT

A. Hardened porous asphalt pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the porous pavement voids, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If porous asphalt pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

3.07 REJECTION

A. Porous asphalt that does not meet the acceptance criteria set forth in Section 1.05.E will be rejected by the Engineer. Porous asphalt that has been rejected by the Engineer shall be removed and replaced at the Contractor's expense.

END OF SECTION

DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints.

DESIGNER NOTE: Green text corresponds to notes to the designer. Blue text corresponds to requirements taken directly from ACI 522.1.

PART 1 GENERAL

1.01 SUMMARY

A. This section includes:

1. Pervious Concrete
2. Pavement Base
3. Geotextile for Soil Separation

B. Related Sections:

DESIGNER NOTE: The designer should list any additional specification sections which relate to the pervious concrete work (i.e., temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards This section incorporates by reference the latest versions of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications
AASHTO	Standards of the American Association of State Highway and Transportation Officials, 1998 or latest edition
ACI 522.1	Specifications for Pervious Concrete Pavement
ACI 301	Specifications for Structural Concrete
ACI 305.1	Standard Specifications for Hot Weather Concreting
ACI 306.1	Standard Specifications for Cold Weather Concreting
ACI 308.1	Standard Specifications for Curing Concrete
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. National Ready Mix Concrete Association (NRMCA) Pervious Concrete Contractor Certifications and project experience as specified in Section 1.05.A for the crew assigned to this project.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: The Contractor shall submit to the Engineer the following a minimum of 20 calendar days prior to the construction of the pervious cement concrete pavement:

1. NRMCA Certifications for the batch plant to be used in the production of pervious concrete for this project.

2. Proposed mix design including the following:

a. Batch weights of all constituents.

b. Portland cement type and brand.

c. Non-Portland cement pozzolan type and source.

d. Microfiber brand and type.

e. Admixture type and brand.

f. Aggregate source(s), gradation(s), LA abrasion, and cleanness value(s).

g. Fresh density of the pervious concrete per ASTM C1688.

No concrete shall be placed until the Engineer has provided written acceptance of the mix design per Section 1.05.B.

3. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base and reservoir course materials performed within one (1) month of product delivery to site.

DESIGNER NOTE: Consider revising acceptable age of sieve test depending on scale of project. On a larger project it may be appropriate to require testing by an independent lab with samples taken at the supplier's yard from the stockpile to be used for the project.

4. Product data sheets for all proposed admixtures and geotextiles.

5. A detailed plan of the proposed paving pattern showing the location and type (saw cut or rolled in plastic concrete) of all planned joints. No deviation from the jointing pattern shown on the Plans will be allowed without written approval of the Engineer.

6. A detailed procedure for the production, transportation, placement, protection, curing, and temperature monitoring of concrete for hot

and/or cold weather, unless written approval of the Engineer waiving the requirement is received.

7. Field technician qualifications as specified in Section 1.05.A.

8. Testing agency qualifications as specified in Section 1.05.A.

9. Density of fresh pervious concrete, length of cores, and density of cores for one (1) reference panel. Reference panel shall be placed, jointed, cured, and tested as specified in Section 1.05.D.1 and be within tolerance of the required thickness defined by the Contract Documents.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect concrete materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

1. Contractor and Personnel Qualifications

a. Contractor qualification: Unless otherwise approved by Engineer, Contractor shall provide evidence of employment for one (1) NRMCA certified Pervious Concrete Installer and four (4) NRMCA certified Pervious Concrete Technicians who must be on site, working as members of each placement crew, during all concrete placement.

For all projects where the total pervious concrete pavement area exceeds 20,000 square feet (sf), the Contractor shall provide evidence of employment for at least one (1) NRMCA certified Pervious Concrete Craftsman who must be onsite, working as part of the placement crew, during all concrete placement. Additionally, for every 10,000 sf of pavement area over 20,000 sf, one (1) additional NRMCA certified Pervious Concrete Installer is required on site, working as part of the placement crew.

The Contractor shall provide documentation showing three (3) successful pervious concrete projects completed in the last three (3) years collectively totaling more than 20,000 square feet. Documentation shall include name and address of project, and contact information for project owner.

DESIGNER NOTE: The designer should adjust as required based on the availability of qualified bidders and the size of the project.

b. Field technician qualification: Field tests of concrete required in the responsibilities of the testing agency shall be performed by an individual certified as both an NRMCA Certified Pervious

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Concrete Technician, or equivalent, and an ACI Concrete Field Testing Technician – Grade I, or equivalent.

DESIGNER NOTE: The designer should adjust as required based on the availability of qualified personnel and the size of the project.

c. Testing agency qualification: Agencies that perform testing on concrete materials shall meet the requirements of ASTM C1077 and provide evidence of employment for at least one (1) NRMCA Certified Pervious Concrete Technician, responsible for testing, or providing direct oversight of testing, of all concrete materials. Agencies inspecting the Work shall meet the requirements of ASTM E329. Testing agencies performing the testing shall be accepted by the Engineer before performing any Work.

d. Batch plant qualification: Batch plant used for pervious concrete shall be a semi-automatic or automatic batching plant with a current NRMCA certification.

DESIGNER NOTE: Volumetric (truck mounted) Site Mixed Mobile Mixers may be used at the designers discretion. Mixing operations should be per manufactures directions. Designer should specify certification and calibration requirements for Volumetric Mobile Mixers including, but not limited to:

- Proof of Volumetric Mixer Manufacturer Bureau (VMMB) certification, compliance with VMMB 100-01 Volumetric Mixer Standards, and associated VMMB rating plate, or equal
- Provisions for calibration of Volumetric Mobile Mixers performed with aggregate manufactured for the project and recalibrated with each restocked stock pile

Additionally, the designer should specify required quality control measures to ensure aggregates, cementitious material, and admixtures are free from contamination from deleterious material or other stockpiles/storage containers, protected from damage by equipment, vehicles, or weather, and properly batched in lieu of batch ticket (e.g., labeling of aggregate bins to ensure correct aggregate is fed into appropriate mixer material compartment.

B. Approved Mix Design: Once accepted by the Engineer, the mix design meeting the criteria specified in Section 2.01.F shall become the Approved Mix Design and shall not be modified in any way. The Approved Mix Design shall be determined from information submitted under Section 1.04 and from results of reference panel testing as described in Section 1.05.D.1.

Modifications to the Approved Mix Design will not be allowed and any modified mix placed in the Work will be rejected. Proposed modifications to

the Approved Mix Design shall be submitted as a new mix design and shall require a new reference panel to validate the proposed mix design and determine the new Approved Mix Design. If accepted by the Engineer, the new mix design shall become the Approved Mix Design. The requirement for a new reference panel may be waived at the discretion of the Engineer. Only one (1) Approved Mix Design shall be valid at any time. Admixture and water dosages may be modified as needed to maintain mix properties.

C. Responsibilities of Contractor

1. Pre-Placement Conference: A mandatory pre-placement conference will take place including at a minimum the Engineer, the Owner, general contractor, pervious concrete installer, concrete supplier, and field testing agency representative. The document Checklist for the Concrete Pre-Construction Conference (available from the National Ready Mix Concrete Association) will be used to review all materials, personnel qualifications, concrete production, delivery, maintaining moisture retention of fresh mixture, preparation, placing, curing (including timing, placement, and securing of curing cover), jointing, testing procedures, and responsibilities. Meeting emphasis will be on how pervious concrete differs from conventional concrete.

2. Reference Panel: Place reference panels on the project site, on a subgrade and base prepared as specified, using the material and construction requirements for pavement in this Specification. Each panel must have a surface area of at least 225 square feet, and a width and thickness as specified for the pavement in the Contract Documents. The Engineer shall observe and accept each element of the pervious concrete construction. Construction and evaluation of the reference panel(s) will occur as follows:

   a. Notify the Engineer at least ten (10) Working Days before installing pervious concrete reference panel.

   b. Coordinate the location of the reference panel with the Engineer.

   c. Notify the Engineer when each element of the reference panel is ready for inspection.

   d. Remove, replace, and dispose of any unsatisfactory portions of reference panel as determined by the Engineer and at no additional cost to the Owner.

   e. Retain and maintain approved reference panels during construction in an undisturbed condition as a standard for judging completed portions of the final installations.

   Approved reference panels may remain as final installations of the Work at the discretion of the Engineer. If not retained, the reference panel shall be removed and disposed of at no additional cost to the Owner.

3. Testing facilitation: Owner's use of testing services will not relieve Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents. Unless otherwise specified in the Contract Documents, Contractor shall assume the following duties and responsibilities:

   a. Furnish the materials to be tested, including concrete cores.

   b. Furnish any necessary labor to assist Owner's testing agency in obtaining and handling samples, including concrete cores, at the project site or at the source of materials.

   c. Provide measures to collect slurry and debris during coring operation in order to avoid sealing adjacent pavement.

   d. Fill core holes in accordance with Section 1.05.D.2.

   e. Advise Owner's testing agency at least 24 hours in advance of operations to allow for completion of quality tests and for assignment of personnel.

4. Pressure wash testing: Before final acceptance by the Engineer, the Contractor shall pressure wash the pervious concrete. Pressure washing shall be provided and completed by using portable washer equipment working at a minimum of 3,000 psi at 2.0 to 2.5 gpm. The nozzle shall be a zero degree nozzle and be held a maximum of three (3) inches off the concrete surface. The Contractor shall pressure test three (3) locations per lot or as determined by the Engineer. Any sections of pervious concrete that breaks up, ravels, or does not infiltrate shall be removed and replaced with acceptable pervious concrete to the nearest joints. The Engineer will reject the concrete if the pressure washing dislodges aggregate particles from more than two (2) percent of the pervious concrete in a single panel (joint to joint) or dislodges aggregates from a contiguous area of the pavement surface exceeding five times the nominal maximum aggregate size in any direction.

   The Contractor shall decide, after placing the pervious concrete, when to perform the quality assurance pressure wash testing for the acceptance.

DESIGNER NOTE: The designer should consider requiring verification of subgrade infiltration rate and provision to increase reservoir course depth based on results.

D. Testing

1. Reference Panel: Testing for the reference panel shall adhere to the requirements for testing of Pavement per Section 1.05.D.2 for approval by the Engineer. Each test shall meet the acceptance criteria for Reference Panel as defined in Section 1.05.E.1.

The Engineer shall inspect and approve the reference panel prior to the placement of additional pervious concrete.

Failure to install acceptable reference panels of pervious concrete will indicate an unqualified installer.

Production sections of this Work shall not be placed until achieving a complete reference panel that fully complies with the Plans and Specifications and has written acceptance issued by the Engineer.

The completed and accepted reference panels shall be maintained and protected throughout the duration of the Work and may not be demolished and disposed of without written permission from the Engineer. If a reference panel is incorporated into the Work, it shall remain in place and be accepted as a single lot.

Unless otherwise determined by the Engineer, density testing of fresh concrete and hardened cores will be used to validate the mix design per the design criteria set forth in Section 1.04.B and the acceptance criteria in Section 1.05.E.1.

The average fresh density and average hardened density of the cores shall be the densities used for the Approved Mix Design.

2. Pavement: The following testing shall be conducted for approval by the Engineer for each reference panel and each lot of pervious concrete placed, where a lot is defined as the lesser of one (1) day's production or 5,000 square feet of pervious concrete, in place, unless otherwise specified below:

   a. Density testing of at least one (1) cubic foot of fresh concrete in accordance with ASTM C1688.

   b. Thickness testing of three (3), four- (4)-inch hardened concrete cores in accordance with ASTM C174 and adhering to the following requirements:

      1) Removed not less than seven (7) days after placement of pervious concrete.

      2) Location selected in accordance with ASTM D3665.

      3) Cut in accordance with ASTM C42.

   c. Density and void content testing of the three (3) hardened concrete cores extracted for thickness testing and trimmed to produce flat core ends per ASTM C42 paragraph 7.4.1 and 7.4.2. Samples shall be tested in accordance with ASTM C1754.

   d. Surface infiltration tests per ASTM C1701 and at the frequency described below.

1) Three (3) test locations per 10,000 square feet of pervious concrete, in place

2) One (1) additional test location per 5,000 square feet of pervious concrete, or fraction thereof, in place

DESIGNER NOTE: Designer to specify the number and location(s) of required post construction infiltration tests.

Core holes shall be filled with solid concrete, pre-blended grout, or pervious concrete and shall match adjacent pavement color, and grade. At the Engineer's discretion, a sacrificial panel for cores may be required or allowed.

Each test shall meet the acceptance criteria for Pavement as defined in Section 1.05.E.2.

E. Acceptance

1. Reference Panel: Acceptance of the reference panel will be based on the criteria for acceptance of Pavement per Section 1.05.E.2 with the following deviations:

   a. Hardened Density: The density of each core shall be within five (5) pounds per cubic foot of the average hardened density of the three (3) cores.

   b. Fresh Density: The fresh density shall be within or equal to five (5) pounds per cubic foot of the average fresh density of the three (3) samples.

2. Pavement: Acceptance of a lot of pervious concrete will be based on the following criteria:

   a. Smoothness: Pervious concrete pavement smoothness shall be checked with a 10-foot straightedge. Vertical measurement should be taken between the pavement's determined plane and straight edge, discounting surface void and roughness irregularities, in a direction perpendicular and parallel to the centerline. The finished pavement shall be uniform to a degree such that no variations greater than 3/8-inch are present between the straight edge and pavement surface over a distance of at least 6 inches.

   b. Grade: Pervious concrete shall be true to designed spot elevations plus or minus ½ inch and shall not deviate from designed slope more than ¼ inch in ten (10) feet. Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the pervious concrete shall be flush.

   c. Line: Pervious concrete margins shall be true to designed lines plus or minus ½ inch at any point.

d. Slope: Pervious concrete shall be sloped as shown on the Plans. Slope shall be consistent to within 1/4 inch in ten (10) feet.

e. Thickness: Each core sample shall be equal to the minimum section depth or more as specified on the Plans.

f. Hardened Density: The density of the core samples for each lot shall be within five (5) pounds per cubic foot of the density as accepted in the reference panel.

g. Void Content: The total void content of the core samples for each reference panel and lot shall be twenty (20) percent, plus or minus five (5) percent, in place, as constructed.

h. Infiltration Rate: The average of all surface infiltration tests shall be greater than 250 inches per hour with no single test less than 100 inches per hour.

DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

- For permeable pavement that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 250 inches per hour with no single test less than 100 inches per hour
- For permeable pavement not subject to run-on OR vehicular traffic:
  - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 75 inches per hour

i. Fresh Density: The fresh density shall be within or equal to five (5) pounds per cubic foot of the fresh density indicated by the Approved Mix Design.

j. Batch Ticket: Each load of pervious concrete transported to the location of placement shall have a Batch Ticket delivered with the load. Batch Tickets shall be provided upon request for each load and shall be in accordance with ASTM C94, with the following additions:

1) Batch weights of all constituents in the mix, including cement, aggregate, admixtures, water, and fibers

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2) Signature of responsible representative of the concrete producer, affirming the accuracy of the information provided

k. Appearance: Each lot of finished pervious concrete will be inspected for appearance by the Engineer after completion of pressure wash testing per Section 1.05.C.4. The pervious concrete shall have a consistent surface texture, shall have no more than five (5) percent of the surface area within each panel (joint to joint) filled with paste, shall be free of ridges or other surface imperfections, shall have joints that are in the specified location and are constructed per specification, shall be free of cracks and shall not be raveled.

A panel will be considered raveled if aggregate is dislodged from a contiguous area of the pavement surface or longitudinally along a joint exceeding five times the nominal maximum aggregate size in any direction OR if aggregate particles are dislodged from more than two (2) percent of the pervious concrete within each panel (joint to joint).Raveling occurring during the first three (3) months after installation is subject to complete removal and replacement of affected panels with acceptable pervious concrete at the Owner's discretion and Contractor's expense. Requirement to replace affected panels shall continue until three (3) months after the date of replacement. Written notification of defects is the sole responsibility of the Owner.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

l. Conformance to Approved Mix Design: The pervious concrete used shall conform to the Approved Mix Design within the limits set forth in ASTM C94.

3. Required Inspections: Notify the Engineer at least 48 hours prior to required inspections specified in Sections 3.01, 3.02, and 3.03.B.

PART 2 PRODUCTS

DESIGNER NOTE: Designers should maximize the use of regionally available materials.

2.01 PERVIOUS CONCRETE

DESIGNER NOTE: No reinforcing bars or tie bars will be used in the installation of pervious concrete.

Pervious Concrete shall comply with ASTM C94, except sections 4.2, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 7, 8, 16, 17, 18, 19, 20 and the requirements specified herein. The volume of fresh concrete in a given batch shall be determined from the total mass of the batch divided by the design density of the concrete. The total mass

of the batch shall be determined as the net mass of the concrete in the batch as delivered, including the total mixing water as defined in ASTM C94 Paragraph 9.3.

A. Cement: Cement in the mix design shall conform to the requirements for Portland Cement or Blended Hydraulic Cement as specified herein:

1. Portland Cement: Portland Cement shall meet the requirements of ASTM C150 Type I, II, or V Portland cement.

2. Blended Hydraulic Cement: Blended Hydraulic Cement shall be Type IP or IS Cement conforming to ASTM C595. Type IP(X), Portland Pozzolan Cement, and IS(X) where (X) dictates pozzolan and slag percentage, respectively, shall be Portland Cement and Pozzolan. The pozzolan shall be limited to fly ash or ground granulated blast furnace slag.

   The fly ash or ground granulated blast furnace slag constituent content in the finished cement shall not vary more than plus or minus 5 percent by weight of the finished cement from the certified value.

3. Supplementary cementitious material shall be as specified herein:

   a. Fly Ash: Fly ash shall conform to the requirements of ASTM C618, Class F or C.

   b. Slag Cement: Slag cement shall meet the requirements of ASTM C989, Grade 100 or Grade 120.

   c. Silica Fume: Silica fume shall meet the requirements of ASTM C1240.

B. Aggregates: Aggregates shall conform to ASTM C33 except as specified herein, unless otherwise approved by the Engineer.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 300 cubic yards of concrete.

Sieve[1]	Percent Passing by Weight				
	Coarse Aggregate				Fine Aggregate
	ASTM No. 7	ASTM No. 8	ASTM No. 89	ASTM No. 9	
2 inch	–	–	–	–	–
1 1/2 inch	–	–	–	–	–
1 inch	–	–	–	–	–
3/4 inch	100	–	–	–	–
1/2 inch	90 to 100	100	100	–	–
3/8 inch	40 to 70	85 to 100	90 to 100	100	100
No. 4	0 to 15	10 to 30	22 to 55	85 to 100	95 to 100
No. 8	0 to 5	0 to 10	5 to 30	10 to 40	80 to 100
No. 16	–	0 to 5	0 to 10	0 to 10	50 to 85
No. 30	–	–	0 to 5	0 to 5	25 to 60

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No. 50	–	–	–	–	5 to 30
No. 100	–	–	–	–	0 to 10
No. 200	–	–	–	–	0 to 3

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

In individual tests, a variation of 4 percent under the minimum percentages or over the maximum percentages will be allowed. The average of three successive tests shall be within the percentages stated above. Aggregate shall contain no pieces larger than two times the maximum sieve size for the specified grading measured along the line of greatest dimension.

2. Coarse Aggregate

   a. LA Abrasion: 35 percent (maximum) tested in accordance with ASTM C131 at least once per 300 cubic yards of concrete.

   b. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 300 cubic yard of concrete.

3. Acceptance of grading and quality of the aggregate may be based on samples taken from stockpiles at the concrete plant or a submitted gradation report at the discretion of the Engineer. The point of acceptance will be determined in the field by the Engineer.

C. Admixtures

1. Air Entraining Admixtures: Air entraining admixtures shall meet the requirements of ASTM C260.

2. Water Reducing Admixtures: Water reducing admixtures shall meet the requirements of ASTM C494, Type A.

3. Hydration Stabilizing Admixtures: Hydration stabilizing admixtures shall meet the requirements of ASTM C494, Type B or Type D.

4. Superplasticizers: Superplasticizers and retarders shall meet the requirements of ASTM C494, Type F or Type G and ASTM C1017, Type 1.

5. Viscosity Modifying Admixtures: Viscosity modifying admixtures may be used if approved by the Engineer.

6. Color Pigment: Color pigment shall meet the requirements of ASTM C979 for integrally colored concrete. Pigments shall be color stable, non-fading, and resistant to lime and other alkalis.

   DESIGNER NOTE: Designer to specify color, as indicated by manufacturer's designation, architect's sample, etc. with provision for approved equal color.

D. Water: Clean potable water or water conforming to ASTM C1602 shall be used in the mix design and on the jobsite. The use of hot water is not permitted.

E. Microfibers: Microfibers shall conform to the requirements of ASTM C1116, Type III and shall be monofilament and ½ inch in length.

F. Mix Design:

1. General: The Contractor shall propose a mix design for pervious concrete and shall submit the mix design to the Engineer for acceptance prior to constructing the reference panels. Pervious concrete shall not be placed in the reference panels without a mix design that has been reviewed and accepted by the Engineer.

2. Mix Design Criteria: The Contractor shall include the following elements and results of the described procedures in the proposed mix design:

   a. The cementitious content, including pozzolans if used, shall be a minimum of 480 and a maximum of 600 pounds per cubic yard.

   b. The mix may incorporate up to 5 percent fine aggregate, by weight.

   c. The mix shall incorporate a hydration stabilizing admixture.

   d. The mix may incorporate microfibers or fibers per Manufacturer's recommendations.

   e. The mix shall be designed to meet the acceptance criteria for Void Content per Section 1.05.F.2 as determined by the testing methods specified in Section 1.05.E.2.

   f. The water/cement ratio shall be between 0.27 and 0.35.

   g. Up to 50 percent of cementitious material in the mix, by weight, may be fly ash, slag cement, or a combination of silica fume and either or both of the above, with silica fume not exceeding 10 percent.

   Deviations from this mix design, such as the use of internal curing admixtures, cementitious content outside of the range specified, or finer aggregate gradations may be permitted at the sole discretion of the Engineer provided the Contractor can demonstrate the viability of the mix design through past successful installations or sound science.

2.02 PAVEMENT BASE

A. Pavement Base Material shall consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials or round river gravel are not permitted. Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than Working 10 days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take

preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to two (2) layers as specified on the Plans and included herein:

1. "Base Course" shall be ASTM No. 3 (modified) or ASTM No. 57 (modified) stone per Section 2.02.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

2. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.02.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed rock to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying courser graded materials or reduction in permeability relative to the underlying material.

C. Pavement Base Material shall meet the following specifications for grading and quality.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
3 inch	100	–	–	–
2 1/2 inch	90 to 100	100	–	–
2 inch	35 to 70	90 to 100	–	–
1 1/2 inch	0 to 15	35 to 70	–	100
1 inch	–	0 to 15	–	95 to 100
3/4 inch	0 to 5	–	–	–
1/2 inch	–	0 to 5	100	25 to 60
3/8 inch	–	–	85 to 100	–

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Sieve[1]	Percent Passing by Weight			
	ASTM No. 2 (modified)	ASTM No. 3 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)
No. 4	–	–	10 to 30	0 to 10
No. 8	–	–	0 to 10	0 to 5
No. 16	–	–	0 to 5	–
No. 100[2]	0 to 2	0 to 2	0 to 2	0 to 2

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

[2] Gradation modified from ASTM for portion passing the No. 100 sieve.

2. R-Value: 78 (minimum) tested in accordance with California Test 301.
3. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C131.
4. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.
5. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.
6. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.03 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%

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Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer and shall be recompacted in accordance with Section 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade.

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

DESIGNER NOTE: Other subgrade verification methods may be required if site conditions limit proof rolling. Consult with geotechnical engineer for acceptable methods.

F. After compaction and proof roll, scarify subgrade ¼- to ½-inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.

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2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer at no additional cost to the Owner. Overlaps of the geotextile shall be a minimum of one (1) foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6) inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10) ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots, additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. The pavement base shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any pervious concrete.

DESIGNER NOTE: Consider developing a testing plan for the required testing and inspection of the pavement base. Verification of the in place density/compaction of the open graded base materials is typically not possible with the use of a nuclear densometer due to nature of these materials. Therefore other means to verify these materials are firm and unyielding (such as observation of the compaction process by a geotechnical engineer) are necessary.

DESIGNER NOTE: Consider requiring the Contractor to compact aggregates without crushing them.

3.03 MIXING, PLACEMENT & CURING OF PERVIOUS CONCRETE

A. Pervious concrete formwork

1. Forms shall be made of steel or wood and shall be in good condition, clean, and capable of being anchored in place so as to ensure pavement placement true to the grades, lines and slopes as specified on the Plans.

2. Forms that are bent, warped, unclean, or otherwise deemed inadequate by the Engineer shall not be used.

3. Existing curbs, structures, or the vertical face of previously placed pervious concrete may be used as a form.

4. Set, align, and brace forms to satisfy the lines, grades, and slopes on the Plans.

5. Apply form-release agent to the form face immediately before placing concrete.

6. No pervious concrete shall be placed until the forms are inspected and accepted by the Engineer.

7. Slip forming is an acceptable method for placement of pervious concrete.

B. Batching, mixing, and delivery

1. Pervious concrete shall be batched and centrally mixed at a batching plant meeting the requirements set forth in Section 1.06.A.4. Pervious concrete shall not be shrink mixed or transit mixed.

2. Begin mixing immediately after cement has been added to aggregates. Batch and mix concrete in compliance with ASTM C94, with the following exceptions:

   a. Placement of concrete shall occur no more than 60 minutes from the time water or aggregate is added to the cement.

   b. If a hydration-stabilizing admixture is used, up to 60 minutes may be added to the placement time, resulting in a maximum placement time of 120 minutes.

   Additional water may be added on site, but the fresh density must still meet the requirements of Section 2.01.F.2 after water addition.

C. Placing and consolidation

1. Pervious concrete shall not be placed on standing water or frozen pavement base.

2. Wet the pavement base with water before concrete placement such that the material is saturated but without any standing water on the prepared base immediately before concrete placement.

3. Place pervious concrete on the prepared pavement base as close to its final position as possible, either directly from the transporting equipment or by conveyor, unless otherwise specified. Spread the concrete using mechanized equipment or hand tools, without segregation.

4. Strike off concrete between forms using a form riding paving machine or roller screed at the appropriate height, as determined by the Contractor, to allow for compaction to finished grade. Equipment used for striking off the pervious concrete shall leave a smooth surface, free of ridges or other imperfections, without drawing excessive paste to the surface. Vibratory screeds are not permitted. Other strike-off devices may be used when accepted by the Engineer.

5. Compact pervious concrete with a purpose built pervious concrete cross roller or alternate method approved by the Engineer. Rollers shall be of sufficient weight and width to compact the fresh pervious concrete to grade, leaving a smooth surface, free of ridges or other imperfections, without drawing excessive paste to the surface.

Compacted pervious concrete shall meet the acceptance criteria for Smoothness set forth in Section 1.05.E.2.

6. Contractor's personnel shall take care to avoid foot traffic in the pervious concrete to prevent non-uniform compaction and to keep contaminated material from entering the pavement mix. Foot traffic on the fresh concrete shall not be allowed after it has been struck off.

7. Place pervious concrete continuously. Where placement has been halted for a period of 15 minutes, a header shall be placed between the forms and a construction joint formed. The construction joint shall be located at a contraction joint location, unless otherwise approved by the Engineer. The pervious concrete shall be compacted and finished to the header before placement may continue. Upon resuming placement, the header may be carefully removed and a construction joint formed at that location. Any sloughing or sagging of the previously placed pervious concrete at the header location shall be corrected prior to placing new pervious concrete against the joint.

D. Edging: Edging of the top surface shall be completed in plastic concrete to a radius of not less than 1/4 inch. Defects shall be repaired immediately.

E. Jointing: Joints shall be of three (3) types: construction, contraction, and isolation. Wherever possible, the angle between intersecting joints shall be between 80 and 100 degrees. Construct joints at the locations and to the horizontal dimensions indicated on the Plans.

1. Construction Joints: Construction joints shall be formed at the end of a day's work or when necessary to stop production for any reason.

   a. Construction joints shall be located as near as possible to the location of a planned contraction or isolation joint.

   b. Construction joints are to be formed by placing a header between the forms, at right angles, to the full depth of the finished pervious concrete, and set to the height of the forms. Pervious concrete shall be placed against the header and compacted and finished as normal, including edging.

   c. Upon resuming paving, the header shall be carefully removed and new pervious concrete placed directly against the existing pervious concrete. The new pervious concrete shall be compacted and finished against the hardened pervious concrete as if it were a form.

   d. If an isolation joint is planned at this location, then the premolded joint filler shall be placed against the existing pervious concrete and the new pervious concrete shall be placed against the premolded joint filler. The joint shall be tooled on both sides of the premolded joint filler.

2. Contraction Joints: Contraction joints shall be used to control random cracking.

   a. Contraction joints shall be placed every 15 feet unless otherwise shown on the Plans.

      DESIGNER NOTE: Designer should consider size and aspect ratio of panels when locating joints.

   b. Plastic Formed Joints: Contraction joints may be formed in the plastic concrete using a roller designed for this purpose or by other methods accepted by the Engineer.

      1) Rollers shall have sufficient weight to produce the joint and shall not otherwise damage or mar the surface.

      2) Plastic formed joints shall be a minimum depth of 1 and 3/4 inches and have a width of no more than 1/8 inch.

      3) Joints shall be tooled on both sides of the joint with a radius not less than 1/4 inch.

   c. Saw Cut Joints: At the option of the Contractor, contraction joints may be saw cut provided joints are early-entry dry-cut type.

      1) Joints shall be cut using purpose built early-entry saw cutting equipment.

      2) Saw cut joints shall be a minimum depth of 1/4 of the pervious concrete thickness, up to a maximum required depth of 1 and 1/4 inches, and have a joint width of no more than 1/8 inch.

      3) Saw cutting shall occur as soon as the concrete is sufficiently cured so that it may be cut without raveling or dislodging aggregate from the finished surface, no longer than four (4) hours after placement of pavement.

      4) Remove cuttings from surface immediately after saw cutting of joints.

      5) To minimize drying, curing materials shall be removed only as needed to make cuts and shall be replaced immediately after cutting. The exposed pervious concrete shall be kept moist for the entire duration of exposure.

3. Isolation Joints: Isolation joints shall be used where the pervious concrete abuts existing facilities or where shown on the Plans.

   a. Isolation joints shall continue through the depth of the pervious concrete using a 3/8 inch premolded joint filler.

   b. Isolation joints may be formed by inserting the premolded joint filler into the plastic concrete or by forming a construction joint

and affixing the premolded joint filler against one side of the joint and placing fresh pervious concrete against it.

c. Isolation joints and filler shall be flush with the surrounding pervious concrete and shall not deviate from the acceptance criteria for Grade as specified in Section 1.05.E.2.

d. The edges of the pervious concrete on either side of the premolded joint filler shall be hand tooled to a radius not less than 1/4 inch.

F. Curing

1. Begin curing within 20 minutes of concrete discharge from the truck, unless otherwise specified or approved by the Engineer.

2. Completely cover the pavement surface and all exposed edges with a minimum six- (6)-mil-thick white polyethylene sheet, unless otherwise specified or approved by the Engineer. No wetted burlap or cloth shall be used.

3. Thoroughly secure a polyethylene sheet at all exterior edges and interior laps without using soil. The method of securing the cover material shall prevent wind from removing the sheet and from blowing under the sheet across the surface of the concrete.

4. Curing compound shall not be used on any pervious cement concrete surface.

5. Cure pavement for a minimum of 7 uninterrupted days, unless otherwise specified or approved by the Engineer.

6. With the exception of saw cutting equipment, all traffic shall be kept off of the pervious concrete during the curing period.

7. Any testing for acceptance shall not occur until the end of the curing period.

G. Cold-weather construction

1. Protect concrete from freezing and record concrete temperature no less than twice per 24-hour period in accordance with ACI 306.1.

3.04 OPENING TO TRAFFIC

A. No traffic shall be allowed on the pervious cement concrete pavement for 10 days.

3.05 PROTECTION OF PAVEMENT

A. Cured and exposed pervious cement concrete pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the pervious pavement voids, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If

pervious cement concrete pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

3.06 REJECTION

A. Pervious concrete that does not meet the acceptance criteria set forth in Section 1.05.E.2 will be rejected by the Engineer on a lot-by-lot basis. Pervious concrete that has been rejected by the Engineer or the Contractor shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

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DESIGNER NOTE: The specifications below are based on the best available information. Designer should modify the specifications to satisfy project-specific constraints. The City uses the term "Permeable Unit Pavers" when infiltration achieved via aggregate filled joints and "Porous Unit Pavers" when infiltration is achieved through the paver material itself.

DESIGNER NOTE: Green text corresponds to notes to the designer.

PART 1 GENERAL

1.01 SUMMARY

A. This section Includes:

1. Permeable/Porous Unit Pavers
2. Joint Filter Aggregate
3. Pavement Base
4. Edge Restraints
5. Geotextile for Soil Separation

B. Related Sections

DESIGNER NOTE: The designer should list any additional specification sections which relate to the permeable/porous unit paver work (i.e., temporary erosion control, utilities, earthwork, etc.)

1.02 STANDARDS AND CODES

A. Reference Standards: This section incorporates by reference the latest version of the following documents. These references are a part of this section as specified and modified.

Reference	Title
Caltrans	Standard Specifications
ASTM C67	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C13	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Method for Sieve Analysis for Fine and Coarse Aggregate
ASTM C140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM D448	Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM C936	Standard Specification for Solid Interlocking Concrete Pavers

ASTM C979	Specification for Pigments for Integrally Colored Concrete
ASTM C1781	Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems
ASTM E2835	Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device

1.03 REFERENCES

DESIGNER NOTE: Designer to provide references to related industry manuals and guidance and all project specific documents (e.g., geotechnical report).

A. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavement manual.

DESIGNER NOTE: The designer should consider the use of the ICPI Permeable Design Pro software for structural design and determination of adequate depth for the pavement section.

1.04 SUBMITTALS

A. Bid Submittals: The Contractor shall submit to the Owner the following as part of the bid proposal:

1. Paver Installation Subcontractor:

a. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute's Concrete Paver Installer Certification program.

b. Job references from three (3) projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone number, and email address.

DESIGNER NOTE: The designer should incorporate by reference these requirements in Division 00 of the Specifications.

B. Pre-Installation Submittals: The Contractor shall submit to the Engineer the following a minimum of 20 calendar days prior to the construction of the permeable/porous unit pavers:

1. Paver manufacturer's/installation subcontractor's drawings and details indicating perimeter conditions, junctions with other materials, expansion and control joints, paver layout/patterns, joint spacing and/or tabs, color arrangement, and installation [and setting] procedures. Drawings and details shall also indicate layout, pattern and relationship of paving joints to fixtures and project formed details.

2. Source certificates, gradations, R-values, LA abrasion, and cleanness values of aggregates for base, reservoir course, and joint filler materials performed within one (1) month of product delivery to site.

DESIGNER NOTE: Consider revising acceptable age of sieve test depending on scale of project. On a larger project it may be appropriate to require testing by an independent lab with samples taken at the supplier's yard from the stockpile to be used for the project.

3. Product data sheets for unit pavers and geotextiles.
4. Laboratory test reports certifying compliance of the concrete pavers with ASTM C936.
5. Manufacturer's certification of concrete pavers by ICPI as having met applicable ASTM standards.

DESIGNER NOTE: Especially when using colored pavers, consider requiring submittal of full-size samples of each paver type, thickness, color, and finish. Require submittal of samples indicating the range of color expected in the finished installation. Accepted samples would become the standard of acceptance for the work of this Section.

1.05 QUALITY CONTROL AND QUALITY ASSURANCE

A. General: Test and inspect permeable/porous unit paver materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered later, nor shall it constitute final acceptance.

1. Paver Installation Subcontractor Qualifications:
2. Installer shall provide documentation showing three (3) successful permeable/porous unit paver installations completed in the last three (3) years, collectively totaling more than 10,000 square feet. Documentation shall include name and address of project, and contact information for project owner.
3. Installer shall utilize job foremen holding a record of completion from the Interlocking Concrete Pavement Institute PICP Installer Technician Course.

DESIGNER NOTE: Consider changing these requirements to match scale and complexity of project including a minimum total amount of pavers placed.

B. Responsibilities of Contractor

1. Pre-Placement Conference: A mandatory pre-placement conference will take place, including at a minimum the Engineer, the Owner, general Contractor, and paver installer, to review the manufacturers' quality control plan, personnel qualifications, and the paver installers' Method Statement and Quality Control Plan.
2. Reference Panel: Place reference panels on the project site, on a subgrade and base prepared as specified, using the material and

construction requirements for pavement in this Specification. Each panel must have a surface area of at least 100 square feet (sf), and a width and thickness as specified for the pavement in the Contract Documents. The Engineer shall observe and accept each element of the paver construction prior to the placement of additional pavement. Failure to install acceptable reference panels of permeable/porous unit pavers will indicate an unqualified installer. Construction and evaluation of the reference panel(s) will occur as follows:

a. Notify the Engineer at least ten (10) Working Days before installing paver reference panel.

b. Coordinate the location of the reference panel with the Engineer.

c. Notify the Engineer when each element of the reference panel is ready for inspection.

d. Remove, replace, and dispose of any unsatisfactory portions of reference panel as determined by the Engineer and at no additional cost to the Owner.

e. Retain and maintain approved reference panel during construction in an undisturbed condition as a standard for judging completed portions of the final installations.

Approved reference panels may remain as final installations of the Work at the discretion of the Engineer. If not retained, the reference panel shall be removed and disposed at no additional cost to the Owner.

DESIGNER NOTE: Mechanized installations may require a larger mock up area. Consult with the paver installation (Sub) Contractor on the size of the reference panel.

DESIGNER NOTE: Use this panel to determine expected settlement (surcharge) of the leveling course, joint sizes, and lines, laying pattern, color and texture of the job.

DESIGNER NOTE: The designer should consider requiring verification of subgrade infiltration rate and provision to increase reservoir course depth based on results.

3. Infiltration Testing: Perform surface infiltration tests per ASTM C1781 as described below.

a. Three (3) test locations per 10,000 square feet of permeable/porous unit pavers, in place

b. One (1) additional test location per 5,000 square feet of permeable/porous unit pavers, or fraction thereof, in place

DESIGNER NOTE: Designer to specify the number and location(s) of required post construction infiltration tests.

C. Acceptance

1. The surface elevation of pavers shall be 1/8 to 1/4 inch (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.
2. Lippage: No greater than 1/8 inch (3 mm) difference in height between adjacent pavers.
3. Bond lines for paver courses shall be within ½ inch (± 15 mm) over a 50-foot (15 m) string line.
4. The final surface tolerance of compacted pavers shall not deviate more than ± 3/8 inch (10 mm) under a 10-foot (3 m) long straightedge.
5. Infiltration Rate: The average of all tests shall be greater than 50 inches per hour with no single test less than 25 inches per hour.

   DESIGNER NOTE: The designer should adjust infiltration rates to reflect project specific conditions such as anticipated sediment loading based on pavement use (e.g., vehicular, pedestrian) and design run-on from adjacent surfaces. The recommended criteria are as follows:

   - For permeable/porous unit pavers that will accept run-on from adjacent impervious and/or pervious surfaces OR pavement that will be subject to vehicular traffic:
     - The average of all surface infiltration tests shall be greater than 100 inches per hour with no single test less than 50 inches per hour
   - For permeable pavement not subject to run-on OR vehicular traffic:
     - The average of all surface infiltration tests shall be greater than 50 inches per hour with no single test less than 25 inches per hour

DESIGNER NOTE: The surface of the pavers may be 1/8 to 1/4 inch (3 to 6 mm) above the final designed elevations after compaction. This helps compensate for possible minor settling normal to pavements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged container packaging with identification tags intact on each paver bundle.

1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

2. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.

D. Unload pavers at job site in such a manner that no damage occurs to the product or existing construction.

E. Storage and Protection: Store materials in a protected area such that they are kept free from mud, dirt, and other foreign materials.

1.07 MAINTENANCE

DESIGNER NOTE: Consider requiring the provision of additional pavers to be retained and stored by the Owner for future maintenance.

- Extra materials: Provide [Specify area] [Specify percentage] additional material for use by Owner for maintenance and repair.
- Extra pavers shall be from the same production run as installed materials.

PART 2 PRODUCTS

DESIGNER NOTE: Some projects may include permeable/porous and solid unit pavers. Specify each product, as required.

2.01 PERMEABLE/POROUS UNIT PAVERS

A. Manufacturer: [Specify manufacturer name.].

1. Contact: [Specify ICPI member manufacturer contact information.].

B. Permeable/Porous Unit Paver Type: [Specify name of product group, family, series, etc.].

1. Material Standard: Comply with ASTM C 936.
2. Color [and finish]: [Specify color.] [Specify finish].
3. Color Pigment Material Standard: Comply with ASTM C979.
4. Size: [Specify.] inches [({Specify.}mm)] x [Specify.] inches [({Specify}mm)] x [Specify.] inches [({Specify.} mm)] thick.
5. Joint Gap Size: [Specify.] inches
6. Joint Gap Mechanism: [Specify if integral spacer, or other paver spacer.] type
7. Bevel Size: [Specify.] inches, [Specify.] type

DESIGNER NOTE: Concrete pavers with spacers integral to each unit are recommended for mechanically installed pavers and pavers subject to vehicular traffic. Verify with manufacturer that overall dimensions do not include spacers.

2.02 JOINT FILLER AGGREGATE

A. Crushed Particles: 90 percent (minimum) tested in accordance with California Test 205.

B. LA Abrasion: Less than 40 tested in accordance with ASTM C131.

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C. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.

D. Rounded river gravel may not be used.

E. Permeable Unit Paver: The following aggregate shall be used to fill joints unless manufacturer recommends otherwise. Aggregate gradations shall be per Section 2.03.C.1. If manufacturer recommendation is different from the gradations shown below the Contractor shall be notified at least 48 hours prior to placement of the joint filler.

Gap Width	Aggregate Gradation
3/8" or ½"	ASTM No. 8 (modified)

F. Porous Unit Pavers: Joint filler shall be per manufacturer's recommendation.

2.03 PAVEMENT BASE

A. Pavement Base Material shall be consist of clean, mechanically crushed stone, substantially free from adherent coatings. Materials shall be washed thoroughly to remove clay, organic matter, extraneous debris, or objectionable materials. Recycled materials or rounded river gravel are not permitted. Material shall be obtained only from a source(s) approved by the Engineer. Written requests for source approval shall be submitted to the Engineer not less than ten (10) Working Days prior to the intended use of the Material. Should the proposed source be one that the Engineer has no history of Material performance with, the Engineer reserves the right to take preliminary samples at the proposed source, and make preliminary tests, to first determine acceptability of the new source and then perform the applicable Material approval testing. Continued approval of a source is contingent upon the Materials from that source continuing to meet Contract requirements. Materials shall meet the Standard Specifications for grading and quality for use in the Work; however, allowable exceptions may be specified in the Contract. The Engineer shall reserve the right to sample and test Material at any time including at the source.

B. Pavement Base shall consist of up to three (3) layers as specified on the Plans and included herein:

1. "Leveling Course" shall be ASTM No. 8 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide a smooth, level surface for placement of pavers.

2. "Base Course" shall be ASTM No. 57 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide structural (load bearing) capacity to the pavement.

3. "Reservoir Course" shall be ASTM No. 2 (modified), ASTM No. 3 (modified), or ASTM No. 57 (modified) stone per Section 2.03.C.

   DESIGNER NOTE: This layer of the pavement base is intended to provide water storage and drainage of the pavement, structural support, and a capillary break. The materials specified should be crushed, clean, washed rock to provide the desired structural capacity, maintain good drainage, function as a capillary barrier, and minimize clogging of the subgrade due to export of fines.

   DESIGNER NOTE: ASTM No. 2 stone is preferred.

DESIGNER NOTE: If the designer chooses to specify materials that differ from those provided herein, the designer should check their filter criteria to evaluate the likelihood of finer-graded material migration into underlying courser graded materials or reduction in permeability relative to the underlying material.

C. Pavement Base Material shall meet the following specifications for grading and quality.

DESIGNER NOTE: If the designer chooses to specify materials per the procedure above, provide the required gradation the in the table below.

1. Aggregate Gradation tested in accordance with ASTM C136 at least once per 500 cubic yards of base material.

Sieve[1]	Percent Passing by Weight					
	ASTM No. 10 (modified)	ASTM No. 89 (modified)	ASTM No. 8 (modified)	ASTM No. 57 (modified)	ASTM No. 3 (modified)	ASTM No. 2 (modified)
3 inch	–	–	–	–	–	100
2 1/2 inch	–	–	–	–	100	90 to 100
2 inch	–	–	–	–	90 to 100	35 to 70
1 1/2 inch	–	–	–	100	35 to 70	0 to 15
1 inch	–	–	–	95 to 100	0 to 15	–
3/4 inch	–	–	–	–	–	0 to 5
1/2 inch	–	100	100	25 to 60	0 to 5	–
3/8 inch	100	90 to 100	85 to 100	–	–	–
No. 4	85 to 100	20 to 55	10 to 30	0 to 10	–	–
No. 8	–	5 to 30	0 to 10	0 to 5	–	–
No. 16	–	0 to 10	0 to 5	–	–	–
No. 30	–	–	–	–	–	–
No. 50	–	0 to 5	–	–	–	–
No. 100[2]	10 to 30	–	0 to 2	0 to 2	0 to 2	0 to 2
No. 200[2]	0 to 2	0 to 2	–	–	–	–

[1] Sieve provided in nominal size square openings or United States Standard Sieve Series sizes.

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[2] Gradation modified from ASTM for portion passing the No. 100 and 200 sieve, as shown.

2. R-Value: 78 (minimum) tested in accordance with California Test 301.
3. L.A. Abrasion: 30 percent (maximum) tested in accordance with ASTM C131.
4. Cleanness Value: 75 (minimum) tested in accordance with California Test 227 at least once per 500 cubic yards of base material.
5. Crushed Particles: 90 percent (minimum) with two (2) or more fractured faces tested in accordance with California Test 205.
6. The combined portion of Material retained on the U.S. No. 4 sieve shall not contain more than 0.1 percent wood waste by weight. The portion of Material passing a U.S. No. 10 sieve shall not have wood waste that results in more than 250 parts per million of organic matter by calorimetric tests when tested. The color shall be measured after the sample has been in the test solution for 1 hour.

2.04 ACCESSORIES

A. Provide accessory materials as follows: Edge Restraints

1. Manufacturer: [Specify manufacturer.].
2. Material(s): [Pre-cast concrete] [Cut stone] [steel].
3. Material Standard: [Specify material standard.].
4. Configuration: [Specify geometry, manufacturer's model number, stakes or spikes, paver spacers, coatings, color, etc.]

DESIGNER NOTE: Curbs will typically be cast-in-place concrete or precast set in concrete haunches. Cast in place concrete curbs should be specified in another Section. Do not use plastic edging with steel spikes to restrain unit pavers for vehicular applications.

2.05 GEOTEXTILE FOR SOIL SEPARATION

DESIGNER NOTE: See ICPI publication, Permeable Interlocking Concrete Pavements for guidance on geotextile selection. Geotextile is not typically required under permeable pavement applications unless recommended by a geotechnical engineer. Geotextile can be placed vertically for material separation between side walls of reservoir course and native soil.

A. Geotextile shall be woven, consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. The geotextile shall also be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation. The geotextile shall conform to the properties specified herein:

Geotextile Property	Test Method	Requirement
Grab Tensile Strength, minimum in weakest direction	ASTM D4632	200 lbs/in
Apparent Opening Size (AOS)	ASTM D4751	40 to 50
Ultraviolet (UV) Radiation Stability, minimum strength retained after 500 hours in weatherometer	ASTM D4355	50%
Flow Rate, minimum	ASTM D4491	140 gal/min/ft^2

DESIGNER NOTE: The designer should consider including specifications for signage and pavement markings in this section.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION AND PROTECTION

A. Construct subgrade to +/- ¾ inch of the grades and slopes specified on the Plans.

B. Grading of subgrade shall be with low ground pressure equipment when within six (6) inches of final subgrade elevation.

C. Compact subgrade to 90 percent (+/- 2 percent) of the maximum dry density per standard Proctor test (ASTM D698), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6939.

DESIGNER NOTE: The designer should set compaction requirements based on consideration of site specific geotechnical properties of the native soil (e.g., permeability, stiffness) and performance requirements for the pavement section (e.g., traffic loading, infiltration, cost).

D. Areas of the subgrade which are over-compacted, as determined by the Geotechnical Engineer, shall be ripped/tilled to a depth of 12 inches (minimum) or as directed by the Geotechnical Engineer and shall be recompacted in accordance with Section 3.01.C. Contractor shall locate all utilities within pavement footprint prior to ripping and re-compacting subgrade.

E. Proof-roll prepared subgrade with loaded dump truck, remove soft spots, and replace with permeable structural fill as directed by the Engineer to achieve uniform subgrade.

DESIGNER NOTE: Other subgrade verification methods may be required if site conditions limit proof rolling. Consult with geotechnical engineer for acceptable methods.

F. After compaction and proof roll, scarify subgrade ¼- to ½-inch deep by hand rake. Once scarified, materials or equipment shall not be permitted within the prepared subgrade area so as to avoid recompaction or clogging of the scarified subgrade.

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G. The subgrade shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the subgrade during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

H. Areas of subgrade over-compacted by construction traffic or other impacts by the Contractor or Subcontractors shall be ripped/tilled and re-compacted in accordance with Section 3.01.D. All work and materials required to correct the over-compacted subgrade, including utility locates within the pavement footprint, shall be at the Contractor's expense.

I. Areas of subgrade contaminated by the accumulation of silty material following rains or other debris or contamination shall be removed and disposed at the Contractor's expense.

J. The subgrade shall be inspected and accepted by the Engineer prior to placement of the geotextile or pavement base.

K. Place geotextile, if required, on scarified subgrade. Care shall be taken to provide full coverage and to prevent the geotextile from being torn. Damaged geotextile shall be repaired as indicated by the manufacturer and to the satisfaction of the Engineer, at no additional cost to the Owner. Overlaps of the geotextile shall be a minimum of 1 foot or to the manufacturer's recommendation, whichever is greater.

DESIGNER NOTE: The use of geotextile under permeable pavement systems should be avoided unless required by the project geotechnical engineer as it can be prone to subsurface clogging.

3.02 PAVEMENT BASE

A. Construct pavement base to the lines, grades, and thicknesses shown on the Plans.

B. Place the pavement base so as to prevent loaded dump trucks from driving directly on the prepared subgrade.

C. Compact pavement base, in six (6)-inch (maximum) lifts, by making a minimum of three passes over the pavement base material with a ten (10)-ton vibratory roller, or as directed by the Geotechnical Engineer. The first two (2) passes (minimum) shall be in vibratory mode. The final pass shall be in static mode. Acceptance of the pavement base will be based on Engineer's observation of aggregate movement during final compaction pass. Compaction equipment shall be accepted by the Engineer prior to use.

DESIGNER NOTE: For areas or sites that cannot accommodate a vibratory roller compactor, consider allowing compaction of pavement base with a 13,500 lbf (60 kN) minimum vibratory plate compactor with a compaction indicator. At least two passes should be made over each lift of the aggregates.

D. Pavement base shall be true to the designed grade and slope, +/- 0.05 feet, after compaction for each layer. In the event of low spots, additional material shall be added and recompacted. In the event of high spots, excess material shall be removed and the area recompacted.

E. Pavement base materials shall be protected from over-compaction or contamination by silty run-off or other contaminants.

1. Provide physical barriers or direct traffic to eliminate unnecessary vehicular traffic on the pavement base during construction in accordance with SFMTA and SFDPW ordinances and specifications.

2. Do not subject placed and compacted gravel leveling course to any pedestrian or vehicular traffic before unit paver installation begins.

3. Provide flow diversion and erosion control measures to protect the permeable pavement area from sedimentation until the upstream catchment area is thoroughly stabilized.

F. Any damage to the pavement base (including contamination by silty run-off) shall be repaired to the satisfaction of the Engineer at the Contractor's expense. Contaminated pavement base shall be removed and replaced to the limits as determined by the Engineer.

G. The pavement base shall be inspected and accepted by the Engineer prior to placing any pavers.

DESIGNER NOTE: Consider developing a testing plan for the required testing and inspection of the pavement base. Verification of the in place density/compaction of the open graded base materials is typically not possible with the use of a nuclear densometer due to nature of these materials. Therefore other means to verify these materials are firm and unyielding (such as observation of the compaction process by a geotechnical engineer) are necessary.

DESIGNER NOTE: Consider requiring the Contractor to compact aggregates without crushing them.

3.03 PAVERS AND JOINT/OPENING FILL MATERIAL

A. Lay the unit pavers in the pattern(s) and joint widths shown on the Plans. Maintain straight pattern lines.

B. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.

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C. Cut pavers and place along the edges with a double-bladed splitter or masonry saw.

D. Fill all openings and joints with joint filler aggregate conforming to Section 2.02.

E. Remove excess aggregate on the surface by sweeping pavers clean.

F. Compact and seat the pavers into the bedding material using a low-amplitude, 75 to 90 Hz plate compactor capable of at least 5,000 lbf (22 kN). This will require at least two passes with the plate compactor.

G. Do not compact within 6 feet (2 m) of the unrestrained edges of unit pavers.

H. Apply additional joint filler aggregate to the openings and joints if needed, filling them completely. Remove excess aggregate by sweeping, then compact the pavers. This will require at least two passes with the plate compactor.

I. All pavers within 6 feet (2 m) of the laying face must be left fully compacted and joints must be filled at the completion of each working day.

J. Compacted unit pavers shall meet the acceptance criteria set forth in Section 1.05.C.

3.04 PROTECTION OF PAVEMENT

A. Pavement surface shall be kept clean and free of clogging debris and soils from the Contractor's operations and all upstream and adjacent debris. If debris or soils contaminate the pavers/joints, the pavement shall be cleaned at the Contractor's expense and to the satisfaction of the Engineer. If pavement cannot be unclogged, it shall be removed and replaced at the Contractor's expense and to the satisfaction of the Engineer.

B. Paver installation (Sub) Contractor shall return to the site after 6 months from the completion of the Work and provide the following as needed to fully meet the specifications described herein: fill paver joints with stones, replace broken or cracked pavers, and re-level settled pavers to initial elevations. **Any additional work shall be considered part of the original bid price and with no additional compensation.**

3.05 REJECTION

A. Pavers that do not meet the acceptance criteria set forth in Section 1.05.C will be rejected by the Engineer on a lot by lot basis. Permeable/porous unit pavers that have been rejected by the Engineer or the Contractor shall be removed and replaced at no additional cost to the Owner.

END OF SECTION

Protecting Alameda County Creeks, Wetlands & the Bay

399 Elmhurst St.
Hayward, CA
94544
p. 510-670-5543

MEMBER AGENCIES:
Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

July 1, 2020

Submitted via EMAIL to: Michael.Montgomery@waterboards.ca.gov

Mr. Michael Montgomery
Executive Officer
San Francisco Bay Region Regional Water Quality Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

SUBJECT: APPLICATION FOR REISSUANCE OF THE MUNICIPAL REGIONAL STORMWATER PERMIT

This cover letter and the enclosures constitute the Alameda Countywide Clean Water Program (ACCWP) Application for Re-issuance of its Municipal Stormwater Discharge Permit under the National Pollutant Discharge Elimination System (permit No. CAS612008) issued by the California Regional Water Quality Control Board – San Francisco Bay Region (Order R2-2015-0049). This Application is submitted on behalf of the seventeen-member agency Permittees of ACCWP.

This application package consists of this cover letter and the following enclosures:

1. Completed Application/Report of Waste Discharge – Form 200, and
2. Supplemental Information to the Form 200.

At the June 24, 2020 meeting of the ACCWP's Management Committee, the ACCWP member agencies by unanimous vote adopted a motion directing the submission of this application for NPDES permit re-issuance to the Water Board on their behalf as specifically authorized by the ACCWP Agreement. This application has also been signed and approved by each ACCWP Permittee as indicated in Table 1 of Part 1 of Form 200.

As you know, the ACCWP has been participating in discussions regarding the development of the third round Municipal Regional Permit (MRP 3.0) for Phase-I municipal stormwater dischargers in the San Francisco Bay Area. We look forward to continuing our work with you and your staff to develop and implement our re-issued stormwater discharge permit.

If you have any questions, please call me at (510) 670-6547.

Sincerely,

Sharon Gosselin

Sharon Gosselin, Chair of Management Committee

Enclosures:
1. Completed Application/Report of Waste Discharge – Form 200;
2. Supplemental Information to the Form 200

Copies to:

Tom Mumley, SFBRWQCB, Assistant Executive Officer,
(Thomas.Mumley@waterboards.ca.gov)

Keith Lichten, SFBRWQCB, Watershed Management Division Chief,
(Keith.Lichten@waterboards.ca.gov)

ACCWP Management Committee via email

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CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. FACILITY:

Name See Table 1 of Part 1 provided in Supplemental Information

Address _____

City/County/State/Zip Code _____

Contact Person _____

Telephone Number _____ Email _____

B. FACILITY OWNER:

Name See Table 1 of Part 1 provided in Supplemental Information

Address _____

City/State/Zip Code _____

Contact Person _____

Telephone Number _____ Email _____

Federal Tax ID _____

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

C. FACILITY OPERATOR (The agency or business, not the person):

Name See Table 1 of Part 1 provided in Supplemental Informtion

Address _____

City/State/Zip Code _____

Contact Person _____

Telephone Number _____ Email _____

Operator Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

D. OWNER OF THE LAND

Name Not Applicable

Address

City/State/Zip Code

Contact Person

Telephone Number Email

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: Land draining to MS4 owned by various public and private parties.

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED

Address See Table 1 of Part 1 provided in Supplemental Information

City/State/Zip Code

Contact Person

Telephone Number Email

F. BILLING ADDRESS

Address See Table 1 of Part 1 provided in Supplemental Information

City/State/Zip Code

Contact Person

Telephone Number Email

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application:

☐ **Waste Discharge to Land** ☑ **Waste Discharge to Surface Water**

Check all that apply:

☐ Animal or Aquacultural Wastewater	☐ Land Treatment Unit
☐ Animal Waste Solids	☐ Landfill (*see instructions*)
☐ Biosolids/Residual	☐ Mining
☐ Cooling Water	☑ Storm Water
☐ Domestic/ Municipal Wastewater Treatment and Disposal	☐ Surface Impoundment
☐ Dredge Material Disposal	☐ Waste Pile
☐ Hazardous Waste (*see instructions*)	☐ Wastewater Reclamation
☐ Industrial Process Wastewater	☐ Other, *please describe*

III. LOCATION OF THE FACILITY

Describe the physical location of the facility:

1. Assessor's Parcel Number(s)
   - Facility: See Section III of the Supplemental Information.
   - Discharge Point: See maps provided in Supplemental Information Appendix A.
2. Latitude
   - Facility: _____
   - Discharge Point: _____
3. Longitude
   - Facility: _____
   - Discharge Point: _____

IV. REASON FOR FILING

Check all that apply:

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency San Francisco Bay Regional Water Quality Control Board

Has a public agency determined that the proposed project is exempt from CEQA?

☑ Yes ☐ No

If yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below:

Exempt based on Section 13389 of the California Water Code

Has a "Notice of Determination" been filed under CEQA?

☐ Yes ☑ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report (EIR), or Negative Declaration. If No, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents: ☐ EIR ☐ Negative Declaration

Expected CEQA Completion Date: _____

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

See Part VII provided in Supplemental Information

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name See the following Certification Pages Title _____

Signature _____ Date _____

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

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Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of Alameda

By: _____ Date: 6/22/20

Print/Type Name: Liam Garland

Print/Type Title: Public Works Director

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of Albany

By: _____ Date: 6/24/20

Print/Type Name: Mark Hurley

Print/Type Title: Public Works Director/City Engineer

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Berkeley

By: _____ Date: 6/23/2020

Print/Type Name: Phillip Harrington

Print/Type Title: Director of Public Works

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Dublin

By: _____ Date: 6/26/2020

Print/Type Name: Shannan Young

Print/Type Title: Environmental Coordinator

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Emeryville

By: _____ Date: 6/24/20

Print/Type Name: Nancy Humphrey

Print/Type Title: Environmental Program Supervisor

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Fremont

By: Kathy Cote Date: 6/25/20

Print/Type Name: Kathy Cote

Print/Type Title: Environmental Services Manager

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Hayward

By: Elisa Wilfong Date: 6-24-20

Print/Type Name: Elisa Wilfong

Print/Type Title: Water Pollution Control Administrator

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Livermore

By: Helen Ling Date: 6/29/2020

Print/Type Name: Helen Ling

Print/Type Title: Water Resources Division Manager / Public Works Department

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Newark

By: _____ Date: 6-24-2020

Print/Type Name: Soren Fajeau

Print/Type Title: Public Works Director/City Engineer

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Oakland

By: Kristin Hathaway Date: 6/26/20

Print/Type Name: Kristin Hathaway

Print/Type Title: Watershed and Stormwater Division Manager

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Piedmont

By: _____ Date: 24 JUNE 2020

Print/Type Name: Chester Nakahara

Print/Type Title: Director of Public Works

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Pleasanton

By: Rita DiCandia Date: 6/24/2020

Print/Type Name: Rita DiCandia

Print/Type Title: Environmental Services Manager

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of San Leandro

By: Debbie Pollart Date: 6/22/20

Print/Type Name: Debbie Pollart

Print/Type Title: Director of Public Works

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Union City

By: _____ Date: 6/30/2020

Print/Type Name: Farooq Azim

Print/Type Title: City Engineer

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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County of Alameda

DocuSigned by:

By: _____ Date: 6/29/2020

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Print/Type Name: Daniel Woldesenbet

Print/Type Title: Director of Public Works

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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Alameda County Flood Control and Water Conservation District

DocuSigned by:

By: _____ Date: 6/29/2020

FD817EF5B3ED467...

Print/Type Name: Daniel Woldesenbet

Print/Type Title: Director of Public Works

DocuSign Envelope ID: 3A85929A-177D-4796-A69F-3343ED953C52

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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Zone 7 Water Agency

DocuSigned by:

By: Valerie Pryor FFAEC424A8EE4C9... Date: 6/23/2020

Print/Type Name: Valerie Pryor

Print/Type Title: General Manager

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SUPPLEMENTAL INFORMATION TO FORM 200 OF THE REPORT OF WASTE DISCHARGE

Municipal Regional Stormwater NPDES Permit
Order No. R2-2015-0049
Amended Order No. R2-2019-0004
NPDES Permit No. CAS612008

MEMBER AGENCIES:

Alameda
Albany
Berkeley
Dublin
Emeryville
Fremont
Hayward
Livermore
Newark
Oakland
Piedmont
Pleasanton
San Leandro
Union City
County of Alameda
Alameda County Flood Control and Water Conservation District
Zone 7 Water Agency

Prepared by:

Alameda Countywide Clean Water Program

399 Elmhurst Street

Hayward, California 94544

Submitted to:

California Regional Water Quality

Control Board, San Francisco Bay Region

July 2020

Protecting Alameda County Creeks, Wetlands & the Bay

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I. Facility Information Sections A-F

Table 1 below presents the following facility information for Form 200 boxes A – F:

A. Facility
B. Facility Owner
C. Facility Operator
D. Owner of the Land
E. Address Where Legal Notice May be Served
F. Billing Address

Table 1: Facility, Facility Owner and Facility Operator Information for the Municipal Separate Storm Sewer System in Alameda County

Municipality	Authorized Representative	Federal Tax ID Number
City of Alameda	Liam Garland, Public Works Director 950 West Mall Square, RM. 110 Alameda, CA 94501-7552 Phone: (510) 747-7930 Email: PW@alamedaca.gov	94-6000288
City of Albany	Mark Hurley Public Works Director/City Engineer 1000 San Pablo Avenue Albany, CA 94706 Phone: (510) 559-7255 Email: mhurley@albanyca.org	94-6000289
City of Berkeley	Phillip Harrington Director of Public Works, City of Berkeley 2180 Milvia Street, Third Floor Berkeley, California 94704 Telephone Number: 510-981-6303 E-mail: PHarrington@cityofberkeley.info	94-6000299
City of Dublin	Shannan Young 100 Civic Plaza Dublin, CA 94568 Phone: (925) 833-6650 Email: Shannan.young@dublin.ca.gov	94-2825202
City of Emeryville	Nancy Humphrey Environmental Programs Supervisor 1333 Park Avenue Emeryville, CA 94608 Phone: (510) 596-3728 Email: nhumphrey@emeryville.org	94-6000326

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Municipality	Authorized Representative	Federal Tax ID Number
City of Fremont	Kathy Cote, Environmental Services Manager 39550 Liberty Street Fremont, CA 94537-5006 Phone: (510) 494-4583 Email: kcote@fremont.gov	94-6027361
City of Hayward	Elisa Wilfong 24499 Soto Road Hayward, CA 94544-1495 Phone: (510) 881-7960 Email: Elisa.Wilfong@hayward-ca.gov	94-6000346
City of Livermore	Helen Ling, Division Manager Water Resources / Public Works Department City of Livermore (925) 960-8126 Email: hling@cityoflivermore.net	94-6000359
City of Newark	Soren Fajeau Public Works Director/City Engineer 37101 Newark Blvd. Newark, CA 94560 Phone: (510) 578-4286 Email: soren.fajeau@newark.org	94-6027360
City of Oakland	Kristin Hathaway Watershed and Stormwater Div. Manager 250 Frank H. Ogawa Plaza, Suite 4314 Oakland, CA 94612 Phone: (510) 238-7571 Email: khathaway@oaklandca.gov	94-6000384
City of Piedmont	Chester Nakahara Director of Public Works 120 Vista Ave. Piedmont, CA 94611 Telephone Number: 510 420-3050 E-mail Address: cnakahara@piedmont.ca.gov	94-1583661
City of Pleasanton	Rita DiCandia P.O. Box 520 Pleasanton, CA 94566-0802 Phone: (925) 931-5644 Email: rdicandia@pleasantonca.gov	94-6000397
City of San Leandro	Debbie Pollart, Director of Public Works 14200 Chapman Road San Leandro, CA 94578 Phone: (510) 577-6020 Email: dpollart@sanleandro.org	94-6000421

Municipality	Authorized Representative	Federal Tax ID Number
City of Union City	Farooq Azim, City Engineer 34009 Alvarado-Niles Road Union City, CA 94587-4497 Phone: (510) 675-5368 Email: FarooqA@unioncity.org	94-6036941
County of Alameda	Daniel Woldesenbet Director of Public Works 399 Elmhurst St. Hayward, CA 94544 Phone: (510) 670-5455 Email: danielw@acpwa.org	94-6000501
Alameda County Flood Control and Water Conservation District	Daniel Woldesenbet Director of Public Works 399 Elmhurst St. Hayward, CA 94544 Phone: (510) 670-5455 Email: danielw@acpwa.org	94-6000501
Zone 7 Water Agency	Valerie Pryor, General Manager 100 North Canyons Parkway Livermore, CA 94551 Phone: (925) 454-5000 Email: vpryor@zone7water.com	94-6000501

II. Type of Discharge

No supplement to Form 200 is needed.

III. Location of the Facility

This permit application is for the municipal separate storm sewer system (MS4) area located in Alameda County within the California Regional Water Quality Control Board San Francisco Bay Region. Maps showing the location of each ACCWP Member Agency Permittee jurisdiction are provided in Attachment A.

IV. Reason for Filing

No supplement to Form 200 is needed.

V. CEQA

No supplement to Form 200 is needed.

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9941

VI. Other Required Information

This section addresses characterization of stormwater discharges from the MS4s located within Alameda County, including design and actual flows, a list of constituents and discharge concentrations of each constituent, a list of other appropriate waste discharge characteristics, a description of stormwater treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

The Alameda County Flood Control and Water Conservation District has created full-featured, interactive maps of every watershed in Alameda County, provided here: https://acfloodcontrol.org/resources/explore-watersheds/. Hover over each shaded area on the map on this web page to see the watershed/subwatershed name. Click a watershed/subwatershed on the map to see its information page. Each watershed page provides more information about its geology, hydrology, creeks, trails, and parks; its map; and information on restoration efforts and volunteer opportunities. Also provided are interactive KMZ watershed map files for the Google Earth program.

VI.1 Design and Actual Flows

MS4s in the municipal jurisdictions within Alameda County are designed to convey storm flows to surface water while minimizing flood risk to life and property. Generally, design standards address large events (i.e., 10-year events up to 100-year events, depending on the value of assets at risk). Actual flows are measured in tributary creeks using standardized flow monitoring techniques. Because of the variable nature of storm events and the multitude of conveyances, specific details on design vs. actual stormwater discharge flows in the storm drain system are beyond the intent and scope of this Report of Waste Discharge.

Baseline modeling conducted for the Reasonable Assurance Analysis required by MRP Provisions C.11.c, C.11.d, C.12.c, and C.12.d estimated the average annual stormwater runoff volume within each jurisdiction in Alameda County, prior to any volume reduction achieved through the implemented treatment control measures described in Section VI.4 (see Table 2 below).

Table 2: Estimated Average Annual Stormwater Runoff Volumes (acre-feet/year)

Jurisdiction	Total Acres	Impervious Acres	% Impervious	Estimated Annual Runoff Volume (ac-ft/yr)
Alameda	6,594	3,697	56%	5,196
Alameda County	225,389	8,591	4%	38,794
Albany	1,124	616	55%	912
Berkeley	6,701	3,190	48%	6,461
Dublin	9,745	2,518	26%	3,847
Emeryville	785	606	77%	853

Jurisdiction	Total Acres	Impervious Acres	% Impervious	Estimated Annual Runoff Volume (ac-ft/yr)
Fremont	38,817	12,865	33%	14,839
Hayward	21,333	8,608	40%	11,810
Livermore	16,922	6,600	39%	6,793
Newark	5,620	2,963	53%	2,960
Oakland	35,503	17,010	48%	30,480
Piedmont	1,085	325	30%	644
Pleasanton	15,497	4,927	32%	6,835
San Leandro	8,059	5,082	63%	6,466
Union City	12,307	3,559	29%	4,903
Total	*405,480*	*81,577*	*18%*	*141,794*

VI.2 Constituents and Characteristics Discharges Concentrations

Water quality monitoring activities required by MRP Provision C.8 are coordinated regionally through the Regional Monitoring Coalition (RMC), a collaborative effort of MRP Permittees under the auspices of the Bay Area Stormwater Management Agencies Association (BASMAA). Alameda Permittees participate in the RMC and coordinate monitoring through the ACCWP. Monitoring activities follow the RMC Quality Assurance Project Plan and Standard Operating Procedures, as updated by the RMC in Fiscal Year (FY) 2015-16 to incorporate changes in the MRP requirements and Surface Water Ambient Monitoring Program (SWAMP) standards. Permittees also participate in the San Francisco Estuary Regional Monitoring Program (RMP) by contributing their fair-share financially on an annual basis.

Permittees, in coordination with the RMC, conduct Creek Status monitoring in compliance with MRP Provision C.8.d. Creek Status monitoring is intended to answer the following questions:

- Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers, and tributaries?
- Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

Creek status monitoring includes the following constituents:

- Biological assessment, including:
    - Nutrients (total ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen (calculated), dissolved orthophosphate and total phosphorous, silica, and chloride); and

    - General water quality parameters (temperature, dissolved oxygen, pH, and specific conductance);
- Chlorine;
- Temperature;
- Continuous monitoring of dissolved oxygen, temperature, and pH; and
- Pathogen indicators (Enterococci and *E. Coli*).

Provision C.8.f requires the Permittees to conduct Pollutants of Concern (POC) monitoring to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of total maximum daily loads (TMDLs) and other pollutant control strategies, assess progress toward achieving waste load allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants. In particular, monitoring required by this provision must be directed toward addressing up to five priority POC management information needs (described in MRP Table 8.1, POC Monitoring Methods) for each of the priority POCs listed in MRP Table 8.2, POC Monitoring Parameters, Effort and Type – which identifies the minimum effort and type of samples to be collected for each POC. POC monitoring is conducted for the following constituents:

- Polychlorinated Biphenyls (PCBs);
- Total mercury;
- Copper;
- Emerging contaminants (perfluorooctane sulfonates (PFOS), perfluoroalkyl sulfonates (PFAS), and alternative flame retardants);
- Total organic carbon, suspended sediments, and hardness; and
- Nutrients (Ammonium, Nitrate, Nitrite, Total Kjeldahl Nitrogen, Orthophosphate, and Total Phosphorus).

In compliance with Provision C.8.g, the Permittees also conduct wet weather and dry weather monitoring of pesticides and toxicity in urban creeks.

The Permittees submitted the results of the monitoring collected during the previous October 1 – September 30 period (Water Year (WY)) by March 31 of each year, as follows:

- Electronic data were submitted to the California Environmental Data Exchange Network (CEDEN), including results from monitoring conducted pursuant to Provisions C.8.d, C.8.e, C.8.f and C.8.g that are CEDEN compatible; and
- A comprehensive Urban Creeks Monitoring Report (UCMR) on these results.

In addition, by October 15 of each year of the MRP 2 permit term (beginning in 2016), the Permittees submitted a Pollutants of Concern (POC) Monitoring Report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year.

A summary of the monitoring results (i.e., discharge concentrations) for WY 2014 through WY 2019 was provided in the Integrated Monitoring Report (IMR), which was submitted to the Regional Water Board on March 31, 2020, as required by Provision C.8.h. The IMR includes the following appendices and attachments:

- A.1A Creek Status Monitoring Report, Water Years 2014 – 2019;
- A.1B Creek Status Bioassessment Monitoring: 2012 – 2019;
- A.2A Stressor/Source Identification Project: Exploring CSCI Results and the Outcomes of Restoration Activities along Sausal Creek, Final Report;
- A.2B Stressor/Source Identification Project: Nutrient/Eutrophication Biological Indicators in the Arroyo Las Positas Watershed, Progress Report;
- A.2C Stressor/Source Identification Project: Castro Valley Creek Sediment Quality, Final Report;
- A.2D Regional SSID Project - Electrical Utilities as a Potential PCBs Source to Stormwater in the San Francisco Bay Area – BASMAA Progress Report;
- A.3A Pollutants of Concern Monitoring Water Years 2014 – 2019;
- A.3B Pollutants of Concern Monitoring Report 2019;
- A.4 Pesticide and Toxicity Monitoring Water Years 2014-2019;
- A.5 Review of Quality Assurance and Quality Control Results;
- Attachment A: Electronic Data Submittal Transmittal Letter dated March 31, 2020 with attached file list; and
- Attachment B BASMAA Regional Monitoring Coalition: Status of Regional Stressor/Source Identification (SSID) Projects, Updated January 2020.

VI.3 Other Appropriate Waste Discharge Characteristics

VI.3.1 Stressor/Source Identification

Provision C.8.e requires Permittees to initiate Stressor/Source Identification (SSID) projects as follow up when monitoring results exceed certain values or criteria listed for parameters in C.8.d

and C.8.g. This provision describes a process for selecting and conducting SSID projects, oriented toward taking action(s) to alleviate stressors and reduce sources of pollutants to receiving waters.

Through the ACCWP, the Permittees:

- Reviewed results of monitoring (C.8.d and C.8.g) annually and maintained a list of all results exceeding thresholds described therein.
- Selected follow up SSID projects from the list developed in C.8.e.i. based on criteria such as magnitude of threshold exceedance; parameter (or a variety of parameters); likelihood that stormwater management action(s) could address the exceedance; and similar priorities.
- Conducted site specific SSID project(s) (or non-site specific if the problem is wide spread) in a stepwise process described in C.8.e.iii.
- Submitted an SSID status report in each UCMR that summarized the actions taken in regard to C.8.e.i-iii.

Three SSID projects were initiated in the previous permit term, as follow up to Creek Status Monitoring results at the following locations in 2012:

- Site 204CRW030 on Crow Creek was triggered by low dissolved oxygen during September 2012. The WY 2017 final report shows that there were no obvious episodic patterns of low DO evident at other stations monitored along the creek. Indeed, several years of intensive monitoring at the study site have not been able to replicate the 2012 findings of multiple instances where DO concentrations fell below objectives. Thus, the trigger threshold exceedance was found to be episodic and reasonable methods have not revealed stressor/source. Based on these inconclusive findings, in accordance with provision C.8.e.iii.(3)(b), the March 2018 UCMR requested that the Executive Officer consider this SSID project complete.
- Site 204R00084 on Dublin Creek was triggered by a combination of “very poor” biological community quality, as indicated by Index of Biological Integrity (IBI) scoring, and elevated sediment concentrations of multiple chemicals that could produce toxicity (although no significant toxicity was observed). However, review of inspection information from the catchment area identified no specific sources of pesticides or metals to sediment and the WY 2017 progress report (considered the final project report) describes the basis, in accordance with provision C.8.e.iii(3)(b), for requesting that the Executive Officer consider this SSID project complete.
- Site 204R00047 on Castro Valley Creek was also triggered by a combination of “very poor” IBI score and elevated sediment chemical concentrations. However, the WY 2017 progress report confirmed that the pollutant concentrations in Castro Valley Creek

sediments are typical of urbanized areas in California. Additional monitoring was conducted in WY 2018, and the project was closed in October 2018. The final SSID report was included in the March 2020 IMR.

ACCWP worked with the RMC Work Group to develop a Draft Work Plan for a new SSID project investigating low California Stream Condition Index (CSCI) scores and the impacts of restoration activities along Sausal Creek, which has a watershed encompassing nearly 2,700 acres in Oakland. The SSID study evaluated whether benthic macroinvertebrate (BMI) metrics improved from pre-project conditions in reaches with restoration projects and assessed whether biological conditions associated with previously measured sub-optimal CSCI scores are a function of recovery/maturation stage or are due to previously unidentified stressors. Data collection and sampling began in Spring 2018, and the final SSID annual report was included in the March 2020 IMR.

The ACCWP has initiated an SSID project that is exploring nutrients, eutrophication, and biological indicators in the Arroyo Las Positas watershed. Triggers from multiple water years included low CSCI scores at nine sites, high pH at one site, and high nitrate concentrations at seven sites. The 2014 and 2016 California Integrated Report identified the Arroyo Las Positas watershed as impaired by eutrophication and the watershed was added to the USEPA's California 303(d) list in 2018. Results in WY 2019 included low CSCI and ASCI scores; temperature, DO, and pH routinely in exceedance of MRP triggers; and high nitrate concentrations. The project will continue in WY 2020 with additional monitoring of nutrients, general water quality, and chlorophyll-a. A progress report was included in the March 2020 IMR.

BASMAA began conducting a regional SSID project on behalf of all RMC members in FY 2018/19, which investigated sources of PCBs from electrical utility equipment in watersheds draining to the San Francisco Bay. An SSID work plan for this project was submitted in March 2019 and a progress report was included in the March 2020 IMR. This project was designed to develop further understanding of the magnitude and extent of this potential source of PCBs to stormwater and to identify controls to reduce water quality impacts. In WY 2019, the project management team prepared and submitted to the Regional Water Board a letter requesting that the Regional Water Board use its regulatory authority to compel the Pacific Gas and Electric Company (PG&E) to provide information needed for a desktop analysis that will gather and evaluate information on electrical utility equipment in the Bay Area, and will provide the foundation for developing a control measure program. However, ongoing bankruptcy proceedings may prolong the receipt of information from PG&E. BASMAA also initiated a partnership with municipally owned electrical utilities to gather information for the desktop analysis. In WY 2020, BASMAA will submit a request for information to municipally owned electrical utilities and will proceed with the desktop analysis upon receipt of the requested data.

VI.3.2 Trash Monitoring

MRP Provision C.10.b.v required Permittees to develop and test a receiving water trash monitoring program plan. BASMAA submitted a Final Trash Monitoring Plan in October 2017. The Trash Monitoring Plan, initiated in October 2017, represented the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay area, during which the pilot protocols and methods were evaluated in the field between October 2017 to July 2020.

The specific goals of the Trash Monitoring Plan, developed through the stakeholder engagement process, include:

- Informs management decisions;
- Accounts for different stream and channel types, and considers temporal variability (e.g., to estimate baseline conditions and show change over time) and seasonality;
- Can assess trends over time;
- Helps to assess if the Permittees' trash reduction efforts are resulting in improvement;
- Allows for comparison of trash levels between sites (understand the range of levels of impact);
- Assists in determining relative contributions from different pathways (i.e., wind, illegal dumping, illegal encampments, MS4s);
- Leverages and exhibits consistency with existing monitoring efforts and other water quality monitoring programs, including direct discharge offset provisions (MRP Provision C.10.e); and
- Cost-effective, efficient, and feasible (e.g., safe, access to sample locations, can be implemented by volunteer monitoring groups).

Project goals were used to guide the development of scientific monitoring questions that informed the study design and selection of methodologies used during the pilot-testing phase of the Trash Monitoring Plan.

The Trash Monitoring Plan primarily focused on two types of monitoring designs:

- Probabilistic Assessment Sites – Randomly selected monitoring sites that were previously established for BASMAA's RMC Creek Status Monitoring Program. These sites are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area.
- Targeted Monitoring Sites – Selected sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is

periodically removed by MRP Permittees. Includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Standard Operating Procedures (SOPs) and associated field forms (Version 1.0) for conducting qualitative visual trash assessments and quantitative trash monitoring were developed as part of the Trash Monitoring Plan. Regionally, a total of 125 urban creek, channel and riverine probabilistic sites were selected and qualitatively assessed for trash. These qualitative visual trash assessments were conducted at a total of 30 probabilistic sites in Alameda, Contra Costa, Santa Clara, and San Mateo Counties, and five sites in Solano County. A total of five qualitative assessment events were conducted at the probabilistic sites during the pilot testing phase of the Trash Monitoring Plan (October 2017 - March 2020). In addition, two rounds of both qualitative assessments and quantitative monitoring were conducted at 100 targeted sites with 29 of these sites in Alameda County. Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara, and San Mateo Counties.

Findings of the pilot-testing phase of the Trash Monitoring Plan are reported in the *San Francisco Bay Area Receiving Water Trash Monitoring: Pilot Testing of Qualitative and Quantitative Monitoring and Assessment Protocols* (Prepared by EOA, Inc. and Applied Marine Sciences, submitted to the Regional Water Board on July 1, 2020). Key findings from the report include:

- Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both the regional and countywide scale. The visual assessment tool is recommended as a valid approach to assess trash conditions for most creeks/channel sites.
- Regionwide, approximately 77% of the urban stream lengths in the MRP area exhibit low to moderate levels of trash.
- Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
- Seasonality appears to have little to moderate effects on trash levels observed/measured at receiving water sites. Storm intensity and frequency does appear to have an influence on trash levels observed during the wet season.
- The Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with the largest proportion of trash observed.

VI.4 Description of Stormwater Treatment Processes

Stormwater treatment control measures include green stormwater infrastructure (GSI), full trash capture devices, enhanced operation and maintenance (O&M) practices, and diversion to

publicly-owned treatment works (POTW). Each of these treatment control measures are described below.

VI.4.1 Green Stormwater Infrastructure

Green stormwater infrastructure (GSI) refers to constructing and retrofitting storm drainage systems to mimic natural processes by enabling stormwater to infiltrate into the soil rather than to runoff directly into storm drains. This control measure includes implementation of GSI in new development and redevelopment projects on private and public properties regulated by MRP Provision C.3, as well as retrofit of existing infrastructure in public right-of-way (ROW) areas and on public properties not subject to Provision C.3. GSI is being used to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural treatment control systems to detain and treat runoff before it reaches tributary creeks and, ultimately, San Francisco Bay. GSI treatment control measures include, for example, pervious pavement, infiltration basins, bioretention facilities, green roofs, and rainwater harvesting systems.

MRP Provision C.3 mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay, including PCBs and mercury. GSI has been incorporated into new development and redevelopment projects in the County since the early 2000's. The first edition of the *C.3 Technical Guidance Manual* was published in 2005. The current 7th Edition of the *C.3 Technical Guidance Manual* was published in 2019. Many additional support documents are continually being developed by the ACCWP to assist the Permittees in C.3 implementation. All of these documents are available on the ACCWP website[1].

Permittees track C.3 project implementation in an ArcGIS Online (AGOL) database. ACCWP developed the countywide GIS database to assist with maintaining, analyzing, interpreting, displaying, and reporting relevant municipal stormwater program data and information related to MRP Provision C.3, Provision C.10 (i.e., trash load reduction activities), and Provisions C.11/C.12 (i.e., mercury and PCBs TMDL implementation activities).

MRP Provision C.3.j required each Permittee to develop a Green Infrastructure Plan for inclusion in the 2019 Annual Report. These Green Infrastructure Plans mapped and prioritized areas for potential and planned public and private GSI projects for implementation by 2020, 2030, and 2040.

[1] See: https://www.cleanwaterprogram.org/businesses/development.html.

Additional actions that the Permittees have taken or will take to promote the implementation of GSI include:

- Incorporate GSI requirements into planning documents such as General Plans, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction;
- Evaluate funding options for GSI projects;
- Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan;
- Conduct public outreach, train Permittee staff, and educate elected officials on the MRP GSI requirements and methods of implementation; and
- Maintain a list of public infrastructure improvement projects that have a potential for incorporating GSI.

VI.4.2 Full Trash Capture Treatment Control Measures

MRP Provision C.10 requires Permittees to implement trash prevention and control actions, including full trash capture systems, to reduce trash generation. Full trash capture systems capture sediment along with trash that may be contaminated with PCBs and mercury. Permittees have installed both large and inlet-based full trash capture devices in response Provision C.10. Large full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes, capture and treat urban runoff from large drainage areas, ranging from 10's to 100' of acres. Inlet-based devices in roadways enhance the capture of sediments that may be contaminated with PCBs and mercury from smaller, localized drainage areas. In addition, these inlets are typically cleaned more frequently as a result of the installation of the full trash capture device.

VI.4.3 Enhanced Operation and Maintenance

Routine MS4 operation and maintenance (O&M) activities conducted by Permittees include street sweeping and drain inlet cleaning. In addition, storm drains, culverts, and channels are maintained as needed (i.e., desilted when needed to remove excessive quantities of accumulated sediment that may be causing localized flooding issues). Infrequent capital improvement projects may also remove accumulated sediment from the MS4, such as storm drain repairs or channel stabilization projects. Each of these O&M activities removes pollutants that are present in the sediment that is removed.

VI.4.4 Diversion to POTW

This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of pollutants in urban runoff. The Alameda County Flood Control and Water Conservation District (District) manages flood control infrastructure for flood protection of most of the urbanized portions of Western Alameda County. The District has an agreement with the East Bay Municipal Utility District (EBMUD) for operation of an urban runoff diversion at the Ettie Street Pump Station (ESPS) that directs dry weather discharge to EBMUD's main wastewater treatment plant for treatment. The project diverts up to 0.5 million gallons per day (mgd) of dry weather flow during the dry season (i.e., approximately April 16th through November 30th). EBMUD completed the installation of its pump and control system and a 6-inch diameter conveyance pipe in 2016 and the stormwater diversion is ongoing. District staff coordinates with and provides assistance to EBMUD staff to ensure proper operation and maintenance of the diversion pump.

VI.5 Best Management Practices Used

VI.5.1 General Pollutant Control BMPs

Municipal Operations

Permittees implement BMPs to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

ACCWP facilitates a Municipal Maintenance Subcommittee at which Permittees share information on MRP compliance and municipal operations BMP implementation. Example topics include municipal maintenance challenges with homeless encampments, current integrated pest management (IPM) practices and strategies, and pursuing a regional training to address IPM issues.

Municipal employees follow IPM policies and standard operating procedures in municipal operations and on municipal property. Pesticides are used by park departments, building maintenance workers, and contractors. ACCWP developed an IPM Resource binder to assist agencies with following IPM practices during municipal operations and on municipal property. Information in the IPM Resources binder can be used by agencies in selecting non-chemical strategies and in using preventative tactics when addressing pest control. Pest Notes and Quick Tips for selected pests are included in the binder. Pest Notes are peer-reviewed scientific publications developed by UC Davis for specific pests. Quick Tips offer quick advice related to pests and environment-friendly gardening practices. Many are abbreviated versions of the more detailed Pest Notes series. The binder also includes agency specific IPM policies and ordinances and a reference list to other local IPM programs.

Industrial and Commercial Site Controls

Permittees implement an industrial and commercial site control program at sites that could reasonably be considered to contribute to pollution of stormwater runoff. Permittees conduct inspections, follow-up, and enforcement to abate potential and actual non-stormwater discharges, consistent with each Permittee's respective Enforcement Response Plan. Inspections confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators. Permittees provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually.

Illicit Discharge Detection and Elimination

The Permittees implement a program to respond to spills, dumping, and complaints, including a program to reduce the discharge of pollutants from mobile businesses. The program includes standard BMPs, an enforcement strategy, inventory, outreach strategy and inspections, as needed. The categories of mobile businesses currently addressed by the Program include automobile washing, power washing, steam cleaning, carpet cleaners and pet care providers. These mobile business categories have minimum standards and BMPs identified in a series of five Tip Sheets developed by the ACCWP: Fundraising Car Washes, Tips for Carpet Cleaners, Tips for Pet Care Providers, Tips for Power Washers and Tips for Mobile Businesses. All of the Tip Sheets are available on the Clean Water Program website.

The ACCWP developed a countywide mobile business inventory from individual agencies, internet searches, the BASMAA surface cleaners list, Santa Clara Valley Urban Runoff Pollution Prevention Program inventory and Contra Costa Clean Water Program inventory in FY 2016/17. A transmittal letter and the appropriate Tip Sheet was sent to the businesses on the countywide inventory. The countywide inventory is updated periodically with businesses identified by municipal inspectors.

The Permittees participate in an Industrial and Illicit Discharge Control (IIDC) Subcommittee to share information, benefit from lessons learned by others, and receive information on permit requirements and products developed by the ACCWP related to MRP Provision C.4 (Industrial and Commercial Site Controls), as well as Provision C.5 (Illicit Discharge Detection and Elimination), Provision C.13.b. (Manage Discharges from Pools, Spas and Fountains that Contain Copper-Based Chemicals), Provision C.13.c (Copper Source Control for Industrial Sources), and C.15. (Exempt and Conditionally Exempt Discharges).

Construction Site Control

Each Permittee implements a construction site inspection and control program, with follow-up and enforcement consistent with each Permittee's respective enforcement response plan (ERP), to prevent construction site discharges of pollutants into storm drains.

Public Information and Outreach

Permittees participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences. Example campaigns, described in the FY 2018/19 Annual Report, are the Soapy, Grimy Water Hurts and Pollution Hurts: Anti-Pollution from Car Washing & Hosing Sidewalks media campaigns.

The Permittees provide the public with stormwater pollution prevention information through the Program's website found at www.cleanwaterprogram.org. Besides comprehensive content on commercial stormwater pollution prevention issues, compliance guidelines, and resources, the website offers a section on the local watersheds and pollutants monitoring, the program's community stewardship grants and school outreach, as well as content tailored to residents promoting everyday practices to help prevent stormwater pollution. Focus areas include toxics reduction and runoff prevention in home and garden, less toxic pest control at home, car care, litter prevention, healthy fish consumption and local volunteer opportunities. Users can connect with the Program through email or phone, listed in the "Contact Us" section.

ACCWP also provides funding to the regional Our Water Our World (OWOW) efforts through BASMAA to conduct outreach to consumers of pesticides at the point of purchase to provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control.

VI.5.2 BMPs for TMDL Pollutants (Mercury and PCBs)

Source control measures to address TMDL pollutants include the following programs:

- Source area investigation and abatement,
- PCBs in building materials management,
- PCBs in electrical utilities management,
- PCBs in infrastructure management, and
- Mercury load avoidance and reduction.

Each of these source control programs is described below.

Source Property Identification and Abatement Program

Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels and are being transported to the MS4. The source property identification and

abatement control measure begins with performing investigations in High Likelihood/Interest areas to identify PCBs sources.

Once a source property is identified, the source of PCBs on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the Regional Water Board for investigation and abatement. Source properties may include sites that were previously remediated but still have soils concentrations of PCBs that are elevated above urban background levels or may be newly identified source properties. Source properties may also include industrial facilities with ongoing industrial activities that are covered under the General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit) or another NPDES permit.

The Permittees identify significantly elevated PCBs concentrations through surface soil/sediment sampling in the ROW or through water sampling where visual inspections and/or other information suggest that a specific property is a potential source of significantly elevated PCBs concentrations. Where data confirm significantly elevated concentrations (e.g., a sediment PCBs concentration equal to or greater than 1.0 mg/kg or a sediment concentration greater than 0.5 mg/kg and other lines of evidence) are present in soil/sediment from a potential source property or in stormwater samples, the Permittees may take actions to cause the property to be abated or may refer that property to the Regional Water Board to facilitate the issuance of orders for further investigation and remediation of the subject property

For each referred source property, the applicable Permittee will implement or cause to be implemented one or a combination of interim enhanced O&M measures in the street or storm drain infrastructure adjacent to the source property during the source property abatement process, or will implement a stormwater treatment system downstream of the property to intercept historically deposited sediment. The intent is to prevent further contaminated sediment from being discharged from the storm drain system. These enhanced O&M measures and/or treatment systems are described in the source property referral form that is sent to the Regional Water Board. The selected enhanced O&M control measure(s) or stormwater treatment must be implemented and maintained during the source property abatement process and should be sufficient to intercept historically deposited sediment in the public ROW and prevent additional contaminated sediment from being discharged from the MS4. When a referred industrial facility is considered to be abated by the Permittee and the Regional Water Board, the enhanced O&M measures may be discontinued, and ongoing facility inspections would be conducted as appropriate as part of the Permittee's routine industrial inspection program.

Management of PCBs in Building Materials Program

The Permittees have developed and implemented, in cooperation with BASMAA, a protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition. PCBs from these structures can enter storm drains

during and/or after demolition through vehicle track-out, airborne releases, soil erosion, stormwater runoff, or improper waste disposal. Applicable structures include, at a minimum, commercial, public, institutional, and industrial structures constructed between the years 1950 and 1980 and with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt.

The ACCWP and Permittees participated in a BASMAA Regional Project to address PCBs in building materials. This Regional Project developed an implementation framework, guidance materials, and tools for local agencies to ensure that PCBs-containing materials and wastes are properly managed during building demolition. This Regional Project also provided training materials and a workshop for municipal staff and an outreach workshop for the industry on implementing the framework/protocols developed via the project. The tools and materials developed as part of the project build upon materials and outputs developed in 2010-2011 by the San Francisco Estuary Partnership with State Water Board grant funding, called the "PCBs in Caulk Project", as well as subsequent and parallel activities by BASMAA.

Permittees have implemented the following process for this control measure:

- Municipalities inform applicable demolition permit applicants that their projects are subject to the program for managing materials with PCBs, necessitating, at a minimum, an initial screening for priority PCBs–containing materials.
- For every applicable demolition project, applicants implement the BASMAA protocol for identifying building materials with PCBs concentrations of 50 ppm and then complete and submit a version of BASMAA's model "PCBs Screening Assessment Form" (Screening Form) or equivalent to the municipality.
- The municipality reviews the Screening Form to make sure it is filled out correctly and is complete and works with the applicant to correct any deficiencies.
- The municipality then issues the demolition permit or equivalent, according to its procedures.
- The municipality sends each completed Screening Form for applicable structures and any supporting documents to its countywide program. The countywide program compiles the forms and works with the other MRP countywide programs to manage and evaluate the data, and to assist Permittees with associated MRP reporting requirements.

Data collection started with implementation of the new program on July 1, 2019. When sufficient amounts of new data have been collected, the data will support:

- Development of a revised estimate of the reduction in PCBs loading to stormwater runoff resulting from implementation of the new program, and

- Evaluation of various aspects of the PCBs management program and the effectiveness of potential future refinements.

Management of PCBs in Electrical Utilities Program

The Management of PCBs in Electrical Utilities Program includes the development and implementation of a new program to manage PCBs in oil-filled electrical equipment (OFEE) for both municipally-owned and non-municipally-owned electrical utilities in the MRP area. The Alameda Municipal Power is the only municipally-owned electrical utility in Alameda County; the remainder of the county is served by PG&E. This control measure program includes two primary actions:

1. Alameda Municipal Power will document the removal of PCBs-containing electrical equipment since 2005 and provide data to support calculations of the associated stormwater load reductions due to these efforts; and
2. Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from electrical utility equipment.

Electrical utility equipment and facilities in both the transmission and distribution systems are distributed across the MRP region. In the past, PCBs were routinely used in electrical utility equipment that contained dielectric fluid as an insulator. This is because prior to the 1979 PCBs ban, dielectric fluid was typically formulated with PCBs due to a number of desirable properties they have (e.g., high dielectric strength, thermal stability, chemical inertness, and non-flammability). Electrical equipment containing dielectric fluid is typically identified as OFEE. Any OFEE that contained PCBs in the past could still potentially contain PCBs today. The most common types of OFEE that may contain PCBs are transformers, capacitors, circuit breakers, reclosers, switches in vaults, substation insulators, voltage regulators, load tap changers, and synchronous condensers (PG&E, 2000).

There are hundreds of thousands of pieces of OFEE in public ROWs and at hundreds of electrical sub-station facilities across the MRP region. Some portion of these OFEE may contain (or contained in the past) dielectric fluids with PCBs at concentrations that are of concern if released to MS4s. Due to their large quantity, dispersed nature, and the difficulty in tracking and monitoring discharges, Permittees are limited in their ability to implement and/or enforce consistent and appropriate control measures to reduce releases of PCBs from this source category. To date, neither the Permittees nor the Regional Water Board have been able to verify that a sound and transparent cleanup protocol is being used consistently by non-municipally owned electrical utilities for PCBs spills from their electrical utility equipment and properties across the MRP region. Moreover, current state and federal regulatory levels for reporting and cleanup of PCBs spills (e.g., cleanup goals for soils) are higher than cleanup levels recommended

by the SFBRWQCB to meet the objectives of the PCBs TMDL. These differences create potential missed opportunities to cleanup spills (or cleanup soils on properties where past spills occurred) to the stringent levels that would be more consistent with the PCBs TMDL requirements, and to reduce the loads of PCBs from MS4s to the Bay.

Management of PCBs in Infrastructure Program

The 2018 BASMAA study *Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure*, submitted to the Regional Water Board with the FY 2018/19 Annual Report, sampled caulk and sealant materials from public roadway and storm drain infrastructure around the Bay Area. The sampling program was designed to specifically target roadway and storm drain structures that were constructed during the most recent time period when PCBs were potentially used in caulk and sealant materials (i.e., prior to 1980, with a focus on the 1960's and 1970's). A total of 54 caulk and sealant samples were collected from ten different types of roadway and storm drain structures in the ROW, including concrete bridges/overpasses, sidewalks, curbs and gutters, roadway surfaces, above and below ground storm drain structures (i.e., flood control channels and storm drains accessed from manholes), and electrical utility boxes or poles attached to concrete sidewalks. The individual samples were grouped by structure type and sample appearance (color and texture) and the groups were combined into 20 composites; 10 of these groups were collected from concrete bridges, overpasses, or roadways.

Total PCBs concentrations across the 20 composite samples ranged from non-detect to greater than 4,000 mg/kg. The majority of the composites had PCBs concentrations that were below 0.2 mg/kg. PCBs were not detected in ten of the composite samples, representing nearly 60% of the individual samples collected during this program. PCBs in twenty-five percent (5 of 20) of the composites were above 1 mg/kg. Of these, two composites had very high PCBs concentrations (greater than 1,000 ppm) that indicate PCBs were likely part of the original caulk or sealant formulations. Both of these composites were comprised of black, pliable joint filler materials that were collected from concrete bridges/overpasses.

This control measure has been developed as a result of the outcome of this study. For this control measure, Permittees will implement the following actions:

1. Maintain a list of applicable bridges that are scheduled for replacement or joint maintenance.
2. Implement or cause to be implemented the Caltrans specifications during applicable bridge projects that are under the direction of the Permittee.
3. Track and report on the use of the specifications for all applicable bridge projects within the Permittee's jurisdiction.

VI.6 Description of Disposal Methods

Stormwater discharges ultimately flows from the MS4s either into creeks that flow into San Francisco Bay or directly into San Francisco Bay.

VII. Other

VII.1 Regional Water Board Information Request

The ACCWP received an e-mail from Keith Lichten of the Regional Water Board on May 17, 2020, communicating additional information that should be included with the ROWD. ACCWP and the Permittees worked diligently to gather and incorporate the requested information into the ROWD and were able to address the majority of the requests. However, having received this communication less than 45 days before the due date of the ROWD, it was not reasonably possible to accelerate and finalize some of the requested information for submittal with the ROWD especially with the limitations imposed by COVID-19 pandemic and safety procedures relating thereto. The information requested and compiled for each requested item is summarized in Table 3 below.

Table 3: Regional Water Board ROWD Request Response

#	Regional Water Board Request	ACCWP Response
1	A completed Form 200	Form 200 has been provided.
2	A list of program member agencies and contacts	A list of program member agencies and contacts has been provided.
3	A list of documents incorporated by reference, including, but not limited to:	A list of documents, incorporated by reference, is provided in Section VII of the *Supplemental Information to Form 200 in the Report of Waste Discharge*.
3a	MOAs/MOUs confirming the relationship of the member agencies to the countywide program	
3b	BASMAA or related projects, such as projects of regional significance, being completed collectively	
3c	Provision C.8 Integrated Monitoring Report	
3d	MRP 3.0 workgroup products (see also item 6, below)	
4	Documents related to MRP Provision C.10, trash load reduction:	See responses provided below.
4a	The final Provision C.10 Receiving Water Monitoring Report	On June 24, 2020, the ACCWP Management Committee approved the *San Francisco Bay Area Receiving Water Trash Monitoring: Pilot Testing of Qualitative and Quantitative Monitoring and Assessment Protocols*, it has been approved by BASMAA on June 25, 2020 and has been submitted to the Regional Board by July 1, 2020. This document as submitted to the Regional Board is included by reference in this submittal.

#	Regional Water Board Request	ACCWP Response
4b	Each permittee's current Trash Load Reduction Plan, pursuant to Provision, C.10.d, incorporating all amendments submitted as part of the Permittee's annual reports.	The list of documents, incorporated by reference, provided in Section VII of the *Supplemental Information to Form 200 in the Report of Waste Discharge* provides links to Permittees' existing Long–Term Trash Load Reduction Plans (LTPs) and Fiscal Year Annual Reports where updates to the LTPs were reported.
4c	A tabular summary of each Permittee's remaining trash management areas (TMA) that are not yet controlled to a low trash generation rate by full trash capture devices or other measures confirmed by on-land visual assessment, and the Permittee's planned approaches to control those areas to a low trash generation rate (i.e., either full trash capture devices or other measures equivalent to full trash capture, verified by visual assessment), as shown in the below table. If planned approaches have not yet been determined, indicate the areas for which that is the case as shown. Permittee-reported trash reductions from the 2019 annual report, not counting credits and offsets (i.e., the data for column 2), are summarized in Appendix A of this Staff Summary Report.	The *Supplemental Information to Form 200 in the Report of Waste Discharge* provides a tabular summary based on FY 2019 Annual Reports. Where possible and where the information is reasonably available, Permittees have provided the planned number of acres to be treated by full trash capture systems in the near future.
5	Documents related to MRP Provisions C.11 and C.12 mercury and PCBs load reductions:	See responses provided below.
5a	Pursuant to Provisions C.11.b and C.12.b, Assess Mercury (or PCBs) Load Reductions from Stormwater, submit information accounting for methodologies to assess mercury and PCBs load reductions in MRP 3.0. These could be references to or resubmittal of information previously submitted if there are no changes. Otherwise, it should include that information and updated information sufficient to account for proposed changes to the methodologies.	The list of documents, incorporated by reference, provided in Section VII of the *Supplemental Information to Form 200 in the Report of Waste Discharge* provides a reference for the BASMAA report that addresses this Permit requirement. The *Source Control Load Reduction Accounting for Reasonable Assurance Analysis Report* is in draft form at this time and will be submitted in September 2020 with the Program's Annual Report and will be thereby incorporated by reference.
5b	Summaries of key information that is required to be submitted in more-detailed form with the 2020 annual reports:	See responses below.

#	Regional Water Board Request	ACCWP Response
5bi	A summary of key information required to be submitted pursuant to MRP Provision C.12.f.iii(5) with the 2020 annual report. That provision requires submittal with the FY 2019-2020 annual report of "…an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition. This should be reported at the regional level on behalf of all Permittees."	A summary of key information required to be submitted pursuant to MRP Provision C.12.f.iii(5) is provided in the Management of PCBs in Building Materials program summary in Section VI.5.2 of the *Supplemental Information to Form 200 in the Report of Waste Discharge.*
5bii	Summaries of key information that required to be submitted pursuant to MRP Provisions C.11.c.iii(2) and C.12.c.iii(2), which require "…an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate." The summaries shall also reference, or otherwise summarize, the reports required pursuant to MRP Provisions C.11.c.iii(1) and C.12.c.iii(1), which required in the 2018 annual reports "…the quantitative relationship between green infrastructure implementation and mercury (or PCBs) load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship." These summaries should information sufficient to account for the 2020 annual report requirement to submit reasonable assurance analyses to demonstrate quantitatively that Mercury reductions of at least 10 kg/yr and PCBs reductions of at least 3 kg/yr will be realized by 2040 implementation of green infrastructure projects with data used and description of models and model inputs relied on to make the demonstration.	The information regarding "…an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040" will be provided in the *ACCWP PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis Report*, which will be submitted to the Regional Water Board in September 2020 with the Annual Report. This information is currently under development, so cannot be summarized at this time. Upon submittal, that information will be incorporated by reference. The reports submitted to the Regional Water Board in 2018 are included in the list of documents, incorporated by reference, provided in Section VII of the *Supplemental Information to Form 200 in the Report of Waste Discharge.*
5c	A summary of draft Reasonable Assurance Analysis outcomes sufficient to inform setting of goals in those provisions (currently under discussion in the workgroup)	The RAA results are not ready to be reported, as they are under development at this time. They will be submitted with the Annual Report and will thereby be incorporated by reference.

#	Regional Water Board Request	ACCWP Response
5d	Methods for estimating PCBs load reductions achieved by new source categories (e.g., removal of PCBs-containing electrical equipment, control of PCBs in infrastructure (e.g., bridge caulk)).	Methods to estimate PCBs load reductions achieved by the new source control categories are summarized in the *Source Control Load Reduction Accounting for Reasonable Assurance Analysis Report*, which is included in the list of documents, incorporated by reference, provided in Section VII of the *Supplemental Information to Form 200 in the Report of Waste Discharge.* Draft white papers summarizing these methods have been shared with Regional Water Board staff.
6	A copy of the Program's priority issues list, organized by provision. It would be acceptable to reference the existing BASMAA workgroup documents we have worked on collectively and identify any significant issues beyond them (although we expect the latter should be a very short list).	The ACCWP List of Priorities for MRP 3.0 is included in Section VII of the *Supplemental Information to Form 200 in the Report of Waste Discharge.*
7	ROWD information relating to new or substantially updated provisions/sub-provisions:	See responses below.
7a	Information sufficient to inform setting of goals and requirements to address discharges associated with homelessness. This is a placeholder for information being worked on in the associated MRP 3.0 workgroup. ROWDs should reference and, as appropriate, respond to work products generated by that workgroup.	ACCWP requests that this request for information be addressed through the MRP 3 Steering Committee Workgroup process. ACCWP Permittees are participating in the MRP 3 Steering Committee workgroups. Documents from that process should be incorporated by reference.
7b	Relatedly, information sufficient to inform setting of goals and requirements to address discharges of bacteria. At a minimum, this should consist of information referenced or generated in response to the immediately preceding item 7.a (discharges associated with homelessness), and additional expectations set in MRP workgroups or the Steering Committee regarding bacteria issues.	ACCWP requests that this request for information be addressed through the MRP 3 Steering Committee Workgroup process. ACCWP Permittees are participating in the MRP 3 Steering Committee workgroups. Documents from that process should be incorporated by reference.
7c	Information sufficient to inform setting of expectations around discharges of pollutants associated with emergency firefighting activities (e.g., chlorinated water, firefighting foams) pursuant to MRP Provision C.15.b.iii. ROWDs should reference and, as appropriate, respond to work products generated by the MRP workgroup.	ACCWP requests that this request for information be addressed through the MRP 3 Steering Committee Workgroup process. ACCWP Permittees are participating in the MRP 3 Steering Committee workgroups. Documents from that process should be incorporated by reference

#	Regional Water Board Request	ACCWP Response
7d	As appropriate, reference to workgroup discussions and outcomes regarding oversight of mobile cleaning businesses.	ACCWP requests that this request for information be addressed through the MRP 3 Steering Committee Workgroup process. ACCWP. Documents from that process should be incorporated by reference. Permittees are participating in the MRP 3 Steering Committee workgroups.
8	Permittee-specific ROWD information:	See responses below.
8a	Provision C.14 – Fecal indicator bacteria controls. The City of Pacifica and San Mateo County: Pursuant to Provision C.14.b.iii(e), a plan "…that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones."	Not relevant to ACCWP
8b	Provision C.16 – Discharges to ASBSs – San Mateo County: a copy of or URL linking to the County's current ASBS Compliance Plan approved by the State Water Board's Executive Director.	Not relevant to ACCWP
8c	We will contact Permittees with any additional expectations (or continue our ongoing communications) regarding the Petaluma River bacteria TMDL (Petaluma); San Francisco Bay Beaches bacteria TMDL (certain Bay-adjacent permittees); Pescadero/Butano Creeks Sediment TMDL (San Mateo County); and San Vicente Creek discharges of bacteria—implementation consistent with Water Board Resolution No. R2-2016-0024 (San Mateo County)	Not relevant to ACCWP
8d	East Contra Costa County Permittees: information sufficient to update or, as appropriate, establish TMDL requirements applicable to those permittees.	Not relevant to ACCWP
8e	Additionally, we will contact Petaluma, as appropriate, regarding any additional needed information associated with joining the MRP.	Not relevant to ACCWP

VII.2 List of Documents Incorporated by Reference

ACCWP Documents

Memorandum of Agreement Providing for the Implementation of the Alameda Countywide Clean Water Program, https://www.cleanwaterprogram.org/about-us/about-the-clean-water-program/management-committee/accwp-moa-fully-executed-3-26-13/viewdocument/332.html.

The Program's and its member agencies Annual Reports, https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/Annual_Reports1.html.

The Program's and its member agencies' Long Term Trash Reduction Plans and Direct Trash Discharge Control Plans, https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/Prov_C10.html.

The Program's Fiscal Year 2020-2021 Budget and Work Plan, https://www.cleanwaterprogram.org/about-us/about-the-clean-water-program/management-committee/accwp-fy-2020-21-budget/viewdocument/2145.html.

Alameda Countywide Clean Water Program Integrated Monitoring Report for Water Years 2014-2019, submitted to the California Regional Water Quality Control Board, San Francisco Bay Region. March 31, 2020.

The Program's Pollutants of Concern Monitoring Reports for WYs 2016, 2017, and 2018, https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/water_quality.html#RMC.

Alameda Countywide Clean Water Program Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions. September 28, 2018. Submitted with the FY 2017/18 Annual Report.

Alameda Countywide Clean Water Program PCBs and Mercury TMDL Control Measure Plan and Reasonable Assurance Analysis Report, in preparation, *to be submitted* September 30, 2020.

BASMAA Documents

BASMAA, 2017a. Clean Watersheds for a Clean Bay (CW4CB) Project Report. Prepared by Geosyntec, Inc, and EOA, Inc. http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project/CW4CB-Overall-Project-Report.

BASMAA, 2017b. Receiving Water Trash Monitoring Program Plan for the San Francisco Bay Region. EOA, Inc. Version 1, October 2017. http://basmaa.org/Announcements/receiving-watertrash-monitoring-program-plan-for-the-san-francisco-bay-region.

BASMAA, 2018a. Bay Area Reasonable Assurance Analysis Guidance Document. Prepared for BASMAA by Geosyntec Consultants and Paradigm Environmental. June 2017, http://basmaa.org/Announcements/bay-area-reasonable-assurance-analysis-guidance-document.

BASMAA, 2018b. Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure. Project Report. Prepared by EOA, Inc., SFEI, Kinnetic Laboratories, Inc., August 2018, http://basmaa.org/Announcements/evaluation-of-pcbs-in-public-roadway-and-storm-draininfrastructure.

BASMAA, 2019a. BASMAA Regional Monitoring Coalition Five-Year Bioassessment Report. Water Years 2012 – 2016. Prepared by EOA, Inc. and Applied Marine Sciences. http://basmaa.org/DesktopModules/EasyDNNNews/DocumentDownload.ashx?portalid=0&moduleid=524&articleid=38&documentid=98.

BASMAA, 2019b. PCBs in Priority Building Materials: Model Screening Assessment Applicant Package. Managing PCBs-Containing Building Materials during Demolition: Guidance, Tools, Outreach and Training. Revised November 2019. http://basmaa.org/Announcements/pcbs-inpriority-building-materials-model-screening-assessment-applicant-package-revised-ovember-2019-1.

BASMAA, 2019c. Pollutant Removal from Stormwater with Biochar Amended Bioretention Soil Media (BSM) Project Report. Prepared for BASMAA by OWP at Sacramento State, EOA, Inc., San Francisco Estuary Institute, and Kinnetic Laboratories, Inc. February 8, 2019. Submitted with the FY 2018/19 Annual Report.

BASMAA, 2019d. Pollutant of Concern Monitoring for Management Action Effectiveness – Evaluation of Mercury and PCBs Removal Effectiveness of Full Trash Capture Hydrodynamic Separator Units Project Report. Prepared for BASMAA by EOA, Inc., OWP at Sacramento State, San Francisco Estuary Institute, and Kinnetic Laboratories, Inc. February 20, 2019. Submitted with the FY 2018/19 Annual Report.

BASMAA, 2020a. Source Control Load Reduction Accounting for Reasonable Assurance Analysis. Prepared for BASMAA by Geosyntec Consultants and EOA, Inc. July 2020, *to be submitted* September 30, 2020.

BASMAA, 2020b. San Francisco Bay Area Receiving Water Trash Monitoring: Pilot Testing of Qualitative and Quantitative Monitoring and Assessment Protocols. Prepared by EOA, Inc. and Applied Marine Sciences, *to be submitted* July 1, 2020.

Municipal Regional Stormwater Permit

San Francisco Regional Water Quality Control Board (SFBRWQCB). 2009. California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit Order R2-2009-0074 NPDES Permit No. CAS612008, 14 October 2009. Amended November 19, 2015. https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2_2015_0049_amended.pdf.

VII.3 List of ACCWP Priorities for MRP 3.0

A list of ACCWP Permittee priorities for MRP 3.0 is provided in Attachment B.

VII.4 Permittee Remaining Trash Management Area Summary

A summary of ACCWP Permittees' remaining trash management areas that are not yet controlled to a low trash generation rate by full trash capture devices or other measures confirmed by on-land visual assessment is provided in Attachment C.

ATTACHMENT A

ACCWP Member Agency Permittee Jurisdiction Maps

Part III of Form 200: Map of ACCWP Member Agency Permittee Jurisdictions

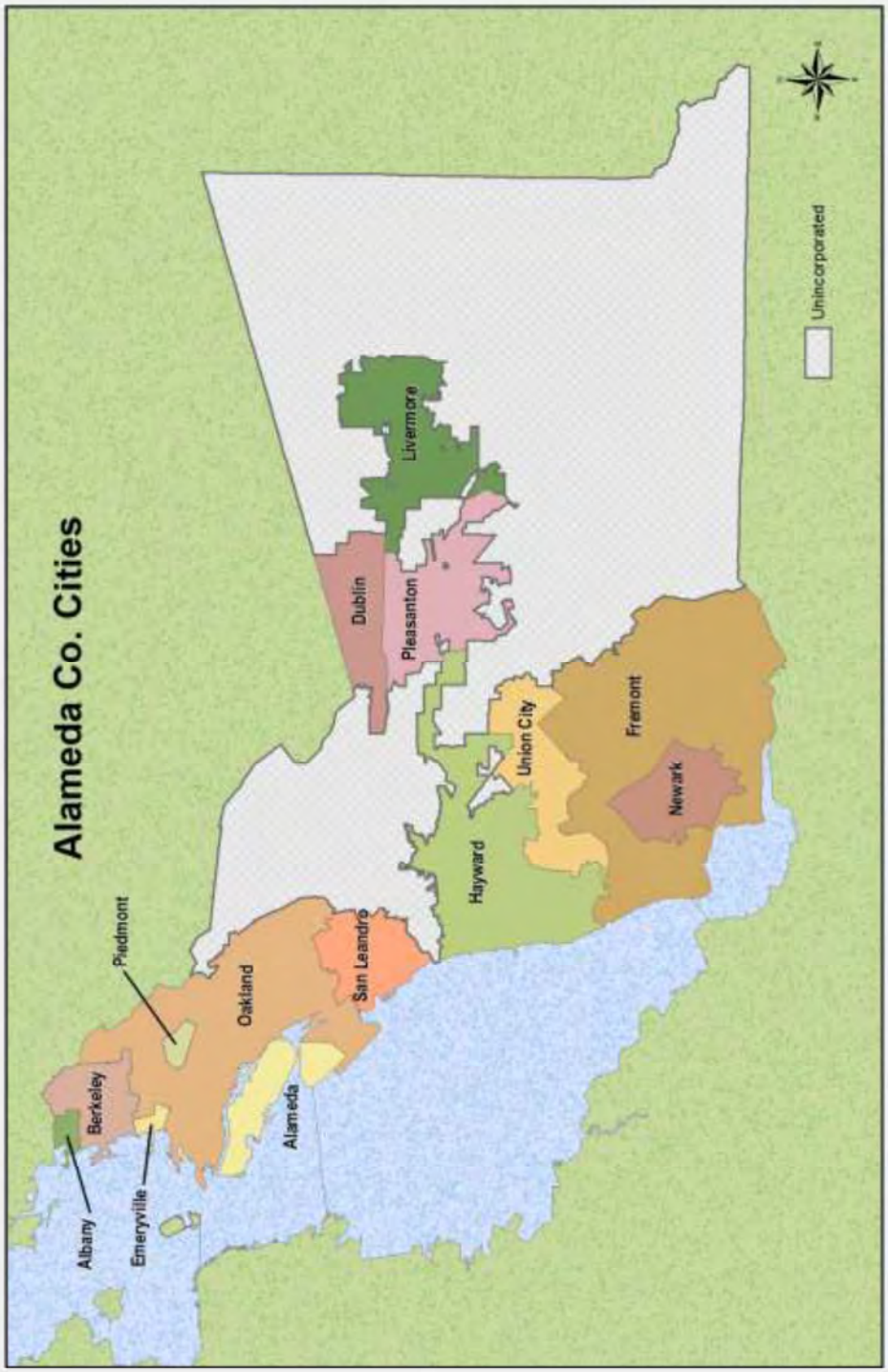

Part III of Form 200: Map of ACCWP Member Agency Permittee Jurisdictions

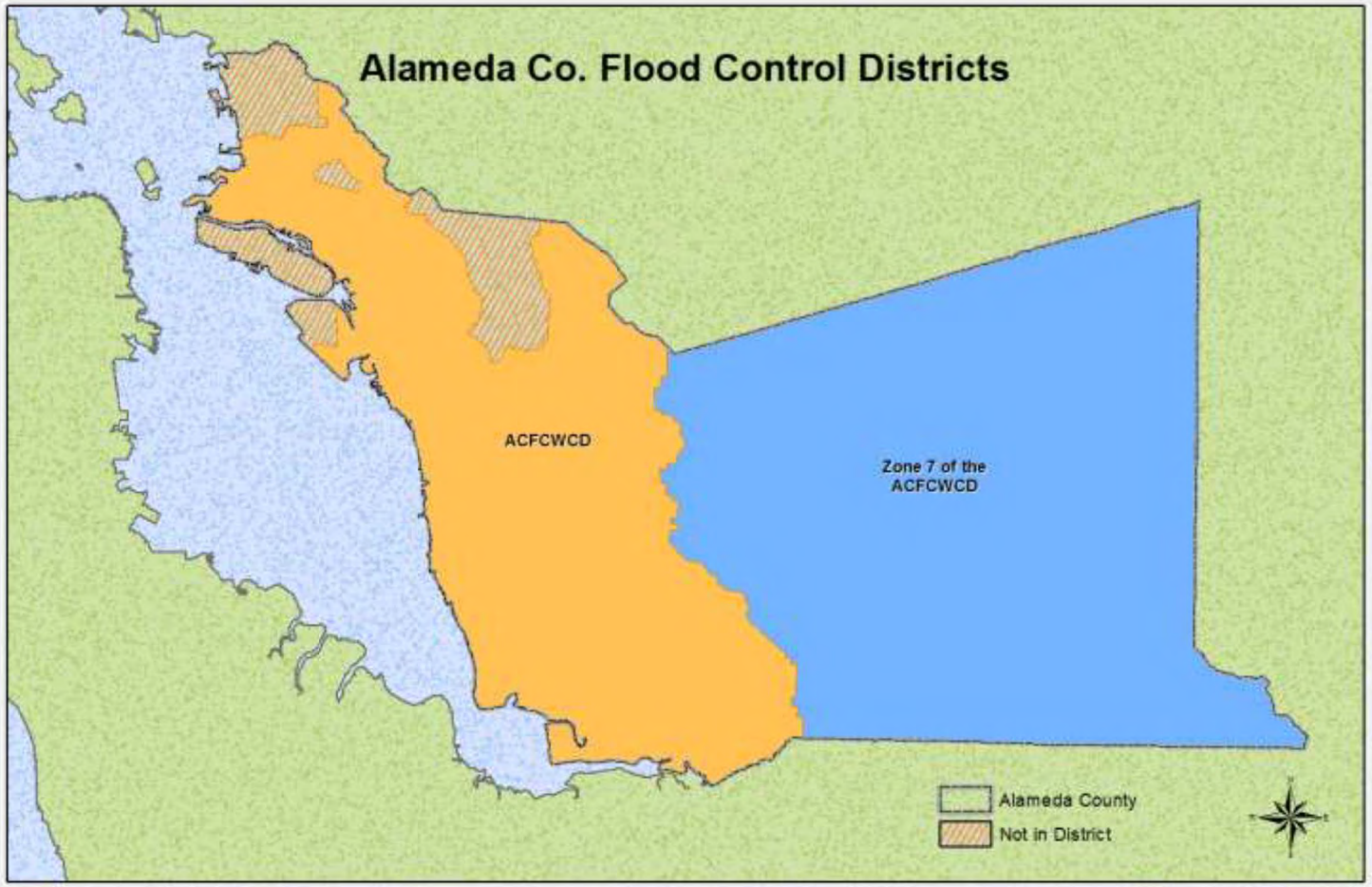

ATTACHMENT B

List of ACCWP Priorities for MRP 3.0

Supplemental Information to Part VII of Form 200: ACCWP Priority Issues for MRP 3

MRP 2 Provision	MRP 2 Requirement	Summary of Issues and Rationale for Changes in Reissued Permit
C.3.b	Regulated Projects	Maintain current project size thresholds, which ensure that nearly all new or replaced impervious area drains to sustainable LID features.
C.3.b	Regulated Projects	Leave requirements for existing streets and roads unchanged, including the exemption from C3 requirements for rehabilitation, repair, and resurfacing of existing roadways.
C.3.b.iv	Regulated Projects Reporting	Eliminate the requirement to report approvals for Regulated Projects; report new Regulated Projects in the year construction is completed.
C.3.b and C.3.i	Required Site Design Measures for Small Projects and Detached Single-Family Home Projects	Continue to allow simplified LID measures to be implemented when constructing one single-family home. Do not require O&M agreements or inspection at single-family homes.
C.3.e.i	Alternative Compliance	Alternative compliance provisions can be improved by clarifying edits to existing options and addition of a third option for a Regional Alternative Compliance Program
C.3.e.ii	Special Projects	Housing is a critical issue in the Bay Area. Homeless population is significantly increasing in many cities. In Oakland for example the homeless population doubled from approximately 2,000 to 4,000 individuals between 2017 and 2019. Covid-19 related economic impacts will further exacerbate the housing crisis. Removing the Special Projects provision will create a further barrier to housing development and could specifically negatively impact the urgently needed affordable housing projects. Affordable housing projects are cannot compete with market rate housing for land and therefore affordable housing projects are often built on the least desirable or smaller parcels where land challenges are the greatest. In Oakland between 2017-2019: >50% of proposed Special Projects included some amount of affordable housing. The Special Projects provision provides flexibility that helps municipalities work with developers to maximize the environmental benefits of projects which in addition to water quality benefits, often include other air quality, health, and climate change resiliency benefits. Many special projects still incorporate LID where feasible. In Oakland, 2017-2019, Special Projects still incorporated 18% more LID than was required under the Provision while allowing site design flexibility that allowed the projects to achieve other environmental benefits and incorporated stormwater treatment measures appropriate for a dense urban environment. Special projects align with municipal zoning strategies that support urban infill in areas where there's often not much space for LID. Properly managed density can be a water quality improvement strategy. On a watershed scale, density can result in existing impervious area or "accessory" impervious areas and automobile-related pollutant impacts. The Regional Board recognized environmental and water quality benefits of these types of projects in MRP 1.0 & 2.0. and the conditions under which special projects support water quality objectives are still in place
C.3.j	Green Infrastructure	If Green Infrastructure mandates are included in MRP 3.0, then: 1. Permittees should be able to just implement their Green Infrastructure Plans, as these plans were very resource intensive to develop and adopt. Permittees should be able to demonstrate local progress toward implementing their Green Infrastructure Plans by selecting and tailoring a suite of local indicators (for example, adoption of policies, documentation of processes for green infrastructure project identification and conceptual design, securing of funding streams, design and construction of initial green infrastructure projects, or other internal performance measures). 2. Express green infrastructure implementation targets as long-term, region-wide goals recognizing that the timing of redevelopment projects and infrastructure opportunities is unpredictable and is largely outside the control of Permittees. 3. "De-couple" green infrastructure implementation targets from mercury/PCB load reductions by removing the C.11.c and C.12.c provisions (and performance criteria tables 11.1 and 12.1, respectively) from MRP 3.0. Permittees should identify, select, and implement GI projects based on broadly defined water quality and other benefits. Tracking of PCB/mercury load reductions achieved via green infrastructure should be conducted under the relevant C.11/12 provisions.
C.5	Illicit Discharge Detection and Elimination	No increase in storm drain mapping requirements as this would be resource intensive and is not necessary for illicit discharge response.
C.8.	Water Quality Monitoring	No increase in monitoring costs, inclusive of any new monitoring requirements in MRP 3 (i.e. C.10, C.11/12, any new provisions, etc.). Reduce the frequency of reporting.

Supplemental Information to Part VII of Form 200: ACCWP Priority Issues for MRP 3

MRP 2 Provision	MRP 2 Requirement	Summary of Issues and Rationale for Changes in Reissued Permit
C.8.d	Creek Status Monitoring	If creek status monitoring requirements are mandated and retained, then: 1. Allow a targeted approach for creek status monitoring, with time to develop thoughtful workplans in year 1, allowing flexibility for designating monitoring resources to answer meaningful Management Questions relevant to watersheds of interest. 2. Request to eliminate probabilistic driven monitoring and move to targeted, project level monitoring.
C.8.e	Stressor/Source Identification (SSID) Projects	SSID studies conducted during MRP 1.0 and MRP 2.0 should be acknowledged as complete and in the future Executive Officer approval is not explicitly required for completing a project.
C.8.f	Pollutants of Concern Monitoring	1. No new "materials characterization" requirements, (e.g. PCBs in infrastructure caulk, MRP 2.0 Provision C.12.e). Any further study of PCBs in infrastructure materials and development of specifications for handling the material should be led by Caltrans. 2. Eliminate the stand-alone Pollutant of Concern (C.8.h.iv) report, currently due in October annually, and instead include the C.8 POC monitoring information (i.e., data, accomplishments and monitoring for the following year) in the Urban Creeks/Integrated Monitoring Reports, due in March annually.
C.10. Trash Load Reduction	Trash Load Reduction	1. Retain source control and creek, shoreline, and direct discharge credits and offsets as in MRP 2.0. Several Permittees rely on source control credits or offsets to meet their load reduction requirements, have invested greatly in these programs, and may fail to comply with load reduction milestones if the credits are removed. 2. Retain existing creek and shoreline cleanup credit, separate from direct discharge plans as these programs provide a valuable method of trash removal and reduce trash amounts that can travel downstream or be windblown throughout the watershed. 3. Apply source control, creek, and shoreline credits jurisdiction-wide, as the benefits of these programs are recognized throughout the jurisdiction. 4. Allow for more time to reach 100% trash reduction due to the length of time needed to collaborate with Caltrans, funding constraints, evolving load reduction strategies, and challenges in achieving the last ~20% reduction. 5. Do not require mapping private lands drainage connections to the MS4.
C.11/C.12	Mercury and PCBs Controls	1. Incorporate the programmatic approach developed by BASMAA in collaboration with Regional Water Board staff, which measures compliance by completing specific agreed upon control measures. Do not include a specified load reduction requirement for the MRP 3 permit term. 2. Remove the Green Infrastructure load reduction requirement; reference instead the C.3.j provisions.
Misc.	Homeless Encampment Mitigation	Based upon the workgroup discussions, Permittees are concerned with the imposition of costly new homeless encampment mitigation obligations which are far beyond the scope of managing MS4 discharges.

ATTACHMENT C

ACCWP Permittee Remaining Trash Management Areas

ACCWP - Total Remaining Untreated Acres by Permittee

Permittee Name	Permittee Trash Reduction reported in 2019 Annual Report	Permittee Trash Reduction reported in 2019 Annual Report, not counting credits and offsets	Total TMA not yet controlled (acres)	Total TMA to be controlled with FTCDs (acres)	Total TMA to be controlled with other measures (acres)	Total TMA with controls not yet determined, source control, offsets, and other (acres)	Moderate trash generation rate area not yet controlled (acres)	Moderate area to be controlled by FTCDs (acres)	Moderate area to be controlled by other measures with visual assessment (acres)	Moderate area – controls not yet determined, source control, offsets, or other (acres)	High trash generation rate area not yet controlled (acres)	High trash generation rate area not yet controlled (acres)	High area to be controlled by FTCDs (acres)	High area – controls not yet determined, source control, offsets, and other (acres)	Very high trash generation rate area not yet controlled (acres)	Very High trash generation rate area not yet controlled (acres)	Very High trash generation rate area not yet controlled (acres)	Very high area – controls not yet determined, source control, offsets, and other (acres)
City of Alameda	73.2%	61%	450	TBD	TBD	450	368	TBD	TBD	368	80	TBD	TBD	80	2	TBD	TBD	2
Alameda County	81.9%	72%	547	387	TBD	160	433	273	TBD	160	114	114	TBD	TBD	0	N/A	N/A	N/A
Albany	93.0%	73%	170	TBD	TBD	TBD	116	TBD	TBD	TBD	52	TBD	TBD	TBD	2	TBD	TBD	TBD
Berkeley	83.1%	63%	1,942	0	13	TBD	1,707	0	13	1,694	199	0	TBD	TBD	36	0	TBD	TBD
Dublin	81.8%	75%	384	TBD	TBD	384	330	TBD	TBD	330	54	TBD	TBD	54	0	N/A	N/A	N/A
Emeryville	88.0%	78%	132	TBD	TBD	TBD	117	TBD	TBD	TBD	8	TBD	TBD	TBD	7	TBD	TBD	TBD
Fremont	94.0%	69%	1,413	TBD	TBD	TBD	1,227	TBD	TBD	TBD	186	TBD	TBD	TBD	0	N/A	N/A	N/A
Hayward	62.1%	47%	2,166	160	TBD	TBD	1,631	140	TBD	TBD	535	20	TBD	TBD	0	N/A	N/A	N/A
Livermore	90.1%	78%	722	TBD	TBD	722	686	TBD	TBD	686	36	TBD	TBD	36	0	N/A	N/A	N/A
Newark	80.8%	75%	673	TBD	TBD	TBD	525	TBD	TBD	TBD	148	TBD	TBD	TBD	0	N/A	N/A	N/A
Oakland	95.8%	61%	10,128	TBD	TBD	TBD	5,983	TBD	TBD	TBD	3,533	TBD	TBD	TBD	612	TBD	TBD	TBD
Piedmont	90.0%	83%	12	TBD	TBD	12	12	TBD	TBD	TBD	0	N/A	N/A	N/A	0	N/A	N/A	N/A
Pleasanton	100.0%	97%	N/A	0	0	0	N/A	0	0	0	N/A	0	0	0	N/A	0	0	0
San Leandro	80.8%	71%	1,797	TBD	TBD	TBD	1,639	TBD	TBD	TBD	151	TBD	TBD	TBD	7	TBD	TBD	TBD
Union City	81.8%	72%	462	TBD	TBD	TBD	392	TBD	TBD	TBD	70	TBD	TBD	TBD	0	N/A	N/A	N/A

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9974

CONTRA COSTA
CLEAN WATER
PROGRAM

July 1, 2020

Submitted via EMAIL to: Michael.Montgomery@waterboards.ca.gov

Michael Montgomery, Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

SUBJECT: Transmittal of Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

Dear Mr. Montgomery:

Please accept the attached Report of Waste Discharge (ROWD) submitted by the Contra Costa Clean Water Program (CCCWP) on behalf of its Permittees in accordance with Provision C.20 in the Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049/amended by Order R2-2019-0004), NPDES Permit No. CAS612008) issued by the San Francisco Bay Regional Water Quality Control Board on November 19, 2015.

CCCWP has been authorized to submit this ROWD on behalf of the 21 member agency Permittees that comprise the CCCWP. These include the Cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek; Towns of Danville and Moraga; Contra Costa County and Contra Costa County Flood Control & Water Conservation District. A copy of the ROWD is being be submitted to the Central Valley Regional Water Quality Control Board on behalf of the East County Permittees (cities of Antioch, Brentwood, and Oakley, Unincorporated Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District).

The ROWD has been prepared in accordance with the *State of California Application/General Information Form for WDRs and NPDES Permits* [Form 200 (10/97)], and the USEPA *Interpretative Policy Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems*. Additionally, CCCWP received an e-mail from Keith Lichten on May 17, 2020, communicating additional information that should be included with the ROWD. CCCWP and the Permittees worked diligently to gather and incorporate the requested information into the ROWD and were able to address the majority of the requests. However, having received this communication less than 45 days before the due date of the ROWD, it was not possible to accelerate and finalize some of the requested information for submittal with the ROWD especially amidst the COVID-19 pandemic. The information compiled for each requested item is discussed

255 Glacier Drive, Martinez, CA 94553-4825 • Tel (925) 313-2360 Fax: 313-2301 • Website: www.cccleanwater.org

in the ROWD. CCCWP commits to continued discussion of the items requested in the May 17, 2020, email and where appropriate will include information with the Annual Report.

CCCWP and the Permittees appreciate the constructive ongoing dialog that we have had with Regional Water Board staff to identify and work through desired changes to MRP provisions and account for the anticipated impacts of the COVID-19 pandemic. CCCWP looks forward to continuing this positive working process to translate the initial concepts and proposals developed by the workgroups into permit language.

A roll-call vote of the duly authorized representatives to approve the submittal of the ROWD was conducted on June 17, 2020 and subsequently certified by them. The certification statements are attached to this transmittal letter.

Sincerely,

Karin Graves

Sr. Watershed Management Planning Specialist
Contra Costa Clean Water Program

Attachments: Permittee Certification Statements
CCCWP ROWD and Reapplication Package

cc:

Tom Mumley, SFBRWQCB, Assistant Executive Officer,
(Thomas.Mumley@waterboards.ca.gov)

Keith Lichten, SFBRWQCB, Watershed Management Division Chief,
(Keith.Lichten@waterboards.ca.gov)

Patrick Pulupa, CVRWQCB, Executive Officer,
(Patrick.Pulupa@waterboards.ca.gov)

Elizabeth Lee, CVRWQCB, Senior Water Resources Control Engineer,
(Elizabeth.Lee@waterboards.ca.gov)

CCCWP Management Committee

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of Antioch

By: _____ June 30, 2020
Date

Philip Hoffmeister
Print/Type Name

Administrative Analyst II
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Brentwood

By: _____ 6/22/20
Date

Meghan Laporta
Print/Type Name

Associate Engineer
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Clayton

By: Laura Hoffmeister

Date
6/30/20

Laura Hoffmeister, Acting City Manager, City of Clayton

Print/Type Name

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Concord

By: _____ *06/19/2020*
Date

Kevin Marstall, PE
Print/Type Name

City Engineer
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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Contra Costa County

By: _____ 6/22/20
Date

Michele Mancuso
Print/Type Name

Sr. Watershed Management Plan. Spclst
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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CCC Flood Control & Water Conservation District

By: Tim Jensen 6/23/20

Date

Tim Jensen

Print/Type Name

Assistant Chief Engineer

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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Town of Danville

By: _____ 6/18/2020
Date

Steven Jones

City Engineer

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of El Cerrito

By: _____ 6/23/2020
Date

Will Provost
Print/Type Name

MANAGEMENT ANALYST III / ACTING OESD MANAGER
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Hercules

By: David Biggs _____ 6/19/2020 *Date*

DAVID BIGGS

Print/Type Name

CITY MANAGER

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Lafayette

By: Niroop K. Srivatsa _____ *June 30, 2020*
Date

Niroop K. Srivatsa,
Print/Type Name

City Manager
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Martinez

By: _____ June 30, 2020
Date

Scott D. Alman, P.E.
Print/Type Name

City Engineer
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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Town of Moraga

By: Shawn Knapp 6/30/2020
Date

Shawn Knapp
Print/Type Name

Director of Public Works / Town Engineer
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Oakley

By: Billilee Saengchalern 06/26/2020

Date

BILLILEE SAENGCHALERN

Print/Type Name

PRINCIPAL ENGINEER

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Orinda

By: Scott Christie 6-23-2020

Date

Scott Christie

Print/Type Name

Sr. Engineer

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of Pinole

By: _____ 6/30/2020
Date

Andrew Murray
Print/Type Name

City Manager
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of Pittsburg

By: Jolan Longway 6/19/20

Date

JOLAN LONGWAY

Print/Type Name

CLEAN WATER PROGRAM COORDINATOR

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Pleasant Hill

By: _____ *Date* 6/19/20

MARIO MORENO

Print/Type Name

CITY ENGINEER

Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Richmond

By: _____ *6/19/2020*
Date

Joanne Le
Print/Type Name

Environmental Services Manager
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of San Pablo

By: _____ 06/23/20
Date

Amanda Booth
Print/Type Name

Sr. Environmental Program Analyst
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

City of San Ramon

By: David Krueger _____ 6/30/20 _____
Date

David Krueger
Print/Type Name

Environmental Programs Manager
Print/Type Title

Report of Waste Discharge and Reapplication Package for Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Order R2-2015-0049) as amended

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City of Walnut Creek

By: Steve R. Waymire **June 18, 2020**
Date

Steven R. Waymire
Print/Type Name

Assistant Public Works Director, City Engineer
Print/Type Title

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. Facility:

Name: Contra Costa Clean Water Program - Municipal Separate Storm Sewer System			
Address: 255 Glacier Drive			
City: Martinez	County: Contra Costa	State: CA	Zip Code: 94553
Contact Person: c/o CCCWP, Karin Graves		Telephone Number: 1 (925) 313-2042	

B. Facility Owner:

Name: See Table 1 provided in Supplemental Information			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address:			3. ☑ Governmental Agency 4. ☐ Partnership
City:	State:	Zip Code:	5. ☐ Other:
Contact Person:		Telephone Number:	Federal Tax ID:

C. Facility Operator (The agency or business, not the person):

Name: See Table 1 provided in Supplemental Information			Operator Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address:			3. ☑ Governmental Agency 4. ☐ Partnership
City:	State:	Zip Code:	5. ☐ Other:
Contact Person:		Telephone Number:	

D. Owner of the Land:

Name: See Table 1 provided in Supplemental Information			Owner Type (Check One) 1. ☐ Individual 2. ☐ Corporation
Address:			3. ☑ Governmental Agency 4. ☐ Partnership
City:	State:	Zip Code:	5. ☐ Other:
Contact Person:		Telephone Number:	

E. Address Where Legal Notice May Be Served:

Address: See Table 1 provided in Supplemental Information		
City:	State:	Zip Code:
Contact Person:		Telephone Number:

F. Billing Address:

Address: See Table 1 provided in Supplemental Information		
City:	State:	Zip Code:
Contact Person:		Telephone Number:

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

☐ **A. WASTE DISCHARGE TO LAND** ☑ **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

- ☐ Domestic/Municipal Wastewater Treatment and Disposal
- ☐ Cooling Water
- ☐ Mining
- ☐ Waste Pile
- ☐ Wastewater Reclamation
- ☐ Animal Waste Solids
- ☐ Land Treatment Unit
- ☐ Dredge Material Disposal
- ☐ Surface Impoundment
- ☐ Industrial Process Wastewater
- ☐ Animal or Aquacultural Wastewater
- ☐ Biosolids/Residual
- ☐ Hazardous Waste (see instructions)
- ☐ Landfill (see instructions)
- ☑ Storm Water
- ☐ Other, please describe: _____

III. LOCATION OF THE FACILITY

Describe the physical location of the facility. Contra Costa County. See Figure 1 for creeks and drainages

1. Assessor's Parcel Number(s)	2. Latitude	3. Longitude
Facility:	Facility:	Facility:
Discharge Point:	Discharge Point:	Discharge Point:

IV. REASON FOR FILING

- ☐ New Discharge or Facility
- ☐ Changes in Ownership/Operator (see instructions)
- ☐ Change in Design or Operation
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Change in Quantity/Type of Discharge
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: San Francisco Bay Regional Water Quality Control Board

Has a public agency determined that the proposed project is exempt from CEQA? ☑ Yes ☐ No

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency: CEQA Statutory Exemption Class 8 regulatory actions for protection of environment.

Has a "Notice of Determination" been filed under CEQA? ☐ Yes ☐ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

☐ **EIR** ☐ **Negative Declaration**

Expected CEQA Completion Date: _____

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

See Part VI and Part VII provided in Supplemental Information

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: Karin Graves **Title:** Sr. Wtrshd Mngmnt Planning Specialist

Signature: **Date:** 6/25/2020

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Supplemental Information

to the Report of Waste Discharge
Stormwater NPDES Permit Order R2-2015-0049
Amended Order R2-2019-0004
NPDES Permit No. CAS612008

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ATTACHMENTS

ATTACHMENT 1: SUMMARY OF PERMITTEE'S REMAINING TRASH MANAGEMENT AREAS

PART I. SECTIONS A-F: FACILITY INFORMATION

Table 1 below presents the following facility information for boxes A – F in Form 200:

A. Facility

B. Facility Owner

C. Facility Operator

D. Owner of the Land

E. Address Where Legal Notice May Be Served

F. Billing Address

TABLE 1: FACILITY OWNER AND OPERATOR INFORMATION FOR THE MUNICIPAL SEPARATE STORM SEWER SYSTEM IN CONTRA COSTA COUNTY

Facility Owner and Operator Information			Legal Notice Address Information	
Agency and Address	**City Manager/ Owner**	**Federal Tax ID Number**	**Stormwater Representative (Primary)**	**Stormwater Representative (Alternate)**
City of Antioch 200 H Street Antioch, CA 94509 Region 5 Permittee	Roy Bernal		Phil Hoffmeister Administrative Analyst II Community Development (925) 779-6169 phoffmeister@ci.antioch.ca.us	No alternate at this time.
City of Brentwood 150 City Park Way Brentwood, CA 94513 Region 5 Permittee	Jagtar "Jack" Dhaliwal, P.E.		Jagtar "Jack" Dhaliwal, PE Assistant Director of Public Works/Engineering (925) 516-5128 jdhaliwal@brentwoodca.gov	Meghan Laporta Associate Engineer Public Works – Engineering (925) 516-5171 mlaporta@brentwood.ca.gov
City of Clayton 6000 Heritage Trail Clayton, CA 94517	Ikani Taupoepeau (Inter CM) (925) 673-7300	94-1568979	Laura Hoffmeister Assistant to the City Manager (925) 673-7308 lhoffmeister@ci.clayton.ca.us	Scott Alman, PE City Engineer (925) 969-8181 cityengineer@ci.clayton.ca.us
City of Concord 1950 Parkside Drive Concord, CA 94519	Valerie Barone (925) 671-3150	94-6000315	Kevin Marstall Stormwater Manager (925) 671-3257 kevin.marstall@cityofconcord.org	Bruce Davis Stormwater Manager (925) 671-3470 bruce.davis@cityofconcord.org Frank Kennedy Stormwater Consultant (925) 932-7857 fjk@fjkennedy.com

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TABLE 1: FACILITY OWNER AND OPERATOR INFORMATION FOR THE MUNICIPAL SEPARATE STORM SEWER SYSTEM IN CONTRA COSTA COUNTY

Facility Owner and Operator Information			Legal Notice Address Information	
Agency and Address	**City Manager/ Owner**	**Federal Tax ID Number**	**Stormwater Representative (Primary)**	**Stormwater Representative (Alternate)**
Contra Costa County 651 Pine St. Martinez, CA 94553	David Twa (925) 335-1080	94-6000509	Brian Balbas Public Works Director (925) 313-2201 brian.balbas@pw.cccounty.us Allison Knapp Deputy Director (925) 313-2177 Allison.knapp@pw.cccounty.us	Tim Jensen Assistant Chief Engineer (925) 313-2390 tim.jensen@pw.cccounty.us Michele Mancuso Sr. Watershed Mgmt. Plan Specialist (925) 313-2236 Michele.mancuso@pw.cccounty.us
CCC Flood Control & Water Conservation District 255 Glacier Drive Martinez, CA 94553	Chief Engineer (925) 313-2201	94-6000509	Tim Jensen Assistant Chief Engineer (925) 313-2390 tim.jensen@pw.cccounty.us	Michele Mancuso Sr. Watershed Mgmt. Plan Specialist (925) 313-2236 Michele.mancuso@pw.cccounty.us Allison Knapp Deputy Director (925) 313-2177 Allison.knapp@pw.cccounty.us
Town of Danville 510 La Gonda Way Danville, CA 94526	Joe Calabrigo (925) 314-3388	94-2834842	Bob Russell Engineering Division (925) 314-3315 brussell@danville.ca.gov	Steven Jones City Engineer (925) 314-3339 sjones@danville.ca.us
City of El Cerrito 10890 San Pablo Ave. El Cerrito, CA 94530	Karen Pinkos (510) 215-4300	94-6000325	Will Provost Management Analyst III (510) 525-7622 wprovost@ci.el-cerrito.ca.us	Stephen Prée Environmental Programs Manager/City Arborist (510) 215-4333 spree@ci.el-cerrito.ca.us

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TABLE 1: FACILITY OWNER AND OPERATOR INFORMATION FOR THE MUNICIPAL SEPARATE STORM SEWER SYSTEM IN CONTRA COSTA COUNTY

Facility Owner and Operator Information			Legal Notice Address Information	
Agency and Address	**City Manager/ Owner**	**Federal Tax ID Number**	**Stormwater Representative (Primary)**	**Stormwater Representative (Alternate)**
City of Hercules 111 Civic Drive Hercules, CA 94547	David Biggs (510) 799-8200	94-6027345	Mike Roberts PW Director/City Engineer (510) 799-8241 mikeroberts@ci.hercules.ca.us	Jose Pacheco Assistant Civil Engineer (510) 799-8247 jpacheco@ci.hercules.ca.us
City of Lafayette 3675 Mt. Diablo Blvd. #210 Lafayette, CA 94549	Niroop Srivatsa (925) 284-1968	94-1674826	Matt Luttropp Engineering Services Manager (925) 299-3247 mluttropp@ci.lafayette.ca.us	
City of Martinez 525 Henrietta Street Martinez, CA 94553	Eric Figueroa (925) 372-3505	94-60003670	Bob Cellini Public Works Superintendent (925) 372-3581 bcellini@cityofmartinez.org	Khalil Yowakim Senior Civil Engineer (925) 372-3569 kyowakim@cityofmartinez.org
Town of Moraga 329 Rheem Blvd. Moraga, CA 94556	Cynthia Battenburg (925) 888-7022	94-2275991	Shawn Knapp PW Director/Town Engineer (925) 888-7025 sknapp@moraga.ca.us	Frank Kennedy Stormwater Consultant (925) 932-7857 fjk@fjkennedy.com
City of Oakley 3231 Main St Oakley, CA 94561 Region 5 Permittee	Bryan Montgomery (925) 625-7007		Billilee Saengchalern Stormwater Program Coordinator Public Works and Engineering (925) 625-7154 Saengchalern@ci.oakley.ca.us	Frank Kennedy Stormwater Consultant (925) 932-7857 fjk@fjkennedy.com

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TABLE 1: FACILITY OWNER AND OPERATOR INFORMATION FOR THE MUNICIPAL SEPARATE STORM SEWER SYSTEM IN CONTRA COSTA COUNTY

Facility Owner and Operator Information			Legal Notice Address Information	
Agency and Address	**City Manager/ Owner**	**Federal Tax ID Number**	**Stormwater Representative (Primary)**	**Stormwater Representative (Alternate)**
City of Orinda 22 Orinda Way Orinda, CA 94563	Janet Keeter (925) 253-4200	68-0069675	Scott Christie Senior Engineer (925) 253-4219 schristie@cityoforinda.org	Jason Chen City Engineer (925) 253-4279 jchen@cityoforinda.org Kevin McCourt Assistant Engineer (925) 253-4251 kmccourt@cityoforinda.org
City of Pinole 2131 Pear Street Pinole, CA 94564	Andrew Murray (510) 724-9000	94-6000394	Tamara Miller Director of Public Works/City Engineer (510) 724-9010 tmiller@ci.pinole.ca.us	Frank Kennedy Stormwater Consultant (925) 932-7857 fjk@fkennedyandassociates.org
City of Pittsburg 65 Civic Avenue Pittsburg, CA 94565	Garrett Evans (925) 252-4850	94-6000395	Jolan Longway Civil Engineer II (925) 252-4803 jlongway@ci.pittsburg.ca.us	Fritz McKinley Community Development Director (925) 252-4930 fmckinley@ci.pittsburg.ca.us
City of Pleasant Hill 100 Gregory Lane Pleasant Hill, CA 94523	June Catalano (925) 671-5267	94-1527260	Mario Moreno City Engineer (925) 671-5252 mmoreno@pleasanthill.ca.org	Frank Kennedy Stormwater Consultant (925) 932-7857 fjk@fjkennedy.com
City of Richmond 450 Civic Center Plaza Richmond, CA 94804	Laura Snideman City Manager (510) 620-6512	94-6000403	Joanne Le Environmental Services Manager (510) 620-6540 joanne_le@ci.richmond.ca.us	Ryan Smith Director of Water Resource Recovery (510) 620-5486 ryan_smith@ci.richmond.ca.us

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TABLE 1: FACILITY OWNER AND OPERATOR INFORMATION FOR THE MUNICIPAL SEPARATE STORM SEWER SYSTEM IN CONTRA COSTA COUNTY

Facility Owner and Operator Information			Legal Notice Address Information	
Agency and Address	**City Manager/ Owner**	**Federal Tax ID Number**	**Stormwater Representative (Primary)**	**Stormwater Representative (Alternate)**
City of San Pablo 13831 San Pablo Avenue San Pablo, CA 94806	Matt Rodriguez (510) 215-3016	94-6000423	Amanda Booth Sr. Environ. Programs Analyst (510) 215-3066 amandab@sanpabloca.gov	Karineh Samkian Environmental Programs Analyst (510) 215-3064 karinehs@sanpabloca.gov
City of San Ramon 7000 Bollinger Canyon Road San Ramon, CA 94583	Joe Gorton (925) 973-2531	94-2907633	David Krueger Program Manager (925) 973-2653 dkrueger@sanramon.ca.gov	Robin Bartlett Division Manager (925) 973-2683 rbartlett@sanramon.ca.gov Maria Fierner Engineering Services Director (925) 973-2670 mfierner@sanramon.ca.gov
City of Walnut Creek 1666 N. Main Street Walnut Creek, CA 94596	Dan Buckshi (925) 943-5826	94-6000450	Lucile Paquette Clean Water Program Manager (925) 256-3511 paquette@walnut-creek.org	Neil Mock Junior Engineer (925) 943-5899 Ext. 2109 mock@walnut-creek.org Carlton Thompson Senior Civil Engineer (925) 943-5899 cthompson@walnut-creek.org Steve Waymire City Engineer (925) 256-3507 waymire@walnut-creek.org

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PART II. TYPE OF DISCHARGE

No supplement to Form 200 needed.

PART III. LOCATION OF THE FACILITY

See **Figure 1**, below.

PART IV. REASON FOR FILING

No supplement to Form 200 needed.

PART V: CEQA

No supplement to Form 200 needed.

PART VI. OTHER REQUIRED INFORMATION

This section addresses characterization of stormwater discharges from the Municipal Separate Storm Sewer Systems (MS4s) located within Contra Costa County. Design and actual flows are briefly discussed, followed by a list of constituents and the characteristic discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description of treatment processes, a description of Best Management Practices (BMPs) used, and a description of disposal methods.

Additionally, information is provided for actions required of East County Permittees (the Cities of Brentwood, Antioch, Oakley, and portions of unincorporated County and the Flood Control District) that result from Central Valley Water Board policies, including TMDLs. While municipalities in eastern Contra Costa County fall within the geographic jurisdiction of the Central Valley Regional Water Board, both Region 2 and Region 5 agreed to regulate all stormwater discharges from Contra Costa municipalities under MRP 2.0 and the MRP was amended.

Where appropriate, based on our learnings and experience from implementing MRP 2.0, we have provided suggestions for developing MRP 3.0 permit language

Figure 1, below, shows the creeks and drainages in Contra Costa County.

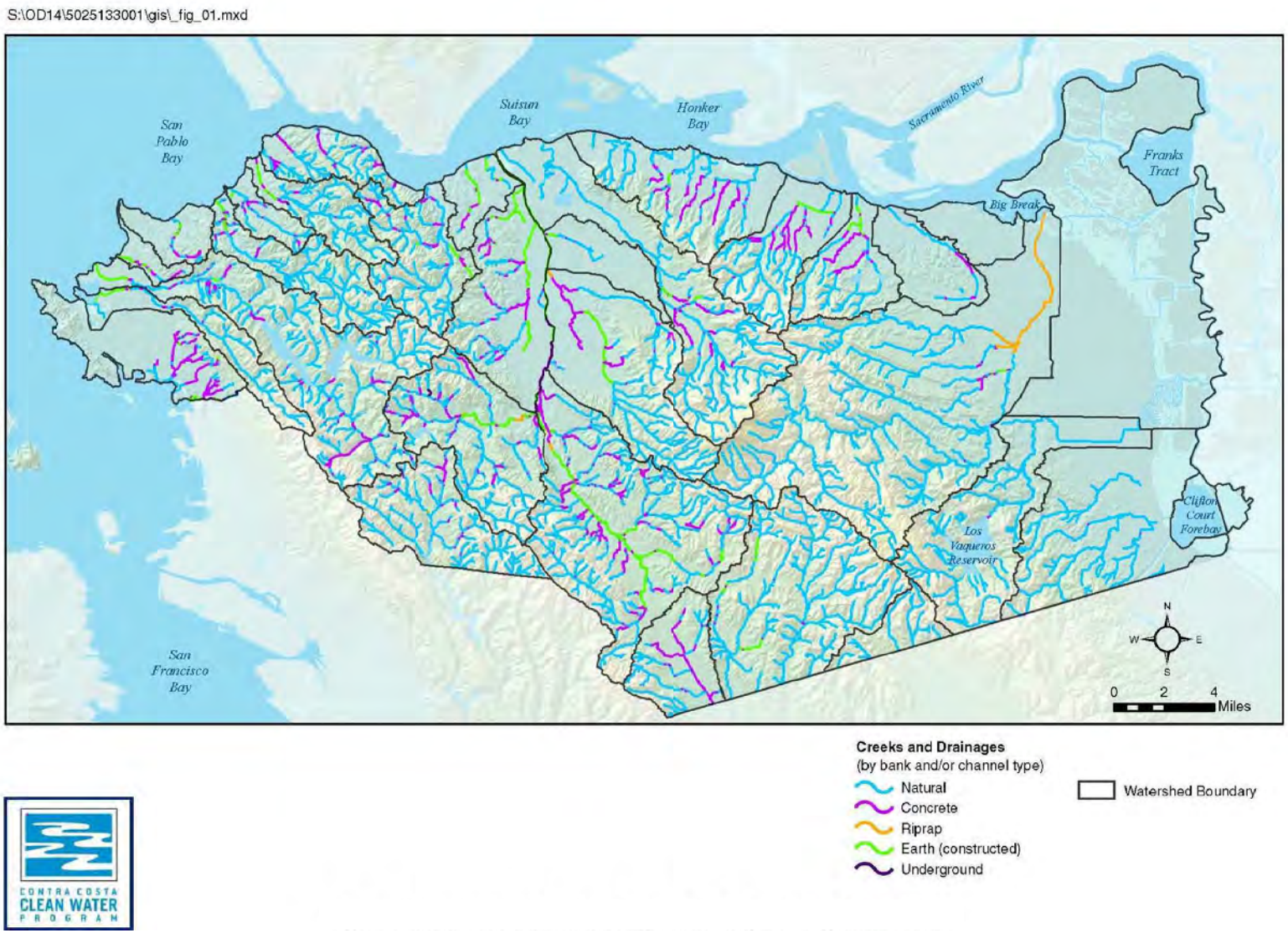

FIGURE 1: CONTRA COSTA CLEAN WATER PROGRAM SITE MAP SHOWING SURFACE WATER

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1.0 DESIGN AND ACTUAL FLOWS

Municipal Separate Storm Sewer Systems (MS4s) in Contra Costa County are designed to convey storm flows to surface water while minimizing flood risk to life and property. Generally, design standards address large events (i.e., 10-year events up to 100-year events, depending on the value of assets at risk). Watershed flows have been modeled using the rational method, or other methods, which uses runoff coefficients to account for slope, vegetative cover, and land use. Actual flows are measured in tributary creeks using standardized flow monitoring techniques. Because of the variable nature of storm events and the multitude of conveyances, specific details on design vs. actual stormwater discharge flows are beyond the intent and scope of this Report of Waste Discharge.

2.0 CONSTITUENTS AND CHARACTERISTIC DISCHARGE CONCENTRATIONS

Table 2 below lists the constituents that are typically present in Contra Costa County creeks and in MS4 discharges, the maximum discharge concentrations recorded to date, and some of the factors affecting discharge concentrations in urban stormwater.

TABLE 2: LIST OF CONSTITUENTS AND CHARACTERISTIC CONCENTRATIONS

Pollutant	Maximum Concentration Observed in Bay Area Urban Creeks	Maximum Concentration Reported in Urban Stormwater	Some of the Factors Affecting Concentrations in Urban Stormwater
Suspended sediment (mg/L)	1,000 [a]	100 [a]	Slope, vegetative cover, land use activities, peak channel velocity, erosion control BMPs, street sweeping, channel composition, local geology
Mercury (ng/L)	1,000 [c]	120 [c]	Suspended sediment concentrations; mercury concentrations in suspended sediments, atmospheric deposition, mining legacy sources
Methylmercury [c] (ng/L)	1 [c]	1 [c]	Suspended sediment concentrations; methylmercury concentrations in suspended sediments; slow moving or stagnant waters that promote growth of bacteria that create methylmercury from mercury
Polychlorinated biphenyls (PCBs) (ng/L)	60 [a]	448 [a]	Suspended sediment concentrations; PCB concentrations in suspended sediments; trackout and wind dispersion from contemporary source areas (e.g. metal recyclers); trackout or discharge from legacy source areas

TABLE 2: LIST OF CONSTITUENTS AND CHARACTERISTIC CONCENTRATIONS

Pollutant	Maximum Concentration Observed in Bay Area Urban Creeks	Maximum Concentration Reported in Urban Stormwater	Some of the Factors Affecting Concentrations in Urban Stormwater
Trash	See Long-Term Trash Plans; Receiving Water Trash Monitoring Report	Not applicable	Proximity to high trash-generation areas, implementation of full trash capture devices or programmatic equivalent
Legacy pesticides, e.g.: diazinon chlorpyrifos	Not detected since 2009 [e]. <1.5 ng/L <2 ng/L	Not available	Product re-registration eliminating use by non-professional has been effective in eliminating exceedances of the water quality objective
Contemporary pesticides, e.g.: pyrethroids carbaryls neonicotinoids	254 ng/L [f]	Not available	Consumer and professional use
Total copper Dissolved copper (µg/L)	20 µg/L [a]	47 [a]	Untreated roadway runoff
Fecal coliform Enterococcus Total coliform (mpn/100 ml)	14,000 2,400 14,000	Not available	People and domestic and wild animals that live outdoors or in motor homes. Growth in shaded / stagnant waters. Septic leaks and sewage spills.

East County Permittees (Cities of Brentwood, Antioch, and Oakley, and portions of unincorporated County and the Flood Control District), are located in the Jurisdiction of the Central Valley Regional Water Quality Control Board. TMDL's from the Central Valley that name East County Permittees currently address mercury, methylmercury, pyrethroid pesticides, diazinon, and chlorpyrifos.

Table 2 Notes

a. Contra Costa County receiving water and MS4 monitoring as reported in Gilbreath et al. (2014) and Gilbreath et al. (2019)
b. Mercury and methylmercury in Contra Costa County creeks and urban runoff as reported by CCCWP (2018)
c. Receiving water monitoring as graphically summarized in permittee trash plans
d. Pesticide monitoring in Contra Costa County creeks as reported by CCCWP (2014, 2020b).
e. Pesticide monitoring in Contra Costa County Creeks as compiled and reported by CCCWP (2020b).
f. Pathogen indicator monitoring in Contra Costa County Creeks as reported by CCCWP (2014, 2020c)

3.0 OTHER APPROPRIATE WASTE DISCHARGE CHARACTERISTICS

A robust monitoring program helps define stormwater discharge characteristics. This section describes Contra Costa Clean Water Program (CCCWP) monitoring as it informs re-issuance of the MRP. Outcomes relevant to managing constituents listed in **Table 2** help understand what is working well and what specific provisions in the MRP could be improved.

CCCWP gathers and reports monitoring data to help permittees assess receiving water quality and inform management actions that help to ameliorate impacts of urban runoff on receiving waters. Each five-year permit term, monitoring results are integrated and analyzed to inform adaptations and improvements to the monitoring program and management actions to improve water quality (CCCWP, 2014; CCCWP, 2020d). Monitoring covers three broad areas of concern:

- Creek Status monitoring via:
    - regional/probabilistic sampling to characterize creek health using bioassessment, water quality, and physical habitat assessments (regional creek status); and
    - local/targeted monitoring of creek health using continuous monitoring of temperature, dissolved oxygen, pH, and conductivity, plus grab sampling
- Pesticides and toxicity monitoring to assess the effects of urban use pesticides on creek health
- Pollutants of concern monitoring to guide control measures for pollutants subject to total maximum daily loads (TMDLS) and assess potential impairment by other pollutants

When creek status or pesticide toxicity monitoring indicates potential problems, stressor source identification (SSID) studies may be carried out to identify causes and recommend solutions where possible.

Outcomes of CCCWP's monitoring programs relevant to permit development are briefly summarized below.

3.1 Creek Status Monitoring (Provision C.8.d)

Contra Costa County residents and the permittees representing them have monitored the health of creek status using bioassessment since 2001. The monitoring program was launched in 2001 under the leadership from the Contra Costa County Community Development Department (CDD) and carried out through the efforts of community-based creek interest groups (CDD, 2003). The time frame and CDD leadership of this early monitoring program reflected the vision and leadership of the then-nascent Contra Costa Watershed Forum[1].

CCCWP provided funding support for bioassessment work during the initial years and took on leadership of the bioassessment monitoring program when it became a Municipal Regional Permit (MRP) requirement in 2009. A summary of bioassessment monitoring from 2001 – 2009 found that creek health was affected by degree of urbanization. In general, stream reaches with higher proportions of surrounding urbanized land use had poorer metrics of biological condition compared to stream reaches draining more open space watersheds (CCCWP, 2010b).

[1] The mission of the Contra Costa Watershed Forum is to identify common principles among parties involved in creek and watershed issues and promote actions that transform these principles into multi-objective enhancements of creeks and watersheds throughout the County. The history, membership, and context of the Contra Costa Watershed Forum is available at http://cocowaterweb.org/history/.

During MRP 1.0 and MRP 2.0 the bioassessment program was modified to implement a randomized stratified sampling design. This shifted the focus away from targeted stream reaches, often prioritized in part by the interest of community creek groups, and towards a regional assessment of urban creek health. Working collaboratively with BASMAA peers, CCCWP developed and implemented a probabilistic sampling design for Contra Costa County creeks. The first five years of bioassessment monitoring culminated in a regional summary of Bay Area creek health (BASMAA, 2019a). CCCWP updated the five-year data set with the past two years of bioassessment monitoring in its most recent Integrated Monitoring Report (CCCWP, 2020d). The end result is a regional data set representing urban creek health that can be statistically analyzed to understand how physical and water quality factors affect creek health.

The evidence shows that aquatic life beneficial uses of wildlife habitat (WILD), warm water fisheries habitat (WARM), and cold-water fisheries habitat (COLD) are attained to varying degrees in Contra Costa County streams. A variety of physical habitat, climatic (rainfall), and watershed/land use factors lead to some areas where beneficial uses are not fully supported.

Concurrently with bioassessment monitoring, CCCWP has monitored creek water quality using continuous monitoring of temperature, pH, dissolved oxygen, and turbidity (CCCWP, 2014, Appendix A.2; CCCWP, 2020c, Appendix 2). Notably low dissolved oxygen in Marsh Creek led to the completion of a successful stressor source identification study conducted from 2018 – 2019 (CCCWP, 2020c, Appendix 3C).

CCCWP permittees and community members are engaged in the planning and implementation of stream stewardship and restoration projects[2]. The Contra Costa Watershed Atlas (CDD, 2003) documents locations of valuable stream resources and potential project areas with superimposed land use, topographic, and jurisdictional information. More recently, the Contra Costa County Stormwater Resources Plan (CCCWP, 2020a) was developed to help permittees build stormwater management projects and programs that value stormwater as a resource. Thus, the Contra Costa permittee's response to the findings of bioassessment monitoring is to continue supporting community efforts to fund and implement stream stewardship and stormwater management projects.

In summary, CCCWP's well-developed Creek Status monitoring program shows responsible monitoring and reporting on the health of Contra Costa County streams. Creek status monitoring can support community actions to protect and improve creek health by establishing baseline conditions and evaluating effectiveness. Creek status monitoring funded by CCCWP permittees is also potentially usable as match for State and Federal grant funding for permittee projects identified in the Storm Water Resource Plan (SWRP).

Relevant to the re-issuance of MRP 3.0, the Permittees request:

- **No increase in monitoring costs, inclusive of any new monitoring requirements in MRP 3 (i.e. C.10, C.11/12, any new provisions, etc.).**

[2] Recent notable examples include the lower Walnut Creek Restoration project, the Three Creeks Parkway project, and the Wildcat Creek Restoration and Greenway Trail Project.

- **Allow a targeted approach for creek status monitoring, with time to develop thoughtful workplans in year 1, allowing flexibility for designating monitoring resources to answer meaningful Management Questions relevant to watersheds of interest.**

3.2 Pesticides and Toxicity Monitoring (Provision C.8.g)

Pesticide and toxicity monitoring helps identify problems and propose corrective measures to pesticide impacts on aquatic life. In the past, monitoring detections of diazinon and chlorpyrifos associated with toxic effects eventually led to a statewide change in regulations that limited the consumer use of those pesticides. As a result, numeric water quality objectives for diazinon and chlorpyrifos are consistently attained in the creeks monitored by CCCWP in water years 2012-2019.

Although CCCWP continues to promote integrated pest management (IPM) and financially supports statewide initiatives to lobby for more stringent controls on pesticide usage. The latter is demonstrably the most effective means of abating pesticide toxicity. Owing to current allowed uses, narrative water quality objectives for “no toxic substances in toxic amounts” are not consistently attained. Toxicity in sediments was observed in seven of the 12 assessments of the sediment quality triad performed in Contra Costa County (CCCWP 2020b, Appendix 1; CCCWP 2014). Chemical analysis shows pyrethroid pesticides are present at concentrations high enough to cause observed toxicity. A follow-up stressor source identification study (CCCWP, 2014) established links between observed toxicity and pyrethroid pesticides, which emerged to replace diazinon and chlorpyrifos.

As evidenced by lessons learned from diazinon and chlorpyrifos, monitoring evidence can be used by regulatory agencies to establish meaningful control programs that make a difference. Data from CCCWP, other Bay Area stormwater programs, and statewide efforts help build a record to support future regulatory controls of pesticides that have emerged to replace diazinon and chlorpyrifos.

3.3 Stressor / Source Identification Studies (Provision C.8.e)

Monitoring results exceeding thresholds of concern can trigger SSID studies to determine potential causes and corrective actions. CCCWP conducted two SSID studies in MRP 1.0 (CCCWP, 2017a, Appendix 1; CCCWP, 2014). One was located in Grayson Creek, a tributary to Walnut Creek, within the jurisdiction of the San Francisco Bay Regional Water Board. The second was located in Dry Creek, a tributary to Marsh Creek located within the jurisdiction of the Central Valley Regional Water Board. Both creeks showed toxicity to benthic amphipods (*Hyalella azteca*). The experimental design addressed pesticide toxicity as an issue of regional significance, satisfying the MRP 1.0 requirement for all BASMAA RMC members for at least two pesticide / toxicity SSID studies during MRP 1.0.

Walnut Creek and Marsh Creek watersheds are the largest and second largest watersheds in Contra Costa County. Thus, in addition to helping the regional collaboration, the approach also addressed an issue in two significant Contra Costa County watersheds, and efficiently met the monitoring requirements of the two separate NPDES permits that at the time applied to East and West Contra Costa County.

During MRP 2.0, recurrent (dating back to 2005) fish mortality in Marsh Creek was investigated using continuous water quality monitoring (CCCWP, 2020c, Appendix 3C). The SSID study found that episodes of lethally low dissolved oxygen are caused by a convergence of three conditions:

1) Daily photosynthetic oscillations;
2) Reduced summertime dry weather flows; and
3) First flush inputs of biochemical oxygen demand.

The observation led to a successful pilot project to evaluate the potential of flow augmentation to ameliorate low dissolved oxygen. Local permittees (City of Brentwood and the Contra Costa County Flood Control and Water Conservation District) have now partnered with CCCWP to continue evaluating flow augmentation as a pilot project. The pivot to Permittee implementation marks the end of a CCCWP-led SSID study required for MRP 2.0.

CCCWP's second SSID study requirement was met through participation in a regional SSID study to address PCBs in oil filled electrical equipment as a regionwide source to stormwater. The goal of the project was to understand the current inventory of PCBs in oil-filled electrical equipment belonging to power companies, the potential for accidents and spills to release PCBs to city streets and ultimately storm drains, and current practices for cleaning up and documenting spills. The project will be completed during MRP 2.0 using municipal power companies as a model to a framework for power companies to describe their enhanced spill response BMPs, and for stormwater programs to credit implementation of the enhanced BMPs as a PCB load reduction. Lessons learned will be used to assist the Regional Water Board in applying the framework to Pacific Gas and Electric Company (PG&E) during MRP 3.0 and subsequent permit terms.

Relevant to the re-issuance of MRP 3.0, the Permittees request:

- **With this ROWD submittal, CCCWP requests that SSID studies conducted by CCCWP and BASMAA during MRP 1.0 and MRP 2.0 be acknowledged as complete, and that in the future Executive Officer approval is not explicitly required for completing a project.**

3.4 Pollutant of Concern Monitoring (Provision C.8.f)

CCCWP's approach to Pollutants of Concern (POC) monitoring addresses Source Identification, Contributions to Bay Impairment, Management Action Effectiveness, Loads and Status, and Trends.

Source identification studies primarily address PCBs, although useful land-use data on mercury and sediment loads has also been developed. Source identification for PCBs focuses on old industrial areas of the county, located mostly within Richmond, San Pablo, Pittsburg, and unincorporated County. The approach is a combination of desktop reconnaissance, inspection, and monitoring to identify potential sources such as former cleanup sites that may still be ongoing sources to the MS4, or sites where current or former business activities may involve materials containing PCBs that can be released to the MS4.

Since 2001, CCCWP has conducted source area assessments to delineate high interest parcels and areas for consideration of property referrals and focused implementation planning for PCBs and mercury load reductions. During MRP 1.0 and MRP 2.0 CCCWP applied a substantial portion

of its required number of PCB samples to source property investigations, referrals, and follow-ups, to good effect. During MRP 3.0, CCCWP anticipates committing the same level of annual effort to POC monitoring, including monitoring for PCBs and mercury to answer information needs related to control measures in the programmatic approach designed with input from Regional Water Board (i.e. source area screening, BMP effectiveness for O&M, etc.).

Calling the source property investigation program "complete" depends on the level of rigor needed to prove the negative finding that no more substantial source property referrals exist. CCCWP believes that the current level of investigation has been sufficient, and that any future discoveries and referrals will yield diminishing returns. Some additional PCB monitoring is warranted, but the resources expended should be balanced against the expected returns and other monitoring needs.

CCCWP funded the monitoring and reporting for a hard-piped stormwater diversion project from the North Richmond Stormwater Pump Station (NRSPS) into the West County Wastewater District (WCWD). This complex, multi-year, multi-jurisdictional pilot test leveraged a capital project to rehabilitate the NRSPS low flow pumps. Using EPA grant funds and Permittee match from the County, Richmond, and CCCWP program funds, a permanent diversion pump and valve system was constructed to allow diversion of first flush and dry weather flows to WCWD for treatment. The PCB loads reduced were disappointingly small, owing to:

- Capacity limitations of the WCWD conveyance system
- Relatively low suspended solids concentrations in the diverted stormwater
- Relatively low PCB/ solids ratios in diverted stormwater

The lesson learned from the stormwater diversion pilot projects conducted by CCCWP and other BASMAA members is that stormwater harvest using sanitary sewage systems would be done for water resources reasons as opportunities allow, taking PCB and mercury removal as added benefits. The cost and complexity of retrofitting diversions of separate storm sewer systems into sanitary sewers for conveyance and treatment is disproportionately high compared to the PCB and mercury loads achieved in the pilot diversion studies.

CCCWP has supported and participated in BASMAA regional projects to evaluate and document the effectiveness of PCB control measures. During MRP 1.0, the grant-funded BASMAA Clean Watersheds for a Clean Bay (CW4CB) program conducted pilot studies to assess the effectiveness of enhanced street sweeping, treatment by green infrastructure as well as more conventional hydrodynamic separators and sand filters (BASMAA, 2017a). Protocols for source property investigation developed, field-tested and formalized through CW4CB continue to be implemented to advance the source property referral/ self-abatement program.

During MRP 2.0, CCCWP funded additional BASMAA effectiveness evaluations: enhanced bioretention media filters (CCCWP 2020, Appendix 4A) and hydrodynamic trash separators (CCCWP, 2020, Appendix 4B). The PCBs in Infrastructure Caulk Project report (BASMAA, 2018) was submitted in the CCCWP fiscal year 2017/18 annual report as Attachment 12.3. CCCWP funded BASMAA monitoring and program development projects that ultimately led to the establishment of the PCBs in building demolition program (BASMAA 2019b).

All of the data and lessons learned from the monitoring activities and projects conducted by CCCWP monitoring activities, BASMAA and other Bay Area stormwater programs have been compiled into a regional PCB Source Control Loads Accounting Report (BASMAA, 2020a). This report is the formal translation of activities in a programmatic PCB control measures plan to PCB loads reduced or avoided in urban stormwater discharges.

CCCWP implemented a methylmercury control study beginning in 2012 to fulfill requirements of the Central Valley Permit (C.11.l). A final report was submitted in October 2018. The study found that methylmercury tends to vary with suspended solids concentrations; methylmercury/ suspended sediment ratios in samples monitoring were generally at expected background levels. The findings of this report were used to develop an implementation strategy to comply with the Delta Methylmercury TMDL. CCCWP generally aligns mercury monitoring projects to address the TMDLs issued by the San Francisco Bay Regional Water Board and the Central Valley Regional Water Board.

CCCWP's monitoring data on nutrients helps validate assumptions used to model stormwater loads to the Bay (Novick and Senn, 2014). Copper monitoring showed that copper/ particle ratios in the urban land use monitored was elevated compared to the more open space/ agricultural land use. That spatial pattern would be consistent with copper in brake pads and other urban sources.

Relevant to the re-issuance of MRP 3.0, the Permittees request:

- **No increase in monitoring costs, inclusive of any new monitoring requirements in MRP 3 (i.e. C.10, C.11/12, any new provisions, etc.) as the program already commits a third ($1 million) of its annual budget to monitoring.**
- **Request to eliminate probabilistic driven monitoring and move to targeted, project level monitoring.**
- **No new "materials characterization" requirements, (e.g. PCBs in infrastructure caulk, MRP 2.0 Provision C.12.e). Any further study of PCBs in construction materials and development of specifications for handling the material should be led by the Caltrans.**
- **Eliminate the stand-alone Pollutant of Concern (C.8.h.iv) report, currently due in October annually, and instead include the C.8 POC monitoring information (i.e. data, accomplishments and allocations for the following year) in the Urban Creeks/Integrated Monitoring Reports, due in March annually.**

3.6 Trash Monitoring (C.10.b.v)

Provision C.10.b.v of MRP 2.0 required Permittees to develop and test a receiving water trash monitoring program plan. The Bay Area Stormwater Management Agencies Association (BASMAA) submitted a Final Trash Monitoring Plan, that addressed all comments received by Regional Water Board staff, in October 2017 (BASMAA, 2017b). Implementation of the Trash Monitoring Plan, initiated in October 2017, represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were evaluated in the field between October 2017 to July 2020.

The specific goals of the Trash Monitoring Plan, developed through the stakeholder engagement process, include:

- Informs management decisions;
- Accounts for different stream and channel types, and considers temporal variability (e.g., to estimate baseline conditions and show change over time) and seasonality;
- Can assess trends over time;
- Helps to assess if the Permittees' trash reduction efforts are resulting in improvement;
- Allows for comparison of trash levels between sites (understand the range of levels of impact);
- Assists in determining relative contributions from different pathways (i.e., wind, illegal dumping, illegal encampments, MS4s);
- Leverages and exhibits consistency with existing monitoring efforts and other water quality monitoring programs, including direct discharge offset provisions (MRP Provision C.10.e); and
- Cost-effective, efficient and feasible (e.g., safe, access to sample locations, can be implemented by volunteer monitoring groups).
- Project goals were used to guide the development of scientific monitoring questions that informed the study design and selection of methodologies used during the pilot-testing phase of the Trash Monitoring Plan.

The Trash Monitoring Plan primarily focused on two types of monitoring designs:

- Probabilistic Assessment Sites – Randomly selected monitoring sites that were previously established for BASMAA's Regional Monitoring Coalition (RMC) Creek Status Monitoring Program. These sites are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area.

- Targeted Monitoring Sites – Selected sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. Includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Standard Operating Procedures (SOPs) and associated field forms (Version 1.0) for conducting qualitative visual trash assessments and quantitative trash monitoring were developed as part of the Trash Monitoring Plan (BASMAA, 2017b). Regionally, a total of 125 urban creek, channel and riverine probabilistic sites were selected and qualitatively assessed for trash. Qualitative visual trash assessments were conducted at a total of 30 probabilistic sites in Alameda, Contra Costa, Santa Clara and San Mateo Counties, and 5 sites in Solano County. A total of five quantitative assessment events were planned at the probabilistic sites during the pilot testing phase of the Trash Monitoring Plan (October 2017 - March 2020).

Key findings from the pilot-testing phase of the Trash Monitoring Plan (BASMAA, 2020b) include:

1. Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both regional and countywide scale. The visual

assessment tool is recommended as a valid approach to assess trash conditions for most creeks/channel sites.

2. Regionwide, approximately 77% of the urban stream lengths in the MRP Area exhibit low to moderate levels of trash.
3. Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
4. Seasonality appears to have little to moderate effects on trash levels observed/measured at receiving water sites. Storm intensity and frequency does appear to have an influence on trash levels observed during the wet season.
5. Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with largest proportion of trash observed.

Relevant to the re-issuance of MRP 3.0, the Permittees request:

- **Eliminate any further required trash receiving water monitoring program. A qualitative visual assessment can be conducted during routine creek monitoring, or on a targeted basis to identify management action needed at problem locations.**

4.0 DESCRIPTION OF STORMWATER TREATMENT PROCESSES

All stormwater treatment systems are documented for maintenance and inspection of proper functioning. Low Impact Development (LID) and full trash capture devices are the most common stormwater treatment systems employed in Contra Costa County. LID is required on most regulated new and redevelopment projects per Provision C.3. Tree-box-type high flowrate biofilters and vault-based high flowrate media filters are used less frequently and where allowed.

Low Impact Development (LID) infiltrates a portion of runoff flows and treats remaining runoff by slow percolation through a biologically active matrix of soil and plant roots. LID is the preferred method of stormwater quality management in Contra Costa County. Schematics and descriptions of LID designs and facilities are presented in the Contra Costa Clean Water Program's *Stormwater C.3 Guidebook*, 7th Edition (CCCWP, 2017b).

Full Trash Capture Devices are designed to trap all particles retained by a 5 mm mesh screen and have a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour storm in the sub-drainage area.

Tree-box-type high flowrate biofilters and vault-based high flowrate media filters are allowable treatment systems on certain smart growth, high density, and transit-oriented developments per Provision C.3.e.ii., where it is infeasible to treat all runoff with bioretention.

5.0 BEST MANAGEMENT PRACTICES USED

Permittees of the CCCWP implement the following Best Management Practices (BMPs) to minimize pollutants in urban runoff discharges. Section 5.1 below describes BMPs used to

address many of the pollutants listed in Table 2. Section 5.2 describes BMPs addressing TMDL POCs (mercury and PCBs) that constitute a programmatic approach to TMDL implementation.

5.1 General Pollutant Control BMPs

Source Control stops or reduces pollutant discharges by eliminating them from uses where they may be discharged into the MS4. Examples include ordinances banning plastic bags or polystyrene, which have been adopted by some Permittees to address trash reduction. Re-registration by USEPA of diazinon and chlorpyrifos to limit use to registered professional applications may account for the notable absence of toxicity to water fleas reported in the CCCWP Integrated Monitoring Report, Part A, Appendix A.1 (ARC, 2014). CCCWP's MRP 1.0 stressor source identification study evaluated whether toxicity to amphipods is caused by current-use of pyrethroids; if so, responsive actions included promoting similar product re-registration efforts for those pesticides.

Source Property Referral to the Regional Water Board or other appropriate authorities where individual parcels are known or suspected to be pollutant sources and where successful enforcement is beyond the capabilities or resources of the local municipal government.

Prohibition of non-stormwater discharges into the MS4 is established by ordinance in each Permittee's jurisdiction.

Illicit Discharge Detection and Elimination programs implement prohibitions by providing an active program of surveillance and response to complaints.

Public Education and Outreach communications and events to raise public awareness and change behaviors that can affect water quality.

Inspection of businesses and construction sites provides oversight of compliance with required guidelines for housekeeping and pollution prevention.

Enforcement provides Permittees with legal authority to correct egregious or recurrent ordinance violations.

Diversion of urban runoff discharges into sanitary sewers can be effective for businesses and/or construction sites, depending on the case. Pilot tests of diverting dry-weather and first-flush stormwater have been evaluated but have not shown promising results as a sustainable BMP for TMDL pollutants.

5.2 Mobile Surface Cleaners

With regards to oversight of mobile cleaning businesses, CCCWP relies on the Bay Area Stormwater Management Agencies Association and CCCWP guidance (http://basmaa.org/Training, https://www.cccleanwater.org/business). An update on control of mobile sources as well as an inventory of mobile businesses was included in the 2019 Annual Report.

5.3 BMPs for TMDL Pollutants (Mercury and PCBs)

CCCWP Permittees have worked diligently with peer stormwater programs through the Bay Area Stormwater Management Agencies Association (BASMAA) to define the actions and quantifiable benefits of PCB and mercury control measures. These actions are discussed below and the Fiscal

Year 2019/20 Annual Report and final work products (*TMDL Implementation Report; BASMAA Source Control Loads Reduction Accounting for Reasonable Assurance Analysis (RAA) Report*) will further discuss the benefits of these actions.

PCBs in Building Materials Management. Most permittees[3] have adopted ordinances requiring that building permits for demolishing certain structures be conditioned on completion of an inspection and, as needed, removal action for caulk found to have PCBs exceeding 50 parts per million. Municipal plan checkers will continue to implement the ordinance, including training and periodic evaluation of how procedures can be improved. Municipal stormwater representatives will be asked by CCCWP annually to provide a summary of applicable permit applications and the results of any investigations triggered (to be included in Annual Report). Contractors and their project owners will be responsible for inspecting, testing, removing, and documenting compliance with the ordinances.

The ability to implement this action is generally understood and accepted, as evidenced by successful development of the model ordinance language by BASMAA in partnership with building industry representatives and regulatory agencies. The amount of PCB-containing caulk removed prior to demolition is being documented through the annual reporting requirement. PCB loads prevented from entering the MS4 system are estimated based on assumptions about 1) the number of applicable buildings demolished per year; 2) the PCBs removed per building; and 3) the fraction of PCBs in a building that would have reached the MS4 system but for prior inspection and removal. The first two assumptions are verifiable. The third assumption, the fraction of PCBs reaching the MS4 without prior removal is difficult to verify.

A desirable outcome in MRP 3.0 is a programmatic approach that stipulates a load reduction for this activity and does not create substantial new study requirements. More studies are not needed to implement the ordinance. Beyond compiling and analyzing data for materials removed, it may be difficult to improve estimates of building materials lost to the MS4 system during a building demolition absent the inspection and removal requirements.

Source Property Identification and Abatement. Permittees with old industrial areas have conducted source area investigations that, in some cases, revealed ongoing sources of PCB-contaminated sediments to adjacent streets and/ or the MS4 system. Conveying this information to the property owner and the Regional Water Board has led to follow-up investigations and abatement actions at some of the referred properties. CCCWP will continue to support Permittee investigations until all remaining old industrial areas have been screened. At a reasonable level of effort, comparable to prior permit cycles, screening and follow up assessment could be completed for old industrial areas by the year 2040.

Referral to the Regional Water Board for enforcement or self-abatements are credited based on the size of the source property (in acres). CCCWP's near-term projections for this control measure are based on knowledge of potential source property referrals. Long-term prospects for identifying

[3] The City of Clayton sought and received an exemption from the ordinance requirement in the MRP based on demonstrating that all structures within its borders are either single family homes, wood-frame construction, or were built after 1980.

any new source properties are unknown and therefore the potential load reduction benefit of this action is assumed to be low after known source properties are referred or self-abated.

Enhanced Operations and Maintenance (O&M).

Routine MS4 O&M activities conducted by Permittees include street sweeping and drain inlet cleaning. In addition, storm drains, culverts, and channels are maintained as needed (i.e., desilted when needed to remove excessive quantities of accumulated sediment that may be causing localized flooding issues). Infrequent capital improvement projects may also remove accumulated sediment from the MS4, such as storm drain repairs or channel stabilization projects. Each of these O&M activities removes PCBs and mercury that are present in the sediment that is removed.

"Enhanced" O&M means increasing the frequency and/ or efficiency of the activities. As noted above, enhanced O&M control measures are implemented as part of the Source Property Identification and Abatement Program for referred source properties. Additional Enhanced O&M measures will be considered for Old Industrial source areas with observed elevated concentrations of PCBs if the source area investigation does not identify a specific source property and the source is suspected to be historically deposited sediment in the public right of way or the storm drain system. Permittees can also choose to implement enhanced O&M opportunistically or strategically to achieve additional PCB load reductions; most often this would be in association with other needs, such as channel maintenance or MS4 inspection and improvement.

PCBs in Electrical Utilities Management. This program will improve the spill response and reporting related to spills and accidental releases from oil-filled electrical equipment. It will be implemented as a regional project collaboratively between BASMAA member programs. By working first with the municipally-owned utilities, the project will deliver a set of guidelines for improved spill response and spill response tracking. This guidance will then be conveyed to the Water Board to help them set expectations for non-municipally owned power utilities, (Pacific Gas and Electric).

This control measure will provide a systematic way for Permittees to document and track the widely distributed potential source. Existing and enhanced practices by Permittee-owned power companies will set the bar for spill cleanup and reporting by PG&E. The program will also address the gap between hazardous waste cleanup levels and more stringent TMDL goals for PCBs in sediments conveyed by the MS4 system to the Bay. As with the PCBs in building materials management program described above, there is little uncertainty that spill response practices and documentation can be improved; similarly the numeric benefit of those improvements will also be difficult to prove precisely.

PCBs in Infrastructure. This control measure builds on lessons learned from the building materials management program. During MRP 2.0 a study of PCBs in caulk present in common infrastructure (e.g., bridges, storm drains, sidewalks, roads) showed elevated concentrations in expansion joints of bridges and overpasses. For this control measure, CCCWP and Permittees assume that the California Department of Transportation will develop contract specifications and special provisions guiding the inspection and removal of PCB-containing material from bridges prior to demolition or major rehabilitation projects that would expose PCB-containing caulk.

CCCWP Permittees would inventory bridges in their jurisdictions, and track maintenance/ rehabilitation projects. This inventory would be the basis for Permittees to include in their Annual Reports documentation that demolition/ rehabilitation projects followed approved Caltrans contract specifications and special provisions for inspection and removing PCB-containing caulk. As with the building demolition program, documenting the amounts of caulk removed, and the concentrations of material removed, is relatively straightforward. Proving with great certainty how much of that material would have reached the Bay but for the interventions may not be achievable to any greater degree than already accomplished.

Green Stormwater Infrastructure. Green stormwater infrastructure (GI) refers to constructing and retrofitting storm drainage systems to mimic natural processes by enabling stormwater to infiltrate into the soil rather than to runoff directly into storm drains. This includes implementation of green infrastructure in new development and redevelopment projects on private and public properties regulated by MRP Provision C.3, as well as retrofit of existing infrastructure in public right-of-way areas and on public properties not subject to Provision C.3.

Green infrastructure reduces runoff volumes, disperses runoff to vegetated areas, harvests and uses runoff where feasible, promotes infiltration and evapotranspiration, and uses bioretention and other natural treatment control systems to detain and treat runoff before it reaches tributary creeks and, ultimately, San Francisco Bay. Green infrastructure treatment control measures include, for example, pervious pavement, infiltration basins, bioretention facilities, green roofs, and rainwater harvesting systems. These processes reduce PCB loads by reducing the PCB concentrations in stormwater (where they are relatively high) and reducing stormwater discharge volumes.

Permittees track C.3 project implementation in an ArcGIS Online (AGOL) database. CCCWP developed the countywide GIS database to assist with reporting relevant municipal stormwater program data and information related to MRP Provision C.3, Provision C.10 (i.e., trash load reduction activities), and Provisions C.11/C.12 (i.e., mercury and PCBs TMDL implementation activities).

Full Trash Capture Treatment Control Measures. Full trash capture devices designed to traps solids greater than 5 millimeters also remove some sediments. In old industrial areas where sediment PCB concentrations are elevated, this provides some PCB load reduction benefit. Efficiency factors have been developed by BASMAA to estimate the PCB load reduction benefit of full trash capture. Permittees track full trash capture implementation in AGOL, and CCCWP summarizes PCB loads reduced based on these AGOL inputs.

Diversion to POTW. As part of MRP 1.0, Permittees implemented a pilot stormwater diversion from a stormwater pump station to a sanitary sewage treatment plant. The resulting PCB loads reduced were small, because the PCB concentrations in sediments captured was moderate to low, the suspended sediments were low, and the volume of stormwater that could be diverted was limited by conveyance and treatment capacity. The pump station investigated is the only Permittee-owned stormwater pump station in Contra Costa County within the PCB TMDL area. This kind of direct stormwater harvest and use project could have some potential for water resource development in the long-term but is not viable for achieving PCB TMDL goals.

6.0 DESCRIPTION OF DISPOSAL METHODS

Stormwater ultimately flows from the MS4 either into creeks that flow into San Francisco Bay and the Sacramento San Joaquin River Delta, or directly into the Bay and Delta.

PART VII. OTHER

The CCCWP implements a coordinated countywide program of water quality control within the jurisdiction of both the San Francisco Bay Regional Water Quality Control Board (Region 2) and the Central Valley Bay Regional Water Quality Control Board (Region 5). The requirements of the program in Region 2 are established by the Municipal Regional Stormwater NPDES Permit (MRP) Order No. R2-2015-0049. While municipalities in eastern Contra Costa County fall within the geographic jurisdiction of the Central Valley Regional Water Board, both Region 2 and Region 5 agreed to regulate all stormwater discharges from Contra Costa municipalities under the MRP and as of February 2019 (Order No. R2-2019-0004), the MRP was amended. Based on the experiences of implementing the provisions of the MRP, the Permittees have gained insight into its workings that are of value in the reissuance of the next MRP. Additionally, CCCWP continues to participate in regional workgroups surrounding important issues such as homelessness, bacteria, and emergency firefighting activities.

Permittees' highest priority concerns and recommendations for MRP reissuance are the provisions on New Development/Green Infrastructure, Trash Load Reduction, and mercury and PCBs Load Reduction.

In the Sections below, CCCWP presents current practices, issues, priorities, and recommended updates for the highest-priority concerns.

1.0 NEW DEVELOPMENT

As new residential and commercial developments are built and older areas are redeveloped using Low Impact Development design, stormwater management via Green Infrastructure (GI) becomes more integrated into the conveyance of storm flows to the ultimate receiving waters[4].

Bay Area MS4 Permittees have led California in implementing LID design in new and redeveloped properties. This trend began with BASMAA's development and publication of *Start at the Source: Residential Site Planning & Design Guidance Manual for Stormwater Quality Protection* (BASMAA, 1997) and *Start at the Source: Design Guidance Manual for Stormwater Quality Protection* (BASMAA, 1999).

In 2003, the Regional Water Board adopted permit amendments that included hydraulic criteria to be used in the design of non-GI treatment facilities (e.g., extended detention basins, sand filters, and hydrodynamic separators). Contra Costa Permittees responded by adapting these criteria to the design of LID features such as bioretention and published these design criteria in a

[4] "Low Impact Development" is a design process as defined in MRP 2 Provision C.3.c. It is the preferred method of stormwater management in Contra Costa County. The term "Green Infrastructure" as used in Provision C.3.j has come to generically many of the constructed outcomes of the LID design process.

Stormwater C.3 Guidebook (CCCWP, 2005). The Guidebook is regularly updated to refine LID design and implementation and is now in its 7th Edition (CCCWP, 2017b).

The 2003 permit amendment also included hydromodification management requirements. Regional Water Board staff subsequently interpreted these requirements to mandate numeric criteria to be used in the design of (non-LID) flow-duration basins. Contra Costa Permittees responded by adapting their design criteria for LID features and facilities to provide equivalent hydromodification management effectiveness. In a 2006 permit amendment, the Regional Water Board adopted the non-LID flow duration design criteria and required Contra Costa Permittees to conduct extensive studies to demonstrate that LID facilities could replicate the performance of (non-LID) flow duration basins.

In the 2009 MRP, the Regional Water Board added LID criteria for stormwater treatment for new developments, while maintaining the non-LID criteria for both treatment and for hydromodification management and renewing the requirement that Contra Costa Permittees conduct studies to demonstrate the effectiveness of LID. The CCCWP completed these studies and submitted the results to the Regional Water Board in 2013.

In MRP 2.0, the Regional Water Board required Contra Costa Permittees to submit a technical report consisting of plan describing future implementation of hydromodification management requirements. The Regional Water Board also added the option of proposing the use of direct simulation of erosion potential, by which to meet the standard for hydromodification management. CCCWP submitted the technical report, which used direct simulation of erosion potential to update sizing and other criteria for LID hydromodification management facilities, in September 2017.

Also in MRP 2.0, the Regional Water Board added requirements for Green Infrastructure. Provision C.3.j.i. requires each municipal Permittee with land use permitting authority to prepare and submit a Green Infrastructure Plan. Each of the 20 such Permittees in Contra Costa submitted such a Plan on September 30, 2019. The Plans include updates to local planning policies, prioritized Green Infrastructure projects, and a process for tracking and mapping completed projects. Provision C.3.j.ii. requires Permittees to review public infrastructure projects for potential opportunities to include Green Infrastructure. CCCWP initiated the preparation of regional criteria for project review, which were distributed through BASMAA. Each Contra Costa Permittee uses the criteria to prepare an annual list of projects reviewed and Green Infrastructure opportunities identified.

In the course of implementing Green Infrastructure roads projects, Permittees have found that incorporating Green Infrastructure can significantly change the scope of a roads project due to constrained space, expansion of the project footprint to accommodate Green Infrastructure facilities, the resulting need for right-of-way acquisition, and utility conflicts. Implementing Green Infrastructure within roads right-of-way often involves trade-offs with Americans with Disabilities Act facilities, multimodal transportation (bike lanes and bus lanes), emergency access routes, and parking.

Provision C3 of MRP 2.0 defines a Regulated Project as a project that generally creates or replaces impervious surface area of 10,000 ft.², and, for some land uses, as little as 5,000 ft.². Regulated Projects must implement stormwater treatment requirements specified in Provision C3. Based on a realization of diminished return, and recognition of underlying complexity, several

types of projects were granted exemptions. One exemption applies to construction of one single-family home that is not part of a larger plan of development. This type of construction is often planned, developed, and built by small, sole-practitioner type businesses that are not versed in implementing LID compliant projects. Provision C3 includes simplified requirements and LID measures that must be implemented when constructing one single-family home.

Provision C.3 in MRP 2.0 exempts routine maintenance or repair such as roof replacement and pavement resurfacing within the existing footprint. The transportation sector is critical for the movement of goods and services throughout our communities and essential for economic stability and development. Maintenance of the transportation system is key to this vital sector and the exemption is an important element in keeping the system adequately maintained.

One of our regional planning objectives is to reduce urban sprawl and concentrate development around transit centers. MRP 2.0 recognizes the environmental benefit of "smart growth, high density or transit-oriented development" by allowing "Special Projects". These are projects where it's infeasible to treat all runoff with bio-retention or other LID methods. In these circumstances, underground media filters are used instead. This accommodation has allowed many multi-family and mixed use projects to be built around transit centers over the past several years.

In considering the New Development provisions of a reissued MS4 permit, Contra Costa Permittees note that thousands of LID facilities have been constructed and will continue to be built in the coming years under the MRP permit mandate. These facilities will be distributed throughout the urban landscape, effectively disconnecting substantial portions of overall impervious area from directly discharging from creeks and the Bay. The Permittees seek to facilitate the effective, sustainable, long-term operation and maintenance of publicly and privately owned LID facilities. The Permittees also seek to incorporate Green Infrastructure by linking multiple benefit opportunities that arise, through transportation projects, infrastructure renewal, restoration and preservation of natural lands with sources of funding.

Relevant to MRP 3.0 re-issuance, the Permittees request:

- **That Permittees be able to demonstrate local progress toward implementing their Green Infrastructure Plans by selecting and tailoring a suite of local indicators (for example, adoption of policies, documentation of processes for green infrastructure project identification and conceptual design, securing of funding streams, design and construction of initial green infrastructure projects, or other internal performance measures).**
- **Express green infrastructure implementation targets as long-term, region-wide goals recognizing that the timing of redevelopment projects and infrastructure opportunities is unpredictable and is largely outside the control of Permittees.**
- **"De-couple" green infrastructure implementation targets from mercury/PCB load reductions by removing the C.11.c and C.12.c provisions (and performance criteria tables 11.1 and 12.1, respectively) from MRP 3.0. Permittees should identify, select, and implement GI projects based on broadly defined water quality and other benefits. Tracking of PCB/mercury load reductions achieved via green infrastructure should be conducted under the relevant C.11/12 provisions.**

- **Add direct simulation of erosion potential as an allowable method of demonstrating compliance with hydromodification management (Provision C.3.g) requirements, consistent with many other California municipal stormwater NPDES permits.**
- **Maintain current project size thresholds (Provision C.3.b), which ensure that nearly all new or replaced impervious area drains to sustainable LID features.**
- **Continue to allow simplified LID measures to be implemented when constructing one single-family home (Provisions C.3.b. and C.3.i.).**
- **Leave requirements for existing streets and roads unchanged, including the exemption from C.3 requirements for rehabilitation, repair, and resurfacing of existing roadways.**
- **Continue the current allowance for on-site non-LID treatment on "Special Projects" as defined in MRP Provision C.3.e.ii, so as not to undermine critical efforts to construct high-density housing near transit.**
- **Make it easier to use of off-site LID treatment where that option is more cost-effective and environmentally beneficial (Provision C.3.e.i).**
- **Eliminate the requirement to report approvals for Regulated Projects; report new Regulated Projects in the year construction is completed.**

2.0 TRASH REDUCTION

MRP 2.0 requires Permittees to meet a goal of 100% load reduction or no adverse impact to receiving waters from trash by July 1, 2022. Compliance with interim goals (currently 80%) was demonstrated via maps showing Very High, High, Moderate, and Low trash generation areas and showing, for all except Low trash generation areas, maintenance of full trash capture (FTC) systems or a combination of management actions that provide control equivalent to FTC. Permittee Trash Load Reduction Plans identify strategies for reducing trash. The submitted reports can be found here: https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/C10/2014/Contra_Costa_County/index.html, and updates to plans are listed in Permittees annual reports each year as modifications are made to further reduce trash (https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/Annual_Reports1.html). A tabular summary of each Permittee's remaining trash management areas (TMAs) that are not yet controlled to a "Low" trash generation rate is provided as Attachment 1. The table requests information regarding how each acre of remaining moderate, high, and very high trash areas will be controlled (full trash capture device, other actions coupled with onland visual trash assessments [OVTAs], or undetermined). Moving forward, trash reduction actions will be tailored around the actions and calculations described in MRP 3.0. MRP 2.0 provided that source control actions (e.g. plastic bag and/ or polystyrene bans) may be used to credit up to 10% of the required load reduction. Source controls provide valuable water quality benefits at levels that may not be seen using OVTAs, which are relatively coarse indicators. MRP 2.0 also provides for two categories of offsets that may be credited toward the load reduction goal at a 1-gallon to 10-gallon ratio of trash removed: (1) Additional creek and shoreline cleanups (beyond a mandated minimum) may account for up to 10% of the required load reduction, and (2) a comprehensive plan for reducing direct discharges of trash (e.g. encampments, illegal dumping), may account for up to 15% of the required load reduction.

Several CCCWP Permittees rely on source control credits or offsets to meet their load reduction requirements and may struggle to comply with load reduction milestones if the credits are removed. Permittees have many reasons for the request to maintain existing and future source control and creek and shoreline cleanup credits, including:

- Creek and shoreline cleanups are a chance to engage and educate the public
- Cities are dedicating their resources to surveying areas for encampments and clearing them as soon as possible, with cleanups presenting hazardous conditions to Permittee staff
- Many have invested resources in being leaders in source control (bans)
- Some Permittees cannot install full capture everywhere. Many locations left are unable to meet the requirements due to infrastructure age, size or design and some areas do not have curb and gutter. Collaboration with Caltrans is not an option for all Permittees.
- Source control is a significant deterrent to windblown trash litter
- Regular on-land and creek cleanups prevent trash litter from moving downstream and into the Bay
- Source control and creek and shoreline cleanups are cost-effective tools in trash litter reduction and protection of clean water
- Permittees want to reserve the right in the future to utilize credits for the actions they have taken or will take

The Permittees are implementing control measures and actions to reduce trash. However, their ability to demonstrate compliance, and to select activities that contribute toward compliance, is dependent on several factors.

Relevant to MRP 3.0 re-issuance, the Permittees request:

- **Retain source control, additional creek and shoreline and direct discharge credits and offsets as in MRP 2.0. Several CCCWP Permittees rely on source control credits or offsets to meet their load reduction requirements, have invested greatly in these programs, and may fail to comply with load reduction milestones if the credits are removed.**
- **Retain existing creek and shoreline cleanup credit, separate from direct discharge plans as these programs provide a valuable method of trash removal and reduce trash amounts that can travel downstream or be windblown throughout the watershed.**
- **Apply source control, creek and shoreline credits jurisdiction-wide, as the benefits of these programs are recognized throughout the jurisdiction.**
- **More time to reach 100% trash reduction due to the length of time needed to collaborate with Caltrans, funding constraints, evolving load reduction strategies, and challenges in achieving the last ~20% reduction.**

The Permittees have worked closely with Regional Water Board staff to address these factors and to develop effective ways to reduce trash and demonstrate compliance. The Permittees identify the final goal of the trash reduction effort as “no adverse impact on beneficial uses due to

trash", and will continue to work with Regional Water Board staff to develop methods to measure the effectiveness of their trash reduction efforts and to characterize impacts to receiving waters.

3.0 PCB LOAD REDUCTIONS AND TMDL COMPLIANCE

MRP 2.0 specified regional and countywide numeric load reductions for PCBs to be achieved by the Permittees in the third and fifth years of the permit term. The Permittees will be expected to reduce PCB and mercury loads during the MRP 3.0 term by implementing management actions described in their Source Control Implementation Plans and by using Source Control Load Reduction Accounting (SCLRA) method (both in development, due in September 2020) to quantify the loads reduced through those actions described within (similar to the current accounting and reporting system). RAAs that will also be submitted in September 2020 will demonstrate through modeling that the Permittees expected load reductions will be achieved via implementing the programs in the SCLRA and Implementation Plan. All of these efforts: developing plans, a regional accounting methodology, modeling for RAAs support Permittees request to negotiate what is called "Plan A," a "Programmatic Approach" where they have certainty of compliance if specified programs documented in the SCLRA are undertaken. This promotes a "one-for-all" approach to reducing unequally distributed pollutant loads to the Bay, and shares the burden and environmental benefit among all Permittees. If a numeric load reduction is required instead, failure to attain the numeric load reduction objectives could constitute noncompliance for individual cities with associated regulatory and legal exposure.

Relevant to MRP 3.0 re-issuance, the Permittees request:

- **Approve implementation of the programmatic approach developed by BASMAA, with significant Regional Water Board staff input, which measures compliance by completing specific agreed upon control measures.**
- **Remove the Green Infrastructure load reduction requirement from the mercury and PCBs provisions (C.11/12.c).**
- **Any monitoring data needed for materials in road/bridge infrastructure research should be conducted by responsible industries and Caltrans, not Permittees.**

4.0 COORDINATION OF EAST COUNTY COMPLIANCE WITH TMDLS AND OTHER POLICIES OF THE CENTRAL VALLEY REGIONAL WATER BOARD

Provision C.16.5 of MRP 2.0 defines actions required of East County Permittees (the Cities of Brentwood, Antioch, Oakley, and portions of unincorporated County and the Flood Control District) that result from Central Valley Regional Water Board policies, including TMDLs.

CCCWP has submitted a methylmercury control plan on behalf of East County Permittees to the Central Valley Regional Water Board in compliance with prior permit provisions implementing the Delta Methylmercury TMDL (CVRWQCB, 2010b). Through implementing the plan, CCCWP will continue to monitor methylmercury and update control measures based on lessons learned. During MRP 3.0, CCCWP anticipates completing a Reasonable Assurance Analysis of current stormwater flows and potential future flow reductions achievable through LID. This action is responsive to technical peer reviewer questions about achieving load reduction goals through infiltration.

CCCWP implements the requirements of the Central Valley Regional Water Board pyrethroid pesticide TMDL by monitoring pesticides and toxicity in compliance with Provision C.8.g and implementing the pesticide control measures required under Provision C.9.

Relevant to MRP 3.0 re-issuance, the Permittees request:

- **Continue operating a single, coordinated countywide program of water quality control. The single permit framework appears to be working well. Remove Section C.16.5.g.iii.(2) to align with the removal of the POC data report from MRP 2.0, Provision C.8.h.iv, as requested in section C.8 above. Report all Methylmercury monitoring data and analysis with all other monitoring data and analysis in the Urban Creeks or Integrated Monitoring Reports, due in March each year.**
- **Note in either the permit language or supporting Fact Sheet that provisions C.9 (pesticide controls) and the pesticide / toxicity monitoring provisions of C.8 are fully responsive to East County Permittees' (Cities of Antioch, Oakley and Brentwood, County, and Flood Control District) implementation responsibilities under the Central Valley Pesticides TMDL.**

5.0 PROGRESS ON THE DELTA METHYLMERCURY TMDL AND RECOMMENDATIONS FOR THE NEXT PERMIT REISSUANCE

Relevant to MRP 3.0 re-issuance, the East County Permittees:

- **Completed and submitted a Methylmercury Control Plan per the requirements of provision C.11.l of the prior NPDES stormwater permit administered by the CVRWQCB (East County Permit, Order No. R5-2010-0102) in October 2018.**
- **Enrolled in coverage in the MRP 2.0 through an amendment approved by the San Francisco Water Board in January 2019.**
- **Continued monitoring mercury and methylmercury in fulfillment of provisions C.8.d and C.16.5.g of MRP 2.0.**
- **Reviewed Technical peer review comments provided by the Delta Stewardship Council, and Central Valley Water Board staff comments and discussed them with Central Valley Water Board staff in May 2020.**
- **Request that permit language consistent with C.16.5.g monitoring questions be continued in MRP 3.0:**
    - **What is the annual average methylmercury load from the Marsh Creek watershed?**
    - **How much of the Marsh Creek methylmercury load results from discharges from the MS4?**
    - **What is the methylmercury load reduction from the MS4 by implementation of reasonable, foreseeable control measures to the maximum extent practicable?**

- **What controllable water quality factors affect methylmercury production and transport from the MS4 system to the Delta? Examples include:**
  - **Do eutrophication and low dissolved oxygen increase methylmercury in ponded areas of the Marsh Creek watershed during low flow periods (depending on the year, low flow periods can range between mid-March through mid-November), and if so:**
    - **Under what unique hydrologic or seasonal circumstances do those effects reach the Delta?**
    - **Are there reasonable and foreseeable management actions to ameliorate that condition?**
  - **Are there design features of stormwater treatment that increase or decrease mercury methylation?**
    - **This management question may be addressed through monitoring methylmercury, infiltration rate studies, regional collaborations, or any combination of the above.**

- **The management questions above are most relevant to managing methylmercury loads from the MS4 system. CCCWP recommends that questions a – c above related to loads can be addressed through simple hydrologic models, and concentration estimates based on monitoring data and simplifying assumptions. CCCWP suggests that a Reasonable Assurance Analysis as an implementation task through provision C.16.5 of MRP 3.0 would be responsive to questions a - c.**
- **CCCWP has made substantial progress on question 5d related to causes of and potential management strategies for low dissolved oxygen in Marsh Creek. Potential linkages between eutrophication/ low dissolved oxygen and methylmercury in Marsh Creek will be addressed through monitoring.**
- **Request no increases to the permit level of effort for mercury monitoring (e.g. no more than eight samples per year on average), and further requests flexibility to apportion sample effort across the permit term (i.e., 40 samples over the entire five year permit term rather than eight per year). The flexibility allows thoughtful design of a monitoring strategy addressing question 5d above.**

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			TOTAL (acres)				MODERATE (acres)				HIGH (acres)				VERY HIGH (acres)			
Permittee name *TMA*	Reduction reported in 2019 Annual Report (%)	Reduction reported in 2019 Annual Report, not counting credits and offsets (%)	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTA	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined
City of Antioch	**27**	**2**																
TMA 1			*282*				*249*				*2*				*30*			
TMA 2			*434*				*268*				*134*				*31*			
TMA 3			*282*				*122*				*120*				*40*			
TMA 4			*252*				*206*				*46*				*0*			
TMA 5			*241*				*121*				*107*				*14*			
TMA 6			*66*				*66*				*0*				*0*			
TMA 7			*69*				*68*				*1*				*0*			
TMA 8			*161*				*139*				*20*				*1*			
TMA 9			*57*				*18*				*32*				*7*			
TMA 10			*220*				*119*				*101*				*0*			
TMA 11			*87*				*87*				*0*				*0*			
TMA 13			*10*				*10*				*0*				*0*			
TMA 14			*184*				*121*				*63*				*0*			
TMA 15			*119*				*108*				*11*				*0*			
TMA 16			*84*				*71*				*11*				*2*			
TMA 17			*108*				*61*				*41*				*6*			
TMA 18			*107*				*85*				*21*				*1*			
TMA 19			*135*				*46*				*84*				*4*			
TMA 20			*166*				*137*				*17*				*12*			
TMA 21			*128*				*107*				*22*				*0*			
TMA 22			*120*				*30*				*90*				*0*			
TMA 23			*118*				*117*				*0*				*0*			
TMA 24			*101*				*101*				*0*				*0*			
TMA 25			*10*				*3*				*8*				*0*			
TMA 26			*67*				*36*				*31*				*0*			
TMA 27			*20*				*20*				*0*				*0*			
TMA 28			*7*				*4*				*3*				*0*			
TMA 30			*28*				*16*				*11*				*0*			
TMA 31			*7*				*7*				*0*				*0*			
TMA 32			*1*				*1*				*0*				*0*			
TMA 33			*47*				*47*				*0*				*0*			
TMA 34			*70*				*70*				*0*				*0*			
TMA 35			*9*				*1*				*9*				*0*			
TMA 36			*13*				*13*				*0*				*0*			
TMA 37			*5*				*5*				*0*				*0*			
TMA 38			*3*				*3*				*0*				*0*			
TMA 39			*57*				*20*				*37*				*0*			
TMA 40			*27*				*27*				*0*				*0*			
TMA 41			*6*				*6*				*0*				*0*			
TMA 42			*43*				*10*				*33*				*0*			

			TOTAL (acres)				MODERATE (acres)				HIGH (acres)				VERY HIGH (acres)			
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TMA 43			*7*				*6*				*1*				*0*			
TMA 44			*1*				*1*				*0*				*0*			
TMA 45			*104*				*1*				*103*				*0*			
TMA 47			*4*				*4*				*0*				*0*			
TMA 48			*74*				*74*				*0*				*0*			
TMA 49			*111*				*109*				*3*				*0*			
City of Brentwood	**86.1**	**86.1**																
TMA 3			*22*				*20*				*3*				*0*			
TMA 4			*2*				*2*				.				*0*			
City of Clayton	**99.5**	**100**																
City of Concord	**83**	**83**																
TMA 1			*11*				*7*				*4*				*0*			
TMA 2			*5*				*2*				*2*				*0*			
TMA 3			*43*				*43*				*1*				*0*			
TMA 4			*41*				*31*				*10*				*0*			
TMA 5			*56*				*50*				*6*				*0*			
TMA 6			*3*				*3*				*0*				*0*			
TMA 8			*4*				*4*				*0*				*0*			
TMA 9			*7*				*7*				*0*				*0*			
TMA 10			*68*				*61*				*7*				*0*			
TMA 11			*6*				*0*				*6*				*0*			
TMA 12			*10*				*10*				*0*				*0*			
TMA 14			*49*				*49*				*0*				*0*			
TMA 16			*101*				*101*				*0*				*0*			
TMA 17			*48*				*48*				*0*				*0*			
TMA 18			*14*				*9*				*5*				*0*			
NJConcord6			*4*				*4*				*0*				*0*			
Contra Costa County	**80.3**	**60**																
Alamo/Diablo/Black			*106*				*106*				*0*				*0*			
Alham Valley Road			*15*				*12*				*3*				*0*			
Alham&Reliez Valley			*11*				*0*				*11*				*0*			
Bailey Road			*4*				*3*				*1*				*0*			
Bay Point			*420*				*376*				*40*				*4*			
Bethel Island			*161*				*158*				*3*				*0*			
Byron			*20*				*15*				*5*				*0*			
Castro Ranch Road			*1*				*1*				*0*				*0*			
Clyde			*4*				*4*				*0*				*0*			
Crockett/Port Costa			*112*				*81*				*29*				*3*			
Cummings Skyway			*43*				*27*				*16*				*0*			
Discovery Bay			*29*				*27*				*2*				*0*			
El Sobrante			*139*				*119*				*20*				*0*			

			TOTAL (acres)				MODERATE (acres)				HIGH (acres)				VERY HIGH (acres)			
Permittee name *TMA*	Reduction reported in 2019 Annual Report (%)	Reduction reported in 2019 Annual Report, not counting credits and offsets (%)	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTA	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined
Franklin Canyon Rd			*12*				*12*				*0*				*0*			
Kensington			*4*				*4*				*0*				*0*			
Kirker Pass Rd			*48*				*15*				*28*				*5*			
North Richmond			*280*				*183*				*80*				*17*			
Pacheco			*30*				*29*				*1*				*0*			
Rodeo			*97*				*89*				*8*				*0*			
San Pablo Dam Rd			*79*				*47*				*31*				*0*			
Uninc Antioch			*81*				*81*				*0*				*0*			
Uninc Brentwood			*6*				*6*				*0*				*0*			
Uninc Clayton			*9*				*6*				*3*				*0*			
Uninc Concord			*185*				*183*				*1*				*0*			
Uninc Martinez			*148*				*134*				*14*				*0*			
Uninc Oakley			*36*				*22*				*14*				*0*			
Uninc Richmond			*378*				*366*				*12*				*0*			
Uninc San Ramon			*9*				*9*				*0*				*0*			
Uninc Walnut Creek			*30*				*30*				*0*				*0*			
Town of Danville	**100**	**100**																
City of El Cerrito	**92**	**73**																
TMA 1			*29*				*29*				*0*				*0*			
TMA 2			*5*				*3*				*3*				*0*			
TMA 3			*40*				*24*				*17*				*0*			
TMA 5			*4*				*4*				*0*				*0*			
TMA 6			*9*				*8*				*1*				*0*			
TMA 7			*26*				*26*				*0*				*0*			
TMA 8			*1*				*1*				*0*				*0*			
TMA 9			*7*				*7*				*0*				*0*			
City of Hercules	**95**	**80**																
TMA 1			*2*				*0*				*2*				*0*			
TMA 2			*6*				*6*				*0*				*0*			
TMA 6			*6*				*6*				*0*				*0*			
City of Lafayette	**88.5**	**88**																
TMA 2			*2*				*2*				*0*				*0*			
TMA 4			*4*				*4*				*0*				*0*			
City of Martinez	**90.5**	**76**																
TMA 1			*5*				*5*				*0*				*0*			
TMA 2			*8*				*4*				*5*				*0*			
TMA 4			*1*				*1*				*0*				*0*			
TMA 5			*36*				*36*				*0*				*0*			
TMA 6			*4*				*4*				*0*				*0*			
TMA 7			*52*				*52*				*0*				*0*			
Town of Moraga	**95**	**95**																

			TOTAL (acres)				MODERATE (acres)				HIGH (acres)				VERY HIGH (acres)			
Permittee name *TMA*	Reduction reported in 2019 Annual Report (%)	Reduction reported in 2019 Annual Report, not counting credits and offsets (%)	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTA	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined
TMA 1			*1*				*1*				*0*				*0*			
TMA 2			*8*				*8*				*0*				*0*			
TMA 3			*1*				*1*				*0*				*0*			
City of Oakley	**77**																	
TMA 2			*14*				*0*				*14*				*0*			
TMA 3			*2*				*0*				*2*				*0*			
TMA 7			*4*				*2*				*2*				*0*			
TMA 10			*8*				*8*				*0*				*0*			
City of Orinda	**86.9**	**86.9**																
TMA 2			*3*				*2*				*1*				*0*			
TMA 3			*6*				*6*				*0*				*0*			
TMA 4			*2*				*2*				*0*				*0*			
TMA 5			*3*				*2*				*1*				*0*			
TMA 8			*5*				*5*				*0*				*0*			
City of Pinole	**63**	**56**																
TMA 1			*14*				*1*				*13*				*0*			
TMA 2			*2*				*0*				*2*				*0*			
TMA 3			*7*				*6*				*1*				*0*			
TMA 4			*15*				*1*				*14*				*0*			
TMA 5			*3*				*3*				*0*				*0*			
TMA 7			*1*				*0*				*1*				*0*			
City of Pittsburg	**80.8**	**64**																
TMA 1			*129*				*71*				*39*				*19*			
TMA 2			*11*				*6*				*5*				*0*			
TMA 3			*14*				*11*				*3*				*0*			
TMA 4			*284*				*169*				*111*				*4*			
TMA 5			*128*				*90*				*37*				*0*			
TMA 6			*90*				*55*				*29*				*7*			
TMA 7			*162*				*150*				*10*				*2*			
TMA 8			*8*				*7*				*1*				*0*			
TMA 9			*8*				*4*				*4*				*0*			
TMA 11			*3*				*0*				*3*				*0*			
TMA 12			*1*				*1*				*0*				*0*			
City of Pleasant Hill	**88**	**83**																
TMA 2			*47*				*29*				*18*				*0*			
TMA 4			*12*				*12*				*0*				*0*			
TMA 6			*1*				*1*				*0*				*0*			
TMA 9			*5*				*5*				*0*				*0*			
City of Richmond	**91.3**	**72**																
TMA 1			*82*				*75*				*1*				*6*			
TMA 2			*900*				*527*				*340*				*33*			

			TOTAL (acres)				MODERATE (acres)				HIGH (acres)				VERY HIGH (acres)			
Permittee name *TMA*	Reduction reported in 2019 Annual Report (%)	Reduction reported in 2019 Annual Report, not counting credits and offsets (%)	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTA	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined	Not yet controlled	To be controlled by FTCDs	To be controlled by other measures with OVTAs	Controls not yet determined
TMA 3			*545*				*525*				*11*				*9*			
TMA 4			*1*				*1*				*0*				*0*			
TMA 5			*2*				*2*				*0*				*0*			
TMA 6			*163*				*142*				*21*				*0*			
TMA 7			*62*				*54*				*5*				*2*			
TMA 8			*656*				*606*				*50*				*0*			
TMA 9			*13*				*13*				*0*				*0*			
City of San Pablo	**80.6**	**68**																
TMA 1			*103*				*60*				*36*				*8*			
TMA 2			*36*				*3*				*26*				*6*			
TMA 3			*34*				*14*				*19*				*2*			
TMA 4			*22*				*0*				*22*				*0*			
TMA 5			*6*				*0*				*6*				*0*			
TMA 6			*8*				*0*				*8*				*0*			
TMA 7			*1*				*1*				*0*				*0*			
TMA 8			*25*				*25*				*0*				*0*			
TMA 10			*47*				*46*				*0*				*1*			
TMA 11			*153*				*153*				*0*				*0*			
TMA 12			*41*				*41*				*0*				*0*			
TMA 13			*34*				*34*				*0*				*0*			
TMA 14			*12*				*11*				*1*				*0*			
NJSanPablo2			*1*				*1*				*0*				*0*			
City of San Ramon	**100**																	
City of Walnut Creek	**96.2**	**88**																
TMA 1			*9*				*9*				*0*				*0*			
TMA 2			*77*				*76*				*1*				*0*			
TMA 3			*10*				*10*				*0*				*0*			
TMA 5			*54*				*54*				*0*				*0*			

Fairfield-Suisun Urban Runoff Management Program

NPDES Permit Application
Report of Waste Discharge

July 3, 2020

Prepared for and by:
Fairfield-Suisun Urban Runoff Program
City of Fairfield
City of Suisun City

FAIRFIELD-SUISUN SEWER DISTRICT
1010 CHADBOURNE ROAD • FAIRFIELD, CALIFORNIA 94534 • (707) 429-8930 • WWW.FSSD.COM
GREGORY G. BAATRUP, GENERAL MANAGER

July 3, 2020

UR -180.10.40

Mr. Michael Montgomery, Executive Officer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Attn: Keith Lichten, Chief Water Resources Division

RE: Fairfield-Suisun Urban Runoff Management Program – NPDES Permit Application

Dear Mr. Montomery:

Attached please find the NPDES permit application for the Fairfield-Suisun Urban Runoff Management Program. As required by USEPA and the San Francisco Bay Regional Water Quality Control Board, this application is being submitted 180 days prior to the December 31, 2020 expiration date of the permit currently in force (CAS612008).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

Kevin A. Cullen

Kevin A. Cullen, P.E.
Senior Environmental Engineer

cc: Paul Kaushal, City of Fairfield
Matt Medill, City of Suisun City

Attachments

CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. FACILITY:

Name Fairfield-Suisun Urban Runoff Management Program

Address 1010 Chadbourne Road

City/County/State/Zip Code Fairfield, Solano County,California, 94533

Contact Person Kevin A. Cullen, P.E.

Telephone Number 707-688-8895 Email KCullen@fssd.com

B. FACILITY OWNER:

Name See attached for clarification

Address

City/State/Zip Code

Contact Person Kevin A. Cullen, P.E.

Telephone Number 707-688-8895 Email KCullen@fssd.com

Federal Tax ID See attached for clarification

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

C. FACILITY OPERATOR (The agency or business, not the person):

Name See attached for clarification

Address

City/State/Zip Code

Contact Person Kevin A. Cullen, P.E.

Telephone Number 707-688-8895 Email KCullen@fssd.com

Operator Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

D. OWNER OF THE LAND

Name See attached for clarification

Address

City/State/Zip Code

Contact Person Kevin A. Cullen, P.E.

Telephone Number 707-688-8895 Email KCullen@fssd.com

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED

Address See attached for clarification

City/State/Zip Code

Contact Person Kevin A. Cullen, P.E.

Telephone Number 707-688-8895 Email KCullen@fssd.com

F. BILLING ADDRESS

Address Fairfield-Suisun Sewer District, 1010 Chadbourne Rd.

City/State/Zip Code Fairfield, CA 94534

Contact Person Kevin A. Cullen, P.E.

Telephone Number 707-688-8895 Email KCullen@fssd.com

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application:

☐ **Waste Discharge to Land** ☑ **Waste Discharge to Surface Water**

Check all that apply:

☐ Animal or Aquacultural Wastewater	☐ Land Treatment Unit
☐ Animal Waste Solids	☐ Landfill (*see instructions*)
☐ Biosolids/Residual	☐ Mining
☐ Cooling Water	☑ Storm Water
☐ Domestic/ Municipal Wastewater Treatment and Disposal	☐ Surface Impoundment
☐ Dredge Material Disposal	☐ Waste Pile
☐ Hazardous Waste (*see instructions*)	☐ Wastewater Reclamation
☐ Industrial Process Wastewater	☐ Other, *please describe*

III. LOCATION OF THE FACILITY

Describe the physical location of the facility:

1. Assessor's Parcel Number(s)
   Facility: See attached for clarification
   Discharge Point: _____
2. Latitude
   Facility: See attached for clarification
   Discharge Point: _____
3. Longitude
   Facility: See attached for clarification
   Discharge Point: _____

IV. REASON FOR FILING

Check all that apply:

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency California Regional Water Quality Control Board, San Francisco Bay Region

Has a public agency determined that the proposed project is exempt from CEQA?

☑ Yes ☐ No

If yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below:

Reissuance is exempt pursuant to section 13389 of the California Water Code

Has a "Notice of Determination" been filed under CEQA?

☐ Yes ☑ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report (EIR), or Negative Declaration. If No, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents: ☐ EIR ☐ Negative Declaration

Expected CEQA Completion Date: _____

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

Clarifications and Other Information as requested under I through VII - July 3, 2020

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name Kevin A. Cullen Title Senior Environmental Engineer

Signature Date July 3, 2020

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

California Environmental Protection Agency
Bill of Rights for Environmental Permit Applicants

California Environmental Protection Agency (Cal/EPA) recognizes that many complex issues must be addressed when pursuing reforms of environmental permits and that significant challenges remain. We have initiated reforms and intend to continue the effort to make environmental permitting more efficient, less costly, and to ensure that those seeking permits receive timely responses from the boards and departments of the Cal/EPA. To further this goal, Cal/EPA endorses the following precepts that form the basis of a permit applicant's "Bill of Rights."

1. Permit applicants have the right to assistance in understanding regulatory and permit requirements. All Cal/EPA programs maintain an Ombudsman to work directly with applicants. Permit Assistance Centers located throughout California have permit specialists from all the State, regional, and local agencies to identify permit requirements and assist in permit processing.
2. Permit applicants have the right to know the projected fees for review of applications, how any costs will be determined and billed, and procedures for resolving any disputes over fee billings.
3. Permit applicants have the right of access to complete and clearly written guidance documents that explain the regulatory requirements. Agencies must publish a list of all information required in a permit application and of criteria used to determine whether the submitted information is adequate.
4. Permit applicants have the right of timely completeness determinations for their applications. In general, agencies notify the applicant within 30 days of any deficiencies or determine that the application is complete. California Environmental Quality Act (CEQA) and public hearing requests may require additional information.
5. Permit applicants have the right to know exactly how their applications are deficient and what further information is needed to make their applications complete. Pursuant to California Government code Section 65944, after an application is accepted as complete, an agency may not request any new or additional information that was not specified in the original application.
6. Permit applicants have the right of a timely decision on their permit application. The agencies are required to establish time limits for permit reviews.
7. Permit applicants have the right to appeal permit review time limits by statute or administratively that have been violated without good cause. For state environmental agencies, appeals are made directly to the Cal/EPA Secretary or to a specific board. For local environmental agencies, appeals are generally made to the local governing board or, under certain circumstances, to Cal/EPA. Through this appeal, applicants may obtain a set date for a decision on their permit and, in some cases, a refund of all application fees (ask boards and departments for details).
8. Permit applicants have the right to work with a single lead agency where multiple environmental approvals are needed. For multiple permits, all agency actions can be consolidated under a lead agency. For site remediation, all applicable laws can be administered through a single agency.
9. Permit applicants have the right to know who will be reviewing their application and the time required to complete the full review process.

Clarifications and Other Information as requested under I through VII

I. Facility Information

A. Facility:

The Cities of Fairfield and Suisun City (Cities) have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Program). As described within NPDES Permit No. CAS612008, Order No. R2-2015-0049, the Cities are collectively referred to as the Fairfield-Suisun Permittees. For the purposes of this application, the Program is the Facility since it is the NPDES permit holder.

B. Facility Owner:
C. Facility Operator:
D. Owner of the Land:

Municipal storm drainage facilities are owned and/or operated by the Cities of Fairfield and Suisun City. The Cities have jurisdiction over and/or maintenance responsibility for their respective municipal separate storm sewer systems and/or watercourses in Solano County, CA.

E. Address Where Legal Notice May Be Served:

Agency and Address	City	Zip Code	Contact Person	Telephone number
City of Fairfield 1000 Webster Street	Fairfield	94533	Paul Kaushal	(707) 428-7477
City of Suisun city 701 Civic Center Blvd.	Suisun City	94585	Mat Medilll	(707) 421-7316
Fairfield Suisun Urban Runoff Program 1010 Chadbourne Rd.	Fairfield	94533	Kevin Cullen	(707) 428-9129

III. Location of the Facility

Municipal storm drainage facilities are owned and/or operated by the Cities. These storm drainage facilities are located throughout both Cities. As a result, the physical location of the facility can not be described as a single facility or discharge point. Please see the attached map entitled: **Fairfield-Suisun Storm Drain Service Area**.

VI. Other Required Information

Characterization of Discharge:

DESIGN AND ACTUAL FLOWS

Municipal Separate Storm Sewer Systems (MS4) in Fairfield and Suisun City are designed to convey storm flows to surface water while minimizing flood risk to life and property. Generally, it is design standards address large events (i.e., 10-year events up to 100-year events, depending on the value of assets at risk). Watershed flows are modeled using the rational method, or other methods, which uses runoff coefficients to account for slope, vegetative cover, and land use. Because of the variable nature of storm events and the multitude of conveyances, specific details on design vs. actual stormwater discharge flows are beyond the intent and scope of this Application/Report of Waste Discharge.

CONSTITUENTS AND CHARACTERISTIC DISCHARGE CONCENTRATIONS

For further information on constituents and characteristic discharge concentrations please see the Urban Creeks Monitoring and Integrated Monitoring Reports for both Permittees on the RWQCB website here:

https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/index.html

BEST MANAGEMENT PRACTICES USED

Permittees of the FSURMP implement the following Best Management Practices (BMPs) to minimize pollutants in urban runoff discharges:

1. Source Control stops or reduces pollutant discharges by eliminating them from uses where they may be discharged into the MS4. Examples include: re-registration by USEPA of diazinon and chlorpyrifos to limit use to registered professional applications; the connection of all interior drains to the sanitary sewer; the requirement of new buildings (such as foods service facilities and/or

multi-family residential complexes) to provide roofed and enclosed areas for dumpsters and recycling.

2. Prohibition of non-stormwater discharges into the MS4 is established by ordinance in each Permittee's jurisdiction.
3. Illicit Discharge Detection and Elimination programs implement prohibitions by providing an active program of surveillance and response to complaints.
4. Public Education and Outreach communications to raise public awareness and change behaviors that can affect water quality.
5. Inspection of businesses and construction sites provides oversight of compliance with required guidelines for housekeeping and pollution prevention.
6. Enforcement provides Permittees with legal authority to correct egregious or recurrent ordinance violations.
7. Referral to the Water Board or other appropriate authorities where individual parcels are known or suspected to be pollutant sources and where successful enforcement is beyond the capabilities or resources of the local municipal government.

For detailed information on current BMPs being implemented at the city level please see the 2018-2019 Annual Reports for both Permittees on the RWQCB website here: https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/index.html

DESCRIPTION OF DISPOSAL METHODS

Stormwater is typically discharged from the MS4 into creeks that flow into Suisun Marsh, the Suisun Bay and then the San Francisco Bay.

OTHER APPROPRIATE WASTE DISCHARGE CHARACTERISTICS

Stormwater discharges are complex mixtures of constituents present in the urban environment, both naturally and from human sources. Another important characteristic of urban stormwater discharges is their inherently episodic nature. For this reason, comparison of constituent concentrations in stormwater discharges to water quality objectives relies on acute (short-duration) exposure assumptions.

Site Maps

The Cities' boundaries are provided within the attached map entitled: Fairfield-Suisun Storm Drain Service Area - NPDES Permit Application. Storm drains within the service area discharge to Laurel Creek, Ledgewood Creek, American Canyon Creek, Jameson Canyon Creek, Dan Wilson Creek, Green Valley Creek, McCoy Creek, and the Suisun Marsh (tributary to San Francisco Bay). Please see attached.

Keith Lichten requests of May 17th 2020 (via Email)

Each ROWD should consist of the following:

1. A completed Form 200

Please see attached.

2. A list of program member agencies and contacts

Information is included in the Clarifications and Other Information as requested under I through VII.

3. A list of documents incorporated by reference, including, but not limited to:
    a. MOAs/MOUs confirming the relationship of the member agencies to the countywide program

The Fairfield Suisun Sewer District has a general agreement with the city of Fairfield and the city of Suisun City through a drainage maintenance agreement developed in the late 80s. Please see attached.

    b. BASMAA or related projects, such as projects of regional significance, being completed collectively

Please see Contra Costa Clean Water Program RoWD for a List of projects of regional significance, being completed collectively

    c. Provision C.8 Integrated Monitoring Report

Please see attached.

    d. MRP 3.0 workgroup products (see also item 6, below)

Please see Contra Costa Clean Water Program ROWD for a list of projects of regional significance, being completed collectively

4. Documents related to MRP Provision C.10, trash load reduction:
    a. The final Provision C.10 Receiving Water Monitoring Report

Please see attached.

    b. Each permittee's current Trash Load Reduction Plan, pursuant to Provision, C.10.d, incorporating all amendments submitted as part of the Permittee's annual reports.

Please see attached.

c. A tabular summary of each Permittee's remaining trash management areas (TMA) that are not yet controlled to a low trash generation rate by full trash capture devices or other measures confirmed by on-land visual assessment, and the Permittee's planned approaches to control those areas to a low trash generation rate (i.e., either full trash capture devices or other measures equivalent to full trash capture, verified by visual assessment), as shown in the below table. If planned approaches have not yet been determined, indicate the areas for which that is the case as shown. Permittee-reported trash reductions from the 2019 annual report, not counting credits and offsets (i.e., the data for column 2), are summarized in Appendix A of this Staff Summary Report.

Please see each Permittees Annual Report for FY 2018-19 for this information.

5. Documents related to MRP Provisions C.11 and C.12, mercury and PCBs load reductions:
   a. Pursuant to Provisions C.11.b and C.12.b, Assess Mercury (or PCBs) Load Reductions from Stormwater, submit information accounting for methodologies to assess mercury and PCBs load reductions in MRP 3.0. These could be references to or resubmittal of information previously submitted if there are no changes. Otherwise, it should include that information and updated information sufficient to account for proposed changes to the methodologies.
   b. Summaries of key information that is required to be submitted in more-detailed form with the 2020 annual reports:
      i. A summary of key information required to be submitted pursuant to MRP Provision C.12.f.iii(5) with the 2020 annual report. That provision requires submittal with the FY 2019-2020 annual report of "*…an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition. This should be reported at the regional level on behalf of all Permittees.*"
      ii. Summaries of key information that required to be submitted pursuant to MRP Provisions C.11.c.iii(2) and C.12.c.iii(2), which require "*…an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.*" The summaries shall also reference, or otherwise summarize, the reports required pursuant to MRP Provisions C.11.c.iii(1) and C.12.c.iii(1), which required in the 2018 annual reports "*…the quantitative relationship between green infrastructure implementation and mercury (or PCBs) load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship.*" These summaries should information sufficient to account for the 2020 annual report requirement to submit reasonable assurance

analyses to demonstrate quantitatively that Mercury reductions of at least 10 kg/yr and PCBs reductions of at least 3 kg/yr will be realized by 2040 implementation of green infrastructure projects with data used and description of models and model inputs relied on to make the demonstration.

c. A summary of draft Reasonable Assurance Analysis outcomes sufficient to inform setting of goals in those provisions (currently under discussion in the workgroup).

d. Methods for estimating PCBs load reductions achieved by new source categories (e.g., removal of PCBs-containing electrical equipment, control of PCBs in infrastructure (e.g., bridge caulk)).

For all of the information requested under Item #5 above, please see each permittee's and the Program Annual Report for FY 2019-20. The Annual Report is due on September 30 of 2020. We do not want to speculate on conclusions with incomplete information as these reports are still being developed.

6. A copy of the Program's priority issues list, organized by provision. It would be acceptable to reference the existing BASMAA workgroup documents we have worked on collectively, and identify any significant issues beyond them (although we expect the latter should be a very short list).

Program Priority List for Reissuance of MRP 3.0, the Fairfield-Suisun Permitees request:

- *No increase in monitoring costs, inclusive of any new monitoring requirements in MRP 3 (i.e. C.10, C.11/12, any new provisions, etc.).*

- *Allow a targeted approach for creek status monitoring, with time to develop thoughtful workplans in year 1, allowing flexibility for designating monitoring resources to answer meaningful Management Questions relevant to watersheds of interest.*

- *Request to eliminate probabilistic driven monitoring and move to targeted, project level monitoring.*

- *No new "materials characterization" requirements, (e.g. PCBs in infrastructure caulk, MRP 2.0 Provision C.12.e). Any further study of PCBs in construction materials and development of specifications for handling the material should be led by the Caltrans.*

- *That Permittees be able to demonstrate local progress toward implementing their Green Infrastructure Plans by selecting and tailoring a suite of local indicators (for example, adoption of policies, documentation of processes for green infrastructure project identification and conceptual design, securing of funding*

streams, design and construction of initial green infrastructure projects, or other internal performance measures).

- *Express green infrastructure implementation targets as long-term, region-wide goals recognizing that the timing of redevelopment projects and infrastructure opportunities is unpredictable and is largely outside the control of Permittees.*

- *"De-couple" green infrastructure implementation targets from mercury/PCB load reductions by removing the C.11.c and C.12.c provisions (and performance criteria tables 11.1 and 12.1, respectively) from MRP 3.0. Permittees should identify, select, and implement GI projects based on broadly defined water quality and other benefits. Tracking of PCB/mercury load reductions achieved via green infrastructure should be conducted under the relevant C.11/12 provisions.*
- *Maintain current project size thresholds (Provision C.3.b), which ensure that nearly all new or replaced impervious area drains to sustainable LID features.*

- *Continue to allow simplified LID measures to be implemented when constructing one single-family home (Provisions C.3.b. and C.3.i.).*

- *Leave requirements for existing streets and roads unchanged, including the exemption from C3 requirements for rehabilitation, repair, and resurfacing of existing roadways.*

- *Continue the current allowance for on-site non-LID treatment on "Special Projects" as defined in MRP Provision C.3.e.ii, so as not to undermine critical efforts to construct high-density housing near transit.*

- *Make it easier to use of off-site LID treatment where that option is more cost-effective and environmentally beneficial (Provision C.3.e.i).*

- *Eliminate the requirement to report approvals for Regulated Projects; report new Regulated Projects in the year construction is completed.*

- *Retain creek and shoreline and direct discharge credits and offsets as in MRP 2.0.*

- *Retain existing creek and shoreline cleanup credit, separate from direct discharge plans as these programs provide a valuable method of trash removal and reduce trash amounts that can travel downstream or be windblown throughout the watershed.*

- *More time to reach 100% trash reduction due to the length of time needed to collaborate with Caltrans, funding constraints, evolving load reduction strategies, and challenges in achieving the last ~20% reduction.*

- *Approve implementation of the programmatic approach developed by BASMAA, with significant Regional Water Board staff input, which measures compliance by completing specific agreed upon control measures.*

- *Remove the Green Infrastructure load reduction requirement from the mercury and PCBs provisions (C.11/12.c).*

- *Any monitoring data needed for materials in road/bridge infrastructure research should be conducted by responsible industries and Caltrans, not Permittees.*

7. ROWD information relating to new or substantially updated provisions/sub-provisions
    a. Information sufficient to inform setting of goals and requirements to address discharges associated with homelessness. This is a placeholder for information being worked on in the associated MRP 3.0 workgroup. ROWDs should reference and, as appropriate, respond to work products generated by that workgroup.
    b. Relatedly, information sufficient to inform setting of goals and requirements to address discharges of bacteria. At a minimum, this should consist of information referenced or generated in response to the immediately preceding item 7.a (discharges associated with homelessness), and additional expectations set in MRP workgroups or the Steering Committee regarding bacteria issues.
    c. Information sufficient to inform setting of expectations around discharges of pollutants associated with emergency firefighting activities (e.g., chlorinated water, firefighting foams) pursuant to MRP Provision C.15.b.iii. ROWDs should reference and, as appropriate, respond to work products generated by the MRP workgroup.
    d. As appropriate, reference to workgroup discussions and outcomes regarding oversight of mobile cleaning businesses.

For all of the information requested under Item #7 above, please see dedicated Water Board staff. Water Board staff have been leading the discussions regarding these types of discharges to the storm drain system and our local creeks. If there are problems locating these documents or the individuals in charge of these permit elements the Program can provide further assistance.

8. Permittee-specific ROWD information:
    a. Provision C.14 – Fecal indicator bacteria controls. The City of Pacifica and San Mateo County: Pursuant to Provision C.14.b.iii(e), a plan "*…that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.*"

b. Provision C.16 – Discharges to ASBSs – San Mateo County: a copy of or URL linking to the County's current ASBS Compliance Plan approved by the State Water Board's Executive Director.
c. We will contact Permittees with any additional expectations (or continue our ongoing communications) regarding the Petaluma River bacteria TMDL (Petaluma); San Francisco Bay Beaches bacteria TMDL (certain Bay-adjacent permittees); Pescadero/Butano Creeks Sediment TMDL (San Mateo County); and San Vicente Creek discharges of bacteria—implementation consistent with Water Board Resolution No. R2-2016-0024 (San Mateo County)
d. East Contra Costa County Permittees: information sufficient to update or, as appropriate, establish TMDL requirements applicable to those permittees.
e. Additionally, we will contact Petaluma, as appropriate, regarding any additional needed information associated with joining the MRP.

Items requested in No. 8 above do not apply to the Fairfield -Suisun Urban Runoff Management Program.

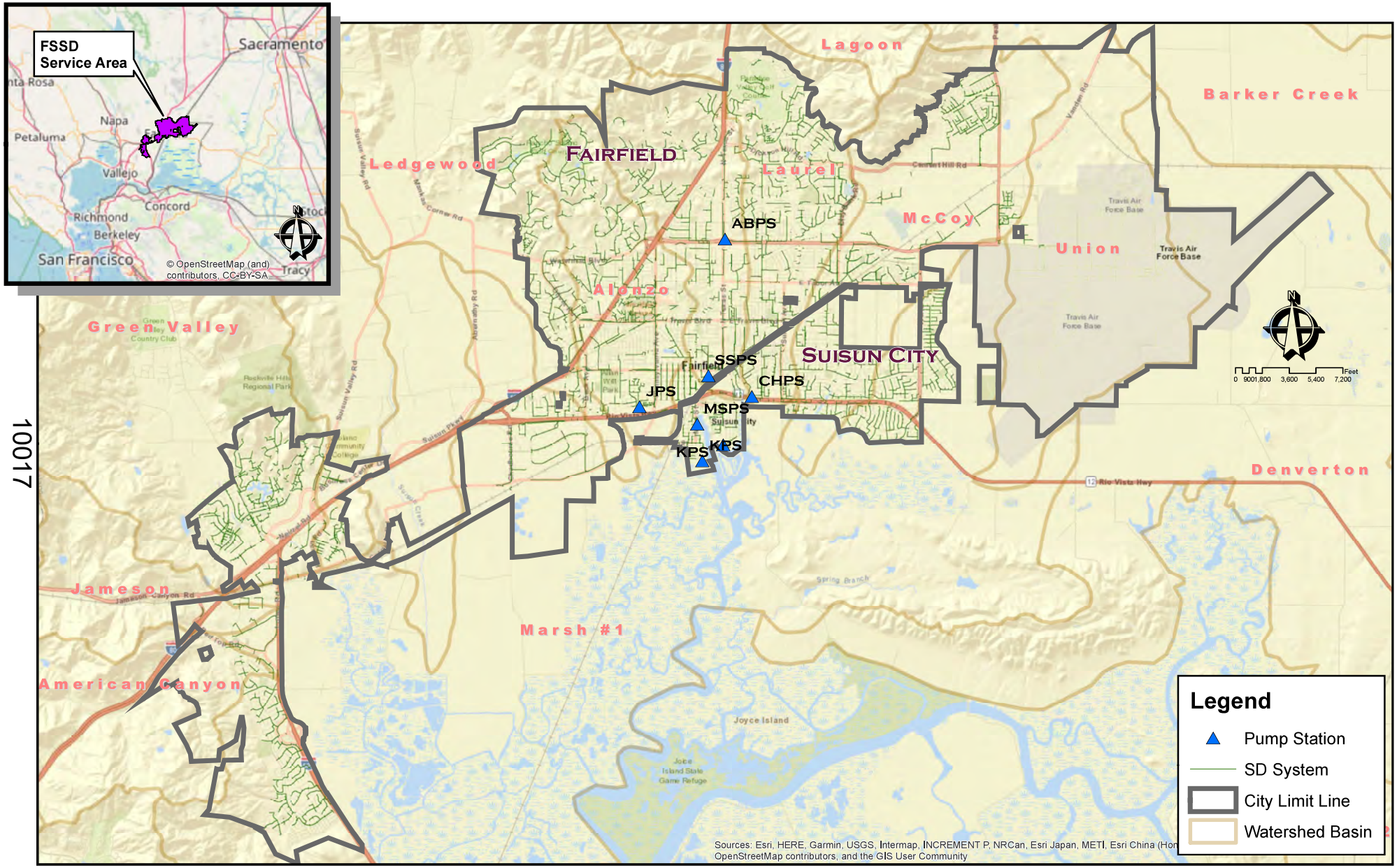

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3/3/2020

FAIRFIELD-SUISUN STORM DRAIN SERVICE AREA

NPDES Permit Application
May 2020

Drainage Maintenance Agreement
Among the Fairfield-Suisun Sewer District,
the City of Fairfield, and the City of Suisun City
Compiled, as amended, through January 23, 1995

DRAINAGE MAINTENANCE AGREEMENT

THIS AGREEMENT MADE AND ENTERED
INTO ON THIS FIRST DAY OF
MARCH, 1988, BY AND BETWEEN

FAIRFIELD-SUISUN SEWER DISTRICT, a public corporation, hereinafter referred to as "DISTRICT,"

AND

CITY OF FAIRFIELD, a municipal corporation, hereinafter referred to as "FAIRFIELD,"

AND

CITY OF SUISUN CITY, a municipal corporation, hereinafter referred to as "SUISUN CITY,"

RECITALS

1. The U.S. Army Corps of Engineers is constructing the modified Fairfield Vicinity Streams Project on land owned by the State of California and FAIRFIELD and SUISUN CITY.

2. FAIRFIELD and SUISUN CITY have agreed with the United States and the State of California to operate and maintain the drainage facilities constructed as part of the Fairfield Vicinity Streams Project.

3. DISTRICT has completed a drainage maintenance feasibility study and additional analyses which demonstrated advantages to regionalizing the maintenance management of certain storm water drainage facilities including the federal Fairfield Vicinity Streams Project.

4. FAIRFIELD and SUISUN CITY are desirous of DISTRICT, through exercise of its statutory authority, assuming limited responsibility for maintenance of drainage facilities.

5. DISTRICT is amenable to assuming such limited responsibility.

NOW, THEREFORE, in consideration of the covenants and conditions herein contained, the parties hereto agree as follows:

SECTION I

DEFINITIONS

1. CITIES – collective reference to FAIRFIELD and SUISUN CITY acting as individual parties to this agreement.

2. District Engineer – The General Manager/District Engineer of the DISTRICT or such other person as may be designated to act on behalf of DISTRICT by the Board of Directors.

3. Director of Public Works – The Director of Public Works or such other person as may be designated to act on behalf of the city by the city council.

4. Local Facilities – those storm drainage facilities for which DISTRICT provides supplemental maintenance funding only under the terms of this agreement but for which CITIES retain direct operation and maintenance responsibility.

5. Regional Facilities – those storm drainage facilities for which DISTRICT accepts limited maintenance responsibility under the terms of this agreement.

6. Natural Creeks – open drainage channels which have not been materially altered in either channel shape or alignment from their natural state.

7. Improved Channels – open drainage channels which have been altered from their natural state in order to improve their capacity to carry water.

SECTION II

DISTRICT AGREES:

1. Regional Facilities – To assume responsibility for the following maintenance activities on Regional Facilities owned by or under the control of CITIES:

    A. Storm Water Pumping Stations

        1) perform all required preventive and corrective maintenance of existing and future pumping stations which are turned over to the DISTRICT in acceptable structural and mechanical condition.

        2) make recommendations for station improvements to increase reliability and/or capacity.

3) make no modifications or improvements to facilities which would adversely affect pumping capacity or reliability without the express written consent of the Director of Public Works of the city in which the facility is located.

4) inspect for operational readiness during dry weather conditions.

5) monitor operational status during wet weather conditions and make reasonable efforts to keep the station in operation.

6) maintain written records of work performed and make such records available for inspection by the Director of Public Works during normal business hours.

B. Other Facilities – provide periodic inspection, cleaning and repair of Regional Facilities including pipelines, improved channels, natural creeks, detention basins, bridge foundations, sloughs, culverts and appurtenant structures as required to maintain design hydraulic capacity in accordance with this agreement, but not including maintenance of fences, gates, guardrails, barricades or other devices intended to limit public access or contact with the maintained facilities.

C. Replace equipment and structures that fail, provided that the District's obligation shall not exceed $50,000 per fiscal year.

D. Prepare and submit such reports on maintenance activity as may be required by non-city agencies. CITIES shall provide data to DISTRICT for preparation of said reports for those facilities maintained by CITIES.

E. Act as Lead Agency for purposes of obtaining permits, licenses, easements or other instruments that may be necessary to carry out DISTRICT responsibilities.

F. Regional Facility Inventory – implement and maintain a computerized data base inventory of regional drainage facilities and make summary reports and data available to CITIES as requested.

G. Act as Lead Agency for the purpose of dealing with the Regional Water Quality Control Board, EPA and other agencies promulgating non-point source pollution control regulations.

H. Insurance – require DISTRICT contractors or other parties working on any activities associated with this contract to indemnify and hold harmless CITIES, and to name CITIES as additional insureds.

I. With approval of DISTRICT Board of Directors, participate in the construction of specific capital improvements to the drainage system.

Section II.I. is added 01/23/1995

2. Local Facilities – Provide supplemental funding to CITIES at levels set by the DISTRICT in accordance with procedures established herein.

3. Enterprise Fund – establish a separate enterprise fund to account for revenues and expenditures related to drainage maintenance activities of the DISTRICT. Revenues shall include drainage maintenance fees, interest income and grants-in-aid related to activities under this agreement.

   A. Restrictions – to make no transfers into or out of the enterprise fund unless authorized by the DISTRICT Board of Directors.

   B. Annual Financial Report – to prepare an annual financial report of the enterprise fund audited by an independent Certified Public Accountant. The report shall be prepared in accordance with generally accepted accounting principles and standards and submitted to the DISTRICT Board of Directors within six months of the close of each fiscal year.

   C. Budget – to prepare an annual budget for the activities covered by this agreement, including estimated revenues, fees, and maintenance and capital expenses and allocation to and status of reserves.

SECTION III

CITIES AGREE:

1. to allow DISTRICT and its contractors and agents free and unencumbered access to facilities for the purpose of performing its obligations under this agreement.

2. to furnish DISTRICT with all available spare parts, construction drawings, maintenance manuals, maintenance records, operational records, equipment guarantees, financial records and related materials for each facility for which DISTRICT assumes limited maintenance responsibility.

3. to warrant the overall structural and mechanical integrity of the facilities as of the effective date of this agreement and make such repairs as may be required by DISTRICT to bring existing facilities up to acceptable structural and mechanical condition. Work shall be completed before the effective date of this agreement.

4. fund and construct such capital improvements to increase reliability and/or hydraulic capacity as may be recommended by DISTRICT and determined to be financially feasible by CITIES.

5. that new storm water pumping stations will be designed and constructed to conform with minimum engineering standards established by DISTRICT.

6. submit to District on or before May 1 each year an annual report on maintenance activities completed during the prior calendar year.

SECTION IV

THE PARTIES MUTUALLY AGREE:

1. Maintenance Planning Committee – there shall be established a Maintenance Planning Committee, hereinafter COMMITTEE, consisting of the District Engineer of DISTRICT, the Director of Public Works of FAIRFIELD and the Director of Public Works of SUISUN CITY, or their respective designees. The COMMITTEE shall meet on a regular basis, but not less than once each calendar year, to review and plan regional maintenance priorities for the upcoming year, and make recommendations to DISTRICT for consideration in preparation of the annual budget.

2. Local Facility Maintenance

Section IV.2.A amended 06/27/1994 & 01/23/1995

   A. Enterprise Fund Accounts – CITIES shall each establish a separate enterprise fund account within their respective financial accounting systems to account for revenues and expenditures directly related to maintenance of local facilities under the terms of this agreement. Revenues include the annual DISTRICT funding and other revenues such as interest earnings or grants-in-aid related to activities under this agreement.

      1) Eligible Expenditures – Eligible expenditures shall be limited to the following:

         a. Direct expenses related directly to the maintenance and rehabilitation of such facilities including salaries, employee fringe benefits, equipment costs, materials, and supplies.

         b. Indirect expenses may be charged to the enterprise fund but not exceeding 15% of the eligible direct expenses.

         c. Capital improvements to the drainage system which have been budgeted and approved by the DISTRICT.

      2) Interfund Transfers and Loans – No interfund transfer of funds into or out of the enterprise fund shall be made unless authorized by the DISTRICT.

      3) Annual Financial Report – CITIES shall prepare an annual financial report of the enterprise fund for the fiscal year which shall be audited by

an independent certified public accountant. The report shall be prepared in accordance with generally-accepted accounting principles and standards and submitted within six months of the close of the fiscal year.

4) Reserve Account – CITIES shall create a reserve account within the enterprise fund for major maintenance and replacement of local facilities. Any funds not spent during the fiscal year shall be deposited to this reserve account. The minimum fund balance shall be maintained at no less than twenty-five percent (25%) of the average annual revenues allocated to CITY by DISTRICT.

5) Disaster Relief Funds – In the event of a flooding emergency for which CITIES apply and receive state and/or federal relief funds, that portion of said relief funds related to repayment of enterprise fund expenditures associated with the emergency shall be deposited in the enterprise fund to offset eligible expenses incurred during the emergency. The CITIES are responsible for providing documentation of the eligible emergency expenses and shall be responsible for responding to the state or federal audits of said funds and expenses.

B. Facility Inventory – CITIES and DISTRICT agree to jointly develop a computerized data base inventory of drainage maintenance facilities within their jurisdictions. The inventory shall be in a format approved by the District Engineer and, as a minimum, contain information on location, type of facility, size, materials of construction, date installed and maintenance history. CITIES shall submit to DISTRICT on or before May 1 each calendar year a printed report listing all facilities within their respective jurisdictions by type and size and an updated copy of the complete inventory on magnetic media. This report shall include all new facilities placed in service during the previous calendar year as well as all previously-inventoried facilities. This inventory shall subdivide facilities into Local and Regional categories for purposes of this agreement. Pipelines under 36" in diameter and appurtenant structures shall be included as local facilities. Designation of larger facilities as local shall be at discretion of CITIES, but local facilities inventory for facilities larger than 33" diameter may not be increased or decreased more than 10 percent in any fiscal year as measured by effect on total supplemental funding by DISTRICT unless authorized by DISTRICT Board.

C. Maintenance Cost Allowance – DISTRICT shall annually remit to CITIES for deposit to each city's enterprise fund an amount of money which shall be calculated on the basis of Unit Maintenance Cost Allowances and number of units maintained in accordance with procedures established herein. Unit Maintenance Cost Allowances shall be established annually by the DISTRICT by incorporation into the annual budget.

The amount to be deposited by DISTRICT shall be determined by multiplying the number of units of each type of facility in each city's Local Facility Inventory by the Unit Maintenance Cost Allowance for that type of facility and subtracting the city's local contribution to the fund as shown in the example attached as EXHIBIT A.

D. Neither DISTRICT nor any officer or employee thereof shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by FAIRFIELD under or in connection with any work, authority or jurisdiction not delegated to DISTRICT under this agreement. It is also agreed that, pursuant to Government Code § 895.4, FAIRFIELD shall fully indemnify and hold DISTRICT harmless from any liability imposed for injury (as defined by Government Code § 810.8) occurring by reason of anything done or omitted to be done by FAIRFIELD under or in connection with any work, authority or jurisdiction not delegated to DISTRICT under this agreement.

E. Neither FAIRFIELD nor any officer or employee thereof, is responsible for any damage or liability occurring by reason of anything done or omitted to be done by DISTRICT under or in connection with any work, authority or jurisdiction delegated to DISTRICT under this agreement. It is also agreed that, pursuant to Government Code § 895.4, DISTRICT shall fully indemnify and hold FAIRFIELD harmless from any liability imposed for injury (as defined by Government Code § 810.8) occurring by reason of anything done or omitted to be done by DISTRICT under or in connection with any work, authority, or jurisdiction delegated to DISTRICT under this agreement.

F. Neither DISTRICT nor any officer or employee thereof shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by SUISUN CITY under or in connection with any work, authority or jurisdiction not delegated to DISTRICT under this agreement. It is also agreed that, pursuant to Government Code § 895.4, SUISUN CITY shall fully indemnify and hold DISTRICT harmless from any liability imposed for injury (as defined by Government Code § 810.8) occurring by reason of anything done or omitted to be done by SUISUN CITY under or in connection with any work, authority or jurisdiction not delegated to DISTRICT under this agreement.

G. Neither SUISUN CITY nor any officer or employee thereof, is responsible for any damage or liability occurring by reason of anything done or omitted to be done by DISTRICT under or in connection with any work, authority or jurisdiction delegated to DISTRICT under this agreement. It is also agreed that, pursuant to Government Code § 895.4, DISTRICT shall fully indemnify and hold SUISUN CITY harmless from any liability imposed for injury (as defined by Government Code § 810.8) occurring by reason of anything done

or omitted to be done by DISTRICT under or in connection with any work, authority, or jurisdiction delegated to DISTRICT under this agreement.

3. Termination – Either CITY may terminate its participation in this agreement by giving written notice to the DISTRICT no later than May 31 of any year. Such termination shall be effective on July 1 of that year. The DISTRICT may terminate its participation in this agreement with respect to either CITY by giving written notice no later than March 1 of any year. Such termination shall be effective on July 1 of that year.

4. FAIRFIELD agrees to provide supplemental financial management services to DISTRICT for Drainage Maintenance activities in accordance with the provisions of the existing financial management agreement between DISTRICT and FAIRFIELD. As compensation for these supplemental services, DISTRICT agrees to pay $2500 per year in addition to compensation provided under existing agreement. Supplemental compensation shall be adjusted annually by the mechanism provided under existing agreement.

5. Mutual Aid – DISTRICT and CITIES agree to provide mutual aid and assistance for drainage maintenance when requested during emergency situations, and agree to reimburse each other for expenses related to said aid and assistance.

6. Effective Date – the effective date of this agreement shall be 12:01 A.M. July 1, 1988.

IN WITNESS the parties hereto have executed this Agreement on the day first above-written.

EXHIBIT A

Example Calculation of Local Facilities Maintenance Cost Allowance

Facility Inventory				Unit Maintenance		Total
Type of Facility	Units	No. of Units		Cost Allowance		Allowance
Storm drain pipes less than 33"	L.F.	200,000	X	$0.20	=	$40,000
Storm drain pipes greater than 33"	L.F.	15,000	X	0.20	=	3,000
Box culvert drains	L.F.	1,000	X	0.35	=	350
Improved Earth Channel	L.F.	15,000	X	2.50	=	37,500
Natural Creek	L.F.	25,000	X	2.00	=	50,000
				Total		130,850
				Less local contribution		-50,000
				District contribution		$80,850

San Francisco Bay Area Receiving Water Trash Monitoring

Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols

FINAL REPORT

Prepared for:

Bay Area Stormwater Management Agencies Association

Prepared by:

EOA inc.

APPLIED marine SCIENCES

June 2020

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List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
BASMAA	Bay Area Stormwater Management Agency Association
CCCWP	Contra Costa Clean Water Program
CEDEN	California Environmental Data Exchange Network
FSURMP	Fairfield Suisun Urban Runoff Management Program
MRP	Municipal Regional Permit
NPDES	National Pollution Discharge Elimination System
OVTA	On-land Visual Trash Assessments
OPC	California Ocean Protection Council
PMT	Project Management Team
QAPP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QA/QC	Quality Assurance/Quality Control
RTA	Rapid Trash Assessment
RMC	Regional Monitoring Coalition
RMP	Regional Monitoring Program
SCCWRP	Southern California Coastal Water Research Project
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFEI	San Francisco Estuary Institute
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SMC	Southern California Monitoring Coalition
SMCWPPP	San Mateo County Water Pollution Prevention Program
SOP	Standard Operating Protocol
WY	Water Year

EXECUTIVE SUMMARY

Provision C.10.b.v of the Municipal Regional Stormwater NPDES Permit (MRP 2.0), issued by the San Francisco Bay Regional Water Quality Control Board to 76 cities, counties and flood control districts in the SF Bay Area, requires public agencies to develop, submit and test a Receiving Water Trash Monitoring Program Plan (Trash Monitoring Plan). Version 1.0 of the Trash Monitoring Plan includes a description of the monitoring design and monitoring/assessment protocols.

In July 2017, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted the first iteration of the Trash Monitoring Plan to SF Bay Water Board staff for review and comment. The Final Trash Monitoring Plan that addressed all comments was submitted to the SF Bay Water Board staff in October 2017 (BASMAA 2017). Implementation of the Trash Monitoring Plan represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were applied during the MRP 2.0-specified timeframe of October 2017 to July 2020.

The MRP requires that the results of the testing phase of the Trash Monitoring Plan be submitted to the SF Bay Regional Water Board as a Final Report by July 1, 2020. The Final Report provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020. Monitoring Plan objectives and scientific monitoring questions outlined in the Trash Monitoring Plan were used to guide the evaluation of trash monitoring and assessment data results presented in this Final Report.

Monitoring Questions

1. Are significantly strong correlations observed between qualitative and quantitative methods?
2. What is the current level of trash deposited in flowing waterbodies in the entire MRP area?
3. What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
4. Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
5. What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
6. Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

The Trash Monitoring Plan primarily focuses on two types of monitoring designs: 1) **probabilistic** (randomly) selected monitoring sites that are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area; and 2) **targeted** sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. The design also includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Two trash assessment tools were developed and applied for the pilot testing phase of the Trash Monitoring Plan. **Qualitative** trash assessments are visual surveys of trash levels (i.e., conditions). Trained personnel assign a trash condition score from 1 to 12 (12 being the most trash) to a site based on the level of trash that is observed both within the water body and along its banks or shoreline within a defined assessment area. **Quantitative** trash monitoring entails removing, sorting and measuring the volume of trash that is found within the assessment area at a targeted site. Both quantitative trash

monitoring methods and the qualitative assessment methods were used at targeted sites to allow for the comparison of qualitative and quantitative approaches.

A total of 125 urban creek, channel and riverine probabilistic sites throughout the MRP Area were qualitatively assessed for trash. A total of 625 qualitative trash assessments were conducted over five sampling events (three during wet season and two during dry season) between October 2017 and March 2020. A total of 100 targeted sites were selected for both qualitative and quantitative trash assessments. A total of 200 trash assessments were conducted over two sampling events at targeted sites. Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara and San Mateo Counties.

Key Findings

1. Significant correlations were observed between qualitative trash condition scores and trash density (volume per unit area) at both regional and countywide scale. The visual assessment tool is recommended as a valid approach to assess conditions when using volume of trash as the indicator for trash conditions.
2. Regionwide, approximately 77% of the urban stream lengths in the MRP Area exhibit low to moderate levels of trash.
3. Trash condition scores at targeted sites were generally higher (more trash), compared to probabilistic sites.
4. Seasonality appears to have no effect on trash levels observed/measured at receiving water sites. Trash levels were highly similar between the dry and wet seasons. Storm intensity and frequency did not appear to have an influence on trash levels observed during the wet season.
5. Litter/Wind and Other/Stormwater trash pathways were the most frequent pathways reported at all monitoring sites, however, Illegal Encampments and Illegal Dumping trash pathways were associated with largest proportion of trash observed.

An evaluation of methods and monitoring design used during the pilot-testing phase of the Trash Monitoring Plan is provided in this report. This evaluation provides guidance for potential revisions to methods that may be used to monitor trash in receiving waters.

1 INTRODUCTION

The San Francisco Bay Regional Water Quality Control Board (Regional Water Board) has determined that trash is a pervasive problem near and in receiving waters, such as local creeks, rivers, and the San Francisco Bay Estuary (SFBRWQCB 2015). Trash can cause major impacts to beneficial uses, including recreation, aquatic life and habitat in those waters. Trash can originate on land or through individuals directly dumping/depositing trash into a receiving water or on its banks/shoreline. Eventually, trash present in local water bodies contributes to the global ocean ecosystem, where it can persist in the environment for hundreds of years, concentrate organic toxins, and be ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared, and can ingest trash that looks like prey, losing the ability to feed properly.

Between 2003 and 2005, trash levels and types deposited in local creeks and rivers were measured by the Regional Water Board using the Surface Water Ambient Monitoring Program's (SWAMP) Rapid Trash Assessment (RTA) Protocol. The Regional Water Board reported that data collected by SWAMP indicated that levels of trash in the waters of the San Francisco Bay region were very high (SFBRWQCB 2007). During 85 surveys conducted at 26 sites throughout the Bay Area, an average of almost three pieces of trash were observed per linear foot of creek. As a result of this new information, the Regional Water Board added 26 waterbodies in the region to the 303(d) list for the pollutant trash and concluded that this set of receiving waters was representative of the trash impacts present in all segments of local receiving waters that flow through urbanized watershed areas, and the shoreline of San Francisco Bay (Bay). Additionally, urban stormwater runoff was identified as an important pathway that transports trash from watersheds to these receiving waters. Identifying stormwater as an important pathway necessitated the inclusion of trash load reduction requirements in the Municipal Regional Stormwater NPDES Permit (MRP 2.0), Order No. R2-2015-0049.

MRP 2.0 was issued by the Regional Water Board on November 19, 2015 to 76 cities/towns, counties and special districts (Permittees). MRP 2.0 includes general stormwater management requirements, as well as those associated with specific pollutants. Provision C.10 of MRP 2.0 (Trash Load Reduction) requires Permittees to reduce trash discharged from their municipal separate storm sewer system (MS4) by demonstrable amounts in specific timeframes, install and maintain trash full capture systems, annually cleanup and assess trash hot spots in receiving waters, and conduct monitoring and assessment activities to address specific management questions regarding trash. Provision C.10.b.v entitled "Receiving Water Monitoring" requires Permittees to develop and test a receiving water trash monitoring program plan (Trash Monitoring Plan).

In July 2017, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted the first iteration of the Trash Monitoring Plan to Regional Water Board staff for review and comment. The Final Trash Monitoring Plan that addressed all comments was submitted to the Regional Water Board staff in October 2017 (BASMAA 2017). Implementation of the Trash Monitoring Plan represents the "pilot-testing phase" of trash receiving water monitoring in the San Francisco Bay Area, during which the pilot protocols and methods were applied during the MRP 2.0-specified timeframe of October 2017 to July 2020.

The overall goal of the Trash Monitoring Program Plan, as described in the MRP 2.0 Fact Sheet, is to establish:

> *"…the least expensive and simplest to use monitoring methods and protocols that are applicable to the various discharge and receiving water scenarios that accounts for the various receiving waters and watershed, community, and drainage characteristics within*

> *Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s). These and other factors, such as feasibility, location logistics, types of trash, complexity, and costs provide a means to focus and limit the number of monitoring tools and protocols, and determine spatial and temporal representativeness of the tools and protocols, representativeness of scenarios that will be tested." (Emphasis added)*

The Fact Sheet also indicates that Permittees may include assessment methods based on the *Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams* (SFBRWQCB 2007). Additionally, MRP 2.0 specifies that the development of receiving water monitoring tools and protocols and a monitoring program shall be designed, to the extent possible, to answer the following management questions:

1. Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)?
2. Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts?
3. Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?
4. Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?

Receiving water trash monitoring conducted through the Trash Monitoring Plan is intended to address these management questions by collecting initial information on the levels of trash in applicable receiving waters, the importance of site and watershed characteristics on trash levels observed/measured, and the relative contributions from important trash sources and pathways. Information and data collected during the testing phase of the Trash Monitoring Plan is not intended to address compliance issues associated with trash reduction requirements of the MRP. Compliance is achieved through other aspects of Provision C.10, including evaluations of the extent of certified trash full capture system implementation and the trash reduction effects of other management actions measured via On-land Visual Trash Assessments (OVTA) conducted on streets, sidewalks and other watershed land areas.

Provision C.10.b.v of the MRP requires that the results of the testing phase of the Trash Monitoring Plan be submitted to the Regional Water Board in two separate reports: 1) Preliminary Report by July 1, 2019; and 2) Final Report by July 1, 2020. This report serves as the Final Report for all MRP 2.0 Permittees and provides analysis of all information/data collected from trash assessments and monitoring conducted between October 2017 and March 2020. Trash assessment results, as well as the methods and approach used in the Trash Monitoring Plan, were evaluated by the BASMAA Project Management Team (PMT), regional stakeholders, and scientific peer reviewers.

2 BACKGROUND

2.1 TRASH MONITORING PLAN OVERVIEW

2.1.1 Monitoring Plan Development Process

The Trash Monitoring Plan was developed through a collaboration of the BASMAA Project Management Team (PMT), regional stakeholders and scientific peer reviewers. Permittees and SF Bay Regional Water Board staff developed a list of stakeholders who would be potentially interested in providing feedback on the Trash Monitoring Plan. Stakeholders included additional permittee representatives, and staff from environmental non-governmental organizations, USEPA, and Regional and State Water Boards.

BASMAA held three stakeholder meetings at key stages of the project to solicit input and share information. Additionally, stakeholders also had an opportunity to contribute information on existing monitoring tools and protocols. Stakeholders were provided the opportunity to review and provide comments on the Draft Trash Monitoring Plan. In some instances, follow-up discussions were necessary with individual stakeholders (e.g., Regional Water Board staff) to obtain clarification and guidance for moving forward with the project. A table of stakeholder comments received and BASMAA responses is provided as an attachment to the Trash Monitoring Plan (BASMAA 2017).

The development of the Trash Monitoring Plan utilized technical experts to review the monitoring tools, protocols and sample design. These peer reviewers were selected by the PMT based on their experience in designing and implementing trash receiving water monitoring programs and/or other types of water quality monitoring. Peer reviewers provided input on key topic areas, which assisted the PMT in developing an effective receiving water trash monitoring program.

2.1.2 Goals/Objectives of Monitoring Plan

The PMT developed specific goals of the Trash Monitoring Plan through the stakeholder engagement process to cost-effectively answer the MRP 2.0 management questions. These goals include:

- Informs management decisions;
- Accounts for the different stream and channel types, and considers temporal variability (e.g., to estimate baseline conditions and show change over time) and seasonality;
- Can assess trends over time;
- Helps to assess if the Permittees' trash reduction efforts are resulting in improvement;
- Allows for comparison of trash levels between sites (understand the range of levels of impact);
- Assists in determining relative contributions from different pathways (e.g., wind, illegal dumping, illegal encampments, MS4s);
- Leverages and exhibits consistency with existing monitoring efforts and other water quality monitoring programs, including direct discharge offset provisions (MRP Provision C.10.e); and
- Cost-effective, efficient and feasible (e.g., safe, access to sample locations, can be implemented by volunteer monitoring groups).

2.1.3 Trash Scientific Monitoring Questions

Project goals were used to guide the development of scientific monitoring questions that informed the study design and selection of methodologies used during the pilot-testing phase of the Trash Monitoring Plan. These scientific monitoring questions were developed to begin answering the broader

Management Questions listed in Table 2-1.

Table 2-1. Scientific monitoring questions developed to guide the design of the trash monitoring program and the methods used to monitor trash in receiving waters.

Management Question	Scientific Monitoring Question
1. Is trash present in receiving water(s) at levels that may cause adverse water quality impacts?	• What is the current level of trash deposited in flowing waterbodies in each MRP county; the entire MRP area? • Are significantly strong correlations observed between qualitative and quantitative methods? • What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
2. Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s) (*over time*)?	• What is the current level of trash deposited in flowing waterbodies in each MRP county; the entire MRP area? • Are significantly strong correlations observed between qualitative and quantitative methods? • Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?
3. Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)?	• What is the current level of trash deposited in flowing waterbodies in each MRP county; the entire MRP area? • Are significantly strong correlations observed between qualitative and quantitative methods? • What is the range of trash levels observed at sites targeted for cleanup? How do these ranges compare to levels in all flowing waterbodies?
4. Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)?	• What percentages of trash observed in receiving waters are attributable to wind/litter, illegal dumping, illegal encampments and other (stormwater/upstream sources)?
5. Is trash (if present) being transported from one receiving water to another, at levels that may cause adverse water quality impacts?	• Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?

2.2 Coordination with State Monitoring Project

In 2015, the State Water Resources Control Board (State Water Board) adopted an Amendment to the Water Quality Control Plan for the Ocean Waters of California (Ocean Plan) to Control Trash and Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries. Together these are referred to as the Trash Amendments. The Trash Amendments prohibit discharge of trash larger than 5 millimeters to state waters from stormwater systems.

The California Ocean Protection Council (OPC) sent a letter to the State Water Board supporting adoption of the Trash Amendments in 2015. The letter expressed the OPC's interest in the use of

scientific measures to track and verify program effectiveness. The OPC recognized that there is no agreed-upon scientific method to monitor for trash in receiving waters and that the lack of methods makes assessing progress on reducing trash in state waters difficult. In close partnership with the State Water Board, the OPC employed the Southern California Coastal Water Research Project (SCCWRP) and San Francisco Estuary Institute (SFEI) to begin evaluating and testing multiple trash monitoring methods with a goal of developing a library of methods with known levels of precision, accuracy, and cross-comparability of results. The methods tested would also be linked to specific management questions. The Trash Monitoring Methods Project sponsored by OPC is intended to provide the research needed to develop scientific measures to monitor macro (>5mm) trash in receiving waters.

The OPC/State Water Board Trash Monitoring Methods Project began subsequent to the finalization of the BASMAA Trash Monitoring Plan. As such, the methods developed via the BASMAA Trash Monitoring Plan were incorporated with other methods being used in Southern California and novel (e.g., aerial photography and machine-learning) methods developed as part of the OPC/State Water Board project. These three methods are currently being tested in coordination with MRP 2.0 permittee efforts described in this report. Additionally, MRP 2.0 Permittee staff participates on the OPC/State Water Board's Technical Advisory Committee (TAC) to provide further coordination on the testing of trash receiving water monitoring methods. This coordination is planned to continue throughout the term of both projects.

3 Data Collection and Analysis Methods

3.1 Study Area

The pilot-testing phase of the Trash Monitoring Plan focuses on initial evaluations of the extent, magnitude and pathways of trash present/deposited on the surface and banks of local creeks, channels, rivers and lakes/lagoons, and the shorelines of San Francisco Bay and the Pacific Ocean. The study area for the Trash Monitoring Program consists of receiving water bodies that are within the MRP Area, which includes portions of the five participating counties (San Mateo, Santa Clara, Alameda, Contra Costa, Solano) that are subject to MRP 2.0 requirements.

3.2 Monitoring Design

The Trash Monitoring Plan primarily focuses on two types of monitoring designs:

1) **Probabilistic Assessment Sites** – Randomly selected monitoring sites that were previously established for BASMAA's Regional Monitoring Coalition (RMC) Creek Status Monitoring Program. These sites are intended to represent the trash conditions in all creek, channel and riverine sites that flow through the urban Bay Area.

2) **Targeted Monitoring Sites** – Selected sites in urban creeks, channel and river segments and sites along San Francisco Bay shorelines where trash regularly deposits and is periodically removed by MRP Permittees. Includes a small number of targeted locations where trash booms are deployed to intercept trash prior to transport downstream to the San Francisco Bay.

Together, probabilistic and targeted sites are intended to represent the full range of trash conditions present in all water bodies flowing through the urban Bay Area that are subject to MRP 2.0 trash reduction requirements, and San Francisco Bay shorelines that may be impacted by contributions of trash from these flowing waters (e.g., creeks, channels and rivers). Brief descriptions of both types of

monitoring design and the associated sites are provided below, followed by descriptions of the types of monitoring methods deployed at each type of site.

3.2.1 Probabilistic Assessment Sites

Probabilistic trash assessment sites were chosen from the sample frame (i.e., stream network) developed by the RMC in 2012 for the Bay Area Regional Creek Status and Trends Monitoring Program (BASMAA 2012). The RMC sample frame includes all perennial and non-perennial creeks, channels and rivers that run through urban and non-urban areas within the five counties subject to MRP requirements. The sample frame was established using the United State Geological Survey (USGS) National Hydrography Dataset, which covers 3,567 miles of stream length in the five counties.

As part of the RMC's Regional Creek Monitoring Program, a pool of urban and non-urban probabilistic monitoring sites were previously established along the RMC sample frame at an average density of one site per 0.62 mile of stream length (i.e., total of 5,740 sites). Urban and non-urban probabilistic sites were previously selected (randomly) from this pool and monitored for physical, chemical and biological integrity as part of the Regional Creek Monitoring Program (2012-2019). The urban[1] sites previously monitored by the RMC formed the pool of sites for which probabilistic trash assessment sites were selected.[2] Additional details of the RMC sample frame and site selection process are summarized in the *BASMAA Regional Monitoring Coalition Five-Year Bioassessment Report Water Years 2012-2016* (BASMAA 2019).

A total of 125 probabilistic trash assessment sites[3] (approximately 7% of the urban sites in the RMC sample frame) representing urban creek, channel and river segments were initially selected for pilot-testing the Trash Monitoring Plan (Figure 3-1). Consistent with the Trash Monitoring Plan, Alameda, Contra Costa, San Mateo and Santa Clara Counties each selected 30 probabilistic assessment sites, and 5 sites were selected in Solano County. Trash assessments at these probabilistic sites focused on qualitatively observing and documenting trash levels and estimating the contributions of trash from different pathways. Because the vast majority of the trash assessment sites included in the Monitoring Program Plan were previously monitored by Permittees via RMC's Creeks Monitoring Program, these sites generally represent accessible locations where trash assessments could feasibly occur and permission to sample could be obtained. Probabilistic trash assessment sites were selected and evaluated in the order they appeared in the site pool to determine if each site met requirements outlined in the Trash Monitoring Plan and was physically accessible (including during higher flow conditions in the wet season). Evaluations of potential trash assessment sites were conducted following the methods presented in *Standard Operating Procedures for Ambient Creek Status Monitoring Site Evaluation* (BASMAA 2016).

3.2.2 Targeted Monitoring Sites

In addition to the 125 probabilistic sites, 100 targeted trash receiving water monitoring sites were selected and monitored (Figure 3-1). These targeted sites were generally known by MRP Permittees to accumulate trash. The vast majority of the sites were previously designated as "trash hot spots" and

[1] Probabilistic sites classified as urban are located within the boundaries of a city or a populated place.

[2] Non-wadeable and tidally influenced probabilistic sites that were originally removed from the site pool during creek status monitoring due to limitations in implementing standardized monitoring protocols at these sites, were added back into the pool of trash assessment sites due to interest in trash levels at these sites.

[3] During dry season sampling event in 2019, four of the sites were replaced due to issues related to physical access. As a result, a total of 129 probabilistic sites were assessed during the pilot testing phase of the project.

undergo periodic trash removal. These sites include segments of urban creeks, channels and rivers, and shoreline sites along the San Francisco Bay. To the extent possible, targeted trash monitoring sites were selected to represent a wide range of known trash levels in water bodies within a majority of MRP Permittee jurisdictions within each of the five MRP counties. The goal was to establish a pool of sites with a wide range of trash conditions as a basis to evaluate the relationship between qualitative and quantitative trash assessment tools. Consistent with the Trash Monitoring Plan, the following numbers of targeted sites were selected and monitored by Permittees in the following MRP counties: Alameda (29), Contra Costa (19), San Mateo (15), Santa Clara (32) and Solano (5).

It is important to note that each county used different criteria to select their targeted monitoring sites. Some counties selected targeted sites that contained illegal encampments with large quantities of trash. Other counties purposefully avoided selecting sites with illegal encampments for practical concerns and safety issues. Due to the discrepancy in the type of targeted sites and associated levels of trash, the quantitative assessment data collected at targeted sites were not compared between counties.

Targeted monitoring was conducted at nine trash boom locations in Alameda, Santa Clara and San Mateo Counties. Location description, agency/organization conducting maintenance, upstream drainage area and period of operation is presented in Table 3-1 and shown in Figure 3-2. Trash boom locations within the three counties include: (1) three booms along the shoreline of Lake Merritt in the City of Oakland, Alameda County; (2) two booms in the Lower Silver - Thompson Creek (tributary to Coyote Creek) and two booms at the bottom of the Adobe and Matadero Creek watersheds (both in Santa Clara County); and (3) two booms in the 16th Street and 19th Street Channels, located in San Mateo County.

Although trash boom monitoring was not identified as a required component of the Trash Monitoring Plan, MRP 2.0 Permittees agreed to conduct monitoring at these sites to better understand the utility of data from these locations and answer management questions outlined in MRP 2.0.

Table 3-1. Location description, drainage area, agency/organization conducting maintenance and period of operation for trash booms located in Alameda, Santa Clara and San Mateo Counties.

County	Jurisdiction	Maintenance	Location	Latitude	Longitude	Drainage Area (acres)	Period of Operation
Alameda	Oakland	Lake Merritt Institute	22nd and Harrison St (Outfall 56)	37.8102	-122.2623	35[1]	All Year
			Glen Echo Arm	37.8106	-122.2616	1609	
			Trestle Glen Arm	37.8081	-122.2500	1952	
Santa Clara	San José	Valley Water	Lower Silver Creek at King Rd	37.3604	-121.8642	12,056[2]	All Year
			Thompson Creek above Tully Rd	37.3292	-121.8106	14,205	
	Palo Alto	Palo Alto	Adobe Creek below Hwy 101	37.4324	-122.1050	8979	April - December
			Matadero Creek above Hwy 101	37.4397	-122.1142	7997	
San Mateo	City of San Mateo	City of San Mateo	16th Avenue Channel	37.5678	-122.2940	1218.3	All Year
			19th Avenue Channel	37.5526	-122.2901	1987	

[1] Total catchment area for storm drain is 138.4 acres; however full capture device at 22nd and Valley captures majority of trash; untreated drainage area upstream of the boom is 35 acres.

[2] Drainage area does not include area upstream Thompson Creek boom (assuming both booms are deployed at the same time). The total drainage area for Lower Silver Creek without Thompson Creek boom is 26,261 acres.

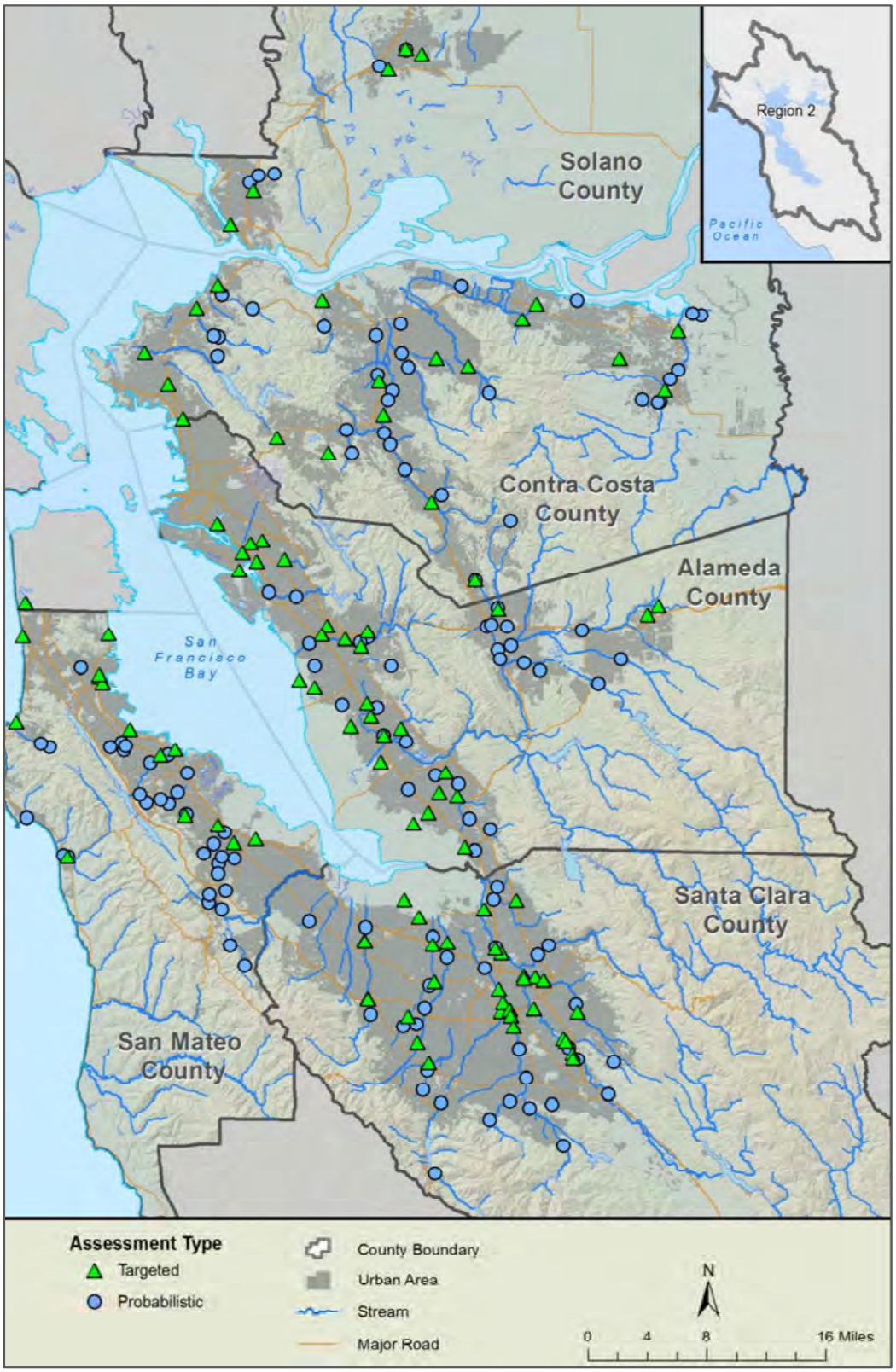

Figure 3-1. Locations of probabilistic and targeted receiving water trash monitoring and assessment sites included in the pilot-testing of the BASMAA Trash Monitoring Plan.

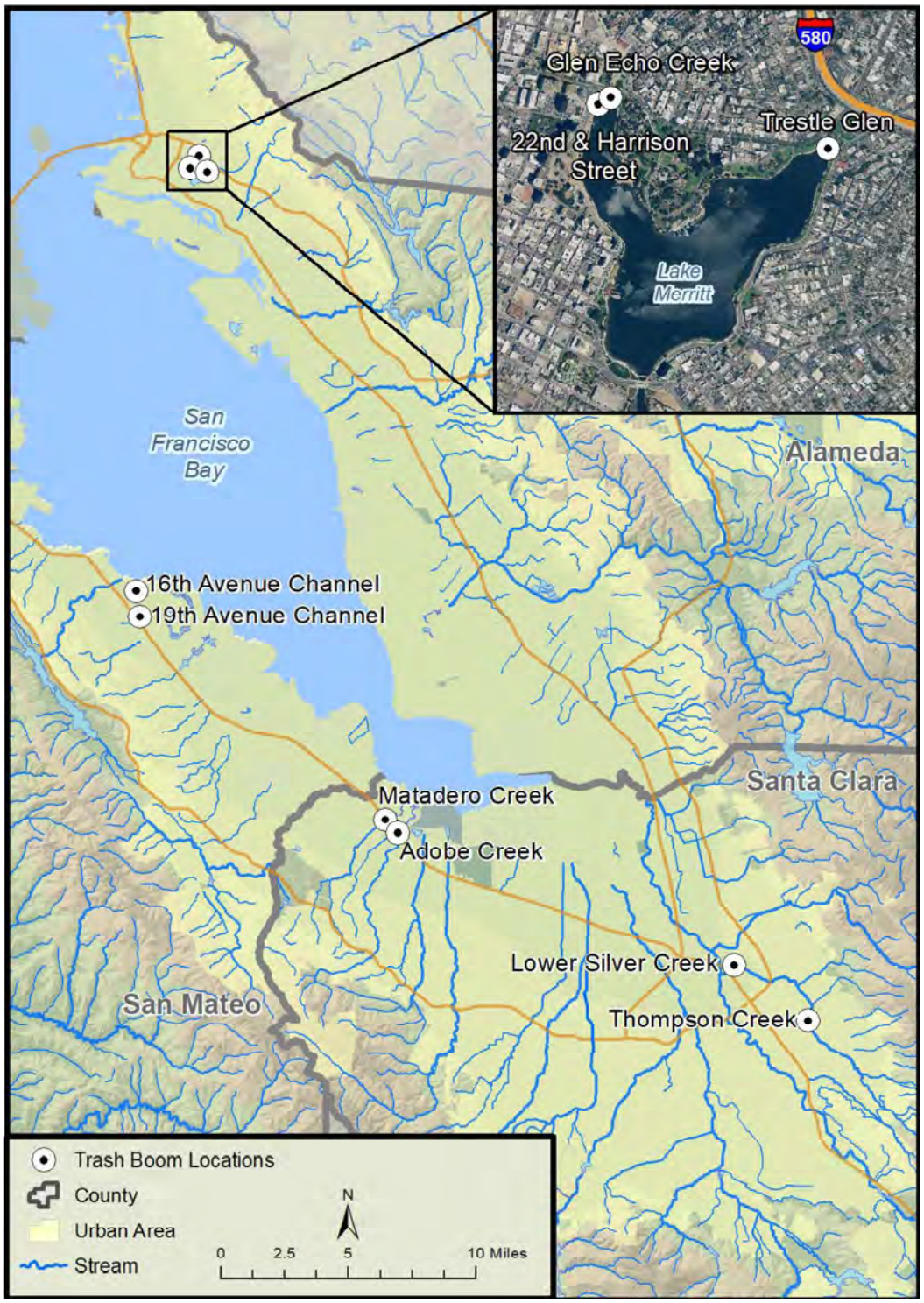

Figure 3-2. Locations of trash boom monitoring in the pilot-testing of the BASMAA Trash Monitoring Plan.

3.3 Monitoring Protocols and Data Collection

Standard Operating Procedures (SOPs) and associated field forms (Version 1.0) for conducting qualitative visual trash assessments and quantitative trash monitoring were developed as part of the Trash Monitoring Plan (BASMAA 2017). The SOPs and field forms were refined (Version 2.0) in July 2018 following recommendations by field staff after pre-monitoring calibration events, the initial assessment event at probabilistic sites, and the trainings conducted for field staff. Revisions of the SOPs primarily consisted of supplementing or modifying specific data fields that are associated with site characteristics. Summaries of qualitative and quantitative assessment methods are provided in Sections 3.3.1 and 3.3.2. Full descriptions of these methods are included in the Trash Monitoring Plan (BASMAA 2017).

3.3.1 Qualitative Visual Assessments

Qualitative trash assessments are visual surveys of trash levels (i.e., conditions) within a defined assessment area of a receiving water body. Trained personnel assign a **trash condition score** from 1 to 12 (12 being the most trash) to a site based on the level of trash that is observed both within the water body and along its banks or shoreline within a defined assessment area. Field personnel assign trash condition scores based on their first impression of the amount of trash that is visually observed within the entire assessment area.

Trash condition scores (1 to 12) are organized into four **trash condition categories** that include narrative descriptions of trash levels associated with the condition scores (Table 3-2). The four trash condition categories and associated condition scores are: Low (1-3), Moderate (4-6), High (7-9) and Very High (10-12). As part of the pilot testing phase of the Trash Monitoring Plan, trash condition scores were compared to trash volume data collected during the quantitative assessment (see Section 3.3.2) at targeted sites to validate the less intensive qualitative assessment method.

Qualitative visual assessments include documentation of site characteristics within the assessment area that may affect the transport and accumulation of trash. Site characteristic information includes predominant channel type (e.g., armored, levee, natural) and the proportion (%) of bank cover (e.g., grasses, shrubs, trees) and creek/channel cover (e.g., woody debris, aquatic vegetation, open/wet, dry) within the assessment area.

In addition to trash condition scoring, field crews estimated the relative contribution of trash associated with four different trash pathways: 1) Litter/Wind; 2) Illegal Encampments; 3) Illegal Dumping and 4) Other (Stormwater/Upstream Sources). The definition and characteristics for each of these four pathways are presented in Table 3-3.

During the testing of the Trash Assessment SOP, field crews determined that trash directly associated with stormwater and MS4s could not be accurately determined in the field. As a result, the "Other" category was created to include any trash that is transported by water to the assessment area from any upstream sources, including stormwater conveyances. Trash items identified as "Other" were typically small, transportable trash observed in the channel that appeared worn due to exposure from water (Table 3-3).

Because stormwater related trash is a component of the "Other" trash pathway, the amount or percentage of trash from stormwater could not be determined. However, the differences between the "Other" pathway and the remaining three trash pathways was investigated to provide information for identifying high priority pathways to inform management programs.

During qualitative assessments, the contribution of trash from each pathway was visually estimated and assigned a percentage between 0 and 100% (increments of 5%) of the total trash observed in the trash assessment area.

Table 3-2. Narrative descriptions of trash condition categories and scoring ranges for qualitative visual assessments in receiving waters.

Condition Category			
Low	Moderate	High	Very High
• Effectively no or very little trash • On first glance, little or no trash is visible • Little or no trash is evident when streambed and stream banks are closely examined for litter and debris • One individual could easily remove all trash observed within 30 minutes	• Predominantly free of trash except for a few littered areas • On first glance, trash is evident in low levels • After close inspection, small levels of trash are evident in stream bank and/or streambed • On average, all trash could be cleaned up by two individuals within 30 minutes to one hour • Approximately 2-3 times more trash than the low condition category	• Predominantly littered except for a few clean areas • Trash is evident upon first glance in moderate levels along streambed and banks • Evidence of site being used by people: scattered cans, bottles, food wrappers, plastic bags, etc. • On average, would take a more organized effort (more than 2 people, but fewer than 5) to remove all trash from the area. Removal of trash would take 30 mins to 2 hours • Approximately 2-6 times more trash than the moderate condition category	• Trash is continuously seen throughout the assessment area • Trash distracts the eye on first glance • Substantial levels of litter and debris in streambed and banks • Evidence of site being used frequently by people (e.g., many cans, bottles, food wrappers, plastic bags, clothing, piles of garbage and debris) • On average, would take a large number of people (more than 5) during an organized effort to remove all trash from the area. Removal of all trash would take more than 2 hours. • Approximately 2 or more times trash than the high condition category
1 2 3	4 5 6	7 8 9	10 11 12

Table 3-3. Characteristics of trash associated with each of the four transport pathways.

Pathway	Characteristics	Potential Location in Assessment Area
Litter/Wind	• Light weight • Distributed evenly, recent/not worn	• Adjacent to or under freeways and road crossings • Near roadways, bike or foot paths adjacent to the water body
Illegal Encampments	• Large items • Dense, multiple piles near current or abandoned camping site • No sign of water damage	• Adjacent to camps or trails • Banks, above and below high-water mark • Under bridges
Illegal Dumping	• Large items • Recent • Large piles, adjacent to roads	• Directly upstream or downstream of bridges • Near roadways
Other (Stormwater/ Upstream Sources)	• Small, persistent, transportable • Old, worn, water damaged • Integrated with vegetation, debris • Well distributed and mixed with debris	• Wetted channel • Banks below high-water line • Directly below outfalls

3.3.2 Quantitative Monitoring

Quantitative trash monitoring entails removing, sorting and measuring the volume of trash that is found within the assessment area at a targeted site. The collected trash is sorted into the four pathway categories (Table 3-2) and the volume of trash attributable to each pathway is quantified by using buckets or trash bags of known size. The quantified volume of trash for each trash pathway is then combined to establish the total volume of trash collected at each monitoring event. Materials that are too large to be placed in buckets or bags are stacked together (by pathway) and the volume of these materials is visually estimated using units of cubic feet or cubic yards. In addition, field crews identify the five most frequently observed types of trash (e.g., single use plastic grocery bags, beverage bottles) that are collected.

Both quantitative trash monitoring methods summarized above and the qualitative assessment methods described in the previous section were used at targeted sites to allow for the comparison of qualitative and quantitative approaches. At targeted sites, qualitative monitoring was conducted directly prior to (i.e., within 1-3 days) each corresponding quantitative monitoring event.

The removal of trash at a site via cleanup events that occur directly before or within a few weeks of assessment/monitoring events can potentially result in lower levels of trash observed at a site, in comparison with sites where recent cleanup events did not occur. Organized or informal cleanup activities that occurred prior to a trash assessment/monitoring event were documented at a small number of the targeted monitoring locations. However, most field crews did not document the last known trash cleanup event on data collection forms and therefore the data were not normalized to elapsed time between cleanup events.

Trash boom monitoring consisted of the removal and estimation of the total volume of trash that accumulated behind the booms during a known period of time. At some booms, trash was sorted and characterized; however, this information is not presented in this report.

3.3.3 Delineation of Assessment Areas

Trash assessments and monitoring was conducted within a defined assessment area within both probabilistic and targeted sites. A standard assessment length of 300-feet was used for sites located in creeks, channels and rivers. This is consistent with the length generally used by the RMC Creek Status and Trends Monitoring Program and for creek/channel trash hot spot cleanups required by MRP 2.0. For sites on creeks, channels and rivers, the width of the assessment area was specific to each site and extended to the upper portions of the banks where a majority of normal discharges and channel-forming activities take place. This creek/channel width is typically referred to as the “bankfull width” of the receiving water. The width of each trash assessment area on a creek or channel included the distance, as measured by the contour of the bank slope, between three equidistant bankfull locations at the middle and each end of each reach.

Trash assessments conducted at targeted sites along bay/ocean shorelines were typically 600 feet in length, which is consistent with the minimum length for trash hot spots, as described in MRP Provision C.10.c.i. For shoreline monitoring locations, the assessment area width was delineated as appropriate, based on a change in substrate material, presence of upland vegetation or the onset of development.

3.3.4 Field Staff Training and Calibration

Trash assessments were conducted by several entities representing MRP 2.0 Permittees (Table 3-4). For this reason, several field calibration events were conducted for field staff representing Permittees in Alameda, Contra Costa, Santa Clara, San Mateo and Solano Permittees to help standardize field data

collection methods. For Santa Clara and San Mateo, additional field training events were conducted to train permittee staff conducting both qualitative and quantitative trash assessments at targeted sites.

Table 3-4. Entities that conducted qualitative and/or quantitative trash assessment/monitoring at probabilistic and targeted receiving water monitoring sites in each county within the MRP Area.

County	Qualitative Assessments at Probabilistic Sites	Qualitative Assessments and Quantitative Monitoring at Targeted Sites
Alameda	Applied Marine Sciences (AMS)	SJ Conservation Corps & Charter School with AMS Supervision
Contra Costa	ADH Environmental	ADH Environmental
Santa Clara	EOA, Inc.	Municipal staff with EOA, Inc. supervision
San Mateo	EOA, Inc.	Municipal staff with EOA, Inc. supervision
Solano	Solano County Resource Conservation District	Solano County Resource Conservation District

3.4 Assessment/Monitoring Frequencies

Regionally, a total of 125 urban creek, channel and riverine probabilistic sites were initially selected and qualitatively assessed for trash. Qualitative visual trash assessments were conducted at a total of 30 probabilistic sites in Alameda, Contra Costa, Santa Clara and San Mateo Counties, and 5 sites in Solano County (Table 3-5). A total of five assessment events were planned at the probabilistic sites during the pilot testing phase of the Trash Monitoring Plan (October 2017 - March 2020). A total of 625 qualitative trash assessments were conducted over the five sampling events (three during wet season and two during dry season). During the 2019 dry season sampling event, four of the sites were replaced due to issues related to physical access. Thus there were 129 probabilistic sites that were assessed over the entire pilot study.

As described in the Trash Monitoring Plan, assessments are planned during three wet season events and two dry season events. Data collected during both seasons is intended to allow comparisons between dry and wet season trash conditions and accumulation rates in receiving waters. Dry season assessments are intended to provide information about non-stormwater sources and pathways, such as wind and illegal dumping. Wet season assessments provide information on the transport and deposition of trash resulting from stormwater runoff and transport from upstream locations.

In addition to the probabilistic sites, a total of 100 targeted sites were selected for qualitative and quantitative trash assessments. The total number of sites was determined based on population for each county: Santa Clara (32), Alameda (29), Contra Costa (19), San Mateo (15) and Solano (5). Targeted sites included 91 sites in urban creeks, channels, rivers and 9 sites along the shorelines of San Francisco Bay. Two quantitative monitoring events were planned at each targeted site during the pilot testing phase of the Trash Monitoring Plan; one during the dry season 2018 and one during dry season 2019. Trash monitoring at targeted sites coincided with Permittee's clean up events at known trash problem areas, which typically occur during the dry season each year. A total of 200 quantitative and qualitative assessments were conducted at 100 targeted sites.

Trash collected from trash booms was removed, bagged and measured (volume) during multiple monitoring events conducted at 9 locations (Table 3-5). The total number of monitoring events and the

period of trash accumulation at each boom were dependent on existing maintenance practices and thus varied among booms. Monitoring data were collected from each municipality/agency and compiled. The number of trash monitoring events ranged from 2 to 8 per boom, and the length of trash accumulation ranged from 6 to 230 days (refer to Table 4-10 for exact dates).

Table 3-5. Total number of sampling sites and events planned during pilot testing phase of Trash Monitoring Plan.

County	Probabilistic Sites (Qualitative Trash Assessments)			Targeted Sites (Qualitative and Quantitative Assessments)			Trash Boom		
	# Sites	Frequency	# Events	# Sites	Frequency	# Events	# Sites	Frequency	# Events
Alameda	30	5x	150	29	2x	58	3	2-4	8
Contra Costa	30	5x	150	19	2x	38	--		
San Mateo	30	5x	150	15	2x	30	2	3-8	11
Santa Clara	30	5x	150	32	2x	64	4	2-3	11
Solano (Vallejo, Suisun City and Fairfield)	5	5x	25	5	2x	10	--		
Total	**125**	**--**	**625**	**100**	**--**	**200**	**9**		**30**

3.5 Data Analysis Methods

All statistical, tabular, and graphical analyses were conducted using RStudio, running R version 3.5.0 (R Core Team 2018). The qualitative trash condition scores (1 to 12) defined in the Trash Monitoring Plan were used to evaluate all trash data collected at probabilistic and targeted sites. Four condition categories were used to distinguish these thresholds: "Low" (trash scores 1-3); "Moderate" (trash scores 4-6); "High" (trash scores 7-9); and "Very High" (trash scores 10-12).

To provide a standardized quantitative estimate of trash levels at targeted sites, trash volumes were converted to density (in units of gallons per square foot of assessment area) for all analyses, by dividing trash volumes (as a total and by pathway) by the site assessment area.

For all analyses of targeted data, multiple sampling events were kept separate when evaluating associations between qualitative and quantitative methods.

3.5.1 Estimating the Extent of Trash Levels in all Urban Streams

Cumulative distribution functions (CDFs) of qualitative trash condition scores were generated for probabilistic sites to estimate overall extent of trash levels within the urban portion of the sampling frame. The estimates were weighted based on total stream length of urban sites, divided by the total stream length in the urban area of the sample frame. Non-urban sites that were part of the original RMC creek status monitoring site selection process were excluded from the analyses of trash levels. Therefore, each urban trash monitoring site contributes an equal proportional amount of stream length to the extent estimates. The adjusted sample weights were used to estimate the proportion of stream length represented by trash condition scores regionwide. Condition estimates and 95% confidence intervals were calculated for all probabilistic results averaged across the five qualitative events, as well as for the trash condition scores generated from each seasonal sampling event individually. All calculations were conducted using the R-package *spsurvey* (Kincaid and Olsen 2016).

3.5.2 Boxplots and Descriptive Statistics

Boxplots and scatterplots were used to summarize the distributional characteristics of the data. In each boxplot, the horizontal line represents the median value, the bounds of the lower and upper box represent the interquartile range (IQR; representing the middle 50% of the data), and the lower and upper whiskers represent the 25th (Q1) and 75th (Q3) percentiles of the data plus 1.5 times the interquartile range (i.e. Q1 – 1.5*IQR or Q3 + 1.5*IQR), respectively. 'Outlier' values outside the whiskers are shown by points. Each set of seasonal assessment results was included (assessments performed at the same sites were not averaged).

Scatterplots are used to evaluate relationships between qualitative (trash condition scores) and quantitative (trash density) results. Linear regression lines were added for perspective only. Similarly, individual assessment results were included as is, and were not averaged.

3.5.3 Statistical Tests

Spearman rank correlation statistics (rho) were used to evaluate relationships between trash condition scores or densities and site characteristics (e.g., channel type, channel width, bank cover, channel cover), and pathways of trash. Each of the multiple trash condition scores collected at each site was used in analyses. For all analyses involving trash densities, only data for targeted sites were used. A p-value of < 0.05 was used to determine significance for all correlation analyses.

To test for statistical significance in trash densities among qualitative trash scores a Kruskal-Wallis rank sum test (a non-parametric analysis-of-variance) was performed, followed by pairwise comparison with adjustment for multiple comparisons. Non-parametric statistical testing was selected due to the non-normal distribution of trash densities that could not be corrected by transformation.

3.6 Data Quality

Field efforts associated with the Trash Monitoring Plan were covered under four Data Quality Objectives (DQOs) and Measurement Quality Objectives (MQOs) established within the Quality Assurance Project Plan (QAPP) to ensure that sound collection of data concerning trash loading was able to occur. Two qualitative DQO/MQOs of representativeness and comparability were put forth for the project, while two quantitative DQO/MQOs of completeness and precision were also established.

The quantification of trash loading is an inherently variable data type with respect to spatial and temporal characteristics, and the significant use of human judgment in associated trash data collection can increase the potential for bias. Given this, it was of importance to ensure effective training and consistent data collection principles so that the data quality goals encompassed within the four DQO/MQOs could be achieved.

A summary of data quality practices used for the project are provided in Appendix A.

4 Results and Discussion

The results and discussion presented in this section considers all data collected during the pilot phase of the Trash Monitoring Plan. The results are organized by the following sections and are intended to answer specific scientific monitoring questions outlined in the Trash Monitoring Plan:

4.1 Comparison of Qualitative Assessment and Quantitative Monitoring Results

- Are significantly strong correlations observed between qualitative and quantitative trash receiving water monitoring/assessment methods?

4.2 Levels of Trash in Urban Water Bodies in the MRP Area

- What is the current level of trash deposited in flowing waterbodies in each MRP county and the entire MRP urban area?
- Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?
- Do other site and landscape variables correlate with trash levels in flowing waterbodies?
- What trash levels are observed at sites targeted for cleanup? How do these levels compare to levels in all flowing waterbodies?

4.3 Contributions of Trash from Different Pathways

- What percentages of trash observed in receiving waters are attributable to stormwater conveyance systems, direct dumping, wind, and encampments?

4.4 Levels of Trash Observed in Receiving Waters Compared to Trash Discharged by Stormwater Conveyances

- Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?

4.1 Comparison of Qualitative Assessment and Quantitative Monitoring Results

Both qualitative visual assessments and quantitative monitoring of trash volumes and densities were conducted at targeted sites (n=100) to evaluate the correlation between these two receiving water trash monitoring methods. Correlations between qualitative and quantitative results would serve as the basis for validating the qualitative assessment methodology and provide the foundation for its potential use as a surrogate method for quantitative trash monitoring in receiving waters. A strong association between these methodologies would provide a reliable estimate of the trash volumes via qualitative assessment results with a known level of variance, and provide the basis for using the less resource-intensive qualitative assessment tool for future trash receiving water monitoring efforts.

Significant correlations were observed between the qualitative trash condition scores (1-12) and trash density estimates (volumes per surface area) at both regional and countywide scales (Table 4-1). A comparison of trash condition scores and trash densities for the two assessment events conducted at targeted sites is presented in Figure 4-1. During both assessments, trash densities were significantly higher at sites with *High* or *Very High* trash condition scores (i.e. $\geq$ 7 condition score), compared to densities measured at sites with *Low* or *Moderate* scores (i.e. $\leq$ 6 condition score). When pooling both events, the Kruskal-Wallis non-parametric statistical test showed a significant difference in trash densities among the 12 trash condition scores. However, multiple-comparison tests revealed that trash densities were only significantly different with trash conditions scores that were separated by large differences in scores (e.g. 4 vs. 8 and 5 vs. 10; $p < 0.05$), compared to smaller differences in scores (e.g., 5 vs. 6 or 9 vs. 10; $p > 0.05$). These results suggest that reducing the scoring range (e.g., 1-8) may statistically increase the difference between the condition categories.

Table 4-1. Correlations between trash densities (volume per unit surface area) and qualitative trash condition scores (1-12) at targeted urban receiving water monitoring sites in the MRP area. Each of the targeted sites was assessed twice (dry season 2018 and dry season 2019).

Strata[1]	Targeted Sites[2]	Correlation Coefficient (rho)	p-value
Alameda	24	0.42	0.003
Contra Costa	19	0.70	< 0.001
San Mateo	12	0.75	< 0.001
Santa Clara	31	0.72	< 0.001
Solano	**5**	**NR**	**NR**
Regional	**91**	**0.60**	**< 0.001**

NR – Not reported due to the low number of samples

[1] Solano County (n=5 sites; n=10 sampling events) is included in the regional evaluation, but had low statistical power to evaluate correlations at the county scale.

[2] Shoreline sites (n = 9) were excluded due to their poor association between qualitative score and densities. Thus, for some counties, the number of sites shown in the table are lower than what was previously presented in Table 3-5.

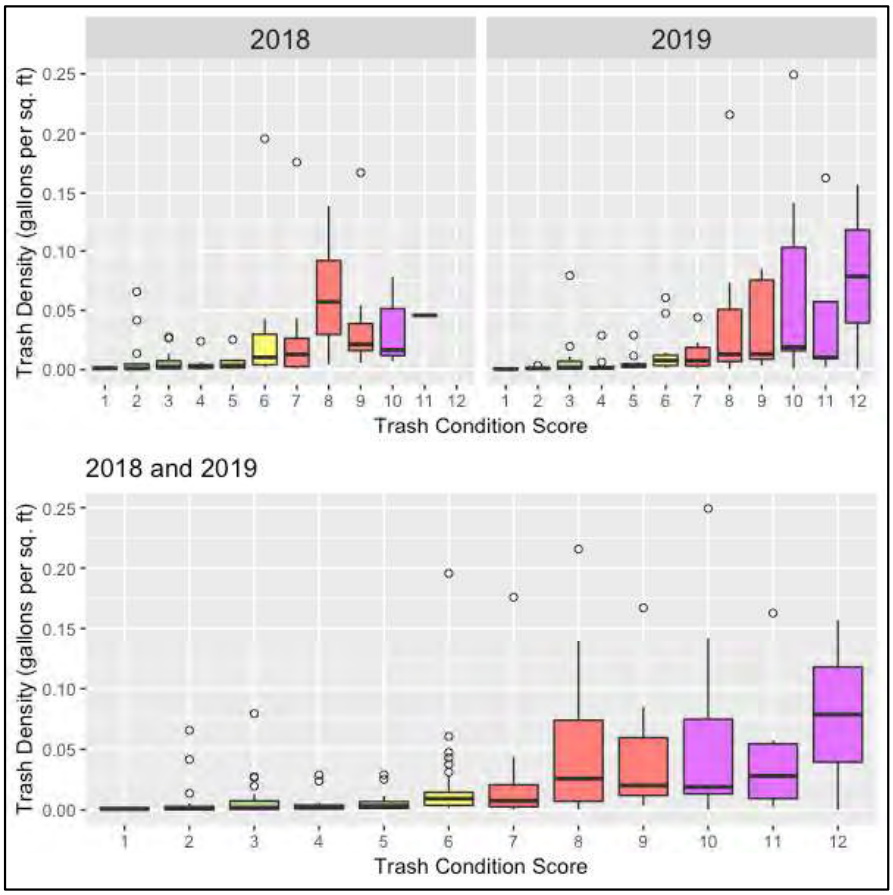

Figure 4-1. Comparison of trash densities (volume per unit surface area) and qualitative trash condition scores (1-12) at targeted receiving water monitoring sites (n=100) in the urban MRP area. Colors designate trash condition scores (Green = Low, Yellow = Moderate, Red = High, and Purple = Very High). Each of the targeted sites was assessed twice (dry season of 2018 and dry season 2019).

Organizing the trash condition scores presented in Figure 4-1 into the four broader trash condition categories shows a clear relationship with trash density (Figure 4-2), which visually confirms the positive correlations outlined in Table 4-1. Kruskal-Wallis non-parametric statistical testing showed that there was a significant difference in trash density among the four trash condition categories. A multiple-comparison test revealed that mean trash densities significantly differed between each of the condition categories, except for the *High* and *Very High* categories ($p = 0.30$). Trash densities between the Low and Moderate condition categories and the Moderate and High condition categories were significantly different ($p < 0.001$).

Based on the significant difference in trash densities between condition categories, descriptive statistics (mean density and quartiles) were calculated for the four condition categories during each of targeted assessments, as well as both targeted datasets pooled together (Table 4-2). During the 2018 assessment, mean trash density ranged from 0.0075 gal/ft^2 at sites corresponding to the *Low* condition category to 0.0439 gal/ft^2 for sites in the *High* condition category (i.e., approximately a factor of six). The mean density of the sites classed in the *Very High* condition category was slightly lower (0.0340 gal. per sq. ft)

than for the sites classed in *High* condition. This deviation is likely associated with the few number of sites (n=7) that represented the *Very High* condition and some sites having variable trash densities.

During the 2019 assessment, trash densities were lower than 2018, in each of the *Low* to *High* condition categories, ranging from 0.0058 to 0.0308 gal/ft^2. However, a significant number of targeted sites were classed in the *Very High* condition in 2019 (n = 18), which resulted in a notably higher mean density of 0.0619 gal/ft^2. Overall, combining the results from both assessments showed that the mean and median trash densities clearly increased with each successive trash condition category.

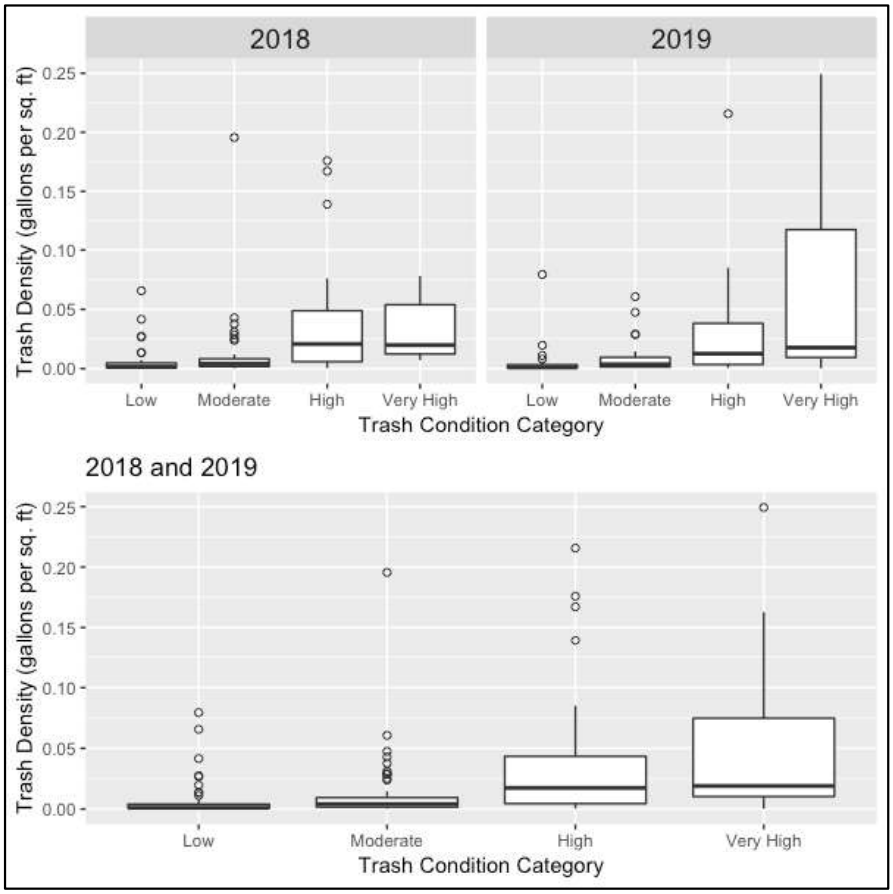

Figure 4-2. Comparison of trash densities (gallons per surface area unit) and qualitative trash condition categories at 100 targeted receiving water monitoring sites. Each of the targeted sites was assessed twice (dry season of 2018 and dry season 2019).

Table 4-2. Summary statistics for trash densities (gal/ft^2) and trash condition categories measured at 100 targeted sites in 2018, 2019, and combined.

Sampling Event	Condition Category	Number of Sites	Mean (gal. per sq. ft)	25th Percentile	50th Percentile	75th Percentile
2018	Low	31	**0.0075**	0.0006	0.0016	0.0048
	Moderate	43	**0.0124**	0.0018	0.0041	0.0083
	High	19	**0.0439**	0.0059	0.0208	0.0488
	Very High	7	**0.0340**	0.0123	0.0199	0.0539
2019	Low	26	**0.0058**	0.0007	0.0010	0.0033
	Moderate	24	**0.0089**	0.0015	0.0037	0.0095
	High	22	**0.0308**	0.0035	0.0126	0.0381
	Very High	18	**0.0619**	0.0095	0.0177	0.1171
2018 and 2019 Combined	Low	57	**0.0067**	0.0007	0.0011	0.0040
	Moderate	77	**0.0109**	0.0017	0.0041	0.0094
	High	41	**0.0368**	0.0045	0.0174	0.0434
	Very High	25	**0.0541**	0.0103	0.0190	0.0748

Outliers[4] shown (as open circles) in Figures 4-1 and 4-2 identify results where the trash density was higher than the 75th percentile + 1.5 times the interquartile range (an indicator of extreme values). There were outlier sites within each of the *Low, Moderate*, and *High* categories, suggesting that trash density can be highly variable among sites assigned a condition category. Closer examination of these outliers provides some insight into issues that may arise when applying both qualitative and quantitative assessment methods. These issues include:

- Trash was not visible in dense vegetation on the banks or under the water surface of the channel and was excluded from the qualitative assessment; however, this trash was removed and measured for the quantitative assessment.
- High volumes of trash occurred in a small proportion of the assessment area (e.g., under bridge), but the remaining area had low levels of trash; as a result, the overall site inappropriately received a low trash condition score during the qualitative assessment.
- High trash levels were observed at the site, but not all trash could be removed and measured due to access issues (e.g., deep water, muddy substrate) or safety issues related to illegal encampments. This example was often the case at shoreline sites, where trash was visible in mudflats which could not be safely accessed, removed and quantitatively measured.

These observations suggest that although correlations between qualitative and quantitative methods appear to be moderately strong, qualitative and quantitative results may not correlate well at every site due to the unique attributes of some sites.

[4] Data from outlier sites were included in the statistical analyses.

4.1.1 Effects of Channel Characteristics on Correlations between Qualitative and Quantitative Methods

Factors that may explain the relationship between qualitative trash condition scores or category and trash density were explored to inform the design of future receiving water trash monitoring. Figure 4-3 illustrates how channel type may affect this relationship. Although data are limited for certain types of sites (e.g., shorelines), trash condition scores correlate well with trash densities in different types of channels. Sites with concrete and natural channels had trash condition scores that spanned between 1 and 12, and exhibited similar relationships to trash density (i.e., slope of regression line ~ 0.008 gal/ft^2). Sites in earthen channels, however, had condition scores that ranged between 1 and 11 and exhibited a different relationship to trash density (i.e., slope of regression line ~0.002 gal/ft^2). Thus, for sites in natural and concrete channels, the trash density was higher for a given trash condition score, compared to earthen channels.

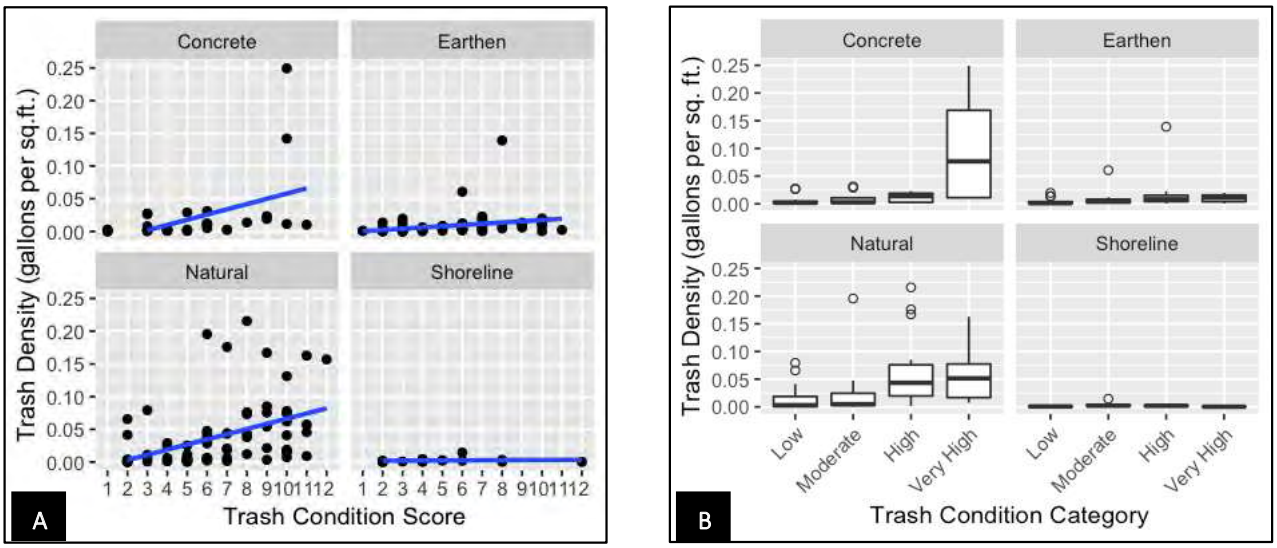

Figure 4-3. Comparison of trash densities and qualitative condition scores (A) and categories (B) observed at 100 targeted receiving water monitoring sites grouped by channel type. Each of the targeted sites was assessed twice (dry season 2018 and dry season 2019).

Although the dataset at shoreline sites is limited (n=18), trash condition scores did not tend to relate as well to trash densities as channels, presumably as a consequence of larger assessment areas where trash dispersion is less constrained that can occur farther away from the site than trash within stream channels. These observations suggest that not all channel types behave similarly in their mode of trash deposition. It should thus be considered in future monitoring that sites be selected or stratified according to different channel types, to ensure a full representation of receiving water conditions are assessed.

Overall, the comparison of qualitative assessments and quantitative monitoring indicates a strong association between the two methodologies. The results indicate potential regional differences in the relationships between the two methods, with Contra Costa, San Mateo, and Santa Clara Counties exhibiting higher correlations than Alameda County. Additionally, it appears that the relationship between qualitative and quantitative methods was weaker at the 1 to 12 scale, compared to categorical scale (i.e., *Low, Moderate, High, Very High*). There were less obvious delineations in trash levels between small incremental changes in condition scores, compared to the four categories. This pattern may suggest that refinements to the qualitative assessment SOP that reduces (or eliminates) the 1 to 12 scale may be

warranted. Alternatively, additional training and calibration of field crews to the current 1 to 12 scale may help improve the relationship to trash densities, along with additional training tools, such as video footage of trash deposition for each of the trash condition categories.

4.2 Levels of Trash in Urban Waterbodies in the MRP Area

4.2.1 Qualitative Visual Assessments at Probabilistic and Targeted Sites

Qualitative trash condition scores for the 129 probabilistic receiving water monitoring sites were used to conduct an evaluation of the extent and magnitude of trash in urban creeks and channels in the MRP area.[5] Table 4-3 illustrates the cumulative distribution results of trash condition scores (averaged over five events) for the regional probabilistic dataset. Condition scores at 40% of the urban probabilistic sites were in the *Low* condition category (i.e., condition score < 4) and 37% were in the *Moderate* category (condition score 4 to 6), indicating that approximately 77% (±13%) of the urban stream lengths in the MRP area exhibit low to moderate levels of trash. In contrast, 22% of the urban stream lengths in the MRP area had trash levels in the two highest condition categories, with only 2% in the *Very High* trash condition category. It is also notable that none of the sites assessed had an average trash condition score of 12.

The cumulative distribution results of the trash condition scores for each of the five monitoring events are shown in Appendix B - Table B1. The variability in trash condition scores for each probabilistic site is shown in Appendix B - Table B2 and for each targeted site in Appendix B – Table B3. Average trash condition scores at probabilistic and targeted stream sites in the region are illustrated in Figures 4-2 and 4-3. Trash condition scores for each site and event in each county are provided in Appendix C.

Table 4-3. Estimates of percent stream length (± 95% Confidence Interval) in the MRP urban area represented by average trash condition scores (1 to 12) and condition categories (Low, Moderate, High and Very High) based on observations at 129 sites within the 5 participating MRP counties.

Trash Condition Score	% of Stream Length (± 95% C.I.)	Trash Condition Category	% of Stream Length (± 95% C.I.)
1	5% (3%)	Low	40% (7%)
2	18% (6%)		
3	17% (6%)		
4	12% (6%)	Moderate	37% (6%)
5	16% (6%)		
6	9% (6%)		
7	12% (4%)	High	20% (2%)
8	6% (3%)		
9	2% (2%)		
10	1% (2%)	Very High	2% (0%)
11	2% (0%)		
12	0% (0%)		

[5] Condition scores from the 100 targeted sites were not used in this evaluation because of the uncertainty in the length of stream represented by these sites, beyond the length of the site. Targeted data were used, however, to compare to condition scores at probabilistic sites to evaluate whether the conditions observed at targeted sites (i.e., trash hot spots) were or were not represented in the probabilistic sample draw.

To estimate the total trash accumulation for urban streams in the MRP area, the trash density statistics from targeted sites was extrapolated to the extent of stream length represented by trash condition scores observed at probabilistic sites. In order to convert volumetric estimates to total accumulation, trash density (gal per sq. ft; Table 4-2) was first converted to linear distance by multiplying by the average assessment width of sites in each condition category. The trash accumulation (gal per ft) was then scaled to the entire MRP area (1,997 urban stream kilometers) by multiplying by the proportion of urban stream length represented by each condition category (Table 4-3). Table 4-4 presents the estimates of total trash accumulation for each condition category. The total accumulation of trash for all urban streams in the MRP area is estimated to be over 4 million gallons, based on trash density estimates from 2018 and 2019 combined. The majority of the trash accumulation is estimated to be derived from channels in the *High* condition category.

Table 4-4. Estimates of total trash accumulation represented by trash condition categories (Low, Moderate, High and Very High) based on observations at 129 probabilistic sites and 100 targeted sites within the 5 participating MRP counties.

Trash Condition Category	Length of Streams in the MRP Urban Area within each Category		Trash Accumulation Level in Streams within each Condition Category	
	km	%	gallons	%
Low	798.8	40%	568,382	14%
Moderate	738.9	37%	879,640	22%
High	399.4	20%	2,242,783	55%
Very High	39.9	2%	373,099	9%

The trash assessment scores from the targeted sites were compared to the results from probabilistic sites to determine if the range of conditions were similar between the two sample designs. The percentage of sites within each condition category was used to compare results. As presented in Table 4-5, 23% fewer targeted sites were in *Low* trash condition category, compared to the probabilistic sites, and more targeted sites were in the *Very High* condition categories than at probabilistic sites. A similar percentage of sites were observed in the *Moderate* and *High* condition categories between the two sampling designs. Targeted sites were selected by MRP Permittees as "trash hot-spots", thus higher trash scores would generally be expected at targeted sites compared to probabilistic sites. However, some of the targeted sites may have lower than expected trash conditions for several reasons, including recent cleanup activities (prior to assessment), exclusion of sites with illegal encampments, and overall low trash levels within some jurisdictional areas.

Table 4-5. Percentage of probabilistic and targeted sites in each trash condition category.

Trash Condition Category	Probabilistic Sites		Targeted Sites	
	% of Sites	# of Sites[1]	% of Sites	# of Sites
Low	40%	52	17%	17
Moderate	37%	48	47%	47
High	20%	26	26%	26
Very High	2%	3	10%	10
Totals		129		100

[1] Although 125 probabilistic sites were assessed during each event, 4 sites assessed during the first event were replaced with new sites before the subsequent monitoring events due to access issues.

Project results suggest that trash hot spot locations identified by MRP Permittees have higher levels of trash compared to the range of trash conditions observed at probabilistic sites. Additionally, these results may suggest that the probabilistic sites assessed via the Trash Monitoring Plan may not fully represent stream lengths with higher trash accumulation (i.e., trash hot spots).

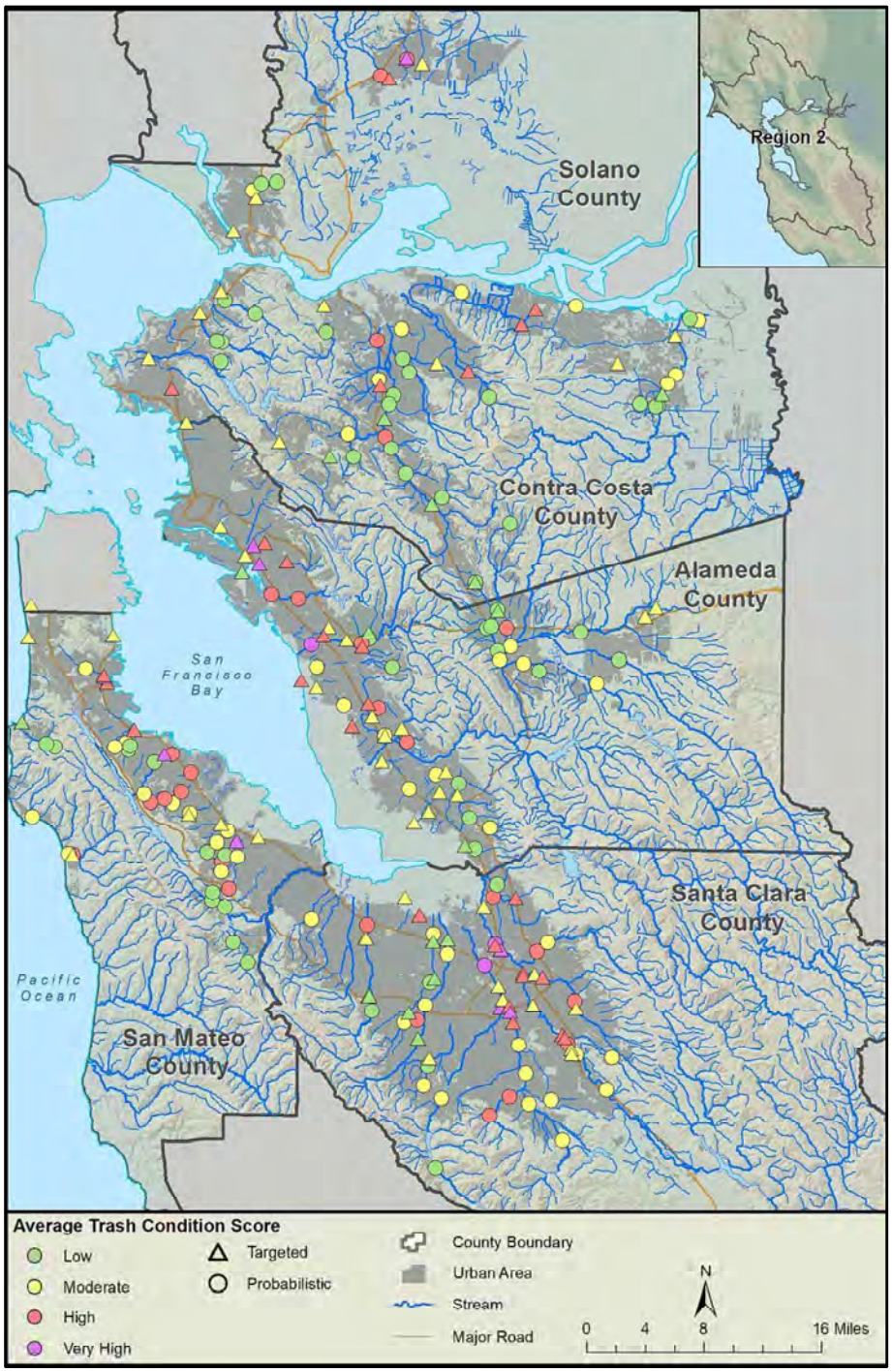

Figure 4-4. Average Trash Condition Scores for 129 probabilistic (average of 5 events) and 100 targeted (median of 2 events) sites in SF Bay Area urban streams and shorelines.

4.2.2 Associations with Site/Landscape Characteristics

To better understand patterns in the extent and magnitude of trash in receiving waters, all site characteristics (e.g., site width, bank cover, channel cover, and channel type) and descriptive site/landscape variables (e.g., range in flow, adjacent land use, number/size of storm drain outfalls, and evidence of public use) were evaluated for their potential association with trash condition scores and trash densities. Spearman correlation analysis, regression analysis, and data visualization were used to evaluate the relationship between site/landscape characteristics and qualitative trash condition scores at probabilistic and trash targeted sites combined, and between site/landscape characteristics and trash densities for targeted sites, where site/landscape characteristic data were available.

Bank and Channel Cover

Spearman correlation results for variables associated with the site width, and types of bank and channel cover are shown in Table 4-6. In general, site characteristic variables were weakly correlated or not correlated at all with qualitative trash condition scores. Higher assessment area widths (rho = 0.18), higher proportions of grasses (rho = 0.14), bushes (rho = 0.19), and trees (rho = 0.12) and lower proportions of armored banks (rho = - 0.21) were all significantly correlated ($p < 0.05$, indicating the correlation was non-zero) with trash condition scores. But there was no correlation with open/exposed banks. Similarly, trash conditions scores were not significantly correlated with the proportion of dry or open/wet channels, or aquatic vegetation/algae cover (i.e., $p > 0.05$). There was a very weak correlation of trash condition scores with woody debris (rho = 0.08, $p = 0.02$). The number of insignificant correlations and generally low correlation coefficients (rho < 0.2) suggests that size of assessment area, bank cover, and channel cover are ineffective groupings for stratification of sites by qualitative trash condition.

Table 4-6. Correlations between bank/channel cover variables and qualitative trash condition scores for all MRP urban sites (probabilistic and targeted). Variables with statistically significant correlations are bolded.

Site Characteristic	Variable	Correlation Coefficient (rho)	p-value
Width	**Contiguous Width**	**0.18**	**< 0.001**
Bank Cover	**% Grasses**	**0.14**	**< 0.001**
	% Bushes/Shrubs	**0.19**	**< 0.001**
	% Trees	**0.12**	**< 0.001**
	% Armored	**-0.16**	**< 0.001**
	% Open/Exposed	-0.01	0.88
Channel Cover	% Open/Wetted Channel	0.05	0.17
	% Woody Debris	0.08	0.02
	% Aquatic Veg/Algae	-0.04	0.30
	% Dry Channel	-0.06	0.06

Landscape Characteristics

Associations between descriptive landscape metrics, such as range in flow, adjacent land use, public use, and number/size of storm drain outfalls and trash condition (scores and densities) were evaluated. The degree of flow at a site was estimated during trash assessments by classification into a range of flow classes that varied from “dry” to “tidal”, as shown in Figure 4-5. There was no general pattern to flow and qualitative trash condition when all sites were combined. However, targeted sites with dry or with only isolated pools had lower trash density than sites in either the 0.1-1 cfs, 1-5 cfs, or 5-20 cfs flow

categories. In contrast, sites with higher runoff or those that were tidally influenced exhibited lower densities of trash that was relatively consistent amongst those sites. Presumably trash at these sites is more widely dispersed, leading to a lack of association with flow and trash density.

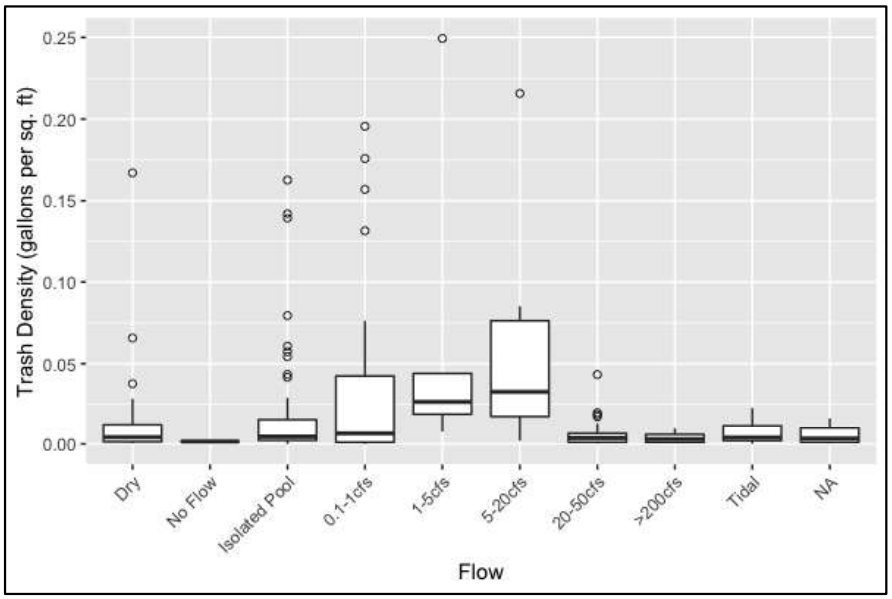

Figure 4-5. Comparison of estimated stream flow and trash density (gal/ft^2) at targeted sites (n=92) sampled during the two dry season assessments (2018 and 2019).

Adjacent land uses were characterized for each assessment site using broad land use categories. Each site was classified into two to four categories, including "residential", "commercial", "industrial", "freeway", "public", and/or "open/park." To assess associations among trash levels and adjacent land uses, the number of sites in each land use category was calculated. Six land use categories were found to be most frequently occurring, irrespective of trash condition category. Sites adjacent to "residential" (including single and multi-family) and "open/park" comprised at least half of all land use designations in the *Low* to *High* trash categories (Figure 4-6). In contrast, sites corresponding to the *High* and *Very High* trash condition were more frequently adjacent to higher proportions of "freeway" and "industrial" land use categories, compared to sites in either *Low* or *Moderate* condition categories. The proportion of commercial land use was relatively consistent between sites with different condition categories, comprising 12% to 22% of the adjacent land uses.

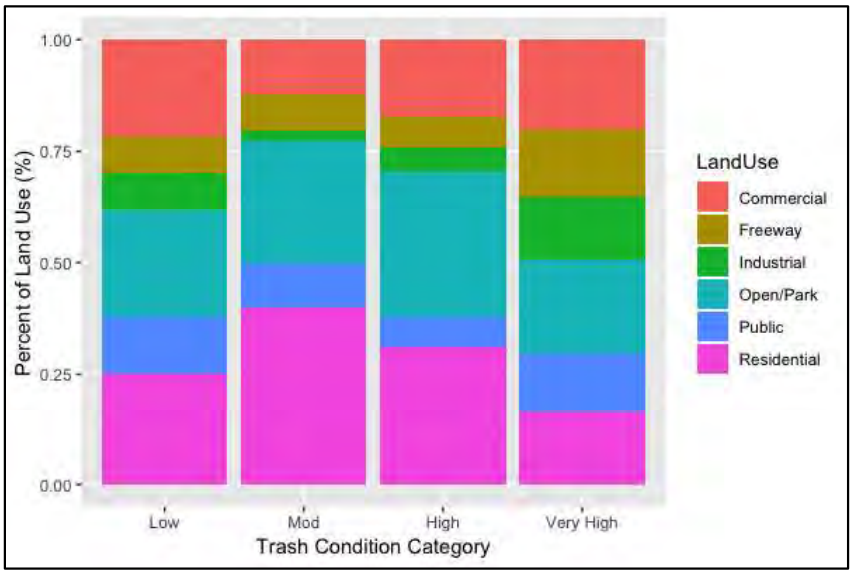

Figure 4-6. Comparison of trash condition categories observed at monitoring sites and the predominate land uses adjacent to these sites.

Evidence of public use was also recorded during surveys based on the categorical assessment scale of "None", "Low", "Moderate" or "High" observed during each assessment (Figure 4-7). As predicted, sites with higher levels of public use generally exhibited higher trash densities. A Kruskal-Wallis statistical test confirmed there was a significant difference in trash density by public use category, where sites classed in the "High" public use category had significantly higher mean trash density than sites in either the "Low" or "Moderate" public use classes.

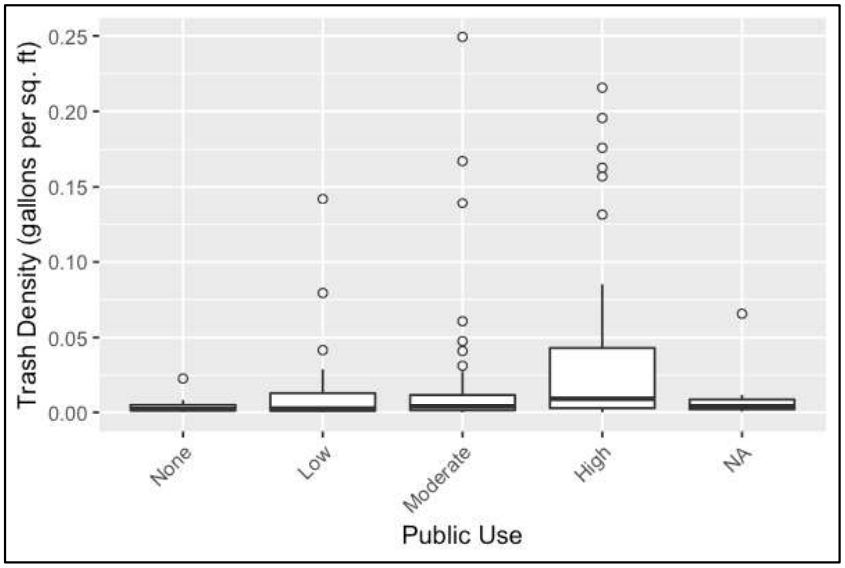

Figure 4-7. Comparison of public use levels and trash density at targeted sites sampled during two dry season assessments (2018 and 2019).

Correlations between the number and size of stormwater outfalls that were observed in the assessment area, and trash condition scores or trash densities were also examined. There was a weak correlation (rho = 0.09 – 0.14, $p < 0.05$) in trash condition scores and the number of outfalls in each of the size classes (18-

24”, 24-36”, 36-48”, > 48”). Similarly, targeted sites showed a modest association between the abundance of stormwater outfalls and total trash density (Figure 4.8).

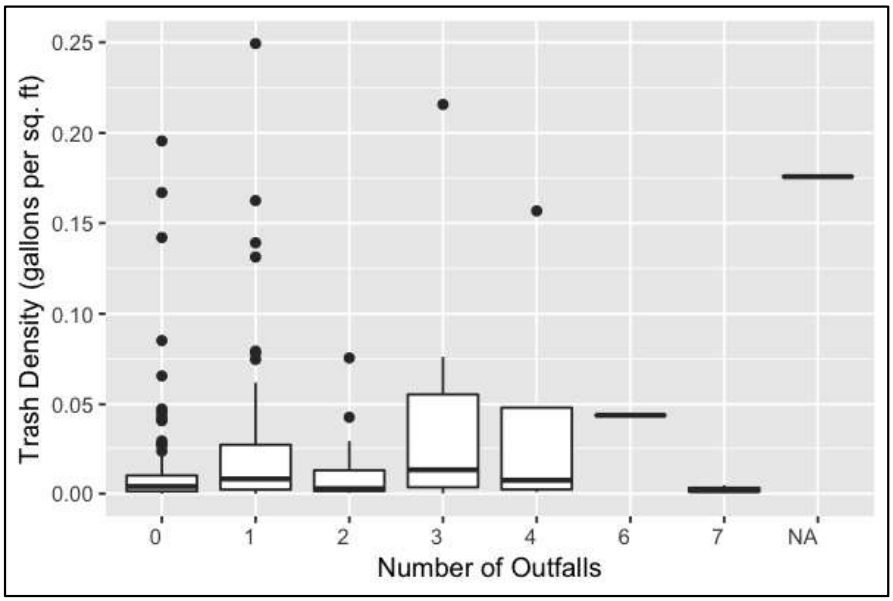

Figure 4-8. Total number of stormwater outfalls compared to the average trash density observed at targeted sites during two dry season assessments (2018 and 2019).

Overall, the comparison of site characteristics to trash densities and condition categories at receiving water monitoring sites suggests that neither bank and channel cover characteristics, magnitude of water flow at the time of the assessment/monitoring event, or the level of public use at the site can be used to fully explain the variations in trash conditions observed at probabilistic and targeted sites. The extent of natural vegetation along banks at a site appears to be somewhat positively correlated to trash condition scores, while the extent of armored banks is negatively correlated to scores. One hypothesis to explain these observations is that natural channels that have riparian vegetation and diverse instream substrate (both woody debris and varying sizes of substrate) “intercept” trash more effectively than channels with fewer obstructions. Similarly, sites with the largest flows observed or high levels of accessibility do not necessarily equate to higher trash densities, though at some sites this may occur. These observations suggest that the largest sources of variations in trash condition scores may be from other factors associated with the wide range of trash sources and pathways, in addition to the site-specific factors evaluated through this pilot project.

4.2.3 Contributions of Trash in Receiving Waters During Different Seasons

Between October 2017 and March 2020, three qualitative trash assessments were conducted during the wet season (October – March) and two assessments were conducted during the dry season (April – September) at the 125 probabilistic sites. Concurrent with the two dry season events, two assessments were conducted at an additional 100 targeted sites. As illustrated in Figure 4-9, the rainfall patterns during each of the three wet seasons differed substantially. During the wet season of 2017-18, storms were infrequent, short and had the highest intensity of the three water years. In 2018-19 wet season, storms were generally more frequent, longer, but less intense. The 2019-20 wet season (through March 2020) had very few storms that were of predominantly lower intensity than most storms occurring in either of the preceding two wet seasons. Despite the differences in rainfall, the distributions of trash

condition scores had minimal differences between wet seasons at probabilistic sites (Figure 4-10). The median of trash condition scores for all probabilistic sites monitored in each wet season (2017-18, 2018-19, 2019-20) was 4 (Moderate) on the 1 to 12 scale. In comparison, the median trash condition score (3) for all probabilistic sites during the 2018 dry season was slightly lower than the median score (4) for the 2019 dry season.

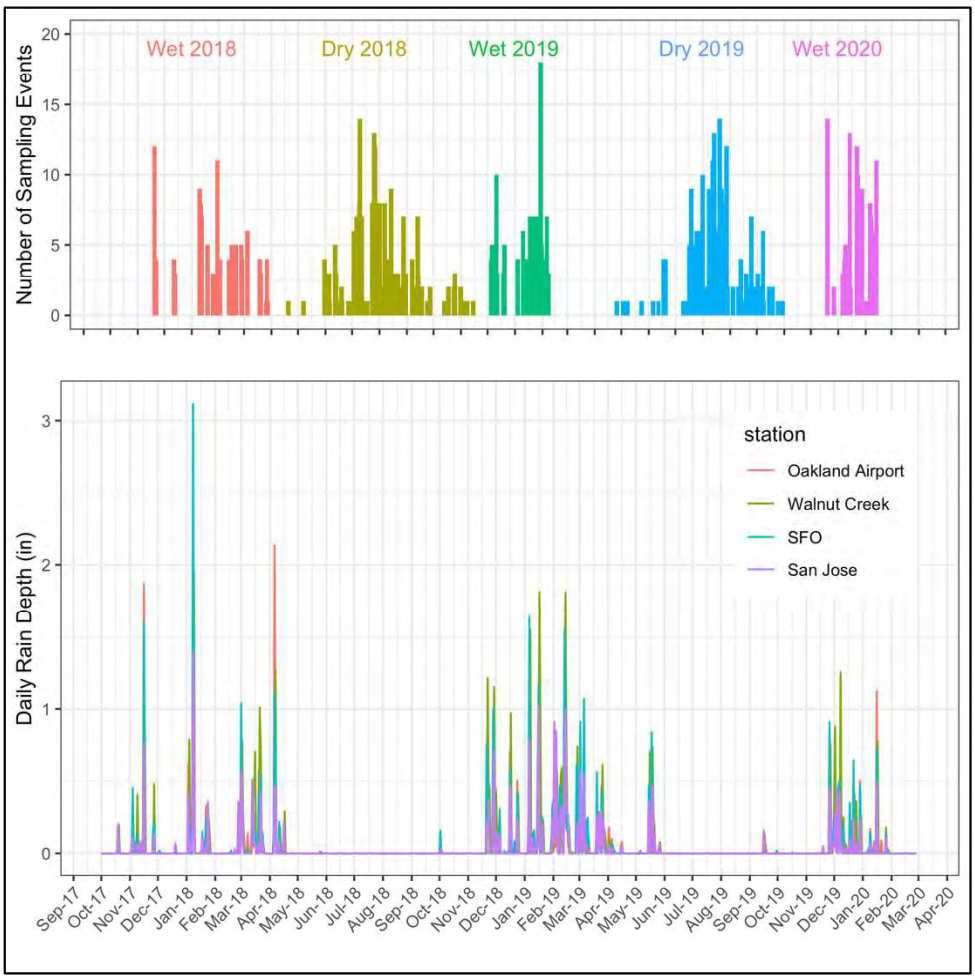

Figure 4-9. Daily precipitation (inches) recorded at four stations across the SF Bay Area from October 2017 through March 2020, and the number of probabilistic and targeted sampling events during that timeframe.

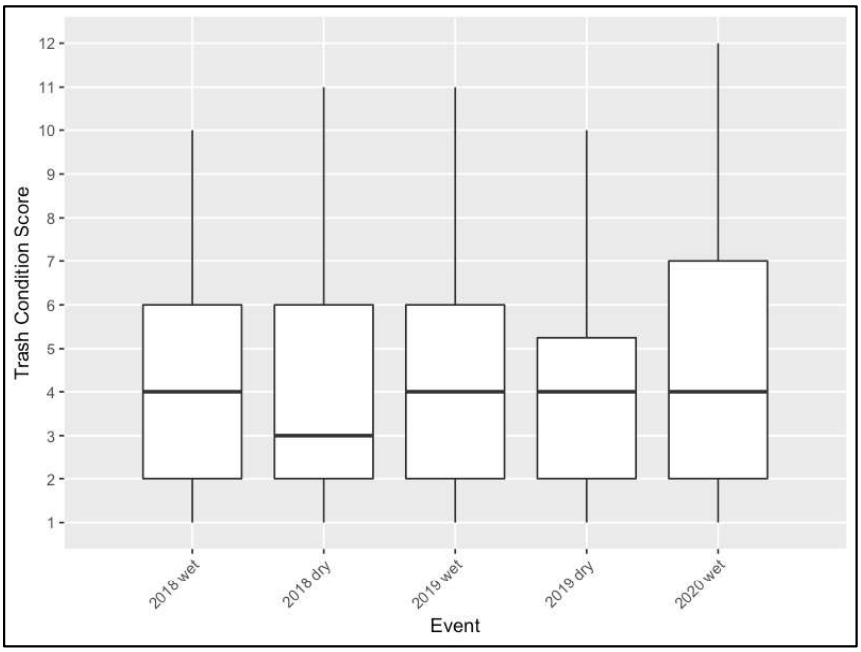

Figure 4-10. Ranges of trash condition scores at probabilistic sites during the 2018, 2019, and 2020 dry and wet season monitoring events.

The trash conditions observed at probabilistic sites indicated that slightly higher trash levels occurred during the wet season events compared to the dry season events. Figure 4-11 illustrates the proportion of probabilistic sites in each of the four trash condition categories for the five events. The proportion of sites in the *High* and *Very High* categories ranged between 22% and 25% for all wet season events, compared to 15% for both dry season events. The proportion of sites in the *Low* category was slightly higher in the dry season (48%-53%) relative to each of the wet season events (42% - 46%). Higher trash conditions during the wet season may be influenced by recent deposition of trash following storm events which mobilized trash to the site from either upstream in-stream sources (e.g., illegal encampments or dumping) or through the stormwater pathway. Additionally, trash is generally more visible during the wet season, when riparian vegetation is less dense, which could affect trash condition scores.

Anecdotal information from field crew experience indicates that dry season is a better time period to physically access the creek and visually observe trash in the channel and along the banks, when stream flows are reduced or creeks/channels are dry. In addition, trash from other pathways (e.g., litter/wind) may be more visible at some locations (e.g., bridges) when flows are lower and the transport of trash downstream is not actively occurring.

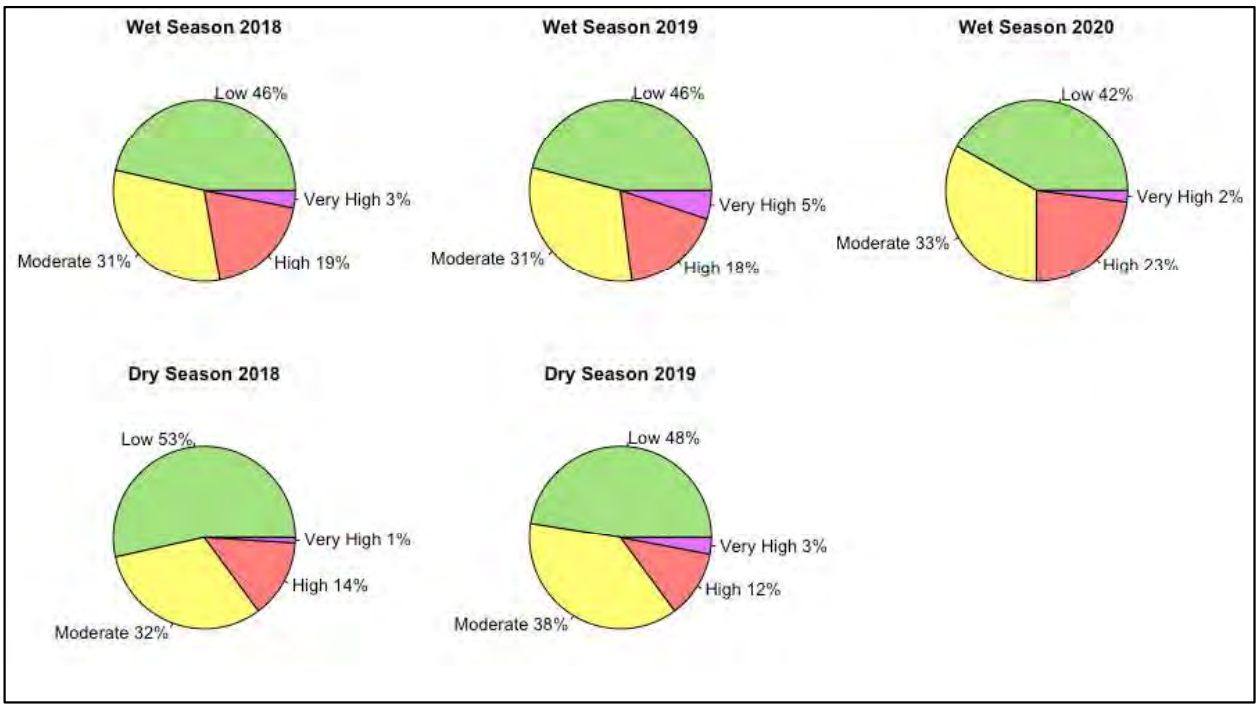

Figure 4-11. Comparison of trash conditions at probabilistic sites for wet and dry season (2018, 2019 & 2020) sampling events.

4.3 Contributions of Trash in Receiving Waters from Different Pathways

The BASMAA trash assessment qualitative and quantitative monitoring protocols include the identification of trash pathways. Field personnel qualitatively identified trash pathways at all sites (both probabilistic and targeted) and estimated the volume of trash from each pathway at targeted sites. Contributions from one or more of the following four pathways were documented: 1) litter/wind; 2) illegal dumping; 3) illegal encampments; and 4) other/stormwater. One of the goals for this project was to determine the relative contribution of trash observed at monitoring sites that is associated with the "Other/Stormwater" pathway.[6] The trash dataset was evaluated to answer the following questions:

- How well do qualitative and quantitative approaches to assessing contributions from different trash pathways compare?
- What are the prevalent pathways of trash observed in receiving waters?
- What are the relationships between trash pathways and trash levels?
- What are key factors that influence trash pathways?

4.3.1 Comparison of Qualitative and Quantitative Approaches

Prior to presenting the information collected on the relative contributions of trash to probabilistic and targeted sites from each of the four pathways, it is important to compare trash pathway contributions

[6] "Other/Stormwater" pathway includes trash that appears to be associated with stormwater and unknown upstream sources (i.e., trash transported by flow and deposited further downstream).

that were determined via two different approaches: 1) qualitative visual assessments and 2) volumetric measurements. Figure 4-12 presents the results of linear regression analyses conducted on data collected at targeted sites (n=100) on the relative (%) contributions by the four pathways using quantitative and qualitative approaches. Based on these analyses, it appears that the qualitative and quantitative approaches were well correlated ($r^2 > 0.7$) for two (i.e., litter/wind and homeless encampments) of the four pathways.

Multiple pathways were identified for the vast majority of the targeted sites using both the qualitative and quantitative approaches. Trash items associated with the litter/wind and other/stormwater pathways are typically light weight and smaller in size (e.g., single-use food ware, plastic bags, cigarettes), and therefore typically contribute smaller proportions of the overall trash volume at sites where the illegal dumping and/or illegal encampment pathways are also present. As a result, the estimates of trash from the litter/wind and other/stormwater pathways have lower regression slopes compared to the illegal encampment pathway, which is associated with larger items.

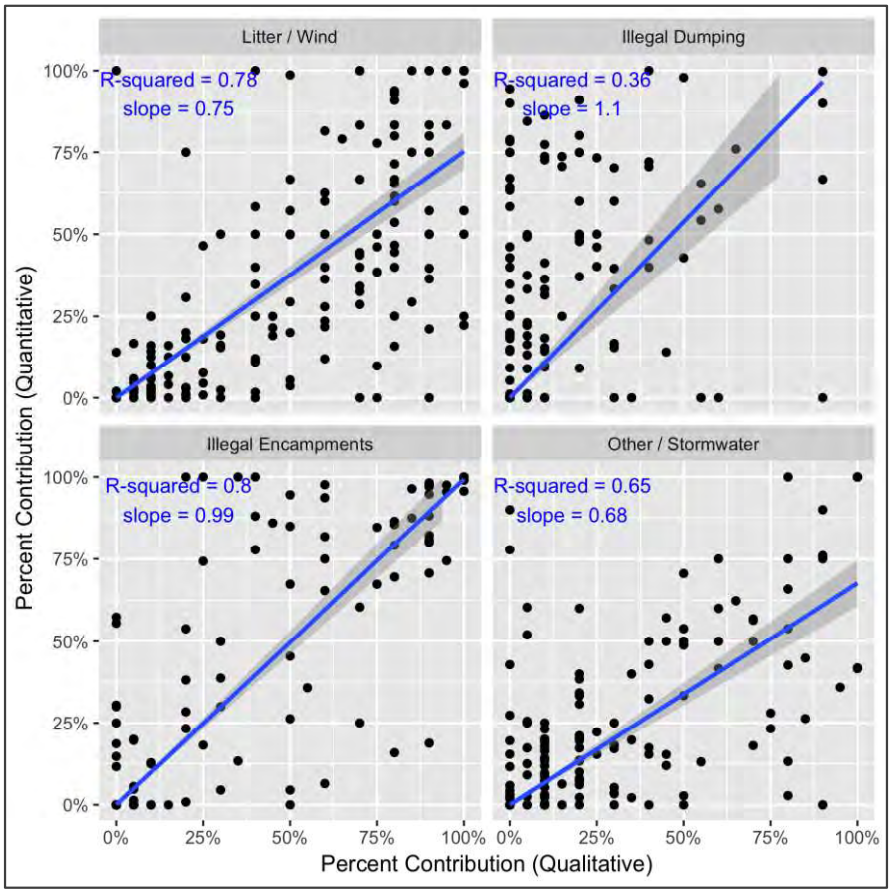

Figure 4-12. Comparisons of quantitative (volume measurements) and qualitative (visual estimate) approaches to relative contributions of trash from four trash pathways at 100 targeted monitoring sites sampled during two monitoring events (n = 200).

4.3.2 Prevalent Trash Pathways

The prevalence of each trash pathway was evaluated by qualitatively assessing whether the pathway was (or was not) identified as a contributor of trash to each site (Table 4-7). The two most common pathways identified as contributors were litter/wind (90% of events) and other/stormwater (78% of events). The

illegal encampment pathway was the least represented pathway (24% of events). These results indicate that trash from the wind/litter and other/stormwater pathways are most prevalent at all sites. Illegal dumping and illegal encampment pathways had higher relative contributions at the targeted sites, compared to the probabilistic sites. This result is expected since these sites were originally selected as trash hot spots, many of which included high trash areas that were associated with illegal encampments.

Table 4-7: Total number and percentage of events at probabilistic and targeted sites when trash from a given pathway was reported as contributing trash to the trash monitoring site.

Type of Site	# of events included in analysis[1]	# of Events where the Pathway was Identified (%)			
		Litter / Wind	Illegal Dumping	Illegal Encampments	Other / Stormwater)
Probabilistic	607	559 (92%)	160 (26%)	117 (19%)	483 (80%)
Targeted	198	166 (84%)	79 (40%)	79 (40%)	141 (71%)
Totals	**805**	**725 (90 %)**	**239 (30 %)**	**196 (24 %)**	**624 (78 %)**

[1] The number of sites included in this analysis are smaller than the total number of monitoring events because of data quality issues with 16 probabilistic sites and 3 targeted sites, as related to pathway determinations.

4.3.3 Relationships Between Trash Pathways and Trash Levels

Although illegal encampments and illegal dumping pathways were less prevalent at targeted and probabilistic sites compared to litter/wind and other/stormwater, these two pathways were associated with the largest volumes of trash observed at sites. During the two targeted monitoring events (dry season of 2018 and 2019), trash volumes were measured for each of the four pathways. In total, about 14,000 gallons of trash in 2018 and 21,000 gallons in 2019 were associated with illegal encampments and illegal dumping, while the litter/wind and other/stormwater pathways combined, accounted for about 3,000 gallons of trash in each event (Figure 4-13).

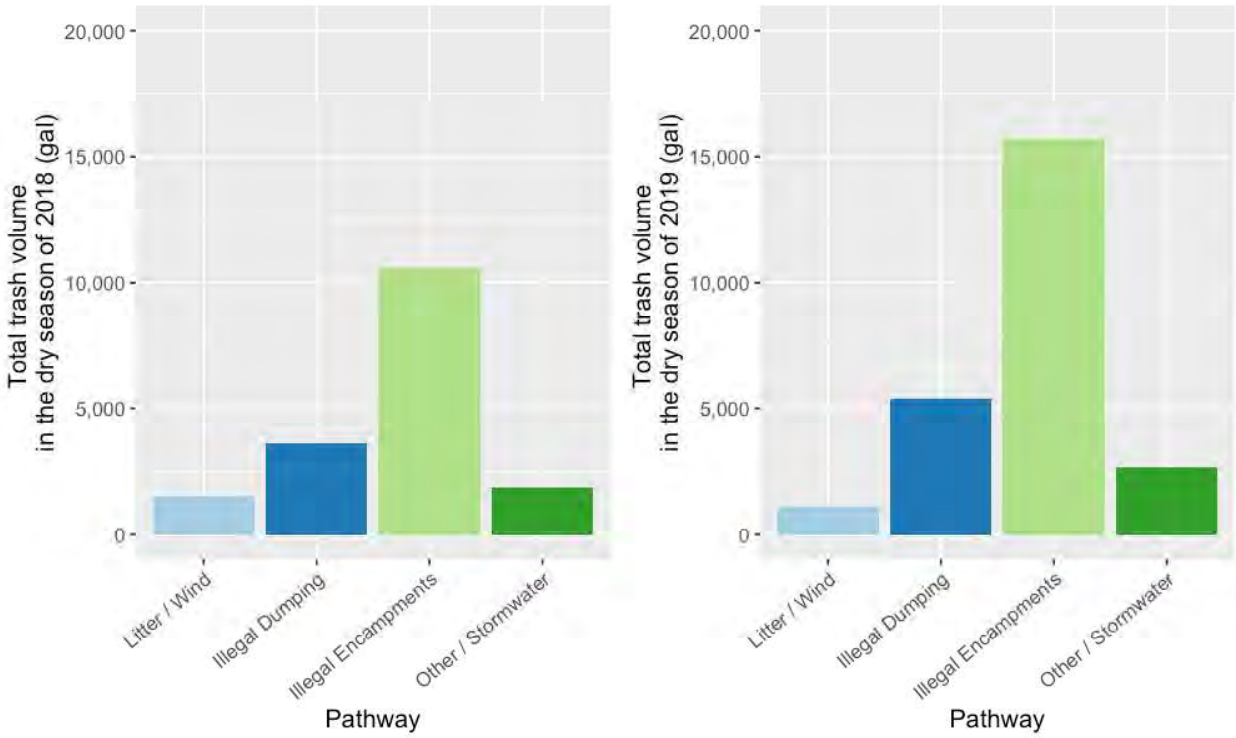

Figure 4-13. Total trash volume for each of the four pathways measured at targeted sites.

The positive association between illegal encampments and illegal dumping pathways, and trash condition scores and volumes, was confirmed using statistical correlation tests. The Spearman correlation analysis presented in Table 4-8 examined correlations between the relative contributions by each trash pathway and the trash condition score observed at the probabilistic and targeted sites. At probabilistic sites, higher trash condition scores were correlated to higher proportions of trash from the illegal encampment and illegal dumping pathways. In contrast, lower condition scores were correlated to proportions of trash from the litter/wind pathway. The contribution of trash from the other/stormwater pathway did not exhibit a correlation to trash condition scores at either targeted or probabilistic sites. That said, it should be noted that contribution estimates are relative percentages and a negative correlation does not indicate that there is less trash from the litter/wind pathway, but merely that this pathway is less dominant, compared to other pathways (i.e., Illegal dumping and Illegal encampments).

Table 4-8. Correlations between qualitative trash condition scores and the qualitative estimation of trash contributed from different pathways at probabilistic (n=129) and targeted (n=100) sites.

	Probabilistic		Targeted	
Pathway	Correlation Coeff. (rho)	p-value	Correlation Coeff. (rho)	p-value
% Litter / Wind	**-0.30**	**< 0.001**	**-0.42**	**< 0.001**
% Illegal Dumping	**0.48**	**< 0.001**	0.12	0.24
% Illegal Encampment	**0.50**	**< 0.001**	**0.53**	**< 0.001**
% Other / Stormwater	0.08	0.37	-0.15	0.15

The association between trash condition category and trash pathway contribution for probabilistic and targeted sites is represented visually in Figure 4-14. Consistent with the statistical analysis results presented in Table 4-7, poor trash conditions are associated with higher proportions of trash from illegal encampments and illegal dumping, and lower proportions of trash from litter/wind. There appears to be little or no change in the relative contribution of trash levels from the other/stormwater pathway.

Figure 4-14. Average contributions of trash observed from each pathway to probabilistic and targeted receiving water monitoring sites during monitoring events. Monitoring events are grouped by trash condition categories.

4.3.4 Factors that Influence Trash Pathways

Seasonal differences in the relative contributions of trash from different pathways were also evaluated. Based on the data collected at probabilistic sites, the relative contributions of the four trash pathways remained relatively consistent across four of the five events (Figure 4-15). Trash associated with the litter/wind pathway was associated with the highest proportion of trash, except during the 2019 wet season, which showed a higher relative contribution from the other/stormwater pathway (i.e., > 50% of the trash) and a lower relative contribution from the litter/wind pathway. As discussed in Section 4.2.1, the 2019 wet season had more frequent storm events, compared to the 2018 and 2020 wet seasons, potentially resulting in more opportunities for trash to be transported and deposited across sites during the 2019 wet season. More frequent storm events may also have resulted in the transport of significantly more trash associated with the other/stormwater pathway, as illustrated in Figure 4-10. Notably, illegal encampments and illegal dumping consistently represented the lowest contribution to trash levels in each of the probabilistic monitoring events. Overall, the comparison of trash levels among seasons suggests that seasonal differences may have an impact on the relative contributions from different trash pathways. In particular, wet seasons with more frequent, runoff-inducing storm events might lead to higher contributions of trash from the other/stormwater pathway.

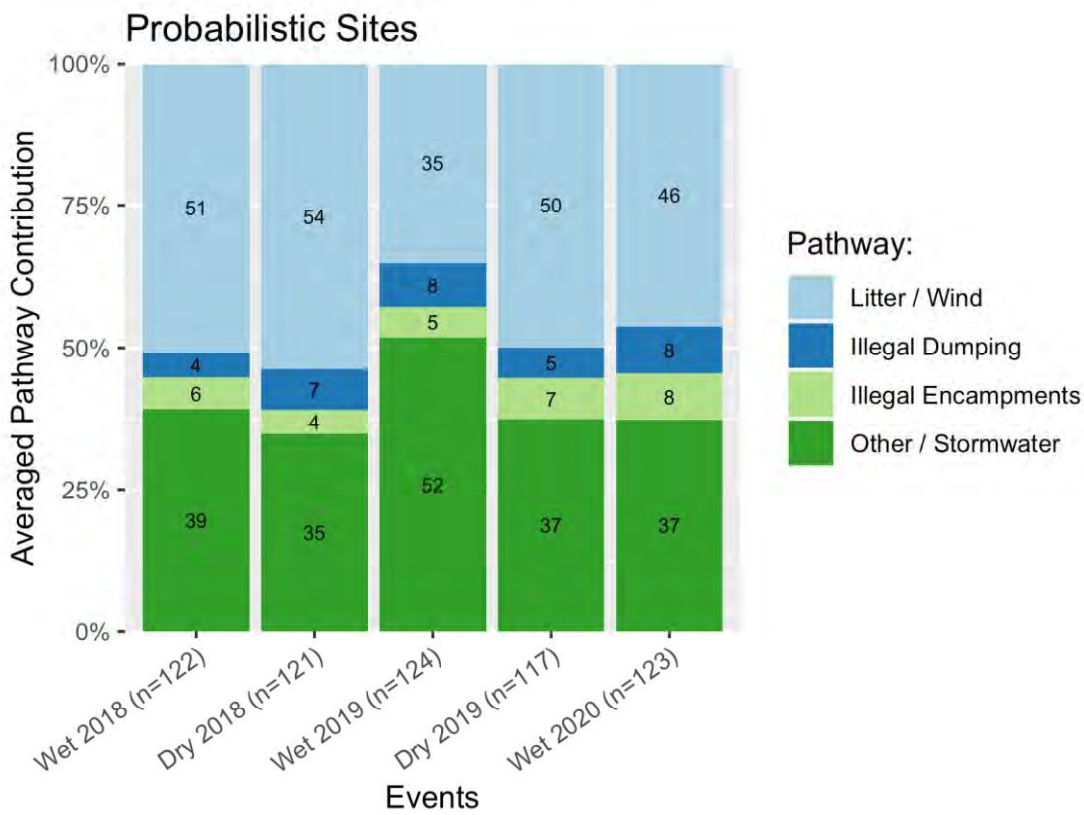

Figure 4-15. Average contributions of trash from each pathway identified during each receiving water trash monitoring event (n=5) at probabilistic sites.

4.4 Levels of Trash Observed in Receiving Waters Compared to Trash Discharged By Stormwater Conveyances

This section compares the amount of trash collected from targeted monitoring sites and trash booms to the amount of trash predicted to currently be generated from the upstream land areas (i.e., catchments) and transported via the stormwater conveyance system to these receiving water monitoring sites. The process used to predict trash generation in these catchments is described below.

Under MRP 2.0, each municipality subject to trash load reduction requirements was required to develop a *Baseline Trash Generation Map* that illustrates the 2009 levels of trash that is deposited on streets, sidewalks, landscaping, and other land areas, and available for transport to local receiving waters via the stormwater conveyance system pathway. These baseline maps serve as the starting point for demonstrating the attainment of stormwater trash load reduction requirements included in the MRP. Maps are color-coded using the color-scheme illustrated in Table 4-9, based on the observed levels of trash on different land areas within their jurisdictional boundaries. Baseline trash generation rates are then assigned to each trash generation category (Table 4-9) to estimate baseline trash generation levels (i.e., annual loads) from land areas, based on their baseline trash levels observed on-land. Annual baseline trash loads do not account for trash control measures that were implemented after 2009, the year the baseline maps depict.

Table 4-9. Average trash generation rates (gallons/acre/year) for each generation category. Rates are used to calculate annual trash loads from land areas within MRP Permittee jurisdictional boundaries.

Trash Generation Category	Low	Moderate	High	Very High
Annual Trash Generation Rate (gallons/acre/year)	0	7.5	30	90

Geographic Information System (GIS) data layers for creek network and stormwater conveyance systems were used to delineate the catchment area upstream of all targeted monitoring sites and trash booms. Annual baseline trash loads for each catchment were calculated by multiplying the rates shown in Table 4-9 by the acreage in each catchment that fall within each trash generation category.

To account for the significant trash control measures implemented by MRP Permittees since 2009, the baseline trash loads for each catchment were adjusted based on the extent of trash full capture systems installed to-date. Generation rates for land areas addressed by full capture systems were adjusted to low/green levels. Baseline loads were not adjusted to account for reductions associated with other types of control measures (e.g., street sweeping or on-land cleanup events) due to the challenges in the accounting methods described in MRP 2.0. The resulting adjusted baseline trash loads are intended to depict "current" trash loading from the stormwater pathway to the targeted monitoring sites and trash booms at the time receiving water trash monitoring was conducted (i.e., 2018-2019).

4.4.1 Comparison of Stormwater Trash Loads to Trash Volumes Removed from Trash Booms

Trash booms collect trash transported in receiving waters during dry and/or wet weather flow events. Data collected at all trash booms monitored during this project depict a combination of trash transported during wet and dry weather events. Annual rates of trash volumes captured by each boom monitored during the project were calculated by dividing total trash volume removed from the boom by the total number of days trash accumulated at the boom. Trash accumulation periods for all monitoring events ranged between 6 and 230 days during 2018 and 2019 (Table 4-10). These data should be interpreted with caution since for some booms, the annual rates were developed by extrapolating 1-2 weeks of trash accumulation for an entire year.[7] Trash accumulation rates were also standardized by area using the upstream catchment area associated with each boom.

Trash volumes collected at the 9 trash booms monitored during the project ranged from 0.1 to 2,020 gallons (Table 4-10). The annual rate of trash accumulation at the booms ranged from 177 to 5,163 gallons. The estimated annual trash volume standardized by area ranged two orders-of-magnitude (0.02 to 2.3 gallons/acre).

[7] For three trash booms in Alameda County, the annual estimate was based on the daily trash rate calculated for wet and dry event applied to number of days with rainfall (n=80) and no rainfall (n=285) during January 2019 through December 2019.

Table 4-10. Trash volumes removed from 9 booms and the estimated trash accumulation rates for each.

Trash Boom Location	Preceding Trash Removal Date	Trash Removal Date	Accumulation Period (days)	Trash Volume Removed (Gallons)	Annual Trash Rate (Gallons/ Year[1])	Annual Trash Rate per Area (Gallons/Acre/Year)
22nd and Harrison (Oakland)	3/27/2018	4/17/2018	21	5	322	2.3
	11/20/2019	11/26/2019	6	0.1		
	2/21/2019	2/28/2019	7	20		
	1/21/2020	1/28/2020	7	30		
Glen Echo (Oakland)	3/27/2018	4/17/2018	21	20.5	1444	0.9
	2/21/2019	2/28/2019	7	102		
Trestle Glen (Oakland)	11/20/2019	11/26/2019	6	30	2796	1.5
	1/21/2020	1/28/2020	7	120		
Lower Silver Creek (San José)	3/5/2019	5/30/2019	86	404	4096	0.34
	10/11/2018	11/20/2018	40	404		
	5/7/2018	8/23/2018	108	1818		
Thompson Creek (San José)	3/14/2019	4/29/2019	46	1010	5163	0.36
	12/18/2018	3/14/2019	86	2020		
	5/7/2018	12/18/2018	225	2020		
Adobe Creek (Palo Alto)	4/15/2019	5/18/2019	33	22	231	0.02
	10/3/2018	12/15/2018	73	45		
Matadero Creek (Palo Alto)	4/15/2019	5/18/2019	33	15	177	0.02
	10/3/2018	12/15/2018	73	60		
	5/19/2018	7/13/2018	55	3		
16th Ave Channel (San Mateo)	12/7/2018	5/28/2019	172	400	1380	1.4
	12/4/2018	12/7/2018	3	150		
	10/31/2018	12/4/2018	34	200		
	10/19/2018	10/31/2018	12	100		
	3/3/2018	10/19/2018	230	400		
	2/11/2018	3/3/2018	20	400		
	2/6/2018	2/11/2018	5	200		
	1/4/2018	2/6/2018	33	75		
19th Ave Channel (San Mateo)	6/6/2018	10/24/2018	140	300	623	0.31
	3/22/2018	6/6/2018	76	75		
	1/4/2018	3/22/2018	77	125		

[1] Annual trash rate was calculated by dividing combined trash volume for all events by total days of accumulation and standardizing to 365 days.

The annual rate of trash accumulation at each boom was compared to the estimated annual stormwater trash load generated from the catchment draining to each boom. As anticipated, the annual stormwater trash load was far greater than the annual volume of trash that accumulated at the booms. The booms accumulated between 4% and 42% of the estimated trash load from the catchment (Table 4-11).

Table 4-11. Estimated portion of the trash volume transported via stormwater from the catchment upstream of the trash boom that is accumulated in the trash boom.

Trash Boom Location	Trash Generation (gallons/year)	Annual Trash Removal (gallons/year)	Portion Accumulated in Trash Boom (%)
22nd and Harrison	2,908	322	11.1
Glen Echo	11,252	1,444	12.8
Trestle Glen	6,730	2,796	41.5
Lower Silver/Thompson (Combined)	65,773	9,259	14
16th Avenue Channel	10,529	1,380	13
19th Avenue Channel	14,340	623	4.3

4.4.2 Comparison of Stormwater Trash Loads to Trash Levels at Targeted Monitoring Sites

Similar to trash booms, stormwater trash loading estimates to each targeted monitoring site were developed and compared to quantitative monitoring results from targeted receiving water monitoring sites. The total estimated volume of trash annually generated in the catchments upstream of the targeted sites ranged from 40 to 162,295 gallons. The average volume of trash associated with the Other/stormwater pathway that was measured during two monitoring events at the non-shoreline targeted sites (n=91) ranged from 0 to 412 gallons. For 90 of the 91 sites, the amount of trash measured was between 0% and 4.5% of the estimated trash loading to the site. For the vast majority (91%) of these sites, the amount of trash measured at the site that was identified as originating from the Other (stormwater/upstream) pathway, was equivalent to less than 1% of the estimated trash load to the site. The volume of trash measured at one site was greater than the estimated trash load to the site.

Overall, the average volume of trash measured at each targeted site associated with the Other (stormwater/upstream) pathway was poorly correlated with the volume of stormwater-generated trash in the watershed (Figure 4-16). The poor association with these data is not surprising for a number of reasons. First, as described in the previous section, there are inherent challenges with accurately distinguishing the portion of trash at creek/channel sites that is associated with the Other (stormwater/upstream) pathway from other trash pathways. Additionally, there is a lack of information to determine what proportion of stormwater-related trash is deposited in assessment area of the channel and banks of a given site, and what portion is deposited upstream of the sites, accumulating at the site but above the assessment area, or is transported downstream of the site. Also, the timing of the trash transport process was not taken into account when making the comparison between trash loading and trash deposited at the site from stormwater. Loading estimates are annual, while the trash deposited in the creeks/channel occurs on a sub-annual basis, consistent with stormwater transport processes (i.e., stormwater flow events) and site-specific factors that were previously discussed as potentially being important for understanding deposition of trash (e.g., channel type and extent/type of vegetation).

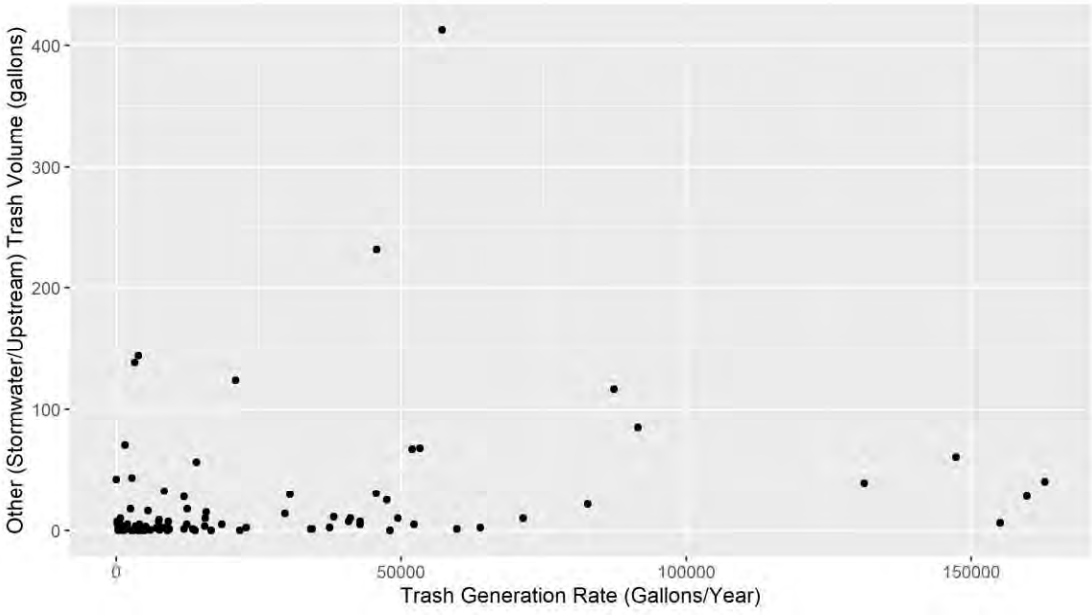

Figure 4-16. Comparison of the average trash volumes (gallons) for the Other (stormwater/upstream) pathway measured at 91 targeted monitoring sites with the predicted annual amount of trash generated in those drainage areas (gallons/year).

5 CONCLUSIONS

The following section presents conclusions for the data analyses presented in the Final Report. The conclusions are organized by specific scientific monitoring questions outlined in the Trash Monitoring Plan.

Comparison of Qualitative Assessment and Quantitative Monitoring Results

- ***Are significantly strong correlations observed between qualitative and quantitative trash receiving water monitoring/assessment methods?*** - Significant correlations are observed between qualitative trash condition scores (1-12) and trash density (volume per unit area) at both regional and countywide scales. Correspondence of qualitative scoring to trash density was better using the categorical scale for trash condition (i.e., Low, Moderate, High, Very High). Low correlation between methods at some sites indicates the assessment tools are less effective under certain types of conditions (e.g., shorelines).

Levels of Trash in Urban Water Bodies in the MRP Area

- ***What is the current level of trash deposited in flowing waterbodies in the entire MRP urban area?***

  Trash levels were evaluated based on the qualitative trash condition scores/categories observed at probabilistic sites. For the probabilistic sites regionwide, 40% are in the Low condition category and 37% are in the Moderate category, indicating that approximately 77% of the urban stream lengths in the MRP area exhibit low to moderate levels of trash. In contrast, only 2% of the stream-lengths have trash levels in the Very High trash condition category. The total estimated amount of trash volume that was present in all urban streams in the MRP area during the study period was just over 4 million gallons. An estimated 64% was of this volume was associated with the 22% of the stream miles that fell into the High or Very High condition categories.

- ***Do other site and landscape variables correlate with trash levels in flowing waterbodies?***

  Site and landscape characteristics for trash receiving water monitoring sites suggests that some bank and channel cover characteristics partially explain the variation in observed trash conditions. The extent of natural vegetation on banks at a site appear to be somewhat positively correlated to trash condition scores, while the extent of armored banks is negatively correlated to condition scores. This is likely because natural channels that have riparian vegetation and diverse instream substrate (both woody debris and varying sizes of substrate) "intercept" trash more effectively than channels with fewer obstructions. Public access was also found to be an important factor for the density of trash observed in streams.

- ***Do trash levels in flowing waterbodies differ significantly between wet and dry seasons?***

  Seasonality appears to have little effect on trash levels observed/measured at receiving water sites. Trash condition categories observed at probabilistic sites indicate slightly greater trash levels during the wet season, compared to the dry season, but not statistically significant. Variations in trash levels between the three wet season events, however, also illustrates the effects that storm frequencies and intensities can have on trash levels observed at the same sites over time during the wet weather season.

- ***What trash levels are observed at sites targeted for cleanup? How do these levels compare to levels in all flowing waterbodies?***

  The trash assessment results from the targeted (hot spot) sites were compared to the results from probabilistic sites to determine if the range of conditions were similar between the two

sample designs. Approximately 23% fewer targeted sites were in Low trash condition category, compared to the probabilistic sites, and more targeted sites were in the Moderate, High, and Very High condition categories than the probabilistic sites. Because targeted sites were selected by MRP Permittees as "trash hot-spots", higher trash scores would be expected at targeted, compared to probabilistic sites.

Contributions of Trash from Different Pathways

- *What percentages of trash observed in receiving waters are attributable to stormwater conveyance systems, direct dumping, wind, and encampments?*

  At targeted sites, illegal encampments and illegal dumping pathways were associated with much larger volumes of trash. In total, at targeted sites we estimate about 14,000 gallons and 21,000 gallons of trash were associated with illegal encampments and illegal dumping in 2018 and 2019, respectively. We also estimated that litter/wind and other/stormwater pathways together accounted for about 3,000 gallons of trash for both years. Based on comparisons between average pathway contribution and trash condition category, poor trash conditions are associated with higher proportions of trash from illegal encampments and illegal dumping. Although little to no association between trash conditions and the other/stormwater pathway have been observed, contributions of trash from this pathway appear to increase during the wet season, compared to the dry season.

Levels of Trash Observed in Receiving Waters Compared to Trash Discharged by Stormwater Conveyances

- *Do trash levels in flowing waterbodies strongly correlate to trash generation levels depicted on Permittee maps?*

  Trash monitoring data collected at 9 trash booms and 91 targeted sites were used to compare the amount of trash accumulation at a site to estimate annual trash loads transported via the stormwater pathway from watershed land areas to boom/targeted sites. A volume of trash equivalent to 4% to 42% of the estimated stormwater trash loads from the upstream catchments is captured by booms. For 90 of the 91 targeted sites, the amount of trash measured was a relatively small percent (between 0% and 4.5%) of the estimated trash loading to the site. For the vast majority (91%) of these sites, the amount of trash measured at the site that was identified as originating from the Other (stormwater/upstream) pathway, was equivalent to less than 1% of the estimated trash load to the site. Overall, the average volume of trash measured at each targeted site associated with the Other (stormwater/upstream) pathway was poorly correlated with the volume of stormwater-generated trash in the watershed. One of the major reasons for this poor correlation is the inherent challenges with accurately distinguishing the portion of trash at creek/channel sites that is associated with the Other (stormwater/upstream) pathway from other trash pathways.

6 EVALUATION OF TRASH MONITORING PROGRAM

An evaluation of methods and monitoring design used during the pilot-testing phase of the Trash Monitoring Plan is provided in the section below. This evaluation provides guidance for potential revisions to approach trash monitoring in receiving waters.

6.1 MONITORING DESIGN

6.1.1 Site Selection

The initial trash monitoring design utilized an existing RMC sample frame to select probabilistic sites for evaluating overall trash conditions within the MRP Area. Overall, 30 sites within each county and 125 sites at urban streams within the MRP area were sampled during the pilot study. The total of 125 sites provided a statistically significant number of samples to estimate probabilities of trash conditions (i.e., cumulative distribution frequencies) for all urban streams in the MRP area.

To evaluate monitoring questions related to seasonal differences, the monitoring design emphasized increased sampling effort at the same sites (i.e., five events at 125 sampling locations) over increased density of sampling sites (i.e., 1 event at 625 sampling locations). As a result, although the design provided adequate sampling to evaluate the seasonal variability of trash conditions in streams, trash conditions observed during the pilot study may under-represent trash conditions when the data are used to extrapolate to all creek/channel areas in the MRP area. This appears to be the case for creek segments with relatively high trash levels (i.e., *High* or *Very High* trash condition category). Overall, the probabilistic sites had low percentage of sites with high trash conditions. In contrast, a much higher percentage of the targeted sites of known trash problem areas had sites that scored in the *High* or *Very High* trash condition. The targeted sites with high trash levels appear to be clustered within certain creek segments, representing a small percentage of the urban creeks in the MRP area. There would have had to be a very large number of sites selected from the RMC sample frame for all of the targeted sites with high trash levels to be selected. Thus, sites of known trash problem areas should be targeted during monitoring designs for future receiving water trash monitoring.

Trash assessment results indicate that channel type may be an important factor influencing trash conditions. Much higher levels of trash were observed in natural channels, compared to concrete or earthen channels. Thus, to fully represent trash conditions, the influence of channel type should be considered in site selection or to stratify probabilistic sites for future sampling design.

6.1.2 Monitoring Frequency and Timing

Trash assessments were conducted during both dry and wet seasons (total of five events) at all probabilistic sites during the pilot study. The results suggest a slightly higher proportion of *High*/*Very High* trash conditions at sites sampled during wet season compared to the dry season. However, there was relatively no difference in median trash condition scores across all five sampling events.

It is important to have good physical access to visually observe the trash within the assessment area when conducting trash monitoring. Physical access in the channel is generally better during the dry season, when stream flows are reduced. However, increased vegetation growth in the dry season can create issues for observing trash. Trash pathways may also vary by season, depending on the type of site. For example, trash associated with illegal encampments may be more prevalent during the dry season. Thus, the timing of assessment may need to be determined based on the dominant pathway/sources of trash for any given site, and in consideration of flow and vegetation levels.

The trash monitoring conducted at probabilistic sites did not include removal of trash following the visual assessment, thus, it was not possible to evaluate changes in trash density over time at any of these sites. Although trash was removed at targeted sites, it was not possible to evaluate changes over time with any confidence as additional trash removal events occurred between assessments at many of the sites. As a result, the pilot study results do not provide insight into appropriate monitoring frequency of sites to determine trash conditions over time.

6.2 Assessment Area

The trash assessment protocol requires delineation of the assessment area to allow for comparison of trash conditions over time, as well as comparison of qualitative and quantitative assessment results. The upper edge of the assessment area for creek/channel sites was defined as bankfull width (or the high-water mark during a 1 – 2-year storm event). The goal was to specifically identify all trash that may impact "flowing waterbodies", with focus on the proportion of trash associated with the other/stormwater pathway.

There were several challenges with defining bankfull width. Channel features associated with bankfull (e.g., bank scour, breaks in type and size of vegetation) are not always present at every site (e.g., armored banks). There are also challenges to exclude the trash associated with less frequent storm events (5 - 10-year storm event) that can accumulate on the upper portions of the banks but is outside the bankfull definition. This trash may enter the channel at some point due to wind or stormwater runoff but was not included in the assessment.

Another major challenge in the assessment protocol was encountered for sites that had trash accumulation areas that could not be accessed (e.g. too deep or muddy, or with highly vegetated bank cover). In these cases, trash may be present in the channel, but the channel was not always accessible or visible from shore. This feature may be associated with some of the variation observed between wet and dry season events. Therefore, the scoring system needs to consider the level of effort involved in trash removal and the proportion of channel assessed.

The assessment protocol does not provide adequate guidelines on how to define shoreline sites. Important issues include when to conduct the assessment (i.e., high or low tide) and whether or not to include inaccessible mudflat areas during low tide. Furthermore, shoreline sites (standardized to 600 feet in length) could be extremely large depending on the distance between water edge and high tide line, which made the visual assessment of trash conditions more challenging. Additional guidance is needed for shoreline trash monitoring, should this occur in the future.

6.3 Assessment Method

The visual assessment tool is recommended as a valid approach to assess trash conditions for most creeks/channel sites for future monitoring design. The qualitative assessment method will provide a cost-effective approach to assess trash conditions at higher spatial density and frequency compared to the more resource intensive quantitative assessment method. The qualitative method has been shown to be a repeatable measure of relative trash condition that correlates with higher trash density.

It is critical that all field personnel are adequately trained to conduct the qualitative assessment method. This requires training and calibration activities to ensure that field crews are assigning the correct

category associated with observed trash conditions. This is especially important when municipal/agency staff may be used to evaluate the trash levels within their jurisdiction, which may bias the scoring towards the range of trash conditions in their region. Training should also ensure that practitioners are accurately assessing trash conditions that may be widely dispersed in a large area or clustered in portions of the site. Training materials should include better photo documentation for the low end and high end of each trash condition category.

Field collection of site characteristics data for the qualitative assessment was relatively time consuming and the data generated does not provide significant information to interpret results, compared to the resources expended. One exception is channel type (natural, earthen and concrete/armored), which had some correlation with trash conditions and therefore should be considered in selecting future sites for monitoring. Percent bank and channel cover estimates were very subjective and should be simplified in the future if used to evaluate channel roughness across a numeric scale (rather than percent for different categories). Identifying storm drain outfalls in the field is not recommended as a high priority information need, since this information is typically available in GIS. Other data types associated with site characteristics that do not appear to be useful for describing trash conditions include flow, water clarity, bank angle and sinuosity.

Assessment of trash pathways was the most subjective information collected during the visual assessments. The other/stormwater pathway was the most difficult pathway to discern, since much of the trash that appears to be worn and transported to receiving waters can be from sources other than stormwater conveyances, including illegal encampments or dumping upstream of the site. Additional guidance should be provided on how far upstream to consider illegal encampment and dumping influences, which would be helpful to standardize data collection in the future. Photographs and examples of trash from each pathway illustrated over time of decay (in addition to the guidance already developed for protocol) should be considered.

6.4 Utility of Boom Data

Trash booms are floating barriers placed in receiving water bodies to capture trash and other floating debris. Trash booms are considered partial capture devices since less buoyant trash can still be transported in the water column below the floating barrier, especially during storm events. However, much of the trash comprised of plastic and expanded polystyrene foam that enter receiving waters is primarily floatable material that is likely to get captured by trash booms. Trash data collected across the nine booms indicated that an amount of trash equivalent to 4% to 42% of the stormwater trash load was removed from the booms monitored. Thus, it appears these structures can effectively trap and remove trash that is likely associated with the stormwater pathway.

7 REFERENCES

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APPENDICES

A. Statement of Data Quality
B. Trash Condition Scores for Probabilistic sites over three sampling events (Tables B1-B2) and targeted sites over two sampling events (Table B3)
C. Trash Condition Scores for probabilistic and targeted sites for all counties (Figures C1-C5)
D. Trash densities at targeted sites (Table D1)

APPENDIX A: STATEMENT OF DATA QUALITY

A1 – Alameda County
A2 – Santa Clara and San Mateo Counties
A3 – Contra Costa County
A4 – Solano County (not included due to small number of samples)

A1 – Data Quality for Alameda County

As identified in BASMAA (2017), there are four main data quality objectives (DQOs) developed for the monitoring program to best ensure data quality: (1) representativeness, (2) comparability; (3) completeness; and (4) precision. ACCWP's activities relative to each of these four components are described briefly below:

Representativeness

Representativeness reflects the ability of data collected to represent the true condition of the sample sites. For the qualitative trash assessments, sample sites were identified through a probabilistic draw. AMS team members used site photos and GPS coordinates to return to the same basic reaches for each sampling event. In some cases, starting coordinates were shifted slightly, for example, due to difficulty in obtaining a precise GPS signal, but in each case reaches overlapped for the vast majority for each of the five sampling events. At the conclusion of each sampling day, the Monitoring Project Manager (MPM) reviewed all recorded site coordinates against targets to confirm reaches were appropriately located.

Overall assessments included three wet season events and two dry season events. All wet season sampling events were initiated only after the first significant rainfall of the year (>0.5" measured precipitation in a 24-hr period). All dry season events were targeted by ACCWP for the timeframe of July through September; due to staffing conflicts, the 2019 dry season effort extended into the first week of October 2019, but there was no significant precipitation experienced before conclusion of assessments.

Comparability

Comparability is the degree to which data can be compared both internally over time and externally to other relevant efforts. Sampling personnel assigned to conduct assessments for ACCWP were drawn from a pool of four individuals for all sampling events as a means of incorporating internal consistency across the five efforts.

Prior to conducting any assessments, ACCWP monitoring personnel participated in the BASMAA intercalibration and cross-training exercise in San José as a means of incorporating consistency with external assessors. ACCWP monitoring personnel also conducted an additional internal intercalibration exercise prior to initiation of WY2019 assessment activities.

Completeness

Completeness is defined as the percentage of valid data collected and assessed, compared to the total percentage of data expected to be obtained under normal operating conditions. The quantitative measurement quality objective (MQO) for assessing completeness of the trash monitoring effort was identified as 90%. Overall, completeness was very high, and well above the 90% threshold. The main exceptions to this were photographs inadvertently missed or that were corrupted before transferring from field cameras to long-term storage, and channel widths that were unable to be measured in the field due to non-wadeable conditions.

Precision

Precision assesses the consistency between individual measurements of a given parameter. Per BASMAA (2017), precision is assessed via replicate analyses of individual parameters at 10% of overall sampling sites. The defined MQO for precision is to achieve a relative percent difference (RPD) on individual metrics of ≤ 20%.

For ACCWP, the MPM assigned field duplicate sites prior to each sampling season. At each duplicate site, the members of the two-person field team worked together to assess the measurements and qualitative factors that required both members' participation (e.g., creek width). The two field team members then split apart and independently assessed the following factors:

- Trash condition
- Bank cover categories, by subcategory
- Channel cover categories, by subcategory
- Trash source categories, by subcategory

These FD assessments were performed at a total of 15 sites over the course of the five events. These encompass a total of 207 distinct datapoints for which replicate assessments were possible. Looking strictly at the MQO of 20% RPD, 62 of the pairs (30%) exceeded the MQO for precision. It should be noted that, due to the relatively small values reported as results for various metrics, even a small difference in reported results can generate a relatively large RPD. This suggests that an alternative MQO may be required to realistically assess precision going forward. Assessments of precision are discussed in more detail by category below.

Due to modifications made to data being collected that were put into effect between WY2018 and WY2019, the number of replicate pairs for each datapoint assessed may vary. For example, while replicate trash condition scores were recorded at all fifteen sites, the proportion of the channel containing algae was only assessed at six sites (consistent with the original WY2018 protocol and datasheets), and the proportion of armored bank cover was only assessed at nine sites (consistent with the revised protocol). For purposes of the following discussion, only categories assessed at a minimum of three events, consistent with current protocol, are described.

Trash Condition

Precision for trash condition score was assessed at a total of 15 replicate sites over the five events. Of the 15 replicate sites assessed, precision exceeded the 20% RPD MQO at 10 (67%). At 14 of the 15 sites, replicate trash condition scores represented a zero- or one-point differential, however, which would generally seem to indicate good agreement between the two assessments. In fact, scores at 9 of the 10 sites exceeding the MQO only differed by one point.

Additionally, it should be noted that in some cases a one-point differential achieves the MQO and in others it does not. For example, at ACCWP site 205R00279 visited in wet season 2020, assigned trash condition scores of 9 and 8 generated a 12% RPD, which achieved the MQO. In comparison, at site 204R00068 also assessed in wet season 2020, assigned trash condition scores of 3 and 2 generated a 40% RPD, which exceeded the MQO. With the current MQO, a one-point differential between scores of 5 or lower will automatically fail to meet the given MQO.

At the lone site that did not represent a zero- or one-point differential, 205R00686 assessed wet season 2020, the assessors' scores differed by three points. This difference appears to be a reflection of the differences in interpretation of characteristics descriptive of each trash condition category. At this site, a narrow concrete channel (approximately 6') with steep banks, fairly long stretches were mostly free of trash. However, there was one point within the reach where a hole had been cut in the surrounding chain link fence and illegal dumping had occurred, including a shopping cart and several smaller items (rope, wrappers, cans, etc.). So, the site reflected characteristics of both the moderate (i.e., all trash could be removed by two individuals within 30 minutes to one hour) and high (i.e., evidence of site being used by people) categories. This may suggest that additional thought needs to go into defining the trash condition categories to help navigate situations like this with conflicting evidence. This type of rethought could also be used to help normalize situations where two sites may reflect similar trash densities, but one would require much more cleanup effort due to larger areal extent.

Bank Cover

Assessments of bank cover are incorporated to help identify the trash capturing capability of the banks. Examining all subcategories of bank cover, 12 of 45 replicate analyses (27%) exceeded the MQO for precision (Table 1). Half of these exceedances represented a difference of ≤10% in the two measurements themselves, however.

Some of the difference between replicate assessments can be explained by uncertainty related to classification of dead and dying vegetation. Consistent with definitions used for bioassessment monitoring activities, this vegetation may be classified as exposed habitat. However, since it may serve a trash capturing function even while dead / desiccated, it may more appropriately be considered in the vegetation category. Additional clarification would likely serve to minimize this disagreement.

Table 1. Maximum Range Between Replicate Pairs and Percentage of Replicates Exceeding MQO for Individual Bank Cover Categories.

Metric	Max. Range (%)	%> MQO
Grasses	15	33
Bushes / Shrubs	35	33
Trees / Roots	0	0
Open / Exposed	45	44
Armored	5	22
Total	-	27

Channel Cover

Similar to bank cover, assessments of channel cover are incorporated to help identify the trash capturing capability within the channel itself. Examining all subcategories of bank cover, 10 of 36 replicate analyses (28%) exceeded the MQO for precision (Table 2). Similar to the case for bank cover replicates, eighty percent of these exceedances represented a difference of ≤10% in the two measurements themselves.

Table 2. Maximum Range Between Replicate Pairs and Percentage of Replicates Exceeding MQO for Individual Channel Cover Categories.

Metric	Max. Range (%)	%> MQO
Aquatic Veg	15	55
Dry Channel	15	33
Woody Debris	5	11
Open Wetted Channel	15	11
Total	-	28

Pathway Analysis

For pathway analysis, assessors are tasked with performing a subjective assessment of the trash present to evaluate its possible source based upon four identified categories. For this assessment, 15 of 60 replicate measurements (25%) exceeded the 20% MQO for precision (Table 3).

Table 3. Maximum Range Between Replicate Pairs and Percentage of Replicates Exceeding MQO for Individual Pathway Analysis Categories.

Metric	Max. Range (%)	%> MQO
Litter / Wind	90	53
Illegal Dumping	90	13
Illegal Encampment	25	13
Other / Stormwater	50	20
Total	-	25

The maximum ranges shown in Table 3 do not reflect the generally good agreement between replicate assessments of individual trash subcategories. For 50 of the 60 data pairs, the two replicate measurements fell within 5% of each other; it should be noted that for 6 of these measurements within 5% of each other, the replicate pair did not meet the MQO due to the relatively low percentages being compared. This again suggests a revised MQO may be required to assess precision effectively.

It should be noted that the 90% maximum ranges shown in Table 3 for the categories of Litter / Wind and Illegal Dumping may also be somewhat misleading. These 90% ranges were recorded at site 204R00068 in wet season 2020. At this site, the two assessors were in general agreement on trash condition (scores of 2 and 3) but differed on the source category associated with an accumulation of food-related waste within a short section of the concrete channel that appeared to originate from the adjacent commercial enterprise; one assessor associated this accumulation with litter / wind and the second assessor associated its origin was illegal dumping.

Discussion

Based on data gathered from the five ACCWP seasonal assessments completed to-date, some metrics exhibit good consistency between different observers (e.g., trash condition, encampment and dumping pathways). Other metrics do appear more difficult to assess in a consistent fashion (e.g., bank cover, litter pathway). As discussed previously, better guidance in how to characterize banks with dead or dying

vegetation may assist with removing some of the variability associated with the bank cover categories. Distinguishing between the pathway categories of litter / wind and other / stormwater may be more difficult and at this time with present guidance remains a judgment call as to what defines locally-generated litter.

Consistent among all of the precision analyses described above is that the current MQO based upon RPD between two replicate pairs is not a viable measurement of precision for this type of monitoring effort. An alternative MQO may need to be identified that incorporates ranges for each metric, for example ±1 (or similar) for trash category and ±15% (or similar) for bank cover, channel cover, and pathway.

A2 – Data Quality for Santa Clara and San Mateo Counties

Field efforts associated with the Pilot Receiving Water Trash Monitoring Program were covered under four Data Quality Objectives (DQOs) and Measurement Quality Objectives (MQOs) established within the Quality Assurance Project Plan (QAPP) to ensure that sound collection of data concerning trash loading was able to occur. Two qualitative DQO/MQOs of representativeness and comparability were put forth for the project, while two quantitative DQO/MQOs of completeness and precision were also established. The quantification of trash loading is an inherently variable data type with respect to spatial and temporal characteristics, and the significant use of human judgment in associated trash data collection can increase the potential for bias. Given this, it was of importance to ensure effective training and consistent data collection principles so that the data quality goals encompassed within the four DQO/MQOs could be achieved.

Before monitoring began in November of 2017, trainings were conducted for all staff involved in associated field efforts. This involved staff developing individual familiarity of the monitoring protocol and then rehearsing all components of the protocol in a routine field setting. The purpose of the trainings was to ensure that each member of a given field crew would be able to use the monitoring protocol to successfully collect all necessary data in the same manner as all other field crews and field crew members. The trainings also gave staff the opportunity to clarify any potential discrepancies within their or others' understanding of the protocol.

Throughout the monitoring period from November of 2017 to March of 2020, inter-calibration and field data duplication activities were orchestrated. These events allowed field staff to maintain consistency regarding execution of the protocol, discuss any questions pertaining to the protocol that had developed during previous project monitoring efforts, and generate field data based on each monitoring component to demonstrate achievement of the DQO/MQOs. Each scheduled inter-calibration and data duplication exercise involved two or more field crews that met at a series of receiving water sites to conduct the monitoring on an individual crew basis and compare the results between crews after finishing the monitoring for each site. During inter-calibration and duplication events, the members of each crew were interchanged on a site-by-site basis so that all possible crew member combinations were examined to ascertain bias or difficulty with protocol execution.

The following is a list of the training events that took place over the course of the monitoring period:

Date	Event Type	Agency
10/23/2017	Training	Santa Clara/San Mateo
1/25/2018	Training	Santa Clara/San Mateo
3/13/2018	Training	Santa Clara
3/28/2018	Training	San Mateo

Fifteen field inter-calibration and duplicate events in both Santa Clara and San Mateo County took place during the monitoring period, constituting 10% of the total sites sampled. The following table shows the calculated relative percent differences (RPDs) between the original and duplicate trash scores generated at the duplicate sites:

County	Site	Date	Orig. Num. Grade	Dup. Num. Grade	RPD (%)	Orig. Letter Grade	Dup. Letter Grade	RPD (%)
SC	282	7/23/2019	8	7	13	C	C	0
SC	346	7/23/2019	5	5	0	B	B	0
SC	659	7/23/2019	6	7	15	B	C	40
SC	90	7/23/2019	3	2	40	A	A	0
SC	154	7/23/2019	4	5	22	B	B	0
SC	538	7/30/2019	6	6	0	B	B	0
SC	26	7/30/2019	6	4	40	B	B	0
SC	586	7/30/2019	2	2	0	A	A	0
SC	714	7/30/2019	4	5	22	B	B	0
SC	67	2/13/2020	6	5	18	B	B	0
SC	234	2/13/2020	1	2	67	A	A	0
SC	259	2/13/2020	11	11	0	D	D	0
SC	355	2/13/2020	6	4	40	B	B	0
SC	554	2/13/2020	2	2	0	A	A	0
SC	627	2/13/2020	7	7	0	C	C	0
SM	180	7/25/2019	2	3	40	A	A	0
SM	436	7/25/2019	2	2	0	A	A	0
SM	807	7/25/2019	5	6	18	B	B	0
SM	884	7/25/2019	4	4	0	B	B	0
SM	1460	7/25/2019	1	2	67	A	A	0
SM	2228	7/25/2019	1	2	67	A	A	0
SM	232	8/1/2019	7	6	15	C	B	40
SM	520	8/1/2019	5	6	18	B	B	0
SM	1256	8/1/2019	2	2	0	A	A	0
SM	520	2/6/2020	5	5	0	B	B	0
SM	1288	2/6/2020	5	4	22	B	B	0
SM	1972	2/6/2020	4	4	0	B	B	0
SM	2056	2/6/2020	6	6	0	B	B	0
SM	2248	2/6/2020	8	8	0	C	C	0
SM	2548	2/6/2020	7	5	33	C	B	40

As shown in the table, the RPDs calculated from duplicate samples taken over the course of the monitoring period were generally low, with eight RPDs exceeding the commonly used threshold of 20% when calculated from numeric trash grades and three exceeding 20% when calculated from letter trash grades. The relatively low RPD values indicate that the DQO/MQO involving sample precision was achieved. The implementation of inter-calibration and data duplication activities in addition to the thorough trainings at the beginning of the program allowed for data representativeness, comparability, completeness, and precision to be maximized during the monitoring period as per the requirements of the DQO/MQOs.

A3 – Data Quality for Contra Costa County

Data Quality Objectives (DQOs) were established by the BASMAA Trash Monitoring Program Plan to ensure that data collected is sufficient and of adequate quality for the intended use. DQOs include both quantitative and qualitative assessment of the acceptability of data. The qualitative goals included representativeness and comparability, and the quantitative goals include completeness and precision. Measurement Quality Objectives (MQOs) are the acceptance thresholds or goals for the data (BASMAA, 2017).

Information and data collected on trash are quantified using personnel trained in the characterization and classification of trash data. DQOs have a strong emphasis on training and oversight, with inter-comparisons between performance of individual field team members participating in the various assessment and characterization efforts.

Table 1. CCCWP Training Events

Date	Event Type	Agency
9-13-18	Inter-Agency Training	ACCWP/CCCWP/SCVURPPP/SMCWPPP
1-26-18	Inter-Agency Calibration	ACCWP/CCCWP
7-12-18	Quantitative Training	CCCWP

The following DQOs and MQOs were established by the BASMAA Trash Monitoring Program Plan:

1. The representativeness of data is the ability of the sampling locations and the sampling procedures to adequately represent the true condition of the sample sites. Representativeness of the sampling event is ensured by sampling within the established assessment area and specified timeframe. The MQOs for sampling event representativeness are measured by proximity to the site location.

Trash surveys were conducted only within the defined assessment area as specified in the Program Plan and ensured by the Field Crew Supervisor. Wet and Dry season assessment requirements were met for all 30 Contra Costa County probabilistic/qualitative sites and 19 Dry season targeted qualitative and quantitative assessments.

2. Comparability is the degree to which data can be compared directly to other relevant studies. The MQOs will rely on training and oversight of the Monitoring Program Manager, Field Crew Supervisor, and Field Crew Members to follow field sampling protocols to ensure comparability with other studies that utilize similar protocols.

All field crew members were trained in methods, procedures and field sampling protocols (see Table 1).

3. Completeness is defined as the percentage of valid data collected and analyzed compared to the total expected to be obtained under normal operating conditions. For qualitative visual assessments, the objective is to conduct one assessment in each 300-foot segment in the assessment area for each site. An overall completeness of greater than 90% of the assessment area segments is considered acceptable for the Receiving Water Trash Monitoring Program. The Field Crew Supervisor should check both qualitative and quantitative data collection forms to make sure they are complete and accurately filled out, prior to leaving the site. Additionally, following quantitative monitoring events, the Field Crew Supervisor should

check the site to make sure that the vast majority of the trash present was removed from the assessment area. Photographs of the site after the cleanup has occurred should also be taken.

Field Crew Supervisors checked the completeness of all field logs and photo documented each site prior to departure. Before and after photos were taken at all 19 quantitative assessment sites, and the Field Crew Supervisor walked the length of the 300-foot reach following each assessment in order to determine completeness and remove any additional trash found within the assessment area.

4. For qualitative visual assessments, precision will be evaluated at 10% of the assessment events conducted by a Stormwater Program. The events should be randomly picked by the Monitoring Program Manager. Precision will be measured by comparing the assessment data collected by the Field Crew Supervisor overseeing the event and the data collected (in parallel) during the event by the Monitoring Program Manager or second Field Crew Supervisor.

For quantitative monitoring events, precision will also be evaluated at 10% of quantitative events conducted by each Stormwater Program. The events should be randomly picked by the Monitoring Program Manager. Monitoring data collected by the Field Crew Supervisor overseeing the quantitative event and the data collected (in parallel) during the event by the Monitoring Program Manager or second Field Crew Supervisor will be compared.

A target relative percent difference between qualitative data points or quantitative measurements (measured in parallel by separate individuals) is < 20%. Additionally, the accuracy in the reporting of crew members and Field Crew Supervisors on field data sheets is very important. All individuals present at the site and participating in the qualitative assessment of qualitative monitoring events should be recorded.

Field crews in Contra Costa County conducted 15 duplicate assessments in order to evaluate precision at a 10% frequency during the Trash Monitoring Program. Calculating Relative Percent Difference results in the magnitude of scores being compared; effecting the calculated RPDs. For continuous data, this is appropriate; for ordinal data, it is a different matter. For example, the RPD of 1 and 2 is 67% while that for 10 and 11 is 10%. Here, the example scores both differ by one unit yet one pair's RPD is less than "commonly used threshold of 25." To more accurately represent the level of precision at which blind duplicate scores are being assessed, a Percent Difference in score has been calculated based on the 12-point grading system, that is [(original score) – (duplicate score)/12] x (100).

Table 2. Duplicate Assessment Scores

County	Site	Date	Orig. Num. Grade	Dup. Num. Grade	Percent Difference (%)	Orig. Letter Grade	Dup. Letter Grade	RPD (%)
CC	388	1/23/2019	2	2	0.0	A	A	0
CC	727	1/24/2019	3	3	0.0	A	A	0
CC	919	1/24/2019	3	2	8.3	A	B	40
CC	880	6/19/2019	4	5	8.3	A	B	40
CC	631	7/17/2019	4	5	8.3	B	B	0
CC	281	7/18/2019	4	3	8.3	B	A	0
CC	395	7/31/2019	3	3	0.0	A	A	0
CC	388	8/28/2019	2	3	8.3	A	A	0
CC	891	8/28/2019	2	2	0.0	A	A	0
CC	27	1/14/2020	3	4	8.3	A	B	40
CC	247	1/14/2020	2	2	0.0	A	A	0
CC	503	1/14/2020	4	6	16.7	B	B	0
CC	843	1/22/2020	1	1	0.0	A	A	0
CC	395	1/22/2020	1	2	8.3	A	A	0
CC	567	1/22/2020	5	6	8.3	B	B	0

APPENDIX B: TRASH CONDITION SCORES AT PROBABILISTIC AND TARGETED SITES

Trash Condition Scores at Probabilistic Sites

Table B1 presents the cumulative distribution results of trash condition scores during each of five events for the entire regional dataset. Table B2 presents the trash condition scores observed at each site during each of the sampling events.

Across all five events, streams exhibited trash condition scores of 1 or 2 (27-38%) and 4 or 5 (20-28%). Less than 30% of the stream length had a condition score of 7 or higher during each of the 2018, 2019, or 2020 wet seasons (22%, 24%, 26%, respectively), and only 15% of the stream length had a score of 7 or higher during each of the dry events.

Table B1. Proportion of stream lengths with different average trash condition scores based on the five sets of observations at 125 sites within the five participating MRP counties. Condition categories are represented as follows: Low (green); Moderate (yellow); High (red) and Very High (purple).

Season	WY 2018 Wet Season	WY 2018 Dry Season	WY 2019 Wet Season	WY 2019 Dry Season	WY 2020 Wet Season
Event	1	2	3	4	5
Trash Condition Score	Percent of Stream Length (± 95% C.I.)				
1	18% (6%)	15% (5%)	15% (5%)	10% (5%)	15% (5%)
2	20% (7%)	22% (7%)	17% (7%)	24% (7%)	12% (7%)
3	9% (7%)	16% (7%)	14% (7%)	13% (6%)	14% (7%)
4	14% (7%)	10% (7%)	13% (7%)	11% (6%)	10% (6%)
5	11% (7%)	10% (7%)	11% (7%)	17% (6%)	18% (7%)
6	6% (6%)	11% (5%)	7% (6%)	11% (5%)	6% (6%)
7	10% (5%)	6% (4%)	8% (6%)	5% (4%)	10% (5%)
8	7% (3%)	6% (2%)	6% (5%)	7% (2%)	7% (4%)
9	2% (2%)	2% (1%)	5% (3%)	2% (1%)	6% (2%)
10	3% (0%)	1% (0%)	3% (2%)	1% (0%)	2% (1%)
11	0% (0%)	0% (0%)	2% (0%)	0% (0%)	1% (0%)
12	0% (0%)	0% (0%)	0% (0%)	0% (0%)	0% (0%)

Table B2. Trash condition scores at probabilistic sites over five sample events. Condition categories are represented as follows: Low (green); Moderate (yellow); High (red) and Very High (purple).

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
202R00284	2	5	4	5	5
202R01308	9	8	4	6	5
202R01356	1	1			
202R01612	1	1	1	1	1
202R02332			7	6	5
204R00020	4	4	2	2	1
204R00047	1	2	2	2	3
204R00068	3	3	2	3	3
204R00084	1	2	4	3	3
204R00100	5	2	3	3	3
204R00180	2	2	3	2	3
204R00191	7	5	3	5	1
204R00200	7	7	9	8	9
204R00232	6	8	5	7	7
204R00244	1	1	1	3	1
204R00292	3	2	2	2	2
204R00303	10	5	8	8	8
204R00327	6	6	6	4	6
204R00334	2	2	4	5	4
204R00340	2	2	4	3	4
204R00356	5	2	7	2	3
204R00367	1	2	2	2	2
204R00383	5	3	4	6	5
204R00388	2	3	2	2	2
204R00391	7	6	7	7	8
204R00436	2	4	3	2	5
204R00447	1	2	2	2	1
204R00473	1	2	2	1	2
204R00520	5	4	4	5	5
204R00575	7	4	5	8	8
204R00583	9	3	9	7	7
204R00596	8	3	9	5	6
204R00639	10	5	11	10	12
204R00680	7	9	9	8	9
204R00711	4	3	6	6	5

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
205R00259	10	11	10	10	11
205R00279	8	7	9	5	9
205R00282	4	3	9	8	7
205R00346	5	6	6	5	7
205R00355	5	5	6	6	6
205R00374	3	4			
205R00387	4	1	3	3	2
205R00419	2	2	2	3	2
205R00430	2	2	2	2	3
205R00451	10	9	11	11	11
205R00474	5	6	5	5	5
205R00535	5	3	3	5	6
205R00538	6	7	7	6	5
205R00547	1	3	1	2	1
205R00554	2	6	3	4	2
205R00586	1	2	2	2	1
205R00602	3	2	7	3	5
205R00622	3	3	2	2	3
205R00627	6	3	7	6	7
205R00659	7	5	7	6	9
205R00686	1	3	2	2	4
205R00707	4	5	4	6	5
205R00714			4	4	7
205R00872	1	1			
205R00878	5	5	4	5	4
205R00984	1	3	1	2	1
205R01704	2	2	3	2	3
205R01816	1	1	1	1	1
205R02408			1	1	1
206R00727			3		1
206R00919	3	1	3	4	3
206R00960	3	2	2	3	5
206R01024	4	2	3	2	2
206R01495	2	2		1	
207R00027	2	2	3	2	3

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
204R00712	8	8	8	7	7
204R00807	4	7	1	5	2
204R00831	7	6	7	5	7
204R00852	1	1	2	2	1
204R00884	6	4	5	4	5
204R01012	4	2	2	4	3
204R01256	6	4	6	2	6
204R01268	2	6	2	4	2
204R01288	4	2	6	5	5
204R01460	3	2	2	1	3
204R01972	4	4	3	5	4
204R02056	6	8	5	8	6
204R02228	1	2	1	1	2
204R02248	6	7	8	7	8
204R02312	8	7	8	6	8
204R02504	5	3	4	5	5
204R02548	7	6	4	6	7
205R00026	4	4	8	6	7
205R00035	5	7	7	8	7
205R00042	4	5	5	5	5
205R00067	5	6	5	5	6
205R00090	4	4	5	3	4
205R00099	4	6	5	3	4
205R00110	2	4	3	5	4
205R00115	7	6	8	8	8
205R00131	8	5	6	7	8
205R00154	7	3	6	4	8
205R00218	5	5	7	6	9
205R00227	2	6	4	4	5
205R00234	2	2	3	1	1
205R00241	2	3	5	4	5

Site ID	Event 1	Event 2	Event 3	Event 4	Event 5
207R00247	1	1	1	1	2
207R00395	5	5	4	3	4
207R00428	8	8	10		9
207R00476	8	7	10		5
207R00503	1	1	1	1	4
207R00567	2	3	5	5	5
207R00619	1	1	1	2	3
207R00631	7	5	5	4	7
207R00688	4	2	4		4
207R00823	2	1	1	5	1
207R00843	3	1	1	2	1
207R00880	4	3	5	3	9
207R00891	2	1	2	2	2
207R01163	9	8	10	3	5
207R01227	2	1	1	2	2
207R01271	1	1	1	1	1
207R01291	8	8	5	4	7
207R01447	2	2	3	2	4
207R02480	1	1	1		1
207R03504	2	1	1		1
543R00137	2	2	2	2	3
544R00025	2	3	1	2	3
544R00281	4	4	6	4	5
544R00342	8	6	4	1	3
544R00464	7	6	3	3	3
544R00598	3	1	3	2	1
544R01049	1	3	1	2	2
544R01305	3	4	8	3	8

10095
10136

Trash Condition Scores at Targeted Sites

Comparison of the trash condition scores for targeted sites by monitoring event suggests the majority of streams in the MRP urban area exhibit low to moderate levels of trash, with some sites in High and Very High condition. Table B3 presents the trash condition scores observed at each site during both of the sampling events. Of the 100 sites, 40% scored in the same condition category during both events, trash condition category increased in 40% of the sites between events, and 20% decreased in trash condition category between the two events.

Across both events, streams exhibited trash condition scores of 3 or 4 (24-28%) and 5 or 6 (25-27%). Less than 25% of the sites had a condition score of 9 or higher during each dry season (14% and 23%, respectively).

Table B3. Trash condition scores at targeted sites over two sample events. Condition categories are represented as follows: Low (green); Moderate (yellow); High (red) and Very High (purple).

Site ID	Event 2	Event 4	Site ID	Event 2	Event 4
ACF_5C_1	6	6	ORI_01	4	5
ACF_5D_1	6	4	PAC01	2	2
ACF_CAL_1	2	3	PIN_01	3	4
ACF_WAR_1	7	9	PIT_01	6	7
ACF_WAR_2	3	10	PIT_04	10	8
ALA_CAS_1	2	2	PLH_01	6	8
ALA_CHA_1	6	8	RCY01	9	10
ALA_EST_1	6	3	RCY03	5	3
ALA_SAN_2	3	11	RIC_01	4	11
ALA_SAN_3	3	8	SCC02	5	5
ALA_SEM_2	9	10	SCC03	6	3
ALA_SITE3	2	4	SCF02	9	9
ANT_04	4	6	SCL01	4	2
BEL01	5	4	SCL02	1	1
BRE_02	2	3	SCL03	2	2
BRI02	3	5	SCP02	10	10
BUR01	5	8	SCS01	4	3
CCC_SF_2	8	3	SJC01A	10	10
CLA_01	7	7	SJC02	10	10
CON_01	5	4	SJC10	6	8
CUO01	3	1	SJC15A	4	7
CUO02	1	1	SJC18	8	11
DAN_01	1	3	SJC22A	7	4
DCY02	4	3	SJC23	10	8
DCY04	6	6	SJC25B	9	3
DUB_ALA_1	2	3	SJC29	6	9
ELC_01	3	5	SJC30	5	9
FF01	10	10	SJC31	8	12
FF03	4	6	SMO01	7	6
FF04	6	7	SMO03	9	10
FRE_CRAN_1	2	7	SNV_01	4	4
FRE_LAG_3	6	6	SNV_02	4	9
FRE_LAG_5	6	6	SPB_01	5	6
FRE_TULE_7	4	8	SRM_02	2	2
HAY_ACF_1	5	7	SSF01	7	7

Site ID	Event 2	Event 4
HAY_DEP_3	3	6
HAY_SFB_7	4	12
HMB01	7	5
LIV_ALP_1	3	5
LIV_ALT_1	2	5
LOA_01	2	3
MIP-01	9	3
MIP-05	8	7
MOR_01	4	2
MOV_01	4	5
MOV_02	3	4
MTZ_01	7	5
OAK_01	4	4
OAK_ARR_1	6	10
OAK_COU_1	5	11
OAK_LMC_1	2	6
OAK_PER_1	11	10
OAK_SAU_2	4	6

Site ID	Event 2	Event 4
SWD_06	7	11
SWD_07	6	5
SWD_08B	9	6
SWD_13	2	6
SWD_19	5	10
UNI_DRY_1	3	7
UNI_OAC_2	2	5
VA01	3	6
VA02	5	3
WCR_02	3	3
WVC02	5	2
WVC03	2	2

APPENDIX C: TRASH CONDITION CATEGORY FOR PROBABILISTIC AND TARGETED SITES FOR EACH COUNTY

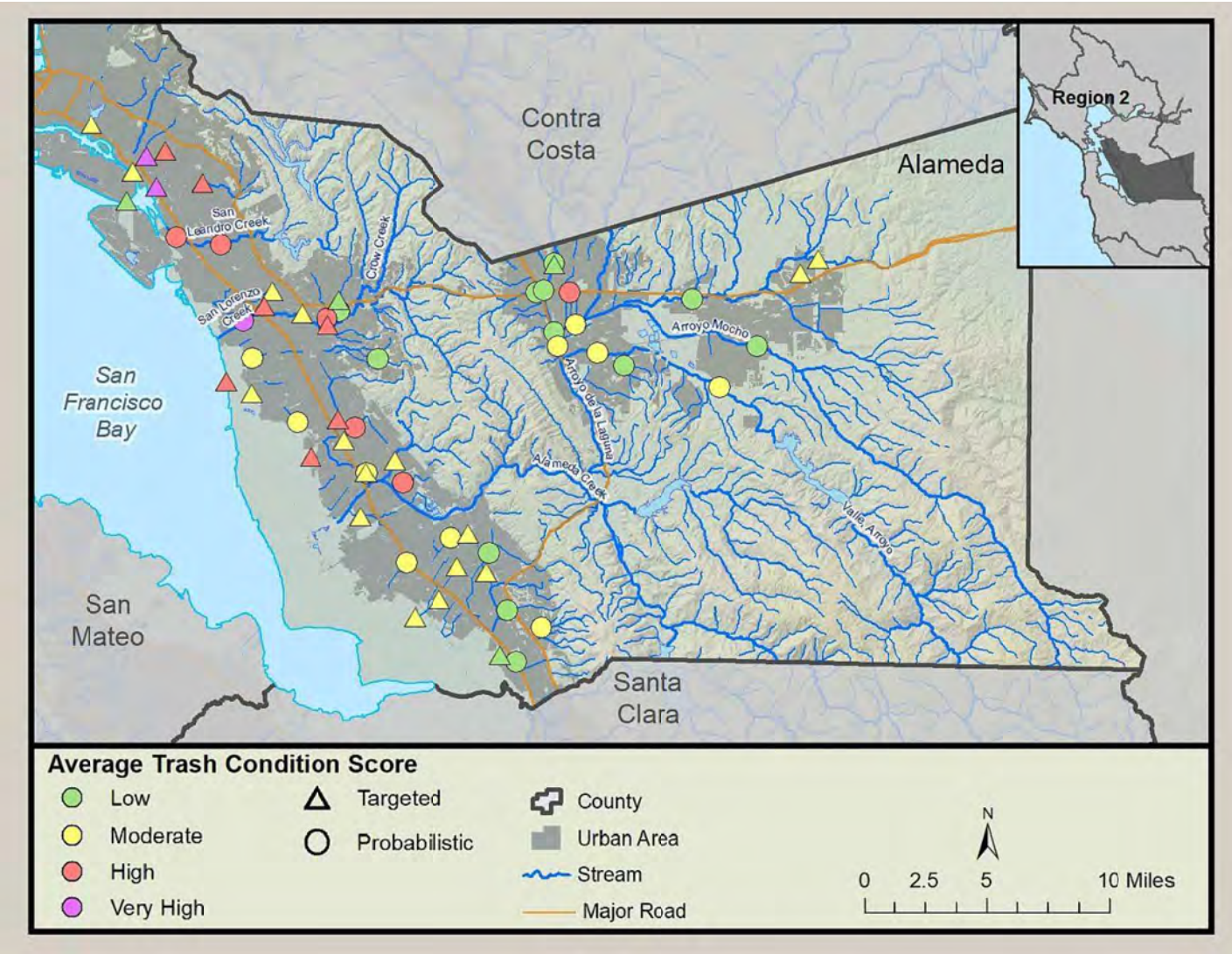
Contra Costa
Alameda
Region 2
San Francisco Bay
San Mateo
Santa Clara
San Leandro Creek
San Lorenzo Creek
Crow Creek
Arroyo Mocho
Arroyo de la Laguna
Alameda Creek
Valle Arroyo
Average Trash Condition Score
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0 2.5 5 10 Miles

10099
10140

10100

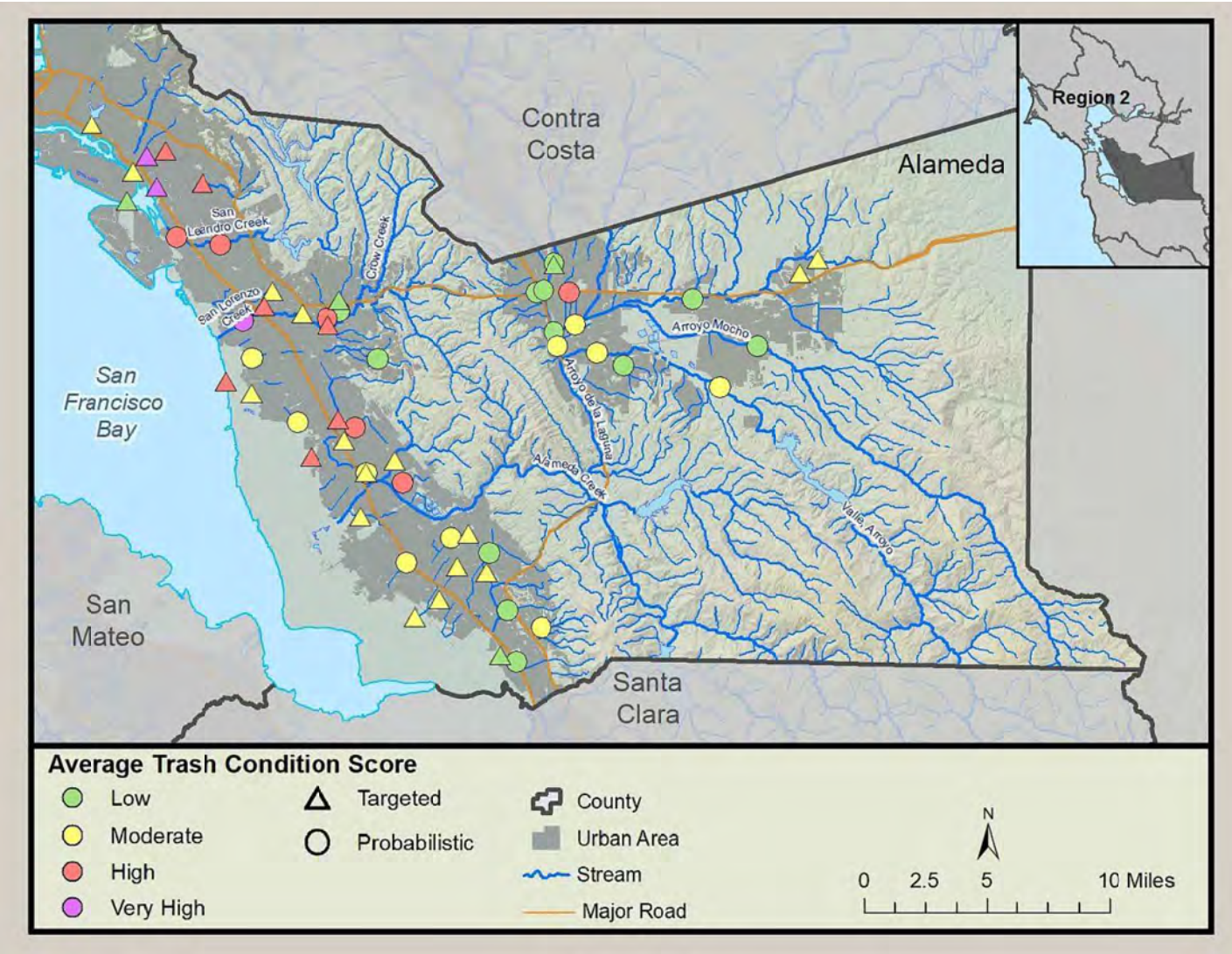

C.1 Average trash condition of probabilistic and targeted sites in Alameda County.

10101

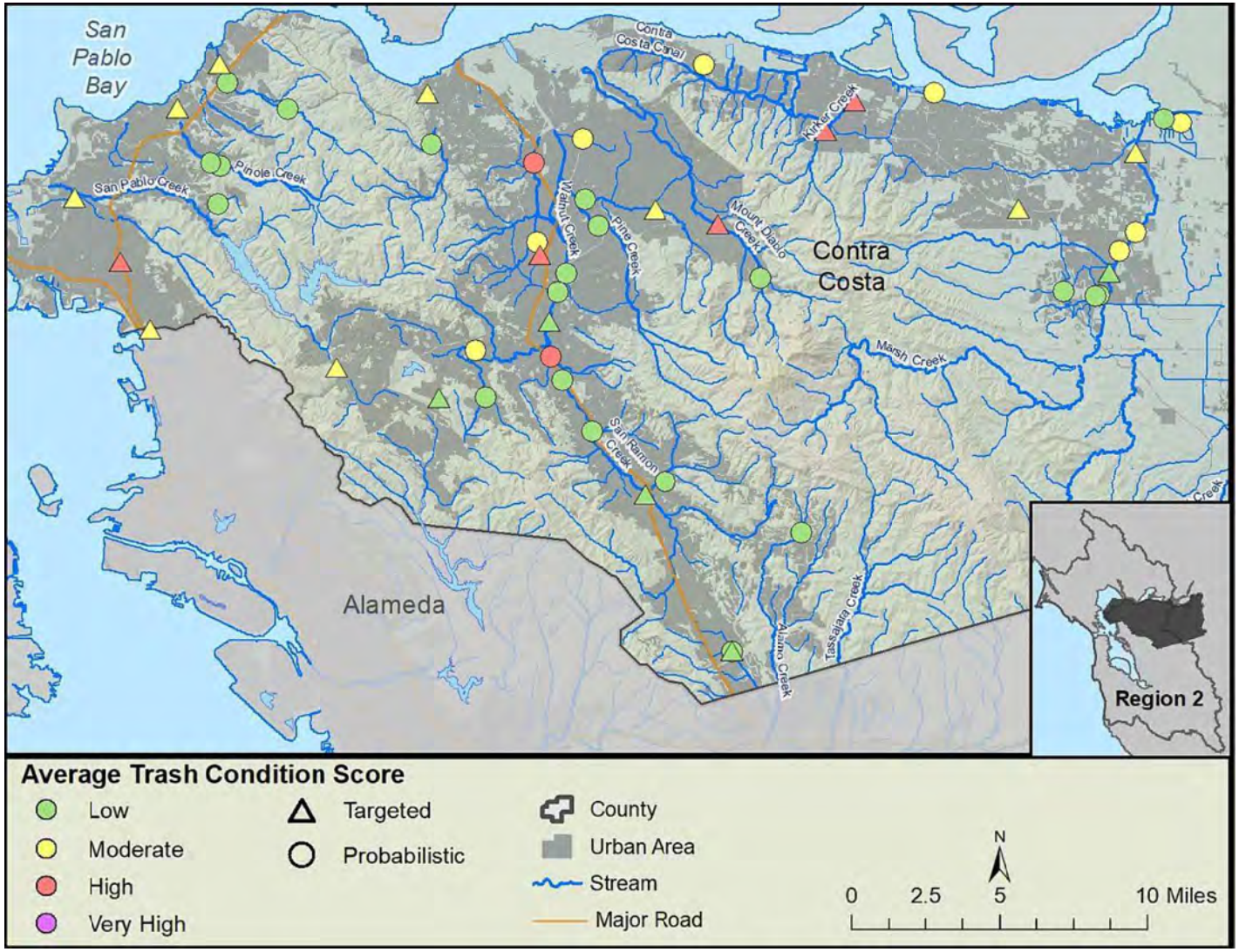
San Pablo Bay
Contra Costa Canal
Kirker Creek
Pinole Creek
San Pablo Creek
Walnut Creek
Pine Creek
Mount Diablo Creek
Contra Costa
Marsh Creek
San Ramon Creek
Alameda
Tassajara Creek
Alamo Creek
Region 2
Average Trash Condition Score
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0 2.5 5 10 Miles

10102

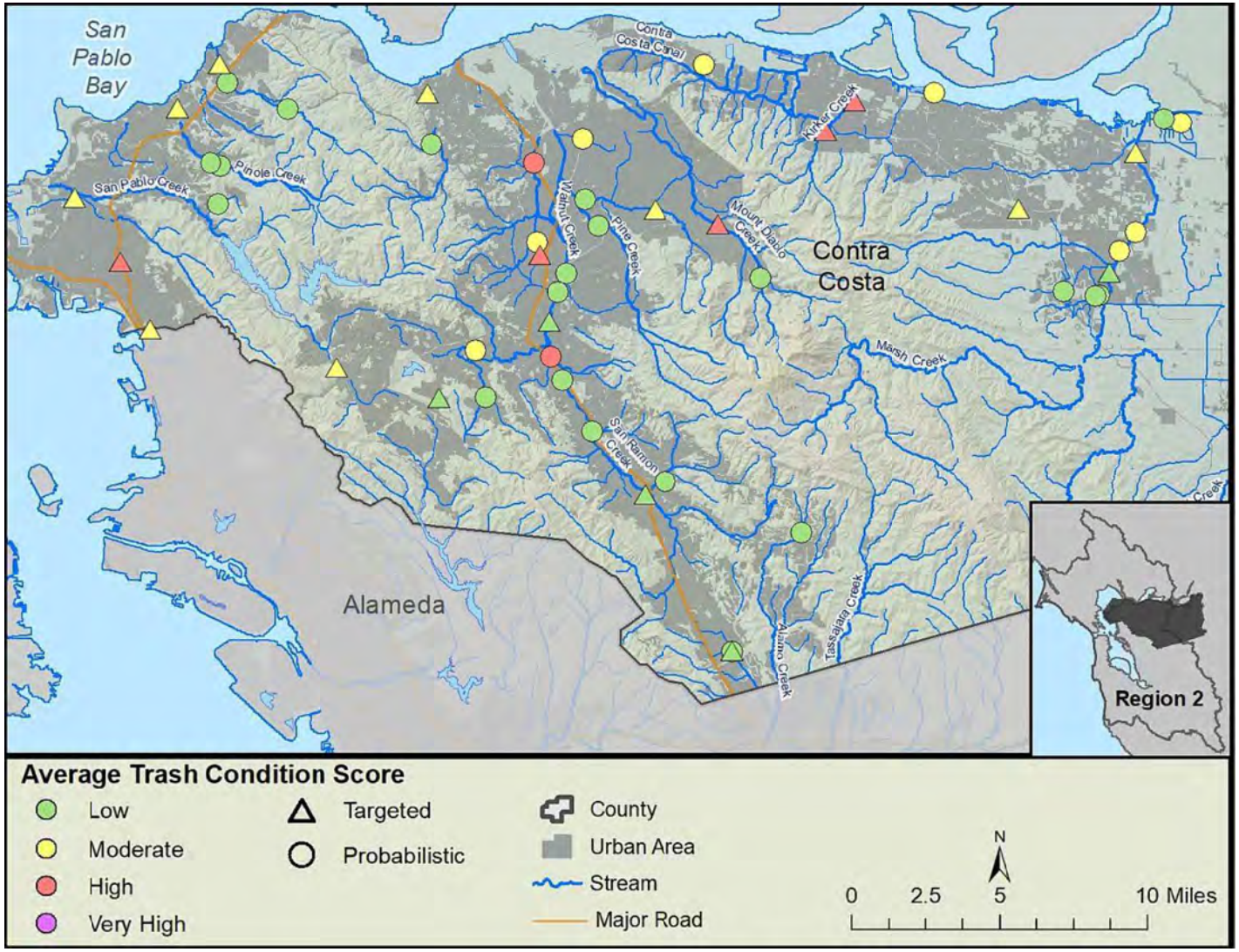

C.2 Average trash condition of probabilistic and targeted sites in Contra Costa County.

10103

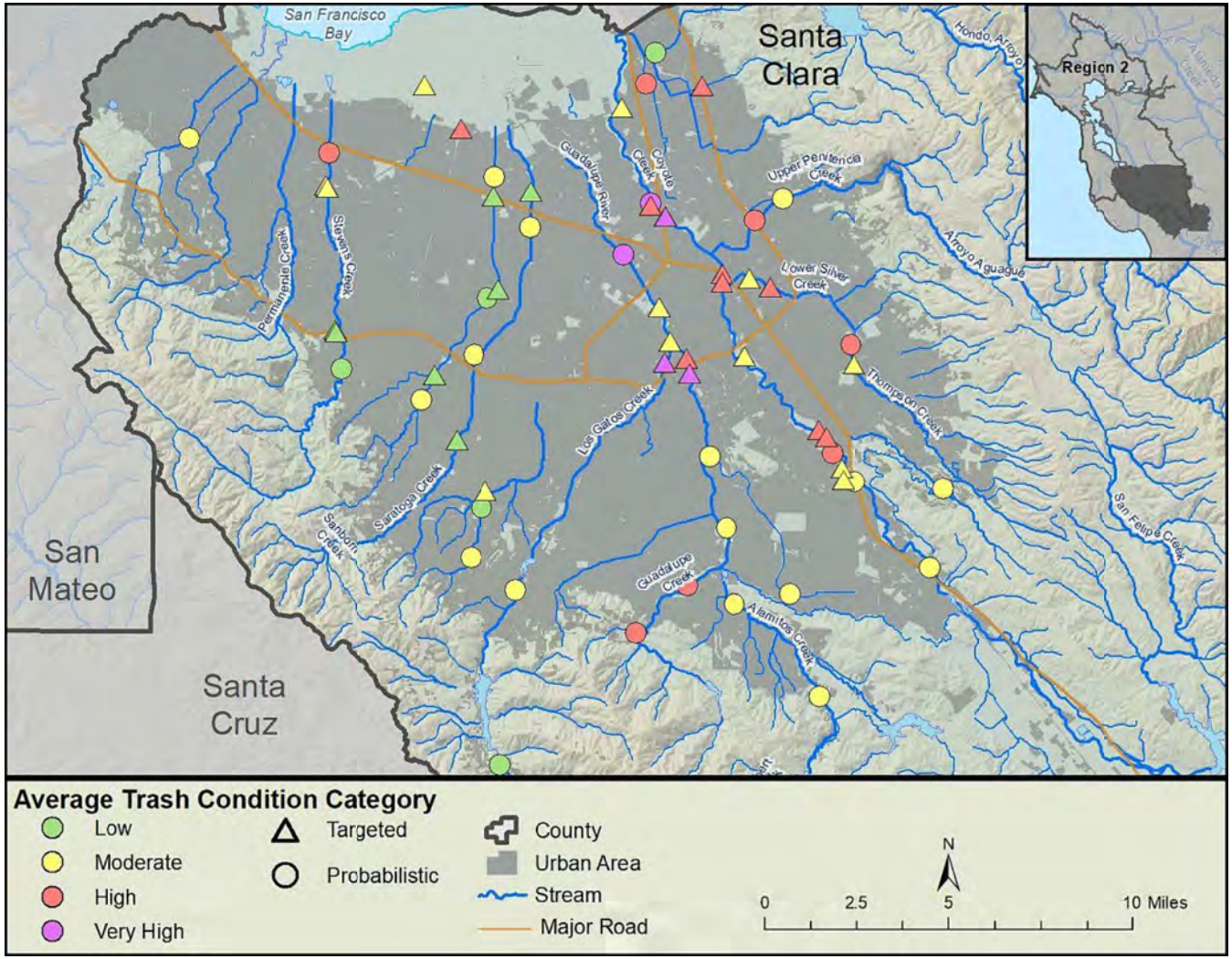
San Francisco Bay
Santa Clara
Region 2
Hondo, Arroyo
Upper Penitencia Creek
Coyote Creek
Guadalupe River
Stevens Creek
Permanente Creek
Lower Silver Creek
Arroyo Aguague
Thompson Creek
Los Gatos Creek
Saratoga Creek
Sanborn Creek
San Felipe Creek
Guadalupe Creek
Alamitos Creek
San Mateo
Santa Cruz
Average Trash Condition Category
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0
2.5
5
10 Miles

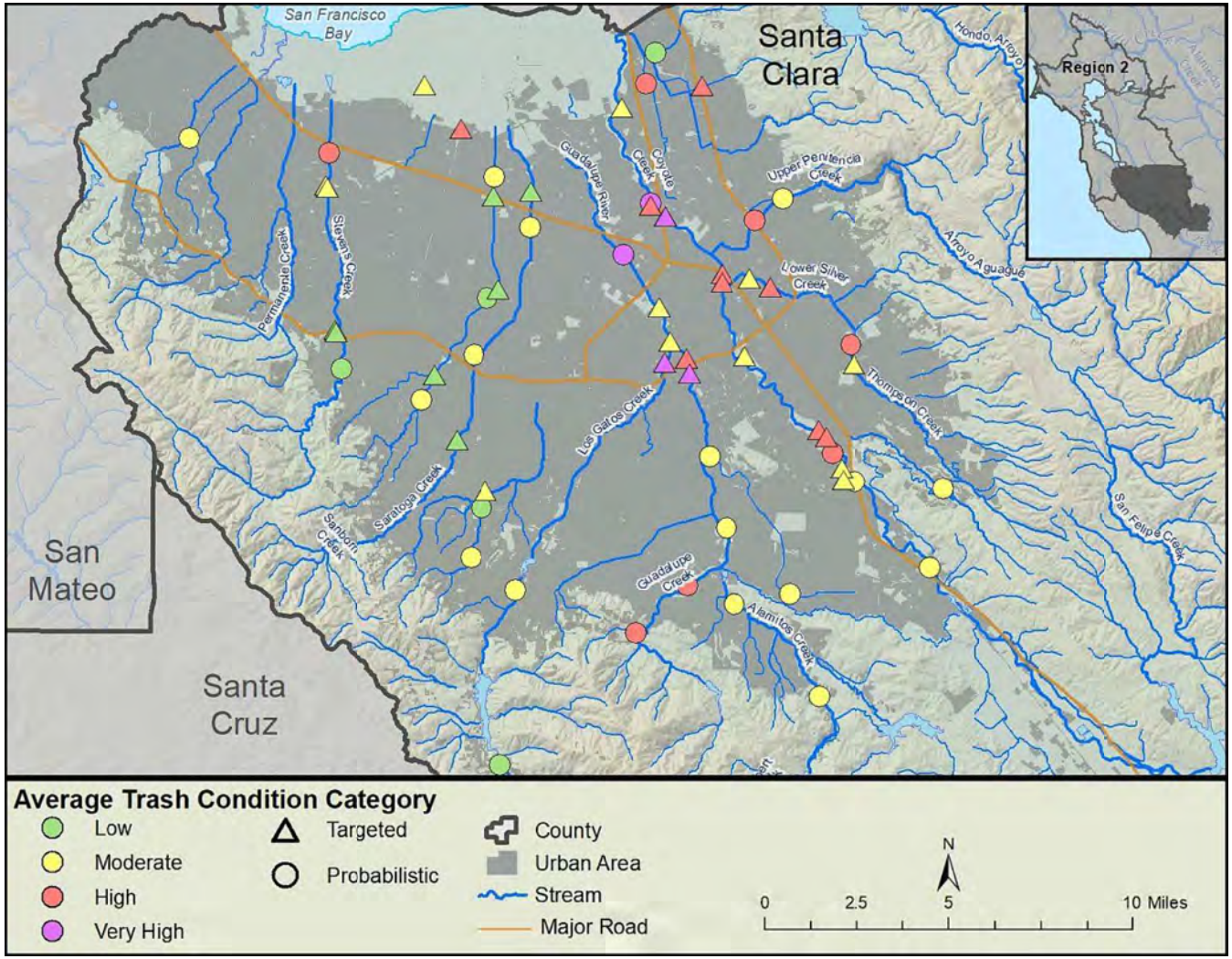

C.3 Average trash condition of probabilistic and targeted sites in Santa Clara County.

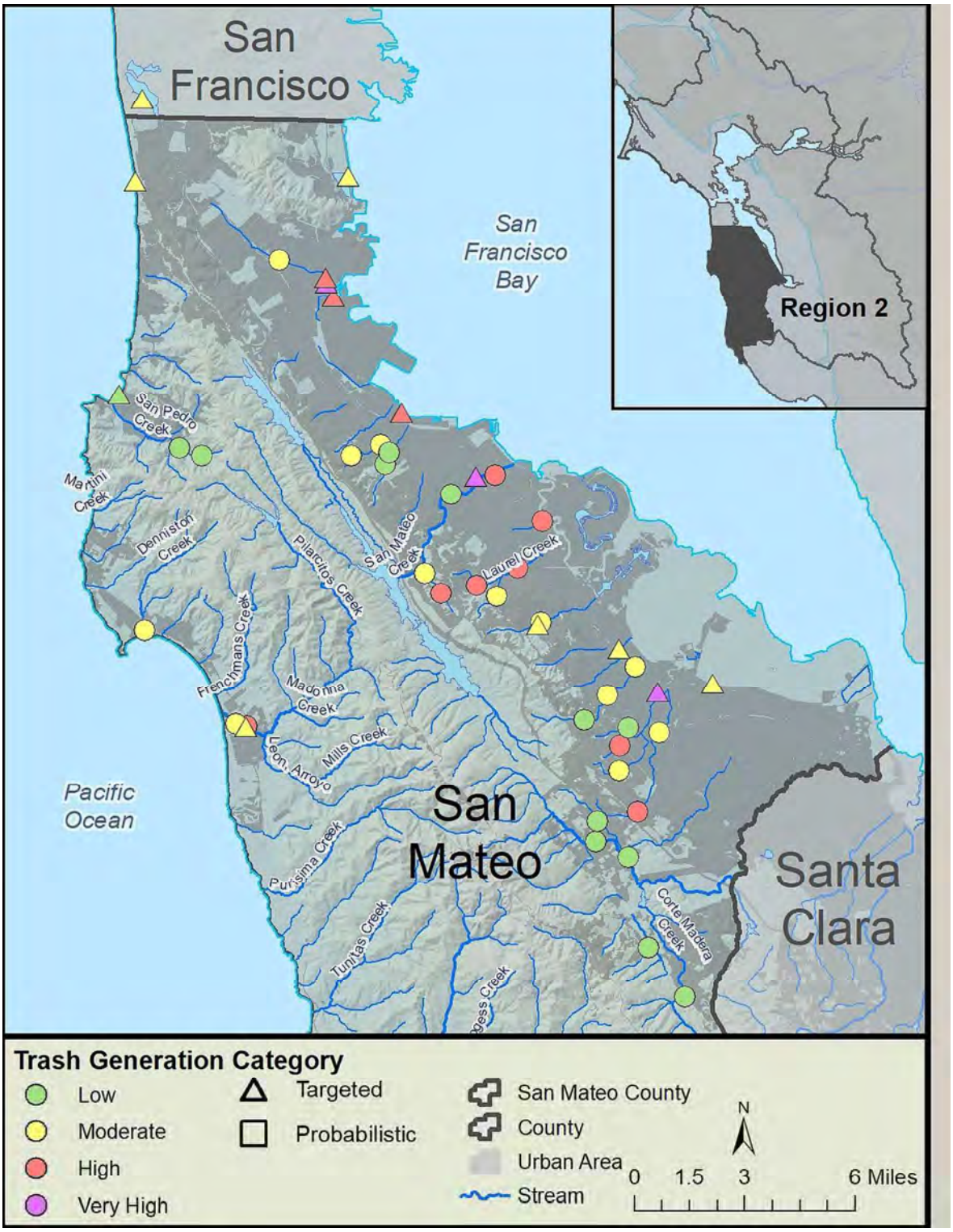
San Francisco
San Francisco Bay
Region 2
San Pedro Creek
Martini Creek
Denniston Creek
Pilarcitos Creek
San Mateo Creek
Laurel Creek
Frenchmans Creek
Madonna Creek
Mills Creek
Leon. Arroyo
Pacific Ocean
San Mateo
Purisima Creek
Tunitas Creek
Corte Madera Creek
Santa Clara
Trash Generation Category
Low
Moderate
High
Very High
Targeted
Probabilistic
San Mateo County
County
Urban Area
Stream
N
0 1.5 3 6 Miles

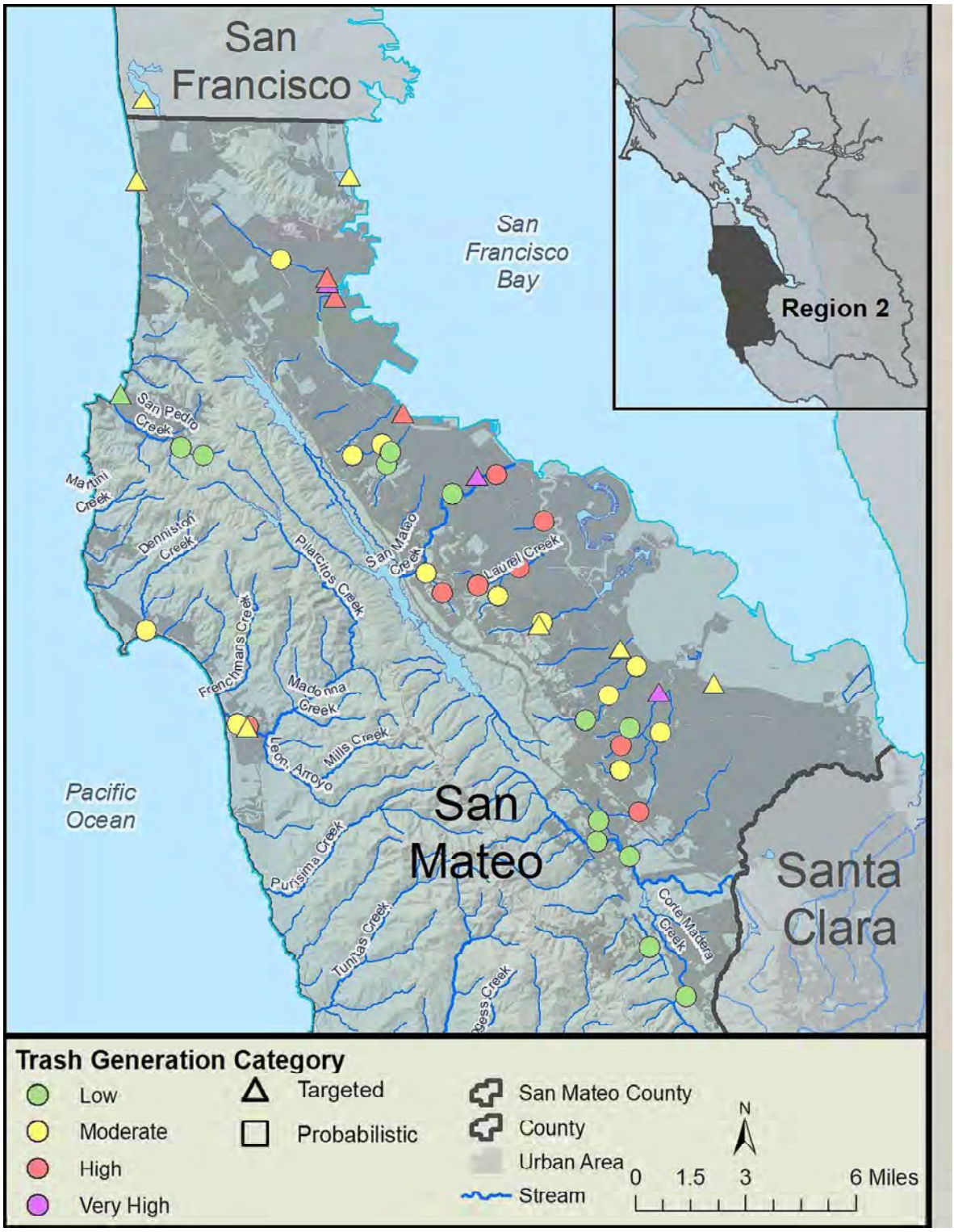

C.4 Average trash condition of probabilistic and targeted sites in San Mateo County.

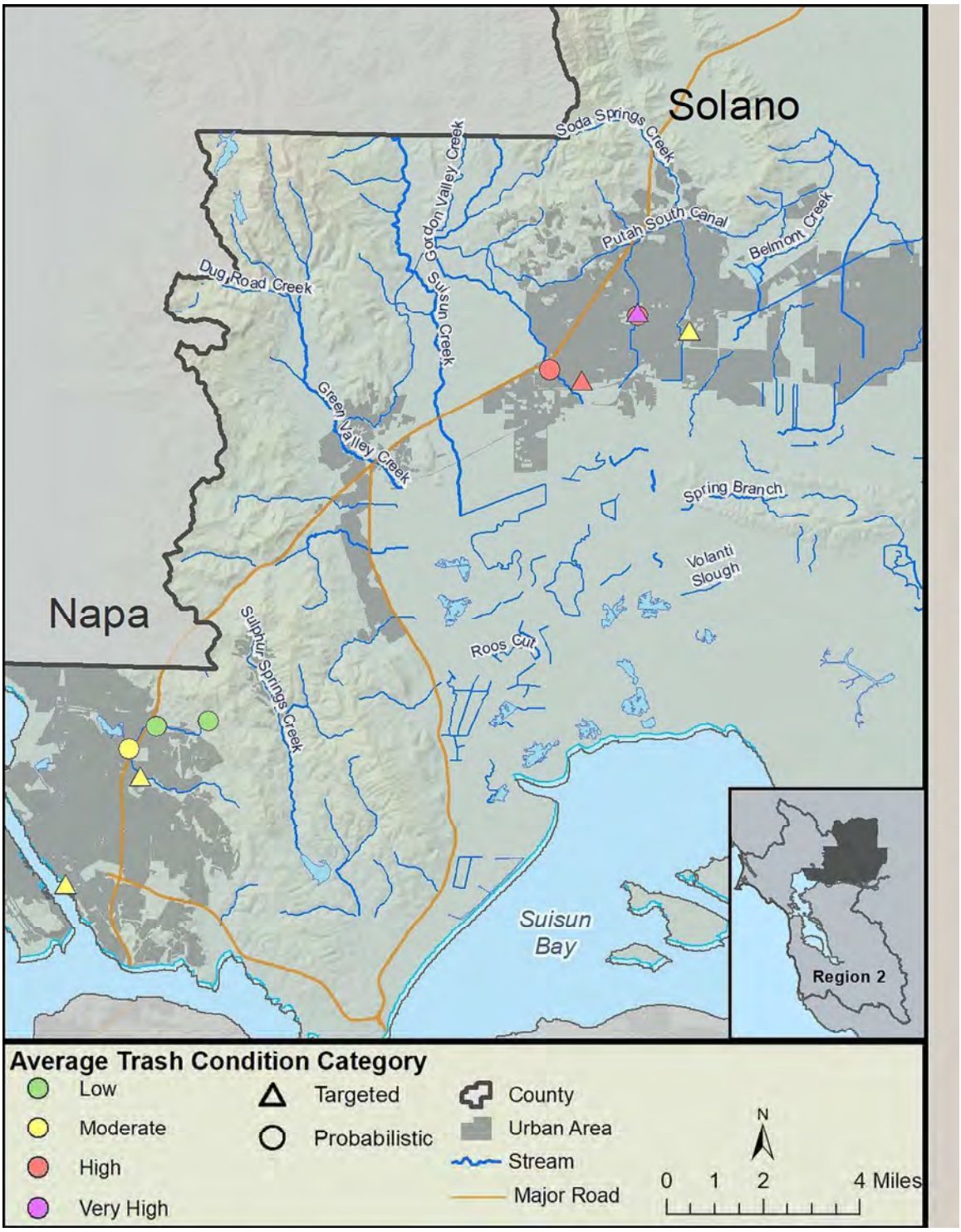
Solano
Napa
Soda Springs Creek
Gordon Valley Creek
Putah South Canal
Belmont Creek
Dug Road Creek
Suisun Creek
Green Valley Creek
Spring Branch
Volanti Slough
Roos Cut
Sulphur Springs Creek
Suisun Bay
Region 2
Average Trash Condition Category
Low
Moderate
High
Very High
Targeted
Probabilistic
County
Urban Area
Stream
Major Road
N
0 1 2 4 Miles

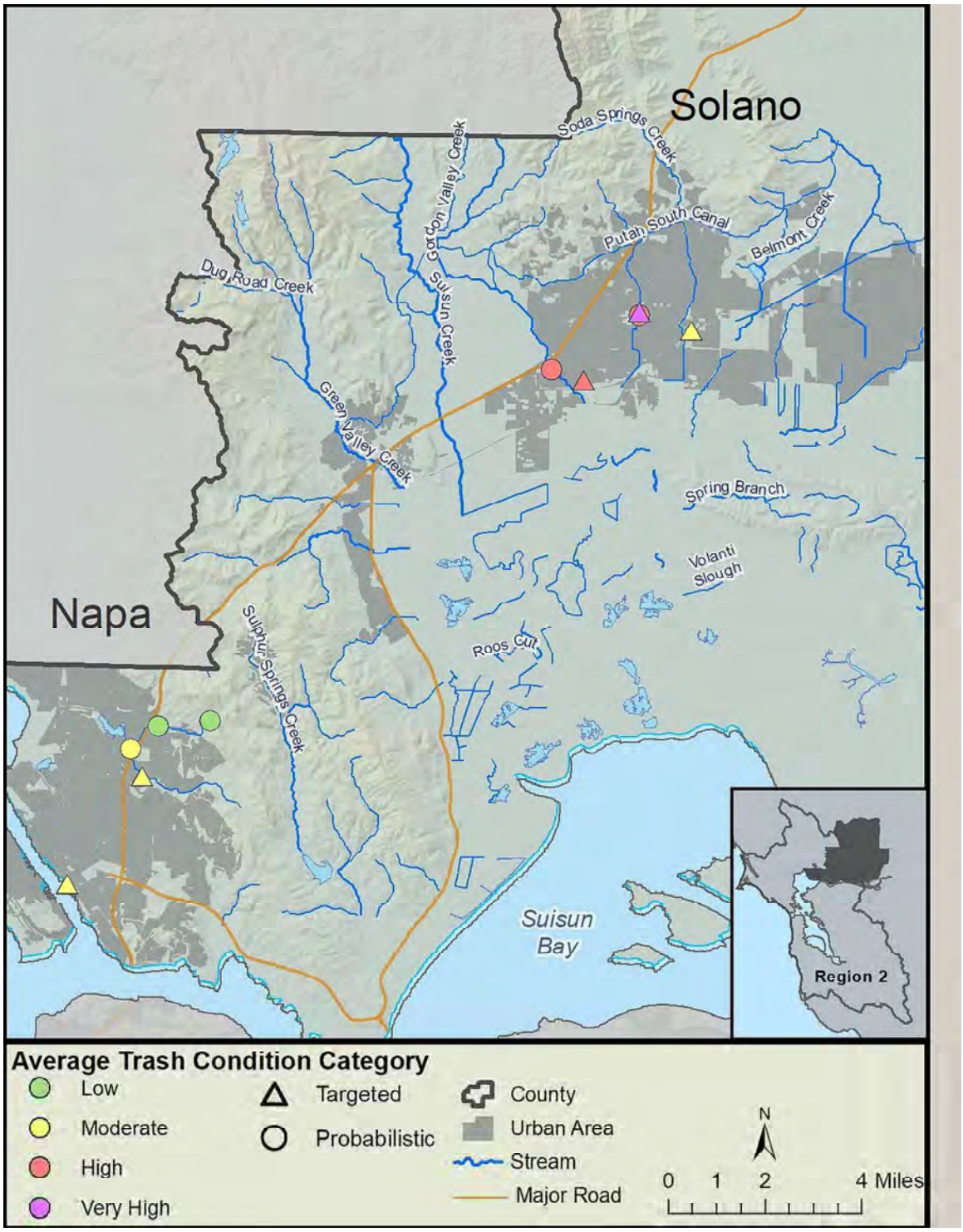

C.5 Average trash condition of probabilistic and targeted sites in Solano County.

APPENDIX D: TRASH VOLUME AT TARGETED SITES

Table D1. Trash volume and density at targeted sites during two sampling events. Qualitative assessment trash condition scores are provided for comparison.

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
ACF_5C_1	20	0.0045	6	54.9	0.0122	6	37.45	0.017
ACF_5D_1	40	0.0035	4	15	0.0010	4	27.5	0.005
ACF_CAL_1	35	0.0056	2	3	0.0055	32.5	19	0.011
ACF_WAR_1	129.8	0.0197	7	62.4	0.0088	9	96.1	0.028
ACF_WAR_2	20	0.0004	3	30	0.0005	10	25	0.001
ALA_CAS_1	99.8	0.0416	2	5	0.0022	2	52.4	0.044
ALA_CHA_1	22.5	0.0044	6	57.5	0.0122	8	40	0.017
ALA_EST_1	119.8	0.0312	6	3.8	0.0009	3	61.8	0.032
ALA_SAN_2	79.8	0.0266	3	115	0.0103	11	97.4	0.037
ALA_SAN_3	82.3	0.0274	3	142.4	0.0137	8	112.35	0.041
ALA_SEM_2	70	0.0059	9	107.4	0.0087	10	88.7	0.015
ALA_SITE3	17.5	0.0011	2	12.5	0.0014	4	15	0.003
ANT_04	42.5	0.0047	4	25.3	0.0028	6	33.9	0.007
BEL01	1	0.0005	5	3	0.0015	4	2	0.002
BRE_02	12.5	0.0011	2	12.5	0.0011	3	12.5	0.002
BRI02	15	0.0008	3	55	0.0029	5	35	0.004
BUR01	75	0.0023	5	143	0.0034	8	109	0.006
CCC_SF_2	75	0.0045	8	15	0.0008	3	45	0.005
CLA_01	107.4	0.0060	7	332	0.0187	7	219.7	0.025
CON_01	40	0.0028	5	35	0.0024	4	37.5	0.005

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
CUO01	6.5	0.0009	3	4	0.0005	1	5.25	0.001
CUO02	0.2	0.0000	1	4.3	0.0005	1	2.25	0.001
DAN_01	11.2	0.0011	1	7.5	0.0007	3	9.35	0.002
DCY02	32	0.0021	4	30.4	0.0020	3	31.2	0.004
DCY04	64	0.0119	6	64	0.0119	6	64	0.024
DUB_ALA_1	10	0.0016	2	5	0.0008	3	7.5	0.002
ELC_01	23.7	0.0025	3	15.5	0.0010	5	19.6	0.003
FF01	139.5	0.0114	10	1314.8	0.1420	10	727.15	0.153
FF03	112.4	0.0040	4	205	0.0094	6	158.7	0.013
FF04	205	0.0120	6	78	0.0228	6	141.5	0.035
FRE_CRAN_1	5	0.0006	2	37.5	0.0076	7	21.25	0.008
FRE_LAG_3	30	0.0104	6	30	0.0060	6	30	0.016
FRE_LAG_5	10	0.0039	6	21.3	0.0053	6	15.65	0.009
FRE_TULE_7	47.4	0.0017	4	17.5	0.0005	8	32.45	0.002
HAY_ACF_1	55	0.0044	5	64.9	0.0037	7	59.95	0.008
HAY_DEP_3	15	0.0010	3	25	0.0016	6	20	0.003
HAY_SFB_7	25	0.0003	4	15	0.0003	12	20	0.001
HMB01	1644.4	0.1759	7	33	0.0035	5	838.7	0.179
LIV_ALP_1	17.5	0.0040	3	10	0.0027	5	13.75	0.007
LIV_ALT_1	12.5	0.0040	2	17.5	0.0048	5	15	0.009
LOA_01	202.5	0.0657	2	71.3	0.0063	3	136.9	0.072
MIP-01	327.5	0.0234	9	122.2	0.0080	3	224.85	0.031
MIP-05	640	0.1391	8	21	0.0033	7	330.5	0.142
MOR_01	7.5	0.0017	4	5	0.0011	2	6.25	0.003
MOV_01	12.5	0.0014	4	10	0.0011	5	11.25	0.002
MOV_02	5	0.0005	3	10	0.0010	4	7.5	0.002

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
MTZ_01	40	0.0027	7	423.9	0.0290	5	231.95	0.032
OAK_01	25	0.0019	4	10	0.0008	4	17.5	0.003
OAK_ARR_1	543.8	0.1956	5	25	0.0157	4	284.4	0.211
OAK_COU_1	5	0.0016	5	30	0.0092	11	17.5	0.011
OAK_LMC_1	7.5	0.0021	2	10	0.0020	6	8.75	0.004
OAK_PER_1	154.7	0.0458	11	74.9	0.0161	10	114.8	0.062
OAK_SAU_2	20	0.0046	4	69.9	0.0146	6	44.95	0.019
ORI_01	15	0.0015	4	15	0.0014	5	15	0.003
PAC01	3	0.0001	2	5	0.0001	2	4	0.000
PIN_01	22.5	0.0027	3	61.2	0.0064	4	41.85	0.009
PIT_01	44.9	0.0036	6	20	0.0016	7	32.45	0.005
PIT_04	319.9	0.0199	10	129.9	0.0081	8	224.9	0.028
PLH_01	68.7	0.0065	6	458.9	0.0433	8	263.8	0.050
RCY01	45	0.0214	9	40	0.0190	10	42.5	0.040
RCY03	46	0.0081	5	0	0.0000	3	23	0.008
RIC_01	52.4	0.0041	4	33.7	0.0023	11	43.05	0.006
SCC02	10	0.0008	5	19.5	0.0047	5	14.75	0.005
SCC03	21.5	0.0024	6	30.5	0.0111	3	26	0.014
SCF02	275	0.0131	9	275	0.0131	9	275	0.026
SCL01	2.5	0.0004	4	6.3	0.0014	2	4.4	0.002
SCL02	7.5	0.0028	1	5	0.0019	1	6.25	0.005
SCL03	10	0.0007	2	15	0.0011	2	12.5	0.002
SCP02	559	0.0133	10	691.9	0.0165	10	625.45	0.030
SCS01	11.7	0.0018	4	10	0.0016	3	10.85	0.003
SJC01A	100	0.0073	10	1030.9	0.0748	10	565.45	0.082
SJC02	760.9	0.0620	10	1609.9	0.1313	10	1185.4	0.193

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
SJC10	517	0.0377	6	2955.8	0.2157	8	1736.4	0.253
SJC15A	247.5	0.0239	4	455.5	0.0440	7	351.5	0.068
SJC18	430	0.0381	8	1835.7	0.1627	11	1132.85	0.201
SJC22A	658	0.0434	7	438	0.0289	4	548	0.072
SJC23	758.9	0.0782	10	710.9	0.0733	8	734.9	0.152
SJC25B	755.9	0.0543	9	1247.9	0.0794	3	1001.9	0.134
SJC29	625	0.0429	6	1100.9	0.0756	9	862.95	0.119
SJC30	273	0.0253	5	921.5	0.0852	9	597.25	0.110
SJC31	980.5	0.0762	8	2020	0.1570	12	1500.25	0.233
SMO01	74.4	0.0025	7	36	0.0050	6	55.2	0.008
SMO03	219.8	0.0190	9	1446.1	0.2493	10	832.95	0.268
SNV_01	69.6	0.0041	4	25	0.0015	4	47.3	0.006
SNV_02	53.7	0.0064	4	28	0.0035	9	40.85	0.010
SPB_01	32.5	0.0062	5	55	0.0096	6	43.75	0.016
SRM_02	5	0.0003	2	7.5	0.0005	2	6.25	0.001
SSF01	20	0.0004	7	50	0.0011	7	35	0.002
SWD_06	277	0.0208	7	252	0.0573	11	264.5	0.078
SWD_07	272.5	0.0285	6	111	0.0116	5	191.75	0.040
SWD_08B	2548.6	0.1671	9	443.9	0.0475	6	1496.25	0.215
SWD_13	419.7	0.0137	2	136	0.0030	6	277.85	0.017
SWD_19	237	0.0076	5	1281.8	0.0410	10	759.4	0.049
UNI_DRY_1	79.8	0.0134	3	84.9	0.0174	7	82.35	0.031
UNI_OAC_2	1.3	0.0003	2	10	0.0039	5	5.65	0.004
VA01	67.4	0.0074	3	351	0.0607	6	209.2	0.068
VA02	115.3	0.0086	5	68.5	0.0197	3	91.9	0.028
WCR_02	20	0.0017	3	8.8	0.0007	3	14.4	0.002

SiteID	Event 1 (2018)			Event 2 (2019)			Site Average	
	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Trash Volume (gallons)	Trash Density (gallons/ft2)	Condition Score	Volume (gallons)	Density (gallons/ft2)
WVC02	7	0.0010	5	25	0.0037	2	16	0.005
WVC03	1	0.0002	2	2.5	0.0004	2	1.75	0.001

APPENDIX E: GUIDANCE FOR PEER REVIEWERS, PEER REVIEW COMMENTS, AND RESPONSES TO PEER REVIEWER COMMENTS

Trash Long-Term Reduction Plan and Progress Assessment Strategy

February 1, 2014

Submitted by:

City of Fairfield

1000 Webster Street

Fairfield, CA 94533

In compliance with Provisions C.10.c of Order R2-2009-0074

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CITY OF FAIRFIELD
LONG-TERM TRASH LOAD REDUCTION PLAN AND ASSESSMENT STRATEGY

CERTIFICATION STATEMENT

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature by Duly Authorized Representative:

George R. Hicks
Director of Public Works

February 1, 2014

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ABBREVIATIONS

BASMAA	Bay Area Stormwater Management Agencies Association
BID	Business Improvement District
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CDS	Continuous Deflection Separator
CEQA	California Environmental Quality Act
CY	Cubic Yards
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
GIS	Geographic Information System
MRP	Municipal Regional Stormwater NPDES Permit
MS4	Municipal Separate Storm Sewer System
NGO	Non-Governmental Organization
NPDES	National Pollutant Discharge Elimination System
Q	Flow
SFRWQCB	San Francisco Regional Water Quality Control Board
SWRCB	State Water Resource Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
Water Board	San Francisco Regional Water Quality Control Board
WDR	Waste Discharge Requirements

PREFACE

This Long-Term Trash Load Reduction Plan and Assessment Strategy (Long-Term Plan) is submitted in compliance with provision C.10.c of the Municipal Regional Stormwater NPDES Permit (MRP) for Phase I communities in the San Francisco Bay (Order R2-2009-0074). The Long-Term Plan was developed using a regionally consistent outline and guidance developed by the Bay Area Stormwater Management Agencies Association (BASMAA) and reviewed by San Francisco Bay Regional Water Quality Control Board staff. The Long-Term Plan is consistent with the Long-Term Trash Load Reduction Framework developed in collaboration with Water Board staff. Its content is based on the City of Fairfield's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with Municipal Separate Storm Sewer (MS4) discharges. This Long-Term Plan is intended to be iterative and may be modified in the future based on information gained through the implementation of trash control measures. The City of Fairfield therefore reserves the right to revise or amend this Long-Term Plan at its discretion. If significant revisions or amendments are made by the City, a revised Long-Term Plan will be submitted to the Water Board through the City's annual reporting process.

1.0 INTRODUCTION

1.1 Purpose of Long-Term Trash Reduction Plan

The Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit for Phase I communities in the San Francisco Bay (Order R2-2009-0074), also known as the Municipal Regional Permit (MRP), became effective on December 1, 2009. The MRP applies to 76 large, medium and small municipalities (cities, towns and counties) and flood control agencies in the San Francisco Bay Region, collectively referred to as Permittees. Provision C.10.c of the MRP requires Permittees to submit a *Long-Term Trash Load Reduction Plan* (Long-Term Plan) by February 1, 2014. Long-Term Plans must describe control measures that are currently being implemented, including the level of implementation, and additional control measures that will be implemented and/or increased level of implementation designed to attain a 70% trash load reduction by July 1, 2017, and 100% (i.e., "No Visual Impact") by July 1, 2022.

This Long-Term Plan is submitted by the City of Fairfield in compliance with MRP provision C.10.c. Consistent with provision C.10 requirements, the goal of the Long-Term Plan is to solve trash problems in receiving waters by reducing the impacts associated with trash in discharges from the Fairfield's Municipal Separate Storm Sewer System (MS4) that are regulated by NPDES Permit requirements. The Long-Term Plan includes:

1. Descriptions the current level of implementation of trash control measures, and the type and extent to which new or enhanced control measures will be implemented to achieve a target of 100% (i.e. full) trash reduction from MS4s by July 1, 2022, with an interim milestone of 70% reduction by July 1, 2017;
2. A description of the *Trash Assessment Strategy* that will be used to assess progress towards trash reduction targets achieved as a result of control measure implementation; and,
3. Time schedules for implementing control measures and the assessment strategy.

The Long-Term Plan was developed using a regionally consistent outline and guidance developed by the Bay Area Stormwater Management Agencies Association (BASMAA) and reviewed by the San Francisco Bay Regional Water Quality Control Board (Water Board) staff. The Long-Term Plan is consistent with the Long-Term Trash Load Reduction Framework (see Section 1.2.1) developed in collaboration with Water Board staff. Its content is based on the City of Fairfield's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with MS4 discharges. The Long-Term Plan builds upon trash control measures implemented by the City prior to the adoption of the MRP and during the implementation of the Short-Term Trash Load Reduction Plan submitted to the Water Board on February 1, 2012.

1.2 Background

1.2.1 Long-Term Trash Load Reduction Plan Framework

A workgroup of MRP Permittee, Bay Area countywide stormwater staff, and Water Board staff met between October 2012 and March 2013 to better define the process for developing and implementing Long-Term Plans, methods for assessing progress toward reduction goals, and tracking and reporting requirements associated with provision C.10. Through these discussions, an eight-step framework for developing and implementing Long-Term Plans was created by the workgroup (Figure 1).

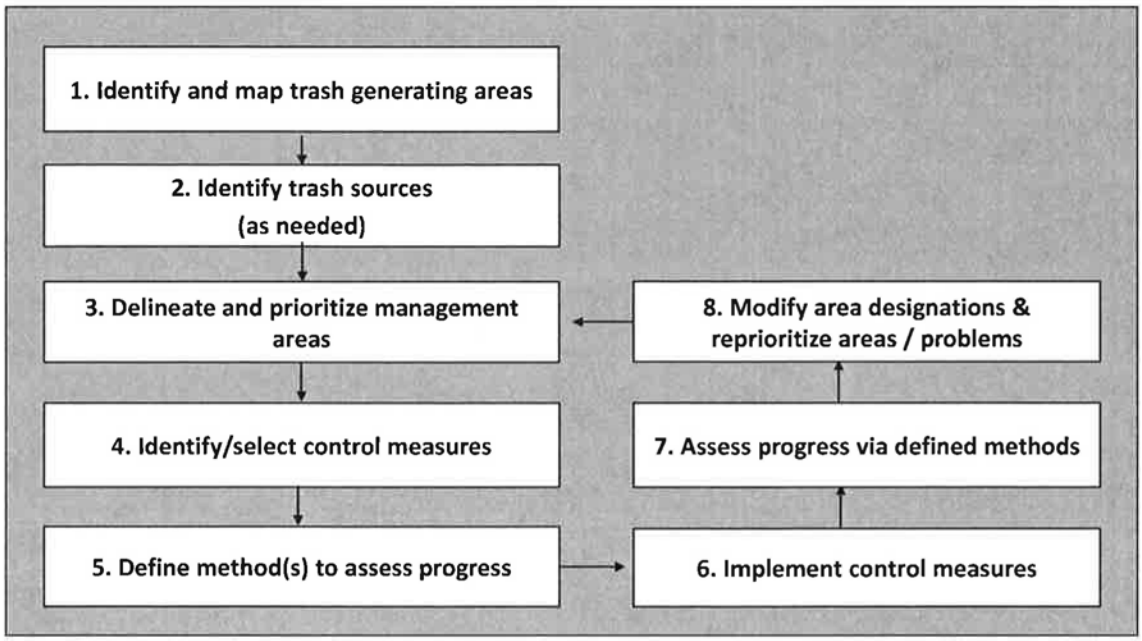

Figure 1. Eight-step framework for developing, implementing and refining Long-Term Trash Reduction Plans.

The workgroup agreed that as the first step in the framework, Permittees would identify very high, high, moderate, and low trash generating areas in their jurisdictional areas. Trash generation rates developed through the *BASMAA Baseline Trash Generation Rates Project* (as discussed below) were used as a starting point for differentiating and delineating land areas with varying levels of trash generation. Permittees would then use local knowledge and field and/or desktop assessments to confirm or refine the level of trash generation for specific areas within their jurisdiction. Each Permittee would then develop a map depicting trash generation categories within their jurisdiction.

As a next step, Permittees would then delineate and prioritize Trash Management Areas (TMAs) where specific control measures exist or are planned for implementation. TMAs delineated by Permittees are intended to serve as reporting units in the future. Reporting at the management area level provides the level of detail necessary to demonstrate implementation and progress towards trash reduction targets.

Once control measures are selected and implemented, Permittees will evaluate progress toward trash reduction targets using outcome-based assessment methods. As the results of the progress assessments are available, Permittees may choose to reprioritize trash management areas and associated control measures designed to improve trash reduction within their jurisdictions.

1.2.2 BASMAA Generation Rates Project

Through approval of a BASMAA regional project in 2010, Permittees agreed to work collaboratively to develop a regionally consistent method to establish trash generation rates within their jurisdictions. The project, also known as the *BASMAA Trash Generation Rates Project* (Generation Rates Project) assisted Permittees in establishing the rates of trash generation and identifying very high, high, moderate and low trash generating areas.

The term "trash generation" refers to the rate at which trash is produced or generated onto the surface of the watershed and is potentially available for transport via MS4s to receiving waters. Generation rates do not explicitly take into account existing control measures that intercept trash prior to transport. Generation rates are expressed as trash volume/acre/year and were established via the Generation Rates Project.

In contrast to trash generation, the term "trash loading" refers to the rate at which trash from MS4s enters receiving waters. Trash loading rates are also expressed as trash volume/acre/year and are equal to or less than trash generation rates because they account for the effects of control measures that intercept trash generated in an area before it is discharged to a receiving water. Trash loading rates are specific to particular areas because they are dependent upon the effectiveness of control measures implemented within an area. Figure 2 illustrates the difference between trash generation and loading.

Figure 2. Conceptual model of trash generation, interception and load.

Trash generation rates were estimated based on factors that significantly affect trash generation (i.e., land use and income). The method used to the establish trash generation rates for each Permittee builds off "lessons learned" from previous trash loading studies conducted in urban areas (Allison and Chiew 1995; Allison et al. 1998; Armitage et al. 1998; Armitage and Rooseboom 2000; Lippner et al. 2001; Armitage 2003; Kim et al. 2004; County of Los Angeles 2002, 2004a, 2004b; Armitage 2007). The method is based on a conceptual model developed as an outgrowth of these studies (BASMAA 2011b).

Trash generation rates were developed through the quantification and characterization of trash captured in Water Board-recognized full-capture treatment devices installed in the San Francisco Bay area. Trash generation rates estimated from this study are listed for each land use type in. Methods used to develop trash generation rates are more fully described in BASMAA (2011b, 2011c, and 2012).

Table 1. San Francisco Bay Area trash generation rates by land use (gallons/acre/year).

Land Use	Low[b]	Best[b]	High[b]
Commercial & Services	0.7	**6.2**	17.3
Industrial	2.8	**8.4**	17.8
Residential[a]	0.3 - 30.2	**0.5 - 87.1**	1.0 - 257.0
Retail[a]	0.7 - 109.7	**1.8 - 150.0**	4.6 - 389.1
K-12 Schools	3	**6.2**	11.5
Urban Parks	0.5	**5.0**	11.4

[a] For residential and retail land uses, trash generation rates are provided as a range that takes into account the correlation between rates and household median income.

[b] For residential and retail land uses: Low = 5% confidence interval; Best = best fit regression line between generation rates and household median income; and, High = 95% confidence interval. For all other land use categories: High = 90th percentile; Best = mean generation rate; and, Low = 10th percentile.

1.2.3 Short-Term Trash Load Reduction Plan

In February 2012, the City of Fairfield developed a Short-Term Trash Load Reduction Plan that described the current level of control measures implementation and identified the type and extent to which new or enhanced control measures would be implemented to attain a 40% trash load reduction from its MS4 by July 1, 2014. Since that time, the City of Fairfield has begun to implement its short-term plan. Control measures implemented to date via the short-term trash reduction plan are:

- Control Measure #1- Full Trash Capture Device.
  This Contech CDS device was installed in June 2012 at the end of a 60-inch storm drain line that outfalls into Railroad Avenue Ditch, which drains approximately 270 acres of residential and commercial area in the heart of Fairfield. This unit has been cleaned out since its installation, and is proving to be successfully capturing and removing trash from the storm drain system.

- Control Measure #2- On-land Trash Clean-ups.
  Since no records were kept when on-land trash was picked up by staff, the City recently began keeping track of the frequency, volumes, and types of trash collected during on-land trash clean-up efforts.

- Control Measure #3- Reduce Trash from Uncovered Loads.
  During the City's recent negotiation of a franchise agreement for solid waste hauling, the City requires contracted trash and construction debris haulers to cover loads when transporting trash to the local landfill and transfer stations.

- Control Measure #4- Creek Clean-ups.
  Working jointly with the City of Suisun City and the Fairfield-Suisun Sewer District, the City of Fairfield has increased its frequency and locations in creek clean-up events, keeping track of the volumes and types of trash collected for each site.

Control measures described in this Long-Term Plan build upon actions taken to-date via City of Fairfield's Short-Term Plan. A full description of control measures implemented via short and long-term plans is included in Section 3.2. Outcomes associated with short-term plan implementation will be reported in the City of Fairfield's Fiscal Year 2013-14 Annual Report, scheduled for submittal to the Water Board by September 15, 2014.

1.3 Organization of Long-Term Plan

This Long-Term Plan is organized into the following sections:

1.0 Introduction;
2.0 Scope of the Trash Problem;
3.0 Trash Management Areas and Control Measures;
4.0 Progress Assessment Strategies; and
5.0 References

Section 2.0 is intended to provide a description of the extent and magnitude of the trash problem in the City of Fairfield. Control measures that will be implemented by City of Fairfield as a result of this Long-Term Plan are described in Section 3.0. Section 4.0 describes the methods that will be used to assess progress toward trash reduction targets.

2.0 SCOPE OF THE TRASH PROBLEM

2.1 Permittee Characteristics

Incorporated in 1903, the City of Fairfield covers 23,776 acres in Solano County, and has a jurisdictional area of approximately 18,875 acres. According to the 2010 Census, it has a current population of approximately 108,300, with a population density of 2,878 people per square mile, and average household size of 3. Of those who call the City of Fairfield home, approximately 27% are under the age of 18, 11% are between 18 and 24, 27% are between 25 and 44, 25% are between 45 and 65, and 10% are 65 or older.

Top employers in the City of Fairfield include Travis Air Force Base, County of Solano, Fairfield-Suisun Unified School District, NorthBay Medical Center, and Solano Community College. The City is also home to the Westfield Mall, Anheuser-Busch Companies, Inc., Clorox, and the Jelly Belly Candy Company. The median household income was $51,151 in 2000.

The City of Fairfield is primarily comprised of seven land uses. Land uses within the City of Fairfield depicted in ABAG (2005) are provided in Table 2 below.

Table 2. Percentages of the Fairfield's jurisdictional area[1] within land use classes identified by ABAG (2005)

Land Use Category	Jurisdictional Area (Acres)	% of Jurisdictional Area
Commercial and Services	947	5.0%
Industrial	1,136	6.0%
Residential	7,185	38.1%
Retail	638	3.4%
K-12 Schools	475	2.5%
Urban Parks	401	2.1%
Other	8,093	42.9%
TOTAL	**18,875**	**100%**

[1] A Permittee's jurisdictional area is defined as the urban land area within a Permittee's boundary that is not subject to stormwater NPDES Permit requirements for traditional and non-traditional small MS4s (i.e. Phase II MS4s) or the California Department of Transportation, or owned and maintained by the State of California, the U.S. federal government or other municipal agency or special district (e.g., flood control district).

2.2 Trash Sources and Pathways

Trash in San Francisco Bay Area creeks and shorelines originates from a variety of sources and is transported to receiving waters by a number of pathways (Figure 3). Of the four source categories, pedestrian litter includes trash sources from high traffic areas near businesses and schools, transitional areas where food/drinks are not permitted (e.g. bus stops), and from public or private special events with high volumes of people. Trash from vehicles occurs due to littering from automobiles and uncovered loads. Inadequate waste container management includes sources such as overflowing or uncovered containers and dumpsters as well as the dispersion of household and business-related trash and recycling materials before, during, and after collection. On-land illegal dumping of trash is the final source category.

Trash is transported to receiving waters through three main pathways: 1) Stormwater Conveyances; 2) Wind; and, 3) Direct Dumping. Stormwater or urban runoff conveyance systems (e.g., MS4s) consist of curbs/gutters, and pipes and channels that discharge to urban creeks and the San Francisco Bay shorelines. Wind can also blow trash directly into creeks or the Bay. Lastly, trash in receiving waters can also originate from direct dumping into urban creeks and shorelines.

This Long-term Plan and associated trash control measures described in Section 3.0 are focused on reducing trash from one of the transport pathways illustrated in Figure 3– **stormwater conveyances**. Specifically, the Long-term Plan is focused on reducing the impacts of discharges from MS4s to San Francisco Area receiving waters and the protection of associated beneficial uses.

Figure 3. Trash sources categories and transport pathways to urban creeks.

2.3 Trash Generating Areas

2.3.1 Generation Categories and Designation of Areas

The process and methods used to identify the level of trash generation within the City of Fairfield are described in this section and illustrated in Figure 4.

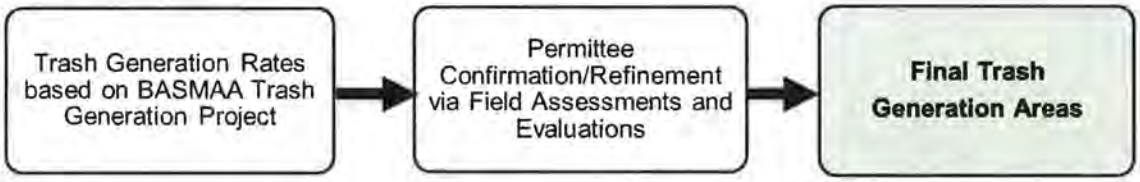

Figure 4. Trash sources categories and transport pathways to urban creeks.

As a first step, trash generation rates developed through *the BASMAA Trash Generation Rates Project* were applied to parcels within the City of Fairfield based on current land uses and 2010 household median incomes. A Draft Trash Generation Map was created as a result of this application. The draft map served as a starting point for the City of Fairfield to identify trash generating levels. Levels of trash generation are depicted on the map using four trash generation rate (gallons/acre/year) categories that are symbolized by four different colors illustrated in Table 3.

Table 3. Trash generation categories and associated generation rates (gallons/acre/year).

Category	Very High	High	Moderate	Low
Generation Rate (gallons/acre/year)	> 50	10-50	5-10	< 5

The City of Fairfield then reviewed and refined the draft trash generation map to ensure that trash generation categories were correctly assigned to parcels or groups of parcels. City staff refined maps using the following process:

1. Based upon our knowledge of trash generation and problem areas within the City, staff identified areas on the draft map that potentially had incorrect trash generation category designations.
2. Trash generation category designations initially assigned to areas identified in step #1 were then assessed and confirmed/refined by the City using the methods listed below.

   a. On-Land Visual Assessments

   To assist Permittees with developing their trash generation maps, BASMAA developed a *Draft On-land Visual Trash Assessment Protocol (Draft Protocol).* The Draft Protocol entails walking a street segment and visually observing the level of trash present on the roadway, curb and gutter, sidewalk, and other areas adjacent to the street that could potentially contribute trash to the MS4. Based on the level of trash observed, each segment (i.e., assessment area) was placed into one of four on-land assessment condition categories that are summarized in Table 4. Using the Draft Protocol, the City assessed a total of **85** areas to assist in conducting/refining trash generating area designations. This assessment included visual "drive-bys" and photographs of each assessment area (over 1,000 photos were taken) to determine the trash generation category for each area. Based on this detailed visual inspection, most areas within the City were classified in the Low trash generation category, with only a few in the categories of Moderate and High and no Very High.

Table 4. Definitions of on-land trash assessment condition categories.

On-land Assessment Condition Category	Summary Definition
A (Low)	Effectively no trash is observed in the assessment area.
B (Moderate)	Predominantly free of trash except for a few pieces that are easily observed.
C (High)	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D (Very High)	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area.

b. Querying Municipal Staff or Members of the Public

City maintenance staff was consulted to further define trash generation categories for each assessment area.

3. Based on assessments conducted to confirm/refine trash generation category designations, city staff created a final trash generation map that depicts the most current understanding of trash generation within the City of Fairfield. The City documented this process by tracking the information collected through the assessments and subsequent refinements to the Draft Trash Generation Map. The City of Fairfield's Final Trash Generation Map is included as Figures 5a & 5b.

2.3.2 Summary of Trash Generating Areas and Sources

Summary statistics for land use and trash generation categories generated through the mapping and assessment process are presented in Table 5.

Table 5. **Percentage of jurisdictional area within the City of Fairfield assigned to each trash generation category.**

Trash Generation Category	Jurisdictional Area (acre/%)	Commercial and Service	Industrial	Residential	Retail	K-12 Schools	Urban Parks	Other
Very High	0 / 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
High	57 / 0.3%	9.5%	0.0%	0.1%	80.9%	0.0%	4.3%	5.2%
Moderate	240 / 1.3%	13.0%	6.4%	51.7%	22.3%	2.3%	0.0%	4.3%
Low	18,578 / 98.4%	4.9%	6.0%	38.1%	2.9%	2.5%	2.1%	43.5%

3.0 TRASH MANAGEMENT AREAS AND CONTROL MEASURES

This section describes the control measures that the City of Fairfield has or plans to implement to solve trash problems and achieve a target of 100% (i.e. full) trash reduction from their MS4 by July 1, 2022. The selection of control measures described in this section is based on the City of Fairfield's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with MS4 discharges. Information on the effectiveness of some trash control measures is currently lacking and therefore in the absence of this information, the City based its selection of control measures on existing effectiveness information, their experience in implementing trash controls and knowledge of trash problems, and costs of implementation. As knowledge is gained through the implementation of these control measures, the City may choose to refine their trash control strategy described in this section. If significant revisions or amendments are made, a revised Long-Term Plan will be submitted to the Water Board through the Fairfield's annual reporting process.

3.1 Management Area Delineation and Prioritization

Consistent with the long-term plan framework, the City of Fairfield delineated and prioritized trash management areas (TMAs) based on the geographical distribution of trash generating areas, types of trash sources, and current or planned control measure locations. TMAs are intended to form the management units by which trash control measure implementation can be tracked and assessed for progress towards trash reduction targets. Once delineated, TMAs were also prioritized for control measure implementation. The City of Fairfield's primary management areas were selected based on the spatial distribution of trash generating areas and the location of specific existing or planned management actions within City's jurisdiction.

A map depicting the City's TMAs is included as Figure 5. All jurisdictional areas within the City are included within a TMA. The amount of jurisdictional land area and associated trash condition categories for each TMA are included in Table 6.

Table 6. Jurisdictional area and percentage of each Trash Management Area (TMA) comprised of trash generation categories

TMA	Jurisdictional Area (Acres)	Trash Generation Category			
		Very High	High	Moderate	Low
1	346.5	0.0%	16.5%	46.0%	37.5%
2	39.3	0.0%	0.0%	100%	0.0%
3	41.1	0.0%	0.0%	100%	0.0%
4	18,448±	0.0%	0.0%	0.0%	100%

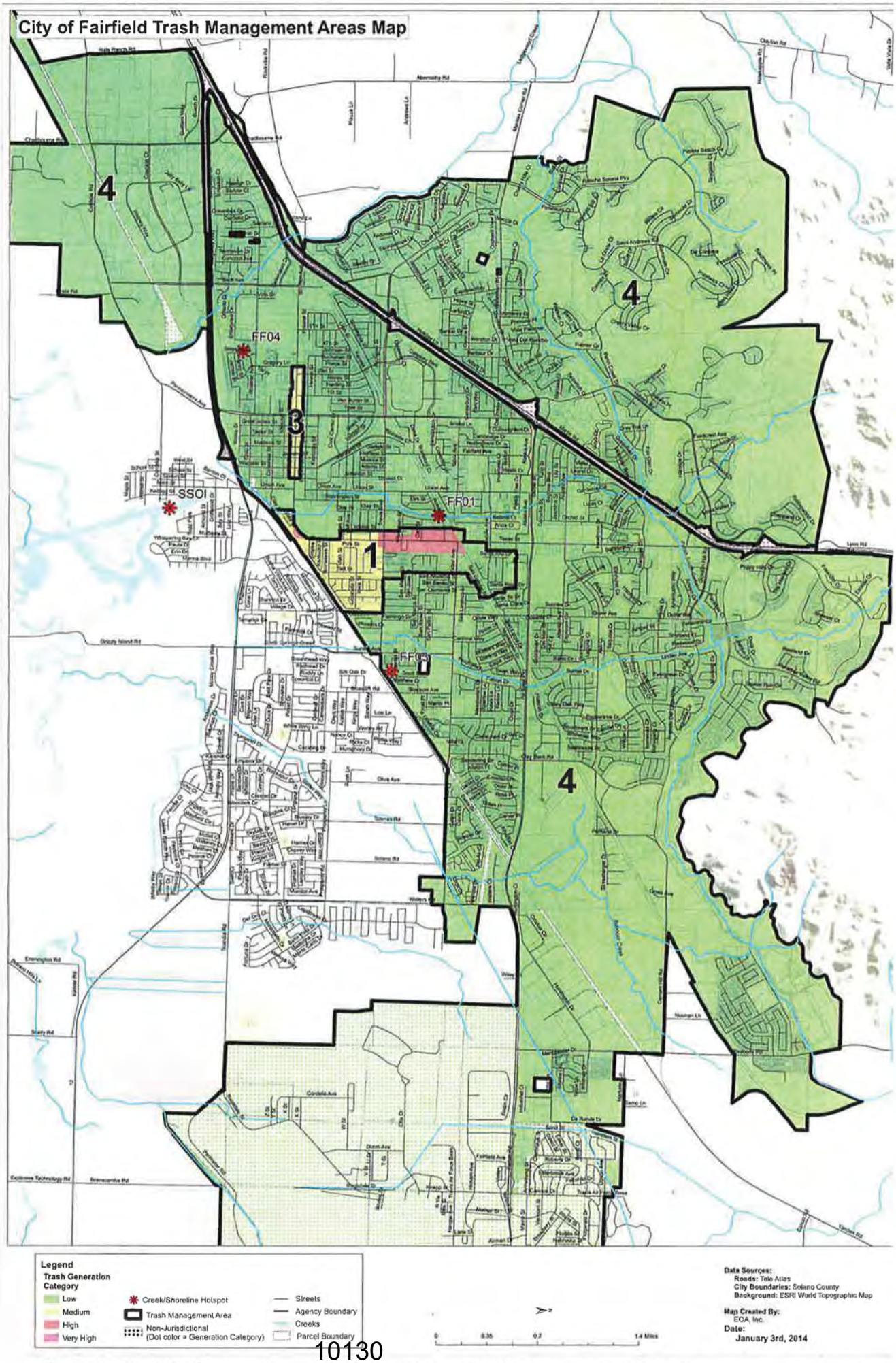

Figure 5A. Final Trash Generation and Trash Management Area Map for the City of Fairfield.

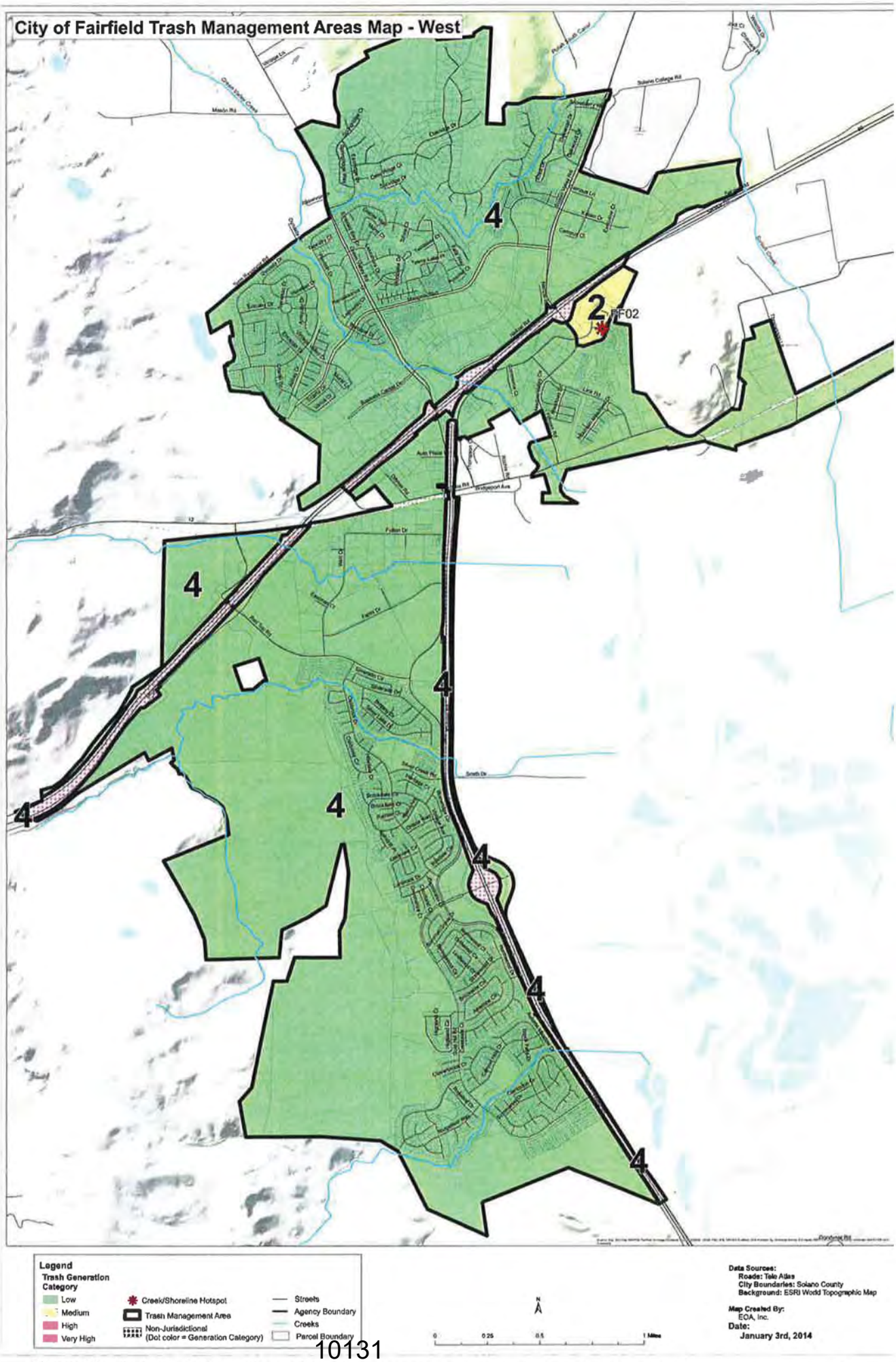

Figure 5B. Final Trash Generation and Trash Management Area Map for the City of Fairfield.

3.2 Current and Planned Trash Control Measures

The majority of the City has a trash generation classification of Low (98.4%), with only three areas that have a moderate or high trash generation classification. Trash control for one of these three areas has already been addressed by the installation of a Full Trash Capture Device, further described under Trash Management Area #1 below. This device treats the only area within the City of Fairfield that has a high trash generation classification. Please refer to Figure 6- Trash Full Capture Treatment Device Map.

The plan for trash control for the other two areas that have moderate trash generation classifications is to also treat these areas by way of Full Trash Capture Devices, as will be further discussed in Trash Management Areas 2 and 3 below.

3.2.1 Trash Management Area #1

The City of Fairfield recently installed a Full Trash Capture device that serves a large portion of the downtown area. The device was installed at the downstream section of a 60-inch storm drain line that outfalls into the Railroad Avenue ditch, located south of the City within the City of Suisun City limits. The device treats approximately 270 acres of commercial and residential development along both sides of North Texas Street. The device was installed in June 2012 and was mainly funded by a grant received from the Association of Bay Area Governments (ABAG). This 270 acres includes the only area within the City that has a high trash generation classification. See below for aerial of Trash Management Area 1.

Trash Management Area 1

Control Measure	Details	Pre-MRP	12/2009 to 7/2014	7/2014 to 7/2022
Full Trash Capture	CDS unit that treats 270 acres of residential & commercial areas that have low, medium, and high trash generation classifications (installed June 2012).		X	
Public Education	Signs promoting No Dumping shall be posted near the full trash capture device and other hot spot locations		X	

3.2.2 Trash Management Area #2

This area is located within the Cordelia area, off of Central Place. It is an area comprised of several fast food restaurants, along with other commercial uses, including gas stations. The area is approximately 40 acres in size, and drains to Dan Wilson Creek via a 24-inch storm drain line. The plan is to install a Large Trash Capture device on the 24-inch storm drain line immediately before it outfalls into Dan Wilson Creek. See below for aerial of Trash Management Area 2.

Trash Management Area 2

Control Measure	Details	Pre-MRP	12/2009 to 7/2014	7/2014 to 7/2022
Full Trash Capture	CDS unit that treats approximately 40 acres of commercial areas that has a medium trash generation classification.			X
Public Education	Signs promoting No Dumping shall be posted at hot spot locations and near the future full trash capture device		X	

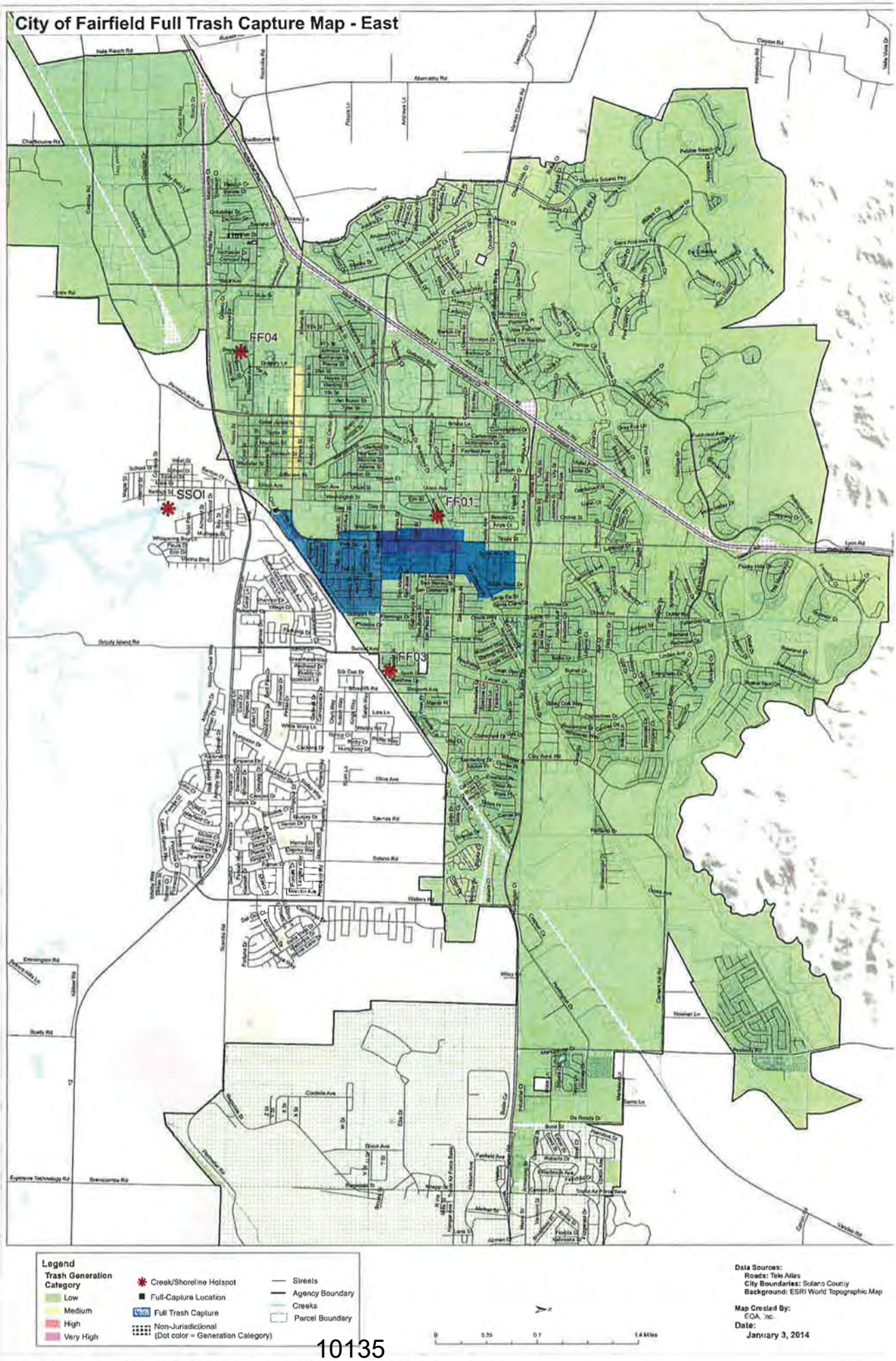

Figure 6. Trash Full Capture Device Map for the City of Fairfield.

3.2.3 Trash Management Area #3

This area is located within the downtown portion of the City of Fairfield. The area centers on Texas Street between Jefferson Street and Gregory Lane. It is approximately 40 acres in size, and is composed of commercial businesses. The area drains to large storm drain lines that outfall into a ditch just north of Highway 12 on the east side of Pennsylvania Avenue, which drains to Pennsylvania Avenue Creek and the Suisun Marsh. The plan is to install a Large Trash Capture device on the large box culvert before it outfalls into the ditch. See below for aerial of Trash Management Area 3.

Trash Management Area 3

Control Measure	Details	Pre-MRP	12/2009 to 7/2014	7/2014 to 7/2022
Full Trash Capture	CDS unit that treats several hundred acres of residential and commercial areas that have low and medium trash generation classifications.			X
Public Education	Signs promoting No Dumping shall be posted at hot spot locations and near the future full trash capture device		X	

3.2.4 Jurisdiction-wide Control Measures

The City of Fairfield performs several different activities that help reduce the amount of trash city-wide. As part of the Municipal Regional Permit, there are various additional elements being initiated by the City for a few of these existing activities, as summarized below.

Control Measure	Details	Pre-MRP	12/2009 to 7/2014	7/2014 to 7/2022
Street Sweeping	No changes are proposed as part of the MRP (no increase in frequency)	X		
On-Land Trash Cleanups	Identify volumes and types of trash collected during cleanup efforts	X	X	X
Reduce Trash from Uncovered Loads	Entered into a hauling service contract requiring loads be covered as part of the latest solid waste hauling agreement		X	X
Public Education and Outreach Programs	City will be installing signs promoting No Dumping near the full trash capture devices and other hot spot locations throughout the City		X	X
Single-Use Carryout Plastic Bag ban	The City is further researching the possibility of enforcing this ban in the future			X
Polystyrene Foam Food Service Ware ban	The City is further researching the possibility of enforcing this ban in the future			X

3.2.5 Creek and Shoreline Hot Spot Cleanups

The City of Fairfield has routinely performed creek and hot-spot cleanup activities throughout the year, starting before the date of the latest Municipal Regional Permit. During the Coast and Creek Cleanup event that occurs on an annual basis, there are numerous locations on several creeks that are cleaned throughout the City of Fairfield.

3.2.6 Summary of Trash Control Measures

Trash Management Area 1

- Full Trash Capture Device, installed in June 2012. Device treats 270 acres of residential and commercial areas with a trash generation classification of low, moderate, and high.
- Public Outreach, including the installation of "No Dumping" signs at Trash Capture Devices and Trash Hotspot Areas.

Trash Management Area 2

- Full Trash Capture Device, proposed to be installed prior to June 2022. Device will treat approximately 40 acres of commercial area with a trash generation classification of moderate.
- Public Outreach, including the installation of "No Dumping" signs at Trash Capture Devices and Trash Hotspot Areas.

Trash Management Area 3

- Full Trash Capture Device, proposed to be installed prior to June 2022. Device will treat several hundred acres of residential and commercial areas with a trash generation classification of low and moderate.
- Public Outreach, including the installation of "No Dumping" signs at Trash Capture Devices and Trash Hotspot Areas.

3.3 Control Measure Implementation Schedule

Please see Table 7 for the City of Fairfield's trash control measure implementation schedule. This Table shall be reviewed and revised as needed as future measures are implemented.

Table 7. City of Fairfield trash control measure implementation schedule.

Trash Management Area and Control Measures	Pre-MRP	Short-Term					Long-Term							
		FY 2009-2010	FY 2010-2011	FY 2011-2012	FY 2012-2013	FY 2013-2014[a]	FY 2014-2015	FY 2015-2016	FY 2016-2017[b]	FY 2017-2018	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022[c]
TMA #1														
Control Measure #1- Full Trash Capture				X										
Control Measure #2- Public Education & Outreach						X								
TMA #2														
Control Measure #1- Full Trash Capture									X					
Control Measure #2- Public Education & Outreach						X								
TMA #3														
Control Measure #1- Full Trash Capture													X	
Control Measure #2- Public Education & Outreach						X								
Jurisdiction-wide Control Measures														
Control Measure #1- Street Sweeping	X	X												
Control Measure #2- On-Land Trash Cleanup	X	X												
Control Measure #3- Reduce Trash Uncovered Loads		X												
Control Measure #4- Public Education & Outreach						X								
Control Measure #5- Plastic Bag Ban											X			
Control Measure #6- Polystyrene Foam Ban											X			
Creek and Shoreline Hot Spot Cleanups														
Control Measure #1- Creek Cleanup	X	X												

[a]July 1, 2014 - 40% trash reduction target
[b]July 1, 2017 - 70% trash reduction target
[c]July 1, 2022 - 100% trash reduction target

4.0 PROGRESS ASSESSMENT STRATEGY

Provision C.10.a.ii of the MRP requires Permittees to develop and implement a trash load reduction tracking method that will be used to account for trash load reduction actions and to demonstrate progress and attainment of trash load reduction targets. Early into the MRP, Permittees decided to work collaboratively to develop a trash load reduction tracking method through the Bay Area Stormwater Management Agencies Association (BASMAA). Permittees, Water Board staff and other stakeholders assisted in developing Version 1.0 of the tracking method. On behalf of all MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted Version 1.0 to the Water Board on February 1, 2012.

The Trash Assessment Strategy (Strategy) described in this section is intended to serve as Version 2.0 of the trash tracking method and replace Version 1.0 previously submitted to the Water Board. The Strategy is specific to Permittees participating in the Fairfield-Suisun Urban Runoff Management Program (FSURMP), including the City of Fairfield. The City intends to implement the Strategy in phases and at multiple geographical scales (i.e., jurisdiction-wide and trash management area) in collaboration with FSURMP. Pilot implementation is scheduled for the near-term and as assessment methods are tested and refined, the Strategy will be adapted into a longer-term approach. The Strategy selected by the City is described in the following sections.

4.1 FSURMP Pilot Assessment Strategy

The following Fairfield Suisun Urban Runoff Management Program Trash Assessment Strategy (FSURMP Strategy) was developed by FSURMP on behalf of the Cities of Fairfield and Suisun City in Solano County. The FSURMP Strategy will be implemented at a pilot scale on a program-wide basis and includes measurements and observations in the City of Fairfield.

4.1.1 Management Questions

The FSURMP Strategy is intended to answer the following core management questions over time as trash control measures outlined in Section 3.0 are implemented and refined:

- Are the MS4 trash load reduction targets being achieved?
- Have trash problems in receiving waters been resolved?
- If trash problems in receiving waters exist, what are the important sources and transport pathways?

The FSURMP Strategy, including indicators and methods, is summarized in this section.

4.1.2 Indicators of Progress and Success

The management questions listed in the previous section will be addressed by tracking information and collecting data needed to report on a set of key environmental indicators. Environmental indicators are simple measures that communicate what is happening in the environment. Since trash in the environment is very complex, indicators provide a more practical and economical way to track the state of the environment than if we attempted to record every possible variable.

With regard to municipal stormwater trash management, indicators are intended to detect progress towards trash load reduction targets and solving trash problems. Ideally, indicators should be robust and able to detect progress that is attributable to multiple types of trash control measure implementation scenarios. Assessment results should also provide Permittees with an adequate level of confidence that trash load reductions from MS4s have occurred, while also assessing whether trash problems in receiving waters have been resolved. Indicators must also be cost effective, relatively easy to generate, and understandable to stakeholders.

Primary and secondary indicators that FSURMP Permittees will use to answer core management questions include:

Primary Indicators:

1-A Reduction in the level of trash present on-land and available to MS4s
1-B Effective full capture device operation and maintenance

Secondary Indicators:

2-A Successful levels of trash control measures implementation
2-B Reductions in the amount of trash in receiving waters

In selecting the indicators above, the City of Fairfield in collaboration with FSURMP recognize that no one environmental indicator will provide the information necessary to effectively determine progress made in reducing trash discharged from MS4s and improvements in the level of trash in receiving waters. Multiple indicators were therefore selected.

The ultimate goal of municipal stormwater trash reduction strategies is to reduce the impacts of trash associated with MS4s on receiving waters. Indicators selected to assess progress towards this goal should ideally measure outcomes (e.g., reductions in trash discharged). The primary indicators selected by FSURMP are outcome-based and include those that are directly related to MS4 discharges. Secondary indicators are outcome or output-based and are intended to provide additional perspective on and evidence of, successful trash control measure implementation and improvements in receiving water condition with regard to trash.

As described in Section 2.2, trash is transported to receiving waters from pathways other than MS4s, which may confound our ability to observe MS4-associated reductions in creeks and shorelines. Due to this challenge of linking MS4 control measure implementation to receiving water conditions, the receiving water based indicator is currently considered a secondary indicator. Evaluations of data on the amount of trash in receiving waters that are conducted over time through the Pilot Assessment Strategy will assist the City in further determinations of the important sources and pathways causing problems in local creeks, rivers and shorelines.

4.1.3 Pilot Assessment Methods

This section briefly summarizes the preliminary assessment methods that the City of Fairfield will implement through the FSURMP Strategy to generate indicator information described in the previous section.

1-A. On-land Visual Assessments

As part of the Trash Generation Map assessment and refinement process (see Section 2.3.1), a draft on-land visual assessment method was developed to assist Permittees in confirming and refining trash generating area designations (i.e., very high, high, moderate and low trash generating categories). The draft on-land visual assessment method is intended to be a cost-effective tool and provide Permittees with a viable alternative to quantifying the level of trash discharged from MS4s. As part of BASMAA's *Tracking California's Trash* grant received from the State Water Resources Control Board (see Section 4.2), quantitative relationships between trash loading from MS4s and on-land visual assessment condition categories will be established. Condition categories defined in the draft on-land assessment protocol are listed in Table 8.

Table 8. Trash condition categories used in the draft on-land visual assessment protocol.

Trash Condition Category	Summary Definition
A (Low)	Effectively no trash is observed in the assessment area.
B (Moderate)	Predominantly free of trash except for a few pieces that are easily observed.
C (High)	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D (Very High)	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area.

On-land visual assessments will be conducted in trash management areas within the City of Fairfield as part of the FSURMP Strategy. On-land assessments are intended to establish initial conditions and detect improvements in the level of trash available to MS4s over time. More specifically, on-land visual assessment methods will be conducted in areas not treated by trash full capture devices in an attempt to evaluate reductions associated with other types of control measures. Assessment methods for areas treated by full capture devices are described in this next section.

Given that the on-land assessment method and associated protocol have not been fully tested and refined, initial assessments will occur at a pilot scale in the City and in parallel to the *Tracking California's Trash* project.

1-B. Full Capture Operation and Maintenance Verification

Consistent with the MRP, adequate inspection and maintenance of trash full capture devices is required to maintain full capture designation by the Water Board. The City of Fairfield is currently developing an operation and maintenance verification program (Trash O&M Verification Program), via FSURMP, to ensure that devices are inspected and maintained at a level that maintains this designation. The FSURMP Trash O&M Verification Program will be modeled on the current O&M verification program for stormwater treatment controls implemented consistent with the Permit new and redevelopment requirements.

2-A. Control Measure Effectiveness Evaluations

In addition to on-land trash assessments and full capture operation and maintenance verification, the City will also conduct assessments of trash control measures implemented within their jurisdictional area. Assessment methods will be selected based on trash sources and the type of control measure being implemented. Control measure effectiveness evaluations are more fully described in the FSURMP Strategy. The following are example assessment methods that may be used to demonstrate successful control measure implementation and progress towards trash reduction targets:

- Product-related Ordinances – Annually tracking and reporting the % of businesses in compliance with the ordinance and the percentage requiring a response.
- Street Sweeping – Reporting the frequency of sweeping and ability to sweep to the curb in specific areas where enhanced sweeping is implemented; and/or documenting the level of trash on streets directly after street sweeping during wet and dry weather seasons.
- Public/Private Trash Container Management – Reporting the magnitude and extent of actions; and/or visually assessing and documenting conditions around public trash containers before and after implementing control measures.
- Targeted Outreach and Enforcement – Reporting the magnitude and extent of actions; tracking and reporting the % increase in enforcement actions; and/or visually assessing and documenting the conditions in targeted areas before and after implementing control measures.
- Public Outreach Campaigns – Reporting the magnitude and extent of actions, and/or conducting pre and post campaign surveys.
- On-land Cleanups and Enforcement – Reporting the magnitude and extent of actions; visually assessing and documenting the conditions in targeted areas before and after control measure implementation; and/or tracking the volumes of trash removed.
- Illegal Dumping Prevention – Reporting the magnitude and extent of actions; and/or tracking and reporting improvements in the number of incidents.
- Business Improvement Districts – Reporting the magnitude and extent of actions; and/or visually assessing and documenting the conditions in BID areas before and after implementing control measures.
- Prevention of Uncovered Loads - Reporting the magnitude and extent of actions; tracking and reporting the decreases in the number of incidents; and/or visually assessing and documenting the conditions in targeted areas before and after implementing control measures.
- Partial Capture Devices – Reporting the magnitude and extent of actions; and/or visually assessing and the amount of trash in storm drains or downstream of partial capture devices.

2-B. Receiving Water Condition Assessments

The ultimate goal of stormwater trash management in the Bay Area is to significantly reduce the amount of trash found in receiving waters. In the last decade, Permittees and volunteers have collected data on the amounts of trash removed during cleanup events. More recently, Permittees have conducted trash assessments in creek and shoreline hotspots using standardized assessment methods. In an effort to answer the core management question *Have trash problems in receiving waters been resolved?*, the City of Fairfield plans to continue conducting receiving water condition assessments at trash hot spots a minimum of one time per year. Assessment will be conducted consistent with Permit hot spot cleanup and assessment requirements.

4.2 BASMAA "Tracking California's Trash" Project

The FSURMP Strategy described in the previous section recognizes that outcome-based trash assessment methods needed to assess progress toward trash reduction targets are not well established by the scientific community. In an effort to address these information gaps associated with trash assessment methods, the Bay Area Stormwater Management Agencies Association (BASMAA), in collaboration with FSURMP, the 5 Gyres Institute, San Francisco Estuary Partnership, the City of Los Angeles, and other stormwater programs in the Bay Area, developed the *Tracking California's Trash* Project. The Project is funded through a Proposition 84 grant awarded to BASMAA by the State Water Resources Control Board who recognized the need for standardized trash assessment methods that are robust and cost-effective.

The Project is intended to assist BASMAA member agencies in testing trash assessment and monitoring methods needed to evaluate trash levels in receiving waters, establish control measures that have an equivalent performance to trash full capture devices, and assess progress in trash reduction over time. The following sections provide brief descriptions of tasks that BASMAA will conduct via the three-year Project. Full descriptions of project scopes, deliverables, and outcomes will be developed as part of the task-specific Sampling and Analysis Plans required by the SWRCB during the beginning of the Project. The Project is currently underway and will continue through 2016.

4.2.1 Testing of Trash Monitoring Methods

BASMAA and the 5 Gyres Institute will evaluate the following two types of assessment methods as part of the Project:

- **Trash Flux Monitoring** – Trash flux monitoring is intended to quantify the amount of trash flowing in receiving waters under varying hydrological conditions. Flux monitoring will be tested in up to four receiving water bodies in San Francisco Bay and/or the Los Angeles areas. Methods selected for evaluation and monitoring will be based on a literature review conducted during this task and through input from technical advisors and stakeholders. Monitoring is scheduled to begin in 2014 and will be completed in 2016.
- **On-land Visual Assessments** – As part of the Project, BASMAA will also conduct an evaluation of on-land visual assessment methods that are included in the FSUMRP Strategy. The methods are designed to determine the level of trash on streets and public right-of-ways that may be transported to receiving waters via MS4s. BASMAA plans to conduct field work associated with the evaluation of on-land visual assessment at a number of sites throughout the region. To the extent practical, sites where the on-land methods evaluations take place will be coordinated with trash flux monitoring in receiving waters. On-land assessments will occur in areas that drain to trash full capture devices, and all sites will be assessed during wet and dry weather seasons in order to evaluate on-land methods during varying hydrologic conditions. Monitoring is scheduled to begin in 2014 and will be completed in 2016.

4.2.2 Full Capture Equivalent Studies

Through the implementation of BASMAA's *Tracking California's Trash* grant-funded project, a small set of "Full Capture Equivalent" projects will also be conducted in an attempt to demonstrate that specific combinations of control measures will reduce trash to a level equivalent to full capture devices. Initial BMP combinations include high-frequency street sweeping, and street sweeping with auto-retractable curb inlet screens. Other combinations will also be considered. Studies are scheduled to begin in 2014 and will be completed in 2016.

4.3 Long-Term Assessment Strategy

The City of Fairfield is committed to implementing standardized assessment methods post-2016 based on the lessons learned from pilot assessments and studies that will occur between 2014 and 2016. Assessment activities described in the previous sections will evaluate the utility of different assessment methods to demonstrate progress towards trash reduction targets and provide recommended approaches for long-term implementation. Lessons learned will be submitted to the Water Board with the FY 2015-2016 Annual Report and a revised Strategy will be developed and submitted, if necessary. The revised Strategy will include agreed upon assessment methods that will be used to demonstrate progress during the remaining term of trash reduction requirements. Reporting using the new/revised methods will begin with the FY 2016-17 Annual Report.

4.4 Implementation Schedule

The implementation schedule for the FSURMP Short-term Strategy, BASMAA's Tracking California's Trash project, and the Long-Term Assessment Strategy are included in. Load reduction reporting milestones are also denoted in the table. The schedule is consistent with the need for near-term pilot assessment results to demonstrate progress toward short-term targets, while acknowledging the need for testing and evaluation of assessment methods and protocols prior to long-term implementation.

Table 9. City of Fairfield trash progress assessment implementation schedule.

Trash Assessment Programs and Methods	Prior to FY 2013-14	Fiscal Year								
		2013-14[a]	2014-15	2015-16	2016-17[b]	2017-18	2018-19	2019-20	2020-21	2021-22[c]
Short-Term Trash Assessment Strategy (FSURMP)										
On-land Visual Assessments										
Initial (Baseline) Assessments	X									
Pilot Progress Assessments		X	X	X	X					
Full Capture Operation and Maintenance Verification			X	X	X					
Control Measure Effectiveness Evaluations	X	X	X	X	X					
Receiving Water Condition Assessments	X		X	X	X					
Tracking California's Trash Project (BASMAA)										
Testing of Trash Monitoring Methods										
Trash Flux Monitoring Protocol Testing			X	X	X					
On-land Visual Assessment Evaluations			X	X	X					
Full Capture Equivalent Studies			X	X	X					
Long-Term Trash Assessment Strategy (FSURMP)						X	X	X	X	X

[a]July 1, 2014 - 40% trash reduction target
[b]July 1, 2017 - 70% trash reduction target
[c]July 1, 2022 - 100% trash reduction target

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CITY COUNCIL
Pedro "Pete" Sanchez, *Mayor*
Lori Wilson, *Mayor ProTem*
Jane Day
Mike Hudson
Michael Segala

CITY COUNCIL MEETING
First and Third Tuesday
Every Month

CITY OF SUISUN CITY

701 Civic Center Blvd.
Suisun City, California 94585

Incorporated October 9, 1868

August 8, 2016

Dale Bowyer
San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: City of Suisun City's Revised Baseline Trash Load

Mr. Bowyer:

It has come to our Department's attention that Suisun City's 2009 Trash Load Generation Rates were submitted with incorrect acreages and trash generation rates. We concur with the map which was submitted in our 2016-2017 MRP Annual Report; however, the corresponding areas and generation rates were submitted incorrectly. See Attachment 1 – City of Suisun City Trash Management Area (TMA) Map, dated January 2, 2014. Suisun City would like to revise its baseline as shown in the attached spreadsheets:

- Attachment 2 - Trash Generation Baseline submitted in 2009 vs Actual Baseline Areas and Loads.
- Attachment 3 - TMA Comparison Table.
- Attachment 4 - 2017 Trash Reduction Calculation.

Please note that with these revised baseline numbers our calculation of 70% trash load reduction submitted in last year's Annual Report, Attachment 4, remains accurate.

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I look forward to hearing back from you on this. Should you have questions, please contact me at nlozano@suisun.com or at (707) 580-0629.

Sincerely,

Nick Lozano

Attachments

cc: Elyse Hilshorn, RWQCB
Kevin Cullen, FSSD

Attachment 2 - Trash Generation Baseline submitted in 2009 vs Actual Baseline Areas and Loads

	2009 Baseline trash generation submittal (Acres)						Actual Baseline Areas and Loads - 2017 (Acres)					
	L	M	H	VH	Total		L	M	H	VH	Total	
TMA												
1	16.5	10	8.5	0	35		0	0	16.3	20.8	37.1	sunset ave strip malls
2	1.5	0.5	0	0	2		0	1.3	0	0.1	1.5	Downtown restaurant area
3	0.8	0.2	0	0	1		0	0	0	0.9	0.9	Boat sales
4	3.5	0.5	0	0	4		0	7.4	0	0.3	7.7	Old industrial area
5	0.5	0.5	0	0	1		0	0	0	1	1	Marina at 12
6	1.5	0.5	0	0	2		0	0	0	1.6	1.6	Peterson and Wlters
7	2002	0	0	0	2002		2612	0	0	0	2612	Residential Areas
Totals	2026	12	9	0	2047		2612	9	16	25	2662	

Attachment 3 - TMA Comparison Table

TMA # 1

	2009 Baseline Area	New Baseline Area
Total	35	36.6
V. High	0	20.3
High	8.5	16.3
Med	10	0
Low	16.5	0

TMA # 2

	2009 Baseline Area	New Baseline Area
Total	2	2.0
V. High	0	0.1
High	0	0.0
Med	0.5	1.9
Low	1.5	0.0

TMA # 3

	2009 Baseline Area	New Baseline Area
Total	1	0.9
V. High	0	0.9
High	0	0
Med	0.2	0
Low	0.8	0

TMA # 4

	2009 Baseline Area	New Baseline Area
Total	4	7.4
V. High	0	0.2
High	0	0.0
Med	0.5	7.2
Low	3.5	0.0

TMA # 5

	2009 Baseline Area	New Baseline Area
Total	1	1
V. High	0	1
High	0	0
Med	0.5	0
Low	0.5	0

TMA # 6

	2009 Baseline Area	New Baseline Area
Total	2	1.6
V. High	0	1.6
High	0	0
Med	0.5	0
Low	1.5	0

TMA # 7

	2009 Baseline Area	New Baseline Area
Total	2002	2612
V. High	0	0
High	0	0
Med	0	0
Low	2002	2612

Attachment 4 - 2017 Trash Reduction Calculation

Trash Generation in Fiscal Year 1617 after accounting for full capture systems assuming full capture in: TMA 1 and 6 under full capture- No Ryders gas

	L	M	H	VH	Total		L	M	H	VH	Total	
TMA												
1			16.35	20.8	37.15		20.3		16.35	0.5	37.15	sunset ave - No Ryder Gas - Full Capture
2		1.33		0.13	1.46			1.33		0.13	1.46	Downtown restaurant area
3				0.88	0.88					0.88	0.88	Boat sales
4		7.68		0.25	7.93			7.68		0.25	7.93	Old industrial area
5				1.18	1.18					1.18	1.18	Marina at 12
6				1.63	1.63		1.63	0	0	0	1.63	Peterson and Wlters - Full capture
7	2612	0	0	0	2612		2612	0	0	0	2612	Residential - Low Trash Gen.
		9.01	16.35	24.87	2662.23		2633.93	9.01	16.35	2.94	2662.23	

372.85 109.69

Final Percent with areas 1 and 6 treated 70.58066246

Trash Long-Term Reduction Plan and Progress Assessment Strategy

February 1, 2014

Submitted by:

City of Suisun City

701 Civic Center Blvd.

Suisun City, CA 94585

In compliance with Provisions C.10.c of Order R2-2009-0074

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CITY OF SUISUN CITY
LONG-TERM TRASH LOAD REDUCTION PLAN AND ASSESSMENT STRATEGY

CERTIFICATION STATEMENT

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature by Duly Authorized Representative:

Daniel Kasperson
Director of Public Works

February 1, 2014

PREFACE

This Long-Term Trash Load Reduction Plan and Assessment Strategy (Long-Term Plan) is submitted in compliance with provision C.10.c of the Municipal Regional Storm water NPDES Permit (MRP) for Phase I communities in the San Francisco Bay (Order R2-2009-0074). The Long-Term Plan was developed using a regionally consistent outline and guidance developed by the Bay Area Storm water Management Agencies Association (BASMAA) and reviewed by San Francisco Bay Regional Water Quality Control Board staff. The Long-Term Plan is consistent with the Long-Term Trash Load Reduction Framework developed in collaboration with Water Board staff. Its content is based on the City of Suisun City's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with Municipal Separate Storm Sewer (MS4) discharges. This Long-Term Plan is intended to be iterative and may be modified in the future based on information gained through the implementation of trash control measures. The City of Suisun City therefore reserves the right to revise or amend this Long-Term Plan at its discretion. If significant revisions or amendments are made by the City, a revised Long-Term Plan will be submitted to the Water Board through the City's annual reporting process.

1.0 INTRODUCTION

1.1 Purpose of Long-Term Trash Reduction Plan

The Municipal Regional Storm water National Pollutant Discharge Elimination System (NPDES) Permit for Phase I communities in the San Francisco Bay (Order R2-2009-0074), also known as the Municipal Regional Permit (MRP), became effective on December 1, 2009. The MRP applies to 76 large, medium and small municipalities (cities, towns and counties) and flood control agencies in the San Francisco Bay Region, collectively referred to as Permittees. Provision C.10.c of the MRP requires Permittees to submit a *Long-Term Trash Load Reduction Plan* (Long-Term Plan) by February 1, 2014. Long-Term Plans must describe control measures that are currently being implemented, including the level of implementation, and additional control measures that will be implemented and/or increased level of implementation designed to attain a 70% trash load reduction by July 1, 2017, and 100% (i.e., "No Visual Impact") by July 1, 2022.

This Long-Term Plan is submitted by the City of Suisun City in compliance with MRP provision C.10.c. Consistent with provision C.10 requirements, the goal of the Long-Term Plan is to solve trash problems in receiving waters by reducing the impacts associated with trash in discharges from the Suisun City's municipal separate storm sewer system (MS4) that are regulated by NPDES Permit requirements. The Long-Term Plan includes:

1. Descriptions of the current level of implementation of trash control measures, and the type and extent to which new or enhanced control measures will be implemented to achieve a target of 100% (i.e. full) trash reduction from MS4s by July 1, 2022, with an interim milestone of 70% reduction by July 1, 2017;
2. A description of the *Trash Assessment Strategy* that will be used assess progress towards trash reduction targets achieved as a result of control measure implementation; and,
3. Time schedules for implementing control measures and the assessment strategy.

The Long-Term Plan was developed using a regionally consistent outline and guidance developed by the Bay Area Storm water Management Agencies Association (BASMAA) and reviewed by the San Francisco Bay Regional Water Quality Control Board (Water Board) staff. The Long-Term Plan is consistent with the Long-Term Trash Load Reduction Framework (see section 1.2.1) developed in collaboration with Water Board staff. Its content is based on the City of Suisun City's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with Municipal Separate Storm Sewer (MS4) discharges. The Long-Term Plan builds upon trash control measures implemented by the City prior to the adoption of the MRP and during the implementation of the Short-Term Trash Load Reduction Plan submitted to the Water Board on February 1, 2012.

1.2 Background

1.2.1 Long-Term Trash Load Reduction Plan Framework

A workgroup of MRP Permittee, Bay Area countywide storm water , and Water Board staff met between October 2012 and March 2013 to better define the process for staff developing and implementing Long-Term Plans, methods for assessing progress toward reduction goals, and tracking and reporting requirements associated with provision C.10. Through these discussions, an eight-step framework for developing and implementing Long-Term Plans was created by the workgroup (Figure 1).

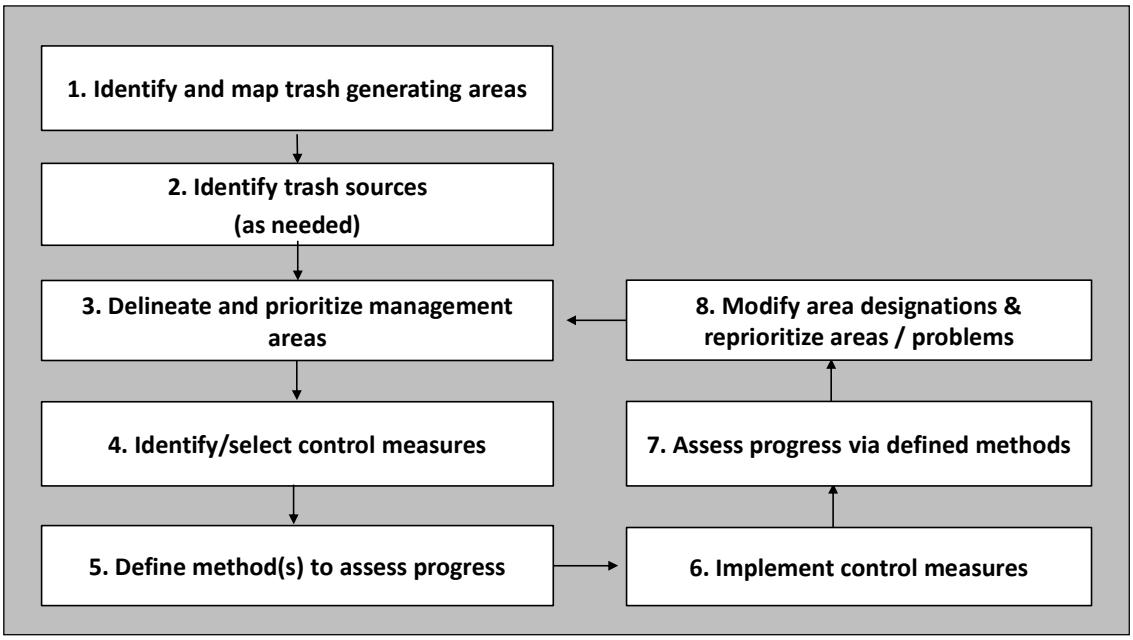

Figure 1. Eight-step framework for developing, implementing and refining Long-Term Trash Reduction Plans.

The workgroup agreed that as the first step in the framework, Permittees would identify very high, high, moderate, and low trash generating areas in their jurisdictional areas. Trash generation rates developed through the *BASMAA Baseline Trash Generation Rates Project* (as discussed below) were used as a starting point for differentiating and delineating land areas with varying levels of trash generation. Permittees would then use local knowledge and field and/or desktop assessments to confirm or refine the level of trash generation for specific areas within their jurisdiction. Each Permittee would then develop a map depicting trash generation categories within their jurisdiction.

As a next step, Permittees would then delineate and prioritize Trash Management Areas (TMAs) where specific control measures exist or are planned for implementation. TMAs delineated by Permittees are intended to serve as reporting units in the future. Reporting at the management area level provides the level of detail necessary to demonstrate implementation and progress towards trash reduction targets.

Once control measures are selected and implemented, Permittees will evaluate progress toward trash reduction targets using outcome-based assessment methods. As the results of the progress assessments are available, Permittees may choose to reprioritize trash management areas and associated control measures designed to improve trash reduction within their jurisdictions.

1.2.2 BASMAA Generation Rates Project

Through approval of a BASMAA regional project in 2010, Permittees agreed to work collaboratively to develop a regionally consistent method to establish trash generation rates within their jurisdictions. The project, also known as the *BASMAA Trash Generation Rates Project* (Generation Rates Project) assisted Permittees in establishing the rates of trash generation and identifying very high, high, moderate and low trash generating areas.

The term "trash generation" refers to the rate at which trash is produced or generated onto the surface of the watershed and is potentially available for transport via MS4s to receiving waters. Generation rates do not explicitly take into account existing control measures that intercept trash prior to transport. Generation rates are expressed as trash volume/acre/year and were established via the Generation Rates Project.

In contrast to trash generation, the term "trash loading" refers to the rate at which trash from MS4s enters receiving waters. Trash loading rates are also expressed as trash volume/acre/year and are equal to or less than trash generation rates because they account for the effects of control measures that intercept trash generated in an area before it is discharged to a receiving water. Trash loading rates are specific to particular areas because they are dependent upon the effectiveness of control measures implemented within an area. Figure 2 illustrates the difference between trash generation and loading.

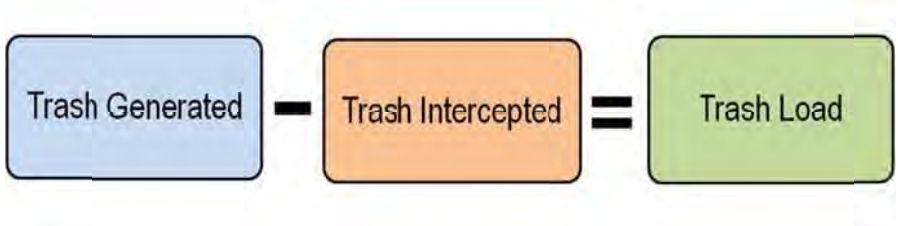

Figure 2. Conceptual model of trash generation, interception and load.

Trash generation rates were estimated based on factors that significantly affect trash generation (i.e., land use and income). The method used to the establish trash generation rates for each Permittee builds off "lessons learned" from previous trash loading studies conducted in urban areas (Allison and Chiew 1995; Allison et al. 1998; Armitage et al. 1998; Armitage and Rooseboom 2000; Lippner et al. 2001; Armitage 2003; Kim et al. 2004; County of Los Angeles 2002, 2004a, 2004b; Armitage 2007). The method is based on a conceptual model developed as an outgrowth of these studies (BASMAA 2011b).

Trash generation rates were developed through the quantification and characterization of trash captured in Water Board-recognized full-capture treatment devices installed in the San Francisco Bay area. Trash generation rates estimated from this study are listed for each land use type in. Methods used to develop trash generation rates are more fully described in BASMAA (2011b, 2011c, and 2012).

Table 1. San Francisco Bay Area trash generation rates by land use (gallons/acre/year).

Land Use	Low[b]	Best[b]	High[b]
Commercial & Services	0.7	**6.2**	17.3
Industrial	2.8	**8.4**	17.8
Residential[a]	0.3 - 30.2	**0.5 - 87.1**	1.0 - 257.0
Retail[a]	0.7 - 109.7	**1.8 - 150.0**	4.6 - 389.1
K-12 Schools	3	**6.2**	11.5
Urban Parks	0.5	**5.0**	11.4

[a] For residential and retail land uses, trash generation rates are provided as a range that takes into account the correlation between rates and household median income.

[b] For residential and retail land uses: Low = 5% confidence interval; Best = best fit regression line between generation rates and household median income; and, High = 95% confidence interval. For all other land use categories: High = 90th percentile; Best = mean generation rate; and, Low = 10th percentile.

1.2.3 Short-Term Trash Load Reduction Plan

In February 2012, the City of Suisun City developed a Short-Term Plan that described the current level of control measures implementation and identified the type and extent to which new or enhanced control measures would be implemented to attain a 40% trash load reduction from its MS4 by July 1, 2014. Since that time, the City of Suisun City has started to implement its short-term plan. Control measures implemented to date via the short-term trash reduction plan are:

- Control Measure #1- Full Trash Capture Device.
  This Con-tech CDS device was installed in June 2012 at the end of a 60-inch storm drain line that outfalls into Railroad Avenue Ditch, which drains approximately 270 acres of residential and commercial area which discharges into the City of Suisun City. This unit has been cleaned out since its installation, proving it to be a successful capture device and removing trash from the storm drain system.

- Control Measure #2- On-land Trash Clean-ups.
  Since no records were kept when on-land trash was picked up by staff, the City recently began keeping track of the frequency, volumes, and types of trash collected during on-land trash clean-up efforts.

- Control Measure #3- Creek Clean-ups.
  Since no records on volumes or types of trash were kept when creek clean-ups were performed, the City recently began keeping track of the volumes and types of trash collected during creek clean-up efforts.

Control measures described in this Long-Term Plan build upon actions taken to-date via City of Suisun City's Short-Term Plan. A full description of control measures implemented via short and long-term plans is included in section 3.2. Outcomes associated with short-term plan implementation will be reported in the City of Suisun City's Fiscal Year 2013-14 Annual Report, scheduled for submittal to the Water Board by September 15, 2014.

1.3 Organization of Long-Term Plan

This Long-Term Plan is organized into the following sections:

1.0 Introduction;
2.0 Scope of the Trash Problem;
3.0 Trash Management Areas and Control Measures;
4.0 Progress Assessment Strategies; and
5.0 References

Section 2.0 is intended to provide a description of the extent and magnitude of the trash problem in the City of Suisun City. Control measures that will be implemented by City of Suisun City as a result of this Long-Term Plan are described in section 3.0. Section 4.0 describes the methods that will be used to assess progress toward trash reduction targets.

2.0 SCOPE OF THE TRASH PROBLEM

2.1 Permittee Characteristics

The City of Suisun City covers 2,634 acres in Solano County, and has a jurisdictional area of 2,047 acres. According to the 2010 Census, it has a population of 28,111, with a population density of 6,752.6 people per square mile, and average household size of 3. Of the 28,111 who call the City of Suisun City home, 27.5% are under the age of 18, 10.5% are between 18 and 24, 27.9% are between 25 and 44, 26.4% are between 45 and 65, and 7.7% are 65 or older.

The City is mainly residential, but does have a small downtown area on the waterfront. The median household income was $60,848 in 2000.

Table 2. Percentages of the *Suisun City*'s jurisdictional area[1] within land use classes identified by ABAG (2005)

Land Use Category	Jurisdictional Area (Acres)	% of Jurisdictional Area
High Density Residential	11	5%
Low Density Residential	1,735	62%
Rural Residential	19	3%
Commercial and Services/ Heavy, Light and Other Industrial	68	14%
Retail and Wholesale	58	8%
K-12 Schools	34	4%
Urban Parks	121	3%
TOTAL	2,047	100%

2.2 Trash Sources and Pathways

Trash in San Francisco Bay Area creeks and shorelines originates from a variety of sources and is transported to receiving waters by a number of pathways (Figure 3). Of the four source categories, pedestrian litter includes trash sources from high traffic areas near businesses and schools, transitional areas where food/drinks are not permitted (e.g. bus stops), and from public or private special events with high volumes of people. Trash from vehicles occurs due to littering from automobiles and uncovered loads. Inadequate waste container management includes sources such as overflowing or uncovered containers and dumpsters as well as the dispersion of household and business-related trash and recycling materials before, during, and after collection. On-land illegal dumping of trash is the final source category.

[1] A Permittee's jurisdictional area is defined as the urban land area within a Permittee's boundary that is not subject to stormwater NPDES Permit requirements for traditional and non-traditional small MS4s (i.e. Phase II MS4s) or the California Department of Transportation, or owned and maintained by the State of California, the U.S. federal government or other municipal agency or special district (e.g., flood control district).

Trash is transported to receiving waters through three main pathways: 1) Storm water Conveyances; 2) Wind; and, 3) Direct Dumping. Storm water or urban runoff conveyance systems (e.g., MS4s) consist of curbs/gutters, and pipes and channels that discharge to urban creeks and the San Francisco Bay shorelines. Wind can also blow trash directly into creeks or the Bay. Lastly, trash in receiving waters can also originate from direct dumping into urban creeks and shorelines.

This Long-term Plan and associated trash control measures described in Section 3.0 are focused on reducing trash from one of the transport pathways illustrated in Figure 3– **storm water conveyances**. Specifically, the Long-term Plan is focused on reducing the impacts of discharges from MS4s to San Francisco Area receiving waters and the protection of associated beneficial uses.

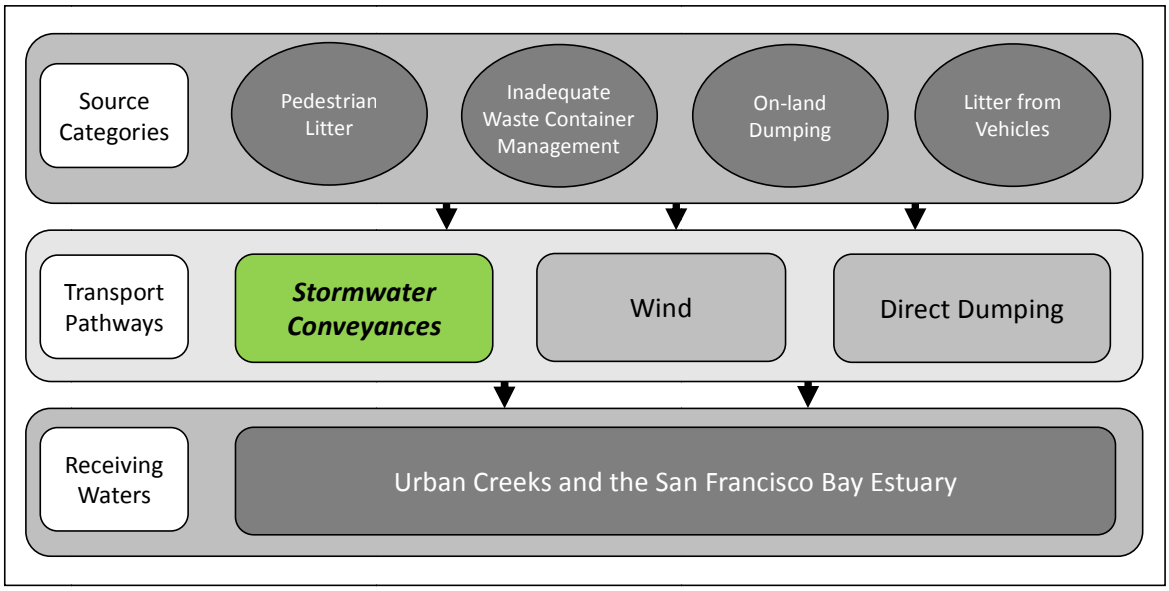

Figure 3. Trash sources categories and transport pathways to urban creeks.

2.3 Trash Generating Areas

2.3.1 Generation Categories and Designation of Areas

The process and methods used to identify the level of trash generation within the City of Suisun City are described in this section and illustrated in Figure 4.

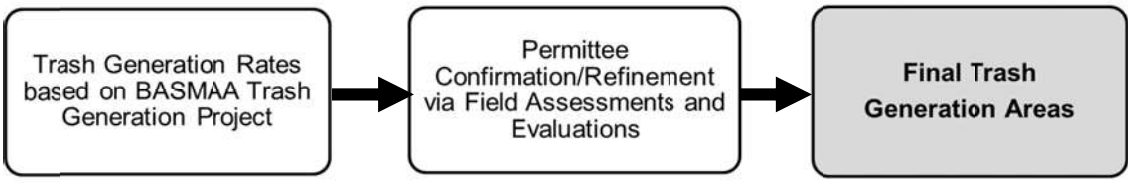

Figure 4. Trash sources categories and transport pathways to urban creeks.

As a first step, trash generation rates developed through *the BASMAA Trash Generation Rates Project* were applied to parcels within the City of Suisun City based on current land uses and 2010 household median incomes. A Draft Trash Generation Map was created as a result of this application. The draft map served as a starting point for the City of Suisun City to identify trash generating levels. Levels of trash generation are depicted on the map using four trash generation rate (gallons/acre/year) categories that are symbolized by four different colors illustrated in Table 3.

Table 3. Trash generation categories and associated generation rates (gallons/acre/year).

Category	**Very High**	**High**	**Moderate**	**Low**
Generation Rate (gallons/acre/year)	**> 50**	**10-50**	**5-10**	**< 5**

The City of Suisun City then reviewed and refined the draft trash generation map to ensure that trash generation categories were correctly assigned to parcels or groups of parcels. City staff refined maps using the following process:

1. Based upon our knowledge of trash generation and problem areas within the City, staff identified areas on the draft map that potentially had incorrect trash generation category designations.
2. Trash generation category designations initially assigned to areas identified in step #1 were then assessed and confirmed/refined by the City using the methods listed below.

a. On-Land Visual Assessments

To assist Permittees with developing their trash generation maps, BASMAA developed a *Draft On-land Visual Trash Assessment Protocol (Draft Protocol).* The Draft Protocol entails walking a street segment and visually observing the level of trash present on the roadway, curb and gutter, sidewalk, and other areas adjacent to the street that could potentially contribute trash to the MS4. Based on the level of trash observed, each segment (i.e., assessment area) was placed into one of four on-land assessment condition categories that are summarized in Table 4. Using the Draft Protocol the City assessed a total of *174* areas to assist in conducting/refining trash generating area designations.

Table 4. Definitions of on-land trash assessment condition categories.

On-land Assessment Condition Category	Summary Definition
A (Low)	Effectively no trash is observed in the assessment area.
B (Moderate)	Predominantly free of trash except for a few pieces that are easily observed.
C (High)	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D (Very High)	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area.

b. Querying Municipal Staff or Members of the Public

City maintenance staff was consulted to further define trash generation categories for each assessment area.

Based on assessments conducted to confirm/refine trash generation category designations, the City created a final trash generation map that depicts the most current understanding of trash generation within the City of Suisun City. The City documented this process by tracking the information collected through the assessments and subsequent refinements to the Draft Trash Generation Map. The City of Suisun City's Final Trash Generation Map is included as Figure 5.

2.3.2 Summary of Trash Generating Areas and Sources

Summary statistics for land use and trash generation categories generated through the mapping and assessment process are presented in Table 5.

Table 5. Percentage of jurisdictional area within the City of Suisun City assigned to each trash generation category.

Trash Generation Category	Commercial and Services	Industrial	Residential	Retail	K-12 Schools	Urban Parks
Very High	*0*	*0*	*0*	*0*	*0*	*0*
High	*5%*	*0*	*0*	*0*	*0*	*0*
Medium	*20%*	*5%*	*0*	*2%*	*0*	*0*
Low	*75%*	*95%*	*100%*	*98%*	*100%*	*100%*

Figure 5. Final Trash Generation Map for the **City of Suisun City**

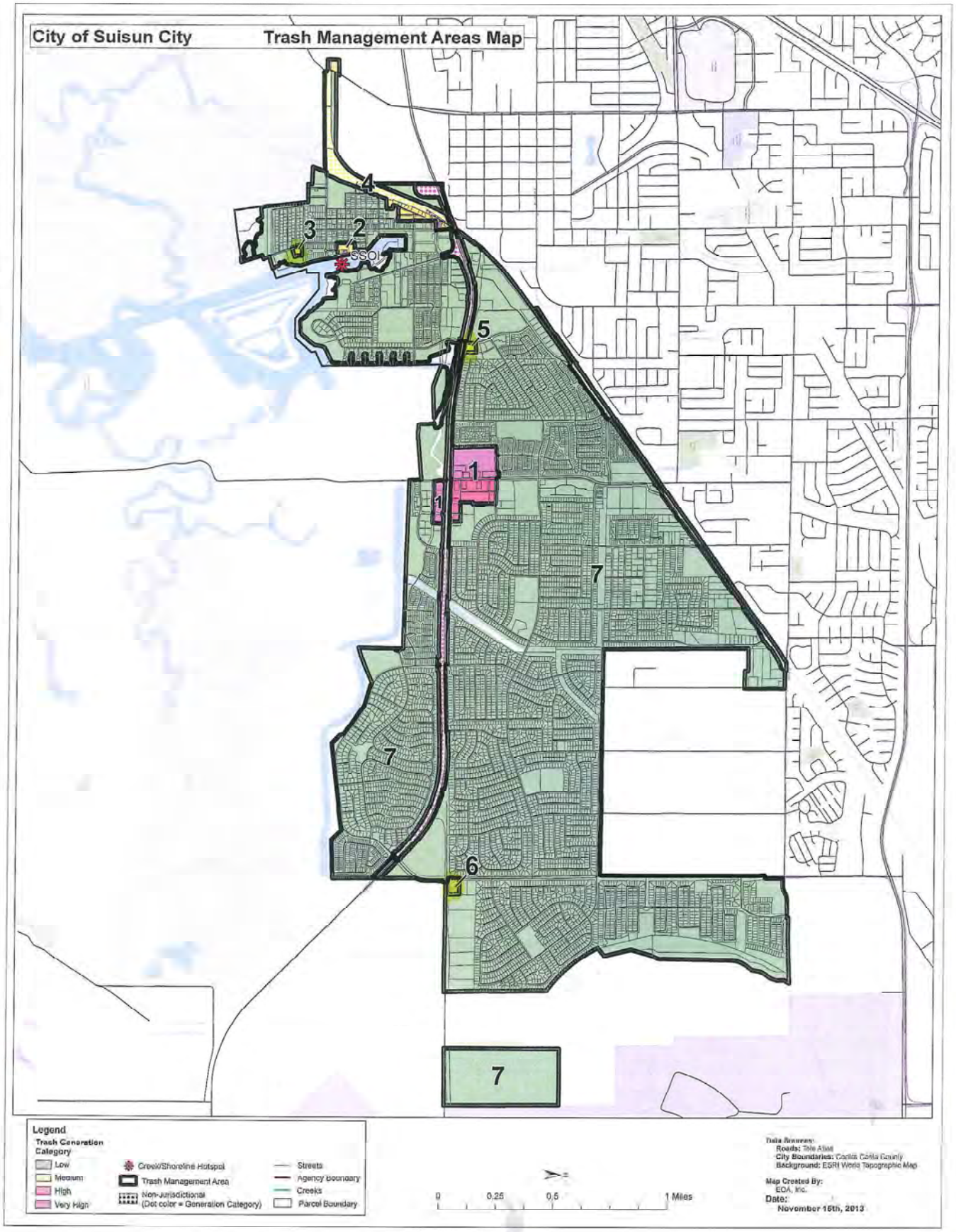
City of Suisun City
Trash Management Areas Map
1
1
2
3
4
5
6
7
7
7
SSO
Legend
Trash Generation Category
Low
Medium
High
Very High
Creek/Shoreline Hotspot
Trash Management Area
Non-Jurisdictional (Dot color = Generation Category)
Streets
Agency Boundary
Creeks
Parcel Boundary
0
0.25
0.5
1 Miles
Data Sources:
Roads: Tele Atlas
City Boundaries: Contra Costa County
Background: ESRI World Topographic Map
Map Created By:
EOA, Inc.
Date:
November 15th, 2013

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3.0 TRASH MANAGEMENT AREAS AND CONTROL MEASURES

This section describes the control measures that the City of Suisun City has or plans to implement to solve trash problems and achieve a target of 100% (i.e. full) trash reduction from their MS4 by July 1, 2022. The selection of control measures described in this section is based on the City of Suisun City's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with MS4 discharges. Information on the effectiveness of some trash control measures is currently lacking and therefore in the absence of this information, the City based its selection of control measures on existing effectiveness information, their experience in implementing trash controls and knowledge of trash problems, and costs of implementation. As knowledge is gained through the implementation of these control measures, the City may choose to refine their trash control strategy described in this section. If significant revisions or amendments are made, a revised Long-Term Plan will be submitted to the Water Board through the Suisun City's annual reporting process.

3.1 Management Area Delineation and Prioritization

Consistent with the long-term plan framework, the City of Suisun City delineated and prioritized trash management areas (TMAs) based on the geographical distribution of trash generating areas, types of trash sources, and current or planned control measure locations. TMAs are intended to form the management units by which trash control measure implementation can be tracked and assessed for progress towards trash reduction targets. Once delineated, TMAs were also prioritized for control measure implementation. The City of Suisun City's primary management areas were selected based on the spatial distribution of trash generating areas and the location of specific existing or planned management actions within City's jurisdiction. City staff used the following procedure to designate TMAs:

EOA generated a draft map for trash generation rates developed through the BASMAA Trash Generation Rates Project were applied to parcels within the City of Suisun City based on current land uses and 2010 household median incomes and then this map was field verified. There was a general concern the map was not a true representation of the trash generated in Suisun City. City staff went out and visually inspected regions and quadrants of Suisun City.

The survey data consisted of BASMAA guideline with photos to compare what value was established or criteria of very high, high, medium and low rating. The information was filled out into a BASMAA spread sheet and photos were taken to insure the creditability of all the sites or all areas. These photos of area are the proof to re-evaluated the area using the establish BASMAA criteria for the rate or warranted value.

This information was then submitted to EOA to generate another draft map with the current surveyed trash generation rates of the City of Suisun City.

All jurisdictional areas within the City are included within a TMA. The amount of jurisdictional land area and associated trash condition categories for each TMA are included in Table 6.

Table 6. Jurisdictional area and percentage of each Trash Management Area (TMA) comprised of trash generation categories

TMA	Jurisdictional Area (Acres)	Trash Generation Category			
		Very High	High	Moderate	Low
1	35	0	8.5	10	16.5
2	2	0	0	.5	1.5
3	1	0	0	0.2	0.8
4	4	0	0	0.5	3.5
5	1	0	0	0.5	0.5
6	2	0	0	0.5	1.5
7	2,002	0	0	0	2,002

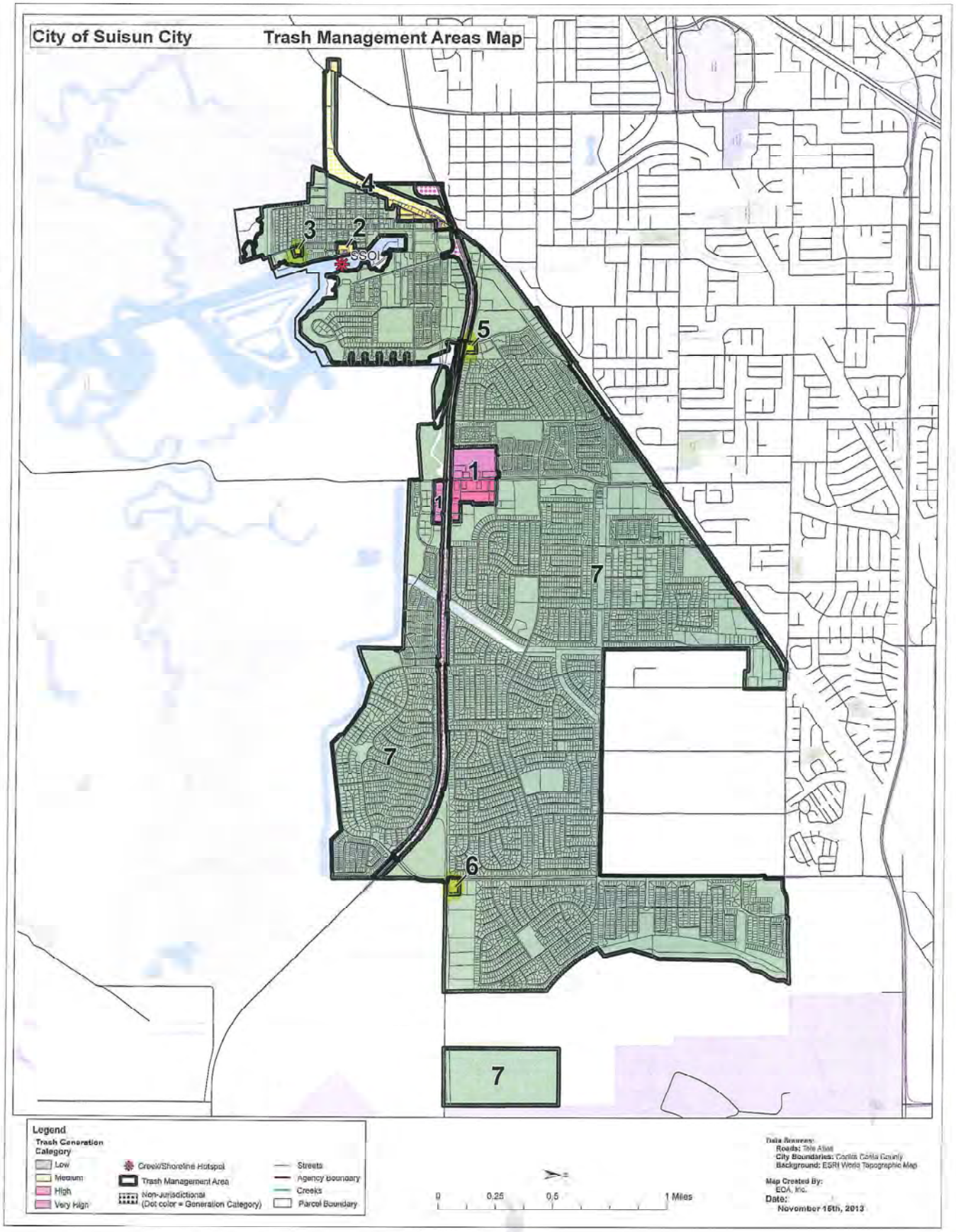
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Trash Management Area
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Agency Boundary
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0.25
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1 Miles
Data Sources:
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City Boundaries: Contra Costa County
Background: ESRI World Topographic Map
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3.2 Current and Planned Trash Control Measures

The majority of the City has a trash generation classification of Low, with only four areas that have a medium or high trash generation classification.

3.2.1 Jurisdiction-wide Control Measures

The City of Suisun City has performed several different activities that help reduce the amount of trash city-wide. As part of the Municipal Regional Permit, there are various additional elements being initiated by the City for a few of these existing activities, as summarized below

Control Measure	Details	Pre-MRP	12/2009 to 7/2014	7/2014 to 7/2022
Street Sweeping	No changes are proposed as part of the MRP (no increase in frequency)	X		
On-Land Trash Cleanups	Identify volumes and types of trash collected during cleanup efforts	X	X	X
Reduce Trash from Uncovered Loads	Entered into a hauling service contract requiring loads be covered as part of the latest solid waste hauling agreement		X	X
Public Education and Outreach Programs	City will be installing signs promoting No Dumping near the full trash capture devices and other hot spot locations throughout the City	X	X	X
Single-Use Carryout Plastic Bag ban	The City is further researching the possibility of enforcing this ban in the future			X
Polystyrene Foam Food Service Ware ban	The City is further researching the possibility of enforcing this ban in the future			X

3.2.2 Creek and Shoreline Hot Spot Cleanups

The City of Suisun City has routinely performed creek and hot-spot cleanup activities throughout the year, starting before the date of the latest Municipal Regional Permit. During the Coast and Creek Cleanup event that occurs on an annual basis, there are numerous locations on numerous creeks that are cleaned throughout the City of Suisun City.

3.2.3 Trash Management Areas

- **Trash Management Area 1**

- Is approximately 35 acres in area (see aerial photo below). This area consists of following commercial services: fast food; gas stations; retail stores; and high volume highway 12 traffic (including garbage trucks heading to the landfill). This management area has a trash generation classification of low, moderate, and high. Priority to this trash management area is currently rated high and is being maintained by the property and business owners.

Trash Management Area 1

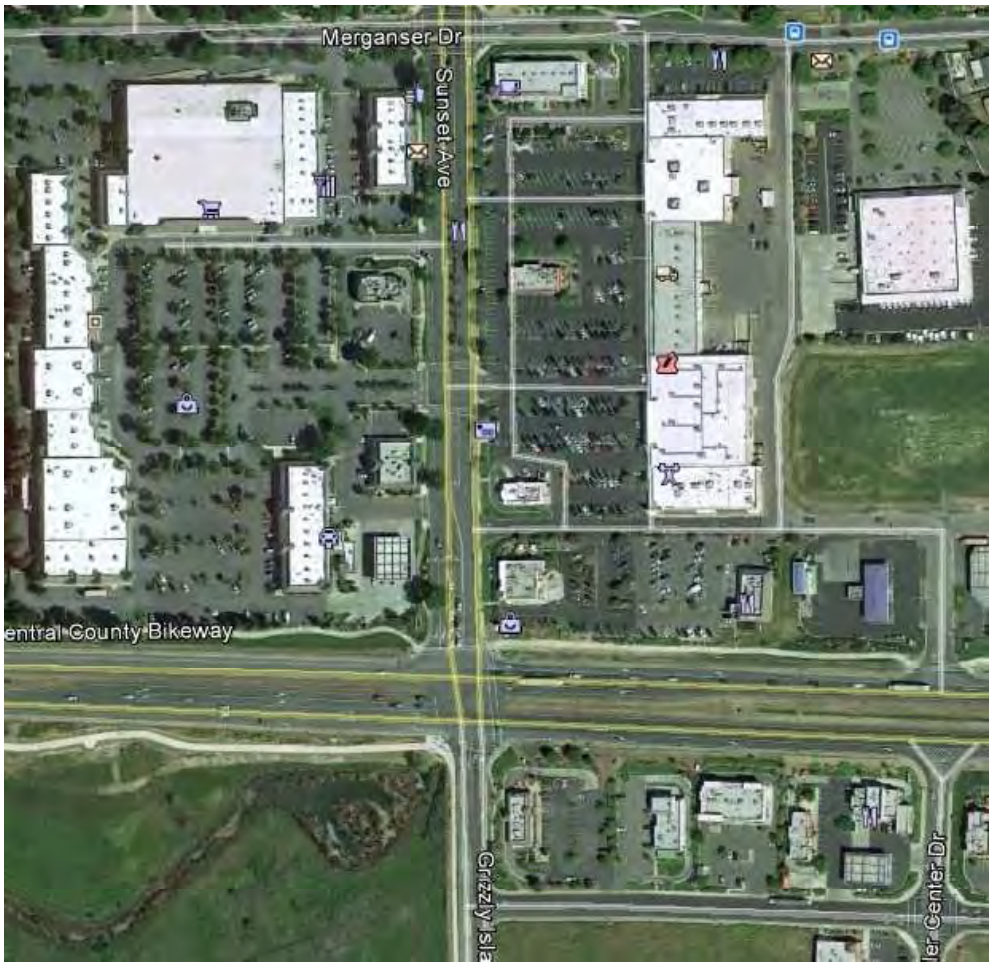

- The City's approach to addressing trash issues is to increase awareness of the public through outreach to property and business owners. The goal is also for our code enforcement officers to take active roles in pursuing trash generators and containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect " signs with the intention to get more people involved to make a difference. The City also intends to install full capture devices in field inlets and catch basins when funding becomes available.

Trash Management Area 2

- Is approximately a 2 acre area in the downtown area (see aerial photo below) . This area consist of restaurants and retail stores. This management area has a trash generation classification of low and medium. Priority to this trash management area is currently rated high and is being maintained by the property and business owners.

Trash Management Area 2

- The City's approach to addressing trash issues is to increase awareness of the public through outreach to property and business owners. The goal is for our code enforcement to take active roles in pursuing trash generators and containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect " signs with the intention to get more people involved to make a difference. The City also intends to install full capture devices in field inlets and catch basins when funding becomes available.

Trash Management Area 3

- Is approximately a 1 acre area (see aerial photo below). This area consist of a commercial business boat repair shop. This management area has a trash generation classification of low and medium. Priority to this trash management area is currently rated high and is being maintained by the property and business owner.

Trash Management Area 3

- The City's approach to addressing trash issues is to increase awareness of the public through outreach to property and business owners. The goal is for our code enforcement to take active roles in pursuing trash dischargers And containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect " signs with the intention to get more people involved to make a difference. The City also intends to install full capture devices in field inlets and catch basins when funding becomes available.

Trash Management Area 4

- Is approximately 4 acres in area (see aerial photo below) . This area consists of a commercial businesses (lumber) and an industrial railroad yard. This management area has a trash generation classification of low to medium. Priority to this trash management area is rated medium and is being maintained by the property and business owners.

Trash Management Area 4 Aerial

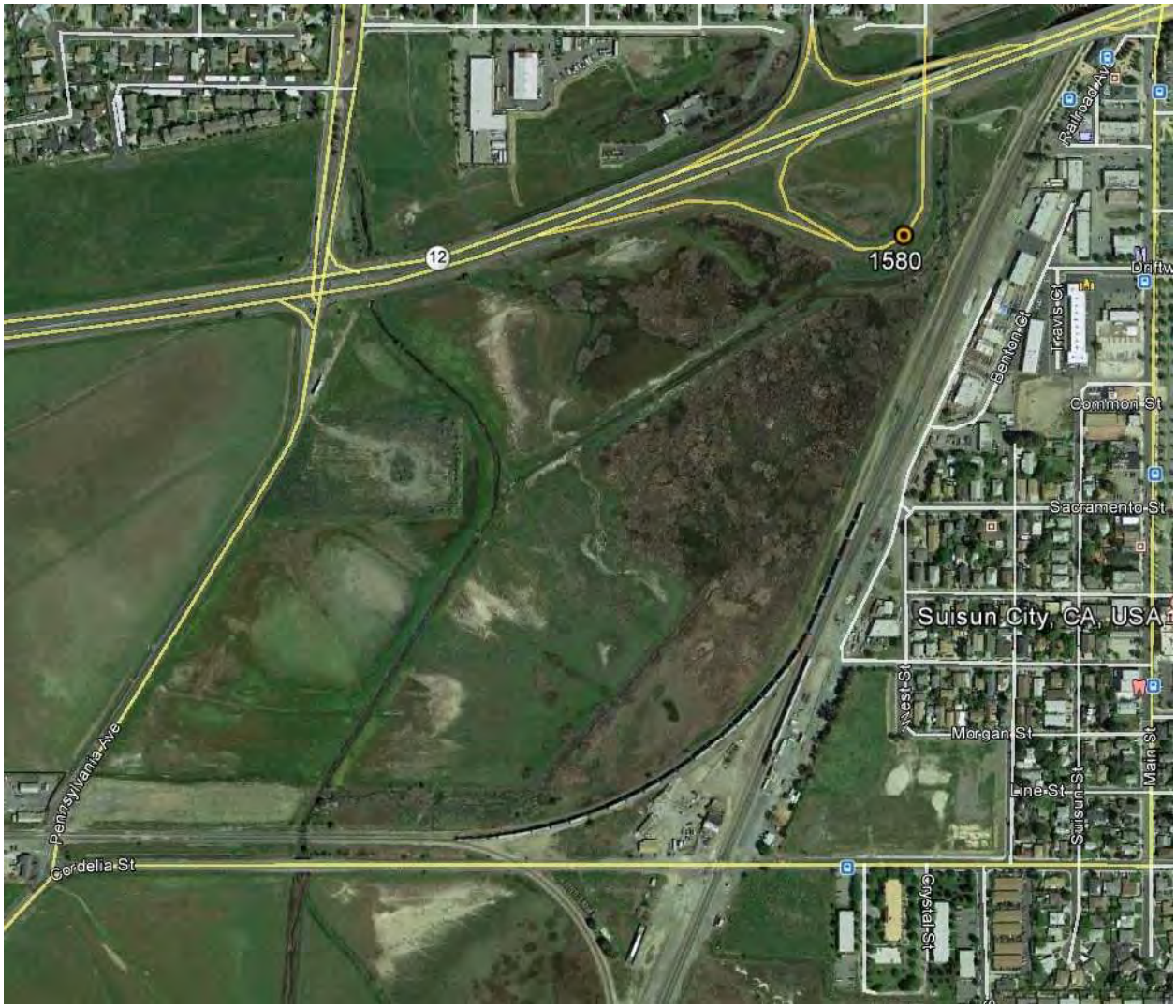

- The City's approach to addressing trash issues in this area is to increase awareness of the public through outreach to property and business owners. The goal is for our code enforcement to take active roles in pursuing trash dischargers and containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect " signs with the intention to get more people involved to make a difference.

Trash Management Area 5

- Is approximately a 1 acre area (see aerial photo below). The area consists of an Arco gas station combined with an Am/Pm Mini- Market store. The area and has a high volume of roadway and highway 12 traffic. This management area has a trash generation classification of low and medium. Priority to this trash management area is currently rated medium and is being maintained by the property and business owner.

Trash Management Area 5 Aerial

- The City's approach to addressing trash issues is to increase awareness of the public through outreach to property and business owners. The goal is for our code enforcement to take active roles in pursuing trash dischargers and containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect " signs with the intention to get more people involved to make a difference. The City also intends to install full capture devices in field inlets and catch basins when funding becomes available.

Trash Management Area 6

- Is approximately 2 acres in area (see aerial photo below). This area consist of a Valero gas station and a Bon Fair Mini-Market. The area has a high volume of roadway and highway 12 traffic including Travis Air Force Base rear gate truck traffic. This management area has a trash generation classification of low and medium. Priority to this trash management area is currently rated medium low and is being maintained by the property and business owner.

Trash Management Area 6 Aerial

- The City's approach to addressing trash issues is to increase awareness of the public through outreach to property and business owners. The goal is for our code enforcement to take active roles in pursuing trash generators and containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect ", signs with the intention to get more people involved to make a difference. The City also intends to install full capture devices in field inlets and catch basins when funding becomes available.

Trash Management Area 7

- Is approximately 2,002 acres in area. This area consists of the overall residential areas of Suisun City. This management area has a trash generation classification of low. Priority to this trash management area is currently rated low and is constantly being maintained by the city street sweepers and property owners. The City maintains the right-of-way with sweeping and catch basin cleaning.

- The City's approach to addressing trash issues is to increase awareness of the public through outreach to property and business owners. The goal is for our code enforcement to take active roles in pursuing trash dischargers and containing trash at the source. Activities also include the installation of educational signs of "Be the solution to water pollution… The Suisun Marsh Is Ours to Protect. Put Trash Where It Belongs. Our Creeks. Our Water. Ours to Protect " signs with the intention to get more people involved to make a difference. The City also intends to install full capture devices in field inlets and catch basins when funding becomes available. The City is contemplating bans on single use plastic bags and styro-foam products.

3.3 Control Measure Implementation Schedule

Table 7. City of Suisun City trash control measure implementation schedule.

Trash Management Area and Control Measures	Pre-MRP	Short-Term					Long-Term							
		FY 2009-2010	FY 2010-2011	FY 2011-2012	FY 2012-2013	FY 2013-2014[a]	FY 2014-2015	FY 2015-2016	FY 2016-2017[b]	FY 2017-2018	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022[c]
TMA #1 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X	X		X	X		X		X
TMA #2 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X		X		X	X		X	X
TMA #3 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X	X		X	X		X		X
TMA #4 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X		X		X	X		X	X
TMA #5 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X	X		X	X		X		X
TMA #6 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X		X		X	X		X	X
TMA #7 Control Measure #1- Public Education & Outreach/ Full Capture Insert when Funding is available						X	X		X	X		X		X
Jurisdiction-wide Control Measures														
Control Measure- Full Trash Capture Device 60"pipe- 270 Acres- June 2012 ABAG Funding Joint Project Suisun City & Fairfield				X										
Control Measure #1- Street Sweeping	X	X				X	X		X		X		X	
Control Measure #2- On-Land Trash Cleanup	X	X				X		X		X		X		X
Control Measure #3- Reduce Trash Uncovered Loads		X									X			
Control Measure #4- Public Education & Outreach						X	X	X	X	X	X	X	X	X
Control Measure #5- Plastic Bag Ban											X			
Control Measure #6- Polystyrene Foam Ban											X			
Creek and Shoreline Hot Spot Cleanups														
Control Measure #1- Creek Cleanup	X	X	X	X	X	X	X	X	X	X	X	X	X	X

[a]July 1, 2014 - 40% trash reduction target
[b]July 1, 2017 - 70% trash reduction target
[c]July 1, 2022 - 100% trash reduction target

4.0 PROGRESS ASSESSMENT STRATEGY

Provision C.10.a.ii of the MRP requires Permittees to develop and implement a trash load reduction tracking method that will be used to account for trash load reduction actions and to demonstrate progress and attainment of trash load reduction targets. Early into the MRP, Permittees decided to work collaboratively to develop a trash load reduction tracking method through the Bay Area Storm water Management Agencies Association (BASMAA). Permittees, Water Board staff and other stakeholders assisted in developing Version 1.0 of the tracking method. On behalf of all MRP Permittees, the Bay Area Storm water Management Agencies Association (BASMAA) submitted Version 1.0 to the Water Board on February 1, 2012.

The Trash Assessment Strategy (Strategy) described in this section is intended to serve as Version 2.0 of the trash tracking method and replace version 1.0 previously submitted to the Water Board. The Strategy is specific to Permittees participating in the Suisun City Suisun Urban Runoff Management Program, including the City of Suisun City**.** The City intends to implement the Strategy in phases and at multiple geographical scales (i.e., jurisdiction-wide and trash management area) in collaboration with FSURMP. Pilot implementation is scheduled for the near-term and as assessment methods are tested and refined, the Strategy will be adapted into a longer-term approach. The Strategy selected by the City is described in the following sections.

4.1 FSURMP Pilot Assessment Strategy

The following Suisun City Suisun Urban Runoff Management Program (FSURMP) Trash Assessment Strategy (FSURMP Strategy) was developed by FSURMP on behalf of the City and Suisun City in Solano County. The FSURMP Strategy will be implemented at a pilot scale on a program wide basis and includes measurements and observations in the City of Suisun City.

4.1.1 Management Questions

The FSURMP Strategy is intended to answer the following core management questions over time as trash control measures outlined in section 3.0 are implemented and refined:

- Are the MS4 trash load reduction targets being achieved?
- Have trash problems in receiving waters been resolved?
- If trash problems in receiving waters exist, what are the important sources and transport pathways?

The FSURMP Strategy, including indicators and methods, is summarized in this section.

4.1.2 Indicators of Progress and Success

The management questions listed in the previous section will be addressed by tracking information and collecting data needed to report on a set of key environmental indicators. Environmental indicators are simple measures that communicate what is happening in the environment. Since trash in the environment is very complex, indicators provide a more practical and economical way to track the state of the environment than if we attempted to record every possible variable.

With regard to municipal storm water trash management, indicators are intended to detect progress towards trash load reduction targets and solving trash problems. Ideally, indicators should be robust and

able to detect progress that is attributable to multiple types of trash control measure implementation scenarios. Assessment results should also provide Permittees with an adequate level of confidence that trash load reductions from MS4s have occurred, while also assessing whether trash problems in receiving waters have been resolved. Indicators must also be cost effective, relatively easy to generate, and understandable to stakeholders.

Primary and secondary indicators that FSURMP Permittees will use to answer core management questions include:

Primary Indicators:

1-A Reduction in the level of trash present on-land and available to MS4s
1-B Effective full capture device operation and maintenance

Secondary Indicators:

2-A Successful levels of trash control measures implementation
2-B Reductions in the amount of trash in receiving waters

In selecting the indicators above, the City of Suisun City in collaboration with FSURMP and other FSURMP Permittees recognize that no one environmental indicator will provide the information necessary to effectively determine progress made in reducing trash discharged from MS4s and improvements in the level of trash in receiving waters. Multiple indicators were therefore selected.

The ultimate goal of municipal storm water trash reduction strategies is to reduce the impacts of trash associated with MS4s on receiving waters. Indicators selected to assess progress towards this goal should ideally measure outcomes (e.g., reductions in trash discharged). The primary indicators selected by FSURMP are outcome-based and include those that are directly related to MS4 discharges. Secondary indicators are outcome or output-based and are intended to provide additional perspective on and evidence of, successful trash control measure implementation and improvements in receiving water condition with regard to trash.

As described in Section 2.2, trash is transported to receiving waters from pathways other than MS4s, which may confound our ability to observe MS4-associated reductions in creeks and shorelines. Due to this challenge of linking MS4 control measure implementation to receiving water conditions, the receiving water based indicator is currently considered a secondary indicator. Evaluations of data on the amount of trash in receiving waters that are conducted over time through the Pilot Assessment Strategy will assist the City in further determinations of the important sources and pathways causing problems in local creeks, rivers and shorelines.

4.1.3 Pilot Assessment Methods

This section briefly summarizes the preliminary assessment methods that the City of Suisun City will implement through the FSURMP Strategy to generate indicator information described in the previous section. Additional information on each method can be found in the FSURMP Strategy submitted to the Water Board by FSURMP on behalf of the City.

1-A. On-land Visual Assessments

As part of the Trash Generation Map assessment and refinement process (see Section 2.3.1), a draft on-land visual assessment method was developed to assist Permittees in confirming and refining trash generating area designations (i.e., very high, high, moderate and low trash generating categories). The draft on-land visual assessment method is intended to be a cost-effective tool and provide Permittees

with a viable alternative to quantifying the level of trash discharged from MS4s. As part of BASMAA's *Tracking California's Trash* grant received from the State Water Resources Control Board (see Section 4.2), quantitative relationships between trash loading from MS4s and on-land visual assessment condition categories will be established. Condition categories defined in the draft on-land assessment protocol are listed in Table 8

Table 8. Trash condition categories used in the draft on-land visual assessment protocol.

Trash Condition Category	Summary Definition
A (Low)	Effectively no trash is observed in the assessment area.
B (Moderate)	Predominantly free of trash except for a few pieces that are easily observed.
C (High)	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D (Very High)	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area.

On-land visual assessments will be conducted in trash management areas within the City of Suisun City as part of the FSURMP Strategy. On-land assessments are intended to establish initial conditions and detect improvements in the level of trash available to MS4s over time. More specifically, on-land visual assessment methods will be conducted in areas not treated by trash full capture devices in an attempt to evaluate reductions associated with other types of control measures. Assessment methods for areas treated by full capture devices are described in this next section.

Given that the on-land assessment method and associated protocol have not been fully tested and refined, initial assessments will occur at a pilot scale in the City and in parallel to the *Tracking California's Trash* project. The frequency of assessments and number of sites where assessments will occur during the pilot stage are more fully described in the FSUMRP Short-Term Trash Assessment Strategy (FSURMP 2014).

1-B. Full Capture Operation and Maintenance Verification

Consistent with the MRP, adequate inspection and maintenance of trash full capture devices is required to maintain full capture designation by the Water Board. The City of Suisun City is currently developing an operation and maintenance verification program (Trash O&M Verification Program), via FSURMP, to ensure that devices are inspected and maintained at a level that maintains this designation. The FSURMP Trash O&M Verification Program will be modeled on the current O&M verification program for storm water treatment controls implemented consistent with the Permit new and redevelopment requirements.

2-A. Control Measure Effectiveness Evaluations

In addition to on-land trash assessments and full capture operation and maintenance verification, the City will also conduct assessments of trash control measures implemented within their jurisdictional area. Assessment methods will be selected based on trash sources and the type of control measure being implemented. Control measure effectiveness evaluations are more fully described in the FSURMP Strategy. The following are example assessment methods that may be used to demonstrate successful control measure implementation and progress towards trash reduction targets:

- Product-related Ordinances – Annually tracking and reporting the % of businesses in compliance with the ordinance and the percentage requiring a response.
- Street Sweeping – Reporting the frequency of sweeping and ability to sweep to the curb in specific areas where enhanced sweeping is implemented; and/or documenting the level of trash on streets directly after street sweeping during wet and dry weather seasons.
- Public/Private Trash Container Management – Reporting the magnitude and extent of enhanced actions; and/or visually assessing and documenting conditions around public trash containers before and after implementing enhanced control measures.
- Targeted Outreach and Enforcement – Reporting the magnitude and extent of enhanced actions; tracking and reporting the % increase in enforcement actions; and/or visually assessing and documenting the conditions in targeted areas before and after implementing control measures.
- Public Outreach Campaigns – Reporting the magnitude and extent of enhanced actions, and/or conducting pre and post campaign surveys.
- On-land Cleanups and Enforcement – Reporting the magnitude and extent of enhanced actions; visually assessing and documenting the conditions in targeted areas before and after control measure implementation; and/or tracking the volumes of trash removed.
- Illegal Dumping Prevention – Reporting the magnitude and extent of enhanced actions; and/or tracking and reporting improvements in the number of incidents.
- Business Improvement Districts – Reporting the magnitude and extent of enhanced actions; and/or visually assessing and documenting the conditions in BID areas before and after implementing control measures.
- Prevention of Uncovered Loads - Reporting the magnitude and extent of enhanced actions; tracking and reporting the decreases in the number of incidents; and/or visually assessing and documenting the conditions in targeted areas before and after implementing control measures.
- Partial Capture Devices – Reporting the magnitude and extent of enhanced actions; and/or visually assessing and the amount of trash in storm drains or downstream of partial capture devices.

2-C. Receiving Water Condition Assessments

The ultimate goal of storm water trash management in the Bay Area is to significantly reduce the amount of trash found in receiving waters. In the last decade, Permittees and volunteers have collected data on the amounts of trash removed during cleanup events. More recently, Permittees have conducted trash assessments in creek and shoreline hotspots using standardized assessment methods. In an effort to answer the core management question *Have trash problems in receiving waters been resolved?,* the City of Suisun City plans to continue conducting receiving water condition assessments at trash hot spots a minimum of one time per year. Assessment will be conducted consistent with Permit hot spot cleanup and assessment requirements.

4.2 BASMAA "Tracking California's Trash" Project

The FSURMP Strategy described in the previous section recognizes that outcome-based trash assessment methods needed to assess progress toward trash reduction targets are not well established by the scientific community. In an effort to address these information gaps associated with trash assessment methods, the Bay Area Stormwater Management Agencies Association (BASMAA), in collaboration with FSURMP, the 5 Gyres Institute, San Francisco Estuary Partnership, the City of Los Angeles, and other stormwater programs in the Bay Area, developed the *Tracking California's Trash* Project. The Project is funded through a Proposition 84 grant awarded to BASMAA by the State Water Resources Control Board (SWRCB) who recognized the need for standardized trash assessment methods that are robust and cost-effective.

The Project is intended to assist BASMAA member agencies in testing trash assessment and monitoring methods needed to evaluate trash levels in receiving waters, establish control measures that have an equivalent performance to trash full capture devices, and assess progress in trash reduction over time. The following sections provide brief descriptions of tasks that BASMAA will conduct via the three-year Project. Full descriptions of project scopes, deliverables, and outcomes will be developed as part of the task-specific Sampling and Analysis Plans required by the SWRCB during the beginning of the Project. The Project is currently underway and will continue through 2016.

4.2.1 Testing of Trash Monitoring Methods

BASMAA and the 5 Gyres Institute will evaluate the following two types of assessment methods as part of the Project:

- **Trash Flux Monitoring –** Trash flux monitoring is intended to quantify the amount of trash flowing in receiving waters under varying hydrological conditions. Flux monitoring will be tested in up to four receiving water bodies in San Francisco Bay and/or the Los Angeles areas. Methods selected for evaluation and monitoring will be based on a literature review conducted during this task and through input from technical advisors and stakeholders. Monitoring is scheduled to begin in 2014 and will be completed in 2016.
- **On-land Visual Assessments –** As part of the Project, BASMAA will also conduct an evaluation of on-land visual assessment methods that are included in the FSUMRP Strategy. The methods are designed to determine the level of trash on streets and public right-of-ways that may be transported to receiving waters via MS4s. BASMAA plans to conduct field work associated with the evaluation of on-land visual assessment at a number of sites throughout the region. To the extent practical, sites where the on-land methods evaluations take place will be coordinated with trash flux monitoring in receiving waters. On-land assessments will occur in areas that drain to trash full capture devices, and all sites will be assessed during wet and dry weather seasons in order to evaluate on-land methods during varying hydrologic conditions. Monitoring is scheduled to begin in 2014 and will be completed in 2016.

4.2.2 Full Capture Equivalent Studies

Through the implementation of BASMAA's *Tracking California's Trash* grant-funded project, a small set of "Full Capture Equivalent" projects will also be conducted in an attempt to demonstrate that specific combinations of control measures will reduce trash to a level equivalent to full capture devices. Initial BMP combinations include high-frequency street sweeping, and enhanced street sweeping with auto-retractable curb inlet screens. Other combinations will also be considered. Studies are scheduled to begin in 2014 and will be completed in 2016.

4.3 Long-Term Assessment Strategy

The City of Suisun City is committed to implementing standardized assessment methods post-2016 based on the lessons learned from pilot assessments and studies that will occur between 2014 and 2016. Assessment activities described in the previous sections will evaluate the utility of different assessment methods to demonstrate progress towards trash reduction targets and provide recommended approaches for long-term implementation. Lessons learned will be submitted to the Water Board with the FY 2015-2016 Annual Report and a revised Strategy will be developed and submitted, if necessary. The revised Strategy will include agreed upon assessment methods that will be used to demonstrate progress during the remaining term of trash reduction requirements. Reporting using the new/revised methods will begin with the FY 2016-17 Annual Report.

4.4 Implementation Schedule

The implementation schedule for the FSURMP Short-term Strategy, BASMAA's Tracking California's Trash project, and the Long-Term Assessment Strategy are included in. Load reduction reporting milestones are also denoted in the table. The schedule is consistent with the need for near-term pilot assessment results to demonstrate progress toward short-term targets, while acknowledging the need for testing and evaluation of assessment methods and protocols prior to long-term implementation.

Table 9. City of Suisun City trash progress assessment implementation schedule.

Trash Assessment Programs and Methods	Prior to FY 2013-14	Fiscal Year								
		2013-14[a]	2014-15	2015-16	2016-17[b]	2017-18	2018-19	2019-20	2020-21	2021-22[c]
Short-Term Trash Assessment Strategy (FSURMP)										
On-land Visual Assessments										
Initial (Baseline) Assessments	X									
Pilot Progress Assessments				X	X	X	X			
Full Capture Operation and Maintenance Verification					X	X	X			
Control Measure Effectiveness Evaluations	X			X	X	X	X			
Receiving Water Condition Assessments	X			X	X	X	X			
Tracking California's Trash Project (BASMAA)										
Testing of Trash Monitoring Methods										
Trash Flux Monitoring Protocol Testing			X	X	X					
On-land Visual Assessment Evaluations			X	X	X					
Full Capture Equivalent Studies			X	X	X					
Long-Term Trash Assessment Strategy (FSURMP)						X	X	X	X	X

[a]July 1, 2014 - 40% trash reduction target
[b]July 1, 2017 - 70% trash reduction target
[c]July 1, 2022 - 100% trash reduction target

5.0 REFERENCES

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Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Valley Watert

Submitted via email to michael.montgomery@waterboards.ca.gov on July 2, 2020

July 2, 2020

Mr. Michael Montgomery
Executive Officer
San Francisco Bay Region - Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Mr. Montgomery:

On behalf of the public agencies in Santa Clara County (Co-permittees) subject to NPDES Permit No. CAS612008 (also referred to as the Municipal Regional Permit, or MRP) issued by the Regional Water Quality Control Board – San Francisco Bay Region (Order No. R2-2015-0049, as amended by Order No. R2-2019-0004), the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program) is pleased to submit an application and Report of Waste Discharge (ROWD) in accordance with Title 23 of the California Code of Regulations. SCVURPPP is a cooperative association created for municipal regulatory compliance and focused on assisting Co-permittees with the management of urban runoff for the protection and enhancement of Santa Clara Valley creeks, rivers, and the San Francisco Bay (Bay). The Program Manager was formally authorized by the SCVURPPP Management Committee at its June 18, 2020 meeting to submit this application and ROWD to the Regional Water Board (see meeting summary and attendance list enclosed).

Consistent with the request received from Water Board staff on May 17, 2020, this ROWD includes:

- An application for NPDES permit reissuance – Form 200 (Attachment 1);
- A list of facilities (i.e., Co-permittees) requesting NPDES permit coverage, addresses, and contact information (Attachment 2);
- A map that illustrates the location of Co-permittee jurisdictional boundaries and associated water bodies (Attachment 3);
- The current Memorandum of Understanding (MOU) that confirms the relationship of SCVURPPP Co-permittees (Attachment 4); and
- A table that includes a summary of priority issues and requested updates to MRP requirements, with references to associated attachments (i.e., reports and documents) that provide justification for the updates, and provides access to information requested by Water Board staff (Attachment 5).[1]

The application and all ROWD components, including documents listed in Attachment 5, can also be found at https://scvurppp.org/report-of-wastewater-discharge-july-3-2020/.

[1] Attachment 5 includes information requested by Water Board staff on the current status of Co-permittee Long-term Trash Plans and the outcomes of trash control actions presented in the tabular format requested.

1021 S.Wolfe Road, Suite 185 • Sunnyvale, CA 94086 • tel: (408) 720-8811 • fax: (408) 720-8812
1410 Jackson Street • Oakland, CA 94612 • tel: (510) 832-2852 • fax: (510) 832-2856
1-866-WATERSHED

Please note that certain information that Water Board staff requested that Co-permittees include in the ROWD is currently under development and will be submitted with the Program's FY 2019-20 Annual Report in September 2020, consistent with MRP requirements.[2]

The successful implementation of permit requirements during the past two decades has provided Co-permittees insight towards optimizing requirements in future NPDES permits. The recommended prioritized updates to the MRP that are included in Attachment 5 are based upon the lessons learned during the implementation of the current MRP and previous permit terms, and are consistent with the following permit reissuance goals expressed by permittees during recent and on-going discussions with Water Board staff (see Attachment 5, Appendix A, Sections 1-8 for meeting summaries) and supported by Regional Water Board members, as described at their June 10, 2020 meeting:

- When developing and adopting the reissued MRP, fully consider the unprecedented situation that Co-permittees are currently facing as a result of the COVID-19 pandemic and associated fiscal impacts;
- Establish the need for and priorities of, added or enhanced requirements proposed for the reissued MRP, as well as the relationship among various provisions; and
- Provide a balance between flexibility and enforceability within the MRP.

SCVURPPP appreciates that Water Board members share these goals and we believe that the recommended updates to permit requirements included in Attachment 5 provide a more cost-effective approach towards improving stormwater quality and achieving the protection and enhancement of water quality in Santa Clara Valley receiving waters and the Bay. That said, Co-permittees remain extremely concerned about the availability of resources to address requirements in the next MRP because of the dramatically increased level of service currently being discussed by Water Board staff and the uncertainty of available resources to Co-permittees due to the COVID-19 pandemic. To this end, Co-permittees are requesting that the Water Board reissue the municipal stormwater NPDES permit in consideration of current economic factors and the reasonable protection of beneficial uses, consistent with the California Water Code.

Co-permittee and Program staff look forward to continuing to work with Water Board staff on the development of an NPDES permit that addresses high priority stormwater quality issues identified by Co-permittees in a cost-effective and practicable manner during the next permit term.

Should you have any questions regarding the ROWD submittal, please do not hesitate to contact me.

Sincerely,

Adam W. Olivieri, Dr. P.H., P.E.
Program Manager

Cc:

Tom Mumley, Assistant Executive Officer, San Francisco Bay Region – Regional Water Quality Control Board
Keith Lichten, Watershed Division Chief, San Francisco Bay Region – Regional Water Quality Control Board
Zach Rokeach, Water Resource Control Engineer, San Francisco Bay Region – Regional Water Quality Control Board
SCVURPPP Management Committee

[2] Water Board staff requested in their May 17, 2020 correspondence the following information be included in the ROWD:

- Summaries of key information that required to be submitted pursuant to MRP Provisions C.11.c.iii(1), C.11.c.iii(2), C.12.c.iii(1) and C.12.c.iii(2);
- A summary of draft Reasonable Assurance Analysis (RAA) outcomes sufficient to inform setting of goals in those provisions; and.
- Methods for estimating PCBs load reductions achieved by new source categories (e.g., removal of PCBs-containing electrical equipment, control of PCBs in infrastructure (e.g., bridge caulk)).

Enclosures:

- Excerpt from the June 18, 2020 SCVURPPP Management Committee meeting summary where the ROWD was approved and the Program Manager was authorized to submit the NPDES permit application and ROWD on behalf of all SCVURPPP Co-permittees.
- **Attachment 1:** Application/Report of Waste Discharge General Information Form for Waste Discharge Requirements or NPDES Permit
- **Attachment 2:** List of SCVURPPP Co-permittees, Management Committee Representatives, and contact information
- **Attachment 3:** Map of Co-permittee Jurisdictional Boundaries and Receiving Water Bodies
- **Attachment 4:** The current Memorandum of Understanding (MOU) that confirms the relationship of SCVURPPP Co-permittees
- **Attachment 5:** A table that includes a summary of priority issues and requested updates to MRP requirements, with references to associated attachments (i.e., reports and documents) that provide justification for the updates, and provides access to information requested by Water Board staff

VII. PROGRAM BUSINESS

A. APPROVALS

1. MRP 3.0 Application/Report of Waste Discharge (ROWD)

Chris Sommers (Program staff) provided an update on the ROWD. An email with submittal details was sent to the MC on June 4, 2020.

Motion: Melody Tovar (Sunnyvale) moved to approve the MRP 3.0/Report of Waste Discharge (ROWD), and authorize the Program Manager to submit the application and ROWD on behalf of SCVURPPP Co-permittees to the Regional Water Board by July 3, 2020, contingent on resolving any comments received by June 29, 2020. **Second**: Sharon Newton (San Jose). **Vote**: Motion passed unanimously.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Meeting Attendance Record

June 18, 2020

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Valley Water

CO-PERMITTEE REPRESENTATIVES (voting members)	***SIGNATURE***
Ursula Syrova – Cupertino Alternate: Alex Wykoff	*Ursula Syrova*
Andrea Trese– Los Altos Alternate: Emiko Ancheta	*Andrea Trese; Emiko Ancheta*
Nichol Bowersox – Los Altos Hills Alternate: Kaho Kong	*Kaho Kong*
Elaine Marshall – Milpitas Alternate: Kan Xu	*Elaine Marshall*
Carrie Sandahl – Mountain View Alternate: Eric Anderson	*Carrie Sandahl*
Karin North – Palo Alto Alternate: Pamela Boyle Rodriguez Alternate: Michel Jeremias	*Karin North; Pamela Boyle Rodriguez*
Sharon Newton – San Jose Alternate: Jeff Sinclair	*Sharon Newton, Jeff Sinclair*
Rinta Perkins – Santa Clara Alternate: Dave Staub	*Rinta Perkins*
Melody Tovar – Sunnyvale Alternate: Nupur Hiremath	*Melody Tovar; Nupur Hiremath*
Vanessa Marcadejas – Santa Clara County Alternate: Julianna Martin	*Vanessa Marcadejas, Julianna Martin*
Kirsten Struve – SCVWD Alternate: James Downing	*Kirsten Struve; James Downing*
Sheila Tucker – West Valley Communities (Campbell, Los Gatos, Monte Sereno, and Saratoga)	*Sheila Tucker*
URBAN RUNOFF PROGRAM STAFF	
Adam Olivieri	*Adam Olivieri*
Jill Bicknell	*Jill Bicknell*
Chris Sommers	*Chris Sommers*
Vishakha Atre	*Vishakha Atre*
INTERESTED PARTIES/AGENCY REPRESENTATIVE	
Trish Mulvey – Clean South Bay	
ADDITIONAL ATTENDEES	
	Peri Newby, Campbell

Attachment 1

Application/Report of Waste Discharge General Information Form for Waste Discharge Requirements or NPDES Permit

CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. FACILITY:

Name Members of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) - See Attachment 2

Address

City/County/State/Zip Code

Contact Person Adam W. Olivieri, Program Manager

Telephone Number 510-832-2852 x115 Email awo@eoainc.com

B. FACILITY OWNER:

Name Members of SCVURPPP (MRP Co-permittees) - See Attachment 2

Address

City/State/Zip Code

Contact Person Adam W. Olivieri, Program Manager

Telephone Number 510-832-2852 x115 Email awo@eoainc.com

Federal Tax ID NA

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☑ Other: MOA/BYLAWS

C. FACILITY OPERATOR (The agency or business, not the person):

Name Members of SCVURPPP (MRP Co-permittees) - See Attachment 2

Address

City/State/Zip Code

Contact Person

Telephone Number Email

Operator Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☑ Other: MOA/BY-LAWS

D. OWNER OF THE LAND

Name Members of SCVURPPP (MRP Co-permittees) - See Attachment 2

Address

City/State/Zip Code

Contact Person

Telephone Number Email

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☑ Other: MOA/BYLAWS

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED

Address See Attachment 2 - MRP Co-permittees

City/State/Zip Code

Contact Person

Telephone Number Email

F. BILLING ADDRESS

Address See Attachment 2 - MRP Co-permittees

City/State/Zip Code

Contact Person

Telephone Number Email

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application:

☐ **Waste Discharge to Land** ☑ **Waste Discharge to Surface Water**

Check all that apply:

☐ Animal or Aquacultural Wastewater	☐ Land Treatment Unit
☐ Animal Waste Solids	☐ Landfill (*see instructions*)
☐ Biosolids/Residual	☐ Mining
☐ Cooling Water	☑ Storm Water
☐ Domestic/ Municipal Wastewater Treatment and Disposal	☐ Surface Impoundment
☐ Dredge Material Disposal	☐ Waste Pile
☐ Hazardous Waste (*see instructions*)	☐ Wastewater Reclamation
☐ Industrial Process Wastewater	☐ Other, *please describe*

III. LOCATION OF THE FACILITY

Describe the physical location of the facility:

1. Assessor's Parcel Number(s)

   Facility: _____

   Discharge Point: See Attachment 3

2. Latitude

   Facility: _____

   Discharge Point: See Attachment 3

3. Longitude

   Facility: _____

   Discharge Point: See Attachment 3

IV. REASON FOR FILING

Check all that apply:

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency N/A

Has a public agency determined that the proposed project is exempt from CEQA?

☐ Yes ☐ No

If yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below:

_____

_____

Has a "Notice of Determination" been filed under CEQA?

☐ Yes ☐ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report (EIR), or Negative Declaration. If No, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents: ☐ EIR ☐ Negative Declaration

Expected CEQA Completion Date: _____

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

_____

_____

_____

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name Adam W. Olivieri, Dr. PH, P.E. Title SCVURPPP Program Manager

Signature Adam W. Olivieri Date July 2, 2020

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

Attachment 2

List of SCVURPPP Co-permittees, Management Committee Representatives, and contact information

Attachment 2
Co-permittees and Management Committee Representatives of the
Santa Clara Valley Urban Runoff Pollution Prevention Program

Organization	Contact	Address	Phone	E-mail
Campbell	Todd Capurso *(contact Sheila Tucker at WVCWPA)*	70 North First Street Campbell, CA 95008-1423	408- 866-2150#	toddc@cityofcampbell.com
Cupertino	Ursula Syrova	10300 Torre Avenue Cupertino, CA 95014	408-777-7603	UrsulaS@cupertino.org
Los Altos	Andrea Trese	One North San Antonio Road Los Altos, CA 94022-3087	650-947-2624	atrese@losaltosca.gov
Los Altos Hills	Nichol Bowersox	26379 Fremont Road Los Altos Hills, CA 94022	650-941-7222	nbowersox@losaltoshills.ca.gov
Los Gatos	Matt Morley *(contact Sheila Tucker at WVCWPA)*	41 Miles Ave or P.O. Box 949 Los Gatos, CA 95031	408-399-5774	MMorley@losgatosca.gov
Milpitas	Elaine Marshall	455 East Calaveras Boulevard Milpitas, CA 95035	408-586-2603	emarshall@ci.milpitas.ca.gov
Monte Sereno	Jessica Kahn *(contact Sheila Tucker at WVCWPA)*	18041 Saratoga-Los Gatos Rd. Monte Sereno, CA 95030	408-354-7635	jessica@cityofmontesereno.org
Mountain View	Carrie Sandahl	500 Castro Street, City Hall, 4th Floor Mountain View, CA 94041	650-903-6224	carrie.sandahl@mountainview.gov
Palo Alto	Karin North	250 Hamilton Ave., 6th Floor, Palo Alto, CA 94301 City of Palo Alto, PO Box 10250, Palo Alto, 94303 2501 Embarcadero Way, Palo Alto, CA 94303	650-329-2104	karin.north@cityofpaloalto.org
San José	Sharon Newton	Environmental Services Department Watershed Protection, City of San Jose 200 East Santa Clara Street, 7th Floor San Jose, CA 95113	408-793-5351	sharon.newton@sanjoseca.gov
Santa Clara	Rinta Perkins	CSC Street Corp. Yard 1700 Walsh Avenue Santa Clara, CA 95050	408-615-3081	rperkins@santaclaraca.gov
Santa Clara County	Vanessa Marcadejas	Clean Water Program 1553 Berger Drive, Bldg. 1 San Jose, CA 95112	408-282-3165	Vanessa.marcadejas@cep.sccgov.org
Santa Clara Valley Water District	Kirsten Struve	5750 Almaden Expressway San José, CA 95118	408-630-3138	kstruve@valleywater.org
Saratoga	Mainini Cabute *(contact Sheila Tucker at WVCWPA)*	13777 Fruitvale Avenue Saratoga, CA 95070	408- 868-1258	mcabute@saratoga.ca.us
Sunnyvale	Melody Tovar	City of Sunnyvale P.O. Box 3707 Sunnyvale, CA 94088	408-730-7740	mtovar@sunnyvale.ca.gov
West Valley Clean Water Program Authority (WVCWPA)	Sheila Tucker	West Valley Clean Water Program Authority One West Campbell Avenue, H-73 Campbell, CA 95008-1039	408-354-5385	stucker@wvcwp.org

Attachment 3

Map of Co-permittee Jurisdictional Boundaries and Receiving Water Bodies

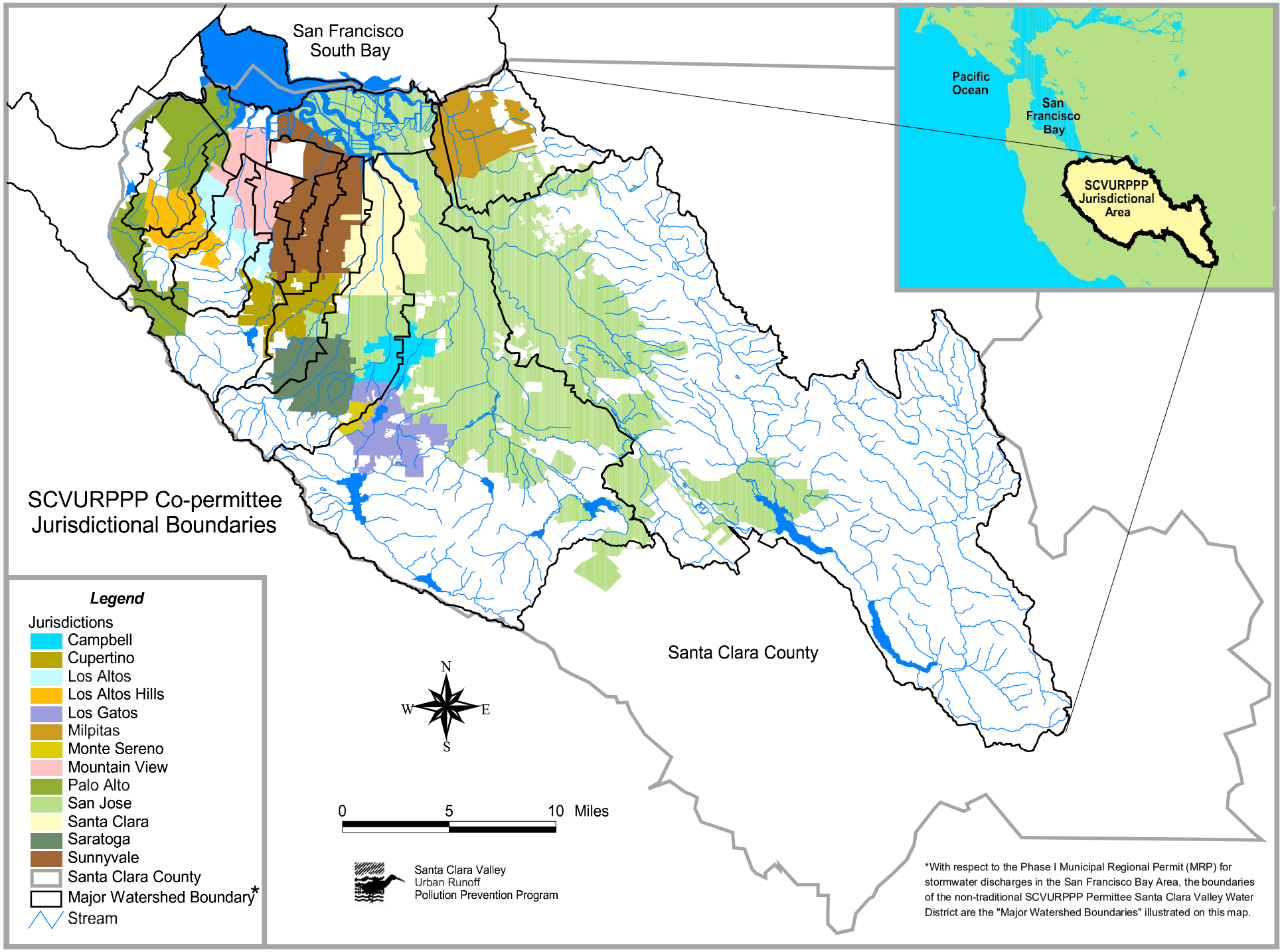

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Attachment 4

Memorandum of Understanding (MOU) that confirms the relationship of SCVURPPP Co-permittees

THIRD AMENDMENT TO AGREEMENT PROVIDING FOR IMPLEMENTATION OF THE SANTA CLARA VALLEY URBAN RUNOFF POLLUTION PREVENTION PROGRAM

THIS THIRD AMENDMENT TO AGREEMENT PROVIDING FOR IMPLEMENTATION OF THE SANTA CLARA VALLEY URBAN RUNOFF POLLUTION PREVENTION PROGRAM (the "Amendment") is entered into by and between the SANTA CLARA VALLEY WATER DISTRICT, a local public agency of the State of California ("District"); CITY OF CAMPBELL, a municipal corporation of the State of California; CITY OF CUPERTINO, a municipal corporation of the State of California; CITY OF LOS ALTOS, a municipal corporation of the State of California; TOWN OF LOS ALTOS HILLS, a municipal corporation of the State of California; TOWN OF LOS GATOS, a municipal corporation of the State of California; CITY OF MILPITAS, a municipal corporation of the State of California; CITY OF MONTE SERENO, a municipal corporation of the State of California; CITY OF MOUNTAIN VIEW, a municipal corporation of the State of California; CITY OF PALO ALTO, a municipal corporation of the State of California; CITY OF SAN JOSE, a municipal corporation of the State of California; CITY OF SANTA CLARA, a municipal corporation of the State of California; CITY OF SARATOGA, a municipal corporation of the State of California; CITY OF SUNNYVALE, a municipal corporation of the State of California; and COUNTY OF SANTA CLARA, a political subdivision of the State of California.

All of the above-mentioned entities are hereinafter collectively referred to as "Parties" or individually as "Party."

RECITALS

A. The Parties previously entered into that certain Agreement Providing For Implementation of the Santa Clara Valley Urban Runoff Pollution Prevention Program (the "Agreement" or "MOA") pursuant to which the Parties established certain terms and conditions relating to the implementation and oversight of the Santa Clara Valley Urban Runoff Pollution Prevention Program (the "Program"), including a cost sharing allocation, which was appended thereto as Exhibit A. A copy of the Agreement, including Exhibit A, is attached hereto as Appendix 1. Unless otherwise set forth herein, all terms shall have the meaning set forth in the Agreement;

B. The Agreement originally provided for a five-year term, which, based on its execution, was set to conclude on or about March 10, 2005. However, on or about February 20, 2005, the Parties unanimously entered into a First Amendment to the Agreement (attached hereto as Appendix 2), which extended the term of the Agreement by one additional year;

C. The Parties thereafter unanimously entered into a Second Amendment to the Agreement (attached hereto as Appendix 3), which extended the term of the amended

Agreement by "one fiscal year beyond the termination date of the (then) next NPDES Permit issued to the Parties, including any administrative extension of the (then) next NPDES Permit's term which occurred pursuant to the NPDES regulations." The next NPDES permit applicable to the Parties (and others) was subsequently adopted the California Regional Water Quality Control Board, San Francisco Bay Region ("RWQCB SFBR") on October 14, 2009 and was known as the Municipal Regional Permit ("MRP") because it covered numerous public agencies in the San Francisco Bay Region in addition to the Parties;

D. The MRP was then administratively extended until a new NPDES Permit applicable to the Parties (and the other public entities in the San Francisco Bay Region) was adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 19, 2015 ("MRP 2.0"). MRP 2.0 became effective on January 1, 2016 and, unless subject to an administrative extension, is scheduled to terminate on December 31, 2020;

E. The Parties expect to utilize the Program to continue to represent their interests relative to MRP 2.0 (including with respect to an administrative appeal of its adoption that is currently pending before the State Water Resources Control Board), to help them effectuate certain aspects of compliance with MRP 2.0, and, beyond that, in negotiating the terms of a further renewed NPDES Permit when MRP 2.0 nears the end of its anticipated five-year term and any administrative extension provided thereto;

F. The Parties also expect to continue to utilize the Program's preferred approach of achieving consensus to resolve issues and reach decisions, and to rely on the Majority Vote mechanism set forth in Section 2.08 of the Agreement at the Management Committee level only when consensus-based resolutions appear or become elusive;

G. The Parties now desire to update the amended Agreement and further extend the term of the MOA as set forth below;

H. Section 7.02 of the MOA provides that it may be amended by the unanimous written agreement of the Parties and that all Parties agree to bring any proposed amendments to their Council or Board, as applicable, within three (3) months following acceptance by the Management Committee; and

I. The Program's Management Committee accepted this Amendment for referral to the Parties' Councils and/or Boards at its meeting on August 18, 2016.

NOW, THEREFORE, THE PARTIES HERETO FURTHER AGREE AS FOLLOWS:

1. Recognition of Current Permit. Recital F of the Agreement, as previously amended, is hereby further amended by the addition of the following subsections:

> 6. Order No. R2-2009-0074 (the Municipal Regional Permit, NPDES Permit CAS612008); adopted, October 14, 2009 and amended by the RWQCB SFBR on November 28, 2011;

7. Order No. R2-2015-0049 (MRP 2.0, NPDES Permit CAS612008); adopted by the RWQCB SFBR on November 19, 2015.

2. Extension of Term of Agreement. Sections 6.02 and 6.02.01 of the Agreement, as previously amended, are hereby replaced as follows:

> This Agreement shall have a term extending one fiscal year beyond the date of termination of MRP 2.0; such termination date shall, however, be deemed to include any administrative extension of MRP 2.0 which occurs or arises pursuant to the NPDES regulations or any modification of the MRP 2.0 termination date that arises from an NPDES permitting action undertaken by the RWQCB SFBR or California State Water Resources Control Board.

3. Superseding Effect. This Third Amendment of the Agreement shall supplement the Second Amendment of the Agreement and supersede any conflicting provisions of the Second Amendment of the Agreement.

[remainder of page intentionally blank]

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of ___Campbell___:

By: Todd Capurso

Name: Todd Capurso

Title: Director of Public Works

Date: 10/6/16

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of Cupertino:

By: _____

Name: David Brandt

Title: City Manager

Date: 10/24/16

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of Los Altos ***:***

By: _____

Name: Christopher Jordan

Title: City Manager

Date: 10/26/2016

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District: By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara: By: _____

Name: _____

Title: _____

Date: _____

Town of Los Altos Hills: By: Carl Cahill

Name: Carl Cahill

Title: City Manager

Date: 10-26-2016

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

Town of ____Los Gatos___:

By: Laurel Prevetti

Name: Laurel Prevetti

Title: Town Manager

Approved As to Form: _____
Robert Schultz, Town Attorney

Attest: Shelley Neis
Shelley Neis, Town Clerk

Date: 10/20/16

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of Milpitas ***:***

By: _____

Name: Thomas C. Williams

Title: City Manager

Date: 12/7/16

APPROVED

Date 12/6/16

Christopher J. Diaz
City Attorney

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of ____Monte Sereno___:

By: _____

Name: Brian Loventhal

Title: City Manager

Date: 10/18/16

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

CITY OF MOUNTAIN VIEW,
a municipal corporation of
the State of California

By: _____
City Manager

By: _____
City Clerk

APPROVED AS TO CONTENT:

_____
Fire Chief

FINANCIAL APPROVAL:

_____
Finance and Administrative
Services Director

APPROVED AS TO FORM:

_____
Sr Asst City Attorney

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District: By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara: By: _____

Name: _____

Title: _____

Date: _____

City of Palo Alto *:* By: _____

Name: JAMES KEENE

Title: CIM MANAGER

Date: 9.20.16

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of San José:

By: _____

Name: TONI TABER

Title: City Clerk

Date: 11-8-2016

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District: By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara: By: _____

Name: _____

Title: _____

Date: _____

City of Santa Clara: By: Rajeev Batra

Name: Rajeev Batra

Title: Acting City Manager

Date: 10.28.16

APPROVED AS TO FORM:
SANTA CLARA CITY ATTORNEY'S OFFICE

ATTEST:

For City Clerk

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: DAVE CORTESE

Title: PRESIDENT BOARD OF SUPERVISORS

Date: NOV 15 2016

Attest: _____

Name: MEGAN DOYLE

Title: Clerk of the Board of Supervisors

Approved as to form and legality:

By: _____

Name: MICHAEL L. ROSSI

Title: LEAD DEPUTY COUNTY COUNSEL

City of _____:

By: _____

Name: _____

Title: _____

Date: _____

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: NATON CHU

Title: ACTING CEO

Date: 11/14/16

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of _____:

By: _____

Name: _____

Title: _____

Date: _____

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of ____Saratoga___:

By: _____

Name: James Lindsay

Title: City Manager

Approved As to Form: _____

Richard S. Taylor, City Attorney

Attest: _____ Debbie Bretschneider

for Crystal Bothelio, City Clerk Deputy City Clerk

Date: 9/22/2016

IN WITNESS WHEREOF, the Parties have executed this Third Amendment effective as of the last date indicated below or December 19, 2016, whichever arises earlier.

Santa Clara Valley Water District:

By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara:

By: _____

Name: _____

Title: _____

Date: _____

City of Sunnyvale ***:***

By: _____

Name: Deanna J. Santana

Title: City Manager

Date: 11/8/2016

APPROVED AS TO FORM:

By: _____

John A. Nagel
City Attorney

Appendix 1

Agreement Providing For Implementation
of the Santa Clara Valley Urban Runoff
Pollution Prevention Program
as fully executed as of March 10, 2000

AGREEMENT
PROVIDING FOR IMPLEMENTATION OF
THE SANTA CLARA VALLEY URBAN RUNOFF
POLLUTION PREVENTION PROGRAM

THIS AGREEMENT, is made and entered into this _____ day of _____ 1999 by and between the SANTA CLARA VALLEY WATER DISTRICT (DISTRICT), a local public agency of the State of California; COUNTY OF SANTA CLARA, a political subdivision of the State of California; CITY OF CAMPBELL, a municipal corporation of the State of California; CITY OF CUPERTINO, a municipal corporation of the State of California; CITY OF LOS ALTOS, a municipal corporation of the State of California; TOWN OF LOS ALTOS HILLS, a municipal corporation of the State of California; TOWN OF LOS GATOS, a municipal corporation of the State of California; CITY OF MILPITAS, a municipal corporation of the State of California; CITY OF MONTE SERENO, a municipal corporation of the State of California; CITY OF MOUNTAIN VIEW, a municipal corporation of the State of California; CITY OF PALO ALTO, a municipal corporation of the State of California; CITY OF SAN JOSE, a municipal corporation of the State of California; CITY OF SANTA CLARA, a municipal corporation of the State of California; CITY OF SARATOGA, a municipal corporation of the State of California; and CITY OF SUNNYVALE, a municipal corporation of the State of California.

All of the above-mentioned entities are hereinafter collectively referred to as "PARTIES" or individually as "PARTY."

RECITALS:

A. The 1986 Water Quality Control Plan for the San Francisco Bay (Basin Plan), adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, in implementation of the Federal Clean Water Act, required that PARTIES develop a program to control pollution from urban runoff, or nonpoint sources of water pollution in the Santa Clara Valley.

B. In furtherance of their responsibilities pursuant to the Basin Plan, the PARTIES have previously entered into a series of agreements to jointly fund the cost of preparing an action plan to evaluate nonpoint source pollutants, monitor identified pollutants, and develop control measures to mitigate or reduce nonpoint source pollution. Collectively, the measures undertaken pursuant to the previous agreements and anticipated to continue pursuant to this Agreement, were known as the Santa Clara Valley Nonpoint Source Pollution Control Program and upon execution of this agreement henceforth shall be known as the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter called "Program").

C. In 1987 Congress added Section 402 (p) to the Federal Clean Water Act (CWA) (33 U.S.C. Section 1342 (p)), which requires certain municipalities and industrial facilities to obtain a National Pollutant Discharge Elimination System (NPDES) permit for the

discharge of stormwater to navigable waters. NPDES permits are also required under Section 402 (p) for any stormwater discharge which the Federal Environmental Protection Agency (EPA) or a State has determined contributes to a violation of a water quality standard or is a significant contributor of pollutants to surface waters.

D. Section 402 (p) further required EPA to promulgate regulations for initial NPDES permit applications for stormwater discharges. The EPA promulgated such regulations in November 1990.

E. The EPA has delegated authority to the California State Water Resources Control Board (SWRCB) to administer the NPDES permit process within California and, in turn, the SWRCB has delegated authority to the California Regional Water Quality Control Board - San Francisco Bay Region (RWQCB-SFBR) to administer the NPDES permit process within its region.

F. Pursuant to Section 402 (p) of the CWA and EPA regulations, the RWQCB-SFBR adopted the following orders further defining the program that the PARTIES are to develop and implement:

1. Order No. 90-094 (NPDES Permit No. CA0029718), adopted June 20,1990; and
2. Order No 95-180 (NPDES Permit No. CAS029718); adopted August 23, 1995.

G. In and for the mutual interest of the PARTIES, the PARTIES wish to continue the Program by entering into this Agreement for the purpose of ensuring continued participation, in terms of cost and administrative responsibilities.

H. DISTRICT is a local public agency of the State of California duly organized and existing within the County of Santa Clara. The County of Santa Clara is a political subdivision of the State of California. All other PARTIES are municipal corporations, duly organized and existing under the laws of the State of California.

I. The RWQCB-SFBR is conducting a Watershed Management Initiative (WMI) in Santa Clara County. The Program is required, as part of its NPDES permit, to develop and implement a Watershed Management Measures Strategy. The Urban Runoff Management Plan of the Program contains the Program's Watershed Management Measures Strategy. This strategy, consistent with the NPDES permit, coordinates Program activities with the WMI to develop and implement cost-effective approaches to address specific urban runoff pollution problems. The Program, through a continuous improvement process, annually reviews the strategy.

NOW, THEREFORE, THE PARTIES HERETO FURTHER AGREE, AS FOLLOWS:

Section 1. Santa Clara Valley Urban Runoff Pollution Prevention Program

1.01 The Santa Clara Valley Nonpoint Source Pollution Control Program ("Program") is hereby continued as the Santa Clara Valley Urban Runoff Pollution Prevention Program to fulfill the requirements of NPDES Permit No. CAS029718 as it exists, may be modified, or may be reissued in the future (hereinafter referred to as "NPDES Permit").

1.02 The Program is a collective effort and implementation of area-wide activities, designed to benefit all PARTIES.

Section 2. Management Committee

2.01 A Management Committee is hereby reconstituted to provide for overall Program coordination, review, and budget oversight, with respect to the NPDES Permit.

2.02 The Management Committee may as necessary adopt and revise Bylaws for its governance.

2.03 The Management Committee is the official management and oversight body of the Program. The Management Committee shall direct and guide the Program and review and approve the Program Budget. The Management Committee shall consider permit compliance, including benefit to a majority of the PARTIES, as a primary objective in approving Program tasks and corresponding budgets.

2.04 The Management Committee may periodically re-evaluate and make recommendations to the PARTIES concerning reallocation of the proportion of the annual Program contribution that each PARTY shall pay.

2.05 The voting membership of the Management Committee shall consist of one designated voting representative from each PARTY. An alternative voting representative may be appointed by each PARTY. The RWQCB-SFBR may appoint a non - voting representative and alternate to the Management Committee.

2.06 A quorum of the Management Committee shall be achieved when at least nine (9) voting representatives, including at least one (1) representative from each of City of San Jose and Santa Clara Valley Water District, are present at any Management Committee meeting.

2.07 Meetings of the Management Committee, including any closed sessions with Program Legal Counsel, shall be conducted in accordance with the "Brown Act"

(Government Code Section 54950 et seq.) The individual parties have differing opinions on whether the Brown Act legally should be interpreted as applying to members of the Management Committee. In executing this Agreement, the parties do not waive their right to take the position that the Brown Act legally does not apply, but voluntarily agree to follow Brown Act procedures for Management Committee meetings. Except for official meetings of the Management Committee, nothing herein shall be interpreted to require meetings between staff members of the individual Parties (including designated representatives of the Parties) to be subject to the Brown Act, where the Brown Act would not otherwise apply. Each party is individually responsible for ensuring that it complies with the Brown Act.

2.08 The affirmative vote of at least eight (8) voting members of the Management Committee, which collectively contribute at least fifty percent (50%) of the area-wide Program costs (a "Majority Vote"), is necessary to approve any measure brought before the Management Committee.

2.09 The Management Committee shall be responsible for selecting any consultant(s) or contractor(s) who are to be paid from Program funds ("Outside Contractors"), using a process approved by the Contracting Agent, and for reviewing and approving any contracts with Outside Contractors, including the scope(s) of work, schedules of performance, use of subcontractors, and compensation for such Outside Contractors.

2.10 The Management Committee shall select a PARTY or Outside Contractor to act as Program Manager for the Program. The Program Manager shall be responsible for Program management and administration, Permit management, and technical program management all in accordance with the NPDES Permit, this Agreement, Program Bylaws, and as directed by the Management Committee in the best interest of the PARTIES as a whole and individually. The Program Manager shall be paid, from Program funds in accordance with the adopted Program budget, for providing the services described hereunder. The Program Manager shall not be responsible for providing program management services related to individual PARTIES permit programs, but may provide such services under separate contract with any PARTY or PARTIES.

2.11 The Management Committee may select an attorney (Program Attorney) or firm that is experienced with the Clean Water Act and Municipal Stormwater NPDES Permits to provide legal advice to the Management Committee on all matters involving administration of the Program's NPDES permit and such other matters upon which the Management Committee may seek legal advice or request legal representation. Program Legal Counsel shall not be responsible for providing legal advice related to permit compliance to individual PARTIES, but may provide such services under separate contract with any PARTY or PARTIES. The Program Manager may

assist in coordination of activities with the Program Attorney but shall not give direction without prior authorization from the Management Committee.

2.12 The Management Committee shall establish timelines and budgets for completion of Program tasks. The Management Committee shall rate the performance of the Program, and in turn rate the performance of the Program Manager, based upon the Program's ability to meet such approved timelines and budgets.

2.13 The Management Committee, through its Bylaws, may establish procedures for tracking, accounting for, and auditing the Program Fund.

Section 3. Program Budget

3.01 A collective budget for the Program (Program Budget) shall be based upon a projection of two consecutive fiscal year cycles, however, the Budget shall be adopted for only one fiscal year cycle. The Budget shall include a Contingency/Reserve Fund which shall not exceed ten percent (10%) of the operating costs of the adopted Budget.

3.02 The PARTIES shall each pay a yearly assessment into a fund established for Program operations for their assigned portion of the Program Budget. The proportionate share of the Program Budget that each PARTY shall pay is shown in the schedule marked Exhibit A hereto and incorporated by reference herein.

3.03 Except as provided in Section 6.03, the ending fund balance at the close of each fiscal year shall be disbursed annually to the PARTIES, or credited to the PARTIES' share of the next fiscal year's costs, in accordance with the PARTIES defined participation rates, as requested by each PARTY.

Section 4. Contracting/ Fiscal Agent

4.01 DISTRICT shall serve as the initial Contracting/Fiscal Agent for the Program.

4.02 DISTRICT may withdraw as the Contracting Fiscal Agent upon the provision of ninety days (90) days written notice to the Management Committee.

4.03 In the event that the Contracting/Fiscal Agent withdraws from the Program or from providing Contracting/Fiscal Agent services to the Program, another PARTY may serve as a successor Contracting/Fiscal Agent. Any PARTY willing to serve as successor Contracting/Fiscal Agent may be nominated by another PARTY. Selection of a Contracting/Fiscal Agent must be by majority vote of the Management Committee.

4.04 The Contracting/Fiscal Agent shall act in a reasonable amount of time to execute contracts with Outside Contractors, including the Program Manager, which have been requested and approved by the Management Committee.

4.05 The Contracting/Fiscal Agent shall be the treasurer of Program funds. The Contracting/Fiscal Agent, in accordance with generally accepted accounting procedures, shall keep the Program funds segregated from any other funds administered by the Contracting/Fiscal Agent; shall credit the Program with appropriate interest income earned on Program funds in each fiscal year; and shall not expend any funds except in accordance with the annual budget approved by the Management Committee or as otherwise directed by the Management Committee.

4.06 The Contracting/Fiscal Agent shall provide a copy of any contract executed on behalf of the Program to any PARTY or person designated by any PARTY or the Management Committee upon request. The governing body of the Contracting/Fiscal Agent, at its discretion, may delegate authority to execute agreements and contracts approved by the Management Committee, to a designated employee. Notice of any such delegation of authority shall be provided to the Management Committee.

4.07 The Contracting/Fiscal Agent may request, as part of the annual Program Budget, reimbursement for reasonable and customary costs incurred in providing the services described hereunder. Reimbursement to the Contracting/Fiscal Agent shall be subject to Management Committee review and approval as part of the Program Budget.

Section 5. Ancillary Rights and Duties of the Parties

5.01 In addition to the participation in the Management Committee, the PARTIES accept and agree to perform the following duties:

1. Each will comply with the NPDES Permit conditions set forth in its Community-Specific plan;

2. Each will participate in Management Committee meetings and other required meetings of the PARTIES;

3. Each will implement its Community-Specific program;

4. Each will provide certain agreed upon reports to the Program for purposes of reporting, on a joint basis, compliance with applicable provisions of the NPDES Permit and the status of Program

implementation; and

5. Each will individually address inter-agency issues, agreements or other cooperative efforts.

5.02 This Agreement does not restrict the PARTIES from the ability to individually (or collectively) request NPDES Permit modifications and/or initiate NPDES Permit appeals for permit provisions to the extent that a provision affects an individual party (or group of PARTIES); however, any such PARTY (or PARTIES) shall make reasonable efforts to provide advance notice of their action to the other PARTIES and allow them to comment upon or join in their action before proceeding.

Section 6. Term of Agreement

6.01 The term of this Agreement shall commence on the date the last duly authorized representative of the PARTIES executes it.

6.02 This Agreement shall have a term of five (5) years.

6.03 Any PARTY may terminate its participation in this Agreement by giving the Chair of the Management Committee at least thirty (30) day written notice. The terminating PARTY will bear the full responsibility for its compliance with the NPDES Permit commencing on the date it terminates its participation, including its compliance with both Community-Specific and Program-wide responsibilities. Unless the termination is scheduled to be effective at the close of the fiscal year in which the notice is given, termination shall constitute forfeiture of all of the terminating PARTY's share of the Program Budget, for the fiscal year in which the termination occurred (both paid and obligated but unpaid amounts). In addition, unless notice of termination is provided at least ninety (90) days prior to the date established by the Management Committee for approval of the budget for the succeeding fiscal year, termination shall constitute forfeiture of all of the terminating PARTY's share of any unexpended, unencumbered funds remaining from all previous fiscal years. The cost allocations for the remaining PARTIES' may be recalculated for the following fiscal year by the PARTIES without the withdrawing PARTY's participation.

Section 7. General Legal Provisions

7.01. This Agreement supersedes any prior agreement among all the PARTIES regarding the Program, but does not supersede any other agreements between any of the PARTIES.

7.02 This Agreement may be amended by unanimous written agreement of the PARTIES. All PARTIES agree to bring any proposed amendment to this Agreement to their Council or Board, as applicable, within three (3) months following acceptance by the Management Committee.

7.03 This Agreement may be executed and delivered in any number of copies ("counterpart") by the PARTIES, including by means of facsimile. When each PARTY has signed and delivered at least one counterpart to the Program, each counterpart shall be deemed an original and, taken together, shall constitute one and the same Agreement, which shall be binding and effective as to the PARTIES hereto.

7.04 No PARTY shall, by entering into this Agreement, participating in the Management Committee, or agreeing to serve as Fiscal Agent, Contracting Agent, Program Manager, and/or Legal Counsel, assume or be deemed to assume responsibility for any other PARTY in complying with the requirements of the NPDES Permit. This Agreement is intended solely for the convenience and benefit of the PARTIES hereto and shall not be deemed to be for the benefit of any third party and may not be enforced by any third party, including, but not limited to, the EPA, the SWRCB, and the RWQCB-SFBR, or any person acting on their behalf or in their stead.

7.05 In lieu of and notwithstanding the pro rata risk allocation which might otherwise be imposed between the PARTIES pursuant to Government Code Section 895.6, the PARTIES agree that all losses or liabilities incurred by a PARTY shall not be shared pro rata but instead the PARTIES agree that pursuant to the Government Code Section 895.4, each of the PARTIES hereto shall fully defend, indemnify and hold harmless each of the other PARTIES from any claim, expense or cost, damage or liability imposed for injury (as defined by Government Code Section 810.8) occurring by reason of the negligent acts of omissions or willful misconduct of the indemnifying PARTY, its officers agents or employees, under or in connection with or arising from any work, authority or jurisdictions delegated to such PARTY under this Agreement, including but not limited to any non-compliance by a PARTY with its obligations under the Program NPDES Permit. No PARTY, nor any officer, board member, employee or agent thereof shall be responsible for any damage or liability incurred by reason of the negligent acts or omissions or willful misconduct of the other parties hereto, their officers, board members, employees or agents under or in connection with or arising from any work, authority or jurisdictions delegated to such PARTY under this Agreement, including but not limited to any non-compliance by a PARTY with its obligations under the Program NPDES Permit.

7.06 In the event that suit shall be brought by either party to this contract, the Parties agree that venue shall be exclusively vested in the state courts of the County of Santa Clara, or where otherwise appropriate, exclusively in the United States District Court, Northern District of California, San Jose, California.

/ / /

EXHIBIT A

SANTA CLARA VALLEY URBAN RUNOFF POLLUTION PREVENTION PROGRAM SCHEDULE OF COST-SHARING PROPORTIONS

Jurisdiction	Proportional Share
Campbell	1.88%
Cupertino	2.46%
Los Altos	1.59%
Los Altos Hills	0.43%
Los Gatos	1.74%
Milpitas	2.75%
Monte Sereno	0.14%
Mountain View	3.91%
Palo Alto	4.06%
Santa Clara	6.23%
Saratoga	1.59%
Sunnyvale	7.25%
Santa Clara County	5.94%
Subtotal	39.97%
San Jose	30.01%
District	30.02%
TOTAL	100.00%

IN WITNESS WHEREOF, the PARTIES hereto have executed this Agreement as of the dates shown below.

SANTA CLARA VALLEY WATER DISTRICT, a body corporate and politic of the State of California

Date: DEC 21 1999

By: _____
Chair, Board of Directors

By: _____
General Manager

APPROVED AS TO FORM:

By: _____
General Counsel

ATTEST:

Date:

By: _____

COUNTY OF SANTA CLARA, a public entity of the State of California

Date: _____

By: _____
Chair, Board of Supervisors

APPROVED AS TO FORM:

By: _____
Deputy County Counsel

ATTEST:

Date:

By: _____

CITY OF _____

Date: _____

By: _____
Name : _____
Title: _____

APPROVED AS TO FORM:

By: _____
Name : _____
Title: _____

Appendix 2

First Amendment to Agreement Providing For Implementation
of the Santa Clara Valley Urban Runoff
Pollution Prevention Program
as fully executed as of March 10, 2005

FIRST AMENDMENT TO AGREEMENT
PROVIDING FOR IMPLEMENTATION
OF
THE SANTA CLARA VALLEY
URBAN RUNOFF POLLUTION PREVENTION PROGRAM

This first amendment to Agreement providing for implementation of the Santa Clara Valley Urban Runoff Pollution Prevention Program (THE "Amendment") is entered into by and between the SANTA CLARA VALLEY WATER DISTRICT, a local public agency of the State of California ("District"); CITY OF CAMPBELL, a municipal corporation of the State of California; CITY OF CUPERTINO, a municipal corporation of the State of California; CITY OF LOS ALTOS, a municipal corporation of the State of California; TOWN OF LOS ALTOS HILLS, a municipal corporation of the State of California; TOWN OF LOS GATOS, a municipal corporation of the State of California; CITY OF MILPITAS, a municipal corporation of the State of California; CITY OF MONTE SERENO, a municipal corporation of the State of California; CITY OF MOUNTAIN VIEW, a municipal corporation of the State of California; CITY OF PALO ALTO, a municipal corporation of the State of California; CITY OF SARATOGA, a municipal corporation of the State of California; CITY OF SAN JOSE, a municipal corporation of the State of California; CITY OF SANTA CLARA, a municipal corporation of the State of California; CITY OF SUNNYVALE, a municipal corporation of the State of California; and COUNTY OF SANTA CLARA, a municipal corporation of the State of California.

All of the above mentioned entities are hereinafter collectively referred to as "Parties" or individually as "Party."

RECITALS

A. The Parties previously entered into that certain Agreement Providing For Implementation of the Santa Clara Valley Urban Runoff Pollution Prevention Program (the "Agreement" or "MOA") pursuant to which the Parties established certain terms and conditions relating to the implementation and oversight of the Santa Clara Valley Urban Runoff Pollution Prevention Program (the "Program"). A copy of the agreement is attached hereto as Appendix A. Unless otherwise set forth herein, all terms shall have the meaning set forth in the Agreement;

B. The Agreement provided for a five-year term, which, based on its execution, is currently set to conclude on or about March 10, 2005;

C. The Parties expect to utilize the Program to submit a reapplication for the NPDES Permit in early 2005 and to otherwise address a variety of matters related to assisting the Parties in effectuating compliance with the Permit after March 10, 2005;

D. The Parties therefore desire to extend the term of the MOA as set forth below;

E. Section 7.02 of the MOA provides that it may be amended by the unanimous written agreement of the Parties and that all Parties agree to bring any proposed amendments to their Council or Board, as applicable, within three (3) months following acceptance by the Management Committee; and

NOW, THEREFORE, THE PARTIES HERETO FURTHER AGREE AS FOLLOWS:

Section 6.

Section 6.02 of the Agreement is hereby amended as follows:

6.02.01 This Agreement shall continue in full force and effect for an additional one year beyond its original termination date of March 10, 2005, unless otherwise terminated by the Parties in accordance with Section 6.03.

Section 2.

Section 2.04 of the Agreement is hereby amended as follows:

2.04.01 The Program shall conduct an independent review by December 31, 2005 to evaluate the MOA's cost allocation formula and evaluate the term, scope and cost of the Program MOA.

IN WITNESS WHEREOF, The Parties have executed this Amendment effective as of March 10, 2005.

Santa Clara Valley Water District: By: Stanley M Williams

Name: Stanley M Williams

Title: CEO

Date: 2/18/05

County of Santa Clara: By: _____

Name: _____

Title: _____

Date: _____

City of _____: By: _____

Name: _____

Title: _____

Date: _____

Appendix 3

Second Amendment to Agreement Providing For Implementation
of the Santa Clara Valley Urban Runoff
Pollution Prevention Program
as fully executed as of March 10, 2006

SECOND AMENDMENT TO AGREEMENT PROVIDING FOR IMPLEMENTATION OF THE SANTA CLARA VALLEY URBAN RUNOFF POLLUTION PREVENTION PROGRAM

THIS SECOND AMENDMENT TO AGREEMENT PROVIDING FOR IMPLEMENTATION OF THE SANTA CLARA VALLEY URBAN RUNOFF POLLUTION PREVENTION PROGRAM (the "Amendment") is entered into by and between the SANTA CLARA VALLEY WATER DISTRICT, a local public agency of the State of California ("District"); CITY OF CAMPBELL, a municipal corporation of the State of California; CITY OF CUPERTINO, a municipal corporation of the State of California; CITY OF LOS ALTOS, a municipal corporation of the State of California; TOWN OF LOS ALTOS HILLS, a municipal corporation of the State of California; TOWN OF LOS GATOS, a municipal corporation of the State of California; CITY OF MILPITAS, a municipal corporation of the State of California; CITY OF MONTE SERENO, a municipal corporation of the State of California; CITY OF MOUNTAIN VIEW, a municipal corporation of the State of California; CITY OF PALO ALTO, a municipal corporation of the State of California; CITY OF SAN JOSE, a municipal corporation of the State of California; CITY OF SANTA CLARA, a municipal corporation of the State of California; CITY OF SARATOGA, a municipal corporation of the State of California; CITY OF SUNNYVALE, a municipal corporation of the State of California; and COUNTY OF SANTA CLARA, a political subdivision of the State of California.

All of the above-mentioned entities are hereinafter collectively referred to as "Parties" or individually as "Party."

RECITALS

A. The Parties previously entered into that certain Agreement Providing For Implementation of the Santa Clara Valley Urban Runoff Pollution Prevention Program (the "Agreement" or "MOA") pursuant to which the Parties established certain terms and conditions relating to the implementation and oversight of the Santa Clara Valley Urban Runoff Pollution Prevention Program (the "Program"), including a cost sharing allocation, which was appended thereto as Exhibit A. A copy of the Agreement, including Exhibit A, is attached hereto as Appendix 1. Unless otherwise set forth herein, all terms shall have the meaning set forth in the Agreement;

B. The Agreement originally provided for a five year term, which, based on its execution, was set to conclude on or about March 10, 2005. However, on or about February 20, 2005, the Parties unanimously entered into a First Amendment to the Agreement (attached hereto as Appendix 2), which extended the term of the Agreement by one additional year and, during that year, directed the Program to undertake a management and cost allocation review. The Program used an independent contractor to conduct the management and cost allocation review, which was completed and submitted to the Management Committee in November 2005;

C. The Parties expect to utilize the Program to continue to represent their interests in negotiating the terms of a renewed NPDES Permit, which may manifest itself in a Municipal Regional Permit ("MRP"), in 2006, and to otherwise address a variety of matters related to assisting the Parties in effectuating compliance with the Permit and/or MRP after March 10, 2006;

D. The Parties also expect to continue to utilize the Program's preferred approach of achieving consensus to resolve issues and reach decisions, and to rely on the Majority Vote mechanism set forth in Section 2.08 of the Agreement at the Management Committee level only when consensus-based resolutions appear or become elusive;

E. The Parties desire to update the Agreement and extend the term of the MOA as set forth below;

F. Section 7.02 of the MOA provides that it may be amended by the unanimous written agreement of the Parties and that all Parties agree to bring any proposed amendments to their Council or Board, as applicable, within three (3) months following acceptance by the Management Committee; and

G. The Program's Management Committee accepted this Amendment for referral to the Parties' Councils and/or Boards at its meeting on December 15, 2005.

NOW, THEREFORE, THE PARTIES HERETO FURTHER AGREE AS FOLLOWS:

1. Recognition of Current Permit. Recital F of the Agreement is hereby amended by the following additional subsections:

> 3. Order No. 01-024 (re-issued NPDES Permit No. CAS029718); adopted February 21, 2001;
>
> 4. Order No. 01-119 (Modification to re-issued NPDES Permit No. CAS029718); adopted October 17, 2001;
>
> 5. Order No. R2-2005-0035 (Further Modification to re-issued NPDES Permit No. CAS029718); adopted July 20, 2005.

2. Cost Sharing Allocation. Effective with fiscal year 2007, the following footnote shall be deemed to have been added to "Exhibit A" of the MOA and to be shown by means of an asterisk placed immediately following the Proportional Share of "30.02%" shown for the District:

> *One-third of the District's 30.02% contribution is expected to be from funding derived by the District from Outcome 2 and Activity 2.5 of the voter-adopted Clean Safe Creeks program; the remaining two-thirds of the District's contribution is expected to be derived by the District from property tax revenues.

3. Contracting/Fiscal Agent. Section 4.02 of the Agreement is hereby replaced by the following:

> In March 2005, the District notified the Management Committee that it was withdrawing as the Contracting/Fiscal Agent within ninety (90) days; the City of Sunnyvale thereafter agreed to serve as the Contracting/Fiscal Agent and was nominated to do so by another Party and selected as the Program's Contracting/Fiscal Agent by a majority vote of the Management Committee. The City of Sunnyvale may withdraw as the Contracting/Fiscal Agent upon the provision of ninety (90) days written notice to the Management Committee.

4. Extension of Term of Agreement. Sections 6.02 and 6.02.01 of the Agreement, as previously amended, are hereby replaced as follows:

> This Agreement shall have a term extending one fiscal year beyond the termination date of the next NPDES Permit issued to the Parties by the RWQCB-SFBR; such termination date shall, include any administrative extension of the next NPDES Permit's term which occurs pursuant to the NPDES regulations.

5. Superseding Effect. This Second Amendment of the Agreement shall supersede and replace the First Amendment of the Agreement.

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IN WITNESS WHEREOF, the Parties have executed this Amendment effective as of March 10, 2006.

Santa Clara Valley Water District: By: _____

Name: _____

Title: _____

Date: _____

County of Santa Clara: By: _____

Name: _____

Title: _____

Date: _____

City of _____: By: _____

Name: _____

Title: _____

Date: _____

Attachment 5

Table summarizing priority issues and requested updates to MRP requirements, with references to associated attachments (i.e., reports and documents) that provide justification for the updates, and provides access to information requested by Water Board staff

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
A	Discharge Prohibitions	No issue identified	None at this time.	--	None.
B	Receiving Water Limitations	No issue identified	None at this time.	--	None.
C.1	Compliance with Discharge Prohibitions and Receiving Water Limitations	No issue identified	None at this time.	--	None.

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.2.a. Road Repair	Permittees shall develop and implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, and repaving or repair maintenance activities such as those described in the CASQA Handbook for Municipal Operations.	Water Board staff have indicated that they would like to revise reporting requirements to include submittal of BMPs/SOPs in Year 1 and annual municipal staff/contractor training. The current Permit identifies appropriate BMP references such as CASQA Handbook for Municipal Operations, BASMAA's Blueprint for a Clean Bay, BASMAA's Mobile Surface Cleaner Program, Caltrans Storm Water Quality Handbook Maintenance Staff Guide (May 2003).	Instead of having Permittees submit BMPs/SOPs, require submittal of a narrative description, including identifying any internal SOPs developed, contract language or BMP reference documents. Add reporting requirement for number of municipal staff trained, training dates, and training topics. Add reporting requirement for how contractor compliance with BMPs is verified (e.g. contract language, training, municipal inspections, etc.).	M	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.2.b. Pavement Washing	Permittees shall implement, and required to be implemented, BMPs that prevent the discharge of polluted washwater and non-stormwater to storm drains for pavement washing; sidewalk and plaza cleaning; mobile cleaning; pressure washing operations in locations such as parking lots and garages; trash areas; and gas station fueling areas.			M	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.2.c.i(1) Bridge & Structural Maintenance & Graffiti Removal	Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.			M	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.2.c.i (2) Bridge & Structural Maintenance & Graffiti Removal	Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and washwater discharges into storm drains.			M	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.2.e. Rural Public Works Construction and Maintenance	Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads.			M	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.2.d Pump Stations	Permittees shall develop and implement measures to operate, inspect and maintain stormwater pumps stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in the stormwater discharges to comply with WQS.	Water Board staff have indicated that they would like to revise reporting requirements to include submittal of BMPs/SOPs in Year 1 and annual municipal staff/contractor training.	Maintain current reporting requirements. Reporting requirements in MRP 1.0 were removed in MRP 2.0.	M	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.2.f.i. Corp Yards	Implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment, and maintenance vehicle parking areas, and material storage facilities, to comply with water quality standards.	Water Board staff have indicated that they would like to revise reporting requirements to include submittal of BMPs/SOPs in Year 1 and annual municipal staff/contractor training.	Revise reporting requirements to include submission of the SWPPP in Year 1. Revise reporting requirements to include training date(s) and number of municipal staff trained in the corporation yard SWPPP.	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12

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MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.3.a Performance Standards	(1) Have adequate legal authority to implement all requirements of Provision C.3; (2) have adequate development review and permitting procedures; (3) evaluate potential water quality effects and identify appropriate mitigation measures; (4) provide adequate interdepartmental staff training; (5) provide adequate outreach; (6) for all projects not regulated by C.3, encourage inclusion of adequate site design measures; (7) for all projects not regulated by C.3, encourage inclusion of adequate source control measures; and (8) revise, as necessary, General Plans to integrate water quality and watershed protection and require implementation of C.3 measures.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.b Regulated Projects	i. Require all projects fitting the category descriptions listed below (hereinafter called Regulated Projects) to implement Low Impact Development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility in accordance with Provisions C.3.c and C.3.d, unless the Provision C.3.e alternate compliance options are evoked.	No issues identified with general concept.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.b Regulated Projects	ii. (1) Special Land Use Categories: Threshold is 5,000 square feet of impervious surface created/replaced for auto service facilities, retail gasoline outlets, restaurants, and stand-alone or uncovered parking lots.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.b Regulated Projects	ii. (2)&(3) New Development and Redevelopment Projects: for projects not in Special Land Use categories, threshold is 10,000 square feet of impervious surface created/replaced. Excludes detached single family homes that are not part of a larger plan of development.	Water Board staff have stated their intent to proposed reducing threshold for all regulated projects to 5,000 square feet of impervious surface created/replaced (including single family homes). Data analysis has shown a disproportionate amount of effort will be required by permittees to address this relatively small increase in additional regulated impervious area	Maintain current thresholds and current exemption for detached single family homes not part of a larger plan of development.	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.b Regulated Projects	ii. (4) Road Projects: Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface: a) new streets/roads; b) widening of existing streets/roads with additional traffic lanes; and c) impervious trails > 10 feet wide and within 50 feet of creek bank. Excludes repavement of existing roads (implicitly), impervious surfaces that drain to permeable areas, permeable surfaces, and Caltrans facilities.	Water Board staff have stated their intent to include reconstruction of existing roads in the list of applicable projects. "Reconstruction" has not been clearly defined but the intent is removal of road surface down to base rock. It is not clear whether they intend to reduce the threshold for this category of projects to 5,000 square feet of impervious surface created/replaced.	Maintain current thresholds and do not extend applicability to existing road reconstruction.	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.3.b Regulated Projects	iv. Reporting	Water Board staff have stated their intent to reduce reporting requirements; however, reduction in C.3 reporting requirements has not yet been discussed in detail.	Recommend eliminating submittal of table of approved project information in each annual report and state that the table shall be made available upon request. Remove reporting requirement in 2017 Annual Report for C.3.b.i.(2) (information on historic projects).	**M**	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.c Low Impact Development (LID)	i.(1) Source Control Requirements	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.c Low Impact Development (LID)	i.(2) Site Design and Stormwater Treatment Measures	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.c Low Impact Development (LID)	ii. Reporting	No issues identified.	Remove one time reporting requirement for pervious pavement specifications, which has been completed.	**L**	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.d Numeric Sizing Criteria for Stormwater Treatment Systems	i. Require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria: (1) Volume Hydraulic Design Basis; (2) Flow Hydraulic Design Basis; and (3) Combination Flow and Volume Design Basis. iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.e Alternative or In-Lieu Compliance with Provision C.3.b	i.The Permittees may allow a Regulated Project to provide alterative compliance with Provision C.3.b in accordance with one of the two options listed below: Option 1: LID Treatment at an Offsite Location; and 2: Payment In-Lieu Fees	Permittees have agreed with Water Board staff on minor language changes to Options 1 and 2 and the addition of an Option 3 to allow Regional Alternative Compliance in another jurisdiction, based on the outcome of a grant funded project being led by the City of San Pablo.	Incorporate language changes agreed to in the MRP 3.0 C3/GI Work Group. Keep alternative compliance as an optional tool for compliance, and do not require all Permittees to develop alternative compliance programs.	**H**	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.3.e Alternative or In-Lieu Compliance with Provisions C.3.b	ii. Special Projects. LID Treatment Reduction Credits approved by the Water Board may be applied to Special Projects, which are Regulated Projects that meet the specific criteria listed in Provisions C.3.e.ii.(3), (4), or (5), if treatment of runoff with 100% of LID is infeasible.	Water Board staff have proposed to eliminate the Special Projects provisions in order to stimulate alternative compliance programs that result in treatment of an equivalent amount of runoff with LID installed offsite. Permittees have argued that the Special Project provisions provide needed flexibility when constructing lot-line to lot-line urban infill projects or high density projects near transit, and that it will take time to develop and implement alternative compliance programs.	Maintain current provisions for Special Projects.	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.e Alternative Compliance with Provisions C.3.c	vi. Reporting on Special Projects - Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but have not received final discretionary approval. In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects. For each project, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. Once the project has final discretionary approval, it shall be reported in the C.3.b table with other approved projects, with some supplemental information.	Special Project reporting has not been discussed with Water Board staff since they have proposed to eliminate the entire provision. Consistent with Water Board staff's stated intent to reduce reporting requirements, Permittees would like to remove the requirement to submit information on potential Special Projects as well as the LID feasibility narrative, and make information on approved Special Projects available upon request.	Update to remove extra reporting requirement and submittal of LID feasibility narrative, and just report Special Projects similar to other approved projects. (See request in C.3.b.iv. to maintain data about approved projects and make available to Water Board staff upon request.)	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.f Alternative Certification of Stormwater Treatment Systems	In lieu of reviewing a Regulated Project's adherence to Provision C.3.d., a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.g Hydromodification Management	All applicable projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.	No issues Identified.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.h Operation and Maintenance of Stormwater Treatment Systems	ii. O&M Verification Program shall include: (1) conditions of approval or other legally enforceable mechanisms; (2) coordination with vector control agency; (3) legally enforceable mechanism to allow access to site for inspection; (4) database to track installed pervious pavement systems (>3,000 SF), treatment systems, and HM controls; (5) database of sites, facilities, and inspections conducted; (6) prioritized O&M Inspection Plan; and (7) ERP for O&M inspections.	No issues identified.	Update implementation dates.	L	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.3.h Operation and Maintenance of Stormwater Treatment Systems	v. Reporting: The database in C.3.h.ii.(4) and (5) shall be maintained by Permittees and made available to Water Board staff upon request. On an annual basis, provide list of newly installed treatment and HM controls to vector control agency. Report summary statistics on number of projects and inspections conducted, and an evaluation of the inspection program.	No issues identified.	Remove one time reporting requirement for 2016 Annual Report. Remove ERP certification requirement for 2017 Annual Report.	L	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.i Site Design Measures for Small Projects and Detached Single-Family Home Projects	i. Require all development projects under the Permittee's jurisdiction that create/replace 2,500 - 10,000 SF of impervious surface and detached single-family home projects that create and/or replace 2,500 SF or more of impervious surface to implement one or more site design measures. On an annual basis, describe the implementation of this requirement.	Water Board staff have proposed to change the thresholds in this provision to 2,500-5,000 SF (consistent with lowering the Regulated Project threshold to 5,000 SF in Provision C.3.b).	Maintain current thresholds for regulated projects and small projects, and maintain site design requirements (only) for single family homes.	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.j Green Infrastructure Planning and Implementation	i. (1) Prepare a framework or workplan that describes specific tasks and timeframes for development of its Green Infrastructure Plan. (2) Prepare a Green Infrastructure Plan with specified elements. (3) Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan. (4) Conduct public outreach, train staff, and educate elected officials.	MRP 3.0 will focus on implementation of GI Plans. Water Board staff and Permittees have discussed requirements that include programmatic elements and implementation goals/targets, as well as asset management requirements focused on structural water quality assets (LID/GI and trash capture devices).Agreement has been reached on programmatic elements and asset management, but no proposed goals or targets have been provided by Water Board staff to date.	Revise this provision to focus on implementation of GI Plans. Allow time for Permittees to continue to make progress on programmatic elements of implementation (e.g., continued coordination with other municipal plans, development of local design standards, outreach, training, development of funding mechanisms, etc.). Provide implementation goals for next permit term that are reasonable, flexible, scalable, and countywide/regional, and include both regulated and non-regulated projects. Limit asset management requirements to structural water quality assets and allow requirements to be met by building on existing tracking systems. Do not require updates to GI Plans.	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.j Green Infrastructure Planning and Implementation	i. (5) Reporting: (a) Submit documentation of approved GI Framework in 2017 Annual Report. (b) Submit completed GI Plan with 2019 Annual Report. (c) Submit documentation of legal mechanisms to ensure implementation of GI Plan with 2019 Annual Report. (d) Submit summary of outreach and education efforts in each Annual Report.	There has been limited discussion of reporting related to C.3.j. Water Board staff have expressed overall intent to reduce reporting requirements in MRP 3.0.	Revise this provision to be consistent with GI Plan Implementation requirements specified in C.3.j. Report on progress twice during permit term.	H	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.3.j Green Infrastructure Planning and Implementation	ii. Early Implementation of GI Projects (No Missed Opportunities): (1)Prepare and maintain a list of GI projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for GI measures. (2) Submit the list with each Annual Report and a summary of planning or implementation status for each GI project.	Water Board staff supports continuing to review capital projects for GI opportunities, and most Permittees are continuing to implement this approach to identifying potential GI projects, using the BASMAA guidance for review of CIPs.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.j Green Infrastructure Planning and Implementation	iii. Participate in Processes to Promote Green Infrastructure: Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14
C.3.j Green Infrastructure Planning and Implementation	iv. Tracking and Reporting Progress: (1) Develop and implement regionally-consistent methods to track and report implementation of GI measures on both public and private parcels. (2) Report on progress on development of tracking methods in each Annual Report. (3) Submit tracking methods and report implementation of GI measures in 2019 Annual Report.	Most Permittees are using countywide stormwater program databases to track and report implementation of GI measures, and support continuing to use these countywide databases for this purpose.	Update reporting requirements to reflect that tracking methodologies have been developed and will continue to be used to report progress. Consider allowing data on completed GI projects to be made available for review on public websites, rather than submitted in Annual Reports.	L	Section 1, Attachments 1-10 Section 2, Attachments 1-16 Section 9, Attachments 1-12 Section 10, Attachments 1-14

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.4.a. Legal Authority	Permittees shall have sufficient legal enforcement authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.4.b. Inspection Plan	Permittees shall continue to update and implement an inspection plan that will serve as a prioritized inspection work plan.	Water Board staff have stated their intent to clarify BIP requirements to include the departments, agencies, contractors, etc., performing C.4 inspections; clarify what types of businesses each group inspects; how do "outside inspectors" communicate findings, follow up actions, and enforcement needs, with the Permittee stormwater staff and, if needed, each other.	If a Permittee relies on multiple entities to perform business and commercial inspections, its Business Inspection Plan should list the entities and their responsibilities.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.4.b.iii Reporting	Include the list of all industrial and commercial facilities requiring inspections identified in Provision C.4.b.ii.(2)(d) in each Annual Report	Permittees requested not to include the list in Annual Reports, rather provide to WB staff upon request. This list is also available in the BIP.	Delete from Reporting section and include clarification that the list is available upon request as part of the description of the list in C.4.b.ii.(2)(d).	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.4.c. Enforcement Response Plan (ERP)	Permittee shall implement and update, as needed, its ERP - a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.	Water Board staff have stated their intent to modify ERP requirement to state that all inspectors have authority to issue first level enforcement. Permittee position is that Provision C.4.c.ii.(1) already requires the ERP to include "the roles and responsibilities of staff responsible for implementing the ERP".	No updates recommended at this time.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.4.d Inspections	Permittees shall conduct inspections and maintain adequate records to demonstrate compliance and appropriate follow up enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system.	WB staff will keep current potential and actual discharger terminology, but would like to define where used, in the text or as a footnote, add to glossary, and maybe list additional example BMPs. Permittee position is that potential discharge is defined in Permit Fact Sheet page A-52.	Add language defining potential discharge from the Fact Sheet to the Glossary.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.4.d.iii.(2)(e) Reporting	A list of facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage	Water Board staff have stated their interest in removing the list from annual reporting and have it available upon request. Thier intent is to request the list every three years.	Delete from Reporting section. Clarify under C.4.d.ii.(2) Recordkeeping that list should be made available upon request.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.4.e Staff Training	Permittees shall provide focused training for inspectors annually. Training may be Program-wide, Region-wide, or Permittee-specific.	Water Board staff have stated their interest in having other agencies or entities performing inspections for the entity submitting the annual report form listed, the number of inspectors from each agency or entity, including the entity submitting the AR and the total number of inspectors performing C.4 inspections for the Permittee.	Revise reporting section to include percentage of inspectors attending training of each agency/entity performing inspections.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.5.a. Legal Authority	Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.b. Enforcement Response Plan (ERP)	Permittees shall implement and update, as needed, its ERP - a reference document for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges and compliance from responsible parties.	WB staff want to clarify that the business, property manager, property owner, etc., that hires the mobile business, AND/OR the Mobile business, are responsible for SW pollution discharged by the mobile business operating at their location. RPs include business owner, business operator, property owner, and mobile business.	Add language to ERP to include guidance for identifying responsible parties for mobile business illicit discharges.	M	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.c.ii.(1)&(2) Spill, Dumping and Complaint Response	Have a central contact point for reporting spills, dumping, and complaints. Publicize the phone number and web reporting address, if used.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.c.ii.(3) Spill, Dumping and Complaint Response	Require municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.c.ii.(4)&(5) Spill, Dumping and Complaint Response	Maintain and update, as needed, a spill/dumping response flow chart and/or phone tree for staff response for response program to identify staff or positions responsible. Maintain and update, as needed, a spill/dumping response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in response that goes beyond Permittee's immediate capabilities.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.c.ii.(6) Spill, Dumping and Complaint Response	Permittees shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct follow up inspections, as needed, to ensure that corrective measures have been effectively implement to achieve and maintain compliance.	WB staff will add the date the complaint investigation is started must not exceed 3 - 5 business days. Permittees prioritize responses by the type and number of complaints received so there should be flexibility for the requirement.	Prefer no change but if language is added to begin complaint investigation within 3-5 business days of receiving the complaint, should include "or within a longer time period if deemed appropriate with a recorded rationale".	H	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.5.d. Tracking and Case Follow-up	Maintain water quality spills, dumping and complaints tracking and follow up in an electronic database or equivalent tabular system.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.d.i Tracking and Case Follow-up	"Task Description: It is not necessary to track and report data according to this provision if they are tracked and reported according to state Water Resource Control Board Order No. 2006-0003-DWQ."	WB staff propose adding the Order title "Waste Discharge Requirements for Sanitary Sewer Systems" to clarify the statement.	Add text.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.d.ii Tracking and Case Follow-up	Implementation Level - "The electronic database or equivalent tabular system shall be made available to Water Board staff or representatives during audits or inspections."	WB staff want to add that inspection information, tracking sheets, and supporting documentation shall be available upon WB request. Permittees are unclear if this wording is needed because WB staff have authority to request records during an audit or inspection.	No updates recommended at this time.	L	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.d.ii(2) Tracking and Case Follow-up	Investigation information	WB staff want to add tracking requirement for departments or agencies responding to release.	Only track name of referral agency if the Permittee stopped an investigation or response and does not track the resolution.	M	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.e.ii(1)(a) Control of Mobile Sources	Implement minimum standards and BMPs to be required for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.	WB staff want to add mobile vehicle fueling to list of example mobile businesses. Note that some Permittees prohibit mobile vehicle fuelers to operate in their jurisdiction.	No opposition to this change.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.e.ii(1)(b) Control of Mobile Sources	Implement an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.e.ii(1)(c) Control of Mobile Sources	Regularly updating mobile business inventories.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12

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C.5.e.ii(1)(d) Control of Mobile Sources	Implement an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.	Water Board staff have stated their intent to shift emphasis from identifying individual mobile businesses to putting the responsibility for discharges from mobile businesses on the company who hires them, property owner, operator, etc.	Revised requirements should allow Permittees flexibility to issue enforcement actions to any responsible party identified per guidance in ERP.	**M**	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
C.5.e.ii(1)(e) Control of Mobile Sources	Inspection of mobile businesses, as needed.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12

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C.5.f. MS4 Map Availability	Permittees shall make maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.	Water Board staff have stated their perspective that Permittees should know the location, materials and condition of the MS4 system on public and private properties and that this information is a necessary part of asset management. Water Board staff have stated their intent to require Permittees to: identify the information gaps in the knowledge and records of their MS4 system; submit documentation identifying and describing the gaps with Permit Year 4 Annual Report; and submit a plan to obtain the missing information over the next permit term. Permittees believe the requirement to publicize availability of maps should only be applied to maps that meet 40CFR122.26(d)(1)(iii)(B)(1)&(5) identifying location of major outfalls. If more detailed maps are required these should be available to municipal staff and developers, as needed, and not the general public. The addition of requiring materials and condition of the entire system would be a significant resource burden to develop this asset management system. These requirements are inconsistent with	Recommend requiring maps of the MS4 public storm drain system be made available to Water Board staff and developers, as needed.	H	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12
New proposed subprovision	No current requirements.	WB staff would like to add a subprovision with requirements for RV and homeless encampment illicit discharges.	Provide narrative description of implementation practices to reduce illicit discharges from RV and homeless encampments.	H	Section 1, Attachments 1-7 Section 3, Attachments 1-3 Section 9, Attachments 1-12

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.6.a. Legal Authority for Effective Site Management	Permittee shall have the ability to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and implement progressively stricter enforcement to achieve expedient compliance the cleanup at all public and private construction sites.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.b. Enforcement Response Plan (ERP)	Permittee shall implement and update, as needed, its ERP - a reference document for inspection staff to take consistent actions to achieve timely and effective compliance.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.c. Best Management Practice Categories	Permittee shall require all construction sites to have site-specific, and seasonally and phase-appropriate, effective BMPs in 6 categories: erosion control, run-on and runoff control, sediment control, active treatment systems (as necessary), good site management, and non-stormwater management.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.d. Plan Approval Process	Permittee shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs. Verify that sites disturbing one acre or more of land have filed a NOI for permit coverage under the construction General Permit.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.e. Inspections	By September 1 of each year, each permittee shall remind all sites disturbing 1 acre or more of soil, hillside projects, and high priority sites to prepare for wet season.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12

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C.6.e. Inspections	Inspect all sites disturbing 1 acre or more of land, hillside projects, and high priority sites monthly during wet season (October - April).	Water Board staff have stated their intent to propose that Permittees conduct stormwater inspections all year round, even during the dry season. Adding another month or more of required inspections would be potentially significant work load for some municipalities. The majority of permittees understand their construction site control program is implemented all year long.	No updates recommended at this time.	H	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.e. Inspections	All inspections shall be recorded on a written or electronic inspection form. Track in an electronic database or tabular format all inspections.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.e. Inspections	Reporting.	Water Board staff have stated their intent to require reporting of the total number of sites requiring inspections and total number of sites inspected to help address issue of double reporting sites that fall under two categories.	Double reporting issue could also be avoided by defining reporting of sites by: 1) total number of active sites disturbing 1 acre of more of soil; 2) total number of active hillside sites disturbing less than one acre of soil requiring inspection; and 3) total number of active sites disturbing less than one acre of soil, not identified as a hillside site (#2) and identified as High Priority sites in C.6.e.ii.(2)(c) requiring inspections	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12
C.6.f. Staff Training	Provide training or access to training for staff conducting construction stormwater inspections.	Water Board staff have stated their intent to require Permittees to report the number of inspectors conducting stormwater inspections, identify their departments, and state whether they received training.	Add to reporting requirements to report total number of inspectors conducting stormwater inspections. Add to reporting requirements to report number of inspectors attending each training by department.	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12

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C.7.a Storm Drain Inlet Marking	Mark and maintain at least 80% of municipally-maintained storm drain inlets with appropriate stormwater pollution prevention message. Inspect and maintain at least once per 5-year permit term. Require inlet marking and maintenance for newly approved, privately-maintained streets, and verify marking prior to accepting the project.	Requirements do not belong in C.7	Move requirement to mark and maintain municipally-maintained inlets to Provision C.5.c Move requirement to require and verify (and report) storm drain inlet marking of newly constructed private streets to Provision C.3.	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7
C.7.b. Advertising Campaigns	Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences. Report results following pre-campaign and post-campaign surveys.	Campaigns/activities and their evaluations are ongoing. Pre-campaign and post-campaign surveys should not be required in reissued permit.	Allow flexibility in the types and timing of effectiveness measures, e.g., surveys, annual website visits, interaction on social media, etc.	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7
C.7.c. Stormwater Pollution Prevention Education	Permittees shall individually or collectively create and maintain a point of contact to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7
C.7.d. Public Outreach and Citizen Involvement Events	Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events	Due to the shelter-in-place guidelines, many outreach events were canceled. Some outreach events were replaced with online presentations/webinars.	Include language that allows virtual events/webinars/presentations in case public health guidelines do not allow large gatherings.	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7
C.7.f. Watershed Stewardship Collaborative Efforts	Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts or community groups and other organizations that benefit the health of the watershed. Report on level of involvement and provide an assessment of effectiveness in each Annual Report.	Some Permittees have expressed concern that the current language restricts the types of organizations that they can partner with	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7
C.7.h. School-Age Children Outreach	Permittees shall individually or collectively implement outreach activities designed to increase awareness or stormwater and/or watershed message(s) in school-age children (K through 12).	Due to the shelter-in-place guidelines, many school/classroom presentations were canceled. Permittees provided online presentations and activities to school teacher and students.	Include language that allows virtual/online activities in case public health guidelines do not allow in-person school/classroom visits.	L	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7
C.7.i. Outreach to Municipal Officials	Permittees shall conduct outreach to municipal officials such as through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials at least once per permit cycle.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 8, Attachment 1 Section 9, Attachments 1-12 Section 11, Attachments 1-7

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.8. Monitoring	Overall Requirements	Goal is to conduct monitoring that supports evaluation of management actions and/or development of new/improved actions. Overall costs should decrease or remain the same. WB staff feedback on C.8 Workgroup matrix and discussions are incorporated throughout.	See below.	H	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.a.ii-iiii Compliance Options	Permittees may choose to meet monitoring requirements through a Regional Collaboration, Area-wide Stormwater Program, and may use Third-party Monitoring.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.b Monitoring Protocols and Data Quality	Data must be SWAMP comparable	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.c San Francisco Estuary Receiving Water Monitoring	Permittees shall contribute financially to the RMP.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d Creek Status Monitoring	Management questions	No issues identified. Management questions remain valid but will be supplemented by specific questions related to targeted site selection (see C.8.d.i(6)).	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(1) Bioassessment	Field and Laboratory Methods	Method references have been superseded.	Replace references in footnotes 22, 23, and 24 with Ode et al. 2016. Otherwise, no change.	L	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(2) Bioassessment	SWAMP training, Scientific Collection Permit, and SWAMP inter-calibration	College of Bioassessment courses have become less frequent due to staff retirement.	Include language to allow relaxation of training requirement, in the event that classes are no longer offered by the College of Bioassessment. Otherwise, no change.	L	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(3) Bioassessment	BMI and algae taxonomy	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(4) Bioassessment	Water quality and nutrient method	Some parameters are optional in the SWAMP method and have not been useful in analyzing prior data collected in the region.	Remove silica from list of parameters.	L	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.8.d.i.(5) Bioassessment	Prevent spread of invasive species	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(6) Bioassessment	Sample Design/Location	The probabilistic monitoring design has run its course and we now have a robust set of "baseline" data. Shifting to targeted site selection will allow Permittees to address new information needs while still contributing to evaluation of creek condition.	Permittees shall select sample locations on a targeted basis, based on: - Current and planned management actions (including GSI) - Areas of quality habitat – opportunity to document resources that should be protected - "Areas of unique importance" (i.e., where there is stakeholder interest) - Known water quality or habitat concerns (e.g., illicit discharges, complaints, 13267 letters, 303d listings, poor CSCI scores) - Data/information gaps - Opportunities for public education - Watershed assessment	H	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(7) Bioassessment	Frequency, Timeframe and Number of Sites	Targeted site selection will result in a greater level-of-effort for planning field work, analyzing data, and writing reports. Other changes to Creek Status Monitoring recommended by WB staff and incorporated below will also result in a greater level-of-effort. The minimum number of annual samples is reduced to offset those increases.	Santa Clara Permittees shall collect at least 18 samples per year.	M	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.i.(8) Bioassessment	Follow up	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.ii(1) - (4) Chlorine	Measure free and total chlorine residual in grab samples - 20 sites per year	Field measurements of chlorine are not reliable and have resulted in wasted efforts trying to track down sources. Also, potential chlorine discharges are already addressed by MRP Provisions C.5 (IDDE) & C.15 (Exempted and Conditionally Exempted Discharges) and NPDES General Permit for Drinking Water Systems (Order WQ 2014-0194-DWQ).	Eliminate this parameter.	L	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.iii Temperature	Continuous monitoring of temperature (Apr - Sep) at 8 sites per year	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49

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C.8.d.iv Continuous DO, Temp, pH	Continuous monitoring of DO, temp, pH at 3 sites per year for two 2-week periods	WB staff recommend increasing the duration of continuous water quality monitoring to get more data. The increased level-of-effort associated with this (additional field visits to calibrate instruments, loss of equipment sharing options, data analysis) would be partially offset by fewer bioassessment samples.	Increase duration to two 3-week periods per year.	**L**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.d.v Pathogen Indicators	Analyze 5 grab samples per year for E. coli and Enterococci	Bacteria densities in Santa Clara Valley streams are highly variable and this monitoring has not been sufficient to assess creek status~~.~~.	Possibly modify to integrate with provision C.8.e modifications and/or modifications to provision C.14.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e. Stressor/Source Identification (SSID) Projects	Conduct 8 regional SSID projects following the defined step-wise process that ends with EO concurrence of project completion. At least one regional project must address toxicity.	SSID projects provide useful data to Permittees. We recommend several modifications to the permit language.	Change title from "SSID" Projects to "Monitoring Projects" to reflect expanded scope. Modify to incorporate control measures for the Cities of Sunnyvale and Mountain View and possibly other Santa Clara Valley co-permittees. Possibly include additional investigation, controls and reporting that would be triggered under situations where SSID projects conducted under provision C.8.e have indicated that defined triggers for bacteria have been exceeded.	**H**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.i SSID	Maintain list of results exceeding trigger thresholds and WQOs. Include POC monitoring results as appropriate.	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.ii SSID	Select projects from list developed in C.8.e.i	While most projects would be selected from the C.8.e.i list, pursuit of projects addressing other data or other information needs would fit within the spirit of this provision.	Add option to select projects from historical data, data collected by other agencies, 303(d) listings, and TMDLs.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.ii SSID	If conducted through a regional collaborative, collectively initiate 8 new projects	Fair allocation of 8 projects among the five Countywide programs is challenging. The typical population-based distribution of level-of-effort cannot be applied to 8 projects.	Reduce collective total to 7 (2 each SC/AC, 1 each SM/CC/Solano).	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.ii SSID	At least one project must address toxicity.	Toxicity is nearly always the result of urban pesticides which are addressed by MRP Provision C.9.	Eliminate the requirement to conduct one project addressing toxicity.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49

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C.8.e.iii (1) SSID	Step 1 (Work plan development) of stepwise process to conduct and complete SSID projects	Sections (f) - (i) briefly describe how specific projects should be designed. This list should be expanded to encompass MS4 Monitoring ideas presented by WB staff in their "C.8 thoughts 043020" document (i.e., GI/LID monitoring, PCBs in building demolition, trash capture effectiveness, channel restoration monitoring, nutrient studies, temperature studies). Each study option should specify a minimum level-of-effort (monitoring type, number of samples). This specificity will give Permittees confidence that, even if the study does not result in conclusive answers, they will still be granted project completion concurrence by the EO (a requirement of C.8.e.iii.(3)).	In addition to the study ideas already listed, add monitoring study options to (f) - (i) consistent with ideas presented by WB staff in "C.8 thoughts 043020.doc". Provide minimum level-of-effort (monitoring type, number of samples) required for each monitoring study option.	H	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.iii (2) SSID	Step 2 (implementation of Work plan) of stepwise process to conduct and complete SSID projects	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.iii (3) SSID	Step 3 (Follow-up actions) of stepwise process to conduct and complete SSID projects	The requirement for EO concurrence of project completion puts pressure on WB staff to recommend project approval, even if the study was inconclusive or if monitoring results do not show improved water quality. In addition, new types of projects proposed here (see C.8.e.iii (1)) may not fit into the current language for project completion. Instead, more frequent communications with WB staff throughout project development and implementation is preferred.	Eliminate requirement for EO concurrence of project completion.	H	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.e.i v SSID	As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f Pollutants of Concern (POC) Monitoring	Priority POC management information needs: Source Identification, Contributions to Bay Impairment, Management Action Effectiveness, Loads and Status, Trends	The information needs are tied to RMP management questions; however, they may not apply to all POCs. Additional changes to C.8.f may be warranted depending on the outcome of C.11/12 Workgroup discussions.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f.i POC Monitoring	Sampling Methods	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5

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C.8.f.ii POC Monitoring	Parameters and Monitoring Frequency - (Table 8.2 - 1st Column) Pollutant of Concern	Emerging Contaminants - the list of required CECs is outdated and should be synced with the RMP list. Nutrients - These are already monitored under C.8.d (Creek Status) and are being addressed by Statewide Policy Efforts.	Emerging Contaminants - Eliminate list of specific parameters and refer to RMC CEC Workgroup. Nutrients - Eliminate this parameter. If it must stay in MRP, add "conduct or cause to be conducted" language similar to emerging contaminants to allow for coordination with RMP nutrient program.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f.ii POC Monitoring	Parameters and Monitoring Frequency - (Table 8.2 - 2nd Column) Total & Yearly Minimums	As a result of the yearly minimum, there is little incentive to conduct a large study that would result in the total number of required samples being collected early in the Permit term. Mercury - Mercury should no longer be tied to PCBs. It is a relatively expensive parameter and due to its ubiquitous presence and atmospheric source, the high total and yearly monitoring minimums are unnecessary to learn more about this parameter.	Add language that allows yearly minimums to cease after the total number of required samples is obtained. Mercury - Reduce the total and yearly minimums to 20 (2).	**L**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f.ii POC Monitoring	Parameters and Monitoring Frequency - (Table 8.2 - 3rd Column) Minimum Number of Samples for each Monitoring Type	Over the past 5 years we have addressed the information needs and some are no longer relevant, as listed, for the POCs. This column could simply list relevant monitoring types/information needs but eliminate the minimum number of samples required for each. Furthermore, as the RMP's STLS evolves, MRP monitoring efforts could adapt accordingly. There appears to be a typo in the footnote for this column: "The minimum # of samples is required by year four of the Permit." It should be "year five".	Change column heading to simply state recommended Monitoring Types rather than requiring a specific number of samples.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.g Pesticides and Toxicity Monitoring	Conduct dry weather and wet weather pesticides and toxicity monitoring.	No issues identified. This type of monitoring will eventually be addressed at the Statewide level.	No updates recommended at this time.	**--**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.h Reporting	Overall Requirements	See below.	See below.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5
C.8.f.i Reporting	WQ Standard Exceedance	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-7 Section 4, Attachments 1-5

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.8.f.ii Reporting	Electronic Reporting	Submittal of data using SWAMP formats/templates requires additional work for eventual upload to CEDEN. And CEDEN now has standard reporting templates which did not exist when the MRP was first issued..	Change format requirement to CEDEN.	**L**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f.iii Reporting	Urban Creeks Monitoring Report	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-7 Section 4, Attachments 1-5
C.8.f.iv Reporting	Pollutant of Concern Monitoring Reports (due October 15)	Development of these reports has not been helpful in tracking POC monitoring requirements or in planning POC monitoring for the forthcoming year. Furthermore, the timing of this report diverts staff energy away from the MRP Annual Reports.	Eliminate this requirement.	**M**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f.v Reporting	Integrated Monitoring Report	No issues identified.	No updates recommended at this time.	**--**	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49
C.8.f.vi Reporting	Standard Report Content	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 4, Attachments 1-5 Section 9, Attachments 1-12 Section 12, Attachments 1-49

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.9.a IPM Policy	Implement IPM policy or ordinance.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.a.iii (1) IPM Policy Reporting	Report trends in quantities and types of pesticide active ingredients used	Permittees currently report the quantities of pesticides of concern. Water Board staff has indicated that they may propose to expand this requirement to include reporting quantities of all pesticides used.	Do not recommend expanding the requirement to include the reporting of all pesticides of concern	M	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.a.iii (2) IPM Policy Reporting	Report two IPM techniques /strategies	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.a.iii (3) IPM Policy Reporting	Submit IPM policies/ordinances and IPM SOPs upon request	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.b Train Municipal Employees	Permittees shall ensure municipal employees are trained in IPM.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.c. Require Contractors to Implement IPM	Require contractors to implement IPM	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12
C.9.d. Interface with County Agricultural Commissioners	Interface with Co. Ag. Commissioners	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.e.ii.(1) Point of Purchase Outreach	Conduct outreach to consumers at point of purchase	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.e.ii.(2) Pest Control Contracting Outreach	Conduct outreach to residents who use or contract for structural pest control and landscape professionals	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.e.ii.(2) Outreach to Pest Control Professionals	Conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.f. Track and Participate in Relevant Regulatory Processes	Participate in regulatory processes	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7
C.9.g. Evaluate Implementation of Pesticide Source Control Actions	Evaluate implementation of source control action related to pesticides	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12 Section 13, Attachments 1-7

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.10.a.i Reduction Schedule	100% trash reduction by July 2022	Definition of 100% reduction is not well established and may be inconsistent with Statewide Trash Amendments.	Consider a change in terminology of performance criteria from "100% reduction from MS4s" to language consistent with the Statewide Trash Amendments (i.e., full capture or equivalent). Full capture system equivalency (FCSE) should be defined in the permit as < 5 gallons/acre per year and as "low trash generation" as defined by OVTAs.	**M**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
		Attainment of the 100% trash load reduction from MS4s performance criteria (i.e., full capture or equivalent) will likely be unattainable for most Permittees by July 1, 2022 given the diminishing returns that are already being realized, the COVID 19 pandemic that has significantly reduced the ability of Permittees to implement trash controls, and the looming economic downturn that will significantly impact Permittees' budgets to fund trash control projects and other non-critical projects/programs. Additionally, the overall performance criteria will not be attainable (regardless of the compliance date) if source control credits and offsets allowed in MRP 2.0 are disallowed in future iterations of the MRP.	A more practical trash reduction goal is warranted during MRP 3.0. State Water Board allows up to 2030 for other Permittees around the State to achieve full capture or equivalent. Extend the timeframe attainment of the performance criteria.	**H**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.a.ii Trash Generation Area Management	Demonstrate attainment of goals by management of mapped trash generation areas to a level of low trash generation.	Current method to attain low trash generation is constrained to full capture or On-land Visual Trash Assessment (OVTA) score of "A" all places, at all times, which is inconsistent with State Water Board Trash Amendments.	Methods that can be used to demonstrate low trash generation needs to be more explicit in the permit and consistent with State Water Board terminology on Full Capture or Full Capture System Equivalency. Definitions of under what circumstances OVTA results and the implementation of actions with established performance standards (e.g., curb inlet screens) with or without OVTAs achieve full capture system equivalency should be explicitly included in the reissued permit.	**H**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
	Permittees shall have an opportunity to correct and/or revise, based on improved information, the 2009 trash levels and trash generation areas in their February 2014 maps by submitting the correction and/or revision no later than the 2016 Annual Report deadline.	Baseline maps may need to be updated as new information becomes available. Not doing so would require the use of resources to conduct ongoing assessments in areas that have achieved low trash generation since 2009.	Provide continued opportunities to revise/improve baseline maps based on new information during the next permit term. Land areas with private drainages were mapped during MRP 2.0 and assessments of baseline conditions of these properties may be needed.	**M**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
	Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems.	Trash generated from private land areas connected to Co-permittee MS4s are difficult to control and may require additional time beyond the schedule included in C.10.a.i.	A practical approach to addressing trash from these private land areas needs to be included in the next permit. This approach could differ from the methods used to demonstrate reductions in the public right of way.	**H**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
		A portion of Caltrans right of ways are currently included on Co-permittee baseline maps and should be removed as jurisdictional areas that are the responsibility of Co-permittees.	Explicit language should be included in the permit to state that Permittees are not responsible for trash generated on Caltrans ROW, nor any other land areas where discharges are covered under separate NPDES permits or Waste Discharge Requirements.		Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.a.iii. Mandatory Minimum Full Trash Capture	Minimum full capture system acreage treatment requirements.	All Co-permittees have achieved the goals set out in this subprovision and therefore it is outdated and unnecessary.	Remove mandatory minimum full trash capture requirements in next permit.	**M**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.b.i. Full Trash Capture Systems - Maintenance and Operation	Requirements for maintenance and operation of full capture systems.	Requirements for maintaining large/high flow capacity systems need to be updated. Current requirements are written to only apply to small/inlet-based systems.	Adjust maintenance requirements for large capture systems and defer to manufacturer recommendations.	**M**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.10.b.ii Other Trash Management Actions	Conduct OVTAs of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions.	Existing ambiguity in MRP 2.0 on visual assessment frequency should be addressed. Frequency of assessments at specific sites may be different based on the variability of scores at a site/TMA.	To ensure consistency among Co-permittees, develop specific visual assessment frequencies that should be achieved. Frequencies should be based on documented variability in OVTA scores at specific sites/TMAs. Once a site/TMA has achieved low trash generation/full capture system equivalency and variability has decreased to acceptable level, frequencies should be reduced accordingly.	H	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
	If attempting to develop a trash reduction performance standard, put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably.	No issues with this provision as worded, however, an additional provision needs to be included that describes the performance standard for curb inlet screens with street sweeping, and allows Co-permittees implementing the performance standard to attain a stipulated trash reduction percentage for the area where the actions are being implemented.	Based on the outcomes of performance standard studies conducted on autoretractable screens with street sweeping, a separate provision needs to be added to the permit to allow for application of the performance standard established and the commensurate stipulated trash reductions.	H	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
iii. Percentage Discharge Reduction	Document reductions based on the formula included in the permit.	No issues.	No changes recommended.	L	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
iv. Source Controls	Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items, may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions.	Water Board staff may be proposing to phase out source control credits.	No changes recommended. Source controls provide valuable water quality benefits at levels that may not be seen using OVTAs, which are relatively coarse indicators. Existing source control credits should be retained and possibly expanded. Additional actions are underway by Permittees and capping the reductions at 10% disincentivizes new source controls.	H	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15

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v. Receiving Water Monitoring	Conduct Pilot Receiving Water Monitoring for trash, to answer the questions included in the permit.	Monitoring conducted during MRP 2.0 is complete and has answered the questions outlined in the permit.	Receiving water trash monitoring requirements should be removed from Provision C.10 and discussed in the context of all water quality monitoring data needs. Monitoring requirements should not be expanded to include Bay and "still" water monitoring. Focus should remain on creeks and channels given that these are the water bodies that are most directly impacted by trash from watersheds and stormwater runoff.	**M**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.c. Trash Hot Spot Selection and Cleanup	Conduct trash hot spot cleanups twice per year and conduct assessments at the number of sites outlined in Attachment E to the permit.	Requirements are not providing significant trash reduction benefits and should be removed from the MRP.	As agreed in the MRP 3.0 Work Group that includes Water Board staff, requirements should be removed or incorporated into offset accounting for creek/shoreline cleanups. This would incentivize additional cleanups, which have a direct water quality benefit.	**M**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.d. Trash Load Reduction Plans	Each Permittee shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report.	No issues identified.	No changes recommended.	**L**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.e. Optional Trash Load Reduction Offset Opportunities - Additional Creek and Shoreline Cleanups	A Permittee may offset part of its provision C.10.a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot cleanups required by C.10.c	Water Board staff is proposing to phase out these offsets.	Existing offsets for creek and shoreline clean ups should be continued (and possibly expanded) into the next permit term. Offset factor (10:1) should not be increased in the next permit term.	**H**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15

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C.10.e. Optional Trash Load Reduction Offset Opportunities - Direct Discharge	A Permittee may offset an additional part of its provision C.10.a trash load percent reduction requirement by implementing a comprehensive plan approved by the Executive Officer for control of direct discharges of trash to receiving waters from non-storm drain system sources.	Water Board staff is proposing to phase out these offsets.	Existing offsets for direct discharge trash control programs should be continued (and possibly expanded) into the next permit term. Offset factor (10:1) should not be increased in the next permit term.	**H**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
C.10.f - Reporting	Report annually as described in the permit.	No issues identified.	No changes recommended.	**L**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15
Other	MRP 1.0 required that non-population based Permittees install and maintain trash full capture systems or equivalent measures. MRP 1.0 and MRP 2.0 required that non-population based Permittees conduct hot spot cleanups.	There is currently a lack of clarity in what requirement in provision C.10 will apply to non-population based Permittees.	Requirements for non-population Permittees should be explicit in MRP 3.0. MRP 1.0 and 2.0 language should be utilized as needed. Requirements for full capture systems and trash hot spot cleanups in receiving waters should be clear.	**H**	Section 1, Attachments 1-10 Section 5, Attachments 1-7 Section 9, Attachments 1-12 Section 14, Attachments 1-15

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C. 11 and 12	Overall Requirements	These provisions are expected to continue pollutant control programs that began during previous permit terms and introduce a couple of new programs. The Bay mercury and PCBs TMDLs are an appropriate water quality priority. However, the associated controls must be appropriately phased, targeted, and prioritized, and specific pollutant load reductions should not be mandated given the uncertainties in their achievability. In addition, meeting the PCBs TMDL allocation in the 20-year time frame appears cost-prohibitive. Prioritization of areas to address and integration with other funding sources related to transportation, urban greening, climate change, etc. is essential.	The permit should require a programmatic approach to pollutant controls rather than including any mandates for pollutant load reductions. Update the PCBs TMDL to better reflect 1) questionable feasibility of meeting allocations and 2) uncertainties in allocations related to a number of factors (e.g., food web and pollutant fate modeling, fish consumption rate and target species, dose response). TMDL updates should make uncertainties explicit while reducing them to the extent possible.	H	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.11/12.a. Implement Control Measures to Achieve Mercury/PCBs Load Reductions	Implement mercury/PCBs source and treatment control measures and pollution prevention strategies to achieve specified mercury/PCBs loads reductions throughout the area covered by the permit.	There is significant uncertainty in Permittees' ability to meet any mandated mercury and PCB load reductions. There is also significant uncertainty in the existing loading rates of these pollutants to storm drains and the Bay and how it relates to the key impairment metric (pollutant levels in fish tissue). If Permittees were unable to demonstrate achievement of numerical load reductions, they would be subject to potential enforcement action by the Regional Water Board and/or citizen suits from third parties as allowed under the Clean Water Act. As such, any mandate for reductions in pollutant loads would result in significant concern about the lack of a clear path to compliance. The permit should employ a programmatic approach by specifying pollutant control programs and stipulating the associated estimated load reduction benefits for the MRP 2.0 permit term. Implementation of the programs and the estimated load reductions actually achieved would be evaluated towards the end of the permit term and the programs would be adjusted as needed for the subsequent permit term (MRP 4.0).	Continue implementing pollutant control programs that began during previous permit terms and initiate a couple of new programs. Identify a list of accountable, trackable program elements that tie directly to stipulated load reductions. Track and report on implementation of PCBs/mercury source and treatment controls. Report implementation levels annually. Programs to include: (1) Conduct investigations of potential PCBs-contaminated areas within their jurisdictional boundaries with primary focus on old industrial land areas; (2) Identify potential high-priority catchments without control measures where enhanced O&M may be appropriate, assess need for implementing additional enhanced O&M measures, and implement enhanced O&M measures where appropriate; (3) Develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for both municipally owned and non-municipally owned electrical utilities in the MRP area (e.g., improved spill response and reporting); and (4) Track development of a Caltrans specification to manage potential PCBs-containing material in bridges as part of replacement, conduct a bridge inventory, identify ownership and bridges due for replacement and schedule of bridge replacement, maintain a list of applicable infrastructure that is scheduled for replacement, implement or cause to be implemented the Caltrans specifications during applicable replacement activities that are under the direction of the Permittee.	H	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.11/12.b. Assess Mercury/PCBs Load Reductions from Stormwater	Develop and implement an assessment methodology and data collection program to quantify in a technically sound manner mercury/PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, including mercury/PCBs source control, stormwater treatment, green infrastructure, and other measures. Use the assessment methodology to demonstrate progress toward achieving the load reductions required in this permit term and the program area wasteload allocations.	Use the methods developed during MRP 2.0 to assess pollutant load reductions associated with the control programs.	Summarize estimated load reductions of implemented control measures once per permit term with the fourth year Annual Report, including programs shown above under C.11/12.a. and Full Trash Capture devices and their catchment areas.		Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.11/12.c. Plan and Implement Green Infrastructure to Reduce PCBs Loads	Implement green infrastructure projects during the term of the permit to achieve the mercury/PCBs load reductions performance criteria. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, prepare a reasonable assurance analysis to demonstrate quantitatively that specified mercury/PCBs load reductions will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.	Green infrastructure requirements should be specified in Provision C.3. Green infrastructure implementation should not be a pollutant control program under C.11/12, but Permittees should continue to account for pollutant loads reduced.	Implement green infrastructure metrics established in C.3., track GI Implementation (annually), and report associated load reductions through green infrastructure implementation (Year 4).	H	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.11/12.d. Prepare Implementation Plan and Schedule to Achieve TMDL Allocations	Prepare a plan and schedule for mercury/PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the mercury/PCBs TMDL wasteload allocations by 2028/2030.	Prepare a similar plan and schedule towards the end of the MRP 2.0 permit term, accounting for the latest data from program implementation/monitoring and any updates to the TMDLs.	The plan should be submitted with the ROWD for MRP 4.0.	M	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.12.e. Evaluate PCBs in Presence in Caulks/Sealants used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way	Collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era.	This study was completed and this requirement is no longer needed in the permit.	Remove this requirement from the permit.	H	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16

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C.12.f. Manage PCB-Containing Materials and Wastes during building demolition activities so that PCBs do not enter municipal storm drains.	Develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition so that PCBs do not enter MS4s. PCBs from these structures can enter storm drains during and/or after demolition through vehicle trackout, airborne releases, soil erosion, or stormwater runoff. Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed or remodeled between the years 1950 and 1980. Single-family residential and wood frame structures are exempt. A Permittee is exempt from this requirement if it provides evidence acceptable to the Executive Officer that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.	Permittees should continue to implement the program to manage PCBs during demolition that was initiated July 1, 2019.	Permittees should continue to enter applicable structures demolished into a tracking system, report numbers of applicable buildings permitted (annually), submit a list of the applicable structures that applied for a demolition permit that had material(s) with PCBs at 50 ppm or greater with the address and demolition date (annually), evaluate data collected to identify any refinements to load reduction equation parameters and/or implementation program, and submit status report with request for additional load reduction credit (if justified) (Year 3).	H	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.12.g. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins	Conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.	No changes needed.	None	M	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16
C.11.e./C.12.h. Implement a Risk Reduction Program	Conduct an ongoing risk reduction program to address public health impacts of mercury/PCBs in San Francisco Bay / Delta fish with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families.	No changes needed.	None	M	Section 1, Attachments 1-10 Section 6, Attachments 1-3 Section 9, Attachments 1-12 Section 15, Attachments 1-16

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.13.a Manage waste generated from cleaning and treating of copper architectural features	Require, when issuing building permits, use of appropriate BMPs for managing waste during and post-construction. Educate installers and operators on appropriate BMPs for managing copper-containing wastes. Enforce against noncompliance.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12
C.13.b Manage discharges from pools, spas, and fountains that contain copper-based chemicals	Either 1) require installation of a sanitary sewer discharge connection; or 2) require diversion of discharge for use in landscaping or irrigation.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12
C.13.c.Industrial Sources	Ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.	No issues identified.	No updates recommended at this time.	--	Section 1, Attachments 1-7 Section 9, Attachments 1-12

10270

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.14 City of Pacifica and San Mateo County Fecal Indicator Bacteria Controls	The City and County shall implement fecal indicator bacteria control measures in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to this provision. The goal of this provision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek (Creek) and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL) and reduce exceedances of the bacterial water quality objectives for the water contact recreation beneficial use during the term of the Permit, thereby making substantial progress toward achieving the TMDL wasteload allocations.	Does not currently apply to SCVURPPP permittees but allegations that discharges from several Co-permittee MS4s are potentially contributing to exceedances of bacterial standards in Santa Clara Valley creeks have been raised during the MRP 2.0 permit period. Provision C.1 directs that the MRP be updated to impose additional pollutant-specific requirements to address such circumstances.	Modify to incorporate control measures for the Cities of Sunnyvale and Mountain View and possibly other Santa Clara Valley co-permittees. Possibly include additional investigation, controls and reporting that would be triggered under situations where SSID projects conducted under provision C.8.e have indicated that defined triggers for bacteria have been exceeded.	H	--

10271

MRP Reissuance - Summary of SCVURPPP Permittee Priority Issues and Updates - 6/12/20

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to ROWD (see Appendix A List and Links)
C.15.a. Exempted Non-Stormwater Discharges	In carrying out Discharge Prohibition A.1, certain unpolluted discharges listed in the permit are exempted from the prohibition against non-stormwater discharges.	No issues identified.	No updates recommended at this time.	--	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12
C.15.b.i. Conditionally Exempted Non-Stormwater Discharges	(1) Pumped Groundwater from Non-Drinking Water Aquifers; (2) Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains;	No issues identified.	No updates recommended at this time.	--	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12
C.15.b.ii Conditionally Exempted Non-Stormwater Discharges	Air Conditioning Condensate	No issues identified.	No updates recommended at this time.	--	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12
C.15.b.iii Conditionally Exempted Non-Stormwater Discharges	Emergency Discharges of Potable Water - iii.(2)(a) The Permittees shall implement or require firefighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located. (b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). (3) Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.	Water Board staff may be proposing to clarify approaches regarding discharges of pollutants associated with emergency firefighting activities (e.g., chlorinated water and firefighting foams). SCVURPPP staff has developed recommended minor language changes to address this concern.	Rename subprovision to Emergency Discharges from Firefighting Activities and include that BMPs shall be implemented for emergency discharges of potable water or foam.	**M**	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12
C.15.b.iv Conditionally Exempted Non-Stormwater Discharges	Individual Residential Car Washing	No issues identified.	No updates recommended at this time.	--	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12
C.15.b.v Conditionally Exempted Non-Stormwater Discharges	Swimming Pool, Hot Tub, Spa, and Fountain Discharges	No issues identified.	No updates recommended at this time.	--	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12
C.15.b.vi Conditionally Exempted Non-Stormwater Discharges	Irrigation Water Landscape Irrigation, and Lawn or Garden Watering	No issues identified.	No updates recommended at this time.	--	Seciton 1, Attachments 1-7 Section 9, Attachments 1-12

Attachment 5 Appendix A- List of Supporting Documents

Links to all documents are provided below or via https://scvurppp.org/report-of-wastewater-discharge-july-3-2020/

Section	Attachment ID	Document Name	Completion Date
MRP 3.0 Work Group Meeting Summaries			
All Provisions - MRP 3.0 Steering Committee Meeting Summaries & Other Related Information			
1	1	MRP 3.0 Steering Committee (SC) Kick-off Meeting Summary	10/30/2018
	2	MRP 3.0 Steering Committee Meeting Summary	1/29/2019
	3	MRP 3.0 Steering Committee Meeting Summary	3/26/2019
	4	MRP 3.0 Steering Committee Meeting Summary	6/25/2019
	5	MRP 3.0 Steering Committee Meeting Summary	11/5/2019
	6	MRP 3.0 Steering Committee Meeting Summary	12/3/2019
	7	MRP 3.0 Steering Committee Meeting Summary	4/7/2020
	8	June 10, 2020 Water Board Meeting - Recording of Meeting	6/10/2020
	9	June 10, 2020 Water Board Meeting - Water Board Staff Presentation	6/10/2020
	10	June 10, 2020 Water Board Meeting - Presentation from Multiple MRP Permittee Representatives regarding Priority Issues	6/10/2020
MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summaries			
2	1	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	2/7/2019
	2	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	3/7/2019
	3	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	4/4/2019
	4	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	5/2/2019
	5	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	6/6/2019
	6	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	7/15/2019
	7	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	9/5/2019
	8	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	10/3/2019
	9	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	11/14/2019
	10	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	12/5/2019
	11	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	1/29/2020
	12	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	2/6/2020
	13	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	3/5/2020
	14	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	4/2/2020
	15	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	5/7/2020
MRP 3.0 C.4/C.5 Work Group Meeting Summaries			
3	1	MRP 3.0 C.4/C.5 Work Group Meeting Summary	2/11/2020
	2	MRP 3.0 C.4/C.5 Work Group Meeting Summary	4/2/2020
	3	MRP 3.0 C.4/C.5 Work Group Meeting Summary	5/13/2020
MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summaries			
4	1	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	2/25/2019
	2	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	3/25/2019
	3	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	4/25/2019
	4	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	8/19/2019
	5	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	10/29/2019
MRP 3.0 C.10 Trash Work Group Meeting Summaries & Other Related Information			
5	1	MRP 3.0 C.10 Trash Work Group Meeting Summary	3/11/2019
	2	MRP 3.0 C.10 Trash Work Group Meeting Summary	4/23/2019
	3	MRP 3.0 C.10 Trash Work Group Meeting Summary	5/29/2019
	4	MRP 3.0 C.10 Trash Work Group Meeting Summary	7/23/2019
	5	December 11, 2019 Water Board Meeting - Presentation made by multiple MRP Permittee and Program Representatives regarding Provision C.10 (Trash Load Reduction	12/11/2019
	6	MRP 3.0 C.10 Trash Work Group Meeting Summary	12/13/2019
	7	MRP 3.0 C.10 Trash Work Group Meeting Summary	3/24/2020
MRP 3.0 C.11/C.12 Work Group Meeting Summaries			
6	1	MRP 3.0 C.11/C.12 Work Group Meeting Summary	4/25/2019
	2	MRP 3.0 C.11/C.12 Work Group Meeting Summary	6/10/2019
	3	MRP 3.0 C.11/C.12 Work Group Meeting Summary	1/30/2020
MRP 3.0 Homelessness Work Group Meeting Summaries			
7	1	MRP 3.0 Homelessness Work Group Meeting Summary	2/24/2020
	2	MRP 3.0 Homelessness Work Group Meeting Summary	4/1/2020
MRP 3.0 Tracking & Reporting Work Group Meeting Summaries			
8	1	MRP 3.0 Tracking & Reporting Work Group Meeting Summary	2/19/2020
SCVURPPP Submittals			
All Provisions- SCVURPPP and Co-Permittee Annual Reports			
9	1	SCVURPPP Program Annual Report FY 2013-14	9/15/2014
	2	SCVURPPP Co-permittee Annual Reports FY 2013-14	9/15/2014
	3	SCVURPPP Program Annual Report FY 2014-15	9/15/2015
	4	SCVURPPP Co-permittee Annual Reports FY 2014-15	9/15/2015
	5	SCVURPPP Program Annual Report FY 2015-16	9/30/2016
	6	SCVURPPP Co-permittee Annual Reports FY 2015-16	9/30/2016
	7	SCVURPPP Program Annual Report FY 2016-17	9/30/2017

Attachment 5 Appendix A- List of Supporting Documents

Section	Attachment ID	Document Name	Completion Date
	8	SCVURPPP Co-permittee Annual Reports FY 2016-17	9/30/2017
	9	SCVURPPP Program Annual Report FY 2017-18	9/30/2018
	10	SCVURPPP Co-permittee Annual Reports FY 2017-18	9/30/2018
	11	SCVURPPP Program Annual Report FY 2018-19	9/30/2019
	12	SCVURPPP Co-permittee Annual Reports FY 2018-19	9/30/2019
C.3 – New Development and Redevelopment			
10	1	SCVURPPP FY 13-14 Installed Stormwater Treatment Systems O&M Verification Inspection Program Report	9/30/2014
	2	BASMAA "White Paper" on Provision C.3 in MRP 2.0	2/27/2015
	3	SCVURPPP FY 14-15 Installed Stormwater Treatment Systems O&M Verification Inspection Program Report	9/28/2015
	4	BASMAA Model Biotreatment Soil Media Specifications - MRP 2.0 Provision C.3.c.i.(2)(c)(ii)	2/5/2016
	5	BASMAA Guidance for Identifying Green Infrastructure Potential in Municipal Capital Improvement Projects	5/6/2016
	6	SCVURPPP FY 15-16 Newly Installed Stormwater Treatment Systems and Hydromodification Management (HM) Controls	9/28/2016
	7	BASMAA Regional Supplement for New Development and Redevelopment FY 2015-16	9/30/2016
	8	SCVURPPP FY 16-17 Newly Installed Stormwater Treatment Systems and Hydromodification Management (HM) Controls	9/28/2017
	9	BASMAA Regional Supplement for New Development and Redevelopment FY 2016-17	9/30/2017
	10	SCVURPPP FY 17-18 Newly Installed Stormwater Treatment Systems and Hydromodification Management (HM) Controls	9/28/2018
	11	BASMAA Regional Supplement for New Development and Redevelopment FY 2017-18	9/30/2018
	12	BASMAA Guidance for Sizing Green Infrastructure Facilities in Street Projects	10/25/2018
	13	SCVURPPP FY 18-19 Newly Installed Stormwater Treatment Systems and Hydromodification Management (HM) Controls	9/27/2019
	14	BASMAA Regional Supplement for New Development and Redevelopment FY 2018-19	9/30/2019
C.7 – Public Information and Outreach			
11	1	BASMAA Final Be the Street Evaluation Report	8/27/2014
	2	BASMAA Regional Supplement for Training and Outreach FY 2013-14	9/15/2014
	3	BASMAA Regional Supplement for Training and Outreach FY 2014-15	9/15/2015
	4	BASMAA Regional Supplement for Training and Outreach FY 2015-16	9/30/2016
	5	BASMAA Regional Supplement for Training and Outreach FY 2016-17	9/30/2017
	6	BASMAA Regional Supplement for Training and Outreach FY 2017-18	9/30/2018
	7	BASMAA Regional Supplement for Training and Outreach FY 2018-19	9/30/2019
C.8 – Water Quality Monitoring			
12	1	SCVURPPP Urban Creeks Monitoring Report for Water Year 2014 (October 2013-September 2014) (Merged)	3/15/2015
	2	SCVURPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2014 (October 2013- September 2014) (Umbrella)	3/15/2015
	3	SCVURPPP Appendix A Creek Status Monitoring Report Water Year 2014 (October 2013- September 2014)	3/15/2015
	4	SCVURPPP Appendix B Upper Penitencia Creek Stressor Source Identification Project Final Work Plan - Water Year 2015 (FY 14-15)	3/15/2015
	5	SCVURPPP Electronic Monitoring Data Submittal for Water 2014	3/15/2015
	6	SCVURPPP Urban Creeks Monitoring Report for Water Year 2015 (October 2014-September 2015) (Merged)	3/28/2016
	7	SCVURPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2015 (October 2014- September 2015) (Umbrella)	3/28/2016
	8	SCVURPPP Appendix A Creek Status Monitoring Report Water Year 2015 (October 2014- September 2015)	3/28/2016
	9	BASMAA Appendix B RMC 2010-2016 Stressor/Source Identification (SSID) Project Locations, Rationales, Status Updated February 2016	3/28/2016
	10	SCVURPPP Appendix C Water Year 2015 POC Monitoring Report PCBs and Mercury Source Area Identification	3/28/2016
	11	SCVURPPP Electronic Monitoring Data Submittal for Water 2015	3/28/2016
	12	BASMAA Regional Monitoring Coalition Creek Status and Pesticides & Monitoring Quality Assurance Project Plan	3/31/2016
	13	BASMAA Regional Monitoring Coalition Creek Status and Pesticides & Monitoring Standard Operating Procedures	3/31/2016
	14	SCVURPPP POC Monitoring Report - Water Year 2016 Accomplishments & Water Year 2017 Planned Allocation of Effort	10/14/2016
	15	SCVURPPP Urban Creeks Monitoring Report for Water Year 2016 (October 2015-September 2016) (Merged))	3/31/2017
	16	SCVURPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2016 (October 2015- September 2016) (Umbrella)	3/31/2017
	17	SCVURPPP Creek Status Monitoring Report Water Year 2016 (October 2015- September 2016)	3/31/2017
	18	BASMAA RMC Regional Status of Stressor/Source Identification (SSID) Projects For Projects Initiated Under MRP 1 Updated February 2017	3/31/2017
	19	SCVURPPP Upper Penitencia Creek Stressor/Source Identification Project Water Year 2016	3/31/2017
	20	SCVURPPP Pollutants of Concern Monitoring - Data Report Water Year 2016	3/31/2017
	21	SCVURPPP Electronic Monitoring Data Submittal for Water 2016	3/31/2017
	22	SCVURPPP POC Monitoring Report - Water Year 2017 Accomplishments & Water Year 2018 Planned Allocation of Effort	10/15/2017
	23	SCVURPPP Urban Creeks Monitoring Report for Water Year 2017 (October 2016-September 2017) (Merged)	3/31/2018
	24	SCVURPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2017 (October 2016- September 2017) (Umbrella)	3/31/2018
	25	SCVURPPP Creek Status Monitoring Report Water Year 2017 (October 2016- September 2017)	3/31/2018
	26	BASMAA RMC Regional Stressor/Source Identification (SSID) Report MRP 2.0 SSID Project Locations, Rationales, Status	3/31/2018
	27	SCVURPPP Upper Penitencia Creek Stressor/Source Identification Monitoring and Management Practice Assessment	3/31/2018
	28	SCVURPPP Coyote Creek Toxicity Stressor Source Project Work Plan- Water Year 2018	3/31/2018
	29	SCVURPPP Pollutants of Concern Monitoring - Data Report Water Year 2017	3/31/2018
	30	SCVURPPP Electronic Monitoring Data Submittal for Water 2017	3/31/2018
	31	SCVURPPP POC Monitoring Report - Water Year 2018 Accomplishments & Water Year 2019 Planned Allocation of Effort	10/15/2018
	32	SCVURPPP Urban Creeks Monitoring Report for Water Year 2018 (October 2017-September 2018) (Merged)	3/31/2019
	33	SCVURPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2018 (October 2017- September 2018) (Umbrella)	3/31/2019

Attachment 5 Appendix A- List of Supporting Documents

Section	Attachment ID	Document Name	Completion Date
	34	SCVURPPP Creek Status Monitoring Report Water Year 2018 (October 2017- September 2018)	3/31/2019
	35	BASMAA RMC Regional Stressor/Source Identification (SSID) Report MRP 2.0 SSID Project Locations, Rationales, Status	3/31/2019
	36	SCVURPPP Pollutants of Concern Monitoring - Data Report Water Year 2018	3/31/2019
	37	BASMAA PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project	3/6/2019
	38	SCVURPPP Electronic Monitoring Data Submittal for Water 2018	3/31/2019
	39	SCVURPPP Lower Silver-Thompson Creek Watershed Stressor Source Identification Project Work Plan - Water Year 2019-2020	7/30/2019
	40	BASMAA Fact Sheet: Assessing the Health of San Francisco Bay Area Creeks Findings from Baseline Monitoring (2012-2016)	8/22/2019
	41	SCVURPPP POC Monitoring Report - Water Year 2019 Accomplishments & Water Year 2020 Planned Allocation of Effort	10/15/2019
	42	SCVURPPP Integrated Monitoring Report for Water Years 2014-2019 (October 1, 2013-September 30, 2019) (Merged)	3/31/2020
	43	SCVURPPP Integrated Monitoring Report Executive Summary Water Years 2014-2019	3/31/2020
	44	SCVURPPP Integrated Monitoring Report Part A: San Francisco Estuary Receiving Water Monitoring Water Years 2014-2019	3/31/2020
	45	SCVURPPP Integrated Monitoring Report Part B: Creek Status Monitoring Water Years 2014-2019	3/31/2020
	46	SCVURPPP Integrated Monitoring Report Part C: Stressor/Source Identification Projects Water Years 2014 through 2019	3/31/2020
	47	SCVURPPP Integrated Monitoring Report Part D: Pollutants of Concern Monitoring Report Water Years 2014-2019	3/31/2020
	48	SCVURPPP Integrated Monitoring Report Part E: Water Quality Monitoring Cost Summary Water Years 2014-2019	3/31/2020
	49	SCVURPPP Electronic Monitoring Data Submittal for Water 2019	3/31/2020
C.9 – Pesticides Toxicity Control			
13	1	BASMAA Regional Supplement for FY 2013-2014 Annual Report -MRP Provision C.9.e.	9/12/2014
	2	BASMAA Regional Supplement for FY 2014-2015 Annual Report- MRP Provision C.9.e.	9/15/2015
	3	BASMAA Regional Supplement for FY 2015-2016 Annual Report- MRP Provision C.9.e	9/30/2016
	4	BASMAA Regional Supplement for FY 2016-2017 Annual Report- MRP Provision C.9.e	9/30/2017
	5	BASMAA Regional Supplement for FY 2017-2018 Annual Report- MRP Provision C.9.e.	9/30/2018
	6	BASMAA Regional Supplement for FY 2018-2019 Annual Report- MRP Provision C.9.e	9/30/2019
	7	SCVURPPP Pesticide Source Control Actions Effectiveness Evaluation	9/30/2019
C.10 – Trash Load Reduction			
14	1	SCVURPPP Co-permittee Long-Term Trash Load Reduction Plans	2/1/2014
	2	BASMAA San Francisco Bay Area Stormwater Trash Generation Rates Final Technical Report	6/20/2014
	3	BASMAA Alternative Trash Assessment Methodology: On-land Trash Cleanup Monitoring Study- Final Study Design Concept	8/17/2016
	4	SCVURPPP Storm Drain Trash Monitoring and Characterization Project Technical Report	9/27/2016
	5	BASMAA On-land Visual Assessment Protocol A - Street and Sidewalk Survey	9/15/2017
	6	BASMAA Responses to Water Board Staff comments (dated 7/31/17) on Receiving Water Trash Monitoring Program Plan	10/22/2017
	7	BASMAA Receiving Water Trash Monitoring Program Plan for the San Francisco Region Version 1.0	10/27/2017
	8	BASMAA On-land Visual Assessment Protocol B - Driving Survey	3/15/2018
	9	BASMAA On-land Visual Assessment Protocol C - Area-based Assessments	3/15/2018
	10	BASMAA Standard Operating Procedures and Data Collection Forms for Qualitative Trash Assessments and Quantitative Trash Monitoring in Receiving Waters (Version 2.0)	7/11/2018
	11	BASMAA San Francisco Bay Area Receiving Water Trash Monitoring Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols Preliminary Report	6/27/2019
	12	SCVURPPP Co-permittee Annual Reports FY 2018-2019 Section C.10.d	9/30/2019
	13	SCVURPPP Stormwater Control Measure Evaluation and Request for Performance Standard Development Curb Inlet Screens	5/25/2020
	14	BASMAA San Francisco Bay Area Receiving Water Trash Monitoring Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols Final Report	6/14/2020
	15	SCVURPPP Co-permittee Trash Load Reduction & Remaining Acres Summary Table- July 2020	7/2/2020
C.11/12 – Mercury and PCB Controls			
15	1	SCVURPPP Pilot Urban Runoff Diversion Evaluation Palo Alto, California	9/15/2015
	2	SCVURPPP Source Property Identification and Referral Pilot Study Leo Avenue Watershed San Jose, California	9/15/2015
	3	SCVURPPP Report on Progress Towards Developing a List of Watershed Management Areas for PCBs and Mercury (MRP 2.0 Provision C.11/12.a.iii)	3/28/2016
	4	BASMAA Bay Area Reasonable Assurance Analysis White Paper	4/21/2016
	5	SCVURPPP Stormwater Control Measures Plan for PCBs and Mercury in the Santa Clara Valley Version 1.0 (2016-2020)	9/30/2016
	6	BASMAA Interim Accounting Methodology for PCBs and Mercury Version 1.1	9/19/2016
	7	BASMAA Clean Watersheds for A Clean Bay (CW4CB) Project (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)	5/2/2017
	8	BASMAA Bay Area Reasonable Assurance Analysis Guidance Document	6/30/2017
	9	SCVURPPP Stormwater Control Measures Plan for PCBs and Mercury in the Santa Clara Valley Version 2.0 (2016-2020)	9/30/2017
	10	BASMAA Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure Project Report	8/18/2018
	11	SCVURPPP Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reduction	9/28/2018
	12	SCVURPPP Stormwater Control Measures Plan for PCBs and Mercury in the Santa Clara Valley Version 3.0 (2016-2020)	9/30/2018
	13	BASMAA Pollutant Removal from Stormwater with Biochar Amended Bioretention Soil Media (BSM) Project Report	2/8/2019
	14	BASMAA Pollutants of Concern Monitoring for Management Action Effectiveness Evaluation of Mercury and PCBs Removal Effectiveness of Full Trash Capture Hydrodynamic Separator Units Project Report	2/20/2019
	15	SCVURPPP Potential Contributions of PCBs to Stormwater from Electrical Utilities in the San Francisco Bay Area	9/28/2019
	16	SCVURPPP Stormwater Control Measures Plan for PCBs and Mercury in the Santa Clara Valley Version 4.0 (2016-2020)	9/30/2019

C/CAG

CITY/COUNTY ASSOCIATION OF GOVERNMENTS OF SAN MATEO COUNTY

Atherton • Belmont • Brisbane • Burlingame • Colma • Daly City • East Palo Alto • Foster City • Half Moon Bay • Hillsborough • Menlo Park • Millbrae • Pacifica • Portola Valley • Redwood City • San Bruno • San Carlos • San Mateo • San Mateo County •South San Francisco • Woodside

Submitted via email and the SMCWPPP website (flowstobay.org)

July 2, 2020

Mr. Michael Montgomery, Executive Officer
California Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: Report of Waste Discharge

Mr. Montgomery:

On behalf of the municipal agencies in San Mateo County subject to NPDES permit No. CAS612008, Order R2-2015-0049 (also referred to as the Municipal Regional Permit, or MRP) issued by the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) is pleased to submit a Report of Waste Discharge (ROWD) in accordance with Title 23 of the California Code of Regulations.[1]

The City/County Associate of Governments of San Mateo County (C/CAG) implements a number of programs related to transportation and quality of life in the county. SMCWPPP is one such program and focuses on municipal stormwater compliance activities mandated through the MRP. Each municipality in San Mateo County is a Permittee and responsible for meeting permit mandates. SMCWPPP provides technical assistance to the Permittees and performs certain compliance activities on their behalf where countywide or regional efficiencies exist. The overall goal is to optimize stormwater runoff management and thereby protect and enhance water quality in San Mateo County creeks and San Francisco Bay.

SMCWPPP is submitting this ROWD by posting all of its components on the SMCWPPP website and providing the following URL to Regional Water Board staff:

flowstobay.org/report-of-waste-discharge/

In addition to this transmittal letter, the ROWD consists of:

- A certification form signed by each of the 21 San Mateo County municipalities' Duly Authorized Representative;
- An application form for NPDES permit reissuance;
- A list of San Mateo County Permittees with contact information;
- A map with the location of San Mateo County Permittee jurisdictional boundaries and associated water bodies;

[1] Each of the 21 San Mateo County municipalities' Duly Authorized Representative authorized Matthew Fabry, the SMCWPPP Program Manager, to submit this ROWD on its behalf.

- The C/CAG Joint Powers Agreement showing the relationship among C/CAG and San Mateo County Permittees;
- A table that summarizes and prioritizes San Mateo County Permittee issues for the permit reissuance and provides recommended updates to MRP requirements with references to supporting documents;
- A list of the ROWD supporting documents; and,
- A table summarizing for each Permittee trash load reduction and remaining acres to be addressed.

Please note that a May 17, 2020 email form Keith Lichten, Chief, Watershed Management Division, summarized Regional Water Board staff's expectations for materials that should be submitted as part of the ROWD. SMCWPPP's ROWD submittal includes all of the materials requested, with the exception of items that are due on September 30, 2020 with the MRP FY 2019/20 Annual Reports (e.g., Reasonable Assurance Analysis-related submittals, and an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition).

It should also be noted that the ROWD supporting documents include a report prepared by the City of Pacifica and the County of San Mateo in compliance with MRP Provision C.14.b.iii (1)(e): If (San Pedro Creek and Pacifica State Beach bacteria TMDL) wasteload allocations are not achieved by the end of the Permit term, the City and County shall submit a plan in their ROWD…that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations.

The successful implementation of permit requirements during the term of the MRP and previous permit terms has provided San Mateo County Permittees with insight towards optimizing requirements in the reissued MRP. The recommended prioritized updates to the permit are based upon these lessons learned and are consistent with the following broader permit reissuance goals:

- Establish priorities based on lessons learned during implementation of the current MRP;
- Provide a balance between flexibility and enforceability;
- Identify and address unintended consequences associated with implementation of the current MRP requirements; and
- Continue to identify and secure state and federal grant resources to assist with local implementation.

Our recommended updates to permit requirements would help provide a more cost-effective approach towards improving stormwater quality and achieving the protection and enhancement of water quality in San Mateo County receiving waters. However, San Mateo County Permittees remain extremely concerned about the availability of resources to address requirements in the reissued MRP, including the uncertainty regarding the availability of resources to Permittees in the future. In particular, the ongoing Covid-19 pandemic will likely impact municipal budgets and available resources for the foreseeable future. San Mateo County Permittees therefore request that the Regional Water Board reissues the MRP in consideration of current economic factors and the reasonable protection of beneficial uses, consistent with the California Water Code 13241.

SMCWPPP and San Mateo County Permittee staff look forward to continuing to work with Regional Water Board staff on the development of a reissued MRP that addresses high priority stormwater quality issues in a cost-effective and practicable manner during the next permit term.

Should you have any questions regarding this ROWD submittal, please do not hesitate to contact me.

Sincerely,

Matthew Fabry, P.E.
Program Manager

cc: Tom Mumley, Assistant Executive Officer, SFBRWQCB
Keith Lichten, Chief, Watershed Management Division, SFBRWQCB
SMCWPPP Stormwater Committee

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

Certification Statement

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Duly Authorized Representative:

6/30/20

Signature Date

Robert Ovadia, Director of Public Works

Printed Name and Title

Town of Atheron

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Leticia Alvarez 7/2/2020
Signature Date

Leticia Alvarez, Asst PW Director / City Engineer
Printed Name and Title

City of Belmont
Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

RJ Breault 6/29/20

Signature Date

Randy L Breault, Director of Public Worsk/City of Engineer

Printed Name and Title

City of Brisbane

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

7/1/2020

Signature Date

Syed Murtuza, Director of Public Works

Printed Name and Title

City of Burlingame

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Brad Donohue 7/1/2020

Signature Date

Brad Donohue / Director of Public Works

Printed Name and Title

Town of Colma

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Richard Chiu Jr. 6-30-2020
Signature Date

Richard Chiu Jr., Director of Public Works
Printed Name and Title

City of Daly City
Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Kamal Fallaha 6-30-2020

Signature Date

Kamal Fallaha, Public Works Director

Printed Name and Title

City of East Palo Alto

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

06/30/2020

Signature Date

Norm Dorais Director of Public Works

Printed Name and Title

City of Foster City

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

July 2, 2020

Signature Date

Paul Willis Director Public Works

Printed Name and Title

Town of Hillsborough

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

6/30/2020

Signature Date

Maziar Bozorginia, City Engineer

Printed Name and Title

City of Half Moon Bay

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

6/30/2020

Signature Date

Andrew Yang, Sr. Civil Engineer

Printed Name and Title

City of Millbrae

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Nicole Nagaya Digitally signed by Nicole Nagaya Date: 2020.06.30 08:16:56 -07'00' June 30, 2020

Signature Date

Nicole Nagaya, Public Works Director

Printed Name and Title

City of Menlo Park

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

June 30, 2020

Signature Date

Raymund Donguines, Senior Civil Engineer

Printed Name and Title

City of Pacifica

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Howard Young 6/29/2020

Signature Date

Howard Young, Director of Public Works

Printed Name and Title

Town of Portola Valley

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

6/30/20

Signature Date

Terence Kyaw, Director of Public Works

Printed Name and Title

City of Redwood City

Agency

REPORT OF WASTE DISCHARGE
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Signature of Duly Authorized Representative:

6/30/2020

Signature Date

Jimmy Tan, Public Works Director

Printed Name and Title

City of San Bruno

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

July 1, 2020

Signature Date

Steven J. Machida, Public Works Director

Printed Name and Title

City of San Carlos

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

Signature 6/30/20
Date

Brad B. Underwood, Director of Public Works
Printed Name and Title

City of San Mateo
Agency

REPORT OF WASTE DISCHARGE
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Signature of Duly Authorized Representative:

Carolyn Blonde 6/30/2020
Signature Date

Carolyn Blonde, Director, Office of Sustainability
Printed Name and Title

Office of Sustainability, San Mateo County, CA
Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

7/1/20

Signature Date

Eunejune Kim, Public Works Director

Printed Name and Title

South San Francisco

Agency

REPORT OF WASTE DISCHARGE
Order No. R2-2015-0049 NPDES Permit No. CAS612008

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Signature of Duly Authorized Representative:

7/2/2020

Signature Date

James C. Porter, Director of Public Works, County of San Mateo

Printed Name and Title

San Mateo County Flood and Sea Level Resiliency District
formerly San Mateo County Flood Control District

Agency

INTRODUCTION

This application package constitutes a Report of Waste Discharge (ROWD) pursuant to California Water Code Section 13260. Section 13260 states that persons discharging or proposing to discharge waste that could affect the quality of the waters of the State, other than into a community sewer system, shall file a ROWD containing information which may be required by the appropriate Regional Water Quality Control Board (RWQCB).

This package is to be used to start the application process for all waste discharge requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permits* issued by a RWQCB except:

1. Those landfill facilities that must use a joint Solid Waste Facility Permit Application Form, California Integrated Waste Management Board Form E-1-77; and

2. General WDRs or general NPDES permits that use a Notice of Intent to comply or specify the use of an alternative application form designed for that permit.

This application package contains:

1. Application/General Information Form for WDRs and NPDES Permits [Form 200 (10/97)].

2. Application/General Information Instructions.

Instructions

Instructions are provided to assist you with completion of the application. If you are unable to find the answers to your questions or need assistance with the completion of the application package, please contact your RWQCB representative. The RWQCBs strongly recommend that you make initial telephone or personal contact with RWQCB regulatory staff to discuss a proposed new discharge before submitting your application. The RWQCB representative will be able to answer procedural and annual fee related questions that you may have. (See map and telephone numbers inside of application cover.)

All dischargers regulated under WDRs and NPDES permits must pay an annual fee, except dairies, which pay a filing fee only. The RWQCB will notify you of your annual fee based on an evaluation of your proposed discharge. Please do NOT submit a check for your first annual fee or filing fee until requested to do so by a RWQCB representative. Dischargers applying for reissuance (renewal) of an existing NPDES permit or update of an existing WDR will be billed through the annual fee billing system and are therefore requested NOT to submit a check with their application. Checks should be made payable to the State Water Resources Control Board.

Additional Information Requirements

A RWQCB representative will notify you within 30 days of receipt of the application form and any supplemental documents whether your application is complete. If your application is incomplete, the RWQCB representative will send you a detailed list of discharge specific information necessary to complete the application process. The completion date of your application is normally the date when all required information, including the correct fee, is received by the RWQCB.

***NPDES PERMITS:** If you are applying for a permit to discharge to surface water, you will need an NPDES permit which is issued under both State and Federal law and may be required to complete one or more of the following Federal NPDES permit application forms: Short Form A, Standard Form A, Forms 1, 2B, 2C, 2D, 2E, and 2F. These forms may be obtained at a RWQCB office or can be ordered from the National Center for Environmental Publications and Information at (513) 891-6561

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

INSTRUCTIONS

Instructions for completing the application/report of waste discharge general information form for: waste discharge requirements/ NPDES permit.

If you have any questions on the completion of any part of the application, please contact your RWQCB representative. A map of RWQCB locations, addresses, and telephone numbers is located on the reverse side of the application cover.

I. FACILITY INFORMATION

You must provide the factual information listed below for ALL owners, operators, and locations and, where appropriate, for ALL general partners and lease holders.

A. ***FACILITY:*** Legal name, physical address including the county, person to contact, phone number, and email at the facility. (NO P.O. Box numbers. If no address exists, use street and nearest cross street).

B. ***FACILITY OWNER:*** Legal owner, address, person to contact, phone number, and email. Also include the owner's Federal Tax Identification Number.

Owner Type: Check the appropriate owner type. The legal owner will be named in the WDRs/NPDES permit.

C. ***FACILITY OPERATOR (The agency or business, not the person):*** If applicable, the name, address, person to contact, telephone number, and email for the facility operator. Check the appropriate Operator Type. If identical to B. above, enter "same as owner".

D. ***OWNER OF THE LAND:*** Legal owner of the land(s) where the facility is located, address, person to contact, and phone number. Check the appropriate Owner Type. If identical to B. above, enter "same as owner".

E. ***ADDRESS WHERE LEGAL NOTICE MAY BE SERVED:*** Address where legal notice may be served, person to contact, and phone number. If identical to B. above, enter "same as owner".

Address where annual fee invoices should be sent, person to contact, and phone number. If identical to B. above, enter "same as owner".

F. ***BILLING ADDRESS:*** Address where annual fee invoices should be sent, person to contact, and phone number. If identical to B. above, enter "same as owner".

II. TYPE OF DISCHARGE

Mark the appropriate box to describe whether the waste will be discharged to: Land or Surface Water.

Check the appropriate box(es) which best describe the activities at your facility.

Hazardous Waste: If you check the Hazardous Waste box, STOP and contact a representative of the RWQCB for further instructions.

Landfills: A separate form, APPLICATION FOR SOLID WASTE FACILITY PERMIT/WASTE DISCHARGE REQUIREMENTS, California Integrated Waste Management Board Form E-1-77, may be required. Contact a RWQCB representative to help determine the appropriate form for your discharge.

III. LOCATION OF THE FACILITY

- Enter the Assessor's Parcel Number(s) (APN), which is located on the property tax bill. The number can also be obtained from the County Assessor's Office. Indicate the APN for both the facility and the discharge point.

- Enter the Latitude of the entrance to the proposed/existing facility and of the discharge point. Latitude and longitude information can be obtained from a U.S. Geological Survey quadrangle topographic map. Other maps may also contain this information.

- Enter the Longitude of the entrance to the proposed/existing facility and of the discharge point.

IV. REASON FOR FILING

NEW DISCHARGE OR FACILITY: A discharge or facility that is proposed but does not now exist, or that does not yet have WDRs or an NPDES permit.

CHANGE IN DESIGN OR OPERATION: A material change in design or operation from existing discharge requirements. Final determination of whether the reported change is material will be made by the RWQCB.

CHANGE IN QUANTITY/TYPE OF DISCHARGE: A material change in characteristics of the waste from existing discharge requirements. Final determination of whether the reported change would have a significant effect will be made by the RWQCB.

CHANGE IN OWNERSHIP/ OPERATOR: Change of legal owner of the facility. Complete Parts I, III, and IV only and contact the RWQCB to determine if additional information is required.

WASTE DISCHARGE REQUIREMENTS UPDATE OR NPDES PERMIT REISSUANCE: WDRs must be updated periodically to reflect changing technology standards and conditions. A new application is required to reissue an NPDES permit which has expired.

OTHER: If there is a reason other than the ones listed, please describe the reason on the space provided. (If more space is needed, attach a separate sheet.)

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

It should be emphasized that communication with the appropriate RWQCB staff is vital before starting the CEQA documentation and is recommended before completing this application. There are Basin Plan issues which may complicate the CEQA effort, and RWQCB staff may be able to help in providing the needed information to complete the CEQA documentation.

Name the Lead Agency responsible for completion of CEQA requirements for the project, i.e., completion and certification of CEQA documentation.

Check YES or NO. Has a public agency determined that the proposed project is exempt from CEQA? If the answer is YES, state the basis for the exemption and the name of the agency supplying the exemption on the space provided. (Remember that, if extra space is needed, use an extra sheet of paper, but be sure to indicate the attached sheet under Section VII. Other.)

Check YES or NO. Has the “Notice of Determination” been filed under CEQA? If YES, give the date the notice was filed and enclose a copy of the Notice of Determination and the Initial Study, Environmental Impact Report, or Negative Declaration. If NO, check the box of the expected type of CEQA document for this project, and include the expected date of completion using the timelines given under CEQA. The date of completion should be taken as the date that the Notice of Determination will be submitted. (If not known, write “Unknown”)

VI. OTHER REQUIRED INFORMATION

To be approved, your application MUST include a COMPLETE characterization of the discharge. If the characterization is found to be incomplete, RWQCB staff will contact you and request that additional specific information be submitted.

This application MUST be accompanied by a site map. A USGS 7.5’ Quadrangle map or a street map, if more appropriate, is sufficient for most applications.

VII. OTHER

If any of the answers on your application form need further explanation, attach a separate sheet. Please list any attachments with the titles and dates on the space provided.

VIII. CERTIFICATION

Certification by the owner of the facility or the operator of the facility, if the operator is different from the owner, is required. The appropriate person must sign the application form.

Acceptable signatures are:

1. for a corporation, a principal executive officer of at least the level of senior vice-president;

2. for a partnership or individual (sole proprietorship), a general partner or the proprietor;

3. for a governmental or public agency, either a principal executive officer or ranking elected/appointed official.

Discharge Specific Information

In most cases, a request to supply additional discharge specific information will be sent to you by a representative of the RWQCB. If the RWQCB determines that additional discharge specific information is not needed to process your application, you will be so notified.

CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. FACILITY:

Name The 21 municipal agencies in San Mateo County as listed in Attachment 2

Address See Attachment 2

City/County/State/Zip Code San Mateo, CA

Contact Person Matt Fabry, SMCWPPP Program Manager

Telephone Number 650/599-1419 Email

B. FACILITY OWNER:

Name The 21 municipal agencies in San Mateo County as listed in Attachment 2

Address See Attachment 2

City/State/Zip Code San Mateo, CA

Contact Person Matt Fabry, SMCWPPP Program Manager

Telephone Number 650/599-1419 Email

Federal Tax ID NA

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

C. FACILITY OPERATOR (The agency or business, not the person):

Name Same as Owner

Address

City/State/Zip Code

Contact Person

Telephone Number Email

Operator Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

D. OWNER OF THE LAND

Name Same as Owner

Address

City/State/Zip Code

Contact Person

Telephone Number Email

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED

Address Same as Owner

City/State/Zip Code

Contact Person

Telephone Number Email

F. BILLING ADDRESS

Address Same as Owner

City/State/Zip Code

Contact Person

Telephone Number Email

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application:

☐ **Waste Discharge to Land** ☑ **Waste Discharge to Surface Water**

Check all that apply:

☐ Animal or Aquacultural Wastewater
☐ Animal Waste Solids
☐ Biosolids/Residual
☐ Cooling Water
☐ Domestic/ Municipal Wastewater Treatment and Disposal
☐ Dredge Material Disposal
☐ Hazardous Waste (*see instructions*)
☐ Industrial Process Wastewater
☐ Land Treatment Unit
☐ Landfill (*see instructions*)
☐ Mining
☑ Storm Water
☐ Surface Impoundment
☐ Waste Pile
☐ Wastewater Reclamation
☐ Other, *please describe*

III. LOCATION OF THE FACILITY

Describe the physical location of the facility:

1. Assessor's Parcel Number(s)

   Facility: _____

   Discharge Point: Attachment 3

2. Latitude

   Facility: _____

   Discharge Point: Attachment 3

3. Longitude

   Facility: _____

   Discharge Point: Attachment 3

IV. REASON FOR FILING

Check all that apply:

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency NA

Has a public agency determined that the proposed project is exempt from CEQA?

☐ Yes ☐ No

If yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below:

_____

_____

Has a "Notice of Determination" been filed under CEQA?

☐ Yes ☐ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report (EIR), or Negative Declaration. If No, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents: ☐ EIR ☐ Negative Declaration

Expected CEQA Completion Date: _____

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

Please note that all MRP-required submittals were also previously submitted to the SFB-RWQCB.

Each of the 21 San Mateo County municipalities authorized Matthew Fabry, the SMCWPPP Program Manager, to submit this ROWD on its behalf via an individual email.

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name Matthew Fabry Title SMCWPPP Program Manager

Signature _____ Date July 2, 2020

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

California Environmental Protection Agency
Bill of Rights for Environmental Permit Applicants

California Environmental Protection Agency (Cal/EPA) recognizes that many complex issues must be addressed when pursuing reforms of environmental permits and that significant challenges remain. We have initiated reforms and intend to continue the effort to make environmental permitting more efficient, less costly, and to ensure that those seeking permits receive timely responses from the boards and departments of the Cal/EPA. To further this goal, Cal/EPA endorses the following precepts that form the basis of a permit applicant's "Bill of Rights."

1. Permit applicants have the right to assistance in understanding regulatory and permit requirements. All Cal/EPA programs maintain an Ombudsman to work directly with applicants. Permit Assistance Centers located throughout California have permit specialists from all the State, regional, and local agencies to identify permit requirements and assist in permit processing.
2. Permit applicants have the right to know the projected fees for review of applications, how any costs will be determined and billed, and procedures for resolving any disputes over fee billings.
3. Permit applicants have the right of access to complete and clearly written guidance documents that explain the regulatory requirements. Agencies must publish a list of all information required in a permit application and of criteria used to determine whether the submitted information is adequate.
4. Permit applicants have the right of timely completeness determinations for their applications. In general, agencies notify the applicant within 30 days of any deficiencies or determine that the application is complete. California Environmental Quality Act (CEQA) and public hearing requests may require additional information.
5. Permit applicants have the right to know exactly how their applications are deficient and what further information is needed to make their applications complete. Pursuant to California Government code Section 65944, after an application is accepted as complete, an agency may not request any new or additional information that was not specified in the original application.
6. Permit applicants have the right of a timely decision on their permit application. The agencies are required to establish time limits for permit reviews.
7. Permit applicants have the right to appeal permit review time limits by statute or administratively that have been violated without good cause. For state environmental agencies, appeals are made directly to the Cal/EPA Secretary or to a specific board. For local environmental agencies, appeals are generally made to the local governing board or, under certain circumstances, to Cal/EPA. Through this appeal, applicants may obtain a set date for a decision on their permit and, in some cases, a refund of all application fees (ask boards and departments for details).
8. Permit applicants have the right to work with a single lead agency where multiple environmental approvals are needed. For multiple permits, all agency actions can be consolidated under a lead agency. For site remediation, all applicable laws can be administered through a single agency.
9. Permit applicants have the right to know who will be reviewing their application and the time required to complete the full review process.

Attachment 2 - Duly Authorized Representatives for the San Mateo County Permittees

Municipality	Duly Authorized Representative	Position	Email	Phone	Address
Atherton	Robert Ovadia	Public Works Director/City Engineer	rovadia@ci.atherton.ca.us	650-752-0451	150 Watkins Ave, Atherton, CA 94027
Belmont	Peter Brown	Public Works Director	PBrown@belmont.gov	650-595-7425	1 Twin Pines Lane, Belmont, CA 94002
Brisbane	Randy Breault	Public Works Director/City Engineer	rbreault@ci.brisbane.ca.us	415-508-2131	50 Park Place, Brisbane, CA 94005
Burlingame	Syed Murtuza	Public Works Director	Smurtuza@burlingame.org	650-558-7230	501 Primrose Rd, Burlingame, CA 94010
Colma	Brad Donohue	Director of Public Works and Planning	brad.donohue@colma.ca.gov	650-757-8888	1188 El Camino Real, Colma, CA 94014
Daly City	Richard Chiu	Public Works Director	rchiu@dalycity.org	650-991-8038	333 90th St. Daly City, CA 94015
East Palo Alto	Kamal Fallaha	City Engineer	kfallaha@cityofepa.org	650-853-3189	1960 Tate Street, East Palo Alto, CA 94303
Foster City	Norm Dorais	Public Works Director/City Engineer	ndorais@fostercity.org	650-286-3288	610 Foster City Bl., Foster City, CA 94404
Half Moon Bay	Maziar Bozorginia	City Engineer	MBozorginia@hmbcity.com	650-726-8251	501 Main St. Half Moon Bay, CA 94019
Hillsborough	Paul Willis	Public Works Director	pwillis@hillsborough.net	650-375-7487	1600 Floribunda Ave, Hillsborough, CA 94010
Menlo Park	Nikki Nagaya	Public Works Director	nhnagaya@menlopark.org	650-330-6781	701 Laurel St. Menlo Park, CA 94025
Millbrae	Andrew Yang	Senior Civil Engineer	AYang@ci.millbrae.ca.us	650-259-2393	621 Magnolia Avenue, Millbrae, CA 94030
Pacifica	Sam Bautista	Acting Public Works Director/City Engineer	bautistas@ci.pacifica.ca.us	650-738-3767	151 Milagra Dr, Pacifica, CA 94044
Portola Valley	Howard Young	Public Works Director	hyoung@portolavalley.net	650-851-1700 x214	765 Portola Road, Portola Valley, CA 94028
Redwood City	Saber Sarwary	City Engineer/Engineering Manager	ssarwary@redwoodcity.org	650-780-7370	1017 Middlefield Rd, Redwood City, CA 94063
San Bruno	Jimmy Tan	Public Services Director	jtan@sanbruno.ca.gov	650-616-7065	567 El Camino Real, San Bruno, CA 94066
San Carlos	Steven Machida	Public Works Director	smachida@cityofsancarlos.org	650-802-4203	600 Elm St, San Carlos, CA 94070
San Mateo	Brad Underwood	Public Works Director	bunderwood@cityofsanmateo.org	650-522-7303	330 W. 20th Avenue, San Mateo, CA 94403
South San Francisco	Eunejune Kim	Public Works Director	Eunejune.Kim@ssf.net	650-877-8551	550 N. Canal, South San Francisco, CA 94080
Woodside	Sean Rose	Town Engineer/Director of Public Works	srose@woodsidetown.org	650-851-6790	2955 Woodside Rd. Woodside, CA 94062
San Mateo County	Jim Porter	Public Works Director	jporter@smcgov.org	650-599-1421	555 County Center, 5th Floor, Redwood City, CA 94063

Attachment 3 - Map of San Mateo County Permittee Jurisdictional Boundaries and Receiving Waters

JOINT POWERS AGREEMENT

Continuing Establishment of the City/County Association of Governments

THIS AGREEMENT, by and between the COUNTY OF SAN MATEO (hereinafter referred to as "County") and those cities within the County of San Mateo who become signatories to this agreement (hereinafter referred to as "Cities" or "City" as the context requires), is made in light of the following recitals:

A. The County and the Cities have authority to perform a variety of functions in their respective communities and desire to establish a City/County Association of Governments (C/CAG) within the County of San Mateo whereby the parties will prepare, review, adopt, monitor and facilitate implementation by the member agencies county-wide state mandated plans as specified in 3(c) below. Local land-use decisions, except as they are affected by state-mandated county-wide plans, will remain solely within the cognizant local jurisdiction.

B. The parties are authorized to contract with each other for the joint exercise of any common power pursuant to Government Code Sections 6500 through 6518.

NOW, THEREFORE, the County and the Cities, in consideration of the mutual promises and agreements contained herein, **AGREE AS FOLLOWS**:

1. **Establishment of City/County Association of Governments of San Mateo County**. The parties hereby create an entity to be known as the City/County Association of

Governments of San Mateo County (hereinafter referred to as "C/CAG") for the preparation, review, adoption, monitoring and facilitation of implementation by the member agencies of county-wide state mandated plans. C/CAG shall be an entity which is separate from the parties to this agreement and shall be responsible for the administration of this agreement. Except as provided herein, the debts, liabilities, and obligations of C/CAG shall be the debts, liabilities, and obligations of the entity and not the debts, liabilities, and/or obligations of the parties to this agreement.

C/CAG shall have the power and is authorized to do any or all of the following:

(a) To make and enter contracts;

(b) To employ agents and employees;

(c) To lease, maintain, manage, acquire, construct or operate any building, works or improvements;

(d) To acquire, hold, or dispose of property;

(e) To incur debts, liabilities, or obligations;

(f) To sue and be sued in its own name;

2. **Board of Directors**. The Board of the City/County Association of Governments of San Mateo County (C/CAG) shall consist of a member of the City Council of each participating City to be selected by that City and one (1) member of the Board of Supervisors to be selected by the Board of Supervisors. Each City Council and the Board of Supervisors may select one (1) alternate member from its body who shall participate when the regular member is absent. In addition, there shall be two (2) non-voting ex-officio members: a representative of the San Mateo County Transit District Board of Directors selected by the Board of Directors and a representative of the San Mateo County Transportation Authority selected by the Authority. Additional Ex-Officio members may be

established by Board action in accordance with the special voting procedures identified in 4 (c). Regular attendance by the designated representative or alternate at the C/CAG Board and ***Committee*** meetings shall be encouraged by the C/CAG Board and member agencies.

3. **Purposes and Activities**. C/CAG is established to fulfill the following purposes operating through the Board of Directors for control, direction, and administration:

(a) Plan, organize, and maintain the work of C/CAG and be responsible for its overall operation.

(b) Advise City Councils and the Board of Supervisors of all significant activities of C/CAG.

(c) Prepare, review, adopt, monitor and facilitate implementation by the member agencies the following state-mandated county-wide plans:

(1) Congestion Management Plan (as the designated Congestion Management Agency including enforcing compliance with the Congestion Management Plan);

(2) Integrated Solid Waste Management Plan (as the designated Local Task Force);

(3) Airport Land Use Plan (as the designated Airport Land Use Commission);

(4) Hazardous Waste Management Plan;

(5) NPDES - Stormwater Management Plan.

(d) Perform such additional county-wide planning activities as approved by or directed by two-thirds (2/3) of the members

representing two-thirds (2/3) of the population of the County. Final adoption of any such plans shall only be after the plan has been introduced at a prior meeting held at least twenty-five (25) days earlier.

(e) Perform any additional County-Wide activities as set forth in this agreement (Sections***20, 21, 22, 23, 24, 25, and 26***).

(f) Utilize and establish advisory committees wherever necessary, including but not limited to:

(1) Airport Land Use Committee

(2) Congestion Management and ***Environmental*** Quality Committee

(3) Congestion Management Plan (CMP) Technical Advisory Committee

(4) Solid Waste Advisory Committee (Local Task Force)

(5) Hazardous Waste Management Plan Advisory Committee

(6) Bikeways and Pedestrian Advisory Committee

(7) Finance Committee

(8) NPDES Committee

(9) NPDES Technical Advisory Committee

(10) Legislative Committee

(11) Resource Management and Climate Protection Committee

(12) C/CAG Investment Committee

Committees may be established by Board action in accordance with the special voting procedures identified in 4 (c). ***Committee*** membership may include persons who are not members of the Board of Directors, including other elected

officials or public members.

(g) Adopt By-laws and such other rules of procedure as may be deemed necessary.

The duties, responsibilities or obligations of C/CAG, as set forth in this Agreement, are not intended, and shall not be interpreted, to expand or diminish any legal duties, responsibilities or obligations that any city or county member of C/CAG has, or may in the future have, under any provision of State or Federal law.

Notwithstanding anything to the contrary in any other provision of this Agreement, C/CAG shall have no authority and/ or obligation to implement or enforce the provisions of any County-wide plan except when C/CAG is functioning as an agency specifically designated by state or federal law as having the authority and/ or obligation to implement or enforce such County-wide plan.

4. **Voting Procedures**. The parties intend to strive for consensus following full discussion but in the event consensus cannot be reached the following voting procedures shall be utilized.

(a) A quorum shall consist of at least a majority of the voting members and shall be required for all meetings of C/CAG.

(b) All decisions and actions shall be by majority vote of those present unless the decision involves the adoption of a county-wide plan or any one (1) member requests the use of the special voting procedures hereinafter set forth.

(c) The special voting procedures shall be utilized upon the request of any one (1) member. Addition of Ex-Officio members to the Board, the establishment of ***Committees,*** and the final adoption of county-wide plans shall require the

special voting procedures. Special voting procedures shall be as follows: for a motion to be successful it must receive the votes of a majority of the members representing a majority of the population of the County. In determining the population of local governments, the population shall be utilized as set forth in a resolution adopted by the Board of Directors pursuant to Section 19.

5. **Budget**. The Board annually shall adopt, by a date C/CAG designates by resolution, an operating budget for C/CAG setting forth anticipated expenses, financing sources and proposed service levels necessary to carry out the purposes of this agreement. C/CAG shall establish its fiscal year by resolution. Immediately after approving the annual budget, the Board shall recommend the budget to the governing bodies of the members for the purpose of securing from each of them contributions and/or appropriations in accordance with each party's obligations as set forth in Section 6 below. It is expressly agreed and understood that the Board has no authority to bind any governing board to make the recommended contribution and/or appropriation and that this decision rests solely with each governing body. Each party shall deposit its monetary contribution to the budget with the C/CAG Treasurer on or before the date C/CAG designates by resolution.

6. **Contribution of Parties**. In consideration of the mutual promises contained herein, the parties agree that they shall make the following annual contributions towards maintaining the program of C/CAG.

Each member's contribution shall be its pro-rata share of the revenue needed for the annual budget as adopted by the Board of Directors. The pro-rata share of each agency shall be based upon its population as set forth in a resolution adopted by the Board of Directors pursuant to

Section 19. By use of the special voting procedures under special circumstances the Board of Directors may waive contributions. If a member fails to pay its annual contribution, it shall forfeit its voting rights as provided in Paragraph 10 and there shall be no further recourse against it for nonpayment.

7. **Treasurer**. The Board of Directors shall select a Treasurer from one of its member entities who shall be the depository and have custody of all the money and property of C/CAG from whatever source. The duties of the C/CAG Treasurer shall include those set forth in the Government Code Section 6500 et seq., Joint Exercise of Powers.

8. **Controller**. The Board of Directors shall select a Controller from one of its member entities who shall perform the functions of auditor and/or controller for C/CAG. The duties of the C/CAG Controller shall include those set forth in Government Code Section 6500 et seq., Joint Exercise of Powers.

9. **Staffing**. It is understood that C/CAG may require the support of its own administrative staff. When deemed necessary, the Board of Directors may employ an Executive Director. The Board shall have responsibility for all employment decisions regarding said Executive Director who shall serve at the pleasure of the Board of Directors.

The Executive Director shall be responsible for the day-to-day administration of C/CAG under the direction of the Board of Directors. The Executive Director shall seek advice and assistance from the Administrators' Advisory Committee. The Executive Director shall have the authority to employ administrative staff consistent with the approved budget of C/CAG.

There shall be an Administrators' Advisory Committee. The Committee will be advisory to the C/CAG Board of Directors and Executive Director to assist them to most effectively accomplish the objectives of C/CAG by giving advice on agenda matters, monitoring outcomes of activities, assisting with identifying and allocating resources, and communicating with all members. The Committee members shall be: the City Managers from cities that contract staff to C/CAG, the County Manager, the General Manager of SamTrans, one (1) City Manager appointed by the City Managers' Association, and, the Chair and Vice-Chair*(s)* and Legal Counsel of C/CAG as ex-officio members. Committee Chairs and staff who have items for discussion at the Committee will be invited to participate. The definition and membership of this Committee may be revised by Board action in accordance with the special voting procedures identified in 4 (c).

It is understood that C/CAG may employ personnel, utilize existing County, SamTrans or City staff, or retain professional consultants to perform any necessary staff work in meeting its goals and objectives. It is further understood that no County, SamTrans or City staff will be utilized without the consent of the employing agency.

10. **Withdrawal**. Any party may withdraw from this agreement by filing written notice of intention to do so with the Chair of the governing board by September 30th of each year, or by another date C/CAG designates by resolution. The rights and obligations of such party shall terminate at the end of the first full fiscal year for which the withdrawing party has made its contribution following such notice having been given. The withdrawal of any party from this agreement shall in no way affect the rights and obligations of the remaining parties. If a party withdraws from this agreement, such party shall not be entitled to the return of any funds contributed to C/CAG nor to the return in cash or in kind of any materials or supplies until termination of this

agreement. If a party fails to make its contribution in accordance with Section 6 of this agreement, that agency shall forfeit its voting rights during the period of such non-payment. However, if one of the Cities or the County wishes to rejoin after forfeiting its membership by non-payment of its contribution, it may do so by paying the designated amount.

11. **Termination and Disposition of Property**. This agreement shall be deemed terminated when the number of Cities participating in this agreement contain less than a majority of the population of the County, or are fewer than eleven (11) in number. Upon termination, equipment and all other assets shall be distributed to the parties hereto in proportion to the contributions of the parties during the life of C/CAG including distribution to parties which may have withdrawn at an earlier date. Upon termination, any surplus money on hand shall be returned to the parties in proportion to the contributions of the parties during the life of C/CAG including distribution to parties which may have withdrawn at an earlier date.

12. **Effective Date/Termination Date**. This agreement shall be effective on July 1, ***2011,*** or upon its execution by the County and by at least eleven (11) cities representing the majority of the population of the County, whichever is later. This agreement ***shall continue at least until December 1, 2015, and thereafter shall continue until terminated pursuant to Section 11 of this agreement.***

13. **Meetings**. Monthly meetings of the C/CAG Board of Directors shall be held in accordance with the Brown Act, Government Code Section 54950 et seq. The Board of Directors shall establish a regular time and place for the required meetings. In addition, the Board of Directors

shall have such other meetings as are deemed necessary.

14. **Notice of Agreement**. Pursuant to Government Code Section 6503.5, C/CAG shall, within thirty (30) days after the effective date of this agreement, cause a notice of the agreement to be prepared and filed with the Office of the Secretary of State.

15. **Other Associations**. Participation in C/CAG is not intended to preclude member entities from entering into similar agreements with other jurisdictions.

16. **Legal Counsel**. Unless the Board of Directors determines otherwise, the County Counsel shall serve as legal counsel to C/CAG and provide all routine legal advice and service necessary including attendance at Board of Directors meetings.

17. **Insurance**. The County shall add C/CAG to its existing excess liability insurance coverage and shall maintain such coverage in full force and effect during the life of this agreement. Said excess liability insurance coverage includes a self-insured retention by the County. Unless the Board of Directors decides otherwise, County shall provide for the defense of any claims or litigation within the amount of the self-insured retention. Legal representation by the County will ordinarily be provided by the Office of the County Counsel.

Any out-of-pocket expenses or loss, by way of judgment or settlement, arising out of the operation of this agreement, within the limits of the County's self-insured retention shall be shared by the parties in accordance with the formula set forth in Section 6. Expenses shall not include salaries or office expenses of any county employees, including any attorneys from the Office

of the County Counsel.

18. **Amendments**. This Joint Powers Agreement may be amended at any time with the agreement of the majority of the members representing a majority of the population of the County, except as provided in 3(d).

19. **Adjustment of Population Figures**. The Board of Directors shall establish by resolution the population figures to be utilized in determining the population of local governments under this agreement based on the results of the decennial federal census or population figures provided by the State Department of Finance, and may revise the population figures at any time by resolution.

20. **Clean Air Vehicle Registration Fee Program**. C/CAG shall serve as the overall program manager for the San Mateo County under Health and Safety Code Section 44241 for funds made available by the increase in motor vehicle registration fees that the Bay Area Air Quality Management District is authorized to levy under A.B. 434, (1991 Statutes, Chapter 807.)

21. **Storm Water Discharge Plan and Permit**. ***To the extent permitted by law and regulation; and recognized by the applicable government agency; the*** City/County Association of Governments shall assume responsibility for the following activities under the National Pollutant Discharge Elimination System (NPDES) Program (40 CFR 122):

(a) Ratify submission of a county-wide storm water discharge permit application and accept permit on behalf of the County and Cities in the County, as co-

permittees.

(b) Prepare preliminary draft and final draft storm water management plan describing existing activities the County and Cities are conducting to help minimize the discharge of pollutants to storm water, describing new pollution measures that will be undertaken during the initial five year period of the NPDES permit, and containing other matters C/CAG determines are necessary or desirable.

(c) Identify and recommend alternatives for implementation of a revenue program.

(d) Enter into contracts with the County, the Cities, the County Flood Control District, and other entities to implement the revenue program and the storm water management plan.

(e) Perform additional county-wide activities in connection with the NPDES program as set forth in the storm water management plan approved by, or as directed, by the Board of Directors.

(f) Provide coordination and overall management of the NPDES program and advice to the County and the Cities on implementation.

The County and each City shall be solely responsible for complying with NPDES permit conditions and all federal, state, and local laws and regulations, relating to discharges from the storm sewers in its jurisdiction and under its control. The County and each City shall defend, indemnify, and hold harmless every other party to this agreement, and its officers and employees, from all claims, suits, actions, fines, penalties, damages, or liability of every name, kind, and description arising in any way out of the negligent or intentional acts of that County or City in complying or failing to comply with NPDES permit conditions, and all federal, state, and local

regulations applicable to that County or City.

22. **Service Authority for Abatement of Abandoned Vehicles**. C/CAG shall be the service authority for the abatement of abandoned vehicles under Vehicle Code Section 22710. C/CAG shall impose a service fee of one dollar ($1) on vehicles registered to an owner with an address in San Mateo County as authorized by Vehicle Code Sections 9250.7 and 22710. As provided in Vehicle Code Section 22710(b), C/CAG may contract and undertake any act convenient or necessary to carry out any law relating to its duties as the service authority.

23. **Programming State and Federal Transportation Funds**. C/CAG acting as the Congestion Management Agency shall be responsible for programming State and Federal Transportation Funds allocated to San Mateo County. These funds include but are not limited to State Transportation Improvement Program ***(STIP), Surface*** Transportation ***Program (STP), Congestion Management and Air Quality (CMAQ),*** and Transportation Development Act Article 3.

24. **AB 1546 Transportation/ Environmental Vehicle Registration Fee Program**. C/CAG shall serve as the overall program manager for the San Mateo County Transportation/Environmental Program which programs up to a $4 motor vehicle fee in accordance with Chapter 2.65 (commencing with Section 65089.11) to Division 1 of Title 7 of the Government Code and Section 9250.5 of the Vehicle Code.

25. Measure M - Local Transportation Improvement Program. C/CAG shall serve as the overall program manager for the Local Transportation Improvement Program which

programs up to a $10 motor vehicle fee in accordance with Section 65089.20 of the Government Code and Section 9250.4 of the Vehicle Code.

26. <u>San Mateo County Energy Watch and Climate Protection.</u> C/CAG shall serve as the overall program manager for the San Mateo County Energy Watch Program that coordinates and provides energy conservation incentives. C/CAG tasks also includes coordinate, support, and provide programs as necessary for Climate Protection.

IN WITNESS WHEREOF, the parties hereto by their duly authorized representative, have affixed their hands on this ***Joint Powers Agreement effective as of the first day of July, 2011.***

COUNTY OF SAN MATEO

ATTEST:

Clerk of the Board

Certificate of Delivery
(Government Code Section 25103)
I certify that a copy of the original document filed in the Office of the Clerk of the Board of Supervisors of San Mateo County has been delivered to the President of the Board of Supervisors.

ATTEST: Deputy Clerk of the Board of Supervisors

by Carole Groom
President of the Board of Supervisors

TOWN OF ATHERTON

Clerk of Town Council

by_____
Mayor

CITY OF BELMONT

ATTEST:

programs up to a $10 motor vehicle fee in accordance with Section 65089.20 of the Government Code and Section 9250.4 of the Vehicle Code.

26. <u>San Mateo County Energy Watch and Climate Protection.</u> C/CAG shall serve as the overall program manager for the San Mateo County Energy Watch Program that coordinates and provides energy conservation incentives. C/CAG tasks also includes coordinate, support, and provide programs as necessary for Climate Protection.

IN WITNESS WHEREOF, the parties hereto by their duly authorized representative, have affixed their hands on this ***Joint Powers Agreement effective as of the first day of July, 2011.***

COUNTY OF SAN MATEO

ATTEST:

_____ by_____

Clerk of the Board *President of the Board of Supervisors*

TOWN OF ATHERTON

ATTEST:

_____ by Jim Dobbie

Clerk of Town Council *Mayor*

CITY OF BELMONT

ATTEST:

CITY OF BELMONT

ATTEST:

Clerk of City Council

by_____
Mayor

CITY OF BRISBANE

ATTEST:

_____
Clerk of City Council

by_____
Mayor

CITY OF BURLINGAME

ATTEST:

_____
Clerk of City Council

by_____
Mayor

TOWN OF COLMA

ATTEST:

_____
Clerk of Town Council

by_____
Mayor

as the overall program manager for the San Mateo County Energy Watch Program that coordinates and provides energy conservation incentives. C/CAG tasks also includes coordinate, support, and provide programs as necessary for Climate Protection.

IN WITNESS WHEREOF, the parties hereto by their duly authorized representative, have affixed their hands on this ***Joint Powers Agreement effective as of the first day of July, 2011.***

COUNTY OF SAN MATEO

ATTEST:

_____ by_____

Clerk of the Board *President of the Board of Supervisors*

TOWN OF ATHERTON

ATTEST:

_____ by_____

Clerk of Town Council *Mayor*

CITY OF BELMONT

ATTEST:

_____ by_____

Clerk of City Council *Mayor*

CITY OF BRISBANE

ATTEST:

_____

Sheri Marie Spediacci
Clerk of City Council

by Gail E. Bilyeu
Mayor

CITY OF BURLINGAME

ATTEST:

_____
Clerk of City Council

by_____
Mayor

TOWN OF COLMA

ATTEST:

_____
Clerk of Town Council

by_____
Mayor

CITY OF DALY CITY

ATTEST:

_____
Clerk of City Council

by_____
Mayor

CITY OF EAST PALO ALTO

ATTEST:

_____
Clerk of City Council

by_____
Mayor

CITY OF BELMONT

ATTEST:

_____
Clerk of City Council

by_____
Mayor

CITY OF BRISBANE

ATTEST:

_____
Clerk of City Council

by_____
Mayor

CITY OF BURLINGAME

ATTEST:

Clerk of City Council

by_____
Mayor

TOWN OF COLMA

ATTEST:

_____
Clerk of Town Council

by_____
Mayor

CITY OF DALY CITY

ATTEST:

_____
Clerk of City Council

by_____
Mayor

COUNTY OF SAN MATEO

ATTEST:

_____
Clerk of the Board

by_____
President of the Board of Supervisors

TOWN OF ATHERTON

ATTEST:

_____
Clerk of Town Council

by_____
Mayor

CITY OF BELMONT

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
A	Discharge Prohibitions	No issue identified	None at this time.	--	None.
B	Receiving Water Limitations	No issue identified	None at this time.	--	None.
C.1	Compliance with Discharge Prohibitions and Receiving Water Limitations	No issue identified	None at this time.	--	None.

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.2.a. Road Repair	Permittees shall develop and implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, and repaving or repair maintenance activities such as those described in the CASQA Handbook for Municipal Operations.	WB staff wants to revise reporting to include submitting BMPs/SOPs in Year 1 and annual municipal staff/contractor training. The current Permit identifies appropriate BMP references such as CASQA Handbook for Municipal Operations, BASMAA's Blueprint for a Clean Bay, BASMAA's Mobile Surface Cleaner Program, Caltrans Storm Water Quality Handbook Maintenance Staff Guide (May 2003).	Instead of having Permittees submit BMPs/SOPs, have them provide a narrative description, including identifying any internal SOPs developed, contract language or BMP reference documents. Add reporting requirement for number of municipal staff trained, training dates, and training topics. Add reporting requirement for how contractor compliance with BMPs is verfied (e.g. contract language, training, municipal inspections, etc.).	M	
C.2.b. Pavement Washing	Permittees shall implement, and required to be implemented, BMPs that prevent the discharge of polluted washwater and non-stormwater to storm drains for pavement washing; sidewalk and plaza cleaning; mobile cleaning; pressure washing operations in locations such as parking lots and garages; trash areas; and gas station fueling areas.			M	
C.2.c.i(1) Bridge & Structural Maintenance & Graffiti Removal	Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.			M	
C.2.c.i (2) Bridge & Structural Maintenance & Graffiti Removal	Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and washwater discharges into storm drains.			M	
C.2.e. Rural Public Works Construction and Maintenance	Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads.			M	
C.2.d Pump Stations	Permittees shall develop and implement measures to operate, inspect and maintain stormwater pumps stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in the stormwater discharges to comply with WQS.	WB staff wants to revise reporting to include submitting BMPs/SOPs in Year 1 and annual municipal staff/contractor training.	Maintain current reporting. Reporting requirements in MRP 1.0 were removed in MRP 2.0.	M	
C.2.f.i. Corp Yards	Implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment, and maintenance vehicle parking areas, and material storage facilities, to comply with water quality standards.	WB staff wants to revise reporting to include submitting SWPPPs in Year 1 and annual municipal staff/contractor training.	Revise reporting to include submission of the SWPPP in Year 1. Revise reporting to include training date(s) and number of municipal staff trained in the corporation yard SWPPP.	L	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.3.a Performance Standards	(1) Have adequate legal authority to implement all requirements of Provision C.3; (2) have adequate development review and permitting procedures; (3) evaluate potential water quality effects and identify appropriate mitigation measures; (4) provide adequate interdepartmental staff training; (5) provide adequate outreach; (6) for all projects not regulated by C.3, encourage inclusion of adequate site design measures; (7) for all projects not regulated by C.3, encourage inclusion of adequate source control measures; and (8) revise, as necessary, General Plans to integrate water quality and watershed protection and require implementation of C.3 measures.	No issues identified.	No updates recommended at this time.	--	
C.3.b Regulated Projects	i. Require all projects fitting the category descriptions listed below (hereinafter called Regulated Projects) to implement Low Impact Development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility in accordance with Provisions C.3.c and C.3.d, unless the Provision C.3.e alternate compliance options are evoked.	No issues identified with general concept.	No updates recommended at this time.	--	
C.3.b Regulated Projects	ii. (1) Special Land Use Categories: Threshold is 5,000 square feet of impervious surface created/replaced for auto service facilities, retail gasoline outlets, restaurants, and stand-alone or uncovered parking lots.	No issues identified.	No updates recommended at this time.	--	
C.3.b Regulated Projects	ii. (2)&(3) New Development and Redevelopment Projects: for projects not in Special Land Use categories, threshold is 10,000 square feet of impervious surface created/replaced. Excludes detached single family homes that are not part of a larger plan of development.	WB staff want to reduce threshold for all regulated projects to 5,000 square feet of impervious surface created/replaced (including single family homes). Data analysis has shown a disproportionate amount of effort will be required by permittees to address this relatively small increase in additional regulated impervious area.	Maintain current thresholds and current exemption for detached single family homes not part of a larger plan of development.	H	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.3.b Regulated Projects	ii. (4) Road Projects: Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface: a) new streets/roads; b) widening of existing streets/roads with additional traffic lanes; and c) impervious trails > 10 feet wide and within 50 feet of creek bank. Excludes repavement of existing roads (implicitly), impervious surfaces that drain to permeable areas, permeable surfaces, and Caltrans facilities.	WB staff want to include reconstruction of existing roads in the list of applicable projects. "Reconstruction" has not been clearly defined but the intent is removal of road surface down to base rock. It is not clear whether they intend to reduce the threshold for this category of projects to 5,000 square feet of impervious surface created/replaced. Permittee perspective is that GI may not be feasible on all road sections, this would take away funding for road maintenance and would result in roads not being maintained, and the GI Plans include prioritization of roads for GI and the use of the "no missed opportunities" approach for evaluating capital projects.	Maintain current thresholds and do not extend applicability to existing road reconstruction.	H	
C.3.b Regulated Projects	iv. Reporting	WB staff have stated intent to reduce reporting requirements; however, reduction in C.3 reporting requirements has not yet been discussed in detail.	Recommend eliminating submittal of table of approved project information in each annual report and state that the table shall be made available upon request. Remove reporting requirement in 2017 Annual Report for C.3.b.i.(2) (information on historic projects).	M	
C.3.c Low Impact Development (LID)	i.(1) Source Control Requirements	No issues identified.	No updates recommended at this time.	--	
C.3.c Low Impact Development (LID)	i.(2) Site Design and Stormwater Treatment Measures	No issues identified.	No updates recommended at this time.	--	
C.3.c Low Impact Development (LID)	ii. Reporting	No issues identified.	Remove one time reporting requirement for pervious pavement specifications, which has been completed.	L	
C.3.d Numeric Sizing Criteria for Stormwater Treatment Systems	i. Require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria: (1) Volume Hydraulic Design Basis; (2) Flow Hydraulic Design Basis; and (3) Combination Flow and Volume Design Basis. iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems	No issues identified.	No updates recommended at this time.	--	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.3.e Alternative or In-Lieu Compliance with Provision C.3.b	i.The Permittees may allow a Regulated Project to provide alterative compliance with Provision C.3.b in accordance with one of the two options listed below: Option 1: LID Treatment at an Offsite Location; and 2: Payment In-Lieu Fees	Permittees have agreed with Water Board staff on minor language changes to Options 1 and 2 and the addition of an Option 3 to allow Regional Alternative Compliance in another jurisdiction, based on the outcome of a grant funded project being led by the City of San Pablo.	Incorporate language changes agreed to in the MRP 3.0 C3/GI Work Group. Keep alternative compliance as an optional tool for compliance, and do not require all Permittees to develop alternative compliance programs.	H	
C.3.e Alternative or In-Lieu Compliance with Provisions C.3.b	ii. Special Projects. LID Treatment Reduction Credits approved by the Water Board may be applied to Special Projects, which are Regulated Projects that meet the specific criteria listed in Provisions C.3.e.ii.(3), (4), or (5), if treatment of runoff with 100% of LID is infeasible.	Water Board staff have proposed to eliminate the Special Projects provisions in order to stimulate alternative compliance programs that result in treatment of an equivalent amount of runoff with LID installed offsite. Permittees have argued that the Special Project provisions provide needed flexibility when constructing lot-line to lot-line urban infill projects or high density projects near transit, and that it will take time to develop and implement alternative compliance programs.	Maintain current provisions for Special Projects.	H	
C.3.e Alternative Compliance with Provisions C.3.c	vi. Reporting on Special Projects - Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but have not received final discretionary approval. In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects. For each project, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. Once the project has final discretionary approval, it shall be reported in the C.3.b table with other approved projects, with some supplemental information.	Special Project reporting has not been discussed with Water Board staff since they have proposed to eliminate the entire provision. Consistent with Water Board staff's stated intent to reduce reporting requirements, Permittees would like to remove the requirement to submit information on potential Special Projects as well as the LID feasibility narrative, and make information on approved Special Projects available upon request.	Update to remove extra reporting requirement and submittal of LID feasibility narrative, and just report Special Projects similar to other approved projects. (See request in C.3.b.iv. to maintain data about approved projects and make availlable to Water Board staff upon request.)	H	
C.3.f Alternative Certification of Stormwater Treatment Systems	In lieu of reviewing a Regulated Project's adherence to Provision C.3.d., a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d.	No issues identified.	No updates recommended at this time.	--	
C.3.g Hydromodification Management	All applicable projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.	No issues Identified.	No updates recommended at this time.	--	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.3.h Operation and Maintenance of Stormwater Treatment Systems	ii. O&M Verification Program shall include: (1) conditions of approval or other legally enforceable mechanisms; (2) coordination with vector control agency; (3) legally enforceable mechanism to allow access to site for inspection; (4) database to track installed pervious pavement systems (>3,000 SF), treatment systems, and HM controls; (5) database of sites, facilities, and inspections conducted; (6) prioritized O&M Inspection Plan; and (7) ERP for O&M inspections.	No issues identified.	Update implementation dates.	L	
C.3.h Operation and Maintenance of Stormwater Treatment Systems	v. Reporting: The database in C.3.h.ii.(4) and (5) shall be maintained by Permittees and made available to Water Board staff upon request. On an annual basis, provide list of newly installed treatment and HM controls to vector control agency. Report summary statistics on number of projects and inspections conducted, and an evaluation of the inspection program.	No issues identified.	Remove one time reporting requirement for 2016 Annual Report. Remove ERP certification requirement for 2017 Annual Report.	L	
C.3.i Site Design Measures for Small Projects and Detached Single-Family Home Projects	i. Require all development projects under the Permittee's jurisdiction that create/replace 2,500 - 10,000 SF of impervious surface and detached single-family home projects that create and/or replace 2,500 SF or more of impervious surface to implement one or more site design measures. On an annual basis, describe the implementation of this requirement.	Water Board staff have proposed to change the thresholds in this provision to 2,500-5,000 SF (consistent with lowering the Regulated Project threshold to 5,000 SF in Provision C.3.b).	Maintain current thresholds for regulated projects and small projects, and maintain site design requirements (only) for single family homes.	H	
C.3.j Green Infrastructure Planning and Implementation	i. (1) Prepare a framework or workplan that describes specific tasks and timeframes for development of its Green Infrastructure Plan. (2) Prepare a Green Infrastructure Plan with specified elements. (3) Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan. (4) Conduct public outreach, train staff, and educate elected officials.	MRP 3.0 will focus on implementation of GI Plans. Water Board staff and Permittees have discussed requirements that include programmatic elements and implementation goals/targets, as well as asset management requirements focused on structural water quality assets (LID/GI and trash capture devices). Agreement has been reached on programmatic elements and asset management, but no proposed goals or targets have been provided by Water Board staff to date.	Revise this provision to focus on implementation of GI Plans. Allow time for Permittees to continue to make progress on programmatic elements of implementation (e.g., continued coordination with other municipal plans, development of local design standards, outreach, training, development of funding mechanisms, etc.). Provide implementation goals for next permit term that are reasonable, flexible, scalable, and countywide/regional, and include both regulated and non-regulated projects. Limit asset management requirements to structural water quality assets and allow requirements to be met by building on existing tracking systems. Do not require updates to GI Plans.	H	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.3.j Green Infrastructure Planning and Implementation	i. (5) Reporting: (a) Submit documentation of approved GI Framework in 2017 Annual Report. (b) Submit completed GI Plan with 2019 Annual Report. (c) Submit documentation of legal mechanisms to ensure implementation of GI Plan with 2019 Annual Report. (d) Submit summary of outreach and education efforts in each Annual Report.	There has been limited discussion of reporting related to C.3.j. Water Board staff have expressed overall intent to reduce reporting requirements in MRP 3.0.	Revise this provision to be consistent with GI Plan Implementation requirements specified in C.3.j. Report on progress twice during permit term.	H	
C.3.j Green Infrastructure Planning and Implementation	ii. Early Implementation of GI Projects (No Missed Opportunities): (1)Prepare and maintain a list of GI projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for GI measures. (2) Submit the list with each Annual Report and a summary of planning or implementation status for each GI project.	Water Board staff supports continuing to review capital projects for GI opportunities, and most Permittees are continuing to implement this approach to identifying potential GI projects, using the BASMAA guidance for review of CIPs.	No updates recommended at this time.	--	
C.3.j Green Infrastructure Planning and Implementation	iii. Participate in Processes to Promote Green Infrastructure: Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of GI measures into local infrastructure projects, including transportation projects.	No issues identified.	No updates recommended at this time.	--	
C.3.j Green Infrastructure Planning and Implementation	iv. Tracking and Reporting Progress: (1) Develop and implement regionally-consistent methods to track and report implementation of GI measures on both public and private parcels. (2) Report on progress on development of tracking methods in each Annual Report. (3) Submit tracking methods and report implementation of GI measures in 2019 Annual Report.	Most Permittees are using countywide stormwater program databases to track and report implementation of GI measures, and support continuing to use these countywide databases for this purpose.	Update reporting requirements to reflect that tracking methodologies have been developed and will continue to be used to report progress. Consider allowing data on completed GI projects to be made available for review on public websites, rather than submitted in Annual Reports.	L	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.4.a. Legal Authority	Permittees shall have sufficient legal enforcement authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance andpollutant abatement at commercial and industrial sites within their jurisdiction.	No issues identified.	No updates recommended at this time.	--	
C.4.b. Inspection Plan	Permittees shall continue to update and implement an inspection plan that will serve as a prioritized inspection work plan.	WB staff wants to clarify BIP requirements to include the departments, agencies, contractors, etc., performing C.4 inspections; clarify what types of businesses each group inspects; how do "outside inspectors" communicate findings, follow up actions, and enforcement needs, with the Permittee stormwater staff and, if needed, each other.	If a Permitee relies on multiple entities to perform business and commercial inspections, its Business Inspection Plan should list the entities and their responsibilities.	L	
C.4.b.iii Reporting	Include the list of all industrial and commercial facilities requiring inspections identified in Provision C.4.b.ii.(2)(d) in each Annual Report	Requested not to include the list in Annual Reports but provide to WB staff upon request. This list is also available in the BIP.	Delete from Reporting section and include clarification that the list is available upon request as part of the description of the list in C.4.b.ii.(2)(d).	L	
C.4.c. Enforcement Response Plan (ERP)	Permittee shall implement and update, as needed, its ERP - a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.	WB staff wants ERP to state that all inspectors have authority to issue first level enforcement. Permittee position is that Provision C.4.c.ii.(1) already requires the ERP to include "the roles and responsibilities of staff responsible for implementing the ERP".	No updates recommended at this time.	L	
C.4.d Inspections	Permittees shall conduct inspections and maitain adequate records to demonstrate compliance and appropriate followup enforcement responses for faciliteis inspected. Permittees shall maintain an electronic database or equivalent tabular system.	WB staff will keep current potential and actual discharger terminology, but would like to define where used, in the text or as a footnote, add to glossary, and maybe list additional example BMPs. Permittee position is that potential discharge is defined in Permit Fact Sheet page A-52.	Add language defining potential discharge from the Fact Sheet to the Glossary.	L	
C.4.d.iii.(2)(e) Reporting	A list of facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage	WB staff suggested removing the list from annual reporting and have it available upon request. Thier intent is to request the list every three years.	Delete from Reporting section. Clarify under C.4.d.ii.(2) Recordkeeping that list should be made available upon request.	L	
C.4.e Staff Training	Permittees shall provide focused training for inspectors annually. Training may be Program-wide, Region-wide, or Permittee-specific.	WB staff wants other agencies or entities performing inspections for the entity submitting the annual report form listed, the number of inspectors from each agency or entity, including the entity submitting the AR and the total number of inspectors performing C.4 inspections for the Permittee.	Revise reporting section to include percentage of inspectors attending training of each agency/entity performing inspections.	L	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.5.a. Legal Authority	Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance.	No issues identified.	No updates recommended at this time.	--	
C.5.b. Enforcement Response Plan (ERP)	Permittees shall implement and update, as needed, its ERP - a reference document for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges and compliance from responsible parties.	WB staff want to clarify that the business, property manager, property owner, etc., that hires the mobile business, AND/OR the Mobile business, are responsible for SW pollution discharged by the mobile business operating at their location. RPs include business owner, business operator, property owner, and mobile business.	Add language to ERP to include guidance for identifying responsible parties for mobile business illicit discharges.	M	
C.5.c.ii.(1)&(2) Spill, Dumping and Complaint Response	Have a central contact point for reporting spills, dumping, and complaints. Publicize the phone number and web reporting address, if used.	No issues identified.	No updates recommended at this time.	--	
C.5.c.ii.(3) Spill, Dumping and Complaint Response	Require municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point.	No issues identified.	No updates recommended at this time.	--	
C.5.c.ii.(4)&(5) Spill, Dumping and Complaint Response	Maintain and update, as needed, a spill/dumping response flow chart and/or phone tree for staff response for response program to identify staff or posistions responsible. Maintain and update, as needed, a spill/dumping response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in response that goes beyond Permittee's immediate capabilities.	No issues identified.	No updates recommended at this time.	--	
C.5.c.ii.(6) Spill, Dumping and Complaint Response	Permittees shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct followup inspections, as needed, to ensure that corrective measures have been effectviely implement to achieve and maintain compliance.	WB staff will add the date the complaint investigation is started must not exceed 3 - 5 business days. Permittees prioritize responses by the type and number of complaints received so there should be flexibility for the requirement.	Prefer no change but if language is added to begin complaint investigation within 3-5 business days of receiviing the complaint, should include "or within a longer time period if deemed appropriate with a recorded rationale".	H	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.5.d. Tracking and Case Follow-up	Maintain water quality spills, dumping and complaints tracking and followup in an electronic database or equivalent tabular system.	No issues identified.	No updates recommended at this time.	--	
C.5.d.i Tracking and Case Follow-up	"Task Description: It is not necessary to track and report data according to this provision if they are tracked and reported according to state Water Resource Control Board Order No. 2006-0003-DWQ."	WB staff propose adding the Order title "Waste Discharge Requirements for Sanitary Sewer Systems" to clarify the statement.	Add text.	L	
C.5.d.ii Tracking and Case Follow-up	Implementation Level - "The electronic database or equivalent tabular system shall be made available to Water Board staff or representatives during audits or inspections."	WB staff want to add that inspection information, tracking sheets, and supporting documentation shall be available upon WB request. Permittees are unclear if this wording is needed because WB staff have authority to request records during an audit or inspection.	No updates recommended at this time.	L	
C.5.d.ii(2) Tracking and Case Follow-up	Investigation information	WB staff want to add tracking requirement for departments or agencies responding to release.	Only track name of referral agency if the Permittee stopped an investigation or response and does not track the resolution. In addition, the Permit requires tracking the IDDE (1)(a) complaint date and time and (2)(a) the investigation date and time. We recommend removing the time component but keeping the date. It does not make sense to have that level of detail and use staff time to search for the exact time the complaint was received or investigation was started since there are a variety of ways a member of the public can submit that information (phone call, in-person, voicemail, etc.) and it is not always easy to verify that data. Keeping records of the date only would be much simpler.	M	

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C.5.e.ii(1)(a) Control of Mobile Sources	Implement minimum standards and BMPs to be required for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.	WB staff want to add mobile vehicle fueling to list of example mobile businesses. Note that some Permittees prohibit mobile vehicle fuelers to operate in their jurisdiction.	No opposition to this change.	--	
C.5.e.ii(1)(b) Control of Mobile Sources	Implement an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.	No issues identified.	No updates recommended at this time.	--	
C.5.e.ii(1)(c) Control of Mobile Sources	Regularly updating mobile business inventories.	No issues identified.	No updates recommended at this time.	--	
C.5.e.ii(1)(d) Control of Mobile Sources	Implement an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.	WB staff want to shift emphasis from identifying individual mobile businesses to putting the responsibility for discharges from mobile businesses on the company who hires them, property owner, operator, etc.	Added language should allow Permittees flexibility to issue enforcement actions to any responsible party identified per guidance in ERP.	**M**	
C.5.e.ii(1)(e) Control of Mobile Sources	Inspection of mobile businesses, as needed.	No issues identified.	No updates recommended at this time.	--	

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C.5.f. MS4 Map Availability	Permittees shall make maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.	WB staff believes Permitees should know the location, materials and condition of the MS4 system on public and private properties and this information is a necessary part of asset management. WB staff proposes requiring Permittees to: identify the information gaps in the knowledge and records of their MS4 system; submit documentation identifying and describing the gaps with Permit Year 4 Annual Report; and submit a plan to obtain the missing information over the next permit term. Permittees believe the requirement to publicize availability of maps should only be applied to maps that meet 40CFR122.26(d)(1)(iii)(B)(1)&(5) identifying location of major outfalls. If more detailed maps are required these should be available to municipal staff and developers, as needed, and not the general public. The addition of requiring materials and condition of the entire system would be a significant resource burden to develop this asset management system. These requirements are inconsistent with asset management requirements proposed in C.3.j.	Recommend requiring maps of the MS4 public storm drain system be made available to staff and developers, as needed.	H	
New proposed subprovision	No current requirements.	WB staff would like to add a subprovision with requirements for RV and homeless encampment illicit discharges.	Provide narrative description of implementation practices to reduce illicit discharges from RV and homeless encampments.	H	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.6.a. Legal Authority for Effective Site Management	Permittee shall have the ability to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and implement progressively stricter enforcement to achieve expedient compliance the cleanup at all public and private construction sites.	No issues identified.	No updates recommended at this time.	--	
C.6.b. Enforcement Response Plan (ERP)	Permittee shall implement and update, as needed, its ERP - a reference document for inspection staff to take consistent actions to achieve timely and effective compliance.	No issues identified.	No updates recommended at this time.	--	
C.6.c. Best Management Practice Categories	Permittee shall require all construction sites to have site-specific, and seasonally and phase-appropriate, effective BMPs in 6 categories: erosion control, run-on and runoff control, sediment control, active treatment systems (as necessary), good site management, and non-stormwater management.	No issues identified.	No updates recommended at this time.	--	
C.6.d. Plan Approval Process	Permittee shall review erosion control plans for consistency with local requirements and the approporiateness and adequacy of proposed BMPs. Verify that sites disturbing one acre or more of land have filed a NOI for permit coverage under the construction General Permit.	No issues identified.	No updates recommended at this time.	--	
C.6.e. Inspections	By September 1 of each year, each permittee shall remind all sites disturbing 1 acre or more of soil, hillside projects, and high priority sites to prepare for wet season.	No issues identified.	No updates recommended at this time.	--	

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C.6.e. Inspections	Inspect all sites disturbing 1 acre or more of land, hillside projects, and high priority sites monthly during wet season (October - April).	WB staff would like Permitees to conduct stormwater inspections all year round, even during the dry season. Adding another month or more of required inspections would be potentially significant work load for some municipalities. The majority of permittees understand their construction site control program is implemented all year long.	No updates recommended at this time.	H	
C.6.e. Inspections	All inspections shall be recorded on a written or electronic inspection form. Track in an electronic database or tabular format all inspections.	No issues identified.	No updates recommended at this time.	--	
C.6.e. Inspections	Reporting.	WB staff recommend reporting the total number of sites requiring inspections and total number of sites inspected to help address issue of double reporting sites that fall under two categories.	Double reporting issue could also be avoided by defining reporting of sites by: 1) total number of active sites disturbing 1 acre of more of soil; 2) total number of active hillside sites disturbing less than one acre of soil requiring inspection; and 3) total number of active sites disturbing less than one acre of soil, not identified as a hillside site (#2) and identified as High Priority sites in C.6.e.ii.(2)(c) requiring inspecitons	L	
C.6.f. Staff Training	Provide training or access to training for staff conducting construction stormwater inspections.	WB staff want Permittees to report the number of inspectors conducting stormwater inspections, identify their departments, and state whether they received training.	Add to reporting requirements to report total number of inspectors conducting stormwater inspections. Add to reporting requirements to report number of inspectors attending each training by department.	L	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.7 Public Outreach	Overall Requirements	Permittees should be able to tailor public outreach requirements to their specific needs (e.g., supporting a funding initiative).	Provide Permittees with additional flexibility to tailor public outreach requirements to their specific needs.	H	
C.7.a Storm Drain Inlet Marking	Mark and maintain at least 80% of municipally-maintained storm drain inlets with appropriate stormwater pollution prevention message. Inspect and maintain at least once per 5-year permit term. Require inlet marking and maintenance for newly approved, privately-maintained streets, and verify marking prior to accepting the project.	Requirements do not belong in C.7	Move requirement to mark and maintain municipally-maintained inlets to Provision C.5.c Move requirement to require and verify (and report) storm drain inlet marking of newly constructed private streets to Provision C.3.	L	
C.7.b. Advertising Campaigns	Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences. Report results following pre-campaign and post-campaign surveys.	Campaigns/activities and their evaluations are ongoing. Pre-campaign and post-campaign surveys are not required.	Allow flexibility in the type of outreach campaign and in the types and timing of effectiveness measures, e.g., surveys, annual website vists, interaction on social media	M	
C.7.c. Stormwater Pollution Prevention Education	Permittees shall individually or collectively create and maintain a point of contact to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives.	No issues identified.	No updates recommended at this time.	--	
C.7.d. Public Outreach and Citizen Involvement Events	Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events	Due to the shelter-in-place guidelines, many outreach events were canceled. Some outreach events were replaced with online presentations/webinars.	Include language that allows virtual events/webinars/presentations in case public health guidelines do not allow large gatherings.	L	
C.7.f. Watershed Stewardship Collaborative Efforts	Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts or community groups and other organizations that benefit the health of the watershed. Report on level of involvement and provide an assessment of effectiveness in each Annual Report.	Some Permittees have expressed concern that the current language restricts the types of organizations that they can partner with.	No updates recommended at this time.	--	
C.7.h. School-Age Children Outreach	Permittees shall individually or collectively implement outreach activities designed to increase awareness or stormwater and/or watershed message(s) in school-age children (K through 12).	Due to the shelter-in-place guidelines, many school/classroom presentations were canceled. Permittees provided online presentations and activities to school teacher and students.	Include language that allows virtual/online activities in case public health guidelines do not allow in-person school/classroon visits.	L	

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C.7.i. Outreach to Municipal Officials	Permittees shall conduct outreach to municipal officials such as through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials at least once per permit cycle.	No issues identified.	No updates recommended at this time.	--	

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C.8. Monitoring	Overall Requirements	Goal is to conduct monitoring that supports evaluation of management actions and/or development of new/improved actions. Overall costs should decrease or remain the same. WB staff feedback on C.8 Workgroup matrix and discussions are incorporated throughout.	See below.	H	
C.8.a.ii-iiii Compliance Options	Permittees may choose to meet monitoring requirements through a Regional Collaboration, Area-wide Stormwater Program, and may use Third-party Monitoring.	No issues identified.	No updates recommended at this time.	--	
C.8.b Monitoring Protocols and Data Quality	Data must be SWAMP comparable	No issues identified.	No updates recommended at this time.	--	
C.8.c San Francisco Estuary Receiving Water Monitoring	Permittees shall contribute financially to the RMP.	No issues identified.	No updates recommended at this time.	--	
C.8.d Creek Status Monitoring	Management questions	No issues identified. Management questions remain valid but will be supplemented by targeted site selection (see C.8.d.i(6)).	No updates recommended at this time.	--	
C.8.d.i.(1) Bioassessment	Field and Laboratory Methods	Method references have been superseded.	Replace references in footnotes 22, 23, and 24 with Ode et al. 2016. Otherwise, no change.	L	
C.8.d.i.(2) Bioassessment	SWAMP training, Scientific Collection Permit, and SWAMP inter-calibration	College of Bioassessment courses have become less frequent due to staff retirement.	Include language to allow relaxation of training requirement, in the event that classes are no longer offered by the College of Bioassessment. Otherwise, no change.	L	
C.8.d.i.(3) Bioassessment	BMI and algae taxonomy	No issues identified.	No updates recommended at this time.	--	
C.8.d.i.(4) Bioassessment	Water quality and nutrient method	Some parameters are optional in the SWAMP method and have not been useful in analyzing prior data collected in the region.	Remove silica from list of parameters.	L	
C.8.d.i.(5) Bioassessment	Prevent spread of invasive species	No issues identified.	No updates recommended at this time.	--	

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C.8.d.i.(6) Bioassessment	Sample Design/Location	The probabilistic monitoring design has run its course and we now have a robust set of "baseline" data. Shifting to targeted site selection will allow Permittees to address new information needs while still contributing to evaluation of creek condition.	Permittees shall select sample locations on a targeted basis, based on: - Current and planned management actions (including GSI) - Areas of quality habitat – opportunity to document resources that should be protected - "Areas of unique importance" (i.e., where there is stakeholder interest) - Known water quality or habitat concerns (e.g., illicit discharges, complaints, 13267 letters, 303d listings, poor CSCI scores) - Data/information gaps - Opportunities for public education - Watershed assessment	H	
C.8.d.i.(7) Bioassessment	Frequency, Timframe and Number of Sites	Targeted site selection will result in a greater level-of-effort for planning field work, analyzing data, and writing reports. Other changes to Creek Status Monitoring recommended by WB staff and incorporated below will also result in a greater level-of-effort. The minimum number of annual samples is reduced to offset those increases.	San Mateo County Permittees shall collect at least 8 samples per year.	M	
C.8.d.i.(8) Bioassessment	Followup	No issues identified.	No updates recommended at this time.	--	
C.8.d.ii(1) - (4) Chlorine	Measure free and total chlorine residual in grab samples - 20 sites per year	Field measurements of chlorine are not reliable and have resulted in wasted efforts trying to track down sources. Also, potential chlorine discharges are already addressed by MRP Provisions C.5 (IDDE) & C.15 (Exempted and Conditionally Exempted Discharges) and NPDES General Permit for Drinking Water Systems (Order WQ 2014-0194-DWQ).	Eliminate this parameter.	L	
C.8.d.iii Temperature	Continuous monitoring of temperature (Apr - Sep) at 8 sites per year	No issues identified.	No updates recommended at this time.	--	
C.8.d.iv Continuous DO, Temp, pH	Continuous monitoring of DO, temp, pH at 3 sites per year for two 2-week periods	WB staff recommend increasing the duration of continuous water quality monitoring to get more data. The increased level-of-effort associated with this (additional field visits to calibrate instruments, loss of equipment sharing options, data analysis) would be partially offset by fewer bioassessment samples.	Increase duration to two 3-week periods per year.	L	

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C.8.d.v Pathogen Indicators	Analyze 5 grab samples per year for E. coli and Entercocci	Bacteria monitoring is being conducted in conjunction with TMDLs. Bacteria densities in streams are highly variable and this monitoring has not been helpful in assessing overall creek health.	Possibly modify to integrate with provision C.8.e modifications.	L	
C.8.e. Stressor/Source Identification (SSID) Projects	Conduct 8 regional SSID projects following the defined step-wise process that ends with EO concurrance of project completion. At least one regional project must address toxicity.	SSID projects provide useful data to Permittees. We recommend several modifications to the permit language to expand the scope of potential projects so that they can address new management questions about stormwater program effectiveness and/or explore data gaps. We also want more certainty about what is expected for project completion by specifying a minimum level-of-effort.	Change title from "SSID" Projects to "Monitoring Projects" to reflect expanded scope.	H	
C.8.e.i SSID	Maintain list of results exceeding trigger thresholds and WQOs. Include POC monitoring results as appropriate.	No issues identified.	No updates recommended at this time.	--	
C.8.e.ii SSID	Select projects from list developed in C.8.e.i	While most projects would be selected from the C.8.e.i list, pursuit of projects addressing other data or other information needs would fit within the spirit of this provision.	Add option to select projects from historical data, data collected by other agencies, 303(d) listings, and TMDLs.	M	
C.8.e.ii SSID	If conducted through a regional collaborative, collectively initiate 8 new projects	Fair allocation of 8 projects among the five Countywide programs is challenging. The typical population-based distribution of level-of-effort cannot be applied to 8 projects.	Reduce collective total to 7 (2 each SC/AC, 1 each SM/CC/Solano).	M	
C.8.e.ii SSID	At least one project must address toxicity.	Toxicity is nearly always the result of urban pesticides which are addressed by MRP Provision C.9.	Eliminate the requirement to conduct one project addressing toxicity.	M	
C.8.e.iii (1) SSID	Step 1 (Work plan development) of stepwise process to conduct and complete SSID projects	Sections (f) - (i) briefly describe how specific projects should be designed. This list should be expanded to encompass MS4 Monitoring ideas presented by WB staff in their "C.8 thoughts 043020" document (i.e., GI/LID monitoring, PCBs in building demolition, trash capture effectiveness, channel restoration monitoring, nutrient studies, temperature studies). Each study option should specify a minimum level-of-effort (monitoring type, number of samples). This specificity will give Permittees confidence that, even if the study does not result in conclusive answers, they will still be granted project completion concurrence by the EO (a requirement of C.8.e.iii.(3)).	In addition to the study ideas already listed, add monitoring study options to (f) - (i) consistent with ideas presented by WB staff in "C.8 thoughts 043020.doc". Provide minimum level-of-effort (monitoring type, number of samples) required for each monitoring study option.	H	

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C.8.e.iii (2) SSID	Step 2 (implementation of Work plan) of stepwise process to conduct and complete SSID projects	No issues identified.	No updates recommended at this time.	--	
C.8.e.iii (3) SSID	Step 3 (Follow-up actions) of stepwise process to conduct and complete SSID projects	The requirement for EO concurrance of project completion puts pressure on WB staff to recommend project approval, even if the study was inconclusive or if monitoring results do not show improved water quality. In addition, new types of projects proposed here (see C.8.e.iii (1)) may not fit into the current language for project completion. Instead, more frequent communications with WB staff throughout project development and implementation is preferred.	Eliminate requirement for EO concurrence of project completion.	H	
C.8.e.i v SSID	As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances.	No issues identified.	No updates recommended at this time.	--	
C.8.f Pollutants of Concern (POC) Monitoring	Priority POC management information needs: Source Identification, Contributions to Bay Impairment, Management Action Effectiveness, Loads and Status, Trends	The information needs are tied to RMP management questions; however, they may not apply to all POCs. Additional changes to C.8.f may be warranted depending on the outcome of C.11/12 Workgroup discussions.	No updates recommended at this time.	--	
C.8.f.i POC Monitoring	Sampling Methods	No issues identified.	No updates recommended at this time.	--	
C.8.f.ii POC Monitoring	Parameters and Monitoring Frequency - (Table 8.2 - 1st Column) Pollutant of Concern	Emerging Contaminants - the list of required CECs is outdated and should be synced with the RMP list. Nutrients - These are already monitoried under C.8.d (Creek Status) and are being addressed by Statewide Policy Efforts.	Emerging Contaminants - Eliminate list of specific parameters and refer to RMC CEC Workgroup. Nutrients - Eliminate this parameter. If it must stay in MRP, add "conduct ot cause to be conducted" language similar to emerging contaminants to allow for coordination with RMP nutrient program.	M	

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C.8.f.ii POC Monitoring	Parameters and Monitoring Frequency - (Table 8.2 - 2nd Column) Total & Yearly Minimums	As a result of the yearly minimum, there is little incentive to conduct a large study that would result in the total number of required samples being collected early in the Permit term. Mercury - Mercury should no longer be tied to PCBs. It is a relatively expensive parameter and due to its ubiquitous presence and atmospheric source, the high total and yearly monitoring minimums are unnecessary to learn more about this parameter.	Add language that allows yearly minimums to cease after the total number of required samples is obtained. Mercury - Reduce the total and yearly minimums to 20 (2).	**L**	
C.8.f.ii POC Monitoring	Parameters and Monitoring Frequency - (Table 8.2 - 3rd Column) Minimum Number of Samples for each Monitoring Type	Over the past 5 years we have addressed the information needs and some are no longer relevant, as listed, for the POCs. This column could simply list relevant monitoring types/information needs but eliminate the minimum number of samples required for each. Furthermore, as the RMP's STLS evolves, MRP monitoring efforts could adapt accordingly. There appears to be a typo in the footnote for this column: "The minimum # of samples is required by year four of the Permit." It should be "year five".	Change column heading to simply state recommended Monitoring Types rather than requiring a specific number of samples.	**M**	
C.8.g Pesticides and Toxicity Monitoring	Conduct dry weather and wet weather pesticides and toxicity monitoring.	No issues identified. This type of monitoring will eventually be addressed at the Statewide level.	No updates recommended at this time.	**--**	
C.8.h Reporting	Overall Requirements	See below.	See below.	**M**	
C.8.f.i Reporting	WQ Standard Exceedance	No issues identified.	No updates recommended at this time.	**--**	
C.8.f.ii Reporting	Electronic Reporting	Submittal of data using SWAMP formats/templates requires additional work for eventual upload to CEDEN. And CEDEN now has standard reporting templates which did not exist when the MRP was first issued..	Change format requirement to CEDEN.	**L**	
C.8.f.iii Reporting	Urban Creeks Monitoring Report	No issues identified.	No updates recommended at this time.	**--**	

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C.8.f.iv Reporting	Pollutant of Concern Monitoring Reports (due October 15)	Development of these reports has not been helpful in tracking POC monitoring requirements or in planning POC monitoring for the forthcoming year. Furthermore, the timing of this report diverts staff energy away from the MRP Annual Reports.	Eliminate this requirement.	**M**	
C.8.f.v Reporting	Integrated Monitoring Report	No issues identified.	No updates recommended at this time.	--	
C.8.f.vi Reporting	Standard Report Content	No issues identified.	No updates recommended at this time.	--	

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C.9.a IPM Policy	Implement IPM policy or ordinance.	No issues identified.	No updates recommended at this time.	--	
C.9.a.iii (1) IPM Policy Reporting	Report trends in quantities and types of pesticide active ingredients used	Permittees currently report the quanities of pesticides of concern. WB staff has indicated that they may expand this requirement to include reporting quanitities of all pesticides used.	Do not recommend expanding the requirement to incude the reporting of all pesticides of concern	M	
C.9.a.iii (2) IPM Policy Reporting	Report two IPM techniques /strategies	No issues identified.	No updates recommended at this time.	--	
C.9.a.iii (3) IPM Policy Reporting	Submit IPM policies/ordinances and IPM SOPs upon request	No issues identified.	No updates recommended at this time.	--	
C.9.b Train Municipal Employees	Permittees shall ensure municipal employees are trained in IPM.	No issues identified.	No updates recommended at this time.	--	
C.9.c. Require Contractors to Implement IPM	Require contractors to implement IPM	No issues identified.	No updates recommended at this time.	--	
C.9.d. Interface with County Agricultural Commissioners	Interface with Co. Ag. Commissioners	No issues identified.	No updates recommended at this time.	--	
C.9.e.ii.(1) Point of Purchase Outreach	Conduct outreach to consumers at point of purchase	No issues identified.	No updates recommended at this time.	--	
C.9.e.ii.(2) Pest Control Contracting Outreach	Conduct outreach to residents who use or contract for structural pest control and landscape professionals	No issues identified.	No updates recommended at this time.	--	
C.9.e.ii.(2) Outreach to Pest Control Professionals	Conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified.	No issues identified.	No updates recommended at this time.	--	
C.9.f. Track and Participate in Relevant Regulatory Processes	Participate in regulatory processes	No issues identified.	No updates recommended at this time.	--	
C.9.g. Evaluate Implementation of Pesticide Source Control Actions	Evaluate implementation of source control action related to pesticides	No issues identified.	No updates recommended at this time.	--	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.10.a.i Reduction Schedule	100% trash reduction by July 2022	Definition of 100% reduction is not well established and may be inconsistent with Statewide Trash Amendments.	Consider a change in terminology of performance criteria from “100% reduction from MS4s” to language consistent with the Statewide Trash Amendments (i.e., full capture or equivalent). Full capture system equivalency (FSCE) should be defined in the permit as ≤ 5 gallons/acre per year or as "low trash generation" as defined by OVTAs.	M	
		Attainment of the 100% trash load reduction from MS4s performance criteria (i.e., full capture or equivalent) will likely be unattainable for most Permittees by July 1, 2022 given the diminishing returns that are already being realized, the COVID 19 pandemic that has signficantly reduced the ability of Permittees to implement trash controls, and the looming economic downturn that will significantly impact Permittees' budgets to fund trash control projects and other non-critical projects/programs. Additionally, the overall performance criteria will not be attainable (regardless of the compliance date) if source control credits and offsets allowed in MRP 2.0 are disallowed in future iterations of the MRP.	A more practical trash reduction goal is warranted during MRP 3.0. State Water Board allows up to 2030 for other Permittees around the State to achieve full capture or equivalent. Extend the timeframe attainment of the performance criteria.	H	
C.10.a.ii Trash Generation Area Management	Demonstrate attainment of goals by management of mapped trash generation areas to a level of low trash generation.	Current method to attain low trash generation is constrained to full capture or On-land Visual Trash Assessment (OVTA) score of "A" all places, at all times, which is inconsistent with State Water Board Trash Amendments.	Methods that can be used to demonstrate low trash generation needs to be more explicit in the permit and consistent with State Water Board teminology on Full Capture or Full Capture System Equivalency. Definitions of under what circumstances OVTA results and the implementation of actions with established performance standards (e.g., curb inlet screens) with or without OVTAs achieve full capture system equivalency should be explicitly included in the reissued permit.	H	

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MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
	Permittees shall have an opportunity to correct and/or revise, based on improved information, the 2009 trash levels and trash generation areas in their February 2014 maps by submitting the correction and/or revision no later than the 2016 Annual Report deadline.	Baseline maps may need to be updated as new information becomes available. Not doing so would require the use of resources to conduct ongoing assessments in areas that have achieved low trash generation since 2009.	Provide continued opportunities to revise/improve baseline maps based on new information during the next permit term. Land areas with private drainages were mapped during MRP 2.0 and assessments of baseline conditions of these properties may be needed.	M	
	Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems.	Trash generated from private land areas connected to Co-permittee MS4s are difficult to control and may require additional time beyond the schedule included in C.10.a.i.	A practical approach to addressing trash from these private land areas needs to be included in the next permit. This approach could differ from the methods used to demonstrate reductions in the public right of way.	H	
		A portion of Caltrans right of ways are currently included on Co-permittee baseline maps and should be removed as jurisdictional areas that are the responsibility of Co-permittees.	Explicit language should be included in the permit to state that Permittees are not responsible for trash generated on Caltrans ROW, nor any other land areas where dischrages are covered under separate NPDES permits or Waste Discharge Requirements.		
C.10.a.iii. Mandatory Minimum Full Trash Capture	Minimum full capture system acreage treatment requirements.	All Co-permittees have achieved the goals set out in this subprovision and therefore it is outdated and unnecessary.	Remove mandatory minimum full trash capture requirements in next permit.	M	
C.10.b.i. Full Trash Capture Systems - Maintenance and Operation	Requirements for mainteance and operation of ful capture systems.	Requirements for maintaining large/high flow capacity systems need to be updated. Current requirements are written to only apply to small/inlet-based systems.	Adjust maintenance requirements for large capture systems and defer to manufacturer recommendations	M	
C.10.b.ii Other Trash Management Actions	Conduct OVTAs of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions.	Existing ambiguity in MRP 2.0 on visual assessment frequency should be addressed. Frequency of assessments at specific sites may be different based on the variability of scores at a site/TMA.	To ensure consistency among SMCWPPP permittees, develop specific visual assessment frequencies that should be achieved. Frequencies should be based on documented variablity in OVTA scores at specific sites/TMAs. Once a site/TMA has achieved low trash generation/full capture system equivalency and variability has decreased to acceptable level, frequencies should be reduced accordingly.	H	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
	If attempting to develop a trash reduction performance standard, put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably.	No issues with this provision as worded, however, an additional provision needs to be included that describes the performance standard for curb inlet screens with street sweeping, and allows Co-permittees implementing the performance standard to attain a stipulated trash reduction percentage for the area where the actions are being implemented.	Based on the outcomes of performance standard studies conducted on autoretractable screens with street sweeping, a separate provision needs to be added to the permit to allow for application of the performance standard established and the commensurate stipulated trash reductions.	H	
iii. Percentage Discharge Reduction	Document reductions based on the formula included in the permit.	No issues.	No changes recommended.	L	
iv. Source Controls	Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items, may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions.	Water Board staff may be proposing to phase out source control credits.	No changes recommended. Source controls provide valuable water quality benefits at levels that may not be seen using OVTAs, which are relatively coarse indicators. Existing source control credits should be retained and possibly expanded. Additional actions are underway by Permittees and capping the reductions at 10% disincentivizes new source controls.	H	
v. Receiving Water Monitoring	Conduct Pilot Receiving Water Monitoring for trash, to answer the questions included in the permit.	Monitoring conducted during MRP 2.0 is complete and has answered the questions outlined in the permit.	Receiving water trash monitoring requirements should be removed from Provision C.10 and discussed in the context of all water quality monitoring data needs. Monitoring requirements should not be expanded to include Bay and “still” water monitoring. Focus should remain on creeks and channels given that these are the water bodies that are most directly impacted by trash from watersheds and stormwater runoff.	M	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.10.c. Trash Hot Spot Selection and Cleanup	Conduct trash hot spot cleanups twice per year and conduct assessments at the number of sites outlined in Attachment E to the permit.	Requirements are not providing significant trash reduction benefits and should be removed from the MRP.	As agreed in the MRP 3.0 Work Group that includes Water Board staff, requirements should be removed or incorporated into offset accounting for creek/shoreline cleanups. This would incentivize additional cleanups, which have a direct water quality benefit.	M	
C.10.d. Trash Load Reduction Plans	Each Permittee shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report.	No issues identified.	No changes recommended.	L	
C.10.e. Optional Trash Load Reduction Offset Opportunities - Additional Creek and Shoreline Cleanups	A Permittee may offset part of its provision C.10.a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot cleanups required by C.10.c	Water Board staff is proposing to phase out these offsets.	Existing offsets for creek and shoreline clean ups should be continued (and possibly expanded) into the next permit term. Offset factor (10:1) should not be increased in the next permit term.	H	
C.10.e. Optional Trash Load Reduction Offset Opportunities - Direct Discharge	A Permittee may offset an additional part of its provision C.10.a trash load percent reduction requirement by implementing a comprehensive plan approved by the Executive Officer for control of direct discharges of trash to receiving waters from non-storm drain system sources.	Water Board staff is proposing to phase out these offsets.	Existing offsets for direct discharge trash control programs should be continued (and possibly expanded) into the next permit term. Offset factor (10:1) should not be increased in the next permit term.	H	
C.10.f - Reporting	Report annually as described in the permit.	No issues identified.	No changes recommended.	L	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C. 11 and 12	Overall Requirements	These provisions are expected to continue pollutant control programs that began during previous permit terms and introduce a couple of new programs. The Bay mercury and PCBs TMDLs are an appropriate water quality priority. However, the associated controls must be appropriately phased, targeted, and prioritized, and specific pollutant load reductions should not be mandated given the uncertainties in their achievability. In addition, meeting the PCBs TMDL allocation in the 20-year time frame appears cost-prohibitive. Prioritization of areas to address and integration with other funding sources related to transportation, urban greening, climate change, etc. is essential.	The permit should require a programmatic approach to pollutant controls rather than including any mandates for pollutant load reductions. Update the PCBs TMDL to better reflect 1) questionable feasibility of meeting allocations and 2) uncertainties in allocations related to a number of factors (e.g., food web and pollutant fate modeling, fish consumption rate and target species, dose response). TMDL updates should make uncertainties explicit while reducing them to the extent possible.	H	
C.11/12.a. Implement Control Measures to Achieve Mercury/PCBs Load Reductions	Implement mercury/PCBs source and treatment control measures and pollution prevention strategies to achieve specified mercury/PCBs loads reductions throughout the area covered by the permit.	There is significant uncertainty in Permittees' ability to meet any mandated mercury and PCB load reductions. There is also significant uncertainty in the existing loading rates of these pollutants to storm drains and the Bay and how it relates to the key impairment metric (pollutant levels in fish tissue). If Permittees were unable to demonstrate achievement of numerical load reductions, they would be subject to potential enforcement action by the Regional Water Board and/or citizen suits from third parties as allowed under the Clean Water Act. As such, any mandate for reductions in pollutant loads would result in significant concern about the lack of a clear path to compliance. The permit should employ a programmatic approach by specifying pollutant control programs and stipulating the associated estimated load reduction benefits for the MRP 3.0 permit term. Implementation of the programs and the estimated load reductions actually achieved would be evaluated towards the end of the permit term and the programs would be adjusted as needed for the subsequent permit term (MRP 4.0).	Continue implementing pollutant control programs that began during previous permit terms and initiate a couple of new programs. Identify a list of accountable, trackable program elements that tie directly to stipulated load reductions. Track and report on implementation of PCBs/mercury source and treatment controls. Report implementation levels annually. Programs to include: (1) Conduct investigations of potential PCBs-contaminated areas within their jurisdictional boundaries with primary focus on old industrial land areas; (2) Identify potential high-priority catchments without control measures where enhanced O&M may be appropriate, assess need for implementing additional enhanced O&M measures, and implement enhanced O&M measures where appropriate; (3) Develop and implement a program to manage PCBs in oil-filled electrical equipment (OFEE) for both municipally owned and non-municipally owned electrical utilities in the MRP area (e.g., improved spill response and reporting); and (4) Track development of a Caltrans specification to manage potential PCBs-containing material in bridges as part of replacement, conduct a bridge inventory, identify ownership and bridges due for replacement and schedule of bridge replacement, maintain a list of applicable infrastructure that is scheduled for replacement, implement or cause to be implemented the Caltrans specifications during applicable replacement activities that are under the direction of the Permittee.	H	

MRP Reissuance - Summary of SMCWPPP Permittee Priority Issues and Updates

MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.11/12.b. Assess Mercury/PCBs Load Reductions from Stormwater	Develop and implement an assessment methodology and data collection program to quantify in a technically sound manner mercury/PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, including mercury/PCBs source control, stormwater treatment, green infrastructure, and other measures. Use the assessment methodology to demonstrate progress toward achieving the load reductions required in this permit term and the program area wasteload allocations.	Use the methods developed during MRP 2.0 to assess pollutant load reductions associated with the control programs.	Summarize estimated load reductions of implemented control measures once per permit term with the fourth year Annual Report, including programs shown above under C.11/12.a. and Full Trash Capture devices and their catchment areas.		
C.11/12.c. Plan and Implement Green Infrastructure to Reduce PCBs Loads	Implement green infrastructure projects during the term of the permit to achieve the mercury/PCBs load reductions performance criteria. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, prepare a reasonable assurance analysis to demonstrate quantitatively that specified mercury/PCBs load reductions will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.	Green infrastructure requirements should be specified in Provision C.3. Green infrastructure implementation should not be a pollutant control program under C.11/12, but Permittees should continue to account for pollutant loads reduced.	Implement green infrastructure metrics established in C.3., track GI Implementation (annually), and report associated load reductions through green infrastructure implementation (Year 4).	H	
C.11/12.d. Prepare Implementation Plan and Schedule to Achieve TMDL Allocations	Prepare a plan and schedule for mercury/PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the mercury/PCBs TMDL wasteload allocations by 2028/2030.	Prepare a similar plan and schedule towards the end of the MRP 2.0 permit term, accounting for the latest data from program implementation/monitoring and any updates to the TMDLs.	The plan should be submitted with the ROWD for MRP 4.0.	M	
C.12.e. Evaluate PCBs in Presence in Caulks/Sealants used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way	Collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era.	This study was completed and this requirement is no longer needed in the permit.	Remove this requirement from the permit.	H	
C.12.f. Manage PCB-Containing Materials and Wastes during building demolition activities so that PCBs do not enter municipal storm drains.	Develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition so that PCBs do not enter MS4s. PCBs from these structures can enter storm drains during and/or after demolition through vehicle trackout, airborne releases, soil erosion, or stormwater runoff. Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed or remodeled between the years 1950 and 1980. Single-family residential and wood frame structures are exempt. A Permittee is exempt from this requirement if it provides evidence acceptable to the Executive Officer that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.	Permittees should continue to implement the program to manage PCBs during demolition that was initiated July 1, 2019.	Permittees should continue to enter applicable structures demolished into a tracking system, report numbers of applicable buildings permitted (annually), submit a list of the applicable structures that applied for a demolition permit that had material(s) with PCBs at 50 ppm or greater with the address and demolition date (annually), evaluate data collected to identify any refinements to load reduction equation parameters and/or implementation program, and submit status report with request for additional load reduction credit (if justified) (Year 3).	H	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.12.g. Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins	Conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.	No issues identified.	No updates recommended at this time.	M	
C.11.e./C.12.h. Implement a Risk Reduction Program	Conduct an ongoing risk reduction program to address public health impacts of mercury/PCBs in San Francisco Bay / Delta fish with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families.	No issues identified.	No updates recommended at this time.	M	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.13.a Manage waste generated from cleaning and treating of copper architectural features	Require, when issuing building permits, use of appropriate BMPs for managing waste during and post-construction. Educate installers and operators on appropriate BMPs for managing copper-containing wastes. Enforce against noncompliance.	No issues identified.	No updates recommended at this time.	--	
C.13.b Manage discharges from pools, spas, and fountains that contain copper-based chemicals	Either 1) require installation of a sanitary sewer discharge connection; or 2) require diversion of discharge for use in landscaping or irrigation.	No issues identified.	No updates recommended at this time.	--	
C.13.c.Industrial Sources	Ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.	No issues identified.	No updates recommended at this time.	--	

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MRP Provision	Current MRP Requirement	Summary of Issues and Rationale for Changes in Reissued Permit	Recommended Update(s)	Priority	Associated Attachments to Permit Application
C.15.a. Exempted Non-Stormwater Discharges	In carrying out Discharge Prohibition A.1, certain unpolluted discharges listed in the permit are exempted from the prohibition against non-stormwater discharges.	No issues identified.	No updates recommended at this time.	--	
C.15.b.i. Conditionally Exempted Non-Stormwater Discharges	(1) Pumped Groundwater from Non-Drinking Water Aquifers; (2) Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains;	No issues identified.	No updates recommended at this time.	--	
C.15.b.ii Conditionally Exempted Non-Stormwater Discharges	Air Conditioning Condensate	No issues identified.	No updates recommended at this time.	--	
C.15.b.iii Conditionally Exempted Non-Stormwater Discharges	Emergency Discharges of Potable Water - iii.(2)(a) The Permittees shall implement or require firefighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located. (b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). (3) Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.	Water Board staff wants to clarify approaches regarding discharges of pollutants associated with emergency firefighting activities (e.g., chlorinated water and firefighting foams). Permittees have developed recommended minor language changes to address this concern.	Rename subprovision to Emergency Discharges from Firefighting Activities and include that BMPs shall be implemented for emergency discharges of potable water or foam.	**M**	
C.15.b.iv Conditionally Exempted Non-Stormwater Discharges	Individual Residential Car Washing	No issues identified.	No updates recommended at this time.	--	
C.15.b.v Conditionally Exempted Non-Stormwater Discharges	Swimming Pool, Hot Tub, Spa, and Fountain Discharges	No issues identified.	No updates recommended at this time.	--	
C.15.b.vi Conditionally Exempted Non-Stormwater Discharges	Irrigation Water Landscape Irrigation, and Lawn or Garden Watering	No issues identified.	No updates recommended at this time.	--	

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C.17.a Annual Reports	Submit Annual Reports	No issues identified.	No updates recommended at this time.	--	
C.17.b Annual Reports	Develop common annual reporting form	No issues identified.	No updates recommended at this time.	--	
C.17.c Annual Reports	Certify compliance with all requirements	No issues identified.	No updates recommended at this time.	--	
C.18.a Modifications to Order	To address significant changed conditions identified in the technical or Annual Reports	No issues identified.	No updates recommended at this time.	--	
C.18.b Modifications to Order	To incorporate applicable requirements of statewide water quality control plans or amendments to Basin Plans	No issues identified.	No updates recommended at this time.	--	
C.18.c Modifications to Order	To comply with any applicable CWA requirements, guidelines, or regulations	No issues identified.	No updates recommended at this time.	--	
C.18.d Modifications to Order	To approve and incorporate an alternative method or methods of distributing the county load reductions for mercury or PCBs on a Permittee-specific basis, as allowed by Provisions C.11 and C.12.	No issues identified.	Consider whether this is needed in MRP 3.0.	L	
C.19 Standard Provisions	Comply with all standard provisions in Attachment G	No issues identified.	No updates recommended at this time.	--	
C.20 Expiration Date	Submit Report of Waste Discharge	No issues identified.	Update dates.	L	
C.21 Recission of Old Order	Recission date for MRP 2.0	No issues identified.	Update Order No. and dates.	L	
C.22 Effective Date	Effective date of MRP 3.0	No issues identified.	Update dates.	L	

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All	pg 5. "....the Permittees shall comply with the following requirements in this Order."	WB staff has stated that Permittees requested clarification on which Provisions apply to non-population based Permittees. This statement is not needed because non-population based Permittees are named Permittees of the MRP. If clarification is needed a statement could be added to the Fact Sheet under the appropriate Provisions.	No updates recommended at this time.	**M**	
Potential New Provision - Cost Reporting	No current requirements	WB staff has stated that the reissued perimit will have requirements for reporting information on costs expended by Co-permittees on compliance with the permit.	No updates or new requirements are recommended at this time. It is currently unclear how cost information would be used by the Water Board. Cost reporting provides an additional burden on Co-permittees that is not likely warranted given the unclear intended use of the information that would be reported by Co-permittees.	--	
Potential New Provision - Homelessness	No current requirements	WB staff has stated that they plan to include specific requirements regarding the management of homeless encampments to protect stormwater quality.	No updates or new requirements are recommended at this time. Stormwater quality is protected through the implementation of actions described in the permit, including but not limited to illicit discharge detection and elimination, municipal operations, and trash requirements.	--	

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ATTACHMENT 5 APPENDIX A- List of Supporting Documents

Section	Attachment ID	Document Name	Completion Date
MRP 3.0 Work Group Meeting Summaries			
All Provisions - MRP 3.0 Steering Committee Meeting Summaries & Other Related Information			
1	1	MRP 3.0 Steering Committee (SC) Kick-off Meeting Summary	10/30/2018
	2	MRP 3.0 Steering Committee Meeting Summary	1/29/2019
	3	MRP 3.0 Steering Committee Meeting Summary	3/26/2019
	4	MRP 3.0 Steering Committee Meeting Summary	6/25/2019
	5	MRP 3.0 Steering Committee Meeting Summary	11/5/2019
	6	MRP 3.0 Steering Committee Meeting Summary	12/3/2019
	7	MRP 3.0 Steering Committee Meeting Summary	4/7/2020
	8	June 10, 2020 Water Board Meeting - Recording of Meeting	6/10/2020
	9	June 10, 2020 Water Board Meeting - Water Board Staff Presentation	6/10/2020
	10	June 10, 2020 Water Board Meeting - Presentation from Multiple MRP Permittee Representatives regarding Priority Issues	6/10/2020
MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summaries			
2	1	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	2/7/2019
	2	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	3/7/2019
	3	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	4/4/2019
	4	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	5/2/2019
	5	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	6/6/2019
	6	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	7/15/2019
	7	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	9/5/2019
	8	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	10/3/2019
	9	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	11/14/2019
	10	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	12/5/2019
	11	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	1/29/2020
	12	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	2/6/2020
	13	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	3/5/2020
	14	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	4/2/2020
	15	MRP 3.0 C.3-Green Infrastructure Work Group Meeting Summary	5/7/2020
MRP 3.0 C.4/C.5 Work Group Meeting Summaries			
3	1	MRP 3.0 C.4/C.5 Work Group Meeting Summary	2/11/2020
	2	MRP 3.0 C.4/C.5 Work Group Meeting Summary	4/2/2020
	3	MRP 3.0 C.4/C.5 Work Group Meeting Summary	5/13/2020
MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summaries			
4	1	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	2/25/2019
	2	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	3/25/2019
	3	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	4/25/2019
	4	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	8/19/2019
	5	MRP 3.0 C.8 Water Quality Monitoring Work Group Meeting Summary	10/29/2019
MRP 3.0 C.10 Trash Work Group Meeting Summaries & Other Related Information			
5	1	MRP 3.0 C.10 Trash Work Group Meeting Summary	3/11/2019
	2	MRP 3.0 C.10 Trash Work Group Meeting Summary	4/23/2019
	3	MRP 3.0 C.10 Trash Work Group Meeting Summary	5/29/2019
	4	MRP 3.0 C.10 Trash Work Group Meeting Summary	7/23/2019
	5	December 11, 2019 Water Board Meeting - Presentation from Multiple MRP Permittee and Program Representatives regarding Provision C.10 (Trash Load Reduction)	12/11/2019
	6	MRP 3.0 C.10 Trash Work Group Meeting Summary	12/13/2019
	7	MRP 3.0 C.10 Trash Work Group Meeting Summary	3/24/2020
MRP 3.0 C.11/C.12 Work Group Meeting Summaries			
6	1	MRP 3.0 C.11/C.12 Work Group Meeting Summary	4/25/2019
	2	MRP 3.0 C.11/C.12 Work Group Meeting Summary	6/10/2019
	3	MRP 3.0 C.11/C.12 Work Group Meeting Summary	1/30/2020
MRP 3.0 Homelessness Work Group Meeting Summaries			
7	1	MRP 3.0 Homelessness Work Group Meeting Summary	2/24/2020
	2	MRP 3.0 Homelessness Work Group Meeting Summary	4/1/2020
MRP 3.0 Tracking & Reporting Work Group Meeting Summary			
8	1	MRP 3.0 Tracking & Reporting Work Group Meeting Summary	2/19/2020
SMCWPPP Submittals			
All Provisions- SMCWPPP and Permittee Annual Reports			
9	1	SMCWPPP Program Annual Report FY 2013-14	9/15/2014
	2	SMCWPPP Co-permittee Annual Reports FY 2013-14	9/15/2014
	3	SMCWPPP Program Annual Report FY 2014-15	9/15/2015
	4	SMCWPPP Co-permittee Annual Reports FY 2014-15	9/15/2015
	5	SMCWPPP Program Annual Report FY 2015-16	9/30/2016
	6	SMCWPPP Co-permittee Annual Reports FY 2015-16	9/30/2016
	7	SMCWPPP Program Annual Report FY 2016-17	9/30/2017
	8	SMCWPPP Co-permittee Annual Reports FY 2016-17	9/30/2017
	9	SMCWPPP Program Annual Report FY 2017-18	9/30/2018
	10	SMCWPPP Co-permittee Annual Reports FY 2017-18	9/30/2018

ATTACHMENT 5 APPENDIX A- List of Supporting Documents

Section	Attachment ID	Document Name	Completion Date
	11	SMCWPPP Program Annual Report FY 2018-19	9/30/2019
	12	SMCWPPP Co-permittee Annual Reports FY 2018-19	9/30/2019
C.3 – New Development and Redevelopment			
10	1	SMCWPPP FY 13-14 Stormwater Treatment Systems and Hydromodification Management Controls Installed within San Mateo County from July 1, 2013 through June 30, 2014	9/30/2014
	2	BASMAA "White Paper" on Provision C.3 in MRP 2.0	2/27/2015
	3	SMCWPPP FY 14-15 Stormwater Treatment Systems and Hydromodification Management Controls Installed within San Mateo County from July 1, 2014 through June 30, 2015	9/30/2015
	4	BASMAA Model Biotreatment Soil Media Specifications - MRP 2.0 Provision C.3.c.i.(2)(c)(ii)	2/5/2016
	5	BASMAA Guidance for Identifying Green Infrastructure Potential in Municipal Capital Improvement Projects	5/6/2016
	6	SMCWPPP FY 15-16 Stormwater Treatment Systems and Hydromodification Management Controls Installed within San Mateo County from July 1, 2015 through June 30, 2016	9/30/2016
	7	BASMAA Regional Supplement for New Development and Redevelopment FY 2015-16	9/30/2016
	8	SMCWPPP FY 16-17 Stormwater Treatment Systems and Hydromodification Management Controls Installed within San Mateo County from July 1, 2016 through June 30, 2017	9/30/2017
	9	BASMAA Regional Supplement for New Development and Redevelopment FY 2016-17	9/30/2017
	10	SMCWPPP FY 17-18 Stormwater Treatment Systems and Hydromodification Management Controls Installed within San Mateo County from July 1, 2017 through June 30, 2018	9/30/2018
	11	BASMAA Regional Supplement for New Development and Redevelopment FY 2017-18	9/30/2018
	12	BASMAA Guidance for Sizing Green Infrastructure Facilities in Street Projects	10/25/2018
	13	SMCWPPP FY 18-19 Stormwater Treatment Systems and Hydromodification Management Controls Installed within San Mateo County from July 1, 2018 through June 30, 2019	9/30/2019
	14	BASMAA Regional Supplement for New Development and Redevelopment FY 2018-19	9/30/2019
C.7 – Public Information and Outreach			
11	1	BASMAA Final Be the Street Evaluation Report	8/27/2014
	2	BASMAA Regional Supplement for Training and Outreach FY 2013-14	9/15/2014
	3	BASMAA Regional Supplement for Training and Outreach FY 2014-15	9/15/2015
	4	BASMAA Regional Supplement for Training and Outreach FY 2015-16	9/30/2016
	5	BASMAA Regional Supplement for Training and Outreach FY 2016-17	9/30/2017
	6	BASMAA Regional Supplement for Training and Outreach FY 2017-18	9/30/2018
	7	BASMAA Regional Supplement for Training and Outreach FY 2018-19	9/30/2019
C.8 – Water Quality Monitoring			
12	1	SMCWPPP Urban Creeks Monitoring Report for Water Year 2014 (October 2013-September 2014) (Merged)	3/15/2015
	2	SMCWPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2014 (October 2013- September 2014)	3/15/2015
	3	SMCWPPP Creek Status Monitoring Report Water Year 2014 (October 2013- September 2014)	3/15/2015
	4	SMCWPPP Electronic Monitoring Data Submittal for Water Year 2014	3/15/2015
	5	SMCWPPP Urban Creeks Monitoring Report for Water Year 2015 (October 2014-September 2015) (Merged)	3/31/2016
	6	SMCWPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2015 (October 2014- September 2015)	3/31/2016
	7	SMCWPPP Appendix A Creek Status Monitoring Report Water Year 2015 (October 2014- September 2015)	3/31/2016
	8	BASMAA RMC 2010-2016 Stressor/Source Identification (SSID) Project Locations, Rationales, Status Updated February 2016	3/31/2016
	9	SMCWPPP San Mateo Creek Low Dissolved Oxygen Stressor/Source Identification Study Final Project Report	6/23/2015
	10	SMCWPPP San Mateo Creek Pathogen Indicator Stressor/Source Identification Final Project Report	9/28/2015
	11	SMCWPPP BMP Effectiveness of Bransten Road, City of San Carlos Report	3/31/2016
	12	SMCWPPP PCBs and Mercury Source Area Identification Water Year 2015 POC Monitoring Report	9/30/2015
	13	SMCWPPP Electronic Monitoring Data Submittal for Water Year 2015	3/31/2016
	14	BASMAA Regional Monitoring Coalition Creek Status and Pesticides & Monitoring Quality Assurance Project Plan	3/31/2016
	15	BASMAA Regional Monitoring Coalition Creek Status and Pesticides & Monitoring Standard Operating Procedures	3/31/2016
	16	SMCWPPP POC Monitoring Report - Water Year 2016 Accomplishments & Water Year 2017 Planned Allocation of Effort	10/12/2016
	17	SMCWPPP Urban Creeks Monitoring Report for Water Year 2016 (October 2015-September 2016) (Merged)	3/31/2017
	18	SMCWPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2016 (October 2015- September 2016)	3/31/2017
	19	SMCWPPP Appendix A Creek Status Monitoring Report Water Year 2016 (October 2015- September 2016)	3/31/2017
	20	BASMAA RMC Regional Status of Stressor/Source Identification (SSID) Projects For Projects Initiated Under MRP 1 Updated February 2017	3/31/2017
	21	SMCWPPP Pollutants of Concern Monitoring - Data Report Water Year 2016	3/31/2017
	22	SMCWPPP Electronic Monitoring Data Submittal for Water Year 2016	3/31/2017
	23	SMCWPPP POC Monitoring Report - Water Year 2017 Accomplishments & Water Year 2018 Planned Allocation of Effort	10/10/2017
	24	SMCWPPP Urban Creeks Monitoring Report for Water Year 2017 (October 2016-September 2017) (Merged)	3/31/2018
	25	SMCWPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2017 (October 2016- September 2017)	3/31/2018
	26	SMCWPPP Appendix A Creek Status Monitoring Report Water Year 2017 (October 2016- September 2017)	3/31/2018
	27	BASMAA RMC Regional Stressor/Source Identification (SSID) Report MRP 2.0 SSID Project Locations, Rationales, Status Updated March 2018	3/31/2018
	28	SMCWPPP Pillar Point Watershed Pathogen Indicator Stressor/Source Identification Project Work Plan	3/31/2018
	29	SMCWPPP Pollutants of Concern Monitoring - Data Report Water Year 2017	3/29/2018

ATTACHMENT 5 APPENDIX A- List of Supporting Documents

Section	Attachment ID	Document Name	Completion Date
	30	SMCWPPP Electronic Monitoring Data Submittal for Water Year 2017	3/31/2018
	31	SMCWPPP POC Monitoring Report - Water Year 2018 Accomplishments & Water Year 2019 Planned Allocation of Effort	10/15/2018
	32	SMCWPPP Urban Creeks Monitoring Report for Water Year 2018 (October 2017-September 2018) (Merged)	3/31/2019
	33	SMCWPPP Urban Creeks Monitoring Report Water Quality Monitoring Water Year 2018 (October 2017- September 2018)	3/31/2019
	34	SMCWPPP Creek Status Monitoring Report Water Year 2018 (October 2017- September 2018)	3/31/2019
	35	BASMAA RMC Regional Stressor/Source Identification (SSID) Report MRP 2.0 SSID Project Locations, Rationales, Status Updated March 2019	3/31/2019
	36	SMCWPPP Pollutants of Concern Monitoring - Data Report Water Year 2018	3/31/2019
	37	BASMAA PCBs from Electrical Utilities in San Francisco Bay Area Watersheds Stressor/Source Identification (SSID) Project Work Plan	3/6/2019
	38	SMCWPPP Electronic Monitoring Data Submittal for Water Year 2018	3/31/2019
	39	BASMAA Fact Sheet: Assessing the Health of San Francisco Bay Area Creeks Findings from Baseline Monitoring (2012-2016) Conducted by the Bay Area's Regional Monitoring Coalition	8/22/2019
	40	SMCWPPP POC Monitoring Report - Water Year 2019 Accomplishments & Water Year 2020 Planned Allocation of Effort	10/15/2019
	41	SMCWPPP Integrated Monitoring Report for Water Years 2014 through 2019 (Merged)	3/31/2020
	42	SMCWPPP Integrated Monitoring Report for San Mateo County Permittes Water Years 2014-2019 Executive Summary	3/31/2020
	43	SMCWPPP Integrated Monitoring Report Part A: San Francisco Estuary Receiving Water Monitoring Water Years 2014 through 2019	3/31/2020
	44	SMCWPPP Integrated Monitoring Report Part B: Creek Status Monitoring Water Years 2014 through 2019	3/31/2020
	45	SMCWPPP Integrated Monitoring Report Part C: Stressor/Source Identification Projects Water Years 2014 through 2019	3/31/2020
	46	SMCWPPP Integrated Monitoring Report Part D: Pollutants of Concern Monitoring Report Data Collected in San Mateo County through 2019	3/31/2020
	47	SMCWPPP Integrated Monitoring Report Part E: Water Quality Monitoring Cost Summary for San Mateo County Water Years 2014-2019	3/31/2020
	48	SMCWPPP Electronic Monitoring Data Submittal for Water Year 2019	3/31/2020
C.9 – Pesticides Toxicity Control			
13	1	BASMAA Regional Supplement for FY 2013-2014 Annual Report -MRP Provision C.9.e.	9/12/2014
	2	BASMAA Regional Supplement for FY 2014-2015 Annual Report- MRP Provision C.9.e.	9/15/2015
	3	BASMAA Regional Supplement for FY 2015-2016 Annual Report- MRP Provision C.9.e	9/30/2016
	4	BASMAA Regional Supplement for FY 2016-2017 Annual Report- MRP Provision C.9.e	9/30/2017
	5	BASMAA Regional Supplement for FY 2017-2018 Annual Report- MRP Provision C.9.e.	9/30/2018
	6	BASMAA Regional Supplement for FY 2018-2019 Annual Report- MRP Provision C.9.e	9/30/2019
	7	SMCWPPP Pesticide Source Control Actions Effectiveness Evaluation	9/30/2019
C.10 – Trash Load Reduction			
14	1	SMCWPPP Permittee Long-Term Trash Load Reduction Plans	2/1/2014
	2	BASMAA San Francisco Bay Area Stormwater Trash Generation Rates Final Technical Report	6/20/2014
	3	BASMAA Alternative Trash Assessment Methodology: On-land Trash Cleanup Monitoring Study- Final Study Design Concept	8/17/2016
	4	BASMAA On-land Visual Assessment Protocol A - Street and Sidewalk Survey	9/15/2017
	5	BASMAA Responses to Water Board Staff comments (dated 7/31/17) on Receiving Water Trash Monitoring Program Plan	10/22/2017
	6	BASMAA Receiving Water Trash Monitoring Program Plan for the San Francisco Region Version 1.0	10/27/2017
	7	BASMAA On-land Visual Assessment Protocol B - Driving Survey	3/15/2018
	8	BASMAA On-land Visual Assessment Protocol C - Area-based Assessments	3/15/2018
	9	BASMAA Standard Operating Procedures and Data Collection Forms for Qualitative Trash Assessments and Quantitative Trash Monitoring in Receiving Waters (Version 2.0)	7/11/2018
	10	BASMAA San Francisco Bay Area Receiving Water Trash Monitoring Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols Preliminary Report	6/27/2019
	11	SMCWPPP Co-permittee Annual Reports FY 2018-2019 Section C.10.d	9/30/2019
	12	BASMAA San Francisco Bay Area Receiving Water Trash Monitoring Pilot-Testing of Qualitative and Quantitative Monitoring and Assessment Protocols Final Report	6/14/2020
	13	SMCWPPP Co-permittee Trash Load Reduction & Remaining Acres Summary Table - July 2020	7/2/2020
C.11/12 – Mercury and PCB Controls			
15	1	SMCWPPP Progress Report: Identification of Watershed Management Areas for PCBs and Mercury	4/1/2016
	2	BASMAA Bay Area Reasonable Assurance Analysis White Paper	4/21/2016
	3	SMCWPPP Identifying Management Areas and Controls for Mercury and PCBs in San Mateo County Stormwater Runoff	9/30/2016
	4	BASMAA Interim Accounting Methodology for PCBs and Mercury Version 1.1	3/23/2017
	5	BASMAA Clean Watersheds for A Clean Bay (CW4CB) Project (http://basmaa.org/Clean-Watersheds-for-a-Clean-Bay-Project)	5/2/2017
	6	BASMAA Bay Area Reasonable Assurance Analysis Guidance Document	6/30/2017
	7	SMCWPPP Updated Control Measures Plan for PCBs and Mercury in San Mateo County Stormwater Runoff (September 2017)	9/30/2017
	8	BASMAA Evaluation of PCBs in Caulk and Sealants in Public Roadway and Storm Drain Infrastructure Project Report	8/16/2018
	9	SMCWPPP Quantitative Relationship between Green Infrastructure Implementation and PCBs/Mercury Load Reduction	9/11/2018
	10	SMCWPPP Updated Control Measures Plan for PCBs and Mercury in San Mateo County Stormwater Runoff (September 2018)	9/30/2018
	11	BASMAA Pollutant Removal from Stormwater with Biochar Amended Bioretention Soil Media (BSM) Project Report	2/8/2019

ATTACHMENT 5 APPENDIX A- List of Supporting Documents

Section	Attachment ID	Document Name	Completion Date
	12	BASMAA Pollutants of Concern Monitoring for Management Action Effectiveness Evaluation of Mercury and PCBs Removal Effectiveness of Full Trash Capture Hydrodynamic Separator Units Project Report	2/20/2019
	13	SMCWPPP Updated Control Measures Plan for PCBs and Mercury in San Mateo County Stormwater Runoff (September 2019)	9/30/2019
C.14 – City of Pacifica and San Mateo County Fecal Indicator Bacteria Controls			
16	1	San Pedro Creek and Pacifica State Beach Bacteria TMDL Best Management Practices Implementation Plan and Monitoring Plan Update	6/26/2020

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP)

Table Identifying the Extent of Trash Generating Areas Remaining in Permittee Jurisdictional Areas

2020 Report of Waste Discharge (July 2, 2020)

Permittee name	Total Jurisdictional Baseline Trash Generating Areas (acres) (Moderate, High and Very High)	Trash Reduction (%) reported in FY 2018-19 Annual Report		% Trash Generating Acres Addressed via Full Capture or Other Actions (via OVTAs) without credits & offsets	Moderate Areas (acres) Remaining to be Addressed				High Trash Generation Areas (acres) Remaining to be Addressed				Very High Trash Generation Areas (acres) Remaining to be Addressed				Total Trash Generation Areas (acres) Remaining to be Addressed			
		With credits and offsets	Without credits and offsets		Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)	Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)	Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)	Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)
Atherton	181	86%	86%	89%	20	0	0	20	0	0	0	0	0	0	0	0	**20**	0	0	20
Belmont	242	96%	96%	82%	43	0	0	43	0	0	0	0	0	0	0	0	**43**	0	0	43
Brisbane	464	89%	79%	69%	140	15	120	5	5	0.3	0	4.7	1	0	1	0	**146**	15.3	121	9.7
Burlingame	664	84%	74%	70%	165	75	20	70	34	10	0	24	3	0	0	3	**202**	85	20	97
Colma	198	92%	82%	65%	65	0	0	65	5	0	0	5	0	0	0	0	**70**	0	0	70
Daly City	1072	80%	70%	59%	339	339	0	0	99	99	0	0	1	1	0	0	**439**	439	0	0
East Palo Alto	1267	93%	86%	74%	252	0	0	252	83	0	0	83	0	0	0	0	**335**	0	0	335
Foster City	109	92%	92%	94%	6	0	0	6	1	0	0	1	0	0	0	0	**7**	0	0	7
Half Moon Bay	131	96%	86%	69%	28	0	0	28	12	0.6	0	11.4[2]	1	0	0	1[3]	**41**	0.6	0	40.4
Hillsborough	0	100%	100%	100%	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0
Menlo Park	250	98%	88%	80%	34	0	0	34	15	0	0	15	0	0	0	0	**49**	0	0	49
Millbrae	367	96%	86%	81%	57	0	57	0	13	0	13	0	0	0	0	0	**70**	0	70	0
Pacifica	365	88%	80%	64%	130	0	0	130	2	2	0	0	0	0	0	0	**132**	2	0	130
Portola Valley	5	92%	82%	80%	1	0	0	1	0	0	0	0	0	0	0	0	**1**	0	0	1
Redwood City	1386	89%	75%	63%	410	0	0	410	98	0	0	98	6	0	0	6	**514**	0	0	514
San Bruno	861	88%	74%	78%	152	0	0	152	36	0	0	36	0	0	0	0	**188**	0	0	188
San Carlos	562	81%	71%	64%	193	0	0	193	9	0	0	9	0	0	0	0	**202**	0	0	202
San Mateo	1812	92%	82%	66%	603	268	0	335	13	83	0	0	0	0	0	0	**616**	351	0	335
San Mateo County Uninc.	938	93%	83%	76%	162	0	0	162	65	0	0	65	0	0	0	0	**227**	0	0	227
South San Francisco	2314	85%	75%	69%	636	0	0	636	89	0	0	89	0	0	0	0	**725**	0	0	725
Woodside	0	100%	100%	100%	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0

Footnotes:

1 - Acres in this column estimated to be addressed by planned Full Capture Systems may be greater than the "Total" acres. Full capture areas may overlap with areas partially addressed by Other Actions via OVTAs and included in the "Total" column.

2 - When the Crawflower Shopping Center (TMA 3B) undergoes redevelopment, the City will require full trash capture as a condition of development. The treatment area is approximately 11.4 acres.

3 - The listed very high trash generation area of one acre in Half Moon Bay is mischaracterized. The trash baseline map requires revision to reflect that the area is low trash generation.

10388
10429

July 2, 2020

Mr. Michael Montgomery
Executive Officer
San Francisco Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

sent via email

Subject: Application for Reissuance of the Municipal Regional Stormwater Permit

Dear Mr. Montgomery:

Attached please find the Waste Discharge General Information Form for National Pollutant Discharge Elimination System (NPDES) Permit Number CAS612008 for the Vallejo Flood & Wastewater District and the City of Vallejo. As co-permittees in Vallejo, the City and District look forward to continued cooperation in the renewal and implementation of the next Municipal Regional Stormwater NPDES permit.

Please do not hesitate to call Robert Newman, Environmental Services Manager, at (707) 648-5410 or email robert.newman@cityofvallejo.net for the City of Vallejo or Jennifer Harrington, Environmental Services Director, at (707) 652-7806 or email jharrington@vallejowastewater.org for the Vallejo Flood & Wastewater District if you have any questions or require additional information.

Sincerely,

Robert Newman

JENNIFER HARRINGTON
Environmental Services Director
Vallejo Flood & Wastewater District

ROBERT NEWMAN
Environmental Services Manager
City of Vallejo

CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. FACILITY:

Name City of Vallejo

Address 555 Santa Clara Street

City/County/State/Zip Code Vallejo, CA 94590

Contact Person Robert Newman

Telephone Number 707-648-5410 Email robert.newman@cityofvallejo.net

B. FACILITY OWNER:

Name City of Vallejo

Address 555 Santa Clara Street

City/State/Zip Code Vallejo, CA 94590

Contact Person Terrance Davis

Telephone Number 707-648-4301 Email terrance.davis@cityofvallejo.net

Federal Tax ID 94-6000448

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

C. FACILITY OPERATOR (The agency or business, not the person):

Name City of Vallejo

Address 555 Santa Clara Street

City/State/Zip Code Vallejo, CA 94590

Contact Person Robert Newman

Telephone Number 707-648-5410 Email robert.newman@cityofvallejo.net

Operator Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

D. OWNER OF THE LAND

Name City of Vallejo

Address 555 Santa Clara Street

City/State/Zip Code Vallejo, CA 94590

Contact Person Terrance Davis

Telephone Number 707-648-4301 Email terrance.davis@cityofvallejo.net

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED

Address 555 Santa Clara Street

City/State/Zip Code Vallejo, CA 94590

Contact Person Terrance Davis

Telephone Number 707-648-4301 Email terrance.davis@cityofvallejo.net

F. BILLING ADDRESS

Address 555 Santa Clara Street

City/State/Zip Code Vallejo, CA 94590

Contact Person Robert Newman

Telephone Number 707-648-5410 Email robert.newman@cityofvallejo.net

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application:

☐ **Waste Discharge to Land** ☑ **Waste Discharge to Surface Water**

Check all that apply:

☐ Animal or Aquacultural Wastewater
☐ Animal Waste Solids
☐ Biosolids/Residual
☐ Cooling Water
☐ Domestic/ Municipal Wastewater Treatment and Disposal
☐ Dredge Material Disposal
☐ Hazardous Waste (*see instructions*)
☐ Industrial Process Wastewater
☐ Land Treatment Unit
☐ Landfill (*see instructions*)
☐ Mining
☑ Storm Water
☐ Surface Impoundment
☐ Waste Pile
☐ Wastewater Reclamation
☐ Other, *please describe* _____

III. LOCATION OF THE FACILITY

Describe the physical location of the facility:

1. Assessor's Parcel Number(s)
   - Facility: Not Applicable
   - Discharge Point: Not Applicable
2. Latitude
   - Facility: Not Applicable
   - Discharge Point: Various
3. Longitude
   - Facility: Not Applicable
   - Discharge Point: Various

IV. REASON FOR FILING

Check all that apply:

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency City of Vallejo

Has a public agency determined that the proposed project is exempt from CEQA?

☑ Yes ☐ No

If yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below:

Water Code Section 13389

Has a "Notice of Determination" been filed under CEQA?

☐ Yes ☐ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report (EIR), or Negative Declaration. If No, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents: ☐ EIR ☐ Negative Declaration

Expected CEQA Completion Date: _____

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

Cover Letter Dated July 2020

Reference documents for joint application with the VFWD

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name Melissa Tigbao for Terrance Davis Title Public Works Director

Signature _____ Date 6/25/2020

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

California Environmental Protection Agency
Bill of Rights for Environmental Permit Applicants

California Environmental Protection Agency (Cal/EPA) recognizes that many complex issues must be addressed when pursuing reforms of environmental permits and that significant challenges remain. We have initiated reforms and intend to continue the effort to make environmental permitting more efficient, less costly, and to ensure that those seeking permits receive timely responses from the boards and departments of the Cal/EPA. To further this goal, Cal/EPA endorses the following precepts that form the basis of a permit applicant's "Bill of Rights."

1. Permit applicants have the right to assistance in understanding regulatory and permit requirements. All Cal/EPA programs maintain an Ombudsman to work directly with applicants. Permit Assistance Centers located throughout California have permit specialists from all the State, regional, and local agencies to identify permit requirements and assist in permit processing.
2. Permit applicants have the right to know the projected fees for review of applications, how any costs will be determined and billed, and procedures for resolving any disputes over fee billings.
3. Permit applicants have the right of access to complete and clearly written guidance documents that explain the regulatory requirements. Agencies must publish a list of all information required in a permit application and of criteria used to determine whether the submitted information is adequate.
4. Permit applicants have the right of timely completeness determinations for their applications. In general, agencies notify the applicant within 30 days of any deficiencies or determine that the application is complete. California Environmental Quality Act (CEQA) and public hearing requests may require additional information.
5. Permit applicants have the right to know exactly how their applications are deficient and what further information is needed to make their applications complete. Pursuant to California Government code Section 65944, after an application is accepted as complete, an agency may not request any new or additional information that was not specified in the original application.
6. Permit applicants have the right of a timely decision on their permit application. The agencies are required to establish time limits for permit reviews.
7. Permit applicants have the right to appeal permit review time limits by statute or administratively that have been violated without good cause. For state environmental agencies, appeals are made directly to the Cal/EPA Secretary or to a specific board. For local environmental agencies, appeals are generally made to the local governing board or, under certain circumstances, to Cal/EPA. Through this appeal, applicants may obtain a set date for a decision on their permit and, in some cases, a refund of all application fees (ask boards and departments for details).
8. Permit applicants have the right to work with a single lead agency where multiple environmental approvals are needed. For multiple permits, all agency actions can be consolidated under a lead agency. For site remediation, all applicable laws can be administered through a single agency.
9. Permit applicants have the right to know who will be reviewing their application and the time required to complete the full review process.

CALIFORNIA Water Boards

GAVIN NEWSOM GOVERNOR

JARED BLUMENFELD SECRETARY FOR ENVIRONMENTAL PROTECTION

State of California
Regional Water Quality Control Board

APPLICATION/REPORT OF WASTE DISCHARGE GENERAL INFORMATION FORM FOR WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT

I. FACILITY INFORMATION

A. FACILITY:

Name Vallejo Flood & Wastewater District

Address 450 Ryder Street

City/County/State/Zip Code Vallejo, Solano, CA 94590

Contact Person Jennifer Harrington

Telephone Number 707-652-7806 Email jharrington@vallejowastewater.org

B. FACILITY OWNER:

Name Vallejo Flood & Wastewater District

Address 450 Ryder Street

City/State/Zip Code Vallejo, CA 94590

Contact Person Jennifer Harrington

Telephone Number 707-652-7806 Email jharrington@vallejowastewater.org

Federal Tax ID 94-6003952

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

C. FACILITY OPERATOR (The agency or business, not the person):

Name Same as Facility Owner.

Address _____

City/State/Zip Code _____

Contact Person _____

Telephone Number _____ Email _____

Operator Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other: _____

D. OWNER OF THE LAND

Name Same as Facility Owner.

Address

City/State/Zip Code

Contact Person

Telephone Number Email

Owner Type (*Mark one*):

☐ Individual ☐ Corporation ☑ Governmental Agency ☐ Partnership

☐ Other:

E. ADDRESS WHERE LEGAL NOTICE MAY BE SERVED

Address Same as Facility Owner.

City/State/Zip Code

Contact Person

Telephone Number Email

F. BILLING ADDRESS

Address Same as Facility Owner.

City/State/Zip Code

Contact Person

Telephone Number Email

II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application:

☐ **Waste Discharge to Land** ☑ **Waste Discharge to Surface Water**

Check all that apply:

☐ Animal or Aquacultural Wastewater
☐ Animal Waste Solids
☐ Biosolids/Residual
☐ Cooling Water
☐ Domestic/ Municipal Wastewater Treatment and Disposal
☐ Dredge Material Disposal
☐ Hazardous Waste (*see instructions*)
☐ Industrial Process Wastewater
☐ Land Treatment Unit
☐ Landfill (*see instructions*)
☐ Mining
☑ Storm Water
☐ Surface Impoundment
☐ Waste Pile
☐ Wastewater Reclamation
☐ Other, *please describe*

III. LOCATION OF THE FACILITY

Describe the physical location of the facility:

1. Assessor's Parcel Number(s)

   Facility: See attached General Information form.

   Discharge Point: _____

2. Latitude

   Facility: _____

   Discharge Point: _____

3. Longitude

   Facility: _____

   Discharge Point: _____

IV. REASON FOR FILING

Check all that apply:

- ☐ New Discharge or Facility
- ☐ Change in Design or Operation
- ☐ Change in Quantity/Type of Discharge
- ☐ Changes in Ownership/Operator (see instructions)
- ☑ Waste Discharge Requirements Update or NPDES Permit Reissuance
- ☐ Other: _____

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency California Regional Water Quality Control Board, San Francisco Bay Region

Has a public agency determined that the proposed project is exempt from CEQA?

☑ Yes ☐ No

If yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below:

Re-issuance is exempt pursuant to Section 13389 of California Water Code.

Has a "Notice of Determination" been filed under CEQA?

☐ Yes ☐ No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report (EIR), or Negative Declaration. If No, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents: ☐ EIR ☐ Negative Declaration

Expected CEQA Completion Date: _____

VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

See attached General Information form.

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name Melissa Morton Title District Manager

Signature Date June 29, 2020

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:

Clarifications and Other Information as requested under I through VII

I. Facility Information

A. Facility:

The City of Vallejo and the Vallejo Flood and Wastewater District are described within NPDES Permit No. CAS612008, Order No. R2-2015-0049, and referred to as the Vallejo Permittees.

B. Facility Owner:
C. Facility Operator:
D. Owner of the Land:

Municipal storm drainage facilities are owned and operated by the Vallejo Flood & Wastewater District. The City of Vallejo and the Vallejo Flood and Wastewater District have independent ordnances designed to protect and keep pollutants out of stormwater discharges in Vallejo while complying with requirements listed in NPDES Permit No. CAS612008, Order No. R2-2015-0049.

E. Address Where Legal Notice May Be Served:
F. Billing Address:

Agency and Address	Contact Person	Email address	Telephone number
Vallejo Flood and Wastewater District 450 Ryder St., Vallejo CA 94590	Jennifer Harrington	jharrington@vallejowastewater.org	(707) 652-7806
City of Vallejo 555 Santa Clara St., Vallejo CA 94590	Robert Newman	Robert.Newman@cityofvallejo.net	(707) 648-5410

III. Location of the Facility

The storm drainage facilities are located throughout Vallejo and portions of unincorporated Solano County located within Vallejo city limits. As a result, the physical location of the facility can not be described as a single facility or discharge point. Please see the attached map entitled: Vallejo Flood & Wastewater District Service Area.

VI. Other Required Information

Characterization of Discharge:

DESIGN AND ACTUAL FLOWS

Municipal Separate Storm Sewer Systems (MS4) in Vallejo are designed to convey storm flows to surface water while minimizing flood risk to life and property. Generally, it is design standards address large events (i.e., 10-year events up to 100-year events, depending on the value of assets at risk). Watershed flows are modeled using the rational method, or other methods, which uses runoff coefficients to account for slope, vegetative cover, and land use. Because of the variable nature of storm events and the multitude of conveyances, specific details on design vs. actual stormwater discharge flows are beyond the intent and scope of this Application/Report of Waste Discharge.

CONSTITUENTS AND CHARACTERISTIC DISCHARGE CONCENTRATIONS

For further information on constituents and characteristic discharge concentrations please see the Urban Creeks Monitoring and Integrated Monitoring Reports for the Vallejo Permittees on the RWQCB website here:
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/index.html

BEST MANAGEMENT PRACTICES USED

The Vallejo Permittees implement the following Best Management Practices (BMPs) to minimize pollutants in urban runoff discharges:

1. Source Control stops or reduces pollutant discharges by eliminating them from uses where they may be discharged into the MS4. Examples include re-registration by USEPA of diazinon and chlorpyrifos to limit use to registered professional applications and the connection of all interior drains to the sanitary sewer.

2. Prohibition of non-stormwater discharges into the MS4 is established by ordinance for each Permittee.
3. Illicit Discharge Detection and Elimination programs implement prohibitions by providing an active program of surveillance and response to complaints.
4. Public Education and Outreach communications to raise public awareness and change behaviors that can affect water quality.
5. Inspection of businesses and construction sites provides oversight of compliance with required guidelines for housekeeping and pollution prevention.
6. Enforcement provides Permittees with legal authority to correct egregious or recurrent ordinance violations.
7. Referral to the Water Board or other appropriate authorities where individual parcels are known or suspected to be pollutant sources and where successful enforcement is beyond the capabilities or resources of the local municipal government.

For detailed information on current BMPs being implemented at the city level please see the 2018-2019 Annual Reports for both Permittees on the RWQCB website here: https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/index.html

DESCRIPTION OF DISPOSAL METHODS

Stormwater is typically discharged either from the MS4 into creeks that flow into the Napa River, Mare Island Straits and San Pablo Bay and then the San Francisco Bay.

OTHER APPROPRIATE WASTE DISCHARGE CHARACTERISTICS

Stormwater discharges are complex mixtures of constituents present in the urban environment, both naturally and from human sources. Another important characteristic of urban stormwater discharges is their inherently episodic nature. For this reason, comparison of constituent concentrations in stormwater discharges to water quality objectives relies on acute (short-duration) exposure assumptions.

Site Maps

The Cities' boundaries are provided within the attached map entitled: Vallejo Flood & Wastewater District Service Area. Storm drains within the service area discharge to Suisun Bay, Carquinez Strait, Mare Island Straits and the Napa River.

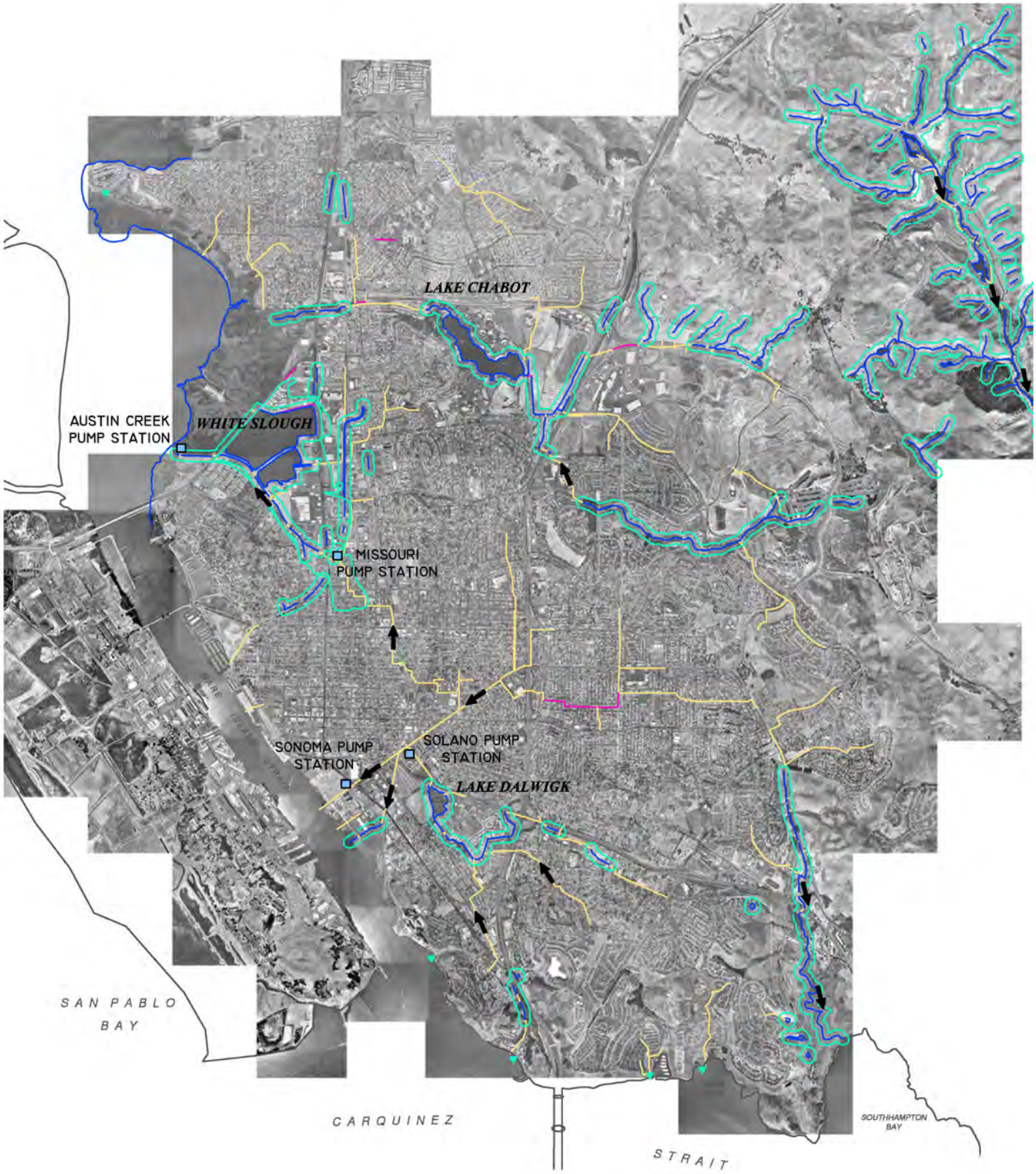

Vallejo Flood & Wastewater District

DISTRICT BOUNDARY

WATER SHED
RESOURCE INVENTORY

- 36" - 108" STORM DRAIN LINE
- IMPROVED CHANNEL
- NATURAL CREEKS
- 200' BUFFER ZONE

Vallejo
FLOOD & WASTEWATER DISTRICT

10402
10443

Links to Relevant Documents

Vallejo Permittees current trash map:
https://www.vallejowastewater.org/SitePages/stormwater.aspx

Vallejo Permittees private systems over 10,000 square feet map:
https://www.vallejowastewater.org/SitePages/stormwater.aspx

Vallejo Permittees annual reports:
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/Annual_Reports1.html

Vallejo Permittees water quality reports:
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/water_quality.html#RMC

MRP priority issues:
https://cal-span.org/unipage/?site=cal-span&owner=RWQCB-SF&date=2020-06-10

LEGEND: C = CITY D = DISTRICT B = BOTH CITY & DISTRICT

Section		Responsible Agency
A. DISCHARGE PROHIBITIONS		
A.1.	The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.	B
A.2.	It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.	B
B. RECEIVING WATER LIMITATIONS		
B.1.	The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State: a. Floating, suspended, or deposited macroscopic particulate matter, or foam; b. Bottom deposits or aquatic growths; c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels; d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and e. Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.	B
B.2.	The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Water Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.	B
C.1. Compliance with Discharge Prohibitions and Receiving Waters Limitations		
	The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.15. Compliance with Provisions C.9 through C.12 and C.14 of this Order, which prescribe requirements and schedules for Permittees identified therein to manage their discharges that may cause or contribute to violations of water quality standards (WQS) for pesticides, trash, mercury, polychlorinated biphenyls (PCBs), and bacteria, shall constitute compliance during the term of this Order with Receiving Water Limitations B.1 and B.2 for the pollutants and the receiving waters identified in the provisions. Compliance with Provision C.10, which prescribes requirements and schedules for Permittees to manage their discharges of trash, shall also constitute compliance with Discharge Prohibitions A.1 and A.2 during the term of this Order for discharges of trash. If exceedance(s) of (WQS), except for exceedances of water quality standards for pesticides, trash, mercury, PCBs, and bacteria that are managed pursuant to Provisions C.9 through C.12 and C.14, persist in receiving waters notwithstanding the implementation of the required controls and actions, the Permittees shall comply with the following procedure:	B
	a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable (WQS), the Permittee(s) shall notify, within no more than 30 days, and thereafter submit a report to the Water Board that describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and	B
	b. Submit any modifications to the report required by the Water Board within 30 days of notification.	B
	As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.	

LEGEND: C = CITY D = DISTRICT B = BOTH CITY & DISTRICT

Section		Responsible Agency
C.2. Municipal Operations		
	The purpose of this provision is to ensure implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater and polluted stormwater discharges to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.	
C.2.a.	**Street and Road Repair and Maintenance**	
	i. Task Description – Asphalt/Concrete Removal, Cutting, Installation, and Repair	C
	The Permittees shall implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving, or repair maintenance activities, such as those described in the California Stormwater Quality Association's (CASQA's) Handbook for Municipal Operations.	
	ii. Implementation Levels	B
	(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer system is available for the wastewater generated from these activities provided that appropriate approvals are obtained and pretreatment standards are met.	
	(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from such work sites upon completion of work. The Permittees shall require cleanup of all construction debris, spills, and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) Blueprint for a Clean Bay.	
	iii. Reporting - The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.	B
C.2.b.	**Sidewalk/Plaza Maintenance and Pavement Washing**	
	i. Task Description - The Permittees shall implement and require to be implemented BMPs that prevent the discharge of polluted wash water and non- stormwater to storm drains for pavement washing; sidewalk and plaza cleaning; mobile cleaning; pressure washing operations in locations such as parking lots and garages; trash areas; and gas station fueling areas. The Permittees shall implement the BMPs included in BASMAA's Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.	B
	ii. Reporting - The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.	B
C.2.c.	**Bridge and Structure Maintenance and Graffiti Removal**	C
	i. Task Description	
	(1) The Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.	
	(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.	
	ii. Implementation Levels	
	(1) The Permittees shall prevent all debris, including structural materials and coating debris, such as paint chips, and other debris and pollutants generated in bridge and structure maintenance or graffiti removal from entering storm drains or water courses.	
	(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks, or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste, or wash water due to graffiti removal from entering storm drains or watercourses.	
	(3) The Permittees shall use proper disposal methods for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts the proper capture and disposal methods for the wastes generated.	
	iii. Reporting - The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report.	C

LEGEND: C = CITY D = DISTRICT B = BOTH CITY & DISTRICT

Section		Responsible Agency
C.2.d.	**Stormwater Pump Stations**	D
	i. Task Description - The Permittees shall implement measures to operate, inspect, and maintain stormwater pump stations to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in stormwater discharges to comply with WQSs.	
	ii. Implementation Levels - The Permittees shall comply with the following at Permittee-owned or -operated pump stations:	
	(1) Upon becoming aware that the discharge from a pump station has a dissolved oxygen (DO) concentration below 3.0 mg/L, implement corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 milligrams per liter (mg/L) and verify the effectiveness of the corrective actions with monitoring. Corrective actions do not need to be implemented on discharges from pump stations that remain in the stormwater collection system or infiltrate into a dry creek immediately downstream.	
	(2) Ensure that pump stations are free from debris and trash and replace any oil absorbent booms, as needed, and investigate and abate illicit discharges. Pump stations excluded from C.2.d.ii.(1) above are not excluded from this requirement.	
	(3) The Permittees shall maintain records of inspection, maintenance, implementation of corrective actions, and any monitoring records at Permittee-owned or -operated pumped stations. These records shall be made available to Water Board staff or its representatives during inspections and audits, or otherwise upon request.	
C.2.e.	**Rural Public Works Construction and Maintenance**	
	i. Task Description - Rural Road and Public Works Construction and Maintenance	N/A
	For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing, or open space uses. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Wildlife (CDFW), and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.	
	ii. Implementation Levels	N/A
	(1) The Permittees shall continue to implement BMPs for erosion and sediment control measures during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities.	
	(2) The Permittees shall implement appropriate BMPs for the following activities. BMPs shall minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities:	
	(a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;	
	(b) Identification and prioritization of rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;	
	(c) Construction of roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;	
	(d) Implementation of an inspection program to maintain rural roads' structural integrity and prevent impacts to water quality;	
	(e) Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, and address excessive erosion;	
	(f) Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and	
	(g) Replacement of existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage, and maintain natural stream geomorphology in a stable manner.	
	(3) The Permittees shall incorporate existing training and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction to avoid water quality impacts.	
	(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.	
	iii. Reporting - The Permittees shall report on the implementation of and compliance with BMPs for the rural public works construction and maintenance activities in their Annual Report, including reporting on increased maintenance in priority areas.	

LEGEND: C = CITY D = DISTRICT B = BOTH CITY & DISTRICT

Section	Responsible Agency
C.2.f. Corporation Yard BMP Implementation	
i. Task Description - Corporation Yard Maintenance	B
(1) The Permittees shall implement and maintain a site-specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment, and maintenance vehicle parking areas, and material storage facilities, to comply with water quality standards. Each SWPPP shall incorporate all applicable BMPs that are described in the California Stormwater Quality Association's (CASQA's) Handbook for Municipal Operations and the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003, and its addenda, as appropriate.	
(2) The requirements in this provision shall apply only to facilities that are not covered under the State Water Board's Industrial Stormwater NPDES General Permit.	
ii. Implementation Level	B
(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters and street sweeper, vactor, and other related equipment wash water. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.	
(2) Routinely inspect corporation yards to ensure that non-stormwater discharges are not entering the storm drain system and pollutant discharges are prevented to the maximum extent practicable. At a minimum, each corporation yard shall be fully inspected each year between September 1 and September 30, beginning the 2016-2017 reporting year. Active non-stormwater discharges shall cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded.	
(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency.	
(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.	
(5) Outdoor storage areas containing pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.	
iii. Reporting	B
(1) In the 2015-2016 Annual Report, Permittees shall report on implementation of SWPPPs, the results of inspections, and any followup actions in their Annual Report.	
(2) Beginning with the 2016-2017 Annual Report, Permittees shall list activities conducted in the corporation yards that have BMPs in the site- specific SWPPP, date of inspections, the results of inspections, and any followup actions, including the date of any necessary corrective actions implemented, in their Annual Report.	
C.3. New Development and Redevelopment	
The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.	C

LEGEND: C = CITY D = DISTRICT B = BOTH CITY & DISTRICT

Section		Responsible Agency
C.3.a.	**New Development and Redevelopment Performance Standard Implementation**	
	i. Task Description - At a minimum, each Permittee shall:	
	(1) Have adequate legal authority to implement all requirements of Provision C.3;	B
	(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;	C
	(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;	
	(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;	
	(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;	
	(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities;	
	(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:	
	· Storm drain inlet stenciling.	
	· Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs, such as Bay-Friendly Landscaping.	
	· Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.	
	· Covered trash, food waste, and compactor enclosures.	
	· Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards:	
	· Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.	
	· Dumpster drips from covered trash and food compactor enclosures.	
	· Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.	
	· Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.	
	· Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.	
	(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the Bay-Friendly Landscape Guidelines).	
	ii. Reporting - Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1)–(8) in the 2016 Annual Report.	C

LEGEND: C = CITY D = DISTRICT B = BOTH CITY & DISTRICT

Section		Responsible Agency
C.3.b.	**Regulated Projects**	
	i. Task Description - The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility1 in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked. For adjacent Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.	C
	(1) Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d. under a previous MS4 permit is exempt from the requirements of Provision C.3.c. (low impact development requirements).	
	(2) Any Regulated Project that was approved with no Provision C.3. stormwater treatment requirements under a previous MS4 permit and that has not begun construction by the effective date of this permit, shall be required to fully comply with the requirements of C.3.c. and C.3.d. Permittees may grant exemptions from this requirement as follows:	
	(a) An exemption may be granted to:	
	(i) Any Regulated Project that was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the ordinance, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law.	
	(ii) Any Regulated Project for which the Permittee has no legal authority to require changes to previously granted approvals, such as projects that have been granted building permits.	
	(b) An exemption from the LID requirements of Provision C.3.c. may be granted to any Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.	
	Regulated Projects, as they are defined in this Provision, do not include detached single-family home projects that are not part of a larger plan of development.	
	ii. Regulated Projects are defined in the following categories:	C
	(1) **Special Land Use Categories**	
	(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 5000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:	
	(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532- 7534, and 7536-7539;	
	(ii) Retail gasoline outlets;	
	(iii) Restaurants (SIC Code 5812); or	
	(iv) Stand-alone uncovered parking lots and uncovered parking lots that are part of a development project if the parking lot creates and/or replaces 5,000 square feet or more of impervious surface. This category includes the top uncovered portion of parking structures, unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.	
	(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:	
	(i) Interior remodels; and	
	(ii) Routine maintenance or repair such as:	
	· roof or exterior wall surface replacement, and/or	
	· pavement resurfacing within the existing footprint.	

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(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).	
(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50** percent of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).	
(2) Other Development Projects New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.	
(3) Other Redevelopment Projects Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee. Specific exclusions to this category are: · Interior remodels; and · Routine maintenance or repair such as: · roof or exterior wall surface replacement, and/or · pavement resurfacing within the existing footprint.	
(a) Where a redevelopment project results in an alteration of **50 percent or more** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).	
(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3., only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).	
(4) Road Projects Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:	C
(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.	
(b) Widening of existing streets or roads with additional traffic lanes.	
(i) Where the addition of traffic lanes results in an alteration of more than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, shall be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).	

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(ii) Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road within the project that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system shall be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.	
(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).	
(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) include the following:	
· Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.	
· Bicycle lanes built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.	
· Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.	
· Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.	
· Caltrans highway projects and associated facilities.	
iii. Implementation Level - All elements of Provision C.3.b.i.-ii. shall be fully implemented immediately, including a database or equivalent tabular format that contains all the information listed under Reporting (Provision C.3.b.iv.)	C
iv. Reporting	C
(1) **C.3.b.i.(2) Reporting**	
In the 2017 Annual Report, each Permittee shall provide a complete list of the development projects that are subject to the requirements of Provision C.3.b.i.(2). For each such project, the Permittee shall indicate the type of stormwater treatment system required or the specific exemption granted, pursuant to Provision C.3.b.i.(2)(a) and (b). If a Permittee has no projects subject to Provision C.3.b.i.(2), it shall so state in the 2017 Annual Report.	
(2) **Annual Reporting – C.3.b.ii. Regulated Projects**	
For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the attached Provision C.3.b. Sample Reporting Table):	
(a) Project Name, Number, Location (cross streets), and Street Address;	
(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description;	
(c) Project watershed;	
(d) Total project site area and total area of land disturbed;	
(e) Total new impervious surface area and/or total replaced impervious surface area;	
(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;	
(g) Status of project (e.g., application date, application deemed complete date, project approval date);	
(h) Source control measures;	
(i) Site design measures;	
(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;	
(k) Operation maintenance responsibility mechanism for the life of project;	

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	(l) Hydraulic Sizing Criteria used; (m) Alternative compliance measures for Regulated Project (if applicable) (i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.iv.(2)(a) – (l) for the offsite project; and (ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.iv.(2)(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and (n) Hydromodification (HM) Controls (see Provision C.3.g.) – If not required, state why not. If required, state control method used.	
C.3.c.	**Low Impact Development (LID)** The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes. **Task Description** i. The Permittees shall, at a minimum, implement the following LID requirements: (1) **Source Control Requirements** Require all Regulated Projects to implement source control measures onsite that, at a minimum, shall include the following: (a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards: · Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants; · Dumpster drips from covered trash, food waste, and compactor enclosures; · Discharges from covered outdoor wash areas for vehicles, equipment, and accessories; · Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and · Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option; (b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas; (c) Properly designed trash storage areas; (d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping; (e) Efficient irrigation systems; and (f) Storm drain system stenciling or signage. (2) **Site Design and Stormwater Treatment Requirements** (a) Require each Regulated Project to implement at least the following design strategies onsite: (i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies; (ii) Conserve natural areas, including existing trees, other vegetation, and soils; (iii) Minimize impervious surfaces;	C

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(iv) Minimize disturbances to natural drainages; and (v) Minimize stormwater runoff by implementing one or more of the following site design measures: · Direct roof runoff into cisterns or rain barrels for reuse. · Direct roof runoff onto vegetated areas. · Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas. · Direct runoff from driveways and/or uncovered parking lots onto vegetated areas. · Construct sidewalks, walkways, and/or patios with pervious pavement systems. · Construct driveways, bike lanes, and/or uncovered parking lots with pervious pavement systems. (b) Permittees shall collectively, on a regional or countywide basis, develop and adopt design specifications for pervious pavement systems, subject to the Executive Officer's approval. If countywide design specifications have been adopted and are contained in countywide stormwater handbooks, Permittees may reference these documents in the Annual Reports. (c) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility. (i) LID treatment measures are harvesting and use, infiltration, evapotranspiration, and biotreatment. (ii) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour, and maximize infiltration to the native soil during the life of the Regulated Project. The soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in Attachment L of the previous permit (Order No. R2-2009-0074), dated November 28, 2011. Permittees may collectively (on an all-Permittee scale or countywide scale) develop and adopt revisions to the soil media minimum specifications, subject to the Executive Officer's approval. (iii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. Permittees shall ensure that green roofs installed at Regulated Projects meet the following minimum specifications: (i) The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1). (ii) The green roof system planting media shall be sufficiently deep to support the long term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional. (d) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(c) above to meet the requirements established in Provision C.3.e for alternative compliance. **ii. Reporting** (1) Permittees shall collectively submit in the 2016 Annual Report, design specifications for pervious pavement systems that have been developed and adopted on a regional or countywide basis. If Permittees within a countywide program are using countywide design specifications that have been adopted and are contained in a countywide stormwater handbook, those Permittees may reference the countywide stormwater handbook in- lieu of submitting the actual design specifications. (2) For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.iv, a reference to those tables will suffice.	

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C.3.d.	**Numeric Sizing Criteria for Stormwater Treatment Systems**	C

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a)The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b)The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flow rate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.iv.(2)

iii. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

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	(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety); (d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality; (e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and (f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).	
C.3.e.	**Alternative or In-Lieu Compliance with Provision C.3.b.** i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.b in accordance with one of the two options listed below: (1) **Option 1: LID Treatment at an Offsite Location** Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit. (2) **Option 2: Payment of In-Lieu Fees** Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees to treat the remaing portion of the Provision C.3.d. runoff with LID treatment measures at a Regional Project. The Regional Project must acheive a net environmental benefit. (3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite and Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of a Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits. **ii. Special Projects** (1) When considered at the watershed scale, certain land development projects characterized as smart growth, high density, or transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provision C.3.e.ii.(2). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems: · Tree-box-type high flowrate biofilters · Vault-based high flowrate media filters	C

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	The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible. (2) Prior to granting any LID Treatment Reduction Credits, Permittees must first establish all the following: (a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite; (b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at an offsite or Regional Project; and (c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards at an offsite or Regional Project. For each Special Project, a Permittee shall document the basis of infeasibility used to establish technical and/or economic infeasibility. Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of 100% LID treatment in each scenario described in Provision C.3.e.ii.(2)(a)-(c) above, for each of the Special Projects for which LID Treatment Reduction Credit was applied. (3) Category A Special Project Criteria (a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria: (i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design. (ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district. (iii) Create and/or replace one half acre or less of impervious surface area. (iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones. (v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment. (b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. (4) Category B Special Project Criteria (a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria: (i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design. (ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian- oriented commercial district, or historic preservation site and/or district. (iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area. (iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones. (v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment. (b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs6) for commercial development projects, in Dwelling Units per Acre (DU/Ac) for residential development projects, and in FARs and DU/Ac for mixed-use development projects.	

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(i) 50% Maximum LID Treatment Reduction Credit • For any commercial Category B Special Project with an FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. • For any residential Category B Special Project with a gross density7 of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. • For any mixed use Category B Special Project with an FAR of at least 2:1 or a gross density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. (ii) 75% Maximum LID Treatment Reduction Credit • For any commercial Category B Special Project with an FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. • For any residential Category B Special Project with a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. • For any mixed use Category B Special Project with an FAR of at least 3:1 or a gross density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. (iii) 100% Maximum LID Treatment Reduction Credit • For any commercial Category B Special Project with an FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. • For any residential Category B Special Project with a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.#.d for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. • For any mixed use Category B Special Project with an FAR of at least 4:1 or a gross density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above. (5) Category C Special Project Criteria (Transit-Oriented Development) (a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria: (i) Be characterized as a non-auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development. (ii) If a commercial development project, achieve at least an FAR of 2:1. (iii) If a residential development project, achieve at least a gross density of 25 DU/Ac. (iv) If a mixed use development project, achieve at least an FAR of 2:1 or a gross density of 25 DU/Ac. (b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.	

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(c) Location Credits (i) A Category C Special Project may qualify for the following Location Credits: a. 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub. b. 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub. c. 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area. (ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits. (iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above. (iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area. (d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above. (i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits: a. 10% Density Credit: Achieve a FAR of at least 2:1. b. 20% Density Credit: Achieve a FAR of at least 4:1. c. 30% Density Credit: Achieve a FAR of at least 6:1. (ii) A Category C Special Project that is a residential or mixed-use development project may qualify for the following Density Credits: a. 10% Density Credit: Achieve a gross density of at least 30 DU/Ac. b. 20% Density Credit: Achieve a gross density of at least 60 DU/Ac. c. 30% Density Credit: Achieve a gross density of at least 100 DU/Ac. (iii) Commercial Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR. Mixed use Category C Projects may use Density Credits based on either DU/Ac or FAR, but not both. (iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits. (e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(5)(c) above. (i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits: a. 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at- grade surface parking. The at-grade surface parking must be treated with LID treatment measures. b. 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones. (ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits. (6) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.).	

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iii. Implementation Level (1) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer. (2) The definitions of FAR and gross density applicable to Provisions C.3.e.ii.(4) and (5) are effective July 1, 2016, and shall apply to all Special Projects granted final discretionary approval on or after July 1, 2016. (3) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h. **iv. Reporting** – Annual reporting shall be done in conjunction with reporting requirements under Provision C.3.b.iv.(2). Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in each Annual Report. **v. Reporting on Special Projects** (1) Permittees shall track any identified potential Special Projects, including those projects that have submitted planning applications but that have not received final discretionary approval. (2) In each Annual Report, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no Special Projects shall so state. For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment onsite, offsite, and at a Regional Project. The narrative discussion shall address each of the following: (a) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite. (b) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures offsite or paying in-lieu fees to treat 100% of the Provision C.3.d runoff with LID treatment measures at a Regional Project. (c) The infeasibility of treating 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with some combination of LID treatment measures onsite, offsite, and/or paying in-lieu fees towards a Regional Project. Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used. (3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:	

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	(a) Submittal Date: Date that a planning application for the Special Project was submitted. (b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information. (c) Site Acreage: Total site area in acres. (d) Gross Density in DU/Ac: Number of dwelling units per acre. (e) Density in FAR: Floor Area Ratio. (f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a. (g) LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied. (h) Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system. (i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.	
C.3.f.	**Alternative Certification of Stormwater Treatment Systems** **i. Task Description** – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third party reviewer must be a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California or staff of another Permittee subject to the requirements of this Permit. **ii. Implementation Level** – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites. Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, CASQA, or the equivalent, may be considered qualifying training. **iii. Reporting** – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.	C
C.3.g.	**Hydromodification Management** **i. Hydromodification Management (HM) Projects** are Regulated Projects that create and/or replace one acre or more of impervious surface except where one of the following applies. All HM Projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii. (1) The post-project impervious surface area is less than, or the same as, the pre-project impervious surface area. (2) The project is located in a catchment that drains to a hardened (e.g., continuously lined with concrete) engineered channel or channels or enclosed pipes that extend continuously to the Bay, Delta, or flow- controlled reservoir, or drains to channels that are tidally influenced. (3) The project is located in a catchment or subwatershed that is highly developed (i.e., that is 70% or more impervious).8 The Hydromodification Applicability Maps developed by the Permittees in the Alameda, Santa Clara, San Mateo, and Fairfield-Suisun Programs, and the City of Vallejo, under the Previous Permit remain in effect and are provided in Attachment C to this Permit. Permittees that do not have the location-based applicability criteria (Provision C.3.g.i.(2) – (3)) shown on existing maps shall develop, or require to be developed, new maps, overlays to existing maps, or other equivalent information that demonstrates whether a project falls under one of those two criteria. Such maps, overlays, or other equivalent information shall be acceptable to the Executive Officer and shall not be effective until accepted by the Executive Officer.	C

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ii. HM Standard Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following: (1) **Range of Flows to Control**: For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, and the City of Vallejo, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow9 up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post- project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow. (2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control. (3) **Standard HM Modeling**: Permittees shall use, or shall cause to be used, a continuous simulation hydrologic computer model to simulate pre-project and post-project runoff, or sizing factors or charts developed using such a model, to design onsite or regional HM controls. The Permittees shall compare, or shall cause to be compared, the pre-project and post-project model output for a long-term rainfall record and shall show that applicable performance criteria in C.3.g.ii.(1)-(3) above are met. HM controls designed using the Bay Area Hydrology Model (BAHM) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual. Modifications to the BAHM shall be acceptable to the Executive Officer, shall be consistent with the requirements of this Provision, and shall be reported as required below: • **Precipitation Data**: Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used. • **Calculating Post-Project Runoff**: Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining. **iii. HM Standard – Methodology for Direct Simulation of Erosion Potential** The Permittees may, collectively, propose an additional method, using direct simulation of erosion potential, by which to meet the HM Standard in Provision C.3.g.ii. Such a method shall be submitted to the Water Board for review and shall not be effective until approved by the Executive Officer. At a minimum, a proposal to use this additional method shall demonstrate that stormwater discharges from HM Projects using the method will not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition, and that increases in runoff flow and volume will be managed so that post-project runoff does not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. Such demonstration shall include, but not be limited to: (1) An appropriately detailed discussion of the theoretical approach behind the method and the results for the areas to which it is proposed to be applied; (2) Appropriate continuous simulation hydrologic modeling using Region- specific field data, including creek data (cross sections, longitudinal data, etc.), precipitation data (a record of at least 30 years of hourly data that is appropriately representative of the areas where the method is to be applied), safety factor(s), and HM control designs; and (3) A description of how the method will be applied, including any models produced and how they will be used by the Permittees and/or project proponents. Such description shall include a listing of HM controls that may be used to comply with the HM requirements of this Permit, a description, with appropriate technical support, of how they will be sized to comply and how the Permittees will ensure appropriate implementation of the method, and all other necessary information, as appropriate.	

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iv. Types of HM Controls Projects shall meet the HM Standard using any of the following HM controls or a combination thereof: (1) **Onsite HM controls** are flow duration control structures, LID features and facilities, and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site. (2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges. (3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel. In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary. In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.10 **v. Implementation Level** All HM Projects shall meet the HM Standard in Provision C.3.g.ii immediately. For Contra Costa Permittees, Projects receiving final planning entitlements on or before January 3, 2018, may be allowed to use the Contra Costa design standards from the Previous Permit. After January 3, 2018, for Contra Costa Permittees, Projects shall comply with the Contra Costa design standards, including any modifications made. **vi. Reporting** (1) New HM Applicability Maps or equivalent information prepared pursuant to Provision C.3.g.i, for those Permittees who do not have an approved Map, shall be submitted, acceptable to the Executive Officer, not later than the second Annual Report following the Permit's effective date. (2) Contra Costa Permittees shall, with the 2017 Annual Report , submit a technical report, acceptable to the Executive Officer, consisting of an HM Management Plan describing how Contra Costa will implement the Permit's HM requirements (e.g., how it will update or modify its practices to meet Permit requirements). At a minimum, the technical report shall provide additional analysis and discussion as to how existing data appropriately evaluates how existing practices available for use meet the Permit's HM requirements, including limit conditions. The report shall, as necessary, propose modifications to Contra Costa's current HM practices, or propose alternate practices that have been accepted by the Water Board, to meet the Permit's HM requirements. The report may also: provide additional data on monitored installations; provide additional analysis and discussion as to how existing and additional data appropriately evaluates existing practices, including limit conditions and the range of conditions present across Contra Costa County; and provide other information or discussion, as appropriate. (3) Reporting of HM projects shall be as described in Provision C.3.b. (4) Permittees shall report collectively, with each Annual Report, a listing, summary, and date of modifications made to the BAHM, including the technical rationale. This shall be prepared at the countywide program level and submitted on behalf of participating Permittees.	

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	(5) In addition, for each HM Project approved during the reporting period, Permittees shall collect and make available the following information. Information shall be reported electronically, and, where appropriate, in tabular form. • Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control(s); • Method used by the project proponent to design and size the device or method used to meet the HM Standard; • Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures; • For projects using standard sizing charts, a summary of sizing calculations used; • For projects using the BAHM, a listing of model inputs; and • For projects using custom modeling, a summary of the modeling calculations with a corresponding graph showing curve matching (existing, post-project, and post-project-with HM controls curves).	
C.3.h.	**Operation and Maintenance of Stormwater Treatment Systems** **i. Task Description** – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program. **ii. Implementation Level** – At a minimum, the O&M Verification Program shall include the following elements: (1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title: (a) The project proponent's signed statement accepting responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; (b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the O&M of the pervious pavement system(s) (if any), onsite, joint, and/or offsite installed stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; (c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite stormwater treatment system(s), and HM control(s) (if any) until such responsibility is legally transferred to another entity; or (d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the O&M responsibility for the installed pervious pavement system(s) (if any), onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee. (2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls. (3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing O&M inspections of the installed pervious pavement system(s) (if any), stormwater treatment system(s) and HM control(s) (if any). (4) A database or equivalent tabular format of the following: (a) All pervious pavement system(s) that total 3000 square feet or more installed at Regulated Projects, offsite, or at a Regional Project. The total square footage should not include pervious pavement systems installed as private-use patios for single family homes, townhomes, or condominiums. (b) All stormwater treatment systems installed onsite at Regulated Projects, offsite, or at a joint or Regional Project. all HM controls installed onsite at Regulated Projects, offsite, or at a joint or Regional Project. (5) The database or equivalent tabular format required in Provision C.3.h.ii.(4) shall include the following information for each Regulated Project, offsite project, and Regional Project: (a) Name and address of the project; (b) Names of the owner(s) and responsible operator(s) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and/or HM control(s); (c) Specific description of the location (or a map showing the location) of the installed pervious pavement system(s) (if any), stormwater treatment system(s), and HM control(s) (if any);	C

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(d) Date(s) that the pervious pavement system(s) (if any), stormwater treatment system(s), and HM controls (if any) was/were installed; (e) Description of the type and size of the pervious pavement systems (if any), stormwater treatment system(s), and HM control(s) (if any) installed; (f) Detailed information on O&M inspections. For each inspection, include the following: (i) Date of inspection. (ii) Type of inspection (e.g., installation, annual, followup, spot). (iii) Type(s) of pervious pavement systems inspected (e.g., pervious concrete, pervious asphalt, pervious pavers). (iv) Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well) and an indication of whether the treatment system is an onsite, joint, or offsite system. (v) Type of HM controls inspected. (vi) Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation or maintenance, maintenance required immediately). (vii) Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, compliance schedule, administrative citation, administrative order). (6) A prioritized O&M Inspection Plan for inspecting all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems and HM controls installed at Regulated Projects, offsite locations, and/or at joint or Regional Projects. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient. At a minimum, the O&M Inspection Plan must specify the following for each fiscal year: (a) Inspection by the Permittee of all newly installed pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls (at Regulated Projects, offsite locations, and/or at joint or Regional Projects) at the completion of installation to ensure approved plans have been followed. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; (b) Inspection by the Permittee of an average of 20 percent, but no less than 15 percent, of the total number (at the end of the preceding fiscal year) of Regulated Projects, offsite projects, or Regional Projects. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; (c) Inspection by the Permittee of all Regulated Projects, offsite projects, or Regional Projects at least once every five years. Each inspection shall include inspection of all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed at the Regulated Project, offsite project, or Regional Project. For residential subdivisions with pervious pavement systems that include individual driveways, inspection of a representative number of driveways is sufficient; and (d) For vault-based stormwater treatment systems, Permittees may accept 3rd party inspection reports in lieu of conducting Permittee O&M inspections only if the 3rd party inspections are conducted at least annually. Information from each 3rd party inspection shall be included in the database or tabular format required in Provision C.3.h.ii.(5) and each inspection shall be clearly identified as a 3rd party inspection.	

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Each 3rd party inspection report must clearly document the following: (i) Name of 3rd party inspection company. (ii) Date of inspection. (iii) Condition of the treatment unit(s) at the time of inspection. (iv) Description of maintenance activities performed during the inspection. (v) Date- and time-stamped photographs of the inside of the vault unit(s) before and after maintenance activities. (7) An Enforcement Response Plan (ERP) for all O&M inspections that serves as a reference document for inspection staff so that consistent enforcement actions can be taken to bring development projects into compliance. At a minimum, the ERP must contain the following: (a) Enforcement Procedures – A description of the Permittee's procedures from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for recognizing common problems with the different types of pervious pavement systems, stormwater treatment systems, and/or HM controls, remedies for the problems, and appropriate enforcement actions, followup inspections, and appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP. (b) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools appropriate for different field scenarios of problems identified with the pervious pavement systems, stormwater treatment systems, and/or HM controls as well as for different types of inadequate response to enforcement actions taken. (c) Timely Correction of Identified Problems – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all identified problems with the pervious pavement systems, stormwater treatment systems, and/or HM controls. Corrective actions shall be implemented no longer than 30 days after a problem is identified by an inspector. Corrective actions can be temporary and more time may be allowed for permanent corrective actions. If more than 30 days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system. **iii. Due Date for Implementation:** Immediate, except as follows: (1) July 1, 2016, for Provision C.3.h.ii.(6) and all requirements pertaining to pervious pavement systems in Provisions C.3.h.ii.(1)-(5), C.3.h.iv., and C.3.h.v. (2) July 1, 2017, for Provision C.3.h.ii.(7). **iv. Maintenance Approvals:** The Permittees shall ensure that all pervious pavement systems that total 3,000 square feet or more (excluding private-use patios for single family homes, townhomes, or condominiums), stormwater treatment systems, and HM controls installed onsite, offsite, or at a joint or Regional Project by development proponents are properly operated and maintained for the life of the projects. In cases where the responsible party for a pervious pavement system, stormwater treatment system or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities, but these approvals are not granted, the Permittees shall be deemed to be in compliance with this Provision. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the O&M requirements contained therein. **v. Reporting** (1) The database or equivalent tabular format required in Provisions C.3.b.ii.(4) and (5) shall be maintained by the Permittees. Upon request from the Executive Officer, information from this database or equivalent tabular format shall be submitted to Water Board staff for review. The requested information may include specific details on each inspection conducted within particular timeframes, such as several fiscal years. (2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.	

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	(3) Each Permittee shall report the following information in the Annual Report each year: (a) Total number of Regulated Projects in the Permittee's database or tabular format as of the end of the reporting period (fiscal year). (b) Total number of Regulated Projects, offsite projects, and Regional Projects inspected during the reporting period (fiscal year). (c) Percentage of the total number of Regulated Projects that were inspected during the reporting period (fiscal year). (d) A discussion of the inspection findings for the year and any common problems encountered with various types of pervious pavement systems, treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year. (e) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program). (f) For the 2016 Annual Report, Permittees may report on the total number and percentage of treatment and HM controls inspected, and exclude discussion of inspection findings for pervious pavement systems. (4) Each Permittee shall certify in the 2017 Annual Report that an Enforcement Response Plan has been completed by July 1, 2017.	
C.3.i.	**Required Site Design Measures for Small Projects and Detached Single-Family Home Projects** **i. Task Description** – The Permittees shall require all development projects, which create and/or replace > 2,500 ft2 to < 10,000 ft2 of impervious surface, and detached single-family home projects, which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures: • Direct roof runoff into cisterns or rain barrels for reuse. • Direct roof runoff onto vegetated areas. • Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas. • Direct runoff from driveways and/or uncovered parking lots onto vegetated areas. • Construct sidewalks, walkways, and/or patios with permeable surfaces. • Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces. This provision applies to all development projects that require approvals and/or permits issued under the Permittees' planning, building, or other comparable authority. **ii. Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.	C
C.3.j.	**Green Infrastructure Planning and Implementation** The Permittees shall complete and implement a Green Infrastructure Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements. The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is being required, in part, as an alternative to expanding the definition of Regulated Projects prescribed in Provision C.3.b to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. It also provides a mechanism to establish and implement alternative or in-lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e. Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff. The Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash, PCBs, mercury, and other pollutants.	C

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The Permittees may comply with any requirement of this Provision through a collaborative effort. **i. Green Infrastructure Program Plan Development** Each Permittee shall: (1) Prepare a framework or workplan that describes specific tasks and timeframes for development of its Green Infrastructure Plan. This framework or workplan shall be approved by the Permittee's governing body, mayor, city manager, or county manager by June 30, 2017. At a minimum, the framework or workplan shall include a statement of purpose, tasks, and timeframes to complete the elements listed in Provision C.3.i.i.(2) below. (2) Prepare a Green Infrastructure Plan, subject to Executive Officer approval, that contains the following elements: (a) A mechanism (e.g., SFEI's GreenPlanIT tool or another tool) to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area-specific basis, for implementation over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12: (i) By 2020; (ii) By 2030; and (iii) By 2040. The mechanism shall include criteria for prioritization (e.g., specific logistical constraints, water quality drivers (e.g., TMDLs), opportunities to treat runoff from private parcels in retrofitted street right-of-way) and outputs (e.g., maps, project lists) that can be incorporated into the Permittee's long-term planning and capital improvement processes. (b) Outputs from the mechanism described above, including, but not limited to, the prioritization criteria, maps, lists, and all other information, as appropriate. Individual project-specific reviews completed using these mechanisms are not required to be submitted with the Plan, but shall be made available upon request. (c) Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12: (i) By 2020; (ii) By 2030; and (iii) By 2040. (d) A process for tracking and mapping completed projects, public and private, and making the information publically available (e.g., SFEI's GreenPlanIT tool). (e) General guidelines for overall streetscape and project design and construction so that projects have a unified, complete design that implements the range of functions associated with the projects. For example, for streets, these functions include, but are not limited to, street use for stormwater management, including treatment, safe pedestrian travel, use as public space, for bicycle, transit, vehicle movement, and as locations for urban forestry. The guidelines should call for the Permittee to coordinate, for example, street improvement projects so that related improvements are constructed simultaneously to minimize conflicts that may impact green infrastructure. (f) Standard specifications and, as appropriate, typical design details and related information necessary for the Permittee to incorporate green infrastructure into projects in its jurisdiction. The specifications shall be sufficient to address the different street and project types within a Permittee's jurisdiction, as defined by land use and transportation characteristics.	

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(g) Requirement(s) that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. For street projects not subject to Provision C.3.b.ii. (i.e., non- Regulated Projects), Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d sizing requirements. The single approach can include different options to address specific issues or scenarios. That is, the approach shall identify the specific constraints that would preclude meeting the sizing requirements and the design approach(es) to take in that situation. The approach should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate, plus all other information, as appropriate (e.g., how to account for load reduction for the PCBs or mercury TMDLs). (h) A summary of the planning documents the Permittee has updated or otherwise modified to appropriately incorporate green infrastructure requirements, such as: General Plans, Specific Plans, Complete Streets Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure. Permittees are expected to complete these modifications as a part of completing the Green Infrastructure Plan, and by not later than the end of the permit term. (i) To the extent not addressed above, a workplan identifying how the Permittee will ensure that green infrastructure and low impact development measures are appropriately included in future plans (e.g., new or amended versions of the kinds of plans listed above). (j) A workplan to complete prioritized projects identified as part of a Provision C.3.e Alternative Compliance program or part of Provision C.3.j Early Implementation. (k) An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, State, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds. (3) Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this provision. (4) Conduct outreach and education in accordance with the following: (a) Conduct public outreach on the requirements of this provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design. (b) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this provision and methods of implementation. (c) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on the requirements of this provision and methods of implementation. (5) Report on Green Infrastructure Planning as follows: (a) Each Permittee shall submit documentation in the 2017 Annual Report that its framework or workplan for development of its Green Infrastructure Plan was approved by its governing body, mayor, city manager, or county manager by June 30, 2017. (b) Each Permittee shall submit its completed Green Infrastructure Plan with the 2019 Annual Report. (c) Each Permittee shall submit documentation of its legal mechanisms to ensure implementation of its Green Infrastructure Plan with the 2019 Annual Report. (d) Each Permittee shall submit a summary of its outreach and education efforts in each Annual Report. **ii. Early Implementation of Green Infrastructure Projects** (No Missed Opportunities) Each Permittee shall: (1) Prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term and infrastructure projects planned for implementation during the permit term that have potential for green infrastructure measures.	

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(2) Submit the list with each Annual Report and a summary of planning or implementation status for each public green infrastructure project and each private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Include a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description of the project and the reasons green infrastructure measures were impracticable to implement.	
iii. Participate in Processes to Promote Green Infrastructure	
(1) The Permittees shall, individually or collectively, track processes, assemble and submit information, and provide informational materials and presentations as needed to assist relevant regional, State, and federal agencies to plan, design, and fund incorporation of green infrastructure measures into local infrastructure projects, including transportation projects. Issues to be addressed include coordinating the timing of funding from different sources, changes to standard designs and design criteria, ranking and prioritizing projects for funding, and implementation of cooperative in-lieu programs.	
(2) In each Annual Report, Permittees shall report on the goals and outcomes during the reporting year of work undertaken to participate in processes to promote green infrastructure.	
(3) In the 2019 Annual Report, Permittees shall submit a plan and schedule for new and ongoing efforts to participate in processes to promote green infrastructure.	
iv. Tracking and Reporting Progress	
(1) The Permittees shall, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions. The methods shall also address tracking needed to provide reasonable assurance that wasteload allocations for TMDLs, including the San Francisco Bay PCBs and mercury TMDLs, and reductions for trash, are being met.	
(2) In each Annual Report, Permittees shall report progress on development and implementation of the tracking methods.	
(3) In the 2019 Annual Report, Permittees shall submit the tracking methods and report implementation of green infrastructure measures including treated area, and connected and disconnected impervious area on both public and private parcels within their jurisdictions.	

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Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Gross Density DU/Ac	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No: Number of the Special Project as it appears in Table 3.1

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Acreage: Total site area in acres.

Gross Density in DU/Ac: Number of dwelling units per acre.

FAR: Floor Area Ratio

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

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C.4. Industrial and Commercial Site Controls		
	Each Permittee shall implement an industrial and commercial site control program at all sites that could reasonably be considered to cause or contribute to pollution of stormwater runoff. Permittees shall conduct inspections, effective followup, and enforcement to abate potential and actual non-stormwater discharges, consistent with each Permittee's respective Enforcement Response Plan. These combined efforts will prevent the discharge of pollutants and impacts to beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.	
C.4.a.	**Legal Authority for Effective Site Management** **i. Task Description** – Permittees shall have sufficient legal authority to inspect, require effective stormwater pollutant control, and implement progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction. **ii. Implementation Level** – Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial facilities to address pollutant sources associated with outdoor process and manufacturing areas; outdoor material storage areas; outdoor waste storage and disposal areas; outdoor vehicle and equipment storage and maintenance areas; outdoor parking areas and access roads; outdoor wash areas; outdoor drainage from indoor areas, rooftop equipment; and contaminated and erodible surface areas; and other sources determined by the Permittees or the Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.	~~C~~ D
C.4.b.	**Industrial and Commercial Business Inspection Plan (Inspection Plan)** **i. Task Description** – Permittees shall continue to update and implement an Inspection Plan that will serve as a prioritized inspection workplan. This Inspection Plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close. **ii. Implementation Level** (1) Facilities For Prioritization Into Inspection Plan Commercial and industrial facilities with the functional aspects and types described below, and other facilities identified by the Permittees as reasonably likely to contribute to pollution of stormwater runoff, shall be prioritized for inspection on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of concern, proximity to a waterbody, potential and actual discharge history of the facility, and other relevant factors. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plan: (a) Sites that include the following types of functions that may produce pollutants when exposed to stormwater include, but are not limited to: • Outdoor process and manufacturing areas • Outdoor material storage areas • Outdoor waste storage and disposal areas • Outdoor vehicle and equipment storage and maintenance areas • Outdoor wash areas • Outdoor drainage from indoor areas • Rooftop equipment • Other sources determined by the Permittee or Water Board as reasonably likely to contribute to pollution of stormwater runoff.	D

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	(b) The following types of industrial and commercial businesses that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges: • Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the Statewide NPDES General Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit); • Vehicle Salvage yards; • Metal and other recycled materials collection facilities, and waste transfer facilities; • Vehicle mechanical repair, maintenance, fueling, or cleaning facilities • Building trades central facilities or yards, corporation yards; • Nurseries and greenhouses; • Building material retailers and storage; • Plastic manufacturers; and • Other facilities designated by the Permittee or Water Board to be reasonably likely to contribute to pollution of stormwater runoff. (2) Inspection Plan – The Inspection Plan shall be updated annually and shall contain the following information: (a) A description of the process for prioritizing inspections and frequency of inspections. The prioritization criteria shall assign a more frequent inspection schedule to the highest priority facilities per Provision C.4.b.ii.(1). If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan. (b) Assign appropriate inspection frequency for each industrial and commercial facility based on the priority established in Provision C.4.b.ii.(2)(a) above, potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality. (c) A mechanism to include new businesses that warrant inspections. (d) Total number and a list of all industrial and commercial facilities requiring inspections, within each Permittee's jurisdiction, based on the prioritization criteria established in Provision C.4.(b)ii.(2)(a). This list shall be updated annually. (e) List of facilities scheduled for inspection each fiscal year of the MRP permit term. Each fiscal year's inspection list shall be added to the Inspection Plan at the beginning of the fiscal year as part of the annual update. Previous fiscal years' inspection lists shall remain in the Inspection Plan. (3) **Record Keeping** – For each facility identified in Provision C.4.b.ii.(2)(d), the Permittee shall maintain a database or equivalent tabular system of at least the following information: (a) Name and address of the business and local business operator; (b) A brief description of business activity or pollutant source, including SIC code. Examples: outdoor process/manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, rooftop equipment, and outdoor drainage from indoor areas; (c) Inspection priority and inspection frequency; and (d) If coverage under the Industrial General Permit is required **iii. Reporting** – The Permittees shall include the list of all industrial and commercial facilities requiring inspections identified in Provision C.4.b.ii.(2)(d) in each Annual Report.	
C.4.c	**Enforcement Response Plan (ERP)** **i. Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.	D

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	ii. Implementation Level – The ERP shall contain the following: (1) Enforcement Procedures – A description of the Permittee's procedures, from the discovery of problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP. (2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to potential discharges (e.g., housekeeping issues, evidence of actual non-stormwater discharges, lack of BMPs, inadequate BMPs, and inappropriate BMPs), actual non-stormwater discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual non-stormwater discharges. (3) Timely Correction of Potential and Actual Non-stormwater Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all potential and actual non-stormwater discharges. Permittees shall require active non-stormwater discharges to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual non-stormwater discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business day are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system. (4) Referral and Coordination with Other Agencies – Each Permittee shall enforce its stormwater ordinances to achieve compliance at sites with observed potential and actual non-stormwater discharges required in Discharge Prohibition A.1. For cases in which Permittee enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney, or other relevant agencies for additional enforcement.	
C.4.d.	**Inspections** **i. Task Description** – Each Permittee shall conduct inspections according to the Inspection Plan in Provision C.4.b.ii.(2) and the ERP in Provision C.4.c.ii. to enforce its ordinance to prevent stormwater pollution. **ii. Implementation Level** (1) Inspections – Inspections shall be conducted to include at least the following activities: (a) Observations for appropriate BMPs to prevent stormwater runoff pollution or illicit discharge; (b) Observations for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater; (c) Observations for noncompliance with Permittee ordinances and other local requirements; and (d) Verification of coverage under the Industrial General Permit, if applicable. (2) Record Keeping – Permittees shall maintain adequate records to demonstrate compliance and appropriate followup enforcement responses for facilities inspected. Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial and commercial site inspections: (a) Name of facility/site inspected (b) Inspection date (c) Industrial General Permit coverage required (Yes or No) (d) Compliance status (e) Specific problems (f) Type of enforcement (if applicable) (g) Problem resolution date (h) Additional comments The electronic database or equivalent tabular system shall be made readily available to Water Board staff or its representative during inspections and audits. (3) Data Evaluation – Permittees shall evaluate the frequency of potential and actual non-stormwater discharges by business category. Note trends and, as needed, implement focused inspections or education in subsequent years to address trends.	D

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	iii. Reporting (1) Permittees shall include the following information in the 2015-2016 Annual Report: (a) Number of inspections conducted, Number of violations issued (excluding verbal warnings), Percentage of sites inspected in violation, and number and percent of violations resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner; (b) Frequency and types/categories of violations observed, Frequency and type of enforcement conducted; (c) Summary of types of violations noted by business category; and (d) Facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage. (2) Beginning with the 2016-2017 Annual Report, Permittees shall include the following information in each Annual Report: (a) Number of inspections conducted; (b) Number of each type of enforcement action, as listed in each Permittee's ERP, issued; (c) Number of enforcement actions or discreet number of potential and actual discharges fully resolved within 10 working days or otherwise deemed resolved in a longer, but still timely manner; (d) Frequency of potential and actual non-stormwater discharges by business category; and (e) A list of facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.	
C.4.e.	**Staff Training** **i. Task Description** – Permittees shall provide focused training for industrial and commercial site inspectors and illicit discharge detection and elimination inspectors annually. Trainings may be program-wide, region-wide, or Permittee- specific. **ii. Implementation Level** – At a minimum, provide inspection training, within the 5-year term of this Permit, in the following topics: (1) Urban runoff pollution prevention; (2) Inspection procedures; (3) Business Inspection Plan; (4) Enforcement Response Plan (5) Illicit Discharge Detection and Elimination; and (6) Appropriate BMPs to be used at different industrial and commercial facilities. **iii. Reporting** – The Permittees shall include the following information in each Annual Report: (1) Dates of training; (2) Training topics covered; (3) Percentage of industrial and commercial site inspectors attending training; and (4) Percentage of Illicit Discharge, Detection, and Elimination inspectors attending training.	D
C.5. Illicit Discharge Detection and Elimination		
	The purpose of this provision is to implement the illicit discharge prohibition and to ensure illicit discharges are detected and controlled that are not otherwise controlled under provisions C.4. – Industrial and Commercial Site Controls and C.6. – Construction Site Controls. Permittees shall implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and followup component to detect and eliminate illicit discharges into the MS4. Permittees shall maintain a complaint tracking and followup data system as their primary accountability reporting for this provision.	

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C.5.a.	**Legal Authority** **i. Task Description** – Permittees shall have the legal authority to prohibit and control illicit discharges and implement progressively stricter enforcement to achieve expedient compliance. **ii. Implementation Level** (1) Permittees shall have adequate legal authority to address illicit discharges to the MS4, including, but not limited to, the following: (a) Sewage; (b) Discharges of wash water resulting from the cleaning of exterior surfaces and pavement, or the equipment and other facilities of any commercial business, or any other public or private facility, including discharges from mobile cleaning businesses; (c) Discharges of runoff from material storage areas, including those containing chemicals, fuels, or other potentially polluting or hazardous materials; (d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water; (e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and (f) Discharges of food-related wastes (e.g., grease, fish processing wastes, restaurant kitchen mat and trash bin wash water). (2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to the MS4. (3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than storm water to the MS4.	B
C.5.b.	**Enforcement Response Plan (ERP)** **i. Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges and compliance from responsible parties. **ii. Implementation Level** – The ERP shall contain the following: (1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of a problem through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP. (2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to potential discharges (e.g., housekeeping issues, evidence of actual discharges, lack of BMPs, inadequate BMPs, and inappropriate BMPs), actual discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual discharges. (3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Each Permittee shall require timely correction of all potential and/or actual discharges. Active discharges shall be required to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.	B
C.5.c.	**Spill, Dumping, and Complaint Response Program** **i. Task Description** – Each Permittee shall implement a program to respond to spills, dumping, and complaints. **ii. Implementation Level** (1) Each Permittee shall have a central contact point for the public and Permittee's staff to report spills, dumping, and complaints. At a minimum, this central contact point shall include a phone number. Permittee shall also include, as feasible, user friendly web reporting for spills and dumping. (2) Each Permittee shall publicize the phone number and web reporting address, if used, to internal Permittee's staff and the public. The Permittee's website shall be one of the places the central contact point is publicized. The Permittee's website shall be updated with the central contact point to report spills and dumping by June 30, 2016. This central contact point shall be readily searchable on the Permittee's website.	B

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	(3) Each Permittee shall require its municipal staff conducting routine maintenance and inspection activities to report illicit discharges found during their activities to the central contact point so that illicit discharge staff can investigate and track. (4) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and/or phone tree for the Permittee's staff responsible for the spill and dumping response program. At a minimum, this flow chart and/or phone tree shall identify staff or positions responsible for receiving the complaints and investigating and abating the complaints. (5) Each Permittee shall maintain and update, as needed, a spill, dumping, and complaint response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittee's immediate capabilities. (6) Each Permittee shall conduct reactive inspections in response to spill, dumping, and complaint reports and shall also conduct followup inspections, as needed, to ensure that corrective measures have been effectively implemented to achieve and maintain compliance. **iii. Reporting** – Permittees shall provide the following information in the 2016 and 2020 Annual Reports: (1) The spill and dumping reporting phone number and the web address, if used; (2) A screen shot of the Permittee's website showing the central contact point; and (3) A discussion of how the central contact point – spill and dumping reporting phone number and, if used, the web address – is being publicized to Permittees' staff and the public.	
C.5.d.	**Tracking and Case Followup** **i. Task Description** – All incidents or discharges reported to the spill, dumping, and complaints central contact point, that might discharge into the MS4, shall be logged to track followup and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems and inter/intra-agency coordination, where appropriate. It is not necessary to track and report data according to this provision if they are tracked and reported according to State Water Resource Control Board Order No. 2006- 0003-DWQ. **ii. Implementation Level** – Maintain a water quality spills, dumping, and complaints tracking and followup in an electronic database or equivalent tabular system. The spill and discharge complaint tracking system shall contain the following information: (1) Complaint information: (a) Date and time of complaint, (b) Type of pollutant, and (c) Problem Status (potential or actual discharge). (2) Investigation information: (a) Date and time started, (b) Type of pollutant, (c) Entered storm drain and/or receiving water, (d) Date and time abated, and (e) Type of enforcement based on the Permittee's ERP. The electronic database or equivalent tabular system shall be made available to Water Board staff or representatives during audits or inspections. **iii. Reporting** – Permittees shall provide the following information in the Annual Report: (1) Number of discharges reported; (2) Number of discharges reaching storm drains and/or receiving waters; and (3) Number discharges resolved in a timely manner.	D
C.5.e.	**Control of Mobile Sources** **i. Task Description** – Permittees shall have oversight and control of pollutants associated with mobile businesses.	B

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	ii. Implementation Level – Each Permittee shall implement a program to reduce the discharge of pollutants from mobile businesses.	
	(1) The program shall include the following:	
	(a) Implementation of minimum standards and BMPs for each of the various types of mobile businesses, such as automobile washing, power washing, steam cleaning, and carpet cleaning.	D
	(b) Implementation of an enforcement strategy that specifically addresses the unique characteristics of mobile businesses.	D
	(c) Regularly updating mobile business inventories.	C
	(d) Implementation of an outreach and education strategy to mobile businesses operating within the Permittee's jurisdiction.	B
	(e) Inspection of mobile businesses, as needed.	D
	(2) Permittees may cooperate county-wide and/or region-wide with the implementation of their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.	B
	iii. Reporting	
	(1) In the 2017 Annual Report, each Permittee shall provide the following: (a) minimum standards and BMPs for each of the various types of mobile businesses; (b) its enforcement strategy; (c) a list and summary of the specific outreach events and education conducted to the different types of mobile businesses operating within the Permittee's jurisdiction; (d) the number of inspections conducted at mobile businesses and/or job sites in 2016-2017; (e) discuss enforcement actions taken against mobile businesses in 2016-2017; (f) Permittee's inventory of mobile businesses operating within the Permittee's jurisdiction; and (g) a list and summary of the county-wide or regional activities conducted, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education (Permittees' annual reports may refer to the county-wide or regional reports for this information.).	B
	(2) In the 2019 Annual Report, each Permittee shall include at least the following: (a) changes to minimum standards and BMPs for each of the various types of mobile businesses since the 2017 Annual Report; (b) changes to the Permittee's enforcement strategy; (c) minimum standards and BMPs developed for additional types of mobile businesses; (d) a list and summary of specific outreach events and education conducted to each type of mobile businesses operating within the Permittee's jurisdiction during the Permit term; (e) a discussion of the inspections conducted at mobile businesses and/or job sites; (f) Permittee's inventory of mobile businesses operating within the Permittee's jurisdiction; and (g) a discussion of the enforcement actions taken against mobile businesses during the permit term.	D
C.5.f.	**Municipal Separate Storm Sewer System (MS4) Map**	D
	i. Task Description – Each Permittee shall make the map(s) of its MS4 available.	
	ii. Implementation Level – Permittees shall make maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.	
	iii. Reporting – In the 2016 and 2019 Annual Reports, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.	
C.6. Construction Site Control		
	Each Permittee shall implement a construction site inspection and control program at all construction sites, with followup and enforcement consistent with each Permittee's respective ERP, to prevent construction site discharges of pollutants into the storm drains. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers. Each Permittee shall in its reporting demonstrate the effectiveness of its inspections and enforcement activities to prevent polluted construction site discharges into storm drains.	C
C.6.a.	**Legal Authority for Effective Site Management**	C
	i. Task Description – Permittees shall have the ability to require effective stormwater pollutant controls to prevent discharge of pollutants into the storm drains, and implement progressively stricter enforcement to achieve expedient compliance and cleanup at all public and private construction sites.	

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	ii. Implementation Level (1) Permittees shall have the legal authority to require at all construction sites year-round effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non-storm water management through all phases of construction (including, but not limited to, site grading, building, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures. (2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and cleanup at all construction sites year-round.	
C.6.b.	**Enforcement Response Plan (ERP)** **i. Task Description** – Each Permittee shall implement and update, as needed, its ERP – a reference document for inspection staff to take consistent actions to achieve timely and effective compliance at all public and private construction sites. **ii. Implementation Level** – The ERP shall contain the following: (1) Enforcement Procedures – A description of the Permittee's procedures from the discovery of the problems through the confirmation of implementation of corrective actions. This shall include guidance for appropriate enforcement actions, followup inspections, referrals to another agency, appropriate time periods for implementation of corrective actions, and the roles and responsibilities of staff responsible for implementing the ERP. (2) Enforcement Tools and Field Scenarios – A discussion of the various, escalating enforcement tools for different field scenarios, including, but not limited to, potential discharges (e.g., housekeeping issues, evidence of actual discharges, lack of ERP, inadequate BMPs, and inappropriate BMPs), actual discharges, non-compliance with previous enforcement actions, and sites with a history of potential and/or actual discharges. (3) Timely Correction of Potential and Actual Discharges – A description of the Permittee's procedures for assigning due dates for corrective actions. Permittees shall require timely correction of all potential and actual discharges. Permittees shall require actual non-stormwater discharges to cease immediately. Corrective actions shall be implemented before the next rain event, but no longer than 10 business days after the potential and/or actual discharges are discovered. Corrective actions can be temporary and more time can be allowed for permanent corrective actions. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.	C
C.6.c.	**Best Management Practices Categories** **i. Task Description** – Permittees shall require all construction sites to have site- specific, and seasonally and phase-appropriate, effective BMPS) in the following six categories: • Erosion Control • Run-on and Run-off Control • Sediment Control • Active Treatment Systems, as necessary • Good Site Management • Non-Stormwater Management. **ii. Implementation Level** The BMPs targeting specific construction site pollutants within the six categories listed in C.6.c.i. shall be site-specific. Site-specific BMPs targeting specific pollutants from the six categories listed in C.6.c.i. may be a combination of BMPs from: • CASQA, BMP Handbook, Construction, January 2009. • Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, March 2003, and addenda. • New BMPs available since the release of these handbooks. • Other BMPs shown to provide equivalent protection.	C

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C.6.d.	**Plan Approval Process** **i. Task Description** – Permittees shall review erosion control plans for consistency with local requirements and the appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land have filed a Notice of Intent for permit coverage under the Construction General Permit. **ii. Implementation Level** – Before approval and issuance of local grading permits, each Permittee shall perform the following: (1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in C.6.c.i. are planned; (2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction General Permit; and (3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.	C
C.6.e.	**Inspections** **i. Task Description** – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in C.6.c.i. in preventing the discharge of construction pollutants into the storm drain; and Permittees shall require timely corrections of all actual and potential discharges observed. **ii. Implementation Level** (1) **Wet Season Notification** By September 1 of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil, hillside projects, and high priority sites to prepare for the upcoming wet season. (2) **Frequency of Inspections** Inspections shall be conducted monthly during the wet season at the following sites: (a) All construction sites disturbing one or more acre of land; (b) All hillside projects (based on the Permittee's map of hillside development areas or criteria, or if the Permittee does not have a map of hillside development areas or criteria, those projects on sites with ≥15% slope) disturbing greater than or equal to 5,000 square feet; and (c) High Priority Sites – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered: (i) Soil erosion potential or soil type; (ii) Site slope; (iii) Project size and type; (iv) Sensitivity or receiving waterbodies; (v) Proximity to receiving waterbodies; (vi) Non-stormwater discharges; and (vii) Any other relevant factors as determined by the local agency or the Water Board. (3) **Contents of Inspections** Inspections shall focus on the adequacy and effectiveness of the site- specific BMPs implemented for the six categories listed in C.6.c.i. Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:	C

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(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from C.6.d.ii.(1)); (b) Assessment of the adequacy and effectiveness of the site-specific BMPs implemented for the six categories listed in C.6.c.i.; (c) Visual observations for: • actual discharges of sediment and/or construction related materials into storm drains and/or waterbodies. • evidence of sediment and/or construction related materials discharges into storm drains and/or waterbodies. • illicit connections, and • potential illicit connections. (d) Education on stormwater pollution prevention, as needed. (4) **Tracking** All inspections shall be recorded on a written or electronic inspection form. Inspectors shall follow the ERP for all actual and potential discharges discovered during the inspection. Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection: (a) Site name; (b) Inspection date; (c) Weather during inspection; (d) Enforcement Response Level (Use ERP); (e) Problem(s) observed using Illicit Discharge and the six BMP categories listed in C.6.c.i.; (f) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and (g) Comments, which shall include all Rationales for Longer Compliance Time, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection. **iii. Reporting** (1) In the 2016 Annual Report, each Permittee shall certify the criteria it uses to determine hillside developments. If the Permittee is using maps of hillside developments areas or other written criteria, include a copy in the Annual Report. (2) In the 2015-2016 Annual Report, each Permittee shall summarize the following information: (a) Total number of active sites disturbing less than one acre of soil requiring inspection; (b) Total number of active sites disturbing one acre or more of soil; (c) Total number of inspections conducted; (d) Number and percentage14 of violations in each of the six categories listed in C.6.c.i.; (e) Number and percentage15 of each type of enforcement action taken as listed in each Permittee's ERP; (f) Number of discharges, actual and those inferred through evidence, of sediment or other construction related materials; (g) Number of sites with discharges, actual and those inferred through evidence, of sediment or other construction related materials; (h) Number and percentage16 of violations fully corrected prior to the next rain event but no longer than 10 business days after the violations are discovered or otherwise considered in a timely, though longer period; and (i) Number and percentage17 of violations not fully corrected 30 days after the violations are discovered.	

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	(3) Beginning with the 2016-2017 Annual Report, each Permittee shall summarize the following information: (a) Total number of active hillside sites disturbing less than one acre of soil requiring inspection; (b) Total number of active sites disturbing 1 acre or more of soil; (c) Total number of active sites disturbing less than one acre of soil identified as High Priority sites in C.6.e.ii.(2)(c) requiring inspections; (d) Total number of inspections conducted; (e) Number of each type of enforcement action taken as listed in each Permittee's ERP; (f) Number of illicit discharges, actual and those inferred through evidence, of sediment or other construction-related materials; (g) Number of enforcement actions or discrete number of potential and actual discharges fully corrected prior to the next rain event, but no longer than 10 business days after the potential and actual discharges18 are discovered or otherwise considered corrected in a timely, though longer period. (4) In each Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in C.6.e.ii.(4) above. This evaluation shall include findings on the program's strength, comparison to previous years' results, as well as areas that need more focused education for site owners, operators, and developers the following year. (5) The Executive Officer may require that the information recorded and tracked by C.6.e.ii.(4) be submitted electronically or in a tabular format. Permittees shall submit the information within 10 working days of the Executive Officer's requirement. Submittal of the information in tabular form for the reporting year is not required in each Annual Report, but it is encouraged.	
C.6.f.	**Staff Training** **i. Task Description** – Permittees shall provide training or access to training for staff conducting construction stormwater inspections. **ii. Implementation Level** – Permittees shall provide training at least every other year to municipal staff responsible for conducting construction site stormwater inspections. Training topics shall include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and the ERP. **iii. Reporting** – Permittees shall include in each Annual Report the following information: training topics covered, dates of training, and the number of the Permittees' inspectors attending each training. If there was no training in that year, so state.	C
C.7. Public Information and Outreach		
	Each Permittee shall increase the awareness of a broad spectrum of the community, including a diversity of socioeconomic groups and ethnic communities, regarding the impacts of stormwater pollution on receiving waters and potential solutions to mitigate the problems caused; positively influence the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution. Outreach required in other provisions may be conducted under Provision C.7.	B
C.7.a.	**Storm Drain Inlet Marking** **i. Task Description –** Permittees shall mark and maintain municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as "No dumping, drains to Bay" or equivalent. For newly-approved, privately maintained streets, Permittees shall require storm drain inlet markings with an appropriate stormwater pollution prevention message by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings on the storm drain inlets shall be verified prior to acceptance of the project. **ii. Implementation Level** (1) Inspect and maintain storm drain inlet markings of at least 80 percent of municipality-maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term. (2) Storm drain inlet markings of newly developed privately-maintained streets shall be verified prior to acceptance of the project. Permittees shall require maintenance of the storm drain inlet markings through the development maintenance entity.	C

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	iii. Reporting – In the 2020 Annual Report, each Permittee shall (1) state how many municipally-maintained storm drain inlets it has, (2) certify that at least 80 percent of municipality-maintained storm drain inlet markings are legibly labeled with an appropriate stormwater pollution prevention message during the permit term; (3) include a picture of a labeled municipality-maintained inlet; and (4) certify that all privately-maintained streets had storm drain inlet markings verified prior to acceptance of the project and were required to maintain the storm drain inlet markings through the development maintenance entity.	
C.7.b.	**Outreach Campaigns** **i. Task Description** – Permittees shall continue to participate in or contribute to outreach campaigns, with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audiences. **ii. Implementation Level** (1) Target a broad audience with a minimum of one outreach campaign with specific stormwater runoff pollution prevention messages. The outreach campaign(s) should utilize various electronic and print media, and paid and free media to best reach the different target audiences. The outreach campaign(s) may be coordinated regionally or county-wide. (2) Permittees shall conduct a post-campaign effectiveness assessment/evaluation to identify and quantify the audiences' knowledge, trends, and attitudes and/or practices; and to measure the overall population's awareness of the messages and behavior changes achieved by the outreach campaigns. Effectiveness assessment/evaluation may be done regionally or county-wide. **iii. Reporting** – In the Annual Report following the post-campaign effectiveness assessment/evaluation, each Permittee (or the Countywide Program, if the effectiveness assessment/evaluation was done county-wide or the regional program, if the effectiveness assessment/evaluation was done regionally) shall provide a report of the effectiveness assessment/evaluation completed, which, at minimum, shall include the following: (1) A description of the outreach campaign. (2) A summary of how the effectiveness assessment/evaluation was implemented. (3) An analysis of the effectiveness assessment/evaluation results. (4) A discussion of the measurable changes in awareness and behavior achieved. (5) A discussion of the planned or future outreach campaigns to influence awareness and behavior changes regarding stormwater runoff pollution prevention messages.	B
C.7.c.	**Stormwater Pollution Prevention Education** **i. Task Description** – Permittees shall continue to maintain a point of contact to provide the public with stormwater pollution prevention information. **ii. Implementation Level** (1) Each Permittee shall maintain and publicize one point of contact for information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives. This point of contact can be maintained individually or collectively and Permittees may combine this function with the spill and dumping complaint central contact point required in C.5. (2) Each Permittee shall place and maintain information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives on its website. In lieu of posting the detailed informational pages directly on their individual websites, Permittees may choose to provide links from their websites to the countywide program's and/or BASMAA's websites. Each Permittee shall publicize its website. **iii. Reporting** – In the 2016 Annual Report, each Permittee shall list the point of contact, discuss how this point of contact and stormwater pollution website are publicized and maintained, and certify that it has a website dedicated to providing and maintaining information on stormwater issues, watershed characteristics, and stormwater pollution prevention alternatives.	B

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C.7.d.	**Public Outreach and Citizen Involvement Events** **i. Task Description** – Public outreach shall include a variety of pollution prevention message such as car washing; proper use, storage and disposal of vehicle waste fluids; household waste materials disposal; pesticide use; and trash. Public outreach events may include venues such as fairs, shows, and workshops. Citizen involvement events may include venues such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, storm drain inlet marking, riparian restoration activities, community grants. **ii. Implementation Level** – Each Permittee shall annually participate and/or host a mix of public outreach and citizen involvement events according to its population, as shown in the table below: **Table 7.1 Public Outreach and Citizen Involvement Events** **Permittee Population / Number of Events** < 10,000 / 2 10,001-40,000 / 4 40,001-100,000 / 5 100,001-175,000 / 7 175,001-250,000 / 8 > 250,000 / 10 Non-population-based Permittees / 6 **iii. Reporting** – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in; identity whether the event is public outreach or citizen involvement; and assess the effectiveness of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event effectiveness assessment/evaluation results, quantity/volume of materials cleaned up and comparisons to previous efforts).	B
C.7.e.	**Watershed Stewardship Collaborative Efforts** **i. Task Description** – Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts of community groups such as the Contra Costa Watershed Forum, the Santa Clara Basin Watershed Management Initiative, "friends of creek" groups, and other organizations that benefit the health of the watershed, such as the Bay-Friendly Landscaping and Gardening Coalition. If no such organizations exist, encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. Coordinate with existing groups to further stewardship efforts. **ii. Implementation Level** – Annually demonstrate effort. **iii. Reporting** – In each Annual Report, each Permittee shall state the level of effort, describe the support given, state what efforts were undertaken and the results of these efforts, and provide an evaluation of the effectiveness of these efforts.	B
C.7.f.	**School-Age Children Outreach** **i. Task Description** – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12). **ii. Implementation Level** – Implement annually and demonstrate effectiveness of efforts through assessment. **iii. Reporting** – In each Annual Report, each Permittee shall state the level of effort, spectrum of children reached, and methods used, and provide an evaluation of the effectiveness of these efforts.	B
C.7.g.	**Outreach to Municipal Officials** **i. Task Description** – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.	B

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	ii. Implementation Level – At least once per permit cycle, or more often. **iii. Reporting** – Permittees shall summarize efforts in the 2020 Annual Report.	
C.8. Water Quality Monitoring		
C.8.a.	**Compliance Options** All Permittees shall comply with all the monitoring requirements in this Provision. Permittees may choose any of the following mechanisms, or a combination of these mechanisms, to meet the monitoring requirements: **i. Regional Collaboration.** Permittees are encouraged to continue contributing to the Regional Monitoring Collaborative (RMC), which coordinates water quality monitoring conducted by all the Permittees. Permittees are encouraged to consider and assign additional duties to the RMC for purposes of increased efficiencies, particularly, but not limited to, reporting duties. **ii. Area-wide Stormwater Program**. Permittees may contribute to their countywide or area-wide Stormwater Program, so that the Stormwater Program conducts monitoring on behalf of its members. **iii. Third-party Monitoring**. Permittees may use data collected by a third-party organization, such as the Water Board or Department of Pesticide Regulation, to fulfill a monitoring requirement, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.b.	D
C.8.b.	**Monitoring Protocols and Data Quality** Where applicable, monitoring data must be Surface Water Ambient Monitoring Program (SWAMP) comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPrP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.	D
C.8.c.	**San Francisco Estuary Receiving Water Monitoring** With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions such as: • Are chemical concentrations in the Estuary potentially at levels of potential concern and are associated impacts likely? • What are the concentrations and masses of contaminants in the Estuary and its segments? • What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary? • Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased? • What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary? The Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program by contributing their fair-share financially on an annual basis.	D
C.8.d.	**Creek Status Monitoring** Creek status monitoring is intended to assess the chemical, physical, and biological impacts of urban runoff on receiving waters. In particular, the monitoring required by this provision is intended to answer the following questions: • Are water quality objectives, both numeric and narrative, being met in local receiving waters, including creeks, rivers and tributaries? • Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses? **i. Biological Assessment including Nutrients and General Water Quality Parameters** (1) Field and Laboratory Method – The Permittees shall conduct biological assessments (also referred to herein as bioassessments) in accordance with SWAMP Standard Operating Procedures22,23,24 and shall include collection and reporting of in-stream biological and physical habitat data according to the SWAMP Standard Operating Procedures for Bioassessment,3 including benthic algae, benthic macroinvertebrates, water chemistry, and full characterization of physical habitat. The bioassessment sampling method shall be multihabitat reach-wide. For algae, the assessment shall include all analytes in the protocol, including diatom and soft algae taxonomy, biomass (ash-free dry weight), chlorophyll a, pebble count algae information, and reach-wide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP full physical habitat characterization method.	D

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(2) The sampling crew shall be trained by a SWAMP-approved trainer and possess a Scientific Collection Permit from the California Department of Fish and Wildlife and participate in a SWAMP-approved inter-calibration exercise at least once in the Permit term. The Permittee may, but is not required to, modify its sampling procedures if these referenced procedures change during the Permit term. In such case, the Permittee shall notify the Water Board and follow the updated SWAMP procedures. (3) Macroinvertebrates shall be identified and classified according to the Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT)25 (except Chironomids should be identified to subfamily) using a fixed count of 600 organisms per sample. The laboratory shall follow the SWAMP Standard Operating Procedures for Laboratory Processing and Identification of Benthic Macroinvertebrates in California.26 Soft-bodied algae and diatom algae shall be identified to the species level. Algae identifications must be harmonized with the SWAMP master taxa list. All quality assurance and quality control steps specified in the SWAMP Quality Assurance Program Plan1 shall be performed. (4) The Permittees shall measure general water quality parameters using a sonde and collect nutrient samples at a site when biological samples are collected. The general water quality parameters shall include temperature, dissolved oxygen, pH, and specific conductance. Nutrients samples shall be analyzed for total ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen (calculated), dissolved orthophosphate and total phosphorous, silica, and chloride. (5) In conducting the required bioassessment monitoring, the Permittees shall take precautions to prevent the introduction or spread of aquatic invasive species. (6) Sample Design/Locations – The Permittees shall continue to use the probabilistic sample design developed in the previous Permit term to select sample locations. Also, Permittees shall continue to use the sampling site order and the rationale to exclude potential sites as previously defined by the sample design and reconnaissance standard operating procedures. After a statistically representative data set (i.e., approximately 30 samples) has been collected to address management questions related to condition of aquatic life, Permittees may select up to 20% of sample locations on a targeted basis to evaluate temporal trends in or other impacts to aquatic life condition. (7) Frequency, Timeframe and Number of Sites – Sampling shall occur once per year during the appropriate index period (April 15-June 30) with consideration of antecedent rainfall. Sampling is a one-time grab sample for biological communities, nutrients, and general water quality collected on the same day. The Permittees shall collect at least the minimum number of samples as shown below: Sampling Agency / Minimum Number of Samples Alameda Permittees / 20 per year Santa Clara Permittees / 20 per year Contra Costa Permittees / 10 per year San Mateo Permittees / 10 per year Fairfield-Suisun Permittees / 8 per 5-year period Vallejo Permittees / 4 per 5-year period (8) Followup – Sites scoring less than 0.795 according to the California Stream Condition Index27 (CSCI) are appropriate for a Stressor Source Identification (SSID) project as defined in C.8.e. Such a score indicates a substantially degraded biological community relative to reference conditions. Sites where there is a substantial difference in CSCI score observed at a location relative to upstream or downstream sites are also appropriate for a SSID project. If many samples show a degraded biological condition, sites where water quality is most likely to cause and contribute to this degradation may be prioritized by the Permittee for a SSID project.	
ii. Chlorine (1) Field and Laboratory Method – Permittees shall collect a grab sample and analyze for free and total chlorine using methods specified in the BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures. (2) Sample Design/Locations – Sample locations may be selected by the Permittees to monitor locations near known or suspected potable water line breaks; to coincide with bioassessment sites; to coincide with creek restoration sites; or to resample a location where chlorine has been found in the past. (3) Frequency, Timeframe, and Number of Samples – Samples shall be collected in spring or summer. Vallejo and Fairfield-Suisun Permittees each shall collect their samples by the end of the second year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:	

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	Sampling Agency / Minimum Number of Locations Sampled Alameda Permittees / 20 per year Santa Clara Permittees / 20 per year Contra Costa Permittees / 10 per year San Mateo Permittees / 10 per year Fairfield-Suisun Permittees / 8 per 5-year period Vallejo Permittees / 4 per 5-year period	
	(4) Followup – The Permittees shall immediately resample if the chlorine concentration is greater than 0.1 mg/L. If the resample is still greater than 0.1 mg/L, then Permittees shall report the observation to the appropriate Permittee central contact point for illicit discharges so that the illicit discharge staff can investigate and abate the associated discharge in accordance with its Provision C.5.e - Spill and Dumping Complaint Response Program.	
	iii. Temperature	
	(1) Field Method – The Permittees shall monitor temperature of their streams using a digital temperature logger or equivalent.	
	(2) Sample Design/Locations – The Permittees shall monitor stream reaches that are documented to support cold water fisheries and where either past data or best professional judgment indicates that temperatures may negatively affect that beneficial use.	
	(3) Frequency, Timeframe and Number of Sites – Loggers shall be installed so that water temperatures are recorded at 60-minute intervals from April through September at the number of sites specified below. Vallejo and Fairfield-Suisun Permittees each shall collect their samples by the end of the second year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:	
	Sampling Agency / Minimum Number of Stream Reaches Sampled Alameda Permittees / 8 per year Santa Clara Permittees / 8 per year Contra Costa Permittees / 4 per year San Mateo Permittees / 4 per year Fairfield-Suisun Permittees / 2 per 5-year period Vallejo Permittees / 2 per 5-year period	
	(4) Followup – The Permittees shall identify a site for which results at one sampling station exceed the applicable temperature trigger or demonstrate a spike in temperature with no obvious natural explanation as a candidate SSID project. The temperature trigger is defined as when two or more weekly average temperatures exceed the Maximum Weekly Average Temperature of 17.0°C for a Steelhead stream, or when 20% of the results at one sampling station exceed the instantaneous maximum of 24°C.28 Permittees shall calculate the weekly average temperature by breaking the measurements into non-overlapping, 7-day periods.	
	iv. Continuous Monitoring of Dissolved Oxygen, Temperature, and pH	
	(1) Field and Laboratory Method – The Permittees shall monitor general water quality parameters of streams using a water quality sonde or equivalent. Parameters shall include dissolved oxygen (mg/L and % saturation), pH, specific conductance (µS), and temperature (°C).	
	(2) Sample Design/Locations – The Permittees shall monitor stream reaches that are documented to support cold water fisheries or where either past data or best professional judgment indicates that temperature may negatively affect the cold water beneficial use.	
	(3) Frequency, Timeframe, and Number of Sites – The Permittees shall install sondes so that parameters are recorded at 15-minute intervals over 1-2 weeks in the spring concurrent with bioassessment sampling and 1-2 weeks in summer at the same sites. The Permittees shall monitor at least the minimum number of sites as shown below:	

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	Sampling Agency / Minimum Number of Sample Sites in Spring / Minimum # of Sample Sites in Summer Alameda Permittees / 3 per year / 3 per year Santa Clara Permittees / 3 per year / 3 per year Contra Costa Permittees / 2 per year / 2 per year San Mateo Permittees / 2 per year / 2 per year Fairfield-Suisun Permittees / 2 per permit term / 2 per 5-year period Vallejo Permittees / 2 per permit term / 2 per 5-year period	
	(4) Followup – When results at one sampling station exceed the applicable temperature or dissolved oxygen trigger or demonstrate a spike in temperature or drop in dissolved oxygen with no obvious natural explanation, the Permittees shall identify that sample site as a candidate SSID project. The Permittees shall calculate the weekly average temperature and dissolved oxygen by separating the measurements into non-overlapping, 7-day periods. The temperature trigger is defined as any of the following: a. Maximum Weekly Average Temperature exceeds 17.0°C for a Steelhead stream, or 20 percent of the instantaneous results exceed 24°C8; b. 20 percent of instantaneous pH results are < 6.5 or > 8.5; c. 20 percent of the instantaneous specific conductance results are > 2000µS, or there is a spike in readings with no obvious natural explanation; or d. 20 percent of instantaneous dissolved oxygen results are < 7 mg/L in a cold water fishery stream.	
	v. Pathogen Indicators (1) Field and Laboratory Method – The Permittees shall collect and analyze samples for Enteroccoci and E. coli in accordance with the most recent U.S. EPA protocols.29 (2) Sample Design/Locations – The Permittees shall collect one or more samples in a creek and at an area where water-contact recreation is likely or at an opportunistic location where there is potential to detect leaking sewerage infrastructure. (3) Frequency, Timeframe and Number of Sites – The Permittees shall collect samples in the dry season. Permittees shall collect at least the minimum number of samples as shown below:	
	Sampling Agency / Minimum Number of Sample Sites Alameda Permittees / 5 per year Santa Clara Permittees / 5 per year Contra Costa Permittees / 5 per year San Mateo Permittees / 5 per year Fairfield-Suisun Permittees / 3 per 5-year period Vallejo Permittees / 3 per 5-year period	
	(4) Followup – If U.S. EPA's statistical threshold value30 for 36 per 1000 primary contact recreators is exceeded, the water body reach shall be identified as a candidate SSID project.	
C.8.e.	**Stressor/Source Identification (SSID) Projects** When any monitoring result triggers a candidate for a SSID project followup as indicated within the provisions of C.8.d and C.8.g, the Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, the Permittee(s) shall take appropriate followup action to reduce the water quality stressor or source and count this action as a completed SSID Project. SSID projects are intended to be oriented toward taking action(s) to alleviate stressors and reduce sources of pollutants; thus the Permittees shall attempt to complete all steps for half their required SSID projects, at a minimum, during the permit term. **i.** Review monitoring (C.8.d and C.8.g) results annually and maintain a list of all results exceeding thresholds described therein. Pollutant of Concern Monitoring (C.8.f) results may be included on the list as appropriate.	D

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ii. Select followup SSID projects from the list developed in C.8.e.i. based on criteria such as magnitude of threshold exceedance; parameter (for a variety of parameters); likelihood stormwater management action(s) could address the exceedance; and similar priorities. (1) Permittees who conduct SSID projects through a regional collaborative shall collectively initiate a minimum of eight new SSID projects (minimum of one for toxicity) during the Permit term. Because these SSID projects are being conducted through a regional collaborative, all SSID project reports shall be presented in a unified, regional-level report when submitted to the Water Board. In the case that no sample exhibits toxicity, as defined within the method required in this section, during the permit term, a SSID project for toxicity is not required. (2) If conducted through a countywide Stormwater Program, the Santa Clara and Alameda Permittees each shall be required to initiate five (minimum of one for toxicity) SSID projects; the Contra Costa and San Mateo Permittees each shall be required to initiate three SSID (one for toxicity) projects; and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate one SSID project(s) during the Permit term. In the case that no sample exhibits toxicity, as defined within the method required in this section, within a countywide program area during the permit term, a SSID project for toxicity is not required. **iii.** The Permittees shall conduct site specific SSID project(s) (or non-site specific if the problem is wide-spread) in the stepwise process described below: (1) Step 1: The Permittees shall develop a work plan for each SSID project and submit the work plans with the Urban Creeks Monitoring Report (UCMR) such that a minimum of half the required number of SSID projects are started (at a minimum, have a workplan) by the third year of the permit term, with the goal of completing Step 2, at a minimum, for half the required SSID projects within the permit term. The work plan shall: (a) Define the problem (e.g., magnitude and temporal and geographic extent) to the extent known; (b) Describe the SSID project objectives, including the management context within which the results of the investigation will be used; (c) Consider the problem within a watershed context and look at multiple types of related indicators, where possible (e.g., basic water quality data and biological assessment results); (d) List candidate causes of the problem (e.g., biological stressors, pollutant sources, and physical stressors); (e) Establish a schedule for investigating the cause(s) of the trigger stressor/source to begin upon completion of the workplan. Investigations may include evaluation of existing data, desktop analyses of land uses and management actions, and/or collection of new data. (f) Conduct a site specific study (or non-site specific if the problem is wide-spread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE) or Toxicity Identification Evaluations (TIE)18. A TRE, as adapted for urban stormwater, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE. For toxicity studies where there is no chemical pollutant associated with the creek status monitoring sample exhibiting toxicity, a TIE should be conducted. Where chemical data indicate a pollutant, such as fipronil or a pyrethroid, is present at adverse effects levels in the sample location, it is not necessary to conduct a TIE, and the SSID project would be considered complete; (g) For physical habitat, physiochemical pollutants (dissolved oxygen, pH, conductivity, temperature), nutrients, metals, and other stressors, the investigation shall generally follow Step 5 (Identify Probably Causes) of the Causal Analysis/Diagnosis Decision Information System (CADDIS); (h) For pathogen indicators, the study shall generally follow the California Microbial Source Identification Manual: A Tiered Approach to Identifying Fecal Pollution Sources to Beaches (2013) or equivalent process or method; and (i) The Permittees may modify the SSID Work Plan in subsequent years of the Permit term in order to address new Creek Status (or POC) results that exceed applicable thresholds and are of a higher priority based on the criteria in C.8.e.ii. (2) Step 2: The Permittees shall conduct SSID investigations according to the schedule in each SSID project work plan and shall report on the status of SSID investigations annually in the UCMR. Local stormwater Permittees shall be advised of the SSID project and consulted regarding possible local sources and potential management actions during the work plan phase and periodically throughout the SSID project.	

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	(3) Step 3: Follow-up actions. (a) When a Permittee(s) determines that discharges to its stormwater collection system(s) contribute to an exceedance of a water quality standard or an exceedance of a trigger threshold such that the water body's beneficial uses are not supported, the Permittee(s) shall submit a report in the UCMR that describes BMPs that are currently being implemented, and the current level of implementation, and additional BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQS. The report shall include an implementation schedule. (b) If a Permittee(s) determines that discharges from its (their) stormwater collection system(s) are not contributing to an exceedance of a water quality standard, the Permittee(s) may end the SSID project. The Executive Officer must concur in writing before an SSID project is determined to be completed. In cases where SSID investigations prove inconclusive (e.g., the trigger threshold exceedance is episodic or reasonable methods do not reveal a stressor/source), the Permittee(s) may request that the Executive Officer consider the SSID project complete. (c) Reporting: The Permittees shall submit an SSID status report in each UCMR which summarizes the actions taken in C.8.e.i-iii above. The SSID status report shall include a running summary of all SSID projects (C.8.e.ii), including start date, brief problem definition, and schedule for each project. As projects progress, the SSID report shall describe findings and monitoring results and outline steps for the upcoming year for each ongoing project. The Permittees shall submit the SSID status report with each UCMR. **iv**. As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.	
C.8.f.	**Pollutants of Concern Monitoring** Pollutants of Concern (POC) monitoring is intended to assess inputs of POCs to the Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants. In particular, monitoring required by this provision must be directed toward addressing the following five priority POC management information needs: 1. **Source Identification** - identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff; 2. **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location); 3. **Management Action Effectiveness** - providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions; 4. **Loads and Status** - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges; and 5. **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time. Not all information needs apply to all POCs (see Table 8.2 below for details). **i. Sampling Methods** – The Permittees shall implement or cause to be implemented the monitoring components shown in Table 8.1 in order to address each of the five POC management information needs.	D

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Table 8.1 POC Monitoring Methods

Monitoring Type	Information Need	Monitoring Methods
1	Identify Source Areas	Monitoring methods to identify watershed sources of POCs should include: • Collection and analysis of POCs on sediments in urban stormwater runoff that are transported through MS4s or receiving waters during stormwater runoff events; or • Collection and analysis of POCs on bedded sediments deposited in MS4s or receiving waters; or • Collection and analysis of POCs in stormwater runoff or bedded sediments on source area properties (e.g. private property); or, • Other monitoring methods designed to identify specific sources or uses of POCs (e.g., caulk in roadways or building materials) or watershed source areas.
2	Identify watershed areas contributing most to Bay impairment	Monitoring methods to identify watershed areas contributing most to Bay impairment should include: • Methods described for Monitoring Type #1; or • Collection of small fish tissue (or equivalent indicator) near tributary confluences with the Bay and analysis for POCs; or • Collection of bedded sediments near tributary confluences with the Bay and analysis for POCs.
3	Provide support for future or existing management actions	Monitoring methods to support future or existing management actions should include: • Methods described for Monitoring Type #1, with a focus on monitoring the effectiveness of specific management actions in reducing or avoiding POCs in MS4 discharges.
4	Provide information on POC loads, concentrations, or presence / absence	Monitoring methods to provide information on POC loads, concentrations or presence/absence should include: • Methods described for Monitoring Type #1, in combination with quantitative modeling associated with quantifying POC loads from MS4s or small tributaries to the Bay.
5	Evaluate POC trends	Monitoring methods to provide information on trends in POC loads and concentrations overtime may include: Methods described for Monitoring Type #1 or #2.

ii. Parameters and Monitoring Frequency The Permittees shall conduct POC monitoring consistent with the monitoring intensity and frequency specified in Table 8.2. Monitoring frequencies are described as the total and minimum number of samples that Permittees within a countywide Stormwater Program shall collectively collect and analyze in a Water Year (October 1 – September 30). Minimum number of samples that Permittees within a countywide Stormwater Program shall collect by the end of the Permit term to address each monitoring type are also specified.

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Table 8.2 POC Monitoring Parameters, Effort and Type

Pollutant of Concern	Total Samples[a] Collected /Analyzed (yearly minimum) for each Countywide Program: Alameda, Contra Costa, Santa Clara, and San Mateo	Minimum Number of Samples for each Monitoring Type[b]
Polychlorinated Biphenyls (PCBs)	80 (8)	8 samples minimum for monitoring types 1-5
Total Mercury	80 (8)	8 samples minimum for monitoring types 1-5
Copper	20 (2)	4 samples minimum for monitoring types 4-5
Emerging Contaminants[c]: Must include but not limited to: Perfluorooctane Sulfonates (PFOS, in sediment) Perfluoroalkyl sulfonates (PFAS, in sediment) Alternative flame retardants	See footnote c	See footnote c
Ancillary Parameters[d]: Total organic carbon Suspended sediments (SSC) Hardness	as necessary to address management questions for other POCs – see footnote d	
Nutrients: Ammonium, Nitrate, Nitrite, Total Kjeldahl Nitrogen, Orthophosphate, Total Phosphorus (all nutrients collected together for each sample)	20 (2) for each nutrient species	20 samples for monitoring type 4 for each nutrient species.

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	aThis column indicates the total number of samples, across all applicable monitoring types (i.e., monitoring types 1-5 from Table 8.1), that must be collected during the permit term. The number in parentheses indicates the minimum number of samples that must be collected, across all applicable monitoring types, during each of the five years of the permit. For example, 80 total samples must be collected for both total PCBs and mercury by each set of Santa Clara County, San Mateo County, Alameda County, and Contra Costa County Permittees during the term of the permit. Permittees must collect a minimum of 8 PCBs samples every year of the permit term, including the final year. **b** This column indicates the monitoring types from Table 8.1 that are applicable to this POC along with the minimum number of samples that shall be collected by each set of Permittees (i.e., Santa Clara County, San Mateo County, Alameda County, and Contra Costa County) by the end of year four of the permit. The applicable monitoring type(s) is also stated to illustrate the management information need(s) motivating the collected data. For example, each set of Permittees (i.e., the Countywide Programs for Santa Clara, San Mateo, Alameda, and Contra Costa counties) must collect and analyze at least 8 samples to address monitoring types 1-5 in Table 8.1 for both total PCBs and total mercury. Some collected samples may address multiple management questions. **c** The Permittees shall conduct or cause to be conducted a special study that addresses relevant management information needs for emerging contaminants. The special study must account for relevant CECs in stormwater and would address at least PFOS, PFAS, and alternative flame retardants being used to replace PBDEs. **d** Total Organic Carbon (TOC) data are not used independently. Rather, TOC can be useful for normalizing PCBs data collected in water and sediment. TOC shall be collected concurrently with PCBs data that should be normalized to TOC. Similarly, suspended sediment concentrations (SSC) samples should be collected and analyzed when water samples are collected that will be used to assess loads, loading trends, or BMP effectiveness for PCBs and Mercury. Hardness data are used in conjunction with copper concentrations collected in fresh water.	
	iii. POC Parameters and Analytical Methods – Samples collected consistent with Table 8.2 shall be analyzed for parameters listed in Table 8.3. Where no laboratory method is listed in Table 8.3, Permittees shall use U.S. EPA or SWAMP-approved methods.	

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Table 8.3 POC Analytes and Analytical Methods

Pollutant of Concern	Matrix	Analyte(s) or Test Species	Laboratory Analytical Methods
Polychlorinated Biphenyls (PCBs)	Water	Total PCBs	U.S. EPA 1668 (RMP 40)
		Total Organic Carbon	
		Suspended sediments (SSC)	
	Bedded Sediment	Total PCBs	As appropriate to address the management information need: U.S. EPA 1668 (RMP 40), 8082A, or 8270D modified by Method 1625
		Total organic carbon	
Mercury	Water	Total Mercury	
	Bedded Sediment	Total Mercury	
Copper	Water	Total Copper	
		Dissolved Copper	
		Hardness	
Nutrients	Water	Ammonium	
		Nitrate	
		Nitrite	
		Total Kjeldahl Nitrogen	
		Orthophosphate	
		Total Phosphorus	

C.8.g. Pesticides and Toxicity Monitoring — D

The Permittees shall conduct wet weather and dry weather monitoring of pesticides and toxicity in urban creeks. If a statewide coordinated pesticides and pesticides- related toxicity monitoring program begins collecting data on an ongoing basis during the Permit term, Permittees may request the Executive Officer modify, reduce or eliminate this monitoring requirement, provided the resultant change, viewed in context of the statewide program, would result in overall improvement of pesticide monitoring data collection.

i. Toxicity in Water Column - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of receiving water using applicable SWAMP comparable methodology. These samples shall be analyzed for the test organisms listed, and by the methods described, on Table 8.4.

Toxicity shall be evaluated using the Test of Significant Toxicity (TST) statistical approach.33 Each sample shall be subject to determination of "Pass" or "Fail" and shall indicate "Percent Effect" from toxicity using nondiluted samples. The TST null hypothesis shall be "mean sample response ≤ 0.75 × mean control response." A test result that rejects this null hypothesis shall be reported as "Pass." A test result that does not reject this null hypothesis shall be reported as "Fail." The relative "Percent Effect" of the sample is defined and reported as: ((Mean control response – Mean sample response) ÷ Mean control response)) × 100.

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Table 8.4 Water Column Aquatic Toxicity Analytical Procedures

Test Species	Test Endpoint(s)	Units	U.S. EPA Method
Pimephales promelas (Fathead Minnow)	Larval Survival and Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013[34] EPA 833-R-10-003[35]
Ceriodaphnia dubia (Freshwater Crustacean)	Survival[a]	Pass or Fail, % Effect <25% Passes, >25% Fails	EPA-821-R-02-013 EPA 833-R-10-003
Ceriodaphnia dubia (Freshwater Crustacean)	Reproduction	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Selenastrum capricornutum (Green Algae)	Growth	Pass or Fail using TST, % Effect	EPA-821-R-02-013 EPA 833-R-10-003
Hyalella azteca (Freshwater Amphipod)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012[36] EPA 833-R-10-003
Chironomus dilutus (midge)	Survival	Pass or Fail using TST, % Effect[b]	EPA-821-R-02-012 EPA 833-R-10-003

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(2) Sample Design/Locations – Sample locations may be selected by the Permittees to monitor locations where toxicity could be likely; to coincide with bioassessment sites; to coincide with creek restoration sites; or to resample a location where toxicity has been found in the past.

(3) Frequency, Timeframe and Number of Sites – The Permittees shall collect samples annually in the dry season. Vallejo and Fairfield-Suisun Permittees each shall collect their sample by the end of the second water year of the permit term. The Permittees shall collect at least the minimum number of samples as shown below:

Sampling Agency / Minimum Number of Sample Sites
Alameda Permittees / 2 per year
Santa Clara Permittees / 2 per year
Contra Costa Permittees / 1 per year
San Mateo Permittees / 1 per year
Fairfield-Suisun & Vallejo Permittees collectively / 1 per 5-year period

ii. Toxicity, Pesticides and Other Pollutants in Sediment - Dry Weather

(1) Field and Laboratory Method – The Permittees shall collect grab samples of creek sediment using applicable SWAMP comparable methodology. These samples shall be analyzed for the pollutants and organisms listed and by the methods described on Table 8.5. Where no laboratory method is listed in Table 8.5, Permittees shall use U.S. EPA or SWAMP-approved methods.

Table 8.5 Sediment Toxicity & Pollutants Analytical Procedures

Test Species or Pollutant	Units	Laboratory Method
Hyalella azteca and *Chironomus dilutus survival*[a]	Pass/Fail using TST, % Effect[a]	EPA-600/R-99-064[37]
Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin		EPA 3540C followed by EPA 8270D by NCI-GCMS
Carbaryl		
Fipronil		
Total PAHs		
Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Zinc		
Total organic carbon		
Grain size		

(2) Sample Design/Locations – Samples shall be collected at fine-grained depositional locations. Such sample locations may be selected by the Permittees to monitor locations where toxicity could be likely, to coincide with bioassessment sites, or to resample a location where toxicity has been found in the past, for example.

(3) Frequency, Timeframe, and Number of Sites – The Permittees shall collect samples annually during the dry season. Vallejo and Fairfield-Suisun Permittees each shall collect their sample by the end of the second year of the permit term. Permittees shall collect at least the minimum number of samples as shown below:

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	iii. Wet Weather Pesticides and Toxicity Monitoring (1) Field and Laboratory Method – The Permittees shall collect water column samples and analyze them for the following parameters using the methods specified in Tables 8.4 and 8.5. For imidacloprid, Permittees shall specify an analytical method that achieves a reporting level as close to 0.05 ppb as possible, but in no case exceeds 0.1 ppb). • Pyrethroids: bifenthrin, cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin • Imidacloprid • Indoxacarb38 • Fipronil • Toxicity (2) Sample Design/Locations – The Permittees shall collect samples annually during storm events. Sample locations shall be representative of urban watersheds (i.e., bottom of watershed locations). (3) Frequency, Timeframe, and Number of Sites – If this (C.8.g.iii) sampling is conducted by the RMC on behalf of all Permittees, a total of ten (10) samples shall be collected over the Permit term, with a minimum of six (6) samples collected by the end of the third water year of the permit term. If this (C.8.g.iii) sampling is conducted by Countywide Stormwater Programs, Permittees shall collect at least the minimum number of samples as shown below: **Sampling Agency / Minimum Number of Sample Sites** Alameda Permittees / 1 per year Santa Clara Permittees / 1 per year Contra Costa Permittees / 1 per yeat San Mateo Permittees / 1 per year Fairfield-Suisun & Vallejo Permittees collectively / 1 per 5-year period **iv. Followup** – The Permittees shall identify a site as a candidate SSID project when analytical results indicate any of the following: (1) A toxicity test of growth, reproduction, or survival of any test organism is reported as "fail" in both the initial sampling and a second, followup sampling, and both have ≥ 50% Percent Effect; (2) A pollutant is present at a concentration exceeding its water quality objective in the Basin Plan; (3) For pollutants without WQOs, results exceed Probable Effects Concentrations or Threshold Effects Concentrations.	
C.8.h.	**Reporting** **i. Water Quality Standard Exceedence –** When data collected pursuant to C.8.a.- C.8.g. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, the Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a followup report in accordance with Provision C.1 requirements. This reporting requirement shall not apply to continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.9 through C.14 of this Order, consistent with Provision C.1. **ii. Electronic Reporting** – The Permittees shall submit to the California Environmental Data Exchange Network (CEDEN) all results from monitoring conducted pursuant to Provisions C.8.d. Creek Status, C.8.e. SSID Projects (as applicable), C.8.f. Pollutants of Concern and C.8.g. Pesticides and Toxicity. Data that CEDEN cannot accept are exempt from this requirement. (1) Data shall be submitted in SWAMP formats and with the quality controls required by CEDEN. (2) Data collected during the previous October 1–September 30 period shall be submitted by March 31 of each year. **iii. Urban Creeks Monitoring Report** – The Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 31 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Each Urban Creeks Monitoring Report shall contain summaries of Creek Status, SSID Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:	D

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(1) Immediately following the Table of Contents, a completed Water Year Summary Table that lists each Program's monitoring sites, with a row for each site. The table columns contain: Site ID; creek name; land use; latitude; longitude; bioassessment, nutrient; chlorine; water column toxicity; sediment toxicity and chemistry; pathogens; temperature loggers; and general water quality (sonde data). For each site, list the site information and check the parameters sampled at that site. This will provide a summary of all Creek Status Monitoring conducted that water year. (2) An SSID status report pursuant to Provision C.8.e.iv. (3) For all data, a statement of the data quality. (4) An analysis of the data, which shall include the following: (a) Identification and analysis of any trends in stormwater or receiving water quality which shall include: • Calculations of CSCI scores and physical habitat endpoints; • Comparison of CSCI scores to: • Each other; • Any applicable, available reference site(s); and • Physical habitat endpoints. (b) A discussion of the data for each monitoring program component, which shall: • Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans; • Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness; • Identify and prioritize water quality problems; • Identify potential sources of water quality problems; • Describe followup actions; • Evaluate the effectiveness of existing control measures; and • Identify management actions needed to address water quality problems. **iv. Pollutants of Concern Monitoring Reports** – By October 15 of each year of the permit (beginning in 2016), the Permittees shall submit a report describing the allocation of sampling effort for POC monitoring for the forthcoming year (i.e., the water year that began October 1 of that year) and what was accomplished for POC monitoring during the preceding water year. The report shall include (for preceding year and projected for forthcoming year): monitoring locations, number and types of samples collected, purpose of sampling (management question addressed), and analytes measured. Any data not reportable to CEDEN should be included in the following Urban Creeks Monitoring Report due annually on March 31. **v. Integrated Monitoring Report** – No later than March 31 of the fifth year of the Permit term, Permittees shall submit an Integrated Monitoring Report in lieu of the annual Urban Creeks Monitoring Report. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit. The Integrated Monitoring Report shall report on all the data collected since the previous Integrated Monitoring Report and shall contain the following: (1) The Water Year Summary Table, as described in Provision C.8.h.iii, containing information pertaining to the fourth year monitoring data; (2) A comprehensive analysis of all data collected pursuant to Provision C.8. since the previous Integrated Monitoring Report, and may include other pertinent studies; (3) For POCs, the report shall include methods, data, calculations, load estimates, and source estimates for each POC parameter, as applicable; and (4) The Integrated Monitoring Report shall include a budget summary for each monitoring requirement and recommendations for future monitoring.	

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	vi. Standard Report Content – All monitoring reports shall include the following: (1) The purpose of the monitoring and briefly describe the study design rationale; (2) Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data; (3) Brief descriptions of sampling protocols and analytical methods; (4) Sample location description, including water body name and segment and latitude and longitude coordinates; (5) Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue); (6) Concentrations detected, measurement units, and detection limits; (7) Assessment, analysis, and interpretation of the data for each monitoring program component; (8) A listing of volunteer and other non-Permittee entities whose data are included in the report; and (9) Assessment of compliance with applicable water quality standards	
C.9. Pesticides Toxicity Control		
	To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses, within their jurisdictions, their own and others' use of pesticides that pose a threat to water quality and that have the potential to enter the municipal conveyance system. This provision implements requirements of the TMDL for Diazinon and Pesticide- Related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide-related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. U.S. EPA phased out urban uses of diazinon in the mid-2000s, and diazinon is no longer detected in urban creeks in the region. Pesticide-related toxicity continues to occur, because State and federal pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that cause or contribute to aquatic toxicity. In adopting the TMDL implementation plan, the Water Board recognized that (1) Permittees must control their own use of pesticides, but Permittees are not solely responsible for attaining the allocations, because their authority to regulate others' pesticide use is constrained by federal and State law; and (2) because a realistic date for achieving allocations cannot be discerned given the current framework for pesticide regulation, reviewing the implementation strategy every five years, at permit reissuance, is the appropriate timeline. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision. Urban-use pesticides of concern to water quality include: diamides (chlorantraniliprole and cyantraniliprole); diuron, fipronil and its degradates; indoxacarb; organophosphorous insecticides (chlorpyrifos, diazinon, and malathion); pyrethroids (metofluthrin, bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda- cyhalothrin, and permethrin); and carbamates (e.g., carbaryl and aldicarb).	B
C.9.a.	**Maintain and Implement an Integrated Pest Management (IPM) Policy or Ordinance and Standard Operating Procedures** All Permittees have developed a pesticide toxicity control program for use of pesticides in municipal operations and on municipal property based on the concepts of IPM and have adopted an IPM policy or ordinance and standard operating procedures to implement the policy or ordinance. **i. Task Description** – The Permittees shall implement their IPM policies or ordinances and standard operating procedures and update their IPM policies or ordinances and standard operating procedures as needed to ensure their use of pesticides do not cause or contribute to pesticide-caused toxicity in receiving waters. **ii. Implementation** - Each Permittee shall require municipal employees and contractors to adhere to its IPM policy or ordinance and standard operating procedures in all the Permittee's municipal operations and on all municipal property. **iii. Reporting** (1) In their Annual Reports, the Permittees shall certify they are implementing their IPM policy or ordinance and standard operating procedures, report trends in quantities and types of pesticide active ingredients used, and explain any increases in use of pesticides of concern to water quality as listed in the introduction section of this Provision. Trends and quantities of pesticide active ingredient usage shall be reported beginning with the September 2017 Annual Report.	B

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	(2) In their Annual Reports, the Permittees shall provide a brief description (e.g., one or two sentences) of two IPM tactics or strategies implemented in the reporting year. Examples could include non-chemical strategies such as monitoring, mowing weeds, mulching, and redesign of problematic landscapes; preventive actions such as sealing holes and gaps in structures, improving sanitation, and outreach to employees about how their actions contribute to pest presence; and examples of integration of several strategies into a cohesive whole, such as tackling a rat problem by educating building occupants, improving sanitation, trimming trees away from buildings, sealing holes in the structure, and trapping rodents. To the extent possible, different IPM actions should be described each year, so that a range of IPM actions is described over the permit term. (3) IPM policies or ordinances and IPM standard operating procedures shall be submitted to the Water Board upon request.	
C.9.b.	**Train Municipal Employees** **i.** Task Description– The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides are trained in IPM practices and the Permittee's IPM policy or ordinance and standard operating procedures. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program, provided both structural and landscape pest control training are provided. **ii. Reporting** (1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in their IPM policy or ordinance and IPM standard operating procedures within the last year. This report shall briefly describe the nature of the training, such as tailgate training provided by a Permittee's IPM coordinator, IPM training through the Pesticide Applicators Professional Association, etc. (2) The Permittees shall submit training materials (e.g., course outline, date, and list of attendees) upon request.	B
C.9.c.	**Require Contractors to Implement IPM** **i. Task Description** – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM, so that all contractors practice IPM on municipal properties. The Permittees shall observe contractor pesticide applications to verify that contractors implement their contract specifications in accordance with the Permittee's IPM policies or ordinance and standard operating procedures. Permittees shall note that contractor certification as a pest control advisor (PCA) alone is not evidence of IPM implementation. Similarly, IPM certifications awarded to a pest control company may not guarantee an individual employee will always use IPM strategies. Thus, periodic Permittee observation of contractor performance is necessary. **ii. Implementation** – Permittees shall periodically monitor their contractors' activities to verify full implementation of IPM techniques. This shall include, at a minimum, evaluation of lists of pesticides and amounts of active ingredient used. **iii. Reporting** – In their Annual Reports, the Permittees shall state how they verified contractor compliance with IPM policies and any actions taken or needed to correct contractor performance.	B
C.9.d.	**Interface with County Agricultural Commissioners** **i. Task Description** – The Permittees shall maintain communications with county agricultural commissioners to (a) get input and assistance on urban pest management practices and use of pesticides, (b) inform them of water quality issues related to pesticides, and (c) report any observed or citizen-reported violations of pesticide regulations (e.g., illegal handling and applications of pesticides) associated with stormwater management, particularly the California Department of Pesticide Regulation (DPR) surface water protection regulations for outdoor, nonagricultural use of pyrethroid pesticides by any person performing pest control for hire (http://www.cdpr.ca.gov/docs/legbills/rulepkgs/11- 004/text final.pdf). **ii. Reporting** – In their Annual Reports, the Permittees shall briefly describe the communications they have had with county agricultural commissioners and report followup actions to correct violations of pesticide regulations.	B
C.9.e.	**Public Outreach** **i. Task Description** – Permittees shall undertake outreach programs to (a) encourage communities within the Permittee's jurisdiction to reduce their reliance on pesticides that threaten water quality; (b) encourage public and private landscape irrigation management that minimizes pesticide runoff; and (c) promote appropriate disposal of unused pesticides.	D

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	ii. Implementation – The Permittees shall conduct each of the following: (1) **Point of Purchase Outreach**: The Permittees shall: • Conduct outreach to consumers at the point of purchase; • Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and • Participate in and provide resources for the "Our Water, Our World" program or a functionally-equivalent pesticide use reduction outreach program. (2) **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural pest control and landscape professionals by (a) explaining the links between pesticide usage and water quality; and (b) providing information about IPM in structural pest management certification programs and landscape professional trainings; and (c) disseminating tips for hiring structural pest control operators and landscape professionals, such as the tips prepared by the University of California Extension IPM Program (UC-IPM). (3) **Outreach to Pest Control Professionals**: The Permittees shall conduct outreach to pest control operators, urging them to promote IPM services to customers and to become IPM-certified by Ecowise Certified or a functionally-equivalent certification program. Permittees are encouraged to work with the Pesticide Applicators Professional Association; the California Association of Pest Control Advisors; DPR; county agricultural commissioners; UC-IPM; BASMAA; EcoWise Certified Program (or functionally equivalent certification program); Bio-integral Resource Center and others to promote IPM to pest control operators. **iii. Reporting** – In each Annual Report, Permittees shall describe their actions taken in the three outreach categories above. Outreach conducted at the county or regional level shall be described in Annual Reports prepared at that respective level; reiteration in individual Permittee reports is discouraged. Reports shall include a brief description of outreach conducted in each of the three categories, including level of effort, messages and target audience. (The effectiveness of outreach efforts shall be evaluated only once in the Permit term, as required in Provision C.9.f.).	
C.9.f.	**Track and Participate in Relevant Regulatory Processes** i. Task Description – The Permittees shall conduct the following activities, which may be done at a county, regional, or state wide level: (1) The Permittees shall track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process; (2) The Permittees shall track DPR pesticide evaluation activities as they relate to surface water quality and, when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process; (3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and county agricultural commissioners in ensuring that pesticide applications comply with WQS; and (4) As appropriate, the Permittees shall submit comment letters on U.S. EPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality. **ii. Reporting** – In their Annual Reports, the Permittees shall summarize participation efforts, information submitted, and how regulatory actions were affected. Permittees who contribute to a county, regional, or state wide effort shall submit one report at the county or regional level. Duplicate reporting is discouraged.	D
C.9.g.	**Evaluate Implementation of Pesticide Source Control Actions** **i. Task Description** – This task is necessary to gauge how effective the implementation actions taken by Permittees are in (a) achieving TMDL targets and (b) avoiding future pesticide-related toxicity in urban creeks. Once during the permit term, Permittees shall conduct a thoughtful evaluation of their IPM efforts, how effective these efforts appear to be, and how they could be improved.	D

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	ii. Implementation – The Permittees shall evaluate the effectiveness of the pesticide control measures implemented by their staff and contractors, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (collected by Permittees, research agencies, and/or State agencies), and identify additions and/or improvements to existing control measures needed to attain targets, with an implementation time schedule. **iii. Reporting** – In their 2019 Annual Reports, the Permittees shall submit this evaluation, which shall include an assessment of the effectiveness of their IPM efforts required in Provisions C.9.a-e and g; a discussion of any improvements made in these efforts in the preceding five years; and any changes in water quality regarding pesticide toxicity in urban creeks. This evaluation shall also include a brief description of one or more pesticide-related area(s) the Permittee will focus on enhancing during the subsequent permit term. Work conducted at the county or regional level shall be evaluated at that respective level; reiteration in individual Permittee evaluation reports is discouraged.	
C.10. Trash Load Reduction		
	The Permittees shall demonstrate compliance with Discharge Prohibition A.1, for trash discharges, Discharge Prohibition A.2, and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of this provision. Flood management agencies are not subject to these trash reduction requirements except for continued implementation of requirements for trash full capture systems and Trash Hot Spot cleanups, as specified in subsections C.10.b.i and C.10.c.	B
C.10.a.	**Trash Reduction Requirements** Permittees shall implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by July 1, 2022.	
	i. Schedule – Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule: a. 70 percent by July 1, 2017; and b. 80 percent by July 1, 2019.	B
	In addition, Permittees should achieve 60 percent reduction by July 1, 2016. This is not a mandatory deadline; rather, it shall be used as a performance guideline to meet the mandatory July 1, 2017 deadline. Permittees that do not attain the 60 percent performance guideline shall submit documentation of a plan and schedule of implementation of additional trash load reduction control actions that will attain the July 1, 2017 deadline.	B
	ii. Trash Generation Area Management – Permittees shall demonstrate attainment of the C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long Term Trash Reduction Plans, submitted in February 2014, in accordance with the requirements and accounting set forth in this provision. The February 2014 maps provide the 2009 trash levels and delineate trash generation areas within Permittees' jurisdictions into the following trash generation rate categories Low = less than 5 gal/acre/yr; Moderate = 5-10 gal/acre/yr; High = 10-50 gal/acre/yr; and Very High = greater than 50 gal/acre/yr.	D
	Permittees also designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, within which they will implement trash control actions. Permittees shall have an opportunity to correct and/or revise, based on improved information, the 2009 trash levels and trash generation areas in their February 2014 maps by submitting the correction and/or revision no later than the 2016 Annual Report deadline.	D
	a. Permittees shall implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better. Actions equivalent to full trash capture means actions that send no more trash down the storm drain system than a full trash capture device would allow, which is essentially no trash discharge except in very large storm flows. The C.10.a.i percent reductions shall be demonstrated by percent of 2009 Very High, High, and Moderate trash generation areas reduced to lower trash generation categories or Low trash generation by the C.10.a.i mandatory deadlines.	B

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	b. Permittees shall ensure that lands that they do not own or operate, but that are plumbed directly to their storm drain systems in Very High, High, and Moderate trash generation areas are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. The efficacy of the latter shall be assessed with visual assessments in accordance with C.10.b.ii. If there is a full trash capture device downstream of these lands, no other trash control is required. Permittees shall map the location, or otherwise record the location, of all such lands greater than 10,000 ft2 that are plumbed directly to their storm drain systems by July 1, 2018, including the trash control status of these areas. This information shall be retained by the Permittees for inspection upon request.	D
	iii. Mandatory Minimum Full Trash Capture Systems - Permittees shall install and maintain a mandatory minimum number of full trash capture devices, to treat runoff from an area equivalent to 30 percent of retail/wholesale land area, as documented by the Association of Bay Area Governments, which drains to the storm drain system within their jurisdictions. A city Permittee with a population less than 12,000 and retail/wholesale land less than 40 acres, or a population less than 2,000, is exempt from this full trash capture requirement. Table 2 in Attachment E contains the minimum amount of drainage areas that must be treated with full trash capture devices by each city or county Permittee, and the minimum number of trash capture devices required to be installed and maintained by flood management agency Permittees. A full capture system is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the sub-drainage area or designed to carry at least the same flow as the storm drain connected to the inlet. The device(s) must also have a trash reservoir large enough to contain a reasonable amount of trash safely without overflowing trash into the overflow outlet between maintenance events. Types of systems certified by the State Water Resources Control Board are deemed full capture systems. A stormwater treatment facility implemented in accordance with Provision C.3 is also deemed a full capture system if the facility, including its maintenance prevents the discharge of trash to the downstream MS4 and receiving waters and discharge points from the facility, including overflows, are appropriately screened or otherwise configured to meet the full trash capture screening specification for storm flows up to the full trash capture one year, one hour storm hydraulic specification (C.10.a.iii.).	~~D~~ B
C.10.b.	**Demonstration of Trash Reduction Outcomes**	
	i. Full Trash Capture Systems – Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system. a. **Maintenance** – The maintenance of each full capture device shall be adequate to prevent plugging, including plugging of the 5 mm screen leading to trash overflow and bypass, flooding, or a full condition of the device's trash reservoir causing bypassing of trash. All full trash capture devices shall be inspected and maintained at least once per year. All such devices in high or very high trash generation areas shall be inspected at least two times per year, with the inspections spaced at least three months or more apart. If this frequency of inspection is found excessive after two inspections, the inspection frequency can be reduced to once per year. If any such device is found to have a plugged or blinded screen or is greater than 50 percent full of trash during a maintenance event, the maintenance frequency shall be increased so that the device is neither plugged nor more than half full of trash at the next maintenance event. b. **Maintenance Records** – Permittees shall retain device specific maintenance records, including, at a minimum: the date(s) of maintenance, the capacity condition of the device at the time of maintenance (full and overflowing or with storage capacity remaining), any special problems such as flooding, screen blinding or plugging from leaves, plastic bags, or other debris causing overflow, damage reducing function, or other negative conditions. A summary of this information shall be reported in each Annual Report which may be limited to the number of full capture devices maintained that exhibited a plugged, full or overflowing condition upon maintenance. c. **Certification** – Permittees shall certify annually that each of their full trash capture systems is operated and maintained to meet full trash capture system requirements. Drainage areas served by an adequately maintained full trash capture system will be considered equivalent to or better than a Low trash generation area.	D
	ii. Other Trash Management Actions – Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.	B

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a. **Implementation Documentation** – Permittees shall maintain documentation of trash control actions that describes each action or combination of actions, the level of implementation, the timing and frequency of implementation, standard operating procedures if applicable, location(s) of implementation actions including mapped location(s) and drainage area(s) affected or description of areal extent, tracking and enforcement procedures if applicable, and other information relevant to effective implementation of the action or combination of actions. b. **Visual Assessment of Outcomes of Other Trash Management Actions** – Permittees shall conduct visual on-land assessment, including photo documentation, or other acceptable assessment method (see C.10.b.ii.b.(iv.)), of each trash generation area within which it is implementing other trash management actions or combination of actions other than full trash capture, to determine or verify the effectiveness of the action or combination of actions. Permittees may assess and account for one or more trash generation areas in a single trash management area within which a control action or combination of control actions is implemented. The visual on-land assessment method used shall meet or exceed the following criteria: (i) Conduct observations within a trash management area of the sidewalk, curb and gutter, or locations associated with trash generation sources. (ii) Conduct observations at randomly selected locations covering at least ten percent of a trash management area's street miles; or conduct observations at strategic locations with justification they are representative of trash generation in the management area and they will represent the effectiveness of the control action(s) implemented or planned in the management area. (iii) Conduct observations at a frequency consistent with known or estimated trash generation rate(s) within a trash management area and the time frequency of implementation of the control action(s) implemented or planned in the management area. Conduct observations for effectiveness approximately at the halfway point of the interval between instances of recurring trash control actions such as street sweeping and on-land cleanup. (iv) Permittees may put forth substantive and credible evidence that certain management actions or sets of management actions when performed to a specified performance standard yield a certain trash reduction outcome reliably. Such a proposal shall be made to the Executive Officer as a submittal separate from any other submittals or reports. If this evidence is accepted by the Executive Officer, the Permittees may claim a similar trash reduction outcome by demonstrating that they have performed these trash reduction actions within certain trash management areas to the same performance standard accepted by the Executive Officer.	
iii. Percentage Discharge Reduction – Percentage discharge reduction from 2009 from Very High generation areas reduced to High, Moderate, and Low, High generation areas reduced to Moderate and Low, and Moderate trash generation areas reduced to Low trash generation category to meet the required total percent reduction (%Reduction) shall be calculated based on the following formula: % Reduction = 100 [(12AVH(2009) + 4AH(2009) + AM(2009)) - (12AVH + 4AH + AM)] / (12AVH2009 + 4AH2009 + AM2009) where: AVH(2009) = total amount of the 2009 very high trash generation category jurisdictional area AH(2009) = total amount of the 2009 high trash generation category jurisdictional area AM(2009) = total amount of the 2009 moderate trash generation category jurisdictional area AVH = total amount of very high trash generation category jurisdictional area in the reporting year AH = total amount of high trash generation category jurisdictional area in the reporting year AM = total amount of moderate trash generation category jurisdictional area in the reporting year 12 = Very High to Moderate weighing ratio 4 = High to Moderate weighing ratio 100 = fraction to percentage conversion factor	B
iv. Source Control – Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items, may be valued toward trash load reduction compliance by up to ten percent load reduction total for all such actions. To claim a load percentage reduction value, Permittees must provide substantive and credible evidence that these actions reduce trash by the claimed value. A Permittee may reference studies in other jurisdictions if it provides evidence that the implementation of source control in its jurisdiction is similarly implemented as the source control assessed in the reference studies.	B
v. Receiving Water Monitoring – Permittees shall conduct receiving water monitoring and develop receiving water monitoring tools and protocols and a monitoring program designed, to the extent possible, to answer the following questions:	D

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	• Have a Permittee's trash control actions effectively prevented trash within a Permittee's jurisdiction from discharging into receiving water(s)? • Is trash present in receiving water(s), including transport from one receiving water to another, e.g., from a creek to a San Francisco Bay segment, at levels that may cause adverse water quality impacts? • Are trash discharges from a Permittee's jurisdiction causing or contributing to adverse trash impacts in receiving water(s)? • Are there sources outside of a Permittee's jurisdiction that are causing or contributing to adverse trash impacts in receiving water(s)? The monitoring tools and protocols shall include direct measurements and/or observations of trash in receiving water(s), or in scenarios where direct measurements or observations are not feasible, surrogates for trash in receiving waters, such as measurement or observations of trash on stream banks or shorelines. a. **Development and Testing Plan** – Permittees shall submit a plan acceptable to the Executive Officer by July 1, 2017, to develop and test a proposed receiving water monitoring program that includes the following: (i) Description of the tools and protocols; (ii) Description of discharge and receiving water scenarios, which will be considered, that accounts for the various receiving waters and watershed, community, and drainage characteristics within Permittees' jurisdictions that affect the discharge of trash and its fate and effect in receiving water(s); (iii) Description of factors, in addition to those in C.10.b.v.a.(ii), that will be considered and evaluated to determine scenarios and spatial and temporal representativeness; (iv) Identification of sites, representative of all the Permittees and discharge and receiving water scenarios, that will be monitored during this permit term; (v) Development of a system to manage and access monitoring results; (vi) Opportunity for input and participation by interested parties; (vii) Scientific peer review of the tools and protocols and testing results; and (viii) Schedule for development and testing; with monitoring at representative sites starting no later than October 2017. If the Permittees conduct this work through an independent third party, approved by the Executive Officer, the Plan may be submitted by July 2018, with monitoring to begin no later than October 2018. **b. Report and Proposed Monitoring Program** – Permittees shall report progress in the 2018 Annual Report, and submit a preliminary report by July 1, 2019 and a final report by July 1, 2020 on the proposed trash receiving water monitoring program. The progress report is not required if the Permittees conduct this work through an independent third party, approved by the Executive Officer, that provides input and participation by interested parties and scientific peer review of the tools and protocols and testing results and proposed receiving monitoring program.	
C.10.c.	**Trash Hot Spot Selection and Cleanup** Trash Hot Spots in receiving waters shall be cleaned annually to achieve the multiple benefits of abatement of impacts and to learn more about the sources and transport routes of trash loading. **i. Trash Hot Spot Cleanup and Definition** – The Permittees shall clean selected Trash Hot Spots to a level of "no visual impact" at least one time per year for the term of the permit. Trash Hot Spots shall be sections of creek or shoreline significantly impacted by trash of at least 100 yards of creek length or 200 yards of shoreline length.	D
	ii. Trash Hot Spot Selection - Permittees shall maintain the same number of trash hot spots identified in the previous permit term, which are included in Attachment E. Permittees may select new trash hot spot locations if past locations are no longer trash hotspots or if other locations may better align with trash management areas. **iii. Trash Hot Spot Assessments** – The Permittees shall quantify the volume of material removed from each Trash Hot Spot cleanup and attempt to identify sources to the extent readily feasible. Documentation of the cleanup activity to be retained by the Permittee shall include the trash condition before and after cleanup of the entire hot spot using photo documentation with a minimum of one photo per 100 feet of hot spot length and the total volume of trash and litter removed from the hot spot. Permittees shall report the volume removed for the most recent five years of hot spot cleanup in each Annual Report, or if a new trash hot spot location is selected, Permittees shall report the volume removed for the years of cleanup of that hotspot	

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C.10.d.	**Trash Load Reduction Plans** Each Permittee shall maintain, and provide for inspection and review upon request, a Trash Load Reduction Plan, including an implementation schedule to meet the C.10.a Trash Load Reduction requirements. A summary of any new revisions to the Plan shall be included in the Annual Report. The Plan shall describe trash load reduction control actions being implemented or planned and the trash generation areas or trash management areas where the actions are or will be implemented, including jurisdiction-wide actions, such as source control ordinances The Plans may include actions to control sources outside of the Permittee's jurisdiction that are causing or contributing to adverse trash impacts in the receiving water(s). Permittees who choose to implement such control actions may account for them towards meeting the C.10.a Trash Load Reduction requirements as long as they can demonstrate the controls will be sustained and they quantify the sustained load reduction benefit relative to control actions in the trash generation areas or trash management areas in their jurisdiction that drained to the affected receiving water.	B
C.10.e.	**Optional Trash Load Reduction Offset Opportunities** **i. Additional Creek and Shoreline Cleanup** – A Permittee may offset part of its provision C.10.a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot cleanups required by C.10.c if the additional cleanup efforts are conducted at a frequency of at least twice per year and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent. A Permittee may claim a load reduction offset of one percent for each total of trash volume removed from additional cleanups that is three and a third percent for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, and ten percent for the 2019 mandatory trash load reduction deadline, of the Permittee's 2009 trash load volume estimates, based on its trash generation maps and average categorical trash generation rates (see C.10.a.ii), in accordance with the following formula:	B
	1% Reduction Offset (Volume) = (12 AVH(2009) + 4 AH(2009) + AM(2009)) OF where: AVH(2009) = total amount of 2009 very high trash generation category jurisdictional area AH(2009) = total amount of 2009 high trash generation category jurisdictional area AM(2009) = total amount of 2009 moderate trash generation category jurisdictional area 12 = Very High to Moderate weighing ratio 4 = High to Moderate weighing ratio OF = offset factor equal to (7.5 x 0.033) for the 2016 performance guideline and 2017 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.033 is the three to one offset ratio, or (7.5 x 0.1) for the 2019 mandatory trash load reduction deadline, where 7.5 is the conversion from acres to gallons based on trash generation rates and 0.1 is the ten to one offset ratio.	

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	ii. Direct Trash Discharge Controls – A Permittee may offset an additional part of its provision C.10.a trash load percent reduction requirement by implementing a comprehensive plan approved by the Executive Officer for control of direct discharges of trash to receiving waters from non-storm drain system sources. The maximum offset that may be claimed is fifteen percent using the C.10.e.i formula. The plan shall be submitted not later than February 1 of the first year in which the offset will be reported in the following Annual Report and shall include the following: a. description of sources of the directly discharged trash; b. description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads in a systematic and comprehensive manner; c. map of the affected receiving water area and associated watershed; and d. description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.	
C.10.f.	**Reporting** Each Permittee shall provide the following in each Annual Report: **i.** A summary of trash control actions within each trash management area, including the types of actions, levels of implementation, areal extent of implementation, and whether the actions are ongoing or new, including initiation date. **ii.** Upon request by the Executive Officer, an updated trash generation area map or maps, which include trash management areas, including the locations and associated drainage areas and of full trash capture systems and other trash control actions, and the location of Trash Hot Spots, with highlight or other indication of any revisions or changes from the previous year map(s). These maps can be used to illustrate progress toward achieving the trash reduction requirements in C.10.a.i. **iii.** Should a Permittee correct and/or revise its 2009 trash generation map submitted in February 2014, the corrected or revised 2009 trash generation map shall be submitted in the 2016 Annual Report, if the Permittee has not already submitted the corrected or revised map. Certification that each of its full trash capture systems is operated and maintained to meet full trash capture system requirements; a description of any systems that did not meet full trash capture system requirements (e.g., due to plugging or overflowing); and any corrective actions taken. **iv.** An accounting of its non-full trash capture system trash control actions assessments by providing a summary description of assessments in each of its trash management areas, including the number and dates of observations. **v.** An accounting of progress toward or attainment of C.10.a.i trash discharge reduction performance guidelines and mandatory deadlines using the C.10.a.ii trash generation area mapping methodology and formula. **a.** If a Permittee cannot demonstrate attainment of the 2016 performance guideline, it shall submit a detailed plan and schedule of implementation of additional trash load reduction control actions that will attain the 2017 mandatory deadline. **b.** If a Permittee cannot demonstrate attainment of the 2017 or 2019 mandatory trash load reduction deadline, it shall submit a report of non-compliance with the associated Annual Report, or in advance of the Annual Report, that describes actions to comply with the mandatory reduction deadline in a timely manner. The report shall include a plan and schedule for implementation of full trash capture systems sufficient to attain the required reduction. A Permittee may submit a plan and schedule for implementation of other trash management actions to attain the required reduction in an area where implementation of a full trash capture system is not feasible. In such cases, the report shall include identification of the area and documentation of the basis of the Permittee's determination that implementation of a full trash capture system is not feasible. **vi.** In the 2018 Annual Report, progress on development and testing of the receiving water monitoring program. **vii.** The volume removed for the most recent five years of hot spot cleanup for each of its trash hot spots, or for the years of cleanup if a new trash hot spot location has been selected. **viii.** For Permittees claiming a C.10.e.i offset, based on additional cleanup of creek and shoreline areas, a summary description of the additional cleanup actions.	D

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ix. For Permittees claiming a C.10.e.ii offset, based on non-storm drain system trash controls, a summary description of control actions receiving water assessment results, quantification of trash volume controlled, and assessment of resulting improvements in receiving water condition, the claimed offset and documentation of information used in the C.10.e.i formula.	
C.11. Mercury Controls	
The Permittees shall implement the following control program for mercury. The Permittees shall perform the control measures (source control, treatment control, and pollution prevention strategies) and report on those control measures according to the provisions below. The provisions implement the urban runoff requirements of the San Francisco Bay and Guadalupe River Watershed mercury TMDLs and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury load allocations established for the TMDLs. The aggregate, regionwide, urban runoff wasteload allocation from the San Francisco Bay mercury TMDL is 82 kg/yr. The TMDL implementation plan calls for attainment of the allocation by February 2028 and, as a way to measure progress, attainment of an interim loading milestone by February 2018 of 120 kg/yr, halfway between the 2003 estimated load, 160 kg/yr, and the aggregate allocation. The Permittees may comply with any requirement of this provision through a collaborative effort.	B
C.11.a. Implement Control Measures to Achieve Mercury Load Reductions	
i. Task Description – Permittees shall implement mercury source and treatment control measures and pollution prevention strategies to reduce mercury loads throughout the area covered by this Permit (permit-area).	B
ii. Implementation level – To comply with this provision element, Permittees shall: (1) Identify the watersheds or portions of watersheds (management areas) in which mercury control measures are currently being implemented and those in which new control measures will be implemented during the term of this Permit (many or most may be the same watersheds as those identified for C.12.a.ii(1)); (2) Identify the control measures that are currently being implemented and those that will be implemented in each watershed and management area (may be the same as those identified for C.12.a.ii(2)); (3) Submit a schedule of control measure implementation; and (4) Implement mercury source and treatment control measures and pollution prevention strategies and quantify mercury load reductions achieved by using the accounting methods established according to provision C.11.b.	D
iii. Reporting (1) The Permittees shall report by April 1, 2016, progress toward developing a list of the watersheds and management areas where mercury control measures are currently being implemented and those in which control measures will be implemented (C.11.a.ii(1)) during the term of this Permit as well as the monitoring data and other information used to select these watersheds and management areas. (2) The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit (C.11.a.ii(1)) along with the specific control measures (C.11.a.ii(2)) that are currently being implemented and those that will be implemented in these watersheds and management areas and an implementation schedule (C.11.a.ii(3)) for these control measures. In addition to the list of watersheds and management areas, this report shall include: a. The number, type, and locations and/or frequency (if applicable) of control measures; b. The description, scope, and start date of pollution prevention measures; c. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural BMPs or other relevant implementation milestones for structural and non-structural BMPs) and a schedule for milestone achievement; and d. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.11.a.ii(2). (3) Beginning with the 2017 Annual Report and continuing in all Annual Reports, Permittees shall update all the information required under C.11.a.iii(2) as necessary to account for new control measures implemented, but not described, in the 2016 Annual Report.	D

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C.11.b.	**Assess Mercury Load Reductions from Stormwater** **i. Task Description** – The Permittees shall develop and implement an assessment methodology and data collection program to quantify in a technically sound manner mercury loads reduced through implementation of pollution prevention, source control, and treatment control measures, including mercury source control, stormwater treatment, green infrastructure, and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations. A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by the Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each control measure implemented. **ii. Implementation Level** – The Permittees shall adequately quantify the mercury load reductions achieved through implementing pollution prevention, source control, and treatment control efforts. **iii. Reporting** (1) In their 2016 Annual Report the Permittees shall submit, for Executive Officer approval, the assessment methodology and data collection program required in C.11.b.i. (2) Beginning with the 2017 Annual Report, Permittees shall report annually the loads reduced using the default (from Fact Sheet) or alternative approved assessment methodology to demonstrate cumulative mercury load reduced from each control measure implemented since the beginning of the Permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates, including appropriate reference to the control measures described in the reporting required under C.11.a. (3) In their 2018 and subsequent Annual Reports, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess mercury load reductions in the subsequent permit.	D
C.11.c.	**Plan and Implement Green Infrastructure to reduce mercury loads** **i. Task Description** – Permittees shall implement green infrastructure projects during the term of the Permit to achieve the mercury load reductions performance criteria in Table 11.1. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, Permittees shall prepare a reasonable assurance analysis (see below and Fact Sheet) to demonstrate quantitatively that mercury load reductions of at least 10 kg/yr will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.	C

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ii. Implementation Level	C

(1) The Permittees shall implement sufficient green infrastructure projects so that mercury loads are collectively reduced by 48 g/yr by June 30, 2020, which shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. Permittees shall demonstrate achievement of these load reductions by using the accounting methods approved under provision C.11.b.iii(1). Load reductions from green infrastructure projects implemented prior to the effective date of this Permit may be counted toward the required green infrastructure reductions of this Permit term if these projects were established and implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term

The Permittees may meet the load reduction as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 11.1. If neither the permit-area-wide total load reduction nor the county-specific load reduction is achieved, Permittees shall achieve load reductions consistent with their share of the county total. The individual Permittee share of the county load reduction is the proportion of county population in each municipality.

If all the Permittees in a county wish to use an alternative method of distributing the county load reductions, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee- specific load fractions in the 2017 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.

Table 11.1 Mercury Load Reduction Performance Criteria via Green Infrastructure Implementation by County

County Permittees / Mercury Load Reduction (g/yr) by June 30, 2020, through green infrastructure
Alameda Permittees / 15
Contra Costa Permittees / 9
San Mateo Permittees / 6
Santa Clara Permittees / 16
Solano Permittees: Suisun City, Vallejo, Fairfield / 2
Totals / 48

(2) Permittees shall prepare a reasonable assurance analysis of future mercury load reductions by doing the following:

a. Quantify the relationship between areal extent of green infrastructure implementation and mercury load reductions. This quantification should take into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies.

b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040.

c. Estimate the amount of mercury load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040.

d. Quantitatively demonstrate that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects.

e. Ensure that the calculation methods, models, model inputs, and modeling assumptions used to fulfill C.11.c.ii(2)(a-d) have been validated through a peer review process.

iii. Reporting — B

(1) The Permittees shall submit in their 2018 Annual Report, as part of reporting for C.11.b.iii(2), the quantitative relationship between green infrastructure implementation and mercury load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship.

(2) The Permittees shall submit in their 2020 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.

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	(3) The Permittees shall submit in their 2020 Annual Report a reasonable assurance analysis to demonstrate quantitatively that mercury reductions of at least 10 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis. (4) The Permittees shall submit as part of reporting for C.11.b.iii(2), beginning with their 2019 Annual Report, an estimate of the amount of mercury load reductions resulting from green infrastructure implementation during the term of the Permit. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate. (5) All Permittees in a county may submit, in the 2017 Annual Report, an alternative (different from the population-based default described in C.11.c.ii(1)) and supporting information to derive Permittee-specific proportions of load reduction criteria.	
C.11.d.	**Prepare Implementation Plan and Schedule to Achieve TMDL Allocations** **i. Task Description**– Permittees shall prepare a plan and schedule for mercury control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the mercury TMDL wasteload allocations by 2028. This plan may share many elements of a similar plan developed for PCBs according to Provision C.12.d. **ii. Implementation level** – Permittees shall prepare a mercury control measure implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in mercury load reductions sufficient to attain the mercury TMDL wasteload allocations by 2028. The plan must: (1) Identify all technically and economically feasible mercury control measures (including green infrastructure projects) to be implemented; (2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and (3) Provide an evaluation and quantification of the mercury load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation. **iii. Reporting** - Permittees shall submit the plan and schedule in the 2020 Annual Report.	B
C.11.e.	**Implement a Risk Reduction Program** **i. Task Description –** The Permittees shall conduct an ongoing risk reduction program to address public health impacts of mercury in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. **ii. Implementation Level** (1) At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3000 individuals annually who are likely consumers of San Francisco Bay- caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. (2) In year four of the permit term, Permittees shall evaluate the effectiveness of their risk reduction program. **iii. Reporting** – The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2020 Annual Report.	D

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C.12. Polychlorinated Biphenyls (PCBs) Controls		
	The Permittees shall implement the following control program for PCBs. The Permittees shall implement PCBs control measures (source control, treatment control, and pollution prevention strategies) in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to the provisions below. The provisions implement the urban runoff requirements of the PCBs TMDL. Permittees shall reduce PCBs loads by a specified amount during the term of the Permit, thereby making substantial progress toward achieving the urban runoff PCBs wasteload allocation in the Basin Plan. The allocation, on an aggregate and regionwide basis, is 2 kg/yr (1.6 kg/yr allocated to Permittees) to be achieved by March 2030. This wasteload allocation represents a load reduction from all urban runoff sources to the Bay of approximately 18 kg/yr (14.4 kg/yr from Permittees) compared to loads estimated using data collected in 2003. The Permittees may comply with any requirement of this Provision through a collaborative effort.	B
C.12.a.	**Implement Control Measures to Achieve PCBs Load Reductions.**	
	i. Task Description – Permittees shall implement PCBs source and treatment control measures and pollution prevention strategies to achieve PCBs load reductions in Table 12.1 throughout the area covered by this Permit (permit-area).	B
	ii. Implementation level –To comply with this provision element, Permittees shall:	B
	(1) Identify the watersheds or portions of watersheds (management areas) in which PCBs control measures are currently being implemented and those in which new control measures will be implemented during the term of this permit; (2) Identify the control measures that are currently being implemented and those that will be implemented in each watershed and management area; (3) Submit a schedule of control measure implementation; and (4) Implement sufficient control measures to achieve the permit-area-wide reduction stated below or the county-specific load reduction performance criteria shown in Table 12.1. The Permittees shall demonstrate achievement of these load reductions as required in provision C.12.b. Load reductions from control measures implemented prior to the effective date of this Permit may be counted toward the required reductions of this Permit term if these control measures were established or implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term (e.g., they were implemented after the 2014 Integrated Monitoring Report was submitted). For all Permittees combined, these county-specific average annual PCBs load reduction performance criteria shall total 0.5 kg/yr by June 30, 2018, and 3.0 kg/yr by June 30, 2020. The June 30, 2020, deadline shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. The Fact Sheet describes the amount of PCBs load reduction benefit associated with implementing a number of control measures. The Permittees may meet the load reductions as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 12.1. If neither the permit-area-wide total load reduction criteria nor the county-specific load reduction criterion is achieved, Permittees shall achieve load reductions consistent with their share of the county total. The individual Permittee share of the county load reduction performance criteria is the proportion of county population in each municipality. If all the Permittees in a county wish to use an alternative method of distributing the county load reductions, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2017 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.	

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	Table 12.1 PCBs Load Reductions Performance Criteria by County **County / PCBs Load Reduction (g/yr) by June 30, 2018 / PCBs Load Reduction (g/yr) by June 30, 2020** Alameda Permittees / 160 / 940 Contra Costa Permittees / 90 / 560 San Mateo Permittees / 60 / 370 Santa Clara Permittees / 160 / 940 Solano Permittees: Suisun City, Vallejo, Fairfield / 30 / 190 **Totals / 500 / 3000**	
	iii. Reporting (1) The Permittees shall report by April 1, 2016, progress toward developing a list of the watersheds and management areas where PCBs control measures are currently being implemented and those in which control measures will be implemented (C.12.a.ii(1)) during the term of this Permit as well as the monitoring data and other information used to select these watersheds and management areas. This list should include watersheds containing contaminated sites referred to the Water Board as well. (2) The Permittees shall report in their 2016 Annual Report the list of watersheds and management areas where control measures are currently being implemented or will be implemented during the term of the Permit (C.12.a.ii(1)) along with the specific control measures (C.12.a.ii(2)) that are currently being implemented and those that will be implemented in these watersheds and management areas and an implementation schedule (C.12.a.ii(3)) for these control measures. In addition to the list of watersheds and management areas, this report shall include: a. The number, type, and locations and/or frequency (if applicable) of control measures; b. A cumulative listing of all potentially PCB-contaminated sites Permittees have discovered and referred to the Water Board to date, with a brief c. The description, scope, and start date, of PCBs control measures; d. For each structural control and non-structural BMP, interim implementation progress milestones (e.g., construction milestones for structural controls or other relevant implementation milestones for structural controls and non-structural BMPs) and a schedule for milestone achievement; and e. Clear statements of the roles and responsibilities of each participating Permittee for implementation of pollution prevention or control measures identified under C.12.a.ii(2). (3) Beginning with the 2017 Annual Report and continuing in all Annual Reports, Permittees shall update all the information required under C.12.a.iii(2) as necessary to account for new control measures implemented but not described in the 2016 Annual Report. (4) All Permittees in a county may submit, in the 2017 Annual Report, an alternative (different from the default described in C.12.a.ii(4)) and supporting information to derive Permittee-specific proportions of load reduction criteria.	D
C.12.b.	**Assess PCBs Load Reductions from Stormwater**	
	i. Task Description – The Permittees shall develop, document, and implement an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, including PCBs source control, stormwater treatment, green infrastructure and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations.	B
	A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each unit of activity.	D

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	ii. Implementation Level – The Permittees shall adequately quantify the PCBs load reductions achieved through all the pollution prevention, source control, and treatment control measures Permittees will implement in this Permit term, except for measures to manage PCB-containing materials and wastes during building demolitions (C.12.f).	D
	For this Permit term, the Permittees will receive a total of 2000 g/yr (2 kg/yr) PCBs load reduction value if they have developed and implemented effective protocols for managing PCB-containing materials during demolition so that PCBs do not drain into the MS4 as required in provision C.12.f. The 2000 g/yr PCBs load reduction value shall be in furtherance of meeting the June 30, 2020, 3000 g/yr requirement in Table 12.1.	B
	The Permittee-specific portion of the 2000 g/yr PCBs load reduction value shall be based on the proportion of county population in each municipality. If all the Permittees in a county wish to use an alternative method of distributing the county load reductions for managing PCB-containing materials during demolition, these Permittees shall report through their countywide stormwater programs on their alternative method (if different from default population-based method) for assigning Permittee-specific load fractions in the 2019 Annual Report. This can be determined by the Permittees within the counties and may be different from one county to the next, but all Permittees within a county shall use the same method of distributing the county load reductions. Any acceptable alternative load reduction criteria must be approved through an amendment of this Permit.	B
	iii. Reporting (1) In their 2016 Annual Report the Permittees shall submit for approval by the Executive Officer the assessment methodology and data collection program required in C.12.b.i. and described in C.12.b.ii. (2) Beginning with the 2017 Annual Report, Permittees shall report annually the loads reduced using the default (from the Fact Sheet) or alternative approved assessment methodology to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates, including appropriate reference to the control measures described in the reporting required under C.12.a. (3) In their 2018 and subsequent Annual Reports, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions in the subsequent Permit. (4) All Permittees in a county may submit, in the 2019 Annual Report, an alternative (different from the default population-based method) and supporting information to derive Permittee-specific shares of load reduction value associated with implementation of C.12.f.	D
C.12.c.	**Plan and Implement Green Infrastructure to reduce PCBs loads**	
	i. Task Description – Permittees shall implement green infrastructure projects during the term of the Permit to achieve PCBs load reduction performance criteria in Table 12.2 in furtherance of meeting the 3000 g/year load reduction criteria required in C.12.a.ii.(4) and Table 12.1. Green infrastructure projects on both public and private land can serve to achieve this load reduction requirement. Additionally, Permittees shall prepare a reasonable assurance analysis (see below and the Fact Sheet) to demonstrate quantitatively that PCBs load reductions of at least 3 kg/yr will be achieved by 2040 through implementation of green infrastructure throughout the permit-area.	C

Table 12.2 PCBs Load Reduction Performance Criteria via Green Infrastructure Implementation by County

County Permittees	PCBs Load Reduction (g/yr) by June 30, 2020, through green structure
Alameda Permittees	37
Contra Costa Permittees	23
San Mateo Permittees	15
Santa Clara Permittees	37
Solano Permittees: Suisun City, Vallejo, Fairfield	8
Totals	**120**

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	ii. Implementation Level	C
	(1) The Permittees shall implement green infrastructure projects so that PCBs loads are collectively reduced by 120 g/yr by June 30, 2020, which shall be extended to December 31, 2020, if the Permittees provide documentation that control measures that will attain the load reduction will be implemented by December 31, 2020. Permittees shall demonstrate achievement of these load reductions by using the accounting methods approved under provision C.12.b.iii(1). Load reductions from green infrastructure projects implemented prior to the effective date of this Permit may be counted toward the required green infrastructure reductions of this Permit term if these projects were established and implemented during the Previous Permit term, but load reductions from the activity were not realized or credited during the Previous Permit term. The Permittees may meet the load reduction as a group. The load reduction requirements summed over all Permittees within each county are set forth in Table 12.2. If neither the permit-area-wide total load reduction nor the county-specific load reduction is achieved, Permittees shall achieve load reductions consistent with their share of the county total under provision C.12.a.ii(4). (2) Permittees shall prepare a reasonable assurance analysis that demonstrates how green infrastructure will be implemented in order to achieve a PCBs load reduction of 3 kg/yr across the permit-area by 2040. This analysis shall include the following: a. Quantify the relationship between areal extent of green infrastructure implementation and PCBs load reductions, taking into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely green infrastructure strategies; b. Estimate the amount and characteristics of land area that will be treated through green infrastructure by 2020, 2030, and 2040; c. Estimate the amount of PCBs load reductions that will result from green infrastructure implementation by 2020, 2030, and 2040; d. Quantitatively demonstrate that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects; and e. Ensure that the calculation methods, models, model inputs and modeling assumptions used to fulfill C.12.c.ii(2)a-d have been validated through a peer review process.	
	iii. Reporting	B
	(1) The Permittees shall submit in their 2018 Annual Report, as part of reporting for C.12.b.iii(3), the quantitative relationship between green infrastructure implementation and PCBs load reductions. This submittal shall include all data used and a full description of models and model inputs relied on to establish this relationship. (2) The Permittees shall submit in their 2020 Annual Report an estimate of the amount and characteristics of land area that will be treated through green infrastructure implementation by 2020, 2030, and 2040. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate. (3) The Permittees shall submit in their 2020 Annual Report a reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of at least 3 kg/yr will be realized by 2040 through implementation of green infrastructure projects. This submittal shall include all data used and a full description of models and model inputs relied on to make the demonstration and documentation of peer review of the reasonable assurance analysis. (4) The Permittees shall submit as part of reporting for C.12.b.iii(4), beginning with their 2019 Annual Report an estimate of the amount of PCBs load reductions resulting from green infrastructure implementation during the term of the Permit. This submittal shall include all data used and a full description of models and model inputs relied on to generate this estimate.	
C.12.d.	**Prepare Implementation Plan and Schedule to Achieve TMDL Wasteload Allocations**	
	i. Task Description – Permittees shall prepare a plan and schedule for PCBs control measure implementation and reasonable assurance analysis demonstrating that sufficient control measures will be implemented to attain the PCBs TMDL wasteload allocations by 2030.	D
	ii. Implementation level – Permittees shall prepare a PCBs control measures implementation plan and corresponding reasonable assurance analysis that demonstrates quantitatively that the plan will result in PCBs load reductions sufficient to attain the PCBs TMDL wasteload allocations by 2030. The plan must:	D
	(1) Identify all technically and economically feasible PCBs control measures to be implemented (including green infrastructure projects); and	B
	(2) Include a schedule according to which these technically and economically feasible control measures will be fully implemented; and	B

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	(3) Provide an evaluation and quantification of the PCBs load reduction of such measures as well as an evaluation of costs, control measure efficiency and significant environmental impacts resulting from their implementation.	B
	iii. Reporting Permittees shall submit the plan and schedule in the 2020 Annual Report.	D
C.12.e.	**Evaluate PCBs Presence in Caulks/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Way**	C
	i. Task Description –Permittees shall collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of the investigations should be on structures installed during this era.	
	ii. Implementation Level Permittees shall collect at least 20 composite samples (throughout the permit-area) of the caulks and sealants used in storm drains or roadway infrastructure in public rights-of-way and analyze this material for PCBs in such a way as to be able to detect a minimum PCBs concentration of 200 parts per billion. This sampling and analysis will count toward partial fulfillment of the monitoring effort aimed at finding PCBs sources (see management information need in C.8.f).	
	iii. Reporting Permittees shall report on the results (including all data gathered) of this investigation no later than the 2018 Annual Report.	
C.12.f.	**Manage PCB-Containing Materials and Wastes During Building Demolition Activities So That PCBs Do Not Enter Municipal Storm Drains**	
	i. Task Description – Permittees shall develop and implement or cause to be developed and implemented an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition so that PCBs do not enter MS4s. PCBs from these structures can enter storm drains during and/or after demolition through vehicle track- out, airborne releases, soil erosion, or stormwater runoff. Applicable structures include, at a minimum, commercial, public, institutional and industrial structures constructed or remodeled between the years 1950 and 1980 with building materials with PCBs concentrations of 50 ppm or greater. Single-family residential and wood frame structures are exempt. A Permittee is exempt from this requirement if it provides evidence acceptable to the Executive Officer that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures.	C
	ii. Implementation Level (1) The Permittees shall develop a protocol by June 30, 2019, that includes each of the following components, at a minimum: a. The necessary authority to ensure that PCBs do not enter MS4s from PCB- containing materials in applicable structures at the time such structures undergo demolition; b. A method for identifying applicable structures prior to their demolition; and c. Method(s) for ensuring PCBs are not discharged to the storm drain from demolition of applicable structures. (2) By July 1, 2019, and thereafter, the Permittees shall implement or cause to be implemented the PCBs management protocol for ensuring PCBs are not discharged to MS4s from demolition of applicable structures via vehicle track- out, airborne releases, soil erosion, or stormwater runoff. (3) By July 1, 2019, Permittees shall develop an assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of the protocol for controlling PCBs during demolition of applicable structures.	B
	iii. Reporting (1) In their 2016, 2017, and 2018 Annual Reports, the Permittees shall summarize the steps they have taken to begin implementing this requirement, which could include working with State and local agencies on inter-agency coordination regarding building demolitions, developing ordinances or policies, obtaining information materials, updating or supplementing permit application materials, developing a tracking tool for potential PCB-containing structures, and training relevant staff as needed to comply with this sub-provision.	B

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	(2) Each Permittee seeking exemption from C.12.f requirements must submit in its 2017 Annual Report documentation, such as historic maps or other historic records, that clearly demonstrates that the only structures that existed pre-1980 within its jurisdiction were single-family residential and/or wood-frame structures. (3) In their 2020 Annual Report, the Permittees shall provide documentation demonstrating implementation with each of the minimum requirements in C.12.f.ii(1)(a)-(c). (4) In their 2020 Annual Report and thereafter, the Permittees shall provide documentation of each of the following items: a. The number of applicable structures that applied for a demolition permit during the reporting year; and b. A running list of the applicable structures that applied for a demolition permit (since the date the PCBs control protocol was implemented) that had material(s) with PCBs at 50 ppm or greater, with the address, demolition date, and brief description of PCBs control method(s) used. (5) In their 2020 Annual Report, Permittees shall submit an assessment methodology and data collection program to quantify PCBs loads reduced through implementation of the protocol for controlling PCBs during building demolition. This should be reported at the regional level on behalf of all Permittees.	
C.12.g.	**Fate and Transport Study of PCBs: Urban Runoff Impact on San Francisco Bay Margins**	D
	i. Task Description –The Permittees shall conduct or cause to be conducted studies concerning the fate, transport, and biological uptake of PCBs discharged from urban runoff to San Francisco Bay margin areas. **ii. Implementation Level** - The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the sediment and food web PCBs concentrations in margin areas receiving urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, especially in Bay margins, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation. **iii. Reporting**-The Permittees shall submit in their 2017 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a preliminary schedule. The Permittees shall report on status of the studies in their 2018 Annual Report. The Permittees shall report in the March 15, 2020, Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.	
C.12.h	**Implement a Risk Reduction Program**	
	i. Task Description –The Permittees shall conduct an ongoing risk reduction program to address public health impacts of PCBs in San Francisco Bay/Delta fish. The fish risk reduction program shall take actions to reduce actual and potential health risks in those people and communities most likely to consume San Francisco Bay-caught fish, such as subsistence fishers and their families. The risk reduction framework developed in the Previous Permit term, which funded community-based organizations to develop and deliver appropriate communications to appropriately targeted individuals and communities, is an appropriate approach. Permittees should work with local health departments, the Bay Area Clean Water Agencies, and the Western States Petroleum Association to leverage resources for this program and to appropriately target at-risk populations.	D
	ii. Implementation Level (1) At a minimum, Permittees shall conduct or cause to be conducted an ongoing risk reduction program with the potential to reach 3,000 individuals annually who are likely consumers of San Francisco Bay-caught fish. Permittees are encouraged to collaborate with San Francisco Bay industrial and wastewater discharger agencies in meeting this requirement. (2) In year four of the Permit term, Permittees shall evaluate the effectiveness of their risk reduction program.	D
	iii. Reporting-The Permittees shall report on the status of the risk reduction program in each of their Annual Reports, including a brief description of actions taken, an estimate of the number of people reached, and why these people are deemed likely to consume Bay fish. The Permittees shall report the findings of the effectiveness evaluation of their risk reduction program in their 2020 Annual Report.	D

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C.13. Copper Controls		
	The Permittees shall implement the following control program for copper. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of C.13 Provisions through a collaborative effort.	B
C.13.a.	**Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.**	
	i. Task Description – The Permittees shall prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of the surface of copper architectural features, including copper roofs.	C
	ii. Implementation Level	C
	(1) The Permittees shall require, when issuing building permits, use of appropriate BMPs for managing waste during and post-construction.	
	(2) The Permittees shall educate installers and operators on appropriate BMPs for managing copper-containing wastes.	
	(3) The Permittees shall enforce against noncompliance.	
	iii. Reporting	~~B~~
	(1) In the 2016 Annual Report, the Permittees shall certify that legal authority currently exists to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of copper architectural features, including copper roofs.	D
	(2) In the 2016 Annual Report, the Permittees shall report how copper architectural features are addressed through the issuance of building permits.	C
	(3) The Permittees shall report annually permitting and enforcement activities.	C
C.13.b.	**Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals**	
	i. Task Description – Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.	D
	ii. Implementation Level – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.	D
	iii. Reporting	D
	(1) In the 2016 Annual Report, the Permittees shall certify that legal authority currently exists to prohibit the discharges to storm drains of water containing copper-based chemicals from pools, spas, and fountains.	
	(2) In the 2016 Annual Report, the Permittees shall report how copper- containing discharges from pools, spas, and fountains are addressed to accomplish the prohibition of the discharge.	
	(3) The Permittees shall report annually on any enforcement activities	
C.13.c.	**Industrial Sources**	
	i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.	D
	ii. Implementation Level	D
	(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.	
	(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.	
	(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on site.	
	iii. Reporting	D
	The Permittees shall highlight copper reduction results in the industrial inspection component in the C.13 portion of each Annual Report.	

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C.14. City of Pacifica and San Mateo County Fecal Indicator Bacteria Controls	
The City of Pacifica (City) and San Mateo County (County) Permittees shall implement Provision C.14 for fecal indicator bacteria. The City and County shall implement fecal indicator bacteria control measures in areas where benefits are most likely to accrue (focused implementation) and report on those control measures according to this provision. The goal of this provision is to implement the urban runoff (stormwater runoff and dry weather flows) requirements of the San Pedro Creek (Creek) and Pacifica State Beach (Beach) Indicator Bacteria TMDL (TMDL) and reduce exceedances of the bacterial water quality objectives for the water contact recreation beneficial use during the term of the Permit, thereby making substantial progress toward achieving the TMDL wasteload allocations. The wasteload allocations and the dates they must be attained by are listed in Table 14.1 below. The City and County may comply with any requirement of this provision through a collaborative effort.	N/A

Table 14.1. Numeric Targets, TMDLs, and Allocations Based on Allowable Exceedances of Single-Sample Bacteria Objectives for San Pedro Creek and Pacifica State Beach

	San Pedro Creek		Pacifica State Beach		
	Dry Weather	Wet Weather	Summer Dry Weather (Apr. 1 to Oct. 31)	Winter Dry Weather (Nov. 1 to Mar. 31)	Wet Weather[4]
Allowable Exceedances of Single-Sample Objectives (assuming daily sampling is conducted) [1,2]	4	26	0	2	30
Allowable Exceedances of Single-Sample Objectives (assuming weekly sampling is conducted) [3]	1	4	0	1	5
Attainment Date	August 1, 2028	August 1, 2028	August 1, 2021	August 1, 2021	August 1, 2021

1. Allowable exceedances are calculated by multiplying exceedance rates observed in the Reference System(s) by the Number of Days during each respective period in the reference year (1994).
2. To end up with whole numbers, where the fractional remainder for the calculated allowable exceedance days exceeds 0.1, the number of days is rounded up.
3. To determine the allowable number of exceedance events given a weekly sampling regime, as practiced for monitoring San Pedro Creek and Pacifica State Beach, the number of exceedance days was adjusted by solving for "X" in the following equation: X = (exceedance days x 52 weeks) / 365 days.
4. Wet weather is defined as any day with 0.1 inches of rain or more and the following three days.

NA

C.14.a. Implement Control Measures to Achieve Indicator Bacteria Wasteload Allocations.	
i. Task Description – The City and County shall implement bacteria control measures and pollution prevention strategies to prevent or reduce discharges of bacteria from their storm drain systems to meet the stormwater TMDL wasteload allocations in the San Pedro Creek watershed and Pacifica State Beach Indicator Bacteria TMDL (TMDL Project Area).	N/A

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ii. Implementation Level – In order to comply with this provision element: (1) The County shall effectively prohibit potential illicit discharges into its storm sewer system from sanitary sewer overflows or the sanitary sewer lines within its jurisdiction. (2) The County shall address bacteria discharges from the existing and future commercial horse and dog kennel facilities (facilities) into its storm sewer sytem within its jurisdiction as follows: (a) Conduct annual site inspections of each facility for code compliance by June 30 of each year, beginning in 2016. (b) Conduct an annual compliance review of each facility's current manure, stormwater, and drainage management plans by June 30 of each year, beginning in 2016. (c) Enforcement actions for noncompliant facilities will be in line with the County's Confined Animal Ordinance. (3) The City shall address bacteria discharges from the existing and future commercial horse facilities (facilities) within its jurisdiction as follows: (a) Review each facility's compliance with the City's Administrative Policy on "Standards for Keeping Animals." (b) Review each facility's compliance with the City's Municipal Code on "Animal Excreta." (c) Conduct annual compliance review and inspection of each facility by June 30 of each year, beginning in 2016. (d) Take progressive enforcement action(s), as needed, to bring noncompliant facilities into compliance with the City's Administrative Policy on "Standards for Keeping Animals" and Municipal Code on "Animal Excreta." (4) The City shall install new dog waste clean-up signs, waste bag dispensers, and trash cans at a minimum of 10 (ten) high priority locations within the TMDL Project Area (each site to receive all three elements: sign, bag dispenser, and trash can, unless some of the elements are already in place) by June 30, 2016. The high priority sites for these installations shall be determined via visual inspections of popular dog walking areas and their potential to discharge improperly deposited dog waste to the Creek or Beach. (5) The City shall develop and implement a visual inspection and cleanup plan for high dog waste accumulation areas along San Pedro Creek and its tributaries by June 30, 2016. From April 1 through October 31, inspections and cleanups shall, at a minimum, be conducted on a quarterly basis (e.g., once each in April, July, and October). From November 1 through March 31, inspections and cleanups shall be conducted prior to forecast rain events with a forecast rainfall depth of 0.2 inches or more (as measured at Half Moon Bay Airport (KHAF) Meteorological Station), and at a frequency of no less than once a month. (6) The City shall develop and implement an enhanced pet waste public outreach and education campaign by June 30, 2016, that, at a minimum, includes all the following: (a) Explore the possibility of establishing a new public pet waste management stakeholder group (e.g., formal or informal dog owners club). (b) Prepare and implement public service announcements regarding pet waste management and associated impacts to the Creek and Beach to play on the local television station and to include in print ads in the Pacifica Tribune. (c) Distribute a mailer with an informational brochure to residents and businesses describing proper pet waste management, the linkage of the watershed to the Creek and Beach, and the adverse impact on those water bodies and those recreating in them from improper pet waste management. (d) Add a new web page to the City website with information on the TMDL and the water quality monitoring and BMP implementation activities, as well as information about proper pet waste management and the impact of improperly deposited waste on water quality of the Creek and Beach and public health. (e) Create and implement a pre-rain pet waste cleanup email alert to residents, reminding them to cleanup accumulated pet waste in their yards that could otherwise get washed into the Creek and Beach. (f) Participate in local events and festivals to distribute pet waste management materials (educational fliers, dog waste bags, etc.). (7) The City and County, based on the results of the source characterization and BMP effectiveness, and wasteload allocation attainment analyses described in sections C.14.b-c, shall modify or refocus control measure implementation efforts as appropriate, at a frequency of no less than every two years.	N/A

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	iii. Reporting (1) No later than March 15 of each year, the City and County shall submit a comprehensive TMDL Status and Monitoring Report, reporting on the specific control measures (as listed in section C.14.a.ii above) that have been implemented in the TMDL Project Area during the forgoing October 1 through September 30 period. This report shall include: (a) The number, type, and locations and/or frequency (if applicable) of control measures; (b) The description, scope, and start date of pollution prevention measures; and (c) Clear statements of the responsibilities of each participating Permittee for implementation of pollution prevention or control measures. (2) Beginning with the 2017 TMDL Status and Monitoring Report and continuing in all TMDL Status and Monitoring Reports, the City and County shall update all the information as necessary to account for new control measures implemented, but not described in the 2016 TMDL Status and Monitoring Report or revisions to control measures.	N/A
C.14.b.	**Conduct Water Quality Monitoring to Assess Attainment of Wasteload Allocations**	
	i. Task Description - The purpose of the attainment monitoring is to determine whether or not the TMDL wasteload allocations are attained	N/A
	ii. Implementation Level - In order to comply with this provision element, the City and County shall conduct attainment water quality monitoring activities as follows:	N/A
	(1) Sample Locations – Two stations shall be monitored to assess attainment of wasteload allocations for stormwater runoff and dry weather flows: the mouth of San Pedro Creek (Creek Mouth) and Pacifica State Beach (Linda Mar #5). (2) Sampling Frequency – The two attainment stations shall be monitored weekly on an ongoing basis for fecal indicator bacteria. The weekly sampling shall occur year-round regardless of weather conditions, provided the conditions are safe for field staff to collect the samples. (3) Constituents –Fecal indicator bacteria species measured in freshwater samples collected from the Creek Mouth shall include E. coli and total coliform. Fecal indicator bacteria species measured in ocean water samples collected from Linda Mar #5 station shall include enterococci, fecal coliform, and total coliform.	
	iii. Reporting (1) In their Annual TMDL Status and Monitoring Reports submitted on March 15 each year, the City and County shall analyze, summarize, and report the results of the ongoing attainment monitoring, as follows: (a) The City and County shall complete a data evaluation, which shall focus on determining whether the TMDL wasteload allocations are being attained in San Pedro Creek and at Pacifica State Beach. (b) The indicator bacteria results from the attainment monitoring stations (Creek Mouth and Linda Mar #5 stations) shall be compared to applicable bacterial water quality objectives and the allowable exceedances of those objectives as specified in the TMDL (Table 14.1). (c) The data evaluation shall include tabulation and review of local rainfall data to determine whether the weekly attainment monitoring sampling events occurred during dry weather or wet weather. (d) An ongoing quantitative analysis of trends in bacteria densities and exceedances of applicable water quality objectives at the two attainment stations shall be conducted and reported annually. (e) A detailed and comprehensive assessment of wasteload allocation attainment by the end of year 4 of the Permit term shall be completed. If wasteload allocations are not achieved by the end of the Permit term, no later than 180 days prior to Permit expiration, the City and County shall submit a plan in their Report Of Waste Discharge, acceptable to the Executive Officer, that describes additional control measures or increased levels of existing control measures that will be implemented to prevent or reduce discharges of bacteria to storm drain systems to attain wasteload allocations. The plan shall include implementation methods, an implementation schedule, and proposed milestones.	N/A
C.14.c.	**Conduct Water Quality Monitoring to Characterize Sources of Bacteria in The Project Area and to Assess BMP Effectiveness**	
	i. Task Description – The purpose of characterization monitoring is to better characterize indicator bacteria contributions from specific sources and to evaluate control measure effectiveness. The characterization monitoring shall provide data to:	N/A

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	(1) Characterize indicator bacteria densities in subwatersheds, storm drain outfalls, and pump stations that have not been sampled in the past. Results of the investigation may be used to drive future control measure actions. (2) Establish baseline (or current) conditions against which future monitoring results can be compared following new or ongoing control measure implementation. Characterization monitoring shall be conducted every other year on a water year basis (i.e., October 1 through September 30) beginning with Water Year 2016 (WY2016) (i.e., October 1, 2015 – September 30, 2016). WY2016 characterization monitoring shall assess E. coli densities throughout the San Pedro Creek watershed, with a focus on the culverted branches of the North Fork. The City and County may elect to focus on other areas with potential or suspected bacteria sources during subsequent years. In WY2016, human-, horse-, and dog-specific genetic markers shall be analyzed for a subset of the samples to investigate whether these species contribute fecal contamination to the Creek. The characterization monitoring shall be iterative in nature and allow for flexibility of design and details in future years. Subsequent years of characterization monitoring, at a minimum, shall have the same level of effort as WY2016; however, in future years, based on the results of the WY2016 monitoring, alternative sampling stations may be targeted, sampling intensities may be modified, sampling frequencies may be adjusted, and/or the species- specific genetic marker sampling may be revised.	
	ii. Implementation Level – The City and County shall conduct characterization monitoring activities as follows: (1) Sample Locations – in WY2016, a minimum of twelve sampling stations shall be monitored. The selected sampling stations for the WY2016 characterization monitoring are divided into three separate categories, as follows: (a) Subwatersheds – Four subwatersheds shall be targeted in WY2016: the North Fork (three stations), Middle Fork (one station), Sanchez Fork (one station), and Main Stem (three stations); (b) Pump stations – The Linda Mar and Anza pump stations shall be sampled during wet weather discharge events to the Beach (during dry weather, flows entering these stations are pumped to a wastewater treatment facility and do not discharge to the Creek or Beach); (c) Stormwater outfalls – The Crespi Canal, which is an engineered and concrete-lined drainage ditch, shall be sampled if it has flowing water. In addition to the above stations, the Creek mouth shall be also sampled during events when species-specific genetic marker samples are collected (see section C.14.c.ii.3). In monitoring years subsequent to the WY2016 monitoring year, based on the results of the WY2016 monitoring, the sample locations and quantity may be modified. However, in each subsequent monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected. (2) Sampling Frequency – in WY2016, the characterization stations shall be sampled a minimum of ten times over the course of the water year, as follows: (a) Characterization monitoring shall begin in WY2016 with the first sample collected in Winter 2016; (b) Wet season – Five sampling events shall be conducted during each of the wet season months (November through March). To the extent possible, wet season sampling events shall occur during wet weather, which as defined in the TMDL is any day with 0.1 inch of rain or more and the following three days; (c) Dry season – Five sampling events shall be conducted during the dry season on a monthly basis from May through September. In subsequent monitoring years, based on the results of the WY2016 monitoring, the sampling frequency may be modified. However, in each subsequent monitoring year, a minimum of one hundred ten (110) fecal indicator bacteria samples shall be collected. (3) Constituents – All samples shall be analyzed for E. coli. In addition, during each monitoring year (i.e., WY2016, and every other water year thereafter), at a minimum, samples collected at four stations during four sampling events (two wet season, two dry season) shall be analyzed for human-, horse-, and dog-specific genetic markers to assess whether the targeted host species contribute fecal contamination to the Creek and Beach. (4) Monitoring Protocols and Data Quality – Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP) for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent SWAMP Standard Operating Procedures.	N/A

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(5) Future Revisions – Any and all changes to the characterization monitoring plan in subsequent years (e.g., WY2018, WY2020, etc.) shall be submitted to the Executive Officer for review and acceptance no later than 90 days prior to implementation.	
iii. Reporting	N/A
(1) In their Annual TMDL Status and Monitoring Reports beginning with the 2016 report submitted on March 15, 2017, and every other year's report thereafter, the City and County shall submit a comprehensive Characterization Monitoring Report reporting on all data collected during the preceding October 1 through September monitoring period.	
(2) Data evaluation shall focus on addressing the following questions:	
(a) Which land uses and/or sources contribute most to bacteria impairments in San Pedro Creek watershed?	
(b) Are controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed?	
(c) What are the multi-year indicator bacteria density trends in the Creek and at the Beach (i.e., do control measures appear to be reducing bacteria)?	
(3) As appropriate, the Report shall include the following:	
(a) Immediately following the Table of Contents, a Data Tables section that includes all the data collected pursuant to Provision C.14.d. and contains the following information pertaining to the foregoing monitoring period:	
(i) A map showing all monitoring locations;	
(ii) Immediately following the map, a single completed Locations and Parameters Table containing the following columns or rows for each location sampled: numeric	
(iii) Immediately following the Locations and Parameters Table, a single completed Results Table containing the following columns or rows for each location sampled: the short-hand site name and datum/result for each constituent analyzed. Constituents that exceed applicable water quality objectives shall be highlighted.	
(b) For all data, a statement of the data quality	
(c) An analysis of the data, which includes the following:	
(i) Basic descriptive statistics using indicator bacteria data;	
(ii) Identification and evaluation of any controllable sources of fecal contamination (e.g., human, horses, and dogs) present in the San Pedro Creek watershed;	
(iii) Identification and analysis of any trends in stormwater or receiving water quality; and	
(iv) Consideration of variability in the data sets.	
(d) A discussion of the data, which shall:	
(i) Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin or the Ocean plans;	
(ii) Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness;	
(iii) Identify and prioritize water quality problems;	
(iv) Identify potential sources of water quality problems;	
(v) Describe followup actions;	
(vi) Evaluate the effectiveness of existing control measures; and	
(vii) Identify management actions needed to address water quality problems.	
C.15. Exempted and Conditionally Exempted Discharges	
The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.	D

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C.15.a.	**Exempted Non-Stormwater Discharges (Exempted Discharges):**	
	i. Discharge Type – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges: (1) Flows from riparian habitats or wetlands; (2) Diverted stream flows; (3) Flows from natural springs; (4) Rising ground waters; (5) Uncontaminated and unpolluted groundwater infiltration; (6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains; (7) Pumped groundwater from drinking water aquifers (excludes well development); and (8) NPDES permitted discharges (individual or general permits).	D
	ii. Implementation Level – The non-stormwater discharges listed in Provision C.15.a.i above are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b below.	D
C.15.b.	**Conditionally Exempted Non-Stormwater Discharges:**	
	The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-vi below.	D
	i. Discharge Type – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains	N/A
	(1) **Pumped Groundwater from Non-Drinking Water Aquifers** Groundwater pumped from a monitoring well, used for groundwater basin management, which is owned and/or operated by a Permittee is allowed if the following requirements are met: (a) **Implementation Level -** Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria: (i) The water samples shall meet water quality standards consistent with the existing effluent limitations or pollutant triggers in the Water Board's NPDES Groundwater General Permit, NPDES No. CAG912002. (ii) The water samples shall be analyzed using approved U.S. EPA methods: (a) U.S. EPA Method 8015 Modified for total petroleum hydrocarbons; (b) U.S. EPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (c) approved U.S. EPA methods to meet the triggers for the metals listed in the general permit discussed in C.15.(b)i.(1)(a)(i) above. (iii) The water samples shall be analyzed for pH and turbidity. If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.	

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(b) **Required BMPs and Monitoring** – When greater than 2,500 gallons per day of uncontaminated (meeting the criteria in C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented: (i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream. (ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering. (iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of banks, nuisance, contamination, and excess sedimentation in the receiving waters. (iv) Maintain proper control of the flowrate and total flow during discharge so that it will not have a negative impact on the receiving waters. (v) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment. (vi) Turbidity of the discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU. (vii) The pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units. (c) If the Permittee is unable to comply with the criteria in Provision C.15.b.i.(1)(b)(i)-(vii), discharge shall cease immediately and the Permittee shall employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES Groundwater General Permits. (d) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected. (2) **Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains** (a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements. Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume. (b) If the groundwater cannot be discharged to a landscaped area or bioretention unit and the discharge is greater than 2,500 gallons per day, it can only be considered for discharge once the following sampling is done to verify that the discharge is uncontaminated: (i) The discharge shall meet WQS consistent with the existing effluent limitations or pollutant triggers in theWater Board's NPDES Groundwater General Permit, NPDES No. CAG912002. (ii) The Permittees shall require that water samples from these discharge types be analyzed using the following approved U.S. EPA methods:	

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	• U.S. EPA Method 8015 Modified for total petroleum hydrocarbons, and U.S. EPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds. • The approved U.S. EPA Methods for the metals listed below that meet the corresponding Reporting Limits: **Metal / Reporting Limit** Antimony / 6µg/1 Arsenic / 10µg/1 Beryllium / 4µg/1 Cadmium / 1.1µg/1 Chromium VI / 11µg/1 Copper / 5.9µg/1 (applicable to Suisun Bay and San Pablo Bay segments of San Francisco Bay) Copper / 3.4µg/1 (applicable to Central Bay and Lower Bay segments of San Francisco Bay) Copper / 4.7µg/1 (applicable to South San Francisco Bay segments of San Francisco Bay) Lead / 3.2µg/1 Mercury / 0.025µg/1 Nickel / 19µg/1 Selenium / 5µg/1 Silver / 2.2µg/1 Thallium / 1.7µg/1 Zinc / 86µg/1 Cyanide / 2.9µg/1 (c) Monitoring and Required BMPs – When the discharge has been verified as uncontaminated per sampling completed in C.15.b.i.(2)(b) above, the Permittees shall require the following: (i) Test the receiving water, upstream and downstream of the discharge point, to determine ambient turbidity and pH prior to discharging. Receiving water monitoring is not required if the discharge infiltrates into a dry creek immediately downstream or if accessing the sampling points poses safety to personnel. (ii) Test water samples for turbidity and pH on the first two consecutive days of dewatering. (iii) Maintain proper control of the discharge at the discharge point to prevent erosion, scouring of bank, nuisance, contamination, and excess sedimentation in the receiving waters. (iv) Maintain proper control of the flow rate and total flow during discharge so that it will not have a negative impact on the receiving waters. (v) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment. (vi) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.	

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(vii) The pH of discharged water shall be maintained within the range of 6.5 to 8.5 and shall not vary from normal ambient pH by more than 0.5 pH units.	
(d) If a Permittee determines that a discharger or a project proponent is unable to comply with the criteria in C.15.b.i.(2)(c)(i)-(vii), the Permittee shall require the discharge to cease immediately and require that the discharger employ treatment to meet the above criteria, use other means of disposal, or apply for coverage under the Water Board's NPDES Groundwater General Permit.	
(e) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected	
ii. Discharge Type – Air Conditioning Condensate	D
Required BMPs – Condensate from air conditioning units shall be reused or directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.	
iii. Discharge Type – Emergency Discharges of Potable Water	D
(1) **Emergency Discharges** -Discharges resulting from firefighting activities.	C
(2) Required BMPs	C
(a) The Permittees shall implement or require firefighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located.	
(b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). The Permittees or firefighting personnel shall control the pollution threat from their activities to the extent that time and resources allow.	
(3) **Reporting Requirements** – Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.	C
iv. Discharge Type – Individual Residential Car Washing	D
Required BMPs	
(1) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their storm drain systems.	
(2) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, or wash cars at commercial car wash facilities.	
v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges	D
(1) **Required BMPs**	
(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.	
(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.	

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	(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection45 to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency. (d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities. (e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain. (2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa, and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.	
	vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering (1) **Required BMPs** -The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following: (a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices; (b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management; (c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands; (d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and (e) Implementing the Illicit Discharge Enforcement Response Plan from C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their storm drain systems. (2) **Reporting** – The Permittees shall provide implementation summaries in their Annual Report.	C
C.16. Discharges to Areas of Special Biological Significance		
	This Provision applies to stormwater discharges from the County of San Mateo into James V. Fitzgerald Marine Reserve Area of Special Biological Significance (ASBS). As set forth in the Fact Sheet, the State Water Board granted an exception to the ASBS discharge prohibition (ASBS Exception) in the Ocean Plan to applicants including the County of San Mateo for their existing stormwater discharges into ASBSs, provided they receive authorization to discharge by an NPDES permit; the discharges comply with all applicable terms, prohibitions, and special conditions of Attachment B - Special Protections (Special Protections) attached to and part of the ASBS Exception; and the discharges are essential for flood control or slope stability, designed to prevent soil erosion, occur only during wet weather, and are composed of only stormwater runoff. This Provision serves as the authorization for the County of San Mateo to discharge stormwater into the ASBS in accordance with the requirements below.	N/A
C.16.a.	**Discharges to the James V. Fitzgerald Marine Reserve ASBS** i. If the County of San Mateo meets all of the conditions set forth in Provision C.16.a.i. and C.16.a.ii., its stormwater discharges into the James V. Fitzgerald Marine Reserve ASBS from MS4 outfalls that were constructed or were under construction prior to January 1, 2005, are permitted for those discharges that:	N/A

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(1) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage; (2) Are designed to prevent soil erosion; (3) Occur only during wet weather; and (4) Are composed only of stormwater runoff. **ii.** The County of San Mateo shall comply with all of the applicable terms, prohibitions, and special conditions of the Special Protections of the ASBS Exception set forth in State Water Board Resolution No. 2012-0012, as amended by State Water Board Resolution No. 2012-0031, including monitoring requirements, as they apply to stormwater. The Special Protections are hereby incorporated by reference into this Order and attached hereto as Attachment F. Notwithstanding anything to the contrary in this Order, the County of San Mateo shall not alter the natural ocean quality of the ASBS; shall not discharge trash into the ASBS; and shall not discharge non-stormwater into the ASBS except as provided in the Special Protections. As required by the Special Protections, the County of San Mateo shall address the preceding requirements (other than trash) in an ASBS Compliance Plan to be approved by the State Water Board Executive Director or the Regional Water Board Executive Officer and comply with the compliance schedule set forth in the Special Protections. **iii.** Reporting – In addition to the monitoring requirements of the Special Restrictions, the County of San Mateo shall submit, upon approval by the State Water Board Executive Director, a copy of its approved ASBS Compliance Plan.	
C.17. Annual Reports	
C.17.a. The Permittees shall submit Annual Reports electronically in all cases by September 30 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.16. A paper copy of each Annual Report shall be submitted by October 15 of each year. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more than ten business days unless otherwise agreed to by the Executive Officer.	B
C.17.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2016. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following Annual Report, to more accurately reflect the reporting requirements of Provisions C.1 – C.16, with the agreement of the Permittees and by the approval of the Executive Officer.	B
C.17.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit, in the cover letter of the Annual Report, the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.	B

Section 10 - Provision C.10 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to **Trash Full Capture Systems** (as reported C.10.b.i)	6.9% (43.6%)*
Percent Trash Reduction in all TMAs due to **Control Measures Other than Trash Full Capture Systems** (as reported in C.10.b.ii)[1]	40.7%
Percent Trash Reduction due to **Jurisdictional-wide Source Control Actions** (as reported in C.10.b.iv)	5.8%
SubTotal for Above Actions	**53.4%**
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	1.4%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	NA
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2018-19	**54.8%**

Discussion of Trash Load Reduction Calculation and Attainment of the 80% Mandatory Deadline:

In September 2017, the City of Vallejo (City) and the Vallejo Flood and Wastewater District (District) reported a trash load reduction less than 70%, the performance milestone that needed to be achieve by July 1, 2017 by all MRP Permittees. As a result, the Water Board issued a Cease and Desist Order (CDO) to the District and the City in June 2018. The CDO required the District and City to:

1) Implement trash load reduction control actions within all significant trash generating areas and prohibit trash discharge in a timely manner sufficient to reach 70% trash load reduction and 80% trash load reduction by July 1, 2019.
2) Submit with the FY 2017-18 Annual Report (September 30, 2018) and subsequently by March 30, 2019, a brief narrative Supplemental Report that describes the Permittees' progress toward meeting the trash load reduction requirements, and includes:
    a. For the proposed full trash capture device installations the status of the partnership agreement with Caltrans, project funding, design and contracting of new full trash capture devices, permitting, and construction
    b. The status of additional trash reduction actions that will be verified by on land visual trash assessments (OVTAs);
    c. The status of OVTAs (e.g., the trash management areas where OVTAs have been or will be completed, number of assessments completed, and schedule for completion of additional OVTAs); and

[1] See Appendix 10-1 for changes between 2009 and FY 18-19 in trash generation by TMA as a result of Full Capture Systems and Other Measures.

d. The outcome of the OVTAs, including any change in trash status for each trash management area and the resulting change in city-wide total trash load reduction associated with OVTAs.

3) Progress toward meeting the 70% and 80% trash load reduction requirement by July 1, 2019, including the resulting city-wide total trash load reduction (percent); and

4) If needed, a description of additional trash load reduction control actions, beyond those identified in the CDO, and a schedule for their implementation, sufficient to achieve the required 70% and 80% reduction by July 1, 2019.

In response to the CDO, the District and City:

- Continued to implement trash control measures described in the FY 16-17 Annual Report;
- Began planning for the construction of three large trash full capture systems, which collectively would address enough of a trash load to achieve the 80% trash load reduction milestone included in the MRP;
- Submitted supplemental reports to the Water Board in September 2018 and March 2019;
- Met with Water Board staff multiple times to discuss the status of additional control measures required to achieve the 80% trash load reduction; and
- Submitted communications to Water Board staff in writing regarding the unanticipated delays in the construction schedule for the three new large full capture systems.

As described in the District's letter to Water Board staff dated June 17, 2019, the District documented the unanticipated construction project delays that have had significant impacts on the District's/City's ability to comply with the trash load reduction milestones included in both the MRP and CDO (i.e., 80% by July 1, 2019). Additionally, as described in that letter, the District anticipates that the construction contract for the three systems will be approved in fall 2019. Construction preparation and construction is scheduled to begin in spring 2020, as soon as possible after the rainy season ends. It is therefore estimated that the three systems will be installed and operational no later than the end of October 2020. The District's letter dated June 17, 2019 to Water Board staff is included as **Appendix 10-2**.

In FY 18-19, the Vallejo Flood Control and Wastewater District (VFWD) and the City of Vallejo (City) attained and report 54.8% trash load reduction (including trash offsets and excluding the three new full capture systems).

*Once the three trash capture systems are installed, the percent trash load reduction in all Trash Management Areas (TMAs) due to trash full Capture Systems (as reported C.10.b.i) will be 43.6%, an increase of nearly 37%.

The most recent version of the City's Baseline Trash Generation Map can be downloaded at:
https://www.vallejowastewater.org/SitePages/stormwater.aspx

C.10.a.iii ► Mandatory Trash Full Capture Systems

Provide the following:

1) Total number and types of full capture systems (publicly and privately-owned) installed prior to FY 18-19, during FY 18-19, and to-date, including inlet-based and large flow-through or end-of-pipe systems, and qualifying low impact development (LID) required by permit provision C.3.
2) Total land area (acres) treated by full capture systems for population-based Permittees and total number of systems for non-population based Permittees compared to the total required by the permit.

Type of System	# of Systems	Areas Treated (Acres)
Installed Prior to FY 18-19		
Kristar Nettech Full Capture Devices (Public)	7	1,670
Installed in FY 18-19		
No new systems were installed in FY 2018-19 due to unanticipated project delays. Additional information on the project status of the design/installation of three proposed trash capture systems can be found in Appendix 10-2.	-	-
Planned for Installation post-FY 18-19		
TrashTrap by StormTrap Technologies	3	7,992
Total for all Systems Installed To-date	**10**	**1,670 (7,992)****
Treatment Acreage Required by Permit (Population-based Permittees)		**168**
Total # of Systems Required by Permit (Non-population-based Permittees)		**NA**

Once the three proposed trash capture systems are installed, the estimated treated area (acres) will be **7.992 acres.

10491
10532

C.10.b.i ► Trash Reduction - Full Capture Systems

Provide the following:

1) Jurisdictional-wide trash reduction in FY 18-19 attributable to trash full capture systems implemented in each TMA;
2) The total number of full capture systems installed to-date in your jurisdiction;
3) The percentage of systems in FY 18-19 that exhibited significant plugged/blinded screens or were >50% full when inspected or maintained;
4) A narrative summary of any maintenance issues and the corrective actions taken to avoid future full capture system performance issues; and
5) A certification that each full capture system is operated and maintained to meet the full capture system requirements in the permit.

TMA	Jurisdiction-wide Reduction (%)	Total # of Full Capture Systems	% of Systems Exhibiting Plugged/Blinded Screens or >50% full in FY 18-19	Summary of Maintenance Issues and Corrective Actions
1	5.3%	7	0%	The trash capture nets were inspected regularly and maintained by a VFWD contractor as needed and prior to predicted rain events. Nets are replaced as needed. Maintenance records are kept by the VFWD. No maintenance issues arose when servicing the nets in FY 2017-18.
2	0.0%			
3	0.0%			
4	0.0%			
5	0.0%			
6	0.1%			
7	0.0%			
8	0.0%			
9	0.0%			
10	0.0%			
11U*	1.4%			
Total	**6.9% (43.6%)****			

Certification Statement:

VFWD certifies that a full capture system maintenance and operation program is currently being implemented to maintain all applicable systems in a manner that meets the full capture system requirements included in the Permit.

*This TMA is entirely comprised of non-jurisdictional land area within the unincorporated portion of Solano County that is addressed via trash full capture systems owned and operated by the VFWD.

**Once the three proposed trash capture systems are installed, the trash load reduction associated with full capture systems will increase to 43.6%.

*The Total jurisdiction-wide reduction reported for full capture systems includes 0.8% reduction for treatment of 106.8 acres of non-jurisdictional public K-12, college and university school land areas.

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART A)

Provide a summary of trash control actions other than full capture systems or jurisdictional source controls that were implemented within each TMA, including the types of actions, levels and areal extent of implementation, and whether actions are new, including initiation date.

TMA	Summary of Trash Control Actions Other than Full Capture Systems
Various	**Public Education and Outreach Programs Targeted at Trash Reduction and Implemented post-MRP Adoption:** The District installed no littering signs and a dog waste disposal bag dispenser at a local waterfront area. The District has also installed trash bins and educational signage at a pedestrian path near White Slough on the North end of Vallejo. Unfortunately the educational signage has been subject to frequent graffiti and has been subsequently removed.
Various	**On-Land Cleanup and Illegal Dumping Abatement Actions:** The City of Vallejo (Public Works Maintenance Division, Police Department, and Code Enforcement Division), Caltrans, Vallejo City Unified School District, Vallejo Flood and Wastewater District, Greater Vallejo Recreational District, Vallejo Watershed Alliance, California Maritime Academy, Six Flags Discovery Kingdom and the Vallejo Chamber of Commerce have partnered with members of the community to clean up, maintain, and landscape all highly visible entrances and major thoroughfares throughout the City of Vallejo. This interagency partnership collaborated on each phased activity to pick up trash, cut down overgrown vegetation, trim trees, remove graffiti, and perform other enhancement tasks to make the target entrances and thoroughfares attractive to citizens, businesses, and visitors. Caltrans and the Vallejo Public Works Maintenance Division primarily address significant blight on public rights-of-way and provide a thorough clean-up of these areas. Meanwhile, the City's Code Enforcement Division plays an important role by conducting educational and enforcement activity for weeds, graffiti, litter, junk, encampments, and other blight on the private properties that abut each phased entrance and thoroughfare area in order to reduce the litter and blight from reoccurring. While not captured in the trash reduction numbers, the Vallejo Permittees need to emphasize that 599 tons of illegally dumped materials were picked up and disposed of in an environmentally appropriate manner in FY 18-19. A fair portion of this is materials that is related to homeless encampments. Many homeless encampments are along waterways, so removing this material truly does prevent much of it from entering the receiving waters. Additionally, the City offers a free "Dump Day" for its residents to bring to a central location. This year, residents brought almost 200 tons of material which if not disposed of properly could have ended up in the waterways.
All	**Enhanced Street Sweeping:** In FY 16-17, City doubled its street sweeping frequency to 2x/month in residential areas. The downtown area continues to be swept at 3x/ week. These increases in frequencies is anticipated to provide significant additional removal of trash from streets in the City. Additionally, the City has contracted with a parking enforcement consultant who will be working with

	City staff to enhance enforcement of City parking restrictions on street sweeping days.

C.10.b.ii ► Trash Reduction – Other Trash Management Actions (PART B)

Provide the following:

1) A summary of the on-land visual assessments in each TMA (or control measure area), including the street miles or acres available for assessment (i.e., those associated with VH, H, or M trash generation areas not treated by full capture systems), the street miles or acres assessed, the % of available street miles or acres assessed, and the average number of assessments conducted per site within the TMA; and
2) Percent jurisdictional-wide trash reduction in FY 18-19 attributable to trash management actions other than full capture systems implemented in each TMA; OR
3) Indicate that no on-land visual assessments were performed.

If no on-land visual assessments were performed, check here **and state why:** [X] **Explanation:** No OVTAs were conducted in TMAs 9 and 11U in FY 18-19 because the land areas in these TMAs are either fully addressed by full capture systems or are low trash generating, as depicted on the Vallejo baseline trash generation map.

TMA ID or *(as applicable)* Control Measure Area	**Total Street Miles[2] Available for Assessment**	**Summary of On-land Visual Assessments[3]**			**Jurisdictional-wide Reduction (%)**
		Street Miles Assessed	**% of Available Street Miles Assessed**	**Avg. # of Assessments Conducted at Each Site[4,5]**	
1	6.1	0.8	12.9%	6.3	1.8%
2	5.5	0.6	10.9%	6.7	3.5%
3	71.3	6.7	9.3%	6.6	24.4%
4	27.1	2.8	10.4%	6.4	4.3%
5	21.1	2.0	9.6%	7.0	3.1%
6	11.2	1.1	10.1%	6.3	1.5%
7	6.6	0.8	11.6%	7.0	1.8%
8	14.9	1.6	10.5%	6.4	0.0%
9	0.0	--	--	--	--
10	0.7	0.4	54.1%	6.5	0.2%
11U	NA	NA	NA	NA	NA
	Total	**16.7**	**-**	**-**	**40.7%**

[2] Linear feet are defined as the street length and do not include street median curbs.
[3] Assessments conducted between August 2017 and July 2019 are assumed to be representative of trash levels in FY 18-19 and were therefore used to calculate the jurisdictional-wide reductions reported in this section.
[4] Each assessment site is roughly 1,000 feet in length.
[5] Based on analyses conducted as part of the BASMAA *Tracking California's Trash* project funded by the State Water Resources Control Board, the optimal number of assessment events to detect an improvement in trash levels is between 4 and 6 per site. Because the OVTA program only began in August 2017 in Vallejo, the average number of assessments conducted at each site are on the lower end of this optimal level. In future years, assessments will be conducted at roughly 3x/FY, allowing 6 assessments to be averaged for each site.

C.10.b.iv ► Trash Reduction – Source Controls

Provide a description of each jurisdictional-wide trash source control action implemented to-date. For each control action, identify the trash reduction evaluation method(s) used to demonstrate on-going reductions, summarize the results of the evaluation(s), and estimate the associated reduction of trash within your jurisdictional area. Note: There is a maximum of 10% total credit for source controls.

Source Control Action	Summary Description & Dominant Trash Sources and Types Targeted	Evaluation/Enforcement Method(s)	Summary of Evaluation/Enforcement Results To-date	% Reduction
Single Use Bag Ban	On November 8, 2016, California voters approved Proposition 67, the statewide Single-Use Carryout Bag Ban. As a result, the new law went into effect in FY 16-17 and most grocery stores, retail stores with a pharmacy, convenience stores, food marts, and liquor stores are no longer able to provide single-use plastic carry-out bags to their customers.	The City of Vallejo and the State of California enforce the bag ban. Violations are reported to either the City or the California Attorney General's Office using its on-line reporting form. A store or producer of reusable grocery bags that violates the law may be fined $1,000 per day for the first violation, $2,000 per day for the second violation, and $5,000 per day for the third and subsequent violations. Although efforts to evaluate reductions in single use bags in Vallejo have not yet occurred, an applicable study was recently conducted in Santa Clara County to determine whether the current levels of litter-prone items (i.e., single-use bags and EPS food service ware) in stormwater have changed since local ordinances prohibiting the distribution of these items were put into effect. Because the ordinances put into place in Santa Clara County are very similar to the statewide bag ban, the results of the study are applicable to the City. For additional details on the study design, methods, and results, see Appendix 10-1 of the SCVURPPP Report at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/MRP/2016_AR/Santa_Clara/SCVURPPP_2015-16_MRP_AR.pdf	The City has received only a few complaints about stores not complying with the statewide law. As complaints occur, the City will respond to the best of its ability. According to the BASMAA "San Francisco Bay Area Stormwater Trash Generation Rates" report finalized on June 20, 2014, single use carryout bags contribute about 8% of the total litter loading to local receiving waters by municipal stormwater. Results from the Santa Clara County Study, which characterized of trash in full trash capture systems pre- and post-ordinance in the Santa Clara Valley, 72% fewer singleuse bags are observed in stormwater since ordinances have gone into effect. Based on the results of the BASMAA and SCVURPPP studies, the City and District estimate an approximate 72% reduction in the number of single-use bags in stormwater, which equates to a 5.8% (i.e., 72% x 8%) reduction of trash discharged from the Vallejo's stormwater conveyance system.	5.8%

C.10.b.v ► Trash Reduction – Receiving Water Monitoring

Report on the progress of developing and testing your agency's trash receiving water monitoring program.

In FY 18-19, the City continued implementing the BASMAA Regional Receiving Water Trash Monitoring Program Plan that was approved by the Water Board's Executive Officer. Implementation included preparing for and conducting qualitative assessments and quantitative monitoring in receiving water locations within the City of Vallejo. Implementation occurred in collaboration with other MRP Permittees in Solano County. Consistent with MRP requirements, a preliminary report describing data results and findings to-date was submitted to the Water Board via BASMAA on July 1, 2019 on behalf of all Permittees. The final report for the development and testing of the Bay Area trash receiving water monitoring program will be submitted by BASMAA by July 1, 2020, consistent with the MRP requirements, following peer review.

C.10.c ► Trash Hot Spot Cleanups

Provide the FY 18-19 cleanup date and volume of trash removed during each MRP-required Trash Hot Spot cleanup during each fiscal year listed. Indicate whether the site was a new site in FY 18-19.

Trash Hot Spot	New Site in FY 18-19 (Y/N)	FY 18-19 Cleanup Date(s)	Volume of Trash Removed (cubic yards)				
			FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19
Central Rindler Creek	N	6/24/19	4.50	1.00	10.0	6	0.25
South Rindler Creek	N	4/3/19, 6/24/19	1.99	1.00	5.0	3	2.25
Blue Rock Springs Creek	N	7/11/18, 6/24/19	0.50	0.00	2.85	0.33	0.25
Coral Street Ditch	N	7/11/18, 6/24/19	0.50	2.10	10.0	0.5	1.0
Austin Creek, 3287 Sonoma Blvd	N	7/11/18, 6/24/19	NA	1.50	6.0	1	0.5

C.10.d ►Long-Term Trash Load Reduction Plan

Provide descriptions of significant revisions made to your Long-term Trash Load Reduction Plan submitted to the Water Board in February 2014. Describe significant changes made to primary or secondary trash management areas (TMA), baseline trash generation maps, control measures, or time schedules identified in your plan. Indicate whether your baseline trash generation map was revised and if so what information was collected to support the revision. If your baseline trash generation map was revised, attach it to your Annual Report.

Description of Significant Revision	Associated TMA
In FY 15-16, consistent with all MRP Permittees, all public K-12 schools, college and university parcels were made non-jurisdictional on the District's baseline trash generation maps. Under California Government Code Sections 4450 through 4461, the construction, modification, or alternation of facilities and/or structures on these parcels are under the jurisdiction of the California Division of State Architect and not the District. The public right-of-way (e.g., streets and sidewalks) surrounding these parcels remain as jurisdictional on the Vallejo Permittees' baseline trash generation maps. The Vallejo Permittees' revised baseline trash generation map was included as **Attachment C.10: Vallejo Trash Reduction Compliance Plan** to its FY 15-16 Annual Report.	All applicable
In FY 16-17, the Vallejo Permittees refined the Vallejo Baseline Trash Generation Map because the trash generation levels included on the map originally included in its Long-term Trash Load Reduction Plan were never fully verified by District and City staff due to a lack of resources. Google Street View applications and On-land Visual Assessments were used to reevaluate baseline trash generation. Trash generation categories were reclassified for areas where information indicated that errors had occurred during initial/preliminary trash generation category assignments. Reclassifications to trash generation categories were used for the purposes of calculating baseline (2009) trash generation included in this report (i.e., as an input parameter to the formula used to calculate load reductions reported). The Vallejo Permittees' refined baseline map is included as **Attachment C.10: Vallejo Trash Reduction Compliance Plan.**	All applicable

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 18-19. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

Offset Program	Summary Description of Actions and Assessment Results		Volume of Trash (CY) Removed/Controlled in FY 18-19	Offset (% Jurisdiction-wide Reduction)
	Event Details	**Evaluation of Effectiveness**		
Additional Creek and Shoreline Cleanups (Max 10% Offset)	7.21.18 Park and Lake Cleanup Blue Rock Springs Park	10 participants; 6 33-gallon bags of trash collected	72.4 CY	1.4%
	9.15.18 Coastal Cleanup Day Various sites around Vallejo	706 volunteers, 19 sites, 11,000 pounds* (11,000 gallons) of trash removed		
	10.20.18 Volunteer Workday Hanns Memorial Park	3 participants refreshed bark path. 2 33-gallon bags of trash were removed.		
	1.19.19 Habitat Restoration & Cleanup Lake Dalwigk	11 attendees planted native grass plugs on the islands and removed 9 33-gallon bags of trash, plus a large canopy structure and large chair base.		
	2.16.19 Volunteer Workday Lake Dalwigk	14 attendees removed 2 cubic yards of trash.		
	3.15.19 Children's Lake Cleanup Lake Dalwigk	More than 50 students, along with 2 teachers and 6 chaperones, removed 17 33-gallon bags of trash from lake.		
	3.16.19 Volunteer Workday Lake Chabot	11 attendees removed 1 cubic yard of trash.		
	4.27.19 Earth Day Cleanup Blue Rock Springs Creek	39 participants removed six 96-gallon toters of trash, and ½ toter of recyclables (400 lbs. trash, 40 lbs. recycling).		
	5.11.19 Creek Cleanup Rindler Creek	10 attendees removed 6 cubic yards of trash (350 lbs.)		
	6.22.19 Artichoke Thistle Removal/Trash Cleanup Hanns Park	9 participants removed two 33-gallon bags of trash in addition to the thistles and tree limbs.		

C.10.e. ► Trash Reduction Offsets (Optional)

Provide a summary description of each offset program implemented, the volume of trash removed, and the offset claimed in FY 18-19. Also, for additional creek and shoreline cleanups, describe the number and frequency of cleanups conducted, and the locations and cleanup dates. For direct discharge control programs approved by the Water Board Executive Officer, also describe the results of the assessments conducted in receiving waters to demonstrate the effectiveness of the control program. Include an Appendix that provides the calculations and data used to determine the trash reduction offset.

Direct Trash Discharge Controls (Max 15% Offset)	NA	NA	NA

*The conversion rate of one pound of trash is equal to one gallon of trash. (Source: Santa Clara Valley Water District,- Creek Cleanup Data Collection Form)

10500
10541

Appendix 10-1. Baseline trash generation and areas addressed by full capture systems and other control measures in Fiscal Year 18-19.[6]

TMA	2009 Baseline Trash Generation (Acres)					Trash Generation (Acres) in FY 18-19 After Accounting for Full Capture Systems					Jurisdiction-wide Reduction via Full Capture Systems (%)	Trash Generation (Acres) in FY 18-19 After Accounting for Full Capture Systems and Other Control Measures					Jurisdiction-wide Reduction via Other Control Measures (%)	Jurisdiction-wide Reduction via Full Capture AND Other Control Measures (%)
	L	M	H	VH	Total	L	M	H	VH	Total		L	M	H	VH	Total		
1	1,362	596	236	0	2,194	1,655	445	94	0	2,194	5.3%	1,888	215	91	0	2,194	1.8%	7.1%
2	52	193	186	9	439	52	193	186	9	439	0.0%	118	241	80	0	439	3.5%	3.5%
3	737	735	1,026	104	2,601	737	735	1,026	104	2,601	0.0%	1,198	1,002	381	20	2,601	24.4%	24.4%
4	578	550	261	0	1,389	578	550	261	0	1,389	0.0%	708	578	101	2	1,389	4.3%	4.3%
5	394	523	147	3	1,068	394	523	147	3	1,068	0.0%	641	338	85	4	1,068	3.1%	3.1%
6	105	247	129	0	482	121	232	129	0	482	0.1%	196	198	88	0	482	1.5%	1.6%
7	250	80	138	0	468	250	80	138	0	468	0.0%	289	110	69	0	468	1.8%	1.8%
8	440	441	18	0	898	440	441	18	0	898	0.0%	538	306	55	0	898	0.0%	0.0%
9	71	0	0	0	71	71	0	0	0	71	0.0%	71	0	0	0	71	NA	NA
10	7,748	7	15	0	7,770	7,748	7	15	0	7,770	0.0%	7,750	15	4	0	7,770	0.2%	0.2%
11U*	0	0	49	0	49	49	0	0	0	49	1.4%	49	0	0	0	49	NA	1.4%
Totals	**11,736**	**3,373**	**2,204**	**115**	**17,429**	**12,094**	**3,206**	**2,013**	**115**	**17,429**	**6.9%**	**13,446**	**3,003**	**953**	**26**	**17,429**	**40.7%**	**47.5%**

Note: "NA" indicates that the TMA has no moderate, high or very high trash generating areas (i.e., all low trash generation and/or non-jurisdictional) and therefore no additional trash control measures are needed.

*This TMA is entirely comprised of non-jurisdictional land area within the unincorporated portion of Solano County that is addressed via trash full capture systems owned and operated by the VFWD.

[6] Due to rounding, total acres and percentages presented in this table may be slightly different than the sum of the acres/percentages in the corresponding rows/columns (e.g., differ by 1 acre or 0.1%).

Supplemental Report on Trash Control Actions
In compliance with Cease and Desist Order No. R2-2018-0033

As required in Cease and Desist Order (CDO) No. R2-2018-0033, the Vallejo Flood and Wastewater District (VFWD) is submitting this brief narrative report that describes the Vallejo Permittees' (VFWD and City of Vallejo's) progress toward meeting the 70% and 80% trash load reduction requirements required by the Municipal Regional Stormwater NPDES Permit (MRP) and the CDO. The CDO states that the narrative report shall include the following:

a) For the proposed full trash capture device installations:
    i. The status of the partnership agreement with Caltrans;
    ii. The status of project funding;
    iii. The status of design and contracting of new full trash capture devices;
    iv. The status of permitting; and
    v. The status of construction

b) The status of additional trash reduction actions that will be verified by on land visual trash assessments (OVTAs) in accordance with Permit Provision C.10.b.ii.b.;
    i. The status of OVTAs (e.g., the trash management areas where OVTAs have been or will be completed, number of assessments completed, and schedule for completion of additional OVTAs); and
    ii. The outcome of the OVTAs, including any change in trash status for each trash management area and the resulting change in city-wide total trash load reduction associated with OVTAs;

c) Progress toward meeting the 70% and 80% trash load reduction requirement by July 1, 2019, including the resulting city-wide total trash load reduction (percent); and

d) If needed, a description of additional trash load reduction control actions, beyond those identified in this Order, and a schedule for their implementation, sufficient to achieve the required 70% and 80% reduction by July 1, 2019.

Narrative Report

On September 18, 2018 the VFWD received notice indirectly that the San Francisco Bay Regional Water Control Board (RWQCB) was concerned about the location of two of the trash full capture devices planned in Vallejo. These concerns stemmed from siting the devices downstream of receiving waters and the RWQCB initially stated that the devices would only receive partial trash removal credit for the drainage area protected by the devices. The VFWD contacted the RWQCB and held a series of meetings to provide the RWQCB with more information regarding the projects. In these meetings, the VFWD and the RWQCB agreed that the devices could receive full trash removal credit if perimeter shoreline cleanups and other actions were taken to mitigate the possibility of trash impacting the receiving waters upstream of the devices. The RWQCB did not, however, conclusively state the device removal credit would be as shown in the Vallejo Trash Capture Feasibility Study.

Due to the uncertainty of the amount of trash removal credit the devices would generate, the possibility the devices would still need to be relocated and the amount of funds VFWD had already

committed to the project, the VFWD reluctantly determined that the most conservative course of action would be to place the project on hold, pending a decision in writing from the RWQCB regarding the trash removal credit the devices would generate. On February 14, 2019 the VFWD submitted a letter to the RWQCB listing the proposed actions that would be undertaken; a written response from the RWQCB was received on April 18, 2019. The VFWD had received authorization from its Board of Trustees for the District Manager to authorize restarting the project without the need to bring the item to the Board for further approvals and notice was given to the contractors to resume the project on April 19, 2019.

a.i. Status of the partnership agreement with Caltrans:

VFWD received a draft "Project Initiation Report" from Caltrans for review and comment on April 22, 2019 for programing the trash capture project in its 2020 SHOPP. VFWD has also been in contact with Caltrans' District 4 Right of Way Excess Lands department in attempts to obtain the easements necessary for one of the proposed trash capture devices. On September 4, 2019 VFWD requested a status update on both of these items, which has not been received to date. The VFWD has continued to communicate with Caltrans regarding the project; the most recent was an email sent September 10, 2019 outlining the project for Caltrans' trash full capture local projects data request. To date, VFWD has not received an agreement proposal in writing from Caltrans. VFWD continues to move forward with implementation of the project.

a.ii. Status of project funding:

To date, the VFWD is still pursuing a funding agreement from Caltrans. Budgeted VFWD capital improvement funds have been used to fund the design of the full capture systems. VFWD capital improvement funds will not cover the entirety of construction costs. If the VFWD is unable to secure a funding reimbursement (cooperative) agreement from Caltrans, funds may have to be drawn from VFWD reserves. Another possibility is to delay or reschedule other storm and flood control projects and re-appropriate those funds toward trash full capture device construction costs.

a.iii. Status of design and contracting of new full trash capture devices:

The VFWD has contracted with BKF Engineering for design of three large full capture devices. The three devices are currently at 100% design stage; the project is undergoing final review and preparations to go out to bid for construction. The District anticipates awarding a contract at the December 2019 or January 2020 Board of Trustees meeting.

a.iv. Status of permitting:

Easements and encroachment permits will be part of the effort to move the project from 60% to 100% design. The VFWD filed a Notice of Exemption (NOE) on October 9, 2018. A NOE is consistent with RWQCB guidance for projects sited entirely in existing storm drain systems.

a.v. Status of construction:

Construction has not begun at the sites. With the delays, it is anticipated that a construction contract will be awarded by the end of 2019 or early 2020, with construction occurring between March and October 2020.

b.i. Status of OVTAs:

The VFWD has contracted with EOA, Inc. to perform OVTAs in Vallejo. A total of 88 street/sidewalk OTVA sites have been established in Vallejo and a total of 226 assessments were conducted in FY 2018-19 as part of the Vallejo OVTA Program. With the exception of TMAs 9 and 11U, which are either entirely addressed via full capture devices or are low trash generating as depicted on the Vallejo baseline trash generation map, all TMAs were assessed in FY 2018-19 and are currently being assessed in FY 19-20. Over the course of the two FYs, each of the 88 sites will be assessed roughly 6 times.

b.ii. Outcome of OVTAs:

In general, the OVTAs conducted in FY 2018-19 showed a decrease in the levels of trash observed, compared to the Vallejo baseline trash generation map, which is intended to depict 2009 levels of trash generated in jurisdictional land areas within the boundaries of the City. In the VFWD/City 2018-19 annual report, the trash load reduction demonstrated by OTVAs was 40.7%, a slight increase from the 38.0% reduction reported in the VFWD's/City's FY 2017-18 annual report. The VFWD anticipates similar reductions will be reported with our FY 2019-20 Annual Report, based on preliminary data collected to-date this FY.

c. Progress toward meeting the 70 percent and 80 percent trash load reduction requirement by July 1, 2019:

The Vallejo Permittees have made progress toward meeting the 70% and 80% trash load reduction requirement on two fronts: 1) by enhancing trash removal activities on-land, which have successfully improved OVTA scores, and 2) by moving forward with the design of three large full trash capture devices. When the three large devices are complete and operational, they will provide an estimated additional 40% trash reduction, which when combined with enhanced trash removal actions, will enable the Vallejo Permittees to meet the 80% trash load reduction requirement. The delays to design and construction of the large devices previously discussed have prevented the Vallejo Permittees from meeting the July 1, 2019 requirement.

d. If needed, a description of additional trash load reduction control actions:

Because the proposed large trash full capture devices are sufficient to bring the Vallejo Permittees to 80%, no additional trash load reduction actions are planned at this time.

Trash Long-Term Reduction Plan and Progress Assessment Strategy

February 1, 2014

Submitted by:

Vallejo Sanitation and Flood Control District

450 Ryder Street

Vallejo, CA 94534

In compliance with Provisions C.10.c of Order R2-2009-0074

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Vallejo Sanitation and Flood Control District
LONG-TERM TRASH LOAD REDUCTION PLAN AND ASSESSMENT STRATEGY

CERTIFICATION STATEMENT

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted, is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature by Duly Authorized Representative:

Daniel Tafolla 2/1/14
Environmental Services Director

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ABBREVIATIONS

BASMAA	Bay Area Stormwater Management Agencies Association
BID	Business Improvement District
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
CDS	Continuous Deflection Separator
CEQA	California Environmental Quality Act
CY	Cubic Yards
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
GIS	Geographic Information System
MRP	Municipal Regional Stormwater NPDES Permit
MS4	Municipal Separate Storm Sewer System
NGO	Non-Governmental Organization
NPDES	National Pollutant Discharge Elimination System
Q	Flow
SFRWQCB	San Francisco Regional Water Quality Control Board
SWRCB	State Water Resource Control Board
TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
Water Board	San Francisco Regional Water Quality Control Board
WDR	Waste Discharge Requirements

PREFACE

This Long-Term Trash Load Reduction Plan and Assessment Strategy (Long-Term Plan) is submitted in compliance with provision C.10.c of the Municipal Regional Stormwater NPDES Permit (MRP) for Phase I communities in the San Francisco Bay (Order R2-2009-0074). The Long-Term Plan was developed using a regionally consistent outline and guidance developed by the Bay Area Stormwater Management Agencies Association (BASMAA) and reviewed by San Francisco Bay Regional Water Quality Control Board staff. The Long-Term Plan is consistent with the Long-Term Trash Load Reduction Framework developed in collaboration with Water Board staff. Its content is based on the Vallejo Sanitation and Flood Control District's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with Municipal Separate Storm Sewer (MS4) discharges. This Long-Term Plan is intended to be iterative and may be modified in the future based on information gained through the implementation of trash control measures. Vallejo Sanitation and Flood Control District therefore reserves the right to revise or amend this Long-Term Plan at its discretion. If significant revisions or amendments are made by Vallejo Sanitation and Flood Control District, a revised Long-Term Plan will be submitted to the Water Board through the Vallejo Sanitation and Flood Control annual reporting process.

1.0 INTRODUCTION

1.1 Purpose of Long-Term Trash Reduction Plan

The Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit for Phase I communities in the San Francisco Bay (Order R2-2009-0074), also known as the Municipal Regional Permit (MRP), became effective on December 1, 2009. The MRP applies to 76 large, medium and small municipalities (cities, towns and counties) and flood control agencies in the San Francisco Bay Region, collectively referred to as Permittees. Provision C.10.c of the MRP requires Permittees to submit a *Long-Term Trash Load Reduction Plan* (Long-Term Plan) by February 1, 2014. Long-Term Plans must describe control measures that are currently being implemented, including the level of implementation, and additional control measures that will be implemented and/or increased level of implementation designed to attain a 70% trash load reduction by July 1, 2017, and 100% (i.e., "No Visual Impact") by July 1, 2022.

This Long-Term Plan is submitted by Vallejo Sanitation and Flood Control District in compliance with MRP provision C.10.c. Consistent with provision C.10 requirements, the goal of the Long-Term Plan is to solve trash problems in receiving waters by reducing the impacts associated with trash in discharges from the Vallejo Sanitation and Flood Control District's municipal separate storm sewer system (MS4) that are regulated by NPDES Permit requirements. The Long-Term Plan includes:

1. Descriptions the current level of implementation of trash control measures, and the type and extent to which new or enhanced control measures will be implemented to achieve a target of 100% (i.e. full) trash reduction from MS4s by July 1, 2022, with an interim milestone of 70% reduction by July 1, 2017;
2. A description of the *Trash Assessment Strategy* that will be used assess progress towards trash reduction targets achieved as a result of control measure implementation; and,
3. Time schedules for implementing control measures and the assessment strategy.

The Long-Term Plan was developed using a regionally consistent outline and guidance developed by the Bay Area Stormwater Management Agencies Association (BASMAA) and reviewed by the San Francisco Bay Regional Water Quality Control Board (Water Board) staff. The Long-Term Plan is consistent with the Long-Term Trash Load Reduction Framework (see section 1.2.1) developed in collaboration with Water Board staff. Its content is based on the Vallejo Sanitation and Flood Control District's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with Municipal Separate Storm Sewer (MS4) discharges. The Long-Term Plan builds upon trash control measures implemented by the Vallejo Sanitation and Flood Control District prior to the adoption of the MRP and during the implementation of the Short-Term Trash Load Reduction Plan submitted to the Water Board on February 1, 2012.

1.2 Background

1.2.1 Long-Term Trash Load Reduction Plan Framework

A workgroup of MRP Permittee, Bay Area countywide stormwater, and Water Board staff met between October 2012 and March 2013 to better define the process for developing and implementing Long-Term Plans, methods for assessing progress toward reduction goals, and tracking and reporting requirements associated with provision C.10. Through these discussions, an eight-step framework for developing and implementing Long-Term Plans was created by the workgroup (Figure 1).

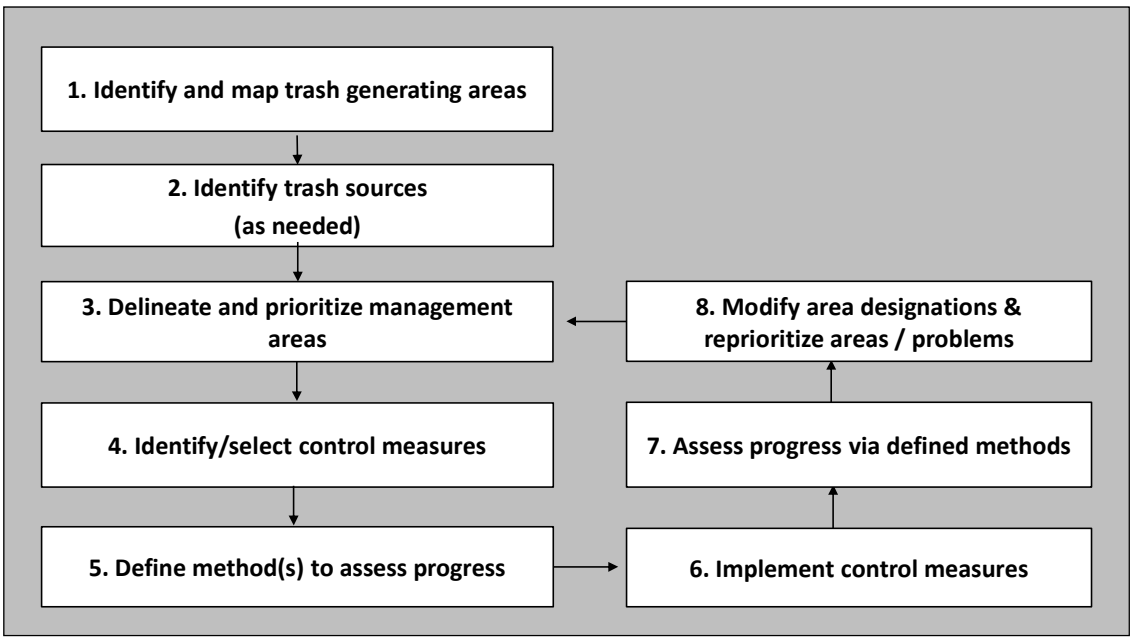

Figure 1. Eight-step framework for developing, implementing and refining Long-Term Trash Reduction Plans.

The workgroup agreed that as the first step in the framework, Permittees would identify very high, high, moderate, and low trash generating areas in their jurisdictional areas. Trash generation rates developed through the *BASMAA Baseline Trash Generation Rates Project* (as discussed below) were used as a starting point for differentiating and delineating land areas with varying levels of trash generation. Permittees would then use local knowledge and field and/or desktop assessments to confirm or refine the level of trash generation for specific areas within their jurisdiction. Each Permittee would then develop a map depicting trash generation categories within their jurisdiction.

As a next step, Permittees would then delineate and prioritize Trash Management Areas (TMAs) where specific control measures exist or are planned for implementation. TMAs delineated by Permittees are intended to serve as reporting units in the future. Reporting at the management area level provides the level of detail necessary to demonstrate implementation and progress towards trash reduction targets.

Once control measures are selected and implemented, Permittees will evaluate progress toward trash reduction targets using outcome-based assessment methods. As the results of the progress assessments are available, Permittees may choose to reprioritize trash management areas and associated control measures designed to improve trash reduction within their jurisdictions.

1.2.2 BASMAA Generation Rates Project

Through approval of a BASMAA regional project in 2010, Permittees agreed to work collaboratively to develop a regionally consistent method to establish trash generation rates within their jurisdictions. The project, also known as the *BASMAA Trash Generation Rates Project* (Generation Rates Project) assisted Permittees in establishing the rates of trash generation and identifying very high, high, moderate and low trash generating areas.

The term "trash generation" refers to the rate at which trash is produced or generated onto the surface of the watershed and is potentially available for transport via MS4s to receiving waters. Generation rates do not explicitly take into account existing control measures that intercept trash prior to transport. Generation rates are expressed as trash volume/acre/year and were established via the Generation Rates Project.

In contrast to trash generation, the term "trash loading" refers to the rate at which trash from MS4s enters receiving waters. Trash loading rates are also expressed as trash volume/acre/year and are equal to or less than trash generation rates because they account for the effects of control measures that intercept trash generated in an area before it is discharged to a receiving water. Trash loading rates are specific to particular areas because they are dependent upon the effectiveness of control measures implemented within an area. Figure 2 illustrates the difference between trash generation and loading.

Figure 2. Conceptual model of trash generation, interception and load.

Trash generation rates were estimated based on factors that significantly affect trash generation (i.e., land use and income). The method used to the establish trash generation rates for each Permittee builds off "lessons learned" from previous trash loading studies conducted in urban areas (Allison and Chiew 1995; Allison et al. 1998; Armitage et al. 1998; Armitage and Rooseboom 2000; Lippner et al. 2001; Armitage 2003; Kim et al. 2004; County of Los Angeles 2002, 2004a, 2004b; Armitage 2007). The method is based on a conceptual model developed as an outgrowth of these studies (BASMAA 2011b).

Trash generation rates were developed through the quantification and characterization of trash captured in Water Board-recognized full-capture treatment devices installed in the San Francisco Bay area. Trash generation rates estimated from this study are listed for each land use type. Methods used to develop trash generation rates are more fully described in BASMAA (2011b, 2011c, and 2012).

Table 1. San Francisco Bay Area trash generation rates by land use (gallons/acre/year).

Land Use	Low[b]	Best[b]	High[b]
Commercial & Services	0.7	**6.2**	17.3
Industrial	2.8	**8.4**	17.8
Residential[a]	0.3 - 30.2	**0.5 - 87.1**	1.0 - 257.0
Retail[a]	0.7 - 109.7	**1.8 - 150.0**	4.6 - 389.1
K-12 Schools	3	**6.2**	11.5
Urban Parks	0.5	**5.0**	11.4

[a] For residential and retail land uses, trash generation rates are provided as a range that takes into account the correlation between rates and household median income.

[b] For residential and retail land uses: Low = 5% confidence interval; Best = best fit regression line between generation rates and household median income; and, High = 95% confidence interval. For all other land use categories: High = 90th percentile; Best = mean generation rate; and, Low = 10th percentile.

1.2.3 Short-Term Trash Load Reduction Plan

In February 2012, Vallejo Sanitation and Flood Control District developed a Short-Term Plan that described the current level of control measures implementation and identified the type and extent to which new or enhanced control measures would be implemented to attain a 40% trash load reduction from its MS4 by July 1, 2014. Since that time, the Vallejo Sanitation and Flood Control District has begun to implement its short-term plan. Control measures implemented to date via the short-term trash reduction plan are:

- Control Measure #1- Full Trash Capture.
  In September, 2012 four large full trash capture devices were installed in Rindler creek West of I-80 behind the Solano County Fairgrounds. These devices are located in Trash Management Area #1. One additional large full trash capture device was installed on January, 2013. This device is located in Trash Management Area #6, on a storm drain outfall into Lake Dalwigk.

- Control Measure #2- On-land Trash Clean-ups.
  As necessary the District continues to fund debris removal from the remains of homeless encampments. This State wide issue will continue to be a resource allocation problem for Vallejo.

- Control Measure #4- Creek Clean-ups.
  Not including Costal Cleanup day the District sponsors or directly funds an average of ten creek clean-ups per year with approximately three cubic yards of trash removed in total.

Control measures described in this Long-Term Plan build upon actions taken to-date via Vallejo Sanitation and Flood Control District's Short-Term Plan. A full description of control measures implemented via short and long-term plans is included in section 3.2. Outcomes associated with short-term plan implementation will be reported in the Vallejo Sanitation and Flood Control District's Fiscal Year 2013-14 Annual Report, scheduled for submittal to the Water Board by September 15, 2014.

1.3 Organization of Long-Term Plan

This Long-Term Plan is organized into the following sections:

1.0 Introduction;
2.0 Scope of the Trash Problem;
3.0 Trash Management Areas and Control Measures;
4.0 Progress Assessment Strategies; and
5.0 References

Section 2.0 is intended to provide a description of the extent and magnitude of the trash problem in the Vallejo Sanitation and Flood Control District. Control measures that will be implemented by Vallejo Sanitation and Flood Control District as a result of this Long-Term Plan are described in section 3.0. Section 4.0 describes the methods that will be used to assess progress toward trash reduction targets.

2.0 SCOPE OF THE TRASH PROBLEM

2.1 Permittee Characteristics

The Vallejo Sanitation & Flood Control District is an independent special district created by the State of California in 1952. Located in Solano County with a jurisdictional area of 17,718 acres and a population of 115,942.

Land uses within Vallejo Sanitation and Flood Control District depicted in ABAG (2005) are provided below.

Table 2. Percentages of Vallejo Sanitation and Flood Control District's jurisdictional area[1] within land use classes identified by ABAG (2005)

Land Use Category	Jurisdictional Area (Acres)	% of Jurisdictional Area
Commercial and Services	634.7	3.6%
Industrial	1,089.1	6.1%
Residential	7,854.5	44.3%
Retail	891.8	5.0%
K-12 Schools	444.7	2.5%
Urban Parks	260.7	1.5%
Other	6542.3	36.9

2.2 Trash Sources and Pathways

Trash in San Francisco Bay Area creeks and shorelines originates from a variety of sources and is transported to receiving waters by a number of pathways (Figure 3). Of the four source categories, pedestrian litter includes trash sources from high traffic areas near businesses and schools, transitional areas where food/drinks are not permitted (e.g. bus stops), and from public or private special events with high volumes of people. Trash from vehicles occurs due to littering from automobiles and uncovered loads. Inadequate waste container management includes sources such as overflowing or uncovered containers and dumpsters as well as the dispersion of household and business-related trash and recycling materials before, during, and after collection. On-land illegal dumping of trash is the final source category.

[1] A Permittee's jurisdictional area is defined as the urban land area within a Permittee's boundary that is not subject to stormwater NPDES Permit requirements for traditional and non-traditional small MS4s (i.e. Phase II MS4s) or the California Department of Transportation, or owned and maintained by the State of California, the U.S. federal government or other municipal agency or special district (e.g., flood control district).

Trash is transported to receiving waters through three main pathways: 1) Stormwater Conveyances; 2) Wind; and, 3) Direct Dumping. Stormwater or urban runoff conveyance systems (e.g., MS4s) consist of curbs/gutters, and pipes and channels that discharge to urban creeks and the San Francisco Bay shorelines. Wind can also blow trash directly into creeks or the Bay. Lastly, trash in receiving waters can also originate from direct dumping into urban creeks and shorelines.

This Long-term Plan and associated trash control measures described in Section 3.0 are focused on reducing trash from one of the transport pathways illustrated in Figure 3– **stormwater conveyances**. Specifically, the Long-term Plan is focused on reducing the impacts of discharges from MS4s to San Francisco Area receiving waters and the protection of associated beneficial uses.

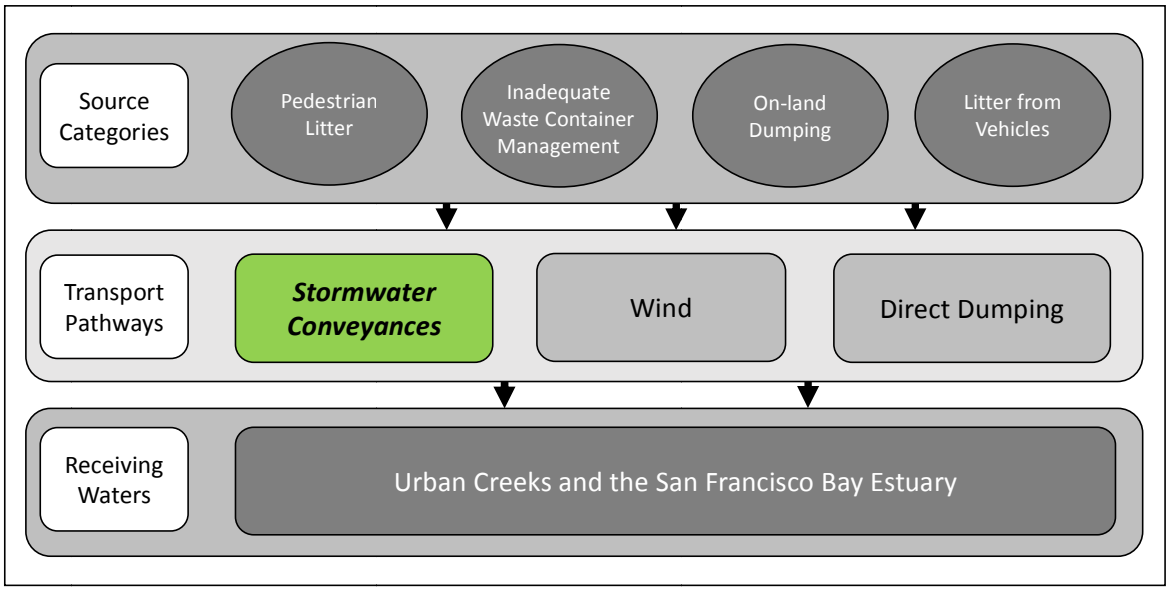

Figure 3. Trash sources categories and transport pathways to urban creeks.

2.3 Trash Generating Areas

2.3.1 Generation Categories and Designation of Areas

The process and methods used to identify the level of trash generation within the Vallejo Sanitation and Flood Control District boundries are described in this section and illustrated in Figure 4.

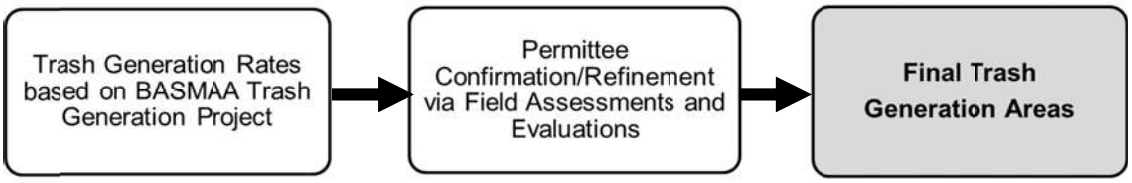

Figure 4. Trash sources categories and transport pathways to urban creeks.

As a first step, trash generation rates developed through *the BASMAA Trash Generation Rates Project* were applied to parcels within the Vallejo Sanitation and Flood Control District based on current land uses and 2010 household median incomes. A Draft Trash Generation Map was created as a result of this application. The draft map served as a starting point for the Vallejo Sanitation and Flood Control District to identify trash generating levels. Levels of trash generation are depicted on the map using four trash generation rate (gallons/acre/year) categories that are symbolized by four different colors illustrated in Table 3.

Table 3. Trash generation categories and associated generation rates (gallons/acre/year).

Category	**Very High**	**High**	**Moderate**	**Low**
Generation Rate (gallons/acre/year)	**> 50**	**10-50**	**5-10**	**< 5**

The Vallejo Sanitation and Flood Control District then reviewed and refined the draft trash generation map to ensure that trash generation categories were correctly assigned to parcels or groups of parcels. Vallejo Sanitation and Flood Control District staff refined maps using the following process:

1. Based upon our knowledge of trash generation and problem areas within the City, staff identified areas on the draft map that potentially had incorrect trash generation category designations.
2. Trash generation category designations initially assigned to areas identified in step #1 were then assessed and confirmed/refined using the methods listed below.

a. On-Land Visual Assessments

To assist Permittees with developing their trash generation maps, BASMAA developed a *Draft On-land Visual Trash Assessment Protocol (Draft Protocol).* The Draft Protocol entails walking a street segment and visually observing the level of trash present on the roadway, curb and gutter, sidewalk, and other areas adjacent to the street that could potentially contribute trash to the MS4. Based on the level of trash observed, each segment (i.e., assessment area) was placed into one of four on-land assessment condition categories that are summarized in Table 4. Using the Draft Protocol the District assessed a total of nine areas to assist in conducting/refining trash generating area designations.

Table 4. Definitions of on-land trash assessment condition categories.

On-land Assessment Condition Category	Summary Definition
A (Low)	Effectively no trash is observed in the assessment area.
B (Moderate)	Predominantly free of trash except for a few pieces that are easily observed.
C (High)	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D (Very High)	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area.

3. Based on assessments conducted to confirm/refine trash generation category designations, the District created a final trash generation map that depicts the most current understanding of trash generation within the City of Vallejo. The District documented this process by tracking the information collected through the assessments and subsequent refinements to the Draft Trash Generation Map. The Final Trash Generation Map is included as figure 5.

Summary statistics for land use and trash generation categories generated through the mapping and assessment process are presented in Table 5.

Table 5. Percentage of jurisdictional area within the City of Vallejo assigned to each trash generation category.

Trash Generation Category	Jurisdictional Area (Acres)	Commercial and Services	Industrial	Residential	Retail	K-12 Schools	Urban Parks	Other
Very High	476.0	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%
High	1,947.5	0.0%	0.0%	79.4%	20.6%	0.0%	0.0%	0.0%
Medium	4,314.1	14.5%	8.4%	60.3%	0.3%	10.3%	6.0%	0.0%
Low	10,980.3	0.1%	6.6%	33.7%	0.0%	0.0%	0.0%	59.6%

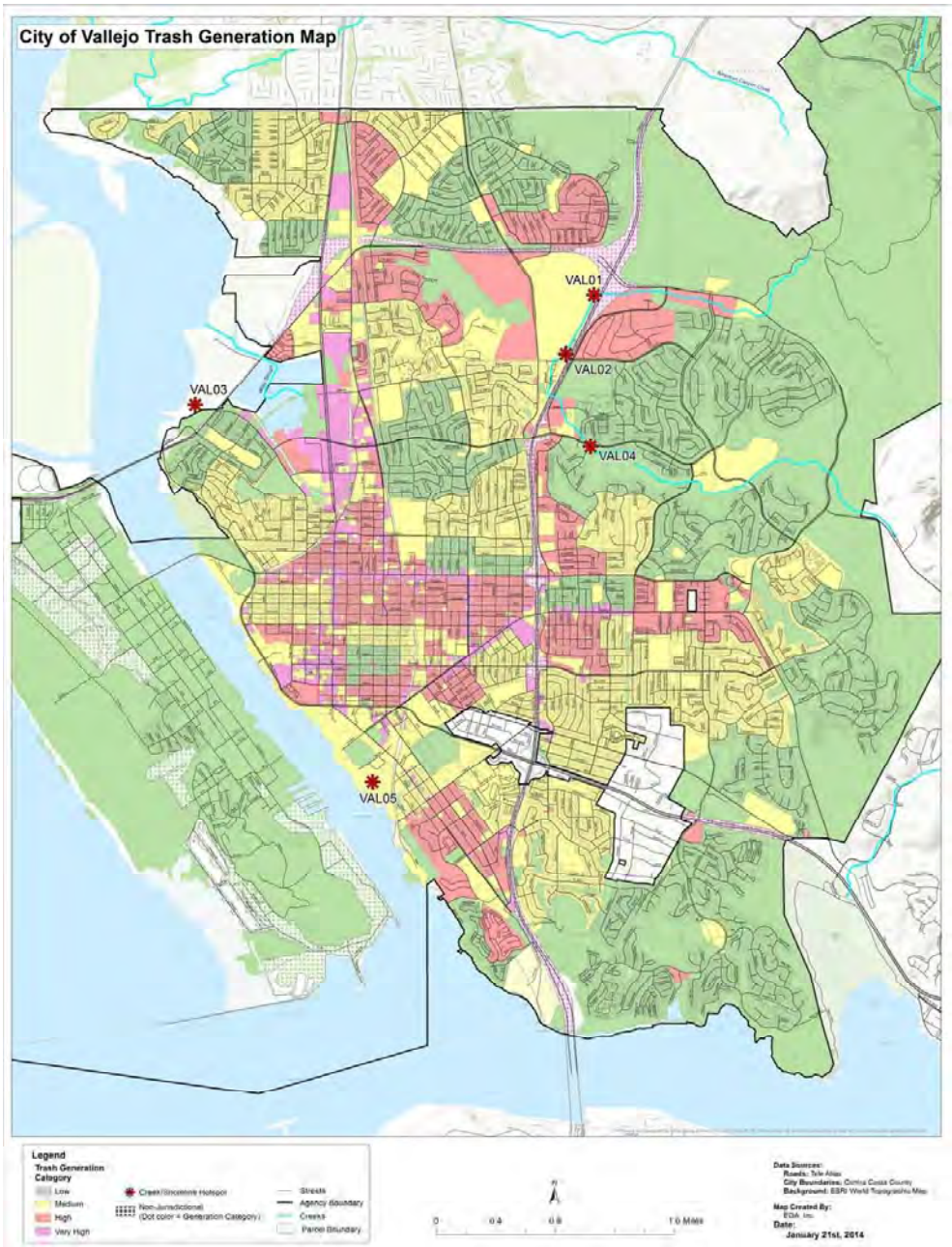

Figure 5. Final Trash Generation Map for Vallejo Sanitation and Flood Control District

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3.0 TRASH MANAGEMENT AREAS AND CONTROL MEASURES

This section describes the control measures that Vallejo Sanitation and Flood Control District has or plans to implement to solve trash problems and achieve a target of 100% (i.e. full) trash reduction from their MS4 by July 1, 2022. The selection of control measures described in this section is based on the District's current understanding of trash problems within its jurisdiction and the effectiveness of control measures designed to reduce trash impacts associated with MS4 discharges. Information on the effectiveness of some trash control measures is currently lacking and therefore in the absence of this information, the District based its selection of control measures on existing effectiveness information, their experience in implementing trash controls and knowledge of trash problems, and costs of implementation. As knowledge is gained through the implementation of these control measures, the District may choose to refine their trash control strategy described in this section. If significant revisions or amendments are made, a revised Long-Term Plan will be submitted to the Water Board through the District's annual reporting process.

3.1 Management Area Delineation and Prioritization

Consistent with the long-term plan framework, Vallejo Sanitation and Flood Control District delineated and prioritized trash management areas (TMAs) based on the geographical distribution of trash generating areas, types of trash sources, and current or planned control measure locations. TMAs are intended to form the management units by which trash control measure implementation can be tracked and assessed for progress towards trash reduction targets. Once delineated, TMAs were also prioritized for control measure implementation. The District's primary management areas were selected based on the spatial distribution of trash generating areas and the location of specific existing or planned management actions within the District's jurisdiction

A map depicting the District's TMAs is included as Figure 6. All jurisdictional areas within the District are included within a TMA. The amount of jurisdictional land area and associated trash condition categories for each TMA are listed below.

Table 6. Jurisdictional area and percentage of each Trash Management Area (TMA) comprised of trash generation categories

TMA	Jurisdictional Area (Acres)	Trash Generation Rate			
		Very High	High	Medium	Low
1	2,225.7	0.3%	19.6%	15.6%	64.5%
2	439.0	42.9%	17.1%	24.9%	15.1%
3	2,690.6	6.9%	19.2%	50.6%	23.3%
4	1,489.2	1.6%	17.3%	37.3%	43.8%
5	1,116.2	1.8%	33.3%	52.1%	12.8%
6	496.2	7.5%	9.2%	68.3%	15.0%
7	479.8	1.1%	44.9%	30.0%	23.9%
8	912.4	0.9%	0.3%	89.9%	9.0%
9	71.5	0.0%	21.3%	76.3%	2.4%
10	7,797.3	0.0%	0.1%	0.1%	99.8%

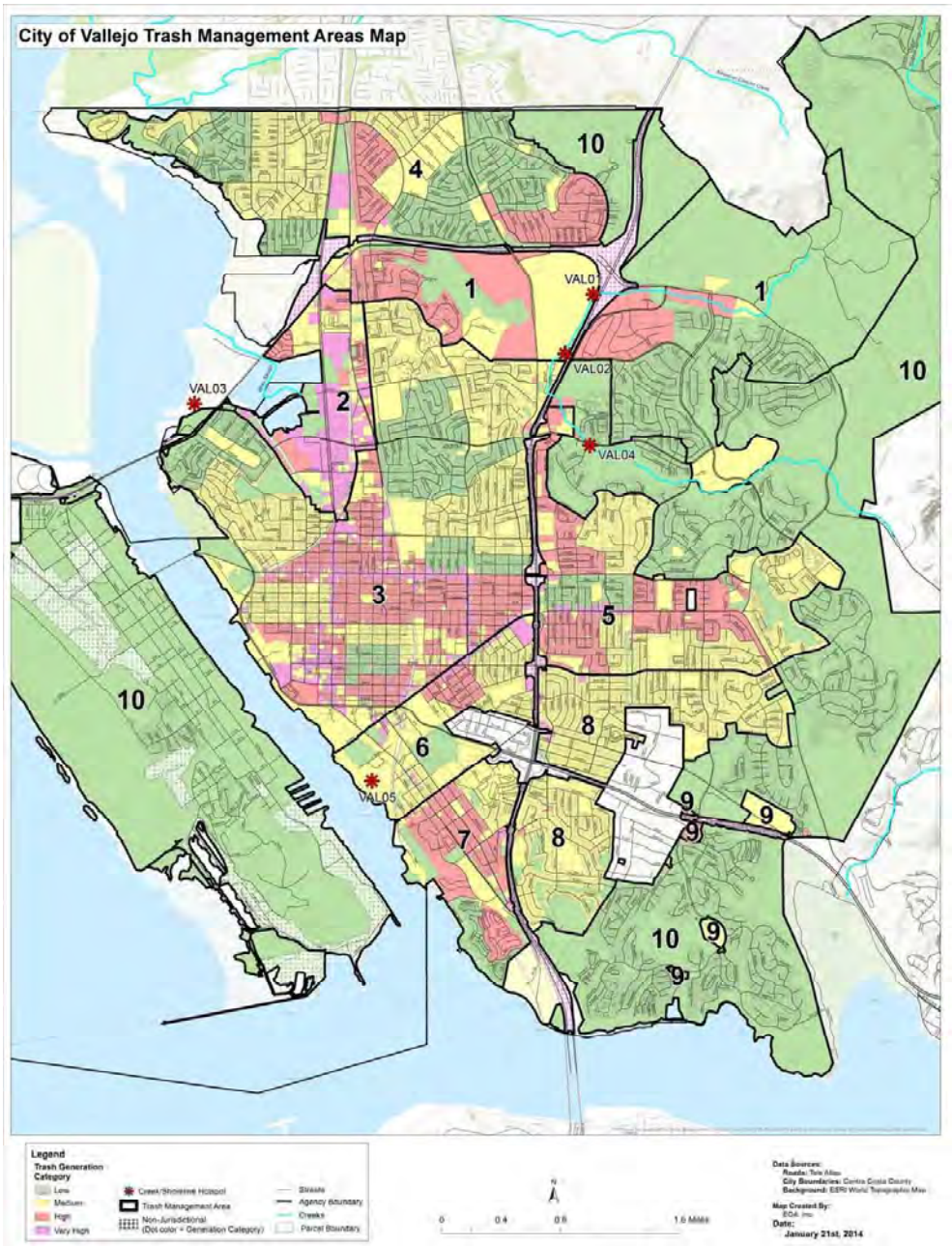

Figure 6. Trash Management Area Map for Vallejo Sanitation and Flood Control District

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3.2 Current and Planned Trash Control Measures

3.2.1 Trash Management Area #1

This area is located West of I-80 and comprises 2225 acres. This is the location of the first series of full trash capture devices installed in the District. This area has been known for a typically large amount of trash converging into Rindler creek. This is also the location of several volunteer and District funded clean-ups. The actions in this area were initiated after the MRP effective date.

3.2.2 Trash Management Area #2

This area is located on the West side of Vallejo and comprises 439 acres. This area has a very high trash generation rate of 42.9%. This site is one of our Costal Cleanup Day sites and usually has several hundred participants. These actions were implemented after the MRP effective date. For future implementation the District will be investigating the potential for a full trash capture device installation.

3.2.3 Trash Management Area #3

This area is West of I-80 and comprises 2690 acres. Roughly centered in the City this area is largely residential with a very high trash generation rate of 6.9%, a high rate of 19.2% and a medium trash generation rate of 50.6%. Few actions have been addressed in this area. Future implementation will include increased on land trash cleanups, potential increased street sweeping and the possibility of full capture device installation.

3.2.4 Trash Management Area #4

Located in the Northern end of Vallejo this area is comprised of 1489 acres. Largely residential with a small area of commercial businesses. Future efforts will include increased on land cleanups and potential increased street sweeping.

3.2.5 Trash Management Area #5

This largely residential area is located on the East side of I-80 and comprises 1116 acres. Future efforts will include increased on land cleanups and potential increased street sweeping.

3.2.6 Trash Management Area #6

This area is located in the South Western end of Vallejo and is comprised of 496 acres. This is the location of the most recently installed full trash capture device. Future plans potentially include another full capture device installation.

3.2.7 Trash Management Area #7

This area is West of I-80 on the Southern end of Vallejo and is comprised of 479 acres. This is a common Costal Cleanup Day site and also the location of several District sponsored on land cleanups. Future plans include investigating the potential for a large trash capture device installation.

3.2.8 Trash Management Area #8

This area is East of I-80 and comprises 912 acres. Future efforts will include increased on land cleanups and potential increased street sweeping.

3.2.9 Trash Management Area #9

This area includes several small areas of higher generation rates dispersed in the largely green area of TMA #10. Future efforts will include increased on land cleanups and investigating the potential of a full trash capture device.

3.2.10 Trash Management Area #10

This area is located on the far Eastern side of Vallejo and also Mare Island it is comprised of 7797 acres. This is a very low generation area and will be included in control measures as necessary.

3.3 Control Measure Implementation Schedule

See Table 7 for Vallejo Sanitation and Flood Control District's trash control measure implementation schedule. This Table shall be reviewed and revised as needed as future measures are implemented.

Table 7. Vallejo Sanitation and Flood Control District trash control measure implementation schedule.

Trash Management Area and Control Measures	Pre-MRP	Short-Term					Long-Term							
		FY 2009-2010	FY 2010-2011	FY 2011-2012	FY 2012-2013	FY 2013-2014[a]	FY 2014-2015	FY 2015-2016	FY 2016-2017[b]	FY 2017-2018	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022[c]
TMA #1														
Control Measure #1-Full trash capture				x										
Control Measure #1-On land cleanups			x											
TMA #2														
Control Measure #1-On land cleanups		x												
Control Measure #2-Full trash capture									x					
TMA #3														
Control Measure #-On land cleanups							x							
Control Measure #2-Increased street sweeping								x						
Control Measure #3-Full trash capture											x			
TMA #4														
Control Measure #1-On land cleanups								x						
Control Measure #2-Increased street sweeping								x						
TMA #5														
Control Measure #1-On land cleanups							x							
Control Measure #2-Increased street sweeping									x					
TMA # 6														
Control Measure #1-Full trash capture					x									

Trash Management Area and Control Measures	Pre-MRP	Short-Term					Long-Term							
		FY 2009-2010	FY 2010-2011	FY 2011-2012	FY 2012-2013	FY 2013-2014[a]	FY 2014-2015	FY 2015-2016	FY 2016-2017[b]	FY 2017-2018	FY 2018-2019	FY 2019-2020	FY 2020-2021	FY 2021-2022[c]
TMA #7														
Control Measure #1-On land cleanups		x												
Control Measure #2-Full trash capture												x		
TMA # 8														
Control Measure #1-On land cleanups								x						
Control Measure #2-Increased street sweeping									x					
TMA #9														
Control Measure #1-On land cleanups								x						
Control Measure #2-Full trash capture										x				
TMA #10														
Control Measure #1-On land cleanups							x							

[a]July 1, 2014 - 40% trash reduction target
[b]July 1, 2017 - 70% trash reduction target
[c]July 1, 2022 - 100% trash reduction target

4.0 PROGRESS ASSESSMENT STRATEGY

Provision C.10.a.ii of the MRP requires Permittees to develop and implement a trash load reduction tracking method that will be used to account for trash load reduction actions and to demonstrate progress and attainment of trash load reduction targets. Early into the MRP, Permittees decided to work collaboratively to develop a trash load reduction tracking method through the Bay Area Stormwater Management Agencies Association (BASMAA). Permittees, Water Board staff and other stakeholders assisted in developing Version 1.0 of the tracking method. On behalf of all MRP Permittees, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted Version 1.0 to the Water Board on February 1, 2012.

The Trash Assessment Strategy (Strategy) described in this section is intended to serve as Version 2.0 of the trash tracking method and replace version 1.0 previously submitted to the Water Board. The Strategy is specific to Vallejo Sanitation and Flood Control District. The Distirct intends to implement the Strategy in phases and at multiple geographical scales (i.e., jurisdiction-wide and trash management area) in collaboration with the City of Vallejo. Pilot implementation is scheduled for the near-term and as assessment methods are tested and refined, the Strategy will be adapted into a longer-term approach. The Strategy selected by the District is described in the following sections.

4.1 Pilot Assessment Strategy

The following Vallejo Sanitation and Flood Control Trash Assessment Strategy was developed by the Distirct. The District's Strategy will be implemented at a pilot scale on a countywide basis and includes measurements and observations in the City of Vallejo.

4.1.1 Management Questions

The District's strategy is intended to answer the following core management questions over time as trash control measures outlined in section 3.0 are implemented and refined:

- Are the MS4 trash load reduction targets being achieved?
- Have trash problems in receiving waters been resolved?
- If trash problems in receiving waters exist, what are the important sources and transport pathways?

The District's strategy, including indicators and methods, is summarized in this section.

4.1.2 Indicators of Progress and Success

The management questions listed in the previous section will be addressed by tracking information and collecting data needed to report on a set of key environmental indicators. Environmental indicators are simple measures that communicate what is happening in the environment. Since trash in the environment is very complex, indicators provide a more practical and economical way to track the state of the environment than if we attempted to record every possible variable.

With regard to municipal stormwater trash management, indicators are intended to detect progress towards trash load reduction targets and solving trash problems. Ideally, indicators should be robust and able to detect progress that is attributable to multiple types of trash control measure implementation scenarios. Assessment results should also provide Permittees with an adequate level of confidence that trash load reductions from MS4s have occurred, while also assessing whether trash problems in receiving

waters have been resolved. Indicators must also be cost effective, relatively easy to generate, and understandable to stakeholders.

Primary and secondary indicators that the District will use to answer core management questions include:

Primary Indicators:

1-A Reduction in the level of trash present on-land and available to MS4s
1-B Effective full capture device operation and maintenance

Secondary Indicators:

2-A Successful levels of trash control measures implementation
2-B Reductions in the amount of trash in receiving waters

In selecting the indicators above, the District recognize that no one environmental indicator will provide the information necessary to effectively determine progress made in reducing trash discharged from MS4s and improvements in the level of trash in receiving waters. Multiple indicators were therefore selected.

The ultimate goal of municipal stormwater trash reduction strategies is to reduce the impacts of trash associated with MS4s on receiving waters. Indicators selected to assess progress towards this goal should ideally measure outcomes (e.g., reductions in trash discharged). The primary indicators selected by the District are outcome-based and include those that are directly related to MS4 discharges. Secondary indicators are outcome or output-based and are intended to provide additional perspective on and evidence of, successful trash control measure implementation and improvements in receiving water condition with regard to trash.

As described in Section 2.2, trash is transported to receiving waters from pathways other than MS4s, which may confound our ability to observe MS4-associated reductions in creeks and shorelines. Due to this challenge of linking MS4 control measure implementation to receiving water conditions, the receiving water based indicator is currently considered a secondary indicator. Evaluations of data on the amount of trash in receiving waters that are conducted over time through the Pilot Assessment Strategy will assist the District in further determinations of the important sources and pathways causing problems in local creeks, rivers and shorelines.

4.1.3 Pilot Assessment Methods

1-A. On-land Visual Assessments

As part of the Trash Generation Map assessment and refinement process (see Section 2.3.1), a draft on-land visual assessment method was developed to assist Permittees in confirming and refining trash generating area designations (i.e., very high, high, moderate and low trash generating categories). The draft on-land visual assessment method is intended to be a cost-effective tool and provide Permittees with a viable alternative to quantifying the level of trash discharged from MS4s. As part of BASMAA's *Tracking California's Trash* grant received from the State Water Resources Control Board (see Section 4.2), quantitative relationships between trash loading from MS4s and on-land visual assessment condition categories will be established. Condition categories defined in the draft on-land assessment protocol are listed in Table 8

Table 8. Trash condition categories used in the draft on-land visual assessment protocol.

Trash Condition Category	Summary Definition
A (Low)	Effectively no trash is observed in the assessment area.
B (Moderate)	Predominantly free of trash except for a few pieces that are easily observed.
C (High)	Trash is widely/evenly distributed and/or small accumulations are visible on the street, sidewalks, or inlets.
D (Very High)	Trash is continuously seen throughout the assessment area, with large piles and a strong impression of lack of concern for litter in the area.

On-land visual assessments will be conducted in trash management areas within the City of Vallejo as part of the District's strategy. On-land assessments are intended to establish initial conditions and detect improvements in the level of trash available to MS4s over time. More specifically, on-land visual assessment methods will be conducted in areas not treated by trash full capture devices in an attempt to evaluate reductions associated with other types of control measures. Assessment methods for areas treated by full capture devices are described in this next section.

Given that the on-land assessment method and associated protocol have not been fully tested and refined, initial assessments will occur at a pilot scale in the City and in parallel to the *Tracking California's Trash* project

1-B. Full Capture Operation and Maintenance Verification

Consistent with the MRP, adequate inspection and maintenance of trash full capture devices is required to maintain full capture designation by the Water Board. The District is currently developing an operation and maintenance verification program (Trash O&M Verification Program), to ensure that devices are inspected and maintained at a level that maintains this designation. The District's Trash O&M Verification Program will be modeled on the current O&M verification program for stormwater treatment controls implemented consistent with the Permit new and redevelopment requirements.

2-A. Control Measure Effectiveness Evaluations

In addition to on-land trash assessments and full capture operation and maintenance verification, the District will also conduct assessments of trash control measures implemented within their jurisdictional area. Assessment methods will be selected based on trash sources and the type of control measure being implemented. The following are example assessment methods that may be used to demonstrate successful control measure implementation and progress towards trash reduction targets:

- Street Sweeping – Reporting the frequency of sweeping and ability to sweep to the curb in specific areas where enhanced sweeping is implemented; and/or documenting the level of trash on streets directly after street sweeping during wet and dry weather seasons.

- Public/Private Trash Container Management – Reporting the magnitude and extent of enhanced actions; and/or visually assessing and documenting conditions around public trash containers before and after implementing enhanced control measures.
- Targeted Outreach and Enforcement – Reporting the magnitude and extent of enhanced actions; tracking and reporting the % increase in enforcement actions; and/or visually assessing and documenting the conditions in targeted areas before and after implementing control measures.
- Public Outreach Campaigns – Reporting the magnitude and extent of enhanced actions, and/or conducting pre and post campaign surveys.
- On-land Cleanups and Enforcement – Reporting the magnitude and extent of enhanced actions; visually assessing and documenting the conditions in targeted areas before and after control measure implementation; and/or tracking the volumes of trash removed.
- Illegal Dumping Prevention – Reporting the magnitude and extent of enhanced actions; and/or tracking and reporting improvements in the number of incidents.
- Business Improvement Districts – Reporting the magnitude and extent of enhanced actions; and/or visually assessing and documenting the conditions in BID areas before and after implementing control measures.
- Prevention of Uncovered Loads - Reporting the magnitude and extent of enhanced actions; tracking and reporting the decreases in the number of incidents; and/or visually assessing and documenting the conditions in targeted areas before and after implementing control measures.
- Partial Capture Devices – Reporting the magnitude and extent of enhanced actions; and/or visually assessing and the amount of trash in storm drains or downstream of partial capture devices.

2-C. Receiving Water Condition Assessments

The ultimate goal of stormwater trash management in the Bay Area is to significantly reduce the amount of trash found in receiving waters. In the last decade, Permittees and volunteers have collected data on the amounts of trash removed during cleanup events. More recently, Permittees have conducted trash assessments in creek and shoreline hotspots using standardized assessment methods. In an effort to answer the core management question *Have trash problems in receiving waters been resolved?,* the District plans to continue conducting receiving water condition assessments at trash hot spots a minimum of one time per year. Assessment will be conducted consistent with Permit hot spot cleanup and assessment requirements.

4.2 BASMAA "Tracking California's Trash" Project

The District's strategy described in the previous section recognizes that outcome-based trash assessment methods needed to assess progress toward trash reduction targets are not well established by the scientific community. In an effort to address these information gaps associated with trash assessment methods, the Bay Area Stormwater Management Agencies Association (BASMAA), in collaboration with Vallejo Sanitation and Flood Control District, the 5 Gyres Institute, San Francisco Estuary Partnership, the City of Los Angeles, and other stormwater programs in the Bay Area, developed the *Tracking California's Trash* Project. The Project is funded through a Proposition 84 grant awarded to BASMAA by the State Water Resources Control Board (SWRCB) who recognized the need for standardized trash assessment methods that are robust and cost-effective.

The Project is intended to assist BASMAA member agencies in testing trash assessment and monitoring methods needed to evaluate trash levels in receiving waters, establish control measures that have an equivalent performance to trash full capture devices, and assess progress in trash reduction over time. The following sections provide brief descriptions of tasks that BASMAA will conduct via the three-year Project. Full descriptions of project scopes, deliverables, and outcomes will be developed as part of the task-specific Sampling and Analysis Plans required by the SWRCB during the beginning of the Project. The Project is currently underway and will continue through 2016.

4.2.1 Testing of Trash Monitoring Methods

BASMAA and the 5 Gyres Institute will evaluate the following two types of assessment methods as part of the Project:

- **Trash Flux Monitoring –** Trash flux monitoring is intended quantify the amount of trash flowing in receiving waters under varying hydrological conditions. Flux monitoring will be tested in up to four receiving water bodies in San Francisco Bay and/or the Los Angeles areas. Methods selected for evaluation and monitoring will be based on a literature review conducted during this task and through input from technical advisors and stakeholders. Monitoring is scheduled to begin in 2014 and will be completed in 2016.
- **On-land Visual Assessments –** As part of the Project, BASMAA will also conduct an evaluation of on-land visual assessment methods that are included in the FSUMRP Strategy. The methods are designed to determine the level of trash on streets and public right-of-ways that may be transported to receiving waters via MS4s. BASMAA plans to conduct field work associated with the evaluation of on-land visual assessment at a number of sites throughout the region. To the extent practical, sites where the on-land methods evaluations take place will be coordinated with trash flux monitoring in receiving waters. On-land assessments will occur in areas that drain to trash full capture devices, and all sites will be assessed during wet and dry weather seasons in order to evaluate on-land methods during varying hydrologic conditions. Monitoring is scheduled to begin in 2014 and will be completed in 2016.

4.2.2 Full Capture Equivalent Studies

Through the implementation of BASMAA's *Tracking California's Trash* grant-funded project, a small set of "Full Capture Equivalent" projects will also be conducted in an attempt to demonstrate that specific combinations of control measures will reduce trash to a level equivalent to full capture devices. Initial BMP combinations include high-frequency street sweeping, and enhanced street sweeping with auto-retractable curb inlet screens. Other combinations will also be considered. Studies are scheduled to begin in 2014 and will be completed in 2016.

4.3 Long-Term Assessment Strategy

The District is committed to implementing standardized assessment methods post-2016 based on the lessons learned from pilot assessments and studies that will occur between 2014 and 2016. Assessment activities described in the previous sections will evaluate the utility of different assessment methods to demonstrate progress towards trash reduction targets and provide recommended approaches for long-term implementation. Lessons learned will be submitted to the Water Board with the FY 2015-2016 Annual Report and a revised Strategy will be developed and submitted, if necessary. The revised Strategy will include agreed upon assessment methods that will be used to demonstrate progress during the remaining term of trash reduction requirements. Reporting using the new/revised methods will begin with the FY 2016-17 Annual Report.

4.4 Implementation Schedule

The implementation schedule for the District's Short-term Strategy, BASMAA's Tracking California's Trash project, and the Long-Term Assessment Strategy are included in table 9. Load reduction reporting milestones are also denoted in the table. The schedule is consistent with the need for near-term pilot assessment results to demonstrate progress toward short-term targets, while acknowledging the need for testing and evaluation of assessment methods and protocols prior to long-term implementation.

Table 9. Vallejo Sanitation and Flood Control District trash progress assessment implementation schedule.

Trash Assessment Programs and Methods	Prior to FY 2013-14	Fiscal Year								
		2013-14[a]	2014-15	2015-16	2016-17[b]	2017-18	2018-19	2019-20	2020-21	2021-22[c]
Short-Term Trash Assessment Strategy										
On-land Visual Assessments										
Initial (Baseline) Assessments	X									
Pilot Progress Assessments		X	X	X	X					
Full Capture Operation and Maintenance Verification			X	X	X					
Control Measure Effectiveness Evaluations	X	X	X	X	X					
Receiving Water Condition Assessments	X	X	X	X	X					
Tracking California's Trash Project (BASMAA)										
Testing of Trash Monitoring Methods										
Trash Flux Monitoring Protocol Testing			X	X	X					
On-land Visual Assessment Evaluations			X	X	X					
Full Capture Equivalent Studies			X	X	X					
Long-Term Trash Assessment Strategy						X	X	X	X	X

[a]July 1, 2014 - 40% trash reduction target
[b]July 1, 2017 - 70% trash reduction target
[c]July 1, 2022 - 100% trash reduction target

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VFWD & City of Vallejo ROWD Trash Table
2020 Report of Waste Discharge

Permittee name	Total Jurisdictional Baseline Trash Generating Areas (acres) (Moderate, High and Very High)	Trash Reduction (%) reported in FY 2018-19 Annual Report		% Trash Generating Acres Addressed via Full Capture or Other Actions (via OVTAs) without credits & offsets	Moderate Areas (acres) Remaining to be Addressed				High Trash Generation Areas (acres) Remaining to be Addressed				Very High Trash Generation Areas (acres) Remaining to be Addressed				Total Trash Generation Areas (acres) Remaining to be Addressed			
		With credits and offsets	Without credits and offsets		Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)	Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)	Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)	Total	By Planned Full Capture Systems[1]	By Planned Other Actions via OVTAs	By to be Determined Actions (including source controls & offset programs)
VFWD & City of Vallejo	5692	55%	48%	30%	3003	1746	0	1257	953	748	0	205	26	11	0	15	**3982**	2505	0	1477

Footnotes:

1 - Acres in this column estimated to be addressed by planned Full Capture Systems may be greater than the "Total" acres. Full capture areas may overlap with areas partially addressed by Other Actions via OVTAs and included in the "Total" column.

DRAFT

1. Source Control Measure RAA Approach Overview

This goal of RAA is to provide evidence of the degree to which the Solano Permittees' planned control measures will reduce PCBs and mercury loading to meet WLA targets specified in the TMDL and required by MRP Provisions C.3, C.11, and C.12. The MRP requires that both the GSI RAA (C.11.c/C.12.c) and the waste load allocation attainment RAA (C.11.d/C.12.d) be documented in the 2020 Annual Report. RAA involves implementation of a numeric hydrologic and pollutant loading model and comparing the anticipated progress to waste load allocation targets.

Solano Permittees have implemented a comprehensive approach to assessing PCBs and mercury load reductions associated with current and planned source control actions that provides articulation with the regional approach, is fully consistent with GSI RAA modeling already completed, and is amenable to ongoing tracking to assess compliance progress. Each PCB and mercury source control measure follows regionally standardized calculation methods specified by BASMAA which have been defined via various data collection and scientific efforts and documented in BASMAA (2020). The modeling process is consistent with the methods defined in the BASMAA RAA Guidance (BASMAA, 2017a). Working closely with Solano Permittees, data on control measure implementation programs was compiled and verified. Control measure implementation data were incorporated into a geodatabase which uses the same spatial architecture as the GSI RAA modeling. BASMAA calculation measures were applied according to the methods described in BASMAA (2020) within the GIS whenever control measure implementation included locational information to ensure that reductions associated with source controls, GSI, and land use redevelopment changes were locally consistent on a granular spatial scale. This often included using parcel-scale inputs to drive load reduction calculations. Source control measure reduction results were summarized at the urban catchment scale in maps for the Solano Permittee area and broken out by city in tables. These results were combined with the GSI reductions (reported in Appendix A) for the specified RAA future scenarios (2020, 2028/2030, 2040) to assess expected compliance with wasteload allocations for the Solano Permittees.

The study area for the Source Control Measure RAA analysis is defined by the Solano Permittee MS4 area, which includes the cities of Fairfield, Suisun, and Vallejo only, and no outside drainage to these areas. This excludes a substantial portion of Solano County that surrounds the Solano Permittee cities (Figure 1) since source control modeling is discrete to the MS4 areas, regardless of upstream flow generation, which typically moves through cities via streams and rivers classified as receiving waters. Unlike GSI and land use redevelopment modeling, source control measures do not affect the hydrologic transport of pollutants downstream. As such, the catchment-scale hydrologic conditions represented in the baseline and GSI future scenarios (see Appendix A) are also reflected in the reduced loading calculations for comparison with wasteload allocations.

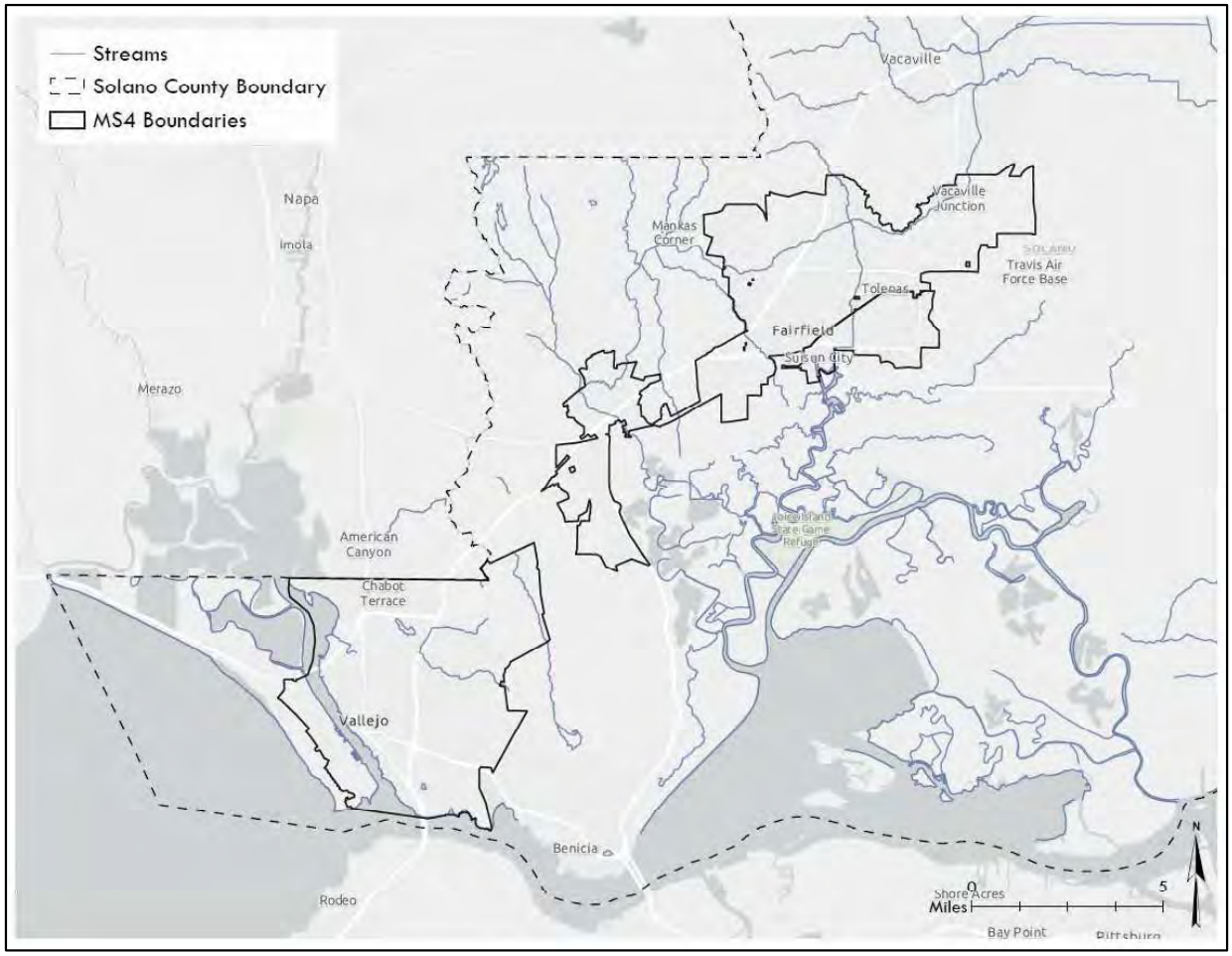

Figure 1. Solano Permittee MS4 Area

2. Refined Baseline PCB and Mercury Baseline Loads

Baseline modeling corresponding to the year 2005 showed that PCB loading is predominantly driven by the presence of Old Industrial and Source Area land uses. Since these land uses dominate Vallejo's Mare Island and are prevalent on the Vallejo Waterfront, they represent the greatest opportunities within the Solano Permittee MS4 Area for realizing pollutant load reductions and meeting waste load allocation targets in the future. Model outputs were highly sensitive to the land use based pollutant runoff concentration layer used by all Bay Area RAA models that includes a PCB concentration range over 1,000x and 10x for mercury. Estimated baseline loads from swTELR were lower than TMDL estimates for the Solano Permittees, especially for mercury, whose baseline estimate from swTELR was below the wasteland allocation target for the Solano Permittees. The divergence between the two estimates is likely due to the strong reliance on population as the method to distribute loads in the TMDL estimates. Strong correspondence between swTELR and the Regional Watershed Spreadsheet Model (RWSM) provides additional confidence in for the updates baseline loading estimates (see Appendix A).

3. Green Stormwater Infrastructure Reductions Summary

Green stormwater Infrastructure (GSI) is a treatment control measure that includes new development and redevelopment projects on private and public properties regulated by Provision C.3, as well as treatment control retrofit of existing infrastructure in public right-of-way (ROW) areas and on public and private properties not subject to Provision C.3. Results of the GSI RAA analysis are summarized in Section 3 and are combined with source control measures.

Solano Permittees have completed a Reasonable Assurance Analysis (RAA) modeling study, in fulfillment of Municipal Permit (MRP) Provisions C.11and C.12.c. to quantify the degree to which they expect to meet future PCBs and mercury reduction targets by implementation of GSI (Appendix A). This study was coordinated with other SF Bay Area Permittees via BASMAA to ensure consistency of methods, rigor, documentation, and logistics within the Bay Area region. The modeling relied strongly on input data from the Solano Permittees and required substantial input and iteration of information with stormwater management staff from the Cities of Fairfield, Suisun, and Vallejo, the Fairfield Suisun Sewer District, and the Vallejo Flood and Wastewater District. This modeling study has been completed in parallel with development of a GSI Work Plan, so that the outputs may inform future GSI implementation. These efforts represent a concerted, collaborative effort on the part of the Solano Permittees to determine PCB and mercury reduction progress to date and the most likely trajectory forward given the best information currently available.

Future modeling scenarios were completed for the Solano Permittee MS4 Area that includes the cities of Fairfield, Suisun, and Vallejo for the years 2020, 2028/2030, and 2040 to quantify reductions of stormwater runoff, PCBs and mercury. These scenarios included land use changes associated with new development and redevelopment as well as implementation of decentralized and centralized structural BMPs that infiltrate and treat stormwater runoff. These scenarios did not include the source control measures, which are addressed in the current analysis. Baseline loading and reductions are summarized for each future scenario for Solano Permittees are summarized in Table 1, with as 61% reduction from the refined baseline load for PCBs and a 20% reduction for mercury. Reductions represent 72% of the load reduction required to meet the Solano Permittees wasteload allocation for PCBs of 110 g/yr. The GSI Work Plan completed by Solano Permittees with their consultant team outlines opportunities for GSI implementation and conceptual-level design of several projects which will help to realize the projected load reductions from GSI.

Table 1. Estimated reductions from enhance street sweeping practices

Scenario	Loading		GSI Reductions		% Reduction from Baseline	
	PCB (g)	Hg (g)	PCB (g)	Hg (g)	PCB (g)	Hg (g)
Baseline	630	1,441	-	-		
2020	504	1,276	137	166	22%	12%
2030	340	1,238	289	204	46%	14%
2040	248	1,146	382	295	61%	20%

4. Summary of PCBs and Mercury Sources

4.1 PCBs sources to urban runoff

PCBs were manufactured in the United States from 1929 to 1977 and were widely used by many industries because of their low electrical conductivity, high boiling point, chemical stability and flame-retardant properties. PCBs were predominantly used in electrical equipment, including transformers and capacitors, but also found in hydraulic fluids, dust control, flame retardants, lubricants, paints, sealants, wood preservatives, inks, dyes and plasticizers. In 1979, the manufacture, import, and distribution of PCBs was banned in the United States. However, PCBs still remain in use in certain closed system devices (e.g. transformers and capacitors), which may still contribute to stormwater loads.

A conceptual model developed by McKee et al. (2006) estimated that erosion of sediments from urban watersheds is the largest source of PCBs to the Bay Area. Construction sites, open spaces, and vacant lots can represent areas of legacy PCB accumulation over the past 50 years. The second largest sources identified were building demolition, and continued PCB use in transformers and capacitors. Lesser sources included atmospheric deposition and contaminated industrial areas.

4.2 Mercury sources to urban runoff

Mercury is a naturally-occurring, persistent, bioaccumulative (as methylmercury) metal that can be present in the elemental, inorganic, or organic forms in the environment. It is both a legacy pollutant and has modern sources. Historically, mercury has been used in a variety of products. Primary among the historical industrial uses were battery manufacturing and chlorine-alkali production; along with paints and industrial instruments. It is also used in laboratories for making thermometers, barometers, diffusion pumps, and other instruments, including mercury switches and other electrical apparatuses. Gaseous mercury is used in mercury-vapor lamps (e.g., fluorescent tubes) and advertising signs. Mercury is also the basis of dental amalgams and preparations, and can be a byproduct of burning fossil fuels and refining petroleum. Mercury has not been mined as a principal mineral product in the U.S. since about

1992. Product substitutions (e.g. LEDs for mercury-containing fluorescent lights) have resulted in substantial reductions in commercial mercury usage in recent decades (McKee et al, 2006).

Erosion from the surface of the urban watershed is also the largest source of mercury to Bay Area urban stormwater (McKee et al., 2006). However, in contrast to PCBs, atmospheric deposition of mercury to urban watersheds provides a substantial source of mercury to SF Bay urban stormwater. Mercury in atmospheric deposition over Bay Area watersheds originates from the release of mercury from global and local sources, both natural (e.g. volcanos, wildfires) and human-caused (e.g. coal combustion).

4.3 PCBs and mercury potential source identification in Solano County

Since the early 1990's, several locations within the San Francisco Bay nearby to Solano County have been sampled by regional monitoring programs such as the SF Bay Regional Monitoring Program (RMP). The Contaminant Data Display & Download (CD3) 6 system, administered by SFEI, provides access to these data which are useful for characterizing historic spatial patterns of pollutant concentrations within receiving waters. Maps presented in McKee et al. 2015 (p.18) illustrated that PCB concentrations in fish tissues and in sediments are relatively low in watersheds and Bay waters adjacent to Solano County, with levels much lower than other identified areas of concern.

Solano Permittees have identified and assessed potential PCB source areas for remediation throughout their cities which have been documented in Pollutants of Concern Implementation Plan (FSURMP, 2014) and Control Measures Implementation Status Report (VSFCD, 2016). There has been very little historic PCB related industrial activity in the Cities of Fairfield and Suisun City, and thus, very few potential remediation sites. Seven potential sites were identified for sediment sampling in Fairfield/Suisun. The largest (by land area) potential source area identified, the Travis Air Force Base, was rejected as a potential monitoring site, since it is a federal facility covered under its own NPDES permit.

Prior to the MRP 1.0 and MRP 2.0 investigations, the Solano Permittees collaborated with several other Bay Area stormwater management agencies to measure concentrations of PCBs and other pollutants of concern in embedded sediments collected from stormwater conveyances throughout the Bay Area (KLI, 2002) via the Joint Stormwater Agency Project. The primary goal of this study was to characterize the distribution of pollutants in watersheds draining to the Bay. A total of about 150 samples were collected during the fall of 2000 and 2001. Six of the samples were collected within the Solano Program's jurisdiction in residential/commercial, industrial, open space and mixed land uses. In 2014, Source Area Maps were developed that described PCB distribution throughout Solano County and the entire SF Bay.

5. RAA PCBs and Mercury Control Measures

Source measures calculations for accounting for reductions of PCBs and Mercury in the San Francisco Bay area are specified in the Source Control Load Reduction Accounting for RAA (BASMAA, 2020), and the appropriate methods for integrating these calculations are outlined in the RAA Guidance (BASMAA,

2017a). Qualified source control measures are summarized below, and more complete descriptions and calculation methods are documented in BASMAA (2020).

- ***Source Property Identification and Abatement*** – Source property identification and abatement involves investigations of properties located in historically industrial land use or other land use areas where PCBs or mercury were used, released, or disposed of or where sediment concentrations of PCBs or mercury are significantly elevated above urban background levels. Once a source property is identified, the source of PCBs or mercury on the property may be abated or caused to be abated directly by the Permittee or the Permittee may choose to refer the source property to the Regional Water Board or another appropriate agency for investigation and abatement.
- ***PCBs in Building Materials Management Program*** – The MRP Permittees have developed a protocol for managing building materials and wastes with PCBs concentrations of 50 parts per million (ppm) or greater in applicable structures at the time demolition occurs so that PCBs do not enter the municipal storm drain system. Implementation of the protocol began July 1, 2019.
- ***PCBs in electrical utilities management program.*** During the first three years of the permit term, the Permittees will develop and implement a program to manage PCBs-containing electrical utility equipment to prevent or reduce PCBs from entering the MS4. The Electrical Utilities Management Program will include improved practices and procedures for documenting removal and disposal of PCBs-containing electrical equipment, responding to unplanned PCBs releases, and monitoring and reporting requirements.
- ***Managing PCBs in storm drain infrastructure caulk management program -*** For this control measure, Permittees will track development of a Caltrans specification for managing PCBs-containing caulks and sealants on bridges or roadway overpasses during bridge replacement or joint maintenance. The Caltrans standard specifications for removal, handling, and disposal of caulk or sealant materials during infrastructure replacement or joint maintenance projects will be used to prevent the release of PCBs to the MS4.
- ***Enhanced Operation and Maintenance Control Measures*** – Routine MS4 operation and maintenance (O&M) activities include street sweeping, drain inlet cleaning, and pump station maintenance. In addition, culverts and channels are also routinely maintained (i.e., desilted). Enhancements to routine operations and new actions such as storm drain line flushing may enhance the Permittees' ability to reduce PCBs and mercury loads in stormwater.
- ***Trash Capture Systems -*** This control measure includes the implementation of large (non-inlet based) full trash capture devices, including hydrodynamic separators (HDS), gross solids removal devices (GSRDs), and baffle boxes in existing developed areas for the purposes of MRP Provision C.10 compliance. These devices collect sediment and debris along with trash, so are considered as a source control measure for the PCBs and mercury associated with the sediment that is captured.

- ***Diversion to Publicly Owned Treatment Works*** – This control measure consists of diverting dry weather and/or first flush events from MS4s to publicly owned treatment works (POTWs) as a method to reduce loads of PCBs and mercury in urban runoff.
- ***Mercury load avoidance and reduction program -*** Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling.

Not all of these control measures have been implemented by the Solano permittees due to either limited resources or lack evidence of source contributions. The following sections describe actions by the Solano Permittees with respect to each control measure along and provide an accounting of pollutant reductions associated with each applicable control measure.

6. Source Control Identification and Abatement

Solano Permittees have made no referrals of potential source properties to the Regional Water Board for abatement. During MRP 1.0 and MRP 2.0 (2009 – 2018), potential remediation areas were identified throughout the City of Vallejo, as part of the PCBs Source Area Identification Screening Program, in coordination with BASMAA's Monitoring and Pollutant of Concern Committee. Out of a total of 191 Vallejo parcels surveyed, 30 are now categorized as high likelihood source parcels, and were further assessed for sampling suitability (VFSD, 2016). The overall findings of source investigations in Solano Permittee jurisdictions show that much of the new urban and older residential areas have low probability of having substantial PCB source areas. The former Mare Island Naval shipyard is considered an old industrial area based on historic land use along with waterfront sections of Vallejo are also considered old industrial and may be examined more closely in the future.

In 2016, four sites within the City of Fairfield and Suisun were investigated as part of a BMP retrofit study and showed that sediments did not contain elevated levels of PCBs (City of Fairfield, 2016). Remediation of two sites that comprised the Vallejo Manufactured Gas Plan Site PG&E in 2019 showed elevated levels of several contaminants but elevated levels of PCBs were not reported.

7. *PCBs in electrical utilities management program*

During MRP 3.0, Permittees propose to implement a new control measure program to manage the release of PCBs from oil filled electrical equipment (OFEE). Under this new program, load reductions will be credited for the following actions:

Action 1: Permittee operated electrical utilities will document the removal of PCBs-containing OFEE since the start of the TMDL and during the five-year permit term, and provide data to support calculations of the associated stormwater load reductions due to these efforts;

Action 2: Permittees will implement (or cause to be implemented) enhanced spill response and reporting protocols to further reduce the mass of PCBs released to stormwater due to accidental releases from PCBs-containing OFEE. To date, Solano permittees have not implemented a program to manage PCBs in electrical utilities.

In order to estimate the loads reduced since the start of the TMDL and the current (2020) PCBs loads to stormwater from PCBs-containing OFEE, the overall 65% load reduction rate shown in the McKee et al. (2006) mass balance models for the fifteen-year period between 1990 and 2005 was used as the high estimate for the load reduction rate. Reductions will be allocated regionally according to the timeframes established in BASMAA (2020).

To date, Solano Permittees have not implemented a plan to document removal of PCB-containing OFEE since the start of the TMDL (Action 1) or implemented enhanced cleanup and reporting protocols (Action 2).

8. *PCBs in Building Materials Management Program*

Beginning in July 2019, the MRP Permittees have developed and implemented a process for managing materials with PCBs concentrations > 50 ppm during demolition. Applicable structures include commercial, public, institutional, and industrial buildings constructed or remodeled from 1950 to 1980 that undergo full-building demolition. The Solano Permittees have adopted this process and since July 2019, there have been 3 buildings demolished that followed the specified BASMAA protocol to receive PCBs reductions credit. All buildings were located on Mare Island and are classified as Old Industrial land use, with relatively high PCB concentrations (see Figure 2). The PCBs load reduction resulting from building materials management (R_b) is calculated as the product of the number of applicable buildings demolished each year (n), the average mass of PCBs per applicable building in kg (5), the average fraction of PCBs that enters the MS4 due to demolition without controls (0.01), and the average fraction of PCBs prevented by controls from entering the MS4 (0.8) (BASMAA, 2020).

$$R_b = n * 5 * 0.01 * 0.8$$

With the three applicable buildings on Mare Island within the City of Vallejo and these parameters with appropriate unit conversions, the mass of PCBs reduced from building materials management is estimated to be 120 g/yr. for the Solano Permittees.

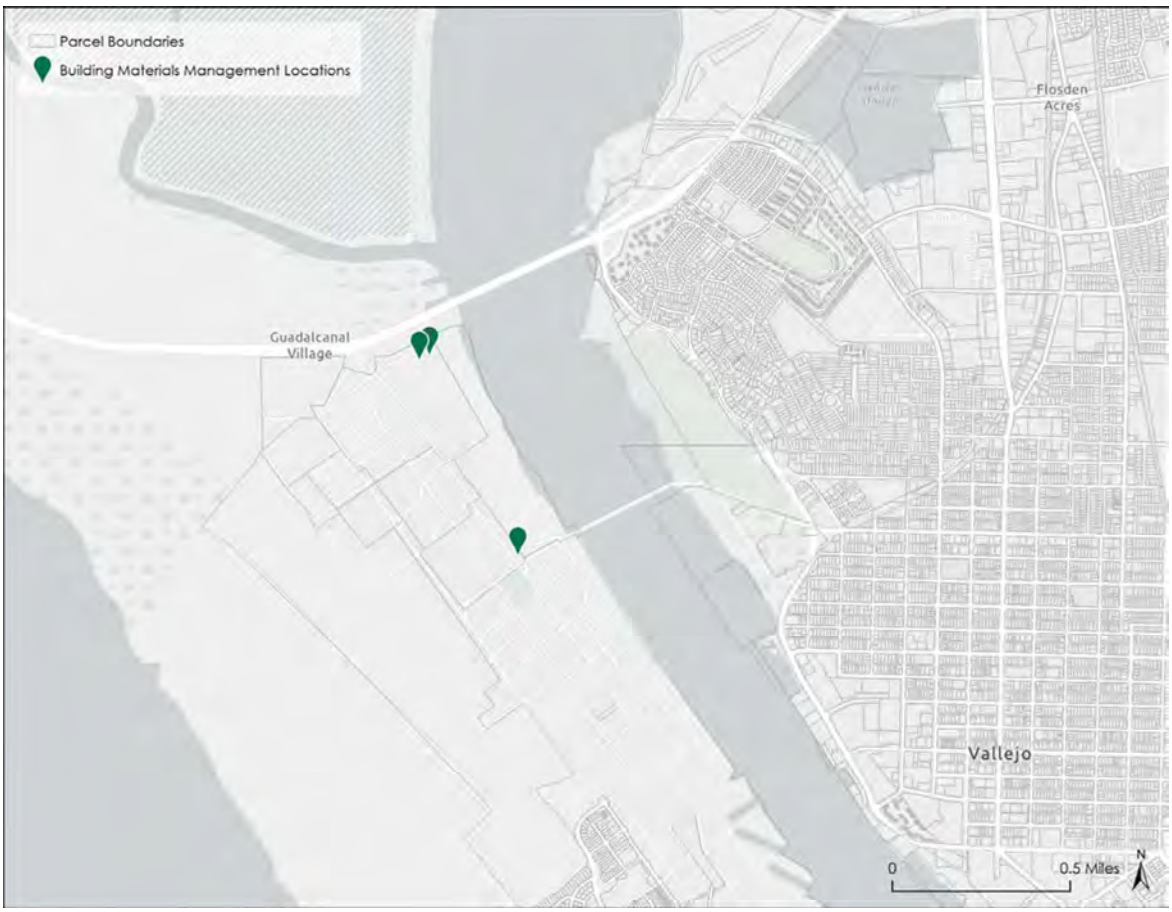

Figure 2. Buildings demolished on Mare Island with PCBs in Building Materials Management Program in effect.

For calculating catchment-level reductions associated with this control measure, locations of the applicable buildings in the Building Materials Management Program were mapped and intersected with the previously delineated urban catchments to produce summary statistics of a total PCBs reductions by catchment.

9. Managing PCBs in storm drain infrastructure caulk management program

Solano Permittees reported the results of an investigation into PCBs in infrastructure in their 2018 Annual Report in an attached report entitled: Evaluation of PCBs in Public Roadway and Storm Drain Infrastructure Caulk and Sealants. Solano Permittees have not yet implemented a program to manage PCB containing caulks within their storm drain infrastructure or roadways to date.

10. Enhanced Operation and Maintenance Control Measures

Solano Permittees have implemented enhanced operations and maintenance with regard to street sweeping and storm drain inlet cleaning. Both enhanced street sweeping and enhanced inlet cleaning are calculated in a similar manner with the annual load of PCBs reduced (R_s) expressed as the product of

the catchment drainage area (*A*), area weighted PCB yield (*Y*), and an enhanced efficiency factor (*E*) (BASMAA, 2020)

$$R_s = A * Y * E$$

Each factor in the reductions accounting was specified according to the relevant GIS data and city maintenance records. Efficiency factors for street sweeping and inlet cleaning were specified based on a combination of factors specified in the methods detailed in BASMAA (2020).

10.1 Street Sweeping

Drainage areas (A) were specified as the area of each urban catchment and the yield was specified based on baseline PCBs and Mercury loads calculated for each catchment (see Appendix A). In this way, the sweeping reductions match the level of spatial granularity of both the baseline modeling and reductions calculated as part of the GSI RAA. Enhanced efficiency factors for catchments associated with sweeping were specified using outputs from the Windows Source Loading Management Model (WinSLAMM) to evaluate various scenarios associated with street roughness and sweeping frequencies. The efficiency factor varies as a function of these two factors. We combined GIS layers of municipal sweeping schedules, pavement condition index, and sweeper types to estimate sweeping efficiency levels for each catchment throughout the MS4 area per tables provided in BASMAA (2020, Appendix H). PCBs and mercury yields used in the calculations were specific to each catchment per baseline modeling reported per GSI RAA (Appendix A). The most common combination of factors used in Solano County was intermediate street roughness with monthly sweeping frequency (see Figure 3). All sweepers used throughout Fairfield, Vallejo, and Suisun are either vacuum assist or regenerative air types, which aligns with the efficiency factors calculated in BASMAA (2020).

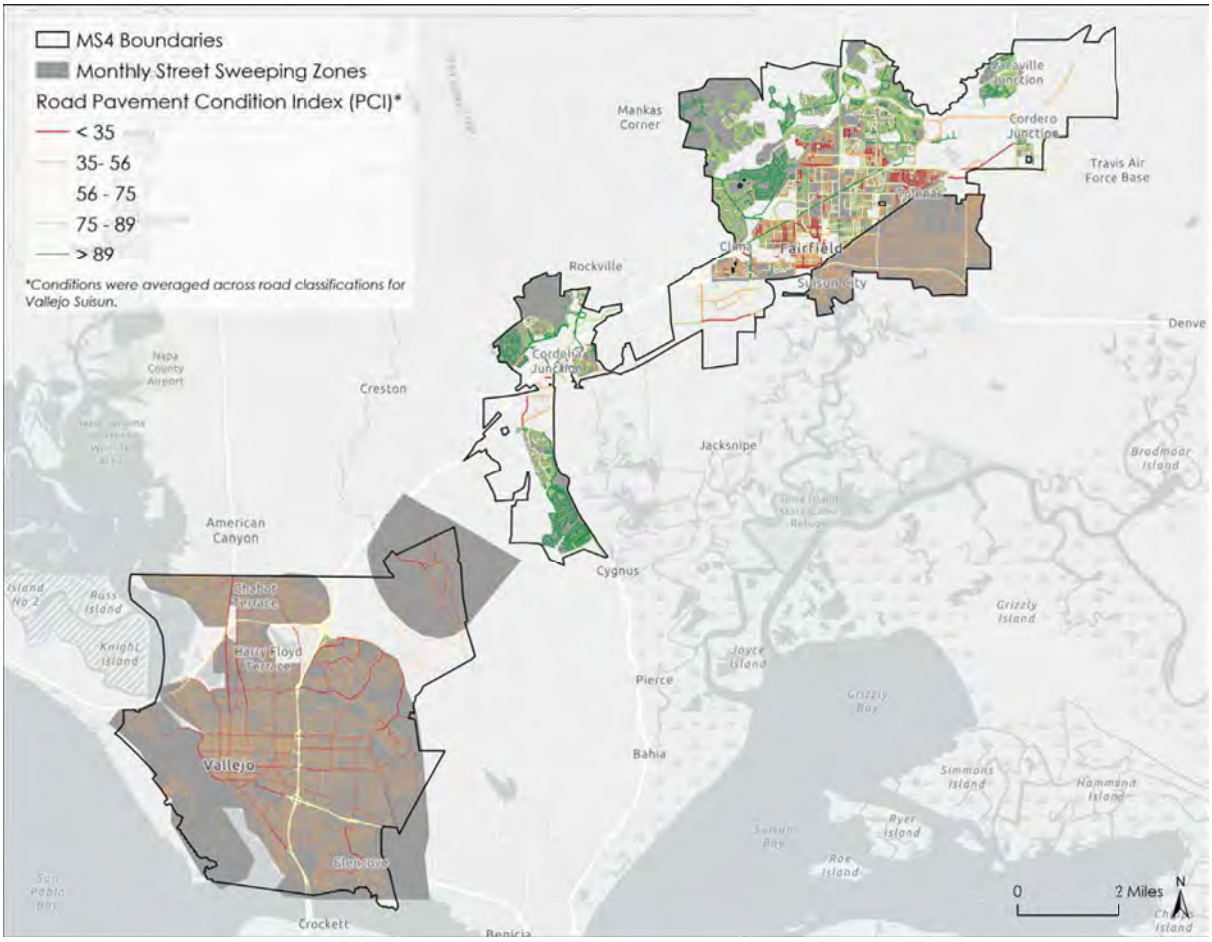

Figure 3. Sweeping schedules and pavement condition for Solano Permittee MS4 area.

For vacuum-assisted sweepers, based on the sweeping frequencies evaluated by BASMAA (2017b), increasing the frequency from monthly to weekly did not yield any benefits for mercury mass removal, and did not yield significant benefits for PCBs (i.e., less than 10% improvement in mass removal). A monthly sweeping frequency was therefore recommended for reducing PCBs and mercury mass (BASMAA, 2017b).

The efficiency enhancement ratio specified is relative to a no sweeping scenario since prior to the baseline year of 2005 used for this RAA, Solano Permittees did not use vacuum assist or regenerative air sweepers. While BASMAA 2017b did not evaluate difference between mechanical broom sweepers and vacuum assist/regenerative air, these differences have been quantified in both the Lake Tahoe Basin (2NDNATURE and NHC, 2009) and the Chesapeake Bay (TetraTech, 2015), who also used WinSLAMM simulations to estimate reductions. Results show that mechanical broom sweepers provide close to zero sediment reduction benefits regardless of sweeping frequency, curb access, or pavement condition. Reductions for PCBs and Mercury calculated for each Solano Permittee cities using the appropriate parameters are shown in Table 2.

Table 2. Estimated reductions from enhance street sweeping practices

Vallejo		Fairfield		Suisun	
PCBs (g)	Hg (g)	PCBs (g)	Hg (g)	PCBs (g)	Hg (g)
52.5	63.6	15.1	66.6	2.3	8.5

10.2 Storm Drain Inlet Cleaning

Like sweeping reductions, catch basin drainage areas were defined by catchments, and since drainage areas to individual inlets are not mapped, the PCBs and mercury yields were assumed to be uniform throughout the catchment and that each inlet drained an equal proportion of the catchment area for purposes of spatial allocation of reductions. The enhanced efficiency factor was specified based on the frequency of inlet cleaning documented by Solano Permittees and estimated reductions reported form the literature that were summarized in BASMAA (2020). A baseline control measure efficiency of 11% was estimated based on annual inlet cleaning schedules (BASMAA, 2020, Appendix G). We assumed that this baseline efficiency to align with the 2005 baseline scenario and increases above this level to contribute to enhanced efficiency of this control measure. Biannual and quarterly cleanings are estimated to provide an enhanced efficiency of 5% above the baseline scenario of annual cleaning. The City of Vallejo provided records of additional inlet cleaning that comprised approximately 2% of their storm drain inlets. The City of Suisun cleans 100% of their inlets quarterly, and the City of Fairfield cleans approximately 15% at greater than annual frequency in response to storm events. Inlet density and inspection schedules are combined in Figure 4 to illustrate the density of inspection frequency throughout all three cities.

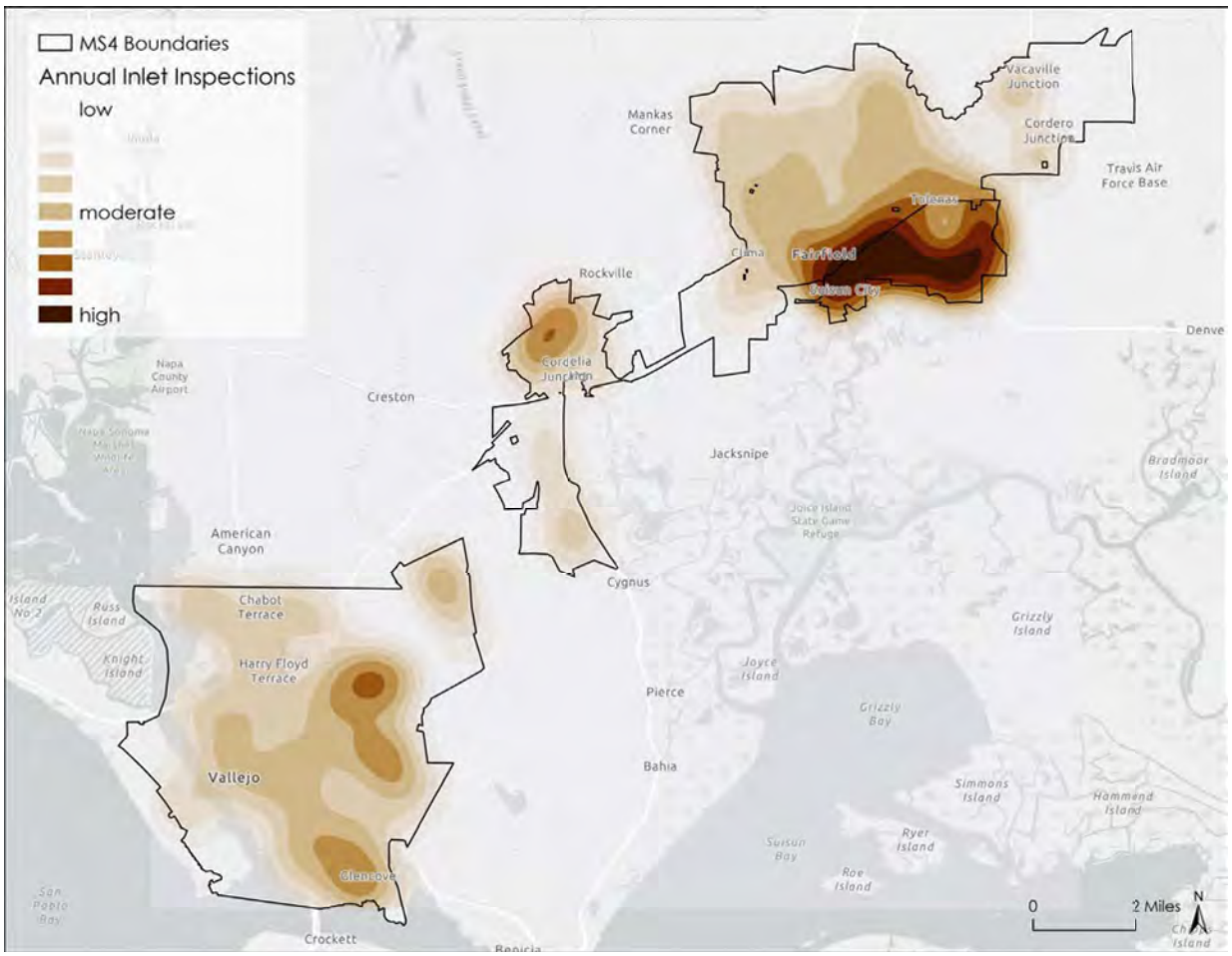

Figure 4. Annual inspection density based on number of inlets and inspection frequency

Storm drain inlet cleaning reductions are summarized for each city in Table 3. Estimated PCBs and mercury reductions resulting from the enhanced inlet cleaning efficiency that show relatively small reductions due to only a small proportion of inlets being cleaned above the baseline annual frequency in Fairfield and Vallejo, which provide the largest contributing areas.

Table 3. Estimated reductions from enhanced storm drain inlet cleaning

Vallejo		Fairfield		Suisun	
PCBs (g)	Hg (g)	PCBs (g)	Hg (g)	PCBs (g)	Hg (g)
0.5	1.0	1.0	5.2	0.8	0.1

11. Trash Capture Systems

Large trash full capture devices collect sediment and debris along with trash, so they are considered a source control measure for the PCBs and mercury associated with the captured sediment. These include hydrodynamic separator units (HDS), gross solids removal devices (GSRDs), and baffle boxes. Load reductions associated with large trash capture devices (R_t) are quantified as the product of treatment drainage area (A), area-weighted yield (Y), an efficiency factor (E)

$$R_t = P * Y * E$$

Drainage areas to large trash capture devices were joined to modeled catchment scale pollutant loads for PCBs to specify yields. Both Fairfield and Suisun include MS4 areas that drain to these large trash full capture devices (see Figure 5). The efficiency factor was specified at 0.20 based on CDS unit sampling data of TSS recorded in the International Stormwater BMP Database (http://bmpdatabase.org/) and reported in BASMAA (2020) and independent analysis of associated PCBs and mercury fractional removal rates (BASMAA, 2019).

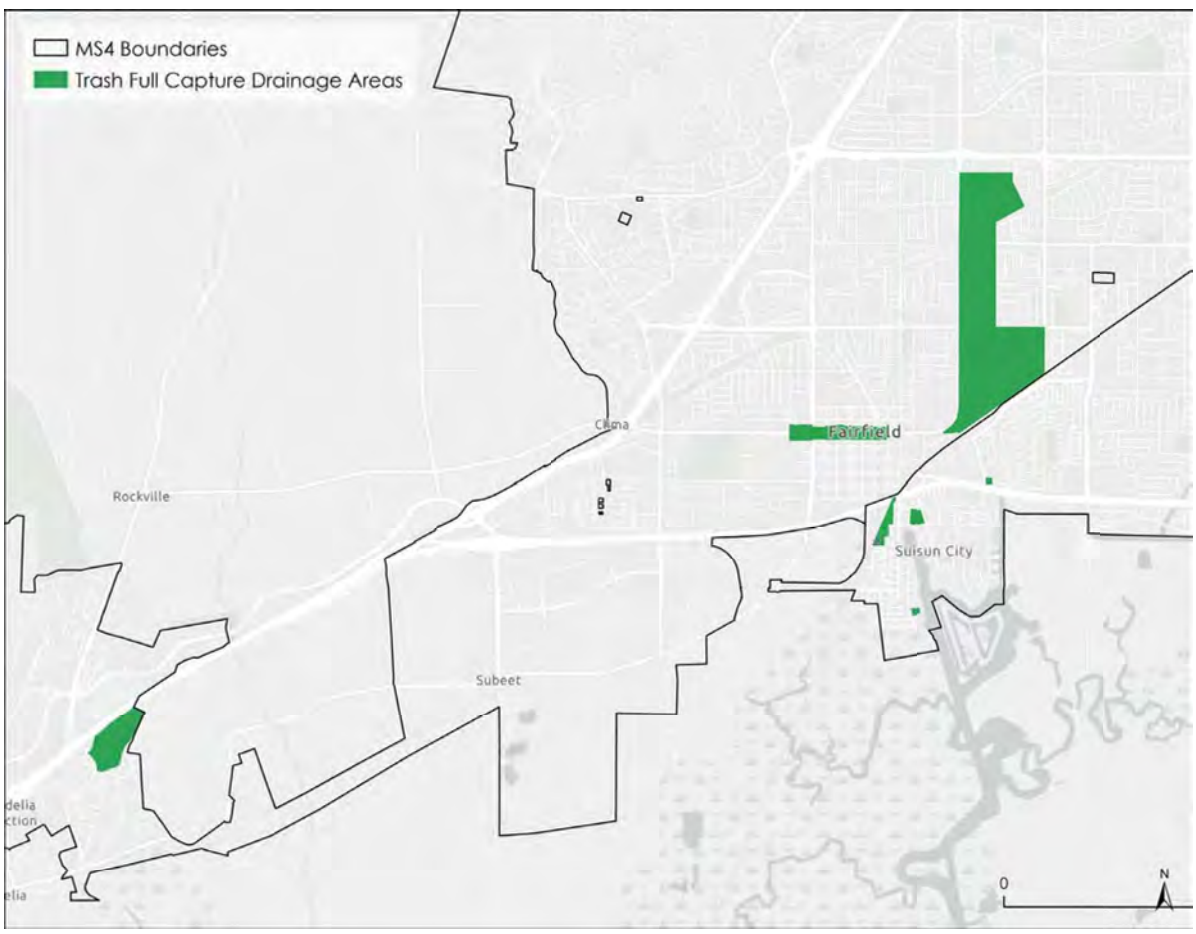

Figure 5. Areas draining to large full trash capture devices

Estimated load reductions are shown in Table 4, with the greatest reductions for the City of Fairfield, which has the largest drainage areas routed to full capture devices. These drainages include cumulative drainages of more than 100 acres of Old Residential land use, which have relatively high concentrations for mercury (63 ng/L)

Table 4. Estimated reductions from large full trash capture devices

Vallejo		Fairfield		Suisun	
PCBs (g)	Hg (g)	PCBs (g)	Hg (g)	PCBs (g)	Hg (g)
0.0	0.0	16.4	132.2	2.9	1.0

12. Diversion to Public Owned Treatment Works

The diversion of dry weather and first flush flows to POTWs in Solano County has been taken on by the Fairfield Suisun Sewer District. The project involved changing the operation of an existing pump station to divert stormwater from the station to the Fairfield Suisun Sewer District wastewater treatment plant. The pump station is located in the city of Fairfield just upstream from Suisun city. It serves a watershed area of approximately 6 acres all of which is zoned commercial, of which a significant portion is automotive repair. The goal of this pilot project was to comply with provision C.11/12f of the MRP by better understanding the applicability, costs, and benefits associated with this and similar projects.

Normal discharges from the State Street Pump Station were terminated in mid –June, 2018. The contents of the pump stations wet well removed by Vactor truck and then discharged to the Fairfield Suisun Sewer District treatment plant. As dry weather runoff accumulates in the pump station, the water was removed and disposed of at the POTW. The pump station resumed its normal discharge operation settings in late September 2018. The annual reduction in loads, assuming an average volume of 2,000 gallons per year and a combined concentration of 28.3 grams per liter (based on water samples taken). The amount of PCBs being removed from the system would be only 0.0002 mg. The Program continues to divert during the dry season to show good effort toward compliance with the PCB waste load reduction requirements in MRP-2.

13. Mercury load avoidance and reduction program

Mercury load avoidance and reduction includes a number of source control measures listed in the California Mercury Reduction Act adopted by the State of California in 2001. These source controls include material bans, reductions of the amount of mercury allowable for use in products, and mercury device recycling. The Permittees coordinate local household hazardous waste (HHW) collection facilities to implement mercury collection and recycling in accordance with MRP Provisions C.11.a.i and C.11.a.ii. FSURMP Permittees collect HHW at the same regional facility in Fairfield, Solano County: Republic Services at 2901 Industrial Court, Fairfield, CA Republic Services serves the communities of Fairfield,

Suisun City and parts of unincorporated Solano County. The types of data collected at this facility includes the standard Cal Recycle 303a form. However, these efforts are no longer required to be reported, but will be tracked for mercury loads reduced through implementation of mercury avoidance and reduction control measures. Reductions associated with this source control measure were not calculated in this analysis due to a lack data to reliably estimate mercury reductions.

14. Wasteload Allocation Compliance Demonstration

14.1 Combined source control measure reductions

Source control measure reductions were combined for each catchment with the Solano Permittee MS4 area using the same geospatial framework used for calculating baseline loading of PCBs and mercury as well as reductions associated with GSI. This alignment ensures that reduction estimates are internally consistent throughout the RAA process for meaningful comparisons with wasteload allocations. Spatial patterns of source control measure load reductions for PCBs throughout the Solano Permittee MS4 area are shown in Figure 6. The largest reductions are largely concentrated in intensively developed areas and on Mare Island, which is strongly influenced by the high degree of Old Industrial land use and associated high PCB concentrations which serve as an input to several source control measures.

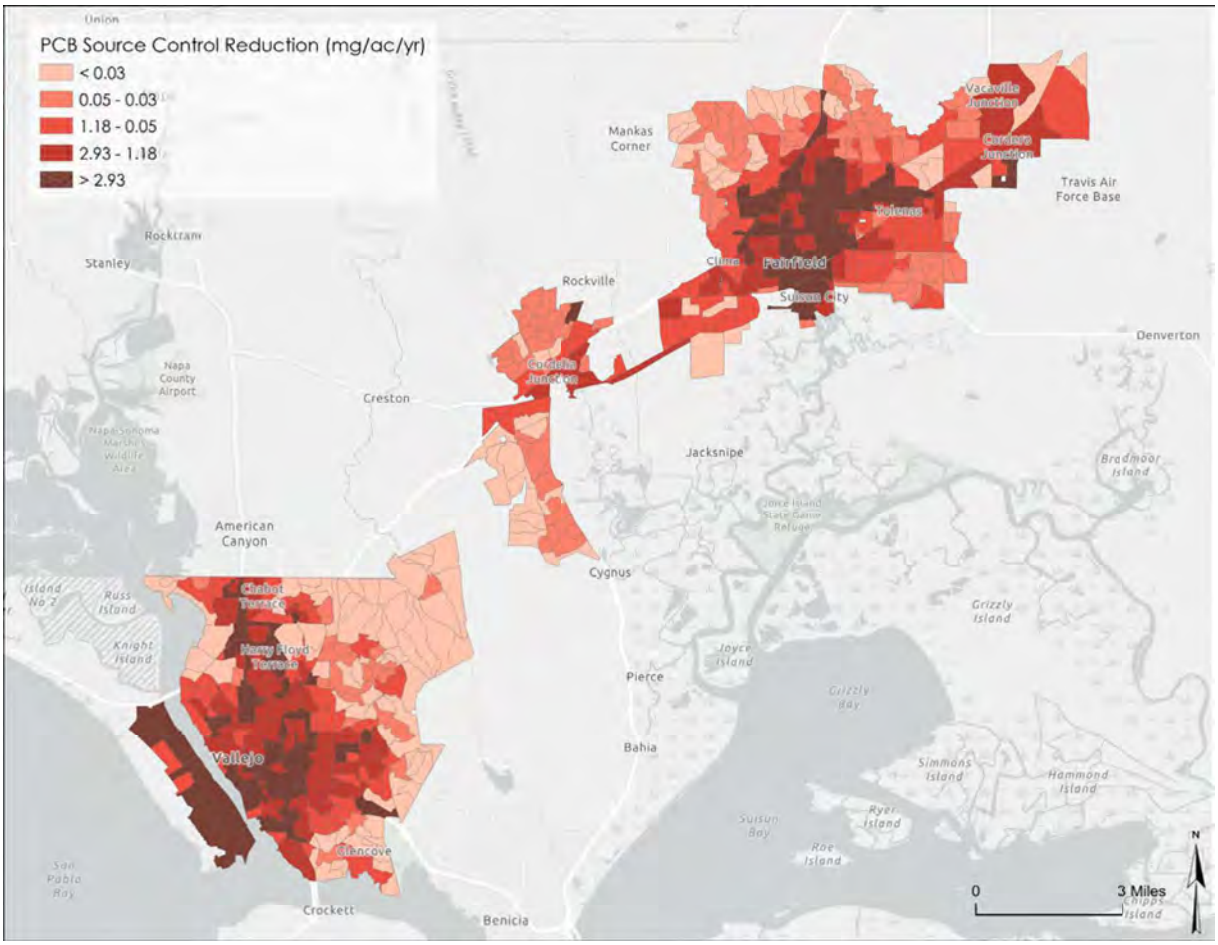

Figure 6. Source control reductions for PCBs

Mercury reductions from source control measures show a somewhat similar pattern to PCBs, with higher reductions concentrated in catchments near city centers (Figure 7). A notable difference is that lower relative reductions on Mare Island, which largely reflects lower variance in mercury concentrations across the land use based yields, compared to PCBs. Thus, mercury reductions more closely reflect variables associated with the control measure implementation itself, rather than levels of baseline loading.

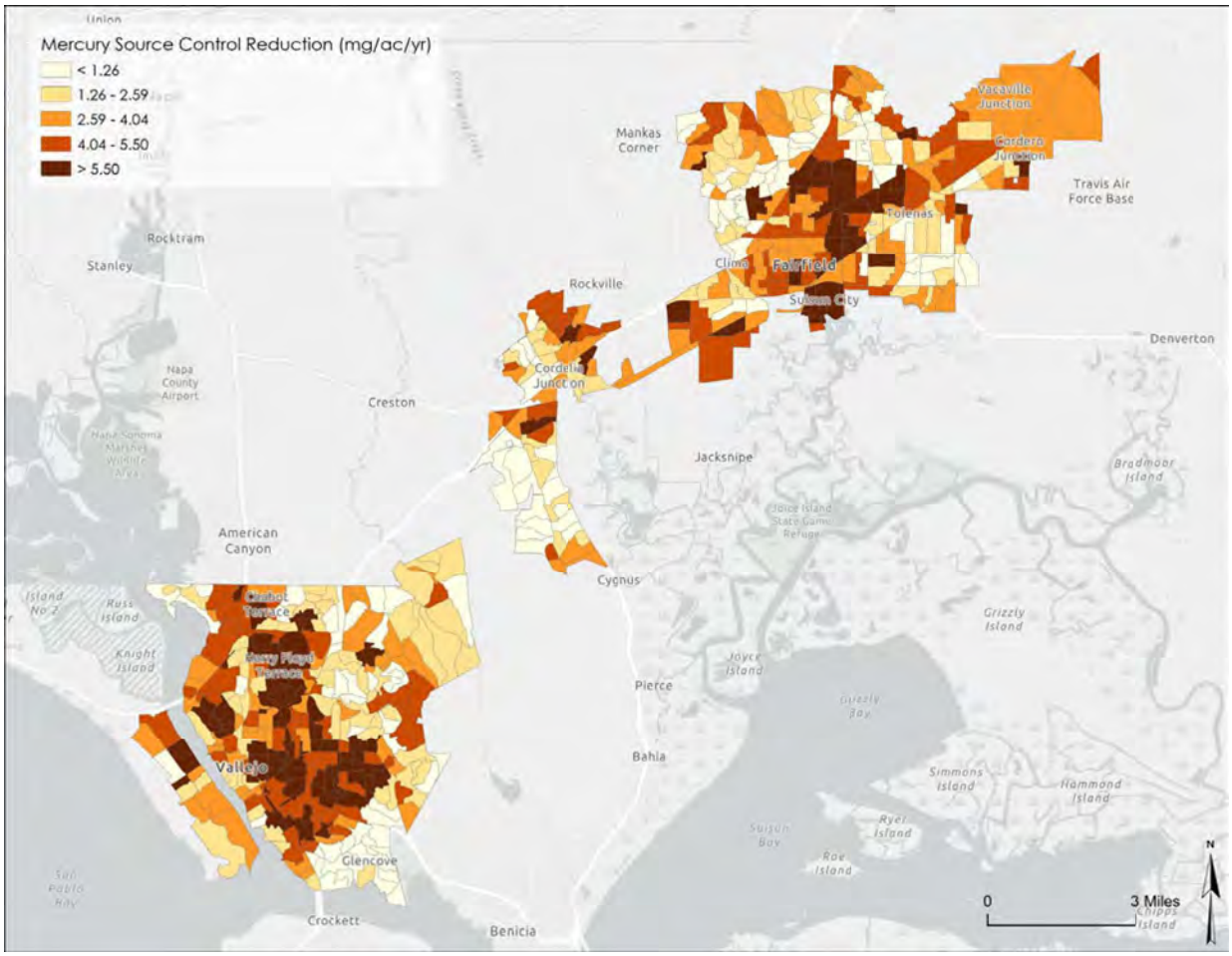

Figure 7. Source control reductions for mercury

Source control measure reductions are summarized by city in Table 5. The largest reductions across all three cities for PCBs is due to building materials management (120 g). For mercury, street sweeping provides the largest reduction (138.7 g) followed closely by trash capture (133.2 g). The combination of those two control measures result in the largest mercury reductions realized for Fairfield (199 g), while the greatest PCBs reductions are in Vallejo from the combination building materials management (120 g) and street sweeping (52.5 g).

Table 5. Source control measure reductions summary

	Vallejo		Fairfield		Suisun		Total PCBs Reduced (g)	Total Mercury Reduced (g)
	PCBs (g)	Hg (g)	PCBs (g)	Hg (g)	PCBs (g)	Hg (g)		
Sweeping	52.5	63.6	15.1	66.6	2.3	8.5	69.9	138.7
Inlet Cleaning	0.5	1.0	1.0	5.2	0.8	0.1	2.3	6.3
Trash Capture	0.0	0.0	16.4	132.2	2.9	1.0	19.3	133.2
Building Mat.	120.0	0.0	0.0	0.0	0.0	0.0	120.0	0.0
Totals	173	65	33	204	6	10	211	278

14.2 Projected loading scenarios and comparison Waste Load Allocation attainment

The GSI RAA established that estimated reductions from GSI and redevelopment provided 72% of the reductions required to reach the Solano Permittees' PCBs wasteload allocation of 110g/yr by the year 2040, and that the remainder reductions would be achieved by either source controls or identification of additional GSI opportunities beyond the areas that are already planned for redevelopment (see Appendix A). Similar to the GSI RAA, reductions achieved from source control measures were applied to future loading scenarios. Per the RAA Guidance (BASMAA, 2017a), source control measure load reductions were not applied the 2020 scenario and no new source controls applied to the 2040 scenario. While no additional source control reductions were applied, it reasonable to assume that source control measures implemented by 2030 will continue to 2040. The total control measure reductions were calculated as the sum of reductions resulting projected GSI implementation, land use redevelopment, and source control measure implementation.

The spatial distribution of total PCBs loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 8. Note that the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A). Note that the catchment classification is unchanged from the maps presented in the GSI RAA to facilitate comparisons. In most areas, source controls provide additional PCB reductions throughout the Solano Permittee MS4 area above what were realized by GSI and land use redevelopment. City centers and Vallejo's Mare Island particularly benefit from street sweeping practices. PCB reduction benefits are disproportionately represented on Mare Island, due to the high proportion of Old Industrial land use which provides relatively high PCB yields. These outputs indicate that by 2040 all catchments on Mare Island have moved out of the highest loading category with the addition of source control measures (Figure 8, 2040 panel).

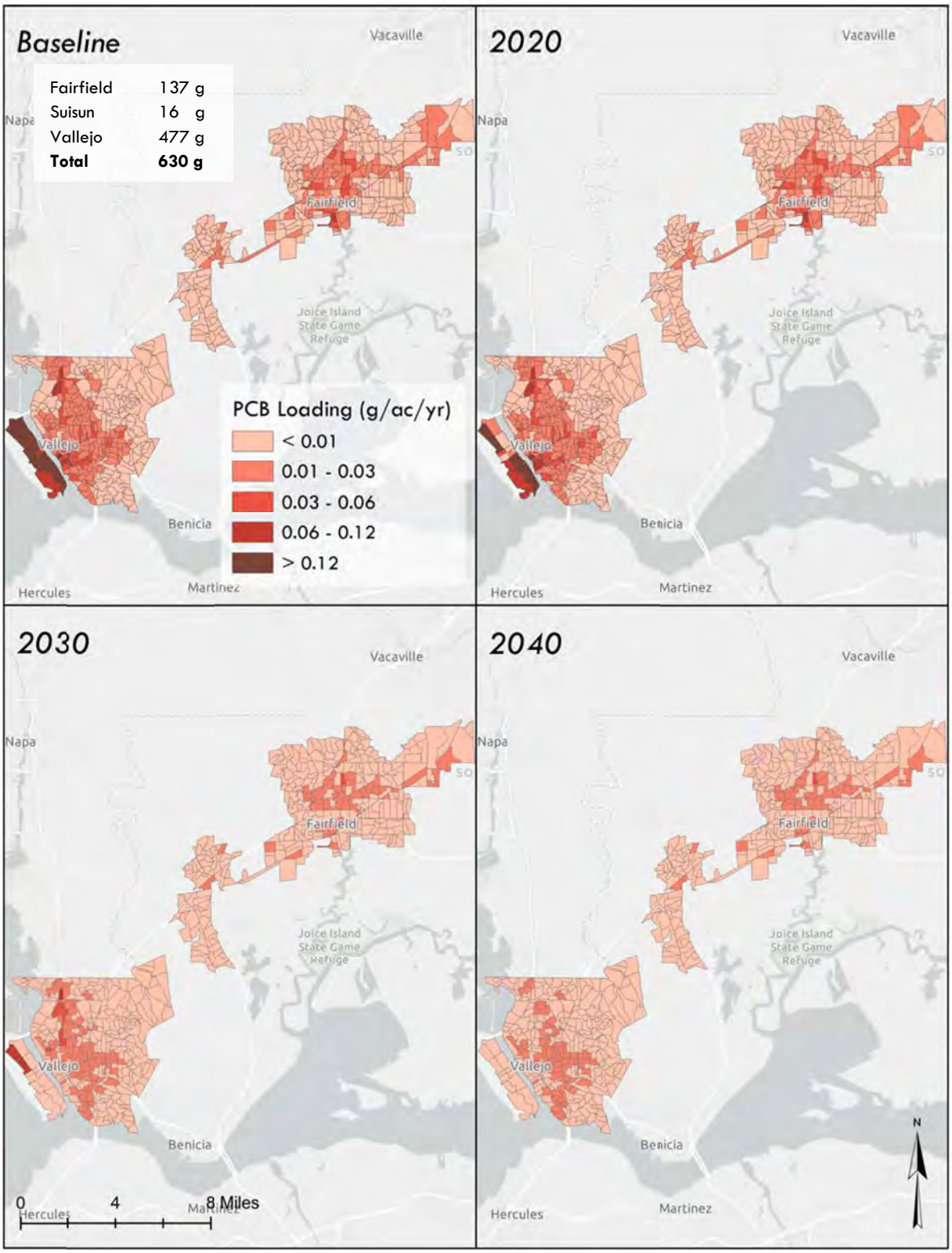

Figure 8. Total PCB reductions for GSI and source control measures for future scenarios.

The spatial distribution of total mercury loading after reductions from GSI, land use redevelopment, and source control measures for each RAA scenario is shown in Figure 9. Like the PCBs maps, the baseline scenario and the 2020 scenario are unchanged from reductions previously reported in the GSI RAA (see Appendix A), and catchment classifications are unchanged from those presented in the GSI RAA scenarios. Source control measures provide additional mercury reductions throughout the Solano Permittee MS4 area above what were realized by GSI and redevelopment, with larger relative reductions due to source control measures versus GSI or redevelopment when compared to PCBs. This is because the calculated mercury yields are generally less sensitive to land use conversion than PCBs. The most evident change is in the 2030 and 2040 scenarios, compared to what was estimated in the GSI RAA (see Appendix A). The outputs show that several catchments in the city centers of Vallejo, Fairfield, and Suisun shift out of the highest loading categories with the implementation of control measures (Figure 9). In Vallejo this is largely due to enhanced street sweeping practices, while in Fairfield and Suisun most reductions in these areas result from a combination of street sweeping and large trash capture devices.

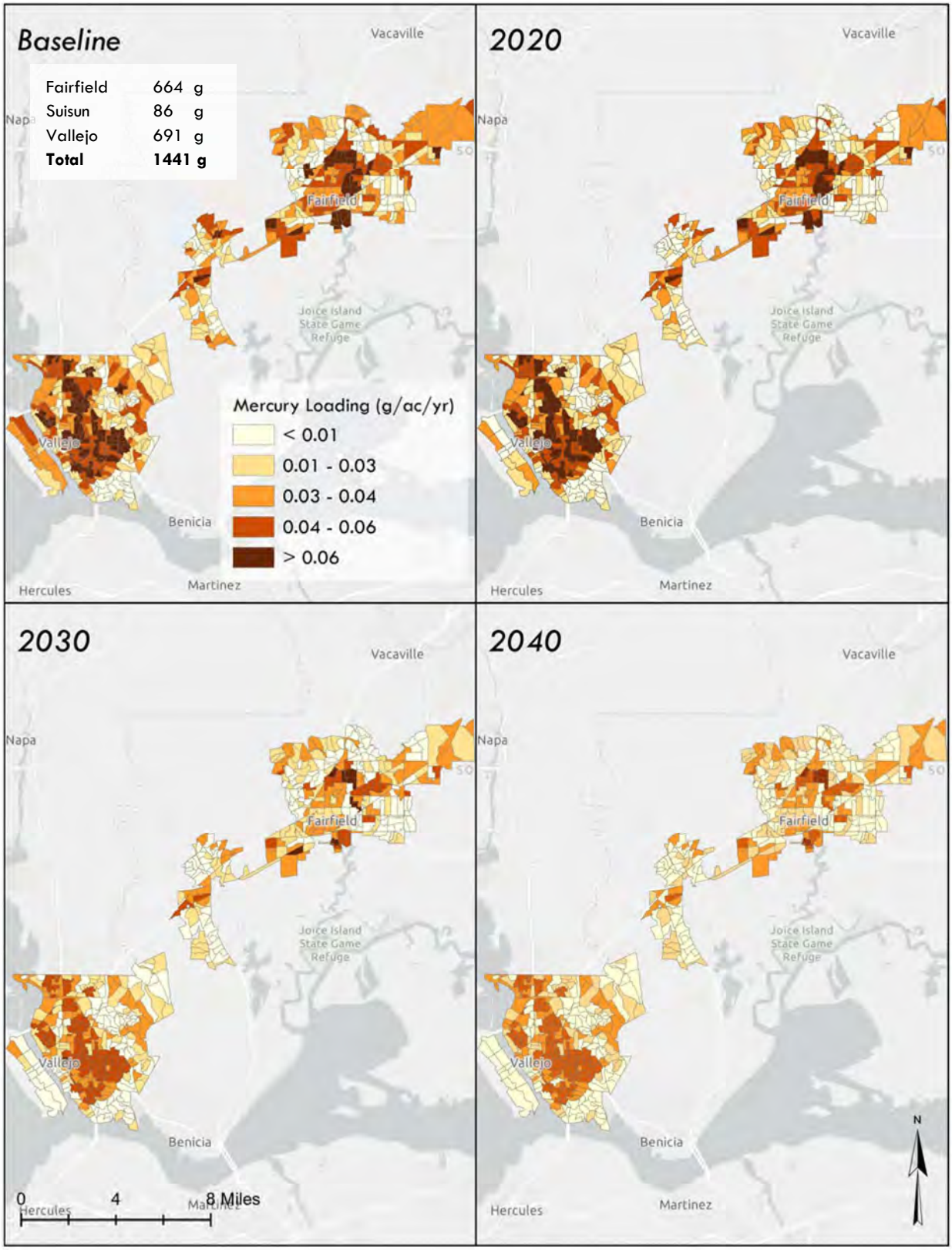

Figure 9. Total mercury reductions for GSI and source control measures for future scenarios

The MRP (sections C.11.d, C.12.d) requires that demonstration of wasteload allocation attainment via reasonable assurance analysis (RAA) is documented in the 2020 Annual Report. The total PCBs and mercury loading after reductions from GSI, associated land-use redevelopment, and source control measure implementation are compared to the Solano County wasteload allocation in Table 6. The 2040 estimated PCB GSI reductions (382 g) provide Solano Permittees with a 61% reduction below baseline loading estimates, which is 72% of the required reduction to meet the Solano Permittee's wasteload allocation of 110g. Table 6 shows that the remainder of the required PCB reductions are projected to be achieved by source control measures by the year 2040.

Table 6. Waste load allocation attainment summary.

Scenario	Baseline Loading (g)		GSI Reductions (g)		Source Control Reductions (g)		Reduction from Baseline (%)		Waste Load Allocation (g)		Allocation Attainment (%)	
	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg	PCBs	Hg
2020			137	166			22%	12%				
2030	630	1,441	289	204	211	278	79%	33%		1600		100%
2040			382	295	211	278	94%	40%	110		100%	

Estimated baseline loads for mercury (1441 g) were below the 2028/2030 wasteload allocation (1600 g), so this is not a relevant target for tracking progress, since it indicates that there are no mercury reductions required for Solano Permittees to meet the MRP requirement. It does however indicate that the Solano Permittees will meet the wasteload allocation for mercury established in the TMDL. If instead we appeal to a relative reduction metric using the refined baseline estimates, GSI reductions of 482 g represent a 33% reduction from the refined baseline estimates. Continued implementation of control measures with planned GSI and land use redevelopment results in a mercury loading rate reduction of 40% by 2040. The discrepancy between the refined baseline loads and those derived from the TMDL are likely related to population-based load allocation methods used for the TMDL, which are discussed in Appendix A.

15. Conclusions and recommendations

Primary findings from the source control RAA and WLA analysis are:

- Estimated PCB and mercury reductions meet wasteload allocation reduction targets specified in the MRP for 2028/2030 and 2040.
- While smaller than reductions associated with GSI and land use redevelopment, source control reductions play an important role in attaining wasteload allocations for Solano Permittees.

- Source control measure PCB reduction estimates from the City of Vallejo are disproportionately large, primarily due to substantial coverage of Old Industrial land use areas on Mare Island.

- Source control reductions are usually largest when implemented in areas with the highest typical land use pollutant concentrations such as Mare Island in Vallejo for PCBs or Old Residential areas in Fairfield

Meeting MRP pollutant load reduction targets will require ongoing tracking of control measure implementation and increased capacity to quantify and update pollutant load reduction estimates for both GSI and source control measures. This RAA has clarified a number of recommendations to improve ongoing tracking and verification of pollutant reductions and help the Solano Permittees become more efficient in demonstrating MRP compliance:

- Prioritizing source control measures such as street sweeping and installation of large trash capture devices provides in areas of Solano Permittee cities with the highest relative pollutant loading and may provide the greatest pollutant reduction value.
- Solano Permittees should adopt a comprehensive data management approach to track implementation of source control measures. This will help them provide ongoing verification to regulators that the estimates contained in this modeling report are proceeding as planned and avoid accounting errors.
- Integrate implementation tracking with a stormwater modeling tool. Ideally, the capacity to make updates to pollutant load reduction estimates resulting from stormwater program actions should reside directly with the Solano Permittees. This can create efficiencies for ongoing PCB and mercury load reduction quantification as implementation proceeds and also provide ongoing support for heuristic management scenarios to optimize implementation locations and BMP types. It can also serve as a key technical node for integration of GIS datasets relevant to stormwater reporting that are currently stored in disparate manner that makes synthesis and reporting inefficient.

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Appendix A

Final DRAFT PCBs and Mercury GSI RAA Modeling Report

FINAL
Green Infrastructure Plan

City of Union City

September 2019

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Acknowledgments

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List of Acronyms

Acronym	Definition
ACCWP	Alameda Countywide Clean Water Program
AGOL	ArcGIS Online
BAHM	Bay Area Hydrology Model
BASMAA	Bay Area Stormwater Management Agencies Association
DMA	Drainage management area
GI	Green infrastructure
HM	Hydromodification management
LID	Low impact development
MRP	Municipal Regional Stormwater Permit
HM	Hydromodification management
RWQCB	Regional Water Quality Control Board
PCB	Polychlorinated biphenyls
TMDL	Total maximum daily load

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1. Introduction

1.1 Statement of Purpose

The purpose of the Green Infrastructure (GI) Plan is to guide the identification, implementation, tracking, and reporting of green infrastructure projects within the City of Union City, in accordance with the Municipal Regional Stormwater Permit (MRP), Order No. R2-2015-0049, adopted by the San Francisco Bay Regional Water Quality Control Board on November 15, 2015. "Green infrastructure" refers to a sustainable system that detains stormwater to meet hydromodification (HM) requirements and slows down runoff by dispersing it to vegetated areas to promote infiltration and evapotranspiration, and uses bioretention and other low impact development practices to clean stormwater runoff.

1.2 MRP Requirements

This GI Plan has been developed to comply with GI Plan requirements in Provision C.3.j of the MRP, which states in part:

> The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff Total Maximum Daily Load (TMDL) wasteload allocations (e.g., for the San Francisco Bay mercury and polychlorinated biphenyls [PCBs] TMDLs) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is being required, in part, as an alternative to expanding the definition of Regulated Projects prescribed in Provision C.3.b to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing impervious surface area. Replaced impervious surface area applies to existing impervious area that is replaced to the subgrade level with new impervious surface area; this does not apply to mill and overlay projects, which replaces existing impervious surface area above the subgrade level. It also provides a mechanism to establish and implement alternative or in-lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.
>
> Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by first dispersing it to vegetated areas prior to releasing into the storm drain system to promote infiltration and evapotranspiration, and uses bioretention and other GI practices to clean stormwater runoff.

The Plan shall also identify the steps and processes to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of GI projects. Further, it shall include steps and processes to track the area within each Permittee's jurisdiction that is treated by GI controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash, PCBs, mercury, and other pollutants.

Table 1-1 below links each section of this plan to the applicable MRP provision.

Table 1-1: GI Plan Sections and Applicable MRP Provisions

Section of GI Plan	Applicable MRP Provision
1. Introduction	C.3.j
2. Prioritizing and Mapping Planned and Potential Projects	C.3.j.i.(2)(a) – (c), and C.3.j.i.(2)(j)
2.1Approach for Prioritizing and Mapping Projects	C.3.j.i.(2)(a)
2.2Summary of Prioritized Projects	C.3.j.i.(2)(b)
2.3Impervious Surface Retrofit Targets	C.3.j.i.(2)(c)
2.4 Prioritized Projects for Alternative Compliance Program or Early Implementation	C.3.j.i.(2)(j)
3. Tracking and Mapping Completed Projects	C.3.j.i.(2)(d) & C.3.d.iv.(1)
4. Summary of General Guidelines for GI Projects	C.3.j.i.(2)(e), C.3.j.i.(2)(f), C.3.j.i.(2)(g)
5. Relationship to Other Planning Documents	C.3.j.i.(2)(h) & (i)
6. Evaluation of Funding Options	C.3.j.i.(2)(k)
Appendix A. Maps and Lists of Prioritized Projects	C.3.j.i.(2)(b)
Appendix B. Workplan for Completing Prioritized Projects	C.3.j.i.(2)(j)
Appendix C. General Guidelines for GI Projects	C.3.j.i.(2)(e), C.3.j.i.(2)(f), C.3.j.i.(2)(g)
Appendix D. Workplan to Incorporate GI Requirements in Planning Documents	C.3.j.i.(2)(i)

2. Prioritizing and Mapping Planned and Potential Projects

Section 2 describes a mechanism for prioritizing and mapping GI projects as required in Provision C.3.j.i.(2)(a), provides a summary description of lists of prioritized GI projects and other outputs of the mechanism per Provision C.3.j.i.(2)(b), presents targets for areas of impervious surface to be retrofitted as required in Provision C.3.j.i.(2)(c), and discusses prioritized projects for alternative compliance or early implementation. The discussion of early implementation references a workplan to complete prioritized projects per Provision C.3.j.i.(2)(j).

2.1 Approach for Prioritizing and Mapping Projects

This section describes the approach used to prioritize and map areas for planned and potential GI projects within the City of Union City. The first part of the approach consists of the Alameda Countywide Multi-Benefit Metrics Prioritization Protocol ("prioritization protocol") interface, along with the Alameda County Project Tracking and Load Reduction Accounting Tool ArcGIS Online web application ("AGOL tool"). The criteria for prioritization used in the GIS metrics-based analysis was created by Alameda Countywide Clean Water Program (ACCWP) consultant, Geosyntec. The second part of the approach consists of projects from the City of Union City's Five-Year Capital Improvement Plan Fiscal Years 2016 to 2020, the City of Union City's Stormwater Annual Reports, and planned private development. GI projects have been prioritized and mapped for implementation by 2020, by 2030, and by 2040, as described below. The map and information of the selected prioritization projects are included in Appendix A, Maps and Lists of Prioritized Projects. GI projects were prioritized based on the ACCWP prioritization and City of Union City prioritization approaches as described in Sections 2.2 and 2.3 respectively.

2.1.1 ACCWP Prioritization of Areas for Planned and Potential Projects

The prioritization protocol done by the ACCWP was a stepwise GIS analysis documented in the Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum[1]. The steps are summarized below.

Step 1. Identify planned projects – Planned future GI projects within Alameda County were identified and entered into a GIS layer, based on project information provided by local agencies within the county.

Step 2. Identify opportunity sites – Additional potential project locations were identified and catalogued by the ACCWP using a GIS-based opportunity analysis.

The project opportunity analysis followed the steps listed below:

a. Identify all publicly-owned parcels.

[1] Geosyntec. 2017. Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum. December 13.

b. Screen identified public parcels to include only those that are at least 0.1 acre in size and have an average slope of less than 10 percent. Parcels that met these criteria were screened for physical feasibility.
c. Identify non-interstate highway public right-of-way (ROW) within urban areas. Roadways considered included state and county highways and connecting roads and local, neighborhood, and rural roads.
d. Identify land uses or adjacent land uses of the sites from steps b and c.
e. Screen sites identified in steps b and c to remove sites with the following physical constraints:
    i. Regional facilities were not considered for sites that were greater than 500 feet from a storm drain due to limited feasibility in treating runoff from a larger drainage area;
    ii. Parcel-based facilities were not considered for sites that were more than 50% undeveloped due to the limited potential for pollutant reduction of concern load reduction;
    iii. Sites with more than 50% of their drainage area outside of the urbanized area, as these sites would not provide opportunity for significant pollutant of concern load reduction;
    iv. Sites with more than 50% overlying landslide hazard zones to avoid the potential for increasing landslide risk.

Step 3. Classify planned projects and opportunity sites in preparation for metrics-based evaluation – A GIS analysis was performed by the ACCWP to classify the planned projects identified in Step 1 and the opportunity sites identified in Step 2 according to four parameters listed below:

a. GI project type – Each project received one of the following classifications: parcel-based, regional, or ROW/green street project.
b. Infiltration feasibility - Each project location received one of the following classifications for infiltration: infeasible, partially feasible, or feasible.
c. Facility type – Each project received one of the following classifications: GI[2], non-GI treatment control facility, water supply augmentation, flood control facility, hydromodification control, public use area or public education area, programmatic stormwater management opportunity.
d. Drainage area information – A drainage area was identified for each project.

Step 4. Score projects using an automated metrics-based evaluation – A quantitative metrics-based multiple benefit evaluation was performed using an automated process. Projects or opportunity sites received a score of 0, 1, or 2 for each of the 14 metrics listed below. The automated scores were used to preliminarily rank the

[2] All opportunity sites identified in Step 2 were classified as GI projects. Based on information provided by local agencies in Step 1, other classifications were assigned, where appropriate, to planned projects. Projects that were not classified as GI have co-benefits that may include GI.

projects by watershed, jurisdiction, project type, and/or project stakeholder(s). Geosyntec provided a jurisdiction-specific list of planned projects and opportunity sites located in the City of Union City, including an automated score for each project. Spatial data for the projects included in the list were provided in both GIS shape file and Google Earth KMZ file formats and included the following information:

a. Parcel area (for regional and parcel-based projects only)
b. Location slope
c. Infiltration feasibility
d. PCBs/mercury yield classification in project drainage area
e. Regional facility
f. Removes pollutant loads from stormwater
g. Augments water supply
h. Provides flood control benefits
i. Re-establishes natural water drainage systems
j. Develops, restores, or enhances habitat and open space
k. Provides enhanced or created recreational and public use areas with potential opportunities for community involvement and education
l. Provides trash capture co-benefit

2.1.2 City of Union City Prioritized Planned and Potential GI Projects (Master List and Short List)

From the prioritization mapping and list provided by the ACCWP from Step 4, the City of Union City used the following steps to prioritize GI projects within their jurisdiction.

Step 1. Compile list of implemented projects – These built public and private projects were compiled from the City of Union City's Five-Year Capital Improvement Plan Fiscal Years 2016 to 2020 and the City of Union City's Stormwater Annual Reports. The AGOL tool was also used to obtain the areas of completed public and private projects within the City of Union City.

Step 2. Investigate the Capital Improvement Plan for future opportunities – Additional future public projects listed in the Five-Year Capital Improvement Plan Fiscal Years 2016 to 2020 were evaluated to determine potential opportunities for GI and prioritized by the City of Union City.

Step 3. Investigate planned private development – Future private development projects submitted to the City of Union City via the development application process were evaluated in coordination with the City of Union City Department of Public Works to determine potential opportunities for GI.

Step 4. Create the Master List of Prioritized Planned and Potential Projects ("Master List") – The Master List, included in in Appendix A, Maps and Lists of Prioritized Projects, is the compilation of the projects determined from Steps 1 to 3.

More than 33 built, planned, and potential future projects are included in the Master List, which presents the following information regarding each project:

- A unique database index number (was provided or given for planned and potential future projects)
- Project name
- Project type (the classification assigned in preparation for metric-based evaluation, which is discussed in more detail in the ACCWP's *Stormwater Resource Plan* [2019])
- Acreage of impervious area within the project
- Whether the property is in public or private ownership
- Street name (if available)

Step 5. Create the Short List of High Priority Projects ("Short List") – The Short List, presented in Appendix A, Maps and Lists of Prioritized Projects, includes projects from in the Master List that are fully-funded public projects and private development that qualify for high priority implementation of GI. Summary information is provided below for several projects included in the Short List of High Priority Projects:

- The ***Install Bike Lanes on Union City Boulevard Project*** is located on Union City Boulevard from south of Alvarado Boulevard to Lowry Road. A portion of this project is ranked as a high priority project based on its 2020 completion date; the flat slopes; its potential for trash capture; and its high potential for pollutant removal.
- The ***Turk Islands Project*** is a residential development project within a 6.1-acre vacant lot located on Westport Way near Carmel Way. This project is ranked as a high priority project based on its near completion date; relatively flat slopes; and its potential for community involvement, trash capture, pollutant removal.

2.1.3 Maps of Planned and Potential Projects

The Master List Map included in Appendix A, Maps and Lists of Prioritized Projects, shows the locations of more than 33 prioritized GI projects. Maps of planned and potential projects may be updated, as needed, to provide necessary information relative to the identification of funding options and consideration for potential inclusion in the City of Union City's Capital Improvement Plan.

2.2 Impervious Surface Retrofit Targets

The City of Union City has identified targets for retrofitting impervious surface, from public and private projects within its jurisdiction, by 2020 (including redevelopment projects regulated under Provision C.3.b of the MRP), 2030, and 2040. The targets are presented in Table 2-1. The time schedules shown in this table are consistent with the timeframes for assessing load reductions for mercury and PCBs specified in Provisions C.11 and C.12 of the MRP. The City of Union City is currently participating in a regional effort to perform a Reasonable Assurance Analysis, that demonstrates how GI will be implemented to achieve PCB and mercury load reductions. To the extent that the implementation of this GI Plan may support load reductions for mercury and PCBs, as outputs from the Regional Assurance Analysis become available, the City of Union City

may consider modifying the targets presented in Table 2-1. Due to uncertainties related to the funding of public GI projects and the unreliability of projections for private development projects, the City of Union City will track the progress toward achieving the targets presented in Table 2-1, identify any challenges that arise in achieving these targets, and propose solutions, in coordination with other MRP Permittees.

Table 2-1: Target Amounts of Existing Impervious Surface to be Retrofitted by 2020, 2030 and 2040

Future Year	Target Amount of Existing Impervious Surface to be Retrofitted for Stormwater Treatment with GI (acres)
2020	28.6 acres (public) 70.1 acres (private)
2030	29.5 acres
2040	66.7 acres

Notes:

1. Amounts shown in the table represent areas of impervious surface existing within the City of Union City as of July 1, 2002, that are anticipated to be retrofitted by the target years as a result of both public and private projects.
2. Projections of existing impervious surface to be retrofitted are based on anticipated results of actions described in Section 2.4, Prioritized Projects for Alternative Compliance Program or Early Implementation; local knowledge of planned future development; anticipated availability of funding; and future development scenarios generated with the Bay Area UrbanSim model used by the Metropolitan Transportation Commission.

2.3 Prioritized Projects for Alternative Compliance Program or Early Implementation

The City of Union City has implemented several GI projects and has mostly met its 2020 retrofit goal. The following prioritized projects have been completed as part of early implementation (in accordance with MRP Provision C.3.j.ii):

- Project name: Decoto Green Streets Phase I
  Location: C Street from 6th Street to 9th Street
  Brief description: This was a street project that involves installation of green street technology, enhanced crosswalks, and bulbouts in the Decoto District. Approximately 6.4 acres was estimated to be treated.
  Status of completion: The project was completed in 2016.

- Project name: South Decoto Green Streets
  Location: 12th to 15th and F to I Street
  Brief description: This was a street project that involves installation of green street technology, enhanced crosswalks, and bulbouts in the Decoto District. Approximately 21.0 acres was estimated to be treated.
  Status of completion: The project was completed in 2018.

- Project name: H Street Green Street Improvements
  Location: H Street from 4th Street to 12th Street
  Brief description: This was a GI project that involves implementing urban greening in the Decoto District. Approximately 7.9 acres was estimated to be treated.
  Status of completion: The project was completed in 2019.

Additional details regarding these projects are provided in Appendix B, Workplan for Completing Prioritized Projects.

There are no Alternative Compliance programs (MRP Provision C.3.e) currently planned within the City of Union City. The Alvarado Business Park Green Streets Improvement Project and the Central Bay Industrial Park Green Streets Improvement Project are being currently considered for alternative compliance. Alternative Compliance programs will also be investigated for future projects.

3. Tracking and Mapping Completed GI Projects

The process for tracking and mapping completed GI projects, both public and private, and making the information publicly available, as required by Provision C.3.j.i.(2)(d), is described below. This process was developed by the ACCWP, which participated in regional coordination with BASMAA, to comply with the requirement in Provision C.3.j.iv.(1) that "Permittees shall, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of GI measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions."

3.1 Project Tracking and Load Reduction Accounting Tool

As a member agency of the ACCWP, the City of Union City uses an ArcGIS online (AGOL) web application-based tool, the C3 Project Tracking and Load Reduction Accounting Tool ("AGOL Tool"), which ACCWP developed in cooperation with the Contra Costa Clean Water Program to assist its member agencies in meeting the requirements described above. Detailed information and instructions on the tool can be found in the C3 Project Tracking and Load Reduction Accounting Tool Guidance Document (ACCWP 2017).

The general process for entering GI projects into the AGOL Tool involves logging in to the ArcGIS online web application, opening the tool, and entering data. There are two methods for entering data, but, in general, both involve locating the project area, drawing the project boundary, entering project attributes, drawing the stormwater treatment facility(ies), and entering facility attributes. Project attributes include fields such as jurisdiction, location description, type of project, project name, and additional optional fields that can be populated if the information is known. Facility attributes include hydraulic sizing criterion, project ID, facility type, treatment, and percent of project area treated by the facility.

The City of Union City has incorporated the use of the AGOL Tool into its processes for reviewing, approving, and reporting C.3 Regulated Projects and non-C.3 Regulated projects that include GI. The City of Union City uses the AGOL tool on both public and private projects. The tool includes a feature for generating tables of C.3 Regulated Projects and GI projects that include MRP-required project data for annual reporting purposes.

3.2 Making Information Publicly Available

As required by the MRP, an aspect of tracking and mapping completed projects (public and private) is making the information generated by the tool publicly available. Information from the tool will be made publicly available as follows:

- The City of Union City's Stormwater Program Annual Report will include (1) a list of GI projects (public and private) that are planned for implementation during the permit term

as required in Provision C.3.j.ii, and (2) a list of Regulated Projects approved during the fiscal year reporting period as required in MRP Provision C.3.b.iv.

- The City of Union City will coordinate with ACCWP to develop a viewable version of the AGOL tool, which is anticipated to be embedded on ACCWP's public website and may also be accessible via the City of Union City's website.

4. Summary of General Guidelines for GI Projects

General Guidelines are presented in Appendix C to guide the City of Union City in designing projects that have unified, complete design that implement the range of functions associated with GI projects, and in providing for appropriate coordination of projects and project elements. The General Guidelines include hydraulic sizing guidance, standard specifications, and typical design details for GI projects. Additional information about the General Guidelines is summarized below.

4.1 Implementing Projects with a Unified, Complete Design

The General Guidelines focus on designing and coordinating projects that implement a range of functions appropriate to the type of project. For example, the range of functions addressed in the General Guidelines for designing street projects include pedestrian travel, use as public space, bicycle, transit, vehicle movement, and as locations for urban forestry. The General Guidelines for coordination identify measures for implementation during construction that would minimize conflicts that may impact GI.

4.2 Hydraulic Sizing Requirements

Provision C.3.j.i.(2)(g) of the MRP states that GI projects are required to meet the treatment and HM sizing requirements included in Provisions C.3.c and C.3.d of the MRP. However, an exception to this requirement is provided in Provision C.3.j.i.(2)(g) for street projects that are not Regulated Projects under Provision C.3.b ("non-Regulated Projects").

The General Guidelines in Appendix C provide hydraulic sizing guidance for GI projects, addressing the hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d, as well as the alternate sizing approach for constrained street projects developed by the Bay Area Stormwater Management Agencies Association. These guidelines do not address Regulated Projects as defined in Provision C.3.b of the MRP.

Please note that some non-Regulated Projects are required to implement site design measures in accordance with Provision C.3.i of the MRP. Appendix L of the C.3 Technical Guidance explains how to determine whether Provision C.3.i applies to your project and how to incorporate applicable site design measures, if required.

Table 4-1 presents a summary of where to find hydraulic sizing guidance, and other applicable guidance, for different types of projects.

Table 4-1: Where to Find Hydraulic Sizing Guidance and Other Guidance - by Project Type

Type of Project	Where to Find Guidance	
	Provision C.3.i or HM Guidance	Treatment Sizing Guidance
Non-Regulated GI Project (public or private project) that is NOT subject to Provision C.3.i[3]	Not applicable	Appendix C – General Guidelines for GI Projects
Non-Regulated GI Project (public or private project) that IS subject to Provision C.3.i	ACCWP C.3 Technical Guidance (Appendix L, Site Design Requirements for Small Projects)	
Regulated Project that is NOT a Hydromodification Management (HM) Project[4]	Not applicable	ACCWP C.3 Technical Guidance (Section 5.1, Hydraulic Sizing Criteria)
Regulated Project that IS an HM Project	ACCWP C.3 Technical Guidance (Chapter 7, Hydromodification Management Measures)	

4.3 Standard Specifications and Typical Designs

Appendix C of this GI Plan includes typical design drawing standards, and standard specifications for GI projects, which address various types of land-use, transportation, and site characteristics. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual (ACCWP 2017b) for other types of low-impact development stormwater treatment facilities, subject to municipal staff approval.

[3] MRP Provision C.3.i applies to projects that create and/or replace at least 2,500 but less than 10,000 square feet of impervious surface; and individual single-family home projects that create and/or replace 2,500 square feet or more of impervious surface.

[4] An HM Project is a Regulated Project that creates and/or replaces one acre or more of impervious surface, will increase impervious surface over pre-project conditions, and is located in a susceptible area, as shown on the ACCWP default susceptibility map.

5. GI Requirements in Planning Documents

In compliance with Provision C.3.j.i.(2)(h), the City of Union City has updated planning documents that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure.

The 2040 General Plan is currently being updated this year (2019) and was prioritized to integrate GI discussions. The sections that will provide GI discussions in the planning document are the Mobility Element and the Public Facilities and Services Element. Various other planning documents were reviewed for incorporation of GI discussion and will be updated at a later date, as discussed in Section 5.1.

5.1 Anticipated Updates of Additional Planning Documents

Table 5-1 lists the additional planning documents that the City of Union City has identified to be updated in the future to incorporate GI requirements. These planning documents have not yet been made for the following reasons:

Table 5-1: Planning Documents to Be Updated to Include GI Requirements

Name of Planning Document	Reason for Deferral of Document Update
Hazard Mitigation Plan	The City of Union City will consider and evaluate opportunities for including GI during the plan's next update.
Climate Action Plan	This document will be updated in 2021.
Pedestrian and Bicycle Master Plan	This document will be updated by 2021.
Americans with Disabilities Act Transition Plan	The City of Union City will consider and evaluate opportunities for including GI during the plan's next update.
Union City Department of Public Works Maintenance Standards: Landscape Standards	The ACCWP is adopting the GI Maintenance Standards. Once this is done, City of Union City will adopt them into their standards.
Specific Plans (Decoto Industrial Park Study Area and 511 Plans)	The City of Union City will consider and evaluate opportunities for including GI during the plans' next update.
Other Considerations: Complete Streets Plan	The discussion of complete streets has already been added in other applicable planning documents. The City of Union City will consider creating a Complete Streets Plan as a separate planning document.

Refer to the Workplan to Incorporate Green Infrastructure Requirements in Planning Documents in Appendix D for planning documents that will incorporate GI discussion in future updates to the City of Union City Planning Department and Department of Public Works.

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6. Evaluation of Funding Options

The City of Union City has evaluated funding options for implementing prioritized projects. Funding options that are currently being implemented are either developer-built, per conditions of approval, or funded by grants for the City of Union City's projects. Table 6-1 lists the evaluated funding options for future projects and their approximate timeframes.

Table 6-1: Summary of Funding Options

Timeframe	Funding Option
Short-Term Pursuits (1-5 years)	Regulatory Fees Business License Fees Developer Impact Fees (AB 1600 Fees) Grants Community Facilities Districts Alternative Compliance Credit Trading Program Transportation Opportunities Caltrans Mitigation Collaboration Develop a policy for investigating multi-purpose capital projects Developer-built, per conditions of approval
Medium-Term Pursuits (5-10 years)	Multi-Agency Partnerships
Long Term Pursuits (10-15 years)	Benefits Assessments Financial Capability Assessment

6.1 Evaluation Criteria

The City of Union City evaluated various balloted and non-balloted funding options for implementing prioritized GI projects. The list of funding strategies is based on feasibility given the competing needs within its jurisdiction.

Funding options were considered on strategies build on existing efforts, support regional collaborations and provide multiple benefits. The list of funding strategies in Appendix E, Funding Option Matrices, contains a general description of the funding option, possible uses for the funds, the pros and cons associated with the various funding options, and the voter thresholds for the funding options.

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7. References

Alameda Countywide Clean Water Program. 2017. C3 Project Tracking and Load Reduction Accounting Tool Guidance Document.

Alameda Countywide Clean Water Program. 2017b. C.3 Technical Guidance Manual, Version 6.

Alameda Countywide Clean Water Program. 2019. Typical Green Infrastructure Designs and Standard Specifications.

City of Union City, California. Five-Year Capital Improvement Plan Fiscal Years 2016 to 2020.

Geosyntec. 2017. Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum. December 13.

National Association of City Transportation Officials. 2017. Urban Street Stormwater Guide.

San Francisco Bay Regional Water Quality Control Board. 2015. Order No. R2-2015-0049, Municipal Regional Stormwater Permit (MRP).

San Mateo Countywide Water Pollution Prevention Program. 2009. San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook.

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Appendix A. Maps and Lists of Prioritized Projects

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Master List of Prioritized, Planned and Potential Projects Map

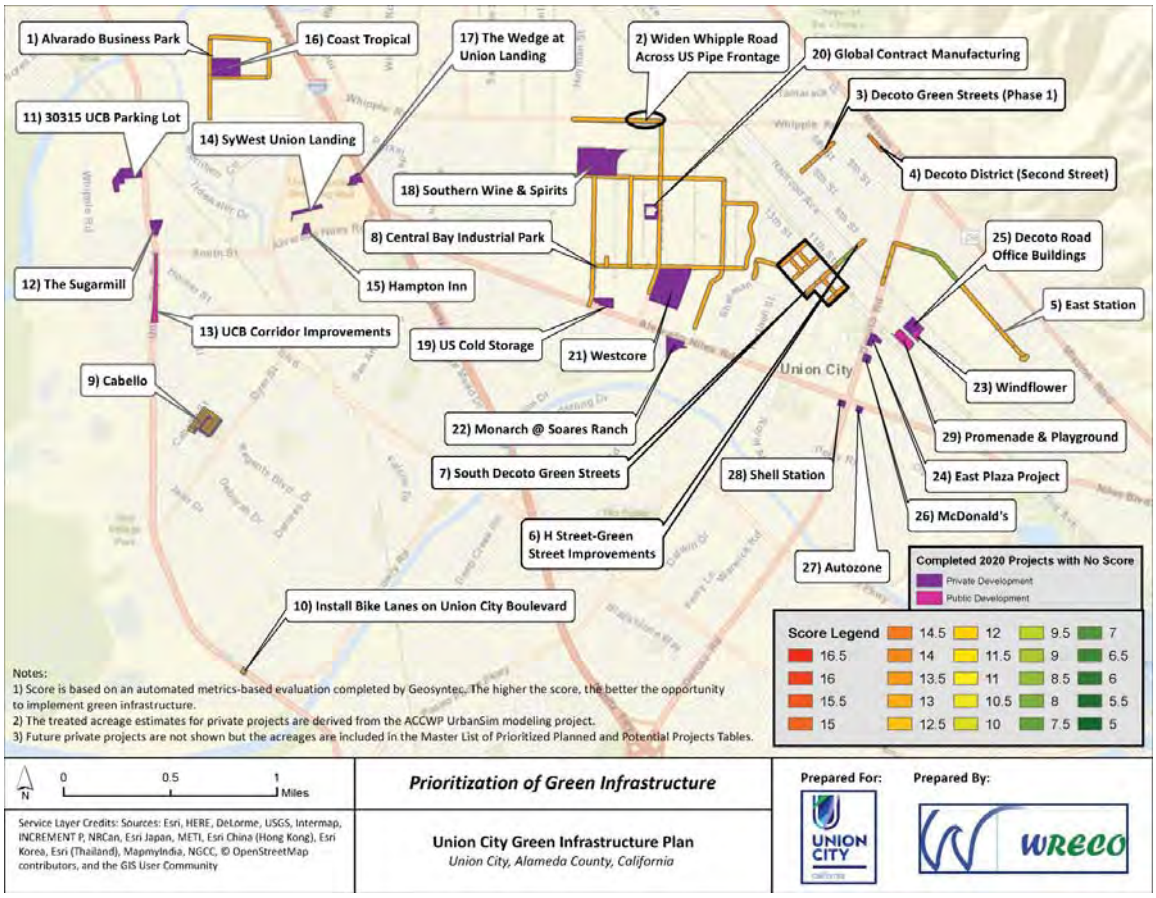

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Master List of Prioritized, Planned and Potential Projects Tables

Map ID	Project Name	DB_Index	Project Type	Treatment Area	Year			
					2020 (public)	2020 (private)	2030	2040
1	Alvarado Business Park Green Street Improvements	Planned_22	(GI) Right-of-Way	13.3 acres	-	-	-	13.3 acres
2	Widen Whipple Road Across US Pipe Frontage	ROW_40372 ROW_70252	ROW Opportunity	10.4 acres	-	-	10.4 acres	-
3	Decoto Green Streets (Phase 1)	ROW_21108 ROW_37975 ROW_10926 ROW_05327 ROW_10926 ROW_37974 ROW_47755	ROW Opportunity	6.4 acres	6.4 acres	-	-	-
4	Decoto District (Second Street)	ROW_45983	ROW Opportunity	1.2 acres	-	-	1.2 acres	-
5	East Station	ROW_37028 ROW_53133 ROW_37029 ROW_33804 ROW_48355 ROW_35235 ROW_65517	ROW Opportunity	11.8 acres	-	-	-	11.8 acres

Map ID	Project Name	DB_Index	Project Type	Treatment Area	Year			
					2020 (public)	2020 (private)	2030	2040
6	H Street	ROW_48313 ROW_37997 ROW_26221 ROW_29303 ROW_16982 ROW_29304 ROW_22671 ROW_19686 ROW_15467 ROW_22704 ROW_39319 ROW_35223	ROW Opportunity	7.9 acres	7.9 acres	-	-	-
7	South Decoto Green Streets	ROW_47435 ROW_35344 ROW_50771 ROW_20493 ROW_46025 ROW_55408 ROW_26086 ROW_23172 ROW_19685 ROW_48154 ROW_47433 ROW_46027 ROW_07472 ROW_47434	ROW Opportunity	11.8 acres	11.8 acres	-	-	-
8	Central Bay Industrial Park	Planned_21	(GI) Right-of-Way	53.4 acres	-	-	-	53.4 acres
9	Cabello	PARCEL_395139 PARCEL_395155 PARCEL_395162 PARCEL_395171 PARCEL_395173 PARCEL_395148 PARCEL_395151 PARCEL_395175 PARCEL_395156 PARCEL_395179 PARCEL_395135 PARCEL_395163 PARCEL_395172 PARCEL_395138 PARCEL_395146 PARCEL_395143 PARCEL_395169 PARCEL_395178 PARCEL_395145 PARCEL_395152 PARCEL_395174 PARCEL_395176 PARCEL_395168 PARCEL_395170 PARCEL_395141 PARCEL_395167 PARCEL_395147 PARCEL_395166 PARCEL_395140 PARCEL_395165 PARCEL_395164 PARCEL_395160 PARCEL_395159 PARCEL_395153 PARCEL_395144 PARCEL_395137 PARCEL_395161 PARCEL_395136 PARCEL_395150 PARCEL_395149 PARCEL_395177 PARCEL_395142 PARCEL_395157 PARCEL_395158 RW_5	Parcel Opportunity	7.6 acres	-	7.6 acres	-	-

Map ID	Project Name	DB_Index	Project Type	Treatment Area	Year			
					2020 (public)	2020 (private)	2030	2040
10	Install Bike Lanes on Union City Boulevard*	ROW_05484 ROW_12758 ROW_70236 ROW_05483	ROW Opportunity	0.4 acres	0.4 acres	-	-	-
11	30315 Union City Blvd. **	PAR_17	Parcel Opportunity	6.0 acres	-	6.0 acres	-	-
12	The Sugarmill**	PAR_18	Parcel Opportunity	1.5 acres	-	1.5 acres	-	-
13	Union City Corridor Improvements	RW_6	Parcel Opportunity	3.7 acres	3.7 acres	-	-	-
14	SyWest**	PAR_19	Parcel Opportunity	0.5 acre	-	0.5 acre	-	-
15	Hampton Inn**	PAR_20	Parcel Opportunity	0.8 acre	-	0.8 acre	-	-
16	Coast Tropical**	PAR_21	Parcel Opportunity	4.5 acres	-	4.5 acres	-	-
17	The Wedge at Union Landing**	PAR_22	Parcel Opportunity	0.4 acre	-	0.4 acre	-	-
18	Southern Wine & Spirits**	PAR_23	Parcel Opportunity	14.6 acres	-	14.6 acres	-	-
19	US Cold Storage**	PAR_24	Parcel Opportunity	1.9 acres	-	1.9 acres	-	-
20	Global Contract Manufacturing**	PAR_25	Parcel Opportunity	1.0 acre	-	1.0 acre	-	-
21	Westcore**	PAR_26	Parcel Opportunity	14.5 acres	-	14.5 acres	-	-
22	Monarch @ Soares Ranch**	PAR_27	Parcel Opportunity	2.3 acres	-	2.3 acres	-	-
23	Windflower**	PAR_28	Parcel Opportunity	2.9 acres	-	2.9 acres	-	-
24	East Plaza Project**	PAR_29	Parcel Opportunity	1.2 acres	-	1.2 acres	-	-
25	Decoto Road Office Buildings**	PAR_30	Parcel Opportunity	1.2 acres	-	1.2 acres	-	-
26	McDonald's**	PAR_31	Parcel Opportunity	0.7 acre	-	0.7 acre	-	-
27	Autozone**	PAR_32	Parcel Opportunity	0.4 acre	-	0.4 acre	-	-
28	Shell Station**	PAR_33	Parcel Opportunity	0.6 acre	-	0.6 acre	-	-
29	Promenade & Playground	RW_7	ROW Opportunity	0.6 acre	0.6 acre	-	-	-
***	Turk Island	PAR_16	Parcel Opportunity	6.1 acres	-	-	6.1 acres	-
				Total	**28.6 acres**	**70.1 acres**	**29.5 acres**	**66.7 acres**

Notes:

* - The treated impervious area applies to the Union City Boulevard/Rocklin Drive intersection

** - The treated acreage estimates for private projects are derived from the ACCWP UrbanSim modeling project.

*** - Future private projects are not shown on the Master Project List Map.

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Short List of Priority Projects Map

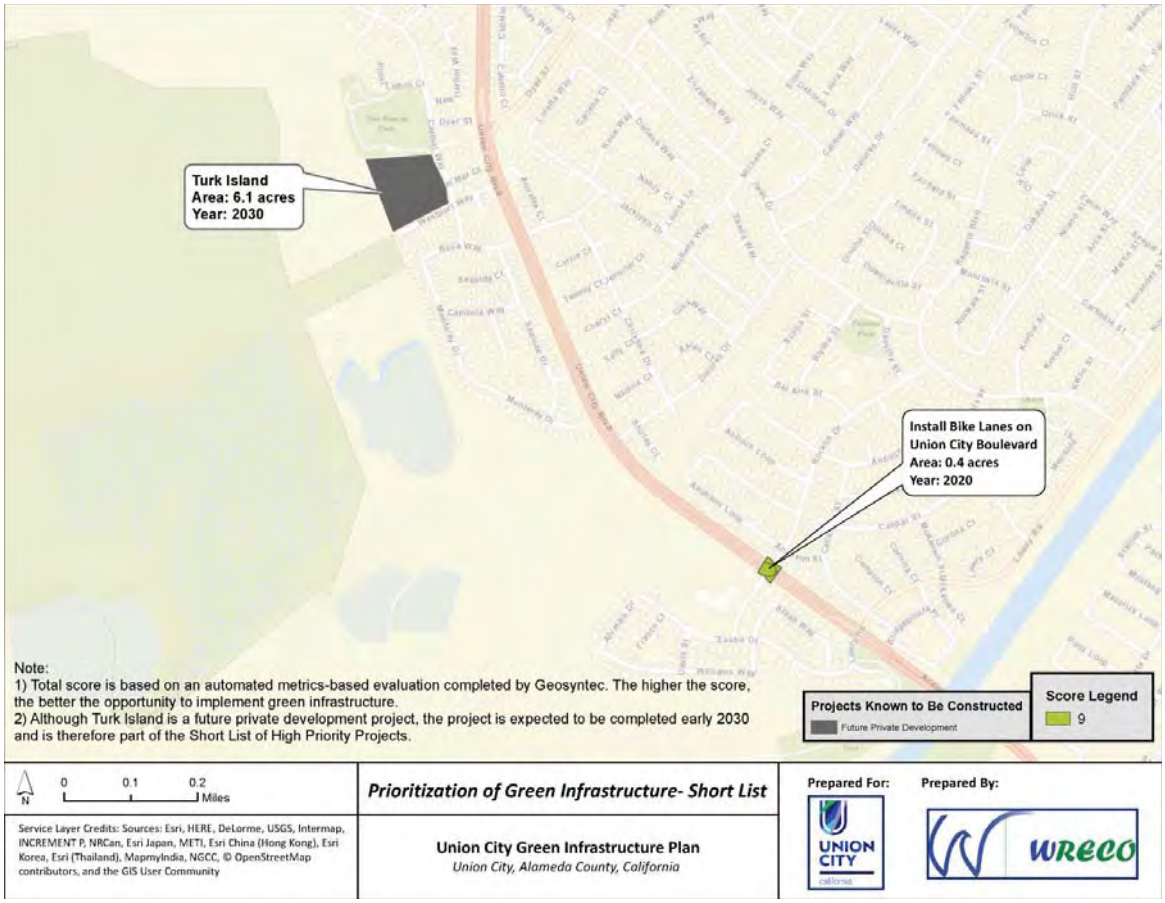

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Appendix B. Workplan for Completing Prioritized Projects

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Workplan for Completing Prioritized GI Projects
City of Union City
2019

1. Statement of Purpose

The purpose of this workplan is to identify the scheduled timeframes and other key information for implementing prioritized green infrastructure (GI) projects identified as part of Provision C3J Early Implementation.

2. Schedule, Budget, and Responsible Party

The following table identifies milestones for the implementation of prioritized projects, as well as the budget, funding source, and responsible party for each project.

Name of Project	Schedule								Budget	Funding source	Responsible Party
	Planning		Preliminary Design		Final Design		Construction				
	Start	Finish	Start	Finish	Start	Finish	Start	Finish			
Decoto Green Streets Phase I	N/A	N/A	2011	2014	2014	2014	2015	2016	$1.36 million	Proposition 84	City of Union City
South Decoto Green Streets	N/A	N/A	2013	2014	2014	2015	2015	2018	$3.68 million	Proposition 84	City of Union City
H Street Green Street Improvements	N/A	N/A	2014	2015	2015	2016	2016	2019	$3.75 million	Proposition 84	City of Union City

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Appendix C. General Guidelines for GI Projects

These General Guidelines have been developed to guide the City of Union City in designing a project that has a unified, complete design that implements the range of functions associated with GI projects, and in providing for appropriate coordination of projects and project elements. The guidelines apply to projects that incorporate GI into an existing roadway segment or a previously developed public parcel and are not Regulated Projects as defined in Provision C.3.b of the MRP. The guidelines are organized as follows.

Section C.1 Functions Associated with GI
Section C.2 Guidelines for GI Retrofits of Existing Streets
Section C.3 Guidelines for GI Retrofits of Public Parcels
Section C.4 Guidelines for Coordination of Projects
Attachment C-1 Hydraulic Sizing Requirements
Attachment C-2 Worksheet for Calculating the Combination Flow and Volume Method
Attachment C-3 Mean Annual Precipitation Map of Alameda County
Attachment C-4 Standard Specifications and Typical Designs
Attachment C-5 Model Sign-off Form for Capital Improvement Projects
Attachment C-6 Guidance for Sizing Green Infrastructure Facilities in Street Projects

C.1 Functions Associated with GI

The functions associated with GI retrofits of existing streets and GI retrofits of public parcels are identified below.

C.1.1 Functions Associated with GI Retrofits of Existing Streets

The following functions are associated with GI retrofits of existing streets:

- Street use for stormwater management, including treatment;
- Safe pedestrian travel;
- Use as public space for bicycle, transit, and vehicle movement/parking; and
- Use as locations for urban forestry.

C.1.2 Functions Associated with GI Retrofits of Public Parcels

Existing facilities on public parcels may be retrofitted with GI. Although there are potentially a wide range of public uses that could occur on various parcels, key issues are associated with the outdoor use of public parcels for landscaping and parking. The following functions are associated with GI retrofits of public parcels:

- Site use for stormwater management and landscaping
- Circulation and parking within the site

C.2 Guidelines for GI Retrofits of Existing Streets

Streets must perform the range of functions described in Section C.1.1. The following guidelines provide general guidelines for designing and constructing GI facilities within the right-of-way of existing streets, to address the full range of functions. Additional design guidance for GI facilities, which are also referred to as low impact development (LID) stormwater treatment facilities, is provided in Chapters 5 and 6 of the Alameda Countywide Clean Water Program's C.3 Technical Guidance, which may be downloaded at, www.cleanwaterprogram.org (click Businesses, then Development).

C.2.1 Guidelines Addressing Street Use for Stormwater Management

The GI guidelines to support street functionality for stormwater management are organized around the following objectives:

- Convey stormwater to GI facilities,
- Identify the appropriate GI typical designs for the project, and
- Convey stormwater away from transportation facilities.

Convey Stormwater to GI Facilities

GI retrofits of existing streets must be designed to convey stormwater runoff from the roadway surface to the proposed GI facilities. Key issues include working with the street profile, working with the existing drainage system, and considering conveyance facilities where needed.

Work with the Existing Street Profile

Modifying the profile of an existing street is costly. Therefore, the designs of GI street retrofits should generally maintain the existing street profile where feasible. The street profile affects how stormwater runoff flows off of a street, and is considered in the design of GI facilities. The most common street profile is crowned, although some streets may be reverse crowned, or may drain to one side, as illustrated in Figures C-1 through C-3. Occasionally, a street may have a flat profile, such as the example shown in Figure C-4 in which a street is designed to drain into pervious pavement. Unless pervious pavement is used for the full width of the street, GI facilities would be located downslope from the roadway surface. In a crowned street, this may allow for GI facilities on both sides of the street. In a reverse crowned street, GI facilities may be considered in the median; and in a side-sloping street, GI facilities would be located on the downslope side.

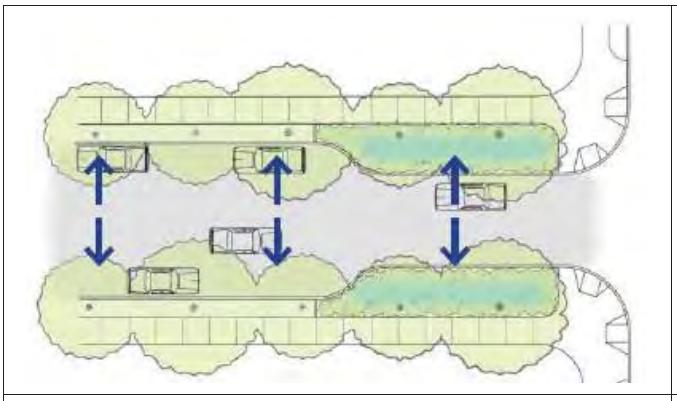

Figure C-1. Crowned Street Profile. A crowned street is designed so that the highest elevation is in the middle of the street, such that stormwater runoff drains to the sides of the street. GI facilities may be located on either side of the street.

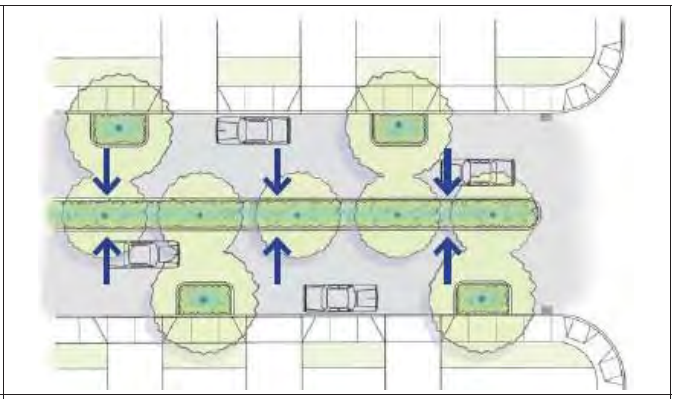

Figure C-2. Reverse Crowned Street Profile. A reversed crowned street is the opposite of a crowned street and directs runoff to the center line of the street. GI facilities may be considered in the median.

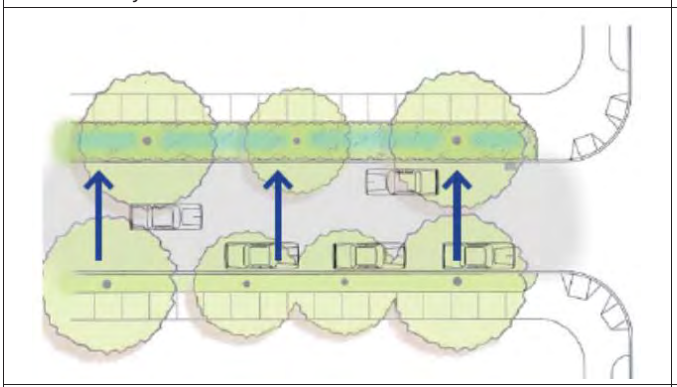

Figure C-3. Side Shed Street Profile. Side shed streets are designed to shed all water to one side of the street. GI facilities would be located on the downslope side.

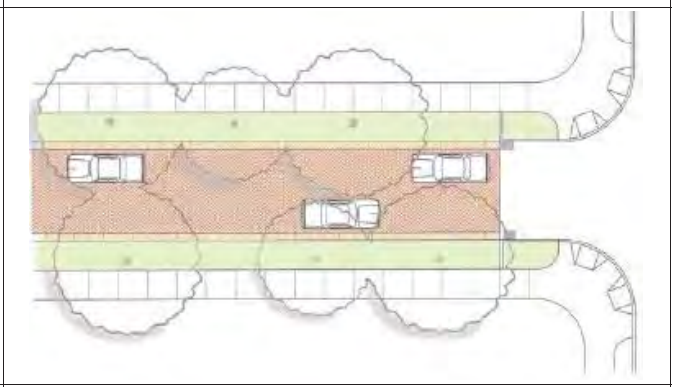

Figure C-4. Flat Street Profile. Flat streets are designed to drain through pervious paving. While these facilities do not have a marked slope, they may be graded slightly so that they drain to the sides or center of the street when there is too much water.

Source: San Mateo Countywide Water Pollution Prevention Program/Nevue Ngan

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Work with the Existing Drainage System

If an underdrain will be included in the GI facility design, a street retrofit site should have an existing storm drain line, to which the underdrain may be connected. If there is no existing storm drain line, subject to municipal approval, in lieu of an underdrain, sites with poorly draining soils may potentially be designed with an oversized reservoir layer of rock below the GI facility. The rock layer would be sized to hold the amount of runoff identified in Section 6, Hydraulic Sizing Requirements. This approach was used in the City of Burlingame's Donnelly Street green street project (Figure C-5), because there was no available storm drain line.

Figure C-5. Donnelly Street Green Street Project. The Donnelly Street Green Street Project includes a rain garden, pictured at right, which captures runoff from the adjacent commercial buildings and parking lot. The rain garden was designed with no underdrain and an enlarged subsurface layer of rock, which serves as a reservoir and allows runoff to slowly infiltrate to the underlying soil. The system was designed for onsite management of flows that exceed the 30-year storm. An overflow to the curb is provided for a 50- to 100-year event scenario.
Source: City of Burlingame

Consider Conveyance Facilities

In some cases, a street retrofit project may be located near an appropriate site for a larger stormwater facility than can be accommodated in the typical street right-of-way. For example, a street retrofit project may be designed to convey stormwater runoff to a bioretention facility that will be constructed on an adjacent park or greenway. This approach is illustrated by the City of El Cerrito's Ohlone Greenway Natural Area and Rain Garden project's incorporation of a rain garden (Figure C-6) that captures and treats stormwater runoff from an adjacent segment of Fairmont Boulevard. Various methods may be considered for conveying runoff to nearby GI facilities, including trench drains (Figure C-7) and vegetated swales or vegetated channels (Figure C-8).

Figure C-6. Ohlone Greenway Natural Area and Rain Garden. This rain garden captures and treats runoff from an adjacent segment of Fairmont Boulevard. In this instance, the rain garden location provided an opportunity to convey and treat stormwater outside the street right-of-way.

Source: PlaceWorks

Figure C-7. Trench Drain. A trench drain can be used to convey runoff to GI facilities.

Figure C-8. Pervious Drainage Channel. Pervious, unlined drainage channels can be designed to convey runoff to GI facilities.

Identify the Appropriate Typical Design for Street Project Site

Refer to Attachment C-4 of this appendix to identify appropriate typical design drawings for the project. Typical designs have been developed for various conditions that may occur at a project site. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual for other types of low impact development storm water treatment facilities, subject to municipal staff approval.

Apply the Appropriate Hydraulic Sizing Criteria

Refer to Attachment C-1 for guidance on identifying and using the appropriate hydraulic sizing criteria for the proposed project.

Convey Stormwater away from Transportation Facilities

To manage the risk of flooding, adequate drainage facilities must be provided for all segments of roadway, in accordance with the City of Union City's storm drainage design standards, including design criteria, standards, policies, and procedures for storm drainage improvements. All storm drainage facilities must be designed in accordance with the applicable standards and accepted engineering principles, as directed by the City of Union City Department of Public Works.

C.2.2 Guidelines Addressing Pedestrian Travel within Street Right of Way

To help reduce pollution from automobiles, the City of Union City has a goal to improve and expand transportation choices, including the pedestrian mode of travel. As part of meeting this goal, the design of GI retrofits of existing streets should incorporate measures that seek to enhance the safety and attractiveness for pedestrians. The following measures may be considered:

- Incorporate into project intersections curb extensions, also referred to as bulbouts, which reduce the street width at intersections and shorten the length of street crossings for pedestrians, while also providing space for GI facilities (see Figure C-9).
- Provide attractive landscaping designs that enhance the sense of place for pedestrians and may potentially include amenities such as shade trees and seating areas.
- Locate the GI facility between the sidewalk and vehicle travel lanes, in order to enhance pedestrian safety by providing protected sidewalks.

Figure C-9. Curb Extension. In addition to reducing the street width and shortening the length of street crossings for pedestrians, curb extensions, or "bulbouts," such as this example in Albany, also provide space for GI facilities.
Source: bluegreenbldg.com

C.2.3 Guidelines Addressing Street Use for Bicycle, Transit, and Vehicle Movement/Parking

Complete streets balance the needs of pedestrian, bicycle, automobile, and public transit modes of travel. To meet the goal of improving and expanding transportation choices, described in Section C.2.2, in addition to pedestrian transportation, GI retrofits of existing streets must also be designed to accommodate bicycles, motor vehicles, and, where appropriate, public transit. The design and construction of each GI project should incorporate appropriate measures to enhance transportation safety and help improve the attractiveness of alternative modes of travel. The following measures may be considered:

<u>Bicycle-Friendly Measures</u>

- Include bicycle lanes in GI retrofits of existing streets.
- Provide a protected bicycle lane by locating a GI facility or other landscaped area, or a lane of parking, between a bicycle lane and lanes of motor vehicle travel.
- Include bicycle racks in GI street retrofit projects.

<u>Public Transit-Friendly Measures</u>

- Enhance the comfort of public transit users by providing shelter, shade, and greenscape at bus stops and other public transit stops.
- Integrate GI into transit facilities, such as boarding bulbs and islands, or rooftops of transit shelters.
- Provide bicycle racks at public transit stops.

Motor Vehicle-Friendly Measures

- Implement GI with geometric changes that reduce vehicle speed and/or improve visibility. This may include "road diet" projects that reduce the number of lanes of travel, or traffic calming projects that incorporate areas of landscaping, such as traffic islands, as visual cues to help slow down traffic.
- Provide visual cues to help slow down traffic and alert drivers to the presence of GI facilities, to help prevent motor vehicles from driving into a stormwater facility. Visual cues may include curbs and landscaping that is readily visible to drivers.

C.2.4 Guidelines Addressing Urban Forestry in Public Right of Way

Increasing the planting of street trees in the City of Union City is anticipated to benefit local water quality, air quality, energy efficiency, and property values. GI projects should incorporate measures to preserve existing street trees and promote the planting of new street trees. The following measures should be incorporated, as appropriate:

- Prioritize the preservation of existing mature trees.
- Replace any mature trees that are removed by the project.
- Maximize the planting of new trees in accordance with the requirements of the City of Union City Department of Public Works.
- The planting of trees within a GI facility should follow guidance, including the identification of appropriate species, provided in Appendix B of the ACCWP C.3 Technical Guidance, which may be downloaded at www.cleanwaterprogram.org (click Businesses, then Development).

C.3 Guidelines for GI Retrofits of Public Parcels

Public parcels must perform the range of functions described in Section C.1. The following guidelines provide general guidelines for GI retrofitting of public parcels, to address the full range of functions. Additional design guidance for GI facilities, which are also referred to as low impact development (LID) storm water treatment facilities, is provided in Chapters 5 and 6 of the ACCWP C.3 Technical Guidance, which may be downloaded at, www.cleanwaterprogram.org (click Businesses, then Development).

C.3.1 Guidelines to Address Parking Lot Use for Landscaping and Stormwater Management

Parking lots often contain excess parking spots and oversized parking spaces and drive aisles. GI retrofits of public parcels should consider options to reduce any unnecessary parking areas, in order to provide space for landscaping, stormwater management, and pedestrian walkways. The following measures may be considered:

Maximize Space for GI and other Landscaping

To allow more space for GI and other landscaping, shorten parking stall lengths to 15 feet, and drive/back-up aisle widths to 22 feet, subject to municipal approval. Parking should be

designed to meet "average day" needs and utilize pervious overflow parking zones to meet peak parking needs.

Consider Specifying Pervious Paving Pervious paving may be used in parking lot designs. Where pervious paving is underlain with pervious soil or pervious storage material sufficient to hold the Municipal Stormwater Regional Permit Provision C.3.d volume of rainfall runoff, it is not considered impervious and can function as a self-treating area. Please see Section 6.6 of the C.3 Technical Guidance for further design guidance for pervious pavement installations.

Convey Stormwater to GI Facilities

GI retrofits of existing sites must be designed to convey stormwater runoff from impervious surfaces (roofs and/or parking lots) to the proposed GI facilities. Key issues include working with the existing drainage system, and considering conveyance facilities where needed.

Work with the Existing Drainage System

If an underdrain will be included in the GI facility design, the site should have access to an existing storm drain line, to which the underdrain may be connected. If there is no existing storm drain line, subject to municipal approval, in lieu of an underdrain, sites with poorly draining soils may potentially be designed with an oversized reservoir layer of rock below the GI facility. The rock layer would be sized to hold the amount of runoff identified in Section 6, Hydraulic Sizing Requirements. This approach was used in the City of Burlingame's Donnelly Street green street project (Figure C-5), because there was no available storm drain line.

Consider Conveyance Facilities

Various methods may be considered for conveying runoff from impervious surfaces to GI facilities, including trench drains (Figure C-7) and vegetated swales or vegetated channels (Figure C-8). In parking lots that include speed bumps, consider using speed bumps to help direct stormwater runoff to GI facilities.

Identify the Appropriate Typical Design for the Project Site

Refer to Attachment C-4, included in this appendix, to identify appropriate typical design drawings for the project. Typical designs have been developed for various conditions that may occur at a project site. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual for other types of low impact development storm water treatment facilities, subject to municipal staff approval.

Apply the Hydraulic Sizing Criteria Identified in Provisions C.3.c and C.3.d

Refer to Attachment C-1 for guidance on using the appropriate hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d as applicable to design GI projects that are not regulated by Provision C.3.b ("non-Regulated Projects).

Prioritize Tree Preservation and Planting

In order to benefit local water quality, air quality, energy efficiency, and property values, GI projects on public parcels should incorporate measures to preserve existing street trees and promote the planting of new trees. The following measures should be incorporated, as appropriate:

- Prioritize the preservation of existing mature trees.
- Replace any mature trees that are removed by the project.
- Maximize the planting of new trees in accordance with the requirements of the City of Union City Department of Public Works.
- Incorporate trees in landscaped areas within parking lots – which serves to shade vehicles and paved surfaces, improve air and water quality, intercept stormwater in the tree canopy, and take up stormwater through the root system.
- The planting of trees within a GI facility should follow guidance, including the identification of appropriate species, provided in Appendix B of the ACCWP C.3 Technical Guidance, which may be downloaded at www.cleanwaterprogram.org (click Businesses, then Development).

C.3.2 Guidelines to Address Parking Lot Use for Vehicular Parking

GI retrofits of public parcels should provide for adequate motor vehicle and bicycle parking for the proposed public use. The following measures may be considered:

- Include bicycle parking facilities.
- Provide pedestrian walkways within parking lots, including bridged walkways across GI facilities.
- Provide safe pedestrian access to and directional signage for adjacent public transit stops.
- Consider other improvements to enhance existing pedestrian circulation and safety.
- Depending on the type of use, larger public parcel retrofits should consider providing bicycle storage, changing rooms, and preferred parking for carpooling

C.4 Guidelines for Coordination of Projects

Installing GI components at a project prior to the completion of that project, or the construction of an adjacent project, has the potential to degrade the functioning of the GI facility. Street improvement or other infrastructure projects, the development of public parcels, and other public and private projects should therefore include coordination of construction schedules to minimize impacts to GI.

The following measures shall be implemented in all GI projects to protect investments in GI:

1. GI facilities shall not be used as temporary sediment basins during construction.
2. Erosion control plans shall include protections for GI; erosion control plans are subject to the following requirements: approval by the City of Union City Planning Commission and the City of Union City Council.

3. Installed GI facilities shall be protected from construction runoff and kept offline until the contributing drainage area is stabilized.

Contractors are encouraged to construct GI facilities at the end of a project, to help protect the facilities from construction-related impacts.

Attachment C-1: Hydraulic Sizing Criteria

This provides guidance on the following topics:

- Hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d as applicable to GI projects that are not regulated by Provision C.3.b ("non-Regulated Projects)
- Alternate sizing approach for constrained street projects

C1.1 Hydraulic Sizing Criteria in MRP Provisions C.3.c and C.3.d

Provision C.3.c requires the use of low impact development (LID) stormwater controls. To meet the MRP definition of LID, bioretention facilities must have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, and infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour.

Provision C.3.d of the MRP includes volume-based, flow-based, and the combination volume- and flow-based hydraulic sizing criteria. Bioretention areas may be sized using a simplified flow-based hydraulic sizing method, known as the "4 percent method," in which the surface area of the bioretention area is 4 percent of the effective impervious surface area that is treated. However, by using a combination volume- and flow-based hydraulic sizing approach, it may be possible to provide a bioretention area that is less than 4 percent of the effective impervious surface area, which can help reduce costs. Step-by-step instructions for using the 4 percent method and the volume-based sizing criteria are provided in Section 5.1 of the C.3 Technical Guidance. Guidance for using the combination flow and volume criteria from Section 5.1 of the C.3 Technical Guidance document are copied below. The worksheet for using this method is provided in Attachment C-2.

The implementation of LID stormwater treatment facilities designed in accordance with Provisions C.3.c and C.3.d of the MRP will provide hydromodification management benefits by infiltrating and detaining stormwater runoff.

Step-by-Step Guidance for Combination Flow and Volume Method

To apply the combination flow and volume approach, use the following steps, which may be performed using the combination flow and volume sizing criteria Excel worksheet provided in Attachment C-2 of this appendix.

1. Mean Annual Precipitation
    - Determine the mean annual precipitation (MAP) for the project site using the Mean Annual Precipitation Map of Alameda County (Attachment C-3). Use the Oakland Airport unit basin storage volume values from Table C1-1(below) if the project location's mean annual precipitation is 16.4 inches or greater and the San Jose values if it is less than 16.4 inches.

- In order to account for the difference between MAP of the project site and the two rainfall locations shown, calculate the ***MAP adjustment factor*** by dividing the project MAP by the MAP for the applicable rain gauge, as shown below: MAP adjustment factor = (project location mean annual precipitation

$$Map\ adjustment\ factor = \frac{(project\ location\ mean\ annual\ precipitation)}{(18.35\ or\ 14.4, as\ appropriate)}$$

2. Effective Impervious Area for the Drainage Management Area
    - Based on the topography of the site and configuration of buildings, divide the site into drainage management areas (DMAs), each of which will drain to a treatment measure. Implement the steps below for each DMA with a volume-based treatment measure.
    - Minimize the amount of landscaping or pervious pavement that will contribute runoff to the treatment measures. Refer to Sections 4.1 and 4.2 of the C.3 Stormwater Technical Guidance to design areas of landscaping or pervious pavement as "self-treating areas" or "self-retaining areas," so that they do not contribute runoff to the LID treatment measure and may be excluded from the DMAs for the treatment measures.
    - For each DMA in which the area that will contribute runoff to the treatment measure includes pervious surfaces (landscaping or properly designed pervious paving), multiply the area of pervious surface by a factor of 0.1.
    - For applicable DMAs, add the product obtained in the previous step to the area of impervious surface, to obtain the "***effective impervious area***." (For DMAs that are 100% impervious, use the entire DMA area.)

3. Unit Basin Storage Volume
    - The effective impervious area of a DMA has a runoff coefficient of 1.0. Refer to Table C1-1 to obtain the ***unit basin storage volume*** that corresponds to your rain gauge area. For example, using the Oakland Airport gauge, the unit basin storage volume would be 0.67 inches. Adjust the unit basin storage volume for the site by multiplying the unit basin storage volume value by the MAP adjustment factor calculated in Step 1.
    - Calculate the ***required capture volume*** by multiplying the effective impervious area of the DMA calculated in Step 2 by the adjusted unit basin storage volume. Due to the mixed units that result, such as acre-inches, it is recommended that the resulting volume be converted to cubic feet for use during design. For example, say you determined the adjusted unit basin storage volume to be 0.5 inches, and the effective impervious area draining to the bioretention facility is 7,000 square feet. Then the required capture volume would be:

$$Required\ capture\ volume = 0.5\ inches\ \times \left(\frac{1\ foot}{12\ inches}\right) \times 7{,}000\ feet^2 = 292\ cubic\ feet$$

Table C1-1. Unit Basin Storage Volume (Inches) for 80 Percent Capture with 48-Hour Drawdown Time		
		Unit Basin Storage Volume for Effective Impervious Area of Drainage Management Area
Location	Mean Annual Precipitation (inches)	Coefficient of 1.00
Oakland Airport	18.35	0.67
San Jose	14.4	0.56
Source: CASQA 2003, cited in Table 6-2 of the C.3 Technical Guidance.		

4. Depth of Infiltration Trench or Pervious Paving Base Layer
    - Assume that the rain event that generates the required capture volume of runoff determined in Step 3 occurs at a constant rainfall intensity of 0.2 inches/hour from the start of the storm (i.e., assume a rectangular hydrograph). Calculate the ***duration of the rain event*** by dividing the unit basin storage volume by the intensity. In other words, determine the amount of time required for the unit basin storage volume to be achieved at a rate of 0.2 inches/hour. For example, if the unit basin storage volume is 0.5 inches, the rain event duration is 0.5 inches ÷ 0.2 inches/hour = 2.5 hours.

5. Preliminary Estimate of the Surface Area the Facility
    - Make a ***preliminary estimate of the surface area*** of the bioretention facility by multiplying the DMA's impervious area (or effective impervious surface if applicable) by the 4 percent method sizing factor of 0.04. For example, a drainage area of 7,000 square feet of impervious surface × 0.04 = 280 square feet of bioretention treatment area.
    - Assume a bioretention area that is about 25% smaller than the bioretention area calculated with the 4 percent method. Using the example above, 280 – (0.25 × 280) = 210 square feet.
    - ***Calculate the volume of runoff that filters through the biotreatment soil*** at a rate of 5 inches per hour (the design surface loading rate for bioretention facilities), for the duration of the rain event calculated in Step 4. For example, for a bioretention treatment area of 210 square feet, with an infiltration rate of 5 inches per hour for a duration of 2.5 hours, the volume of treated runoff = 210 square feet × 5 inches/hour × (1 foot/12 inches) × 2.5 hours = 219 cubic feet. (Note: when calculating ponding depth, the mulch layer is not included in the calculation.)

6. Initial Adjustment of Depth of Surface Ponding Area
    - Calculate the portion of the required capture volume ***remaining after treatment is accomplished by filtering*** through the treatment soil. The result is the amount that must be stored in the ponding area above the reduced bioretention area assumed in Step 6. For example, the amount remaining to be stored comparing Step 3 and Step 5 is 292 cubic feet – 219 cubic feet = 73 cubic feet. If this volume

is stored over a surface area of 210 square feet, the ***average ponding depth*** would be 73 cubic feet ÷210 square feet = 0.35 feet or 4.2 inches.

- Check to see if the ***average ponding depth is between 6 and 12 inches***, which is the recommended allowance for ponding in a bioretention facility or flow-through planter.

7. Optimize the Size of the Treatment Measure
    - If the ponding depth is greater than 12 inches, a larger surface area will be required. (In the above example, the optimal size of the bioretention area is 190 square feet with a ponding depth of 6 inches.) In order to build conservatism into this sizing method, the Countywide Program recommends that municipalities not approve the design of any bioretention areas or rain gardens that have a surface area that is less than 3 percent of the effective impervious area within the DMA.

Please note that Appendix C of the C.3 Stormwater Technical Guidance includes an example of sizing bioretention areas using the combination flow- and volume-based method.

C1.2 Alternate Sizing Approach for Constrained Street Projects

Provision C.3.j.i.(2)(g) of the MRP allows the jurisdictions subject to the MRP (MRP Permittees) to develop an alternate sizing approach for street projects that are not subject to Provision C.3.b.ii. (non-Regulated Projects) in which project constraints preclude fully meeting the C.3.d sizing requirements. This approach, developed by the Bay Area Stormwater Management Agencies Association (BASMAA), is described as follows.

The Guidance for Sizing Green Infrastructure Facilities in Street Projects, provided by BASMAA and included as Attachment C-6, states that bioretention facilities in street projects should be sized as large as feasible and meet the Provision C.3.d sizing criteria where possible. It further states that bioretention facilities in street projects smaller than what would be required to meet the Provision C.3.d criteria may be appropriate in some circumstances, and provides guidance that may be applied to those circumstances.

Attachment C-2: Worksheet for Calculating the Combination Flow and Volume Method

The worksheet for calculating the combination flow and volume method is provided on the following page.

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Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

1-1 Project Name:

1-2 City application ID:

1-3 Site Address or APN:

1-4 Tract or Parcel Map No:

1-5 Site Mean Annual Precip. (MAP)[1] **Inches**

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as:

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA:

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface		**1.0**	
2-3	Pervious service		**0.1**	
	Total DMA Area (square feet) =			

2-4 ***Total Effective Impervious Area (EIA)*** **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1 Rainfall intensity **0.2 Inches per hour**

4-2 Divide Item 3-2 by Item 4-1 **Hours of Rain Event Duration**

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1 4% of DMA impervious surface **Square feet**

5-2 Area 25% smaller than item 5-1 **Square feet**

5-3 Volume of treated runoff for area in Item 5-2 **Cubic feet** (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1 Subtract Item 5-3 from Item 3-3 **Cubic feet** (Amount of runoff to be stored in ponding area)

6-2 Divide Item 6-1 by Item 5-2 **Feet** (Depth of stored runoff in surface ponding area)

6-3 Convert Item 6-2 from ft to inches **Inches** (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1 Enter an area larger or smaller than Item 5-2 **Sq.ft.** (enter larger area if you need less ponding depth; smaller for more depth.)

7-2 Volume of treated runoff for area in Item 7-1 **Cubic feet** (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)

7-3 Subtract Item 7-2 from Item 3-3 **Cubic feet** (Amount of runoff to be stored in ponding area)

7-4 Divide Item 7-3 by Item 7-1 **Feet** (Depth of stored runoff in surface ponding area)

7-5 Convert Item 7-4 from feet to inches **Inches** (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

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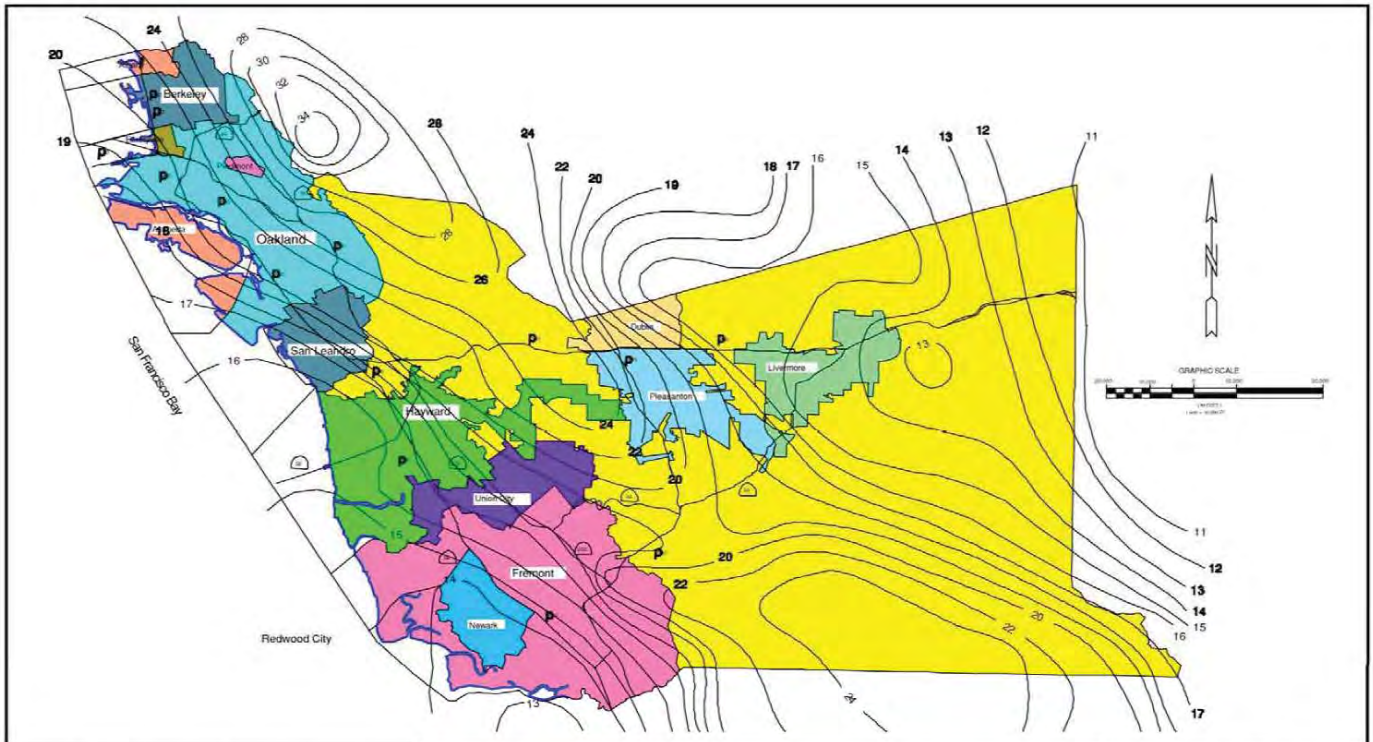

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	MEAN ANNUAL PRECIPITATION (VALUES IN INCHES)	DATE: MAY 2003
		ATTACHMENT-6

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Combination Flow and Volume Sizing Approach

Step by Step Guidance

(Excerpt from Chapter 5, Section 5.1 of the C.3 Technical Guidance, Version 4.0)

To apply the combination flow and volume approach, use the following steps, which may be performed using this combination flow and volume sizing criteria Excel worksheet.

1. Mean Annual Precipitation

- Determine the ***mean annual precipitation (MAP)*** for the project site using the Mean Annual Precipitation Map of Alameda County (Appendix D). Use the Oakland Airport unit basin storage volume values from Table 5-4 if the project location's mean annual precipitation is 16.4 inches or greater and the San Jose values if it is less than 16.4 inches.
- In order to account for the difference between MAP of the project site and the two rainfall locations shown, calculate the ***MAP adjustment factor*** by dividing the project MAP by the MAP for the applicable rain gauge, as shown below:

$$\text{MAP adjustment factor} = \frac{\text{(project location mean annual precipitation)}}{\text{(18.35 or 14.4, as appropriate)}}$$

2. Percent Imperviousness and Drainage Management Area

- Based on the topography of the site and configuration of buildings, divide the site into drainage management areas (DMAs), each of which will drain to a treatment measure. Implement the steps below for each DMA in which you will design a combined flow- and volume-based treatment measure.
- Minimize the amount of landscaping or pervious pavement that will contribute runoff to the treatment measures. Refer to Sections 4.1 and 4.2 to design areas of landscaping or pervious pavement as "self-treating areas" or "self-retaining areas," so that they do not contribute runoff to the LID treatment measure and may be excluded from the DMAs for the treatment measures.
- For each DMA in which the area that will contribute runoff to the treatment measure includes pervious surfaces (landscaping or properly designed pervious paving), multiply the area of pervious surface by a factor of 0.1.
- For applicable DMAs, add the product obtained in the previous step to the area of impervious surface, to obtain the "effective impervious area."

3. Unit Basin Storage Volume

- The effective impervious area of a DMA effectively has a runoff coefficient of 1.0. Therefore, refer to Table 5-4 to obtain the ***unit basin storage volume value*** that corresponds to your rain gauge area. For example using the Oakland Airport values, the unit basin storage volume would be 0.67 inches. Adjust the unit basin storage volume value by multiplying the unit basin storage volume value by the MAP adjustment factor calculated in Step 1.

- Calculate the ***required capture volume*** by multiplying the area of the DMA (or the effective impervious area if it includes landscaping), calculated in step 2, by the adjusted unit basin storage volume value. Due to the mixed units that result, such as acre-inches, it is recommended that the resulting volume be converted to cubic feet for use during design. For example, say you determined the adjusted unit basin storage volume to be 0.5 inches, and the drainage area to the bioretention facility is 7,000 square feet. Then the required capture volume would be 0.5 inches × (1 foot/12 inches) × 7,000 square feet = 292 cubic feet.

Table 5-4
Unit Basin Storage Volumes in Inches for 80 Percent Capture Using 48-Hour Drawdown (Based on Runoff Coefficient)

		Unit Basin Storage Volume Based on Runoff Coefficient of Drainage Management Area[1]
Applicable Rain Gauge	Mean Annual Precipitation inches	Runoff Coefficient of 1.0
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

[1] The combination flow and volume approach conservatively assumes that all rain that falls on impervious will become runoff; thus the effective impervious area for a DMA has a runoff coefficient of 1.0.

Source: CASQA 2003.

4. *Duration of Rain Event*

- Assume that the rain event that generates the required capture volume of runoff determined in Step 3 occurs at a constant rainfall intensity of 0.2 inches/hour from the start of the storm (i.e., assume a rectangular hydrograph). Calculate the ***duration of the rain event*** by dividing the unit basin storage volume by the intensity. In other words, determine the amount of time required for the unit basin storage volume to be achieved at a rate of 0.2 inches/hour. For example, if the unit basin storage volume is 0.5 inches, the rain event duration is 0.5 inches ÷ 0.2 inches/hour = 2.5 hours.

5. *Preliminary Estimate of the Surface Area the Facility*

- Make a ***preliminary estimate of the surface area*** of the bioretention facility by multiplying the DMA's area of impervious surface (or equivalent impervious surface from step 2, if applicable) by the 4 percent method sizing factor of 0.04. For example, a drainage area of 7,000 square feet of impervious surface × 0.04 = 280 square feet of bioretention treatment area.
- Assume a bioretention area that is about 25% smaller than the bioretention area calculated with the 4 percent method. Using the example above, 280 – (0.25 × 280) = 210 square feet.

Attachment C-3: Mean Annual Precipitation Map

The Mean Annual Precipitation Map for Alameda County is provided on the following page.

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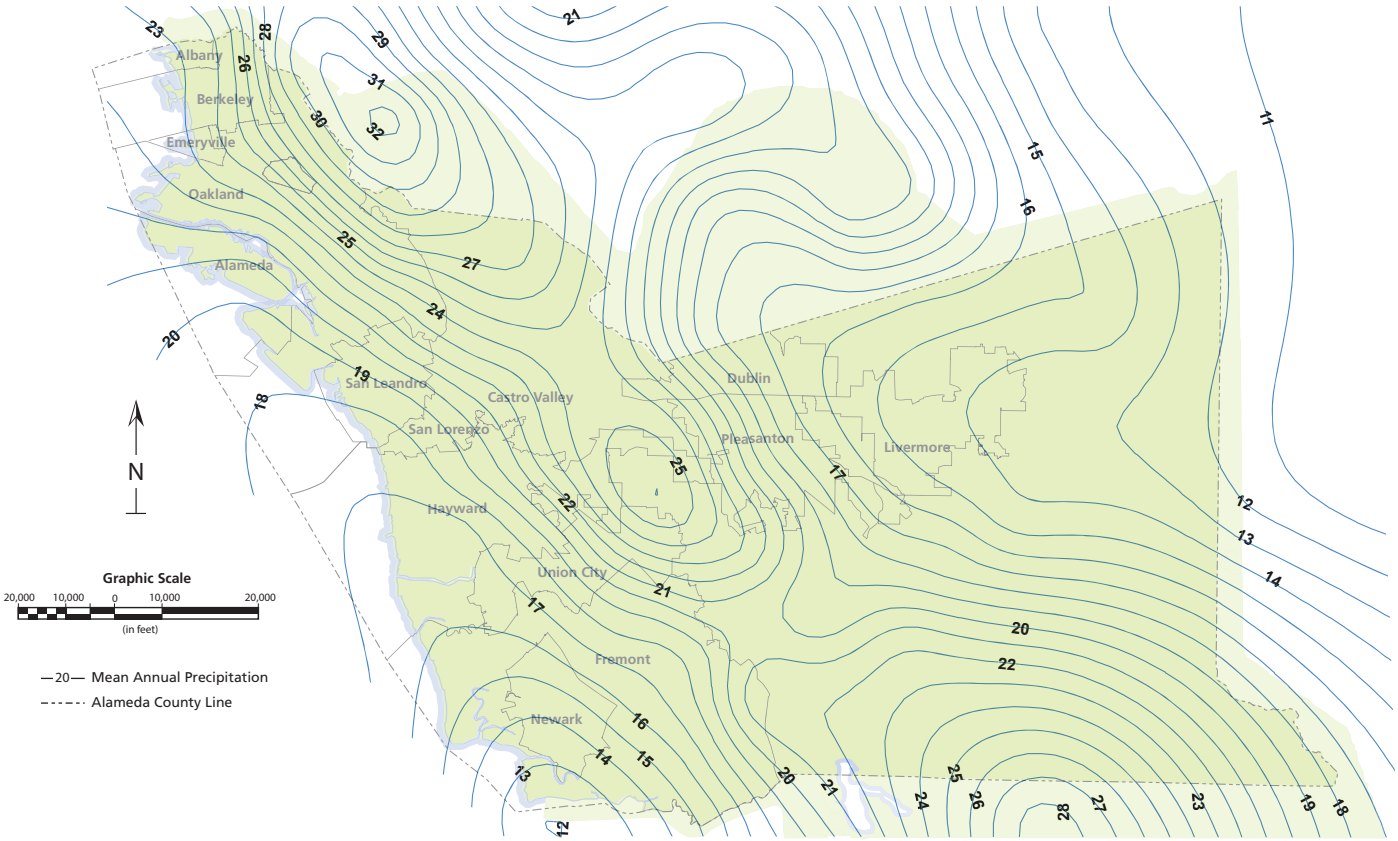

This map is Attachment 6 of the Alameda County Hydrology & Hydraulics Manual and may be downloaded as a GIS file from the Alameda County Flood Control District website.

(District 2011)

Flood Control & Water Conservation DISTRICT	Mean Annual Precipitation	

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Attachment C-4: Standard Specifications and Typical Designs

Standard specifications and typical design drawings for GI projects are provided on the following pages, as indicated in Table C4-1.

Table C4-1: GI Typical Designs/Standard Specifications

Sheet No.	Title of Drawing/Standard Specifications	Site Characteristics		
		Land Use	Street Classification	Other
GI-2A	Bioretention area: Plan view with street parking	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane
GI-2B	Bioretention area: Bulbout plan view	Commercial, industrial, or residential	Arterial, collector, or local streets	Intersection with sidewalks
GI-2C	Bioretention area: Street Median	Commercial, industrial, or residential	Arterial, collector, or local streets	Median
GI-3A	Bioretention Area: Sloped Sides Cross Section	Commercial, industrial, or residential	Arterial, collector, or local streets	Sidewalk
GI-3B	Bioretention Area: Vertical Side Wall Cross Section	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane and sidewalk
GI-4	Bioretention Components: Outlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	--
GI-5	Bioretention Components: Edge Treatment Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	No parking
GI-6A	Bioretention Components: Gutter Curb Cut Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	--
GI-6B	Bioretention Components: Trench Drain Curb Cut Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane and sidewalk
GI-6C	Bioretention Components: Curb Cut At Bulbout Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Intersection with Sidewalks
GI-7	Bioretention Components: Check Dam Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Slope requiring check dams

GI-XX	Bioretention area with bike lane plan view	Commercial, industrial, or residential	Arterial, collector, or local streets	Bike lane

Source: Alameda Countywide Clean Water Program 2019

PURPOSE:

PROVISION C.3 OF THE MUNICIPAL REGIONAL STORMWATER NPDES PERMIT (MRP) REQUIRES TREATMENT OF IMPERVIOUS SURFACES USING GREEN INFRASTRUCTURE FOR BOTH PUBLIC AND PRIVATE DEVELOPMENT PROJECTS. BIORETENTION AREAS ARE EXPECTED TO BE THE MOST COMMON GREEN INFRASTRUCTURE APPLICATION IN PUBLIC RIGHT-OF-WAY (ROW). THE PURPOSE OF THE BIORETENTION AREA IS TO IMPROVE WATER QUALITY BY FILTRATION THROUGH THE BIOTREATMENT SOIL AND TO CONTROL RUNOFF PEAK FLOW RATES AND VOLUMES THROUGH STORAGE AND INFILTRATION.

NOTES & GUIDELINES:

1. THE ENGINEER SHALL ADAPT PLAN AND SECTION DRAWINGS TO ADDRESS SITE-SPECIFIC CONDITIONS.
2. BIORETENTION AREA SHALL BE SIZED TO MEET THE REQUIREMENTS OF MRP PROVISION C.3 SIZING.
3. 48 HOUR MAXIMUM FACILITY DRAWDOWN TIME (TIME FOR MAXIMUM SURFACE PONDING TO DRAIN THROUGH THE BIOTREATMENT SOIL AFTER THE END OF A STORM). REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR DRAINAGE CONSIDERATIONS.
4. A STORAGE LAYER OF CALTRANS STANDARD CLASS II PERMEABLE MATERIAL IS REQUIRED UNDER THE BIOTREATMENT SOIL. REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR SPECIFICATIONS.
5. CHECK DAMS SHALL BE USED TO TERRACE FACILITIES TO PROVIDE SUFFICIENT PONDING FOR SLOPED INSTALLATIONS. ENGINEER SHALL SPECIFY CHECK DAM HEIGHT AND SPACING. REFER TO DETAIL **GI-7** FOR GUIDANCE ON CHECK DAM DESIGN.
6. DEPENDING ON THE DEPTH OF THE BIORETENTION AREA, ADDITIONAL STRUCTURAL CONSIDERATIONS MAY BE REQUIRED TO ADDRESS HORIZONTAL LOADING. REFER TO DETAIL **GI-5** FOR GUIDANCE ON EDGE TREATMENTS.
7. WHEN FACILITY CONSTRUCTION IMPACTS EXISTING SIDEWALK, ALL SAW CUTS SHALL ADHERE TO LOCAL JURISDICTION STANDARDS. SAW CUTS SHALL BE ALONG SCORE LINES OR ALONG CONSTRUCTION JOINTS, AS DETERMINED BY THE CITY ENGINEER, AND ANY DISTURBED SIDEWALK FLAGS SHALL BE REPLACED IN THEIR ENTIRETY.
8. BIORETENTION AREAS IN PUBLIC RIGHT OF WAY SHALL BE DESIGNED WITH AN EMERGENCY OVERFLOW. IN THE EVENT THE BIORETENTION AREA OVERFLOW DRAIN IS OBSTRUCTED OR CLOGGED, THE INUNDATION AREA SHALL BE CONTAINED WITHIN THE STREET AND SHALL NOT BE WITHIN ADJACENT PRIVATE PROPERTIES.
9. BIORETENTION AREA VEGETATION SHALL BE SPECIFIED BY LANDSCAPE DESIGN PROFESSIONAL. SEE C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR PLANT LIST AND VEGETATION GUIDANCE.
10. THE ENGINEER SHALL EVALUATE THE NEED FOR EROSION PROTECTION AT ALL INLET LOCATIONS. ALL COBBLES USED FOR ENERGY DISSIPATION SHALL BE GROUTED. ENGINEER TO CONSIDER MAINTENANCE REQUIREMENTS TO FACILITATE EASY SEDIMENT REMOVAL AND ADEQUATE VECTOR CONTROL.
11. THE PROJECT PLANS SHALL SHOW ALL EXISTING UTILITIES AND INDICATE POTENTIAL UTILITY CROSSINGS OR CONFLICTS.
12. CHECK WITH LOCAL JURISDICTION FOR UTILITY CROSSING PROVISIONS.
13. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES SHALL CONFORM TO CURRENT LOCAL JURISDICTION STANDARDS AND OTHER UTILITY PROVIDER REQUIREMENTS.
14. VERTICAL SIDEWALLS EXTENDING INTO EXISTING STORM DRAIN PIPE TRENCH BACKFILL SHALL BE DESIGNED WITH A CONCRETE BACKFILL ACCEPTABLE TO THE CITY ENGINEER.
15. OVERFLOW RISER MUST BE FORMED SUCH THAT IT IS A MINIMUM OF 6" ABOVE THE BOTTOM OF THE SYSTEM INLET, OR AS DESIGNED. PLACE STRUCTURE ADJACENT TO PEDESTRIAN EDGE TO ALLOW FOR MONITORING ACCESS.
16. DETAILS WERE ADAPTED FROM SFPUC GREEN INFRASTRUCTURE TYPICAL DETAILS AND SPECIFICATIONS.
17. DETAILS WERE DEVELOPED BY GEOSYNTEC CONSULTANTS.

ENGINEER CHECKLIST (SHALL SPECIFY, AS APPLICABLE):

- ☐ BIORETENTION AREA WIDTH AND LENGTH
- ☐ DEPTH OF PONDING
- ☐ AMOUNT OF FREEBOARD PROVIDED
- ☐ DEPTH OF BIOTREATMENT SOIL (18" MIN)
- ☐ UNDERDRAIN SPECIFICATIONS AND LOCATION (IF FACILITY IS LINED PLACE UNDERDRAIN AT BOTTOM OF FACILITY)
- ☐ BIORETENTION SURFACE ELEVATION (TOP OF BIOTREATMENT SOIL) AT UPSLOPE AND DOWNSLOPE ENDS OF FACILITY
- ☐ CONTROL POINTS AT EVERY BIORETENTION WALL CORNER AND POINT OF TANGENCY
- ☐ DIMENSIONS AND DISTANCE TO EVERY INLET, OUTLET, CHECK DAM, SIDEWALK NOTCH, ETC.
- ☐ ELEVATIONS OF EVERY INLET, OVERFLOW RISER, STRUCTURE RIM AND INVERT CHECK DAM, BIORETENTION AREA WALL CORNER, AND SIDEWALK NOTCH
- ☐ TYPE AND DESIGN OF BIORETENTION AREA COMPONENTS (E.G., EDGE TREATMENTS, INLETS/GUTTER MODIFICATIONS, UTILITY CROSSINGS, LINER, AND PLANTING DETAILS)
- ☐ DEPTH AND TYPE OF MULCH (NON-FLOATING; ORGANICALLY-DERIVED; NOT BARK OR GORILLA HAIR; 3" MIN)

RELATED TECHNICAL GUIDANCE	SOURCE
BIORETENTION: - BIOTREATMENT SOIL MIX - CALTRANS CLASS II PERM LAYER STORAGE - PERFORATED UNDERDRAIN - NON-FLOATING MULCH	C.3 TECHNICAL GUIDANCE MANUAL (ACCWP)

NOT FOR CONSTRUCTION

cleanwater PROGRAM

BIORETENTION AREA: NOTES

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-1

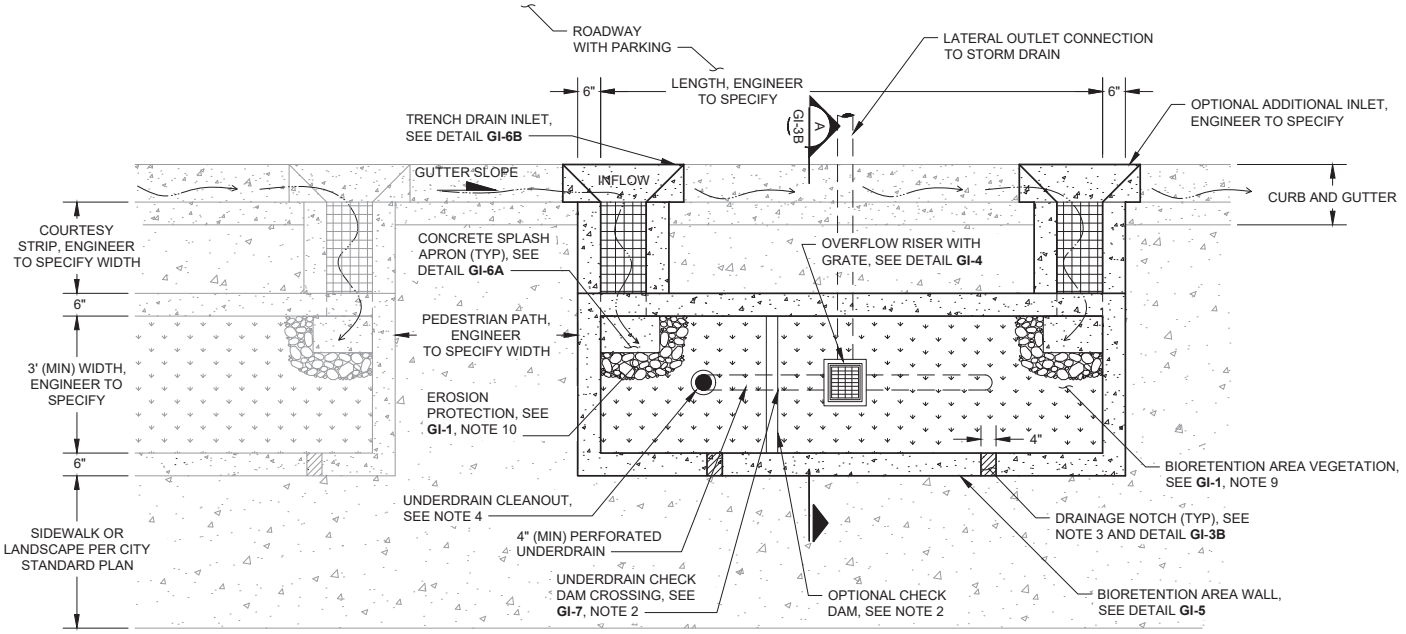

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN (SEE DETAIL **GI-7**).
3. LAY OUT DRAINAGE NOTCHES AS APPLICABLE TO PREVENT PONDING BEHIND BIORETENTION AREA WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
4. PROVIDE ONE UNDERDRAIN CLEANOUT PER BIORETENTION AREA (MIN). CLEANOUT REQUIRED AT UPSTREAM END AND PIPE ANGLE POINTS EXCEEDING 45 DEGREES. LONGITUDINAL SLOPE OF PIPE SHALL BE 0.5% (MIN).

NOT FOR CONSTRUCTION

BIORETENTION AREA: PLAN VIEW WITH STREET PARKING

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-2A

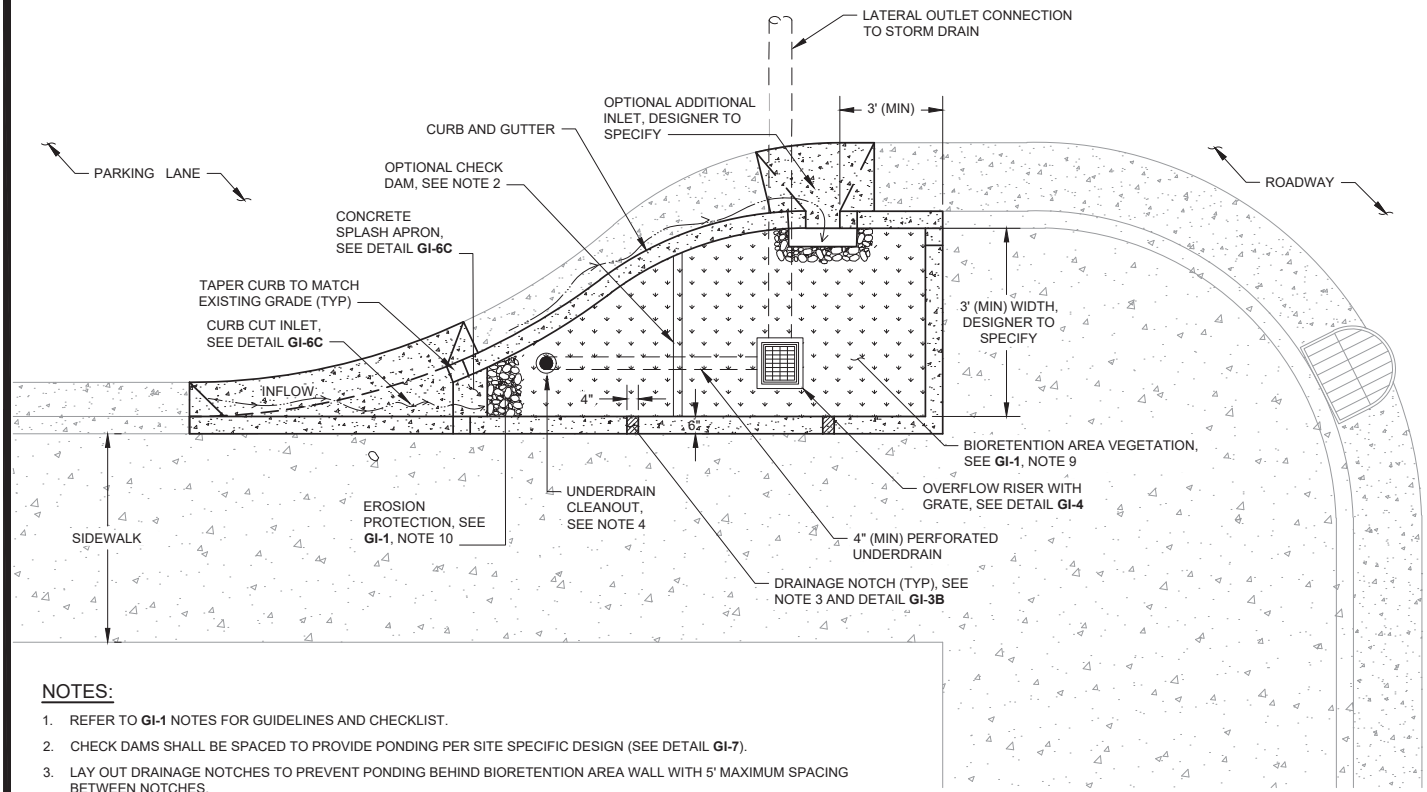

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN (SEE DETAIL **GI-7**).
3. LAY OUT DRAINAGE NOTCHES TO PREVENT PONDING BEHIND BIORETENTION AREA WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
4. PROVIDE ONE UNDERDRAIN CLEANOUT PER BIORETENTION AREA (MIN). CLEANOUT REQUIRED AT UPSTREAM END AND PIPE ANGLE POINTS EXCEEDING 45 DEGREES. LONGITUDINAL SLOPE OF PIPE SHALL BE 0.5% (MIN).

NOT FOR CONSTRUCTION

BIORETENTION AREA: BULBOUT PLAN VIEW

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-2B

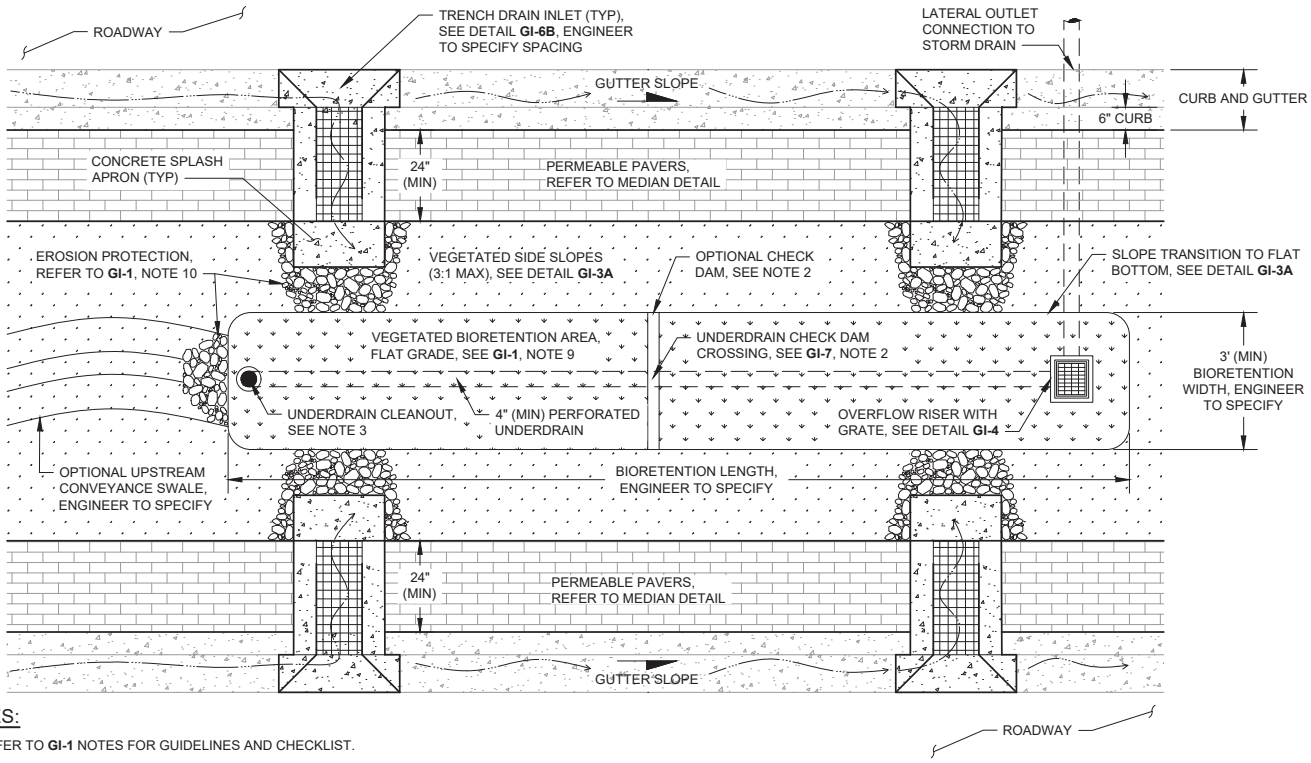

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. CHECK DAMS SHALL BE SPACED TO PROVIDE PONDING PER SITE SPECIFIC DESIGN (SEE DETAIL **GI-7**).
3. PROVIDE ONE UNDERDRAIN CLEANOUT PER BIORETENTION AREA (MIN). CLEANOUT REQUIRED AT UPSTREAM END AND PIPE ANGLE POINTS EXCEEDING 45 DEGREES. LONGITUDINAL SLOPE OF PIPE SHALL BE 0.5% (MIN).
4. DESIGNERS TO REFERENCE AASHTO ROADSIDE SAFETY DESIGN REQUIREMENTS AND CONSIDER USE OF MEDIAN BIORETENTION AREAS IN RELATION TO STREET CLASSIFICATION AND STREET SPEEDS.
5. A STORAGE VOLUME SAFETY FACTOR OF 1.5 SHALL BE INCLUDED IN THE DESIGN OF MEDIAN BIORETENTION AREAS TO PREVENT FLOODING.
6. SLOPED SIDES (**GI-3A**) DEPICTED IN PLAN VIEW ABOVE, REFER TO **GI-3B** IF VERTICAL SIDE WALLS ARE USED.

NOT FOR CONSTRUCTION

BIORETENTION AREA: STREET MEDIAN

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-2C

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. AVOID UNNECESSARY COMPACTION OF EXISTING SUBGRADE BELOW AREA.
3. SCARIFY SUBGRADE TO A DEPTH OF 3" (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF CALTRANS CLASS 2 PERMEABLE MATERIAL STORAGE LAYER AND BIOTREATMENT SOIL MATERIALS.
4. AGGREGATE STORAGE LAYER COMPRISED OF 12" MIN CALTRANS CLASS 2 PERMEABLE MATERIAL.
5. REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR BIOTREATMENT SOIL MIX SPECIFICATIONS. INSTALL BIOTREATMENT SOIL AT 85% COMPACTION FOLLOWING BASMAA INSTALLATION GUIDANCE.
6. ANGLE OF REPOSE VARIES PER GEOTECHNICAL ENGINEER RECOMMENDATIONS.
7. UNDERDRAIN AND CLEAN OUT PIPE (1 MIN PER FACILITY) REQUIRED, REFER TO C.3 TECHNICAL GUIDANCE MANUAL (ACCWP) FOR DESIGN CONSIDERATIONS. UNDERDRAINS SHOULD BE ELEVATED 6" (MIN) WITHIN THE CALTRANS CLASS 2 PERMEABLE MATERIAL STORAGE LAYER TO PROMOTE INFILTRATION. IN FACILITIES WITH AN IMPERMEABLE LINER, THE UNDERDRAIN SHOULD BE PLACED AT THE BOTTOM OF THE CALTRANS CLASS 2 PERMEABLE MATERIAL STORAGE LAYER. PERFORATED/SLOT DRAINS SHOULD BE DOWNWARD FACING TO FACILITATE BETTER STORAGE IN THE GRAVEL LAYER.
8. THE UNDERDRAIN IN ALL FACILITIES LOCATED IN THE PUBLIC RIGHT-OF-WAY SHALL BE VIDEO RECORDED AND PROVIDED TO THE CITY FOR REVIEW PRIOR TO PROJECT ACCEPTANCE.
9. REFER TO LOCAL JURISDICTION STANDARDS FOR CURB AND SIDEWALK DETAILS.

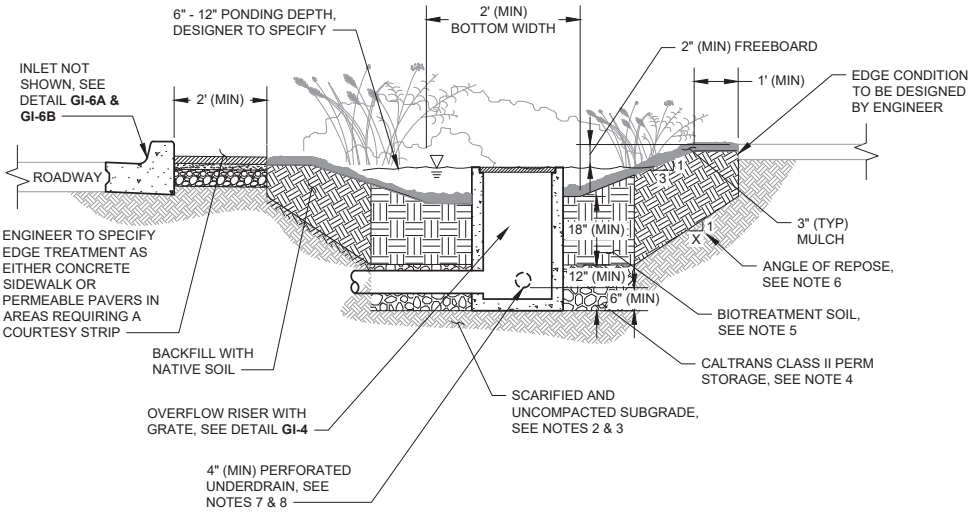

NOT FOR CONSTRUCTION

BIORETENTION AREA: SLOPED SIDES CROSS SECTION

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-3A

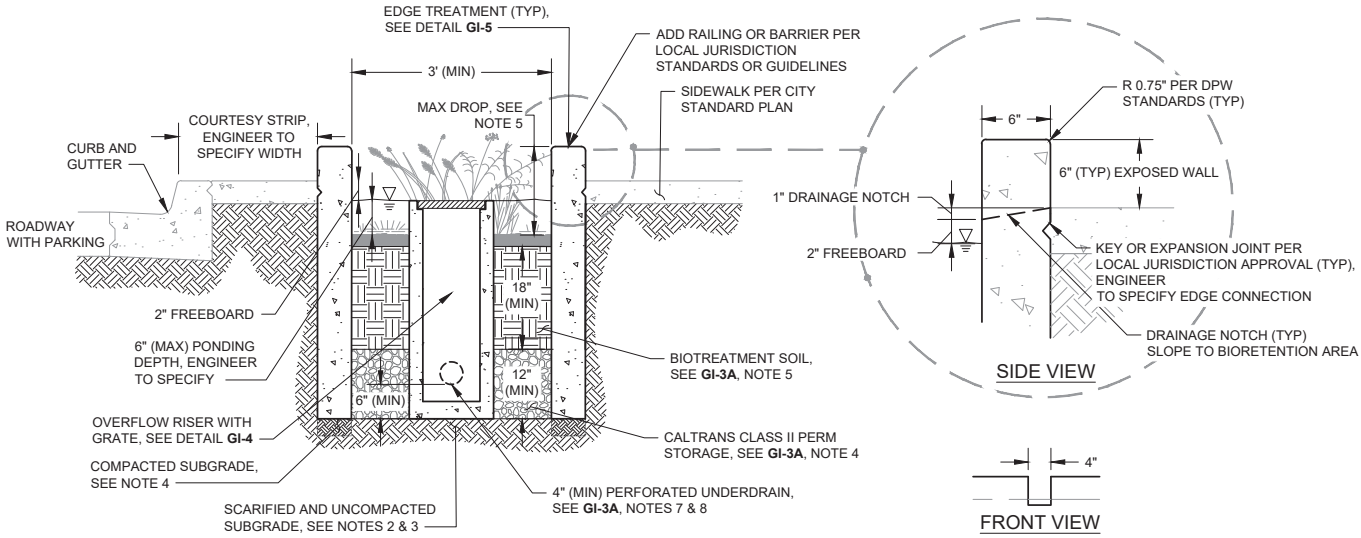

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. AVOID UNNECESSARY COMPACTION OF EXISTING SUBGRADE BELOW BIORETENTION AREA.
3. SCARIFY SUBGRADE TO A DEPTH OF 3" (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIOTREATMENT SOIL MATERIAL.
4. FOR STRUCTURAL SUPPORT, SUBGRADE UNDER WALLS ONLY COMPACTED PER ENGINEER SPECIFICATIONS.
5. MAXIMUM DROP, PER LOCAL BUILDING CODE, FROM TOP OF CURB TO TOP OF BIOTREATMENT SOIL SHALL INCLUDE CONSIDERATIONS FOR BIOTREATMENT SOIL SETTLEMENT. THE DROP IS THE SUM OF PONDING DEPTH (6" TYP), FREEBOARD (2" TYP), AND CURB HEIGHT (6" TYP).
6. REFER TO LOCAL JURISDICTION STANDARDS FOR CURB AND SIDEWALK DETAILS.

NOT FOR CONSTRUCTION

cleanwater PROGRAM

BIORETENTION AREA: VERTICAL SIDE WALL CROSS SECTION

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-3B

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. ALL MATERIAL AND WORKMANSHIP FOR OVERFLOW STRUCTURES SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. DESIGN OVERFLOW WEIR AND OUTLET PIPE TO CONVEY 10-YR, 24-HR STORM FLOW OR DESIGN INLET TO DIVERT FLOWS LARGER THAN THE DESIGN STORM DIRECTLY TO THE STORM DRAIN. LOCATE ALL OVERFLOW PIPES AT AN ELEVATION HIGHER THAN THE STORM SEWER HYDRAULIC GRADE LINE TO PREVENT BACKFLOW INTO THE BIORETENTION FACILITY.
4. STORM DRAIN OUTLET PIPES SHALL BE SIZED TO MEET HYDRAULIC REQUIREMENTS WITH APPROPRIATE COVER DEPTH AND PIPE MATERIAL.
5. PERFORATED UNDERDRAINS WITH CLEANOUT PIPES ARE REQUIRED. PERFORATED/SLOT DRAINS SHOULD BE DOWNWARD FACING TO FACILITATE BETTER STORAGE IN THE GRAVEL LAYER.
6. MAINTENANCE ACCESS IS REQUIRED FOR ALL OUTLET STRUCTURES AND CLEANOUT FACILITIES. 12" (MIN) CLEARANCE WITHIN OVERFLOW STRUCTURE SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
7. ENGINEER SHALL REFER TO LOCAL JURISDICTION STANDARDS AND/OR ASSESS NEED FOR GRAVEL BASE. ENGINEER SHALL EVALUATE BUOYANCY OF STRUCTURES FOR SITE SPECIFIC APPLICATION AND SPECIFY THICKENED OR EXTENDED BASE / ANTI-FLOATATION COLLAR, AS NECESSARY.
8. SIZE OF GRATE SHALL MATCH SIZE OF RISER SPECIFIED IN PLANS, SHALL BE REMOVABLE TO PROVIDE MAINTENANCE ACCESS, AND SHALL BE BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM. MAXIMUM GRATE OPENING SHALL BE 2".
9. IF INTERIOR DEPTH OF OVERFLOW STRUCTURE EXCEEDS 5', A PERMANENT BOLTED LADDER AND MINIMUM CLEAR SPACE OF 30" BY 30" SHALL BE PROVIDED FOR MAINTENANCE ACCESS.
10. MINIMUM DIAMETER OF OPTIONAL GROUTED COBBLES SHALL BE LARGER THAN MAXIMUM GRATE OPENING.
11. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.

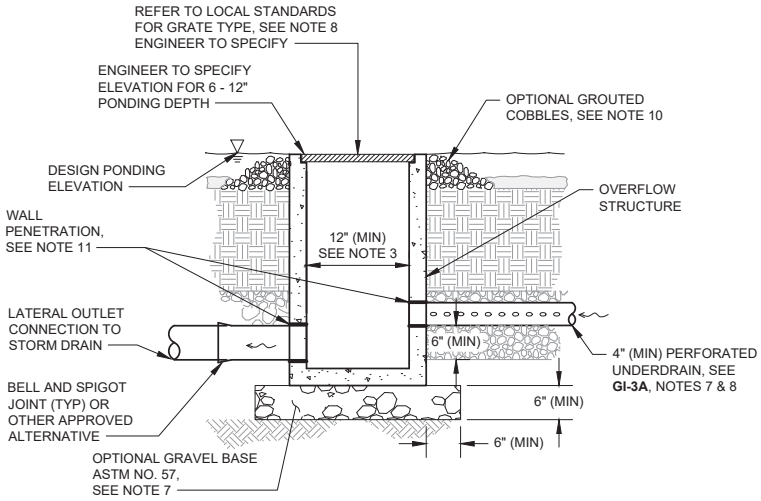

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: OUTLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-4

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. THE ENGINEER SHALL ADAPT EDGE TREATMENT DESIGN TO ADDRESS SITE SPECIFIC CONSTRAINTS TO EFFECTIVELY STABILIZE ADJACENT PAVEMENT AND MINIMIZE LATERAL MOVEMENT OF WATER.
3. STANDARD CURB EDGE (WHEN SPACE AVAILABLE):
   - A. REFER TO LOCAL JURISDICTION STANDARDS FOR CURB AND SIDEWALK DETAILS.
   - B. ANGLE OF REPOSE VARIES PER GEOTECHNICAL ENGINEERS RECOMMENDATIONS.
4. VERTICAL SIDE WALLS (WHEN SPACE LIMITED):
   - A. ALL BIORETENTION AREA WALLS SHALL EXTEND TO BOTTOM OF AGGREGATE STORAGE LAYER OR DEEPER. MINIMUM DEPTHS SHALL BE DESIGNED TO PREVENT LATERAL SEEPAGE INTO THE ADJACENT PAVEMENT SECTION.
   - B. FOOTING AND/OR LATERAL BRACING SHALL SHALL BE DESIGNED BY THE ENGINEER TO WITHSTAND ANTICIPATED LOADING ASSUMING NO REACTIVE FORCES FROM THE UNCOMPACTED BIOTREATMENT SOIL.
   - C. BIORETENTION AREA WALLS EXTENDING MORE THAN 36" BELOW ADJACENT LOAD-BEARING SURFACE, OR WHEN LOCATED ADJACENT TO PAVERS, SHALL HAVE FOOTING OR LATERAL BRACING. FOOTING OR LATERAL BRACING MAY BE EXCLUDED ONLY IF THE ENGINEER DEMONSTRATES THAT THE PROPOSED WALL DESIGN MEETS LOADING REQUIREMENTS. WALL SHALL NOT ENCROACH INTO TREATMENT AREA.
   - D. CONTRACTOR TO PROVIDE 3" MINIMUM COVER OVER ALL LATERAL BRACING FOR PLANT ESTABLISHMENT.
   - E. ALL CONSTRUCTION COLD JOINTS SHALL INCORPORATE EPOXY, DOWEL/TIE BAR, KEYWAY, OR WATER STOP.

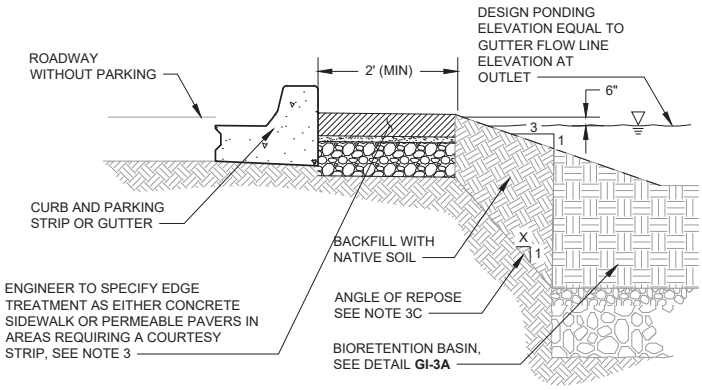

STANDARD CURB EDGE AT BIORETENTION BASIN (1)

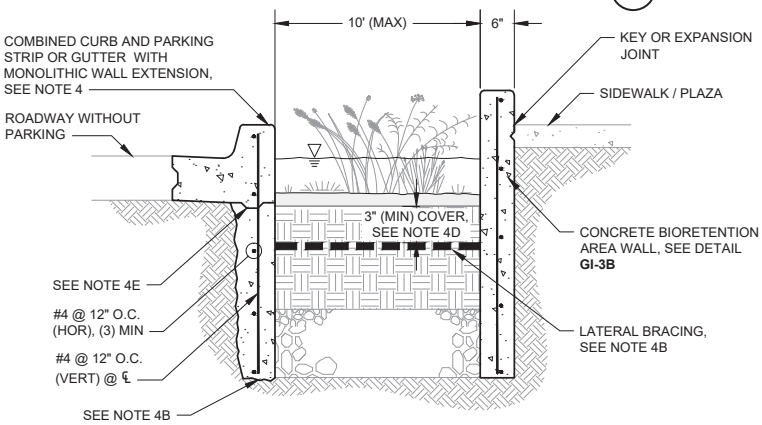

EXTENDED BIORETENTION AREA WALL WITH LATERAL BRACING (2)

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: EDGE TREATMENT DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-5

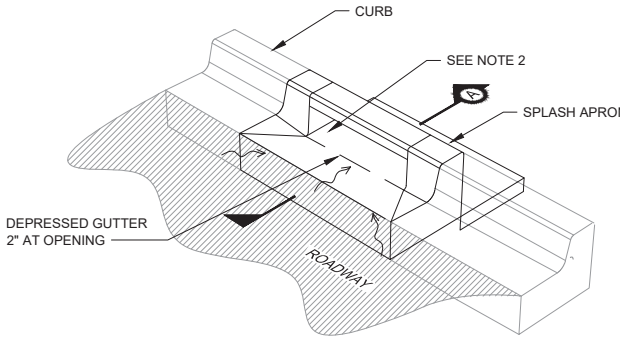

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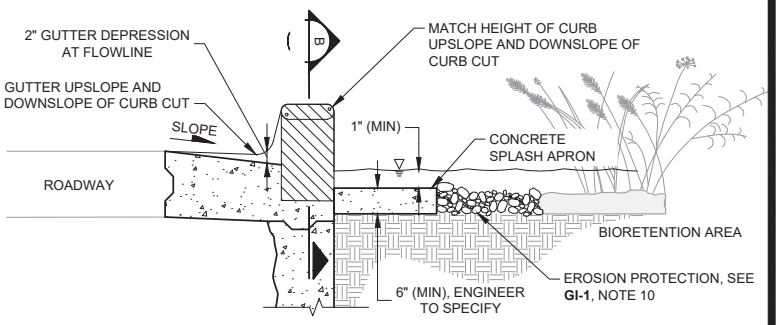

SECTION A

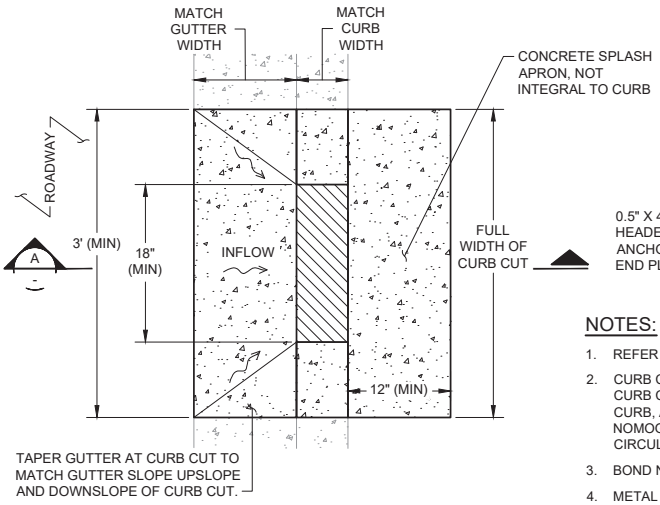

PLAN

METAL INLET ASSEMBLY

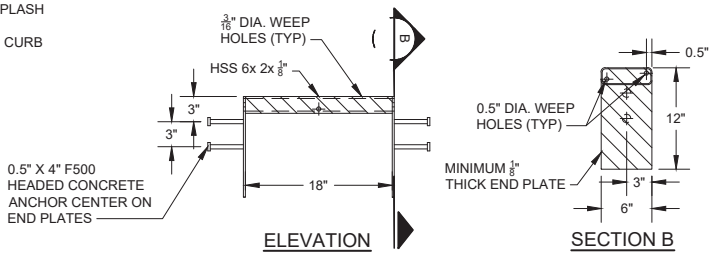

ELEVATION

SECTION B

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. CURB CUT INLETS SHALL BE ADEQUATELY SIZED, SPACED, AND SLOPED TO MEET HYDRAULIC REQUIREMENTS. THE CURB CUT OPENING WIDTH SHALL BE SIZED BASED ON THE CATCHMENT AREA, LONGITUDINAL SLOPE ALONG THE CURB, AND THE CROSS SLOPE OF THE GUTTER OR ADJACENT PAVEMENT AT THE INLET. SEE SIZING EQUATIONS AND NOMOGRAPHS FOR CURB OPENING INLETS IN THE U.S. DEPARTMENT OF TRANSPORTATION HYDRAULIC ENGINEERING CIRCULAR NO. 27.
3. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
4. METAL INLET ASSEMBLY SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A-123.

NOT FOR CONSTRUCTION

cleanwater PROGRAM

BIORETENTION COMPONENTS: GUTTER CURB CUT INLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

SCALE: NOT TO SCALE	
DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
DRAWN BY: K. K.	REVISED BY: E.F.
CHECKED BY: A. R.	

GI-6A

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. ALL MATERIAL AND WORKMANSHIP FOR TRENCH DRAIN ASSEMBLY SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. TRENCH DRAIN INLETS SHALL BE ADEQUATELY SIZED, SPACED, AND SLOPED TO MEET HYDRAULIC REQUIREMENTS. SEE NOTE 2 DETAIL **GI-6A** FOR REFERENCE.
4. SLOPE TO PROVIDE AT LEAST 1" DROP OVER LENGTH OF CHANNEL OR A MINIMUM OF 2%, WHICHEVER IS LARGER.
5. ALL TRENCH GRATES SHALL BE REMOVABLE, RATED PER THE ANTICIPATED LOADING, AND BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM, FLUSH OR RECESSED IN GRATE.
6. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.
7. HORIZONTAL CONTROL JOINTS SHALL BE PROVIDED EVERY 10' (LINEAR), OR PER MANUFACTURER'S RECOMMENDATIONS.
8. APPLY EPOXY BONDING AGENT AT ALL TRENCH DRAIN CONSTRUCTION COLD JOINTS.
9. INLET CURB CUT AND CONCRETE CHANNEL WIDTH SHALL BE SIZED TO ACCOUNT FOR CATCHMENT AREA AND GUTTER SLOPE.

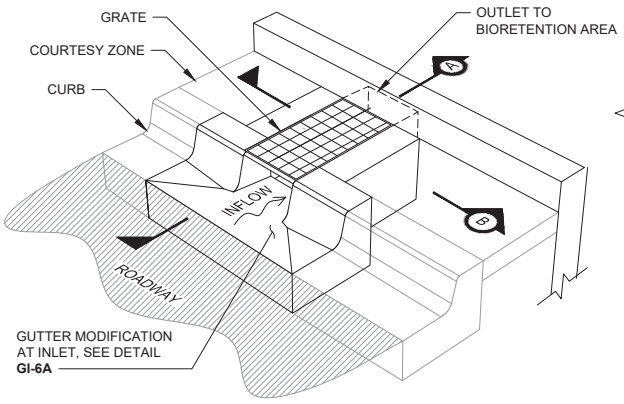

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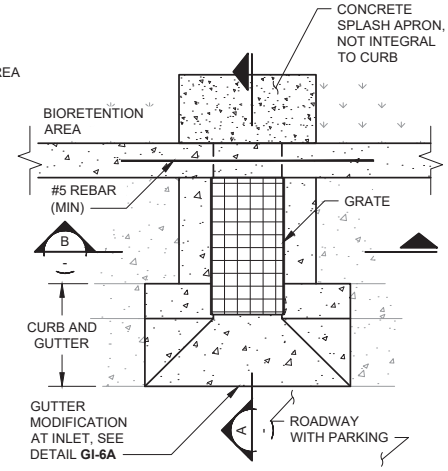

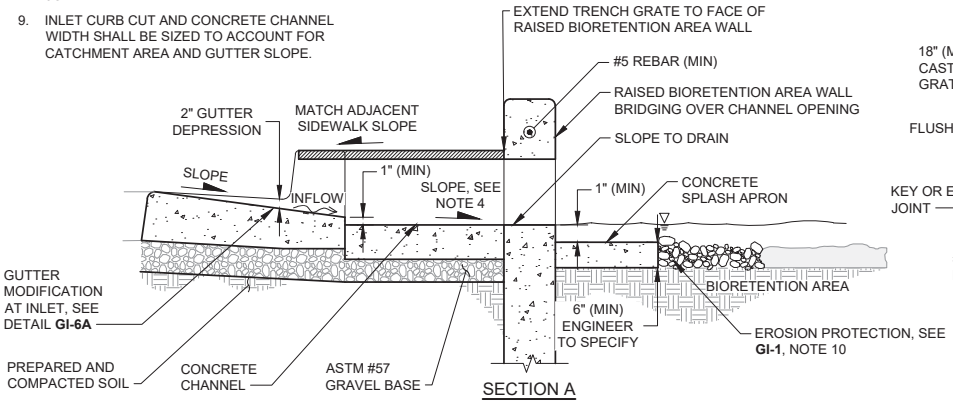

SECTION A

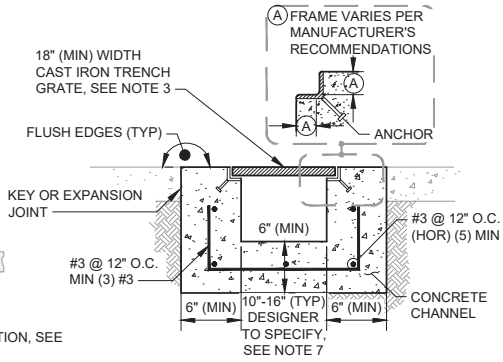

SECTION B

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: TRENCH DRAIN CURB CUT INLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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CHECKED BY: A. R.	

GI-6B

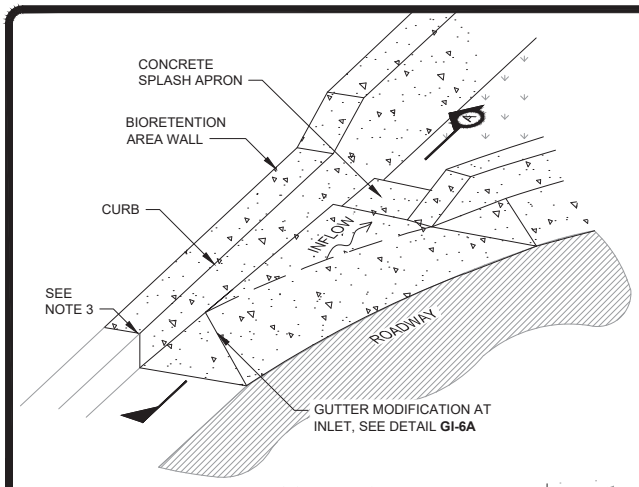

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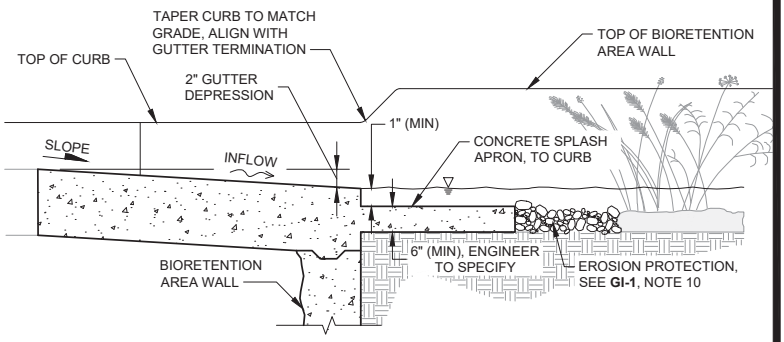

SECTION A

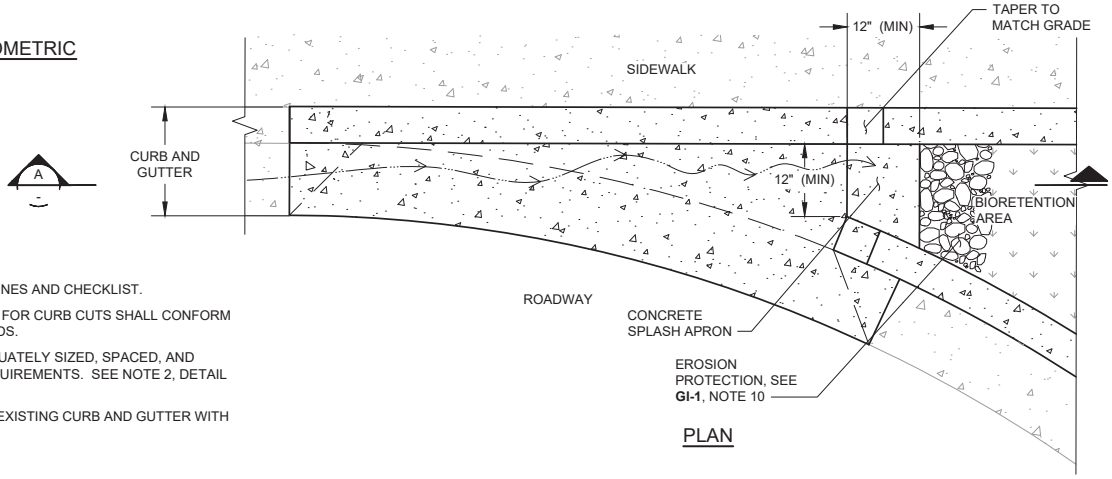

PLAN

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. ALL MATERIAL AND WORKMANSHIP FOR CURB CUTS SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. CURB CUT INLETS SHALL BE ADEQUATELY SIZED, SPACED, AND SLOPED TO MEET HYDRAULIC REQUIREMENTS. SEE NOTE 2, DETAIL **GI-6A** FOR REFERENCE.
4. BOND NEW CURB AND GUTTER TO EXISTING CURB AND GUTTER WITH EPOXY AND DOWEL CONNECTION.

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: CURB CUT AT BULBOUT INLET DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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DRAWN BY: K. K.	REVISED BY: E. F.
CHECKED BY: A. R.	

GI-6C

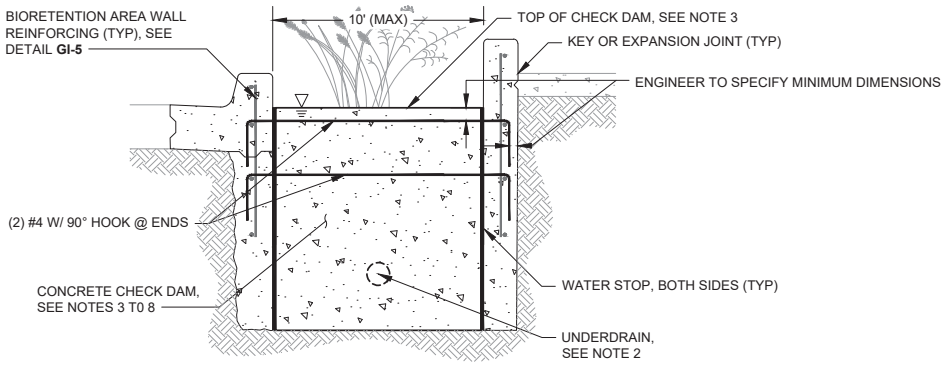

SECTION - CONCRETE CHECK DAM (1)

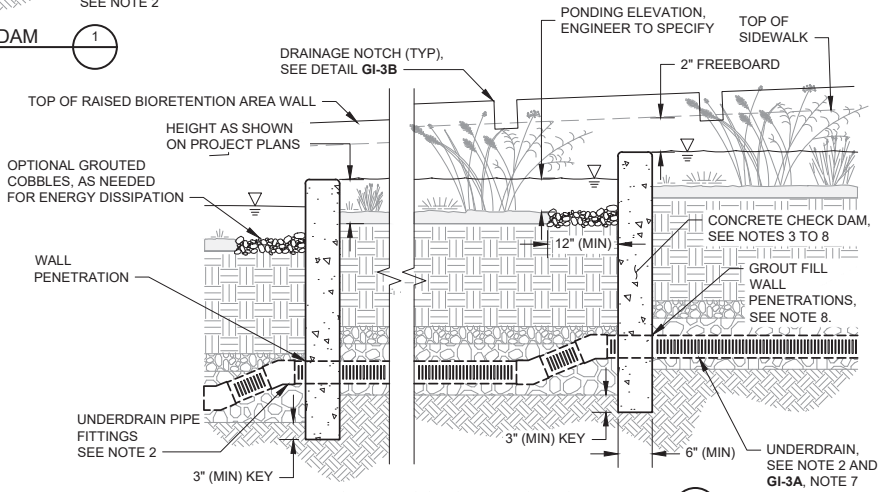

PROFILE - CONCRETE CHECK DAM (2)

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. UNDERDRAIN TO PASS THROUGH CHECK DAM IN NON-PERFORATED PIPE. PIPE FITTINGS SHALL BE USED TO ACCOMMODATE CHANGES IN GRADE, AS NEEDED.
3. HEIGHT AND SPACING OF CHECK DAMS SHALL BE ESTABLISHED BASED ON THE PONDING DEPTH REQUIRED TO MEET PROJECT HYDROLOGIC PERFORMANCE GOALS AND THE MAXIMUM DESIRED DROP FROM THE SURROUNDING GRADE TO THE FACILITY BOTTOM.
4. ALL MATERIAL AND WORKMANSHIP FOR CHECK DAM ASSEMBLY SHALL CONFORM TO LOCAL JURISDICTION STANDARD SPECIFICATIONS.
5. CONCRETE CHECK DAM SHALL BE CONTINUOUS (NO JOINTS) AND REINFORCED WITH #4 BAR, PLACED AT 18" ON CENTER, EACH WAY.
6. CONCRETE CHECK DAM SHALL BE DESIGNED BY THE ENGINEER AND MEET STRUCTURAL REQUIREMENTS FOR LATERAL BRACING WHEN USED AS LATERAL BRACING.
7. TOP OF CHECK DAM TO BE LEVEL WITH CREST ELEVATION MATCHING PONDING ELEVATION UNLESS NOTCH SIZED TO CONVEY DESIGN FLOWS PROVIDED.
8. GROUT ALL PENETRATIONS, CRACKS, SEAMS, AND JOINTS WITH CLASS "C" MORTAR.

NOT FOR CONSTRUCTION

BIORETENTION COMPONENTS: CHECK DAM DETAIL

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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DATE: MAY 11, 2018	REVISED: JUNE 11, 2019
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GI-7

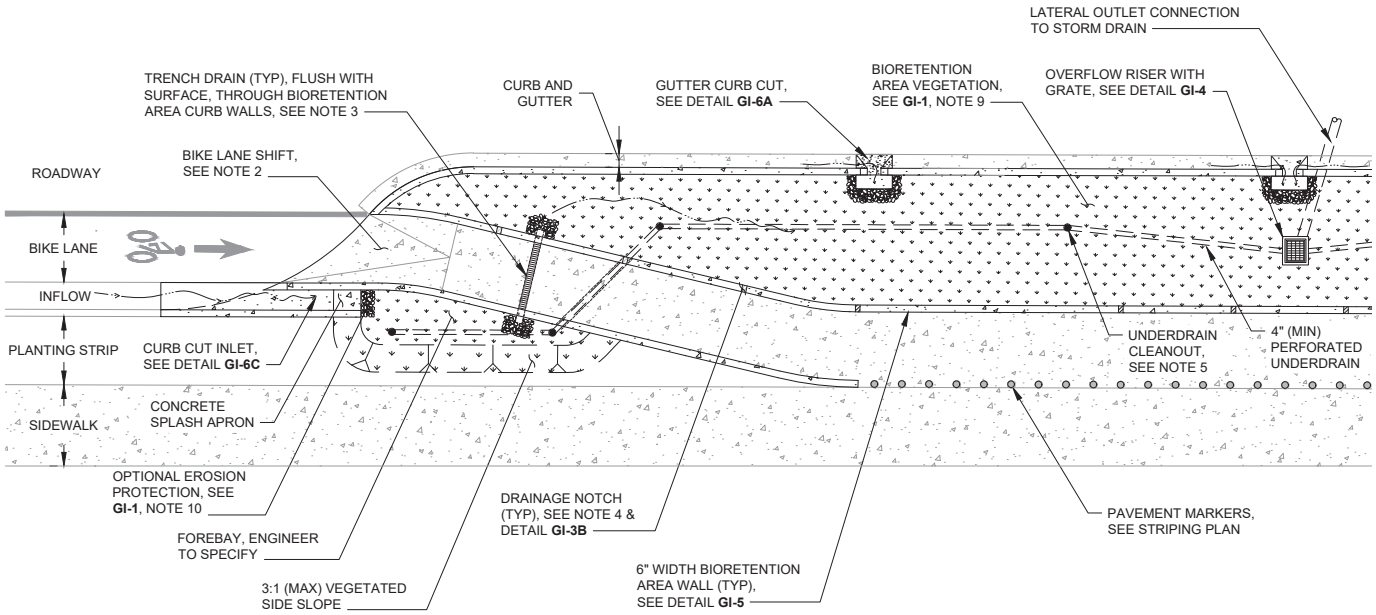

NOTES:

1. REFER TO **GI-1** NOTES FOR GUIDELINES AND CHECKLIST.
2. RAMP BIKE LANE UP ONTO BULBOUT AND SHIFT LANE OVER. MAXIMUM 1:5 HORIZONTAL TRANSITION RATE. TRANSITION GEOMETRY SHALL CONFORM TO LOCAL JURISDICTION STANDARDS.
3. HYDRAULIC CONNECTION OF SEPARATED BIORETENTION AREAS PROVIDED BY TRENCH DRAINS. ENGINEER TO SPECIFY, FOLLOWING FLOW AND STRUCTURAL REQUIREMENTS.
4. LAY OUT DRAINAGE NOTCHES AS APPLICABLE TO PREVENT PONDING BEHIND BIORETENTION AREA WALL WITH 5' MAXIMUM SPACING BETWEEN NOTCHES.
5. PROVIDE ONE UNDERDRAIN CLEANOUT PER BIORETENTION AREA (MIN). CLEANOUT REQUIRED AT UPSTREAM END AND PIPE ANGLE POINTS EXCEEDING 45 DEGREES. LONGITUDINAL SLOPE OF PIPE SHALL BE 0.5% (MIN). PIPE SLEEVES REQUIRED FOR UNDERDRAINS TRANSITIONING BETWEEN BIORETENTION AREAS.
6. DRAWING GI-XX MODIFIED FROM THE BASMAA URBAN GREENING BAY AREA TYPICAL GI DETAILS FIGURE C-1.4.

NOT FOR CONSTRUCTION

BIORETENTION AREA: WITH BIKE LANE PLAN VIEW

GREEN INFRASTRUCTURE EXAMPLE DETAILS

ALAMEDA COUNTYWIDE CLEAN WATER PROGRAM

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CHECKED BY: A. R.	

GI-8

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Attachment C-5: Capital Improvement Projects Sign-off Form

The Clean Water Program's Capital Improvement Projects Sign-off Form is provided on the following page. This form is used by the agency to document whether a Regulated Project (as defined in Provision C.3.b) has complied with Provision C.3 requirements, and whether a non-Regulated Project has been evaluated for GI potential.

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How to Use the

C.3 Stormwater Compliance Sign-off Form for Capital Improvement Program (CIP) Projects

Introduction

The attached checklist is for Alameda Countywide Clean Water Program (Clean Water Program) member agencies to document that capital improvement program (CIP) projects either are exempt or have complied with the requirements for C.3 Regulated Projects, as defined in Provision C.3.b of the Municipal Regional Stormwater Permit (MRP), issued by the San Francisco Bay Regional Water Quality Control Board on November 19, 2015.

Step-by-Step Instructions

1. Fill out the project information at the top of the form (Project Name, Address, etc.)

2. Review the project description and the square footage of impervious surfaces that will be created and/or replaced by the project to determine whether the project may meet any of the conditions identified in the form, under the heading, "Project is NOT a C.3 Regulated Project and the Review of GI Potential Is Documented." If the project meets any of those conditions, check the appropriate box (or boxes).
   - If one or more boxes are checked, the project is NOT a C.3 Regulated Project. Continue to Step 3.
   - If no boxes are checked, the project IS a C.3 Regulated Project. Skip to Step 4.

3. Refer to the Clean Water Program's Worksheet for Identifying GI Potential in Municipal CIP Projects[1] (or your agency's equivalent worksheet or form) to evaluate the project for the potential to include green infrastructure (GI). In the C.3 Stormwater Compliance Sign-off Form for CIP Projects, under the subheading, "Green Infrastructure Potential Review," check the box to indicate the name of the worksheet or form that was used for this review, and indicate the date on which the worksheet or form was completed.
   - Skip to Step 5.

4. Refer to the project's stormwater control plan, construction documents, and/or other project documentation, such as a completed Stormwater Requirements Checklist[2], to determine whether the requirements for C.3 Regulated Projects have been met. If all requirements have been met, including the hydromodification management (HM) requirements in Provision C.3.g (if applicable) and the documentation of operation and maintenance responsibility as required by Provision C.3.h.ii.(1), check the box to indicate the name of the applicable document(s), and write the date of the document(s).
   - Continue to Step 5.

5. Sign and date the completed C.3 Stormwater Compliance Sign-off Form for CIP Projects.

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[1] The worksheet is available on the New Development Subcommittee's members only website at: https://cleanwaterprogram.org/index.php/committees/new-development-committee.html.

[2] The checklist is available on the Clean Water Program's public website at: https://cleanwaterprogram.org/. Click on "Resources," then "Development," and scroll down to "Stormwater Requirements Checklist."

C.3 Stormwater Compliance Sign-off Form for Capital Improvement Program (CIP) Projects

This form references Provision C.3 of the Municipal Regional Stormwater Permit (MRP), issued by the San Francisco Bay Regional Water Quality Control Board on November 19, 2015.

Project Name: _____

Project Address: _____ APN: _____

Contact Person: _____

Contact Phone: _____ Contact Email: _____

☐ **Project is NOT a C.3 "Regulated Project" and the Review of "GI Potential" Is Documented.**

C.3 "Regulated Project" Review

The project is NOT a C.3 "Regulated Project" based on the Regulated Project definitions in Provision C.3.b as indicated below. Please check the applicable box(es):

- ☐ Project would create and/or replace less than 5,000 square feet of impervious area.
- ☐ Project would create and/or replace less than 10,000 square feet of impervious area **AND** project does not include auto service/maintenance facilities, restaurants, uncovered parking areas (stand-alone or as part of a larger project), or structures with rooftop parking.
- ☐ Project is a Road Project **AND** project would construct less than 10,000 square feet of new contiguous impervious area when the following are excluded from the calculation:[3]
  - o Sidewalks built as part of new streets or roads that direct stormwater runoff to adjacent vegetated areas.
  - o Bicycle lanes built as part of new streets or roads that are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent impervious areas.
  - o Impervious trails that are:
    - A. less than 10 feet wide and more than 50 feet away from the top of a creek bank.

    OR

    - B. designed to direct stormwater runoff to adjacent vegetated areas or other non-erodible permeable areas (preferably away from creeks or towards the outboard side of levees).
  - o Sidewalks, bicycle lanes, or trails constructed with permeable surfaces (pervious concrete, porous asphalt, unit pavers, or granular materials).
  - o Caltrans highway projects and associated facilities.
- ☐ Project consists of interior remodel.
- ☐ Project consists of routine maintenance and repairs (e.g., roof replacement, replacement of exterior wall surface, and/or pavement resurfacing) within the existing footprint.

[3] *When calculating the impervious area of a Road Project, include all roadway surfaces related to creation of additional traffic lanes (including, for example, passing lanes and turning pockets). Shoulders and widened portion of existing lanes may be excluded from the calculation.*

"Green Infrastructure (GI) Potential" Review

Capital improvement program (CIP) projects that are NOT C.3 Regulated Projects must be reviewed to determine whether they have green infrastructure (GI) potential, as required in Provision C.3.j.ii.(2). When conducting these reviews, agencies should follow the Bay Area Municipal Stormwater Management Agencies Association's (BASMAA) Guidance for Identifying GI Potential in Municipal CIP Projects. One way to follow this guidance is to use the Clean Water Program's Worksheet for Identifying GI Potential in Municipal CIP Projects. These documents can be downloaded from www.cleanwaterprogram.com (click "Resources," then "Development"). Please attach documentation to demonstrate that the project was reviewed for GI potential.

The non-C.3 Regulated Project has been reviewed for GI potential as shown in the following document(s):

- ☐ Worksheet for Identifying GI Potential in Municipal CIP Projects, dated: _____
- ☐ Other documentation (describe): _____

☐ **Project IS a C.3 "Regulated Project" — Compliance Documented.**

The C.3 Regulated Project has met all requirements for C.3 Regulated Projects as shown in the following documents:

- ☐ Stormwater Control Plan, dated: _____
- ☐ Construction Documents, dated: _____
- ☐ Other documentation (describe): _____

_____

Signature Date

_____

Name Title

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Attachment C-6: Guidance for Sizing Green Infrastructure Facilities in Street Projects

The Guidance for Sizing Green Infrastructure Facilities in Street Projects, provided by the Bay Area Stormwater Management Agencies Association (BASMAA), is included on the following page of paper copies of this GI Plan. The electronic version of this GI Plan includes the Guidance for Sizing Green Infrastructure Facilities in Street Projects as a stand-alone electronic file.

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Appendix D. Workplan to Incorporate Green Infrastructure Requirements in Planning Documents

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Workplan to Incorporate Green Infrastructure Requirements
in Union City's Planning Documents

May 2019

The requirements of the MRP include preparation of a workplan for updating and aligning planning documents to impact the future alignment, configuration, or design of impervious surfaces within Union City's jurisdiction. The following workplan identifies how the City of Union City will ensure that green infrastructure and low impact development measures are appropriately included in upcoming planning efforts.

1. Statement of Purpose

The purpose of this workplan is to identify how the City of Union City's will ensure that green infrastructure (GI) and low impact development (LID) measures are appropriately included in plans and planning documents that may affect the future alignment, configuration, or design of impervious surfaces within its jurisdiction. This workplan specifically addresses plans and planning documents that could not be updated prior to the September 30, 2019, which are listed as follows:

- Hazardous Mitigation Plan
- Climate Action Plan
- Bicycle and Pedestrian Master Plans
- Americans with Disabilities Act Transition Plan
- Landscape Standards
- Specific Area Plan (Decoto Industrial Park Study Area and 511 Plans)

2. Tasks

The incorporation of GI and LID measures in the above-listed plans and planning documents will be accomplished by implementing the following tasks:

Task 1: Draft Text to Incorporate in the Planning Documents

The City of Union City will develop draft text to incorporate into the identified plans and planning documents. The draft text will set forth green infrastructure requirements for projects that are identified in the applicable plans or planning documents, and for projects that may be developed to meet the planning goals, objectives, and policies articulated in the documents.

Task 2: Coordination and Outreach to Update Planning Documents

The City of Union City will prepare draft revisions of relevant sections of planning documents to ensure that the GI implementation text prepared in Task 1 is included in the scheduled updates of applicable plans and planning documents. This step will include coordination with and outreach to departments within the agency, stakeholders, decision-making bodies, and the general public. Planning document updates are anticipated to be circulated for public review prior to the final approval of the documents that are updated to include GI requirements.

Task 3: Track and Record the Update of Planning Documents

Throughout the process of updating plans and planning documents, and after the documents are updated, the City of Union City will document coordination with and outreach to internal departments, stakeholders, decision-making bodies, and the general public, including the final approval of the documents that are updated to include GI requirements. This includes tracking

and recording the dates on which draft planning documents are circulated for review, the dates on which public hearings or other public meetings are held, and the dates when final planning documents are approved.

3. Schedule

The plans listed in Section 1 are anticipated to be updated by 2025.

Table D-1. City of Union City Planning Documents to be Updated

Type of Document	Name of Document	Department Responsible for Document	Describe Opportunities and/or Conflicts
General Plan	2040 General Plan, Mobility Element, http://www.uc2040.com/wp-content/uploads/2018/08/UCGPU_PD_Mobility_Rev-PRELIM_2018-08-08.pdf	Union City Planning Department	This is a proposal for a new policy to be included in the General Plan Mobility Element M.1.11: Incorporation of Green Infrastructure into Roadway Projects. The City shall strive to incorporate green infrastructure into roadway capital projects, including but not limited to, streetscapes, repaving, and bicycle and pedestrian projects.
General Plan	Public Facilities and Services Element, http://www.uc2040.com/wp-content/uploads/2018/05/UCGPU_PD_Public_Facilities_and_Services_REV_Prelim_2018-05-02_2.pdf	Union City Planning Department	Section 5 – Stormwater Collection and Drainage Goal PF-5: Provide a stormwater collection system that reduces excess runoff and minimizes flood potential from existing and future development, reduces impacts to water quality, improves environmental quality and incorporates nature-based flood management and green infrastructure. (Source: Existing General Plan, Goal PF-E.1, modified) PF-5.6 Stormwater Detention Facilities. The City shall consider the use of stormwater detention facilities, with green infrastructure elements, to mitigate drainage impacts and reduce storm drainage system costs in new development. (Source: Existing General Plan, Policy PF-E.1.8) PF-5.7 Evaluate Need for On-Site Detention and/or Retention Facilities. The City shall evaluate public and private development projects to determine the effects of the projects on on-site and downstream drainage patterns and

Type of Document	Name of Document	Department Responsible for Document	Describe Opportunities and/or Conflicts
			associated ecological systems. Projects may require on-site detention or retention facilities to maintain existing storm flows and velocities in natural drainage system. Any new facilities shall incorporate green infrastructure elements identified in the Green Infrastructure Plan to the extent feasible. (Source: Existing General Plan, Policy NHR-B.1.4, modified) IPF-5.11 Improve Stormwater Treatment in Established Neighborhoods. The City shall improve storm water treatment in established neighborhoods by implementing programs such as green streets stormwater management as identified in the Green Infrastructure Plan, street sweeping, parking enforcement for street sweeping, and the installation of trash capture devices. (Source: New Policy) PF-5.12 Prepare and Implement Green Infrastructure Plan. The City shall prepare and implement a Green Infrastructure Plan to facilitate the development of low impact development (LID) drainage design into public and private streets, parking lots, building roofs and other facilities to achieve water quality, flow reduction and other environmental and community benefits.
2016 Union City / Newark Multi-jurisdictional Hazard Mitigation Plan	Volume 1 – Planning – Area-Wide Element https://docs.wixstatic.com/ugd/60e4bd_6be05590e3194ee29b319992bc28b481.pdf	Union City Economic and Community Development	Policy: When next updated, the team will evaluate opportunity include GI.

Type of Document	Name of Document	Department Responsible for Document	Describe Opportunities and/or Conflicts
Specific Plan(s) (Redevelopment		Union City Planning Department	The City of Union City is in the process of updating the General Plan. They have made an effort to consolidate and reduce redundancy between elements. GI was integrated into a few strategic sections where it is seen to have the most impact. The Specific Area Plans, Climate Action Plans, Bicycle and Pedestrian Master Plan will be updated by 2021. The City of Union City will review those plans for policy options.
ADA Transition Plans	2016 update to ADA Transition Plan, https://www.unioncity.org/DocumentCenter/View/650/Draft-2016-Update-to-ADA-Transition-Plan-PDF?bidId=	Union City Department of Public Works	As can be seen from the attached Exhibit B, Sidewalk Deficiency List, most of the sidewalks are deficient due to the uplifting caused by tree roots. ….. However, the City has been sharing the cost of the repairs with the property owner by paying for the curb & gutter repairs while the property owner pays for the sidewalk repairs. As the city undertakes complete and green street project, these provide an opportunity to bring curb & gutter up to current ADA standards.
Public Works Maintenance Standards	Landscape Standards	Union City Department of Public Works	Update the standard details to include GI guidance. Investigate and make available to the public. Short term timeline

Type of Document	Name of Document	Department Responsible for Document	Describe Opportunities and/or Conflicts
Complete Streets Plan		Union City Planning Department	A resolution for complete streets that was required to update for eligibility for transportation funding. **Complete Streets Routinely Addressed by All Departments.** All relevant departments of the City will work towards making complete streets practices a routine part of everyday operations, approach every relevant project, program, and practice as an opportunity to improve streets and the transportation network for all categories of users, and work in coordination with other departments, agencies, and jurisdictions to maximize opportunities for complete streets, connectivity, and cooperation.
One or more universal, relevant document(s) or policy(ies) that could potentially cover GI requirements with a single revision/update		Union City Department of Public Works	Early action in the policy table. The City shall commit to investigate all new capital projects for opportunities to include green infrastructure as identified in the Green Infrastructure Plan to be adopted in 2019.

Appendix E. Funding Option Matrices

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Table E-1 Funding Options (Already Implemented)

Local Funding	Description	Pros	Cons	Voter Approval Thresholds
Developer Led Capital Projects	The developer builds green infrastructure in connection with conditions of approval from the City of Union City. Funds offset the public costs associated with the proposed development.	This is a low cost and low effort method for increasing the amount of green infrastructure built in Union City.	To ensure performance, the City of Union City will review the projects and provide same oversight it provides for regulatory driven green infrastructure as part of C.3. compliance. This would be a larger set of projects than the City of Union City are currently reviewing which may require	
Grants	Grants are one-time funding sources for qualifying projects from a federal, state and/or other granting authority.	Grants can fund programs or systems and new and innovative ideas. Grants can also be used to leverage other sources of funding. No ballot is needed for grants.	Funding for grants is competitive. It is not guaranteed and typically only available once. Grants often require maintenance and monitoring records. The City of Union City must provide matching funds, grant writers, and ongoing monitoring and reporting after the project is construction. An underlying, dedicated and sustainable revenue source such as a stormwater fee or tax is needed.	Grants are a non-balloted approach.

Table E-2 Funding Options (Short-Term Pursuits, 1 of 3)

Local Funding	Description	Pros	Cons	Voter Approval Thresholds
Regulatory Fees	Regulatory fees are ongoing fee requirements from services such as plan check and inspection fees related to stormwater and green infrastructure.	Regulatory fees can be a funding source for stormwater regulatory compliance with the Municipal Regional Permit for new and redevelopment. Many municipalities already use this funding option.	Proposition 26 has limited this applicability. Confirmation is needed to ensure regulatory fees do not require a ballot process.	Non balloted approaches may encounter public resistance and require a nexus between fees and impacts on the payer to not be considered a tax. The nexus/cost of service analysis must be conducted prior to ballot processes.
Business License Fees	Business license fees are ongoing fee requirements for commercial and industrial businesses within the local agency.	A ballot is not needed to implement business license fees.	Business license fees apply to commercial operation with impacts on stormwater, restaurants, vehicle repairs, etc.	Non balloted approaches may encounter public resistance and require a nexus between fees and impacts on the payer to not be considered a tax. The nexus/cost of service analysis must be conducted prior to ballot processes.
Developer Impact Fees (AB 1600 Fees)	Developer fees for green infrastructure are charged by municipality in connection with conditions of approval. Funds offset the public costs associated with the proposed development. Payment is voluntary and must be reasonably related to the cost of the service provided by the agency. Similar impact fees are aimed at improvements to municipal water systems, sewer systems, and parks or schools.	This strategy is good for green infrastructure in communities anticipating growth. Developments will likely be required to comply with stormwater management requirements. It is possible to tie the local and regional green infrastructure needs to the community at large, and the new development would pay its portion of green infrastructure costs. No ballot is needed for developer impact fees.	Non balloted approaches may encounter public resistance and require that there is a nexus between fees and impacts. The fee is voluntary and must be reasonably related to the cost of the service provided by the City of Union City. Developer impact fees must comply with AB1600 and the nexus study is required.	When the fee exceeds the reasonable cost of providing the public service, it may be declared as a special tax and may be subject to a two-thirds voter approval.
DIPSA and CDF and CFF for Transit Impact Fees				

Table E-3 Funding Options (Short-Term Pursuits, 2 of 3)

Local Funding	Description	Pros	Cons	Voter Approval Thresholds
Grants	Grants are one-time funding sources for qualifying projects from a federal, state and/or other granting authority.	Grants can fund programs or systems and new and innovative ideas. Grants can also be used to leverage other sources of funding. No ballot is needed for grants.	Funding for grants is competitive. It is not guaranteed and typically only available once. Grants often require maintenance and monitoring records. The City of Union City must provide matching funds, grant writers, and ongoing monitoring and reporting after the project is construction. An underlying, dedicated and sustainable revenue source such as a stormwater fee or tax is needed.	Grants are a non-balloted approach.
Community Facilities Districts (Mello-Roos)	The Community Facilities Districts tax is a special tax that must be approved by property owners or registered voters. This is often formed during the development process for a finite set of parcels owned by a single entity. This tax is often included in the conditions of approval for a proposed development.	The Community Facilities Districts tax provides a flexible funding option. Publicly-owned property can be exempted. The tax can be easily structured to allow for future development expansion.	The flexibility of the Community Facilities Districts tax allows diverse types of improvements or services that are funded. The Community Facilities Districts tax is primarily used for new development and may be restricted new developments only.	The Community Facilities Districts tax is a non-balloted approach and must be approved by property owners or registered voters.
Alternative Compliance	Alternative compliance programs are for new public and private development and redevelopment projects that use off-site projects to either supplement or replace stormwater management requirements. The Municipal Regional Permit allows the following: • Construction of a joint stormwater treatment facility • Construction of a stormwater treatment system off-site (on public or other private property) • Payment of an in-lieu fee for a regional project (on another public or private property)	Alternative Compliance programs increase flexibility and incentive the implementation of GI by the regulated community.	These programs can be complex to administer.	The alternative compliance programs are a non-balloted approach.
Credit Trading Program	A credit trading program allows a property owner to overbuild green infrastructure on their site and then trade "credits" to other properties who cannot meet their stormwater management requirements. This program is managed by a government agency to can create incentives to exceed the NDPES permit requirements and to incentivize green infrastructure on non-regulated sites.	Credit trading programs create incentives to exceed the NDPES permit requirements and to incentivize green infrastructure on non-regulated sites. The City of Union City could become more than just the broker of credits and be a creator or consumer of credits to be applied toward its green infrastructure retrofit goals. These credits would be a form of currency, analogous to in-lieu fees.	These programs would likely require coordination with other municipalities.	The credit trading programs are a non-balloted approach.

Table E-4 Funding Options (Short-Term Pursuits, 3 of 3)

Local Funding	Description	Pros	Cons	Voter Approval Thresholds
Transportation Opportunities	Transportation opportunities are for transportation projects that have recently begun to be subject to NPDES requirements. These opportunities trend towards complete and green streets involving green infrastructure even when not required by NPDES permits.	Multi-benefit projects demonstrate how transportation funding can be leveraged to satisfy stormwater treatment – and green infrastructure – goals economically.	There are often limitations to the uses of transportation funding and there may be political concerns about reallocating those dollars that can be used for stormwater treatment.	
Caltrans Mitigation Collaboration	Caltrans has shared NPDES obligations with other permittees and has funding available to mitigate various pollutant loading in instances where the obligation is shared. The local permittees administer Cooperative Implementation Agreements to pursue local or regional green infrastructure projects, thereby allowing Caltrans to meet its pollutant load mitigation requirements in partnership with the local agencies.	This partnership creates a benefit for local communities and Caltrans.	There are numerous municipalities that will be vying for these funds and they must have projects that can be implemented within Caltran's timelines for compliance.	
Developer Led Capital Projects	The developer builds green infrastructure in connection with conditions of approval from the City of Union City. Funds offset the public costs associated with the proposed development.	This is a low cost and low effort method for increasing the amount of green infrastructure built in Union City.	To ensure performance, the City of Union City will review the projects and provide same oversight it provides for regulatory driven green infrastructure as part of C.3. compliance. This would be a larger set of projects than the City of Union City are currently reviewing which may require more staff.	

Table E-5 Funding Options (Medium-Term Pursuits)

Local Funding	Description	Pros	Cons	Voter Approval Thresholds
Multi-Agency Partnerships	Multi-agency partnerships can take advantage of situations where regional projects and programs span jurisdictional boundaries.	Multi-agency partnerships optimize the partners' respective strengths such as obtaining grants but lacking in project delivery capacity or have environmental conditions that may be more or less conductive to green infrastructure. Sharing resources and funding have the potential to allows regional projects to be delivered more efficiently by taking advantage of economies of-scale savings for projects and programs. These types of projects can be an opportunity to be either a generator of trading credits or a way to invest trading credits. In addition, such partnerships can be a source of multi-benefit projects – projects that can achieve green infrastructure goals as well as other important public and private goals.	Development of the mechanisms for planning, capital, operations and maintenance and administrative chores requires coordination between agencies. The coordination may be difficult due to potential timing and communication issues.	

Table E-6 Funding Options (Long-Term Pursuits)

Local Funding	Description	Pros	Cons	Voter Approval Thresholds
Benefits Assessments	Benefits assessments are levied on properties to pay for services such as landscaping, lighting, recreation facilities, parks, fire protection, mosquito abatement, cemeteries, etc. These fees are governed by statutes that vary depending on the type of service or improvement. Benefit assessments must comply with Proposition 218, which requires assessments to have a nexus with the services rendered. Benefits that are general must be funded from sources other than the benefit assessments – such as a city's general fund. Benefit assessments typically are collected as part of the annual property tax bill.	Property owners in a watershed could be assessed to fund stormwater runoff management programs that provide direct benefits to properties within that watershed or sub-basin. The watershed unit may be particularly effective and equitable as programs can be tailored to address specific priorities identified within that watershed and would include the diverse socio-economic demographics from the hills to the flatlands typical to a Bay Area urban watershed.	Benefit assessments are not taxes or fees and must be approved by a weighted majority of the affected property owners that cast votes.	Benefits assessments are a non-balloted approach. Benefit assessments are not taxes or fees and must be approved by a weighted majority of the affected property owners that cast votes.
Financial Capability Assessment	An United States Environmental Protection Agency (EPA) process called the "Financial Capability Assessment Framework for Municipal Clean Water Act Requirements" allows communities that meet financial capability criteria to apply for delayed schedules for compliance with some of their NPDES stormwater permit elements. This assessment is designed to help communities develop a more accurate and complete picture of their ability to pay for Clean Water Act obligations, emphasizing factors beyond the 2% threshold for median income.	The financial capability assessment gives eligible municipalities more time to comply with their permit requirements.	The financial capability assessment does not help to generate additional funding nor allow the agency to avoid compliance with the NPDES stormwater permit requirements. The results of the assessment allows the agency to work with the EPA and the San Francisco Bay Regional Water Quality Control Board to work out an alternative compliance schedule depending on the community's financial capabilities.	

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 Clay Street, Suite 1400, Oakland, California 94612
waterboards.ca.gov/sanfranciscobay

ORDER R2-2022-0034
NPDES PERMIT CA0005789

The following Discharger is subject to the waste discharge requirements (WDRs) set forth in this Order:

Discharger	**Martinez Refining Company LLC**
Name of Facility	**Martinez Refining Company**
Facility Address	**3485 Pacheco Blvd** **Martinez, California 94553** **Contra Costa County**

Table 1. Discharge Locations

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Treated refinery process wastewater and stormwater	38.0322	-122.1289	Carquinez Strait
002	Stormwater	38.0225	-122.1106	Peyton Slough
004	Stormwater	38.0150	-122.1186	Peyton Creek
005	Stormwater	38.0161	-122.1019	Peyton Creek
007	Stormwater	38.0014	-122.1019	Peyton Creek
008	Stormwater	38.0111	-122.1067	Peyton Creek

This Order was adopted on:	**November 9, 2022**
This Order shall become effective on:	**January 1, 2023**
This Order shall expire on:	**December 31, 2027**
CIWQS regulatory measure number:	**449848**

The Discharger shall file a Report of Waste Discharge as an application for updated WDRs in accordance with title 23, California Code of Regulations, and an application for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit no later than **March 1, 2027.** The U.S. Environmental Protection Agency (U.S. EPA) and the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) have classified this discharge as "**major**."

I hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the Regional Water Board on the date indicated above.

Eileen White

Digitally signed by Eileen White
Date: 2022.11.14 11:10:55 -08'00'

Eileen White, Executive Officer

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1. FACILITY INFORMATION

Information describing Martinez Refining Company LLC's Martinez Refining Company Wastewater Treatment Plant (Facility) is summarized on the cover page and in Fact Sheet (Attachment F) sections 1 and 2. Fact Sheet section 1 also includes information regarding the permit application.

2. FINDINGS

The Regional Water Board finds the following:

2.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as an NPDES permit authorizing the Discharger to discharge into waters of the United States as described in Table 1 subject to the WDRs in this Order.

2.2. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on information the Discharger submitted as part of its application, information obtained through monitoring and reporting programs, and other available information. The Fact Sheet contains background information and rationale for the requirements in this Order and is hereby incorporated into and constitutes findings for this Order. Attachments A through E, G, and S are also incorporated into this Order.

2.3. Notification of Interested Parties. The Regional Water Board notified the Discharger and interested agencies and persons of its intent to prescribe these WDRs and has provided an opportunity to submit written comments and recommendations. Fact Sheet section 8.1 provides details regarding the notification.

2.4. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Fact Sheet section 8.3 provides details regarding the public hearing.

THEREFORE, IT IS HEREBY ORDERED that Order R2-2017-0039 (previous order) is rescinded upon the effective date of this Order, except for enforcement purposes, and, in order to meet the provisions contained in Water Code division 7 (commencing with § 13000) and regulations adopted thereunder and the provisions of the CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order. This action in no way prevents the Regional Water Board from taking enforcement action for violations of the previous order.

3. DISCHARGE PROHIBITIONS

3.1. Discharge of treated or partially-treated wastewater at a location or in a manner different than described in this Order is prohibited.

3.2. Discharge at Discharge Point 001 is prohibited when treated wastewater does not receive an initial dilution of at least 16:1, as modeled. Compliance shall be achieved by proper operation and maintenance of the discharge outfall to ensure that it (or its replacement, in whole or part) is in good working order and is consistent with or can achieve better mixing than that described in Fact Sheet section 4.3.5.2. The Discharger shall address measures taken to ensure this in its application for permit reissuance.

3.3. Bypass of untreated or partially-treated wastewater to waters of the United States is prohibited, except as provided for in Attachment D section 1.7 of this Order.

4. EFFLUENT LIMITATIONS

4.1. Discharge Point 001

4.1.1. **Effluent Limitations.** The discharge at Discharge Point 001 shall meet the following effluent limitations, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program (MRP, Attachment E):

Table 2. Effluent Limitations – Discharge Point 001

Parameter	Units	Average Monthly	Maximum Daily	Instantaneous
Biochemical Oxygen Demand	lbs/day	1,800	3,300	-
Total Suspended Solids	lbs/day	1,500	2,300	-
Chemical Oxygen Demand	lbs/day	13,000	25,000	-
Oil and Grease	lbs/day	530	1,000	-
Sulfide, Total	lbs/day	9.6	22	-
Phenolic Compounds, Total	lbs/day	7.6	25	-
Ammonia Nitrogen, Total (as N)	lbs/day	1,000	2,200	-
Chromium, Total Recoverable	lbs/day	8.9	26	-
Chromium (VI), Total Recoverable	lbs/day	0.73	1.6	-
Ammonia Nitrogen, Total (as N)	mg/L	21	57	-
Chronic Toxicity	TUc	-	10 [1][2]	-
Copper, Total Recoverable	µg/L	52	120	-
Cyanide, Total	µg/L	21	37	-
Nickel, Total Recoverable	µg/L	43	72	-
Selenium, Total Recoverable [3]	kg/day	1.1	-	-
Dioxin-TEQ	µg/L	1.4E-8	2.8E-8	-
pH [4]	standard units	-	-	6.0-9.0

Footnotes:

[1] This maximum daily effluent limit shall be replaced by the new maximum daily effluent limit (MDEL) and median monthly effluent limit (MMEL) described in Provision 4.1.2 on the first day of the month following U.S. EPA approval of the State Water Board's *State Policy for Water Quality Control: Toxicity Provisions* (Toxicity Provisions).

[2] Bioassays shall be conducted in accordance with MRP section 5.2. The maximum daily effluent limitation for chronic toxicity shall be interpreted as the maximum test result for the month.

[3] Compliance shall be evaluated by calculating the arithmetic mean of daily selenium mass discharges for each day of the calendar month. Daily mass discharges shall be calculated based on the total daily flow and the corresponding selenium concentration for each day that selenium is measured. The Discharger shall also report its average annual selenium load as required by Provision 6.3.4.4.

[4] If the Discharger monitors pH continuously, pursuant to 40 C.F.R. section 401.17 the Discharger shall be in compliance with this pH limitation provided that both of the following conditions are satisfied: (1) the total time during which the pH is outside the required range shall not exceed 7 hours and 26 minutes in any calendar month; and (2) no individual excursion from the required pH range shall exceed 60 minutes.

4.1.2. **Chronic Toxicity (After U.S. EPA Approval of Toxicity Provisions).** The chronic toxicity effluent limitation in Table 2 shall apply to the discharge at Discharge Point 001 until U.S. EPA approves the State Water Board's *State Policy for Water Quality Control: Toxicity Provisions* (Toxicity Provisions). On the first day of the month following U.S. EPA's approval of the Toxicity Provisions and thereafter, the discharge at Discharge Point 001 shall meet the following maximum daily effluent limit (MDEL) and median monthly effluent limit (MMEL) at Monitoring Location EFF-001, with compliance measured using the instream waste concentration of 10 percent effluent, the most sensitive species as described in the MRP, and the Test of Significant Toxicity:

- MDEL: No chronic aquatic toxicity test result of "fail" and no percent effect greater than or equal to 50 percent for any sub-lethal endpoint.

- MMEL: No more than one chronic aquatic toxicity test result of "fail" in a calendar month for any endpoint.

4.1.3. **Acute Toxicity (Prior to U.S. EPA Approval of Toxicity Provisions).** Until first day of the month following U.S. EPA's approval of the Toxicity Provisions, the discharge at Discharge Point 001 shall meet the following acute toxicity effluent limitations, with compliance measured at Monitoring Location EFF-001 as described in the MRP. These requirements are the same as those required after U.S. EPA approval of the Toxicity Provisions; see section 6.3.4.9 of this Order. If the Discharger can demonstrate that toxicity exceeding these acute toxicity limits is caused solely by ammonia and that the ammonia in the discharge complies with the ammonia effluent limits in Table 2 of this Order, then such toxicity shall not constitute a violation of these acute toxicity limits.

4.1.3.1. The 11-sample median shall not exhibit less than 90 percent survival (i.e., a bioassay test showing survival of less than 90 percent shall represent a violation of this effluent limit if five or more of the past ten or fewer bioassay tests show less than 90 percent survival).

4.1.3.2. The 11-sample 90th percentile shall not exhibit less than 70 percent survival (i.e., a bioassay test showing survival of less than 70 percent shall represent a violation of this effluent limit if one or more of the past ten or fewer bioassay tests also show less than 70 percent survival).

4.1.4. ***Enterococcus* Bacteria.** The discharge shall meet the following *Enterococcus* effluent limitations, with compliance measured at Monitoring Location EFF-001D as described in the MRP:

4.1.4.1. The six-week rolling geometric mean of *Enterococcus* bacteria shall not exceed 93 colony forming units per 100 milliliters (CFU/100 mL). Compliance with this limit shall be determined weekly by calculating the geometric mean of all *Enterococcus* sample results from the past six weeks.

4.1.4.2. No more than 10 percent of all *Enterococcus* bacteria samples collected in a calendar month shall exceed 890 CFU/100 mL. Compliance with this limit shall be determined based on measured sample results. The Discharger shall not report interpolated results. If the Discharger has 9 or fewer sample results in a calendar month, compliance shall be based on the highest result. If the Discharger has 10 to 19 sample results, compliance shall be based on the second highest result, and so on.

4.1.5. **Additional Contaminated Runoff Effluent Limitation Allocations.** Additional effluent limitation allocations for contaminated runoff commingled with process wastewater are established on top of the process wastewater mass-based limitations in Table 2. When contaminated runoff is discharged through Discharge Point 001, an additional effluent limitation allocation may be added to the effluent limitation in Table 2 for each pollutant in Table 3, below. The additional allocation shall be equal to the contaminated runoff flow times the pollutant concentration in Table 3.

Table 3. Additional Contaminated Runoff Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
Biochemical Oxygen Demand	mg/L	26	48
Total Suspended Solids	mg/L	21	33
Chemical Oxygen Demand	mg/L	180	360
Oil and Grease	mg/L	8.0	15
Phenolic Compounds, Total	mg/L	0.17	0.35
Chromium, Total Recoverable	mg/L	0.21	0.60
Chromium (VI), Total Recoverable	mg/L	0.028	0.062

4.1.6. **Additional Ballast Water Effluent Limitation Allocations.** Additional effluent limitation allocations for ballast water commingled with process wastewater are established on top of the process wastewater mass-based limitations in Table 2. When ballast water is discharged through Discharge Point 001, an additional effluent limitation allocation may be added to the effluent limitation in

Table 2 for each pollutant in Table 4, below. The additional allocation shall be equal to the ballast water flow times the pollutant concentration in Table 4.

Table 4. Additional Ballast Water Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
Biochemical Oxygen Demand	mg/L	26	48
Total Suspended Solids	mg/L	21	33
Chemical Oxygen Demand	mg/L	240	470
Oil and Grease	mg/L	8.0	15

4.1.7. **Recycled Water Use Effluent Limitation Adjustments.** If the Discharger replaces raw water used in its operations with recycled water and complies with Provision 6.3.4.8, an additional allocation shall be added to the mass-based and concentration-based effluent limitations by calculating adjustments as described below and adding them to the effluent limitations in Table 2. All calculations supporting such limitation adjustments shall be described in applicable self-monitoring reports.

4.1.7.1. **Concentration-based Effluent Limitation Adjustments.** The adjustment for a concentration-based effluent limitation shall be the difference between the recycled water influent mass and raw water influent mass, divided by the effluent volume for the applicable monitoring interval (e.g., seven days for a constituent monitored weekly) and shall be calculated according to the following example in which constituent B is monitored weekly and the lag time is Y days:

Step 1: Influent mass of B = [(Influent recycled water concentration of B) – (Influent raw water concentration of B)] x (Influent recycled water volume)

Step 2: Effluent volume for monitoring period = Effluent volume at Monitoring Location EFF-001 for the one-week period beginning Y days after influent mass determined

Step 3: Effluent limitation adjustment for B = (Influent mass of B) / (Effluent volume for monitoring period)

4.1.7.2. **Mass-based Effluent Limitation Adjustments.** The adjustment for a mass-based effluent limitation shall be the difference between the recycled water influent mass and raw water influent mass, divided by the number of days in the monitoring period, and shall be calculated according to the following example for constituent B (lag time is not used for this calculation):

Step 1: Influent mass of B = [(Influent recycled water concentration of B) – (Influent raw water concentration of B)] x (Influent recycled water volume)

Step 2: Effluent limitation adjustment for B = (Influent mass of B) / (Monitoring interval in days)

4.2. Discharge Points 002, 004, 005, 007, and 008

4.2.1. The Discharger shall comply with the following effluent limitations at Discharge Points 002, 004, 005, 007, and 008, with compliance measured at Monitoring Locations EFF-002, EFF-004, EFF-005, EFF-007, and EFF-008 as described in the MRP:

Table 5. Effluent Limitations for Stormwater Outfalls

Parameter	Units	Maximum Daily Limit	Other Limits
Total Organic Carbon	mg/L	110	-
Oil and Grease	mg/L	15	-
pH	s.u.	-	6.5 – 8.5 at all times
Visible Oil and Grease	-	-	None observed
Visible Color	-	-	None observed

4.2.2. If the total organic carbon or oil and grease effluent limitation in Table 5 is exceeded at any of Monitoring Locations EFF-002, EFF-004, EFF-005, EFF-007, and EFF-008, the Discharger shall also comply with the following effluent limitations at the same monitoring location as described in the MRP:

Table 6. Supplemental Effluent Limitations for Stormwater Outfalls

Pollutant	Units	Maximum Daily Limit	Average Monthly Limit [1]
BOD_5	mg/L	48	26
TSS [2]	mg/L	33	21
COD	mg/L	360	180
Oil and Grease	mg/L	15	8.0
Phenolic Compounds	mg/L	0.35	0.17
Total Chromium	mg/L	0.60	0.21
Hexavalent Chromium	mg/L	0.062	0.028

Footnotes:

[1] These limitations shall not apply unless there is sufficient runoff for sampling on at least three days during the month.

[2] As indicated in Provision 6.3.4.3, the TSS numeric action levels are an annual average of 100 mg/L and a daily maximum of 400 mg/L.

4.2.3. The Discharger shall comply with the requirements of Provision 6.3.4.3 as narrative effluent limitations.

5. RECEIVING WATER LIMITATIONS

5.1. The discharge shall not cause the following conditions at any place in receiving waters:

5.1.1. Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;

5.1.2. Alteration of suspended sediment in such a manner as to cause nuisance or adversely affect beneficial uses or detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life;

5.1.3. Suspended material in concentrations that cause nuisance or adversely affect beneficial uses;

5.1.4. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

5.1.5. Alteration of temperature beyond present natural background levels unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses;

5.1.6. Changes in turbidity that cause nuisance or adversely affect beneficial uses, or increases from normal background light penetration or turbidity greater than 10 percent in areas where natural turbidity is greater than 50 nephelometric turbidity units, or above 55 nephelometric turbidity units in areas where natural turbidity is less than or equal to 50 nephelometric turbidity units;

5.1.7. Coloration that causes nuisance or adversely affects beneficial uses;

5.1.8. Visible, floating, suspended, or deposited oil or other products of petroleum origin; or

5.1.9. Toxic or other deleterious substances in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

5.2. The discharge shall not cause the following limits to be exceeded at any place in receiving waters within one foot of the water surface:

5.2.1.	Dissolved Oxygen	5.0 mg/L, minimum The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations
5.2.2.	Dissolved Sulfide	Natural background levels

5.2.3. pH — The pH shall not be depressed below 6.5 nor raised above 8.5. The discharge shall not cause changes greater than 0.5 pH units in normal ambient pH levels.

5.2.4. Nutrients — Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

5.3. The discharge shall not cause a violation of any water quality standard for receiving waters adopted by the Regional Water Board or State Water Resources Control Board (State Water Board) as required by the CWA and regulations adopted thereunder beyond any mixing zone established through this Order. If more stringent water quality standards are promulgated or approved pursuant to CWA section 303, or amendments thereto, the Regional Water Board may revise or modify this Order in accordance with the more stringent standards.

6. PROVISIONS

6.1. Standard Provisions

6.1.1. The Discharger shall comply with all “Standard Provisions” in Attachment D.

6.1.2. The Discharger shall comply with all applicable provisions of the “Regional Standard Provisions, and Monitoring and Reporting Requirements for NPDES Wastewater Discharge Permits” in Attachment G.

6.1.3. For discharges from Discharge Points 002, 004, 005, 007, and 008, the Discharger shall comply with the applicable provisions of Attachment S (*Stormwater Provisions, Monitoring, and Reporting Requirements*).

6.1.4. If there is any conflict, duplication, or overlap between provisions in this Order, the more stringent provision shall apply.

6.2. Monitoring and Reporting Provisions

The Discharger shall comply with the Monitoring and Reporting Program (MRP, Attachment E) and future revisions thereto, and applicable monitoring and reporting requirements in Attachments D and G.

6.3. Special Provisions

6.3.1. **Reopener Provisions**

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law or as otherwise authorized by law. The Discharger may request a permit modification

based on any of these circumstances. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses as necessary.

6.3.1.1. If present or future investigations demonstrate that the discharges governed by this Order have or will have a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters;

6.3.1.2. If new or revised water quality objectives or total maximum daily loads (TMDLs) come into effect for San Francisco Bay or contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order may be modified as necessary to reflect the updated water quality objectives or wasteload allocations. Adoption of the effluent limitations in this Order is not intended to restrict in any way future modifications based on legally-adopted water quality objectives or TMDLs or as otherwise permitted under federal regulations governing NPDES permit modifications;

6.3.1.3. If translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified;

6.3.1.4. If a State Water Board precedential decision, new policy, new law, or new regulation is adopted; or

6.3.1.5. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to this discharge.

6.3.2. **Effluent Characterization Study and Report**

6.3.2.1. **Study Elements.** The Discharger shall characterize and evaluate the discharge from Discharge Points 001 and 002 as required by the MRP to verify that the reasonable potential analysis conclusions of this Order remain valid and to inform the next permit reissuance. The Discharger shall collect representative samples at Monitoring Locations EFF-001 and, when Discharge Point 002 discharges stormwater from upper Lake Slobodnik, Monitoring Location EFF-002, as defined in the MRP. If concentrations of any of the priority pollutants listed in Attachment G, Table B, significantly increase over past performance. The Discharger shall investigate the cause of any such increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. The Discharger shall establish remedial measures addressing any increase resulting in reasonable potential to cause or contribute to an exceedance of applicable water quality objectives. This requirement may be satisfied through identification of the constituent as a “pollutant of concern” in the Discharger’s Pollutant Minimization Program, described in Provision 6.3.3.

The Discharger shall evaluate on an annual basis if concentrations of any of these pollutants significantly increase over past performance. The Discharger shall investigate the cause of any such increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. The Discharger shall establish remedial measures addressing any increase resulting in reasonable potential to cause or contribute to an exceedance of applicable water quality objectives. This requirement may be satisfied through identification of the constituent as a "pollutant of concern" in the Discharger's Pollutant Minimization Program, described in Provision 6.3.3.

6.3.2.2. **Reporting Requirements**

6.3.2.2.1. **Routine Reporting.** The Discharger shall report the pollutants detected at or above applicable water quality objectives (see Fact Sheet Table F-6 for the objectives) in the transmittal letter for the self-monitoring report associated with the month in which samples were collected. This requirement does not apply to pollutants with effluent limitations (see Table 2 of this Order).

6.3.2.2.2. **Annual Reporting.** The Discharger shall summarize the annual data evaluation and source investigation in the annual self-monitoring report.

6.3.3. **Pollutant Minimization Program**

6.3.3.1. The Discharger shall continue to improve its existing Pollutant Minimization Program to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

6.3.3.2. The Discharger shall submit an annual report no later than February 28 of each calendar year. Each annual report shall include at least the following information:

6.3.3.2.1. **Brief description of wastewater treatment plant.** The description shall include the treatment plant processes.

6.3.3.2.2. **Discussion of current pollutants of concern.** Periodically, the Discharger shall analyze its circumstances to determine which pollutants are currently a problem and which pollutants may be potential future problems. This discussion shall include the reasons for choosing the pollutants.

6.3.3.2.3. **Identification of sources for pollutants of concern.** This discussion shall include how the Discharger intends to estimate and identify pollutant sources. The Discharger shall include sources or potential sources not directly within the ability or authority of the Discharger to control, such as pollutants in the potable water supply and air deposition.

6.3.3.2.4. **Identification of tasks to reduce the sources of pollutants of concern.** This discussion shall identify and prioritize tasks to address the Discharger's pollutants of concern. The Discharger may implement the tasks by itself or participate in group, regional, or national tasks that address its pollutants of concern. The Discharger is strongly encouraged to participate in group, regional, or national tasks that address its pollutants of concern whenever it is efficient and appropriate to do so. An implementation timeline shall be included for each task.

6.3.3.2.5. **Outreach to employees.** The Discharger shall inform employees about the pollutants of concern, potential sources, and how they might be able to help reduce the discharge of these pollutants of concern into the Facility. The Discharger may provide a forum for employees to provide input.

6.3.3.2.6. **Discussion of criteria used to measure Pollutant Minimization Program and task effectiveness.** The Discharger shall establish criteria to evaluate the effectiveness of its Pollutant Minimization Program. This discussion shall identify the specific criteria used to measure the effectiveness of each task in Provisions 6.3.3.2.3, 6.3.3.2.4, 6.3.3.2.5, and 6.3.3.2.6.

6.3.3.2.7. **Documentation of efforts and progress.** This discussion shall detail all of the Discharger's Pollutant Minimization Program activities during the reporting year.

6.3.3.2.8. **Evaluation of Pollutant Minimization Program and task effectiveness.** The Discharger shall use the criteria established in Provision 6.3.3.2.7 to evaluate the program and task effectiveness.

6.3.3.2.9. **Identification of specific tasks and timelines for future efforts.** Based on the evaluation, the Discharger shall explain how it intends to continue or change its tasks to more effectively reduce the amount of pollutants flowing to the treatment plant, and subsequently in its effluent.

6.3.3.3. The Discharger shall develop and conduct a Pollutant Minimization Program as described below when there is evidence that a priority pollutant is present in the effluent above an effluent limitation (e.g., sample results reported as detected but not quantified [DNQ] when the effluent limitation is less than the method detection limit [MDL], sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, or results of benthic or aquatic organism tissue sampling) and either:

6.3.3.3.1. A sample result is reported as DNQ and the effluent limitation is less than the Reporting Level (RL); or

6.3.3.3.2. A sample result is reported as not detected (ND) and the effluent limitation is less than the MDL, using definitions described in Attachment A and reporting protocols described in the MRP.

6.3.3.4. If triggered for a reason set forth in Provision 6.3.3.3, above, the Discharger's Pollutant Minimization Program shall include, but not be limited to, the following actions and submittals:

6.3.3.4.1. An annual review and semi-annual monitoring of potential sources of the reportable priority pollutants, which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures when source monitoring is unlikely to produce useful analytical data;

6.3.3.4.2. Quarterly monitoring for the reportable priority pollutants in the influent to the wastewater treatment system. The Executive Officer may approve alternative measures when influent monitoring is unlikely to produce useful analytical data;

6.3.3.4.3. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutants in the effluent at or below the effluent limitation;

6.3.3.4.4. Implementation of appropriate cost-effective control measures for the reportable priority pollutants, consistent with the control strategy; and

6.3.3.4.5. Inclusion of the following specific items within the annual report required by Provision 6.3.3.2, above:

6.3.3.4.5.1. All Pollutant Minimization Program monitoring results for the previous year;

6.3.3.4.5.2. List of potential sources of the reportable priority pollutants;

6.3.3.4.5.3. Summary of all actions undertaken pursuant to the control strategy; and

6.3.3.4.5.4. Description of actions to be taken in the following year.

6.3.4. **Other Special Provisions**

6.3.4.1. **Copper Action Plan.** The Discharger shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule:

Table 7. Copper Action Plan

Task No.	Task	Deadline
1	**Review Potential Copper Sources.** Submit an up-to-date inventory of potential copper sources.	With annual pollution minimization program report due February 28, 2023
2	**Implement Copper Control Program.** Continue to minimize copper sources, as identified in Discharger's Pollutant Prevention and Minimization Plan. Incorporate additional measures as appropriate to address newly identified potential copper sources.	Implementation shall be ongoing
3	**Implement Additional Actions.** If the Regional Water Board notifies the Discharger that the three-year rolling mean dissolved copper concentration in San Pablo Bay exceeds 3.0 µg/L, then within 90 days of the notification, evaluate the effluent copper concentration trend and, if it is increasing, develop and begin implementation of additional measures to control copper discharges. Report the conclusion of the trend analysis and provide a schedule for any new actions to be taken within the next 12 months.	With next annual pollution minimization program report due February 28 (at least 90 days following notification)
4	**Report Status.** Submit an annual report documenting copper control program implementation that evaluates the effectiveness of the actions taken, including any additional actions required by Task 2 above, and provides a schedule for actions to be taken within the next 12 months.	Annually, with annual pollution minimization program report due February 28 each year

6.3.4.2. **Cyanide Action Plan.** The Discharger shall implement monitoring and surveillance, pretreatment, source control, and pollution prevention for cyanide in accordance with the following tasks and time schedule:

Table 8. Cyanide Action Plan

Task No.	Task	Deadline
1	**Review Potential Cyanide Sources.** Submit an up-to-date inventory of potential cyanide sources.	With annual pollution minimization program report due February 28, 2023
2	**Implement Cyanide Control Program.** Continue to minimize cyanide sources, as identified in Discharger's Pollutant Prevention and Minimization Plan consisting, at a minimum, of the following elements: a. Inspect each potential source to assess the need to include that source in the control program. b. Maintain an emergency monitoring and response plan to be implemented if a significant cyanide discharge occurs.	Implementation shall be ongoing following Executive Officer notification under Task 1
3	**Implement Additional Measures.** If the Regional Water Board notifies the Discharger that ambient monitoring shows cyanide concentrations are 1.0 . g/L or higher in the main body of San Francisco Bay, then within 90 days of the notification, commence actions to identify and abate cyanide sources responsible for the elevated ambient concentrations, report on the progress and effectiveness of the actions taken, and provide a schedule for actions to be taken within the next 12 months.	With next annual pollution minimization program report due February 28 (at least 90 days following notification)

Task No.	Task	Deadline
4	**Report Status of Cyanide Control Program.** Submit an annual report documenting cyanide control program implementation and addressing the effectiveness of actions taken, including any additional cyanide controls required by Task 3, above, and provide a schedule for actions to be taken within the next 12 months.	Annually, with annual pollution minimization program report due February 28 each year

6.3.4.3. **Stormwater Pollution Prevention Plan and Annual Report.** By October 1, 2023, the Discharger shall submit and implement an updated Stormwater Pollution Prevention Plan (SWPPP). The SWPPP shall contain the elements listed in Attachment S section 1.1.

The Discharger shall submit an annual stormwater report by July 30 of each year covering data for the previous wet weather season. The annual stormwater report shall, at a minimum, include the elements listed in Attachment S section 3.1 and the following:

6.3.4.3.1. A tabulated summary of all sampling results and visual observations for all stormwater discharge points; and

6.3.4.3.2. A comprehensive discussion of compliance with effluent limitations, stormwater action levels (Attachment S, section 1.7), and other requirements of this Order and any corrective actions taken or planned,

6.3.4.4. **Average Annual Selenium Load.** The Discharger shall report the average annual selenium load from Discharge Point 001 in its Annual Self-Monitoring Report. The average annual load shall be the arithmetic mean of the annual mass discharges for the previous permit term. Annual mass emissions shall be computed as follows:

$$\text{Annual Mass emission rate (kg/day)} = (3.785/N) \sum Q_i C_i$$

Where:

N = number of samples in a year
Q_i = flow rate (MGD) associated with the ith sample, valid until a new sample is collected
C_i = selenium concentration (mg/L) associated with the ith sample, valid until a new sample is collected

When calculating selenium loads, the Discharger shall use estimated values and assume data reported below the method detection limit equal half of the detection limit.

6.3.4.5. **Acceptance of Ballast Water.** Before accepting ballast water at its treatment plant, the Discharger shall obtain approval from the California State Lands Commission and notify the Regional Water Board of that approval.

6.3.4.6. **Interim Pond 7 (ETP-1) Operating Plan.** Until the Discharger replaces Pond 7 (ETP-1) with a new biotreater, it shall submit quarterly progress reports by January 1, April 1, July 1, and October 1 of each year. The progress reports shall include actions completed over the previous quarter and any updates to the schedule in Fact Sheet section 2.6. At a minimum, the Discharger shall report the following:

- Internal and third party inspections by licensed professionals to check for evidence of erosion, leaks, and structural integrity, including photographic documentation;
- Berm maintenance to maintain freeboard, either by sandbags or other methods; and
- French drain maintenance to prevent seepage along northern portion of the Pond 7.

The Discharger shall submit a schedule for decommissioning Pond 7 within 30 days from the date it commences use of the new biotreater (ETP-4) (specified below in Provision 6.3.4.7).

6.3.4.7. **New Biotreater (ETP-4).** By July 1, 2025, the Discharger shall complete proposed upgrades to its biotreater (see Fact Sheet section 2.6) and submit the following documentation:

- Documentation that the reliability, capability, and performance of the plant upgrades will maintain compliance with this Order (i.e., the Discharger shall evaluate the hydraulic and organic loading capacities of the treatment facilities by appropriate combinations of desk-top analyses and treatment process stress testing to simulate design peak loading conditions under both dry-weather and wet-weather design flow conditions);
- Certification by a licensed professional that the new biotreater has been constructed as designed, has been tested, and is ready for use;
- Demonstration of compliance with all applicable provisions of CEQA (California Public Resources Code Division 13, Chapter 3, Section 21100 et seq.);
- Updates to the Operation and Maintenance Manual and Contingency Plan to include the plant upgrades; and
- Specific date the Discharger proposes to commence use of the new biotreater.

Under Water Code section 13385(j)(1)(D), the Discharger may, at least 30 days in advance of operating the plant upgrades, submit a startup operations plan. The plan should describe the actions the Discharger will take during a specific period that requires adjusting and testing new treatment plant units, including steps to prevent violations of the requirements of this Order. If the Discharger pursues this option, it should define the shortest reasonable time required for the period of adjusting and testing, which shall not exceed 90 days for biological treatment units and shall not exceed 30 days for any other treatment unit.

6.3.4.8. **Conditions for Mass and Concentration Adjustments for Recycled Water.** Prior to any allocation of recycled water use adjustments to the mass-based or concentration-based effluent limitations in Table 2 (see Provision 4.1.7), the Discharger shall satisfy all of the following conditions:

6.3.4.8.1. The Discharger shall sample and analyze influent recycled water for any constituents for which it seeks adjustments at Monitoring Location INF-001 at least as frequently as the MRP requires for effluent monitoring at Monitoring Location EFF-001.

6.3.4.8.2. The Discharger shall sample and analyze influent raw water for any constituents for which it seeks adjustments at Monitoring Location INF-002 at least once per year. The annual average concentration may be used in the calculations described in Provision 4.1.7.

6.3.4.8.3. The Discharger shall determine the interval between the introduction of a limited constituent in recycled water and the appearance of that constituent in the final effluent.

6.3.4.8.4. The Discharger shall submit a technical report demonstrating that the proposed adjustments will not impair beneficial uses in the vicinity of the discharge (such as by creating a zone acutely toxic to aquatic organisms). At a minimum, the report shall assess toxicity testing results and compare the effluent concentrations projected when using recycled water to the proposed adjusted effluent limitations.

6.3.4.8.5. The Discharger shall submit one or more examples of how influent recycled and raw water concentrations, lag time, and effluent limitation adjustments will be calculated in accordance with Provision 4.1.7.

6.3.4.8.6. The Discharger shall obtain written concurrence from the Executive Officer stating that these conditions have been met.

6.3.4.9. **Acute Toxicity (After U.S. EPA Approval of Toxicity Provisions).** On the first day of the month following U.S. EPA's approval of the Toxicity Provisions, the discharge at Discharge Point 001 shall meet the following acute toxicity requirements, with compliance measured at Monitoring Location EFF-001 as described in the MRP. These requirements are the

same as those required prior to U.S. EPA approval of the Toxicity Provisions; see section 4.1.3 of this Order. If the Discharger can demonstrate that toxicity exceeding these acute toxicity limits is caused solely by ammonia and that the ammonia in the discharge complies with the ammonia effluent limits in Table 2 of this Order, then such toxicity shall not constitute a violation of these acute toxicity limits.

6.3.4.9.1. The 11-sample median shall not exhibit less than 90 percent survival (i.e., a bioassay test showing survival of less than 90 percent shall represent a violation of this effluent limit if five or more of the past ten or fewer bioassay tests show less than 90 percent survival).

6.3.4.9.2. The 11-sample 90th percentile shall not exhibit less than 70 percent survival (i.e., a bioassay test showing survival of less than 70 percent shall represent.

6.3.4.10. **Measures to maintain selenium performance.** The Discharger shall complete the following tasks and submit a report by June 1, 2023:

- Assess the feasibility of using its sand filter downstream of the selenium processing unit. Evaluate when the sand filter can be used and describe situations when it cannot be used, such as high flows;
- Evaluate the selenium removal provided by the sand filter, including conditions when selenium removal could be optimized;
- Investigate alternatives to using the sand filter for selenium removal if using the sand filter is infeasible or the sand filter does not remove selenium;
- Investigate methods other refineries use to comply with selenium limits. Evaluate the feasibility of using these methods to decrease selenium discharges; and
- Describe alternative measures to be implemented to ensure selenium discharges comply with the wasteload allocation in the North San Francisco Bay Selenium TMDL.

ATTACHMENT A – DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Alternative Hypothesis
Statement used to propose a statistically significant relationship in a set of given observations. Under the TST approach, when the Null Hypothesis is rejected, the Alternative Hypothesis is accepted in its place, indicating a relationship between variables and an acceptable level of toxicity.

Arithmetic Mean (.)
Also called the average, sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$

where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples

Average Monthly Effluent Limitation (AMEL)
Highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
Highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Taken up by an organism from its surrounding medium through gill membranes, through epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Calendar Month(s)
Period from the first day of a month through the last day of a month (e.g., January 1 to January 31). For toxicity monitoring, the period is from the first day of a routine monitoring test to the day before the corresponding day of the next month (e.g., from June 15 to July 14), or to the last day of the next month if there is no corresponding day (e.g., January 31 to February 28).

Carcinogenic
Known to cause cancer in living organisms.

Coefficient of Variation (CV)
Measure of data variability calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Either: (1) the total mass of a constituent discharged over a calendar day (12:00 a.m. through 11:59 p.m.) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit) for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of a constituent over a day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period is considered the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ)
Sample results less than the RL, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dilution Credit
Amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effective Concentration (EC)
The EC is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC25 is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

Effluent Concentration Allowance (ECA)
Value derived from the water quality criterion or objective, dilution credit, and ambient background concentration that is used, in conjunction with the CV for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as wasteload allocation (WLA) as used in U.S. EPA guidance (*Technical Support Document for Water Quality-based Toxics Control*, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest

distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
Concentration that results from the confirmed detection of a substance below the ML by the analytical method.

Estuaries
Waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220; Suisun Bay; Carquinez Strait downstream to the Carquinez Bridge; and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inhibition Concentration (IC)
The IC is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC25 is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as U.S. EPA's Bootstrap Procedure.

Inland Surface Waters
All surface waters of the state that are not the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
Highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
Lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Instream Waste Concentration (IWC)
Concentration of effluent in the receiving water after any dilution credit is applied. The IWC is the inverse of 1 plus the dilution credit, D, or IWC = 1/(1+D), expressed as a percentage (e.g., if D = 9, the IWC is 10 percent). If no dilution credit is granted, the IWC is 100 percent.

Maximum Daily Effluent Limitation (MDEL)
Highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour

period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For toxicity, the MDEL is based on the outcome of the TST and the percent effect at the IWC (applied to the results of any single bioassay). For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
Middle measurement in a data set. The median of a data set is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2+1)})/2$ (i.e., the midpoint between n/2 and n/2+1).

Median Monthly Effluent Limitation (MMEL)
Highest allowable median of daily discharges over a calendar month, calculated as the median of all daily discharges measured during a calendar month. For aquatic toxicity, the MMEL is an effluent limitation based on a maximum of three independent toxicity tests analyzed using the TST during a calendar month.

Median Monthly Effluent Target (MMET)
Target based on a maximum of three independent toxicity tests using the TST during a calendar month used to determine whether a TRE should be conducted. Not meeting a MMET is not a violation of an effluent limitation. The MMET only applies to discharges with no numeric toxicity limits or to testing with *Ceriodaphnia dubia* prior to January 1, 2024.

Method Detection Limit (MDL)
Minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 C.F.R. part 136, Appendix B.

Minimum Level (ML)
Concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Limited volume of receiving water allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

MMEL Compliance Test
For chronic toxicity monitoring, one of up to two tests used in addition to a routine monitoring test to determine compliance with the chronic toxicity MMEL and MDEL.

No Observed Effect Concentration (NOEC).
The NOEC is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

No Observed Effect level (NOEL).
For compliance determination, the NOEL is equal to IC25 or EC25. If the IC25 or EC25 cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Null Hypothesis
Statement used in statistical testing that has been put forward either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved.

Percent Effect
Value that denotes the difference in response between a test concentration and a control, divided by the mean control response and multiplied by 100.

Persistent Pollutants
Substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program
Program of waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of a Pollutant Minimization Program is to reduce all potential sources of a priority pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. Cost effectiveness may be considered when establishing the requirements of a Pollutant Minimization Program. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), is considered to fulfill the Pollutant Minimization Program requirements.

Pollution Prevention
Any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such

an approach are identified to the satisfaction of the State Water Resources Control Board or Regional Water Board.

Regulatory Management Decision (RMD)
Decision that represents the maximum allowable error rates and thresholds for toxicity and non-toxicity that would result in an acceptable risk to aquatic life.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. For priority pollutants, the MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from State Implementation Plan (SIP) Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Response
Measured biological effect (e.g., on survival, reproduction, growth) of exposure to a stimulus.

Routine Monitoring
Regular chronic toxicity monitoring required during the permit term. Routine monitoring results may trigger MMEL compliance tests. If a violation of the MDEL or MMEL occurs, Routine monitoring also includes one sample collected during the following month (regardless of the regular monitoring frequency), which is used to determine if a TRE is necessary. Routine monitoring does not include surveillance monitoring.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) beneficial use.

Standard Deviation (σ)
Measure of variability calculated as follows:

Standard deviation = $\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$

where: x is the observed value
μ is the arithmetic mean of the observed values
n is the number of samples

Test of Significant Toxicity (TST)
Statistical approach used to analyze aquatic toxicity test data, as described in section III.B.3 of *State Water Board's State Policy for Water Quality Control: Toxicity Provisions*.

Toxicity Reduction Evaluation (TRE)
Study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. A TIE is a set of procedures to identify the specific chemicals responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

ABBREVIATIONS

%	Percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/L	Micrograms per liter
1/Blending Event	Once per blending event
1/Day	Once per day
1/Month	Once per month
1/Quarter	Once per quarter
1/Week	Once per week
1/Year	Once per year
1/Event	Once per event
2/Month	Two times per month
2/Week	Twice per week
2/Year	Twice per year
3/Week	Three times per week
4/Week	Four times per week
5/Week	Five times per week
AMEL	Average monthly effluent limitation
AWEL	Average weekly effluent limitation
B	Background concentration
bpd	Barrels per day
C	Water quality criterion or objective
C-24	24-hour composite
CFU/100 mL	Colony forming units per 100 milliliters

Continuous	Measured continuously
Continuous/D	Measured continuously, and recorded and reported daily
Continuous/H	Measured continuously, and recorded and reported hourly
CV	Coefficient of Variation
DNQ	Detected, but not quantified
DL	Detection level
ECA	Effluent Concentration Allowance
gpm	Gallons per minute
Grab	Grab sample
MDEL	Maximum Daily Effluent Limitation
MDL	Method detection limit
MEC	Maximum effluent concentration
MG	Million gallons
mg/L	Milligrams per liter
mg/L as N	Milligrams per liter as nitrogen
MGD	Million gallons per day
ML	Minimum level
MPN/100 mL	Most probable number per 100 milliliters
ND	Not detected
NTU	Nephelometric turbidity units
ppt	Parts per thousand
RL	Reporting level
RPA	Reasonable potential analysis
s.u.	Standard pH units
TIE	Toxicity identification evaluation
TRE	Toxicity reduction evaluation
TUa	Acute toxicity units
TUc	Chronic toxicity units

ATTACHMENT B – MAPS

Figure B-1. Satellite Image of Facility

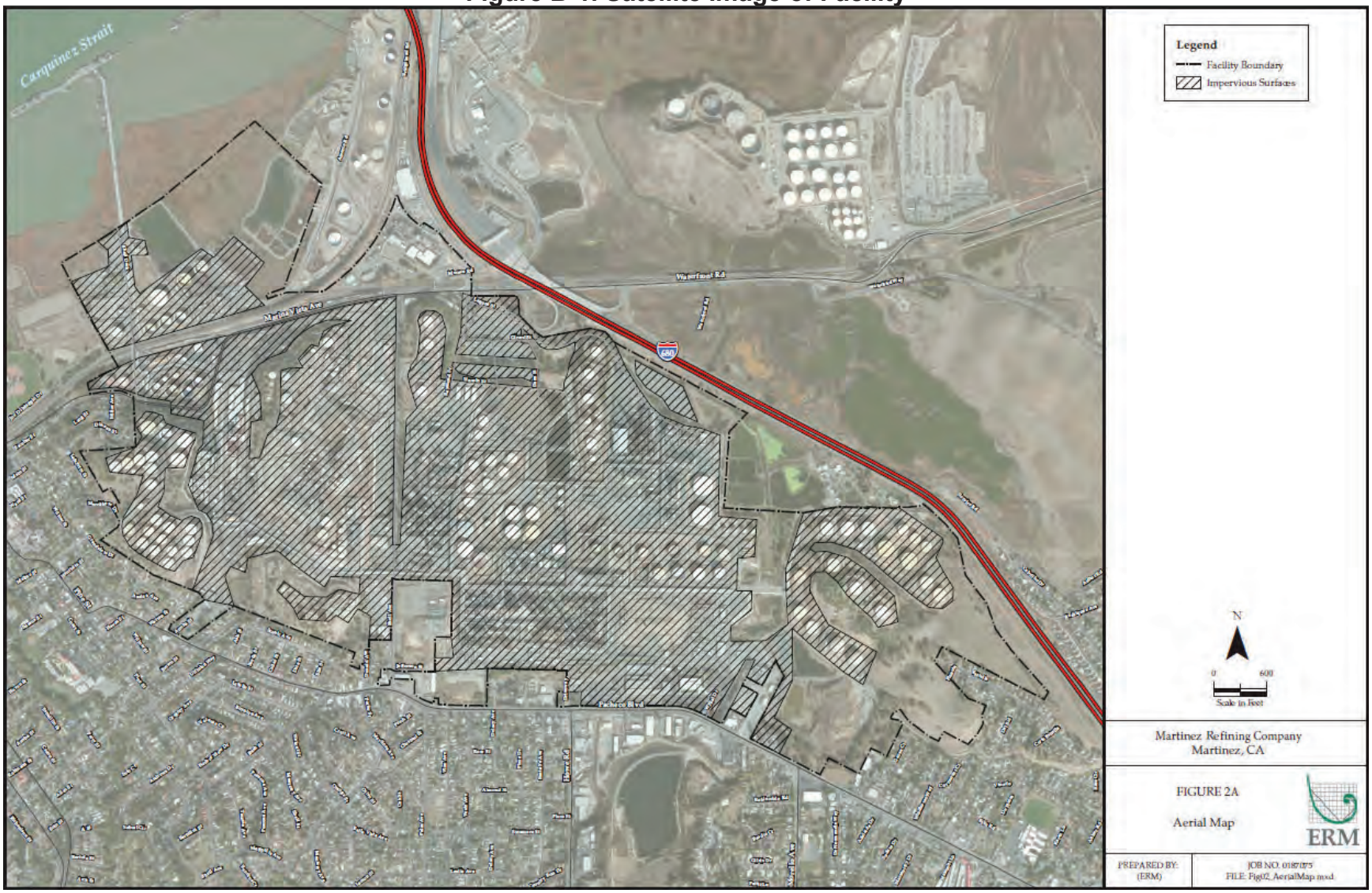

Figure B-2. Facility Map

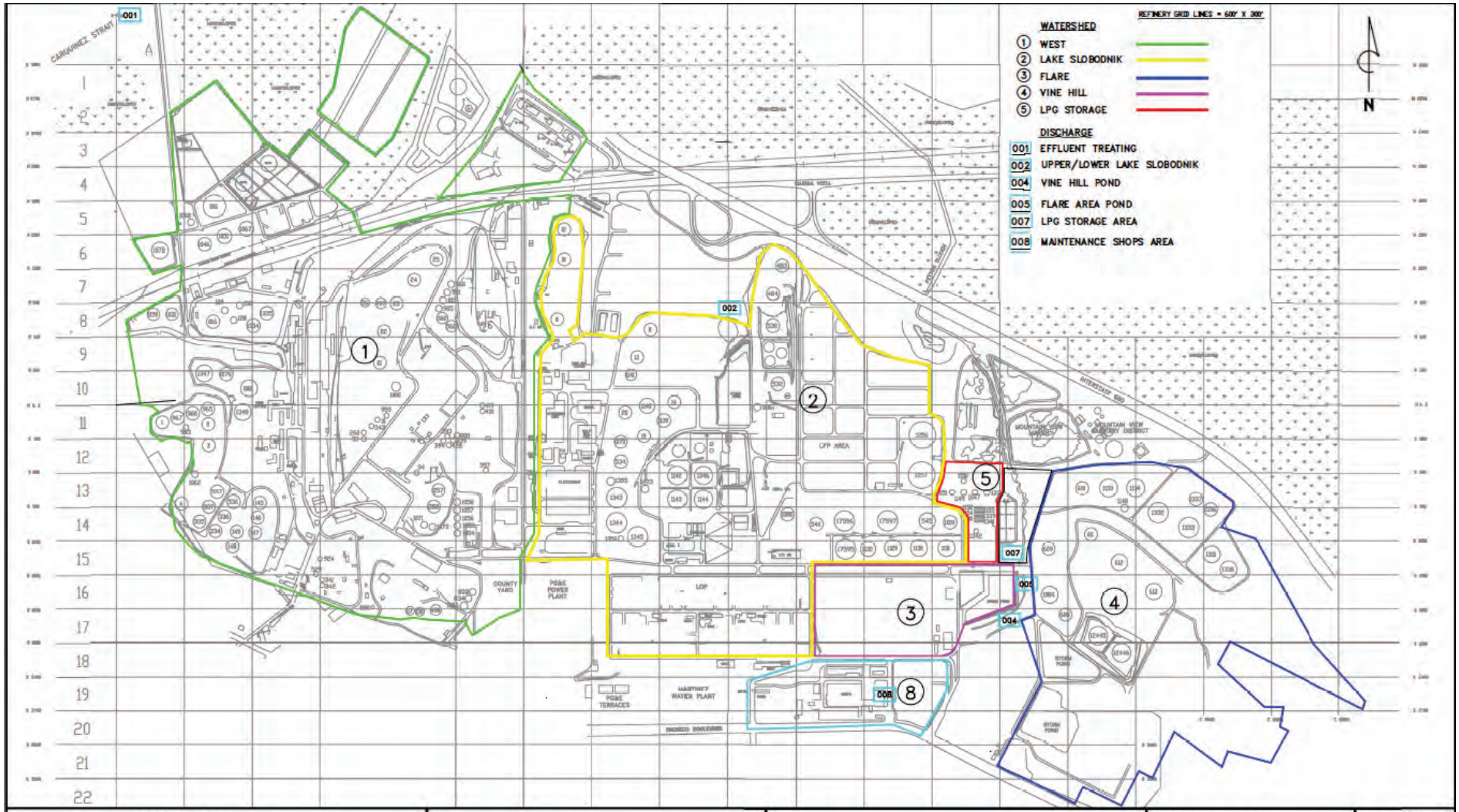

ATTACHMENT C – FLOW SCHEMATIC

Figure C-1: Wastewater Treatment Flow Diagram

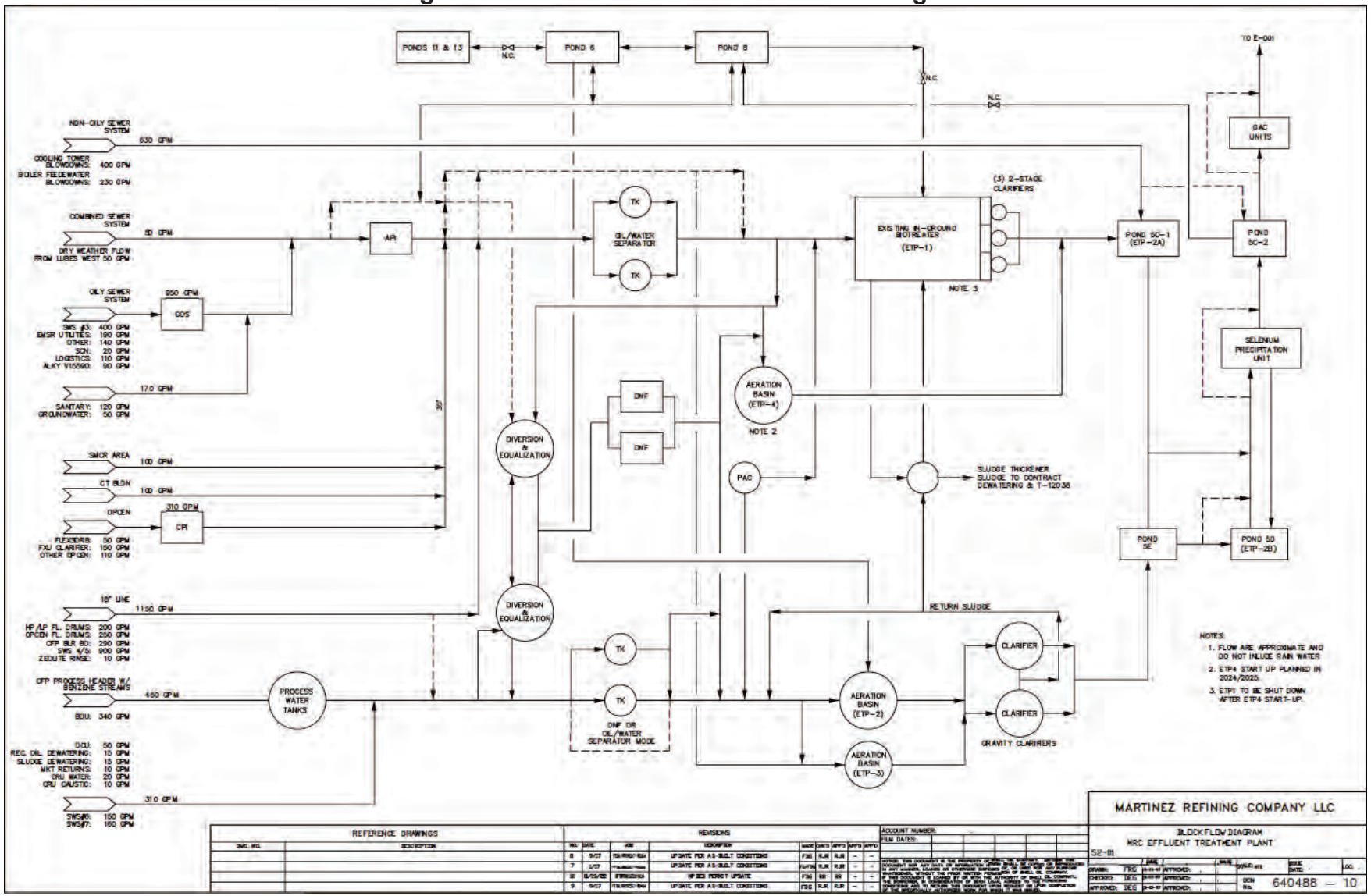

ATTACHMENT D – STANDARD PROVISIONS

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ATTACHMENT D – STANDARD PROVISIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

1.1. Duty to Comply

1.1.1. The Discharger must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); Wat. Code, §§ 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, 13385.)

1.1.2. The Discharger shall comply with effluent standards or prohibitions established under CWA section 307(a) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

1.2. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

1.3. Duty to Mitigate. The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

1.4. Proper Operation and Maintenance. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

1.5. Property Rights

1.5.1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

1.5.2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

1.6. Inspection and Entry. The Discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); Wat. Code, §§ 13267, 13383):

1.6.1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); Wat. Code, §§ 13267, 13383);

1.6.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); Wat. Code, §§ 13267, 13383);

1.6.3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); Wat. Code, §§ 13267, 13383); and

1.6.4. Sample or monitor, at reasonable times, for the purposes of ensuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); Wat. Code, §§ 13267, 13383.)

1.7. Bypass

1.7.1. **Definitions**

1.7.1.1. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

1.7.1.2. “Severe property damage” means substantial physical damage to property; damage to the treatment facilities, which causes them to become inoperable; or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

1.7.2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur that does not cause exceedances of effluent limitations, but only if it is for essential maintenance to ensure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance sections 1.7.3, 1.7.4, and 1.7.5 below. (40 C.F.R. § 122.41(m)(2).)

1.7.3. **Prohibition of bypass.** Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

1.7.3.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

1.7.3.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

1.7.3.3. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance section 1.7.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

1.7.4. **Approval.** The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance section 1.7.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

1.7.5. **Notice**

1.7.5.1. **Anticipated bypass.** If the Discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the date of the bypass. The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(i).)

1.7.5.2. **Unanticipated bypass.** The Discharger shall submit a notice of an unanticipated bypass as required in Standard Provisions – Reporting section 5.5 below (24-hour notice). The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

1.8. Upset. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1.8.1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance section 1.8.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

1.8.2. **Conditions necessary for a demonstration of upset.** A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

1.8.2.1. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

1.8.2.2. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

1.8.2.3. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting section 5.5.2.2 below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

1.8.2.4. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance section 1.3 above. (40 C.F.R. § 122.41(n)(3)(iv).)

1.8.3. **Burden of proof.** In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

2. STANDARD PROVISIONS – PERMIT ACTION

2.1. General. This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

2.2. Duty to Reapply. If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

2.3. Transfers. This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)

3. STANDARD PROVISIONS – MONITORING

3.1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

3.2. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or as required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

3.2.1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, and either the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

3.2.2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N, for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under 40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapter N, monitoring must be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3), 122.41(j)(4), 122.44(i)(1)(iv).)

4. STANDARD PROVISIONS – RECORDS

4.1. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

4.2. Records of monitoring information shall include:

4.2.1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

4.2.2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

4.2.3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4.2.4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

4.2.5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

4.2.6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

4.3. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

4.3.1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

4.3.2. Permit applications and attachments, permits, and effluent data. (40 C.F.R. § 122.7(b)(2).)

5. STANDARD PROVISIONS – REPORTING

5.1. Duty to Provide Information. The Discharger shall furnish to the Regional Water Board, State Water Board, or U.S. EPA within a reasonable time, any information that the Regional Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, §§ 13267, 13383.)

5.2. Signatory and Certification Requirements

5.2.1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions – Reporting sections 5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.6 below. (40 C.F.R. § 122.41(k).)

5.2.2. For a corporation, all permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to ensure long term environmental

compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 C.F.R. § 122.22(a)(1).)

For a partnership or sole proprietorship, all permit applications shall be signed by a general partner or the proprietor, respectively. (40 C.F.R. § 122.22(a)(2).)

For a municipal, state, federal, or other public agency, all permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3).).

5.2.3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting section 5.2.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

5.2.3.1. The authorization is made in writing by a person described in Standard Provisions – Reporting section 5.2.2 above (40 C.F.R. § 122.22(b)(1));

5.2.3.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

5.2.3.3. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

5.2.4. If an authorization under Standard Provisions – Reporting section 5.2.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting section 5.2.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5.2.5. Any person signing a document under Standard Provisions – Reporting section 5.2.2 or 5.2.3 above shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

5.2.6. Any person providing the electronic signature for documents described in Standard Provisions – Reporting sections 5.2.1, 5.2.2, or 5.2.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting section 5.2, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R § 122.22(e).)

5.3. Monitoring Reports

5.3.1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.41(l)(4).)

5.3.2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board. All reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 and comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(l)(4)(i).)

5.3.3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. chapter 1, subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Regional Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

5.3.4. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

5.4. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

5.5. Twenty-Four Hour Reporting

5.5.1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 21, 2025, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted to the Regional Water Board and must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

5.5.2. The following shall be included as information that must be reported within 24 hours:

5.5.2.1. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

5.5.2.2. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.5.3. The Regional Water Board may waive the above required written report on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.6. Planned Changes. The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

5.6.1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 C.F.R. section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

5.6.2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order unless the discharge is an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a). (40 C.F.R. § 122.41(l)(1)(ii).) If the discharge is an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a), this notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under 40 C.F.R. section 122.42(a)(1) (see Additional Provisions – Notification Levels section 7.1.1). (40 C.F.R. § 122.41(l)(1)(ii).)

5.7. Anticipated Noncompliance. The Discharger shall give advance notice to the Regional Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

5.8. Other Noncompliance. The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting sections 5.3, 5.4, and 5.5 above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting section 5.5 above. For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting section 5.5 and the applicable required data in appendix A to 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(7).)

5.9. Other Information. When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or U.S. EPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

5.10. Initial Recipient for Electronic Reporting Data. The owner, operator, or duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient defined in 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. section 127.2(c)]. U.S. EPA will update and maintain this list. (40 C.F.R. § 122.41(l)(9).)

6. STANDARD PROVISIONS – ENFORCEMENT

6.1. The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, Water Code sections 13268, 13385, 13386, and 13387.

7. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

7.1. Non-Municipal Facilities. Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 C.F.R. § 122.42(a)):

7.1.1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels” (40 C.F.R. § 122.42(a)(1)):

7.1.1.1. 100 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(1)(i));

7.1.1.2. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4 dinitrophenol and 2-methyl 4,6 dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(1)(ii));

7.1.1.3. Five (5) times the maximum concentration reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(1)(iii)); or

7.1.1.4. The level established by the Regional Water Board in accordance with 40 C.F.R. section 122.44(f). (40 C.F.R. § 122.42(a)(1)(iv).)

7.1.2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 C.F.R. § 122.42(a)(2)):

7.1.2.1. 500 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(2)(i));

7.1.2.2. 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(2)(ii));

7.1.2.3. Ten (10) times the maximum concentration reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(2)(iii)); or

7.1.2.4. The level established by the Regional Water Board in accordance with 40 C.F.R. section 122.44(f). (40 C.F.R. § 122.42(a)(2)(iv).)

7.2 Publicly Owned Treatment Works (POTWs)

7.2.1. All POTWs shall provide adequate notice to the Regional Water Board of any new introduction of pollutants into the POTW from an indirect discharger that

would be subject to CWA sections 301 or 306 if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)).

7.2.2. All POTWs shall provide adequate notice to the Regional Water Board of any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of this Order. (40 C.F.R. § 122.42(b)(2).)

7.2.3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Clean Water Act (CWA) section 308 and 40 C.F.R. sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. This Monitoring and Reporting Program (MRP) establishes monitoring, reporting, and recordkeeping requirements that implement the federal and State laws and regulations.

1. GENERAL MONITORING PROVISIONS

1.1. The Discharger shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 C.F.R. section 122.63. If any discrepancies exist between this MRP and the "Regional Standard Provisions, and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits" (Attachment G), this MRP shall prevail.

1.2. The Discharger shall conduct all monitoring in accordance with Attachment D section 3, as supplemented by Attachment G. Equivalent test methods must be more sensitive than those specified in 40 C.F.R. section 136 and must be specified in this permit.

1.3. For the analysis of monitoring samples, the Discharger shall use laboratories certified by the State Water Resources Control Board (State Water Board) in accordance with Water Code section 13176 and shall obtain quality assurance/quality control data with laboratory reports. For any onsite field tests (e.g., turbidity, pH, temperature, dissolved oxygen, conductivity, disinfectant residual) analyzed by a noncertified laboratory, the Discharger shall implement a Quality Assurance-Quality Control Program. The Discharger shall keep a manual onsite containing the steps followed in this program and shall demonstrate sufficient capability to adequately perform these field tests (e.g., qualified and trained employees, properly calibrated and maintained field instruments). The program shall conform to U.S. EPA guidelines or other approved procedures.

1.4. The Discharger shall ensure that the results of the Discharge Monitoring Report-Quality Assurance (DMR-QA) Study or most recent Water Pollution Performance Evaluation Study are submitted annually to the State Water Board electronically to the DMR-QA Officer via email.

2. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements of this Order:

Table E-1. Monitoring Locations

Discharge Point	Monitoring Location	Monitoring Location Description
Recycled Water	INF-001	Any point in the Facility's recycled water supply pipe upstream of any water treatment unit, blending point, or point of use (not including landscape irrigation).
Raw Water	INF-002	Any point in the Facility's raw water supply pipe upstream of any water treatment unit, blending point, or point of use.
Treated Wastewater	EFF-001	Any point in the discharge line from the treatment facilities, at which samples are representative of treated wastewater discharged at Discharge Point 001.
Treated Wastewater	EFF-001D	Any point downstream from the disinfection facilities for the Facility's sanitary sewage, at which all sewage is present and adequate disinfection is ensured.
Stormwater	EFF-002	The point of discharge from retention ponds for Discharge Point 002.
Stormwater	EFF-004	The point of discharge from retention ponds for Discharge Point 004.
Stormwater	EFF-005	The point of discharge from retention ponds for Discharge Point 005.
Stormwater	EFF-007	The point of discharge from retention ponds for Discharge Point 007.
Stormwater	EFF-008	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 008 can be obtained prior to discharge.

3. INFLUENT MONITORING

3.1. Recycled Water Intake. Monitoring recycled water at Monitoring Location INF-001 is only required if the Discharger chooses to apply for recycled water adjustments in accordance with Provision 4.1.7 of this Order. The Discharger need monitor only those parameters for which it seeks effluent limitation adjustments; monitoring other parameters is optional.

Table E-2. Influent Monitoring – Monitoring Location INF-001

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Recycled Water Flow [1]	MGD	Continuous	Continuous
Biochemical Oxygen Demand (BOD_5) (5-day @ 20 degrees Celsius)	mg/L	C-24	1/Month
Total Suspended Solids (TSS)	mg/L	C-24	1/Week or 3/Week [2]
Chemical Oxygen Demand (COD)	mg/L	C-24	1/Month
Oil and Grease	mg/L	Grab	1/Month
Sulfide, Total	mg/L	Grab	1/Month
Phenolic Compounds, Total	mg/L	C-24	1/Month
Ammonia	mg/L as N	C-24	1/Month
Chromium, Total Recoverable	mg/L	C-24	1/Month

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Chromium (VI), Total Recoverable [3]	mg/L	Grab	1/Month
Copper, Total Recoverable	µg/L	C-24	1/Month
Cyanide, Total [4]	µg/L	Grab	1/Month
Nickel, Total Recoverable	µg/L	C-24	1/Month
Selenium, Total Recoverable [5]	µg/L	C-24	1/Week
Dioxin-TEQ	pg/L	C-24	2/Year

Footnotes:

[1] Flow shall be monitored continuously and the following flow information shall be reported in monthly self-monitoring reports:

- Daily average flow rate (MGD)
- Total monthly flow volume (MG)

[2] From April 1 through November 30, the TSS monitoring frequency at Monitoring Location EFF-001 shall be once per week. From December 1 through March 31, the TSS monitoring frequency at Monitoring Location EFF-001 shall be three times per week. In accordance with Provision 6.3.4.3 of this Order, the Discharger shall sample and analyze TSS at Monitoring Location INF-001 at least as frequently as this MRP requires for monitoring at Monitoring Location EFF-001.

[3] The Discharger may, at its option, comply with the hexavalent chromium limitations by using total chromium results. In this case, analysis for hexavalent chromium shall be waived. The Discharger shall use the same chromium analysis as the one it conducts for Monitoring Location EFF-001.

[4] The Discharger may, at its option, analyze for cyanide as weak acid dissociable cyanide using protocols specified in 40 C.F.R. Part 136, or an equivalent method in the latest Standard Method edition.

[5] The Discharger shall analyze selenium using U.S. EPA Method No. 200.8 or Standard Method No. 3114B or 3114C.

3.2. Raw Water Intake. Monitoring raw water at Monitoring Location INF-002 is only required if the Discharger chooses to apply for recycled water adjustments in accordance with Provision 4.1.7 of this Order. The Discharger need monitor only those parameters for which it seeks effluent limitation adjustments; monitoring other parameters is optional.

Table E-3. Influent Monitoring – Monitoring Location INF-002

Parameter	Unit	Sample Type	Minimum Sampling Frequency
BOD_5	mg/L	C-24	1/Year [1]
TSS	mg/L	C-24	1/Year [1]
COD	mg/L	C-24	1/Year [1]
Oil and Grease	mg/L	Grab	1/Year [1]
Sulfide, Total	mg/L	Grab	1/Year [1]
Phenolic Compounds, Total	mg/L	C-24	1/Year [1]
Ammonia	mg/L as N	C-24	1/Year [1]
Chromium, Total Recoverable	mg/L	C-24	1/Year [1]
Chromium (VI), Total Recoverable [2]	mg/L	Grab	1/Year [1]
Copper, Total Recoverable	µg/L	C-24	1/Year [1]
Cyanide, Total [3]	µg/L	Grab	1/Year [1]

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Nickel, Total Recoverable	µg/L	C-24	1/Year [1]
Selenium, Total Recoverable [4]	µg/L	C-24	1/Year [1]
Dioxin-TEQ	ρg/L	C-24	1/Year [1]

Footnotes:

[1] As described in Provision 6.3.4.8 of this Order, the Discharger shall sample and analyze influent raw water at least once per year at Monitoring Location INF-001 for any constituents for which it seeks recycled water use adjustments. The annual average concentration may be used in the calculations described in provision 4.1.7 of this Order.

[2] The Discharger may, at its option, comply with the hexavalent chromium limitations by using total chromium results. In this case, analysis for hexavalent chromium shall be waived. The Discharger shall use the same chromium analysis as the one it conducts for Monitoring Location EFF-001.

[3] The Discharger may, at its option, analyze for cyanide as weak acid dissociable cyanide using protocols specified in 40 C.F.R. Part 136, or an equivalent method in the latest Standard Method edition.

[4] The Discharger shall analyze selenium using U.S. EPA Method No. 200.8 or Standard Method No. 3114B or 3114C.

4. EFFLUENT MONITORING

4.1. Monitoring Location EFF-001. The Discharger shall monitor treatment plant effluent at Monitoring Location EFF-001 as follows:

Table E-4. Effluent Monitoring – Monitoring Location EFF-001

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Flow [1]	MGD	Continuous	Continuous
pH [2]	standard units	Continuous	Continuous
Temperature	ºF	Continuous	Continuous
BOD_5	mg/L, lbs/day	C-24	1/Month
TSS	mg/L, lbs/day	C-24	1/Week or 3/Week [3]
COD	mg/L, lbs/day	C-24	1/Month
Oil and Grease	mg/L, lbs/day	Grab	1/Month
Sulfide, Total	mg/L, lbs/day	Grab	1/Month
Phenolic Compounds, Total	mg/L, lbs/day	C-24	1/Month
Ammonia	mg/L as N, lbs/day	C-24	1/Month
Chromium, Total Recoverable	mg/L, lbs/day	C-24	1/Month
Chromium (VI), Total Recoverable [4]	mg/L, lbs/day	Grab	1/Month
Copper, Total Recoverable	µg/L	C-24	1/Month
Cyanide, Total [5]	µg/L	Grab	1/Month
Nickel, Total Recoverable	µg/L	C-24	1/Month
Nitrate-nitrite	mg/L as N	C-24	1/Month
Phosphorus, Total	µg/L	C-24	1/Month
Dioxin-TEQ	µg/L	C-24	2/Year
Selenium, Total Recoverable [6]	µg/L	C-24	1/Week
Acute Toxicity [7]	% survival	Flow through	1/Week
Chronic Toxicity (Prior to U.S. EPA Approval of Toxicity Provisions) [8]	TUc [9]	C-24	1/Quarter

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Chronic Toxicity (After U.S. EPA Approval of Toxicity Provisions) [10]	"pass" or "fail" and % effect [11]	C-24	1/Month [12]
Other Priority Pollutants [13]	µg/L	Grab	2/Year

Footnotes:

[1] For effluent flows, daily average flow (MGD) and total monthly flow (MG) shall be monitored and reported in self-monitoring reports.

[2] If pH is monitored continuously, the minimum and maximum pH values for each day shall be reported in self-monitoring reports.

[3] From April 1 through November 30, the TSS monitoring frequency at Monitoring Location EFF-001 shall be once per week. From December 1 through March 31, the TSS monitoring frequency at Monitoring Location EFF-001 shall be three times per week.

[4] The Discharger may, at its option, comply with the hexavalent chromium limitations by using total chromium results. In this case, analysis for hexavalent chromium shall be waived.

[5] The Discharger may, at its option, analyze for cyanide as weak acid dissociable cyanide using protocols specified in Standard Method Part 4500-CN-I, U.S. EPA Method OI 1677, or an equivalent method in the latest edition.

[6] The Discharger shall analyze selenium using U.S. EPA Method No. 200.8 or Standard Method No. 3114B or 3114C.

[7] Acute bioassay tests shall be performed in accordance with MRP section 5.1.

[8] Chronic toxicity tests shall be performed in accordance with MRP section 5.2 until the first day of the month following U.S. EPA approval of the State Water Board's *State Policy for Water Quality Control: Toxicity Provisions* (Toxicity Provisions), at which time MRP section 5.2 shall no longer apply and chronic toxicity tests shall be performed in accordance with MRP section 5.3.

[9] Chronic toxicity monitoring results shall be reported in TUc until the first day of the month following U.S. EPA approval of the Toxicity Provisions, at which time this requirement shall no longer apply.

[10] Chronic toxicity tests shall be performed in accordance with MRP section 5.3 as of the first day of the month following U.S. EPA approval of the Toxicity Provisions.

[11] Chronic toxicity monitoring results shall be reported as "pass" or "fail" and percent effect as of the first day of the month following U.S. EPA approval of the Toxicity Provisions.

[12] The Executive Officer may reduce the minimum sampling frequency as described in Toxicity Provisions § III.C.4.b.i(B) if the Discharger has complied with chronic toxicity requirements for the prior five consecutive years.

[13] The Discharger shall monitor for the pollutants listed in Attachment G, Table B. The Discharger shall collect C-24 samples for metals.

4.2. Monitoring Location EFF-001D. The Discharger shall monitor treated wastewater at Monitoring Location EFF-001D as follows:

Table E-5. Effluent Monitoring - Monitoring Location EFF-001D

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Enterococcus [1, 2]	CFU/100 mL [3]	Grab	1/Week

Footnotes:

[1] U.S. EPA Method 1600 or an equivalent method is suggested to measure culturable *Enterococci*.

[2] If the data contain results that are "Not Detected" (ND), the Discharger shall use the minimum detection level to calculate the geometric mean. If the data set contains results that are "Detected, but Not Quantified" (DNQ), the Discharger shall use the DNQ value to calculate the geometric mean.

[3] Results may be reported as either MPN/100 mL if the laboratory method used provides results in MPN/100 mL or CFU/100 mL if the laboratory method used provides results in CFU/100 mL.

4.3. Stormwater Monitoring Locations EFF-002 through EFF-007. The Discharger shall monitor stormwater discharges at Monitoring Locations EFF-002, EFF-004, EFF-005, and EFF-007 as follows:

Table E-6. Stormwater Monitoring – Monitoring Locations EFF-002 through EFF-007

Parameter	Unit	Sample Type	Minimum Sampling Frequency
TOC	mg/L	Grab [2]	Each discharge event
Oil and Grease	mg/L	Grab [2]	Each discharge event
pH	s.u.	Grab [2]	Each discharge event
Specific Conductance	µmhos/cm	Grab [2]	Each discharge event
TSS	mg/L	Grab [2]	Each discharge event
Standard Observations	-	-	Each discharge event
BOD_5	mg/L	Grab [2]	Daily during discharge event [3]
COD	mg/L	Grab [2]	Daily during discharge event [3]
Phenolic Compounds	mg/L	Grab [2]	Daily during discharge event [3]
Total Chromium	µg/L	Grab [2]	Daily during discharge event [3]
Hexavalent Chromium	µg/L	Grab [2]	Daily during discharge event [3]
Priority Pollutants	µg/L	Grab	Each Discharge Event [4]

Footnotes:

[1] The monthly cumulative rainfall shall be measured, and the total volume of stormwater discharged for each month shall be calculated based on the drainage area served by each discharge point. The monthly rainfall and monthly discharge volume for each discharge point shall be reported in self-monitoring reports.

[2] At least one grab sample shall be collected within the first 30 minutes of significant flow during each discharge event.

[3] If and when the supplemental effluent limitations in Table 6 of this Order become effective in accordance with section 4.2.2 of this Order, the monitoring frequency at the outfalls where the limitations are in effect shall be increased to daily during each discharge event. The Discharger shall continue daily monitoring until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 5 of this Order.

[4] Monitoring is required only at Monitoring Location EFF-002 when Discharge Point 002 discharges stormwater from upper Lake Slobodnik.

4.4. Stormwater Monitoring Location EFF-008. The Discharger shall monitor stormwater discharges at Monitoring Location EFF-008 as follows:

Table E-7. Stormwater Monitoring – Monitoring Location EFF-008

Parameter	Unit	Sample Type	Minimum Sampling Frequency [1]
TOC	mg/L	Grab [2]	2/Wet Weather Season or 1/Day [3]
Oil and Grease	mg/L	Grab [2]	2/Wet Weather Season or 1/Day [3]
pH	s.u.	Grab [2]	2/Wet Weather Season or 1/Day [3]
Specific Conductance	µmhos/cm	Grab [2]	2/Wet Weather Season or 1/Day [3]
TSS	mg/L	Grab [2]	2/Wet Weather Season or 1/Quarter or 1/Day [3,4]
Standard Observations [6]	-	-	2/Wet Weather Season or 1/Day [3]
BOD_5	mg/L	Grab [2]	2/Wet Weather Season [5]
COD	mg/L	Grab [2]	2/Wet Weather Season [5]
Phenolic Compounds	mg/L	Grab [2]	2/Wet Weather Season [5]
Total Chromium	µg/L	Grab [2]	2/Wet Weather Season [5]

Parameter	Unit	Sample Type	Minimum Sampling Frequency [1]
Hexavalent Chromium	µg/L	Grab [2]	2/Wet Weather Season [5]

Footnotes:

[1] The Discharger shall conduct monitoring during periods when the laboratory is normally staffed.

[2] The Discharger shall collect at least one grab sample within the first 30 minutes of significant flow during the storm event.

[3] If and when supplemental effluent limitations for the pollutants in Table 6 of this Order become effective, the Discharger shall increase the monitoring frequency at outfalls where the limitations are in effect to daily during each storm. The Discharger shall continue daily monitoring until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 5 of this Order.

[4] If TSS exceeds one or both of the numeric action levels in Attachment S section 1.7 during the previous wet weather season, the Discharger shall increase the monitoring frequency at outfalls where a numeric action level exceedance occurred to four times per year. The Discharger shall continue monitoring TSS four times per year until TSS levels for an entire wet weather season are below the numeric action levels.

[5] If and when supplemental effluent limitations for the pollutants in Table 6 of this Order become effective, the Discharger shall begin monitoring at outfalls where the limitations are in effect. The Discharger shall continue monitoring each storm event until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 5 of this Order.

[6] Standard observations are specified in Attachment G section 3.2.

5. TOXICITY MONITORING

5.1. Acute Toxicity

5.1.1 Compliance with the acute toxicity effluent limitations shall be evaluated at Monitoring Location EFF-001 by measuring survival of test organisms exposed to 96-hour continuous flow-through bioassays.

5.1.2. Test organisms shall be rainbow trout (*Onchorhynchus mykiss*). Alternatively, the Executive Officer may specify a more sensitive organism or, if testing a particular organism proves unworkable, the most sensitive organism available.

5.1.3. All bioassays shall be performed according to the most up-to-date protocols in 40 C.F.R. part 136, currently *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition (EPA-821-R-02-012). If these protocols prove unworkable, the Executive Officer and the Environmental Laboratory Accreditation Program may grant exceptions in writing upon the Discharger's request with justification.

5.1.4. Bioassay monitoring shall include, on a daily basis, pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be reported. If final or intermediate results of an acute bioassay test indicate a violation (e.g., the percentage of surviving test organisms is less than 70 percent), the Discharger shall initiate a new test as soon as practical and shall investigate the cause of the mortalities and report its findings in the next self-monitoring report. The Discharger shall repeat the test until a test fish survival rate of 90 percent or greater is observed. If the control fish survival rate is less than 90 percent, the bioassay test shall be restarted with new fish and shall continue as soon as practical until an acceptable test is completed (i.e., control fish survival rate is 90 percent or greater).

5.2. Chronic Toxicity (Before U.S. EPA Approval of Toxicity Provisions)

The following requirements shall apply until the first day of the month following U.S. EPA approval of the State Water Board's *State Policy for Water Quality Control: Toxicity Provisions* (Toxicity Provisions).

5.2.1. Monitoring Requirements

5.2.1.1. **Sampling.** The Discharger shall collect 24-hour composite effluent samples at Monitoring Location EFF-001 for critical life stage toxicity testing as indicated below. Effluent samples may be before disinfection for toxicity tests. For toxicity tests requiring renewals, the Discharger shall collect 24-hour composite samples on consecutive or alternating days.

5.2.1.2. **Test Species.** The test species shall be the red abalone (*Haliotis rufescens*). The Discharger shall conduct a screening chronic toxicity test as described in Appendix E-1, following any significant change in the nature of the effluent. If there is no significant change in the nature of the effluent, the Discharger shall conduct a screening test if required by an applicable State Water Board plan and submit the results with its application for permit reissuance. Upon completion of the chronic toxicity screening, the Discharger shall use the most sensitive species to conduct subsequent monitoring.

5.2.1.3. **Frequency.** Chronic toxicity monitoring shall take place at the frequency specified in Table E-3 above.

5.2.1.3.1. The Discharger shall accelerate monitoring to monthly after exceeding a single-sample maximum of 10 TUc. Based on the TUc results, the Executive Officer may specify a different accelerated monitoring frequency to ensure that accelerated monitoring provides useful information.

5.2.1.3.2. The Discharger shall return to routine monitoring if accelerated monitoring does not exceed the chronic toxicity effluent limit.

5.2.1.3.3. If accelerated monitoring confirms consistent toxicity greater than the chronic toxicity effluent limit, the Discharger shall continue accelerated monitoring and initiate toxicity reduction evaluation (TRE) procedures in accordance with section 5.2.3, below.

5.2.1.3.4. The Discharger shall return to routine monitoring after implementing appropriate elements of the TRE, and either the toxicity drops below the chronic toxicity effluent limit, or, based on the TRE results, the Executive Officer determines that accelerated monitoring would no longer provide useful information.

5.2.1.3.5. Monitoring conducted pursuant to a TRE shall satisfy the requirements for routine and accelerated monitoring while the TRE is underway.

5.2.1.4. **Methodology.** Sample collection, handling, and preservation shall be in accordance with U.S. EPA protocols. Bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-2. These are *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, currently 1st edition (EPA/600/R-95-136), Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, currently third edition (EPA-821-R-02-014) and *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, currently fourth edition (EPA-821-R2-02-013). If these protocols prove unworkable, the Executive Officer and the Environmental Laboratory Accreditation Program may grant exceptions in writing upon the Discharger's request with justification.

If the Discharger demonstrates that specific identifiable substances in the discharge are rapidly rendered harmless upon discharge to the receiving water, compliance with the chronic toxicity limit may be determined after test samples are adjusted to remove the influence of those substances. The adjustment shall not remove the influence of other substances. Written acknowledgement that the Executive Officer concurs with the Discharger's demonstration must be obtained prior to any such adjustment.

5.2.1.5. **Dilution Series.** The Discharger shall conduct tests at 100%, 50%, 25%, 10%, 5%, and 2.5%. The "%" represents percent effluent as discharged. Test sample pH may be controlled to the level of the effluent sample as received prior to being salted up.

5.2.2. **Reporting Requirements.** The Discharger shall provide toxicity test results with self-monitoring reports and shall include the following, at a minimum, for each test:

5.2.2.1. Sample date;

5.2.2.2. Test initiation date;

5.2.2.3. Test species;

5.2.2.4. End point values for each dilution (e.g., number of young, growth rate, percent survival);

5.2.2.5. No Observable Effect Level (NOEL) values in percent effluent. The NOEL shall equal the IC25 or EC25 (see Attachment A). If the IC25 or EC25 cannot be statistically determined, the NOEL shall equal the No Observable Effect Concentration (NOEC) derived using hypothesis testing. The NOEC is the maximum percent effluent concentration that causes no observable effect on test organisms based on a critical life stage toxicity test;

5.2.2.6. IC15, IC25, IC40, and IC50 values (or EC15, EC25, EC40, and EC50) as percent effluent;

5.2.2.7. TUc values (100/NOEL and upper and lower confidence intervals, where NOEL = IC25, EC25, or NOEC);

5.2.2.8. Mean percent mortality (±standard deviation) after 96 hours in 100% effluent (if applicable);

5.2.2.9. IC50 or EC50 values for reference toxicant tests; and

5.2.2.10. Available water quality measurements for each test (e.g., pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia).

5.2.3. **Toxicity Reduction Evaluation (TRE)**

5.2.3.1. The Discharger shall prepare a generic TRE work plan within 90 days of the effective date of this Order to be ready to respond to toxicity events. The Discharger shall review and update the work plan as necessary so that it remains current and applicable to the discharge and discharge facilities.

5.2.3.2. Within 30 days of exceeding the chronic toxicity effluent limit, the Discharger shall submit a TRE work plan, which shall be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

5.2.3.3. Within 30 days of completing an accelerated monitoring test observed to exceed the chronic toxicity effluent limit, the Discharger shall initiate a TRE in accordance with a TRE work plan that incorporates any and all Executive Officer comments.

5.2.3.4. The TRE shall be specific to the discharge and be in accordance with current technical guidance and reference materials, including U.S. EPA guidance materials. The Discharger shall conduct the TRE as a tiered evaluation as summarized below:

5.2.3.4.1. Tier 1 shall consist of basic data collection (routine and accelerated monitoring).

5.2.3.4.2. Tier 2 shall consist of evaluation of treatment process, including operational practices and in-plant process chemicals.

5.2.3.4.3. Tier 3 shall consist of a toxicity identification evaluation (TIE).

5.2.3.4.4. Tier 4 shall consist of a toxicity source evaluation.

5.2.3.4.5. Tier 5 shall consist of a toxicity control evaluation, including options for modifications of in-plant treatment processes.

5.2.3.4.6. Tier 6 shall consist of implementation of selected toxicity control measures, and follow-up monitoring and confirmation of implementation success.

5.2.3.5. The Discharger may end the TRE at any stage if monitoring finds there is no longer consistent toxicity (i.e., compliance with the chronic toxicity effluent limit).

5.2.3.6. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity. The Discharger shall employ all reasonable efforts using currently available TIE methodologies.

5.2.3.7. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the toxic substances from the discharge. The Discharger shall take all reasonable steps to reduce toxicity to levels below the chronic toxicity effluent limit.

5.2.3.8. Many recommended TRE elements parallel required or recommended efforts related to source control, pollution prevention, and stormwater control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to demonstrate compliance with TRE requirements.

5.3. **Chronic Toxicity (After U.S. EPA approval of Toxicity Provisions)**

The following requirements shall apply as of the first day of the month following U.S. EPA approval of the Toxicity Provisions.

5.3.1. **Compliance Monitoring**

5.3.1.1. **Sampling.** The Discharger shall collect 24-hour composite effluent samples at Monitoring Location EFF-001 for critical life stage toxicity testing as indicated below. For toxicity tests requiring renewals, the Discharger shall collect 24-hour composite samples on consecutive or alternating days.

5.3.1.2. **Test Species.** The test species shall be the red abalone (*Haliotis rufescens*) unless a more sensitive species is identified in accordance with MRP Appendix E-1. The Discharger shall conduct chronic toxicity species sensitivity screening as required in Appendix E-1. Upon completion of the chronic toxicity screening, the test species shall be the most sensitive species. The Executive Officer may designate the next most sensitive species available of those listed in MRP Tables AE-1 and AE-2 as the “most sensitive species” if testing a particular species proves unworkable (e.g., the discharger encounters unresolvable test interference or cannot secure a

reliable supply of test organisms). The Executive Officer will specify changes in test species in writing.

5.3.1.3. **Frequency.** The Discharger shall monitor chronic toxicity as specified below:

5.3.1.3.1. **Routine Monitoring.** The Discharger shall conduct routine monitoring once per month at the Instream Waste Concentration (IWC) set forth in section 4.1.2 of the Order, and continue routine monitoring during any Toxicity Reduction Evaluation (TRE) consistent with MRP section 5.3.3.7.

5.3.1.3.2 **MMEL Compliance Tests and TRE Determination.** If any routine monitoring test result is "fail," the Discharger shall conduct at least one and at most two MMEL compliance tests. The results of these tests shall be used to determine if a TRE is necessary according to the process shown in Appendix E-3. The Discharger shall initiate these tests within the same calendar month as the failed routine monitoring test. (For the purposes of MMEL compliance tests, the "calendar month" shall begin on the calendar day that the failed routine monitoring test was initiated. The "calendar month" shall end on the day before the corresponding day of the following month, or on the last day of the following month if it has no corresponding day [e.g., January 31 through February 28]).

5.3.1.3.2.1. If the first MMEL compliance test result is "pass," then the Discharger shall conduct a second MMEL compliance test. If the first MMEL compliance test result is "fail," that result constitutes an MMEL violation and a second MMEL compliance test is not required. If any of the failed tests were also an MDEL violation, the discharger shall conduct a TRE (see MRP § 5.3.3).

5.3.1.3.2.2. If the second MMEL compliance test result is "pass," then the Discharger shall return to routine monitoring as described in MRP section 5.3.1.3.1. (See Appendix E-5, Toxicity Reduction Evaluation Process Flowchart.) If the second MMEL compliance Test result is "fail," that result constitutes an MMEL violation. If any of the failed tests were also an MDEL violation, the discharger shall conduct a TRE (see MRP § 5.3.3).

5.3.1.3.2.3. If the Discharger cannot conduct an MMEL compliance test because not enough effluent is available to test, the Discharger shall return to routine monitoring as soon as enough effluent is available.

5.3.1.4. **Methodology.** Sample collection, handling, and preservation shall be in accordance with U.S. EPA protocols. Bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-2. These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, currently 1st edition (EPA/600/R-95/136); *Short-Term*

Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, currently 3rd edition (EPA-821-R-02-014); and *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, currently 4th edition (EPA-821-R-02-013). If these protocols prove unworkable, the Executive Officer and the Environmental Laboratory Accreditation Program may grant exceptions in writing upon the Discharger's request with justification.

Chronic toxicity shall be evaluated using the Test of Significant Toxicity (TST) as described in Toxicity Provisions section III.B.3. The selected test concentrations shall include the IWC. The TST shall be conducted using the IWC sample and a control as described in Toxicity Provisions section III.B.3. Test sample pH may be controlled to the level of the effluent sample as received by the laboratory prior to being salted up. A result of "fail" indicates toxicity at the IWC.

If the Discharger demonstrates that specific identifiable substances in the discharge are rapidly rendered harmless upon discharge to the receiving water, compliance with the chronic toxicity limit may be determined after test samples are adjusted to remove the influence of those substances. The adjustment shall not remove the influence of other substances. Written acknowledgement that the Executive Officer concurs with the Discharger's demonstration must be obtained prior to any such adjustment.

5.3.2. **Reporting.** The Discharger shall provide toxicity test results with self-monitoring reports and shall include the following, at a minimum, for each test:

5.3.2.1. Sample date.

5.3.2.2. Test initiation date.

5.3.2.3. Test species.

5.3.2.4. End point values for the control and IWC sample (e.g., number of young, growth rate, percent survival). For routine monitoring and MMEL compliance tests, the Discharger shall report the results as either "pass" or "fail," and the percent effect at the IWC for each endpoint.

5.3.2.5. End point values for each replicate of the control and IWC sample (e.g., number of young, growth rate, percent survival).

5.3.2.6. Available water quality measurements for each test (e.g., pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia).

5.3.3. **Toxicity Reduction Evaluation (TRE)**

5.3.3.1. The Discharger shall prepare a generic TRE work plan within 90 days of the effective date of this Order to be ready to respond to toxicity events. The Discharger shall review and update the generic work plan as necessary so it remains current and applicable to the discharge and discharge facilities.

5.3.3.2. Within 30 days of the following circumstances, the Discharger shall submit a TRE work plan that shall be the generic work plan revised as appropriate for the particular toxicity observed. The circumstances triggering a TRE are as follows:

5.3.3.2.1. The Discharger has any combination of two or more MDEL or MMEL violations within a single calendar month or two successive calendar months; or

5.3.3.2.2. The Discharger violates the MDEL or MMEL during a calendar month, there is no effluent available to test in the following calendar month, and the Executive Officer requires a TRE;

5.3.3.3. Within 30 days of submitting the TRE work plan, the Discharger shall initiate a TRE in accordance with the TRE work plan. The TRE shall be specific to the discharge and be in accordance with current technical guidance and reference materials, including U.S. EPA guidance materials. The Discharger shall conduct the TRE as a tiered evaluation as summarized below:

5.3.3.3.1. Tier 1 shall consist of basic data collection (routine monitoring, additional routine monitoring, and MMEL compliance tests);

5.3.3.3.2. Tier 2 shall consist of evaluating treatment processes, including operational practices and process chemicals;

5.3.3.3.3. Tier 3 shall consist of a toxicity identification evaluation (TIE) to identify the substance or combination of substances causing the observed toxicity. The Discharger shall employ all reasonable efforts using currently available TIE methodologies;

5.3.3.3.4. Tier 4 shall consist of a toxicity source evaluation;

5.3.3.3.5. Tier 5 shall consist of a toxicity control evaluation that considers alternative strategies, including treatment process modifications, to reduce or eliminate the toxic substances from the discharge; and

5.3.3.3.6. Tier 6 shall consist of implementing all reasonable toxicity control measures, and follow-up monitoring and confirmation of implementation success.

5.3.3.4. The Discharger may end the TRE at any stage if monitoring finds there is no longer consistent toxicity (i.e., two consecutive test results of “pass”).

5.3.3.5. The Executive Officer may authorize the Discharger to end a TRE if the Discharger documents that it has exhausted all reasonable efforts to identify the cause of the toxicity.

5.3.3.6. Many recommended TRE elements parallel required or recommended efforts related to source control, pollution prevention, and stormwater control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to demonstrate compliance with TRE requirements.

5.3.3.7. The routine monitoring frequency shall be a minimum of two tests per calendar year at the IWC when the Discharger is conducting toxicity testing as part of a TRE during that calendar year. The Discharger must return to the routine monitoring frequency specified in MRP section 5.3.1.3.1 at the conclusion of the TRE or one year after the initiation of the TRE, whichever occurs sooner.

TRE triggers are set forth below.

Table E-8. Toxicity Reduction Evaluation (TRE) Triggers

Monitoring Type and Frequency	Triggers	TRE Required?
Routine and MMEL compliance monitoring, less than monthly frequency	1. Violation of MDEL or MMEL in a calendar month, AND 2. No discharge during the following calendar month	EO may require TRE
Routine and MMEL compliance monitoring	Any combination of two or more MDEL or MMEL violations in a single calendar month or successive calendar months	TRE is required

6. RECEIVING WATER MONITORING

The Discharger shall continue to participate in the Regional Monitoring Program, which collects data on pollutants and toxicity in San Francisco Bay water, sediment, and biota.

7. REPORTING REQUIREMENTS

7.1. General Monitoring and Reporting Requirements. The Discharger shall comply with all Standard Provisions (Attachments D, G, and S) related to monitoring, reporting, and recordkeeping.

7.2. Self-Monitoring Reports (SMRs)

7.2.1. **SMR Format.** The Discharger shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program website (waterboards.ca.gov/water_issues/programs/ciwqs). The CIWQS website will provide additional information for SMR submittal in the event of a planned service interruption for electronic submittal.

7.2.2. **SMR Due Dates and Contents.** The Discharger shall submit SMRs by the due dates, and with the contents, specified below:

7.2.2.1. **Monthly SMRs** — Monthly SMRs shall be due 30 days after the end of each calendar month, covering that calendar month. Each SMR shall contain the applicable items described in Provisions 6.3.2 (Effluent Characterization Study and Report) of the Order, Attachment D section 5.2, and Attachment G section 5.3. Each SMR shall include all new monitoring results obtained since the last SMR was submitted. If the Discharger monitors any pollutant more frequently than required by this Order, the Discharger shall include the results of such monitoring in the calculations and reporting for the SMR. The Discharger shall report when its sand filter is in use, downstream of its Selenium Precipitation Unit.

7.2.2.2. **Annual SMR** — Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain the applicable items described in Provisions 6.3.2 (Effluent Characterization Study and Report) and 6.3.4.4 (Annual Selenium Load) of the Order and Attachment G section 5.3.1.6. The Discharger shall include a mass balance for each month of the calendar year that documents the amount of solids (in tons) dredged and removed from Ponds 7, 5C-1, 5C-2, 5D, and the Selenium Processing Unit relative to the amount of solids added to these treatment units.

7.2.3. **Specifications for Submitting SMRs to CIWQS.** The Discharger shall submit analytical results and other information using one of the following methods:

Table E-9. CIWQS Reporting

Parameter	Method of Reporting: EDF/CDF data upload	Parameter
All parameters identified in influent, effluent, and receiving water monitoring tables (except Dissolved Oxygen and Temperature)	Required for all results	-
Dissolved Oxygen, Temperature	Required for monthly maximum and minimum results only [1]	Discharger may use this method for all results or keep records
Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Selenium, Silver, Thallium, Zinc, Dioxins & Furans (by U.S. EPA Method 1613), Other Pollutants (by U.S. EPA Methods 601, 602, 608, 610, 614, 624, and 625)	Required for all results [2]	-

Parameter	Method of Reporting: EDF/CDF data upload	Parameter
Analytical Method	Not required (Discharger may select "data unavailable") [1]	-
Collection Time, Analysis Time	Not required	-

Footnotes:

[1] The Discharger shall continue to monitor at the minimum frequency specified in this MRP, keep records of the measurements, and make the records available upon request.

[2] These parameters require EDF/CDF data upload or manual entry regardless of whether monitoring is required by this MRP or other provisions of this Order (except for biosolids, sludge, or ash provisions).

The Discharger shall arrange all reported data in a tabular format and summarize data to clearly illustrate whether the Facility is operating in compliance with effluent limitations. The Discharger is not required to duplicate the submittal of data entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format, the Discharger shall electronically submit the data in a tabular format as an attachment.

7.2.4. **Monitoring Periods.** Monitoring periods for all required monitoring shall be as set forth below unless otherwise specified:

Table E-10. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous/D	Order effective date	All times
Continuous/1H	Order effective date	Measured continuously or, if infeasible, at least every hour
1/Hour	Order effective date	Every hour on the hour
1/Day	Order effective date	Any 24-hour period that reasonably represents a calendar day for sampling purposes (e.g., beginning at midnight and continuing through 11:59 p.m.)
1/Week 2/Week 3/Week	First Sunday following or on Order effective date	Sunday through Saturday
1/Month	First day of calendar month following or on Order effective date [2]	First day of calendar month through last day of calendar month
1/Quarter	Closest January 1, April 1, July 1, or October 1 before or after Order effective date [1]	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
1/Year	Closest January 1 before or after Order effective date [1]	January 1 through December 31
2/Year	Closest January 1 or July 1 before or after Order effective date [1]	January 1 through June 30 July 1 through December 31
Each Discharge Event	As soon as possible after Discharger becomes aware of the event	Any time when sampling can characterize the discharge event

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
2/Wet Weather Season	Closest November 1 before or after Order effective date [1]	November 1 through April 30
Once	Order effective date	Once during the term of the Order within 12 months prior to applying for permit reissuance

Footnotes:

[1] Monitoring performed during the previous order term may be used to satisfy monitoring required by this Order.

[2] See Attachment A for the definition of a calendar month for chronic toxicity testing.

7.2.5. **RL and MDL Reporting.** The Discharger shall report with each sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 C.F.R. part 136. The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

7.2.5.1. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

7.2.5.2. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For purposes of data collection, the Discharger shall require the laboratory to write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means the laboratory considers appropriate.

7.2.5.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected", or ND.

7.2.5.4. The Discharger shall instruct laboratories to establish calibration standards so that the minimum level (ML) value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

7.2.6. **Compliance Determination.** Compliance with effluent limitations shall be determined using sample reporting protocols defined above, in the Fact Sheet, and in Attachments A, D, and G. For purposes of reporting and administrative enforcement by the Regional Water Board and State Water Board, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the pollutant in the monitoring sample is greater than the effluent limitation and, if applicable, greater than or equal to the RL.

7.3. Discharge Monitoring Reports (DMRs). DMRs are U.S. EPA reporting requirements. The Discharger shall electronically certify and submit DMRs together with SMRs using Electronic Self-Monitoring Reports module eSMR 2.5 or the latest upgraded version. Electronic DMR submittal shall be in addition to electronic SMR submittal. Information about electronic DMR submittal is available at the DMR website (waterboards.ca.gov/water_issues/programs/discharge_monitoring).

APPENDIX E-1
CHRONIC TOXICITY
DEFINITION OF TERMS AND
SPECIES SENSITIVITY SCREENING REQUIREMENTS

1. Definition of Terms

1.1. Continuous Discharger. Discharger that discharges without interruption throughout its operating hours, except for infrequent shutdowns for maintenance, process changes, or other similar activities, and that discharges throughout the calendar year.

1.2. Non-Continuous Discharger. Discharger that does not discharge in a continuous manner or does not discharge throughout the calendar year (e.g., intermittent and seasonal dischargers).

2. Chronic Toxicity Species Sensitivity Screening

2.1. The Discharger shall perform species sensitivity screening as specified in Toxicity Provisions section III.C.2:

2.1.1. The Discharger shall conduct species sensitivity screening and submit a technical report that identifies the most sensitive test species within 18 months of the effective date of this Order if the Discharger has not previously conducted a species sensitivity screening as specified in Toxicity Provisions section III.C.2.

2.1.2. The Discharger shall conduct species sensitivity screening and submit a technical report that identifies the most sensitive test species with the application for permit reissuance. Alternatively, the Discharger may provide species sensitivity screening results from a previous sensitive species screening conducted within the 10 years before the expiration date of this Order if that sensitive species screening was conducted as specified in Toxicity Provisions section III.C.2.

2.1.3. The Discharger shall conduct species sensitivity screening and submit a technical report that identifies the most sensitive test species no later than 18 months after any significant change in the nature of the effluent discharged due to changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts.

2.2. Species sensitivity screening shall, at a minimum, reflect the following elements:

2.2.1. Test species specified in Appendix E-2, attached, and protocols referenced in those tables. Test species shall be Tier I unless those species are unavailable. In such cases, the Executive Officer may approve a Tier II test species.

2.2.2. <u>Continuous Dischargers:</u> four sets of tests, one in each calendar quarter of a calendar year.

Non-continuous Dischargers: at least two sets of tests, one in each calendar quarter with at least 15 days of discharge, unless the Discharger discharges in only one quarter of a calendar year; in that case, both sets of testing shall occur during the same calendar quarter. Testing in a specific species sensitivity screening can be conducted using effluent that is not discharged into surface waters (e.g., effluent discharged onto land because of a summer prohibition on discharges into surface waters) as long as the effluent tested is representative of the effluent that will be discharged to surface waters.

2.2.3. Appropriate controls.

2.2.4. Tests conducted at a waste concentration of 10 percent or the IWC, whichever represents a higher concentration of effluent. Alternatively, the Executive Officer may specify a higher waste concentration if needed to increase the likelihood that potential effects might be observed.

2.3. The Discharger shall submit a species sensitivity screening proposal at least 30 days prior to initiating any species sensitivity screening. The proposal shall address each of the elements listed above.

2.4. Unless the Executive Officer specifies otherwise, the most sensitive species shall be the species exhibiting the highest percent effect.

APPENDIX E-2: SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Table AE-1. West Coast Marine Chronic Toxicity Test Species and Methods

Species	(Scientific Name)	Tier	Effect	Test Duration	Reference
Giant kelp	*(Macrocystis pyrifera)*	I	Percent germination; germ tube length	48 hours	1
Red Abalone	*(Haliotis rufescens)*	I	Larval development	48 hours	1
Oyster Mussel	*(Crassostrea gigas)* *(Mytilus sp.)*	I	Larval development	48 hours	1
Purple Urchin Sand dollar	*(Strongylocentrotus purpuratus)* *(Dendraster excentricus)*	I	Percent fertilization or larval development	1 hour or 72 hours	1
Shrimp	*(Americamysis bahia)*	II	Percent survival; growth	7 days	2
Topsmelt	*(Atherinops affinis)*	I	Percent survival; growth	7 days	2
Silverside	*(Menidia beryllina)*	II	Larval growth rate; percent survival	7 days	2

Toxicity Test References:

1. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.
2 Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/821/R-02/014. October 2002.

Table AE-2. Freshwater Chronic Toxicity Test Species and Method

Species	Scientific Name	Tier	Effect	Test Duration	Reference
Fathead minnow	*Pimephales promelas*	I	Survival; growth rate	7 days	1
Water flea	*Ceriodaphnia dubia*	I	Survival; number of young	7 days	1
Green Alga	*Selenastrum capricornutum*	I	Final cell density	4 days	1

Toxicity Test Reference:

1. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, fourth Edition Chronic manual (EPA-821-R-02-013, October 2002).

Table AE-3. Toxicity Test Requirements for Species Sensitivity Screening

Requirements	Discharges to Marine or Estuarine Water (San Francisco Bay) [1]	Discharges to Freshwater [1]
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Screening Requirement	A total of 3 Marine and/or Freshwater species from Table AE-1 and Table AE-2	3 Freshwater species from Table AE-2[2]

Footnotes:

[1] (a) "Marine" refers to receiving water salinities greater than 1.0 parts per thousand (ppt) at least 95 percent of the time during a normal water year.

(b) "Freshwater" refers to receiving water with salinities less than 1.0 ppt at least 95 percent of the time during a normal water year.

(c) "Estuarine" refers to all other cases (i.e., when receiving water salinity is above 1.0 less than 95 percent of the time and below 1.0 less than 95% of the time).

[2] The freshwater species may be substituted with a marine species if:

(a) The salinity of the effluent is above 1 ppt greater than 95 percent of the time, or

(b) The ionic strength (TDS or conductivity) of the effluent at the IWC is documented to be toxic to the test species.

APPENDIX E-3: TOXICITY REDUCTION EVALUATION PROCESS FLOWCHART ROUTINE MONITORING

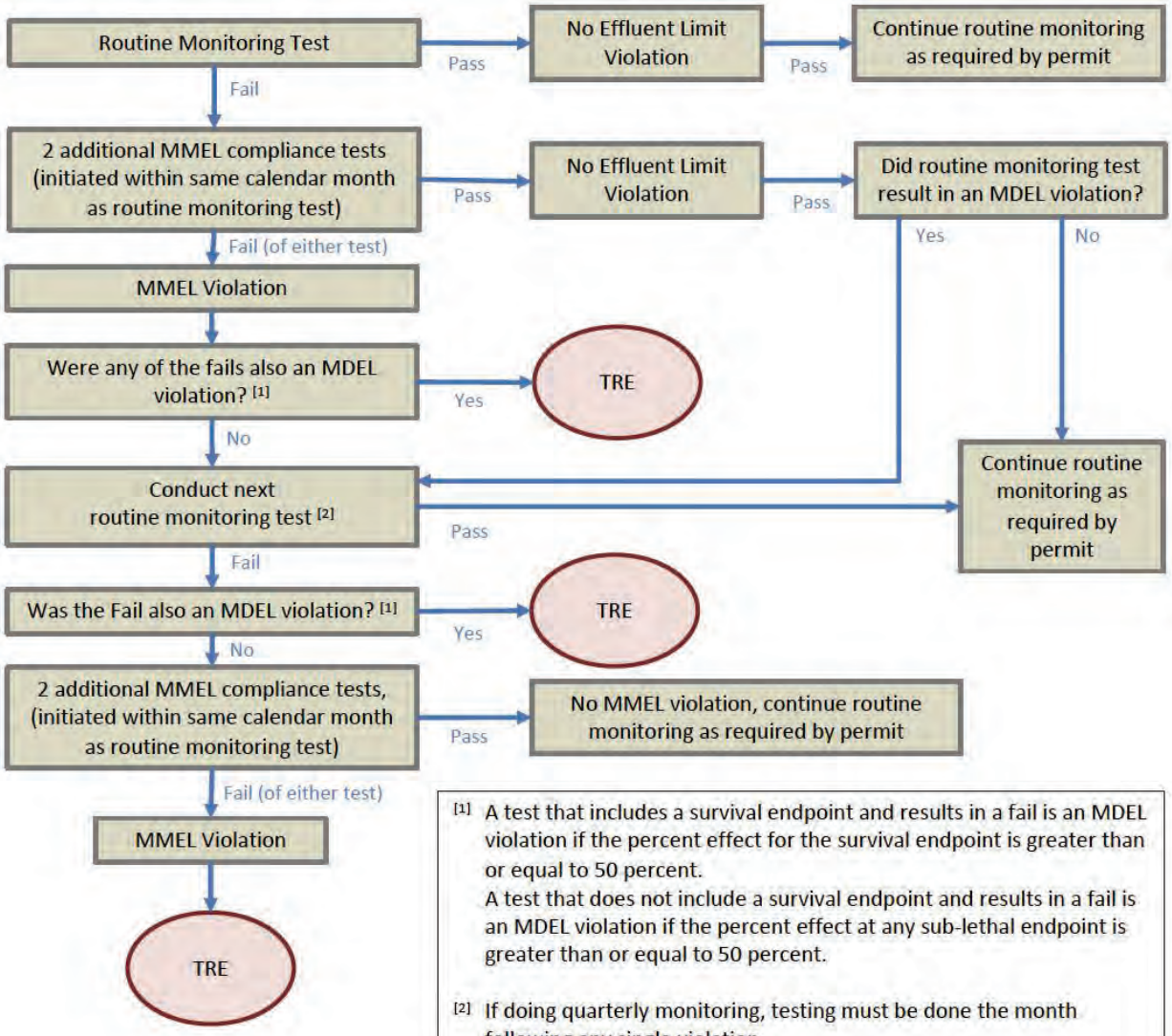

[1] A test that includes a survival endpoint and results in a fail is an MDEL violation if the percent effect for the survival endpoint is greater than or equal to 50 percent.
A test that does not include a survival endpoint and results in a fail is an MDEL violation if the percent effect at any sub-lethal endpoint is greater than or equal to 50 percent.

[2] If doing quarterly monitoring, testing must be done the month following any single violation

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in section 2.2 of the Order, the Regional Water Board incorporates this Fact Sheet as findings supporting the issuance of the Order.

1. PERMIT INFORMATION

The following table summarizes administrative information related to the facility.

Table F-1. Facility Information

WDID	2 071042001
CIWQS Place ID	256695
Discharger	Martinez Refining Company LLC
Facility Name	Martinez Refining Company
Facility Address	3485 Pacheco Blvd. Martinez, CA 94553 Contra Costa County
Facility Contact, Title, and Phone	Morgan Zellers, Staff Engineer, (408) 646-9463
Authorized Person to Sign and Submit Reports	Daniel Ingram, Refinery Manager, (925) 313-3333
Mailing Address	Same as Facility Address
Billing Address	Same as Facility Address
Facility Type	Petroleum Refinery
Major or Minor Facility	Major
Water Quality Threat	1
Complexity	A
Pretreatment Program	No
Recycling Requirements	No
Mercury and PCBs Requirements	NPDES Permit CA0038849
Nutrients Requirements	Not applicable
Permitted Flow	10 MGD (hydraulic capacity)
Average Flow	5.3 MGD
Watershed	San Francisco Bay
Receiving Water	Carquinez Strait
Receiving Water Type	Estuarine
Last Inspection	August 17, 2021

1.1. Martinez Refining Company, LLC (Discharger) owns and operates Martinez Refining Company (Facility), an 831-acre petroleum refinery. Attachment B includes a map of the Facility and its surroundings.

For the purposes of this Order, references to the “discharger” or “permittee” in applicable federal and State laws, regulations, plans, and policies are held to be equivalent to references to the Discharger herein.

1.2. The Discharger is regulated pursuant to National Pollutant Discharge Elimination System (NPDES) Permit CA0005789. The Discharger was previously subject to Order R2-2017-0039 (previous order). The Discharger filed a Report of Waste Discharge and submitted an application for reissuance of its Waste Discharge Requirements (WDRs) and NPDES permit on March 7, 2022.

1.3. The Discharger is authorized to discharge subject to the WDRs in this Order at the discharge locations described in Table 1 of this Order. Regulations in 40 C.F.R. section 122.46 limit the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, this Order limits the effective period for the discharge authorization. Pursuant to 40 C.F.R. section 122.6(d) and California Code of Regulations, title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the permit if the Discharger complies with all requirements for continuation of expired permits.

1.4. The discharge is also regulated pursuant to NPDES Permit CA0038849, which establishes mercury and polychlorinated biphenyls (PCBs) requirements for wastewater discharges to San Francisco Bay. This Order does not affect that permit.

1.5. For areas where stormwater is not subject to physical treatment, the Discharger has obtained coverage under NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, State Water Board Order 2009-0009-DWQ. This Order authorizes discharges of stormwater that drains to the Discharger’s wastewater treatment plant and stormwater treated in earthen basins via physical settling prior to discharge.

2. FACILITY DESCRIPTION

The Facility processes an average crude oil throughput of 140,000 barrels per day, producing propane, butanes, gasolines, diesel, jet fuels, marine fuel oil, and petroleum coke. The Facility discharges to Carquinez Strait via Discharge Point 001, Peyton Slough via Discharge Point 002, and Peyton Creek via Discharge Points 004, 005, 007, and 008. Attachment B provides site maps.

2.1. Wastewater Treatment at Discharge Point 001. The Facility discharges process wastewater, non-process wastewater, sanitary wastewater, and stormwater at Discharge Point 001 after treatment at the wastewater treatment plant. Process wastewater and non-process wastewater include desalted effluent, sour water, boiler blowdown, cooling tower blowdown, and groundwater from extraction systems. Periodically, water from process area fire equipment monitoring and fire hydrant testing is also directed to the wastewater treatment plant. Attachment C provides a process flow diagram for the wastewater treatment plant.

The wastewater treatment plant consists of three oil-water separators (one American Petroleum Institute [API] separator, one Gross Oil Separator [GOS], and one Corrugated Plate Interceptor [CPI], four tanks that can operate as either oil-water separators or dissolved nitrogen flotation units, five equalization and diversion tanks, three activated sludge biological treatment systems (biotreaters), four treatment ponds, four retention ponds to store wastewater requiring additional treatment or wastewater from turnaround activities, a chemical precipitation unit for selenium removal, and a granular activated carbon (GAC) adsorption system that provides final polishing of treated wastewater by reducing effluent toxicity and removing some metals and hydrocarbons. The Discharger adds caustic soda after the API to raise the pH and assist with sanitary waste disinfection. The Discharger also has a removable sand filter it can use after selenium removal to attempt to lower the amount of selenium in its discharge. This filter may be used during wet weather when selenium is expected to be higher. The filter is easily blocked, so it is not used year-round.

The treatment plant hydraulic capacity is approximately 10 MGD. All wastewater is processed through the entire treatment system, except for low biochemical oxygen demand streams, such as cooling tower blowdown, boiler system blowdown, and noncontact stormwater. Depending on operation, these streams can be routed to either the selenium precipitation unit or the polishing pond (Pond 5C-2), before then being treated by GAC adsorption units. The Discharger also routes wastewater from the Shell Chemical Plant, along with a stream of cooling tower blowdown water from that area, downstream of the API oil-water separator to two tanks that can operate as oil-water separators or dissolved nitrogen flotation units and then to the biotreater.

All stormwater runoff generated within refinery property west of Shell Avenue, paved areas of Operations Central (OPCEN), the Tank 8-12 string, the Distillates Saturation Unit, the Martinez Terminal Company, and the Shell Martinez Catalyst Plant (SMCP) is routed to the wastewater treatment system described above, along with all process wastewater from the refinery. Using temporary pumps and piping, contained stormwater from other areas of the facility may also be treated and discharged sometimes via Discharge Point 001.

Treated wastewater is discharged from Discharge Point 001 to Carquinez Strait through a 24-inch multiport diffuser located about 500 feet from shore under the Martinez Refinery Wharf. The diffuser is 54 feet long, lies at an average depth of 25 feet, and has 18 horizontal 3-inch-diameter ports spaced 24 feet apart facing the seaward direction (Exponent, Diffuser Dilution Study in Support of NPDES Permit Renewal, December 9, 2016). The Discharger last inspected the diffuser on August 18, 2022 to clear blocked diffuser ports.

2.2. Stormwater Treatment and Control. The Facility discharges stormwater runoff from most process areas at Discharge Point 001. The Facility discharges stormwater runoff from most non-process areas from five stormwater discharge points (see Table 2 of the Order and Attachment B). Stormwater routed to

retention basins is discharged from four outfalls (Discharge Points 002, 004, 005, and 007). There is also a small area where stormwater discharges via sheet flow (Discharge Point 008). The stormwater from the area around the SMCP that previously discharged to Discharge Point 009 is now covered under the State Water Board's General Permit for Storm Water Discharges Associated with Industrial Activities (NPDES Permit CAS000001).

2.2.1. **Discharge Point 001.** The Facility discharges stormwater runoff from most process areas at Discharge Point 001 after treatment at the wastewater treatment plant. During wet weather, these wastewater flows can contain a significant volume of stormwater. At times, to maintain efficient operations and to avoid flooding the API oil-water separator, the Discharger re-routes stormwater downstream of the API oil-water separator to the ETP-2 equalization/diversion tanks, Pond 6, or Pond 8 (see Attachment C). This allows oil-water separation that is functionally equivalent to the API units. Additionally, this accommodates storm surge volumes until the water can be processed through one of the biotreaters and downstream treatment units. The process for determining when these alternate routings are necessary depends on several factors, including the API separator level (typically kept at less than 90 percent), the amount of rainfall, and the ETP-2 diversion tank levels. These typical wet weather operations are not bypasses subject to Attachment D section 1.7. Moreover, significant storms that result in high flows may require that a portion of biologically-treated wastewater bypass the GAC adsorption units. High flow conditions are generally defined as an effluent discharge rate of 8.6 MGD (about 6,000 gallons per minute) or higher. Bypass of the GAC adsorption units is subject to Attachment D section 1.7.

2.2.2. **Discharge Point 002.** Discharge Point 002 discharges stormwater runoff from about 230 acres. This area includes the Light Oil Processing area, tank farms, and many of the units for the Clean Fuels area. During wet weather, the Discharger routes first flush stormwater from the Light Oil Processing area and Clean Fuels area to the wastewater treatment plant. After the first-flush, the Discharger routes stormwater from these areas, along with stormwater from the tank farms, to three ponds operated in series (commonly referred to as the Lake Slobodnik system). There is an upper, middle, and lower pond, and each is equipped with an oil baffle/weir and a valve that is kept closed and manually opened only when needed. Before opening the valve, the Discharger conducts visual observations and measures pH, total organic carbon (TOC), and sometimes oil and grease. Discharge is from the lower pond at a point about 600 feet south of the Marina Vista I-680 southbound on-off ramps into an unnamed earthen drainage course contiguous with Peyton Slough, which flows into Carquinez Strait.

Historically, oil sheen has been observed in the upper pond of the Lake Slobodnik system due to process wastewater mixing with stormwater. In response, the Discharger revised the first flush procedure. At the start of a rain event, runoff from the Clean Fuel PAD sump is diverted to the wastewater

treatment plant. This first flush lasts approximately 30 minutes, after which runoff is routed to the Low Point sump. After the first flush from the Clean Fuel PAD sump has begun, the first flush from the Low Point sump (also lasting approximately 30 minutes) is diverted to the wastewater treatment plant. The Discharger then routes stormwater runoff from the Light Oil Processing area and Clean Fuels area to Lake Slobodnik. Because of the potential for the upper pond of Lake Slobodnik system to contain process wastewater, Provision 6.3.2 of this Order requires the Discharger to monitor for priority pollutants during any discharge from Discharge Point 002 that contains water from upper Lake Slobodnik.

2.2.3. **Discharge Point 004.** Discharge Point 004 discharges stormwater runoff from about 230 acres. This area includes a tank farm. The Discharger collects stormwater runoff in two ponds that operate in series (commonly referred to as the Vine Hill ponds). There is an upper and lower pond, and each is equipped with an oil baffle/weir and a valve that is kept closed and manually opened only when needed. Before opening the valve, the Discharger conducts visual observations and measures pH, TOC, and sometimes oil and grease. Discharge is from the lower pond to Peyton Creek at a point about 1,500 feet south of the Mt. View Sanitary District treatment plant, then into Peyton Slough, which flows into Carquinez Strait.

2.2.4. **Discharge Point 005.** Discharge Point 005 discharges stormwater runoff from about 30 acres. This area includes an emergency flare system. The Discharger routes stormwater runoff from this area to a pond equipped with an oil baffle/weir and valve that is kept closed and manually opened only when needed. Before opening the valve, the Discharger conducts visual observations and measures pH, TOC, and sometimes oil and grease. Discharge from the pond is to Peyton Creek at a point about 900 feet south of the Mt. View Sanitary District treatment plant, then into Peyton Slough, which flows into Carquinez Strait.

2.2.5. **Discharge Point 007.** Discharge Point 007 discharges stormwater runoff from about 7 acres. This area includes a propane/butane storage area. The Discharger routes stormwater runoff from this area to a pond equipped with an oil baffle/weir and valve that is kept closed and manually opened only when needed. Before opening the valve, the Discharger conducts visual observations and measures pH, TOC, and sometimes oil and grease. Discharge from the pond is to Peyton Creek at a point about 600 feet south of the Mt. View Sanitary District treatment plant, then into Peyton Slough, which flows into Carquinez Strait.

2.2.6. **Discharge Point 008.** Discharge Point 008 discharges stormwater runoff from about 16 acres. This area includes maintenance shops and warehouses. Stormwater runoff from this area is discharged to Peyton Creek and eventually to Peyton Slough, which flows into Carquinez Strait.

2.3. Previous Requirements and Monitoring Data

2.3.1. **Monitoring data for Discharge Point 001.** The tables below present the previous order's effluent limitations and representative monitoring data from the previous order term (December 1, 2017 – May 2022):

Table F-2. Previous Effluent Limitations and Monitoring Data

Parameter	Units	Average Monthly Limit	Maximum Daily Limit	Other Limits	Average	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ degrees Celsius) (BOD_5)	lbs/day	1,800	3,300	-	290	700
Total Suspended Solids (TSS)	lbs/day	1,500	2,300	-	310	10,000
Chemical Oxygen Demand (COD)	lbs/day	13,000	25,000	-	4,400	17,000
Oil and Grease	mg/L	8.0	15	-	0.38	2.3
Oil and Grease	lbs/day	530	1,000	-	69	110
Sulfide, Total	lbs/day	9.6	22	-	1.4	3.9
Phenolic Compounds, Total	lbs/day	7.6	25	-	0.28	1.0
Nickel, Total Recoverable	µg/L	43	72	-	17	39
Ammonia Nitrogen, Total (as N)	mg/L	21	57	-	1.4	5.9
Ammonia Nitrogen, Total (as N)	lbs/day	1,000	2,200	-	62	260
Chromium, Total Recoverable	lbs/day	8.9	26	-	0.026	0.08
Chromium (VI), Total Recoverable	lbs/day	0.73	1.6	-	0.026	0.08
Copper, Total Recoverable	µg/L	60	120	-	3.1	13
Cyanide, Total	µg/L	22	38	-	9.7	23
Selenium, Total Recoverable	kg/day	-	1.1	-	0.67	1.0
Dioxin-TEQ	µg/L	1.4E-8	2.8E-8	-	-	1.4E-9
Acute Toxicity	percent survival	-	-	90% (11-sample median)	-	97 [1]
Acute Toxicity	percent survival	-	-	70% (11-sample 90th percentile)	-	90 [1]
Chronic Toxicity	TUc	-	-	10 (single-sample maximum)	-	4.4
pH	Standard units	-	-	6.0 - 9.0	-	6.2 - 8.8 [2]

Footnotes:

[1] Lowest percent survival.

[2] These are the lowest and highest reported pH values.

2.3.2. **Monitoring data for Discharge Points 002, 004, 005, 007, 008 and 009.** The following table describes stormwater quality during the previous order term (December 1, 2017 – May 2022):

Table F-3. Monitoring Data for Discharge Points 002, 004, 005, 007, 008, and 009

Discharge Point	TOC (mg/L)		Oil and Grease (mg/L)		TSS (mg/L)		pH (s.u.)	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Min.	Max.
002	15	11	2.1	<1.6	36	13	6.6	8.6
004	11	8.3	1.7	<1.4	2200	220	6.7	7.8
005	8.9	6.1	3.2	<1.7	50	11	6.5	8.4
007	11	7.8	<1.4	<1.4	32	14	6.6	7.9
008	5.4	3.6	3	<1.9	110	52	5.6	7.0
009 [1]	22	9.4	4.6	<1.8	66	20	5.4	6.9

Footnote:

[1] This Order no longer authorizes discharges from Discharge Point 009 because they are now covered under the State Water Board's General Permit for Storm Water Discharges Associated with Industrial Activities (NPDES CAS000001).

2.4. Compliance Summary

2.4.1. **Discharge Point 001.** Since December 1, 2017, the Discharger has violated its effluent limits seven times at Discharge Point 001. All of these violations occurred in March 2020 when the Discharger had seven consecutive TSS violations because of dredging issues in its Selenium Processing Unit. The Regional Water Board issued an Administrative Civil Liability (Order R2-2021-1007) against the Discharger in the amount of $120,000 for these violations.

2.4.2. **Discharge Points 002, 004, 005, 007, 008, and 009.** Since December 1, 2017, the Discharger has violated its stormwater limits six times at its stormwater discharge points. The Discharger reported pH levels below its 6.5 stormwater effluent limit from Discharge Points 008 and 009 in 2018 and 2019. The Regional Water Board issued a $9,000 mandatory minimum penalty (Order R2-2021-1001) for these violations and similar violations that took place during the previous Order. The Discharger was unable to identify the cause of the low pH, but has not since violated the limit at those discharge points. The Discharger exceeded its pH limit of 8.5 once at Discharge Point 002 in March 2020.

2.5. Sea Level Rise. The Discharger's Long-Term Flood Protection report identifies facility structures that could be impacted by a 100-year flood with three to five feet of sea level rise. The Discharger maintains that this level of flooding would have no negative impact on its structures. To evaluate sea level rise impacts associated with rising groundwater, the Discharger is conducting an evaluation and plans to re-evaluate flooding impacts once that has been completed.

2.6. Planned Changes. The Discharger plans to install a new biotreater, ETP-4, as a replacement for the existing ETP-1 (Pond 7) biotreater. Upon start-up of ETP-4, Pond 7 will be taken out of service. ETP-4 will consist of an integrated aeration

tank and secondary clarifier, along with miscellaneous support equipment. The existing TK-1067 will be retrofitted for construction of ETP-4. ETP-4 will operate in parallel with ETP-2 and ETP-3. The Discharger intends to begin construction of ETP-4 toward the end 2022, with startup and commissioning activities expected in the second half of 2024. The tank will have a diameter of 130 feet and wastewater depth of 31 feet, with a capacity of about 3.1 million gallons. ETP-4 will have a maximum hydraulic capacity of 3,000 gallons per minute of wastewater feed.

The Discharger also plans to install two new dissolved nitrogen flotation (DNF) units. The proposed DNF units, DNF West and DNF East, will separate suspended contaminants from influent wastewater prior to the biotreaters. DNF West and DNF East will receive wastewater from the refinery after treatment by oil and water separators. The two DNFs will operate in parallel with the existing ETP-1 DNF units, ETP-2 DNF Unit North and ETP-2 DNF Unit South. The Discharger anticipates that construction of the DNF units will begin toward the end 2022.

These changes are not requirements of this Order, except to the extent that they pertain to ensuring Facility reliability.

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the U.S. EPA, and Water Code chapter 5.5, division 7 (commencing with § 13370). It serves as an NPDES permit authorizing the Discharger to discharge into waters of the United States at the discharge locations described in Table 1 subject to the WDRs in this Order.

3.2. California Environmental Quality Act (CEQA). Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (CEQA), Public Resources Code division 13, chapter 3 (commencing with § 21100).

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin Plan. In addition, this Order implements State Water Board Resolution 88-63, which established State Policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supply. Because of the marine influence on Carquinez Strait, total dissolved solids

exceed 3,000 mg/L; therefore, Carquinez Strait meets an exception to State Water Board Resolution 88-63. Therefore, the beneficial uses applicable to Carquinez Strait are listed below:

Table F-4. Beneficial Uses

Discharge Points	Receiving Water	Beneficial Uses
001	Carquinez Strait	Industrial Service Supply (IND) Navigation (NAV) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Ocean Commercial and Sport Fishing (COMM) Wildlife Habitat (WILD) Preservation of Rare and Endangered Species (RARE) Fish Migration (MIGR) Fish Spawning (SPWN) Estuarine Habitat (EST)
002	Peyton Slough (tributary of Carquinez Strait)	Same as above
004, 005, 007, and 008	Peyton Creek (tributary of Carquinez Strait)	Same as above

3.3.2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** The NTR and CTR contain federal water quality criteria for priority pollutants. U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 NTR criteria apply in California. U.S. EPA adopted the CTR on May 18, 2000. The CTR promulgated new toxics criteria for California and incorporated the NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001.

3.3.3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP establishes implementation provisions for priority pollutant criteria and objectives, and provisions for chronic toxicity control. The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated for California through the NTR and the priority pollutant objectives the Regional Water Board established through the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. Requirements of this Order implement the SIP.

3.3.4. **Bacteria Objectives**. The State Water Board adopted the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California – Part 3, Bacteria Provisions and a Water Quality Standards Variance

Policy on August 7, 2018, and it became effective on March 22, 2019. This plan establishes Enterococcus bacteria water quality objectives and related implementation provisions for discharges to marine and estuarine waters that support the water contact recreation beneficial use.

3.3.5. **Sediment Quality.** The State Water Board adopted the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* on September 16, 2008, and it became effective on August 25, 2009. The State Water Board adopted amendments to the plan on June 5, 2018, that became effective on March 11, 2019. This plan establishes sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

3.3.6. **Toxicity Provisions.** The State Water Board adopted the *State Policy for Water Quality Control: Toxicity Provisions* (Toxicity Provisions) on October 5, 2021. The Office of Administrative Law approved the Toxicity Provisions on April 25, 2022. U.S. EPA is currently reviewing the Toxicity Provisions in accordance with Clean Water Act section 303(c) and 40 C.F.R. part 131. Following U.S. EPA approval, Toxicity Provisions sections II.C.1 and II.C.2 will establish numeric chronic and acute toxicity objectives that apply to all inland surface waters, enclosed bays, and estuaries in the State with aquatic life beneficial uses. The Toxicity Provisions include related implementation provisions and require that compliance with the chronic toxicity water quality objectives be assessed using U.S. EPA's Test of Significant Toxicity (TST) (U.S. EPA, *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* [EPA/833-R-10-003], June 2010). This Order will implement the Toxicity Provisions on the first day of the month following U.S. EPA approval.

3.3.7. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, which incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.

3.3.8. **Anti-Backsliding Requirements.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.9. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including wildlife and estuarine habitat. The Discharger is responsible for meeting all applicable Endangered Species Act requirements.

3.4. Impaired Water Bodies on CWA section 303(d) List. On May 11, 2022, U.S. EPA approved a revised list of impaired waters pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt total maximum daily loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for nonpoint sources and are established to achieve water quality standards.

Carquinez Strait is listed as impaired by mercury, PCBs, dioxin-like PCBs, selenium, chlordane, DDT, dieldrin, dioxin compounds, furan compounds, and invasive species. On February 12, 2008, U.S. EPA approved a TMDL for mercury in San Francisco Bay. On March 29, 2010, U.S. EPA approved a TMDL for PCBs in San Francisco Bay. On August 23, 2016, U.S. EPA approved a selenium TMDL for North San Francisco Bay (including Carquinez Strait). The TMDLs for mercury and PCBs are implemented through NPDES Permit CA0038849. This Order implements the selenium TMDL as it applies to the Discharger. According to the Discharger's Report of Waste Discharge submitted March 2022, chlordane, DDT, and dieldrin have not been detected in Facility discharges. This Order contains dioxin-TEQ effluent limitations to ensure that dioxins and furans in effluent are kept below water quality objectives. Facility discharges are not a source of invasive species because the California State Lands Commission sets conditions for approving ballast water disposal, as discussed in Fact Sheet section 6.3.4.5 below.

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters.

4.1. Discharge Prohibitions

4.1.1. Discharge Prohibitions in this Order

4.1.1.1. **Discharge Prohibition 3.1 (No discharge other than as described):** This prohibition is based on 40 C.F.R. section 122.21(a) and Water Code section 13260, which require filing an application and Report of Waste Discharge before a discharge can occur. Discharges not described in the application and Report of Waste Discharge, and subsequently in this Order, are prohibited.

4.1.1.2. **Discharge Prohibition 3.2 (No discharge at Discharge Point 001 when treated wastewater does not receive initial dilution of at least 16:1):** This prohibition is based on Basin Plan Discharge Prohibition 1, which prohibits discharges that do not receive a minimum initial dilution of at least 10:1 (10 parts total receiving water after mixing with 1 part effluent). Furthermore, this order allows a 10:1 dilution credit in the calculation of some water quality-based effluent limitations and a 16:1 dilution credit in the calculation of the ammonia water quality-based effluent limitations. These water quality-based effluent limitations would not be protective of water quality if the discharge did not actually achieve at least 16:1 dilution.

4.1.1.3. **Discharge Prohibition 3.3 (No bypass of untreated or partially-treated effluent):** This prohibition is based on 40 C.F.R. section 122.41(m). Bypass of treatment is prohibited except in accordance with 40 C.F.R. section 122.41(m) (see Attachment D section 1.7).

4.1.2. **Basin Plan Discharge Prohibition 1.** This Order permits discharge of stormwater from Discharge Points 002, 004, 005, 007, and 008 without an initial dilution of at least 10:1. Although Basin Plan Discharge Prohibition 1 prohibits discharges having characteristics of particular concern that do not receive a minimum initial dilution of 10:1, the Basin Plan indicates that the prohibition is to address discharges of undiluted wastes or abnormal discharges caused by the malfunction or upset of a treatment process. Since these stormwater discharges do not contain process wastewaters that are undiluted or would be subject to upset, the prohibition does not apply.

4.2. Technology-Based Effluent Limitations

4.2.1. **Scope and Authority.** CWA section 301(b) and 40 C.F.R. section 122.44(a) require that permits include applicable technology-based limitations based on several levels of control:

- Best practicable treatment control technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-

conventional pollutants. Conventional pollutants include biochemical oxygen demand, total suspended solids (TSS), pH, and oil and grease.

- Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

- Best conventional control technology (BCT) represents the control from existing industrial point sources of conventional pollutants. The BCT standard is established after considering the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

- New source performance standards (NSPS) represent the best available demonstrated control technology standards for new sources. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

Where U.S. EPA has not yet developed technology-based standards for a particular industry or a particular pollutant, CWA section 402(a)(1) and 40 C.F.R. section 125.3 authorize the use of best professional judgement (BPJ) to derive technology-based effluent limitations on a case-by-case basis. When BPJ is used, the permit must reflect specific factors outlined at 40 C.F.R. section 125.3.

U.S. EPA has established standards of performance (technology-based limitations and standards) for the petroleum refining industry at 40 C.F.R. section 419, Effluent Limitations Guidelines for the Petroleum Refining Point Source Category. Subpart B of these regulations for the Cracking Refinery Subcategory applies to discharges from the Facility and have been used to develop this Order's limitations and requirements (see Attachment F-1).

4.2.2. **Technology-Based Effluent Limitations – Discharge Point 001.** The effluent limitations guidelines established in 40 C.F.R. part 419 require that technology-based effluent limitations for Discharge Point 001 be derived based on refinery production (total crude oil throughput) and the treatment processes used. Attachment F-1 presents the derivation of the production-based effluent limitations based on 40 C.F.R. part 419, subpart B. Crude oil throughput is currently 167,000 barrels per day (bbls/d).

The table below lists the most stringent of the calculated BPT, BAT, and BCT limitations. (NSPS limitations do not apply because the Facility was constructed prior to October 18, 1982.) The table also presents the previous order's limitations that were based on a lower crude oil throughput of 147,400 bbls/d.

To avoid backsliding, this Order includes the more stringent effluent limitations from the previous order.

Table F-5 Technology-Based Effluent Limitations for Process Wastewater

Pollutant	Newly Calculated Maximum Daily Limit (lbs/day)	Newly Calculated Average Monthly Limit (lbs/day)	Previous Maximum Daily Limit (lbs/day)	Previous Average Monthly Limit (lbs/day)
BOD_5	3,900	2,200	3,300	1,800
TSS	2,700	1,700	2,300	1,500
COD	29,000	15,000	25,000	13,000
Oil and Grease	1,200	630	1,000	530
Sulfide	26	11	22	9.6
Phenolic Compounds, Total	29	8.7	25	7.6
Total Ammonia, as N	2,600	1,200	2,200	1,000
Chromium, Total Recoverable	29	10	26	8.9
Chromium (VI), Total Recoverable	1.9	0.84	1.6	0.73
pH	6.0 – 9.0 s.u. (instantaneous)	-	6.0 – 9.0 s.u. (instantaneous)	-

Because ballast water (e.g., cargo hold wash water) and contaminated runoff commingled with process wastewater may also be discharged through Discharge Point 001, Tables 3 and 4 of this Order provide additional allocations that may be applied to the mass-based effluent limitations in Table 2. These additional contaminated runoff allocations are based on 40 C.F.R. sections 419.52(e)(2), 419.53(f)(2), and 419.54(e)(2). The ballast water allocations are based on 40 C.F.R. sections 419.52(c), 419.53(d), and 419.54(c). Attachment F-1 explains these allocations.

4.2.3. **Technology-Based Effluent Limitations – Discharge Points 002, 004, 005, 007, and 008.** The technology-based effluent limitations for the stormwater outfalls are based on 40 C.F.R. section 419, subpart B (see Attachment F-1). However, the pH limitations in this Order are based on Basin Plan section 3.3.9 because the water quality-based effluent limitations are more stringent than the technology-based effluent limitations required by 40 C.F.R. section 419, subpart B, and are necessary to achieve water quality standards. Water quality-based effluent limitations for pH, visible oil, and visible color are discussed in Fact Sheet section 4.3.6.

4.3. Water Quality-Based Effluent Limitations

4.3.1. **Scope and Authority.** CWA section 301(b) and 40 C.F.R. section 122.44(d) require permits to include limitations more stringent than federal technology-based requirements where necessary to achieve water quality standards. According to 40 C.F.R. section 122.44(d)(1)(i), permits must include effluent limitations for all pollutants that are or may be discharged at levels that have a

reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective, water quality-based effluent limitations (WQBELs) must be established using (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting a narrative criterion, supplemented with relevant information. The process for determining reasonable potential and calculating WQBELs when necessary is intended to achieve applicable water quality objectives and criteria, and thereby protect designated beneficial uses of receiving waters.

4.3.2. **Beneficial Uses and Water Quality Criteria and Objectives.** Fact Sheet section 3.3.1 identifies the beneficial uses of the receiving waters. Water quality criteria and objectives to protect these beneficial uses are described below.

4.3.2.1. **Basin Plan Objectives.** The Basin Plan specifies numerous water quality objectives, including, for example, numeric objectives for 10 priority pollutants, un-ionized ammonia, and pH, and narrative objectives for oil and grease, color, toxicity, and bioaccumulation.

4.3.2.1.1. **Color.** The narrative color objective (Basin Plan § 3.3.4) states, “Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.”

4.3.2.1.2. **Oil and Grease.** The narrative oil and grease water quality objective (Basin Plan § 3.3.7) states, “Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.”

4.3.2.1.1. **Un-ionized Ammonia.** Basin Plan section 3.3.20 contains water quality objectives for un-ionized ammonia of 0.025 mg/L (as nitrogen) as an annual median and 0.16 mg/L (as nitrogen) as a maximum for San Francisco Bay and upstream waters, including Carquinez Strait. Effluent and receiving water data are available for total ammonia, but not un-ionized ammonia because (1) sampling and laboratory methods are unavailable to analyze for un-ionized ammonia, and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on pH, salinity, and temperature of the receiving water.

To translate the un-ionized ammonia objectives into total ammonia criteria, pH, salinity, and temperature data were obtained from the Pacheco Creek Monitoring Station (BF10). The un-ionized fraction of total ammonia was calculated using on the following equations (U.S. EPA, 1989, Ambient

Water Quality Criteria for Ammonia (Saltwater)–1989, EPA Publication 440/5-88-004):

$$\text{Fraction of un-ionized ammonia} = (1 + 10^{[pK - pH]})^{-1}$$

Where, for salinity less than 1 ppt:

pK = 0.09018 + 2729.92/T
T = temperature in Kelvin

Where, for salinity greater than 10 ppt:

pK = 9.245 + 0.116*(I) + 0.0324*(298-T) + 0.0415*(P)/T
I = molal ionic strength of saltwater = 19.9273*(S)/(1000-1.005109*S)
S = salinity (parts per thousand)
T = temperature in Kelvin
P = pressure (one atmosphere)

The 90th percentile and median un-ionized ammonia fractions were then used to express the maximum and annual average un-ionized objectives as acute and chronic total ammonia criteria. This approach is consistent with U.S. EPA guidance on translating dissolved metal water quality objectives to total recoverable metal water quality criteria (*The Metals Translator: Guidance for Calculating a Total Recoverable Limit from a Dissolved Criterion,* EPA Publication 823-B96-007, 1996). The equivalent acute and chronic total ammonia criteria are 4.7 mg/L and 1.2 mg/L (as nitrogen).

4.3.2.1.2. **Chronic Toxicity (Prior to U.S. EPA approval of the Toxicity Provisions).** Basin Plan section 3.3.18 contains the following chronic toxicity water quality objective:

> All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.... There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community. Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests…, or other methods selected by the Water Board.

For this Order, prior to U.S. EPA approval of the Toxicity Provisions, this narrative objective is translated into a numeric criterion of 1.0 chronic toxicity unit (TUc). At 1.0 TUc, there is no observable detrimental effect when the indicator organism is exposed to 100 percent effluent; therefore,

1.0 TUc is a direct translation of the narrative objective into a number. Moreover, in T*echnical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001, March 1991) (see section 3.3.3), U.S. EPA recommends that 1.0 TUc be used as a criterion continuous concentration (typically a four-day average).

4.3.2.1.3. **Chronic Toxicity (After U.S. EPA approval of the Toxicity Provisions).** After U.S. EPA approves the Toxicity Provisions, the following additional chronic toxicity water quality objective will apply:

H_o:
Mean Response (ambient water) ≤ 0.75 x Mean Response (control water)

H_a:
Mean Response (ambient water) > 0.75 x Mean Response (control water).

Where:

H_o = Null Hypothesis

H_a = Alternative Hypothesis,

0.75 = Regulatory Management Decision Criterion (i.e., 75 percent)

H_o means the ambient water is toxic when the test organism response in a bioassay is less than or equal to 75 percent of the control response; H_a means the ambient water is not toxic when the test organism response is greater than 75 percent of the control response. For example, if an average of 75 percent of bioassay test organisms or fewer survive when exposed to ambient water relative to the average number that survive when exposed to control water, the ambient water is toxic (i.e., the test result is “fail”). Conversely, if an average of more than 75 percent of bioassay test organisms survive relative to those exposed to control water, the ambient water is not toxic (i.e., the test result is “pass”).

4.3.2.1.4. **Dioxin-TEQ.** The narrative bioaccumulation objective (Basin Plan § 3.3.2) states, “Many pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.” Because it is the consensus of the scientific community that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissue of fish and other organisms, the Basin Plan’s narrative bioaccumulation water quality objective applies to these pollutants. Elevated levels of dioxins and furans in San Francisco Bay fish tissue demonstrate that the narrative bioaccumulation water quality objective is not being met. U.S. EPA has therefore placed Suisun Bay on

its 303(d) list of receiving waters where water quality objectives are not being met after imposition of applicable technology-based requirements.

When the CTR was promulgated, U.S. EPA stated its support for the regulation of dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs). U.S. EPA stated, "For California waters, if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric water quality-based effluent limits for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme" (Fed. Reg. Vol. 65, No. 97, pages 31695-31696, May 18, 2000). This Order uses a TEQ scheme based on a set of toxicity equivalency factors (TEFs) the World Health Organization developed in 2005, and a set of bioaccumulation equivalency factors (BEFs) U.S. EPA developed for the Great Lakes region (40 C.F.R. § 132, Appendix F) to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD). Although the 2005 World Health Organization scheme includes TEFs for dioxin-like PCBs, they are not included in this Order's TEQ scheme. The CTR has established a specific water quality criterion for PCBs, and dioxin-like PCBs are included in the analysis of total PCBs.

The CTR establishes a numeric water quality objective for 2,3,7,8-TCDD of 1.4 x 10-8 µg/L for the protection of human health when water and aquatic organisms are consumed. This CTR criterion is used as a criterion for dioxin-TEQ because dioxin-TEQ represents a toxicity-weighted concentration equivalent to 2,3,7,8 TCDD, thus translating the narrative bioaccumulation objective into a numeric criterion.

4.3.2.2. **CTR Criteria.** The CTR specifies numeric aquatic life and human health criteria for numerous priority pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries. Some human health criteria are for consumption of "water and organisms" and others are for consumption of "organisms only." The criteria applicable to "organisms only" apply to the Carquinez Strait because it is not a source of drinking water.

4.3.2.3. **NTR Criteria.** The NTR establishes numeric aquatic life and human health criteria for a number of toxic pollutants for San Francisco Bay waters upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. The NTR criteria apply to Carquinez Strait.

4.3.2.4. **Sediment Quality Objectives.** The *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* contains the following narrative water quality objectives:

4.3.2.4.1. "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of

California." This objective is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this objective, it is to impose the objective as a receiving water limit.

4.3.2.4.2. "Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health in bays and estuaries of California." This objective is to be implemented by a three-tiered procedure based on pollutant concentrations in sediment and fish tissue.

4.3.2.4.3. "Pollutants shall not be present in sediment at levels that alone or in combination are toxic to wildlife and resident finfish by direct exposure or bioaccumulate in aquatic life at levels that are harmful to wildlife or resident finfish by indirect exposure in bays and estuaries of California." This objective is to be implemented on a case-by-case basis, based upon an ecological risk assessment.

4.3.2.5. **Receiving Water Salinity and Hardness.** Basin Plan section 4.6.2 (like the CTR and NTR) states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water are to be considered in determining the applicable water quality objectives. Freshwater criteria apply to discharges to waters with salinities equal to or less than one part per thousand (ppt) at least 95 percent of the time. Saltwater criteria apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities in between these two categories, or tidally-influenced freshwaters that support estuarine beneficial uses, the water quality objectives are the lower of the salt or freshwater criteria (the latter calculated based on ambient hardness) for each substance.

Carquinez Strait, the receiving water for Discharge Point 001, is tidally-influenced. Carquinez Strait is estuarine pursuant to the Basin plan salinity definition. Therefore, this Order specifies effluent limitations for discharges to Carquinez Strait based on the lower of the marine and freshwater objectives. The Discharger collected hardness data near its outfall from 2011 through 2016. During this period, the geometric mean of hardness data collected by the Discharger was 5,100 mg/L. The Regional Water Board chose to use a more conservative value of 400 mg/L for hardness because U.S. EPA recommends 400 mg/L as the maximum hardness value that should be used in determining water quality objectives.

4.3.2.6. **Metals Translators.** Regulations at 40 C.F.R. section 122.45(c) require effluent limitations for metals to be expressed as total recoverable metal. Since the water quality objectives for metals are typically expressed as

dissolved metal, translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. The CTR contains default translators; however, site-specific conditions, such as water temperature, pH, total suspended solids, and organic carbon may affect the form of metal (dissolved, non-filterable, or otherwise) present and therefore available to cause toxicity. In general, dissolved metals are more available and more toxic to aquatic life than other forms. Site-specific translators can account for site-specific conditions, thereby preventing overly stringent or under-protective water quality objectives. For copper, Basin Plan Table 7.2.1-2 contains site-specific translators for deep-water discharges of 0.38 for chronic conditions and 0.66 for acute conditions. For nickel, this Order uses site-specific translators the Clean Estuary Partnership developed, as set forth in *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* report (March 2005): 0.27 and 0.57 (chronic and acute).

4.3.2.7. **Bacteria Objectives.** *The Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California – Part 3, Bacteria Provisions and a Water Quality Standards Variance Policy* establishes *Enterococcus* bacteria water quality objectives to limit cases of gastrointestinal illness from water contact recreation. The *Enterococcus* bacteria objectives apply to marine and estuarine waters.

4.3.3. **Reasonable Potential Analysis – Discharge Point 001**

4.3.3.1. **Available Information.** The reasonable potential analysis is based on effluent monitoring data the Discharger collected from December 2017 through May 2022. For ambient background data, this reasonable potential analysis relies on the Regional Monitoring Program *San Francisco Bay California Toxics Rule Priority Pollutant Ambient Water Monitoring Report* (2017), which includes data collected through the RMP at the Yerba Buena RMP station (BC10) from 1993 through 2017, supplemented by additional Bay Area Clean Water Agencies data *from San Francisco Bay Ambient Water Monitoring Interim Report* (2003) and *Ambient Water Monitoring: Final CTR Sampling Update* (2004).

This Order does not contain WQBELs for constituents that do not demonstrate reasonable potential; however, the MRP still requires monitoring for those pollutants. If concentrations are found to have increased significantly, Provision 6.3.2.1 of this Order requires the Discharger to investigate the causes of the increases and implement remedial measures if the increases pose a threat to receiving water quality

4.3.3.2. **Priority Pollutants, Ammonia, and Dioxin-TEQ.** SIP section 1.3 sets forth the methodology used to assess whether priority pollutants have reasonable potential to exceed CTR and NTR water quality objectives. Here, SIP section 1.3 is also used as guidance for ammonia and dioxin-TEQ.

The analysis begins with identifying the maximum effluent concentration (MEC) observed for each pollutant based on available effluent concentration data and the ambient background concentration (B). SIP section 1.4.3 states that ambient background concentrations are either the maximum ambient concentration observed or, for water quality objectives intended to protect human health, the arithmetic mean of observed concentrations. There are three triggers in determining reasonable potential:

- **Trigger 1** is activated if the maximum effluent concentration is greater than or equal to the lowest applicable water quality objective (MEC ≥ water quality objective).
- **Trigger 2** is activated if the ambient background concentration observed in the receiving water is greater than the lowest applicable water quality objective (B > water quality objective) and the pollutant is detected in any effluent sample.
- **Trigger 3** is activated if a review of other information indicates that a WQBEL is needed to protect beneficial uses.

The maximum effluent concentrations, most stringent applicable water quality criteria and objectives, and ambient background concentrations used in the analysis are presented in the following table, along with the reasonable potential analysis results (yes, no, or unknown) for each pollutant. Based on this analysis, ammonia, copper, nickel, cyanide, and dioxin-TEQ have reasonable potential.

Table F-6. Reasonable Potential Analysis

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1][5]	B or Minimum DL (µg/L) [1]	RPA Result [2]
1	Antimony	4300	0.78	1.8	No
2	Arsenic	36	2.9	2.5	No
3	Beryllium	No Criteria	<0.09	0.22	No
4	Cadmium	3.4	0.17	0.13	No
5a	Chromium (III) [3]	644	2.2	4.4	No
5b	Chromium (VI)	11	2.2	4.4	No
6	**Copper**	14.2	13	**2.5**	**Yes** [5]
7	**Lead**	8.5	0.46	**0.8**	**Yes**
8	Mercury [4]	-	-	-	-
9	**Nickel**	**30.4**	**39**	**3.7**	**Yes**
10	**Selenium** [4]	**-**	**-**	**-**	**-**
11	Silver	2.2	0.3	0.052	No
12	Thallium	6.3	<0.05	0.023	No
13	Zinc	86	80	5.1	No

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1][5]	B or Minimum DL (µg/L) [1]	RPA Result [2]
14	**Cyanide**	**2.9**	**23**	**0.52**	**Yes**
15	Asbestos (fibers/L)	No Criteria	-	-	U
16	2,3,7,8-TCDD	1.4E-08	<1.2E-06	2.7E-08	U
	Dioxin-TEQ	**1.4E-08**	**1.4E-09**	**2.7E-09**	**Yes** [6]
17	Acrolein	780	<0.81	<0.5	No
18	Acrylonitrile	0.66	<0.75	0.03	U
19	Benzene	71	<0.18	<0.05	No
20	Bromoform	360	0.67	<0.15	No
21	Carbon Tetrachloride	4.4	<0.16	0.06	No
22	Chlorobenzene	21000	<0.18	<0.18	No
23	Chlorodibromomethane	34	1.9	<0.05	No
24	Chloroethane	No Criteria	<0.15	<0.38	U
25	2-Chloroethylvinyl ether	No Criteria	<0.28	<0.28	U
26	Chloroform	No Criteria	10	<0.19	U
27	Dichlorobromomethane	46	3.7	<0.05	No
28	1,1-Dichloroethane	No Criteria	<0.19	<0.05	No
29	1,2-Dichloroethane	99	<0.18	0.04	No
30	1,1-Dichloroethylene	3.2	<0.21	<0.21	U
31	1,2-Dichloropropane	39	<0.18	<0.05	No
32	1,3-Dichloropropylene	1700	<0.09	<0.16	No
33	Ethylbenzene	29000	<0.1	<0.26	No
34	Methyl Bromide	4000	<0.3	<0.3	No
35	Methyl Chloride	No Criteria	<0.3	<0.3	U
36	Methylene Chloride	1600	<0.4	22	No
37	1,1,2,2-Tetrachloroethane	11	<0.15	<0.05	No
38	Tetrachloroethylene	8.9	<0.19	<0.05	No
39	Toluene	200000	<0.19	<0.19	No
40	1,2-Trans-Dichloroethylene	140000	<0.22	<0.22	No
41	1,1,1-Trichloroethane	No Criteria	<0.19	<0.19	No
42	1,1,2-Trichloroethane	42	<0.16	<0.05	No
43	Trichloroethylene	81	<0.2	<0.2	No
44	Vinyl Chloride	525	<0.25	<0.25	No
45	2-Chlorophenol	400	<0.4	<0.7	No
46	2,4-Dichlorophenol	790	<0.4	<0.9	No
47	2,4-Dimethylphenol	2300	<0.4	<0.8	No
48	2-Methyl- 4,6-Dinitrophenol	765	<0.3	<0.6	No
49	2,4-Dinitrophenol	14000	<0.2	<0.7	No
50	2-Nitrophenol	No Criteria	<0.4	<0.8	U
51	4-Nitrophenol	No Criteria	<0.5	<0.5	U
52	3-Methyl 4-Chlorophenol	No Criteria	<0.5	<0.8	U
53	Pentachlorophenol	0.00589294	<0.4	<0.6	U

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1][5]	B or Minimum DL (µg/L) [1]	RPA Result [2]
54	Phenol	4600000	<0.3	<0.5	No
55	2,4,6-Trichlorophenol	6.5	<0.5	<0.97	No
56	Acenaphthene	2700	<0.02	0.002	No
57	Acenaphthylene	No Criteria	<0.02	0.001	U
58	Anthracene	110000	<0.01	0.001	No
59	Benzidine	0.00054	<4.0	<0.0003	U
60	Benzo(a)Anthracene	0.049	<0.02	0.005	U
61	Benzo(a)Pyrene	0.049	<0.02	0.002	U
62	Benzo(b)Fluoranthene	0.049	<0.02	0.005	U
63	Benzo(ghi)Perylene	No Criteria	<0.02	0.003	U
64	Benzo(k)Fluoranthene	0.049	<0.02	0.002	U
65	Bis(2-Chloroethoxy)Methane	No Criteria	<0.5	<0.3	U
66	Bis(2-Chloroethyl)Ether	1.4	<0.4	<0.3	U
67	Bis(2-Chloroisopropyl)Ether	170000	<0.4	<0.6	No
68	Bis(2-Ethylhexyl)Phthalate	5.9	<0.5	<0.5	No
69	4-Bromophenyl Phenyl Ether	No Criteria	<0.5	<0.23	U
70	Butylbenzyl Phthalate	5200	<0.5	<0.5	No
71	2-Chloronaphthalene	4300	<0.4	<0.3	No
72	4-Chlorophenyl Phenyl Ether	No Criteria	<0.5	<0.3	U
73	Chrysene	0.049	<0.02	0.002	U
74	Dibenzo(a,h)Anthracene	0.049	<0.02	0.001	U
75	1,2-Dichlorobenzene	17000	<0.27	<0.27	No
76	1,3-Dichlorobenzene	2600	<0.18	<0.18	No
77	1,4-Dichlorobenzene	2600	<0.18	<0.18	No
78	3,3 Dichlorobenzidine	0.077	<5.0	<0.0002	U
79	Diethyl Phthalate	120000	<0.5	<0.2	No
80	Dimethyl Phthalate	2900000	<0.5	<0.2	No
81	Di-n-Butyl Phthalate	12000	<0.4	<0.5	No
82	2,4-Dinitrotoluene	9.1	<0.4	<0.27	U
83	2,6-Dinitrotoluene	No Criteria	<0.4	<0.29	U
84	Di-n-Octyl Phthalate	No Criteria	<0.4	<0.38	U
85	1,2-Diphenyhydrazine	0.54	<0.5	0.004	U
86	Fluoranthene	370	<0.02	0.011	No
87	Fluorene	14000	<0.01	0.002	No
88	Hexachlorobenzene	0.00077	<0.4	0.00002	U
89	Hexachlorobutadiene	50	<0.4	<0.3	U
90	Hexachlorocyclopentadiene	17000	<0.3	<0.3	No
91	Hexachloroethane	8.9	<0.4	<0.2	No
92	Indeno(1,2,3-cd)Pyrene	0.049	<0.02	0.004	U
93	Isophorone	600	<0.5	<0.3	No
94	Naphthalene	No Criteria	<0.02	0.009	U

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1][5]	B or Minimum DL (µg/L) [1]	RPA Result [2]
95	Nitrobenzene	1900	<0.5	<0.25	No
96	N-Nitrosodimethylamine	8.1	<0.3	<0.3	U
97	N-Nitrosodi-n-Propylamine	1.4	<0.5	<0.0002	U
98	N-Nitrosodiphenylamine	16	<0.3	<0.001	No
99	Phenanthrene	No Criteria	<0.02	0.006	U
100	Pyrene	11000	<0.02	0.019	No
101	1,2,4-Trichlorobenzene	No Criteria	<0.4	<0.3	No
102	Aldrin	0.00014	<0.002	<0.0000085	U
103	Alpha-BHC	0.013	<0.003	0.0005	No
104	Beta-BHC	0.046	<0.003	0.0004	No
105	Gamma-BHC	0.063	<0.003	0.001	No
106	Delta-BHC	No Criteria	<0.003	0.0001	U
107	Chlordane	0.00059	<0.007	0.0001	U
108	4,4'-DDT	0.00059	<0.003	0.0002	U
109	4,4'-DDE	0.00059	<0.004	0.001	U
110	4,4'-DDD	0.00084	<0.003	0.0003	U
111	Dieldrin	0.00014	<0.004	0.0003	U
112	Alpha-Endosulfan	0.0087	<0.003	0.0001	No
113	beta-Endosulfan	0.0087	<0.003	0.0001	No
114	Endosulfan Sulfate	240	<0.003	0.0001	No
115	Endrin	0.0023	<0.003	0.00004	No
116	Endrin Aldehyde	0.81	<0.004	<0.005	No
117	Heptachlor	0.00021	<0.003	0.00002	U
118	Heptachlor Epoxide	0.00011	<0.003	0.0001	U
119-125	PCBs sum [4]	-	-	-	-
126	Toxaphene	0.0002	<0.2	<0.00000082	U
	Total Ammonia	**1.3**	**5.9**	**0.22**	**Yes**

Footnotes:

[1] The MEC and ambient background concentration are the actual detected concentrations unless preceded by a "<" sign, in which case the value shown is the minimum detection level (MDL).

[2] RPA Results = Yes, if MEC ≥ WQC, B > WQC and MEC is detected, or Trigger 3
= No, if MEC and B are < WQC or all effluent data are undetected
= Unknown (U) if no criteria have been promulgated or data are insufficient.

[3] The maximum effluent and ambient background concentrations are the total chromium concentration. The chromium (III) concentrations are unknown but less than these values.

[4] SIP section 1.3 excludes from its reasonable potential analysis procedure priority pollutants for which a TMDL has been developed. TMDLs have been developed for mercury and PCBs in San Francisco Bay and selenium in North San Francisco Bay. Mercury and PCBs from wastewater discharges are regulated under NPDES Permit CA0038849, which implements the San Francisco Bay Mercury and PCBs TMDLs. This Order implements the North San Francisco Bay Selenium TMDL.

[5] Basin Plan section 7.2.1.2 requires copper WQBELs.

[6] Reasonable potential is based on Trigger 3 because San Francisco Bay is 303(d)-listed for dioxin-TEQ and elevated levels of dioxin-TEQ are found in San Francisco Bay fish tissue.

4.3.3.3. **Acute Toxicity**

4.3.3.3.1 **Prior to U.S. EPA approval of the Toxicity Provisions.** Basin Plan section 4.5.5.3.1 requires acute toxicity monitoring and limitations.

4.3.3.3.2 **After U.S. EPA approval of the Toxicity Provisions.** When approved, the Toxicity Provisions will supersede Basin Plan section 4.5.5.3.1 and acute toxicity monitoring and limitations will not necessarily be required. During the previous order term, the Discharger monitored its effluent monthly for acute toxicity and all results showed 90 percent survival. Therefore, there is no reasonable potential for the discharge to cause or contribute to acute toxicity in the receiving water. However, this Order retains the previous order's acute toxicity limits as a special provision to ensure that the Discharger continues to properly operate and maintain its granular activated carbon treatment to remove residual toxicity at the end of its treatment process.

4.3.3.4. **Chronic Toxicity**

4.3.3.4.1. **Prior to U.S. EPA approval of the Toxicity Provisions.** Due to the complexity of the discharge, there is reasonable potential for it to cause or contribute to exceedance of the narrative toxicity objectives in Basin Plan section 3.3.18, which states, "There shall be no chronic toxicity in ambient waters." Petroleum refinery discharges can contain many different combinations of potentially toxic pollutants in addition to those for which numeric water quality objectives have been established. Chronic toxicity effluent limitations are needed to ensure the toxicity objective is met in Carquinez Strait.

4.3.3.4.2. **After U.S. EPA approval of the Toxicity Provisions.** Toxicity Provisions section III.C.3.c states that reasonable potential exists if any of at least four chronic toxicity tests at the IWC within five years prior to permit reissuance (1) results in a "fail" or (2) has at least a 10 percent effect. If data from these tests were not analyzed using the TST, the data must be re-analyzed using the TST. If previous tests were not conducted at the IWC, then a concentration of effluent higher than the IWC may be used. Data from older tests may also be considered. If a minimum of four chronic toxicity tests is unavailable, the Regional Water Board is to require the Discharger to conduct a minimum of four chronic toxicity tests at the IWC and analyze the data using the TST.

During the last year, the Discharger's chronic toxicity screening included quarterly testing on one vertebrate, one invertebrate, and one aquatic plant/algae from Table 1 of Toxicity Provisions section III.B.2. The TST resulted in a fail at 100 percent effluent for three out of the four tests. The highest percent effect observed at the 100 percent effluent treatment was a 100 percent effect. At the IWC of 10 percent, all species passed the

TST; the highest percent effect was 4.4 percent. However, because petroleum refinery discharges have the potential to contain toxic pollutants, the Regional Water Board finds reasonable potential pursuant to Toxicity Provisions section III.C.3.c, which states that the presence of toxic pollutants may be used to determine reasonable potential.

4.3.3.5. ***Enterococcus* Bacteria.** The *Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California – Part 3*, Bacteria *Provisions and a Water Quality Standards Variance Policy* requires *Enterococcus* bacteria effluent limitations for discharges to marine and estuarine receiving waters that support the water contact recreation (REC1) beneficial use.

4.3.3.6. **Sediment Quality.** Pollutants in some receiving water sediments may be present in quantities that alone or in combination are toxic to benthic communities. Based on available information, the Regional Water Board cannot draw a conclusion about reasonable potential for this discharge to cause or contribute to exceedances of the sediment quality objectives. Nevertheless, the Discharger continues to participate in the Regional Monitoring Program, which routinely monitors San Francisco Bay sediment and seeks to identify stressors responsible for degraded sediment quality.

4.3.4. **Reasonable Potential Analysis – Discharge Points 002, 004, 005, 007, and 008.** Discharge Points 002, 004, 005, 007, and 008 discharge stormwater from current and former areas of refinery operations. Stormwater discharged at these discharge points has a reasonable potential to cause or contribute to an exceedance of the narrative water quality objectives for color (Basin Plan § 3.3.4), oil and grease (Basin Plan § 3.3.7), and pH (Basin Plan § 3.3.9) because it could come in contact with process waste. To ensure that stormwater discharged at these discharge points will not be contaminated with process waste, this Order includes effluent limitations for oil and grease and total organic carbon, as required by 40 C.F.R. section 419, subpart B (see Attachment F-1). This Order also includes effluent limitations for pH and visible oil and color. Stormwater discharges have no reasonable potential to cause or contribute to an exceedance of the water quality objectives for *Enterococcus* bacteria (Basin Plan Table 3-1) because they do not contain sanitary wastewater. Stormwater discharges could contain other pollutants that could cause or contribute to exceedances of narrative or numeric water quality objectives; therefore, Provision 6.3.4.3 requires a Stormwater Pollution Prevention Plan and Best Management Practices.

4.3.5. **Water Quality-Based Effluent Limitations – Discharge Point 001.** Water Quality-Based Effluent Limitations (WQBELs) were developed for the pollutants determined to have reasonable potential to cause or contribute to exceedances of water quality objectives. The WQBEL calculations are based on the procedures in SIP section 1.4, with the exception of those for acute toxicity,

chronic toxicity (after U.S. EPA approval of the Toxicity Provisions), and *Enterococcus* bacteria.

4.3.5.1. **WQBEL Expression.** NPDES regulations at 40 C.F.R. section 122.45(d) require that permit limits for industrial dischargers be expressed as maximum daily and average monthly limits, unless impracticable.

4.3.5.2. **Mixing Zones and Dilution Credits.** SIP section 1.4.2 allows dilution credits under certain circumstances. The outfall at Discharge Point 001 is designed to achieve a minimum initial dilution ratio of at least 10:1. According to the Discharger's dilution study titled *Diffuser Dilution Study in Support of NPDES Permit Renewal* (Exponent, December 9, 2016), which relied on U.S. EPA's *Visual Plumes UM3* modeling software, a conservative estimate of the initial dilution is 27:1.

The study estimated initial dilution at Discharge Point 001 at slack tide (i.e., zero ambient current) for both the maximum wet-weather discharge and the average daily discharge. The estimated minimum near-field dilution the Discharger modeled used an average daily discharge rate of 6.0 MGD (the average of daily measurements collected from April 1, 2001 to March 31, 2016) and a maximum wet-weather discharge rate of 10 MGD (the hydraulic capacity of the treatment plant). The seasonal average temperature and salinity of the receiving water were based on data from the California Data Exchange Center Martinez Station for January 2012 through December 2015. Modeling showed that, during slack tide conditions, the diffuser could be expected to achieve a minimum initial dilution of 38:1, with little variation between seasons. In a tidally influenced estuary environment, such as Carquinez Strait, slack tide conditions are typically assumed to represent worst-case scenarios, but this study showed that the minimum dilution over a tidal cycle is, at times, lower than dilution at slack tide. The conditions influencing the observed minimum initial dilution during a typical tidal cycle, like slack current conditions, are momentary occurrences persisting for a very short time, and additional mixing occurs beyond the zone of initial dilution due to ambient flow and turbulence. The study concluded that a conservative estimate of the initial dilution is 27:1.

4.3.5.2.1. **Bioaccumulative Pollutants.** For certain bioaccumulative pollutants, dilution credit is significantly restricted or denied. Specifically, these pollutants include dioxin and furan compounds, which appear on the CWA section 303(d) list for San Francisco Bay, including Suisun Bay because, based on available data on the concentrations of these pollutants in aquatic organisms, sediment, and the water column, they impair San Francisco Bay beneficial uses. The following factors suggest insufficient assimilative capacity in San Francisco Bay for these pollutants.

Tissue samples taken from San Francisco Bay fish show the presence of these pollutants at concentrations greater than screening levels

(Contaminant Concentrations in Fish from San Francisco Bay, May 1997). The results of a 1994 San Francisco Bay pilot study, presented in Contaminated Levels in Fish Tissue from San Francisco Bay (Regional Water Board, 1994), also show elevated levels of chemical contaminants in fish tissues. The Office of Environmental Health and Hazard Assessment completed a preliminary review of the data in the 1994 report and in December 1994 issued an interim consumption advisory covering certain fish species in San Francisco Bay due to the levels of some of these pollutants. The Office of Environmental Health and Hazard Assessment updated this advisory in a May 2011 report, Health Advisory and Safe Eating Guidelines for San Francisco Bay Fish and Shellfish, which still suggests insufficient assimilative capacity in San Francisco Bay for 303(d)-listed pollutants. Therefore, dilution credits are denied for bioaccumulative pollutants on the 303(d) list for which data are lacking on sources and significant uncertainty exists about how different sources contribute to bioaccumulation.

4.3.5.2.2. **Ammonia.** For ammonia, a conservative initial dilution of 27:1 (D=26) was used to calculate the effluent limitations. This is justified because ammonia, a nonpersistent pollutant, quickly disperses and degrades to a non-toxic state, and cumulative toxicity is unlikely. The previous order's limits were more stringent because they were based on an older dilution study. Those limits were retained to avoid backsliding.

4.3.5.2.3. **Other Non-Bioaccumulative Pollutants.** This Order grants a conservative dilution credit of 10:1 (D = 9) for other non-bioaccumulative pollutants (excluding ammonia), including chronic toxicity and *Enterococcus* bacteria. This dilution credit is based, in part, on Basin Plan Prohibition 1 (Table 4-1), which prohibits discharges with less than 10:1 dilution. SIP section 1.4.2 allows for limiting the dilution credit. The dilution credit is limited for the following reasons:

4.3.5.2.3.1. San Francisco Bay is a complex estuarine system with highly variable and seasonal upstream freshwater inflows and diurnal tidal saltwater inputs. SIP section 1.4.3 allows background conditions to be determined on a discharge-by-discharge or water body-by-water body basis. A water body-by-water body approach is taken here due to inherent uncertainties in characterizing ambient background conditions in a complex estuarine system on a discharge-by-discharge basis.

4.3.5.2.3.2. Because of the complex hydrology of San Francisco Bay, there are uncertainties in accurately determining an appropriate mixing zone. The models used to predict dilution do not consider the three dimensional nature of San Francisco Bay currents resulting from the interaction of tidal flushes and seasonal fresh water outflows. Being heavier and colder than fresh water, ocean saltwater enters San Francisco Bay on a twice-daily tidal cycle, generally beneath the warmer fresh water that

flows seaward. When these waters mix and interact, complex circulation patterns occur due to the varying densities of the fresh and ocean waters. The complex patterns occur throughout San Francisco Bay, but are most prevalent in San Pablo Bay, Carquinez Strait, and Suisun Bay. The locations of this mixing and interaction change, depending on the strength of each tide. Additionally, sediment loads from the Central Valley change on a long-term basis, affecting the depth of different parts of San Francisco Bay, resulting in alteration of flow patterns, mixing, and dilution at the outfall.

4.3.5.3. **Copper, Cyanide, Dioxin-TEQ, Ammonia, and Nickel.** The following table shows the WQBEL calculations for copper, cyanide, dioxin-TEQ, ammonia, and nickel in accordance with SIP section 1.4.

Table F-7. WQBEL Calculations

Pollutant	Copper	Cyanide	Dioxin-TEQ	Ammonia (acute)	Ammonia (chronic)	Nickel
Units	µg/L	µg/L	µg/L	mg/L N	mg/L N	µg/L
Basis and Criteria type	Basin Plan Site Specific Objectives	Basin Plan Site Specific Objectives	Basin Plan and CTR saltwater	Basin Plan Aquatic Life	Basin Plan Aquatic Life	CTR Aquatic Life
CTR Aquatic Life Criteria - Acute	-	9.4	-	4.6	-	74
CTR Aquatic Life Criteria - Chronic	-	2.9	-	-	1.2	8.2
CTR Human Health Criteria - Organisms Only	-	-	-	-	-	-
Site-Specific Objective Criteria - Acute	3.9	-	-	-	-	-
Site-Specific Objective Criteria - Chronic	2.5	-	-	-	-	-
Water Effects Ratio (WER)	2.4	1	1	1	1	1
Lowest WQO	2.5	2.9	1.4E-08	4.6	1.2	8.2
Site Specific Translator – MDEL	0.66	-	-	-	-	0.57
Site Specific Translator – AMEL	0.38	-	-	-	-	0.27
Dilution Factor (D)	9	9	0	26	26	9
No. of samples per month	4	4	4	4	30	4
Aquatic life criteria analysis required? (Y/N)	Y	Y	N	Y	Y	Y
HH criteria analysis required? (Y/N)	N	Y	Y	N	N	N
Applicable Acute WQO	14	9.4	-	4.6	-	130
Applicable Chronic WQO	16	2.9	-		1.2	30
HH Criteria	-	220,000	1.4E-08	N	N	4,600
Background (Maximum Conc. for Aquatic Life Calc.)	2.5	0.52	-	0.22	0.07	3.7
Background (Average Conc. for Human Health Calc.)	-	0.44	2.2E-08	-	-	-

Pollutant	Copper	Cyanide	Dioxin-TEQ	Ammonia (acute)	Ammonia (chronic)	Nickel
Is the pollutant on the 303d list and/or bioaccumulative (Y/N)?	N	N	N	N	N	N
ECA Acute	119	89	221	120	-	1265
ECA Chronic	135	24	86	-	31	270
ECA HH	-	220,000	-	-	-	-
No. of data points <10 or at least 80% of data reported non-detect? (Y/N)	N	N	Y	N	N	N
Avg of effluent data points	3.1	9.7	-	1.4	1.4	17
Std Dev of effluent data points	2.4	4.3	-	1.5	1.5	6
CV Calculated	0.79	0.45	-	1.0	1.0	0.36
CV (Selected) – Final	0.79	0.45	0.60	1.0	1.0	0.36
ECA Acute Mult99	0.25	0.41	-	0.20	-	0.47
ECA Chronic Mult99	0.44	0.61	-	-	0.88	0.67
LTA Acute	30	36	-	23	-	592
LTA Chronic	60	14.9	-	-	28	181
Minimum of LTAs	30	14.9	-	23	28	181
AMEL Mult95	1.7	1.4	1.6	2.0	1.3	1.3
MDEL Mult99	4.0	2.5	3.1	5.1	5.1	2.1
AMEL (Aquatic Life)	52	21	-	46	37	239
MDEL (Aquatic Life)	120	37	-	120	140	386
MDEL/AMEL Multiplier	2.3	1.8	2.0	2.6	3.8	1.6
AMEL (Human Health)	-	2.2E06	1.4E-08	-	-	-
MDEL (Human Health)	-	3.9E06	2.8E-08	-	-	-
Minimum of AMEL for Aq. Life vs HH	52	21	1.4E-08	46	37	239
Minimum of MDEL for Aq. Life vs HH	120	37	2.8E-08	120	140	386
Previous Order Limit – AMEL	60	22	1.4E-08	21	21	43
Previous Order Limit – MDEL	120	38	2.8E-08	57	57	72
Final Limit – AMEL	**52**	**21**	**1.4E-08**	**21**	**21**	**43**
Final Limit – MDEL	**120**	**37**	**2.8E-08**	**57**	**57**	**72**

4.3.5.4. **Selenium.** A TMDL for selenium has been adopted for North San Francisco Bay, including a portion of the Sacramento/San Joaquin Delta, Suisun Bay, Carquinez Strait, San Pablo Bay, and Central San Francisco Bay. The TMDL establishes a wasteload allocation of 244 kg/year for the Discharger. Basin

Plan section 7.2.4.5 allows the Discharger to discharge no more than its current load based on its selenium concentration and discharge volumes as reported from 2000 through 2012. Specifically, it says selenium WQBELs are to be calculated as the 95th percentile daily load based on representative data reported during 2000 through 2012 and are to be expressed in units of kilograms per day (kg/day). The 95th percentile daily load for this period, after excluding outliers greater than 1.4 kg/day, was 1.1 kg/day. Therefore, this Order establishes a performance-based average monthly mass emission limitation of 1.1 kg/day.

4.3.5.5. **Toxicity (Prior to U.S. EPA approval of the Toxicity Provisions)**

4.3.5.5.1. **Acute Toxicity.** Before U.S. EPA approval of the Toxicity Provisions, this Order includes effluent limitations for acute toxicity based on Basin Plan Table 4-3.

4.3.5.5.2. **Chronic Toxicity.** Before U.S. EPA approval of the Toxicity Provisions, this Order includes chronic toxicity effluent limitations based on Basin Plan section 4.5.5.3.2. The effluent limitation was calculated based on SIP section 1.4 using the following equation:

$$ECA = C + D (C – B)$$

where:

ECA = Effluent Concentration Allowance (effluent limitation)
C = water quality objective (1 TUc)
D = dilution factor (D = 9)
B = background concentration (0 TUc)

This calculation results in a single-sample WQBEL of 10 TUc.

4.3.5.6. **Toxicity (After U.S. EPA approval of the Toxicity Provisions)**

4.3.5.6.1. **Acute Toxicity**. Following U.S. EPA approval of the Toxicity Provisions, this Order retains the previous order's acute toxicity limits as a special provision to ensure that existing treatment performance is maintained.

4.3.3.6.2. **Chronic Toxicity.** Following U.S. EPA approval of the Toxicity Provisions, this Order includes chronic toxicity limitations based on Toxicity Provisions section III.C.5. This Order grants a mixing zone for chronic toxicity corresponding to a dilution ratio of at least 10:1 (D=9), equivalent to an IWC of 10 percent effluent. This Order imposes a maximum daily effluent limit (MDEL) and median monthly effluent limit (MMEL) based on testing at the IWC.

4.3.5.7. ***Enterococcus* Bacteria.** This Order includes *Enterococcus* effluent limitations based on the *Water Quality Control Plan for Inland Surface*

Waters, Enclosed Bays, and Estuaries of California – Part 3, Bacteria Provisions and a Water Quality Standards Variance Policy, which requires limitations for discharges to receiving waters with the water contact recreation beneficial use. This Order accounts for a conservative initial dilution of 10:1 (D=9) to calculate the *Enterococcus* effluent limitation. To establish background conditions, the Discharger collected five receiving water samples for *Enterococcus* near its outfall from May 2011 through February 2012. The geometric mean of these samples was 23 MPN/100 mL. (The units of most probable number and colony forming units are considered comparable for the purposes of this calculation.) The *Enterococcus* effluent limitation was calculated as specified in SIP section 1.4 using the following equation:

$$ECA = C + D (C – B)$$

where:

ECA = Effluent Concentration Allowance (effluent limitation)
C = water quality objective (30 CFU/100 mL, 110 CFU/100mL)
D = dilution factor (D = 9)
B = background concentration (23 MPN/100 mL)

This calculation results in a six-week rolling geometric mean *Enterococcus* effluent limitation of 93 CFU/100 mL and a 90th percentile limitation of 890 CFU/100mL (based on all *Enterococcus* samples collected in a calendar month).

4.3.5.8. **Effluent Limitation Adjustments for Recycled Water Use.** Provisions 4.1.7 and 6.3.4.8 of this Order provide a process for the Discharger to obtain effluent limitation credits for recycled water used in its processes (this process does not apply to treated wastewater used onsite for landscape irrigation). These requirements are included to encourage wastewater recycling, consistent with Basin Plan section 4.16 and State Water Board Resolutions 77-1 and 2009-0011, by accounting for increased pollutant concentrations that may result from recycled water use.

4.3.6. **WQBELs – Discharge Points 002, 004, 005, 007, and 008.** For stormwater discharged from Discharge Points 002, 004, 005, 007, and 008, this Order retains from the previous order the narrative WQBELs of no visible oil or grease, no visible color, and the requirements set forth in Provision 6.3.4.3. These requirements include best management practices in accordance with 40 C.F.R. section 122.44(k). This Order also imposes pH WQBELs based on Basin Plan section 3.3.9 because they are more stringent than the technology-based pH effluent limitations

4.4. Discharge Requirement Considerations

4.4.1. **Anti-backsliding.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed. This Order complies with the anti-backsliding provisions. The requirements of this Order are at least as stringent as those in the previous order, except for the removal of total coliform limits. The changes to chronic toxicity and bacteria requirements are discussed below.

On the first day of the month following U.S. EPA approval of the Toxicity Provisions, this Order will impose new chronic toxicity effluent limits and will not retain the chronic toxicity effluent limits in place prior to U.S. EPA approval of the Toxicity Provisions. This complies with anti-backsliding requirements because the new chronic toxicity effluent limits, based on the TST, are comparable to the chronic toxicity effluent limits currently in the Basin Plan, which are based on point estimates of chronic toxicity. The AMELs and the MDELs in place prior to U.S. EPA approval allow for a 10:1 dilution credit. Similarly, the MDEL and MMEL that apply after U.S. EPA approval are based on an IWC of 10 precent effluent, corresponding to dilution of 10:1. Thus, the use of the TST will not relax effluent limitations. There is no backsliding for acute toxicity because this Order retains the previous order's acute toxicity limits as a special provision once U.S. EPA approves the Toxicity Provisions.

This Order contains new *Enterococcus* bacteria effluent limits based on the *Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California – Part 3, Bacteria Provisions and a Water Quality Standards Variance Policy* (Bacteria Provisions). The Bacteria Provisions superseded the Basin Plan's water quality objectives for bacteria for REC-1 that served as the basis for the enterococcus and total coliform effluent limits in the previous order. The new *Enterococcus* effluent limitations are expressed using different averaging periods than the previous limits and are therefore not directly comparable.

The previous order's total coliform effluent limits were water-quality based. CWA section 402(o)(1) allows for relaxation of WQBELs if it is consistent with the provisions of CWA section 303(d)(4). CWA section 303(d)(4)(B) applies to this discharge because Carquinez Strait attains the water quality level, making it an attainment water. Under CWA section 303(d)(4)(B), a limitation based on a water quality standard or any other permitting standard may only be relaxed where the action is consistent with antidegradation policy. As explained below in Fact Sheet section 4.4.2, by applying *Enterococcus* bacteria limits and removing total coliform limits, there will be no degradation to water quality.

4.4.2. **Antidegradation.** This Order complies with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16. This Order

does not allow for an increased volume, increased concentration of pollutants, or reduced level of treatment relative to the previous order. It continues the status quo with respect to the level of discharge authorized in the previous order (i.e., authorizes the same flow and imposes limits that are at least as stringent as those in the previous order), which was adopted in accordance with the antidegradation policies and thus serves as the baseline by which to measure whether degradation will occur.

The removal of total coliform effluent limitations, which were implemented to protect water contact recreation, will not degrade water quality because the Discharger still must meet new *Enterococcus* bacteria limits that are protective of water contact recreation. Because *Enterococcus* and total coliform are both indicators for fecal waste, they are removed in similar ways. Historically, when the Discharger's total coliform levels were high, its *Enterococcus* levels were high as well, indicating similar removal during treatment. Therefore, by applying *Enterococcus* bacteria limits and removing total coliform limits, there is no degradation to water quality.

4.4.3. **Stringency of Requirements for Individual Pollutants.** This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based requirements implement best professional judgement and applicable federal technology-based requirements. In addition, this Order contains more stringent effluent limitations as necessary to meet water quality standards. Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement CWA requirements.

This Order's WQBELs have been derived to implement water quality objectives that protect beneficial uses. The beneficial uses and water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 C.F.R. section 131.38. The procedures for calculating these WQBELs are based on the CTR, as implemented in accordance with the SIP, which U.S. EPA approved on May 18, 2000. U.S. EPA approved most Basin Plan beneficial uses and water quality objectives prior to May 30, 2000. Beneficial uses and water quality objectives submitted to U.S. EPA prior to May 30, 2000, but not approved by U.S. EPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 C.F.R. section 131.21(c)(1). U.S. EPA approved the remaining beneficial uses and water quality objectives, so they are also applicable water quality standards pursuant to 40 C.F.R. section 131.21(c)(2).

5. RATIONALE FOR RECEIVING WATER LIMITATIONS

The receiving water limitations in sections 5.1 and 5.2 of the Order are based on Basin Plan narrative and numeric water quality objectives. The receiving water

limitation in section 5.3 of the Order requires compliance with federal and State water quality standards in accordance with the CWA and regulations adopted thereunder.

6. RATIONALE FOR PROVISIONS

6.1. Standard Provisions

Attachment D contains standard provisions that apply to all NPDES permits in accordance with 40 C.F.R. section 122.41 and additional conditions applicable to specific categories of permits in accordance with 40 C.F.R. section 122.42. The Discharger must comply with these provisions. The conditions set forth in 40 C.F.R. sections 122.41(a)(1) and (b) through (n) apply to all state-issued NPDES permits and must be incorporated into permits either expressly or by reference.

In accordance with 40 C.F.R. section 123.25(a)(12), states may omit or modify conditions to impose more stringent requirements. Attachment G contains standard provisions that supplement the provisions in Attachment D. This Order omits the federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the State's enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates Water Code section 13387(e) by reference.

6.2. Monitoring and Reporting Provisions

CWA section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP establishes monitoring, reporting, and recordkeeping requirements that implement federal and State requirements. For more information, see Fact Sheet section 7.

6.3. Special Provisions

6.3.1. **Reopener Provisions.** These provisions are based on 40 C.F.R. sections 122.62 and 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated water quality objectives, regulations, or other new and relevant information that may become available in the future, and other circumstances as allowed by law.

6.3.2. **Effluent Characterization Study and Report.** This Order does not include WQBELs for pollutants that do not demonstrate reasonable potential, but this provision requires the Discharger to evaluate monitoring data to verify that the reasonable potential analysis conclusions of this Order remain valid. This requirement is authorized pursuant to 40 C.F.R. section 122.41(h) and Water Code section 13383, and is necessary to inform the next permit reissuance and

to ensure that the Discharger takes timely steps in response to any unanticipated change in effluent quality during the term of this Order.

This provision also requires the Discharger to monitor for priority pollutants at Monitoring Location EFF-002 if the discharge at Discharge Point 002 contains water from the upper pond of Lake Slobodnik. This Order authorizes only stormwater to be discharged at this outfall. Because there is a potential for process wastewater to enter the upper pond, if any water from this portion of the Lake Slobodnik system is present in the discharge, the Discharger must monitor for priority pollutants to document that process wastewater has not mixed with stormwater and the discharge from Discharge Point 002 complies with Discharge Prohibition 3.1. Moreover, monitoring data for Discharge Point 002 may be used to conduct a future reasonable potential analysis.

6.3.3. **Pollutant Minimization Program.** This provision is based on Basin Plan section 4.13.2 and SIP section 2.4.5.

6.3.4. **Other Special Provisions**

6.3.4.1. **Copper Action Plan.** This provision is based on Basin Plan section 7.2.1.2 and is necessary to ensure that use of copper site-specific objectives is consistent with antidegradation policies. This Order requires the Discharger to implement pretreatment, source control, and pollution prevention for identified sources. Additional actions may be necessary depending on the three-year rolling mean copper concentration in Suisun Bay. Data the San Francisco Estuary Institute compiled for 2015-2019 indicate no degradation of San Francisco Bay water quality with respect to copper (sfei.org/pages/copper-site-specific-objective-3-year-rolling-averages-0).

6.3.4.2. **Cyanide Action Plan.** This provision is based on Basin Plan section 4.7.2.2 and is necessary to ensure that use of cyanide site-specific objectives is consistent with antidegradation policies.

6.3.4.3. **Stormwater Pollution Prevention Plan and Annual Report.** This provision supplements Attachment S. It is based on Basin Plan section 4.8 and is consistent with the requirements of *NPDES General Permit for Storm Water Discharges Associated with Industrial Activities* (State Water Board Order 2014-0057-DWQ). These narrative requirements include implementation of best management practices in accordance with 40 C.F.R. section 122.44(k).

6.3.4.4. **Average Selenium Load.** This provision is based on Basin Plan section 7.2.4.5. The information will be used to confirm that selenium loads are consistent with wasteload allocations. The requirements regarding treatment of estimated and non-detect values are consistent with the load calculations performed for the North San Francisco Bay Selenium TMDL.

6.3.4.5. **Acceptance of Ballast Water.** This provision is necessary to ensure that ballast water discharges are not a pathway for invasive species to reach San

Francisco Bay. It is consistent with California Code of Regulations, title 2, section 2284(a)(4), which requires approval by the California State Lands Commission to discharge ballast water to a facility. Such approval requires a treatment process adequate to ensure that the discharge of treated ballast water does not release invasive species.

6.3.4.6. **Interim Pond 7 (ETP-1) Operating Plan.** This provision is required because Pond 7 is not seismically stable. Therefore, it is necessary for the Discharger to submit progress reports to ensure that it properly operates and maintains Pond 7 until it constructs a new biotreater.

6.3.4.7. **New Biotreater (ETP-4).** This provision is based on 40 C.F.R. section 122.41(l). It specifies conditions that must be met before the Discharger brings its new treatment process online. It is necessary for the Regional Water Board to know when the Discharger implements upgrades to ensure that the plant can effectively and reliably comply with the requirements of this Order.

The Discharger plans to complete upgrades by the end of 2024. The July 1, 2025, deadline provides the Discharger with some additional time in case it encounters construction delays.

The option to submit a startup operations plan is based on Water Code section 13385(j)(1)(D), which exempts the Discharger from mandatory minimum penalties for violations within a defined startup adjustment and testing period under specific conditions. This option is necessary if the Discharger wants to demonstrate that it adequately satisfied the conditions necessary for exemption from mandatory minimum penalties associated with any potential violations during the upgraded plant's startup period. Pursuant to Water Code section 13385(j)(1)(D), the Discharger is exempt from mandatory minimum penalties for violations within the defined startup adjustment and testing period if the Discharger can demonstrate the following:

6.3.4.7.1. Compliance with its operations plan,

6.3.4.7.2. Violations resulted from the operation of the new or upgraded wastewater treatment units, and

6.3.4.7.3. Violations could not have reasonably been avoided.

6.3.4.8. **Conditions for Recycled Water Use Adjustment.** This provision protects beneficial uses by requiring the Discharger to ensure that recycled water use adjustments, if any are applied, will not cause toxicity. This provision does not authorize any increase in pollutant mass to the receiving water. It authorizes recycling of treated wastewater that could otherwise be discharged to the receiving water without further treatment.

6.3.4.9. **Acute Toxicity (After U.S. EPA Approval of Toxicity Provisions).** This Order retains the previous order's acute toxicity limits as a special provision to ensure that the Discharger continues to properly operate and maintain its granular activated carbon treatment to remove residual toxicity at the end of its treatment process.

6.3.4.10. **Measures to maintain selenium performance.** This provision is required to ensure that the Discharger remains below its wasteload allocation of 244 kilograms of selenium discharged per year over this permit term.

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The following provides the rationale for the monitoring and reporting requirements in the MRP.

7.1 Monitoring Requirements Rationale

7.1.1. **Influent Monitoring.** This Order does not require the Discharger to conduct monitoring of Facility influent. However, the Discharger has the option of using recycled water in exchange for effluent limitation adjustments, in which case the Discharger will need to conduct monitoring at Monitoring Locations INF-001 and INF-002 (recycled water and raw water intakes).

7.1.2. **Effluent Monitoring.** Effluent flow monitoring is necessary to understand Facility operations. Monitoring for other parameters is necessary to evaluate compliance with this Order's effluent limitations and to conduct future reasonable potential analyses.

7.1.3. **Toxicity Monitoring.** Acute and chronic toxicity tests are necessary to evaluate compliance with this Order's effluent limitations, evaluate whether the Toxicity Provisions' chronic toxicity water quality objectives are met, and to conduct future reasonable potential analyses. Chronic toxicity tests are also necessary to evaluate whether Toxicity Reduction Evaluations are needed. The Discharger conducted a chronic toxicity species sensitive screening on March 3, 2022, which satisfies the minimum screening requirements in Toxicity Provisions section III.C.2.a.

7.1.4. **Receiving Water Monitoring.** The Discharger is required to continue participating in the Regional Monitoring Program, which involves collecting data on pollutants and toxicity in San Francisco Bay water, sediment, and biota. The monitoring is necessary to characterize the receiving water and the effects the discharge has on it.

7.1.5 **Other Monitoring Requirements.** Pursuant to CWA section 308, U.S. EPA requires some dischargers to participate in a Discharge Monitoring Report-Quality Assurance (DMR-QA) Study Program that evaluates the analytical abilities of laboratories that perform or support NPDES permit-required monitoring. The program applies to discharger laboratories and contract

laboratories, and evaluates each laboratory's ability to analyze wastewater samples to produce quality data that ensure the integrity of the NPDES program. There are two options to comply: (1) the Discharger may obtain and analyze DMR-QA samples, or (2) pursuant to a waiver U.S. EPA issued to the State Water Board, the Discharger may submit results from the most recent Water Pollution Performance Evaluation Study. MRP section 1.4 requires the Discharger to ensure that the results of the DMR-QA Study or most recent Water Pollution Performance Evaluation Study are submitted to the State Water Board, which forwards the results to U.S. EPA.

7.2. Monitoring Requirements Summary. The table below summarizes routine monitoring requirements. This table is for informational purposes only. The actual requirements are specified in the MRP and elsewhere in this Order. In addition to undertaking the monitoring below, the Discharger must also conduct receiving water monitoring by continuing to participate in the Regional Monitoring Program.

Table F-8. Monitoring Requirements Summary

Parameter	Influent INF-001	Influent INF-002	Effluent EFF-001	Effluent EFF-001D	Effluent EFF-002,[1] EFF-004, EFF-005, and EFF-007	Effluent EFF-008
Flow	Continuous [2]	-	Continuous	-	-	-
pH	-	-	Continuous	-	Each Discharge Event	2/Wet Weather Season or 1/Day [3]
Temperature	-	-	Continuous	-	-	-
Specific Conductance	-	-	-	-	Each Discharge Event	2/Wet Weather Season or 1/Day [3]
BOD_5	1/Month [2]	1/Year [2]	1/Month	-	Each Discharge Event [4]	2/Wet Weather Season [5]
TSS	1/Week or 3/Week [2, 6]	1/Year [2]	1/Week or 3/Week [7]	-	Each Discharge Event	2/Wet Weather Season or 4/Year or 1/Day [3, 8]
COD	1/Month [2]	1/Year [2]	1/Month	-	Each Discharge Event [4]	2/Wet Weather Season [5]
TOC	-	-	-	-	Each Discharge Event	2/Wet Weather Season or 1/Day [3]
Oil and Grease	1/Month [2]	1/Year [2]	1/Month	-	Each Discharge Event	2/Wet Weather Season or 1/Day [3]
Sulfide, Total	1/Month [2]	1/Year [2]	1/Month	-	-	-
Phenolic Compounds, Total	1/Month [2]	1/Year [2]	1/Month	-	Each Discharge Event [4]	2/Wet Weather Season [5]

Parameter	Influent INF-001	Influent INF-002	Effluent EFF-001	Effluent EFF-001D	Effluent EFF-002,[1] EFF-004, EFF-005, and EFF-007	Effluent EFF-008
Ammonia Nitrogen, Total (as N)	1/Month [2]	1/Year [2]	1/Month	-	-	-
Chromium, Total Recoverable	1/Month [2]	1/Year [2]	1/Month	-	Each Discharge Event [4]	2/Wet Weather Season [5]
Chromium (VI), Total Recoverable	1/Month [2]	1/Year [2]	1/Month	-	Each Discharge Event [4]	2/Wet Weather Season [5]
Copper, Total Recoverable	1/Month [2]	1/Year [2]	1/Month	-	-	-
Cyanide, Total	1/Month [2]	1/Year [2]	1/Month	-	-	-
Nickel, Total Recoverable	1/Month [2]	1/Year [2]	1/Month	-	-	-
Nitrate-nitrite	-	-	1/Month	-	-	-
Phosphorus, Total	-	-	1/Month	-	-	-
Selenium, Total Recoverable	1/Week [2]	1/Year [2]	1/Week	-	-	-
Dioxin-TEQ	2/Year [2]	1/Year [2]	2/Year	-	-	-
Enterococcus	-	-	-	1/Month	-	-
Acute Toxicity	-	-	1/Week	-	-	-
Chronic Toxicity (Prior to U.S. EPA Approval of Toxicity Provisions)	-	-	1/Quarter	-	-	-
Chronic Toxicity (After U.S. EPA Approval of Toxicity Provisions)	-	-	1/Month	-	-	-
All other priority pollutant	-	-	2/Year	-	-	-
Standard Observations	-	-	-	-	Each Discharge Event	2/Wet Weather Season or 1/Day [3]

Footnotes:

[1] The Discharger is to monitor for all priority pollutants at Monitoring Location EFF-002 when discharge from Discharge Point 002 contains stormwater from upper Lake Slobodnik.

[2] This monitoring is only required when seeking recycled water use effluent limitation adjustments.

[3] If and when supplemental effluent limitations for the pollutants in Table 6 of this Order become effective, the Discharger is to increase the monitoring frequency at outfalls where the limitations are in effect to daily during each storm. The Discharger is to continue daily monitoring until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 5 of this Order.

[4] If and when supplemental effluent limitations for the pollutants in Table 6 of this Order become effective, the Discharger is to begin monitoring at outfalls where the limitations are in effect. The Discharger is to continue

monitoring each discharge event until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 5 of this Order.

[5] If and when supplemental effluent limitations for the pollutants in Table 6 of this Order become effective, the Discharger is to begin monitoring at outfalls where the limitations are in effect. The Discharger is to continue monitoring each storm event until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 5 of this Order.

[6] In accordance with Provision 6.3.4.8 of this Order, the Discharger is to sample and analyze TSS at Monitoring Location INF-001 at least as frequently as the MRP requires for monitoring at Monitoring Location EFF-001 if it wishes to seek effluent limitation adjustments.

[7] From April 1 through November 30, the TSS monitoring frequency at Monitoring Location EFF-001 is once per week. From December 1 through March 31, the TSS monitoring frequency at Monitoring Location EFF-001 is three times per week.

[8] If TSS exceeds one or both of the numeric action levels in Attachment S section 1.7 during the previous wet weather season, the Discharger is to increase the monitoring frequency at outfalls where a numeric action level exceedance occurred to four times per year. The Discharger is to continue monitoring TSS four times per year until TSS levels for an entire wet weather season are below the numeric action levels.

8. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for the Facility. As a step in the WDR adoption process, Regional Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process.

8.1. Notification of Interested Parties. The Regional Water Board notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge, and provided an opportunity to submit written comments and recommendations. The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website (waterboards.ca.gov/sanfranciscobay).

8.2. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were to be submitted either in person or by mail to the Executive Office at the Regional Water Board at 1515 Clay Street, Suite 1400, Oakland, California 94612, to the attention of Gaurav Mittal.

Written comments were due at the Regional Water Board office by 5:00 p.m. on October 3, 2022.

8.3. Public Hearing. The Regional Water Board held a public hearing on the tentative WDRs during its meeting at the following date and time:

Date: November 9, 2022
Time: 9:00 a.m.
Contact: Gaurav Mittal, (510) 622-2407, Gaurav.mittal@waterboards.ca.gov

Interested persons were provided notice of the hearing and information on how to participate. At the public hearing, the Regional Water Board heard testimony pertinent to the discharge and Order.

Dates and venues can change. The Regional Water Board's website is (waterboards.ca.gov/sanfranciscobay), where one can access the current agenda for changes.

8.4. Reconsideration of Waste Discharge Requirements. Any person aggrieved by this Regional Water Board action may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050. The State Water Board must receive the petition at the following address within 30 calendar days of the date of Regional Water Board action:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

A petition may also be filed by email at waterqualitypetitions@waterboards.ca.gov.

For instructions on how to file a water quality petition for review, see the Water Board's petition instructions (waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml).

8.5. Information and Copying. The Report of Waste Discharge, related supporting documents, and comments received are on file and may be inspected at the Regional Water Board address above at any time online or by making an appointment with the Regional Water Board's custodian of records. Document copying may be arranged by calling (510) 622-2300 or emailing Melinda.Wong@waterboards.ca.gov.

8.6. Register of Interested Persons. Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference the Facility, and provide a name, address, and phone number.

8.7. Additional Information. Requests for additional information or questions regarding this Order should be directed to Gaurav Mittal, (510) 622-2407, gaurav.mittal@waterboards.ca.gov.

ATTACHMENT F-1

Derivation of Technology-Based Effluent Limitations

Martinez Refining Company

References

1. 40 C.F.R. section 419, subpart B – Cracking Subcategory, *Effluent Limitation Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category* (2006)

2. *Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category,* EPA/4401-82/014 (1982)

3. *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry,* U.S. EPA Office of Water Regulations and Standards (1985)

4. Martinez Refining Company LLC, NPDES Application for Permit Renewal, NPDES Permit CA0005789 (March 7, 2022)

Applicable Definitions

Process Wastewater means any water, which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. [40 C.F.R. § 401.11(q)]

Runoff means the flow of stormwater resulting from precipitation coming into contact with petroleum refinery property. [40 C.F.R. § 419.11(b)]

Ballast means the flow of waters, from a ship, that is treated along with refinery wastewaters in the main treatment system. [40 C.F.R. § 419.11(c)]

Contaminated Runoff means runoff that comes into contact with any raw material, intermediate product, finished product, by-product or waste product located on petroleum refinery property. [40 C.F.R. section 419.11(g)]

Background

According to the Effluent Limitation Guidelines (ELGs) for the Cracking Subcategory of the Petroleum Refining Point Source Category at 40 C.F.R. part 419, subpart B, technology-based effluent limitations are to be based in part on a discharger's production rate. The Discharger's current production rate is 167,000 barrels per day (bbls/d) (the highest annual average production rate from 2017 through 2021). The ELGs also take into account a discharger's specific refinery processes and configuration as explained below.

Process Wastewaters. The ELGs include limits for process wastewaters based on best practicable control technology currently available (BPT), best available technology economically achievable (BAT), and best conventional pollutant control technology (BCT). The most stringent of the BPT, BAT, and BCT limits apply. New Source Performance Standard limitations do not apply because the Facility was constructed prior to October 18, 1982.

The ELGs call for many limits to be calculated based on size factors and process factors. For the process wastewaters discharged at Discharge Point 001, the size factor and process factor are determined as follows:

Size Factor. Pursuant to the ELGs at 40 C.F.R. section 419.22(b)(1) for BPT, 40 C.F.R. section 419.23(b)(1) for BAT, and 40 C.F.R. section 419.24(b)(1) for BCT, the size factor for a crude production rate of 167,000 bbls/d is 1.41.

Process Factor. The process factor is derived from the total process configuration. To calculate the total process configuration, the process feedstock rate for each crude, cracking and coking, lube, and asphalt process[1] is divided by the overall production rate (167,000 bbls/d). The resulting ratios (process feedstock divided by overall production rate) are then added together, and the result is multiplied by a weight factor specific to each process. Derivation of the Facility's total process configuration is shown in the following table. The Discharger does not have lube or asphalt processes, so those process groups are not shown.

Table F-1A. Process Configurations

Process	Process Feedstock Rate (bbls/d)	Production Rate (bbls/d)	Process Feedstock / Production Ratio	Weight Factor	Process Configuration
Crude	-	-	-	-	-
Atm. Dist.	167,000	167,000	1	-	-
Vac. Dist.	124,000	167,000	0.74	-	-
Desalt.	156,000	167,000	0.93	-	-
Total	-	-	*2.68*	*1*	*2.68*
Cracking and Coking	-	-	-	-	-
Fluid Catalytic Cracking	78,000	167,000	0.47	-	-
Hydrocracking	41,000	167,000	0.25	-	-
Flexicoking	19,000	167,000	0.11		
Delayed Coking	24,000	167,000	0.14		
Total	-	-	*0.97*	*6*	*5.82*

[1] The specific process groups are listed in the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 19).

Process	Process Feedstock Rate (bbls/d)	Production Rate (bbls/d)	Process Feedstock / Production Ratio	Weight Factor	Process Configuration
Reforming and Alkylation Processes	-	-	-	-	-
Catalytic Reforming	26,000	167,000	0.16	-	-
Reforming and Alkylation	23,000	167,000	0.14	-	-
Total	-	-	*0.29*	*0*	*0*
-	-	-	-	-	-
Total	**-**	**-**	**-**	**-**	**8.5**

Pursuant to the ELGs at 40 C.F.R. section 419.22(b)(2) for BPT, 40 C.F.R. section 419.232(b)(2) for BAT, and 40 C.F.R. section 419.22(b)(2) for BCT, the process factor for a total process configuration of 8.5 is 1.67.

Contaminated Runoff. The ELGs include limits for contaminated runoff based on BPT, BAT, and BCT. These limits apply to all stormwater discharges, except stormwater treated and discharged with process wastewaters through Discharge Point 001. The ELGs at 40 C.F.R. section 419.22(e)(2) and 419.23(f)(2) establish limits for oil and grease and total organic carbon (TOC). They also establish additional limits for biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total suspended solids (TSS), phenolic compounds, pH, hexavalent chromium, and total chromium that apply if the limits for oil and grease or TOC are exceeded.

Determination of Process Wastewater Effluent Limitations

BPT. The following table shows the derivation of the process wastewater BPT limits for the Facility based on the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Size Factor) x (Process Factor) x (Feed Stock Rate)

Table F-1B. BPT Limitations for Process Wastewaters

Pollutant	Maximum Daily Factor [1]	Average Monthly Factor [1]	Size Factor	Process Factor	Feed Stock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
BOD_5	9.9	5.5	1.41	1.67	167	3,900	2,200
TSS	6.9	4.4	1.41	1.67	167	2,700	1,700
COD	74.0	38.4	1.41	1.67	167	29,000	15,000
Oil and Grease	3.0	1.6	1.41	1.67	167	1,200	630
Phenolics (4AAP)	0.074	0.036	1.41	1.67	167	29	14
Ammonia (as N)	6.6	3.0	1.41	1.67	167	2,600	1,200
Sulfide	0.065	0.029	1.41	1.67	167	26	11
Total Chromium	0.15	0.088	1.41	1.67	167	59	35
Hexavalent Chromium	0.012	0.0056	1.41	1.67	167	4.7	2.2

Footnotes:

[1] From 40 C.F.R. § 419.22(a) (pounds per 1000 bbls of feedstock)
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)

BAT. The following table shows the derivation of the process wastewater BAT limits for the Facility based on the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Size Factor) x (Process Factor) x (Feed Stock Rate)

Table F-1C. Process Wastewater BAT Limitations

Pollutant	Maximum Daily Factor [1]	Average Monthly Factor [1]	Size Factor	Process Factor	Feed Stock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
COD	74.0	38.4	1.41	1.67	167	29,000	15,000
Ammonia (as N)	6.6	3.0	1.41	1.67	167	2,600	1,200
Sulfide	0.065	0.029	1.41	1.67	167	26	11
pH	-	-	-	-	-	[4]	[4]

Footnotes:

[1] From 40 C.F.R. § 419.23(a) (pounds per 1,000 bbls feedstock)
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)
[4] The pH is to be within the range of 6.0 to 9.0 as instantaneous limits.

To determine BAT limits for total and hexavalent chromium and phenolic compounds in process wastewaters, the ELGs require consideration of effluent factors and refinery processes. BAT effluent factors are presented at 40 C.F.R. section 419.23(c)(1); the refinery processes considered are the crude, cracking and coking, and reforming and alkylation processes, which correspond to those identified within the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 20).

Table F-1D. Process Feedstock Rates (bbls/d)

Crude	-
Crude Distillation	167,000
Vacuum Distillation	124,000
Crude Desalting	156,000
Total	**447,000**
Cracking and Coking	-
Fluid Catalytic Cracking	78,000
Hydrocracking	41,000
Flexicoking,	19,000
Delayed Coking	24,000
Total	**162,000**

Reforming and Alkylation	-
Catalytic Reforming	26,000
Alkylation	23,000
Total	**49,000**

Based on the total feedstock rates for each process shown above, the following table shows the derivation of the BAT limits for total and hexavalent chromium and phenolic compounds using the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Process Feedstock Rate)

Table F-1E. Process Wastewater BAT Limitations (Chromium and Phenolics)

Process	Maximum Daily Factor [1]	Average Monthly Factor [1]	Process Feedstock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
Phenolic Compounds	-	-	-	-	-
Crude	0.013	0.0030	447	5.8	1.3
Cracking and Coking	0.147	0.036	162	24	5.8
Reforming and Alkylation	0.132	0.032	49	6.5	1.6
Limit (Sum)	-	-	-	**36**	**8.7**
Total Chromium	-	-	-	-	-
Crude	0.011	0.0040	447	4.9	1.8
Cracking and Coking	0.119	0.041	162	19.2	6.6
Reforming and Alkylation	0.107	0.037	49	5.2	1.8
Limit (Sum)	-	-	-	**29**	**10.2**
Hexavalent Chromium	-	-	-	-	-
Crude	0.00070	0.00030	447	0.31	0.13
Cracking and Coking	0.0076	0.0034	162	1.2	0.55
Reforming and Alkylation	0.0069	0.0031	49	0.34	0.15
Limit (Sum)	-	-	-	**1.9**	**0.84**

Footnotes:

[1] From 40 C.F.R. § 419.23(c), lbs per 1,000 barrels feedstock
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)

BCT. The following table shows the derivation of the process wastewater BCT limits for the Facility based on the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Size Factor) x (Process Factor) x (Feed Stock Rate)

Table F-1F. Process Wastewater BCT Limitations

Pollutant	Maximum Daily Factor [1]	Average Monthly Factor [1]	Size Factor	Process Factor	Feed Stock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
BOD_5	9.9	5.5	1.41	1.67	167	3,900	2,200
TSS	6.9	4.4	1.41	1.67	167	2,700	1,700

Oil and Grease	3.0	1.6	1.41	1.67	167	1,200	630
pH	-	-	-	-	-	[4]	[4]

Footnotes:

[1] From 40 C.F.R. § 419.24(a), pounds per 1,000 barrels feedstock
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)
[4] The pH is to be within the range of 6.0 to 9.0 as instantaneous limits.

Most Stringent Technology-Based Effluent Limitations for Process Wastewater. The following table presents the technology-based effluent limits for process wastewater discharged from Discharge Point 001. These limits are the most stringent of the BPT, BAT, and BCT limits calculated above. All are based on BPT, except for the chromium limits, which are based on BAT.

Table F-1G. Summary of Technology-Based Effluent Limitations for Process Wastewater

Pollutant	Maximum Daily Limit (lbs/day)	Average Monthly Limit (lbs/day)
BOD_5	3,900	2,200
TSS	2,700	1,700
COD	29,000	15,000
Oil and Grease	1,200	630
Phenolics (4AAP)	29	8.7
Ammonia (as N)	2,600	1,200
Sulfide	26	11
Total Chromium	29	10
Hex Chromium	1.9	0.84
pH	[1]	[1]

Footnote:

[1] The pH is to be within the range of 6.0 to 9.0 as instantaneous limits.

Determination of Contaminated Runoff Effluent Limitations

The ELGs at 40 C.F.R. section 419.22(e)(2) and 419.23(f)(2) establish a limit of 15 mg/L for oil and grease and 110 mg/L for total organic carbon (TOC). If contaminated stormwater discharges exceed the oil and grease limit or the total organic carbon limit, additional concentration-based limits for BOD_5, TSS, COD, phenolic compounds, total chromium, hexavalent chromium, and pH must become effective immediately. The effluent limits for these pollutants are derived from the most stringent of the BAT and BPT effluent concentration-based limits provided in the ELGs, found at 40 C.F.R. section 419.22(e)(2) and 419.23(f)(2). Tables summarizing these additional effluent limits are shown below:

Table F-1H. Effluent Limitations for Contaminated Runoff

Pollutant	Daily Maximum (mg/L)	Average Monthly (mg/L)
BOD_5	48	26
TSS	33	21

COD	360	180
Oil and Grease	15	8.0
Phenolic Compounds	0.35	0.17
Total Chromium	0.60	0.21
Hexavalent Chromium	0.062	0.028
pH	[1]	[1]

Footnote:

[1] Within the range of 6.0 to 9.0

Determination of Additional Effluent Limitation Allocations

If contaminated runoff or ballast water is comingled with process wastewater, additional mass-based effluent limitation allocations may be added to the mass-based process wastewater limits indicated in Provision 4.1.1 of the Order. These additional effluent limitation allocations are derived from the most stringent concentration-based limits for contaminated runoff (see Table F-1H) or the table below for ballast water:

Table F-1I. Additional Ballast Water Effluent Limitation Allocations

Pollutant	Daily Maximum (mg/L) [1]	Average Monthly (mg/L) [1]
BOD_5	48	26
TSS	33	21
COD	470	240
Oil and Grease	15	8.0

Footnote:

[1] These values reflect the BPT-based effluent limits of 40 C.F.R. § 419.22(c).

ATTACHMENT G – REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

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ATTACHMENT G – REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

APPLICABILITY

This document supplements the requirements of Federal Standard Provisions (Attachment D). For clarity, these provisions are arranged using to the same headings as those used in Attachment D.

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

1.1. Duty to Comply – Not Supplemented

1.2. Need to Halt or Reduce Activity Not a Defense – Not Supplemented

1.3. Duty to Mitigate – Supplement to Attachment D, Provision 1.3.

1.3.1. **Contingency Plan.** The Discharger shall maintain a Contingency Plan as prudent in accordance with current facility emergency planning. The Contingency Plan shall describe procedures to ensure that existing facilities remain in, or are rapidly returned to, operation in the event of a process failure or emergency incident, such as employee strike, strike by suppliers of chemicals or maintenance services, power outage, vandalism, earthquake, or fire. The Discharger may combine the Contingency Plan and Spill Prevention Plan (see Provision 1.3.2, below) into one document. In accordance with Regional Water Board Resolution No. 74-10, discharge in violation of the permit where the Discharger has failed to develop and implement a Contingency Plan as described below may be the basis for considering the discharge a willful and negligent violation of the permit pursuant to California Water Code section 13387. The Contingency Plan shall, at a minimum, provide for the following:

1.3.1.1. Sufficient personnel for continued facility operation and maintenance during employee strikes or strikes against contractors providing services;

1.3.1.2. Maintenance of adequate chemicals or other supplies, and spare parts necessary for continued facility operations;

1.3.1.3. Emergency standby power;

1.3.1.4. Protection against vandalism;

1.3.1.5. Expeditious action to repair failures of, or damage to, equipment, including any sewer lines;

1.3.1.6. Reporting of spills and discharges of untreated or inadequately treated wastes, including measures taken to clean up the effects of such discharges; and

1.3.1.7. Maintenance, replacement, and surveillance of physical condition of equipment and facilities, including any sewer lines.

1.3.2. **Spill Prevention Plan.** The Discharger shall maintain a Spill Prevention Plan to prevent accidental discharges and to minimize the effects of any such discharges. The Spill Prevention Plan shall do the following:

1.3.2.1. Identify the possible sources of accidental discharge, untreated or partially-treated waste bypass, and polluted drainage;

1.3.2.2. State when current facilities and procedures became operational and evaluate their effectiveness; and

1.3.2.3. Predict the effectiveness of any proposed facilities and procedures and provide an implementation schedule with interim and final dates when the proposed facilities and procedures will be constructed, implemented, or operational.

1.4. Proper Operation and Maintenance – Supplement to Attachment D, Provision 1.4

1.4.1. **Operation and Maintenance Manual.** The Discharger shall maintain an Operation and Maintenance Manual to provide the plant and regulatory personnel with a source of information describing all equipment, recommended operational strategies, process control monitoring, and maintenance activities. To remain a useful and relevant document, the Operation and Maintenance Manual shall be kept updated to reflect significant changes in treatment facility equipment and operational practices. The Operation and Maintenance Manual shall be maintained in usable condition and be available for reference and use by all relevant personnel and Regional Water Board staff.

1.4.2. **Wastewater Facilities Status Report.** The Discharger shall maintain a Wastewater Facilities Status Report and regularly review, revise, or update it, as necessary. This report shall document how the Discharger operates and maintains its wastewater collection, treatment, and disposal facilities to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the Discharger's service responsibilities.

1.4.3. **Proper Supervision and Operation of Publicly-Owned Treatment Works (POTWs).** POTWs shall be supervised and operated by persons possessing

certificates of appropriate grade pursuant to Title 23, section 3680, of the California Code of Regulations.

1.5. Property Rights – Not Supplemented

1.6. Inspection and Entry – Not Supplemented

1.7. Bypass – Not Supplemented

1.8. Upset – Not Supplemented

1.9. Other – Addition to Attachment D

1.9.1. Neither the treatment nor the discharge of pollutants shall create pollution, contamination, or nuisance as defined by California Water Code section 13050.

1.9.2. Collection, treatment, storage, and disposal systems shall be operated in a manner that precludes public contact with wastewater. If public contact with wastewater could reasonably occur on public property, warning signs shall be posted.

1.9.3. If the Discharger submits a timely and complete Report of Waste Discharge for permit reissuance, this permit shall continue in force and effect until the permit is reissued or the Regional Water Board rescinds the permit.

2. STANDARD PROVISIONS – PERMIT ACTION – NOT SUPPLEMENTED

3. STANDARD PROVISIONS – MONITORING

3.1. Sampling and Analyses – Supplement to Attachment D, Provisions 3.1 and 3.2

3.1.1. **Certified Laboratories.** Water and waste analyses shall be performed by a laboratory certified for these analyses in accordance with California Water Code section 13176.

3.1.2. **Minimum Levels.** For the 126 priority pollutants, the Discharger should use the analytical methods listed in Table B unless the Monitoring and Reporting Program (MRP, Attachment E) requires a particular method or minimum level (ML). All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

3.1.3. **Monitoring Frequency.** The MRP specifies the minimum sampling and analysis schedule.

3.1.3.1. **Sample Collection Timing**

3.1.3.1.1. The Discharger shall collect influent samples on varying days selected at random and shall not include any plant recirculation or other sidestream wastes, unless otherwise stipulated in the MRP. The Executive Officer

may approve an alternative influent sampling plan if it is representative of plant influent and complies with all other permit requirements.

3.1.3.1.2. The Discharger shall collect effluent samples on days coincident with influent sampling, unless otherwise stipulated by the MRP. If influent sampling is not required, the Discharger shall collect effluent samples on varying days selected at random, unless otherwise stipulated in the MRP. The Executive Officer may approve an alternative effluent sampling plan if it is representative of plant discharge and in compliance with all other permit requirements.

3.1.3.1.3. The Discharger shall collect effluent grab samples during periods of daytime maximum peak flows (or peak flows through secondary treatment units for facilities that recycle effluent).

3.1.3.1.4. Effluent sampling for conventional pollutants shall occur on at least one day of any multiple-day bioassay the MRP requires. During the course of the bioassay, on at least one day, the Discharger shall collect and retain samples of the discharge. In the event that a bioassay result does not comply with effluent limitations, the Discharger shall analyze the retained samples for pollutants that could be toxic to aquatic life and for which it has effluent limitations.

3.1.3.1.4.1. The Discharger shall perform bioassays on final effluent samples; when chlorine is used for disinfection, bioassays shall be performed on effluent after chlorination and dechlorination; and

3.1.3.1.4.2. The Discharger shall analyze for total ammonia nitrogen and calculate the amount of un ionized ammonia whenever test results fail to meet effluent limitations.

3.1.3.2. **Conditions Triggering Accelerated Monitoring**

3.1.3.2.1. **Average Monthly Effluent Limitation Exceedance.** If the results from two consecutive samples of a constituent monitored in a particular month exceed the average monthly effluent limitation for any parameter (or if the required sampling frequency is once per month or less and the monthly sample exceeds the average monthly effluent limitation), the Discharger shall, within 24 hours after the results are received, increase its sampling frequency to daily until the results from the additional sampling show that the parameter complies with the average monthly effluent limitation.

3.1.3.2.2. **Maximum Daily Effluent Limitation Exceedance.** If a sample result exceeds a maximum daily effluent limitation, the Discharger shall, within 24 hours after the result is received, increase its sampling frequency to daily until the results from two samples collected on consecutive days show compliance with the maximum daily effluent limitation.

3.1.3.2.3. **Acute Toxicity.** If final or intermediate results of an acute bioassay indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay is less than 70 percent), the Discharger shall initiate a new test as soon as practical or as described in applicable State Water Board plan provisions that become effective after adoption of these Regional Standard Provisions. The Discharger shall investigate the cause of the mortalities and report its findings in the next self-monitoring report.

3.1.3.2.4. **Chlorine.** The Discharger shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate control and reliable operation. If an effluent violation is detected, the Discharger shall collect grab samples at least every 30 minutes until compliance with the limitation is achieved, unless the Discharger monitors chlorine residual continuously. In such cases, the Discharger shall continue to conduct continuous monitoring.

3.1.3.2.5. **Bypass.** Except as indicated below, if a Discharger bypasses any portion of its treatment facility, it shall monitor flows and collect samples at affected discharge points and analyze samples for all constituents with effluent limitations on a daily basis for the duration of the bypass. The Discharger need not accelerate chronic toxicity monitoring. The Discharger also need not collect and analyze samples for mercury, dioxin-TEQ, and PCBs after the first day of the bypass. The Discharger may satisfy the accelerated acute toxicity monitoring requirement by conducting a flow-through test or static renewal test that captures the duration of the bypass (regardless of the method specified in the MRP). If bypassing disinfection units only, the Discharger shall only monitor bacteria indicators daily.

3.1.3.2.5.1. **Bypass for Essential Maintenance.** If a Discharger bypasses a treatment unit for essential maintenance pursuant to Attachment D section 1.7.2, the Executive Officer may reduce the accelerated monitoring requirements above if the Discharger (i) monitors effluent at affected discharge points on the first day of the bypass for all constituents with effluent limitations, except chronic toxicity; and (ii) identifies and implements measures to ensure that the bypass will continue to comply with effluent limitations.

3.1.3.2.5.2. **Approved Wet Weather Bypasses.** If a Discharger bypasses a treatment unit or permitted outfall during wet weather with Executive Officer approval pursuant to Attachment D section 1.7.4, the Discharger shall monitor flows and collect and retain samples for affected discharge points on a daily basis for the duration of the bypass. The Discharger shall analyze daily for TSS using 24 hour composites (or more frequent increments) and for bacteria indicators with effluent limitations using grab samples. If TSS exceeds 45 mg/L in any

composite sample, the Discharger shall also analyze daily the retained samples for all other constituents with effluent limitations, except oil and grease, mercury, PCBs, dioxin-TEQ, and acute and chronic toxicity. Additionally, at least once each year, the Discharger shall analyze the retained samples for one approved bypass for all other constituents with effluent limitations, except oil and grease, mercury, PCBs, dioxin-TEQ, and acute and chronic toxicity. This monitoring shall be in addition to the minimum monitoring specified in the MRP.

3.2. Standard Observations – Addition to Attachment D

3.2.1. **Receiving Water Observations.** The following requirements only apply when the MRP requires standard observations of receiving waters. Standard observations shall include the following:

3.2.1.1. **Floating and Suspended Materials (e.g., oil, grease, algae, and other macroscopic particulate matter) —** presence or absence, source, and size of affected area.

3.2.1.2. **Discoloration and Turbidity** — color, source, and size of affected area.

3.2.1.3. **Odor** — presence or absence, characterization, source, and distance of travel.

3.2.1.4. **Beneficial Water Use** — estimated number of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities.

3.2.1.5. **Hydrographic Condition** — time and height of high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time).

3.2.1.6. **Weather Conditions** — wind direction, air temperature, and total precipitation during five days prior to observation.

3.2.2. **Wastewater Effluent Observations.** The following requirements only apply when the MRP requires standard observations of wastewater effluent. Standard observations shall include the following:

3.2.2.1. **Floating and Suspended Material of Wastewater Origin** (e.g., oil, grease, algae, and other macroscopic particulate matter) — presence or absence.

3.2.2.2. **Odor** — presence or absence, characterization, source, distance of travel, and wind direction.

3.2.3. **Beach and Shoreline Observations.** The following requirements only apply when the MRP requires standard observations of beaches or shorelines. Standard observations shall include the following:

3.2.3.1. **Material of Wastewater Origin —** presence or absence, description of material, estimated size of affected area, and source.

3.2.3.2. **Beneficial Use —** estimate of number of people participating in recreational water contact, non-water contact, and fishing activities.

3.2.4. **Waste Treatment and/or Disposal Facility Periphery Observations.** The following requirements only apply when the MRP requires standard observations of the periphery of waste treatment or disposal facilities. Standard observations shall include the following:

3.2.4.1. **Odor** — presence or absence, characterization, source, and distance of travel.

3.2.4.2. **Weather Conditions** — wind direction and estimated velocity.

4. STANDARD PROVISIONS – RECORDS

4.1. Records to be Maintained – Supplement to Attachment D, Provision 4.1

The Discharger shall maintain records in a manner and at a location (e.g., the wastewater treatment plant or the Discharger's offices) such that the records are accessible to Regional Water Board staff. The minimum retention period specified in Attachment D, Provision IV, shall be extended during the course of any unresolved litigation regarding permit-related discharges, or when requested by Regional Water Board or U.S. EPA, Region IX, staff.

A copy of the permit shall be maintained at the discharge facility and be available at all times to operating personnel.

4.2. Records of Monitoring – Supplement to Attachment D, Provision 4.2

Monitoring records shall include the following:

4.2.1. **Analytical Information.** Records shall include analytical method detection limits, minimum levels, reporting levels, and related quantification parameters.

4.2.2. **Disinfection Process.** For the disinfection process, records shall include the following:

4.2.2.1. For bacteriological analyses:

4.2.2.1.1. Wastewater flow rate at the time of sample collection; and

4.2.2.1.2. Required statistical parameters for cumulative bacterial values (e.g., moving median or geometric mean for the number of samples or sampling period identified in the MRP).

4.2.2.2. For the chlorination process (when chlorine is used for disinfection), at least daily average values for the following:

4.2.2.2.1. Chlorine residual of treated wastewater as it enters the chlorine contact basin (mg/L);

4.2.2.2.2. Chlorine dosage (kg/day); and

4.2.2.2.3. Dechlorination chemical dosage (kg/day).

4.2.3. **Wastewater Treatment Process Solids.** For each treatment unit process that involves solids removal from the wastewater stream, records shall include the following:

4.2.3.1. Total volume or mass of solids removed from each collection unit (e.g., grit, skimmings, undigested biosolids, or combination) for each calendar month or other time period as appropriate, but not to exceed annually; and

4.2.3.2. Final disposition of such solids (e.g., landfill, other subsequent treatment unit).

4.2.4. **Treatment Process Bypasses.** For all treatment process bypasses, including wet weather blending, records shall include the following:

4.2.4.1. Chronological log of treatment process bypasses;

4.2.4.2. Identification of treatment processes bypassed;

4.2.4.3. Beginning and ending dates and times of bypasses;

4.2.4.4. Bypass durations;

4.2.4.5. Estimated bypass volumes; and

4.2.4.6. Description of, or reference to other reports describing, the bypasses, their cause, the corrective actions taken (except for wet weather blending explicitly approved within the permit and in compliance with any related permit conditions), and any additional monitoring conducted.

4.2.5. **Treatment Plant Overflows.** The Discharger shall retain a chronological log of overflows at the treatment plant, including the headworks and all units and appurtenances downstream, and records supporting the information provided in accordance with Provision 5.5.2, below.

4.3. Claims of Confidentiality – Not Supplemented

5. STANDARD PROVISIONS – REPORTING

5.1. Duty to Provide Information – Not Supplemented

5.2. Signatory and Certification Requirements – Not Supplemented

5.3. Monitoring Reports – Supplement to Attachment D, Provision 5.3

5.3.1. **Self-Monitoring Reports.** For each reporting period established in the MRP, the Discharger shall submit a self-monitoring report to the Regional Water Board in accordance with the requirements listed in the MRP and below:

5.3.1.1. **Transmittal Letter.** Each self-monitoring report shall be submitted with a transmittal letter that includes the following:

5.3.1.1.1. Identification of all violations of effluent limitations or other waste discharge requirements found during the reporting period;

5.3.1.1.2. Details regarding the violations, such as parameters, magnitude, test results, frequency, and dates;

5.3.1.1.3. Causes of the violations;

5.3.1.1.4. Corrective actions taken or planned to resolve violations and prevent recurrences, and dates or time schedules for implementation (the Discharger may refer to previously submitted reports that address the corrective actions);

5.3.1.1.5. Explanation for any data invalidation. Data should not be submitted in a self-monitoring report if it does not meet quality assurance/quality control standards. However, if the Discharger wishes to invalidate a measurement after submitting it in a self-monitoring report, the Discharger shall identify the measurement suspected to be invalid and state the Discharger's intent to submit, within 60 days, a formal request to invalidate the measurement. The formal request shall include the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports invalidation (e.g., laboratory sheet, log entry, test results), and a discussion of the corrective actions taken or planned (with a time schedule for completion) to prevent recurrence of the sampling or measurement problem;

5.3.1.1.6. Description of blending, if any. If the Discharger blends, it shall describe the duration of blending events and certify whether the blending complied with all conditions for blending;

5.3.1.1.7. Description of other bypasses, if any. If the Discharger bypasses any treatment units (other than blending), it shall describe the duration of the bypasses and effluent quality during those times; and

5.3.1.1.8. Signature. The transmittal letter shall be signed in accordance with Attachment D, Provision 5.2.

5.3.1.2. **Compliance Evaluation Summary.** Each self-monitoring report shall include a compliance evaluation summary that addresses each parameter for which the permit specifies effluent limitations, the number of samples taken during the monitoring period, and the number of samples that exceed the effluent limitations.

5.3.1.3. **More Frequent Monitoring.** If the Discharger monitors any pollutant more frequently than required by the MRP, the Discharger shall include the results of such monitoring in the calculation and reporting of the data submitted in the self-monitoring report.

5.3.1.4. **Analysis Results**

5.3.1.4.1. **Tabulation.** Each self-monitoring report shall include tabulations of all required analyses and observations, including parameters, dates, times, sample stations, types of samples, test results, method detection limits, method minimum levels, and method reporting levels (if applicable), signed by the laboratory director or other responsible official.

5.3.1.4.2. **Multiple Samples.** Unless the MRP specifies otherwise, when determining compliance with effluent limitations (other than instantaneous effluent limitations) and more than one sample result is available, the Discharger shall compute the arithmetic mean. If the data set contains one or more results that are “Detected, but Not Quantified (DNQ) or “Not Detected” (ND), the Discharger shall instead compute the median in accordance with the following procedure:

5.3.1.4.2.1. The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

5.3.1.4.2.2. The median of the data set shall be determined. If the data set has an odd number of data points, the median is the middle value. If the data set has an even number of data points, the median is the average of the two values around the middle, unless one or both of these values is ND or DNQ, in which case the median shall be the lower of the two results (where DNQ is lower than a quantified value and ND is lower than DNQ).

5.3.1.4.3. **Duplicate Samples.** The Discharger shall report the average of duplicate sample analyses when reporting for a single sample result (or the median if one or more of the duplicates is DNQ or ND [see Provision 5.3.1.4.2, above]). For bacteria indicators, the Discharger shall report the geometric mean of the duplicate analyses.

5.3.1.4.4. **Dioxin-TEQ.** The Discharger shall report for each dioxin and furan congener the analytical results of effluent monitoring, including the reporting level, the method detection limit, and the measured concentration. The Discharger shall report all measured values of individual congeners, including data qualifiers. When calculating dioxin-TEQ, the Discharger shall set congener concentrations below the minimum levels (MLs) to zero. The Discharger shall calculate and report dioxin-TEQ using the following formula, where the MLs, toxicity equivalency factors (TEFs), and bioaccumulation equivalency factors (BEFs) are as provided in Table A:

$$\text{Dioxin-TEQ} = \Sigma\ (Cx \times TEFx \times BEFx)$$

where: Cx = measured or estimated concentration of congener x
TEFx = toxicity equivalency factor for congener x
BEFx = bioaccumulation equivalency factor for congener x

Table A
Minimum Levels, Toxicity Equivalency Factors, and Bioaccumulation Equivalency Factors

Dioxin or Furan Congener	Minimum Level (pg/L)	2005 Toxicity Equivalency Factor (TEF)	Bioaccumulation Equivalency Factor (BEF)
2,3,7,8-TCDD	10	1.0	1.0
1,2,3,7,8-PeCDD	50	1.0	0.9
1,2,3,4,7,8-HxCDD	50	0.1	0.3
1,2,3,6,7,8-HxCDD	50	0.1	0.1
1,2,3,7,8,9-HxCDD	50	0.1	0.1
1,2,3,4,6,7,8-HpCDD	50	0.01	0.05
OCDD	100	0.0003	0.01
2,3,7,8-TCDF	10	0.1	0.8
1,2,3,7,8-PeCDF	50	0.03	0.2
2,3,4,7,8-PeCDF	50	0.3	1.6
1,2,3,4,7,8-HxCDF	50	0.1	0.08
1,2,3,6,7,8-HxCDF	50	0.1	0.2
1,2,3,7,8,9-HxCDF	50	0.1	0.6
2,3,4,6,7,8-HxCDF	50	0.1	0.7
1,2,3,4,6,7,8-HpCDF	50	0.01	0.01
1,2,3,4,7,8,9-HpCDF	50	0.01	0.4
OCDF	100	0.0003	0.02

5.3.1.5. **Results Not Yet Available.** The Discharger shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. Certain analyses may require additional time to complete analytical processes and report results. In these cases, the Discharger shall describe the circumstances in the self-monitoring report and include the data for these parameters and relevant discussions of any violations in the next self-monitoring report due after the results are available.

5.3.1.6. **Annual Self-Monitoring Reports.** By the date specified in the MRP, the Discharger shall submit an annual self-monitoring report covering the previous calendar year. The report shall contain the following:

5.3.1.6.1. Comprehensive discussion of treatment plant performance, including documentation of any blending or other bypass events, and compliance with the permit. This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve the performance and reliability of wastewater collection, treatment, or disposal practices;

5.3.1.6.2. List of approved analyses, including the following:

5.3.1.6.2.1. List of analyses for which the Discharger is certified;

5.3.1.6.2.2. List of analyses performed for the Discharger by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory need not be submitted but shall be retained onsite); and

5.3.1.6.2.3. List of “waived” analyses, as approved;

5.3.1.6.3. Plan view drawing or map showing the Discharger’s facility, flow routing, and sampling and observation station locations; and

5.3.1.6.4. Results of facility report reviews. The Discharger shall regularly review, revise, and update, as necessary, the Operation and Maintenance Manual, Contingency Plan, Spill Prevention Plan, and Wastewater Facilities Status Report so these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Discharger shall describe or summarize its review and evaluation procedures, recommended or planned actions, and estimated time schedule for implementing these actions. The Discharger shall complete changes to these documents to ensure that they remain up-to-date.

5.4. Compliance Schedules – Not supplemented

5.5. Twenty-Four Hour Reporting – Supplement to Attachment D, Provision 5.5

5.5.1. **Oil or Other Hazardous Material Spills**

5.5.1.1. Within 24 hours of becoming aware of a spill of oil or other hazardous material not contained onsite and completely cleaned up, the Discharger shall report as follows:

5.5.1.1.1. If the spill exceeds reportable quantities for hazardous materials listed in 40 C.F.R. part 302. The Discharger shall call the California Office of Emergency Services (800 852-7550).

5.5.1.1.2. If the spill does not exceed reportable quantities for hazardous materials listed in 40 C.F.R., part 302, the Discharger shall call the Regional Water Board (510-622-2369).

5.5.1.2. The Discharger shall submit a written report to the Regional Water Board within five working days following either of the above telephone notifications unless directed otherwise by Regional Water Board staff. A report submitted electronically is acceptable. The written report shall include the following:

5.5.1.2.1. Date and time of spill, and duration if known;

5.5.1.2.2. Location of spill (street address or description of location);

5.5.1.2.3. Nature of material spilled;

5.5.1.2.4. Quantity of material spilled;

5.5.1.2.5. Receiving water body affected, if any;

5.5.1.2.6. Cause of spill;

5.5.1.2.7. Estimated size of affected area;

5.5.1.2.8. Observed impacts to receiving waters (e.g., oil sheen, fish kill, water discoloration);

5.5.1.2.9. Corrective actions taken to contain, minimize, or clean up the spill;

5.5.1.2.10. Future corrective actions planned to prevent recurrence, and implementation schedule; and

5.5.1.2.11. Persons or agencies notified.

5.5.2. **Unauthorized Municipal Wastewater Treatment Plant Discharges**[1]

5.5.2.1. **Two-Hour Notification.** For any unauthorized discharge that enters a drainage channel or surface water, the Discharger shall, as soon as possible, but not later than two hours after becoming aware of the discharge, notify the California Office of Emergency Services (800-852-7550) and the local health officer or director of environmental health with jurisdiction over the affected water body. Notification shall include the following:

5.5.2.1.1. Incident description and cause;

5.5.2.1.2. Location of threatened or involved waterways or storm drains;

5.5.2.1.3. Date and time that the unauthorized discharge started;

5.5.2.1.4. Estimated quantity and duration of the unauthorized discharge (to the extent known), and estimated amount recovered;

5.5.2.1.5. Level of treatment prior to discharge (e.g., raw wastewater, primary-treated wastewater, or undisinfected secondary-treated wastewater); and

5.5.2.1.6. Identity of person reporting the unauthorized discharge.

5.5.2.2. **Five-Day Written Report.** Within five business days following the two-hour notification, the Discharger shall submit a written report that includes, in addition to the information listed in Provision 5.5.2.1, above, the following:

5.5.2.2.1. Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

5.5.2.2.2. Efforts implemented to minimize public exposure to the unauthorized discharge;

5.5.2.2.3. Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of receiving water) and extent of sampling if conducted;

5.5.2.2.4. Corrective measures taken to minimize the impact of the unauthorized discharge;

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[1] California Code of Regulations, Title 23, section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially-treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment, or disposal system.

5.5.2.2.5. Measures to be taken to minimize the potential for a similar unauthorized discharge in the future;

5.5.2.2.6. Summary of Spill Prevention Plan or Operation and Maintenance Manual modifications to be made, if necessary, to minimize the potential for future unauthorized discharges; and

5.5.2.2.7. Quantity and duration of the unauthorized discharge, and the amount recovered.

5.6. Planned Changes – Not supplemented

5.7. Anticipated Noncompliance – Not supplemented

5.8. Other Noncompliance – Not supplemented

5.9. Other Information – Not supplemented

6. STANDARD PROVISIONS – ENFORCEMENT – NOT SUPPLEMENTED

7. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS – NOT SUPPLEMENTED

8. DEFINITIONS – ADDITION TO ATTACHMENT D

More definitions can be found in Attachment A of this NPDES Permit.

8.1. Arithmetic Calculations

8.1.1. **Geometric Mean.** The antilog of the log mean or the back-transformed mean of the logarithmically transformed variables, which is equivalent to the multiplication of the antilogarithms. The geometric mean can be calculated with either of the following equations:

Geometric Mean = Anti log (1/N ∑ Log C_i)

or

Geometric Mean = $(C_1 \times C_2 \times \ldots \times C_N)^{1/N}$

Where “N” is the number of data points for the period analyzed and “C” is the concentration for each of the “N” data points.

8.1.2. **Mass Emission Rate.** The rate of discharge expressed in mass. The mass emission rate is obtained from the following calculation for any calendar day:

$$\text{Mass emission rate (lb/day)} = \frac{8.345}{N} \sum_{i=1}^{N} Q_i C_i$$

$$\text{Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of samples analyzed in any calendar day and "Q_i" and "C_i" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" grab samples that may be taken in any calendar day. If a composite sample is taken, "C_i" is the concentration measured in the composite sample and "Q_i" is the average flow rate occurring during the period over which the samples are composited. The daily concentration of a constituent measured over any calendar day shall be determined from the flow weighted average of the same constituent in the combined waste streams as follows:

$$C_d = \text{Average daily concentration} = \frac{1}{Q_i}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of component waste streams and "Q" and "C" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" waste streams. "Q_t" is the total flow rate of the combined waste streams.

8.1.3. **Removal Efficiency.** The ratio of pollutants removed by the treatment facilities to pollutants entering the treatment facilities (expressed as a percentage). The Discharger shall determine removal efficiencies using monthly averages (by calendar month unless otherwise specified) of pollutant concentration of influent and effluent samples collected at about the same time and using the following equation (or its equivalent):

Removal Efficiency (%) =
100 x [1 - (Effluent Concentration / Influent Concentration)]

8.2. Blending – the practice of bypassing biological treatment units and recombining the bypass wastewater with biologically-treated wastewater.

8.3. Composite Sample – a sample composed of individual grab samples collected manually or by an automatic sampling device on the basis of time or flow as specified in the MRP. For flow-based composites, the proportion of each grab sample included in the composite sample shall be within plus or minus five percent (+/-5%) of the representative flow of the waste stream being measured at the time of grab sample collection. Alternatively, equal volume grab samples may be individually analyzed with the flow-weighted average calculated by averaging flow-weighted ratios of each grab sample analytical result. Grab samples comprising time-based composite samples shall be collected at intervals not greater than those specified in the MRP. The quantity of each grab sample comprising a time-based composite sample shall be a set of flow proportional volumes as specified in

the MRP. If a particular time-based or flow-based composite sampling protocol is not specified in the MRP, the Discharger shall determine and implement the most representative protocol.

8.4. Duplicate Sample – a second sample taken from the same source and at the same time as an initial sample (such samples are typically analyzed identically to measure analytical variability).

8.5. Grab Sample – an individual sample collected during a short period not exceeding 15 minutes. Grab samples represent only the condition that exists at the time the sample is collected.

8.6. Overflow – the intentional or unintentional spilling or forcing out of untreated or partially-treated waste from a transport system (e.g., through manholes, at pump stations, or at collection points) upstream of the treatment plant headworks or from any part of a treatment plant.

8.7. Priority Pollutants – those constituents referred to in 40 C.F.R. part 122 as promulgated in the Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000, also known as the California Toxics Rule.

8.8. Untreated waste – raw wastewater.

Table B
List of Monitoring Parameters, Analytical Methods, and Minimum Levels (µg/L)[1]

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
1	Antimony	204.2	-	-	-	-	10	5	50	0.5	5	0.5	-	1000
2	Arsenic	206.3	-	-	-	20	-	2	10	2	2	1	-	1000
3	Beryllium	-	-	-	-	-	20	0.5	2	0.5	1	-	-	1000
4	Cadmium	200 or 213	-	-	-	-	10	0.5	10	0.25	0.5	-	-	1000
5a	Chromium (III)	SM 3500	-	-	-	-	-	-	-	-	-	-	-	-
5b	Chromium (VI)	SM 3500	-	-	-	10	5	-	-	-	-	-	-	1000
	Chromium (total)[3]	SM 3500	-	-	-	-	50	2	10	0.5	1	-	-	1000
6	Copper	200.9	-	-	-	-	25	5	10	0.5	2	-	-	1000
7	Lead	200.9	-	-	-	-	20	5	5	0.5	2	-	-	10,000
8	Mercury	1631[4]	-	-	-	-	-	-	-	-	-	-	-	-
9	Nickel	249.2	-	-	-	-	50	5	20	1	5	-	-	1000
10	Selenium	200.8 or SM 3114B or C	-	-	-	-	-	5	10	2	5	1	-	1000
11	Silver	272.2	-	-	-	-	10	1	10	0.25	2	-	-	1000
12	Thallium	279.2	-	-	-	-	10	2	10	1	5	-	-	1000
13	Zinc	200 or 289	-	-	-	-	20	-	20	1	10	-	-	-
14	Cyanide	SM 4500 CN^- C or I	-	-	-	5	-	-	-	-	-	-	-	-
15	Asbestos (only required for dischargers to MUN waters)[5]	0100.2[6]	-	-	-	-	-	-	-	-	-	-	-	-
16	2,3,7,8-TCDD and 17 congeners (Dioxin)	1613	-	-	-	-	-	-	-	-	-	-	-	-
17	Acrolein	603	2.0	5	-	-	-	-	-	-	-	-	-	-
18	Acrylonitrile	603	2.0	2	-	-	-	-	-	-	-	-	-	-
19	Benzene	602	0.5	2	-	-	-	-	-	-	-	-	-	-
33	Ethylbenzene	602	0.5	2	-	-	-	-	-	-	-	-	-	-
39	Toluene	602	0.5	2	-	-	-	-	-	-	-	-	-	-
20	Bromoform	601	0.5	2	-	-	-	-	-	-	-	-	-	-
21	Carbon Tetrachloride	601	0.5	2	-	-	-	-	-	-	-	-	-	-

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CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
22	Chlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
23	Chlorodibromomethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
24	Chloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
25	2-Chloroethylvinyl Ether	601	1	1	-	-	-	-	-	-	-	-	-	-
26	Chloroform	601	0.5	2	-	-	-	-	-	-	-	-	-	-
75	1,2-Dichlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
76	1,3-Dichlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
77	1,4-Dichlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
27	Dichlorobromomethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
28	1,1-Dichloroethane	601	0.5	1	-	-	-	-	-	-	-	-	-	-
29	1,2-Dichloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
30	1,1-Dichloroethylene or 1,1-Dichloroethene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
31	1,2-Dichloropropane	601	0.5	1	-	-	-	-	-	-	-	-	-	-
32	1,3-Dichloropropylene or 1,3-Dichloropropene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
34	Methyl Bromide or Bromomethane	601	1.0	2	-	-	-	-	-	-	-	-	-	-
35	Methyl Chloride or Chloromethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
36	Methylene Chloride or Dichloromethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
37	1,1,2,2-Tetrachloroethane	601	0.5	1	-	-	-	-	-	-	-	-	-	-
38	Tetrachloroethylene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
40	1,2-Trans-Dichloroethylene	601	0.5	1	-	-	-	-	-	-	-	-	-	-
41	1,1,1-Trichloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
42	1,1,2-Trichloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
43	Trichloroethene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
44	Vinyl Chloride	601	0.5	2	-	-	-	-	-	-	-	-	-	-
45	2-Chlorophenol	604	2	5	-	-	-	-	-	-	-	-	-	-
46	2,4-Dichlorophenol	604	1	5	-	-	-	-	-	-	-	-	-	-
47	2,4-Dimethylphenol	604	1	2	-	-	-	-	-	-	-	-	-	-

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CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
48	2-Methyl-4,6-Dinitrophenol or Dinitro-2-methylphenol	604	10	5	-	-	-	-	-	-	-	-	-	-
49	2,4-Dinitrophenol	604	5	5	-	-	-	-	-	-	-	-	-	-
50	2-Nitrophenol	604	-	10	-	-	-	-	-	-	-	-	-	-
51	4-Nitrophenol	604	5	10	-	-	-	-	-	-	-	-	-	-
52	3-Methyl-4-Chlorophenol	604	5	1	-	-	-	-	-	-	-	-	-	-
53	Pentachlorophenol	604	1	5	-	-	-	-	-	-	-	-	-	-
54	Phenol	604	1	1	-	50	-	-	-	-	-	-	-	-
55	2,4,6-Trichlorophenol	604	10	10	-	-	-	-	-	-	-	-	-	-
56	Acenaphthene	610 HPLC	1	1	0.5	-	-	-	-	-	-	-	-	-
57	Acenaphthylene	610 HPLC	-	10	0.2	-	-	-	-	-	-	-	-	-
58	Anthracene	610 HPLC	-	10	2	-	-	-	-	-	-	-	-	-
60	Benzo(a)Anthracene or 1,2 Benzanthracene	610 HPLC	10	5	-	-	-	-	-	-	-	-	-	-
61	Benzo(a)Pyrene	610 HPLC	-	10	2	-	-	-	-	-	-	-	-	-
62	Benzo(b) Fluoranthene or 3,4 Benzofluoranthene	610 HPLC	-	10	10	-	-	-	-	-	-	-	-	-
63	Benzo(ghi)Perylene	610 HPLC	-	5	0.1	-	-	-	-	-	-	-	-	-
64	Benzo(k)Fluoranthene	610 HPLC	-	10	2	-	-	-	-	-	-	-	-	-
74	Dibenzo(a,h)Anthracene	610 HPLC	-	10	0.1	-	-	-	-	-	-	-	-	-
86	Fluoranthene	610 HPLC	10	1	0.05	-	-	-	-	-	-	-	-	-
87	Fluorene	610 HPLC	-	10	0.1	-	-	-	-	-	-	-	-	-
92	Indeno(1,2,3-cd)Pyrene	610 HPLC	-	10	0.05	-	-	-	-	-	-	-	-	-
100	Pyrene	610 HPLC	-	10	0.05	-	-	-	-	-	-	-	-	-
68	Bis(2-Ethylhexyl)Phthalate	606 or 625	10	5	-	-	-	-	-	-	-	-	-	-
70	Butylbenzyl Phthalate	606 or 625	10	10	-	-	-	-	-	-	-	-	-	-
79	Diethyl Phthalate	606 or 625	10	2	-	-	-	-	-	-	-	-	-	-
80	Dimethyl Phthalate	606 or 625	10	2	-	-	-	-	-	-	-	-	-	-
81	Di-n-Butyl Phthalate	606 or 625	-	10	-	-	-	-	-	-	-	-	-	-
84	Di-n-Octyl Phthalate	606 or 625	-	10	-	-	-	-	-	-	-	-	-	-
59	Benzidine	625	-	5	-	-	-	-	-	-	-	-	-	-

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CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
65	Bis(2-Chloroethoxy)Methane	625	-	5	-	-	-	-	-	-	-	-	-	-
66	Bis(2-Chloroethyl)Ether	625	10	1	-	-	-	-	-	-	-	-	-	-
67	Bis(2-Chloroisopropyl) Ether	625	10	2	-	-	-	-	-	-	-	-	-	-
69	4-Bromophenyl Phenyl Ether	625	10	5	-	-	-	-	-	-	-	-	-	-
71	2-Chloronaphthalene	625	-	10	-	-	-	-	-	-	-	-	-	-
72	4-Chlorophenyl Phenyl Ether	625	-	5	-	-	-	-	-	-	-	-	-	-
73	Chrysene	625	-	10	5	-	-	-	-	-	-	-	-	-
78	3,3'-Dichlorobenzidine	625	-	5	-	-	-	-	-	-	-	-	-	-
82	2,4-Dinitrotoluene	625	10	5	-	-	-	-	-	-	-	-	-	-
83	2,6-Dinitrotoluene	625	-	5	-	-	-	-	-	-	-	-	-	-
85	1,2-Diphenylhydrazine[7]	625	-	1	-	-	-	-	-	-	-	-	-	-
88	Hexachlorobenzene	625	5	1	-	-	-	-	-	-	-	-	-	-
89	Hexachlorobutadiene	625	5	1	-	-	-	-	-	-	-	-	-	-
90	Hexachlorocyclopentadiene	625	5	5	-	-	-	-	-	-	-	-	-	-
91	Hexachloroethane	625	5	1	-	-	-	-	-	-	-	-	-	-
93	Isophorone	625	10	1	-	-	-	-	-	-	-	-	-	-
94	Naphthalene	625	10	1	0.2	-	-	-	-	-	-	-	-	-
95	Nitrobenzene	625	10	1	-	-	-	-	-	-	-	-	-	-
96	N-Nitrosodimethylamine	625	10	5	-	-	-	-	-	-	-	-	-	-
97	N-Nitrosodi-n-Propylamine	625	10	5	-	-	-	-	-	-	-	-	-	-
98	N-Nitrosodiphenylamine	625	10	1	-	-	-	-	-	-	-	-	-	-
99	Phenanthrene	625	-	5	0.05	-	-	-	-	-	-	-	-	-
101	1,2,4-Trichlorobenzene	625	1	5	-	-	-	-	-	-	-	-	-	-
102	Aldrin	608	0.005	-	-	-	-	-	-	-	-	-	-	-
103	α-BHC	608	0.01	-	-	-	-	-	-	-	-	-	-	-
104	β-BHC	608	0.005	-	-	-	-	-	-	-	-	-	-	-
105	γ-BHC (Lindane)	608	0.02	-	-	-	-	-	-	-	-	-	-	-
106	δ-BHC	608	0.005	-	-	-	-	-	-	-	-	-	-	-
107	Chlordane	608	0.1	-	-	-	-	-	-	-	-	-	-	-
108	4,4'-DDT	608	0.01	-	-	-	-	-	-	-	-	-	-	-
109	4,4'-DDE	608	0.05	-	-	-	-	-	-	-	-	-	-	-

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
110	4,4'-DDD	608	0.05	-	-	-	-	-	-	-	-	-	-	-
111	Dieldrin	608	0.01	-	-	-	-	-	-	-	-	-	-	-
112	Endosulfan (alpha)	608	0.02	-	-	-	-	-	-	-	-	-	-	-
113	Endosulfan (beta)	608	0.01	-	-	-	-	-	-	-	-	-	-	-
114	Endosulfan Sulfate	608	0.05	-	-	-	-	-	-	-	-	-	-	-
115	Endrin	608	0.01	-	-	-	-	-	-	-	-	-	-	-
116	Endrin Aldehyde	608	0.01	-	-	-	-	-	-	-	-	-	-	-
117	Heptachlor	608	0.01	-	-	-	-	-	-	-	-	-	-	-
118	Heptachlor Epoxide	608	0.01	-	-	-	-	-	-	-	-	-	-	-
119-125	PCBs: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260	608	0.5	-	-	-	-	-	-	-	-	-	-	-
126	Toxaphene	608	0.5	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

[1] Minimum levels are from the *State Implementation Policy*. They are the concentration of the lowest calibration standard for that technique based on a survey of contract laboratories. Laboratory techniques are defined as follows: GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; LC = High Pressure Liquid Chromatography; Color = Colorimetric; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; ICP = Inductively Coupled Plasma; ICPMS = Inductively Coupled Plasma/Mass Spectrometry; SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., U.S. EPA 200.9); Hydride = Gaseous Hydride Atomic Absorption; CVAA = Cold Vapor Atomic Absorption; DCP = Direct Current Plasma.

[2] The suggested method is the U.S. EPA Method unless otherwise specified (SM = Standard Methods). The Discharger may use another U.S. EPA-approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Discharger has the discretion to use any standard method.

[3] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium criterion (11 ug/l).

[4] The Discharger shall use ultra-clean sampling (U.S. EPA Method 1669) and ultra-clean analytical methods (U.S. EPA Method 1631) for mercury monitoring. The minimum level for mercury is 2 ng/l (or 0.002 ug/l).

[5] MUN = Municipal and Domestic Supply. This designation, if applicable, is in the Findings of the permit.

[6] Determination of Asbestos Structures over 10 [micrometers] in Length in Drinking Water Using MCE Filters, U.S. EPA 600/R-94-134, June 1994.

[7] Detected as azobenzene.

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ATTACHMENT S– STORMWATER PROVISIONS, MONITORING, AND REPORTING REQUIREMENTS

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ATTACHMENT S – STORMWATER PROVISIONS, MONITORING, AND REPORTING REQUIREMENTS

APPLICABILITY

These stormwater provisions only apply to facilities that do not direct all stormwater flows from proves areas to a wastewater treatment plant's headwork or do not enroll in NPDES Permit CAS000001 (General Permit for Stormwater Discharges Associated with Industrial Activities).

1. STORMWATER PROVISIONS – PERMIT COMPLIANCE

1.1. Stormwater Pollution Prevention Plan (SWPPP)

The Discharger shall prepare a SWPPP that includes the following elements:

1.1.1. Facility name and contact information;

1.1.2. Site map;

1.1.3. List of industrial materials;

1.1.4. Description of potential sources;

1.1.5. Assessment of potential pollutant sources;

1.1.6. Minimum Best Management Practices (BMPs);

1.1.7. Advanced BMPs, if applicable;

1.1.8. Monitoring implementation plan;

1.1.9. Annual comprehensive facility compliance evaluation; and

1.1.10. Date SWPPP initially prepared and dates of each SWPPP amendment.

The SWPPP shall be designed in accordance with good engineering practices to achieve the following objectives:

- Identify and evaluate all pollutant sources that may affect stormwater discharge quality;
- Identify, assign, and implement control measures and management practices to reduce or prevent pollutants in stormwater discharges; and
- Identify and describe conditions or circumstances that may require revisions to the SWPPP.

The SWPPP shall be retained onsite, revised whenever necessary, and made available upon request of any Regional Water Board representative. The SWPPP may be combined with the Spill Prevention Plan (Attachment G section 1.3.2).

1.2. Site Map

The Discharger shall prepare one or more site maps that include notes, legends, a north arrow, and other data as appropriate to ensure the map is clear, legible and understandable, including the following:

1.2.1 The facility boundary, stormwater drainage areas within the facility boundary, and portions of any drainage area impacted by discharges from surrounding areas (the maps shall include the flow direction of each drainage area, on-facility surface water bodies, areas of soil erosion, and locations of nearby water bodies [e.g., rivers, lakes, wetlands] or municipal storm drain inlets that may receive the facility's industrial stormwater discharges and authorized non-stormwater discharges);

1.2.2. Locations of stormwater collection and conveyance systems, associated discharge locations, and direction of flow (the maps shall include sample locations if different than the discharge locations);

1.2.3. Locations of stormwater collection and conveyance systems, associated discharge locations, and direction of flow (the maps shall include sample locations if different than the discharge locations);

1.2.4. I dentification of all impervious areas, including paved areas, buildings, covered storage areas, or other roofed structures;

1.2.5. Locations where materials are directly exposed to precipitation and the locations where identified significant spills or leaks have occurred; and

1.2.6. Areas of industrial activity (the maps shall identify all industrial storage areas and storage tanks, shipping and receiving areas, fueling areas, vehicle and equipment storage and maintenance areas, material handling and processing areas, waste treatment and disposal areas, dust or particulate generating areas, cleaning and material reuse areas, and other areas of industrial activity that may have potential pollutant sources).

1.3. List of Industrial Materials

The SWPPP shall contain a list of industrial materials handled at the facility and the locations where each material is stored, received, shipped, and handled, as well as the typical quantities and handling frequency.

1.4. Potential Pollutant Sources

The Discharger shall describe and assess potential stormwater pollutant sources, including the following:

1.4.1. **Industrial Processes.** Industrial processes may include manufacturing, cleaning, maintenance, recycling, and disposal. The SWPPP shall describe the type, characteristics, and approximate quantity of industrial materials used and areas protected by containment structures and the corresponding containment capacity.

1.4.2. **Material Handling and Storage Areas.** The SWPPP shall describe the type, characteristics, and quantity of industrial materials handled or stored; shipping, receiving, and loading procedures; spill and leak prevention and response procedures; and areas protected by containment structures and the corresponding containment capacity.

1.4.3. **Dust and Particulate Generating Activities.** The SWPPP shall describe the discharge locations, source type, and characteristics of the dust or particulate pollutant.

1.4.4. **Significant Spills and Leaks.** The Discharger shall evaluate the facility for areas where spills and leaks can occur. The SWPPP shall list any industrial materials spilled or leaked in significant quantities and discharged from the facility's stormwater conveyance system within the previous five years, including but not limited to any chemicals identified in 40 C.F.R. section 302 as reported on U.S. EPA Form R and any oil and hazardous substances discharged in excess of reportable quantities (40 C.F.R. §§ 110, 117, and 302). The SWPPP shall also list any industrial materials spilled or leaked in significant quantities that had the potential to be discharged from the facility's stormwater conveyance system within the previous five years. For each listed industrial material spill and leak, the SWPPP shall include the location, characteristics, and approximate quantity of the material spilled or leaked; the approximate quantity of the material discharged; the cleanup or remedial actions taken or planned; the approximate quantity of remaining material that could be discharged; and the preventive measures taken to ensure that spills or leaks do not reoccur.

1.4.5. **Non-Stormwater Discharges.** The SWPPP shall describe all non-stormwater discharges, including the source, quantity, frequency, characteristics, and associated drainage area, and indicate whether these discharges are authorized or unauthorized.

1.4.6. **Erodible Surfaces.** The SWPPP shall describe any facility locations where soil erosion may be caused by industrial activity, contact with stormwater, authorized and unauthorized non-stormwater discharges, or run-on from areas surrounding the facility.

1.5. Assessment of Potential Pollutant Sources

The SWPPP shall include a narrative assessment of all areas of industrial activity with potential industrial pollutant sources, including, at a minimum, the following:

1.5.1. Facility areas with likely sources of pollutants;

1.5.2. Pollutants likely to be present in industrial stormwater discharges;

1.5.3. Approximate quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each industrial material handled, produced, stored, recycled, or disposed;

1.5.4. Degree to which the pollutants associated with such materials may be exposed to, and mobilized by, contact with stormwater;

1.5.5. Direct and indirect pathways by which pollutants may be exposed to stormwater;

1.5.6. Sampling, visual observation, and inspection records;

1.5.7. Effectiveness of existing BMPs to reduce or prevent pollutants in industrial stormwater discharges; and

1.5.8. Estimated effectiveness of implementing, to the extent feasible, minimum BMPs to reduce or prevent pollutants in industrial stormwater discharges.

Based upon the assessment, the SWPPP shall identify facility areas where the minimum BMPs described in Provision 1.6, below, will not adequately reduce or prevent pollutants in stormwater discharges and any necessary advanced BMPs, as described in Provision 1.7, below, for those areas.

1.6. Minimum Best Management Practices (BMPs)

The Discharger shall, to the extent feasible, implement and maintain the following BMPs:

1.6.1. **Good Housekeeping.** The Discharger shall do the following:

1.6.1.1. Observe all outdoor areas associated with industrial activity, including stormwater discharge locations, drainage areas, conveyance systems, waste handling and disposal areas, and perimeter areas affected by off-facility materials or stormwater run-on to determine housekeeping needs. Any identified debris, waste, spills, tracked materials, or leaked materials shall be cleaned and disposed of properly;

1.6.1.2. Minimize or prevent material tracking;

1.6.1.3. Minimize dust generated from industrial materials or activities;

1.6.1.4. Ensure that all facility areas impacted by rinse or wash waters are cleaned as soon as possible;

1.6.1.5. Cover all stored industrial materials that can be readily mobilized by contact with stormwater;

1.6.1.6. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper) that can be transported or dispersed by the wind or contact with stormwater;

1.6.1.7. Prevent disposal of any rinse or wash waters or industrial materials into the stormwater conveyance system;

1.6.1.8. Minimize stormwater discharges from non-industrial areas (e.g., stormwater flows from employee parking areas) that contact industrial areas of the facility; and,

1.6.1.9. Minimize authorized non-stormwater discharges from non-industrial areas (e.g., potable water, fire hydrant testing) that contact areas of the sanitary or industrial facility.

1.6.2. **Preventative Maintenance.** The Discharger shall (1) identify all equipment and systems used outdoors that may spill or leak pollutants, (2) observe the identified equipment and systems to detect leaks or identify conditions that may result in the development of leaks, (3) establish an appropriate schedule for maintenance of identified equipment and systems, and (4) establish procedures for prompt maintenance and repair of equipment and maintenance of systems when conditions exist that may result in the development of spills or leaks.

1.6.3. **Spill and Leak Prevention and Response.** The Discharger shall (1) establish procedures and controls to minimize spills and leaks; (2) develop and implement spill and leak response procedures to prevent industrial materials from discharging through the stormwater conveyance system (spilled or leaked industrial materials shall be cleaned promptly and disposed of properly); (3) identify and describe all necessary and appropriate spill and leak response equipment, locations of spill and leak response equipment, and spill or leak response equipment maintenance procedures; and (4) identify and train appropriate spill and leak response personnel.

1.6.4. **Material Handling and Waste Management.** The Discharger shall do the following:

1.6.4.1. Prevent or minimize handling of industrial materials or wastes that can be readily mobilized by contact with stormwater during a storm;

1.6.4.2. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powers, shredded paper) that can be transported or dispersed by the wind or contact with stormwater;

1.6.4.3. Cover industrial waste disposal containers and industrial material storage containers that contain industrial materials when not in use;

1.6.4.4. Divert run-on and stormwater generated from within the facility away from all stockpiled materials;

1.6.4.5. Clean all spills of industrial materials or wastes that occur during handling in accordance with spill response procedures; and,

1.6.4.6. Observe and clean, as appropriate, any outdoor material or waste handling equipment or containers that can be contaminated by contact with industrial materials or wastes.

1.6.5. **Erosion and Sediment Control.** The Discharger shall (1) implement effective wind erosion controls; (2) provide effective stabilization for inactive areas, finished slopes, and other erodible areas prior to a forecasted storms; (3) maintain effective perimeter controls and stabilize site entrances and exits to sufficiently control discharges of erodible materials; and (4) divert run-on and stormwater generated from within the facility away from erodible materials.

1.6.6. **Employee Training.** The Discharger shall ensure that all personnel implementing the SWPPP are properly trained with respect to BMP implementation, BMP effectiveness evaluations, visual observations, and monitoring activities. The Discharger shall

identify which personnel need to be trained, their responsibilities, and the type of training they are to receive and maintain documentation of completed training and the personnel that received the training with the SWPPP.

1.6.7. **Quality Assurance and Record Keeping.** The Discharger shall (1) develop and implement management procedures to ensure that appropriate personnel implement all SWPPP elements; (2) develop methods of tracking and recording BMP implementation; and (3) maintain BMP implementation records, training records, and records related to any spills and clean-up related response activities for a minimum of five years.

1.7. Action Levels and Advanced BMPs

If the Discharger samples total suspended solids (TSS), oil and grease, or pH in excess of an action level in Table S-1, the Discharger shall review the SWPPP to identify appropriate modifications to existing BMPs or additional BMPs as necessary to reduce pollutant discharge concentrations to levels below the action level. The Discharger shall revise the SWPPP accordingly before the next storm, if possible, or as soon as practical, and in no event later than three months following the exceedance.

Table S-1. Stormwater Action Levels

Parameter	Unit	Instantaneous Action Level	Annual Action Level
Total Suspended Solids	mg/L	400	100
Oil and Grease	mg/L	25	15
pH	s.u.	6.0-9.0[1]	----

Footnotes:

[1] Values below or above this range require action.

If, upon subsequent monitoring, the pollutants measured in Table S-1 continue to exceed their respective action levels, the Discharger shall further evaluate its BMPs and update its SWPPP accordingly to include advanced BMPs in addition to the minimum BMPs described in Provision 1.6, above. The Discharger shall, to the extent feasible, implement and maintain any advanced BMPs identified pursuant to Provision 1.5.8, above, as necessary to reduce or prevent discharges of pollutants in stormwater discharges in a manner that reflects best industry practice considering technological availability and economic practicability and achievability. Advanced BMPs may include one or more of the following:

1.7.1. **Exposure Minimization BMPs**. These include storm resistant shelters (either permanent or temporary) that prevent the contact of stormwater with identified industrial materials.

1.7.2. **Stormwater Containment and Discharge Reduction BMPs.** These include BMPs that divert, infiltrate, reuse, contain, retain, or reduce the volume of stormwater runoff.

1.7.3. **Treatment Control BMPs.** These include mechanical, chemical, biologic, or any other treatment technology that will meet the treatment design standard.

1.8. BMP Descriptions

The SWPPP shall identify each BMP being implemented at the facility, including the following:

1.8.1. The pollutants the BMP is designed to reduce or prevent;

1.8.2. The frequency, times of day, or conditions when the BMP is scheduled for implementation;

1.8.3. The locations within each area of industrial activity or industrial pollutant source where the BMP shall be implemented;

1.8.4. The individual responsible for implementing the BMP;

1.8.5. The procedures, including maintenance procedures, and instructions to implement the BMP effectively; and

1.8.6. The equipment and tools necessary to implement the BMP effectively.

1.9. Annual Comprehensive Facility Compliance Evaluation

The Discharger shall conduct one annual facility evaluation for each reporting year (July 1 to June 30). If the Discharger conducts an annual evaluation fewer than 8 months, or more than 16 months, after it conducts the previous annual evaluation, it shall document the justification for doing so. The Discharger shall revise the SWPPP, as appropriate, and implement the revisions within 90 days of the annual evaluation. At a minimum, the annual evaluations shall consist of the following:

1.9.1. A review of all sampling, visual observation, and inspection records conducted during the previous reporting year;

1.9.2. An inspection of all areas of industrial activity and associated potential pollutant sources for evidence of, or the potential for, pollutants entering the stormwater conveyance system;

1.9.3. An inspection of all drainage areas previously identified as having no exposure to industrial activities and materials;

1.9.4. An inspection of equipment needed to implement the BMPs; and

1.9.5. An assessment of any other factors needed to comply with the requirements of the Annual Stormwater Report (see Provision 3.1, below).

2. STORMWATER PROVISIONS – MONITORING

2.1. Monthly Visual Observations

2.1.1. At least once per month, the Discharger shall visually observe each drainage area for the following:

2.1.1.1. The presence or indication of prior, current, or potential unauthorized non-stormwater discharges and their sources;

2.1.1.2. Authorized non-stormwater discharges, sources, and associated BMPs; and

2.1.1.3. Outdoor industrial equipment and storage areas, outdoor industrial activities areas, BMPs, and all other potential sources of industrial pollutants.

2.1.2. The monthly visual observations shall be conducted during daylight hours of scheduled facility operating hours and on days without precipitation.

2.1.3. The Discharger shall provide an explanation in the Annual Stormwater Report for uncompleted monthly visual observations (see Provision 3.1, below).

2.2. Sampling Event Visual Observations

Sampling event visual observations shall be conducted at the same time sampling occurs at a discharge location. At each discharge location where a sample is obtained, the Discharger shall observe the discharge of stormwater associated with industrial activity.

2.2.1. The Discharger shall ensure that visual observations of stormwater discharged from containment sources (e.g., secondary containment or storage ponds) are conducted at the time that the discharge is sampled.

2.2.2. If the Discharger employs volume-based or flow-based treatment BMPs, it shall sample any bypass that occurs while the visual observations and sampling of stormwater discharges are conducted.

2.2.3. The Discharger shall visually observe and record the presence or absence of floating and suspended materials, oil and grease, discolorations, turbidity, odors, trash/debris, and sources of any discharged pollutants.

2.2.4. If a discharge location is not visually observed during the sampling event, the Discharger shall record which discharge locations were not observed during sampling or that there was no discharge from the discharge location.

2.2.5. The Discharger shall provide an explanation in the Annual Stormwater Report for uncompleted sampling event visual observations (see Provision 4.1, below).

2.3. Visual Observation Records

The Discharger shall maintain records of all visual observations. Records shall include the date, approximate time, locations observed, presence and probable source of any observed pollutants, name of persons who conducted the observations, and any response actions and/or additional SWPPP revisions necessary in response to the visual observations.

2.4. SWPPP Revisions

The Discharger shall revise its BMPs as necessary when the visual observations indicate pollutant sources have not been adequately addressed.

2.5. Sampling and Analysis

2.5.1. The Discharger shall collect and analyze stormwater samples as specified in the MRP.

2.5.2. Samples shall be (1) representative of stormwater associated with industrial activities and any commingled authorized non-stormwater dischargers; or (2) associated with the discharge of contained stormwater.

2.5.3. On a facility-specific basis, the Discharger shall also analyze additional parameters that serve as indicators of the presence of all industrial pollutants identified in the pollutant source assessment. These additional parameters may be modified (added or removed) in accordance with any updated SWPPP pollutant source assessment.

3. STORMWATER PROVISIONS – REPORTING

3.1. Annual Stormwater Report

The results of the Discharger's Annual Comprehensive Facility Compliance Evaluation shall be reported in the Annual Stormwater Report to the Regional Water Board no later than July 30. The Discharger shall include in the Annual Stormwater Report the following:

3.1.1. A compliance checklist that indicates whether the Discharger has complied with or addressed all applicable requirements of the SWPPP;

3.1.2. An explanation for any non-compliance requirements within the reporting year, as indicated in the compliance checklist;

3.1.3. An identification, including page numbers and sections, of all revisions made to the SWPPP within the reporting year; and

3.1.4. The date(s) of the annual evaluation.

4. STORMWATER PROVISIONS – DEFINTIONS

4.1. Authorized Non-Stormwater Discharges – non-stormwater discharges are authorized if they meet the following conditions:

4.1.1. Fire-hydrant and fire prevention or response system flushing;

4.1.2. Potable water sources, including potable water related to the operation, maintenance, or testing of potable water systems;

4.1.3. Drinking fountain water and atmospheric condensate, including refrigeration, air conditioning, and compressor condensate;

4.1.4. Irrigation drainage and landscape watering, provided that all pesticides, herbicides, and fertilizers have been applied in accordance with manufacturer's labels;

4.1.5. Uncontaminated natural springs, groundwater, foundation drainage, footing drainage;

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 Clay Street, Suite 1400, Oakland, California 94612
waterboards.ca.gov/sanfranciscobay

ORDER R2-2023-0025
NPDES PERMIT CA0005134

The following Discharger is subject to the waste discharge requirements (WDRs) set forth in this Order:

Discharger	**Chevron Products Company, a division of Chevron U.S.A. Inc.** **Chevron Environmental Management Company**
Name of Facility	**Chevron Products Company, Richmond Refinery**
Facility Address	**841 Chevron Way** **Richmond, California 94801** **Contra Costa County**

Table 1. Discharge Locations

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Treated process wastewater and stormwater	.. .9708˚	-122.4292	San Pablo Bay
002	Stormwater and firewater from Richmond Long Wharf (RLW)	37.9208˚	-122.4083˚	San Francisco Bay
003	Stormwater, steam condensate, and firewater from North Yard Impound Basin (NYIB)	37.9542˚	-122.3917˚	San Pablo Bay
004	Stormwater from 12 Basin	37.9542˚	-122.4125˚	San Francisco Bay
005	Stormwater from 11 Basin	37.9583˚	-122.425˚	San Francisco Bay
006	Stormwater from 10 Basin	37.9542	-122.4208˚	San Francisco Bay
007	Stormwater from Basin 13 and Horse Pasture	37.9542˚	-122.4208˚	San Francisco Bay
008	Stormwater from Tank Field (100' channel)	37.9542˚	-122.3917˚	San Pablo Bay
009	Stormwater, steam condensate, and firewater from 8 Basin (SPCC)	37.9333˚	-122.4042˚	San Francisco Bay
010	Stormwater from Reclamation Yard	37.9547˚	-122.3792˚	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
011	Stormwater from Castro Acres Surge Pond	37.9458˚	-122.3750˚	Castro Creek to San Pablo Bay
014	Stormwater from Consolidation Area	37.9500˚	-122.3792˚	Castro Creek to San Pablo Bay
017	Stormwater from 3 Basin and 3a Basin	37.9292˚	-122.4083˚	San Francisco Bay
018	Stormwater, steam condensate, and firewater from 9 Basin (SPCC)	37.9292˚	-122.4000˚	San Francisco Bay
019	Stormwater, steam condensate, and firewater from 7 Basin (SPCC)	37.9583˚	-122.4250˚	San Francisco Bay
020	Stormwater from Castro Street (38' channel)	37.9542˚	-122.3875˚	Castro Creek to San Pablo Bay
021	Stormwater from Landfill 15	37.9458˚	-122.3750˚	Castro Creek to San Pablo Bay
022	Stormwater from Parr Richmond	37.9542˚	-122.3792˚	Castro Creek to San Pablo Bay
023	Stormwater from Gertrude Street	37.9542˚	-122.3792˚	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay

This Order was adopted on: **November 8, 2023**
This Order shall become effective on: **January 1, 2024**
This Order shall expire on: **December 31, 2028**
CIWQS regulatory measure number: **454999**

The Discharger shall file a Report of Waste Discharge as an application for updated WDRs in accordance with title 23, California Code of Regulations, and an application for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit no later than **April 1, 2028.** The U.S. Environmental Protection Agency (U.S. EPA) and the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) have classified this discharge as "**major**."

I hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the Regional Water Board on the date indicated above.

Eileen White Digitally signed by Eileen White
Date: 2023.11.13 20:37:39 -08'00'
Water Boards

Eileen White, Executive Officer

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1. FACILITY INFORMATION

Information describing Chevron Products Company's and Chevron Environmental Management Company's, Chevron Richmond Refinery (Facility) is summarized on the cover page and in Fact Sheet (Attachment F) sections 1 and 2. Fact Sheet section 1 also includes information regarding the permit application.

2. FINDINGS

The Regional Water Board finds the following:

2.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as an NPDES permit authorizing the Discharger to discharge into waters of the United States as described in Table 1 subject to the WDRs in this Order.

2.2. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on information the Discharger submitted as part of its application, information obtained through monitoring and reporting programs, and other available information. The Fact Sheet contains background information and rationale for the requirements in this Order and is hereby incorporated into and constitutes findings for this Order. Attachments A through E, G, and S are also incorporated into this Order.

2.3. Notification of Interested Parties. The Regional Water Board notified the Discharger and interested agencies and persons of its intent to prescribe these WDRs and has provided an opportunity to submit written comments and recommendations. Fact Sheet section 8.1 provides details regarding the notification.

2.4. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Fact Sheet section 8.3 provides details regarding the public hearing.

THEREFORE, IT IS HEREBY ORDERED that Order R2-2016-0047 (previous order) is rescinded upon the effective date of this Order, except for enforcement purposes, and, in order to meet the provisions contained in Water Code division 7 (commencing with § 13000) and regulations adopted thereunder and the provisions of the CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order. This action in no way prevents the Regional Water Board from taking enforcement action for violations of the previous order.

3. DISCHARGE PROHIBITIONS

3.1. Discharge of treated or partially-treated wastewater at a location or in a manner different than described in this Order is prohibited.

3.2. Discharge at Discharge Point 001 is prohibited when treated wastewater does not receive an initial dilution of at least 34:1, as modeled. Compliance shall be achieved by proper operation and maintenance of the discharge outfall to ensure that it (or its replacement, in whole or part) is in good working order and is consistent with or can achieve better mixing than that described in Fact Sheet section 4.3.4.2. The Discharger shall describe measures taken to ensure this in its application for permit reissuance. The Discharger may reuse a portion of its biologically-treated wastewater for onsite landscape irrigation or in the Facility's fire protection system, including the Richmond Long Wharf Fire Protection System.

3.3. Bypass of untreated or partially-treated wastewater to waters of the United States is prohibited, except as provided for in Attachment D section 1.7 of this Order. Routing peak wet weather flows around the 1A or 2A Separators to the bioreactor is not considered a bypass and is not a violation of this Order if such flow is at least 80 percent stormwater and does not contain visible oil.

3.4. Discharge of stormwater from the former Chevron Chemical Company Hensley Street Plant site (drainage area for Discharge Point 011) to waters of the United States is prohibited unless a 24-hour rainfall event exceeding a 25-year return frequency (i.e., a 24-hour, 25-year storm) occurs. If such a rainfall event occurs, the Discharger may discharge the volume of stormwater exceeding that attributable to a 24-hour, 25-year storm.

3.5. Discharge of Richmond Refinery Enhancement Wetland treatment facility (Wetland) effluent to Discharge Point 001 downstream of granular activated carbon treatment is prohibited unless the Discharger complies with Provision 6.3.4.7 of this Order.

4. EFFLUENT LIMITATIONS

4.1. Discharge Point 001

4.1.1. **Effluent Limitations.** The discharge at Discharge Point 001 shall meet the following effluent limitations, with compliance measured at Monitoring Location EFF-001 as described in the Monitoring and Reporting Program (MRP, Attachment E):

Table 2. Effluent Limitations

Parameter	Units	Average Monthly	Maximum Daily	Instantaneous
Biochemical Oxygen Demand 5-day @ 20°C (BOD_5)	lbs/day	5,800	11,000	-
Total Suspended Solids (TSS)	lbs/day	4,800	7,600	-

Parameter	Units	Average Monthly	Maximum Daily	Instantaneous
Chemical Oxygen Demand (COD)	lbs/day	40,000	78,000	
Oil and Grease	lbs/day	1,800	3,400	
Phenolic Compounds, Total	lbs/day	20	80	
Ammonia Nitrogen, Total (as N)	mg/L	42	130	-
Ammonia Nitrogen, Total (as N)	lbs/day	2,200	4,800	
Sulfide, Total	lbs/day	32	71	
Chromium, Total Recoverable	lbs/day	23	67	
Chromium (VI), Total Recoverable	lbs/day	1.9	4.3	
Arsenic, Total	µg/L	260	590	
Copper, Total Recoverable	µg/L	71	120	-
Cyanide, Total	µg/L	19	37	-
Dioxin-TEQ	µg/L	1.4×10^{-8}	2.8×10^{-8}	-
Nickel	µg/L	230	380	
Selenium [1]	kg/day	0.68	-	-
pH [2]	standard units	-	-	6.0-9.0

Footnotes:

[1] Compliance shall be evaluated by calculating the arithmetic mean of daily selenium mass discharges for each day of the calendar month that selenium is measured. Daily mass discharges shall be calculated based on the total daily flow and the corresponding selenium concentration for each day that selenium is measured. The Discharger shall also report its average annual selenium load as required by Provision 6.3.4.4.

[2] If the Discharger monitors pH continuously, pursuant to 40 C.F.R. section 401.17 the Discharger shall be in compliance with this pH limitation provided that both of the following conditions are satisfied: (1) the total time during which the pH is outside the required range shall not exceed 7 hours and 26 minutes in any calendar month; and (2) no individual excursion from the required pH range shall exceed 60 minutes.

4.1.2. **Chronic Toxicity.** The discharge at Discharge Point 001 shall meet the following maximum daily effluent limit (MDEL) and median monthly effluent limit (MMEL) at Monitoring Location EFF-001, with compliance measured using the instream waste concentration of 10 percent effluent, the most sensitive species as described in the MRP, and the Test of Significant Toxicity:

- MDEL: No chronic aquatic toxicity test result of “fail” for any sub-lethal endpoint and no percent effect greater than or equal to 50 percent for the survival endpoint (if the most sensitive species has a survival endpoint) or greater than or equal to 50 percent for any sub-lethal endpoint (if the most sensitive species has no survival endpoint).

- MMEL: No more than one chronic aquatic toxicity test result of “fail” in a calendar month for any endpoint.

4.1.3. **Acute Toxicity.** The discharge at Discharge Point 001 shall meet the following acute toxicity effluent limitations, with compliance measured at Monitoring Location EFF-001, as described in the MRP. If the Discharger can demonstrate that toxicity exceeding these acute toxicity limits is caused solely by ammonia and that the ammonia in the discharge complies with the ammonia effluent

limits in Table 2 of this Order, then such toxicity shall not constitute a violation of these acute toxicity limits.

4.1.3.1. The 11-sample median shall not exhibit less than 90 percent survival (i.e., a bioassay test showing survival of less than 90 percent shall represent a violation of this effluent limit if five or more of the past ten or fewer bioassay tests show less than 90 percent survival).

4.1.3.2. The 11-sample 90th percentile shall not exhibit less than 70 percent survival (i.e., a bioassay test showing survival of less than 70 percent shall represent.

4.1.4. **Additional Contaminated Runoff Effluent Limitation Allocations.** Additional effluent limitation allocations for contaminated runoff commingled with process wastewater are established on top of the process wastewater mass-based limitations in Table 2. When contaminated runoff is discharged through Discharge Point 001, an additional effluent limitation allocation may be added to the effluent limitation in Table 2 for each pollutant in Table 3, below. The additional allocation shall be equal to the contaminated runoff flow times the pollutant concentration in Table 3.

Table 3. Additional Contaminated Runoff Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
Biochemical Oxygen Demand	mg/L	26	48
Total Suspended Solids	mg/L	21	33
Chemical Oxygen Demand	mg/L	180	360
Oil and Grease	mg/L	8.0	15
Phenolic Compounds, Total	mg/L	0.17	0.35
Chromium, Total Recoverable	mg/L	0.21	0.60
Chromium (VI), Total Recoverable	mg/L	0.028	0.062

4.1.5. **Additional Ballast Water Effluent Limitation Allocations.** Additional effluent limitation allocations for ballast water commingled with process wastewater are established on top of the process wastewater mass-based limitations in Table 2. When ballast water is discharged through Discharge Point 001, an additional effluent limitation allocation may be added to the effluent limitation in Table 2 for each pollutant in Table 4, below. The additional allocation shall be equal to the ballast water flow times the pollutant concentration in Table 4.

Table 4. Additional Ballast Water Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
Biochemical Oxygen Demand	mg/L	26	48
Total Suspended Solids	mg/L	21	33
Chemical Oxygen Demand	mg/L	240	470
Oil and Grease	mg/L	8.0	15

4.1.6. **Recycled Water Use Effluent Limitation Adjustments for North Richmond Water Reclamation Plant and Richmond Advanced Recycled Expansion.** When the Discharger replaces raw water used in its operations with recycled water (as described in Fact Sheet section 4.3.5.7.), an additional allocation shall be added to the mass-based and concentration-based effluent limitations by calculating adjustments as described below and adding them to the effluent limitations in Table 2. All calculations supporting such limitation adjustments shall be described in applicable self-monitoring reports.

4.1.6.1. **Concentration-based Effluent Limitation Adjustments.** The adjustment for a concentration based effluent limitation shall be the difference between its recycled water influent mass and raw water influent mass, divided by the effluent volume for the applicable monitoring interval (e.g., seven days for a constituent monitored weekly) and shall be calculated according to the following example in which constituent B is monitored weekly and the lag time is Y days:

Step 1: Influent mass of B = [(Influent recycled water concentration of B) – (Influent raw water concentration of B)] x (Influent recycled water volume)

Step 2: Effluent volume for monitoring period = Effluent volume at Monitoring Location EFF-001 for the one-week period beginning Y days after influent mass determined

Step 3: Effluent limitation adjustment for B = (Influent mass of B) / (Effluent volume for monitoring period)

The Discharger shall determine the lag time based on the interval between the introduction of the constituent in the influent recycled water and its first appearance in the final effluent. The potable water concentrations used in Step 1 can be an average of samples collected over the last year.

The adjustments shall not result in effluent limitations greater than the following:

Table 5. Maximum Recycled Water Adjusted Effluent Limitations

Parameter	Units	Average Monthly	Maximum Daily
Arsenic	mg/L	520	1,200
Copper	mg/L	140	240
Cyanide	mg/L	43	76
Nickel	mg/L	480	750

4.1.6.2. **Mass-based Effluent Limitation Adjustments.** The adjustment for a mass-based effluent limitation shall be the difference between the recycled water influent mass and raw water influent mass, divided by the number of days in

the monitoring period, and shall be calculated according to the following example for constituent B (lag time is not used for this calculation):

Step 1: Influent mass of B = [(Influent recycled water concentration of B) – (Influent raw water concentration of B)] x (Influent recycled water volume)

Step 2: Effluent limitation adjustment for B = (Influent mass of B) / (Monitoring interval in days)

4.2. Discharge Points 002 through 023

4.2.1 The Discharger shall comply with the following effluent limitations at Discharge Points 002 through 023, with compliance measured at Monitoring Locations EFF-002 through EFF-023, as described in the MRP:

Table 6. Effluent Limitations for Stormwater Outfalls

Parameter	Units	Maximum Daily Limit	Other Limits
Total Organic Carbon	mg/L	110	-
Oil and Grease	mg/L	15	-
pH	s.u.	-	6.5 – 8.5 at all times
Visible Oil and Grease	-	-	None observed
Visible Color	-	-	None observed

4.2.2. If the total organic carbon or oil and grease effluent limitation in Table 6 is exceeded at any of Monitoring Locations EFF-002 through EFF-023, the Discharger shall also comply with the following effluent limitations at the same monitoring location as described in the MRP:

Table 7. Supplemental Effluent Limitations for Stormwater Outfalls

Pollutant	Units	Maximum Daily Limit	Average Monthly Limit [1]
BOD_5	mg/L	48	26
TSS [2]	mg/L	33	21
COD	mg/L	360	180
Oil and Grease	mg/L	15	8.0
Phenolic Compounds	mg/L	0.35	0.17
Total Chromium	mg/L	0.60	0.21
Hexavalent Chromium	mg/L	0.062	0.028

Footnotes:

[1] These limitations shall not apply unless there is sufficient runoff for sampling on at least three days during the month.

[2] As indicated in Provision 6.3.4.3, the numeric actions levels for TSS are an annual average of 100 mg/L and a daily maximum of 400 mg/L.

5. RECEIVING WATER LIMITATIONS

5.1. The discharge shall not cause the following conditions at any place in receiving waters:

5.1.1. Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;

5.1.2. Alteration of suspended sediment in such a manner as to cause nuisance or adversely affect beneficial uses or detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life;

5.1.3. Suspended material in concentrations that cause nuisance or adversely affect beneficial uses;

5.1.4. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

5.1.5. Alteration of temperature beyond present natural background levels unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses;

5.1.6. Changes in turbidity that cause nuisance or adversely affect beneficial uses, or increases from normal background light penetration or turbidity greater than 10 percent in areas where natural turbidity is greater than 50 nephelometric turbidity units, or above 55 nephelometric turbidity units in areas where natural turbidity is less than or equal to 50 nephelometric turbidity units;

5.1.7. Coloration that causes nuisance or adversely affects beneficial uses;

5.1.8. Visible, floating, suspended, or deposited oil or other products of petroleum origin; or

5.1.9. Toxic or other deleterious substances in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

5.2. The discharge shall not cause the following limits to be exceeded at any place in receiving waters within one foot of the water surface:

5.2.1.	Dissolved Oxygen	5.0 mg/L, minimum The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations
5.2.2.	Dissolved Sulfide	Natural background levels

5.2.3. pH — The pH shall not be depressed below 6.5 nor raised above 8.5. The discharge shall not cause changes greater than 0.5 pH units in normal ambient pH levels.

5.2.4. Nutrients — Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

5.3. The discharge shall not cause a violation of any water quality standard for receiving waters adopted by the Regional Water Board or State Water Resources Control Board (State Water Board) as required by the CWA and regulations adopted thereunder beyond any mixing zone established through this Order. If more stringent water quality standards are promulgated or approved pursuant to CWA section 303, or amendments thereto, the Regional Water Board may revise or modify this Order in accordance with the more stringent standards.

6. PROVISIONS

6.1. Standard Provisions

6.1.1. The Discharger shall comply with all “Standard Provisions” in Attachment D.

6.1.2. The Discharger shall comply with all applicable provisions of the “Regional Standard Provisions, and Monitoring and Reporting Requirements for NPDES Wastewater Discharge Permits” in Attachment G.

6.1.3. For discharges from Discharge Points 002 through 023, the Discharger shall comply with the applicable provisions of Attachment S (*Stormwater Provisions, Monitoring, and Reporting Requirements*).

6.1.4. If there is any conflict, duplication, or overlap between provisions in this Order, the more stringent provision shall apply.

6.2. Monitoring and Reporting Provisions

The Discharger shall comply with the Monitoring and Reporting Program (MRP, Attachment E) and future revisions thereto, and applicable monitoring and reporting requirements in Attachments D and G.

6.3. Special Provisions

6.3.1. **Reopener Provisions**

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law or as otherwise authorized by law. The Discharger may request a permit modification

based on any of these circumstances. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses as necessary.

6.3.1.1. If present or future investigations demonstrate that the discharges governed by this Order have or will have a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters;

6.3.1.2. If new or revised water quality objectives or total maximum daily loads (TMDLs) come into effect for San Francisco Bay or contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order may be modified as necessary to reflect the updated water quality objectives or wasteload allocations. Adoption of the effluent limitations in this Order does not restrict in any way future modifications based on legally-adopted water quality objectives or TMDLs or as otherwise permitted under federal regulations governing NPDES permit modifications;

6.3.1.3. If translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified;

6.3.1.4. If a State Water Board precedential decision, new policy, new law, or new regulation is adopted; or

6.3.1.5. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to this discharge.

6.3.2. **Effluent Characterization Study and Report**

6.3.2.1. **Study Elements.** The Discharger shall characterize and evaluate the discharge from Discharge Point 001 as required by the MRP to verify that the reasonable potential analysis conclusions of this Order remain valid and to inform the next permit reissuance. The Discharger shall evaluate on an annual basis if concentrations of any of the priority pollutants listed in Attachment G, Table B, significantly increase over past performance. The Discharger shall investigate the cause of any such increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. The Discharger shall establish remedial measures addressing any increase resulting in reasonable potential to cause or contribute to an exceedance of applicable water quality objectives. This requirement may be satisfied through identification of the constituent as a “pollutant of concern” in the Discharger’s Pollutant Minimization Program, described in Provision 6.3.3.

6.3.2.2. **Reporting Requirements**

6.3.2.2.1. **Routine Reporting.** The Discharger shall report the pollutants detected at or above applicable water quality objectives (see Fact Sheet Table F-5 for

the objectives) in the transmittal letter for the self-monitoring report associated with the month in which samples were collected. This requirement does not apply to pollutants with effluent limitations (see Table 2 of this Order).

6.3.2.2.2. **Annual Reporting.** The Discharger shall summarize the annual data evaluation and source investigation in the annual self-monitoring report.

6.3.3. **Pollutant Minimization Program**

6.3.3.1. The Discharger shall continue to improve its existing Pollutant Minimization Program to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

6.3.3.2. The Discharger shall submit an annual report no later than February 28 of each calendar year. Each annual report shall include at least the following information:

6.3.3.2.1. **Brief description of treatment plant.** The description shall include the treatment plant processes.

6.3.3.2.2. **Discussion of current pollutants of concern.** Periodically, the Discharger shall analyze its circumstances to determine which pollutants are currently a problem and which pollutants may be potential future problems. This discussion shall include the reasons for choosing the pollutants.

6.3.3.2.3. **Identification of sources for pollutants of concern.** This discussion shall include how the Discharger intends to estimate and identify pollutant sources. The Discharger shall include sources or potential sources not directly within the ability or authority of the Discharger to control, such as pollutants in the potable water supply and air deposition.

6.3.3.2.4. **Identification of tasks to reduce the sources of pollutants of concern.** This discussion shall identify and prioritize tasks to address the Discharger's pollutants of concern. The Discharger may implement the tasks by itself or participate in group, regional, or national tasks that address its pollutants of concern. The Discharger is strongly encouraged to participate in group, regional, or national tasks that address its pollutants of concern whenever it is efficient and appropriate to do so. An implementation timeline shall be included for each task.

6.3.3.2.5. **Outreach to employees.** The Discharger shall inform employees about the pollutants of concern, potential sources, and how they might be able to help reduce the discharge of these pollutants of concern into the Facility. The Discharger may provide a forum for employees to provide input.

6.3.3.2.6. **Discussion of criteria used to measure Pollutant Minimization Program and task effectiveness.** The Discharger shall establish criteria to evaluate the effectiveness of its Pollutant Minimization Program. This discussion shall identify the specific criteria used to measure the effectiveness of each task in Provisions 6.3.3.2.3, 6.3.3.2.4, 6.3.3.2.5, and 6.3.3.2.6.

6.3.3.2.7. **Documentation of efforts and progress.** This discussion shall detail all of the Discharger's Pollutant Minimization Program activities during the reporting year.

6.3.3.2.8. **Evaluation of Pollutant Minimization Program and task effectiveness.** The Discharger shall use the criteria established in Provision 6.3.3.2.7 to evaluate the program and task effectiveness.

6.3.3.2.9. **Identification of specific tasks and timelines for future efforts.** Based on the evaluation, the Discharger shall explain how it intends to continue or change its tasks to more effectively reduce the amount of pollutants flowing to the treatment plant, and subsequently in its effluent.

6.3.3.3. The Discharger shall develop and conduct a Pollutant Minimization Program as described below when there is evidence that a priority pollutant is present in the effluent above an effluent limitation (e.g., sample results reported as detected but not quantified [DNQ] when the effluent limitation is less than the method detection limit [MDL], sample results from analytical methods more sensitive than those methods required by this Order, presence of aquatic toxicity, health advisories for fish consumption, or results of benthic or aquatic organism tissue sampling) and either:

6.3.3.3.1. A sample result is reported as DNQ and the effluent limitation is less than the Reporting Level (RL); or

6.3.3.3.2. A sample result is reported as not detected (ND) and the effluent limitation is less than the MDL, using definitions described in Attachment A and reporting protocols described in the MRP.

6.3.3.4. If triggered for a reason set forth in Provision 6.3.3.3, above, the Discharger's Pollutant Minimization Program shall include, but not be limited to, the following actions and submittals:

6.3.3.4.1. An annual review and semi-annual monitoring of potential sources of the reportable priority pollutants, which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures when source monitoring is unlikely to produce useful analytical data;

6.3.3.4.2. Quarterly monitoring for the reportable priority pollutants in the influent to the wastewater treatment system. The Executive Officer may approve

alternative measures when influent monitoring is unlikely to produce useful analytical data;

6.3.3.4.3. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutants in the effluent at or below the effluent limitation;

6.3.3.4.4. Implementation of appropriate cost-effective control measures for the reportable priority pollutants, consistent with the control strategy; and

6.3.3.4.5. Inclusion of the following specific items within the annual report required by Provision 6.3.3.2, above:

6.3.3.4.5.1. All Pollutant Minimization Program monitoring results for the previous year;

6.3.3.4.5.2. List of potential sources of the reportable priority pollutants;

6.3.3.4.5.3. Summary of all actions undertaken pursuant to the control strategy; and

6.3.3.4.5.4. Description of actions to be taken in the following year.

6.3.4. **Other Special Provisions**

6.3.4.1. **Copper Action Plan.** The Discharger shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule:

Table 8. Copper Action Plan

Task No.	Task	Deadline
1	**Review Potential Copper Sources.** Submit an up-to-date inventory of potential copper sources.	With annual pollution minimization program report due February 28, 2024
2	**Implement Copper Control Program.** Continue to minimize copper sources, as identified in Discharger's Pollutant Prevention and Minimization Plan. Incorporate additional measures as appropriate to address newly identified potential copper sources.	Implementation shall be ongoing
3	**Implement Additional Actions.** If the Regional Water Board notifies the Discharger that the three-year rolling mean dissolved copper concentration in San Pablo Bay exceeds 3.0 µg/L, then within 90 days of the notification, evaluate the effluent copper concentration trend and, if it is increasing, develop and begin implementation of additional measures to control copper discharges. Report the conclusion of the trend analysis and provide a schedule for any new actions to be taken within the next 12 months.	With next annual pollution minimization program report due February 28 (at least 90 days following notification)
4	**Report Status.** Submit an annual report documenting copper control program implementation that evaluates the effectiveness of the actions taken, including any additional actions required by Task 2 above, and provides a schedule for actions to be taken within the next 12 months.	Annually, with annual pollution minimization program report due February 28 each year

6.3.4.2. **Cyanide Action Plan.** The Discharger shall implement monitoring and surveillance, pretreatment, source control, and pollution prevention for cyanide in accordance with the following tasks and time schedule:

Table 9. Cyanide Action Plan

Task No.	Task	Deadline
1	**Review Potential Cyanide Sources.** Submit an up-to-date inventory of potential cyanide sources.	With annual pollution minimization program report due February 28, 2024
2	**Implement Cyanide Control Program.** Continue to minimize cyanide sources, as identified in Discharger's Pollutant Prevention and Minimization Plan consisting, at a minimum, of the following elements: a. Inspect each potential source to assess the need to include that source in the control program. b. Maintain an emergency monitoring and response plan to be implemented if a significant cyanide discharge occurs.	Implementation shall be ongoing following Executive Officer notification under Task 1
3	**Implement Additional Measures.** If the Regional Water Board notifies the Discharger that ambient monitoring shows cyanide concentrations are 1.0 µg/L or higher in the main body of San Francisco Bay, then within 90 days of the notification, commence actions to identify and abate cyanide sources responsible for the elevated ambient concentrations, report on the progress and effectiveness of the actions taken, and provide a schedule for actions to be taken within the next 12 months.	With next annual pollution minimization program report due February 28 (at least 90 days following notification)
4	**Report Status of Cyanide Control Program.** Submit an annual report documenting cyanide control program implementation and addressing the effectiveness of actions taken, including any additional cyanide controls required by Task 3, above, and provide a schedule for actions to be taken within the next 12 months.	Annually, with annual pollution minimization program report due February 28 each year

6.3.4.3. **Stormwater Pollution Prevention Plan and Annual Report.** By October 1, 2024, the Discharger shall submit and implement an updated Stormwater Pollution Prevention Plan (SWPPP). The SWPPP shall contain the elements listed in Attachment S section 1.1.

The Discharger shall submit an annual stormwater report by July 30 of each year covering data for the previous wet weather season. The annual stormwater report shall, at a minimum, include the elements listed in Attachment S section 3.1 and the following:

6.3.4.3.1. A tabulated summary of all sampling results and visual observations for all stormwater discharge points; and

6.3.4.3.2. A comprehensive discussion of attainment of stormwater action levels (Attachment S, section 1.7), compliance with effluent limitations and other requirements of this Order, and any corrective actions taken or planned.

6.3.4.4. **Average Annual Selenium Load.** The Discharger shall report the average annual selenium load from Discharge Point 001 in its Annual Self Monitoring

Report. The average annual load shall be the arithmetic mean of the annual mass discharges for the previous permit term. Annual mass emissions shall be computed as follows:

Annual Mass emission rate (kg/day) = $(3.785/N) \sum Q_i C_i$

Where:

N = number of samples in a year
Q_i = flow rate (MGD) associated with the ith sample, valid until a new sample is collected
C_i = selenium concentration (mg/L) associated with the ith sample, valid until a new sample is collected

When calculating selenium loads, the Discharger shall use estimated values and assume data reported below the method detection limit equal half of the detection limit.

6.3.4.5. **Acceptance of Ballast Water.** Before accepting ballast water at its treatment plant, the Discharger shall obtain approval from the California State Lands Commission and notify the Regional Water Board of that approval.

6.3.4.6. **Construction and Development Requirements for Stormwater.** In areas where stormwater is not subject to physical treatment, the Discharger shall obtain coverage under *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (NPDES Permit CAS000002, currently State Waterboard Order 2022-0057-DWQ. For potential development in refinery areas that discharge to Discharge Point 020 (City of Richmond Pump Station), the Discharger shall also comply with the City of Richmond's specifications so that the City complies with Provisions C.3 and C.6 of the Municipal Regional Stormwater Permit (NPDES Permit CAS612008, currently Order R2-2022-0018).

These requirements do not apply to stormwater that drains to the Discharger's wastewater treatment plant or stormwater that is treated in earthen basins via physical settling.

6.3.4.7. **Wastewater Discharges from the Wetland.** The Discharger may discharge Wetland effluent directly to Discharge Point 001 (downstream of the granular activated carbon treatment filters) provided Wetland effluent discharges do not exceed a daily maximum of 3.0 MGD and Wetland effluent does not cause acute toxicity.

To demonstrate that Wetland effluent does not cause acute toxicity, the Discharger shall conduct at least two consecutive weekly flow-through bioassays with at least 80 percent survival. Acute toxicity testing shall be conducted in accordance with MRP section 5.1. If Wetland toxicity tests show less than 80 percent survival, the Discharger shall route Wetland effluent

through granular activated carbon treatment units before discharge at Discharge Point 001. The Discharger may resume discharging Wetland effluent directly to Discharge Point 001 after at least two consecutive toxicity tests, started at least five days apart, demonstrate at least 80 percent survival. When discharging Wetland effluent directly to Discharge Point 001, the Discharger shall report the daily flow of this treated wastewater and the results of acute toxicity testing in self-monitoring reports.

6.3.4.8. **Richmond Advanced Recycled Expansion (RARE) Enhancement Project.** If the Discharger completes construction of the RARE Enhancement Project (as described in Fact Sheet section 2.6.), it shall notify the Regional Water Board prior to commencing recycled water operations. The notification shall specify the anticipated date the operations will commence, describe the project as constructed, and include documentation that "reject water" (concentrate) from the reverse osmosis process will completely mix with treated wastewater prior to Monitoring Location EFF-001. Within 120 days of commencing the RARE Enhancement Project, the Discharger shall submit a technical report that includes the following:

6.3.4.8.1. Volume of reverse osmosis concentrate relative to treated wastewater for worst-case conditions;

6.3.4.8.2. Acute and chronic toxicity test results that use worst-case conditions (maximum reverse osmosis concentrate to treated wastewater ratio);

6.3.4.8.3. A mixing zone modeling study that demonstrates the discharge will receive the initial dilution required by Discharge Prohibition 3.2. The study shall use an EPA-approved model, such as Visual PLUMES or CORMIX, and estimate the initial dilution of the discharge at the outfall under worst-case conditions;

6.3.4.8.4. Reverse osmosis concentrate concentrations for pollutants listed in Regional Standard Provisions (Attachment G) Table B;

6.3.4.8.5. Analysis of whether pollutant concentrations will trigger reasonable potential under worst-case conditions for the water quality objectives listed in Fact Sheet Table F-7;

6.3.4.8.6. Documentation that the Discharger will comply with all effluent limits (including acute and chronic toxicity) under worst-case conditions;

6.3.4.8.7. Documentation that the Discharger will conduct a species sensitivity screening, as required by Monitoring and Reporting Program (Attachment E) section 2.1.3.; and

6.3.4.8.8. If new pollutants trigger reasonable potential or if the Discharger determines it may not comply with effluent limits, a list of corrective actions it shall implement to ensure compliance with this Order.

6.3.4.9. **Conditions for Recycled Water Use Adjustment for RARE Enhancement Project.** Prior to any allocation of recycled water use adjustments to mass-based or concentration-based effluent limitations (see Table 2) for the RARE Enhancement Project (as described in Fact Sheet section 2.6), the Discharger shall satisfy all of the following conditions:

6.3.4.9.1. The Discharger shall sample and analyze influent recycled water for any constituents for which it seeks adjustments at Monitoring Location INF-001 at least as frequently as the MRP requires for effluent monitoring at Monitoring Location EFF-001.

6.3.4.9.2. The Discharger shall sample and analyze influent raw water for any constituents for which it seeks adjustments at Monitoring Location INF-002 at least once per year. The annual average concentration may be used in the calculations described in section 4.1.7 of this Order.

6.3.4.9.3. The Discharger shall determine the interval between the introduction of a limited constituent in recycled water and the appearance of that constituent in the final effluent.

6.3.4.9.4. The Discharger shall submit a technical report demonstrating that the proposed adjustments will not impair beneficial uses in the vicinity of the discharge (such as by creating a zone acutely toxic to aquatic organisms). At a minimum, the report shall assess toxicity testing results and compare the effluent concentrations projected when using recycled water to the proposed adjusted effluent limitations.

6.3.4.9.5. The Discharger shall submit one or more examples of how influent recycled and raw water concentrations, lag time, and effluent limitation adjustments will be calculated in accordance with section 4.1.5 of this Order.

6.3.4.9.6. The Discharger shall obtain written concurrence from the Executive Officer stating that these conditions have been met.

ATTACHMENT A – DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Alternative Hypothesis
Statement used to propose a statistically significant relationship in a set of given observations. Under the TST approach, when the Null Hypothesis is rejected, the Alternative Hypothesis is accepted in its place, indicating a relationship between variables and an acceptable level of toxicity.

Arithmetic Mean (.)
Also called the average, sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$

where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples

Average Monthly Effluent Limitation (AMEL)
Highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
Highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Taken up by an organism from its surrounding medium through gill membranes, through epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Calendar Month(s)
Period from the first day of a month through the last day of a month (e.g., January 1 to January 31). For toxicity monitoring, the period is from the first day of a routine monitoring test to the day before the corresponding day of the next month (e.g., from June 15 to July 14), or to the last day of the next month if there is no corresponding day (e.g., January 31 to February 28).

Carcinogenic
Known to cause cancer in living organisms.

Coefficient of Variation (CV)
Measure of data variability calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Either: (1) the total mass of a constituent discharged over a calendar day (12:00 a.m. through 11:59 p.m.) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit) for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of a constituent over a day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period is considered the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ)
Sample results less than the RL, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dilution Credit
Amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effective Concentration (EC)
The EC is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC25 is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

Effluent Concentration Allowance (ECA)
Value derived from the water quality criterion or objective, dilution credit, and ambient background concentration that is used, in conjunction with the CV for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as wasteload allocation (WLA) as used in U.S. EPA guidance (*Technical Support Document for Water Quality-based Toxics Control*, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest

distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
Concentration that results from the confirmed detection of a substance below the ML by the analytical method.

Estuaries
Waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220; Suisun Bay; Carquinez Strait downstream to the Carquinez Bridge; and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inhibition Concentration (IC)
The IC is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC25 is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as U.S. EPA's Bootstrap Procedure.

Inland Surface Waters
All surface waters of the state that are not the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
Highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
Lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Instream Waste Concentration (IWC)
Concentration of effluent in the receiving water after any dilution credit is applied. The IWC is the inverse of 1 plus the dilution credit, D, or IWC = 1/(1+D), expressed as a percentage (e.g., if D = 9, the IWC is 10 percent). If no dilution credit is granted, the IWC is 100 percent.

Maximum Daily Effluent Limitation (MDEL)
Highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour

period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For toxicity, the MDEL is based on the outcome of the TST and the percent effect at the IWC (applied to the results of any single bioassay). For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Maximum Daily Effluent Target (MDET)
Target based on a single independent toxicity test using the TST used to determine whether a TRE should be conducted. Not meeting the MDET is not a violation of an effluent limitation. The MDET only applies to discharges with no numeric toxicity limits.

Median
Middle measurement in a data set. The median of a data set is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2+1)})/2$ (i.e., the midpoint between n/2 and n/2+1).

Median Monthly Effluent Limitation (MMEL)
Highest allowable median of daily discharges over a calendar month, calculated as the median of all daily discharges measured during a calendar month. For aquatic toxicity, the MMEL is an effluent limitation based on a maximum of three independent toxicity tests analyzed using the TST during a calendar month.

Median Monthly Effluent Target (MMET)
Target based on a maximum of three independent toxicity tests using the TST during a calendar month used to determine whether a TRE should be conducted. Not meeting a MMET is not a violation of an effluent limitation. The MMET only applies to discharges with no numeric toxicity limits or to testing with *Ceriodaphnia dubia* prior to January 1, 2024.

Method Detection Limit (MDL)
Minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 C.F.R. part 136, Appendix B.

Minimum Level (ML)
Concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Limited volume of receiving water allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

MMEL Compliance Test
For chronic toxicity monitoring, one of up to two tests used in addition to a routine monitoring test to determine compliance with the chronic toxicity MMEL and MDEL.

MMET Test
For chronic toxicity monitoring, one of up to two tests used in addition to a routine monitoring test to evaluate if the discharge meets the chronic toxicity MMET and MDET.

No Observed Effect Concentration (NOEC).
The NOEC is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

No Observed Effect level (NOEL).
For compliance determination, the NOEL is equal to IC25 or EC25. If the IC25 or EC25 cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Null Hypothesis
Statement used in statistical testing that has been put forward either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved.

Percent Effect
Value that denotes the difference in response between a test concentration and a control, divided by the mean control response and multiplied by 100.

Persistent Pollutants
Substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program
Program of waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of a Pollutant Minimization Program is to reduce all potential sources of a priority pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. Cost effectiveness may be considered when establishing the requirements of a Pollutant Minimization Program. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), is considered to fulfill the Pollutant Minimization Program requirements.

Pollution Prevention
Any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State Water Resources Control Board or Regional Water Board.

Regulatory Management Decision (RMD)
Decision that represents the maximum allowable error rates and thresholds for toxicity and non-toxicity that would result in an acceptable risk to aquatic life.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. For priority pollutants, the MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from State Implementation Plan (SIP) Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Response
Measured biological effect (e.g., on survival, reproduction, growth) of exposure to a stimulus.

Routine Monitoring
Regular chronic toxicity monitoring required during the permit term. Routine monitoring results may trigger MMEL compliance tests. If a violation of the MDEL or MMEL occurs, Routine monitoring also includes one sample collected during the following month (regardless of the regular monitoring frequency), which is used to determine if a TRE is necessary. Routine monitoring does not include surveillance monitoring.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) beneficial use.

Standard Deviation (σ)
Measure of variability calculated as follows:

$$\text{Standard deviation} = \sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$$

where: x is the observed value
μ is the arithmetic mean of the observed values
n is the number of samples

Surveillance Monitoring
Chronic toxicity monitoring performed using the most sensitive species at an effluent concentration at least double the IWC. Surveillance monitoring results are not for assessing compliance with the chronic toxicity MMEL or MDEL.

Test of Significant Toxicity (TST)
Statistical approach used to analyze aquatic toxicity test data, as described in section III.B.3 of *State Water Board's State Policy for Water Quality Control: Toxicity Provisions*.

Toxicity Reduction Evaluation (TRE)
Study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. A TIE is a set of procedures to identify the specific chemicals responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

ABBREVIATIONS

°F	degrees Fahrenheit
°C	degrees Celsius
%	Percent
μg/L	Micrograms per liter
1/Blending Event	Once per blending event
1/Discharge	Once per discharge
1/Day	Once per day
1/Month	Once per month
1/Quarter	Once per quarter
1/Week	Once per week
1/Year	Once per year
2/Month	Two times per month
2/Week	Twice per week
2/Year	Twice per year

3/Week	Three times per week
4/Week	Four times per week
5/Week	Five times per week
AMEL	Average monthly effluent limitation
AWEL	Average weekly effluent limitation
B	Background concentration
bpd	Barrels per day
C	Water quality criterion or objective
C-24	24-hour composite
CFU/100 mL	Colony forming units per 100 milliliters
CIWQS	California Integrated Water Quality System
Continuous	Measured continuously
Continuous/D	Measured continuously, and recorded and reported daily
Continuous/H	Measured continuously, and recorded and reported hourly
CTR	California Toxics Rule
CV	Coefficient of Variation
DMR	Discharge Monitoring Report
DNQ	Detected, but not quantified
DL	Detection level
ECA	Effluent Concentration Allowance
gpm	Gallons per minute
Grab	Grab sample
IWC	Instream Waste Concentration
MDEL	Maximum Daily Effluent Limitation
MDET	Maximum Daily Effluent Target
MDL	Method detection limit
MEC	Maximum effluent concentration
MG	Million gallons
mg/L	Milligrams per liter
mg/L as N	Milligrams per liter as nitrogen
MGD	Million gallons per day
ML	Minimum level
MMEL	Median Monthly Effluent Limitation

MMET	Median Monthly Effluent Target
MPN/100 mL	Most probable number per 100 milliliters
MRP	Monitoring and Reporting Program (Attachment E)
ND	Not detected
NTR	National Toxics Rule
NTU	Nephelometric turbidity units
ppt	Parts per thousand
RL	Reporting level
RPA	Reasonable potential analysis
SIP	*Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy)
SMR	Self-Monitoring Report
s.u.	Standard pH units
TIE	Toxicity identification evaluation
TRE	Toxicity reduction evaluation
TST	Test of Significant Toxicity
WDRs	Waste discharge requirements
WQBEL	Water quality-based effluent limitation

ATTACHMENT B – MAPS

Figure B-1. Satellite Image of Facility

Figure B-2. Facility Map

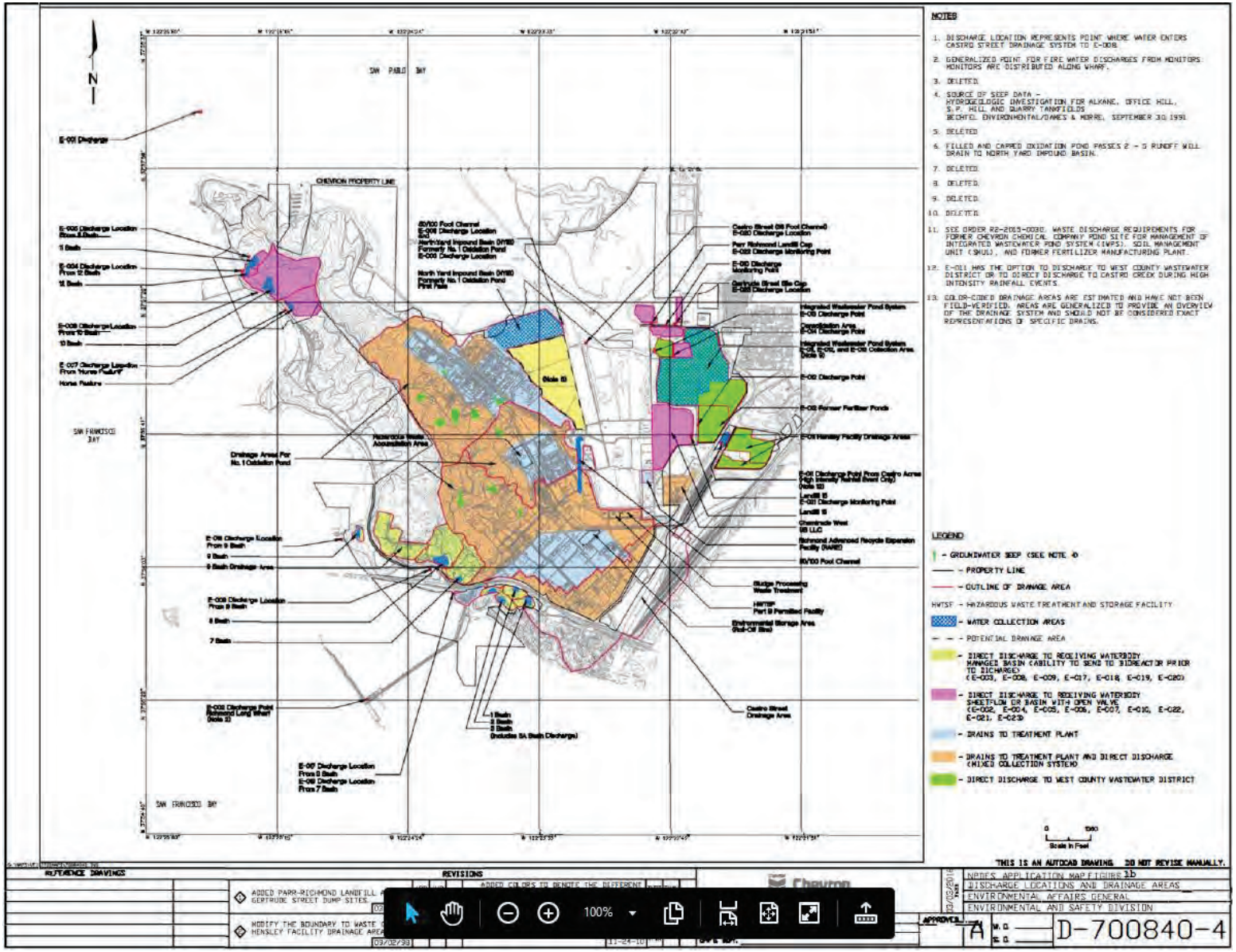

10857
10898

ATTACHMENT C – FLOW SCHEMATICS

Figure C-1. Wastewater Treatment Flow Diagram

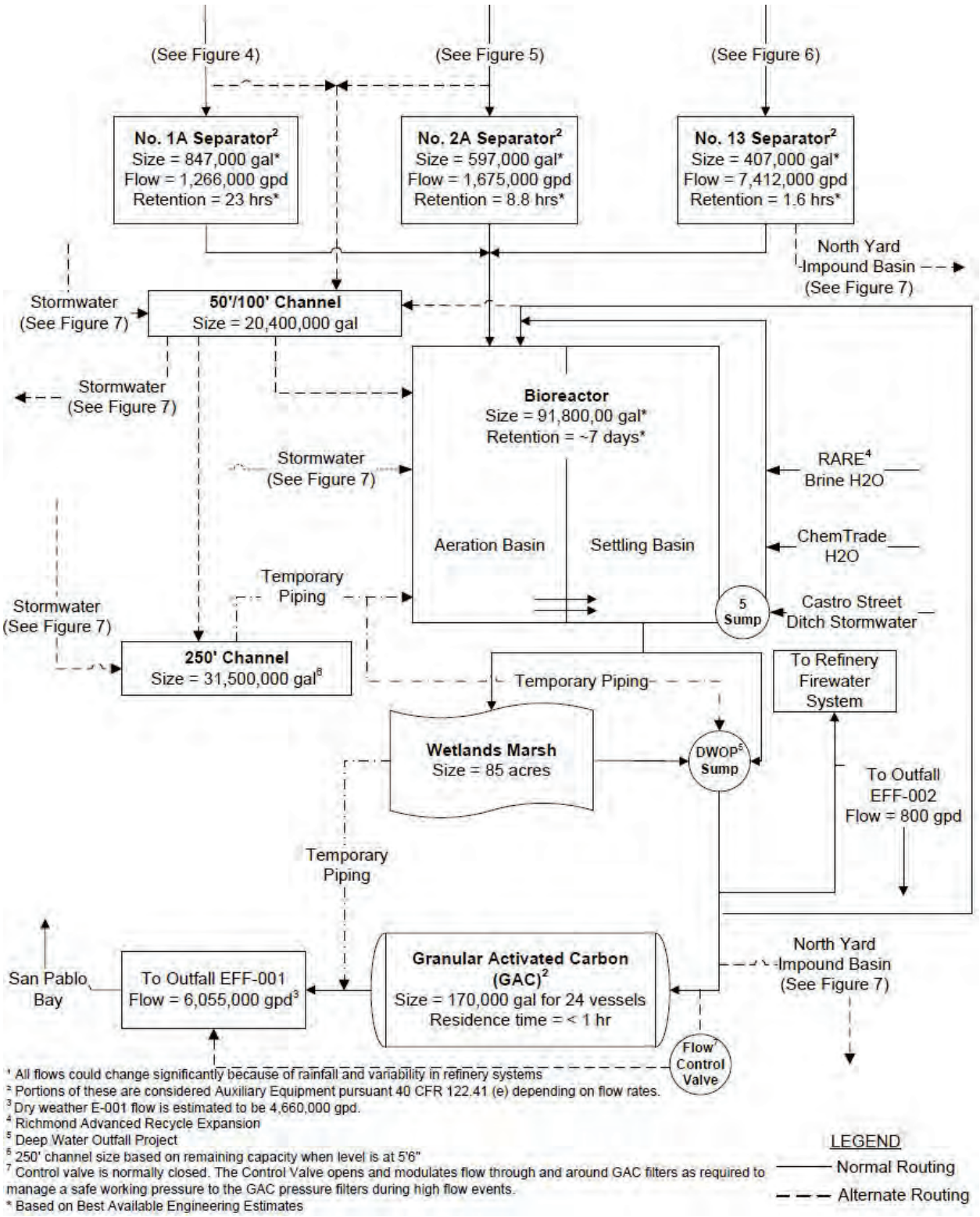

[1] All flows could change significantly because of rainfall and variability in refinery systems
[2] Portions of these are considered Auxiliary Equipment pursuant 40 CFR 122.41 (e) depending on flow rates.
[3] Dry weather E-001 flow is estimated to be 4,660,000 gpd.
[4] Richmond Advanced Recycle Expansion
[5] Deep Water Outfall Project
[6] 250' channel size based on remaining capacity when level is at 5'6"
[7] Control valve is normally closed. The Control Valve opens and modulates flow through and around GAC filters as required to manage a safe working pressure to the GAC pressure filters during high flow events.
* Based on Best Available Engineering Estimates

Figure C-2. Refinery Overall Water Balance

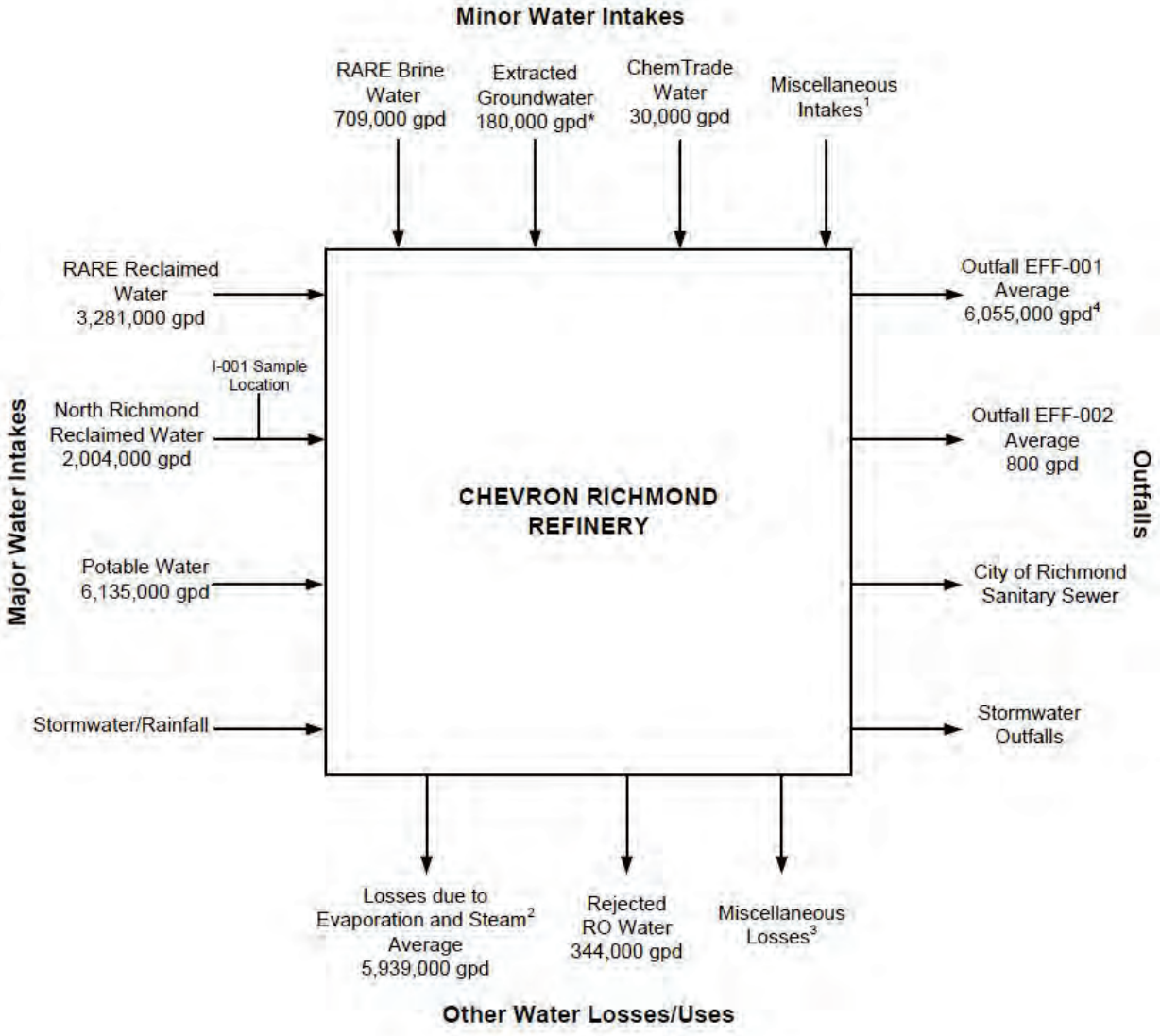

[1] Miscellaneous Intakes include but are not limited to water present in crude oil, ballast water, and water from the Chevron Marketing Terminal, Technology Center, and Pipeline.
[2] Evaporation includes but is not limited to water lost from Cooling Towers and the Effluent Treatment System.
[3] Miscellaneous Losses include but are not limited to water used for irrigation, domestic use, production of products or intermediates, and firewater.
[4] Dry weather EFF-001 flow is estimated to be 4,660,000 gpd.
* Flow Data is based on Best Available Engineering Estimates.

Figure C-3. Refinery Process Area Stormwater Flow Diagram

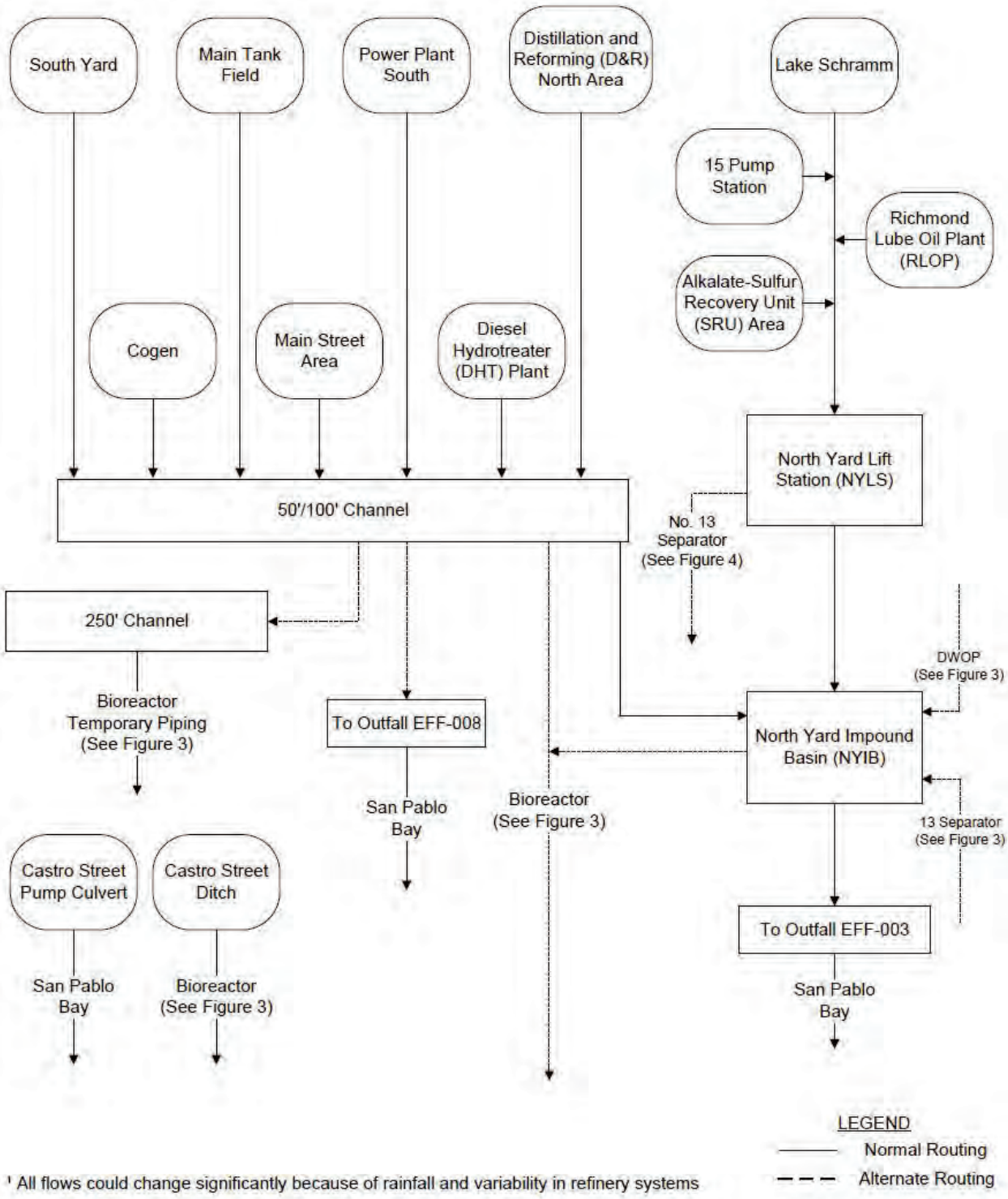

[1] All flows could change significantly because of rainfall and variability in refinery systems

Figure C-4: 1A Oil/Water Separator Flow Diagram

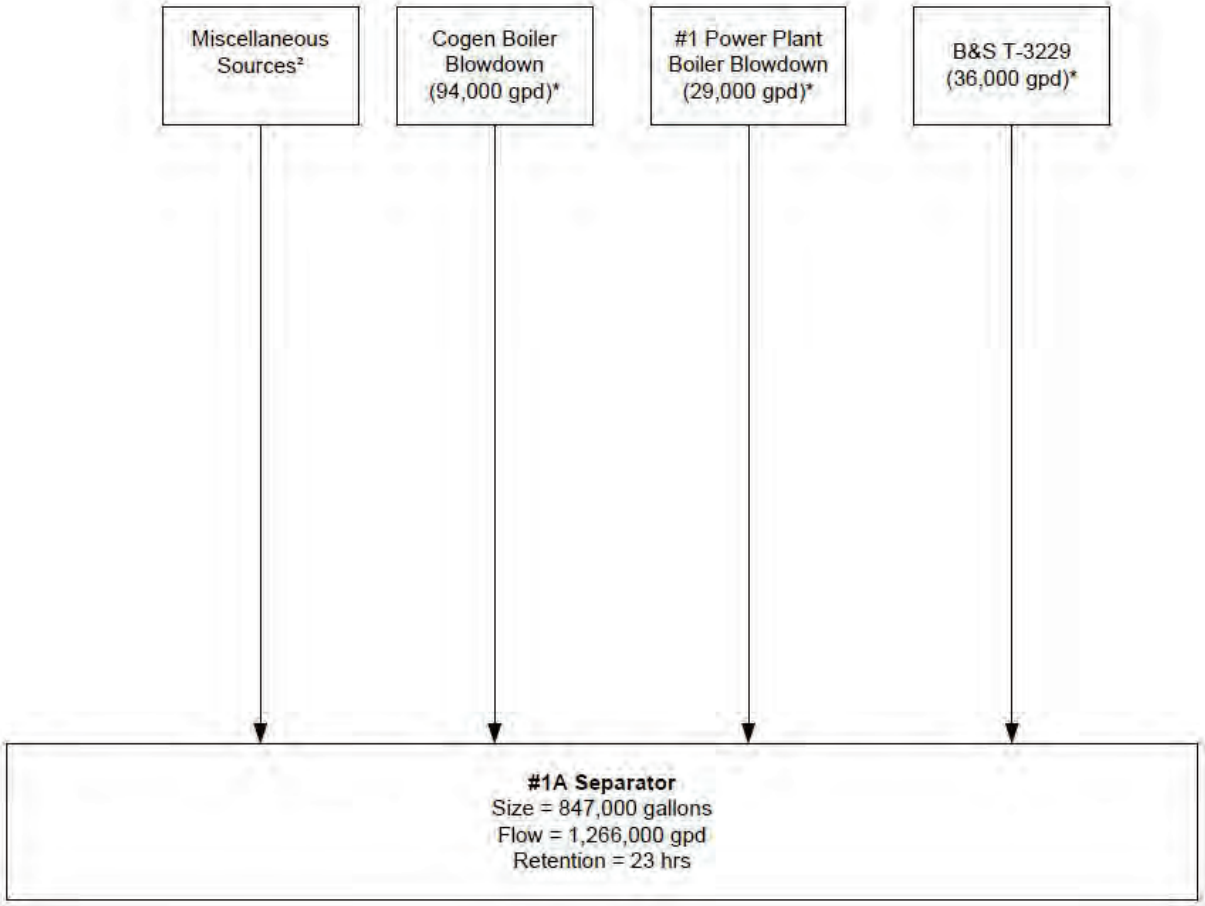

[1] All flows could change significantly because of rainfall and variability in refinery systems.
[2] Miscellaneous Sources include wastewater and storm water from off-site Chevron facilities, plant washdowns, drain temperature control, equipment cleaning and hydrotesting, lab waste water, fire systems testing and training, storm water from construction sites including those one acre or more, etc.
* Flow based on Best Available Engineering Estimates

Figure C-5: 2A Oil/Water Separator Flow Diagram

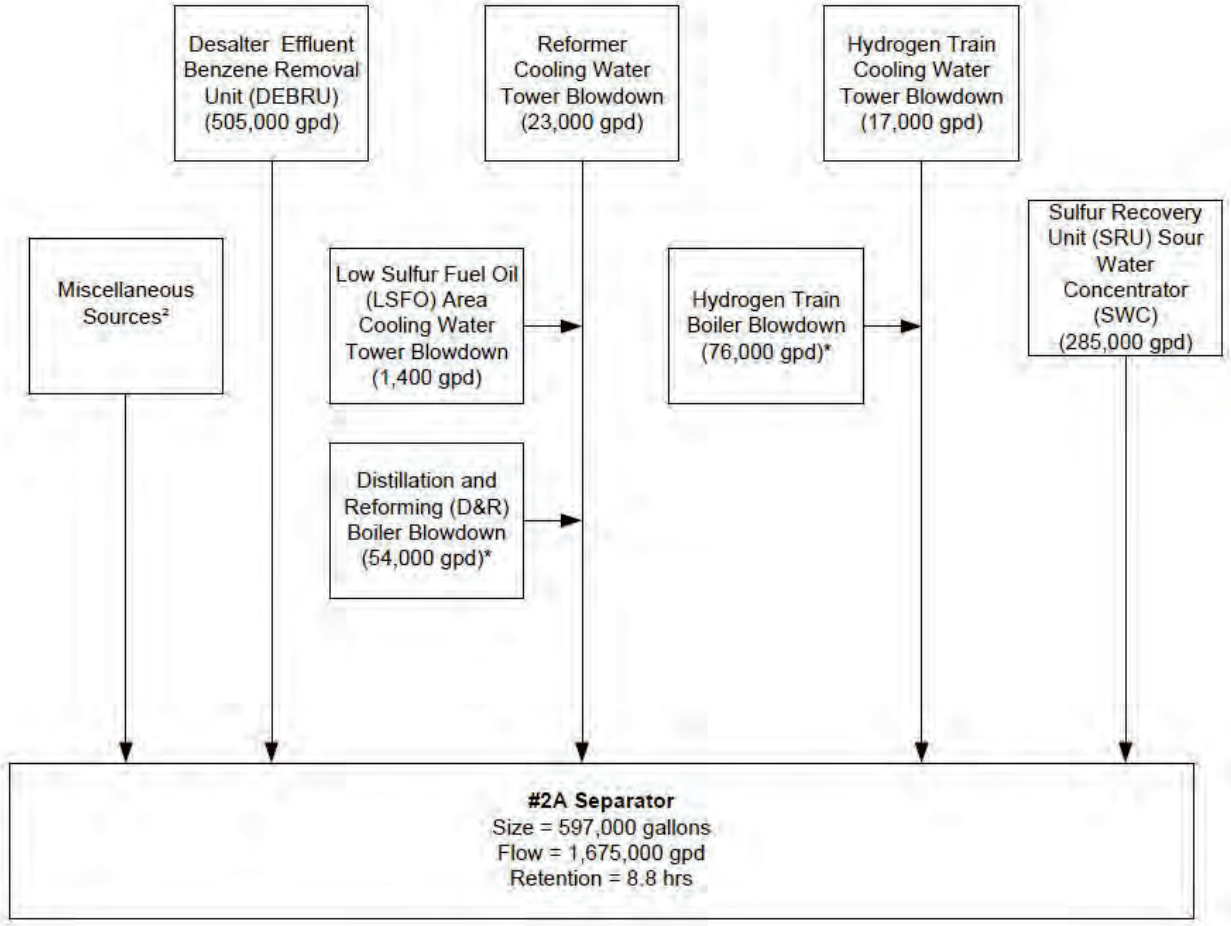

¹ All flows could change significantly because of rainfall and variability in refinery systems.
² Miscellaneous Sources include wastewater and storm water from off-site Chevron facilities, plant washdowns, drain temperature control, equipment cleaning and hydrotesting, lab waste water, fire systems testing and training, storm water from construction sites including those one acre or more, etc.
* Flow based on Best Available Engineering Estimates

Figure C-6: 13 Oil/Water Separator Flow Diagram

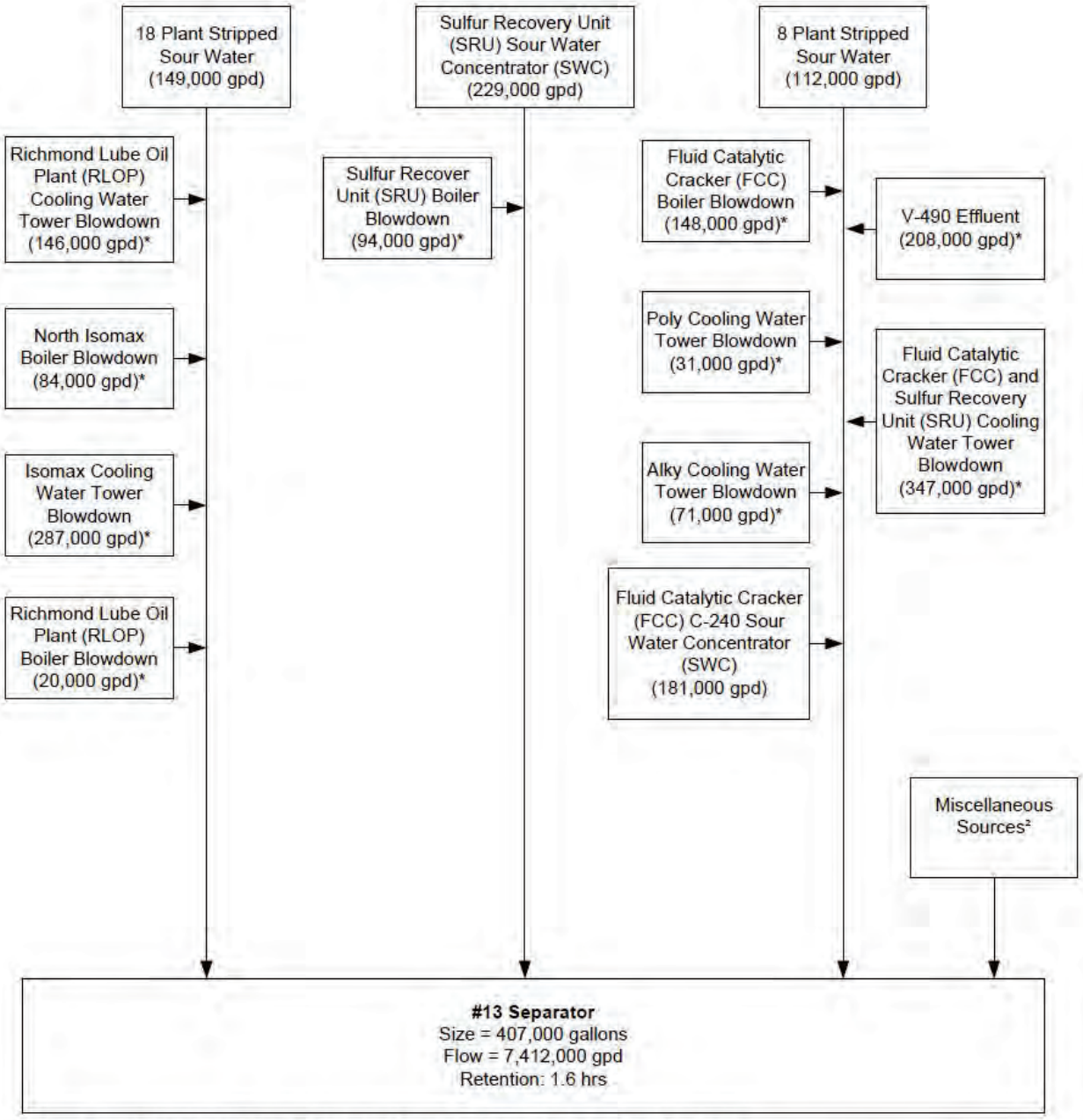

¹ All flows could change significantly because of rainfall and variability in refinery systems.
² Miscellaneous Sources include wastewater and storm water from off-site Chevron facilities, plant washdowns, drain temperature control, equipment cleaning and hydrotesting, lab waste water, fire systems testing and training, storm water from construction sites including those one acre or more, etc.
* Flow based on Best Available Engineering Estimates

Figure C-7: Proposed Treatment Flow Diagram incorporating RARE Enhancement Project

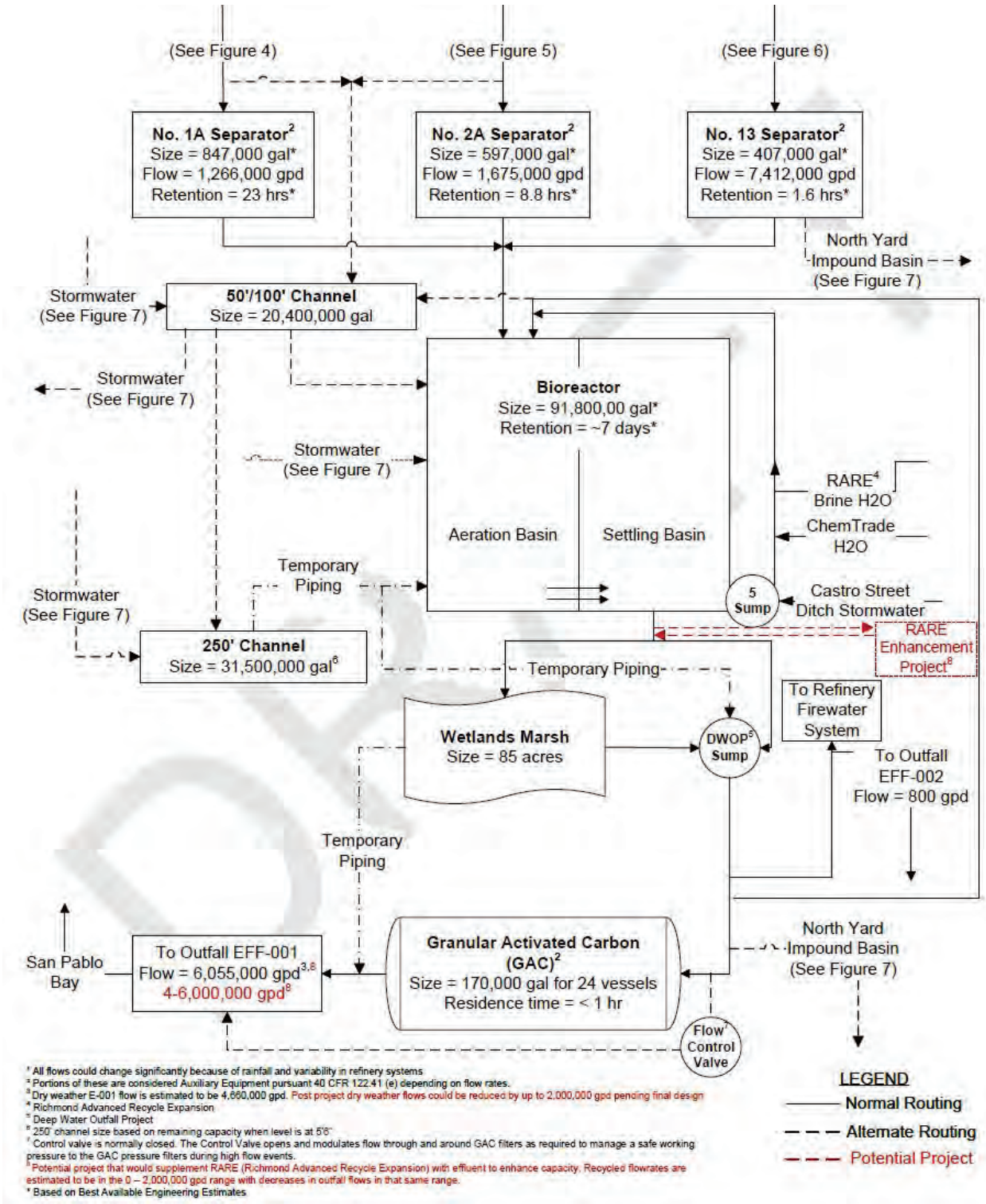

[1] All flows could change significantly because of rainfall and variability in refinery systems
[2] Portions of these are considered Auxiliary Equipment pursuant 40 CFR 122.41 (e) depending on flow rates.
[3] Dry weather E-001 flow is estimated to be 4,660,000 gpd. Post project dry weather flows could be reduced by up to 2,000,000 gpd pending final design
[4] Richmond Advanced Recycle Expansion
[5] Deep Water Outfall Project
[6] 250' channel size based on remaining capacity when level is at 5'6"
[7] Control valve is normally closed. The Control Valve opens and modulates flow through and around GAC filters as required to manage a safe working pressure to the GAC pressure filters during high flow events.
[8] Potential project that would supplement RARE (Richmond Advanced Recycle Expansion) with effluent to enhance capacity. Recycled flowrates are estimated to be in the 0 – 2,000,000 gpd range with decreases in outfall flows in that same range.
* Based on Best Available Engineering Estimates

ATTACHMENT D – STANDARD PROVISIONS

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ATTACHMENT D – STANDARD PROVISIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

1.1. Duty to Comply

1.1.1. The Discharger must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); Wat. Code, §§ 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, 13385.)

1.1.2. The Discharger shall comply with effluent standards or prohibitions established under CWA section 307(a) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

1.2. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

1.3. Duty to Mitigate. The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

1.4. Proper Operation and Maintenance. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

1.5. Property Rights

1.5.1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

1.5.2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

1.6. Inspection and Entry. The Discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); Wat. Code, §§ 13267, 13383):

1.6.1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); Wat. Code, §§ 13267, 13383);

1.6.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); Wat. Code, §§ 13267, 13383);

1.6.3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); Wat. Code, §§ 13267, 13383); and

1.6.4. Sample or monitor, at reasonable times, for the purposes of ensuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); Wat. Code, §§ 13267, 13383.)

1.7. Bypass

1.7.1. **Definitions**

1.7.1.1. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

1.7.1.2. “Severe property damage” means substantial physical damage to property; damage to the treatment facilities, which causes them to become inoperable; or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

1.7.2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur that does not cause exceedances of effluent limitations, but only if it is for essential maintenance to ensure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance sections 1.7.3, 1.7.4, and 1.7.5 below. (40 C.F.R. § 122.41(m)(2).)

1.7.3. **Prohibition of bypass.** Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

1.7.3.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

1.7.3.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

1.7.3.3. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance section 1.7.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

1.7.4. **Approval.** The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance section 1.7.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

1.7.5. **Notice**

1.7.5.1. **Anticipated bypass.** If the Discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the date of the bypass. The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(i).)

1.7.5.2. **Unanticipated bypass.** The Discharger shall submit a notice of an unanticipated bypass as required in Standard Provisions – Reporting section 5.5 below (24-hour notice). The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

1.8. Upset. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1.8.1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance section 1.8.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

1.8.2. **Conditions necessary for a demonstration of upset.** A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

1.8.2.1. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

1.8.2.2. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

1.8.2.3. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting section 5.5.2.2 below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

1.8.2.4. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance section 1.3 above. (40 C.F.R. § 122.41(n)(3)(iv).)

1.8.3. **Burden of proof.** In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

2. STANDARD PROVISIONS – PERMIT ACTION

2.1. General. This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

2.2. Duty to Reapply. If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

2.3. Transfers. This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)g

3. STANDARD PROVISIONS – MONITORING

3.1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

3.2. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or as required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

3.2.1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, and either the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

3.2.2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N, for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under 40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapter N, monitoring must be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3), 122.41(j)(4), 122.44(i)(1)(iv).)

4. STANDARD PROVISIONS – RECORDS

4.1. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

4.2. Records of monitoring information shall include:

4.2.1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

4.2.2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

4.2.3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4.2.4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

4.2.5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

4.2.6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

4.3. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

4.3.1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

4.3.2. Permit applications and attachments, permits, and effluent data. (40 C.F.R. § 122.7(b)(2).)

5. STANDARD PROVISIONS – REPORTING

5.1. Duty to Provide Information. The Discharger shall furnish to the Regional Water Board, State Water Board, or U.S. EPA within a reasonable time, any information that the Regional Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, §§ 13267, 13383.)

5.2. Signatory and Certification Requirements

5.2.1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions – Reporting sections 5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.6 below. (40 C.F.R. § 122.41(k).)

5.2.2. For a corporation, all permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to ensure long term environmental

compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 C.F.R. § 122.22(a)(1).)

For a partnership or sole proprietorship, all permit applications shall be signed by a general partner or the proprietor, respectively. (40 C.F.R. § 122.22(a)(2).)

For a municipal, state, federal, or other public agency, all permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3).).

5.2.3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting section 5.2.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

5.2.3.1. The authorization is made in writing by a person described in Standard Provisions – Reporting section 5.2.2 above (40 C.F.R. § 122.22(b)(1));

5.2.3.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

5.2.3.3. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

5.2.4. If an authorization under Standard Provisions – Reporting section 5.2.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting section 5.2.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5.2.5. Any person signing a document under Standard Provisions – Reporting section 5.2.2 or 5.2.3 above shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

5.2.6. Any person providing the electronic signature for documents described in Standard Provisions – Reporting sections 5.2.1, 5.2.2, or 5.2.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting section 5.2, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R § 122.22(e).)

5.3. Monitoring Reports

5.3.1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.41(l)(4).)

5.3.2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board. All reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 and comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(l)(4)(i).)

5.3.3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. chapter 1, subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Regional Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

5.3.4. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

5.4. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

5.5. Twenty-Four Hour Reporting

5.5.1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 21, 2025, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted to the Regional Water Board and must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

5.5.2. The following shall be included as information that must be reported within 24 hours:

5.5.2.1. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

5.5.2.2. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.5.3. The Regional Water Board may waive the above required written report on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.6. Planned Changes. The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

5.6.1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 C.F.R. section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

5.6.2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order unless the discharge is an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a). (40 C.F.R. § 122.41(l)(1)(ii).) If the discharge is an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a), this notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under 40 C.F.R. section 122.42(a)(1) (see Additional Provisions – Notification Levels section 7.1.1). (40 C.F.R. § 122.41(l)(1)(ii).)

5.7. Anticipated Noncompliance. The Discharger shall give advance notice to the Regional Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

5.8. Other Noncompliance. The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting sections 5.3, 5.4, and 5.5 above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting section 5.5 above. For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting section 5.5 and the applicable required data in appendix A to 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(7).)

5.9. Other Information. When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or U.S. EPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

5.10. Initial Recipient for Electronic Reporting Data. The owner, operator, or duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient defined in 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. section 127.2(c)]. U.S. EPA will update and maintain this list. (40 C.F.R. § 122.41(l)(9).)

6. STANDARD PROVISIONS – ENFORCEMENT

6.1. The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, Water Code sections 13268, 13385, 13386, and 13387.

7. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

7.1. Non-Municipal Facilities. Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 C.F.R. § 122.42(a)):

7.1.1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels” (40 C.F.R. § 122.42(a)(1)):

7.1.1.1. 100 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(1)(i));

7.1.1.2. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4 dinitrophenol and 2-methyl 4,6 dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(1)(ii));

7.1.1.3. Five (5) times the maximum concentration reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(1)(iii)); or

7.1.1.4. The level established by the Regional Water Board in accordance with 40 C.F.R. section 122.44(f). (40 C.F.R. § 122.42(a)(1)(iv).)

7.1.2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 C.F.R. § 122.42(a)(2)):

7.1.2.1. 500 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(2)(i));

7.1.2.2. 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(2)(ii));

7.1.2.3. Ten (10) times the maximum concentration reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(2)(iii)); or

7.1.2.4. The level established by the Regional Water Board in accordance with 40 C.F.R. section 122.44(f). (40 C.F.R. § 122.42(a)(2)(iv).)

7.2 Publicly Owned Treatment Works (POTWs)

7.2.1. All POTWs shall provide adequate notice to the Regional Water Board of any new introduction of pollutants into the POTW from an indirect discharger that

would be subject to CWA sections 301 or 306 if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)).

7.2.2. All POTWs shall provide adequate notice to the Regional Water Board of any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of this Order. (40 C.F.R. § 122.42(b)(2).)

7.2.3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Clean Water Act (CWA) section 308 and 40 C.F.R. sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. This Monitoring and Reporting Program (MRP) establishes monitoring, reporting, and recordkeeping requirements that implement the federal and State laws and regulations.

1. GENERAL MONITORING PROVISIONS

1.1. The Discharger shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 C.F.R. section 122.63. If any discrepancies exist between this MRP and the "Regional Standard Provisions, and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits" (Attachment G), this MRP shall prevail.

1.2. The Discharger shall conduct all monitoring in accordance with Attachment D section 3, as supplemented by Attachment G. Equivalent test methods must be more sensitive than those specified in 40 C.F.R. section 136 and must be specified in this permit.

1.3. For the analysis of monitoring samples, the Discharger shall use laboratories certified by the State Water Resources Control Board (State Water Board) in accordance with Water Code section 13176 and shall obtain quality assurance/quality control data with laboratory reports. For any onsite field tests (e.g., turbidity, pH, temperature, dissolved oxygen, conductivity, disinfectant residual) analyzed by a noncertified laboratory, the Discharger shall implement a Quality Assurance-Quality Control Program. The Discharger shall keep a manual onsite containing the steps followed in this program and shall demonstrate sufficient capability to adequately perform these field tests (e.g., qualified and trained employees, properly calibrated and maintained field instruments). The program shall conform to U.S. EPA guidelines or other approved procedures.

1.4. The Discharger shall ensure that the results of the Discharge Monitoring Report-Quality Assurance (DMR-QA) Study or most recent Water Pollution Performance Evaluation Study are submitted annually to the State Board at the following address:

State Water Resources Control Board
Quality Assurance Program Officer
Office of Information Management and Analysis
1001 I Street
Sacramento, CA 95814

2. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements of this Order:

Table E-1. Monitoring Locations

Discharge Point	Monitoring Location	Monitoring Location Description
Recycled Water	INF-001	Any point in pipe that delivers only recycled water to the Facility but upstream of any wastewater treatment unit, blending point, or point of use.
Raw Water	INF-002	Any point that is representative of raw water delivered to the Facility.
Treated Process Wastewater	EFF-001	Any point in the discharge line from the deepwater discharge pump sump such that samples are representative of treated wastewater discharged at Discharge Point 001.
Richmond Long Wharf (fire protection system)	EFF-002	Any point where representative samples of stormwater and authorized non-stormwater discharges for the drainage area for Discharge Point 002 can be obtained prior to discharge.
Stormwater	EFF-003	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 003 can be obtained prior to discharge.
Stormwater	EFF-004	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 004 can be obtained prior to discharge.
Stormwater	EFF-005	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 005 can be obtained prior to discharge.
Stormwater	EFF-006	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 006 can be obtained prior to discharge.
Stormwater	EFF-007	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 007 can be obtained prior to discharge.
Stormwater	EFF-008	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 008 can be obtained prior to discharge.
Stormwater	EFF-009	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 009 can be obtained prior to discharge.
Stormwater	EFF-010	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 010 can be obtained prior to discharge.
Stormwater	EFF-011	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 011 can be obtained prior to discharge.
Stormwater	EFF-014	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 014 can be obtained prior to discharge.

Discharge Point	Monitoring Location	Monitoring Location Description
Stormwater	EFF-017	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 017 can be obtained prior to discharge.
Stormwater	EFF-018	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 018 can be obtained prior to discharge.
Stormwater	EFF-019	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 019 can be obtained prior to discharge.
Stormwater	EFF-020	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 020 can be obtained prior to discharge.
Stormwater	EFF-021	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 021 can be obtained prior to discharge.
Stormwater	EFF-022	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 022 can be obtained prior to discharge.
Stormwater	EFF-023	Any point where representative samples of the stormwater discharge for the drainage area for Discharge Point 023 can be obtained prior to discharge.
Receiving Water	RSW-001	Any point that is representative of salinity and hardness near Discharge Point 001.
Rainfall	R-1	Nearest official National Weather Service rainfall station, Discharger's Laboratory rain gauge, or other station acceptable to the Executive Officer.

3. INFLUENT MONITORING

3.1. Recycled Water Intake. Monitoring recycled water at Monitoring Location INF-001 is only required if the Discharger chooses to apply for recycled water adjustments in accordance with provision 4.1.7 of this Order. The Discharger need monitor only those parameters for which it seeks effluent limitation adjustments; monitoring other parameters is optional.

Table E-2. Influent Monitoring – Monitoring Location INF-001

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Recycled Water Flow [1]	MGD	Continuous	Continuous
Biochemical Oxygen Demand (BOD_5) (5-day @ 20 degrees Celsius)	mg/L	C-24	1/Month
Total Suspended Solids (TSS)	mg/L	C-24	1/Week
Chemical Oxygen Demand (COD)	mg/L	C-24	1/Month
Oil and Grease	mg/L	Grab	1/Month
Phenolic Compounds, Total	mg/L	C-24	1/Month
Ammonia, Nitrogen Total (as N)	mg/L as N	C-24	1/Month
Sulfide, Total	mg/L	Grab	1/Month

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Chromium, Total Recoverable	mg/L	C-24	1/Month
Chromium (VI), Total Recoverable [2]	mg/L	Grab	1/Month
Arsenic, Total	mg/L	C-24	1/Month
Copper, Total Recoverable	µg/L	C-24	1/Month
Cyanide, Total [3]	µg/L	Grab	1/Month
Nickel, Total Recoverable	µg/L	C-24	1/Month
Selenium, Total Recoverable [4]	µg/L	C-24	1/Week
Dioxin-TEQ	ρg/L	C-24	2/Year

Footnotes:

[1] Flow shall be monitored continuously and the following flow information shall be reported in monthly self-monitoring reports:

- Daily average flow rate (MGD)
- Total monthly flow volume (MG)

[2] The Discharger may, at its option, comply with the hexavalent chromium limitations by using total chromium results. In this case, analysis for hexavalent chromium shall be waived. The Discharger shall use the same chromium analysis as the one it conducts for Monitoring Location EFF-001.

[3] The Discharger may, at its option, analyze for cyanide as weak acid dissociable cyanide using protocols specified in 40 C.F.R. Part 136, or an equivalent method in the latest Standard Method edition.

[4] The Dischargers shall analyze selenium using U.S. EPA Method No. 200.8 or Standard Method No. 3114B or 3114C.

3.2. Raw Water Intake. Monitoring raw water at Monitoring Location INF-002 is only required if the Discharger chooses to apply for recycled water adjustments in accordance with provision 4.1.7. of this Order. The Discharger need monitor only those parameters for which it seeks effluent limitation adjustments; monitoring other parameters is optional.

Table E-3. Influent Monitoring – Monitoring Location INF-002

Parameter	Unit	Sample Type	Minimum Sampling Frequency
BOD_5	mg/L	C-24	1/Year [1]
TSS	mg/L	C-24	1/Year [1]
COD	mg/L	C-24	1/Year [1]
Oil and Grease	mg/L	Grab	1/Year [1]
Phenolic Compounds, Total	mg/L	C-24	1/Year [1]
Ammonia	mg/L as N	C-24	1/Year [1]
Sulfide, Total	mg/L	Grab	1/Year [1]
Chromium, Total Recoverable	mg/L	C-24	1/Year [1]
Chromium (VI), Total Recoverable [2]	mg/L	Grab	1/Year [1]
Arsenic, Total	mg/L	C-24	1/Year [1]
Copper, Total Recoverable	µg/L	C-24	1/Year [1]
Cyanide, Total [3]	µg/L	Grab	1/Year [1]

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Nickel, Total Recoverable	µg/L	C-24	1/Year [1]
Selenium, Total Recoverable [4]	µg/L	C-24	1/Year [1]
Dioxin-TEQ	pg/L	C-24	1/Year [1]

Footnotes:

[1] As described in Provision 4.1.6. of this Order, the Discharger shall sample and analyze influent raw water at least once per year at Monitoring Location INF-002 for any constituents for which it seeks recycled water use adjustments. The annual average concentration may be used in the calculations described in provision 4.1.7 of this Order.

[2] The Discharger may, at its option, comply with the hexavalent chromium limitations by using total chromium results. In this case, analysis for hexavalent chromium shall be waived. The Discharger shall use the same chromium analysis as the one it conducts for Monitoring Location EFF-001.

[3] The Discharger may, at its option, analyze for cyanide as weak acid dissociable cyanide using protocols specified in 40 C.F.R. Part 136, or an equivalent method in the latest Standard Method edition.

[4] The Discharger shall analyze selenium using U.S. EPA Method No. 200.8 or Standard Method No. 3114B or 3114C.

4. EFFLUENT MONITORING

4.1. Monitoring Location EFF-001. The Discharger shall monitor treatment plant effluent at Monitoring Location EFF-001 as follows:

Table E-4. Effluent Monitoring – Monitoring Location EFF-001

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Flow [1]	MGD	Continuous	Continuous/D
pH [2]	standard units	Continuous	Continuous
Temperature	?F	Continuous	Continuous
Salinity	ppt	C-24	1/Month
BOD_5	mg/L, lbs/day	C-24	1/Month
TSS	mg/L, lbs/day	C-24	1/Month
COD	mg/L, lbs/day	C-24	1/Month
Oil and Grease	mg/L, lbs/day	Grab	1/Month
Phenolics Compounds	mg/L, lbs/day	C-24	1/Month
Ammonia	mg/L as N, lbs/day	C-24	1/Month
Sulfide, Total	mg/L, lbs/day	Grab	1/Month
Chromium, Total Recoverable	mg/L, lbs/day	C-24	1/Month
Chromium (VI), Total Recoverable [3]	mg/L, lbs/day	Grab	1/Month
Arsenic, Total	µg/L	C-24	1/Month
Copper, Total Recoverable	µg/L	C-24	1/Month
Cyanide, Total [4]	µg/L	Grab	1/Month
Nickel, Total Recoverable	µg/L	C-24	1/Month
Dioxin-TEQ	µg/L	C-24	2/Year
Phosphorus, Total	µg/L	C-24	1/Month
Nitrate-nitrite	mg/L as N	C-24	1/Month
Selenium, Total Recoverable [5]	µg/L	C-24	1/Week
Acute Toxicity [6]	% survival	C-24	1/Week

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Chronic Toxicity [7]	"pass" or "fail" and % effect [9]	C-24	1/Month
Other Priority Pollutants [8]	µg/L	Grab	2/Year

Footnotes:

[1] For effluent flows, daily average flow (MGD) and total monthly flow (MG) shall be monitored and reported in self-monitoring reports.

[2] If pH is monitored continuously, the minimum and maximum pH values for each day shall be reported in self-monitoring reports.

[3] The Discharger may, at its option, comply with the hexavalent chromium limitations by using total chromium results. In this case, analysis for hexavalent chromium shall be waived.

[4] The Discharger may, at its option, analyze for cyanide as weak acid dissociable cyanide using protocols specified in Standard Method Part 4500-CN-I, U.S. EPA Method OI 1677, or an equivalent method in the latest edition.

[5] The Discharger shall analyze selenium using U.S. EPA Method No. 200.8 or Standard Method No. 3114B or 3114C.

[6] Acute bioassay tests shall be performed in accordance with MRP section 5.1.

[7] Chronic toxicity tests shall be performed in accordance with MRP section 5.2.

[8] The Discharger shall monitor for the pollutants listed in Attachment G, Table B. The Discharger shall collect C-24 samples for metals.

4.3. Stormwater Monitoring Locations EFF-002, EFF-003, EFF-009, EFF-010, EFF-014, and EFF-017 through EFF-023. The Discharger shall monitor stormwater discharges at Monitoring Locations EFF-002, EFF-003, EFF-009, EFF-010, EFF-014, and EFF-017 through EFF-023 as follows:

Table E-6. Stormwater Monitoring – Monitoring Locations EFF-002, EFF-003, EFF-009, EFF-010, EFF-014, and EFF-017 through EFF-023

Parameter	Unit	Sample Type	Minimum Sampling Frequency [1]
TOC	mg/L	Grab [2]	2/Wet Weather Season or 1/Day [3]
Oil and Grease	mg/L	Grab [2]	2/Wet Weather Season or 1/Day [3]
pH	s.u.	Grab [2]	2/Wet Weather Season or 1/Day [3]
Specific Conductance	µmhos/cm	Grab [2]	2/Wet Weather Season or 1/Day [3]
TSS	mg/L	Grab [2]	2/Wet Weather Season or 1/Day [3, 4]
BOD_5	mg/L	Grab [2]	Daily during discharge event [5]
COD	mg/L	Grab [2]	Daily during discharge event [5]
Phenolic Compounds	mg/L	Grab [2]	Daily during discharge event [5]
Total Chromium	µg/L	Grab [2]	Daily during discharge event [5]
Hexavalent Chromium	µg/L	Grab [2]	Daily during discharge event [5]
Standard Observations [6]	-	-	Daily during discharge event [5]

Footnotes:

[1] Sampling shall occur at least twice during the storm season for stormwater discharges that do not drain to stormwater basins. Such monitoring shall be conducted during periods when the laboratory is normally staffed.

[2] The Discharger shall collect samples representative of first flush conditions if feasible. For locations with valve-controlled discharge, at least one sample shall be collected prior to or within the first 30 minutes of discharge.

[3] If and when supplemental effluent limitations for the pollutants in Table 7 of this Order become effective, the Discharger shall increase the monitoring frequency at outfalls where the limitations are in effect to daily

during each storm. The Discharger shall continue daily monitoring until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 6 of this Order.

[4] If TSS exceeds one or both of the numeric action levels in Attachment S section 1.7 during the previous wet weather season, the Discharger shall increase the monitoring frequency at outfalls where a numeric action level exceedance occurred to four times per year. The Discharger shall continue monitoring TSS four times per year until TSS levels for an entire wet weather season are below the numeric action levels.

[5] If and when supplemental effluent limitations for the pollutants in Table 7 of this Order become effective, the Discharger shall begin monitoring at outfalls where the limitations are in effect. The Discharger shall continue monitoring each storm event until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 6 of this Order.

[6] Standard observations are specified in Attachment G section 3.2.

4.4. Stormwater Monitoring Locations EFF-008 and EFF-011. The Discharger shall document in self-monitoring reports that it only discharges stormwater from Discharge Point 011 in excess of that attributable to a 24-hour, 25-year storm and monitor at Monitoring Locations EFF-008 and EFF-011 as follows:

Table E-7. Stormwater Monitoring – Monitoring Locations EFF-008 and EFF-011

Parameter	Unit	Sample Type	Minimum Sampling Frequency
TOC	mg/L	Grab [1]	Each discharge event
Oil and Grease	mg/L	Grab [1]	Each discharge event
pH	s.u.	Grab [1]	Each discharge event
Specific Conductance	µmhos/cm	Grab [1]	Each discharge event
TSS	mg/L	Grab [1]	Each discharge event
Standard Observations [2]	-	-	Each discharge event
Priority Pollutants [3]	µg/L	Grab [1]	First Discharge Event of wet season
BOD_5	mg/L	Grab [1]	Daily during discharge event [4]
COD	mg/L	Grab [1]	Daily during discharge event [4]
Phenolic Compounds	mg/L	Grab [1]	Daily during discharge event [4]
Total Chromium	µg/L	Grab [1]	Daily during discharge event [4]
Hexavalent Chromium	µg/L	Grab [1]	Daily during discharge event [4]

Footnotes:

[1] The Discharger shall collect at least one grab sample prior to or within the first 30 minutes of discharge.

[2] Standard observations are specified in Attachment G section 3.2.

[3] The Discharger shall monitor for the pollutants listed in Attachment G, Table B. The Discharger shall collect C-24 samples for metals.

[4] If and when the supplemental effluent limitations in Table 7 of this Order become effective in accordance with section 4.2.2 of this Order, the monitoring frequency at the outfalls where the limitations are in effect shall be increased to daily during each discharge event. The Discharger shall continue daily monitoring until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 6 of this Order.

4.5. Stormwater Monitoring Locations EFF-004 through EFF-007. The Discharger shall monitor at Monitoring Locations EFF-004 through EFF-007 as follows:

Table E-8. Stormwater Monitoring – Monitoring Locations EFF-004 through EFF-007

Parameter	Unit	Sample Type	Minimum Sampling Frequency
TOC	mg/L	Grab [1]	Once [2]
Oil and Grease	mg/L	Grab [1]	Once [2]
pH	s.u.	Grab [1]	Once [2]
Specific Conductance	µmhos/cm	Grab [1]	Once [2]

Parameter	Unit	Sample Type	Minimum Sampling Frequency
TSS	mg/L	Grab [1]	Once [2]
Standard Observations [3]	-	-	Once [2]
BOD_5	mg/L	Grab [1]	Daily during discharge event [4]
COD	mg/L	Grab [1]	Daily during discharge event [4]
Phenolic Compounds	mg/L	Grab [1]	Daily during discharge event [4]
Total Chromium	µg/L	Grab [1]	Daily during discharge event [4]
Hexavalent Chromium	µg/L	Grab [1]	Daily during discharge event [4]

Footnotes:

[1] The Discharger shall collect at least one grab sample prior to or within the first 30 minutes of discharge.

[2] If and when supplemental effluent limitations for the pollutants in Table 7 of this Order become effective, the Discharger shall increase the monitoring frequency at outfalls where the limitations are in effect to daily during each storm. The Discharger shall continue daily monitoring until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 6 of this Order.

[3] Standard observations are specified in Attachment G section 3.2.

[4] If and when supplemental effluent limitations for the pollutants in Table 7 of this Order become effective, the Discharger shall begin monitoring at outfalls where the limitations are in effect. The Discharger shall continue monitoring each storm event until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 6 of this Order.

5. TOXICITY MONITORING

5.1. Acute Toxicity

5.1.1. Compliance with the acute toxicity effluent limitations shall be evaluated at Monitoring Location EFF-001 by measuring survival of test organisms exposed to 96-hour continuous flow-through bioassays.

5.1.2. Test organisms shall be rainbow trout (*Onchorhynchus mykiss*). Alternatively, the Executive Officer may specify a more sensitive organism or, if testing a particular organism proves unworkable, the most sensitive organism available.

5.1.3. All bioassays shall be performed according to the most up-to-date protocols in 40 C.F.R. part 136, currently *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition (EPA-821-R-02-012). If these protocols prove unworkable, the Executive Officer and the Environmental Laboratory Accreditation Program may grant exceptions in writing upon the Discharger's request with justification.

5.1.4. Bioassay monitoring shall include, on a daily basis, pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be reported. If final or intermediate results of an acute bioassay test indicate a violation (e.g., the percentage of surviving test organisms is less than 70 percent), the Discharger shall initiate a new test as soon as practical and shall investigate the cause of the mortalities and report its findings in the next self-monitoring report. The Discharger shall repeat the test until a test fish survival rate of 90 percent or greater is observed. If the control fish survival rate is less than 90 percent, the bioassay test shall be restarted with new fish and

shall continue as soon as practical until an acceptable test is completed (i.e., control fish survival rate is 90 percent or greater).

5.2. Chronic Toxicity

5.2.1. Compliance Monitoring

5.2.1.1. **Sampling.** The Discharger shall collect 24-hour composite effluent samples at Monitoring Location EFF-001 for critical life stage toxicity testing as indicated below. For toxicity tests requiring renewals, the Discharger shall collect 24-hour composite samples on consecutive or alternating days.

5.2.1.2. **Test Species.** The test species shall be water flea (*Ceriodaphnia dubia*) unless a more sensitive species is identified in accordance with MRP, Appendix E-1. The Discharger shall conduct chronic toxicity species sensitivity screening as required in Appendix E-1. Upon completion of the chronic toxicity screening, the most sensitive species shall be the species that exhibits the highest percent effect. The Executive Officer may temporarily designate the next most sensitive species available of those listed in MRP Tables AE-1 and AE-2 as the “most sensitive species” if testing a particular species proves unworkable (e.g., the discharger encounters unresolvable test interference or cannot secure a reliable supply of test organisms). The Executive Officer will specify a temporary designation of the most sensitive species in writing.

5.2.1.3. **Frequency.** The Discharger shall monitor chronic toxicity as specified below:

5.2.1.3.1. **Routine Monitoring.** The Discharger shall conduct routine monitoring once per month at the Instream Waste Concentration (IWC) set forth in section 4.1.2 of the Order, and continue routine monitoring during any Toxicity Reduction Evaluation (TRE) consistent with MRP section 5.2.3.7.

5.2.1.3.2 **MMEL Compliance Tests and TRE Determination.** If any routine monitoring test result is “fail,” the Discharger shall conduct at least one and at most two MMEL compliance tests. The results of these tests shall be used to determine if a TRE is necessary according to the process shown in Appendix E-3. The Discharger shall initiate these tests within the same calendar month as the failed routine monitoring test. (For the purposes of MMEL compliance tests, the “calendar month” shall begin on the calendar day that the failed routine monitoring test was initiated. The “calendar month” shall end on the day before the corresponding day of the following month, or on the last day of the following month if it has no corresponding day [e.g., January 31 through February 28]).

5.2.1.3.2.1. If the first MMEL compliance test result is “pass,” then the Discharger shall conduct a second MMEL compliance test. If the first MMEL compliance test result is “fail,” that result constitutes an MMEL violation and a second MMEL compliance test is not required. If any of the failed

tests were also an MDEL violation, the discharger shall conduct a TRE (see MRP § 5.2.3).

5.2.1.3.2.2. If the second MMEL compliance test result is “pass,” then the Discharger shall return to routine monitoring as described in MRP section 5.2.1.3.1. (See Appendix E-5, Toxicity Reduction Evaluation Process Flowchart.) If the second MMEL compliance Test result is “fail,” that result constitutes an MMEL violation. If any of the failed tests were also an MDEL violation, the discharger shall conduct a TRE (see MRP § 5.2.3).

5.2.1.3.2.3. If the Discharger cannot conduct an MMEL compliance test because not enough effluent is available to test, the Discharger shall return to routine monitoring as soon as enough effluent is available.

5.2.1.4. **Methodology.** Sample collection, handling, and preservation shall be in accordance with U.S. EPA protocols. Bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-2. These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, currently 1st edition (EPA/600/R-95/136); *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, currently 3rd edition (EPA-821-R-02-014); and *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, currently 4th edition (EPA-821-R-02-013). If these protocols prove unworkable, the Executive Officer and the Environmental Laboratory Accreditation Program may grant exceptions in writing upon the Discharger’s request with justification.

Chronic toxicity shall be evaluated using the Test of Significant Toxicity (TST) as described in Toxicity Provisions section III.B.3. The selected test concentrations shall include the IWC. The TST shall be conducted using the IWC sample and a control as described in Toxicity Provisions section III.B.3. Test sample pH may be controlled to the level of the effluent sample as received by the laboratory prior to being salted up. A result of “fail” indicates toxicity at the IWC.

If the Discharger demonstrates that specific identifiable substances in the discharge are rapidly rendered harmless upon discharge to the receiving water, compliance with the chronic toxicity limit may be determined after test samples are adjusted to remove the influence of those substances. The adjustment shall not remove the influence of other substances. Written acknowledgement that the Executive Officer concurs with the Discharger’s demonstration must be obtained prior to any such adjustment.

5.2.2. **Reporting.** The Discharger shall provide toxicity test results with self-monitoring reports and shall include the following, at a minimum, for each test:

5.2.2.1. Sample date.

5.2.2.2. Test initiation date.

5.2.2.3. Test species.

5.2.2.4. End point values for the control and IWC sample (e.g., number of young, growth rate, percent survival). For routine monitoring and MMEL compliance tests, the Discharger shall report the results as either “pass” or “fail,” and the percent effect at the IWC for each endpoint.

5.2.2.5. End point values for each replicate of the control and IWC sample (e.g., number of young, growth rate, percent survival).

5.2.2.6. Available water quality measurements for each test (e.g., pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia).

5.2.3. **Toxicity Reduction Evaluation (TRE)**

5.2.3.1. The Discharger shall prepare a generic TRE work plan within 90 days of the effective date of this Order to be ready to respond to toxicity events. The Discharger shall review and update the generic work plan as necessary so it remains current and applicable to the discharge and discharge facilities.

5.2.3.2. Within 30 days of the following circumstances, the Discharger shall submit a TRE work plan that shall be the generic work plan revised as appropriate for the particular toxicity observed. The circumstances triggering a TRE are as follows:

5.2.3.2.1. The Discharger has any combination of two or more MDEL or MMEL violations within a single calendar month or two successive calendar months; or

5.2.3.2.2. The Discharger violates the MDEL or MMEL during a calendar month, there is no effluent available to test in the following calendar month, and the Executive Officer requires a TRE;

5.2.3.3. Within 30 days of submitting the TRE work plan, the Discharger shall initiate a TRE in accordance with the TRE work plan. The TRE shall be specific to the discharge and be in accordance with current technical guidance and reference materials, including U.S. EPA guidance materials. The Discharger shall conduct the TRE as a tiered evaluation as summarized below:

5.2.3.3.1. Tier 1 shall consist of basic data collection (routine monitoring, additional routine monitoring, and MMEL compliance tests);

5.2.3.3.2. Tier 2 shall consist of evaluating treatment processes, including operational practices and process chemicals;

5.2.3.3.3. Tier 3 shall consist of a toxicity identification evaluation (TIE) to identify the substance or combination of substances causing the observed toxicity. The Discharger shall employ all reasonable efforts using currently available TIE methodologies;

5.2.3.3.4. Tier 4 shall consist of a toxicity source evaluation;

5.2.3.3.5. Tier 5 shall consist of a toxicity control evaluation that considers alternative strategies, including treatment process modifications, to reduce or eliminate the toxic substances from the discharge; and

5.2.3.3.6. Tier 6 shall consist of implementing all reasonable toxicity control measures, and follow-up monitoring and confirmation of implementation success.

5.2.3.4. The Discharger may end the TRE at any stage if monitoring finds there is no longer consistent toxicity (i.e., two consecutive test results of “pass”).

5.2.3.5. The Executive Officer may authorize the Discharger to end a TRE if the Discharger documents that it has exhausted all reasonable efforts to identify the cause of the toxicity.

5.2.3.6. Many recommended TRE elements parallel required or recommended efforts related to source control, pollution prevention, and stormwater control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to demonstrate compliance with TRE requirements.

5.2.3.7. The routine monitoring frequency shall be a minimum of two tests per calendar year at the IWC when the Discharger is conducting toxicity testing as part of a TRE during that calendar year. The Discharger must return to the routine monitoring frequency specified in MRP section 5.2.1.3.1 at the conclusion of the TRE or one year after the initiation of the TRE, whichever occurs sooner. TRE triggers are set forth below.

Table E-9. Toxicity Reduction Evaluation (TRE) Triggers

Monitoring Type and Frequency	Triggers	TRE Required?
Routine and MMEL compliance monitoring, less than monthly frequency	1. Violation of MDEL or MMEL in a calendar month, AND 2. No discharge during the following calendar month	EO may require TRE
Routine and MMEL compliance monitoring	Any combination of two or more MDEL or MMEL violations in a single calendar	TRE is required

Monitoring Type and Frequency	Triggers	TRE Required?
	month or successive calendar months	

6. RECEIVING WATER MONITORING

6.1 The Discharger shall continue to participate in the Regional Monitoring Program, which collects data on pollutants and toxicity in San Francisco Bay water, sediment, and biota.

6.2 The Discharger shall conduct receiving water monitoring at Monitoring Location RSW-001 as described below (alternatively, the Discharger may satisfy this requirement by ensuring that the RMP collects such samples):

Table E-10. Receiving Water Monitoring – Monitoring Location RWS-001

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Salinity	ppt	Grab	1/Quarter
Hardness	mg/L	Grab[]	1/Quarter

Footnotes:

[1] U.S. EPA Method 1600 or an equivalent method is suggested to measure culturable enterococci.

[2] Results may be reported as either MPN/100 mL if the laboratory method used provides results in MPN/100 mL or CFU/100 mL if the laboratory method used provides results in CFU/100 mL.

7. REPORTING REQUIREMENTS

7.1. General Monitoring and Reporting Requirements. The Discharger shall comply with all Standard Provisions (Attachments D, G, and S) related to monitoring, reporting, and recordkeeping.

7.2. Self-Monitoring Reports (SMRs)

7.2.1. **SMR Format.** The Discharger shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program website (waterboards.ca.gov/water_issues/programs/ciwqs). The CIWQS website will provide additional information for SMR submittal in the event of a planned service interruption for electronic submittal.

7.2.2. **SMR Due Dates and Contents.** The Discharger shall submit SMRs by the due dates, and with the contents, specified below:

7.2.2.1. **Monthly SMRs** — Monthly SMRs shall be due the first day of the second month after the monthly monitoring period. Each SMR shall contain the applicable items described in Provision 6.3.2 (Effluent Characterization Study and Report) of the Order, Attachment D section 5.2, and Attachment G section 5.3. Each SMR shall include all new monitoring results obtained since the last SMR was submitted. If the Discharger monitors any pollutant more frequently than required by this Order, the Discharger shall include the results of such monitoring in the calculations and reporting for the SMR. The

Discharger shall report when peak wet weather flows are routed around the 1A or 2A Separators to the bioreactor, monitor these flows for oil and grease, and submit documentation (e.g. oil and grease sampling) that demonstrate that such flow is at least 80 percent stormwater and does not contain visible oil..

7.2.2.2. **Annual SMR** — Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain the applicable items described in Provisions 6.3.2 (Effluent Characterization Study and Report) and 6.3.4.5 (Annual Selenium Load) of the Order, and Attachment G section 5.3.1.6.

7.2.3. **Specifications for Submitting SMRs to CIWQS.** The Discharger shall submit analytical results and other information using one of the following methods:

Table E-11. CIWQS Reporting

Parameter	Method of Reporting: EDF/CDF data upload	Parameter
All parameters identified in influent, effluent, and receiving water monitoring tables (except Dissolved Oxygen and Temperature)	Required for all results	-
Dissolved Oxygen, Temperature	Required for monthly maximum and minimum results only [1]	Discharger may use this method for all results or keep records
Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Selenium, Silver, Thallium, Zinc, Dioxins & Furans (by U.S. EPA Method 1613), Other Pollutants (by U.S. EPA Methods 601, 602, 608, 610, 614, 624, and 625)	Required for all results [2]	-
Analytical Method	Not required (Discharger may select “data unavailable”) [1]	-
Collection Time, Analysis Time	Not required	-

Footnotes:

[1] The Discharger shall continue to monitor at the minimum frequency specified in this MRP, keep records of the measurements, and make the records available upon request.

[2] These parameters require EDF/CDF data upload or manual entry regardless of whether monitoring is required by this MRP or other provisions of this Order (except for biosolids, sludge, or ash provisions).

The Discharger shall arrange all reported data in a tabular format and summarize data to clearly illustrate whether the Facility is operating in compliance with effluent limitations. The Discharger is not required to duplicate the submittal of data entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format, the Discharger shall electronically submit the data in a tabular format as an attachment.

7.2.4. **Monitoring Periods.** Monitoring periods for all required monitoring shall be as set forth below unless otherwise specified:

Table E-12. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Order effective date	All times
Continuous/1H	Order effective date	Measured continuously or, if infeasible, at least every hour
1/Hour	Order effective date	Every hour on the hour
1/Day	Order effective date	Any 24-hour period that reasonably represents a calendar day for sampling purposes (e.g., beginning at midnight and continuing through 11:59 p.m.)
1/Week 2/Week	First Sunday following or on Order effective date	Sunday through Saturday
1/Month	First day of calendar month following or on Order effective date [2]	First day of calendar month through last day of calendar month
1/Quarter	Closest January 1, April 1, July 1, or October 1 before or after Order effective date [1]	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
1/Year	Closest January 1 before or after Order effective date [1]	January 1 through December 31
2/Year	Closest January 1 or July 1 before or after Order effective date [1]	January 1 through June 30 July 1 through December 31
Each Discharge Event	As soon as possible after Discharger becomes aware of the event	Any time when sampling can characterize the discharge event
2/Wet Weather Season	Closest November 1 before or after Order effective date [1]	November 1 through April 30
Once	Order effective date	Once during the term of the Order within 12 months prior to applying for permit reissuance

Footnote:

[1] Monitoring performed during the previous order term may be used to satisfy monitoring required by this Order.

[2] See Attachment A for the definition of a calendar month for chronic toxicity testing.

7.2.5. **RL and MDL Reporting.** The Discharger shall report with each sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 C.F.R. part 136. The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

7.2.5.1. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

7.2.5.2. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For purposes of data collection, the Discharger shall require the laboratory to write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means the laboratory considers appropriate.

7.2.5.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected", or ND.

7.2.5.4. The Discharger shall instruct laboratories to establish calibration standards so that the minimum level (ML) value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

7.2.6. **Compliance Determination.** Compliance with effluent limitations shall be determined using sample reporting protocols defined above, in the Fact Sheet, and in Attachments A, D, and G. For purposes of reporting and administrative enforcement by the Regional Water Board and State Water Board, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the pollutant in the monitoring sample is greater than the effluent limitation and, if applicable, greater than or equal to the RL.

7.3. Discharge Monitoring Reports (DMRs). DMRs are U.S. EPA reporting requirements. The Discharger shall electronically certify and submit DMRs together with SMRs using Electronic Self-Monitoring Reports module eSMR 2.5 or the latest upgraded version. Electronic DMR submittal shall be in addition to electronic SMR submittal. Information about electronic DMR submittal is available at the DMR website (waterboards.ca.gov/water_issues/programs/discharge_monitoring).

APPENDIX E-1

CHRONIC TOXICITY DEFINITION OF TERMS AND SCREENING PHASE REQUIREMENTS

1. Definition of Terms

1.1. Continuous Discharger. Discharger that discharges without interruption throughout its operating hours, except for infrequent shutdowns for maintenance, process changes, or other similar activities, and that discharges throughout the calendar year.

1.2. Non-Continuous Discharger. Discharger that does not discharge in a continuous manner or does not discharge throughout the calendar year (e.g., intermittent and seasonal dischargers).

2. Chronic Toxicity Species Sensitivity Screening

2.1. The Discharger shall perform species sensitivity screening as specified in Toxicity Provisions section III.C.2:

2.1.1. The Discharger shall conduct species sensitivity screening and submit a technical report that identifies the most sensitive test species within 18 months of the effective date of this Order, whichever is latest, if the Discharger has not previously conducted a species sensitivity screening as specified in Toxicity Provisions section III.C.2.

2.1.2. The Discharger shall conduct a species sensitivity screening and submit a technical report that identifies the most sensitive test species with the application for permit reissuance. Alternatively, the Discharger may provide species sensitivity screening results from a previous sensitive species screening conducted within the 15 years before the expiration date of this Order if that sensitive species screening was conducted as specified in Toxicity Provisions section III.C.2.

2.1.3. The Discharger shall conduct species sensitivity screening and submit a technical report that identifies the most sensitive test species no later than 18 months after any significant change in the nature of the effluent discharged due to changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts.

2.2. Species sensitivity screening shall, at a minimum, reflect the following elements:

2.2.1 Test species specified in Appendix E-2, attached, and protocols referenced in those tables. Test species shall be Tier I unless those species are unavailable. In such cases, the Executive Officer may approve a Tier II test species.

2.2.2. Continuous Dischargers: four sets of tests, one in each calendar quarter of a calendar year.

Non-continuous Dischargers: at least two sets of tests, one in each calendar quarter with at least 15 days of discharge, unless the Discharger discharges in only one quarter of a calendar year; in that case, both sets of testing shall occur during the same calendar quarter. Testing in a specific species sensitivity screening can be conducted using effluent that is not discharged into surface waters (e.g., effluent discharged onto land because of a summer prohibition on discharges into surface waters) as long as the effluent tested is representative of the effluent that will be discharged to surface waters.

2.2.3. Appropriate controls as required by the applicable U.S. EPA test method for the selected test species.

2.2.4. Tests conducted at a waste concentration of 10 percent or the IWC, whichever represents a higher concentration of effluent. Alternatively, the Executive Officer may specify a higher waste concentration if needed to increase the likelihood that potential effects might be observed.

2.3. The Discharger shall submit a species sensitivity screening proposal at least 30 days prior to initiating any species sensitivity screening. The proposal shall address each of the elements listed above.

2.4. The most sensitive species shall be the species exhibiting the highest percent effect.

APPENDIX E-2: SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Table AE-1. West Coast Marine Chronic Toxicity Test Species and Methods

Species	Scientific Name	Tier	Effect	Test Duration	Reference
Giant kelp	*Macrocystis pyrifera*	I	Percent germination; germ tube length	48 hours	1
Red Abalone	*Haliotis rufescens*	I	Larval development	48 hours	1
Oyster Mussel	*Crassostrea gigas* *Mytilus sp.*	I	Larval development	48 hours	1
Purple Urchin Sand dollar	*Strongylocentrotus purpuratus* *Dendraster excentricus*	I	Percent fertilization or larval development	1 hour or 72 hours	1
Shrimp	*Americamysis bahia*	II	Percent survival; growth	7 days	2
Topsmelt	*Atherinops affinis*	I	Percent survival; growth	7 days	1
Silverside	*Menidia beryllina*	II	Larval growth rate; percent survival	7 days	2

Toxicity Test References:

1. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.
2 Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/821/R-02/014. October 2002.

Table AE-2. Freshwater Chronic Toxicity Test Species and Method

Species	Scientific Name	Tier	Effect	Test Duration	Reference
Fathead minnow	*Pimephales promelas*	I	Survival; growth rate	7 days	1
Water flea	*Ceriodaphnia dubia*	I	Survival; number of young	7 days	1
Green Alga	*Selenastrum capricornutum*	I	Final cell density	4 days	1

Toxicity Test Reference:

1. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, fourth Edition Chronic manual (EPA-821-R-02-013, October 2002).

Table AE-3. Toxicity Test Requirements for Species Sensitivity Screening

Requirements	Discharges to Marine or Estuarine Water (San Francisco Bay) [1]	Discharges to Freshwater [1]
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Screening Requirement	A total of 3 Marine and/or Freshwater species from Table AE-1 and Table AE-2	3 Freshwater species from Table AE-2[2]

Footnotes:

[1] (a) "Marine" refers to receiving water salinities greater than 1.0 parts per thousand (ppt) at least 95 percent of the time during a normal water year.

(b) "Freshwater" refers to receiving water with salinities less than 1.0 ppt at least 95 percent of the time during a normal water year.

(c) "Estuarine" refers to all other cases (i.e., when receiving water salinity is above 1.0 less than 95 percent of the time and below 1.0 less than 95% of the time).

[2] The freshwater species may be substituted with a marine species if:

(a) The salinity of the effluent is above 1 ppt greater than 95 percent of the time, or

(b) The ionic strength (TDS or conductivity) of the effluent at the IWC is documented to be toxic to the test species.

APPENDIX E-3: TOXICITY REDUCTION EVALUATION PROCESS FLOWCHART ROUTINE MONITORING

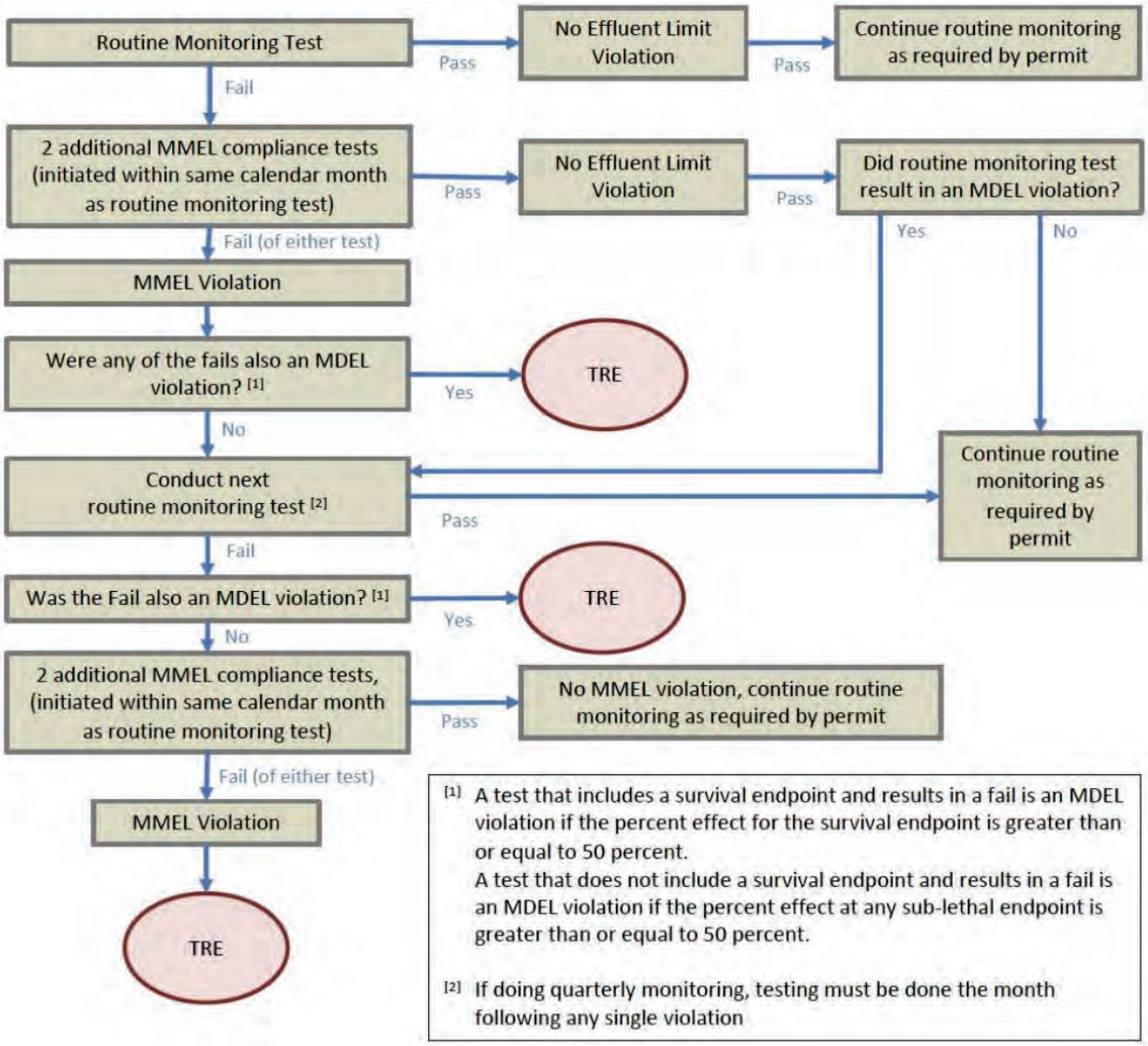

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ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in section 2.2 of the Order, the Regional Water Board incorporates this Fact Sheet as findings supporting the issuance of the Order.

1. PERMIT INFORMATION

The following table summarizes administrative information related to the facility.

Table F-1. Facility Information

WDID	2 071044001
CIWQS Place ID	252650
Discharger	Chevron Products Company, a division of Chevron U.S.A. Inc. Chevron Environmental Management Company
Facility Name	Chevron Richmond Refinery
Facility Address	841 Chevron Way Richmond, CA 94801 Contra Costa County
Facility Contact, Title, and Phone	Kris Battleson, HSE Manager, (510) 242-1400
Authorized Person to Sign and Submit Reports	Same as Facility contact
Mailing Address	Same as Facility Address
Billing Address	PO Box 1272 Richmond, CA 94802
Facility Type	Petroleum Refinery
Major or Minor Facility	Major
Water Quality Threat	1
Complexity	A
Pretreatment Program	No
Recycling Requirements	No
Mercury and PCBs Requirements	NPDES Permit CA0038849
Nutrients Requirements	Not Applicable
Average Facility Flow	6.1 MGD – projected average daily flow
Permitted Flow	25 MGD (maximum reported daily flow)
Watershed	San Francisco Bay
Receiving Water	San Pablo Bay and San Francisco Bay
Receiving Water Type	Marine
Last Inspection	June 12, 2023

1.1. Chevron Products Company (a division of Chevron U.S.A., Inc.) and Chevron Environmental Management Company (collectively the Discharger) own and operate the Chevron Richmond Refinery (Facility), a 2,900-acre petroleum refinery. Attachment B includes maps of the Facility and its surroundings.

For the purposes of this Order, references to the “discharger” or “permittee” in applicable federal and State laws, regulations, plans, and policies are held to be equivalent to references to the Discharger herein.

1.2. The Discharger is regulated pursuant to National Pollutant Discharge Elimination System (NPDES) Permit CA0005134. The Discharger was previously subject to Order R2-2016-0047 (previous order). The Discharger filed a Report of Waste Discharge and submitted an application for reissuance of its Waste Discharge Requirements (WDRs) and NPDES permit on May 5, 2021.

1.3. The Discharger is authorized to discharge subject to the WDRs in this Order at the discharge locations described in Table 1 of this Order. Regulations in 40 C.F.R. section 122.46 limit the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, this Order limits the effective period for the discharge authorization. Pursuant to 40 C.F.R. section 122.6(d) and California Code of Regulations, title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the permit if the Discharger complies with all requirements for continuation of expired permits.

1.4. The discharge is also regulated pursuant to NPDES Permit CA0038849, which establishes mercury and polychlorinated biphenyls (PCBs) requirements for wastewater discharges to San Francisco Bay. This Order does not affect that permit.

1.5 For areas where stormwater is not subject to physical treatment, the Discharger must obtain coverage under *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities*, (NPDES Permit CAS000002, State Water Board Order 2022-0057-DWQ. This Order authorizes discharges of stormwater that drains to the Discharger’s wastewater treatment plant and stormwater treated in earthen basins via physical settling prior to discharge.

2. FACILITY DESCRIPTION

The Facility occupies most of Point San Pablo Peninsula and processes an average crude oil throughput of 251,000 barrels per day, producing diesel fuels, lubricant base oils, as well as fuel oil, liquefied petroleum gas, and hydrogen solely for its own use. The Facility discharges to San Pablo Bay and San Francisco Bay (in some cases by way of Wildcat Creek or Castro Creek) via 19 outfalls: Discharge Points 001 through 023. Attachment B provides site maps with approximate discharge point locations.

2.1. Wastewater Treatment at Discharge Point 001. The Facility discharges process wastewater, non-process wastewater, and stormwater at Discharge Point 001 after treatment at the wastewater treatment plant. Process water as well as non-process water from utility infrastructure and other operations enters the wastewater treatment system from many sources. Wastewaters include, but are

not limited to, desalter effluent, sour water, boiler blowdown, cooling tower blowdown, reverse osmosis brine from freshwater treatment facilities, ballast water, stormwater from refinery process areas, underflow from the recovered oil system and groundwater extraction systems, and wastewater from steam and electrical generation facilities, steam distribution systems, firewater testing, hydrotesting, laboratories, collocated facilities, the Chem Trade West US facility. In addition, wastewater may also contain water generated from onsite and offsite activities, including construction activities, marketing and pipeline activities, facility washing equipment cleaning, environmental remediation activities, inspection and maintenance activities, drain temperature control testing, fire protection system testing and training, and other activities. In the event of a fire emergency, firefighting fluids and other materials (e.g., hydrocarbons wash water, foam, sediment, and combustion materials) would likely drain to the wastewater treatment plant. Attachment C provides process flow diagrams for the wastewater treatment plant and several of its components.

The wastewater collection system consists of a network of drains and trunk lines leading from areas throughout the refinery to the wastewater treatment plant. The wastewater is initially treated in one of three American Petroleum Institute oil-water separators, each servicing different areas of the refinery (Attachment C, Figures 4 through 6). Each oil-water separator consists of two or more parallel cells. The Discharger may leave cells out of service if their capacity is not required to treat a given flow; such cells may constitute auxiliary treatment consistent with 40 C.F.R. section 122.41(e).

Wastewater flows from the oil-water separators to a bioreactor. Flows from Chem Trade West US, Richmond Advanced Recycled Expansion, and Castro Street Ditch (stormwater) enter the bioreactor directly. The bioreactor consists of two sections. The first section provides biological treatment through aeration; the second section functions as a settling basin. Bioreactor residence time is about 25 days at average system flow. The Discharger routes about 3 MGD of bioreactor effluent to the Richmond Refinery Enhancement Wetland pilot treatment facility (Wetland) and the remaining portion to granular activated carbon (GAC) filters, as described below.

The Wetland consists of 85 acres of wetlands arranged in three passes and improves effluent quality prior to final treatment with GAC filters. To minimize exposure of resident wildlife to selenium and prevent selenium accumulation in resident birds, the Discharger maintains a water level of about three to four feet in the first pass and no more than about one foot in the second pass. This approach discourages bird use in the first pass, where most selenium is removed. Most Wetland effluent flows to the GAC filters; however, the Discharger may discharge up to 3.0 MGD of Wetland effluent directly to Discharge Point 001, provided that it complies with Provision 6.3.4.7. Also, the Discharger diverts about 200 MG of Wetland and bioreactor effluent per year to the fire protection system. The Discharger returns most water discharged during firefighting and fire protection system testing and training to the wastewater treatment plant. The Discharger

uses a small portion at the Richmond Long Wharf and discharges it through Discharge Point 002 (see Fact Sheet section 2.3.1.).

Most Wetland effluent and all bioreactor effluent that bypasses the Wetland flows to 24 GAC filters operated in paired series during normal operations and in parallel during high flow conditions. The GAC filters remove some metals and hydrocarbons and reduce effluent toxicity. The Discharger may leave individual GAC filters out of service if their capacity is not required to treat a given flow; such filters may be considered auxiliary treatment pursuant to 40 C.F.R. section 122.41(e). GAC filter effluent is discharged through Discharge Point 001, a deepwater outfall equipped with a diffuser at an average depth of 30 to 50 feet, approximately 2,000 feet offshore north of Point San Pablo (see Attachment B). During large rain events, to avoid overflow of the bioreactor, Chevron can partially open a flow control valve to allow some bioreactor flow to bypass the GAC filters. This is done so to prevent an overflow while still maximizing flow through the GAC filters.

The Discharger uses about 3.0 MGD of tertiary-treated recycled water from the East Bay Municipal Utility District (EBMUD) North Richmond Water Reclamation Plant in Facility cooling towers and about 3.5 MGD from the EBMUD Richmond Advanced Recycled Expansion (RARE) plant, located at the Facility, in Facility boilers. The RARE plant treats secondary effluent from the West County Wastewater District through microfiltration and reverse osmosis. The Discharger directs reverse osmosis brine to its bioreactor and microfiltration backwash water to the West County Wastewater District.

2.2. Stormwater Treatment and Control. The Facility discharges stormwater runoff from process areas at Discharge Point 001 after treatment at the wastewater treatment plant, and stormwater runoff from non-process areas, including former Chevron facilities located offsite, through 18 stormwater discharge points (see Table 1 of the Order and Attachment B). Stormwater handling is summarized below.

2.2.1. **Process Area Stormwater.** Process area stormwater commingles with process wastewater (i.e., commingled stormwater) and flows to the wastewater treatment plant, with exceptions during large storm events described below. Process area stormwater flow is shown in Attachment C, Figure 3.

A flow-splitter box upstream of the 1A and 2A Separators diverts some commingled stormwater during large storms that could exceed their design capacities. Such commingled stormwater is diverted to the 20-MG capacity 100-foot Channel for temporary storage. The flow-splitter box includes overflow and underflow weirs that provide initial oil-water separation. When flows subside, the Discharger routes commingled stormwater from the 100-foot Channel to the wastewater treatment plant. If visual inspection confirms there is no visible oil, the Discharger routes this commingled stormwater to the bioreactor; otherwise, the Discharger routes it to the 1A or 2A Separator.

The Discharger also diverts stormwater from the Richmond Lube Oil Plant, Lake Schramm, and Petrolite Hill away from the 13 Separator to the North Yard Impound Basin during large storms that could exceed the 13 Separator's design capacity. The diverted stormwater flows first to the North Yard Lift Station, then to the North Yard Impound Basin. If the Discharger has only diverted non-commingled stormwater from these areas to the North Yard Impound Basin, it discharges the stormwater directly to San Francisco Bay via Discharge Point 003; otherwise, it routes it to the bioreactor. In large storms, the Discharger may also route commingled stormwater treated by the 13 Separator directly to the North Yard Impound Basin, then to the bioreactor.

2.2.2. **Non-Process Area Stormwater.** Stormwater from non-process areas (mainly current or former tank farms) is discharged either to San Pablo Bay or San Francisco Bay. This stormwater either drains to basins that provide treatment by settling prior to discharge, or is discharged directly by sheet flow (see Table F-2 below). Fact Sheet section 2.3 describes the 18 stormwater outfalls and their discharges.

2.2.3. **Stormwater Ponds.** Stormwater from certain areas flows to stormwater ponds from which discharge is usually prohibited. The Discharger typically routes stormwater from the Castro Acres Surge Pond (Discharge Point 011), to the West County Wastewater District or the bioreactor. The Discharger typically routes stormwater from the 100-foot Channel (Discharge Point 008) to the bioreactor. The Discharger will no longer discharge stormwater from the Fertilizer Evaporation Pond (Discharge Point 012), and Integrated Wastewater Pond System (Discharge Point 013). These discharge points and their treatment controls are listed in the table below:

Table F-2. Stormwater Outfalls and Treatment Controls

Discharge Point	Type of Treatment Control
002	None (sheet flow)
003	Settling Basin; valve-controlled discharge
004	Settling Basin
005	Settling Basin
006	Settling Basin
007	Settling Basin
008	Settling Basin (effluent normally sent to bioreactor)
009	Settling Basin; valve-controlled discharge
010	None (sheet flow)
011	Settling Basin; valve-controlled discharge (effluent normally sent to West County Wastewater District)
014	None (sheet flow)
017	Settling Basin; valve-controlled discharge
018	Settling Basin; valve-controlled discharge
019	Settling Basin; valve-controlled discharge
020	Settling Basin and sheet flow
021	None (sheet flow)

022	None (sheet flow)
023	None (sheet flow)

2.3. Stormwater Outfall Descriptions

2.3.1. **Discharge Point 002 (Richmond Long Wharf).** Discharge Point 002 discharges stormwater runoff from Richmond Long Wharf (an area of approximately 2 acres) directly to San Francisco Bay by sheet flow. Discharge Point 002 also discharges non-stormwater, including San Francisco Bay water used in the fire protection system, steam condensate, pipeline exterior wash water, and fire protection water. Fire protection water discharges average 5,600 gallons and occur during housekeeping activities and tests of, or maintenance on, the fire protection system. Fire protection system testing occurs about once per week and lasts for about 10 minutes each time.

2.3.2. **Discharge Point 003 (North Yard Impound Basin).** Discharge Point 003 discharges stormwater runoff from approximately 410 acres within the Poleyard and Alkane Tank Fields and adjacent hillsides, liquid petroleum gas and Ammonia Storage Facilities, former Oxidation Ponds 2 through 5, Cracking and Hydroprocessing facilities and processing areas, and the Hydropits Cap to San Pablo Bay. Discharge Point 003 also discharges steam condensate, groundwater seepage, non-contact San Pablo Bay water, and residual hydrotesting and fire protection system water. The Discharger routes hydrotesting and fire protection system water from the North Yard Impound Basin to the bioreactor, but residual amounts may be discharged with stormwater. Flow from the Tank Field 100-foot Channel, otherwise discharged at Discharge Point 008, may also be routed to the North Yard Impound Basin and discharged at Discharge Point 003.

The North Yard Impound Basin treats stormwater via physical settling. Prior to discharge, the Discharger analyzes North Yard Impound Basin stormwater samples for compliance with the effluent limits in Table 6 of the Order. Once compliance is confirmed, the Discharger performs a valve-controlled gravity discharge to San Pablo Bay.

2.3.3. **Discharge Point 004 (12-Basin).** Discharge Point 004 discharges stormwater runoff from an area of approximately 4 acres in the former Point Orient Tank Field to San Francisco Bay. The Point Orient Tank Field is no longer in use. Stormwater from 12-Basin may be transferred to 10-Basin for discharge at Discharge Point 006.

2.3.4. **Discharge Point 005 (11-Basin).** Discharge Point 005 discharges stormwater runoff from an approximately 3-acre area in the former Point Orient Tank Field to San Francisco Bay. The Point Orient Tank Field is no longer in use.

2.3.5. **Discharge Point 006 (10-Basin).** Discharge Point 006 discharges stormwater runoff from an approximately 48-acre area in the former Point Orient Tank Field

to San Francisco Bay. The Point Orient Tank Field is no longer in use. Stormwater from 12-Basin (Discharge Point 004), Horse Pasture, and 13-Basin (Discharge Point 007) may be transferred to 10-Basin for discharge at Discharge Point 006.

2.3.6. **Discharge Point 007 (Horse Pasture, 13-Basin).** Discharge Point 007 discharges stormwater runoff from an approximately 17-acre area in the former Point Orient Tank Field (commonly referred as Horse Pasture) and 13-Basin to San Francisco Bay. Stormwater from the Horse Pasture and 13-Basin may also be transferred to 10-Basin for discharge at Discharge Point 006.

2.3.7. **Discharge Points 008 (Tank Field 100-foot Channel).** Discharge Point 008 discharges stormwater runoff from approximately 500 acres in and around the Main Tank field, adjacent hillsides, Distillation and Reforming facilities, Main and South Yard Areas, rail car loading racks, and the Cogeneration Facility to San Pablo Bay. Tank Field 100-foot Channel, an earthen basin, provides treatment by physical settling. The Discharger typically routes all water from the 100-foot Channel to the bioreactor.

2.3.8. **Discharge Point 009 (8-Basin).** Discharge Point 009 discharges stormwater from approximately 26 acres within the Quarry Tank Field to San Francisco Bay. Discharge Point 009 also discharges non-stormwater, including steam condensate, groundwater seepage, irrigation water, hydrotesting water, and fire protection system water. The Discharger routes most hydrotesting and fire protection system water from the 8-Basin to the bioreactor, but residual amounts may be discharged along with stormwater.

The 8-Basin, an earthen basin, provides treatment by physical setting. Before discharging, the Discharger analyzes stormwater samples for compliance with the effluent limits in Table 6 of the Order. Once compliance is confirmed, the Discharger performs a valve-controlled gravity discharge.

2.3.9. **Discharge Point 010 (Reclamation Area).** Discharge Point 010 discharges stormwater from approximately 6 acres within the former Reclamation Yard area by sheet flow from Gertrude Street to Wildcat Creek, which then drains to Castro Creek, a tributary of San Pablo Bay.

2.3.10. **Discharge Point 011 (Castro Acres Surge Pond).** Discharge Point 011 discharges stormwater from approximately 36 acres within the former Chevron Chemical Company Hensley Street Plant to Castro Creek, a tributary of San Pablo Bay, only when 24-hour rainfall exceeds the 25-year return frequency (i.e., a 24-hour, 25-year storm occurs) (see Discharge Prohibition 3.4 of the Order and Fact Sheet section 4.1.1.4.). Otherwise, the Discharger routes Castro Acres Surge Pond effluent to the West County Wastewater District's sanitary sewer system via the Integrated Wastewater Pond System or directly to the bioreactor. Discharge Point 011 also discharges non-stormwater,

including groundwater, irrigation water, and fire protection system water. The Castro Acres Surge Pond provides treatment by physical settling.

2.3.11. **Discharge Point 012 (Fertilizer Evaporation Pond).** This Order does not permit stormwater discharges at Discharge Point 012. The Discharger routes stormwater from the Fertilizer Evaporation Pond to West County Wastewater District Sanitary Sewer or directly to the bioreactor.

2.3.12. **Discharge Point 013 (Integrated Wastewater Pond System).** This Order does not permit stormwater discharge at Discharge Point 013. In the previous order, Discharge Point 013 discharged stormwater to Castro Creek from approximately 81 acres of synthetically-lined surface impoundments and, potentially, runoff from the former Hensley Street Plant, the Fertilizer Evaporation Pond, and from an adjacent 4-acre capped Class II waste management unit (Soil Management Unit 1). Discharge Point 013 also discharged non-stormwater, including irrigation water and groundwater.

The Discharger routes stormwater from the Integrated Wastewater Pond System to West County Wastewater District Sanitary Sewer or directly to the bioreactor.

2.3.13. **Discharge Point 014 (Consolidation Area).** Discharge Point 014 discharges stormwater by sheet flow from approximately 5 acres that include a capped waste management unit to Castro Creek, a tributary of San Pablo Bay.

2.3.14. **Discharge Point 015 (1-Basin).** This Order does not permit stormwater discharges at Discharge Point 015. The Discharger routes stormwater from 1-Basin to Discharge Point 020.

2.3.15. **Discharge Point 016 (2-Basin).** This Order does not permit stormwater discharges at Discharge Point 016. The Discharger routes stormwater from 2-Basin to Discharge Point 020.

2.3.16. **Discharge Point 017 (3-Basin).** Discharge Point 017 discharges stormwater from approximately 7 acres within a former tank field area to San Francisco Bay. Discharge Point 017 also discharges non-stormwater, including fire protection system water. The Discharger routes most fire protection system water from the 3-Basin to the bioreactor, but residual amounts may be discharged with stormwater.

The 3-Basin is an earthen basin that treats stormwater by physical settling. Before discharge, the Discharger analyzes stormwater samples for compliance with the effluent limits in Table 6 of the Order. Once compliance is confirmed, the Discharger performs a valve-controlled gravity discharge.

2.3.17. **Discharge Point 018 (9-Basin).** Discharge Point 018 discharges stormwater from approximately 29 acres in the Quarry Tank Field to San Francisco Bay. Discharge Point 018 also discharges non-stormwater, including residual water

from steam traps, fire protection system water, and hydrotesting water. The Discharger routes most hydrotesting and fire protection system water from the 9-Basin to the bioreactor, but residual amounts may be discharged with stormwater.

The 9-Basin is an earthen basin that treats stormwater by physical settling. Before discharge, the Discharger analyzes stormwater samples for compliance with the effluent limits in Table 6 of the Order. Once compliance is confirmed, the Discharger performs a valve-controlled gravity discharge.

2.3.18. **Discharge Point 019 (7-Basin).** Discharge Point 019 discharges stormwater from approximately 20 acres within the SP Hill Tank Field to San Francisco Bay. Discharge Point 019 also discharges non-stormwater, including residual water from steam traps, hydrotesting water, and fire protection system water. The Discharger routes most hydrotesting and fire protection system water from the 7-Basin to the bioreactor, but residual amounts may be discharged with stormwater.

The 7-Basin is an earthen basin that treats stormwater by physical settling. Before discharge, the Discharger analyzes stormwater samples for compliance with the effluent limits in Table 6 of the Order. Once compliance is confirmed, the Discharger performs a valve-controlled gravity discharge.

2.3.19. **Discharge Point 020 (Castro Street, 1-Basin, and 2-Basin).** Discharge Point 020 discharges stormwater from the City of Richmond's stormwater management system, which consists of (a) stormwater from approximately 260 acres at Castro Street, (b) stormwater collected at the 1-Basin from approximately 4 acres within a former tank field area, and (c) stormwater collected at the 2-Basin from approximately 5 acres within a former tank field area. The Discharger routes stormwater from these three locations and from City of Richmond storm sewers to the Castro Street Pump Station, then to Chevron's 38-foot Channel. The 38-foot Channel discharges to Castro Creek, a tributary of San Pablo Bay. This Order permits the discharge of stormwater from 1-Basin and 2-Basin through Discharge Point 020.

2.3.20. **Discharge Point 021 (Landfill 15).** Discharge Point 021 discharges stormwater by sheet flow from approximately 41 acres that include a capped waste management unit to Castro Creek, a tributary of San Pablo Bay.

2.3.21. **Discharge Point 022 (Parr-Richmond).** Discharge Point 022 discharges stormwater by sheet flow from approximately 24 acres that include a capped waste management unit to Wildcat Creek, which drains to Castro Creek, a tributary of San Pablo Bay.

2.3.22. **Discharge Point 023 (Gertrude Street)**. Discharge Point 023 discharges stormwater by sheet flow from approximately 3 acres to Wildcat Creek, which drains to Castro Creek, a tributary of San Pablo Bay.

2.3. Previous Requirements and Monitoring Data

2.3.1. **Monitoring data for Discharge Point 001.** The table below presents the previous order's effluent limitations and representative monitoring data from the previous order term (February 2017 – May 2023):

Table F-3. Previous Effluent Limitations and Monitoring Data

Parameter	Units	Average Monthly Limit	Maximum Daily Limit	Other Limits	Average	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ 20°C) (BOD_5)	lbs/day	5,800	11,000	-	740	12,000 [1]
Total Suspended Solids (TSS)	lbs/day	4,800	7,600	-	500	5,100
Chemical Oxygen Demand (COD)	lbs/day	40,000	78,000	-	3,300	16,000
Oil and Grease	lbs/day	1,800	3,400	-	74	600
Sulfide, Total	lbs/day	32	71	-	1.6	7.0
Phenolic Compounds, Total	lbs/day	20	80	-	0.28	2.4
Ammonia Nitrogen, Total (as N)	mg/L	50	150	-	0.77	6.1
Ammonia Nitrogen, Total (as N)	lbs/day	2,200	4,800	-	45	490
Chromium, Total Recoverable	lbs/day	23	67	-	0.14	0.38
Chromium (VI), Total Recoverable	lbs/day	1.9	4.3	-	0.043	0.41
Selenium, Total Recoverable	kg/day	-	0.68	-	0.31	0.65
Copper, Total Recoverable	µg/L	71	120	-	1.6	3.5
Cyanide, Total	µg/L	19	38	-	2.1	5.1
Dioxin-TEQ	µg/L	1.4E-8	2.8E-8	-	3.9E-9	3.5E-6
Nickel, Total Recoverable	µg/L	240	380	-	24	76
Acute Toxicity	percent survival	-	-	90% (11-sample median)	-	99 [2]
Acute Toxicity	percent survival	-	-	70% (11-sample 90th percentile)	-	100 [1]
Chronic Toxicity	TUc	-	-	10 (single-sample maximum)	-	44
pH	Standard units	-	-	6.0 - 9.0	7.1	6.0 - 8.5 [3]

Footnotes:

[1] This BOD discharge included an effluent limitation allocation for contaminated runoff.

[2] Lowest percent survival.

[3] These are the lowest and highest reported pH values.

2.3.2. **Monitoring data for Discharge Points 002 through 023.** The following table presents stormwater quality during the previous order term (March 2016 – February 2021):

Table F-4. Monitoring Data for Discharge Points 002 through 023

Discharge Point	TOC (mg/L)		Oil and Grease (mg/L)		TSS (mg/L)		pH (s.u.)	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Min.	Max.
002	16	11	9.3	2.0	890	26	7	8.5
003	8.14	6.6	4.2	1.8	47	23	7.3	8.1
004	--	--	--	--	--	--	--	--
005	--	--	--	--	--	--	--	--
006	7.5	7.5	ND	ND	72	72	7.3	7..3
007	13	13	1.6	1.6	23	23	7.4	7.4
008	11	11	1.6	1.6	74	74	7.4	7.4
009	13	7.0	2.1	2.1	72	28	7.3	8.5
010	11.1	2.6	2.2	1.6	140	29	6.7	8
011	--	--	--	--	--	--	--	--
012	--	--	--	--	--	--	--	--
013	--	--	--	--	--	--	--	--
014	29	14	2	1	25	10	7.6	8.4
017	17	9.6	1.3	1.3	15	7.4	6.8	7.5
018	23	11	2.4	1.8	33	17	7.4	8.4
019	10	10	1.3	1.3	400	310	7.4	7.7
020	5.4	4.5	4	2.9	76	32	7.1	8.2
021	12	8.5	4	3.5	9.3	4.9	7.7	8.4
022	3.8	2.9	ND	ND	12	6.1	7.2	7.7
023	10	4.0	ND	ND	4.9	3.2	6.6	7.9

2.4. Compliance Summary

2.4.1. **Discharge Point 001.** During the previous order (February 2017 through January 2022), the Discharger violated its chronic toxicity maximum daily effluent limitation once. At the time of the violation, the Discharger was conducting maintenance on one of the processing units. During maintenance turnarounds, the Discharger cleans and repairs equipment, which may introduce additional pollutants. As a corrective measure, the Discharger stored wash waters and initiated accelerated (monthly) monitoring. The proceeding chronic toxicity test passed and accelerated monitoring was discontinued.

2.4.2. **Discharge Points 002 through 023.** As shown in Table F-4, the Discharger complied with all stormwater effluent limits within the previous order term.

2.5. Sea Level Rise. The Discharger's *Assessment of Potential Future Physical Risks to Richmond Refinery for California Regulatory Compliance* evaluated potential flood risk of the Refinery under future sea level rise, groundwater rise, and storm surge conditions. A detailed perimeter berm evaluation identifies locations and

timeframes when areas of the facility are at risk for inundation from storm events, and inferred potential berm elevations that could reduce interior flood risk. The Discharger also notes that inundation along the coastal areas of the facility does not necessarily result in inundation of interior facilities. An evaluation of potential rising groundwater impacts found that due to the elevated topography associated with the Potrero-San Pablo Ridge, large areas of the Facility are at low risk of impacts from emergent groundwater due to sea level rise. Areas of emergent groundwater and shallow groundwater primarily occur along the seaward margin, with tidal marshes, along surface water drainage features, and near water retention basins. As part of the CEQA requirements for the facility Modernization Project, the Discharger will submit a Flood Contingency Plan to the City of Richmond by April 2024. This contingency plan will use a phased approach and must be updated and resubmitted every five years.

2.6. Planned Changes. The Discharger plans to increase recycled water use within the Refinery cooling towers by using a combination of rainwater runoff and recycled treatment plant effluent. Based on the results of a bench-scale study, the Refinery treatment plant effluent may be a viable supplemental feed source for the RARE water treatment plant, but more investigations are required to ensure permit compliance and evaluate the effect on the RARE microfiltration and reverse osmosis (RO) system. The current plan is to divert some bioreactor effluent to the RARE plant for recycling and to send the RO brine upstream of the Wetlands (see Attachment C, Figure 7). A pilot study to investigate the feasibility and impacts of the project is scheduled to begin in late 2023 or early 2024.

The Discharger also plans to replace and reposition aerators in the bioreactor. While the bioreactor is offline for repairs, the Discharger is considering installation of a BioWeb textile in an aerated section of the bioreactor. The BioWeb is a lock-knit textile designed to encourage biofilm growth on the textile media, which could enhance nutrient removal within the lagoon.

The Discharger also plans to install 14.5 acres of floating photo voltaic solar arrays in the 250-foot channel and 25.4 acres of ground mounted photo voltaic solar arrays on the capped landfill. The project will connect the 15-megawatt capacity to an existing Refinery substation. The project is expected to provide about 35 gigawatt-hours per year.

These changes are not requirements of this Order, except to the extent that they pertain to ensuring Facility reliability.

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also

issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the U.S. EPA, and Water Code chapter 5.5, division 7 (commencing with § 13370). It serves as an NPDES permit authorizing the Discharger to discharge into waters of the United States at the discharge locations described in Table 1 subject to the WDRs in this Order.

3.2. California Environmental Quality Act (CEQA). Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (CEQA), Public Resources Code division 13, chapter 3 (commencing with § 21100).

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin Plan. In addition, this Order implements State Water Board Resolution 88-63, which established State Policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal and domestic supply. Because of the marine influence on San Pablo Bay and San Francisco Bay, total dissolved solids exceed 3,000 mg/L; therefore, San Pablo Bay and San Francisco Bay meet an exception to State Water Board Resolution 88-63. Therefore, the beneficial uses applicable to San Pablo Bay and Central San Francisco Bay are listed below:

Table F-5. Beneficial Uses

Discharge Points	Receiving Water [1]	Beneficial Uses
001, 003, 008, 010 through 014, and 020 through 023	San Pablo Bay	Industrial Service Supply (IND) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)
002, 004 through 007, 009, and 017 through 019	San Francisco Bay Central	Industrial Service Supply (IND) Industrial Process Supply (PRO) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE)

Discharge Points	Receiving Water [1]	Beneficial Uses
		Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

Footnotes:

[1] Wildcat Creek and Castro Creek are not listed because the discharge location is located within the tidal portion of the creek.

3.3.2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** The NTR and CTR contain federal water quality criteria for priority pollutants. U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 NTR criteria apply in California. U.S. EPA adopted the CTR on May 18, 2000. The CTR promulgated new toxics criteria for California and incorporated the NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001.

3.3.3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP establishes implementation provisions for priority pollutant criteria and objectives, and provisions for chronic toxicity control. The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated for California through the NTR and the priority pollutant objectives the Regional Water Board established through the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. Requirements of this Order implement the SIP.

3.3.4. **Sediment Quality.** The State Water Board adopted the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* on September 16, 2008, and it became effective on August 25, 2009. The State Water Board adopted amendments to the plan on June 5, 2018, that became effective on March 11, 2019. This plan establishes sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

3.3.5. **Toxicity Provisions.** The State Water Board adopted the *State Policy for Water Quality Control: Toxicity Provisions* (Toxicity Provisions) on October 5, 2021. U.S. EPA approved the Toxicity Provisions on May 1, 2023. Toxicity Provisions sections II.C.1 and II.C.2 establish numeric chronic and acute toxicity objectives that apply to all inland surface waters, enclosed bays, and estuaries in the State with aquatic life beneficial uses. The Toxicity Provisions include related implementation provisions and require that compliance with the chronic toxicity water quality objectives be assessed using U.S. EPA's Test of

Significant Toxicity (TST) (U.S. EPA, *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document* [EPA/833-R-10-003], June 2010).

3.3.6. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, which incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.

3.3.7. **Anti-Backsliding Requirements.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.8. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. The Discharger is responsible for meeting all applicable Endangered Species Act requirements.

3.4. Impaired Water Bodies on CWA section 303(d) List. On May 11, 2022, U.S. EPA approved a revised list of impaired waters pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt total maximum daily loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for nonpoint sources and are established to achieve water quality standards.

San Pablo Bay and Central San Francisco Bay are listed as impaired waterbodies for chlordane, DDT, dieldrin, dioxin compounds, furan compounds, invasive species, mercury, PCBs, dioxin-like PCBs, and selenium. Central San Francisco Bay is also listed as impaired for trash. On February 12, 2008, U.S. EPA approved

a TMDL for mercury in San Francisco Bay. On March 29, 2010, U.S. EPA approved a TMDL for PCBs in San Francisco Bay. On August 23, 2016, U.S. EPA approved a selenium TMDL for North San Francisco Bay (including San Pablo Bay). The TMDLs for mercury and PCBs are implemented through NPDES Permit CA0038849. This Order implements the selenium TMDL as it applies to the Discharger. According to the Discharger's Report of Waste Discharge submitted May 2021, chlordane, DDT, and dieldrin have not been detected in Facility discharges. This Order contains dioxin-TEQ effluent limitations to ensure that dioxins and furans in effluent are kept below water quality objectives. Facility discharges are not a source of invasive species because the California State Lands Commission sets conditions for approving ballast water disposal, as discussed in Fact Sheet section 6.3.4.5 below.

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters.

4.1. Discharge Prohibitions

4.1.1. Prohibitions in this Order

4.1.1.1. **Discharge Prohibition 3.1 (No discharge other than as described):** This prohibition is based on 40 C.F.R. section 122.21(a) and Water Code section 13260, which require filing an application and Report of Waste Discharge before a discharge can occur. Discharges not described in the application and Report of Waste Discharge, and subsequently in this Order, are prohibited.

4.1.1.2. **Discharge Prohibition 3.2 (No discharge at Discharge Point 001 when treated wastewater does not receive initial dilution of at least 34:1):** This prohibition is based on Basin Plan Discharge Prohibition 1, which prohibits discharges that do not receive a minimum initial dilution of at least 10:1 (10 parts total receiving water after mixing with 1 part effluent). Furthermore, this order allows a 10:1 dilution credit in the calculation of some water quality-based effluent limitations and a 34:1 dilution credit in the calculation of the ammonia water quality-based effluent limitations. These water quality-based effluent limitations would not be protective of water quality if the discharge did not actually achieve at least 34:1 dilution.

4.1.1.3. **Discharge Prohibition 3.3 (No bypass to waters of the United States):** This prohibition is based on 40 C.F.R. section 122.41(m) (see Attachment D section 1.7). This Order allows the Discharger to route peak wet weather flows around the 1A or 2A Separator directly to the bioreactor if the Discharger documents that stormwater constitutes at least 80 percent of the redirected water and the redirected water does not contain visible oil. Downstream treatment units can effectively treat process wastewater diluted to this extent.

4.1.1.4. **Discharge Prohibition 3.4 (No discharge of stormwater from Hensley Street Plant site unless a 24-hour, 25-year storm occurs):** This prohibition is retained from the previous order and is necessary to prevent discharge of contaminated stormwater from the former Hensley Street Plant site, where the Discharger manufactured and formulated fertilizers, pesticides, and fuel additives until 1996.

4.1.1.5. **Discharge Prohibition 3.5 (No discharge of Wetland effluent to Discharge Point 001):** This prohibition is retained from the previous order and is necessary to ensure that treated wastewater will not be toxic to aquatic life.

4.1.2 Basin Plan Discharge Prohibitions. Basin Plan Discharge Prohibition 1 prohibits wastewater discharges having characteristics of particular concern that do not receive a minimum initial dilution of 10:1, the Basin Plan indicates that the prohibition is to address discharges of undiluted wastes or abnormal discharges caused by the malfunction or upset of a treatment process. This Order permits discharge of stormwater from Discharge Points 002 through 023 without an initial dilution of at least 10:1. Since these stormwater discharges do not contain process wastewaters that are undiluted or would be subject to upset, the prohibition does not apply.

Basin Plan Discharge Prohibition 8 prohibits discharge of floating oil or other materials to protect wildlife. This Order establishes effluent limits for oil and grease, and requires the Discharger to conduct acute toxicity tests that ensure that treated effluent is protective of wildlife.

Basin Plan Discharge Prohibition 13 prohibits discharge of oil except in accordance with waste discharge requirements. This Order establishes waste discharge requirements for oil and grease.

4.2. Technology-Based Effluent Limitations

4.2.1. Scope and Authority. CWA section 301(b) and 40 C.F.R. section 122.44(a) require that permits include applicable technology-based limitations based on several levels of control:

Best practicable treatment control technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory.

BPT standards apply to toxic, conventional, and non-conventional pollutants. Conventional pollutants include BOD_5, TSS, pH, and oil and grease.

Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

Best conventional control technology (BCT) represents the control from existing industrial point sources of conventional pollutants. The BCT standard is established after considering the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

New source performance standards (NSPS) represent the best available demonstrated control technology standards for new sources. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

Where U.S. EPA has not yet developed technology-based standards for a particular industry or a particular pollutant, CWA section 402(a)(1) and 40 C.F.R. section 125.3 authorize the use of best professional judgement (BPJ) to derive technology-based effluent limitations on a case-by-case basis. When BPJ is used, the permit must reflect specific factors outlined at 40 C.F.R. section 125.3.

U.S. EPA has established standards of performance (technology-based limitations and standards) for the petroleum refining industry at 40 C.F.R. section 419, *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category*. Subpart E of these regulations for the Integrated Subcategory applies to discharges from the Facility and have been used to develop this Order's limitations and requirements (see Attachment F-1).

4.2.2. Technology-Based Effluent Limitations – Discharge Point 001. The effluent limitations guidelines established in 40 C.F.R. part 419 require that technology-based effluent limitations for Discharge Point 001 be derived based on refinery production (total crude oil throughput) and the treatment processes used. Attachment F-1 presents the derivation of the production-based effluent limitations based on 40 C.F.R. part 419, subpart E. Crude oil throughput is currently 251,000 barrels per day (bbls/d).

The table below lists the most stringent of the calculated BPT, BAT, and BCT limitations. (NSPS limitations do not apply because the Facility was constructed prior to October 18, 1982.) The table also presents the previous order's limitations that were based on a lower crude oil throughput of 244,000 bbls/d.

To avoid backsliding, this Order imposes the more stringent effluent limitations from the previous order.

Table F-6 Technology-Based Effluent Limitations for Process Wastewater

Pollutant	Newly Calculated Maximum Daily Limit (lbs/day)	Newly Calculated Average Monthly Limit (lbs/day)	Previous Maximum Daily Limit (lbs/day)	Previous Average Monthly Limit (lbs/day)
BOD_5	11,000	6,000	11,000	5,800
TSS	7,800	5,000	7,600	4,800
COD	80,000	41,000	78,000	40,000
Oil and Grease	3,500	1,900	3,400	1,800
Sulfide	73	33	71	32
Phenolic Compounds, Total	85	40	80	20
Total Ammonia, as N	4,900	2,200	4,800	2,200
Chromium, Total Recoverable	170	100	67	23
Chromium (VI), Total Recoverable	15	6.5	4.3	1.9
pH	6.0 – 9.0 s.u. (instantaneous)	-	6.0 – 9.0 s.u. (instantaneous)	-

Because ballast water (e.g., cargo hold wash water) and contaminated runoff commingled with process wastewater may also be discharged through Discharge Point 001, Tables 3 and 4 of this Order provide additional allocations that may be applied to the mass-based effluent limitations in Table 2. These additional contaminated runoff allocations are based on 40 C.F.R. sections 419.52(e)(2), 419.53(f)(2), and 419.54(e)(2). The ballast water allocations are based on 40 C.F.R. sections 419.52(c), 419.53(d), and 419.54(c). Attachment F-1 explains these allocations.

4.2.3. Technology-Based Effluent Limitations – Discharge Points 002 through 023. The technology-based effluent limitations for the stormwater outfalls are based on 40 C.F.R. section 419, subpart E (see Attachment F-1). However, the pH limitations in this Order are based on Basin Plan section 3.3.9 because the water quality-based effluent limitations are more stringent than the technology-based effluent limitations required by 40 C.F.R. section 419, subpart E, and are necessary to achieve water quality standards. The stormwater discharges are also subject to the provisions of Attachment S, which constitute narrative technology-based effluent limits. These requirements reflect BAT and BCT as CWA section 301(b) requires.

4.3. Water Quality-Based Effluent Limitations

4.3.1. Scope and Authority. CWA section 301(b) and 40 C.F.R. section 122.44(d) require permits to include limitations more stringent than federal technology-based requirements where necessary to achieve water quality standards.

According to 40 C.F.R. section 122.44(d)(1)(i), permits must include effluent limitations for all pollutants that are or may be discharged at levels that have a reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective, water quality-based effluent limitations (WQBELs) must be established using (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting a narrative criterion, supplemented with relevant information. The process for determining reasonable potential and calculating WQBELs when necessary is intended to achieve applicable water quality objectives and criteria, and thereby protect designated beneficial uses of receiving waters.

4.3.2. Beneficial Uses and Water Quality Criteria and Objectives. Fact Sheet section 3.3.1 identifies the beneficial uses of the receiving waters. Water quality criteria and objectives to protect these beneficial uses are described below.

4.3.2.1. **Basin Plan Objectives.** The Basin Plan specifies numerous water quality objectives, including numeric objectives for 10 priority pollutants, un-ionized ammonia, and pH, and narrative objectives for toxicity and bioaccumulation.

4.3.2.1.1. **Un-ionized Ammonia.** Basin Plan section 3.3.20 contains water quality objectives for un-ionized ammonia of 0.025 mg/L (as nitrogen) as an annual median and 0.4 mg/L (as nitrogen) as a maximum for Lower San Francisco Bay and upstream waters. Effluent and receiving water data are available for total ammonia, but not un-ionized ammonia, because (1) sampling and laboratory methods are unavailable to analyze for un-ionized ammonia, and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on pH, salinity, and temperature of the receiving water.

To translate the un-ionized ammonia objectives into total ammonia criteria, pH, salinity, and temperature collected at the Yerba Buena Island monitoring station (BC10) between 1993 and 2013 were used. The un-ionized fraction of the total ammonia was calculated using the following equations (*Ambient Water Quality Criteria for Ammonia (Saltwater)*–1989, EPA Publication 440/5-88-004, 1989):

Fraction of un-ionized ammonia = (1 + 10[pK – pH])-1

Where, for salinity greater than 10 ppt:

pK = 9.245 + 0.116*(I) + 0.0324*(298-T) + 0.0415*(P)/T
I = molal ionic strength of saltwater = 19.9273*(S)/(1000-1.005109*S)
S = salinity (parts per thousand)

T = temperature in Kelvin

P = pressure (one atmosphere)

The 90th percentile and median un-ionized ammonia fractions were then used to express the maximum and annual average un-ionized objectives as acute and chronic total ammonia criteria. This approach is consistent with U.S. EPA guidance on translating dissolved metal water quality objectives to total recoverable metal water quality criteria (*U.S. EPA, 1996, The Metals Translator: Guidance for Calculating a Total Recoverable Limit form a Dissolved Criterion*, EPA Publication 823-B96-007). The equivalent chronic and acute total ammonia criteria are 1.26 mg/L and 4.15 mg/L (as nitrogen).).

4.3.2.1.2. **Bioaccumulation and Dioxin-TEQ.** Basin Plan section 3.3.2 contains the following narrative toxicity water quality objective:

> Many pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

Because it is the consensus of the scientific community that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissue of fish and other organisms, the Basin Plan's narrative bioaccumulation water quality objective applies to these pollutants. Elevated levels of dioxins and furans in San Francisco Bay fish tissue demonstrate that the narrative bioaccumulation water quality objective is not being met. U.S. EPA has therefore placed San Pablo Bay on its 303(d) list of receiving waters where water quality objectives are not being met after imposition of applicable technology-based requirements.

When the CTR was promulgated, U.S. EPA stated its support for the regulation of dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs). U.S. EPA stated, "For California waters, if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric water quality-based effluent limits for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme" (Fed. Reg. Vol. 65, No. 97, pages 31695-31696, May 18, 2000). This Order uses a TEQ scheme based on a set of toxicity equivalency factors (TEFs) the World Health Organization developed in 2005, and a set of bioaccumulation equivalency factors (BEFs) U.S. EPA developed for the Great Lakes region (40 C.F.R. § 132, Appendix F) to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD).

Although the 2005 World Health Organization scheme includes TEFs for dioxin-like PCBs, they are not included in this Order's TEQ scheme. The CTR has established a specific water quality criterion for PCBs, and dioxin-like PCBs are included in the analysis of total PCBs.

The CTR establishes a numeric water quality objective for 2,3,7,8-TCDD of 1.4×10^{-8} µg/L for the protection of human health when water and aquatic organisms are consumed. This CTR criterion is used as a criterion for dioxin-TEQ because dioxin-TEQ represents a toxicity-weighted concentration equivalent to 2,3,7,8 TCDD, thus translating the narrative bioaccumulation objective into a numeric criterion.

4.3.2.2. **CTR Criteria.** The CTR specifies numeric aquatic life and human health criteria for numerous priority pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries. Some human health criteria are for consumption of "water and organisms" and others are for consumption of "organisms only." The criteria applicable to "organisms only" apply to the San Pablo Bay because it is not a source of drinking water.

4.3.2.3. **NTR Criteria.** The NTR establishes numeric aquatic life and human health criteria for a number of toxic pollutants for San Francisco Bay waters upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. The NTR criteria apply to San Pablo Bay and San Francisco Bay.

4.3.2.4. **Toxicity Provisions.** The Toxicity Provisions establish numeric chronic and acute toxicity objectives that apply to all inland surface waters, enclosed bays, and estuaries in the State with aquatic life beneficial uses. The chronic toxicity water quality objective is as follows:

H_o:
mean response (ambient water) ≤ 0.75 x mean response (control water)

H_a:
mean response (ambient water) > 0.75 x mean response (control water)

Where:

H_o = null hypothesis
H_a = alternative hypothesis,
0.75 = regulatory management decision criterion (i.e., 75 percent)

H_o means the ambient water is toxic when the test organism response in a bioassay is less than or equal to 75 percent of the control response; H_a means the ambient water is not toxic when the test organism response is greater than 75 percent of the control response. For example, if an average of 75 percent of bioassay test organisms or fewer survive when exposed to ambient water relative to the average number that survive when exposed to control water, the ambient water is toxic (i.e., the test result is "fail").

Conversely, if an average of more than 75 percent of bioassay test organisms survive relative to those exposed to control water, the ambient water is not toxic (i.e., the test result is “pass”).

4.3.2.5. **Sediment Quality Objectives.** The *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* contains the following narrative water quality objectives:

4.3.2.5.1. “Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California.” This objective is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this objective, it is to impose the objective as a receiving water limit.

4.3.2.5.2. “Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health in bays and estuaries of California.” This objective is to be implemented by a three-tiered procedure based on pollutant concentrations in sediment and fish tissue.

4.3.2.5.3. “Pollutants shall not be present in sediment at levels that alone or in combination are toxic to wildlife and resident finfish by direct exposure or bioaccumulate in aquatic life at levels that are harmful to wildlife or resident finfish by indirect exposure in bays and estuaries of California.” This objective is to be implemented on a case-by-case basis, based upon an ecological risk assessment.

4.3.2.6. **Receiving Water Salinity.** Basin Plan section 4.6.2 (like the CTR and NTR) states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water are to be considered in determining the applicable water quality objectives. Freshwater criteria apply to discharges to waters with salinities equal to or less than one part per thousand (ppt) at least 95 percent of the time. Saltwater criteria apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities in between these two categories, or tidally-influenced freshwaters that support estuarine beneficial uses, the water quality objectives are the lower of the salt or freshwater criteria (the latter calculated based on ambient hardness) for each substance.

San Pablo Bay, the receiving water for Discharge Point 001, is tidally-influenced. The Discharger collected receiving water salinity data from March 2016 to March 2021 at Monitoring Location RSW-001. These data showed that 100 percent of the samples exceeded 10 ppt, indicative of a marine

environment. Therefore, the salt water criteria apply to the discharge. Discharge Point 002 through 023 discharge to tidally-influenced areas of San Francisco Bay, San Pablo Bay, or San Pablo Bay tributaries.

4.3.2.7. **Metals Translators.** Regulations at 40 C.F.R. section 122.45(c) require effluent limitations for metals to be expressed as total recoverable metal. Since the water quality objectives for metals are typically expressed as dissolved metal, translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. The CTR contains default translators; however, site-specific conditions, such as water temperature, pH, total suspended solids, and organic carbon may affect the form of metal (dissolved, non-filterable, or otherwise) present and therefore available to cause toxicity. In general, dissolved metals are more available and more toxic to aquatic life than other forms. Site-specific translators can account for site-specific conditions, thereby preventing overly stringent or under-protective water quality objectives. For copper, Basin Plan Table 7.2.1-2 contains site-specific translators for deep-water discharges of 0.38 for chronic conditions and 0.66 for acute conditions. For nickel, this Order uses site-specific translators the Clean Estuary Partnership developed, as set forth in North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators report (March 2005): 0.27 and 0.57 (chronic and acute).

4.3.3. Reasonable Potential Analysis – Discharge Point 001

4.3.3.1. **Available Information.** The reasonable potential analysis is based on effluent monitoring data the Discharger collected from February 2017 through January 2022. For ambient background data, this reasonable potential analysis relies on the Regional Monitoring Program *San Francisco Bay California Toxics Rule Priority Pollutant Ambient Water Monitoring Report* (2017), which includes data collected through the RMP at the Yerba Buena RMP station (BC10) from 1993 through 2019, supplemented by additional Bay Area Clean Water Agencies data from *San Francisco Bay Ambient Water Monitoring Interim Report* (2003) and *Ambient Water Monitoring: Final CTR Sampling Update* (2004). For ammonia, the RPA was conducted and WQBELs were calculated using receiving water data collected at the Yerba Buena RMP monitoring station (BC10).

SIP section 1.4.3 requires that background water quality data be representative of the ambient receiving water that will mix with the discharge. For priority pollutants, the Yerba Buena RMP monitoring station (BC10), relative to other RMP stations best fits SIP guidance for establishing background conditions at Discharge Point 001.

This Order does not contain WQBELs for constituents that do not demonstrate reasonable potential; however, the MRP still requires monitoring for those pollutants. If concentrations are found to have increased significantly, Provision 6.3.2.1 of this Order requires the Discharger to

investigate the causes of the increases and implement remedial measures if the increases pose a threat to receiving water quality.

4.3.3.2. **Priority Pollutants, Ammonia, and Dioxin-TEQ.** SIP section 1.3 sets forth the methodology used to assess whether priority pollutants have reasonable potential to exceed CTR and NTR water quality objectives. Here, SIP section 1.3 is also used as guidance for dioxin-TEQ and ammonia.

The analysis begins with identifying the maximum effluent concentration (MEC) observed for each pollutant based on available effluent concentration data and the ambient background concentration (B). SIP section 1.4.3 states that ambient background concentrations are either the maximum ambient concentration observed or, for water quality objectives intended to protect human health, the arithmetic mean of observed concentrations. There are three triggers in determining reasonable potential:

- **Trigger 1** is activated if the maximum effluent concentration is greater than or equal to the lowest applicable water quality objective (MEC ≥ water quality objective).
- **Trigger 2** is activated if the ambient background concentration observed in the receiving water is greater than the lowest applicable water quality objective (B > water quality objective) and the pollutant is detected in any effluent sample.
- **Trigger 3** is activated if a review of other information indicates that a WQBEL is needed to protect beneficial uses.

The maximum effluent concentrations, most stringent applicable water quality criteria and objectives, and ambient background concentrations used in the analysis are presented in the following table, along with the reasonable potential analysis results (yes, no, or unknown) for each pollutant. Based on this analysis, the priority pollutants that demonstrate reasonable potential are arsenic, copper, cyanide, nickel, ammonia, and dioxin-TEQ.

Table F-7. Reasonable Potential Analysis

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1]	B or Minimum DL (µg/L) [1]	RPA Result [2]
1	Antimony	4300	1.1	1.8	No
2	Arsenic	**36**	**64**	**2.5**	**Yes**
3	Beryllium	No Criteria	<0.09	0.22	No
4	Cadmium	1.0	0.08	0.13	No
5a	Chromium (III) [4]	186	3.3	4.4	No
5b	Chromium (VI)	11	5.5	4.4	No

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1]	B or Minimum DL (µg/L) [1]	RPA Result [2]
6	Copper	**14**	**3.5**	**2.5**	**Yes** [6]
7	Lead	2.7	1.6	0.8	No
8	Mercury [5]	-	-	-	-
9	Nickel	**30.4**	**76**	**3.7**	**Yes**
10	Selenium [7]	-	-	-	-
11	Silver	2.2	0.03	0.052	No
12	Thallium	6.3	<0.05	0.023	No
13	Zinc	86	33	5.1	No
14	Cyanide	**2.9**	**6.1**	**0.52**	**Yes** [6]
15	Asbestos (fibers/L)	No Criteria	-	-	U
16	2,3,7,8-TCDD	1.4E-08	<4.9E-07	2.7E-08	U
	Dioxin-TEQ	**1.4E-08**	3.5E-06	**4.1E-08**	**Yes** [5]
17	Acrolein	780	<1.7	<0.5	No
18	Acrylonitrile	0.66	<1.8	0.03	U
19	Benzene	71	<0.18	<0.05	No
20	Bromoform	360	<0.15	<0.15	No
21	Carbon Tetrachloride	4.4	<0.16	0.06	No
22	Chlorobenzene	21000	<0.18	<0.18	No
23	Chlorodibromomethane	34	<0.17	<0.05	No
24	Chloroethane	No Criteria	<0.38	<0.38	U
25	2-Chloroethylvinyl ether	No Criteria	<0.28	<0.28	U
26	Chloroform	No Criteria	2.5	<0.19	U
27	Dichlorobromomethane	46	0.7	<0.05	No
28	1,1-Dichloroethane	No Criteria	<0.19	<0.05	No
29	1,2-Dichloroethane	99	<0.18	0.04	No
30	1,1-Dichloroethylene	3.2	<0.21	<0.21	U
31	1,2-Dichloropropane	39	<0.18	<0.05	No
32	1,3-Dichloropropylene	1700	<0.35	<0.16	No
33	Ethylbenzene	29000	<0.26	<0.26	No
34	Methyl Bromide	4000	<0.3	<0.3	No
35	Methyl Chloride	No Criteria	<0.3	<0.3	U
36	Methylene Chloride	1600	<0.4	22	No
37	1,1,2,2-Tetrachloroethane	11	<0.15	<0.05	No
38	Tetrachloroethylene	8.9	0.2	<0.05	No
39	Toluene	200000	<0.19	<0.19	No
40	1,2-Trans-Dichloroethylene	140000	<0.22	<0.22	No
41	1,1,1-Trichloroethane	No Criteria	<0.19	<0.19	No
42	1,1,2-Trichloroethane	42	<0.16	<0.05	No
43	Trichloroethylene	81	<0.2	<0.2	No
44	Vinyl Chloride	525	<0.25	<0.25	No
45	2-Chlorophenol	400	<0.4	<0.7	No

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1]	B or Minimum DL (µg/L) [1]	RPA Result [2]
46	2,4-Dichlorophenol	790	<0.9	<0.9	No
47	2,4-Dimethylphenol	2300	<0.4	<0.8	No
48	2-Methyl- 4,6-Dinitrophenol	765	<2	<0.6	No
49	2,4-Dinitrophenol	14000	<2	<0.7	No
50	2-Nitrophenol	No Criteria	<1	<0.8	U
51	4-Nitrophenol	No Criteria	<1	<0.5	U
52	3-Methyl 4-Chlorophenol	No Criteria	<0.5	<0.8	U
53	Pentachlorophenol	7.9	<0.4	<0.6	U
54	Phenol	4600000	<0.3	<0.5	No
55	2,4,6-Trichlorophenol	6.5	<2	<0.97	No
56	Acenaphthene	2700	<0.02	0.002	No
57	Acenaphthylene	No Criteria	<0.02	0.001	U
58	Anthracene	110000	<0.03	0.001	No
59	Benzidine	0.00054	<4	<0.0003	U
60	Benzo(a)Anthracene	0.049	<0.02	0.005	U
61	Benzo(a)Pyrene	0.049	<0.04	0.002	U
62	Benzo(b)Fluoranthene	0.049	<0.02	0.005	U
63	Benzo(ghi)Perylene	No Criteria	<0.05	0.003	U
64	Benzo(k)Fluoranthene	0.049	<0.02	0.002	U
65	Bis(2-Chloroethoxy)Methane	No Criteria	<0.5	<0.3	U
66	Bis(2-Chloroethyl)Ether	1.4	<0.9	<0.3	U
67	Bis(2-Chloroisopropyl)Ether	170000	<0.9	<0.6	No
68	Bis(2-Ethylhexyl)Phthalate	5.9	<0.5	<0.5	No
69	4-Bromophenyl Phenyl Ether	No Criteria	<2	<0.23	U
70	Butylbenzyl Phthalate	5200	<2	<0.5	No
71	2-Chloronaphthalene	4300	<1	<0.3	No
72	4-Chlorophenyl Phenyl Ether	No Criteria	<0.28	<0.3	U
73	Chrysene	0.049	<0.02	0.002	U
74	Dibenzo(a,h)Anthracene	0.049	<0.02	0.001	U
75	1,2-Dichlorobenzene	17000	<1	<0.27	No
76	1,3-Dichlorobenzene	2600	<0.9	<0.18	No
77	1,4-Dichlorobenzene	2600	<0.9	<0.18	No
78	3,3 Dichlorobenzidine	0.077	<5	<0.0002	U
79	Diethyl Phthalate	120000	<0.5	<0.2	No
80	Dimethyl Phthalate	2900000	<0.5	<0.2	No
81	Di-n-Butyl Phthalate	12000	<0.4	<0.5	No
82	2,4-Dinitrotoluene	9.1	<0.9	<0.27	U
83	2,6-Dinitrotoluene	No Criteria	<0.4	<0.29	U
84	Di-n-Octyl Phthalate	No Criteria	<0.4	<0.38	U
85	1,2-Diphenyhydrazine	0.54	<0.5	0.004	U
86	Fluoranthene	370	<0.02	0.011	No

CTR No.	Pollutant	C or Governing Criterion or Objective (µg/L)	MEC or Minimum DL (µg/L) [1]	B or Minimum DL (µg/L) [1]	RPA Result [2]
87	Fluorene	14000	<0.02	0.002	No
88	Hexachlorobenzene	0.00077	<1	0.00002	U
89	Hexachlorobutadiene	50	<0.4	<0.3	U
90	Hexachlorocyclopentadiene	17000	<0.9	<0.3	No
91	Hexachloroethane	8.9	<0.9	<0.2	No
92	Indeno(1,2,3-cd)Pyrene	0.049	<0.02	0.004	U
93	Isophorone	600	<0.5	<0.3	No
94	Naphthalene	No Criteria	<0.02	0.009	U
95	Nitrobenzene	1900	<0.5	<0.25	No
96	N-Nitrosodimethylamine	8.1	<0.7	<0.3	U
97	N-Nitrosodi-n-Propylamine	1.4	<0.5	<0.0002	U
98	N-Nitrosodiphenylamine	16	<0.7	<0.001	No
99	Phenanthrene	No Criteria	<0.02	0.006	U
100	Pyrene	11000	<0.02	0.019	No
101	1,2,4-Trichlorobenzene	No Criteria	<0.9	<0.3	No
102	Aldrin	0.00014	<0.02	<0.0000085	U
103	Alpha-BHC	0.013	<0.03	0.0005	No
104	Beta-BHC	0.046	<0.03	0.0004	No
105	Gamma-BHC	0.063	<0.03	0.001	No
106	Delta-BHC	No Criteria	<0.03	0.0001	U
107	Chlordane	0.00059	<0.2	0.0001	U
108	4,4'-DDT	0.00059	<0.02	0.0002	U
109	4,4'-DDE	0.00059	<0.02	0.001	U
110	4,4'-DDD	0.00084	<0.03	0.0003	U
111	Dieldrin	0.00014	<0.02	0.0003	U
112	Alpha-Endosulfan	0.0087	<0.03	0.0001	No
113	beta-Endosulfan	0.0087	<0.03	0.0001	No
114	Endosulfan Sulfate	240	<0.04	0.0001	No
115	Endrin	0.0023	<0.04	0.00004	No
116	Endrin Aldehyde	0.81	<0.04	<0.005	No
117	Heptachlor	0.00021	<0.03	0.00002	U
118	Heptachlor Epoxide	0.00011	<0.03	0.0001	U
119-125	PCBs sum [5]	-	-	-	-
126	Toxaphene	0.0002	<3	<0.00000082	U
	Total Ammonia (mg/L)	**1.2**	**6.1**	**0.43**	**Yes**

Footnotes:

[1] The MEC and ambient background concentration are the actual detected concentrations unless preceded by a "<" sign, in which case the value shown is the minimum detection level (MDL).

[2] RPA Results = Yes, if MEC ≥ WQC, B > WQC and MEC is detected, or Trigger 3
= No, if MEC and B are < WQC or all effluent data are undetected
= Unknown (U) if no criteria have been promulgated or data are insufficient.

[3] The maximum effluent and ambient background concentrations are the total chromium concentration. The chromium (III) concentrations are unknown but less than these values.

[4] SIP section 1.3 excludes from its reasonable potential analysis procedure priority pollutants for which a TMDL has been developed. TMDLs have been developed for mercury and PCBs in San Francisco Bay. Mercury and PCBs from wastewater discharges are regulated by NPDES Permit CA0038849, which implements the San Francisco Bay Mercury and PCBs TMDLs.

[5] Reasonable potential is based on Trigger 3 because San Francisco Bay is 303(d)-listed for dioxin-TEQ and elevated levels of dioxin-TEQ are found in San Francisco Bay fish tissue.

[6] Reasonable potential is based in part on Basin Plan sections 7.2.1.2 and 4.7.2.2.

[7] A TMDL has been developed for selenium in North San Francisco Bay, including San Pablo Bay. This Order implements the North San Francisco Bay Selenium TMDL by establishing mass-based selenium limitations consistent with the TMDL. See Fact Sheet section 4.3.4.4.

4.3.3.3. **Chronic Toxicity.** Toxicity Provisions section III.C.3.c states that reasonable potential exists if any of at least four chronic toxicity tests at the IWC within five years prior to permit reissuance (1) results in a “fail” or (2) has at least a 10 percent effect. If data from these tests were not analyzed using the TST, the data must be re-analyzed using the TST. If previous tests were not conducted at the IWC, then a concentration of effluent higher than the IWC may be used. Data from older tests may also be considered. If a minimum of four chronic toxicity tests is unavailable, the Regional Water Board is to require the Discharger to conduct a minimum of four chronic toxicity tests at the IWC and analyze the data using the TST.

The Discharger’s chronic toxicity screening included quarterly testing on one vertebrate, one invertebrate, and one aquatic plant/algae from Table 1 of Toxicity Provisions section III.B.2. The tests resulted in a fail at 100 percent effluent for three of the four tests. The highest percent effect observed at the 100 percent effluent treatment was a 77 percent effect. At the Instream Waste Concentration (IWC) of 10 percent, there was also one fail; with a percent effect of 22 percent. Based on Toxicity Provisions section III.C.3.c, the tests demonstrate that the discharge has a reasonable potential to contain toxicity above the water quality objectives in the Toxicity Provisions.

4.3.3.4. **Acute Toxicity.** During the previous order term, the Discharger monitored its effluent monthly for acute toxicity and all results showed 90 percent survival. Therefore, there is no reasonable potential for the discharge to cause or contribute to acute toxicity in the receiving water. However, this Order retains the previous order’s acute toxicity limits to ensure that the Discharger continues to properly operate and maintain its granular activated carbon treatment to remove residual toxicity at the end of its treatment process.

4.3.3.5. **Sediment Quality.** Pollutants in some receiving water sediments may be present in quantities that alone or in combination are toxic to benthic communities. The Sediment Quality Plan states that effluent limits to protect sediment quality are to be developed when: (1) a direct relationship between the discharge and degraded sediment has been established; (2) the pollutants causing degradation have been identified; and (3) the reductions in pollutant loading needed to restore sediment quality have been estimated.

However, to date there is no evidence directly linking compromised sediment conditions to the discharges subject to this Order; therefore, the Regional Water Board does not find reasonable potential for this discharge to cause or contribute to exceedances of the sediment quality objectives. Nevertheless, the Discharger continues to participate in the Regional Monitoring Program, which routinely monitors San Francisco Bay sediment and seeks to identify stressors responsible for degraded sediment quality.

4.3.4. **Reasonable Potential Analysis – Discharge Points 002 through 023.** Discharge Points 002 through 023 discharge stormwater from current and former areas of refinery operations and are subject to the technology-based requirements discussed in Fact Sheet section 4.2.3. These requirements, including development and implementation of a Stormwater Pollution Prevention Plan, ensure that stormwater discharges will not contain pollutants that cause or contribute to exceedances of narrative or numeric water quality objectives.

4.3.5. Water Quality-Based Effluent Limitations (WQBELs). WQBELs were developed for the pollutants determined to have reasonable potential to cause or contribute to exceedances of water quality objectives. The WQBEL calculations are based on the procedure in SIP section 1.4.

This Order does not contain WQBELs for constituents that do not demonstrate reasonable potential to exceed the water quality objectives; however, Provision 6.3.2 of the Order requires monitoring for such pollutants. If concentrations are found to have increased significantly, Provision 6.3.2 requires the Discharger to investigate the sources of the increases and implement remedial measures if the increases pose a threat to receiving water quality.

4.3.5.1. **WQBEL Expression.** NPDES regulations at 40 C.F.R. section 122.45(d) require that permit limits for industrial dischargers be expressed as maximum daily and average monthly limits, unless impracticable.

4.3.5.2. **Mixing Zones and Dilution Credits.** SIP section 1.4.2 allows dilution credits under certain circumstances. The outfall at Discharge Point 001 is designed to achieve a minimum initial dilution ratio of at least 10:1. According to the Discharger's dilution study titled *Diffuser Dilution Study in Support of NPDES Permit Renewal* (Exponent, February 12, 2016), which relied on U.S. EPA's *Visual Plumes UM3* modeling software, a lowest conservative estimate of the initial dilution is 34:1. This study showed that the average initial dilution at the edge of the mixing zone, under a maximum observed flow and the assumption of conservative effluent and receiving water salinity and temperature conditions, is 52:1 (receiving water to effluent) during a range of seasonal slack tide conditions. The modeling study was based on ambient and effluent data collected between August 2010 and August 2015. The estimated minimum near-field dilution the Discharger modeled encompassed the maximum recorded daily flow at Discharge Point 001 (27.5 MGD,

reported September 1, 2011) and the most conservative average seasonal receiving water temperature and salinity depth profiles. It also assumed slack tide conditions (i.e., zero ambient current), which occur daily in tidally-influenced estuary environments, such as San Pablo Bay. These worst-case conditions result in a minimum initial dilution ratio of 52:1, which would be expected to persist for about 3 minutes under a complete tidal cycle.

4.3.5.2.1. **Bioaccumulative Pollutants.** For certain bioaccumulative pollutants, dilution credit is significantly restricted or denied. Specifically, these pollutants include dioxin and furan compounds, which appear on the CWA section 303(d) list for San Francisco Bay, including Suisun Bay because, based on available data on the concentrations of these pollutants in aquatic organisms, sediment, and the water column, they impair San Francisco Bay beneficial uses. The following factors suggest insufficient assimilative capacity in San Francisco Bay for these pollutants.

Tissue samples taken from San Francisco Bay fish show the presence of these pollutants at concentrations greater than screening levels (Contaminant Concentrations in Fish from San Francisco Bay, May 1997). The results of a 1994 San Francisco Bay pilot study, presented in Contaminated Levels in Fish Tissue from San Francisco Bay (Regional Water Board, 1994), also show elevated levels of chemical contaminants in fish tissues. The Office of Environmental Health and Hazard Assessment completed a preliminary review of the data in the 1994 report and in December 1994 issued an interim consumption advisory covering certain fish species in San Francisco Bay due to the levels of some of these pollutants. The Office of Environmental Health and Hazard Assessment updated this advisory in a May 2011 report, Health Advisory and Safe Eating Guidelines for San Francisco Bay Fish and Shellfish, which still suggests insufficient assimilative capacity in San Francisco Bay for 303(d)-listed pollutants. Therefore, dilution credits are denied for bioaccumulative pollutants on the 303(d) list for which data are lacking on sources and significant uncertainty exists about how different sources contribute to bioaccumulation.

4.3.5.2.2. **Ammonia.** For ammonia, a conservative initial dilution of 34:1 (D=33) was used to calculate the effluent limitations. This is justified because ammonia, a nonpersistent pollutant, quickly disperses and degrades to a non-toxic state, and cumulative toxicity is unlikely. As such, cumulative toxicity associated with ammonia from other unrelated discharges is unlikely.

4.3.5.2.3. **Other Non-Bioaccumulative Pollutants**. This Order grants a conservative dilution credit of 10:1 (D =9) for other non-bioaccumulative pollutants (excluding ammonia), including chronic toxicity. This dilution credit is based, in part, on Basin Plan Discharge Prohibition 1 (Basin Plan Table 4-1), which prohibits discharges with less than 10:1 dilution, SIP

section 1.4.2 allows for limiting the dilution credit. The dilution credit is limited for the following reasons:

4.3.5.2.3.1. San Francisco Bay is a complex estuarine system with highly variable and seasonal upstream freshwater inflows and diurnal tidal saltwater inputs. SIP section 1.4.3 allows background conditions to be determined on a discharge-by-discharge or water body-by-water body basis. A water body-by-water body approach is taken here due to inherent uncertainties in characterizing ambient background conditions in a complex estuarine system on a discharge-by-discharge basis.

4.3.5.2.3.2. Because of the complex hydrology of San Francisco Bay, there are uncertainties in accurately determining an appropriate mixing zone. The models used to predict dilution do not consider the three-dimensional nature of San Francisco Bay currents resulting from the interaction of tidal flushes and seasonal freshwater outflows. Being heavier and colder than freshwater, ocean saltwater enters San Francisco Bay on a twice-daily tidal cycle, generally beneath the warmer freshwater that flows seaward. When these waters mix and interact, complex circulation patterns occur due to the varying densities of the fresh and ocean waters. The complex patterns occur throughout San Francisco Bay but are most prevalent in San Pablo Bay, Carquinez Strait, and Suisun Bay. The locations of this mixing and interaction change depending on the strength of each tide. Additionally, sediment loads from the Central Valley change on a long-term basis, affecting the depth of different parts of San Francisco Bay, resulting in alteration of flow patterns, mixing, and dilution at the outfall.

4.3.5.3. **Arsenic, Copper, Cyanide, Nickel, Ammonia, and Dioxin-TEQ.** The following table shows the WQBEL calculations for arsenic, copper, cyanide, nickel, ammonia, and dioxin-TEQ in accordance with SIP section 1.4, which is used as guidance for ammonia and dioxin-TEQ.

Table F-8. WQBEL Calculations

Pollutant	Arsenic	Copper	Cyanide	Nickel	Dioxin-TEQ	Ammonia
Units	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
Basis and Criteria type	Basin Plan Salt Water Aquatic Life	Basin Plan Site Specific Objective	Basin Plan Site Specific Objective	Basin Plan and CTR saltwater	Basin Plan Narrative	Basin Plan Aquatic Life (Acute)
CTR Aquatic Life Criteria - Acute	69	-	-	74	-	4.15
CTR Aquatic Life Criteria - Chronic	36	-	-	8.2	-	-
CTR Human Health Criteria - Organisms Only	-	-	-	-	-	-
Site-Specific Objective Criteria - Acute	-	3.9	9.4	-	-	-

Pollutant	Arsenic	Copper	Cyanide	Nickel	Dioxin-TEQ	Ammonia
Site-Specific Objective Criteria - Chronic	-	2.5	2.9	-	-	-
Water Effects Ratio (WER)	1	2.4	1	1	1	1
Lowest WQO	36	2.5	2.9	8.2	1.4E-08	4.2
Site Specific Translator – MDEL	-	0.66	-	0.57	-	-
Site Specific Translator – AMEL	-	0.38	-	0.27	-	-
Dilution Factor (D)	9	9	9	9	0	33
No. of samples per month	4	4	4	4	4	4
Aquatic life criteria analysis required? (Y/N)	Y	Y	Y	Y	N	Y
HH criteria analysis required? (Y/N)	N	N	Y	N	Y	N
Applicable Acute WQO	69	14	9.4	130	-	4.2
Applicable Chronic WQO	36	16	2.9	30.0	-	
HH Criteria	-	-	220000	4600	1.4E-08	N
Background (Maximum Conc. for Aquatic Life Calc.)	2.5	2.5	0.52	3.7	-	0.22
Background (Average Conc. for Human Health Calc.)	-	-	0.44	-	2.2E-08	-
Is the pollutant on the 303d list and/or bioaccumulative (Y/N)?	N	N	N	N	Y	N
ECA Acute	667.5	119	89	1265	-	127
ECA Chronic	337.5	135.4	24	270	-	-
ECA HH		-	2199996	-	1.4E-08	-
No. of data points <10 or at least 80% of data reported non-detect? (Y/N)	N	N	N	N	Y	N
Avg of effluent data points	23.84	1.58	2.0	23.9	3.8E-07	0.68
Std Dev of effluent data points	17.75	0.52	0.89	12.81	1.15E-06	1.26
CV Calculated	0.74	0.33	0.44	0.54	N/A	1.87
CV (Selected) – Final	0.74	0.33	0.44	0.54	0.60	1.87
ECA Acute Mult99	0.27	0.50	0.41	0.35	-	0.12
ECA Chronic Mult99	0.46	0.69	0.62	0.56	-	----
LTA Acute	177.6	59.57	36.6	445.7	-	15.5
LTA Chronic	155.8	93.81	15.0	151.7	-	----
Minimum of LTAs	155.8	59.57	15.0	151.7	-	15.5
AMEL Mult95	1.7	1.3	1.4	1.49	1.55	2.69
MDEL Mult99	3.8	2.0	2.4	2.84	3.11	8.16
AMEL (Aquatic Life)	264.1	76.9	21.0	226.0	-	41.80
MDEL (Aquatic Life)	585.7	119.3	36.6	430.4	-	126.90

Pollutant	Arsenic	Copper	Cyanide	Nickel	Dioxin-TEQ	Ammonia
MDEL/AMEL Multiplier	2.22	1.55	1.74	1.90	2.01	3.04
AMEL (Human Health)	-	-	2.2.E+06	4.60E+04	1.40E-08	-
MDEL (Human Health)	-	-	3.8.E+06	8.76E+04	2.81E-08	-
Minimum of AMEL for Aq. Life vs HH	260	77	21	230	1.40E-08	42
Minimum of MDEL for Aq. Life vs HH	590	120	37	430	2.81E-08	130
Previous Order Limit – AMEL	-	71	19	240	1.40E-08	50
Previous Order Limit – MDEL	-	120	38	380	2.80E-08	150
Final Limit – AMEL	260	71	19	230	1.40E-08	42
Final Limit – MDEL	590	120	37	380	2.80E-08	130

4.3.5.4. **Selenium.** A TMDL for selenium has been adopted for North San Francisco Bay, including a portion of the Sacramento/San Joaquin Delta, Suisun Bay, Carquinez Strait, San Pablo Bay, and Central San Francisco Bay. The TMDL establishes a wasteload allocation of 111 kg/year for the Discharger. Basin Plan section 7.2.4.5 allows the Discharger to discharge no more than its current load based on its selenium concentration and discharge volumes as reported from 2000 through 2012. Specifically, it says selenium WQBELs are to be calculated as the 95th percentile daily load based on representative data reported during 2000 through 2012 and are to be expressed in units of kilograms per day (kg/day). The 95th percentile daily load for this period, after excluding outliers greater than 0.90 kg/day, was 0.68 kg/day. Therefore, this Order establishes a limitation of 0.68 kg/day.

4.3.5.5. **Acute Toxicity.** This Order retains the previous order's acute toxicity limits to ensure that existing treatment performance is maintained.

4.3.5.6. **Chronic Toxicity.** This Order includes chronic toxicity limitations based on Toxicity Provisions section III.C.5. This Order grants a mixing zone for chronic toxicity corresponding to a dilution ratio of at least 10:1 (D=9), equivalent to an IWC of 10 percent effluent. This Order imposes a maximum daily effluent limit (MDEL) and median monthly effluent limit (MMEL) based on testing at the IWC.

4.3.5.7. **Recycled Water Use Effluent Limitation Adjustments for North Richmond Water Reclamation Plant and Richmond Advanced Recycled Expansion.** This Order provides effluent limitation adjustments for recycled water use to encourage wastewater recycling, consistent with Basin Plan section 4.16 and State Water Board Resolutions 77-1 and 2009-0011, by accounting for increased pollutant concentrations that may result from recycled water use. In this sense, "recycled water" does not include treated

wastewater used onsite for landscape irrigation. To justify effluent limitation adjustments for recycled water, the Discharger submitted a technical report titled *Permit Provision C.6 Recycled Water Credits Technical Report* (October 2006) to the Regional Water Board. Relevant report findings are summarized below:

4.3.5.7.1. The Discharger uses approximately 3.4 MGD of tertiary-treated recycled water from EBMUD's North Richmond Water Reclamation Plant in refinery cooling towers.

4.3.5.7.2. The Discharger generates approximately 3.5 MGD of recycled water from the Richmond Advanced Recycled Expansion (RARE) suitable for use as boiler feedwater at the Facility by treating secondary effluent from the West County Wastewater District Water Pollution Control Plant through microfiltration and reverse osmosis. This treatment produces two waste streams:

4.3.5.7.2.1. Microfiltration backwash is returned to the West County Wastewater District Water Pollution Control Plant for treatment, and

4.3.5.7.2.2. Reverse osmosis reject water (approximately 0.525 MGD) is sent to the bioreactor prior to discharge at Discharge Point No. 001.

4.3.5.7.3. The Discharger calculated the total mass of pollutants for which it wishes to receive effluent limitation adjustments using pollutant concentrations in the North Richmond Water Reclamation Plant's tertiary effluent (including flows from the West County Wastewater District Water Pollution Control Plant). The use of the higher quality tertiary-treated effluent results in a conservative estimate for the recycled water adjustments.

4.3.5.7.4. The Discharger performed acute and chronic whole effluent toxicity tests and two priority pollutant scans on reverse osmosis reject water and reverse osmosis reject water blended with the Discharger's effluent. The priority pollutant scans did not reveal any new priority pollutants that would need to be regulated. Further, the whole effluent toxicity tests showed compliance with acute and chronic toxicity objectives.

Provision 4.1.6.1. of this Order continues use of the effluent limitation adjustments for copper, cyanide, nickel, and selenium described in the Discharger's October 2006 technical report, and adds an adjustment for arsenic.

The maximum adjustments are based on the WQBELs that would apply if a more liberal dilution of 20:1 was granted. This dilution is still less than the conservative estimate of 34:1 initial dilution demonstrated in the Discharger's dilution study (see Fact Sheet section 4.3.5.2).

4.3.6. **WQBELs – Discharge Points 002 through 023**. For stormwater discharged from Discharge Points 002 through 023, this Order retains from the previous order the narrative WQBELs of no visible oil or grease, no visible color, and the requirements set forth in Provision 6.3.4.3. This Order also imposes pH WQBELs based on Basin Plan section 3.3.9 because they are more stringent than the technology-based pH effluent limitations.

4.4. Discharge Requirement Considerations

4.4.1. **Anti-backsliding.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations, standards, and conditions in a reissued permit be as stringent as those in the previous permit, with some exceptions in which requirements may be relaxed. This Order complies with the anti-backsliding provisions. The requirements of this Order are at least as stringent as those in the previous order, except for the stormwater allocation for hexavalent chromium as explained below. The changes to chronic toxicity requirements are as stringent as the requirements in the previous permit and are also discussed below.

This Order allows for a small increase in the stormwater allocation for hexavalent chromium. The previous order used a concentration of 0.026 mg/L to determine additional allocations for hexavalent chromium from stormwater—this was a typographical error. To be consistent with the technology-based effluent limits prescribed in 40 C.F.R. sections 419.52 and 419.53, this Order uses a concentration average monthly limit of 0.028 mg/L. CWA section 402(o)(2)(B)(ii) allows such backsliding to correct a technical error.

This Order imposes new chronic toxicity effluent limits and does not retain the chronic toxicity effluent limits in place prior to the new Toxicity Provisions. This complies with anti-backsliding requirements because the new chronic toxicity effluent limits, based on the TST, are comparable to the chronic toxicity effluent limits in the previous permit, which were based on point estimates of chronic toxicity. The AMELs and the MDELs in place prior to the new Toxicity Provisions allow for a 10:1 dilution credit. Similarly, the new MDEL and MMEL are based on an IWC of 10 precent effluent, corresponding to dilution of 10:1. Thus, the use of the TST will not relax effluent limitations. There is no backsliding for acute toxicity because this Order retains the previous order's acute toxicity limits as a special provision.

4.4.2. **Antidegradation.** This Order complies with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16. This Order does not allow for an increased volume, increased concentration of pollutants, or reduced level of treatment relative to the previous order. It continues the status quo with respect to the level of discharge authorized in the previous order (i.e., imposes limits that are at least as stringent as those in the previous order except for a small increase in the stormwater allocation for hexavalent

chromium that the Discharger has not previously used), which was adopted in accordance with the antidegradation policies and thus serves as the baseline by which to measure whether degradation will occur.

4.4.3. **Stringency of Requirements for Individual Pollutants.** This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based requirements implement best professional judgement and applicable federal technology-based requirements. In addition, this Order contains more stringent effluent limitations as necessary to meet water quality standards. Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement CWA requirements.

This Order's WQBELs have been derived to implement water quality objectives that protect beneficial uses. The beneficial uses and water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 C.F.R. section 131.38. The procedures for calculating these WQBELs are based on the CTR, as implemented in accordance with the SIP, which U.S. EPA approved on May 18, 2000. U.S. EPA approved most Basin Plan beneficial uses and water quality objectives prior to May 30, 2000. Beneficial uses and water quality objectives submitted to U.S. EPA prior to May 30, 2000, but not approved by U.S. EPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 C.F.R. section 131.21(c)(1). U.S. EPA approved the remaining beneficial uses and water quality objectives, so they are also applicable water quality standards pursuant to 40 C.F.R. section 131.21(c)(2).

5. RATIONALE FOR RECEIVING WATER LIMITATIONS

The receiving water limitations in sections 5.1 and 5.2 of the Order are based on Basin Plan narrative and numeric water quality objectives. The receiving water limitation in section 5.3 of the Order requires compliance with federal and State water quality standards in accordance with the CWA and regulations adopted thereunder.

6. RATIONALE FOR PROVISIONS

6.1. Standard Provisions

Attachment D contains standard provisions that apply to all NPDES permits in accordance with 40 C.F.R. section 122.41 and additional conditions applicable to specific categories of permits in accordance with 40 C.F.R. section 122.42. The Discharger must comply with these provisions. The conditions set forth in 40 C.F.R. sections 122.41(a)(1) and (b) through (n) apply to all state-issued NPDES permits and must be incorporated into permits either expressly or by reference.

In accordance with 40 C.F.R. section 123.25(a)(12), states may omit or modify conditions to impose more stringent requirements. Attachment G contains standard provisions that supplement the provisions in Attachment D. This Order omits the federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the State's enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates Water Code section 13387(e) by reference.

Attachment S contains stormwater provisions consistent with the State Water Board's General Permit for Stormwater Discharges Associated with Industrial Activities (NPDES CAS000001) (Industrial General Permit), including requirements for the Discharger to prepare a Stormwater Pollution Prevention Plan, to evaluate BMP performance using stormwater action levels (stormwater action levels are not effluent limitations), and to submit an annual stormwater report.

6.2. Monitoring and Reporting Provisions

CWA section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP establishes monitoring, reporting, and recordkeeping requirements that implement federal and State requirements. For more information, see Fact Sheet section 7.

6.3. Special Provisions

6.3.1. Reopener Provisions

These provisions are based on 40 C.F.R. sections 122.62 and 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated water quality objectives, regulations, or other new and relevant information that may become available in the future, and other circumstances as allowed by law.

6.3.2. Effluent Characterization Study and Report

This Order does not include WQBELs for pollutants that do not demonstrate reasonable potential, but this provision requires the Discharger to evaluate monitoring data to verify that the reasonable potential analysis conclusions of this Order remain valid. This requirement is authorized pursuant to 40 C.F.R. section 122.41(h) and Water Code section 13383, and is necessary to inform the next permit reissuance and to ensure that the Discharger takes timely steps in response to any unanticipated change in effluent quality during the term of this Order.

6.3.3. Pollutant Minimization Program

This provision is based on Basin Plan section 4.13.2 and SIP section 2.4.5.

6.3.4. Other Special Provisions

6.3.4.1. **Copper Action Plan.** This provision is based on Basin Plan section 7.2.1.2 and is necessary to ensure that use of copper site-specific objectives is consistent with antidegradation policies. This Order requires the Discharger to implement pretreatment, source control, and pollution prevention for identified sources. Additional actions may be necessary depending on the three-year rolling mean copper concentration in San Pablo Bay. Data the San Francisco Estuary Institute compiled for 2015-2019 indicate no degradation of San Francisco Bay water quality with respect to copper (sfei.org/pages/copper-site-specific-objective-3-year-rolling-averages-0).

6.3.4.2. **Cyanide Action Plan.** This provision is based on Basin Plan section 4.7.2.2 and is necessary to ensure that use of cyanide site-specific objectives is consistent with antidegradation policies.

6.3.4.3. **Stormwater Pollution Prevention Plan and Annual Report.** This provision supplements Attachment S. It is based on Basin Plan section 4.8 and is consistent with the requirements of *NPDES General Permit for Storm Water Discharges Associated with Industrial Activities* (NPDES Permit CAS000001, State Water Board Order 2014-0057-DWQ). These narrative requirements include implementation of best management practices in accordance with 40 C.F.R. section 122.44(k).

6.3.4.4. **Average Selenium Load.** This provision is based on Basin Plan section 7.2.4.5. The information will be used to confirm that selenium loads are consistent with wasteload allocations. The requirements regarding treatment of estimated and non-detect values are consistent with the load calculations performed for the North San Francisco Bay Selenium TMDL.

6.3.4.5. **Acceptance of Ballast Water.** This provision is necessary to ensure that ballast water discharges are not a pathway for invasive species to reach San Francisco Bay. It is consistent with California Code of Regulations, title 2, section 2284(a)(4), which requires approval by the California State Lands Commission to discharge ballast water to a facility. Such approval requires a treatment process adequate to ensure that the discharge of treated ballast water does not release invasive species.

6.3.4.6. **Construction and Development Requirements for Stormwater**. This provision clarifies when the Discharger must apply for coverage under the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (NPDES Permit CAS000002, State Waterboard Order 2022-0057-DWQ).

6.3.4.7. **Wastewater Discharges from the Wetland.** This provision ensures that discharges of Wetland effluent directly through Discharge Point 001 without GAC treatment will not pose a threat to water quality. For intermittent discharges, Basin Plan Table 4-3 requires that acute toxicity tests meet a minimum of 70 percent survival. A Consent Decree *United States v. Chevron Industries Inc.*, Civil No. C98-3966-MEJ and DOJ No. 90-11-3-1398 that was terminated in 2001 allowed Chevron to discharge 3.0 MGD from the Wetland directly to Discharge Point 001 as long as acute toxicity tests of Wetland effluent had at least 80 percent survival. To satisfy anti-backsliding requirements, this Order requires that acute toxicity tests of Wetland effluent meet a minimum of at least 80 percent survival. During the previous permit term, there was one incident of Wetland effluent bypassing GAC filters, due to a severe storm event.

6.3.4.8. **Richmond Advanced Recycled Expansion (RARE) Enhancement Project.** This provision specifies conditions the Discharger must comply with before and after it begins operations of the RARE Enhancement Project. To ensure the Discharger will be able to collect representative samples, this provision requires documentation that there will be complete mixing of treated wastewater and reverse osmosis concentrate prior to Monitoring Location EFF-001.

By reducing effluent flows, the RARE Enhancement Project may increase the toxicity of the discharge and concentration of pollutants in refinery effluent. To evaluate whether there is reasonable potential for an exceedance of water quality objectives, Provision 6.3.4.8.2. requires the Discharger to conduct acute and chronic toxicity tests under worst-case conditions and to monitor reverse osmosis concentrate for pollutants listed in Regional Standard Provisions Table B.

6.3.4.9. **Conditions for Recycled Water Use Adjustment for RARE Enhancement Project.** This provision protects beneficial uses by requiring the Discharger to ensure that recycled water use adjustments, if any are applied, will not cause toxicity. This provision does not authorize any increase in pollutant mass to the receiving water. It authorizes recycling of treated wastewater that could otherwise be discharged to the receiving water without further treatment.

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The following provides the rationale for the monitoring and reporting requirements in the MRP.

7.1 Monitoring Requirements Rationale

7.1.1. **Influent Monitoring.** This Order does not require the Discharger to conduct monitoring of Facility influent. However, the Discharger has the option of using

recycled water in exchange for effluent limitation adjustments, in which case the Discharger will need to conduct monitoring at Monitoring Locations INF-001 and INF-002 (recycled water and raw water intakes).

7.1.2. **Effluent Monitoring.** Effluent flow monitoring is necessary to understand Facility operations. Monitoring for other parameters is necessary to evaluate compliance with this Order's effluent limitations and to conduct future reasonable potential analyses.

7.1.3. **Toxicity Monitoring.** Acute and chronic toxicity tests are necessary to evaluate compliance with this Order's effluent limitations, evaluate whether the Toxicity Provisions' chronic toxicity water quality objectives are met, and to conduct future reasonable potential analyses. Chronic toxicity tests are also necessary to evaluate whether Toxicity Reduction Evaluations are needed. The Discharger conducted a chronic toxicity species sensitive screening on March 3, 2022, which satisfies the minimum screening requirements in Toxicity Provisions section III.C.2.a.

7.1.4. **Receiving Water Monitoring.** The Discharger is required to continue participating in the Regional Monitoring Program, which involves collecting data on pollutants and toxicity in San Francisco Bay water, sediment, and biota. The monitoring is necessary to characterize the receiving water and the effects the discharge has on it.

7.1.5. **Other Monitoring Requirements.** Pursuant to CWA section 308, U.S. EPA requires some dischargers to participate in a Discharge Monitoring Report-Quality Assurance (DMR-QA) Study Program that evaluates the analytical abilities of laboratories that perform or support NPDES permit-required monitoring. The program applies to discharger laboratories and contract laboratories, and evaluates each laboratory's ability to analyze wastewater samples to produce quality data that ensure the integrity of the NPDES program. There are two options to comply: (1) the Discharger may obtain and analyze DMR-QA samples, or (2) pursuant to a waiver U.S. EPA issued to the State Water Board, the Discharger may submit results from the most recent Water Pollution Performance Evaluation Study. MRP section 1.4 requires the Discharger to ensure that the results of the DMR-QA Study or most recent Water Pollution Performance Evaluation Study are submitted to the State Water Board, which forwards the results to U.S. EPA.

7.2. Monitoring Requirements Summary. The table below summarizes routine monitoring requirements. This table is for informational purposes only. The actual requirements are specified in the MRP and elsewhere in this Order. In addition to undertaking the monitoring below, the Discharger must also conduct receiving water monitoring by continuing to participate in the Regional Monitoring Program.

Table F-9. Monitoring Requirements Summary

Parameter	Influent INF-001	Influent INF-002	Effluent EFF-001	Effluent EFF-002 to 003, EFF-009 to 010, EFF-014, and EFF-017 to 023	Effluent EFF-008, and EFF-011	Effluent EFF-004 to EFF-007	Receiving Water RWS-001
Flow	Continuous	-	Continuous	-	-	-	
pH	-	-	Continuous	2/Wet Weather Season or 1/Day	Each Discharge Event	Once	
Temperature	-	-	Continuous	-	-	-	
Specific Conductance	-	-	-	2/Wet Weather Season or 1/Day	Each Discharge Event	Once	
BOD_5	1/Month	1/Year [2]	1/Month	Daily during discharge event [3]	Daily during discharge event [3]	Daily during discharge event [3]	
TSS	1/Week	1/Year [2]	1/Month	2/Wet Weather Season or 1/Day	-	Once	
COD	1/Month	1/Year [2]	1/Month	Daily during discharge event [3]	Daily during discharge event [3]	Daily during discharge event [3]	
TOC	-	-	-	2/Wet Weather Season or 1/Day	Each Discharge event	Once	
Oil and Grease	1/Month	1/Year [2]	1/Month	2/Wet Weather Season or 1/Day	Each Discharge Event	Once	
Sulfide, Total	1/Month]	1/Year [2]	1/Month	-	-	-	
Phenolic Compounds, Total	1/Month	1/Year [2]	1/Month	Daily during discharge event [3]	Daily during discharge event [3]	Daily during discharge event [3]	
Ammonia Nitrogen, Total (as N)	1/Month	1/Year [2]	1/Month	-	-	-	
Chromium, Total Recoverable	1/Month	1/Year [2]	1/Month	Daily during discharge event [3]	Daily during discharge event [3]	Daily during discharge event [3]	
Chromium (VI), Total Recoverable	1/Month	1/Year [2]	1/Month	Daily during discharge event [3]	Daily during discharge event [3]	Daily during discharge event [3]	
Arsenic, Total	1/Month	1/Year [2]	1/Month	-	-	-	
Copper, Total Recoverable	1/Month	1/Year [2]	1/Month	-	-	-	
Cyanide, Total	1/Month	1/Year [2]	1/Month	-	-	-	

Parameter	Influent INF-001	Influent INF-002	Effluent EFF-001	Effluent EFF-002 to 003, EFF-009 to 010, EFF-014, and EFF-017 to 023	Effluent EFF-008, and EFF-011	Effluent EFF-004 to EFF-007	Receiving Water RWS-001
Nickel, Total Recoverable	1/Month	1/Year [2]	1/Month	-	-	-	
Nitrate-nitrite	-	-	1/Month	-	-	-	
Phosphorus, Total	-	-	1/Month	-	-	-	
Selenium, Total Recoverable	1/Week	1/Year [2]	1/Week	-	-	-	
Dioxin-TEQ	2/Year	1/Year [2]	2/Year	-	-	-	-
Salinity	-	-	1/Month	-	-	-	1/Quarter
Hardness					-	-	1/Quarter
Acute Toxicity	-	-	1/Week	-	-	-	
Chronic Toxicity	-	-	1/Month	-	-	-	
All other priority pollutant	-	-	2/Year	-	First discharge event of wet season	-	
Standard Observations	-	-	-	Each discharge event	-	Once	

Footnotes:

[1] The Discharger must also comply with the monitoring requirements in the Mercury and PCBs Watershed Permit (NPDES Permit CA0038849).

[2] The Discharger shall sample and analyze influent raw water at least once per year at Monitoring Location INF-001 for any constituents for which it seeks recycled water use adjustments.

[3] If and when supplemental effluent limitations for the pollutants in Table 7 of this Order become effective, the Discharger shall begin monitoring at outfalls where the limitations are in effect. The Discharger shall continue monitoring each storm event until two consecutive samples show compliance with the TOC and oil and grease limitations in Table 6 of this Order.

8. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for the Facility. As a step in the WDR adoption process, Regional Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process.

8.1. Notification of Interested Parties. The Regional Water Board notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge, and provided an opportunity to submit written comments and recommendations. The public had access to the agenda and any changes in dates

and locations through the Regional Water Board's website (waterboards.ca.gov/sanfranciscobay).

Water Code sections 189.7 and 13149.2 require specific outreach and findings related to potential environmental justice, tribal impact, and racial equity considerations for reissued individual WDRs that include time schedules for achieving compliance with water quality objectives. This Order does not contain such a time schedule; therefore, the specified outreach and findings are not required.

8.2. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were to be submitted either in person or by mail to the Executive Office at the Regional Water Board at 1515 Clay Street, Suite 1400, Oakland, California 94612, to the attention of William Burrell.

Written comments were due at the Regional Water Board office by 5:00 p.m. on September 15, 2023.

8.3. Public Hearing. The Regional Water Board held a public hearing on the tentative WDRs during its meeting at the following date and time:

Date: November 8, 2023
Time: 9:00 a.m.

Contact: William Burrell, (510) 622-2317, william.burrell@waterboards.ca.gov

Interested persons were provided notice of the hearing and information on how to participate. At the public hearing, the Regional Water Board heard testimony pertinent to the discharge and Order.

Dates and venues can change. The Regional Water Board's website is (waterboards.ca.gov/sanfranciscobay), where one can access the current agenda for changes.

8.4. Reconsideration of Waste Discharge Requirements. Any person aggrieved by this Regional Water Board action may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050. The State Water Board must receive the petition at the following address within 30 calendar days of the date of Regional Water Board action:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

A petition may also be filed by email at waterqualitypetitions@waterboards.ca.gov.

For instructions on how to file a water quality petition for review, see the Water Board's petition instructions (waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml).

8.5. Information and Copying. The Report of Waste Discharge, related supporting documents, and comments received are on file and may be inspected at the Regional Water Board address above at any time online or by making an appointment with the Regional Water Board's custodian of records. Document copying may be arranged by calling (510) 622-2300 or emailing Melinda.Wong@waterboards.ca.gov.

8.6. Register of Interested Persons. Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference the Facility, and provide a name, address, and phone number.

8.7. Additional Information. Requests for additional information or questions regarding this Order should be directed to William Burrell, (510) 622-2317, william.burrell@waterboards.ca.gov.

ATTACHMENT F-1

Derivation of Technology-Based Effluent Limitations
Chevron Richmond Refining

References

1. 40 C.F.R. section 419, subpart E – Integrated Subcategory, *Effluent Limitation Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category* (2006)

2. *Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category,* EPA/4401-82/014 (1982)

3. *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry,* U.S. EPA Office of Water Regulations and Standards (1985)

4. Chevron Products Company, NPDES Application for Permit Renewal, NPDES Permit CA0005789 (May 5, 2021)

Definitions

Process Wastewater means any water, which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. [40 C.F.R. § 401.11(q)]

Runoff means the flow of stormwater resulting from precipitation coming into contact with petroleum refinery property. [40 C.F.R. § 419.11(b)]

Ballast means the flow of waters, from a ship, that is treated along with refinery wastewaters in the main treatment system. [40 C.F.R. § 419.11(c)]

Contaminated Runoff means runoff that comes into contact with any raw material, intermediate product, finished product, by-product or waste product located on petroleum refinery property. [40 C.F.R. section 419.11(g)]

Background

According to the Effluent Limitation Guidelines (ELGs) for the Integrated Subcategory of the Petroleum Refining Point Source Category at 40 C.F.R. part 419, subpart E, technology-based effluent limitations are to be based in part on a discharger's production rate. The Discharger's current production rate is 251,000 barrels per day (bbls/d) (the highest annual average production rate from 2017 through 2021). The ELGs also take into account a discharger's specific refinery processes and configuration as explained below.

Process Wastewaters. The ELGs include limits for process wastewaters based on best practicable control technology currently available (BPT), best available technology economically achievable (BAT), and best conventional pollutant control technology (BCT). The most stringent of the BPT, BAT, and BCT limits apply. New Source Performance Standard limitations do not apply because the Facility was constructed prior to October 18, 1982.

The ELGs call for many limits to be calculated based on size factors and process factors. For the process wastewaters discharged at Discharge Point 001, the size factor and process factor are determined as follows:

Size Factor. Based on process data collected between February 2017 through May 2021, the Facility's crude processing rate is 251,100 bbls/day. Pursuant to the ELGs at 40 C.F.R. section 419.52(b)(1) for BPT, at 40 C.F.R. section 419.53(b)(1) for BAT, and at 40 C.F.R. section 419.54(b)(1) for BCT, the size factor for deriving technology-based effluent limitations is 1.04.

Process Factor. The process factor is derived from the total process configuration. To calculate the total process configuration, the process feedstock rate for each crude, cracking and coking, lube, and asphalt process[1] is divided by the overall production rate (251,100 bbls/d). The resulting ratios (process feedstock divided by overall production rate) are then added together, and the result is multiplied by a weight factor specific to each process. Derivation of the Facility's total process configuration is shown in the following table:

Table F-1A. Process Configurations

Process	Process Feedstock Rate (bbls/d)	Process Feedstock / Production Ratio	Weight Factor	Process Configuration
Crude	-	-	-	-
Atm. Dist.	251.1	1	-	-
Vac. Dist.	110.3	0.439	-	-
Desalting	251.1	1	-	-
Total	*612.5*	*2.439*	*1*	*2.439*
Cracking and Coking	-	-	-	-
Fluid Catalytic Cracking	76.8	0.306	-	-
Hydrocracking	126.3	0.503		
Hydrotreating Products	180.6	0.719		
Total	*383.7*	*1.528*	*6*	*9.168*
Lube	-	-	-	-

[1] The specific process groups are listed in the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 19).

Process	Process Feedstock Rate (bbls/d)	Process Feedstock / Production Ratio	Weight Factor	Process Configuration
Lube Hydrofining	21.9	0.087		
Total	21.9	0.087	13	1.134
Asphalt Processes				
Asphalt Production	39	0.155		
Total	39	0.155	12	1.864
Reforming and Alkylation Processes				
Catalytic Reforming	44.5	0.177	-	-
H_2SO_4 Alkylation	27.9	0.111	-	-
Total	72.4	0.288	0	0
-	-	-	-	-
Total	**-**	**-**	**-**	**14.61**

Pursuant to the ELGs at 40 C.F.R. section 419.22(b)(2) for BPT, 40 C.F.R. section 419.232(b)(2) for BAT, and 40 C.F.R. section 419.22(b)(2) for BCT, the process factor for a total process configuration of 14.61 is 2.26.

To determine BAT limitations for total and hexavalent chromium and phenolic compounds in process wastewaters, the ELGs require consideration of effluent factors and refinery processes as explained in 40 C.F.R. section 419.53(c)(1) and the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining*.

Contaminated Runoff. The ELGs include limits for contaminated runoff based on BPT, BAT, and BCT. These limits apply to all stormwater discharges, except stormwater treated and discharged with process wastewaters through Discharge Point 001. The ELGs at 40 C.F.R. section 419.22(e)(2) and 419.23(f)(2) establish limits for oil and grease and total organic carbon (TOC). They also establish additional limits for biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total suspended solids (TSS), phenolic compounds, pH, hexavalent chromium, and total chromium that apply if the limits for oil and grease or TOC are exceeded.

Process Wastewater Effluent Limitations

BPT. The following table shows the derivation of the process wastewater BPT limits for the Facility based on the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Size Factor) x (Process Factor) x (Feed Stock Rate)

Table F-1B. BPT Limitations for Process Wastewaters

Pollutant	Maximum Daily Factor [1]	Average Monthly Factor [1]	Size Factor	Process Factor	Feed Stock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
BOD_5	19.2	10.2	1.04	2.26	251.1	11,000	6,000
TSS	13.2	8.4	1.04	2.26	251.1	7,800	50,000
COD	136	70	1.04	2.26	251.1	80,000	41,000
Oil and Grease	6	3.2	1.04	2.26	251.1	3,500	1,900
Phenolics (4AAP)	0.14	0.068	1.04	2.26	251.1	83	40
Ammonia (as N)	8.3	3.8	1.04	2.26	251.1	4,900	2,200
Sulfide	0.124	0.056	1.04	2.26	251.1	73	33
Total Chromium	0.29	0.17	1.04	2.26	251.1	170	100
Hexavalent Chromium	0.025	0.0011	1.04	2.26	251.1	15	6.5

Footnotes:

[1] From 40 C.F.R. § 419.22(a) (pounds per 1,000 bbls of feedstock)
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)

BAT. The following table shows the derivation of the process wastewater BAT limits for the Facility based on the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Size Factor) x (Process Factor) x (Feed Stock Rate)

Table F-1C. Process Wastewater BAT Limitations

Pollutant	Maximum Daily Factor [1]	Average Monthly Factor [1]	Size Factor	Process Factor	Feed Stock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
COD	136	70	1.04	2.26	251.1	80,000	41,000
Ammonia (as N)	8.3	3.8	1.04	2.26	251.1	4,900	2,200
Sulfide	0.124	0.056	1.04	2.26	251.1	73	33
pH	-	-	-	-	-	[4]	[4]

Footnotes:

[1] From 40 C.F.R. § 419.23(a) (pounds per 1,000 bbls feedstock)
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)
[4] The pH is to be within the range of 6.0 to 9.0 as instantaneous limits.

To determine BAT limits for total and hexavalent chromium and phenolic compounds in process wastewaters, the ELGs require consideration of effluent factors and refinery processes. BAT effluent factors are presented at 40 C.F.R. section 419.23(c)(1); the refinery processes considered are the crude, cracking and coking, and reforming and alkylation processes, which correspond to those identified within the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 20).

Table F-1D. Process Feedstock Rates (bbls/d)

Crude	-
Crude Distillation	251.1
Vacuum Distillation	110.3
Crude Desalting	251.1
Total	**612.5**
Cracking and Coking	-
Fluid Catalytic Cracking	76.8
Hydrocracking	126.3
Hydrotreating Products	180.6
Total	**383.7**
Lubes	
Lube Hydrofining	21.9
Total	**21.9**
Asphalt	
Asphalt Production	39
Total	**39**
Reforming and Alkylation	-
Catalytic Reforming	44.5
H_2SO_4 Alkylation	27.9
Total	**72.4**

Based on the total feedstock rates for each process shown above, the following table shows the derivation of the BAT limits for total and hexavalent chromium and phenolic compounds using the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Process Feedstock Rate)

Table F-1E. Process Wastewater BAT Limitations (Chromium and Phenolics)

Process	Maximum Daily Factor [1]	Average Monthly Factor [1]	Process Feedstock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
Phenolic Compounds	-	-	-	-	-
Crude	0.013	0.0030	612.5	8.0	1.8
Cracking and Coking	0.147	0.036	1383.7	56	14
Lube	0.079	0.019	21.9	3.1	0.74
Asphalt	0.369	0.09	39	8.1	2.0
Reforming and Alkylation	0.132	0.032	72.4	9.6	2.3
Limit (Sum)	-	-	-	**85**	**21**
Total Chromium	-	-	-	-	-
Crude	0.011	0.0040	612.5	6.7	2.5
Cracking and Coking	0.119	0.041	383.7	46	16
Lube	0.064	0.022	21.9	2.5	0.86
Asphalt	0.299	0.104	39	6.6	2.3
Reforming and Alkylation	0.107	0.037	72.4	7.8	2.7
Limit (Sum)	-	-	-	**69**	**24**

Hexavalent Chromium	-	-	-	-	-
Crude	0.0007	0.0003	612.5	0.0003	0.18
Cracking and Coking	0.0076	0.0034	383.7	0.0034	1.30
Lube	0.0041	0.0019	21.9	0.0019	0.07
Asphalt	0.0192	0.0087	39	0.0087	0.19
Reforming and Alkylation	0.0069	0.0031	72.4	0.0031	0.22
Limit (Sum)	-	-	-	**0.02**	**2.0**

Footnotes:

[1] From 40 C.F.R. § 419.23(c), lbs per 1,000 barrels feedstock
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)

BCT. The following table shows the derivation of the process wastewater BCT limits for the Facility based on the following equation:

Effluent Limitation =
(Maximum Daily or Average Monthly Factor) x (Size Factor) x (Process Factor) x (Feed Stock Rate)

Table F-1F. Process Wastewater BCT Limitations

Pollutant	Maximum Daily Factor [1]	Average Monthly Factor [1]	Size Factor	Process Factor	Feed Stock Rate [2]	Maximum Daily Limit [3]	Average Monthly Limit [3]
BOD_5	19.2	10.2	1.04	2.26	251.1	11,000	6,000
TSS	13.2	8.4	1.04	2.26	251.1	7,800	5,000
Oil and Grease	6	3.2	1.04	2.26	251.1	3,500	1,900
pH	-	-	-	-	-	[4]	[4]

Footnotes:

[1] From 40 C.F.R. § 419.24(a), pounds per 1,000 barrels feedstock
[2] 1,000 bbls/d
[3] Pounds per day (lbs/d)
[4] The pH is to be within the range of 6.0 to 9.0 as instantaneous limits.

Most Stringent Technology-Based Effluent Limitations for Process Wastewater. The following table presents the technology-based process wastewater effluent limitations that apply to the Discharger. The limitations are the most stringent of the BPT, BAT, and BCT limitations required by the ELGs and are expressed in units of lbs/day based on a production rate of 251,100 bbls/day.

Table F-1G. Summary of Technology-Based Effluent Limitations for Process Wastewater

Pollutant	Maximum Daily Limit (lbs/day)	Average Monthly Limit (lbs/day)
BOD_5	11,000	6,000
TSS	7,800	5,000
COD	80,000	41,000
Oil and Grease	3,500	1,900
Phenolics (4AAP)	85	21
Ammonia (as N)	5,000	2,200

Pollutant	Maximum Daily Limit (lbs/day)	Average Monthly Limit (lbs/day)
Sulfide	73	33
Total Chromium	69	24
Hex Chromium	4.4	2.0
pH	[1]	[1]

Footnote:

[1] The pH is to be within the range of 6.0 to 9.0 as instantaneous limits.

Contaminated Runoff Effluent Limitations

The ELGs at 40 C.F.R. section 419.22(e)(2) and 419.23(f)(2) establish a limit of 15 mg/L for oil and grease and 110 mg/L for total organic carbon (TOC). If contaminated stormwater discharges exceed the oil and grease limit or the total organic carbon limit, additional concentration-based limits for BOD_5, TSS, COD, phenolic compounds, total chromium, hexavalent chromium, and pH become effective immediately. The effluent limits for these pollutants are derived from the most stringent of the BAT and BPT effluent concentration-based limits provided in the ELGs found at 40 C.F.R. section 419.22(e)(2) and 419.23(f)(2). These additional effluent limits are shown below:

Table F-1H. Effluent Limitations for Contaminated Runoff

Pollutant	Daily Maximum (mg/L)	Average Monthly (mg/L)
BOD_5	48	26
TSS	33	21
COD	360	180
Oil and Grease	15	8.0
Phenolic Compounds	0.35	0.17
Total Chromium	0.60	0.21
Hexavalent Chromium	0.062	0.028
pH	[1]	[1]

Footnote:

[1] Within the range of 6.0 to 9.0

Additional Effluent Limitation Allocations

If contaminated runoff or ballast water is comingled with process wastewater, additional mass-based effluent limitation allocations may be added to the mass-based process wastewater limits indicated in Provision 4.1.1 of the Order. These additional effluent limitation allocations are derived from the most stringent concentration-based limits for contaminated runoff (see Table F-1H) or the table below for ballast water:

Table F-1I. Additional Ballast Water Effluent Limitation Allocations

Pollutant	Daily Maximum (mg/L) [1]	Average Monthly (mg/L) [1]
BOD_5	48	26
TSS	33	21
COD	470	240
Oil and Grease	15	8.0

Footnote:

[1] These values reflect the BPT-based effluent limits of 40 C.F.R. § 419.22(c).

ATTACHMENT G – REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

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ATTACHMENT G – REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

APPLICABILITY

This document supplements the requirements of Federal Standard Provisions (Attachment D). For clarity, these provisions are arranged using to the same headings as those used in Attachment D.

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

1.1. Duty to Comply – Not Supplemented

1.2. Need to Halt or Reduce Activity Not a Defense – Not Supplemented

1.3. Duty to Mitigate – Supplement to Attachment D, Provision 1.3.

1.3.1. **Contingency Plan.** The Discharger shall maintain a Contingency Plan as prudent in accordance with current facility emergency planning. The Contingency Plan shall describe procedures to ensure that existing facilities remain in, or are rapidly returned to, operation in the event of a process failure or emergency incident, such as employee strike, strike by suppliers of chemicals or maintenance services, power outage, vandalism, earthquake, or fire. The Discharger may combine the Contingency Plan and Spill Prevention Plan (see Provision 1.3.2, below) into one document. In accordance with Regional Water Board Resolution No. 74-10, discharge in violation of the permit where the Discharger has failed to develop and implement a Contingency Plan as described below may be the basis for considering the discharge a willful and negligent violation of the permit pursuant to California Water Code section 13387. The Contingency Plan shall, at a minimum, provide for the following:

1.3.1.1. Sufficient personnel for continued facility operation and maintenance during employee strikes or strikes against contractors providing services;

1.3.1.2. Maintenance of adequate chemicals or other supplies, and spare parts necessary for continued facility operations;

1.3.1.3. Emergency standby power;

1.3.1.4. Protection against vandalism;

1.3.1.5. Expeditious action to repair failures of, or damage to, equipment, including any sewer lines;

1.3.1.6. Reporting of spills and discharges of untreated or inadequately treated wastes, including measures taken to clean up the effects of such discharges; and

1.3.1.7. Maintenance, replacement, and surveillance of physical condition of equipment and facilities, including any sewer lines.

1.3.2. **Spill Prevention Plan.** The Discharger shall maintain a Spill Prevention Plan to prevent accidental discharges and to minimize the effects of any such discharges. The Spill Prevention Plan shall do the following:

1.3.2.1. Identify the possible sources of accidental discharge, untreated or partially-treated waste bypass, and polluted drainage;

1.3.2.2. State when current facilities and procedures became operational and evaluate their effectiveness; and

1.3.2.3. Predict the effectiveness of any proposed facilities and procedures and provide an implementation schedule with interim and final dates when the proposed facilities and procedures will be constructed, implemented, or operational.

1.4. Proper Operation and Maintenance – Supplement to Attachment D, Provision 1.4

1.4.1. **Operation and Maintenance Manual.** The Discharger shall maintain an Operation and Maintenance Manual to provide the plant and regulatory personnel with a source of information describing all equipment, recommended operational strategies, process control monitoring, and maintenance activities. To remain a useful and relevant document, the Operation and Maintenance Manual shall be kept updated to reflect significant changes in treatment facility equipment and operational practices. The Operation and Maintenance Manual shall be maintained in usable condition and be available for reference and use by all relevant personnel and Regional Water Board staff.

1.4.2. **Wastewater Facilities Status Report.** The Discharger shall maintain a Wastewater Facilities Status Report and regularly review, revise, or update it, as necessary. This report shall document how the Discharger operates and maintains its wastewater collection, treatment, and disposal facilities to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the Discharger's service responsibilities.

1.4.3. **Proper Supervision and Operation of Publicly-Owned Treatment Works (POTWs).** POTWs shall be supervised and operated by persons possessing

certificates of appropriate grade pursuant to Title 23, section 3680, of the California Code of Regulations.

1.5. Property Rights – Not Supplemented

1.6. Inspection and Entry – Not Supplemented

1.7. Bypass – Not Supplemented

1.8. Upset – Not Supplemented

1.9. Other – Addition to Attachment D

1.9.1. Neither the treatment nor the discharge of pollutants shall create pollution, contamination, or nuisance as defined by California Water Code section 13050.

1.9.2. Collection, treatment, storage, and disposal systems shall be operated in a manner that precludes public contact with wastewater. If public contact with wastewater could reasonably occur on public property, warning signs shall be posted.

1.9.3. If the Discharger submits a timely and complete Report of Waste Discharge for permit reissuance, this permit shall continue in force and effect until the permit is reissued or the Regional Water Board rescinds the permit.

2. STANDARD PROVISIONS – PERMIT ACTION – NOT SUPPLEMENTED

3. STANDARD PROVISIONS – MONITORING

3.1. Sampling and Analyses – Supplement to Attachment D, Provisions 3.1 and 3.2

3.1.1. **Certified Laboratories.** Water and waste analyses shall be performed by a laboratory certified for these analyses in accordance with California Water Code section 13176.

3.1.2. **Minimum Levels.** For the 126 priority pollutants, the Discharger should use the analytical methods listed in Table B unless the Monitoring and Reporting Program (MRP, Attachment E) requires a particular method or minimum level (ML). All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

3.1.3. **Monitoring Frequency.** The MRP specifies the minimum sampling and analysis schedule.

3.1.3.1. **Sample Collection Timing**

3.1.3.1.1. The Discharger shall collect influent samples on varying days selected at random and shall not include any plant recirculation or other sidestream wastes, unless otherwise stipulated in the MRP. The Executive Officer

may approve an alternative influent sampling plan if it is representative of plant influent and complies with all other permit requirements.

3.1.3.1.2. The Discharger shall collect effluent samples on days coincident with influent sampling, unless otherwise stipulated by the MRP. If influent sampling is not required, the Discharger shall collect effluent samples on varying days selected at random, unless otherwise stipulated in the MRP. The Executive Officer may approve an alternative effluent sampling plan if it is representative of plant discharge and in compliance with all other permit requirements.

3.1.3.1.3. The Discharger shall collect effluent grab samples during periods of daytime maximum peak flows (or peak flows through secondary treatment units for facilities that recycle effluent).

3.1.3.1.4. Effluent sampling for conventional pollutants shall occur on at least one day of any multiple-day bioassay the MRP requires. During the course of the bioassay, on at least one day, the Discharger shall collect and retain samples of the discharge. In the event that a bioassay result does not comply with effluent limitations, the Discharger shall analyze the retained samples for pollutants that could be toxic to aquatic life and for which it has effluent limitations.

3.1.3.1.4.1. The Discharger shall perform bioassays on final effluent samples; when chlorine is used for disinfection, bioassays shall be performed on effluent after chlorination and dechlorination; and

3.1.3.1.4.2. The Discharger shall analyze for total ammonia nitrogen and calculate the amount of un ionized ammonia whenever test results fail to meet effluent limitations.

3.1.3.2. **Conditions Triggering Accelerated Monitoring**

3.1.3.2.1. **Average Monthly Effluent Limitation Exceedance.** If the results from two consecutive samples of a constituent monitored in a particular month exceed the average monthly effluent limitation for any parameter (or if the required sampling frequency is once per month or less and the monthly sample exceeds the average monthly effluent limitation), the Discharger shall, within 24 hours after the results are received, increase its sampling frequency to daily until the results from the additional sampling show that the parameter complies with the average monthly effluent limitation.

3.1.3.2.2. **Maximum Daily Effluent Limitation Exceedance.** If a sample result exceeds a maximum daily effluent limitation, the Discharger shall, within 24 hours after the result is received, increase its sampling frequency to daily until the results from two samples collected on consecutive days show compliance with the maximum daily effluent limitation.

3.1.3.2.3. **Acute Toxicity.** If final or intermediate results of an acute bioassay indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay is less than 70 percent), the Discharger shall initiate a new test as soon as practical or as described in applicable State Water Board plan provisions that become effective after adoption of these Regional Standard Provisions. The Discharger shall investigate the cause of the mortalities and report its findings in the next self-monitoring report.

3.1.3.2.4. **Chlorine.** The Discharger shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate control and reliable operation. If an effluent violation is detected, the Discharger shall collect grab samples at least every 30 minutes until compliance with the limitation is achieved, unless the Discharger monitors chlorine residual continuously. In such cases, the Discharger shall continue to conduct continuous monitoring.

3.1.3.2.5. **Bypass.** Except as indicated below, if a Discharger bypasses any portion of its treatment facility, it shall monitor flows and collect samples at affected discharge points and analyze samples for all constituents with effluent limitations on a daily basis for the duration of the bypass. The Discharger need not accelerate chronic toxicity monitoring. The Discharger also need not collect and analyze samples for mercury, dioxin-TEQ, and PCBs after the first day of the bypass. The Discharger may satisfy the accelerated acute toxicity monitoring requirement by conducting a flow-through test or static renewal test that captures the duration of the bypass (regardless of the method specified in the MRP). If bypassing disinfection units only, the Discharger shall only monitor bacteria indicators daily.

3.1.3.2.5.1. **Bypass for Essential Maintenance.** If a Discharger bypasses a treatment unit for essential maintenance pursuant to Attachment D section 1.7.2, the Executive Officer may reduce the accelerated monitoring requirements above if the Discharger (i) monitors effluent at affected discharge points on the first day of the bypass for all constituents with effluent limitations, except chronic toxicity; and (ii) identifies and implements measures to ensure that the bypass will continue to comply with effluent limitations.

3.1.3.2.5.2. **Approved Wet Weather Bypasses.** If a Discharger bypasses a treatment unit or permitted outfall during wet weather with Executive Officer approval pursuant to Attachment D section 1.7.4, the Discharger shall monitor flows and collect and retain samples for affected discharge points on a daily basis for the duration of the bypass. The Discharger shall analyze daily for TSS using 24 hour composites (or more frequent increments) and for bacteria indicators with effluent limitations using grab samples. If TSS exceeds 45 mg/L in any

composite sample, the Discharger shall also analyze daily the retained samples for all other constituents with effluent limitations, except oil and grease, mercury, PCBs, dioxin-TEQ, and acute and chronic toxicity. Additionally, at least once each year, the Discharger shall analyze the retained samples for one approved bypass for all other constituents with effluent limitations, except oil and grease, mercury, PCBs, dioxin-TEQ, and acute and chronic toxicity. This monitoring shall be in addition to the minimum monitoring specified in the MRP.

3.2. Standard Observations – Addition to Attachment D

3.2.1. **Receiving Water Observations.** The following requirements only apply when the MRP requires standard observations of receiving waters. Standard observations shall include the following:

3.2.1.1. **Floating and Suspended Materials (e.g., oil, grease, algae, and other macroscopic particulate matter) —** presence or absence, source, and size of affected area.

3.2.1.2. **Discoloration and Turbidity** — color, source, and size of affected area.

3.2.1.3. **Odor** — presence or absence, characterization, source, and distance of travel.

3.2.1.4. **Beneficial Water Use** — estimated number of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities.

3.2.1.5. **Hydrographic Condition** — time and height of high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time).

3.2.1.6. **Weather Conditions** — wind direction, air temperature, and total precipitation during five days prior to observation.

3.2.2. **Wastewater Effluent Observations.** The following requirements only apply when the MRP requires standard observations of wastewater effluent. Standard observations shall include the following:

3.2.2.1. **Floating and Suspended Material of Wastewater Origin** (e.g., oil, grease, algae, and other macroscopic particulate matter) — presence or absence.

3.2.2.2. **Odor** — presence or absence, characterization, source, distance of travel, and wind direction.

3.2.3. **Beach and Shoreline Observations.** The following requirements only apply when the MRP requires standard observations of beaches or shorelines. Standard observations shall include the following:

3.2.3.1. **Material of Wastewater Origin —** presence or absence, description of material, estimated size of affected area, and source.

3.2.3.2. **Beneficial Use —** estimate of number of people participating in recreational water contact, non-water contact, and fishing activities.

3.2.4. **Waste Treatment and/or Disposal Facility Periphery Observations.** The following requirements only apply when the MRP requires standard observations of the periphery of waste treatment or disposal facilities. Standard observations shall include the following:

3.2.4.1. **Odor** — presence or absence, characterization, source, and distance of travel.

3.2.4.2. **Weather Conditions** — wind direction and estimated velocity.

4. STANDARD PROVISIONS – RECORDS

4.1. Records to be Maintained – Supplement to Attachment D, Provision 4.1

The Discharger shall maintain records in a manner and at a location (e.g., the wastewater treatment plant or the Discharger's offices) such that the records are accessible to Regional Water Board staff. The minimum retention period specified in Attachment D, Provision IV, shall be extended during the course of any unresolved litigation regarding permit-related discharges, or when requested by Regional Water Board or U.S. EPA, Region IX, staff.

A copy of the permit shall be maintained at the discharge facility and be available at all times to operating personnel.

4.2. Records of Monitoring – Supplement to Attachment D, Provision 4.2

Monitoring records shall include the following:

4.2.1. **Analytical Information.** Records shall include analytical method detection limits, minimum levels, reporting levels, and related quantification parameters.

4.2.2. **Disinfection Process.** For the disinfection process, records shall include the following:

4.2.2.1. For bacteriological analyses:

4.2.2.1.1. Wastewater flow rate at the time of sample collection; and

4.2.2.1.2. Required statistical parameters for cumulative bacterial values (e.g., moving median or geometric mean for the number of samples or sampling period identified in the MRP).

4.2.2.2. For the chlorination process (when chlorine is used for disinfection), at least daily average values for the following:

4.2.2.2.1. Chlorine residual of treated wastewater as it enters the chlorine contact basin (mg/L);

4.2.2.2.2. Chlorine dosage (kg/day); and

4.2.2.2.3. Dechlorination chemical dosage (kg/day).

4.2.3. **Wastewater Treatment Process Solids.** For each treatment unit process that involves solids removal from the wastewater stream, records shall include the following:

4.2.3.1. Total volume or mass of solids removed from each collection unit (e.g., grit, skimmings, undigested biosolids, or combination) for each calendar month or other time period as appropriate, but not to exceed annually; and

4.2.3.2. Final disposition of such solids (e.g., landfill, other subsequent treatment unit).

4.2.4. **Treatment Process Bypasses.** For all treatment process bypasses, including wet weather blending, records shall include the following:

4.2.4.1. Chronological log of treatment process bypasses;

4.2.4.2. Identification of treatment processes bypassed;

4.2.4.3. Beginning and ending dates and times of bypasses;

4.2.4.4. Bypass durations;

4.2.4.5. Estimated bypass volumes; and

4.2.4.6. Description of, or reference to other reports describing, the bypasses, their cause, the corrective actions taken (except for wet weather blending explicitly approved within the permit and in compliance with any related permit conditions), and any additional monitoring conducted.

4.2.5. **Treatment Plant Overflows.** The Discharger shall retain a chronological log of overflows at the treatment plant, including the headworks and all units and appurtenances downstream, and records supporting the information provided in accordance with Provision 5.5.2, below.

4.3. Claims of Confidentiality – Not Supplemented

5. STANDARD PROVISIONS – REPORTING

5.1. Duty to Provide Information – Not Supplemented

5.2. Signatory and Certification Requirements – Not Supplemented

5.3. Monitoring Reports – Supplement to Attachment D, Provision 5.3

5.3.1. **Self-Monitoring Reports.** For each reporting period established in the MRP, the Discharger shall submit a self-monitoring report to the Regional Water Board in accordance with the requirements listed in the MRP and below:

5.3.1.1. **Transmittal Letter.** Each self-monitoring report shall be submitted with a transmittal letter that includes the following:

5.3.1.1.1. Identification of all violations of effluent limitations or other waste discharge requirements found during the reporting period;

5.3.1.1.2. Details regarding the violations, such as parameters, magnitude, test results, frequency, and dates;

5.3.1.1.3. Causes of the violations;

5.3.1.1.4. Corrective actions taken or planned to resolve violations and prevent recurrences, and dates or time schedules for implementation (the Discharger may refer to previously submitted reports that address the corrective actions);

5.3.1.1.5. Explanation for any data invalidation. Data should not be submitted in a self-monitoring report if it does not meet quality assurance/quality control standards. However, if the Discharger wishes to invalidate a measurement after submitting it in a self-monitoring report, the Discharger shall identify the measurement suspected to be invalid and state the Discharger's intent to submit, within 60 days, a formal request to invalidate the measurement. The formal request shall include the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports invalidation (e.g., laboratory sheet, log entry, test results), and a discussion of the corrective actions taken or planned (with a time schedule for completion) to prevent recurrence of the sampling or measurement problem;

5.3.1.1.6. Description of blending, if any. If the Discharger blends, it shall describe the duration of blending events and certify whether the blending complied with all conditions for blending;

5.3.1.1.7. Description of other bypasses, if any. If the Discharger bypasses any treatment units (other than blending), it shall describe the duration of the bypasses and effluent quality during those times; and

5.3.1.1.8. Signature. The transmittal letter shall be signed in accordance with Attachment D, Provision 5.2.

5.3.1.2. **Compliance Evaluation Summary.** Each self-monitoring report shall include a compliance evaluation summary that addresses each parameter for which the permit specifies effluent limitations, the number of samples taken during the monitoring period, and the number of samples that exceed the effluent limitations.

5.3.1.3. **More Frequent Monitoring.** If the Discharger monitors any pollutant more frequently than required by the MRP, the Discharger shall include the results of such monitoring in the calculation and reporting of the data submitted in the self-monitoring report.

5.3.1.4. **Analysis Results**

5.3.1.4.1. **Tabulation.** Each self-monitoring report shall include tabulations of all required analyses and observations, including parameters, dates, times, sample stations, types of samples, test results, method detection limits, method minimum levels, and method reporting levels (if applicable), signed by the laboratory director or other responsible official.

5.3.1.4.2. **Multiple Samples.** Unless the MRP specifies otherwise, when determining compliance with effluent limitations (other than instantaneous effluent limitations) and more than one sample result is available, the Discharger shall compute the arithmetic mean. If the data set contains one or more results that are “Detected, but Not Quantified (DNQ) or “Not Detected” (ND), the Discharger shall instead compute the median in accordance with the following procedure:

5.3.1.4.2.1. The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

5.3.1.4.2.2. The median of the data set shall be determined. If the data set has an odd number of data points, the median is the middle value. If the data set has an even number of data points, the median is the average of the two values around the middle, unless one or both of these values is ND or DNQ, in which case the median shall be the lower of the two results (where DNQ is lower than a quantified value and ND is lower than DNQ).

5.3.1.4.3. **Duplicate Samples.** The Discharger shall report the average of duplicate sample analyses when reporting for a single sample result (or the median if one or more of the duplicates is DNQ or ND [see Provision 5.3.1.4.2, above]). For bacteria indicators, the Discharger shall report the geometric mean of the duplicate analyses.

5.3.1.4.4. **Dioxin-TEQ.** The Discharger shall report for each dioxin and furan congener the analytical results of effluent monitoring, including the reporting level, the method detection limit, and the measured concentration. The Discharger shall report all measured values of individual congeners, including data qualifiers. When calculating dioxin-TEQ, the Discharger shall set congener concentrations below the minimum levels (MLs) to zero. The Discharger shall calculate and report dioxin-TEQ using the following formula, where the MLs, toxicity equivalency factors (TEFs), and bioaccumulation equivalency factors (BEFs) are as provided in Table A:

$$\text{Dioxin-TEQ} = \Sigma\,(C_x \times TEF_x \times BEF_x)$$

where: C_x = measured or estimated concentration of congener x
TEF_x = toxicity equivalency factor for congener x
BEF_x = bioaccumulation equivalency factor for congener x

Table A
Minimum Levels, Toxicity Equivalency Factors, and Bioaccumulation Equivalency Factors

Dioxin or Furan Congener	Minimum Level (pg/L)	2005 Toxicity Equivalency Factor (TEF)	Bioaccumulation Equivalency Factor (BEF)
2,3,7,8-TCDD	10	1.0	1.0
1,2,3,7,8-PeCDD	50	1.0	0.9
1,2,3,4,7,8-HxCDD	50	0.1	0.3
1,2,3,6,7,8-HxCDD	50	0.1	0.1
1,2,3,7,8,9-HxCDD	50	0.1	0.1
1,2,3,4,6,7,8-HpCDD	50	0.01	0.05
OCDD	100	0.0003	0.01
2,3,7,8-TCDF	10	0.1	0.8
1,2,3,7,8-PeCDF	50	0.03	0.2
2,3,4,7,8-PeCDF	50	0.3	1.6
1,2,3,4,7,8-HxCDF	50	0.1	0.08
1,2,3,6,7,8-HxCDF	50	0.1	0.2
1,2,3,7,8,9-HxCDF	50	0.1	0.6
2,3,4,6,7,8-HxCDF	50	0.1	0.7
1,2,3,4,6,7,8-HpCDF	50	0.01	0.01
1,2,3,4,7,8,9-HpCDF	50	0.01	0.4
OCDF	100	0.0003	0.02

5.3.1.5. **Results Not Yet Available.** The Discharger shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. Certain analyses may require additional time to complete analytical processes and report results. In these cases, the Discharger shall describe the circumstances in the self-monitoring report and include the data for these parameters and relevant discussions of any violations in the next self-monitoring report due after the results are available.

5.3.1.6. **Annual Self-Monitoring Reports.** By the date specified in the MRP, the Discharger shall submit an annual self-monitoring report covering the previous calendar year. The report shall contain the following:

5.3.1.6.1. Comprehensive discussion of treatment plant performance, including documentation of any blending or other bypass events, and compliance with the permit. This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve the performance and reliability of wastewater collection, treatment, or disposal practices;

5.3.1.6.2. List of approved analyses, including the following:

5.3.1.6.2.1. List of analyses for which the Discharger is certified;

5.3.1.6.2.2. List of analyses performed for the Discharger by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory need not be submitted but shall be retained onsite); and

5.3.1.6.2.3. List of “waived” analyses, as approved;

5.3.1.6.3. Plan view drawing or map showing the Discharger’s facility, flow routing, and sampling and observation station locations; and

5.3.1.6.4. Results of facility report reviews. The Discharger shall regularly review, revise, and update, as necessary, the Operation and Maintenance Manual, Contingency Plan, Spill Prevention Plan, and Wastewater Facilities Status Report so these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Discharger shall describe or summarize its review and evaluation procedures, recommended or planned actions, and estimated time schedule for implementing these actions. The Discharger shall complete changes to these documents to ensure that they remain up-to-date.

5.4. Compliance Schedules – Not supplemented

5.5. Twenty-Four Hour Reporting – Supplement to Attachment D, Provision 5.5

5.5.1. **Oil or Other Hazardous Material Spills**

5.5.1.1. Within 24 hours of becoming aware of a spill of oil or other hazardous material not contained onsite and completely cleaned up, the Discharger shall report as follows:

5.5.1.1.1. If the spill exceeds reportable quantities for hazardous materials listed in 40 C.F.R. part 302. The Discharger shall call the California Office of Emergency Services (800 852-7550).

5.5.1.1.2. If the spill does not exceed reportable quantities for hazardous materials listed in 40 C.F.R., part 302, the Discharger shall call the Regional Water Board (510-622-2369).

5.5.1.2. The Discharger shall submit a written report to the Regional Water Board within five working days following either of the above telephone notifications unless directed otherwise by Regional Water Board staff. A report submitted electronically is acceptable. The written report shall include the following:

5.5.1.2.1. Date and time of spill, and duration if known;

5.5.1.2.2. Location of spill (street address or description of location);

5.5.1.2.3. Nature of material spilled;

5.5.1.2.4. Quantity of material spilled;

5.5.1.2.5. Receiving water body affected, if any;

5.5.1.2.6. Cause of spill;

5.5.1.2.7. Estimated size of affected area;

5.5.1.2.8. Observed impacts to receiving waters (e.g., oil sheen, fish kill, water discoloration);

5.5.1.2.9. Corrective actions taken to contain, minimize, or clean up the spill;

5.5.1.2.10. Future corrective actions planned to prevent recurrence, and implementation schedule; and

5.5.1.2.11. Persons or agencies notified.

5.5.2. **Unauthorized Municipal Wastewater Treatment Plant Discharges**[1]

5.5.2.1. **Two-Hour Notification.** For any unauthorized discharge that enters a drainage channel or surface water, the Discharger shall, as soon as possible, but not later than two hours after becoming aware of the discharge, notify the California Office of Emergency Services (800-852-7550) and the local health officer or director of environmental health with jurisdiction over the affected water body. Notification shall include the following:

5.5.2.1.1. Incident description and cause;

5.5.2.1.2. Location of threatened or involved waterways or storm drains;

5.5.2.1.3. Date and time that the unauthorized discharge started;

5.5.2.1.4. Estimated quantity and duration of the unauthorized discharge (to the extent known), and estimated amount recovered;

5.5.2.1.5. Level of treatment prior to discharge (e.g., raw wastewater, primary-treated wastewater, or undisinfected secondary-treated wastewater); and

5.5.2.1.6. Identity of person reporting the unauthorized discharge.

5.5.2.2. **Five-Day Written Report.** Within five business days following the two-hour notification, the Discharger shall submit a written report that includes, in addition to the information listed in Provision 5.5.2.1, above, the following:

5.5.2.2.1. Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

5.5.2.2.2. Efforts implemented to minimize public exposure to the unauthorized discharge;

5.5.2.2.3. Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of receiving water) and extent of sampling if conducted;

5.5.2.2.4. Corrective measures taken to minimize the impact of the unauthorized discharge;

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[1] California Code of Regulations, Title 23, section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially-treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment, or disposal system.

5.5.2.2.5. Measures to be taken to minimize the potential for a similar unauthorized discharge in the future;

5.5.2.2.6. Summary of Spill Prevention Plan or Operation and Maintenance Manual modifications to be made, if necessary, to minimize the potential for future unauthorized discharges; and

5.5.2.2.7. Quantity and duration of the unauthorized discharge, and the amount recovered.

5.6. Planned Changes – Not supplemented

5.7. Anticipated Noncompliance – Not supplemented

5.8. Other Noncompliance – Not supplemented

5.9. Other Information – Not supplemented

6. STANDARD PROVISIONS – ENFORCEMENT – NOT SUPPLEMENTED

7. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS – NOT SUPPLEMENTED

8. DEFINITIONS – ADDITION TO ATTACHMENT D

More definitions can be found in Attachment A of this NPDES Permit.

8.1. Arithmetic Calculations

8.1.1. **Geometric Mean.** The antilog of the log mean or the back-transformed mean of the logarithmically transformed variables, which is equivalent to the multiplication of the antilogarithms. The geometric mean can be calculated with either of the following equations:

Geometric Mean = Anti log ($1/N \sum \text{Log } C_i$)

or

Geometric Mean = $(C_1 \times C_2 \times \ldots \times C_N)^{1/N}$

Where “N” is the number of data points for the period analyzed and “C” is the concentration for each of the “N” data points.

8.1.2. **Mass Emission Rate.** The rate of discharge expressed in mass. The mass emission rate is obtained from the following calculation for any calendar day:

$$\text{Mass emission rate (lb/day)} = \frac{8.345}{N} \sum_{i=1}^{N} Q_i C_i$$

$$\text{Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of samples analyzed in any calendar day and "Q_i" and "C_i" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" grab samples that may be taken in any calendar day. If a composite sample is taken, "C_i" is the concentration measured in the composite sample and "Q_i" is the average flow rate occurring during the period over which the samples are composited. The daily concentration of a constituent measured over any calendar day shall be determined from the flow weighted average of the same constituent in the combined waste streams as follows:

$$C_d = \text{Average daily concentration} = \frac{1}{Q_i}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of component waste streams and "Q" and "C" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" waste streams. "Q_t" is the total flow rate of the combined waste streams.

8.1.3. **Removal Efficiency.** The ratio of pollutants removed by the treatment facilities to pollutants entering the treatment facilities (expressed as a percentage). The Discharger shall determine removal efficiencies using monthly averages (by calendar month unless otherwise specified) of pollutant concentration of influent and effluent samples collected at about the same time and using the following equation (or its equivalent):

Removal Efficiency (%) =
100 x [1 - (Effluent Concentration / Influent Concentration)]

8.2. Blending – the practice of bypassing biological treatment units and recombining the bypass wastewater with biologically-treated wastewater.

8.3. Composite Sample – a sample composed of individual grab samples collected manually or by an automatic sampling device on the basis of time or flow as specified in the MRP. For flow-based composites, the proportion of each grab sample included in the composite sample shall be within plus or minus five percent (+/-5%) of the representative flow of the waste stream being measured at the time of grab sample collection. Alternatively, equal volume grab samples may be individually analyzed with the flow-weighted average calculated by averaging flow-weighted ratios of each grab sample analytical result. Grab samples comprising time-based composite samples shall be collected at intervals not greater than those specified in the MRP. The quantity of each grab sample comprising a time-based composite sample shall be a set of flow proportional volumes as specified in

the MRP. If a particular time-based or flow-based composite sampling protocol is not specified in the MRP, the Discharger shall determine and implement the most representative protocol.

8.4. Duplicate Sample – a second sample taken from the same source and at the same time as an initial sample (such samples are typically analyzed identically to measure analytical variability).

8.5. Grab Sample – an individual sample collected during a short period not exceeding 15 minutes. Grab samples represent only the condition that exists at the time the sample is collected.

8.6. Overflow – the intentional or unintentional spilling or forcing out of untreated or partially-treated waste from a transport system (e.g., through manholes, at pump stations, or at collection points) upstream of the treatment plant headworks or from any part of a treatment plant.

8.7. Priority Pollutants – those constituents referred to in 40 C.F.R. part 122 as promulgated in the Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000, also known as the California Toxics Rule.

8.8. Untreated waste – raw wastewater.

Table B
List of Monitoring Parameters, Analytical Methods, and Minimum Levels (µg/L)[1]

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
1	Antimony	204.2	-	-	-	-	10	5	50	0.5	5	0.5	-	1000
2	Arsenic	206.3	-	-	-	20	-	2	10	2	2	1	-	1000
3	Beryllium	-	-	-	-	-	20	0.5	2	0.5	1	-	-	1000
4	Cadmium	200 or 213	-	-	-	-	10	0.5	10	0.25	0.5	-	-	1000
5a	Chromium (III)	SM 3500	-	-	-	-	-	-	-	-	-	-	-	-
5b	Chromium (VI)	SM 3500	-	-	-	10	5	-	-	-	-	-	-	1000
	Chromium (total)[3]	SM 3500	-	-	-	-	50	2	10	0.5	1	-	-	1000
6	Copper	200.9	-	-	-	-	25	5	10	0.5	2	-	-	1000
7	Lead	200.9	-	-	-	-	20	5	5	0.5	2	-	-	10,000
8	Mercury	1631[4]	-	-	-	-	-	-	-	-	-	-	-	-
9	Nickel	249.2	-	-	-	-	50	5	20	1	5	-	-	1000
10	Selenium	200.8 or SM 3114B or C	-	-	-	-	-	5	10	2	5	1	-	1000
11	Silver	272.2	-	-	-	-	10	1	10	0.25	2	-	-	1000
12	Thallium	279.2	-	-	-	-	10	2	10	1	5	-	-	1000
13	Zinc	200 or 289	-	-	-	-	20	-	20	1	10	-	-	-
14	Cyanide	SM 4500 CN^- C or I	-	-	-	5	-	-	-	-	-	-	-	-
15	Asbestos (only required for dischargers to MUN waters)[5]	0100.2[6]	-	-	-	-	-	-	-	-	-	-	-	-
16	2,3,7,8-TCDD and 17 congeners (Dioxin)	1613	-	-	-	-	-	-	-	-	-	-	-	-
17	Acrolein	603	2.0	5	-	-	-	-	-	-	-	-	-	-
18	Acrylonitrile	603	2.0	2	-	-	-	-	-	-	-	-	-	-
19	Benzene	602	0.5	2	-	-	-	-	-	-	-	-	-	-
33	Ethylbenzene	602	0.5	2	-	-	-	-	-	-	-	-	-	-
39	Toluene	602	0.5	2	-	-	-	-	-	-	-	-	-	-
20	Bromoform	601	0.5	2	-	-	-	-	-	-	-	-	-	-
21	Carbon Tetrachloride	601	0.5	2	-	-	-	-	-	-	-	-	-	-

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
22	Chlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
23	Chlorodibromomethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
24	Chloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
25	2-Chloroethylvinyl Ether	601	1	1	-	-	-	-	-	-	-	-	-	-
26	Chloroform	601	0.5	2	-	-	-	-	-	-	-	-	-	-
75	1,2-Dichlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
76	1,3-Dichlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
77	1,4-Dichlorobenzene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
27	Dichlorobromomethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
28	1,1-Dichloroethane	601	0.5	1	-	-	-	-	-	-	-	-	-	-
29	1,2-Dichloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
30	1,1-Dichloroethylene or 1,1-Dichloroethene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
31	1,2-Dichloropropane	601	0.5	1	-	-	-	-	-	-	-	-	-	-
32	1,3-Dichloropropylene or 1,3-Dichloropropene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
34	Methyl Bromide or Bromomethane	601	1.0	2	-	-	-	-	-	-	-	-	-	-
35	Methyl Chloride or Chloromethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
36	Methylene Chloride or Dichloromethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
37	1,1,2,2-Tetrachloroethane	601	0.5	1	-	-	-	-	-	-	-	-	-	-
38	Tetrachloroethylene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
40	1,2-Trans-Dichloroethylene	601	0.5	1	-	-	-	-	-	-	-	-	-	-
41	1,1,1-Trichloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
42	1,1,2-Trichloroethane	601	0.5	2	-	-	-	-	-	-	-	-	-	-
43	Trichloroethene	601	0.5	2	-	-	-	-	-	-	-	-	-	-
44	Vinyl Chloride	601	0.5	2	-	-	-	-	-	-	-	-	-	-
45	2-Chlorophenol	604	2	5	-	-	-	-	-	-	-	-	-	-
46	2,4-Dichlorophenol	604	1	5	-	-	-	-	-	-	-	-	-	-
47	2,4-Dimethylphenol	604	1	2	-	-	-	-	-	-	-	-	-	-

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
48	2-Methyl-4,6-Dinitrophenol or Dinitro-2-methylphenol	604	10	5	-	-	-	-	-	-	-	-	-	-
49	2,4-Dinitrophenol	604	5	5	-	-	-	-	-	-	-	-	-	-
50	2-Nitrophenol	604	-	10	-	-	-	-	-	-	-	-	-	-
51	4-Nitrophenol	604	5	10	-	-	-	-	-	-	-	-	-	-
52	3-Methyl-4-Chlorophenol	604	5	1	-	-	-	-	-	-	-	-	-	-
53	Pentachlorophenol	604	1	5	-	-	-	-	-	-	-	-	-	-
54	Phenol	604	1	1	-	50	-	-	-	-	-	-	-	-
55	2,4,6-Trichlorophenol	604	10	10	-	-	-	-	-	-	-	-	-	-
56	Acenaphthene	610 HPLC	1	1	0.5	-	-	-	-	-	-	-	-	-
57	Acenaphthylene	610 HPLC	-	10	0.2	-	-	-	-	-	-	-	-	-
58	Anthracene	610 HPLC	-	10	2	-	-	-	-	-	-	-	-	-
60	Benzo(a)Anthracene or 1,2 Benzanthracene	610 HPLC	10	5	-	-	-	-	-	-	-	-	-	-
61	Benzo(a)Pyrene	610 HPLC	-	10	2	-	-	-	-	-	-	-	-	-
62	Benzo(b) Fluoranthene or 3,4 Benzofluoranthene	610 HPLC	-	10	10	-	-	-	-	-	-	-	-	-
63	Benzo(ghi)Perylene	610 HPLC	-	5	0.1	-	-	-	-	-	-	-	-	-
64	Benzo(k)Fluoranthene	610 HPLC	-	10	2	-	-	-	-	-	-	-	-	-
74	Dibenzo(a,h)Anthracene	610 HPLC	-	10	0.1	-	-	-	-	-	-	-	-	-
86	Fluoranthene	610 HPLC	10	1	0.05	-	-	-	-	-	-	-	-	-
87	Fluorene	610 HPLC	-	10	0.1	-	-	-	-	-	-	-	-	-
92	Indeno(1,2,3-cd)Pyrene	610 HPLC	-	10	0.05	-	-	-	-	-	-	-	-	-
100	Pyrene	610 HPLC	-	10	0.05	-	-	-	-	-	-	-	-	-
68	Bis(2-Ethylhexyl)Phthalate	606 or 625	10	5	-	-	-	-	-	-	-	-	-	-
70	Butylbenzyl Phthalate	606 or 625	10	10	-	-	-	-	-	-	-	-	-	-
79	Diethyl Phthalate	606 or 625	10	2	-	-	-	-	-	-	-	-	-	-
80	Dimethyl Phthalate	606 or 625	10	2	-	-	-	-	-	-	-	-	-	-
81	Di-n-Butyl Phthalate	606 or 625	-	10	-	-	-	-	-	-	-	-	-	-
84	Di-n-Octyl Phthalate	606 or 625	-	10	-	-	-	-	-	-	-	-	-	-
59	Benzidine	625	-	5	-	-	-	-	-	-	-	-	-	-
65	Bis(2-Chloroethoxy)Methane	625	-	5	-	-	-	-	-	-	-	-	-	-

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
66	Bis(2-Chloroethyl)Ether	625	10	1	-	-	-	-	-	-	-	-	-	-
67	Bis(2-Chloroisopropyl) Ether	625	10	2	-	-	-	-	-	-	-	-	-	-
69	4-Bromophenyl Phenyl Ether	625	10	5	-	-	-	-	-	-	-	-	-	-
71	2-Chloronaphthalene	625	-	10	-	-	-	-	-	-	-	-	-	-
72	4-Chlorophenyl Phenyl Ether	625	-	5	-	-	-	-	-	-	-	-	-	-
73	Chrysene	625	-	10	5	-	-	-	-	-	-	-	-	-
78	3,3'-Dichlorobenzidine	625	-	5	-	-	-	-	-	-	-	-	-	-
82	2,4-Dinitrotoluene	625	10	5	-	-	-	-	-	-	-	-	-	-
83	2,6-Dinitrotoluene	625	-	5	-	-	-	-	-	-	-	-	-	-
85	1,2-Diphenylhydrazine[7]	625	-	1	-	-	-	-	-	-	-	-	-	-
88	Hexachlorobenzene	625	5	1	-	-	-	-	-	-	-	-	-	-
89	Hexachlorobutadiene	625	5	1	-	-	-	-	-	-	-	-	-	-
90	Hexachlorocyclopentadiene	625	5	5	-	-	-	-	-	-	-	-	-	-
91	Hexachloroethane	625	5	1	-	-	-	-	-	-	-	-	-	-
93	Isophorone	625	10	1	-	-	-	-	-	-	-	-	-	-
94	Naphthalene	625	10	1	0.2	-	-	-	-	-	-	-	-	-
95	Nitrobenzene	625	10	1	-	-	-	-	-	-	-	-	-	-
96	N-Nitrosodimethylamine	625	10	5	-	-	-	-	-	-	-	-	-	-
97	N-Nitrosodi-n-Propylamine	625	10	5	-	-	-	-	-	-	-	-	-	-
98	N-Nitrosodiphenylamine	625	10	1	-	-	-	-	-	-	-	-	-	-
99	Phenanthrene	625	-	5	0.05	-	-	-	-	-	-	-	-	-
101	1,2,4-Trichlorobenzene	625	1	5	-	-	-	-	-	-	-	-	-	-
102	Aldrin	608	0.005	-	-	-	-	-	-	-	-	-	-	-
103	α-BHC	608	0.01	-	-	-	-	-	-	-	-	-	-	-
104	β-BHC	608	0.005	-	-	-	-	-	-	-	-	-	-	-
105	γ-BHC (Lindane)	608	0.02	-	-	-	-	-	-	-	-	-	-	-
106	δ-BHC	608	0.005	-	-	-	-	-	-	-	-	-	-	-
107	Chlordane	608	0.1	-	-	-	-	-	-	-	-	-	-	-
108	4,4'-DDT	608	0.01	-	-	-	-	-	-	-	-	-	-	-
109	4,4'-DDE	608	0.05	-	-	-	-	-	-	-	-	-	-	-
110	4,4'-DDD	608	0.05	-	-	-	-	-	-	-	-	-	-	-

CTR No.	Pollutant / Parameter	Analytical Method[2]	GC	GC MS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGF AA	HYD RIDE	CVAA	DCP
111	Dieldrin	608	0.01	-	-	-	-	-	-	-	-	-	-	-
112	Endosulfan (alpha)	608	0.02	-	-	-	-	-	-	-	-	-	-	-
113	Endosulfan (beta)	608	0.01	-	-	-	-	-	-	-	-	-	-	-
114	Endosulfan Sulfate	608	0.05	-	-	-	-	-	-	-	-	-	-	-
115	Endrin	608	0.01	-	-	-	-	-	-	-	-	-	-	-
116	Endrin Aldehyde	608	0.01	-	-	-	-	-	-	-	-	-	-	-
117	Heptachlor	608	0.01	-	-	-	-	-	-	-	-	-	-	-
118	Heptachlor Epoxide	608	0.01	-	-	-	-	-	-	-	-	-	-	-
119-125	PCBs: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260	608	0.5	-	-	-	-	-	-	-	-	-	-	-
126	Toxaphene	608	0.5	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

[1] Minimum levels are from the *State Implementation Policy*. They are the concentration of the lowest calibration standard for that technique based on a survey of contract laboratories. Laboratory techniques are defined as follows: GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; LC = High Pressure Liquid Chromatography; Color = Colorimetric; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; ICP = Inductively Coupled Plasma; ICPMS = Inductively Coupled Plasma/Mass Spectrometry; SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., U.S. EPA 200.9); Hydride = Gaseous Hydride Atomic Absorption; CVAA = Cold Vapor Atomic Absorption; DCP = Direct Current Plasma.

[2] The suggested method is the U.S. EPA Method unless otherwise specified (SM = Standard Methods). The Discharger may use another U.S. EPA-approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Discharger has the discretion to use any standard method.

[3] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium criterion (11 ug/l).

[4] The Discharger shall use ultra-clean sampling (U.S. EPA Method 1669) and ultra-clean analytical methods (U.S. EPA Method 1631) for mercury monitoring. The minimum level for mercury is 2 ng/l (or 0.002 ug/l).

[5] MUN = Municipal and Domestic Supply. This designation, if applicable, is in the Findings of the permit.

[6] Determination of Asbestos Structures over 10 [micrometers] in Length in Drinking Water Using MCE Filters, U.S. EPA 600/R-94-134, June 1994.

[7] Detected as azobenzene.

ATTACHMENT S– STORMWATER PROVISIONS, MONITORING, AND REPORTING REQUIREMENTS

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ATTACHMENT S – STORMWATER PROVISIONS, MONITORING, AND REPORTING REQUIREMENTS

APPLICABILITY

These stormwater provisions only apply to facilities that do not direct all stormwater flows from proves areas to a wastewater treatment plant's headwork or do not enroll in NPDES Permit CAS000001 (General Permit for Stormwater Discharges Associated with Industrial Activities).

1. STORMWATER PROVISIONS – PERMIT COMPLIANCE

1.1. Stormwater Pollution Prevention Plan (SWPPP)

The Discharger shall prepare a SWPPP that includes the following elements:

1.1.1. Facility name and contact information;

1.1.2. Site map;

1.1.3. List of industrial materials;

1.1.4. Description of potential sources;

1.1.5. Assessment of potential pollutant sources;

1.1.6. Minimum Best Management Practices (BMPs);

1.1.7. Advanced BMPs, if applicable;

1.1.8. Monitoring implementation plan;

1.1.9. Annual comprehensive facility compliance evaluation; and

1.1.10. Date SWPPP initially prepared and dates of each SWPPP amendment.

The SWPPP shall be designed in accordance with good engineering practices to achieve the following objectives:

- Identify and evaluate all pollutant sources that may affect stormwater discharge quality;
- Identify, assign, and implement control measures and management practices to reduce or prevent pollutants in stormwater discharges; and
- Identify and describe conditions or circumstances that may require revisions to the SWPPP.

The SWPPP shall be retained onsite, revised whenever necessary, and made available upon request of any Regional Water Board representative. The SWPPP may be combined with the Spill Prevention Plan (Attachment G section 1.3.2).

1.2. Site Map

The Discharger shall prepare one or more site maps that include notes, legends, a north arrow, and other data as appropriate to ensure the map is clear, legible and understandable, including the following:

1.2.1 The facility boundary, stormwater drainage areas within the facility boundary, and portions of any drainage area impacted by discharges from surrounding areas (the maps shall include the flow direction of each drainage area, on-facility surface water bodies, areas of soil erosion, and locations of nearby water bodies [e.g., rivers, lakes, wetlands] or municipal storm drain inlets that may receive the facility's industrial stormwater discharges and authorized non-stormwater discharges);

1.2.2. Locations of stormwater collection and conveyance systems, associated discharge locations, and direction of flow (the maps shall include sample locations if different than the discharge locations);

1.2.3. Locations of stormwater collection and conveyance systems, associated discharge locations, and direction of flow (the maps shall include sample locations if different than the discharge locations);

1.2.4. I dentification of all impervious areas, including paved areas, buildings, covered storage areas, or other roofed structures;

1.2.5. Locations where materials are directly exposed to precipitation and the locations where identified significant spills or leaks have occurred; and

1.2.6. Areas of industrial activity (the maps shall identify all industrial storage areas and storage tanks, shipping and receiving areas, fueling areas, vehicle and equipment storage and maintenance areas, material handling and processing areas, waste treatment and disposal areas, dust or particulate generating areas, cleaning and material reuse areas, and other areas of industrial activity that may have potential pollutant sources).

1.3. List of Industrial Materials

The SWPPP shall contain a list of industrial materials handled at the facility and the locations where each material is stored, received, shipped, and handled, as well as the typical quantities and handling frequency.

1.4. Potential Pollutant Sources

The Discharger shall describe and assess potential stormwater pollutant sources, including the following:

1.4.1. **Industrial Processes.** Industrial processes may include manufacturing, cleaning, maintenance, recycling, and disposal. The SWPPP shall describe the type, characteristics, and approximate quantity of industrial materials used and areas protected by containment structures and the corresponding containment capacity.

1.4.2. **Material Handling and Storage Areas.** The SWPPP shall describe the type, characteristics, and quantity of industrial materials handled or stored; shipping, receiving, and loading procedures; spill and leak prevention and response procedures; and areas protected by containment structures and the corresponding containment capacity.

1.4.3. **Dust and Particulate Generating Activities.** The SWPPP shall describe the discharge locations, source type, and characteristics of the dust or particulate pollutant.

1.4.4. **Significant Spills and Leaks.** The Discharger shall evaluate the facility for areas where spills and leaks can occur. The SWPPP shall list any industrial materials spilled or leaked in significant quantities and discharged from the facility's stormwater conveyance system within the previous five years, including but not limited to any chemicals identified in 40 C.F.R. section 302 as reported on U.S. EPA Form R and any oil and hazardous substances discharged in excess of reportable quantities (40 C.F.R. §§ 110, 117, and 302). The SWPPP shall also list any industrial materials spilled or leaked in significant quantities that had the potential to be discharged from the facility's stormwater conveyance system within the previous five years. For each listed industrial material spill and leak, the SWPPP shall include the location, characteristics, and approximate quantity of the material spilled or leaked; the approximate quantity of the material discharged; the cleanup or remedial actions taken or planned; the approximate quantity of remaining material that could be discharged; and the preventive measures taken to ensure that spills or leaks do not reoccur.

1.4.5. **Non-Stormwater Discharges.** The SWPPP shall describe all non-stormwater discharges, including the source, quantity, frequency, characteristics, and associated drainage area, and indicate whether these discharges are authorized or unauthorized.

1.4.6. **Erodible Surfaces.** The SWPPP shall describe any facility locations where soil erosion may be caused by industrial activity, contact with stormwater, authorized and unauthorized non-stormwater discharges, or run-on from areas surrounding the facility.

1.5. Assessment of Potential Pollutant Sources

The SWPPP shall include a narrative assessment of all areas of industrial activity with potential industrial pollutant sources, including, at a minimum, the following:

1.5.1. Facility areas with likely sources of pollutants;

1.5.2. Pollutants likely to be present in industrial stormwater discharges;

1.5.3. Approximate quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each industrial material handled, produced, stored, recycled, or disposed;

1.5.4. Degree to which the pollutants associated with such materials may be exposed to, and mobilized by, contact with stormwater;

1.5.5. Direct and indirect pathways by which pollutants may be exposed to stormwater;

1.5.6. Sampling, visual observation, and inspection records;

1.5.7. Effectiveness of existing BMPs to reduce or prevent pollutants in industrial stormwater discharges; and

1.5.8. Estimated effectiveness of implementing, to the extent feasible, minimum BMPs to reduce or prevent pollutants in industrial stormwater discharges.

Based upon the assessment, the SWPPP shall identify facility areas where the minimum BMPs described in Provision 1.6, below, will not adequately reduce or prevent pollutants in stormwater discharges and any necessary advanced BMPs, as described in Provision 1.7, below, for those areas.

1.6. Minimum Best Management Practices (BMPs)

The Discharger shall, to the extent feasible, implement and maintain the following BMPs:

1.6.1. **Good Housekeeping.** The Discharger shall do the following:

1.6.1.1. Observe all outdoor areas associated with industrial activity, including stormwater discharge locations, drainage areas, conveyance systems, waste handling and disposal areas, and perimeter areas affected by off-facility materials or stormwater run-on to determine housekeeping needs. Any identified debris, waste, spills, tracked materials, or leaked materials shall be cleaned and disposed of properly;

1.6.1.2. Minimize or prevent material tracking;

1.6.1.3. Minimize dust generated from industrial materials or activities;

1.6.1.4. Ensure that all facility areas impacted by rinse or wash waters are cleaned as soon as possible;

1.6.1.5. Cover all stored industrial materials that can be readily mobilized by contact with stormwater;

1.6.1.6. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper) that can be transported or dispersed by the wind or contact with stormwater;

1.6.1.7. Prevent disposal of any rinse or wash waters or industrial materials into the stormwater conveyance system;

1.6.1.8. Minimize stormwater discharges from non-industrial areas (e.g., stormwater flows from employee parking areas) that contact industrial areas of the facility; and,

1.6.1.9. Minimize authorized non-stormwater discharges from non-industrial areas (e.g., potable water, fire hydrant testing) that contact areas of the sanitary or industrial facility.

1.6.2. **Preventative Maintenance.** The Discharger shall (1) identify all equipment and systems used outdoors that may spill or leak pollutants, (2) observe the identified equipment and systems to detect leaks or identify conditions that may result in the development of leaks, (3) establish an appropriate schedule for maintenance of identified equipment and systems, and (4) establish procedures for prompt maintenance and repair of equipment and maintenance of systems when conditions exist that may result in the development of spills or leaks.

1.6.3. **Spill and Leak Prevention and Response.** The Discharger shall (1) establish procedures and controls to minimize spills and leaks; (2) develop and implement spill and leak response procedures to prevent industrial materials from discharging through the stormwater conveyance system (spilled or leaked industrial materials shall be cleaned promptly and disposed of properly); (3) identify and describe all necessary and appropriate spill and leak response equipment, locations of spill and leak response equipment, and spill or leak response equipment maintenance procedures; and (4) identify and train appropriate spill and leak response personnel.

1.6.4. **Material Handling and Waste Management.** The Discharger shall do the following:

1.6.4.1. Prevent or minimize handling of industrial materials or wastes that can be readily mobilized by contact with stormwater during a storm;

1.6.4.2. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powers, shredded paper) that can be transported or dispersed by the wind or contact with stormwater;

1.6.4.3. Cover industrial waste disposal containers and industrial material storage containers that contain industrial materials when not in use;

1.6.4.4. Divert run-on and stormwater generated from within the facility away from all stockpiled materials;

1.6.4.5. Clean all spills of industrial materials or wastes that occur during handling in accordance with spill response procedures; and,

1.6.4.6. Observe and clean, as appropriate, any outdoor material or waste handling equipment or containers that can be contaminated by contact with industrial materials or wastes.

1.6.5. **Erosion and Sediment Control.** The Discharger shall (1) implement effective wind erosion controls; (2) provide effective stabilization for inactive areas, finished slopes, and other erodible areas prior to a forecasted storms; (3) maintain effective perimeter controls and stabilize site entrances and exits to sufficiently control discharges of erodible materials; and (4) divert run-on and stormwater generated from within the facility away from erodible materials.

1.6.6. **Employee Training.** The Discharger shall ensure that all personnel implementing the SWPPP are properly trained with respect to BMP implementation, BMP effectiveness evaluations, visual observations, and monitoring activities. The Discharger shall identify which personnel need to be trained, their responsibilities, and the type of training they are to receive and maintain documentation of completed training and the personnel that received the training with the SWPPP.

1.6.7. **Quality Assurance and Record Keeping.** The Discharger shall (1) develop and implement management procedures to ensure that appropriate personnel implement all SWPPP elements; (2) develop methods of tracking and recording BMP implementation; and (3) maintain BMP implementation records, training records, and records related to any spills and clean-up related response activities for a minimum of five years.

1.7. Action Levels and Advanced BMPs

If the Discharger samples total suspended solids (TSS), oil and grease, or pH in excess of an action level in Table S-1, the Discharger shall review the SWPPP to identify appropriate modifications to existing BMPs or additional BMPs as necessary to reduce pollutant discharge concentrations to levels below the action level. The Discharger shall revise the SWPPP accordingly before the next storm, if possible, or as soon as practical, and in no event later than three months following the exceedance.

Table S-1. Stormwater Action Levels

Parameter	Unit	Instantaneous Action Level	Annual Action Level
Total Suspended Solids	mg/L	400	100
Oil and Grease	mg/L	25	15
pH	s.u.	6.0-9.0[1]	----

Footnotes:

[1] Values below or above this range require action.

If, upon subsequent monitoring, the pollutants measured in Table S-1 continue to exceed their respective action levels, the Discharger shall further evaluate its BMPs and update its SWPPP accordingly to include advanced BMPs in addition to the minimum BMPs described in Provision 1.6, above. The Discharger shall, to the extent feasible, implement and maintain any advanced BMPs identified pursuant to Provision 1.5.8, above, as necessary to reduce or prevent discharges of pollutants in stormwater discharges in a manner that reflects best industry practice considering technological availability and

economic practicability and achievability. Advanced BMPs may include one or more of the following:

1.7.1. **Exposure Minimization BMPs**. These include storm resistant shelters (either permanent or temporary) that prevent the contact of stormwater with identified industrial materials.

1.7.2. **Stormwater Containment and Discharge Reduction BMPs.** These include BMPs that divert, infiltrate, reuse, contain, retain, or reduce the volume of stormwater runoff.

1.7.3. **Treatment Control BMPs.** These include mechanical, chemical, biologic, or any other treatment technology that will meet the treatment design standard.

1.8. BMP Descriptions

The SWPPP shall identify each BMP being implemented at the facility, including the following:

1.8.1. The pollutants the BMP is designed to reduce or prevent;

1.8.2. The frequency, times of day, or conditions when the BMP is scheduled for implementation;

1.8.3. The locations within each area of industrial activity or industrial pollutant source where the BMP shall be implemented;

1.8.4. The individual responsible for implementing the BMP;

1.8.5. The procedures, including maintenance procedures, and instructions to implement the BMP effectively; and

1.8.6. The equipment and tools necessary to implement the BMP effectively.

1.9. Annual Comprehensive Facility Compliance Evaluation

The Discharger shall conduct one annual facility evaluation for each reporting year (July 1 to June 30). If the Discharger conducts an annual evaluation fewer than 8 months, or more than 16 months, after it conducts the previous annual evaluation, it shall document the justification for doing so. The Discharger shall revise the SWPPP, as appropriate, and implement the revisions within 90 days of the annual evaluation. At a minimum, the annual evaluations shall consist of the following:

1.9.1. A review of all sampling, visual observation, and inspection records conducted during the previous reporting year;

1.9.2. An inspection of all areas of industrial activity and associated potential pollutant sources for evidence of, or the potential for, pollutants entering the stormwater conveyance system;

1.9.3. An inspection of all drainage areas previously identified as having no exposure to industrial activities and materials;

1.9.4. An inspection of equipment needed to implement the BMPs; and

1.9.5. An assessment of any other factors needed to comply with the requirements of the Annual Stormwater Report (see Provision 3.1, below).

2. STORMWATER PROVISIONS – MONITORING

2.1. Monthly Visual Observations

2.1.1. At least once per month, the Discharger shall visually observe each drainage area for the following:

2.1.1.1. The presence or indication of prior, current, or potential unauthorized non-stormwater discharges and their sources;

2.1.1.2. Authorized non-stormwater discharges, sources, and associated BMPs; and

2.1.1.3. Outdoor industrial equipment and storage areas, outdoor industrial activities areas, BMPs, and all other potential sources of industrial pollutants.

2.1.2. The monthly visual observations shall be conducted during daylight hours of scheduled facility operating hours and on days without precipitation.

2.1.3. The Discharger shall provide an explanation in the Annual Stormwater Report for uncompleted monthly visual observations (see Provision 3.1, below).

2.2. Sampling Event Visual Observations

Sampling event visual observations shall be conducted at the same time sampling occurs at a discharge location. At each discharge location where a sample is obtained, the Discharger shall observe the discharge of stormwater associated with industrial activity.

2.2.1. The Discharger shall ensure that visual observations of stormwater discharged from containment sources (e.g., secondary containment or storage ponds) are conducted at the time that the discharge is sampled.

2.2.2. If the Discharger employs volume-based or flow-based treatment BMPs, it shall sample any bypass that occurs while the visual observations and sampling of stormwater discharges are conducted.

2.2.3. The Discharger shall visually observe and record the presence or absence of floating and suspended materials, oil and grease, discolorations, turbidity, odors, trash/debris, and sources of any discharged pollutants.

2.2.4. If a discharge location is not visually observed during the sampling event, the Discharger shall record which discharge locations were not observed during sampling or that there was no discharge from the discharge location.

2.2.5. The Discharger shall provide an explanation in the Annual Stormwater Report for uncompleted sampling event visual observations (see Provision 4.1, below).

2.3. Visual Observation Records

The Discharger shall maintain records of all visual observations. Records shall include the date, approximate time, locations observed, presence and probable source of any observed pollutants, name of persons who conducted the observations, and any response actions and/or additional SWPPP revisions necessary in response to the visual observations.

2.4. SWPPP Revisions

The Discharger shall revise its BMPs as necessary when the visual observations indicate pollutant sources have not been adequately addressed.

2.5. Sampling and Analysis

2.5.1. The Discharger shall collect and analyze stormwater samples as specified in the MRP.

2.5.2. Samples shall be (1) representative of stormwater associated with industrial activities and any commingled authorized non-stormwater dischargers; or (2) associated with the discharge of contained stormwater.

2.5.3. On a facility-specific basis, the Discharger shall also analyze additional parameters that serve as indicators of the presence of all industrial pollutants identified in the pollutant source assessment. These additional parameters may be modified (added or removed) in accordance with any updated SWPPP pollutant source assessment.

3. STORMWATER PROVISIONS – REPORTING

3.1. Annual Stormwater Report

The results of the Discharger's Annual Comprehensive Facility Compliance Evaluation shall be reported in the Annual Stormwater Report to the Regional Water Board no later than July 30. The Discharger shall include in the Annual Stormwater Report the following:

3.1.1. A compliance checklist that indicates whether the Discharger has complied with or addressed all applicable requirements of the SWPPP;

3.1.2. An explanation for any non-compliance requirements within the reporting year, as indicated in the compliance checklist;

3.1.3. An identification, including page numbers and sections, of all revisions made to the SWPPP within the reporting year; and

3.1.4. The date(s) of the annual evaluation.

4. STORMWATER PROVISIONS – DEFINTIONS

4.1. Authorized Non-Stormwater Discharges – non-stormwater discharges are authorized if they meet the following conditions:

4.1.1. Fire-hydrant and fire prevention or response system flushing;

4.1.2. Potable water sources, including potable water related to the operation, maintenance, or testing of potable water systems;

4.1.3. Drinking fountain water and atmospheric condensate, including refrigeration, air conditioning, and compressor condensate;

4.1.4. Irrigation drainage and landscape watering, provided that all pesticides, herbicides, and fertilizers have been applied in accordance with manufacturer's labels;

4.1.5. Uncontaminated natural springs, groundwater, foundation drainage, footing drainage;

4.1.6. Seawater infiltration where the seawater is discharged back into the source; or,

4.1.7. Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but not intentional discharges from cooling towers (e.g., "piped" cooling tower blowdown or drains).

4.2. Stormwater – stormwater runoff, snow melt runoff, and surface runoff and drainage, excluding infiltration and runoff from agricultural land.

CALIFORNIA Water Boards

GAVIN NEWSOM
GOVERNOR

JARED BLUMENFELD
SECRETARY FOR
ENVIRONMENTAL PROTECTION

ORDER No. R2-2020-0021
NPDES PERMIT No. CAG992001

GENERAL WASTE DISCHARGE REQUIREMENTS FOR Discharge of Residual Firework Pollutants from Public Fireworks Displays (Fireworks General Permit)

Table 1. Administrative Information

This Order was adopted by the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), on:	June 10, 2020
This Order shall become effective on:	August 1, 2020
This Order shall expire on:	July 31, 2025
CIWQS Place Number:	860226
CIWQS Regulatory Measure Number:	438619
The U.S. Environmental Protection Agency (U.S. EPA) and the Regional Water Board have classified the discharges under this general National Pollutant Discharge Elimination System (NPDES) permit (General Permit) as minor discharges based on their impact to receiving waters.	
To obtain coverage under this General Permit, prospective Dischargers must submit a Notice of Intent (NOI) using the form in Attachment B and a filing fee equivalent to the first year's annual fee. If the NOI is complete, the Regional Water Board Executive Officer will issue an Authorization to Discharge to the Discharger.	
Authorized Dischargers that intend to continue discharging after this Order's expiration date shall file a new NOI no later than November 4, 2024. Such discharges may become subject to a reissued order upon Executive Officer authorization.	

I do hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on the date indicated above.

Digitally signed by Michael Montgomery
Date: 2020.06.12 14:58:29 -07'00'

Water Boards

Michael Montgomery, Executive Officer

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Attachments

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I. SCOPE OF GENERAL PERMIT

These Waste Discharge Requirements (WDRs) serve as an NPDES General Permit for the discharge of residual firework pollutants associated with public fireworks displays.

This General Permit covers discharges to San Francisco Bay (i.e., the Sacramento/San Joaquin River Delta, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Richardson Bay, Lower San Francisco Bay, and South San Francisco Bay) and other inland waters (e.g., Foster City Lagoon in San Mateo County, Lake Merritt in Alameda County, and Lake Chabot in Solano County).

This General Permit does not cover the following:

1. Discharges from individuals who use fireworks;
2. Discharges to the Pacific Ocean;
3. Discharges covered by individual NPDES permits or WDRs; or
4. Discharges to sanitary and storm sewer systems.

Fact Sheet (Attachment F) sections I and II provide additional information describing covered discharges.

II. FINDINGS

The Regional Water Board finds:

A. Legal Authorities. This Order serves as WDRs pursuant to California Water Code (Water Code) article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370).

B. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on available information. The Fact Sheet (Attachment F) contains background information and rationale for the requirements in this Order and is hereby incorporated into, and constitutes findings for, this Order. Attachments A through D are also incorporated into this Order.

C. Provisions and Requirements Implementing State Law. No provision or requirement in this Order is included to implement State law only.

D. Notification of Interested Parties. The Regional Water Board notified prospective enrollees and interested agencies and persons of its intent to prescribe these WDRs and provided an opportunity to submit written comments and recommendations. The Fact Sheet provides details regarding the notification.

E. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. The Fact Sheet provides details regarding the public hearing.

THEREFORE, IT IS HEREBY ORDERED that to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the Clean Water

Act and regulations and guidelines adopted thereunder, Dischargers authorized to discharge pursuant to this Order shall comply with the requirements in this Order.

III. DISCHARGE PROHIBITIONS

A. Discharge of residual firework pollutants at a location or in a manner different than described in a Notice of Intent (NOI) and Authorization to Discharge pursuant to this Order is prohibited.

B. Discharge of pollutants so as to create pollution, contamination, or nuisance as defined by Water Code section 13050 is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The Discharger shall implement best management practices in accordance with Provision VI.C.

V. RECEIVING WATER LIMITATIONS

A. Discharge shall not cause the following conditions to exist in receiving waters:

1. Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;

2. Alteration of suspended sediment in such a manner as to cause nuisance, or to adversely affect beneficial uses, or to cause detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life;

3. Suspended material in concentrations that cause nuisance or adversely affect beneficial uses;

4. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

5. Alteration of temperature beyond present natural background levels;

6. Changes in turbidity that cause nuisance or adversely affect beneficial uses, or increases from normal background light penetration or turbidity relatable to waste discharge greater than 10 percent in areas where natural turbidity is greater than 50 nephelometric turbidity units (NTU), or turbidity increases above 55 NTU in areas where natural turbidity is less than 50 NTU;

7. Coloration that causes nuisance or adversely affects beneficial uses;

8. Visible, floating, suspended, or deposited oil or other products of petroleum origin; or

9. Toxic or other deleterious substances in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

B. Discharge shall not cause a violation of any water quality standard for receiving waters adopted by the Regional Water Board or State Water Resources Control Board (State Water Board) as required by the Clean Water Act and regulations adopted thereunder.

VI. PROVISIONS

A. Application for General Permit Coverage and Authorization to Discharge

1. Notice of Intent (NOI)

A prospective Discharger seeking Authorization to Discharge pursuant to this Order shall complete and submit the NOI form in Attachment B and include all applicable documentation (e.g., Best Management Practices Plan). The NOI shall be submitted at least 60 days before any planned discharge. A prospective Discharger seeking coverage for similar discharges from multiple events or multiple locations may complete one NOI form that describes all proposed discharges. A Discharger may be the fireworks event host, fireworks display operator, or any other entity that agrees to be responsible for compliance with all conditions specified in this Order. The Executive Officer may modify the NOI form in Attachment B or require additional information prior to authorizing any discharge.

2. Authorization to Discharge

Upon receipt of a complete NOI, the Executive Officer will review the NOI to determine whether the proposed discharges may be authorized pursuant to this Order. If the Executive Officer concludes that a proposed discharge is eligible for coverage, the Executive Officer will issue an Authorization to Discharge. Upon the effective date of the Authorization to Discharge, the Discharger shall comply with the requirements of this Order, including its attachments. Any non-compliance with this Order's requirements shall constitute a violation of the Clean Water Act and Water Code, and may be grounds for enforcement; termination, revocation and reissuance, or modification of the Authorization to Discharge; issuance of an individual permit; or denial of an application for reissuance.

3. NOI Modification

A Discharger may modify its NOI by submitting a modified NOI form (e.g., a mark-up of the original NOI form showing all changes and including a new signature and date) at least 30 days before it proposes to implement changes. The Discharger shall include a transmittal letter describing the changes, their purpose, when they are to go into effect, and any new or different measures taken or planned to comply with this Order's requirements. Changes shall be authorized if and when the Executive Officer modifies the Authorization to Discharge.

4. Application to Extend Coverage

A Discharger that intends to continue discharging after the expiration date stated on the first page of this Order shall submit a new NOI by November 4, 2024.

5. Discharge Termination

A Discharger may terminate its coverage under this Order by submitting a letter rescinding its NOI and stating the reason for termination.

The Executive Officer may terminate or revoke coverage under this Order for any of the causes set forth in 40 C.F.R. section 122.28(b)(3). After providing notice and opportunity for a hearing, coverage under this Order may be terminated or modified for cause, including, but not limited to, the following:

a. Violation of any term or condition of this Order;

b. Misrepresentation or failure to disclose all relevant facts in obtaining coverage under this Order; or

c. Change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

6. Need for Individual NPDES Permit

The Executive Officer may require any Discharger authorized to discharge pursuant to this Order to subsequently apply for and obtain an individual NPDES permit in the following circumstances:

a. The Discharger is not in compliance with the requirements of this Order;

b. A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants associated with the discharge;

c. Effluent limitation guidelines are promulgated for the discharges covered by this Order;

d. A new or revised water quality control plan containing requirements applicable to the discharges covered by this Order is approved;

e. The requirements of 40 C.F.R. section 122.28(a) (the circumstances under which the Regional Water Board may issue a general permit) are not met; or

f. Any other condition specified in 40 C.F.R. section 122.28(b)(3) is met.

B. Standard Provisions

The Discharger shall comply with the "Standard Provisions" in Attachment D of this Order, as applicable (e.g., Attachment D provisions I.G, V.D, and VII.B do not apply).

C. Best Management Practices (BMPs)

Prior to commencing discharge pursuant to this Order, the Discharger shall prepare and implement a Best Management Practices Plan (BMPs Plan) that describes steps to ensure that residual firework pollutant discharges will not adversely affect receiving waters. The BMPs Plan shall include the following elements:

1. Discharge Characterization

Describe activities conducted within the firing range, potential pollutant sources associated with each activity, and the nature of the pollutants that could be discharged.

2. BMP Identification

Describe the BMPs to be implemented to control pollutant discharges, including BMPs for each potential pollutant source that represent the best available technology that is economically achievable. Describe the anticipated effectiveness of each BMP. Consider, and include as appropriate, the following:

- Preventative BMPs – measures to reduce or eliminate the generation of pollutants and waste.
- Control BMPs – measures to control or manage pollutants and waste after they are generated and before they come in to contact with water.
- Response BMPs – measures to respond to discharges with containment control, or cleanup measures to minimize the potential adverse effects of pollutant discharge.

Implement each of the following minimum BMPs to the extent practicable and economically achievable:

a. Use alternative fireworks that replace perchlorate with other oxidizers and contain biodegradable components;

b. Use propellants that burn cleaner, produce less smoke, and reduce residual firework pollutant loading to surface waters;

c. Select firing range locations and designs that reduce residual firework pollutant discharges;

d. Secure all pyrotechnic equipment and fireworks in a manner that minimizes the risk of such materials and objects entering receiving waters before, during, and after fireworks displays;

e. Inspect each firework launch area for potential safety issues on an ongoing basis;

f. Perform visual observations and monitoring activities to assess BMP performance;

g. Prior to fireworks displays, deploy containment measures to collect and control the mobility of fireworks debris, particulate matter, and waste from within the design firing ranges for all firework launch areas;

h. As soon as practicable and no later than 24 hours after fireworks displays, collect, remove, and manage fireworks debris, particulate matter, and waste from within the design firing ranges for all firework launch areas;

i. As soon as practicable, properly dispose of fireworks debris, particulate matter, and waste collected from within the design firing ranges for all firework launch areas; and

j. As soon as practicable after fireworks displays, conduct BMP effectiveness evaluations.

3. Employee Training

Ensure that all personnel implementing the BMPs Plan are properly trained regarding BMP implementation. Identify the personnel to be trained, their responsibilities, and the type of training they are to receive.

4. Record Keeping

Develop and implement management procedures to track and record implementation of the BMPs required by Provision VI.C.2 and the training required by Provision VI.C.3, and maintain implementation records for a minimum of five years.

5. Annual Evaluation

At least once each calendar year, evaluate the effectiveness of the BMPs Plan, update the BMPs Plan as appropriate, and describe any revisions in the self-monitoring report required by Provision VI.D.3.

D. Reporting Provisions

1. Fireworks Display Notifications

At least 21 calendar days prior to each fireworks display, the Discharger shall notify the Regional Water Board, via email to R2NPDES.GeneralPermits@waterboards.ca.gov, of its intent to conduct a public fireworks display so Regional Water Board staff may inspect the site and evaluate compliance with this Order.

2. Fireworks Display Reports

The Discharger shall complete and maintain a Fireworks Display Report (see Attachment C) for each fireworks display within 14 calendar days following each fireworks display. Fireworks Display Reports shall be provided to the Regional Water Board upon request and shall be submitted with the self-monitoring reports required by Provision VI.D.3.

3. Self-Monitoring Reports

a. **Format.** The Discharger shall submit self-monitoring reports (SMRs) via email to R2NPDES.GeneralPermits@waterboards.ca.gov. At any time during the term of this Order, the State Water Board or Regional Water Board may notify the Discharger to electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) website (http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide additional information for SMR submittal in the event of a planned service interruption.

b. **Due Dates and Contents.** The Discharger shall submit SMRs annually by February 15 each year, covering the previous calendar year (January 1 through December 31). If there has been no discharge during the year, the Discharger must still submit an SMR to report the status of the discharge. SMRs shall contain the items described below:

i. Transmittal letter that includes the following:

(a) CIWQS Place Identification Number as shown in the Authorization to Discharge;

(b) List of fireworks displays and their locations, if any, held during the year;

(c) Clear identification of any violations of this Order or clear statement that there were no violations;

(d) Detailed description of any violations, their causes, and proposed time schedule for corrective actions taken or planned to resolve the violations and prevent recurrence (if previous reports address the corrective actions, then reference the earlier reports);

(e) Documentation that the annual fee has been paid; and

(f) Signature in accordance with Attachment D section V.B.

ii. Fireworks Display Report (see Attachment C) for each fireworks display.

iii. Comprehensive discussion of performance and compliance, including any corrective actions taken or planned, such as changes to equipment or operations needed to achieve compliance, and any other actions taken or planned that are intended to improve the performance and reliability of the Discharger's practices.

iv. Documentation that the Discharger evaluated and updated its BMPs Plan, as appropriate, in accordance with Provision VI.C.5, including evaluation dates, personnel who performed the evaluations, and descriptions of any revisions.

4. Discharge Monitoring Reports

The Discharger shall submit Discharge Monitoring Reports (DMRs) in accordance with Attachment D section V.C.2 if instructed to do so by the Regional Water Board or State Water Board.

5. Violations and Unauthorized Discharges

a. The Discharger shall report by telephone and email to Regional Water Board staff who oversees the implementation of this Order (Authorizations to Discharge will identify the staff contact) within 24 hours of becoming aware of a violation of this Order.

b. The Discharger shall report spills or unauthorized discharges to the California Office of Emergency Services (telephone 800-852-7550) when spills meet or exceed applicable reportable quantities for hazardous materials.

c. The Discharger shall submit a written report to the Regional Water Board within five calendar days following the telephone and email notification described above unless directed otherwise by Regional Water Board staff in writing. Electronic submittal is acceptable. The report shall include the following:

i. Date, time, and duration of violation;

ii. Location of violation (map, street address, and description of location);

iii. Nature of violation;

iv. Volume and quantity of any material involved;

v. Affected receiving water, if any;

vi. Cause of violation;

vii. Estimated size of affected area;

viii. Observed receiving water impacts (e.g., oil sheen, fish kill, water discoloration);

ix. Actions taken to correct violation or to contain, minimize, or clean up discharges;

x. Future corrective actions planned to prevent recurrence and implementation schedule; and

xi. Persons or agencies notified.

E. Reopener Provisions

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law:

1. If present or future investigations demonstrate that the discharges governed by this Order have or will have, or will cease to have, a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters;

2. If new or revised water quality standards or total maximum daily loads (TMDLs) come into effect for receiving waters (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order may be modified as necessary to reflect the updated water quality standards or TMDL wasteload allocations. Adoption of the effluent limitations in this Order is not intended to restrict in any way future modifications based on legally adopted water quality standards or TMDLs or as otherwise permitted under federal regulations governing NPDES permit modifications;

3. If translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified;

4. If State Water Board-precedential decisions, new policies, new laws, or new regulations are adopted;

5. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to those applicable to these discharges; or

6. As otherwise authorized by law.

A Discharger may request a permit modification based on any of the circumstances above. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses.

ATTACHMENT A – DEFINITIONS

Aerial Fireworks
Aerial fireworks provide their own propulsion or are shot into the air in an aerial shell by a mortar using a black powder lift charge or propellant.

Aerial Shell
Cylinder or spherical cartridge containing a burst charge and pyrotechnic or non-pyrotechnic effects, a fuse, and a black powder lift charge that is fired from a mortar (19 CCR § 980[a][1]). Aerial shells are typically designed to burst between 200 and 1,000 feet above ground level.

Alternative Fireworks
Fireworks produced with new pyrotechnic formulas that replace perchlorate with other oxidizers and propellants that burn cleaner, produce less smoke, and reduce residual firework pollutant loading to surface waters.

Barge
Water vessel with from which fireworks are launched or ignited.

Best Management Practices (BMPs)
Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices that prevent or reduce the pollution of water of the United States.

Break
Individual burst from an aerial shell, producing either a visible or audible effect, or both, that may consist of a single burst or multiple effects (19 CCR § 980[b][7]).

Dud
Pyrotechnic item that leaves the mortar and returns to earth without producing the intended burst or effect (19 CCR § 980[d][4]).

Fallout Area
Area in which firework debris and pollutants fall after a pyrotechnic device is burst. The extent of the fallout area depends on the wind and the angle of mortar placement.

Fireworks
Device containing chemical elements and chemical compounds capable of burning independently of the oxygen in the atmosphere and producing an audible, visual, mechanical, or thermal effect that is useful as a pyrotechnic device or for entertainment. The term “fireworks” includes, but it is not limited to, devices designated by the manufacturer as fireworks, torpedoes, skyrockets, roman candles, rockets, Daygo bombs, sparklers, party poppers, paper caps, chasers, fountains, smoke sparks, aerial bombs, and fireworks kits (California Health and Safety Code § 12511).

Fireworks Display
See *Public Fireworks Display*.

Firing Range
Area over which fireworks may travel by design or accident and upon which residual firework pollutants may fall, including fireworks launch areas and adjacent shorelines, quays, docks, barges, and fireworks fallout areas.

Ground Display Piece
Pyrotechnic device that functions on the ground (as opposed to an aerial shell that functions in the air) and that includes fountains, wheels, and set pieces.

Low-level Fireworks
Low-level fireworks consist of stars or other components that produce single or multi-colored fountain effects or sparks. They are designed to burn at less than 200 feet above ground level.

Minimum Level (ML)
Concentration at which the entire analytical system gives a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Misfire
Pyrotechnic item that fails to function as designed after initiation (19 CCR § 980[m][5]).

Mortar
Cylinder used to hold and fire public display or special effects pyrotechnic items or compositions (19 CCR § 980[m][8]).

Multiple Break
Aerial shell that has two or more breaks (19 CCR § 980[m][11]).

Net Explosive Weight
Weight of all pyrotechnic compositions, explosives material, and fuse (22 CCR § 67384.3).

Pier
Structure extending from the land out over a body of water to afford convenient passage for persons, property, and vessels.

Public Fireworks Display (also referred to as Fireworks Display)
Entertainment feature where the public or a private group is admitted or permitted to view a display or discharge of fireworks (22 CCR § 67384.3).

Pyrotechnic Operator
Licensed pyrotechnic operator, who by examination, experience, and training, has demonstrated required skill and ability in the use and discharge of fireworks as authorized by the license granted (22 CCR § 67384.3).

Pyrotechnic Compositions
Combination of chemical elements or chemical compounds capable of burning independently of the oxygen of the atmosphere (California Health and Safety Code § 12525).

Quay
Wharf for loading and unloading goods carried by ships.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from SIP Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Roman Candle
Heavy paper or cardboard tube containing pellets of pyrotechnic composition that, when ignited, are expelled into the air at several second intervals (19 CCR § 980[r][3]).

Salute
Aerial shell or another pyrotechnic item whose primary effects are detonation and flash of light (19 CCR § 980[s][1]).

Star
Small pellet of composition that produces a pyrotechnic effect. A single aerial firework shell could contain several hundred stars (22 CCR § 67384.3).

Set Piece Fireworks
Set piece firework devices are primarily static and typically do not launch into the air. They produce effects at less than 50 feet above ground level.

ATTACHMENT B – NOTICE OF INTENT FORM

This Notice of Intent form shall be completed and submitted to apply for Authorization to Discharge under NPDES Permit No. CAG992001 (Fireworks General Permit) to waters of the United States.

I. DISCHARGER INFORMATION AND CERTIFICATION

This certification shall be signed in accordance with Attachment D section V.B.2. The Discharger hereby agrees to comply with and be responsible for all conditions specified in the Fireworks General Permit.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.		
Signature:		Date:
Printed Name:		
Title:		
Discharger Type (Check One) ☐ Public ☐ Private ☐ Other, specify type:	New or Previously Authorized Discharger (Check One) ☐ New ☐ Previously Authorized	
Discharger Name:		
Mailing Address:		
Duly Authorized Representative (DAR): The following individual (or any individual occupying the position listed below) may act as the Discharger's duly authorized representative and may sign and certify submittals in accordance with Attachment D section V.B.3. The individual shall be responsible for the overall operation of the regulated facility or activity or an individual position having overall responsibility for environmental matters for the Discharger.		
DAR Name and Title:		
DAR Email:		
DAR Phone Number:		

☐ Check here if additional Discharger information is attached to this form.

II. BILLING INFORMATION

☐ Check this box if same as Section I (otherwise, complete this section).
Discharger Name:
Mailing Address:
Billing Contact Name and Title:
Billing Contact Email:
Billing Contact Phone Number:

III. DISCHARGE INFORMATION

Receiving Water:
Discharge Frequency: ☐ Once ☐ Annual ☐ Other (please describe):

☐ Check here if information for additional discharge locations is attached to this form.

IV. BEST MANAGEMENT PRACTICES PLAN

Attach a Best Management Practices Plan (BMPs Plan) as described in Provision VI.C of this Order.

V. APPLICATION FEES AND MAILING INSTRUCTIONS

Submit check payable to "State Water Resources Control Board" for appropriate application fee to this address:

San Francisco Bay Regional Water Quality Control Board
Attn: NPDES Wastewater Division
1515 Clay Street, Suite 1400
Oakland, CA 94612

For current fees for general NPDES permit category 3, see Water Code section 2200(b)(9) or visit www.waterboards.ca.gov/resources/fees.

Submit this form (with signature and attachments) via email or as otherwise indicated on the Regional Water Board's website:
www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/general_permits.html.

ATTACHMENT C – FIREWORKS DISPLAY REPORT FORM

The Fireworks Display Report shall be completed no later than 14 calendar days following each fireworks display. The Discharger may attach additional information as necessary. Fireworks Display Reports shall be made available to the San Francisco Bay Regional Water Quality Control Board upon request and shall be submitted with self-monitoring reports in accordance with Provision VI.D.3 of this Order.

I. GENERAL EVENT INFORMATION

Discharger Name: Event Name:	
Event Contact Person Name: Phone Number: Email:	
Event Location Address: GPS Coordinates:	
Receiving Water Name:	
Event Date:	Event Start and End Time:

II. FIRING RANGE MAP

Attach an aerial or satellite map identifying the firing range, fireworks fallout area, affected receiving waters, and adjacent shorelines, barges, docks, piers, quays, and any other relevant features or landmarks.

III. PYROTECHNIC OPERATORS

Name	License Number	Date Issued	Expiration Date

IV. FIREWORKS INFORMATION

Aerial Fireworks			Low Level Fireworks		Set Piece Fireworks	
Shell Size	**No. Single Breaks**	**No. Multiple Breaks**	**Type**	**No.**	**Type**	**No.**
25 mm			Mines		Sets	
80 mm			Romans		Devices	
2”			Comets			
3”			Cakes			
4”						
5”						
6”						
8”						
9”						
10”						
11”						
12”						

Net Explosive Weight: _____ pounds (lbs)

Were alternative fireworks used? If so, describe:

Were the entire firing range (including the fireworks launching area and adjacent shorelines, quays, docks, and fireworks fallout area), barges (if used), and adjacent surface waters inspected and cleaned of particulate matter and debris from ignited and un-ignited pyrotechnic material within 24 hours following the display?

☐ Yes Date: _____ Time: _____

☐ No

If no, explain:

Total amount of debris collected from receiving water: _____ lbs wet weight

_____ lbs dry weight (if known)

Total amount of debris collected: _____ lbs wet weight

V. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Signature: Date:	
Printed Name:	
Title:	
Discharger Name:	
Address:	
Email:	Phone No.:

ATTACHMENT D – STANDARD PROVISIONS

I. STANDARD PROVISIONS—PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); Wat. Code §§ 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, 13385.)

2. The Discharger shall comply with effluent standards or prohibitions established under Clean Water Act section 307(a) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); Wat. Code, §§ 13267, 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); Wat. Code, §§ 13267, 13383);

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); Wat. Code, §§ 13267, 13383);

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); Wat. Code, §§ 13267, 13383); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the Clean Water Act or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); Wat. Code, §§ 13267, 13383.)

G. Bypass

1. Definitions

a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 C.F.R. § 122.41(m)(2).)

3. **Prohibition of bypass.** Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of

equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

4. Approval. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions—Permit Compliance I.G.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

5. Notice

a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass. The notice shall be sent to the Regional Water Board. As of December 21, 2020, a notice shall also be submitted electronically to the initial recipient in Standard Provisions – Reporting V.J below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(i).)

b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). The notice shall be sent to the Regional Water Board. As of December 21, 2020, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting V.J below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22 and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

b. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

c. The Discharger submitted notice of the upset as required in Standard Provisions—Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

d. The Discharger complied with any remedial measures required under Standard Provisions—Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

II. STANDARD PROVISIONS—PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the Clean Water Act and the Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)

III. STANDARD PROVISIONS—MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

B. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

1. The method minimum level (ML) is at or below the level of the effluent limitation established in the permit for the measured pollutant or pollutant parameter, and either (a) the method ML is at or below the level of the applicable water quality criterion for the measured pollutant or pollutant parameter, or (b) the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N, for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under 40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapters N, monitoring must be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3), 122.41(j)(4), 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS—RECORDS

A. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

B. Records of monitoring information shall include the following:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));
2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));
3. The date(s) the analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));
4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));
5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and
6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and
2. Permit applications and attachments, permits, and effluent data. (40 C.F.R. § 122.7(b)(2).)

V. STANDARD PROVISIONS—REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or U.S. EPA within a reasonable time, any information which the Regional Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, §§ 13267, 13383.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions—Reporting V.B.2, V.B.3, V.B.4, and V.B.5, and V.B.6 below. (40 C.F.R. § 122.41(k).)

2. For a corporation, all permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 C.F.R. § 122.22(a)(1).)

For a partnership or sole proprietorship, all permit applications shall be signed by a general partner or the proprietor, respectively. (40 C.F.R. § 122.22(a)(2).)

For a municipality, state, federal, or other public agency**,** all permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Standard Provisions—Reporting V.B.2 above (40 C.F.R. § 122.22(b)(1));

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions—Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5. Any person signing a document under Standard Provisions—Reporting V.B.2 or V.B.3 above shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

6. Any person providing electronic signature for documents described in Standard Provisions – V.B.1, V.B.2, or V.B.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting V.B, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R. § 122.22(e).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program in this Order. (40 C.F.R. § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board. As of December 21, 2016, all reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting V.J and comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR reporting form specified by the Regional Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 21, 2020, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted to the Regional Water Board and must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting V.J. The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours:

a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral and written report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 C.F.R. section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (Alternatively, for an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a), this notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under 40 C.F.R. section 122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1).) (40 C.F.R. § 122.41(l)(1)(ii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions—Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision—Reporting V.E above. For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting V.E and the applicable required data in appendix A to 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section (40 C.F.R. § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or U.S. EPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

J. Initial Recipient for Electronic Reporting Data

The owner, operator, or duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient defined in 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. § 127.2(c)]. U.S. EPA will update and maintain this list. (40 C.F.R. § 122.41(l)(9).)

VI. STANDARD PROVISIONS—ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this Order under several provisions of the Water Code, including, but not limited to, sections 13268, 13350, 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS—NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 C.F.R. § 122.42(a)):

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 C.F.R. § 122.42(a)(1)):
   - **a.** 100 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(1)(i));
   - **b.** 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(1)(ii));
   - **c.** Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(1)(iii)); or
   - **d.** The level established by the Regional Water Board in accordance with section 122.44(f). (40 C.F.R. § 122.42(a)(1)(iv).)
2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 C.F.R. § 122.42(a)(2)):
   - **a.** 500 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(2)(i));
   - **b.** 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(2)(ii));
   - **c.** Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(2)(iii)); or
   - **d.** The level established by the Regional Water Board in accordance with section 122.44(f). (40 C.F.R. § 122.42(a)(2)(iv).)

B. Publicly Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 C.F.R. § 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to Clean Water Act sections 301 or 306 if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of this Order. (40 C.F.R. § 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – NOT USED

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in section II.B of the Order, the Regional Water Board incorporates this Fact Sheet as findings supporting the issuance of the Order.

I. PERMIT INFORMATION

A. This Order regulates residual firework pollutant discharges to San Francisco Bay associated with public fireworks displays.

B. Entities that submit a Notice of Intent (NOI) (see Attachment B) and thus apply for Authorization to Discharge pursuant to this Order, and that are subsequently granted such authorization, are hereinafter called "Dischargers." For purposes of this Order, references to "discharger" or "permittee" in applicable federal and State laws, regulations, plans, and policies are held to be equivalent to references to any Discharger herein.

II. DISCHARGE DESCRIPTION

This Order covers residual fireworks pollutant discharges to waters of the United States associated with public fireworks displays. Dischargers enrolled under this Order conduct public fireworks displays for community celebrations, such as for Fourth of July and New Year's Eve, and entertainment associated with sporting, business, and school events. Fireworks are a class of low explosive pyrotechnic devices used for aesthetic or entertainment purposes (e.g., noise, light, smoke, or confetti).

A. Firework Categories. Fireworks vary in design but can be grouped according to their design detonation height:

1. **Aerial Fireworks.** Aerial fireworks are typically shot into the air by a mortar using a black powder lift charge or propellant. The aerial shell typically consists of a cylinder or spherical cartridge, usually constructed of paper, plastic, or cardboard, and may include some plastic or paper internal components within the shell. The shell casing contains a burst charge, pyrotechnic material that emits prescribed colors and effects when burst, a fuse, and a black powder lift charge. Aerial shells are often combined in a fireworks display to create a variety of shapes and colors upon detonation.

   The lift charge and shell are placed at the bottom of a mortar partially buried in earth or sand, or placed within a rack. Shells can be launched one at a time or in a barrage of simultaneous launches or launches in quick succession. Shells are typically designed to perform between 200 and 1,000 feet above ground level. Most of the incendiary elements and shell casings burn up in the atmosphere; however, portions of the casings and some internal structural components and chemical residue fall back to the ground or receiving waters.

2. **Low-level Fireworks.** Low-level fireworks devices consist of pyrotechnic pellets packed linearly within a tube. When the device is ignited, the pellets exit the tube in succession producing a fountain effect of single or multi-colored lights as the pellets burn through the course of their flight. Typically, the pellets burn rather than explode, thus producing a ball or trail of sparkling light to a prescribed altitude, then extinguish. Sometimes they may

terminate with a small explosion similar to a firecracker. Other low-level fireworks devices emit a projected hail of colored sparks or perform erratic low-level flight while emitting a high-pitched whistle. Some emit a pulsing light pattern, or crackling or popping sound effects. Generally, low-level launch devices and encasements remain on the ground or attached to a fixed structure and can be removed upon completion of the display. They are generally designed to produce effects between 0 and 200 feet above ground level.

3. **Set Piece Fireworks.** Set piece fireworks are primarily static and remain close to the ground. They are usually attached to a frame that may be crafted in the design of a logo or familiar shape, and illuminated by pyrotechnic devices, such as flares, sparklers, or strobes. Set pieces are typically used in concert with low-level effects or an aerial show, and sometimes act as a centerpiece for the display. Set pieces may have moving parts, but typically do not launch devices into the air. Set piece displays are typically designed to produce effects between 0 and 50 feet above ground level.

B. **Firework Chemical Constituents.** The following table includes a partial list of chemicals used in fireworks as fuels, oxidizers, binding agents, and coloration and sound effects:

Table F-1. Firework Chemical Constituents

Constituent	Function
Aluminum	Creates silver and white flames and sparks.
Antimony	Creates glitter effects.
Barium	Creates green colors and stabilizes other volatile elements.
Carbon	Provides fuel as a main component of black powder.
Calcium	Enhances fireworks colors; calcium salts produce orange fireworks.
Chlorine	Enhances volatility and light emission of color-producing metals.
Cesium	Creates indigo colors.
Copper	Creates blue colors.
Iron	Creates sparks that vary in color according to the heat of the metal.
Lithium	Creates red colors; lithium carbonate is a common colorant.
Magnesium	Creates white sparks or improves firework brilliance.
Phosphorus	Creates glow-in-the-dark effects and burns spontaneously in air; found in some firework fuels.
Potassium	Creates violet colors; provides oxygen as a salt compound (e.g., potassium nitrate, potassium perchlorate) in black powder.
Sodium	Creates gold or yellow colors frequently masking less intense colors.
Strontium	Creates red colors and stabilizes fireworks mixtures.
Sulfur	Provides fuel as a main component of black powder.

Constituent	Function
Titanium	Creates silver sparks.
Zinc	Creates smoke effects.

C. **Fireworks Discharges.** Fireworks chemical constituents burn at high temperatures when the fireworks are burst. The burst charge scatters the chemical constituents within the fireworks, separating them from the fireworks casing and internal shell components. Combustion residues are produced in the form of smoke, airborne particulates, chemical pollutants, and debris, including paper, cardboard, and fuses. Combustion residues can fall into receiving waters. Un-ignited pyrotechnic material, such as duds, can also fall into receiving waters.

Various factors can affect residual firework pollutant concentrations in receiving waters adjacent to fireworks displays, including event frequency, duration, number of ignited fireworks per event, type and size of fireworks, burn efficiency, and wind direction and velocity. The receiving water fallout area affected by residual fireworks pollutants varies depending on wind speed and direction, shell size, mortar placement angle, type and height of fireworks explosions, and other environmental factors. Wind shear and tidal action can transport residual fireworks pollutants to waters and shorelines outside the fallout area.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

A. Legal Authorities

This Order serves as Waste Discharge Requirements (WDRs) pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to Clean Water Act section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as an NPDES permit for point source discharges to surface waters as described in Authorizations to Discharge issued pursuant to this Order.

B. California Environmental Quality Act

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act, Public Resources Code division 13, chapter 3 (commencing with § 21100).

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin Plan. In addition, this Order implements State Water Board Resolution No. 88-63, which established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Receiving water beneficial uses include some or all of the following:

- Agricultural Supply
- Areas of Special Biological Significance
- Cold Freshwater Habitat
- Commercial and Sport Fishing
- Estuarine Habitat
- Freshwater Replenishment
- Groundwater Recharge
- Industrial Service Supply
- Marine Habitat
- Fish Migration
- Municipal and Domestic Supply
- Navigation
- Industrial Process Supply
- Preservation of Rare and Endangered Species
- Water Contact Recreation
- Non-Contact Water Recreation
- Shellfish Harvesting
- Fish Spawning
- Warm Freshwater Habitat
- Wildlife Habitat

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, U.S. EPA adopted the CTR. The CTR promulgated new toxics criteria for California and incorporated the previously adopted NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001. These rules contain water quality criteria for priority pollutants.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated for California through the NTR and the priority pollutant objectives the Regional Water Board established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives, and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Sediment Quality.** The State Water Board adopted the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* on September 16, 2008, and it became effective on August 25, 2009. The State Water Board adopted amendments to the plan on June 5, 2018, that became effective on March 11, 2019. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries. This Order implements the sediment quality objectives of this plan.

5. **Safe Clean Water.** In compliance with Water Code section 106.3, it is State of California policy that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. This Order promotes that policy because, as explained in Fact Sheet section IV.C.3, the reasonable potential analysis considers applicable water quality objectives, including maximum contaminant levels designed to protect human health and to ensure that water is safe for domestic use, where applicable.

6. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 requires that state water quality standards include an antidegradation policy consistent with the federal policy. The

State Water Board established California's antidegradation policy through State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," which is deemed to incorporate the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution No. 68-16.

7. **Anti-Backsliding Requirements.** Clean Water Act sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous version of the permit, with some exceptions in which limitations may be relaxed.

8. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. The Discharger is responsible for meeting all applicable Endangered Species Act requirements.

D. Impaired Waters on Clean Water Act 303(d) List

In April 2018, U.S. EPA approved a revised list of impaired waters prepared pursuant to Clean Water Act section 303(d), which requires identification of specific waters where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt total maximum daily loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for non-point sources and are established to achieve the water quality standards for the impaired waters. The discharges regulated through this Order are not expected to contribute to any water quality impairment because the requirements of Provision VI.C of this Order will sufficiently control potential pollutant discharges.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The Clean Water Act requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) more stringent than federal technology-based requirements where necessary to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters.

A. Discharge Prohibitions

1. **Discharge Prohibition III.A** (No discharge other than as described in NOI and Authorization to Discharge): This prohibition is based on 40 C.F.R. section 122.21(a) and Water Code section 13260, which require filing an application and Report of Waste Discharge before discharge can occur. Discharges not described in an NOI and subsequent Authorization to Discharge are prohibited.

2. **Discharge Prohibition III.B** (No discharge causing pollution, contamination, or nuisance): This prohibition is based on California Water Code section 13263, which requires the Regional Water Board to prescribe WDRs that prevent nuisance conditions.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Clean Water Act section 301(b) and 40 C.F.R. section 122.44 require that permits include conditions meeting technology-based requirements at a minimum and any more stringent effluent limitations necessary to meet water quality standards. The Clean Water Act requires that technology-based effluent limitations be established based on several levels of control:

a. **Best practicable treatment control technology (BPT)**. BPT represents the average of the best existing performance by well-operated facilities within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants.

b. **Best available technology economically achievable (BAT)**. BAT represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

c. **Best conventional pollutant control technology (BCT)**. BCT represents the control from existing industrial point sources of conventional pollutants, including biochemical oxygen demand, total suspended solids, fecal coliform, pH, and oil and grease. BCT standards are established after considering a two-part reasonableness test. The first test compares the relationship between the costs of attaining a reduction in effluent discharge and the resulting benefits. The second test examines the cost and level of reduction of pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources. Effluent limitations must be reasonable under both tests.

d. **New source performance standards (NSPS)**. NSPS represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

The Clean Water Act requires U.S. EPA to develop effluent limitations, guidelines, and standards representing application of BPT, BAT, BCT, and NSPS. There are no promulgated effluent limitations, guidelines, or standards for the types of discharges this Order covers.

Clean Water Act section 402(a)(1) and 40 C.F.R. section 125.3 authorize the use of best professional judgment to derive technology-based effluent limitations on a case-by-case basis whenever U.S. EPA has not promulgated effluent limitations, guidelines, and standards. When best professional judgement is used, the Regional Water Board must consider specific factors outlined in 40 C.F.R. section 125.3.

2. Applicable Limitations

Since U.S. EPA has not issued effluent limit guidelines for the pyrotechnic industry, Provision VI.C of this Order imposes narrative BMP-based requirements that represent BPT and BAT controls based on best professional judgment. BPT and BAT controls are required because typical fireworks constituents include toxic and non-conventional pollutants (e.g., aluminum, antimony, barium, carbon, calcium, chlorine, cesium, copper, iron, potassium, lithium, magnesium, oxidizers such as nitrates, chlorates and perchlorates, phosphorus, sodium sulfur, strontium, titanium, and zinc). BCT controls do not apply to these discharges because they only apply to conventional pollutants (i.e., biochemical oxygen demand, total suspended solids, fecal coliform, pH, and oil and grease). NSPS controls do not apply to these discharges because they are not "new sources" (i.e., sources created after U.S. EPA established NSPS effluent limitations, guidelines, and standards for the pyrotechnic industry, which it has not done).

This narrative approach is authorized by 40 C.F.R. section 122.44(k), which allows BMPs to be used to control or abate pollutant discharges when numeric effluent limitations are infeasible. Numeric effluent limitations for residual fireworks pollutants are infeasible because it is impracticable to capture, treat, and monitor pollutants dispersed in the air before they enter the receiving waters.

In establishing these limits, the Regional Water Board considered the factors specified in 40 C.F.R. sections 125.3(d)(1) and 125.3(d)(3), as indicated in the table below:

Table F-2. Factors Considered Pursuant to 40 C.F.R. sections 125.3(d)(1) and 125.3(d)(3)

Factor	Considerations
Cost of achieving effluent reduction and cost relative to benefits	BMPs, such as cleaning firework launch and fallout areas using boats, brushes, brooms, and nets, are economically achievable in the context of fireworks display operations. For example, readily available motorized equipment and existing fireworks personnel can be used to remove potential pollutants in cleanup efforts. The costs are anticipated to be relatively small relative to the benefits of preventing pollutants from harming receiving water quality.
Age of equipment and facilities	Dischargers may need to acquire new equipment to implement appropriate BMPs (e.g., rental or purchase of boats for cleanup). Dischargers may also be able to rely on some existing equipment, such as brooms, brushes, nets, and boats.
Process employed	These limits can be met with readily implemented processes, such as sweeping, wiping, and collecting debris with nets. No unusual or technically challenging processes are required.
Engineering aspects of application of control techniques	Readily available controls are practicable and capable of meeting the requirements of this Order. For example, cleaning fireworks launch and fallout areas does not require sophisticated engineering controls.

Factor	Considerations
Process changes	New processes may be needed to comply with this Order, but necessary equipment is readily available.
Non-water-quality environmental impact (including energy requirements)	No significant non-water-quality impacts are foreseeable beyond the minimal impacts of using limited amounts of fuel to operate boats needed for cleanup efforts. Waste materials must be removed from fireworks launch and fallout areas and be properly disposed of.

C. Water Quality-Based Effluent Limitations

1. Scope and Authority

Clean Water Act section 301(b) and 40 C.F.R. section 122.44(d) require that permits include limitations more stringent than federal technology-based requirements where necessary to achieve applicable water quality standards. According to 40 C.F.R. section 122.44(d)(1)(i), permits must include effluent limitations for all pollutants that are or may be discharged at levels that have a reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective, WQBELs must be established using (1) U.S. EPA criteria guidance under Clean Water Act section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting a narrative criterion, supplemented with relevant information (40 C.F.R. § 122.44[d][1][vi]). The process for determining reasonable potential and calculating WQBELs is intended to achieve applicable water quality objectives and criteria and to protect designated uses of receiving waters as specified in the Basin Plan.

2. Beneficial Uses and Water Quality Criteria and Objectives

Fact Sheet section III.C.1 identifies the potential beneficial uses of the receiving waters for discharges subject to this Order. Water quality criteria and objectives to protect these beneficial uses are described below:

a. **Basin Plan.** The Basin Plan specifies numerous water quality objectives, including numeric objectives for 10 priority pollutants, to protect aquatic life, human health, and other beneficial uses. These objectives include the primary and secondary maximum contaminant levels for waters designated for use as domestic or municipal supply.

b. **CTR.** The CTR specifies numeric aquatic life and human health criteria for numerous priority pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries. Some human health criteria are for consumption of “water and organisms” and others are for consumption of “organisms only.” Waters with the municipal or domestic supply beneficial use designation are subject to the “water and organisms” criteria.

c. **NTR.** The NTR establishes numeric aquatic life and human health criteria for a number of pollutants for San Francisco Bay waters upstream to and including Suisun Bay and the San Joaquin-Sacramento River Delta.

d. **Sediment Quality Objectives.** The *Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality* contains a narrative water quality objective: "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This objective is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this objective, it is to impose the objective as a receiving water limit.

e. **Receiving Water Salinity.** Basin Plan section 4.6.2 (like the CTR and NTR) states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water are to be considered in determining the applicable water quality objectives. Freshwater criteria apply to discharges to waters with salinities equal to or less than one part per thousand (ppt) at least 95 percent of the time. Saltwater criteria apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to waters with salinities in between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the water quality objectives are the lower of the salt or freshwater criteria (the latter calculated based on ambient hardness) for each substance. This Order covers discharges to various receiving waters; therefore, the reasonable potential analysis is based on the more stringent of the freshwater and saltwater water quality criteria and objectives.

f. **Receiving Water Hardness.** Some freshwater objectives for metals are hardness dependent (as hardness increases, the toxicity of certain metals decreases). This Order assumes a hardness of 100 milligrams per liter as calcium carbonate to calculate freshwater water quality objectives that are hardness-dependent based on Basin Plan Table 3-4. The hardness value is conservative and generally protective of aquatic life in all circumstances contemplated by this permit considering that mean and median hardness values in San Francisco Bay Region surface waters are 250 mg/L and 232 mg/L, as determined from data collected through the Surface Water Ambient Monitoring Program.

g. **Site Specific Translators**. Since water quality objectives for metals are typically expressed as dissolved metal, translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. The CTR includes default translators. Site-specific conditions, such as water temperature, pH, suspended solids, and organic carbon, affect the form of metal (dissolved, non-filterable, or otherwise) present and therefore available to cause toxicity. In general, dissolved metals are more available and more toxic to aquatic life than other forms. Site-specific translators can account for site-specific conditions, thereby preventing overly stringent or under-protective water quality objectives.

This Order covers discharges to various receiving waters. CTR default translators were used for priority pollutant metals, except copper in San Francisco Bay. Basin Plan Tables 7.2.1-1 and 7.2.1-2 set forth site-specific copper translators for San Francisco Bay segments. The site-specific translators for Central and Lower San Francisco Bay result in the most stringent copper criteria. These translators are listed in the table below:

Table F-3. Copper Translators

Acute	Chronic
0.87	0.73

3. Need for Limitations (Reasonable Potential Analysis)

Assessing whether a pollutant has reasonable potential to exceed a water quality objective is the fundamental step in determining whether a WQBEL is required.

a. Available Information. The reasonable potential analysis for this Order is based on receiving water and sediment monitoring conducted by SeaWorld San Diego (SeaWorld) from September 2012 through September 2018 to evaluate the potential impacts of its fireworks-related discharges to Mission Bay in the San Diego Region (Annual Fireworks Monitoring Reports, SeaWorld, 2013 – 2019). The effects of SeaWorld's fireworks displays on Mission Bay are representative of worst case conditions for the San Francisco Bay Region because SeaWorld conducts far more fireworks events each year than the number of events typically scheduled throughout the San Francisco Bay Region (SeaWorld conducted 378 fireworks displays from 2012 to 2018 compared to about 160 fireworks displays occurring throughout this Region). Moreover, SeaWorld implements BMPs similar to those specified in Provision VI.C of this Order before, during, and after each of its fireworks displays.

b. Priority Pollutants and Other Fireworks Pollutants of Concern

i. Methodology. SIP section 1.3 sets forth the methodology used for this Order for assessing whether a priority pollutant has reasonable potential to exceed a water quality objective. The same methodology is used as guidance for other fireworks pollutants of concern. There are three triggers in determining reasonable potential:

(a) Trigger 1 is activated if the maximum effluent concentration is greater than or equal to the lowest applicable water quality objective.

(b) Trigger 2 is activated if the receiving water concentration is greater than the lowest applicable water quality objective *and* the pollutant is detected in effluent.

(c) Trigger 3 is activated if a review of other information indicates that a WQBEL is needed to protect beneficial uses.

The reasonable potential analysis typically begins by considering Trigger 1 (i.e., identifying the maximum effluent concentration observed for each pollutant based on available effluent concentration data). However, effluent data are unavailable because the fireworks-related pollutants are dispersed in the air before they enter receiving waters. Thus, this analysis begins by considering Trigger 2 (i.e., identifying the estimated receiving water concentrations for the fireworks pollutants of concern listed in Fact Sheet Table F-1). SIP section 1.4.3 states that either the maximum receiving water concentration should be used or, for water quality objectives intended to protect human health, the arithmetic mean should be used.

ii. **Analysis.** The following table presents the most stringent applicable water quality criteria and objectives and estimated receiving water concentrations for the receiving waters potentially affected by authorized fireworks discharges. Metals are expressed in total recoverable concentrations. There is no reasonable potential for any of the pollutants considered to exceed a water quality criterion or objective because the estimated receiving water concentrations do not exceed the most stringent criteria and objectives.

Table F-4. Reasonable Potential Analysis – Water Quality

Pollutant	Unit	Governing Criterion or Objective	Estimated Receiving Water Concentration (SeaWorld, 2012 – 2018)
Aluminum	µg/L	200	80
Antimony	µg/L	6.0	0.23
Barium	µg/L	1,000	10
Copper	µg/L	8.2	7.5
Iron	µg/L	300	32
Perchlorate	µg/L	6.0	2.5
Phosphorus, Total	µg/L	No criteria	250
Potassium	mg/L	No criteria	450
Strontium	mg/L	No criteria	8.4
Titanium	µg/L	No criteria	72
Zinc	µg/L	86	14

Abbreviations:

µg/L = micrograms per liter
mg/L = milligrams per liter

c. **Sediment Quality.** Pollutants in some receiving water sediments may be present in quantities that alone or in combination are toxic to benthic communities. Efforts are underway to identify stressors causing such conditions. However, available evidence does not link compromised sediment conditions in the San Francisco Bay Region to the discharges subject to this Order. Moreover, sediment monitoring SeaWorld conducted in San Diego's Mission Bay from September 2012 through September 2018 indicates fireworks discharges are unlikely to cause or contribute to exceedances of the sediment quality objectives (Annual Fireworks Monitoring Report, SeaWorld, 2019). The potential impacts of fireworks displays in the San Francisco Bay Region are expected to be significantly less than those in Mission Bay due to the lower event frequency and greater geographic distribution of the fireworks events.

In 2012, 2015, and 2018, SeaWorld assessed sediment chemistry, benthic community condition, and sediment toxicity at three Mission Bay locations within its fireworks fallout area and two reference locations. Its conclusions regarding Mission Bay sediment conditions are presented in the following table:

Table F-5. Mission Bay San Diego Sediment Assessments

Monitoring Location	Station No.	2012[1]	2015[1]	2018[1]
Fireworks Fallout Area	1	Unimpacted	Likely Impacted	Possibly Impacted
Fireworks Fallout Area	2	Unimpacted	Likely Unimpacted	Possibly Impacted

Monitoring Location	Station No.	2012[1]	2015[1]	2018[1]
Fireworks Fallout Area	3	Unimpacted	Unimpacted	Possibly Impacted
Reference	1	Likely Unimpacted	Likely Unimpacted	Unimpacted
Reference	2	Likely Unimpacted	Unimpacted	Unimpacted

Footnote:

[1] Impacts are determined based on three lines of evidence (LOE): sediment chemistry, benthic community condition, and sediment toxicity. Impact categories are defined based on *Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality*:

Unimpacted: Confident that sediment contamination is not causing significant adverse impacts to aquatic life living in the sediment at the site.

Likely Unimpacted: Sediment contamination at the site is not expected to cause adverse impacts to aquatic life, but some disagreement among the LOE reduces certainty in classifying the site as unimpacted.

Possibly Impacted: Sediment contamination at the site may be causing adverse impacts to aquatic life, but these impacts are either small or uncertain because of disagreement among LOE.

Likely Impacted: Evidence for a contaminant-related impact to aquatic life at the site is persuasive, even if there is some disagreement among LOE.

Clearly Impacted: Sediment contamination at the site is causing clear and severe adverse impacts to aquatic life.

Inconclusive: Disagreement among the LOE suggests that either the data are suspect or that additional information is needed before a classification can be made.

In 2012 and 2015, five of six results indicated no or likely no sediment impact in Mission Bay. In 2018, three results indicated a potential sediment impact, but the 2018 assessment is questionable because the sediment sampling coincided with an extensive dredge and fill program in Mission Bay that took place from January through October 2018. Furthermore, the sediment quality assessment occurred in September 2018, at the end of the 2016-18 triennial period, when the number of fireworks displays was considerably lower than during the previous triennial period (i.e., 86 versus 273 events). This indicates that the "possibly impacted" results were unlikely the result of the fireworks displays since fewer impacts were observed when more fireworks displays took place. Moreover, as indicated above, the potential impacts of fireworks displays in the San Francisco Bay Region are expected to be far less.

4. Limitations

This Order does not contain WQBELs because the narrative technology-based requirements of Provision VI.C of this Order will control discharges sufficiently to meet applicable water quality standards (i.e., there is no reasonable potential for the discharges to cause exceedances of water quality objectives). There is evidence that the implementation of BMPs is sufficient to maintain water quality standards. After the Super Bowl 50 fireworks shows in January and February 2016, fireworks debris, including cardboard, plastic, fuses, and wires, washed up on the San Francisco Bay shoreline at Aquatic Park for roughly one month after the events. In July 2016, Baykeeper and a fireworks contractor signed a Memorandum of Understanding committing the contractor to implement BMPs similar to those required by Provision VI.C of this Order. Baykeeper confirmed that the contractor consistently implemented the BMPs and, thus, significant fireworks debris has not been reported since.

D. Discharge Requirement Considerations

1. **Anti-backsliding.** Clean Water Act sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) require effluent limitations in a reissued permit to be as stringent as those in the

previous permit. This is the first NPDES permit issued for the discharge of residual fireworks pollutants in the San Francisco Bay Region; therefore, there is no backsliding.

2. **Antidegradation**. Antidegradation policies require that existing water quality be maintained unless degradation is justified based on specific findings. State Water Board Resolution No. 68-16 sets forth California's Antidegradation policy. Consistent with 40 C.F.R section 131.12, Resolution No. 68-16 incorporates the federal antidegradation policy. The Basin Plan implements, and incorporates by reference, the State and federal antidegradation policies. Permitted discharges must be consistent with these policies.

   In accordance with State Water Board Administrative Procedures Update No. 90-004, the potential for degradation is evaluated by comparing the receiving water quality likely to result from the new permit to the water quality baseline. The water quality baseline is the best receiving water quality that has existed since 1968 when considering Resolution No. 68-16 or since 1975 under the federal policy, unless subsequent lowering was due to regulatory action consistent with State and federal antidegradation policies. If poorer water quality was permitted, the most recent water quality resulting from permitted action is the baseline water quality. For purposes of this analysis, existing water quality is assumed to be the best that has existed since 1968 and 1975. Water quality in 1968 and 1975 was worse than it is now because most Clean Water Act controls, such as the secondary treatment standards for municipal wastewater treatment, were not yet in place. Fireworks displays have taken place, unregulated, for decades, and no poorer water quality has been permitted. This Order will improve water quality in the San Francisco Bay Region and will thus comply with the intent and purpose of the antidegradation policies.

3. **Stringency of Requirements for Individual Pollutants**. This Order contains technology-based effluent limitations that implement minimum applicable federal technology-based requirements. This Order's restrictions on individual pollutants are no more stringent than required to implement Clean Water Act requirements.

   This Order's requirements maintain water quality standards, including beneficial uses and water quality objectives approved pursuant to federal law. U.S. EPA approved most Basin Plan beneficial uses and water quality objectives prior to May 30, 2000. Beneficial uses and water quality objectives submitted to U.S. EPA prior to May 30, 2000, but not approved by U.S. EPA before that date, are nonetheless "applicable water quality standards for purposes of the Clean Water Act" pursuant to 40 C.F.R. section 131.21(c)(1). U.S. EPA approved the remaining beneficial uses and water quality objectives, so they are applicable water quality standards pursuant to 40 C.F.R. section 131.21(c)(2).

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

The receiving water limits are based on the water quality objectives listed in Basin Plan chapter 3 and are intended to ensure that receiving waters meet water quality standards in accordance with the Clean Water Act and regulations adopted thereunder.

VI. RATIONALE FOR PROVISIONS

A. Application for General Permit Coverage and Authorization to Discharge

Based on 40 C.F.R. section 122.28(b), this provision requires each Discharger to submit an NOI form (see Attachment B) and, upon receiving an Authorization to Discharge from the Executive Officer, comply with this Order. Pursuant to 40 C.F.R. section 122.28(b)(3), it also authorizes the Executive Officer to terminate any Authorization to Discharge or require a Discharger to apply for an individual permit.

B. Standard Provisions

Attachment D contains standard provisions that apply to all NPDES permits in accordance with 40 C.F.R. section 122.41 and additional conditions applicable to specific categories of permits in accordance with 40 C.F.R. section 122.42. Dischargers must comply with these provisions. The conditions set forth in 40 C.F.R. sections 122.41(a)(1) and (b) through (n) apply to all state issued NPDES permits and must be incorporated into the permits either expressly or by reference.

In accordance with 40 C.F.R. section 123.25(a)(12), states may omit or modify conditions to impose more stringent requirements. This Order omits federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the State's enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates Water Code section 13387(e) by reference. This Order also recognizes that Attachment D provisions I.G, V.D, and VII.B do not apply to the types of discharges covered by this Order.

C. Best Management Practices (BMPs)

This provision is based on Clean Water Act section 304(e) and 40 C.F.R. section 122.44(k), which allow the use of BMPs to control or abate pollutant discharges when numeric effluent limitations are infeasible. BMPs are derived from 22 CCR section 67384.8 and guidance targeting perchlorate-containing fireworks (i.e., Massachusetts Department of Environmental Protection, Fireworks Best Environmental Management Practices, May 2011). This guidance is also relevant to preventing, controlling, and responding to discharges associated with other types of fireworks. Based on this guidance, these BMPs reflect best available technology economically achievable (BAT) and best practicable treatment control technology (BPT) to reduce or prevent discharges of pollutants in a manner that reflects best industry practice considering technological availability and economic practicability and achievability. The requirements of this provision serve as narrative effluent limitations and facilitate compliance with Discharge Prohibition III.B.

D. Reporting Provisions

Clean Water Act section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify reporting requirements. Water Code sections 13267 and 13383 also authorize the Regional Water Board to establish inspection, entry, reporting, and recordkeeping requirements. This provision establishes reporting, and recordkeeping requirements that implement federal and State requirements. The Executive Officer may amend

these requirements pursuant to 40 C.F.R. sections 122.62, 122.63, and 124.5. Pursuant to Water Code section 13267, the Executive Officer may specify additional monitoring and reporting requirements in individual Authorizations to Discharge, such as, but not limited to, monitoring in response to a complaint and additional discharge observations. The notification and reporting requirements are necessary to evaluate compliance with this Order, to assess BMP performance and implementation, and to inform the next permit reissuance.

E. Reopener Provisions

These provisions are based on 40 C.F.R. sections 122.62 and 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated water quality objectives, regulations, or other new and relevant information that may become available in the future, and other circumstances as allowed by law.

VII. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for the discharge of residual firework pollutants associated with public fireworks displays in the San Francisco Bay Region. As a step in the WDRs adoption process, the Regional Water Board developed tentative WDRs and encouraged public participation in the WDRs adoption process.

A. Notification of Interested Parties. The Regional Water Board notified Dischargers and interested agencies and persons of its intent to prescribe WDRs and provided an opportunity to submit written comments and recommendations. The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website at www.waterboards.ca.gov/sanfranciscobay.

B. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were due either in person or by mail at the Regional Water Board office at 1515 Clay Street, Suite 1400, Oakland, California 94612, to the attention of Marcos De la Cruz.

For full staff response and Regional Water Board consideration, the written comments were due at the Regional Water Board office by **5:00 p.m. on May 1, 2020**.

C. Public Hearing. The Regional Water Board held a public hearing on the tentative WDRs during its regular meeting at the following date and time:

Date:	June 10, 2020
Time:	9:00 a.m.
Contact:	Marcos De la Cruz, (510) 622-2365, marcos.delacruz@waterboards.ca.gov

Interested persons were provided notice of the hearing and information on how to participate. During the public hearing, the Regional Water Board heard testimony pertinent to the discharges, WDRs, and permit. For accuracy of the record, important testimony was requested to be in writing.

Dates and venues can change. The Regional Water Board web address is www.waterboards.ca.gov/sanfranciscobay, where one could access the current agenda for changes.

D. Reconsideration of Waste Discharge Requirements. Any aggrieved person may petition the State Water Board to review the Regional Water Board decision regarding the final WDRs. The State Water Board must receive the petition within 30 calendar days of the Regional Water Board action. For instructions on how to file a petition for review, see www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

E. Information and Copying. Supporting documents and comments received are on file and may be inspected at the address above at any time between 8:00 a.m. and 5:00 p.m. (except noon to 1:00 p.m.), Monday through Friday. Copying of documents may be arranged by calling (510) 622-2300.

F. Register of Interested Persons. Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference the general permit, and provide a name, address, and phone number.

G. Additional Information. Requests for additional information or questions regarding this Order should be directed to Marcos De la Cruz at (510) 622-2365 or marcos.delacruz@waterboards.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. R4-2023-0180
GENERAL NPDES PERMIT NO. CAG994007

WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES OF RESIDUAL FIREWORK POLLUTANTS FROM PUBLIC FIREWORKS DISPLAYS TO SURFACE WATERS IN LOS ANGELES AND VENTURA COUNTIES

Table 1. Administrative Information

This Order was adopted Los Angeles Water Board on:	**May 25, 2023**
Enrollment to this Order shall become effective on:	**May 25, 2023**
This Order shall expire on:	**May 25, 2028**

The United State Environmental Protection Agency (USEPA) and the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board) have classified discharges covered under this General National Pollutant Discharge Elimination System (NPDES) Permit as minor discharges.

I, Susana Arredondo, Executive Officer, do hereby certify the following is a full, true, and correct copy of an Order adopted by the Los Angeles Water Board on the date indicated above.

Jenny Newman
Digitally signed by Jenny Newman
Date: 2023.06.08 09:47:09 -07'00'

Susana Arredondo
Executive Officer

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ATTACHMENT F - FACT SHEET F-1

I. FACILITY/DISCHARGE INFORMATION

This Order (also referred to as "General Permit") is intended to authorize discharges from public firework displays (residual firework pollutants) into waters of the United States in the Los Angeles Region (Discharges). The Clean Water Act (CWA) prohibits the discharge of any pollutant to waters of the United States, except in compliance with an NPDES permit. Residual firework pollutants discharged into surface waters constitutes discharge of a pollutant. Therefore, coverage under an NPDES permit is required before residual firework pollutant discharges associated with the public display of fireworks can be lawfully discharged. Discharges authorized under this Order are subject to all applicable conditions set forth in this Order.

II. PERMIT COVERAGE AND NOTIFICATION REQUIREMENTS

A. Permit Coverage

This Order covers the discharge of residual firework pollutants to waters of the United States (Surface Waters) within the jurisdiction of the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board). Any person who proposes to discharge pollutants from the public display of fireworks to surface waters (Discharger) must obtain coverage under this Order prior to the public display of fireworks event. This Order does not cover 1) Discharges from private individuals who use Safe and Sane fireworks for personal display, 2) Discharges covered by individual or other NPDES permits or WDRs, or 3) Discharges over land and/or to the municipal separate storm sewer system (MS4).

B. Eligibility Criteria

Any person who proposes to discharge pollutants from the public display of fireworks to surface waters (Discharger) must submit a Notice of Intent (NOI) to obtain coverage under this Order in accordance with the requirements of Part II.D of the Order.

C. Authorization

Upon receipt of the application, the Executive Officer shall determine the applicability of this Order to such a discharge. If the discharge is eligible, the Executive Officer shall issue a notice of applicability (NOA) to the Discharger that the discharge is authorized under the terms and conditions of this Order noting any specific conditions that may be necessary to be in compliance with this Order. The Discharger shall comply with the requirements of this Order and other conditions prescribed in the NOA. For new discharges, the discharge shall not commence until receipt of the NOA for coverage under this Order or until an individual permit is issued by the Los Angeles Water Board.

D. Permit Application/Notice of Intent

1. Deadline for Submission

A Discharger shall complete and submit the NOI form at least 45 days before commencement of the fireworks event unless a shorter deadline has been granted by the Los Angeles Water Board.

2. Application Requirements

The Discharger may be the fireworks event host, or the fireworks display operator, who agrees to be responsible for compliance with all conditions specified in this Order.

The NOI submittal may address multiple fireworks events at different locations throughout the Los Angeles Region. The Los Angeles Water Board may require the joint submission of an NOI from both the host and the person operating the fireworks event on a case-by-case basis.

The Discharger shall use the NOI form in Attachment C of this Order or the current version of the form available on the Los Angeles Water Board website at https://www.waterboards.ca.gov/losangeles/publications_forms/forms/general_npdes_application_forms.html.

The Discharger, upon request, shall submit any additional information that the Los Angeles Water Board deems necessary to evaluate applicability and to determine whether any specific conditions are necessary to ensure compliance with the Order.

3. NOI Modification:

A Discharger may modify its NOI by submitting a modified NOI form (e.g., a mark-up of the original NOI form showing all changes and including a new signature and date) at least 30 days before the proposed change implementation date. The Discharger shall include a transmittal letter describing the changes, its purpose for changes, when the changes are to go into effect, and any new or different measures taken or planned to comply with this Order's requirements. Changes shall be authorized if and when the Executive Officer modifies or issues the NOA.

4. Annual Fee

Title 23 of the California Code of Regulations (CCR) requires that all discharges subject to waste discharge requirements shall pay an annual fee. Fireworks discharges require no treatment systems to meet the terms and conditions of this Order and pose no significant threat to water quality. As such, these discharges are classified as Category 3 pursuant to the fee schedule. The fees applicable to this Order are set forth in CCR, section 2200, subdivision (a)(10). The check or money order shall be made payable to the State Water Resources Control Board as described in section IV of Attachment B of this Order.

5. Notice of Termination (NOT)

Dischargers shall submit a Notice of Termination (NOT) when coverage under this Order is no longer needed. A NOT contains the Waste Discharge Identification Number (WDID) or Compliance Inspection (CI) number, and the name and address of the Discharger. The NOT shall be signed and dated by the Discharger, certifying that the discharge associated with Permit No. CAG994007 has been eliminated or that there has been a change in ownership. Upon submission of the NOT, the Discharger is no longer authorized to discharge wastewater associated with this Order.

6. Change of Ownership/ Notice of Transfer (NOTT)

Dischargers shall submit a Notice of Transfer (NOTT) when there has been a change in ownership. Coverage under this Order may be transferred in case of change of ownership of land or discharge facility provided the existing Discharger notifies the Executive Officer at least 30 days before the proposed transfer date, and the notice includes a written agreement between the existing and new Dischargers containing a specific date of transfer of coverage, responsibility for compliance with this Order, and liability between them. The Los Angeles Water Board may require modification or revocation and reissuance of coverage under the Order to change the name of the Permittee or to incorporate other requirements as may be necessary under the CWA and the California Water Code (CWC).

III. FINDINGS

The Los Angeles Water Board finds:

A. Legal Authorities

This Order serves as waste discharge requirements (WDRs) pursuant to Article 4, Chapter 4 of the CWC (commencing with section 13260; see in particular section 13263, subd. (i) [general permits]). This Order also serves as an NPDES permit for discharges of residual firework pollutants from public displays of fireworks to Surface Waters within the jurisdiction of the Los Angeles Water Board, is issued pursuant to section 402 of the CWA, the implementing regulations adopted by the EPA, and Chapter 5.5, Division 7 of the CWC (commencing with section 13370).

B. Background

On September 22, 1989, EPA granted the State of California, through the State Water Resources Control Board (State Water Board) and the Los Angeles Water Board, the authority to issue general NPDES permits pursuant to Title 40 of the Code of Federal Regulations (40 CFR) parts 122 and 123.

40 CFR section 122.28(a)(2)(ii) provides for issuance of general NPDES permits to regulate a category of point sources, other than storm water point sources, if the sources within the category:

1. Involve the same or substantially similar types of operations;
2. Discharge the same types of waste;
3. Require the same effluent limitations or operating conditions;
4. Require the same or similar monitoring; and
5. In the opinion of the permitting authority, discharges are more appropriately controlled under a general NPDES permit rather than individual NPDES permits.

General NPDES permits and WDRs enable the Los Angeles Water Board to expedite the processing of requirements, simplify the application process for dischargers, better utilize limited staff resources, and avoid the expense and time involved in repetitive public noticing, hearings, and permit adoptions.

C. Rationale for Requirements

The Los Angeles Water Board developed the requirements in this Order based on applicable federal and state laws and regulations, information collected as part of previous investigations, input from prospective dischargers and environmental advocates, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for the requirements in this Order, is hereby incorporated into and constitutes Findings for the Order. Attachments A through E are also incorporated into this Order.

D. Notification of Interested Parties

The Los Angeles Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of the notification are provided in the Fact Sheet.

E. Consideration of Public Comment

The Los Angeles Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet.

IV. DISCHARGE PROHIBITIONS

- Discharges of any waste at a location different from the location(s) listed in the issued NOA are prohibited.
- Discharge of residual firework pollutants to waters of the United States so as to create, or to cause pollution, contamination, or nuisance as defined in Water Code section 13050 is prohibited.
- Discharge of plastic trash to waters of the United States is prohibited.

V. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

Effluent limitations are not included in the Order. The Discharger shall implement the best management practices in accordance with Provision VII.C.

VI. RECEIVING WATER LIMITATIONS

The discharge shall not cause or contribute to any of the following:

1. Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;
2. Alteration of suspended sediment in such a manner as to cause nuisance, or to adversely affect beneficial uses, or to cause detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life;
3. Suspended material, including trash, in concentrations that cause nuisance or adversely affect beneficial uses;
4. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

5. Alteration of temperature beyond present natural background levels;
6. Coloration that causes nuisance or adversely affects beneficial uses;
7. Taste or odor-producing substances in concentrations that alter the natural taste, odor, and/or color of fish, shellfish, or other edible aquatic resources; cause nuisance; or adversely affect beneficial uses;
8. Visible, floating, suspended, or deposited oil or other products of petroleum origin;
9. Toxic or other deleterious substances in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration; or
10. Violations of any water quality standard for receiving waters adopted by the Los Angeles Water Board, State Water Resources Control Board (State Water Board), or USEPA as required by the Clean Water Act and regulations adopted thereunder.

VII. PROVISIONS

This Order provides Standard Provisions and Special Provisions. Dischargers enrolled under the Order must comply with all Standard and Special Provisions. Standard Provisions applying to all NPDES permits in accordance with 40 CFR sections 122.41 and 122.42 are included in Attachment D of this Order.

A rationale for the special provisions contained in this Order is provided in Attachment F, Fact Sheet. Special Provisions provided in this Order are in sections VII. A. through VII.E. below.

A. Standard Provisions

Los Angeles Water Board Standard Provisions. The Discharger shall comply with the following provisions. If there is any conflict, duplication, or overlap between provisions specified by this Order, the provisions stated herein prevail:

1. Oil or oily materials, chemicals, refuse, or other materials that may cause pollution in storm water and/or urban runoff shall not be stored or deposited in areas where they may be picked up by rainfall/urban runoff or wind and discharged to surface waters. Any spill of such materials shall be contained, removed, and cleaned immediately.
2. This Order neither exempts the Discharger from compliance with any other laws, regulations, or ordinances that may be applicable, nor legalizes the facility or activity.
3. The Discharger shall at all times properly operate and maintain all systems installed or used to achieve compliance with this Order.
4. Any Discharger authorized under this Order may request to be excluded from the coverage of this Order by applying for an individual permit.
5. The provisions of this Order are severable. If any provision of this Order or the application of any provision of this Order is found invalid, the remainder of this Order shall not be affected.

6. A copy of this Order shall be made available to all personnel/staff (including field staff or contractors and their agents and representatives) involved with the compliance of this Order.
7. Failure to comply with provisions or requirements of this Order, or violation of other applicable laws or regulations governing discharges of residual firework pollutants, may subject the Discharger to administrative or civil liabilities, criminal penalties, and/or other enforcement remedies to ensure compliance. Additionally, certain violations may subject the Discharger to civil or criminal enforcement from appropriate local, state, or federal law enforcement entities.
8. Violation of any of the provisions of this Order may subject the Discharger to any of the penalties described herein or in Attachment D of this Order, or any combination thereof, at the discretion of the prosecuting authority.

B. Best Management Practices (BMP) Plan

The Discharger shall prepare a BMP Plan (Plan) that describes procedures to ensure that residual firework pollutants discharges will not adversely affect receiving waters. While developing the Plan, an analysis of alternatives should be conducted to determine the BMPs. The Plan, along with the alternative analysis, shall be submitted as a component of the NOI to the Los Angeles Water Board. The Discharger shall implement the BMPs in the approved Plan and it shall make the approved Plan available to all persons who request it.

The Plan shall include the following three elements to avoid and/or mitigate potential impacts to receiving water quality:

Pollution Prevention

Use alternative (e.g., biodegradable) fireworks materials and/or select an alternative debris fallout location based on readily available meteorological data to eliminate or reduce residual firework pollutant discharges to waters of the United States.

Pollutants Identification

Describe activities conducted within the firing range that have a potential to release pollutants and identify the potential pollutant sources associated with each activity.

Pollution Control

Provide measures of controlling pollutant discharges during the firework operations and cleaning up the fallout areas to minimize the potential adverse effects of pollutant discharges after the firework displays. These measures shall represent the best available technology that is economically achievable. At a minimum, the Plan shall include the following BMPs to the extent practicable and economically achievable:

1. Use alternative fireworks that replace perchlorate with other oxidizers and contain biodegradable components.
2. Use fireworks that do not contain plastic outer casings or have non-biodegradable inner components.
3. Use propellants that burn cleaner, produce less smoke, and reduce residual firework

pollutant discharges to surface waters.

4. Select firing range locations based on readily available meteorological data and designs that reduce residual firework pollutant discharges.
5. Secure all pyrotechnic equipment and fireworks in a manner that minimizes the risk of such materials and objects entering receiving waters before, during, and after fireworks displays.
6. Inspect each firework launch area for potential safety issues on an ongoing basis.
7. Perform visual observations and monitoring activities to assess BMP performance.
8. Prior to fireworks displays, set up a retaining wall/fence or other barrier around three of the four sides of the launch site to control the mobility of fireworks debris, particulate matter, and to avoid fuses and other debris falling into the surface water.
9. As soon as practicable after fireworks displays, conduct BMP effectiveness evaluations.
10. Whenever practicable, feasible, and safe, remove all plastic and aluminum labels and wrappings from aerial shells and special effect pyrotechnic devices before they are launched.
11. Describe in the Plan how shells and special effect pyrotechnic devices will be secured during the firework show and the plan to collect all firework related wastes following the fireworks event.
12. As soon as practicable, and no later than 12 hours following a public display of fireworks, collect, remove, and manage particulate matter and debris from ignited and un-ignited pyrotechnic material including aerial shells, stars (small pellets of composition that produce color pyrotechnic effects), paper, cardboard, wires and fuses found during inspection of the entire firing range, nearby shoreline and adjacent affected surface water(s) in addition to complying with title 19 of the California Code of Regulations, section 1003 (operation of fireworks display).
13. Other than system firing cables and common or grounding wires intended to be recovered after the display, secure electric igniter wires used to trigger the fireworks to minimize the risk that the wires fall into the water during or after the discharge.
14. When the fireworks have been cleared from the launch area, rake or sweep the decks of each barge or floating platform that contained fireworks to gather fireworks debris and prevent it from being deposited into the water. Collect all non-hazardous solid waste resulting from the set-up, firing, and strike of the public display, including wires, boxes, and packaging, and properly disposed of the solid waste. Pick up fireworks debris on the nearby shoreline in the morning of the day immediately following the fireworks event.
15. Immediately following the public display of fireworks, handle and manage all hazardous fireworks waste, including duds, resulting from the set-up, firing, and strike of the public display, including live pyrotechnics waste, in accordance with applicable fireworks and hazardous waste laws and regulations.

16. Document the shipping manifest weight of the aerial shells and special effect pyrotechnic devices prior to use to determine net explosive weight. Indicate in the Plan what percentage of the total weight of fireworks-related waste will be created. Ensure that any floatable degradable and non-biodegradable components of the fireworks-related waste are collected after the event.
17. Setup, discharge, and take down the fireworks and fireworks equipment in accordance with the laws and regulations applying to that display by a public display operator licensed by the State of California. Obtain all required permits, licenses and approvals from the authorities having jurisdiction over the fireworks display and comply with the requirements and conditions of those permits and licenses.
18. Package, transport, store, set-up, and handle firework in accordance with California Code of Regulations, Title 19, Division1, Chapter 6, Fireworks and Title 22, Chapter 33, Best Management Practices for Perchlorate Materials to prevent or minimize firework pollutant wastes from entering surface waters.

C. Reopener Provisions

1. Pursuant to 40 CFR sections 122.62 and 122.63, this Order may be modified, revoked and reissued, or terminated for cause, including, but not limited to:
   a. Violation of any term or condition contained in this Order;
   b. Obtaining this Order by misrepresentation, or by failure to disclose fully all relevant facts; or
   c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.
2. This Order may be reopened if present or future investigations demonstrate that the discharges governed by this Order have or will have, or will cease to have, a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters.
3. If more stringent applicable water quality standards are promulgated or approved pursuant to section 303 of the CWA, or amendments thereto, the Los Angeles Water Board may revise or modify this Order in accordance with such standards.
4. This Order may be reopened if translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified.
5. This Order may be reopened and modified to the extent necessary, to be consistent with new or revised policies, new or revised state-wide plans, new laws, or new regulations.
6. This Order may be reopened if an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to those applicable to these discharges.
7. This Order may be reopened upon submission by the Discharger of adequate information, as determined by the Los Angeles Water Board. The filing of a request by the Discharger for an Order modification, revocation and issuance, or termination, or a

notification of planned changes or anticipated noncompliance does not stay any condition of this Order.

D. Expiration and Continuation of this Order

This Order expires on May 25, 2028. If this Order is not reissued or replaced prior to the expiration date, it will be administratively continued in accordance with 40 CFR 122.6 and remain in full force and effect.

E. Reauthorization

Upon reissuance of a new order, existing dischargers enrolled under this Order shall file a Notice of Intent or a new Report of Waste Discharge within 90 days of adoption of the new Order.

F. Special Study

The Dischargers shall conduct a special study to determine the impacts of the constituents from fireworks in the fallout zone by collecting samples in “real time” during the fireworks displays. The Dischargers shall submit a work plan within 12 months from the effective date of this Order for approval by the Executive Officer of the Los Angeles Water Board. The Work Plan shall include real time sampling for all the constituents hereby specified: Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Thallium, Tin, Titanium, Vanadium, Zinc, nitrate, bis-phthalate, Total Phosphorous, Perchlorate, and Sulfur within the fall out zone.

VIII. COMPLIANCE DETERMINATION

This Order contains discharge prohibitions and requires the use of minimum BMPs to control and abate the discharge of pollutants from public fireworks displays to surface waters in the Los Angeles Region. Proper implementation of BMPs will ensure the protection of water and sediment quality within the receiving waters. Dischargers enrolled under this Order are expected to comply with all water and sediment quality objectives through the implementation of BMPs. Compliance will be determined by evaluating the proper implementation of the minimum stipulated BMPs and their effectiveness in preventing and minimizing pollutant loading from public fireworks events to surface waters. Compliance will also be evaluated using information obtained under the monitoring and reporting program of this Order.

ATTACHMENT A- DEFINITIONS

Aerial Fireworks
Aerial fireworks provide their own propulsion or are shot into the air in an aerial shell by a mortar using a black powder lift charge or propellant.

Aerial Shell
Cylinder or spherical cartridge containing a burst charge and pyrotechnic or non-pyrotechnic effects, a fuse, and a black powder lift charge that is fired from a mortar (19 CCR § 980[a][1]). Aerial shells are typically designed to burst between 200 and 1,000 feet above ground level.

Alternative Fireworks
Fireworks are produced with new pyrotechnic formulas that replace perchlorate with other oxidizers and propellants that burn cleaner, produce less smoke, and reduce residual firework pollutant loading to surface waters.

Barge
Water vessel with from which fireworks are launched or ignited.

Best Management Practices (BMPs)
Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices that prevent or reduce the pollution of water of the United States.

Biodegradable
Biodegradable means capable of decomposing rapidly by microorganisms under natural conditions (aerobic and/or anerobic). Biodegradable in the context of fireworks will be interpreted to mean non-plastic and non-toxic to humans or aquatic organisms.

Break
Individual burst from an aerial shell, producing either a visible or audible effect, or both, that may consist of a single burst or multiple effects (19 CCR § 980 (b((7)).

Dud
Pyrotechnic item that leaves the mortar and returns to earth without producing the intended burst or effect (19 CCR § 980 (d)(4)).

Enclosed Bays
means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays do not include inland surface waters or ocean waters.

Estuaries
means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where

there is no significant mixing of fresh water and seawater. Estuaries do not include inland surface waters or ocean waters.

Fallout Area
Area in which firework debris and pollutants fall after a pyrotechnic device is burst. The extent of the fallout area depends on the wind and the angle of mortar placement.

Fireworks
Device containing chemical elements and chemical compounds capable of burning independently of the oxygen in the atmosphere and producing an audible, visual, mechanical, or thermal effect that is useful as a pyrotechnic device or for entertainment. The term "fireworks" includes, but it is not limited to, devices designated by the manufacturer as fireworks, torpedoes, skyrockets, roman candles, rockets, Daygo bombs, sparklers, party poppers, paper caps, chasers, fountains, smoke sparks, aerial bombs, and fireworks kits (California Health and Safety Code § 12511).

Fireworks Display
See *Public Fireworks Display*.

Firing Range
Area over which fireworks may travel by design or accident and upon which residual firework pollutants may fall, including fireworks launch areas and adjacent shorelines, quays, docks, barges, and fireworks fallout areas.

Ground Display Piece
Pyrotechnic device that functions on the ground (as opposed to an aerial shell that functions in the air) and that includes fountains, wheels, and set pieces.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Low-level Fireworks
Low-level fireworks consist of stars or other components that produce single or multi-colored fountain effects or sparks. They are designed to burn at less than 200 feet above ground level.

Minimum Level (ML)
Concentration at which the entire analytical system gives a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Misfire
Pyrotechnic item that fails to function as designed after initiation (19 CCR § 980(m)(5)).

Mortar
Cylinder used to hold and fire public display or special effects pyrotechnic items or compositions (19 CCR § 980 (m)(8)).

Multiple Break
Aerial shell that has two or more breaks (19 CCR § 980(m)(11)).

Net Explosive Weight
Weight of all pyrotechnic compositions, explosives material, and fuse (22 CCR § 67384.3).

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent Pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pier
Structure extending from the land out over a body of water to afford convenient passage for persons, property, and vessels.

Pollutant Minimization Program (PMP) means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bio accumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Los Angeles Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Los Angeles Water Board.

Public Fireworks Display (also referred to as Fireworks Display)
Entertainment feature where the public or a private group is admitted or permitted to view a display or discharge of fireworks (22 CCR § 67384.3).

Pyrotechnic Operator
Licensed pyrotechnic operator, who by examination, experience, and training, has demonstrated required skill and ability in the use and discharge of fireworks as authorized by the license granted (22 CCR § 67384.3).

Pyrotechnic Compositions
Combination of chemical elements or chemical compounds capable of burning independently of the oxygen of the atmosphere (California Health and Safety Code § 12525).

Quay
Wharf for loading and unloading goods carried by ships.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Los Angeles Water Board either from SIP Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Roman Candle
Heavy paper or cardboard tube containing pellets of pyrotechnic composition that, when ignited, are expelled into the air at several second intervals (19 CCR § 980 (r)(3)).

Safe and Sane Fireworks
Any fireworks which do not come within the definition of “dangerous fireworks” or “exempt fireworks.” (California Health and Safety Code § 12529).

Salute
Aerial shell or another pyrotechnic item whose primary effects are detonation and flash of light (19 CCR § 980 (s)(1)).

Star
Small pellet of composition that produces a pyrotechnic effect. A single aerial firework shell could contain several hundred stars (22 CCR § 67384.3).

Set Piece Fireworks
Set piece firework devices are primarily static and typically do not launch into the air. They produce effects at less than 50 feet above ground level.

Trash
All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

ATTACHMENT B- NOTICE OF INTENT

This Notice of Intent form shall be completed and submitted to apply for Authorization to Discharge under NPDES Permit No. CAG994007 (Fireworks General Permit) to waters of the United States.

I. DISCHARGER INFORMATION AND CERTIFICATION

This certification shall be signed in accordance with Attachment D section V.B.2. The Discharger hereby agrees to comply with and be responsible for all conditions specified in the Fireworks General Permit.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
Signature:	Date:
Printed Name:	
Title:	
Discharger Type (Check One) ☐Public ☐Private ☐ Other, specify type: Discharger Name:	New or Previously Authorized Discharger (Check One) ☐New ☐Previously Authorized Discharger
Mailing Address:	
Legally Responsible Person (LRP): The following individual (or any individual occupying the position listed below) may act as the Discharger's duly authorized representative and may sign and certify submittals in accordance with Attachment D section V.B.3. The individual shall be responsible for the overall operation of the regulated facility or activity or an individual position having overall responsibility for environmental matters for the Discharger.	
LRP Name and Title:	
LRP Email:	
LRP Phone Number:	

□ Check here if additional Discharger information is attached to this form.

II. BILLING INFORMATION

☐ Check this box if same as Section I (otherwise, complete this section).
Discharger Name:
Mailing Address:
Billing Contact Name and Title:
Billing Contact Email:
Billing Contact Phone Number:

III. DISCHARGE INFORMATION

Receiving Water:
Discharge Frequency: ☐ Once ☐ Annual ☐ Other (please describe): ☐ **Project location (address, latitude & longitude information)** Stating means of firework deployment (i.e., barge, and staging area necessary to determine the closest receiving waters).

☐ Check here if information for additional discharge locations is attached to this form.

IV. BEST MANAGEMENT PRACTICES PLAN

Attach a Best Management Practices Plan (Plan) as described in Provision VII.B of this Order.

V. APPLICATION FEES AND MAILING INSTRUCTIONS

Submit check payable to "State Water Resources Control Board" for appropriate application fee to this address:

Los Angeles Regional Water Quality Control Board
340 West 4th Street, Suite 200
Los Angeles, CA 90013

For current fees for general NPDES permit category 3, see Water Code section 2200(b)(9) or visit www.waterboards.ca.gov/resources/fees.

Submit this form (with signature and attachments) via email augustine.anijielo@waterboards.ca.gov or as otherwise indicated on the Los Angeles Water Board's website:
https://www.waterboards.ca.gov/losangeles/water_issues/programs/index.html

ATTACHMENT C- FIREWORKS DISPLAY REPORT FORM

The Fireworks Display Report shall be completed following each fireworks display. The Discharger may attach additional information as necessary. Fireworks Display Reports shall be made available to the Los Angeles Water Board upon request and shall be submitted with self-monitoring reports in accordance with section VIII.C of Attachment E, MRP.

I. GENERAL EVENT INFORMATION

Discharger Name: Event Name:	
Event Contact Person Name: Phone Number: Email:	
Event Location Address: GPS Coordinates:	
Receiving Water Name:	
Event Date:	Event Start and End Time:

II. FIRING RANGE MAP

Attach an aerial or satellite map identifying the firing range, fireworks fallout area, affected receiving waters, and adjacent coastlines, barges, docks, piers, quays, and any other relevant features or landmarks.

III. PYROTECHNIC OPERATORS

Name	License Number	Date Issued	Expiration Date

IV. FIREWORKS INFORMATION

Aerial Fireworks			Low Level Fireworks			Set Piece Fireworks
Shell Size	**No. Single Breaks**	**No. Multiple Breaks**	**Type**	**No.**	**Type**	**No.**
25 mm			Mines		Sets	
80 mm			Romans		Devices	
2”			Comets			
3”			Cakes			
4”						
5”						
6”						
8”						
9”						
10”						
11”						
12”						

Net Explosive Weight: pounds (lbs)	

Were alternative fireworks used? If so, describe:

Were the entire firing range (including the fireworks launching area and adjacent coastline, quays, docks, and fireworks fallout area), barges (if used), and adjacent surface waters inspected and cleaned of particulate matter and debris from ignited and un-ignited pyrotechnic material within 24 hours following the display?

☐ Yes Date: _____ Time: _____

☐ No

If no, explain:

Total amount of debris collected from receiving water: _____lbs wet weight

_____lbs dry weight (if known)

Total amount of debris collected: _____lbs wet weight

V. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.	
Signature:	Date:
Printed Name:	
Title:	
Discharger Name:	
Address:	
Email:	Phone No.:

ATTACHMENT D- STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the CWA and the CWC and is grounds for enforcement action, for permit termination, revocation and reissuance, or denial of a permit renewal application (40 CFR section 122.41(a)).

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order (40 CFR section 122.41(c)).

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment (40 CFR section 122.41(d)).

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order (40 CFR section 122.41(e)).

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges (40 CFR section 122.41(g)).
2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations (40 CFR section 122.5(c)).

F. Inspection and Entry

The Discharger shall allow the Los Angeles Water Board, State Water Resources Control Board (State Water Board), EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 U.S.C. section 1318(a)(4)(B); 40 CFR section 122.41(i); CWC sections 13267 and 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. section 1318(a)(4)(B)(i); 40 CFR section 122.41(i)(1); CWC sections 13267 and 13383);
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. section 1318(a)(4)(B)(ii); 40 CFR section 122.41(i)(2); CWC sections 13267 and 13383);

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. section 1318(a)(4)(B)(ii); 40 CFR section 122.41(i)(3); CWC sections 13267 and 13383);
4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the CWC, any substances or parameters at any location (33 U.S.C. section 1318(a)(4)(B)(ii); 40 CFR section 122.41(i)(4); CWC sections 13267 and 13383).
5. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof (40 CFR section 122.41(n)(4)).

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition (40 CFR section 122.41(f)).

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit (40 CFR section 122.41(b)).

C. Transfers

This Order is not transferable to any person except after notice to the Los Angeles Water Board. The Los Angeles Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the CWC (40 CFR sections 122.41(l)(3) and 122.61).

III. STANDARD PROVISIONS – MONITORING (NOT APPLICABLE)

IV. STANDARD PROVISIONS – RECORDS

A. The Discharger shall retain records of all monitoring information, including copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Los Angeles Water Board Executive Officer at any time (40 CFR section 122.41(j)(2)).

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR section 122.41(j)(3)(i));
2. The individual(s) who performed the sampling or measurements (40 CFR section 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 CFR section 122.41(j)(3)(iii));
4. The individual(s) who performed the analyses (40 CFR section 122.41(j)(3)(iv));
5. The analytical techniques or methods used (40 CFR section 122.41(j)(3)(v)); and
6. The results of such analyses (40 CFR section 122.41(j)(3)(vi)).

C. Claims of confidentiality for the following information will be denied (40 CFR section 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR section 122.7(b)(1)); and
2. Permit applications and attachments, permits and monitoring data (40 CFR section 122.7(b)(2)).

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Los Angeles Water Board, State Water Board, or EPA within a reasonable time, any information which the Los Angeles Water Board, State Water Board, or EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Los Angeles Water Board, State Water Board, or EPA copies of records required to be kept by this Order (40 CFR section 122.41(h); CWC sections 13267 and 13383).

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Los Angeles Water Board, State Water Board, and/or EPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below (40 CFR section 122.41(k)).
2. All permit applications shall be signed as follows:
   a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR section 122.22(a)(1));

b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively [(40 CFR section 122.22(a)(2)); or

c. For a municipality, State, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA) (40 CFR section 122.22(a)(3)).

3. All reports required by this Order and other information requested by the Los Angeles Water Board, State Water Board, or EPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR section 122.22(b)(1));

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company (a duly authorized representative may thus be either a named individual or any individual occupying a named position) (40 CFR section 122.22(b)(2)); and

c. The written authorization is submitted to the Los Angeles Water Board, State Water Board, or EPA (40 CFR section 122.22(b)(3)).

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Los Angeles Water Board, State Water Board or EPA prior to or together with any reports, information, or applications, to be signed by an authorized representative (40 CFR section 122.22(c)).

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

a. “I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations” (40 CFR section 122.22(d)).

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program in this Order (40 CFR section 122.41(*l*)(4)).
2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Los Angeles Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices (40 CFR section 122.41(*l*)(4)(i)).

D. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance (40 CFR section 122.41(*l*)(6)(i)).
2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR section 122.41(*l*)(6)(ii)):

   Any emergency that occurred which results in fireworks-related trash not being able to be collected following an event.

E. Planned Changes

The Discharger shall give notice to the Los Angeles Water Board as soon as possible of any alterations to the permitted activity (40 CFR section 122.41(*l*)(1)). Notice is required under this provision when:

1. The changes meet one of the criteria for determining whether a facility is a new source in 40 CFR section 122.29(b) (40 CFR section 122.41(*l*)(1)(i)); or
2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in this Order, nor to notification requirements under 40 CFR section 122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1) (40 CFR section 122.41(*l*)(1)(ii)).
3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan (40 CFR section 122.41(*l*)(1)(iii)).

F. Anticipated Noncompliance

The Discharger shall give advance notice to the Los Angeles Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with the requirements of this Order (40 CFR section 122.41(*l*)(2)).

G. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.E.3, V.E.4, and V.E.5 above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above (40 CFR section 122.41(*l*)(7)).

H. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Los Angeles Water Board, State Water Board, or EPA, the Discharger shall promptly submit such facts or information (40 CFR section 122.41(*l*)(8)).

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Los Angeles Water Board and State Water Board is authorized to enforce the terms of this Order under several provisions of the CWC, including, but not limited to, sections 13268, 13385, 13386, and 13387.

1. The CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the CWA, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the CWA, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the CWA, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the CWA, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall

be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions (40 CFR section 122.41(a)(2); CWC sections 13385 and 13387).

2. Any person may be assessed an administrative penalty by the Los Angeles Water Board for violating section 301, 302, 306, 307, 308, 318 or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 (40 CFR section 122.41(a)(3)).

3. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both (40 CFR section 122.41(j)(5)).

4. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both (40 CFR section 122.41(k)(2)).

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural dischargers shall notify the Los Angeles Water Board as soon as they know or have reason to believe (40 CFR section 122.42(a)):

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 CFR section 122.42(a)(1)):

   a. 100 micrograms per liter (µg/L) (40 CFR section 122.42(a)(1)(i));

   b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4 dinitrophenol and 2 methyl 4,6 dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 CFR section 122.42(a)(1)(ii));

   c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR section 122.42(a)(1)(iii)); or

d. The level established by the Los Angeles Water Board in accordance with 40 CFR section 122.44(f) (40 CFR section 122.42(a)(1)(iv)).

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 CFR section 122.42(a)(2)):

e. 500 micrograms per liter (µg/L) (40 CFR section 122.42(a)(2)(i));

f. 1 milligram per liter (mg/L) for antimony (40 CFR section 122.42(a)(2)(ii));

g. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR section 122.42(a)(2)(iii)); or

h. The level established by the Los Angeles Water Board in accordance with 40 CFR section 122.44(f) (40 CFR section 122.42(a)(2)(iv)).

ATTACHMENT E - MONITORING AND REPORTING PROGRAM (MRP)

40 CFR section 122.48 requires that all NPDES permits specify monitoring and reporting requirements. Section 13383 of the CWC also authorizes the Los Angeles Water Board to establish monitoring, reporting, and recordkeeping requirements. This MRP establishes monitoring and reporting requirements which implement the federal and California laws and/or regulations.

I. GENERAL MONITORING PROVISIONS

A. Visual and video monitoring locations shall be established where accurate visual and pictural information can be obtained during and after the fireworks display.

B. The Discharger shall monitor the implementation of best management practices in accordance with Provision VII.B of R4-2023-0180

C. Each monitoring report shall state whether there was any change in the discharge as described in the Order during the reporting period.

D. In the event wastes generated from the fireworks display are transported to a different disposal site during the report period, the following shall be reported in the monitoring report:

1. Types of wastes and quantity of each type;
2. Name and address for each hauler of wastes (or method of transport if other than by hauling); and
3. Location of the final point(s) of disposal for each type of waste.

If no wastes are transported off-site during the reporting period, a statement to that effect shall be submitted.

II. MONITORING LOCATION

The Discharger shall establish monitoring locations for each fireworks display event that covers the firing range and adjacent affected surface waters to access implementation and compliance with the BMPs.

III. EFFLUENT MONITORING REQUIREMENTS – N/A

IV. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS – N/A

V. LAND DISCHARGE REQUIREMENTS – N/A

VI. RECLAMATION MONITORING REQUIREMENTS – N/A

VII. RECEIVING WATER MONITORING REQUIREMENTS – SURFACE WATER

A. Visual Monitoring:

The Discharger shall conduct visual monitoring within one hour following the end of the fireworks event, if feasible and practical. Visual monitoring must be conducted latest in the morning of the day immediately following the fireworks event. Visual monitoring shall occur within and adjacent to the firing range, and at the area most likely to accumulate fireworks debris based on the prevailing wind, current, and tides. Visual monitoring of the surface water conditions, such as wind (direction and speed), weather (cloudy, sunny, or rainy), direction of current, tidal conditions (high or low), discoloration, oil and grease,

turbidity, odor, and floatable or suspended fireworks debris, if any, at the designated receiving water shall be recorded. The results of visual monitoring shall be submitted with the Display of Fireworks Post-Event Report Form in accordance with the schedule in section VIII.C of this MRP.

B. Visual Monitoring applicable for fireworks display from Barges or vessels on Surface Waters.

C. Discharger or its pyrotechnics company shall:

1. Collect video footage of the event, with filming taking place on the barge to capture the extent of debris and potential fallout zone in the immediate vicinity of the barge.
2. Monitor any discharge of fireworks into the water, (i.e., the base-level explosive material discharges), not the display itself;
3. Use more than one video to capture any discharge in the water adjacent to the barge and the potential discharge from the barge itself.
4. Take photos of the barge before and after the show to capture debris fallout.
5. Take photos of the debris collected from the barge cleanup/sweeping efforts.
6. Dive Team/Equivalent Monitoring Device. Take photographs of the bay floor prior to the fireworks display events and as soon thereafter as possible to capture visual evidence of suspended debris and/or debris deposition within the fallout zone.

D. Special Study:

E. In recent years, the Los Angeles Water Board has issued multiple Investigative Orders, pursuant to California Water Code section 13267, to fireworks organizers in Long Beach Harbor and Alamitos Bay to conduct water quality monitoring before fireworks displays to determine baseline and post-display conditions to determine any water quality impacts caused by the fireworks activities. Although water quality data were collected in response to these investigative orders, the data only provided a partial picture of the impacts from the fireworks activities because the sampling was conducted 12 hours after the displays occurred, allowing time for pollutants to move out of the fallout zone and beyond sampling locations. Therefore, a more immediate and comprehensive understanding of the fate, transport, and impacts of residual pollutants from fireworks is necessary.

Thus, the Dischargers shall conduct a special study to determine the impacts of the constituents from fireworks in the fallout zone by collecting samples in “real time” during the fireworks displays. The Dischargers shall submit a work plan within 12 months from the effective date of this Order for approval by the Executive Officer of the Los Angeles Water Board. The Work Plan shall include real time sampling for all the constituents hereby specified: Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Thallium, Tin, Titanium, Vanadium, Zinc, nitrate, bis-phthalate, Total Phosphorous, and Perchlorate within the fall out zone.

Pollutants shall be analyzed using the analytical methods described in 40 CFR Part 136; for priority pollutants the methods must meet the lowest minimum levels (MLs) specified

in Attachment 4 of the SIP (and included as Appendix A of this Order), or where no methods are specified for a given pollutant, pollutants shall be analyzed by methods approved by the Los Angeles Water Board or the State Water Board. Monitoring results and the report shall be submitted to the Los Angles Water Board within 90 days of the completion of the monitoring.

VIII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

1. The Discharger shall comply with all Standard Provisions (Attachment D) of Order R4-2023-0180 related to monitoring, reporting, and recordkeeping.
2. Each monitoring report shall contain a separate section titled “Summary of Non-Compliance” which discusses the compliance record and corrective actions taken or planned that may be needed to bring the discharge into full compliance with waste discharge requirements. This section shall clearly list all non-compliance with waste discharge requirements.
3. The Discharger shall inform the Los Angeles Water Board well in advance of any proposed activity that could potentially affect compliance with applicable requirements.

B. Fireworks Display Reports

The Discharger shall complete and maintain a Fireworks Display Report (see Attachment C) for each fireworks display. Fireworks Display Reports shall be submitted to the Los Angeles Water Board with the self-monitoring reports required by Section VIII.C. of this MRP within 60 days of conducting of the firework display event.

C. Self-Monitoring Reports

1. The Discharger shall submit SMRs 60 days after each fireworks event. The Discharger shall submit SMRs via email to losangeles@waterboard.ca.gov . If there has been no discharge (i.e., no public fireworks display) during the previous calendar year (January 1 through December 31), the Discharger shall submit SMRs annually by February 15 stating that there was no discharge. SMRs shall include the following:

a. A cover letter with summary of non-compliance;

b. The Fireworks Display Report (Attachment C);

c. The list of fireworks displays and location(s),;

d. Discussion of performance and compliance of the fireworks operations in the reporting period, including any corrective actions taken or planned, such as changes to equipment or operations needed to achieve compliance and any other actions taken or planned that are intended to improve the performance and reliability of the Discharger’s practices;

e. Identification of any violations of this Order or a statement that there were no violations in the reporting period, and detailed description of the causes of the violations and proposed time schedule for corrective actions taken or planned to resolve the violations and prevent recurrence (if previous reports address the

corrective actions, then reference the earlier reports);

f. Visual and video monitoring report;

g. Evaluation of BMP performance; and

h. Signature in accordance with the standard provision on signature requirements in Attachment D of the Order.

1. If SMRs and documents are 10 MB or larger, the documents should be transferred to a disk and mailed to the address listed below.

LARWQCB – Los Angeles Region

320 West 4th Street, Suite 200
Los Angeles, CA 90013
Attn: General Permitting Unit

2. At any time during the term of this General Permit, the State or Los Angeles Water Board may notify the Discharger to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall email electronic copy of SMRs to losangeles@waterboards.ca.gov. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

D. Discharge Monitoring Reports (DMRs) (not applicable)

E. Other Reports

F. **1. Special Study Report**: Real time samples shall be collected within the firework fallout area and the special study report shall include results of chemical analysis, meteorological conditions on the date of monitoring, sampling methods and sampling devices, analytical methods, and other relevant information pertaining to the monitoring activities. The special study report shall be submitted to the Los Angles Water Board within 90 days of the completion of the special study.

G. Notifications:

At least 14 calendar days prior to each fireworks display; the Discharger shall notify the Los Angeles Water Board, via email to losangeles@waterboards.ca.gov, of its intent to conduct public fireworks display, providing date and location of the event.

ATTACHMENT F - FACT SHEET

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Table F-3. Factors Considered Pursuant to 40 CFR 125.3(d)(1) and 125.3(d)(3) F-15

ATTACHMENT F – FACT SHEET

The California Regional Water Quality Control Board, Los Angeles (Los Angeles Water Board) incorporates this Fact Sheet as findings of the Los Angeles Water Board supporting the issuance of this Order. This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for Dischargers in the State of California (State). Only those sections of this Order that are specifically identified as "not applicable" have been determined not to apply to Dischargers under this Order. Sections of this Order not specifically identified as "not applicable" are fully applicable to this Discharger.

I. PERMIT INFORMATION

The State Water Resources Control Board (State Water Board) has been authorized by the EPA, pursuant to Section 402 of the Clean Water Act (CWA), to administer the National Pollutant Discharge Elimination System (NPDES) program in California since 1973. The procedures for the State Water Board and the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board) to issue NPDES permits, pursuant to NPDES regulations at 40 Code of Federal Regulations (CFR) Sections 122 and 1231, were established through the NPDES Memorandum of Agreement between the EPA and the State Water Board on September 22, 1989.

Section 122.28(a)(2)(ii) provides for issuance of general NPDES permits to regulate a category of point sources, other than storm water point sources, if the sources within the category: (a) involve the same or substantially similar types of operations; (b) discharge the same types of waste; (c) require the same effluent limitations or operating conditions; (d) require the same or similar monitoring; and (e) in the opinion of the permitting authority, are more appropriately controlled under a general NPDES permit rather than individual NPDES permits. General NPDES permits enable the Los Angeles Water Board to expedite the processing of requirements, simplify the application process for Dischargers, better utilize limited staff resources, and avoid the expense and time involved in repetitive public noticing, hearings, and permit adoptions.

When fireworks are detonated and combusted, firework combustion residue is produced in the form of smoke, airborne particulates, chemical pollutants, and debris including plastic, paper, cardboard, wires, and fuses. This combustion residue can fall into surface waters. Un-ignited pyrotechnic materials including duds and misfires can also fall into surface waters. Evidence gathered by the San Francisco and San Diego Water Boards as well as information submitted to the Los Angeles Water Board establishes that fireworks-related trash is discharged in connection with public fireworks displays.

Chemicals released from the firework combustion residues and un-ignited pyrotechnic materials include, but are not limited to, aluminum, antimony, barium, carbon, calcium, chlorine, cesium, copper, iron, potassium, lithium, magnesium, nitrates, perchlorates, phosphorus, sodium sulfur, strontium, titanium, and zinc. The fireworks residue fallout area

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

on receiving water can vary depending on wind speed and direction, shell sizes (in general, the fallout area is 70 feet per inch of shell diameter), the angle of mortar placement, the type and height of firework explosions and other environmental factors. Once the firework residue enters a water body, it can be transported to waters and coastline outside the fallout area due to the horizontal water movements due to wind shear and tidal effects. However, several years of monitoring reports submitted to the Los Angeles Water Board in compliance with 13267 letters issued for fireworks displays in Long Beach Harbor and Alamitos Bay showed no evidence of sediment or water quality impairment to receiving waters from fireworks shows conducted during New Years Day and 4th of July celebrations.

Section 301(a) of CWA broadly prohibits the discharge of any pollutant to waters of the United States, except in compliance with an NPDES permit. Fireworks residue waste discharged into surface waters constitutes discharge of a pollutant. Therefore, coverage under an NPDES permit is required before residual firework pollutant discharges associated with the public display of fireworks can be lawfully discharged.

Effluent limitations and permit conditions are the two major mechanisms in NPDES permits to regulate discharge of pollutants from point-sources. Effluent limitation, as defined in Section 502(11) of CWA, refers to any restriction established by NPDES authorities in an NPDES permit on quantities, rates, and concentrations of chemical, physical, biological, and other pollutants. The restrictions are commonly effluent limits expressed in numerical values. In some cases, nonnumeric or narrative effluent limitations rather than, or in addition to, numeric limitations are applied in NPDES permits. This Order prohibits discharge of plastic trash associated with firework displays into surface waters, and requires implementation of best management practices (BMPs) in lieu of traditional effluent limitations, to ensure the discharges of residual firework pollutants do not cause pollution or nuisance conditions in surface waters within the Los Angeles Region.

II. DISCHARGE DESCRIPTION

This Order covers residual firework pollutant discharges to waters of the United States associated with public fireworks displays. Dischargers enrolled under this Order conduct public fireworks displays for community celebrations, such as for Fourth of July and New Year's Eve, and entertainment associated with sporting, business, and school events.
Discharge Information

This Order regulates discharges of the residual pollutants from public firework displays (residual firework pollutants) to surface waters within the jurisdiction of the Los Angeles Water Board. Public displays of fireworks are conducted throughout the year at various locations within the Los Angeles Region as part of national and community celebrations and other special events. Additionally, firework displays and pyrotechnics special effects are periodically used in other venues such as business grand openings, special events, school events, sport events, and local fairs. The most significant and widespread use of fireworks displays in the Los Angeles Region are for annual Fourth of July and New Year's Eve events. Firework display sites on or adjacent to urban coastlines, and on surface waterbodies such as lakes are often the preferred setting to provide public access and avoid fire hazards associated with terrestrial display sites.

Fireworks are a class of low explosive pyrotechnic devices used to produce four primary effects: noise, light, smoke, and floating materials (e.g., confetti), for aesthetic or entertainment purposes. Fireworks may be designed to burn with colored flames and sparks including red, orange, yellow, green, blue, purple, and silver.

1. Firework Types

Fireworks can be detonated at ground (set piece or lance work fireworks) or up to over 1,000 feet in the air (aerial fireworks), which decisively determines the sizes of the residual fallout area. According to their design detonation height, fireworks are grouped into three general categories in this Order:

a. Aerial Fireworks

Aerial fireworks are typically shot into the air by a mortar using a black powder lift charge or propellant. The aerial shell typically consists of a cylinder or spherical cartridge, usually constructed of paper, plastic, or cardboard, and may include some plastic or paper internal components within the shell. The shell casing contains a burst charge, pyrotechnic material that emits prescribed colors and effects when burst, a fuse, and a black powder lift charge. Aerial shells are often combined in fireworks display to create a variety of shapes and colors upon detonation.

The lift charge and shell are placed at the bottom of a mortar partially buried in earth and or placed within a rack. Shells can be launched one at a time or in a barrage of simultaneous launches or launches in quick succession. Shells are typically designed to perform between 200 and 1,000 feet above ground level. Most of the incendiary elements and shell casings burn up in the atmosphere; however, portions of the casings and some internal structural components and chemical residue fall back to the ground or receiving waters.

b. Low-level Fireworks

Low-level fireworks devices consist of pyrotechnic pellets packed linearly within a tube. When the device is ignited, the pellets exit the tube in succession producing a fountain effect of single or multi-colored lights as the pellets burn through the course of their flight. Typically, the pellets burn rather than explode, thus producing a ball or trail of sparkling light to a prescribed altitude, then extinguish. Sometimes they may terminate with a small explosion similar to a firecracker. Other low-level fireworks devices emit a projected hail of colored sparks or perform erratic low-level flight while emitting a high-pitched whistle. Some emit a pulsing light pattern or crackling or popping sound effects. Generally, low-level launch devices and encasements remain on the ground or attached to a fixed structure and can be removed upon completion of the display. They are generally designed to produce effects between 0 and 200 feet above ground level.

c. Set Piece Fireworks

Set piece fireworks are primarily static and remain close to the ground. They are usually attached to a frame that may be crafted in the design of a logo or familiar shape, and illuminated by pyrotechnic devices, such as flares, sparklers, or strobes. Set pieces are typically used in concert with low-level effects or an aerial show, and sometimes act as

a centerpiece for the display. Set pieces may have moving parts, but typically do not launch devices into the air. Set piece displays are typically designed to produce effects between 0 and 50 feet above ground level.

2. Firework Chemical Constituents

A partial list of chemical elements used in fireworks for fuels, oxidizers, binding agents, coloration effects and sound effects are provided in the following table. Although monitoring to date in the Los Angeles region has shown no impacts to water quality, public displays of fireworks over or adjacent to surface waters may result in the discharge of residual firework pollutants containing these chemical elements to surface waters at levels that could cause or contribute to cause to an exceedance of a water quality standard in the receiving water.

Table F-1. Firework Chemical Constituents and Functions

Constituent	Function
Aluminum (Al)	Creates silver and white flames and sparks.
Antimony (Sb)	Creates glitter effects.
Barium (Ba)	Creates green colors and stabilizes other volatile elements.
Carbon (C)	Provides fuel as a main component of black powder.
Calcium (Ca)	Enhances fireworks colors; calcium salts produce orange fireworks.
Chlorine (Cl)	Enhances volatility and light emission of color-producing metals.
Cesium (Cs)	Creates indigo colors.
Copper (Cu)	Creates blue colors.
Iron (Fe)	Creates sparks that vary in color according to the heat of the metal.
Lithium (Li)	Creates red colors; lithium carbonate is a common colorant.
Magnesium (Mg)	Creates white sparks or improves firework brilliance.
Phosphorus (P)	Creates glow-in-the-dark effects and burns spontaneously in air; found in some firework fuels.
Strontium (Sr)	Creates red colors and stabilizes fireworks mixtures.
Sulfur (S)	Provides fuel as a main component of black powder.
Titanium (Ti)	Creates silver sparks.
Zinc (Zn)	Creates smoke effects.

Various factors can affect the levels of firework chemical residues in surface waters adjacent to fireworks displays, such as the frequency of firework events, the overall number of ignited fireworks per event, efficiency of perchlorate oxidation which controls the mass of perchlorate introduced to the environment, wind direction, velocity which controls the dispersion and fall-out of firework particles, and number of duds or misfires. All of these factors associated with the detonation of fireworks have a potential to adversely affect or contribute to degradation of water and sediment quality within the receiving water.

3. Discharge Points and Receiving Waters

Under the General Permit, there may be multiple discharge points. Information regarding the discharge points and applicable receiving waters can be found in the completed NOI and will be included in the Notice of Applicability (NOA).

The following table summarizes administrative information related to the facility of dischargers covered under the Order.

Table F-2. Facility Information

Discharger	Any person discharging pollutants associated with the public display of fireworks to surface waters in the Los Angeles Region.
Major or Minor Facility	Minor
Threat to Water Quality	3
Complexity	C
Watershed	Watersheds within Los Angeles Water Board's Jurisdiction.
Receiving Water	Surface waters in Los Angeles and Ventura Counties
Receiving Water Type	Ocean waters, enclosed bays, estuaries, and inland surface waters

4. Fees

Section 2200 (Annual Fee Schedules) of Title 23 of the California Code of Regulations (CCR) requires that all discharges subject to waste discharge requirements shall pay an application fee and subsequent annual fees (if applicable). Section 2200 of the CCR provides Annual Fee Schedules based on threat to water quality and complexity of the discharge.

Residual firework pollutant discharges are classified as Category 3 pursuant to the fee schedule. This category is appropriate because this Order incorporates BMPs to control potential impacts to beneficial uses, requires no treatment systems to meet the Order's terms and conditions, and prohibits residual firework pollutants from causing excursions of water quality objectives. Residual firework pollutants discharges pose no significant threat to water quality.

The annual fee associated with this category can be found on the Water Quality Fees webpage under NPDES Permit Fees (https://www.waterboards.ca.gov/resources/fees/water_quality/#npdes).

III. APPLICABLE PLANS, POLICIES AND REGULATIONS

The requirements contained in the Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the CWA and implementing regulations adopted by the EPA and Chapter 5.5, Division 7 of the California Water Code (CWC) (commencing with section 13370). It shall serve as a NPDES permit for point source discharges of residual firework pollutants from public fireworks displays to surface waters under the jurisdiction of the Los Angeles Water Board. This Order also serves as WDRs pursuant to Article 4, Chapter 4 of the CWC (commencing with section 13260; see in particular section 13263, subd. (i) [general permits]).

States may request authority to issue general NPDES permits pursuant to 40 CFR section 122.28. The State Water Board has been authorized by the EPA to administer the NPDES program in California since 1973. The procedures for the State Water Board and the Los Angeles Water Board to issue NPDES permits pursuant to 40 CFR Parts 122 and 123 were established through the NPDES Memorandum of Agreement between the EPA and the State Water Board on September 22, 1989.

B. California Environmental Quality Act (CEQA)

Under CWC section 13389, this action to adopt an NPDES permit is exempt from CEQA, (commencing with section 21100) of Division 13 of the Public Resources Code See also *County of Los Angeles v. State Water Resources Control Board (SWRCB)* (2006) 143 Cal.App.4th 985, 1007. Fireworks shows are also existing discharges.

C. State and Federal Regulations, Policies, and Plans

1. Water Quality Control Plans.

The Los Angeles Water Board's *Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. The Basin Plan states that the beneficial uses of any specifically identified water body generally apply to its tributary streams.

2. California Ocean Plan

The State Water Board adopted the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, 2005, 2009, 2012, 2015, and 2018. The State Water Board adopted the latest amendment on August 7, 2018, the USEPA approved the amendments on March 22, 2019, and it became effective on March 22, 2019. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean.

3. California Thermal Plan.

The State Water Board adopted the Water Quality Control Plan for Control of Temperature in the Costal and Interstate Water and Enclosed Bays and Estuaries of California (Thermal Plan) on January 7, 1971, and amended this plan on September 18, 1975.

4. Sediment Quality

The State Water Board adopted the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* on September 16, 2008, and it became effective on August 25, 2009. This plan contains a narrative water quality objective: "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This objective is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The plan requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this objective, it is to impose the objective as a receiving water limit.

According to the sediment monitoring that SeaWorld conducted in San Diego's Mission Bay from September 2012 through September 2018, fireworks discharges are unlikely to cause or contribute to exceedances of the sediment quality objectives (Annual Fireworks Monitoring Report, SeaWorld, 2019). The potential impacts of fireworks displays in the Los Angeles Region are expected to be significantly less than those in Mission Bay due to infrequency (once per year) and greater geographic distribution of the fireworks events. This is further supported by several years of monitoring reports submitted to the Los Angeles Water Board in compliance with 13267 letters issued for fireworks displays in Long Beach Harbor and Alamitos Bay. The reports showed no evidence of sediment or water quality impairment from fireworks shows conducted during New Year and 4th of July of each year. Therefore, this Order does not implement sediment quality objectives and does not establish sediment monitoring for discharges governed by this Order.

5. National Toxics Rule (NTR) and California Toxics Rule (CTR).

EPA promulgated the NTR on December 22, 1992, and later revised it on May 4, 1995, and November 9, 1999. About forty water quality criteria in the NTR applied in California. On May 18, 2000, EPA promulgated the CTR (40 CFR section 131.38). The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was revised on February 13, 2001. These rules contain water quality criteria for priority pollutants.

6. State Implementation Policy.

On March 2, 2000, the State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the EPA through the NTR and to the priority pollutant objectives established by the Los Angeles Water Board in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the EPA through the CTR. The State Water Board

adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control.

7. Antidegradation Policy.

40 CFR section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified, based on specific findings. The Los Angeles Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in more detail later in this Fact Sheet, the permitted discharge is consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

8. Anti-Backsliding Requirements.

Sections 402(o) and 303(d)(4) of the CWA and section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed.

9. Endangered Species Act.

This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with requirements intended to protect the beneficial uses of waters of the state. The Discharger is responsible for meeting all requirements of the Endangered Species Acts.

10. Trash Amendments.

The State Water Board adopted the "Amendment to the Ocean Plan and Part I Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California" (Trash Amendments) through Resolution No. 2015-0019, which was approved by the Office of Administrative Law (OAL) on December 2, 2015, and became effective upon U.S. EPA approval on January 12, 2016. The Trash Amendments established a narrative water quality objective and a prohibition on the discharge of trash, to be implemented through permits issued pursuant to CWA section 402(p), waste discharge requirements, or waivers of waste discharge requirements.

The Trash Amendments apply to all surface waters of the State, with the exception of those waters within the jurisdiction of the Los Angeles Water Board where trash or debris Total Maximum Daily Loads (TMDLs) were in effect prior to the effective date of the Trash Provisions. The Trash Amendments identify plastic trash, in particular, as a priority, and targeted reductions in marine debris, due to the facts that plastics do not readily

biodegrade, constitute the larger percentage of floating trash, and can serve as a transport medium for pollutants and sorb persistent organic pollutants in the marine environment. Ingestion of plastics by birds and marine mammals has been identified as "detrimental," posing a "significant threat," and causing fatalities. The Trash Amendments also acknowledge the threat of micro-plastics, which occur as the result of breakdown of plastic trash in the environment. The Trash Amendments authorize NPDES permitting authorities, such as the Los Angeles Water Board, to require dischargers to implement any appropriate trash controls in areas or facilities that may generate trash. This Order incorporates the requirements of the Trash Amendments through discharge prohibitions and requirements to develop and implement BMPs to prevent the discharge of trash, in particular plastic trash, to surface waters.

11. Environmental Justice and Advancing Racial Equity.

When issuing or reissuing regional or statewide waste discharge requirements or waivers of waste discharge requirements, the state board or a regional board shall make a concise, programmatic finding on potential environmental justice, tribal impact, and racial equity considerations related to the issuance. The finding shall be based on readily available information identified by staff or raised during the public review process and include the information specified in paragraphs (1) and (2) of subdivision (b). (Water Code § 13149.2, effective Jan. 1, 2023). Water Code section 189.7 requires the Los Angeles Water Board to conduct outreach in affected disadvantaged and/or tribal communities. The Los Angeles Water Board is also committed to developing and implementing policies and programs to advance racial equity and environmental justice so that race can no longer be used to predict life outcomes, and outcomes for all groups are improved.

This General Order regulates residual firework pollutant discharges associated with the public display of fireworks to surface waters -- mostly harbors, bays, and ocean fronts -- where previously no specific regulations from the Los Angeles Water Board were implemented. The General Order aims to provide level guidance, regulation and accountability to fireworks shows conducted over receiving waters throughout the region. Based on historical public fireworks display locations, the areas around the fireworks displays in Los Angeles County don't have disadvantaged communities as defined in Water Code section 189.7(d)(1), but there are multiple tribal communities. The area around the one known historical fireworks display in Ventura County has a disadvantaged community and tribal communities. The areas around fireworks displays in Los Angeles County have Cal EnviroScreen scores ranging from 5-38, which indicate that the surrounding communities are not disproportionately impacted by pollution burden. A Cal EnviroScreen score of 81 is reported for the Ventura county location, which indicates the surrounding community may be disproportionally burdened by pollution.

The Los Angeles Water Board has therefore conducted outreach consistent with Water Code section 189.7 by reaching out to surrounding communities and tribal communities about this Order. Additionally, the Board considered any environmental justice concerns within the Board's authority and raised by interested persons with regard to those impacts. In accordance with the Water Boards' efforts to advance racial equity, the Order

requires the Permittee to meet water quality standards to protect public health and the environment, thereby benefitting all persons and communities within the Region. Therefore, the Los Angeles Water Board anticipates that the issuance of this Order will not result in water quality impacts to disadvantaged or tribal communities or raise environmental justice concerns.

D. Impaired Water Bodies on CWA Section 303(d) List

The State Water Board prepared the California 2020 and 2022 Integrated Report based on a compilation of the Los Angeles Water Boards' Integrated Reports. These Integrated Reports contain both the Clean Water Act (CWA) section 305(b) water quality assessment and section 303(d) list of impaired waters. In developing the Integrated Reports, the Water Boards solicit data, information, and comments from the public and other interested persons. On January 19, 2022, the State Water Board approved the CWA Section 303(d) List portion of the State's 2020 and 2022 Integrated Report (State Water Board Resolution No. 2022-0006). On May 11, 2022, the EPA approved California's 2020 and 2022 list of water quality limited segments requiring a TMDL under CWA section 303(d) for the Los Angeles Region as well as the rest of California. The CWA section 303(d) list can be found at the following link: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html The Los Angeles Water Board has adopted trash TMDLs for fifteen watersheds and water bodies: Los Angeles River Watershed, Ballona Creek, Malibu Creek Watershed, Santa Monica Bay Nearshore and Offshore, San Gabriel River East Fork, Revolon Slough and Beardsley Wash, Ventura River Estuary, Machado Lake, Lake Elizabeth, Lake Hughes, Munz Lake, Peck Road Park Lake, Echo Park Lake, Lincoln Park Lake and Legg Lake. The discharges regulated through this Order are not expected to contribute to any water quality impairment because the requirements of Provision VII.B of this Order will sufficiently control potential pollutant discharges.

E. Related Fireworks Regulatory Agencies

1. Office of the California State Fire Marshal.

California's Fireworks Law, passed in 1938, established the Office of the State Fire Marshal (SFM) as the fireworks classification authority in California.

Fireworks are classified through laboratory analysis, field examinations and test firing of items. As part of the program, SFM requires the licensing of all pyrotechnic operators, fireworks manufacturers, importer-exporters, wholesalers, retailers, and public display companies. Pyrotechnic operators, who discharge fireworks at public displays or launch high powered and experimental rockets, must also pass a written examination and provide proof of experience. The State's Explosives Law authorizes the California State Fire Marshal to adopt regulations for the safe use, handling, storage and transportation of fireworks in California. The laws and regulations governing the transportation, use and storage of fireworks in California are contained in:

a. State Fireworks Law, California Health and Safety Code, Section 12500 – 12728;

b. State Fireworks Regulations, Title 19, California Code of Regulations (CCR), Chapter 6;

c. Storage, Title 27, Code of Federal Regulations (CFR) part 55, Sub-part K; and

d. Hazardous Materials Transportation, Title 13, CCR.

2. California State Department of Toxic Substances Control.

In light of the risks to public health and the environment posed by perchlorate releases, the California Legislature adopted the Perchlorate Contamination Prevention Act of 2003, amending Chapter 6.5 of Division 20 of, the Health and Safety Code and requiring the California Department of Toxic Substances Control (DTSC) to adopt regulations specifying BMPs for perchlorate and perchlorate-containing substances. The perchlorate BMP regulations were adopted on December 31, 2005 and are contained in CCR, Title 22. Social Security Division 4.5. Environmental Health Standards for the Management of Hazardous Waste Chapter 33. Best Management Practices for Perchlorate Materials Article 1, § 67384.1 - § 67384.11. These regulations provide at § 67384.8 (c), Special Best Management Practices for Flares and Pyrotechnic Perchlorate Materials, that:

"Within twenty-four (24) hours of a public display of fireworks or the use of dangerous fireworks, the pyrotechnics operator, in addition to complying with title 19 of the California Code of Regulations, section 1003, shall, to the extent practical, collect any stars and un-ignited pyrotechnic material found during the required inspection of the entire firing range."

3. United States Coast Guard.

The United States Coast Guard (USCG), pursuant to 33 CFR 100, implements a Marine Safety Program designed to ensure the safety of vessels and recreational boaters on navigable United States waters during fireworks display events. The USCG issues Marine Event permits to parties sponsoring or hosting public display of fireworks marine events that have the potential to endanger marine safety. An Application for Approval of Marine Event must be submitted to the USCG or approval no later than 135 days prior to the event if the applicant does not meet criteria specified in 33 CFR 100.15 (c), or 60 days prior to the event if the applicant does meet the criteria. After approving plans for the holding of a fireworks display event, the USCG is authorized to promulgate special local regulations as necessary to ensure public safety on navigable waters immediately prior to, during, and immediately after the approved fireworks event. Such regulations may include a restriction on, or control of, the movement of vessels through a specified fireworks display area.

4. South Coast Air Quality Management District.

The South Coast Air Quality Management District (AQMD) is the air pollution control agency for all of Orange County and the urban portions of Los Angeles, Riverside and San Bernardino Counties. The AQMD historically has not required permits for equipment associated with fireworks displays at theme park activities or annual celebrations. AQMD Rule 219- Exemptions From Written Permit Requirements, specifically exempts pyrotechnic equipment from written permit requirements. AQMD prohibitory Rule 4–4 - Open Burning, also provides exemption from rule provisions for various fireworks and pyrotechnics activities. Ventura County Air Pollution Control District has no similar rules.

5. United States Department of Transportation.

Prior to transportation into and within the United States, all explosives, including fireworks, must be classed and approved by Department of Transportation (DOT). Federal hazardous materials (hazmat) transportation law (Federal hazmat law; 49 U.S.C., 5101 et seq.) authorizes DOT to issue classification documents in accordance with the Hazardous Materials Regulations (HMR; 49 CFR, parts 100 -185). All fireworks must be in compliance with, and meet the terms and conditions of, the American Pyrotechnic Association (APA) Standard 87-1 (which is incorporated by reference as part of the HMR, or be submitted to a DOT-approved laboratory for examination and classification (see 49 CFR 173.56(b)). If approved, fireworks are assigned an explosives classification number by the Associate Administrator of Hazardous Materials Safety.

Approval holders also must comply with the rules set forth by the USCG; United States Customs and Border Protection; Bureau of Alcohol, Tobacco, and Firearms; as well as the Consumer Product Safety Commission.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations. Section 122.44(a) requires that permits include applicable technology-based limitations and standards; and section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water.

As most recently evaluated in *Coastal Environmental Rights Foundation v. Naples Restaurant Group, LLC* (2023 C.D. Cal.) ___F.Supp.3d ___ (Case No. 2:21-cv-09172-MCS-JEM), mortars constitute a point source from which discharges of residual firework pollutants, such as debris and chemicals, may occur. This Order does not establish effluent limitations but requires BMPs and establishes prohibitions.

A. Discharge Prohibitions

Based on 40 CFR section 122.21(a) and Water Code section 13260, which require filing an application and Report of Waste Discharge before discharge can occur, Section IV.1. of the Order prohibits discharges of any waste at a location different from the location(s) listed in the NOA.

Based on California Water Code section 13263, which requires the Los Angeles Water Board to prescribe WDRs that prevent nuisance conditions, Section IV.2. of the Order prohibits discharge of pollutants so as to create pollution, contamination, or nuisance as defined by Water Code section 13050.

B. Technology Based Effluent Limitations

Section 301(b) of the CWA and implementing EPA permit regulations at 40 CFR section 122.44 require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to

meet applicable water quality standards in the receiving water. The CWA requires USEPA to develop effluent limitations, guidelines and standards (ELGs). USEPA has not developed ELGs for this type of industry or discharge. Section 402(a)(1) of the CWA and section 125.3 of the CFR authorize the use of best professional judgment to derive technology-based effluent limitations on a case-by-case basis where ELGs are not available for certain industrial categories and/or pollutants of concern.

C. Water Quality Based Effluent Limitations

1. Scope and Authority

Section 301(b) of the CWA and section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards in the receiving water.

2. Applicable Beneficial Uses, and Water Quality Criteria and Objectives

Typical beneficial uses covered by this Order include the following:

a. Inland surface waters above an estuary – municipal and domestic supply, industrial service and process supply, agricultural supply, groundwater recharge, freshwater replenishment, aquaculture, warm and cold freshwater habitats, inland saline water and wildlife habitats, water contact and noncontact recreation, fish migration, and fish spawning.

b. Inland surface waters within and below an estuary – industrial service supply, marine and wetland habitats, estuarine and wildlife habitats, water contact and noncontact recreation, commercial and sport fishing, aquaculture, migration of aquatic organisms, fish migration, fish spawning, preservation of rare and endangered species, preservation of biological habitats, and shellfish harvesting.

c. Coastal Zones (both nearshore and offshore) – industrial service supply, navigation, water contact and noncontact recreation, commercial and sport fishing, marine habitat, wildlife habitat, fish migration and spawning, shellfish harvesting, and rare, threatened, or endangered species habitat.

Water quality criteria and objectives to protect these beneficial uses are described below:

a. Basin Plan - The Basin Plan specifies numerous water quality objectives to protect aquatic life, human health, and other beneficial uses. These objectives include the primary and secondary maximum contaminant levels for waters designated for use as domestic or municipal supply.

b. CTR - The CTR specifies numeric aquatic life and human health criteria for numerous priority pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries. Some human health criteria are for consumption of “water and organisms” and others are for consumption of “organisms only.” Waters with the municipal or domestic supply beneficial use designation are subject to the “water and organisms” criteria.

c. Ocean Plan - The Ocean Plan specifies water quality objectives to protect the quality

of ocean waters for use and enjoyment. The beneficial uses of the ocean waters that shall be protected include industrial, recreation, navigation, and aquatic life. This plan is applicable to both point sources and non-point sources of waste discharges to the ocean.

3. Determining the Need for WQBELs

a. Available Information

The need for WQBELs in the Order is evaluated based on the pertinent EPA regulations and SIP requirements for a reasonable potential analysis (RPA). Available water quality information for the RPA includes data collected from fireworks water quality monitoring conducted in the Los Angeles Region (San Pedro Bay and Alamitos Bay Fireworks Water Quality Monitoring reports in 2017, 2018, and 2022) and the San Diego Region (Annual Fireworks Monitoring Reports, SeaWorld, 2013 – 2019).

The Los Angeles Water Board issued several Investigative Orders from 2017 to 2022, for July 4th-related firework display activities conducted at Boathouse on the Bay, Queen Mary and Big Bang on the Bay events in the Long Beach harbor area. The investigative orders required surface and depth-discrete water samples, which were collected and analyzed before and after firework displays. Post-event samples were taken at different depths of the receiving waters. Parameters typically found in fireworks were analyzed, including Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Thallium, Tin, Titanium, Vanadium, Zinc, bis-phthalate, Total Phosphorous, and Perchlorate. No statistically significant evidence from the post-event samples indicated that concentrations of the analyzed parameters were higher than those in the pre-event samples from any of the fireworks events.

Receiving water and sediment monitoring were conducted by SeaWorld San Diego (SeaWorld), from September 2012 through September 2018, to evaluate the potential impacts of its fireworks-related discharges to Mission Bay in the San Diego Region. The effects of SeaWorld's fireworks displays on Mission Bay are representative of worst case conditions compared to the Los Angeles Region firework shows because SeaWorld conducts far more fireworks events each year than the few events typically scheduled within the Los Angeles Region, occurring primarily on major holidays, like the 4th of July or New Years holidays.

The table below presents the most stringent applicable water quality criteria and objectives and estimated receiving water concentrations for the receiving waters potentially affected by authorized fireworks discharges. Metals are expressed in total recoverable concentrations. There is no reasonable potential for any of the pollutants considered to exceed a water quality criterion or objective because the estimated receiving water concentrations do not exceed the most stringent criteria and objectives.

Table F-3. Water Quality RPA (SeaWorld, 2012 – 2018)

Pollutant	Unit	Governing Criterion/Objective	Estimated Receiving Water Concentration

Aluminum	µg/L	200	80
Antimony	µg/L	6.0	0.23
Barium	µg/L	1,000	10
Copper	µg/L	8.2	7.5
Iron	µg/L	300	32
Perchlorate	µg/L	6.0	2.5
Phosphorus, Total	µg/L	No criteria	250
Potassium	mg/L	No criteria	450
Strontium	mg/L	No criteria	8.4
Titanium	µg/L	No criteria	72
Zinc	µg/L	86	14

b. Water Quality Objectives from Basin Plan

TMDL-based Wasteload Allocations (WLAs) are the main water quality objectives in Basin Plan applicable to this Order. The Los Angeles Water Board developed TMDL-based WLAs for metals, nutrients, toxic organic compounds in the major rivers and its tributaries in the Los Angeles Water Board Region. Discharges to a receiving water with an established TMDL limitation are considered to have shown a reasonable potential for the pollutants to be present in the discharge at levels that would cause or contribute to a violation of water quality standards.

The Los Angeles Water Board is required to ensure that the effluent limitations in this Order are “consistent with the assumptions and requirements of any available wasteload allocation for the discharge.” (40 CFR section 122.44(d)(1)(vii)(B).) Although TMDLs apply to discharges authorized under this Order, none of the TMDLs for metals, nutrients, or toxic organic compounds or supporting staff reports indicate that discharges from the public fireworks displays authorized under this Order are significant sources of the relevant pollutants.

In addition, based on the relevant data gathered in the Los Angeles Region and the instantaneous, intermittent short-term nature of discharges from the public fireworks displays, the Los Angeles Water Board determined that discharges regulated under this Order meet section 122.44(d)(1)(vii)(B) requirements because (1) applicable TMDLs do not identify specific waste load allocations for discharges from fireworks displays activities and these discharges do not significantly impact water quality, and (2) more stringent requirements than those included in this Order are not needed to address impairment of surface waters with TMDLs.

If the Executive Officer determines that any existing or any newly adopted WLAs must be implemented through TMDL-specific permit requirements for discharges from fireworks displays, the Discharger will be required to maintain enrollment under this

Order until the Los Angeles Water Board issues an individual or general NPDES Permit for those discharges to which the WLAs apply. Alternatively, if future TMDLs are adopted that address pollutants that are likely to be in discharges from fireworks displays and allocate waste loads specifically to Dischargers regulated under this Order, the Los Angeles Water Board may consider adding TMDL-specific permit requirements to this Order in a subsequent permit amendment per the reopener provisions or during permit reissuance.

The Los Angeles Water Board has developed minerals water quality objectives for waterbodies in the Los Angeles Region. These water quality objectives do not require or contemplate a reasonable potential analysis at the permit development stage.

c. Water Quality Criteria from CTR

SIP section 1.3 sets forth the reasonable potential analysis (RPA) procedures used for this Order for assessing whether a priority pollutant in the CTR has reasonable potential to exceed a water quality objective. The same procedures are used as guidance for other firework pollutants of concern. There are three triggers in determining reasonable potential:

Trigger 1 is activated if the maximum effluent concentration is greater than or equal to the lowest applicable water quality objective.

Trigger 2 is activated if the receiving water concentration is greater than the lowest applicable water quality objective *and* the pollutant is detected in effluent.

Trigger 3 is activated if a review of other information indicates that a WQBEL is needed to protect beneficial uses.

Additionally, Section 1.3 of the SIP recognizes that a reasonable potential analysis at the permit development stage is unnecessary if a TMDL has been developed and WLAs assigned to the discharge.

Trigger 1 is not applicable to the Order because the residual firework pollutants are present and dispersed over the receiving water after solid fireworks are delivered to the air. “Maximum effluent concentration” used in Trigger 1 does not exist in the fireworks context.

There are water quality impaired waterbodies in the Los Angeles Region in which concentrations of pollutants regulated under this Order are greater than the lowest applicable water quality objective. Since the Order covers residual firework pollutants discharges to any and all waterbodies in the Los Angeles Region, Trigger 2 is activated for all discharges under the Order.

There is no other information available indicating a WQBEL is needed to protect beneficial uses. Therefore, Trigger 3 is not activated.

4. WQBEL Calculations

WQBELs in NPDES permits are generally calculated in the numeric form following procedures contained in EPA’s *Technical Support Document for Water Quality-Based Toxics Control (TSD) of 1991* (USEPA/505 /2-90-001) and the SIP. When numeric effluent limitations are infeasible, in accordance with 40 CFR 122.44(k), best

management practices shall be included in applicable NPDES permits to control or abate the discharge of pollutants. Since the residual firework pollutants are present only after the delivery of fireworks to air and are not in the form of liquid effluent, it is infeasible, pursuant to the TSD and/or SIP procedures, to calculate numerical effluent limitations for the residual firework pollutants discharge covered by the Order. Accordingly, applicable water quality criteria and objectives are translated to the narrative BMPs as permit conditions in the Order.

A. Final Effluent Limitation Considerations

1. Anti-Backsliding Requirements

Sections 402(o) and 303(d)(4) of the CWA and federal regulations at 40 CFR 122.44(*l*) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. There is no backsliding issue in the Order since it sets forth a first time NPDES permit to regulate the discharge of residual firework pollutants in the Los Angeles Region.

2. Antidegradation Policies

The State Water Board established California's Antidegradation Policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal Anti-Degradation Policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing high quality of waters is maintained unless degradation is justified based on specific findings. The Los Angeles Water Board's Basin Plan implements, and incorporates by reference, both the state and federal policies.

In accordance with State Water Board Administrative Procedures Update No. 90-004, the potential for degradation is evaluated by comparing the receiving water quality likely to result from the new permit to the water quality baseline. The water quality baseline is the best receiving water quality that has existed since 1968 when considering Resolution No. 68-16 or since 1975 under the federal policy, unless subsequent lowering was due to regulatory action consistent with State and federal antidegradation policies. If poorer water quality was permitted, the most recent water quality resulting from permitted action is the baseline water quality. For purposes of this analysis, existing water quality is assumed to be the best that has existed since 1968 and 1975. Water quality in 1968 and 1975 was worse than it is now because most Clean Water Act controls, such as the secondary treatment standards for municipal wastewater treatment, were not yet in place. Fireworks displays have taken place, unregulated, for decades, and no poorer water quality has been permitted. Therefore, the permitted discharge under this Order is consistent with the federal Anti-Degradation provision of 40 CFR Section 131.12 and State Water Board Resolution No. 68-16 and will improve water quality in the Los Angeles Region by virtue of implementing discharge prohibitions and requiring BMPs that will reduce impacts of residual firework pollutants to surface waters.

3. Stringency of Requirements for Individual Pollutants

This Order's restrictions on individual pollutants are no more stringent than required to implement Clean Water Act requirements.

This Order's requirements protect water quality standards, including beneficial uses and water quality objectives approved pursuant to federal law. EPA approved most Basin Plan beneficial uses and water quality objectives prior to May 30, 2000. Beneficial uses and water quality objectives submitted to EPA prior to May 30, 2000, but not approved by EPA before that date, are nonetheless "applicable water quality standards for purposes of the Clean Water Act" pursuant to 40 CFR 131.21(c)(1). EPA approved the remaining beneficial uses and water quality objectives, so they are applicable water quality standards pursuant to 40 CFR 131.21(c)(2).

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Discharges covered under the Order must conform to applicable water quality standards and shall not cause an exceedance above any applicable narrative or numeric water quality objective in the receiving water, including but not limited to all applicable provisions contained in:

1. Water Board's Basin Plan, including beneficial uses, water quality objectives, and implementation plans;
2. State Water Board plans and policies for water and sediment quality control including:
   a. Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries (Thermal Plan);
   b. Water Quality Control Plan Ocean Waters of California (Ocean Plan), including beneficial uses, water quality objectives, and implementation plans;
   c. Amendment to the Ocean Plan and Part I Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California;
   d. Water Quality Control Plan for Enclosed Bays and Estuaries of California – Sediment Quality Provisions (Sediment Quality Provisions), including the narrative objectives for sediment quality;
   e. Water Quality Control Policy for the Enclosed Bays and Estuaries of California;
   f. Policy for Implementation of Toxics Standards for Inland Surface Waters, and Enclosed Bays, and Estuaries of California; and
   g. Statement of Policy with Respect to Maintaining High Quality of Waters in California (State Water Board Resolution No. 68-16);
3. Priority pollutant criteria promulgated by EPA through:
   - National Toxics Rule (NTR), 40 CFR 131.36, (promulgated on December 22, 1992, and amended on May 4, 1995, and November 9, 1999); and
   - California Toxics Rule (CTR), 65 Federal Register 31682-31719 (May 18, 2000), adding section 131.38 to 40 CFR.

VI. RATIONALE FOR PROVISIONS

A. Standard Provisions

40 CFR 122.41 provides conditions that apply to all NPDES permits. They are the Standard Provisions of this Order listed in Attachment D. The Dischargers enrolled in this Order permit shall comply with all the Standard Provisions as applicable.

40 CFR 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFRs 122.41(j)(5) and (k)(2) because the enforcement authority under the California Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference California Water Code section 13387(e).

Because the discharge of residual firework pollutants does not share typical attributes of facilities engaged in wastewater discharge, some Standard Provides in Attachment D, such as conditions on bypass and compliance schedules, are not applicable.

B. Discharge Prohibitions

40 CFR 122.42 provides additional conditions applicable to specified categories of NPDES permits. In the NPDES permit regulation, these categories are specified as “Existing manufacturing, commercial, mining, and silvicultural dischargers”, “Publicly owned treatment works”, “Municipal separate storm sewer systems”, “Storm water discharges”, “Concentrated animal feeding operations”, and “Public notification requirements for CSO discharges to the Great Lakes Basin”. This Order does not fall within any of the specified categories and, therefore, does not include additional conditions.

C. Special Prohibitions

In addition to conditions required for all and specified categories of NPDES permits, 40 CFR 122.43 requires establishment of conditions on a case-by-case basis, to provide for and ensure compliance with all applicable requirements of CWA and regulations. Special Provisions are established in this Order that apply to all discharges of residual firework pollutants to surface waters in the Los Angeles Region.

D. Best Management Practices

As discussed in section IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS of the Factsheet, it is infeasible to establish numeric effluent limitations for the residual firework pollutant discharges from fireworks displays. Therefore, BMPs are required in lieu of effluent limitations to control and abate residual firework pollutant discharges and serve as special permit conditions in the Order, in accordance with 40 CFR section 122.44(k).

The BMPs are derived from 22 CCR section 67384.8, guidance targeting perchlorate-containing fireworks (see Massachusetts Department of Environmental Protection, Fireworks Best Environmental Management Practices, May 2011), NPDES orders governing fireworks in other regions, and other applicable authorities cited herein. These guidance and authorities are relevant to preventing, controlling, and responding to discharges associated with fireworks. The BMPs reflect best available technology

economically achievable (BAT) and best practicable treatment control technology (BPT) to reduce or prevent discharges of pollutants in a manner that reflects best industry practice, considering technological availability and economic practicability and achievability.

E. Reopener Provisions

Pursuant to 40 CFR 122.62, this Order may be modified, revoked and reissued, or terminated for cause. Reasons for modification may include new information on the impact of discharges regulated under this Order, promulgation of new effluent standards and/or regulations, adoption of new policies and/or water quality objectives, and/or new judicial decisions affecting requirements of this Order. In addition, if receiving water quality is threatened due to discharges covered under this Order, the Order may be reopened to incorporate more stringent requirements addressing the constituents creating the threat.

VII. PUBLIC PARTICIPATION

The Los Angeles Water Board has considered the issuance of WDRs that will serve as a General NPDES permit for Discharges of Residual Firework Pollutants from Public Fireworks Displays to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties. As a step in the WDR adoption process, the Los Angeles Water Board staff developed tentative WDRs. The Los Angeles Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Los Angeles Water Board notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharge and provided them with an opportunity to submit their written comments and recommendations. Notification was provided through email and public notice.

The public had access to the agenda and any changes in dates and locations through the Los Angeles Water Board's website at http://www.waterboards.ca.gov/losangeles.

B. Written Comments

Interested persons were invited to submit written comments concerning these tentative WDRs as provided through the notification process electronically at losangeles@waterboards.ca.gov with a copy to Peter.ho@waterboards.ca.gov.

To be fully responded to and considered by the Los Angeles Water Board, written comments were due at the Los Angeles Water Board offices by 5:00 p.m. **on May 4, 2023**.

C. Public Hearing

The Los Angeles Water Board held a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: May 25, 2023
Time: 9 AM

Location: Junipero Serra Building (Carmel Room)
320 West 4th Street, Los Angeles, CA 90013

A virtual platform was also available for those who wanted to join online. The directions were provided in the agenda to register or to view the Board meeting.

Additional information about the location of the hearing and options for participating are made available 10 days before the hearing. Any person desiring to receive future notices about any proposed Board action regarding this Discharger, please contact Peter.ho@waterboards.ca.gov, to be included on the e-mail list.

Interested persons were invited to attend. At the public hearing, the Los Angeles Water Board heard testimony, if any, pertinent to the discharge, WDRs, and NPDES Permit. For accuracy of the record, important testimony was requested in writing.

D. Waste Discharge Requirements Petitions

Any person aggrieved by this action of the Los Angeles Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, Title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., within 30 calendar days of the date of adoption of this Order at the following address, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

Or by email at waterqualitypetitions@waterboards.ca.gov

For instructions on how to file a petition for review, see:
http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml

E. Information and Copying

The Tentative Permit and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the Los Angeles Water Board by calling (213) 576-6651.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding this Order was invited to contact the Los Angeles Water Board, reference this Order, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this Order should be directed to Peter Ho at (213) 620-2093 or at Peter.ho@waterboards.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 Clay Street, Suite 1400, Oakland, California 94612
waterboards.ca.gov/sanfranciscobay

ORDER R2-2022-0038
NPDES PERMIT CA0038849

WASTE DISCHARGE REQUIREMENTS FOR MERCURY AND PCBS FROM MUNICIPAL AND INDUSTRIAL WASTEWATER DISCHARGES TO SAN FRANCISCO BAY

The following dischargers are subject to waste discharge requirements (WDRs) set forth in this Order, for the purpose of implementing the San Francisco Bay Mercury and PCBs Total Maximum Daily Load (TMDL) wasteload allocations for municipal and industrial wastewater discharges to San Francisco Bay and its contiguous bay segments:

Table 1A. Municipal Discharger Information

Discharger	Facility Name	Facility Address	Minor/Major
American Canyon, City of	American Canyon Water Reclamation Facility	151 Mezzetta Court American Canyon, CA 94503 Napa County	Major
Benicia, City of	City of Benicia Wastewater Treatment Plant	614 East Fifth Street Benicia, CA 94510 Solano County	Major
Burlingame, City of	Burlingame Wastewater Treatment Plant	1103 Airport Boulevard Burlingame, CA 94010 San Mateo County	Major
Calistoga, City of	Calistoga City Dunaweal Wastewater Treatment Plant	1100 Dunaweal Lane Calistoga, CA 94515 Napa County	Minor
Central Contra Costa Sanitary District	Central Contra Costa Sanitary District Wastewater Treatment Plant	5019 Imhoff Place Martinez, CA 94553 Contra Costa County	Major
Central Marin Sanitation Agency	Central Marin Sanitation Agency Wastewater Treatment Plant	1301 Andersen Drive San Rafael, CA 94901 Marin County	Major
Crockett Community Services District	Port Costa Wastewater Treatment Plant	End of Canyon Lake Drive Port Costa, CA 94569 Contra Costa County	Minor
Delta Diablo	Delta Diablo Wastewater Treatment Plant	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County	Major
East Bay Dischargers Authority (EBDA)	EBDA Common Outfall		
City of Hayward	Hayward Water Pollution Control Facility		

Discharger	Facility Name	Facility Address	Minor/Major
City of San Leandro	San Leandro Water Pollution Control Plant	EBDA Common Outfall 14150 Monarch Bay Drive San Leandro, CA 94577 Alameda County	Major
Oro Loma Sanitary District and Castro Valley Sanitary District	Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant		
Union Sanitary District	Raymond A. Boege Alvarado Wastewater Treatment Plant		
Livermore-Amador Valley Water Management Agency	Livermore-Amador Valley Water Management Agency Export and Storage Facilities		
Dublin San Ramon Services District	Dublin San Ramon Services District Wastewater Treatment Plant		
City of Livermore	City of Livermore Water Reclamation Plant		
East Bay Municipal Utility District	East Bay Municipal Utility District, Special District No. 1 Wastewater Treatment Plant	2020 Wake Avenue Oakland, CA 94607 Alameda County	Major
Fairfield-Suisun Sewer District	Fairfield-Suisun Wastewater Treatment Plant	1010 Chadbourne Road Fairfield, CA 94534 Solano County	Major
Las Gallinas Valley Sanitary District	Las Gallinas Valley Sanitary District Sewage Treatment Plant	300 Smith Ranch Road San Rafael, CA 94903 Marin County	Major
Marin County (Paradise Cove), Sanitary District No. 5 of	Paradise Cove Treatment Plant	3700 Paradise Drive Tiburon, CA 94920 Marin County	Minor
Marin County (Tiburon), Sanitary District No. 5 of	Wastewater Treatment Plant	2001 Paradise Drive Tiburon, CA 94920 Marin County	Minor
Millbrae, City of	Water Pollution Control Plant	400 East Millbrae Avenue Millbrae, CA 94030 San Mateo County	Major
Mt. View Sanitary District	Mt. View Sanitary District Wastewater Treatment Plant	3800 Arthur Road Martinez, CA 94553 Contra Costa County	Major
Napa Sanitation District	Soscol Water Recycling Facility	1515 Soscol Ferry Road Napa, CA 94558 Napa County	Major
Novato Sanitary District	Novato Sanitary District Wastewater Treatment Plant	500 Davidson Street Novato, CA 94945 Marin County	Major
Palo Alto, City of	Palo Alto Regional Water Quality Control Plant	2501 Embarcadero Way Palo Alto, CA 94303 Santa Clara County	Major

Discharger	Facility Name	Facility Address	Minor/Major
Petaluma, City of	Ellis Creek Water Recycling Facility	3890 Cypress Drive Petaluma, CA 94954 Sonoma County	Major
Pinole, City of	Pinole-Hercules Water Pollution Control Plant	11 Tennent Avenue Pinole, CA, 94564 Contra Costa County	Major
Rodeo Sanitary District	Rodeo Sanitary District Water Pollution Control Facility	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County	Major
St. Helena, City of	City of St. Helena Wastewater Treatment and Reclamation Plant	1 Chaix Lane St. Helena, CA 94574 Napa County	Minor
San Francisco (San Francisco International Airport), City and County of	Mel Leong Treatment Plant, Sanitary Plant	Bldg. 924 Clearwater Drive San Francisco, CA 94128 San Mateo County	Major
San Francisco (Southeast Plant), City and County of	Southeast Water Pollution Control Plant	750 Phelps Street San Francisco, CA 94124 San Francisco County	Major
San Jose and Santa Clara, Cities of	San Jose/Santa Clara Water Pollution Control Plant	700 Los Esteros Road San Jose, CA 95134 Santa Clara County	Major
San Mateo, City of	Water Quality Control Plant	2050 Detroit Drive San Mateo, CA 94404 San Mateo County	Major
Sausalito-Marin City Sanitary District	Sausalito-Marin City Sanitary District Wastewater Treatment Plant	1 East Road Sausalito, CA 94965 Marin County	Major
Sewerage Agency of Southern Marin	Sewerage Agency of Southern Marin Wastewater Treatment Plant	450 Sycamore Avenue Mill Valley, CA 94941 Marin County	Major
Silicon Valley Clean Water	Silicon Valley Clean Water Wastewater Treatment Plant	1400 Radio Road Redwood City, CA 94065 San Mateo County	Major
Sonoma Valley County Sanitation District	Sonoma Valley County Sanitation District Wastewater Treatment Plant	22675 8th Street East Sonoma, CA 95476 Sonoma County	Major
South San Francisco and San Bruno, Cities of	South San Francisco and San Bruno Water Quality Control Plant	195 Belle Air Road South San Francisco, CA 94080 San Mateo County	Major
Sunnyvale, City of	Sunnyvale Water Pollution Control Plant	1444 Borregas Avenue, Sunnyvale, CA 94089 Santa Clara County	Major
Treasure Island Development Authority	Treasure Island Wastewater Treatment Plant	1220 Avenue M San Francisco, CA 94130 San Francisco County	Major
Vallejo Flood and Wastewater District	Vallejo Flood and Wastewater District Wastewater Treatment Plant	450 Ryder Street Vallejo, CA 94590 Solano County	Major

Discharger	Facility Name	Facility Address	Minor/Major
West County Agency	West County Agency Combined Outfall	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	Major
West County Wastewater District	West County Wastewater District Treatment Plant		
City of Richmond and Richmond Municipal Sewer District	Richmond Municipal Sewer District Water Pollution Control Plant		
Yountville, Town of	Town of Yountville Wastewater Reclamation Facility	7501 Solano Avenue Yountville, CA 94599 Napa County	Minor

Table 1B. Industrial Discharger Information

Discharger	Facility Name	Facility Address	Minor/Major
Non-Petroleum Refineries [1]			
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Department	Joint Use Phillip F. Meads Water Treatment Plant	830 Loring Avenue Crockett, CA 94525 Contra Costa County	Major
Crockett Cogeneration, LP	Crockett Cogeneration Plant	550 Loring Avenue Crockett, CA 94525-1232 Contra Costa County	Minor
Eco Services Operations, LLC	Eco Services Martinez Plant	100 Mococo Road Martinez, CA 94553 Contra Costa County	Major
The Pittsburg Owner LPV, LLC [2]	Pittsburg Generating Station	696 W. 10th Street Pittsburg, CA 94565 Contra Costa County	Minor
USS-UPI, LLC	Pittsburg Plant	900 Loveridge Road Pittsburg, CA 94565 Contra Costa County	Major
Petroleum Refineries [1]			
Chevron Products Company	Richmond Refinery	841 Chevron Way Richmond, CA 94801 Contra Costa County	Major
Phillips 66	San Francisco Refinery	1380 San Pablo Avenue Rodeo, CA 94572-1354 Contra Costa County	Major
Martinez Refining Company, LLC	Martinez Refinery	3485 Pacheco Blvd Martinez CA 94553 Contra Costa County	Major
Tesoro Refining & Marketing Co.	Tesoro Martinez Facility	150 Solano Way Martinez, CA 94553 Contra Costa County	Major
Valero Refining Company	Valero Benicia Refinery	3400 East Second Street Benicia, CA 94510-1005 Solano County	Major

Footnotes:

[1] Some facilities deemed as petroleum refineries in the Mercury TMDL no longer operate as petroleum refineries. However, this Order retains the previous order's nomenclature to remain consistent with the Mercury TMDL.

[2] Upon the Regional Water Board's issuance of a notice to rescind The Pittsburg Owner LPV, LLC's individual NPDES permit (NPDES Permit CA0004880), The Pittsburg Owner LPV, LLC may submit a notice of termination of coverage under this Order to the Regional Water Board requesting expedited termination procedures under 40 C.F.R. § 122.64(c).

Table 2A. Municipal Discharger Locations

Discharger	Discharge Points	Discharge Point Latitude (North-South)	Discharge Point Longitude (East-West)	Receiving Water
American Canyon, City of	001	38.1879º	-122.2771º	North Slough
	003	38.1849º	-122.2791º	Constructed freshwater wetlands
Benicia, City of	001	38.041667º	122.150833º	Carquinez Strait
Burlingame, City of	002 [1]	37.665278º	-122.361389º	Lower San Francisco Bay
Calistoga, City of	001	38.559444 º	-122.557778 º	Napa River
	002	38.570278º	-122.561111º	Napa River
	003	38.469341º	-122.556744º	Napa River
Central Contra Costa Sanitary District	001	38.0456º	-122.0986º	Suisun Bay
Central Marin Sanitation Agency	001	37.948333º	-122.456389º	Central San Francisco Bay
Crockett Community Services District	001	38.048611º	-122.182222º	Carquinez Strait
Delta Diablo	001	38.0266º	-121.8414º	New York Slough
East Bay Dischargers Authority (EBDA) [2]	001	37.6944º	-122.1832º	Lower San Francisco Bay
City of Hayward				
City of San Leandro				
Oro Loma Sanitary District and Castro Valley Sanitary District				
Union Sanitary District				
Livermore-Amador Valley Water Management Agency				
Dublin San Ramon Services District				
City of Livermore				
East Bay Municipal Utility District	001	37.815081º	-122.351159º	Central San Francisco Bay
Fairfield-Suisun Sewer District	001	38.2092º	-122.0567º	Boynton Slough
	002	38.2144º	-122.0656º	Duck Pond 1
	003	38.2097º	-122.0581º	Duck Pond 2
	005	38.2333º	-122.0589º	Ledgewood Creek
Las Gallinas Valley Sanitary District	001	38.23718º	-122.43186º	Miller Creek
	002	38.21834º	-122.38325º	Miller Creek
Marin County (Paradise Cove), Sanitary District No. 5 of	001	37.89786º	-122.46094º	Central San Francisco Bay
Marin County (Tiburon), Sanitary District No. 5 of	001	37.8700°	-122.4514°	Raccoon Strait in Central San Francisco Bay

Discharger	Discharge Points	Discharge Point Latitude (North-South)	Discharge Point Longitude (East-West)	Receiving Water
Millbrae, City of	001	37.665278º	-122.361389º	Lower San Francisco Bay
Mt. View Sanitary District	001	38.021111º	-122.103611º	Peyton Slough, a tributary to Carquinez Strait
Napa Sanitation District	001	38.23583º	-122.28611º	Napa River
Novato Sanitary District	001	38.0585°	-122.4890°	San Pablo Bay
	002 [3]	38.0640°	-122.5115°	San Pablo Bay
Palo Alto, City of	001	37.4592º	-122.1108º	South San Francisco Bay
	002	37.4406º	-122.1130º	Matedero Creek via Renzel Marsh Pond
Petaluma, City of	001	38.2088º	-122.5820º	Petaluma River
	002 [4]	38.2145º	-122.5747º	Petaluma River
Pinole, City of	001	38.051667º	-122.270000º	San Pablo Bay
Rodeo Sanitary District	001	38.051667º	-122.270000º	San Pablo Bay
St. Helena, City of	001	38.5028º	-122.4375º	Napa River
San Francisco (San Francisco International Airport), City and County of	002 [1]	37.665278º	-122.361389º	Lower San Francisco Bay
San Francisco (Southeast Plant), City and County of	001	37.749444º	-122.372778º	Lower San Francisco Bay
San Jose and Santa Clara, Cities of	001	37.4398º	-121.9581º	Artesian Slough, a tributary to Coyote Creek and South San Francisco Bay
San Mateo, City of	001	37.5812°	-122.2552°	Lower San Francisco Bay
Sausalito-Marin City Sanitary District	001	37.844072º	-122.476061º	Central San Francisco Bay
Sewerage Agency of Southern Marin	001	37.8700º	-122.4514º	Raccoon Strait in Central San Francisco Bay
Silicon Valley Clean Water	001	37.561111º	-122.217222º	Lower San Francisco Bay
Sonoma Valley County Sanitation District	001	38.23718º	-122.43186º	Schell Slough, a tributary to the San Pablo Bay
South San Francisco and San Bruno, Cities of	002 [1]	37.665278º	-122.361389º	Lower San Francisco Bay
Sunnyvale, City of	001	37.4202º	-122.0166º	Moffett Channel, a tributary to South San Francisco Bay via Guadalupe Slough
Treasure Island Development Authority	001	37.8328º	-122.3694º	Central San Francisco Bay
	002	37.8283°	-122.3666°	
Vallejo Flood and Wastewater District	001	38.0647º	-122.2283º	Carquinez Strait
	002	38.0897º	-122.2533º	Mare Island Strait, a tributary to Carquinez Strait
West County Agency [6]	001	37.913056º	-122.418333º	Central San Francisco Bay
West County Wastewater District				

Discharger	Discharge Points	Discharge Point Latitude (North-South)	Discharge Point Longitude (East-West)	Receiving Water
City of Richmond and Richmond Municipal Sewer District				
Yountville, Town of	001	38.4065º	-122.3420º	Napa River

Footnotes:

[1] These Dischargers share the North Bayside System Unit outfall, which serves as combined Discharge Point 002 into San Francisco Bay. However, each Discharger must comply with the requirements of this Order at its individual monitoring location specified in the individual NPDES permit listed in Attachment B of this Order.

[2] The East Bay Dischargers Authority (EBDA) is a Joint Powers Agency (JPA) whose member agencies are the City of Hayward, City of San Leandro, Oro Loma and Castro Valley sanitary districts, and Union Sanitary District. The Livermore-Amador Valley Water Management Agency (LAVWMA) is another JPA whose member agencies include, in part, the Dublin San Ramon Services District and City of Livermore. The EBDA and LAVWMA member agencies, jointly or individually, own wastewater treatment plants and discharge secondary treated wastewater through the EBDA Common Outfall to Lower San Francisco Bay. Compliance with this Order's effluent limitations and monitoring requirements is measured at the EBDA Common Outfall (Discharge Point 001).

[3] Discharge Point 002 is to a new San Pablo Bay wetland and will replace Discharge Point 001. The exact location (latitude and longitude) may change from what is indicated in this table.

[4] The City of Petaluma may relocate its outfall to Discharge Point 002 during this Order term.

[5] Discharge Point 002 will replace Discharge Point 001 after the Treasure Island Development Authority completes its planned facility.

[6] The West County Agency is a JPA whose member agencies are the West County Wastewater District, City of Richmond, and Richmond Municipal Sewer District. The West County Wastewater District owns the West County Wastewater District Treatment Plant, and the City of Richmond and the Richmond Municipal Sewer District jointly own the Richmond Municipal Sewer District Water Pollution Control Plant. The member agencies discharge secondary treatment wastewater through the West County Agency Combined Outfall to Central San Francisco Bay. Compliance with this Order's effluent limitations and monitoring requirements is measured at the West County Agency Combined Outfall (Discharge Point 001).

Table 2B. Industrial Discharger Locations

Discharger	Discharge Points	Discharge Point Latitude (North-South)	Discharge Point Longitude (East-West)	Receiving Water
Non-Petroleum Refineries [1]				
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	002 [2]	38.058333º	-122.224444º	Carquinez Strait
Crockett Cogeneration, LP	001	38.056111º	-122.218056º	Carquinez Strait
Eco Services Operations, LLC	001	38.0381º	-122.1180º	Carquinez Strait
The Pittsburg Owner LPV, LLC	001 [2]	38.0381º	-122.1180º	Suisun Bay
USS-UPI, LLC	001 [2]	38.030000º	-121.86444º	New York Slough
Petroleum Refineries [1]				
Chevron Products Company	001	37.970833º	-122.429167º	San Pablo Bay
Phillips 66 [1]	002	38.056111º	-122.261430º	San Pablo Bay
Martinez Refining Company, LLC	001	38.032222º	-122.128889º	Carquinez Strait
Tesoro Refining & Marketing Co.	001	38.048333º	-122.089444º	Suisun Bay
Valero Refining Company	001 [3]	38.05500º	-122.11980º	Suisun Bay

Footnotes:

[1] Some facilities deemed as petroleum refineries in the Mercury TMDL no longer operate as petroleum refineries. However, this Order retains the previous order's nomenclature to remain consistent with the Mercury TMDL.

[2] This Order applies to the mercury discharges from internal waste streams discharged through these discharge points, and not to any once through cooling water discharges.

[3] Latitude and longitude may change with outfall upgrade as specified in the Discharger's individual NPDES permit listed in Attachment B of this Order.

This Order was adopted on:	**December 14, 2022**
This Order shall become effective on:	**February 1, 2023**
This Order shall expire on:	**January 31, 2028**

I hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the Regional Water Board on the date indicated above.

Eileen White

Digitally signed by Eileen White
Date: 2022.12.14 20:26:06 -08'00'

Eileen White, Executive Officer

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1. FACILITY INFORMATION

Information describing the facilities subject to this Order is summarized in Tables 1A and 1B and in Fact Sheet (Attachment F) sections 1 and 2.

2. FINDINGS

The Regional Water Board finds the following:

2.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as an NPDES permit for point source discharges of mercury and PCBs from the Discharger facilities listed in Attachment B to surface waters.

2.2. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on the detailed technical analyses that provide the foundation for the Mercury and PCBs TMDLs. The Fact Sheet (Attachment F) contains background information and rationale for the requirements in this Order and is hereby incorporated into and constitutes findings for this Order. Attachments A, B, C, and E are also incorporated into this Order.

2.3. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe these WDRs and has provided an opportunity to submit written comments and recommendations. Fact Sheet section 8.1 provides details regarding the notification.

2.4. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Fact Sheet section 8.3 provides details regarding the public hearing.

THEREFORE, IT IS HEREBY ORDERED that Order R2-2017-0041 (previous order), as amended by Orders R2-2016-0008 and R2-2021-0028, is rescinded upon the effective date of this Order, except for enforcement purposes, and, in order to meet the provisions contained in Water Code division 7 (commencing with § 13000) and regulations adopted thereunder and the provisions of the CWA and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order. This action in no way prevents the Regional Water Board from taking enforcement action for violations of the previous order.

3. DISCHARGE PROHIBITIONS

This Order does not establish additional discharge prohibitions beyond those established in the individual NPDES permits listed in Attachment B of this Order.

4. EFFLUENT LIMITATIONS

4.1. Municipal Discharger Effluent Limitations. Municipal Dischargers shall comply with the following mass and concentration effluent limitations at discharge points and monitoring locations specified in the Monitoring and Reporting Program (MRP) (Attachment E).

Table 3A. Mercury Effluent Limitations for Municipal Dischargers

Discharger	Average Annual Effluent Limit (kg/yr) [1]	Average Monthly Effluent Limit (µg/L)	Average Weekly Effluent Limit (µg/L)
American Canyon, City of	0.095	0.025	0.027
Benicia, City of	0.088	0.066	0.072
Burlingame, City of	0.089	0.066	0.072
Calistoga, City of	0.016	0.066	0.072
Central Contra Costa Sanitary District	1.3	0.066	0.072
Central Marin Sanitation Agency	0.11	0.066	0.072
Crockett Community Services District	0.00072	0.066	0.072
Delta Diablo [2]	0.19	0.066	0.072
East Bay Dischargers Authority (EBDA) [3]	2.2	0.066	0.072
City of Hayward			
City of San Leandro			
Oro Loma Sanitary District and Castro Valley Sanitary District			
Union Sanitary District			
Livermore-Amador Valley Water Management Agency			
Dublin San Ramon Services District			
City of Livermore			
East Bay Municipal Utility District	1.5	0.066	0.072
Fairfield-Suisun Sewer District	0.17	0.025	0.027
Las Gallinas Valley Sanitary District	0.10	0.066	0.072
Marin County (Paradise Cove), Sanitary District No. 5 of	0.00055	0.066	0.072
Marin County (Tiburon), Sanitary District No. 5 of	0.0099	0.066	0.072
Millbrae, City of	0.052	0.066	0.072
Mt. View Sanitary District	0.034	0.025	0.027
Napa Sanitation District	0.17	0.066	0.072
Novato Sanitary District	0.079	0.066	0.072
Palo Alto, City of	0.31	0.025	0.027

Discharger	Average Annual Effluent Limit (kg/yr) [1]	Average Monthly Effluent Limit (µg/L)	Average Weekly Effluent Limit (µg/L)
Petaluma, City of	0.063	0.066	0.072
Pinole, City of	0.055	0.066	0.072
Rodeo Sanitary District	0.060	0.066	0.072
St. Helena, City of	0.047	0.066	0.072
San Francisco (San Francisco International Airport), City and County of	0.032	0.066	0.072
San Francisco (Southeast Plant), City and County of	1.6	0.066	0.072
San Jose and Santa Clara, Cities of	0.8	0.025	0.027
San Mateo, City of	0.19	0.066	0.072
Sausalito-Marin City Sanitary District	0.078	0.066	0.072
Sewerage Agency of Southern Marin	0.076	0.066	0.072
Silicon Valley Clean Water	0.32	0.066	0.072
Sonoma Valley County Sanitation District	0.041	0.066	0.072
South San Francisco and San Bruno, Cities of	0.18	0.066	0.072
Sunnyvale, City of	0.12	0.025	0.027
Treasure Island Development Authority	0.026	0.066	0.072
Vallejo Flood and Wastewater District	0.34	0.066	0.072
West County Agency	0.23	0.066	0.072
West County Wastewater District			
City of Richmond and Richmond Municipal Sewer District			
Yountville, Town of	0.040	0.066	0.072
Aggregate Mass Emission Limit (kg/yr) [1],[4]	**11**	**Not Applicable**	**Not Applicable**

Footnotes:

[1] Compliance with the Average Annual Effluent Limitations is determined annually for each Municipal Discharger each calendar year and is attained if the sum of all individual Municipal Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass Emission Limit of 11 kg/yr. If the sum of all individual Municipal Dischargers' mercury mass emissions is greater than 11 kg/yr, the Municipal Dischargers whose mercury mass emissions exceed their individual limitations in Table 3A shall be deemed to be in violation of their mercury mass limitations. For compliance determination, mass emissions shall be determined as defined below:

a. The total annual aggregate mass emission shall be the sum of the individual annual mass emissions from each Municipal Discharger. The sum shall be rounded to the nearest kilogram for comparison with the 11 kg/yr limit.

b. The annual average mass emission for each Discharger shall be computed for the period January 1 through December 31, annually.

c. The annual average mass emission for each Discharger listed in Table 3A shall be the arithmetic average of available quarterly mass emissions as follows:

$$\text{Annual Mass Emission, kg/year} = \sum(\text{Quarterly Mass Emission Rates, kg/quarter})$$

Or, for Dischargers with less frequent mercury monitoring than quarterly, the Annual Mass Emission shall be computed using the arithmetic average of available quarterly mass emissions as follows:

$$\text{Annual Mass Emission, kg/year} = \left(\frac{\sum \text{Quarterly Mass Emission, kg/quarter}}{\text{Number of Quarterly Mass Emissions Calculated}}\right) * 4 \text{ quarters/year}$$

where:

$$\text{Quarterly Mass Emission, kg/quarter} = \left(\frac{0.003785}{N}\right) * \left(\sum_{i=1}^{N} Q_i C_i\right) * 91.5 = \frac{0.34633}{N} * \left(\sum_{i=1}^{N} Q_i C_i\right)$$

and where:

C_i	= mercury concentration of each individual sample, . g/L
Q_i	= Discharger flow rate on date of sample, millions of gallons per day (MGD)
N	= number of samples collected during the quarter
0.003785	= conversion factor to convert (µg/L)*(MGD) into kg/day
91.5	= number of days in a standard quarter
0.34633	= product of (conversion factor)*(number of standard days per quarter)

The quarterly mass emission shall be calculated at the end of each quarterly period as defined in the Discharger's individual NPDES permit listed in Attachment B of this Order.

For intermittent Dischargers (Dischargers that do not discharge every day in a calendar quarter, or that have no discharge for an entire quarter [Qi = 0]), Qi shall be computed as follows:

$$Qi = \left(\frac{\sum_{d=1}^{D} Q_d}{91.5}\right)$$

where:

Q_d	= total flow for the day when discharge occurred, million gallons
D	= total number of days where discharge occurred in a quarter
91.5	= number of days in a standard quarter

d. The Quarterly Mass Emission for a Discharger that provides recycled wastewater for industrial supply shall include the effluent discharge adjustment granted to the Industrial Discharger for its recycled wastewater use as described in Provision 6.3.5 of this Order. The quarterly effluent discharge adjustment mass shall be reported in each Self-Monitoring Report due at the end of a quarterly period, as defined in the Discharger's individual permit, and noted in the Annual Report.

[2] Delta Diablo may, as its option, apply a discharge adjustment to its discharge concentrations or mass emission to be subtracted from the final discharge concentrations or mass emission when determining compliance with its limits. The adjustment shall be based on measured mercury and PCBs levels from the reverse osmosis concentrate it receives from the City of Antioch's Brackish Water Desalination Project. The method for calculating and applying the adjustment shall be consistent with Provision 6.3.5 of this Order, where C_i and Q_t correspond to the reverse osmosis concentrate mercury concentration and flow volume.

[3] EBDA's mass emissions shall be calculated using the mercury concentration sampled at the EBDA Common Outfall (Discharge Point 001) times the combined average daily flows discharged from the EBDA Common Outfall and the Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant's local outfall (covered under NPDES Permit CA0037559) on the same day as EBDA's mercury sampling.

[4] The total differs slightly from the column sum due to rounding to the nearest kilogram.

Table 3B. PCBs Effluent Limitations for Municipal Dischargers

Discharger	Average Monthly Effluent Limit (µg/L) [1]	Maximum Daily Effluent Limit (µg/L) [1]
American Canyon, City of	0.00039	0.00049
Benicia, City of	0.012	0.017
Burlingame, City of	0.012	0.017
Calistoga, City of	0.012	0.017
Central Contra Costa Sanitary District	0.012	0.017
Central Marin Sanitation Agency	0.012	0.017
Crockett Community Services District	0.012	0.017
Delta Diablo [2]	0.012	0.017
East Bay Dischargers Authority (EBDA)	0.012	0.017
City of Hayward		
City of San Leandro		
Oro Loma Sanitary District and Castro Valley Sanitary District		
Union Sanitary District		
Livermore-Amador Valley Water Management Agency		
Dublin San Ramon Services District		
City of Livermore		
East Bay Municipal Utility District	0.012	0.017
Fairfield-Suisun Sewer District	0.00039	0.00049
Las Gallinas Valley Sanitary District	0.012	0.017
Marin County (Paradise Cove), Sanitary District No. 5 of	0.012	0.017
Marin County (Tiburon), Sanitary District No. 5 of	0.012	0.017
Millbrae, City of	0.012	0.017
Mt. View Sanitary District	0.00039	0.00049
Napa Sanitation District	0.012	0.017
Novato Sanitary District	0.012	0.017
Palo Alto, City of	0.00039	0.00049
Petaluma, City of	0.012	0.017
Pinole, City of	0.012	0.017
Rodeo Sanitary District	0.012	0.017
Saint Helena, City of	0.012	0.017
San Francisco (San Francisco International Airport), City and County of	0.012	0.017

Discharger	Average Monthly Effluent Limit (µg/L) [1]	Maximum Daily Effluent Limit (µg/L) [1]
San Francisco (Southeast Plant), City and County of	0.012	0.017
San Jose and Santa Clara, Cities of	0.00039	0.00049
San Mateo, City of	0.012	0.017
Sausalito-Marin City Sanitary District	0.012	0.017
Sewerage Agency of Southern Marin	0.012	0.017
Silicon Valley Clean Water	0.012	0.017
Sonoma Valley County Sanitation District	0.012	0.017
South San Francisco and San Bruno, Cities of	0.012	0.017
Sunnyvale, City of	0.00039	0.00049
Treasure Island Development Authority	0.012	0.017
Vallejo Flood and Wastewater District	0.012	0.017
West County Agency	0.012	0.017
West County Wastewater District		
City of Richmond and Richmond Municipal Sewer District		
Yountville, Town of	0.012	0.017

Footnotes:

[1] The Dischargers shall use U.S. EPA Method 608.3 or 625.1 for Aroclor monitoring. These data will be used to assess compliance with the above limits. Non-detected and estimated values shall be treated as zeros in the calculation of Total PCBs.

[2] Delta Diablo may, as its option, apply a discharge adjustment to its discharge concentrations to be subtracted from the final discharge concentrations when determining compliance with its limits. The adjustment shall be based on measured PCBs (as Aroclors) levels from the reverse osmosis concentrate it receives from the City of Antioch's Brackish Water Desalination Project. The method for calculating and applying the adjustment shall be consistent with Provision 6.3.5 of this Order, where C_t and Q_t correspond to the reverse osmosis concentrate PCBs concentration and flow volume.

4.2. Industrial Discharger Effluent Limitations. Industrial Dischargers shall comply with the following mass and concentration effluent limitations at discharge points and monitoring locations specified in the MRP (Attachment E).

Table 4A. Mercury Effluent Limitations for Industrial Dischargers

Discharger	Average Annual Effluent Limit (kg/yr) [1]	Average Monthly Effluent Limit (µg/L)	Maximum Daily Effluent Limit (µg/L)
Non-Petroleum Refineries			
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Department	0.045	0.079	0.12

Discharger	Average Annual Effluent Limit (kg/yr) [1]	Average Monthly Effluent Limit (µg/L)	Maximum Daily Effluent Limit (µg/L)
Crockett Cogeneration, LP	0.0047	0.079	0.12
Eco Services Operations LLC	0.011	0.079	0.12
The Pittsburg Owner LPV, LLC	0.0078	0.079	0.12
USS-UPI, LLC	0.045	0.079	0.12
Petroleum Refineries			
Chevron Products Company	0.34	0.079	0.12
Phillips 66	0.13	0.079	0.12
Martinez Refining Company, LLC	0.22	0.079	0.12
Tesoro Refining & Marketing Co.	0.11	0.079	0.12
Valero Refining Company	0.08	0.079	0.12
Aggregate Mass Emission Limit (kg/yr) [2]	**1.0**	**Not Applicable**	**Not Applicable**

Footnotes:

[1] Compliance with the Average Annual Effluent Limitations is determined annually for each Municipal Discharger each calendar year and is attained if the sum of all individual Municipal Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass Emission Limit of 1.0 kg/yr. If the sum of all individual Industrial Dischargers' mercury mass emissions is greater than 1.0 kg/yr, the Industrial Dischargers whose mercury mass emissions exceed their individual limitations in Table 4A shall be deemed to be in violation of their mercury mass limitations. For compliance determination, mass emissions shall be determined as defined below:

a. The total annual aggregate mass emission shall be the sum of the individual annual mass emissions from each Industrial Discharger. The sum shall be rounded to the nearest kilogram for comparison with the 1.0 kg/yr limit.

b. The annual average mass emission for each Discharger shall be computed for the period January 1 through December 31, annually.

c. The annual average mass emission for each Discharger listed in Table 4A shall be the arithmetic average of available quarterly mass emissions as follows:

$$\text{Annual Mass Emission, kg/year} = \sum(\text{Quarterly Mass Emission Rates, kg/quarter})$$

Or, for Dischargers with less frequent mercury monitoring than quarterly, the Annual Mass Emission shall be computed using the arithmetic average of available quarterly mass emissions as follows:

$$\text{Annual Mass Emission, kg/year} = \left(\frac{\sum \text{Quarterly Mass Emission, kg/quarter}}{\text{Number of Quarterly Mass Emissions Calculated}}\right) * 4 \text{ quarters/year}$$

where:

$$\text{Quarterly Mass Emission, kg/quarter} = \left(\frac{0.003785}{N}\right) * \left(\sum_{i=1}^{N} Q_i C_i\right) * 91.5 = \frac{0.34633}{N} * \left(\sum_{i=1}^{N} Q_i C_i\right)$$

and where:

C_i = mercury concentration of each individual sample, µg/L

Q_i = Discharger flow rate on date of sample, millions of gallons per day (MGD)

N = number of samples collected during the quarter

0.003785 = conversion factor to convert (µg/L)*(MGD) into kg/day

91.5 = number of days in a standard quarter

0.34633 = product of (conversion factor)*(number of standard days per quarter)

The quarterly mass emission shall be calculated at the end of each quarterly period as defined in the Discharger's individual NPDES permit listed in Attachment B of this Order.

For intermittent Dischargers (Dischargers that do not discharge every day in a calendar quarter, or that have no discharge for an entire quarter [Qi = 0]), Qi shall be computed as follows:

$$Qi = \left(\frac{\sum_{d=1}^{D} Q_d}{91.5}\right)$$

where:

Q_d = total flow for the day when discharge occurred, million gallons

D = total number of days where discharge occurred in a quarter

91.5 = number of days in a standard quarter

Dischargers shall average duplicate samples when reporting a sample result for mass emission calculations (or report the median if one or more of the duplicates is DNQ or ND).

d. For an Industrial Discharger that uses treated recycled wastewater for industrial supply from a Municipal Discharger named in this Order, the Industrial Discharger shall subtract from its Quarterly Mass Emission in footnote c, above, an adjustment for the recycled water used and discharged through its discharge point as provided in Provision 6.3.5 of this Order. The Industrial Discharger shall report this effluent discharge adjustment mass to the Municipal Discharger that provided the recycled wastewater within 15 days following the end of the calendar quarter for which an adjustment is applied and shall report the adjustment in each Self-Monitoring Report due at the end of a quarterly period, as defined in the Discharger's individual permit, and in its Annual Report.

[2] The total differs slightly from the column sum due to rounding to the nearest kilogram.

Table 4B. PCBs Effluent Limitations for Industrial Dischargers

Discharger	Average Monthly Effluent Limit (µg/L) [1]	Maximum Daily Effluent Limit (µg/L) [1]
Non-Petroleum Refineries		
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Department	0.012	0.018
Eco Services Operations LLC	0.012	0.018
USS-UPI, LLC	0.012	0.018
Petroleum Refineries		
Chevron Products Company	0.00095	0.0015
Phillips 66	0.00095	0.0015
Martinez Refining Company, LLC	0.00095	0.0015
Tesoro Refining & Marketing Co.	0.00095	0.0015
Valero Refining Company	0.00095	0.0015

Footnote:

[1] Dischargers shall use U.S. EPA Method 608.3 or 625.1 for Aroclor monitoring. These data will be used to assess compliance with the above limits. Non-detected and/or estimated values shall be treated as zeros in the calculation of Total PCBs.

5. RECEIVING WATER LIMITATIONS

This Order does not establish additional receiving water limitations beyond those established in the individual NPDES permits listed in Attachment B of this Order.

6. PROVISIONS

6.1. Standard Provisions

6.1.1. The Dischargers shall comply with all “Standard Provisions” in Attachment D (as amended) of their individual NPDES permits listed in Attachment B of this Order.

6.1.2. The Dischargers shall comply with all applicable provisions of the “Regional Standard Provisions, and Monitoring and Reporting Requirements for NPDES Wastewater Discharge Permits” in Attachment G (as amended) of their individual NPDES permits listed in Attachment B of this Order.

6.1.3. If there is any conflict, duplication, or overlap between provisions in this Order, the more stringent provision shall apply.

6.2. Monitoring and Reporting Provisions

The Dischargers shall comply with the Monitoring and Reporting Program (MRP, Attachment E) and future revisions thereto, and applicable monitoring and reporting requirements in Attachments D and G (as amended) of their individual NPDES permits listed in Attachment B of this Order. Notwithstanding Provision 6.1.3, the MRP in Attachment E of this Order shall apply over any more stringent, conflicting, duplicative, or overlapping requirement in Attachments D and G of the individual NPDES permits listed in Attachment B of this Order. Between the MRP in Attachment E of this Order and the MRP in individual NPDES permits listed in Attachment B of this Order, the more stringent MRP shall apply.

6.3. Special Provisions

6.3.1. Reopener Provision

The Regional Water Board may modify or reopen this Order prior to its expiration date if there is modification of the San Francisco Bay Mercury or PCBs TMDL implementation provisions.

6.3.2. Triggers for Additional Mercury Control

6.3.2.1. Each individual Discharger shall comply with the tasks specified in Provision 6.3.2.3 of this Order if its discharge exceeds any of the applicable mercury triggers described in Tables 5 and 6.

Table 5. Mercury Triggers for Municipal Dischargers

Treatment Plant Type	Trigger Type	Average Monthly	Maximum Daily
Secondary	Mercury Concentration	0.041 µg/L	0.065 µg/L
Advanced Secondary	Mercury Concentration	0.011 µg/L	0.021 µg/L

All	Mass Emission	Individual annual mass emission limit, as depicted in Table 3A, above, and computed as a 12-month running average, as shown in Provision 6.3.2.2, below.

Table 6. Mercury Triggers for Industrial Dischargers

Trigger Type	Average Monthly	Maximum Daily
Mercury Concentration	0.037 µg/L	0.062 µg/L
Mass Emission	Individual annual mass emission limit, as depicted in Table 4A, above, and computed as a 12-month running average, as shown in Provision 6.3.2.2, below.	

6.3.2.2. The running 12-month average mercury mass emission shall be calculated at the end of each quarterly period as defined in each Discharger's individual NPDES permit listed in Attachment B of this Order, as follows:

$$(\text{12-month running average, kg}) = (\text{current quarter's mass emission, kg}) + \sum (\text{Previous 3 quarters' mass emissions, kg})$$

where the current quarter's mass emission is computed as shown in Section 4 (Effluent Limitations), footnote 1c of Tables 3A and 4A, above.

6.3.2.3. Each Discharger that exceeds any of the applicable triggers for mercury listed in Table 5 or 6, above, shall comply with the following action requirements:

Table 7. Action Plan Required in Response to Mercury Trigger Exceedance

Task [1]	Task Description	Deadline
a	***Accelerated Sampling.*** As soon as the Discharger becomes aware of an exceedance of a mercury trigger, re-sample within 48 hours and commence at minimum weekly sampling for a total of at least six new samples. If all six new samples show mercury levels below the triggers, return to routine sampling. If during the accelerated sampling (1) any of the new samples are above the maximum daily trigger, or (2) the monthly average of the new samples is above the monthly trigger, or (3) the 12-month running average mass is above the mass trigger, then proceed with an action plan for mercury reduction and continue sampling monthly until the observed mercury discharge is below the triggers for three consecutive months, at which point the Discharger shall complete the reporting of this exceedance as required by tasks **b** and **d**, below, and return to routine monitoring, and discontinue efforts under task **c**, below.	See deadlines in task description.
b	***Trigger Exceedance Reporting.*** Report to the Regional Water Board any exceedance of mercury triggers in the cover letter of Self-Monitoring Report and the status of plans and actions to accelerate monitoring and/or develop and implement an action plan for mercury reduction.	In Self-Monitoring Report due 30 days after end of monitoring period.
c	***Action Plan for Mercury Reduction.*** Develop, submit, and implement an Action Plan that (1) evaluates the cause [2] of trigger exceedances, (2) evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future	Within 130 days of initial trigger exceedance.

Task [1]	Task Description	Deadline
	exceedances, (3) evaluates the feasibility and effectiveness of technology enhancements to improve treatment plant performance, and (4) evaluates other measures for preventing future exceedances. In addition, identify in the Action Plan mercury reduction measures to be implemented, along with an implementation schedule for those measures, to correct current and prevent future trigger exceedances.	
d	***Annual Reporting.*** Provide a status of its mercury reduction efforts in the annual Self-Monitoring Report. Additionally, as causes and corrective actions are identified, the Discharger shall amend or supplement its Action Plan as appropriate. Such changes shall be reported to the Regional Water Board in the Discharger's Annual Self-Monitoring Report.	February 1 of each year until Discharger demonstrates compliance with trigger for continuous 3-month period of sampling.

Footnotes:

[1] Refer to Appendix F-1 for an example of responding to a mercury trigger.

[2] Possible causes of exceedances include (but are not limited to) changes in reclamation; increases in the number of sewer connections; increases in infiltration and inflow (I/I); changes in the type or number of industrial, commercial, or residential sources; changes in the raw material used in manufacturing processes; changes in treatment system operation; or factors beyond the Discharger's control, such as a natural disaster, vandalism, illegal dumping, or extreme flood event.

6.3.3. **Mercury and PCBs Source Control Programs.** Each Discharger shall evaluate whether there are controllable sources of mercury or PCBs to its wastewater system (e.g., PCBs-containing industrial equipment for PCBs, discharges from amalgam-generating dental practices for mercury). The Discharger shall continue to implement and look for opportunities to improve existing measures to control such sources. Each Discharger shall submit the results of this evaluation, including any proposed control actions and implementation schedules, in its annual pollution prevention reports required by its individual NPDES permit.

6.3.4. **Risk Reduction Programs.** Each Discharger shall continue to implement and participate in programs to reduce mercury and PCBs-related risks to humans from consumption of San Francisco Bay and Sacramento San Joaquin River Delta fish. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts. Each Discharger shall describe the progress of its efforts in its Annual Self-Monitoring Report. Alternatively, the Bay Area Clean Water Agencies (BACWA) may fulfill the annual reporting requirement by providing a summary of annual risk reduction program efforts for agencies that choose to participate through BACWA.

6.3.5. **Mercury and PCBs Discharge Adjustments for Recycled Wastewater Use by Industrial Dischargers.** When an Industrial Discharger listed in Table 1B uses recycled wastewater from a Municipal Discharger listed in Table 1A, the Industrial Discharger may, at its option, apply a discharge adjustment (hereinafter Mercury or PCBs Adjustment) to its mercury or PCBs discharge concentration or mercury mass emission to be subtracted from the final discharge concentration or mass emission when determining compliance with

its concentration and mass limits specified in Tables 4A and 4B. The Industrial Discharger may also use its own recycled wastewater to receive a mercury or PCBs concentration adjustment. The Mercury or PCBs Adjustment shall be based on measured influent mercury and PCBs levels from the recycled wastewater in accordance with the following:

6.3.5.1. **Monitoring Frequencies.** The Industrial Discharger shall sample and analyze the influent recycled wastewater and the effluent discharge at least semi-annually for mercury and annually for PCBs. Influent sampling shall include measurement of daily flow volume for the entire duration that the Mercury or PCBs Adjustment is applied. Influent sampling shall occur at an appropriate influent monitoring location as identified in the Discharger's individual permit.

6.3.5.2. **Time Intervals between Influent and Effluent Sampling.** The Industrial Discharger shall determine the time interval (i.e., lag time) between sampling a given constituent of concern in the influent recycled water and sampling the same water for the constituent when it appears in the final effluent. The basis for this determination shall be included in any calculation of a Mercury or PCBs Adjustment.

6.3.5.3. **Adjustment Calculation Procedure**

6.3.5.3.1. **Concentration Adjustment.** The Mercury or PCBs Adjustment for concentration shall be calculated as follows:

$$(C_i - C_p) \times Q_t \div Q_y$$

where:

C_i = Recycled water influent mercury or PCBs concentration, µg/L

C_p = Potable water influent mercury or PCBs concentration, µg/L

Q_t = Total influent recycled water flow volume corresponding to the appropriate monitoring period and no less than annually (e.g., quarterly flow volume for mercury and annual flow volume for PCBs), million gallons

Q_y = Total effluent flow volume corresponding to the appropriate monitoring period and lag time (e.g.,Y days) after influent is sampled, million gallons

Example: Mercury is monitored quarterly. The lag time is Y days.

Step 1: {(influent concentration of mercury in recycled wastewater, C_i) – (influent concentration of mercury in potable water, C_p)} x

(total influent volume of recycled wastewater for the quarter, Q_t) = (influent mass of mercury from recycled wastewater for the quarter)

Step 2: (influent mass) ÷ (total effluent discharge volume for the quarterly period, Y days after influent sampled, Q_y) = (Mercury Adjustment to be subtracted from the concentration of mercury in the discharge, valid for that quarter)

6.3.5.3.2. **Mass Adjustment.** The Mercury Adjustment for mass shall be calculated as follows:

$$(C_i - C_p) \times Q_t$$

where

C_i = Recycled water influent mercury concentration, µg/L

C_p = Potable water influent mercury concentration, µg/L

Q_t = Total influent recycled water flow volume corresponding to the appropriate monitoring period and no less than annually (e.g., quarterly flow volume for mercury and annual flow volume for PCBs), million gallons

Example: Mercury is monitored quarterly. The lag time is Y days.

Step: {(influent concentration of mercury in recycled wastewater, C_i) – (influent concentration of mercury in potable water, C_p)} x (total influent volume of recycled wastewater for the quarter, Q_t) = (influent mass of mercury from recycled wastewater, or Mercury Adjustment to be subtracted from the quarterly mass emission, valid for that quarter, and to be reported to the Municipal Discharger that provided the recycled wastewater)

6.3.5.4. **Effluent Limit Exceedance.** If an Industrial Discharger opts to apply a Mass Adjustment after receiving recycled wastewater from a Municipal Discharger listed in Table 1A, the Regional Water Board shall transfer that adjustment to the mass emission for the corresponding discharge interval from the Municipal Discharger that is the producer and source of the recycled wastewater. If this reverse adjustment results in an adjusted mass discharge level above both of the following criteria, then that Municipal Discharger is in violation of its Annual Average Effluent Limit and is subject to Regional Water Board enforcement:

6.3.5.4.1. **Individual Mass Adjustment.** The sum of the adjusted mass discharge levels from the Industrial Discharger and the Municipal Discharger

exceeds the sum of the individual Average Annual Effluent Limits for these two Dischargers; and

6.3.5.4.2. **Aggregate Mass Adjustment.** The adjusted mass discharge levels from the Municipal Discharger results in an aggregate mass emission from all Municipal Dischargers that exceeds the Aggregate Mass Emission Limit for Municipal Dischargers.

6.3.6. **PCBs Discharge Adjustment for Urban Stormwater Treatment by Municipal Dischargers.** When a Municipal Discharger listed in Table 1A accepts and treats urban runoff that is diverted from municipal separate storm sewer systems to all or parts of its wastewater treatment facility, the Municipal Discharger may, at its option, apply an adjustment (hereinafter Runoff Adjustment) to its PCBs discharge concentration when determining compliance with its concentration limits specified in Table 3B, provided that the total mass used in Runoff Adjustments from all Municipal Dischargers does not exceed 1 kg/year. The Runoff Adjustment shall be based on measured influent PCBs levels from urban runoff in accordance with the following:

6.3.6.1. **Representative Samples.** The Municipal Discharger shall have data from a representative sample or samples of the urban runoff targeted for diversion. Separate sampling shall be conducted to characterize dry weather diversions and wet weather diversions. The Discharger shall measure daily flow volumes for the entire duration that the Runoff Adjustment is to be applied. The Discharger shall measure these flows at an appropriate influent monitoring location as identified in the Discharger's individual permit and shall categorize each diversion as a dry weather diversion or a wet weather diversion.

6.3.6.2. **Adjustment Calculation Procedure.** The PCBs Runoff Adjustment shall be calculated as follows:

$$[(C_{di} \times Q_{dr}) + (C_{wi} \times Q_{wr})] \div Q_t$$

where

C_{di} = Dry weather urban runoff influent PCBs concentration, µg/L

Q_{dr} = Total dry weather influent urban runoff flow volume corresponding to the appropriate monitoring period for the dry season (e.g., semi-annual flow volume), million gallons

C_{wi} = Wet weather urban runoff influent PCBs concentration, µg/L

Q_{wr} = Total wet weather influent urban runoff flow volume corresponding to the appropriate monitoring period for the wet season (e.g., semi-annual flow volume), million gallons

Q_t = Total effluent flow volume corresponding to the appropriate monitoring period, million gallons

Example: PCBs are monitored twice during the Order term; once during dry weather (May 1 through October 31) and once during the wet weather (November 1 through April 30).

Step 1: {(influent urban runoff concentration of PCBs in dry weather, C_{di}) x (total influent urban runoff volume of dry weather diversion for the dry season, Q_{dr}) + (influent urban runoff concentration of PCBs in wet weather, C_{wi}) x (total influent urban runoff volume of wet weather diversion for the wet season, Q_{wr})} = (influent mass of PCBs from urban runoff)

Step 2: (influent mass) ÷ (total effluent discharge volume for the monitoring period, Q_t) = (Runoff Adjustment to be subtracted from the concentration of PCBs, valid for that monitoring period)

ATTACHMENT A – DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Arithmetic Mean (.)
Also called the average, sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$

where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples

Average Monthly Effluent Limitation (AMEL)
Highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
Highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Taken up by an organism from its surrounding medium through gill membranes, through epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic
Known to cause cancer in living organisms.

Coefficient of Variation (CV)
Measure of data variability calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Either: (1) the total mass of a constituent discharged over a calendar day (12:00 a.m. through 11:59 p.m.) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit) for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of a constituent over a day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period is considered the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ)
Sample results less than the RL, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dilution Credit
Amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA)
Value derived from the water quality criterion or objective, dilution credit, and ambient background concentration that is used, in conjunction with the CV for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration.
The ECA has the same meaning as wasteload allocation (WLA) as used in U.S. EPA guidance (*Technical Support Document for Water Quality-based Toxics Control*, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
Concentration that results from the confirmed detection of a substance below the ML by the analytical method.

Estuaries
Waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220; Suisun Bay; Carquinez Strait downstream to the Carquinez Bridge; and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the state that are not the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
Highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
Lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL)
Highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
Middle measurement in a data set. The median of a data set is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2+1)})/2$ (i.e., the midpoint between n/2 and n/2+1).

Method Detection Limit (MDL)
Minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 C.F.R. part 136, Appendix B.

Minimum Level (ML)
Concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Limited volume of receiving water allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Persistent Pollutants
Substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program
Program of waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of a Pollutant Minimization Program is to reduce all potential sources of a priority pollutant through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. Cost effectiveness may be considered when establishing the requirements of a Pollutant Minimization Program. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), is considered to fulfill the Pollutant Minimization Program requirements.

Pollution Prevention
Any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State Water Resources Control Board or Regional Water Board.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. For priority pollutants, the MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from State Implementation Plan (SIP) Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) beneficial use.

Standard Deviation (σ)
Measure of variability calculated as follows:

$$\text{Standard deviation} = \sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$$

where: x is the observed value
μ is the arithmetic mean of the observed values
n is the number of samples

Toxicity Reduction Evaluation (TRE)
Study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. A TIE is a set of procedures to identify the specific chemicals responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

ABBREVIATIONS

%	Percent
µg/L	Micrograms per liter
1/Month	Once per month
1/Quarter	Once per quarter
1/Week	Once per week
1/Year	Once per year
2/Year	Twice per year
AMEL	Average monthly effluent limitation
AWEL	Average weekly effluent limitation
B	Background concentration
C	Water quality criterion or objective
C-24	24-hour composite
Continuous	Measured continuously
Continuous/D	Measured continuously, and recorded and reported daily
Continuous/H	Measured continuously, and recorded and reported hourly
CV	Coefficient of Variation
DNQ	Detected, but not quantified
DL	Detection level
ECA	Effluent Concentration Allowance
Grab	Grab sample

MDEL	Maximum Daily Effluent Limitation
MDL	Method detection limit
MEC	Maximum effluent concentration
MG	Million gallons
MGD	Million gallons per day
ML	Minimum level
ND	Not detected
pg/L	Picograms per liter
RL	Reporting level
RPA	Reasonable potential analysis

ATTACHMENT B – INDIVIDUAL NPDES PERMIT AND ORDER NUMBERS

Discharger	NPDES Permit	Existing Order	Existing Order Effective Date	Existing Order Expiration Date
Municipal Dischargers				
American Canyon, City of	CA0038768	R2-2022-0019	8/01/2022	7/31/2027
Benicia, City of	CA0038091	R2-2019-0034	2/01/2020	1/31/2025
Burlingame, City of	CA0037788	R2-2018-0024	8/12/2018	7/31/2023
Calistoga, City of	CA0037966	R2-2022-0010	5/01/2022	4/30/2027
Central Contra Costa Sanitary District	CA0037648	R2-2022-0020	8/01/2022	7/31/2027
Central Marin Sanitation Agency	CA0038628	R2-2018-0003	3/01/2018	2/28/2023
Crockett Community Services District	CA0037885	R2-2018-0053	2/01/2019	1/31/2024
Delta Diablo	CA0038547	R2-2019-0035	2/01/2020	1/31/2025
East Bay Dischargers Authority (EBDA)	CA0038768	R2-2022-0023	9/01/2022	8/31/2027
City of Hayward				
City of San Leandro				
Oro Loma Sanitary District and Castro Valley Sanitary District				
Union Sanitary District				
Livermore-Amador Valley Water Management Agency	CA0038679	R2-2021-0007	7/01/2021	6/30/2026
City of San Leandro – Treatment Wetland	CA0038881	R2-2022-0006	6/01/2022	5/31/2027
Oro Loma Sanitary District and Castro Valley Sanitary District – Wet Weather	CA0037559	R2-2018-0010	1/01/2019	12/31/2023
Union Sanitary District – Wet Weather	CA0038733	R2-2020-0027	12/01/2020	11/30/2025
Dublin San Ramon Services District	CA0037613	R2-2022-0024	9/01/2022	8/31/2027
City of Livermore	CA0038008	R2-2022-0025	9/01/2022	8/31/2027
East Bay Municipal Utility District	CA0037702	R2-2020-0024	11/01/2020	10/31/2025
Fairfield-Suisun Sewer District	CA0038024	R2-2020-0012	5/01/2020	4/30/2025
Las Gallinas Valley Sanitary District	CA0037851	R2-2020-0022	9/01/2020	8/31/2025
Marin County (Paradise Cove), Sanitary District No. 5 of	CA0037427	R2-2021-0017	12/01/2021	11/30/2026
Marin County (Tiburon), Sanitary District No. 5 of	CA0037753	R2-2018-0038	10/01/2018	9/30/2023
Millbrae, City of	CA0037532	R2-2019-0009	5/01/2019	4/30/2024
Mt. View Sanitary District	CA0037770	R2-2021-0026	2/01/2022	1/31/2027
Napa Sanitation District	CA0037575	R2-2022-0003	4/01/2022	3/31/2027
Novato Sanitary District	CA0037958	R2-2020-0019	9/01/2020	8/31/2025
Palo Alto, City of	CA0037834	R2-2019-0015	6/1/2019	5/31/2024
Petaluma, City of	CA0037810	R2-2021-0008	7/01/2021	6/30/2026
Pinole, City of	CA0037796	R2-2018-0004	4/01/2018	3/31/2023

Discharger	NPDES Permit	Existing Order	Existing Order Effective Date	Existing Order Expiration Date
Rodeo Sanitary District	CA0037826	R2-2022-0037	2/01/2023	1/31/2028
St. Helena, City of	CA0038016	R2-2021-0004	6/01/2021	5/30/2026
San Francisco (San Francisco International Airport), City and County of	CA0038318	R2-2018-0045	12/01/2018	11/30/2023
San Francisco (Southeast Plant), City and County of	CA0037664	R2-2013-0029	10/01/2013	9/30/2018
San Jose and Santa Clara, Cities of	CA0037842	R2-2020-0001	4/01/2020	3/31/2025
San Mateo, City of	CA0037541	R2-2018-0016	7/01/2018	6/30/2023
Sausalito-Marin City Sanitary District	CA0038067	R2-2018-0025	8/01/2018	7/31/2023
Sewerage Agency of Southern Marin	CA0037711	R2-2018-0039	10/01/2018	9/30/2023
Silicon Valley Clean Water	CA0038369	R2-2018-0005	4/01/2018	3/31/2023
Sonoma Valley County Sanitation District	CA0037800	R2-2019-0019	9/01/2019	8/31/2024
South San Francisco and San Bruno, Cities of	CA0038130	R2-2019-0021	9/01/2019	8/31/2024
Sunnyvale, City of	CA0037621	R2-2020-0002	4/01/2020	3/31/2025
Treasure Island Development Authority	CA0110116	R2-2020-0020	8/01/2020	7/31/2025
Vallejo Flood and Wastewater District	CA0037699	R2-2017-0035	11/01/2017	10/31/2022
West County Agency	CA0038539	R2-2019-0003	04/01/2019	03/31/2024
West County Wastewater District				
City of Richmond and Richmond Municipal Sewer District				
Yountville, Town of	CA0038121	R2-2020-0026	12/01/2020	11/30/2025
Industrial Dischargers (Non-Petroleum Refineries) [1]				
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	CA0005240	R2-2018-0012	7/01/2018	6/30/2023
Crockett Cogeneration, LP	CA0029904	R2-2021-0025	2/01/2022	1/31/2027
Eco Services Operations, LLC	CA0006165	R2-2021-0012	8/01/2021	7/31/2026
The Pittsburg Owner LPV, LLC	CA0004880	R2-2018-0017	7/01/2018	6/30/2023
USS-UPI, LLC	CA0005002	R2-2016-0043	1/01/2017	12/31/2021
Industrial Dischargers (Petroleum Refineries) [1]				
Chevron Products Company	CA0005134	R2-2016-0047	2/01/2017	1/31/2022
Phillips 66	CA0005053	R2-2016-0044	1/01/2017	12/31/2021
Martinez Refining Company, LLC	CA0005789	R2-2017-0039	12/01/2017	11/30/2022
Tesoro Refining & Marketing Co.	CA0004961	R2-2021-0029	3/01/2022	2/28/2027
Valero Refining Company	CA0005550	R2-2020-0033	1/01/2021	12/31/2025

Footnote:

[1] Some facilities deemed as petroleum refineries in the Mercury TMDL no longer operate as petroleum refineries. However, this Order retains the previous order's nomenclature to remain consistent with the Mercury TMDL.

ATTACHMENT C – MAPS OF MUNICIPAL AND INDUSTRIAL DISCHARGERS

Figure C-1. Municipal Discharger Outfall Locations

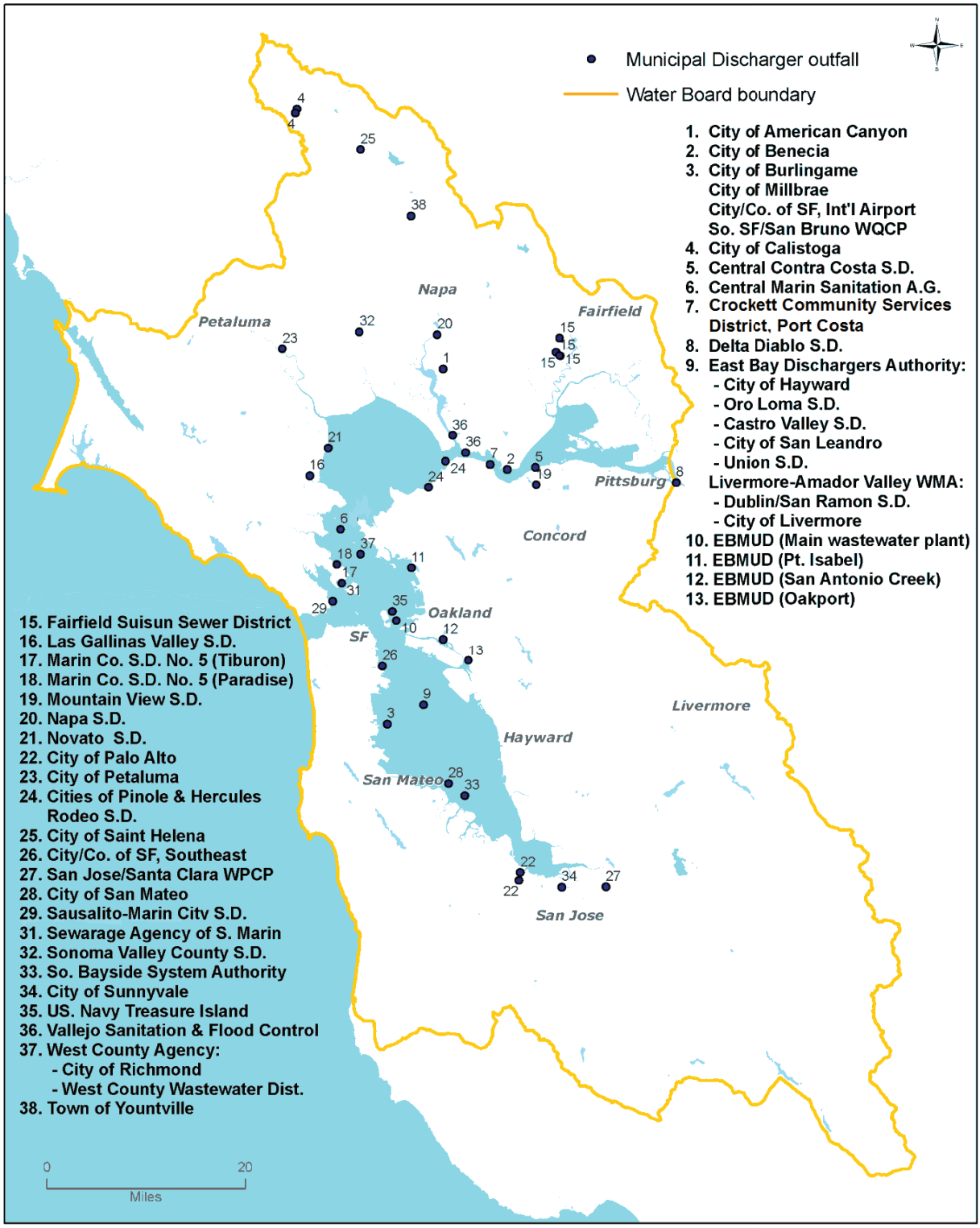

Figure C-2. Industrial Discharger Outfall Locations

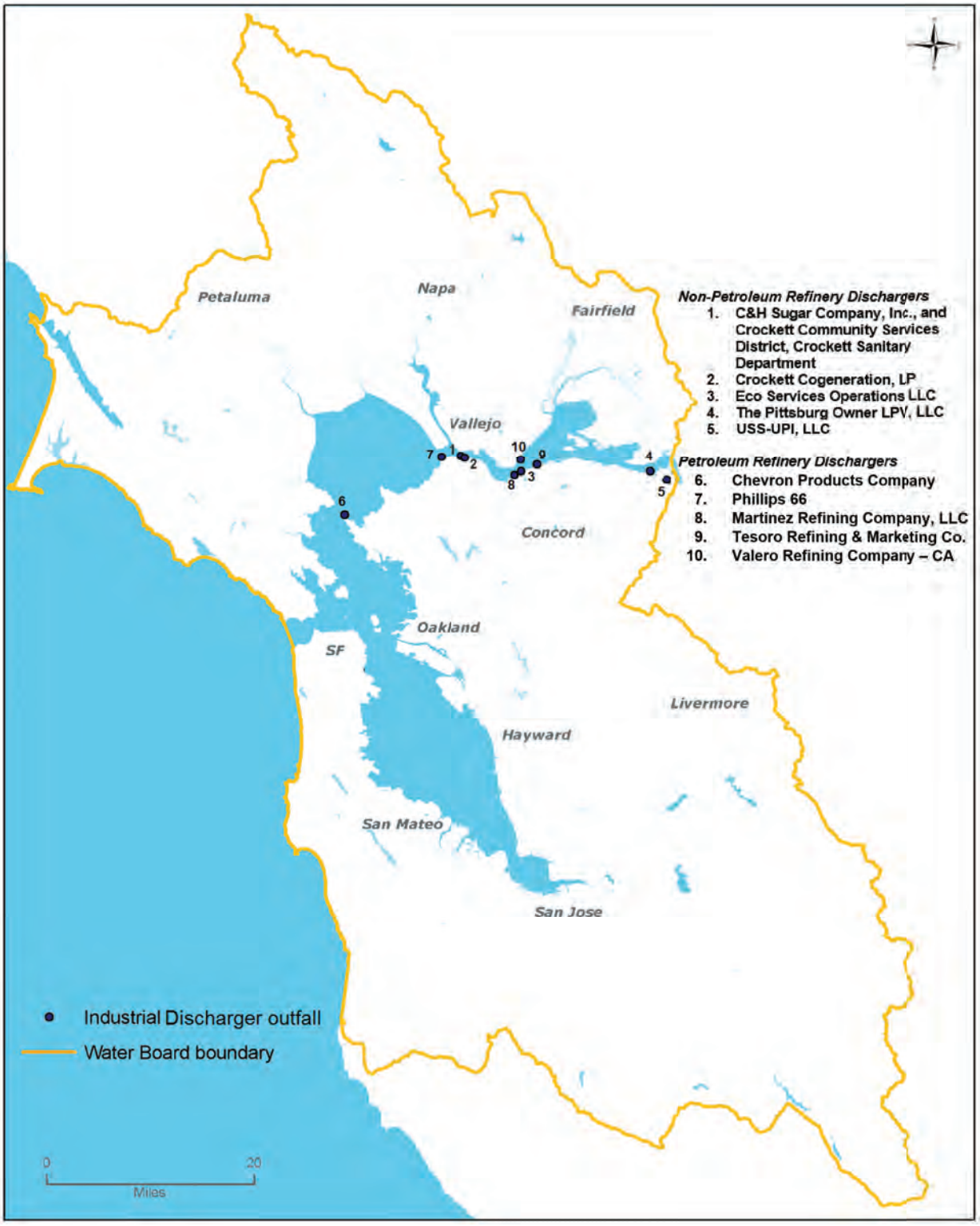

ATTACHMENT D – STANDARD PROVISIONS

Refer to Attachment D in the individual permits listed in Attachment B of this Order.

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Clean Water Act (CWA) section 308 and 40 C.F.R. sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. This MRP establishes monitoring, reporting, and recordkeeping requirements that implement the federal and state laws and regulations.

1. GENERAL MONITORING PROVISIONS

1.1. Dischargers shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 C.F.R. section 122.63. If any discrepancies exist between this MRP and the "Regional Standard Provisions, and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits" (Attachment G) in the individual permits listed in Attachment B of this Order, this MRP shall prevail. If any discrepancies exist between this MRP and the MRP in individual NPDES permits listed in Attachment B of this Order, the more stringent requirements shall apply.

1.2. Dischargers shall conduct all monitoring in accordance with Attachment D section 3 of their individual permits listed in Attachment B of this Order, as supplemented by Attachment G of their individual permits listed in Attachment B of this Order. Equivalent test methods must be more sensitive than those specified in 40 C.F.R. section 136 and must be specified in this permit.

1.3. For compliance monitoring, analyses shall be conducted using the lowest commercially available and reasonably achievable detection levels. The objective is to provide quantification of constituents sufficient to allow evaluation of observed concentrations with respect to the Minimum Levels given below. All Minimum Levels are expressed as µg/L, equivalent to parts per billion (ppb). According to the SIP, method-specific factors can be applied. In such cases, the additional factor must be applied in the computation of the Reporting Level. Application of such factors will alter the Reporting Level from the Minimum Level for the analysis. Dischargers are to instruct laboratories to establish calibration standards so that the Minimum Level is the lowest calibration standard. At no time is a Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. Table E-1 below indicates the highest Minimum Level that the Discharger's laboratory may achieve for calibration purposes:

Table E-1. Minimum Levels

Constituent Analysis	Minimum Level	Units
Mercury	0.0005	µg/L
PCBs 1016, 1221, 1232, 1242, 1248, 1254, 1260	0.5	µg/L

2. MONITORING LOCATIONS

Dischargers shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements of this Order:

Table E-2. Monitoring Locations

Sample Type	Monitoring Location	Monitoring Location Description
Effluent	Individual monitoring locations for discharges of treated wastewater (normally Monitoring Location EFF-001) are specified in the MRPs of Dischargers' individual NPDES permits as listed in Attachment B of this Order.[1]	Individual monitoring location descriptions are provided in the MRPs of Dischargers' individual NPDES permits as listed in Attachment B of this Order.

Footnotes:

[1] For the City and County of San Francisco (Southeast Plant), the monitoring location shall be Monitoring Location EFF-001A.
For the City of Calistoga, annual monitoring shall alternate each year between Monitoring Locations EFF-001 and EFF-002.
For C&H Sugar Company, Inc., the monitoring location shall be Monitoring Location EFF-002.
For Fairfield-Suisun Sewer District, the monitoring location shall be Monitoring Location EFF-001D.
For The Pittsburg Owner LPV, LLC, the monitoring location shall be Monitoring Location EFF-001G.

3. EFFLUENT MONITORING REQUIREMENTS

The Dischargers listed in Tables 3A and 4A of the Order shall monitor their individual treatment plant effluent for mercury and the Dischargers listed in Tables 3B and 4B of the Order shall monitor their individual treatment plant effluent for PCBs as follows:

Table E-3. Effluent Monitoring

Parameter	Unit	Sample Type [1]	Minimum Sampling Frequency [2]
Major Dischargers (see Tables 1A and 1B of the Order)			
Mercury, Total [3]	µg/L	C-24 or Grab [4]	1/Quarter
PCBs, Total (as Aroclors) [5]	µg/L or pg/L	Grab	Once
PCBs (as congeners) [6]	µg/L or pg/L	Grab	2/Year (for design flows [7] ≥ 50 MGD)
			1/Year (for design flows [7] 5.0 MGD ≤ Q < 50 MGD [8]
			Once (for design flows [7] < 5.0 MGD)
Minor Dischargers (see Tables 1A and 1B of the Order)			
Mercury, Total [3],[9]	µg/L	C-24 or Grab [4]	2/year
PCBs, Total (as Aroclors) [5]	µg/L or pg/L	Grab	Once
PCBs (as congeners) [6]	µg/L or pg/L	Grab	Once

Footnotes:

[1] 24-hour composites may be made up of discrete grab samples collected over a 24-hour period or may be collected using automatic compositing equipment. If using compositing equipment, the Discharger shall implement all feasible ultra clean techniques to reduce sample contamination (such as using ultra clean Teflon tubing).

[2] Intermittent or seasonal Dischargers shall collect samples during those quarters for which a discharge occurs.

[3] Dischargers shall use ultra-clean sampling (U.S. EPA Method 1669) and ultra-clean analytical methods (U.S. EPA Method 1631) for total mercury monitoring.

[4] If allowed in the Pretreatment and Biosolids Monitoring Requirements of the Dischargers' individual NPDES permits, grab samples may be collected coincident with composite samples collected for the analysis of other regulated parameters.

[5] Dischargers shall use U.S. EPA Method 608.3 or 625.1 for Aroclor monitoring. These data will be used to assess compliance with the limits in Tables 3B and 4B of the Order. Non-detected and estimated values shall be treated as zeros in the calculation of Total PCBs.

[6] PCBs congeners monitoring is for informational purposes. Dischargers shall use U.S. EPA Proposed Method 1668C and report the results for each of the 40 congeners that contribute to San Francisco Bay's impairment and congeners that co-elute with the 40 congeners (see Fact Sheet Tables F-7 and F-8). For congeners that co-elute with the 40 congeners, Dischargers shall report the sum of these co-eluting congeners. A summation for total PCBs as congeners is not required. When the Regional Water Board estimates sums, non-detected values are treated as zeros and estimated values are counted.

[7] The design flows for each facility are included in Fact Sheet Tables F-1A and F-1B.

[8] For the Cities of San Jose and Santa Clara and the Treasure Island Development Authority, the minimum monitoring frequency for PCBs (as congeners) shall be 1/Year.

[9] For Sanitary District No. 5 of Marin County (Paradise Cove) and Crockett Community Services District (Port Costa), the minimum monitoring frequency for total mercury shall be 1/Year.

4. PCBS CONGENERS SAMPLING REQUIREMENTS (U.S. EPA METHOD 1668C)

4.1. Sample Collection. Dischargers shall collect samples as 1-liter (L) grab samples in appropriate pre-cleaned amber glass bottles following applicable clean sampling techniques from U.S. EPA Method 1669 (U.S. EPA, 1996). The following procedures shall be used to reduce the likelihood of sample contamination:

- Wear clean, powder-free gloves
- Minimize the time the container is open
- Avoid setting the bottle lid down
- Avoid rainwater from dripping into the bottle
- Avoid touching the inside of the bottle or lid

Dischargers shall keep bottles dust-free prior to sample collection. Dischargers shall collect multiple 1-L grab samples at each monitoring location sufficient for analysis and quality-control (QC). Additional 1-L grab samples may be collected and retained onsite at the facility until the analysis is completed and the data are accepted for reporting to the Regional Water Board. In the event of a QC failure or loss of the initial grab samples, Dischargers shall send an extra sample retained onsite to the laboratory to be analyzed and reported or collect new samples.

4.2. Sample Handling. If residual chlorine is present, Dischargers shall add 80 mg of sodium thiosulfate to each 1-L sample. Samples shall be kept in the dark at less than or equal to 6ºC from the time of collection until receipt at the laboratory. Sample bottles, shipping instructions, chain of custody templates, and billing information shall be provided by the analytical laboratory. If the sample will be frozen, the Discharger shall allow room for expansion. U.S. EPA Method 1668C allows samples to be held for up to one year prior to extraction if stored in the dark at less than or equal to 6ºC.

4.3. Analytical Laboratories. All samples shall be analyzed using proposed U.S. EPA Method 1668C (April 2010) to provide consistent concentration information for the 40 PCB congeners and their co-elutions. Any laboratory analyzing and reporting PCB congeners data shall demonstrate that laboratory background levels do not adversely affect the analytical results by statistically determining and documenting that laboratory background levels found in laboratory method blanks are acceptable. To achieve this, for each congener, the value of two standard deviations above the mean in a minimum of 10 blanks shall be at or below 75 percent of the corresponding method-specified Minimum Level (ML). The sample-specific detection limit (SSDL) of the corresponding congener shall be used as a numerical value in the following equation when the congener is not detected (ND) as specified by the method:

$$MEAN_{MB,\,10} + (2 \times SD_{MB,\,10}) \leq 0.75 \times ML$$

where:

$MEAN_{MB,\,10}$ = The mean of 10 or more method blanks
$SD_{MB,\,10}$ = Standard deviation of 10 or more method blanks
ML = Corresponding ML for the congener

4.4. Quality Assurance and Quality Control. Quality assurance and quality control (QA/QC) samples are required in conjunction with samples to verify data quality. With each batch of 20 or fewer samples, the laboratory shall analyze method-required QA/QC samples of method blanks and spike blanks. Matrix spikes may be analyzed based on sample availability.

Method-required batch controls are as follows:

- Method blank – for batch contamination monitoring. If any of the 40 congeners or co-elutes of interest are present in the method blank at greater than 20 pg/L, the batch is invalidated.
- Spike blank – for sample preparation recovery assessment.
- Mid-calibration range standards performed at the start and every 12 hours of instrument calibration thereafter – as calibration verification. Calibration verification shall also be performed at the end of the analysis.

5. REPORTING REQUIREMENTS

5.1. General Monitoring and Reporting Requirements. The Dischargers shall comply with all Standard Provisions (Attachments D and G) related to monitoring, reporting, and recordkeeping.

5.2. Individual Reporting in Self-Monitoring Reports (SMRs)

5.2.1. **SMR Format.** Dischargers shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program website (waterboards.ca.gov/water_issues/programs/ciwqs). The CIWQS website will provide additional information for SMR submittal in the event of a planned service interruption for electronic submittal.

5.2.2. **SMR Due Dates and Contents.** The Discharger shall submit SMRs by the due dates, and with the contents, specified below:

5.2.2.1. **Routine SMRs** — Dischargers shall submit mercury and PCBs data collected to comply with this Order in the routine monthly or quarterly SMRs required in Dischargers' individual NPDES permits. This includes data for mercury, total PCBs as Aroclors (using U.S. EPA Method 608.3 or 625.1), and PCBs as congeners (using U.S. EPA Method 1668C). The PCBs congeners shall include the 40 that contribute to San Francisco Bay water quality impairment plus co-elutes (59 to 66 congeners in total, see Fact Sheet Tables F-7 and F-8), using U.S. EPA Method 1668C.

For Industrial Dischargers claiming a discharge adjustment for recycled water use pursuant to Provision 6.3.5 of the Order, the amount of adjustment claimed for that month shall be reported monthly to the Municipal Discharger that supplied the recycled water. The reporting from the Industrial Discharger to the Municipal Discharger shall be completed no later than 15 days following the end of the calendar month. The Municipal and Industrial Dischargers shall then include this information in their respective monthly (or quarterly) and annual SMRs.

Each SMR shall include all new mercury or PCBs monitoring results obtained since the last SMR was submitted. If a Discharger monitors mercury or PCBs more frequently than required by this Order, the Discharger shall include the results of such monitoring in the calculations and reporting for the SMR.

5.2.2.2. **Annual SMR** — Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain a summary of all mercury data. This summary shall include, at a minimum, mercury concentrations for each sample, the corresponding flow, and the annual mercury loading.

5.2.3. **Specifications for Submitting SMRs to CIWQS.** Dischargers shall submit analytical mercury, total PCBs as Aroclors (using U.S. EPA Method 608.3 or 625.1), and PCBs as congeners (using U.S. EPA Method 1668C) results to CIWQS in electronic reporting format by EDF/CDF upload or through manual entry.

When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format, the Discharger shall electronically submit the data in a tabular format as an attachment. Dischargers shall arrange all reported data in a tabular format and summarize the data to clearly illustrate whether their facility is operating in compliance with the effluent limitations.

5.2.4. **Monitoring Periods.** Monitoring periods for all required monitoring shall be as set forth below unless otherwise specified:

Table E-4. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
1/Month	First day of calendar month following or on Order effective date	First day of calendar month through last day of calendar month
1/Quarter [1]	Closest January 1, April 1, July 1, or October 1 before or after Order effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
1/Year	Closest January 1 before or after Order effective date	January 1 through December 31
2/Year	Closest January 1 or July 1 before or after Order effective date	January 1 through June 30 July 1 through December 31
Once	Order effective date	Once during the term of the Order within 12 months of the expiration date

Footnote:

[1] Definitions of 1/Quarter in the individual NPDES permits listed in Attachment B of this Order supersede this definition.

5.2.5. **RL and MDL Reporting.** The Discharger shall report with each sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 C.F.R. part 136. The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

5.2.5.1. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

5.2.5.2. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For purposes of data collection, the Discharger shall require the laboratory to write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be

percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means the laboratory considers appropriate.

5.2.5.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected", or ND.

5.2.5.4. Dischargers shall instruct laboratories to establish calibration standards so that the minimum level (ML) value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time are Dischargers to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

5.2.6. **PCBs Congeners Reporting.** General requirements for reporting U.S. EPA Method 1668C data are as follows:

5.2.6.1. **Minimum Levels.** The ML for each congener shall be published Method MLs (Table 2 of EPA1668C). The laboratory analyzing the samples shall have on file data demonstrating a lower calibration level that is equal to or less than the published Method ML. Laboratories may revise the lower calibration level based on final published values if and when U.S. EPA Method 1668C is fully approved or promulgated.

5.2.6.2. **Method Detection Limits.** The MDLs reported by the laboratory shall meet the criteria set in U.S. EPA Method 1668C. The laboratory shall demonstrate capability by achieving MDLs below method-specified MDLs. The MDL is based on analysis of low-level replicates of clean matrices (e.g., deionized water). SSDLs for each congener shall be reported when there is a ND result. The SSDL is calculated by using the instrument processing method based on the noise level in the vicinity of the largest peak in sample extracts containing the real matrix.

5.2.6.3. **Co-elution.** Congeners in a co-elution shall be reported as a combination of the congeners, with the lowest numerically designated congener reported first and separated by a slash (/) from numerically higher designated congeners.

For example, if PCB congeners 020, 021, and 033 are co-eluted, the Discharger shall report the co elution as PCB 020/021/033.

5.2.6.4. **Qualifiers.** Qualifiers allowed in reporting U.S. EPA 1668C data are as follows:

Table E-5. U.S. EPA Method 1668C Qualifiers in CIWQS

Qualifiers	CIWQS Field	Qualifier Description
ND	Qualifier	The analyte was not detected in the sample at the SSDL.
DNQ	Qualifier	The reported result is an estimate. The concentration is greater than the SSDL but less than the method-specified ML.
M	QA Code	Estimated maximum possible concentration.
D	QA Code	Result obtained from the analysis of a diluted sample.
B	QA Code	Congener is present in the method blank.

5.2.6.5. **Method Blank Correction.** Results shall be reported without method blank correction.

5.2.6.6. **Units.** Concentrations shall be reported in micrograms per liter (µg/L) or picograms per liter (pg/L).

5.2.7. **Transmittal Letter.** Each Discharger shall attach a transmittal letter to its SMR. The transmittal letter shall clearly identify violations of this Order and any trigger exceedances. The Discharger shall also describe any requirement violated or trigger exceeded, discuss corrective actions taken or planned, and propose a time schedule for the corrective actions.

5.2.8. **Compliance Determination.** Compliance with effluent limitations shall be determined using sample reporting protocols defined above, in Attachment A of this Order, and in Attachments D and Attachment G (as amended) of Dischargers' individual NPDES permits listed in Attachment B of this Order. For purposes of reporting and administrative enforcement by the Regional Water Board and State Water Board, the Dischargers shall be deemed out of compliance with effluent limitations if the concentration of the pollutant in the monitoring sample is greater than the effluent limitation and, if applicable, greater than or equal to the RL.

5.3. Discharge Monitoring Reports (DMRs). DMRs are U.S. EPA reporting requirements. The Discharger shall electronically certify and submit DMRs together with SMRs using Electronic Self-Monitoring Reports module eSMR 2.5 or the latest upgraded version. Electronic DMR submittal shall be in addition to electronic SMR submittal. Information about electronic DMR submittal is available at the DMR website (waterboards.ca.gov/water_issues/programs/discharge_monitoring).

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ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in section 2.2 of the Order, the Regional Water Board incorporates this Fact Sheet as findings supporting the issuance of the Order.

1. PERMIT INFORMATION

The following table summarizes administrative information related to the Dischargers' facilities:

Table F-1A. Municipal Facility Information

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
American Canyon, City of	Pam Phillips Environmental Services Manager (707) 647-4544	151 Mezzetta Court American Canyon, CA 94503 Napa County	Advanced Secondary	2.5
Benicia, City of	Jeff Gregory Wastewater Treatment Plant Superintendent (707) 746-4336	614 East Fifth Street Benicia, CA 94510 Solano County	Secondary	4.5
Burlingame, City of	Manuel Molina General Manager (650) 342-3727	501 Primrose Road Burlingame, CA 94010 San Mateo County	Secondary	5.5
Calistoga, City of	Ben Zacharia Utility Systems Superintendent (707) 942-2847	414 Washington Street Calistoga, CA 94515 Napa County	Secondary	0.84
Central Contra Costa Sanitary District	Lori Schectel Env. Compliance Manager (925) 229-7143	5019 Imhoff Place Martinez, CA 94553 Contra Costa County	Secondary	53.8
Central Marin Sanitation Agency	Chris Finton Treatment Plant Manager (415) 459-1455 x101	1301 Andersen Drive San Rafael, CA 94901 Marin County	Secondary	10
Crockett Community Services District	James Barnhill Sanitary Department Manager (510) 787-2992	P.O. Box 578 Crockett, CA 94525 Contra Costa County	Secondary	0.033
Delta Diablo	Amanda Roa Environmental Programs Manager (925) 756-1940	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County	Secondary	19.5
East Bay Dischargers Authority (EBDA)	Jacqueline Zipkin General Manager (510) 278-5910	2651 Grant Avenue San Lorenzo, CA 94580 Alameda County	Secondary	107.8
City of Hayward				
City of San Leandro				

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
Oro Loma Sanitary District and Castro Valley Sanitary District				
Union Sanitary District				
Livermore-Amador Valley Water Management Agency				
Dublin San Ramon Services District				
City of Livermore				
East Bay Municipal Utility District	Chris Dembiczak Senior EH&S Specialist (925) 640-4738	P.O. Box 24055 Oakland, CA 94623-1055 Alameda County	Secondary	120
Fairfield-Suisun Sewer District	Meg Herston Director of Environmental Services (707) 428-9109	1010 Chadbourne Road Fairfield, CA 94534 Solano County	Advanced Secondary	23.7
Las Gallinas Valley Sanitary District	Mel Liebmann Chief Plant Operator (415) 472-1734	300 Smith Ranch Road San Rafael, CA 94903 Marin County	Secondary	2.92
Marin County (Paradise Cove), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	P.O. Box 227 Tiburon, CA 94920 Marin County	Secondary	0.04
Marin County (Tiburon), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	2001 Paradise Drive Tiburon, CA 94920 Marin County	Secondary	0.98
Millbrae, City of	Khee Lim Public Works Director (650) 259-2347	621 Magnolia Avenue Millbrae, CA 94030 San Mateo County	Secondary	3.0
Mt. View Sanitary District	Lilia Corona District Manager (925) 228-5635 ext. 18	P.O. Box 2757 Martinez, CA 94553 Contra Costa County	Advanced Secondary	3.2
Napa Sanitation District	James Keller Operations Services Director (707) 258-6020 ext. 601	1515 Soscol Ferry Road Napa, CA 94558 Napa County	Secondary	15.4
Novato Sanitary District	Sandeep Karkal General Manager-Chief Engineer (415) 892-1694	500 Davidson Street Novato, CA 94945 Marin County	Secondary	7.0
Palo Alto, City of	James Allen Plant Manager (650) 329-2243	2501 Embarcadero Way, Palo Alto, CA 94303 Santa Clara County	Advanced Secondary	39
Petaluma, City of	Matthew Pierce Operations Supervisor (707) 776-3726	202 N. McDowell Blvd. Petaluma, CA 94954 Sonoma County	Secondary	6.7
Pinole, City of	Josh Binder Plant Manager (510) 724-8964	2131 Pear Street, Pinole, CA 94564 Contra Costa County	Secondary	4.06

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
Rodeo Sanitary District	Steve Beall District Manager (510) 799-2970 ext. 100	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County	Secondary	1.14
St. Helena, City of	Mark Rincon-Ibarra Public Works Director 707-968-2629 ext. 540	1572 Railroad Avenue St. Helena, CA 94574 Napa County	Secondary	0.5
San Francisco (San Francisco International Airport), City and County of	Jennifer Acton Env. Operations Manager (650) 455-9241	P.O. Box 8097 San Francisco, CA 94128 San Mateo County	Secondary	2.2
San Francisco (Southeast Plant), City and County of	Amy Chastain Regulatory Manager (415) 554-1683	1155 Market St., 11th Floor San Francisco, CA 94103 San Francisco County	Secondary	85.4
San Jose and Santa Clara, Cities of	Eric Dunlavey Wastewater Compliance Program Manager (408) 635-4017	700 Los Esteros Road San Jose, CA 95134 Santa Clara County	Advanced Secondary	167
San Mateo, City of	Michael Sutter Operations Superintendent (650) 522-7380	330 West 20th Avenue San Mateo, CA 94403	Secondary	15.7
Sausalito-Marin City Sanitary District	Jeffrey Kingston General Manager (415) 332-0244	1 East Road Sausalito, CA 94965 Marin County	Secondary	1.8
Sewerage Agency of Southern Marin	Mark Grushayev General Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941 Marin County	Secondary	3.6
Silicon Valley Clean Water	Monte Hamamoto Chief Operating Officer (650) 832-6266	1400 Radio Road Redwood City, CA 94065 San Mateo County	Secondary	29
Sonoma Valley County Sanitation District	Frank Mello Operations Coordinator (707) 521-1843	Sonoma County Water Agency 404 Aviation Blvd. Santa Rosa, CA 95403 Sonoma County	Secondary	3.0
South San Francisco and San Bruno, Cities of	Brian Schumacker Plant Superintendent (650) 829-3844	195 Belle Air Road South San Francisco, CA 94080 San Mateo County	Secondary	13
Sunnyvale, City of	Rohan Wikramanayake Water Pollution Control Plant Division Manager (781) 491-6177	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707 Santa Clara County	Advanced Secondary	29.5
Treasure Island Development Authority	Bob Beck Treasure Island Director (415) 274-0062	1 Avenue of the Palms, Ste 241	Secondary	2.0

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (MGD)
		San Francisco, CA 94130 San Francisco County		
Vallejo Flood and Wastewater District	Jennifer Harrington Environmental Services Director (707) 652-7806	450 Ryder Street Vallejo, CA 94590 Solano County	Secondary	15.5
West County Agency West County Wastewater District City of Richmond and Richmond Municipal Sewer District	Aaron Winer Director of Water Quality and Resource Recovery (510) 837-6223	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	Secondary	28.5
Yountville, Town of	John Ferons Public Works Director (707) 944-8851	6550 Yount Street Yountville, CA 94599 Napa County	Secondary	0.55

Table F-1B. Industrial Facility Information

Discharger	Facility Contact, Title, and Phone	Mailing Address	Facility Type	Facility Design Flow (MGD)
Non-Petroleum Refineries [1]				
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	Hal McCutchan Environmental Supervisor (510) 201-0126 Gaunt Murdock General Manager/District Engineer (510) 787-2992	C&H Sugar Company 830 Loring Avenue Crockett, CA 94525 Contra Costa County Crockett Sanitary Dept. P.O. Box 578 Crockett, CA 94525 Contra Costa County	Sugar Cane Crystalline Industry	1.8
Crockett Cogeneration, LP	Thane Jennings Plant Engineer (510) 787-4101	550 Loring Avenue Crockett, CA 94525-1232 Contra Costa County	Industrial – Electrical Generation, SIC Code 4931	0.5
Eco Services Operations, LLC	Wahyet Li Plant Manager (925) 313-8204	100 Mococo Road Martinez, CA 94553 Contra Costa County	Industrial – Chemical and Allied Products, SIC Code 2891	0.8
The Pittsburg Owner LPV, LLC	Glenn Brown Entitlements (925) 984-7137	888 San Clemente Drive, Suite 100 Newport Beach, CA 92660 Orange County	Decommissioned Electric Power Generation	2.2 [1]
USS-UPI, LLC	Freddy Ripoli Manager – Health and Safety (925) 439-6706	900 Loveridge Road Pittsburg, CA 94565 Contra Costa County	Industrial – Steelworks, SIC Code 3312	28

Discharger	Facility Contact, Title, and Phone	Mailing Address	Facility Type	Facility Design Flow (MGD)
Petroleum Refineries [1]				
Chevron Products Company	Shawn Lee Health, Safety, & Env. Manager (510) 242-1400	841 Chevron Way Richmond, CA 94801 Contra Costa County	Industrial – Petroleum Refining	25
Phillips 66	John Francis Carroll II Environmental Specialist 510-245-4677	1380 San Pablo Avenue Rodeo, CA 94572-1354 Contra Costa County	Industrial – Petroleum Refining	10
Martinez Refining Company, LLC	Adeline Ford Staff Engineer (925) 229-6370	3485 Pacheco Blvd Martinez CA 94553 Contra Costa County	Industrial – Petroleum Refining	8.2
Tesoro Refining & Marketing Co.	Kevin Obad Environmental Supervisor (925) 228-1220 ext. 2325	150 Solano Way Martinez, CA 94553 Contra Costa County	Industrial – Petroleum Refining	10.4
Valero Refining Company	Marisol Pacheco-Mendez Environmental Engineer (707) 745-7573	3400 East Second Street Benicia, CA 94510-1005 Solano County	Industrial – Petroleum Refining	3.7

Footnotes:

[1] Some facilities deemed as petroleum refineries in the Mercury TMDL no longer operate as petroleum refineries. However, this Order retains the previous order's nomenclature to remain consistent with the Mercury TMDL.

[2] Though The Pittsburg Owner LPV, LLC's facility has a permitted design flow of 2.2 MGD, it discharges less than 1.0 MGD of treated stormwater runoff. Additionally, The Pittsburg Owner LPV, LLC plans to upgrade its treatment system with a design flow of less than 1.0 MGD. Therefore, The Pittsburg Owner LPV, LLC is classified as a minor discharger (see Table 1B).

Table F-2A. Additional Municipal Facility Information

Discharger	Authorized Person to Sign and Submit Reports	Billing Address	Pretreatment Program	Receiving Water Type
American Canyon, City of	Pam Phillips Environmental Services Manager (707) 647-4544	151 Mezzetta Court American Canyon, CA 94503 Napa County	Yes	Estuarine
Benicia, City of	Jeff Gregory Wastewater Treatment Plant Superintendent (707) 746-4336	614 East Fifth Street Benicia, CA 94510 Solano County	Yes	Estuarine
Burlingame, City of	Robert Spankowski Operations Manager (650) 333-6037	501 Primrose Road Burlingame, CA 94010 San Mateo County	Yes	Marine
Calistoga, City of	Ben Zacharia Utility Systems Superintendent (707) 942-2847	414 Washington Street Calistoga, CA 94515 Napa County	No	Freshwater
Central Contra Costa Sanitary District	Lori Schectel Env. Compliance Manager (925) 229-7143	5019 Imhoff Place Martinez, CA 94553 Contra Costa County	Yes	Estuarine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address	Pretreatment Program	Receiving Water Type
Central Marin Sanitation Agency	Chris Finton Treatment Plant Manager (415) 459-1455 ext. 101	1301 Andersen Drive San Rafael, CA 94901 Marin County	Yes	Estuarine
Crockett Community Services District	James Barnhill Sanitary Department Manager (510) 787-2992	P.O. Box 578 Crockett, CA 94525 Contra Costa County	No	Estuarine
Delta Diablo	Joaquin Gonzalez Operations Manager (925) 756-1971	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County	Yes	Estuarine
East Bay Dischargers Authority (EBDA)	Jacqueline Zipkin General Manager (510) 278-5910	2651 Grant Avenue San Lorenzo, CA 94580 Alameda County	Yes	Estuarine
City of Hayward				
City of San Leandro				
Oro Loma Sanitary District and Castro Valley Sanitary District				
Union Sanitary District				
Livermore-Amador Valley Water Management Agency				
Dublin San Ramon Services District				
City of Livermore				
East Bay Municipal Utility District	Glenn Dombeck Manager of Wastewater Treatment (510) 287-1407	P.O. Box 24055, MS#59 Oakland, CA 94623-1055 Alameda County	Yes	Marine
Fairfield-Suisun Sewer District	Jordan Damerel Assistant General Manager/District Engineer (707) 428-9155	1010 Chadbourne Road Fairfield, CA 94534 Solano County	Yes	Estuarine
Las Gallinas Valley Sanitary District	Mel Liebmann Chief Plant Operator (415) 472-1734	300 Smith Ranch Road San Rafael, CA 94903 Marin County	No	Estuarine
Marin County (Paradise Cove), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	P.O. Box 227 Tiburon, CA 94920 Marin County	No	Marine
Marin County (Tiburon), Sanitary District No. 5 of	Tony Rubio District Manager (415) 435-1501	2001 Paradise Drive Tiburon, CA 94920 Marin County	No	Marine
Millbrae, City of	Khee Lim Public Works Director (650) 259-2347	621 Magnolia Avenue Millbrae, CA 94030 San Mateo County	No	Marine
Mt. View Sanitary District	Stacey Ambrose Environmental Services Manager (925) 228-5635 ext. 12	P.O. Box 2757 Martinez, CA 94553 Contra Costa County	No	Estuarine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address	Pretreatment Program	Receiving Water Type
Napa Sanitation District	James Keller Operations Services Director (707) 258-6020 ext. 601	1515 Soscol Ferry Road Napa, CA 94558 Napa County	Yes	Estuarine
Novato Sanitary District	Sandeep Karkal General Manager-Chief Engineer (415) 892-1694	500 Davidson Street Novato, CA 94945 Marin County	Yes	Estuarine
Palo Alto, City of	James Allen Plant Manager (650) 329-2243	2501 Embarcadero Way, Palo Alto, CA 94303 Santa Clara County	Yes	Estuarine
Petaluma, City of	Matthew Pierce Operations Supervisor (707) 776-3726	202 N. McDowell Blvd. Petaluma, CA 94954 Sonoma County	Yes	Estuarine
Pinole, City of	Josh Binder Plant Manager (510) 724-8964	2131 Pear Street, Pinole, CA 94564 Contra Costa County	No	Marine
Rodeo Sanitary District	Steve Beall District Manager (510) 799-2970 ext. 100	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County	No	Estuarine
St. Helena, City of	Alan Planje Chief Plant Operator	1480 Main Street St. Helena, CA 94574 Napa County	No	Freshwater
San Francisco (San Francisco International Airport), City and County of	Leroy Sisneros Director of Facilities (650) 821-5400	P.O. Box 8097 San Francisco, CA 94128 San Mateo County	Yes	Marine
San Francisco (Southeast Plant), City and County of	Andrew Clark Operations Superintendent (415) 920-4944	1155 Market St., 11th Floor San Francisco, CA 94103 San Francisco County	Yes	Marine
San Jose and Santa Clara, Cities of	Eric Dunlavey Wastewater Compliance Program Manager (408) 635-4017	700 Los Esteros Road San Jose, CA 95134 Santa Clara County	Yes	Estuarine
San Mateo, City of	Michael Sutter Operations Superintendent (650) 522-7380	330 West 20th Avenue San Mateo, CA 94403	Yes	Marine
Sausalito-Marin City Sanitary District	Jeffrey Kingston General Manager (415) 332-0244	1 East Road Sausalito, CA 94965 Marin County	No	Marine
Sewerage Agency of Southern Marin	Mark Grushayev General Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941 Marin County	No	Marine
Silicon Valley Clean Water	Monte Hamamoto Chief Operating Officer (650) 832-6266	1400 Radio Road Redwood City, CA 94065 San Mateo County	Yes	Marine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address	Pretreatment Program	Receiving Water Type
Sonoma Valley County Sanitation District	Frank Mello Operations Coordinator (707) 521-1843	Sonoma County Water Agency 404 Aviation Blvd. Santa Rosa, CA 95403 Sonoma County	No	Estuarine
South San Francisco and San Bruno, Cities of	Brian Schumacker Plant Superintendent (650) 829-3844	195 Belle Air Road South San Francisco, CA 94080 San Mateo County	Yes	Marine
Sunnyvale, City of	Rohan Wikramanayake Water Pollution Control Plant Division Manager (781) 491-6177	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707 Santa Clara County	Yes	Estuarine
Treasure Island Development Authority	Andrew Clark Operations Superintendent (415) 920-4944	1 Avenue of the Palms, Ste 161 San Francisco, CA 94130 San Francisco County	No	Marine
Vallejo Flood and Wastewater District	Jennifer Harrington Environmental Services Director (707) 652-7806	450 Ryder Street Vallejo, CA 94590 Solano County	Yes	Estuarine
West County Agency West County Wastewater District City of Richmond and Richmond Municipal Sewer District	Andrew Clough Agency Manager (510) 237-6603	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	Yes	Estuarine
Yountville, Town of	John Ferons Public Works Director (707) 944-8851	6550 Yount Street Yountville, CA 94599 Napa County	No	Freshwater

Table F-2B. Additional Industrial Facility Information

Discharger	Authorized Person to Sign and Submit Reports	Billing Address	Pretreatment Program	Receiving Water Type
Non-Petroleum Refineries				
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	Hal McCutchan Environmental Supervisor (510) 201-0126 Gaunt Murdock General Manager/District Engineer (510) 787-2992	C&H Sugar Company 830 Loring Avenue Crockett, CA 94525 Contra Costa County Crockett Sanitary Dept. P.O. Box 578 Crockett, CA 94525 Contra Costa County	No	Estuarine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address	Pretreatment Program	Receiving Water Type
Crockett Cogeneration, LP	Thane Jennings Plant Engineer (510) 787-4101	550 Loring Avenue Crockett, CA 94525-1232 Contra Costa County	No	Estuarine
Eco Services Operations, LLC	Wahyet Li Plant Manager (925) 313-8204	100 Mococo Road Martinez, CA 94553 Contra Costa County	No	Estuarine
The Pittsburg Owner LPV, LLC	Glenn Brown Entitlements (925) 984-7137	888 San Clemente Drive, Suite 100 Newport Beach, CA 92660 Orange County	No	Estuarine
USS-UPI, LLC	Freddy Ripoli Manager – Health and Safety (925) 439-6706	900 Loveridge Road Pittsburg, CA 94565 Contra Costa County	No	Estuarine
Petroleum Refineries				
Chevron Products Company	Shawn Lee Health, Safety, & Env. Manager (510) 242-1400	841 Chevron Way Richmond, CA 94801 Contra Costa County	No	Marine
Phillips 66	John Joseph Sprafka, Jr. Refinery Manager (510) 245-4588	1380 San Pablo Avenue Rodeo, CA 94572-1354 Contra Costa County	No	Estuarine
Martinez Refining Company, LLC	Daniel Ingram Refinery Manager (925) 313-3333	3485 Pacheco Blvd Martinez CA 94553 Contra Costa County	No	Estuarine
Tesoro Refining & Marketing Co.	Kevin Obad Environmental Supervisor (925) 228-1220 ext. 2325	150 Solano Way Martinez, CA 94553 Contra Costa County	No	Estuarine
Valero Refining Company	Kimberly A. Ronan Director of Health, Safety, Env. and Governmental Affairs (707) 745-7990	3400 East Second Street Benicia, CA 94510-1005 Solano County	No	Estuarine

1.1. Municipal Dischargers listed in Table 1A and Industrial Dischargers listed in Table 1B (collectively, Dischargers) own and operate their respective wastewater treatment plants and collection systems (collectively, Facilities). Municipal Dischargers provide secondary or advanced secondary treatment of wastewater collected from their service areas, and Industrial Dischargers provide various levels of wastewater treatment depending on their activities. After treatment, both Municipal and Industrial Dischargers discharge to San Francisco Bay and its tributaries. Details of the Municipal and Industrial wastewater treatment processes and discharges are described in the individual NPDES permits listed in Attachment B of this Order.

For the purposes of this Order, references to “discharger” or “permittee” in applicable federal and State laws, regulations, plans, or policies are held to be equivalent to references to the Dischargers herein.

1.2. The Dischargers are regulated pursuant to NPDES Permit CA0038849. The Dischargers are authorized to discharge subject to waste discharge requirements (WDRs) in this Order at the discharge locations described in Tables 2A and 2B of this Order.

1.3. The Dischargers were previously subject to Order R2-2017-0041 (previous order) as amended by Orders R2-2016-0008 and R2-2021-0028.

- Order R2-2016-0008 amended the previous order to provide for an alternate monitoring program.
- Order R2-2021-0028 amended Order R2-2016-0008 and the previous order to provide updated monitoring requirements and require supplemental funding for the Regional Monitoring Program (RMP).

Provisions of these orders have been incorporated into this Order as appropriate and applicable.

1.5. Regulations in 40 C.F.R. section 122.46 limit the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, this Order limits the effective period for the discharge authorization. Pursuant to 40 C.F.R. section 122.6(d) and California Code of Regulations, title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the permit if the Discharger complies with all requirements for continuation of expired permits.

1.6. This Order continues to implement the wasteload allocations and implementation requirements of the San Francisco Bay Mercury Total Maximum Daily Load (TMDL), adopted August 9, 2006, and PCBs TMDL, adopted February 13, 2008.

1.7. When applicable, state law requires dischargers to file a petition with the State Water Resources Control Board (State Water Board), Division of Water Rights, and receive approval for any change in the point of discharge, place of use, or purpose of use of treated wastewater that decreases the flow in any portion of a watercourse. The State Water Board retains separate jurisdictional authority to enforce such requirements under Water Code section 1211. This is not an NPDES permit requirement.

2. FACILITY DESCRIPTION

2.1. Wastewater Collection and Treatment

2.1.1. **Locations and Service Areas.** The municipal wastewater treatment plants are located throughout the San Francisco Bay Region. The industrial wastewater

treatment plants are located around San Pablo Bay, Carquinez Strait, and Suisun Bay.

2.1.2. **Wastewater Treatment.** Municipal wastewater treatment plants provide at least secondary treatment, which includes screening, skimming, settling, and biological treatment. Some plants also provide advanced secondary treatment, which typically removes additional solids, often with sand filtration. Removing additional solids removes additional pollutants, including mercury and PCBs that adhere to particles. Municipal wastewater treatment plants generally remove over 90 percent of the mercury and PCBs in their influent. While the removed mercury and PCBs are not directly discharged to water, some is returned to the environment through landfills, incinerators, or soil amendments. The primary sources of mercury in municipal wastewater are expected to be human waste and medical and dental facilities. The primary source of PCBs in municipal wastewater is expected to be human waste.

Industrial Dischargers include petroleum refineries, chemical plants, and other large industrial facilities. Their mercury and PCBs loads depend on the types of activities in which they engage. The primary sources of mercury in industrial wastewater are expected to be human waste and industrial activities with materials containing mercury (e.g., refining crude oil). The primary sources of PCBs in industrial wastewater are expected to be human waste and wastewater generated from old industrial equipment that may contain PCBs.

2.2. Discharge Points and Receiving Waters. The municipal wastewater treatment plants discharge throughout San Francisco Bay, including Lower South San Francisco Bay, South San Francisco Bay, Central San Francisco Bay, San Pablo Bay, Carquinez Strait, Suisun Bay, and connected tributaries. Most industrial wastewater treatment plants discharge to San Pablo Bay, Carquinez Strait, and Suisun Bay. Tables 2A and 2B of this Order provide the discharge locations for each facility. Attachment C shows a map of these discharge locations.

2.3. Previous Requirements. The previous order's effluent limitations were the same as those in this Order.

2.4. Compliance Summary. Annual load calculations for mercury and PCBs vary year-to-year but have remained generally consistent. Variability in annual loads could be due to sample timing, analytical variability, or weather.

2.4.1. **Mercury.** Annual mercury loads for Municipal and Industrial Dischargers have been well below annual mass allocations since the previous order became effective in 2018, as shown in the charts below:

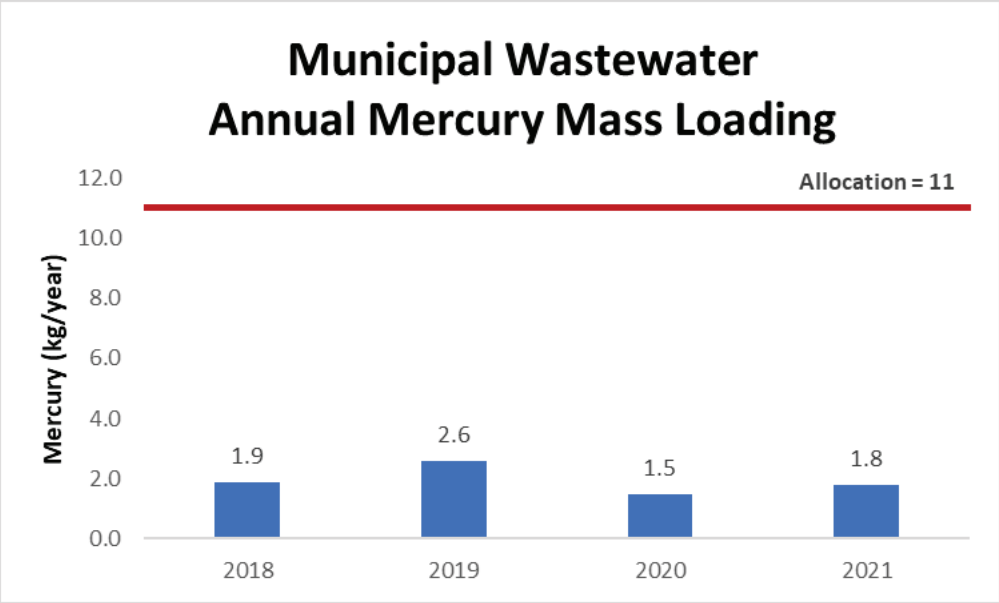

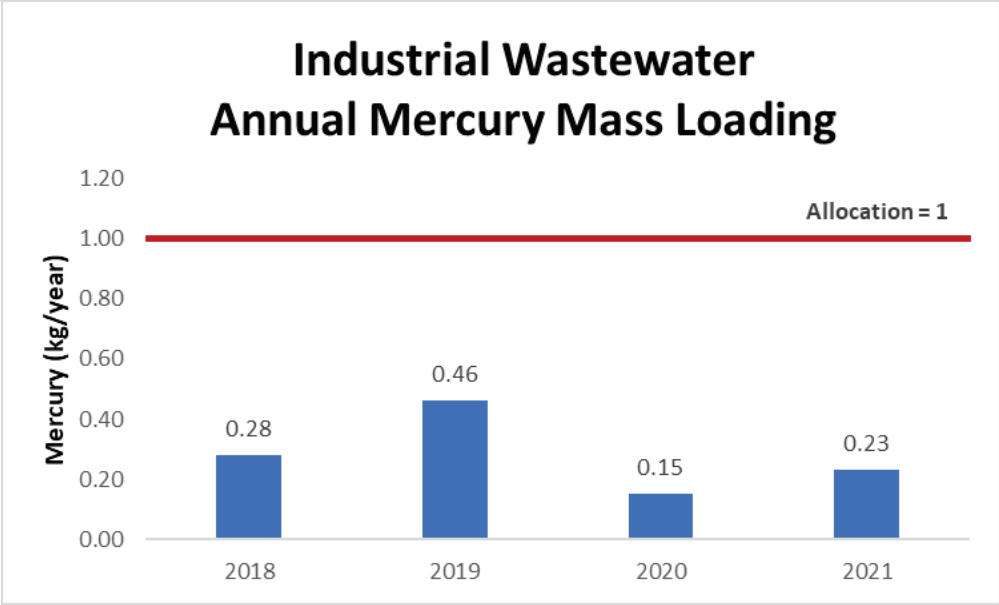

2.4.1.1. **Municipal Dischargers.** On average, the annual municipal load during the previous order term was 17 percent of the TMDL load allocation. In 2020, the municipal load was 1.5 kg/year, the lowest annual load recorded since adoption of the TMDL. In 2021, the municipal load was 1.8 kg/year, which is comparable to the performance throughout the previous order term.

During the previous order term, the most significant exceedance of mercury effluent limitations occurred at the Rodeo Sanitary District Water Pollution Control Facility, which exceeded its average weekly effluent limitation (0.072 µg/L) once in February 2019 with a single result of 0.75 µg/L. Subsequent accelerated sampling resulted in concentrations well below the facility's effluent limitations and triggers, indicating the exceedance was an

isolated incident. Rodeo Sanitary District, which treats domestic and commercial wastewater, did not identify a cause for the exceedance, but it has not exceeded its mercury limitations or triggers since February 2019.

2.4.1.2. **Industrial Dischargers.** On average, the annual industrial load during the previous order term was 28 percent of the TMDL load allocation. In 2020 and 2021, the industrial loads were 0.15 kg/year and 0.23 kg/year, the lowest and second-lowest annual loads recorded since adoption of the TMDL.

During the previous order term, the most significant exceedance of mercury effluent limitations occurred at the Valero Benicia Refinery, which exceeded its maximum daily effluent limitation (0.12 µg/L) twice on January 20 and 21, 2018, with results of 0.17 µg/L and 0.20 µg/L. Valero Benicia Refinery reported the high mercury concentrations were caused by an equipment bypass to repair a failed tank mixer during the same period. Subsequent accelerated sampling resulted in concentrations well below the facility's effluent limitations and triggers, and the Valero Refining Company has not exceeded its mercury limitations or triggers since January 2018.

2.4.2. **PCBs.** Annual PCBs loads for Municipal and Industrial Dischargers have been well below annual mass allocations since the previous order became effective in 2018. PCBs as congeners, which are measured for informational purposes, were used to evaluate mass loads. The annual PCBs congeners mass loads during the previous order term, which includes all detected and estimated values, are shown in the charts below:

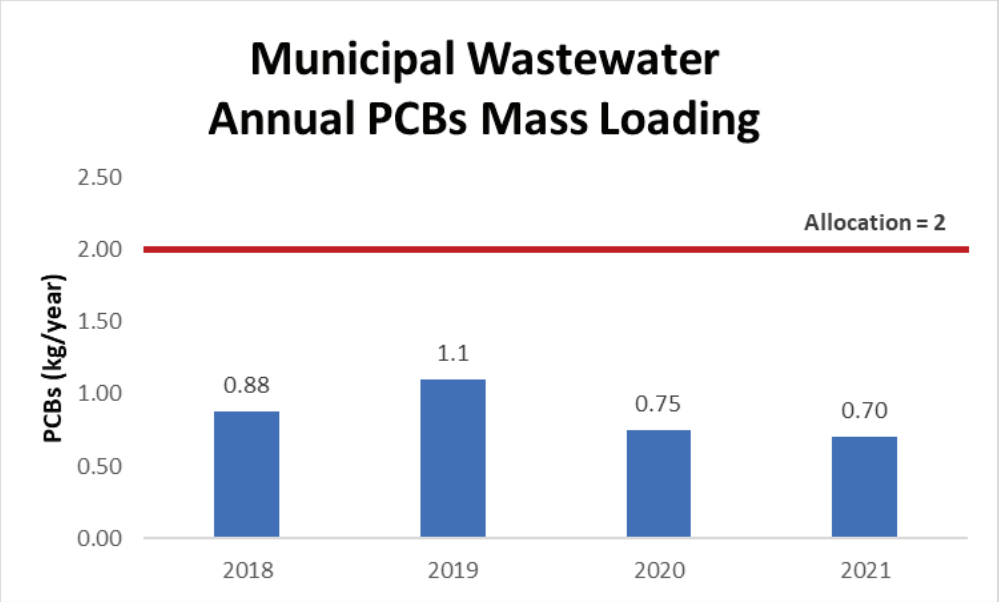

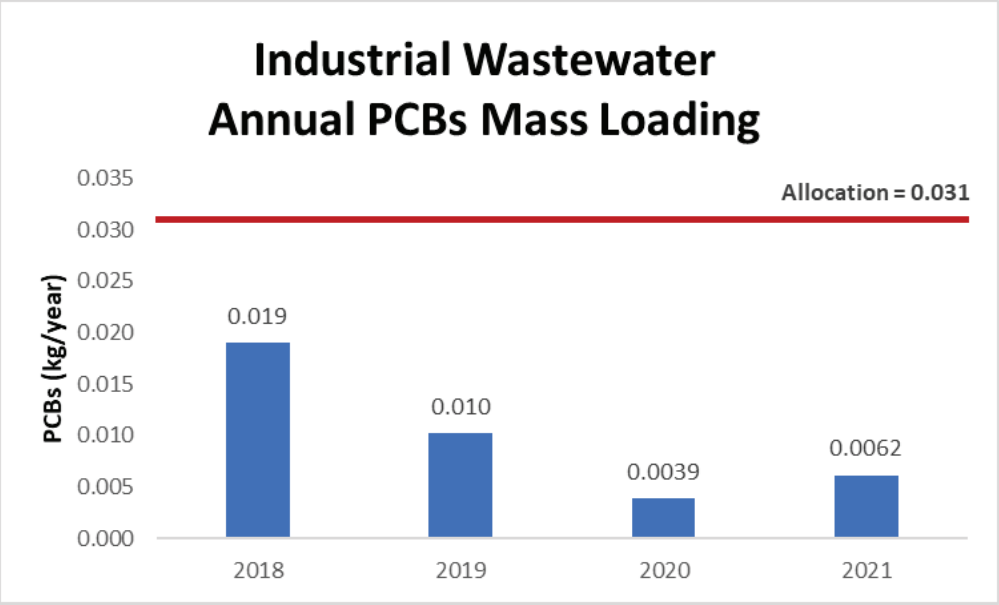

2.4.2.1. **Municipal Dischargers.** On average, the annual municipal load during the previous order term was 43 percent of the TMDL load allocation. Throughout the previous order term, annual loads remained consistent, and all Municipal Dischargers complied with their PCBs effluent limitations.

2.4.2.2. **Industrial Dischargers.** On average, the annual municipal load during the previous order term was 32 percent of the TMDL load allocation. In 2020 and 2021, the industrial loads were 0.0039 kg/year and 0.0062 kg/year, the lowest and second-lowest annual loads recorded since adoption of the TMDL. All Industrial Dischargers complied with their PCBs effluent limitations during the previous order term.

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the U.S. EPA, and Water Code chapter 5.5, division 7 (commencing with § 13370). It serves as an NPDES permit authorizing the Discharger to discharge into waters of the United States at the discharge location described in Table 1 subject to the WDRs in this Order.

3.2. California Environmental Quality Act (CEQA). Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (CEQA), Public Resources Code division 13, chapter 3 (commencing with § 21100).

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin Plan. State Water Board Resolution 88-63, establishes as state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Beneficial uses applicable to San Francisco Bay and its tributaries are as shown below:

Table F-3. Beneficial Uses

Discharge Points	Receiving Water	Beneficial Uses
[1]	San Francisco Bay and its tributaries [2]	Agricultural Supply (AGR) Cold Freshwater Habitat (COLD) Ocean, Commercial, and Sport Fishing (COMM) Estuarine Habitat (EST) Industrial Service Supply (IND) Marine Habitat (MAR) Fish Migration (MIGR) Municipal and Domestic Supply (MUN) Navigation (NAV) Industrial Process Supply (PROC) Preservation of Rare and Endangered Species (RARE) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Shellfish Harvesting (SHELL) Fish Spawning (SPWN) Warm Freshwater Habitat (WARM) Wildlife Habitat (WILD)

Footnotes:

[1] Individual discharge points for discharges of treated wastewater (normally Discharge Point 001) are specified in the MRPs of Dischargers' individual NPDES permits as listed in Attachment B of this Order.

[2] Specific beneficial uses that apply to each Discharger are included in the individual NPDES permits listed in Attachment B of this Order.

The Regional Water Board adopted a Basin Plan Amendment on August 9, 2006, that established new water quality objectives for mercury and a San Francisco Bay Mercury TMDL to attain the new objectives in San Francisco Bay and contiguous bay segments. The Regional Water Board's Executive Officer made corrections on May 23, 2007, and the State Water Board approved the Basin Plan Amendment (as corrected) and the water quality objectives on July 17, 2007. The U.S. EPA approved the new water quality objectives on February 12, 2008.

The Regional Water Board also adopted a Basin Plan Amendment on February 13, 2008, that established a San Francisco Bay PCBs TMDL to attain

water quality objectives for PCBs in San Francisco Bay and contiguous bay segments. The State Water Board approved the Basin Plan amendment on October 20, 2009, and U.S. EPA approved the amendment on March 29, 2010.

3.3.2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** The NTR and CTR contain federal water quality criteria for priority pollutants. U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 NTR criteria apply in California. U.S. EPA adopted the CTR on May 18, 2000. The CTR promulgated new toxics criteria for California and incorporated the NTR criteria that applied in the state. U.S. EPA amended the CTR on February 13, 2001.

3.3.3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP establishes implementation provisions for priority pollutant criteria and objectives, and provisions for chronic toxicity control. The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated for California through the NTR and the priority pollutant objectives the Regional Water Board established through the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. Requirements of this Order implement the SIP.

3.3.4. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, which incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.

3.3.5. **Anti-Backsliding Requirements.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.6. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act

that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state, including protecting rare, threatened, or endangered species. The Discharger is responsible for meeting all applicable Endangered Species Act requirements.

3.4. Impaired Water Bodies on CWA section 303(d) List. On May 11, 2022, U.S. EPA approved a revised list of impaired waters pursuant to CWA section 303(d), which requires identification of water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt TMDLs for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for nonpoint sources and are established to achieve water quality standards.

San Francisco Bay is listed as impaired by mercury and PCBs. On February 12, 2008, U.S. EPA approved a TMDL for mercury in San Francisco Bay. On March 29, 2010, U.S. EPA approved a TMDL for PCBs in San Francisco Bay. The Mercury and PCBs TMDLs apply to the discharges covered by this Order and are implemented through this Order.

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters. The individual NPDES permits listed in Attachment B of this Order contain the applicable technology-based limitations for the discharges covered by this Order. No additional discharge prohibitions beyond those already specified in the Dischargers' individual NPDES permits are necessary to implement the San Francisco Bay Mercury and PCBs TMDLs.

4.1. Water Quality-Based Effluent Limitations

4.1.1. Scope and Authority

CWA section 301(b) and 40 C.F.R. section 122.44(d) require permits to include limitations more stringent than federal technology-based requirements where necessary to achieve water quality standards. WQBELs are included in this

permit to implement the wasteload allocations established through the San Francisco Bay Mercury and PCBs TMDLs.

4.1.2. Beneficial Uses and Water Quality Criteria and Objectives

Fact Sheet section 3.3.1 identifies the beneficial uses of San Francisco Bay and its tributaries. Water quality criteria and objectives to protect these beneficial uses are described below.

4.1.2.1. **Mercury.** Basin Plan Table 3-3B specifies two mercury water quality objectives that apply to all San Francisco Bay segments, including all marine and estuarine waters contiguous to San Francisco Bay:

4.1.2.1.1. **Protection of Human Health**. The mercury water quality objective for protection of human health from fish consumption is 0.2 milligrams (mg) mercury per kilogram (kg) fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans).

4.1.2.1.2. **Protection of Aquatic Organisms and Wildlife**. The mercury water quality objective for protection of aquatic organisms and wildlife is 0.03 mg mercury per kg fish (average wet weight concentration measured in whole fish 3 to 5 centimeters (cm) in length.

4.1.2.2. **PCBs.** Basin Plan section 7.2.3.1 includes a narrative water quality objective that states that controllable water quality factors shall not cause a detrimental increase in toxic substances found in bottom sediments or aquatic life. Basin Plan section 7.2.3.2 specifies a numeric fish tissue target to protect both human health and wildlife, expressed as an average fish tissue concentration of 10 micrograms total PCBs per kilogram of typically consumed fish on a wet weight basis (10 µg/kg wet weight). The PCBs TMDL and implementation plan are designed to attain the fish tissue target and resolve PCBs impairment in all San Francisco Bay segments. For municipal and industrial wastewater discharges, this means limiting loads to 2.0 kg/year and 0.035 kg/year.

4.1.3. Reasonable Potential Analysis

The Regional Water Board is including WQBELs for mercury and PCBs in this Order that are consistent with the assumptions and requirements of the San Francisco Bay Mercury and PCBs TMDLs, including wasteload allocations. Based on the water quality monitoring done prior to TMDL adoption, the TMDLs set the wasteload allocations for mercury and PCBs at levels necessary to attain water quality standards. Therefore, compliance with the effluent limitations will satisfy the TMDL requirements.

The Regional Water Board has developed WQBELs for mercury and PCBs pursuant to 40 C.F.R. section 122.44(d)(1)(vii), which does not require a reasonable potential analysis. Similarly, SIP section 1.3 recognizes that a reasonable potential analysis is unnecessary if a TMDL has been developed.

4.1.4. Water Quality-Based Effluent Limitations

4.1.4.1. **Mercury.** This Order contains mass-based and concentration-based WQBELs:

4.1.4.1.2. **Mass-based WQBELs**. The mass-based WQBELs are based on the established aggregate wasteload allocations for Municipal Dischargers and Industrial Dischargers that comprise a portion of the San Francisco Bay Mercury TMDL. For the San Francisco Bay Mercury TMDL, loads are expressed in terms of annual mercury loads because the adverse effects of mercury occur through long-term bioaccumulation. The loads are intended to represent long-term averages and account for long-term variability, including seasonal variability.

Basin Plan Table 7.2.2-3 specifies the San Francisco Bay Mercury TMDL's aggregate mass emission limit and associated individual mass emission limits for Municipal Dischargers as shown below:

Table F-4. Mercury Mass Emission Allocations for Municipal Dischargers

Discharger	NPDES Permit	Average Annual Effluent Limit (kg/yr)
American Canyon, City of	CA0038768	0.095
Benicia, City of	CA0038091	0.088
Burlingame, City of	CA0037788	0.089
California Department of Parks and Recreation (Angel Island State Park)	[1]	0.013
Calistoga, City of	CA0037966	0.016
Central Contra Costa Sanitary District	CA0037648	1.3
Central Marin Sanitation Agency	CA0038628	0.11
Crockett Community Services District	CA0037885	0.00072
Delta Diablo	CA0038547	0.19
East Bay Dischargers Authority (EBDA)	CA0038768	2.2
City of Hayward		
City of San Leandro		
Oro Loma Sanitary District and Castro Valley Sanitary District		
Union Sanitary District		

Hayward Marsh	CA0038636	
Livermore-Amador Valley Water Management Agency	CA0038679	
Dublin San Ramon Services District	CA0037613	
City of Livermore	CA0038008	
East Bay Municipal Utility District	CA0037702	1.5
Fairfield-Suisun Sewer District	CA0038024	0.17
Las Gallinas Valley Sanitary District	CA0037851	0.10
Marin County (Paradise Cove), Sanitary District No. 5 of	CA0037427	0.00055
Marin County (Tiburon), Sanitary District No. 5 of	CA0037753	0.0099
Millbrae, City of	CA0037532	0.052
Mt. View Sanitary District	CA0037770	0.034
Napa Sanitation District	CA0037575	0.17
Novato Sanitary District	CA0037958	0.079
Palo Alto, City of	CA0037834	0.31
Petaluma, City of	CA0037810	0.063
Pinole, City of	CA0037796	0.055
Rodeo Sanitary District	CA0037826	0.060
St. Helena, City of	CA0038016	0.047
San Francisco (San Francisco International Airport), City and County of	CA0038318	0.032
San Francisco (Southeast Plant), City and County of	CA0037664	1.6
San Jose and Santa Clara, Cities of	CA0037842	0.8
San Mateo, City of	CA0037541	0.19
Sausalito-Marin City Sanitary District	CA0038067	0.078
Sewerage Agency of Southern Marin	CA0037711	0.076
Silicon Valley Clean Water	CA0038369	0.32
Sonoma Valley County Sanitation District	CA0037800	0.041
South San Francisco and San Bruno, Cities of	CA0038130	0.18
Sunnyvale, City of	CA0037621	0.12
Treasure Island Development Authority	CA0110116	0.026
Vallejo Flood and Wastewater District	CA0037699	0.34
West County Agency	CA0038539	0.23
West County Wastewater District		
City of Richmond and Richmond Municipal Sewer District		
Yountville, Town of	CA0038121	0.040

Total Aggregate Mass Emission Limit [2]	-	***11***

Footnotes:

[1] The Regional Water Board rescinded the individual NPDES permit.

[2] Total differs slightly from the column sum due to rounding to the nearest kilogram.

The municipal wasteload allocations are based on load estimates computed using available data on effluent mercury concentrations and effluent discharge volumes from 2000 through 2003. At the time of San Francisco Bay Mercury TMDL development, the combined mercury load for all Municipal Dischargers discharging to San Francisco Bay and its tributaries was estimated to be about 17 kg/yr. The San Francisco Bay Mercury TMDL granted Municipal Dischargers 20 years to ensure aggregate loads do not exceed a limit of 11 kg/yr. However, pursuant to 40 C.F.R. section 122.47, which requires compliance as soon as possible, the 2012 order imposed the limit of 11 kg/yr because municipal discharges had been well below this limit.

This Order does not contain requirements for California Department of Parks and Recreation (Angel Island State Park) because it ceased discharging from its facility and the Regional Water Board rescinded its NPDES permit. Due to the small mass allocation (0.013 kg/year), the permit rescission had a negligible effect on the aggregate municipal limit.

In 2018, the Regional Water Board adopted an individual NPDES permit for the Oro Loma and Castro Valley Sanitary Districts to discharge out of their shared facility's local outfall to Lower San Francisco Bay during wet weather (NPDES Permit CA0037559). In 2022, the Regional Water Board adopted an individual NPDES permit for the City of San Leandro to discharge to Lower San Francisco Bay from its treatment wetland (NPDES Permit CA0038881). Discharges from these facilities are included in the East Bay Dischargers Authority's mercury TMDL allocation.

Also in October 2022, the Regional Water Board rescinded the individual NPDES permit for Hayward Marsh (NPDES Permit CA0038636) because it ceased discharging. The allocation for the East Bay Dischargers Authority remains unchanged because treated wastewater that was discharged to Hayward Marsh, and subsequently San Francisco Bay, is now conveyed to the EBDA Common Outfall (see Table 2A for the discharge point).

Basin Plan Tables 7.2.2-4 and 7.2.2-5 specify the San Francisco Bay Mercury TMDL's final aggregate mass emission limit and associated individual mass emission limits for Industrial Dischargers as below:

Table F-5. Mercury Mass Emission Allocations for Industrial Dischargers

Discharger	NPDES Permit	Average Annual Effluent Limit (kg/yr)
Non-Petroleum Refineries [1]		
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	CA0005240	0.045
Crockett Cogeneration, LP	CA0029904	0.0047
Dow Chemical Company	[2]	0.041
General Chemical	[2]	0.21
GWF Power Systems, Site I	[2]	0.0016
GWF Power Systems, Site V	[2]	0.0025
Hanson Aggregates, Amador Street	[3]	0.000005
Hanson Aggregates, Tidewater Avenue, Oakland	[3]	0.000005
Pacific Gas and Electric, East Shell Pond	[2]	0.00063
Pacific Gas and Electric, Hunters Point Power Plant	[2]	0.020
Eco Services Operations, LLC	CA0006165	0.011
The Pittsburg Owner LPV, LLC	CA0004880	0.0078
San Francisco (San Francisco International Airport Industrial WWTP), City and County of	[2]	0.051
Southern Energy Delta LLC (Potrero Power Plant)	[2]	0.0031
U.S. Department of Navy (Point Molate)	[2]	0.013
USS-UPI, LLC	CA0005002	0.045
Total Aggregate Mass Emission Limit [4]	-	***0.4***
Petroleum Refineries [1]		
Chevron Products Company	CA0005134	0.34
Phillips 66	CA0005053	0.13
Martinez Refining Company, LLC	CA0005789	0.22
Tesoro Refining & Marketing Co.	CA0004961	0.11
Valero Refining Company	CA0005550	0.08
Total Aggregate Mass Emission Limit [4]	-	***0.9***

Footnotes:

[1] Wasteload allocations for industrial wastewater discharges do not include mass from once-through cooling water. The Regional Water Board will apply intake credits to once-through cooling water as allowed by law and consistent with Provision 6.3.5. of this Order.

[2] The Regional Water Board rescinded the individual NPDES permit.

[3] This facility is now covered under NPDES Permit CAG982001, which covers aggregate mining, marine sand washing, and sand offloading activities.

[4] Total differs slightly from the column sum due to rounding to the nearest kilogram.

Like the municipal wasteload allocations, the industrial wasteload allocations are based on load estimates computed using available data on effluent mercury concentrations and effluent discharge volumes from 2000 through 2003. The combined load for all Industrial Dischargers was estimated to be about 1.3 kg/yr. Combined with the municipal wasteload allocation, the total municipal; and industrial wastewater discharges were estimated to account for a load of about 18.3 kg/yr, or about two percent of San Francisco Bay's total mercury load.

This Order does not contain requirements for Dow Chemical Company, General Chemical, GWF Sites I and V, Hanson Aggregates (Olin Jones Dredge Spoils Disposal Facility), Pacific Gas and Electric, Southern Energy Delta LLC, and the U.S. Department of Navy (Point Molate) because these dischargers have ceased discharging from their facilities, and the Regional Water Board has rescinded their NPDES permits. To account for these rescissions, the 2012 order reduced the aggregate industrial limit from 1.3 to 1.0 kg/yr. This Order retains the reduced aggregate industrial limit.

This Order also does not contain requirements for the Hanson Aggregates Amador Street and Tidewater Avenue facilities because they are covered under NPDES Permit CAG982001, which covers aggregate mining, marine sand washing, and sand offloading activities consistent with those facilities' activities and is consistent with the San Francisco Bay Mercury TMDL. In addition, this Order does not contain requirements for the San Francisco International Airport industrial wastewater treatment plant because it is now regulated as a single facility for both sanitary municipal and industrial activities. Because flows to the San Francisco International Airport's treatment facility are now predominantly municipal, it is appropriate to regulate this facility as a municipal wastewater treatment plant. These facilities comprise a very small portion of the total wastewater mercury load to San Francisco Bay.

In 2016, the Regional Water Board adopted an individual NPDES permit (NPDES Permit CA0030228) for Schnitzer Steel Industries, Inc. This Order does not contain requirements for Schnitzer Steel Industries, Inc., because it discharges to the City of Oakland's storm drain, which is covered under the Alameda County Clean Water Program wasteload allocation of 20 kg/yr and implemented through NPDES Permit CAS612008, which covers San Francisco Bay Mercury TMDL urban stormwater discharge requirements for regional stormwater discharges.

The Regional Water Board may rescind the individual NPDES permit for The Pittsburg Owner LPV, LLC (NPDES Permit CA0004880) during this Order term. The Pittsburg Owner LPV, LLC decommissioned its power generation plant on January 1, 2017, but continues to operate a

stormwater treatment system to address residual contaminants in runoff from former process areas. Influent monitoring shows a decreasing trend in mercury concentrations well below this Order's effluent limitations and triggers, indicating that the site is not generating additional contaminants. Due to The Pittsburg Owner LPV, LLC's small mass allocation (0.0078 kg/year), the permit rescission would have a negligible effect on the aggregate industrial limit of 1.0 kg/year.

4.1.4.1.3. **Concentration-based WQBELs**. The concentration-based WQBELs are consistent with the San Francisco Bay Mercury TMDL and State Water Board Resolution 2007-0045 approving the TMDL, which states, in part, the following:

> *… any NPDES permit or permits that implement the San Francisco Bay Mercury TMDL will include individual numeric effluent limitations consistent with the assumptions and requirements of waste load allocations for each wastewater discharger, that will be individually-enforceable.*

A primary assumption and requirement of the San Francisco Bay Mercury TMDL is that wastewater dischargers maintain current treatment performance. The TMDL and its supporting documents state this assumption:

> *The watershed NPDES permit for municipal facilities will put in place a set of triggered actions … intended … to ensure that municipal wastewater facilities maintain their ongoing operation, maintenance, and performance." (*Total Maximum Daily Load [TMDL] Proposed Basin Plan Amendment and Staff Report*, September 2, 2004, p. 75)*
>
> *[The TMDL's] conditions are intended … to ensure that industrial wastewater facilities maintain proper operation, maintenance, and performance." (Basin Plan section 7.2.2.6)*

This Order retains the individual concentration-based limitations from the previous order, which are consistent with Municipal and Industrial Discharger performance because Dischargers continue to perform well below their mass allocation. Three separate performance categories were derived using mercury data between 2000 and 2003: municipal secondary treatment, municipal advanced secondary treatment, and industrial treatment performance. Non-petroleum refinery performance-based limitations were determined using performance data from petroleum refineries because the TMDL set performance-based triggers for all Industrial Dischargers using petroleum refinery data. The data used to derive these performance-based limitations are from the same dataset used to calculate the San Francisco Bay Mercury TMDL's initial wasteload

allocations; therefore, these performance-based limitations are consistent with the TMDL. Appendix F-2 of this Fact Sheet describe the effluent limitation calculations.

40 C.F.R. section 122.45(d) requires average monthly and average weekly effluent limitations for Municipal Dischargers, and average monthly and maximum daily effluent limitations for Industrial Dischargers. These limitations are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that wastewater facilities maintain proper operation, maintenance, and performance.

4.1.4.2. **PCBs.** Basin Plan section 7.2.3.6 states that NPDES permits must include performance based WQBELs consistent with the wasteload allocations of the San Francisco Bay PCBs TMDL. This Order retains the individual concentration-based effluent limitations from the previous order because these concentration limits resulted in mass discharges that complied with the TMDL (see Appendix F-3 for U.S. EPA 1668C data of 66 PCBs congeners used to calculate loads between 2018 and 2021).

Four separate performance categories were derived using PCBs data between 1999 and 2001 (included in Appendix F-4 of this Fact Sheet): municipal secondary treatment, municipal advanced secondary treatment, petroleum refinery, and non-petroleum refinery. The data used to derive these performance-based limitations are from the same dataset used to calculate the San Francisco Bay PCBs TMDL wasteload allocations; therefore, these performance-based limitations are consistent with the TMDL. Calculating limits based on categories of treatment type reduces the likelihood of penalizing good performers and Dischargers that have implemented effective control measures.

40 C.F.R. section 122.45(d) requires, unless impracticable, average monthly and average weekly effluent limitations for Municipal Dischargers and average monthly and maximum daily effluent limitations for Industrial Dischargers. This Order continues to implement a maximum daily effluent limitation instead of an average weekly effluent limitation for Municipal Dischargers consistent with the U.S. EPA's Technical Support Document (section 5.2.3), which states, "*… in lieu of an AWL [average weekly effluent limitation] for POTWs, EPA recommends establishing an MDL [maximum daily effluent limitation] for toxic pollutants and pollutant parameters in water quality permitting.*"

Consistent with previous orders, this Order does not establish mass-based limitations. Concentration-based limitations better relate to facility performance because mass-based limitations rely on flows, which are highly influenced by rainfall and thus not entirely within a Discharger's control. Furthermore, the derivation of limitations with longer averaging periods,

which would be required to establish mass-based limitations, requires frequent monitoring (e.g., monthly) in order to capture performance variability. Frequent monitoring is not a reasonable or practicable use of resources because the Municipal and Industrial Dischargers are a small source of PCBs to San Francisco Bay (less than seven percent) relative to the high cost of PCBs analyses (approximately $800 for each sample).

The performance-based limitations were derived from the 99 percent upper confidence level of the mean concentration for each dataset of the four performance categories. The 99 percent upper confidence level was used on the mean of the datasets because of the high level of uncertainty in the actual mean (or actual performance) from the very small dataset for each discharge category used to establish TMDL allocations (the number of samples were between 6 and 14). The resulting long-term average for each performance category was then multiplied by the appropriate multiplier from the Technical Support Document to calculate the average monthly and maximum daily effluent limitations, as shown below:

Table F-6. PCBs WQBEL Calculations

	Secondary	Advanced Secondary	Petroleum Refinery	Non-Petroleum Refinery
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Number of data points <10 or at least 80% of data reported non-detect? (Y/N)	Y	N	N	Y
Mean of TMDL effluent data points	0.003556	0.000211	0.000272	0.003543
Standard deviation of TMDL effluent data points	0.002206	0.000066	0.000199	0.001554
Coefficient of variation, calculated	0.62	0.31	0.73	0.44
Coefficient of variation, Selected	0.60	0.31	0.73	0.60
99% upper confidence level on the mean	0.005547	0.00025	0.000402	0.005678
AMEL multiplier95 from U.S. EPA Technical Support Document	2.13	1.58	2.37	2.13
MDEL multiplier99 from U.S. EPA Technical Support Document	3.11	1.94	3.70	3.11
AMEL	**0.012**	**0.00039**	**0.00095**	**0.012**
MDEL	**0.017**	**0.00049**	**0.0015**	**0.018**

These limitations are based on data for 40 congeners that are representative surrogates for the PCBs causing impairment. These 40 congeners are the same ones monitored in the Regional Monitoring Program (using U.S. EPA Method 1668A) that formed the basis for the impairment determination.

Because some other congeners co-elute with these 40 congeners (using U.S. EPA Method 1668C), the concentrations of as many as 66 congeners, if the laboratory uses a SB-Octyl column (shown in Table F-7 below), or as many as 59 congeners, if the laboratory uses a DB-1 column (shown in Table F-8 below), form the basis for the limits. Therefore, it would be reasonable and consistent with the San Francisco Bay PCBs TMDL (if U.S. EPA Proposed Method 1668C is an approved method at the time of the next permit reissuance) that any future compliance with effluent limitations be determined using the same congeners used to derive the limits specified in this Order.

Table F-7. PCBs Congeners, Including Co-Elution with SB-Octyl Column

PCB 005	PCB 061	PCB 099	PCB 149	PCB 181
PCB 008	PCB 066	PCB 101	PCB 151	PCB 182
PCB 018	PCB 070	PCB 105	PCB 153	PCB 183
PCB 020	PCB 073	PCB 106	PCB 156	PCB 187
PCB 021	PCB 074	PCB 110	PCB 158	PCB 190
PCB 028	PCB 076	PCB 115	PCB 160	PCB 194
PCB 031	PCB 080	PCB 116	PCB 163	PCB 195
PCB 033	PCB 086	PCB 118	PCB 164	PCB 196
PCB 043	PCB 087	PCB 127	PCB 168	PCB 201
PCB 044	PCB 089	PCB 128	PCB 169	PCB 203
PCB 049	PCB 090	PCB 132	PCB 170	
PCB 052	PCB 093	PCB 138	PCB 174	
PCB 056	PCB 095	PCB 139	PCB 177	
PCB 060	PCB 097	PCB 141	PCB 180	

Table F-8. PCBs Congeners, Including Co-Elution with DB-1 Column

PCB 005	PCB 061	PCB 110	PCB 160	PCB 196
PCB 008	PCB 066	PCB 117	PCB 161	PCB 201
PCB 018	PCB 069	PCB 118	PCB 162	PCB 203
PCB 020	PCB 070	PCB 125	PCB 163	
PCB 021	PCB 074	PCB 128	PCB 164	
PCB 028	PCB 076	PCB 132	PCB 170	
PCB 031	PCB 087	PCB 138	PCB 174	
PCB 033	PCB 090	PCB 139	PCB 177	
PCB 043	PCB 095	PCB 141	PCB 180	
PCB 044	PCB 097	PCB 149	PCB 182	
PCB 049	PCB 099	PCB 151	PCB 183	
PCB 052	PCB 101	PCB 153	PCB 187	
PCB 056	PCB 105	PCB 156	PCB 194	
PCB 060	PCB 106	PCB 158	PCB 195	

4.4. Discharge Requirement Considerations

4.4.1. **Anti-Backsliding.** This Order complies with the anti-backsliding provisions of CWA sections 402(o) and 303(d)(4), and 40 C.F.R. section 122.44(l), which generally require effluent limitations in a reissued permit to be as stringent as those in the previous order. The requirements of this Order are at least as stringent as those in the previous order.

4.4.2. **Antidegradation.** This Order complies with the antidegradation provisions of 40 C.F.R. section 131.12 (federal policy) and State Water Board Resolution 68-16 (state policy). Permitted discharges must be consistent with these policies. This Order does not decrease the quality nor increase the quantity of the Dischargers' discharges to San Francisco Bay and its tributaries.

5. RATIONALE FOR RECEIVING WATER LIMITATIONS

No additional receiving water limits beyond those already specified in the Dischargers' individual NPDES permits are necessary to implement the San Francisco Bay Mercury and PCBs TMDLs.

6. RATIONALE FOR PROVISIONS

6.1. Standard Provisions

Attachment D of each individual NPDES permit listed in Attachment B of this Order contains standard provisions that apply to all NPDES permits in accordance with 40 C.F.R. section 122.41 and additional conditions applicable to specific categories of permits in accordance with 40 C.F.R. section 122.42. The Discharger must comply with these provisions. The conditions set forth in 40 C.F.R. sections 122.41(a)(1) and (b) through (n) apply to all state-issued NPDES permits and must be incorporated into permits either expressly or by reference.

In accordance with 40 C.F.R. section 123.25(a)(12), states may omit or modify conditions to impose more stringent requirements. Attachment G of each individual NPDES permit listed in Attachment B of this Order contains standard provisions that supplement the provisions in Attachment D. This Order omits the federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the state's enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates Water Code section 13387(e) by reference.

6.2. Monitoring and Reporting Provisions

CWA section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorize the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The

MRP establishes monitoring, reporting, and recordkeeping requirements that implement federal and state requirements. For more information, see Fact Sheet section 7.

6.3. Special Provisions

6.3.1. Reopener Provisions

This provision allows changes or modifications if the Mercury or PCBs TMDL is revised.

6.3.2. Triggers for Additional Mercury Control

Mass and concentration-based triggers were developed to allow for early actions in the event that a Discharger observes an increasing trend in mercury discharge. The purpose of the triggers is to identify potential new mercury sources and reduce them to ensure that wasteload allocations continue to be achieved.

Consistent with the San Francisco Bay Mercury TMDL, mass triggers for Municipal and Industrial Dischargers are equivalent to the individual mass-based limitations stated in this Order, with the exception that compliance with the mass-based limitations is determined monthly, instead of annually, using a rolling 12-month average. This is necessary to capture any mercury load increase in a timely manner and allow development and implementation of reduction measures that may avoid effluent limit violations.

For concentration-based triggers, there are two broad categories of municipal facilities: (1) those that provide secondary treatment, and (2) those that provide advanced secondary treatment. Facilities providing advanced treatment have better performance, hence lower effluent concentrations than those providing secondary treatment. Therefore, the triggers for advanced treatment facilities are lower than those for secondary treatment facilities.

Consistent with the TMDL implementation plan, the proposed effluent mercury concentration triggers for municipal secondary treatment facilities are a daily maximum of 0.065 µg/l total mercury (derived from the 99th percentile concentration of effluent data collected from January 2000 to September 2002) and a monthly average of 0.041 µg/l total mercury (derived from the 95th percentile concentration of effluent data collected from January 2000 to September 2002). For facilities providing advanced treatment, the proposed concentration triggers are a daily maximum of 0.021 µg/l total mercury (the 99th percentile concentration) and a monthly average of 0.011 µg/l total mercury (the 95th percentile concentration).

Consistent with the TMDL implementation plan, the proposed effluent triggers for Industrial Dischargers are a daily maximum of 0.062 µg/l total mercury

(derived from the 99th percentile concentration of petroleum-refinery effluent data collected from January 2000 to September 2002) and a monthly average of 0.037 µg/l total mercury (derived from the 95th percentile concentration of petroleum-refinery effluent data collected from January 2000 to September 2002).

Consistent with the TMDL, if a Discharger exceeds either its mass or concentration trigger, this Order requires the Discharger to report the exceedance in its Self-Monitoring Report and include the following:

a. Evaluation of the cause of the trigger exceedance;

b. Evaluation of the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances; and

c. Evaluation of the feasibility and effectiveness of technology enhancements to improve plant performance.

This Order allows 130 days to provide this report, which allows for 30 days for standard laboratory turnaround on ultra-clean samples, 40 days for accelerated monitoring to verify and better characterize trigger exceedances, and 60 days from the TMDL implementation plan to submit the report. The Regional Water Board may pursue enforcement against Dischargers that do not respond to trigger exceedances or do not implement actions to correct and prevent trigger exceedances. Determination of appropriate actions will be based on an updated assessment of source control measures and wastewater treatment technologies applicable for the term of each issued or reissued permit.

The TMDL implementation plan requires the permit to specify that a trigger exceedance cause a Discharger to take corrective actions. The TMDL implementation plan explains that one of the concepts behind requiring triggered actions is to ensure that wastewater dischargers continue ongoing operation, maintenance, and performance of their treatment facilities. This Order is consistent with the TMDL because it allows accelerated monitoring to determine if ongoing performance is maintained before corrective measures must be taken. Accelerated weekly monitoring for at least six events spanning over two months is sufficient to provide reasonable and convincing weight of evidence that the first trigger exceedance was either an anomaly or reflected a spurious source and can be disregarded. The additional samples would also help to characterize the duration and magnitude of the exceedance and help with development of the action plan if one is necessary.

See Appendix F-1 for an example of actions required in response to initial trigger exceedances.

6.3.3. Mercury and PCBs Source Control Programs

The San Francisco Bay Mercury and PCBs TMDLs both require that Municipal and Industrial Dischargers develop and implement programs to identify and control manageable sources of mercury and PCBs. Therefore, this Order requires Dischargers to implement source control programs to reduce mercury and PCBs loads to their respective treatment plants.

6.3.4. Risk Reduction Programs

The San Francisco Bay Mercury and PCBs TMDLs require Municipal and Industrial Dischargers to develop and implement effective programs to reduce mercury related and PCBs-related risks to human health and aquatic organisms and wildlife and to quantify risk reductions resulting from these activities. This Order requires Dischargers to implement these measures to reduce mercury and PCBs-related risks.

In coordination with this effort, the Regional Water Board will work with different health agencies and Dischargers that pursue risk management as part of their mercury and PCBs-related programs. For an effective and efficient regional program, this Order allows for third parties to conduct these programs if Dischargers provide funding for this purpose.

6.3.5. Mercury and PCBs Discharge Adjustments for Recycled Wastewater Use by Industrial Dischargers

The Regional Water Board encourages water recycling pursuant to Water Code sections 13510 through 13512. Recycled wastewater can preserve potable water supply sources. Consistent with Basin Plan section 4.6.1.1, the Mercury or PCBs Adjustment provided in this Order accounts for recycled water that is produced by Municipal Dischargers and used by Industrial Dischargers in industrial processes.

The Mercury or PCBs Adjustments only apply if the mercury or PCBs in the recycled wastewater is discharged through an Industrial Discharger's outfall. The Mercury or PCBs Adjustments are calculated based on mass balance principles and will not result in any net increase in mercury or PCBs loads to San Francisco Bay.

The Mass Adjustment is subtracted from the actual mass discharge of one Industrial Discharger and is then added to the actual mass discharge of the Municipal Discharger who supplied the recycled wastewater who would have otherwise discharged that mercury or PCBs through its municipal treatment plant outfall. Local impacts from this shifting in load would be minimal because the municipal or industrial discharge would be discharged to the same receiving water body, as the cost of water transport between facilities that are very far apart would make such a reuse project infeasible.

A Concentration Adjustment is provided because a typical reuse project for an industrial facility involves using the recycled water in cooling towers or boilers where the concentration of mercury or PCBs increases through evaporative losses. The blowdown would eventually go to the Industrial Discharger's sewer and potentially elevate its discharge concentration. Since the concentration limit is based on past performance, future recycled wastewater use could affect the Industrial Discharger's compliance with the performance limitation. Unlike the Mass Adjustment, it is inappropriate to add the Concentration Adjustment to the supplying Municipal Discharger because an increase in concentration that occurs at the industrial facility does not affect or reflect the Municipal Discharger's performance.

6.3.6. PCBs Discharge Adjustment for Urban Stormwater Treatment for Urban Stormwater Treatment by Municipal Dischargers

The Regional Water Board recognizes that routing urban runoff through municipal wastewater treatment facilities may be an efficient means of reducing PCBs and other particle-associated contaminant loads to the San Francisco Bay. For this reason, the San Francisco Bay PCBs TMDL includes a reserve allocation of 1.0 kg/year for municipal wastewater treatment plants to treat urban runoff (specified in Basin Plan Table 7.2.3-2). This provision provides a mechanism for Municipal Dischargers to receive a credit for treating urban runoff that would otherwise be discharged directly to San Francisco Bay.

Adjustments are calculated based on mass balance principles and will not result in any net increase in PCBs loadings to San Francisco Bay. Unlike the use of recycled water, urban runoff diversions will occur intermittently, most likely over a period of hours. For this reason, it is impossible to coordinate influent and effluent sampling with the precision applied for recycled water adjustments. Additionally, the concentrations of PCBs in urban runoff are expected to be much more variable than those found in recycled water. East Bay Municipal Utility District's study, *Characterization of Stormwater Flows, Diversion of Dry Weather and First Flush Flows to a Publicly-Owned Treatment Works* (July 2010), found the concentrations of PCBs in dry weather runoff to be almost an order of magnitude lower than those found in wet weather. As such, when determining credits for urban runoff diversions, this Order groups them into two categories: (1) dry weather diversions and (2) wet weather diversions.

During this Order term, the Municipal Discharger may use the entire influent PCBs mass for the concentration adjustment described in Provision 6.3.6.

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Attachment E contains the MRP for this Order. It specifies monitoring locations, monitoring frequencies, and reporting requirements. The following provides the rationale for these requirements.

Basin Plan sections 7.2.2.6 and 7.2.3.6 require Dischargers to monitor and report mercury and PCBs discharge loads. Effluent monitoring is also necessary to capture any increases in loading and develop and implement reduction measures in advance of an effluent limitation exceedance.

Compliance with effluent limitations must be determined using an approved method under 40 C.F.R. Part 136. For PCBs, this is either U.S. EPA Method 608.3 or 625.1, used to monitor PCBs Aroclors. Consistent with the San Francisco Bay PCBs TMDL, this Order also requires each Discharger to monitor and report PCBs congeners using the proposed U.S. EPA Method 1668C, which can quantify PCBs that are present at lower levels than U.S. EPA Method 608.3 or 625.1. The Regional Water Board will use U.S. EPA Method 1668C data to verify assumptions and evaluate the need to further refine wasteload allocations in the TMDL.

This Order reduces the monitoring frequencies for PCBs congeners. An analysis of PCBs congeners data from the previous order term supported by a technical memo by the Bay Area Clean Water Agencies, *Proposal for PCB Congener Monitoring Reductions in 2022 Mercury and PCBs Watershed Permit* (2022), confirmed that a reduction in monitoring frequencies to the frequencies defined in the MRP of this Order would not significantly change the characterization of PCBs in San Francisco Bay.

8. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for point source discharges of mercury and PCBs from Municipal and Industrial Dischargers. As a step in the WDR adoption process, Regional Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process.

8.1. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided an opportunity to submit written comments and recommendations. The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website (waterboards.ca.gov/sanfranciscobay).

8.2. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were to be submitted either in person, by e-mail, or by mail to the Executive Office at the Regional Water Board at 1515 Clay Street, Suite 1400, Oakland, California 94612, to the attention of James Parrish.

For full staff response and Regional Water Board consideration, the written comments were due at the Regional Water Board office by 5:00 p.m. on November 14, 2022.

8.3. Public Hearing. The Regional Water Board held a public hearing on the tentative WDRs during its meeting at the following date and time:

Date: December 14, 2022
Time: 9:00 a.m.

Contact: James Parrish, (510) 622-2381, James.Parrish@waterboards.ca.gov

Interested persons were provided notice of the hearing and information on how to participate. At the public hearing, the Regional Water Board heard testimony pertinent to the discharge, WDRs, and permit. For accuracy of the record, important testimony was requested to be in writing.

If the date or venue of any public hearing changes, the changes will be reflected in the most current agenda posted on the Regional Water Board's website (waterboards.ca.gov/sanfranciscobay).

8.4. Reconsideration of Waste Discharge Requirements. Any person aggrieved by this Regional Water Board action may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, sections 2050. The State Water Board must receive the petition at the following address within 30 calendar days of the date of Regional Water Board action:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

A petition may also be filed by email at waterqualitypetitions@waterboards.ca.gov.

For instructions on how to file a water quality petition for review, see the Water Board's petition instructions (waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml).

8.5. Information and Copying. Supporting documents and comments received are on file. To review these documents, contact Melinda Wong the Regional Water Board's custodian of records by calling (510) 622-2300 or emailing Melinda.Wong@waterboards.ca.gov. Document copying may be arranged.

8.6. Register of Interested Persons. Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference the Facility, and provide a name, address, and phone number.

8.7. Additional Information. Requests for additional information or questions regarding this Order should be directed to James Parrish, (510) 622-2381, James.Parrish@waterboards.ca.gov.

APPENDIX F-1
WHEN REQUIRED MERCURY INVESTIGATIVE ACTIONS ARE TRIGGERED

This appendix provides an example of the actions necessary to respond to a mercury trigger exceedance, as described in Provision 6.3.2. of the Order:

Discharger X is subject to the following triggers:

Average Monthly Trigger = 0.041 μg/L
Maximum Daily Trigger = 0.065 μg/L
12-month Mass Emission Trigger = 0.91 kg/yr

A sample collected on May 4 is 0.046 μg/L, with the results received on May 30 by Discharger X from its contract laboratory.

Discharger Action 1: Initiate accelerated monitoring (weekly or more frequent) as soon as practical (and within 48 hours) after receipt of sample result above trigger (0.046 μg/L is above the monthly trigger of 0.041 μg/L).

Discharger Action 2: Report this exceedance in its cover letter for the May Self-Monitoring Report (due June 30) and continue to report mercury data on the cover letter until successful completion of the accelerated monitoring requirements described in Table 7, task a, of the Order.

Discharger Action 3: Continue accelerated monitoring until not less than a total of six new samples have been collected.

Discharger X's accelerated samples reveal the following results:

Sample Date	Sample Result, μg/L	12-month mass, kg/yr
(May 4)	**(0.046)**	(0.80)
June 1	0.031	0.79
June 5	0.059	0.82
June 14	0.023	0.81
June 18	0.055	0.82
June 30	0.040	0.82
July 5	0.029	0.81

Discharger Action 4: Initiate, no later than July 5, development of Action Plan for Mercury Reduction.

Note: Although one sample for July is below all three triggers, the average of the samples in June is above the monthly average trigger.

Discharger Action 5: Discharger X may shift to monthly monitoring after collection of the sixth accelerated sample.

Additional monitoring results:

Sample Date	Sample Result, µg/L	12-month mass, kg/yr
August 11	0.027	0.80
September 14	**0.042**	0.78
October 5	0.042	0.075
October 7	ND (<0.0005)	
November 5	0.035	0.81
December 10	0.022	**0.93**
January 5	0.018	**0.94**
February 14	0.028	0.85
March 25	0.010	0.81
April 7	0.023	0.75

Discharger Action 6: Submit and implement Action Plan for Mercury Reduction (due 130 days after May 30).

Note: Despite the July and August samples being below both concentration triggers, three consecutive months below **all** triggers are necessary before the Action Plan activities are no longer required. The May sample is still above the monthly trigger.

Note: In September, though that sample is above the monthly concentration trigger, accelerated monitoring is not required again because Discharger X has already been triggered into Action Plan mode.

Note: In December, though the concentrations have been below concentration triggers for three consecutive months, Discharger X must continue with the Action Plan because its 12-month running average mass discharge still exceeds the mass trigger.

Discharger Action 7: Report on current mercury reduction efforts in its Annual Self-Monitoring Report due February 1st.

In April, three consecutive months show successful completion of this effort. Discharger X is no longer required to further implement its Action Plan and may thus return to routine monitoring. Discharger X reports its mercury reduction efforts in its Annual Self-Monitoring Report due the following February.

APPENDIX F-2
CALCULATION OF CONCENTRATION-BASED MERCURY LIMITS

Introduction

To calculate concentration-based mercury limitations that are consistent with the assumptions and requirements of the San Francisco Bay Mercury TMDL, the Regional Water Board analyzed mercury data from 2000 to 2003 and grouped that data into three categories (municipal secondary treatment, municipal advanced secondary treatment involving filtration, and industrial treatment). The statistical analysis used data from 17 secondary treatment plants, 7 advanced secondary treatment plants, and 5 petroleum refineries.

The purpose of pooling mercury data to calculate limitations based on category of treatment and/or processes that are similar was to reduce the likelihood of penalizing Dischargers who have implemented effective control measures and are already performing well and rewarding other Dischargers who may not have implemented similar measures.

Data Analysis of Municipal Treatment Facilities

Regional Water Board staff analyzed mercury data from all treatment plants that were using the Regional Water Board's electronic reporting system. Mercury data that did not appear to result from ultra-clean sampling because of high detection limits were removed (i.e., EBMUD data from January 2000 through May 2001 and the San Francisco City and County Southeast Plant from October 21, 2003). Additionally, when detection limits were very low (e.g., the practical quantification limit [PQL] equaled 0.5 ng/L and the method detection limit equaled 0.24 ng/L), Regional Water Board staff censored data at the PQL. Finally, the Regional Water Board did not use data from Silicon Valley Clean Water because its treatment plant did not always filter treated wastewater, which made it difficult to categorize the plant as performing secondary or advanced secondary treatment.

Secondary Treatment Plants

The Regional Water Board's analysis of secondary treatment plants indicates that mercury data fit a log-normal distribution since the data closely follow the line of normality, as shown in Figure 1 below:

Figure 1. Probability Plot of Mercury Data for Secondary Treatment Plants

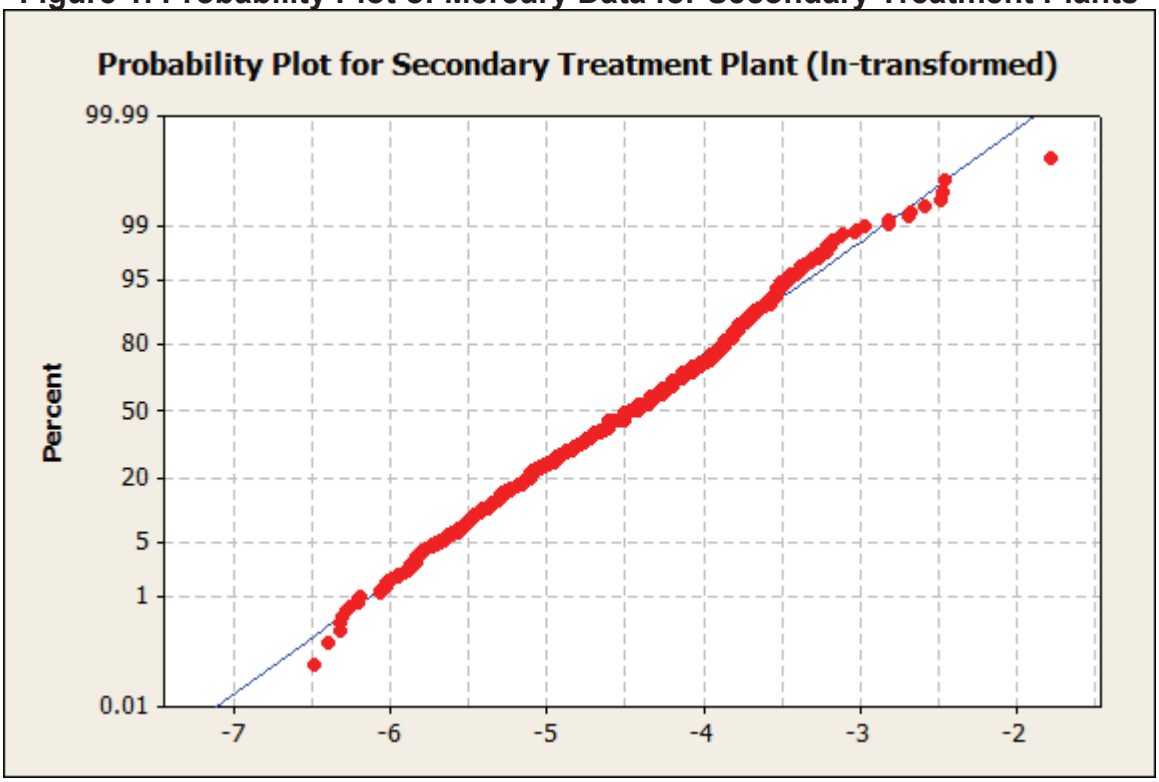

Because natural log-transformed mercury data for secondary treatment plants fit a normal distribution, it was possible to calculate performance-based limits based on select percentiles. For secondary treatment plants (data sample size of 984), the mean and standard deviation in the natural log phase were -4.5212 and 0.7188, respectively. Regional Water Board staff calculated daily, weekly, and monthly mercury limits based on the 99.87th percentile (3 standard deviations above the mean), the 99.57th percentile (2.625 standard deviations above the mean), and the 99.38th percentile (2.5 standard deviations above the mean).

Table 1. Mercury Limits for Secondary Treatment Plants

Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	94
99.57th	Weekly	72
99.38th	Monthly	66

Advanced Secondary Treatment Plants

The Regional Water Board's analysis of advanced secondary treatment plants indicates those data also fit a log-normal distribution since the data follow the line of normality, as shown in Figure 2 below:

Figure 2. Probability Plot of Mercury Data for Advanced Secondary Treatment Plants

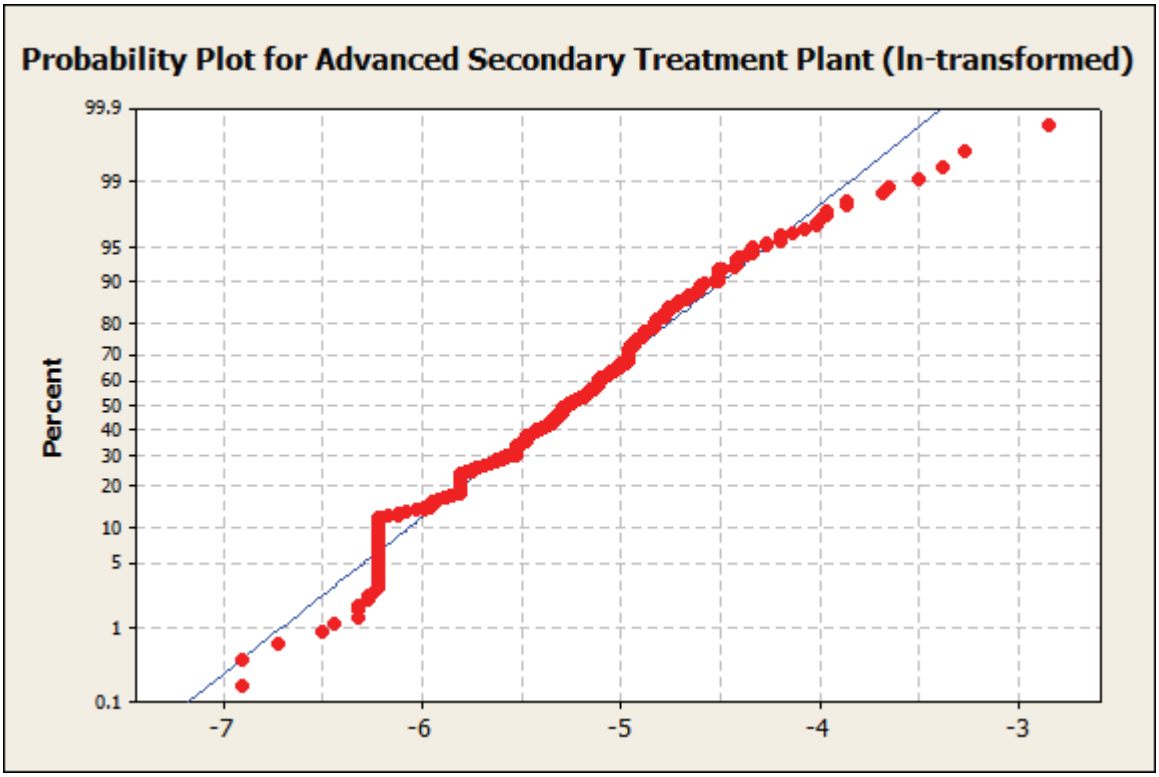

Because natural log-transformed mercury data for advanced secondary treatment plants fit a normal distribution, it was possible to calculate performance-based limits based on select percentiles. For advanced secondary treatment plants (data sample size of 434), the mean and standard deviation in the natural log phase were -5.3457 and 0.6664, respectively. Regional Water Board staff calculated daily, weekly, and monthly mercury limits based on the 99.87th percentile, the 99.57th percentile, and the 99.38th percentile.

Table 2. Mercury Limits for Advanced Secondary Treatment Plants

Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	35
99.57th	Weekly	27
99.38th	Monthly	25

Data Analysis of Industrial Treatment Facilities

The Regional Water Board analyzed mercury data from five petroleum refineries that report data to the Water Board's electronic reporting system. Regional Water Board staff determined that a number of data points from three of the refineries (i.e., Chevron, Phillips 66, and Shell) were not indicative of treatment plant performance, and therefore, were removed. Additionally, when detection limits were very low, the Regional Water Board censored data at the PQL.

The Regional Water Board's analysis of five Bay Area refineries indicated that mercury data fit a log-normal distribution since the data closely follow the line of normality, as shown in Figure 3 below:

Figure 3. Probability Plot of Mercury Data for Bay Area Refineries

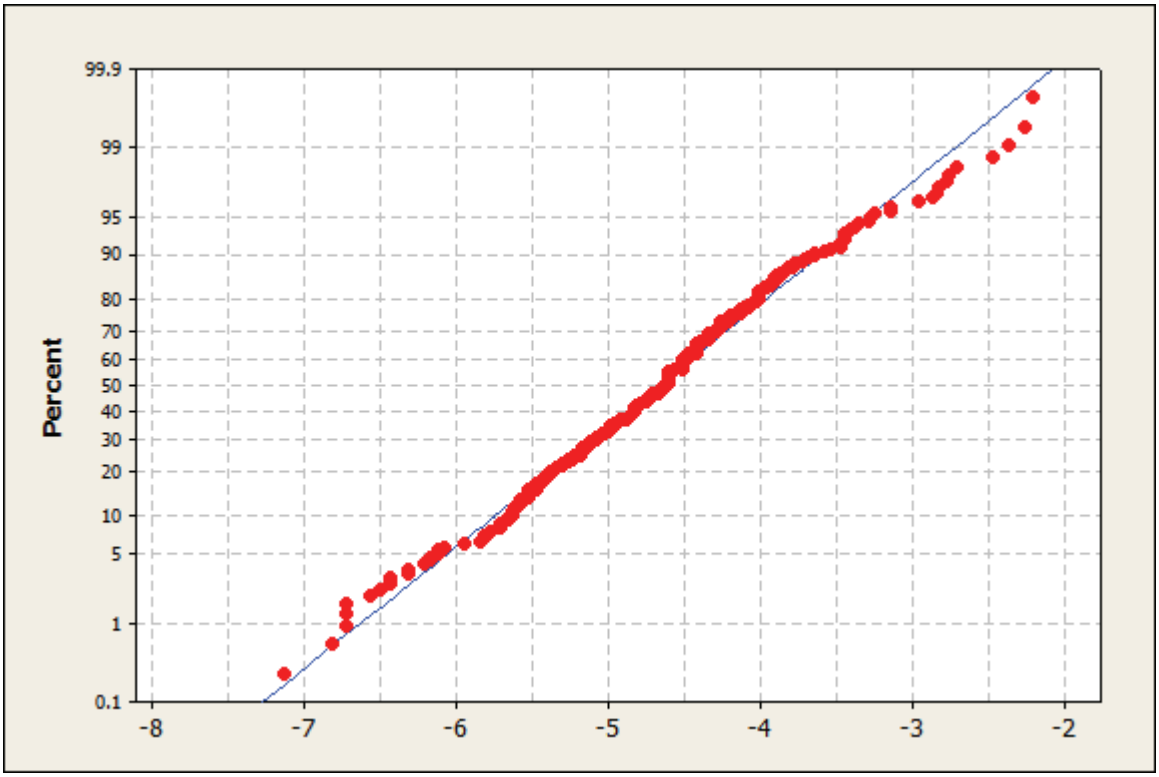

Because natural log-transformed mercury data fit a normal distribution, it was possible to calculate performance-based limits based on select percentiles. For refineries (data sample size of 296), the mean and standard deviation in the natural log phase were -4.7000 and 0.8654, respectively. Regional Water Board staff calculated daily, weekly, and monthly mercury limits based on the 99.87th percentile (3 standard deviations above the mean), the 99.57th percentile (2.625 standard deviations above the mean), and the 99.38th percentile (2.5 standard deviations above the mean).

Table 3. Mercury Limits for Industries Using Petroleum Refinery Performance

Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	122
99.57th	Weekly	88
99.38th	Monthly	79

APPENDIX F-3
SUMMARY OF PCBs LOADS (CONGENERS)

Table 1. PCBs Loads – Municipal Dischargers (Secondary Treatment)

Discharger	PCBs Loads (kg/yr)			
	Year			
	2018	2019	2020	2021
Benicia, City of	0.00746	0.00287	0.00449	0.00230
Burlingame, City of	0.00226 0.00120 0.000418 0.000397	0.00103 0.00146 0.00210 ND	0.00109 0.000336 - -	0.00158 0.000692 - -
Calistoga, City of	ND	-	-	-
Central Contra Costa Sanitary District	0.0112 0.0109 0.00998 0.00049	0.0326 0.0156 0.00908 0.00603	0.0110 0.0122 0.00966 0.00378	0.0244 0.0137 0.0122 0.0085
Central Marin Sanitation Agency	0.00646 0.00375 0.00266 0.00248	0.00577 0.00416 0.0135 0.00395	0.00465 0.00648 0.00309 0.00271	0.00646 0.00401 0.00584 -
Delta Diablo	0.00497 0.00665	0.00305 0.00887	0.00419 0.00423	0.00568 0.00462
East Bay Dischargers Authority	0.0573 0.0430 0.0240 0.0227	0.229 0.106 0.0553 0.0566	0.0372 0.0382 0.0264 0.0263	0.0773 0.0314 0.0419 0.0258
East Bay Municipal Utility District	0.0506 0.0304 0.0291 0.0223	0.0405 0.0523 0.0292 0.0215	0.0897 0.0282 0.0262 0.0192	0.0602 0.0365 0.0220 0.0173
Las Gallinas Valley Sanitary District	0.00311	0.00996	0.00659	0.00457
Millbrae, City of	0.00169 0.000445	0.00155 -	0.00193 -	0.00115 -
Napa Sanitation District	0.00833 0.00109 0.00256	0.0312 0.00284 -	0.00826 0.00113 -	0.00393 0.00209 -
Novato Sanitary District	0.000872 0.000957	0.00175 0.000689	0.000634 0.000947	0.00133 0.000434
Petaluma, City of	0.000178	0.000301	0.0000626	0.000350

	0.000132 0.0000730	0.000167 -	0.0000602 0.0000151	0.000102 0.0000383
Pinole, City of	0.000622 0.000737	0.000680 0.000776	0.000423 0.000247	0.00244 0.000504
Rodeo Sanitary District	0.000270	0.000330	0.000145	0.000706
St. Helena, City of	-	-	ND	-
San Mateo, City of	0.0141 0.00413	0.00788 0.0146	0.00963 0.00508	0.0105 0.0116
Sewerage Agency of Southern Marin	0.0223	0.00964	0.00547	0.00487
Sausalito-Marin City Sanitary District	0.00203 0.00105 0.000343	0.00364 - -	0.00165 0.00110 -	0.00288 0.00165 -
Marin County (Paradise Cove), Sanitary District No. 5 of	0.0000085 -	0.0000208 0.0000126	0.0000671 0.0000220	0.0000268 0.0000204
Marin County (Tiburon), Sanitary District No. 5 of	0.000281 0.000210	0.000865 0.000482	0.00541 0.000815	0.000850 0.000470
San Francisco (Southeast Plant), City and County of	0.132 0.0470 0.0334 0.0335	0.0435 0.0349 0.0453 0.0312	0.0574 0.0365 0.0258 0.0206	0.0196 0.019 0.0195 0.0141
San Francisco (San Francisco International Airport), City and County of	0.00146 0.000420	0.00319 -	0.00111 -	0.000789 -
Silicon Valley Clean Water	0.0328 0.0106	0.0248 0.00868	0.0166 0.00697	0.0203 0.0143
Sonoma Valley County Sanitation District	0.000293 0.0000274 -	0.0000338 - -	0.0 0.0 0.0	0.0 0.0 -
South San Francisco and San Bruno, Cities of	0.0135 0.00321 0.00208	0.00294 0.00322 -	0.001976 ND -	0.00404 0.00197 -
Treasure Island Development Authority	0.0103	0.0119	0.0634	0.0163
Vallejo Flood and Wastewater District	0.00821 0.00661 0.00510 0.00518	0.0202 0.0115 0.00828 0.00512	0.00945 0.00647 0.00656 0.00555	0.00817 0.00784 0.00413 -
West County Agency	0.00529 0.00482 0.00470	0.0175 - -	0.0120 0.0151 -	0.0218 0.00278 -
Yountville, Town of	0.000148	0.000491	0.00000698	-

Total	**0.78**	**1.1** [1]	**0.69**	**0.63**

Footnote:

[1] The 2019 annual sum of total secondary and advanced secondary municipal loads (from Tables 1 and 2) differs slightly from the 2019 municipal mass load total presented in Fact Sheet section 2.4 due to rounding.

Table 2. PCBs Loads – Municipal Dischargers (Advanced Secondary Treatment)

Discharger	PCBs Loads (kg/yr)			
	Year			
	2018	2019	2020	2021
American Canyon, City of	0.0000956	0.0000232	ND	ND
Fairfield-Suisun Sewer District	0.00610 0.000343	0.00814 0.0096350	0.00553 0.00292	0.0177 0.00616
Mt. View Sanitary District	0.000935 0.000504	0.00295 0.000776	0.000592 -	0.000611 -
Palo Alto, City of	0.0414 0.0148 0.00260 0.00167	0.0259 0.00803 - -	0.0127 0.00861 - -	0.0137 0.0107 - -
San Jose and Santa Clara, Cities of	0.00682 0.00551 0.00623 0.00433	0.00822 0.00532 0.00380 0.00383	0.00401 0.00239 0.00226 0.00235	0.00360 0.00215 0.00219 0.00184
Sunnyvale, City of	0.00369 0.000975	0.00297 0.00540	0.0140 0.00367	0.00628 0.00627
Total	**0.096**	**0.085** [1]	**0.059**	**0.071**

Footnote:

[1] The 2019 sum of total secondary and advanced secondary municipal loads (from Tables 1 and 2) differs slightly from the 2019 municipal mass load total presented in Fact Sheet section 2.4 due to rounding.

Table 3. PCBs Loads – Industrial Dischargers (Non-Petroleum Refineries)

Discharger	PCBs Loads (kg/yr)			
	Year			
	2018	2019	2020	2021
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	0.000206 0.000208	0.000266 0.000195	0.0000679 0.0000588	0.0001770 0.0000989
Crockett Cogeneration, LP	0.0000285	-	-	-
Eco Services Operations, LLC	0.000137 0.0000355	0.00000425 0.000139	0.0000875 -	0.0000168 -

The Pittsburg Owner, LPV, LLC	-	-	-	-
USS-UPI, LLC	0.006220 0.000309	0.00313 0.00252	0.00191 0.000193	0.00149 0.000572
Total	**0.0071**	**0.0063**	**0.0023**	**0.0024**

Table 4. PCBs Loads – Industrial Dischargers (Petroleum Refineries)

Discharger	**PCBs Loads (kg/yr)**			
	Year			
	2018	**2019**	**2020**	**2021**
Chevron Products Company	0.00456 0.00363 0.00208 0.00147	0.00215 0.00125 - -	0.000958 0.000395 - -	0.00250 0.00131 - -
Phillips 66	ND ND	ND ND	0.000217 ND	ND ND
Martinez Refining Company, LLC	ND ND	0.00000650 ND	ND ND	ND ND
Tesoro Refining & Marketing Co.	0.000241 0.000217	0.000435 0.0000796	0.0000109 -	ND ND
Valero Refining Company	ND ND	0.0000989 -	0.00000982 0.0000109	ND -
Total	**0.012**	**.0040**	**0.0016**	**0.0038**

APPENDIX F-4
DATA SUPPORTING PERFORMANCE-BASED PCBs EFFLUENT LIMITATIONS

Below is PCBs dataset used to calculate the San Francisco Bay PCBs TMDL wasteload allocations. These data, collected between 1999 and 2001, were categorized by discharger treatment type, and used to derive the PCBs performance-based effluent limitations in this Order (see Fact Sheet section 4.1.4.2).

Discharge Category – PCBs Data (µg/L)			
Advanced Secondary	**Secondary**	**Petroleum Refinery**	**Non-Petroleum Refinery**
0.000250	0.0079	0.000650	0.000860
0.000310	0.0011	0.000570	0.003700
0.000190	0.0047	0.000170	0.005600
0.000200	0.0022	0.000380	0.004300
0.000310	0.0057	0.000280	0.003400
0.000170	0.0014	0.000150	0.003400
0.000190	0.0037	0.000110	
0.000130	0.0027	0.000150	
0.000320	0.0026	0.000170	
0.000170		0.000085	
0.000120			
0.000240			
0.000190			
0.000160			

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 Clay Street, Suite 1400, Oakland, California 94612
www.waterboards.ca.gov/sanfranciscobay

ORDER R2-2023-0007
NPDES PERMIT CAG032012

GENERAL WASTE DISCHARGE REQUIREMENTS FOR DISCHARGES FROM DRY DOCK OPERATIONS

This Order was adopted on:	**June 14, 2023**
This Order shall become effective on:	**September 30, 2023**
This Order shall expire on:	**October 1, 2028**
CIWQS regulatory measure number:	**453066**

To obtain coverage under this Order, prospective dischargers must submit the Notice of Intent (NOI) form shown in Attachment B and a filing fee equivalent to the first year's annual fee. Applicable prospective dischargers must also submit the NOI form shown in Attachment C to obtain coverage for landside stormwater discharge. Discharge is not authorized until the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), Executive Officer issues an Authorization to Discharge. Authorized Dischargers that intend to continue discharging after this Order's expiration date shall file a new NOI form no later than **January 5, 2028**.

The U.S. Environmental Protection Agency (U.S. EPA) and the Regional Water Board have classified discharges under this general National Pollutant Discharge Elimination System (NPDES) permit (General Permit) as "**minor**."

I do hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the Regional Water Board on the date indicated above.

Eileen White
Digitally signed by Eileen White
Date: 2023.06.16 09:41:51 -07'00'

Eileen White, Executive Officer

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1. GENERAL PERMIT SCOPE

These waste discharge requirements (WDRs) shall serve as an NDPES General Permit for discharges to San Francisco Bay associated with the operation of floating and graving dry docks used for repairing, constructing, and dismantling marine vessels. Fact Sheet (Attachment F) sections 1 and 2 provide additional information describing covered facilities and discharges.

1.1. Discharges Covered by this General Permit

1.1.1. Water that washes over dry dock decks after cleaning when dry docks are submerged or flooded;

1.1.2. Non-contact cooling water from ships awaiting maintenance in dry docks;

1.1.3. Integral ballast water discharged from floating dry docks;

1.1.4. Saltwater fire suppression water;

1.1.5. Stormwater falling on dry dock surfaces after cleaning, and;

1.1.6. Stormwater from landside facilities associated with dry docks.

1.2. Discharges Not Covered by this General Permit

1.2.1. Process wastewaters used in ship dismantling operations;

1.2.2. Seepage water from graving dry dock walls;

1.2.3. Seepage water from graving dry dock caissons;

1.2.4. Ballast water from vessels in dry dock;

1.2.5. Stormwater runoff from dry dock surfaces prior to cleaning; and

1.2.6. Sanitary wastewaters (sewage).

2. FINDINGS

The Regional Water Board finds the following:

2.1. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370).

2.2. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on information submitted as part

of the application process, information obtained through monitoring and reporting programs, and other available information. The Fact Sheet contains background information and rationale for the requirements in this Order and is hereby incorporated into and constitutes findings for this Order. Attachments A through E and G are also incorporated into this Order.

2.3 Notification of Interested Parties. The Regional Water Board notified prospective enrollees and interested agencies and persons of its intent to prescribe these WDRs, and has provided an opportunity to submit written comments and recommendations. Fact Sheet section 8.1 provides details regarding the notification.

2.5. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Fact Sheet section 8.3 provides details regarding the public hearing.

THEREFORE, IT IS HEREBY ORDERED that Order R2-2017-0027 (previous order) is rescinded upon the effective date of this Order, except for enforcement purposes, and, in order to meet the provisions contained in Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order. This action in no way prevents the Regional Water Board from taking enforcement action for violations of the previous order.

3. DISCHARGE PROHIBITIONS

3.1. Discharge of waste at a location or in a manner different than described in an NOI and Authorization to Discharge is prohibited.

3.2. Discharge of sanitary wastewater (sewage) is prohibited.

3.3. Discharge of solid materials, solid wastes, spent abrasives, or paint residues to waters of the State is prohibited.

3.4. Discharge of oil or other petroleum products, or other floating materials, from any activity that may cause sheen, deleterious bottom deposits, turbidity, or discoloration in surface waters is prohibited.

3.5. Discharge of oil or any residuary product of petroleum to waters of the State is prohibited, except as allowed by Water Code division 7.

3.6. Discharge of ship ballast water from vessels in dry dock is prohibited.

3.7. Discharge of power washing or pressure washing water, boiler drainage, or process water used or accumulated in dry dock areas is prohibited.

3.8. Discharge of graving dock seepage water from dry dock walls or caissons, or stormwater runoff from dry dock surfaces when vessels are being processed, is prohibited.

3.9. Discharge of fire suppression water (for purposes of system testing or pressure relief) into a receiving water from which it did not originate, or that contains chemical additives, is prohibited.

4. EFFLUENT LIMITATIONS

4.1. Each Discharger shall prevent or minimize the discharge of pollutants from any surface of its floating dry docks during submergence or, for graving dry docks, when opening its caisson by implementing a Best Management Practices Program as described in Provisions 6.3.4 and 6.3.5.

4.2. Each Discharger that discharges non-contact cooling water shall implement a Best Management Practices Program as described in Provision 6.3.6.

4.3. On an ongoing basis, each Discharger shall remove spent abrasives, paint residues, and other debris, particulate matter, and waste from those portions of its dry dock surfaces that are reasonably accessible to the degree achievable by scraping, broom cleaning, and power or pressure washing.

Prior to submergence or flooding, any remaining area of the dry dock deck that was previously inaccessible shall be cleaned by scraping, broom cleaning, and power or pressure washing as soon as practical. The Discharger may then submerge or flood the dry dock and bring in another vessel for repair and maintenance.

4.4. Each Discharger shall perform regular dry dock cleaning while work is being conducted to minimize the potential for pollutants to build up on, or to be released from, its dry dock surfaces.

5. RECEIVING WATER LIMITATIONS

5.1. Discharges shall not cause the following conditions in receiving waters:

5.1.1. Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;

5.1.2. Alteration of suspended sediment in such a manner as to cause nuisance or adversely affect beneficial uses or detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life;

5.1.3. The presence of pollutants in sediments in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California;

5.1.4. The presence of pollutants in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health in bays and estuaries of California;

5.1.5. The presence of pollutants in sediment at levels that alone or in combination are toxic or harmful to wildlife or fish by direct exposure or by bioaccumulation within aquatic life;

5.1.6. Suspended material in concentrations that cause nuisance or adversely affect beneficial uses;

5.1.7. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

5.1.8. Alteration of temperature beyond present natural background levels, unless it is demonstrated that such alteration in temperature does not adversely affect beneficial uses;

5.1.9. Changes in turbidity that cause nuisance or adversely affect beneficial uses, or increases from normal background light penetration or turbidity greater than 10 percent in areas where natural turbidity is greater than 50 nephelometric turbidity units (NTU), or above 55 NTU in areas where natural turbidity is less than or equal to 50 NTU;

5.1.10. Coloration that causes nuisance or adversely affects beneficial uses;

5.1.11. Oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses; or

5.1.12. Concentrations or quantities of toxic or other deleterious substances that cause deleterious effects on wildlife, waterfowl, or other aquatic life, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

5.2. Discharges shall not cause the following limits to be exceeded at any place in receiving waters within one foot of the water surface:

5.2.1. Dissolved Oxygen

Downstream of Carquinez Bridge: 5.0 mg/L, minimum
Upstream of Carquinez Bridge: 7.0 mg/L, minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.

5.2.2.	Dissolved Sulfide	Natural background levels
5.2.3.	pH	The pH shall not be depressed below 6.5 nor raised above 8.5. The discharge shall not cause changes greater than 0.5 pH units in normal ambient pH levels.
5.2.4.	Nutrients	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

5.3. Discharges shall not cause a violation of any water quality standard for receiving waters adopted by the Regional Water Board, State Water Resources Control Board (State Water Board), or U.S. EPA as required by the CWA and regulations adopted thereunder. If more stringent water quality standards are promulgated or approved pursuant to CWA section 303, or amendments thereto, the Regional Water Board may revise or modify this Order in accordance with the more stringent standards.

6. PROVISIONS

6.1. Standard Provisions

6.1.1. Each Discharger shall comply with all “Standard Provisions” in Attachment D.

6.1.2. If there is any conflict, duplication, or overlap between provisions in this Order, the more stringent provision shall apply.

6.2. Monitoring and Reporting Provisions

Each Discharger shall comply with the Monitoring and Reporting Program (Attachment E) and future revisions thereto, and applicable monitoring and reporting requirements in Attachments D and G.

6.3. Special Provisions

6.3.1. **Reopener Provisions.** The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law or as otherwise authorized by law. A Discharger may request a permit modification based on any of these circumstances. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses as necessary.

6.3.1.1. If present or future investigations demonstrate that the discharges governed by this Order have or will have a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters;

6.3.1.2. If new or revised water quality objectives or total maximum daily loads (TMDLs) come into effect for San Francisco Bay or contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order may be modified as necessary to reflect the updated water quality objectives or wasteload allocations. Adoption of the effluent limitations in this Order is not intended to restrict in any way future modifications based on legally adopted water quality objectives or TMDLs or as otherwise permitted under federal regulations governing NPDES permit modifications;

6.3.1.3. If metal translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified;

6.3.1.4. If a State Water Board precedential decision, new policy, new law, or new regulation is adopted; or

6.3.1.5. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to this discharge.

6.3.2. **Application for General Permit Coverage and Authorization to Discharge**

6.3.2.1. **Notice of Intent.** A prospective Discharger seeking Authorization to Discharge pursuant to this Order shall complete and submit the NOI form in Attachment B. For landside industrial stormwater coverage, the prospective Discharger shall also complete and submit the NOI form in Attachment C. The Executive Officer may modify the NOI forms in Attachments B and C or require additional information prior to authorizing any discharge. Dischargers authorized to discharge under the previous order that submitted an NOI at the end of the previous order term need not submit a new NOI form to renew their Authorization to Discharge.

6.3.2.2. **Authorization to Discharge.** If the Executive Officer concludes that a proposed or previously authorized discharge is eligible for coverage under this Order, the Executive Officer will issue an Authorization to Discharge (or a modified Authorization to Discharge, if appropriate). Upon the effective date of the Authorization of Discharge, the Discharger shall comply with the requirements of this Order and its attachments. Any non-compliance with this Order's requirements shall constitute a violation of the CWA and Water Code and may be grounds for enforcement; termination, revocation and reissuance, or modification of the Authorization to Discharge; issuance of an individual permit; or denial of an application for reissuance.

6.3.2.3. **Facility Modifications.** At least 90 days prior to any significant facility modification, the Discharger proposing the modification shall submit a modified NOI form (e.g., a mark-up of the original NOI form showing all changes and including a new signature and date). The Discharger shall include a letter describing the changes, their purpose, when they are to go

into effect, and any new or additional measures taken or planned to prevent potential non-compliance with this Order's requirements.

6.3.2.4. **Discharge Termination.** A Discharger may terminate coverage under this Order by submitting a letter requesting termination and stating the reason. The Executive Officer may also terminate or revoke coverage under this Order for any of the causes specified for an individual permit as set forth in 40 C.F.R. section 122.28(b)(3). After providing notice and an opportunity for a hearing, coverage under this Order may be terminated or modified for cause, including, but not limited to, the following:

6.3.2.4.1. Violation of any term or condition of this Order;

6.3.2.4.2. Misrepresentation or failure to disclose all relevant facts in obtaining coverage under this Order; or

6.3.2.4.3. Change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

6.3.2.5. **Need for Individual NPDES Permit.** The Executive Officer may require any Discharger authorized to discharge pursuant to this Order to subsequently apply for and obtain an individual NPDES permit in the following circumstances:

6.3.2.5.1. The Discharger is not in compliance with the requirements of this Order;

6.3.2.5.2. A change has occurred in the availability of demonstrated technology or practices for the control or abatement of pollutants from the facility;

6.3.2.5.3. Effluent limitation guidelines are promulgated for the discharges covered by this Order;

6.3.2.5.4. A new or revised water quality control plan containing requirements applicable to the discharge is approved;

6.3.2.5.5. The requirements of 40 C.F.R. section 122.28(a) (the circumstances under which the Regional Water Board is authorized to issue a general permit) are not met; or

6.3.2.5.6. Any other condition specified in 40 C.F.R. section 122.28(b)(3) is met.

6.3.3. **Contingency Plan.** Each Discharger shall maintain a Contingency Plan that describes procedures to ensure that its facilities remain in, or are rapidly returned to, operation in the event of equipment failure or another type of emergency, such as an employee strike, a strike by suppliers or maintenance services, a power outage, vandalism, an earthquake, or a fire. Each Discharger shall regularly review, revise, and update, as necessary, its Contingency Plan so the document remains useful and relevant to current practices. At a

minimum, the Discharger shall review the Contingency Plan annually. The Discharger shall include, in each Annual Report, a description or summary of its review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing any improvements. The Discharger shall update these documents as necessary.

The Contingency Plan shall, at a minimum, contain the provisions below:

6.3.3.1. Provision of personnel for cleaning and testing dry dock surfaces during employee strikes or strikes against contractors providing services;

6.3.3.2. Maintenance of adequate supplies necessary for cleaning and testing dry dock surfaces;

6.3.3.3. Provision of emergency standby power;

6.3.3.4. Protection against vandalism;

6.3.3.5. Expeditious action to repair failures of, or damage to, equipment; and

6.3.3.6. Reporting of spills and discharges of waste, including measures taken to clean up the effects of such discharges

6.3.4. **Best Management Practices for Cleaning Dry Dock Surfaces.** Prior to commencing dry dock operations pursuant to this Order, each Discharger shall prepare and implement a Best Management Practices (BMPs) Plan that clearly describes its cleaning procedures, which must include sweeping, vacuuming, and power washing. The Discharger shall implement its BMPs Plan to identify and evaluate sources of wastes and pollutants associated with facility activities and shall continue to identify and implement site-specific BMPs to reduce or prevent the discharge of wastes and pollutants. The BMPs Plan shall include provisions for developing, annually updating, and implementing the BMPs Plan in a manner consistent with the general guidance contained in U.S. EPA's *Guidance Manual for Developing Best Management Practices* (EPA 833-B-93-004). The BMPs Plan shall address potential discharges from all discharge points and must include the following elements:

6.3.4.1. **Discharge Characterization.** The BMPs Plan shall assess all individual activities conducted at the site, potential pollutant sources associated with each activity, and the nature of the pollutants that could be discharged.

6.3.4.2. **BMP Identification.** The BMPs Plan shall describe the BMPs to be implemented at the site to control pollutant discharges. BMPs shall be identified and described for each potential pollutant source, including the anticipated effectiveness of each BMP. Dischargers shall consider, and include as appropriate, the following:

6.3.4.2.1. **Preventative BMPs** – measures to reduce or eliminate the generation of pollutants and waste, including measures to prevent leaks and spills;

6.3.4.2.2. **Control BMPs** – measures to control or manage pollutants and waste after they are generated and before they come into contact with water, including measures to contain dust and particulate material;

6.3.4.2.3. **Response to Release BMPs** – measures to respond to leaks, spills, and other releases with containment, control, and cleanup measures to prevent or minimize the potential for pollutant discharge and any adverse effects of such discharge;

6.3.4.2.4. **Dry Dock Surface Monitoring BMPs** – measures to monitor dry dock surfaces, as described in the MRP; and

6.3.4.2.5. **Response to Trigger Exceedance BMPs** – measures to be taken in response to dry dock surface monitoring results that exceed the trigger specified in Provision 6.3.5.

6.3.4.2.6. The BMPs Plan shall address the following activities, if applicable:

- Control of large solid materials;
- Abrasive blasting;
- Oil, grease, and fuel transfer;
- Paint and solvent use;
- Dust and overspray;
- Over-water or near-shore activities;
- Storm drain inlet protection;
- Hose, piping, and fitting use and maintenance;
- Segregation of water from debris;
- Hydro-blasting;
- Material and waste storage;
- Sewage disposal;
- Gray water disposal;
- Oily bilge and ballast water disposal;
- Floating dry dock cleanup;
- Graving dock cleanup;
- Discharges resulting from wind, tidal action, and site runoff;
- Leaks and spills;
- Waste disposal;
- Recovery of ship launch grease or wax;
- Cathodic protection and anode handling and storage;
- Hull cleaning; and
- Other activities with potential to result in the discharge of wastes or pollutants to the receiving water.

6.3.4.3. **Site Map.** The BMPs Plan shall include a site map that includes:

- Address, city, and county;
- Site boundaries and structures;
- Runoff collection and conveyance system locations, and points of discharge;
- Areas of industrial activity where discharges originate; and
- Material handling and processing areas; waste treatment, storage, and disposal areas; dust and particulate generating areas; cleaning and rinsing areas; and other areas of industrial activity that are potential pollutant sources.

6.3.4.4. **Annual Comprehensive Site Compliance Evaluation.** Each Discharger shall conduct at least one comprehensive site compliance evaluation per calendar year to determine the effectiveness of its BMPs Plan and submit an evaluation report, and a description of BMPs Plan revisions based on the evaluation, with each annual report submitted pursuant to MRP section 7.2.2.2. The Discharger shall implement revisions within 30 days of evaluation.

Evaluations shall be conducted not less than 8 months nor more than 16 months apart. At least 30 days prior to conducting each evaluation, the Discharger shall notify the Regional Water Board of its intent to conduct the evaluation, so a Regional Water Board representative is presented with an opportunity to accompany the Discharger during its facility inspection and its BMP review.

Each Discharger shall summarize the evaluation in an evaluation report that includes the above elements. Each Discharger shall sign and certify the report in accordance with Attachment D section 5.2 and retain each report for at least five years.

Evaluations shall include the following:

6.3.4.4.1. Date of evaluation and identification of personnel performing evaluation;

6.3.4.4.2. Review of all visual observation records, inspection records, and sampling and analysis records;

6.3.4.4.3. Visual inspection of all pollutant sources and potential sources for pollutant discharges;

6.3.4.4.4. Review and evaluation of all BMPs to determine whether they are adequate, whether they are properly implemented and maintained, and whether additional BMPs are needed;

6.3.4.4.5. Review of wipe test procedures to ensure they quantitatively detect residual contaminates. If a review indicates that changes to the sampling procedures are necessary, the Discharger shall implement the changes following written concurrence of the Executive Officer; and

6.3.4.4.6. Identification of incidents of non-compliance, corrective actions taken, and necessary program revisions.

6.3.5. **Best Management Practices for Responses to Trigger Exceedances**

6.3.5.1. **Best Management Practices Review.** If the wipe test monitoring required by MRP section 3.2 shows an exceedance of a copper trigger of 1,400 micrograms per square foot (. g/sq.ft.), within seven days of discovering the trigger exceedance the Discharger shall review the BMPs in the BMPs Plan with its staff to (1) remind the staff of the importance of properly following the BMPs and (2) refresh the staff's familiarity with the BMPs to ensure that they are diligently implemented. This review shall be documented in the subsequent quarterly self-monitoring report, which shall include the following information:

6.3.5.1.1. Date wipe test was performed, date monitoring results were received, and date BMPs were reviewed;

6.3.5.1.2. BMPs reviewed and how those BMPs relate to the trigger exceedance; and

6.3.5.1.3. Brief description of the staff addressed through the review.

6.3.5.2. **Best Management Practices Enhancement with Pressure Washing.** If the copper trigger is exceeded during accelerated monitoring pursuant to MRP section 3.2.5, the Discharger shall enhance its BMPs before the next subsequent dry dock use. The BMPs enhancement shall, at a minimum, add pressure washing of all areas where industrial activity occurs on the dry dock deck surfaces prior to submersion. "Pressure washing" means using a water jet of at least 1,500 pounds per square inch (psi) (compared to "power washing," which means using a water jet of approximately 60 to 100 psi). The Discharger shall collect pressure washing wash water and dispose of it via the sanitary sewer or another authorized means (i.e., not discharge it directly to waters of the U.S.). The Discharger shall update its BMPs Plan to incorporate the enhanced BMPs within 30 days of learning that the copper trigger is exceeded during accelerated monitoring.

6.3.5.3. **Further Best Management Practices Enhancement.** If the copper trigger is exceeded following the implementation of pressure washing, the Discharger shall further evaluate its BMPs, its staff's implementation of the BMPs, and the feasibility of resurfacing the dry dock with a material more amenable to cleaning. The Discharger shall update its BMPs Plan to include any remaining technically-and-economically achievable control measures and

adhere to a schedule for resurfacing the dry dock surface, if feasible, within 30 days of receiving results exceeding the trigger following the implementation of pressure washing.

6.3.5.4. **No Further Action.** When no further technically and economically achievable control measures can be implemented, the Executive Officer may authorize a Discharger to return to the routine monitoring frequency indicated in MRP section 3.2.3 or cease conducting wipe tests altogether.

6.3.6. **Best Management Practices for Non-Contact Cooling Water.** Prior to discharging any non-contact cooling water, each Discharger that discharges non-contact cooling water shall establish and implement a BMPs Plan that describes steps to ensure that non-contact cooling water discharges will not adversely affect the receiving water.

The BMPs Plan shall narratively describe the BMPs to be implemented to control the discharge of thermal waste in non-contact cooling water. The BMPs Plan shall evaluate the anticipated effectiveness of each BMP. The Discharger shall consider (1) measures to reduce the generation of non-contact cooling water and (2) measures to dissipate thermal waste before discharge to surface waters. Such measures shall include use of shore-side power when available and feasible. Additional measures could include evaporative cooling (e.g., spraying the non-contact cooling water over the receiving water surface). The BMPs Plan shall ensure that non-contact cooling water discharges are no warmer than 86 degrees Fahrenheit and no more than 4 degrees Fahrenheit above the natural receiving water temperature by the time the water reaches the receiving waters.

Each applicable Discharger shall conduct at least one compliance evaluation per calendar year to determine the effectiveness of the BMPs Plan for non-contact cooling water and submit an evaluation report, and a description of BMPs Plan revisions based on the evaluation, with each annual report submitted pursuant to MRP section 7.2.2.2. The Discharger shall implement revisions within 30 days of evaluation.

6.3.7. **Best Management Practices for Landside Stormwater.** Each Discharger that has enrolled for coverage of its landside (non-dry dock) industrial stormwater discharges shall comply with the following requirements:

6.3.7.1. **Stormwater Pollution Prevention Plan (SWPPP).** The Discharger shall prepare a SWPPP that is designed in accordance with good engineering practices and retained onsite, revised whenever necessary, and made available upon request of any Regional Water Board representative. The SWPPP includes the following elements:

- Facility name and contact information;
- SWPPP performance standards;

- Planning and organization;
- Site map;
- List of industrial materials;
- Description of potential pollution sources;
- Assessment of potential pollutant sources;
- Identification and evaluation of all pollutant sources that may affect stormwater discharge quality;
- Identification, assignment, and implementation of control measures and management practices to reduce pollutants in stormwater discharges;
- Minimum BMPs;
- Advanced BMPs, if applicable;
- Monitoring implementation plan;
- Annual comprehensive facility evaluation; and
- Date SWPPP was initially prepared and dates of each SWPPP amendment.

6.3.7.2. **Best Management Practices.** The Discharger shall select, design, install, and maintain BMPs that reduce or prevent discharges of pollutants in stormwater in a manner that reflects best industry practice considering technological availability and economic practicability and achievability. The SWPPP shall identify these BMPs, including, at a minimum, the following:

6.3.7.2.1. **Good Housekeeping.** The Discharger shall do the following:

6.3.7.2.1.1. Observe all outdoor areas associated with industrial activity; including stormwater discharge locations, drainage areas, conveyance systems, waste handling/disposal areas, and perimeter areas affected by off-facility materials or stormwater run-on to determine housekeeping needs. Any identified debris, waste, spills, tracked materials, or leaked materials shall be cleaned and disposed of properly;

6.3.7.2.1.2. Minimize or prevent material tracking;

6.3.7.2.1.3 Minimize dust generated from industrial materials or activities;

6.3.7.2.1.4 Ensure that all facility areas impacted by rinse and wash waters are cleaned as soon as possible;

6.3.7.2.1.5 Cover all stored industrial materials that can be readily mobilized by contact with stormwater;

6.3.7.2.1.6 Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper) that can be transported or dispersed by the wind or contact with stormwater;

6.3.7.2.1.7 Prevent disposal of any rinse and wash waters or industrial materials into the stormwater conveyance system;

6.3.7.2.1.8 Minimize stormwater discharges from non-industrial areas (e.g., stormwater flows from employee parking area) that contact industrial areas of the facility; and

6.3.7.2.1.9 Minimize authorized non-stormwater discharges from non-industrial areas (e.g., potable water, fire hydrant testing) that contact industrial areas of the facility.

6.3.7.2.2. **Preventive Maintenance.** The Discharger shall identify all equipment and systems used outdoors that may spill or leak pollutants, observe the identified equipment and systems to detect leaks or identify conditions that may result in the development of leaks, establish an appropriate schedule for maintenance of identified equipment and systems, and establish procedures for prompt maintenance and repair of equipment and maintenance of systems when conditions exist that may result in the development of spills or leaks.

6.3.7.2.3. **Spill and Leak Prevention and Response.** The Discharger shall establish procedures and controls to minimize spills and leaks; develop and implement spill and leak response procedures to prevent industrial materials from discharging through the stormwater conveyance system (spilled or leaked industrial materials shall be cleaned promptly and disposed of properly); identify and describe all necessary and appropriate spill and leak response equipment, locations of spill and leak response equipment, and spill or leak response equipment maintenance procedures; and identify and train appropriate spill and leak response personnel.

6.3.7.2.4. **Material Handling and Waste Management.** The Discharger shall do the following:

6.3.7.2.4.1. Prevent or minimize handling of industrial materials or wastes that can be readily mobilized by contact with stormwater during a storm;

6.3.7.2.4.2. Contain all stored non-solid industrial materials or wastes (e.g., particulates, powders, shredded paper) that can be transported or dispersed by the wind or contact with stormwater;

6.3.7.2.4.3. Cover industrial waste disposal containers and industrial material storage containers that contain industrial materials when not in use;

6.3.7.2.4.4. Divert run-on and stormwater generated from within the facility away from all stockpiled materials;

6.3.7.2.4.5. Clean all spills of industrial materials or wastes that occur during handling in accordance with spill response procedures; and

6.3.7.2.4.6. Observe and clean, as appropriate, any outdoor material or waste handling equipment or containers that can be contaminated by contact with industrial materials or wastes.

6.3.7.2.5. **Erosion and Sediment Control.** The Discharger shall implement effective wind erosion controls; provide effective stabilization for inactive areas, finished slopes, and other erodible areas prior to forecasted storms; maintain effective perimeter controls and stabilize site entrances and exits to sufficiently control discharges of erodible materials; and divert run-on and stormwater generated from within the facility away from erodible materials.

6.3.7.2.6. **Employee Training.** The Discharger shall ensure that all personnel implementing the SWPPP are properly trained with respect to BMP implementation, BMP effectiveness evaluations, visual observations, and monitoring activities. The Discharger shall identify which personnel need to be trained, their responsibilities, and the types of training they are to receive, and maintain documentation of completed training and the personnel that received the training with the SWPPP.

6.3.7.2.7. **Quality Assurance and Record Keeping.** The Discharger shall develop and implement management procedures to ensure that appropriate personnel implement all SWPPP elements; develop methods of tracking and recording BMP implementation; and maintain BMP implementation records, training records, and records related to any spills and clean-up related response activities for a minimum of three years.

6.3.7.3. **Stormwater Action Levels.** The Discharger is subject to the following action levels and requirements:

Table 1. Stormwater Action Levels

Parameter	Unit	Action Level
pH	standard units	6.0-9.0 [1]
Total Suspended Solids	mg/L	100
Oil and Grease	mg/L	15
Aluminum, Total Recoverable	µg/L	750
Copper, Total Recoverable	µg/L	33
Lead, Total Recoverable	µg/L	260
Zinc, Total Recoverable	µg/L	260

Footnote:
[1] Values below or above this range require action.

6.3.7.3.1. Upon measurement of a pollutant (see MRP section 6) in excess of an action level above, the Discharger shall review the SWPPP to identify appropriate modifications to existing BMPs or additional BMPs as necessary to reduce pollutant discharge concentrations to levels below the action level. The Discharger shall revise the SWPPP accordingly before

the next storm, if possible, or as soon as practical, and in no event later than three months following the exceedance.

6.3.7.3.2. If, upon subsequent monitoring, the pollutant continues to exceed an action level above, the Discharger shall further evaluate its BMPs and update its SWPPP accordingly to include enhanced BMPs. Enhanced BMPs may include exposure minimization BMPs (e.g., shelters that prevent stormwater contact with industrial materials or activities), stormwater containment or discharge reduction BMPs (e.g., BMPs that divert, infiltrate, reuse, contain, retain, or reduce stormwater runoff volumes), or treatment control BMPs (e.g., mechanical, chemical, biological, or other treatment technologies). BMP enhancement shall continue until either the pollutant measured is maintained below the action level above or the Discharger has implemented all technically-and-economically-achievable control measures. In any case, the Discharger shall document its actions in its Annual Stormwater Report (see MRP section 7.4).

ATTACHMENT A – DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

Arithmetic Mean (.)
Also called the average, sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$

where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples

Average Monthly Effluent Limitation (AMEL)
Highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
Highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Taken up by an organism from its surrounding medium through gill membranes, through epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic
Known to cause cancer in living organisms.

Coefficient of Variation (CV)
Measure of data variability calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Either: (1) the total mass of a constituent discharged over a calendar day (12:00 a.m. through 11:59 p.m.) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit) for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of a constituent over a day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period is considered the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ)
Sample results less than the RL, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dilution Credit
Amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA)
Value derived from the water quality criterion or objective, dilution credit, and ambient background concentration that is used, in conjunction with the CV for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as wasteload allocation (WLA) as used in U.S. EPA guidance (*Technical Support Document for Water Quality-based Toxics Control*, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
Concentration that results from the confirmed detection of a substance below the ML by the analytical method.

Estuaries
Waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters are considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code section 12220; Suisun Bay; Carquinez Strait downstream to the Carquinez Bridge; and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the state that are not the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
Highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
Lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL)
Highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
Middle measurement in a data set. The median of a data set is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2+1)})/2$ (i.e., the midpoint between n/2 and n/2+1).

Method Detection Limit (MDL)
Minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 C.F.R. part 136, Appendix B.

Minimum Level (ML)
Concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Limited volume of receiving water allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Persistent Pollutants
Substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollution Prevention
Any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State Water Resources Control Board or Regional Water Board.

Reporting Level (RL)
ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. For priority pollutants, the MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from State Implementation Plan (SIP) Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) beneficial use.

Standard Deviation (σ)
Measure of variability calculated as follows:

Standard deviation = $\sigma = (\Sigma[(x - \mu)^2]/(n - 1))^{0.5}$

where: x is the observed value
μ is the arithmetic mean of the observed values
n is the number of samples

Toxicity Reduction Evaluation (TRE)
Study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. A TIE is a set of procedures to identify the specific chemicals responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

ABBREVIATIONS

%	Percent
µg/L	Micrograms per liter
µg/kg	Micrograms per kilogram
µg/sq. ft.	Micrograms per square feet
1/Blending Event	Once per blending event
1/Day	Once per day
1/Month	Once per month
1/Quarter	Once per quarter
1/Week	Once per week
1/Year	Once per year
2/Month	Two times per month
2/Week	Twice per week
2/Year	Twice per year
3/Week	Three times per week
4/Week	Four times per week
5/Week	Five times per week
AMEL	Average monthly effluent limitation
AWEL	Average weekly effluent limitation
B	Background concentration
C	Water quality criterion or objective
C-24	24-hour composite
CFU/100 mL	Colony forming units per 100 milliliters
Continuous	Measured continuously
Continuous/D	Measured continuously, and recorded and reported daily
Continuous/H	Measured continuously, and recorded and reported hourly
CV	Coefficient of Variation
DNQ	Detected, but not quantified
DL	Detection level
ECA	Effluent Concentration Allowance
Grab	Grab sample
GPM	Gallons per minute

MDEL	Maximum Daily Effluent Limitation
MDL	Method detection limit
MEC	Maximum effluent concentration
MG	Million gallons
mg/L	Milligrams per liter
mg/L as N	Milligrams per liter as nitrogen
MGD	Million gallons per day
ML	Minimum level
MPN/100 mL	Most probable number per 100 milliliters
ND	Not detected
NTU	Nephelometric turbidity units
RL	Reporting level
RPA	Reasonable potential analysis
s.u.	Standard pH units
TIE	Toxicity identification evaluation
TRE	Toxicity reduction evaluation
TUa	Acute toxicity units
TUc	Chronic toxicity units

ATTACHMENT B – NOTICE OF INTENT FORM

This **NOTICE OF INTENT** form shall be completed and submitted to apply for authorization or reauthorization to discharge from dry dock facilities under NPDES Permit CAG032012 (Dry Dock General Permit) to waters of the United States.

1. OWNER INFORMATION AND CERTIFICATION

The following certification shall be signed in accordance with Attachment D section 5.2. The Discharger hereby agrees to comply with and be responsible for all conditions specified in the Dry Dock General Permit.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (40 C.F.R. § 122.22(d).)		
Signature		Date
Printed Name		Title
Owner Type (check one) ☐ Public ☐ Private ☐ Other, specify type:		New or Previously Authorized Facility (check one) ☐ New Facility ☐ Previously Authorized Facility
Company / Owner Name		
Mailing Address		Phone Number
City	County	Zip Code
Contact Person Name and Title		
Contact Person Email		Contact Person Phone Number

☐ Check here if additional owners information is attached to this form.

2. FACILITY OPERATION INFORMATION

Facility Operator Name (if there is more than one operator, each operator must submit a separate Notice of Intent)		Facility Operator Type (check one) ☐ Public ☐ Private ☐ Other, specify type:	
Facility Name	Facility Address		
City	State	Zip Code	Phone Number
Contact Person's Name and Title			
Contact Person's Email		Contact Person's Phone Number	
Duly Authorized Representative: The following individual (or any individual occupying the position listed below) may act as the facility's duly authorized representative and may sign and certify submittals in accordance with Attachment D section 5.2.3. This individual shall be responsible for the overall operation of the facility or for facility environmental matters. Name			
Title			
Company/Organization			
Street Address			
City	State	Zip Code	Phone Number
Email			

3. BILLING INFORMATION

Facility Operator Name	Check as applicable: ☐ Owner ☐ Operator		
Mailing Street Address			
City	State	Zip Code	Phone Number
Contact Person Name			
Contact Person Email	Contact Person Phone Number		

4. DESCRIPTION OF OPERATIONS

Description of Operations

Complete table to describe operations, filling in rows as needed. Include the types of discharge and attach additional sheets as needed.

Dry Dock No.	Type (floating or graving)	Maximum Number of Vessels Per Year	Maximum Size of Vessels Per Year
1			
2			
3			
4			
5			

Types of Discharge (select all discharge types that apply)

Identify type of discharge by checking appropriate boxes and providing details.

☐ **Integral Ballast Water**
Frequency of discharge: _____
Maximum volume per dry dock submersion: _____
Number of dry dock submersions per year: _____
Average daily discharge flow (gallons/day) when discharging: _____

☐ **Non-Contact Cooling Water**
Frequency of Discharge: _____
Maximum flow: _____ (gallons/day) Million gallons per year: _____
Average daily discharge flow (gallons/day) when discharging: _____

☐ **Salt Water Fire Suppression Water**
Frequency of discharge: _____
Maximum flow: _____ (gallons/day) Million gallons per year: _____
Average daily discharge flow (gallons/day) when discharging: _____

☐ Stormwater from dry dock surfaces *after* cleaning

☐ Other discharges (provide daily and annual total flows):

5. DRY DOCK DIMENSIONS AND CAPACITIES

Dry Dock No.	Average Submerged or Immersed Depth (feet)	Width at Top (feet)	Length to Outer Sill or Caisson (feet)	Capacity (million gallons)
1				
2				
3				
4				
5				

☐ Check here if information for additional dry docks is attached to this form.

6. RECEIVING WATERS, DISCHARGE POINTS, AND MONITORING LOCATIONS

Provide the name of the receiving water and the latitude and longitude for each point described in the table below. Attach additional sheets for additional receiving waters, discharge points, and sampling points. See MRP section 2 and Table E-1 for information related to monitoring locations.

RECEIVING WATER NAME:

MONITORING LOCATIONS		
Receiving Water Monitoring Location (near each dry dock)[1]	**Latitude** (degrees, to five decimal places)	**Longitude** (degrees, to five decimal places)
RSW-00*n*		
Reference Water Monitoring Location[1]	**Latitude** (degrees, to five decimal places)	**Longitude** (degrees, to five decimal places)
RSW-00(N+1)		
Sediment Monitoring Locations (for each dry dock)[1]	**Latitude** (degrees, to five decimal places)	**Longitude** (degrees, to five decimal places)
SED-00*n*		
Reference Sediment Monitoring Location[1]	**Latitude** (degrees, to five decimal places)	**Longitude** (degrees, to five decimal places)
SED-00(N+1)		

[1] Receiving water must be monitored at one location per dry dock, and sediment must be monitored at one location per dry dock. "*n*" is the number designation of the dry dock. "N" is the total number of dry docks at the facility. For example, if there are two dry docks, the location names must be as follows:

- Receiving water monitoring locations: RSW-001 and RSW-002
- Reference water monitoring location: RSW-003
- Sediment monitoring locations: SED-001 and SED-002
- Reference sediment monitoring location: SED-003

Regardless of the number of dry docks, only one reference water and one reference sediment location are required.

7. MONITORING DATA

Summarize monitoring data collected during the past five years, including receiving water samples collected near each dry dock, reference water samples, and wipe samples. For new facilities, report analytical results for receiving water near each dry dock. Provide a separate data summary table for each sample location.

Receiving Water Data at Dry Dock *n*
Location ID No. (e.g., RSW-00*n*): _____

Parameter	Highest Value	Range	Units	Test Method	Method Detection Limit	Number of Samples
Total Suspended Solids						
Settleable Solids						
Oil and Grease						
Chromium III						
Chromium VI						
Copper						
Lead						
Nickel						
Zinc						
PCBs						
Tributyltin						

Reference Water Data
Location ID No. (e.g., RSW-00[N+1]): _____

Parameter	Highest Value	Range	Units	Test Method	Method Detection Limit	Number of Samples
Total Suspended Solids						
Settleable Solids						
Oil and Grease						
Chromium III						
Chromium VI						
Copper						
Lead						
Nickel						
Zinc						
PCBs						
Tributyltin						

Wipe Sample Data

Parameter	Highest Value	Range	Units	Test Method	Method Detection Limit	Number of Samples
Copper						

8. VICINITY MAP AND SITE LAYOUT MAP

Include vicinity map and site layout map. The vicinity map must show facility location and surrounding landmarks. Site layout map must be topographic with the following information:

- Legal facility boundaries;
- Location and identification number of each dry dock;
- Discharge points for integral ballast water used for submersion;
- Discharge points of non-contact cooling water;
- Receiving water sample locations for each dry dock;
- Reference water sample location;
- Sediment sample location for each dry dock; and
- Reference sediment sample location.

9. APPLICATION FEE AND MAILING INSTRUCTIONS

Submit application fee by check payable to “State Water Resources Control Board” to this address:

San Francisco Bay Regional Water Quality Control Board
Attn: NPDES Wastewater Division
1515 Clay Street, Suite 1400
Oakland, CA 94612

Discharges authorized under the Dry Dock General Permit are “Category 3” discharges. For the current fee, see Water Code § 2200(b)(10) (https://www.waterboards.ca.gov/resources/fees/water_quality/).

Submit this form (with signature and attachments) via email to R2NPDES.GeneralPermits@waterboards.ca.gov or as otherwise indicated at www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/general_permits.shtml.

ATTACHMENT C– NOTICE OF INTENT FORM FOR LANDSIDE STORMWATER

This **NOTICE OF INTENT** form shall be completed and submitted to apply for authorization or reauthorization to discharge stormwater associated with landside industrial activities at dry dock facilities under NPDES Permit CAG032012 (Dry Dock General Permit) to waters of the United States.

1. OWNER INFORMATION AND CERTIFICATION

The following certification shall be signed in accordance with Attachment D section 5.2. The Discharger hereby agrees to comply with and be responsible for all conditions specified in the Dry Dock General Permit.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. (40 C.F.R. § 122.22(d).)		
Signature		Date
Printed Name		Title
Owner Type (check one) ☐ Public ☐ Private ☐ Other, specify type:		New or Previously Authorized Facility (check one) ☐ New Facility ☐ Previously Authorized Facility
Company / Owner Name		
Mailing Address		Phone Number
City	County	Zip Code
Contact Person Name and Title		
Contact Person Email		Contact Person Phone Number

☐ Check here if additional owners information is attached to this form.

2. FACILITY OPERATOR INFORMATION

Facility Operator Name (if there is more than one operator, each operator must submit a separate Notice of Intent)		Facility Operator Type (check one) ☐ Public ☐ Private ☐ Other, specify type:	
Facility Name	Facility Address		
City	State	Zip Code	Phone Number
Site Size (acres):	Industrial Area Exposed to Stormwater (acres):	Percent of Site Impervious (including rooftops):	
Contact Person's Name and Title			
Contact Person's Email		Contact Person's Phone Number	
Duly Authorized Representative: The following individual (or any individual occupying the position listed below) may act as the facility's duly authorized representative and may sign and certify submittals in accordance with Attachment D section 5.2.3. This individual shall be responsible for the overall operation of the facility or for facility environmental matters.			
Name			
Title			
Company/Organization			
Street Address			
City	State	Zip Code	Phone Number
Email			

☐ Check here if information for additional operators is attached to this form.

3. DISCHARGE INFORMATION, RECEIVING WATERS, AND MONITORING LOCATIONS

DISCHARGE INFORMATION	
Discharge to Receiving Water: ☐ Direct ☐ Via storm drain system	**Storm drain system owner:**
RECEIVING WATER NAME:	

MONITORING LOCATIONS		
Stormwater Monitoring Location Name (STW-00n)[1]	**Latitude** (degrees, to five decimal places)	**Longitude** (degrees, to five decimal places)
STW-001		

[1] Stormwater must be monitored at each stormwater discharge point. "*n*" is the number designation of the stormwater discharge point.

☐ Check here if information for additional monitoring locations is attached to this form.

4. SITE LAYOUT MAP

Include a site layout map. The site layout map must show the facility location and surrounding landmarks, including storm drain system, stormwater discharge points. The site layout map must be topographic with the following information:

- Legal facility boundaries;
- Location and identification number of each dry dock;
- Landside stormwater discharge point(s);
- Landside stormwater monitoring location(s) (i.e., STW-00n);
- Landside general stormwater flow direction;
- Landside stormwater drainage area(s); and
- Receiving water

5. APPLICATION MAILING INSTRUCTIONS

Submit this form (with signature and attachments) via email to R2NPDES.GeneralPermits@waterboards.ca.gov or as otherwise indicated at www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/general_permits.shtml

ATTACHMENT D – STANDARD PROVISIONS

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ATTACHMENT D – STANDARD PROVISIONS

1. STANDARD PROVISIONS – PERMIT COMPLIANCE

1.1. Duty to Comply

1.1.1. The Discharger must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (40 C.F.R. § 122.41(a); Wat. Code, §§ 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, 13385.)

1.1.2. The Discharger shall comply with effluent standards or prohibitions established under CWA section 307(a) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

1.2. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

1.3. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

1.4. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

1.5. Property Rights

1.5.1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

1.5.2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

1.6. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i); Wat. Code, §§ 13267, 13383):

1.6.1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(i); 40 C.F.R. § 122.41(i)(1); Wat. Code, §§ 13267, 13383);

1.6.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(2); Wat. Code, §§ 13267, 13383);

1.6.3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. § 1318(a)(4)(B)(ii); 40 C.F.R. § 122.41(i)(3); Wat. Code, §§ 13267, 13383); and

1.6.4. Sample or monitor, at reasonable times, for the purposes of ensuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. § 1318(a)(4)(B); 40 C.F.R. § 122.41(i)(4); Wat. Code, §§ 13267, 13383.)

1.7. Bypass

1.7.1. Definitions

1.7.1.1. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)

1.7.1.2. “Severe property damage” means substantial physical damage to property; damage to the treatment facilities, which causes them to become inoperable; or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)

1.7.2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur that does not cause exceedances of effluent limitations, but only if it is for essential maintenance to ensure efficient operation. These bypasses are not

subject to the provisions listed in Standard Provisions – Permit Compliance sections 1.7.3, 1.7.4, and 1.7.5 below. (40 C.F.R. § 122.41(m)(2).)

1.7.3. **Prohibition of bypass.** Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):

1.7.3.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));

1.7.3.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

1.7.3.3. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance section 1.7.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

1.7.4. **Approval.** The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance section 1.7.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

1.7.5. **Notice**

1.7.5.1. **Anticipated bypass.** If the Discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the date of the bypass. The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(i).)

1.7.5.2. **Unanticipated bypass.** The Discharger shall submit a notice of an unanticipated bypass as required in Standard Provisions – Reporting section 5.5 below (24-hour notice). The notice shall be sent to the Regional Water Board. As of December 21, 2025, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 below. Notices shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(m)(3)(ii).)

1.8. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1.8.1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance section 1.8.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).)

1.8.2. **Conditions necessary for a demonstration of upset.** A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

1.8.2.1. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

1.8.2.2. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

1.8.2.3. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting section 5.5.2.2 below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

1.8.2.4. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance section 1.3 above. (40 C.F.R. § 122.41(n)(3)(iv).)

1.8.3. **Burden of proof.** In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

2. STANDARD PROVISIONS – PERMIT ACTION

2.1. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

2.2. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

2.3. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and Water Code. (40 C.F.R. §§ 122.41(l)(3), 122.61.)

3. STANDARD PROVISIONS – MONITORING

3.1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

3.2. Monitoring must be conducted according to test procedures approved under 40 C.F.R. part 136 for the analyses of pollutants unless another method is required under 40 C.F.R. chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 C.F.R. part 136 for the analysis of pollutants or pollutant parameters or as required under 40 C.F.R. chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

3.2.1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, and either the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

3.2.2. The method has the lowest ML of the analytical methods approved under 40 C.F.R. part 136 or required under 40 C.F.R. chapter 1, subchapter N, for the measured pollutant or pollutant parameter.

3.3. In the case of pollutants or pollutant parameters for which there are no approved methods under 40 C.F.R. part 136 or otherwise required under 40 C.F.R. chapter 1, subchapter N, monitoring must be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 C.F.R. §§ 122.21(e)(3), 122.41(j)(4), 122.44(i)(1)(iv).)

4. STANDARD PROVISIONS – RECORDS

4.1. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

4.2. Records of monitoring information shall include:

4.2.1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

4.2.2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

4.2.3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4.2.4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

4.2.5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

4.2.6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

4.3. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

4.3.1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

4.3.2. Permit applications and attachments, permits, and effluent data. (40 C.F.R. § 122.7(b)(2).)

5. STANDARD PROVISIONS – REPORTING

5.1. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or U.S. EPA within a reasonable time, any information that the Regional Water Board, State Water Board, or U.S. EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or U.S. EPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, §§ 13267, 13383.)

5.2. Signatory and Certification Requirements

5.2.1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or U.S. EPA shall be signed and certified in accordance with Standard Provisions – Reporting sections 5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.6 below. (40 C.F.R. § 122.41(k).)

5.2.2. For a corporation, all permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (2) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to ensure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 C.F.R. § 122.22(a)(1).)

For a partnership or sole proprietorship, all permit applications shall be signed by a general partner or the proprietor, respectively. (40 C.F.R. § 122.22(a)(2).)

For a municipal, state, federal, or other public agency, all permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA). (40 C.F.R. § 122.22(a)(3).).

5.2.3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or U.S. EPA shall be signed by a person described in Standard Provisions – Reporting section 5.2.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

5.2.3.1. The authorization is made in writing by a person described in Standard Provisions – Reporting section 5.2.2 above (40 C.F.R. § 122.22(b)(1));

5.2.3.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or

position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

5.2.3.3. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

5.2.4. If an authorization under Standard Provisions – Reporting section 5.2.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting section 5.2.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5.2.5. Any person signing a document under Standard Provisions – Reporting section 5.2.2 or 5.2.3 above shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 C.F.R. § 122.22(d).)

5.2.6. Any person providing the electronic signature for documents described in Standard Provisions – Reporting sections 5.2.1, 5.2.2, or 5.2.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting section 5.2, and shall ensure that all relevant requirements of 40 C.F.R. part 3 (Cross-Media Electronic Reporting) and 40 C.F.R. part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 C.F.R § 122.22(e).)

5.3. Monitoring Reports

5.3.1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.41(l)(4).)

5.3.2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board. All reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 and comply

with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. (40 C.F.R. § 122.41(l)(4)(i).)

5.3.3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 C.F.R. part 136, or another method required for an industry-specific waste stream under 40 C.F.R. chapter 1, subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Regional Water Board or State Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

5.3.4. Calculations for all limitations that require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

5.4. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

5.5. Twenty-Four Hour Reporting

5.5.1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 21, 2025, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted to the Regional Water Board and must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting section 5.10 The reports shall comply with 40 C.F.R. part 3, 40 C.F.R. section 122.22, and 40 C.F.R. part 127. The

Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(6)(i).)

5.5.2. The following shall be included as information that must be reported within 24 hours:

5.5.2.1. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

5.5.2.2. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.5.3. The Regional Water Board may waive the above required written report on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

5.6. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

5.6.1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 C.F.R. section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

5.6.2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order unless the discharge is an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a). (40 C.F.R. § 122.41(l)(1)(ii).) If the discharge is an existing manufacturing, commercial, mining, or silvicultural discharge as referenced in 40 C.F.R. section 122.42(a), this notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under 40 C.F.R. section 122.42(a)(1) (see Additional Provisions – Notification Levels section 7.1.1). (40 C.F.R. § 122.41(l)(1)(ii).)

5.7. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 C.F.R. § 122.41(l)(2).)

5.8. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting sections 5.3, 5.4, and 5.5 above at the time

monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting section 5.5 above. For noncompliance related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting section 5.5 and the applicable required data in appendix A to 40 C.F.R. part 127. The Regional Water Board may also require the Discharger to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 C.F.R. § 122.41(l)(7).)

5.9. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or U.S. EPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

5.10. Initial Recipient for Electronic Reporting Data

The owner, operator, or duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 C.F.R. part 127 to the initial recipient defined in 40 C.F.R. section 127.2(b). U.S. EPA will identify and publish the list of initial recipients on its website and in the Federal Register, by state and by NPDES data group [see 40 C.F.R. section 127.2(c)]. U.S. EPA will update and maintain this list. (40 C.F.R. § 122.41(l)(9).)

6. STANDARD PROVISIONS – ENFORCEMENT

The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, Water Code sections 13268, 13385, 13386, and 13387.

7. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

7.1. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 C.F.R. § 122.42(a)):

7.1.1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels” (40 C.F.R. § 122.42(a)(1)):

7.1.1.1. 100 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(1)(i));

7.1.1.2. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4 dinitrophenol and 2-methyl 4,6 dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(1)(ii));

7.1.1.3. Five (5) times the maximum concentration reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(1)(iii)); or

7.1.1.4. The level established by the Regional Water Board in accordance with 40 C.F.R. section 122.44(f). (40 C.F.R. § 122.42(a)(1)(iv).)

7.1.2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 C.F.R. § 122.42(a)(2)):

7.1.2.1. 500 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(2)(i));

7.1.2.2. 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(2)(ii));

7.1.2.3. Ten (10) times the maximum concentration reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(2)(iii)); or

7.1.2.4. The level established by the Regional Water Board in accordance with 40 C.F.R. section 122.44(f). (40 C.F.R. § 122.42(a)(2)(iv).)

7.2. Publicly Owned Treatment Works (POTWs)

7.2.1. All POTWs shall provide adequate notice to the Regional Water Board of any new introduction of pollutants into the POTW from an indirect discharger that would be subject to CWA sections 301 or 306 if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)).

7.2.2. All POTWs shall provide adequate notice to the Regional Water Board of any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of this Order. (40 C.F.R. § 122.42(b)(2).)

7.2.3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Clean Water Act (CWA) section 308 and 40 C.F.R. sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. This MRP establishes monitoring, reporting, and recordkeeping requirements that implement the federal and State laws and regulations.

1. GENERAL MONITORING PROVISIONS

1.1. Each Discharger shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 C.F.R. section 122.63.

1.2. Each Discharger shall conduct all monitoring in accordance with Attachment D section 3. Equivalent test methods must be more sensitive than those specified in 40 C.F.R. section 136 and must be specified in this permit or the Discharger's Authorization to Discharge.

1.3. For the analysis of monitoring samples, each Discharger shall use laboratories certified by the State Water Resources Control Board (State Water Board) in accordance with Water Code section 13176 and shall obtain quality assurance/quality control data with laboratory reports. For any onsite field tests (e.g., pH) analyzed by a noncertified laboratory, the Discharger shall implement a Quality Assurance-Quality Control Program. Each Discharger shall keep a manual onsite containing the steps followed in this program and shall demonstrate sufficient capability to adequately perform these field tests (e.g., qualified and trained employees, properly calibrated and maintained field instruments). The program shall conform to U.S. EPA guidelines or other approved procedures.

1.4. If required by U.S. EPA, each Discharger shall ensure that the results of the Discharge Monitoring Report-Quality Assurance (DMR-QA) Study or most recent Water Pollution Performance Evaluation Study are submitted annually to the State Water Board at the following address:

State Water Resources Control Board
Quality Assurance Program Officer
Office of Information Management and Analysis
1001 I Street
Sacramento, CA 95814

2. MONITORING LOCATIONS

Each Discharger shall establish the following monitoring locations to demonstrate compliance with this Order:

Table E-1. Monitoring Locations

Monitoring Location Type	Monitoring Location [1]	Monitoring Location Description
Exposed Deck of Dry Dock	EFF-00n	Randomly selected areas on dry dock n deck that have been exposed to wastes from operations (three areas at a minimum, each a minimum of one square foot).
Receiving Water at Dry Dock	RSW-00n-L	For each dry dock, location near the perimeter or end of dry dock n, close to Monitoring Location SED-00n-L.
Reference Water	RSW-R00N	Water location at sufficient distance from dry dock and other potential discharges to represent reference conditions (close to Monitoring Location SED-R00N).
Sediment at Dry Dock	SED-00n-L	For each dry dock, location where representative sediment samples may be collected at the perimeter of dry dock n, close to Monitoring Location RSW-00n-L.
Reference Sediment	SED-R00N	Sediment location at sufficient distance from dry dock and other potential discharges to represent reference conditions (close to Monitoring Location RSW-R00N). [2]
Stormwater	STW-00N	Locations representing each stormwater discharge point prior to contact with receiving water, where a representative stormwater sample can be obtained.

Footnotes:

[1] Receiving water shall be monitored at one location per dry dock, at minimum, and sediment shall be monitored at one location per dry dock, at minimum. For Monitoring Locations EFF-00n, RSW-00n-L, and SED-00n-L, "n" is the number designation of the dry dock and "L" is the number designation of the monitoring location for that dry dock. For Monitoring Locations RSW-R00N, SED-R00N, and STW-00N, "N" is the number designation of the monitoring location. For example, if there are two floating dry docks, each with two receiving water monitoring locations, two sediment monitoring locations, two reference water monitoring locations, two reference sediment monitoring locations, and two stormwater monitoring locations, the location names shall be as follows:

- Dry dock monitoring locations: EFF-001 and EFF-002.
- Receiving water monitoring locations: RSW-001-1, RSW-001-2, RSW-002-1, and RSW-002-2.
- Reference water monitoring locations: RSW-R001 and RSW-R002.
- Sediment monitoring locations: SED-001-1, SED-001-2, SED-002-1 and SED-002-2.
- Reference sediment monitoring locations: SED-R001 and SED-R002
- Stormwater monitoring locations: STW-001 and STW-002

Regardless of the number of dry docks, one reference water and one reference sediment location are required, at minimum.

[2] Reference sediment monitoring locations shall be located in areas expected to be uninfluenced by the discharge of pollutants of concern and shall be representative of habitat characteristics of the assessment area (e.g., salinity, grain size).

3. DRY DOCK SURFACE MONITORING REQUIREMENTS

3.1 Prior to each incident of flooding or submergence of each dry dock, each Discharger shall observe the cleanliness of the dry dock surfaces. Each Discharger shall record observations with the date and time of dry dock use and other observations relevant to the discharge of wastes. Each Discharger shall note any conditions requiring correction, such as the presence of waste materials. Each Discharger shall correct any such condition prior to dry dock flooding or

submergence. Inspection reports shall identify the inspector's name, title, and any corrective actions taken.

3.2 The Discharger shall conduct monitoring at Monitoring Locations EFF-00n as described below:

3.2.1 **Wipe Sampling Locations.** Three samples are required for each sampling event for Monitoring Locations EFF-00n. Prior to each sampling event, sample locations shall be selected by a randomized grid procedure. Sample locations shall be recorded and reported in quarterly self-monitoring reports. To assess the amount of pollutant remaining on the dry dock after cleaning and before submergence, three areas shall be selected randomly from a grid on the dry dock deck. At each area, wipe samples shall be collected for analysis of copper.

3.2.2. **Wipe Sampling Procedures.** Samples shall be collected using commercially available wipe test kits for the collection of metals. The wipe sample shall be collected using a lead dust sampling wipe, 5 inches by 7.75 inches, pre-moistened with water, polysorbate 20, methylparaben, and propylparaben and placed in a sterile digestion tube. The results of the analyses shall be reported as micrograms per square foot (µg/sq.ft.). The Discharger shall follow U.S. EPA-recommended procedures, including but not limited to EPA/600/R-07/004, January 2007; EPA/540/P-91/008 (OSWER Directive 9360.4-07), January 1991; and 40 C.F.R. section 761.123.

3.2.3. **Wipe Sampling Frequency.** Dry dock surfaces shall be sampled quarterly for copper at each dry dock whenever vessel cleaning was conducted during the quarter. This monitoring shall occur after the cleaning and no more than four days prior to flooding or submergence of the dry dock.

3.2.4. **Wipe Sample Trigger.** Copper wipe data shall be compared to the copper trigger of 1,400 µg/sq.ft.

3.2.5. **Accelerated Monitoring.** If the wipe test monitoring result shows an exceedance of the copper trigger of 1,400 µg/sq.ft., the Discharger shall conduct accelerated monitoring as follows until three consecutive monitoring events provide results below the trigger:

3.2.5.1. For results that exceed the trigger by less than two times the trigger (i.e., results from 1,400 µg/sq.ft. through 2,800 µg/sq.ft.), the accelerated monitoring frequency shall be monthly (or, if the dry dock is not flooded or submerged for more than one month, until the next flooding or submergence event); or

3.2.5.2. For results that exceed the trigger by more than two times the trigger (i.e., results above 2,800 µg/sq.ft.), the accelerated monitoring frequency shall be once before each flooding or submergence event after working on any vessel in the dry dock.

3.3. If the sampling protocol specified in MRP section 3.2 proves unworkable or unreliable, a Discharger may propose an alternate procedure. The Discharger may commence use of the alternate procedure with written Executive Officer concurrence. The dry dock wipe tests should be coordinated with receiving water sampling to maximize the usefulness of the data set in determining whether dry dock operations are resulting in water quality objective exceedances within the receiving water.

4. RECEIVING WATER MONITORING

Each Discharger shall monitor receiving waters at Monitoring Locations RSW-00n-L and RSW-R00N as specified below:

Table E-2. Receiving Water Monitoring

Parameter	Unit	Sample Type	RSW-001 [1]
Total Suspended Solids	mg/L	Grab	1/Year
Settleable Solids	mg/L	Grab	1/Year
Oil and Grease	mg/L	Grab	1/Year
Metals, Total Recoverable [2]	µg/L	Grab	1/Year
PCBs	µg/L	Grab	1/Year
Tributyltin	µg/L	Grab	1/Year
Standard Observations [3]	-	-	1/Event

Footnotes:

[1] Receiving water monitoring shall be performed as soon as feasible following a flooding/submergence event, and no more than 6 hours following the flooding/submergence event. Receiving water monitoring shall be performed at least once each year for a flooding/submergence event for which dry dock deck wipe samples have been collected, as described in MRP section 3.

[2] Metals shall include chromium III, chromium VI, copper, lead, nickel, and zinc.

[3] See MRP section 7.2.2.1.3.1.

5. SEDIMENT MONITORING

Each Discharger shall perform sediment monitoring once during this Order term, consistent with the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions* (State Water Board, 2018), to evaluate sediment toxicity, benthic community condition, and sediment chemistry. Sediment sampling shall occur outside the influence of any dredging, if possible. Dredging activity in the vicinity of the monitoring locations during sampling shall be described in annual reports.

5.1. Monitoring Locations. The Discharger shall conduct sediment monitoring at Monitoring Locations SED-00n-L and SED-R00N.

5.2. Field Procedures. For sediment toxicity and chemistry analyses, grab samples shall be collected from the upper 5 centimeters (cm) of the sediment surface. For benthic community conditions analyses, grab samples shall be collected with a minimum penetration depth of 5 cm and the entire sample contents shall be

collected. In all cases, sediment samples shall be screened through a 0.5 millimeter-mesh screen.

5.3. Test Methods. All samples shall be tested and evaluated as described in the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions,* sections IV.A.1.e (Laboratory Testing), IV.A.1.f (Sediment Toxicity), IV.A.1.g (Benthic Community Condition), and IV.A.1.h (Sediment Chemistry). Sediment chemistry samples shall be tested for the analytes below:

Table E-3. Sediment Chemistry Monitoring

Parameter	Unit	Sample Type	Minimum Sampling Frequency
Total Organic Carbon	mg/kg	Grab	Once
Percent Fines	%	Grab	Once
Metals, Total Recoverable [1]	µg/kg	Grab	Once
PCBs [2]	µg/kg	Grab	Once
Pesticides [2]	µg/kg	Grab	Once
PAHs [2]	µg/kg	Grab	Once
Tributyltin	µg/kg	Grab	Once

Footnotes:

[1] Metals include cadmium, chromium III, chromium VI, copper, lead, mercury, nickel, and zinc.

[2] PCBs, pesticides, and PAHs include those listed in *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions*, Appendix A-3.

5.4. Integrated Sediment Assessment. The Discharger shall conduct an integrated sediment assessment in accordance with *Water Quality Control Plan for Enclosed Bays and Estuaries of California*, *Sediment Quality Provisions*, sections IV.A.1.i and IV.A.1.j to determine the aquatic life sediment quality attained at the sediment monitoring location. Determination of the presence of a line of evidence effect (i.e., biologically significant chemical exposure, toxicity, or benthic community disturbance) shall be based on a comparison to a numeric response value or a statistical comparison to a result for a reference station. Comparison to reference station results shall be accomplished by compiling data for appropriate regional reference sites and determining the reference envelope using statistical methods (e.g., tolerance interval).

5.5. Sediment Stressor Identification Study. If the Discharger determines sediments at any dry dock sediment monitoring location (i.e., a non-reference sediment monitoring location) are “Likely Impacted” or “Clearly Impacted” through sediment monitoring assessments, it shall proceed with conducting a sediment stressor identification study in accordance with *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions,* section IV.A.4.f. The stressor identification study shall seek characterization of pollutant related impacts, pollutant identification, and source identification to determine whether sediment impacts are linked to dry dock operations. The Discharger shall prioritize stressor identification to the monitoring locations designated as “Clearly Impacted,”

followed by “Likely Impacted.” At least 30 days before initiating the study, the Discharger shall develop and submit a workplan to the Regional Water Board.

For monitoring locations designated as “Possibly Impacted,” the Discharger shall conduct confirmation monitoring in accordance with MRP section 5. The Discharger shall initiate a stressor identification study if the monitoring location is confirmed as “Likely Impacted” or “Clearly Impacted.”

5.6. Regional Coordination. The Discharger may choose to coordinate sediment monitoring with the Regional Monitoring Program to collect and analyze sediment samples. (The Regional Monitoring Program may decline to coordinate its activities with the Discharger.) If coordinating with the Regional Monitoring Program, the Discharger may monitor at the frequency chosen by the Regional Monitoring Program for its regional monitoring purposes (i.e., discharger sediment samples may be collected and analyzed with Regional Monitoring Program sediment samples), but in no case shall the monitoring frequency be less than once during this Order term. If the Discharger chooses to coordinate with the Regional Monitoring Program, it shall indicate so and describe the coordination in its annual report submitted pursuant to MRP section 7.2.2.2.4.

6. LANDSIDE STORMWATER MONITORING

Each Discharger that has enrolled for coverage of its landside (non-dry dock) industrial stormwater discharges shall conduct stormwater monitoring at Monitoring Location STW-00N as described below:

Table E-4. Landside Stormwater Monitoring

Parameter	Unit	Sample Type	Minimum Sampling Frequency
pH	standard units	Grab	4 Storms/Year [3]
Total Suspended Solids	mg/L	Grab	4 Storms/Year [3]
Oil and Grease	mg/L	Grab	4 Storms/Year [3]
Aluminum, Total Recoverable	µg/L	Grab	4 Storms/Year [3]
Copper, Total Recoverable	µg/L	Grab	4 Storms/Year [3]
Lead, Total Recoverable	µg/L	Grab	4 Storms/Year [3]
Zinc, Total Recoverable	µg/L	Grab	4 Storms/Year [3]
Sampling Event Visual Observations [1]	-	-	4 Storms/Year [3]
BMP Visual Observations [2]	-	-	4 Storms/Year [3]

Footnotes:

[1] See MRP section 6.2.

[2] See MRP section 6.3.

[3] The Discharger shall collect and analyze samples from two storms between July 1 and December 31 and two storms between January 1 and June 30.

6.1. Sample Collection and Frequency. The Discharger shall conduct stormwater monitoring at all locations identified in its Notice of Intent form (i.e., Monitoring Location STW-00N). Grab samples shall be collected when the precipitation event

produces a discharge from at least one drainage area and the precipitation event is preceded by 48 hours with no discharge from any drainage area. Samples shall be taken during the first 30 minutes of the discharge. If collection during the first 30 minutes is impracticable, grab samples may be taken during the first hour of the discharge, and the Discharger shall explain in the Annual Stormwater Report why the grab samples could not be taken within the first 30 minutes. Samples shall represent the quality and quantity of stormwater discharged from the facility.

6.2. Sampling Event Visual Observations. The Discharger shall make the following observations when collecting stormwater samples:

6.2.1. Floating and suspended materials: presence or absence of floating material, such as oil, grease, algae, and other macroscopic particulate matter.

6.2.2. Discoloration and turbidity: description of color, source, and size of affected area.

6.2.3. Odor: presence or absence, characterization, source, distance of travel, and wind direction.

6.2.4. Weather conditions: air temperature and total precipitation during the five days prior to observation.

6.3. BMP Visual Observations. The Discharger shall visually observe equipment, storage areas, and BMPs within each drainage area for the presence or indication of prior, current, or potential unauthorized non-stormwater discharges and their sources; and correct BMP implementation if necessary.

The monthly visual observations shall be conducted during daylight hours of scheduled facility operating hours and on days without precipitation. The Discharger shall explain any uncompleted monthly visual observations in the Annual Stormwater Report.

7. REPORTING REQUIREMENTS

7.1. General Reporting Requirements

Each Discharger shall comply with all Standard Provisions (Attachments D) related to monitoring, reporting, and recordkeeping.

7.2. Self-Monitoring Reports (SMRs)

7.2.1. **Format.** Each Discharger shall submit self-monitoring reports (SMRs) and cover letters via email to R2NPDES.GeneralPermits@waterboards.ca.gov and as further instructed in its Authorization to Discharge. At any time during the term of this Order, the State or Regional Water Board may notify the Discharger to electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) website

(http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide additional information for SMR submittal in the event of a planned service interruption.

7.2.2. **Due Dates and Contents.** Each Discharger shall submit quarterly SMRs and annual reports by the due dates and with the contents specified below:

7.2.2.1. **Quarterly SMRs** — Quarterly SMRs shall be due the first day of the second month following each calendar quarter (January 1 – March 31, April 1 – June 30, July 1 – September 30, and October 1 – December 31), covering that calendar quarter. Each SMR shall contain the items listed below:

7.2.2.1.1. Cover letter that includes the following information:

7.2.2.1.1.1. Clear identification of any violations or a clear statement that there were no violations.

7.2.2.1.1.2. Compliance evaluation summary that identifies the following:

- Types of samples obtained during the monitoring period;
- Number and concentrations of samples that exceed the trigger;
- Violations of any prohibition, effluent limitation, discharge specification, or receiving water limitation; and
- Any failure to follow the BMPs Plans.

7.2.2.1.1.3. Detailed description of any violations, their causes, and proposed time schedule for corrective actions taken or planned to resolve the violations and prevent recurrence. If previous reports address the corrective actions, then reference the earlier reports.

7.2.2.1.1.4. Signature and certification in accordance with Attachment D sections 5.2 and 5.3.

7.2.2.1.2. All new monitoring results obtained since submitting the last SMR. If the Discharger monitors any pollutant more frequently than required by this Order, the Discharger shall include the results of such monitoring in the calculations and reporting for the SMR. If the analytical data for samples collected during a quarter are unavailable for incorporation into that quarterly SMR, then the status of laboratory reports shall be reported and the data shall be included in the next quarterly SMR.

7.2.2.1.3. Tabulated results of all monitoring specified in the MRP, including wipe tests, receiving water monitoring, standard observations, and sediment monitoring, as follows:

7.2.2.1.3.1. **Standard Observations.** Each Discharger shall tabulate standard observations to show the location, date of observation, and compliance or lack thereof for each of the following observations:

7.2.2.1.3.1.1. Floating and suspended materials (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

7.2.2.1.3.1.2. Discoloration and turbidity: color, source, and size of affected area.

7.2.2.1.3.1.3. Odor: presence or absence, characterization, source, and distance of travel.

7.2.2.1.3.1.4. Beneficial water use: estimated number of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities.

7.2.2.1.3.1.5. Hydrographic condition: time and height of high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time).

7.2.2.1.3.1.6. Weather conditions: wind direction, air temperature, and total precipitation during five days prior to observation.

7.2.2.1.3.2. **Analytical Results.** Each Discharger shall arrange all analytical and field test results in a tabular format to clearly illustrate compliance or lack thereof with the effluent limits and receiving water limits, and any exceedances of the trigger in Provision 6.3.4 of the Order. Tabulated monitoring data shall include the monitoring location name (e.g., EFF-00n, SED-00n-L, RSW-00n-L), sample date, sample type, parameter, test results, units, corresponding analytical method detection limits, minimum levels, reporting levels, and related quantification parameters as signed by the laboratory director or other responsible laboratory official. Laboratory reports shall be included in an appendix.

7.2.2.1.4. Discussion of BMPs for responses to trigger exceedances (see Provision 6.3.4), including wipe sampling dates and dates when the Discharger received results; and BMPs reviewed and how they relate to the trigger exceedance.

7.2.2.1.5. Explanation of the circumstances of any dredging activity in the vicinity of the sediment sampling locations (see MRP section 5).

7.2.2.1.6. Monitoring results for any pollutant sampled more frequently than required by this Order.

7.2.2.1.7. Clear statement regarding whether the dry dock cleaning procedures in the BMPs Plan were followed.

7.2.2.1.8. Dry dock flooding or submergence data in a tabulated format. Tabulated data shall also include the dry dock identification number/name, vessel names and types, docking dates, and undocking dates. Each dry dock

shall be listed in the table; if a dry dock was not flooded or submerged during the quarter, this information shall also be documented in the table.

7.2.2.1.9. Identification, in a tabular format, of each vessel that discharged non-contact cooling water to the receiving water. Tabulated data shall include an estimate of the daily flow in gallons per day, the duration of discharge, and whether and how the BMPs in the BMPs Plan were used to lower the temperature prior to discharge.

7.2.2.2. **Annual SMR** — Annual SMRs shall be due February 15 each year, covering the previous calendar year. Annual SMRs shall cover the period of January 1 through December 31 and contain the items described below:

7.2.2.2.1. Annual compliance summary.

7.2.2.2.2. Comprehensive discussion of performance and compliance. This summary shall include any corrective actions taken or planned, such as changes to equipment or operations that may be needed to achieve compliance and any other actions taken or planned that are intended to improve the performance and reliability of the Discharger's practices.

7.2.2.2.3. Both tabular (one year) and graphical (five years) summaries of monitoring data (the Discharger shall identify trends, if any, in pollutant concentrations found in wipe or receiving water samples for previous years).

7.2.2.2.4. Description of regional coordination with the Regional Monitoring Program, as applicable.

7.2.2.2.5. Annual Comprehensive Site Compliance Evaluation Report as required by Provision 6.3.3.1.4 of the Order.

7.2.2.2.6. Annual Non-Contact Cooling Water Compliance Evaluation Report as required by Provision 6.3.5 of the Order.

7.2.3. **Monitoring Periods.** Monitoring periods for all required monitoring shall be as set forth in the table below:

Table E-5. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On	Monitoring Period
1/Event for wipe sampling	Effective date of Authorization to Discharge	After dry dock deck cleaning and no more than four days prior to dry dock flooding or submergence
1/Year	Closest January 1 before or after effective date of Authorization to Discharge [1]	January 1 through December 31

Sampling Frequency	Monitoring Period Begins On	Monitoring Period
Once	Effective date of Authorization to Discharge	Once during the term of the Order so that all related information is submitted no later than January 5, 2028.

Footnote:

[1] Monitoring performed before the effective date of an Authorization to Discharge may be used to satisfy the monitoring required by this Order.

7.2.4. **RL and MDL Reporting for Receiving Water and Sediment Sampling.** The Discharger shall report with each receiving water sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 C.F.R. part 136. The Discharger may select any analytical methods described in 40 C.F.R. part 136; however, the RLs shall be below applicable water quality objectives. Otherwise, RLs shall be as low as possible. The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

7.2.4.1. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

7.2.4.2. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported. For purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means the laboratory considers appropriate.

7.2.4.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected" or "ND."

7.2.4.4. The Discharger shall instruct laboratories to establish calibration standards so that the lowest calibration standard is at or below the minimum level specified below (or its equivalent if there is differential treatment of samples relative to calibration standards). At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. The table below lists minimum levels for priority pollutants:

Table E-6. Minimum Levels

CTR No.	Parameter	Suggested Analytical Method [1]	Minimum Level (ug/L) [2]
	Aluminum, Total Recoverable	200.5	4.9
5a	Chromium (III)	SM 3500	-

CTR No.	Parameter	Suggested Analytical Method [1]	Minimum Level (ug/L) [2]
	Aluminum, Total Recoverable	200.5	4.9
5b	Chromium (VI)	SM 3500	10
	Chromium (total) [3]	SM 3500	10
6	Copper, Total Recoverable	200.9	5.0
7	Lead, Total Recoverable	200.9	5.0
9	Nickel, Total Recoverable	249.2	5.0
	Tributyltin	SM 6710B	-
13	Zinc, Total Recoverable	200 or 289	20
119-125	PCBs: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260	608	0.50

Footnotes:

[1] The suggested method is the U.S. EPA Method unless otherwise specified (SM = Standard Methods). The Discharger may use another U.S. EPA approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Discharger may use any standard method.

[2] Minimum levels are from the State Implementation Policy or, for aluminum, U.S. EPA Method 200.5.

[3] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium water quality criterion (11 µg/L).

7.3. Sediment Stressor Identification Report

When applicable, the Discharger shall submit a Sediment Stressor Identification Report no later than January 5, 2028, that covers the work performed as required by MRP section 5.4. The Discharger shall plan accordingly so that workplans, studies, and reports are completed within a reasonable period after detecting potential sediment quality impacts at sediment monitoring locations.

7.4. Annual Stormwater Report. When applicable, the Discharger shall submit an Annual Stormwater Report by July 15 each year providing data for the previous year (July 1 through June 30). The Annual Stormwater Report shall, at a minimum, include the following:

7.3.1. Identification of any non-compliance within the reporting year, with discussion of response actions;

7.3.2 Tabulated summary of all monitoring results (see MRP Table E-4) and visual observations taken during inspections;

7.3.3. Comprehensive discussion of source identification and control programs for oil and grease, pH, TSS, aluminum, copper, lead, zinc, and any other chemical constituents that should not be present in stormwater; and

7.3.4. Comprehensive discussion of corrective actions taken or planned, including but not limited to a summary of BMP changes implemented during the previous year and changes planned for the following year.

7.5. Discharge Monitoring Reports (DMRs)

The Discharger shall submit Discharge Monitoring Reports (DMRs) in accordance with Attachment D section 5.3.2 if instructed to do so by the Regional Water Board or State Water Board.

7.6. Violations and Unauthorized Discharges

7.6.1. Within 24 hours of becoming aware of a violation of this Order, the Discharger shall report by telephone or email to the Regional Water Board staff overseeing this Order (see Authorization to Discharge).

7.6.2. The Discharger shall report spills to the California Office of Emergency Services (telephone 800-852-7550) when spills meet or exceed applicable reportable quantities for hazardous materials.

7.6.3. The Discharger shall submit a written report to the Regional Water Board within five business days following the telephone or email notifications described in sections 7.6.1 and 7.6.2 above unless directed otherwise by Regional Water Board staff in writing. Electronic submittal is acceptable. The written report shall include the following:

7.6.3.1. Date, time and duration of violation or spill;

7.6.3.2. Location of violation or spill (street address or description of location);

7.6.3.3. Nature of violation or material spilled;

7.6.3.4. Volume and quantity of any material involved;

7.6.3.5. Receiving water affected, if any;

7.6.3.6. Cause of violation or spill;

7.6.3.7. Estimated size of affected area;

7.6.3.8. Observed receiving water impacts (e.g., oil sheen, fish kill, or water discoloration);

7.6.3.9. Actions taken to correct violation or to contain, minimize, or clean up spill;

7.6.3.10. Future corrective actions planned to prevent recurrence and implementation schedule; and

7.6.3.11. Persons or agencies notified.

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ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in section 2.2 of the Order, the Regional Water Board incorporates this Fact Sheet as findings supporting the issuance of the Order.

1. PERMIT INFORMATION

1.1. This Order regulates discharges from dry dock operations. It reissues NPDES General Permit CAG032012, which the Regional Water Board adopted through Order R2-2017-0027 (previous order) on July 12, 2017. The previous order became effective September 1, 2017.

1.2. Site owners and operators that complete an NOI and apply for an Authorization to Discharge under this Order, and that are granted such authorization, are hereinafter called “Dischargers.” For purposes of this Order, references to “discharger” or “permittee” in applicable federal and State laws, regulations, plans, and policies are held to be equivalent to references to Discharger herein.

2. FACILITY AND DISCHARGE DESCRIPTIONS

2.1. Facility Descriptions. This Order is for dry dock operations located within the San Francisco Bay Region. Dischargers that enroll under this Order use floating dry docks or graving dry docks to get ships and other vessels into and out of the water.

2.1.1. **Floating Dry Docks.** With a floating dry dock, the vessel is moved into position over supports on the dry dock deck, which is partially submerged under the vessel. The water is then pumped out of ballast tanks into adjacent waters to raise the dry dock and vessel out of the water. After work is completed, the process is reversed (ballast tanks are filled) to submerge the dry dock and refloat the vessel.

2.1.2. **Graving Dry Docks.** When a graving dry dock is flooded, a vessel is brought into the dry dock and positioned onto support blocks. The dock end is closed with a caisson (dry dock “door”), and the dock is emptied of all water via a sump pump that discharges the water. The vessel is then left standing on the support blocks. When work is completed, water is pumped back into the dry dock to refloat the vessel. The caisson is opened, and the vessel may leave the dry dock.

2.2. Discharge Description. Discharges covered by this Order are described in Fact Sheet sections 2.2.1 through 2.2.6 below.

2.2.1. **Discharges from Dry Dock Surfaces.** Discharges regulated by this Order consist of water that washes over the dry docks when they are submerged or flooded. Water flowing over dry dock surfaces can carry particulates and other

residual material. Shipyard activities can involve many sources of pollutants, including blast abrasives, paint chips, cutting and welding slag, paper trash, discarded materials, sediment, marine growth, oil, solvents, and plastics. When work on a vessel is complete, the dry dock deck, or floor, is swept, and debris that ends up on the dry dock floor is removed prior to submerging or flooding the dry dock. Any residual particulate matter remaining on the floor of the dry dock after cleanup has the potential to contact water when the dry dock is submerged or flooded.

2.2.2. **Discharges of Non-Contact Cooling Water.** This Order covers non-contact cooling water associated with vessels undergoing maintenance and repair. Such vessels may have crew living on-board while in dry dock. In those situations, on-board equipment, such as heating, air conditioning, and power generation equipment, continues to operate. This equipment requires cooling water to remove waste heat. This cooling water is pumped from adjacent surface water, through heat exchangers, and then returned to the same water body.

2.2.3. **Discharges of Integral Ballast Water.** Floating dry docks use integral ballast water to raise and lower vessels into and out of the water.

2.2.4. **Discharges of Fire Suppression Water.** This Order covers fire suppression water when the source of the water is the same as the receiving water (i.e., salt water, not potable water). Dischargers may occasionally release over-pressure from the fire protection systems that circulate water for fire suppression when needed.

2.2.5. **Discharges of Stormwater from Dry Dock Surfaces after Cleaning.** When no shipyard activity is occurring and the dry docks are clean, stormwater runoff from dry dock surfaces may be discharged.

2.2.6. **Discharges of Stormwater from Landside Facilities Associated with Dry Docks.** This Order covers stormwater discharges from onshore structures and surfaces, including piers, associated with dry dock facilities. Runoff from these industrial areas may carry particulate and residual material, including blast abrasives, paint chips, cutting and welding slag, paper trash, discarded materials, sediment, marine growth, oil, solvents, and plastics. Dischargers may enroll landside stormwater discharges under this Order or maintain coverage under the statewide General Permit for Storm Water Discharges Associated with Industrial Activities (Industrial General Permit), NPDES Permit CAS000001. Dischargers may terminate coverage under the Industrial General Permit for any landside stormwater discharges covered under this Order as of the effective date of an Authorization to Discharge.

2.2.7. Discharges NOT covered by this Order. This Order does not cover process water used in ship dismantling operations, seepage water from graving dry dock walls, seepage water from graving dry dock caissons, ballast water from

vessels in dry dock, and stormwater runoff from dry dock surfaces collected in dry dock sumps. This Order also does not cover sanitary wastewater. Such wastewaters must be disposed of in accordance with applicable federal, State, and local laws and other requirements. The State Water Board developed the Industrial General Permit for stormwater discharges associated with industrial activities. Stormwater discharges not commingled with other wastewaters may be covered under the Industrial General Permit.

2.3. Discharge Points and Receiving Waters. Dischargers may discharge to any receiving waters in the San Francisco Bay Region, which, for purposes of this Order, include Central, Lower, and South San Francisco Bay; San Pablo Bay; Carquinez Strait; Mare Island Strait; Suisun Bay; and the Sacramento-San Joaquin Delta. The NOI form in Attachment B requires Dischargers to specify their discharge locations and show them on a topographic map.

2.4. Previous Order Requirements. The previous order imposed discharge prohibitions, receiving water limitations, narrative effluent limitations, and provisions requiring the implementation of Best Management Practices (BMPs) to ensure that dry dock surfaces are clean and free of pollutants prior to submergence or flooding. As a component of the required BMPs, the previous order required routine collection of wipe samples of dry dock surfaces prior to submergence or flooding. It required Dischargers to analyze the samples for copper, which potentially results from ship repair, rebuilding, and dismantling operations. It contained a trigger (1,800 micrograms per square foot [µg/sq.ft.]) that, when exceeded, required Dischargers to reexamine and, if possible, improve their cleaning procedures to reduce residual contaminants on dry dock surfaces. Wipe sample test results from the previous order term are summarized below:

Table F-1. Wipe Sample Test Results

Parameter	Unit	Mare Island Dry Dock LLC	Lind Marine LLC	Bay Ship & Yacht Co.
Copper	µg/sq. ft.	13 – 22,000	62 – 2,300	1.2 – 3,900

2.5. Compliance Summary

Three dischargers were enrolled under the previous order during previous order term. Their compliance with the previous order is described below:

2.5.1. **Mare Island Dry Dock LLC.** On April 24, 2018, Regional Water Board staff inspected Mare Island Dry Dock LLC and observed BMP deficiencies for landside industrial stormwater management and response to trigger exceedances. The deficiencies primarily related to spill containment and leak prevention measures, container labeling practices, accelerated monitoring for copper, and facility staff training following a trigger exceedance. The Discharger addressed the deficiencies when it submitted a corrective action report.

2.5.2. **Lind Marine LLC.** On May 2, 2018, Regional Water Board staff inspected Lind Marine LLC and observed BMP deficiencies for landside industrial stormwater

management and dry dock cleaning. The deficiencies primarily related to maintenance of stormwater inlets; outdoor storage practices of equipment, scrap metal, and materials; and spill containment measures for fuel containers. The Discharger addressed and corrected the deficiencies when it submitted a corrective action report.

2.5.3. **Bay Ship & Yacht Co.** On May 8, 2018, Regional Water Board staff inspected Bay Ship & Yacht Co. and observed BMP deficiencies for landside industrial stormwater management and dry dock cleaning. The deficiencies primarily related to spill containment and leak prevention measures for waste and fuel containers, and container labeling practices. The Discharger addressed the deficiencies when it submitted a corrective action report.

On July 3, 2019, Regional Water Board staff issued a notice of violation to Bay Ship & Yacht Co. for violations identified in 2018 and 2019 quarterly and annual reports. This included failure to collect wipe samples and conduct accelerated monitoring following copper trigger exceedances, to report standard observations, and to notify the Regional Water Board of its intent to perform comprehensive site compliance evaluations. The Discharger addressed these violations when it submitted a corrective action report.

3. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities

This Order serves as WDRs pursuant to California Water Code article 4, section 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the U.S. EPA, and Water Code section 5.5, division 7 (commencing with § 13370). It serves as an NPDES permit for point source discharges to surface waters from enrolled facilities.

3.2. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act (CEQA), Public Resources Code division 13, section 3 (commencing with § 21100).

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin

Plan. In addition, this Order implements State Water Board Resolution 88-63, which established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Receiving water beneficial uses include some or all of the following:

- Agricultural Supply
- Commercial and Sport Fishing
- Estuarine Habitat
- Fish Migration
- Fish Spawning
- Groundwater Recharge
- Industrial Process Supply
- Industrial Service Supply
- Municipal and Domestic Supply
- Navigation
- Preservation of Rare or Endangered Species
- Shellfish Harvesting
- Water Contact Recreation
- Non-Contact Water Recreation
- Wildlife Habitat

3.3.2. **Thermal Plan.** The State Water Board adopted the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan) on January 7, 1971, and amended this plan on September 18, 1975. This plan contains temperature objectives for surface waters. It defines “thermal waste” as cooling water and industrial process water used for the purpose of transporting waste heat; therefore, some discharges covered by this Order are thermal wastes subject to the Thermal Plan. This Order implements the Thermal Plan.

3.3.3. **Sediment Quality.** The State Water Board adopted the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* on September 16, 2008, and amended this plan on June 5, 2018. This plan supersedes other narrative sediment quality objectives and establishes sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries. This Order implements the sediment quality objectives of this plan.

3.3.4. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** The NTR and CTR contain federal water quality criteria for priority pollutants. U.S. EPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 NTR criteria apply in California. U.S. EPA adopted the CTR on May 18, 2000. The CTR promulgated new toxics criteria for California and incorporated the NTR criteria that applied in the State. U.S. EPA amended the CTR on February 13, 2001.

3.3.5. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP establishes implementation provisions for priority pollutant criteria and objectives, and provisions for chronic toxicity control. The SIP became effective on April 28, 2000, with respect to the priority pollutant

criteria U.S. EPA promulgated for California through the NTR and the priority pollutant objectives the Regional Water Board established through the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria U.S. EPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. Requirements of this Order implement the SIP.

3.3.6. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, which incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.

3.3.7. **Anti-Backsliding Requirements.** CWA sections 402(o) and 303(d)(4) and 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.8. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050 to 2097) or Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. Dischargers are responsible for meeting all applicable Endangered Species Act requirements.

3.4. Impaired Water Bodies on CWA section 303(d) List

On April 6, 2018, U.S. EPA approved a revised list of impaired waters pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. This list includes San Francisco Bay as a waterbody impaired by mercury, PCBs, selenium, chlordane, DDT, dieldrin, dioxin and furan compounds, and invasive species. Where it has not done so already, the Regional Water Board plans to adopt total maximum daily loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload

allocations for point sources and load allocations for nonpoint sources and are established to achieve water quality standards.

The SIP requires effluent limitations for all 303(d)-listed pollutants to be consistent with TMDLs and associated wasteload allocations. A TMDL for mercury became effective February 12, 2008, and a TMDL for PCBs became effective March 29, 2010. Neither TMDL contains wasteload allocations for dry docks because dry docks are not known to be significant sources of mercury. Dry docks could be a source of PCBs, but receiving water and sediment monitoring completed during the previous order term did not detect any PCBs associated with dry dock discharges. A TMDL for selenium in North San Francisco Bay became effective on August 23, 2016. This TMDL does not contain wasteload allocations for dry dock facilities because these facilities are not known to be sources of selenium. Dry docks are also not known to be significant sources of chlordane, DDT, dieldrin, dioxin and furan compounds, or invasive species.

4. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards, and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters.

4.1. Discharge Prohibitions

4.1.1. Prohibitions in this Order

4.1.1.1. **Discharge Prohibition 3.1. (No discharge other than as described):** This prohibition is based on 40 C.F.R. section 122.21(a) and Water Code section 13260, which require filing an application and Report of Waste Discharge before a discharge can occur. Discharges not described in the application and Report of Waste Discharge, and subsequently in this Order, are prohibited.

4.1.1.2. **Discharge Prohibition 3.2. (No discharge of sanitary wastewater):** This prohibition is necessary because the requirements of this Order do not address sanitary wastewater. Sanitary wastewater discharges must meet secondary treatment standards and other requirements. This Order's requirements do not implement these standards so sanitary discharges are prohibited.

4.1.1.3. **Discharge Prohibition 3.3. (No discharge of solid materials and wastes, spent abrasive and paint residues):** This prohibition is based on Basin

Plan Table 4-1, Discharge Prohibitions 6 and 7, which prohibit discharges of stable toxic and deleterious substances and discharges of solid wastes. The rationale for this prohibition is to minimize the discharge of persistent toxic pollutants and solid wastes.

4.1.1.4. **Discharge Prohibition 3.4. (No discharge of oil and floating materials):** This prohibition is based on Basin Plan Table 4-1, Discharge Prohibitions 8 and 13, which prohibit the discharge of oil and other petroleum products, and other floating materials, to protect birds and other wildlife from possible toxic effects.

4.1.1.5. **Discharge Prohibition 3.5. (No discharge of oil or any residuary product of petroleum):** This prohibition is based on Basin Plan Table 4-1, Discharge Prohibition 13, which prohibits the discharge of oil and residuary product of petroleum to protect birds and other wildlife, except as allowed by Water Code division 7.

4.1.1.6. **Discharge Prohibition 3.6. (No discharge of ballast water from vessels in dry dock):** This prohibition is necessary because ballast water from vessels in dry dock may contain invasive species and the requirements of this Order do not reflect the discharge of such ballast water.

4.1.1.7. **Discharge Prohibition 3.7. (No discharge of power washing or pressure washing water, boiler drainage, or other process wastewater):** This prohibition is necessary because the requirements of this Order do not reflect the discharge of power washing or pressure washing water, boiler drainage, or any process water; thus, this Order prohibits these discharges. Wash waters are to be collected for discharge to a sanitary sewer system or through other legal means not subject to this Order.

4.1.1.8. **Discharge Prohibition 3.8. (No discharge of seepage water or stormwater):** This prohibition is necessary because the requirements of the Order do not address seepage water from dry dock walls or caissons or stormwater runoff from dry dock surfaces when vessels are being processed. Seepage or stormwater could contain pollutants not controlled by the BMPs specified in this Order; thus, this Order may not sufficiently protect water quality if seepage water or stormwater were discharged.

4.1.1.9. **Discharge Prohibition 3.9. (No discharge of fire suppression water containing chemical additives):** This prohibition is necessary because the requirements of this Order do not reflect the discharge of fire suppression water, for purposes of system testing or pressure relief, into a receiving water from which it does not originate, or that contains chemical additives. Fire suppression water could contain pollutants not controlled by the BMPs specified in this Order, thus, this Order may not sufficiently protect water quality if fire suppression water is discharged.

4.1.2. Basin Plan Discharge Prohibition 1

Basin Plan Table 4-1, Discharge Prohibition 1, prohibits the discharge of any wastewater that has particular characteristics of concern to beneficial uses at any point at which the wastewater does not receive a minimum initial dilution of at least 10:1, or into any nontidal water. This prohibition is intended to provide an added degree of protection from the continuous effect of discharges and provide a buffer against the effects of abnormal discharges caused by temporary upsets or malfunctions. Basin Plan section 4.2 allows exceptions to Discharge Prohibition 1 in the following circumstances:

- An inordinate burden would be placed on the discharger relative to the beneficial uses protected, and an equivalent level of environmental protection can be achieved by alternate means; or
- A discharge is approved as part of reclamation project; or
- A net environmental benefit will be derived as a result of the discharge; or
- A discharge is approved as part of a groundwater cleanup project.

The Basin Plan further states:

> In reviewing requests for exceptions, the Water Board will consider the reliability of the discharger's system in preventing inadequately treated wastewater from being discharged to the receiving water and the environmental consequences of such discharges.

The 10:1 dilution requirement was intended to accommodate treatment plant upsets. Discharges from the dry dock facilities covered by this Order are neither continuous nor subject to upset. In any case, providing an initial dilution of at least 10:1 would be impracticable for dry dock discharges; dischargers would likely need to construct a deepwater outfall costing millions of dollars, capture all water that washes over their dry docks and related facilities, and route that water through the deepwater outfall, constituting an inordinate burden for Dischargers. Moreover, Provisions 6.3.3 through 6.3.7 of the Order requiring development and implementation of BMPs to control potential pollutants provides an equivalent level of water quality protection.

4.2. Technology-Based Effluent Limitations

CWA section 301(b) and 40 C.F.R. section 122.44 require that permits include conditions meeting technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet water quality standards. The CWA requires that technology-based effluent limitations (TBELs) be established based on several levels of control:

- **Best practicable treatment control technology (BPT)**. BPT represents the average of the best existing performance by well-operated facilities within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants.

- **Best available technology economically achievable (BAT).** BAT represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

- **Best conventional pollutant control technology (BCT).** BCT represents the control from existing industrial point sources of conventional pollutants, including biochemical oxygen demand, total suspended solids, fecal coliform, pH, and oil and grease. BCT standards are established after considering the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result and the cost effectiveness of additional industrial treatment beyond BPT.

- **New source performance standards (NSPS).** NSPS represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

The CWA requires U.S. EPA to develop effluent limitations, guidelines, and standards representing the application of BPT, BAT, BCT, and NSPS. CWA section 402(a)(1) and 40 C.F.R. section 125.3 authorize the use of best professional judgment to derive technology-based effluent limitations on a case-by-case basis whenever U.S. EPA has not promulgated effluent limitations, guidelines, and standards. When best professional judgment is used, the Regional Water Board must consider specific factors outlined in 40 C.F.R. section 125.3.

U.S. EPA has not promulgated effluent limitations, guidelines, or standards for the ship building and repair industry; however, U.S. EPA conducted an extensive study of the ship building and repair industry and issued the *Development Document for Proposed Best Management Practices for the Shipbuilding and Repair Industry: Dry Docks Point Source Category* (December 1979). U.S. EPA concluded, “This industry is such that numerical effluent limitations are impractical and difficult to apply in a manner which could be monitored…” and “…Best Management Practices (BMP) have been developed for general application and should be considered as guidance in lieu of numerical limitations.” Therefore, this Order (Provisions 6.3.3 through 6.3.7) contains narrative BMP-based requirements that represent BPT controls based on best professional judgement. In setting these limits, the factors specified in 40 C.F.R. sections 125.3(d)(1) and (3) were considered:

Table F-2. Factors Considered Pursuant to 40 C.F.R. Section 125.3(d)

Factors	Considerations
Cost of application of technology relative to effluent reduction benefits	The cost of imposing these limits is reasonable given that existing Dischargers can comply through their existing processes. Thorough cleaning of dry dock surfaces using brushes and vacuums is achievable in the context of dry dock operations. Readily available motorized equipment can be used to remove potential pollutants, providing a substantial benefit relative to the total cost incurred.
Age of equipment and facilities	The limitations can be met with existing equipment and facilities. Dry docks, some of which may be old, cannot be readily altered. However, new and effective equipment (brooms, power washers, etc.) can be used to collect and remove potential pollutants.
Process employed	The limitations can be met with existing processes. Methodical cleaning operations can be specified in the Best Management Practices Plan and can be readily monitored for compliance. No unusual or technically challenging processes are required.
Engineering aspects of various controls	The existing controls are practicable and capable of meeting these limits. The process of sweeping, scrubbing, and cleaning dry dock surfaces does not lend itself to more sophisticated engineering controls.
Process changes	No process changes are necessary to meet these limits. Existing dry dock operators have been cleaning the surfaces of their dry docks after ship maintenance operations and prior to submergence or flooding for years. No specific process changes are required.
Non-water quality environmental impacts	Because no process changes are necessary, no non-water-quality impacts are foreseeable. Waste materials would continue to be removed from dry docks and recycled or properly disposed of as appropriate.

4.3. Water Quality-Based Effluent Limitations

4.3.1. Scope and Authority

CWA section 301(b) and 40 C.F.R. section 122.44(d) require permits to include limitations more stringent than federal technology-based requirements where necessary to achieve water quality standards. According to 40 C.F.R. section 122.44(d)(1)(i), permits must include effluent limitations for all pollutants that are or may be discharged at levels that have a reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective, water quality-based effluent limitations (WQBELs) must be established using (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting a narrative

criterion, supplemented with relevant information. The process for determining reasonable potential and calculating WQBELs when necessary is intended to achieve applicable water quality objectives and criteria, and thereby protect designated beneficial uses of receiving waters. This Order imposes WQBELs for pollutants with reasonable potential to cause or contribute to exceedances of water quality standards. 40 C.F.R. section 122.44(k) allows use of BMPs in place of numeric effluent limitations when numeric effluent limitations are infeasible, as is the case with discharges from dry dock surfaces from submergence or flooding, stormwater runoff after cleaning, and landside industrial stormwater runoff.

4.3.2. **Beneficial Uses and Water Quality Criteria and Objectives**

Fact Sheet section 3.3.1 identifies the potential beneficial uses of the receiving waters for discharges subject to this Order. Water quality criteria and objectives to protect these beneficial uses are described below:

4.3.2.1. **Basin Plan Objectives.** The Basin Plan specifies numeric water quality objectives for many pollutants to protect aquatic life (see Basin Plan section 3.3.21). It also specifies narrative water quality objectives, such as the narrative toxicity objective: “All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.”

4.3.2.2. **CTR Criteria.** The CTR specifies numeric aquatic life and human health criteria for numerous priority pollutants. These criteria apply to inland surface waters and enclosed bays and estuaries. Some human health criteria are for consumption of “water and organisms” and others are for consumption of “organisms only.” Waters with municipal or domestic supply beneficial use designation are subject to the “water and organisms” criteria.

4.3.2.3. **NTR Criteria.** The NTR establishes numeric aquatic life and human health criteria for a number of toxic pollutants for San Francisco Bay waters upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta.

4.3.2.4. **Thermal Plan**. The Thermal Plan defines specific water quality objectives for specific circumstances. Although the objectives differ somewhat for enclosed bays versus estuaries, and existing discharges versus new discharges, they essentially require the following:

- Discharge temperatures must protect beneficial uses;
- Discharge temperatures may be no more than four degrees Fahrenheit (ºF) above the natural temperature of the receiving waters; and
- Discharge temperatures may not be higher than 86ºF.

4.3.2.5. **Sediment Quality Objectives.** The *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions,* contains the following narrative water quality objectives:

4.3.2.5.1. "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This objective is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this objective, it is to impose the objective as a receiving water limit.

4.3.2.5.2. "Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health in bays and estuaries of California." This objective is to be implemented by a three-tiered procedure based on pollutant concentrations in sediment and fish tissue.

4.3.2.5.3. "Pollutants shall not be present in sediment at levels that alone or in combination are toxic to wildlife and resident finfish by direct exposure or bioaccumulate in aquatic life at levels that are harmful to wildlife or resident finfish by indirect exposure in bays and estuaries of California." This objective is to be implemented on a case-by-case basis, based upon an ecological risk assessment.

4.3.3. **Reasonable Potential Analysis**

Assessing whether a pollutant has reasonable potential to exceed a water quality objective is the fundamental step in determining whether a WQBEL is required. Data representative of effluent quality are unavailable due to the nature of the discharges; therefore, this reasonable potential analysis is based on the nature of dry dock operations and the shipyard industry in general. This Order finds that there is reasonable potential if TBELs implemented as BMPs are not adequately implemented and therefore not protective of water quality objectives.

4.3.3.1. **Discharges from Dry Dock Surfaces.** Based on industry practices and operations, there is reasonable potential for residual material to be washed into the receiving water when a dry dock is submerged or flooded. Such material may contain metals common to the shipyard industry (e.g., chromium, copper, lead, nickel, and zinc) and tributyltin at concentrations that could cause or contribute to exceedances of water quality objectives. This determination is based on the Oregon Department of Environmental Quality and U.S. EPA Office of Enforcement and Compliance Assurance documents, which provide descriptions of the pollutants generated during vessel maintenance and overhaul work. These documents also suggest that

PCBs could be discharged from dry docks, but receiving water and sediment monitoring completed during the previous order term did not detect PCBs associated to dry dock discharges. The documents are as follows:

- *Best Management Practices for Oregon Shipyards*, Oregon Department of Environmental Quality, 2000;
- *USEPA Office of Compliance Sector Notebook Project: Profile of the Shipbuilding and Repair Industry*, U.S. EPA Office of Enforcement and Compliance Assurance, 1997; and
- *A Guide for Ship Scrappers*, U.S. Office of Enforcement and Compliance Assurance, 2000, EPA 315-B-00-001.

4.3.3.2. **Integral Ballast Water.** Integral ballast water is water drawn from the receiving water, stored in the ballasts of a floating dry dock, and returned to the receiving water. There is no reasonable potential for any pollutant because there is no opportunity to introduce any pollutant to a floating dry dock's integral ballasts.

4.3.3.3. **Non-Contact Cooling Water.** Vessels in dry dock may continue to operate on-board heating and cooling systems that use non-contact cooling water taken from the adjacent surface water and return it to the same water body. In such cases, the returned cooling water contains waste heat that is then dissipated into the receiving water. There is thus reasonable potential for this waste heat to exceed Thermal Plan water quality objectives.

4.3.3.4. **Fire Suppression Water.** Fire suppression water is drawn from the receiving water and immediately returned to the receiving water. There is no reasonable potential for any pollutant because there is no opportunity to introduce any pollutant before the water is discharged.

4.3.3.5. **Stormwater from Dry Dock Surfaces after Cleaning.** There is reasonable potential for stormwater collected from dry dock surfaces after cleaning takes place if the BMPs required by Provisions 6.3.4 and 6.3.5 of the Order are not adequately implemented. Proper implementation of these BMPs would remove any pollutants from the dry dock surfaces.

4.3.3.6. **Landside Stormwater Discharges.** There is reasonable potential for stormwater collected from landside surfaces to cause or contribute to exceedances of water quality objectives because runoff may carry pollutants (e.g., particulate material, metals, oil and grease) washed off from onshore equipment, structures, and surfaces associated with dry dock facilities.

4.3.3.7. **Sediment.** Pollutants in some receiving water sediments may be present in quantities that alone or in combination are toxic to benthic communities. To determine potential sediment quality impacts from dry dock operations, the

previous order required sediment monitoring to evaluate three lines of evidence (LOEs): sediment toxicity, benthic community condition, and sediment chemistry.

4.3.3.7.1. **Sediment Toxicity.** Sediment toxicity measures the response of invertebrates exposed to surficial sediments under controlled laboratory conditions. The sediment toxicity LOE is used to assess both pollutant-related and biological effects and exposure. Sediment toxicity tests are of short durations and may not duplicate exposure conditions in natural systems. This LOE provides a measure of exposure to all pollutants present, including non-traditional or unmeasured chemicals. Sediment toxicity results are classified into one of the following four categories:

- Nontoxic: response is not substantially different from that expected in sediments that are uncontaminated and have optimum characteristics for the test species (e.g., control sediments);
- Low toxicity: response is of relatively low magnitude; response may not be greater than test variability;
- Moderate toxicity: response is of moderate magnitude and there is a high confidence that a statistically significant toxic effect is present; or
- High toxicity: response is of high magnitude and there is a high confidence that a statistically significant toxic effect is present.

4.3.3.7.2. **Benthic Community Condition.** Benthic community condition measures species composition, abundance, and diversity of the sediment-dwelling invertebrates inhabiting surficial sediments. The benthic community LOE is used to assess impacts to the primary receptors targeted for protections in bays and estuaries of California. Benthic community composition is a measure of the biological effects of both natural and anthropogenic stressors. Benthic community condition is classified into one of the following four categories:

- Reference: community composition equivalent to least affected or unaffected site;
- Low disturbance: community exhibits some indication of stress but could be within measurement error of unaffected condition;
- Moderate disturbance: community exhibits clear evidence of physical, chemical, natural, or anthropogenic stress; or
- High disturbance: community exhibits high magnitude of stress.

4.3.3.7.3. **Sediment Chemistry.** Sediment chemistry measures the concentration of chemicals of concern in surficial sediment. This sediment LOE is used to assess the potential risk to benthic organisms from toxic pollutants in surficial sediments. The sediment chemistry LOE is intended only to evaluate overall exposure risk from chemical pollutants in surficial sediment. It does not determine causality between exposure risk and specific chemicals. Sediment chemistry results are classified into one of the following four exposure categories:

- Minimal exposure: sediment-associated contamination may be present, but exposure is unlikely to result in effects;
- Low exposure: small increase in pollutant exposure that may be associated with increased effects, but magnitude or frequency of occurrence of biological impacts is low;
- Moderate exposure: clear evidence of sediment pollutant exposure that is likely to result in biological effects; or
- High exposure: pollutant exposure highly likely to result in possibly severe biological effects; generally present in small percentage of samples.

4.3.3.7.4. **Integrated Sediment Assessment.** Assessment as to whether the aquatic life sediment quality objective has been attained at a sediment monitoring location is accomplished by interpreting and integrating multiple lines of evidence (MLOE). None of the individual LOEs are sufficiently reliable when used alone to assess sediment quality impacts. However, each LOE produces information that, when integrated with the other LOEs, provides a more confident assessment of sediment quality relative to the sediment quality objectives.

Assessment categories are assigned to the three LOEs and evaluated to determine the final assessment for each sediment monitoring location. The assessment category represented by each of the possible MLOE combinations reflects the presence and severity of two characteristics of the sample: severity of biological effects and potential for chemical-mediated effects:

- Severity of biological effects: severity of biological effects present at a site is determined by integrating the toxicity LOE and benthic condition LOE using the decision matrix in Table F-3.
- Potential for chemical-mediated effects: potential for effects to be chemical-mediated is determined by integrating the toxicity LOE and chemistry LOE using the decision matrix presented in Table F-4.

Table F-3. Severity of Biological Effects Matrix

		Sediment Toxicity LOE Category			
		Nontoxic	**Low Toxicity**	**Moderate Toxicity**	**High Toxicity**
Benthic Community Condition LOE Category	**Reference**	Unaffected	Unaffected	Unaffected	Low Effect
	Low Disturbance	Unaffected	Low Effect	Low Effect	Low Effect
	Moderate Disturbance	Moderate Effect	Moderate Effect	Moderate Effect	Moderate Effect
	High Disturbance	Moderate Effect	High Effect	High Effect	High Effect

Table F-4. Potential for Chemical-Mediated Effects Matrix

		Sediment Toxicity LOE Category			
		Nontoxic	**Low Toxicity**	**Moderate Toxicity**	**High Toxicity**
Sediment Chemistry LOE Category	**Minimal Exposure**	Minimal Potential	Minimal Potential	Low Potential	Moderate Potential
	Low Exposure	Minimal Potential	Low Potential	Moderate Potential	Moderate Potential
	Moderate Exposure	Low Potential	Moderate Potential	Moderate Potential	Moderate Potential
	High Disturbance	High Exposure	Moderate Potential	High Potential	High Potential

The MLOE combines the intermediate classifications for severity of biological effect and potential for chemical-mediated effect result into one of the following six categories:

- Unimpacted: confident that sediment contamination is not causing significant adverse impacts to aquatic life living in the sediment at the site;
- Likely unimpacted: sediment contamination at the site is not expected to cause adverse impacts to aquatic life, but some disagreement among the LOE reduces the certainty in classifying the site as unimpacted;
- Possibly impacted: sediment contamination at the site may be causing adverse impacts to aquatic life, but these impacts are either small or uncertain because of disagreement among the LOE;

- Likely impacted: evidence for a contaminant-related impact to aquatic life at the site is persuasive, even if there is some disagreement among the LOE;

- Clearly Impacted: sediment contamination at the site is causing clear and severe adverse impacts to aquatic life; or

- Inconclusive: disagreement among the LOE suggests that either the data are suspect or that additional information is needed before a classification can be made.

Table F-5. Assessment Matrix

		Severity of Effect			
		Unaffected	**Low Effect**	**Moderate Effect**	**High Effect**
Potential for Chemical-Mediated Effects	**Minimal Potential**	Unimpacted	Likely Unimpacted	Likely Unimpacted	Inconclusive [1]
	Low Potential	Unimpacted	Likely Unimpacted	Possibly Impacted	Possibly Impacted
	Moderate Potential	Likely Unimpacted	Possibly Impacted or Inconclusive [1]	Likely Impacted	Likely Impacted
	High Potential	Inconclusive [1]	Likely Impacted	Clearly Impacted	Clearly Impacted

Determination of the presence of an LOE effect (i.e., biologically significant chemical exposure, toxicity, or benthic community disturbance) is based on a comparison to a numeric response value or a statistical comparison to reference monitoring locations. The numeric values or statistical comparisons (e.g., confidence interval) used to classify a LOE as “Effected” are specified in sections IV.A.1.f through IV.A.1.h of the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions* to indicate “High Chemical Exposure,” “High Toxicity,” or “High Disturbance.” Reference monitoring locations are to be located in an area expected to be uninfluenced by the discharge or pollutants of concern in the assessment area and representative of other habitat characteristics of the assessment area (e.g., salinity, grain size). Comparison to reference monitoring locations is accomplished by compiling data for appropriate regional reference sites and determining the reference envelope using statistical methods (e.g., tolerance intervals).

4.3.3.7.5. **Discharger Sediment Assessments.** In 2019 and 2022, Dischargers performed sediment monitoring consistent with the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions.* MLOE-based sediment assessments for dry dock monitoring locations and reference monitoring locations (unimpacted by dry dock operations) are summarized below:

Table F-6. MLOE-based Sediment Assessments

Discharger	Monitoring Location	Chemical Exposure	Benthic Disturbance	Toxicity	Final Assessment
Mare Island Dry Dock LLC	SED-001	Low	Moderate	Nontoxic	Likely Unimpacted
	SED-002	Low	Moderate	Low	Possibly Impacted
	SED-003	Moderate	Moderate	Low	Likely Impacted
	Reference (SED-005)	Low	Moderate	Nontoxic	Likely Unimpacted
Lind Marine LLC	SED-004	Low	Moderate	Nontoxic	Likely Unimpacted
	Reference (SED-005)	Low	Moderate	Nontoxic	Likely Unimpacted
Bay Ship & Yacht Co.	SED-001	Moderate	Moderate	Nontoxic	Possibly Impacted
	SED-002	Moderate	Moderate	Low	Likely Impacted
	Reference (SED-003)	High	Moderate	Low	Likely Impacted

Based on these assessments, it is unclear whether dry dock discharges cause or contribute to pollutants in sediments in quantities that, alone or in combination, are toxic to benthic communities. Moderate benthic community disturbance has been observed at all monitoring locations, including reference monitoring locations that are outside the influence of dry dock operations. Chemical exposure data also show the presence of pollutants unrelated to dry dock discharges, such as polycyclic aromatic hydrocarbons, in comparable concentrations between dry dock and reference monitoring locations. Additional studies are needed before concluding that dry dock discharges are linked to sediment quality impacts.

While the impact of dry dock discharges on sediment quality is unclear, this Order conservatively finds reasonable potential that discharges authorized under this Order could cause or contribute to an exceedance of the sediment objectives; therefore, consistent with the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions,* this Order imposes the sediment objectives as receiving water limits (see Provisions 5.1.3 through 5.1.5 of the Order). Furthermore, the Monitoring and Reporting Program (MRP) section 5.5 requires confirmation monitoring for sediments categorized as “Possibly

Impacted," and stressor identification studies for sediments categorized as "Likely Impacted" and "Clearly Impacted" to clarify the potential impacts dry dock discharges could have on sediment quality and to inform future reasonable potential analyses. This requirement is consistent with section IV.A.4.f of the plan.

4.3.4. Water Quality-Based Effluent Limitations

Dry dock discharges of thermal wastes, metals common to the shipyard industry (e.g., chromium, copper, lead, nickel, and zinc), and tributyltin exhibit reasonable potential to cause or contribute to exceedances of water quality objectives. Similarly, landside stormwater discharges containing metals (e.g., aluminum, copper, lead, and zinc), oil and grease, and particulate material can cause or contribute to exceedances of water quality objectives. However, the establishment, evaluation, and enforcement of numeric effluent limitations for these pollutants are infeasible because representative effluent samples cannot readily be obtained from these types of discharges. These discharges are most appropriately controlled through BMPs, as set forth in Provisions 6.3.3 through 6.3.6 of the Order. CWA section 304(e) authorizes the use of BMPs as narrative effluent limitations. In accordance with 40 C.F.R. section 122.44(k), BMPs can be used to control or abate the discharge of pollutants when numeric effluent limitations are infeasible, or when BMPs are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. This Order, therefore, contains narrative discharge specifications that require implementation of BMPs that cover the pollutants with reasonable potential.

4.4. Discharge Requirement Considerations

4.4.1. **Anti-Backsliding.** This Order complies with the anti-backsliding provisions of CWA sections 402(o) and 303(d)(4), and 40 C.F.R. section 122.44(l), which generally require effluent limitations in a reissued permit to be as stringent as those in the previous order. The requirements of this Order are at least as stringent as those in the previous order.

4.4.2. **Antidegradation.** This Order complies with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16. It does not authorize lowering water quality as compared to the level of discharge authorized in the previous order, which is the baseline by which to measure whether degradation will occur. This Order does not allow for an increased flow, a reduced level of treatment, or increased effluent limitations relative to the previous order. Therefore, further analysis and findings authorizing degradation are unnecessary.

4.4.3. **Stringency of Requirements for Individual Pollutants.** This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based requirements implement minimum, applicable

federal technology-based requirements. In addition, this Order contains more stringent effluent limitations as necessary to meet water quality standards. Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement CWA requirements.

This Order's WQBELs have been derived to implement water quality objectives that protect beneficial uses. The beneficial uses and water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 C.F.R. section 131.38. The procedures for calculating these WQBELs are based on the CTR, as implemented in accordance with the SIP, which U.S. EPA approved on May 18, 2000. U.S. EPA approved most Basin Plan beneficial uses and water quality objectives prior to May 30, 2000. Beneficial uses and water quality objectives submitted to U.S. EPA prior to May 30, 2000, but not approved by U.S. EPA before that date, are nonetheless "applicable water quality standards for purposes of the CWA" pursuant to 40 C.F.R. section 131.21(c)(1). U.S. EPA approved the remaining beneficial uses and water quality objectives, so they are also applicable water quality standards pursuant to 40 C.F.R. section 131.21(c)(2).

5. RATIONALE FOR RECEIVING WATER LIMITATIONS

The receiving water limitations in sections 5.1 and 5.2 of the Order are based on Basin Plan narrative and numeric water quality objectives. The receiving water limitation in section 5.3 of the Order requires compliance with federal and State water quality standards in accordance with the CWA and regulations adopted thereunder.

6. RATIONALE FOR PROVISIONS

6.1. Standard Provisions

Attachment D contains standard provisions that apply to all NPDES permits in accordance with 40 C.F.R. section 122.41 and additional conditions applicable to specific categories of permits in accordance with 40 C.F.R. section 122.42. The Discharger must comply with these provisions. The conditions set forth in 40 C.F.R. sections 122.41(a)(1) and (b) through (n) apply to all state-issued NPDES permits and must be incorporated into permits either expressly or by reference.

In accordance with 40 C.F.R. section 123.25(a)(12), states may omit or modify conditions to impose more stringent requirements. This Order also omits the federal conditions that address enforcement authority specified in 40 C.F.R. sections 122.41(j)(5) and (k)(2) because the State's enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates Water Code section 13387(e) by reference.

6.2. Monitoring and Reporting Provisions

CWA section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP establishes monitoring, reporting, and recordkeeping requirements that implement federal and State requirements. For more information, see Fact Sheet section 7.

6.3. Special Provisions

6.3.1. Reopener Provisions

These provisions are based on 40 C.F.R. sections 122.62 and 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated water quality objectives, regulations, or other new and relevant information that may become available in the future, and other circumstances as allowed by law.

6.3.2. Application for General Permit Coverage and Authorization to Discharge

These provisions require submittal of an NOI form and compliance with this Order upon receipt of an Authorization to Discharge, and are based on 40 C.F.R. section 122.28(b). They allow the Executive Officer to terminate an Authorization to Discharge based on 40 C.F.R. section 122.28(b). The provision allowing the Executive Officer to require an individual permit is based on 40 C.F.R. section 122.28(b)(3).

6.3.3. Contingency Plan

The requirement to develop a Contingency Plan to ensure proper facility operation in the event of an emergency is based on Regional Water Board Resolution 74-10. Discharge in violation of this Order where the Discharger has failed to develop and implement a Contingency Plan as the Order requires could be the basis for considering the discharge a willful and negligent violation of the Order pursuant to Water Code section 13387.

6.3.4. Best Management Practices for Cleaning Dry Dock Surfaces

Provision 6.3.4 is based on CWA section 304(e) and 40 CFR 122.44(k), which allow use of BMPs to control or abate pollutant discharges when numeric effluent limitations are infeasible. The narrative discharge specifications in this Order call for removing particulates and residuals from dry docks through scraping, sweeping, and pressure washing and taking other appropriate actions prior to submergence or flooding of any portion of a dry dock. These measures are based on guidance provided in U.S. EPA's *Development Document for*

Proposed Best Management Practices for the Ship Building and Repair Industry: Dry docks Point Source Category (1979).

6.3.5. Best Management Practices for Responses to Trigger Exceedances

Provision 6.3.5 requires Dischargers to compare the results of wipe sample tests from dry dock decks and floors after cleaning to a copper trigger set forth in the Order (1,400 µg/sq.ft.). The purposes of the trigger are (1) to provide feedback regarding how thoroughly the BMPs are being implemented and (2) to indicate whether additional BMPs may be appropriate. Accelerated monitoring requirements and BMP enhancements, if necessary, ensure that pollutants on dry dock deck surfaces are removed to the extent technologically and economically feasible. When no further BMP enhancements can be implemented, this Order allows the Executive Officer to authorize a Discharger to return to the routine monitoring frequency indicated in MRP section 3.2.3 or cease conducting wipe tests. Under such circumstances, the Regional Water Board may consider the Discharger's efforts and revise the trigger with the next permit reissuance so the trigger continues to provide feedback regarding how thoroughly the BMPs are implemented.

The trigger is not an effluent limitation and is not intended to evaluate whether discharges could cause or contribute to exceedances of water quality objectives in the receiving water. This Order requires receiving water monitoring to assess the effects of the discharge on receiving water quality.

Data collected between 2013 and July 2016 indicate that copper is a reliable indicator of BMP implementation. Only copper and zinc were detected in wipe tests at levels greater than the triggers in previous orders. Copper was detected far more frequently than zinc and, when found, exceeded its trigger by significantly greater magnitudes than zinc. Because BMPs that control copper also control zinc and other pollutants related to dry dock operations, testing for copper alone is sufficient to evaluate BMP implementation.

The trigger is calculated to relate the residual copper found on a wipe sample to a concentration potentially discharged to receiving waters after flooding or submergence. The water volume in a column of water directly above the wipe sample area is assumed to mix completely with any copper remaining on the dry dock deck or floor after cleaning. The flooded or submerged depth varies among dry docks. For a floating dry dock, the fully submerged dry dock deck lies below 20 to 40 feet of water. For a graving dry dock, the dry dock floor lies below at most 40 feet of water. To allow for a margin of safety, the copper trigger is based on one half of the depth at full submersion of the Bay Ship & Yacht dry dock in Alameda, currently the smallest dry dock in the Region. This is 10 feet or about 300 centimeters (cm) of water. The copper (measured in micrograms) on 1.0 square foot (930 square centimeters, cm^2) of dry dock area would be mixed into about 280,000 cubic centimeters of water (930 cm^2 x 300 cm of water).

Because some receiving waters may be estuarine, the copper trigger is based on the freshwater chronic toxicity criterion (5.0 micrograms per liter) in Basin Plan Table 3-4 and the CTR assuming a hardness value of 48 milligrams of calcium carbonate (mg $CaCO_3$). This is the lowest hardness recorded at two Regional Monitoring Program sampling stations (Napa River and Davis Point) relatively close to the dry docks at Mare Island. Water at this location tends to be fresher and have lower hardness than water near the other dry docks in the Region. The freshwater criterion is roughly the same as the saltwater criterion. The use of the dissolved freshwater criterion without using a translator or conversion factor to estimate total recoverable copper is conservative.

The trigger is calculated by multiplying the water quality criterion (5.0 µg/L) by the water column volume above one square foot (280 liters) to obtain 1,400 µg/sq.ft.

6.3.6. Best Management Practices for Non-Contact Cooling Water

Occasional low-volume non-contact cooling water discharges are most appropriately controlled through BMPs, as authorized by CWA section 304(e) and 40 CFR 122.44(k). BMPs are an effective way to ensure that the Thermal Plan water quality objectives are met.

6.3.7. Best Management Practices for Landside Stormwater

6.3.7.1. **Stormwater Pollution Prevention Plan.** This provision is based on Basin Plan section 4.8 and is consistent with the requirements of the Industrial General Permit.

6.3.7.2. **Best Management Practices.** This provision is based on U.S. EPA regulations in 40 C.F.R. section 122.44 (k), which refer to U.S. EPA's *Guidance Manual for Developing Best Management Practices* (October 1993, EPA 833-B-93-004). Dischargers are required to incorporate a Best Management Practices Manual by reference into their SWPPPs.

6.3.7.3. **Stormwater Monitoring and Action Levels.** This provision establishes pollutant concentrations in landside stormwater discharges to be used to evaluate BMP effectiveness. These requirements are consistent with, and at least as stringent as, the requirements of the Industrial General Permit.

7. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

CWA section 308 and 40 C.F.R. sections 122.41(h), 122.41(j)-(l), 122.44(i), and 122.48 require that NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP (Attachment E) establishes monitoring, reporting, and recordkeeping requirements that implement federal and State requirements. The following provides the rationale for the MRP requirements:

7.1. Dry Dock Surface Monitoring

The MRP establishes requirements for assessing the impact of pollutants on water flooding dry dock surfaces. It does not require direct sampling of water flushing over dry dock surfaces because collecting such samples may be unsafe and because it is impractical to control the amount of water relative to the affected surface area during these very dynamic operations, particularly for floating dry docks. Instead, the MRP requires Dischargers to collect wipe samples from randomly selected dry dock locations that could be affected by ship building, repair, and maintenance operations. Wipe tests will indicate the effectiveness of the BMPs in removing potential pollutants from the dry docks before they are submerged or flooded. Wipe samples are to be collected using solvents as described in MRP section 3. Analysis of wipe samples yields pollutant values that can be compared with the copper trigger set forth in Provision 6.3.5 of the Order and described in Fact Sheet section 6.3.5.

7.2. Receiving Water Monitoring

Receiving water monitoring is necessary to characterize the effects discharges could have on receiving waters and, in some cases, to evaluate compliance with receiving water limits. The MRP also requires receiving water monitoring to establish reference water quality conditions to evaluate whether dry docks are the cause of observed receiving water conditions. Because receiving water quality will likely remain relatively stable in San Francisco Bay, the frequency of reference monitoring is limited to once per year.

7.3. Sediment Monitoring

The MRP requires collection of sediment samples near dry docks (i.e., assessment areas). It also requires sediment monitoring farther from the dry docks, in an area expected to be uninfluenced by the discharge or pollutants of concern in the assessment area and representative of other habitat characteristics of the assessment area to establish reference conditions. The monitoring frequency is consistent with the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions*. Sediment samples are needed to determine sediment toxicity, benthic community conditions, and sediment chemistry to generate data for comparison with the sediment quality objectives.

The requirement for a Sediment Stressor Identification Study is based on section IV.A.4.f of the *Water Quality Control Plan for Enclosed Bays and Estuaries of California, Sediment Quality Provisions,* which requires Dischargers to conduct stressor identification studies when sediment monitoring determines samples are “Likely Impacted” or “Clearly Impacted.”

This Order allows Dischargers to choose to coordinate with the Regional Monitoring Program to collect and analyze sediment samples (i.e., discharger sediment samples may be collected and analyzed together with Regional

Monitoring Program sediment samples). It does not require the Regional Monitoring Program to coordinate with the Dischargers.

7.4. Landside Stormwater Monitoring

Landside stormwater monitoring is necessary to evaluate BMP effectiveness and to determine whether additional BMPs are necessary to control landside stormwater discharges.

7.5. Other Monitoring

This Order requires each Discharger to evaluate sampling data on a temporal basis to identify trends, if any. In addition, if wipe sample results indicate that the copper trigger is exceeded, the Discharger must comply with additional requirements specified in Provision 6.3.5 of the Order.

8. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for dry dock facilities in the San Francisco Bay Region. As a step in the WDR adoption process, Regional Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process.

8.1. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided an opportunity to submit written comments and recommendations. The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website at waterboards.ca.gov/sanfranciscobay.

8.2. Environmental Justice. Water Code sections 189.7 and 13149.2 require specific outreach and findings related to potential environmental justice, disadvantaged community and tribal community impact, and racial equity considerations for reissued regional WDRs. This Order requires that all discharges immediately comply with applicable water quality objectives; therefore, the nature and location of the discharges under this Order are not expected to impact environmental justice, disadvantaged communities and tribal communities, and racial equity. Nevertheless, Regional Water Board staff reached out to disadvantaged and tribal communities for consultation on this Order before the formal public comment period described in Fact Sheet section 8.3 began.

8.3. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were to be submitted either in person, by email, or by mail to the attention of Marcos De la Cruz.

Written comments were due at the Regional Water Board office by 5:00 p.m. on May 8, 2023.

8.4. Public Hearing. The Regional Water Board held a public hearing on the tentative Order during its regular meeting at the following date and time:

Date: June 14, 2023
Time: 9:00 a.m.
Contact: Marcos De la Cruz, (510) 622-2365, marcos.delacruz@waterboards.ca.gov

Interested persons were provided notice of the hearing and information on how to participate. During the public hearing, the Regional Water Board heard testimony pertinent to the discharges, and Order.

Dates and venue can change. The Regional Water Board's web address is https://www.waterboards.ca.gov/sanfranciscobay, where one can access the current agenda for changes.

8.5. Reconsideration of Waste Discharge Requirements. Any person aggrieved by this Regional Water Board action may petition the State Water Board to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050. The State Water Board must receive the petition at the following address within 30 calendar days of the date of Regional Water Board action:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

A petition may also be filed by email at waterqualitypetitions@waterboards.ca.gov.

For instructions on how to file a water quality petition for review, see waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

8.6. Information and Copying. The Report of Waste Discharge, related supporting documents, and comments received are on file and may be inspected at the Regional Water Board address above by making an appointment with the Regional Water Board's custodian of records. Document copying may be arranged by calling (510) 622-2300.

8.7. Register of Interested Persons. Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference the Facility, and provide a name, address, and phone number.

8.8. Additional Information. Requests for additional information or questions regarding this Order should be directed to Marcos De la Cruz, (510) 622-2365, marcos.delacruz@waterboards.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

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https://www.waterboards.ca.gov/sandiego/

ORDER NO. R9-2023-0011
AS AMENDED BY ORDER NO. R9-2025-0002
NPDES NO. CA0109282

Waste Discharge Requirements For Southern California Edison Company, Discharge to the Pacific Ocean Related to the Decommissioning of San Onofre Nuclear Generating Station, San Diego County

The following Discharger is subject to waste discharge requirements (WDRs) set forth in this Order:

Discharger	Southern California Edison Company
Name of Facility	San Onofre Nuclear Generating Station
Facility Address	5000 Pacific Coast Highway, San Clemente, CA 92672

Table 1. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude (North)	Discharge Point Longitude (West)	Receiving Water
002	Ocean water and low-volume waste stream	33º 20’ 55.8” N	117º 34’ 13.5” W	Pacific Ocean
001-E	Yard Drains	--	--	Internal Discharge Location
001-F	Dewatering	--	--	Internal Discharge Location
002-D	Makeup Demineralizer (mobile)	--	--	Internal Discharge Location
002-E	Radwaste System	--	--	Internal Discharge Location
002-K	Concrete Cutting Water and/or Dust Control (mobile)	--	--	Internal Discharge Location
002-L	Common Oil Removal System	--	--	Internal Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude (North)	Discharge Point Longitude (West)	Receiving Water
002-M	Dewatering	--	--	Internal Discharge Location

This Order was adopted on: **April 12, 2023**
This Order shall become effective on: **June 1, 2023**
This Order shall expire on: **May 31, 2028**

The Discharger shall file a Report of Waste Discharge (ROWD) as an application for reissuance of WDRs in accordance with title 23 of the California Code of Regulations, and an application for reissuance of a National Pollutant Discharge Elimination System (NPDES) permit no later than 180 days prior to the Order expiration date. The United States Environmental Protection Agency (USEPA) and the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) have classified this discharge as follows: **Major.**

I, David W. Gibson, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of the Order adopted by the San Diego Water Board on the date indicated above, as amended by Order No. R9-2025-0002 on March 12, 2025.

David W. Gibson
Digitally signed by David W. Gibson
Date: 2025.03.19 09:46:25 -07'00'

David W. Gibson, Executive Officer

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1. Facility Information

Information describing the San Onofre Nuclear Generating Station (SONGS or Facility) is summarized on page 1 and in sections 1 and 2 of the Fact Sheet (Attachment F). Section 1 of the Fact Sheet also includes information regarding the Discharger's permit application.

2. Findings

The San Diego Water Board finds:

2.1. **Legal Authorities**. This Order serves as WDRs pursuant to article 4, chapter 4, division 7 of the California Water Code (Water Code) (commencing with section 13260). This Order is also issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the USEPA and chapter 5.5, division 7 of the Water Code (commencing with section 13370). This Order shall serve as an NPDES permit authorizing the Discharger to discharge into waters of the United States at the discharge location described in Table 1 subject to the WDRs in this Order.

2.2. **Background and Rationale for Requirements**. The San Diego Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for the requirements in this Order, is hereby incorporated into and constitutes Findings for this Order. Attachments A through E, and G are also incorporated into this Order.

2.3. **Provisions and Requirements Implementing State Law**. The provisions/requirements in subsections 4.3, 4.4, and 5.2 are included to implement State of California (State) law only. These provisions/requirements are not required or authorized under the federal CWA; consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

2.4. **Executive Officer Delegation of Authority.** The San Diego Water Board by prior resolution has delegated all matters that may legally be delegated to its Executive Officer to act on its behalf pursuant to Water Code section 13223. Therefore, the Executive Officer is authorized to act on the San Diego Water Board's behalf on any matter within this Order unless such delegation is unlawful under Water Code section 13223, or this Order explicitly states otherwise.

2.5. **Notification of Interested Parties**. The San Diego Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of the notification are provided in the Fact Sheet (Attachment F).

2.6. **Consideration of Public Comment**. The San Diego Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet (Attachment F).

THEREFORE, IT IS HEREBY ORDERED, that this Order supersedes Order No. R9-2015-0073, except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal CWA and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order. The Discharger is hereby authorized to discharge subject to WDRs in this Order at the discharge locations described in Table 1 to the Pacific Ocean offshore of the coast of San Diego County. This action in no way prevents the San Diego Water Board from taking enforcement action for past violations of Order No. R9-2015-0073.

3. Discharge Prohibitions

3.1. Discharges of waste in a manner or to a location that has not been specifically authorized by this Order and for which valid WDRs are not in force are prohibited.

3.2. The discharge of oil or any residuary product of petroleum to waters of the State, except in accordance with WDRs or other provisions of division 7 of the Water Code, is prohibited.

3.3. The discharge of polychlorinated biphenyl (PCB) compounds, such as those commonly used for transformer fluid, is prohibited.

3.4. The total combined discharge of wastewater through Discharge Point No. 002 in excess of 42.202 million gallons per day (MGD) is prohibited.

3.5. The discharge of total residual oxidants (such as free available chlorine, total residual chlorine, or bromine) is prohibited from any unit through the discharge point for more than two hours per day and not more than one unit in any plant at any one time, unless the Discharger has demonstrated to the San Diego Water Board Executive Officer's satisfaction in advance of the discharge that a discharge lasting for more than two hours is required (.e.g., for macroinvertebrate control). The duration of a chlorination cycle exceeding 25 minutes is prohibited.

3.6. This section was removed per Amending Order No. R9-2025-0002.

3.7. The Discharger must comply with the Waste Discharge Prohibitions contained in chapter 4 of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan), incorporated into this Order as if fully set forth herein and summarized in Attachment G, as a condition of this Order.

3.8. The Discharger must comply with the Waste Discharge Prohibitions contained in the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan), incorporated into this Order as if fully set forth herein and summarized in Attachment G, as a condition of this Order.

4. Effluent Limitations and Discharge Specifications

4.1. Effluent Limitations – Discharge Point No. 002

4.1.1. **Internal Effluent Limitations**

4.1.1.1. This section was removed per Amending Order No. R9-2025-0002.

Table 2. This Table removed per Amending Order No. R9-2025-0002.

4.1.1.2. **Combined Low-Volume Waste Stream Compliance Points (INT-002).** The Discharger shall maintain compliance with the following internal effluent limitations using the flow-weighted composite sample of discharges of all the low-volume waste streams taken together. The flow-weighted composite sample (Monitoring Location INT-002) includes samples from Monitoring Locations INT-001-E, INT-001-F, INT-002-D, INT-002-E, INT-002-K, INT-002-L, and INT-002-M as described in the MRP (Attachment E). Scientific "E" notation is used to express certain values. In scientific "E" notation, the number following the "E" indicates that position of the decimal point in the value. Negative numbers after the "E" indicate that the value is less than 1, and positive numbers after the "E" indicate that the value is greater than 1. In this notation, a value of 6.1E-02 represents 6.1×10^{-2} or 0.061, 6.1E+02 represents 6.1×10^{2} or 610, and 6.1E+00 represents 6.1×10^{0} or 6.1.

Table 3. Internal Effluent Limitations – Combined Low-Volume Waste Streams[1]

Parameter	Units[2]	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)
TSS	mg/L	--	30	100
TSS	lbs/day	--	2972	9906
Oil and Grease	mg/L	--	15	20
Oil and Grease	lbs/day	--	1486	1981
pH	Standards units	--	--	Between 6.0 and 9.0 at all times
Cadmium, Total Recoverable	lbs/day	1.1E+00	--	4.4E+00
Copper, Total Recoverable	lbs/day	1.3E+00	--	1.1E+01
Mercury, Total Recoverable	lbs/day	4.3E-02	--	1.7E-01
Nickel, Total Recoverable	lbs/day	5.4E+00	--	2.2E+01
Selenium, Total Recoverable	lbs/day	1.63E+01	--	6.54E+01
Silver, Total Recoverable	lbs/day	6.0E-01	--	2.9E+00
Zinc, Total Recoverable	lbs/day	1.39E+01	--	7.93E+01
Cyanide, Total (as Cyanide)[4]	lbs/day	1.1E+00	--	4.4E+00
Ammonia (as Nitrogen)	lbs/day	6.54E+02	--	2.62E+03
Phenolic Compounds (non-chlorinated)[1]	lbs/day	3.3E+01	--	1.3E+02
Chlorinated Phenolics[1]	lbs/day	1.1E+00	--	4.4E+00
Endosulfan[1]	lbs/day	9.8E-03	--	2.0E-02
Endrin	lbs/day	2.2E-03	--	4.4E-03
Hexachlorocyclohexane (HCH)[1]	lbs/day	4.4E-03	--	8.7E-03
Acrolein	lbs/day	--	2.40E+02	--

Parameter	Units[2]	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)
Bis(2-chloroethoxy) methane	lbs/day	--	4.79E+00	--
Bis(2-chloroisopropyl) ether	lbs/day	--	1.31E+03	--
Chlorobenzene	lbs/day	--	6.21E+02	--
Chromium (III), Total Recoverable [3]	lbs/day	--	2.07E+05	--
Di-n-butyl phthalate	lbs/day	--	3.81E+03	--
Dichlorobenzenes[1]	lbs/day	--	5.56E+03	--
Diethyl phthalate	lbs/day	--	3.60E+04	--
Dimethyl phthalate	lbs/day	--	8.94E+05	--
4,6-Dinitro-2-methylphenol	lbs/day	--	2.40E+02	--
2,4-Dinitrophenol	lbs/day	--	4.36E+00	--
Ethylbenzene	lbs/day	--	4.47E+03	--
Fluoranthene	lbs/day	--	1.63E+01	--
Hexachlorocyclopentadiene	lbs/day	--	6.32E+01	--
Nitrobenzene	lbs/day	--	5.34E+00	--
Thallium, Total Recoverable	lbs/day	--	2.18E+00	--
Toluene	lbs/day	--	9.26E+04	--
Tributyltin	lbs/day	--	1.53E-03	--
1,1,1-Trichloroethane	lbs/day	--	5.88E+05	--
Acrylonitrile	lbs/day	--	1.09E-01	--
Aldrin	lbs/day	--	2.40E-05	--
Benzene	lbs/day	--	6.43E+00	--
Benzidine	lbs/day	--	7.52E-05	--
Beryllium, Total Recoverable	lbs/day	--	3.60E-02	--
Bis(2-chloroethyl) ether	lbs/day	--	4.90E-02	--
Bis(2-ethylhexyl) phthalate	lbs/day	--	3.81E+00	--
Carbon tetrachloride	lbs/day	--	9.81E-01	--
Chlordane[1]	lbs/day	--	2.51E-05	--
Chlorodibromomethane	lbs/day	--	9.37E+00	--
Chloroform	lbs/day	--	1.42E+02	--
Dichlorodiphenyltrichloroethane (DDT)[1]	lbs/day	--	1.85E-04	--
1,4-Dichlorobenzene	lbs/day	--	1.96E+01	--
3,3'-Dichlorobenzidine	lbs/day	--	8.83E-03	--
1,2-Dichloroethane	lbs/day	--	3.05E+01	--
1,1-Dichloroethylene	lbs/day	--	9.81E-01	--
Dichlorobromomethane	lbs/day	--	6.76E+00	--
Dichloromethane	lbs/day	--	4.90E+02	--
1,3-Dichloropropene	lbs/day	--	9.70E+00	--
Dieldrin	lbs/day	--	4.36E-05	--

Parameter	Units[2]	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)
2,4-Dinitrotoluene	lbs/day	--	2.83E+00	--
1,2-Diphenylhydrazine	lbs/day	--	1.74E-01	--
Halomethanes[1]	lbs/day	--	1.42E+02	--
Heptachlor	lbs/day	--	5.45E-05	--
Heptachlor Epoxide	lbs/day	--	2.18E-05	--
Hexachlorobenzene	lbs/day	--	2.29E-04	--
Hexachlorobutadiene	lbs/day	--	1.53E+01	--
Hexachloroethane	lbs/day	--	2.72E+00	--
Isophorone	lbs/day	--	7.95E+02	--
N-nitrosodimethylamine	lbs/day	--	7.95E+00	--
N-nitrosodi-N-propylamine	lbs/day	--	4.14E-01	--
N-nitrosodiphenylamine	lbs/day	--	2.72E+00	--
Polynuclear aromatic hydrocarbons (PAHs)[1]	lbs/day	--	9.59E-03	--
PCBs[1]	lbs/day	--	2.07E-05	--
TCDD equivalents[1]	lbs/day	--	4.25E-09	--
1,1,2,2-Tetrachloroethane	lbs/day	--	2.51E+00	--
Tetrachloroethylene	lbs/day	--	2.18E+00	--
Toxaphene	lbs/day	--	2.29E-04	--
Trichloroethylene	lbs/day	--	2.94E+01	--
1,1,2-Trichloroethane	lbs/day	--	1.02E+01	--
2,4,6-Trichlorophenol	lbs/day	--	3.16E-01	--
Vinyl chloride	lbs/day	--	3.92E+01	--

Notes for Table 3

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The MER effluent limitation was calculated based on the equation in section 7.13 of this Order. The MER calculations utilized the flow limitation for the combined low-volume waste stream of 11.878 MGD and dilution of 10:1.
3. The Discharger may, at their option, apply this effluent limitation as a total chromium effluent limitation.
4. If the Discharger can demonstrate to the satisfaction of USEPA and the State Water Resources Control Board (State Water Board) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations may be evaluated with the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in title 40 of the Code of Federal Regulations (40 CFR) part 136.

4.1.1.3. **Individual Low-Volume Waste Stream Compliance Points.** The Discharger shall maintain compliance with the following internal effluent limitations at all individual, low-volume waste stream discharges from the NIA, Unit 2, and Unit 3. Compliance shall be determined individually at Monitoring Locations INT-001-E, INT-001-F, INT-002-D, INT-002-E, INT-002-K, INT-002-L, and INT-002-M, as described in the MRP (Attachment E).

Table 4. Internal Effluent Limitations – Individual Low-Volume Waste Streams[1]

Parameter	Units	MDEL	30-Day Average Effluent Limitation
TSS	mg/L	100	30
Oil and Grease	mg/L	20	15

Note for Table 4
1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.

4.1.2. **Ocean Outfall (Discharge Point No. 002)**

The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 002, with compliance measured at Monitoring Location EFF-002 (Discharge Point No. 002), as described in the MRP (Attachment E). Scientific "E" notation is used to express certain values. In scientific "E" notation, the number following the "E" indicates that position of the decimal point in the value. Negative numbers after the "E" indicate that the value is less than 1, and positive numbers after the "E" indicate that the value is greater than 1. In this notation, a value of 6.1E-02 represents 6.1×10^{-2} or 0.061, 6.1E+02 represents 6.1×10^{2} or 610, and 6.1E+00 represents 6.1×10^{0} or 6.1.

Table 5. Final Effluent Limitations – Ocean Outfall Discharge Point No. 002[1,2]

Parameter	Units	MDEL	Instantaneous Maximum Effluent Limitation	Six-Month Median Effluent Limitation
Total Residual Chlorine	µg/L	88	660	22
Total Residual Chlorine	lbs/day	31	70[3]	7.7
Chronic Toxicity	Toxic Units Chronic (TUc)	11[4]	--	--
Arsenic	µg/L	--	8.5E+02	--
Arsenic	lbs/day	--	3.0E+02	--
Cadmium, Total Recoverable	µg/L	--	1.1E+02	--
Cadmium, Total Recoverable	lbs/day	--	3.9E+01	--
Chromium (hexavalent), Total Recoverable[5]	µg/L	--	2.2E+02	--

Parameter	Units	MDEL	Instantaneous Maximum Effluent Limitation	Six-Month Median Effluent Limitation
Chromium (hexavalent), Total Recoverable[5]	lbs/day	--	7.7E+01	--
Copper, Total Recoverable	µg/L	--	3.1E+02	--
Copper, Total Recoverable	lbs/day	--	1.1E+02	--
Lead, Total Recoverable	µg/L	--	2.2E+02	--
Lead, Total Recoverable	lbs/day	--	7.7E+01	--
Mercury, Total Recoverable	µg/L	--	4.4E+00	--
Mercury, Total Recoverable	lbs/day	--	1.5E+00	--
Selenium, Total Recoverable	µg/L	--	1.7E+03	--
Selenium, Total Recoverable	lbs/day	--	5.8E+02	--
Silver, Total Recoverable	µg/L	--	7.5E+01	--
Silver, Total Recoverable	lbs/day	--	2.7E+01	--
Cyanide[6]	µg/L	--	1.1E+02	--
Cyanide[6]	lbs/day	--	3.9E+01	--
Ammonia, Un-ionized (as Nitrogen)	µg/L	--	6.6E+04	--
Ammonia, Un-ionized (as Nitrogen)	lbs/day	--	2.3E+04	--
Non-Chlorinated Phenolic Compounds	µg/L	--	3.3E+03	--
Non-Chlorinated Phenolic Compounds	lbs/day	--	1.2E+03	--
Chlorinated Phenolics	µg/L	--	1.1E+02	--
Chlorinated Phenolics	lbs/day	--	3.9E+01	--
Endosulfan	µg/L	--	3.0E-01	--
Endosulfan	lbs/day	--	1.0E-01	--
Endrin	µg/L	--	6.6E-02	--
Endrin	lbs/day	--	2.3E-02	--
HCH	µg/L	--	1.3E-01	--
HCH	lbs/day	--	4.7E-02	--

Notes for Table 5

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. Except as noted for the instantaneous maximum effluent limitation for total residual chlorine, the MER effluent limitation was calculated based on the equation in section 7.13 of this Order. The MER calculations utilized the flow limitation for the ocean outfall of 42.202 MGD and dilution of 10:1.
3. The instantaneous maximum mass-based limitation was based on the maximum concentration standard for best available technology economically achievable (BAT) (0.20 mg/L). See section 4.2.2.2.2.2. of the Fact Sheet for more information.

4. Compliance with the MDEL for chronic toxicity shall be based on the procedures specified in section 7.16 of this Order and section 3.3 of Attachment E of this Order.
5. The Discharger may, at their option, apply this effluent limitation as a total chromium effluent limitation.
6. If the Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to USEPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metal cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136.

4.2. Discharge Specifications

4.2.1. Waste management systems that discharge to the Pacific Ocean must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community.

4.2.2. Waste discharged to the ocean must be essentially free of:

4.2.2.1. Material that is floatable or will become floatable upon discharge;

4.2.2.2. Settleable material or substances that may form sediments which will degrade benthic communities or other aquatic life;

4.2.2.3. Substances which will accumulate to toxic levels in marine waters, sediments, or biota;

4.2.2.4. Substances that significantly decrease the natural light to benthic communities and other marine life; and

4.2.2.5. Materials that result in aesthetically undesirable discoloration of the ocean surface.

4.2.3. Waste effluents shall be discharged in a manner which provides sufficient initial dilution to minimize the concentrations of substances not removed in the treatment.

4.2.4. Location of waste discharges must be determined after a detailed assessment of the oceanographic characteristics and current patterns to assure that:

4.2.4.1. Pathogenic organisms and viruses are not present in areas where shellfish are harvested for human consumption or in areas used for swimming or other body-contact sports;

4.2.4.2. Natural water quality conditions are not altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater; and

4.2.4.3. Maximum protection is provided to the marine environment.

4.2.5. Waste that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing and water-contact sports areas to maintain applicable bacterial standards without disinfection. Where conditions are such

that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard should be used.

4.3. Land Discharge Specifications – Not Applicable

4.4. Recycling Specifications – Not Applicable

5. Receiving Water Limitations

5.1. Surface Water Limitation

The receiving water limitations set forth below for ocean waters are based on water quality objectives contained in the Basin Plan and Ocean Plan and are a required part of this Order. The discharge of waste shall not cause or contribute to violation of these limitations in the Pacific Ocean. Compliance with these limitations shall be determined from samples collected at stations representative of the area outside of the zone of initial dilution (ZID).

5.1.1. **Bacterial Characteristics**

5.1.1.1. Within a zone bounded by the shoreline and a distance of three nautical miles from the shoreline, including all kelp beds, the following bacterial objectives shall be maintained throughout the water column. The ZID for the ocean outfall is excluded.

5.1.1.1.1. **Fecal Coliform**

5.1.1.1.1.1. Thirty-day geometric mean of fecal coliform density not to exceed 200 colony forming units (CFU) per 100 milliliters (ml) calculated based on the five most recent samples from each site.

5.1.1.1.1.2. Single sample maximum not to exceed 400 CFU per 100 ml.

5.1.1.1.2. **Enterococci**

5.1.1.1.2.1. Six-week rolling geometric mean not to exceed 30 CFU per 100 ml, calculated weekly.

5.1.1.1.2.2. Statistical threshold value (STV) of 110 CFU per 100 ml not to be exceeded by more than 10 percent of samples collected in a calendar month, calculated in a static manner.

5.1.1.2. The ZID of any wastewater outfall shall be excluded from designation as kelp beds for purposes of bacterial standards. Adventitious assemblages of kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp beds for purposes of bacterial standards.

5.1.1.3. At all areas where shellfish may be harvested for human consumption, as determined by the San Diego Water Board, the median total coliform density (CFU) shall not exceed 70 per 100 ml throughout the water column, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

5.1.2. **Physical Characteristics**

5.1.2.1. Floating particulates and grease and oils shall not be visible.

5.1.2.2. The discharge of waste shall not cause aesthetically undesirable discoloration of the ocean surface.

5.1.2.3. Natural light shall not be significantly reduced at any point outside the initial dilution zone as a result of the discharge of waste.

5.1.2.4. The rate of deposition of inert solids and the characteristics of inert solids in the ocean sediments shall not be changed such that benthic communities are degraded.

5.1.2.5. Trash shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

5.1.3. **Chemical Characteristics**

5.1.3.1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.

5.1.3.2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.

5.1.3.3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.

5.1.3.4. The concentration of substances set forth in chapter II, Table 3 of the Ocean Plan shall not be increased in marine sediments to levels that would degrade indigenous biota.

5.1.3.5. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade marine life.

5.1.3.6. Nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota.

5.1.3.7. The water quality objectives set forth in chapter II, Table 3 of the Ocean Plan shall not be exceeded.

5.1.4. **Biological Characteristics**

5.1.4.1. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.

5.1.4.2. The natural taste, odor, color of fish, shellfish, or other marine resources used for human consumption shall not be altered.

5.1.4.3. The concentration of organic materials in fish, shellfish, or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

5.1.5. **Radioactivity**

5.1.5.1. Discharge of radioactive waste shall not degrade marine life.

5.1.5.2. As stated in Attachment F, Fact Sheet section 3.5.3, the United States Nuclear Regulatory Commission (USNRC) regulates radioactivity from the Facility pursuant to the Atomic Energy Act (AEA).

5.1.6. **Elevated Temperature Requirements (Thermal Plan)**

5.1.6.1. As stated in Attachment F, Fact Sheet section 3.3.6., the San Diego Water Board has determined that the Thermal Plan no longer applies to this Order.

5.2. Groundwater Limitations – Not Applicable

6. Provisions

6.1. Standard Provisions

6.1.1. **Federal Standard Provisions.** The Discharger shall comply with all Standard Provisions included in Attachment D of this Order.

6.1.2. **San Diego Water Board Standard Provisions.** The Discharger shall comply with the following provisions. In the event that there is any conflict, duplication, or overlap between provisions specified by this Order, the more stringent provision shall apply.

6.1.2.1. The expiration date of this Order is contained on page 2 of this Order. After the expiration date, the terms and conditions of this Order are automatically continued pending issuance of a new permit, provided that all requirements of USEPA's NPDES regulations at 40 CFR section 122.6 and the State's regulations at title 23, division 3, chapter 9, article 3, section 2235.4 of the CCR regarding the continuation of expired permits and WDRs are met.

6.1.2.2. The Discharger shall maintain a copy of this Order for access in hard copy at a prominent on-site location at the Facility or access in electronic format. The Order shall be available for access by site personnel, San Diego Water Board, State Water Board, and USEPA or their authorized representative at all times. Electronic access to the Order through a device that provide on-line access on the premises of the Facility shall be considered equivalent to on-site access.

6.2. Monitoring and Reporting Program (MRP) Requirements

6.2.1. The Discharger shall comply with the MRP, and future revisions thereto, in Attachment E of this Order.

6.2.2. Notifications required to be provided under this Order to the San Diego Water Board shall be made to:

E-mail – SanDiego@waterboards.ca.gov, or
Telephone – (619) 516-1990, or
Facsimile – (619) 516-1994.

6.3. Special Provisions

6.3.1. Reopener Provisions

6.3.1.1. This Order may be reopened for modification to include an effluent limitation if monitoring establishes that the discharge causes, has the reasonable potential to cause, or contributes to an excursion above an Ocean Plan Table 3 water quality objective. (40 CFR section 122.44(d)(1))

6.3.1.2. This Order may be reopened for modification of the monitoring and reporting requirements and/or special studies requirements, at the discretion of the San Diego Water Board. Such modification(s) may include, but is (are) not limited to, revision(s) (i) to implement recommendations from Southern California Coastal Water Research Project (SCCWRP); (ii) to develop, refine, implement, and/or coordinate a regional monitoring program; (iii) to develop and implement improved monitoring and assessment programs in keeping with San Diego Water Board Resolution No. R9-2012-0069, *Resolution in Support of a Regional Monitoring Framework*; and/or (iv) to add provisions to require the Dischargers to evaluate and provide information on cost and values of the MRP (Attachment E).

6.3.1.3. This Order may be modified, revoked and reissued, or terminated for cause in accordance with the provisions of 40 CFR parts 122, 124, and 125 at any time prior to its expiration under any of the following circumstances:

6.3.1.3.1. Violation of any terms or conditions of this Order. (Water Code section 13381(a));

6.3.1.3.2. Obtaining this Order by misrepresentation or failure to disclose fully all relevant facts. (Water Code section 13381(b)); and

6.3.1.3.3. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge. (Water Code section 13381(c).

6.3.1.4. The filing of a request by the Discharger for modifications, revocation and reissuance, or termination of this Order does not stay any condition of this Order. Notification by the Discharger of planned operational or Facility changes, or anticipated noncompliance with this Order does not stay any condition of this Order. (40 CFR section 122.41(f))

6.3.1.5. If any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under federal CWA section 307(a) for a toxic pollutant and that standard or prohibition is more stringent than any limitation on the pollutant in this Order, the San Diego Water Board may institute proceedings under these regulations to modify or revoke and reissue this Order to conform to the toxic effluent standard or prohibition. (40 CFR section 122.44(b)(1))

6.3.1.6. This Order may be reopened and modified for consistency with any new water quality control plan, policy, law, or regulation. (40 CFR section 122.62(a)(3))

6.3.1.7. This Order may be reopened and modified to revise effluent limitations as a result of future Ocean Plan, Basin Plan, and/or other statewide Water Quality Control Plan amendments; or the adoption of a total maximum daily load (TMDL) for the receiving water. (40 CFR section 122.62(a)(2))

6.3.1.8. This Order may be reopened upon submission by the Discharger of adequate information, as determined by the San Diego Water Board, to provide for dilution credits or a mixing zone, as may be appropriate. (40 CFR section 122.62(a)(2))

6.3.1.9. This Order may also be reopened and modified, revoked and reissued, or terminated in accordance with the provisions of 40 CFR sections 122.44, 122.62 to 122.64, and 125.62. Causes for taking such actions include, but are not limited to, failure to comply with any condition of this Order, and endangerment to human health or the environment resulting from the permitted activity.

6.3.2. **Special Studies, Technical Reports, and Additional Monitoring Requirements**

6.3.2.1. **Spill Reporting Requirements**

The Discharger shall report spills in accordance with the following procedures:

6.3.2.1.1. If a spill results in a discharge of treated or untreated wastewater that is equal to or exceeds 1,000 gallons, and/or results in a discharge to a drainage channel and/or surface water, or results in a discharge to a storm drain that was not fully captured and returned to a sanitary sewer system for treatment at a sewage treatment plant, the Discharger shall:

6.3.2.1.1.1. Report the spill to the San Diego Water Board by email at SanDiego@waterboards.ca.gov within 24 hours from the time the Discharger become aware of the spill. If email communication is not possible, report the spill by telephone (619-516-1990) within 24 hours from the time the Discharger becomes aware of the spill. The report shall include a description of the spill and its cause; the spill material; the duration of the spill including exact dates and times; the estimated spill volume and its destination; if the spill has not been terminated, the anticipated time it is expected to continue; and steps taken or planned to reduce and/or eliminate the spill.

6.3.2.1.1.2. Submit a written report by email at SanDiego@waterboards.ca.gov, as well as any additional pertinent information, to the San Diego Water Board no later than five days from the time the Discharger becomes aware of the spill. The written report must be signed and certified as required by section 5 of the Standards Provisions (Attachment D).

6.3.2.1.1.3. The San Diego Water Board may waive the above-required written report under this provision on a case-by-case basis if the email or oral report has been received within 24 hours.

6.3.2.1.2. If a spill results in a discharge of treated or untreated wastewater less than 1,000 gallons and the discharge does not reach a drainage channel or surface waters, or results in a discharge to a storm drain that was fully captured and returned to a sanitary sewer system for treatment at a sewage treatment plant, the Discharger is not required to notify the San Diego Water Board within 24 hours, or provide a 5-day written report.

6.3.2.1.3. For spills of waste material other than treated or untreated wastewater, including any such spills that may endanger human health or the environment, the Discharger shall:

6.3.2.1.3.1. Notify the San Diego Water Board by email at SanDiego@waterboards.ca.gov within 24 hours from the time the Discharger becomes aware of the spill. If email communication is not possible, report the spill by telephone (619-516-1990) within 24 hours from the time the Discharger becomes aware of the spill. The report shall include a description of the spill and its cause; the spill material; the duration of the spill including exact dates and times; the estimated spill volume and its destination; if the spill has not been terminated, the anticipated time it is expected to continue; and steps taken or planned to reduce and/or eliminate the spill.

6.3.2.1.3.2. Submit a written report by email at SanDiego@waterboards.ca.gov, as well as any additional pertinent information, to the San Diego Water Board no later than five days from the time the Discharger becomes aware of the spill. The written report must be signed and certified as required by section 5 of the Standards Provisions (Attachment D).

6.3.2.1.3.3. The San Diego Water Board may waive the above-required written report under this provision on a case-by-case basis if the email or oral report has been received within 24 hours.

6.3.2.1.4. For all spills, the Discharger shall include a detailed summary of spills in the monthly self-monitoring report (SMR) for the month in which the spill occurred. If no spills occurred during the calendar month, the Discharger shall report no spills in the monthly SMR for that calendar month.

6.3.2.1.5. The spill reporting requirements contained in this Order do not relieve the Discharger of responsibilities to report spills to other agencies, such as the California Office of Emergency Services and the San Diego Department of Environmental Health.

6.3.2.2. **Receiving Water Violation Assessment**

In the event of a violation of any receiving water limitation established within this Order, the San Diego Water Board may require the Discharger to perform a special assessment to investigate the nature and cause of the receiving

water violation. The receiving water assessment shall identify measures needed to ensure future compliance with receiving water limitations. The Discharger shall submit the required assessment to the San Diego Water Board within 90 days of receipt of the San Diego Water Board's notification to perform a Receiving Water Violation Assessment.

6.3.3. **Best Management Practices (BMPs) and Pollution Prevention**

The Discharger shall continue to operate the Facility in accordance with their BMP Plan and in accordance with any subsequent amendments to the BMP Plan due to decommissioning. The Discharger shall maintain their existing BMP Plan in accordance with the *USEPA Guidance Manual for Developing Best Management Practices (BMPs)* (EPA 833-B-93-004) and update the plan whenever there is a change in Facility design, construction, operation, or maintenance, which materially affects the potential for discharge from the Facility of significant amounts of hazardous or toxic pollutants into waters of the United States.

The BMP Plan and any updates thereto, shall be subject to the approval of the San Diego Water Board and shall be modified as directed by the San Diego Water Board. The Discharger shall submit the BMP Plan and any updates thereto to the San Diego Water Board upon request of the San Diego Water Board. A copy of the up-to-date BMP Plan shall be maintained at the Facility and shall be readily available to operating personnel at all times.

6.3.4. **Construction, Operation and Maintenance Specifications**

6.3.4.1. All proposed new treatment facilities and expansions of existing treatment facilities shall be completely constructed and operable prior to initiation of the discharge from the new or expanded facilities. The Discharger shall submit a certification report for each new treatment facility, expansion of an existing treatment facility, and design capacity re-ratings, prepared by the design engineer. For design capacity re-ratings, the certification report shall be prepared by the engineer who evaluated the treatment facility design capacity. The signature and engineering license number of the engineer preparing the certification report shall be affixed to the report. If reasonable, the certification report shall be submitted prior to beginning construction of new treatment facilities or expansions of existing treatment facilities.

6.3.4.1.1. The certification report shall:

6.3.4.1.1.1. Identify the design capacity of the treatment facility, including the daily and 30-day design capacity;

6.3.4.1.1.2. Certify the adequacy of each component of the treatment facility; and

6.3.4.1.1.3. Contain a requirement-by-requirement analysis, based on acceptable engineering practices, of the process and physical design of the facility to ensure compliance with this Order.

6.3.4.1.2. The Discharger shall not initiate a discharge from a treatment facility at a daily flow rate in excess of its previously approved design capacity until:

6.3.4.1.2.1. The certification report is received by the San Diego Water Board,

6.3.4.1.2.2. The San Diego Water Board has received written notification of completion of construction (new or expanded treatment facilities only),

6.3.4.1.2.3. An inspection of the facility has been made by the San Diego Water Board or its designated representatives (new or expanded treatment facilities only), and

6.3.4.1.2.4. The San Diego Water Board has provided the Discharger with written authorization to initiate discharge from a new or expanded treatment facility or at a daily flow rate in excess of its previously approved design capacity.

6.3.4.2. The Facility shall be protected against a 100-year frequency flood flows as defined by the San Diego County Flood Control District.

6.3.4.3. The Facility shall be protected against erosion, overland runoff, and other impacts resulting from a 100-year, 24-hour storm event as defined by the National Oceanic and Atmospheric Administration Atlas 14 Point Precipitation Frequency Estimates available at https://www.nws.noaa.gov/oh/hdsc/index.html.

6.3.4.4. The Facility shall be protected against regional impacts of changing climate conditions (e.g., rising sea levels, flooding, higher storm surges, and changing hydrography, including more intense atmospheric rivers). Compliance with this requirement shall be implemented through development and implementation of applicable measures identified in the Climate Change Action Plan (CCAP) which is required to be submitted within three years of the effective date of this Order pursuant to section 6.3 of the MRP (Attachment E).

6.3.5. **Special Provisions for Publicly-Owned Treatment Works (POTWs) – Not Applicable**

6.3.6. **Other Special Provisions – Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once-Through Cooling or OTC Policy)**

6.3.6.1. Offshore Intake Structures. The offshore intake structures shall be constructed and operable in accordance with the requirements of this Order:

- The intake of seawater must not exceed 30 MGD.
- The Discharger shall continue to maintain the large organism exclusion devices (LOEDs) at the Facility's primary offshore intake structures, including any necessary inspections, repairs, and redesigns. The LOEDs must be functional in accordance with the OTC Policy.
- A minimum 93 percent reduction in intake flow rate for each SONGS unit is required, compared to the unit's design intake flow rate, and the

through-screen intake velocity at the onset of seawater withdrawal must not exceed 0.5 foot per second at all times.

- The intake of seawater shall be reduced to the minimum volume necessary to maintain Facility operations.
- The Discharger shall cease intake of seawater except when intake of seawater is necessary to maintain Facility operations or to comply with this Order.
- Heat treatment of the intake system is prohibited.

6.3.6.2. OTC Policy's Interim Mitigation Requirements. The Discharger shall continue to demonstrate compliance with the OTC Policy's interim mitigation requirements through the ongoing SONGS Marine Mitigation Program required by and monitored through the California Coastal Commission.

6.3.7. **Compliance Schedules – Not Applicable**

7. Compliance Determination

Compliance with the effluent limitations contained in section 4 of this Order will be determined as specified below:

7.1 Compliance with 30-Day Average Effluent Limitation

If the arithmetic mean of daily discharges over any 30 consecutive day period exceeds the 30-day average effluent limitation, an alleged violation will be flagged, and the Discharger will be considered out of compliance for each day of that 30-day period for that parameter. The next assessment of compliance will occur after the next sample is taken. If only a single sample is taken during a given 30-day period and the analytical result for that sample exceeds the 30-day average effluent limitation, the Discharger will be considered out of compliance for the 30-day period. For any 30-day period during which no sample is taken, no compliance determination can be made for the 30-day average effluent limitation.

7.2. Compliance with Average Monthly Effluent Limitation (AMEL)

If the average of daily discharges over a calendar month exceeds the AMEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that month for that parameter (e.g., resulting in 31 days of noncompliance in a 31-day month). The average of daily discharges over the calendar month that exceeds the AMEL for a parameter will be considered out of compliance for that month only. If only a single sample is taken during the calendar month and the analytical result for that sample exceeds the AMEL, the Discharger will be considered out of compliance for that calendar month. For any one calendar month during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar month.

7.3. Compliance with Average Weekly Effluent Limitation (AWEL)

If the average of daily discharges over a calendar week (Sunday through Saturday) exceeds the AWEL for a given parameter, an alleged violation will be flagged and the Discharger will be considered out of compliance for each day of that week for that parameter, resulting in seven days of noncompliance. The average of daily discharges over the calendar week that exceeds the AWEL for a parameter will be considered out of compliance for that week only. If only a single sample is taken during the calendar week and the analytical result for that sample exceeds the AWEL, the Discharger will be considered out of compliance for that calendar week. For any one calendar week during which no sample (daily discharge) is taken, no compliance determination can be made for that calendar week.

7.4. Compliance with Maximum Daily Effluent Limitation (MDEL)

The MDEL shall apply to flow-weighted 24-hour composite samples, or grab samples, as specified in the MRP (Attachment E). If a daily discharge exceeds the MDEL for a given parameter, an alleged violation will be flagged, and the Discharger will be considered out of compliance for that parameter for that one day only within the reporting period. For any one day during which no sample is taken, no compliance determination can be made for that day.

7.5. Compliance with Instantaneous Minimum Effluent Limitation

The instantaneous minimum effluent concentration limitation shall apply to grab sample determinations. If the analytical result of a single grab sample is lower than the instantaneous minimum effluent limitation for a parameter, an alleged violation will be flagged, and the Discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both are lower than the instantaneous minimum effluent limitation would result in two instances of noncompliance with the instantaneous minimum effluent limitation).

7.6. Compliance with Instantaneous Maximum Effluent Limitation

The instantaneous maximum effluent concentration limitation shall apply to grab sample determinations. If the analytical result of a single grab sample is higher than the instantaneous maximum effluent limitation for a parameter, an alleged violation will be flagged, and the Discharger will be considered out of compliance for that parameter for that single sample. Non-compliance for each sample will be considered separately (e.g., the results of two grab samples taken within a calendar day that both exceed the instantaneous maximum effluent limitation would result in two instances of noncompliance with the instantaneous maximum effluent limitation).

7.7. Compliance with Six-Month Median Effluent Limitation

If the median of daily discharges over any 180-day period exceeds the six-month median effluent limitation for a given parameter, an alleged violation will be

flagged, and the Discharger will be considered out of compliance for each day of that 180-day period for that parameter. The next assessment of compliance will occur after the next sample is taken. If only a single sample is taken during a given 180-day period and the analytical result for that sample exceeds the six-month median, the Discharger will be considered out of compliance for the 180-day period. For any 180-day period during which no sample is taken, no compliance determination can be made for the six-month median limitation.

7.8. Mass and Concentration Limitations

Compliance with mass and concentration effluent limitations for the same parameter shall be determined separately with their respective limitations. When the concentration of a constituent in an effluent sample is determined to be not detected (ND) or detected, but not quantified (DNQ), the corresponding MER determined from that sample concentration shall also be reported as “ND” or “DNQ.”

7.9. This section was removed per Amending Order No. R9-2025-0002.

7.10. Compliance with Single-constituent Effluent Limitations

The Discharger shall be deemed out of compliance with an effluent limitation or discharge specification if the concentration of the constituent in the monitoring sample is greater than the effluent limitation or discharge specification and greater than or equal to the minimum level (ML).

7.11. Compliance with Effluent Limitations Expressed as a Sum of Several Constituents

The Discharger is out of compliance with an effluent limitation that applies to the sum of a group of chemicals (e.g., PCBs) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

7.12. Multiple Sample Data Reduction

The concentration of the pollutant in the effluent may be estimated from the result of a single sample analysis or by a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses when all sample results are quantifiable (i.e., greater than or equal to the reported ML). When one or more sample results are reported as ND or DNQ, the central tendency concentration of the pollutant shall be the median (middle) value of the multiple samples. If, in an even number of samples, one or both of the middle values is ND or DNQ, the median will be the lower of the two middle values.

7.13. Mass Emission Rate (MER)

The MER, in lbs/day, shall be obtained from the following calculation for any calendar day:

$$MER = 8.34 \, x \, Q \, x \, C$$

In which Q and C are the flow rate in MGD and the constituent concentration in mg/L, respectively, and 8.34 is a conversion factor (lbs/gallon of water). If a composite sample is taken, then C is the concentration measured in the composite sample and Q is the average flow rate occurring during the period over which the samples are composited. If the constituent concentration is µg/L, the conversion factor is 0.00834.

7.14. Bacterial Standards and Analysis

7.14.1. **Geometric Mean**

The geometric mean used for determining compliance with bacterial standards is calculated with the following equation:

$$\text{Geometric Mean} = (C1 \times C2 \times \ldots \times Cn)1/n$$

Where n is the number of days samples were collected during the period and C is the concentration of bacteria (CFU/100 ml) found on each day of sampling.

7.14.2. **Statistical Threshold Value (STV)**

The STV used for determining compliance with bacterial standards shall not be exceeded by more than 10 percent of the samples collected in a calendar month, collected in a static manner.

7.14.3. **Sample Dilutions**

Sample dilutions for fecal coliform bacterial analyses should be performed so the range of values extends from 2 to 16,000 CFU. Sample dilutions for enterococci bacterial analyses shall range from 1 to 10,000 CFU per 100 ml. The detection methods used for each analysis shall be reported with the results of the analysis. Detection methods used for fecal coliform shall be those listed in 40 CFR part 136 or any improved method determined by the San Diego Water Board (and approved by USEPA) to be appropriate. Detection methods used for enterococci shall be those presented in USEPA publication USEPA 600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water by Membrane Filter Procedure*, listed under 40 CFR part 136, and any other method approved by the San Diego Water Board.

7.15. Single Operational Upset (SOU)

A SOU that leads to simultaneous violations or more than one pollutant parameter shall be treated as a single violation and limits the Discharger's liability in accordance with the following conditions:

7.15.1. A SOU is broadly defined as a single unusual event that temporarily disrupts the usually satisfactory operation of a system in such a way that it results in violation of multiple pollutant parameters.

7.15.2. Discharger may assert SOU to limit liability only for those violations which the Discharger submitted notice of the upset as required in section 1.8 of Attachment D.

7.15.3. For purposes outside of Water Code sections 13385(h) and (i), determination of compliance and civil liability (including any more specific definition of SOU), the requirements for Discharger to assert the SOU limitation of liability, and the manner of counting violations, shall be in accordance with the *USEPA Memorandum Issuance of Guidance Interpreting Single Operational Upset* (September 27, 1989).

7.15.4. For purposes of Water Code sections 13385(h) and (i), determination of compliance and civil liability (including any more specific definition of SOU), the requirements for Discharger to assert the SOU limitation of liability, and the manner of counting violations shall be in accordance with Water Code section 13385(f)(2).

7.16. Chronic Toxicity

Chronic toxicity is used to measure the acceptability of waters for supporting a healthy marine biota until approved methods are developed to evaluate biological response. Compliance with the chronic toxicity effluent limit established in section 4.1.2. of this Order for Discharge Point No. 002 shall be determined using critical life stage toxicity tests in accordance with procedures prescribed by the Ocean Plan (2019) and restated in the MRP (Attachment E). Chronic toxicity shall be expressed as TUc, where:

$$TUc = 100 / NOEC$$

where NOEC is the No Observed Effect Concentration (also referred to as the No Observed Effect Level or NOEL) and is expressed as the maximum percent of effluent that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test. The MDEL for chronic toxicity is exceeded and a violation will be flagged when a chronic toxicity test results in greater than or equal to 11 TUc.

ATTACHMENT A – ABBREVIATIONS AND DEFINITIONS

Part 1. – Abbreviations

For the abbreviations with an asterisk (*), see Part 2 of Attachment A (Glossary of Common Terms) for further definition.

Abbreviation	Definition
40 CFR	Title 40 of the Code of Federal Regulations
AEA	Atomic Energy Act
AMEL*	Average Monthly Effluent Limitation
AQUA	Aquaculture
ASBS*	Areas of Special Biological Significance
ATP	Alternative Test Procedure
AWEL*	Average Weekly Effluent Limitation
Basin Plan	*Water Quality Control Plan for the San Diego Basin*
BEF	Bioaccumulation Equivalency Factor
BAT	Best Available Technology
BCT	Best Conventional Pollutant Control Technology
BIOL	Preservation of Biological Habitats of Special Significance
BMPs	Best Management Practices
BMPs	Best Management Practices
BPJ	Best Professional Judgement
BPT	Best Practicable Treatment
CCAP	Climate Change Action Plan
CDDs	Chlorinated Dibenzodioxins
CDFs	Chlorinated Dibenzofurans
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CFU	Colony Forming Units
CIWQS	California Integrated Water Quality System
COMM	Commercial and Sport Fishing
CSLC	California State Lands Commission
CWA	Clean Water Act
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT*	Dichlorodiphenyltrichloroethane
Discharger	Southern California Edison Company
DL	Don Light
DMR*	Discharge Monitoring Report
DNQ*	Detected, But Not Quantified
EC25	Effects Concentration at 25 Percent
ELAP	Environmental Laboratory Accreditation Program
ELGs	Effluent Limitation Guidelines

Abbreviation	Definition
eSMR	Electronic Self-Monitoring Reports
°F	Degrees Fahrenheit
Facility	San Onofre Nuclear Generating Station Units 2 and 3
gpm	Gallons per minute
GPS	Global Positioning System
HCH*	Hexachlorocyclohexane
IND	Industrial Service Supply
lbs/day	Pounds per Day
MAR	Marine Habitat
MDEL*	Maximum Daily Effluent Limitation
MDL*	Method Detection Limit
MEC	Maximum Effluent Concentration
MER	Mass Emission Rate
mg/L	Milligram per Liter
MGD	Million Gallons per Day
MIGR	Migration of Aquatic Organisms
ML*	Minimum Level
ml	Milliliter
ml/L	Milliliter per Liter
MRP	Monitoring and Reporting Program
NAV	Navigation
NIA	North Industrial Area
ND*	Not Detected
NOEC	No Observed Effect Concentration
NOEL	No Observed Effect Level
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
NTU	Nephelometric Turbidity Units
OAL	Office of Administrative Law
Ocean Plan	*Water Quality Control Plan for Ocean Waters of California*
ODCM	Offsite Dose Calculation Manual
OTC	Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once-Through Cooling or OTC Policy)
PAHs*	Polynuclear Aromatic Hydrocarbons
PCBs*	Polychlorinated Biphenyls
pCi/L	Picocuries per Liter
PMP*	Pollutant Minimization Program
POTWs	Publicly-Owned Treatment Works
ppt	Parts per Thousand
QA	Quality Assurance
QC	Quality Control
RARE	Rare, Threatened, or Endangered Species
REC-1	Contact Water Recreation
REC-2	Non-Contact Water Recreation

Abbreviation	Definition
RCRA	Resource Conservation and Recovery Act
RL	Reporting Level
RNKSC	Region Nine Kelp Survey Consortium
ROWD	Report of Waste Discharge
RPA	Reasonable Potential Analysis
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SCCWRP	Southern California Coastal Water Research Project
SHELL	Shellfish Harvesting
SIC	Standard Industrial Classification
SM	San Mateo
SMR	Self-Monitoring Report
SO	San Onofre
SONGS	San Onofre Nuclear Generating Station
SOU	Single Operational Upset
SPWN	Spawning, Reproduction, and/or Early Development
State Water Board	State Water Resources Control Board
STV	Statistical Threshold Value
SWDA	Solid Waste Disposal Act
SWPPP	Storm Water Pollution Prevention Plan
SWQPAs	State Water Quality Protection Areas
TAC	Test Acceptability Criteria
TBELs	Technology-Based Effluent Limitations
TCDD*	Tetrachlorodibenzodioxin
TEF	Toxicity Equivalency Factor
Thermal Plan	*Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California*
TIE*	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TRE*	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solids
TUa	Toxic Units Acute
TUc*	Toxic Units Chronic
µg/L	Microgram per Liter
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USNRC	United States Nuclear Regulatory Commission
Water Code	California Water Code
WDRs	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WILD	Wildlife Habitat
WQBELs	Water Quality-Based Effluent Limitations
ZID	Zone of Initial Dilution

Part 2. – Definitions

30-day average

The arithmetic mean of pollutant parameter values of samples collected in a period of 30 consecutive days.

6-Month Median Effluent Limitation

The highest allowable moving median of all daily discharges for any 180-day period.

Antidegradation

Policies which ensure protection of water quality for a particular body where the water quality exceeds levels necessary to protect fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as outstanding natural resource waters.

Areas of Special Biological Significance (ASBS)

Those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of SWQPAs.

Average Monthly Effluent Limitation (AMEL)

The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)

The highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Beneficial Uses

The uses of water necessary for the survival or wellbeing of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goal. "Beneficial Uses" of the waters of the State of California that may be protected against include, but are not limited to, domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. In the Basin Plan, existing beneficial uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential beneficial uses are uses that would probably develop in future years through the implementation of various control measures. “Beneficial Uses” are equivalent to "Designated Uses" under federal law. (Water Code section 13050(f)).

Bioaccumulation

The accumulation of contaminants in the tissues of organisms through any route, including respiration, ingestion, or direct contact with contaminated water, sediment, food, or dredged material.

Brine

The byproduct of desalinated water having a salinity concentration greater than a desalination facility's intake source water.

Bypass

The intentional diversion of waste streams from any portion of a treatment facility. (40 CFR section 122.41(m)(1)(i).)

Chlordane

The sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

Chlorinated Phenolics

The sum of 4-chloro-3-methylphenol, 2-chlorophenol, pentachlorophenol, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol.

Chronic Toxicity

The measure of the sub-lethal effects of a discharge or ambient water sample (e.g., reduced growth or reproduction). Certain chronic toxicity tests include an additional measurement of lethality. Compliance with the effluent limitation for chronic toxicity in this Order is demonstrated by conducting chronic toxicity tests for the effluent as described in section 7.16 of this Order and section 3.3 of the MRP (Attachment E). Chronic Toxicity effluent limitation is expressed as TUc and is calculated by the following equation:

$$TUc = 100 / NOEC$$

where NOEC is the No Observed Effect Concentration (also referred to as the No Observed Effect Level or NOEL) or the maximum percent effluent that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test.

Composite Sample

The combination of at least eight sample aliquots of at least 100 ml, collected at periodic intervals during the operating hours of a facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. The 100 ml minimum volume of an aliquot does not apply to automatic self-purging samplers. If one day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

A grab sample is an individual sample of at least 100 ml collected at a randomly selected time over a period not exceeding 15 minutes.

Daily Discharge

Either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass; or (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

A composite sample is defined as a combination of at least eight sample aliquots of at least 100 ml, collected at periodic intervals during the operating hours of a. facility over a 24-hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. The 100 ml minimum volume of an aliquot does not apply to automatic self-purging samplers. If one day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

A grab sample is an individual sample of at least 100 ml collected at a randomly selected time over a period not exceeding 15 minutes.

Degrade

Degradation shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected or are not the only ones affected.

Detected, But Not Quantified (DNQ)

Sample results that are less than the reported ML, but greater than or equal to the laboratory's MDL. Sample results reported as DNQ are estimated concentrations.

Dichlorobenzenes

The sum of 1,2- and 1,3-dichlorobenzene.

Dichlorodiphenyltrichloroethane (DDT)

The sum of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

Discharge of a Pollutant

Discharge of a pollutant means: (a) Any addition of any ‘‘pollutant’’ or combination of pollutants to ‘‘waters of the United States’’ from any ‘‘point source,’’ or (b) Any addition of any pollutant or combination of pollutants to the waters of the ‘‘contiguous zone’’ or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a state, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any ‘‘indirect discharger.’’ “Discharge” when used without qualification means the “discharge of a pollutant.” (40 CFR section 122.2)

Discharge Monitoring Reports (DMRs)

The USEPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by ‘‘approved States’’ as well as by USEPA. USEPA will supply DMRs to any approved state upon request. The USEPA national forms may be modified to substitute the state agency name, address, logo, and other similar information, as appropriate, in place of USEPA’s.

Downstream Ocean Waters

Waters downstream with respect to ocean currents.

Dredged Material

Any material excavated or dredged from the navigable waters of the United States, including material otherwise referred to as “spoil.”

Enclosed Bays

Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes but is not limited to Humboldt Bay, Bodega Harbor, Tomales Bay, Drakes Estero, San Francisco Bay, Morro Bay, Los Angeles Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay.

Endosulfan

The sum of endosulfan-alpha and -beta and endosulfan sulfate.

Estuaries and Coastal Lagoons

Estuaries and Coastal Lagoons are waters at the mouths of streams that serve as mixing zones for fresh and ocean waters during a major portion of the year. Mouths of streams that are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters will generally be considered to extend from a bay or the open ocean to the upstream limit of tidal action but may be considered to extend

seaward if significant mixing of fresh and salt water occurs in the open coastal waters. The waters described by this definition include but are not limited to the Sacramento-San Joaquin Delta as defined by section 12220 of the Water Code, Suisun Bay, Carquinez Strait downstream to Carquinez Bridge, and appropriate areas of the Smith, Klamath, Mad, Eel, Noyo, and Russian Rivers.

Facility

San Onofre Nuclear Generating Station

Halomethanes

The sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

Hexachlorocyclohexane (HCH)

The sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

Initial Dilution

The process that results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and non-buoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the San Diego Water Board, whichever results in the lower estimate for initial dilution.

Instantaneous Maximum Effluent Limitation

The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation

The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Interference

A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

(1) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(2) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the federal CWA, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Kelp Beds

For purposes of the bacteriological standards of the Ocean Plan, kelp beds are significant aggregations of marine algae of the genera *Macrocystis* and *Nereocystis*. Kelp beds include the total foliage canopy of *Macrocystis* and *Nereocystis* plants throughout the water column.

Mariculture

The culture of plants and animals in marine waters independent of any pollution source.

Material

(a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of the Ocean Plan relating to waste disposal, dredging and the disposal of dredged material and fill, MATERIAL means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the United States. See also, DREDGED MATERIAL.

Maximum Daily Effluent Limitation (MDEL)

The highest allowable daily discharge of a pollutant.

Method Detection Limit (MDL)

The minimum concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results, as defined in 40 CFR part 136, Attachment B.

Minimum Level (ML)

The concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Natural Light

Reduction of natural light may be determined by the San Diego Water Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the San Diego Water Board.

Natural water quality

Water quality (based on selected physical, chemical, and biological characteristics) that is required to sustain marine ecosystems, and which is without apparent human influence, i.e., an absence of significant amounts of:

- Man-made constituents (e.g., DDT);
- Other chemical (e.g., trace metals), physical (temperature/thermal pollution, sediment burial), and biological (e.g., bacteria) constituents at concentrations that have been elevated due to man's activities above those resulting from the naturally occurring processes that affect the area in question; and
- Non-Indigenous (e.g., invasive algal bloom species) or Genetically Modified biota that has been introduced either deliberately or accidentally by man.

Not Detected (ND)

Those sample results less than the laboratory's MDL.

Ocean Waters

The territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. If a discharge outside the territorial waters of the State could affect the quality of the waters of the State, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

Offshore intake

Offshore intake refers to any submerged intake structure that is not located at the shoreline, and includes such intakes that are located in ocean, bay and estuary environments.

Pass Through

A discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Percent Removal

A percentage expression of the removal efficiency across a treatment plant for a given pollutant parameter, as determined from the monthly average values of the raw wastewater influent pollutant concentrations to the facility and the monthly average values of the effluent pollutant concentrations for a given time period. (40 CFR section133.101(j))

PAHs (polynuclear aromatic hydrocarbons)

The sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4 benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

PCBs (polychlorinated biphenyls)

The sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

Phenolic Compounds (non-chlorinated)

The sum of 2,4-dimethylphenol, 4,6-dinitro-2-methylphenol, 2,4-dinitrophenol, 2-methylphenol, 4-methylphenol, 2-nitropheneol, 4-nitrophenol, and phenol.

Pollutant

Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean: (a) Sewage from vessels; or (b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Pollutant Minimization Program (PMP)

A program to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures, in order to maintain the effluent concentration at or below the effluent limitation.

Publicly-Owned Treatment Works (POTW)

A treatment works as defined by section 212 of the federal CWA, which is owned by a State or municipality (as defined by section 502(4) of the federal CWA). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in section 502(4) of the federal CWA, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

Radiation

Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used in this part, does not include non-ionizing radiation, such as radio- or microwaves, or visible, infrared, or ultraviolet light.

Recycled Water

Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

Reported Minimum Level (ML)

The reported ML (also known as the Reporting Level or RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order, including an additional factor if applicable as discussed herein. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the San Diego Water Board either from Appendix II of the Ocean Plan in accordance with II.C.5.a. of the Ocean Plan or established in accordance with section III.C.5.b. of the Ocean Plan. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the reported ML.

Salinity

A measure of the dissolved salts in a volume of water. Salinity shall be measured using a standard method approved by the San Diego Water Board (e.g., Standard Method 2520 B, USEPA Method 120.1, USEPA Method 160.1) and reported in parts per thousand. For historical salinity data not recorded in parts per thousand, the San Diego Water Board may accept converted data at their discretion.

Severe Property Damage

Substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR section 122.41(m)(1)(ii))

Shellfish

Organisms identified by the California Department of Health Services as shellfish for public health purposes (i.e., mussels, clams, and oysters).

Significant Difference

Statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

Six-Month Median Effluent Limitation

See 6-Month Median above for the definition of this term.

Sludge

Any solid, semisolid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect.

State Water Quality Protection Areas (SWQPAs)

Non-terrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All ASBS that were previously designated by the State Water Board in Resolutions 74-28, 74-32, and 75-61 are now also classified as a subset of State Water Quality Protection Areas and require special protections afforded by the Ocean Plan.

Statistical Threshold Value (STV)

A set value that approximates the 90th percentile of the water quality distribution for a bacterial population.

Tetrachlorodibenzodioxin (TCDD) Equivalents

The sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

Isomer Group	Toxicity Equivalency Factor
2,3,7,8-tetra CDD	1.0
2,3,7,8-penta CDD	0.5
2,3,7,8-hexa CDDs	0.1
2,3,7,8-hepta CDD	0.01
octa CDD	0.001
2,3,7,8 tetra CDF	0.1
1,2,3,7,8 penta CDF	0.05
2,3,4,7,8 penta CDF	0.5
2,3,7,8 hexa CDFs	0.1
2,3,7,8 hepta CDFs	0.01
octa CDF	0.001

Thirty-Day Average

See 30-day average above for the definition of this term.

Toxicity Identification Evaluation (TIE)

A set of procedures conducted to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.

Toxicity Reduction Evaluation (TRE)

A study conducted in a stepwise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the

TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and BMPs. A TIE may be required as part of the TRE, if appropriate.

Trash

All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

Upset

An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Waste

As used in the Ocean Plan, waste includes a Discharger's total discharge, of whatever origin, i.e., gross, not net, discharge.

Water Quality Control Plans

There are two types of water quality control plans - Basin Plans and Statewide Plans. Regional Boards adopt Basin Plans for each region based upon surface water hydrologic basin boundaries. The Regional Basin Plans designates or describes (1) existing and potential beneficial uses of ground and surface water; (2) water quality objectives to protect the beneficial uses; (3) implementation programs to achieve these objectives; and (4) surveillance and monitoring activities to evaluate the effectiveness of the water quality control plan. The Statewide Plans address water quality concerns for surface waters that overlap Regional Board boundaries, are statewide in scope, or are otherwise considered significant and contain the same four elements. Statewide Water Quality Control Plans include the Ocean Plan, the Enclosed Bays and Estuaries Plan, the Inland Surface Waters Plan, and the Thermal Plan. A water quality control plan consists of a designation or establishment for the waters within a specified area of (1) beneficial uses to be protected, (2) water quality objectives, and (3) a program of implementation needed for achieving water quality objectives (Water Code section 13050(j)).

Water Quality Objectives

Numerical or narrative limits on constituents or characteristics of water designed to protect designated beneficial uses of the water. (Water Code section 13050(h)). California's water quality objectives are established by the State and Regional Water Boards in the Water Quality Control Plans.

Water Quality Standards

Provisions of State or federal law which consist of a designated use or uses for waters of the United States and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the federal CWA (40 CFR section 131.3(i)). Under State law, the Water Boards establish beneficial uses and water quality objectives in their water quality control plans or basin plans. Together with an antidegradation policy, these beneficial uses and water quality objectives serve as water quality standards under the CWA. In CWA parlance, state beneficial uses are called “designated uses” and state water quality objectives are called “criteria.” Throughout this Order, the relevant term is used depending on the statutory scheme.

ATTACHMENT B – MAPS

Map 1 – San Onofre Nuclear Generating Station (SONGS) Site Location Map

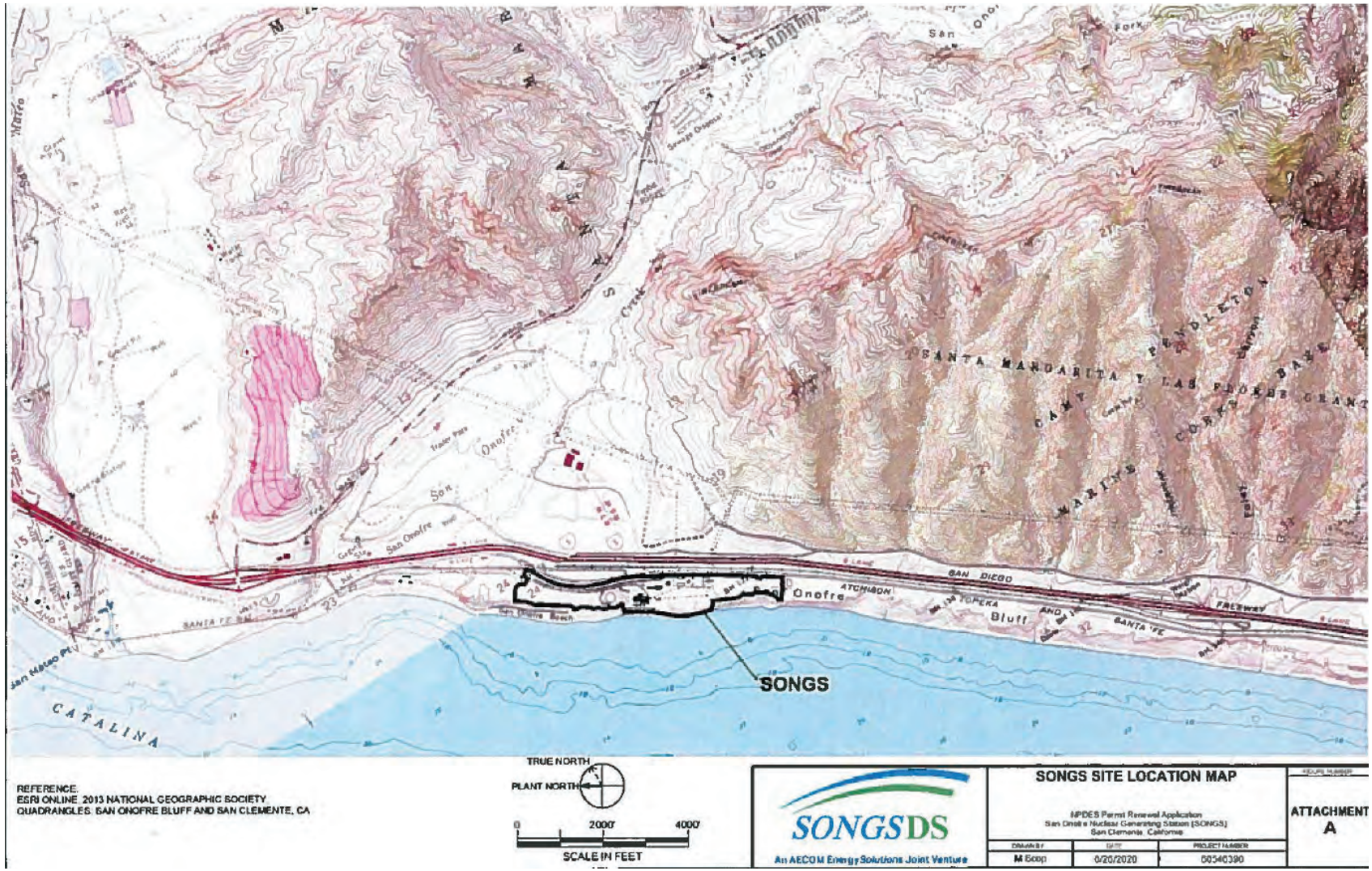

Map 2 – SONGS Aerial View

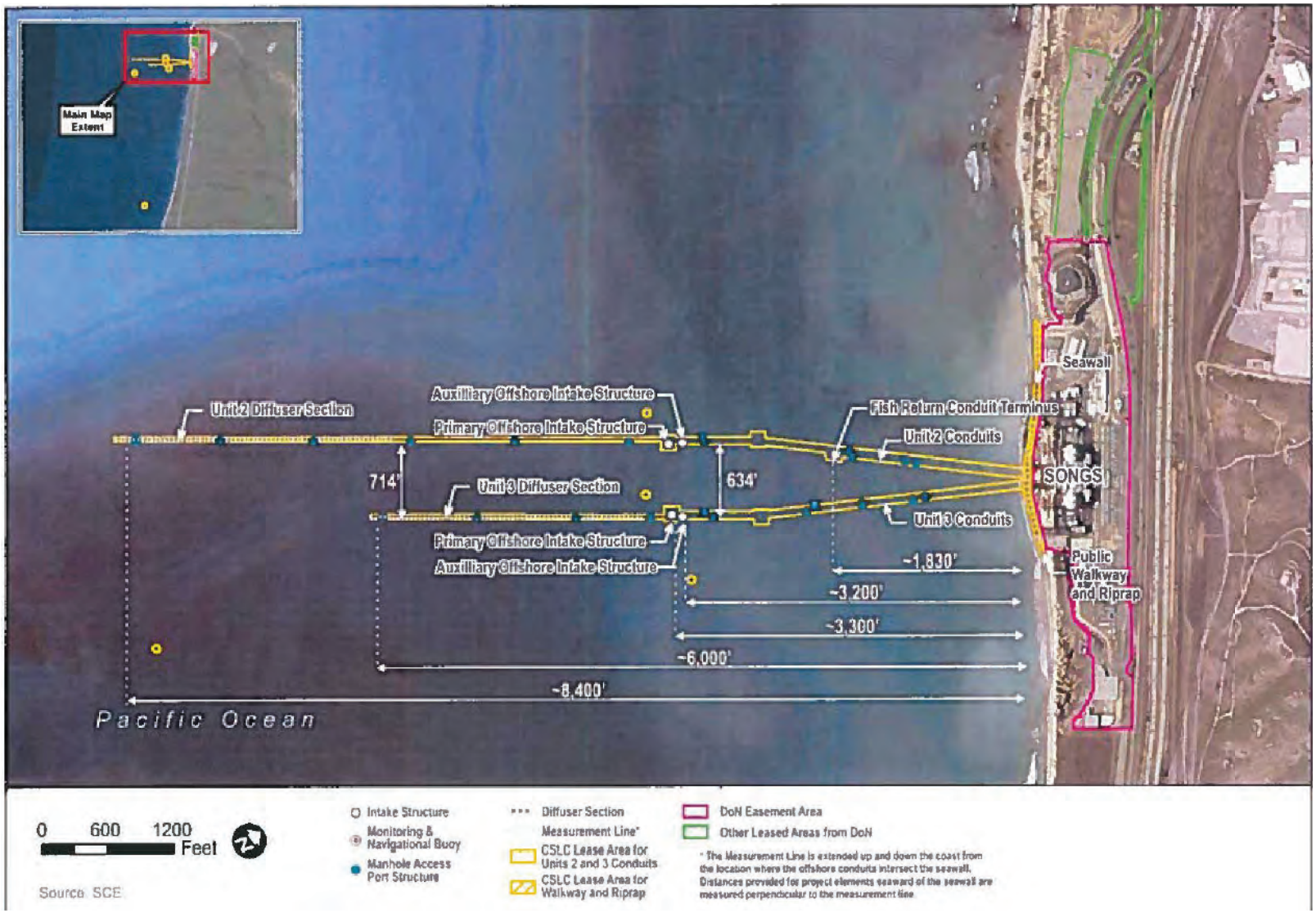

Map 3 – SONGS Site Map
The areas in the yellow boxes have been dismantled or they are undergoing active demolition.

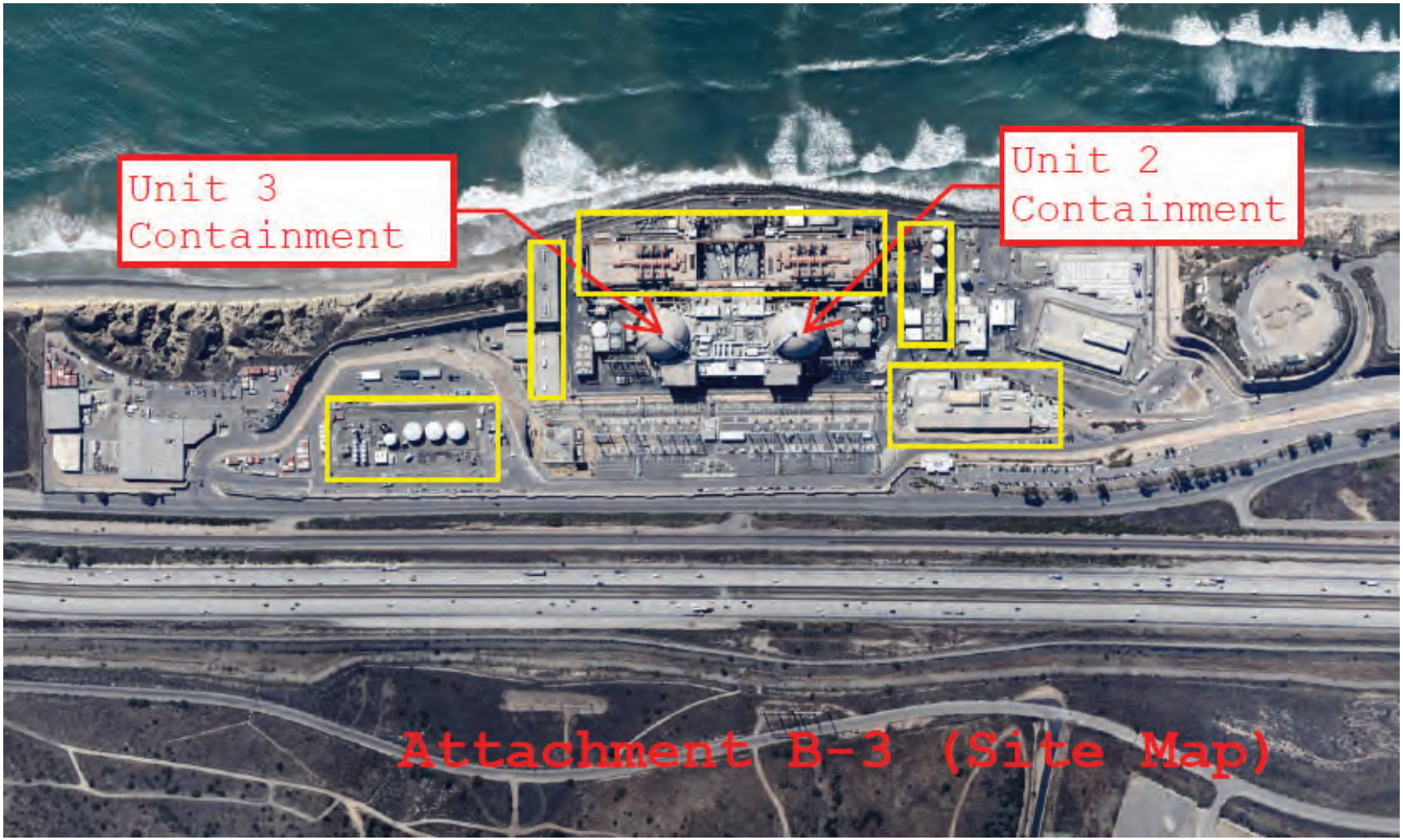

Map–4 - Location of temperature and water quality profiles offshore of SONGS

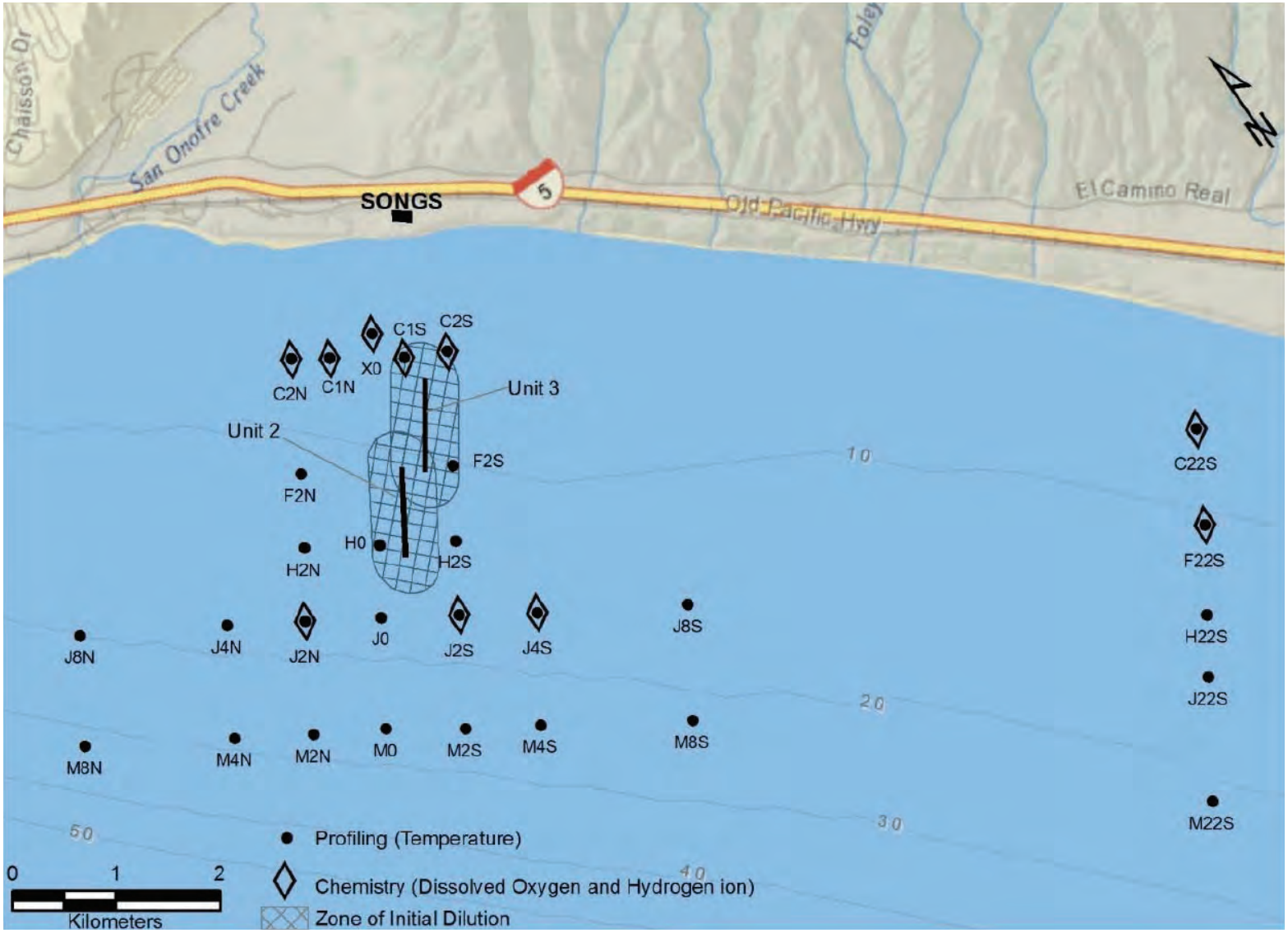

Map 5 – Location of three trawling sites (each site with three sampling stations) offshore of San Mateo Point, SONGS, and Don Light. Blue lines represent 10-m depth contours. Green and red dots represent the start and end locations of each trawl, respectively, with an arrow indicating the direction of the tow.

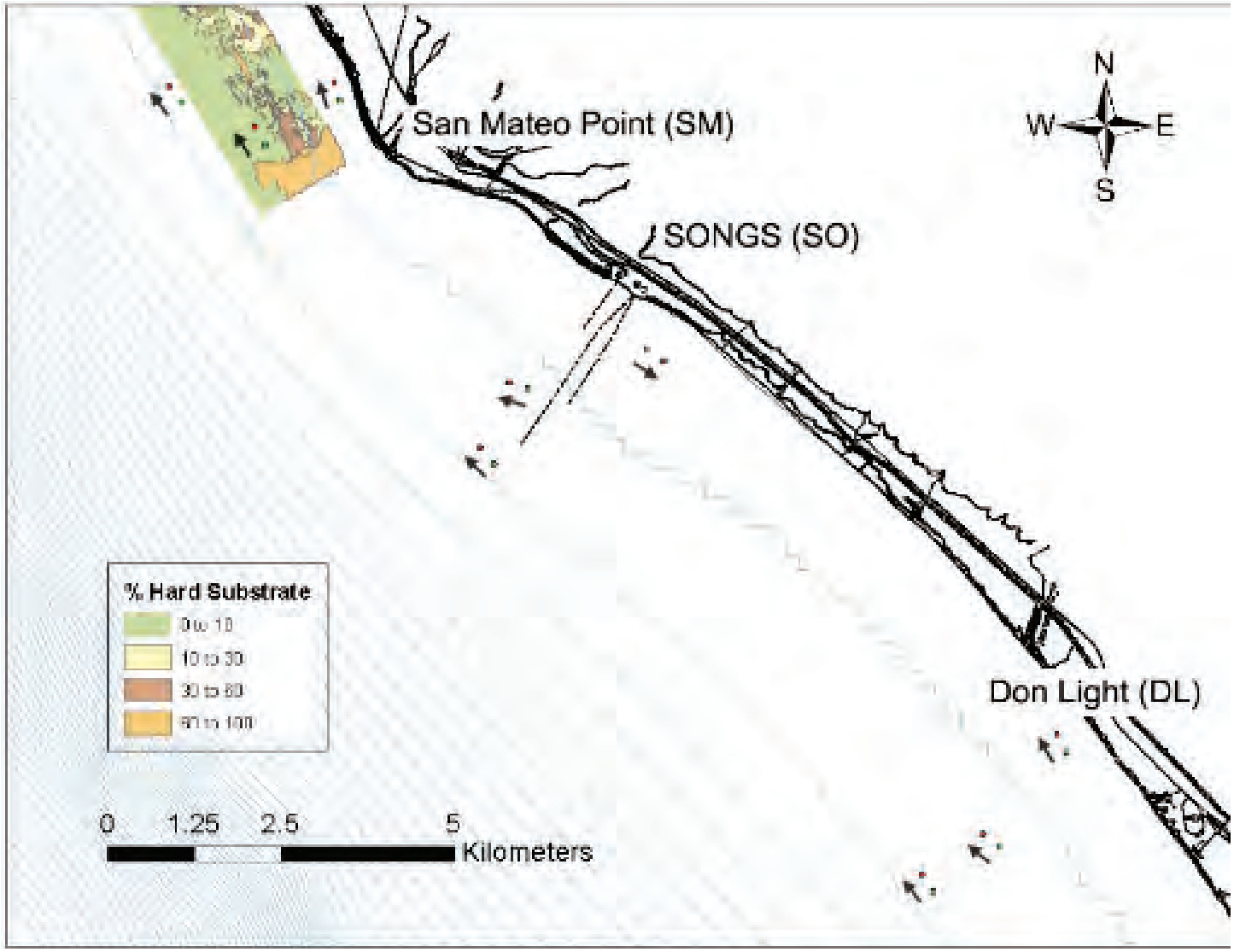

Map 6 – Location of six sampling stations (Stations 10, 14-15, 16-17, 18-19, 22, and 23) located in the San Onofre Kelp.

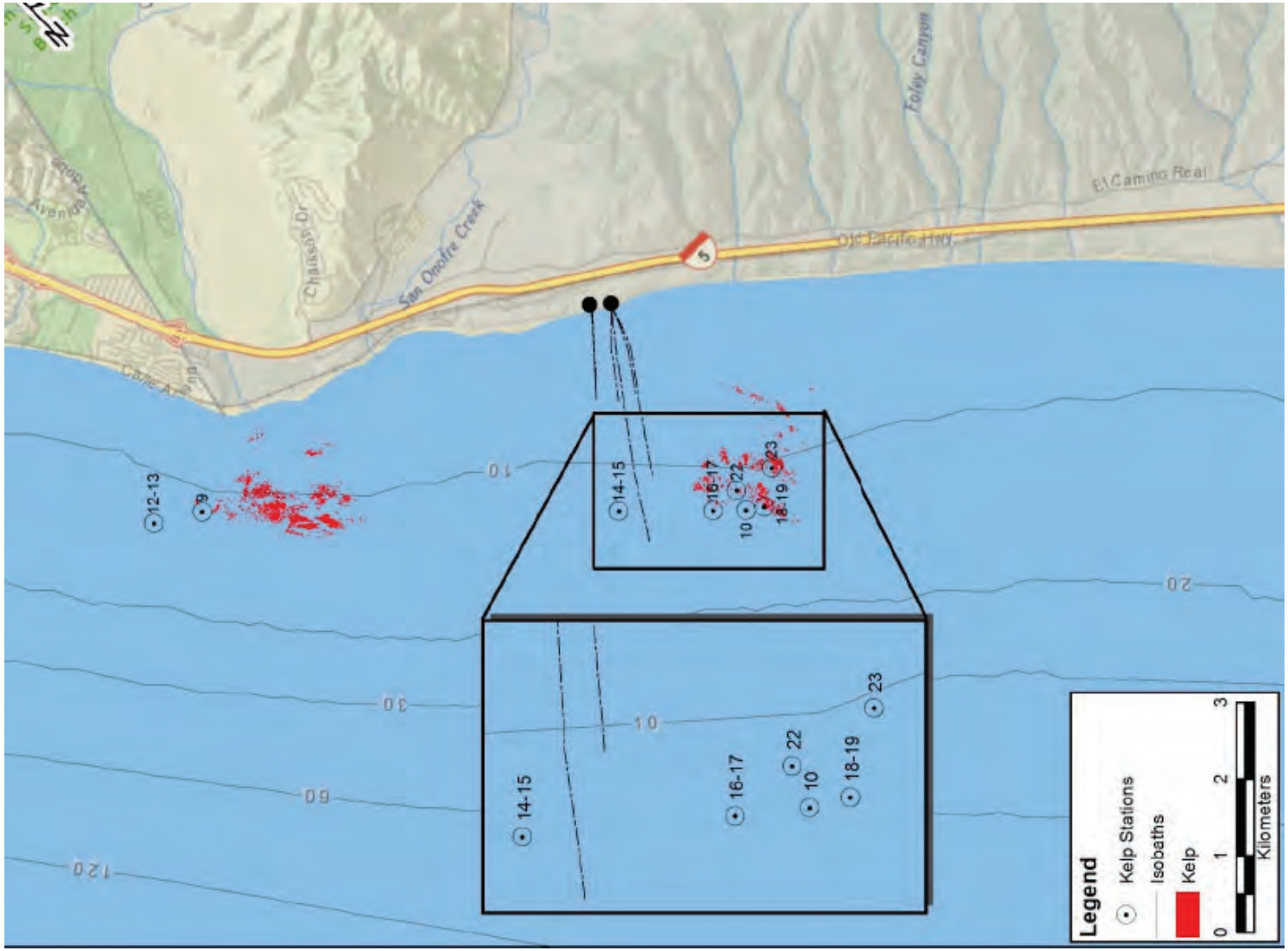

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ATTACHMENT C – FLOW SCHEMATICS

Flow Schematic 1 was removed per Amending Order No. R9-2025-0002

Flow Schematic 2 – San Onofre Nuclear Generating Station (SONGS) Water Balance Diagram
Total low-volume waste stream, Monitoring Location INT-002 = 0.12 MGD (INT-002-E) + 0.02 MGD (INT-002-D) + 3.75 MGD (INT-001-F/INT-001-E) + 7.5 MGD (INT-002-M) + 0.2 MGD (INT-002-K) + 0.288 MGD (INT-002-L) = 11.878 MGD.
Total flow to Outfall 002, Monitoring Location EFF-002 = 11.878 MGD (INT-002) + 0.324 MGD (stormwater) + 30 MGD (saltwater) = 42.202 MGD

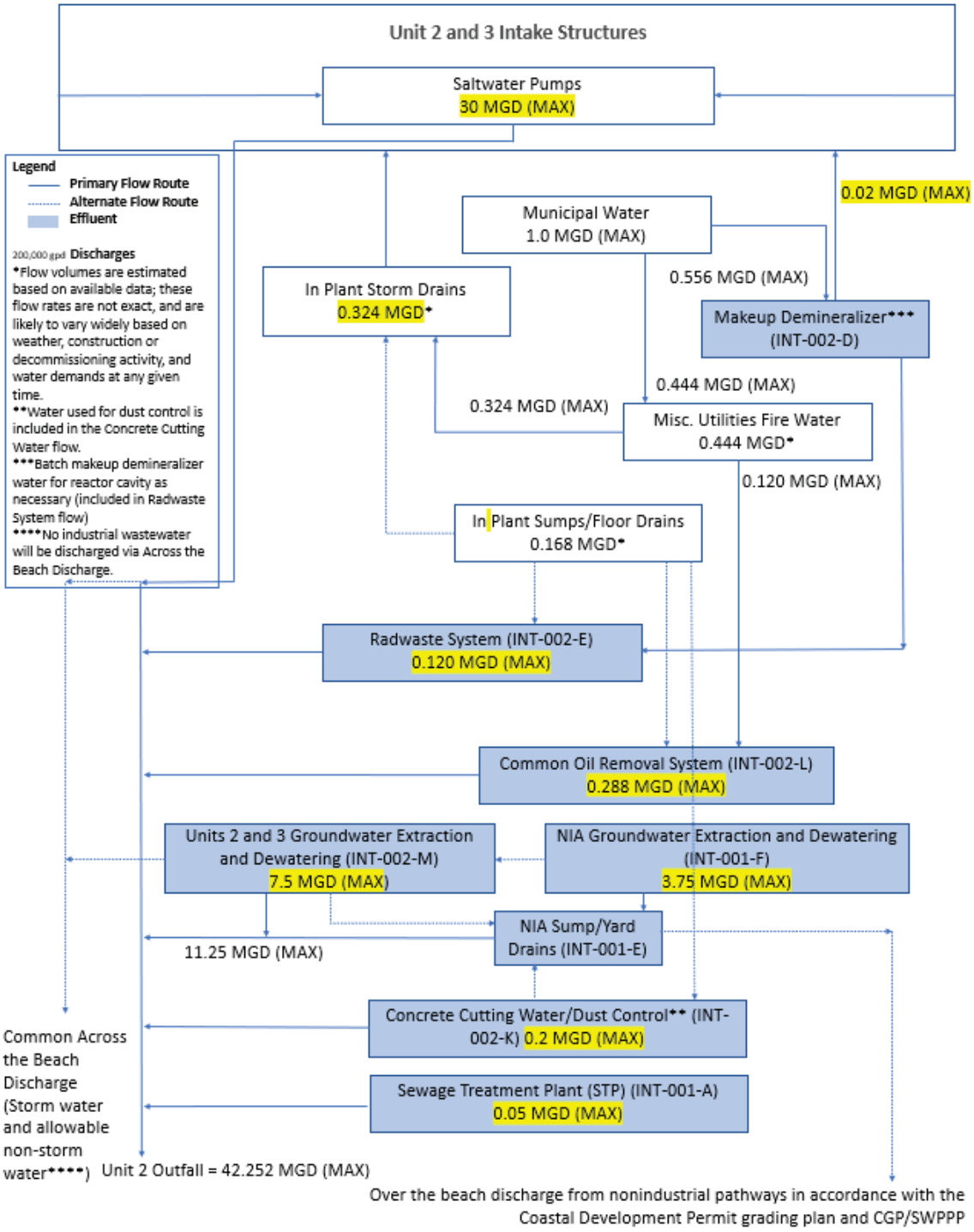

ATTACHMENT D – STANDARD PROVISIONS

1. Standard Provisions – Permit Compliance

1.1. Duty to Comply

1.1.1. The Discharger must comply with all of the terms, requirements, and conditions of this Order. Any noncompliance constitutes a violation of the federal Clean Water Act (CWA) and the California Water Code (Water Code) and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; denial of a permit renewal application; or a combination thereof. (title 40 of the Code of Federal Regulations (40 CFR) section 122.41(a); Water Code, sections 13261, 13263, 13265, 13268, 13000, 13001, 13304, 13350, 13385.)

1.1.2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the federal CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR section 122.41(a)(1).)

1.2. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR section 122.41(c).)

1.3. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR section 122.41(d).)

1.4. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by the Discharger only when necessary to achieve compliance with the conditions of this Order. (40 CFR section 122.41(e).)

1.5. Property Rights

1.5.1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR section 122.41(g).)

1.5.2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations. (40 CFR section 122.5(c).)

1.6. Inspection and Entry

The Discharger shall allow the San Diego Water Board, State Water Resources Control Board (State Water Board), United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (33 United States Code (U.S.C.) section 1318(a)(4)(b); 40 CFR section 122.41(i); Water Code, sections 13267, 13383):

1.6.1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (33 U.S.C. section 1318(a)(4)(b)(i); 40 CFR section 122.41(i)(1); Water Code, sections 13267, 13383);

1.6.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (33 U.S.C. section 1318(a)(4)(b)(ii); 40 CFR section 122.41(i)(2); Water Code, sections 13267, 13383);

1.6.3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (33 U.S.C. section 1318(a)(4)(b)(ii); 40 CFR section 122.41(i)(3); Water Code, sections 13267, 13383); and

1.6.4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the federal CWA or the Water Code, any substances or parameters at any location. (33 U.S.C. section 1318(a)(4)(b); 40 CFR section 122.41(i)(4); Water Code, sections 13267, 13383.)

1.7. Bypass

1.7.1. **Definitions**

1.7.1.1. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR section 122.41(m)(1)(i).)

1.7.1.2. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR section 122.41(m)(1)(ii).)

1.7.2. **Bypass not exceeding limitations.** The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance 1.7.3, 1.7.4, and 1.7.5 below. (40 CFR section 122.41(m)(2).)

1.7.3. **Prohibition of bypass.** Bypass is prohibited, and the San Diego Water Board may take enforcement action against the Discharger for bypass, unless (40 CFR section 122.41(m)(4)(i)):

1.7.3.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR section 122.41(m)(4)(i)(A));

1.7.3.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR section 122.41(m)(4)(i)(B)); and

1.7.3.3. The Discharger submitted notice to the San Diego Water Board as required under Standard Provisions – Permit Compliance 1.7.5 below. (40 CFR section 122.41(m)(4)(i)(C).)

1.7.4. The San Diego Water Board may approve an anticipated bypass, after considering its adverse effects, if the San Diego Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance 1.7.3 above. (40 CFR section 122.41(m)(4)(ii).)

1.7.5. **Notice**

1.7.5.1. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the date of the bypass. The notice shall be sent to the San Diego Water Board. As of December 2023, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10 below. Notices shall comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. (40 CFR section 122.41(m)(3)(i).)

1.7.5.2. Unanticipated bypass. The Discharger shall submit a notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). The notice shall be sent to the San Diego Water Board. As of December 2023, a notice shall also be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10 below. Notices shall comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. (40 CFR section 122.41(m)(3)(ii).)

1.8. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR section 122.41(n)(1).)

1.8.1. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance 1.8.2 below are met. No determination made during administrative review of claims that

noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR section 122.41(n)(2).)

1.8.2. **Conditions necessary for a demonstration of upset.** The Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR section 122.41(n)(3)):

1.8.2.1. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR section 122.41(n)(3)(i));

1.8.2.2. The permitted facility was, at the time, being properly operated (40 CFR section 122.41(n)(3)(ii));

1.8.2.3. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting 5.5.2.2 below (24-hour notice) (40 CFR section 122.41(n)(3)(iii)); and

1.8.2.4. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance. (40 CFR section 122.41(n)(3)(iv).)

1.8.3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset have the burden of proof. (40 CFR section 122.41(n)(4).)

2. Standard Provisions – Permit Action

2.1. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR section 122.41(f).)

2.2. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 CFR section 122.41(b).)

2.3. Transfers

This Order is not transferable to any person except after notice to the San Diego Water Board. The San Diego Water Board may require modification or revocation and reissuance of the Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the federal CWA and the Water Code. (40 CFR sections 122.41(l)(3), 122.61.)

3. Standard Provisions – Monitoring

3.1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR section 122.41(j)(1).)

3.2. Monitoring must be conducted according to test procedures approved under 40 CFR part 136 for the analyses of pollutants unless another method is required under 40 CFR chapter 1, subchapter N. Monitoring must be conducted according to sufficiently sensitive test methods approved under 40 CFR part 136 for the analysis of pollutants or pollutant parameters or as required under 40 CFR chapter 1, subchapter N. For the purposes of this paragraph, a method is sufficiently sensitive when:

3.2.1. The method minimum level (ML) is at or below the level of the most stringent effluent limitation established in the permit for the measured pollutant or pollutant parameter, and either the method ML is at or below the level of the most stringent applicable water quality criterion for the measured pollutant or pollutant parameter or the method ML is above the applicable water quality criterion but the amount of the pollutant or pollutant parameter in the facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or

3.2.2. The method has the lowest ML of the analytical methods approved under 40 CFR part 136 or required under 40 CFR chapter 1, subchapter N for the measured pollutant or pollutant parameter.

In the case of pollutants or pollutant parameters for which there are no approved methods under 40 CFR part 136 or otherwise required under 40 CFR chapter 1, subchapter N, monitoring must be conducted according to a test procedure specified in this Order for such pollutants or pollutant parameters. (40 CFR sections 122.21(e)(3),122.41(j)(4), 122.44(i)(1)(iv).)

4. Standard Provisions – Records

4.1. The Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the San Diego Water Board Executive Officer at any time. (40 CFR section 122.41(j)(2).)

4.2. Records of monitoring information shall include:

4.2.1. The date, exact place, and time of sampling or measurements (40 CFR section 122.41(j)(3)(i));

4.2.2. The individual(s) who performed the sampling or measurements (40 CFR section 122.41(j)(3)(ii));

4.2.3. The date(s) analyses were performed (40 CFR section 122.41(j)(3)(iii));

4.2.4. The individual(s) who performed the analyses (40 CFR section 122.41(j)(3)(iv));

4.2.5. The analytical techniques or methods used (40 CFR section 122.41(j)(3)(v)); and

4.2.6. The results of such analyses. (40 CFR section 122.41(j)(3)(vi).)

4.3. Claims of confidentiality for the following information will be denied (40 CFR section 122.7(b)):

4.3.1. The name and address of any permit applicant or Discharger (40 CFR section 122.7(b)(1)); and

4.3.2. Permit applications and attachments, permits and effluent data. (40 CFR section 122.7(b)(2).)

5. Standard Provisions – Reporting

5.1. Duty to Provide Information

The Discharger shall furnish to the San Diego Water Board, State Water Board, or USEPA within a reasonable time, any information which the San Diego Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the San Diego Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR section 122.41(h); Water Code, sections 13267, 13383.)

5.2. Signatory and Certification Requirements

5.2.1. All applications, reports, or information submitted to the San Diego Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting 5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.6 below. (40 CFR section 122.41(k).)

5.2.2. All permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 CFR section 122.22(a)(1).).

5.2.3. All reports required by this Order and other information requested by the San Diego Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting 5.2.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

5.2.3.1. The authorization is made in writing by a person described in Standard Provisions – Reporting 5.2.2 above (40 CFR section 122.22(b)(1));

5.2.3.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR section 122.22(b)(2)); and

5.2.3.3. The written authorization is submitted to the San Diego Water Board and State Water Board. (40 CFR section 122.22(b)(3).)

5.2.4. If an authorization under Standard Provisions – Reporting 5.2.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting 5.2.3 above must be submitted to the San Diego Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR section 122.22(c).)

5.2.5. Any person signing a document under Standard Provisions – Reporting 5.2.2 or 5.2.3 above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 CFR section 122.22(d).)

5.2.6. Any person providing the electronic signature for documents described in Standard Provisions – 5.2.1, 5.2.2, or 5.2.3 that are submitted electronically shall meet all relevant requirements of Standard Provisions – Reporting 5.2 and shall ensure that all relevant requirements of 40 CFR part 3 (Cross-Media Electronic Reporting) and 40 CFR part 127 (NPDES Electronic Reporting Requirements) are met for that submission. (40 CFR section 122.22(e).)

5.3. Monitoring Reports

5.3.1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR section 122.41(l)(4).)

5.3.2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the San Diego Water Board or State

Water Board. As of December 21, 2016, all reports and forms must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10 and comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. (40 CFR section 122.41(l)(4)(i).)

5.3.3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under 40 CFR part 136, or another method required for an industry-specific waste stream under 40 CFR chapter 1, subchapter N, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the San Diego Water Board or State Water Board. (40 CFR section 122.41(l)(4)(ii).)

5.3.4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR section 122.41(l)(4)(iii).)

5.4. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 CFR section 122.41(l)(5).)

5.5. Twenty-Four Hour Reporting

5.5.1. The Discharger shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A report shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (i.e., combined sewer overflow, sanitary sewer overflow, or bypass event), type of overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volume untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the event, and whether the noncompliance was related to wet weather.

As of December 2023, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events must be submitted to the San Diego Water Board and must be submitted electronically to the initial recipient defined in Standard Provisions – Reporting 5.10. The reports shall comply with 40 CFR part 3, 40 CFR section 122.22, and 40 CFR part 127. The San Diego Water Board may also require the Discharger to electronically submit reports not related to

combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 CFR section 122.41(l)(6)(i).)

5.5.2. The following shall be included as information that must be reported within 24 hours:

5.5.2.1. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR section 122.41(l)(6)(ii)(A).)

5.5.2.2. Any upset that exceeds any effluent limitation in this Order. (40 CFR section 122.41(l)(6)(ii)(B).)

5.5.3. The San Diego Water Board may waive the above required written report on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR section 122.41(l)(6)(ii)(B).)

5.6. Planned Changes

The Discharger shall give notice to the San Diego Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR section 122.41(l)(1)):

5.6.1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR section 122.29(b) (40 CFR section 122.41(l)(1)(i)); or

5.6.2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 CFR section 122.41(l)(1)(ii).)

5.6.3. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under 40 CFR section 122.42(a)(1) (see Additional Provisions—Notification Levels 7.1.1). (40 CFR section 122.41(l)(1)(ii).)

5.7. Anticipated Noncompliance

The Discharger shall give advance notice to the San Diego Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with this Order's requirements. (40 CFR section 122.41(l)(2).)

5.8. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting 5.3, 5.4, and 5.5 above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting 5.5 above. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in Standard Provision – Reporting 5.5 and the applicable required data in appendix A to 40 CFR part 127. The San Diego Water Board may also require the Discharger to electronically submit reports not related

to combined sewer overflows, sanitary sewer overflows, or bypass events under this section. (40 CFR section 122.41(l)(7).)

5.9. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the San Diego Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR section 122.41(l)(8).)

5.10. Initial Recipient for Electronic Reporting Data

The owner, operator, or the duly authorized representative is required to electronically submit NPDES information specified in appendix A to 40 CFR part 127 to the initial recipient defined in 40 CFR section 127.2(b). USEPA will identify and publish the list of initial recipients on its website and in the Federal Register, by State and by NPDES data group (see 40 CFR section 127.2(c)). USEPA will update and maintain this listing. (40 CFR section 122.41(l)(9).)

6. Standard Provisions – Enforcement

The San Diego Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13268, 13385, 13386, and 13387.

7. Additional Provisions – Notification Levels

Non-Municipal Facilities - Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the San Diego Water Board as soon as they know or have reason to believe (40 CFR section 122.42(a)):

7.1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 CFR section 122.42(a)(1)):

7.1.1. 100 micrograms per liter (. g/L) (40 CFR section 122.42(a)(1)(i));

7.1.2. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4 dinitrophenol and 2 methyl 4,6 dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 CFR section 122.42(a)(1)(ii));

7.1.3. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR section 122.42(a)(1)(iii)); or

7.1.4. The level established by the San Diego Water Board in accordance with section 122.44(f). (40 CFR section 122.42(a)(1)(iv).)

7. 2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 CFR section 122.42(a)(2)):

7.2.1. 500 µg/L (40 CFR section 122.42(a)(2)(i));

7.2.2. 1 mg/L for antimony (40 CFR section 122.42(a)(2)(ii));

7.2.3. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 C CFR section 122.42(a)(2)(iii)); or

7.2.4. The level established by the San Diego Water Board in accordance with section 122.44(f). (40 CFR section 122.42(a)(2)(iv).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

Section 308 of the federal Clean Water Act (CWA) and sections 122.41(h), (j)-(l), 122.44(i), and 122.48 of title 40 of the Code of Federal Regulations (40 CFR) require that all National Pollutant Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code (Water Code) section 13383 also authorizes the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) to establish monitoring, inspection, entry, reporting, and recordkeeping requirements. Pursuant to this authority, this MRP establishes conditions for the Southern California Edison Company (Discharger) to conduct routine or episodic self-monitoring of the discharges regulated under this Order at specified effluent and receiving water monitoring locations. The MRP requires the Discharger to report the results to the San Diego Water Board with information necessary to evaluate discharge characteristics and compliance status. While the San Diego Water Board is not required to consider MRP costs, it recognizes that monitoring and reporting costs can be a significant burden. Based on an email from the Discharger dated November 17, 2022, the monitoring and reporting costs are approximately $399,500 annually. The MRP is reasonable given the needs and benefits of the reports.

The purpose of the MRP is to determine and ensure compliance with effluent limitations and other requirements established in this Order, assess treatment efficiency, characterize effluents, and characterize the receiving water and the effects of the discharge on the receiving water. The MRP also specifies requirements concerning the proper use, maintenance, and installation of monitoring equipment and methods, and the monitoring type intervals and frequency necessary to yield data that are representative of the activities and discharges regulated under this Order.

Each monitoring section contains an introductory paragraph summarizing why the monitoring is needed and the key management questions the monitoring is designed to answer. In developing the list of key management questions, the San Diego Water Board considered four basic types of information for each question:

(1) Management Information Need – Why does the San Diego Water Board need to know the answer?
(2) Monitoring Criteria – What monitoring will be conducted for deriving an answer to the question?
(3) Expected Product – How should the answer be expressed and reported?
(4) Possible Management Actions – What actions will be potentially influenced by the answer?

The framework for this monitoring program has three components that comprise a range of spatial and temporal scales: 1. core monitoring, 2. regional monitoring, and 3. special studies.

1. Core monitoring consists of the basic site-specific monitoring necessary to measure compliance with individual effluent limits and/or impacts to receiving water quality. Core monitoring is typically conducted in the immediate vicinity of the discharge by examining local scale spatial effects.
2. Regional monitoring provides information necessary to make assessments over large areas and serves to evaluate cumulative effects of all anthropogenic inputs. Regional

monitoring data also assists in the interpretation of core monitoring studies. In the event that a regional monitoring effort takes place during the permit cycle in which the MRP does not specifically address regional monitoring, the San Diego Water Board may allow relief from aspects of core monitoring components in order to encourage participation pursuant to section 5 of this MRP.

3. Special studies are directed monitoring efforts designed in response to specific management or research questions identified through either core or regional monitoring programs. Often, they are used to help understand core or regional monitoring results, where a specific environmental process is not well understood, or to address unique issues of local importance.

1. General Monitoring Provisions

1.1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitoring discharge. All samples shall be taken at the monitoring points specified in section 2, Table E-1 and, unless otherwise specified, before the monitored flow joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the San Diego Water Board.

1.2. Appropriate flow measurement devices and/or engineering methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurement is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ±10 percent from true discharge rates throughout the range of expected discharge volumes.

.1.3. Monitoring must be conducted according to United States Environmental Protection Agency (USEPA) test procedures approved at 40 CFR part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the CWA* as amended, or an alternative test procedure (ATP) approved by USEPA, or by the San Diego Water Board when there are no methods specified for a pollutant at 40 CFR part 136.

1.4. Data produced and reports submitted pursuant to this Order shall be generated by a laboratory accredited by the State of California Environmental Laboratory Accreditation Program (ELAP). The laboratory must hold a valid certificate of accreditation for the analytical test method specified in 40 CFR part 136, an ATP approved by USEPA, or by the San Diego Water Board when there are no methods specified for a pollutant at 40 CFR part 136. The laboratory must include quality assurance/quality control data in all data reports required by this Order and submit electronic data as required by the San Diego Water Board. Data generated using field tests is exempt pursuant to Water Code Section 13176. Additional information on ELAP can be accessed at: https://www.waterboards.ca.gov/drinking_water/certlic/labs/index.shtml.

1.5. Records of monitoring information shall include information required under Standard Provision, Attachment D, section 4 of this Order.

1.6. The Discharger shall have, and implement, an acceptable written quality assurance (QA) plan for laboratory analyses. Duplicate chemical analyses must be conducted on a minimum of 10 percent of the samples or at least one sample per month, whichever is greater. A similar frequency shall be maintained for analyzing spiked samples. The Discharger should have a success rate equal or greater than 80 percent.

1.7. The Discharger shall ensure that the results of the Discharge Monitoring Report-Quality Assurance (DMR-QA) Study or the most recent Water Pollution Performance Evaluation Study are submitted annually to the State Water Resources Control Board (State Water Board) at the following address:

State Water Resources Control Board Quality Assurance Program Officer
Office of Information Management and Analysis
State Water Resources Control Board
1001 I Street, Sacramento, CA 95814

1.8. Analysis for toxic pollutants, including chronic toxicity, with effluent limitations based on water quality objectives and criteria of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) and the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) shall be conducted in accordance with procedures described in the Ocean Plan and restated in this MRP.

1.9. The Discharger shall ensure that analytical procedures used to evaluate compliance with effluent limitations established in this Order use minimum levels (MLs) no greater than the applicable effluent limitations and are consistent with the requirements of the Ocean Plan and 40 CFR part 136, or otherwise approved by USEPA and authorized by the San Diego Water Board. If no authorized ML value is below the effluent limitation, then the method must achieve an ML no greater than the lowest ML value provided in the Ocean Plan and/or 40 CFR part 136.

2. Monitoring Locations

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order. The north latitude and west longitude information in Table E-1 are approximate for administrative purposes.

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description[1]
--	INF-001-A	This monitoring location was removed per Amending Order No. R9-2025-0002.
--	INF-002	**Influent:** A location where a representative sample of the ocean water from the saltwater pump intake for Unit 2 can be obtained. (Previously INF-2-Cool)
--	INF-003	**Influent:** A location where a representative sample of the ocean water from the saltwater pump intake for Unit 3 can be obtained. (Previously INF-3-Cool)

Discharge Point Name	Monitoring Location Name	Monitoring Location Description[1]
001-A	INT-001-A	This discharge point and monitoring location was removed per Amending Order No. R9-2025-0002.
001-E	INT-001-E[2]	**NIA Internal Waste streams Routed to Discharge Point 002:** A location where a representative sample of the NIA Yard Drains (sump) flow can be obtained.
001-F	INT-001-F[2]	**NIA Internal Waste streams Routed to Discharge Point 002:** A location where a representative sample of the NIA Dewatering flow can be obtained.
--	INT-002[2]	**Unit 2 Internal Waste Streams Routed to Discharge Point 002:** Aliquot of all in-plant low-volume wastewater discharges for Unit 2. Unit 2 combined discharge monitoring shall be conducted at a point before all in-plant and/or low-volume waste streams comingle with ocean water.
002-D	INT-002-D[2]	**Unit 2 Internal Waste Streams Routed to Discharge Point 002:** A location where a representative sample of the Makeup Demineralizer can be obtained.
002-E	INT-002-E[2]	**Unit 2 Internal Waste Streams Routed to Discharge Point 002:** A location where a representative sample of the Radwaste System can be obtained.
002-K	INT-002-K[2]	**Unit 2 Internal Waste Streams Routed to Discharge Point 002:** A location where a representative sample of the Concrete Cutting Water can be obtained.
002-L	INT-002-L[2]	**Unit 2 Internal Waste Streams Routed to Discharge Point 002:** A location where a representative sample of the Common Oil Removal System can be obtained.
002-M	INT-002-M[2]	**Unit 2 Internal Waste Streams Routed to Discharge Point 002:** A location where a representative sample of the Dewatering can be obtained.
002	EFF-002	**Effluent to the Pacific Ocean:** A location where a representative sample of the Combined Discharge to Discharge Point No. 002 can be obtained. Latitude 33° 20' 55.84" North, Longitude 117° 34' 13.5" West

Discharge Point Name	Monitoring Location Name	Monitoring Location Description[1]
--	Receiving Water	All receiving water sample stations are shown in Attachment B of this Order. Locations for the stations are based on the zero-line reference, with stations arranged in a grid pattern upcoast (N) and downcoast (S) of the zero line (Figure 2-2). Numerical designations are related to historic onshore-offshore monitoring transect locations upcoast (1, 2, 4 and 8) and downcoast (1, 2, 4, 8 and 22). Stations of approximately similar depth are designated by the same initial letter: C = 10 m, F = 12 m, H = 15 m, J = 20 m, and M = 25 m. Using this system, Station F2N represents the second transect line upcoast of the zero line at 12-m depth. The line of stations farthest downcoast—Stations C22S, F22S, H22S, J22S, and M22S—are the designated reference stations (aka control stations). These stations are 6,706 m downcoast of the zero line to provide a reference station for each depth.
--	M22S	Reference Station: 33° 18.038’, 117° 31.566’ Temperature only.
--	J22S	Reference Station: 33° 18.490’, 117°, 31.212’ Temperature only.
--	H22S	Reference Station: 33° 18.716’, 117°, 31.034’ Temperature only.
--	F22S	Reference Station: 33° 19.042’, 117°, 30.773’ Temperature, dissolved oxygen, and pH.
--	C22S	Reference Station: 33° 19.408’, 117°, 30.522’ Dissolved oxygen, pH., and continuous temperature monitoring.
--	C1S	Impact Station: 33° 21.643’, 117°, 33.694’ Temperature, dissolved oxygen, and pH.
--	C2S	Impact Station: 33° 21.556’, 117°, 33.491’ Dissolved oxygen, pH., and continuous temperature monitoring.
--	X0	Impact Station: 33° 21.807’, 117°, 33.761’ Temperature, dissolved oxygen, and pH.
--	C1N	Impact Station: 33° 21.826’, 117°, 34.016’ Temperature, dissolved oxygen, and pH.
--	C2N	Impact Station: 33° 21.918’, 117°, 34.180’ Temperature, dissolved oxygen, and pH.
--	F2S	Impact Station: 33° 21.134’, 117°, 33.809’ Continuous temperature monitoring only.

Discharge Point Name	Monitoring Location Name	Monitoring Location Description[1]
--	F2N	Impact Station: 33° 21.484’, 117°, 34.482’ Temperature only.
--	H2N	Impact Station: 33° 21.211’, 117° 34.690’ Temperature only.
--	H0	Impact Station: 33° 21.033’, 117°, 34.358’ Temperature only.
--	H2S	Impact Station: 33° 20.859’, 117°, 34.019’ Temperature only.
--	J8S	Impact Station: 33° 20.051’, 117°, 33.220’ Temperature only.
--	J4S	Impact Station: 33° 20.400’, 117°, 33.889’ Temperature, dissolved oxygen, and pH.
--	J2S	Impact Station: 33° 20.586’, 117°, 34.230’ Temperature, dissolved oxygen, and pH.
--	J0	Impact Station: 33° 20.772’, 117°, 34.570’ Temperature only.
--	J2N	Impact Station: 33° 20.948’, 117°, 34.904’ Temperature, dissolved oxygen, and pH.
--	J4N	Impact Station: 33° 21.128,’ 117°, 35.251’ Temperature only.
--	J8N	Impact Station: 33° 21.460’, 117°, 35.911’ Temperature only.
--	M8N	Impact Station: 33° 21.053’, 117°, 36.219’ Temperature only.
--	M4N	Impact Station: 33° 20.707’, 117°, 35.555’ Temperature only.
--	M2N	Impact Station: 33° 20.524', 117° 35.206' Temperature only.
--	M0	Impact Station: 33° 20.363', 117° 34.881' Temperature only.
--	M2S	Impact Station: 33° 20.165', 117° 34.543' Temperature only.
--	M4S	Impact Station: 33° 19.989', 117° 34.208' Temperature only.
--	M8S	Impact Station: 33° 19.627', 117°33.545' Temperature only.

Discharge Point Name	Monitoring Location Name	Monitoring Location Description[1]
--	San Onofre (SO) trawl site	San Onofre (SO) trawl site, characterized by soft-bottom seafloor, the middle isobath is close to natural rock reef structure. Station SO1: 18.3-meters (60-feet) isobath Station SO2: 12.2-meters (40-feet) isobath Station SO3: 6.1-meters (20-feet) isobath
--	San Mateo Point (SM, northern reference site)	San Mateo Point (SM, northern reference site) located approximately 5 km north of SONGS, characterized by soft-bottom seafloor, with rocky reefs in the vicinity of San Mateo, situated on the east and west sides of the SONGS mitigation reef project. Station SM1: 18.3-meters (60-feet) isobath Station SM2: 12.2-meters (40-feet) isobath Station SM3: 6.1-meters (20-feet) isobath
--	Don Light (DL, southern reference site)	Don Light (DL, southern reference site) located approximately 8.5 km south of SONGS, characterized by soft-bottom seafloor, with rocky reefs in the vicinity of San Onofre. Station DL1: 18.3-meters (60-feet) isobath Station DL2: 12.2-meters (40-feet) isobath Station DL3: 6.1-meters (20-feet) isobath.

Notes for Table E-1
1. Latitude and Longitude coordinates are provided in NAD 83 Data.
2. The facility shut down in 2013. Since 2019, as different parts of the facility are decommissioned, this stream discharges intermittently or not at all.

3. Core Monitoring Requirements

3.1. Influent Monitoring Requirements – Not Applicable

Influent monitoring for the NIA Sewage Treatment Plant influent at Monitoring Location INF-001-A was removed per Amending Order No. R9-2025-0002.

Table E-2. This Table was removed per Amending Order No. R9-2025-0002.

3.2. Effluent Monitoring Requirements

Effluent monitoring is the collection and analysis of samples or measurements of effluents, after all treatment processes, to determine and quantify contaminants and to demonstrate compliance with applicable effluent limitations, standards, and other requirements of this Order.

Effluent monitoring is necessary to address the following questions:

(1) Does the effluent comply with permit effluent limitations and other requirements of this Order, thereby ensuring that water quality standards are achieved in the receiving water?
(2) What is the mass of constituents that are discharged daily, monthly, or annually?
(3) Is the effluent concentration or mass changing over time?
(4) Is the Facility being properly operated and maintained to ensure compliance with the conditions of this Order?

3.2.1. Effluent Monitoring for the NIA Sewage Treatment Plant at Monitoring Location INT-001-A was removed per Amending Order No. R9-2025-0002.

Table E-3. This Table was removed per Amending Order No. R9-2025-0002.

3.2.2. **Monitoring Location INT-002 - Combined Low-Volume Waste Stream from Monitoring Locations INT-001-E, INT-001-F, INT-002-D, INT-002-E, INT-002-K, INT-002-L, and INT-002-M (Internal Outfall INT-002):**

For the purposes of monitoring, the following wastewaters are considered low-volume waste streams: water draining to NIA Yard Drains (INT-001-E), NIA dewatering (INT-001-F), makeup demineralizer wastewater (INT-002-D), radwaste system wastewater (INT-002-E), concrete cutting water (INT-002-K), oil removal system wastewater (INT-002-L), and groundwater dewatering (INT-002-M).

A composite sample shall be taken collectively, as if from one source, from as many individual low-volume waste stream discharge sources as possible, that are collected as grab samples and composited on a flow-weighted basis. Individual low-volume waste stream discharges that account for no flow on the day of sample collection should not be included in a composite sample. The flow rate used to determine the proportion of each individual low-volume waste stream discharge in the composited sample shall be the actual flow rate (preferred) or the estimated flow rate for the day on which samples are collected. The composite sample representing combined individual low-volume waste stream discharges from the NIA and Unit 2 shall be monitored as described in Table E-4 below with the results reported as Monitoring Location INT-002. The Discharger shall report which low-flow waste streams are included in the composite sample.

Table E-4. Internal Effluent Monitoring – Combined Low-Volume Waste Stream Discharges[1]

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
TSS	mg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Oil and Grease	mg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
pH	standards units	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Arsenic	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Cadmium, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Chromium (hexavalent), Total Recoverable[4]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Copper, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Lead, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Mercury, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Nickel, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Selenium, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Silver, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Zinc, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Cyanide, Total (as CN)[5]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Ammonia (expressed as nitrogen)	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Phenolic compounds[1] (non-chlorinated)	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Chlorinated phenolics[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Endosulfan[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Endrin	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Hexachlorocyclohexane (HCH)[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Acrolein	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Antimony	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Bis(2-chloroethoxy)methane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Bis(2-chloroisopropyl)ether	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Chlorobenzene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Chromium (III), Total Recoverable[4]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
di-n-butyl phthalate	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Dichlorobenzenes[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Diethyl phthalate	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Dimethyl phthalate	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
4,6-Dinitro-2-methylphenol	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
2,4-Dinitrophenol	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Ethylbenzene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Fluoranthene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Hexachlorocyclopentadiene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Nitrobenzene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Thallium, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Toluene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Tributyltin	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,1,1-Trichloroethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Acrylonitrile	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Aldrin	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Benzene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Benzidine	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Beryllium, Total Recoverable	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Bis(2-chloroethyl)ether	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Bis(2-ethylhexyl)phthalate	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Carbon tetrachloride	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Chlordane[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Chlorodibromomethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Chloroform	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Dichlorodiphenyltrichloroethane (DDT)[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,4-Dichlorobenzene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
3-3'-Dichlorobenzidine	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,2-Dichloroethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,1-Dichloroethylene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Dichlorobromomethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Dichloromethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
1,3-Dichloropropene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Dieldrin	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
2,4-Dinitrotoluene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,2-Diphenylhydrazine	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Halomethanes[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Heptachlor	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Heptachlor epoxide	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Hexachlorobenzene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Hexachlorobutadiene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Hexachloroethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Isophorone	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
N-Nitrosodimethylamine	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
N-Nitrosodi-n-propylamine	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
N-Nitrosodiphenylamine	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Parameter[1]	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Polynuclear aromatic hydrocarbons (PAH)[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Polychlorinated Biphenyl (PCB)[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
TCDD Equivalents[1]	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,1,2,2-Tetrachloroethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Tetrachloroethylene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Toxaphene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Trichloroethylene	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
1,1,2-Trichloroethane	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
2,4,6-Trichlorophenol	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.
Vinyl Chloride	µg/L, lbs/day[2]	Flow Weighted Composite	Annually[3]	As required under 40 CFR part 136.

Notes for Table E-4

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The MERs shall be calculated in accordance with section 7.13 of this Order. The flow rate used for the MER calculation shall be the sum of the flow rates used to determine the proportion of each individual low-volume waste stream discharges in the composited sample.
3. The minimum frequency of monitoring for this constituent shall increase to twice the minimum frequency specified, if any analysis for this constituent yields a result higher than the applicable effluent limitation specified in this Order. The increased minimum frequency of monitoring shall remain in effect until the results of a minimum of four consecutive analyses for this constituent are below all applicable effluent limitations specified in this Order.

4. The Discharger may, at their option, meet this effluent limitation as a total chromium effluent limitation and monitor for total recoverable chromium in lieu of total recoverable chromium (III) or total recoverable chromium (hexavalent).
5. If the Discharger can demonstrate to the satisfaction of the San Diego Water Board (subject to approval of an ATP by USEPA) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations may be evaluated with the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136, as revised May 14, 1999.

3.2.3. **Individual Low-volume Waste Stream Discharges from INT-001-E, INT-001-F, INT-002-D, INT-002-E, INT-002-K, INT-002-L, and INT-002-M:**

For the purposes of monitoring, the following wastewaters are considered low-volume waste steam discharges: tire demineralizer wastewater, radwaste system wastewater, water draining to plant drains, intake structure sump water, concrete cutting water, oil removal system wastewater, and dewatering.

The Discharger shall monitor individual, low-volume waste steam discharges at INT-001-E, INT-001-F, INT-002-D, INT-002-E, INT-002-K, INT-002-L, INT-002-M as described in Table E-5 below.

Table E-5. Internal Effluent Monitoring – Individual Low-volume Waste Steam Discharges[1]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow (Average and Daily Maximum)	MGD	Meter or Estimate	Continuous	--
TSS	mg/L, lbs/day[2]	Grab	Monthly	As required under 40 CFR part 136.
Oil and Grease	mg/L, lbs/day[2]	Grab	Monthly	As required under 40 CFR part 136.

Notes for Table E-5

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The MERs shall be calculated in accordance with section 7.13 of this Order. The flow rate used for each MER calculation shall be the flow rate of the corresponding individual low-volume waste steam discharge at the time of sampling.

3.2.4. Discharge Point No. 002 (EFF-002): The Discharger shall monitor the discharge from Discharge Point No. 002 at Monitoring Location EFF-002 as described in Table E-6 below. If no effluent is discharged during the reporting period, the Discharger shall report the dates within the reporting period of no discharge.

Table E-6. Final Effluent Monitoring (EFF-002)[1]

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow (Average and Maximum Daily)	MGD	Recorder/Totalizer	Continuous	--
Total Residual Chlorine	µg/L	Grab	Weekly[2,3]	As required under 40 CFR part 136.
Turbidity	NTU	Grab	Monthly	As required under 40 CFR part 136.
pH	standard units	Grab	Monthly	As required under 40 CFR part 136.
Chronic Toxicity	Toxic Units Chronic (TUc)	Composite	Quarterly	As required under 40 CFR part 136.
Arsenic	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Cadmium, Total Recoverable	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Chromium (hexavalent), Total Recoverable[4]	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Copper, Total Recoverable	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Lead, Total Recoverable	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Mercury, Total Recoverable	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Nickel, Total Recoverable	µg/L, lbs/day	Grab	Semiannually	As required under 40 CFR part 136.

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Selenium, Total Recoverable	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Silver, Total Recoverable	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Zinc, Total Recoverable	µg/L, lbs/day	Grab	Semiannually	As required under 40 CFR part 136.
Cyanide, Total (as CN)[5]	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Ammonia, Un-ionized (as Nitrogen)	mg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Phenolic compounds[1] (non-chlorinated)	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Chlorinated phenolics[1]	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Endosulfan[1]	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
Endrin	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.
HCH[1]	µg/L, lbs/day	Grab	Quarterly[3]	As required under 40 CFR part 136.

Notes for Table E-6

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. Monitoring for total residual chlorine is only required if the Discharger is chlorinating the discharge.
3. The minimum frequency of monitoring for this constituent shall increase from quarterly to monthly, if any analysis for this constituent yields a result higher than the applicable effluent limitation specified in this Order. The increased minimum frequency of monitoring shall remain in effect until the results of at least four consecutive analyses for this constituent are below all applicable effluent limitations specified in this Order.
4. The Discharger may, at their option, meet this effluent limitation as a total chromium effluent limitation and monitor for total recoverable chromium in lieu of total recoverable chromium (III) or total recoverable chromium (hexavalent).

5. If a Discharger can demonstrate to the satisfaction of USEPA and the State Water Board that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations may be evaluated with the combined measurement of free cyanide, simple alkali metals cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR part 136.

3.3. Whole Effluent Toxicity (WET) Testing Requirements

The WET refers to the overall aggregate toxic effect of an effluent measured directly by an aquatic toxicity test(s). The control of WET is one approach this Order uses to control the discharge of toxic pollutants. WET tests evaluate the 1) aggregate toxic effects of all chemicals in the effluent including additive, synergistic, or antagonistic toxicity effects; 2) the toxicity effects of unmeasured chemicals in the effluent; and 3) variability in bioavailability of the chemicals in the effluent.

Monitoring to assess the overall toxicity of the effluent is required to answer the following questions:

(1) Does the effluent comply with effluent limitations for toxicity thereby ensuring that water quality standards are achieved in the receiving water?
(2) If the effluent does not comply with effluent limitations for toxicity, are unmeasured pollutants causing risk to aquatic life?
(3) If the effluent does not comply with effluent limitations for toxicity, are pollutants in combinations causing risk to aquatic life?

3.3.1. Sample Volume and Holding Time

The total sample volume shall be determined by the specific toxicity test method used. Sufficient sample volume of the effluent shall be collected to perform the required toxicity test. Sufficient sample volume shall also be collected during accelerated monitoring for subsequent Toxicity Identification Evaluation (TIE) studies, if necessary, at each sampling event. All toxicity tests shall be conducted as soon as possible following sample collection. No more than 36 hours shall elapse before the conclusion of sample collection and test initiation.

3.3.2. Chronic Marine Species and Test Methods

The Discharger shall conduct the following chronic toxicity tests on effluent samples in accordance with species and test methods in *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine Estuarine Organisms* (EPA/600/R-95/136, 1995). Artificial sea salts or hypersaline brine shall be used to increase sample salinity if needed. In no case shall these species be substituted with another test species unless written authorization from the San Diego Water Board is received.

3.3.2.1. A static renewal toxicity test with the topsmelt, *Atherinops affinis* (Larval Survival and Growth Test Method 1006.01). If laboratory-held cultures of the topsmelt, *Atherinops affinis*, are not available for testing, then the Discharger shall conduct a static renewal toxicity test with the inland silverside, *Menidia beryllina* (Larval

Survival and Growth Test Method 1006.01), found in the third edition of *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (EPA-821-R-02-014, 2002; Table IA, 40 CFR part 136). Additional species may be used by the Discharger if approved by the San Diego Water Board.

3.3.2.2. A static non-renewal toxicity test with the purple sea urchin, *Strongylocentrotus purpuratus*/sand dollar, *Dendraster excentricus* (Fertilization Test Method 1008.0 or Larval Development Test Method); or a static non-renewal toxicity test with the red abalone, *Haliotis rufescens* (Larval Shell Development Test Method).

3.3.2.3. A static non-renewal toxicity test with the giant kelp, *Macrocystis pyrifera* (Germination and Growth Test Method 1009.0).

3.3.3. **Species Sensitivity Screening**

Species sensitivity screening shall be conducted during this Order's first required sample collection, or within 24 months of the most recent screening, whichever is later.

For each suite during the species sensitivity screening, the Dischargers shall collect a single effluent sample to initiate and concurrently conduct three toxicity tests using the fish, an invertebrate, and the alga species previously referenced. This sample shall also be analyzed for the parameters required on a monthly frequency for the discharge, during that given month. As allowed under the test method for the *Atherinops affinis*, a second and third sample shall be collected for use as test solution renewal water as the seven-day toxicity test progresses. The species exhibiting the highest TUc is considered the most sensitive species for that suite.

If the first suite of rescreening tests demonstrates that the same species is the most sensitive, then the rescreening does not need to include more than one suite of tests. If a different species is the most sensitive or if there is ambiguity, then the Dischargers shall proceed with suites of screening tests for a minimum of three, but not to exceed five suites.

Species sensitivity rescreening is required every 24 months. The Dischargers shall rescreen with the marine vertebrate species, a marine invertebrate species, and the alga species previously referenced, and continue to monitor with the most sensitive species.

The species used during routine monitoring shall be the most sensitive species from the most recent species sensitivity screening.

During the calendar month, toxicity tests used to determine the most sensitive test species shall be reported as effluent compliance monitoring results for the chronic toxicity maximum daily effluent limitation (MDEL).

3.3.4. **Quality Assurance (QA) and Additional Requirements**

The QA measures, instructions, and other recommendations and requirements are found in the test methods manual previously referenced. Additional requirements are specified below.

3.3.4.1. The discharge is subject to an MDEL for chronic toxicity based on TUc using the No Observed Effect Concentration (NOEC; also referred to as the No Observed Effect Level or NOEL) approach described in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, EPA-821/600/R-95/136. TUc is calculated by the following equation:

$$TUc = 100 / NOEC$$

3.3.4.2. If the effluent toxicity test does not meet all test acceptability criteria (TAC) specified in the referenced test method, *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995), the test should be declared invalid, then the Discharger must resample and re-test within 14 days of test termination.

3.3.4.3. Dilution water and control water, including brine controls, shall be 1-mircrometer-filtered uncontaminated natural seawater, hypersaline brine prepared using uncontaminated natural seawater, or laboratory water prepared and used as specified in the test methods manual. Dilution water and control water, including brine controls, shall be uncontaminated natural water, as specified in the test methods manual. If dilution water and control water is different from test organism culture water, then a second control using culture water shall also be used.

3.3.4.4. Reference toxicant testing shall be conducted in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995). All reference toxicant test results should be reviewed and reported using the effects concentration at 25 percent (EC25).

3.3.4.5. The Discharger shall perform toxicity tests on final effluent samples. Chlorine and ammonia shall not be removed from the effluent sample prior to toxicity testing, unless explicitly authorized under this section of this MRP and the rationale is explained in the Fact Sheet (Attachment F).

3.3.5. **Reporting**

The Self-Monitoring Report (SMR) shall include a full laboratory report for each toxicity test. This report shall be prepared using the format and content of the test methods manual chapter called Report Preparation[1], and shall include:

3.3.5.1. The valid toxicity test results for the NOEC approach, reported in TUc. All toxicity test results (whether identified as valid or otherwise) conducted during the calendar month shall be reported on the SMR due date specified in Table E-8.

[1] Section 10 of *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to the West Coast Marine and Estuarine Organisms*, August 1995, EPA/600/R-95-136, https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=524691

3.3.5.2. Summary water quality measurements for each toxicity test (e.g., pH, dissolved oxygen, temperature, conductivity, hardness, salinity, chlorine, ammonia).

3.3.5.3. The statistical methods used to calculate the endpoints.

3.3.5.4. Statistical program output results, including graphical plots, for each toxicity test.

3.3.5.5. Graphical plots clearly showing the laboratory's performance for the reference toxicant for the previous 20 tests and the laboratory's performance for the control mean, control standard deviation, and control coefficient of variation for the previous 12-month period.

3.3.5.6. Any additional quality assurance/quality control (QA/QC) documentation or any additional chronic toxicity-related information, upon written request from the San Diego Water Board.

3.3.6. **Preparation of an Initial Investigation Toxicity Reduction Evaluation (TRE) Work Plan**

The Discharger shall prepare and submit a copy of the Discharger's Initial Investigation TRE Work Plan to the San Diego Water Board for approval within 90 days of the effective date of this Order. If the San Diego Water Board does not disapprove the work plan within 60 days, the work plan shall become effective. The Discharger shall use *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070), or most current version, as guidance. The TRE Work Plan shall describe the steps that the Discharger intend to follow if toxicity is detected, and shall include, at a minimum:

- A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency;
- A description of the Discharger's methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the Facility; and
- If a TIE is necessary, an indication of the person who would conduct the TIEs (i.e., an in-house expert or an outside contractor).

3.3.7. **Accelerated Monitoring Schedule for Maximum Daily Single Result**

The maximum daily single result of greater than or equal to 11 TUc shall be used to determine if accelerated testing needs to be conducted.

Once the Dischargers become aware that the maximum daily single result is greater than or equal to 11 TUc, the Discharger shall notify the San Diego Water Board and implement an accelerated monitoring schedule within five calendar days of the receipt of the result. However, if the sample is contracted out to a commercial laboratory, the Discharger shall ensure that the San Diego Water Board is notified, and the first of six accelerated monitoring tests is initiated within seven calendar days of the Discharger becoming aware of the result. The accelerated monitoring schedule shall consist of six toxicity tests, conducted at approximately two-week intervals, over a twelve-week period; in preparation for the TRE process and

associated reporting, these results shall also be reported using the EC25. If each of the accelerated toxicity tests results in less than 11 TUc, the Discharger shall return to routine monitoring for the next monitoring period. If one of the accelerated toxicity tests results in greater than or equal to 11 TUc, the Discharger shall immediately implement the TRE Process conditions set forth below. During accelerated monitoring schedules, chronic toxicity tests results shall be used to determine effluent compliance for the chronic toxicity MDEL.

3.3.8. **TRE Process**

During the TRE Process, minimum effluent monitoring shall resume and results for chronic toxicity tests reported in TUc shall be used to determine effluent compliance for the chronic toxicity MDEL.

3.3.8.1. Preparation and Implementation of Detailed TRE Work Plan. The Discharger shall immediately initiate a TRE using, according to the type of treatment facility, *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070, 1989) and, within 15 days of receiving validated results, submit to the San Diego Water Board a Detailed TRE Work Plan, which shall follow the Initial Investigation TRE Work Plan revised as appropriate for this toxicity event. The TRE Work Plan shall include the following information, and comply with additional conditions set by the San Diego Water Board:

- Further actions by the Discharger to investigate, identify, and correct the causes of toxicity;
- Actions the Discharger will take to mitigate the effects of the discharge and prevent the recurrence of toxicity; and
- A schedule for these actions, progress reports, and the final report.

3.3.8.2. TIE Implementation. The Discharger may initiate a TIE as part of a TRE to identify the causes of toxicity using the same species and test method and, as guidance, USEPA manuals: *Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures* (EPA/600/6-91/003, 1991); *Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080, 1993); *Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/081, 1993); *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I* (EPA/600/6-91/005, 1991); and *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document* (EPA/600/R-96-054, 1996). The TIE should be conducted on the species demonstrating the most sensitive toxicity response.

3.3.8.3. Many recommended TRE elements parallel required or recommended efforts for source control, pollution prevention, and storm water control programs. Whenever possible, TRE efforts should be coordinated with such efforts. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with toxicity evaluation parameters.

3.3.8.4. The Discharger shall continue to conduct the minimum effluent monitoring while the TRE and/or TIE process is taking place. Additional accelerated monitoring and TRE Work Plans are not required once a TRE is begun.

3.3.8.5. The San Diego Water Board recognizes that toxicity may be episodic and identification of causes and reduction of sources of toxicity may not be successful in all cases. Upon approval from the San Diego Water Board, the TRE may be ended at any stage if routine monitoring finds there is no longer toxicity.

3.3.8.6. TRE/TIE results. The San Diego Water Board shall be notified no later than 30 days from completion of each aspect of TRE/TIE analyses. Prior to the completion of the final TRE/TIE report, the Discharger shall provide status updates in the monthly SMRs, indicating which TRE/TIE steps are underway, which steps have been completed, and the estimated time to completion of the final TRE/TIE report.

3.3.8.7. TRE/TIE Final Report. The final TRE/TIE report shall be submitted to the San Diego Water Board within 30 days of report completion. At minimum, the TRE/TIE Final Report should include the following:

- A description of the probable source and cause of the toxicity effluent limitation exceedances (if known);
- A summary of the findings including a tabulation, evaluation, and interpretation of the data generated;
- A list of corrective actions taken or planned by the Discharger to reduce toxicity so that the Discharger can achieve consistent compliance with the toxicity effluent limitation of this Order and prevent recurrence of exceedances of the limitation; and
- If the exceedances of the toxicity effluent limitation have not been corrected, the anticipated time it is expected to continue and a time schedule for the steps planned to reduce, eliminate, and prevent recurrence of the exceedances.

3.3.8.8. The San Diego Water Board may consider the results of any TRE/TIE studies in an enforcement action.

3.4. Land Discharge Monitoring Requirements – Not Applicable

3.5. Recycling Monitoring Requirements – Not Applicable

4. Receiving Water Monitoring Requirements

The receiving water monitoring requirements set forth below are designed to measure the effects of the discharge from the Facility on the receiving ocean waters, including effects on coastal water quality, seafloor sediments, and marine life. The overall receiving water monitoring program is intended to answer the following questions:

(1) Does the receiving water meet water quality standards?
(2) Are the receiving water conditions getting better or worse over time?
(3) What is the relative contribution of the Facility discharge to pollution in the receiving water?
(4) What are the effects of the discharge on the receiving waters?

Receiving water monitoring in the vicinity of the discharge from the Facility shall be conducted as specified below. This program is intended to document conditions, within the zone of initial dilution (ZID), within the waste field where initial dilution is completed, at reference stations, and at other areas beyond the ZID where discharge impacts might be reasonably expected. Station location, sampling, sample preservation, and analyses, when not specified, shall be by methods approved by the San Diego Water Board. The receiving water monitoring program may be modified by the San Diego Water Board at any time. The Discharger may also submit a list of proposed changes with supporting rationale to these monitoring requirements that it considers to be appropriate to the San Diego Water Board for approval.

All receiving water monitoring shall be conducted in accordance with restrictions and requirements established by the State of California Department of Fish and Wildlife and this Order. During monitoring events, sample stations shall be located using a land-based microwave positioning system or a satellite positioning system such as global positioning system (GPS).

In the event that the Discharger is unable to obtain a sample from a receiving water monitoring station(s) due to safety, legal, or other reasons, collection of samples at such station(s) can be omitted. If practicable, an effort should be made to return to the sampling station that was omitted and collect the sample during safer conditions within the same reporting period. In the event that a monitoring location is omitted, the Discharger shall submit a statement to the San Diego Water Board within the Annual Receiving Waters Monitoring Report containing, at a minimum, the following information:

- The monitoring station(s) that was omitted;
- The date the monitoring station was omitted; and
- A description of the circumstances for omitting the collection of data at the monitoring station.

4.1. Continuous Temperature Monitoring

Continuously recording thermographs will be employed at Stations C2S, F2S, and C22S (see Table E-1 and Attachment B of this Order). Measurements will be obtained from the surface, 5 meters, 10 meters, and near-bottom. Measurements will be reported as hourly data.

4.2. Turbidity

Quarterly aerial photographic surveys will be conducted in the area of the Unit 2 diffuser system. The aerial overflights may be merged with the kelp overflights required in section 4.4 of this MRP.

4.3. Trawling Surveys

To survey fish populations, trawling surveys for fish shall be conducted semiannually at three stations (see Table E-1 and Attachment B of this Order). Daylight sampling by otter trawl will be conducted at the 20-feet (6.1-meters), 40-feet (12.2-meters) and 60 feet (18.3-meters) isobaths at each station. Each trawl will be of five-minute duration. Collected fishes will be identified and enumerated, and sex determined for selected species. The results of the trawling surveys shall be reported annually in accordance with the due dates specified in Table E-8 for the Annual Receiving Waters Monitoring Report.

4.4. Kelp Densities

Fixed Quadrant Sampling: Individual giant kelp plants and the number of associated stipes greater than 2 m will be counted tri-annually at fixed quadrants associated with six stations (Stations 10, 14-15, 16-17, 18-19, 22, and 23) located in the San Onofre Kelp (see Attachment B of this Order). The composition of the substrate will be qualitatively described, and percent cover information will be collected at each of the fixed quadrant sites.

Random Quadrant Sampling: Semiannual sampling shall also be conducted at ten 10-m^2 circular quadrants randomly selected within 30-m radius of each of the six stations (Stations 10, 14-15, 16-17, 18-19, 22, and 23) located in the San Onofre Kelp (see Attachment B of this Order). The random sampling shall include the enumeration of giant kelp, and an estimate of the substratum composition (i.e., percent of sand, cobble, and boulder) within each of the random quadrants.

4.5. Temperature

Temperature profiles from the surface to the bottom will be measured quarterly at the following designated Impact and Control Stations (see Table E-1 and Attachment B of this Order): Impact Stations (X0, C1N, C2N, C1S, C2S, F2N, F2S, H0, H2N, H2S, J0, J2N, J4N, J8N, J2S, J4S, J8S, M0, M2N, M4N, M8N, M2S, M4S, and M8S) and Control Stations (C22S, F22S, H22S, J22S, and M22S).

4.6. Water Quality Measurements

Water Quality Measurements is necessary to answer the following questions:

(1) Does the discharge of oxygen demanding waste cause the dissolved oxygen concentration to be depressed at any time more than 10 percent from that which occurs naturally?
(2) Does the discharge of waste cause the pH to change at any time more than 0.2 units from that which occurs naturally to determine compliance with Receiving Water Limitations, section 5.1.3.2 of the Order?

Dissolved oxygen concentrations and pH will be measured quarterly at the surface of the following designated Impact and Control Stations (see Table E-1 and Attachment B of this Order): Impact Stations (X0, C1N, C2N, C1S, C2S, J2N, J2S, and J4S) and Control Stations (C22S and F22S).

4.7 Indicator bacteria monitoring removed per Amending Order No. R9-2025-0002.

4.8 Sediment Monitoring

Sediment monitoring is necessary to answer the following questions:

(1) Is the dissolved sulfide concentration of waters in sediments significantly increased above that present under natural conditions?
(2) Is the concentration of substances set forth in Table 3 of the Ocean Plan, for protection of marine aquatic life, in marine sediments at levels which would degrade the benthic community?
(3) Is the concentration of organic pollutants in marine sediments at levels that would degrade the benthic community?

Acid volatile sulfides, organophosphorus insecticides, Ocean Plan Table 3 metals, ammonia-nitrogen, polynuclear aromatic hydrocarbons, and chlorinated hydrocarbons shall be measured in sediments annually. The Discharger shall submit to the San Diego Water Board within 180 days after the effective date of this Order, a Sediment Monitoring Work Plan to implement the sediment monitoring program. The Sediment Monitoring Work Plan is not required if the Discharger is fulfilling the sediment monitoring required in this section by participating in a regional monitoring program, as described in this MRP, section 5.2, *Southern California Bight Monitoring Program Participation Requirements*.

4.9 Benthic Community Health Monitoring

Benthic community health monitoring is necessary to answer the following question:

(1) Are benthic communities degraded as a result of the discharge?

The Discharger shall conduct benthic community health monitoring at least once during the permit term. The Discharger shall submit to the San Diego Water Board within 180 days after the effective date of this Order, a Benthic Community Health Monitoring Work Plan to implement the benthic community health monitoring program. The Benthic Community Health Monitoring Work Plan is not required if the Discharger is fulfilling the benthic community health monitoring required in this section by participating in a regional monitoring program, as described in this MRP, section 5.2, *Southern California Bight Monitoring Program Participation Requirements*.

4.10 Bioaccumulation Monitoring

Bioaccumulation monitoring is necessary to answer the following questions:

(1) Does the concentration of pollutants in fish, shellfish, or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
(2) Does the concentration of pollutants in marine life bioaccumulate to levels that degrade marine communities?

The Discharger shall conduct bioaccumulation monitoring at least once during the permit term. Constituents to be monitored must include pesticides (at the discretion of the San Diego Water Board), Ocean Plan Table 3 metals, and polynuclear aromatic hydrocarbons. Bioaccumulation may be monitored by a mussel watch program or a fish tissue program. Resident mussels are preferred over transplanted mussels. Sand crabs and/or fish may be added or substituted for mussels at the discretion of the San Diego Water Board. The Discharger shall submit to the San Diego Water Board within 180 days after the effective date of this Order, a Bioaccumulation Monitoring Work Plan to implement the bioaccumulation monitoring program. The Bioaccumulation Monitoring Work Plan is not required if the Discharger is fulfilling the bioaccumulation monitoring required in this section by participating in a regional monitoring program, as described in this MRP, section 5.2, Southern California Bight Monitoring Program Participation Requirements.

4.11. Reporting

A report containing detailed analyses of the previous year's receiving water monitoring data required in section 4 of this MRP and impingement/entrainment monitoring required in section 6.1 of this MRP shall be submitted to the San Diego Water Board by August 1 of each year. Each section of the report shall contain a graphical and written summary of historical data with the goal of displaying long term trends.

4.12. California Environmental Data Exchange Network

In addition to submitting SMRs, the Discharger shall also ensure that all the receiving water monitoring results are submitted to the California Environmental Data Exchange Network (CEDEN) or an equivalent database that is linked to CEDEN annually by August 1. Any data not accepted by CEDEN is not required to be submitted. A statement certifying that all applicable monitoring results have been timely uploaded into CEDEN or an equivalent database shall be submitted annually by August 1 of each year to coincide with submission of the Annual Receiving Waters Monitoring Report.

5. Regional Monitoring Requirements

Regional ocean water monitoring provides information about the sources, fates, and effects of anthropogenic contaminants in the coastal marine environment necessary to make assessments over large areas. The large-scale assessments provided by regional monitoring describe and evaluate cumulative effects of all anthropogenic inputs and enable better decision-making regarding protection of beneficial uses of ocean waters. Regional monitoring data assists in the interpretation of core monitoring studies by providing a more accurate and complete characterization of reference conditions and natural variability. Regional monitoring also leads to methods standardization and improved quality control through inter-calibration exercise. The coalitions implementing regional monitoring enable sharing of technical resources, trained personnel, and associated costs. Focusing these resources on regional issues and developing a broader understanding of pollutants effects in ocean waters enables the development of more rapid and effective response strategies. Based on all of these considerations the San Diego Water Board supports regional approaches to monitoring ocean waters.

The Discharger shall, as directed by the San Diego Water Board, participate with other regulated entities, other interested parties, and the San Diego Water Board in development and implementation of new and improved monitoring and assessment programs for ocean waters in the San Diego Region and discharges to those waters. These programs shall be developed and implemented so as to answer the following questions:

(1) What are the status and trends of conditions in ocean waters in the San Diego Region with regard to beneficial uses? For example:
   i. Are fish and shellfish safe to eat?
   ii. Is water quality safe for swimming?
   iii. Are ecosystems healthy?

(2) What are the primary stressors causing or contributing to conditions of concern?

(3) What are the major sources of the stressors causing or contributing to conditions of concern?
(4) Are the actions taken to address such stressors and sources effective (i.e., environmental outcomes)?

Development and implementation of new and improved monitoring and assessment programs for ocean waters will be guided by the following:

- The Ocean Plan;
- San Diego Water Board Resolution No. R9-2012-0069, *Resolution in Support of a Regional Monitoring Framework*;
- San Diego Water Board staff report entitled *A Framework for Monitoring and Assessment in the San Diego Region*; and
- Other guidance materials, as appropriate.

5.1. Kelp Bed Canopy Monitoring Requirements

Kelp consists of a number of species of brown algae. Along the central and southern California coast, giant kelp (*Macrocystis pyrifera*) is the largest species colonizing rocky, and in some cases sandy, subtidal habitats. Giant kelp is an important component of coastal and island communities in southern California, providing food and habitat for numerous animals. Monitoring of the kelp beds is necessary to answer the following questions:

(1) What is the maximum areal extent of the coastal kelp bed canopies each year?
(2) What is the variability of the coastal kelp bed canopy over time?
(3) Are coastal kelp beds disappearing? If yes, what are factors that could contribute to the disappearance?
(4) Are new coastal kelp beds forming?

The Discharger shall participate with other Southern California ocean dischargers in an ongoing regional survey of coastal kelp beds in the Southern California Bight. The intent of these surveys is to provide an indication of the health of these kelp beds, recognizing that the extent of kelp bed canopies may change due to a variety of influences.

Kelp beds shall be monitored by means of vertical aerial infrared photography to determine the maximum areal extent of the canopies of coastal kelp beds each year. Surveys shall be conducted as close as possible to when kelp bed canopies are at their greatest extent during the year. The entire San Diego Region coastline, from the international boundary to the San Diego Region/Santa Ana Region boundary shall be photographed on the same day.

Annually by October 1, the Discharger shall submit to the San Diego Water Board a report which summarizes the data, analyses, assessment, and images produced by the surveys. The report is a joint collaboration among multiple ocean dischargers in the Southern California (e.g., Regional 9 Kelp Survey Consortium member agencies). In addition to the kelp bed canopies, the images shall show onshore reference points, locations of all ocean outfalls and diffusers, artificial reefs, areas of known hard-bottom substrate (i.e., rocky reefs), and depth contours at intervals of 30-feet mean lower low

water (MLLW). The report shall also be made available in a user-friendly format on a website that is readily available to the public.

The surveys shall be conducted on a "continuous improvement" basis, as needed improvements shall be made in monitoring, analysis, assessment, and/or documentation. For example, these could include:

- More sophisticated analysis of patterns, correlations, and cycles that may be related to the extent of kelp bed canopies; or
- Projects to improve understanding of influences on kelp beds or of how the extent of the canopies of various kelp beds has changed since the early 20th century.

5.2. Southern California Bight Monitoring Program Participation Requirements

The Discharger shall, as directed by the San Diego Water Board, participate in the Southern California Bight Regional Monitoring Program coordinated by the Southern California Coastal Water Research Project (SCCWRP), or any other coordinator named by the San Diego Water Board, pursuant to Water Code section 13383, and 40 CFR section 122.48. The intent of the Southern California Bight Regional Monitoring Program is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled scientific resources of the Southern California Bight.

During these coordinated sampling efforts, a portion of the Discharger's receiving water sampling and analytical effort, as defined in section 4 of this MRP, may be reallocated to provide a regional assessment of the impact of the discharge of wastewater to the Southern California Bight. In that event, the San Diego Water Board shall notify the Discharger in writing that a portion of the requirements to perform the receiving water sampling and analytical effort defined in section 4 of this MRP is suspended for the duration of the reallocation. Anticipated modifications to the monitoring program will be coordinated so as to provide a more comprehensive picture of the ecological and statistical significance of monitoring results and to determine cumulative impacts of various pollution sources. The level of resources in terms of sampling and analytical effort redirected from the receiving water monitoring program required under section 4 of this MRP shall approximately equal the level of resources provided to implement the regional monitoring and assessment program, unless the San Diego Water Board and the Discharger agree otherwise. The specific scope and duration of the receiving water monitoring program reallocation and redirection shall be determined in writing by the San Diego Water Board, in consultation with the Discharger.

6. Special Studies Requirements

The ocean water intake monitoring, and fish impingement/entrainment monitoring requirements set forth below are designed to ensure compliance with State and federal regulations. The overall intake monitoring program is intended to answer the following questions:

(1) Does the intake water meet water quality standards?
(2) What is the relative contribution of the Facility's thermal waste discharge to the receiving water?

(3) Is the Facility in compliance with the requirements in the Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once-Through Cooling or OTC Policy)?
(4) What is the status of the Once-Through Cooling Water Compliance Schedule? Has the Discharger completed immediate and/or interim requirements?
(5) Is the Facility in compliance with CWA section 316(b) requirements?

In addition to the Core Monitoring, Receiving Water Monitoring, and Regional Monitoring requirements (see sections 3 through 4 of this MRP), the Discharger shall comply with the following special study monitoring requirements:

6.1. Fish Impingement and Entrainment Monitoring

Since the intake flow rates have been drastically reduced due to decommissioning activities, impingement has not occurred. The Units 2 and 3 intake structures/forebays have been isolated from the ocean and dewatered. The Discharger has indicated that water still seeps into the intake structures/forebays and periodically needs to be pumped out. The Discharger has indicated that they plan to backfill the intake structures/forebays with slurry in the first half of 2023.

The results of the visual assessment shall be reported semiannually. If the visual assessment identifies that fish are impinged or entrained, then the Discharger shall record the following:

1. Total weight and number of each species of fish removed from the Units 2 and 3 intake pipes and screens;
2. Standard length and sex of select species in a representative sample removed from the traveling bar racks and screens. For fish length, where up to 125 individuals of a species are removed, the "representative sample" shall consist of all the individuals removed. Where more than 125 individuals of a species are removed, the "representative sample" shall consist of not less than 125 individuals. For determination of fish sex, the “representative sample” shall be the same as for fish length, except the number of individuals shall be 50.

A report describing the visual assessment and also containing detailed analysis of the previous year’s fish entrainment monitoring data, if any, shall be submitted by August 1 of each year with the Annual Receiving Water Monitoring Report required in section 4.7 of this MRP. The report shall contain a narrative and graphical summary of all historical data with the goal of displaying long-term trends.

6.2. Monitoring Location INF-002 and INF-003– Ocean Water Intake Monitoring

Ocean water inflow shall be monitored and analyzed in accordance with the following schedule. The Discharger shall monitor the ocean water intake at INF-002 and INF-003 as described in Table E-7 below.

Table E-7. Influent Monitoring (INF-002 and INF-003)[1]

Parameter	Units	Sample Type[2]	Minimum Sampling Frequency	Required Analytical Test Method
Flow (Average and Maximum Daily)	MGD	Meter or estimate	Continuous	--
Turbidity	NTU	Grab	Monthly	As required under 40 CFR part 136.

Notes for Table E-7

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. A grab sample is an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

6.3. Climate Change Action Plan (CCAP)

The Dischargers shall prepare and submit a CCAP within three years of the effective date of this Order. The Dischargers may make use of existing climate-change-related plans to comply with this requirement.

Climate change research indicates the overarching driver of change is increased atmospheric carbon dioxide (CO_2) from human activity. The increased CO_2 emissions trigger changes to climatic patterns, which increase sea level and the intensity of coastal storm surges (Δ Sea Level) lead to more erratic local weather patterns (Δ Weather Patterns), increased incidents of flooding and wildfires, trigger a gradual warming of freshwater and ocean temperatures (Δ Water Temperature), and trigger changes to ocean water chemistry (Δ Water pH). The CCAP shall identify the magnitude and timing of projected regional impacts on the Facility, and the Discharger's ability to meet the requirements of this Order due to climate change if current trends continue. The CCAP shall also identify steps being taken or planned to address greenhouse gas emissions attributable to the decommissioning of the Facility.

The CCAP shall also identify steps being taken or planned to address flooding, sea level rise, and wildfire risks; volatile rain period impacts (both dry and wet weather); impacts on wastewater treatment operations and quality; the potential need to adjust NPDES permit conditions and the Dischargers' pollution control program; the financing needed to pay for planned actions; schedules to update the CCAP as more information on climate change and its effect become more available; and any other factors as appropriate. Any impacts or risks projected to jeopardize permit compliance must be addressed by a plan that includes scheduled risk assessments and mitigation measures as needed to maintain compliance.

7. Reporting Requirements

7.1. General Monitoring and Reporting Requirements

7.1.1. The Discharger shall comply with all Standard Provisions (Attachment D) related to monitoring, reporting, and recordkeeping.

7.1.2. The Discharger shall report all instances of noncompliance not reported under sections 5.5, 5.7, and 5.8 of the Standard Provisions (Attachment D) at the time monitoring reports are submitted.

7.2. Self-Monitoring Reports (SMRs)

7.2.1. The Discharger shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) program website (https://www.waterboards.ca.gov/water_issues/programs/ciwqs/). The CIWQS website will provide additional information for SMR submittal in the event there will be a planned or unplanned service interruption for electronic submittal. SMRs must be signed and certified as required by section 5 of the Standards Provisions (Attachment D). The Discharger shall maintain sufficient staffing and resources to ensure it submits SMRs that are complete and timely. This includes provision for training and supervision of individuals on how to prepare and submit SMRs.

7.2.2. The Discharger shall report in the SMR the results for all monitoring specified in this MRP under sections 3, 4, and 6. The Discharger shall submit SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order. SMRs are to include all new monitoring results obtained since the last SMR was submitted. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR.

7.2.3. Monitoring periods and reporting for required monitoring contained in sections 3 and 6.2 of this MRP shall be completed according to the following schedule:

Table E-8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period	SMR Due Date
Continuous	Permit effective date	All	First day of second calendar month following month of sampling.
Daily	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.	First day of second calendar month following month of sampling.
Weekly	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday	First day of second calendar month following month of sampling.

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period	SMR Due Date
Monthly	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month	First day of second calendar month following month of sampling.
Quarterly	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31	May 1 August 1 November 1 February 1
Semiannually	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31	August 1 February 1
Annually	Closest of January 1 (or on) permit effective date	January 1 through December 31	February 1

7.2.4. **Reporting Protocols.** The Discharger shall report with each sample result the applicable reported Minimum Level (reported ML, also known as the Reporting Level, or RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR part 136.

The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

7.2.4.1. Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

7.2.4.2. Sample results less than the reported ML, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

7.2.4.3. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

7.2.4.4. Discharger is to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

7.2.5. **Compliance Determination.** Compliance with effluent limitations for reportable pollutants shall be determined using sample reporting protocols defined above and in Attachment A of this Order. For purposes of reporting and administrative enforcement by the San Diego Water Board and State Water Board, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the reportable pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported ML.

7.2.6. **Multiple Sample Data.** When determining compliance with a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses and the data set contains one or more reported determinations of DNQ or ND, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

7.2.6.1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

7.2.6.2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

7.2.7. The Discharger shall submit SMRs in accordance with the following requirements:

7.2.7.1. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the Facility is operating in compliance with interim and/or final effluent limitations. The Discharger is not required to duplicate the submittal of data that is entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

7.2.7.2. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the waste discharge requirements; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

7.2.7.3. The Discharger shall add all violations, including violations of receiving water limitations, to CIWQS under the “Violations” tab.

7.2.7.4. Copies of all reports submitted by the discharger to the Nuclear Regulatory Commission pertaining to monitoring of radioactive materials in wastewaters released from the Facility shall be transmitted to the San Diego Water Board.

7.3. Discharge Monitoring Reports (DMRs)

The DMRs are USEPA reporting requirements. The Discharger shall electronically certify and submit DMRs together with SMRs using Electronic Self-Monitoring Reports (eSMR) module eSMR 2.5 or any upgraded version. Electronic DMRs submittal shall be in addition to eSMR submittal. Information about electronic DMRs submittal is available at the DMR website (https://www.waterboards.ca.gov/water_issues/programs/discharge_monitoring/).

7.4. Other Reports

The following reports are required under Special Provisions (sections 4.1, 6.1, and 6.3 of this Order), sections 1, 3, 4, 5, and 6 of this MRP, and the California Code of Regulations (CCR). The reports shall be submitted to the San Diego Water Board using the State Water Board's CIWQS program website, unless otherwise noted. The reports must be signed and certified as required by section 5 of the Standards Provisions (Attachment D). The CIWQS website will provide additional information for SMR submittal in the event of a planned or unplanned service interruption for electronic submittal.

Table E-9. Other Reports

Report	Location of requirement	Due Date
Report of Waste Discharge (ROWD) (for reissuance)	Page 1 of the Order	No later than 180 days before the Order expiration date
DMR-QA Study	Section 1.7 of this MRP	Annually no later than December 31[2]
Initial Investigation TRE Work Plan	Section 3.3.7 of this MRP	Within 90 days of the effective of this Order
Indicator Bacteria Monitoring Work Plan	Section 4.7 of this MRP	Within 180 days after the effective date of this Order
Sediment Monitoring Work Plan	Section 4.8 of this MRP	Within 180 days after the effective date of this Order
Benthic Community Health Monitoring Work Plan	Section 4.9 of this MRP	Within 180 days after the effective date of this Order
Bioaccumulation Monitoring Work Plan	Section 4.10 of this MRP	Within 180 days after the effective date of this Order
Annual Receiving Water Monitoring Report	Section 4.11 of this MRP	Annually no later than August 1
California Environmental Data Exchange Network Data Submittal Certification	Section 4.12 of this MRP	Annually no later than August 1
Kelp Bed Canopy Report	Section 5.1 of this MRP	Annually no later than October 1

Notes for Table E-9

1. Submit in person or by mail to the San Diego Water Board office (2375 Northside Drive. Suite 100, San Diego, CA 92108) or by email at SanDiego@waterboards.ca.gov.
2. See section 1.7. of this MRP for instructions on how to submit the study.

ATTACHMENT F – FACT SHEET

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ATTACHMENT F – FACT SHEET

As described in section 2.2 of this Order, the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) incorporates this Fact Sheet as findings of the San Diego Water Board supporting the issuance of this Order. This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for dischargers in the State of California (State). Only those sections or subsections of this Order that are specifically identified as “not applicable” have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as “not applicable” are fully applicable to this Discharger.

1. Permit Information

The following table summarizes administrative information related to the Facility.

Table F-1. Facility Information

Type of Information	Facility/Discharger Information
WDID	9 000002842
Discharger	Southern California Edison Company
Facility	San Onofre Nuclear Generating Station
Facility Address	5000 Pacific Coast Highway, San Clemente, CA 92672
Facility Contact, Title and Phone	John Mourer, Advisor, 949-275-7893; Ron Pontes, General Manager, Environmental and Site Closure, 949-324-2571; Fred Bailly, SONGS Vice President, 840-217-4957
Authorized Person to Sign and Submit Reports	Douglas R. Bauder, Vice President, Decommissioning and Chief Nuclear Officer
Mailing Address	2244 Walnut Grove Avenue, Rosemead, CA 91770
Billing Address	P.O. Box 4030, San Clemente, CA 92673
Type of Facility	Industrial, Standard Industrial Classification (SIC) Code No. 4911
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	N/A
Recycling Requirements	N/A
Facility Permitted Flow	42.202 million gallons per day (MGD)
Facility Design Flow	2,574 MGD
Watershed	Pacific Ocean
Receiving Water	Pacific Ocean
Receiving Water Type	Ocean waters

1.1. Southern California Edison Company (Discharger) is the principal owner and operator of the San Onofre Nuclear Generating Station (SONGS or Facility), a nuclear-fueled electrical power generating facility which permanently ceased power operations on June 7, 2013, and is undergoing decommissioning, decontamination, and dismantlement. The Discharger is the owner of 78.32% of SONGS, while San Diego Gas & Electric and City of Riverside own 20% and 1.68%, respectively. The Discharger, San Diego Gas & Electric, and City of Riverside (collectively referred to as the Participants) are engaged in the decommissioning, decontamination, and dismantlement of the Facility pursuant to regulatory requirements of the United States Nuclear Regulatory Commission (USNRC).

The Facility is located to the west of the Interstate-5 Freeway in northern San Diego County. The onshore portion of the Facility lies within the boundaries of the Marine Corps Base Camp Pendleton (MCBCP) under real estate agreements between the Participants and the U.S. Government, Department of Navy - Southwest Division Naval Facilities Engineering Command. The address of the Facility is 5000 Pacific Coast Highway, San Clemente, San Diego County, California, 92672.

For the purposes of this Order, references to the “discharger” or “permittee” in applicable federal and State laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

1.2. The Facility discharges wastewater to the Pacific Ocean, a water of the United States. The Discharger was previously regulated by Order No. R9-2015-0073 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0109282 adopted on December 16, 2015, and expired on January 31, 2021. Attachment B provides maps of the area around the Facility. Attachment C provides flow schematics of the Facility.

1.3. The Discharger filed a Report of Waste Discharge (ROWD) and submitted an application for reissuance of its waste discharge requirements (WDRs) and NPDES permit on July 22, 2020. The application was deemed complete on August 18, 2020. The Discharger submitted an ROWD amendment on December 14, 2022. A compliance evaluation inspection was conducted on January 19, 2023.

1.4. Regulations at title 40 of the Code of Federal Regulations (40 CFR) section 122.46 limit the duration of NPDES permits to a fixed term not to exceed five years. Accordingly, this Order limits the duration of the discharge authorization. However, pursuant to California Code of Regulations (CCR), title 23, section 2235.4, the terms and conditions of an expired permit are automatically continued pending reissuance of the permit if the Discharger complies with all federal NPDES requirements for continuation of expired permits.

2. Facility Description

SONGS Is a former nuclear-fueled electric power generating facility that has permanently ceased power operations and is currently undergoing decommissioning, decontamination, and dismantlement pursuant to USNRC

regulatory requirements. The Discharger formally notified the USNRC on June 12, 2013, that it had permanently ceased power operations at SONGS on June 7, 2013. The notification, called a Certification of Permanent Cessation of Power Operations, set the stage for the Discharger to begin preparations for decommissioning and dismantling the Facility.

The Facility is located at 5000 Pacific Coast Highway, San Clemente, CA. The Facility is located on the north San Diego County coast immediately adjacent to the Pacific Ocean, approximately two and one-half miles southeast of San Mateo Point, approximately two and one-half miles southeast of the City of San Clemente and approximately 12 miles northwest of the City of Oceanside.

The onshore portion of the Facility is approximately 4,500 feet long and 800 feet wide, comprising 84 acres. The property on which the Facility is built is owned by the Department of Navy - Southwest Division Naval Facilities Engineering Command. The Facility site also includes an additional California State Lands Commission (CSLC) offshore lease area comprised of 21 acres of tide and submerged lands in the Pacific Ocean. The adjoining offshore leased area is located southwest of the onshore portion of the Facility site and contains the SONGS Units 2 and 3 offshore intake and discharge conduits and associated appurtenances; navigational and environmental monitoring buoys; and riprap along the shore seaward of the ordinary high-water mark,

SONGS is comprised of three permanently closed separate power generating units, named the North Industrial Area (the NIA) (the NIA was formerly known as Unit 1), Unit 2, and Unit 3; along with administrative offices and related facilities referred to as the “Mesa”. NIA is owned by the Discharger and San Diego Gas and Electric and was operated solely by the Discharger. Units 2 and 3 are primarily owned by the Discharger. San Diego Gas and Electric and the City of Riverside have a minority ownership share of Units 2 and 3. The Facility is operated solely by the Discharger. This Order addresses on-going discharges from the NIA, Unit 2, and Unit 3 while decommissioning, decontamination, and dismantlement activities of the Facility are underway.

Decommissioning refers to a regulatory process administered by the USNRC that involves safely removing the Facility from service followed by the eventual removal and disposal of radioactive components and materials from the site. Dismantlement of the Facility began the first quarter of 2020 and involves the deconstruction of above-grade structures associated with SONGS in compliance with USNRC requirements, as well as the partial removal of offshore undersea conduits and offshore buoys and anchors. The Decommissioning Plan for the Facility has three primary components:

- Activities related to a separate, already-approved project allowing for the installation, operation, and maintenance of the Independent Spent Fuel Storage Installation located on-site, from 2015 through 2035;
- Activities associated with dismantlement of onshore above-grade structures, meeting USNRC requirements for unrestricted use and the CSLC Lease

Offshore Activities which cover the SONGS Units 2 and 3 offshore intake and discharge conduits and associated structures from 2019 through 2028; and

- Additional activities projected to begin in approximately 2035 including transfer of stored spent nuclear fuel (SNF) to off-site storage, additional substructure removal, and final site restoration.

The NIA, located adjacent to Units 2 and 3, was a nuclear-fueled electrical power generating facility like Units 2 and 3. The NIA was in commercial operation from 1968 to 1992 and had a generating capacity of 436 megawatts. The Discharger began formal decommissioning of the NIA in September 1999. Units 2 and 3 were pressurized water reactor nuclear steam supply systems and are virtually identical. Unit 2 was in commercial operation from 1983 to 2013 and had a generating capacity of 1070 megawatts. Unit 3 was in commercial operation from 1984 to 2013 and had a generating capacity of 1080 megawatts.

The ROWD states “the [Facility] eliminates the last use of ocean water for ‘once-through cooling,’ but the continued intake of ocean water is needed for the ongoing operation of saltwater pumps to move wastewater discharge though the approximately one-mile-long offshore pipeline (outfall 002). As a result, ocean water intake requirements can be further reduced from 49 million gallons to 30 million gallons per day.” The ROWD also includes the Outfall Number 003; however, the Discharger’s ROWD amendment dated December 14, 2022, requested that Outfall Number 003 be removed.

The Facility has two independent intake structures to provide ocean water to Units 2 and 3 (Monitoring Locations INF-002 and INF-003). Ocean water is withdrawn from the Pacific Ocean through two submerged intake conduits, each extending approximately 3,100 feet offshore at a bottom depth of 30 feet. The submerged end of each conduit is fitted with a velocity cap to minimize the entrainment of motile fish into the system by converting the vertical flow to a lateral flow, thus triggering a flight response from fish.

2.1. Effluent Sources

2.1.1. NIA Sewage Treatment Plant – Discharge Point 001A, Monitoring Location INT-001-A

The NIA Sewage Treatment Plant was located within the NIA of SONGS and treated sewage from the plant site, including the newly constructed independent Spent Fuel Storage Installation Security Building. Most of the buildings at the Mesa have been removed or abandoned, and the connection between Mesa sewage treatment plant and the NIA Sewage Treatment Plant has been severed. Any remaining buildings will be turned over to the Department of the Navy who will assume direct responsibility for providing alternative future sewage treatment before the remaining buildings are reoccupied. This turnover of the Mesa property is expected to occur within the next 2 to 3 years. The Discharger maintained the current maximum discharge flow of 0.05 MGD from the NIA Sewage Treatment Plant (**Monitoring Location INT-001-A)** to **Outfall Number 002 (Monitoring Location EFF-002)**.

Consistent with the previous Order, Order No. R9-2015-0073, the NIA Sewage Treatment Plant operated only one of two treatment trains since the digester requires sufficient waste quantities and flow to operate at optimal effectiveness and therefore flows will be consolidated into either of the two trains.

By letter dated April 2, 2024, the Discharger confirmed that it closed the NIA Sewage Treatment Plant on March 28, 2024, and no longer discharges treated domestic wastewater to the ocean.

2.1.2. Radioactive Waste Management System (Radwaste) – Discharge Points 002-D(Mobile)/002-E, Monitoring Locations INT-002-D/INT-002-E

The Radioactive Waste Management System (Radwaste) includes the controlled releases of licensed radioactive liquid materials. Liquids potentially containing licensed radioactive materials are routed to the Radwaste processing system and radioactivity is removed through a series of paper filters, charcoal filters, and ion exchange (resin) filters. The water is sampled and analyzed for radioactivity prior to release through an additional radiation monitor. All radioactivity sampling, reporting, and regulatory oversight fall under the jurisdiction of the USNRC in accordance with the federal Atomic Energy Act.

In addition to the possible discharge of groundwater potentially containing licensed radioactive materials, SONGS must also discharge residual liquids stored in the reactor cavity, the spent fuel pool, piping, tanks, and pressure vessels that previously conveyed or stored water potentially containing licensed radioactive material. To safely remove the reactor, the reactor cavity will be flooded with water from the makeup demineralizer to complete the segmentation and removal. The approximate volume to be removed from the spent fuel pools and the reactor cavities is on the order of 3 million gallons, which will occur in approximate 120,000-gallon batch discharges.

The effluent from the spent fuel pool and the reactor cavity will be processed in batches as necessary to remove suspended materials and any suspended solid licensed radioactive material. Then the radioactive activity level of the processed liquid is measured. Based on the radioactive activity level, the necessary flow rate of ocean water/ saltwater required for dispersion through the discharge diffusers is evaluated pursuant to the SONGS Offsite Dose Calculation Manual (ODCM) guidance. The ODCM enumerates dose and concentration specifications, instrument requirements, as well as describes the methodology and parameters to be used in the calculation of offsite doses from radioactive liquid and airborne effluents. The flow condition of the ocean water/saltwater pump(s) to be used for the batch release is documented and the flow release is adjusted as necessary to ensure that the discharge of the combined flows meet the requirements of the ODCM and the USNRC Standards for Protection Against Radiation in title 10 of the Code of Regulations part 20 (10 CFR part 20). The concentration of boron is also calculated for each batch discharge to confirm it is less than outfall limit of 22.5 parts per million and accounting for naturally occurring boron in seawater. The current estimate for these flows is approximately 110 to 130 gallons per minute (gpm).

There are also sumps on-site that potentially contain licensed radioactive materials. These sumps typically collect pump seal water, storm water runoff from surfaces containing or covered with licensed radiological material or other relatively low activity but still licensed material. Water from these site sources is sampled for oil and grease and treated if oil and grease could be present from a particular sump source. Those contaminants are disposed of off-site under the State hazardous waste permit as combined/mixed wastes. The effluent is then continuously monitored for radiological activity (**Monitoring Location INT-002-E**) and released only when sufficient ocean water/saltwater are available to accommodate dispersion through the discharge diffusers as per the credited and approved ODCM pathway (**Outfall Number 002 (Monitoring Location EFF-002)**). A maximum of 0.12 MGD of treated wastewater is expected from this process, which is approximately 40% less than the radwaste system flows allowed under the previous Order, Order No. R9-2015-0073.

As discussed above and shown on the Water Balance Diagram in Attachment C of this Order, the makeup demineralizer effluent (**Monitoring Location INT-002-D**) is routed through the reactor cavity and ultimately through the Radwaste System. Up to 0.02 MGD of the makeup demineralizer effluent may be routed to the Unit 2 and 3 Intake Structures.

2.1.3. In Plant Storm Drains – Discharge Point 001-E, Monitoring Location INT-001-E

There are three separate collection areas and two specific points of stormwater discharge to the outfall. Units 2 and 3 each have their own catchments and the NIA has another catchment.

According to the Water Balance Diagram in Attachment C of this Order, NIA Groundwater Extraction and Dewatering is monitored at **Monitoring Location INT-001-F** before flowing to the NIA Sump, which also collects stormwater. Effluent from the NIA sump is monitored at **Monitoring Location INT-001-E**. More information on Monitoring Location INT-001-F is in section 2.1.4 of this Fact Sheet. From the NIA Sump, the storm water, groundwater extraction, and dewatering are pumped to the Unit 2 outfall (**Outfall Number 002 (Monitoring Location EFF-002)**).

The “Unit 2” yard drain system (“In Plant Sumps/Floor Drains”, Water Balance Diagram in Attachment C of this Order) collects stormwater and miscellaneous surface drainage from the yard areas immediately adjacent to structures along the east road and the west road. The storm drain headers combine into a single 36-inch line that runs south along the west road and enters the Unit 2 intake structure that is transferred to the Unit 2 outfall (**Outfall Number 002 (Monitoring Location EFF-002)**) via the ocean water/saltwater pumps.

The “Unit 3” yard drain system is a mirror image of the Unit 2 system. The “Unit 3” yard drain system (“Intake Structure & Building Sumps”) collects stormwater (“In Plant Storm Drains”) and surface drainage from the switchyard, the former high flow makeup demineralizer area, the south yard area, the multi-purpose

handling facility, parking lots 1 and 2, an offsite culvert crossing under Interstate 5, and access areas south of the plant ("Misc. Utilities Fire Water", Water Balance Diagram in Attachment C of this Order). The multiple storm drain headers combine into a single 72-inch line that runs north along the west road and enters the Unit 3 intake structure that is transferred to the Unit 2 outfall (**Outfall Number 002 (Monitoring Location EFF-002)**) ocean water/saltwater pumps.

The Units 2 and 3 subsurface drainage system is designed to accommodate the runoff from onsite areas and offsite areas west of Interstate Highway 5 and should accommodate resulting runoff from a precipitation intensity of up to three inches per hour. The storm drainpipes are sized based upon maximum flow rates of 520 cubic feet per second (cfs) from the 72-inch pipe coming into the Facility from under Interstate 5, approximately 27 cfs from Unit 2, and 26 cfs from Unit 3 for the 100-year storm event. This equates to a design capacity of 572 cfs or approximately 260,000 gpm. At that rate, in a 10-minute period, a volume of 2,500,000 gallons will pass through these two main storm water systems. On a daily average basis, a maximum of 0.324 MGD will be discharged as stormwater. These are the same estimates as the combined stormwater average flow presented in the previous Order, Order No. R9-2015-0073.

There are also some stormwater flows that do not discharge to the outfalls. Other stormwater flows at the Facility are generated from parking lots and are discharged to culverts leading directly to the beach. These stormwater discharges are not within the formerly industrialized area of the Facility.

Stormwater flows that discharge to the beach and that discharge to the Unit 2 outfall are addressed in the Facility Stormwater Pollution Prevention Plan (SWPPP) for decommissioning and dismantlement activities prepared in compliance with the *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit), Order 2009-0009-DWQ, NPDES NO. CAS000002, (WDID 9 37C388840). The SWPPP includes stormwater control and monitoring activities during decommissioning, and post-decommissioning plans for site stabilization and stormwater discharge.

As the Facility is undergoing decommissioning and dismantlement, structures (and associated floor drains and sumps) are being removed, backfilled, and areas final graded and stabilized as outlined in the CDP Grading Plan and the SWPPP post-decommissioning plan. During decommissioning and dismantlement, depending on source and/or radiological levels of collected water, water may be directed to: 1) the "Common Oil Removal System" (**Monitoring Location INT-002-L**) before entering the Unit 2 storm drain system that is transferred to Unit 2 outfall (**Outfall Number 002 (Monitoring Location EFF-002)** via the ocean water/saltwater pumps, 2) holding tanks for further treatment as "Concrete Cutting Water" (**Monitoring Location INT-002-K)** or "Radioactive Waste (Radwaste) System" **(Monitoring Location INT-002-E)**, or 3) to a yard drain ("In Plant Storm Drains" **[Monitoring Location INT-001-E]** or a

storm drain). More information on the “Common Oil Removal System”, “Concrete Cutting Water”, and “Radioactive Waste (Radwaste) System” is in Section 2.1.6, 2.1.5, and 2.1.2, respectively.

2.1.4. Groundwater Extraction and Dewatering Flows - Discharge Points 001-F/002-M, Monitoring Locations INT-001-F/INT-002-M

Groundwater extraction performed at the NIA following the dismantlement of Unit 1 was included in the current NPDES permit. This extraction is not currently being conducted but may be necessary in the future to contain the radioactive activity level and potential for off-site dispersion of groundwater potentially containing licensed radioactive material. Groundwater extraction would occur through one or more of the four extraction wells placed selectively to remove groundwater suspected of contributing to the higher radioactive activity levels at the NIA.

The groundwater radioactive activity levels at the NIA are monitored regularly with sampling from separate monitoring-wells. The extracted groundwater is pumped to the nearby NIA sump. The radioactive activity levels are observed in the NIA sump, the ocean water/saltwater pump flows are confirmed, and the NIA sump is metered out at a flow rate such that the discharge to the Unit 2 ocean outfall, when combined with the ocean water/saltwater pump flows, reduces the radioactive activity levels in the combined discharge to a value in compliance with the limits of the ODCM and requirements of 10 CFR part 20, *Standards for Protection Against Radiation*. All discharges of licensed radioactive materials are monitored continuously with feedback control to stop the discharge of licensed radioactive material if any flow rate or radioactive activity level poses a challenge to the ODCM limits for release. If utilized, up to 3.75 MGD of NIA groundwater potentially containing licensed radioactive material would be discharged from the NIA pumps. According to the Water Balance Diagram in Attachment C of this Order, NIA Groundwater Extraction and Dewatering effluent (**Monitoring Location INT-001-F**) flows to the NIA Sump (**Monitoring Location INT-001-E**) before reaching the outfall (**Outfall Number 002 (Monitoring Location EFF-002)**). More information on Monitoring Location INT-001-E is in section 2.1.3 of this Fact Sheet.

Similar licensed radioactive material in groundwater may be present under Unit 2 and Unit 3 and will be confirmed when structures are removed during the SONGS dismantlement and site characterization is completed. The groundwater extraction flow rates may increase in order to control the monitored radioactive activity levels and any off-site dispersion of groundwater containing licensed radioactive materials. Therefore, the combined extraction and dewatering discharge flows for NIA (Unit 1) of 3.75 MGD will be maintained. In addition, the water balance for decommissioning-related groundwater dewatering is explained in more detail later in this section.

Limited construction dewatering is expected to be required for the removal of below grade structures supporting Unit 2 and 3; however, the final scope of

foundation removal and end state is not yet finalized. The depth of excavations and foundation removal will also be dependent on the on-site characterization results. All groundwater with field measurable levels of radioactive material will be discharged consistent with the practices already established for the NIA extraction well discharge and will comply with ODCM requirements. The water balance includes a maximum of 7.5 MGD of dewatering to account for each of the Unit 2 and 3 flows that is expected to be similar to the dewatering discharge for the NIA.

Included in the groundwater dewatering estimate are short-term dewatering discharges. For example, following installation of isolation gates in the intake/forebay area that is below sea-level, approximately 7.5 million gallons of trapped intake seawater will need to be removed and returned to the ocean at an estimated flow rate of 3,000 to 4,000 gpm. Following the initial dewatering, seawater in-leakage would be on the order of 200 to 300 gpm. The plan is to discharge the un-impacted seawater to the Unit 2 outfall or to the ocean through the existing beach discharge (up to 7.824 MGD). No radwaste or sewage treatment wastewater would be released via the beach discharge pathway. Per the site grading plan only storm water will be routed through the beach discharge pathway at the end of the decommissioning project.

All included, the maximum discharge rate for future groundwater extraction and dewatering processes is 11.25 MGD, the same flow rate presented in the previous Order, Order No. R9-2015-0073.

2.1.5. Concrete Cutting Water/Dust Control - Discharge Point 002-K, Monitoring Location INT-002-K

Concrete cutting will be performed periodically as needed to support Facility dismantlement. Water not only helps cool and lubricate the cutting saw, but also helps control dust. This effluent will also include other general dust control wastewaters used during demolition activities. This process would be managed for compliance with the CGP and SWPPP, and may discharge a maximum of 0.2 MGD, consistent with the previous Order, Order No. R9-2015-0073. If pH adjustment/treatment of concrete cutting water is required to meet effluent limitations, Discharger may utilize a tank to capture and treat the concrete cutting water. Treated water will be resampled to evaluate whether pH limits are met prior to discharge.

2.1.6. Common Oil Removal System - Discharge Point 002-L, Monitoring Location INT-002-L

A Unit 2 and 3 common oil water separator receives flow from building sumps that collect nonradioactive plant water and intake structure sumps that collect ocean water released from system piping, bearings and pumps. The non-radioactive plant drains refer to drains from systems that do not normally contain radioactivity, but on occasion may contain trace amounts. Non-radioactive plant drains are routed through a radiation monitor and/or sampled and analyzed. The oil removal system separates the oil and grease and precipitates or settles out

suspended sediments and discharges the separated water to the Unit 2 outfall. Segregated oil and grease are collected for offsite disposal.

According to the Water Balance Diagram in Attachment C of this Order, effluent from the "Unit 2" and "Unit 3" in plant sumps and floor drains flow to the "Common Oil Removal System" (**Monitoring Location INT-002-L**) before entering the Unit 2 outfall. More information on the "Common Oil Removal System" is in section 2.1.3 of this Fact Sheet.

The common oil removal system discharges a maximum of 0.288 MGD consistent with the previous Order, Order No. R9-2015-0073.

2.1.7. Discontinued Discharges

Order No. R9-2015-0073 included Outfalls 002 and 003. The Discharger's ROWD amendment dated December 14, 2022, states, "Unit 3 outfall has not been utilized since 2017; the current piping configuration routes everything over to the Unit 2 outfall. Therefore, [Southern California Edison Company] requests the elimination of Discharge No. 003 from the NPDES Permit." The Discharger plans to dismantle this location as part of the SONGS decommissioning. As such, this Order removes Discharge Point 003 (Effluent Monitoring Location EFF-003) because this location is no longer operable.

This Order removes the following internal waste streams: INT-002-A / INT-003-A (metal cleaning wastes), INT-002-J / INT-003-J (Intake Structure Sump), INT-003-D (Rubber Tire Demineralizer), INT-003-E (Radwaste System), INT-003-K (Concrete Cutting Water), INT-003-L (Common Oil Removal System), and INT-003-M (Dewatering). Amending Order No. R9-2025-0002 removes the internal waste stream INT-001-A (NIA Sewage Treatment Plant).

2.1.8. Total Flows

The total internal low-volume waste streams from INT-002-E (0.12 MGD), INT-002-D (0.02 MGD), INT-001-F/INT-001-E (3.75 MGD), INT-002-M (7.5 MGD), INT-002-K (0.2 MGD),and INT-002-L (0.288 MGD) is 11.878 MGD, a reduction from the previous Order's total internal low-volume waste stream of 12.8 MGD.

The total flow from the internal low-volume waste streams (11.878 MGD, INT-002), NIA Sewage Treatment Plant (0.05 MGD, INT-001-A), stormwater (0.324 MGD), and saltwater pumps (30 MGD) is 42.252 MGD, a reduction from the previous Order's total flow of 56.3 MGD.

By letter dated April 2, 2024, the Discharger confirmed that it closed the NIA Sewage Treatment Plant (0.05 MGD, INT-001-A) on March 28, 2024, and no longer discharges treated domestic wastewater to the ocean. This reduces the total flow from the internal low-volume waste streams from 42.252 to 42.202 MGD.

2.2. Discharge Points and Receiving Waters

The internal waste streams from the NIA and Unit 2, the stormwater, and the saltwater discharge to the Pacific Ocean through Discharge Point No. 002.

The SONGS Unit 2 diffuser Discharge Point No. 002 is equipped with a 2,462-foot-long diffuser pipe, which starts at 5,888 feet offshore and extends to 8,350 feet offshore. The Unit 2 diffuser pipe ranges in depth from 39 feet to 49 feet. The offshore end of the Unit 2 diffuser pipe is located at latitude 33º 20' 55.84" North and longitude 117º 34' 13.5" West. The diffuser is equipped with 63 jet nozzles. The nozzles are alternated in the direction of 25 degrees upcoast and 25 degrees downcoast along the diffuser pipe. Further, the nozzles are directed at an angle of 20 degrees off the bottom and the nozzle openings are only two feet off the seafloor. The initial offshore momentum of the effluent from the jet nozzles promotes the mixing of the effluent with the receiving seawater.

The nearest Unit 2 diffuser jet nozzle is located approximately 2,700 feet away from either of the two intakes (in the longitudinal direction). The design of the Unit 2 diffusers ensures that heated effluent actively travels away from the diffusers and shoreline in a longitudinal direction. This also ensures that the discharge from the diffusers does not move in the lateral direction and get entrained in the Unit 2 and 3 intake structures.

2.3. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations contained in the previous Order, Order No. R9-2015-0073, for discharges from the Facility and representative monitoring data obtained from February 2016 to July 2022 are as follows:

Table F-2. Historical Effluent Limitations and Monitoring Data at Monitoring Location INT-001-A[1,2]

Parameter	Units	Average Monthly Effluent Limitation (AMEL)	Average Weekly Effluent Limitation (AWEL)	Instantaneous Maximum Effluent Limitation	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Instantaneous Maximum
Flow	MGD	--	--	--	0.006	--	--
Oil and Grease	milligram per liter (mg/L)	25	40	75	2	2	2
Oil and Grease	pounds per day (lbs/day)	21	--	--	0.2	--	--
Total Suspended Solids (TSS)	mg/L	--	--	[3]	--	--	[3]
Settleable Solids	milliliters per liter (ml/L)	1.0	1.5	3.0	0.1	0.1	0.1
Turbidity	nephelometric turbidity units (NTU)	75	100	225	8.2	8.2	8.2

Parameter	Units	Average Monthly Effluent Limitation (AMEL)	Average Weekly Effluent Limitation (AWEL)	Instantaneous Maximum Effluent Limitation	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Instantaneous Maximum
pH	standard units	--	--	6.0 – 9.0[4]	--	--	6.5 – 8.3[4]

Notes for Table F-2

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. See Order No. R9-2015-0073, Tables E-2 and E-3 for the monitoring requirements and Table 5 for the effluent limitations.
3. Not more than 25% of influent TSS.
   Calculated values not reported.
   Reported TSS influent at INF-001-A from February 2016 to July 2022 was 176 to 11,600 mg/L.
   Reported TSS effluent at INT-001-A from February 2016 to July 2022 was 0.1 to 24 mg/L.
4. Minimum and maximum value.

The previous Order, Order No. R9-2015-0073 includes effluent monitoring requirements for chemical and non-chemical metal cleaning wastes from Unit 2 (INT-002-A) and Unit 3 (INT-003-A) in Table E-4 and effluent limitations in Table 6. During the permit term of Order No. R9-2015-0073, no data was reported for the effluent for chemical and non-chemical metal cleaning wastes from Unit 2 (INT-002-A) and Unit 3 (INT-003-A). As discussed in section 2.1.7, metal effluent discharges have been discontinued. The Discharger's monthly and annual reports stated that Monitoring Locations INT-002-A and INT-003-A had no discharge from 10/01/2017 to 7/31/2022.

Table F-3. Historical Effluent Limitations and Monitoring Data for the Combined Low-Volume Miscellaneous Discharge at INT-002 and INT-003[1,2]

Parameter	Units	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)	Highest Maximum Daily / Daily Discharge
TSS	mg/L	--	30	100	25
TSS	lbs/day	--	3200	10700	2.3
Oil and Grease	mg/L	--	15	20	4.06
Oil and Grease	lbs/day	--	1600	2100	0.86

Parameter	Units	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)	Highest Maximum Daily / Daily Discharge
pH	Standard units	--	--	Between 6.0 and 9.0 at all times	Reported values between 7.5 and 8.15
Arsenic	lbs/day	6.2	--	34.4	0.004030828
Cadmium, Total Recoverable	lbs/day	1.2	--	4.7	0.0000031
Chromium (hexavalent), Total Recoverable	lbs/day	2.3	--	9.4	0.0002661
Copper, Total Recoverable	lbs/day	1.4	--	12.0	0.08178492
Mercury, Total Recoverable	lbs/day	0.05	--	0.19	0.000326305
Selenium, Total Recoverable	lbs/day	17.6	--	70.5	0.000886
Silver, Total Recoverable	lbs/day	0.65	--	3.1	<0.0009
Zinc, Total Recoverable	lbs/day	14.9	--	85.4	0.041142822
Cyanide, Total (as Cyanide)	lbs/day	1.2	--	4.7	0.000367
Ammonia (as Nitrogen)	lbs/day	705	--	2820	2.29832316
Phenolic Compounds (non-chlorinated)[1]	lbs/day	35	--	141	<0.01171
Chlorinated Phenolics[1]	lbs/day	1.2	--	4.7	0.000025
Endosulfan[1]	lbs/day	0.01	--	0.02	0.0000319
Endrin	lbs/day	0.002	--	0.004	0.00000018
Hexachlorocyclohexane (HCH)[1]	lbs/day	0.004	--	0.009	0.000000529
Acrolein	lbs/day	--	258	--	<0.00368
Antimony	lbs/day	--	1400	--	<0.000572
Bis(2-chloroethoxy) methane	lbs/day	--	5.2	--	<0.00038
Bis(2-chloroisopropyl) ether	lbs/day	--	1400	--	<0.00053
Chlorobenzene	lbs/day	--	670	--	<0.00043
Chromium (III), Total Recoverable	lbs/day	--	223000	--	0.000042
Di-n-butyl phthalate	lbs/day	--	4100	--	<0.0005055
Dichlorobenzenes[1]	lbs/day	--	6000	--	<0.00078
Diethyl phthalate	lbs/day	--	39000	--	<0.00031
Dimethyl phthalate	lbs/day	--	960000	--	<0.0008
4,6-Dinitro-2-methylphenol	lbs/day	--	260	--	<0.00709
2,4-Dinitrophenol	lbs/day	--	4.7	--	<0.00141
Ethylbenzene	lbs/day	--	4800	--	<0.00053

Parameter	Units	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)	Highest Maximum Daily / Daily Discharge
Fluoranthene	lbs/day	--	17.6	--	<0.00018
Hexachlorocyclopentadiene	lbs/day	--	68	--	<0.00709
Nitrobenzene	lbs/day	--	5.8	--	<0.00032
Thallium, Total Recoverable	lbs/day	--	2.3	--	<0.00312
Toluene	lbs/day	--	99800	--	<0.00068
Tributyltin	lbs/day	--	0.002	--	0.00000003
1,1,1-Trichloroethane	lbs/day	--	634000	--	<0.00032
Acrylonitrile	lbs/day	--	0.12	--	<0.00212
Aldrin	lbs/day	--	0.000026	--	<0.0000002
Benzene	lbs/day	--	6.9	--	<0.00066
Benzidine	lbs/day	--	0.000081	--	<0.00292
Beryllium, Total Recoverable	lbs/day	--	0.04	--	<0.00255
Bis(2-chloroethyl) ether	lbs/day	--	0.05	--	<0.00059
Bis(2-ethylhexyl) phthalate	lbs/day	--	4.1	--	<0.000878
Carbon tetrachloride	lbs/day	--	1.1	--	<0.00053
Chlordane[1]	lbs/day	--	0.000027	--	<0.00002
Chlorodibromomethane	lbs/day	--	10	--	0.008796052
Chloroform	lbs/day	--	153	--	0.003546795
Dichlorodiphenyltrichloroethane (DDT)[1]	lbs/day	--	0.0002	--	<0.0000036
1,4-Dichlorobenzene	lbs/day	--	21	--	<0.00051
3,3'-Dichlorobenzidine	lbs/day	--	0.09	--	<0.00083
1,2-Dichloroethane	lbs/day	--	33	--	<0.00035
1,1-Dichloroethylene	lbs/day	--	1.0	--	<0.00009
Dichlorobromomethane	lbs/day	--	7.3	--	0.007802949
Dichloromethane	lbs/day	--	530	--	<0.00061
1,3-Dichloropropene	lbs/day	--	10.5	--	<0.00136
Dieldrin	lbs/day	--	0.000047	--	<0.0000001
2,4-Dinitrotoluene	lbs/day	--	3.1	--	<0.00063
1,2-Diphenylhydrazine	lbs/day	--	0.19	--	<0.00141
Halomethanes[1]	lbs/day	--	150	--	0.005816744
Heptachlor	lbs/day	--	0.000059	--	<0.0000002
Heptachlor Epoxide	lbs/day	--	0.000023	--	<0.0000001
Hexachlorobenzene	lbs/day	--	0.00025	--	<0.00049
Hexachlorobutadiene	lbs/day	--	16	--	<0.00079
Hexachloroethane	lbs/day	--	2.9	--	<0.00035
Isophorone	lbs/day	--	857	--	<0.0009

Parameter	Units	6-Month Median Effluent Limitation	30-Day Average Effluent Limitation	Maximum Daily Effluent Limitation (MDEL)	Highest Maximum Daily / Daily Discharge
N-nitrosodimethylamine	lbs/day	--	8.6	--	<0.00709
N-nitrosodi-N-propylamine	lbs/day	--	0.45	--	<0.00082
N-nitrosodiphenylamine	lbs/day	--	2.9	--	<0.00017
Polynuclear aromatic hydrocarbons (PAHs)[1]	lbs/day	--	0.01	--	<0.00381
Polychlorinated biphenyls (PCBs)[1]	lbs/day	--	0.000022	--	<0.00397
TCDD equivalents[1]	lbs/day	--	0.0000000046	--	<0.0000002
1,1,2,2-Tetrachloroethane	lbs/day	--	2.7	--	<0.00059
Tetrachloroethylene	lbs/day	--	2.3	--	< 0.00069
Toxaphene	lbs/day	--	0.00025	--	< 0.0007
Trichloroethylene	lbs/day	--	32	--	< 0.00043
1,1,2-Trichloroethane	lbs/day	--	11	--	< 0.00048
2,4,6-Trichlorophenol	lbs/day	--	0.34	--	< 0.00141
Vinyl chloride	lbs/day	--	42	--	< 0.00066

Notes for Table F-3

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The previous Order, Order No. R9-2015-0073 required the Discharger to monitor the combined low-volume miscellaneous discharge at NIA (Monitoring Locations INT-001-E and INT-001-F), Unit 2 (Monitoring Locations INT-002-D, INT-002-E, INT-002-J, INT-002-K, INT-002-L, and INT-002-M), and Unit 3 (Monitoring Locations INT-003-D, INT-003-E, INT-003-J, INT-003-K, INT-003-L, and INT-003-M). and to report aliquot as Monitoring Locations INT-001 (NIA), INT-002 (Unit 2) and INT-003 (Unit 3) (see Order No. R9-2015-0073, Table E-6). The effluent limitations for the combined low-volume miscellaneous discharge are contained in Order No. R9-2015-0073, Table 8. In 2016, the INT-002 composite sample included INT-001E, INT-002-L, and INT-002-J; and the INT-003 composite sample included INT-003-J. From 2017 to 2020, the INT-002 composite sample included INT-001E and INT-002L; no data for INT-003. In 2021, INT-002 composite only included INT-001E; no data for INT-003.

Table F-4. Historical Effluent Limitations and Monitoring Data for the Individual Low-Volume Miscellaneous Discharge[1,2]

Monitoring Location	Parameter	Units	AMEL	Daily Maximum Effluent Limitation	Highest Average Monthly Discharge	Highest Daily Maximum
INT-001-E	Flow	MGD	--	--	0.092	0.155
INT-001-E	TSS	mg/L	30	100	29.2	82
INT-001-E	Oil and Grease	mg/L	15	20	14.2	17.6
INT-002-D	Flow	MGD	--	--	0.001	0.0077
INT-002-D	TSS	mg/L	30	100	<0.4	<0.4
INT-002-D	Oil and Grease	mg/L	15	20	<13.4	19.4
INT-002-E	Flow	MGD	--	--	0.007	0.097
INT-002-E	TSS	mg/L	30	100	2.5	2.5
INT-002-E	Oil and Grease	mg/L	15	20	<5	<5
INT-002-J	Flow	MGD	--	--	0.07	0.07
INT-002-J	TSS	mg/L	30	100	10.9	10.9
INT-002-J	Oil and Grease	mg/L	15	20	<5	<5
INT-002-L	Flow	MGD	--	--	0.028	0.19
INT-002-L	TSS	mg/L	30	100	10.8	10.8
INT-002-L	Oil and Grease	mg/L	15	20	11.68	42
INT-003-J	Flow	MGD	--	--	0.07	0.07
INT-003-J	TSS	mg/L	30	100	27.9	27.9
INT-003-J	Oil and Grease	mg/L	15	20	<5	<5

Notes for Table F-4

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The previous Order, Order No. R9-2015-0073 required the Discharger to monitor the individual, low-volume, miscellaneous discharges at NIA (001-E and 001-F), Unit 2 (002-D, 002-E, 002-J, 002-K, 002-L, and 002-M), and Unit 3 (003-D, 003-E, 003-J, 003-K, 003-L, and 003-M), with compliance measured at Monitoring Locations NIA (INT-001-E and INT-001-F), Unit 2 (INT-002-D, INT-002-E, INT-002-J, INT-002-K, INT-002-L, and INT-002-M), and Unit 3 (INT-003-D, INT-003-E, INT-003-J, INT-003-K, INT-003-L, and INT-003-M) (see Order No. R9-2015-0073, Table E-8). The effluent limitations for the individual, low-volume, miscellaneous discharges are contained in Order No. R9-2015-0073, Table 9. During the permit term of Order No. R9-2015-0073, data was only reported for Monitoring Locations INT-001-E, INT-002-D, INT-002-E, INT-002-J, INT-002-L, and INT-003-J.

The previous Order, Order No. R9-2015-0073 contained Discharge Prohibition III.D, "The total combined discharge of wastewater, through Discharge Point No. 002 and Discharge Point No. 003, in excess of 56.3 million gallons per day (MGD) is prohibited."

The maximum reported total flow from Discharge Point Nos. 002 and 003 was 48.6 MGD.

Table F-5. Historical Effluent Limitations and Monitoring Data at Monitoring Locations EFF-002[1,2]

Parameter	Units	MDEL	Instantaneous Maximum Effluent Limitation	Six-Month Median Effluent Limitation	Highest Maximum Daily	Highest Instantaneous Maximum	Highest Six-Month Median
Total Residual Chlorine	µg/L	88	660	22	0[3]	0[3]	0[3]
Turbidity	NTU	--	--	--	--	4.17	--
Chronic Toxicity	Pass/Fail	Pass	--	--	Pass	--	--
Residual Heat	ºF	--	[4]	--	--	6[5]	--
Arsenic	µg/L	--	850	--	--	6.7	--
Cadmium, Total Recoverable	µg/L	--	110	--	--	<19.6	--
Chromium (hexavalent), Total Recoverable	µg/L	--	220	--	--	<0.75	--
Copper, Total Recoverable	µg/L	--	310	--	--	34	--
Lead, Total Recoverable	µg/L	--	220	--	--	3.06	--
Mercury, Total Recoverable	µg/L	--	4.4	--	--	0.23	--
Nickel, Total Recoverable	µg/L	--	550	--	--	13.2	--
Selenium, Total Recoverable	µg/L	--	1,700	--	--	284	--
Silver, Total Recoverable	µg/L	--	75	--	--	10.2	--
Zinc, Total Recoverable	µg/L	--	2,100	--	--	53.2	--

Parameter	Units	MDEL	Instantaneous Maximum Effluent Limitation	Six-Month Median Effluent Limitation	Highest Maximum Daily	Highest Instantaneous Maximum	Highest Six-Month Median
Cyanide	µg/L	--	110	--	--	2.5	--
Ammonia, Un-ionized (as Nitrogen)	mg/L	--	66	--	--	7.25	--
Non-Chlorinated Phenolic Compounds[1]	µg/L	--	3,300	--	--	<23	--
Chlorinated Phenolics[1]	µg/L	--	110	--	--	<4.27	--
Endosulfan[1]	µg/L	--	0.30	--	--	0.034	--
Endrin	µg/L	--	0.066	--	--	0.023	--
HCH[1]	µg/L	--	0.13	--	--	0.0055	--

Notes for Table F-5

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The previous Order, Order No. R9-2015-0073 required the Discharger to monitor Discharge Point No. 002 at Monitoring Location EFF-002 (see Order No. R9-2015-0073, Table E-9). Order No. R9-2015-0073 Table 10 Final Effluent Limitations – Ocean Outfall Discharge Points Nos. 002 or 003 apply to Monitoring Location EFF-002.
3. All data reported as zero usually with the comment “No sample taken, no chlorination since August 2013”.
4. The maximum temperature of the discharge through Monitoring Location EFF-002 to the Pacific Ocean shall not exceed, at any time, the natural temperature of the receiving water by more than 20ºF.
5. Reported as “Temp Diff b/n Intake and Discharge” on April 18, 2016.

Table F-6. Historical Effluent Limitations and Monitoring Data at Monitoring Location EFF-003[1,2]

Parameter	Units	MDEL	Instantaneous Maximum Effluent Limitation	Six-Month Median Effluent Limitation	Highest Maximum Daily	Highest Instantaneous Maximum	Highest Six-Month Median
Total Residual Chlorine	µg/L	88	660	22	No reported data	--	--
Turbidity	NTU	--	--	--	--	1.5	--
Chronic Toxicity	Pass/Fail	Pass	--	--	Pass	--	--
Residual Heat	ºF	--	[3]	--	--	4[4]	--
Arsenic	µg/L	--	850	--	--	6.9	--
Cadmium, Total Recoverable	µg/L	--	110	--	--	<0.4	--
Chromium (hexavalent), Total Recoverable	µg/L	--	220	--	--	<0.27	--
Copper, Total Recoverable	µg/L	--	310	--	--	140	--
Lead, Total Recoverable	µg/L	--	220	--	--	11	--
Mercury, Total Recoverable	µg/L	--	4.4	--	--	0.26	--
Nickel, Total Recoverable	µg/L	--	550	--	--	4	--
Selenium, Total Recoverable	µg/L	--	1,700	--	--	<5.2	--
Silver, Total Recoverable	µg/L	--	75	--	--	<0.7	--
Zinc, Total Recoverable	µg/L	--	2,100	--	--	31	--
Cyanide	µg/L	--	110	--	--	<20	--

Parameter	Units	MDEL	Instantaneous Maximum Effluent Limitation	Six-Month Median Effluent Limitation	Highest Maximum Daily	Highest Instantaneous Maximum	Highest Six-Month Median
Ammonia, Un-ionized (as Nitrogen)	mg/L	--	66	--	--	8	--
Non-Chlorinated Phenolic Compounds	µg/L	--	3,300	--	--	<8.26	--
Chlorinated Phenolics	µg/L	--	110	--	--	<4.27	--
Endosulfan[1]	µg/L	--	0.30	--	--	0.034	--
Endrin	µg/L	--	0.066	--	--	0.002	--
HCH[1]	µg/L	--	0.13	--	--	0.014	--

Notes for Table F-6

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The previous Order, Order No. R9-2015-0073 required the Discharger to monitor Discharge Point No. 003 at Monitoring Location EFF-003 (see Order No. R9-2015-0073, Table E-9). Order No. R9-2015-0073 Table 10 Final Effluent Limitations – Ocean Outfall Discharge Points Nos. 002 or 003 apply to Monitoring Location EFF-003.
3. The maximum temperature of the discharge through Monitoring Location EFF-003 to the Pacific Ocean shall not exceed, at any time, the natural temperature of the receiving water by more than 20ºF.
4. Reported as “Temp Diff b/n Intake and Discharge” on May 12, 2016.

Table F-7. Historical Monitoring Data at Monitoring Locations INF-002 and INF-003[1,2]

Monitoring Location	Parameter	Units	Highest Maximum Daily
INF-002	Flow (Average Daily)	MGD	14.832
INF-002	Flow (Maximum Daily)	MGD	35.771
INF-002	Turbidity (Instantaneous Maximum)	NTU	13.9
INF-002	Temperature (Average Daily)	°F	73
INF-002	Temperature (Maximum Daily)	°F	74
INF-003	Flow (Average Daily)	MGD	22.32
INF-003	Flow (Maximum Daily)	MGD	14.688
INF-003	Turbidity (Instantaneous Maximum)	NTU	24.5

Monitoring Location	Parameter	Units	Highest Maximum Daily
INF-003	Temperature (Average Daily)	°F	64
INF-003	Temperature (Maximum Daily)	°F	63

Notes for Table F-7

1. See Attachment A for definitions of abbreviations and a glossary of common terms used in this Order.
2. The previous Order, Order No. R9-2015-0073 required the Discharger to monitor at Monitoring Locations INF-002 and INF-003 (see Order No. R9-2015-0073, Table E-10).

2.4. Compliance Summary

As of September 23, 2022, the Discharger has reported the following alleged violations of Order No. R9-2015-0073:

2.4.1. In accordance with Attachment E, section X.B.4, the laboratory used by the San Onofre Nuclear Generating Station (Discharger) is required to meet the minimum levels (MLs) specified in Appendix II of the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan). The laboratory reports documented a minimum detection limit (MDL) that is greater than the ML specified in Appendix II of the Ocean Plan for seven constituents in the semi-annual SMR.

2.4.2. Order No. R9-2015-0073, Table 9 includes an MDEL of 20 mg/L for oil and grease for individual low-volume waste streams. On July 16, 2019, and September 26, 2022, at one of the individual low-volume waste streams (monitoring location INT-002-L), the discharger reported an oil and grease daily maximum of 42 and 59.4 mg/L, respectively, exceeding the limitation.

2.4.3. Order No. R9-2015-0073, Table 9 includes a 30-day average limitation of 15 mg/L for oil and grease for individual low-volume waste streams. On September 26, 2022, at one of the individual low-volume waste streams (monitoring location INT-002-L), the discharger reported an oil and grease 30-day average of 59.4 mg/L, exceeding the limitation.

2.4.4. Order No. R9-2015-0073, Table 9 includes a 30-day average limitation of 30 mg/L for TSS for individual low-volume waste streams. On September 26, October 5, October 6, October 24, and October 25, 2022, at one of the individual low-volume waste streams (monitoring location INT-002-L), the calculated 30-day average for TSS was 95.5, 52.0, 47.8, 38.6, and 33.0 mg/L, respectively, exceeding the limitation.

2.4.5. Order No. R9-2015-0073, discharge prohibition III.A states “The discharge of waste in a manner or to a location that has not been specifically described to the San Diego Water Board and for which valid WDRs are not in force are prohibited.” The Discharger reported a discharge of partially treated sewage on March 25, 2020, from 0530 to 0730 from the NIA sewage treatment plant in violation of discharge prohibition III.A. The total volume of partially treated sewage was between 6,000 to 7,000 gallons. “During the release, the partially treated effluent was diluted by a factor greater than the minimum 10:1 dilution required by [Order No. R9-2015-0073].”

2.4.6. Order No. R9-2015-0073, Attachment E, Table E-9 requires a minimum sampling frequency of once per week for temperature. In January 2022, the Discharger reported deficient monitoring, stating "Temperature readings were not collected during three weekend run times."

2.5. Planned Changes

The Discharger is continuing the decommissioning of the Facility. The discharges described in section 2.1 of this Fact Sheet are required for the continued operation and the dismantlement of site facilities at SONGS. While some of these effluent flow volumes are known, others like groundwater extraction and dewatering volumes will not be fully known until the depths of excavation/structure removal and site characterization are finalized.

During dismantlement, each effluent source except storm water (and possibly groundwater extraction) will be eliminated as a point source discharge, and storm water will be managed under the Construction General Permit. Eventually, upon completion of site restoration, the storm water point-source will be replaced with a dispersed set of non-point source discharges to the ocean via the common across the beach discharge. In addition, more of the storm water will be retained on site via infiltration when site hardscape is replaced with more permeable materials. Until that time, the Discharger will continue to maintain the Unit 2 point-source discharge (Discharge Point No. 002) regulated by the conditions of this Order.

As stated in section 2.1.1 of this Fact Sheet, the connection between Mesa sewage treatment plant and the NIA Sewage Treatment Plant has been severed. Remaining buildings in the Mesa area will be turned over to the Department of the Navy who will assume direct responsibility for providing alternative future sewage treatment before the remaining buildings are reoccupied. This turnover of the Mesa property is expected to occur within the next 2 to 3 years.

3. Applicable Plans, Policies, and Regulations

The requirements contained in this Order are based on the requirements and authorities described in this section.

3.1. Legal Authorities

This Order serves as WDRs pursuant to article 4, chapter 4, division 7 of the California Water Code (Water Code) (commencing with section 13260). This Order is also issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the United States Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the Water Code (commencing with section 13370). It shall serve as an NPDES permit authorizing the Discharger to discharge into waters of the United States at the discharge location described in Table 1 subject to the WDRs in this Order.

3.2. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA, (commencing with section 21100) of Division 13 of the Public Resources Code.

3.3. State and Federal Laws, Regulations, Policies, and Plans

3.3.1. **Water Quality Control Plan.** The San Diego Water Board adopted a Water Quality Control Plan for the San Diego Basin (Basin Plan) on September 8, 1994, that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for the Pacific Ocean and other receiving waters addressed through the plan. Subsequent revisions to the Basin Plan have also been adopted by the San Diego Water Board and approved by the State Water Resources Control Board (State Water Board). Beneficial uses applicable to the Pacific Ocean specified in the Basin Plan are summarized in Table F-8. To protect the beneficial uses, the Basin Plan establishes water quality objectives and a program of implementation. Requirements of this Order implement the Basin Plan.

Table F-8. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
002	Pacific Ocean	• Industrial service supply (IND); • Navigation (NAV); • Water contact recreation (REC-1); • Non-contact recreation (REC-2); • Commercial and sport fishing (COMM); • Preservation of biological habitats of special significance (BIOL); • Wildlife habitat (WILD); • Rare, threatened, or endangered species (RARE); • Marine habitat (MAR); • Aquaculture (AQUA); • Migration of aquatic organisms (MIGR); • Spawning, reproduction, and/or early development (SPWN); and • Shellfish harvesting (SHELL).

3.3.2. **California Ocean Plan.** The State Water Board adopted the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, 2005, 2009, 2012, 2015, and 2018. The State Water Board adopted the latest amendment on August 7, 2018, the USEPA approved the amendments on March 22, 2019, and it became effective on March 22, 2019. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. The Ocean Plan identifies beneficial uses of ocean

waters of the State to be protected as summarized in Table F-9. To protect the beneficial uses, the Ocean Plan establishes water quality objectives and a program of implementation. Requirements of this Order implement the Ocean Plan.

Table F-9. Ocean Plan Beneficial Uses

Discharge Point	Receiving Water	Beneficial Uses
002	Pacific Ocean	• IND; • REC-1; • REC-2, including aesthetic enjoyment; • NAV; • COMM; • Mariculture; • Preservation and enhancement of designated Areas of Special Biological Significance (ASBS); • Rare and endangered species; • MAR; • Fish migration; • Fish spawning; and • SHELL.

3.3.3. **Antidegradation Policy.** Federal regulation 40 CFR section 131.12 requires that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*. Resolution 68-16 is deemed to incorporate the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The San Diego Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution 68-16.

3.3.4. **Anti-Backsliding Requirements.** Sections 402(o) and 303(d)(4) of the federal CWA and federal regulations at 40 CFR section 122.44(l) restrict backsliding in NPDES permits. These Anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3.3.5. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code, sections 2050 to 2097) or the federal Endangered Species Act (16 United States Code (U.S.C.) sections 1531

to 1544). This Order requires compliance with effluent limitations, receiving water limits, and other requirements to protect the beneficial uses of waters of the State, including protecting rare and endangered species. The Discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

3.3.6. **Thermal Plan and CWA Section 316(a).** The State Water Board adopted the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan) on January 7, 1971. The State Water Board amended this plan on September 18, 1975. This plan contains temperature objectives for coastal waters.

As stated in the previous Order, Order No. R9-2015-0073, the Discharger is no longer discharging elevated thermal waste and no longer performs heat treatments to control biofouling. The ROWD states that the Facility's Units 2 and 3 permanently ceased operation and the Facility no longer requires circulating cooling waters. The Discharger's monitoring report indicates that the effluent (Monitoring Location EFF-002) was no more than 6 °F above intake seawater (Monitoring Location INF-002). The Discharger last reported data for Monitoring Location EFF-003 in June 2016 because the discharge for this location ended at that time. The Facility no longer has the capability to produce heated waters and is undergoing further decommissioning that will remove structures that contained heated water. As such, the San Diego Water Board has determined that the Thermal Plan no longer applies to this Order.

3.4. Impaired Water Bodies on the CWA section 303(d) List

In April 2018, USEPA-approved the list of impaired water bodies, prepared by the State Water Board pursuant to federal CWA section 303(d), which are not expected to meet applicable water quality standards after implementation of technology-based effluent limitations (TBELs) for point sources. This 303(d) list includes the Pacific Ocean shoreline within the San Clemente Hydrologic Area at Poche Beach, San Clemente City Beach at Pier and North Beach, and South Capistrano Beach as impaired for enterococcus and total coliform.

The San Clemente Hydrologic Area is included in Resolution No. R9-2010-0001, *A Resolution Amending the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Revised Total Maximum Daily Loads* [TMDLs] *for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek)* (TMDL Basin Plan Amendment), adopted on February 10, 2010. The TMDL Basin Plan Amendment was subsequently approved by the State Water Board on December 14, 2010, the Office of Administrative Law (OAL) on April 4, 2011, and the USEPA on June 22, 2011. Under state law, the TMDL Basin Plan Amendment became fully effective on April 4, 2011, the date of OAL approval.

The discharge from the Facility is outside the defined receiving waters of the TMDL Basin Plan Amendment and is therefore not subject to any applicable waste load allocations or regulatory actions based on the TMDL Basin Plan Amendment. Due to the relatively low volume of treatment plant effluent within the combined discharge, degradation to the receiving water is not anticipated.

3.5. Other Plans, Polices and Regulations

3.5.1. CWA Section 316(b) – Impingement and Entrainment

CWA section 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the Best Technology Available (BTA) for minimizing adverse environmental impacts related to entrainment (drawing organisms into the cooling water system) and impingement (trapping organisms against the intake screens).

On May 4, 2010, the State Water Board adopted a Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once-Through Cooling or OTC Policy). The administrative record for the OTC Policy was approved by the Office of Administrative Law (OAL) on September 27, 2010. The OTC Policy became effective on October 1, 2010.

The OTC Policy establishes technology-based standards to implement federal CWA section 316(b) and reduce the harmful effects associated with cooling water intake structures on marine and estuarine life. The OTC Policy applies to existing power plants that currently have the ability to withdraw water from the State's coastal and estuarine waters using a single-pass system, also known as once-through cooling. Closed-cycle wet cooling has been selected as the BTA.

As stated in section 2 of this Fact Sheet, the cooling water intake structures are still in place and in use. Although the ocean water is no longer used for "one-through cooling", the ocean water intake structures are needed for ongoing operation of ocean water/saltwater pumps to move wastewater discharges through the offshore pipelines.

The Policy requires compliance under two alternatives:

- Track 1, where an owner or operator of an existing power plant must reduce intake flow rate at each unit, at a minimum, to a level commensurate with that which can be attained by a closed-cycle wet cooling system. A minimum 93 percent reduction in intake flow rate for each unit is required for Track 1 compliance, compared to the unit's design intake flow rate. The through-screen intake velocity must not exceed 0.5 foot per second. The installation of closed cycle dry cooling systems meets the intent and minimum reduction requirements of this compliance alternative, or
- Track 2, where an owner or operator of an existing power plant demonstrates to the State Water Board's satisfaction that compliance with Track 1 is not feasible, the owner or operator of an existing power plant must reduce impingement mortality and entrainment of marine life for the facility, on a unit-by-unit basis, to a comparable level to that which would be achieved under Track 1, using operational or structural controls, or both.

The State Water Board previously required the Discharger to perform special studies specified in section 3.D.(1) of the OTC Policy. By letter dated January 9, 2015, the State Water Board waived the requirement to perform the special

studies given the decision to permanently shut down the Facility and to immediately reduce intake flows by approximately 96 percent.

3.5.2. **Storm Water.** As stated in section 2.1.3 of this Fact Sheet, the Facility has a SWPPP that was prepared in compliance with the Construction General Permit.

3.5.3. **United States Nuclear Regulatory Commission.** Section 301 of the CWA establishes a broad prohibition against the discharge of pollutants except in compliance with the CWA's permit requirements; and section 502 of the CWA defines "pollutant" to include, among other things, radioactive materials [33 U.S.C. 1362 (6)]. The USEPA, which implements the CWA's prohibition on unauthorized discharges, requires a permit for every discharge of pollutants from a point source to waters of the United States through the NPDES permit program. In its implementing regulations for the NPDES Program (40 CFR part 122), the USEPA also defines "pollutant" in 40 CFR section 122.2 to include radioactive materials, but expressly excludes radioactive materials that are regulated under the Atomic Energy Act (AEA) of 1954. Radioactive materials covered by the AEA are those encompassed in its definition of source, byproduct, or special nuclear materials. The difference in the mandate of the CWA and the USEPA's implementing procedures in 40 CFR part 122 regarding the regulation of radioactive materials by the NPDES program was addressed by the U. S. Supreme Court in 1976, when citizens groups, concerned about potential discharges of radioactive effluents from nuclear facilities in Colorado, sought clarification of the definition of "pollutant." The U.S. Supreme Court found that since the first AEA was passed, control over the production and use of atomic energy has rested with the Atomic Energy Commission, which became the USNRC in 1972. The AEA gives authority to the USNRC to regulate three types of radioactive materials: (1) source material, (2) special nuclear material, and (3) byproduct material. Production of atomic energy for industrial and commercial purposes may be undertaken only in accordance with licenses issued by the USNRC, which address potential releases of these nuclear materials into the environment. [*Train v. Colorado Public Interest Research Group, Inc., et al.*, 426 U.S. 1 (1976)] The Court agreed with the USEPA that the USEPA did not have authority to control radioactive materials that are regulated under the AEA through the NPDES permit program. This Order, therefore, does not regulate radioactive materials to the extent that such materials are the responsibility of the USNRC pursuant to the AEA. Radioactive materials associated with the fuel source of a nuclear-powered electrical generating station, like the Facility, are source material, special nuclear material, or byproduct material, as defined by the AEA, and therefore, not subject to regulation by this Order.

4. Rationale for Effluent Limitations and Discharge Specifications

The federal CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two

principal bases for effluent limitations in the Code of Federal Regulations: 40 CFR section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR section 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where applicable technology-based limitations and standards and WQBELs both result in effluent limitations, the more protective numeric limitation shall be applied.

4.1. Discharge Prohibitions

This Order retains the discharge prohibitions from the previous Order, Order No. R9-2015-0073, as described below. Discharges from the Facility to surface waters in violation of prohibitions contained in this Order are violations of the federal CWA and therefore are subject to third party lawsuits. Discharges from the Facility to land in violation of prohibitions contained in this Order are violations of the Water Code and are not subject to third party lawsuits under the federal CWA because the Water Code does not contain provisions allowing third party lawsuits.

4.1.1. Order No. R9-2015-0073 contained Discharge Prohibition III.A (The discharge of waste in a manner or to a location that has not been specifically described to the San Diego Water Board and for which valid WDRs are not in force are prohibited.). This prohibition is retained in this Order as Discharge Prohibition 3.1.

4.1.2. Order No. R9-2015-0073 contained Discharge Prohibition III.B (The discharge of oil or any residuary product of petroleum to waters of the state, except in accordance with waste discharge requirements or other provisions of division 7 of the Water Code, is prohibited.). This prohibition is retained in this Order as Discharge Prohibition 3.2.

4.1.3. Order No. R9-2015-0073 contained Discharge Prohibition III.C (The discharge of polychlorinated biphenyl (PCB) compounds, such as those commonly used for transformer fluid, is prohibited.). This prohibition is retained in this Order as Discharge Prohibition 3.3 and is a restatement of the applicable effluent limitations guidelines for steam electric power plants at 40 CFR section 423.13(a). (Refer to section 4.2.2.2.2.1., National Effluent Limitation Guidelines and Standards, of this Fact Sheet for more information)

4.1.4. Order No. R9-2015-0073 contained Discharge Prohibition III.D (The total combined discharge of wastewater, through Discharge Point No. 002 and Discharge Point No. 003, in excess of 56.3 million gallons per day (MGD) is prohibited.). This prohibition is retained in this Order as Discharge Prohibition 3.4 but updated from Order No. R9-2015-0073 to reflect the maximum possible discharge from the Facility to Discharge Point No. 002 as described by the Discharger's ROWD.

4.1.5. Order No. R9-2015-0073 contained Discharge Prohibition III.E (The discharge of total residual oxidants that are used to control fouling within the main condenser cooling system, such as chlorine or bromine, is prohibited though either

discharge point for more than two hours per day unless the Discharger has demonstrated to the San Diego Water Board Executive Officer's satisfaction in advance of the discharge that a discharge lasting for more than two hours is required for macroinvertebrate control.). This prohibition is a restatement of the applicable effluent limitations guidelines for steam electric power plants at 40 CFR section 423.13(b)(2). This prohibition is retained in this Order as Discharge Prohibition 3.5 but was modified to include applicable effluent limitations guidelines for steam electric power plants at 40 CFR sections 423.12(b)(8) and 423.13(b)(2). (Refer to sections 4.2.2.2.1.4. and 4.2.2.2.2.3. National Effluent Limitation Guidelines and Standards, of this Fact Sheet for more information).

4.1.6. This section was removed per Amending Order No. R9-2025-0002.

4.1.7. Order No. R9-2015-0073 contained Discharge Prohibition III.G (The discharge of wastewater not in compliance with the Discharge Prohibitions contained in chapter 4 of the Basin Plan, incorporated in this Order as if fully set forth herein and summarized in Attachment G, is prohibited.). This prohibition requires the discharger to comply with the Discharge Prohibitions of the Basin Plan. This prohibition is retained in this Order as Discharge Prohibition 3.7.

4.1.8. Order No. R9-2015-0073 contained Discharge Prohibition III.H (The discharge of wastewater not in compliance with the Discharge Prohibitions contained in the Water Quality Control Plan - Ocean Waters of California 2012 (Ocean Plan), incorporated in this Order as if fully set forth herein and summarized in Attachment G, is prohibited.). This prohibition is required by the Ocean Plan which specifies the plan is applicable in its entirety to point source discharges to the ocean. This prohibition is retained in this Order as Discharge Prohibition 3.8 but updated to reference the most recent Ocean Plan.

4.1.9. Order No. R9-2015-0073 contained Discharge Prohibition III.I (The discharge shall not cause a violation of any applicable water quality standards for receiving waters adopted by the San Diego Water Board or the State Water Board as required by the federal CWA and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to section 303 of the federal CWA, and amendments thereto, the San Diego Water Board will revise and modify this Order in accordance with such more stringent standards.) Section V, Receiving Water Limitations covers the obligation to not violate water quality standards. Thus, this prohibition was not retained in this Order.

4.2. Technology-Based Effluent Limitations

4.2.1. Scope and Authority

Section 301(b) of the federal CWA and implementing USEPA permit regulations at 40 CFR section 122.44 require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based

requirements based on Effluent Limitations Guidelines and Standards for the Steam Electric Point Source Category in 40 CFR part 423.

The CWA requires that technology-based effluent limitations are established based on several levels of controls:

- Best practicable treatment control technology (BPT) represents the average of the best existing performance by well-operated facilities within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants.
- Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.
- Best conventional pollutant control technology (BCT) represents the control from existing industrial point sources of conventional pollutants including BOD, TSS, fecal coliform, pH, and oil and grease. The BCT standard is established after considering a two-part reasonableness test. The first test compares the relationship between the costs of attaining a reduction in effluent discharge and the resulting benefits. The second test examines the cost and level of reduction of pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources. Effluent limitations must be reasonable under both tests.
- New source performance standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

The CWA requires USEPA to develop Effluent Limitation Guidelines (ELGs) representing application of BPT, BAT, BCT, and NSPS. Section 402(a)(1) of the CWA and 40 CFR section 125.3 authorize the use of best professional judgment (BPJ) to derive technology-based effluent limitations on a case-by-case basis where ELGs are not available for certain industrial categories and/or pollutants of concern. Where BPJ is used, the Water Board must consider specific factors outlined in 40 CFR section 125.3.

4.2.2. Applicable Technology-Based Effluent Limitations

4.2.2.1. This section was removed per Amending Order No. R9-2025-0002.

Table F-10. This Table was removed per Amending Order No. R9-2025-0002.

4.2.2.2. **National Effluent Limitation Guidelines and Standards.** Pursuant to section 306(b)(1) of the CWA, USEPA has established standards of performance for the steam electric power point source category (40 CFR section 423.10). Standards of performance for existing facilities (instead of new source performance standards) are applicable to all units of the Facility because their

construction was completed or commenced prior to publication of regulations on November 19, 1982, which proposed standards of performance for the industry. The following are applicable technology-based standards of performance (BPT and BAT) applicable to the Facility based on the ELGs for existing sources at 40 CFR part 423. The guidelines do not include standards of performance based on BCT.

4.2.2.2.1. **Standards of Performance Based on BPT**

4.2.2.2.1.1. The pH of all discharges, except once-through cooling water, shall be within the range of 6.0 – 9.0 [40 CFR section 423.12(b)(1)]. Refer to Table 3 of this Order.

4.2.2.2.1.2. Low-volume wastes are defined as those wastewater sources for which specific limitations are not established by the ELGs at 40 CFR part 423. The quantity of pollutants discharged from low-volume waste sources shall not exceed the mass quantity determined by multiplying the flow of the low-volume waste sources times the concentration as specified in Table F-11 [40 CFR section 423.12(b)(3)].

Table F-11. Effluent Limitation Guidelines for Low-volume Waste

Pollutant	Daily Maximum (mg/L)	30 Day Average (mg/L)
TSS	100	30
Oil and Grease	20	15

At the permitting authority's discretion, the quantity of pollutant allowed to be discharged may be expressed as concentration-based limitations instead of the mass-based limitations required above. [40 CFR section 423.12(b)(12)]. Section 122.45(f)(2) of 40 CFR allows pollutants that are limited in terms of mass to additionally be limited in terms of other units of measurement. This Order includes effluent limitations expressed in terms of mass and concentration.

The previous Orders (Order Nos. R9-2005-0005, R9-2005-0006, and R9-2015-0073) established mass-based and concentration-based limitations to the combined low-volume waste stream. Order No. R9-2015-0073 calculated the mass-based limitations using a flow rate of 12.8 MGD. This Order uses the reduced flow rate of 11.878 MGD (for more information, see section 2.1.8. of this Fact Sheet) to calculate the mass-based limitations.

The previous Orders also established concentration-based limitations to the individual low-volume waste stream due to the changing flow-volumes. These limitations were carried over to this Order.

Refer to Tables 3 and 4 of this Order.

4.2.2.2.1.3. Order No. R9-2015-0073 contained ELGs for metal cleaning wastes. As stated in section 2 of this Fact Sheet, metal cleaning has been discontinued.

Thus, ELGs for metal cleaning waste has not been carried over from Order No. R9-2015-0073. [40 CFR section 423.12(b)(5)]

4.2.2.2.1.4. Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator or State, if the State has NPDES permit issuing authority, that the units in a particular location cannot operate at or below this level or chlorination. [40 CFR section 423.12(b)(8)] (Refer to section 4.1.5., Discharge Prohibitions, of this Fact Sheet.)

4.2.2.2.2. **Standards of Performance Based on BAT**

4.2.2.2.2.1. There shall be no discharge of PCB compounds such as those commonly used for transformer fluid [40 CFR section 423.13(a)]. (Refer to section 4.1.3., Discharge Prohibitions, of this Fact Sheet.)

4.2.2.2.2.2. The quantity of pollutants discharged in once-through cooling water from the discharge point shall not exceed the quantity determined by multiplying the flow of once-through cooling water from the discharge point times the concentration as specified below. [40 CFR section 423.13(b)(1)]. Refer to Table 5, footnote 3 of this Order.

Table F-12. Effluent Limitation Guidelines for Low-volume Waste

Pollutant	Maximum concentration (mg/L)
Total Residual Chlorine	0.20

4.2.2.2.2.3. Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the Discharger demonstrates to the permitting authority that discharge for more than two hours per day is required for macroinvertebrate control [40 CFR section 423.13(b)(2)]. The duration of each chlorination cycle shall not exceed 25 minutes. (See section 4.1.5., Discharge Prohibitions, of this Fact Sheet.)

4.3. Water Quality-Based Effluent Limitations (WQBELs)

4.3.1. Scope and Authority

Federal CWA section 301(b) and 40 CFR section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards.

Section 122.44(d)(1)(i) of 40 CFR requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using: (1) USEPA criteria guidance under the federal CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator

parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed State criterion or policy interpreting the State's narrative criterion, supplemented with other relevant information, as provided in 40 CFR section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan and Ocean Plan and achieve applicable water quality objectives and criteria that are contained in other State plans and policies, or any applicable water quality criteria contained in the Ocean Plan.

4.3.2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan and Ocean Plan designate beneficial uses, establish water quality objectives, and contain implementation programs and policies to achieve those objectives for ocean waters.

4.3.2.1. **Basin Plan.** The beneficial uses specified in the Basin Plan applicable to the Pacific Ocean are summarized in section 3.3.1 of this Fact Sheet.

The Basin Plan water quality objective for dissolved oxygen applicable to ocean waters is stated as follows: "The dissolved oxygen concentration in ocean waters shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials." (Basin Plan (2021), p.3-11.)

The Basin Plan states, "The pH value shall not be changed at any time more than 0.2 pH units from that which occurs naturally." (Basin Plan (2021), p. 3-11.)

4.3.2.2. **Ocean Plan.** The beneficial uses specified in the Ocean Plan for the Pacific Ocean are summarized in section 3.3.2 of this Fact Sheet. The Ocean Plan also includes water quality objectives for the ocean receiving water for bacterial characteristics, physical characteristics, chemical characteristics, biological characteristics, and radioactivity.

Table 3 of the Ocean Plan includes the following water quality objectives for toxic pollutants and whole effluent toxicity (WET):

- Six-month median, daily maximum, and instantaneous maximum objectives for 19 chemicals and chemical characteristics, including total chlorine residual, for the protection of marine aquatic life.
- 30-day average objectives for 20 non-carcinogenic chemicals for the protection of human health. These have been applied as AMELs.
- 30-day average objectives for 42 carcinogenic chemicals for the protection of human health. These have been applied as AMELs.
- Daily maximum objectives for acute and chronic toxicity.

4.3.2.3. **Thermal Plan.** The Thermal Plan establishes water quality objectives for discharges of Thermal and Elevated Temperature Waste to Coastal and Interstate Waters and Enclosed Bays and Estuaries. Thermal waste is defined as "Cooling water and industrial process water used for the purpose

of transporting heat." Elevated temperature waste is defined as "Liquid, solid, or gaseous material including thermal waste discharge at a temperature higher than the natural temperature of receiving water. As stated in section 3.3.6., the Thermal Plan does not apply to this Order. As such, effluent limitations for thermal wastes have not been carried over to this Order.

4.3.3. Determining the Need for WQBELs

Consistent with Order No. R9-2015-0073, this Order follows the special procedures in section III.C.8.d. of the Ocean Plan for Powerplants and Heat Exchange Dischargers for determining compliance with Table 3 objectives of the Ocean Plan. Effluent concentration values (Ce) shall be determined through the use of equation 1 in the Ocean Plan considering the minimal probable initial dilution of the combined effluent (in-plant waste streams plus ocean water). These concentration values shall then be converted to mass emission limitations as indicated in equation 3 of the Ocean Plan. The mass emission limits will then serve as requirements applied to all in-plant waste streams (known as "low volume waste sources" in 40 CFR part 423) taken together which discharge into the ocean water flow, except that limits for total chlorine residual, acute (if applicable per section (3)(c)) and chronic toxicity, and instantaneous maximum concentrations in Table 3 of the Ocean Plan shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table 3 objective for radioactivity in the Ocean Plan shall apply to the undiluted combined final effluent.

Pursuant to 40 CFR 423.11(b), "The term low volume waste sources means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations or standards are otherwise established in this part. Low volume waste sources include, but are not limited to, the following: Wastewaters from ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, recirculating house service water systems, and wet scrubber air pollution control systems whose primary purpose is particulate removal. Sanitary wastes, air conditioning wastes, and wastewater from carbon capture or sequestration systems are not included in this definition." In this Order, the low volume waste sources are described in sections 2.1.2. through 2.1.6. of this Fact Sheet.

The San Diego Water Board evaluated the need for effluent limitations for non-conventional and toxic pollutant parameters, based on water quality objectives in Table 3 of the Ocean Plan. The evaluation was performed in accordance with 40 CFR section 122.44(d) and guidance for statistically determining the "reasonable potential" for a discharged pollutant to exceed an objective, as outlined in the revised *Technical Support Document for Water Quality-based Toxics Control* (TSD; EPA/505/2-90-001, 1991) and the Ocean Plan Reasonable Potential Analysis (RPA) Amendment that was adopted by the State Water Board on April 21, 2005. The statistical approach combines knowledge of effluent variability (as estimated by a coefficient of variation) with

the uncertainty due to a limited amount of effluent data to estimate a maximum effluent value at a high level of confidence. This estimated maximum effluent value is based on a lognormal distribution of daily effluent values. Projected receiving water values (based on the estimated maximum effluent value or the reported maximum effluent value and minimum probable initial dilution) can then be compared to the appropriate objective to determine potential for an exceedance of that objective and the need for an effluent limitation. According to the Ocean Plan amendment, the RPA can yield three endpoints: 1) Endpoint 1, an effluent limitation is required and monitoring is required; 2) Endpoint 2, an effluent limitation is not required and the San Diego Water Board may require monitoring; and 3) Endpoint 3, the RPA is inconclusive, monitoring is required, and an existing effluent limitation may be retained or a permit reopener clause may be included to allow inclusion of an effluent limitation if future monitoring warrants the inclusion. Endpoint 3 is typically the result when there are fewer than 16 data points and all are censored data (i.e., below quantitation or method detection levels (MDLs) for an analytical procedure).

The implementation provisions for Table 3 of the Ocean Plan specify that the minimum probable initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates are to be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial dilution process, flow across the discharge structure. Before establishing a dilution credit for a discharge, it must first be determined if, and how much, receiving water is available to dilute the discharge.

The minimum initial dilution factor (Dm) determined for use in the previous Order, Order No. R9-2015-0073, was 10 to 1. This 10 to 1 dilution factor has been used for the discharges from this Facility since 1989. There is no information or study available to indicate that the Dm of 10 to 1 based on the 1989 analysis of dilution is no longer valid in the vicinity of the discharge. Therefore, the Dm of 10 to 1 will be retained from Order No. R9-2015-0073 and applied to WQBELs established herein.

Conventional pollutants were not considered as part of the RPA. TBELs for these pollutants are included in this Order as described in section 4.2 of this Fact Sheet.

Using the RPcalc 2.0 software tool developed by the State Water Board for conducting RPAs, the San Diego Water Board has conducted the RPA for the combined low-volume waste stream compliance point (e.g., miscellaneous discharge) at Monitoring Location INT-002 in Table F-13 below and for the ocean outfall Discharge Point No. 002 at Monitoring Location EFF-002 in Table F-14 below. A narrative limit statement to comply with all Ocean Plan objectives requirements is provided for any parameters not displaying reasonable potential. The Discharger is required to monitor for these constituents as stated in the Monitoring and Reporting Program (MRP, Attachment E) of this Order to gather data for use in RPAs for future permit reissuances.

Effluent data provided in the Discharger's monitoring reports for the Facility's combined low-volume waste stream compliance point (e.g., miscellaneous discharge) at Monitoring Location INT-002 from 2017 to 2021, appear to be representative of the current combined low-volume waste stream discharge and were used in the RPA (data obtained on December 13, 2022). A minimum probable initial dilution of 10:1 was considered in this evaluation.

A summary of the RPA results is provided in Table F-13:

Table F-13. RPA Results Summary, Combined Low-Volume Waste Stream (Monitoring Location INT-002)

Parameter	Units	N[1]	MEC[2,3]	Most Stringent Criteria	Background	RPA Endpoint[4]
Arsenic	µg/L	5	2.17	8[5]	3[6]	2
Cadmium, Total Recoverable	µg/L	5	0.11	1[5]	0	3
Chromium (hexavalent), Total Recoverable	µg/L	5	1.1	2[5]	0	2
Copper, Total Recoverable	µg/L	5	10.2	3[5]	2[6]	1
Lead, Total Recoverable	µg/L	5	0.45	2[5]	0	3
Mercury, Total Recoverable	µg/L	5	<0.02	0.04[5]	0.0005[6]	3
Nickel, Total Recoverable	µg/L	5	12.9	5[5]	0	1
Selenium, Total Recoverable	µg/L	5	16.8	15[5]	0	1
Silver, Total Recoverable	µg/L	5	<0.28	0.7[5]	0.16[6]	3
Zinc, Total Recoverable	µg/L	12	161	20[5]	8[6]	1
Cyanide	µg/L	5	13	1[5]	0	1
Ammonia	µg/L	5	1050	600[5]	0	1
Phenolic Compounds	µg/L	5	<0.99	30[5]	0	3
Chlorinated Phenolics	µg/L	5	<0.74	1[5]	0	3
Endosulfan	µg/L	5	0.12	0.009[5]	0	1
Endrin	µg/L	12	<0.0007	0.002[5]	0	3
HCH	µg/L	5	<0.0038	0.004[5]	0	3
Acrolein	µg/L	5	<0.89	220[7]	0	3
Antimony	µg/L	5	5.97	1,200[7]	0	2
Bis (2-chloroethoxyl) methane	µg/L	5	<0.059	4.4[7]	0	3
Bis(2-chloroisopropyl)ether	µg/L	5	<0.041	1,200[7]	0	3
Chlorobenzene	µg/L	5	<0.21	570[7]	0	3
Chromium (III), Total Recoverable	µg/L	5	1.32	190,000[7]	0	3
Di-n-butyl phthalate	µg/L	5	<0.068	3,500[7]	0	3
Dichlorobenzenes	µg/L	5	<0.18	5,100[7]	0	3
Diethyl phthalate	µg/L	5	<0.095	33,000[7]	0	3

Parameter	Units	N[1]	MEC[2,3]	Most Stringent Criteria	Background	RPA Endpoint[4]
Dimethyl phthalate	µg/L	5	<0.063	820,000[7]	0	3
4,6-Dinitro-2-methylphenol	µg/L	5	<0.86	220[7]	0	3
2,4-Dinitrophenol	µg/L	5	<0.97	4[7]	0	3
Ethylbenzene	µg/L	5	<0.14	4,100[7]	0	3
Fluoranthene	µg/L	5	<0.043	15[7]	0	3
Hexachlorocyclopentadiene	µg/L	5	<0.034	58[7]	0	3
Nitrobenzene	µg/L	5	<0.064	4.9[7]	0	3
Thallium, Total Recoverable	µg/L	5	<0.18	2[7]	0	3
Toluene	µg/L	5	<0.077	85,000[7]	0	3
Tributyltin	µg/L	5	0.003	0.0014[7]	0	3
1,1,1-Trichloroethane	µg/L	5	<0.094	540,000[7]	0	3
Acrylonitrile	µg/L	5	<0.83	0.1[7]	0	3
Aldrin	µg/L	5	<0.0007	0.000022[7]	0	3
Benzene	µg/L	5	<0.13	5.9[7]	0	3
Benzidine	µg/L	5	<0.74	0.000069[7]	0	3
Beryllium, Total Recoverable	µg/L	5	<0.033	0.033[7]	0	3
Bis(2-chloroethyl) ether	µg/L	5	<0.038	0.045[7]	0	3
Bis(2-ethylhexyl) phthalate	µg/L	5	<0.86	3.5[7]	0	3
Carbon tetrachloride	µg/L	5	<0.2	0.9[7]	0	3
Chlordane	µg/L	5	<0.0048	0.000023[7]	0	3
Chlorodibromomethane	µg/L	5	<0.089	8.6[7]	0	3
Chloroform	µg/L	5	<0.18	130[7]	0	3
DDT	µg/L	3	<0.0083	0.00017[7]	0	3
1,4-Dichlorobenzene	µg/L	5	<0.24	18[7]	0	3
3,3-Dichlorobenzidine	µg/L	5	<1.2	0.0081[7]	0	3
1,2-Dichloroethane	µg/L	5	<0.22	28[7]	0	3
1,1-Dichloroethylene	µg/L	5	<0.07	0.9[7]	0	3
Dichlorobromomethane	µg/L	5	<0.084	6.2[7]	0	3
Dichloromethane (Methylene Chloride)	µg/L	5	<0.19	450[7]	0	3
1,3-Dichloropropene (1,3-dichloropropylene)	µg/L	2	<0.2	8.9[7]	0	3
Dieldrin	µg/L	5	<0.0005	0.00004[7]	0	3
2,4-Dinitrotoluene	µg/L	5	<0.029	2.6[7]	0	3
1,2-Diphenylhydrazine	µg/L	5	<0.045	0.16[7]	0	3
Halomethanes	µg/L	5	<0.67	130[7]	0	3
Heptachlor	µg/L	5	<0.0007	0.00005[7]	0	3
Heptachlor Epoxide	µg/L	5	<0.0004	0.00002[7]	0	3
Hexachlorobenzene	µg/L	5	<0.0012	0.00021[7]	0	3
Hexachlorobutadiene	µg/L	5	<0.051	14[7]	0	3

Parameter	Units	N[1]	MEC[2,3]	Most Stringent Criteria	Background	RPA Endpoint[4]
Hexachloroethane	µg/L	5	<0.052	2.5[7]	0	3
Isophorone	µg/L	5	<0.053	730[7]	0	3
N-nitrosodimethylamine	µg/L	3	<0.13	7.3[7]	0	3
N-nitrosodi-N-propylamine	µg/L	3	<0.034	0.38[7]	0	3
N-nitrosodiphenylamine	µg/L	5	<0.046	2.5[7]	0	3
PAHs	µg/L	5	<0.053	0.0088[7]	0	3
PCBs	µg/L	5	<0.039	0.000019[7]	0	3
TCDD equivalents	µg/L	5	9.6E-08	3.9E-09[7]	0	3
1,1,2,2-Tetrachloroethane	µg/L	5	<0.064	2.3[7]	0	3
Tetrachloroethylene (Tetrachloroethene)	µg/L	5	<0.25	2[7]	0	3
Toxaphene	µg/L	5	<0.013	0.00021[7]	0	3
Trichloroethylene (Trichloroethene)	µg/L	5	<0.16	27[7]	0	3
1,1,2-Trichloroethane	µg/L	5	<0.12	9.4[7]	0	3
2,4,6-Trichlorophenol	µg/L	5	<0.035	0.29[7]	0	3
Vinyl Chloride	µg/L	5	<0.14	36[7]	0	3

Notes for Table F-13

1. Number of data points available for the RPA.
2. If there is a detected value, the highest reported value is summarized in the table. If there are no detected values, the lowest MDL is summarized in the table.
3. Note that the reported Maximum Effluent Concentration (MEC) does not account for dilution. The RPA does account for dilution; therefore, it is possible for a parameter with an MEC in exceedance of the most stringent criteria not to present a reasonable potential (i.e., Endpoint 2).
4. End Point 1 – Reasonable potential determined, limit required, monitoring required.
   End Point 2 – Discharge determined not to have reasonable potential; monitoring may be established.
   End Point 3 – RPA was inconclusive, carry over previous limitations if applicable, and establish monitoring.
5. Based on the six-Month Median in the Table 3 of the Ocean Plan.
6. Background concentrations contained in Table 5 of the Ocean Plan.
7. Based on the 30-Day Average in Table 3 of the Ocean Plan.

Endpoint 1

Reasonable potential to cause or contribute to an exceedance of water quality objectives contained within the Ocean Plan (i.e., Endpoint 1) was determined for copper, nickel, selenium, zinc, cyanide, ammonia, and endosulfan. Effluent limitations have been retained in this Order from the previous Order, Order No. R9-2015-0073 for copper, selenium, zinc, cyanide, ammonia, and endosulfan. The RPA for the previous Order, Order

No. R9-2015-0073, resulted in endpoint 2 for nickel and the removal of effluent limitations for nickel in Order No. R9-2015-0073. This Order adds the effluent limitations for nickel.

Endpoint 2

Endpoint 2 was determined for arsenic, chromium (hexavalent), and antimony. The effluent limitations for these parameters can be removed; however, monitoring will still be required to determine if an effluent limitation is required in the future.

Endpoint 3

For parameters for which Endpoint 3 was concluded, reasonable potential was inconclusive. For parameters for which Endpoint 3 was concluded and previous effluent limitations had been established in Order No. R9-2015-0073, effluent limitations have been retained in this Order. The RPA for the previous Order, Order No. R9-2015-0073, resulted in endpoint 2 for nickel and lead and the removal of effluent limitations for nickel and lead in Order No. R9-2015-0073. As stated above, Order No. R9-2015-0073 did not contain any performance goals.

Effluent data provided in the Discharger's monitoring reports for the Facility's final discharge to the ocean at Discharge Point No. 002 (Monitoring Location EFF-002) from September 2016 to September 2022, appear to be representative of the current discharge and were used in the RPA (data obtained on December 13, 2022). From February 1, 2016, to June 9, 2016, low-volume waste steam discharges could flow to either Discharge Point No. 002 or 003. On June 10, 2016, flows ceased to Discharge Point No. 003 and total flows from the Facility dropped from approximately 45 MGD to approximately 22 MGD, averaging 14 MGD in the past year from August 2021 to July 2022. Thus, data from February 2016 to June 2016 were not used in this RPA. A minimum probable initial dilution of 10:1 was considered in this evaluation.

A summary of the RPA results is provided in Table F-14:

Table F-14. RPA Results Summary, Final Effluent (Monitoring Location EFF-002)

Parameter	Units	N[1]	MEC[2,3]	Most Stringent Criteria	Background	RPA Endpoint[4]
Arsenic	µg/L	12	61.1	8[5]	3[6]	1
Cadmium, Total Recoverable	µg/L	12	<0.2	1[5]	0	3
Chromium (hexavalent), Total Recoverable	µg/L	12	<0.005	2[5]	0	3
Copper, Total Recoverable	µg/L	12	32	3[5]	2[6]	1
Lead, Total Recoverable	µg/L	12	3.06	2[5]	0	3
Mercury, Total Recoverable	µg/L	12	<0.01	0.04[5]	0.0005[6]	3
Nickel, Total Recoverable	µg/L	12	13.2	5[5]	0	2

Parameter	Units	N[1]	MEC[2,3]	Most Stringent Criteria	Background	RPA Endpoint[4]
Selenium, Total Recoverable	µg/L	12	284	15[5]	0	1
Silver, Total Recoverable	µg/L	12	10.2	0.7[5]	0.16[6]	1
Zinc, Total Recoverable	µg/L	12	53.2	20[5]	8[6]	2
Cyanide	µg/L	12	2.53	1[5]	0	3
Total Chlorine Residual	µg/L	--[7]	--[7]	2[5]	0	3[7]
Ammonia	µg/L	12	7250	600[5]	0	1
Acute Toxicity	TUa	N/A[8]	N/A[8]	0.3[9]	0	N/A[8]
Chronic Toxicity	Pass/Fail	22	"pass"	1[9]	0	2
Phenolic Compounds	µg/L	13	<0.97	30[5]	0	3
Chlorinated Phenolics	µg/L	12	<0.28	1[5]	0	3
Endosulfan	µg/L	12	<0.0007	0.009[5]	0	3
Endrin	µg/L	12	<0.0007	0.002[5]	0	3
HCH	µg/L	7	0.0055	0.004[5]	0	3

Notes for Table F-14

1. Number of data points available for the RPA.
2. If there is a detected value, the highest reported value is summarized in the table. If there are no detected values, the lowest MDL is summarized in the table.
3. Note that the reported MEC does not account for dilution. The RPA does account for dilution; therefore, it is possible for a parameter with an MEC in exceedance of the most stringent criteria not to present a reasonable potential (i.e., Endpoint 2).
4. End Point 1 – Reasonable potential determined, limit required, monitoring required.
   End Point 2 – Discharge determined not to have reasonable potential; monitoring may be established.
   End Point 3 – RPA was inconclusive, carry over previous limitations if applicable, and establish monitoring.
5. Based on the six-Month Median in the Table 3 of the Ocean Plan.
6. Background concentrations contained in Table 5 of the Ocean Plan.
7. Order No. R9-2015-0073 stated, "Monitoring for Total Residual Chlorine is only required if the Facility is chlorinating their discharge." Insufficient data provided to evaluate RPA for chlorine. All data reported as zero usually with the comment "No sample taken, no chlorination since August 2013".
8. Order No. R9-2015-0073 did not contain effluent limitations, performance goals, or effluent monitoring for acute toxicity.
9. Based on the Daily Maximum in Table 3 of the Ocean Plan.

Endpoint 1

Reasonable potential to cause or contribute to an exceedance of water quality objectives contained within the Ocean Plan (i.e., Endpoint 1) was determined for arsenic, copper, selenium, silver, and ammonia and effluent limitations have been retained in this Order from the previous Order, Order No. R9-2015-0073.

Endpoint 2

Endpoint 2 was determined for nickel, zinc, and chronic toxicity. The effluent limitations for nickel and zinc can be removed; however, monitoring will still be required to determine if an effluent limitation is required in the future. For chronic toxicity, this Order retains the final effluent limitations for chronic toxicity based on best professional judgement. There is a possibility of synergistic effects from the former nuclear power plant to contribute to chronic toxicity.

Endpoint 3

For parameters for which Endpoint 3 was concluded, reasonable potential was inconclusive. For parameters for which Endpoint 3 was concluded and previous effluent limitations had been established in Order No. R9-2015-0073, effluent limitations have been retained in this Order. As stated above, Order No. R9-2015-0073 did not contain any performance goals.

Bacterial Indicators

This Order does not include effluent limitations for bacterial indicators for the following reasons:

- Discharge Point No. 002 is located 5,888 feet offshore at a depth of 39 feet.
- The minimum probable dilution factor is 10:1.
- The San Diego Water Board is not aware of any shellfish harvesting within Discharge Point No. 002.
- The reported daily discharge from the NIA Sewage Treatment Plant is 0.03 MGD or less, a small fraction of the total discharge. Also, by letter dated April 2, 2024, the Discharger confirmed that it closed the NIA Sewage Treatment Plant on March 28, 2024, and no longer discharges treated domestic wastewater to the Pacific Ocean through the SONGS Unit 2 diffuser.

The MRP (Attachment E) is designed to obtain additional information for these constituents to determine if reasonable potential exists for these constituents in future permit renewals and/or updates.

4.3.4. WQBEL Calculations

4.3.4.1. From the Table 3 water quality objectives of the Ocean Plan, effluent limitations are calculated according to the following equation for all pollutants, except for acute toxicity (if applicable) and radioactivity:

Ce = Co + Dm (Co – Cs) where,
Ce = the effluent limitation (µg/L)
Co = the water quality objective to be met at the completion of initial dilution (µg/L)
Cs = background seawater concentration
Dm = minimum probable initial dilution expressed as parts seawater per part wastewater

4.3.4.2. As discussed in section 4.3.3 above, this Order carries over the Dm of 10:1 from the previous Order, Order No. R9-2015-0073.

4.3.4.3. Table 5 of the Ocean Plan establishes background concentrations for some pollutants to be used when determining reasonable potential (represented as "Cs"). In accordance with Table 3 implementing procedures of the Ocean Plan, Cs equals zero for all pollutants not established in Table 5 of the Ocean Plan. The background concentrations provided in Table 5 of the Ocean Plan are summarized in Table F-15 below:

Table F-15. Pollutants Having Background Concentrations

Pollutant	Background Seawater Concentration
Arsenic	3 µg/L
Copper, Total Recoverable	2 µg/L
Mercury, Total Recoverable	0.0005 µg/L
Silver, Total Recoverable	0.16 µg/L
Zinc, Total Recoverable	8 µg/L

4.3.4.4. As an example, effluent limitations for total chlorine residual were determined as follows.

Water quality objectives from the Ocean Plan for total chlorine residual are:

Table F-16. Example Parameter Water Quality Objectives

Parameter	Units	Six-Month Median	Daily Maximum	Instantaneous Maximum
Total Chlorine Residual	µg/L	2	8	60

Using the equation from section 4.3.4.1., effluent limitations are calculated as follows for total chlorine residual.

Ce = 2 + 10 (2 – 0) = 22 (six-Month Median)
Ce = 8 + 10 (8 – 0) = 88 (Daily Maximum)
Ce = 60 + 10 (60 – 0) = 660 (Instantaneous Maximum)

Based on the implementing procedures described above, effluent limitations have been calculated for Facility discharge.

4.3.4.5. Section 122.45(f)(1) of the 40 CFR requires effluent limitations be expressed in terms of mass, with some exceptions, and 40 CFR section 122.45(f)(2) allows pollutants that are limited in terms of mass to additionally be limited in terms of other units of measurement. However, section III.C.4.j of the Ocean

Plan requires that mass limitations be established for all parameters in Table 3 of the Ocean Plan. This Order includes effluent limitations expressed in terms of mass and concentration. In addition, pursuant to the exceptions to mass limitations provided in 40 CFR section 122.45(f)(1), some effluent limitations are not expressed in terms of mass, such as pH and temperature, and when the applicable standards are expressed in terms of concentration (e.g., California Toxics Rule criteria and maximum contaminant levels) and mass limitations are not necessary to protect the beneficial uses of the receiving water.

Mass-based effluent limitations were calculated using the following equation:

$$MER = 8.34 \, x \, Q \, x \, C$$

where MER is in lbs/day, 8.34 is a conversion factor, Q is the permitted flow in MGD, and C is the pollutant concentration in mg/L.

4.3.4.6. As stated in section 4.3.3. of this Fact Sheet, consistent with section III.C.8.d. of the Ocean Plan, the mass emission limitations based on the water quality objectives from Table 3 of the Ocean Plan serve as requirements applied to combined low-volume waste stream (Monitoring Location INT-002), except for total chlorine residual, chronic toxicity, and instantaneous maximum concentrations.

For the internal effluent limitations, combined low-volume waste stream, Order No. R9-2015-0073 calculated the mass-based limitations using a flow rate of 12.8 MGD. This Order uses the reduced flow rate of 11.878 MGD (for more information, see section 2.1.8. of this Fact Sheet) to calculate the mass-based limitations based on the flow rates provided in the Discharger's ROWD.

The WQBELs established in this Order for the low-volume waste sources are contained in section 4.1, Table 3 of this Order.

4.3.4.7. As stated in section 4.3.3. of this Fact Sheet, consistent with section III.C.8.d. of the Ocean Plan, limitations for total chlorine residual, chronic toxicity, and instantaneous maximum concentrations from Table 3 of the Ocean Plan serve as requirements applied to the final effluent (Monitoring Location EFF-002). The previous Order, Order No. R9-2015-0073 included concentration-based effluent limitation for the final effluent, which are carried over to this Order. Consistent with 40 CFR sections 122.45(f)(1) and (2), this Order adds mass emission limitations for the combined final effluent using the flow rate of 42.202 MGD (for more information, see section 2.1.8. of this Fact Sheet).

The WQBELs established in this Order for the combined final effluent are contained in section 4.1, Table 5 of this Order.

4.3.5. Whole Effluent Toxicity (WET)

4.3.5.1. The WET testing protects receiving waters from the aggregate toxic effect of a mixture of pollutants in the effluent.

4.3.5.2. For chronic toxicity, the previous Order, Order No. R9-2015-0073 established a “pass” / “fail” effluent limitation and quarterly monitoring. During the term of Order No. R9-2015-0073, the chronic toxicity results were “pass”. Using the RPA procedures from the Ocean Plan, the effluent does not have reasonable potential to cause an exceedance of the narrative water quality objective for chronic toxicity (i.e., Endpoint 2). However, as stated in section 4.3.3 of this Fact Sheet, this Order retains the effluent limitation for chronic toxicity based on best professional judgement given the possibility of synergistic effects from the former nuclear power plant.

This Order establishes an effluent limitation for chronic toxicity based on the chronic toxicity water quality objective in the 2019 Ocean Plan. The effluent limitation shall be implemented using *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995). Chronic toxicity expressed as

$$TUc = 100 / NOEC$$

where NOEC (No Observed Effect Concentration; also referred to as the No Observed Effect Level or NOEL) is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism.

This Order contains a reopener to require the San Diego Water Board to modify the effluent limitations for toxicity, if necessary, to make it consistent with any new policy, law, or regulation.

4.3.5.3. Order No. R9-2015-0073 did not contain any acute toxicity effluent limitations, performance goals, or monitoring requirements. A chronic toxicity test is conducted over a short or a longer period of time and may measure mortality, reproduction, and growth. A chemical at a low concentration could have chronic effects but no acute effects until the chemical was at a higher concentration. Thus, chronic toxicity is a more stringent requirement than acute toxicity. To ensure the aggregated impacts of pollutants present within the Discharger’s effluent does not result in the presence of toxicity within the receiving water, this Order maintains effluent limitations for chronic toxicity.

4.4. Final Effluent Limitation Considerations

4.4.1. Satisfaction of Anti-Backsliding Requirements

NPDES permits must conform with Anti-backsliding requirements discussed in section 3.3.4 of this Fact Sheet. These Anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be less stringent. This Order complies with all applicable federal and State Anti-backsliding regulations. The effluent limitations in this Order are at least as stringent as the effluent limitations in Order No. R9-2015-0073.

Section 402(o)(2)(B)(i) of the CWA provides an exception to Anti-backsliding requirements when new information is obtained that would have justified the application of a less stringent standard at the time of permit issuance. New data was obtained by the San Diego Water Board since adoption of Order No. R9-2015-0073 that qualifies for this exception.

As stated in section 2.1.7 of this Fact Sheet, metal cleaning effluents that previously discharged to internal outfalls 002-A/003-A (Monitoring Locations INT-002-A / INT-003-A) have been discontinued at the Facility. The Facility notified the San Diego Water Board that this activity was discontinued and will not occur in the future because of the decommissioning of this Facility. Based on this new information, this Order removes the effluent limitations for metal cleaning effluents. As such, removal of this effluent limitation is consistent with the Anti-backsliding requirements of the CWA and federal regulations.

Effluent limitations for arsenic, chromium (hexavalent), and antimony at monitoring location INT-002, and nickel and zinc at monitoring location EFF-002 have been discontinued and are not carried forward in this Order. This is because the RPA conducted using new monitoring data collected during the previous permit term determined that the discharge does not have reasonable potential to cause or contribute to exceedance of water quality objectives. As specified in section 4.3.3. of this Fact Sheet, the RPA for arsenic, chromium (hexavalent), antimony, nickel, and zinc (at the specified outfalls) resulted in endpoint 2 as defined in the Ocean Plan. Endpoint 2 indicates that the parameters do not have reasonable potential to cause or contribute to an exceedance of water quality objectives. In such cases, the Ocean Plan does not require effluent limitations. As such, removal of the effluent limitations for these parameters is consistent with the Anti-backsliding requirements of the CWA because the new information obtained led to a new RPA result.

As stated in section 3.3.6. of this Fact Sheet, the San Diego Water Board has determined that the Thermal Plan no longer applies to this Order. The effluent limitation for residual heat was based on the Thermal Plan. The Facility has informed the San Diego Water Board that it no longer produces heated water and the structures that stored warm waters will be dismantled as part of the decommissioning of the power plant. Based on this new information, the effluent limitation for residual heat no longer applies to this Order and has not been carried over to this Order. As such, removal of this effluent limitation is consistent with the Anti-backsliding requirements of the CWA and federal regulations.

The San Diego Water Board has determined that effluent limitations related to the NIA Sewage Treatment Plant no longer apply to this Order because the NIA Sewage Treatment Plant has been removed permanently as part of SONGS decommissioning. Based on this new information, this effluent limitation no longer applies to this Order and has not been carried over to this Order. As such, removal of this effluent limitation is consistent with the Anti-backsliding requirements of the CWA and federal regulations.

4.4.2. Satisfaction of Antidegradation Policies

The WDRs for the Discharger must conform with antidegradation requirements discussed in section 3.3.3 of this Fact Sheet. The antidegradation policies require that beneficial uses and the water quality necessary to maintain those beneficial uses in the receiving waters of the discharge shall be maintained and protected, and, if existing water quality is better than the quality required to maintain beneficial uses, the existing water quality shall be maintained and protected unless allowing a lowering of water quality is necessary to accommodate important economic and social development or consistent with maximum benefit to the people of California. Based on this Order's requirements, no degradation of the receiving water should occur. As such, this Order complies with the antidegradation provision of 40 CFR section 131.12 and State Water Board Resolution No. 68-16.

This Order does not include WQBELs for arsenic, chromium (hexavalent), and antimony at monitoring location INT-002, and nickel and zinc at monitoring location EFF-002, as the discharge does not have reasonable potential to cause an exceedance of water quality objectives for those parameters at the specified outfalls based on new monitoring data. The removal of effluent limitations by itself should not result in a change to the physical nature of the effluent discharged and should not impact beneficial uses nor cause a reduction of the water quality of the receiving water.

In addition, monitoring is required for Ocean Plan parameters without effluent limitations. The San Diego Water Board may use the monitoring results for arsenic, chromium (hexavalent), and antimony at monitoring location INT-002, and nickel and zinc at monitoring location EFF-002 to determine whether to reopen this Order to add effluent limitations.

This Order does not include a WQBEL for residual heat at monitoring location EFF-002, because as stated in section 3.3.6. of this Fact Sheet, the Facility no longer has the capability to produce heated waters and is undergoing further decommissioning that will remove structures that contained heated water. Removal of this WQBEL should not by itself cause degradation to water quality because the WQBEL was removed in response to the Facility no longer producing heated waters. The Facility will dismantle these structures through decommissioning.

4.4.3. Stringency of Requirements for Individual Pollutants

This Order contains both TBELs and WQBELs for individual pollutants. The TBELs consist of restrictions on TSS, oil and grease, settleable solids, turbidity, pH, total residual chlorine. Restrictions on these pollutants are discussed in section 4.2 of this Fact Sheet. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. These limitations are not more stringent than required by the federal CWA.

WQBELs have been derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. The procedures for calculating the individual WQBELs are based on the Ocean Plan, which was approved by USEPA on February 14, 2006, and has since been further amended. All beneficial uses and water quality objectives contained in the Basin Plan were approved under State law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the federal CWA" pursuant to 40 CFR section 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the federal CWA.

4.5 Discharge Specifications

The Ocean Plan includes section III.A.2, *General Requirements for Management of Waste Discharge to the Ocean*. In section 4.2 of this Order, these requirements are incorporated for the discharge of waste to the ocean from the Facility.

4.6. Land Discharge Specifications – Not Applicable

4.7. Recycling Specifications – Not Applicable

5. Rationale for Receiving Water Limitations

Receiving water limitations of this Order are derived from the water quality objectives for ocean waters established by the Basin Plan and the Ocean Plan.

Prior to 2009, the San Diego Water Board interpreted the Bacterial Characteristics Water-contact Standards of the Ocean Plan to apply only in the zone bounded by the shoreline and a distance 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and within kelp beds. The Ocean Plan provides that these Bacteriological Standards also apply in designated areas outside this zone used for water contact sports, as determined by the Regional Water Boards (i.e., all waters designated with the REC-1 beneficial use). These designated areas must be specifically defined in the Basin Plan. Because the San Diego Water Board has designated the ocean waters with the REC-1 beneficial use in the Basin Plan, the Ocean Plan Bacterial Standards apply throughout State territorial marine waters in the San Diego Region, which extend from surface to bottom, out to three nautical miles from the shoreline. This interpretation has been confirmed by USEPA and added to this Order.

The Ocean Plan Bacteria Standards were amended in February 2019 and include new standards for fecal coliform and enterococci. As a result, this Order includes receiving water limitations for fecal coliform and enterococci based on the 2019 Ocean Plan Bacteria Standards.

6. Rationale for Provisions

6.1. Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR section 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR section 122.42, are provided in the Standard Provisions (Attachment D).

Sections 122.41(a)(1) and (b) through (n) of 40 CFR establish conditions that apply to all State-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the order. Section 123.25(a)(12) of 40 CFR allows the State to omit or modify conditions to impose more stringent requirements. In accordance with 40 CFR section 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

6.2. Special Provisions

6.2.1. Reopener Provisions

This Order may be re-opened and modified, revoked and reissued, or terminated for cause in accordance with the provisions of 40 CFR parts 122, 123, 124, and 125. The San Diego Water Board may reopen the permit to modify permit conditions and requirements. Causes for modification include, but are not limited to, revisions to effluent limitations, receiving water requirements, monitoring and reporting requirements; participation in the Southern California Coastal Water Research Project (SCCWRP) monitoring program or other regional or water body monitoring coalition as determined by the San Diego Water Board; revisions to sludge use or disposal practices; or adoption of new or revised regulations, water quality control plans, or policies by the State Water Board or the San Diego Water Board, including revisions to the Basin Plan or Ocean Plan.

The previous Order, Order No. R9-2015-0073 stated “This Order may be re-opened and modified at the San Diego Water Board’s discretion in response to a request to allow sewage from the Mesa facility to be routed to the NIA Sewage Treatment Plant once the U.S. Marine Corps takes possession of the Mesa facility. By email dated November 7, 2022, the Discharger stated, “the plans for the U.S. Marine Corps will not utilize or transfer any water to the NIA sewage treatment plant.” Thus, this reopener provision was not carried over from Order No. R9-2015-0073 to this Order.

6.2.2. Special Studies and Additional Monitoring Requirements

6.2.2.1. Spill Reporting Requirements

To determine compliance with Discharge Prohibition 3.1 and provide appropriate notification to the general public for the protection of public health, spill reporting requirements have been established in section 6.3.2.1 of this Order.

6.2.2.2. **Receiving Water Violation Assessment**

In the event of a violation of any receiving water limitation established within this Order, the San Diego Water Board may require the Discharger to perform a special assessment. The purpose of the special assessment shall be to investigate the nature and cause of the receiving water violation and identify measures needed to ensure future compliance with receiving water limitations. The Discharger shall submit the required assessment to the San Diego Water Board within 90 days of receipt of the San Diego Water Board notification of the need to perform a Receiving Water Violation Assessment. The results of the assessment will assist the Discharger and the San Diego Water Board in determining permit compliance and appropriate corrective actions for the protection of water quality and designated beneficial uses.

6.2.3. Best Management Practices and Pollution Prevention

Requirements to continue to operate the Facility in accordance with the Discharger's Best Management Practices (BMPs) Plan has been carried over from the previous Order, Order No. R9-2015-0073 to this Order. The requirements for BMPs are authorized by CWA sections 304(e) and 402(p), for toxic pollutants and hazardous substances, and for the control of stormwater discharges.

6.2.4. Construction, Operation, and Maintenance Specifications

6.2.4.1. This Order carries over provisions from the previous Order, Order No. R9-2015-0073 to ensure that new treatment facilities and expansions of existing treatment facilities are completely constructed and operable prior to initiation of the discharge from the new or expanded facilities.

6.2.4.2. This Order carries over a provision from the previous Order, Order No. R9-2015-0073 to ensure the Facility is protected against the impact of storm events.

6.2.4.3. This Order adds a provision to ensure the Facility is protected against regional impacts due to climate change (e.g., sea level rise and floods).

6.2.5. Special Provisions for Publicly-Owned Treatment Works (POTWs) – Not Applicable

6.2.6. Other Special Provisions

6.2.6.1. **Special Studies.** The State Water Board previously required the Discharger to perform special studies specified in section 3.D.(1) of the OTC Policy. By letter dated January 9, 2015, the State Water Board waived the requirement to perform the special studies given the decision to permanently shut down the Facility and to immediately reduce intake flows by approximately 96 percent. In the letter, the State Water Board also determined that the Discharger has demonstrated compliance with the OTC Policy's Track 1 requirements due to the drastic reduction in flow.

6.2.6.2. **Large Organism Exclusion Devices (LOEDs).** Although the Facility is no longer generating power, the Discharger has indicated it will continue to utilize ocean water during the decommissioning process, and the reduced intake water is needed for the operation of the onsite spent nuclear fuel pools, and also to comply with this Order for effluent discharges, primarily sewage. By letter dated January 9, 2015, the State Water Board states that as long as the Facility continues ocean water intake, the Facility is still subject to applicable requirements of the OTC Policy, including the installation of LOEDs no later than December 31, 2016. The previous Order, Order No. R9-2015-0073 required the Discharger to achieve full compliance with LOED requirements by December 31, 2016. In a report dated September 2, 2016, the Discharger stated that the LOED installation was completed August 4, 2016.

In a letter dated November 30, 2022, the Dischargers requested a waiver of LOED requirements stating that the LOEDs have design and maintenance issues and the Facility had only one entrainment since 2013. However, the OTC Policy does not contemplate a waiver process. As such, this Order requires that the LOED be maintained in accordance with the OTC Policy's goal of protecting organisms from being trapped in the intake water because the intake structure still exists.

6.2.6.3. The previous Order, Order No. R9-2015-0073 states "The Discharger shall implement the following actions in compliance with the Ocean Plan:
a) As of October 1, 2011, any unit that is not directly engaged in power generating activities or critical system maintenance shall cease intake flows unless it has been demonstrated to the State Water Board that a reduced minimum flow is necessary for operations.
b) Commencing on the effective date of this Order, the Discharger shall implement interim measures to mitigate impingement and entrainment impacts until full compliance is achieved, by December 31, 2022. If the Discharger proposes to mitigate impacts by providing funding to the California State Coastal Conservancy (working with the California Ocean Protection Council), such as for mitigation projects directed toward increases in marine life associated with the State's Marine Protected Areas within the local area, the Discharger's mitigation funding shall be based on an amount that is determined by the State Water Board's Chief Deputy Director."

By letter dated April 1, 2011, the Discharger has demonstrated compliance with the OTC Policy's interim mitigation requirements through the ongoing SONGS Marine Mitigation Program required by and monitored through the California Coastal Commission.

6.2.7. Compliance Schedules – Not Applicable

7. Rationale for Monitoring and Reporting Requirements

CWA section 308 and 40 CFR sections 122.41(h), (j)-(l), 122.44(i), and 122.48 require that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorize the San Diego Water Board to establish

monitoring, inspection, entry, reporting, and recordkeeping requirements. The MRP (Attachment E) establishes monitoring, reporting, and recordkeeping requirements that implement federal and State requirements. The reports required by the MRP (Attachment E) are needed to ensure compliance with the Order, protect beneficial uses, and obtain other benefits as described in this Fact Sheet and the MRP (Attachment E). Thus, the burdens, including costs, of the MRP (Attachment E) required by this Order bear a reasonable relationship to the need for and benefits to be obtained from the MRP (Attachment E). The following provides the rationale for the monitoring and reporting requirements contained in the MRP (Attachment E) for the Facility. This monitoring location descriptions have been updated from the previous Order, Order No. R9-2015-0073 to reflect the Discharger's discontinued use of cooling water (see Table E-1 of the MRP (Attachment E)).

7.1. Core Monitoring Requirements

7.1.1. Influent Monitoring

Influent monitoring is required to assess the performance of the NIA Sewage Treatment Plant and to evaluate compliance with effluent limitations. The influent monitoring frequency and sample type for TSS has been retained from the previous Order, Order No. R9-2015-0073 for the NIA Sewage Treatment Plant.

Refer to section 3.1 of the MRP (Attachment E) of this Order.

7.1.2. Effluent Monitoring

Effluent monitoring is required to determine compliance with the conditions of this Order, to identify operational problems, to improve plant performance, and to conduct reasonable potential analyses for subsequent orders. Effluent monitoring also provides information on effluent characteristics for use in interpreting water quality and biological data. Effluent monitoring requirements have been carried over from the previous Order, Order No. R9-2015-0073 with the following exceptions:

7.1.2.1. This Order adds requirements to calculate and report the monthly average percent removal for TSS for the NIA Sewage Treatment Plant to determine compliance with the existing effluent limitation for TSS (carried over from Order No. R9-2015-0073).

7.1.2.2. For the combined low-volume waste stream discharges (Monitoring Location INT-002), this Order adds requirements to report the concentration results, as well as the calculated MERs, for all parameters in Table 3 of the Ocean Plan.

7.1.2.3. For Monitoring Location EFF-002, this Order adds requirements to calculate and report the MERs to determine compliance with the mass-based final effluent limitations.

7.1.2.4. For Monitoring Location EFF-002, this Order increases the monitoring frequency for parameters that have been assigned effluent limitations from semiannually to quarterly to ensure the effluent is meeting the effluent limitations.

7.1.2.5. .For Monitoring Location EFF-002, this Order adds a trigger to increase the monitoring frequency from quarterly to monthly for any parameter that exceeds effluent limitations to ensure that compliance is being adequately assessed.

7.1.2.6. As stated in section 3.3.6. of this Fact Sheet, the San Diego Water Board has determined that the Thermal Plan no longer applies to this Order. Therefore, this Order removes the requirements to monitor the temperature at the discharge (Discharge Point No. 002/Monitoring Location EFF-002) and influent (Monitoring Locations INF-002 and INF-003).

Refer to section 3.2 of the MRP (Attachment E) of this Order.

7.1.3. Whole Effluent Toxicity Testing Requirements

This Order contains chronic toxicity effluent limitations as described in section 4.3.6. of this Fact Sheet.

Consistent with the requirements of the Ocean Plan, section 3.3.7 of the MRP (Attachment E) requires the Discharger to develop an Initial Investigation Toxicity Reduction Evaluation (TRE) Work Plan and submit the Initial Investigation TRE Work Plan within 90 days of the effective date of this Order. The Initial Investigation TRE Work Plan must describe steps the Discharger intends to follow if the effluent limitation for chronic toxicity is exceeded.

Section III.C.10 of the Ocean Plan requires a TRE if a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table 3 of the Ocean Plan. To determine if the discharge consistently exceeds the toxicity effluent limitation, this Order requires the Discharger to notify the San Diego Water Board and to accelerate toxicity testing if the effluent limitation for chronic toxicity is exceeded in any one test. If any of the additional tests demonstrate toxicity, in accordance with section III.C.10 of the Ocean Plan, the Discharger is required to submit a Detailed TRE Work Plan in accordance with its submitted Initial Investigation TRE Work Plan and USEPA guidance[2] which shall include further steps taken by the Discharger to investigate, identify, and correct the causes of toxicity; actions the Discharger will take to mitigate the effects of the discharge and prevent the recurrence of toxicity; and a schedule for these actions. The Discharger may also implement a Toxicity Identification Evaluation (TIE), as necessary, based upon the magnitude and persistence of toxicity effluent limitation exceedances. Once the source of toxicity is identified, the Discharger must take all reasonable steps to reduce the toxicity to meet the chronic toxicity effluent limitation identified in section 4.1 of this Order.

[2] See (a) *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070); *Toxicity Identification Evaluation, Phase I* (EPA/600/6-91/005F); (b) *Methods for Aquatic Toxicity Identification Evaluations, Phase II* (EPA/600/R-92/080); (c) *Methods for Aquatic Toxicity Identification Evaluations, Phase III* (EPA/600/R-92/081); and (d) *Marine Toxicity Identification Evaluation (TIE): Phase I Guidance Document* (EPA/600/R-96-054,1996).

The above accelerated monitoring (a minimum of six succeeding tests performed at 14-day intervals) is based on the probability of encountering at least one toxicity exceedance assuming a true, but unknown level of occurrence.

Within 30 days of completion of the TRE, the Discharger must submit the results of the TRE, including a summary of the findings, data generated, a list of corrective actions taken or planned to achieve consistent compliance with the toxicity effluent limitation of this Order and prevent recurrence of exceedances of the effluent limitation, and a time schedule for implementation of any planned corrective actions. The Discharger must implement any planned corrective actions in the TRE Final Report in accordance with the specified time schedule, unless otherwise directed in writing by the San Diego Water Board. The corrective actions and time schedule must be modified at the direction of the San Diego Water Board.

Refer to section 3.3 of the MRP (Attachment E) of this Order.

7.2. Receiving Water Monitoring Requirements

The receiving water requirements have been carried over from the previous Order, Order No. R9-2015-0073. The language has been updated to be consistent with other permits in the San Diego Region. This Order adds the details of the receiving water monitoring locations from the previous Order, Order No. R9-2005-0005.

Based on the requirements in the Ocean Plan, Appendix III, section 4.0, this Order adds indictor bacteria monitoring to this Order.

Based on the requirements in the Ocean Plan, Appendix III, sections 6, 8, and 9, this Order adds:

- Annual sediment monitoring for acid volatile sulfides, organophosphorus insecticides, Ocean Plan Table 3 metals, ammonia-nitrogen, polynuclear aromatic hydrocarbons, and chlorinated hydrocarbons (Ocean Plan, Appendix III, section 6.1);
- Benthic community monitoring once per permit cycle (Ocean Plan, Appendix III, section 8.1); and
- Bioaccumulation monitoring once per permit cycle for pesticides, Table 3 metals, and polynuclear aromatic hydrocarbons (Ocean Plan, Appendix III, section 9.1).

Refer to section 4 of the MRP (Attachment E) of this Order.

7.2.1. California Environmental Data Exchange Network

The California Environmental Data Exchange Network (CEDEN) is a central database to find and share information about the State's water bodies, including streams, lakes, rivers, and the coastal ocean. Many groups in the State monitor water quality, aquatic habitat, and wildlife health to ensure good stewardship of our ecological resources. CEDEN aggregates this data and makes it accessible to environmental managers and the public. CEDEN requires a minimum level of

quality assurance and quality control measures to ensure the data reported are of sufficient quality. When developing integrated reports for listing impaired water bodies pursuant to the federal CWA section 303(d), Regional Water Quality Control Boards must rely on data submitted to CEDEN to make determinations of water quality. Data not included in CEDEN are generally not permissible to be included in the integrated reports.

This Order requires the Discharger submit applicable receiving water monitoring data to CEDEN or an equivalent database that is linked to CEDEN to ensure the monitoring data is available to the San Diego Water Board for integrated reports and is easily accessible to the public and other environmental managers. Additionally, the requirement to submit receiving water monitoring data to CEDEN is consistent with the San Diego Water Board's *A Framework for Monitoring and Assessment in the San Diego Region*, endorsed by the San Diego Water Board in December 2012 through Resolution No. R9-2012-0069. CEDEN currently does not accept all receiving water monitoring data collected pursuant to this Order; however, CEDEN is periodically updated to accept additional data. The Discharger is required to submit data that is in a format approved by CEDEN. The Discharger is required to submit an annual certification that all applicable receiving water monitoring data has been timely uploaded to CEDEN.

7.2.2. Receiving Water Monitoring Report

The requirement for an annual receiving water monitoring report has been carried over from the previous Order, Order No. R9-2015-0073.

7.4. Groundwater – Not Applicable

7.5. Regional Monitoring Requirements

Regional ocean water monitoring provides information about the sources, fates, and effects of anthropogenic contaminants in the coastal marine environment necessary to make assessments over large areas. The large-scale assessments provided by regional monitoring describe and evaluate cumulative effects of all anthropogenic inputs and enable better decision-making regarding protection of beneficial uses of ocean waters. Regional monitoring data assists in the interpretation of core monitoring studies by providing a more accurate and complete characterization of reference conditions and natural variability. Regional monitoring also leads to methods standardization and improved quality control through inter-calibration exercise. The coalitions implementing regional monitoring enable sharing of technical resources, trained personnel, and associated costs. Focusing these resources on regional issues and developing a broader understanding of pollutants effects in ocean waters enables the development of more rapid and effective response strategies. Based on all of these considerations the San Diego Water Board supports regional approaches to monitoring ocean waters.

Consistent with Appendix III section 1 of the Ocean Plan, the Discharger may be required by the San Diego Water Board, to participate with other regulated entities,

other interested parties, and the San Diego Water Board in development and implementation of new and improved monitoring and assessment programs for ocean waters in the San Diego Region and discharges to those waters.

Refer to section 5 of the MRP (Attachment E) of this Order.

7.5.1. Kelp Bed Canopy Monitoring Requirements

Kelp consists of a number of species of brown algae. Along the central and southern California coast, giant kelp (*Macrocystis pyrifera*) is the largest species colonizing rocky, and in some cases sandy, subtidal habitats. Giant kelp is an important component of coastal and island communities in southern California, providing food and habitat for numerous animals. The Discharger is required to participate with other ocean dischargers under San Diego Water Board's jurisdiction in an ongoing regional survey of coastal kelp beds in the Southern California Bight. The intent of these surveys is to provide an indication of the health of these kelp beds, recognizing that the extent of kelp bed canopies may change due to a variety of influences.

Giant kelp (Macrocystis pyrifera) beds along most of the southern California mainland coast have been mapped quarterly as part of NPDES permit requirements for most ocean dischargers in the San Diego Region by the Region Nine Kelp Survey Consortium (RNKSC) since 1983. The RNKSC participants agreed that the monitoring program would be methodologically based upon aerial kelp surveys that were conducted since 1967 by the late Dr. Wheeler J. North.

The RNKSC program area extends from Abalone Point in northern Laguna Beach in Orange County southward to the U.S./Mexico Border in San Diego County and recognizes 24 existing or historic kelp beds. Kelp beds associated with harbors, marinas, or hard substrate also are surveyed. Region Nine supports what are usually the two largest kelp beds in southern California, the La Jolla and Point Loma kelp beds. There are eight ocean outfalls, including the SONGS ocean outfalls, located within the geographical area surveyed on behalf of the RNKSC.

The results of these kelp surveys are published in a single separate report for each region prior to 2012. These reports have since been combined into a single "Status of the Kelp Beds" report published each year that is required to be submitted as part of the MRP in Attachment E of this Order.

Refer to section 5.1 of the MRP (Attachment E) of this Order.

7.5.2. Southern California Bight Regional Monitoring Program Participation Requirements

The Southern California Bight (Bight), defined as the concave bend of the shoreline extending from Point Conception to Punta Colonet in Mexico, is host to unique, biologically diverse marine ecosystems that have long been vulnerable to the impacts of human activity. The coastal zone of the Bight hosts nearly 22 million United States residents that engage in a wide variety of industrial, military, and recreational activities. Approximately 5,600 miles of watersheds, half of which is

highly developed, drain into the Bight. The Southern California Bight Regional Monitoring Program brings together researchers and water-quality managers to pool their resources and work together to investigate the condition of marine ecosystems both spatially and temporally and extend greater protections to the Bight's diverse habitats and natural resources.

Consistent with Appendix III section 1 of the Ocean Plan, the Discharger may be required to participate in the Southern California Bight Regional Monitoring Program coordinated by SCCWRP, or any other coordinator named by the San Diego Water Board, pursuant to Water Code section 13383, and 40 CFR section 122.48. The intent of the Southern California Bight Regional Monitoring Program is to maximize the efforts of all monitoring partners using a more cost-effective monitoring design and to best utilize the pooled scientific resources of the Bight.

During these coordinated sampling efforts, the Discharger's receiving water sampling and analytical effort, as defined in section 4 of the MRP (Attachment E), may be reallocated to provide a regional assessment of the impact of the discharge of wastewater to the Bight. In that event, the San Diego Water Board will notify the Discharger in writing that a portion of the requirement to perform the receiving water sampling and analytical effort defined in section 4 of the MRP (Attachment E) is suspended for the duration of the reallocation. Anticipated modifications to the monitoring program will be coordinated so as to provide a more comprehensive picture of the ecological and statistical significance of monitoring results and to determine cumulative impacts of various pollution sources. The level of resources in terms of sampling and analytical effort redirected from the receiving water monitoring program required under section 4 of the MRP (Attachment E) shall equal the level of resources provided to implement the regional monitoring and assessment program unless the San Diego Water Board and the Discharger agrees otherwise. The specific scope and duration of the receiving water monitoring program reallocation and redirection will be determined and set by the San Diego Water Board, in consultation with the Discharger.

Refer to section 5.2 of the MRP (Attachment E) of this Order.

7.6. Special Studies Requirements

7.6.1. Fish Impingement/Entrainment Monitoring

The fish impingement/entrainment monitoring requirements have been carried over from the previous Order, Order No. R9-2015-0073.

Refer to section 6.1 of the MRP (Attachment E) of this Order.

7.6.2. Monitoring Location INF-002 – Cooling Water/Ocean Water Intake Monitoring

The cooling water/ocean water intake monitoring requirements have been carried over from the previous Order, Order No. R9-2015-0073. The requirements have been updated to reflect the Discharger's discontinued use of cooling water.

Refer to section 6.2 of the MRP (Attachment E) of this Order.

7.6.3. Climate Change Action Plan (CCAP)

Climate change research indicates the overarching driver of change is increased atmospheric carbon dioxide (CO_2) from human activity. The increased CO_2 emissions trigger changes to climatic patterns, which increase sea level and the intensity of coastal storm surges (Δ Sea Level) lead to more erratic local weather patterns (Δ Weather Patterns), increased incidents of flooding and wildfires, trigger a gradual warming of freshwater and ocean temperatures (Δ Water Temperature), and trigger changes to ocean water chemistry (Δ Water pH). The changes to the sea level and weather patterns may affect the Facility (e.g., flooding, increased influent flows during wet weather, wildfires, and heat waves). The changes to the water temperature and pH may affect how the receiving waters reacts to the discharges.

The California Public Resources Code (Public Resources Code) recognizes that anthropogenic greenhouse gas emissions responsible for climate change are also driving major shifts in the chemical properties of the world's oceans (Public Resources Code section 35630(c)). Furthermore, Governor Newsom's Executive Order N-10-1920 directs state agencies to prepare a water resiliency portfolio that meets the needs of California's communities, economy, and environment. The State Water Board's Resolution No. 2017-0012, *Comprehensive Response to Climate Change*, and the San Diego Water Board's Resolution No. R9-2018-0051, *Addressing Threats to Beneficial Uses from Climate Change*, also require a proactive approach to climate change in all state and regional actions.

Based on all of these considerations, this Order requires the Discharger to prepare and submit a CCAP within three years of the effective date of this Order.

Refer to section 6.3 of the MRP (Attachment E) of this Order.

7.7. Other Monitoring Requirements

Discharge Monitoring Report-Quality Assurance (DMR-QA) Study Program. Under the authority of section 308 of the CWA (33 U.S.C. section 1318), USEPA requires major and selected minor permittees under the NPDES Program to participate in the annual DMR-QA Study Program. The DMR-QA Study evaluates the analytical ability of laboratories that routinely perform or support self-monitoring analyses required by NPDES permits. There are two options to satisfy the requirements of the DMR-QA Study Program: (1) The Discharger can obtain and analyze a DMR-QA sample as part of the DMR-QA Study; or (2) Per the waiver issued by USEPA to the State Water Board, the Discharger can submit the results of the most recent Water Pollution Performance Evaluation Study from its own laboratories or its contract laboratories. A Water Pollution Performance Evaluation Study is similar to the DMR-QA Study. Thus, it also evaluates a laboratory's ability to analyze wastewater samples to produce quality data that ensure the integrity of the NPDES Program. The Discharger shall ensure that the results of the DMR-QA Study or the results of the most recent Water Pollution Performance Evaluation Study are submitted annually to the State Water Board. The State Water Board's Quality Assurance Program Officer will send the DMR-QA Study results or the results of

the most recent Water Pollution Performance Evaluation Study to USEPA's DMR-QA Coordinator and Quality Assurance Manager.

Refer to section 1.7 of the MRP (Attachment E) of this Order.

8. Public Participation

The San Diego Water Board has considered the issuance of WDRs that will serve as an NPDES permit for the Facility. As a step in the WDR adoption process, the San Diego Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process by providing a period of a minimum of 30 days for public review and comment on the Tentative Order.

8.1. Notification of Interested Parties

The San Diego Water Board notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided an opportunity to submit written comments and recommendations. Notification was provided by posting a Notice of Public Hearing and Opportunity to Comment and the tentative WDRs on the San Diego Water Board's website for the duration of the public comment period. The Tentative Order was posted on the San Diego Water Board website and emailed to the Discharger, and all known interested parties on February 2, 2023.

The public also had access to the meeting agenda including all supporting documents and any changes in meeting dates and locations through the San Diego Water Board's website at: https://www.waterboards.ca.gov/sandiego/.

8.2. Written Comments

Interested persons were invited to submit written comments concerning tentative WDRs as provided through the notification process. Comments were due either in person or by mail to the San Diego Water Board at 2375 Northside Drive, Suite 100, San Diego, CA 92108.

To be fully responded to by staff and considered by the San Diego Water Board, the written comments were due at the San Diego Water Board office by 5:00 p.m. on March 6, 2023.

8.3. Public Hearing

The San Diego Water Board held a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: April 12, 2023
Time: 9:00 AM
Location: City of Laguna Beach,
City Council Chambers,
505 Forest Avenue,
Laguna Beach, CA 92651

Interested persons were invited to attend. At the public hearing, the San Diego Water Board heard testimony, pertinent to the discharge, WDRs, and permit. For accuracy of the record, important testimony was requested in writing.

8.4. Reconsideration of Waste Discharge Requirements

Any person aggrieved by this action of the San Diego Water Board may petition the State Water Board to review the action in accordance with Water Code section 13320 and CCR, title 23, section 2050. The State Water Board must receive the petition by 5:00 p.m., within 30 calendar days of the date of adoption of this Order at the following address, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or State holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Petitions may be sent in as follows:

By mail:
State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

In Person:
State Water Resources Control Board
Office of Chief Counsel
1001 I Street
Sacramento, California 95814

By email:
waterqualitypetitions@waterboards.ca.gov

By fax:
(916) 341-5199

For instructions on how to file a petition for review, see:
https://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml

8.5. Information and Copying

The ROWD, other supporting documents, and comments received are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday. Copying of documents may be arranged through the San Diego Water Board by calling (619) 516-1990.

8.6. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the San Diego Water Board, reference this Facility, and provide a name, address, and phone number.

8.7. Additional Information

Requests for additional information or questions regarding this Order should be directed to Joann Lim by email at Joann.Lim@waterboards.ca.gov or by phone at (619) 521-3362.

ATTACHMENT G – DISCHARGE PROHIBITIONS CONTAINED IN THE OCEAN PLAN AND BASIN PLAN

1. Ocean Plan Discharge Prohibitions

1.1. The Discharge of any radiological chemical, or biological warfare agent or high-level radioactive waste into the ocean is prohibited.

1.2. Waste shall not be discharged to designated Areas of Special Biological Significance except as provided in chapter III.E. of the Ocean Plan.

1.3. Pipeline discharge of sludge to the ocean is prohibited by federal law; the discharge of municipal and industrial waste sludge directly to the ocean, or into a waste stream that discharges to the ocean, is prohibited. The discharge of sludge digester supernatant directly to the ocean, or to a waste stream that discharges to the ocean without further treatment, is prohibited.

1.4. The by-passing of untreated wastes containing concentrations of pollutants in excess of those of Table 3 or Table 4 [of the Ocean Plan] to the ocean is prohibited, except as allowed by Federal Standard Provisions I.G and I.H (Attachment D).

1.5. The discharge of trash to surface waters of the State or the deposition of trash where it may be discharged into surface waters of the State is prohibited.

2. Basin Plan Discharge Prohibitions

2.1. The discharge of waste to waters of the State in a manner causing, or threatening to cause a condition of pollution, contamination or nuisance as defined in Water Code section 13050, is prohibited.

2.2. The discharge of waste to land, except as authorized by WDRs of the terms described in Water Code section 13264 is prohibited.

2.3. The discharge of pollutants or dredged or fill material to waters of the United States except as authorized by an NPDES permit or a dredged or fill material permit (subject to the exemption described in Water Code section 13376) is prohibited.

2.4. Discharges of recycled water to lakes or reservoirs used for municipal water supply or to inland surface water tributaries thereto are prohibited, unless the San Diego Water Board issues an NPDES permit authorizing such a discharge; the proposed discharge has been approved by the State of California Department of Public Health and the operating agency of the impacted reservoir; and the discharger has an approved fail-safe long-term disposal alternative.

2.5. The discharge of waste to inland surface waters, except in cases where the quality of the discharge complies with applicable receiving water quality objectives, is prohibited. Allowances for dilution may be made at the discretion of the San Diego Water Board. Consideration would include streamflow data, the degree of treatment provided and safety measures to ensure reliability of facility performance. As an example, discharge of secondary effluent would probably be

permitted if streamflow provided 100:1 dilution capability.

2.6. The discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned or under the control of the discharger is prohibited, unless the discharge is authorized by the San Diego Water Board.

2.7. The dumping, deposition, or discharge of waste directly into waters of the State, or adjacent to such waters in any manner which may permit it's being transported into the waters, is prohibited unless authorized by the San Diego Water Board.

2.8. Any discharge to a storm water conveyance system that is not composed entirely of storm water is prohibited unless authorized by the San Diego Water Board. [The federal regulations, 40 CFR section 122.26(b)(13), define storm water as storm water runoff, snow melt runoff, and surface runoff and drainage. 40 CFR section 122.26(b)(2) defines an illicit discharge as any discharge to a storm water conveyance system that is not composed entirely of storm water except discharges pursuant to an NPDES permit and discharges resulting from firefighting activities.] [section 122.26 amended at 56 FR 56553, November 5, 1991; 57 FR 11412, April 2, 1992].

2.9. The unauthorized discharge of treated or untreated sewage to waters of the State or to a storm water conveyance system is prohibited.

2.10. The discharge of industrial wastes to conventional septic tank/subsurface disposal systems, except as authorized by the terms described in Water Code section 13264, is prohibited.

2.11. The discharge of radioactive wastes amenable to alternative methods of disposal into the waters of the State is prohibited.

2.12. The discharge of any radiological, chemical, or biological warfare agent into waters of the State is prohibited.

2.13. The discharge of waste into a natural or excavated site below historic water levels is prohibited unless the discharge is authorized by the San Diego Water Board.

2.14. The discharge of sand, silt, clay, or other earthen materials from any activity, including land grading and construction, in quantities which cause deleterious bottom deposits, turbidity or discoloration in waters of the State or which unreasonably affect, or threaten to affect, beneficial uses of such waters is prohibited.

Sent via email
Confirmation of receipt requested

January 8, 2021

To: Attached Mailing List

Subject: Water Code Section 13383 Order Requiring Submittal of Information on Climate Change Adaptation

This letter requires Chevron Products Company, Martinez Refining Company, Tesoro Refining and Marketing Company, Phillips 66 Company, and Valero Refining Company-California (Dischargers) to provide reports evaluating the risks posed to operations at their facilities by existing and future climate conditions, and proposing plans to mitigate or avoid such risks. Climate change is shifting precipitation and temperature patterns, exacerbating extreme weather events, and causing sea level and groundwater rise. These conditions have significant implications for wastewater and stormwater collection, treatment, and discharge operations. This request is made pursuant to Water Code section 13383 and Regional Water Board Orders R2-2015-0033, R2-2016-0044, R2-2016-0047, R2-2017-0039, and R2-2020-0033 (NPDES permits, Attachment D, provision V.A).

We consider the Ocean Protection Council's *Sea-Level Rise Guidance*[1] to be the most current authoritative source supporting planning for sea level rise in California. In May 2020, the California Coastal Commission adopted *Making California's Coast Resilient to Sea Level Rise: Principles for Aligned State Action*.[2] The California Environmental Protection Agency, including the State Water Resources Control Board, has endorsed these principles, which recommend using a minimum sea level rise target of 3.5 feet by 2050 for planning purposes. This target applies a safety factor to the California Ocean Protection Council's sea level rise estimates, which do not account for extreme storm surges, tides, or other weather events on top of sea level rise.

In addition to providing the information required below, Dischargers must update, as necessary, the contingency plan, spill prevention plan, operation and maintenance manual, and wastewater facilities status report as required by their NPDES permits (Attachment G, provisions I.C and I.D) to reflect their responses to this letter. Likewise,

[1] https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf
[2] https://documents.coastal.ca.gov/reports/2020/5/w6g/w6g-5-2020-exhibits.pdf

Dischargers must notify us of any anticipated facility modifications as required by their NPDES permits (Attachment D, provisions II.B and V.F).

Requirements

By February 1, 2022, Dischargers shall provide the information described below. We hope each Discharger has already initiated some of this work, and Dischargers may rely on existing planning, to the extent that it is relevant, to respond to this requirement.

1. **Vulnerability Assessment**. Assess the vulnerability of the facility's wastewater and stormwater collection, treatment, and discharge systems to the following: (1) sea level rise, (2) groundwater rise, (3) changing climate and weather, and (4) power outages and wildfires.

   a. ***Sea Level Rise***. Explain how the Discharger manages existing flooding risks (e.g., protective measures already in place, planned, or proposed). Explain how the Discharger intends to manage future flooding risks over a 50-year time horizon (e.g., planning efforts and protective measures in place, planned, or proposed). What guidance and assumptions are being used to anticipate sea level rise? If the Discharger has not yet established a plan, explain the process and timeline for doing so in response to item 2, below.

   b. ***Groundwater Rise***. Explain how the Discharger intends to manage future flooding related to groundwater rise over a 50-year time horizon (e.g., ongoing planning efforts and protective measures in place, planned, or proposed). If the Discharger has not yet established a plan, explain the process and timeline for doing so in response to item 2, below. If the Discharger believes it will not be susceptible to flooding related to groundwater rise within 50 years, explain the basis for the conclusion.

   c. ***Changing Climate and Weather***. Assess how increased temperatures, greater rainfall intensity and more frequent storms, and longer and drier summers may affect the facility's collection, treatment, and discharge systems. Explain how the Discharger intends to manage future risks of this nature. If the Discharger has not yet established a plan, explain the process and timeline for doing so in response to item 2, below.

   d. ***Power Outages and Wildfires***. Assess critical equipment and any need for additional back-up power. This may be necessary due to increasing stress on the power grid from more extreme heat waves and expanded public safety power shutoffs to the facility's service area due to wildfires. Explain how the Discharger intends to manage future risks of this nature. If the Discharger has not yet established a plan, explain the process and timeline for doing so in response to item 2, below.

2. **Adaptation Strategies**. Based on the vulnerabilities of the facility's wastewater and stormwater collection, treatment, and discharge systems, identify mitigation and control measures needed to maintain, protect, and improve the Discharger's

wastewater infrastructure under existing and possible future conditions. This assessment should include the following:

a. ***Regional Collaboration***. Document how the Discharger plans to work with regional stakeholders to address sea level rise and groundwater rise in the facility area. A regional approach may best provide cost-effective ways to manage sea level rise and groundwater rise, while ensuring that the actions of one party do not adversely affect the adaptation plans of other parties.

b. ***Time-Critical Measures***. Identify any time-critical mitigation and control measures, and propose an implementation schedule to complete them.

c. ***Design Modifications and Improvements***. Explain how the Discharger will modify infrastructure identified as vulnerable to sea level rise, groundwater rise, or extreme weather events in the future. For example, it may be necessary to relocate critical equipment above projected flood levels or waterproof facilities at risk of flooding. As sea level rises, increasing the facility's pumping capacity may also be necessary to ensure it can discharge treated wastewater under an increased hydraulic pressure head.

d. ***Emergency Response Planning***. Describe actions the Discharger will take to keep its facilities operating, or to return to operation as quickly as practicable, if a climate-change-related emergency occurs. The Discharger's emergency response planning should also address how it will ensure the health and safety of its employees under such conditions.

Basis for Requirements

We require the information described above pursuant to Water Code section 13383 and the NPDES permits. Water Code section 13383, subdivision (a), authorizes the Regional Water Board to establish reporting and recordkeeping requirements, as authorized by Water Code sections 13160, 13376, or 13377, for any person who discharges to navigable waters. The NPDES permits (Attachment D, Provision V.A) implement 40 Code of Federal Regulations part 122.41(h) and require Dischargers to furnish any information the Regional Water Board requests to determine permit compliance or whether cause exists to modify the permit. Water Code section 13383, subdivision (b), further authorizes the Regional Water Board to require "any person subject to this section" to provide reasonably required information.

The Regional Water Board is therefore authorized to require Dischargers to report on climate change vulnerabilities and adaptation strategies. This information is necessary to determine whether each Discharger's contingency plan, spill prevention plan, operation and maintenance manual, and wastewater facilities status report are up-to-date as required by the NPDES permits (Attachment G, sections I.C and I.D) and to inform permit reissuance. The information is also reasonably required to prevent disruptions of facility operations by existing and future climate conditions.

Failure to comply with the requirements in this letter could subject each Discharger to administrative civil liability of up to $10,000 per day of violation pursuant to Water Code section 13385.

Any person aggrieved by this action may file a petition with the State Water Resources Control Board in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050. The State Water Resources Control Board must receive the petition within 30 days of the date of this letter. Copies of the law and regulations that apply to water quality petitions may be found at http://www.waterboards.ca.gov/public_notices/petitions/water_quality. Any extension in the above deadline must be confirmed in writing by Regional Water Board staff.

If you have any questions regarding this letter, please contact Robert Schlipf at robert.schlipf@waterboards.ca.gov.

Sincerely,

Michael Montgomery
Executive Officer

Copy to (via email):

Julie Song, U.S. EPA, song.julie@epa.gov
Kimberly Ronan, Valero Refining Company-California, kim.ronan@valero.com
Gordon Johnson, Martinez Refining Company LLC, gordon.johnson@pbfenergy.com
Maureen Dunn, Chevron Richmond Refinery, maureendunn@chevron.com
Donald Bristol, Phillips 66 Company, don.a.bristol@p66.com
Anne Partman, Tesoro Refining & Marketing Company, LLC, apartmann@marathonpetroleum.com

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. R2-2018-0009

GENERAL WASTE DISCHARGE REQUIREMENTS AND WATER QUALITY CERTIFICATION for:

CONSTRUCTION AND MAINTENANCE OF OVERWATER STRUCTURES SAN FRANCISCO BAY

The California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), finds that:

1. The Regional Water Board regulates the construction and maintenance of overwater structures in San Francisco Bay, as well as associated bank and shoreline stabilization projects, because these activities discharge or have the potential to discharge sediment and other wastes into waters of the State. The Regional Water Board issues up to 20 Clean Water Act (CWA) section 401 water quality certifications/WDRs annually for the construction and maintenance of overwater structures. This general order will streamline the CWA section 401 permitting process for projects below certain size limits that are not expected to have significant water quality impacts and will reduce the number of individual water quality certifications issued by the Regional Water Board.
2. Section 13260(a) of the California Water Code (Water Code) requires any person discharging waste or proposing to discharge waste where it could affect the quality of the waters of the State to file a report of waste discharge. The activities regulated under this Order constitute a discharge of waste that could affect the quality of waters of the State. Every person (Permittee) proposing such an activity shall file a report of waste discharge (Application) with the Regional Water Board.
3. CWA section 401 (33 U.S.C. § 1341) requires Permittees to obtain "water quality certification" from the State of California that the project will comply with State water quality standards before the U.S. Army Corps of Engineers (Corps) may issue a Clean Water Act section 404 dredge and fill permit or a Rivers and Harbor Act section 10 permit for structures affecting navigable waters. (33 USC §§ 401-413; 1251 *et seq.).*
4. Water Code section 13263(a) requires that waste discharge requirements (WDRs) be prescribed as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge. Such WDRs must implement any relevant water quality control plans, taking into consideration beneficial uses to be protected, the water quality objectives reasonably required for those purposes, other waste discharges, the need to prevent nuisance, and the provisions of Water Code section 13241.
5. Water Code section 13263(i) authorizes the Regional Water Board to prescribe general WDRs for a category of discharges if the discharges are produced by the same or similar operations; the discharges involve the same or similar types of waste; the discharges require the same or similar treatment standards; and the discharges are more appropriately regulated under general discharge requirements than individual discharge requirements. Here, general WDRs are warranted because construction and maintenance of similarly-sized overwater structures generate similar types and amounts of wastes and are subject to similar treatment standards. General WDRs will simplify the application and oversight management process.

Program Description, Impacts, and Mitigation

6. This Order applies to the construction and maintenance of certain overwater structures in San Francisco Bay, including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg, within the jurisdiction of the Regional Water Board. The Order applies to the following Bay segments: Sacramento and San Joaquin Delta, Suisun Bay, Carquinez Strait, San Pablo Bay, Richardson Bay, Central Bay, Lower Bay, and South Bay.
7. This Order refers to Project proponents authorized for coverage under the Order as Permittees.
8. "Overwater structure" is an umbrella term encompassing a of number of types of buildings, structures, and apparatuses built in or over water, generally for purposes of facilitating vessel mooring, loading, or navigation. Common overwater structures include piers, docks,[1] wharves,[2] marinas,[3] floats, and buoys.
9. The Order covers activities associated with construction or maintenance, including upgrades, retrofit, expansion, demolition, and reconfiguration of piers and docks (including associated ramps and floating docks) where the Permittee owns or operates a facility of less than 10,000 square feet (sq. ft.) of overwater coverage, including any expanded areas. This includes pile removal, replacement, and installation. The General WDRs do not cover such activities by owners or operators of piers and docks greater than 10,000 sq. ft.
10. The Order covers activities associated with upgrade, retrofit, expansion, demolition, and reconfiguration and new construction of wharves and marinas where the Permittee owns or operates a facility of less than 50,000 sq. ft. of overwater coverage. This includes pile removal, replacement, and installation. The General WDRs do not cover such activities by owners or operators of wharves and marinas greater than 50,000 sq. ft.
11. The Order covers bank and shoreline stabilization activities associated with the construction, maintenance, demolition, and reconfiguration of an associated overwater structure. Bank stabilization activities covered by the Order are limited to 500 linear feet of shoreline for repair of existing structures, 200 linear feet for new structures, and 1,000 sq. ft. in area. Bank stabilization or breakwater projects not connected to the construction, maintenance, or demolition of an overwater structure are not covered by this Order.
12. The Order covers the placement and replacement of temporary and permanent floats and buoys, when that replacement is part of the construction and maintenance of overwater structures.
13. Most of the shoreline covered by this Order is highly urbanized. Most of the projects authorized by this Order are expected to take place in areas where overwater structures have been historically present.
14. The Order requires the potential impacts of construction, maintenance and demolition activities to be avoided, minimized, and mitigated in accordance with mitigation and monitoring plans. Unavoidable temporary and permanent impacts to beneficial uses are required to be offset with

[1] "Pier" and "dock" are used interchangeably for purposes of this order to mean a structure, often wooden, used for the loading or unloading of materials or as a moorage for boats.

[2] A "wharf" has a very similar definition to "pier" and "dock," in that it is also "a structure built along or at an angle from the shore of navigable waters so that ships may lie alongside to receive and discharge cargo and passengers."

[3] A "marina" for the purposes of this order refers "a basin providing secure moorings for pleasure boats and often offering supply, repair, and other facilities."

appropriate compensatory mitigation, including creation, restoration, and enhancement of waters of the State.

15. This Order is effective only if the Permittee proposing such an activity pays all fees required under Title 23, California Code of Regulations (23 CCR).

Regulatory Framework

16. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation plans to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), the Office of Administrative Law, and U.S. EPA, where required.

17. The Basin Plan lists the following existing and potential beneficial uses for surfaces waters in San Francisco Bay:

    (a) Ocean, Commercial, and Sport Fishing (COMM);
    (b) Estuarine Habitat (EST);
    (c) Industrial Service Supply (IND);
    (d) Fish Migration (MIGR);
    (e) Navigation (NAV);
    (f) Industrial Process Supply (PROC);
    (g) Preservation of Rare and Endangered Species (RARE);
    (h) Water Contact Recreation (REC-1);
    (i) Non-water Contact Recreation (REC-2);
    (j) Shellfish Harvesting (SHELL);
    (k) Fish Spawning (SPWN); and
    (l) Wildlife Habitat (WILD).

18. State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (Antidegradation Policy), states that discharges to existing high quality waters will be required to meet WDRs that will result in the best practicable treatment or control of the discharge necessary to assure that (a) a condition of pollution or nuisance will not occur, and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained. These General WDRs are consistent with Resolution No. 68-16 because implementation of the proposed activities as mitigated is not expected to adversely affect existing or potential beneficial uses of the waters of the State, and existing water quality will be maintained or improved. Any impacts to beneficial uses that do occur must be offset by mitigation.

19. Pursuant to 23 CCR sections 3857 and 3859, the Regional Water Board is issuing General WDRs for the construction and maintenance of overwater structures, including associated bank stabilization projects, in San Francisco Bay. Water Code section 13260(d)(1) requires that the Permittees for whom WDRs have been prescribed pursuant to section 13263 submit a fee according to a reasonable schedule. The fee shall be in accordance with the current fee schedule, per 23 CCR, Division 3, Chapter 9, Waste Discharge Reports and Requirements Article 1 Fees, section 2200(a)(2).

20. The following California- and federally-listed species and designated critical habitat are present at the project location:

(a) Delta smelt (*Hypomesus transpacificus)*;
(b) Longfin smelt (*Spirinchus thaleichthys*);
(c) Green sturgeon (*Acipenser medirostris*);
(d) Steelhead trout, central California coast evolutionarily significant unit (ESU) (*Oncorhynchus mykiss*);
(e) Steelhead trout, California central valley ESU (*Oncorhynchus mykiss*); and
(f) Chinook salmon, Central Valley (Sacramento) spring-run (*Oncorhynchus tshawytscha*).

21. The following Federal Fisheries Management Plans (FMP) are applicable at the project location: the *Pacific Groundfish FMP*, the *Coastal Pelagic FMP*, and the *Pacific Coast Salmon FMP*.

22. On October 11, 2011, the National Marine Fisheries Services (NMFS) issued an Essential Fish Habitat Consultation (2011 NMFS Consultation) (Attachment A) for the construction and maintenance of overwater structures in San Francisco Bay. The purpose of the Consultation is to expedite the formal federal section 7 consultation process for such projects. The Consultation analyzes the potential adverse effects to federally-listed species resulting from all anticipated construction and maintenance of overwater structures in the San Francisco Bay Area.

23. In October 2014, NMFS issued the California Eelgrass Mitigation Policy and Implementation Guidelines (Eelgrass Guidelines) (Attachment B). The purpose of the Eelgrass Guidelines is to implement NMFS' policy of no net loss of eelgrass habitat function in California.

24. Filling of waters of the U.S. and State may cause partial or complete loss of the beneficial uses provided by those waters. This Order requires Permittees to complete and implement mitigation and monitoring plans to ensure that impacts are mitigated through avoidance and minimization and that unavoidable loss of beneficial uses is offset with appropriate compensatory mitigation, including creation, restoration, or (in exceptional cases) preservation of other waters of the State, or a combination thereof. These mitigation requirements are consistent with those adopted by U.S. EPA and the Army Corps for regulation of dredged or fill discharges to federal waters under CWA section 404.

25. Title to all abandoned archaeological sites and historic or cultural resources on or in the submerged lands of California is vested in the State and under the jurisdiction of the California State Lands Commission (Pub. Resources Code, § 6313).

26. Projects authorized by this Order may still require authorizations from other local, State, or federal agencies.

27. Potential dischargers and all other known interested parties have been notified of the intent to adopt these General WDRs.

28. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to this Order.

California Environmental Quality Act

29. The Regional Water Board is the lead agency for these General WDRs (Project) under the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 *et seq*.). The Regional Water Board prepared and circulated an Initial Study/Mitigated Negative Declaration (IS/MND) for the Project for public review. The Regional Water Board adopted the IS/MND as Resolution No. R2-2018-XXXX finding that the IS/MND reflects the independent judgment and analysis of the Regional Water Board and that there is no substantial evidence that

these General WDRs will have a significant effect on the environment with implementation of mitigation measures identified in the IS/MND and required by this Order (Cal. Code Regs., tit. 14, § 15074). The Regional Water Board further finds that the mitigation measures identified in the Mitigated Negative Declaration to keep impacts to less-than-significant levels, as well as a program for monitoring and reporting on such mitigation measures, are required as conditions of these General WDRs. The Regional Water Board's decision is based on the record as a whole for the Project, which is available at the Regional Water Board's offices.

30. This Order authorizes the permitting of the construction and maintenance of overwater structures, such as piers and docks, wharves and marinas, mooring, floats and buoys, and associated bank stabilization projects subject to the limits set forth in this Order. The Order is designed to enhance the protection of surface water resources.

31. The Regional Water Board has satisfied its obligation to address tribal cultural resources under AB 52. The notification and consultation provisions of AB 52 were triggered and completed, and no comments were received on the Project.

Public Notice

32. The Regional Water Board has reviewed the contents of this Order and all evidence concerning this matter, written public comments, and testimony provided at the public hearing on February 14, 2018, in Oakland, California, and hereby finds that the adoption of this Order is consistent with the Basin Plan and is in the public interest.

33. The Regional Water Board has publicly notified interested agencies and persons of its intent to issue this Order for discharges of wastes from the construction and maintenance of overwater structures, has provided them with an opportunity for a public meeting and an opportunity to submit comments, and has considered all comments and testimony on the Order.

IT IS HEREBY ORDERED that the Permittees under this Order shall comply with the following. The Regional Water Board certifies that the overwater activities described herein comply with CWA sections 301, 302, 303, 306, and 307 and with applicable provisions of State law, provided that the Permittees comply with the following:

A. Discharge Prohibitions

1. The direct or indirect discharge of wastes, as defined in Water Code section 13050(d), within or outside of an active project site, to surface waters or surface water drainage courses is prohibited, except as authorized in this Order.

2. Maintenance activities subject to these requirements shall not cause a condition of pollution or nuisance as defined in Water Code section 13050 (l) and (m), respectively.

3. No unauthorized construction-related materials or wastes shall be allowed to enter into or be placed where they may be washed by rainfall or runoff into waters of the State. When operations are completed, any excess material shall be removed from the work area and any areas adjacent to the work area where such material may be washed into waters of the State.

4. Existing creosote piles in the project area shall be completely removed or cut/broken at least three feet below the mud-line and disposed at appropriate upland disposal sites. No new creosote piles shall be installed. Any chemically-treated wood material (e.g., pilings, decking) shall comply with the 2011 NMFS Consultation.

5. Construction and maintenance activities shall not occur within tidal marshes.

B. Discharge Specifications

1. Effective erosion and sediment control best management practices (BMPs) shall be undertaken and maintained to prevent discharge of sediment to waters of the State.
2. Excavated material shall be fully contained to prevent any transport by wind, surface runoff, or other means into waters of the State.
3. All staging must occur on adjacent access roads or previously-disturbed areas.
4. For construction and maintenance of overwater structures within 150 feet of mapped eelgrass beds, Permittees must perform pre-construction eelgrass surveys of the project area during the active growth period for eelgrass in San Francisco Bay.
5. The discharge of any hazardous, designated or non-hazardous waste as defined in 27 CCR, Division 2, Subdivision 1, Chapter 2 must be conducted in accordance with applicable State and federal regulations.
6. The Permittees shall clean up, remove, and relocate any wastes discharged in violation of the General WDRs/Certification.
7. Projects that include placing rock rip-rap or other hardscape materials for bank protection may be allowed, where those materials are replacing existing rip-rap or other hardscape materials. Gabions, concrete mats, tires, and rubble are prohibited.
8. In accordance with Water Code section 13260, the Permittees shall file with the Regional Water Board a report of any material change in the character, location, or quantity of this waste discharge that is beyond the scope of this Order. Any proposed material change in the discharge requires approval by the Regional Water Board after a hearing under Water Code section 13263.
9. No later than within 24 hours of occurrence of an adverse condition, the Permittees shall notify Regional Water Board staff by telephone or e-mail. An adverse condition includes, but is not limited to, a violation or threatened violation of the conditions of this Order, spill of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance. A written notification of the adverse condition shall be submitted to the Regional Water Board within five days of occurrence of an adverse condition. The written notification shall identify the adverse condition, describe the actions taken or necessary to remedy the condition, and if applicable, specify a timetable for the remedial actions that follow any initial response to the adverse condition and any further reporting of the effectiveness of the remedy for the adverse condition.

C. Receiving Water Limitations

1. Construction and maintenance of overwater structures shall not cause the following conditions to exist in waters of the State at any place:
   a. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
   b. Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

c. Waters shall not contain bio-stimulatory substances in concentrations that promote aquatic growth to the extent that such growth cause nuisance or adversely affect beneficial uses.

d. Waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

e. There shall be no alteration of temperature beyond present natural background levels.

f. *Dissolved Oxygen:*
For all tidal waters, the following objectives shall apply:

- Downstream of Carquinez Bridge 5.0 mg/l minimum
- Upstream of Carquinez Bridge 7.0 mg/l minimum

g. *pH:*
The pH shall not be depressed below 6.5 nor raised above 8.5. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

h. *Turbidity:*
Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

2. Activities shall not cause a violation of any particular water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the CWA and regulations adopted there under. If more stringent applicable water quality standards are promulgated or approved pursuant to CWA section 303, or amendments thereto, the Regional Water Board will revise and modify this Order in accordance with more stringent standards.

D. Provisions

Overwater Activities

1. Construction and maintenance activities shall incorporate effective BMPs to ensure that no debris, cement, concrete, or washings thereof, or other construction-related materials or wastes, petroleum products, or other organic or earthen materials shall be allowed to enter into or be placed where it may discharge to waters of the State.
2. All staging shall occur on adjacent access roads or previously-disturbed areas. Soil and riprap shall be staged in areas that have been previously disturbed (e.g., service roads and turnouts). Alternative staging options shall be submitted with the NOI to the Regional Water Board and may not be implemented until approved by the Regional Water Board Executive Officer.
3. The discharge of any hazardous, designated or non-hazardous waste as defined in 27 CCR, Division 2, Subdivision 1, Chapter 2 shall be conducted in accordance with applicable State and federal regulations.
4. The Permittees shall clean up, remove, and relocate any wastes that are discharged in violation of this Order.

Avoidance, Mitigation, and Monitoring

1. If the proposed project is within 150 feet of a mapped eelgrass bed,[4] then prior to construction, the Permittees shall perform an eelgrass survey of the project area during the months of May through September (i.e., the active growth period for eelgrass in San Francisco Bay). All eelgrass surveys shall be performed in accordance with the latest version of NMFS' California Eelgrass Mitigation Policy and Implementing Guidelines.[5] The survey is valid for either 60 days from the survey date or until the next active growth period if construction occurs after the end of the active growth period.
2. If the results of the pre-construction survey indicate that the proposed project is located within an eelgrass bed, the Permittees shall modify the project to avoid placing any portion of the overwater structure in or over eelgrass unless the Permittees submit an assessment of alternatives that demonstrates that it is infeasible to avoid placing the structure in or over eelgrass.
3. If it is infeasible to avoid placing the structure in or over eelgrass, the Permittees shall design the project to minimize impacts to eelgrass beds to the maximum extent feasible. At a minimum, decking materials above eelgrass shall be comprised of slotted materials or spaced to provide a minimum 40 percent transparency, thereby minimizing impacts from shading of eelgrass by allowing light penetration below the structure.
4. If it is not feasible to avoid placement of the structure in or over eelgrass, the Permittees shall submit to the Regional Water Board a mitigation and monitoring plan (MMP) that shall be implemented to compensate for unavoidable impacts to eelgrass. Construction of the proposed project shall not commence until the Executive Officer provides written approval of the MMP.
5. To compensate for any remaining unavoidable impacts to eelgrass beds, the Permittees shall prepare an MMP that includes:
    a. A post-construction eelgrass survey and assessment of impacts, which shall be completed in the same month as the preconstruction survey during the next growing season immediately following the completion of the project, or within the first 30 days of completion of construction if within the active growth period. The post-construction survey shall document adverse impacts to eelgrass and any changes in density and extent of vegetative cover. The post-construction survey and impact assessment shall be conducted in compliance with all recommendations of Section II.D., "Assessing Impacts to Eelgrass Habitat," of the California Eelgrass Mitigation Policy and Implementing Guidelines prepared by NMFS West Coast Region, dated October 2014.
    b. The affected area shall be monitored for a period of no less than 2 years following construction.
    c. Eelgrass beds shall reach a minimum recovery of 100 percent aerial coverage and 85 percent density compared to preconstruction levels.

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[4] Maps of eelgrass beds in the San Francisco Bay are available on the Department of Fish and Wildlife's MarineBIOS website at http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/seagrass_info/california_eelgrass.html. To access the eelgrass layers, click on the habitat drop down menu of the layers tab.

[5] NOAA Fisheries. October 2014. *California Eelgrass Mitigation Policy and Implementing Guidelines*. Available on-line at http://www.westcoast.fisheries.noaa.gov/publications/habitat/california_eelgrass_mitigation/Final%20CEMP%20October%202014/cemp_oct_2014_final.pdf.

d. If the affected eelgrass mitigation areas have not met the recovery criteria described above at the end of the 2-year monitoring period, additional mitigation will be required at a minimum mitigation ratio of areal coverage of 1.2:1.

The MMP shall be prepared by a qualified biologist with experience in surveying, monitoring, and implementing eelgrass mitigation plans.

6. To compensate for impacts not related to eelgrass impacts, the Permittee shall propose mitigation commensurate with the impacts.
7. The purpose of the required monitoring is to evaluate the success or failure of avoidance, minimization, and compensatory mitigation for eelgrass impacts. The level of detail of the MMP and associated reporting shall be commensurate with the scope and size of the restoration.
8. New anchored moorings and persistently moored vessels shall be placed in areas in which submerged aquatic vegetation habitat is ordinarily absent.
9. Persistently moored vessels shall be placed in waters deep enough so that the bottom of the vessel remains a minimum of 18 inches off the substrate during extreme low tide events to prevent adverse grounding impacts to benthic habitat.
10. Piles shall be removed with a vibratory hammer whenever practicable.
11. Piles shall be installed during low tide periods using a vibratory hammer, unless the Permittee demonstrates that it is infeasible.
12. Impact hammer use with wood piles shall be limited to projects using only one hammer, and no more than 20 piles shall be installed per day.
13. Impact hammer use with concrete piles shall be limited to piles less than 18 inches in diameter, and no more than 20 piles shall be installed per day.
14. Impact hammer use with steel piles shall be limited to piles less than 12 inches in diameter, and the hammer must be 3000 pounds or smaller and must use a wood or nylon (plastic) cushion block between hammer and pile. Projects shall be limited to using only one hammer, and no more than 20 piles shall be installed per day.
15. In-water construction periods shall be restricted to environmental work windows protective of aquatic species (June 1 – November 30).
16. Project activities within 700 feet of tidal marsh or suitable Ridgway's Rail (formerly California Clapper Rail) or California Black Rail habitat are prohibited during rail breeding season (January 15 – August 31 for Ridgway's Rail, February 1 – August 31 for California Black Rail).
17. No project activities shall occur within 50 feet of suitable Ridgway's Rail or California Black Rail habitat during extreme high tide events or when adjacent tidal marsh is flooded. Extreme high tides events are defined as a tide forecast of 6.5 feet or higher measured at the Golden Gate Bridge and adjusted to the timing of local high tides.

Application Requirements

18. The Order covers activities associated with construction or maintenance, including upgrades, retrofit, expansion, demolition, and reconfiguration of piers and docks (including associated ramps and floating docks) where the Permittee owns or operates a facility of less than 10,000 sq. ft. of overwater coverage, including any expanded areas. This includes pile removal, replacement, and

installation. The General WDRs do not cover such activities by owners or operators of piers and docks greater than 10,000 sq. ft.

19. This Order covers activities associated with upgrade, retrofit, expansion, demolition, and reconfiguration and new construction of wharves and marinas where the Permittee owns or operates a facility of less than 50,000 sq. ft. of overwater coverage. This includes pile removal, replacement, and installation. The General WDRs do not cover such activities by owners or operators of wharves and marinas greater than 50,000 sq. ft.
20. This Order covers bank and shoreline stabilization activities associated with the construction, maintenance, demolition, and reconfiguration of an associated overwater structure. Bank stabilization activities covered by the Order are limited to 500 linear feet of shoreline for repair of existing structures, 200 linear feet for new structures, and 1,000 sq. ft. in area. Bank stabilization or breakwater projects not connected to the construction, maintenance, or demolition of an overwater structure are not covered by this Order.
21. This Order covers the placement and replacement of temporary and permanent floats and buoys, when that replacement is part of the construction and maintenance of overwater structures.
22. Permittees shall submit to the Regional Water Board a project plan along with a completed Notice of Intent to Comply with the Terms of the WDRs/WQC Form (NOI) (Attachment C), which will serve as a report of waste discharge, indicating the intent to discharge in compliance with the terms and conditions of this Order.
23. The NOI must be signed by the Permittee or the Permittee's authorized agent. The NOI must include a statement that the submitted information is complete and describe why the project is water dependent. Pre-project photographs shall also be included with a descriptive title, date taken, photographic site, and photographic orientation.
24. The NOI shall indicate whether the project area contains eelgrass beds and the result of any pre-construction eelgrass survey(s).
25. The NOI shall indicate whether Ridgway's Rail or California Black Rail are present, if work is proposed within their breeding season.
26. The NOI shall include an alternative analysis consistent with the specifications of U.S. EPA's Clean Water Act Section 404(b)(1) Guidelines (Alternatives Analysis) demonstrating that the Permittee will sequentially avoid and minimize any adverse impacts to waters of the State and U.S. resulting from the project to the maximum extent practicable, The thoroughness of the alternatives analysis shall be commensurate with the purpose of the discharge, the value and sensitivity of the receiving water(s), and the extent, severity, and duration of the effect on the quality of waters. The Alternatives Analysis shall demonstrate the following:
    a. Avoidance - No discharge shall be permitted if there is a practicable alternative[6] to the proposed discharge, which would have less adverse impact to the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences.

[6] An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the Permittees which could reasonably be obtained, utilized, expanded, or managed in order to fulfil the basic purpose of the proposed activity may be considered (this definition is the same as presented in federal regulations at section 230.10(a)(2) of Title 33 of the CFR).

b. Minimization – Unavoidable temporary impacts shall be mitigated by restoring waterbodies and vegetation to pre-discharge conditions as quickly as practicable and by taking other practicable measures to reduce the severity and duration of such impacts.

27. If the Alternatives Analysis demonstrates that it is not practicable to avoid all adverse impacts to waters of the State and U.S., the NOI shall include a MMP that, when implemented, will compensate for any unavoidable adverse impacts to waters of the State and U.S. Specifically, the MMP shall demonstrate that discharges resulting in unavoidable permanent impacts to waters of the State and U.S. shall result in "no net loss" of area (acreage), functions, and beneficial use values by providing appropriate compensatory mitigation including creation, restoration, enhancement, or (in exceptional cases) preservation of waters of the State and U.S. The Executive Officer will consider, at a minimum, the following when reviewing the adequacy of compensatory mitigation:

- Highest potential condition of habitat onsite;
- Value of project site for habitat connectivity;
- Ratio of area of proposed compensation to proposed loss;
- Certainty of successfully implementing the compensatory mitigation proposal;
- Monitoring methods and performance criteria for determining success of the compensatory mitigation proposal;
- Contingency plan for failure to meet performance criteria; and
- Any other information requested by the Regional Water Board or State Water Board.

Upon finding that a Permittee has submitted a complete and acceptable NOI, the Executive Officer may issue a Notice of Applicability (NOA) to the Permittee, indicating that the project activities are authorized under this Order. If project activities do not qualify for coverage, the Executive Officer shall issue a Notice of Exclusion (NOE) stating the project is not authorized under the Order. If a project does not comply with State water quality standards, the Executive Officer may issue a denial of certification for the project. If the State or Regional Water Board does not issue a NOA or NOE to the Permittee within 30 days of receipt of the Application, the Permittee may proceed with the discharge.

28. Notice of Completion - Permittees shall provide the Regional Water Board a Notice of Completion (NOC) no later than 30 days after project completion and shall demonstrate that the project has been carried out in accordance with the project's description as provided in the Application. The NOC shall include a map of the project location(s), including the final boundaries of the project area(s) and post-project photographs. Each photograph shall include a descriptive title, date taken, and photographic site identification.

General Provisions

29. All Provisions in this Order apply to all waters located within San Francisco Bay.

30. Permittees shall comply with all the Discharge Prohibitions, Discharge Specifications, Receiving Water Limitations, and Provisions of this Order immediately as provided in the Order.

31. Permittees shall comply with all necessary approvals or permits for the proposed overwater activities, including, but not limited to, those issued by the Regional Water Board, California Department of Fish and Wildlife (CDFW), the Corps, the U.S. Fish and Wildlife Service (USFWS), NMFS, and local agencies. Permittees shall submit copies of such approvals or permits to the Executive Officer with their NOIs and not later than prior to implementation of overwater activities.

32. The final disposition of archaeological, historical, and paleontological resources recovered on State land under the jurisdiction of the California State Lands Commission must be approved by the Commission.

33. These WDRs and water quality certification do not allow for the take, or incidental take, of any special status species. Permittees shall use the appropriate protocols, as approved by CDFW, USFWS, and NMFS, to ensure that overwater activities do not impact the beneficial use of the Preservation of Rare and Endangered Species.

34. Permittees shall implement overwater activities in accordance with the findings herein and shall comply with all applicable water quality standards.

35. If, at any time, an unauthorized discharge to surface water occurs, or any water quality problem arises, the associated overwater activities shall cease immediately until corrective actions have been implemented, including ensuring that adequate BMPs are implemented to eliminate the discharge, and clean up and remediate any recoverable pollutants. The Regional Water Board shall be notified promptly and in no case more than 24 hours after the unauthorized discharge or water quality problem arises.

36. Permittees shall report promptly to the Regional Water Board any proposed material change in the character, location, area, and/or volume of the discharge. Permittees shall obtain confirmation from the Regional Water Board that such proposed modifications do not disqualify the Permittee from coverage under these General WDRs.

37. This Order is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Water Code section 13330 and 23 CCR section 3867.

38. The Regional Water Board may add to or modify the conditions of this Order, as appropriate, to implement any new or revised water quality standards and implementation plans adopted or approved pursuant to the Water Code or CWA section 303.

39. Permittees shall maintain a copy of this Order and all relevant plans at work sites, so as to be available at all times to site operating personnel.

40. Permittees shall permit Regional Water Board staff or its authorized representative, upon presentation of credentials:

    a. Entry on to the premises on which maintenance activities are planned or under way, wastes are located, or in which records are kept.

    b. Access to copy any records required to be kept under the terms and conditions of this Order.

    c. Access to sample any discharge or surface water covered by this Order.

41. In the event of any violation or threatened violation of the conditions of this Order, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under applicable State or federal law. Permittees shall implement all mitigation measures identified in the Order relating to aquatic species, water quality, and hazardous materials.

42. Permittees shall pay the full fees required by 23 CCR section 3833 and owed by the Permittees. The State Water Board dredge and fill fee calculator for General Orders is located at http://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/dredgefillcalculator.xlsx A check payable to the Regional Water Board in the appropriate amount shall be enclosed with the copy of the NOI.

43. This Order is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR subsection 3855(b) and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

44. This Order is not transferable.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on February 14, 2018.

Digitally signed by Bruce H. Wolfe
Date: 2018.02.23 17:33:14 -08'00'

Bruce H. Wolfe
Executive Officer

Attachment A: National Marine Fisheries Services Essential Fish Habitat Consultation for the construction and maintenance of overwater structures in San Francisco Bay

Attachment B: California Eelgrass Mitigation Policy and Implementation Guidelines

Attachment C: Notice of Intent to Comply with the Terms of the WDRs/WQC Form

Attachment A

NMFS Essential Fish Habitat Consultation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

OCT 11 2011

In response refer to:
2011/06605

Lieutenant Colonel Torrey A. DiCiro
District Engineer
U.S. Army Corps of Engineers
San Francisco District
1455 Market Street
San Francisco, California 94103-1398

Dear Lt. Colonel DiCiro:

Thank you for your letter of December 7, 2010, requesting a programmatic consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to the essential fish habitat (EFH) provisions of the Magnuson Stevens Fishery Conservation and Management Act (MSA). This consultation pertains to construction and maintenance of overwater structures in the San Francisco Bay area authorized by the San Francisco District of the U.S. Army Corps of Engineers' (USACE) Regulatory Program under section 10 of the Rivers and Harbors Act of 1899 (33 USC §401-413) and section 404 of the Clean Water Act (33 USC §1251 *et seq.*).

Section 305(b)(2) of the MSA requires federal action agencies to consult with NMFS for any action they authorize, fund, or undertake that may adversely affect EFH. Programmatic consultation provides an efficient and effective means for NMFS and a federal agency to consult regarding a potentially large number of similar individual actions occurring within a given geographic area. NMFS has determined that in accordance with 50 CFR 600.920(j) of the EFH regulations, programmatic consultation is appropriate for construction and maintenance of overwater structures in the San Francisco Bay area, because all activities are routinely undertaken or authorized by USACE, and sufficient information is available to develop EFH Conservation Recommendations that will address reasonable foreseeable adverse impacts to EFH.

This programmatic EFH consultation applies to new or replacement overwater structure construction, modification, maintenance, and associated indirect activities as described in the enclosed consultation. This programmatic consultation will not cover any dredging activities or fill activities (*e.g.*, breakwaters, boat ramps) other than pilings to support overwater structures. The geographic scope of this consultation includes the estuarine waters of the San Francisco Bay region and portions of the Sacramento-San Joaquin Delta west of Sherman Island.

In the enclosed programmatic EFH consultation, NMFS has evaluated the potential adverse effects to EFH pursuant to Section 305(b)(2) of the MSA. As described in enclosed effects analysis, NMFS has determined that the programmatic activities would adversely affect EFH and Habitat Areas of Particular Concern (HAPC) for various federally-managed fish species within the Pacific Groundfish, Pacific Salmon, and Coastal Pelagic Fishery Management plans. Adverse effects include: increased shading, wave energy regime and substrate effects, water quality degradation, elevated levels of sound pressure waves, support or spread of non-indigenous species, and cumulative effects. Therefore, pursuant to section 305 (b)(4)(A) of the MSA, NMFS offers the enclosed Programmatic EFH Conservation Recommendations to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH.

Please be advised that regulations (50 CFR 600.920(k)) to implement the EFH provisions of the MSA require your office to provide a written response to this programmatic consultation within 30 days of its receipt and prior to its use. A preliminary response indicating the anticipated submission date of the final response is acceptable if a final response cannot be completed within 30 days. Your final response must include a description of how the EFH Conservation Recommendations will be implemented and any other measures that will be required to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with any of our EFH Conservation Recommendations, you must provide an explanation for not implementing the recommendation(s) at least 10 days prior to final approval of the action. This explanation must include scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects.

Once NMFS and USACE reach agreement on the programmatic EFH Conservation Recommendations, an individual overwater structure project must implement all of the EFH Conservation Recommendations relevant to that project in order to be covered with this programmatic EFH consultation. If relevant EFH Conservation Recommendations are not implemented, USACE must initiate a separate EFH consultation for that project.

This programmatic EFH consultation will be in effect for 10 years from the date of issuance. At any time, NMFS may revoke or revise this programmatic consultation if it is determined that it is not being implemented as intended or if new information becomes available indicating a significant discrepancy in either the effects analysis or effectiveness of EFH Conservation Recommendations.

Please note that Public Notices will no longer need to initiate EFH consultation for overwater structure projects that are covered by this programmatic EFH consultation, but should instead state that projects are covered by the programmatic EFH consultation and indicate which EFH Conservation Recommendations are being implemented relevant to the project.

If you have any questions regarding this programmatic consultation or require additional information, please contact Korie Schaeffer of my staff at (707) 575-6087, or by electronic mail at Korie.Schaeffer@noaa.gov.

Sincerely,

Robert S. Hoffman
Assistant Regional Administrator
for Habitat Conservation

Enclosure

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Copy to File Administrative Record # 1501316SWR2011SR00174

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT
ESSENTIAL FISH HABITAT CONSULTATION

ACTION AGENCIES	United States Army Corps of Engineers, South Pacific Division, San Francisco District (USACE)
ACTION	Construction of New and Replacement Overwater Structures in the San Francisco Bay Area
CONDUCTED BY	National Marine Fisheries Service, Southwest Region
TRACKING NUMBER	2011/06605
DATE ISSUED	OCT 11 2011

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I. STATUTORY AND REGULATORY INFORMATION

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, establishes a national program to manage and conserve the fisheries of the United States through the development of federal Fishery Management Plans (FMPs), and federal regulation of domestic fisheries under those FMPs, within the 200-mile U.S. Exclusive Economic Zone ("EEZ"). 16 USC §1801 *et seq*. To ensure habitat considerations receive increased attention for the conservation and management of fishery resources, the amended MSA required each existing, and any new, FMP to "describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 1855(b)(1)(A) of this title, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat." 16 U.S.C. §1853(a)(7). Essential Fish Habitat (EFH) is defined in the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" 16 USC §1802(10). The components of this definition are interpreted at 50 CFR §600.10 as follows: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Pursuant to the MSA, each federal agency is mandated to consult with NOAA's National Marine Fisheries Service (NMFS) (as delegated by the Secretary of Commerce) with respect to any action authorized, funded, or undertaken, or proposed to be, by such agency that may adversely affect any EFH under this Act. 16 USC §1855(b)(2). The MSA further mandates that where NMFS receives information from a Fishery Management Council or federal or state agency or determines from other sources that an action authorized, funded, or undertaken, or proposed to be, by any federal or state agency would adversely affect any EFH identified under this Act, NMFS has an obligation to recommend to such agency measures that can be taken by such agency to conserve EFH. 16 USC §1855(4)(A). The term "adverse effect" is interpreted at 50 CFR §600.810(a) as any impact that reduces quality and/or quantity of EFH and may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce quantity and/or quality of EFH. In addition, adverse effects to EFH may result from actions occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

If NMFS determines that an action would adversely affect EFH and subsequently recommends measures to conserve such habitat, the MSA proscribes that the federal action agency that receives the EFH Conservation Recommendation must provide a detailed response in writing to NMFS within 30 days after receiving EFH Conservation Recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS' EFH

Conservation Recommendations, the federal agency must explain its reasons for not following the recommendations. 16 USC §1855(b)(4)(B).

Consultation can be addressed programmatically to broadly consider as many adverse effects as possible through programmatic EFH Conservation Recommendations. 50 CFR 600.920 (j) states that programmatic consultation is appropriate for specified activities, if sufficient information is available that will allow NMFS to develop EFH Conservation Recommendations, which address reasonable and foreseeable adverse impacts to EFH resulting from activities of a program. The purpose of a programmatic consultation is to implement the EFH consultation requirements efficiently and effectively by incorporating many individual actions that may adversely affect EFH into one consultation.

II. BACKGROUND AND CONSULTATION HISTORY

NMFS routinely consults with U.S. Army Corps of Engineers (USACE) on both new and replacement overwater structure projects in the San Francisco Bay area. Due to the similarity in permitted projects impacts on EFH and the Conservation Recommendations offered, NMFS determines that consulting on these activities programmatically would improve NMFS' protection of trust resources, provide certainty in the regulatory requirements for applicants, and streamline the permitting process.

October 2010	NMFS and USACE began discussions for Programmatic EFH consultation.
December 2010	USACE issued request for Programmatic EFH consultation for Overwater Structures in San Francisco Bay.
December 2010 - February 2011	NMFS and USACE coordinated meetings to discuss the scope of projects covered and to determine project size thresholds.
April 21, 2011	NMFS provides a first draft of this document to USACE for preliminary review.
June 2011 - July 2011	NMFS received comments on first draft and provides USACE with revisions.
September 2011	Final programmatic consultation issued.

III. PROPOSED ACTION

A. Overview of Programmatic Consultation

This Programmatic Consultation applies to permit applications for (standard permits, letters of permission, nationwide permits, or general permits of those types of authorization) under the San Francisco District of the USACE' Regulatory Program within the defined geographic area (see section IV.A below). The following permits are considered together as they are administered together by the USACE' Regulatory Branch through a single permit application.

RIVERS AND HARBORS ACT OF 1899 (SECTION 10)
Authorities: 33 U.S.C. § 401-413: Rivers and Harbors Act of 1899; 33 CFR 323: Permits for Structures or Work Affecting Navigable Waters of the United States.

CLEAN WATER ACT (SECTION 404)
Authorities: 33 U.S.C. §1251 et seq.: Federal Water Pollution Control Act; 33 FCR 322: Permits for Discharges of Dredged or Fill Material into the Waters of the United States.

A Section 10 permit is required for all work, including structures, within waters subject to the ebb and flow of the tide shoreward to the mean high water mark and/or presently used, or have been used in the past, or are susceptible for use to transport interstate or foreign commerce. The term includes coastal and inland waters, lakes, rivers and streams that are navigable, and the territorial seas. A Section 404 permit is required for activities that involve the discharge of dredged or fill material into waters of the United States, including not only navigable waters, but also coastal waters, inland rivers, lakes, streams, and wetlands.

The San Francisco District routinely permits (Section 10 and 404) a variety of projects that occur in estuarine and near shore waters designated as EFH. These projects include constructing, maintaining, replacing and expanding various structures including piers, wharves, bulkheads, dolphins, marinas, floating docks and floats.

B. Actions

Due to the similarity of activity effects on EFH, NMFS determines that a category of activities authorized by the San Francisco District of USACE may be covered under a single programmatic consultation. This programmatic consultation applies to new or replacement overwater structure construction, modification, maintenance, and associated indirect activities as described below. The scope of activities covered in this programmatic consultation includes the following and will NOT cover any dredging activities or fill activities (*e.g.*, breakwaters, boat ramps) other than pilings to support overwater structures:

1. Piers/Docks – Covers all activities associated with upgrade/retrofit, expansion, reconfiguration and new construction of piers and docks (including associated ramps and floating docks) with less than 10,000 square feet (sq ft) of overwater coverage. This includes pile removal, replacement, and installation. All projects proposing overwater

coverage's in excess of 10,000 sq ft, new or existing, will require individual consultation with NMFS and will not be covered under this programmatic consultation.

2. Wharves/Marinas – Covers all activities associated with upgrade/retrofit, expansion and reconfiguration and new construction of wharfs and marinas with less than 50,000 sq ft of overwater coverage. This includes pile removal, replacement, and installation. All projects proposing new or existing, overwater coverage's in excess of 50,000 sq ft, will require individual consultation with NMFS and will not be covered under this programmatic consultation.

3. Bank stabilization – Covers those activities that are proposed in association with the construction or demolition of an associated overwater structure and meets the size limits for bank stabilizations covered by the not likely to adversely affect (NLAA) programmatic (NMFS tracking #2007/07427). Activity is limited to 500 linear feet of shoreline for repair of existing structures, 200 linear feet for new structures, or 1,000 sq ft in area (for details, see http://swr.nmfs.noaa.gov/hcd/HCD_webContent/EFH/ Programmatic_EFH%20NLAA_Consultation_122107.pdf). Individual bank stabilization or breakwater projects that are not connected to the construction or demolition of an associated overwater structure are not covered by this programmatic consultation.

4. Moorings/Floats/Buoys – Covers all activities associated with temporary and permanent mooring, float, and buoy placement.

C. Effective Date and Duration

This programmatic EFH consultation will be in effect for 10 years from the date of issuance. At any time, NMFS may revoke or revise this programmatic consultation if it is determined that it is not being implemented as intended or if new information becomes available indicating a significant discrepancy in either the effects analysis or effectiveness of EFH Conservation Recommendations.

IV. ACTION AREA

The proposed activities occur within areas identified as EFH for various life stages of fish species managed with the following Fishery Management Plans (FMP) under the MSA:

Pacific Groundfish FMP – various rockfish, sole and sharks;
Pacific Salmon FMP – Chinook salmon; and
Coastal Pelagic FMP – northern anchovy, Pacific sardine, mackerel, squid.

In addition, some activities will occur within areas designated as Habitat Areas of Particular Concern for various federally managed fish species within the Pacific Groundfish FMP. Habitat Areas of Particular Concern (HAPC) are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or

located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. As defined in the Pacific Groundfish FMP San Francisco Bay is designated as estuary HAPC. Submerged aquatic vegetation (SAV), such as eelgrass and widgeon grass, occurs within the project footprint and is also designated as HAPC.

Because SAV distribution fluctuates and can expand, contract, disappear, and recolonize, SAV presence within the action area may not always be consistent. Therefore, this programmatic EFH consultation references suitable SAV habitat, which are those habitats generally definable based on history of SAV presence, and/or physical characteristics.

A. Geographic Scope

The action area spans 10 counties, including Marin, Sonoma, Napa, Solano, San Joaquin, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco counties. The geographic scope of potential impacts included in this consultation comprises the estuarine waters of the San Francisco Bay region and portions of the Sacramento-San Joaquin Delta (Delta) west of Sherman Island. It also includes the wetlands and shallow intertidal areas that form a margin around the estuary and the tidal portion of its tributaries. It includes the Napa River, Petaluma River, and other freshwater tributaries up to the limit of tidal exchange. It does not include waters west of the Golden Gate Bridge or the mountainous or inland areas far removed from navigable waters. See Figure 1 for detailed representation of the action area and the geographic scope covered by this programmatic.

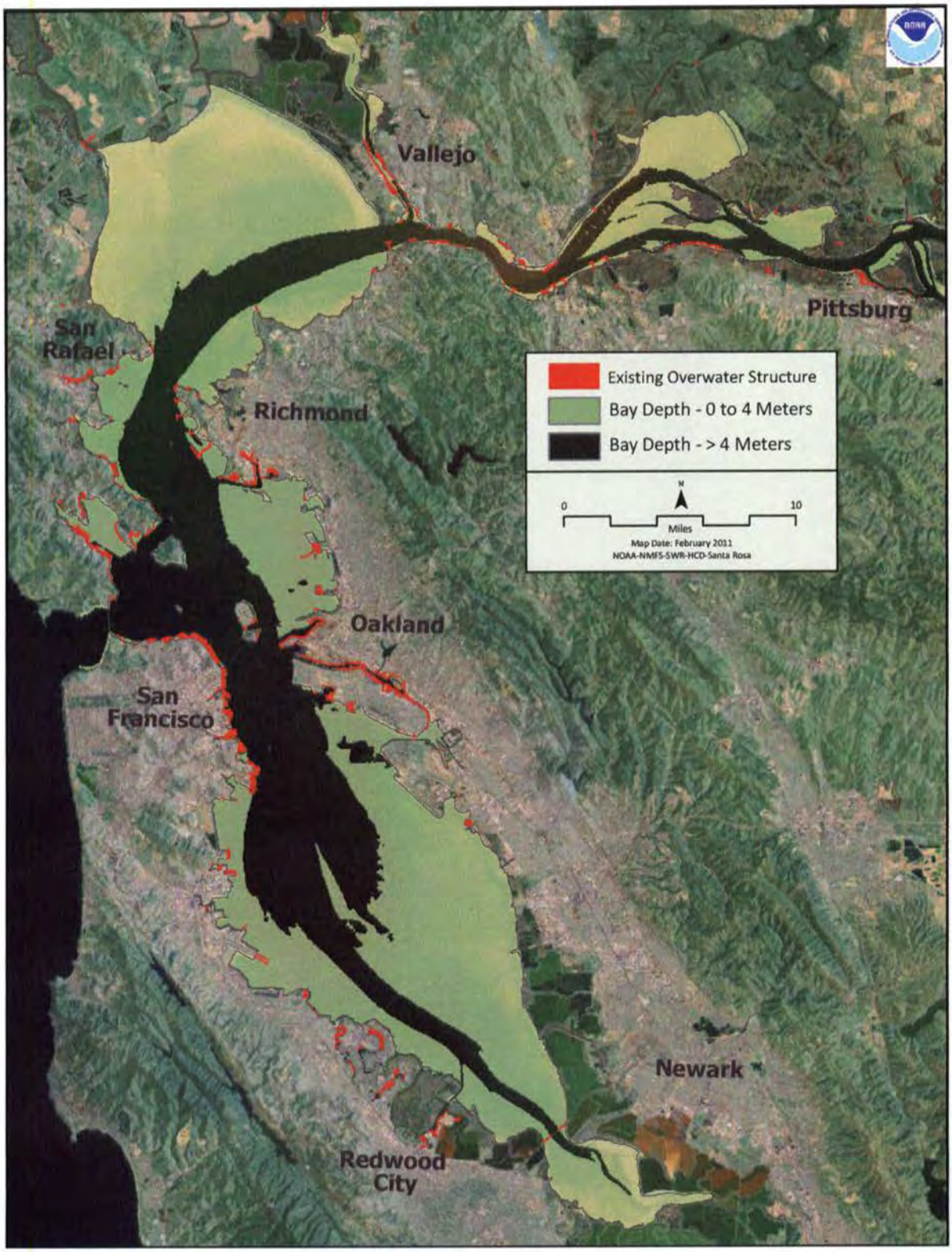

Figure 1. Action area covered by the EFH Programmatic Consultation for Overwater Structures in San Francisco Bay.

B. Habitat Types

For the purposes of this programmatic consultation, habitats within the geographic scope of the proposed project are categorized and described as follows:

Soft bottom habitat

Soft bottom substrates are the most common substrate types in San Francisco Bay. They are characterized by a lack of large stable surfaces for plant and animal attachment. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms within the sediments (USGS 1998). Soft bottom substrates do provide habitat for epibenthic microalgae, and a diverse assemblage of invertebrate epifauna and infauna, and therefore provide important habitat for fish to forage, reproduce, rear, and grow (NMFS 2007).

Wetland habitat

There are numerous definitions for the term "wetland" with 19 definitions recently identified by the San Francisco Estuary Institute (SFEI 2009). At the federal level, both the U.S. Fish and Wildlife Service (USFWS) and USACE have specified unique definitions. USFWS' definition includes the following language:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

USACE defines wetlands as follows:

> The term "wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

USACE established identification and delineation procedures for wetlands, specifically the USACE 1987 Wetland Manual and subsequent regional supplements (USACE 2010). According to USACE' definition and delineation methodology, areas that are not dominated by hydrophytes but that provide wetland beneficial uses and ecological services, such as tidal flats, are not necessarily identified as wetlands. However, tidal flats are known to provide productive shallow water habitat for epibenthic fishes (Sogard and Able 1991).

While all areas of a properly functioning wetland benefit fish in some way, there are specific components that are directly considered fish habitat. For the purposes of this document, the

following wetland components are considered fish habitat: tidal marsh, tidal flats, and tidal sloughs. Given the varying definitions for the term "wetland", these wetland components that are important for fish survival, reproduction, and growth to maturity will be collectively referred to as "marsh complex" in subsequent sections.

Tidal marshes, which include brackish and salt marshes, are vegetated wetlands subject to tidal action that occur throughout much of the Bay extending from approximately Mean Sea Level to the maximum height of the tides. Established tidal marshes provide an essential and complex habitat for many species of fish, other aquatic organisms and wildlife. Tidal marshes provide foraging habitat and refugia for fish (Boesch and Turner 1984). In the early 1800s, tidal marshes covered some 190,000 acres on the fringes of the Bay. Tidal marsh bordering the Bay now totals approximately 40,000 acres, a loss of approximately 80 percent of the Bay's historic tidal marshes.

Tidal flats occur from the elevation of the lowest tides to approximately Mean Sea Level and include mudflats, sandflats and shellflats. Mudflats comprise the largest area of tidal flat areas and support an extensive community of invertebrate aquatic organisms, such as diatoms, worms and shellfish, as well as fish that feed during higher tides, and plants such as algae and eelgrass. Of the 50,000 acres of tidal flats that historically occurred around the margins of the Bay, approximately 30,000 acres remain, a reduction of approximately 40 percent (Goals Project 1999).

Sloughs/channels are the primary paths of moving water through wetlands, providing fish access to productive foraging habitat. Sloughs are subtidal, allowing fish permanent access and offering a haven between tidal inundations of salt marshes. Slough habitat is used for more than just transit to productive wetlands as demonstrated by observations of greater species diversity in sloughs than in associated shallow tidal creeks (Desmond *et al.* 2000). Sloughs occur throughout the San Francisco Bay, for example, Montezuma and Suisun Sloughs in Suisun Bay, branches off the lower portions of the Napa and Petaluma rivers in the North Bay, branches off Corte Madera Creek in the Central Bay, and Redwood, Alviso, and Guadalupe sloughs in the South Bay.

Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV) collectively refers to the vascular plants that grow rooted in the sediments of marine, estuarine, and freshwater systems, and which grow completely submerged during some part of the tidal cycle. SAV species that are known to occur in the action area include eelgrass, widgeon grass, and sago pondweed.

Eelgrass (*Zostera marina*) is a flowering vascular plant that grows both subtidally and intertidally in estuaries and in shallow coastal areas. Studies have shown that seagrasses, including eelgrass, are among the areas of highest primary productivity in the world (Herke and Rogers 1993, Hoss and Thayer 1993). In San Francisco Bay, eelgrass beds are considered to be a valuable shallow-water habitat, providing shelter, feeding, or breeding habitat for many species of invertebrates, fishes, and some waterfowl. Eelgrass beds supply organic material to nearshore environments, and their root systems stabilize area sediments. Intermittent eelgrass surveys suggest eelgrass

abundance has varied greatly in San Francisco Bay in the last several decades. In the late 1920s, eelgrass was reported as an abundant species along the shores of San Francisco Bay (Setchell 1929). In 1987, a survey of the Bay found only 128 hectares of eelgrass, with much of the existing habitat exhibiting conditions of environmental stress (Wyllie-Echeverria and Rutten 1989, Wyllie-Echeverria 1990). In 2003 and 2009, hydroacoustic surveys documented 1,061 and 1,500 hectares of eelgrass, respectively, covering approximately 1 percent of San Francisco Bay (Merkel & Associates 2004, 2010a). Monitoring in 2010 resulted in a baywide eelgrass estimate of 1,522 hectares (Merkel & Associates 2010b).

As discussed above, eelgrass is designated as EFH for various federally-managed fish species within the Pacific Groundfish and Pacific Salmon Fisheries Management Plans (FMP) (PFMC 2008 and PFMC 1999). Eelgrass is designated HAPC for various species within the Pacific Groundfish FMP, and considered a special aquatic site under the 404 (b)(1) guidelines of the Clean Water Act (40 CFR Part 230.43). Under these guidelines, special aquatic sites are subject to greater protection than other waters of the United States, because of their significant contribution to the overall environment.

Two additional native SAV species, widgeon grass (*Ruppia sp.*) and sago pondweed (*Stuckenia* or *Potamogeton*) occur within San Francisco Bay. While less is known about these species than is known about eelgrass, they provide primary productivity and organic material to nearshore environments and provide shelter for invertebrates and fishes. Native submerged aquatic vegetation is designated as EFH for various federally-managed fish species within the Pacific Groundfish and Pacific Salmon FMPs and is designated HAPC for various species within the pacific Groundfish FMP (PFMC 2008 and PFMC 1999).

Rock Habitat

Rock habitats are generally categorized as either near shore or offshore in reference to the proximity of the habitat to the coastline. Rock habitat may be composed of bedrock, boulders, or smaller rocks, such as cobble and gravel. Hard substrates are one of the least abundant benthic habitats in the action area, yet they are among the most important habitats for groundfish species. Rock habitats provide the appropriate substratum for colonization of diverse algal and invertebrate assemblages creating a complex physical and biogenic habitat that provides important shelter and foraging opportunities for many species of groundfish. NMFS expects very few overwater structures will adversely affect natural rocky reef communities given their predominantly open coast distribution. Most overwater structure projects occur within protected waters. Therefore, a detailed description of rock habitat does not seem warranted for this programmatic consultation.

V. EFFECTS OF THE ACTION

A. Types of Effects

Alterations to the near shore light, wave energy, and substrate regimes affect the nature of

EFH and near shore food webs that are important to a wide variety of marine finfish and shellfish (Armstrong *et al.*1987; Beal 2000; Burdick and Short 1995; Cardwell and Koons 1981; Fresh and Williams 1995; Kenworthy and Haunert 1991; Olson *et al.* 1996; Parametrix and Battelle 1996; Penttila and Doty 1990; Shafer 1999; Simenstad *et al.* 1978, 1979, 1980, 1998; Thom and Shreffler, 1996; Weitkamp 1991).

Overwater structures and associated activities can impact the ecological functions of habitat by altering habitat controlling factors. These alterations can, in turn, interfere with habitat processes supporting the key ecological functions of fish spawning, rearing, and refugia. The matrix presented in Table 1, adapted from Nightingale and Simenstad (2001), identifies the potential mechanisms of impact overwater structures can pose to near shore habitats. Whether any of these impacts occur and to what degree they occur at any one site depends upon the nature of site-specific habitat controlling factors and the type, characteristics, and use patterns of a given overwater structure located at a specific site.

Each of the types of effects discussed below in considered in terms of their direct, indirect, and cumulative effects. NMFS defines the impacts as follows (modified from The National Environmental Policy Act (NEPA) Regulations):

1. Direct - Direct effects are caused by the action and occur at the same time and place.

2. Indirect - Indirect effects are caused by the action or associated actions and may occur later in time or farther removed in distance, but are still reasonably foreseeable.

3. Cumulative - Cumulative impacts are the impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Table 1. Overwater structure near shore habitat impact mechanisms (modified from Nightingale and Simenstad 2001)

Habitat Controlling Factors	Overwater Structure and Activities	Direct Impacts	Indirect Impacts
Light Regime and Shading Effects	• Piers/Docks • Wharves/Marinas • Floats/Moored Vessels • Pilings	• Reduced light levels • Altered ambient light patterns	• Limited plant growth and recruitment • Altered plant and animal assemblages • Altered animal behavior

Wave Energy Regime	• Piers/Docks • Wharves/Marinas • Floats/Moored Vessels • Pilings	• Altered wave and tidal energy patterns	• Altered plant and animal assemblages • Altered substrate type • Altered sediment transport and distribution
Substrate Effects	• Propeller and anchor scour • Floats and moored vessels (grounding) • Piling install/removal	• Substrate disturbance and smothering	• Altered plant and animal assemblages • Altered substrate type • Altered sediment transport and distribution
Water Quality Effects	• Discharges from marinas/wharves • Boat and upland run-off • Piling install/removal	• Increased Non-indigenous species • Increased toxics • Increased nutrients and bacterial introductions	• Altered plant and animal assemblages • Limited growth and recruitment • Exotic species replacement of natives
Noise Effects	• Pile install/removal	• Physical injury to fish	• None anticipated
Non-indigenous Species	• Piers/Docks • Wharves Marinas • Floats/Moored Vessels • Pilings	• Increased Non-indigenous species	• Altered plant and animal assemblages • Exotic species replacement of natives

1. Shading Effects

a.) Direct Impacts

The underwater light environment is a naturally light-reduced ecosystem. Light is attenuated with depth as a result of refraction at the water's surface and through scatter and absorption of light by phytoplankton, detritus and dissolved organic matter in the water column. Depending on the biological, physical, and chemical properties of the water, the light available at depth may be dramatically reduced from that available at the surface. Because light energy drives the photosynthetic process controlling plant growth and survival, it is one of the principal limiting factors of primary productivity (Govindjee and Govindjee 1975, Underwood and Kromkamp 1999, MacIntyre *et al.* 1996). Marine and estuarine primary producers, including seagrass, salt marsh plants, and algae are particularly susceptible to light limitation (Kearny *et al.* 1983, Dennison *et al.* 1993, Shafer 1999, Shafer and Robinson 2001, Whitcraft and Levin 2007, Shafer *et al.* 2008).

Seagrasses have unusually high light requirements ranging from 10 percent to 37 percent of in-water surface irradiance (Kenworthy and Fonseca 1996). One explanation for the high light requirements of seagrass is the optical properties of the leaves. Optically active pigments (Chlorophylls *a* and *b*) are arranged in a complex manner within the chloroplasts in the cells, effectively reducing the light harvesting efficiency of the chlorophyll within the leaves (Larkum *et al.* 2006). These high light requirements make seagrasses particularly vulnerable to deteriorated water quality and light competition from micro- and macroalgal blooms induced by eutrophication, and shading from overwater structures (Zimmerman 2006).

Minimum light requirements for seagrass growth vary among species, due to physiological and morphological differences, and within species due to photoacclimation of populations to local light conditions (Duarte 1991, Lee *et al.* 2007). Thom *et al.* (2008) determined that eelgrass in the Pacific Northwest requires an average of at least 7 moles per square meter per day (mol/m^2/day) throughout the summer months, and an overall average of 3 mol/m^2/day for long term survival. In San Francisco Bay, similar results were described by Zimmerman *et al.* (1991), where eelgrass depth limits were strongly correlated with turbidity and light requirements. At the most turbid site, eelgrass maximum depth was only 0.5 meter, and plants required a period of light saturation of 11.1 hours. At the least turbid site eelgrass maximum depth was 2 meters, and plants there required only 6.7 hours of light saturation. Merkel's (2000) study in San Diego Bay examined the effects of light and temperature on eelgrass, and determined that eelgrass distribution and abundance in San Diego Bay was not temperature limited, but was light limited. Light conditions monitored at sites with and without eelgrass demonstrated significantly different levels of photosynthetically active radiation (PAR). The sites where eelgrass occurred typically had higher mean PAR values than the sites where eelgrass was absent. This study identified the threshold for eelgrass growth in San Diego Bay was 8.5mol/m^2/day.

In the already reduced light environment where marine and estuarine primary producers occur, the addition of overwater structures further reduces underwater light penetration through shading. Under-structure light levels can fall below the threshold for the photosynthesis of diatoms, algae, and eelgrass (Kenworthy and Haunert 1991). Thus, shading by such structures may adversely affect vegetation, habitat complexity, and overall net primary production (Haas *et al.* 2002, Struck *et al.* 2004).

Shading by overwater structures has empirically been demonstrated to decrease shoot density and biomass in temperate, tropical, and subtropical seagrass species, including *Zostera marina* L., *Thalassia testudinum, Halodule wrightii*, and *Posidonia australis* (Walker *et al.* 1989, Czerny and Dunton 1995, Loflin 1995, Burdick and Short 1999, Shafer 1999). Burdick and Short (1995, 1999) found that 75 percent of the floating docks in and around eelgrass beds resulted in complete seagrass loss underneath the dock, while the remainder resulted in significantly reduced cover. Given the variety of ecological functions associated with eelgrass, reductions in its extent may adversely affect estuarine and nearshore ecosystems.

Whitney and Darley (1983) found that microalgal communities in shaded areas are generally less productive than unshaded areas, with productivity positively correlated with ambient irradiance. Stutes *et al.* (2006) found a significant effect of shading on both sediment primary production and metabolism (*i.e.*, sediment respiration). Intertidal salt marsh plants are also impacted by shading. The density of *Spartina alterniflora* was significantly lower under docks than adjacent to docks in South Carolina estuaries, with stem densities decreased by 71 percent (Sanger *et al.* 2004). Kearny *et al.* (1983) found the *S. alterniflora* was shaded out completely under docks that were less than 40 centimeter high and that the elimination of the macrophytic communities under the docks ultimately led to increased sediment erosion.

Reductions in benthic primary productivity may in turn adversely affect invertebrate distribution patterns. For example, Struck *et al.* (2004) observed invertebrate densities under bridges at 25-52 percent of those observed at adjacent unshaded sites. These results were found to be correlated with diminished macrophyte biomass, a direct result of increased shading. Overwater structures that attenuate light may adversely affect estuarine marsh food webs by reducing macrophyte growth, soil organic carbon, and altering the density and diversity of benthic invertebrates (Whitcraft and Levin 2007). Reductions in primary and invertebrate productivity may additionally limit available prey resources for federally managed fish species and other important commercial and recreational species. Prey resource limitations likely impact movement patterns and the survival of many juvenile fish species. Adverse impacts to estuarine productivity may therefore have effects that cascade through the near shore food web.

Fishes rely on visual cues for spatial orientation, prey capture, schooling, predator avoidance, and migration. Juvenile and larval fish are primarily visual feeders with starvation being the major cause of larval mortality in marine fish populations. Early life history stages are likely critical determining factors for recruitment and survival, with survival linked to the ability to locate and capture prey and to avoid predation (Britt 2001). The reduced-light conditions found under an overwater structure limit the ability of fishes, especially juveniles and larvae, to perform these essential activities. For example, Able *et al.* (1999) found that caged fish under piers had growth rates similar to those held in a laboratory setting without food. In contrast, growth rates of fish caged in pile fields and open water were significantly higher. Able *et al.* (1998) also demonstrated that juvenile fish abundance and species richness was significantly lower under piers in an urban estuary. Although some visual predators may use alternative modes of perception, feeding rates sufficient for growth in dark areas usually demand high prey concentrations and encounter rates (Grecay and Targett 1996).

The shadow cast by an overwater structure may increase predation on federally managed species by creating a light/dark interface that allows ambush predators to remain in a darkened area (barely visible to prey) and watch for prey to swim by against a bright background (high visibility) (Helfman 1981). Prey species moving around the structure are unable to see predators in the dark area under the structure and are more susceptible to predation. Furthermore, the reduced vegetation (*i.e.*, eelgrass) densities associated with overwater structures decrease the available refugia from predators, and prey availability. As coastal development and overwater structure expansion continues, the underwater light

environment will continue to degrade resulting in adverse effects to EFH and near shore ecosystems.

The overall morphology of the shadow cast by a structure is dependent on the height, width, construction material, and polar orientation of the structure. Work by Battelle Marine Science Laboratory in Washington determined that shading influence from docks can range from four to ten times the total surface area of the dock depending upon dock orientation and season (Washington DNR, 2005). Therefore, the extent and the magnitude of shading impacts to primary producers and subsequently to the upper trophic levels in the system is both sites specific and directly influenced by the specific design of the overwater structure.

A number of studies have determined that modifications to the design of overwater structures can significantly increase the quantity of light transmitted through or around these structures to the underlying habitat, decreasing the impacts of shading and the size of the shaded footprint (Beal *et al.* 1999, Burdick and Short 1999, Blanton *et al.* 2002, Steinmetz *et al.* 2004, Fresh *et al.* 2006, Landry *et al.* 2008). Burdick and Short (1999) demonstrated that orientating docks along a north-south plane minimized the shading affect on eelgrass. Several studies have demonstrated that structures at least 5 feet above mean higher high water (MHHW) have a significantly reduced impact on primary producers (Beal *et al.* 1999, Burdick and Short 1999, Shafer *et al.* 2008). Docks built no wider than 4 feet in width have also been found to reduce shading impacts (Shafer *et al.* 2008). The use of light transmitting material and increased spacing between deck boards has also been found to increase the light transmitted through overwater structures, helping to decrease shading impacts resulting from these structures (Blanton *et al.* 2002, Fresh *et al.* 2006, Landry *et al.* 2008, Shafer *et al.* 2008). Dock construction guidelines following these principles have been developed and implemented with success in other regions (NMFS and USACE 2001).

b.) Indirect Impacts

Although shading impacts from overwater structures is considered the primary factor affecting primary producers, several other factors may also result in indirect impacts to these communities. Indirect effects may be associated with construction and maintenance of the overwater structure, or resulting from the long-term associated uses of the structure. As most overwater structures are designed to support boating activities, impacts from boats are a primary source of indirect effects, especially for seagrasses. For example, the presence of the boat itself increases the shading impact footprint. Simenstad *et al.* (1998) demonstrated that indirect effects from construction of overwater structures and boating activities contributed to the elimination of eelgrass, but also appeared to prohibit recruitment back to the area in the long-term.

c.) Cumulative Impacts

Although the area of primary producers directly impacted by an individual overwater structure may seem relatively small, the cumulative impacts resulting from all of the overwater structures throughout a geographic area, especially in highly developed areas, is

substantial. In addition to the direct impact of shading on the primary producers in the footprint of the individual structure, many overwater structures in an area contribute to the overall fragmentation of marine and estuarine macrophytes, seagrasses and saltmarshes. Fragmentation of eelgrass beds in particular may cause further destabilization of these habitats, making them more susceptible to other stressors or disturbances, such as eutrophication, disease or severe storms (Burdick and Short 1999). Reductions in macrophytic vegetation may compromise the physical integrity of remaining habitat by decreasing the attenuation of wave energy and sediment stabilization, leaving shaded, unvegetated, or sparsely vegetated areas more susceptible to further habitat loss by erosion (Knutson 1988, Walker *et al.* 1989).

2. Wave Energy Regime and Substrate Effects

a.) Direct Impacts

Changes to wave energy and water transport from overwater structures may have substantial impacts to near shore detrital foodwebs through alterations in substrate size, distribution and abundance (Hanson *et al.* 2003). Altering sediment transport can create barriers to natural processes that build spits and beaches as well as provide substrate necessary for plant propagation, animal rearing and spawning (Thom *et al.* 1994, 1997).

Structures, such as pilings, used to support the majority of overwater structures have been found to have adverse effects to EFH through alterations of wave energy, and substrate composition (Nightingale and Simenstad 2001, Thom and Shreffler 1996, Williams 1988). When placed in moving water, pilings may disrupt the water's flow, either increasing flow rates immediately around their base, or by slowing the flow of water over the area of the dock. The increased flow may cause scour and erosion around the base of the pilings and the decreased flow may result in increased sedimentation across a larger area (Kelty and Bliven 2003). For example, three dimensional sediment and current transport modeling has indicated that multi-slip docks increase sedimentation, reduce flushing and subsequently increase concentrations of contaminants (Edinger and Martin 2010). The resulting changes in sediments caused by scour or deposition may affect fish, shellfish or habitat (Bowman and Dolan 1982).

Placement of pilings in seagrass beds results in the direct physical removal of seagrass during dock construction. However different piling installation and removal techniques themselves may influence the extent and magnitude of the impact. Jetting uses high-pressure water pumps to blow a deep hole in the bottom for placement or removal and can have adverse impacts to the substrate, while increasing turbidity and potentially suspending contaminants. When jetting is used, the new pilings are set into the hole and sand is back-filled around the base of the piling. Jetting tends to cause greater disruption than driving piles with a drop hammer. Jetting may disrupt adjacent vegetation resulting in bare areas around pilings that are subject to scour. Using a low pressure pump to produce a starter hole and subsequent insertion of a sharpened pile with a drop hammer in a sandy area "reduces the physical removal and disturbance" of seagrasses in the area of the piling and results in little to no sand

deposition around the pilings. Regardless of the technique employed for driving piles, these activities directly impact the substrate and associated biota.

Depending on the piling material, the number of piles, and their spacing, the chronic impacts may be significant. The long-term presence of pilings, with and without associated overwater decking, may impact adjacent seagrass communities by altering currents, sediment accumulation or scouring, attracting bioturbators, and leaching from chemically treated timber (Beal *et al.* 1999). Bare areas around the base of pilings placed in seagrass beds ranged between 35-78 inches in diameter in St. Andrews Bay, Florida (Shafer and Robinson 2001). Dock pilings have been found to alter adjacent substrates with increased shellhash deposition from piling communities and changes to substrate bathymetry. The accumulation of debris and shell from barnacles, molluscs, and other marine organisms at the base of the pilings may inhibit the ability of seagrasses to recolonize the area surrounding the pilings (Fresh *et al.* 1995; Shafer and Lundin 1999). The presence of pilings can alter sediment distribution and bottom topography, creating small depressions that preclude eelgrass growth (Fresh *et al.* 1995). These changes may alter the plant and animal communities within a given site (Penttila and Doty 1990, Thom and Shreffler 1996).

Just as pile installation may adversely impact EFH, similar impacts may be observed in pile removal. The primary effects of pile removal are the resuspension of sediments and release of contaminants that may be contained within the pile and associated substrate. Direct pull or use of a clamshell to remove broken or old piles may suspend large amounts of sediment and contaminants. When the piling is pulled from the substrate using these two methods, sediments clinging to the piling will slough off as it is raised through the water column, producing a potentially harmful plume of turbidity and/or contaminants. Using a clamshell may suspend additional sediment if it penetrates the substrate while grabbing the piling. The associated turbidity plumes of suspended particulates may reduce light penetration and lower the rate of photosynthesis for submerged aquatic vegetation (Dennison 1987) and the primary productivity of an aquatic area if turbid conditions persist (Cloern 1987). If suspended sediments loads remain high, fish may suffer reduced feeding ability (Benfield and Minello 1996) and be prone to fish gill injury (Nightingale and Simenstad 2001).

While EFH may be adversely affected as a result of removing piles, many of those removed are old creosote-treated timber piles. In some cases, the long-term benefits to EFH from removing a consistent source of contamination may outweigh the temporary adverse effects of turbidity.

Mooring buoys are a common method for anchoring boats; however their chains can drag across the seafloor tearing up vegetation. In addition to uprooting seagrass, mooring chains can alter sediment composition ultimately impacting the benthic biota (Ostendorp *et al.* 2008). Walker *et al.* (1989) investigated the impacts of mooring buoys in Western Australia and found that 5.4 hectares of seagrass had been lost to mooring. The location of the damage within the bed may influence the extent of damage, with more significant impacts associated with mooring in the center of the bed versus along the edge. The trend of seagrass loss from boat moorings is increasing, which correlates with increased vessel use (Hastings *et al.*

1995). Examples of mooring chain damages are evident throughout the world (Jackson *et al.* 2002, Hiscock *et al.* 2005, Otero 2008)

Williams and Bechter (1996) examined the effects of 5 different mooring systems on marine vegetation. Their study concluded that mid-line float systems and all-rope lines had the least impact on substrate and aquatic vegetation. Disturbance impact of the remaining mooring types (*e.g.*, swinging chain moorings) ranged from 86 percent to 100 percent disturbance.

Other regions have begun incorporating best management practices (BMPs) for moorings in order to reduce impacts to eelgrass beds (Short 2009). Examples include clumping mooring lines together to minimize the extent of eelgrass damage (Herbert *et al.* 2009), the use of cyclone moorings that prevent swinging of chains (Shafer 2002), and elastic lines that stretch instead of requiring long lengths of chain.

b.) Indirect Impacts

As most overwater structures are designed to support boating activities, impacts from boats are a primary source of indirect effects, especially for seagrasses. At low tide, grounded floating docks and moored vessels have also been documented to damage benthic communities (Kennish 2002). Grounding of large objects poses the risk of smothering and destroying shellfish populations, scouring vegetation, and potentially lowering the levels of dissolved oxygen (Nightingale and Simenstad 2001). Simenstad *et al.* (1998) demonstrated that indirect effects from construction of overwater structures and boating activities contributed to the elimination of eelgrass, but also appeared to prohibit recruitment back to the area in the long-term.

By their very design, the majority of overwater structures originates on land above mean higher high water (MHHW), cross over the intertidal zone, and continue over shallow water in order to permit pedestrian access to boats from land. As a result, boats are drawn into these shallow waters for temporary and permanent docking, anchoring, and mooring. Furthermore, a large majority of recreational boating activities, including fishing, waterskiing, tubing, jet skiing, etc., occurs in these shallow waters adjacent to the shoreline. Therefore, it is not surprising that with increases in coastal populations, and boat ownership, has come an increase in damage to shallow water habitats, especially SAV, from boat groundings and propeller scarring.

When a vessel strays from marked channels or its operator is unable to visualize the shallow banks due to impaired water quality, entering into waters too shallow for the draft of the boat, the propeller comes in contact with the sediment surface, scouring the sediments, disturbing benthic biota, and increasing turbidity in the area. If seagrass is present, the plant canopy may be cropped or the plants may be uprooted entirely, forming what is referred to as a propeller scar (or prop scar). At the extreme, a boat may run completely aground. Commonly, when a boat begins to run aground operators will attempt to use the propeller to motor off the bed, resulting in even greater damage. Damage resulting from both prop scars

and boat groundings involve the physical removal of seagrass, algae, and the benthic fauna. Unfortunately, once the sediment-trapping seagrass rhizome network is removed, the sediments may be further scoured and eroded, possibly causing an expansion of the scar into the surrounding area and preventing successful recruitment of seagrasses back into the scar (Rasheed 2004). Several studies have shown that natural recovery of propeller scarred seagrass may take over 60 years (Rasheed 1999, Fonseca *et al.* 2004).

Another indirect effect to sensitive marine and estuarine habitats from boat use is increased shoreline erosion associated with boat wakes. Many studies have related boat wakes with shore erosion (*e.g.*, Zabawa *et al.* 1980, Camfield *et al.* 1980, Hagerty *et al.* 1981). Larger vessels with deeper draft in particular can generate problematic wakes. As these waves travel to shore and eventually contact the shoreline, the energy transfer may scour and erode sediments and cause damage to seagrass and saltmarsh vegetation.

In addition, boat anchoring impacts the substrate. Though overwater structures including single-family docks, wharfs, and marinas are most often designed for use as boat landings, these structures are associated with other boating activities that encourage boats to anchor or moor in their vicinity. A single anchoring may have minor, localized effects, but the cumulative effect of multiple anchoring in high traffic areas can have long-term effects on seagrass beds. Francour *et al.* (1999) found that approximately 20 shoots of *Posidonia oceanica* were removed when an anchor was set and another 14 during retrieval, resulting in reduced cover and overall bed fragmentation. Further damage may result after an anchor is set in high wind or sea conditions when the boat drags the anchor along the bottom, and especially when the anchor is dragged through sensitive seagrass habitat (Sargent *et al.* 1995). Hall type anchors tend to disturb seagrass beds the least, though even minimal disturbances can have lasting effects (Milazzo *et al.* 2004). Permanent moorings in Sausalito Marina Bay have resulted in visible scars within the eelgrass beds in Richardson Bay within San Francisco Bay.

Anchor damage is common in seagrass beds worldwide and has been implicated in many studies of global seagrass decline. During a period of two decades, anchor scars fragmented and reduced seagrass coverage in the U.S. Virgin Islands, causing a reduction in the carrying capacity for sea turtles to just 11-31 individuals. When scars were fenced off to exclude boats and prevent further anchoring, scars were found to recover much faster (Williams 1988b). The Whitsunday Islands adjacent to the Great Barrier Reef in Australia are heavily impacted by recreational boating and tourism. Subsequently, extensive seagrass communities there have been significantly impacted by anchor damage (Campbell *et al.* 2002). Port Townsend Bay has implemented a voluntary no-anchoring zone to protect their eelgrass from additional scarring (Jefferson County Marine Resources Committee 2010). And in California, several construction projects in the vicinity of eelgrass have been required to submit anchoring plans to minimize loss of eelgrass (California Coastal Commission 2003).

c.) Cumulative Impacts

Although not directly attributed to construction of overwater structures, the associated use of

such structures by vessels may adversely affect benthic habitat. For example, propeller scarring has been documented to adversely impact benthic habitats (Burdick and Short 1999, Shafer 1999, Thom *et al.* 1996). Sargent *et al.* (1995) conducted a state-wide survey in Florida to examine the cumulative extent of seagrass propeller scarring. The study found that approximately 1.7 out of 2.7 million acres of seagrass were scarred to a certain degree. The impacts were directly linked to increased human population and increased boating activity. New and/or expanded overwater structures may facilitate additional impacts given the associated use of such structures. In 2008, scientists at Everglades National Park surveyed aerial imagery of Florida Bay and analyzed results with Geographic Information Systems (GIS) to determine the effects of boat scarring on seagrass beds. Their efforts found over 12,000 scars ranging from 6.6 to 5,250 feet for a total length of 325 miles. Because more scars were found in this survey than when previously conducted in 1995, the authors concluded that propeller scarring was on the rise. A separate analysis showed both studies may have underestimated the number of propeller scars. Factors that correlated with high scarring rates were high vessel traffic and insufficient channel markings (SFNRC Technical Series 2008). This problem is not confined to Florida (Fonseca 1998, Shafer 2002, Kelty and Bliven 2003, Thom *et al.* 1996, Burdick and Short 1999) and is likely a significant issue along coastal estuaries of the Pacific coast.

Pilings, grounding of floating structures, and scours associated with mooring anchors and propellers, have indirect adverse impacts to submerged vegetation and benthic substrates. Each pile, scour or grounding creates an impacted space in the habitat, functionally separating a biological community, and creating patches of viable habitat separated by low quality, impacted habitat. The fragmentation of continuous habitats is arguably one of the most important factors contributing to loss of biological diversity (Wilcox and Murphy 1985). A study conducted in the United Kingdom (Frost *et al.* 1999) made faunal comparisons between fragmented and continuous eelgrass habitat. The study identified significant differences in the macrofaunal community composition via modification of both the physical nature of the habitat and possible the biological interactions that took place within them. The cumulative impacts of these activities will be dependent upon the duration, frequency, and distribution of impact. As habitat patches become more sparsely distributed the ability of the native biological community to recover from disturbance becomes less likely, and the likelihood of non-indigenous species (NIS) becoming established increases.

3. Water Quality Effects

a.) Direct Impacts

As discussed above (sectionV.A.2), pile installation and removal activities related to construction of overwater structures may result in greatly elevated levels of fine-grained mineral and organic particles in the water column, or suspended sediment concentration (SSC). Turbidity plumes of suspended particulates reduce light penetration through the water column, resulting in temporary shading impacts to primary producers (discussed in further details in section V.A.1), and potential behavioral impacts to fish.

While fish in San Francisco Bay are exposed to naturally elevated concentrations of suspended sediments resulting from storm flow runoff events, wind and wave action, and benthic foraging activities of other aquatic organisms (Schoellhammer 1996), dredging induced concentrations of suspended sediments may be significantly elevated to have direct effects on fish behavior. If suspended sediment loads remain high for an extended period of time, fish may suffer increased larval mortality (Wilber & Clarke 2001), reduced feeding ability (Benfield & Minello 1996) and be prone to fish gill injury (Nightingale & Simenstad 2001a). Additionally, the contents of the suspended material may react with the dissolved oxygen in the water and result in short-term oxygen depletion to aquatic resources (Nightingale & Simenstad 2001).

Pile installation and removal can disturb aquatic habitats by resuspending bottom sediments and, thereby, recirculating toxic metals, hydrocarbons, hydrophobic organics, pesticides, pathogens, and nutrients into the water column (USEPA 2000, SFEI 2008). Any toxic metals and organics, pathogens, and viruses, absorbed or adsorbed to fine-grained particulates in the sediment, may become biologically available to organisms either in the water column or through food chain processes.

Activities associated with overwater structures (marinas, wharves, piers, *etc.*) and treated wood used to support overwater structures have been found to have adverse effects on water quality. Research has demonstrated that contaminants introduced into marine environments and taken up by marine organisms, are generally passed or magnified through the foodweb subsequently affecting animal reproduction and population viability (Johnson *et al.* 1991, 1993, O'Neill *et al.* 1995, West 1997). In addition, sediment re-suspension associated with overwater structures have resulted in alteration of temperature regimes, levels of dissolved oxygen, and pH of the water.

Treated wood used in the construction of many overwater structures has been found to have adverse effects on EFH (particularly groundfish) and marine ecosystems as a whole. In treated wood products, the main active ingredients of concern affecting fishery resources are copper, in metal treated wood products, and polycyclic aromatic hydrocarbons (PAHs), in creosote treated wood. Copper leaches from treated wood products in a dissolved state. Once in the aquatic system, it can rapidly bind to organic and inorganic materials in suspension. The adsorbed material may then settle and become incorporated into the sediments. Resuspension of these sediments is of great concern because the copper can be made available for uptake by other organisms (Hecht *et al.* 2007). Copper has been found to have significant effects on fish behavior and olfaction (Baldwin *et al.* 2003, Sandhal *et al.* 2007). Creosote is a distillate of coal tar and is a variable mixture of 200-250 compounds consisting of simple PAHs, multi-aromatic fused rings, cyclic nitrogen-containing heteronuclear compounds and phenolic substances (USEPA 2008). PAHs are released from wood treated with creosote and are known to cause cancer, reproductive anomalies, immune dysfunction, and to impair growth and development, and to cause other impairments in fish exposed to sufficiently high concentrations over periods of time (Johnson *et al.* 1999, Karrow *et al.* 1999).

b.) Indirect Impacts

In addition to the direct impacts resulting from the use of treated wood, several indirect sources of contaminants are associated with overwater structures. Nutrient and contaminant loading from vessel discharges, engine operations, boat scraping/painting, boat washdowns, haulouts, paint sloughing, and vessel maintenance pose threats to water quality and sediment contamination (Cardwell and Koons 1981, Hall 1988, Krone *et al.* 1989). Boat motors have been associated with contamination of waterways resulting from discharges of oil and gasoline (Milliken and Lee 1990).

Copper based paints are frequently used on boat hulls in marine environments as an antifouling agent. These pesticidal paints slowly leach copper from the hull to in order to deter attachment of fouling species which may slow boats and increase fuel consumption. Copper that is leached into the marine environment does not break down and may accumulate in aquatic organisms, particularly in systems with poor tidal flushing. Many of the 303(d) listed water bodies in California are listed due to high levels of copper (USEPA 2001). At low concentrations metals such as copper may inhibit development and reproduction of marine organisms, and at high concentrations they can directly contaminate and kill fish and invertebrates. These metals have been found to adversely impact phytoplankton (NEFMC 1998), larval development in haddock, and reduced hatch rates in winter flounder (Bodammer 1981, Klein-MacPhee *et al.* 1984). Other animals can acquire elevated levels of copper indirectly through trophic transfer, and may exhibit toxic effects at the cellular level (DNA damage), tissue level (pathology), organism level (reduced growth, altered behavior and mortality) and community level (reduced abundance, reduced species richness, and reduced diversity) (Weis *et al.* 1998, Weis and Weis 2004, Eisler 2000). San Diego Bay is recognized as having some of the highest copper levels in a natural waterbody. Ninety-two percent of the 2,163 kilograms of copper that enter the waters at the Shelter Island Yacht Basin, in San Diego Bay, has been attributed to passive leaching of copper from antifouling paints (Neira *et al.* 2009).

c.) Cumulative Impacts

None anticipated

<u>Noise Effects</u>

a.) Direct Impacts

Pile driving generates intense underwater sound pressure waves that may adversely affect the ecological functioning of EFH. These pressure waves have been shown to injure and kill fish. Injuries associated directly with pile driving are poorly studied, but include rupture of the swimbladder and internal hemorrhaging. Sound pressure levels (SPL) 100 decibels (dB) above the threshold for hearing are thought to be sufficient to damage the auditory system in many fishes. Short-term exposure to peak SPL above 190 dB (re: 1 μPa) are thought to injure fish. However, 155 dB (re: 1 μPa) may be sufficient to temporarily stun small fish. Of

the reported fish kills associated with pile driving, most have occurred during use of an impact hammer on hollow steel piles.

The California Department of Transportation (Caltrans) (2001) examined fish that died during exposure to underwater sound waves associated with pile driving. The results demonstrated that mortality was caused by the exposure to the pile-driving sound. Dead fish from several species were found within 50 meters from the impact location. Subsequent necropsy determined that internal bleeding and swim bladder damage was the primary cause of mortality. In 2004, Caltrans conducted a similar study to determine the effectiveness of air-bubble curtains used during pile driving in minimizing impacts to fish. In general, the study found that air-bubble curtains decreased overall trauma to exposed fish.

b.) Indirect Impacts

None anticipated

c.) Cumulative Impacts

None anticipated

Non-indigenous Species

a.) Direct Impacts

None anticipated

b.) Indirect Impacts

Non-indigenous species (NIS) are a significant environmental threat to biological diversity (Vitousek *et al.* 1996, Simberloff *et al.* 2005). The cost of NIS to the United States' economy was estimated to be in excess of $137 billion in 2005 (Pimentel *et al.* 2005). With the expansion of worldwide shipping, the transport of marine NIS via ballast water tanks on ships is now the most significant pathway of introduction of aquatic invasive species into marine ecosystems. Large scale surveys in California (CDFG 2008) found that each commercial harbor area had significant numbers of NIS. The San Francisco Bay estuary has one of the highest rates of invasion by non-native species of any water body on earth (Cohen 1997, Cohen and Moyle 2004). As of the mid-1990s, the estuary supported more than 200 non-native species (Cohen 1998). In some areas of the estuary these non-native species account for up to 100 percent of the common species encountered during sampling. San Francisco Bay and its tributaries have been found by the Regional Board, State Board, and the U.S. Environmental Protection Agency (USEPA) to be impaired by non-native species (see CWA section 303(d) list).

Although not the direct cause of introductions, artificial overwater structures and associated substrate may provide increased opportunity for NIS colonization and exacerbate the increase

in abundance and distribution of NIS (Bulleri and Chapman 2010). In a survey of NIS within sheltered waters of CA, the largest numbers of exotic species were found on floating piers and associated structures (Cohen *et al.* 2002). Glasby *et al.* (2007) argue that artificial structures, such as floating docks and pilings, provide entry points for invasion and increase the spread and establishment of NIS in estuaries. Within Elkhorn Slough, Wasson *et al.* (2005) found that hard substrate harbored significantly more exotic species than soft substrate. In Maine, Tyrell and Byers (2007) found that exotic tunicates were disproportionately abundant on artificial surfaces. Dafforn *et al.* (2009b) found that, overall, native species were disproportionally less numerous than NIS on shallow moving surfaces. These results would implicate floating structures, such as floating docks, pontoons, mooring balls, and vessel hulls as potential "hotspots" for NIS. Dafforn *et al.* (2009a) also found NIS were more abundant on artificial substrates exposed to copper and/or anti-fouling paints, indicating that artificial structures associated with overwater structures such as vessel hulls may also promote NIS. Given the relative lack of natural hard bottom habitat in estuaries, the addition of artificial hard structures within this type of habitat may provide an invasion opportunity for non-indigenous hard substratum species (Glasby *et al.* 2007, Wasson *et al.* 2005, Tyrell and Byers 2007). Therefore, NMFS believes that artificial substrate in estuaries may contribute to further proliferation of NIS. Some researchers have recommended that coastal managers should consider limiting the amount of artificial hard substrates in estuarine environments (Wasson *et al.* 2005, Tyrell and Byers 2007).

Silva *et al.* (2002) documented the presence of the Asian kelp *Undaria pinnatifida,* a non-native alga in Los Angeles and Long Beach harbors, Channel Islands Harbor, Port Hueneme, Santa Barbara Harbor, and Catalina Island. It was discovered in southern California in the spring of 2000, and by the summer of 2001 had been collected at several California sites from Los Angeles to Monterey Harbor. It was discovered and removed from docks in San Francisco Bay in 2009. With the exception of the Catalina site, all observations were found on floating docks, piers, pilings, or other artificial substrate in a protected environment. More recent observations made by various site-specific surveys in southern California continue to observe this trend. For example, a site-specific survey conducted at port of Los Angeles Berths 145-147 indicated that the dominant flora in the project vicinity was *Undaria pinnatifida*, which was found exclusively on pilings (Merkel and Associates, 2009). The most recent biological baseline survey conducted in the Ports of Los Angeles and Long Beach documented *Undaria* at all eight inner harbor sites and at 7 of 12 outer harbor locations, indicating an expanded distribution since 2000 (SAIC 2010). Another recent example in the Long Beach Harbor is the occurrence of a non-native, brown seaweed (*Sargassum horneri*). It was first found in 2003, but by 2004, it moved to both sides of the harbor's back channel. Since then, this non-native species has been found in Orange County, the Channel Islands, and as far south as San Diego Bay.

Peeling (1974) noted the dominance of various hydroids and tunicates in deeper portions of pilings in San Diego Bay. Specifically, *Bugula neritina*, a colonial bryozoan, and two tunicate species, *Styela barnharti* (more commonly known as *Styela clava*) and *S. plicata*, were identified. *B. neritina* is a common member of fouling communities in harbors and bays on the Pacific Coast, from intertidal to shallow subtidal depths. It is common on dock

sides, buoys, pilings and rocks, settling often on shells and sometimes on seaweeds, sea grasses, sea squirts and other bryozoans (Cohen 2005). *Styela plicata* is an exotic species reported on harbor floats and pilings from Santa Barbara to San Diego (Cohen 2005). *Styela clava* is common on rocks, floats and pilings in protected waters, and on oyster and mussel shells, and is occasionally found on seaweeds. It mainly occurs in the low intertidal to shallow subtidal zones. At high densities and/or abundance, these non-native species may adversely affect other native organisms by competing for space, food, or by consuming planktonic larvae, thus reducing rates of settlement (Cohen 2005).

Long-term impacts of NIS can change the natural community structure and dynamics, lower the overall fitness and genetic diversity of natural stocks, and pass and/or introduce disease. Overall, exotic species introductions create five types of negative impacts to EFH and associated federally management fish species: 1) habitat alteration, 2) trophic alteration, 3) gene pool alteration, 4) spatial alteration, and 5) introduction of diseases/pests.

Non-native plants and algae can degrade coastal and marine habitats by changing natural habitat qualities. Habitat alteration includes the excessive colonization of exotic species (*e.g.*, *Caulerpa taxifola*) which preclude the growth of native organisms (*e.g.*, eelgrass). *Caulerpa taxifolia* is a green alga native to tropical waters that typically grows in limited patches. A particularly cold tolerant clone (tolerant of temperatures at least as low as 10 °C for a period of three months) of this species has already proven to be highly invasive in the Mediterranean Sea and efforts to control its spread have been unsuccessful. In areas where the species has become well established, it has caused ecological and economic devastation by overgrowing and eliminating native seaweeds, seagrasses, reefs, and other communities. In the Mediterranean, it is reported to have harmed tourism and pleasure boating, devastated recreational diving, and had a significant impact on commercial fishing both by altering the distribution of fish as well as creating a considerable impediment to net fisheries. *C. taxifolia* had been detected, but eradicated in two locations in southern California (Huntington Harbor and Agua Hedionda), which alone cost over 7 million dollars.

The introduction of NIS may also alter community structure by preying on native species or by population explosions of the introduced species (Byers 1999). Introduced NIS increases competition with indigenous species or forage on indigenous species, which can reduce fish and shellfish populations. Although hybridization is rare, it may occur between native and introduced species and can result in gene pool deterioration (Currant *et al.* 2008). Spatial alteration occurs when territorial introduced species compete with and displace native species (Blossey and Notzold 1995). The introduction of bacteria, viruses, and parasites is another severe threat to EFH as it may reduce habitat quality. New pathogens or higher concentrations of disease can be spread throughout the environment resulting in deleterious habitat conditions, impact species survival and overall fitness.

c.) Cumulative Impacts

Scientists, academics, leaders of industry, and land managers are realizing that invasive species are one of the most serious environmental threats of the 21st century (Mooney and

Hobbs 2000). The economic impacts of NIS alone are significant. Pimentel *et al.* (2000, 2005) estimated the annual cost to Americans as 137 billion dollars. Ecologically, the impacts of NIS are also significant and are still being understood.

The San Francisco Bay/Delta Estuary is an example of how species invasions can change an entire ecosystem. It is possibly the most invaded estuary in the entire world (Cohen and Carlton 1998). More than 230 NIS have become established in the system, and there are an additional 100-200 species that may be nonindigenous but whose origin cannot yet be determined. The known invasive species cover a wide range of taxonomic groups: 69 percent of the species are invertebrates such as mollusks, crustaceans, and tubeworms; 15 percent are fish and other vertebrates; 12 percent are vascular plants; and 4 percent are microbial organisms. NIS dominates many estuarine habitats, accounting for 40 to 100 percent of the common species at many sites in the estuary, whether calculated as a percentage of the number of species present, the number of individuals, or of total biomass (Cohen and Carlton 1995).

Established populations of NIS may also facilitate the invasion of other NIS that would otherwise be unable to invade. For example, Heiman *et al.* (2008) found that non-native tubeworm reefs in Elkhorn Slough created non-native structural habitat, which in turn provided the hard substrate necessary for the invasion of other NIS. These types of invasions are an example of an 'invasional meltdown' in which NIS facilitate ongoing and subsequent invasions by increasing survival, population size, or the magnitude of ecological impacts of other NIS (Simberloff and Von Holle 1999).

NIS introductions have dramatically reduced some native populations, altered habitat structure and energy flows, and caused billions of dollars in economic damage (Cohen and Carlton 1995). The pace of invasion is apparently accelerating. Roughly half of the NIS in California arrived in the last 35 years. Between 1851 and 1960, a new species was established in the San Francisco Bay every 55 weeks. The primary means of introduction can be attributed to the shipping and boating industry.

Overall Cumulative Impacts

As a result of California's large population and intense economic and recreational activity, a large proportion of our shoreline has been subject to construction, mineral extraction, or other forms of resource utilization and habitat alteration. Dredging, fill, shoreline armoring, and overwater structures are the primary causes of habitat alteration within San Francisco Bay. At the ports of San Francisco, Richmond, Oakland, and Redwood City, increasing global economic pressures have resulted in the need for larger, deeper draft ships to transport cargo. Thus increasing demand for new construction dredging to widen and deepen channels, turning basins, and slips to accommodate these larger vessels. These activities result in permanent loss of shallow water habitats and chronic effects on water quality. In addition to the ports, the rest of the Bay has experienced significant adverse impacts associated with shoreline, intertidal, and shallow subtidal development.

Coupled with overwater structure expansion and modification, San Francisco Bay has experienced high levels of ecological stress, modification, and continual decline in valuable shallow water habitats. These habitats are designated EFH for many federally managed fish species and essential for many recreational fish, and need to be managed rigorously and carefully. As coastal development continues these necessary habitats are increasingly stressed, degraded and eliminated. The challenge of the future will be to manage these systems in a responsible and sustainable manner that will foster economic stability and growth, while protecting and conserving valuable marine resources.

Throughout California, human activities associated with urban development, recreational boating, fishing, and commercial shipping continue to degrade, disturb, and/or destroy important near shore and protected embayment habitats. Halpern *et al.* (2009) mapped cumulative impacts at the scale of the California Current marine ecosystem and found that intertidal and near shore ecosystems are most heavily impacted because of exposure to stressors from both land- and ocean-based human activities. Furthermore, Central California, including San Francisco Bay, ranked as one of the highest areas for cumulative impacts.

Most recent estimates have the current world population at approximately 6.8 billion humans with a predicted increase to 8.9 billion by 2050. Presently, 40 percent of the world's population resides within 100 kilometers of the coast. Since 1990 the San Francisco Bay area's population has grown from 6.0 million to 7.4 million, a growth of at least 19 percent (CA Census Data 2009). As the population increases, so does the need for development. Infrastructure such as bridges, roads, and highways must be reconfigured and expanded. Shipping and cargo capacities of ports and harbors will increase, which will require expansion and modification of overwater port facilities. As the population directly along the coast increases, recreational needs will increase, likely requiring the expansion of marina and recreational dock facilities. Increasing the number of overwater structures with adverse effects to the marine environment magnifies the extent of adverse impacts.

Global climate change and population growth over the next century will likely add more environmental stress to eelgrass habitat from anticipated increases in seawater temperature and sea level, with secondary changes to tidal range, current circulation patterns and velocities, salinity intrusion, ocean acidification, storm activity, frequency and magnitude of flooding, as well as coastal development (Short and Neckles 1999). While it is difficult to predict specific impacts to eelgrass in different areas of California, available information indicates that individual elements of climate change will affect seagrass productivity, distribution, and function throughout its range (Short and Neckles 1999). Sea levels are expected to rise over 3 feet by 2100. While this may seem relatively benign as it relates to eelgrass distribution, many eelgrass beds in California are at or very near their lower depth limits. The importance of eelgrass both ecologically and economically, coupled with ongoing human pressure and potentially increasing degradation and loss from climate change, highlights the need to protect, maintain, and, where feasible, enhance eelgrass habitat.

Phytoplankton populations are decreasing globally (Boyce *et al.* 2010). These changes are likely related to climatic and oceanographic variability and to increasing sea surface temperature over

the past century. Global marine productivity may constrain some fisheries (Chassot 2010). For example, poor ocean productivity and the associated disruptions of the pelagic food chain were cited as principal reasons for the sudden collapse of the Sacramento River Chinook salmon fishery (Lindley *et al.* 2009). Longstanding and ongoing degradation of freshwater and estuarine habitats were also considered likely contributing factors to the collapse of the stock. Overwater structures are likely not affecting the same drivers of offshore plankton productivity, but the influence of estuarine and near shore sources of primary productivity may become more critical. Although the coastal zone represents only 8 percent of the earth, it provides 20 percent of the oceanic production (Liu *et al.* 2000).

B. Effects Analysis

In order to quantify the spatial extent of existing overwater structures in San Francisco Bay, an analysis was performed using GIS. Spatial data representing the shoreline of San Francisco Bay at Mean Sea Level was used to calculate the total two dimensional area of the Bay in acres. Polygons representing existing overwater structures (docks, piers, wharfs, marinas, floating breakwaters, *etc.*) were drawn manually in Google Earth. These polygons were imported into ArcGIS, and the total area of these polygons was calculated. It must be acknowledged that calculated areas are estimates only and do not represent exact acreages. In some instances polygons representing specific projects may have covered a larger area than is actually shaded and in some instances a smaller area than is actually shaded. Calculated values were determined merely to provide a rough estimate of in-Bay disturbance caused by existing overwater structures.

From the spatial analysis, total area of the Bay was calculated to be 285,786 acres. The total area of existing overwater structure in San Francisco Bay was estimated to be 770 acres. Because the acreage of the Bay includes large expanses of open water not likely to support overwater structures, we calculated the area of shallow water habitat (less than 4 meters depth) that was shaded by existing overwater structure. Approximately 180,100 acres of San Francisco Bay were less than 4 meters deep, or 63 percent of the total acreage. This analysis estimated that 460 acres of shallow water habitat is currently shaded by existing overwater structures.

In addition to the spatial analysis, NMFS staff evaluated records of EFH consultations on overwater structure projects permitted by USACE during the previous 4-year authorization period (*i.e.*, 2007-2010) and the area associated with each of these projects. During the previous 4-year period, NMFS consulted on 37 projects with an overwater structure component, 21 of which were for new structures or for replacements with an expanded footprint. For these 21 projects, the average increase in project footprint was 3,195 sq ft. The maximum project footprint consulted on was 37,480 sq ft, however, only 2 of the 21 projects had footprints that exceeded 10,000 sq ft. NMFS anticipates that a similar number of permits will be issued over the next five years with reasonably similar project footprints.

VI. EFH CONSERVATION RECOMMENDATIONS

As described in the above effects analysis, NMFS determines that the proposed action would

adversely affect EFH for various federally managed fish species within the Pacific Groundfish, Coastal Pelagic, and Pacific Salmonid FMPs. Moreover, increases in overwater structures will adversely affect estuary and seagrass HAPC. Given the significant alteration of existing shoreline habitat, NMFS believes additional impacts to EFH associated with expanded overwater coverage would be substantial. Therefore, pursuant to section 305(b)(4)(A) of the MSA, NMFS offers the following EFH Conservation Recommendations to avoid, minimize, mitigate, or otherwise offset the adverse effects to EFH.

A. General Recommendations

1. All overwater structure construction (including in-kind replacement) that would occur within 45 meters of eelgrass (see NMFS' Programmatic EFH Consultation for Maintenance Dredging in San Francisco Bay Area) should be required to follow eelgrass monitoring requirements put forth in the Southern California Eelgrass Mitigation Policy (SCEMP) unless superseded by another NMFS' eelgrass mitigation policy. Exceptions may be granted for areas that USACE and NMFS believe are highly unlikely to support eelgrass habitat.

2. Given the significant alteration of existing shoreline and shallow water habitats in some regions of San Francisco Bay, all overwater structures should be water dependent (e.g., could not be constructed over land). Proposed projects should clearly explain their water dependency and why the project is in the public's best interest.

3. As part of the project application, the proponent should describe how their proposal addresses the specific conservation recommendations identified below. NMFS recognizes that not all conservation recommendations will be relevant in all situations. Therefore, the proponent should clearly articulate when a particular recommendation is not applicable to the proposed project. Based on the project application, USACE should determine if the project implements appropriate conservation recommendations and, therefore, can be covered by this programmatic consultation.

B. Mooring Anchors and Persistently Moored Vessels

For all projects, the project proponent should strive to implement avoidance measures to the extent feasible. When avoidance measures are not feasible, minimization measures should be implemented.

Avoidance:

1. All new anchored moorings and persistently moored vessel should be placed in areas in which suitable submerged aquatic vegetation (SAV) habitat is absent. This will prevent adverse shading impacts to SAV.

2. Persistently moored vessels should be placed in waters deep enough so that the bottom of the vessel remains a minimum of 18 inches off the substrate during extreme low tide events. This will prevent adverse grounding impacts to benthic habitat.

Minimization:

1. Mooring anchors placed within SAV or habitat suitable for SAV should be of the type which use midline floats to prevent chain scour to the substrate. This will prevent adverse impacts to SAV and other benthic habitat.

2. Persistently moored vessels that are moored over SAV or rocky reef habitats with less than 18 inches between the bottom of the vessel and the substrate at low tides should utilize float stops. This will prevent adverse grounding impacts to benthic habitat.

C. Pile Removal and Installation

Minimization:

1. Remove piles with a vibratory hammer rather than a direct pull or clamshell method.

2. Slowly remove pile to allow sediment to slough off at or near the mudline.

3. Hit or vibrate the pile first to break the bond between the sediment and the pile to minimize the likelihood of the pile breaking and to reduce the amount of sediment sloughed.

4. Encircle the pile with a silt curtain that extends from the surface of the water to the substrate, where appropriate and feasible, if within suitable SAV habitat.

5. If contaminated sediment occurs in the footprint of the proposed project, cap all holes left by the piles with clean native sediments.

6. Drive piles during low tide periods when substrates are exposed in intertidal areas. This minimizes the direct impacts to fish from sound waves and minimizing the amount of sediments resuspended in the water column.

7. Use a vibratory hammer to install piles, when possible. Under those conditions where impact hammers are required (*i.e.*, substrate type and seismic stability) the pile should be driven as deep as possible with a vibratory hammer prior to the use of the impact hammer. This will minimize noise impacts.

D. Pile-supported Overwater Structures

For all projects, the project proponent should strive to implement avoidance measures to the extent feasible. When avoidance measures are not feasible, minimization measures should be

implemented. Although it may not be feasible to implement all the recommendations below, when used in combination, impacts to EFH will be greatly minimized. **In order to determine which avoidance and, or minimization measures are applicable on a project-specific basis see the "Keys for Construction Conditions" in Appendix A-C.**

Avoidance:

1. To the maximum extent practicable, site overwater structure (OWS) in areas not occupied by or determined to be suitable for sensitive habitat (*e.g.*, SAV, salt marsh, intertidal flats).

2. To the maximum extent practicable, any cross or transverse bracing should be placed above the mean higher high water line (MHHW) to avoid impacts to water flow and circulation.

Minimization:

1. Minimize, to the maximum extent practicable, the footprint of the OWS. The OWS should be the minimum size necessary to meet the water-dependent purpose of the project.

2. Design structures in a north-south orientation, to the maximum extent practicable, to minimize persistent shading over the course of a diurnal cycle.

3. For all OWS, excluding ramps, terminal platforms, and floating docks, the height of the structure above water should be a minimum of 5 feet above MHHW.

4. For all OWS, the width of the structure should be limited to a maximum of 4 feet wide. In situations where it is necessary to construct a dock walkway wider than 4 feet to comply with Americans and Disabilities Act (ADA, P.L. 110-325), the structure height should be increased by a corresponding amount to offset the increased shading effects of the wider structure (*e.g.*, a 1-foot increase in width above the 4-feet maximum should be accompanied by a 1-foot increase in height above MHHW—a 5-foot-wide walkway should be elevated at least 6 feet above MHHW). Additional exceptions may be provided to comply with ADA requirements.

5. For all OWS, turnarounds should not exceed 60 square feet, and for single-family docks and similar OWS, only one turnaround is permitted not exceeding 10 feet in length and 6 feet wide. The turnaround is intended to accommodate efficient unloading/loading of boating equipment and is not intended to be used for non-water dependent uses.

6. For all OWS, a terminal platform should not exceed 5 feet long by 20 feet wide, or 100 square feet.

7. Place the structure's terminal platform into nearest adjacent deep water to minimize the need for dredging and to minimize the likelihood of boat grounding, propeller scar/scour in shallow water habitat.

8. Use the fewest number of piles as practicable for necessary support of the structure to minimize pile shading, substrate impacts, and impacts to water circulation. Pilings should be spaced a minimum of 10 feet apart on center.

9. Gaps between deck boards should be a minimum of ½ inch. If the OWS is placed over SAV or salt marsh habitat, 1 inch deck board spacing or use of light transmitting material with a minimum of 40 percent transmittance should be used. Exceptions may be provided to comply with Americans with Disabilities Act (P.L. 110-325), requirements.

10. The use of floating dock structures should be minimized to the extent practicable and should be restricted to terminal platforms placed in the deepest water available at the project site.

11. Incorporate materials into the OWS design to maximize light transmittance. When suitable SAV habitat is within the project vicinity, the use of appropriate grating or light transmitting material should be used to permit sufficient light for SAV production.

E. Reporting Requirement

1. To avoid adverse effects to EFH that may occur from improper utilization of this programmatic consultation, NMFS recommends that USACE provide annual reports to NMFS on all activities conducted under this programmatic consultation. Reports should be submitted to NMFS within 90 days of the end of each calendar year. Reports should include a summary of annual overwater structure activities (total number of projects, and total acreages of new overwater coverage, summary of conservation recommendations implemented).

2. To avoid adverse effects to EFH that may occur from improper utilization of this programmatic consultation, NMFS recommends that USACE notify NMFS of the following:

a. When a project will indirectly impact eelgrass and which BMP is being used (inclusion of BMP in Public Notice and submission of notice to NMFS is satisfactory);

b. When a project will directly impact eelgrass and what mitigation is proposed.

At any time, NMFS may revoke or revise this programmatic consultation if it is determined that it is not being implemented as intended or if new information becomes available indicating a significant discrepancy in either the effects analysis or effectiveness of EFH Conservation Recommendations.

F. Compensatory Mitigation

As discussed above (*See* B. Effects Analysis), OWS shade an estimated 460 acres of shallow water habitat and modify an undetermined length of associated shoreline in San Francisco Bay. Continued modification of shallow water and estuarine shorelines as a result of overwater structures will further reduce the ecological functions and services provided by these unique habitats. In addition, the cumulative impacts associated with reduced tidal circulation and expanded boat use may degrade water quality. NMFS is not recommending compensatory mitigation to offset these impacts in this programmatic EFH consultation. However, NMFS and USACE should evaluate annual reports developed as part of this programmatic EFH consultation to determine if cumulative adverse impacts to EFH and aquatic resources in San Francisco Bay from on-going OWS development warrant compensatory mitigation, such as an in-lieu fee program, in the future.

VII. STATUTORY RESPONSE REQUIREMENT

Please be advised that regulations (50 CFR 600.920(k)) to implement the EFH provisions of the MSA require your office to provide a written response to this letter within 30 days of its receipt and prior to the final action. A preliminary response is acceptable if final response cannot be completed within 30 days. Your final response must include a description of how the EFH Conservation Recommendations will be implemented and any other measures that will be required to avoid, mitigate, or offset the adverse impacts of the activity. If your response is inconsistent with our EFH Conservation Recommendations, you must provide an explanation for not implementing this recommendation at least 10 days prior to final approval of the action. This explanation must include scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects. If the final response is inconsistent with our project-specific EFH Conservation Recommendations, projects to which these recommendations apply will not be covered by the programmatic consultation and must be consulted on individually. However, USACE and USEPA may propose and develop alternative EFH Conservation Recommendations subject to NMFS' approval, to compensate for outstanding adverse effects.

VIII. SUPPLEMENTAL CONSULTATION

This concludes programmatic EFH consultation for construction and maintenance of overwater structures in the San Francisco Bay area and associated indirect activities. Pursuant to 50 CFR 600.920(l) of the EFH regulations, USACE and USEPA must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations.

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APPENDIX A

Key for Construction Conditions for Single-Family Docks and Similar Overwater Structures Constructed in Essential Fish Habitat (EFH), Southwest Region

1a. The construction site is not within designated EFH for Federally managed species in the Southwest region. *No construction conditions required by NMFS.*

1b. The construction proposed is a replacement of an existing structure with no expansion in surface area. The construction site is within designated EFH but sensitive species (SAV or saltmarsh) or their suitable habitat are not in the vicinity. *No construction conditions required by NMFS.*

1c. The construction proposed is a replacement of an existing structure with no expansion in surface area. The construction site is within designated EFH and sensitive species (SAV or saltmarsh) or their suitable habitat are in the vicinity. *Go to 2.*

1d. The construction proposed is for a new structure or an expansion of an existing structure. The construction site is within EFH and sensitive species (including SAV and/or saltmarsh vegetation) or their suitable habitat are not in the vicinity, and. *Go to 2.*

1e. The construction proposed is for a new structure or an expansion of an existing structure. The construction site is within EFH and sensitive species (including SAV and/or saltmarsh vegetation) or their suitable habitat are in the vicinity. *Go to 4.*

2a. The new or replacement structure meets all of the following conditions: is built with north-south orientation (within 45 degrees), at a minimum of 5 feet over mean higher high water (MHHW), not wider than 4 feet, no more than one turnaround exceeding 60 square feet, not more than one uncovered boat lift, terminal end not exceeding 100 square feet, pilings spaced at a minimum of 10 feet on center, and gaps between deck boards minimum of ½ inch apart. *No additional construction conditions required by NMFS.*

2b. The new or replacement structure does not meet all of the following conditions: is built with north-south orientation (within 45 degrees), at a minimum of 5 feet over MHHW, not wider than 4 feet, no more than one turnaround exceeding 60 square feet, not more than one uncovered boat lift, terminal end not exceeding 100 square feet, pilings spaced at a minimum of 10 feet on center, and gaps between deck boards spaced ½ inch or greater. *Go to 3.*

3a. The new or replacement structure will be constructed with gaps between deck boards a minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *No additional construction conditions required by NMFS.*

3b. The new or replacement structure cannot be constructed with gaps between deck boards a

minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *Go to 5.*

4a. The new or replacement structure meets all of the following conditions: is built with north-south orientation (within XX degrees), at a minimum of 5 feet over MHHW, not wider than 4 feet, no more than one turnaround exceeding 60 square feet, not more than one uncovered boat lift, terminal end not exceeding 100 square feet, pilings spaced at a minimum of 10 feet on center, and either the gaps between deck boards are minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *No additional construction conditions required by NMFS.*

4b. The new or replacement structure does not meet all of the following conditions: is built with north-south orientation (within XX degrees), at a minimum of 5 feet over MHHW, not wider than 4 feet, no more than one turnaround exceeding 60 square feet, not more than one uncovered boat lift, terminal end not exceeding 100 square feet, pilings spaced at a minimum of 10 feet on center, and either the gaps between deck boards are minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *Go to 5.*

5. Consultation required.

APPENDIX B

Key for Construction Conditions for Multi-Family Docks, Marinas, and Similar Overwater Structures Constructed in Essential Fish Habitat (EFH), Southwest Region

1a. The construction site is not within designated EFH for Federally managed species in the Southwest region. *No construction conditions required by NMFS.*

1b. The construction proposed is a replacement of existing structures with no expansion in surface area. The construction site is within designated EFH but sensitive species (SAV or saltmarsh) or their suitable habitat are not in the vicinity. *No construction conditions required by NMFS.*

1c. The construction proposed is a replacement of existing structures with no expansion in surface area. The construction site is within designated EFH and sensitive species (SAV or saltmarsh) or their suitable habitat are in the vicinity. *Go to 2.*

1d. The construction proposed is for new structures or an expansion of existing structures. The construction site is within EFH and sensitive species (including SAV and/or saltmarsh vegetation) or their suitable habitat are not in the vicinity, and. *Go to 2.*

1e. The construction proposed is for new structures or an expansion of existing structures. The construction site is within EFH and sensitive species (including SAV and/or saltmarsh vegetation) or their suitable habitat are in the vicinity. *Go to 4.*

2a. The new or replacement structures meets all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, no covered structures such as dry docks or boat houses, terminal ends do not exceed 100 square feet, pilings spaced at a minimum of 10 feet on center, and gaps between deck boards are minimum of ½ inch apart. *No additional construction conditions required by NMFS.*

2b. The new or replacement structure does not meet all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, no covered structures such as dry docks or boat houses, terminal ends do not exceed 100 square feet, pilings spaced at a minimum of 10 feet on center, and gaps between deck boards are minimum of ½ inch apart. *Go to 3.*

3a. The new or replacement structure will be constructed with gaps between deck boards a minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *No additional construction conditions required by NMFS.*

3b. The new or replacement structure cannot be constructed with gaps between deck boards a

minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *Go to 5.*

4a. The new or replacement structure meets all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, no covered structures such as dry docks or boat houses, terminal ends do not exceed 100 square feet, pilings spaced at a minimum of 10 feet on center, and gaps between deck boards are minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *No additional construction conditions required by NMFS.*

4b. The new or replacement structure does not meet all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, no covered structures such as dry docks or boat houses, terminal ends do not exceed 100 square feet, pilings spaced at a minimum of 10 feet on center, and gaps between deck boards are minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *Go to 5.*

5. Consultation required.

Key for Construction Conditions for Large, Industrial Overwater Structures Constructed in Essential Fish Habitat (EFH), Southwest Region

1a. The construction site is not within designated EFH for Federally managed species in the Southwest region. *No construction conditions required by NMFS.*

1b. The construction proposed is a replacement of existing structures with no expansion in surface area. The construction site is within designated EFH but sensitive species (SAV or saltmarsh) or their suitable habitat are not in the vicinity. *No construction conditions required by NMFS.*

1c. The construction proposed is a replacement of existing structures with no expansion in surface area. The construction site is within designated EFH and sensitive species (SAV or saltmarsh) or their suitable habitat are in the vicinity. *Go to 2.*

1d. The construction proposed is for new structures or an expansion of existing structures. The construction site is within EFH and sensitive species (including SAV and/or saltmarsh vegetation) or their suitable habitat are not in the vicinity, and. *Go to 2.*

1e. The construction proposed is for new structures or an expansion of existing structures. The construction site is within EFH and sensitive species (including SAV and/or saltmarsh vegetation) or their suitable habitat are in the vicinity. *Go to 4.*

2a. The new or replacement structures meets all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, no covered structures such as dry docks or boat houses, and terminal ends do not exceed 100 square feet. *No additional construction conditions required by NMFS.*

2b. The new or replacement structure does not meet all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, and terminal ends do not exceed 100 square feet. *Go to 3.*

3a. The new or replacement structure will be constructed with gaps between deck boards a minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *No additional construction conditions required by NMFS.*

3b. The new or replacement structure can not be constructed with gaps between deck boards a minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *Go to 5.*

4a. The new or replacement structure meets all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, terminal ends do not exceed 100 square feet, and gaps between deck boards are minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *No additional construction conditions required by NMFS.*

4b. The new or replacement structure does not meet all of the following conditions: all solid structure is elevated at a minimum of 5 feet over mean higher high water (MHHW), individual surfaces are not wider than 4 feet, turnarounds do not exceed 60 square feet, terminal ends do not exceed 100 square feet, and gaps between deck boards are minimum of 1 inch apart or using light transmitting material with 40 percent transmittance. *Go to 5.*

5. Consultation required.

Attachment B

NOAA Eelgrass Guidelines

NOAA FISHERIES
West Coast Region

California Eelgrass Mitigation Policy and Implementing Guidelines

October 2014

Photo credit: www.Lorenz-Avelar.com

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I. National Marine Fisheries Service's (NMFS) California Eelgrass Mitigation Policy

A. Policy Statement

It is NMFS' policy to recommend **no net loss of eelgrass habitat function** in California.

For all of California, compensatory mitigation should be recommended for the loss of existing eelgrass habitat function, but only after avoidance and minimization of effects to eelgrass have been pursued to the maximum extent practicable. Our approach is congruous with the approach taken in the federal Clean Water Act guidelines under section 404(b)(1) (40 CFR 230). In absence of a complete functional assessment, eelgrass distribution and density should serve as a proxy for eelgrass habitat function. Compensatory mitigation options include comprehensive management plans, in-kind mitigation, mitigation banks and in-lieu-fee programs, and out-of-kind mitigation. While in-kind mitigation is preferred, the most appropriate form of compensatory mitigation should be determined on a case-by-case basis.

Further, it is the intent of this policy to ensure that there is no loss associated with delays in establishing compensatory mitigation. This should be accomplished by creating a greater amount of eelgrass than is lost, if the mitigation is performed contemporaneously or after the impacts occur. To achieve this, NMFS, in most instances, should recommend compensatory mitigation for vegetated and unvegetated eelgrass habitat be successfully completed at a ratio of at least 1.2:1 mitigation area to impact area. This ratio is based on present value calculation[1] using a discount rate of 0.03 (NOAA-DARP 1999). This ratio assumes that restored eelgrass habitat achieves habitat function comparable to existing eelgrass habitat within a period of three years or less (Hoffman 1986, Evans & Short 2005, Fonseca *et al.* 1990).

For ongoing projects, once mitigation has been successfully implemented to compensate for the loss of eelgrass habitat function within a specified footprint, NMFS should not recommend additional mitigation for subsequent loss of eelgrass habitat if 1) ongoing project activities result in subsequent loss of eelgrass habitat function within the same footprint for which mitigation was completed and 2) the project applicant can document that no new area of eelgrass habitat is impacted by project activities.

This policy does not address mitigation for potential eelgrass habitat. NMFS recognizes impacts to potential eelgrass habitat may preclude eelgrass movement or expansion to suitable unvegetated areas in the future, potentially resulting in declines in eelgrass abundance over time. In addition, it does not address other shallow water habitats. Regulatory protections in the estuarine/marine realm typically focus on wetlands and submerged aquatic vegetation. Mudflats, sandflats, and other superficially bare habitats do not garner the same degree of recognition and

[1] Present Value (PV) is a calculation used in finance to determine the present day value of an amount that is received at a future date. The premise of the equation is that receiving something today is worth more than receiving the same item at a future date; $PV = C_1/(1+r)^n$ where C_1= resource at period 1, r= interest or discount rate, n=number of periods.

concern, even though these are some of the most productive and fragile ecosystems (Reilly *et al*. 1999). NMFS will continue to collaborate with federal and state partners on these issues.

B. Eelgrass Background and Information

Eelgrass species (*Zostera marina* L. and *Z. pacifica*) are seagrasses that occur in the temperate unconsolidated substrate of shallow coastal environments, enclosed bays, and estuaries. Eelgrass is a highly productive species and is considered to be a "foundation" or habitat forming species. Eelgrass contributes to ecosystem functions at multiple levels as a primary and secondary producer, as a habitat structuring element, as a substrate for epiphytes and epifauna, and as sediment stabilizer and nutrient cycling facilitator. Eelgrass provides important foraging areas and shelter to young fish and invertebrates, food for migratory waterfowl and sea turtles, and spawning surfaces for invertebrates and fish such as the Pacific herring. Eelgrass also provides a significant source of carbon to the detrital pool which provides important organic matter in sometimes food-limited environments (*e.g.*, submarine canyons). In addition, eelgrass has the capacity to sequester carbon in the underlying sediments and may help offset carbon emissions. Given the significance and diversity of the functions and services provided by seagrass, Costanza *et al.* (2007) determined seagrass ecosystems to be one of Earth's most valuable.

California supports dynamic eelgrass habitats that range in extent from less than 11,000 acres to possibly as much as 15,000 acres statewide. This is inclusive of estimates for poorly documented beds in smaller coastal systems as well as open coastal and insular areas. While among the most productive of habitats, the overall low statewide abundance makes eelgrass one of the rarest habitats in California. Collectively just five systems, Humboldt Bay, San Francisco Bay, San Diego Bay, Mission Bay and Tomales Bay support over 80 percent of the known eelgrass in the state. The uneven distribution of eelgrass resources increases the risk to this habitat and also contributes to its dynamic nature. Further, the narrow depth range within which eelgrass can occur further places this habitat at risk in the face of global climate change and sea level rise predictions.

Seagrass habitat has been lost from temperate estuaries worldwide (Duarte 2002, Lotze *et al.* 2006, Orth *et al.* 2006). While both natural and human-induced mechanisms have contributed to these losses, impacts from human population expansion and associated pollution and upland development is the primary cause (Short and Wyllie-Echeverria 1996). Human activities that affect eelgrass habitat distribution and abundance, including, but not limited to, urban development, harbor development, aquaculture, agricultural runoff, effluent discharges, and upland land use associated sediment discharge (Duarte 2008) occur throughout California. For example, dredging and filling; shading and alteration of circulation patterns; and watershed inputs of sediment, nutrients, and unnaturally concentrated or directed freshwater flows can directly and indirectly destroy eelgrass habitats. Conversely, in many areas great strides have been made at restoring water quality and expanding eelgrass resources through directed efforts at environmental improvements and resource enhancement. While improvements in eelgrass management have occurred overall, the importance of eelgrass both ecologically and economically, coupled with ongoing human pressure and potentially increasing degradation and losses associated with climate change, highlight the need to protect, maintain, and where feasible, enhance eelgrass habitat.

C. Purpose and Need for Eelgrass Mitigation Policy

Eelgrass warrants a strong protection strategy because of the important biological, physical, and economic values it provides, as well as its importance to managed species under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Vegetated shallows that support eelgrass are also considered special aquatic sites under the 404(b)(1) guidelines of the Clean Water Act (40 C.F.R. § 230.43). The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) developed this policy to establish and support a goal of protecting this resource and its habitat functions, including spatial coverage and density of eelgrass habitats. This NMFS policy and implementing guidelines are being shared with agencies and the public to ensure there is a clear and transparent process for developing eelgrass mitigation recommendations.

Pursuant to the MSA, eelgrass is designated as an essential fish habitat (EFH) habitat area of particular concern (HAPC) for various federally-managed fish species within the Pacific Coast Groundfish Fishery Management Plan (FMP) (PFMC 2008). An HAPC is a subset of EFH that is rare, particularly susceptible to human-induced degradation, especially ecologically important, and/or located in an environmentally stressed area. HAPC designations are used to provide additional focus for conservation efforts.

This policy and guidelines support but do not expand upon existing NMFS authorities under the MSA, the Fish and Wildlife Coordination Act (FWCA), and the National Environmental Policy Act (NEPA). Pursuant to the EFH provisions of the MSA, FWCA, and obligations under the NEPA as a responsible agency, NMFS annually reviews and provides recommendations on numerous actions that may affect eelgrass resources throughout California. Section 305(b)(1)(D) of the MSA requires NMFS to coordinate with, and provide information to, other federal agencies regarding the conservation and enhancement of EFH. Section 305(b)(2) requires all federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. Under section 305(b)(4) of the MSA, NMFS is required to provide EFH Conservation Recommendations to federal and state agencies for actions that would adversely affect EFH (50 C.F.R. § 600.925). NMFS makes its recommendations with the goal of avoiding, minimizing, or otherwise compensating for adverse effects to EFH. When impacts to NMFS trust resources are unavoidable, NMFS may recommend compensatory mitigation to offset those impacts. In order to fulfill its consultative role, NMFS may also recommend, among other things, the development of mitigation plans, habitat distribution maps, surveys and survey reports, progress milestones, monitoring programs, and reports verifying the completion of mitigation activities.

Eelgrass impact management and mitigation throughout California has historically been undertaken without a statewide strategy. Federal actions with impacts to eelgrass require considerable NMFS staff time for project review, coordination and development of conservation recommendations. As federal staff resources vary with budgets, and threats to aquatic resources remain steady or increase, regulatory streamlining and increased efficiency are crucial for continued protection of important coastal habitats, including eelgrass. The California Eelgrass Mitigation Policy (CEMP) is meant to increase efficiency of existing regulatory authorities in a

programmatic manner, provide transparency to federal agencies and action proponents, and ensure that unavoidable impacts to eelgrass habitat are fully and appropriately mitigated. It is the intent of NMFS to collaborate with other federal, state, and local agencies charged with the protection of marine resources to seek a unified approach to actions affecting eelgrass such that consistency across agencies with respect to this resource may be enhanced.

D. Relevance to Other Federal and State Policies

Based on our understanding of existing federal and state policies regarding aquatic resource conservation, the CEMP does not conflict with existing policies and complements the federal and state wetland policies as described below. NMFS does not intend to make any recommendations, which, if adopted by the action agency and carried out, would violate other federal, state, or local laws. The CEMP also complements the NOAA Aquaculture Policy and National Shellfish Initiative and builds upon the NOAA Seagrass Conservation Guidelines and the Southern California Eelgrass Mitigation Policy.

1. Corps/EPA Mitigation Rule and supporting guidance

In 2008, the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) issued revised regulations governing compensatory mitigation for authorized impacts to wetlands, streams, and other waters of the U.S. under Section 404 of the Clean Water Act. The regulations emphasize avoiding impacts to wetlands and other water resources. For unavoidable impacts, the rule incorporates Natural Resource Council recommendations to improve planning, implementing and managing wetland replacement projects, including: science-based assessment of impacts and compensation measures, watershed assessments to drive mitigation sites and plans, measurable and enforceable ecological performance standards for evaluating mitigation projects, mitigation monitoring to document whether the mitigation employed meets ecological performance standards, and complete compensation plans. The regulations also encourage the expansion of mitigation banking and in lieu fee agreements to improve the quality and success of compensatory mitigation projects.

The NMFS policy to recommend no net loss of eelgrass function and the eelgrass mitigation guidelines offered herein align with the provisions of the EPA and Corps mitigation rule, but provide more specific recommendations on how to avoid and minimize impacts to eelgrass and how to implement eelgrass surveys, assessments, mitigation, and monitoring.

2. State of California Wetland Conservation Policies

The 1993 State of California Wetlands Conservation Policy established a framework and strategy to ensure no overall net loss and long-term gain in the quantity, quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property, reduce procedural complexity in administration of state and federal wetlands conservation programs, and encourage partnerships to make landowner incentive programs and cooperative planning efforts the primary focus of wetlands conservation and restoration.

The State of California is also developing a Wetland and Riparian Area Protection Policy. The first phase of this effort was published as the "Preliminary Draft Wetland Area Protection Policy" with the purpose of protecting all waters of the State, including wetlands, from dredge and fill discharges. It includes a wetland definition and associated delineation methods, an assessment framework for collecting and reporting aquatic resource information, and requirements applicable to discharges of dredged or fill material. The draft specifies that dredge or fill projects will provide for replacement of existing beneficial uses through compensatory mitigation. The preliminary policy includes a determination that compensatory mitigation will sustain and improve the overall abundance, diversity and condition of aquatic resources in a project watershed area.

Based on the definition of wetlands included in these state wetland policies, the policies do not directly apply to subtidal eelgrass habitat, but may apply to intertidal eelgrass habitat. The NMFS policy of recommending no net loss to eelgrass habitat function and recommendations for compensatory mitigation for eelgrass impacts complement the state protection policies for wetlands.

3. NOAA Aquaculture Policy and National Shellfish Initiative

In 2011, NOAA released the National Marine Aquaculture Policy and the National Shellfish Initiative. The Policy encourages and fosters sustainable aquaculture development that provides domestic jobs, products, and services and that is in harmony with healthy, productive, and resilient marine ecosystems, compatible with other uses of the marine environment, and consistent with the National Policy for the Stewardship of the Ocean, our Coasts, and the Great Lakes (National Ocean Policy). The goal of the Initiative is to increase populations of bivalve shellfish in our nation's coastal waters—including oysters, clams, abalone, and mussels—through both sustainable commercial production and restoration activities. The Initiative supports shellfish industry jobs and business opportunities to meet the growing demand for seafood, while protecting and enhancing habitat for important commercial, recreational, and endangered and threatened species and species recovery. The Initiative also highlights improved water quality, nutrient removal, and shoreline protection as benefits from shellfish production and restoration. Both the Policy and the Initiative seek to improve interagency coordination for permitting commercial and restoration shellfish projects, as well as support research and other data collection to assess and refine conservation strategies and priorities.

The regulatory efficiencies, transparency, and compensation for impacts to eelgrass promoted by the CEMP directly support the National Aquaculture Policy statements and National Shellfish Initiative through: (1) protection of eelgrass, an important component of productive and resilient coastal ecosystems in California and habitat for wild species, and (2) improved coordination with federal partners regarding planning and permitting for commercial shellfish projects. Furthermore, research conducted under the direction of the National Shellfish Initiative could be informed by and also inform NMFS consultations regarding eelgrass impacts and mitigation in California.

4. NOAA Seagrass Conservation Guidelines

The NOAA publication, "Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters" (1998) was developed by Mark Fonseca of NOAA's Beaufort Laboratory along with Jud Kenworthy and Gordon Thayer and was funded by NOAA's Coastal Ocean Program. The document presents an overview of seagrass conservation and restoration in the United States, discusses important issues that should be addressed in planning seagrass restoration projects, describes different planting methodologies, proposes monitoring criteria and means for evaluation success, and discusses issues faced by resource managers. The CEMP considers information presented in the Fonseca *et al*. document, but deviates in some cases in order to provide reasonable and practicable guidelines for eelgrass conservation in California.

5. Southern California Eelgrass Mitigation Policy

In southern and central California, eelgrass mitigation has been addressed in accordance with the Southern California Eelgrass Mitigation Policy applied by NMFS, US Fish & Wildlife Service, California Department of Fish and Wildlife, California Coastal Commission, US Army Corps of Engineers, and other resource and regulatory agencies since 1991, and which has generally been effective at ensuring eelgrass impacts are mitigated in most circumstances. Given the success of the Southern California Eelgrass Mitigation Policy over its 20-year history, this policy reflects an expansion of the application of the Southern California policy with minor modifications to ensure a high standard of statewide eelgrass management and protection. This policy will supersede the Southern California Eelgrass Mitigation Policy for all areas of California upon its adoption.

II. Implementing Guidelines for California

This policy and guidelines will serve as the guidance for staff and managers within NMFS for developing recommendations concerning eelgrass issues through EFH and FWCA consultations and NEPA reviews throughout California. This policy will inform NMFS's position on eelgrass issues for California in other roles as a responsible, advisory, or funding agency or trustee. In addition, this document provides guidance to assist NMFS in performing its consultative role under the statutes described above. Finally, pursuant to NMFS obligation to provide information to federal agencies under Section 305(b)(1)(D) of the MSA, this policy serves that role by providing information intended to further the conservation and enhancement of EFH. Should this policy or guidelines be inconsistent with any formally-promulgated NMFS regulations, those formally-promulgated regulations will take precedence over any inconsistent provisions of this policy.

While many of the activities impacting eelgrass are similar across California, eelgrass stressors and growth characteristics differ between southern California (U.S./Mexico border to Pt. Conception), central California (Point Conception to San Francisco Bay entrance), San Francisco Bay, and northern California (San Francisco Bay to the California/Oregon border). The amount of scientific information available to base management decisions on also differs among areas within California, with considerably more information and history with eelgrass habitat management in southern California than the other regions. Gaps in region-specific scientific

information do not override the need to be protective of eelgrass habitat while relying on the best information currently available from areas within and outside of California. Although the primary orientation of this policy is toward statewide use, where indicated below, specific elements of this policy may differ between southern California, central California, northern California and San Francisco Bay.

NMFS will continue to explore the science of eelgrass habitat and improve our understanding of eelgrass habitat function, impacts, assessment techniques, and mitigation efficacy. Approximately every 5 years, NMFS intends to evaluate monitoring and survey data collected by federal agencies and action proponents per the recommendations of these guidelines. NMFS managers will determine if updates to these guidelines are appropriate based on information evaluated during the 5-year review. Updates to these guidelines and supporting technical information will be available on the NMFS website.

The information below serves as a common starting place for NMFS recommendations to achieve no net loss of eelgrass habitat function. NMFS employees should not depart from the guidelines provided herein without appropriate justification and supervisory concurrence. However, the recommendations that NMFS ultimately makes should be provided on a case-by-case basis to provide flexibility when site specific conditions dictate. In the EFH context, NMFS recommendations are provided to the action agency, which has final approval of the action; in accordance with the MSA, the action agency may take up NMFS recommendations or articulate its reasons for not following the recommendations. In the FWCA context, NMFS makes recommendations which must be considered, but the action agency is ultimately responsible for the wildlife protective measures it adopts (if any). For these reasons, neither this policy nor its implementing guidelines are to be interpreted as binding on the public.

A. Eelgrass Habitat Definition

Eelgrass distribution fluctuates and can expand, contract, disappear, and recolonize areas within suitable environments. Vegetated eelgrass areas can expand by as much as 5 meters (m) and contract by as much as 4 m annually (Donoghue 2011). Within eelgrass habitat, eelgrass is expected to fluctuate in density and patch extent based on prevailing environmental factors (*e.g.*, turbidity, freshwater flows, wave and current energy, bioturbation, temperature, etc.). To account for seagrass fluctuation, Fonseca *et al.* (1998) recommends that seagrass habitat include the vegetated areas as well as presently unvegetated spaces between seagrass patches.

In addition, there is an area of functional influence, where the habitat function provided by the vegetated cover extends out into adjacent unvegetated areas. Those functions include detrital enrichment, energy dampening and sediment trapping, primary productivity, alteration of current or wave patterns, and fish and invertebrate use, among other functions. The influence of eelgrass on the local environment can extend up to 10 m from individual eelgrass patches, with the distance being a function of the extent and density of eelgrass comprising the bed as well as local biologic, hydrographic, and bathymetric conditions (Bostrom and Bonsdorff 2000, Bostrom *et al*. 2001, Ferrell and Bell 1991, Peterson *et al*. 2004, Smith *et al.* 2008, van Houte-Howes *et al.* 2004, Webster *et al*. 1998). Detrital enrichment will generally extend laterally as well as down slope from the beds, while fish and invertebrates that utilize eelgrass beds may move away from the

eelgrass core to areas around the bed margins for foraging and in response to tides or diurnal cycles (Smith *et al*. 2008).

To encompass fluctuating eelgrass distribution and functional influence around eelgrass cover, for the purposes of this policy and guidelines, eelgrass habitat is defined as areas of vegetated eelgrass cover (any eelgrass within 1 m^2 quadrat and within 1 m of another shoot) bounded by a 5 m wide perimeter of unvegetated area (See Attachment 1 for a graphical depiction of this definition). Unvegetated areas may have eelgrass shoots a distance greater than 1 m from another shoot, and may be internal as well as external to areas of vegetated cover. For isolated patches and on a case-by-case basis, it may be acceptable to include an unvegetated area boundary less than or greater than 5 m wide. The definition excludes areas of unsuitable environmental conditions such as hard bottom substrates, shaded locations, or areas that extend to depths below those supporting eelgrass. Suitable depths can vary substantially depending upon site-specific conditions. In general, eelgrass does not extend deeper than 12 feet mean lower low water (MLLW) in most protected bays and harbors in Southern California, and is more limited in Central and Northern California embayments. However, eelgrass can grow much deeper in entrance channels and offshore areas

B. Surveying Eelgrass

NMFS may recommend action agencies conduct surveys of eelgrass habitat to evaluate effects of a proposed action. Eelgrass habitat should be surveyed using visual or acoustic methods and mapping technologies and scales appropriate to the action, scale, and area of work. Surveys should document both vegetated eelgrass cover as well as unvegetated areas within eelgrass habitat (See section II.A. for definition). Assessing impacts to eelgrass habitat relies on the completion of quality surveys and mapping. As such, inferior quality of surveys and mapping (*e.g.*, completed at an inappropriate scale or using inappropriate methods) may make proper evaluation of impacts impossible, and may result in a recommendation from NMFS to re-survey and re-map project areas. Also, to account for fluctuations in eelgrass habitat due to environmental variations, a reference site(s) should be incorporated into the survey (See section V.B.4 below for more details).

1. Survey Parameters

Because eelgrass growth conditions in California vary, eelgrass mapping techniques will also vary. Diver transects or boundary mapping may be suited to very small scale mapping efforts, while aerial and/or acoustic survey with ground-truthing may be more suited to larger survey areas. Aerial and above-water visual survey methods should be employed only where the lower limit of eelgrass is clearly visible or in combination with methods that adequately inventory eelgrass in deeper waters.

The survey area should be scaled as appropriate to the size of the potential action and the potential extent and distribution of eelgrass impacts, including both direct and indirect effects. The resolution of mapping should be adequate to address the scale of effects reasonably expected to occur. For small projects, such as individual boat docks, higher mapping resolution is appropriate in order to detect actual effects to eelgrass at a scale meaningful to the project size. At larger scales, the mapping resolution may be less refined over a larger area, assuming that

minor errors in mapping will balance out over the larger scale. Survey reports should provide a detailed description of the survey coverage (*e.g.*, number, location, and type of samples) and any interpolation methods used in the mapping.

While many parameters may be useful to describe eelgrass habitat condition (*e.g.*, plant biomass, leaf length, shoot:root ratios, epiphytic loading), many are labor intensive and may be impractical for resource management applications on a day-to-day basis. For this reason, four parameters have been identified for use in eelgrass habitat surveys and assessment of effects of an action on eelgrass. These parameters that should be articulated in eelgrass surveys are: 1) spatial distribution, 2) areal extent, 3) percentage of vegetated cover, and 4) the turion (shoot) density.

a) Spatial Distribution

The spatial distribution of eelgrass habitat should be delineated by a contiguous boundary around all areas of vegetated eelgrass cover extending outward a distance of 5 m, excluding gaps within the vegetated cover that have individual plants greater than 10 m from neighboring plants. Where such separations occur, either a separate area should be defined, or a gap in the area should be defined by extending a line around the void along a boundary defined by adjacent plants and including the 5 meter perimeter. The boundary of the eelgrass habitat should not extend into areas where depth, substrate, or existing structures are unsuited to supporting eelgrass habitat.

b) Aerial Extent

The eelgrass habitat aerial extent is the quantitative area (*e.g.*, square meters) of the spatial distribution boundary polygon of the eelgrass habitat. The total aerial extent should be broken down into extent of vegetated cover and extent of unvegetated habitat. Areal extent should be determined using commercially available geo-spatial analysis software. For small projects, coordinate data for polygon vertices could be entered into a spreadsheet format, and area could be calculated using simple geometry.

c) Percent Vegetated Cover

Eelgrass vegetated cover exists when one or more leaf shoots (turions) per square meter is present. The percent bottom cover within eelgrass habitat should be determined by totaling the area of vegetated eelgrass cover and dividing this by the total eelgrass habitat area. Where substantial differences in bottom cover occur across portions of the eelgrass habitat, the habitat could be subdivided into cover classes (*e.g.*, 20% cover, 50% cover, 75% cover).

d) Turion (Shoot) Density

Turion density is the mean number of eelgrass leaf shoots per square meter within mapped eelgrass vegetated cover. Turion density should be reported as a mean ± the standard deviation of replicate measurements. The number of replicate measurements (n) should be reported along with the mean and deviation. Turion densities are determined only within vegetated areas of

eelgrass habitat and therefore, it is not possible to measure a turion density equal to zero. If different cover classes are used, a turion density should be determined for each cover class.

2. Eelgrass Mapping

For all actions that may directly or indirectly affect eelgrass habitat, an eelgrass habitat distribution map should be prepared on an accurate bathymetric chart with contour intervals of not greater than 1 foot (local vertical datum of MLLW). Exceptions to the detailed bathymetry could be made for small projects or for projects where detailed bathymetry may be infeasible. Unless region-specific mapping format and protocols are developed by NMFS (in which case such region-specific mapping guidance should be used), the mapping should utilize the following format and protocols:

a) Bounding Coordinates

Horizontal datum - Universal Transverse Mercator (UTM), NAD 83 meters, Zone 11 (for southern California) or Zone 10 (for central, San Francisco Bay, and northern California) is the preferred projection and datum. Another projection or datum may be used; however, the map and spatial data should include metadata that accurately defines the projection and datum.

Vertical datum - Mean Lower Low Water (MLLW), depth in feet.

b) Units

Transects, grids, or scale bars should be expressed in meters. Area measurements should be in square meters.

c) File Format

A spatial data layer compatible with readily available commercial geographic information system software producing file formats compatible with ESRI® ArcGIS software should be sent to NMFS when the area mapped supports at least 10 square meters of eelgrass. For those areas supporting less than 10 square meters of eelgrass, a table may alternatively be provided giving the vertices bounding x, y coordinates of the eelgrass areas in a spreadsheet or an ASCII file format. In addition to a spatial layer and/or table, a hard-copy map should be included with the survey report. The projection and datum should be clearly defined in the metadata and/or an associated text file.

Eelgrass maps should, at a minimum, include the following:

- A graphic scale bar, north arrow, legend, horizontal datum and vertical datum;
- A boundary illustrating the limits of the area surveyed;
- Bathymetric contours for the survey area, including both the action area(s) and reference site(s) in increments of not more than 1 foot;
- An overlay of proposed action improvements and construction limits;
- The boundary of the defined eelgrass habitat including an identification of area exclusions based on physical unsuitability to support eelgrass habitat; and

- The existing eelgrass cover within the defined eelgrass habitat at the time of the survey.

3. Survey Period

All mapping efforts should be completed during the active growth period for eelgrass (typically March through October for southern California, April through October for central California, April through October for San Francisco Bay, and May through September for northern California) and should be considered valid for a period of 60 days to ensure significant changes in eelgrass distribution and density do not occur between survey date and the project start date. The 60 day period is particularly important for eelgrass habitat survey conducted at the very beginning of the growing season, if eelgrass habitat expansion occurs as the growing season progresses. A period other than 60 days could be warranted and should be evaluated on a case-by-case basis, particularly for surveys completed in the middle of the growing season. However, when the end of the 60-day validity period falls outside of the region-specific active growth period, the survey could be considered valid until the beginning of the next active growth period. For example, a survey completed in southern California in the August-October time frame would be valid until the resumption of the active growth phase (i.e., in most instances, March 1). In some cases, NMFS and the action agency may agree to surveys being completed outside of the active growth period. For surveys completed during or after unusual climatic events (*e.g.*, high fluvial discharge periods, El Ni□o conditions), NMFS staff should be contacted to determine if any modifications to the common survey period are warranted.

4. Reference Site Selection

Eelgrass habitat spatial extent, aerial extent, percent cover and turion density are expected to naturally fluctuate through time in response to natural environmental variables. As a result, it is necessary to correct for natural variability when conducting surveys for the purpose of evaluating action effects on eelgrass or performance of mitigation areas. This is generally accomplished through the use of a reference site(s), which is expected to respond similarly to the action area in response to natural environmental variability. It is beneficial to select and monitor multiple reference sites rather than a single site and to utilize the average reference site condition as a metric for environmental fluctuations. This is especially true when a mitigation site is located within an area of known environmental gradients, and reference sites may be selected on both sides of the mitigation site along the gradient. Environmental conditions (*e.g.*, sediment, currents, proximity to action area, shoot density, light availability, depth, onshore and watershed influences) at the reference site(s) should be representative of the environmental conditions at the impact area (Fonseca *et al*. 1998). Where practical, the reference site(s) should be at least the size of the anticipated impact and/or mitigation area to limit the potential for minor changes in a reference site (*e.g.*, propeller scarring or ray foraging damage) overly affecting mitigation needs. The logic for site(s) selection should be documented in the eelgrass mitigation planning documents.

C. Avoiding and Minimizing Impacts to Eelgrass

This section describes measures to avoid and minimize impacts to eelgrass caused by turbidity, shading, nutrient loading, sedimentation and alteration of circulation patterns. Not all measures

are equally suited to a particular project or condition. Measures to avoid or minimize impacts should be focused on stressors where the source and control are within the purview of the permittee and action agency. Action agencies in coordination with NMFS should evaluate and establish impact avoidance and minimization measures on a case-by-case basis depending on the action and site-specific information, including prevailing current patterns, sediment source, characteristics, and quantity, as well as the nature and duration of work.

1. Turbidity

To avoid and minimize potential turbidity-related impacts to eelgrass:

- Where practical, actions should be located as far as possible from existing eelgrass; and
- In-water work should occur as quickly as possible such that the duration of impacts is minimized.

Where proposed turbidity generating activities must occur in proximity to eelgrass and increased turbidity will occur at a magnitude and duration that may affect eelgrass habitat, measures to control turbidity levels should be employed when practical considering physical and biological constraints and impacts. Measures may include:

- Use of turbidity curtains where appropriate and feasible;
- Use of low impact equipment and methods (*e.g.*, environmental buckets, or a hydraulic suction dredge instead of clamshell or hopper dredge, provided the discharge may be located away from the eelgrass habitat and appropriate turbidity controls can be provided at the discharge point);
- Limiting activities by tide or day-night windows to limit light degradation within eelgrass habitat;
- Utilizing 24-hour dredging to reduce the overall duration of work and to take advantage of dredging during dark periods when photosynthesis is not occurring; or
- Other measures that an action party may propose and be able to employ to minimize potential for adverse turbidity effects to eelgrass.

NMFS developed a flowchart for a stepwise decision making process as guidance for action agencies to determine when to implement best management practices (BMPs) for minimizing turbidity from dredging actions as part of a programmatic EFH consultation in San Francisco Bay. The parameters considered in the flow chart are relevant to all marine areas of California. This document is posted on the NMFS West Coast Region web page (http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/seagrass_info/california_eelgrass.html) and may be used to evaluate avoidance and minimization measures for any project that generates increased turbidity.

2. Shading

A number of potential design modifications may be used to minimize effects of shading on eelgrass. Boat docks, ramps, gangways, and similar structures should avoid eelgrass habitat to the maximum extent feasible. If avoidance of eelgrass or habitat is infeasible, impacts should be minimized by utilizing, to the maximum extent feasible, design modifications and construction materials that allow for greater light penetration. Action modifications should include, but are not limited to:

- Avoid siting over-water or landside structures in areas where shading of eelgrass habitat would occur;
- Maximizing the north-south orientation of the structure;
- Maximizing the height of the structure above the water;
- Minimizing the width and supporting structure mass to decrease shade effects;
- Relocating the structure in deeper water and limiting the placement of structures in shallow areas where eelgrass occurs to the extent feasible; and
- Utilizing light transmitting materials in structure design.

Construction materials used to increase light passage beneath the structures may include, but are not limited to, open grating or adequate spacing between deck boards to allow for effective illumination to support eelgrass habitat. The use of these shade reducing options may be appropriate where they do not conflict with safety, ADA compliance, or structure utility objectives.

NMFS developed a stepwise key as guidance for action agencies to determine which combination of modifications are best suited for minimizing shading effects from overwater structures on eelgrass as part of a programmatic EFH consultation in San Francisco Bay. The parameters considered in the flow chart are relevant to all marine areas of California. This document is posted on the West Coast Region web page (http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/seagrass_info/california_eelgrass.html) and may be used to evaluate avoidance and minimization measures for any project that results in shading.

3. Circulation patterns

Where appropriate to the scale and nature of potential eelgrass impacts, action parties should evaluate if and how the action may alter the hydrodynamics of the action area such that eelgrass habitat within or in proximity to the action area may be adversely affected. To maintain good water flow and low residence time of water within eelgrass habitat, action agencies should ensure actions:

- Minimize scouring velocities near or within eelgrass beds;
- Maintain wind and tidal circulation to the extent practical by considering orientation of piers and docks to maintain predominant wind effects;
- Incorporate setbacks on the order of 15 to 50 meters from eelgrass habitat where practical to allow for greater circulation and reduced impact from boat maneuvering, grounding, and propeller damage, and to address shading impacts; and
- Minimize the number of piles and maximize pile spacing to the extent practical, where piles are needed to support structures.

For large-scale actions in the proximity of eelgrass habitats, NMFS may request specific modeling and/or field hydrodynamic assessments of the potential effects of work on characteristics of circulation within eelgrass habitat.

4. Nutrient loading

Where appropriate to the scale and nature of potential eelgrass impacts, the following measures should be considered for implementation to reduce the potential for excessive nutrient loading to eelgrass habitat:

- diverting site runoff from landscaped areas away from discharges around eelgrass habitat;
- implementation of fertilizer reduction program;
- reduction of watershed nutrient loading;
- controlling local sources of nutrients such as animal wastes and leach fields; and
- maintaining good circulation and flushing conditions within the water body.

Reducing nutrient loading may also provide opportunities for establishing eelgrass as mitigation for project impacts.

5. Sediment loading

Watershed development and changes in land use may increase soil erosion and increase sedimentation to downstream embayments and lagoons.

- To the extent practicable, maintain riparian vegetation buffers along all streams in the watershed.
- Incorporate watershed analysis into agricultural, ranching, and residential/commercial development projects.
- Increase resistance to soil erosion and runoff. Sediment basins, contour farming, and grazing management are examples of key practices.
- Implement best management practices for sediment control during construction and maintenance operations (*e.g.,* Caltrans 2003).

Reducing sediment loading may also provide opportunities for establishing eelgrass as mitigation for project impacts in systems for which sedimentation is a demonstrable limiting factor to eelgrass.

D. Assessing Impacts to Eelgrass Habitat

If appropriate to the statute under which the consultation occurs, NMFS should consider both direct and indirect effects of the project in order to assess whether a project may impact eelgrass. NMFS is aware that many of the statutes and regulations it administers may have more specific meanings for certain terms, including "direct effect" and "indirect effect", and will use the statutory or regulatory meaning of those terms when conducting consultations under those statutes.[2] Nevertheless, it is useful for NMFS to consider effects experienced

[2] In the EFH context, adverse effects include any impact that reduces quality and/or quantity of EFH, including direct or indirect physical, chemical, or biological alterations of the waters or substrate (50 CFR 600.910). The Council of Environmental Quality (CEQ) regulations regarding NEPA implementation (40 CFR 1508.8(a)) define direct and indirect impacts of an action for the purposes of NEPA. Other NMFS statutes provide their own definitions regarding effects.

contemporaneously with project actions (both at the project site and away from the project site) and which might occur later in time.

Generally, effects to eelgrass habitat should be assessed using pre- and post-project surveys of the impact area and appropriate reference site(s) conducted during the time period of maximum eelgrass growth (typically March through October for southern California, April through October for central California, April through October for San Francisco Bay, and May through September for northern California). NMFS should consider the likelihood that the effects would occur before recommending pre- and post-project eelgrass surveys. The pre-construction survey of the eelgrass habitat in the action area and an appropriate reference site(s) should be completed within 60 days before start of construction. After construction, a post-action survey of the eelgrass habitat in the action area and at an appropriate reference site(s) should be completed within 30 days of completion of construction, or within the first 30 days of the next active growth period following completion of construction that occurs outside of the active growth period. Copies of all surveys should be provided to the lead federal agency, NMFS, and other interested regulatory and/or resource agencies within 30 days of completing the survey. The recommended timing of surveys is intended to minimize changes in eelgrass habitat distribution and abundance during the period between survey completion and construction initiation and completion. For example, a post-action survey completed beyond 30 days following construction or outside of the active growing season may show declines in eelgrass habitat as a result of natural senescence rather than the action.

The lead federal agency and NMFS should consider reference area eelgrass performance, physical evidence of impact, turbidity and construction activities monitoring data, as well as other documentation in the determination of the impacts of the action undertaken. Impact analyses should document whether the impacts are anticipated to be complete at the time of the assessment, or whether there is an anticipation of continuing eelgrass impacts due to chronic or intermittent effects. Where eelgrass at the impact site declines coincident with and similarly to decline at the reference site(s), the percentage of decline at the reference site should be deducted from the decline at the impact site. However, if eelgrass expands within the reference site(s), the impact site should only be evaluated against the pre-construction condition of the reference site and not the expanded condition. If an action results in increased eelgrass habitat relative to the reference sites, this increase could potentially be considered (subject to the caveats identified herein) by NMFS and the action agency as potential compensation for impacts to eelgrass habitat that occur in the future (see Section II. E. 3). An assessment should also be made as to whether impacts or portions of the impact are anticipated to be temporary. Information supporting this determination may be derived from the permittee, NMFS, and other resource and regulatory agencies, as well as other eelgrass experts.

For some projects, environmental planning and permitting may take longer than 60 days. To accommodate longer planning schedules, it may also be necessary to do a preliminary eelgrass survey prior to the pre-construction survey. This preliminary survey can be used to anticipate potential impacts to eelgrass for the purposes of mitigation planning during the permitting process. In some cases, preliminary surveys may focus on spatial distribution of eelgrass habitat only or may be a qualitative reconnaissance to allow permittees to incorporate avoidance and minimization measures into their proposed action or to plan for future mitigation needs. The pre-

and post- project surveys should then verify whether impacts occur as anticipated, and if planned mitigation is adequate. In some cases, a preliminary survey could be completed a year or more in advance of the project action.

1. Direct Effects

Biologists should consider the potential for localized losses of eelgrass from dredging or filling, construction-associated damage, and similar spatially and temporally proximate impacts (these effects could be termed "direct"). The actual area of the impact should be determined from an analysis that compares the pre-action condition of eelgrass habitat with the post-action conditions from this survey, relative to eelgrass habitat change at the reference site(s).

2. Indirect Effects

Biologists should also consider effects caused by the action which occur away from the project site; furthermore, effects occurring later in time (whether at or away from the project site) should also be considered. Biologists should consider the potential for project actions to alter conditions of the physical environment in a manner that, in turn, reduce eelgrass habitat distribution or density (*e.g.*, elevated turbidity from the initial implementation or later operations of an action, increased shading, changes to circulation patterns, changes to vessel traffic that lead to greater groundings or wake damage, increased rates of erosion or deposition).

For actions where the impact cannot be fully determined until a substantial period after an action is taken, an estimate of likely impacts should be made prior to implementation of the proposed action based on the best available information (*e.g.*, shading analyses, wave and current modeling). A monitoring program consisting of a pre-construction eelgrass survey and three post-construction eelgrass surveys at the impact site and appropriate reference site(s) should be performed. The action party should complete the first post-construction eelgrass survey within 30 days following completion of construction to evaluate any immediate effects to eelgrass habitat. The second post-construction survey should be performed approximately one year after the first post-construction survey during the appropriate growing season. The third post-construction survey should be performed approximately two years after the first post-construction survey during the appropriate growing season. The second and third post-construction surveys will be used to evaluate if indirect effects resulted later in time due to altered physical conditions; the time frames identified above are aligned with growing season (attempting a survey outside of the growing season would show inaccurate results).

A final determination regarding the actual impact and amount of mitigation needed, if any, to offset impacts should be made based upon the results of two annual post-construction surveys, which document the changes in the eelgrass habitat (areal extent, bottom coverage, and shoot density within eelgrass) in the vicinity of the action, compared to eelgrass habitat change at the reference site(s). Any impacts determined by these monitoring surveys should be mitigated. In the event that monitoring demonstrates the action to have resulted in greater eelgrass habitat impacts than initially estimated, additional mitigation should be implemented in a manner consistent with these guidelines. In some cases, adaptive management may allow for increased success in eelgrass mitigation without the need for additional mitigation.

E. Mitigation Options

The term mitigation is defined differently by various federal and State laws, regulations and policies. In a broad sense, mitigation may include a range of measures from complete avoidance of adverse effects to compensation for adverse effects by preserving, restoring or creating similar resources at onsite or offsite locations. The Corps and EPA issued regulations governing compensatory mitigation to offset unavoidable adverse effects to waters of the United States authorized by Clean Water Act section 404 permits and other permits issued by the Corps (73 FR 19594; April 10, 2008). For those regulations (33 CFR 332.2 and 40 CFR 230.92, respectively), the Corps and EPA, define "compensatory mitigation" as "the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse effects which remain after all appropriate and practicable avoidance and minimization has been achieved."

When impacts to eelgrass would occur, the action agency should develop a mitigation plan to achieve no net loss in eelgrass function following the recommended steps in this policy. If NMFS determines a mitigation plan is needed, and it was not included with the EFH Assessment for the proposed action, NMFS may recommend, either as comments on the EFH Assessment or as an EFH Conservation Recommendation, that one be provided. Potential mitigation options are described below. The action agency should consider site specific conditions when determining the most appropriate mitigation option for an action.

1. Comprehensive management plans

NMFS supports the development of comprehensive management plans (CMPs) that protect eelgrass resources within the context of broader ecosystem needs and management objectives. Recommendations different from specific elements described below for in-kind mitigation may be appropriate where a CMP (*e.g.,* an enforceable programmatic permit, Special Area Management Plan, harbor plan, or ecosystem-based management plan) exists that is considered to provide adequate population-level and local resource distribution protections to eelgrass. One such CMP under development at the time these guidelines were developed is *City of Newport Beach Eelgrass Protection Mitigation Plan for Shallow Water in Lower Newport Bay: An Ecosystem Based Management Plan.* If satisfactorily completed and adopted, it is anticipated the protection measures for eelgrass within this area would be adequate to meet the objectives of this policy.

In general, it is anticipated that CMPs may be most appropriate in situations where a project or collection of similar projects will result in incremental but recurrent impacts to a small portion of local eelgrass populations through time (*e.g.*, lagoon mouth maintenance dredging, maintenance dredging of channels and slips within established marinas, navigational hazard removal of recurrent shoals, shellfish farming, and restoration or enhancement actions). In order to ensure that these alternatives provide adequate population-level and local resource distribution protections to eelgrass and that the plan is consistent with the overall conservation objectives of this policy, NMFS should be involved early in the plan's development.

2. In-kind mitigation

In-kind compensatory mitigation is the creation, restoration, or enhancement of habitat to mitigate for adverse impacts to the same type of habitat. In most cases in-kind mitigation is the preferred option to compensate for impacts to eelgrass. Generally, in-kind mitigation should achieve a final mitigation ratio of 1.2:1 across all areas of the state, independent of starting mitigation ratios. A starting mitigation ratio is the ratio of mitigation area to impact area when mitigation is initiated. The final mitigation ratio is the ratio of mitigation area to impact area once mitigation is complete. The 1.2:1 ratio assumes: (1) there is no eelgrass function at the mitigation site prior to mitigation efforts, (2) eelgrass function at the mitigation site is achieved within three years, (3) mitigation efforts are successful, and (4) there are no landscape differences (*e.g.*, degree of urban influence, proximity to freshwater source), between the impact site and the mitigation site. Variations from these assumptions may warrant higher or lower mitigation ratios. For example, a higher ratio would be appropriate for an enhancement project where the mitigation site has some level of eelgrass function prior to the mitigation action.

Typically, in-kind eelgrass mitigation involves transplanting or seeding of eelgrass into unvegetated habitat. Successful in-kind mitigation may also warrant modification of physical conditions at the mitigation site to prepare for transplants (*e.g.*, alter sediment composition, depth, etc.). In some areas, other in-kind mitigation options such as removing artificial structures that preclude eelgrass growth may be feasible. If in-kind mitigation that does not include transplants or seeding is proposed, post-mitigation monitoring as described below should be implemented to verify that mitigation is successful.

Information provided below in Section II.F includes specific recommendations for in-kind mitigation, including site selection, reference sites, starting mitigation ratios, mitigation methods, mitigation monitoring and performance criteria. Many of the recommendations provided in these guidelines for eelgrass assessments, surveys, and mitigation may apply throughout the state even if a non-transplant mitigation option is proposed.

3. Mitigation banks and in-lieu-fee programs

In 2006 and 2011, the NMFS Southwest Region (merged with the Northwest Region in 2013 to form the West Coast Region) signed interagency Memorandum of Understandings that established and refined a framework for developing and using combined or coordinated approaches to mitigation and conservation banking and in-lieu-fee programs in California. Other signatory agencies include: the California Resources Agency, California Department of Fish and Wildlife, the Corps, the US Fish &Wildlife Service, the EPA, the Natural Resource Conservation Service, and the State Water Resources Control Board.

Under this eelgrass policy, NMFS supports the use of mitigation bank and in-lieu fee programs to compensate for impacts to eelgrass habitat, where such instruments are available and where such programs are appropriate to the statutory structure under which mitigation is recommended. Mitigation banks and in-lieu fee conservation programs are highly encouraged by NMFS in heavily urbanized waters. Credits should be used at a ratio of 1:1 if those credits have been established for a full three-year period prior to use. If the bank credits have been in place for a

period less than three years, credits should be used at a ratio determined through application of the wetland mitigation calculator (King and Price 2004).

At the request of the action party, and only with approval of NMFS and other appropriate resource agencies and subject to the caveats below, surplus eelgrass area that, after 60-months, exceeds the mitigation needs, as defined in section II.F.6 Mitigation Monitoring and Performance Milestones, has the potential to be considered for future mitigation needs. Additionally, only with the approval of NMFS and other appropriate resource agencies and subject to the caveats below, eelgrass habitat expansion resulting from project activities, and that otherwise would not have occurred, has the potential to be considered for future mitigation needs. Exceeding mitigation needs does not guarantee or entitle the action party or action agency to credit such mitigation to future projects, since every future project must be considered on a case-by-case basis (including the location and type of impact) and viewed in light of the relevant statutory authorities.

4. Out-of-kind mitigation

Out-of-kind compensatory mitigation means the adverse impacts to one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type. In most cases, out-of-kind mitigation is discouraged, because eelgrass is a rare, special-status habitat in California. There may be some scenarios, however, where out-of-kind mitigation for eelgrass impacts is ecologically desirable or when in-kind mitigation is not feasible. This determination should be made based on an established ecosystem plan that considers ecosystem function and services relevant to the geographic area and specific habitat being impacted. Any proposal for out-of-kind mitigation should demonstrate that the proposed mitigation will compensate for the loss of eelgrass habitat function within the ecosystem. Out-of-kind mitigation that generates services similar to eelgrass habitat or improves conditions for establishment of eelgrass should be considered first. NMFS and the federal action agency should be consulted early when out-of-kind mitigation is being proposed in order to determine if out-of-kind mitigation is appropriate, in coordination with other relevant resource agencies (e.g., California Department of Fish and Wildlife, California Coastal Commission, U.S. Fish and Wildlife Service)

F. In-kind Mitigation for Impacts to Eelgrass

As all mitigation project specifics will be determined on a case-by-case basis, circumstances may exist where NMFS staff will need to modify or deviate from the recommended measures described below before providing their recommendation to action agencies.

1. Mitigation Site Selection

Eelgrass habitat mitigation sites should be similar to the impact site. Site selection should consider distance from action, depth, sediment type, distance from ocean connection, water quality, and currents. Where eelgrass that is impacted occurs in marginally suitable environments, it may be necessary to conduct mitigation in a preferable location and/or modify the site to be better suited to support eelgrass habitat creation. Mitigation site modification should be fully coordinated with NMFS staff and other appropriate resource and regulatory agencies. To the extent feasible, mitigation should occur within the same hydrologic system

(*e.g.*, bay, estuary, lagoon) as the impacts and should be appropriately distributed within the same ecological subdivision of larger systems (*e.g.*, San Pablo Bay or Richardson Bay in San Francisco Bay), unless NMFS and the action agency concur that good justification exists for altering the distribution based on valued ecosystem functions and services.

In identifying potentially suitable mitigation sites, it is advisable to consider the current habitat functions of the mitigation site prior to mitigation use. In general, conversion of unvegetated subtidal areas or disturbed uplands to eelgrass habitats may be considered appropriate means to mitigate eelgrass losses, while conversion of other special aquatic sites (*e.g.*, salt marsh, intertidal mudflats, and reefs) is unlikely to be considered suitable. It may be necessary to develop suitable environmental conditions at a site prior to being able to effectively transplant eelgrass into a mitigation area. Mitigation sites may need physical modification, including increasing or lowering elevation, changing substrate, removing shading or debris, adding wave protection or removing impediments to circulation.

2. Mitigation Area Needs

In-kind mitigation plans should address the components described below to ensure mitigation actions achieve no net loss of eelgrass habitat function. Alternative contingent mitigation should be specified and included in the mitigation plan to address situations where performance milestones are not met.

a) Impacts to Areal Extent of Eelgrass Habitat

Generally, mitigation of eelgrass habitat should be based on replacing eelgrass habitat extent at a 1.2 (mitigation) to 1 (impact) mitigation ratio for eelgrass throughout all regions of California. However, given variable degrees of success across regions and potential for delays and mitigation failure, NMFS calculated *starting* mitigation ratios using "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004) developed for NMFS Office of Habitat Conservation. The calculator utilizes methodology similar to Habitat Equivalency Analysis (HEA), which is an accepted method to determine the amount of compensatory restoration needed to provide natural resource services that are equivalent to loss of natural resource services following an injury (http://www.darrp.noaa.gov/economics/pdf/heaoverv.pdf). HEA is commonly used by NOAA during damage assessment cases, including those involving seagrass. Similar to HEA, the mitigation calculator is based on the "net present value" approach to asset valuation, an economics concept used to compare values of all types of investments, and then modified to incorporate natural resource services. Using the calculator allows for consistency in methodology for all areas within California, avoids arbitrary identification of size of the mitigation area, and avoids cumulative loss to eelgrass habitat that would likely occur with a standard 1:1 ratio (because of the complexity of eelgrass mitigation and the time for created eelgrass to achieve full habitat function).

The calculator includes a number of metrics to determine appropriate ratios that focus on comparisons of quality and quantity of function of the mitigation relative to the site of impact to ensure full compensation of lost function. (see Attachment 4). Among other metrics, the calculator employs a metric of likelihood of failure within the mitigation site based on regional mitigation failure history. As such, the mitigation calculator identifies a recommended starting

mitigation ratio (the mitigation area to eelgrass impact area) based on regional history of success in eelgrass mitigation. Increased initial mitigation site size should be considered to provide greater assurance that the performance milestones, as specified in Section II.F.6, will be met. This is a common practice in the eelgrass mitigation field to reduce risk of falling short of mitigation needs (Thom 1990). Independent of starting mitigation ratio utilized for a given mitigation action, mitigation success should generally be evaluated against a ratio of 1.2:1.

The elevated starting mitigation ratio should be applied to the area of impact to vegetated eelgrass cover only. For unvegetated eelgrass habitat, a starting mitigation ratio of 1.2:1 is appropriate.

To determine the recommended starting mitigation ratio for each region, the percentage of transplant successes and failures was examined over the history of transplanting in the region. NMFS staff examined transplants projects over the past 25 years in all mitigation regions (see Attachment 6). Eelgrass mitigation in Southern California has a 35-year history with 66 transplants performed over that period. In the past 25 years, a total of 47 eelgrass transplants for mitigation purposes have been conducted in Southern California. Forty-three of these were established long enough to evaluate success for these transplants. The overall failure rate, with failure defined as not meeting success criteria established for the project, was 13 percent. Eelgrass mitigation within central California has a better history of successful completion than within southern California, San Francisco Bay, and northern California. However, the number of eelgrass mitigation actions conducted in this region is low and limited to areas within Morro Bay. While the success of eelgrass mitigation in central California has been high, the low number of attempts makes mitigation in this region uncertain. Eelgrass habitat creation/restoration in San Francisco Bay and in northern California has had varied success.

In all cases, best information available at the time of this policy's development was used to determine the parameter values entered into the calculator formula. As regional eelgrass mitigation success changes and the results of ongoing projects become available, the starting mitigation ratio may be updated. Updates in mitigation calculator inputs should not be made on an individual action basis, because the success or lack of success of an individual mitigation project may not reflect overall mitigation success for the region. Rather NMFS should re-evaluate the regional transplant history approximately every 5 years, increasing the record of transplant success in 5 year increments for new projects implemented after NMFS' adoption of these guidelines. If the 5-year review shows that new efforts are more successful than those from the beginning of the 25-year period, NMFS staff should consider removing early projects (*e.g.*, those completed 20 years prior) from the analysis.

On a case-by-case basis and in consultation with action agencies, NMFS may consider proposals with different starting mitigation ratios where sufficient justification is provided that indicates the mitigation site would achieve the no net loss goal. In addition, CMPs could consider different starting mitigation ratios, or other mitigation elements and techniques, as appropriate to the geographic area addressed by the CMP.

Regardless of starting mitigation ratio, eelgrass mitigation should be considered successful, if it meets eelgrass habitat coverage over an area that is 1.2 times the impact area with comparable

eelgrass density as impacted habitat. Please note, delayed implementation, supplemental transplant needs, or NMFS and action agency agreement may result in an altered mitigation area. In the EFH consultation context, NMFS may recommend an altered mitigation area during implementation of the federal agency's mitigation plan following EFH consultation or NEPA review, or as an EFH Conservation Recommendation if the federal agency re-initiates EFH consultation.

(1) Southern California (Mexico border to Pt. Conception)

For mitigation activities that occur concurrent to the action resulting in damage to existing eelgrass habitat, a starting ratio of 1.38 to 1 (transplant area to vegetated cover impact area) should be recommended to counter the regional failure risk. That is, for each square meter of vegetated eelgrass cover adversely impacted, 1.38 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat.

(2) Central California (Point Conception to mouth of San Francisco Bay).

For mitigation activities that occur concurrent to the action resulting in damage to existing eelgrass habitat, a starting ratio of 1.20 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 0 percent failure rate over the past 25 years (4 transplant actions). It should however be noted that all of these successful transplants included a greater area of planting than was necessary to achieve success such that the full mitigation area would be achieved, even with areas of minor transplant failure.

(3) San Francisco Bay (including south, central, San Pablo and Suisun Bays).

For mitigation activities that occur concurrent to the action resulting in damage to the existing eelgrass bed resource, a ratio of 3.01 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 60 percent failure rate over the past 25 years (10 transplant actions). That is, for each square meter adversely impacted, 3.01 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat.

(4) Northern California (mouth of San Francisco Bay to Oregon border).

For mitigation activities that occur concurrent to the action resulting in damage to the existing eelgrass habitat, a starting ratio of 4.82 to 1 (transplant area to vegetated cover impact area) should be recommended based on a 75 percent failure rate over the past 25 years (4 transplant actions). That is, for each square meter of eelgrass habitat adversely impacted, 4.82 square meters of new habitat with suitable conditions to support eelgrass should be planted with a comparable bottom coverage and eelgrass density as impacted habitat.

b) Impacts to Density of Eelgrass Beds

Degradation of existing eelgrass habitat that results in a permanent reduction of eelgrass turion density greater than 25 percent, and that is a statistically significant difference from pre-impact density, should be mitigated based on an equivalent area basis. The 25 percent and statistically significant threshold is believed reasonable based on supporting information (Fonseca *et al.* 1998, WDFW 2008), and professional practice under SCEMP. In these cases, eelgrass remains present at the action site, but density may be potentially affected by long-term chronic or intermittent effects of the action. Reduction of density should be determined to have occurred when the mean turion density of the impact site is found to be statistically different (α=0.10 and β=0.10) from the density of a reference and at least 25 percent below the reference mean during two annual sampling events following implementation of an action. The number of samples taken to describe density at each site (*e.g.*, impact and reference) should be sufficient to provide for appropriate statistical power. For small impact areas that do not allow for a sample size that provides statistical power, alternative methods for pre- and post- density comparisons could be considered. Mitigation for reduction of turion density without change in eelgrass habitat area should be on a one-for-one basis either by augmenting eelgrass density at the impact site or by establishing new eelgrass habitat comparable to the change in density at the impact site. For example, a 25 percent reduction in density of 100-square meters (100 turions/square meter) of eelgrass habitat to 75 turions/square meter should be mitigated by the establishing 25 square meters of new eelgrass habitat with a density at or above the 100 turions/square meter pre-impact density.

3. Mitigation Technique

In-kind mitigation technique should be determined on a case-by-case basis. Techniques for eelgrass mitigation should be consistent with the best available technology at the time of mitigation implementation and should be tailored to the specific needs of the mitigation site. Eelgrass transplants have been highly successful in southern and central California, but have had mixed results in San Francisco Bay and northern California. Bare-root bundles and seed buoys have been utilized with some mixed success in northern portions of the state. Transplants using frames have also been used with some limited success. For transplants in southern California, plantings consisting of bare-root bundles consisting of 8-12 individual turions each have proven to be most successful (Merkel 1988).

Donor material should be taken from the area of direct impact whenever practical, unless the action resulted in reduced density of eelgrass at the area of impact. Site selections should consider the similarity of physical environments between the donor site and the transplant receiver site and should also consider the size, stability, and history of the donor site (*e.g.*, how long has it persisted and is it a transplant site). Plants harvested should be taken in a manner to thin an existing bed without leaving any noticeable bare areas. For all geographic areas, no more than 10 percent of an existing donor bed should be harvested for transplanting purposes. Ten percent is reasonable based on recommendations in Thom *et al.* (2008) and professional practice under SCEMP. Harvesting of flowering shoots for seed buoy techniques should occur only from widely separated plants.

It is important for action agencies to note that state laws and regulations affect the harvesting and transplantation of donor plants and permission from the state, where required, should be obtained; for example, California Department of Fish and Wildlife may need to provide written authorization for harvesting and transplanting donor plants and/or flowering shoots.

4. Mitigation Plan

NMFS should recommend that a mitigation plan be developed for in-kind mitigation efforts. During consultation, NMFS biologists should request that mitigation plans be provided at least 60 days prior to initiation of project activities to allow for NMFS review. When feasible, mitigation plans should be developed based on preliminary or pre-project eelgrass surveys. When there is uncertainty regarding whether impacts to eelgrass will occur, and the need for mitigation is based on comparison of pre- and post-project eelgrass surveys, NMFS biologists should request that the mitigation plan be provided no more than 60 days following the post-project survey to allow for NMFS review and minimize any delay in mitigation implementation.

At a minimum, the mitigation plan should include:

- Description of the project area
- Results of preliminary eelgrass survey and pre/post-project eelgrass surveys if available (see Section II.B.1 and II.B.2)
- Description of projected and/or documented eelgrass impacts
- Description of proposed mitigation site and reference site(s) (see Section II.B.4)
- Description of proposed mitigation methods (see Section II.F.3)
- Construction schedule, including specific starting and ending dates for all work including mitigation activities. (see Section II.F.5)
- Schedule and description of proposed post-project monitoring and when results will be provided to NMFS
- Schedule and description of process for continued coordination with NMFS through mitigation implementation
- Description of alternative contingent mitigation or adaptive management should proposed mitigation fail to achieve performance measures (see Section II.F.6)

5. Mitigation Timing

Mitigation should commence within 135 days following the initiation of the in-water construction resulting in impact to the eelgrass habitat, such that mitigation commences within the same eelgrass growing season as impacts occur. If possible, mitigation should be initiated prior to or concurrent with impacts. For impacts initiated within 90 days prior to, or during, the low-growth period for the region, mitigation may be delayed to within 30 days after the start of the following growing season, or 90 days following impacts, whichever is longer, without the need for additional mitigation as described below. This timing avoids survey completion during the low growth season, when results may misrepresent progress towards performance milestones.

Delays in eelgrass mitigation result in delays in ultimate reestablishment of eelgrass habitat functions, increasing the duration and magnitude of project impacts to eelgrass. To offset loss of eelgrass habitat function that accumulates through delay, an increase in successful eelgrass

mitigation is needed to achieve the same compensatory habitat function. Because habitat function is accumulated over time once the mitigation habitat is in place, the longer the delay in initiation of mitigation, the greater the additional habitat area needed (i.e., mitigation ratio increasingly greater than 1.2:1) to offset losses. Unless a specific delay is authorized or dictated by the initial schedule of work, federal action agencies should determine whether delays in mitigation initiation in excess of 135 days warrant an increased final mitigation ratio. If increased mitigation ratios are warranted, NMFS should recommend higher mitigation ratios (see Attachment 7). Where delayed implementation is authorized by the action agency, the increased mitigation ratio may be determined by utilizing the Wetlands Mitigation Calculator (King and Price 2004) with an appropriate value for parameter D (See Attachment 4). Examples of delay multipliers generated using the Wetlands Mitigation Calculator are provided in Attachment 5.

Conversely, implementing mitigation ahead of impacts can be used to reduce the mitigation needs by achieving replacement of eelgrass function and services ahead of eelgrass losses. If eelgrass is successfully transplanted three years ahead of impacts, the mitigation ratio would drop from 1.2:1 to 1:1. If mitigation is completed less than three years ahead of impacts, the mitigation calculator can be used to determine the appropriate intermediate mitigation ratio.

6. Mitigation Monitoring and Performance Milestones

In order to document progress and persistence of eelgrass habitat at the mitigation site through and beyond the initial establishment period, which generally is three years, monitoring should be completed for a period of five years at both the mitigation site and at an appropriate reference site(s) (Section II.B.4. Reference Site Selection). Monitoring at a reference site(s) may account for any natural changes or fluctuations in habitat area or density. Monitoring should determine the area of eelgrass and density of plants at 0, 12, 24, 36, 48, and 60 months after completing the mitigation. These intervals will provide yearly updates on the establishment and persistence of eelgrass during the growing season. These monitoring recommendations are consistent with findings of the National Research Council (NRC 2001), the Corps requirements for compensatory mitigation (33 CFR 332.6(b)), and other regional resource policies (Corps 2010, Evans and Leschen 2010, SFWMD 2007).

All monitoring work should be conducted during the active eelgrass growth period and should avoid the recognized low growth season for the region to the maximum extent practicable (typically November through February for southern California, November through March for central California, November through March for San Francisco Bay, and October through April for northern California). Sufficient flexibility in the scheduling of the 6 month surveys should be allowed in order to ensure the work is completed during this active growth period. Additional monitoring beyond the 60-month period may be warranted in those instances where the stability of the proposed mitigation site is questionable, where the performance of the habitat relative to reference sites is erratic, or where other factors may influence the long-term success of mitigation. Mitigation plans should include a monitoring schedule that indicates when each of the monitoring events will be completed.

The monitoring and performance milestones described below are included as eelgrass transplant success criteria in the SCEMP. These numbers represent milestones and associated timelines

typical of successful eelgrass habitat development based on NMFS' experience with: (1) conducting eelgrass surveys and monitoring and (2) reviewing mitigation monitoring results for projects implemented under SCEMP. Restored eelgrass habitat is expected to develop through an initial 3 year monitoring period such that, within 36 months following planting, it meets or exceeds the full coverage and not less than 85 percent of the density relative to the initial condition of affected eelgrass habitat. Restored eelgrass habitat is expected to sustain this condition for at least 2 additional years.

Monitoring events should evaluate the following performance milestones:

Month 0 – Monitoring should confirm the full coverage distribution of planting units over the initial mitigation site as appropriate to the geographic region.

Month 6 – Persistence and growth of eelgrass within the initial mitigation area should be confirmed, and there should be a survival of at least 50 percent of the initial planting units with well-distributed coverage over the initial mitigation site. For seed buoys, there should be demonstrated recruitment of seedlings at a density of not less than one seedling per four (4) square meters with a distribution over the extent of the initial planting area. The timing of this monitoring event should be flexible to ensure work is completed during the active growth period.

Month 12– The mitigation site should achieve a minimum of 40 percent coverage of eelgrass and 20 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 24– The mitigation site should achieve a minimum of 85 percent coverage of eelgrass and 70 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 36– The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 48– The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Month 60– The mitigation site should achieve a minimum of 100 percent coverage of eelgrass and 85 percent density of reference site(s) over not less than 1.2 times the area of the impact site.

Performance milestones may be re-evaluated or modified if declines at a mitigation site are also demonstrated at the reference site, and therefore, may be a result of natural environmental stressors that are unrelated to the intrinsic suitability of the mitigation site. In the EFH consultation context, NMFS should provide recommendations regarding modification of performance milestones as technical assistance during interagency coordination as described in

the mitigation plan or as EFH Conservation Recommendations if the federal action agency re-initiates EFH consultation.

7. Mitigation Reporting

NMFS biologists should request monitoring reports and spatial data for each monitoring event in both hard copy and electronic version, to be provided within 30 days after the completion of each monitoring period to allow timely review and feedback from NMFS. These reports should clearly identify the action, the action party, mitigation consultants, relevant points of contact, and any relevant permits. The size of permitted eelgrass impact estimates, actual eelgrass impacts, and eelgrass mitigation needs should be identified, as should appropriate information describing the location of activities. The report should include a detailed description of eelgrass habitat survey methods, donor harvest methods and transplant methods used. The reports should also document mitigation performance milestone progress (see II.F.6. Mitigation Monitoring and Performance Milestones). The first report (for the 0-month post-planting monitoring) should document any variances from the mitigation plan, document the sources of donor materials, and document the full area of planting. The final mitigation monitoring report should provide the action agency and NMFS with an overall assessment of the performance of the eelgrass mitigation site relative to natural variability of the reference site to evaluate if mitigation responsibilities were met. An example summary is provided in Attachment 3.

8. Supplemental Mitigation

Where development of the eelgrass habitat at the mitigation site falls short of achieving performance milestones during any interim survey, the monitoring period should be extended and supplemental mitigation may be recommended to ensure that adequate mitigation is achieved. In the EFH consultation context, NMFS should provide recommendations regarding extended monitoring as technical assistance during interagency coordination as described in the mitigation plan or as EFH Conservation Recommendations if the federal action agency re-initiates EFH consultation. In some instances, an adaptive management corrective action to the existing mitigation area may be appropriate. In the event of a mitigation failure, the action agency should convene a meeting with the action party, NMFS, and applicable regulatory and/or resource agencies to review the specific circumstances and develop a solution to achieve no net loss in eelgrass habitat function.

As indicated previously, while in-kind mitigation is preferred, the most appropriate form of compensatory mitigation should be determined on a case-by-case basis. In cases where it is demonstrated that in-kind replacement is infeasible, out-of-kind mitigation may be appropriate over completion of additional in-kind mitigation. The determination that an out-of-kind mitigation is appropriate will be made by NMFS, the action agency, and the applicable regulatory agencies, where a regulatory action is involved.

G. Special Circumstances

Depending on the circumstances of each individual project, NMFS may make recommendations different from those described above on a case by case basis. For the scenarios described below,

for example, NMFS could recommend a mitigation ratio or 1:1 or for use of out-of-kind mitigation. Because NMFS needs a proper understanding of eelgrass habitat in the project area and potential impacts of the proposed project to evaluate the full effects of authorized activities, NMFS should not make recommendations that diverge from these guidelines if they would result in surveys, assessments or reports inferior to those which might be obtained through the guidance in Section II. The area thresholds described below are taken from the SCEMP and/or reflect recommendations NMFS staff have repeatedly made during individual EFH consultations. These thresholds minimize impacts to eelgrass habitat quality and quantity, based on NMFS' experience with: (1) conducting eelgrass surveys and monitoring and (2) reviewing project monitoring results for projects implemented under SCEMP. The special circumstance included for shellfish aquaculture longlines is supported by Rumrill and Poulton (2004) and the NMFS Office of Aquaculture.

1. Localized Temporary Impacts

NMFS may consider modified target mitigation ratios for localized temporary impacts wherein the damage results in impacts of less than 100 square meters and eelgrass habitat is fully restored within the damage footprint within one year of the initial impact (e.g., placement of temporary recreational facilities, shading by construction equipment, or damage sustained through vessel groundings or environmental clean-up operations). In such cases, the 1.2:1 mitigation ratio should not apply, and a 1:1 ratio of impact to recovery would apply. A monitoring program consisting of a pre-construction eelgrass survey and three post-construction eelgrass surveys at the impact site and appropriate reference site(s) should be completed in order to demonstrate the temporary nature of the impacts. NMFS should recommend that surveys be completed as follows: 1) the first post-construction eelgrass survey should be completed within 30 days following completion of construction to evaluate direct effects of construction, 2) the second and third post-construction surveys should be performed approximately one year after the first post-construction survey, and approximately two years after the first post-construction survey, respectively, during the appropriate growing season to confirm no indirect, or longer term effects resulted from construction. A compelling reason should be demonstrated before any reduced monitoring and reporting recommendations are made.

2. Localized Permanent Impacts

a) If both NMFS and the authorizing action agencies concur, the compensatory mitigation elements of this policy may not be necessary for the placement of a single pipeline, cable, or other similar utility line across existing eelgrass habitat with an impact corridor of no more than 1 meter wide. NMFS should recommend the completion of pre- and post-action surveys as described in section II.B. and II.D. The actual area of impact should be determined from the post-action survey. NMFS should recommend the completion of an additional survey (after 1 year) to ensure that the action or impacts attributable to the action have not exceeded the 1-meter corridor width. NMFS should recommend that, if the post-action or 1 year survey demonstrates a loss of eelgrass habitat greater than the 1-meter wide corridor, mitigation should be undertaken.

b)) If both NMFS and the authorizing action agencies concur that the spacing of shellfish aquaculture longlines does not result in a measurable net loss of eelgrass habitat in the project

area, then mitigation associated with local losses under longlines may not be necessary. NMFS should recommend the completion of pre- and post-action surveys as described in section II.B. and II.D. NMFS should recommend the completion of additional post-action monitoring surveys (to be completed approximately 1 year and 2 years following implementation of the action) to ensure that the action or impacts attributable to the action have not resulted in net adverse impacts to eelgrass habitat. NMFS should recommend that, if the 1-year or 2-year survey demonstrates measurable impact to eelgrass habitat, mitigation should be undertaken. c) NMFS should consider mitigation on a 1:1 basis for impacts less than 10 square meters to eelgrass patches where impacts are limited to small portions of well-established eelgrass habitat or eelgrass habitat that, despite highly variable conditions, generally retain extensive eelgrass, even during poor years. A reduced mitigation ratio should not be considered where impacts would occur to isolated or small eelgrass habitat areas within which the impacted area constitutes more than 1% of the eelgrass habitat in the local area during poor years.

c) If NMFS concurs and suitable out-of-kind mitigation is proposed, compensatory mitigation may not be necessary for actions impacting less than 10 square meters of eelgrass.

III. Glossary of Terms

Except where otherwise specified, the explanations of the following terms are provided for informational purposes only and are described solely for the purposes of this policy; where a NMFS statute, regulation, or agreement requires a different understanding of the relevant term, that understanding of the term will supplant these explanations provided below.

Compensatory mitigation – restoration, establishment, or enhancement of aquatic resources for the purposes of offsetting unavoidable authorized adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Ecosystem – a geographically specified system of organisms, the environment, and the processes that control its dynamics. Humans are an integral part of an ecosystem.

Ecosystem function – ecological role or process provided by a given ecosystem.

Ecosystem services – contributions that a biological community and its habitat provide to the physical and mental well-being of the human population (*e.g.*, recreational and commercial opportunities, aesthetic benefits, flood regulation).

Eelgrass habitat – areas of vegetated eelgrass cover (any eelgrass within 1 square meter quadrat and within 1 m of another shoot) bounded by a 5 m wide perimeter of unvegetated area

Essential fish habitat (EFH) – EFH is defined in the MSA as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity."

EFH Assessment – An assessment as further explained in 50 C.F.R. § 600.920(e).

EFH Consultation – The process explained in 50 C.F.R. § 600.920

EFH Conservation Recommendation – provided by the National Marine Fisheries Service (NMFS) to a federal or state agency pursuant to section 305(b)(4)(A) of the Magnuson-Stevens Act regarding measures that can be taken by that agency to conserve EFH. As further explained in 50 C.F.R. § 600.925, EFH Conservation Recommendations may be provided as part of an EFH consultation with a federal agency, or may be provided by NMFS to any federal or state agency whose actions would adversely affect EFH .

Habitat – environment in which an organism(s) lives, including everything that surrounds and affects its life, including biological, chemical and physical processes.

Habitat function – ecological role or process provided by a given habitat (*e.g.*, primary production, cover, food, shoreline protection, oxygenates water and sediments, etc.).

In lieu fee program – a program involving the restoration, establishment, and/or enhancement of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation needs; an in lieu fee program works like a mitigation bank, however, fees to compensate for impacts to habitat function are collected prior to establishing an on-the-ground conservation/restoration project.

In-kind mitigation – mitigation where the adverse impacts to a habitat are mitigated through the creation, restoration, or enhancement of the same type of habitat.

Mitigation – action or project undertaken to offset impacts to an existing natural resource.

Mitigation bank – a parcel of land containing natural resource functions/values that are conserved, restored, created and managed in perpetuity and used to offset unavoidable impacts to comparable resource functions/values occurring elsewhere. The resource functions/values contained within the bank are translated into quantified credits that may be sold by the banker to parties that need to compensate for the adverse effects of their activities.

Out-of-kind mitigation – mitigation where the adverse impacts to one habitat type are mitigated through the creation, restoration, or enhancement of another habitat type

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ATTACHMENT 1. Graphic depiction of eelgrass habitat definition including spatial distribution and aerial coverage of vegetated cover and unvegetated eelgrass habitat.

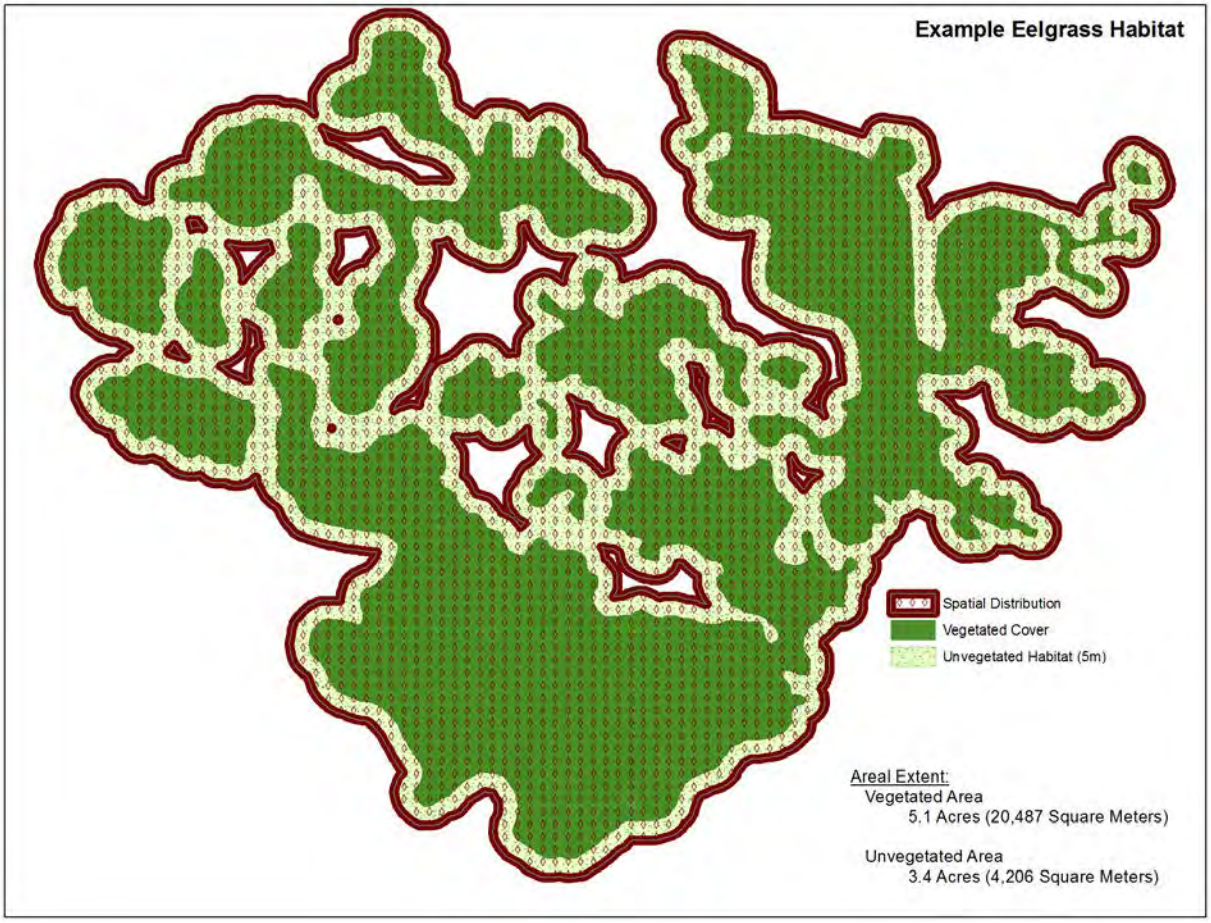

ATTACHMENT 2. Example Eelgrass Habitat Percent Vegetated Cover.

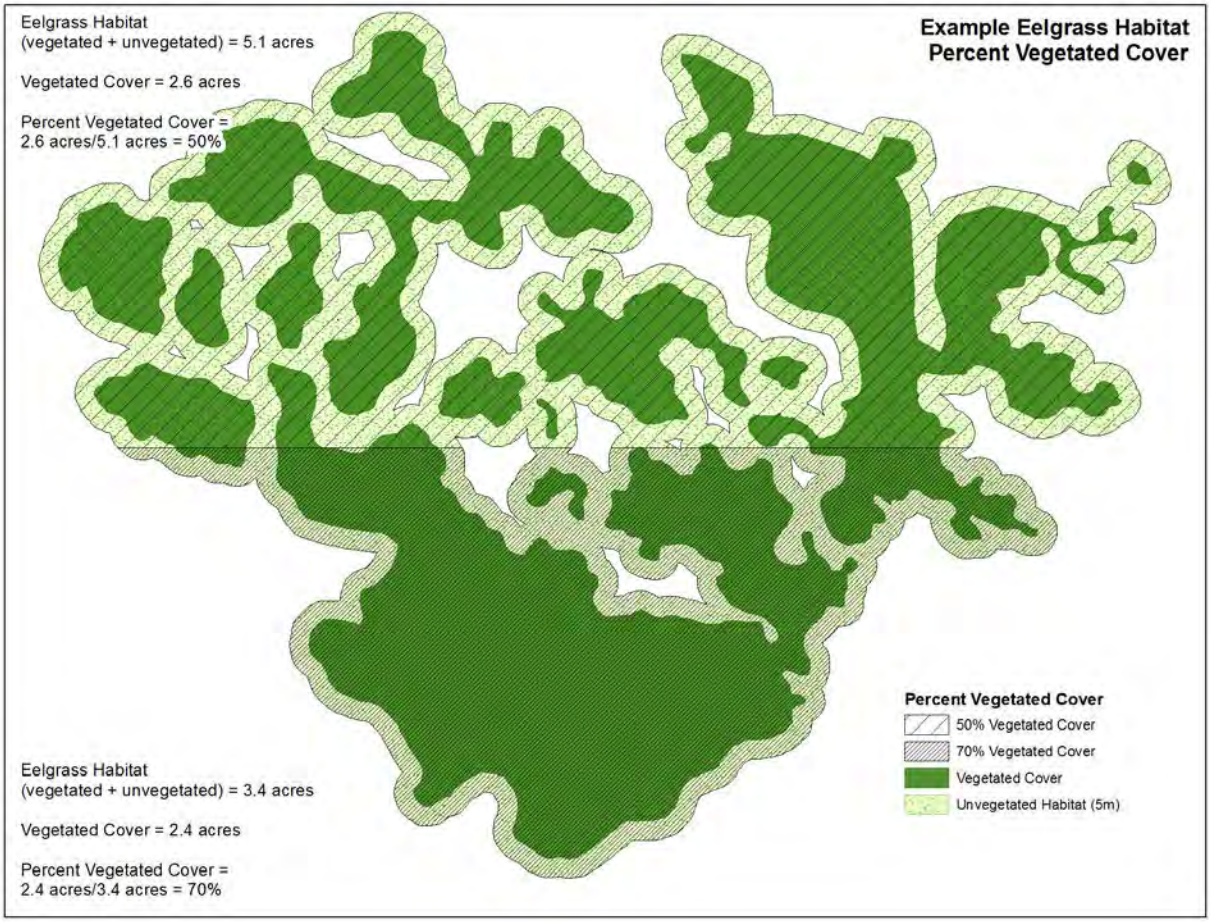

ATTACHMENT 3. Flow chart depicting timing of surveys and monitoring.

a) Eelgrass impact surveys

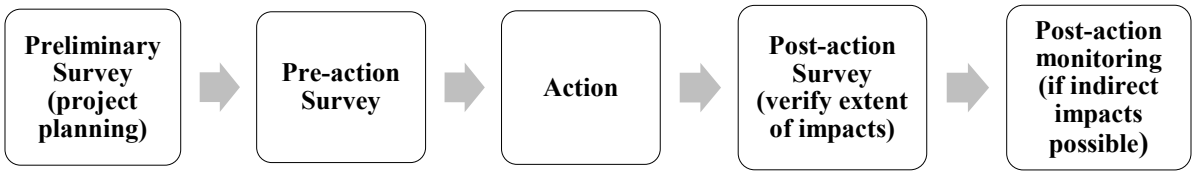

- All surveys should be completed during the growing season
- Surveys should be completed at the impact site and an appropriate reference site(s)
- A preliminary survey completed for planning purposes may be completed a year or more in advance of the action.
- Pre-action and post-action surveys should be completed within 60 days of the action.
- A survey is good for 60 days, or if that 60 day period extends beyond the end of growing season, until start of next growing season
- Two years of monitoring following the initial post-action monitoring event may be needed to verify lack or extent of indirect effects.
- Survey reports should be provided to NMFS and the federal action agency within 30 days of completion of each survey event

b) Eelgrass mitigation monitoring

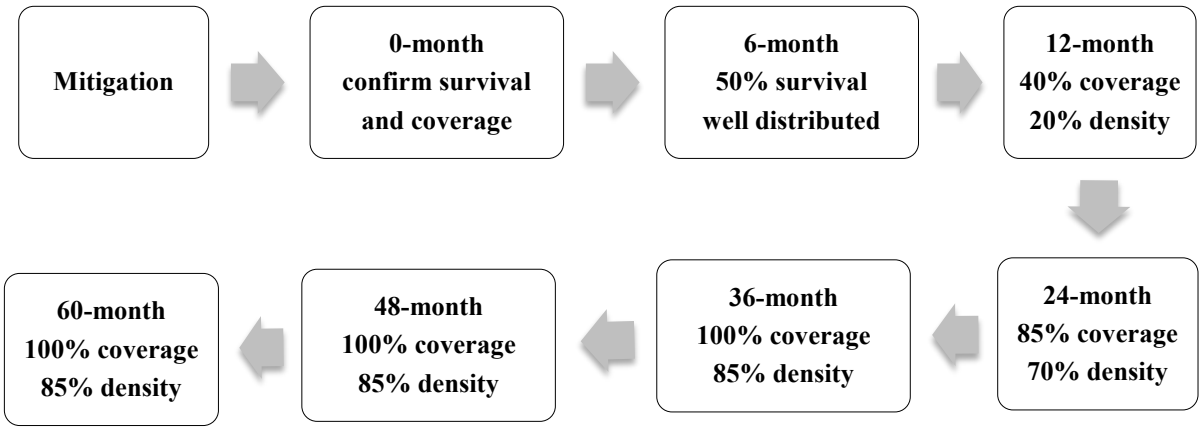

- Mitigation should occur coincident or prior to the action
- All monitoring should be completed during the growing season
- Performance metrics for each monitoring event are compared to the 1.2:1 mitigation ratio
- Monitoring reports should be provided to NMFS and the federal action agency 30 days of completion of each monitoring event
- NMFS and action agency will evaluate if performance metrics met, and decide if supplemental mitigation or other adaptive management measures are needed

ATTACHMENT 4. Eelgrass transplant monitoring report.

In order to ensure that NMFS is aware of the status of eelgrass transplants, action agencies should provide or ensure that NMFS is provided a monitoring report summary with each monitoring report. For illustrative purposes only, an example of a monitoring report summary is provided below.

ACTION PARTY CONTACT INFORMATION:

Action Name (same as permit reference):

(a) Action party Information

Name		Address	
Contact Name		City, State, Zip	
Phone		Fax	
Email			

MITIGATION CONSULTANT

Name		Address	
Contact Name		City, State, Zip	
Phone		Fax	
Email			

PERMIT DATA:

Permit	Issuance Date	Expiration Date	Agency Contact

EELGRASS IMPACT AND MITIGATION NEEDS SUMMARY:

Permitted Eelgrass Impact Estimate (m^2):			
Actual Eelgrass Impact (m^2):		On (post-construction date):	
Eelgrass Mitigation Needs (m^2):		Mitigation Plan Reference:	
Impact Site Location:			
Impact Site Center Coordinates (actionion &			

datum):	
Mitigation Site Location:	
Mitigation Site Center Coordinates (actionion & datum):	

ACTION ACTIVITY DATA:

Activity	Start Date	End Date	Reference Information
Eelgrass Impact			
Installation of Eelgrass Mitigation			
Initiation of Mitigation Monitoring			

MITIGATION STATUS DATA:

	Mitigation Milestone	Scheduled Survey	Survey Date	Eelgrass Habitat Area (m^2)	Bottom Coverage (Percent)	Eelgrass Density (turions/m^2)	Reference Information
Month	0						
	6						
	12						
	24						
	36						
	48						
	60						

FINAL ASSESSMENT:

Was mitigation met?	
Were mitigation and monitoring performed timely?	
Were mitigation delay increases needed or were supplemental mitigation programs necessary?	

ATTACHMENT 5. Wetlands mitigation calculator formula and parameters.

Starting mitigation ratios for each region within California were calculated using "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004) developed for NMFS Office of Habitat Conservation. The discrete time equation this method uses to solve for the appropriate mitigation ratio is as follows:

$$R = \frac{\sum_{t=0}^{T_{max}} (1+r)^{-t}}{(B(1-E)(1+L)-A)\left[\sum_{t=-D}^{C-D-1} \frac{(t+D)}{C(1+r)^{t}} + \sum_{C-D}^{T_{max}} (1+r)^{-t}\right] + \left[\sum_{t=-D}^{T_{max}} \frac{\left(1-(1-k)^{(t+D)}\right)}{(1+r)^{(t+D)}}\right](A(1+L))}$$

The calculator parameters in the above equation and values used to calculate starting mitigation ratios for CEMP are as follows:

Symbol	Calculator Parameter	Value
A	The level of habitat function provided at the mitigation site prior to the mitigation project	0%
B	The maximum level of habitat function that mitigation is expected to attain, if it is successful	100%
C	The number of years after construction that the mitigation project is expected to achieve maximum function	3 yrs
D	The number of years before destruction of the impacted wetland that the mitigation project begins to generate habitat function	0 yrs
E	The percent likelihood that the mitigation project will fail and provide none of the anticipated benefits	various*
L	The percent difference in expected habitat function based on differences in landscape context of the mitigation site when compared with the impacted wetland	0%
k	The percent likelihood that the mitigation site, in the absence purchase or easement would be developed in any future year	0%
r	The discount rate used for comparing gains and losses that accrue at different times in terms of their present value	3%**
Tmax	The time horizon used in the analysis (chosen to maintain 1.2:1 ratio at E=100% and other parameter values listed above).	13 yrs

* The value for E was based on regional history of success in eelgrass mitigation and varied between regions (see Attachment X).

** NOAA suggests the use of a 3 percent real discount rate for discounting interim service losses and restoration gains, unless a different proxy for the social rate of time preference is more appropriate. (NOAA-DARP 1999) We use this value here, because it is based on best available information and is consistent with the NOAA Damage Assessment and Restoration Program.

ATTACHMENT 6. Example calculations for application of starting and final mitigation ratios for impacts to eelgrass habitat in southern California.

In this example, a pier demolition and construction would impact 0.122 acres of vegetated eelgrass habitat (dark green) and 0.104 acres of unvegetated habitat (pink). Area of impact is indicated by purple hatch mark. Application of recommended starting mitigation ratio for southern California (1.38:1) and final mitigation ratio (1.2:1) to compute starting and final mitigation area for this example are shown in the table.

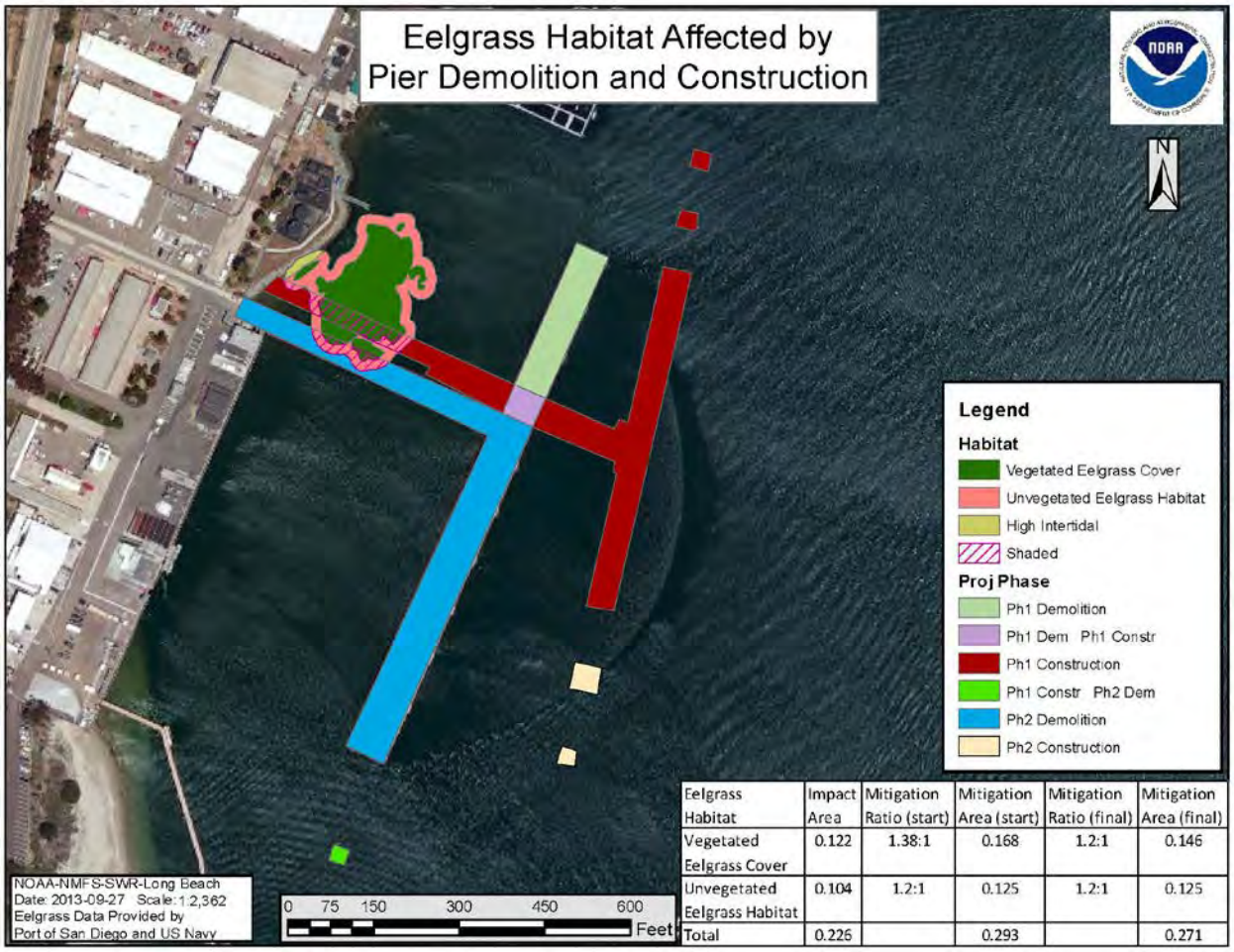

Eelgrass Habitat	Impact Area	Mitigation Ratio (start)	Mitigation Area (start)	Mitigation Ratio (final)	Mitigation Area (final)
Vegetated Eelgrass Cover	0.122	1.38:1	0.168	1.2:1	0.146
Unvegetated Eelgrass Habitat	0.104	1.2:1	0.125	1.2:1	0.125
Total	0.226		0.293		0.271

ATTACHMENT 7. Example mitigation area multipliers for delay in initiation of mitigation activities.

Delays in eelgrass transplantation result in delays in ultimate reestablishment of eelgrass habitat values, increasing the duration and magnitude of project effects to eelgrass. The delay multipliers in the table below have been generated by altering the implementation start time within "The Five-Step Wetland Mitigation Ratio Calculator" (King and Price 2004).

MONTHS POST-IMPACT	DELAY MULTIPLIER (Percent of Initial Mitigation Area Needed)
0-3 mo	100%
4-6 mo	107%
7-12 mo	117%
13-18 mo	127%
19-24 mo.	138%
25-30 mo.	150%
31-36 mo	163%
37-42 mo.	176%
43-48 mo.	190%
49-54 mo.	206%
55-60 mo.	222%

ATTACHMENT 8. Summary of Eelgrass Transplant Actions in California

See table starting next page.

SUMMARY OF EELGRASS (*ZOSTERA MARINA*) TRANSPLANT PROJECTS IN CALIFORNIA

No.	Region	System	Location	Year	Size*	Type**	Consistent with Permit Conditions	Success Status***	Net Result****
Southern California Eelgrass Restoration History									
	Southern	San Diego Bay	North Island	1976	<0.1	SP	yes	no	-
	Southern	San Diego Bay	"Delta" Beach	1977	1.6	SP	yes	partial	-
	Southern	San Diego Bay	North Island	1978	<0.1	SP	yes	yes	+
	Southern	Newport Bay	Carnation Cove	1978	<0.1	SP	no	no	-
	Southern	Newport Bay	West Jetty	1980	<0.1	SP	yes	partial	0
	Southern	Mission Bay	multiple beaches	1982	<0.1	SP	no	partial	0
	Southern	LA/LB Harbor	Cabrillo Beach	1985	<0.1	BR	yes	yes	+
	Southern	Alamitos Bay	Peninsula	1985	<0.1	BR	yes	yes	+
	Southern	Huntington Hbr.	Main Channel	1985	<0.1	BR	yes	no	0
	Southern	Newport Bay	Upper	1985	<0.1	BR	yes	no	0
	Southern	Mission Bay	Sail Bay	1986	2.7	BR	yes	yes	+
	Southern	San Diego Bay	NEMS I	1987	3.8	BR	no	yes	+
	Southern	San Diego Bay	Chula Vista Wildlife Reserve	1987	<0.1	BR	yes	no	+[1]
	Southern	San Diego Bay	Harbor Island	1988	0.1	BR	yes	yes	+
	Southern	Huntington Harbour	Entrance Channel	1989	0.1	BR	no	yes	+
	Southern	San Diego Bay	Le Meridien Hotel	1990	<0.1	BR	yes	yes	+
	Southern	San Diego Bay	Embarcadero	1991	<0.1	BR	yes	yes	+[2]
	Southern	Mission Bay	Sea World Lagoon	1991	<0.1	BR	yes	yes	+
	Southern	San Diego Bay	Loew's Marina	1991	<0.1	BR	yes	yes	+
	Southern	San Diego Bay	NEMS 2	1993	<0.1	BR	yes	yes	+
	Southern	San Diego Bay	Sea Grant Study	1993	<0.1	BR	yes	yes	+
	Southern	Agua Hedionda Lagoon	Outer Lagoon	1993	<0.1	BR	yes	yes	+
	Southern	San Diego Bay	NEMS 5	1994	0.4	BR	yes	yes	+
	Southern	Mission Bay	South Shores Basin	1994	2.9	BR	yes	yes	+
	Southern	Talbert Marsh	Talbert Channel	1995	<0.1	BR	na	yes	+[4]
	Southern	Mission Bay	various sites	1995	4.8	BR	yes	yes	+
	Southern	Mission Bay	Ventura Cove[5]	1996	0.5	BR	yes	yes	+[6]
	Southern	Mission Bay	Santa Clara Cove	1996	<0.1	BR	yes	no	0[10]
	Southern	Mission Bay	West Mission Bay Drive Bridge	1996	<0.1	BR	no	yes	0[10]
	Southern	Mission Bay	De Anza Cove	1996	<0.1	BR	yes	yes	+
	Southern	Batiquitos Lagoon	all basins	1997	21.6 [7]	BR	yes	yes	+[4]
	Southern	San Diego Bay	NEMS 5	1997	7.1	BR	yes	yes	+
	Southern	San Diego Bay	Convair Lagoon	1998	2.5	BR	yes	no	-[12]
	Southern	San Diego Bay	NEMS 6	1999	0.3	BR	yes	yes	+
	Southern	Aqua Hedionda	Bristol Cove	1999	0.3	BR	yes	yes	+
	Southern	Aqua Hedionda	Middle Lagoon and Inner Lagoon	1999	4	BR	yes	yes	+
	Southern	Newport Bay	Balboa Is.Grand Cana	1999	<0.1	BR	yes	yes	+
	Southern	Mission Bay	West Ski Island	2001	0.2	BR	yes	yes	+

No.	Region	System	Location	Year	Size*	Type**	Consistent with Permit Conditions	Success Status***	Net Result****
	Southern	San Diego Bay	Expanded NEMS 6	2001	0.6	BR	yes	yes	+
	Southern	Newport Bay	USCG Corona del Mar	2002	<0.1	BR	yes	yes	+
	Southern	Huntington Harbour	Sunset Bay	2002	<0.1	BR	yes	yes	+
	Southern	San Diego Bay	Navy Enhancement Is.	2002	1	BR	yes	yes	+
	Southern	San Diego Bay	Coronado Bay Bridge	2003	0.3	BR	no	no	0
	Southern	LA Harbor	P300 Expansion Area	2003	5.9	BR	yes	partial	-[9]
	Southern	Newport Bay	Newport Bay Channel Dredging	2004	0.4	BR	yes	no	-
	Southern	San Diego Bay	South Bay Borrow Pit	2004	4.2	BR	yes	yes	pending[8]
	Southern	San Diego Bay	USCG ATC Pier	2004	0.1	BR	yes	yes	+
	Southern	San Diego Bay	South Bay Borrow Pit Sup.	2006	4.2	BR	yes	yes	pending[8]
	Southern	San Diego Bay	D Street Marsh	2006	0.3	BR	yes	pending	pending
	Southern	LA Harbor	P300 Supplement	2007	0.8	BR	yes	yes	pending
	Southern	San Diego Bay	Glorietta Bay Shoreline Park	2007	0.2	BR	yes	yes	pending
	Southern	Bolsa Chica	Pilot Eelgrass Restoration	2007	0.5	BR	yes	yes	+[4]
	Southern	San Diego Bay	Borrow Pit Supplement	2007	4.2	BR	yes	yes	pending[8]
	Southern	San Diego Bay	Sweetwater Silvergate Frac-out	2008	<0.1	BR	yes	yes	0[11]
	Southern	San Diego Bay	Harbor Drive Bridge/NTC Channel	2009	<0.1	BR	yes	pending	pending
Southern California Eelgrass Success Rate (1989-2009, Last 20 Years)								**87%**	**n=43**
Central California Eelgrass Restoration History									
	Central	Morro Bay	Anchorage Area	1985	<0.1	BR	no	yes	+
	Central	Morro Bay	Target Rock	1997	<0.1	BR	no	yes	+
	Central	Morro Bay	Morro Bay Launch Ramp	2000	<0.1	BR	yes	yes	+
	Central	Morro Bay	Mooring Area A1	2002	0.3	BR	yes	yes	+
	Central	Morro Bay	Western Shoal	2010	0.8	BR	yes	pending	pending
Central California Eelgrass Success Rate (1985-2009, Inadequate History to Exclude Older Projects)								**100%**	**n=4**
San Francisco Bay Eelgrass Restoration History									
	San Francisco Bay	San Francisco Bay	Richmond Training Wall	1985	<0.1	BR	NA	no	NA[4]
	San Francisco Bay	San Francisco Bay	Keil Cove and Paradise Cove	1989	0.1	Plugs	NA	partial	NA[4]
	San Francisco Bay	San Francisco Bay	Bayfarm Island/Middle Harbor Shoal	1998	0.1	BR and Plugs	NA	partial	NA[4]
	San Francisco Bay	San Francisco Bay	Bayfarm Island	1999	0.1	BR	NA	partial	NA[4]
	San Francisco Bay	San Francisco Bay	Brickyard Cove, Berkeley	2002	0.2	BR	yes	yes	+[13]
	San Francisco Bay	San Francisco Bay	Emeryville Shoals	2002	0.1	Mixed Test	NA	no	NA[4]
	San Francisco Bay	San Francisco Bay	Marin CDay, R&GC, Audubon	2006	0.6	Seed Bouy	NA	partial	pending[4]
	San Francisco Bay	San Francisco Bay	Marin CDay, R&GC, Audubon	2006	<0.1	mod. TERFS	NA	partial	pending[4]
	San Francisco Bay	San Francisco Bay	Marin CDay, R&GC, Audubon	2006	<0.1	Seeding	NA	no	NA[4]
	San Francisco Bay	San Francisco Bay	Clipper Yacht Harbor, Sausalito	2007	<0.1	Frames	yes	pending	pending
	San Francisco Bay	San Francisco Bay	Albany, Emeryville, San Rafael	2007	<0.1	BR	NA	partial	pending[4]
	San Francisco Bay	San Francisco Bay	Belvedere	2008	<0.1	Frames	yes	pending	pending
San Francisco Bay Eelgrass Success Rate (1985-2009, Inadequate History to Exclude Older Projects)								**40%**	**n=10**

No.	Region	System	Location	Year	Size*	Type**	Consistent with Permit Conditions	Success Status***	Net Result****
Northern California Eelgrass Restoration History									
	Northern	Humboldt Bay	Indian Island	1982	unknown	BR	unknown	no	-
	Northern	Bodega Harbor	Spud Point Marina	1984	1.3	BR	yes	no	-
	Northern	Humboldt Bay	Indian Island	1986	<0.1	BR	yes	no	-
	Northern	Humboldt Bay		1986	0.2	unknown	unknown	no	-
	Northern	Humboldt Bay	SR255 Bridge	2004	<0.1	BR	yes	no	-
	Northern	Humboldt Bay	Maintenance Dredging Project	2005	<0.1	BR	yes	yes	+
Northern California Eelgrass Success Rate (1982-2009, Inadequate History to Exclude Older Projects)								**25%**	**n=4**

* size in hectares
SP = sediment laden plug
** BR = bare root
*** success status is measured as yes, no, partial, pending, or unknown. Success rate is reported as percentage of sucessful over total completed within the past 25 years.
yes = 1, partial = 0.5, no = 0, and pending or unknown are not counted in either the numerator or denominator in determining success percentage.
**** + = net increase in eelgrass coverage, 0 = no change in eelgrass coverage, - = net decrease in eelgrass coverage
1 Transplant was initially adversely impacted by an unknown source of sediment and was deemed unsuitable.
2 The transplant declined initially and later recovered from what was determined to be a one time sedimentation event.
3 Transplant was experimental due to dense beds of the exotic muscle *Musculista senhousia*
which inhibited the growth of the transplant. Replacement transplant done elsewhere.
Transplant was completed in an area deemed unsuitable. Insufficient coverage required the construction of a remedial site.
Monitoring continues at both the initial and remedial sites.
4 Transplant was experimental.
5 Multiple sites.
6 Mitigation for marina at Princess Resort, project not built
7 Amount of eelgrass present within all basins as of 2000 mapping.
8 Regional eelgrass decline has resulted in die-offs both within restoration and reference areas equally full recovery had not occurred at the time of evaluation, yet project exceeds control-corrected requ
9 Original site was constructed as a plateau that was underfilled and anticipated to fall short of objectives. A supplemental
transplant was therefore completed when development began to exhibit shortfalls in area.
10 Shortfall mitigated by withdraw from established eelgrass mitigation bank.
11 Exception conditions from SCEMP requiring only replacement in place for unanticipated damage
12 Mitigated out-of-kind with non-eelgrass to satisfy permit requirements after shortfall in eelgrass mitigation.

Attachment C

Notice of Intent

California Regional Water Quality Control Board
San Francisco Bay Region

Watershed Division
1515 Clay Street, Suite 1400, Oakland, CA 94612

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF
GENERAL WASTE DISCHARGE REQUIREMENTS FOR PROJECTS UNDER THE CONSTRUCTION AND MAINTENANCE OF OVERWATER STRUCTURES
IN
SAN FRANCISCO BAY
ORDER NUMBER R2-2018-0009

FOR AGENCY TRACKING USE ONLY			
Place ID:	*Reg Measure ID:*	*Date NOI Received:*	*Check# and Amount*

I. PROJECT and APPLICANT INFORMATION

Project Title:	Click here to enter text.		
Applicant Name:	Click here to enter text.		
Business/Agency:	Click here to enter text.		
Street Address:	Click here to enter text.		
City, County, State, Zip:	Click here to enter text.		
Telephone:	Click here to enter text.	Fax	Click here to enter text.
E-mail:	Click here to enter text.		

II. PROPERTY OWNER

☐ **Check Box if Same As Above**

Name:			
Street Address:	Click here to enter text.		
City, County, State, Zip:	Click here to enter text.		
Telephone:	Click here to enter text.	Fax	Click here to enter text.
E-mail:	Click here to enter text.		

III. PROJECT LOCATION

A. Address or description of project location.				
Click here to enter text.				
B. Check box to verify that a map of the project location is enclosed:			☐	
C. County:	Click here to enter text.			
D. Assessor's Parcel No.:	Click here to enter text.			
E. Coordinates (*If available, provide at least latitude/longitude or UTM coordinates. Check appropriate boxes)*				
Latitude/Longitude:	*Latitude:*	Click here to enter text.	*Longitude:*	Click here to enter text.
	☐ Degrees/Minutes/Seconds	☐ Decimal Degrees	☐ Decimal	

IV. PROJECT CATEGORY

Explain the covered activity or activities being implemented for this project:
Click here to enter text.

V. PROJECT INFORMATION

A. Estimated Project Term:	Beginning (Month / Year*)*	Click here to enter text.	Ending (Month / Year)	Click here to enter text.
B. Seasonal Work Period:	Click here to enter text.			
C. Estimated Total Number of Work Days:	Click here to enter text.			

D. Describe the project in detail and enclose diagrams, drawings, plans, and/or maps that provide all of the following: site-specific construction details; dimensions of each structure; extent of activity in San Francisco Bay, where equipment will enter or exit the area, if applicable; and project overview showing the location of each structure and calculations at each site of area of disturbance. (*Attach additional sheets as needed*).
Click here to enter text.
E. Specify the equipment and machinery (if any) that will be used to complete the project. Describe in detail the measures that will be taken to prevent unauthorized discharges of construction materials and waste.
Click here to enter text.

H. Projects associated with construction or maintenance, including upgrades, retrofit, expansion, demolition, and reconfiguration of piers and docks (including associated ramps and floating docks) up to 10,000 square feet of overwater coverage are permitted under this Order. -This includes pile removal, replacement, and installation. -Will the proposed project fit under this category?	☐ yes ☐ no
I. Projects associated with upgrade, retrofit, expansion, demolition, and reconfiguration and new construction of wharves and marinas with less than 50,000 square feet of overwater coverage are permitted under this Order. This includes pile removal, replacement, and installation. Will the proposed project fit under this category?	☐ yes ☐ no
J. Is this project within 150 feet of mapped eelgrass beds? Maps of eelgrass beds in the San Francisco Bay are available on the Department of Fish and Wildlife's MarineBIOS website at http://www.westcoast.fisheries.noaa.gov/habitat/habitat_types/seagrass_info/california_eelgrass.html To access the eelgrass layers, click on the habitat drop down menu at the layers tab.	☐ yes ☐ no
K. If the proposed project is within 150 feet of mapped eelgrass beds, by checking the "yes" box, the Applicant confirms they will perform pre-construction eelgrass surveys during the active growth period, from May – September.	☐ yes ☐ no
L. Project activities within 700 feet of tidal marsh of suitable Ridgway's Rail (formerly California Clapper Rail) or California Black Rail habitat are prohibited during rail breeding season (January 15 - August 31 for Ridgway's Rail, February 1 - August 31 for California Black Rail). By checking "yes", the Applicant confirms they will work outside these dates.	☐ yes ☐ no
M. No project activities shall occur within 50 feet of suitable Ridgway's Rail or California Black Rail habitat during extreme high tide events or when adjacent tidal marsh is flooded. Extreme high tides events are defined as a tide forecast of 6.5 feet or higher measured at the Golden Gate Bridge and adjusted to the timing of local high tides. By checking "yes", the Applicant confimrs they will comply with these conditions.	☐ yes ☐ no

VI. DISCHARGE INFORMATION

B. Identify the volume or quantity of material for each project activity that will result in impacts to Waters. Declare the amount of each type of materials placed in Waters and whether the placement is temporary or permanent.

Material Type	Volume or Number	Maximum Allowed	Permanent Effect
1. Piles	Click here to enter text.	20 per day	☐ yes ☐ no
2. Piers and Docks	Click here to enter text.	10,000 square feet	☐ yes ☐ no
3. Wharves and Marinas	Click here to enter text.	50,000 square feet	☐ yes ☐ no

4. Floats and Buoys	Click here to enter text.		☐ yes ☐ no
5. Bank Stabilization	Click here to enter text.	500 linear feet	☐ yes ☐ no

VII. PROJECT SIZE

A. For the receiving water body, indicate the area(s) in ACRES and/or LINEAR FEET that will be affected by the project and identify the impact(s) as permanent or temporary.

San Francisco Bay	Temporary Impact		Permanent Impact	
	Acres	Linear Feet	Acres	Linear feet
AREA AFFECTED	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

IX. NOTICE OF TERMINATION AND CERTIFICATION

Applicants must notify the Regional Water Board once the project is complete, including as-built plans and date of completion.

X. APPLICATION REQUIREMENTS AND FEES

Permit:	Submit Application to:	Time Restrictions:
General WDR Order No. R2-2018-0009	Regional Water Board – SF Bay Region Watershed Management Division 1515 Clay Street, Suite 1400, Oakland, CA 94612	Must be submitted at least 30 days prior to start of proposed project.
Fees:	Submit with this NOI the required fee for the project. Fees are determined based on the current statewide Dredge & Fee calculator. The calculator is available on the "resources for applicants" section of the Water Boards' Dredge/Fill (401) and Wetlands program website: http://www.waterboards.ca.gov/water_issues/programs/cwa401/#resources	

XI. SIGNATURE / CERTIFICATION

San Francisco Bay Regional Water Quality Control Board: Notice of Intent to Comply with the Terms of General Waste Discharge Requirements and Clean Water Act § 401 Water Quality Certification for the construction and maintenance of Overwater Structures - Order No. R2-2018-0009

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel property gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or imprisonment. Furthermore, I understand and will comply with the Requirements of Order R2-2018-0009	
_____ Applicant Signature	_____ Date
_____ Printed Name	

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. R2-2018-0019

WASTE DISCHARGE REQUIREMENTS for:

EDEN SHORES ASSOCIATES I, LLC,
EDEN SHORES RESIDENTIAL 2 PROJECT,
HAYWARD, ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter the Regional Water Board), finds that:

1. This Order serves as Waste Discharge Requirements (WDRs) for construction of the Eden Shores Residential 2 Project (Project) on 6.3 acres of undeveloped land (Site) in the southwestern portion of the City of Hayward, immediately west of Hesperian Boulevard (See Figures 1 and 2 in Attachment A) (Latitude: 37.612827; Longitude: -122.087405). The Site consists of four connected parcels (APNs 456-0101-011-01, 456-0101-012, 456-0101-013-03, and 454-0101-014-03).
2. The Project proponent, Eden Shores Associates I, LLC, a Delaware Limited Liability Company, has submitted a Report of Waste Discharge to the Regional Water Board for authorization to construct the Project and is hereafter referred to as the Discharger.
3. The Project encompasses the construction of an approximately 6.3-acre residential development, including a primary road that connects the development to Marina Drive to the west and secondary driveways (See Fig. 5 in Att. A) and pedestrian pathways. Multiple single-family homes will be constructed by the Project, along with attendant utilities and development features (e.g., parks, landscaping, parking infrastructure, stormwater management facilities).
4. The majority of the Site consists of uplands vegetated with non-native, disturbance-adapted herbs dominated with soft chess (*Bromus hordeaceus*), ripgut brome (*B. diandrus*), Italian rye grass (*Festuca perennis*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), mouse barley (*H. murinum*), slender oat (*Avena barbata*), prickly lettuce (*Lactuca serriola*), and red-stem filaree (*Erodium cicutarium*).
5. The Site contains 0.58 acres of seasonal wetlands, distributed over the Site (See Fig. 3 in Att. A). These wetlands are dominated by non-native hydrophytic herbs, such as Mediterranean barley (*Hordeum marinum*), common rabbit's-foot grass (*Polypogon monspeliensis*), cut-leaf plantain (*Plantago coronopifolia*), bird's-foot trefoil (*Lotus corniculatus*), and perennial pepperweed (*Lepidium latifolium*).

Project Impacts, and Mitigation

6. The 0.58 acres of seasonal wetlands within the central and northwestern portions of the Site will be permanently impacted through direct filling with clean fill as part of the construction of the Project (See Fig. 4 in Att. A). Ground elevations across the Site will be raised on average by about 1 foot.

7. Avoidance and minimization of the wetland impacts is not practicable because of their location. It would not be possible to avoid filling wetlands and their contributing drainage watersheds without eliminating essential Project elements, such as residences, primary and internal access roads, and important utility infrastructure. The elimination of these elements would make the Project impracticable.

8. To compensate for permanent impacts to 0.58 acres of seasonal wetlands, this Order requires the Discharger to provide offsite mitigation through the purchase of 0.60 acres of seasonal wetland creation mitigation credits at the San Francisco Bay Wetland Mitigation Bank (Bank) in Redwood City (Corps File No. 2008 00046S).

9. The purchase of mitigation credits from the Bank will accomplish the goal of the California Wetlands Conservation Policy (No Net Loss Policy; Executive Order W-59-93) to "ensure no overall net loss and achieve a long-term net gain in the quantity, quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship, and respect for private property."

10. This Order requires submittal of documentation of the purchase of 0.60 acres of wetland mitigation credit to Regional Water Board's Executive Officer, prior to impacting waters of the State and no later than September 1, 2018.

11. Regional, State, and national studies have determined that tracking of mitigation/restoration projects must be improved to assess the performance of these projects. In addition, to effectively carry out the No Net Loss Policy, the State needs to track both wetland losses and mitigation/restoration project success closely. Therefore, this Order requires the Discharger to submit the California Wetlands Form to provide project information related to impacts and mitigation measures. An electronic copy of the form and instructions can be downloaded at: http://www.waterboards.ca.gov/sanfranciscobay/certs.shtml. Project information concerning impacts and mitigation/restoration will be made available at the web link: http://www.ecoatlas.org/regions/ecoregion/bay-delta/projects.

Post-Construction Stormwater Management

12. Stormwater discharges from urban and developing areas in the San Francisco Bay Region are significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Regional Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, trash, and selenium in San Francisco Bay. Runoff from impervious surfaces at the developed Site may contribute to water quality impairment in the Region.

13. This Order requires the Discharger to implement stormwater treatment best management practices (BMPs) for post-construction stormwater runoff from the Project's impervious surfaces, consistent with the *Stormwater Management Plan for Eden Shores Residential Site – Phase 2, City of Hayward, Alameda County* (Ruggeri-Jensen-Azar, November 30, 2017) (See Attachment B). Stormwater treatment controls must be constructed concurrently with each phase of the Project, so that treatment is provided for each completed phase. The Order requires a final version of the plan in Attachment B to this Order, including measures to appropriately control

trash, to be submitted to the Executive Officer for review and approval at least 90 days before construction starts on the phase of the Project that will be treated by the plan.

14. The Order requires the Discharger to implement the *Declaration Establishing Storm Water Maintenance Covenants* (See Att. B). The Order requires the Discharger to submit, no later than 30 days prior to the first disturbance of waters of the State at the Site, a notarized copy of the *Declaration Establishing Storm Water Maintenance Covenants* to the Executive Officer. Any changes to the text of the *Declaration Establishing Storm Water Maintenance Covenants* in Attachment B must be submitted to the Executive Officer for review and approval before the revised *Declaration Establishing Storm Water Maintenance Covenants* is notarized.

Regional Water Board Jurisdiction

15. The Regional Water Board has authority to regulate the proposed discharge of fill materials into waters of the State by issuance of WDRs pursuant to California Water Code (Water Code) section 13263 and section 3857 of title 23 of the California Code of Regulations (23 CCR). The Regional Water Board considers WDRs necessary to adequately address impacts and mitigation to beneficial uses of waters of the State from the Project, to meet the objectives of the No Net Loss Policy, and to accommodate and require changes to the Project as described and allowed herein.

16. The Discharger is required to pay annual fees pursuant to Water Code section 13260, 23 CCR (Cal. Code Regs., tit. 23, § 2200 et seq.), and in accordance with Provision D.8.

Regulatory Framework

17. The *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation plans to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and U.S. EPA, where required.

18. The Basin Plan lists the following existing and potential beneficial uses for groundwater within the Niles Cone sub-basin of the Santa Clara Valley Basin (Basin Number 2-9.01), which underlies the Site:

    a. Municipal and Domestic Water Supply (MUN)

    b. Industrial Process Supply (PROC)

    c. Industrial Service Supply (IND)

    d. Agricultural Water Supply (AGR)

19. The Basin Plan lists the following existing and potential beneficial uses for seasonal palustrine wetlands:

    a. Agricultural Water Supply (AGR)

    b. Cold Freshwater Habitat (COLD)

    c. Freshwater replenishment (FRESH)

d. Groundwater Recharge (GWR)

e. Water Contact Recreation (REC1)

f. Non-contract Water Recreation (REC2)

g. Warm Freshwater Habitat (WARM)

h. Wildlife Habitat (WILD)

i. Preservation of Rare and Endangered Species (RARE)

20. Project implementation would permanently impact the beneficial uses of the seasonal palustrine wetlands at the Site.

21. The California Environmental Quality Act (CEQA) requires all discretionary projects approved by public agencies to be reviewed in compliance with requirements of CEQA. The Site is part of the larger Eden Shores Business Park Site (Figure 2 in Attachment A), which was assessed as part of the South of Route 92 Specific Plan, adopted by the City of Hayward in 1988. The Specific Plan provided for a mixed-use development consisting of a business park, single-family housing, light manufacturing, open space, and active recreation on about 333.5 acres, which at the time was used mostly for agriculture. In 1998, the City of Hayward, acting as the CEQA lead agency, certified the *Environmental Impact Report for the South of Route 92 General Plan Amendment and Specific Plan for the Oliver Estate/Weber Properties* (EIR) (State Clearinghouse Number 95103079). Some of the development anticipated in the Specific Plan, and analyzed in the 1998 EIR, has been completed, including a sports park, a large retail development, and residential subdivisions.

    In 2007, an Initial Study / Mitigated Negative Declaration (IS/MND) was prepared for an amendment to the 1998 Specific Plan to allow for changes in land uses from commercial to residential in the undeveloped portions of the 1998 Specific Plan area. This IS/MND addressed development of the 5.43-acre Eden Shores Commercial Project and the 14.4-acre residential project, which consisted of the already constructed 8.1-acre Eden Shores Residential 1 Project (See Fig. 4 in Att. A) and the current 6.3-acre Residential 2 Project. Impacts to waters of the State associated with the current Project are consistent with the impacts identified in the 2007 IS/MND.

22. The Regional Water Board, as a responsible agency under CEQA, has independently considered the EIR and IS/MND and finds that significant environmental impacts of the proposed Project to waters of the State have been identified and mitigated to less than significant levels by the mitigation requirements adopted in this Order (See Cal. Code Regs., tit. 14, § 15096, subd. (g).).

23. The State of California recognizes that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes (Wat. Code § 106.3; State Water Board Reso. 2016-10.). This Order promotes that policy by requiring discharges to meet discharge levels designed to protect human health and ensure that water is safe for domestic use.

24. The Regional Water Board provided public notice of the application pursuant to 23 CCR section 3858 on March 14, 2018, and posted information describing the Project on the Regional Water Board's website. The Regional Water Board has notified the Discharger and interested parties of its intent to issue WDRs for the Project.

25. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to this Order.

26. In a letter from the San Francisco District of the U.S. Army Corps of Engineers (Corps), dated January 6, 2016 (Corps File Number SPN-1999-241560S), the Corps notified the Discharger that the wetlands at the Site were not regulated as waters of the U.S. Therefore, fill of the seasonal wetlands at the Project does not require authorization pursuant to a Clean Water Act section 404 permit. This discharge of fill to waters of the State at the Site is regulated under Water Code section 13263 and 23 CCR.

27. Pursuant to 23 CCR section 3857, the Regional Water Board is issuing WDRs for the proposed Project.

IT IS HEREBY ORDERED that the Discharger, in order to meet the provisions contained in Division 7 of the Water Code and regulations adopted thereunder, shall comply with the following, pursuant to authority under Water Code sections 13263 and 13267:

A. Discharge Prohibitions

1. The direct or indirect discharge of wastes, as defined in Water Code section 13050(d), within or outside of an active project site, to surface waters or surface water drainage courses is prohibited, except as authorized in this Order.
2. The Discharger shall not cause degradation of any municipal water supply.
3. The wetland fill activities subject to these requirements shall not cause a nuisance as defined in Water Code §13050(m).
4. The discharge of materials other than stormwater, which are not otherwise regulated by a separate NPDES permit or allowed by this Order, to waters of the State is prohibited.
5. The groundwater in the vicinity of the Project shall not be degraded as a result of the placement of fill for the Project.
6. No debris, soil, silt, sand, cement, concrete, or washings thereof, or other construction related materials or wastes, oil or petroleum products or other organic or earthen material shall be allowed to enter into or be placed where they may be washed by rainfall or runoff into waters of the State. When operations are completed, any excess material shall be removed from the work area and any adjacent areas where such materials could be washed into waters of the State.

B. Discharge Specifications

1. In accordance with Water Code section 13260, the Discharger shall file with the Regional Water Board a report of any material change in the character, location, or quantity of this waste discharge that is beyond the scope of this Order. Any proposed material change in the discharge requires approval by the Regional Water Board.
2. The Discharger shall notify the Regional Water Board promptly by telephone or email, and in no case more than 24 hours after, if an adverse condition occurs as a result of a discharge. An adverse condition includes, but is not limited to, a violation of the conditions of this Order, spill of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance. A written notification of the adverse condition shall be

submitted to the Regional Water Board within five days of occurrence. The written notification shall identify the adverse condition, describe the actions taken or planned to remedy the condition, and specify a timetable, subject to approval by the Executive Officer, for the remedial actions that follow any initial response to the adverse condition.

C. Receiving Water Limitations

1. With the exception of the fill of waters of the State authorized by this Order, the discharge shall not cause the following conditions to exist in waters of the State at any place:

   a. Waters shall not contain floating material, including solids, liquids, foams, and scum in concentrations that cause nuisance or adversely affect beneficial uses.

   b. Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or otherwise adversely affect beneficial uses.

   c. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth cause nuisance or adversely affect beneficial uses.

   d. Waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

   e. The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses. The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature.

2. The discharge shall not cause nuisance, or adversely affect the beneficial uses of the receiving water.

3. With the exception of the fill of waters of the State authorized by this Order, the discharge shall not cause the following limits to be exceeded in waters of the State at any point:

a. Dissolved Oxygen:	5.0 (WARM) or 7.0 (COLD) mg/l minimum. When natural factors cause lesser concentrations, then this discharge shall not cause further reduction in the concentration of dissolved oxygen.
b. pH:	A variation of natural ambient pH by more than 0.5 pH units.
c. Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where ambient turbidity is greater than 50 NTU. Where ambient turbidity is less than 50 NTU, activities authorized by this Order shall not increase turbidity by more than 5 NTU.
d. Toxicity	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.

e. Salinity — The Project shall not increase total dissolved solids or salinity to a degree that the increase adversely affects beneficial uses or water quality.

f. Chlorine — The Project shall not discharge water to waters of the State with residual chlorine levels (free chlorine plus chloramines) that exceed the instantaneous limit of 0 mg/L in Table 4-2 of the Basin Plan. Chlorine residual levels that are non-detect at a reporting limit of 0.08 mg/L will be considered to be in compliance with the instantaneous limit in Table 4-2 in the Basin Plan.

D. Provisions

1. The Project shall be constructed as described in the application materials submitted by the Discharger on October 3, 2014, and supplemental application materials received through December 4, 2017. Any changes to the Project design shall be submitted, acceptable to the Executive Officer, and shall not be implemented until they have been accepted in writing.

Compensatory Mitigation

2. To provide mitigation for the Project's impacts to waters of the State, the Discharger shall purchase 0.60 acres of seasonal wetland creation mitigation credits from the Bank as described in Finding 8.

Monitoring and Reporting

3. California Wetlands Portal: The Discharger shall complete the standard California Wetlands Form for the Project site. The Discharger shall electronically submit the completed standard form and map showing the location of the Project site to habitatdata@waterboards.ca.gov.

Notice of Mitigation Completion

4. Mitigation for impacts to wetlands will be satisfied through purchase of 0.60 acres of wetland mitigation credits from the Bank; proof of such purchase shall be submitted to the Executive Officer prior to impacting wetlands at the Project site and no later than September 1, 2018.

Project Site Stormwater Management

5. The Discharger shall comply with the State Water Board's General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit) (Order No. 2009-0009-DWQ, as amended and as may be reissued; NPDES Permit No. CAS000002). The Discharger shall prepare and implement a site-specific Stormwater Pollution Prevention Plan (SWPPP) for the construction of each phase of the Project, in accordance with the requirements, provisions, limitations, and prohibitions of the General Construction Permit for discharges of stormwater associated with construction activity.

6. The Discharger, or its successors, shall ensure that the post-construction stormwater treatment best management practices (BMPs), including bioretention areas, in the *Stormwater Management Plan for Eden Shores Residential Site – Phase 2, City of Hayward, Alameda County* (Ruggeri-Jensen-Azar, November 30, 2017) (see Att. B) are constructed and appropriately maintained for the life of the Project. Stormwater treatment controls shall be constructed concurrently with each phase of the Project, so that treatment

is provided for each completed new area of impervious surfaces in the same year that new impervious surfaces are created. The Discharger shall submit a final version of the plan in Attachment B to the Executive Officer for review and approval at least 90 days before construction starts on the phase of the Project that will be treated by the plan. The final version of the plan shall provide final construction details, including measures sufficient to achieve full trash capture consistent with the requirements of Regional Water Board Order No. R2-2015-0049 (NPDES Permit No. CAS612008), Provision C.10. Construction of that phase of the Project shall not commence until the Executive Officer has approved the altered BMP proposal (construction consists of any disturbance of the site surface that results in the creation of new impervious surfaces). Any transfer of responsibility for this Provision's requirements from the Discharger to another party must be approved by the Executive Officer before the responsibility may be transferred. To propose such a transfer, the Discharger shall submit the terms of such a transfer of responsibility to the Executive Officer for review and approval.

7. Before responsibility for maintaining the post-construction stormwater BMPs at the Project site is transferred to a Home Owners Association (HOA), the proposed language in the HOA's Covenants, Conditions and Restrictions (CC&Rs) for the Project that relate to the treatment specified in Findings 13 and 14 and Provision 6, as well as the funding mechanism for managing and maintaining the stormwater BMPs, shall be submitted to the Executive Officer for review and approval. The CC&Rs shall detail the HOA's responsibility for the maintenance and operation of the stormwater BMPs described in Finding 13 and the Storm Water Management Plan in Attachment B, so that these BMPs continue to provide MEP treatment of stormwater runoff for the life of the Project. Detailed provisions for managing and maintaining the stormwater bioretention cells to provide the treatment specified in Condition 13, as well as the funding mechanism for managing and maintaining the stormwater bioretention cells, shall be incorporated in the CC&Rs for the Project. The responsibility for maintenance and monitoring of the Site's post-construction stormwater treatment system shall be written into the CC&R's and thus transferred to all future owners, for the life of the Project. Enforcement of these restrictions shall be reflected in the CC&Rs. The sections of the CC&Rs that address operation and maintenance of the stormwater BMPs may not be altered without the approval of the Executive Officer. Measures shall be in place to notify all occupants and potential occupants of the restrictions in the CC&Rs related to stormwater management. The CC&Rs shall not be finalized and recorded until the Executive Officer has approved the proposed stormwater management provisions of the Project's CC&Rs, including scheduled inspections and minor and major (e.g., replacement of filter media) maintenance activities.

8. As-built plans for the post-construction stormwater treatment measures for each phase of the Project shall be prepared and submitted to the Regional Water Board within six weeks of the completion of construction and planting of each post-construction stormwater treatment feature. As-built plans shall be accompanied by an as-built report that describes any changes to the approved plans that were necessary during construction of the stormwater treatment feature, as well as a technical justification for any design changes that were necessary in the field. The technical justification must demonstrate that the constructed treatment measures are consistent with the requirements of Regional Water Board Order No. R2-2015-0049 (NPDES Permit No. CAS612008).

Fees

9. The fee amount for these WDRs shall be in accordance with the current fee schedule, per 23 CCR section 2200(a), based on the quantity of waters of the State impacted by discharges authorized by this Order. The Project will permanently impact 0.58 of waters of the State. The application fee for these impacts is $7,695, which was paid in full on March 8, 2018. An annual discharge fee shall also be paid to the Regional Water Board in each year in which impacts to waters of the State that are authorized by this Order are implemented (note: the Annual Active Discharge Fee may be changed by the State Water Board; at the time that this Order was adopted, it was $1,500 per year). After the initial year, the Annual Active Discharge portion of the fee shall be billed annually to the Discharger. Fee payments shall indicate the Order number, the CIWQS Place ID Number in the header for this Order, and the applicable year.

Records Provisions

10. The Discharger shall retain records of all reports required by this Order for a period of at least five years from the date of the report. This period may be extended by request of the Executive Officer at any time. The Discharger shall submit electronic versions of any submitted reports or documents.

General Provisions

11. The Discharger shall comply with all the Prohibitions, Effluent and Receiving Water Limitations, and Provisions of this Order immediately upon adoption of this Order or as provided in this Order.
12. All reports pursuant to these Provisions shall be prepared by professionals registered in the State of California.
13. The Discharger shall immediately notify the Regional Water Board by telephone and e-mail whenever an adverse condition occurs as a result of this discharge. Such a condition includes, but is not limited to, a violation of the conditions of this Order, a significant spill of petroleum products or toxic chemicals, or damage to control facilities that would cause noncompliance. Pursuant to Water Code section 13267(b), a written notification of the adverse condition shall be submitted to the Regional Water Board within two weeks of occurrence. The written notification shall identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to the modifications of the Regional Water Board, for the remedial actions.
14. The Discharger shall notify the Regional Water Board in writing at least 30 days prior to the actual start date of impacts to waters of the State associated with the Project.
15. All work performed within waters of the State shall be completed in a manner that minimizes impacts to beneficial uses and habitat. Measures shall be employed to minimize disturbances that will adversely impact the water quality of waters of the State. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete Project implementation.
16. The Discharger is considered to have full responsibility for correcting any and all problems that arise in the event of a failure that results in an unauthorized release of waste or wastewater.

17. The discharge of any hazardous, designated, or non-hazardous waste as defined in Title 23, Division 3, Chapter 15 of the California Administrative Code, shall be disposed of in accordance with applicable state and federal regulations.

18. These WDRs are subject to modification or revocation upon administrative or judicial review, including review and/or reconsideration pursuant to Water Code sections 13320 and 13330 and 23 CCR section 3867.

19. These WDRs are not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR section 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

20. The Discharger shall maintain a copy of this Order and all relevant plans and BMPs at the Project site, so as to be available at all times to site operating personnel.

21. The Discharger shall permit the Regional Water Board staff or its authorized representative, upon presentation of credentials:

    a. Entry on to the premises on which maintenance activities are planned or underway, wastes are located, or in which records are kept;

    b. Access to copy any records required to be kept under the terms and conditions of this Order;

    c. Access to inspect any treatment equipment, monitoring equipment, or monitoring method required by this Order; and

    d. Access to sample any discharge or surface water covered by this Order.

22. In the event of any violation or threatened violation of the conditions of this Order, the violation or threatened violation shall be subject to any remedies, penalties, process, or sanctions as provided for under applicable State policies, codes, and regulations. In response to a suspected violation of any condition of this Order, the Regional Water Board may require the Discharger to furnish, under penalty of perjury, any technical or monitoring reports the Regional Water Board deems appropriate, provided that the burden, including costs, of the reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In response to any violation of the conditions of this Order, the Regional Water Board may add to or modify the conditions of this Order as appropriate to ensure compliance.

23. In accordance with Water Code section 13260, the Discharger shall file with the Regional Water Board a report of any proposed change in ownership or any material change in the character, location, or quantity of this waste discharge. Any proposed material change in the discharge requires approval by the Regional Water Board after a hearing under Water Code section 13263. Material change includes, but is not be limited to, all significant new soil disturbances, all proposed expansion of development, or any change in drainage characteristics at the Site. For the purpose of this Order, this includes any proposed change in the boundaries of the area of wetland/waters of the State to be filled and mitigated.

24. This Order is not transferable.

25. This Order does not authorize commission of any act causing injury to the property of another or of the public; does not convey any property rights; does not remove liability under federal, State, or local laws, regulations or rules of other programs and agencies, nor does this Order authorize the discharge of wastes without appropriate permits from other agencies or organizations.
26. The Regional Water Board will consider rescission of this Order upon Project completion, including review and approval by the Executive Officer of the portions of the Project's CC&Rs related to stormwater management, and the Executive Officer's acceptance of notices of completion of mitigation for all mitigation, creation, and enhancement projects required or otherwise permitted now or subsequently under this Order.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on May 9, 2018.

Bruce Wolfe

Digitally signed by Bruce H. Wolfe
Date: 2018.05.15 16:44:35 -07'00'

Bruce H. Wolfe
Executive Officer

Attachment A: Site Figures and Stormwater Treatment Measures
Attachment B: *Declaration Establishing Storm Water Maintenance Covenants* and the *Stormwater Management Plan for Eden Shores Residential Site – Phase 2, City of Hayward, Alameda County* (Ruggeri-Jensen-Azar, November 30, 2017)

ATTACHMENT A

Waste Discharge Requirements and Water Quality Certification for the Eden Shores Residential Phase 2Project in Hayward in Alameda County

Site Figures and Stormwater Treatment Measures

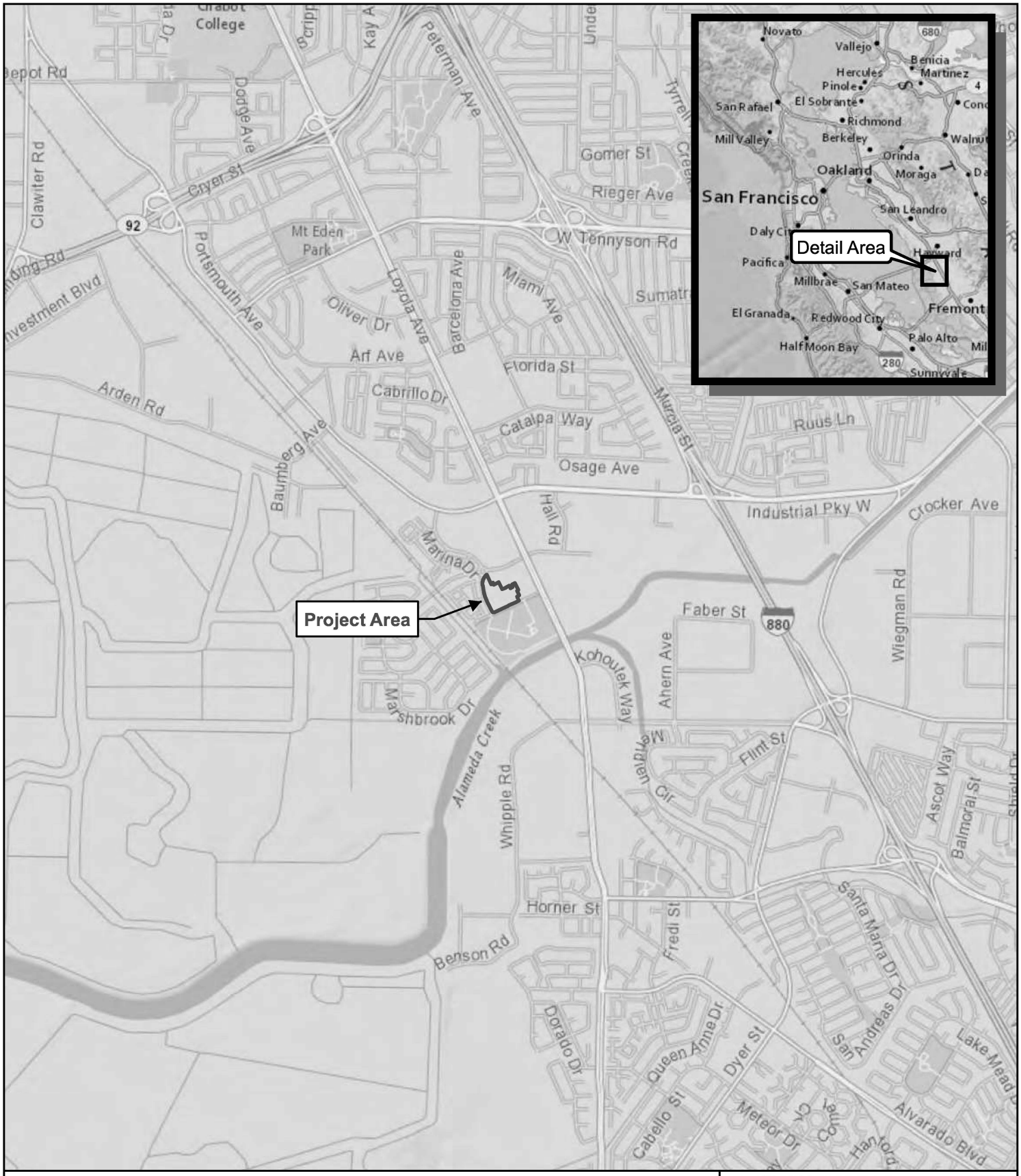

Figure 1 of 2. Project Area Location Map
Corps reference number (SPN-24156)

Legacy Partners LLC
Eden Shores Residential 2
Alameda County, California

0 0.25 0.5 1
11574 Miles

wra
ENVIRONMENTAL CONSULTANTS

Map Prepared Date: 10/20/2015
Map Prepared By: SGillespie
Base Source: ESRI National Geographic
Data Source(s): WRA

Path: L:\Acad 2000 Files\23000\23235-2\GIS\ArcMap\Fig1_LocMap_20151020.mxd

Figure 2. Eden Shores Business Park Site Containing Eden Shores Residential 2 Parcel

N
W E
S

0 250 500 1,000
Feet

Eden Shores Residential 2
Alameda County, California

wra
ENVIRONMENTAL CONSULTANTS

Date: September 2014
Map By: DC
Base Source: ESRI Streaming Imagery

Path: L:\Acad 2000 Files\23000\23235-2\GIS\ArcMap\Fig2_Site_20140904.mxd

Eden Shores Boulevard
R-05
R-07
R-06
R-03
R-04
R-01
R-02
Eden Park Place
11576
11617

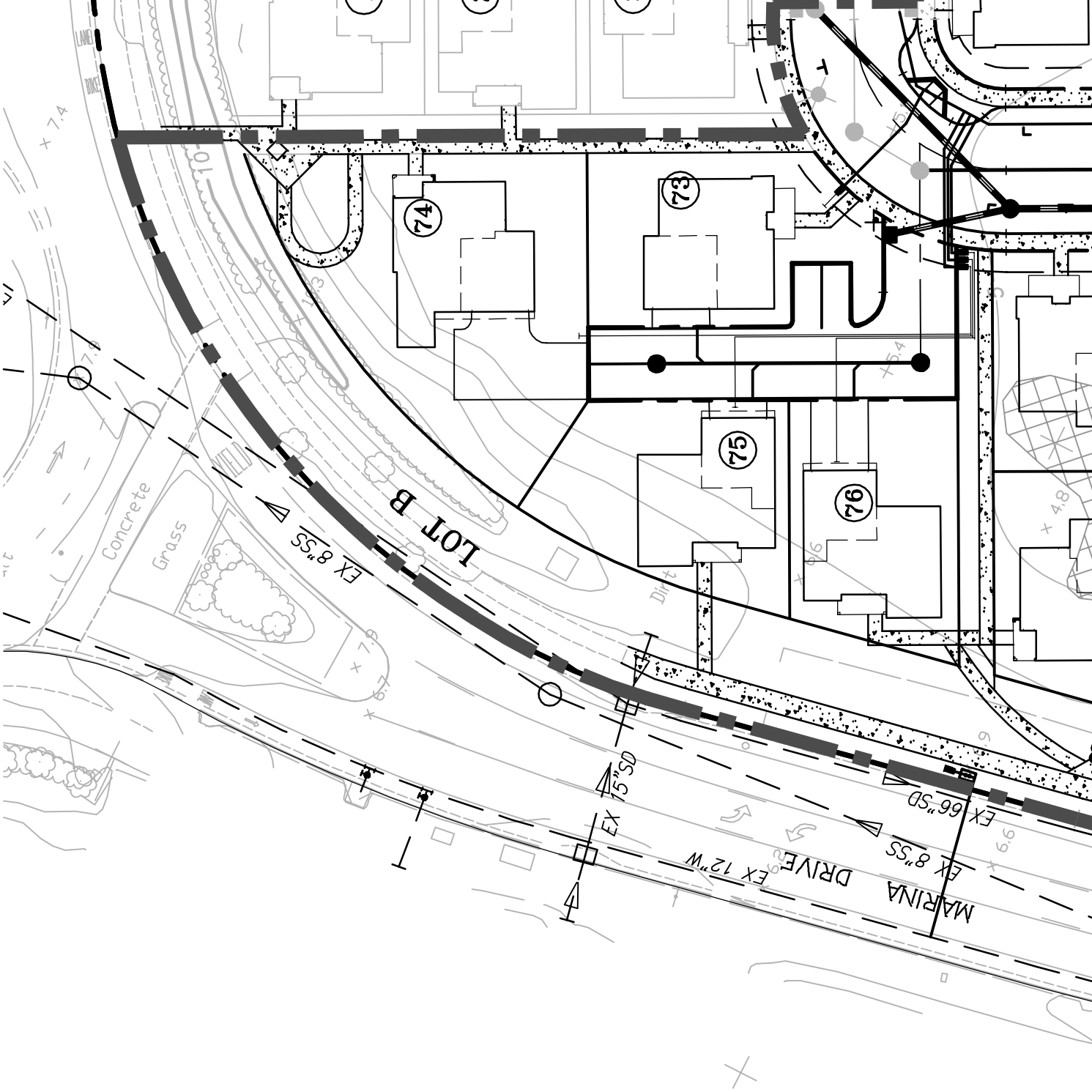
74
73
75
76
LOT B
EX 8"SS
EX 15"SD
EX 66"SD
EX 8"SS
EX 12"W
MARINA DRIVE
Concrete
Grass
Dirt
7.4
7.3
7.0
6.7
6.6
6.9
6.3
4.8
5.4
6.6

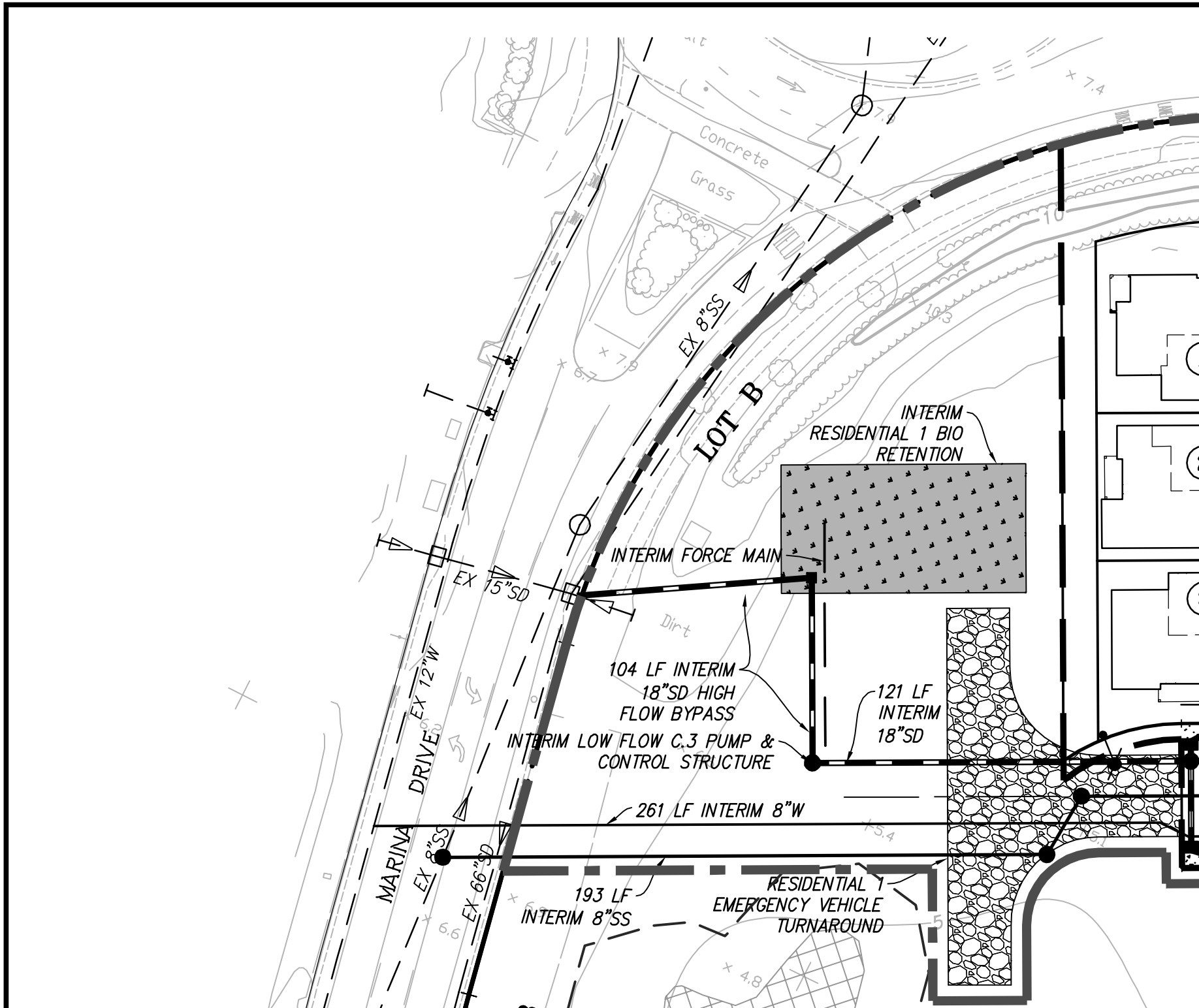
Concrete
Grass
EX 8"SS
LOT B
INTERIM
RESIDENTIAL 1 BIO
RETENTION
INTERIM FORCE MAIN
EX 15"SD
Dirt
104 LF INTERIM
18"SD HIGH
FLOW BYPASS
121 LF
INTERIM
18"SD
INTERIM LOW FLOW C.3 PUMP &
CONTROL STRUCTURE
EX 12"W
MARINA DRIVE
261 LF INTERIM 8"W
EX 8"SS
EX 66"SD
193 LF
INTERIM 8"SS
RESIDENTIAL 1
EMERGENCY VEHICLE
TURNAROUND

11578
11619

ATTACHMENT B

Waste Discharge Requirements and
Water Quality Certification for the
Eden Shores Residential Phase 2Project
in
Hayward in
Alameda County

Declaration Establishing Storm Water Maintenance Covenants and the *Stormwater Management Plan for Eden Shores Residential Site – Phase 2, City of Hayward, Alameda County* (Ruggeri-Jensen-Azar, November 30, 2017)

RECORDING REQUESTED BY:

_____

WHEN RECORDED MAIL TO:

Eden Shores Associates I, LLC
c/o SteelWave IMS, LLC
4000 East Third Avenue, Suite 500
Foster City, CA 94404
Attn: Steven M. Dunn

SPACE ABOVE RESERVED FOR FILING STAMP

DECLARATION ESTABLISHING STORM WATER MAINTENANCE COVENANTS

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DECLARATION ESTABLISHING STORM WATER MAINTENANCE COVENANTS

THIS DECLARATION ESTABLISHING STORM WATER MAINTENANCE COVENANTS ("**Declaration**") is made and entered into by Eden Shores Associates I, LLC, a Delaware limited liability company (the "**Declarant**") as of this __ day of _____ 2017 with reference to the facts set forth below.

RECITALS

All initially capitalized terms used but not defined in the Recitals shall have the meanings set forth in **Article 1** of this Declaration.

A. Declarant is the Owner of that certain real property located in the City of Hayward, County of Alameda, State of California, more particularly described on **Exhibit "A"** attached hereto and incorporated herein (the "**Property**").

B. In connection with obtaining the entitlements and developing the Property, Declarant has submitted to the City and obtained the approval from the City of a Storm Water Management Plan and has obtained a RWQCB Permit from the RWQCB which Storm Water Management Plan and RWQCB Permit relate to storm water, the discharge of storm water and the operation and maintenance of the storm water facilities serving the Property. The City and the RWQCB have required Declarant to record this Declaration to set forth certain obligations relating to storm water, the discharge of storm water and the maintenance and operation of the Storm Water Facilities within and serving the Property and compliance within the Storm Water Management Plan.

C. As of the date of recordation of this Declaration, Declarant owns all of the Property. Declarant may convey the Property for development to a Successor Owner and, in such case, such Successor Owner shall be responsible to perform the Maintenance Obligations hereunder. If, however, the Property is further subdivided into Individual Parcels or Condominiums the Declarant or the then current Successor Owner of the Property who is causing the further subdivision to occur shall be obligated to establish an Association or annex the Property into an existing Association as described herein. References herein to the Responsible Party means Declarant, while it is the Owner of the Property or a Successor Owner of the Property, but upon the occurrence of the Association Establishment Event, references herein to the Responsible Party mean such Association.

NOW, THEREFORE, to comply with the requirements of the City and the RWQCB, Declarant is hereby recording this Declaration to establish covenants, conditions, restrictions, upon the Property as equitable servitudes upon the Property, which shall run with the land and shall inure to the benefit of and be binding upon Declarant, its successors and assigns, and all subsequent Owners of all or any portion of the Property.

ARTICLE 1
DEFINITIONS

1.1 **"Applicable Laws"** means the entitlements for the Property and any law, regulation, rule, order or ordinance of any Governmental Agency(ies) having jurisdiction over the Property which are applicable to the Property or any portion thereof now in effect or as hereafter promulgated.

1.2 **"Association"** means any owners association formed to govern the Property upon the occurrence of an Association Establishment Event, including any owners association to which the Property is made subject to its jurisdiction by annexation.

1.3 **"Association Declaration"** means any declaration of covenants, conditions and restrictions recorded against the Property which provides for the establishment of an Association or to which the Property is annexed.

1.4 **"Association Establishment Event"** means the occurrence of the further subdivision of the Property into Individual Parcels or Condominiums and the first conveyance of such Individual Parcels or Condominiums to an individual purchaser at which time the Property shall have been made subject to the jurisdiction of an Association and such Association shall be obligated to perform the Maintenance Obligations under this Declaration.

1.5 **"Best Management Practices" or "BMPs"** means structural or non-structural pollution prevention measures, such as site design, source control, treatment control, and hydromodification control methods required to minimize polluted runoff from the Property as described in the RWQCB Permit. Best Management Practices include all best management practices established by any governmental agencies, the National Pollutant Discharge Elimination System and requirements adopted pursuant to the Federal Clean Water Act.

1.6 **"City"** means the City of Hayward, California.

1.7 **"Condominium"** means any residential condominium within the Property established pursuant to Section 4125 of the California Civil Code.

1.8 **"County"** means the County of Alameda, California.

1.9 **"Declarant"** means Eden Shores Associates I, LLC, a Delaware limited liability company and any person or entity acquiring all or any portion of Declarant's interest in the Property (including all or any portion of Declarant's rights and obligations as created and established herein) pursuant to written assignments from Declarant which are recorded in the Official Records. A successor Declarant shall also be deemed to include the beneficiary under any deed of trust securing an obligation from a then existing Declarant encumbering all or any portion of the Property, which beneficiary has acquired any such Property by foreclosure, power of sale or deed in lieu of such foreclosure or sale.

1.10 **"Declaration"** means this Declaration Establishing Storm Water Maintenance Covenants and all amendments to this Declaration as may be recorded, from time to time, in the Official Records.

1.11 **"Governmental Agencies"** means the RWQCB, the City, the County and any other federal, state or local agency or authority having jurisdiction over the Property.

1.12 **"Individual Parcels"** means the subdivided legal parcels within the Property created under a final parcel or subdivision map as a result of the further subdivision of the Property.

1.13 **"Maintenance Obligations"** means the maintenance obligations established under the RWQCB Permit and the Storm Water Management Plan described in this Declaration.

1.14 **"Official Records"** means the Office of the County Recorder of Alameda County.

1.15 **"Owner"** means the record owner, whether one or more persons or entities, including Declarant, of any Lot or Condominium within the Property, excluding those having such interest merely as security for the performance of an obligation.

1.16 **"Parcel"** means a legal lot or parcel shown on a final subdivision map.

1.17 **"Property"** means all of the real property described on **Exhibit "A"** of this Declaration.

1.18 **"Responsible Party"** means the Declarant or a Successor Owner while it owns all of the Property and upon the occurrence of the Association Establishment Event means the Association with jurisdiction over the Property.

1.19 **"RWQCB"** means the Regional Water Quality Control Board and any successor agency to the RWQCB

1.20 **"RWQCB Permit"** means the permit issued by the RWQCB in the form attached hereto as **Exhibit "B"** and any amendments thereto with the approval of the RWQCB.

1.21 **"Storm Water Facilities"** means any storm water facilities installed within the Property pursuant to the RWQCB Permit and/or the Storm Water Management Plan.

1.22 **"Storm Water Management Plan"** means the Storm Water Management Plan dated November 1, 2016 which was submitted to and approved by the RWQCB in the form attached hereto as **Exhibit "C."**

1.23 **"Successor Owner"** means a successor Owner to whom Declarant has conveyed all of the Property.

ARTICLE 2
STORM WATER COVENANTS AND ASSOCIATION ESTABLISHMENT EVENT

2.1 **Compliance with RWQCB Permit**. The Responsible Party shall comply with all obligations imposed under the RWQCB Permit and the Storm Water Management Plan including, without limitation, all reporting requirements.

2.2 **Maintenance of Storm Water Facilities and Compliance with the RWQCB Permit**. The Responsible Party shall maintain the Storm Water Facilities and all other portions of the Property in compliance with the RWQCB Permit and the Storm Water Management Plan and shall ensure that at all times such maintenance is performed in accordance with all Best Management Practices. Each Owner shall comply with all Best Management Practices with respect to the discharge of storm water within such Owner's Lot or Condominium.

2.2.1 **Scope of Maintenance**. The maintenance obligations of the Responsible Party hereunder shall include inspection and servicing of the Storm Water Facilities as may be necessary to ensure the Storm Water Facilities retain their effectiveness.

2.2.2 **Obligations of Association**. In addition to the obligations of the Responsible Party described above, any Association formed to govern the Property shall have the obligation to enforce compliance by any Owners of any Lots or Condominiums on the Property with respect to storm water and the discharge of storm water. In the event of any violation hereof by an Owner, if the RWQCB or other Governmental Agency makes a claim on the Association, the Association shall be entitled to pursue any remedies it may have against a defaulting Owner.

2.2.3 **Best Management Practices and Storm Water Pollution**. Each Owner shall comply with the any Best Management Practices which may be applicable to any Lot or Condominium owned by such Owner.

2.2.4 **Compliance With Requirements Regarding Storm Water Pollution**. Each Owner and the Association acknowledges that water that enters a storm drain flows directly to natural sources of water, including waterways, creeks, drains, rivers, and lakes. Each Owner and the Association further acknowledges that storm water runoff can carry eroded soils and other non-storm water substances and materials into natural sources of water, which can have an adverse impact on the environment. Unlike the water in the sewer system, which flows to wastewater treatment plants, water that enters a storm drain flows directly, without any treatment, to waterways, creeks, streams, rivers, lakes and/or oceans. The Association, and the Owners shall not dispose of any substance into the Storm Water Facilities that will cause a violation of any Best Management Practices or the RWQCB Permit. Solid waste, garbage, rocks, sand, lawn clippings, yard waste, detergents, pet waste, toxic chemicals, fertilizers, or hydrocarbon compounds (including, without

limitation, gasoline, motor oil, antifreeze, solvents, paints, paint thinners, and wood preservatives) and any other such materials or pollutants shall not be discharged into any street, public or private, gutters, or into storm drains or storm water conveyance systems. The Association and each Owner further acknowledge that the disposal of such pollutants and materials into a storm drain system may result in significant penalties and fines and that the Association, and each Owner may be responsible for any activities by their respective contractors (e.g., painters, landscapers) who dispose of such pollutants into the Storm Water Facilities. Use and disposal of all toxic chemicals, hydrocarbon compounds, pesticides, fungicides, herbicides, insecticides, fertilizers, and other such chemicals shall meet all federal, state, and city requirements and requirements of the RWQCB.

2.2.5 **Records**. The Responsible Party shall maintain all records of any reports required under the RWQCB Permit for a period of five (5) years as required by the RWQCB Permit

2.3 **Grant of Right of Entry**. Each Owner and any Association formed to govern the Property hereby grants to the RWQCB and any Governmental Agency enforcing the requirements of the RWQCB Permit and the Storm Water Management Plan, the right to enter the Property to inspect the Storm Water Facilities and to undertake any other actions under the Storm Water Management Plan and/or the RWQCB Permit including exercising its remedies as provided herein.

2.4 **Association Establishment Event**. Upon the occurrence of an Association Establishment Event, the Declarant if Declarant is further subdividing the Property or the successor Owner if the successor Owner is subdividing the Property shall, as a condition to any conveyance of any individual Parcel or individual Condominium establish an Association or annex the Property into an existing Association and all of the Maintenance Obligations shall be transferred to and assumed by such Association.

ARTICLE 3
RWQCB AND/OR CITY ENFORCEMENT RIGHTS

3.1 **Enforcement**. The RWQCB and/or the City shall have the right to enforce any violation of this Declaration and the RWQCB Permit and/or Storm Water Management Plan by any proceeding at law or equity. Prior to exercising such rights the RWQCB or the City, as applicable, shall deliver written notice of default to the Association and any Owner within the Property who is in default and if the default is not cured within fifteen (15) days after the delivery of the notice or if the cure requires more than fifteen days if the Owner or Party does not commence to cure the default and diligently pursue the same to completion then the RWQCB and/or the City shall have the right to pursue any remedies at law or equity.

ARTICLE 4
GENERAL PROVISIONS

4.1 **Headings**. All headings are for convenience only and shall not affect the interpretation of this Agreement.

4.2 **Severability**. In the event that any provision of this Declaration shall for any reason, be determined to be invalid, illegal, or unenforceable in any respect, the remainder of this Agreement shall remain in full force and effect and the parties hereto shall negotiate in good faith and agree to such amendments, modifications, or supplements to this Declaration or such other appropriate action as shall, to the maximum extent practicable in light of such determination, implement and give effect to the intentions of the parties as reflected herein.

4.3 **No Waiver**. The waiver or failure to enforce any breach or violation of any covenant herein contained shall not be deemed to be a waiver or abandonment of such covenant, or any waiver of the right to enforce any subsequent breach or violation of such covenant.

4.4 **Term**. The covenants shall run with and bind the Property for a term of sixty (60) years from the date this Declaration is recorded, after which time this Declaration shall be automatically extended for

successive periods of ten (10) years, unless an instrument, signed by the RWQCB and the Owners of a majority of the Lots, agreeing to terminate this Declaration, in whole or in part, has been recorded within one (1) year prior to the termination of the initial sixty (60) year term, or within one (1) year prior to the termination of any successive ten (10) year period.

4.5 **Covenants Running With The Land**. Each of the covenants shall be deemed to be established upon the recordation of this Declaration, and shall thenceforth be deemed to be covenants running with the land for the use and benefit of the Lots, and superior to all other encumbrances applied against or in favor of any portion of the Property.

4.6 **Construction**. The provisions of this Declaration shall be liberally construed to effectuate its purpose of creating a uniform plan for the development, use, occupancy and enjoyment of the Property. The Article and section headings have been inserted for convenience only, and shall not be considered or referred to in resolving questions of interpretation or construction.

4.7 **Amendments**. This Declaration may be amended solely with the consent of Declarant (so long as Declarant owns any portion of the Property) and the RWQCB and, if an Association Establishment Event has occurred the consent of the Association as evidenced by the approval of a majority of the board of directors of such Association.

4.8 **Exhibits**. All exhibits referred to herein are incorporated by reference.

4.9 **Mortgagee Protection**. Any Mortgagee who acquires title to all or any portion of the Property as a result of a foreclosure or deed in lieu of foreclosure ("**Foreclosure**") shall not be liable for any defaults hereunder occurring prior to the date such Mortgagee acquires title to such portion of the Property as a result of such Foreclosure but such Mortgagee shall be bound by this Declaration and all obligations arising hereunder from and after the date of such Foreclosure.

4.10 **Governing Law**. This Declaration is being executed and delivered, is intended to be performed, in the State of California, and to the extent permitted by law, the execution, validity, construction and performance of this Declaration shall be construed and enforced in accordance with the laws of the State of California.

[Remainder of Page Intentionally Left Blank]

4.11 **Statutory References**. All references in this Declaration to various statutes, codes, regulations, ordinances and other laws shall be deemed to include those laws in effect as of the date of this Declaration and any successor laws as may be amended from time to time.

IN WITNESS WHEREOF, Declarant has executed this instrument as of the date set forth below.

Date: _____

DECLARANT

EDEN SHORES ASSOCIATES I, LLC,
a Delaware limited liability company

By: Legacy Partners II Hayward I, LLC,
a Delaware limited liability company,
its Administrative Member

By: Legacy Partners Realty Fund II, LLC,
a Delaware limited liability company,
its managing member

By: SteelWave IMS, LLC,
a Delaware limited liability company,
its Administrative Member

By:_____
Name: _____
Title: _____

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of _____)

On _____, before me, _____, a Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____

EXHIBIT "A"

PROPERTY

PARCEL ONE:

REAL PROPERTY SITUATE IN THE CITY OF HAYWARD, COUNTY OF ALAMEDA, STATE OF CALIFORNIA, BEING PORTIONS OF THE PARCELS DESCRIBED AS NEW LOT 10, NEW LOT 11, NEW LOT 16, AND NEW LOT 17 IN THE DEED RECORDED IN DOCUMENT NUMBER 2011-120623 IN OFFICIAL RECORDS OF ALAMEDA COUNTY, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID NEW LOT 16; THENCE ALONG THE WEST LINE OF NEW LOT 16, NORTH 27° 28' 25" WEST – 356.81 FEET TO THE NORTHWEST CORNER OF NEW LOT 16, SAME CORNER BEING ON THE SOUTH LINE OF NEW LOT 11; THENCE ALONG THE SOUTHERLY LINE OF NEW LOT 11, SOUTH 62° 31' 35" WEST – 303.59 FEET TO THE SOUTHWEST CORNER OF NEW LOT 11, SAME CORNER BEING AT THE BEGINNING OF A CURVE TO THE RIGHT, FROM WHICH POINT THE CENTER BEARS NORTH 70° 57' 42" EAST, THENCE ALONG THE WESTERN LINE OF NEW LOT 11 FOR THE FOLLOWING THREE (3) COURSES: (1) IN A NORTHERLY DIRECTION 90.16 FEET ALONG THE ARC OF SAID CURVE TO THE RIGHT, HAVING A RADIUS OF 651.00 FEET AND THROUGH A CENTRAL ANGLE OF 07° 56' 06", (2) NORTH 11° 06' 12" WEST - 116.10 FEET TO THE BEGINNING OF A CURVE TO THE RIGHT, AND (3) IN A NORTHEASTERLY DIRECTION 233.98 FEET ALONG THE ARC OF SAID CURVE TO THE RIGHT, HAVING A RADIUS OF 230.00 FEET AND THROUGH A CENTRAL ANGLE OF 58° 17' 14"; THENCE CROSSING THROUGH NEW LOT(S) 10, 11, 16, AND 17 FOR THE FOLLOWING SIXTEEN (16) COURSES: (1) SOUTH 26° 54' 28" EAST – 196.65, (2) SOUTH 74° 32' 58" EAST – 50.85 FEET, (3) NORTH 63° 05' 32" EAST – 104.00 FEET, (4) SOUTH 26° 54' 28" EAST - 149.00 FEET, (5) NORTH 63° 05' 32" EAST - 71.00 FEET, (6) SOUTH 26° 54' 28" EAST – 22.67 FEET, (7) NORTH 63° 05' 32" EAST – 10.50 FEET, (8) SOUTH 26° 54' 28" EAST – 27.33 FEET, (9) NORTH 63° 05' 32" EAST – 119.00 FEET, (10) NORTH 26° 54' 28" WEST - 27.33 FEET, (11) NORTH 63° 05' 32" EAST - 10.50 FEET, (12) NORTH 26° 54' 28" WEST - 22.67 FEET, (13) NORTH 63° 05' 32" EAST - 59.00 FEET, (14) SOUTH 26° 54' 28" EAST - 149.00 FEET, (15) SOUTH 63° 05' 32" WEST – 63.00 FEET, (16) SOUTH 26° 54' 28" EAST - 180.48 FEET TO A POINT ON THE SOUTH LINE OF NEW LOT 17; THENCE ALONG THE SOUTH LINE(S) OF NEW LOT(S) 16 AND 17 FOR THE FOLLOWING FOUR (4) COURSES: (1) SOUTH 63° 21' 35" WEST – 17.10 FEET TO THE BEGINNING OF A CURVE TO THE LEFT, (2) IN A WESTERLY DIRECTION, 63.26 FEET ALONG THE ARC OF SAID CURVE TO THE LEFT, HAVING A RADIUS OF 1000.00 FEET AND THROUGH A CENTRAL ANGLE OF 03° 37' 28" TO THE POINT OF REVERSE CURVATURE, (3) IN A WESTERLY DIRECTION 63.26 FEET ALONG THE ARC OF SAID CURVE TO THE RIGHT, HAVING A RADIUS OF 1000.00 FEET AND THROUGH A CENTRAL ANGLE OF 03° 37' 28", AND (4) SOUTH 63° 21' 35" WEST – 106.29 FEET TO THE POINT OF BEGINNING.

AND BEING FURTHER DESCRIBED AS NEW PARCEL 1 ON THAT CERTAIN LOT LINE ADJUSTMENT NO. LLA 13-03 RECORDED MAY 8, 2015 AS INSTRUMENT NO. 2015123413, OFFICIAL RECORDS.

APN: 456-0101-013-06

PARCEL TWO:

REAL PROPERTY SITUATE IN THE CITY OF HAYWARD, COUNTY OF ALAMEDA, STATE OF CALIFORNIA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

LOT 15, AS SHOWN ON THAT CERTAIN MAP ENTITLED "TRACT 7065", WHICH MAP WAS FILED IN THE OFFICE OF THE RECORDER OF THE COUNTY OF ALAMEDA COUNTY, STATE OF CALIFORNIA ON OCTOBER 16, 2001, IN BOOK 261 OF MAPS PAGES 68 THROUGH 74, INCLUSIVE.

APN: 456-0101-012

EXHIBIT "B"

RWQCB PERMIT

[To Be Attached]

EXHIBIT "C"

STORM WATER MANAGEMENT PLAN

[Attached]

STORM WATER MANAGEMENT PLAN

for

EDEN SHORES RESIDENTIAL SITE – PHASE 2

City of Hayward, Alameda County, California

November 30, 2017

Prepared for:

Steelwave

4000 East Third Avenue, Suite 500

Foster City, CA 94404

(650) 235-2833

sdunn@steelwavellc.com

Contact: Mr. Steve Dunn

Prepared by:

Ruggeri-Jensen-Azar

4690 Chabot Drive, Suite 200

Pleasanton, CA 94588

(925) 227-9100

esieu@rja-gps.com

Contact: Eddie Sieu

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Appendix B – Preliminary Storm Water Management Plans

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Appendix D – Storm Water Inlet Trash Capture Devices

I. INTRODUCTION

Urban storm water runoff is a significant source of pollution to the nation's water. In 1987, congress began to address this issue by requiring municipal storm water programs to obtain National Pollutant Discharge Elimination System (NPDES) permits. This resulted in local requirements for storm runoff from development projects. In 2003, Regional Water Quality Control Board added provision C.3 to the municipalities Storm water NPDES permit to provide guidance to local agencies for implementation of the storm water requirements.

In Alameda County, development projects must comply with NPDES permit issued to the County wide Clean Water Program by the Regional Water Quality Control Board in October 14, 2009. Development projects must implement best management practices (BMPs) and post construction storm water treatment measures to minimize long term water quality impacts using site design and source control measures to keep pollutants out of storm water runoff. Furthermore, changes to the permit requires (starting December 1, 2011) storm water treatment measures will have to be met using low impact development (LID) such as evapotranspiration and/or rain water harvesting and reuse. Where this is infeasible, landscape based treatment such as bio-retention, flow thru planters or rain garden shall be used to meet the permit requirements.

The purpose of this plan is to provide selection, preliminary design and guidance for the operation and maintenance of post construction storm water treatment measures to meet the C.3 provision and permit requirements to the maximum extent practicable for the storm runoff generated from the impervious surfaces for the proposed project.

II. PROJECT INFORMATION

A. Size and Location

The project site is approximately 6.18± acres and is located at the southeast corner of Eden Shore Boulevard and Marina Drive in the city of Hayward, Alameda County. A vicinity map, Exhibit "A," is included in Appendix for reference.

B. Existing Condition

The project site is currently vacant and is bordered to the west and south by public streets. A new residential development is being constructed to the east. The proposed project will be an extension (or "Phase 2") of this current residential development. The topography is generally flat with a very gentle slope towards Marina Drive.

C. Project Description

The proposed project is a residential development consisting of 52 units of single family detached residential units.

D. Pollutants of Concern

Pollutants of concern include oil, grease, sediments, pesticides, fertilizer, and trash. The post construction storm water treatment measures should be designed to remove these pollutants prior to entering into the underground storm drains.

E. Site Design of Water Quality

1. Site Design Measures

Site design measures are site planning techniques to help reduce storm water pollutants and reduce impervious surfaces of development sites. The following site design measures will be implemented:

- reduce impervious surfaces by using previous pavement, if feasible, in common area walkways.
- maximum use of landscaping by minimizing hardscape and encouraging more tree planting by use of structural soils or silva cells as recommended in Section 4.5.3. of the Alameda County C.3 Guidebook.
- direct storm water runoff generated by the proposed impervious surfaces to LID treatment areas.

2. Source Controls

Source controls prevent potential pollutant sources from contacting rainfall and storm water. Source control measures consist of structural or operational "good housekeeping" practices. The following source control measures will be implemented:

- Use non-chemical controls before using chemicals to treat a pest problem and pest resistant landscaping referencing Section 8.6 of the Alameda County C.3 Guidebook and the Integrated Pest Management Techniques based on the Alameda County Bay Friendly Landscaping Guidelines.
- Select planting materials to site specific characteristics such as soil type, climate, prevailing wind, sunlight, or rainfall to ensure successful establishment.
- Regular sweeping of streets and sidewalk to minimize accumulation of litter or debris.
- Routine inspection and cleaning of storm water inlets and trash capture devices as outlined in Appendix C.
- Storm drain inlets clearly marked "no dumping – drains to bay".
- Proper maintenance of landscaping with minimal pesticide and fertilizer use as outlined in Appendix C.
- Project CC&R's or education materials to inform tenants and/or building owners that no person shall dispose of, or permit the disposal, directly or indirectly of vehicle fluids, hazardous materials or rinsed water from tools, equipment, or trash cans into storm drains.
- Regularly mow grass in bio-retention areas and remove clippings from the site.
- Install trash capture devices in storm water inlets. A preferred list by San Francisco Bay Regional Water Quality Control Board is attached in Appendix D for reference.

3. **Storm Water Treatment Measures**

Storm water treatment measures are landscape based engineered treatment system to remove pollutants from storm water using natural process such as infiltration, ponding, flow-thru, or sedimentation. Storm water treatment measures must be sized to comply with provision C.3 and the Alameda County C.3 Storm Water Technical Guidance. The proposed project will generate impervious surfaces that would be required to be treated using landscaped base C.3 treatment measures. Selection, preliminary design and calculations of the proposed C.3 storm water treatment measures are outlined in more details in Sections III and IV below.

4. **Hydromodification Management Measures**

Hydromodification management (HM) measures include site design and source control measures that promote infiltration or minimize change in the rate and flow of runoff, when compared to pre-development condition, and to minimize downstream channel sediment and erosion. Based on the Alameda County wide Clean Water Program HMP susceptibility map, the project site is exempt from HM due because the site is tidally influenced. As a result, HM is not included as a part of this project. A copy of the HM susceptibility map is included in appendix for reference.

III. C.3 STORM WATER TREATMENT EVALUATION

A. Site Constraints and Opportunities

1. The low permeability and high clay content of the site soil combined with potentially high ground water table make it undesirable to promote infiltration.

2. The proposed project is a small in-fill site with physical constraints and existing improvements limiting use of sediment basins.

3. Due to nature of this development, parkway strips and/or open landscape areas are limited where these areas could be utilized for LID treatment areas. However, "large" landscape buffers surround the project site along the perimeter where these landscape buffers could be utilized for treatment areas. The new impervious surfaces will need to be treated prior to discharging into the underground storm drains.

B. C.3 Storm Water Treatment Measures Selection

Given the constraints and opportunities of the proposed site and the goal of LID to reduce storm water runoff and mimic a site's predevelopment hydrology, bio-retention in the landscape buffers are selected to treat and reduce storm water pollutants from entering into the underground storm drains. Runoff from the new impervious surface is collected by area drains and storm water inlets and conveyed to the on-site storm drains. The storm drains then discharge and connect to an existing 66" storm drain in Marina Drive. Prior to discharging into this existing 66" storm drain, runoff is conveyed into low flow pumps, which discharge the storm runoff into the bio-retention treatment areas placed in the landscape buffers mentioned previously.

1. Bio-retention

Bio-retention functions as soil and plant based filtration that removes pollutants through a variety of physical, biological, and chemical process. These facilities consist of a layer of cobble stone (mulch is not recommend), planted landscape (grass, shrub or trees), sandy loam soil (with a minimum percolation rate of 5 inches/hour and a maximum percolation rate of 10 inches/hour), drain rock and under drains. The storm water runoff from impervious surface is directed and passed through the bio-retention areas and distributed evenly along a ponding area. Storm water runoff will percolate through the sandy loam treatment soil and eventually captured by the under drains and discharged into the underground storm drains. A detail of the bio-retention is on the preliminary storm water management plan included in the Appendix.

IV. C.3 STORM WATER TREATMENT MEASURES DESIGN AND CALCULATIONS

As mentioned in the last section of this plan, storm runoff from the new impervious surfaces (roofs, sidewalks, street paving, etc.) for the entire site is collected and conveyed to a low flow pump located at downstream end of the on-site storm drain system just before the storm drains exit the site. The low flow runoff is then pumped into the bio-retention placed at the perimeter of the project site via a force main then "bubbled up" into the treatment areas.

The C.3 provision of the Municipal Regional Storm Water Permit (MRP) specifies three alternatives for hydrology sizing: Flow Based, Volume Based, or Combination Flow and Volume Based. For the purposes of sizing the bio-retention for this project, the combination flow and volume based (4% method) is used, in which the surface area of the treatment measure is designed to be 4% of the "effective impervious surface." If areas of landscaping or pervious paving contribute runoff to the treatment measure, the area of these pervious surfaces is multiplied by a factor of 0.1 and added to the "impervious area" to obtain the amount of "effective impervious area."

Based on the criteria noted above and the MRP C.3 provision requirements, surface area of the treatment measure for the DMA is calculated and tabulated on Table 1 as shown on the Preliminary Storm Water Management Plans, Exhibit B.

As shown in Table 1, bio-retention provided sufficient treatment area for runoff generated from the proposed effective impervious areas. In addition, each bio-retention is designed to provide a minimum of 6" ponding before the runoff infiltrates the treatment soil as recommended by the C.3 guidebook.

V. OPERATION AND MAINTENANCE

Maintenance is essential for assuring the storm water treatment measures function effectively and do not cause flooding, provide habitat for mosquitos or otherwise become a nuisance. Essential maintenance will include:

- Flushing the storm drain pipes once annually before the rainy season begins.
- Inspect and service the trash capture devices
- Inspect and service the bio-retention treatment areas.
- Perform other site source controls outlined in Section E above.

The homeowners association (HOA) of the proposed residential development will be responsible for providing adequate funding to maintain these post-construction storm water treatment measures. An Operation and Maintenance (O&M) Agreement will be executed by the HOA with the City at project approval stage accepting responsibility for maintenance as well as ensuring access to the City, Water Board, Alameda County Mosquito Abatement District or Vector Control District for routine inspection.

Maintenance plans outlining routine activities and frequency of the maintenance for bio-retention and trash capture devices are included in the Appendix for reference.

APPENDIX A
VICINITY MAP

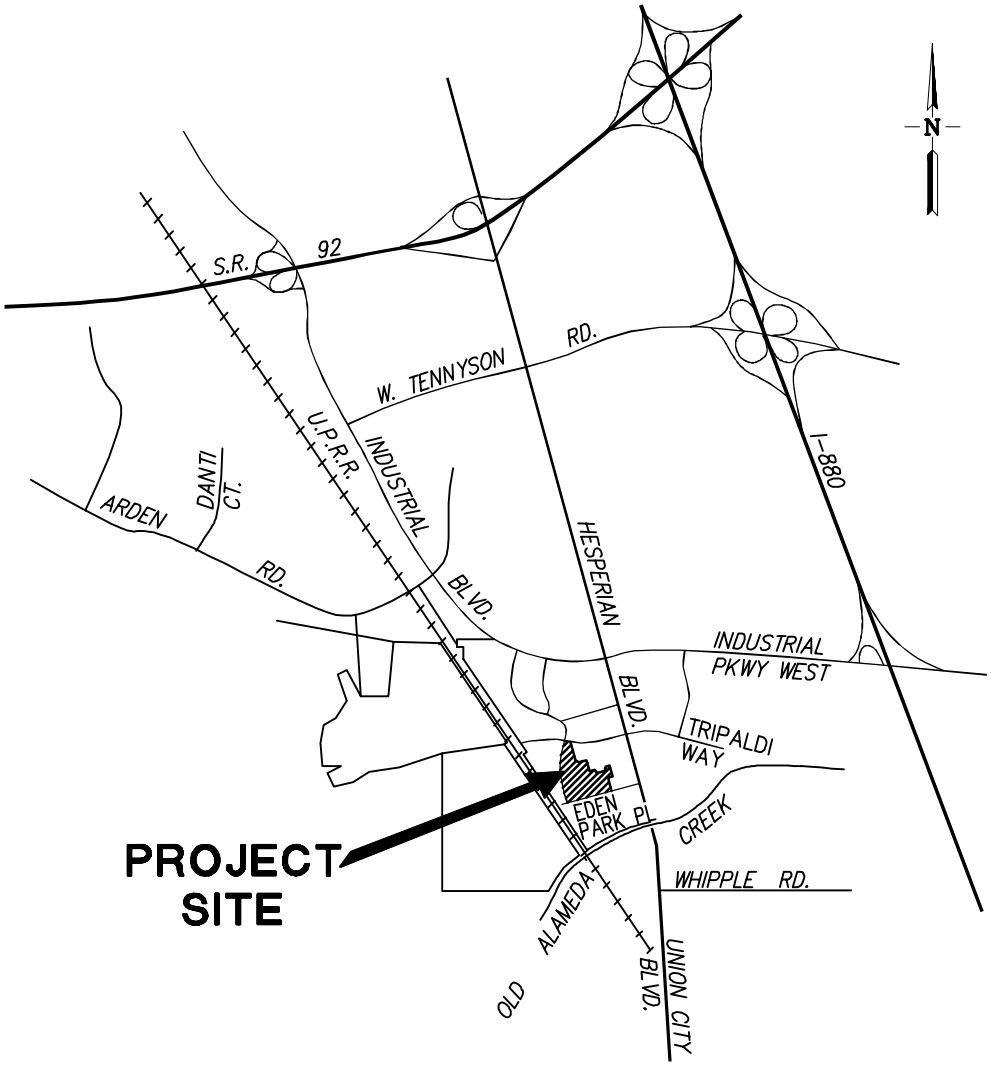

EXHIBIT A - VICINITY MAP

NOT TO SCALE

RUGGERI-JENSEN-AZAR
ENGINEERS ▪ PLANNERS ▪ SURVEYORS
4690 CHABOT DRIVE, SUITE 200 PLEASANTON, CA 94588
PHONE: (925) 227-9100 FAX: (925) 227-9300

DATE: NOVEMBER 1, 2016 JOB NO.: 131046SW

G:\JOB2013\131046SW\ADMIN\STORMWATER O&M MANUAL\VICINITY MAP.DWG 11/1/2016 10:36:42 AM HILLARY RAYA

APPENDIX B
PRELIMINARY STORM WATER MANAGEMENT PLAN

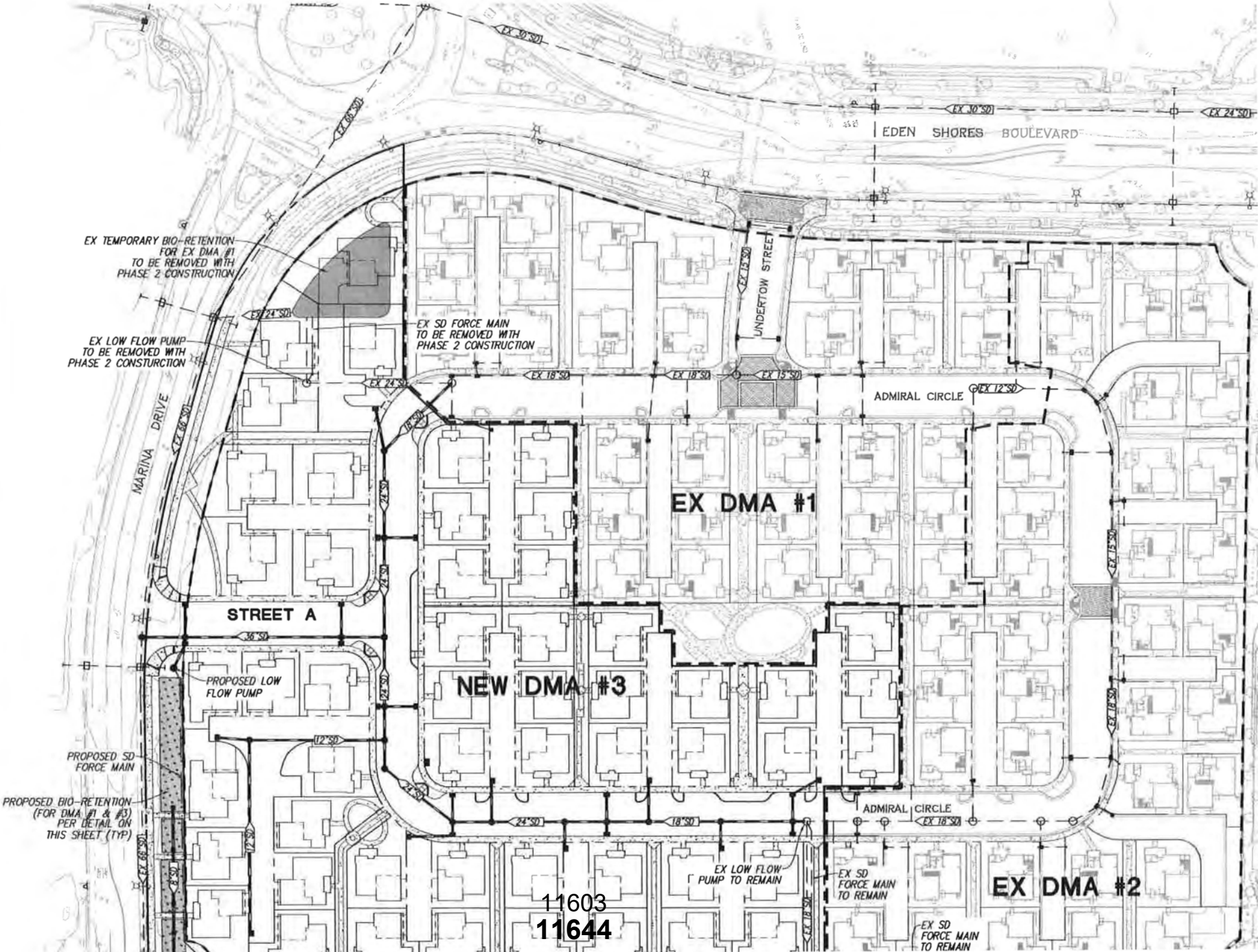
EDEN SHORES BOULEVARD
EX TEMPORARY BIO-RETENTION FOR EX DMA #1 TO BE REMOVED WITH PHASE 2 CONSTRUCTION
EX LOW FLOW PUMP TO BE REMOVED WITH PHASE 2 CONSTURCTION
EX SD FORCE MAIN TO BE REMOVED WITH PHASE 2 CONSTRUCTION
UNDERTOW STREET
ADMIRAL CIRCLE
MARINA DRIVE
EX DMA #1
STREET A
NEW DMA #3
PROPOSED LOW FLOW PUMP
PROPOSED SD FORCE MAIN
PROPOSED BIO-RETENTION (FOR DMA #1 & #3) PER DETAIL ON THIS SHEET (TYP)
EX LOW FLOW PUMP TO REMAIN
EX SD FORCE MAIN TO REMAIN
EX DMA #2
EX SD FORCE MAIN TO REMAIN

APPENDIX C
MAINTENANCE PLANS

Bio-Retention Maintenance Plan

I. Routine Maintenance Activities

The maintenance objective is to prevent sediment buildup and clogging and to keep up the pollutant removal efficiency by maintaining a dense, healthy vegetated cover. Routine maintenance activities, and the frequency at which they will be conducted, are shown in the table below.

Table 1
Routine Maintenance Activities for Bioretention Areas

No.	Maintenance Task	Frequency of Task
1	Remove obstructions, debris and trash from bioretention area and dispose of properly.	Monthly, or as needed after storm events
2	Inspect bioretention area to ensure that it drains between storms and within five days after rainfall.	Monthly, or as needed after storm events
3	Inspect inlets for channels, soil exposure or other evidence of erosion. Clear obstructions and remove sediment.	Monthly, or as needed after storm events
4	Remove and replace all dead and diseased vegetation.	Twice a year
5	Maintain vegetation and the irrigation system. Prune and weed to keep bioretention area neat and orderly in appearance.	Before wet season begins, and after wet season
6	Till or replace soil (using soil mix specified in C.3 Technical Guidance Appendix K) as necessary to maintain the design elevation of soil (see Section V, Soil Mixing and Replacement for proper installation of bio-retention soils).	As needed when bio-retention area does not drain between storms and within 5 days after rainfall
7	Check if cobble stone is missing, patching or out of place and replace as necessary before wet season begins.	Monthly, or before wet season begins.
8	Inspect bioretention area using the attached inspection checklist.	Monthly, or after large storm events, after wet season, and monthly during wet season

II. Prohibitions

The use of pesticides and quick release fertilizers shall be minimized, and the principles of integrated pest management (IPM) followed:

1. Employ non-chemical controls (biological, physical and cultural controls) before using chemicals to treat a pest problem.
2. Prune plants properly and at the appropriate time of year.
3. Provide adequate irrigation for landscape plants. Do not over water.
4. Limit fertilizer use unless soil testing indicates a deficiency. Slow-release or organic fertilizer is preferable. Check with municipality for specific requirements.
5. Pest control should avoid harming non-target organisms, or negatively affecting air and water quality and public health. Apply chemical controls only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, apply the least toxic and the least persistent pesticide that will provide adequate pest control. Do not apply pesticides on a prescheduled basis.
6. Sweep up spilled fertilizer and pesticides. Do not wash away or bury such spills.
7. Do not over apply pesticide. Spray only where the infestation exists. Follow the manufacturer's instructions for mixing and applying materials.
8. Only licensed, trained pesticide applicators shall apply pesticides.

9. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides into runoff. With the exception of pre-emergent pesticides, avoid application if rain is expected.
10. Unwanted/unused pesticides shall be disposed as hazardous waste.

Standing water shall not remain in the treatment measures for more than five days, to prevent mosquito generation. Should any mosquito issues arise, contact the Alameda County Mosquito Abatement District (ACMAD), as needed for assistance. In Albany, contact the Alameda County Vector Control Services District (ACVCSD). Mosquito larvicides shall be applied only when absolutely necessary, as indicated by the ACMAD or ACVCSD, and then only by a licensed professional or contractor. Contact information for ACMAD and ACVCSD is provided below.

III. Vector Control Contacts

Alameda County Mosquito Abatement District
23187 Connecticut St.
Hayward, CA 94545
Phone: (510) 783-7747

Alameda County Vector Control Services District
1131 Harbor Bay Parkway, Ste. 166
Alameda, CA 94502
Phone: (510) 567-6800

IV. Inspections

The attached Bioretention Area Inspection and Maintenance Checklist shall be used to conduct inspections monthly (or as needed), identify needed maintenance, and record maintenance that is conducted.

V. Soil Mixing and Placement

- Do not excavate, place soils, or amend soils during wet or saturated conditions.
- Operate equipment adjacent to (not in) the facility.
- If machinery must operate in the facility, use light weight, low ground-contact pressure equipment.
- It may be necessary to rip or scarify the bottom soils to promote greater infiltration or excavate any sediment that may have built up during construction.
- Consider the time of year and site working area when determining whether to mix bioretention soil on-site or to import pre-mixed soil.
- If mixing bioretention media on-site, use an adjacent impervious area or on plastic sheeting.
- Place soil in 12”lifts with machinery adjacent to the facility. If working within the facility, to avoid over-compacting, place first lifts at far end from entrance and place backwards towards entrance.
- Do not place or work bioretention soil if it is saturated or raining.

- Allow bioretention soil lifts to settle naturally, boot pack (walk around to firm) lifts to achieve 85% compaction effort. After all lifts are placed, wait a few days to check for settlement, and add additional media as needed.
- An alternative to boot compaction is to settle bioretention soils by lightly watering until soils ae just saturated. Allow soil to dry between lifts. It may take a day or more to dry adequately between lifts. Soil cannot be worked when saturated so this method should be used with caution. Allow for extra time to let soils dry between each lift. After all lifts are placed, wait a few days to check for settlement, and add additional media as needed.
- Verify bioretention soil elevations before applying cobble stone or installing plants.

Bioretention Area

Inspection and Maintenance Checklist

Property Address: _____ Property Owner: _____

Treatment Measure No.: _____ Date of Inspection: _____ Type of Inspection: ☐ Monthly ☐ Pre-Wet Season

☐ After heavy runoff ☐ End of Wet Season

Inspector(s): _____ ☐ Other:_____

Defect	**Conditions When Maintenance Is Needed**	**Maintenance Needed? (Y/N)**	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	**Results Expected When Maintenance Is Performed**
1. Standing Water	When water stands in the bioretention area between storms and does not drain within five days after rainfall.			There should be no areas of standing water once inflow has ceased. Any of the following may apply: sediment or trash blockages removed, improved grade from head to foot of bioretention area, or added underdrains.
2. Trash and Debris Accumulation	Trash and debris accumulated in the bioretention area.			Trash and debris removed from bioretention area and disposed of properly.
3. Sediment	Evidence of sedimentation in bioretention area.			Material removed so that there is no clogging or blockage. Material is disposed of properly.
4. Erosion	Channels have formed around inlets, there are areas of bare soil, and/or other evidence of erosion.			Obstructions and sediment removed so that water flows freely and disperses over a wide area. Obstructions and sediment are disposed of properly.
5. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.
6. Cobblestone	Cobble stone is missing or patchy in appearance. Areas of bare earth are exposed, or cobble stone layer is less than 3 inches in depth.			All bare earth is covered, except cobble stone is kept 6 inches away from trunks of trees and shrubs. Cobble stone is even in appearance, at a depth of 3 inches.
7. Irrigation	Irrigation system is not working properly.			Repair as needed and confirm irrigation system works properly.

8. Soil shrinkage	The soil surface is more than 6” below overflow drain.			Add biotreatment soil mix (specified in C.3 Technical Guidance Appendix K), so that soil is at proper depth (top of mulch is typically 6 inches below the overflow outlet).
9. Overlfow Pipe to Outlet to Storm Drain	Excess fire flows are not conveyed safely to storm drain. Piping is damaged or disconnected.			Repair the overflow pipe or remove material clogging the overflow outlet, so that excess flow is conveyed efficiently to storm drain.
10. Miscellaneous	Any condition not covered above that needs attention in order for the bioretention area to function as designed.			Meet the design specifications.

Trash Capture Device Maintenance Plan

I. Routine Maintenance Activities

The maintenance objective is to minimize trash going into the storm drain system by capturing and removing trash at the storm water inlets at location where storm water entering into the storm drain system. Routine maintenance activities at which they will be conducted are outlined below.

1. The storm water inlet should be inspected and serviced at a minimum two times per year. One inspection and service should be conducted before the rainy season begins annually and one should be conducted after the rainy season is ended.
2. Clean surface area immediately around each storm water inlet utilizing a stiff bristled push-broom, flat shovel or industrial vacuum.
3. Remove grate cover and set aside.
4. Inspect trash capture filter and ensure it is secured in the storm water inlet. Replace device, if damaged, as needed.
5. Remove debris trapped in grate slot openings.
6. Utilize an industrial vacuum to remove debris from within storm water inlet.
7. Place grate cover back on storm water inlet grate frame.
8. Secure dated service lock-out tag on grate lid.
9. Identify storm water inlet on site map for tracking and reporting.
10. Note observations, concerns or recommendation on maintenance report.

Storm water Treatment Measures Operation and Maintenance

Inspection Report to the

_____, Alameda County, California

This report and attached inspection checklists document the inspection and maintenance conducted for the identified storm water treatment measures (STMs) and flow duration controls (FDCs) subject to the Maintenance Agreement between the City and the property owner during the annual reporting period indicated below.

I. Property Information:

Property Address or APN: _____

Property Owner: _____

II. Contact Information:

Name of person to contact regarding this report: _____

Phone number of contact person: _____ Email: _____

Address to which correspondence regarding this report should be directed:

_____

_____

III. Reporting Period:

This report, with the attached completed inspection checklists, documents the inspections and maintenance of the identified treatment measures during the time period from January 1 to December 31 annually.

IV. Storm Water Treatment Measure and Flow Duration Control Information:

The following STMs and FDCs are located on the property identified above and are subject to the Maintenance Agreement:

Number of each type of STM or FDC	Type of STM or FDC	Location of STMs & FDCs on the Property

V. Sediment Removal

Total amount of accumulated sediment removed from the storm water treatment measure(s) during the reporting period: _____ cubic yards.

The sediment was removed and disposed as follows: _____

_____

VI. Inspector Information:

The inspections documented in the attached inspection checklists were conducted by the following inspector(s):

Inspector Name and Title	Inspector's Employer and Address

VII. Statement of STM and FDC Condition

Based on the inspections documented in the attached checklists, are the STMs and FDCs identified in this report present, functional and being maintained as required by the Maintenance Plan? (Check yes or no.)

____YES ____NO

If "NO", describe problem, proposed solution and schedule of correction:

VIII. Certification:

I hereby certify, under penalty of perjury, that the information presented in this report and attachments is true and complete:

_____ _____

Signature of Property Owner or Other Responsible Party Date

_____

Type or Print Name

_____

Company Name

_____

Address

Phone number:_____ Email:_____

APPENDIX D
STORM WATER INLET TRASH CAPTURE DEVICES

Full Trash Capture Manufacturers and Maintenance Providers

Full Trash Capture Manufacturers

The following vendors of catch basin inserts have been approved by the San Francisco Bay Regional Water Quality Control Board as meeting the Municipal Regional Permit Provision C.10 full trash capture requirements and have been approved by the Alameda County Mosquito Abatement District in regard to mosquito maintenance issues. High flow capacity devices have not been evaluated by the Alameda County Mosquito Abatement District. If high flow capacity devices are used, there must be an easily removable access point or allow for direct application of liquid or solid mosquito control treatments.

	SEEP Device ID	Vendor	Device Name	Vendor Website
Catch basin inserts	AS-1/ST3, or AS-2/ST3	Advanced Solutions	Stormtek ST3	www.stormtekcps.com
	BC-3	Bioclean Environmental Services, Inc.	Modular Connector Pipe Screen	www.biocleanenvironmental.com
	G2-2	G2 Construction, Inc.	Camlock Debris Gate	www.g2construction.com
	REM-1	Revel Environmental Manufacturing, Inc.	Triton Bioflex Drop Inlet Trash Guard	http://remfilters.com
	USW-1	United Stormwater	Connector Pipe Screen	unitedstormwater.com
High Flow Capacity Devices	BC-5HF	Bioclean Environmental Services, Inc.	Nutrient Separating Baffle Box	www.biocleanenvironmental.com
	CCP-1HF	Contech Construction Industries	Continuous Deflective Separator (CDS)	http://www.conteches.com
	KS-7HF	Oldcastle Precast	FloGard Dual Vortex Hydrodynamic Separator	https://oldcastleprecast.com
	KS-8HF	Oldcastle Precast	FloGard Perk Filter	https://oldcastleprecast.com
	RMC-1HF	Roscoe Moss Company	Storm Flo Screen	https://roscoemoss.com

Full Trash Capture Device Maintenance Companies

The following companies are known to the City of Dublin to provide service for trash capture devices. This may not be a complete list. Contact the Public Works Department at 925-833-6630 to add your company to the list.

Company	Contact Name	Contact Phone Number
Drainage Protection Services (DPS)	Gary Jones	Office: 888-950-8826 Cell: 510-714-0832
Media Filtration Maintenance (MFM)	Heather Clem	Office: 707-987-9831or 707-738-3711
Revel Environmental Manufacturing Inc. (REM)	Marcel Stone	Office: 888-526-4736 ext. 103 Cell: 925-858-8005

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. R2-2015-0020

GENERAL WASTE DISCHARGE REQUIREMENTS for:

PROJECTS UNDER THE VOLUNTARY HABITAT RESTORATION PROGRAM ADMINISTERED BY ALAMEDA COUNTY RESOURCE CONSERVATION DISTRICT ALAMEDA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter the Regional Water Board, finds that:

1) The Alameda County Resource Conservation District (District) administers a Voluntary Local Program (Program), in partnership with the California Department of Fish and Wildlife (CDFW), that recognizes the unique and important role that private landowners in California play in wildlife and habitat enhancement. The purpose of the Program is to encourage farmers and ranchers engaged in agricultural activities to voluntarily enhance and maintain habitat for endangered and threatened species.

2) The District works jointly with the Natural Resources Conservation Service (NRCS) to assist ranchers and farmers with implementing these voluntary habitat restoration projects. The District and NRCS provide technical assistances on projects under the Program through oversight, planning, funding, installation, and monitoring of the projects.

3) Federal Clean Water Act (CWA) section 404(f) provides that the discharge of dredged or fill materials into waters of the United States in connection with certain activities is exempt from CWA section 404 permitting requirements. These activities include normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, fiber and forest products, and upland soil and water conservation practices. The activities proposed under the Program fall under the CWA section 404(f) exemption.

4) Section 13260(a) of the California Water Code (Water Code) requires that any person discharging waste or proposing to discharge waste within any region, other than to a community sewer system, which could affect the quality of the waters of the State, file a report of waste discharge. The discharge of dredged or fill material may constitute a discharge of waste that could affect the quality of waters of the State.

5) Water Code section 13263(a) requires that waste discharge requirements (WDRs) be prescribed as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge. Such WDRs must implement any relevant water quality control plans, taking into consideration beneficial uses to be protected, the water quality objectives reasonably required for those purposes, other waste discharges, the need to prevent nuisance, and the provisions of Water Code section 13241.

6) Water Code section 13263(i) authorizes the Regional Water Board to prescribe general WDRs for a category of discharges if the discharges are produced by the same or similar

operations; the discharges involve the same or similar types of waste; the discharges require the same or similar treatments standards; and the discharges are more appropriately regulated under general discharge requirements than individual discharge requirements.

7) The discharges authorized by these General WDRs meet the criteria for general WDRs set forth in Water Code section 13263(i) because they are all produced by dredging or filling operations; they all involve the discharge of earth, rock, or similar solid materials; they are all limited in size per the terms of the WDRs; they all involve agricultural activities that are exempt under CWA section 404(f); and they all require participation in the Program, which has planning procedures and best management practices to avoid and minimize adverse impacts. They are appropriately regulated under general WDRs because of their similar nature and amenability to being regulated through the use of similar discharge restrictions, as specified in these General WDRs.

8) Habitat restoration activities will occur in several watersheds within Alameda County. The majority of projects will occur in the Alameda Creek, San Leandro Creek, and San Lorenzo Creek watersheds. Additional watersheds include Laguna Creek and Agua Fria Creek. A few projects may occur in smaller watersheds within Alameda County. These watersheds drain to San Francisco Bay. This Order applies to the portions of these watersheds that are located within the jurisdiction of the Regional Water Board.

9) The following activities are authorized by these General WDRs:

A. Pond Restoration

The activities covered under Pond Restoration are associated with the repair, maintenance, and restoration of breeding and refugia habitat present in livestock ponds for the California red-legged frog, California tiger salamander, and other native aquatic species, as well as other common wildlife including mammals, birds, and reptiles.

Pond Restoration implementation activities are listed below and will result in the enhancement and/or restoration of aquatic wildlife habitat by restoring critical breeding habitat, decreasing predatory species populations in suitable habitat, reducing soil erosion and sedimentation, improving and providing long-term habitat protection, and improving livestock and wildlife water availability.

i) Predator species control – Drain ponds to remove predators, such as bullfrogs, and non-native fish species, such as bass, catfish, sunfish, and mosquito fish.

ii) Establish native vegetation – Plant native vegetation around ponds and control non-native invasive plant species

iii) Structural components repair – Improve and repair spillways, provide alternative pipe outlets for water flow, and repair embankments as necessary to maintain the pond such that it provides breeding and refugia habitat. Management practices that involve structural component repair include:

(1) Spillway repair – Design and repair of the emergency earthen spillway utilizing grade stabilization structures to address potential gully erosion

associated with spillways. This activity can be used to improve the size of a spillway to adequately address the hydrology of the watershed and/or repair a spillway that is actively eroding and contributing sediment downstream. This practice stabilizes existing spillways to prevent future gully erosion to protect and improve water quality. This practice applies in locations where concentrated runoff, steep grades, wetness, prolonged base flow, seepage, or piping is such that lining is needed to control erosion or where soils are highly erosion or climactic conditions preclude using vegetation only. Rock rip-rap and bioengineered structures are authorized for installation as stabilization structures. Gabions, stacked concrete, broken concrete, or other non-native materials are not included as approved stabilization structures.

(2) Alternative pipe outlets for water flow – Installation of pipe to act as a principal or auxiliary spillway in pond restoration. The activity includes pipe sizing based on the hydrology of the watershed; required appurtenances and installation requirements, such as fill materials, compaction, and depth of cover. The following appurtenances could be included:

(a) Filter diaphragm and diaphragm drainage material;
(b) Cement slurry bedding;
(c) Inlet structures constructed from concrete, steel, and/or plastic materials; and,
(d) Outlet energy dissipation structures constructed from rock rip-rap.

(3) Pond embankment repair – Includes repairs to embankments (e.g., dams) that are leaking or other embankment repairs as deemed necessary.

iv) Obstruction removal – This activity involves the removal of concrete rubble, rock rip-rap, wood, old tires, refuse (such as household trash), and other debris from the pond area and spillway.

v) Pond desiltation – This activity includes removal of sediment from existing ponds to increase and improve available breeding habitat.

B. Livestock and Wildlife Water Distribution

The activities covered under Livestock and Wildlife Water Distribution include implementation of practices that provide benefits to habitat, water quality, and listed species by improving livestock distribution through the development of springs. These off-stream water developments may help reduce pressure on riparian habitats and other aquatic features by decreasing the amount of time livestock spend in streams, enhancing water quality, and reducing sedimentation from stream bank erosion. Proper placement of off-stream developments contributes to proper forage use by livestock, which decreases erosion and the presence of invasive plants, resulting in improvements to the surrounding upland habitat. In addition to providing additional livestock water to support ongoing grazing management, the development of springs also provides clean and readily available water for wildlife such as bats, birds, deer, and other mammals.

The primary practice included is the spring development conservation practice, which consists of collecting water at or capping a spring or seep and transporting the water through pipelines to tanks or troughs to provide alternative livestock watering facilities. All allowed spring developments are confined to springs or seep areas that could furnish a dependable supply of water. Spring development activities that impair spring flow to a wetland area so as to adversely affect its size, functions, and values are not authorized by these General WDRs. However, water flow from the spring or seep may be temporarily reduced during the construction period.

C. Erosion Control

The activities covered under Erosion Control include implementation of practices that provide benefits to habitat and State-listed species by reducing damage from discharges of sediment and runoff to watercourses. Erosion control practices can improve water quality by reducing non-point source pollution and improving habitat for aquatic species.

i) Access road improvements – This activity is limited to the improvement of an existing road to prevent erosion and maintain or improve water quality. This practice may be used for repair, removal, or installation of water control structures associated with access road improvements. These structures could include rolling dips, protected low water crossings, culverts, or bridges. In some cases, this practice may also be used to decommission improperly placed roads (e.g., a road that impacts habitat such as a seep area or a road that is too steep and contributing significant erosion) and re-route a new road to a more appropriate path. Appendix A provides specific design requirements that all road improvements, crossings, and bridges must adhere to.

(1) Water control structures – Installation of a structure in a drainage, stream, or gully, that conveys water, controls the direction or rate of flow, or maintains a desired water surface elevation (e.g., in a wetland), such as culverts, pipe drops, or chutes within gullies, debris screens, bridges, etc. These structures are used to replace or retrofit existing culverts that are either not functioning properly or are a barrier to fish passage. The placement of new culverts, when environmentally beneficial, is also included in this practice.

ii) Vegetation establishment – This activity relates to the planting, maintenance, and establishment of native or non-persistent, non-invasive vegetation to reduce erosion and discharges of non-point source pollution to waterways, while also enhancing habitat. This management practice includes critical area planting and installation of filter strips and grassed waterways.

(1) Critical area planting – Planting of trees, shrubs, grasses, or legumes on highly erosive or critically eroding areas.

(2) Filter strips – Filter strips or areas of vegetation shall be used at the lower edges of fields, pastures, or other areas adjacent to streams, ponds, and lakes to remove sediment, organic matter, and other pollutants from runoff and wastewater. Installation often requires soil manipulation to remove surface irregularities and to properly address water movement through the filter strip. Pesticides and nutrients may be removed from runoff flowing through the

vegetated filter strip by infiltration, absorption, adsorption, decomposition, and volatilization, thereby protecting water quality downstream.

iii) Grassed waterways – Grassed waterways are a shaped or graded channel that is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet. This practice is used to control runoff by shaping or grading natural or constructed channels and planting the area to grass. This practice may reduce erosion in areas of concentrated flow (e.g., gullies or pond spillways) and result in the reduction of sediment and substances delivered to receiving waters. Vegetation may act as a filter in removing some of the sediment delivered to the waterway, although this is not the primary function of a grassed waterway. This practice applies in areas where added water conveyance capacity and vegetative protection are needed to control erosion resulting from concentrated runoff.

10) The District has developed *Planning Procedures and Best Management Practices for the Voluntary Habitat Restoration Program, Alameda County* (Attachment A). This document details specific design requirements, impact avoidance measures, Best Management Practices (BMPs), and habitat restoration measures covered under this Order.

11) The District has entered into an agreement with CDFW as authorized by CDFW's Voluntary Local Program Regulations (Cal. Code Regs., tit. 14, § 786.0(a)). The Program encourages farmers and ranchers engaged in agricultural activities to establish locally-designed programs to voluntarily enhance and maintain habitat for endangered and threatened species. These activities are to be carried out on public and private lands while providing take authorization as a result of conservation efforts to increase numbers of, and habitat for, special status species on their lands. The Program specifically addresses liability for take under the California Endangered Species Act and does not necessarily satisfy any other legal requirements. Entities proposing projects that are subject to Fish and Game Code section 1602 must still notify CDFW in accordance with Fish and Game Code section 1600.

12) On September 26, 2012, the U.S. Fish and Wildlife Service (USFWS) issued a Programmatic Biological Opinion (BO) for the NRCS' Conservation Practices in Alameda County. The purpose of the BO is to expedite the formal section 7 consultation process for projects funded and implemented by the NRCS. The BO analyzes the potential adverse effects to federally-listed species resulting from all anticipated NRCS activities within Alameda County.

Eligibility Criteria

13) The total footprint of a project covered under these General WDRs shall not exceed 5 acres. Individual projects are restricted to dredged or fill discharges of not more than two-tenths (0.2) of an acre, 400 linear feet of channel and not more than 4,000 cubic yards of material for pond desiltation discharges.

14) Under this Order, a Discharger is the entity that will perform certain agricultural activities that are exempt under CWA section 404(f) while participating in the Program. A

Discharger must complete and submit to the Regional Water Board a Notice of Intent (NOI) (Attachment B) to enroll under and comply with these General WDRs. The NOI will specify the management practices that will be carried out on the enrolled property and include a timeline for implementing the identified activities. Along with the NOI, the Discharger must submit a Certificate of Inclusion (Attachment C) to demonstrate participation in a planning process with the Program.

15) If the proposed activities do not qualify for coverage under this Order, a Notice of Exclusion will be issued by the Regional Water Board to the Discharger.

Regulatory Framework

16) The *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation plans to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law, and U.S. EPA, where required.

17) The Basin Plan lists the following existing and potential beneficial uses for surface waters in Alameda County within the jurisdiction of the Regional Water Board. The majority of the proposed habitat restoration activities will occur in the Alameda, San Leandro, and San Lorenzo Creek watersheds that drain to San Francisco Bay, with the following designated beneficial uses:

a. Agricultural Supply (AGR)
b. Cold Freshwater Habitat (COLD)
c. Freshwater Replenishment (FRSH)
d. Groundwater Recharge (GWR)
e. Fish Migration (MIGR)
f. Municipal and Domestic Supply (MUN)
g. Navigation (NAV)
h. Preservation of Rare and Endangered Species (RARE)
i. Water Contact Recreation (REC-1)
j. Non-contact Water Recreation (REC-2)
k. Fish Spawning (SPWN)
l. Warm Freshwater Habitat (WARM)
m. Wildlife Habitat (WILD)

18) A *Mitigated Negative Declaration for the Alameda County Voluntary Local Program* was prepared by the District. A Notice of Determination for the Negative Declaration was filed with Alameda County on August 24, 2012. The Regional Water Board has considered the environmental effects of the project as shown in the Mitigated Negative Declaration. The Regional Water Board finds that the project, as mitigated, will not result in significant effects to the environment. The Regional Water Board further finds that no changes have occurred since the adoption of the Mitigated Negative Declaration to require a subsequent or supplemental environmental document.

19) The goals of the California Wetlands Conservation Policy (Governor's Executive Order W-59-93, signed August 23, 1993) include ensuring no "overall loss," and achieving a

"long-term net gain in the quantity, quality, and permanence of wetlands acreage and values… ."

20) Senate Concurrent Resolution No. 28 states that "[i]t is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and multiple resources which depend on them for the benefit of the people of the State."

21) Water Code Section 13142.5 requires that the "[h]ighest priority shall be given to improving or eliminating discharges that adversely affect … [w]etlands, estuaries, and other biologically sensitive areas."

22) State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" ("Antidegradation Policy"), states that discharges to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur, and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained. These General WDRs are consistent with Resolution No. 68-16 because implementation of the proposed activities will result in benefits to water quality and restore wildlife habitat. These activities will not adversely affect existing or probable beneficial uses of the water and existing water quality will be maintained or improved.

23) Pursuant to Title 23, California Code of Regulations (CCR) sections 3857 and 3859, the Regional Water Board is issuing General WDRs for proposed work under the Voluntary Habitat Restoration Program. Water Code section 13260(d)(1) requires that each person for whom WDRs have been prescribed pursuant to section 13263 shall submit a fee according to a reasonable schedule. The fee shall be in accordance with the current fee schedule, per CCR, Division 3, Chapter 9, Article 1, section 2200(a)(2).

24) The Regional Water Board has notified the District, NRCS, potential Dischargers, and interested parties of its intent to issue General WDRs for the Voluntary Habitat Restoration Program, Alameda County.

25) The Regional Water Board, in a public meeting, heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED that pursuant to Water Code section 13263, the Discharger, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. *Eligibility*

Only discharges that meet all of the following criteria can be enrolled under these General WDRs:

1. The project must be a part of the District's Voluntary Local Program.

2. The discharge proposed is from agricultural activities that fall under the CWA section 404(f) exemption.

3. The discharge shall be dredged or fill materials only.

4. The total project footprint shall not exceed five acres. Projects are restricted to dredged or fill discharges of not more than two-tenths (0.2) of an acre, 400 linear feet of channel for fill and excavation discharges, and not more than 4,000 cubic yards of material for pond desiltation discharges.

5. Project size criteria apply to the whole of a project, and a project cannot be piecemealed to fit within the size eligibility criteria herein.

6. The discharge, either individually or in combination with other discharges, shall not cause an individually or cumulatively significant effect on water quality or beneficial uses of the waters of the State including, but not limited to, wetlands and headwaters.

B. ***Application Requirements***

Dischargers seeking enrollment under these General WDRs shall submit the following to the Regional Water Board's Executive Officer at least 30 days prior to any discharge:

1. A complete, accurate, and signed Notice of Intent (NOI) to be enrolled under and to comply with these General WDRs.

2. A complete and signed Certificate of Inclusion (COI) from the District.

3. A fee pursuant to CCR Title 23 section 2200.

C. ***Discharge Prohibitions***

1. The discharge of dredged or fill material is prohibited until the Discharger has received a Notice of Applicability (NOA) from the Executive Officer or as allowed by Water Code section 13264.

2. No discharges are authorized under these General WDRs if the Discharger has received a Notice of Exclusion (NOE) from the Executive Officer.

3. The direct or indirect discharge of wastes, as defined in Water Code section 13050(d), within or outside of the active project site, to surface waters or surface water drainage courses is prohibited, except as authorized in this Order.

4. The discharge shall not cause degradation of water quality and beneficial uses.

5. The discharge of material in a manner other than as described and authorized in the NOI, COI, and these General WDRs is prohibited.

6. Excavated sediment shall remain within designated disposal areas at all times. The designated disposal areas are: (a) any offsite, authorized temporary or permanent location maintained in compliance with federal and State regulations, (b) any onsite, authorized temporary or permanent location, provided material will be isolated and contained to prevent impacts to waters of the State and their beneficial uses, or (c) a permitted landfill.

7. The discharge of sediment and runoff/decant water that exceeds effluent limits, from excavated materials disposed of at any temporary or permanent disposal site, to waters of the State is prohibited.

8. Any dredge and disposal activity subject to these requirements shall not cause a condition of pollution or nuisance as defined in Water Code section 13050(l) and (m).

9. Groundwater beneficial uses shall not be degraded as a result of habitat restoration activities.

10. No debris, soil, silt, sand, cement, concrete, or washings thereof, or other construction related materials or wastes, oil or petroleum products or other organic or earthen material shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into waters of the State. When operations are completed, any excess material shall be removed from the work area and any areas adjacent to the work area where such material may be washed into waters of the State.

D. ***Discharge Specifications***

1. Each Discharger shall discharge in a manner that is consistent with the information provided in the NOI and COI and in accordance with *Planning Procedures and Best Management Practices for the Voluntary Habitat Restoration Program, Alameda County* (Attachment A).

2. Appropriate soil erosion control measures shall be undertaken and maintained to prevent discharge of sediment to surface waters or surface water drainage courses.

3. A responsible representative of each Discharger shall immediately, and in all cases within 24 hours, notify Regional Water Board staff by telephone whenever an adverse condition occurs as a result of this discharge. An adverse condition includes, but is not limited to, a violation or threatened violation of the requirements of this Order, significant spill of petroleum products, or damage to control facilities that could affect compliance. Pursuant to Water Code section 13267(b), a written notification of the adverse condition shall be submitted to the Regional Water Board within five days of occurrence. The written notification shall identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to the modifications of the Regional Water Board, for the remedial actions.

4. In the event of a hazardous substance or sewage discharge, a responsible representative of each Discharger shall immediately notify the California Office of Emergency Services (Cal OES) of the discharge. Pursuant to Water Code section 13271, notification shall be provided as soon as possible and when the notice can be provided without substantially impeding cleanup or other emergency measures. In addition to notifying Cal OES, the Regional Water Board shall also be notified. A written report to the Regional Water Board shall be submitted within 10 days of the discharge describing the cause and how a recurrence will be prevented.

E. ***Effluent Limitations***

Excavated material effluent (decant water) discharged from any permanent or temporary disposal site located on the project site or off the site shall not exceed the following numeric and narrative limits at any time:

1. Numeric Limits:
   a. pH 6.5 – 8.5
   b. Settleable Matter < 1.0 ml/l-hour
   c. Dissolved sulfide concentrations < 0.1mg/L

2. Narrative Limits:

   Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

F. ***Receiving Water Limitations***

1. Work in and around the stream channel or Bay shoreline shall not cause the following conditions to exist in waters of the State at any place:
   a. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses;
   b. Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses;
   c. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth cause nuisance or adversely affect beneficial uses;
   d. Waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life;
   e. There shall be no alteration of temperature, turbidity, or apparent color beyond present natural background levels;
   f. Dissolved oxygen, with the beneficial use designations listed in F.1.g.a. below, shall not be reduced below the listed minimums in the receiving water from the point of discharge;
   g. Routine maintenance activities shall not cause the following limits to be exceeded in waters of the State at any point:

      i. Dissolved Oxygen: 5.0 (WARM) or 7.0 (COLD) mg/l minimum. When natural factors cause lesser concentrations, then this discharge shall not cause further reduction in the concentration of dissolved oxygen.[1]

[1] Potential discharge locations support both the WARM and COLD beneficial uses. The more stringent criteria of 7.0 (COLD) mg/L dissolved oxygen shall apply unless the Discharger demonstrates the lower 5.0 (WARM) mg/L dissolved oxygen is applicable to the water body. The

ii. Dissolved Sulfide:	< 0.1mg/L.
iii. pH:	A variation of natural ambient pH by more than 0.5 pH units.
iv. Toxicity:	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.
v. Un-ionized Ammonia:	0.025 mg/L as N, annual median; and 0.16 mg/L as N, maximum.
vi. Salinity:	The project shall not increase total dissolved solids or salinity to adversely affect beneficial uses.
vii. Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU, or greater than 5 NTU where natural turbidity is less than 50 NTU.

2. The discharge shall not cause a violation of any particular water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the Clean Water Act and regulations adopted there under. If more stringent applicable water quality standards are promulgated or approved pursuant to section 303 of the Clean Water Act, or amendments thereto, the Regional Water Board will revise and modify this Order in accordance with such more stringent standards.

3. Groundwater shall not be degraded as a result of maintenance activities or sediment disposal.

G. *Provisions*

General Water Quality

1. Each Discharger shall comply with all the Prohibitions, Receiving Water Limitations, and Provisions of this Order.

2. Each Discharger shall take all reasonable steps to prevent any discharge in violation of these General WDRs.

3. Each Discharger shall report promptly to the Regional Water Board any proposed material change in the character, location, area, and/or volume of the discharge. Each Discharger shall obtain confirmation from the Regional Water Board that such proposed modifications do not disqualify the Discharger from coverage under these General WDRs. Confirmation or new WDRs shall be obtained before any modifications are implemented.

WARM threshold shall only apply to water bodies where neither the water body nor any water body downstream of that water body, to which it discharges directly or indirectly, have the COLD beneficial use.

4. The filing of a request by each Discharger for an order modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance does not stay any condition of these General WDRs.

5. Where each Discharger becomes aware that it failed to submit any relevant facts in an NOI or submitted incorrect information in an NOI to the Regional Water Board, it shall promptly submit such facts or information.

6. Each Discharger shall furnish, within a reasonable time, any information the Regional Water Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the Discharger's coverage under these General WDRs. Each Discharger shall also furnish to the Regional Water Board, upon request, copies of records required to be kept by these General WDRs.

7. Each Discharger shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with these General WDRs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the noncompliance.

8. Each Discharger shall comply with all of the conditions of these General WDRs. Any noncompliance with these General WDRs constitutes a violation of the Water Code and is grounds for an enforcement action.

Waste Management

9. Each Discharger shall ultimately dispose of dewatered material at an appropriate upland sediment disposal site or at an approved reuse site in accordance with applicable State and federal regulations, including applicable provisions of this Order.

10. The discharge of any hazardous, designated, or non-hazardous waste as defined in CCR Title 27, Division 2, Subdivision 1, Chapter 2 shall be conducted in accordance with applicable State and federal regulations.

11. Each Discharger shall remove and relocate any wastes that are discharged in violation of this Order. Waste shall be disposed of at a location in compliance with federal and State regulations and in such a way as to prevent impacts to waters of the State and their beneficial uses.

12. Projects that disturb one or more acres of soil are required to obtain coverage under the State Water Board's General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ), as amended.

13. Each Discharger shall maintain a copy of this Order and all relevant plans and BMPs at its project sites so as to be available at all times to site operating personnel.

14. These General WDRs do not convey any property rights or exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury

to persons or property, do not protect each Discharger from liability under federal, State, or local laws, and do not create a vested right to continue to discharge waste.

15. These General WDRs do not relieve each Discharger from the responsibility to obtain other necessary local, State, and federal permits, nor do these General WDRs prevent imposition of additional standards, requirements, or conditions by any other regulatory agency.

16. These WDRs are subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Water Code section 13330 and CCR Title 23 section 3867.

17. After notice and opportunity for a hearing, coverage of an individual discharge under these General WDRs may be terminated or modified for cause, including, but not limited to, the following:
    a. Violation of any term or condition of these General WDRs;
    b. Obtaining these General WDRs by misrepresentation or failure to disclose all relevant facts; and
    c. Any change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

18. Each Discharger shall permit Regional Water Board staff or authorized representatives, upon presentation of credentials:
    a. Entry on to the premises on which maintenance activities are planned or underway, wastes are located, or in which records are kept;
    b. Access to copy any records required to be kept under the terms and conditions of this Order;
    c. Access to inspect any treatment equipment, monitoring equipment or monitoring method required by this Order; and
    d. Access to sample any discharge or surface water covered by this Order.

19. Upon completion of the project, each Discharger shall complete and submit to the Executive Officer a Notice of Termination (Attachment D), signed by both the Discharger and the District, requesting to be un-enrolled from these General WDRs.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on May 13, 2015.

Digitally signed by Bruce H. Wolfe
DN: cn=Bruce H. Wolfe, o=SWRCB, ou=Region 2, email=bwolfe@waterboards.ca.gov, c=US
Date: 2015.05.15 17:59:42 -07'00'

BRUCE H. WOLFE
Executive Officer

CIWQS Place ID Number 814065
CIWQS Regulatory Measure ID Number 400353

Attachments:

A: *Planning Procedures and Best Management Practices for the Voluntary Habitat Restoration Program, Alameda County*
B: Notice of Intent (NOI)
C: Certificate of Inclusion (COI)
D: Notice of Termination (NOT)

Attachment A

Planning Procedures and Best Management Practices for the Voluntary Habitat Restoration Program

Alameda County Resource Conservation District

General Waste Discharge Requirements

Projects Under the Voluntary Habitat Restoration Program Administered by Alameda County Resource Conservation District

Order No. R2-2015-0020

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The Regional Water Board has issued Waste Discharge Requirements for implementation of voluntary habitat conservation practices within jurisdictional watershed features associated with ponds, streams, ephemeral channels, and wetlands within Alameda County.

Each Discharger shall complete a Notice of Intent, which will specify the management practices that will be carried out on the enrolled property and include a timeline for implementing the identified activities. As part of completing a Notice of Intent, the Discharger must demonstrate participation in a planning process with the Alameda County Resource Conservation District (District) and/or the Natural Resources Conservation Service (NRCS) to determine the applicability of the selected management practices to the subject project. Participation with the District and/or NRCS must be demonstrated by a Certificate of Inclusion with the District. Additionally, all Dischargers who apply for coverage under this General WDR are required to adhere to the Best Management Practices (BMPs) included in this Attachment.

A "project" requires participation in the District's Voluntary Local Program and consists of agricultural activities that fall under the CWA section 404(f) exemption. Discharge(s) associated with a project shall be dredged or fill materials only.

NRCS/District Planning Procedures

Dischargers will request assistance from NRCS/District to complete development of a project plan. During the planning process, each project will be evaluated utilizing an extensive environmental evaluation process. The NRCS uses an interdisciplinary environmental evaluation and planning approach in which specialists and groups having different technical expertise act as a team to jointly evaluate existing and future environmental conditions at each project site. The interdisciplinary group considers the structure and function of natural resource systems, complexity of problems, and the economic, social, and environmental effects of alternative actions. Project needs and feasibility are identified and addressed through the NRCS' three-phase, nine-step Conservation Planning Process. Through technical assistance, NRCS and District conservation planners identify and assess benchmark conditions, resource concerns, and the effects of the current conditions. Once the assessments are complete, they develop, evaluate, and select alternative solutions to address the resource concerns.

As part of the planning process and to ensure compliance with the National Environmental Policy Act (NEPA), NRCS, acting as the lead agency, is required to complete an Environmental Evaluation (EE) when providing technical and/or financial assistance on public and private lands. The EE is the part of the planning process that inventories and estimates the potential effects of selected conservation practices on the ecological and human environment. A wide range of environmental data, together with social and economic information, is considered in determining whether a proposed action is a major Federal action significantly affecting these environments. Potential effects of both selected conservation practices, as well as a no action alternative, on soil, water, air, plants, animals, energy, and humans are all evaluated. Special environmental concerns that are evaluated include: Clean Air Act, the Clean Water Act/Waters of the US, coastal zone areas, coral reefs, cultural resources/historic properties, endangered and threatened species, environmental justice, essential fish habitat, floodplain management, invasive species, migratory birds and eagles, natural areas, prime and unique farmlands, riparian areas, scenic beauty, wetlands, and wild and scenic rivers. NRCS involvement only continues on projects that do not have a significant impact on natural resources and the above special environmental concerns.

In addition to the planning process, all projects comply with the California Environmental Quality Act through the District's Final Mitigated Negative Declaration for the Alameda County Voluntary Local Program (State Clearinghouse #2012072030) that describes all activities included under this General WDR.

Each management practice implemented under this General WDR will be implemented to meet the minimum standards and specifications for the NRCS and will be tailored for project-specific requirements based on the natural resource need at each site. The District and/or its contractors provide construction oversight assistance for each project.

During the planning process for an individual project, the District and/or NRCS will assess each proposed project site to determine resource conditions at the site. Implementation of the conservation practices will incorporate the best available scientific information into the site conditions to ensure that the projects are being implemented to maximize water quality, wildlife and habitat benefits without compromising the economics of the Dischargers' agricultural operations.

Best Management Practices

The following General BMPs apply to ALL activities included in this program:

1. A project shall not exceed five acres or a cumulative total of 400 linear feet of stream bank. Projects are restricted to dredged or fill discharges of not more than two-tenths (0.2) of an acre and of not more than 4,000 cubic yards of material from pond desiltation.

2. Prior to construction, an education program will be conducted for the Discharger and/or any construction employee in reference to potential listed species on site and erosion control measures, The Applicant shall maintain a list of education program attendees. The following measures are required:

a) Silt fence or appropriate sediment control barriers shall be installed around disturbed soil, including sediment placement areas;

b) All disturbed areas shall be reseeded prior to the first rain depositing more than 0.25 inches; and,

c) Best Management Practice control measures to be installed to meet the 2006 Caltrans Standard Specifications if rain is called for over 80%

3. Construction activities shall be conducted during daylight hours, to the maximum extent practicable.

4. Projects that disturb one or more acres of soil are required to obtain coverage under the Statewide NPDES General Permit for Discharges of Storm Water Associated with Construction Activity, Construction General Permit Order 2009-0009-DWQ, as amended.

5. Grading and construction activities shall be limited to the period from April 1 through October 15.

6. Restoration activities at ponds and within sensitive species habitat shall take place between August 31 and October 15 (or the first rainfall of the season depositing more than 0.25 inch).

7. Excavation and grading activities shall only be conducted during dry weather.

8. Practices shall be constructed to meet the Natural Resources Conservation Service's (NRCS') design standards and construction specifications.

9. Whenever feasible, BMP's identified in the California Salmonid Stream Habitat Restoration Manual shall be implemented.

10. Projects shall be designed to minimize disturbance of existing vegetation near and on permanent and seasonal pools of streams, marshes, ponds, and shorelines with extensive emergent vegetation, or weedy vegetation.

11. Native tree removal and disturbance of native shrubs or woody perennials adjacent to the stream bank or stream channel shall be avoided and minimized to the fullest extent possible. If riparian vegetation will be disturbed, it shall be replaced with similar species.

12. Discharger shall ensure that the spread or introduction of invasive exotic plant species shall be avoided to the maximum extent possible. When practicable, invasive exotic plants in the project areas shall be removed.

13. No plastic or monofilament erosion control material shall be used near riparian habitat, along the perimeter of ponds, or near other aquatic habitat.

14. Sediment removed during restoration or construction activities shall not be placed where it may pass into any other waters of the state.

15. Removed concrete, rock rip-rap, wood, or other anthropogenic debris during restoration activities shall be properly disposed of off-site at approved locations.

16. Projects shall be designed to minimize off-site stormwater runoff that might otherwise impact surrounding aquatic habitat. When soil disturbance is necessary, standard construction BMPs shall be incorporated into construction designs, plans, and specifications, and required of contractors during construction.

17. All trash and debris within the work area shall be placed in containers with secure lids before the end of each work day in order to reduce the likelihood of predators being attracted to the site by discarded food wrappers and other rubbish that may be left on-site. Containers shall be emptied as necessary to prevent trash overflow onto the site and all rubbish shall be disposed of at an appropriate off-site location.

18. The use or storage of petroleum-powered equipment shall be accomplished in a manner to prevent the release of petroleum materials into waters of the State.

19. Staging and storage areas for equipment, materials, fuels, lubricants and solvents, shall be located outside of stream channels. Stationary equipment such as motors, pumps, generators, compressors, and welders, located within or adjacent to streams or ponds, shall be positioned over drip pans. Construction materials and heavy equipment shall be stored outside of the active flow of stream channels. Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily to prevent leaks of materials that, if introduced to

water, could be deleterious to aquatic life. No fueling, cleaning, or maintenance of vehicles or equipment shall take place within any areas where an accidental discharge to waters of the State may occur. Vehicles shall be moved away from the stream prior to refueling and lubrication.

20. For any dewatering activities, water shall be diverted by installation of a temporary barrier. All water above the barrier shall be diverted downstream at an appropriate rate to maintain downstream flows during construction. All reasonable efforts shall be made to capture and move all stranded aquatic life observed in the dewatered areas. Adequate water depth and channel width will be maintained at all times. When construction is completed, the barriers to flow shall be removed in a manner that will allow flow to resume with the least disturbance possible to the substrate and water quality.

21. When pumps are necessary to maintain flow around the work site, intakes shall be completely screened with wire mesh not larger than 5 millimeters to avoid entraining any life stages of listed species that may be present at the work site and the screens shall be monitored regularly while the pump is on.

22. Newly poured concrete shall be allowed to completely cure (a minimum of 28 days) or be treated with a CDFW-approved sealant before it comes into contact with flowing water. Any concrete pours shall be isolated from all natural waterbodies through appropriate wrapping or water barrier equipment.

Specific BMPs for Pond Restoration

23. Desiltation of livestock ponds shall not involve any increase in the original storage capacity of a pond and shall incorporate design features that will benefit listed species, prevent erosion, and protect water quality.

24. All dam repairs shall be analyzed using geologists, soil scientists, and other experts as necessary to determine the efficacy of such improvements.

25. Practices shall meet NRCS standards and specifications for pond repair and be approved by the project engineer in order to meet Federal standards. The primary design considerations for pond restoration projects include seismic, soil and geological considerations, hydrology and hydraulic design, and structural design, and include:

    a. Failure of the embankment will not result in loss of life or damage to homes, commercial structures, etc;

    b. The height and storage capacity of the pond are within limits identified in the practice standard;

        i. Failure of the dam will not result in loss of life, damage to homes, commercial or industrial buildings, main highways, or railroads or in interruption of the use or service of public utilities;

ii. The product of the storage (volume in acre-feet) times the effective height of the dam (height of the dam is the difference in elevation in feet between the auxiliary spillway crest and lowest point in the cross section of the centerline of the dam) is less than 3,000; and,

iii. The effective height of the dam is 35 feet or less and the dam is a hazard class (a).

c. Seismic hazard is addressed (including proximity to faults, horizontal acceleration, and susceptibility to liquefaction) through the configuration, material, and construction methods used on the structures;

d. Runoff from the design storm (50- or 100-year storm depending on spillway type) can be safely passed through a natural or constructed spillway;

e. The drainage area above the pond can provide adequate water (and water quality) for the intended use, and must be protected against erosion to the extent that expected sedimentation will not shorten the planned effective life of the structure;

f. Seepage is controlled around any pipe structures installed through the embankment.

26. The following habitat design features were developed in consultation with species experts and shall be incorporated to the extent feasible on all pond restoration projects (NRCS and District, 2006).

a. Ponds shall be sized to retain sufficient water for larval development during the entire rearing season (January, or whenever rains commence, through late July or early August in most years); ponds can be allowed to dry during the fall (typically mid-August through early December).[2]

b. Ponds shall contain a shallow water area for larval and juvenile rearing. This shallow area (approximately 1 foot deep) should be unshaded and contain no or very short emergent plants. The shallow area shall be designed so that the water warms quickly in the winter sun but is of sufficient water depth to provide aquatic habitat throughout spring.

c. Ponds also shall contain a deep-water escape area with portions deeper than approximately 3.5 feet.[3] This deep-water area should contain a mosaic of open water and dense aquatic vegetation when appropriate, or dense patches of shoreline vegetation adjacent to deep water when appropriate.

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[2] Note that pond management that mimics the natural water cycle, where possible, will be the most beneficial for the California red-legged frog and the California tiger salamander (USFWS 2002).
[3] Including an area deeper than approximately 3.5 feet provides an area where California red-legged frogs can escape predators, and including an area deeper than approximately 5 feet discourages uniformly thick growth of emergent plants that might shade the entire area (which would provide poor habitat for both California red-legged frogs and California tiger salamanders).

d. When possible, the areal extent of the shallow and deep portions of the pond should be about equal.

Specific BMPs for Livestock Water Development

27. Selection of spring developments shall evaluate and consider the potential impacts on long-term groundwater supply, effects on stream flows in the watershed, and maintaining adequate flow so that the spring development enhances the habitat values of the spring or seep area. The potential effects of the impoundment on existing ecological function, local wildlife, and wildlife habitat shall be evaluated.

28. The need for the spring development shall be clearly documented by evaluating stocking rates, forage animal balance, RDM, and the locations of all other available water sources.

29. Sufficient spring flow shall remain in the wetland area to maintain or improve the functions and values of the original wetland area. Water collected from the spring shall not be held for more than 30 days. Overflow from the development shall be directed back into the wetland area.

30. Activities shall comply with the NRCS policy for protection of wetlands, including the provisions of Executive Order 11990. The area around the water source may be fenced to limit livestock access. This fencing shall be wildlife friendly to retain access by smaller species.

31. All troughs associated with the development shall have float valves installed, which shall be used to control water flow. All troughs shall have escape ramps for wildlife.

32. Spring development and enhancement shall be constructed in accordance with NRCS Conservation Practice Standards and Specifications for spring development, wetland restoration, and associated practices.

33. All troughs installed are required to incorporate adequate safe access and escape opportunities such as ramps for small wildlife.

34. Pipeline installation shall be designed to follow existing impacted areas (e.g., roads) whenever possible.

Specific BMPs for Vegetation Removal and Establishment

35. Removal of non-native plant species shall by hand, herbicide application and/or mechanical means. All non-native plant material will be disposed of properly on site to prevent spread of plants or disposed of off-site at appropriate location.

36. Use of herbicides shall be completed according to labeled directions and local, State, and Federal regulations and guidelines, including the interim protective measures as described in the U.S. Environmental Protection Agency's stipulated injunction for pesticide use. Activities shall be limited to the dry period of the year and shall be restricted to periods of low rainfall (less than 0.25 inch per 24 hour period), time periods with less than a 30 percent chance of rain, or dry weather

periods. If rain is predicted based on the above criteria, within 72 hours during project activity, all activities shall cease until no further rain is forecast.

37. Species, rates of seeding or planting, minimum quality of planting stock (e.g. pure live seed (PLS) or stem caliper), method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock shall be used.

38. Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species.

39. Livestock shall be excluded for a minimum of one year following vegetation establishment and carefully monitoring in subsequent years. All areas to be grazed shall have a grazing plan developed.

40. When establishing vegetation on bank and channel slopes, slopes steeper than 2:1 shall not be stabilized using vegetation alone. A combination of vegetative and structural measures, such as jute netting or an approved erosion control blanket appropriate for seed germination, will be used.

Specific BMPs for Access Road Improvements

41. Practices shall meet NRCS design standards and construction specifications for access road and stream crossing practices and be approved by a certified engineer.

42. The capacity and design of all culverts, bridges, fords, or grade dips for water management shall be consistent with sound engineering principles and shall be adequate for the class of vehicle, type of road, development, or use. When a culvert or bridge is installed in a drainage way, its minimum capacity shall convey the design storm runoff without causing erosion, road overtopping, or appreciably altering the stream flow characteristics. Minimum design storm frequencies are defined in the practice standard.

43. Stream crossings shall be installed only in areas where the streambed is stable. Crossings shall not be placed in areas where channel grade or alignment changes abruptly, excessive seepage or instability is evident, and/or incision and bed instability exists.

44. Stream crossings shall be installed perpendicular to the direction of stream flow where possible.

45. Stream approaches shall be blended with existing site conditions where possible and shall be installed to a stable grade no steeper than a 4:1 slope. Surface runoff shall be diverted around the approaches to prevent erosion.

46. Crossings shall be adequately protected so that out-of-bank flows safely bypass without damaging the structure or eroding the streambanks or the crossing. Where possible, crossings will be located outside of shady riparian areas or gates will be included in the design to minimize livestock loafing.

47. For a stream crossing or underground outlet (ditch relief) to convey water under the road, at least one culvert pipe shall be placed with its entire length set a minimum of six inches below the existing stream bottom. Additional culverts may be used a various elevations to maintain terrace or floodplain hydraulics and water surface elevations.

48. Bridges shall be designed with sufficient capacity to convey the design flow and transported material without appreciably altering the stream flow characteristics.

49. Bridges shall be designed to fully span the stream, passing at least the bank-full flow.

50. Culverts shall be designed with sufficient capacity to convey the design flow and transported material without appreciably altering the stream flow characteristics.

51. Culverts shall be designed to minimize habitat fragmentation and to minimize barriers to aquatic organism movement.

52. Culverts shall NOT be used where large flows of sediment or large woody material are expected or where the channel gradient exceeds 6 percent.

53. Acceptable culvert materials include concrete, corrugated metal, corrugated plastic, and new or used high quality steel.

54. Ford crossing shall be designed so that the cross-sectional area of the crossing is equal to or greater than the natural channel cross-sectional area. Ford shape shall match the channel cross-section to the extent possible.

References

Natural Resources Conservation Service California Handbook. Electronic Field Office Technical Guide, Section IV (http://efotg.sc.egov.usda.gov//efotg_locator.aspx).

Natural Resources Conservation Service and Alameda County Resource Conservation District. 2006. Draft Pond Restoration Design and Plan.

Attachment B

California Regional Water Quality Control Board
San Francisco Bay Region

Watershed Division
1515 Clay Street, Suite 1400, Oakland, CA 94612

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF GENERAL WASTE DISCHARGE REQUIREMENTS FOR PROJECTS UNDER THE VOLUNTARY HABITAT RESTORATION PROGRAM – ALAMEDA COUNTY ORDER NUMBER R2-2015-0020

FOR AGENCY TRACKING USE ONLY			
Place ID:	*Reg Measure ID:*	*Date NOI Received:*	*Check# and Amount*

I. PROJECT and APPLICANT INFORMATION

Project Title:	Click here to enter text.		
Applicant Name:	Click here to enter text.		
Business/Agency:	Click here to enter text.		
Street Address:	Click here to enter text.		
City, County, State, Zip:	Click here to enter text.		
Telephone:	Click here to enter text.	Fax	Click here to enter text.
E-mail:	Click here to enter text.		

II. PROPERTY OWNER

☐ **Check Box if Same As Above**

Name:			
Street Address:	Click here to enter text.		
City, County, State, Zip:	Click here to enter text.		
Telephone:	Click here to enter text.	Fax	Click here to enter text.
E-mail:	Click here to enter text.		

III. PROJECT LOCATION

A. Address or description of project location.				
Click here to enter text.				
B. Check box to verify that a map of at least 1:24000 (1" = 2000') detail of the proposed project site (e.g., USGS 7.5 minute topo map) is enclosed:			☐ Project Map Enclosed	
C. County:	Click here to enter text.			
D. Assessor's Parcel No.:	Click here to enter text.			
E. Coordinates (*If available, provide at least latitude/longitude or UTM coordinates. Check appropriate boxes)*				
Latitude/Longitude:	*Latitude:*	Click here to enter text.	*Longitude:*	Click here to enter text.
	☐ Degrees/Minutes/Seconds	☐ Decimal Degrees	☐ Decimal	
UTM coordinates:	*Easting:*	Click here to enter text.	*Northing:*	Click here to enter text.
Datum or UTM:	☐ NAD 27	☐ NAD 83 or WGS 84		
F. River(s), stream(s), lake(s), or wetland(s) affected by the project:	Click here to enter text.			
G. Name the receiving watershed or water body:	Click here to enter text.			
H. Is the watershed listed as impaired under Section 303(d) of the Clean Water Act?	☐ yes ☐ no	Pollutant Category(ies): Click here to enter text.		

IV. PROJECT CATEGORY

Select the covered activity or activities being implemented for this project? (*check one or more boxes below)*	
☐ Pond Restoration	☐ Livestock and Wildlife Water Distribution
☐ Erosion Control	

V. PROJECT INFORMATION

A. Estimated Project Term:	Beginning (Month / Year)	Click here to enter text.	Ending (Month / Year)	Click here to enter text.
B. Seasonal Work Period:	Click here to enter text.			
C. Estimated Total Number of Work Days:	Click here to enter text.			

D. Describe the project in detail and enclose diagrams, drawings, plans, and/or maps that provide all of the following: site-specific construction details; dimensions of each structure; extent of activity in the bed channel, bank, or floodplain; where equipment will enter or exit the area, if applicable; and project overview showing the location of each structure and calculations at each site of area of disturbance. (*Attach additional sheets as needed*).

Click here to enter text.

E. Specify the equipment and machinery (if any) that will be used to complete the project. Describe in detail the measures that will be taken to prevent discharges and spills of oil, grease, and other petroleum products.

Click here to enter text.

F. Will water be present during the proposed work period?	☐ yes ☐ no ☐ Unknown
G. Will the proposed project require work in the wetted portion of the channel? If yes, please describe the work that will be required, the type of equipment to be used, whether the channel will need to be dewatered, and how long equipment will be in the wetted portion of the channel.	☐ yes ☐ no ☐ Unknown

Click here to enter text.

H. Projects that disturb one or more acres of soil are required to obtain coverage under the statewide General Permit for	☐ yes ☐ no

Discharges of Storm Water Associated with Construction Activity. Is coverage necessary for this Project?	
I. Verify that the project is **not** part of a compensatory mitigation project (e.g., Cleanup and Abatement Order, Supplemental Environmental Project).	☐ I verify this to be true.
J. Verify that the primary project purpose is habitat restoration. This project is not proposed as part of a larger project whose primary purpose is not habitat restoration (e.g., land development or flood management).	☐ I verify this to be true.
K. Verify that the project footprint shall not exceed 5 acres and dredged or fill discharges of not more than two-tenths (0.2) of an acre and 400 linear feet of channel and of not more than 4,000 cubic yards of material for pond desiltation discharges.	☐ I verify this to be true.

VI. DISCHARGE INFORMATION

A. Within the box provided below, identify the type(s) of material that are proposed to be introduced or "discharged" into Waters of the State as a result of the project.

☐ Soil ☐ Rock Rip-Rap ☐ Native Vegetation ☐ Non-native Vegetation ☐ Large woody material
☐ Rootwads ☐ Erosion Control Materials (jute netting, straw wattles, etc.) ☐ Culverts
☐ Anchoring (bolts, cables, rebar, chains, etc.) ☐ Fertilizers ☐ Pesticides[4]
☐ Other: Click here to enter text.

B. For each of the materials identified above, identify the volume or quantity of material that is intended to be introduced or "discharged" into Waters of the State. Declare whether or not the material type is expected to cause a "temporary" or "permanent" effect. Include estimates of incidental material discharges that may occur from project implementation or as a result of post-project adjustment.

Material Type	Volume or Number	Temporary Effect	Permanent Effect
1. Click here to enter text.	Click here to enter text.	☐ yes ☐ no	☐ yes ☐ no
2. Click here to enter text.	Click here to enter text.	☐ yes ☐ no	☐ yes ☐ no
3. Click here to enter text.	Click here to enter text.	☐ yes ☐ no	☐ yes ☐ no
4. Click here to enter text.	Click here to enter text.	☐ yes ☐ no	☐ yes ☐ no
5. Click here to enter text.	Click here to enter text.	☐ yes ☐ no	☐ yes ☐ no

[4] The point source discharge of aquatic pesticides into Waters of the United States requires a separate National Pollutant Discharge Elimination System (NPDES) permit administered by the State Water Resources Control Board. Information about pesticide permits can be found at the following Web address: http://www.waterboards.ca.gov/water_issues/programs/npdes/aquatic.shtml

C. In the space provided below, describe the intended purpose or reason for the discharges associated with each of the material type(s) listed above:
Click here to enter text.

VII. PROJECT SIZE

A. For each of the applicable water body type(s) listed below, indicate the area(s) in ACRES and LINEAR FEET that will be affected by the project and identify the impact(s) as permanent or temporary.

Water Body Type	Temporary Impact		Permanent Impact	
	Acres	Linear Feet	Acres	Linear feet
Wetland	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Streambed/Stream bank	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
Pond/Lake/Reservoir	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.
TOTAL AREA AFFECTED:	Click here to enter text.	Click here to enter text.	Click here to enter text.	Click here to enter text.

B. Pond Desiltation Volume (cubic yards):

IX. NOTICE OF TERMINATION AND CERTIFICATION

Applicants utilizing this General WDR Certification form must submit a Notice of Termination (NOT) once the project is complete. The NOT must be accompanied by a signature providing certification from the Alameda County Resource Conservation District that projects have been installed to meet the General WDR standards.

APPLICATION REQUIREMENTS AND FEES

Permit:	Submit Application to:	Time Restrictions:
General WDR Order No. R2-2015-0020	Regional Water Board – SF Bay Region Watershed Division 1515 Clay Street, Suite 1400, Oakland, CA 94612	Must be submitted at least 30 days prior to proposed discharge.
Fees:	Fees are subject to the most current statewide Dredge & Fee calculator. Refer to the resources for applicants section of the Dredge/Fill (401) and Wetlands program website for the most current fee information. http://www.waterboards.ca.gov/water_issues/programs/cwa401/#resources	

X. SIGNATURE / CERTIFICATION

San Francisco Bay Regional Water Quality Control Board: Notice of Intent to Comply with the Terms of General Waste Discharge Requirements for Projects under the Alameda County Voluntary Habitat Restoration Program Administered by the Alameda County Resource Conservation District - Order No. R2-2015-0020

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel property gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or imprisonment.

_____ _____
Applicant Signature Date

_____
Printed Name

Attachment C

Alameda County Resource Conservation District

Voluntary Habitat Restoration Program – Alameda County
for Compliance with San Francisco Bay Regional Water Quality Control Board
General Waste Discharge Requirements Order No. R2-2015-0020

Certificate of Inclusion

This certifies that the property described as follows, [DESCRIPTION], and shown on Exhibit A, owned by [NAME OF APPLICANT], is enrolled and participating with the Alameda County Resource Conservation District to plan, design and implement voluntary restoration activities within the Alameda County Voluntary Habitat Restoration Program for Compliance with San Francisco Bay Regional Water Quality Control Board (Water Board) General Waste Discharge Requirements - Order No. R2-2015-0020 authorized by the Water Board on May 13, 2015.

Exhibit B provides a list of the covered activities and associated Best Management Practices that area applicable to the project.

The Water Board's General Order authorization allows Applicants to complete a Notice of Intent to implement restoration activities practices by the Applicant as part of the Voluntary Habitat Restoration Program to maintain, restore, and enhance habitat for the common, listed and endangered species while minimizing impacts to water quality.

_____
Alameda County Resource Conservation District

_____
Title

Date: _____

Alameda County Resource Conservation District

Voluntary Habitat Restoration Program – Alameda County
for Compliance with San Francisco Bay Regional Water Quality Control Board
General Waste Discharge Requirements Order No. R2-2015-0020

Exhibit A

[Map of the property subject to the Certificate of Inclusion]

Alameda County Resource Conservation District

Voluntary Habitat Restoration Program – Alameda County
for Compliance with San Francisco Bay Regional Water Quality Control Board
General Waste Discharge Requirements Order No. R2-2015-0020

Exhibit B

[List and Description of Covered Activities and BMPs]

Attachment D

California Regional Water Quality Control Board
San Francisco Bay Region

1515 Clay Street, Suite 1400, Oakland, CA 94612

NOTICE OF TERMINATION

TO COMPLY WITH THE TERMS OF
GENERAL WASTE DISCHARGE REQUIREMENTS FOR PROJECTS UNDER THE
VOLUNTARY HABITAT RESTORATION PROGRAM – ALAMEDA COUNTY
ORDER No. R2-2015-0020

FOR AGENCY TRACKING USE ONLY			
Place ID:	*Reg Measure ID:*	*Date NOI Received:*	*Check# and Amount*

I. PROJECT and APPLICANT INFORMATION

Project Title:	Click here to enter text.		
Applicant Name:	Click here to enter text.		
Business/Agency:	Click here to enter text.		
Street Address:	Click here to enter text.		
City, County, State, Zip:	Click here to enter text.		
Telephone:	Click here to enter text.	Fax	Click here to enter text.
E-mail:	Click here to enter text.		

II. PROPERTY OWNER ☐ **Check Box if Same As Above**

Name:			
Street Address:	Click here to enter text.		
City, County, State, Zip:	Click here to enter text.		
Telephone:	Click here to enter text.	Fax	Click here to enter text.
E-mail:	Click here to enter text.		

III. PROJECT CATEGORY

Select the covered activity or activities implemented for this project? (*check one or more boxes below)*		
☐ Pond Restoration	☐ Livestock and Wildlife Water Distribution	☐ Erosion Control

IV. BASIS OF TERMINATION

Select one of the following:

☐ The project is complete and the following conditions have been met:
The project was implemented and is in compliance with the requirements under the General WDR Order No. R2-2015-0020.

Date of Project Completion: Click here to enter text.

☐ Project activities have been suspended:

Temporarily ☐ Indefinitely ☐

Date of suspension: Click here to enter text.
Expected startup date (if applicable): Click here to enter text.

V. ALAMEDA COUNTY RESOURCE CONSERVATION DISTRICT SIGNATURE / CERTIFICATION

I certify that the covered activities implemented for this project were completed to meet the General WDR Order No. R2-2015-0020 and were installed to meet Natural Resources Conservation Service standards and specifications detailed in *Planning Procedures and Best Management Practices for the Voluntary Habitat Restoration Program, Alameda County*. The project is complete.

_____
Alameda County Resource Conservation District Signature — Date

_____
Printed Name

VI. APPLICANT SIGNATURE / CERTIFICATION

I certify under penalty of law that all dredge and fill discharges associated with the restoration activity from the identified site that are authorized under General WDR Order No. R2-2015-0020 have been completed. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge water and materials associated with the any restoration activity under the General WDR Order No. R2-2015-0020.

_____ _____
Applicant Signature — Date

_____
Printed Name

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2017-0033

GENERAL WASTE DISCHARGE REQUIREMENTS FOR VINEYARD PROPERTIES IN THE NAPA RIVER AND SONOMA CREEK WATERSHEDS

The California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

Scope of Coverage

1. Order No. R2-2017-0033 (hereafter, Order) specifies general waste discharge requirements (WDRs) for existing and potential discharges of waste from Vineyard Properties located in the Napa River and/or Sonoma Creek watersheds that meet the terms and conditions of this Order.

2. For purposes of this Order, a "Vineyard Property" is defined by a parcel or contiguous parcels under the same ownership, each of which is developed to include a vineyard. Landowners and operators of Vineyard Properties discharging, or proposing to discharge, waste from a Vineyard Property are hereinafter referred to as "Dischargers".

3. Existing and potential discharges of waste from Vineyard Properties include storm runoff from vineyards and unpaved roads that contain elevated levels of sediment, pesticides, or nutrients or excess runoff that may cause a condition of pollution or nuisance due to erosion or flooding. This Order also regulates Vineyard Properties with on-channel reservoirs that receive treated wastewater. Only a few such reservoirs are known to occur within the Sonoma Creek and/or Napa River watersheds. Discharges from these reservoirs also are defined as "waste discharges."

4. This Order regulates discharges from Vineyard Properties that meet the following criteria:
   a. Each parcel within an *existing* Vineyard Property (including a replant) where ≥ 5 acres are planted in grapevines;
   b. Each parcel within a *new* Vineyard Property where ≥ 5 acres are planted in grapevines on a slope ≤ 30 percent; or
   c. Any parcel within an existing or new Vineyard Property where < 5 acres are planted in grapevines that is deemed by Water Board staff to discharge waste that could affect water quality and could be adequately regulated through this Order.

5. This Order does not apply to any parcels within a new Vineyard Property where: a) vineyard development involves a timber conversion plan or permit, b) any part of a vineyard is located on a slope > 30 percent, or c) the proposed vineyard would be constructed on a Ridgetop[1]. Any parcels within a new Vineyard Property that meet any of these criteria must submit a report of

[1] A Ridgetop is as defined per Sonoma County Code (Chapter 11): "A relatively flat topographic divide above divergent and descending slopes where one (1) or more of the descending slopes has a natural slope steeper than fifty (50) percent for more than fifty (50) feet in slope length."

waste discharge (ROWD) in accordance with Water Code section 13260 to be regulated through individual WDRs.

6. This Order contains three tiers that are based on the administrative costs to regulate Vineyard Properties and considers relative risk to water quality, as needed to achieve all water quality standards. Movement between tiers may occur subject to meeting the qualifications for enrollment in Tiers 1 through 3, which are defined as follows:

   Tier 1 (Stewardship Tier): A Discharger qualifies for enrollment under Tier 1 if the Farm Plan, as described in Attachment A, has been Verified[2] and is fully implemented to achieve all applicable performance standards for discharge, and, where the Vineyard Property is located adjacent to an unconfined alluvial channel, the Vineyard Property also meets the performance standard for Stream and Riparian Habitats (as specified in Attachment A).

   Tier 2: A Discharger qualifies for enrollment under Tier 2 if: a) it has developed a Verified Farm Plan or the Water Board has approved the Farm Plan, or b) it is working with an approved Third-Party Program[3] to develop a Verified Farm Plan.

   Tier 3: Dischargers who elect to develop a Farm Plan independently - without the Farm Plan being Verified – are required to enroll in Tier 3. These Dischargers must submit their Farm Plan (as specified in Attachment A) to the Water Board for review and approval. Following Water Board approval of the Farm Plan, the Discharger, as applicable, could move into Tier 2 or Tier 1.

   Attachment A (Farm Plan Requirements) and Attachment E (Monitoring and Reporting Requirements) provide additional information and specific details regarding conditions for compliance for Dischargers enrolled under Tiers 1, 2, and 3.

7. The Water Board recognizes that certain limited resource farmers (as defined by the U.S. Department of Agriculture, Natural Resources Conservation Service, 2014[4]) may have difficulty achieving compliance with this Order. The Water Board will prioritize assistance to these farmers, including but not limited to technical assistance, grant opportunities, and necessary flexibility to achieve compliance with this Order (e.g., adjusted farm plan, monitoring, reporting, or time schedules).

Water Quality Concerns

8. The Napa River, Sonoma Creek, and their tributaries provide habitat for federally-listed steelhead populations, locally-rare Chinook salmon populations, and exceptionally diverse native fish assemblages. Elevated concentrations of fine sediment (primarily sand) in streambeds and channel incision, defined by the progressive lowering of the streambed as a result of net erosion over the long-term, are significant threats to watershed fish populations and

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[2] "Verified" means that an approved Third-Party Program has coordinated a technical review of the Farm Plan by a Qualified Professional who has signed - the Farm Plan, a verification form, or a letter - to indicate that she/he concludes that, upon full implementation, the Farm Plan would achieve all applicable performance standards for sediment and storm runoff control. Although a Verified Farm Plan receives technical review, it remains the Discharger's responsibility to ensure the Farm Plan is implemented to achieve all applicable performance standards for discharge. Third-Party Program verification does not constitute an approval of the Farm Plan.

[3] Third-Party Programs provide technical assistance/expertise to help the Dischargers comply with requirements of this Order. See Attachment C for description of Third-Party Programs.

[4] The USDA Natural Resources Conservation Service definition of a limited resources farmer can be found at https://lrftool.sc.egov.usda.gov/LRP_Definition.aspx (URL as indexed on June 3. 2017).

other special-status aquatic species including California freshwater shrimp, foothill yellow-legged frog, and western pond turtle.

9. Channel incision is a significant fine sediment source and is the primary mechanism for habitat simplification in the Napa River, Sonoma Creek, and alluvial reaches of their tributaries. As channels have incised, spawning and rearing habitats have been substantially reduced. Channel incision has separated the channels from floodplains and reduced baseflow persistence and the extent and diversity of riparian vegetation.

10. Vineyard Properties, including farming areas and extensive unpaved roads, have been identified as significant sources of fine sediment discharges to the Napa River, Sonoma Creek, and their tributaries. Storm runoff increases resulting from infiltration losses in vineyards and roads are two of several causes for channel incision. Also, where hard engineering approaches (rip-rap, gabions, etc.) are used to stabilize streambanks, these structures can compromise channel stability and habitat complexity in adjacent channel reaches. Such unintended impacts are magnified in incised channel reaches, where the force per unit area exerted on the channel bed and banks is substantially increased.

11. Vineyard Property development and management practices, including but not limited to: 1) deep ripping of soils to develop and/or replant a vineyard, 2) conversion of natural vegetation cover, 3) soil compaction as a result of the use of tractors to conduct agricultural activities, 4) establishment of engineered surface and subsurface drainage, and 5) the development and maintenance of property access roads, may cause or contribute to significant increases in erosion and/or storm runoff, which are direct or indirect sources of elevated rates of fine sediment delivery to channels, and/or in some cases a contributing factor to downstream channel incision.

12. Unpaved roads are a water quality concern because of their hydrologic connectivity to streams or other water bodies. Any road segment that has a continuous surface flow path to a natural stream channel during a storm runoff event is termed a “hydrologically connected” road or road reach. Connectivity usually occurs through road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces. Road-related erosion has been identified as a significant sediment source in both the Napa River and Sonoma Creek watersheds.

13. Vineyard Properties are a potential source of toxicity or bio-stimulatory substances where the application rate and/or discharge of agrichemicals and/or fertilizers are not properly controlled to limit discharges to the surface and/or groundwater. Wine grapes are planted over almost the entire land area devoted to farming in the Napa River and Sonoma Creek watersheds, making viticulture in this region susceptible to pest infestations and therefore subject at times to potentially high rates of pesticide application. At present, several pesticides are applied in large amounts (> 1000 pounds of active ingredient) and/or over extensive land areas (> 1000 acres) within the permit area that are xenoestrogens, which present the potential to contribute to feminization of Chinook salmon and/or which have moderate to very high potential to contribute to aquatic toxicity. Pesticides of highest concern that currently are applied in large amounts over extensive areas within the permit area include pedimethalin, pryaclostrobin, trifloxystrobin, oxyfluorfen, cyprodinil, triflumizole, and imidacloprid. These compounds may pose a potential threat to water quality; however, at present there is limited information on their occurrence in waters.

14. Vineyards developed on slopes > 30 percent present a much higher potential for significant landslide, fluvial, and surface erosion as a consequence of vineyard construction and management actions including removal of natural vegetation cover, grading, deep ripping of soils, engineered drainage, and additional road development on steep slopes. Therefore, new Vineyard Properties developed on slopes > 30 percent, as described earlier, must submit a ROWD in accordance with Water Code section 13260 to be regulated through individual WDRs.

15. When a forest is converted to a vineyard, rainfall interception, soil infiltration capacity, evapotranspiration, and root strength all can be substantially reduced with the potential for consequent significant increases in storm runoff and erosion. Also, tree root strength, in most circumstances, greatly increases mechanical resistance to shear stress, and, therefore, conversion from forest cover to vineyard also can significantly increase landslide activity. Therefore, new Vineyard Properties that involve a timber conversion plan or permit, as described earlier, must submit a ROWD in accordance with Water Code section 13260 to be regulated through individual WDRs.

16. New vineyard constructed on a Ridgetop (as defined earlier) also pose high risk of significant sediment delivery to channels as a result of their discharge into colluvial swales and headwater channels that are especially sensitive to development-related changes in storm runoff. Therefore, new Vineyard Properties that are constructed on a Ridgetop, as described earlier, must submit a ROWD in accordance with Water Code section 13260 to be regulated through individual WDRs.

Background

17. This Order implements the sediment Total Maximum Daily Loads (TMDLs) for the Napa River and Sonoma Creek watersheds that are included in Chapter 7 of the Water Quality Control Plan for the San Francisco Bay Basin Plan (Basin Plan). These TMDLs include load allocations to sediment sources and implementation plans that call for the adoption of pollutant control programs to control sediment discharges from Vineyard Properties and discharges from other significant land-use related sediment sources. The implementation plans also recommend developing and implementing plans to enhance stream-riparian habitat conditions and reduce sediment supply.

18. Vineyard Properties constitute about 162,000 acres or 40 percent of the total land area in the Napa River and Sonoma Creek watersheds. Vineyard Properties include: planted grapevines, which cover approximately 59,000 acres; farm buildings; adjacent open-spaces under natural vegetation cover; and property-wide road networks - most of which are unpaved. The 59,000 acres of planted grapevines correspond to about 16 percent of the total land area in these two watersheds.

19. In order to achieve load allocations for soil erosion in farmed areas, as specified in the Basin Plan, effective erosion and/or sediment control measures need to be in place at almost all Vineyard Properties in these watersheds. Based on GIS analysis, establishing a five-acre vineyard size threshold as the primary criteria for enrollment under the Order will result in approximately 90 percent of the vineyard acreage and two-thirds of total property acreage (i.e., a Vineyard Property includes the Farm Area, property-wide access roads, reservoirs, and

undeveloped areas) having effective Best Management Practices (BMPs) in place for the control of pollutant discharges.

20. Monitoring and reporting under Tier 1 is reduced as compared to Tier 2 and 3 because Dischargers enrolled under Tier 1 have: a) fully implemented a Verified Farm Plan to meet all applicable performance standards for discharge, in some cases in advance of the deadlines for compliance; and b) also as applicable, have achieved the performance standards for Stream and Riparian Habitats (as specified in Attachment A). Actions taken to protect and/or restore stream-riparian corridors significantly enhance habitat complexity and connectivity, contributing to resolution of impacts as related to channel incision.

Regulatory Framework

21. The State Water Resources Control Board (State Water Board) and the Regional Water Boards are the primary agencies with responsibility for the protection of water quality pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act, codified in Water Code Division 7). The Legislature declared that the activities and factors that may affect the quality of the waters of the State shall be regulated to attain the highest water quality that is reasonable, considering all demands being made on it (Water Code § 13000).

22. Water Code (CWC) section 13260 (a) requires that any person discharging waste or proposing to discharge waste that could affect the quality of the waters of the State, other than into a community sewer system, file with the Water Board a ROWD containing such information and data as may be required by the Water Board, unless the Water Board waives such requirement pursuant to CWC section 13269.

23. CWC section 13263 (i) authorizes the Water Board to prescribe general WDRs for a category of discharges if the discharges are produced by the same or similar operations; involve the same or similar types of waste; require the same or similar treatment standards; and are more appropriately regulated under general WDRs. The WDRs must implement relevant water quality control plans and take into consideration, among other things, the beneficial uses of water to be protected, the water quality objectives reasonably required for that purpose, and the need to prevent nuisance.

24. It is appropriate to issue general WDRs that apply to Vineyard Properties in the Napa River and the Sonoma Creek watersheds because:

    a. Vineyard Properties in these two watersheds have similar development and management practices, and consequently they have similar pollutant discharges;

    b. Vineyard Properties in these two watersheds pose similar threats to water quality, requiring the same or similar treatment standards, pollutant control, and monitoring programs; and

    c. Given the time and resources needed for regulatory oversight, most Vineyard Properties in these two watersheds are more appropriately regulated under general WDRs rather than individual WDRs.

25. Pursuant to this Order and CWC section 13267, Dischargers must implement a Monitoring and Reporting Program as specified in Attachment E. The burden, including costs, of the Monitoring and Reporting Program bears a reasonable relationship to the need for the Program and the

benefits to be obtained from it. Specifically, the Monitoring and Reporting Program is necessary to ensure compliance with this Order's terms and provisions in order to protect water quality. The Program requires regular BMP implementation monitoring, BMP effectiveness monitoring, streambed monitoring, reporting regarding Farm Plan completion and progress per implementation and achievement of performance standards, and record-keeping.

26. This Order is consistent with the State Water Board's 2004 Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program (NPS Policy) because it regulates nonpoint source discharges that may adversely affect water quality.

Water Quality Control Plan for the San Francisco Bay Basin

27. The Basin Plan is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives (WQOs) for waters of the State, including surface waters and groundwater. The Region's TMDLs and associated implementation plans to achieve WQOs are also part of the Basin Plan. The Basin Plan was duly adopted by the Water Board and approved by the State Water Board, the Office of Administrative Law, and U.S. EPA. The latest version can be found on the Water Board's website at http://www.waterboards.ca.gov/sanfranciscobay/basin_planning.shtml.

28. Pursuant to the Basin Plan, the existing and potential beneficial uses of waters in the San Francisco Bay Region that could be impacted by the discharge of wastes include:

Beneficial Use	Napa River	Sonoma Creek
Agricultural Supply (AGR)	X	
Cold Freshwater Habitat (COLD)	X	X
Ocean, Commercial, and Sport Fishing (COMM)		
Estuarine Habitat (EST)		
Industrial Service Supply (IND)		
Fish Migration (MIGR)	X	X
Municipal and Domestic Supply (MUN)	X	
Navigation (NAV)	X	
Preservation of Rare and Endangered Species (RARE)	X	X
Water Contact Recreation (REC-1)	X	X
Non-contact Recreation (REC-2)	X	X
Shellfish Harvesting (SHELL)		
Fish Spawning (SPWN)	X	X
Warm Freshwater Habitat (WARM)	X	X
Wildlife Habitat (WILD)	X	X

29. The Basin Plan provides a framework for actions needed to achieve water quality objectives for sediment, settleable material, and population and community ecology to address elevated concentrations of fine sediment (primarily sand) in the beds of the Napa River, Sonoma Creek, and their tributaries and pervasive channel incision. These actions translate into 50 percent-or-greater reduction in human-caused sediment inputs as identified in the TMDLs.

30. In order to protect beneficial uses, this Order includes requirements to implement the Basin Plan. Consistent with U.S. EPA's Section 404(b)(1) Guidelines for Dredge and Fill, in determining the circumstances under which stream or wetland filling may be permitted, in general, it is preferable to avoid disturbance. When this is not possible, disturbance should be minimized. Mitigation for lost stream or wetland acreage and habitat values through restoration or creation should only be considered after disturbance has been minimized.

Anti-Degradation

31. State Water Board Resolution 68-16 ("*Statement of Policy with Respect to Maintaining High Quality of Waters in California*") requires whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality must be maintained. Resolution 68-16 only allows change in the existing high quality if it has been demonstrated to the Water Board that the change is consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses of such water, and will not result in water quality less than that prescribed in the policies. Resolution 68-16 further requires that discharges meet WDRs that will result in the best practicable treatment or control of the discharge necessary to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with the maximum benefit to the people of the State will be maintained. Resolution 68-16 incorporates the federal "antidegradation" policy (Cal. Code Regs., tit. 40, § 131.12). This Order is consistent with these policies because its implementation will result in improved water quality and achievement of TMDL sediment load allocations.

32. This Order will result in the best practicable treatment or control (BPT) of discharges to prevent pollution or nuisance and the maintenance of the highest water quality consistent with the maximum benefit to the people of the State. The management practices required under the Order are BPT because they reflect the state-of-the-art methods for Vineyard Property controls that integrate soil and site management practices for pest management and weed control, nutrient management, pesticide storage, handling and modern spray techniques, vineyard and road erosion, and road runoff control. The methods have proven to be effective where implemented in vineyards and associated roads.

California Environmental Quality Act (CEQA)

33. The Water Board is the lead agency pursuant to the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 *et seq*.).

34. The Water Board has satisfied its obligation to address tribal cultural resources under AB 52. The notification and consultation provisions of that statute were not applicable, because no tribes in the project area had requested notification at the time of the decision to undertake general WDRs.

35. On July 7, 2014, the Water Board filed a Notice of Preparation (NOP) with the State Clearinghouse, which included an Initial Study, to public agencies and persons with interest in the Order. Copies of the NOP and Initial Study were available for review at the Water Board's Oakland office. Additionally, the NOP and Initial Study were posted at the Water Board's webpage, and an announcement of its availability was forwarded to individuals that subscribed to the electronic mailing lists relevant to information on the Order. Filing of the NOP started a 30-day comment period that closed on August 6, 2014.

36. On July 23, 2014, the Water Board conducted a CEQA scoping meeting in the Napa County Agricultural Commissioner's Office, for the Environmental Impact Report (EIR) to solicit input from agencies and interested parties on issues to be addressed in the EIR.

    On July 15, 2016, the Water Board issued a draft Environmental Impact Report (DEIR) for public review and filed a Notice of Completion with the State Clearinghouse (SCH). (Cal. Code Regs., tit. 14, § 15085.) The public comment period for the DEIR (SCH No. 2014072013) was from July 15, 2016 to August 29, 2016, which was extended to September 14, 2016, at the request of stakeholders. The Water Board received and evaluated comments on the DEIR from public agencies and the other interested parties. The Water Board has considered, certified, and approved the final EIR (FEIR) pursuant to California Code of Regulations (CCR), title 14, sections 15090 - 15092.

37. Impacts and mitigation measures identified in the EIR are included in Attachment F. Mitigation measures identified in the EIR for this Order, and required to be implemented as described in Attachment F, will substantially reduce environmental effects of the project. The mitigation measures included in this Order have eliminated or substantially lessened all significant effects on the environment, where feasible. Where noted, some of the mitigation measures are within the responsibility and jurisdiction of other public agencies. The mitigation measures discussed herein can and should be adopted, as applicable, by those other agencies. Pursuant to CCR, title 14, sections 15091 and 15093, the Water Board makes the following Statement of Overriding Considerations in conjunction with the approval of this Order.

38. **Statement of Overriding Considerations Supporting Approval of the Order.** The Water Board has duly considered the EIR, which conservatively identifies significant and unavoidable impacts resulting from adoption and implementation of the Order. Consistent with CEQA Guidelines section 15093, subsection (a), the Water Board has considered and balanced the economic, legal, social, technological, and other benefits of this Order, including region-wide environmental benefits, against the unavoidable environmental risks. The benefits outweigh the potentially unavoidable adverse environmental effects, and the unavoidable adverse environmental effects are acceptable because:

    - Adoption of this Order will greatly improve water quality through compliance actions to reduce sediment and storm runoff discharges from vineyards and roads and to restore properly functioning substrate conditions in freshwater channel reaches that provide critical habitat for listed populations of steelhead, locally-rare Chinook salmon populations, and exceptionally diverse assemblages of native fish species.

    - Compliance with this Order will result in effective pollutant discharge control measures for pesticides and nutrients being implemented and maintained at Vineyard Properties throughout the Napa River and Sonoma Creek watersheds, reducing potential impacts to beneficial uses including all native aquatic and riparian species.

- Compliance with the Order, including performance standards for storm runoff from Hillslope Vineyards[5] and roads, will significantly reduce storm runoff and, therefore, also contribute to a significant enhancement of groundwater recharge.

- Compliance with the Order would significantly reduce operational GHG emissions through decreases in tillage and increases in cover crops at vineyards, substantial reductions in soil erosion throughout vineyard properties (including extensive networks of property access roads), and increases in riparian vegetation resulting from the implementation of soil biotechnical projects.

- Implementation of BMPs would enhance agricultural productivity through increases in soil organic matter, enhanced soil infiltration capacity, and a reduction in soil erosion both within and adjacent to Farm Areas.

After balancing the above benefits of the Order against its unavoidable environmental risks, the benefits of the Order outweigh the unavoidable adverse environmental effects, and these adverse environmental effects are considered "acceptable."

39. In accordance with CCR Title 14, section 15094, the Water Board will file a Notice of Determination with the State Clearinghouse, along with payment of applicable fees as required by the Department of Fish and Wildlife (https://www.wildlife.ca.gov/Conservation/CEQA/Fees) within five working days from the issuance of the Order.

Annual Fees

40. Water Code section 13260 authorizes the Water Board to include as a condition of general WDRs the payment of an annual fee. The Discharger shall pay an annual fee to the State Water Board in accordance with the fee schedule for each fiscal year. (Cal. Code Regs., tit. 23, § 2200).

Third-Party Programs

41. The NPS Policy encourages the Water Boards to "be as creative and efficient as possible in devising approaches to prevent or control nonpoint source pollution." This includes development of third-party programs, including coalitions of dischargers, in cooperation with a third-party representative, organization, or government agency to assist the dischargers in complying with the requirements and assure the Water Board and the public that actions have been taken to reduce nonpoint source pollution.

42. The Water Board supports the use of Third-Party Programs that have been approved by the Executive Officer to assist Dischargers in filing required forms, to provide technical assistance to Dischargers in preparing Farm Plans and implementing non-point source pollutant control projects, and/or to assist Dischargers with the monitoring and reporting requirements described in Attachment E. Third-Party Programs may also opt to collect fees on behalf of its members.

[5] A "Hillslope Vineyard" is defined by grapes planted on an average slope > 5 percent. The method for determining slope is as specified by Napa County: www.countyofnapa.org/WorkArea/DownloadAsset.aspx?id=4294967662. An "existing" Hillslope Vineyard is one that was planted prior to adoption of this Order.

43. Attachment C explains the roles, responsibilities, and prerequisite qualifications of Third-Party Programs and provides guidance on the types of information needed for Third-Party Program approval.

44. The Water Board will review a Third-Party Program's performance to ensure that adequate Farm Plans are being consistently prepared by the Dischargers subject to this Order and that all monitoring and reporting requirements are being met.

Safe Drinking Water Act

45. It is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. This Order promotes that policy by requiring the Dischargers to meet water quality objectives, as applicable, designed to protect human health and ensure that water is safe for domestic uses.

California Endangered Species Act

46. This Order does not allow for the take, or incidental take, of any special status species. The applicant shall use the appropriate protocols, as approved by the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and/or the National Marine Fisheries Service, to ensure that activities do not impact the beneficial use of the Preservation of Rare and Endangered Species.

Public Notice

47. The Water Board has notified the Dischargers, interested agencies, and the public of its intent to adopt this Order and has provided them the opportunity to attend a public meeting and to submit their written comments.

48. The Water Board, in two public meetings (April 12, 2017, and July 12, 2017), heard and considered all comments pertaining to this matter.

IT IS HEREBY ORDERED that in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, all Dischargers of Vineyard Properties that meet the criteria described in the above findings shall comply with the following:

A. DISCHARGE PROHIBITIONS

1. The discharge of waste to waters of the State other than as defined in this Order is prohibited.

2. The discharge of hazardous waste, as defined in CWC section 13173 and CCR Title 23 section 2521(a), respectively, is prohibited.

3. The discharge of wastes (e.g., fertilizers, fumigants, pesticides) into groundwater via backflow through a water supply well is prohibited.

4. The discharge of any wastes (e.g., fertilizers, fumigants, pesticides) down a groundwater well casing is prohibited.

B. **PERFORMANCE STANDARDS:** The Discharger shall install, maintain, and evaluate effectiveness of BMPs as needed throughout the Vineyard Property to attain the following discharge Performance Standards:

1. Soil erosion in the Farm Area: soil loss rate ≤ tolerable soil loss rate. The tolerable soil loss rate is as defined by the USDA Soil Conservation Service (1994).

2. Sediment delivery from existing unpaved roads (Hillslope Vineyards only): a) culvert inlets have a low plug potential[6]; b) critical dips shall be installed at culverted crossings that have a diversion potential; and c) ≤ 25 percent of the total length of unpaved roads are hydrologically connected[7].

3. Sediment delivery from new roads (Hillslope Vineyards only): all new roads (unpaved and/or paved) shall be storm-proofed roads (as specified in Attachment A).

4. Storm runoff from an existing Hillslope Vineyard[8]: shall not cause or contribute to downstream increases in bed and/or bank erosion (as specified in Attachment A).

5. Storm runoff from a new Hillslope Vineyard[9]: a) peak storm runoff in 2-, 10-, 50-, and 100-year (24-hour duration) rainfall events following vineyard development shall not be greater

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[6] Trash barriers or deflectors are installed where needed. For additional guidance, please see Weaver et al. (2014), "Culvert Inlet and Outlet Treatments", pp. 137-143.

[7] Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. Any road segment that has a continuous surface flow path to a natural stream channel during a storm runoff event is termed a hydrologically connected road or road reach. Connectivity usually occurs through road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces.

[8] A "Hillslope Vineyard" is defined by grapes planted on an average slope > 5 percent. The method for determining slope is as specified by Napa County:

http://www.countyofnapa.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=4294967662 . An "existing" Hillslope Vineyard is one that was planted prior to adoption of this Order.

than pre-development peak storm runoff[10], and b) shall not cause or contribute to downstream increases in bed and/or bank erosion (as specified in Attachment A).

6. Pesticide management: an integrated pest management program shall be developed and implemented for the vineyard (UC Statewide IPM Program, 2015), and effective practices implemented to avoid mixing, storage, or application of pesticides near wells and surface waters or in ways that could contribute to receiving water toxicity.

7. Nutrient management: BMPs to guide nutrient applications (e.g., fertigation, cover crops, soil amendments, plant and/or soil testing) shall be implemented such that discharges do not contribute to violation of water quality standards.

C. PROVISIONS

1. Time Schedule for Achievement of Performance Standards

a. Existing Vineyard Property: Performance Standards for soil erosion in the Farm Area, pesticide management, and nutrient management must be achieved within three years of adoption of the Order. The Performance Standard for storm runoff from Hillslope Vineyards – as related to bed and bank erosion - must be attained within six years of adoption of this Order. The Performance Standards for sediment and storm runoff discharges from existing unpaved roads must be achieved within ten years of adoption of this Order.

b. New Vineyard Property: Performance Standards for soil erosion in the Farm Area, pesticide management and nutrient management must be achieved by the date of vineyard construction. The Performance Standard for storm runoff from new Hillslope Vineyards – as related to peak storm runoff change - must be achieved by the date of vineyard construction. The Performance Standard for storm runoff – as related to bed and bank erosion – must be achieved within six years of vineyard construction. The Performance Standards for sediment discharge and storm runoff from existing unpaved roads must be achieved within ten years of construction of the new vineyard.

c. Hillslope Vineyard Properties: where a new road – paved or unpaved - is constructed following adoption of this Order, at the time of construction, the new road must achieve all applicable Performance Standards for storm-proofed roads (as specified in Attachment A).

2. Monitoring and Reporting

a. Dischargers shall conduct monitoring and site inspections of the entire Vineyard Property to document that discharge control actions implemented consistent with the Farm Plan are in-place and functioning properly such that the Performance Standards in B.1 through B.7 are being met.

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[9] A "new vineyard" is any vineyard that is 5 acres or more in size that is established subsequent to adoption of this Order.

[10] Attainment of this Performance Standard shall be evaluated through site-specific hydrologic modeling and subsequent to development, group or site-specific BMP effectiveness monitoring (see Attachment E). In modeling runoff change, deep ripping of soils cannot be credited for a reduction in peak runoff.

b. Representative photo-points shall be established and monitored to document winter readiness, demonstrate annual maintenance practices and BMP implementation, and document habitat and water quality conditions in receiving waters at and/or near points of discharge from the vineyard, as specified in Attachment E.

c. Site readiness inspections shall be completed annually, prior to the beginning of the rainy season, and shall encompass the Farm Area and property access roads to ensure the facility's readiness for the rainy season. Vineyard Property inspections shall be conducted periodically throughout the rainy season and after storm events to confirm that management practices have functioned as designed and to determine if additional management measures are required.

d. Required reporting is as specified in Attachment E. Tier 2 and Tier 3 Dischargers also must conduct stream monitoring and BMP effectiveness monitoring as specified in Attachment E. The Executive Officer may modify Attachment E as necessary or appropriate. Public notice of the modification of Attachment E would be provided, and revised requirements would be posted on the Water Board website.

e. This Order does not require a Discharger to perform inspections or take other implementation actions during dangerous weather conditions or when a storm begins after scheduled facility operating hours or when there is heavy flooding.

f. The Discharger shall maintain records of inspections, monitoring observations, and any responses taken to reduce potential sources of pollutants from the Vineyard Property. These records shall be maintained at the same location as the Farm Plan. If excessive rates of erosion are observed during the inspection, the Discharger shall record the source and cause of erosion (based on available information), note the management practices taken to correct it, and report it in the Annual Reporting Form.

3. CEQA Required Mitigation

Mitigation measures identified in the EIR for this Order shall be implemented as described in Attachment F (CEQA Mitigation Measures).

D. ENFORCEMENT

1. The Discharger shall comply with all of the conditions of this Order. Any noncompliance with this Order constitutes grounds for an enforcement action and/or termination of enrollment.

2. CWC section 13387(e) provides that any person who knowingly makes any false statement, representation, or certification in any record, report, plan, notice to comply, or other document filed with a regional water board or the State Water Board, or who knowingly falsifies, tampers with, or renders inaccurate any monitoring device or method required under this division shall be punished by a fine of not more than $25,000, or by imprisonment in state prison for not more than two years, or by both.

E. PERMIT REOPENING, REVISIONS, REVOCATION, TERMINATION AND REISSUANCE

1. The Water Board may modify or revoke and reissue this Order at any time.

2. An authorization to discharge wastes under this Order is not transferable to any person. In the event of any change in operation, control, or ownership of land or waste discharge facilities, the Discharger shall notify any succeeding owner/operator of its responsibility to enroll under this Order by letter at least 30 days in advance of such change of ownership. A copy of such letter shall be submitted to the Water Board, along with a Notice of Termination (NOT), Attachment D, in order for the original Discharger to be relieved of its responsibility to comply with this Order.

3. To enroll under this Order, the succeeding owner/operator must submit a completed Notice of Intent to the Water Board within 15 days of receipt of the letter referenced in E.2 and request approval from the Executive Officer to discharge under this Order. The succeeding owner/operator is not authorized to discharge under the Order and may be subject to enforcement until written approval of the coverage transfer from the Executive Officer.

4. In the event of closure or change in land use of the Discharger's facility, the Discharger shall file a NOT (see Attachment D) that explains the extent of the change in operation, measures taken to close and/or change the operation, and owner/operator contact information.

5. Water Board staff shall review the NOT and determine its appropriateness. The review may include a field staff inspection to verify project completion and water quality protection. The Executive Officer shall notify the Discharger regarding approval or disapproval of the NOT.

6. This Order may be reopened to address any changes in State or federal plans, policies, or regulations that would affect the quality requirements for the discharges and as authorized by federal and State law.

7. The Executive Officer may, at any time, terminate coverage under this Order as to a particular Discharger where the Discharger fails to comply with this Order; such termination is in the public interest; the activities could adversely affect beneficial uses of waters of the State; or the Executive Officer determines, based on changes to the Discharger's facility, that coverage under individual WDRs is more appropriate.

8. If an owner or operator of a Vineyard Property can demonstrate that the Vineyard Property does not discharge to surface waters of the State and that existing and anticipated uses of waters of the State are fully protected from Vineyard Property operations, the owner or operator may request an exemption from this Order.

   The request shall be made in writing and will be subject to Water Board verification and Executive Officer approval. If future conditions or Vineyard Property operations change, or the potential for water quality impacts is found, the owner or operator of the Vineyard Property may need to obtain coverage under this Order, or in certain circumstances, individual WDRs.

F. REQUIRED REPORTS AND NOTICES

The Discharger must complete the following tasks in accordance with the time schedule required to achieve the performance standards:

1. Farm Water Quality Protection Plan

a. The Farm Water Quality Protection Plan (Farm Plan) must include a comprehensive inventory of vineyards, roads, reservoirs, and waterways located throughout the Vineyard Property to document the BMPs already in-place and/or to prescribe additional BMPs that shall be implemented and maintained to comply with all conditions of this Order, including but not limited to, attainment of all applicable Performance Standards for discharge and also to document the actions implemented to protect and/or enhance stream-riparian habitat complexity and connectivity. The Farm Plan also must include a specific time schedule and corresponding milestones to measure progress toward attainment of the Performance Standards and a monitoring plan to document BMP implementation and assess effectiveness.

b. For all existing Vineyard Properties, the Farm Plan must be completed and verified consistent with the requirements in Attachment A, **within 3 years following adoption of this Order**. At a new Vineyard Property, the Farm Plan shall completed and verified consistent with the requirements in Attachment A, **by the date of completion of vineyard construction or within 3 years following adoption of this Order, whichever date is later**.

2. Annual Report

a. The Discharger shall submit an Annual Compliance Form to the Water Board. The Annual Compliance Form shall certify that the facility meets the conditions of this Order and that the Farm Plan is being implemented according to the schedule established in the Farm Plan. A sample Annual Compliance Reporting Form is included in Attachment E (Table E-1).

b. Annual Reporting Forms shall be submitted electronically each year no later than December 15.

G. APPLICATION REQUIREMENTS

1. In order to obtain coverage under this Order, the Discharger shall apply for coverage by submitting an electronic Notice of Intent form (NOI) for an existing Vineyard Property within one year of the date of adoption of this Order. An example electronic NOI form is included as Attachment B. For a new Vineyard Property, which is one where a vineyard ≥ 5 acres is developed following adoption of the Order, the Discharger shall apply for coverage by submitting a NOI, as specified above, one year prior to construction of the new vineyard or within one year of adoption of this Order, whichever date is later. An example NOI form is provided as Attachment B.

2. If the Discharger becomes aware that a relevant fact was omitted in a Notice of Intent, or incorrect information was submitted in a Notice of Intent or in any report to the Water Board, it shall promptly submit the correct facts or information. Completed forms shall be sent to the Water Board at the following address:

   San Francisco Bay Regional Water Board
   ATTN: Vineyard Program
   1515 Clay Street, Suite 1400
   Oakland, CA 94612

3. Coverage under this Order is subject to fees as determined by the State Water Board. The annual fee schedule is developed by the State Water Board. The Discharger shall pay all required annual fees either directly to the State Water Board or through established discharger groups.

I, BRUCE H. WOLFE Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on July 12, 2017.

Digitally signed by Bruce H. Wolfe
Date: 2017.07.17 18:01:24 -07'00'

BRUCE H. WOLFE
Executive Officer

Attachment A – Farm Plan Requirements
Attachment B – Notice of Intent Form
Attachment C – Third-Party Program Roles, Responsibilities and Approval Process
Attachment D – Notice of Termination
Attachment E – Monitoring and Reporting Requirements
Attachment F – CEQA Mitigation Measures
Attachment G - Glossary

ATTACHMENT A

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements
Order No. R2-2017-0033

Farm Plan Requirements

Introduction

This Order requires Dischargers to prepare and implement a Farm Plan[1] that controls sediment discharges and storm runoff increases from vineyards and roads and also controls pesticide and nutrient discharges from vineyards, as needed to attain the Performance Standards described in this attachment. Once the Farm Plan has been Verified[2], and/or has been approved by the Water Board, a copy of the Farm Plan shall be kept at the Vineyard Property and be available for review by Water Board staff upon request. The process for approval of a Third-Party Program is as specified in Attachment C to this Order. Except in cases of an unauthorized discharge or emergency circumstances, Water Board staff will typically provide Dischargers a minimum of 72 hours advance notice prior to inspection. Only Water Board staff, or other individuals authorized by the Discharger, will inspect the Vineyard Property. Table 1 of this attachment defines the schedule for compliance as related to attainment of Performance Standards for discharge (specified in Section 3 herein) and also for Farm Plan submittal.

1. Approach and Scope

The Farm Plan shall be based on an inventory of the vineyards, roads, reservoirs, and waterways located throughout the Vineyard Property[3] to document the conservation practices already in-place and/or to prescribe additional best management practices (BMPs) that will be implemented and maintained to comply with all conditions of this Order. As follows, "existing" (e.g., Vineyard Property, vineyard, road) means the feature is in-place prior to adoption of this Order, and "new" refers to the feature being constructed subsequent to adoption.

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[1] The "Farm Plan" documents natural features, developed areas, and best management practices (BMPs) implemented to achieve applicable performance standards for discharge. Its scope and contents are as defined herein.

[2] "Verified" means that an approved Third-Party Program has coordinated a technical review of the Farm Plan by a Qualified Professional who has signed - the Farm Plan, a verification form, or a letter - to indicate that she/he concludes that, upon full implementation, the Farm Plan would achieve all applicable performance standards for sediment and storm runoff control. Although a Verified Farm Plan receives technical review, it remains the Discharger's responsibility to ensure the Farm Plan is implemented to achieve all applicable Performance Standards for discharge. Third-Party Program verification does not constitute an approval of the Farm Plan.

[3] A "Vineyard Property" is defined by a parcel or contiguous parcels under the same ownership, each of which is developed to include a vineyard.

2. Base Map

The base map for the Farm Plan shall include the entire Vineyard Property and may be an aerial photograph, topographic map, LiDAR derived shaded relief map, Google Earth image, or equivalent that depicts features at 1:6000 or larger scale (a 1:2400 scale base map is recommended so that smaller features including stream channels, riparian corridors, vineyard drainage structures, reservoirs, roads, etc., can be discerned and delineated accurately). Topography shall be delineated to distinguish the land areas where the average ground surface slope is < 5 percent, 5-to-30 percent, and those areas > 30 percent, and also shall include 5-to-40 foot (consistent with US Geological Survey 7.5 minute quadrangle conventions), or higher resolution contour intervals.

The Vineyard Property base map(s) shall include a north arrow and delineate the following:

- Property boundaries;
- Parcel boundaries and identifiers (APN numbers);
- Geomorphic terrane units (see Water Board, 2009, pp. 19-21) and/or soil series (with series identifier and erosion potential rating);
- Boundaries of vineyard blocks (showing row direction, slope, and block ID);
- Engineered drainage structures (e.g., subsurface drainage systems, underground outlets, diversion ditches, lined waterways or outlets);
- Vineyard avenues;
- Non-vineyard land uses (grazing areas, winery area, etc.);
- Farm buildings, agrichemical handling and mixing sites, agrichemical storage facilities, and equipment yards and/or staging areas;
- All channels including Class I, II, and III, and also human-made waterways/ditches;
- All water wells (agricultural, domestic, winery, unused, or abandoned) and streamflow diversion structures;
- Springs and seeps;
- Reservoirs, ponds, and lakes;
- All roads and road crossings, with road surface type (paved or unpaved) and crossing type (culvert, bridge, ford, etc.) also delineated; and
- Known active or potentially active landslides[4], soils with high erosion hazards, and known active or potentially active gullies.

[4] Mapped landslides and/or areas with a high potential for future landsliding may be identified based on field observations, aerial photo interpretation, and/or review of published information including: California Geological Survey (2016), US Geological Survey (1997a), and US Geological Survey (1997b). Also, a Debris Flow Potential Map developed for the Water Board by UC Berkeley is available upon request.

3. Performance Standards for Discharge

BMPs shall be installed and maintained as needed throughout the Vineyard Property to achieve the following Performance Standards:

a) Soil erosion in the Farm Area[5]: soil loss rate ≤ tolerable soil loss rate. The tolerable soil loss rate is as defined by the USDA Soil Conservation Service (1994).

b) Sediment delivery from existing unpaved roads (Hillslope Vineyards only): a) culvert inlets have a low plug potential[6]; b) critical dips shall be installed at culverted crossings that have a diversion potential; and c) ≤ 25 percent of the total length of unpaved roads are hydrologically connected[7].

c) Sediment delivery from new roads (Hillslope Vineyards only): all new roads (unpaved and/or paved) shall be storm-proofed roads (see below, **Storm-Proofed Roads**).

d) Storm Runoff from an existing Hillslope Vineyard[8]: shall not cause or contribute to downstream increases in bed and/or bank erosion (see below, **Bed and Bank Erosion**).

e) Storm runoff from a new Hillslope Vineyard: a) peak storm runoff[9] in 2-, 10-, 50-, and 100-year (24-hour duration) rainfall events following vineyard development shall not be greater than pre-development peak storm runoff (see below, **Peak Storm Runoff)**[10], and b) shall not cause or contribute to downstream increases in bed and/or bank erosion (see below, **Bed and Bank Erosion**).

f) Pesticide management: an integrated pest management program shall be developed and implemented for the vineyard (UC Statewide IPM Program, 2015), and effective practices shall be implemented to avoid mixing, storage, or application of pesticides near wells and surface waters or in ways that could contribute to receiving water toxicity.

g) Nutrient management: BMPs to guide nutrient applications (e.g., fertigation, cover crops, soil amendments, plant and/or soil testing) shall be implemented as needed to protect water quality.

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[5] The Farm Area includes all vineyard blocks, lanes, and avenues. Vineyard lanes and avenues are the field roads along the edges and/or in between the vineyard blocks.

[6] Trash barriers or deflectors are installed where needed. For additional guidance, please see Weaver et al. (2014), "Culvert Inlet and Outlet Treatments", pp. 137-143.

[7] Hydrologic connectivity refers to the length or proportion of a road that drains runoff directly to streams or other water bodies. Any road segment that has a continuous surface flow path to a natural stream channel during a storm runoff event is termed a hydrologically connected road or road reach. Connectivity usually occurs through road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces.

[8] A "Hillslope Vineyard" is defined by grapes planted on an average slope > 5 percent. The method for determining slope is as specified by Napa County: http://www.countyofnapa.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=4294967662 . An "existing" Hillslope Vineyard is one that was planted prior to adoption of this Order.

[9] Peak runoff is defined as the instantaneous maximum value for discharge during a storm runoff event.

[10] Attainment of this Performance Standard shall be evaluated prior to vineyard development through site-specific hydrologic modeling. In modeling runoff, ripping of soils shall not be inferred to result in a long-term increase soil infiltration capacity, and Hydrologic Soil Group Classification shall not be modified.

Further Specification of Performance Standards for Discharge

Peak Storm Runoff: The model developed to evaluate attainment of the peak storm runoff Performance Standard, as specified above, shall include and be consistent with all of the following:

- Pre- and post-project peak runoff estimates shall be provided for each sub-watershed area that drains into a vineyard drainage outfall. The size of the sub-watershed area is dictated by the drainage area lying upslope of each drainage structure outfall directing runoff from a vineyard block.
- Pre- and post-project peak flow estimates shall also be quantified at all locations where runoff exits the property (e.g., swales, creeks, ditches).
- Numerical modeling shall include hydraulic computations that integrate routing of flow through drainage elements such as pipes, surface ditches, rock/grass-lined swales, sedimentation basins, etc., into the numerical rainfall-runoff model.
- Numerical modeling shall include and account for all types of runoff from roads that drain into modelled sub-watershed areas.
- Numerical modeling shall include routing of flow through proposed BMP structures that would be implemented to control erosion and/or attenuate runoff.
- BMP structures shall be designed to address predicted project hydraulic conditions, such as water depth and velocity.
- Similar to vineyard drainage elements, routing of flows through BMPs (e.g., flow control structures, energy dissipaters/outlet protection, rock lined ditches, check dams, sediment basins, slope drains, streambank stabilization structures, and gravel berms) may alter runoff rate and, therefore, shall be integrated into the model/hydrologic analysis.
- A comprehensive description of the modeling approach, methods, assumptions, and peak flow estimates shall be integrated into the erosion control plan.

Storm-Proofed Roads (applies only to new roads built within a Hillslope Vineyard Property) (as defined by Weaver, et al. (2014) shall meet the following specifications (as applicable) :

- Stream crossings have a drainage structure designed for the 100-year flood flow including woody debris and sediment (Cafferata, et al, (2004)).
- Stream crossings do not have diversion potential.
- Culvert inlets have a low plug potential (trash barriers or deflectors are installed where needed).
- Culverts are installed at the base of the fill and in line with the natural channel.
- Emergency overflow culverts that emerge higher in the fill have full round, anchored downspouts that extend to the natural channel.
- Deep fills (deeper than a backhoe can reach from the roadbed) with undersized culverts or culverts with high plugging potential are fitted with an emergency overflow culvert.

- Bridges have stable, non-eroding abutments and do not significantly restrict 100-year flood flow.
- Stream crossing fills are stable.
- Approaching road surfaces and ditches are "disconnected" from streams and stream crossing culverts to the maximum extent feasible using road shaping and road drainage structures.
- Class I (fish-bearing) stream crossings meet California Department of Fish and Wildlife and National Marine Fisheries Service fish passage criteria.
- Road surfaces and ditches are hydrologically "disconnected" from streams and stream crossing culverts. Road surface runoff is dispersed, rather than collected and concentrated.
- Ditches are drained frequently by functional ditch relief culverts and/or rolling dips.
- Outflow from ditch relief culverts does not discharge to streams.
- Ditches and road surfaces drainage does not discharge (through culverts and/or rolling dips) onto active or potential landslides and/or into gullies.
- Fine sediment contributions from roads, cutbanks, and ditches are minimized by utilizing seasonal closures and installing a variety of surface drainage techniques including road surface shaping (outsloping, insloping, or crowning), rolling dips, ditch relief culverts, water bars, and other measures to disperse road surface runoff and reduce or eliminate sediment delivery to the stream.

Bed and Bank Erosion: the Performance Standard for bed and bank erosion downslope of a Hillslope Vineyard is evaluated and achieved as follows:

1. Review available information including: property land-use and natural disturbance history; vineyard design and management practices; natural and engineered drainage features; and soil, geology, landslide, and topographic maps.
2. Conduct a field survey[11] to evaluate and document channel condition, beginning at the point(s) of discharge from the Hillslope Vineyard along overland flow pathways and/or into the receiving channel(s), downstream to the first response reach (e.g., gravel-bedded channel reach with a slope ≤ 0.02), and/or to the property boundary (whichever is encountered first).

As technically and economically feasible, at sites where a Hillslope Vineyard discharges into an Unstable Area,[12] as a precaution the Discharger shall implement additional BMPs to attenuate Vineyard Property storm runoff. For example, these BMPs may include establishment of no-till cover crops, application of composted mulch, soil amendments to increase organic matter content (e.g., crop residues, manure, and/or compost), installation of level-spreaders, disconnecting existing drainage pipe systems, and/or construction of detention basins. Also, as technically and economically feasible, the Discharger shall

[11] At a minimum, the field survey shall be conducted once every five years and also following a 5-year or greater recurrence interval peak discharge, that is ≥ 10,000 cfs at the Napa River near St. Helena gage.

[12] Unstable areas include down-cutting and/or head-cutting stream channels, gullies, and/or landslides.

implement soil bioengineering projects to control erosion in actively eroding gullies and landslides and also in channel reaches that are down-cutting and/or head-cutting. Example soil bioengineering projects are described in Marin Resource Conservation District (2007). Where a Hillslope Vineyard discharges into an unstable area, cross-section and photo-point monitoring is required to evaluate erosional volume and response to BMP implementation and other factors (see Attachment E, p. E-6 for specific details).

4. Performance Standards for Stream and Riparian Habitats[13] (only applicable to unconfined alluvial channel reaches)

To qualify for enrollment in Tier 1, stream-riparian habitats shall be fully protected by:

a) Establishing and maintaining stream setbacks, as measured from the top of bank, along all unconfined alluvial channels[14] that are on average ≥ 1.5 times the bankfull width (see Table 2 for calculation of setback width as a function of watershed area); and/or

b) Implementing active and/or passive restoration measures, including managed bank retreat with vegetation restoration only, through Farm Plan implementation and/or participation in a reach-based habitat enhancement project, including the Rutherford Napa River Restoration, the Oakville to Oak Knoll Napa River Restoration, the Carneros Creek Adaptive Management Plan, and/or any other reach or tributary scale stewardship plan that has been reviewed and approved by the Water Board.

Note: all permittees must prepare the stream-riparian element of the Farm Plan as specified below in Section 5.

5. Required Elements of the Farm Plan

The Farm Plan shall include all of the following elements:

a) Base map(s) (as specified above);

b) Conservation practices to control discharges of agrichemicals;

c) Conservation practices to control Farm Area sediment discharge and to attenuate peak runoff;

d) Conservation practices to reduce sediment discharge and attenuate peak runoff associated with property access roads;

e) Stream-riparian habitat characterization, and as applicable, a description of conservation practices implemented;

f) Water quality controls for reservoirs that receive recycled wastewater and which may discharge to surface waters of the State (as applicable); and

[13] An unconfined reach, is where the valley width is greater than four-times the bankfull channel width. Examples of unconfined alluvial channel reaches include: a) almost the entire length of the Napa River and Sonoma Creek; and b) also along their tributaries where they exit canyons to traverse alluvial fans or valleys.

[14] No vineyard avenues, roads, or rows can be maintained within the setback, which is measured perpendicular to the channel beginning at the top of the bank. Where the stream setback width required by the local land-use authority is greater than 1.5 times the bankfull channel width, the full width of the locally required stream setback must be complied with in order to qualify for Tier 1 designation under the General WDRs.

g) Photo point monitoring.

Progress toward achievement of the Performance Standards for unpaved roads and bed and bank erosion shall be reported as part of the Annual Compliance Reporting Form (See Attachment E, Table E-1).

Where the deadline for the achievement of a performance standard is later than the date of completion of the Farm Plan (Table 1), the Farm Plan shall include a time schedule for achievement of the performance standard and milestones to gauge incremental progress.

Agrichemical controls

The Farm Plan shall describe the BMPs that are in-place and those that will be implemented to control discharges of agrichemicals including all nutrients and pesticides. This element of the Farm Plan shall describe practices for safe storage, mixing, and loading of agrichemicals and/or to protect against discharges to surface and groundwater that could contribute to a violation of water quality standards. Specifically, this element of the Farm Plan shall be developed and implemented to attain the Performance Standards for pesticide management and nutrient management as specified above. Performance Standards for nutrient management and pesticide management must be achieved by the date of completion of the Farm Plan, which, for an existing Vineyard Property, is within three years of adoption of this Order and, for a new Vineyard Property, is within three years of adoption of this Order or by the completion of vineyard construction (whichever date is later)[15].

Farm Area sediment discharge and peak runoff controls

The Farm Plan shall describe the BMPs that are in-place and those that will be implemented within the Farm Area, which includes the vineyard blocks and avenues, to control sediment delivery to stream channels and to attenuate peak storm runoff. Specifically, this element of the Farm Plan shall be developed and implemented to attain the Performance Standards for vineyard soil erosion and, as applicable, for storm runoff from a Hillslope Vineyard (as specified above).

The Performance Standards for vineyard soil erosion must be achieved by the date of completion of the Farm Plan, which, for an existing Vineyard Property, is within three years of adoption of this Order and, for a new Vineyard Property, by the completion of construction of the new vineyard.

The Performance Standards for storm runoff from a Hillslope Vineyard - as related to bed and bank erosion - must be achieved: a) at an existing Hillslope Vineyard, within six years of adoption of this Order; and b) at a new Hillslope Vineyard, within six years of the completion of vineyard construction.

At a new Hillslope Vineyard, in addition to required monitoring and reporting (specified in Attachment E), achievement of the Performance Standard for peak runoff shall be evaluated through site-specific hydrologic modeling, and the Hydrologic Model shall be appended to the

[15] Whichever date is later is specified to allow new vineyards constructed in the year following permit adoption sufficient time to achieve compliance.

Farm Plan. In preparing the hydrologic model, ripping of soils may not be inferred to result in an improvement with regard to infiltration capacity.

Road sediment discharge and peak runoff controls

The Farm Plan shall describe the BMPs that are in-place and those that will be implemented throughout the Vineyard Property to control sediment delivery to stream channels and attenuate storm runoff peak from existing unpaved roads and also from all new roads including unpaved and paved roads. Specifically, this element of the Farm Plan shall be developed and implemented at a Hillslope Vineyard Property to attain the Performance Standards for existing unpaved roads including those for percent road length that is hydrologically connected, plug potential, stream diversion potential, and also for storm-proofing of all new roads (as specified above). At an existing Hillslope Vineyard Property, road-related Performance Standards for existing unpaved roads must be achieved within ten years of adoption of this Order. At a new Hillslope Vineyard Property, road-related Performance Standards for existing unpaved roads must be achieved within ten years of completion of construction of the vineyard. All new roads constructed within a Hillslope Vineyard Property must be storm-proofed by the completion of construction.

Stream-Riparian Habitat Characterization

The entire stream network, including swales, ephemeral channel reaches, intermittent channel reaches, and perennial channel reaches, shall be delineated throughout the Vineyard Property. All channel reaches shall be classified and delineated as confined, moderately confined (alluvial), and unconfined (alluvial). Channel condition within moderately confined alluvial channel reaches and unconfined alluvial channel reaches[16] shall be assessed to describe the active channel including:

- Active channel width,
- Bars, pools, and riffles,
- Large woody debris,
- Summer baseflow,
- Flood levels,
- Bank heights,

[16] Channel confinement defines the ratio of the valley width (VW) to the channel width (CW). Where VW < 2CW a channel is classified as confined. Where VW > 4CW, a channel is classified as unconfined. Moderately confined channels are where CW < VW < 4CW. Within the Napa River and Sonoma Creek watersheds, unconfined alluvial channel reaches are where the adverse impacts of channel incision on habitat complexity and floodplain connectivity are most pronounced. Examples of unconfined alluvial channel reaches include: a) almost the entire length of the Napa River and Sonoma Creek; and b) also along their tributaries where they exit canyons to traverse alluvial fans or valleys. Unconfined alluvial channel reaches provide essential habitat for: a) exceptionally diverse assemblages of native fishes; b) all of the potential habitat for Chinook salmon; and c) much of the potential habitat for steelhead. The steeper and more confined tributary channel reaches, with step-pool and/or cascade bedform types, that also provide part of the habitat network for steelhead, are classic sediment transport reaches that are much less sensitive to incision. However, substantial changes in large woody debris loading in these reaches can change reach scale habitat structure and complexity.

- Bank erosion areas,
- Riparian corridor width and proximity to the Farm Area,
- Description of the vegetation types and sizes within the riparian corridor including the extent of non-native/invasive species,
- Observations of fish and wildlife,
- Locations of roads, on- or off-channel reservoirs, and/or other features upstream or downstream (e.g., grade control structures, bank stabilization structures, road crossings) that may affect bed and bank erosion locally or at reach scale, and
- Description of the management regime for the channel and/or corridor management.

Consistent with U.S. EPA's Section 404(b)(1) Guidelines for Dredge and Fill Material, in determining the circumstances under which stream or wetland filling may be permitted, in general, it is preferable to avoid disturbance. When this is not possible, disturbance should be minimized. Mitigation for lost stream or wetland acreage and habitat values through restoration or creation should only be considered after disturbance has been minimized. Marin RCD (2007) and Cramer, et al. (2012) provide useful guidance with regard to streambank stabilization techniques for stream channels that are consistent with the protection of ecological and geomorphic functions. Fischenich (2001) provides useful information regarding stability thresholds for bioengineering techniques. An example of an acceptable approach, with regard to level of detail[17] is as described in Sonoma County RCD, et al. (2016).

Stream and Riparian Habitats Performance Standard[18]

Vineyard Properties that have a Verified Farm Plan that is fully implemented and that have attained the Performance Standard for Stream and Riparian Habitats, as applicable, are eligible for enrollment under Tier 1. Table 2 presents the relationship between bankfull channel width and watershed area within the permit area.

Water quality controls for reservoirs that receive recycled wastewater and which may discharge to surface waters of the State[19] (only as applicable)

The Farm Plan shall describe the BMPs that are in-place and/or that will be implemented to protect water quality in downstream water bodies located on parcels under the same ownership as the Discharger, as related to operation and maintenance of reservoirs that receive recycled water, and which may discharge to surface waters of the State. This element shall detail operation and maintenance activities of these reservoirs, design overflow conditions, and the drainage location(s) during overflow and/or maintenance. The Discharger shall consider the

[17] Please note that LandSmart is revising the Farm Plan Template (Version 3.0) to include information regarding summer baseflow and also flood levels.

[18] This Performance Standard for stream and riparian habitats is not applicable at Vineyard Properties that do not include unconfined alluvial channels. Such properties also qualify for enrollment under Tier 1 upon full implementation of a Verified Farm Plan that attains applicable Performance Standards for discharge (as defined in Section 3 of this Attachment).

[19] These include reservoirs constructed on-channel and/or off-channel reservoirs that include spillways where subsequent to overflow there would be a discharge to surface waters of the State.

timing, magnitude, and duration of water released from these reservoir(s) to downstream waterbodies including minimizing the discharge of recycled water. The Discharger shall implement erosion and sediment control BMPs to prevent potential erosion impacts to creeks at the point of discharge and downstream of the discharge. The Discharger shall take measures to enhance downstream riparian areas including as applicable eradicating non-native species in downstream riparian areas within the Vineyard Property, augmenting gravel and wood supply to downstream channel reaches, and/or riparian habitat enhancement. The Farm Plan also shall include appended Water Rights permits or licenses that apply to the reservoir and describe management measures and reporting measures to ensure compliance with any bypass requirements and ensure net environment benefit associated with the use and storage of recycled water.

Photo point monitoring

The Farm Plan shall include photo point monitoring data as specified in Attachment E (Monitoring and Reporting).

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Table 1. Summary of Deadlines for Compliance

Existing Vineyard Property		New Vineyard Property	
Farm Plan: completed and Verified [20]	Within **three years of adoption of this Order**	**Farm Plan**: completed and Verified	By **completion of vineyard construction or** within **three years of adoption of this Order** (whichever date is later)
Performance Standards for new roads	By **completion of construction**	**Performance Standards** for new roads	By **completion of vineyard construction**
Performance Standards for Soil erosion in the Farm Area, Pesticide Management, and Nutrient Management	Within **three years of adoption of this Order**	**Performance Standards** for Soil erosion in the Farm Area, Pesticide Management, and Nutrient Management	By **completion of vineyard construction**
Performance Standards for Bed and Bank Erosion	Within **six years of adoption of this Order** (see note below)	**Performance Standards** for Bed and Bank Erosion	Within **six years of vineyard construction** (see note below)
Performance Standards for Peak Runoff	(see note below)	**Performance Standards** For Peak Runoff	Assessed via modeling By **completion of vineyard construction** (see note below)
Performance Standards for existing unpaved roads	Within **ten years of adoption of this Order**	**Performance Standards** for existing unpaved roads	Within **ten years of completion of vineyard construction**

Note 1: The effectiveness of BMPs implemented to attain Performance Standards for storm runoff from Hillslope Vineyards also shall be validated via required monitoring (see Attachment E).

Note 2: The Performance Standards listed in Table 1 are abbreviated from Section 3 (Performance Standards for Discharge) beginning on p. A-3.The Performance Standards for new roads are described on p. A-4 (see Storm-Proofed Roads); the Performance Standards for Bed and Bank Erosion are described on p. A-5 (see Bed and Bank Erosion); the Performance Standards for Peak Runoff are described on p. A-4 (see Peak Storm Runoff); the Performance Standards for soil erosion in the Farm Area, Pesticide management, and Nutrient management on p. A-3; and the Performance Standards for existing unpaved road are described on p. A-3.

[20] **If a Discharger chooses to develop the Farm Plan independently, the Farm Plan must be submitted to the Water Board for review/approval**. For an existing Vineyard Property, the deadline for submittal is within two years of adoption of this Order. For a new Vineyard Property, the deadline for submittal is within two years of adoption of this Order or at the time of vineyard construction, whichever date is later.

Table 2. Relationship between Bankfull Channel Width and Watershed Area (Marcus, 2015)

(Bankfull Width in feet = 13.03 * [Watershed Area, mi^2]$^{0.494}$; R^2 = 0.76; N = 50 sites)

Watershed Area (mi^2)	Estimated Bankfull Channel Width (ft)
0.1	4
0.2	6
0.5	9
1	13
2	18.5
3	23
4	26
5	29
8	37
10	41
15	50
20	59
50	93
100	131

ATTACHMENT B

Notice of Intent Form

Posted at:

www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/vineyard/index.shtml

ATTACHMENT C

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements
Order No. R2-2017-0033

Agricultural Third-Party Program
Roles, Responsibilities, and Approval Process

The Water Board encourages Dischargers to work with Third-Party Programs[1] in the development and implementation of Farm Plans.

This document explains the roles, responsibilities, and prerequisite qualifications of Third-Party Programs and provides guidance on the types of information needed for Water Board approval of Third-Party Programs.

1. What are the roles of a Third-Party Program?

Third-Party Programs provide technical assistance/expertise to help Dischargers comply with requirements of this Order. Third-Party Programs must fulfill all of the following roles:

- Assist Dischargers with development of Farm Plans as needed to achieve the Performance Standards in this Order;
- Verify that a Farm Plan prepared under your program, or professional oversight, is complete and that upon full implementation it will achieve all applicable Performance Standards for discharge, as described in this Order. Verified Farm Plans receive a technical review by a Qualified Professional who signs - the Farm Plan, a verification form, or a letter - to indicate that she/he concurs that upon full implementation, the Farm Plan would achieve all applicable Performance Standards for sediment and storm runoff control. A "Qualified Professional" is defined to include a California registered professional in a discipline associated with erosion and sediment control, for example, a professional engineer, licensed geologist, or certified professional in erosion or sediment control. Subject to review and approval by the Executive Officer, other individuals also may be designated as Qualified Professionals.

Optional roles may also include:

- Assist Dischargers with the filing of Notice of Intent and/or other required paperwork;
- Assisting Dischargers in securing the necessary permits for projects implemented to comply with this Order;
- Assisting Dischargers with monitoring and reporting;

[1] Third-Party Programs provide technical assistance/expertise to help Dischargers comply with requirements of this Order.

- Assisting Dischargers with preparation and/or submittal of annual reports;
- Assisting Dischargers with applications for grants or other financial assistance;
- Conducting monitoring; and/or
- Managing fee collection and payment to the State Water Board.

2. Who can qualify to be an approved Third-Party Program?

To be eligible for approval, Third-Party Programs must demonstrate that they have experience working with Vineyard Property owners and/or managers and technical expertise and experience in developing and implementing non-point source pollution control programs. Third-Party Programs providing technical assistance must provide objective input.

Groups that may apply for approval

- Local public agencies
- Resource Conservation Districts
- UC Cooperative Extension
- Non-profit organizations
- Water quality coalitions or other watershed groups

Groups and Individuals that will not be approved

- Entities that own or operate a Vineyard Property regulated by the Water Board (except in those cases where the vineyard is operated primarily for public education, research, or demonstration purposes).
- Entities or individuals that have a conflict of interest. A conflict of interest is a situation in which financial or other personal considerations have the potential to compromise or bias professional judgment and objectivity in verifying that a Farm Plan is complete and/or upon full implementation that it would attain the Performance Standards for discharge (as applicable) that are contained in this Order. An individual is considered to have a financial conflict of interest if they have a financial stake/interest in the facility for which they are providing technical assistance. Entities that collect fees from program participants to sustain or administer Third-Party Programs or assist with State Water Board fee collection are not considered to have a financial conflict of interest.

3. What is documentation is required of a Program seeking Water Board Approval?

Third-Party Programs seeking Executive Officer approval must submit the information below:

a. Provide a description of the methods that will be used to maintain records of: the Dischargers/Vineyard Properties enrolled in your program and also of the Dischargers/Vineyard Properties that have Farm Plans that are Verified (as complete and that upon full implementation will attain Performance Standards for discharge).

b. Demonstrate that Farm Plan assistance materials (e.g., templates, work books, guides) were developed with input from Water Board staff, other agency staff, technical experts, and/or academics and growers who have experience and knowledge of agricultural management

practices and road management to control erosion. Materials must be sufficiently comprehensive to ensure that full implementation of the Farm Plans will achieve the Performance Standards of this Order.

c. Describe the process (e.g., workshops/training, site visits, outreach) to be used to assist Dischargers in developing complete and accurate Farm Plans.

d. Demonstrate that the Third-Party Program has the qualified staff, or access to contractors, who have the appropriate professional licenses or certifications, technical expertise, or academic training in disciplines associated with preparing and implementing Farm Plans.

e. Describe the process that will be used to verify that a Farm Plan is complete and that upon its full implementation will achieve the Performance Standards for discharge specified in this Order. Where the Farm Plan is verified independently, that is by professionals not employed by the Third-Party Program, the Third-Party Program should submit a list of Qualified Professionals, one-or-more of whom would provide technical review to verify Farm Plans.

Third-Party Programs interested in providing assistance with fee collection also must submit:

f. Group Fee Collection: Describe the process and procedures that will be used to track and manage group fee collection. If a Discharger is a member of a group that has been approved by the State Water Board to manage fee collection and payment, there is a discounted fee assessed per acre.

4. How to request Water Board Approval?

Interested Third-Party Programs seeking Water Board approval should submit written requests that include items 3a through 3e, listed above, and/or item 3f (as applicable). The Water Board's Executive Officer will review each request and will either:

- Approve the request
- Request additional information if the application package is incomplete and additional information is needed to complete the submittal, or
- Disapprove the request if items 3a-3f cannot be adequately addressed.

Following Executive Officer approval of the request, electronic copies of the Executive Officer-approved Third-Party Program's Farm Plan templates and assistance materials will be made available to the public upon request.

A request for approval must be submitted electronically to [*electronic mailbox to be provided*]. An initial list of approved Third-Party Programs will be posted by January 12, 2018 (six months following Adoption of this Order). In order to be included on the initial list, a complete application must be submitted by October 12, 2017 (three months following adoption of this Order), and the interested Third-Party Program must be approved by the Executive Officer.

5. How will the Water Board review and evaluate Third-Party Program performance?

Water Board staff will periodically review and evaluate the performance of approved Third-Party Programs to ensure that the program and services provided meet the requirements specified above, that any required documentation is complete, submittals for group reporting and fee collection (optional) are accurate and timely, and that adequate Farm Plans are consistently being

prepared by the group's regulated entities. The Executive Officer may terminate its approval of a Third-Party Program if it is determined that the Water Board's requirements are not being met.

Nonpoint Source Policy

The State Water Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program adopted on May 20, 2004 (NPS Policy) requires regulation of nonpoint source pollution in California through WDRs, WDR waiver programs, or discharge prohibitions.

The NPS Policy specifically allows for Third-Party Programs or coalitions of dischargers to work collaboratively to improve water quality and allows the Water Board to evaluate Third-Party Program performance. Each proposed program will be judged individually on its merits.

ATTACHMENT D

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements
Order No. R2-2017-0033

NOTICE OF TERMINATION

Signed forms must be submitted to:

San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612
ATTN: Vineyard Program

SECTION I. FACILITY OPERATOR INFORMATION

Name:		Contact E-mail:
Mailing Address:		
City:	State: CA	Zip Code:
Name of Contact Person:		Contact Phone:

SECTION II. LANDOWNER INFORMATION (IF OPERATOR IS NOT THE OWNER)

Name:		Contact E-mail:
Mailing Address:		
City:	State:	Zip Code:
Name of Contact Person:		Contact Phone:

SECTION III. FACILITY INFORMATION

A. Facility Name		County:
Mailing Address:		Contact E-mail:
City:	State: CA	Zip Code:

Name of the Contact Person for the Vineyard Property : _____	Contact Phone: Email:
Facility County Assessor's Parcel Number	
A. Total Vineyard Property Parcel(s) Size: _____ acres B. Total area planted in grapes: _____ acres	

SECTION IV. BASIS OF TERMINATION

A. CHANGE OF VINEYARD PROPERTY OWNERSHIP or CHANGE IN CONTROL OF VINEYARD PROPERTY (check if true)

[ ] The control or ownership of this **Vineyard Property** changed on the following date: _____

The contact information for the succeeding **Vineyard Owner or Operator** is :

_____

B. VINEYARD PROPERTY CLOSURE or CHANGE IN LAND USE

[ ] The use of the **Vineyard Property** changed and the **Vineyard Property** no longer meets the eligibility requirements of the General Waste Discharge Requirements for the following reasons:

_____

as of the following date: _____

SECTION V. LANDOWNER NOTIFICATION

If the facility is leased or operated by someone other than the owner, this section must be signed by the operator.

I certify that the owner of the facility has been notified of these General Waste Discharge Requirements and that I have been designated by the owner as the "Authorized Representative."

Operator's Printed Name:_____ Signature:_____

Title: _____ Date: _____

SECTION VI. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Owner or Authorized Representative Printed Name:_____

Owner or Authorized Representative Signature:_____ _____

Date:_____

Telephone Number:_____Email:_____

ATTACHMENT E

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements
Order No. R2-2017-0033

MONITORING AND REPORTING REQUIREMENTS

This Monitoring and Reporting Program (MRP) is issued pursuant to Order No. R2-2017-0033 (Order) and California Water Code (CWC) section 13267. The Discharger shall not implement any changes to this MRP unless, and until, a revised MRP is approved by the Executive Officer. To allow the Water Board to evaluate compliance with the terms and conditions of the Order, this MRP requires that monitoring, sampling, and record-keeping be conducted by Vineyard Property owners and operators (hereinafter, Dischargers). The Executive Officer may modify Attachment E as necessary or appropriate. Public Notice of the modification of Attachment E would be provided, and revised requirements would be posted on the Water Board website.

This MRP requires that Tier 2 and Tier 3 Dischargers prepare an Annual Report of compliance (Table E-1), to be submitted to the Water Board by December 15 of each year. The Annual Report shall document: a) status of the Farm Plan (e.g., as applicable, completed, "Verified"); b) property inspections; and c) progress toward attainment of applicable Performance Standards for discharge (e.g., miles of unpaved roads and percent length hydrologically connected). Per the time schedule and specifications, defined as follows herein, Tier 2 and Tier 3 Dischargers also are required to submit a Monitoring Plan and a Monitoring Results Report to evaluate Streambed Conditions and BMP effectiveness.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS:

Tier 1:
Verification Letter
BMP Implementation Monitoring

Tiers 2 and Tier 3*:
BMP Implementation Monitoring
Stream Monitoring
BMP Effectiveness Monitoring
Annual Compliance Report
Monitoring Plan (per BMP Effectiveness and Streambed Monitoring)
Monitoring Results Report (per BMP Effectiveness and Streambed Monitoring)

*Tier 3 Dischargers must submit their Farm Plan to the Water Board for review/approval.

MONITORING AND REPORTING BASED ON TIERS

Three tiers for enrollment are defined under this Order and the MRP that are related to the relative level of threat to water quality presented by pollutant discharges at an individual Vineyard Property. Tier 1 sites are expected to present the lowest level of threat, Tier 2 an intermediate level, and Tier 3 the highest potential threat. Required monitoring and reporting, as related to enrollment tier, is as presented below:

A. Tier 1 (Stewardship Tier): Water Quality Monitoring and Reporting Requirements

Tier 1 Dischargers are required to submit a Verification Letter and to conduct BMP Implementation Monitoring, as specified immediately below. Attachment A specifies requirements for enrollment in Tier 1 (Stewardship Tier). In summary, these include having fully implemented a "Verified" Farm Plan to meet all applicable Performance Standards (which are as specified in Attachment A).

Verification Letter (Confirming Attainment of Performance Standards)

At the time of enrollment in Tier 1, the permittee shall submit a letter signed by a representative of an approved Third-Party Program confirming that: a) the Farm Plan has been "verified" and has been fully implemented; and b) as applicable, that the Performance Standard for Stream and Riparian Habitats has been attained (as defined in Attachment A). Once every five years thereafter, a verification letter must be submitted to the Water Board verifying that the Farm Plan remains fully implemented in order for the permittee to retain its Tier 1 status.

BMP Implementation Monitoring

Photo-points provide a qualitative indication of BMP performance and habitat and water quality conditions in receiving waters. Photo-points shall be established and monitored each year to document winter readiness, demonstrate annual maintenance practices and BMP implementation, and to document habitat and water quality conditions in receiving waters at and/or near points of discharge. Photo-points shall be numbered and depicted on maps contained in the Farm Plan (requirements and specifications for the Farm Plan are included in Attachment A). Photo-point records and field notes shall be appended to the Farm Plan. Guidance regarding establishment and protocols for photo-point monitoring are provided in OWEB (2007) and NRCS (2009).

B. Tier 2 and 3 Dischargers: Water Quality Monitoring and Reporting Requirements

Introduction

Tier 2 and Tier 3 Dischargers are required to conduct BMP Implementation Monitoring, Streambed Monitoring (as applicable), and BMP Effectiveness Monitoring and also submit an Annual Compliance Report (Table E-1). The required Streambed and BMP effectiveness monitoring may be satisfied either through participation in a watershed-based group effort or through individual property-specific monitoring. Following permit adoption, in State fiscal year 2017-18, Water Board staff intend~~s~~ to work with Third-Party Programs, and/or establish a technical advisory committee, to provide additional guidance with regard to BMP effectiveness monitoring and streambed monitoring and reporting.

BMP Implementation Monitoring

Photo-points provide a qualitative indication of BMP performance and habitat and water quality conditions in receiving waters. Photo-points shall be established and monitored each year to document winter readiness, demonstrate annual maintenance practices and BMP implementation, and document habitat and water quality conditions in receiving waters at and/or near points of discharge. Photo-points shall be numbered and depicted on maps contained in the Farm Plan (requirements and specifications for the Farm Plan are included in Attachment A). Photo-point records and field notes shall be appended to the Farm Plan. Guidance regarding establishment and protocols for photo-point monitoring are provided in OWEB (2007) and NRCS (2009).

Specification of Streambed and BMP Effectiveness Monitoring Option

This MRP allows Tier 2 and 3 Dischargers to conduct stream monitoring and BMP effectiveness monitoring either through individual or watershed-based group monitoring. We strongly encourage Dischargers to participate in a watershed-based group monitoring program. Dischargers who do not elect to participate in a group monitoring program must submit their individual monitoring plans to the Executive Officer for review and approval and conduct individual, property-specific surface water quality monitoring that achieves the same purpose as the group program. At the time of enrollment, Tier 2 and Tier 3 Dischargers must elect a surface water quality monitoring option, either:

a) **Napa River and/or Sonoma Creek Watershed-Based Group Monitoring**; or
b) **Individual Property-Specific Monitoring**,

in order to comply with the monitoring requirements specified in this Order.

For all existing Vineyard Properties, regardless of the monitoring option Tier 2 and 3 Dischargers elect, **by July 15, 2019**, a surface water quality monitoring plan (monitoring plan) shall be submitted to the Executive Officer for review and approval. **By July 15, 2022**, a report that presents and analyzes monitoring results (monitoring report) shall be submitted for review and approval by the Executive Officer. The scope of the monitoring plan and monitoring report shall include BMP effectiveness and streambed monitoring as described below. As indicated earlier, the Executive Officer may modify Attachment E, as necessary or appropriate at a future date.

For new Vineyard Properties, those that are developed subsequent to adoption of this Order, that elect the Group Monitoring option, the monitoring plan and report requirements are satisfied subject to meeting the terms of enrollment in the group (i.e., if the new Vineyard Property enrolls in a group that has previously submitted a monitoring plan and report that were approved by the Executive Officer, these reporting requirements are satisfied). For new Vineyard Properties that elect the Individual Property-Specific Monitoring option, the requirements are the same; however, the deadline for the monitoring plan submittal is by two-years following vineyard development and for the monitoring report by five-years following vineyard development.

Streambed Monitoring

Streambed substrate conditions shall be monitored in channel reaches that provide existing and/or potential spawning habitat for steelhead and/or salmon to evaluate attainment of TMDL numeric targets for sedimentation in the Napa River and Sonoma Creek watersheds (Water Board 2008b, Table 1; Water Board 2009b, Table 1). The requirement to monitor streambed substrate conditions may be satisfied through participation in a Watershed-Based Group Monitoring program or by

Individual Property-Specific Monitoring, which is applicable, if a Vineyard Property includes channel reaches that provide existing and/or potential spawning habitat for steelhead or salmon. Potential spawning sites are as defined in Water Board, 2009b, Table 1, which is included immediately below. A Watershed-Based Group Monitoring program for streambed monitoring already has been developed for the Napa River watershed that could be implemented to satisfy this requirement as defined in Stillwater Sciences (2013) and/or with refinements. Field sampling protocols for: a) spawning gravel permeability are defined in Barnard and McBain (1994) and/or in Stillwater Sciences (2013); b) streambed scour as defined in Nawa and Frissell (1993), Schuett-Hames, et al. (1999), and/or in Stillwater Sciences (2013); c) substrate composition percent fines, are defined in Valentine (1995); and d) v-star are defined in Hilton and Lisle (1993).

TMDL sediment targets [streambed conditions] for the Napa River and its Tributaries
(Table 1, Water Board, 2009b).

Spawning gravel permeability	Median value ≥ 7000 cm/hr[a]
Streambed scour	Mean depth of scour ≤ 15 cm[b]

[a] Target applies to all potential spawning sites for steelhead and salmon in the Napa River and its tributaries, excluding those upstream of municipal water supply reservoirs.

[b] Target applies to the response of the streambed to peak flows less than the bankfull event at all potential spawning sites for salmon in gravel-bedded reaches of: 1) mainstem Napa River; and 2) alluvial reaches of tributaries where streambed slope is between 0.001 and 0.02. Potential spawning sites can be identified based on the following: 1) dominant substrate size in the streambed surface layer is between 8 and 128 mm; 2) minimum surface area of gravel deposit is 0.2 square meters in tributaries and 1.0 square meter in mainstem Napa River; or 3) located within mainstem Napa River at a riffle head, pool tail, and/or pool margin or in tributary reaches where streambed slope < 0.03, or in tributary reaches where streambed slope > 0.03 in pool tails, backwater pools, and/or in gravel deposits associated with flow obstructions (e.g., woody debris, boulders, banks).

TMDL sediment targets [streambed conditions] for Sonoma Creek and its Tributaries
(Table 1, Water Board, 2008b).

Spawning gravel permeability	Median value ≥ 7000 cm/hr[a]
Pool filling	Decreasing trend in the volume of fine sediment deposited in pools
Substrate Composition- Percent Fines	Percent of fine sediment less than 0.85 mm in diameter is less than or equal to 14 percent of the total bulk core sample (<14% fines < 0.85 mm)[b]
	Percent of fine sediment less than 6.40 mm in diameter is less than or equal to 30 percent of the total bulk core sample (<30% fines < 6.40 mm)[b]

[a] Target applies to all potential spawning sites for steelhead and salmon in Sonoma Creek and its tributaries.

[b] Target applies to wadeable streams and rivers with gradient less than 3 percent. A wadeable stream is one which an average human can safely cross on foot during the summer, low flow season while wearing chest waders.

BMP Effectiveness Monitoring

BMP Effectiveness Monitoring shall be conducted to evaluate attainment of the Performance Standards for sediment discharge and storm runoff, specified by this Order. As described in the introduction to Section B, all aspects of required BMP effectiveness monitoring may be performed as part of a Group Monitoring plan (where a stratified sample of sites is monitored) or may be performed as part of an Individual Property-Specific Monitoring plan. In summary:

a) All vineyards must perform a **ground cover survey** to evaluate attainment of the Performance Standard for soil erosion in the farm area; and

b) Hillslope Vineyard Properties also must perform **road inventories** to evaluate attainment of the Performance Standard for sediment delivery from existing unpaved roads, and **bed and bank erosion monitoring** (cross-sectional profiles), as applicable, to evaluate attainment of the Performance Standard for bed and bank erosion[1].

Ground Cover Survey: At all Vineyard Properties, annually during the month of November, percent ground cover shall be estimated based on a weighted average value of samples collected to characterize vineyard rows, inter-rows, and vineyard avenues. Examples of acceptable approaches for ground cover survey and estimation are presented in US Department of Agriculture (1999). Alternative approaches (e.g., normalized difference vegetation index (NDVI)) for estimation of percent ground cover also may be proposed for review and approval of the Executive Officer. In the evaluation of ground cover survey data, submitted as part of the Monitoring Results Report (see above), a weighted average or weighted median value for ground cover (accounting for relative proportions of the Farm Area in inter-rows, rows, avenues, and for inter-annual variation) could be input into the universal soil loss equation (USLE) or the revised universal soil loss equation (RUSLE) model to evaluate attainment of the Performance Standard for soil erosion within the Farm Area, which corresponds to the soil loss rate being less than or equal to the tolerable soil loss rate as defined by the USDA Soil Conservation Service (1994). Other analytical approaches to evaluate attainment of the Performance Standard also may be proposed.

Road Inventory: At Hillslope Vineyard Properties, an inventory of unpaved roads shall be conducted after each winter and no later than May 15, to qualitatively evaluate road sediment discharge potential and BMP effectiveness. Sources of erosion and evidence of sediment transport to stream channels shall be documented on a road inventory form. An example of an acceptable approach to road inventory is provided by the California Department of Forestry and Fire Protection (2014). Other approaches also may be proposed for review and approval of the Executive Officer.

Bed and Bank Erosion (cross section profiles): This monitoring is applicable only at Hillslope Vineyard Properties. As specified in Attachment A (to evaluate attainment of the performance standard for bed and bank erosion), a field survey must be performed (as specified in Attachment A) to evaluate attainment of the Performance Standard. Based on conditions documented in the

[1] As specified in Attachment A, this Performance Standard applies only to Hillslope Vineyards. Where a Hillslope Vineyard discharges into an unstable area (e.g., an actively eroding gully, landslide, and/or a down-cutting or head-cutting channel), in addition to the required channel reconnaissance and photo-points, bed and bank erosion monitoring would include cross-sectional surveys to evaluate effectiveness of additional BMPs implemented to attenuate storm runoff and soil bioengineering practices implemented to control erosion in the unstable area.

required field survey[2], where a Hillslope Vineyard discharges into an unstable area (e.g., an actively eroding gully, a landslide, and/or a head-cutting and/or down-cutting channel), additional BMPs must be implemented (as feasible) to attenuate storm runoff and to control erosion in the unstable area. The required cross-section and photo-point monitoring (where a Hillslope Vineyard discharges into an unstable area) is to evaluate erosional volume and response to BMP implementation and other factors, and shall be presented and evaluated in the Monitoring Results Report (see above). Other approaches to monitoring may be proposed in the required Monitoring Plan.

Annual Compliance Report

Following permit adoption, each year by December 15, all Tier 2 and Tier 3 Dischargers must submit an annual report that documents progress toward completion of the Farm Plan and progress toward attainment of the performance standards for discharge. The Annual Compliance Reporting Form is included as Table E-1 to this attachment.

Farm Plan Submittal

Tier 3 Dischargers also must submit a completed Farm Plan (as specified in Attachment A) to the Water Board for review and approval in conformance with the schedule for compliance specified in Attachment A. Upon approval, such a Farm Plan is defined as Verified, and the Vineyard Property would qualify for enrollment in Tier 2 or Tier 1, as applicable.

[2] At a minimum, the field survey shall be conducted prior to submittal of the monitoring report, and at least once every five years thereafter, and/or following the occurrence of a 5-year or greater recurrence interval peak discharge, that is ≥ 10,000 cfs at the US Geological Survey Napa River near St. Helena gauge.

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TABLE E-1: ANNUAL COMPLIANCE REPORTING FORM

This Vineyard Property is in compliance with the General WDRs for Vineyard Properties in the Napa River and Sonoma Creek Watersheds (Order No. R2-2017-0033).

Vineyard Property Name:	Phone: Email:
Mailing Address or P.O. Box:	City, State, ZIP Code:
List all Assessor Parcel Numbers (APNs) or legal description (Township, Range, Sections) for the Vineyard Property included in this plan:	

Enrolled under: ☐Tier 2 ☐Tier 3

Farm Plan (check each box below, as applicable)

☐ Farm Plan has been completed[3].

☐ Farm Plan has been Verified[4] by: _____ Date: _____

Property Inspections (fill in dates when inspections were completed)

☐Representative photo-points have been established and are being monitored to document winter readiness, to demonstrate BMP implementation, and to document habitat and water quality conditions in receiving waters.

☐Inspections, prior to the wet season, were conducted in the Farm Area and on Vineyard Property access roads to ensure readiness. Date(s) of inspection(s): _____

☐Inspections, and as needed maintenance actions, were completed during the wet season to confirm that BMPs are functioning properly and/or to address problems. Date(s) of inspection(s): _____

If the Vineyard Property includes Hillslope Vineyard Blocks:

☐ Field surveys were conducted to assess compliance with the bed & bank erosion performance standard. Date(s) of field survey(s): _____

[3] All required elements of the Farm Plan have been prepared.

[4] "Verified" means that an approved Third-Party Program has coordinated a technical review of the Farm Plan by a Qualified Professional who has signed - the Farm Plan, a verification form, or a letter - to indicate that she/he concludes that, upon full implementation, the Farm Plan would achieve all applicable performance standards for sediment and storm runoff control. Although a Verified Farm Plan receives technical review, it remains the Discharger's responsibility to ensure the Farm Plan is implemented to achieve all applicable performance standards for discharge. Third-Party Program verification does not constitute an approval of the Farm Plan.

TABLE E-1 (CONTINUED): ANNUAL COMPLIANCE REPORTING FORM

Baseline Conditions as Related to Performance Standards

Farm Area
Acres in the Farm Area: _____

Acres under a County approved ECP: _____

Hillslope Vineyard Runoff (check boxes below as applicable)
☐The Vineyard Property includes Hillslope Vineyard blocks.

☐Hillslope Vineyard blocks drain into an unstable area (e.g., landslide, gully, or head-cutting or down-cutting channel).

☐The Farm Plan includes BMPs to achieve the performance standard for bed and bank erosion.

Unpaved Roads
Miles of unpaved roads: _____

Percent, by length, of unpaved roads that are hydrologically connected: _____

Number of stream crossings along unpaved roads: _____

Of these, number of crossings with diversion potential: _____

Number of stream crossings on unpaved roads that drain forested areas: _____

Of these, number of stream crossings with trash racks: _____

Farm Plan Submittal (applicable only to Tier 3 Dischargers)
Farm Plan completed: ☐Yes, the Farm Plan is attached or was previously submitted.

☐No, the Farm Plan has not been completed yet.

Note: Tier 3 Dischargers must submit the Farm Plan for review and approval. For an existing Vineyard Property, the Farm Plan must be submitted within two years of adoption of this Order. For a Vineyard Property developed subsequent to adoption of this Order, the Farm Plan must be submitted at or before the time that vineyard construction is completed.

TABLE E-1 (CONTINUED): ANNUAL COMPLIANCE REPORTING FORM

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Owner or Authorized Representative Printed Name*:_____

Owner or Authorized Representative Signature: _____

Date: _____

Telephone Number: _____ Email: _____

* A duly authorized person designated by the owner of the Vineyard Property, as having responsibility for the overall operation of the regulated facility. The authorized representative may be the Vineyard Property operator or operator's duly authorized designee.

ATTACHMENT F

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements
Order No. R2-2017-0033

CEQA Impacts and Mitigation Measures

Table F-1 provides a summary of impacts and mitigation measures, which are presented in detail in the Environmental Impact Report.

Table F-1: Summary of CEQA Impacts and Mitigation Measures

Category: Air Quality and Greenhouse Gases		
EIR Impact No.	Impact Summary	General Order Mitigation Measures
Impact 5.1	Compliance actions (e.g., construction of BMPs that involve earth moving) completed at Vineyard Properties throughout the project area could conflict with implementation of an applicable air quality plan. The primary pollutant of concern is fine particulate matter.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measures AQ-1 through AQ-4.
Impact 5.2	Compliance actions (e.g., construction of BMPs that involve earth moving) completed at Vineyard Properties throughout the project area could violate air quality standards or contribute substantially to an existing or projected air quality violation. The primary pollutant of concern is fine particulate matter.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measures AQ-1 through AQ-4.
Impact 5.4	Compliance actions (e.g., construction of BMPs that involve earth moving) completed at Vineyard Properties throughout the project area may have the potential to expose sensitive receptors to substantial pollutant concentrations. The primary pollutant of concern is fine particulate matter.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measures AQ-1 through AQ-4.
Impact 5.6	Compliance actions (e.g., construction of BMPs that involve earth moving) completed at Vineyard Properties throughout the project area may generate significant GHG emissions.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measure GHG-1.

Table F-1 (Cont.): Summary of CEQA Impacts and Mitigation Measures

Category: Biological Resources		
EIR Impact No.	Impact Summary	General Order Mitigation Measures
Impact 6.1b	Short-term increases in sedimentation associated with BMP construction in some cases may have the potential to adversely affect special-status aquatic species.	As identified in the EIR, and as applicable to the actions taken to comply with this Order, the Discharger shall implement mitigation measures BR-1 through BR-8.
Impact 6.2	BMP construction and/or maintenance, in some cases may have the potential to adversely affect riparian habitats and/or special-status species therein.	As identified in the EIR, and as applicable to the actions taken to comply with this Order, the Discharger shall implement mitigation measures BR-1 through BR-8.
Impact 6.3	Noise generated by heavy equipment used to construct BMPs could in some cases disrupt breeding or nesting by special-status bird species.	As identified in the EIR, and as applicable to the actions taken to comply with this Order, the Discharger shall implement mitigation measures BR-1 through BR-8. Also, where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measures BR-9 and BR-10.
Impact 6.4	Detention basins and/or new storm-proofed roads could be sited in upland areas (i.e., areas upslope of waters and wetlands of the State) outside of the developed footprint of the Vineyard Property that in some cases may provide habitat for special-status species and/or are defined as Sensitive Natural Communities. In such cases, impacts to these biological resources could be significant.	As identified in the EIR, and as applicable to the actions taken to comply with this Order, the Discharger shall implement mitigation measures BR-1 through BR-8. Also, where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measures BR-9 through BR-11.

Table F-1 (continued): Summary of CEQA Impacts and Mitigation Measures

Category: Cultural Resources		
EIR Impact No.	Impact Summary	General Order Mitigation Measures
Impact 7.2	Compliance actions (e.g., construction of BMPs that involve earth moving) may have the potential at some Vineyard Properties to cause a substantial adverse change in the significance of an archeological resource.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measure CR 7-2.
Impact 7.3	Compliance actions (e.g., construction of BMPs that involve earth moving) may have the potential at some Vineyard Properties to directly or indirectly destroy a unique paleontological or geologic feature.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measure CR 7-2.
Impact 7.4	Compliance actions (e.g., construction of BMPs that involve earth moving) may have the potential at some Vineyard Properties to disturb human remains including those interred outside of formal cemeteries.	Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, the Discharger shall implement Mitigation Measure CR 7-2.
Category: Hydrology and Water Quality		
EIR Impact No.	Impact Summary	General Order Mitigation Measures
Impact 8.4b	Construction activities on unpaved roads and/or outside of the developed footprint of the vineyard that would occur in order to comply with the general WDRs, which could result in temporary increases in fine sediment delivery to stream channels, and resultant sedimentation.	As identified in the EIR, and as applicable to the actions taken to comply with this Order, the Discharger shall implement mitigation measures BR-1 through BR-8. In Sensitive Water Supply Drainages, as defined by the County of Napa, where compliance actions are subject to the requirement to obtain a discretionary permit, as applicable, the Discharger shall comply with Mitigation Measures HY-1 and/or HY-2.

Note: all compliance actions listed above that are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, as applicable, can and should be adopted by other agencies as part of their respective approval processes (See CEQA Guideline 15091 and 15126.4.).

The following mitigation measures identified in the Environmental Impact Report for these General WDRs shall be implemented by the Discharger, as applicable to actions taken to comply with this Order:

A. Biological Resources

Mitigation Measure BR-1: Requirement to Obtain and Comply with CWA 401 permits

Where BMP construction overlaps with and/or disturbs a stream channel, riparian area, and/or other wetlands or waters of the United States, the Water Board would require the project proponent to comply with Mitigation Measure BR-1: to apply for a Clean Water Act (CWA) section 401 permit.

Projects subject to CWA section 401 permits also are subject to CWA section 404 permits issued by the U.S. Army Corps of Engineers and also to Endangered Species Act Section 7 Consultations where species listed under the federal Endangered Species Act have the potential to occur. Where BMP construction activities overlap at all with aquatic and/or riparian habitats, they also are subject to Streambed Alteration Agreements issued by the California Department of Fish and Wildlife (CDFW).

Mitigation Measures BR-2 through BR-8: Construction Activity Controls

To avoid significant increases in sediment delivery to channels (and resultant sedimentation) that could arise from any construction activities undertaken to comply with the General WDRs, the Discharger shall incorporate a suite of Construction Activity Controls (Mitigation Measures BR-2 through BR-8), shown below, to avoid and minimize potential pollutant discharges that may be associated with construction activities and/or post-construction erosion in areas that were disturbed.

Mitigation Measure BR-2: Temporal Limitations on Construction

1. The timing of construction activities will take into consideration fisheries and other aquatic wildlife usage in the project area. Construction activities will occur in the period between June 1 and October 15, unless (as applicable[36]) CDFW, U.S. Fish & Wildlife Service (USFWS), and/or NOAA Fisheries define an alternative work window to avoid site specific impacts on special-status species. Work in and around streams that support anadromous fish populations or California freshwater shrimp may not begin until June 15. Work beyond October 15 may be authorized on a site-specific basis with approval (as applicable) from the Water Board, CDFW, USFWS, and/or NOAA Fisheries and provided the work would be completed prior to first winter rains. Planting may occur after October 15, if success of vegetation establishment is increased due to more favorable environmental conditions. Planting above the ordinary high water line may occur at any time of the year.
2. Excavation and grading activities shall occur only in dry weather periods. Upon completion of grading, slope protection of all disturbed sites will be installed prior to the onset of rain.
3. Construction within 75 feet of established riparian vegetation shall be avoided during the migratory bird nesting season (February 15 to August 15). If work must occur during this period,

[36] In describing requirements under Mitigation Measures BR-2 through BR-8, "as applicable" refers to all projects (BMP construction/maintenance actions) that are subject to the requirement to obtain a permit from the agency that is indicated in the text that follows.

a qualified biologist or individual approved by CDFW will conduct a pre-construction survey for bird nests or nesting activity in the project area. If active nests or nesting behavior are observed (for any species other than starlings and house sparrows) an exclusion zone of 75 feet will be established to protect the nesting birds. If any listed or sensitive bird species are identified, CDFW must be notified prior to further action. Take of active bird nests is prohibited.

4. To protect California red-legged frog (CRLF) and/or foothill yellow-legged frog, all construction within stream channels shall take place during daylight hours. If suitable habitat is present for CRLF or foothill yellow-legged frog, project activities will begin after July 1 to avoid impacts on breeding or egg masses.

Mitigation Measure BR-3: Construction Site Management Controls

1. As feasible, the Discharger shall use existing ingress or egress points. Placement of temporary access road, staging areas, and other facilities shall avoid or limit disturbance to habitat and will be restored to preconstruction conditions.
2. Disturbance to existing grades and vegetation shall be limited to the actual site of the conservation project and necessary access routes.
3. Trash, litter, construction debris, cigarette butts, etc., shall be stored in a designated portion of the construction site (that does not overlap with or impact natural habitat areas), and/or shall be removed from the site at the end of each working day. Upon completion of work, the Discharger is responsible for removing all trash, litter, construction debris, cigarette butts, etc.
4. All construction debris and sediments shall be taken to appropriate landfills or, in the case of sediments, disposed of in upland areas on- or offsite.
5. No petroleum products, chemicals, silt, fine soils, and any substances deleterious to fish, amphibian, plant, or bird life shall be allowed to pass into, or be placed where it can pass into the waters of the state.
6. Contractors shall have emergency spill cleanup gear (spill containment and absorption materials) and fire equipment available on site at all times.
7. The use or storage of petroleum-powered equipment shall be accomplished in a manner to prevent the potential release of petroleum materials into waters of the state (Fish and Game Code §5650).
8. All vehicles and equipment on the site must not leak any type of hazardous materials such as oil, hydraulic fluid, or fuel. Fueling shall take place outside of the riparian corridor.
9. As needed, a contained area located at least 50 feet from a watercourse shall be designated for equipment storage, short-term maintenance, and refueling. If possible, these activities will not take place on the project site.
10. Vehicles shall be inspected for leaks and repaired immediately. Leaks, drips, and other spill will be cleaned up immediately to avoid soil or groundwater contamination. Major vehicle maintenance and washing will be done off site. All spent fluids, including motor oil, radiator coolant, or other fluids, and used vehicle batteries will be collected, stored, and recycled as hazardous waste off site. Dry cleanup methods (i.e., absorbent materials, cat litter, and/or rags) will be available on site. Spilled dry materials will be swept up immediately

11. Best management practices for construction period runoff and erosion control shall be employed as described in Requirements for Erosion Control below.

Mitigation Measure BR-4: Erosion Control Requirements

1. Best management practices for construction period runoff and erosion control shall be employed.
2. Erosion control and/or sediment detention devices shall be incorporated into the project design and implemented at the time of construction. These devices will be in place prior to October 15 for the purposes of minimizing fine sediment input to flowing water. These devices will be placed at all locations where the likelihood of sediment input exists. Sediment collected in these devices will be disposed of away from the collection site and above the normal high water mark. These devices will be inspected regularly to ensure they are functioning properly.
3. The project site will be restored to pre-construction condition or better. Disturbed areas shall be re-vegetated prior to the onset of rain by live planting, native seed casting, or hydro-seeding. See also Limitations on Construction Equipment, Earthmoving, and Vegetation Removal sections below.
4. When implementing or maintaining a critical area planting[37] above the high water line, a filter fabric fence, biodegradable fiber rolls, gravel bars, and/or hay bales shall be utilized, if needed, to keep sediment from flowing into the adjacent waterbody. At the time vegetation is sufficiently mature to provide erosion control, it may be appropriate to remove the fence, fiber rolls and/or hay bales. Annual review by the vineyard owner/operator and/or their representative(s) will occur until the critical area planting is established to control erosion.
5. All debris, sediment, rubbish, vegetation, or other material removed from the channel banks, channel bottom, or sediment basins shall be removed to a location where they will not re-enter the waters of the state.
6. Soil exposed as a result of construction and soil above rock riprap shall be re-vegetated using native seed casting or by hydro-seeding prior to the onset of rain. In general, interstitial spaces between rocks will be planted with riparian vegetation such as willows rather than hydro-seeded.
7. Discharge of decant water from any onsite temporary sediment stockpile or storage areas or any other discharge of construction dewatering flows to surface waters, except as described in Limitations to Work in Streams and Permanently Ponded Areas below, outside of the active dredging site is prohibited.
8. Inspection of the performance of sediment control devices shall occur at least once each day during construction to ensure the devices are functioning properly.

Mitigation Measure BR-5: Limitations on Construction Equipment

1. As feasible, the Discharger shall use existing ingress or egress points, and work will be performed from the top of creek banks.
2. When heavy equipment is used, woody debris and vegetation on banks and in the channel shall not be disturbed if outside of the project's scope.

[37] A critical area planting involves establishing permanent vegetation on sites that have or are expected to have, high erosion rates.

3. Heavy equipment shall not be used in a flowing stream, creek, or ponded area, except to cross a stream or pond to access the work site.
4. Heavy equipment use in a streambed is only permissible when the streambed is dry. The amount of time heavy equipment is stationed, working, or traveling within the creek bed shall be minimized.
5. Use of heavy equipment shall be avoided in a channel bottom with rocky or cobbled substrate. If access to the work site requires heavy equipment to travel on a rocky or cobbled substrate, a rubber tire loader/backhoe is the preferred vehicle.

Mitigation Measure BR-6: Limitations on Earthmoving

1. Finished grades shall not exceed 2:1 side slopes.
2. Excavated material not used in the implementation of the BMP shall be removed out of the 100-year flood plain.
3. Placement of temporary access roads, staging areas, and other facilities shall avoid or limit disturbance to habitat and shall be restored to pre-construction conditions.
4. Road improvement projects shall be modeled on the "Handbook for Forest and Ranch Roads: A Guide for planning, designing, constructing, reconstructing, maintaining and closing wildland roads," (Weaver et al., 2014).
5. If the substrate of a seasonal pond, creek, stream or waterbody is altered during work activities, it shall be returned to approximate pre-construction conditions after the work is completed, unless (as applicable) NOAA Fisheries and/or CDFW determine that other measures should be implemented.
6. Overhanging banks within potential California freshwater shrimp habitat shall remain undisturbed.

Mitigation Measure BR-7: Limitations on Vegetation Removal and Replanting

1. The spread or introduction of exotic plant species shall be avoided to the maximum extent possible by avoiding areas with established native vegetation during project activities, restoring disturbed areas with native species where appropriate, and performing post-project monitoring and control of exotic species.
2. Removal of invasive exotic species is strongly recommended. Removal using hand tools, including chainsaws and weed-whackers, and hand pulling of exotics shall be done in preparation for establishment of native plantings. To the extent possible, re-vegetation will be implemented at the same time removal of exotic vegetation occurs. If giant reed (*Arundo donax*) is removed, cuttings will be disposed of in a manner that shall not allow reseeding to occur.
3. Disturbance of native shrubs or woody perennials or removal of trees from streambanks or stream channels will be avoided or minimized; if native riparian vegetation will be disturbed, it will be replaced with similar native species.
4. Except (as applicable) with approval from CDFW, there will be no cutting or removal of native trees 4" or greater diameter at breast height (DBH), except willows, for which there will be no cutting or removal of trees 6" or greater DBH. Exotic trees that are causing habitat damage or

hazardous situations may be removed with approval of the project biologist. Any exotic trees removed will be replaced with appropriate natives. For any permitted tree removal, the root structure will be left intact unless (as applicable) removal is authorized by CDFW.

5. If native trees over 6" DBH are to be removed (with approval from CDFW), they will be replaced at a 3:1 ratio.
6. Projects within potential California red-legged frog habitat will be designed to minimize disturbance to vegetation near or in permanent and seasonal pools of streams, marshes, ponds, or shorelines with extensive emergent or weedy vegetation.
7. Project activities in areas of potential California freshwater shrimp habitat will avoid removal of or damage to overhanging vegetation along stream channels.
8. Hand labor will be used to trim vegetation within the channel or on the bank. Handheld equipment such a weed-whackers and chainsaws are authorized.
9. Native plants characteristic of the local habitat type will be the preferred alternative when implementing and maintaining the BMPs in natural areas. When specified, as required by the regulatory agencies, only native plant species will be used. Under special circumstances, regulators may allow for the use of non-invasive, non-persistent grass species.
10. All areas disturbed by the project or in which vegetation was removed will be restored to a natural state with native trees, shrubs, and/or grasses. Barren areas will typically be planted with a combination of willow stakes, native shrubs, and trees and/or erosion control grass mixes.
11. For projects that have removed native vegetation, post-construction re-vegetation success shall be equivalent to or better than the pre-project conditions. If, after 5 years, that level of success has not been achieved, the vineyard owner/operator or their representative(s) shall consult with CDFW to develop and implement measures to achieve success.
12. If needed, an irrigation system shall be installed to ensure establishment of vegetation; when vegetation is sufficiently established, irrigation materials will be removed.
13. The project area shall be restored to pre-construction conditions or better.

Mitigation Measure BR-8: Limitations on Work in Streams and Permanently Ponded Areas

In specific cases where it is deemed necessary to work in a flowing stream/creek, the work area shall be isolated, and all flowing water shall be temporarily diverted around the work site to maintain downstream flows during construction. A qualified biologist shall prepare a species protection and dewatering plan and be present for all dewatering and re-watering events. The plan shall be prepared with guidance (as applicable) from NOAA Fisheries and/or CDFW. When construction is completed, the flow diversion structure shall be removed in a manner that will allow flow to resume with the least disturbance to the substrate and water quality.

Hydrology and Water Quality

Dischargers shall comply with Mitigation Measures BR-2 through BR-8 (described above) that address potential short-term construction-related increases in erosion and sedimentation impacts. These include:

- Temporal limits on construction activities (BR-2)
- Construction site management actions (BR-3)
- Requirements for erosion control (BR-4)
- Limitations on heavy-equipment use (BR-5)
- Limitations on earth moving/grading (BR-6)
- Limitations on vegetation removal and requirements for replanting (BR-7), and
- Limitations on work in streams and/or ponded areas (BR-8).

In Sensitive Water Supply Drainages, as defined by the County of Napa, where compliance actions are subject to the requirement to obtain a discretionary permit, as applicable, the Discharger shall comply with Mitigation Measures HY-1 and/or HY-2.

Hydrology-1: Restriction on the Timing of Grading and Earthmoving Activities in Sensitive Water Supply Drainages:

> Grading and earthmoving activities undertaken to comply with this Order that are subject to Napa County's requirements are restricted to the period between April 1 and September 1, unless a grading extension is otherwise granted by Napa County.

Hydrology-2: Sensitive Water Supply Drainage Requirements:

> Except as specified under the performance standard for storm-proofing of new roads, drainage facilities and outfalls constructed in a sensitive domestic water supply drainage (as defined by Napa County) that are constructed to comply with this Order shall be sized to handle runoff from a 100-year storm event (i.e., a 24-hour duration rainfall event that has a 100-year recurrence frequency).

Where compliance actions are subject to the requirement to obtain a discretionary permit from the local land-use authority and/or from another State or federal agency, the following mitigation measures **(AQ-1** through **AQ-4**, **GHG-1**, **BR-9** through **BR-**11, and **CR-**1) shall be implemented by the Discharger, as applicable. These mitigation measures can and should be adopted by other agencies as part of their respective approval processes (See CEQA Guideline 15091 and 15126.4.).

B. Air Resources - Mitigation Measures

For implementation of BMPs with a construction site size of four acres or less, implementation of the Basic Measures (mitigation measure **AQ-1**) described below would reduce this impact to a less than significant level. For implementation of BMPs with a construction site size greater than four acres, implementation of the Enhanced Measures (mitigation measure **AQ-2**) described below would reduce this impact to a less than significant level. For implementation of BMPs that are large

in area, located near sensitive receptors, or which for other reasons may warrant additional emissions reductions, implementation of the Optional Measures (mitigation measure **AQ-3**) described below would reduce this impact to a less than significant level. Implementation of mitigation measure **AQ-4,** described below, is recommended in areas considered likely to contain naturally occurring asbestos (NOA).

The following are the Basic Measures from Table 2 of the 1999 BAAQMD CEQA Guidelines, which describes the measures as those that would be implemented at all construction sites, with **AQ-4** being implemented at sites likely to contain NOA. The following descriptions are directly from the BAAQMD CEQA Guidelines and describe measures for the wide range of land use and infrastructure projects that may not be applicable to all BMPs. However, because detailed information on implementation of specific BMPs to comply with these general WDRs is not available, the following list is cited to be as inclusive as possible.

Mitigation Measure AQ-1: Basic Criteria Pollutant Emission Controls

The following Basic Measures from Table 2 of the 1999 BAAQMD CEQA Guidelines shall be implemented during construction at sites 4 acres or less in size:

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

Mitigation Measure AQ-2: Enhanced Criteria Pollutant Emission Controls

The following Enhanced Measures from Table 2 of the 1999 BAAQMD CEQA Guidelines shall be utilized at construction sites larger than 4 acres in size:

- All “Basic” control measures listed above.
- Hydro-seed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.)
- Limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.

Mitigation Measure AQ-3: Optional Criteria Pollutant Emission Controls

The following are the Optional Measures from Table 2 of the 1999 BAAQMD CEQA Guidelines, which describes the measures as those that are strongly encouraged at construction sites that are large in area, located near sensitive receptors or which for any reason may warrant additional emissions reductions:

- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
- Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.
- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- Limit the area subject to excavation, grading and other construction activity at any one time.

Mitigation Measure AQ-4: Naturally-Occurring Asbestos Emission Reduction Controls

The following mitigation measure shall be implemented at sites containing naturally occurring asbestos. Implementation of the following mitigation measure would reduce this impact to a less than significant level.

- Comply with the BAAQMD NOA program and ARB ATCM 93105. Complying with these regulations would reduce the potential for entraining NOA, and reduce this impact to a less than significant level.

C. Greenhouse Gas Emissions (GHG-1)

The following mitigation measures can reduce the amount of construction-related GHG emissions:

Mitigation Measure GHG-1: Greenhouse Gas Emissions Controls

- Use Newer Construction Equipment. Construction equipment with newer engine models is subject to stricter emissions standards, and would generate less GHG emissions.
- Use Equipment Powered by Electricity. Some types of equipment can be powered by either diesel fuel, electricity, or a hybrid. Use of equipment powered by electricity or a hybrid would generally generate less GHG emissions.
- Use Equipment Powered by Alternative Fuels. Some types of equipment can be powered by alternative fuels (i.e., not diesel fuel). Use of alternative fuels would generally generate less GHG emissions.

Mitigation Measure BR-9: Limitations on Work within ¼ mile of Douglas fir or Redwood Habitat

Wherever road erosion control BMPs and/or detention basins are constructed using heavy equipment, and these projects occur within ¼ -mile of Douglas fir or redwood forest habitat, construction activities shall be restricted to August 1st through October 15th to avoid overlapping with nesting periods of all special-status bird species including northern spotted owl; or if a protocol survey determines that suitable nesting habitat is unoccupied, construction activities may

occur throughout the standard work window for compliance actions under the general WDRs, which is June 15-October 15.

Mitigation Measure BR-10: Limitations on Work within ¼ mile of Mapped Sensitive Natural Community

Wherever road erosion control BMPs and/or detention basins are constructed using heavy equipment, and these projects occur within ¼-mile of any mapped sensitive natural community (that may provide potential breeding and/or nesting habitat for special-status birds) and/or there has been a documented occurrence of any special-status bird species, the work window for heavy equipment use shall be restricted to August 1st through October 15th to greatly reduce the potential for overlap with breeding and nesting periods of special-status bird species. Alternatively, if a protocol survey determines that potentially suitable nesting habitat is not present or unoccupied then construction activities may occur throughout the standard work window for compliance actions under the General WDRs, which corresponds to June 15-October 15.

Mitigation Measure BR-11: **Preparation of a Biological Inventory**

If protected species or their habitats are present at the project area, the Discharger, prior to any ground disturbance or construction, shall engage a qualified biologist to prepare biological inventory of site resources. If protected species or their habitats are present, the Discharger shall comply with applicable federal and State endangered species acts and regulations. The Discharger shall ensure that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.

D. Cultural Resources

Mitigation Measure CR-1: Cultural Resources Survey and Consultations

Recognized and accepted measures that are routinely required before and during construction that involves earthmoving include:

1. Perform a cultural resources survey by a qualified archaeologist or cultural specialist that conforms to the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in 36 Code of Federal Regulations.

2. Contact the State Historic Preservation Officer and federal lead agencies as appropriate for coordination of Nation-to-Nation consultations with the Native American Tribes.

3. Consult a qualified paleontological resources specialist to determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high or known potential for containing resources. If the assessment is inconclusive, a surface survey is recommended to determine the fossil potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources mitigation plan.

4. Consult established archaeological and historical records and conduct a field survey of the project prior to construction. Survey records shall be filed with the appropriate archaeological or historical data centers.

5. Consult with local Native American representatives as appropriate to obtain local knowledge of the project vicinity.

6. Prepare site development and grading plans that avoid disturbance of known cultural sites and/or documented sensitive areas. Project plans shall include appropriate measures to protect sensitive resources.

7. Retain a qualified archaeologist or Native American representative to monitor site development activities, particularly grading and trenching. If artifacts are observed during construction, require that construction be halted until a qualified archaeologist has been consulted.

8. Alert onsite workers to the possibility of encountering human remains during construction activities, and prepare appropriate procedures. It is usually required that all construction activities near the location of identified human skeletal remains are halted until proper consultation and mitigation is arranged.

ATTACHMENT G

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements
Order No. R2-2017-0033

GLOSSARY OF TERMS

Annual Compliance Reporting Form	A form submitted to the Water Board annually, documenting progress with regard to development of a Verified Farm Plan, required monitoring, and water quality conditions as compared to Performance Standards.
Beneficial Use	The uses of water protected against degradation, such as: domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves. Existing beneficial uses are uses that were attained in the surface or groundwater after Nov. 28, 1975, and potential beneficial uses are uses that would develop in the future through control measures.
Best Management Practice (BMP)	Methods or measures designed and selected to effectively control the discharge of pollutants from point and nonpoint source discharges.
California Environmental Quality Act (CEQA)	The California Environmental Quality Act (CEQA) establishes a duty for public agencies to avoid or minimize environmental damage where feasible, recognizing that a public agency has an obligation to balance a variety of public objectives. Passed into law in 1970, CEQA sets statewide policies that require both state and local agencies to consider the environmental consequences of decisions that involve changes to the environment. It applies to projects that require discretionary approval by a government agency.
Discharger	Landowner and operator of Vineyard Property discharging, or proposing to discharge waste from a Vineyard Property.
Erosion	The detachment and movement of soil and rock fragments by water or under the force of gravity, which result in the wearing away of the land. When water is the eroding agent, erosional processes include sheet and rill erosion, gully erosion, and channel erosion.
Farm Area	The area that includes the vineyard blocks, vineyard lanes, and avenues (i.e., the field roads along the edges and/or in between the vineyard blocks).
Farm Plan	The plan described in Attachment A of this Order documenting natural features, developed areas, and best management practices implemented to achieve applicable performance standards for discharge.

Hillslope Vineyard	A "Hillslope Vineyard" is defined by grapes planted on an average slope > 5 percent. The method for determining slope is as specified by Napa County: www.countyofnapa.org/WorkArea/DownloadAsset.aspx?id=4294967662. An "existing" Hillslope Vineyard is one that was planted prior to adoption of this Order.
Hydrologic Connectivity	Having a continuous surface flow path (road ditches, road surfaces, gullies, or other drainage structures or disturbed surfaces) to a natural stream channel during a storm runoff event.
Incision	The progressive lowering over time of streambed elevation, as a result of net erosion.
Infiltration	The movement of water into soil.
Infiltration capacity	The maximum rate at which the soil can absorb water.
Landowner	An owner or proprietor of land.
Monitoring and Reporting Program	The monitoring and reporting required by a Discharger enrolled under this Order.
Nonpoint Source	The Clean Water Act focuses on two possible sources of pollution: point and nonpoint. "Point" sources refer to discrete discharges, such as from a pipe. "Nonpoint" refers to everything else, including agricultural runoff.
Non-Point Source Policy	Adopted in 2004, the NPS Policy is designed to assist all responsible and/or interested parties in understanding how the State's NPS water quality control requirements will be implemented and enforced. The parties involved include the State Water Resources Control Board and the Regional Water Quality Control Boards, and also other federal, state and local agencies, individual dischargers, Third-Party Programs and any other stakeholders.
Notice of Intent (NOI)	A document that must be completed by the Discharger or their representative, as required to enroll a Vineyard Property into the General WDRs permit.
Operator	Person(s) responsible for management decisions made in the operation of the Vineyard Property.
Photo-point Monitoring	Photo monitoring is a qualitative tool for documenting the current management of a farm or ranch, as well as, conditions or events that may assist in its management. Monitoring is based on the establishment of permanent photo locations or photographs, which can be revisited at regular intervals to reflect changes that have occurred over time at the same location.
Peak Runoff	The instantaneous maximum value for discharge during a storm runoff event, usually expressed as cubic feet per second.
Performance Standards	Standards for pollutant discharge control that are specified as conditions

	for discharge under this Order.
Qualified Professional	California registered professional in a discipline associated with erosion and sediment control including, for example, a professional engineer, licensed geologist, registered landscape architect, or certified professional in erosion and sediment control.
Reach	A subdivision of a drainage system consisting of a discreet portion of a channel.
Report of Waste Discharge	The California Water Code Section 13260 states that persons discharging or proposing to discharge waste that could affect the quality of waters of the State, other than into a community sewer system, shall file a report of waste discharge (ROWD) with the appropriate Water Board, that completely characterizes the discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentrations of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic of all treatment processes, a description of best management practices used, and a description of disposal methods. The ROWD is used to start the application process for all waste discharge requirements except for general waste discharge requirements that use a Notice of Intent to satisfy the requirements of the ROWD.
Restoration	The returning of the natural/historic functions and values to a former or degraded site.
Ridgetop	A relatively flat topographic divide above divergent and descending slopes where one or more of the descending slopes has a natural slope steeper than fifty percent for more than fifty feet in slope length.
Riparian	Located along the edge of a channel, generally on the floodplain. Characterized by access to and influence of the channel, but not in it. A riparian zone or riparian area is the interface between land and a river system. Riparian habitat is composed of trees, and other vegetation and physical features normally found on the stream banks and flood plains associated with streams, lakes, or other bodies of water.
San Francisco Bay Basin Plan	The Water Board's master water quality control planning document, designating beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater.
Section 401 Water Quality Certifications	Water Quality Certifications are issued by the Water Board pursuant to Clean Water Act section 401 to certify that projects permitted by the U.S. Army Corps of Engineers pursuant to Clean Water Act section 404 meet State law, regulations, and policy.
Section 404	Refers to a section of the Clean Water Act establishing a permit program for the discharge of dredged or fill materials into waters of the United States.

Soil bioengineering	A method of bank stabilization emphasizing the incorporation of biological materials such as plants, plant parts (e.g., root wads), or a combination of vegetation and inert materials (e.g., brush mats/sills, wattles, fascines, or branch packing/layering).
Third-Party Program	An organization that provides technical assistance/expertise to help Dischargers to comply with requirements of this Order.
Tier 1	A Discharger qualifies for enrollment under Tier 1, if the Farm Plan has been Verified and is fully implemented to achieve all applicable performance standards for discharge, and where the Vineyard Property is located adjacent to an unconfined alluvial channel, the Vineyard Property also meets the performance standard for Stream and Riparian Habitats.
Tier 2	A Discharger qualifies for enrollment under Tier 2 if: a) it has developed a Verified Farm Plan; b) the Water Board has approved the Farm Plan; or c) it is working with an approved Third-Party Program to develop a Verified Farm Plan.
Tier 3	A Discharger who elects to develop a Farm Plan independently – without the Farm Plan being Verified – are required to enroll in Tier 3. These Dischargers must submit their Farm Plan to the Water Board for review and approval. Following Water Board approval of the Farm Plan, the Discharger, as applicable, could move into Tier 2 or Tier 1.
Total Maximum Daily Load	An evaluation of the condition of an impaired surface water on the Section 303(d) List that establishes limitations on the amount of pollution that water can be exposed to without adversely affecting its beneficial uses, and allocating proportions of the total limitation among dischargers to the impaired surface water.
Verified Farm Plan	This means that an approved Third-Party Program has coordinated a technical review of the Farm Plan by a Qualified Professional who has signed - the Farm Plan, a verification form, or a letter - to indicate that she/he concludes that upon full implementation the Farm Plan would achieve all applicable performance standards for sediment and storm runoff control. Although a Verified Farm Plan receives technical review, it remains the Discharger's responsibility to ensure the Farm Plan is implemented to achieve all applicable performance standards for discharge. Third-Party Program verification does not constitute an approval of the Farm Plan.
Vineyard Properties	A parcel or contiguous parcels under the same ownership, each of which is developed to include a vineyard.
Waste Discharge	The discharge of any waste, including sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

Waste Discharge Requirement	State regulations pertaining to the treatment, storage, processing, or disposal of waste discharges.
Water Quality Objective	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or the prevent problems within a specific area. Water quality objectives may be numeric or narrative.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2016-0031

GENERAL WASTE DISCHARGE REQUIREMENTS FOR CONFINED ANIMAL FACILITIES WITHIN THE SAN FRANCISCO BAY REGION

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

Scope of Coverage

1. Order No. R2-2016-0031 (hereafter, Order) serves as general waste discharge requirements (WDRs) for discharges of waste from confined animal facilities (CAFs)[1] that meet the terms and conditions of this Order.

2. This Order covers the management of process water, manure, and other organic materials at CAFs, including the application of such materials to land. Other wastes, such as medicines, pesticides, chemicals, and fertilizers must be disposed at appropriately permitted facilities.

3. Owners and operators of CAFs discharging, or proposing to discharge, waste from a CAF in any manner that could affect the quality of the waters of the State within the San Francisco Bay Region (Region) and who have been designated by the Water Board are hereinafter defined as "Dischargers" and are subject to the terms and conditions of this Order.

4. This Order applies to commercial CAFs[2] including:
   a. All existing operating dairies;
   b. Existing CAFs located within water quality-impaired watersheds and identified as a categorical pollutant source in Chapter 7 of the Basin Plan;
   c. Other, existing CAFs, that the Water Board determines need coverage under this Order due to threat to water quality;
   d. CAFs (as described above in 4. a.-c.) that are inactive as of the adoption date of this Order but are subsequently re-opened as a CAF; and
   e. New or expanded CAFs[3] that demonstrate compliance with the provisions of the California Environmental Quality Act (CEQA) in the form of a certified Environmental Impact Report, Mitigated Negative Declaration, or Negative Declaration.

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[1] Title 27 of the California Code of Regulations, section 20164, defines a CAF as "… *any place where cattle, calves, sheep, swine, horses, mules, goats, fowl, or other domestic animals are corralled, penned, tethered, or otherwise enclosed or held and where feeding is by means other than grazing*."
[2] The term "commercial CAFs" refers to any non-residential CAF that conducts activities onsite that require a local business license.
[3] New CAFs are new structural facilities not in existence as of the date of Order adoption. An expanded CAF is a facility that requires newly constructed facilities to accommodate an increase in herd size.

5. Dischargers may be eligible for an exemption from this Order if the facility is in compliance with this Order, meets certain special operational and/or physical criteria, and is determined to be an insignificant threat to water quality (see Section H.3.).

6. This Order includes three tiers that are based on CAF type and threat to water quality. The tiers are defined as follows:
   a. **Tier 1** applies to CAFs that do not utilize liquid waste retention ponds. Operators must be able to comply with the discharge prohibitions in this Order at the time of enrollment. Dischargers must certify that their facility is structurally and operationally in compliance with all terms and conditions of this Order within two years of submittal of a Notice of Intent.
   b. **Tier 2** applies to CAFs that utilize liquid waste retention ponds, such as cow dairies or large-scale poultry facilities. Dairies previously enrolled under the Conditional Waiver must be able to comply with the terms and conditions of this Order at the time of enrollment and must certify that their facility is structurally and operationally in compliance with the prohibitions and waste discharge specifications in this Order. New Dischargers must certify that their facility is structurally and operationally in compliance with all terms and conditions of this Order within two years of submittal of a Notice of Intent.
   c. **Tier 3** applies to any type of CAF that the Dischargers cannot certify in the Notice of Intent (Attachment F) or Annual Report (Attachment A, Appendix 1) meets the requirements of this Order, or that the Executive Officer determines is a threat to water quality or is contributing to adverse water quality impacts.

7. Dischargers who discharge or propose to discharge pollutants to the waters of the United States are required to obtain coverage under a National Pollutant Discharge Elimination System (NPDES) permit and are not required to seek coverage under this Order[4].

8. CAFs that are defined by federal regulations as a large concentrated animal feeding operation (CAFO)[5] must separately address any stormwater-related discharges from land application areas. Such discharges can qualify as "agricultural stormwater discharges," not subject to NPDES permitting, if manure and wastewater are applied to the land in accordance with site-specific nutrient management practices that ensure appropriate agricultural utilization of the nutrients in the manure, litter, or process wastewater (40 CFR section 122.23(e)).

9. Large CAFOs that discharge stormwater from cropland where manure, litter, or process wastewater has been applied may enroll under this Order if they are implementing a Nutrient Management Plan upon enrollment under this Order. Large CAFOs that discharge such stormwater without a Nutrient Management Plan are in violation of the federal Clean Water

[4] 40 CFR section 122.23 (d)(1) requires only facilities that discharge to waters of the United States to seek NPDES permit coverage. A facility proposes to discharge if, based on an objective assessment, it is designed, constructed, operated, or maintained such that a pollutant discharge will occur.

[5] 40 CFR section 122.23 (b)(4) defines a large CAFO as an operation that stables or confines as many as, or more than, 700 mature dairy cows, whether milked or dry, 10,000 sheep or lambs or 500 horses. The size thresholds for all animal sectors are listed in 40 CFR 122.23(b) and (c).

Act (CWA) and may be fined for the discharge and/or required to enroll under an NPDES permit.

10. This Order applies to the disposal of waste generated by CAFs and related food-processing activities. Food-processing activities, such as cheese-making, that generate additional waste and/or wastewater, which may be co-mingled with the animal production waste stream, must be included in the facility's Ranch Water Quality Plan (required for facilities without liquid waste retention ponds) or Waste Management Plan (required for facilities with liquid waste retention ponds), consistent with the technical standards specified in Attachment B or C.

11. This Order **does not apply** to other types of waste, including, but not limited to, wastes such as cannery waste, septage, municipal or industrial sludge and/or biosolids, or similar types of waste generated onsite or brought onto the facility for disposal or nutrient recycling. Dischargers must apply for coverage under applicable general or individual WDRs as determined by the Water Board prior to receiving and/or discharging such wastes.

12. This Order does not address the cleanup of existing degraded surface and groundwater from past CAF operations. Any required cleanup actions are handled under separate authority under the California Water Code (CWC).

Water Quality Concerns

13. Pursuant to the CWC, Division 7, the Water Board regulates the discharge of wastes that could affect the quality of the waters of the State to ensure protection of the beneficial uses of both surface water and groundwater and the prevention of nuisances. CAFs, as described herein, represent a significant source of waste discharges in the Region.

14. CAFs are operations where animals are confined and fed in an area that has a roof or is devoid of vegetation, generating solid and liquid manure wastes that are collected and disposed of on land (crops and pastures) or offsite. Within the Region, the primary types of CAFs are cow dairies, horse facilities, a few goat and sheep dairies, and a few egg, chicken, turkey, and/or swine production facilities. The majority of animal waste is produced by cow dairies within the counties of Marin and Sonoma. There are approximately 46 cow dairies currently operating within the Region, with total herd sizes ranging from 100 to 2200, and averaging 200-300 head.

15. CAFs generate wastes that include, but are not limited to, manure, process wastewater, animal wash water, and any water, precipitation, or rainfall runoff that contacts animal confinement areas and/or raw materials, products, or byproducts such as manure, compost piles, feed, bedding materials, silage, eggs, or milk. Wastewaters may also contain certain chemicals such as detergents, disinfectants, and biocides. Waste from such facilities can contain significant amounts of pathogens, oxygen-depleting organic matter, sediment, nitrogen compounds, and other suspended and dissolved solids that can impact both groundwater and surface water if not properly managed. Daily operations can cause degradation of water quality of surface and groundwater as a result of waste discharges and activities that result in soil erosion and destruction of riparian habitat.

16. CAF wastes are stored in retention ponds, in corrals, and/or in waste piles. These wastes are then applied to onsite cropland or pastures or transported offsite. The applied wastes are a source of nutrients to crops and pastures but, if improperly managed, can create nuisance conditions and cause pollution of surface and groundwaters. Adverse aquatic habitat impacts associated with improper waste management and application may include: nutrient enrichment resulting in algal blooms, organic waste loading resulting in lowered oxygen levels, siltation of gravel areas that can eliminate fish habitat, high levels of ammonia that are toxic to fish and aquatic invertebrates, and elevated levels of nitrates and other salts in groundwater.

Background

17. In 2003, the Water Board adopted Order No. R2-2003-0093, General Waste Discharge Requirements for Confined Animal Facilities (2003 General WDRs). The 2003 General WDRs will be rescinded upon adoption of this Order. In 2015, the Water Board renewed a Conditional Waiver of Waste Discharge Requirements for Existing Dairies (2015 Conditional Waiver). The 2015 Conditional Waiver, Order No. R2-2015-0031, applies only to operating Tier 2 dairies. These facilities will be required to enroll into Tier 2 of this Order when the 2015 Conditional Waiver expires on June 9, 2020.

18. Dairies that do not meet the conditions of the 2015 Conditional Waiver are enrolled in the 2003 General WDRs. Upon adoption of this Order, these facilities will be required to enroll in Tier 3. Tier 3 facilities must implement site-specific water quality monitoring and a short and long-term improvement schedule. These facilities also must obtain professional assistance to complete all management plans.

19. CAFs eligible for Order coverage that do not utilize liquid waste ponds have separate monitoring and waste management planning requirements under Tier 1. These facilities are required to assess their facility for pollution prevention and to develop one comprehensive plan for waste management. Tier 1 facilities are not required to conduct groundwater monitoring.

20. Numerous watersheds throughout the Region are listed as impaired pursuant to CWA section 303(d). The CWA requires states to address these impairments by developing Total Maximum Daily Loads (TMDLs) that examine these water quality problems, identify sources of pollutants, and specify actions that create solutions and restore beneficial uses.

21. Issuance of these General WDRs provides an opportunity to include implementation plan requirements identified in Chapter 7, Water Quality Attainment Strategies Including Total Maximum Daily Loads of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan).

22. The Basin Plan specifies implementation measures for each categorical pollutant source identified as contributing to the water quality impairment in specific watersheds. Livestock grazing lands and confined animal facilities, including dairies and equestrian facilities, are identified as categorical pollutant sources, in certain watersheds, that are required to implement site-specific management measures to control and reduce animal waste and

sediment runoff. This Order implements the Basin Plan by requiring management measures for pollutant sources that will improve water quality in the designated impaired watersheds.

23. The Water Board adopted Resolution No. R2-2011-0060, Conditional Waiver of Waste Discharge Requirements for Grazing Operations in the Napa River and Sonoma Creek Watersheds and Resolution No. R2-2013-0039, renewal of Conditional Waiver of Waste Discharge Requirements for Grazing Operations in the Tomales Bay Watershed (Grazing Waiver). These conditional waivers require dischargers of grazing operations to implement specific management practices to minimize discharges of sediment, pathogens, and nutrients from their grazing operations to receiving waters, conduct compliance monitoring, and submit annual reports of progress made in controlling and minimizing discharges. This Order includes similar waste discharge specifications for grazing activities; therefore, CAFs under this Order are not required to have coverage under the Grazing Waiver.

24. This Order includes consideration for potential impacts to groundwater associated with CAFs, including dairies. Since the adoption of the 2003 General WDRs, California groundwater data and various published studies related to dairies and groundwater impacts have been evaluated in order to determine the effectiveness of current confined animal State regulations in protecting groundwater quality. Findings from these studies indicate that effective groundwater protection depends on whether subsurface conditions were adequately assessed in the siting, design, and operation of each facility. Since impacts to groundwater depend on site-specific considerations, facility-specific data are necessary to assess compliance with groundwater water quality objectives. Therefore, this Order requires sampling of existing groundwater wells, including existing monitoring wells, at any CAF that utilizes a waste pond to store and manage operational wastes.

Regulatory Framework

25. CWC section 13260 (a) requires that any person discharging waste or proposing to discharge waste within any region that could affect the quality of the waters of the State, other than into a community sewer system, must file with the appropriate Water Board a Report of Waste Discharge (ROWD) containing such information and data as may be required by the Water Board, unless the requirement is waived pursuant to CWC section 13269.

26. CWC section 13263 (i) authorizes the Water Board to prescribe general WDRs and /or waivers of WDRs for a category of discharges if the discharges are produced by the same or similar operations, involve the same or similar types of waste, require the same or similar treatment standards, and are more appropriately regulated under general WDRs or waivers than individual WDRs.

27. The Water Board finds that it is appropriate to issue general WDRs for CAFs because:

    a. Waste discharges involve the same or substantially similar types of operations, namely operations where animals are confined and wastes are managed by onsite storage, land application, or removal offsite.

    b. They discharge the same or similar types of waste, primarily animal waste; State regulations impose the same effluent limitations and operating conditions on CAFs.

c. They have many of the same types of potential impacts to surface and groundwater and, therefore, require the same or similar monitoring.

d. Given the time and resources necessary to effectively regulatory oversight of CAFs in the Region, they are more appropriately regulated under general WDRs than individual WDRs.

The Water Board, however, may determine that a specific individual CAF is not appropriately regulated under general WDRs and must obtain individual WDRs.

28. Pursuant to this Order and CWC section 13267, Dischargers must implement a Monitoring and Reporting Program (Attachment A). The Monitoring and Reporting Program is necessary to ensure compliance with this Order's terms and provisions in order to prevent or reduce uncontrolled waste discharges and to protect water quality; it requires regular visual inspections, individual facility water quality sampling, reporting, and record-keeping.

29. This Order satisfies the State Water Resources Control Board's (State Water Board's) 2004 Policy for the Implementation and Enforcement of the Nonpoint Source Pollution Control Program (NPS Policy), which requires that nonpoint source discharges of waste be regulated by WDRs, waiver of WDRs, or prohibitions to ensure compliance with Water Board Water Quality Control Plans.

30. This Order is consistent with the requirements of the Statewide Minimum Standards for confined animal facilities, California Code of Regulations (CCRs), title 27, sections 22560-22565, which are attached to this Order as Attachment K (hereafter, the "Statewide Minimum Standards"). These Statewide Minimum Standards require containment of manure, wash water, and stormwater runoff from animal confinement areas. The Statewide Minimum Standards are the *minimum* standards for discharges of animal waste at CAFs and must be implemented in waste discharge requirements.

Water Quality Control Plan for the San Francisco Bay Basin

31. The Basin Plan is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. Economics were considered as required by law during the development of these objectives. It also includes programs of implementation to achieve water quality objectives. The Region's TMDLs and associated implementation plans are also part of the Basin Plan. The Basin Plan was duly adopted by the Water Board and approved by the State Water Board, Office of Administrative Law, and U.S. EPA, where required.

32. Pursuant to the Basin Plan, the existing and potential beneficial uses of waters in the Region that could be impacted by the discharge of wastes include:

a. Municipal and domestic water supply
b. Agricultural water supply
c. Groundwater recharge
d. Estuarine habitat
e. Marine habitat
f. Preservation of rare and endangered species
g. Water contact recreation

h. Noncontact water recreation
i. Shellfish harvesting
j. Cold freshwater habitat
k. Warm freshwater habitat
l. Wildlife habitat
m. Preservation of areas of special biological significance.

33. The Basin Plan directs the Executive Officer to work with the dairy industry through local dairy waste committees and local/State agencies in obtaining cooperative corrections of dairy waste problems. The Basin Plan also recommends adoption of WDRs in those cases where water quality objectives for waters, within watersheds dominated by agricultural activities, are consistently exceeded or where corrective action is not yet successful in eliminating either short- or long-term water quality problems or threats.

Anti-Degradation

34. State Water Board Resolution 68-16 ("*Statement of Policy with Respect to Maintaining High Quality of Waters in California*") requires whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality must be maintained. Resolution 68-16 only allows change in the existing high quality if it has been demonstrated to the Water Board that the change is consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses of such water, and will not result in water quality less than that prescribed in the policies. Resolution 68-16 further requires that discharges comply with WDRs that will result in the best practicable treatment or control of the discharge necessary to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with the maximum benefit to the people of the State will be maintained. Resolution 68-16 incorporates the federal "antidegradation" policy (Cal. Code Regs., tit. 40, § 131.12). This Order is consistent with these policies.

    This Order prohibits discharges of waste to surface waters except in specified circumstances that are consistent with federal regulations, requires Dischargers to manage waste and waste disposal to prevent degradation of groundwater, and requires Dischargers to manage waste to minimize odors and prohibit nuisance conditions. The Water Board finds that under normal operating conditions:

    a. The discharge conditions and effluent limitations established in this Order will ensure that the existing beneficial uses and quality of waters of the State in the Region will be maintained and protected, and

    b. Discharges regulated by this Order will not degrade existing water quality if the terms and conditions of this Order are met.

35. This Order requires that discharges of waste, as defined in Finding 15, from CAFs shall not cause surface water or groundwater to be further degraded, to exceed water quality objectives, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. This Order also requires monitoring of surface water and groundwater to demonstrate compliance with water quality objectives.

California Environmental Quality Act

36. The Water Board is the lead agency for these general WDRs (Project) under CEQA (Public Resources Code section 21000 *et seq.*). The Water Board prepared and circulated a Mitigated Negative Declaration for the Project that was adopted on June 8, 2016. The Water Board has considered the Mitigated Negative Declaration, as well as all comments, and finds that there is no substantial evidence that these general WDRs will have a significant effect on the environment. The Water Board further finds that the mitigation measures identified in the Mitigated Negative Declaration to keep impacts to less-than-significant levels, as well as a program for monitoring and reporting on such mitigation measures, are required as conditions of these general WDRs. The Water Board's decision is based on the record as a whole for the Project, which is available at the Board's offices. The Mitigated Negative Declaration reflects the Water Board's independent judgment and analysis.

37. This Order involves the permitting of facilities, which are defined as CAFs, including dairies, that are fully constructed, and operating as of the effective date of this Order, and which have subsequently undergone no expansion in size of their physical facilities beyond the designed animal holding capacity. This Order is designed to enhance the protection of surface and groundwater resources, and its application to existing facilities is exempt from the provisions of CEQA in accordance with the following categorical exemptions:

    a . CEQA Guidelines Exemption 1 for Existing Facilities (Cal. Code Regs., tit.14, § 15301), which exempts the "operation, repair, maintenance, [and] permitting … of existing public or private structures, facilities, mechanical equipment, or topographical features" from environmental review. The restoration of, or improvements to, CAF waste management systems to ensure proper function in compliance with this Order will involve minor alterations of existing private facilities.

    b . CEQA Guidelines Exemption 2 for Replacement of Existing Structures (Cal. Code Regs., tit.14, § 15302) exempts "replacement or reconstruction of existing structures and facilities where the new structure will be located on the same site as the structure replaced and will have substantially the same purpose and capacity as the structure replaced." Consistent with the categorical exemption for Replacement of Existing Structures, this Order may require covered CAFs to replace or reconstruct retention ponds or other structures on the facility to ensure proper function in compliance with this Order.

    c. CEQA Guidelines Exemption 4 for Minor Alterations (Cal. Code Regs., tit.14, § 15304) exempts "minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry and agricultural purposes…" Consistent with the categorical exemption for Minor Alterations, this Order may require covered CAFs to make improvements to their facilities that will result in minor alterations to land, water, and/or vegetation.

38. Facilities defined as "new" or "expanding" pursuant to this Order must submit proof of compliance with the provisions of CEQA in the form of a certified Environmental Impact Report (EIR), Mitigated Negative Declaration, or Negative Declaration, together with a Notice of Intent (NOI) and appropriate fee, to the Executive Officer to qualify for coverage under this Order. Completing the NOI includes making a demonstration that:

a. Any potential impacts to wetlands and vernal pools have been addressed in permits pursuant to CWA sections 401 or 404;

b. A Section 1602 Streambed Alteration has been procured, if necessary;

c. The Discharger has obtained coverage under the State Water Board's Construction General Stormwater Permit, if necessary;

d. The Discharger has obtained a Timberland Conversion Permit, if necessary;

e. The development of the CAF is in compliance with any applicable county regulations and ordinances, including grading, construction, and building ordinances;

f. That any and all impacts to special-status species have been fully mitigated; and

g. That all potential impacts to cultural resources will be appropriately addressed and mitigated.

39. Food and Agricultural Code section 33487 exempts state agencies from any requirement to prepare a EIR for CAFOs under the following circumstances: (1) when the CAFO will be constructed and operated in accordance with the minimum standards in Chapter 5 of the Food and Agricultural Code; (2) where applicable local agencies have completed all necessary reviews and approvals including that required by CEQA; and (3) where a permit for construction was issued by a local agency on or after the effective date of Food and Agricultural Code section 33487 and construction has begun.

40. Issuance of this Order is also exempt from CEQA in accordance with CCRs, title 14, section 15307, which exempts from environmental review actions by regulatory agencies for the protection of natural resources. This action may also be considered exempt from environmental review pursuant to CCRs, title 14, section 15308, which exempts actions by regulatory agencies for the protection of the environment.

41. The Water Board has satisfied its obligation to address tribal cultural resources under AB 52. The notification and consultation provisions of AB 52 were not triggered because, when the decision occurred to undertake the Project, there were no letters requesting notification and consultation.

Safe Drinking Water Act

42. It is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. This Order promotes that policy by requiring Dischargers to meet water quality objectives, as applicable, designed to protect human health and ensure that water is safe for domestic use.

Third-Party Programs

43. The NPS Policy encourages the Water Boards to "be as creative and efficient as possible in devising approaches to prevent or control nonpoint source pollution." This includes development of third-party programs to assist Dischargers in complying with the requirements of the Order and assure the Water Board and the public that actions have been taken to reduce nonpoint source pollution.

44. The Water Board supports the use of third-party programs to assist Dischargers in filing required forms, providing technical assistance to Dischargers in preparing required management plans, implementing nonpoint source pollutant control projects, assisting with water quality monitoring, and annual reporting to the Water Board.

45. Since its inception in 1998, the California Dairy Quality Assurance Program has provided valuable educational resources to assist dairy operators in the preparation of site-specific management plans. These efforts have resulted in dairy operators having a greater understanding of the need for water quality protection. The Water Board supports the development of similar Quality Assurance Programs for equine or other non-dairy CAFs that would advance water quality protection and assist Dischargers in complying with the requirements of the Order.

Public Notice

46. The Water Board has reviewed the contents of this Order and all evidence concerning this matter, written public comments, and testimony provided at the public hearing on June 8, 2016, in Oakland and hereby finds that the adoption of this Order is consistent with the Basin Plan and is in the public interest.

47. The Water Board has publicly notified interested agencies and persons of its intent to issue this Order for discharges of wastes from CAFs (including associated grazing operations) and has provided them with an opportunity for a public meeting and an opportunity to submit comments.

IT IS HEREBY ORDERED that the Dischargers, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. DISCHARGE PROHIBITIONS

1. The discharge of waste classified as hazardous (Cal. Code Regs., tit. 23, §2521(a)) is prohibited.

2. The collection, treatment, storage, discharge, or disposal of waste at a CAF shall not cause a condition of nuisance, contamination, pollution, or degradation of surface water or groundwater (as defined in CWC section 13050).

3. The discharge of waste from a CAF that causes or contributes to an exceedance of any applicable water quality objective in the Basin Plan, or any applicable State or federal water quality criteria, or a violation of any applicable State or federal policies or regulations, is prohibited.

4. The direct and indirect discharge of waste, including stormwater contacting wastes, from the animal production or housing area to any surface water, or tributary thereof, is prohibited.

5. The application of manure or process water to a land application area in a manner that results in the discharge of wastes to surface water is prohibited.

6. The disposal of dead animals at the facility or in any liquid manure or wastewater retention pond is prohibited. The Discharger must dispose of dead animals in compliance with all applicable federal, State, county, and local laws and regulations.

7. The discharge of manure or process water to lands not owned, leased, or controlled by the Discharger without written permission from the landowner and in a manner not in compliance with this Order is prohibited.

8. The direct discharge of wastewater into groundwater via backflow through water supply or irrigation supply wells is prohibited.

B. WASTE DISCHARGE SPECIFICATIONS BY FACILITY OPERATION

1. PRODUCTION/CONFINED AREA

a. Facilities shall be designed, constructed, operated, and maintained to retain all waste, wastewater flow, and stormwater contacting manured areas that are likely to accumulate up to and during a 25-year, 24-hour storm event. Management of the facilities shall be in accordance with a site-specific Ranch Water Quality Plan or Waste Management Plan, consistent with the technical standards specified in Attachments B and C. (Cal. Code Regs., tit. 27, §22562(a).)

b. In addition to manure waste and wastewater generated from stormwater contacting manured areas, the Discharger must properly contain and manage all other wastes

including, but not limited to, silage leachate, compost leachate, dead animals, waste milk, veterinary medical waste, solid and liquid waste from onsite slaughtering, solid and liquid waste from onsite food processing (such as cheese), spoiled feed, bedding, and any precipitation contacting these materials. Specific pollution prevention measures must be included in the facility's Waste Management Plan or Ranch Water Quality Plan.

c. All precipitation and clean surface drainage outside of manured areas, including that from roofed areas and tributary drainages, shall be diverted away from confined and/or manured areas, unless such drainage is fully contained in a retention pond. (Cal. Code Regs., tit. 27, §22562(b).)

d. All animal confinement areas and feed / waste storage areas shall be managed to minimize standing water and maximize the infiltration of water into underlying soils. No standing water should be present 72 hours after the last rainfall.

e. All confined animals shall be fenced or excluded from any surface water or perennial streams passing through the confined area. Creek crossings shall be bridged in a manner that prevents animal waste from entering the waterway.

2. RETENTION PONDS (if applicable)

a. Retention ponds and manured areas at CAFs in operation on or after November 27, 1984, shall be protected from inundation or washout by overflow from any stream channel during 20-year peak flows. CAFs existing before November 27, 1984, and that are protected against 100-year peak stream flows must continue to provide such protection. CAFs, or portions thereof, that began operating after November 27, 1984, shall be protected against 100-year peak stream flows. (Cal. Code Regs., tit. 27, §22562(c).)

b. All existing retention ponds must, at a minimum, be lined with, or underlain by, soils that contain at least ten (10) percent clay and not more than ten (10) percent gravel or artificial materials or materials with equivalent impermeability or include additional lining materials necessary to comply with this Order's Discharge Prohibitions No. 2 and No. 3. (Cal. Code Regs., tit. 27, §22562(d).)

c. Retention ponds constructed after adoption of this Order must meet all applicable federal, State, and local laws and regulations. Waste storage facilities should be located outside of floodplains; however, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 100-year flood event, or larger if required by laws, rules, and regulations.

d. Retention ponds (or expanded ponds) constructed after adoption of this Order must comply with Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313 including a maximum specific discharge (unit seepage rate) of 1×10^{-6} cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the pond liner meets this requirement. Waste shall not be placed into the retention

pond until after the Water Board notifies the Discharger in writing that the report is acceptable.

e. Retention ponds shall be managed to have sufficient freeboard, but in no case less than two feet in partially or completely aboveground ponds and one foot in pond structures that are completely in ground. Freeboard shall be measured vertically, from the water surface up to the point on the surrounding berm or dike having the lowest elevation, and shall be designed and constructed to prevent overtopping as a result of windy storm conditions. Lesser freeboard may be approved by the Executive Officer if documented by a registered civil engineer that structural integrity and required capacity will not be compromised with the proposed freeboard.

f. Following a storm event, the Discharger shall restore the wastewater holding capacity of retention ponds, if necessary, in a timely manner and in a manner consistent with the Waste Management Plan and Nutrient Management Plan.

g. Retention pond clean-out shall occur annually, at a minimum, and should be conducted prior to the start of the rainy season, but no later than October 31.

3. LAND APPLICATION AREAS (if applicable)

a. Discharges to land of solid and liquid waste shall be conducted in such areas that prevent the discharge of waste to surface waters or flood-prone areas and shall be managed to minimize percolation to groundwater.

b. Discharges to land of solid or liquid waste shall be at rates that are reasonable for crop, soil, climate, special local situations, management system, and type of manure. Discharges to land shall not exceed the amount needed to meet crop demand and shall be conducted in accordance with the facility's Ranch Water Quality Plan or Nutrient Management Plan, consistent with the technical standards specified in Attachments B or D.

c. Manure and wastewater discharges to land, including spray irrigation, shall be conducted during non-rainy or non-saturated conditions, must not result in runoff to surface waters, and must infiltrate completely within 72 hours after application.

d. Manure and wastewater shall not be applied or stockpiled closer than 100 feet to any downgradient surface waters, open tile lined intake structures, sinkholes, agricultural or domestic well heads, or other conduits to surface waters, unless a 35-foot wide vegetative buffer or physical barrier is substituted for the 100-foot setback or alternative conservation practices or field-specific conditions will provide pollutant reductions equivalent or better than the reductions achieved by the 100-foot setback.

e. Large CAFOs that are eligible to enroll under this Order must implement an adequate Nutrient Management Plan (in accordance with the technical standards specified in Attachment D) <u>prior to discharging and prior to obtaining coverage</u> if they will discharge stormwater from cropland where manure, litter, or process wastewater has been applied.

4. GRAZING OPERATIONS (if applicable)

a. Dischargers shall implement site-specific management practices that reduce water pollution due to grazing and protect water quality. In selecting management practices for the facility, the Discharger shall take into consideration the vegetation, terrain, kind of livestock, and general facility operation procedures.

b. Dischargers with grazing operations on grazing lands that encompass an area of 50 acres or more, or encompass an area smaller than 50 acres and are identified by the Executive Officer as posing a threat to water quality, must develop and implement a Grazing Management Plan, consistent with the technical standards specified in Attachment E. If all technical standards and provisions of Attachment E are implemented by another management plan, a separate Grazing Management Plan is not required.

C. PROVISIONS

1. The Discharger shall comply with all applicable provisions of the CWC, CCRs title 27, and the Basin Plan.

2. The Discharger shall comply with the attached Monitoring and Reporting Program (Attachment A), and also develop and implement site-specific management plans. All existing plans must be updated and new plans developed in accordance with the technical standards specified in Attachments A, B, C, D, and E. **Plans must be completed within the schedule outlined below in Section H. Required Reports and Notices. All management plans must comply with the mitigation measures in the attached Mitigated Negative Declaration.**

   If the Discharger's facility requires additional management practices and/or physical improvements to comply with this Order (Tier 3), a detailed improvement schedule, acceptable to Water Board staff, must be developed and implemented. Improvement progress must also be reported within the Annual Report.

3. If the Discharger observes deficiencies, defects, and/or impending failures in any of the manure-contacted water conveyances, controls, and/or retention structures, the Discharger shall take immediate action to correct and/or prevent any unauthorized release. Records of such actions shall be kept and maintained as required in the Monitoring and Reporting Program. The facility management plans shall be updated to include corrective management measures needed to avoid a recurrence of the observed condition.

4. If onsite or offsite monitoring (visual or water quality testing) results indicate that the Discharger's facility (including land application areas) is causing a condition of nuisance, contamination, pollution, or degradation of surface water or groundwater, the Discharger shall take immediate corrective action to cease such pollutant discharges. The corrective action must be documented and submitted with a Noncompliance Report, as required by the Monitoring and Reporting Plan.

5. Manifests are required to be kept onsite to record transfer of waste to outside facilities and must be kept as part of the Nutrient Management Plan or Ranch Water Quality Plan. The application of manure or process water to lands not owned, leased, or controlled by the Discharger without written permission from the landowner, or in a manner that is not consistent with the conditions of this Order, is prohibited. The requirements for such third-party agreements are outlined in Attachment D, Nutrient Management Plan Minimum Requirements and Attachment B, Ranch Water Quality Plan Minimum Requirements.

6. The Discharger shall comply with all federal, State, county, and local laws and regulations pertaining to the discharge of wastes from the facility that are no less stringent than the requirements of this Order.

7. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the Discharger from liabilities under federal, State, or local laws, nor guarantee the Discharger a capacity right in receiving waters.

8. This Order does not convey any property rights or exclusive privileges. In accordance with CWC section 13263(g), "No discharge of waste into the waters of the state, whether or not the discharge is made pursuant to waste discharge requirements, shall create a vested right to continue the discharge. All discharges of waste into waters of the state are privileges, not rights."

9. This Order does not authorize any act that results in the taking of threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §§ 2050-2097) or the federal Endangered Species Act (16 U.S.C. §§ 1531-1544). Dischargers shall be responsible for meeting all applicable requirements of the Endangered Species Acts. A discharge that is deleterious to fish, plant life, mammals, or bird life or otherwise in violation of Fish and Game Code section 5650 is not a discharge which is authorized nor in compliance with the terms and conditions of this Order. The Discharger shall obtain permits as necessary, and comply with permit conditions and all other applicable federal, State, county, and local laws and regulations.

10. Upon presentation of credentials at reasonable hours or in response to a complaint or report of noncompliance, the Water Board and other authorized representatives shall be allowed:

    a. Entry upon premises where a regulated facility or activity is located or conducted or where records are kept under the conditions of this Order;

    b. Access to copy any records that are kept under the conditions of this Order;

    c. To inspect any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

    d. To photograph, sample, and monitor for the purpose of assuring compliance with this Order.

11. The Discharger shall maintain a copy of this Order and each applicable management plan (i.e., Waste or Ranch Water Quality, Grazing, and Nutrient Management) at the site so as to be available at all times to site-operating personnel. The Discharger shall ensure that all site-operating personnel are familiar with the content of this Order and each management plan.

12. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order shall not be affected thereby. If there is any conflicting or contradictory language between this Order and the associated attachments that outline technical requirements for the Monitoring and Reporting Program, Waste Management Plan, Nutrient Management Plan, Grazing Management Plan, or Ranch Water Quality Plan, the language in the Order shall govern over the other documents.

13. Compliance determination with the terms of this Order shall be based on the following:
    a. Periodic inspections by Water Board staff;
    b. Evaluation of the completed Annual Report and required information submitted according to the Monitoring and Reporting Program, including monitoring results, completed Waste Management Plan, Nutrient Management Plan, Grazing Management Plan, and Ranch Water Quality Plan; and
    c. Any other information deemed necessary by the Executive Officer.

D. RE-OPENING AN EXISTING BUT DORMANT CAF

1. In order to be eligible for coverage under this Order, those seeking to start-up a new CAF operation utilizing an existing but dormant facility must comply with the following conditions prior to start-up and enrollment:
    a. Dischargers must develop site-specific management plans applicable to each operation, in accordance with the technical standards outlined in this Order. Such plans may include a Waste Management Plan or Ranch Water Quality Plan for confined areas, a Nutrient Management Plan for lands where manure products are applied, and a Grazing Management Plan for grazing lands totaling 50 acres or more. All required plans must be submitted to Water Board for review, either attached to the Notice of Intent for Re-opening Dormant Facilities (Attachment G) or separately.
    b. Retention ponds must comply with NRCS Waste Storage Facility Code 313, including a maximum specific discharge (unit seepage rate) of 1×10^{-6} cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the pond liner meets this requirement.
    c. Operations must not include more animals than the existing infrastructure is designed to accommodate. The Order does not authorize construction or expansions of facilities.

E. OPENING A NEW OR EXPANDING FACILITY

1. In order to be eligible for coverage under this Order, those constructing a new or expanding facility must comply with the following conditions prior to start-up:
   a. Dischargers must submit proof of compliance with the provisions of CEQA in the form of a certified EIR, Mitigated Negative Declaration, or Negative Declaration;
   b. Dischargers must demonstrate that all local, State and federal permits have been obtained for the construction by completing and submitting a Notice of Intent for New or Expanding Facilities (Attachment H);
   c. Dischargers must develop site-specific management plans applicable to each operation, in accordance with the technical standards outlined in this Order. Such plans may include a Waste Management Plan or Ranch Water Quality Plan for confined areas, a Nutrient Management Plan for lands where manure products are applied, and a Grazing Management Plan for grazing lands totaling 50 acres or more. All required plans must be submitted to Water Board for review, either attached to the Notice of Intent (Attachment H) or separately.
   d. Retention ponds must comply with NRCS Waste Storage Facility Code 313, including a maximum specific discharge (unit seepage rate) of 1×10^{-6} cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the pond liner meets this requirement.

F. PERMIT REOPENING, REVISION, REVOCATION, TERMINATION AND RE-ISSUANCE

1. The Board may modify, revoke, and/or reissue this Order at any time.

2. An authorization to discharge wastes under this Order is not transferable to any person without written authorization from the Executive Officer. In the event of any change in operation, control, or ownership of land or waste discharge facilities, the Discharger shall notify any succeeding Discharger of its responsibility to comply with this Order by letter at least 60 days in advance of such change. A copy of such letter shall be submitted to the Water Board, along with a Notice of Termination (NOT), in order for the original Discharger to be relieved of its responsibility to comply with this Order.

3. To assume operation under this Order, the succeeding Discharger must submit a completed Notice of Intent (Attachment F) to the Water Board within 15 days of receipt of such notice and receive approval by the Executive Officer. The succeeding Discharger is not authorized to discharge under the Order and may be subject to enforcement until written approval of the coverage transfer from the Executive Officer.

4. In the event of closure or change in land use of the Discharger's facility, the Discharger shall file a NOT in the form of a letter that explains the extent of the change in operation, measures taken to close and/or change the operation, and Discharger contact information (if changed). Prior to NOT approval, all manure and waste-impacted soil is to be disposed of in a manner that will not pose a threat to surface water or groundwater quality or create a condition of nuisance.

5. The Water Board staff shall review the NOT and determine its appropriateness. The review may include a field staff inspection to verify project completion and water quality protection. The Executive Officer shall notify the Discharger(s) regarding approval or disapproval of the NOT.

6. If more stringent requirements are necessary to implement or be consistent with any total maximum daily load adopted by the Water Board to achieve applicable water quality standards pursuant to CWA section 303, or amendments thereto, the Water Board will revise and modify this Order.

7. This Order may be reopened to address any changes in State or federal plans, policies, or regulations that would affect the quality requirements for the discharges and as authorized by federal and State law.

8. The Executive Officer may at any time terminate coverage under this Order as to a particular Discharger if the Discharger fails to comply with this Order; such termination is in the public interest; the activities could adversely affect beneficial uses of waters of the State; or the Executive Officer determines, based on changes to the Discharger's facility, that coverage under individual WDRs or an NPDES permit is more appropriate.

9. A Discharger designated to Tier 3 may request approval for a transfer to Tier 1 or 2 (as applicable) following a minimum of three consecutive years of compliance with this Order and proof of completion of one educational program approved by the Executive Officer. A shorter demonstration period may be approved by the Executive Officer, given circumstances that merit special consideration.

G. ENFORCEMENT

1. A Discharger who fails to comply with the terms and conditions of this Order is subject to an enforcement action to the extent allowed by law, including but not limited to, administrative civil liabilities. Discharges that could affect the quality of the waters of the State may commence only in accordance with CWC section 13260 *et seq.*

2. Section 13387(e) of the CWC provides that any person who knowingly makes any false statement, representation, or certification in any record, report, plan, notice to comply, or other document filed with a Regional Water Board or the State Water Board, or who knowingly falsifies, tampers with, or renders inaccurate any monitoring device or method required under this division shall be punished by a fine of not more than $25,000, or by imprisonment in state prison for not more than two years, or by both.

3. Large CAFOs that discharge stormwater from land application areas without implementing an adequate Nutrient Management Plan are in violation of the CWA and may be fined for the discharge and/or required to enroll under an NPDES permit.

4. Section 13350 of the CWC provides that any person who violates WDRs or a provision of the CWC is subject to civil liability of up to $15,000 per day of violation or up to $20 per gallon of waste discharged. Alternatively, administrative civil liability may be

imposed up to $5,000 per day of violation or $10 for each gallon of waste discharged, depending on the violation or combination of violations.

5. If it is determined that a Tier 1 or Tier 2 facility does not meet the Order requirements and/or the Minimum State Standards (Title 27), due to a failure to implement effective pollution prevention management practices or structural deficiencies that can be corrected within 30 days, a short term improvement plan and schedule must be prepared and implemented. Tier 3 facilities must prepare, implement, and submit for Water Board review, a site-specific workplan that delineates a short and long-term improvement schedule for bringing all facilities into compliance with this Order. Tier 3 facilities must also obtain professional assistance to assess the potential causes for non-compliance and to develop complete and effective management plans.

6. If a Tier 1 facility cannot comply with all conditions and provisions of this Order within two years, the Executive Officer may designate the facility into Tier 3. Within one year from this designation, the Ranch Water Quality Plan must be revised and updated by a qualified professional and all facility improvements must be completed within two years.

H. REQUIRED REPORTS AND NOTICES

1. The Discharger must complete the following tasks and submit a certification of completion either separately or attached to the Annual Report. If tasks are completed and certification was previously submitted, indicate this in the Annual Report.

2. **Monitoring and Management Plan**

   a. **Tier 1 Dischargers - CAFs <u>without</u> liquid waste retention ponds:**

   Facility Monitoring Program

   The facility's Monitoring and Reporting Plan must be completed and implemented consistent with the technical standards specified in Attachment A, <u>within one year</u> from enrollment under this Order (submittal of a Notice of Intent), but no later than November 1, before the first monitoring period. This is an onsite operational plan to implement visual inspections and associated documentation and water quality monitoring. Preparations must be made in order to begin rainy season monitoring within one year.

   If the Discharger opts to participate in an Executive Officer-approved watershed or group monitoring program in lieu of individual surface water quality testing, confirmation of such participation must be documented in the facility's first Annual Report (Attachment A, Appendix 1), and the program must also be prepared to begin sampling by November 1, before the first monitoring period.

Ranch Water Quality Plan (RWQP)

The RWQP must be completed, and implemented consistent with the technical standards specified in Attachment B, within two years of submittal of a Notice of Intent.

Tier 1 Dischargers have the option to prepare their own RWQP, with or without the assistance of a qualified professional, as described in Attachment B, General Requirement 2.

A copy of the RWQP must be kept at the CAF and made available upon request by Water Board staff during inspections.

b. **Tier 2 Dischargers - Dairies and other CAFs with liquid waste retention ponds:**

When the 2015 Conditional Waiver expires in June 2020, dairies must have completed all reporting and monitoring requirements stipulated by the 2015 Conditional Waiver, prior to enrolling into Tier 2. Competed plans shall be updated when necessary to account for changes to the facility or operation.

Dischargers eligible for Tier 2 coverage, not previously enrolled under the 2015 Conditional Waiver, must complete the following tasks:

Facility Monitoring Program

The facility's Monitoring and Reporting Plan must be completed and implemented consistent with the technical standards specified in Attachment A, by within one year of enrollment under this Order (submittal of a Notice of Intent), but no later than November 1, before the first monitoring period. This is an onsite operational plan to implement visual inspections and associated documentation and water quality monitoring. Preparations must be made in order to begin rainy season monitoring within one year.

If the Discharger opts to participate in an Executive Officer-approved watershed or group monitoring program in lieu of individual surface water quality testing, confirmation of such participation must be documented in the facility's first Annual Report (Attachment A, Appendix 1), and the program must also be prepared to begin sampling by November 1, before the first monitoring period.

Waste Management Plan (WMP)

A WMP must be updated or completed and implemented consistent with the technical standards specified in Attachment C, within two years of submittal of a Notice of Intent.

Tier 2 Dischargers have the option to prepare the entire WMP, including containment structure specifications, through a technical education program, administrated by a qualified professional, as described in Attachment C. General Requirement 2.

A copy of the WMP must be kept at the CAF and made available upon request by Water Board staff during inspections.

Grazing Management Plan (GMP)

If grazing occurs on 50 acres or more, a GMP must be completed and implemented consistent with the technical standards specified in Attachment E, within two years of submittal of a Notice of Intent. If all technical standards and provisions of Attachment E are included in the WMP or NMP, a separate GMP is not required.

A copy of the GMP must be kept on the facility site and made available upon request by Water Board staff during inspections.

Nutrient Management Plan (NMP)

If waste is applied to land, an NMP must be completed and implemented consistent with the technical standards specified in Attachment D, within four years of submittal of a Notice of Intent.

Tier 2 Dischargers may develop their own NMP, with the assistance of a qualified professional, as described in Attachment D.

Large Concentrated Animal Feeding Operations (700 mature cows or more) must implement an NMP prior to enrolling under the Order.

A copy of the NMP must be kept on the CAF site and made available upon request by Water Board staff during inspections.

c. **Tier 3 Dischargers – Designated by the Executive Officer due to threat to water quality:**

Facility Monitoring Program

Tier 3 Dischargers must implement an individual monitoring program, including onsite surface water (all dischargers) and groundwater (those with liquid retention ponds) quality sampling and may not participate in a watershed or group monitoring program.

The facility's Monitoring and Reporting Plan must be completed and implemented consistent with the technical standards specified in Attachment A, within one year of Tier 3 designation or submittal of a Notice of Intent, but no later than November 1, before the first monitoring period. This is an onsite operational plan to implement visual inspections and associated documentation and water quality monitoring. Preparations must be made in order to begin rainy season monitoring within one year.

Ranch Water Quality Plan or Waste Management Plan

A RWQP (facilities without liquid waste retention ponds) or WMP (facilities with liquid waste retention ponds) must be prepared by a qualified professional[6] and submitted to the Water Board for review. It must also be kept on the CAF site and made available for review by Water Board staff during inspections.

[6] Examples of these professionals include, but are not limited to, registered professional engineers (PE), or the qualified staff of the Natural Resource Conservation District (NRCS), Resource Conservation Districts (RCDs), the University California Cooperative Extension, or technical service providers (TSPs) certified by the NRCS. The Executive Officer may approve the use of alternative specialists.

The RWQP or WMP must be completed and implemented consistent with the technical standards specified in Attachment B (RWQP) or Attachment C (WMP) within one year of Tier 3 designation or submittal of a Notice of Intent.

Grazing Management Plan (GMP)

If grazing occurs on 50 acres or more, a GMP must be developed and submitted to the Water Board for review. It must also be kept on the CAF site and made available for review by Water Board staff during inspections.

The GMP must be completed and implemented consistent with the technical standards specified in Attachment E, within one year of Tier 3 designation or submittal of a Notice of Intent. If all technical standards and provisions of Attachment E are included in the RWQP, WMP, or NMP, a separate GMP is not required.

Nutrient Management Plan (NMP)

If liquid waste is applied to land, a NMP must be must be prepared by a qualified professional and submitted to the Water Board for review. It must also be kept on the CAF site and made available for review by Water Board staff during inspections.

The NMP must be completed, and implemented consistent with the technical standards specified in Attachment D, within two years of Tier 3 designation or submittal of a Notice of Intent.

3. **Notice of Non-Applicability**

A CAF that meets any of the following conditions may apply for an exclusion from coverage under this Order by submitting a Notice of Non-Applicability (NONA) (Attachment I), subject to Executive Officer approval:

a. Number of animals within confined areas is small in relation to the size of the facility and poses no potential for adverse water quality impact;

b. Primary means for feeding and containing animals is on pasture lands (coverage under a Grazing Waiver may be required);

c. Animals are rarely confined and/or fed in areas devoid of vegetation, especially during the rainy season; or

d. Stormwater does not contact manure or waste materials within the facility's confined areas and all waste is disposed lawfully offsite.

These facilities may need to obtain coverage under this Order in the future if conditions or operations change or the potential for water quality impacts is found.

4. **Annual Reporting**

The Discharger must submit an Annual Report (Attachment A, Appendix 1) to the Water Board by **November 30 each year,** in accordance with the Monitoring and Reporting Program requirements. The Annual Report shall assess whether BMPs for waste

containment, nutrient application to land at agronomic rates, and grazing management measures are effective in preventing discharges to surface water and groundwater for the past year (November 1 of the last year through October 31 of the current year). It shall also include documentation that rainy-season preparations have been completed, results of water quality sampling (if individual monitoring was required), and updates regarding any schedules for compliance and other data, as described in the Monitoring and Reporting Program. If participating in a watershed-based or group monitoring program, a statement identifying the group must be included.

5. **Noncompliance Reports**

   a. The Discharger shall report any noncompliance that endangers human health or the environment within 24 hours of becoming aware of its occurrence. **The incident shall be reported to the Water Board Spill Hotline (510) 622-2369 and to the California Office of Emergency Services (OES) (800) 852-7550.** During non-business hours, the Discharger shall leave a message on the Water Board's office voice mail. The message shall include the time, date, and place of the discharge. OES is operational 24 hours a day. The Discharger shall submit a written report to the Water Board within five business days of becoming aware of the incident. The report shall include complete details of the steps that the Discharger has taken or intends to take, to correct the condition and prevent recurrence. The written submission shall, at a minimum, contain:

      - The approximate date, time, and location of the discharge;
      - A description of the noncompliance and its cause;
      - The flow rate, volume, and duration of the discharge;
      - A description of the noncompliance, its causes, duration, if the noncompliance has been corrected and/or the actual or anticipated time for achieving compliance; and
      - A time schedule and a plan to implement necessary corrective actions to prevent the recurrence of such discharges.

   b. The Discharger shall take all reasonable steps to minimize any adverse impact to the waters of the State resulting from noncompliance with this Order. Such steps shall include accelerated or additional monitoring as necessary to determine the nature and impact of the noncompliance.

   c. The fact that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the Order shall not be a defense for violations.

6. **Reporting Provision**

   a. All technical reports and/ or monitoring program reports submitted to the Water Board shall be accompanied by a cover letter signed by the owner, operator, or duly authorized representative, with the following certification:

      "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my

inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

b. Any Discharger authorized to discharge waste under this Order shall furnish, within a reasonable time, any information the Water Board may request, to determine whether cause exists for modifying, revoking, and reissuing, or terminating coverage under this Order. The Discharger shall also furnish to the Water Board, upon request, copies of records required to be kept by this Order.

c. Except for data determined to be exempt from disclosure under the Public Records Act (California Government Code Sections 6275 to 6276), and data determined to be confidential under CWC section 13267(b)(2), all reports prepared in accordance with the terms of this Order and submitted to the Executive Officer shall be available for public inspection at the offices of the Water Board. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in section 13387 of the CWC.

7. The Discharger shall submit a ROWD to the Water Board at least 140 days prior to any changes or proposed changes in:

   a. The character, location, volume, or disposal methods of waste discharges;

   b. The size and/or use of the facilities;

   c. The animal population, if it increases beyond the existing design capacity of the facility specified in the Ranch Water Quality Plan, Waste Management Plan, Nutrient Management Plan, and/or Grazing Management Plan.

8. The filing of a request by the Discharger for modification, revocation, reissuance, or termination of this Order, or notification of planned changes or anticipated noncompliance, does not stay any condition of this Order.

9. The Discharger may be required to submit technical reports as directed by the Executive Officer in accordance with CWC section 13267.

10. **Extension Request**

    The Discharger may request an extension to deadlines by written request to the Executive Officer at least 30 days prior to the deadlines. This request must include a description of incomplete plan elements, an alternative date of compliance, and assurance of water quality protection in the interim. Any requests for extension are subject to approval by the Executive Officer, and a written response from Water Board staff will be issued granting or denying the request.

I. APPLICATION REQUIREMENTS

1. In order for existing facilities to obtain coverage under this Order, Dischargers shall apply for coverage by submitting a completed Notice of Intent form (Attachment F) on or before October 31, 2016.

2. Prior to operating an existing dormant CAF, Dischargers shall certify that all requirements listed in Section D. are completed by submitting a Notice of Intent for Re-opening Dormant Facilities (Attachment G).

3. Prior to operating a new or expanding CAF, Dischargers must certify that all requirements listed in Section E. are completed, and all local, State, and federal construction permits have been obtained, by completing and submitting a Notice of Intent for New or Expanding Facilities (Attachment H).

4. Dairies currently enrolled under the 2015 Conditional Waiver are required to enroll into Tier 2 of this Order when the 2015 Conditional Waiver expires on June 9, 2020. In order to obtain coverage under this Order, Dischargers shall submit a completed Notice of Intent form by September 1, 2020.

5. Other existing Dischargers that the Executive Officer subsequently determines need coverage under this Order, shall submit a complete Notice of Intent and associated required information within 90 days of being notified to comply with this Order.

6. If the Discharger becomes aware that a relevant fact was omitted in a Notice of Intent, or incorrect information was submitted in a Notice of Intent or in any report to the Water Board, it shall promptly submit the correct facts or information. Completed forms shall be sent to the Water Board at the following address:

   San Francisco Bay Regional Water Quality Control Board
   ATTN: Confined Animal Facility Program
   1515 Clay Street, Suite 1400
   Oakland, CA 94612

7. Coverage under this Order is subject to fees as determined by the State Water Board. The application fee/annual fee schedule is developed by the State Water Board annually.

8. Facilities that are certified under a Quality Assurance Program, approved by the State Water Board or under a county regulatory program approved by the appropriate Regional Water Board, currently receive a 50 percent fee reduction. If the Water Board issues a Notice of Violation for an off-property discharge, the facility's certification and fee reduction will be revoked. The fee reduction will be revoked for a minimum of one billing cycle, and for all subsequent billing cycles, until all corrective actions are complete as determined by the Water Board and the facility's certification is restored.

J. Order No. R2-2003-0093 is hereby rescinded.

I, BRUCE H. WOLFE, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 8, 2016.

Digitally signed by Bruce H. Wolfe
DN: cn=Bruce H. Wolfe, o=SWRCB, ou=Region 2, email=bwolfe@waterboards.ca.gov, c=US
Date: 2016.06.09 17:54:29 -07'00'

BRUCE H. WOLFE
Executive Officer

Attachment A - Monitoring and Reporting Program (MRP) No. R2-2016-0031
Appendix 1 - Annual Report (to be provided)
Appendix 2 - Sampling and Analysis Reduction Certification (to be provided)
Attachment B - Ranch Water Quality Plan (RWQP)
Attachment C - Waste Management Plan (WMP)
Attachment D - Nutrient Management Plan (NMP)
Attachment E - Grazing Management Plan (GMP)
Attachment F - Notice of Intent (NOI)
Attachment G - Notice of Intent for Re-opening Dormant Facilities
Attachment H - Notice of Intent for New or Expanding Facilities
Attachment I - Notice of Non-Applicability (NONA)
Attachment J - Definitions
Attachment K -Title 27 of the California Code of Regulations, sections 22560-22565
Attachment L - Initial Study and Mitigated Negative Declaration

ATTACHMENT A

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements

MONITORING AND REPORTING PROGRAM NO. R2-2016-0031 FOR CONFINED ANIMAL FACILITIES

This Monitoring and Reporting Program (MRP) is issued pursuant to Order No. R2-2016-0031 (Order) and California Water Code (CWC) section 13267. The Discharger shall not implement any changes to this MRP unless, and until, a revised MRP is approved by the Executive Officer.

To allow the Water Board to evaluate compliance with the terms and conditions of the Order, this MRP requires that regular monitoring, sampling, and record-keeping be conducted by confined animal facility (CAF) owners and operators (hereinafter, Dischargers). The required sampling and analyses are minimum parameters necessary to evaluate if CAF operations are contributing to adverse water quality impacts. If sampling data indicate that concentrations are above the benchmarks (based on the San Francisco Bay Basin Plan), then the Discharger must take immediate action to identify pollutant sources and correct the problem.

This MRP requires preparation of an Annual Report of compliance, to be submitted to the Water Board by November 30 of each year (Appendix 1). The Annual Report shall document required pre-rainy season preparations, individual monitoring data (if not participating in a watershed or group monitoring program), compliance schedule progress, an evaluation of water quality sampling data, an evaluation of the effectiveness of management practices, and records of any inspections where a water quality problem was identified, as well as the management practices taken to correct these problems.

I. DISCHARGER TIER REQUIREMENTS

The level of requirements for water quality testing and reporting for each Discharger is dependent on each Discharger's designated tier (as defined in Order No. R2-2016-0031, Finding 6). While all facilities must implement the provisions of this MRP, the tier-specific requirements are as follows:

A. Tier 1 Dischargers (CAFs <u>without</u> liquid waste retention ponds):

1. Option to Participate in a Watershed or Group Monitoring Program

Dischargers may satisfy the individual surface water testing requirements by participating in a qualified watershed-based or group monitoring program that meets the standards set-forth below. This program must be developed and administered by a professionally qualified third-party entity approved by the Executive Officer. The program's content, parameters, and sampling locations must provide substantially similar monitoring information (as outlined below) for each participant and must also be approved by the Executive Officer prior to implementation. The option to participate in a watershed-based or group monitoring program may be revoked if monitoring data and/or inspection findings indicate that a facility has an increased potential for adverse water quality impacts, thus requiring site-specific water quality monitoring.

2. Site Specific Monitoring

Each facility is required to conduct individual visual inspections and grazing operation monitoring and reporting (for grazing lands of 50 acres or more), as specified below in sections II, A and B. Groundwater well testing is not required.

3. Reporting

A Ranch Water Quality Plan must be completed within the schedule outlined in the Order. The plan is to be kept onsite and is not required to be submitted to the Water Board for approval. A letter certifying that the plan is complete must be submitted, by the Discharger or responsible professional who helped prepare the plan, either separately or attached to the facility's Annual Report. A copy of the plan must be made available for review by Water Board staff during inspections.

B. Tier 2 Dischargers (CAFs <u>with</u> liquid waste retention ponds):

1. Option to Participate in a Watershed Monitoring Program

Dischargers may satisfy the individual surface water testing requirements by participating in a qualified watershed-based or group monitoring program that meets the standards set-forth below. This program must be developed and administered by a professionally qualified third-party entity approved by the Executive Officer. The program's content, parameters, and sampling locations must provide substantially similar monitoring information (as outlined below) for each participant and must also be approved by the Executive Officer prior to implementation. The option to participate in a watershed-based or group monitoring program may be revoked if monitoring data and/or inspection findings indicate that a facility has an increased potential for adverse water quality impacts, thus requiring site-specific water quality monitoring.

2. Site Specific Monitoring

Each facility is required to conduct individual visual inspections, grazing operation monitoring and reporting (for grazing lands of 50 acres or more) and groundwater well testing, as specified below in sections II A, B (as applicable), and C.

3. Reporting

a. Management plans must be updated or completed within the schedule outlined in the Order but are not required to be submitted for approval. A letter certifying that each plan is complete must be submitted by the Discharger (if prepared through a technical education program) or responsible professional who helped prepare the plan, either separately or attached to the facility's Annual Report. Copies of each management plan must be made available for review by Water Board staff during inspections.

b. Site-specific water quality monitoring results (i.e., groundwater monitoring) are required to be submitted in the Annual Report. If participating in a watershed-based monitoring program, all other results will be submitted in a group monitoring report.

C. Tier 3 Dischargers (Designated by the Executive Officer due to threat to water quality):

1. Individual Monitoring Program Required

Dischargers within Tier 3 must implement a site-specific water quality monitoring program that includes all elements described below. Tier 3 CAFs that utilize waste retention ponds to store and manage operational waste are subject to groundwater monitoring requirements outlined in C.2., below.

2. Reporting

a. Management plans must be developed by a qualified professional and completed within the accelerated schedule outlined in the Order. Plans must be submitted to the Executive Officer for review and approval. Additionally, copies of each management plan must be kept on-site and made available for review by Water Board staff during inspections.

b. Dischargers must include a schedule for improvements and updates within each Annual Report.

c. Dischargers must include all individual water quality monitoring data within each Annual Report.

II. MONITORING PROVISIONS

Visual inspections and sampling of surface and ground waters are required to assess compliance with conditions of this Order.

A. Visual Inspections

This MRP requires all Dischargers to conduct periodic visual inspections to ensure the CAF is operated and maintained in compliance with the Order. Visual inspections shall be done when conditions are safe to do so. Observations of any threats to water quality and corrective actions taken shall be documented and submitted in each Annual Report. All adverse conditions, including discharges that are a threat to human health or the environment, shall be reported to the Water Board within 24 hours. Corrective actions shall be implemented to stop the discharge as soon as possible.

1. Production / Confined Areas

The Discharger shall conduct **daily** inspections of the production / confined areas (including all retention ponds, pumping equipment, water lines, outdoor animal wash racks, corrals, and nearby surface waters,) and document any non-storm water waste discharges from the property under the control of the Discharger.

2. Retention Pond Freeboard and Integrity (if applicable)

The Discharger(s) shall measure and document the freeboard in each retention pond **weekly**, during the rainy season (October through March), and **monthly** during the dry season (April through September). Freeboard is the vertical distance from the pond surface to the lowest elevation of the surrounding berm or the bottom of the spillway. The size of ponds/containment structures needed to contain waste materials and rain water from a 25-year 24-hour storm event will vary from facility to facility. To maintain structural integrity

and prevent a discharge, **two (2) feet of freeboard shall be maintained in partially or completely above ground ponds and one (1) foot of freeboard shall be maintained in pond structures that are completely in ground.** Lesser freeboard may be approved by the Executive Officer if documented by a registered civil engineer that structural integrity and required capacity will not be compromised with the proposed freeboard.

The Discharger shall conduct weekly inspections of the manure containment structures for effective capacity, berm integrity, cracking, slumping, excess vegetation, animal burrows, and/or seepage. Repairs shall be made to prevent discharges to surface water and/or groundwater, and noted in the Annual Report.

3. **Cropland and/or Pasture (if applicable)**
The Discharger(s) shall inspect any cropland on which solid manure or wastewater is applied. Inspections shall occur **at least once daily during each irrigation event and/or spreading event**, and shall be documented. Any erosion, conditions of field saturation, runoff form the cropland containing pollutants, or violation of set-back requirements shall be remedied as necessary to protect water quality and prevent nuisance conditions. The following shall be documented:

   a. Descriptions of erosion, field saturation, runoff, set-back violation, or the presence of nuisance conditions in the cropland;

   b. Dates, location, and approximate volume of wastewater and/or solid waste applied to land, in accordance to the Nutrient Management Plan;

   c. Weather conditions at the time of and 24 hours prior to and following waste application; and

   d. Dates, occurrences, location, and estimated amounts of unauthorized releases from the ponds or cropland either off-property or to surface water drainage courses (such releases shall be reported in accordance with the reporting requirements below).

4. **Storm Event Preparations**
The following inspections shall be conducted prior to anticipated storm events, during extended storm events, and after actual storm events.

   a. Inspect all retention ponds / structures. These structures shall be inspected for berm integrity, cracking, slumping, excess vegetation, burrowing animals, and seepage.

   b. Inspect the closest receiving water, upstream and downstream of all facilities, to monitor any change in water quality resulting from facility operations. Any change in water quality shall be reported in accordance with the reporting requirements below.

   c. Inspect confined areas to ensure that all pollution prevention measures, as specified in the facility's Waste Management Plan or Ranch Water Quality Plan, are implemented and effective.

The Discharger shall document any discharges of stormwater that has commingled with wastewater, litter, or manure, and the approximate duration and amount of wastes discharged to surface waters. Such discharges shall be reported in accordance with non-compliance reporting requirements below.

B. Grazing Operation Monitoring and Reporting (required for grazing lands of 50 acres or more)

1. The Discharger shall conduct visual inspections of the grazing lands to verify that chosen management practices are being implemented and that the Waste Discharge Specifications for grazing operations are being met.
2. The Discharger shall, in addition to inspecting the grazing lands, visually inspect the closest receiving water, upstream and downstream of the grazing facility, to monitor any change in water quality resulting from facility operations. These inspections are needed to determine the effectiveness of the management practices implemented at the grazing facility.
3. Inspections shall occur twice during the dry season and at least monthly during the rainy season, preferably before and after a forecasted storm event. One of the dry season inspections shall be conducted in the month of September, prior to the beginning of the rainy season, and shall encompass the entire ranch facility to ensure the facility's readiness for the rainy season. A Discharger is not required to perform inspections during dangerous weather conditions or when a storm begins after scheduled facility operating hours.
4. Pre-storm inspections of the entire grazing facility shall ensure that appropriate management practices are properly installed and maintained; post-storm inspections are to evaluate whether management practices have functioned adequately and whether additional measures or maintenance work is needed.
5. The Discharger shall annually measure and record measurements of residual dry matter (RDM[1]), prior to fall rains, as specified in the University of California 2002, California Guidelines for Residual Dry Matter Management on Coastal and Foothill Annual Rangelands, Rangeland Monitoring Series Publication 8092. These measurements shall be included in the Annual Report. If minimum RDM standards (included in the guidelines) are not met, the Discharger shall provide an explanation for not meeting the recommendations in the Annual Report.
6. The Discharger shall maintain records of inspections, monitoring observations, and any response taken to eliminate potential sources of sediment, nutrients, and pathogens from the grazing facility. If a water quality problem is found during the inspection, the Discharger shall record the nature of the problem, and the management practices taken to correct it, and report it in the Annual Report.

[1] As cited in Napa River Sediment TMDL and Sonoma Creek Sediment TMDL.

C. **Water Quality Testing**

Water quality sampling and reporting is required to allow the Water Board to assess compliance with Basin Plan water quality objectives and to assess the effectiveness of facility management plans. Sampling results shall be used by the Discharger to assess water quality conditions and to make informed decisions regarding management practices. Short-term groundwater well sampling is required in order to assess whether the current management measure and design criteria are protective of groundwater quality. If the initial monitoring results are indicative of adverse water quality impacts, then management measures (specified by the management plans) must be redesigned accordingly and additional monitoring may be required.

1. **Surface Water Sampling**

Surface watercourses that flow through the facility, including the production area, cropland, or pastures, must be sampled using grab samples at the point where the watercourse leaves the lands used for the CAF operation. If multiple watercourses flow through the property, the Discharger may submit a written request to the Executive Officer asking for reduced representative sampling locations.

Alternatively, if surface waters flow adjacent to the CAF operation lands but not through it, and are located such that they could be impacted by the operation, the grab samples shall be collected downstream of the areas closest to the property, assuring legal access for Discharger or third party sampling. In the event downstream, representative grab samples show exceedances above benchmark values, the Discharger, or representative third party sampling group representative, will collect additional grab surface water samples upstream, or at other representative locations, to bracket and isolate the problem so that the Discharger can take corrective action.

Sampling shall take place during or directly following each of three major storm events after at least 1 inch of rain per 24 hours. Sampling will occur in the winter rainy season, which generally begins in October and ends in March, with the first samples to be collected starting 1 year after submitting a Notice of Intent. Sampling events shall be at least 14 days apart. Sampling shall be done when conditions are safe to do so. Visual observations, such as changes in surface water color or turbidity, must be recorded at the time of surface water sampling and reported in or submitted with the Annual Report.

a. **Sampling Parameters:**
Temperature, pH, and specific conductance shall be measured on-site with a handheld data sonde or comparable field equipment. Total ammonia nitrogen shall be measured either with a field test kit (colorimetric field kits are acceptable) or by a certified laboratory. These laboratory analyses shall be conducted in accordance with the Title 40 Code of Federal Regulations Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants) or other test methods approved by the Executive Officer. One (1) sample to be tested for total ammonia nitrogen, pH, specific conductance, and temperature shall be collected at each location. Data collection for pH, specific conductance, and temperature parameters must comply with the Surface Water Ambient Monitoring Program Quality Assurance Program Plan (QAPrP) at http://www.waterboards.ca.gov/water_issues/programs/swamp/tools.shtml.

b. **Constituents and Benchmarks:**

Constituents	Units	Benchmarks
Specific conductance	µS/cm	Below 2000
Total ammonia nitrogen ($NH_3 + NH_{4+}$)	mg/L	Below 1 mg/l and meets calculated unionized ammonia benchmark below
Unionized ammonia (NH_3) as calculated[1]	mg/l	0.025 mg/l
pH		6.5-8.5
Temperature	°C	none

2. **Groundwater Well Sampling (CAFs with liquid waste retention ponds)**

a. **Sampling Parameters:**

Any existing representative wells located at the confined animal facility, including domestic and agricultural supply wells, shall be sampled four (4) times total, approximately six (6) months apart. A sample must be collected in: (1) Fall 2017, (2) Spring 2018, (3) Fall 2018, and (4) Spring 2019. Results of groundwater samples collected consistently with the sampling protocols and within these time frames for another purpose (e.g., for a county health department or by the county milk inspector) may be submitted to the Executive Officer instead of collecting additional samples. The sample must be representative of groundwater well conditions (i.e., not disinfected).

Groundwater samples from domestic wells shall be collected from the tap before the pressure tank and after water has been pumped from this tap for 10 to 20 minutes. If the sample cannot be collected prior to a pressure tank, the well must be purged at least twice the volume of the pressure tank. Groundwater samples from agricultural supply wells shall be collected after the pump has run for a minimum of 30 minutes or after at least three well volumes have been purged from the well. Alternatives to this protocol may be approved by the Executive Officer. Groundwater samples shall be analyzed by a laboratory certified by the State Department of Health Services or a laboratory pre-approved by the Water Board staff.

[1] The toxicity level of unionized ammonia is directly affected by pH and temperature. The higher the pH and temperature of the water, the higher the proportion of total ammonia that exists in toxic form. The Central Valley Regional Water Board has developed clear procedures for using Total Ammonia field test kits and for using field sampling results to calculate unionized ammonia values. This guidance can be found at: http://www.waterboards.ca.gov/centralvalley/water_issues/dairies/general_order_guidance/sampling_analysis/field_analysis_final_rpt.pdf

b. **Constituents and Benchmarks:**

One (1) sample from each well shall be tested for the following parameters:

Constituents	Units	Benchmarks (municipal supply)
Nitrate[2]	mg/l	Nitrate (NO^3) = 45.0 mg/l or Nitrogen (N) = 10 mg/l
Total Coliform Bacteria	MPN/100ml	1.1 MPN/100ml[3]

3. **Sampling Protocol**

a. The Discharger shall use clean sample containers and sample handling, storage, and preservation methods that are accepted or recommended by the selected analytical laboratory or, as appropriate, in accordance with approved United States Environmental Protection Agency analytical methods.

b. All samples collected shall be representative of the volume and nature of the material being sampled.

c. All sample containers shall be labeled and records maintained to show the time and date of collection as well as the person collecting the sample and the sample location.

d. All samples collected for laboratory analyses shall be preserved and submitted to the laboratory within the required holding time appropriate for the analytical method used and the constituents analyzed.

e. All samples submitted to a laboratory for analyses shall be identified in a properly completed and signed Chain of Custody form.

f. Field test instruments used for electrical conductivity, pH, temperature, and total ammonia nitrogen, may be used, provided:

- The operator is trained in the proper use and maintenance of the instruments;
- The instruments are field calibrated prior to each monitoring event; and
- Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency.

g. Alternative sampling protocols may be proposed and shall be approved by the Executive Officer.

[2] Nitrate may be analyzed and reported as either Nitrate as NO^3 or Nitrate as N.
[3] In groundwater with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL) (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

4. **Request for Sampling Reduction**

   Dischargers in Tier 1 or 2 that conduct individual facility surface water quality sampling may request a reduction in the sample frequency and/or number of locations sampled. In order to be eligible for a sampling reduction each facility must submit a Sampling and Analysis Reduction Certification (Appendix 2) to the Water Board documenting the following:

   a. Results from at least 6 consecutive sampling events at or below benchmarks, and

   b. The Discharger is in full compliance with the requirements of this Order and has updated, certified and submitted all documents, data, and reports required by this Order during the time period in which samples were collected.

III. REPORTING PROVISIONS

A. Documentation and Annual Reporting

The objective of the Annual Report (MRP Appendix 1) is to provide the Water Board updates (using photographs and narrative text) on new management practices and the effectiveness of existing management practices to control pathogen and nutrient sources at the CAF. Documentation of compliance with conditions of the Order must be submitted to the Water Board in an Annual Report due each **November 30.** The annual reporting period is November 1 through October 31. Water Board staff will review the Annual Report and provide comments if necessary for the facility to meet the Order requirements. If the Water Board provides comments on the Annual Report or any technical report, the Discharger will be required to address those comments. A copy of the Annual Report including photo documentation must be kept at the facility for Water Board review during inspections. The contents of the Annual Report shall include:

1. Photos shall be taken each year **by October 31** and submitted to the Water Board to confirm that:

   a. The liners of the retention ponds are protective of water quality (free of weeds and cracks that may disturb the liner); and

   b. The retention ponds have sufficient storage capacity prior to the rainy season.

2. Photos of other pollution prevention measures to protect surface and groundwater must also be submitted with the Annual Report. Examples of pollution prevention measures include:

   a. Cleaning up of pollutants from areas where storm water runoff occurs,

   b. Covering of manure, compost, and feed storage areas,

   c. Installing impermeable ground covering in manure storage areas,

   d. Protecting watercourses from erosion and wastes, and

   e. Any other best management practices or control measures for water quality protection.

   Photos of permanent and/or structural pollution prevention measures only need to be submitted once, as long as the measures remain operational and effective.

3. A narrative summary of measures taken to protect surface and groundwater and to meet conditions of the Order. Where appropriate, sketches of pollution prevention measures implemented since the previous Annual Report may also be submitted.

4. A status report for any improvement schedules implemented, as required by the Ranch Water Quality Plan (WDRs Attachment B) or Waste Management Plan (WDRs Attachment C).

5. Analytical results of surface water and groundwater samples (if required).). If participating in a watershed or group monitoring effort pre-approved by the Executive Officer, surface water sampling results can be included in the group monitoring report. If results of groundwater samples collected for another purpose are submitted to meet these MRP requirements, an explanation is required in the Annual Report.

   If sample results exceed Basin Plan water quality objectives or other public health standards, the Discharger shall note the noncompliance in the Annual Report and describe any corrective measures that were taken and/or needed. The Executive Officer may require additional corrective actions and additional monitoring.

B. **Noncompliance Reporting**

The Discharger shall report any spill, discharge, or other type of noncompliance that violates the conditions of this Order and/or endangers human health or the environment within 24 hours of becoming aware of its occurrence. The incident shall be reported to the **Water Board Spill Hotline (510) 622-2369 and to the California Office of Emergency Services (OES) (800) 852-7550.** During non-business hours, the Discharger shall leave a message on the Water Board's office voice mail. OES is operational 24 hours a day. The message shall include the time, date, place, and description of the discharge.

A written Noncompliance Report shall be submitted to the Water Board office within fourteen (14) business days of the Discharger becoming aware of the incident. The report shall include complete details of the steps that the Discharger has taken, or intends to take, in order to prevent recurrence. The written submission shall, at a minimum, contain:

1. The approximate date, time, and location of the discharge;
2. A description of the noncompliance and its cause;
3. The flow rate, volume, and duration of the discharge;
4. Whether the noncompliance has been corrected and/or the actual or anticipated time for achieving compliance; and
5. A time schedule and a plan to implement necessary corrective actions to prevent the recurrence of such discharges.

The Discharger shall notify the Water Board by letter when it returns to compliance with the time schedule. Violations may result in enforcement action, including Water Board or court orders requiring corrective action or imposing civil monetary liability, or in terminating the applicability of this Order to a specific facility or discharger.

If during the performance of Discharger and/or Water Board staff inspections, deficiencies, defects, and/or impending failures are observed in any of the manure-contacted water conveyance, control, and/or retention structures, the Discharger shall take immediate action to correct and/or prevent any unauthorized release. The corrective action(s) must be documented and these records attached to the Noncompliance Report.

C. Record-Keeping

The Discharger shall create, maintain for five years, and make available to the Water Board during inspections and upon request by the Water Board, any reports or records required by the Order including those required under this MRP.

D. **Signature and Submittal**

Each Annual Report and Noncompliance Report shall be signed by the Discharger or a duly authorized representative and shall contain the following statement:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this report and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Reports shall be submitted to:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attention: Confined Animal Facility Program

Or email to: R2ConfinedAnimals@waterboards.ca.gov

E. **Extension Request**

The Discharger may request an extension to MRP deadlines by written request to the Executive Officer at least 30 days prior to the deadlines. This request must include a description of incomplete plan elements, an alternative date of compliance, and assurance of water quality protection in the interim. A letter from the Executive Officer will be issued granting or denying the request. A staff inspection may be necessary.

APPENDIX

1. Annual Report
2. Sampling and Analysis Reduction Certification

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California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements

Ranch Water Quality Plan
Minimum Requirements
(Dischargers without liquid waste retention ponds within Tiers 1 or 3)

Order No. R2-2016-0031 (hereafter, General WDRs) requires Dischargers of confined animal facilities (CAF) that do not utilize liquid waste retention ponds, to prepare and implement a Ranch Water Quality Plan (RWQP) for activities within the production and/or confined areas including, but not limited to, the corrals, barns, feed storage area, compost piles, dry manure storage areas, animal wash areas, and onsite ancillary operations such as food processing. The RWQP must also include pollution prevention measures for grazing activities and pasture land activities such as grazing and solid manure applications. The complexity of a RWQP depends on each facility's activities, location, size of operation, intensity of land use, etc.

The level of regulatory oversight is dependent upon each Discharger's designated water quality tier (as defined in General WDRs, Finding 5). Tier specific requirements are described below.

Tier 1 (CAFs without liquid waste retention ponds):

1. Dischargers have the option to prepare their own RWQP, with or without the assistance of a qualified professional. Examples of these professionals include, but are not limited to, registered professional engineers (PE), or the qualified staff of the Natural Resource Conservation Service (NRCS), Resource Conservation Districts (RCDs), the University California Cooperative Extension, or technical service providers (TSPs) certified by the NRCS. The Executive Officer may approve the use of alternative specialists.

2. The RWQP shall be <u>completed and implemented within two years</u> of submitting an NOI. A statement attesting that the RWQP is complete must be submitted to the Executive Officer by separate letter or as an attachment to the Annual Report within this two year period.

3. The RWQP must include a statement from the Discharger or responsible professional that the RWQP was developed in accordance with the requirements of the General WDRs, that it includes all necessary documentation (including calculations), and that all contents of the RWQP were done consistent with requirements of the General WDRs and Title 27.

4. The RWQP must be kept on the CAF site and must be made available for review by Water Board staff during inspections. Temporary controls must be in place to prevent waste discharges to surface water and groundwater prior to implementation of the completed plan.

Tier 3 (Designated by Executive Officer due to threat to water quality):

1. The RWQP must be prepared by a qualified professional, as described above in Requirement A.1.

2. Within one year of Tier 3 designation or submittal of a Notice of Intent, the RWQP must be completed and submitted to the Water Board for review. A copy must also be kept on the CAF site and made available for review by Water Board staff during inspections. Temporary controls must be in place to prevent waste discharges to surface water and groundwater prior to implementation of the completed plan.

3. The RWQP must include a professional assessment of the overall facility, evaluating any conditions or problems preventing compliance with the State's minimum standards and/or requirements of the General WDRs (i.e., overgrazed areas, erosion problems, condition of waste collection system, proximity of confined areas to waterways, etc.).

4. The RWQP must include an improvement schedule, including short-term corrective measures to immediately address identified pollutant sources, and needed corrective measures that may require a long-term schedule due to logistics and economic considerations. Such a schedule shall not exceed 3 years.

5. If a Tier 1 facility cannot comply with all conditions and provisions of the General WDRs within 2 years, the Executive Officer may designated the facility into Tier 3. Within 1 year from this designation, the RWQP must be revised and updated by a qualified professional and all facility improvements must be completed within 2 years.

A. Minimum Pollution Prevention Standards

The purpose of the RWQP is to ensure that the CAF is designed, constructed, operated, and maintained so that wastes, nutrients, and contaminants generated by the facility are managed to prevent adverse impacts to surface water and groundwater quality. The RWQP must evaluate existing facilities and pollutant sources/problems and describe how these sources are controlled utilizing Best Management Practices (BMPs) depending on the type and size of the confined animal facility. At a minimum, the plan must demonstrate how the facility complies with or will comply with the following:

1. Facility Design and Management

a. Animal confinement areas (barns, corrals, stalls, wash racks, etc.) and storage areas for manure, feed, soil amendments, and other potential sources of contaminants shall be designed, constructed, operated and maintained to retain all waste, wastewater, and stormwater contacting these areas that are likely to accumulate up to and during a 25-year, 24 hour storm event.

b. The animal confinement areas are designed, constructed, and operated to minimize stormwater contact with manure or waste materials and to collect and divert all wastewater away from surface waters and groundwater wells. If a retention pond must be used to prevent contaminated stormwater from discharging to surface waters, then the CAF is defined as a Tier 2 facility and must comply with Tier 2 requirements.

c. Storage areas for manure, soil amendments, feed and other materials are designed and constructed to minimize infiltration of leachate and to divert clean stormwater runoff away from these areas. Where practicable, these areas should be covered to prevent stormwater contact;

d. All precipitation and clean surface drainage outside of manured and waste storage areas, including that from roofed areas and tributary drainages, shall be diverted away from manured and waste storage areas, unless such drainage is fully contained. Covers shall be used where practical during precipitation to reduce leaching and runoff.

e. All animal confinement areas, and feed and waste storage areas, shall be managed to minimize standing water as of 72 hours after the last rainfall and the infiltration of water into underlying soils.

f. Water Wells, Section 8, Par II, in the California Well Standards, Supplemental Bulletin 74-90 (June 1991), and Bulletin 94-91 (December 1981), California Department of Water Resources (DWR), contains well setback standards. A setback of 100 feet is required between supply wells and animal enclosures in the production area. A minimum setback of 100 feet, or other control structures (such as housing, berming, grading), shall also be required for the protection of existing wells or new wells installed in the cropland. If a county or local agency adopts more stringent setback standards than that adopted by DWR, then these local standards shall carry precedence over the DWR Well Standards, and the Discharger shall comply with the more stringent standards.

2. Pasture and Land Management

The RWQP must include pollution prevention measures and/or BMPs that reduce nonpoint source pollution due to grazing, trail use, onsite roads, etc. In selecting what BMPs to use at the facility, the Discharger must take in consideration the vegetation, terrain, kind of livestock, and general facility operation procedures. An effective plan for pasture and land management shall accomplish the following:

a. Minimize delivery of sediment from ranching lands to surface waters.

b. Minimize delivery of pathogens and nutrients from ranching lands to surface waters.

c. Establish manure management operations designed to minimize runoff from entering watercourse.

d. Manage animal use areas to minimize sediment/pathogen/nutrient runoff to water course(s).

e. Construct and maintain access and ranch roads to minimize erosion.

f. Manage existing grazing operations to prevent additional erosion of legacy sediment delivery sites.

g. Manage and design animal crossings to minimize pathogen/sediment/nutrient runoff into watercourses.

h. Protect vegetation along flowing watercourses from overgrazing to maintain natural water temperatures and protect stream banks.

3. Application of Manure to Land

If manure or manure-laden debris is applied to land as fertilizer, BMPs must be in place to prevent discharges to surface and groundwater and to comply with the General WDRs Discharge Prohibitions and Waste Discharge Specifications, as follows:

a. The collection, treatment, storage, or application of manure or process water shall not:

- Degrade surface water or groundwater,
- Contaminate or pollute surface water or groundwater, or
- Create a condition of nuisance (as defined by the California Water Code section 13050).

This requirement applies to any degradation products or any constituents of soil mobilized by the interactions between applied materials and soil or soil biota.

b. The application of manure and/or wastewater shall not violate any applicable local, State, or federal laws or regulations or contribute to an exceedance of any applicable water quality objective in the Basin Plan or of any applicable State or federal water quality criteria.

c. Manure and wastewater discharges to land shall be conducted during non-rainy or non-saturated conditions must not result in runoff to surface waters and must infiltrate completely within 72 hours after application.

d. Land application areas that receive dry manure and/or process water shall be managed to minimize erosion.

e. The timing of nutrient application must correspond as closely as possible with plant nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, and land application area accessibility. The anticipated maximum time between land application events (i.e., the storage period) shall be used to determine the needed storage capacity.

f. Discharges to land of solid or liquid waste shall be applied at rates that are reasonable for crop, soil, climate, special local situations, management system and type of manure. The total nutrient loading shall not exceed the amount needed to meet crop demand.

g. Manure, manured bedding and process water shall not be stored or applied within a 100-foot setback to any down-gradient surface water unless a 35-foot wide vegetated buffer or physical barrier (i.e., a berm) is substituted for the 100-foot setback; or an alternative conservation practice or field-specific condition that provides pollutant reductions equivalent to or better than achieved by the 100-foot setback. Any alternative practice utilized must be described in the RWQP.

4. Flood Protection

The RWQP shall contain documentation (engineering report or a copy of flood zone map) that the concentrated confined areas have adequate flood protection in accordance with the following Title 27 requirement:

"Retention ponds and manured areas at CAFs in operation on November 27, 1984, shall be protected from inundation or washout by overflow from any stream channel during 20-year peak flows. CAFs existing before November 27, 1984, and that are protected against 100-year peak stream flows must continue to provide such protection. New CAFs, or portions thereof, that began operating after November 27, 1984, shall be protected against 100-year peak stream flows."

B. RWQP Outline

1. Facility Description / Map

a. Facility Name and Address.
b. Assessor's Parcel Number, and Township, Range, Section(s), and Baseline Meridian of the property where the CAF is located.
c. The name(s), address(es), and telephone number(s) of the property owner(s), facility operator(s), and the contact person for the facility.
d. A description of all activities and operations on the facility (type of animals, where and how are the animals housed and/or confined, type of waste containment facilities used, other onsite food processing operations such as cheese-making).
e. Maximum animal population categories as listed in the Notice of Intent (General WDRs Attachment F, G or H).
f. A site map (or maps) of appropriate scale to show property boundaries, all existing and proposed land-use designations (crops, grazed areas, buildings, pastures, covered and uncovered confined areas, feeding areas, etc.) and the following in sufficient detail:

- ✓ Structures used for animal housing, milk production, food processing, and other buildings; corrals and ponds; solids separation facilities (settling basins or mechanical separators); other areas where animal wastes are deposited or stored; feed storage areas; drainage flow directions and nearby surface waters; all water supply wells (domestic, irrigation, and barn wells) and groundwater monitoring wells.
- ✓ Process wastewater conveyance structures, discharge points, and discharge/mixing points with irrigation water supplies; pumping facilities and flow meter locations; upstream diversion structures, drainage ditches and canals, culverts, drainage controls (berms/levees, etc.), and drainage easements; and any additional components of the waste handling and storage system.
- ✓ The basic location and features of all land application areas under the Discharger's control (total acres of each field, whether it is owned, rented, or leased) to which manure or process wastewater from the production area is or may be applied for nutrient recycling
- ✓ The location of pasture lands and the pathways which animals travel to and from the production areas (if applicable).

2. Facility Evaluation and Improvement Plan

Each operator must assess their own facility and identify if problem areas exist that will contribute to adverse water quality impacts. If additional minor structural or management measures are required in order to ensure compliance with the terms of the General Permit, a schedule for improvement must be included within the RWQP and must not exceed 2 year.

3. Operation and Maintenance Best Management Practices

The RWQP shall describe ongoing facility operation and maintenance activities that demonstrate compliance with the discharge prohibitions and specifications of the General WDRs. The plan must describe how the operator complies with the Minimum Pollution

Prevention Standards listed above, including the management practices and stormwater pollution prevention measures for the following:

- ✓ Confined area stormwater management
- ✓ Waste storage/composting/transferring/onsite use
- ✓ Pasture management
- ✓ Design and maintenance for roads, trails, and stream crossings
- ✓ Erosion and sediment control

The plan may include daily, monthly or yearly operational check lists, and must also include, but not be limited to:

a. A description of pollution prevention measures for confined areas including heavily used areas devoid of vegetation, such as travel lanes, corrals and feed racks. Uncovered feeding and/or confined loafing areas must be scraped / cleaned of manure prior to the start of the rainy season, but no later than October 31. These areas should not be used during the rainy season, if they are a source of polluted stormwater discharges.

b. A determination of the facility's overall animal capacity with respect to existing facility design and which will prevent the discharge of animal waste or polluted stormwater to waters of the State.

c. An evaluation of any areas where animals may have access to creek channels and identification of pollution prevention measures both currently used and needed in the future to restrict animal access. All confined animals shall be fenced or excluded from any surface water or perennial streams passing through the confined area. Creek crossings shall be bridged in a manner that prevents animal waste from entering the waterway.

d. The plan must describe the methods by which manure and any process water are applied to land application areas and describe the BMPs that are implemented to protect surface water and groundwater.

e. A description of all surface water or potential conduits to surface water that are within 100 feet of any area where manure is applied as a fertilizer. Operators must take appropriate actions to protect water quality, such as utilizing vegetated buffers and setbacks from surface waters.

f. A description of pollution prevention measures for all non-manure waste or wastewater streams including, but not limited to, silage leachate, compost leachate, dead animals, waste milk, veterinary medical waste, solid and liquid waste from onsite slaughtering, solid and liquid waste from onsite food processing (such as cheese), spoiled feed, bedding, and any precipitation contacting these materials. The disposal of dead animals at the facility is prohibited. The Discharger must dispose of dead animals in compliance with all applicable federal, State, county, and local laws and regulations.

g. A detailed description of any onsite activities or operations that may generate additional waste and/or wastewater that may discharge offsite (such as onsite cheese-

making operations or animal wash water). Such a description must include, at a minimum, an analysis of all waste constituents and concentrations, estimates of daily volumes generated, pollution prevention management measures for such activities, and documentation that the waste and/or waste water is contained.

h. Manifests are required to be kept onsite to record transfer of waste to outside facilities and must be kept as part of the RWQP. The application of manure or process water to lands not owned, leased, or controlled by the Discharger without written permission from the landowner is prohibited.

i. Chemicals, including, but not limited to pesticides, herbicides, fungicides, cleaning products, equipment/machinery fluids, fertilizers and other contaminants at the facilities must be used according to manufacturer's directions and in accordance with federal, State, county, and local regulations. Chemicals must not be disposed of in any manure or process water, or stormwater storage or treatment system, unless the unit is specifically designed to treat such chemicals and other contaminants. The use of disinfectants per label directions is allowed.

j. Wellheads must be protected to prevent movement of contaminants to groundwater. The RWQP must discuss the manner by which wellheads are protected. The RWQP must contain documentation from a trained professional (i.e., a person certified by the American Backflow Prevention Association, an inspector from a State or local governmental agency who has experience and/or training in backflow prevention, or a consultant with such experience and/or training) that there are no cross-connections that would allow the backflow of waste into a well. The Executive Officer may approve the use of alternative specialists. If testing or modification of the well and/or associated piping is recommended by a responsible professional, then all testing and modifications are to be completed within 90 days from the time of the recommendation.

k. A description of all erosion and sediment control measures implemented at the CAF to protect surface water. Such measures may include, but are not limited to, installation of bridges, culverts, or armored crossings, fencing, barriers, vegetative buffers, vegetative cover and/or other control measures to protect surface waters and water quality. Feeding and locating water troughs, shade, and salt/nutrient blocks away from the watercourses may also be appropriate and are encouraged wherever possible.

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements

Waste Management Plan
Minimum Requirements
(Only Dischargers with liquid waste retention ponds within Tier 2 or Tier 3)

Order No. R2-2016-0031 (hereafter, General WDRs) requires Dischargers of dairies and other confined animal facilities (CAF) that utilize liquid waste retention ponds, to prepare and implement a Waste Management Plan (WMP) for activities within the production and/or confined areas including, but not limited to, the corrals, barns, feed storage area, compost piles, retention ponds, dry manure storage areas, animal wash areas, and onsite ancillary operations such as food processing.

The purpose of the WMP is to ensure that the CAF is designed, constructed, operated, and maintained so that wastes, nutrients, and contaminants generated by the facility are managed to prevent adverse impacts to surface water and groundwater quality. The WMP must evaluate existing facilities and pollutant sources/problems and describe how these sources are controlled utilizing Best Management Practices (BMPs) depending on the type and size of the confined animal facility. The plan must detail how the facility operator maintains compliance with General WDRs discharge prohibitions and discharge specifications for all confined areas and retention ponds.

The level of regulatory oversight is dependent upon each Discharger's designated water quality risk (as defined in General WDRs, Finding 5). Tier specific requirements are described in Sections A and B below.

A. **Tier 2 (CAFs with liquid waste retention ponds):**

1. Dischargers have the option to prepare the entire WMP, including containment structure specifications, through a technical education program administrated by a qualified professional. Examples of these professionals include, but are not limited to, registered professional engineers (PE), or the qualified staff of the Natural Resource Conservation District (NRCS), Resource Conservation Districts (RCDs), the University California Cooperative Extension, or technical service providers (TSPs) certified by the NRCS. The Executive Officer may approve the use of alternative specialists.

2. The WMP must include a statement from the Discharger or responsible professional that the WMP was developed in accordance with the requirements of the General WDRs, that it includes all necessary documentation (including calculations), and that all contents of the WMP were done consistent with requirements of the General WDRs and Title 27. Within two years of submitting an NOI, this statement must be submitted to the Executive Officer by separate letter or as an attachment to the Annual Report.

3. The facility WMP must be kept on the CAF site and must be made available for review by Water Board staff during inspections. Temporary controls must be in place to prevent waste discharges to surface water and groundwater prior to implementation of the completed plan.

B. **Tier 3 (Dairies and other CAFs with liquid waste retention ponds):**

1. The WMP must be prepared by a qualified professional, as described above in Requirement A.1. Portions of the plan related to manure and/or waste containment and structural facility specifications shall be certified by a civil engineer who is registered pursuant to California law or another person as may be permitted under the provisions of the California Business and Professions Code to assume responsible charge of such work.

2. Within one year of Tier 3 designation or submittal of a Notice of Intent, the WMP must be completed and submitted to the Water Board for review. It must also be kept on the CAF site and made available for review by Water Board staff during inspections. Temporary controls must be in place to prevent waste discharges to surface water and groundwater prior to implementation of the completed plan.

3. The WMP must include a professional assessment of the overall facility, evaluating any conditions or problems preventing compliance with the State's minimum standards and/or requirements of the General WDRs (i.e., overgrazed areas, erosion problems, condition of waste collection system, proximity of confined areas to waterways, etc.).

4. The WMP must include an improvement schedule, including short-term corrective measures to immediately address identified pollutant sources, and needed corrective measures that may require a long-term schedule due to logistics and economic considerations. Such a schedule shall not exceed 3 years.

The plan must contain the following site-specific information:

C. Facility Description

1. Facility Name and Address.

2. Assessor's Parcel Number, and Township, Range, Section(s), and Baseline Meridian of the property where the CAF is located.

3. The name(s), address(es), and telephone number(s) of the property owner(s), facility operator(s), and the contact person for the facility.

4. A description of all activities and operations on the facility (type of animals, where and how are the animals housed and/or confined, type of waste containment facilities used, other onsite food processing operations such as cheese-making).

5. Maximum animal population categories as listed in the Notice of Intent (General WDRs Attachment F, G or H).

6. A site map (or maps) of appropriate scale to show property boundaries, all existing and proposed land-use designations (crops, grazed areas, buildings, pastures, covered and uncovered confined areas, feeding areas, etc.) and the following in sufficient detail:

   a. Structures used for animal housing, milk production, food processing, and other buildings; corrals and ponds; solids separation facilities (settling basins or mechanical separators); other areas where animal wastes are deposited or stored; feed storage areas; drainage flow directions and nearby surface waters; all water supply wells (domestic, irrigation, and barn wells) and groundwater monitoring wells.

b. Process wastewater conveyance structures, discharge points, and discharge/mixing points with irrigation water supplies; pumping facilities and flow meter locations; upstream diversion structures, drainage ditches and canals, culverts, drainage controls (berms/levees, etc.), and drainage easements; and any additional components of the waste handling and storage system.

c. The basic location and features of all land application areas under the Discharger's control (total acres of each field, whether it is owned, rented, or leased) to which manure or process wastewater from the production area is or may be applied for nutrient recycling. A separate map with land application details is required in the Nutrient Management Plan (NMP, General WDRs Attachment D).

d. The location of pasture lands and the pathways which animals travel to and from the production areas (if applicable).

D. Waste Containment Capacity

1. The WMP must contain an analysis of the existing facility's waste containment capacity. The report shall include calculations of average daily volumes of manure and waste water generated (liquids and solids), showing that the existing containment structures are capable of retaining all the process water generated by the facility, together with all precipitation on and drainage through manured areas or waste/feedstock storage areas that are likely to accumulate up to and during a 25-year, 24 hour storm event.

2. The determination of the necessary pond storage volume shall reflect:

   a. The maximum period of time (storage period) anticipated between land application events based on the NMP;

   b. The volume of manure and all process wastewater accumulated during the storage period;

   c. Normal precipitation or normal precipitation times a factor of one and a half (1.5), less evaporation on the surface area during the entire storage period. If normal precipitation is used in the calculation of necessary storage volume, the WMP shall include a Contingency Plan, as specified below;

   d. Runoff from production and manure storage areas resulting from normal precipitation (or runoff due to normal precipitation times a factor of one and a half) during the storage period. If normal precipitation runoff is used in the calculation of necessary storage volume, the WMP shall include a Contingency Plan, as specified below;

   e. 25-year, 24-hour precipitation on the facility's retention pond surface(s) (at the required design storage volume level);

   f. 25-year, 24-hour runoff from the area of the facility draining to the retention pond;

   g. Residual solids after liquids have been removed; and

   h. To maintain structural integrity in all ponds and protect water quality, two feet of freeboard shall be maintained in partially or completely aboveground ponds and one (1) foot of freeboard shall be maintained in pond structures that are completely in ground. Freeboard shall be measured vertically, from the water surface up to the point on the surrounding berm or dike having the lowest elevation, and shall be designed and constructed to prevent overtopping as a result of windy storm conditions. Lesser

freeboard may be approved by the Executive Officer for soil and clay lined ponds if documented by a registered civil engineer that structural integrity and required capacity will not be compromised with the proposed freeboard.

3. Existing retention ponds must, at a minimum, be lined with, or underlain by, soils which contain at least ten (10) percent clay and not more than ten (10) percent gravel or artificial materials or materials with equivalent impermeability or include additional lining materials necessary to comply with the General WDRs Discharge Prohibitions.

4. Retention ponds (or expanded ponds) constructed after adoption of the General WDRs must comply with NRCS Waste Storage Facility Code 313 including a maximum specific discharge (unit seepage rate) of 1×10^{-6} cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the liner meets this requirement. Waste shall not be placed into the retention pond until after Water Board staff notifies the Discharger in writing that the report is acceptable.

E. Facility Design

1. Animal confinement areas and storage areas for manure, feeds, soil amendments, and other potential sources of contaminants shall be designed, constructed, operated and maintained to retain all waste, wastewater, and stormwater contacting these areas that are likely to accumulate up to and during a 25-year, 24 hour storm event. The following features shall be included:

   a. The production facility is designed, constructed, and operated to minimize infiltration of manure into the underlying soils and to collect and divert all wastewater to the retention pond(s);

   b. Corrals and other animal housing is designed and constructed to divert all water that has contacted manure or wastewater to a retention pond(s) or other type of containment;

   c. Storage areas for manure, soil amendments, feed and other materials are designed and constructed to minimize infiltration of leachate and to divert clean stormwater runoff away from these areas unless all runoff from these areas is discharged to the retention pond(s). Where practicable, these areas should be covered to prevent storm water contact;

   d. All precipitation and clean surface drainage outside of manured and waste storage areas, including that from roofed areas and tributary drainages, shall be diverted away from manured and waste storage areas, unless such drainage is fully contained in a retention pond and is included in the calculation of retention pond storage volume requirements. Covers shall be used where practical during precipitation to reduce leaching and runoff.

   e. All animal confinement areas, and feed and waste storage areas, shall be managed to minimize standing water as of 72 hours after the last rainfall and the infiltration of water into underlying soils.

F. Flood Protection

1. The WMP shall contain documentation (engineering report or a copy of flood zone map) that the production area has adequate flood protection in accordance with the following Title 27 requirement:

   "Retention ponds and manured areas at CAFs in operation on November 27, 1984, shall be protected from inundation or washout by overflow from any stream channel during 20-year peak flows. CAFs existing before November 27, 1984, and that are protected against 100-year peak stream flows must continue to provide such protection. New CAFs, or portions thereof, that began operating after November 27, 1984, shall be protected against 100-year peak stream flows."

2. Retention ponds must be in conformance with NRCS Waste Storage Facility Code 313 which states that: "*Waste storage facilities must be planned, designed, and constructed to meet all federal, state, and local laws and regulations. To minimize the potential for contamination of streams, waste storage facilities should be located outside of floodplains, however, if site restriction require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event, or larger if required by laws, rules and regulations*."

G. Operation and Maintenance

A detailed Operations and Management Plan shall be developed in order to comply with all Discharge Prohibitions, Waste Discharge Specifications, and Provisions of the General WDRs. This plan shall also include, but not be limited to, the following:

1. A description of all erosion and sediment control measures implemented at the CAF to protect surface water. Such measures may include, but are not limited to, installation of bridges, culverts, or armored crossings, fencing, barriers, vegetative buffers, vegetative cover and/or other control measures to protect surface waters and water quality. Feeding and locating water troughs, shade, and salt/nutrient blocks away from the watercourses may also be appropriate and are encouraged wherever possible.

2. A description of pollution prevention measures for confined areas including heavily used areas devoid of vegetation, such as travel lanes and feed racks. Uncovered feeding and/or confined loafing areas must be scraped / cleaned prior to the start of the rainy season, but no later than October 31. These areas should not be used during the rainy season, unless all storm water contacting these areas is contained.

3. A determination of the facility's overall animal capacity with respect to existing facility design and which will prevent the discharge of animal waste or polluted stormwater to waters of the State.

4. An evaluation of any areas where animals may have access to creek channels and identification of pollution prevention measures both currently used and needed in the future to restrict animal access. All confined animals shall be fenced or excluded from any surface water or perennial streams passing through the confined area. Creek crossings shall be bridged in a manner that prevents animal waste from entering the waterway.

5. A description of pollution prevention measures for all non-manure waste or wastewater streams including, but not limited to, silage leachate, compost leachate, dead animals, waste milk, veterinary medical waste, solid and liquid waste from onsite slaughtering, solid and liquid waste from onsite food processing (such as cheese), spoiled feed, bedding, and any precipitation contacting these materials. The disposal of dead animals at the facility or in any liquid manure or wastewater retention pond is prohibited. The Discharger must dispose of dead animals in compliance with all applicable federal, State, county, and local laws and regulations.

6. A detailed description of any onsite activities or operations that may generate additional waste and/or wastewater that may be co-mingled with the animal production waste stream (such as onsite cheese-making operations). Such a description must include, at a minimum, an analysis of all waste constituents and concentrations, estimates of daily volumes generated, pollution prevention management measures for such activities, and documentation that the existing waste containment system has the capacity to include such wastes.

7. The operation and maintenance for retention ponds must ensure that:

   a. Corrals and/or pens are designed and maintained to direct all process water and stormwater to the retention pond(s);

   b. The production facilities (e.g., barn, shed, milk parlor) are designed and maintained to direct all process wastewater and stormwater that has contacted manure, feedstocks, or soil amendments to the retention pond(s);

   c. All ponds must be managed to prevent nuisances (odors, breeding of mosquitoes, etc.), damage from burrowing animals, damage from equipment during removal of solids, embankment settlement, erosion, seepage, excess weeds, algae, and other vegetation;

   d. Retention ponds must provide necessary storage volume prior to winter storms, maintain capacity considering buildup of solids, and comply with the minimum freeboard. For ponds designated to contain the runoff from a 25 year /24 hour storm event, it is recommended that a depth marker be placed within the retention pond that clearly indicates the minimum capacity necessary to contain the runoff and direct precipitation from a 25 year/ 24 hour storm;

   e. The removal of solids from any lined pond must prevent damage to the pond liner; and

   f. Retention pond inspections and clean-out shall be conducted prior to the start of the rainy season, but no later than **October 31** of each year to ensure design storage capacity.

8. A contingency plan is required if the necessary calculated storage volume is based on normal precipitation and/or runoff rather than precipitation or runoff from normal precipitation times a factor of one and a half. This plan shall describe how the excess precipitation will be managed and also shall outline emergency response options for situations such as loss of freeboard due to higher than normal precipitation, pipeline breaks, power outage, earthquake and/or flood. The contingency plan shall include names and numbers for emergency waste haulers and pump rental companies, and alternative waste disposal options, such as nearby waste ponds with adequate capacity or municipal waste treatment facilities willing to accept wastewater in an emergency situation.

9. Manifests are required to be kept onsite to record transfer of waste to outside facilities and must be kept as part of the WMP. The application of manure or process water to lands not owned, leased, or controlled by the Discharger without written permission from the landowner is prohibited. The requirements for such third party agreements are outlined in Attachment D. Nutrient Management Plan Minimum Requirements.

10. Chemicals, including, but not limited to pesticides, herbicides, fungicides, cleaning products, equipment/machinery fluids, fertilizers and other contaminants at the facilities must be used according to manufacturer's directions and in accordance with federal, State, county, and local regulations. Chemicals must not be disposed of in any manure or process water, or stormwater storage or treatment system, unless the unit is specifically designed to treat such chemicals and other contaminants. The use of disinfectants per label directions is allowed. <u>The WMP must identify which chemicals are used within the production facility, including the volume and frequency of use.</u>

11. The WMP must contain an emergency spill prevention plan (SPP) detailing measures to be taken in the case of a discharge or threatened discharge of manure, chemicals, sediment, nutrients, or pathogens to surface water or groundwater. Personnel training, first response actions, and emergency contacts must be described in the SPP. The SPP must be kept onsite and made accessible to CAF personnel. A copy of the SPP must be included in the WMP for review by Water Board staff during inspections.

12. Wellheads must be protected to prevent movement of contaminants to groundwater. The WMP must discuss the manner by which wellheads are protected. The WMP must contain documentation from a trained professional (i.e., a person certified by the American Backflow Prevention Association, an inspector from a State or local governmental agency who has experience and/or training in backflow prevention, or a consultant with such experience and/or training) that there are no cross-connections that would allow the backflow of waste into a well. The Executive Officer may approve the use of alternative specialists. If testing or modification of the well and/or associated piping is recommended by a responsible professional, then all testing and modifications are to be completed within 90 days from the time of the recommendation.

13. Water Wells, Section 8, Par II, in the *California Well Standards, Supplemental Bulletin 74-90 (June 1991)*, and *Bulletin 94-91 (December 1981)*, California Department of Water Resources (DWR), contains well setback standards. A setback of 100 feet is required between supply wells and animal enclosures in the production area. A minimum setback of 100 feet, or other control structures (such as housing, berming, grading), shall also be required for the protection of existing wells or new wells installed in the cropland. If a county or local agency adopts more stringent setback standards than that adopted by DWR, then these local standards shall carry precedence over the DWR Well Standards, and the Discharger shall comply with the more stringent standards.

ATTACHMENT D

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements

Nutrient Management Plan
Minimum Requirements
(Only Dischargers with liquid waste retention ponds within Tier 2 or Tier 3)

Order No. R2-2016-0031 (hereafter, General WDRs) requires the preparation and implementation of a Nutrient Management Plan (NMP) for facilities that require the use of liquid waste retention ponds and that apply manure and/or process water to land as a soil amendment or source of nutrients**.** Manure and process water cannot be applied to land for the purpose of disposal. Manure and process water that are wastes must be disposed at an appropriately permitted disposal facility.

In accordance with federal regulations, facilities defined as a large Concentrated Animal Feeding Operation (CAFO)[1], that discharge stormwater from cropland where manure, litter, or process wastewater has been applied may enroll under the General WDRs if they are implementing a Nutrient Management Plan upon enrollment.

A. NMP Purpose and Implementation

The purpose of the NMP is to identify the management practices used at the facility to minimize adverse impacts to surface water and groundwater from runoff and leaching from land application areas. The NMP is specific for a particular facility and considers crops, soil types, climate, local conditions, sources of nutrients, and the non-nutrient salts applied to each field. All nutrient applications to land, including applications to pasture, must be made in accordance with an NMP. Implementation of the NMP is closely linked to each facility's waste management system, monitoring program, and environmental conditions. The NMP must be updated in response to changing conditions and the results of monitoring.

The NMP shall be developed by Dischargers with the assistance of specialists such as those that are appropriately certified or licensed such as a professional soil scientist, agronomist, crop advisor, University of California Cooperative Extension (UCCE) service advisor or technician, or a technical service provider certified by the Natural Resources Conservation Service (NRCS). In particular, Dischargers shall get assistance from these specialists in completing the nutrient budget calculations. The Executive Officer may approve the use of alternative specialists.

The most current version of the NMP must be kept at the facility and must be made available for review by Water Board staff during inspections. <u>If the facility is designated as a Tier 3 facility, the NMP shall be submitted to the Water Board for review, within 2 years of Tier 3 designation or submittal of an NOI.</u>

[1] 40 CFR section 122.23 (b)(4) defines a large CAFO as an operation that stables or confines as many as, or more than, 700 mature dairy cows, whether milked or dry, 10,000 sheep or lambs, or 500 horses. The size thresholds for all animal sectors are listed in CFR 122.23(b) and (c).

The NMP shall be revised within 30 days when discharges from a land application area result in an exceedance of water quality objectives. The NMP shall be revised within 90 days when any of the following occur:

1. Site-specific information becomes available to replace default values used in the initial NMP,
2. Changes in operating practices result in the production of nutrients that are not addressed by the NMP,
3. Crops will be grown that are not covered by the NMP,
4. There is a change of 15% or more in the acreage used for land application, or
5. The NMP is not effective in preventing periodic discharges of manure or process water to waters of the United States (U.S.).

The Discharger shall review the NMP annually and revise it if changes in conditions or practices at the facility require changes in the NMP. The review/revision date must be noted in the NMP. Records on the timing and amounts of manure and process water applied to land and information developed through a Monitoring and Reporting Program (MRP) for the facility must be considered when making decisions related to nutrient management.

B. Management of Manure and Process Water

During the development of a complete NMP, land application best management practices (BMPs – see Section E) must be in place to prevent discharges to surface waters and to comply with General WDRs Discharge Prohibitions:

1. The collection, treatment, storage, or application of manure or process water shall not result in:
   a. Degradation of surface water or groundwater,
   b. Contamination or pollution of surface water or groundwater, or
   c. Condition of nuisance (as defined by the California Water Code section 13050).

   This requirement applies to any degradation products or any constituents of soil mobilized by the interactions between applied materials and soil or soil biota.

2. The application of manure and process water shall not violate any applicable local, State, or federal laws or regulations or contribute to an exceedance of any applicable water quality objective in the Basin Plan or of any applicable State or federal water quality criteria.

3. The discharge of process water to surface water is prohibited.

4. For large CAFOs the discharge of stormwater to surface water from land where manure or process water has been applied is prohibited unless all applications to land are in accordance with an NMP.

C. Contents of NMP

The NMP must contain, at a minimum, the following components:

1. **Contact Information:** The name, mailing address, and phone number of (a) the owner, (b) the operator (if different), and (c) any specialist who participated in the development of the NMP.

2. **Specific dates:** The date that the NMP was completed and documentation of subsequent updates.

3. **Maps:** One or more United States Geological Survey quadrangle maps or equivalent showing the location of the facility and all areas under the Discharger's control, whether owned, rented, or leased, to which manure or process water may be applied. If suitable, an aerial photo with appropriate notations may be utilized. The map(s), aerial photos, and/or drawings (see next section) should show the locations of all the following that exist at the facility:
   a. Surface water courses and conveyances,
   b. Pipelines (above or underground), where process water is mixed with irrigation water or discharged,
   c. Drainage flows for the production area and each field,
   d. Drainage ditches and drainage easements,
   e. Drainage controls (berms, levees, etc.) for tailwater and stormwater,
   f. Extent of subsurface (tile) drainage systems and associated discharge points,
   g. Pumping facilities and flow meters,
   h. Wells and type (domestic, industrial, agricultural, or monitoring),
   i. Stormwater discharge points,
   j. Any septic systems,
   k. Total acreage of each field,
   l. Crops grown and rotations, if any, for each application area,
   m. Where types of waste are applied (solids, waste water, and/or both),
   n. All water quality sampling points, and
   o. A map legend.

4. **Nutrient Budget Calculations:** The NMP must include calculations showing all sources of nutrients used by the facility and demonstrating that nutrients are applied at rates that are protective of water quality. These calculations must be reviewed annually and updated if there are any significant changes in conditions or practices at the facility that necessitate changes in the NMP. These calculations may be reviewed by Water Board staff during inspections. The details of the nutrient budget are discussed below in Section D.

5. **Land application practices and water quality protection:** The NMP must describe the methods by which manure and process water are applied to land application areas and describe the BMPs that are implemented to protect surface water and groundwater.

6. **Sampling and analysis program:** The NMP must describe the associated sampling program including sampling locations, sampling frequency, and sample collection and preservation procedures.

D. Nutrient Budget Calculations

The Discharger shall develop a nutrient budget that establishes the nutrient application practices for each crop in each land application area. The initial nutrient budget may be based on default values if site-specific information is not available[2]. Subsequent nutrient budgets shall be based on site-specific analytical data for soil, manure, process water, irrigation water, other sources of nutrients, and plant tissue. The nutrient budget for all sources of nutrients (nitrogen, phosphorus, potassium) shall include the following:

1. The rate of nutrient applications (e.g., pounds of nitrogen per acre) based on default values or site-specific analytical data in order to meet each crop's needs for nitrogen and phosphorus without exceeding the application rates that will protect water quality. The rate of nutrient applications shall be based on realistic yield goals for each crop in each land application area. For new crops or varieties, industry yield expectations may be used until site-specific yield information is available.

2. The quantity of manure, soil amendments, and/or process water to be applied shall be based on the nutrient content of the material, the characteristics of the material (e.g., the amount of organic nitrogen), and the site conditions (e.g., if a pasture is not grazed or mowed, the amount of residual nutrients in soil will be higher). In determining the quantity to apply, the Discharger shall consider all sources of nutrients including irrigation water, commercial fertilizers, and previous crops.

3. The timing of applications shall be based on seasonal and climatic conditions, the growth stage of the crop, and the availability of water. The anticipated maximum time between land application events (i.e., the storage period) shall be used to determine the needed storage capacity for manure and process water.

4. The method of manure, soil amendment, and process water application for each crop in each land application area shall be based on site-specific conditions and shall minimize the discharge of sediments, nutrients, and salts from the application area.

Nutrient application rates shall not approach a site's maximum ability to contain one or more nutrients through soil adsorption. If the nutrient budget shows that the nutrients generated by the facility exceed the amount needed by crops in the land application area, then the Discharger must implement management practices that will prevent impacts to surface water or groundwater due to application of excess nutrients. Such practices may include obtaining access to additional land for nutrient application, exporting manure, or reducing the number of animals at the facility.

Supplementary commercial fertilizers and/or soil amendments may be added when the application of nutrients contained in manure and process water alone is not sufficient to meet the crop needs. Specific nutrients are discussed below.

[2] Crop nutrient needs may be based on recommendations from the University of California or the Western Fertilizer Handbook (9th Edition). Acceptable default values for the nutrient content of materials include values recognized by the American Society of Agricultural and Biological Engineers (ASABE), the Natural Resources Conservation Service (NRCS), and/or the University of California. The nutrient content of commercial fertilizers shall be California Department of Food and Agriculture published values.

Nitrogen: Total Ammonia Nitrogen (NH_3 + NH_{4+}) and Total Nitrogen will be measured at the facility through water and soil sampling. Nitrogen application rates shall not result in total nitrogen applied to the land application areas exceeding the nitrogen application in each location as recommended by UCCE, NRCS, other local information, or 1.4 times the anticipated nitrogen removal in forage.

If application of total nitrogen to a land application area exceeds the budgeted application rate for the specific land application area, the Discharger shall either revise the nutrient budget to prevent such exceedance in the future or demonstrate and record that the application rates have not contaminated surface or ground water. Applications of nitrogen exceeding the initial recommendations are allowable if the following conditions are met:

1. Soil Plant Available Nitrogen (PAN) testing or plant tissue testing has been conducted and indicates that additional nitrogen is required to obtain crop yield estimates typical for the soils and other local conditions;
2. The amount of additional nitrogen applied is based on the soil or tissue testing; and is consistent with UCCE or NRCS guidelines or written recommendations from a nutrient management specialist or Certified Crop Advisor;
3. The form, timing, and method of application facilitates timely nitrogen availability to the crop; and
4. Records are maintained documenting the need for the additional applications.

Phosphorus and Potassium: Application of these nutrients at agronomic levels, along with reasonable erosion control and runoff control measures, will normally prevent water quality problems. In some instances, other best management practices may need to be included in the NMP.

E. Land Application Practices

Discharges to land of solid or liquid waste shall be at rates that are reasonable for crop, soil, climate, special local situations, management system and type of manure. The total nutrient loading shall not exceed the amount needed to meet crop demand and shall be in accordance with the nutrient budget calculations. The timing of nutrient application must correspond as closely as possible with plant nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, and land application area accessibility.

The NMP must identify all surface water or potential conduits to surface water that are within 100 feet of any land application area and take appropriate actions to protect water quality. The following sections discuss practices that reduce the potential for pollutants from land application areas to reach surface water:

1. **Setbacks, vegetated buffers:** A setback is a specified distance that separates land application areas from surface water or a potential conduit to surface water, and where manure and process water may not be applied, but where crops may be grown. A vegetated buffer is a relatively narrow (approximately 35 feet), permanent strip of dense vegetation where no crops are grown and which is established perpendicular to the dominant slope of a land application area for the purposes of slowing water runoff, enhancing water infiltration, trapping pollutants bound to sediment, and minimizing the risk of pollutants reaching surface waters. A berm is another alternative to prevent runoff from reaching surface water.

Manure and process water shall not be applied within a 100-foot setback to any down-gradient surface water unless a 35-foot wide vegetated buffer or physical barrier (i.e., a berm) is substituted for the 100-foot setback; or an alternative conservation practice or field-specific condition that provides pollutant reductions equivalent to or better than achieved by the 100-foot setback. This setback requirement also applies to temporary storage piles of manure and/or compost. Any alternative practice utilized must be described in the NMP.

Practices for establishing and maintaining vegetated buffers include:

a. Limiting removal of vegetation within the buffers and promoting plant growth in the buffer;
b. Maintaining the recommended height for the plant species;
c. Establishing plant density for adequate filtering capacity;
d. Improving soil conditions to reduce erosion and increase infiltration; and
e. Preventing erosion channels and gullies from forming.

2. **Best Management Practices to protect surface water:**
   a. Manure and wastewater discharges to land, including spray irrigation, shall be conducted during non-rainy or non-saturated conditions, must not result in runoff to surface waters and must infiltrate completely within 72 hours after application.
   b. Land application areas that receive dry manure and/or process water shall be managed to minimize erosion.
   c. Spray irrigation applications must be accurately timed and consistently monitored in order to prevent discharges to surface waters and/or beyond the property line.

3. **Avoiding conduits that can transport pollutants:** Manure and process water shall not be applied closer than 100 feet to open tile line intake structures, sinkholes, or well heads unless the NMP contains a statement from a professional explaining that an alternative practice will be as protective as the 100-foot separation. This professional must be a registered or certified engineering geologist or hydrogeologist, or a responsible professional with experience in manure containment and structural facility specification. Documentation from initial wellhead construction may be acceptable upon review by Water Board staff.

4. **Wetland Protection**: Wetlands are waters of the State and are protected under State regulations by provisions of the California Water Code. Wetlands are also protected as waters of the U.S. under the federal Clean Water Act. The beneficial use of wetlands must be protected against water quality degradation. Discharges of manure and process water to wetlands with standing water must be addressed in the NMP. Wetlands containing standing water shall be protected through animal exclusion and the exclusion of manure or process water application.

F. Sampling, Analysis, and Calculations

Soil, manure, soil amendments, process water, irrigation water, and plant tissue shall be monitored, sampled, and analyzed, in accordance to U.S. Department of Agriculture, Natural Resource Conservation Service, 590-Practice Procedures for Nutrient Management, or an alternative

sampling and analysis program developed by technical education administrator (as described above in Section A), and approved by the Executive Officer. The analytical results shall be used during the development, implementation, and revision of the NMP.

Samples of soils and crop tissues shall be analyzed for available phosphorus at least once every five years. Sampling results shall be reviewed to verify that phosphorus levels do not exceed limits needed to maintain acceptable crop yields and prevent adverse impacts to water quality. If this review determines that a buildup of phosphorus threatens water quality, application rates must be decreased until the situation is corrected.

Nutrient credit from previous legume crops shall be determined by methods acceptable to the UCCE, the NRCS, Resource Conservation District, or a technical service provider that is NRCS-certified in developing NMPs.

The NMP must identify the analytical laboratory utilized and the analyses to be conducted for soil, manure, soil amendments, process water, irrigation water, plant tissue, etc. If this information is in the MRP (General WDRs, Attachment A), the NMP can reference that MRP. The laboratory utilized must be certified and use the analysis methods identified in California Analytical Methods Manual for Dairy General Order Compliance – Nutrient Management Plan Constituents:

http://anlab.ucdavis.edu/docs/uc_analytical_methods.pdf

G. Field Risk Assessment

Dischargers are required to sample discharges of stormwater from land application areas to surface water, as detailed in the MRP. The analytical results for those samples shall be used by the Discharger to assess water quality conditions and to inform management practices. If results indicate a potential for adverse impacts to receiving waters, the Discharger shall modify its NMP to reduce such movement and collect additional samples to assess the effectiveness of the modifications.

Land application areas must be managed to prevent contamination of crops grown for human consumption. When crops grown for human consumption without processing (berries, nut trees, etc.) are grown near to land application areas, the Discharger shall take appropriate actions to prevent movement of pathogens that could cause adverse impacts to human health.

H. Manifests and Third-Party Agreements

Manifests are required to be kept onsite to record transfer of waste to outside facilities and must be kept as part of the NMP. The application of manure or process water to lands not owned, leased, or controlled by the Discharger without written permission from the landowner is prohibited. The Discharger shall have a written agreement with each third-party that receives process wastewater from the Discharger for its own use. The written agreement(s) shall be effective until the third-party is covered under waste discharge requirements or a waiver of waste discharge requirements. The written agreement shall:

1. Clearly identify:
    a. The Discharger and CAF from which the process wastewater originates,
    b. The third-party that will control the application of the process wastewater to cropland,

c. The Assessor's Parcel Number(s) and the acreage(s) of the cropland where the process wastewater will be applied, and

2. Include an agreement by the third-party to:

a. Use the process wastewater at agronomic rates appropriate for the crops to be grown, and

b. Prevent the runoff to surface waters of wastewater, stormwater, or irrigation supply water that has come into contact with manure or is blended with wastewater.

I. Record-Keeping

The Discharger must maintain records for five years, for each land application area and use the records as a basis for revisions to the NMP. In addition to the manifest records described above, records shall include:

1. All analyses of manure, process wastewater, irrigation water, soil, plant tissue, discharges (including tailwater discharges), surface water, stormwater, subsurface (tile) drainage, and groundwater.

2. All records for nutrient management and land application areas including:

a. Expected and actual crop yields (or estimated yields if crop is grazed);

b. Identification of crop, acreage, and dates of planting and harvest for each field;

c. Dates, locations, and approximate weight and moisture content of manure applied to each field;

d. Dates, locations, and volume of process wastewater applied to each field;

e. Whether precipitation occurred, or standing water was present, at the time of manure and process wastewater applications and for 24 hours prior to and following applications;

f. Test methods and procedures for soil, manure, process wastewater, irrigation water, and plant tissue sampling;

g. Results from manure, process wastewater, irrigation water, soil, plant tissue, discharge (including tailwater), and stormwater sampling;

h. Explanation for the basis for determining manure or process wastewater application rates;

i. Calculations showing the total nitrogen, total phosphorus, and potassium to be applied to each field, including sources other than manure or process wastewater (Nutrient Budget);

j. Total amount of nitrogen, phosphorus, and potassium actually applied to each field, including documentation of calculations for the total amount applied (Nutrient Application Calculations);

k. The method(s) used to apply manure and/or process wastewater; and

l. Records documenting any corrective actions taken to correct deficiencies noted as a result of the inspections required in the Monitoring Requirements above. Deficiencies not corrected in 30 days must be accompanied by an explanation of the factors preventing immediate correction.

ATTACHMENT E

California Regional Water Quality Control Board
San Francisco Bay Region

General Waste Discharge Requirements

Grazing Management Plan
Minimum Requirements

Order No. R2-2016-0031 requires the preparation and implementation of a Grazing Management Plan (GMP) for confined animal facilities (CAFs) with grazing operations on grazing lands that encompass an area of 50 acres or more or encompass an area smaller than 50 acres and are identified by the Executive Officer as posing a threat to water quality. The purpose of the GMP is to identify the necessary site-specific grazing management measures to reduce animal waste and sediment runoff. In selecting what management practices to use at the facility, the Discharger shall take in consideration the vegetation, terrain, kind of livestock, and general ranch facility operation procedures. Dischargers have the option to combine the GMP elements with the facility's Nutrient Management Plan or Waste Management Plan.

A. **General Requirements:**

The Discharger is required to have a completed GMP kept onsite and available for review by Water Board staff during inspections. Elements of the GMP shall include:

1. A ranch facility map, or aerial photo on a 1:12,000 scale;
2. An inventory of grazing resources based on visual observations and/or existing reports;
3. An assessment of facility conditions, per the checklist titled *Checklist Form For Assessing Grazing Operations* (attached)*, identifying controllable discharge points for pathogens, nutrients, and sediment;
4. Identification of sediment legacy discharge points, if appropriate;
5. An annual assessment of residual dry matter (RDM) as specified in the University of California 2002, California Guidelines for Residual Dry Matter Management on Coastal and Foothill Annual Rangelands, Rangeland Monitoring Series Publication 8092; and
6. A description of the of the GMP's objectives.

* The checklist is intended to guide the Discharger in the inventory of resources and the preparation of the GMP. Alternative checklists may be used, provided the Executive Officer approves of them in writing.

B. Best Management Practices

1. The GMP must include pollution prevention measures and/or best management practices (BMPs) that reduce nonpoint source pollution due to grazing and protect water quality. In selecting what BMPs to use at the facility, the Discharger must take in consideration the vegetation, terrain, kind of livestock, and general facility operation procedures. A complete and effective GMP will accomplish the following:
   a. Minimize delivery of sediment from ranching lands to surface waters.
   b. Minimize delivery of pathogens and nutrients from ranching lands to surface waters.

c. Establish manure management operations designed to minimize runoff from entering watercourse.

d. Manage animal use areas to minimize sediment/pathogen/nutrient runoff to water course(s).

e. Construct and maintain access and ranch roads to minimize erosion.

f. Manage existing grazing operations to prevent additional erosion of legacy sediment delivery sites.

g. Manage and design animal crossings to minimize pathogen/sediment/nutrient runoff into watercourses.

h. Protect vegetation along flowing watercourses from overgrazing to maintain natural water temperatures and protect stream banks.

2. The GMP shall also include:

   a. A description of all management practices currently implemented at the facility;

   b. A schedule for implementation of newly-selected management practices to comply with the above BMPs;

   c. An implementation schedule for management of grazing activities, structural improvements, livestock management, and land treatments necessary to comply with the above BMPs; and

   d. An implementation schedule for road-erosion control and prevention actions and actions to avoid increases in erosion of existing unstable areas due to grazing practices to comply with the above BMPs.

3. The implementation schedules shall be included in the GMP and may be updated yearly thereafter.

4. A list of potential BMPs may be found in the Natural Resource Conservation Service Field Office Technical Guide or equivalent rangeland management guidance documents. The Conservation Service Field Office Technical Guide can be obtained at local offices of the USDA Natural Resources Conservation Service or the Conservation District office.

C. Special Requirements for Walker Creek Watershed

In selecting BMPs that reduce nonpoint source pollution due to grazing, Dischargers in the Walker Creek watershed, downstream of the Gambonini Mine, must choose BMPs that will minimize the discharge of mercury or the production of methylmercury. Any proposed BMPs that involve work within the floodplain, or any proposal to implement BMPs that may have the potential for increasing the discharge of mercury or the production methylmercury, must be reviewed by Water Board staff prior to implementation. This review is typically made as part of required review and approval for other relevant permits.

If Water Board staff determine that the proposed management practice/control measure does have the potential to increase the discharge of mercury or the production of methylmercury, then the management practice/control measure will not be covered by this Order, and a separate Report of Waste Discharge, pursuant to CWC section 13260 shall be submitted by the Discharger.

Checklist Form
For Assessing Grazing Operations

Date: _____Weather: _____

Name of Person Completing checklist:_____

Facility Information

Facility Name:	**Owner Name & Address (if different):**
Address:	**Nearest Water Body:**
Operator Name &Address:	**Number of Animals:**
Operator Telephone Number:	**Type of Animals:**
Facility's Assessor's Parcel Number:	

Erosion and Sediment Sources

Sediment from Sheet, Rill, and Gully Erosion: Sheet and rill erosion generally occurs on crop-fields or overgrazed pastures and corrals. Gullies can occur from these same conditions, or can be caused by natural occurrences, such as from burrowing animals.

Pastures	**Yes**	**No**
Upon close inspection, is bare soil visible in pastures?		
At a distance of 20 feet, can you distinguish small objects such as roots and cow pies?		
Are there gullies or headcuts in pastures?		
Crop Fields		
Do crop-fields have rill or other signs of surface erosion?		
Are crop-fields clean cultivated so that all plant residue is tilled under?		
Road Erosion		
Do ranch roads show signs of surface erosion such as rills or gullies?		
Are there any gullies caused by unprotected culverts?		
Are drainage ditches eroding?		
Do road surfaces consist of bare soil?		

Other types of erosion noted: _____
_____
_____

_____
_____

Suggestions for correcting problems indicated by yes answers above:_____
_____
_____
_____
_____
_____
_____

Nutrients and Pathogens

Pollution from animal waste: This generally occurs where animals congregate or are confined, or where animals have access to creeks. Nutrient pollution problems are best evaluated during the rainy season when water testing can be used to locate problems.

	Yes	No
Are there possible sources of nutrients and pathogens from direct animal access to creeks?		
Are feeding areas, water troughs, or salting areas near creeks?		
Are manure stock piles located where runoff could flow into creeks?		

Locations of problem areas:_____
_____
_____
_____
_____
_____

Other types of animal waste pollution noted:_____
_____
_____
_____
_____
_____

Suggestions for correcting problems indicated by yes answers above:_____
_____
_____
_____
_____
_____
_____

Riparian Areas

Condition of Creek and Streams: Riparian areas are sensitive to damage from livestock. Livestock should be excluded from or carefully managed in riparian areas. Condition of riparian areas can be evaluated at any time of the year.

	Yes	No
Do creek banks lack good cover of grasses trees and shrubs?		
Are creeks exposed to full sun?		
Is there excessive growth of algae in creeks?		
Are creek banks actively eroding or trampled?		
Do livestock have access to riparian areas?		
Do livestock congregate in riparian areas?		
Are waterway crossings secure and bermed?		
Are water troughs located away from riparian areas?		

Location of problem areas:_____
_____
_____
_____
_____

Other types of riparian areas degradation noted:_____
_____
_____
_____
_____

Suggestions for correcting problems indicated by yes answers above:_____
_____
_____
_____
_____
_____
_____

CALIFORNIA Water Boards

EDMUND G. BROWN JR. GOVERNOR

MATTHEW RODRIQUEZ SECRETARY FOR ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF ORDER NO. R2-2016-0031

GENERAL WASTE DISCHARGE REQUIREMENTS FOR CONFINED ANIMAL FACILITIES

SECTION I. GENERAL WASTE DISCHARGE REQUIREMENT TIER

Instructions: This Notice of Intent (NOI) applies to existing CAF facilities operating on or before June 8, 2016. Check the tier below that describes your CAF facility. Unless the Water Board Executive Officer has already designated your tier, you must self-designate.

If you are reopening an existing dormant facility or building a new or significantly expanded facility, you must complete the alternate Notice of Intent for Reopened or New Facilities.

Dairies currently enrolled under Resolution No. R2-2015-0031 (Conditional Waiver) will be required to enroll under this Order when the Conditional Waiver expires on June 9, 2020.

Mail completed NOI to: San Francisco Bay Regional Water Quality Control Board; 1515 Clay Street, Suite 1400; Oakland, CA 94612, Attn: Confined Animal Program. Or email to: R2ConfinedAnimals@waterboards.ca.gov

[ ] **Tier 1:** CAF that does not utilize liquid waste retention ponds. Facility must currently comply with the Order's discharge prohibitions and waste discharge specifications. If minor structural or operational improvements are necessary, a short-term improvement plan or update is required within the first Annual Report.

[ ] **Tier 2:** CAF that utilizes liquid waste retention ponds. Facility must currently comply with the Order's discharge prohibitions and waste discharge specifications. If minor structural or operational improvements are necessary, a short-term improvement plan or update is required within the first Annual Report.

[ ] **Tier 3:** CAF that requires significant structural or operational improvements are necessary to comply with the prohibitions and waste discharge specifications. Temporary controls must be deployed immediately to prevent waste discharges to surface water and groundwater, and must be reported in the first Annual Report. A comprehensive improvement schedule for short and long-term improvements must be part of the Waste Management Plan.

Send Correspondence to : [ ] Facility Owner Address (Section II) [ ] Lessee/Operator Address (Section III) [ ] Facility Address (Section IV)

SECTION II. FACILITY OWNER INFORMATION

Name:		Contact E-mail:
Mailing Address:		
City:	State:	Zip Code:
Contact Person:		Contact Phone:

SECTION III. FACILITY OPERATOR INFORMATION

Is the facility currently leased and/or operated by someone other than owner? Yes _____ No _____ If the answer is yes, who is the lessee and/or operator?_____

Provide lessee/operator contact info: Address:_____

Phone number: |__|__|__| -- |__|__|__| -- |__|__|__|__| Email:

SECTION IV. FACILITY INFORMATION

A. Facility Name:

Former Facility Name (if applicable):

County:

Physical Address:

Contact E-mail:

City:

State: C | A

Zip Code:

Contact Person:

Contact Phone:

Provide Latitude and Longitude of confined areas only if facility does not have a valid street address

	Degree/minutes/seconds	**Decimal Form**
Latitude:	° ' "	.
Longitude:	° ' "	.

Provide Assessor Parcel Number(s) for entire operation; indicate if owned or leased (Grazing parcels provided separately in Section IV k.)

B. Size of Herd:

_____ Mature Milked/Dry Cows
_____ Heifer/Calf
_____ Sheep, milking ewes
_____ Lambs
_____ Goats
_____ Horses
_____ Other
_____ Total

C. Operation Type: (check one)

1. [ ] Cow Dairy 2. [ ] Goat Dairy 3. [ ] Sheep Dairy

4. [ ] Horse Boarding 5. [ ] Other (list animal type)

_____

D. Start Date of Current Operations:
____/____/____

E. Maximum design capacity of current confined facility. Report in # of animals:_____

F. Do your facilities have 700 or more mature cows, 500 horses, or 10,000 or more sheep? Yes_____ No_____

Is a Nutrient Management Plan (NWP) complete? Yes_____ No_____ Date of completion: ____/____/____

G. Type of containment structure(s) for waste including: manure, litter, silage leachate, process waste or wastewater (including stormwater contacting waste): _____

Total storage capacity of above structure(s): _____ tons/gallons (circle one)

H. Does the facility have any food processing activities that would contribute to the waste stream and volume?

Yes_____ No_____

I. Total acres under the control of the discharger available for land application of manure, litter, or process wastewater:

_____ Acres

J. Is your dairy California Dairy Quality Assurance Program (CDQAP) certified? Yes _____ No _____ Not applicable_____

Date of most recent certification: _____/_____/_____

K. Does the facility maintain a grazing operation on lands encompassing 50 acres or greater? Yes _____ No _____

If the answer is yes, please list the Assessor's Parcel Numbers for the grazing operation below (owned and/or leased):

_____

SECTION V. RECEIVING WATER INFORMATION

Does your facility's clean stormwater flow directly and/or indirectly into waters of the State (a stream, river, lake, ocean, etc.)? (circle one)

If it is indirect explain: (for example, "stormwater is diverted to ditch that travels 100 yards to offsite ditch that eventually drains to San Antonio Creek".)

Explanation:_____

Closest receiving waterbody is: _____

SECTION VI. IMPLEMENTATION OF ORDER PROVISIONS

A. STATEWIDE MINIMUM STANDARDS FOR CONFINED ANIMAL FACILITIES (*check if true*)

[ ] Facility is currently operating in compliance with Statewide Minimum Standards for Discharges of Animal Waste (Title 27, see Attachment K)

B. FACILITY / OPERATION MANAGEMENT (check if true)

[ ] Liquid waste retention ponds and/or manure storage facilities are designed to accommodate the waste water flow and stormwater contacting confined manured areas, that is likely to accumulate up to and during a 25-year, 24-hour storm event.

[ ] Liquid waste retention ponds and manure storage facilities are managed in accordance with the waste discharge specifications for the General WDRs.

[ ] All non-manure wastes and/or waste water such as silage leachate, dead animals, waste milk, veterinary medical waste, spoiled feed, bedding, animal wash water, etc., are contained and managed in accordance with the waste discharge specifications for the General WDRs.

[ ] All direct and indirect discharges of waste and/or manure, including stormwater contacting waste and/or manure, from the animal confinement areas are contained and prevented from entering any surface water, or tributary thereof.

[ ] All confined animals are fenced or excluded from any surface water or perennial streams passing through the confined area.

SECTION VII. MONITORING PROGRAM

[ ] The Monitoring and Reporting Program will be reviewed and all tasks will be conducted as required (check if true)

Please check one regarding required surface water sampling:

[ ] The facility will participate in group surface water monitoring

[ ] The facility will perform individual surface water monitoring

SECTION VIII. LANDOWNER NOTIFICATION AND CERTIFICATION

If the facility is currently leased or operated by someone other than the owner, this section must be signed by the operator.

I certify that the owner of the facility has been notified of these General Waste Discharger Requirements and that I have been designated by the owner as the "authorized representative".

Operator's Printed Name:_____Signature:_____

Title: _____Date:_____

SECTION IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the Order, including the implementation of a Monitoring Program Plan, will be complied with."

Owner or Authorized Representative Printed Name*:_____

Owner or Authorized Representative Signature:_____ Date:_____

Telephone Number:_____Email:_____

***** A duly authorized person designated by the owner of the confined animal facility, as having responsibility for the overall operation of the regulated facility. The authorized representative may be the confined animal facility operator or operator's duly authorized designee.

CALIFORNIA Water Boards

EDMUND G. BROWN JR. GOVERNOR

MATTHEW RODRIQUEZ SECRETARY FOR ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

NOTICE OF INTENT for Re-opening of Dormant Confined Animal Facilities

TO COMPLY WITH THE TERMS OF ORDER NO. R2-2016-0031

GENERAL WASTE DISCHARGE REQUIREMENTS FOR CONFINED ANIMAL FACILITIES

SECTION I. GENERAL WASTE DISCHARGE REQUIREMENT TIER

Instructions: If you are reopening an existing dormant confined animal facility (CAF), you must complete this Notice of Intent (NOI) form to seek coverage under Order No. R2-2016-0031. This NOI applies to existing, dormant CAFs that are re-opened after June 8, 2016.

Check the tier below that describes your CAF facility. Unless the Water Board Executive Officer has already designated your tier, you must self-designate.

Mail completed NOI to: San Francisco Bay Regional Water Quality Control Board; 1515 Clay Street, Suite 1400; Oakland, CA 94612, Attn: Confined Animal Program. Or email to: R2ConfinedAnimals@waterboards.ca.gov

[ ] Tier 1: CAF that does not utilize liquid waste retention ponds. Facility must currently comply with the Order's discharge prohibitions and waste discharge specifications. To qualify for coverage, the Discharger must demonstrate completion of the following:

MANAGEMENT PLANS: Prior to start-up, the Discharger must develop a site-specific Ranch Water Quality Plan applicable to each operation, in accordance with technical standards outlined in the Order. Check which of the following apply:

YES NO

[ ] [ ] Is your Ranch Water Quality Plan complete?

If no, please provide an explanation:

_____

_____

YES NO

[ ] [ ] Does the CAF include more animals than the existing infrastructure is designed to accommodate? The Order does not authorize construction or expansions of facilities.

Please provide an explanation:

_____

_____

[ ] Tier 2: CAF that utilizes liquid waste retention ponds. Facility must currently comply with the Order's discharge prohibitions and waste discharge specifications. To qualify for coverage, the Discharger must demonstrate completion of the following:

MANAGEMENT PLANS: Prior to start-up, the Discharger must develop site-specific management plans applicable to each operation, in accordance with technical standards outlined in the Order. Such plans must include a Waste Management Plan for confined areas, a Nutrient Management Plan for lands where manure products are applied and a Grazing Management Plan for grazing lands totaling 50 acres or more. Check which of the following apply:

YES NO

[ ] [ ] Waste Management Plan complete?

[ ] [ ] Nutrient Management Plan complete?

[ ] [ ] Grazing Management Plan complete?

If no, please provide an explanation:

_____

_____

RETENITION PONDS: Prior to start-up, retention ponds must comply with Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313, including a maximum specific discharge (unit seepage rate) of 1 x 10-6 cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the liner meets this requirement.

Tier 2 continued:

YES	NO	
[ ]	[ ]	Do retention ponds meet Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313, including a maximum specific discharge (unit seepage rate) of 1 x 10-6 cm/sec.?
YES	**NO**	
[ ]	[ ]	Does the CAF include more animals than the existing infrastructure is designed to accommodate? The Order does not authorize construction or expansions of facilities.

Send Correspondence to : [ ] Facility Owner Address (Section II) [ ] Lessee/Operator Address (Section III) [ ] Facility Address (Section IV)

SECTION II. FACILITY OWNER INFORMATION

Name:		Contact E-mail:
Mailing Address:		
City:	State:	Zip Code:
Contact Person:		Contact Phone:

SECTION III. FACILITY OPERATOR INFORMATION

Is the facility currently leased and/or operated by someone other than owner? Yes _____ No _____ If the answer is yes, who is the lessee and/or operator? _____

Provide lessee / operator contact info: Address:_____

Phone number: |__|__|__| -- |__|__|__| -- |__|__|__|__| Email:

SECTION IV. FACILITY INFORMATION

A. Facility Name: Former Facility Name (if applicable):		County:
Physical Address:		Contact E-mail:
City:	State: **C A**	Zip Code:
Contact Person:		Contact Phone:

Provide Latitude and Longitude of confined areas only if facility does not have a valid street address	**Degree/minutes/seconds**	**Decimal Form**
	Latitude: |__|__|__| ° |__|__|__| ' |__|__|__| "	|__|__|__| . |__|__|__|__|__|__|__|__|
	Longitude: |__|__|__|__| ° |__|__|__| ' |__|__|__| "	|__|__|__|__| . |__|__|__|__|__|__|__|__|

Provide Assessor Parcel Number(s) for entire operation; indicate if owned or leased (Grazing parcels provided separately in Section IV k.)	_____ _____ _____

B. Size of Herd:

_____ Mature Milked/Dry Cows
_____ Heifer/Calf
_____ Sheep, milking ewes
_____ Lambs
_____ Goats
_____ Horses
_____ Other
_____ Total

C. Operation Type: (check one)

1. [ ] Cow Dairy
2. [ ] Goat Dairy
3. [ ] Sheep Dairy
4. [ ] Horse Boarding
5. [ ] Other (list animal type)

_____
_____

D. Start Date of Current Operations: ____/____/____

E. Maximum design capacity of dormant confined facility. Report in # of animals:_____
_____
_____

F. Maximum design capacity of re-opened confined facility. Report in # animals: _____
_____
_____

G. Do your facilities have 700 or more mature cows, 500 horses, or 10,000 or more sheep? Yes_____ No_____

Is a Nutrient Management Plan (NWP) complete? Yes_____ No_____ Date of completion: ____/____/____

H. Type of containment structure(s) for waste including: manure, litter, silage leachate, process waste or wastewater (including stormwater contacting waste): _____

Total storage capacity of above structure(s): _____ tons/gallons (circle one)

I. Does the facility have any food processing activities that would contribute to the waste stream and volume?

Yes_____ No_____

J. Total acres under the control of the Discharger available for land application of manure, litter, or process wastewater:

_____ Acres

K. Is your dairy California Dairy Quality Assurance Program (CDQAP) certified? Yes _____ No _____ Not applicable_____

Date of most recent certification: _____/_____/_____

L. Does the facility maintain a grazing operation on lands encompassing 50 acres or greater? Yes _____ No _____

If the answer is yes, please list the Assessor's Parcel Numbers for the grazing operation below (owned and/or leased):

_____

SECTION V. RECEIVING WATER INFORMATION

Does your facility's clean stormwater flow directly and/or indirectly into waters of the State (a stream, river, lake, ocean, etc.)? (circle one)

If it is indirect explain: (for example, "stormwater is diverted to ditch that travels 100 yards to offsite ditch that eventually drains to San Antonio Creek".)

Explanation:_____
_____
_____

Closest receiving waterbody is: _____

SECTION VI. IMPLEMENTATION OF ORDER PROVISIONS

A. STATEWIDE MINIMUM STANDARDS FOR CONFINED ANIMAL FACILITIES (*check if true*)

[ ] Facility is currently operating in compliance with Statewide Minimum Standards for Discharges of Animal Waste (Title 27, see Attachment K)

B. FACILITY / OPERATION MANAGEMENT (check if true)

[ ] Liquid waste retention ponds and/or manure storage facilities are designed to accommodate the waste water flow and stormwater contacting confined manured areas, that is likely to accumulate up to and during a 25-year, 24-hour storm event.

[ ] Liquid waste retention ponds and manure storage facilities are managed in accordance with the waste discharge specifications for the General WDRs.

[ ] All non-manure wastes and/or waste water such as silage leachate, dead animals, waste milk, veterinary medical waste, spoiled feed, bedding, animal wash water, etc., are contained and managed in accordance with the waste discharge specifications for the General WDRs.

[ ] All direct and indirect discharges of waste and/or manure, including stormwater contacting waste and/or manure, from the animal confinement areas are contained and prevented from entering any surface water, or tributary thereof.

[ ] All confined animals are fenced or excluded from any surface water or perennial streams passing through the confined area.

SECTION VII. MONITORING PROGRAM

[ ] The Monitoring and Reporting Program will be reviewed and all tasks will be conducted as required (check if true)

Please check one regarding required surface water sampling:

[ ] The facility will participate in group surface water monitoring

[ ] The facility will perform individual surface water monitoring

SECTION VIII. LANDOWNER NOTIFICATIONAND CERTIFICATION

If the facility is currently leased or operated by someone other than the owner, this section must be signed by the operator.

I certify that the owner of the facility has been notified of these General Waste Discharger Requirements and that I have been designated by the owner as the “authorized representative”.

Operator’s Printed Name:_____Signature:_____

Title: _____Date:_____

SECTION IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the Order, including the implementation of a Monitoring Program Plan, will be complied with."

Owner or Authorized Representative Printed Name*:_____

Owner or Authorized Representative Signature:_____ _____ Date:_____

Telephone Number:_____Email:_____

* A duly authorized person designated by the owner of the confined animal facility, as having responsibility for the overall operation of the regulated facility. The authorized representative may be the confined animal facility operator or operator’s duly authorized designee.

CALIFORNIA Water Boards

EDMUND G. BROWN JR. GOVERNOR

MATTHEW RODRIQUEZ SECRETARY FOR ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

NOTICE OF INTENT for New or Expanding Confined Animal Facilities

TO COMPLY WITH THE TERMS OF ORDER NO. R2-2016-0031

GENERAL WASTE DISCHARGE REQUIREMENTS FOR CONFINED ANIMAL FACILITIES

Instructions:

Facilities defined as "new" or "expanding" pursuant to the Order must submit proof of compliance with the provisions of the California Environmental Quality Act (CEQA) in the form of a certified Environmental Impact Report (EIR), Mitigated Negative Declaration, or Negative Declaration, together with completion of this Notice of Intent (NOI) and appropriate fee, to the Executive Officer to qualify for coverage under the Order.

Mail completed NOI to: San Francisco Bay Regional Water Quality Control Board; 1515 Clay Street, Suite 1400; Oakland, CA 94612, Attn: Confined Animal Program.

Or email to: R2ConfinedAnimals@waterboard.ca.gov

SECTION I. CALIFORNIA ENVIRONMENTAL QUALITY ACT AND REGULATORY COMPLIANCE

California Environmental Quality Act (CEQA) - Demonstration of Completion

YES NO

[ ] [ ] Has a certified Environmental Impact Report (EIR), Mitigated Negative Declaration (MND), or Negative Declaration been completed?

Please attach a copy of the EIR, MND, or ND to this NOI.

Environmental Compliance Assessment

Yes [ ] No [ ] Will development of your CAF result in impacts to wetlands and vernal pools?

If yes, attach a copy of the Army Corps Section 404 Permit or justification for use of a Nationwide Permit along with any required 401 Certification issued by the San Francisco Bay Regional Water Board to this NOI.

Yes [ ] No [ ] Will development of your CAF:

- Divert or obstruct the natural flow of, or substantially change, any river, stream, or lake?
- Utilize material from the bed, channel, or bank of any river, stream, or lake?
- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake?

If yes to any, attach a copy of the Section 1602 Streambed Alteration Agreement, along with a copy of the receipt for the regulatory fee paid to the California Department of Fish and Wildlife to this NOI.

Yes [ ] No [ ] Will development of your CAF disturb one or more acres of soil, or is it part of a larger common plan of development that, in total, will disturb one or more acres?

If yes, attach a copy of the submitted Notice of Intent to enroll in the Construction General Stormwater Permit, State Water Board Order No. 2009-0009-DWQ, to this NOI.

Yes [ ] No [ ] Will development of your CAF result in the removal of commercial tree species?

If yes, attach a copy of any exemption (e.g., Conversion Exemption, a Public Agency, Public and Private Utility Right of Way Exemption, a Notice of Exemption from Timberland Conversion Permit for Subdivision) or an Application for Timberland Conversion Permit to this NOI.

Yes [ ] No [ ] If you are constructing a structure, have the construction plans been approved by the appropriate local building department?

Not applicable- no structure is being built [ ]

If yes, attach all relevant correspondence and approvals from the local building department.

IF "NO" THE BOARD CANNOT ENROLL YOUR SITE UNDER THIS GENERAL ORDER.

Yes [ ] No [ ] Is the development of your CAF in compliance with any applicable County regulations and ordinances, including grading, construction, and building ordinances?

If yes, attach a County Grading Permit and any required Erosion Control Plan to this NOI.

Yes [ ] No [ ] Have you completed a biological site assessment (BSA) prepared by a qualified wildlife biologist for the project site?

If Yes attach a copy of the BSA that describes whether there are any sensitive biological resources such as wetlands, streams, or habitats for special status species and that maps all biological constraints on site development plans to this NOI.

IF "NO" THE BOARD CANNOT ENROLL YOUR SITE UNDER THIS GENERAL ORDER.

Yes [ ] No [ ] Did the BSA determine that special-status species could be affected by site development activities?

IF "YES" THE BOARD CANNOT ENROLL YOUR SITE UNDER THIS GENERAL ORDER. YOU MUST SUBMIT AND INDIVIDUAL RWD TO THE BOARD TO REVEIVE REGULATORY COVERAGE AND ADDITIONAL CEQA COMPLIANCE MAY BE REQUIRED.

Yes [ ] No [ ] Have you completed a cultural resources inventory by a qualified cultural resources professional?

If yes, attach a copy of the Cultural Resources Inventory Report to this NOI.

IF "NO" THE BOARD CANNOT ENROLL YOUR SITE UNDER THIS GENERAL ORDER.

Yes [ ] No [ ] Have you required that all construction contractors that will perform ground-disturbing activities implement inadvertent discovery measures for cultural resources? Inadvertent discovery measures must include procedures for discovery and protection of cultural resources during construction.

If yes, attach a copy of your Inadvertent Discovery Workplan to this NOI that includes discovery measures that require all construction or ground-disturbing activities be halted within 100 feet of a cultural resources discovery until a qualified professional archaeologist can evaluate the find. If known or suspected human remains are discovered, the County Coroner will immediately be notified, and if the remains are of Native American origin, the Native American Heritage Commission will be notified within 24 hours.

IF "NO" THE BOARD CANNOT ENROLL YOUR SITE UNDER THIS GENERAL ORDER.

Space provided for additional explanation for any answers selected above:

_____
_____
_____
_____
_____
_____
_____
_____
_____

SECTION II. Check the Tier below that describes your CAF Operation

[ ] **Tier 1:** CAF that does not utilize liquid waste retention ponds. Facility must currently comply with the Order's discharge prohibitions and waste discharge specifications. To qualify for coverage, the Discharger must demonstrate completion of the following:

MANAGEMENT PLANS: Prior to start-up, the Discharger must develop a site-specific Ranch Water Quality Plan applicable to each operation, in accordance with technical standards outlined in the Order. Check which of the following apply:

YES NO

[ ] [ ] Is your Ranch Water Quality Plan complete?

If no, please provide an explanation:

_____

_____

YES NO

[ ] [ ] Does the CAF include more animals than the existing infrastructure is designed to accommodate? The Order does not authorize construction or expansions of facilities.

If no, please provide an explanation:

_____

_____

[ ] **Tier 2:** CAF that utilizes liquid waste retention ponds. Facility must currently comply with the Order's discharge prohibitions and waste discharge specifications. To qualify for coverage, the Discharger must demonstrate completion of the following:

MANAGEMENT PLANS: Prior to start-up, the Discharger must develop site-specific management plans applicable to each operation, in accordance with technical standards outlined in the Order. Such plans may include a Waste Management Plan or Ranch Management Plan for confined areas, a Nutrient Management Plan for lands where manure products are applied and a Grazing Management Plan for grazing lands totaling 50 acres or more. Check which of the following apply:

YES NO

[ ] [ ] Waste Management Plan complete?

[ ] [ ] Nutrient Management Plan complete?

[ ] [ ] Grazing Management Plan complete?

Please provide an explanation for any "no" answers selected above:

_____

_____

RETENITION PONDS: Prior to start-up, retention ponds must comply with Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313, including a maximum specific discharge (unit seepage rate) of 1 x 10-6 cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the liner meets this requirement.

YES NO

[ ] [ ] Do retention ponds meet Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313, including a maximum specific discharge (unit seepage rate) of 1 x 10-6 cm/sec.?

YES NO

[ ] [ ] Does the CAF include more animals than the existing infrastructure is designed to accommodate?

The Order does not authorize construction or expansions of facilities.

Send Correspondence to : [ ] Facility Owner Address (Section II) [ ] Lessee/Operator Address (Section III) [ ] Facility Address (Section IV)

SECTION III. FACILITY OWNER INFORMATION

Name:		Contact E-mail:
Mailing Address:		
City:	State:	Zip Code:
Contact Person:		Contact Phone:

SECTION IV. FACILITY OPERATOR INFORMATION

Is the facility currently leased and/or operated by someone other than owner? Yes _____ No _____ If the answer is yes, who is the lessee and/or operator?_____

Provide lessee / operator contact info: Address:_____

Phone number: |__|__|__| -- |__|__|__| -- |__|__|__|__| Email:

SECTION V. FACILITY INFORMATION

A. Facility Name: Former Facility Name (if applicable):		County:
Physical Address:		Contact E-mail:
City:	State: **C | A**	Zip Code:
Contact Person:		Contact Phone:

Provide Latitude and Longitude of confined areas only if facility does not have a valid street address	**Degree/minutes/seconds**	**Decimal Form**
	Latitude: |__|__|__| ° |__|__| ' |__|__| "	|__|__|__| . |__|__|__|__|__|__|__|
	Longitude: |__|__|__| ° |__|__| ' |__|__| "	|__|__|__| . |__|__|__|__|__|__|__|
Provide Assessor Parcel Number(s) for entire operation; indicate if owned or leased (Grazing parcels provided separately in Section IV k.)	_____ _____ _____	

B. Size of Herd:	C. Operation Type: (check one)	E. Maximum design capacity of dormant confined facility. Report in # of animals:_____
_____ Mature Milked/Dry Cows _____ Heifer/Calf _____ Sheep, milking ewes _____ Lambs _____ Goats _____ Horses _____ Other _____ Total	1. [ ] Cow Dairy 2. [ ] Goat Dairy 3. [ ] Sheep Dairy 4. [ ] Horse Boarding 5. [ ] Other (list animal type) _____ D. Start Date of Current Operations: ____/____/____	_____ _____ _____

F. Do your facilities have 700 or more mature cows, 500 horses, or 10,000 or more sheep? Yes_____ No_____

Is a Nutrient Management Plan (NWP) complete? Yes_____ No_____ Date of completion: ____/____/____

G. Type of containment structure(s) for waste including: manure, litter, silage leachate, process waste or wastewater (including stormwater contacting waste): _____

Total storage capacity of above structure(s): _____ tons/gallons (circle one)

H. Does the facility have any food processing activities that would contribute to the waste stream and volume?

Yes_____ No_____

I. Total acres under the control of the discharger available for land application of manure, litter, or process wastewater:

_____ Acres

J. Is your dairy California Dairy Quality Assurance Program (CDQAP) certified? Yes _____ No _____ Not applicable_____

Date of most recent certification: _____/_____/_____

K. Does the facility maintain a grazing operation on lands encompassing 50 acres or greater? Yes _____ No _____

If the answer is yes, please list the Assessor's Parcel Numbers for the grazing operation below (owned and/or leased):

_____

SECTION VI. RECEIVING WATER INFORMATION

Does your facility's clean stormwater flow directly and/or indirectly into waters of the State (a stream, river, lake, ocean, etc.)? (circle one)

If it is indirect explain: (for example, "stormwater is diverted to ditch that travels 100 yards to offsite ditch that eventually drains to San Antonio Creek".)

Explanation:_____

Closest receiving waterbody is: _____

SECTION VII. IMPLEMENTATION OF ORDER PROVISIONS

A. STATEWIDE MINIMUM STANDARDS FOR CONFINED ANIMAL FACILITIES (*check if true*)

[ ] Facility is currently operating in compliance with Statewide Minimum Standards for Discharges of Animal Waste (Title 27, see Attachment K)

B. FACILITY / OPERATION MANAGEMENT (check if true)

[ ] Liquid waste retention ponds and/or manure storage facilities are designed to accommodate the waste water flow and stormwater contacting confined manured areas, that is likely to accumulate up to and during a 25-year, 24-hour storm event.

[ ] Liquid waste retention ponds and manure storage facilities are managed in accordance with the waste discharge specifications for the General WDRs.

[ ] All non-manure wastes and/or waste water such as silage leachate, dead animals, waste milk, veterinary medical waste, spoiled feed, bedding, animal wash water, etc., are contained and managed in accordance with the waste discharge specifications for the General WDRs.

[ ] All direct and indirect discharges of waste and/or manure, including stormwater contacting waste and/or manure, from the animal confinement areas are contained and prevented from entering any surface water, or tributary thereof.

[ ] All confined animals are fenced or excluded from any surface water or perennial streams passing through the confined area.

SECTION VIII. MONITORING PROGRAM

[ ] The Monitoring and Reporting Program will be reviewed and all tasks will be conducted as required (check if true)

Please check one regarding required surface water sampling:

[ ] The facility will participate in group surface water monitoring

[ ] The facility will perform individual surface water monitoring

SECTION IX. LANDOWNER NOTIFICATION

If the facility is currently leased or operated by someone other than the owner, this section must be signed by the operator.

I certify that the owner of the facility has been notified of these General Waste Discharger Requirements and that I have been designated by the owner as the “authorized representative”..

Operator’s Printed Name:_____Signature:_____

Title: _____Date:_____

SECTION X. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the Order, including the implementation of a Monitoring Program Plan, will be complied with."

Owner or Authorized Representative Printed Name:_____

Owner or Authorized Representative Signature:_____ _____ Date:_____

Telephone Number:_____Email:_____

CALIFORNIA Water Boards

EDMUND G. BROWN JR. GOVERNOR

MATTHEW RODRIQUEZ SECRETARY FOR ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

NOTICE OF NON-APPLICABILITY

OF COVERAGE UNDER REGIONAL WATER BOARD ORDER No. R2-2016-0031
GENERAL WASTE DISCHARGE REQUIREMENTS FOR CONFINED ANIMAL FACILITIES
WITHIN SAN FRANCISCO BAY REGION
(General WDRs)

Submission of this Notice of Non-Applicability constitutes notice by the owner and operator of the Confined Animal Facility (CAF) identified on this form that they should not be required to comply with Water Board Order No. R2-2016-0031 at this time. Only owners or operators that are not filing a Notice of Intent (NOI) for coverage under the General WDRs should file this form. If you are unsure whether your CAF is required to comply with the General WDRs, please contact the San Francisco Bay Regional Water Board at 510-622-2508 or email at R2ConfinedAnimals@waterboards.ca.gov.

Note: If the information provided in this form is inaccurate or incomplete, or if the activity at the CAF has changed, this Notice may no longer apply. Further, the information provided shall in no way release the landowner or operator of the CAF from any liability which may result from noncompliance with the requirements of the General WDRs, should they apply. The on-going accuracy of the information provided may be subject to verification by inspection by Water Board staff.

I. OWNER INFORMATION

NAME: _____

MAILING ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____ PHONE: _____

EMAIL: _____

II. OPERATOR INFORMATION (If different than owner above)

NAME: _____

MAILING ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____ PHONE: _____

EMAIL: _____

III. FACILITY INFORMATION

BUSINESS NAME: _____

ASSESSOR PARCEL NUMBER(S) (APN):_____

FACILITY ADDRESS: _____

CITY: _____STATE:_____ZIP:_____PHONE:_____ _____

TYPE OF BUSINESS CONDUCTED AT THE FACILITY: _____

IV. BASIS OF NON-APPLICABILITY

Check each that apply and provide an explanation for each in Section V. below.

_____ **1.** This facility is not a commercial confined animal facility.

Title 27 of the California Code of Regulations, section 20164, defines a confined animal facility as "*… any place where cattle, calves, sheep, swine, horses, mules, goats, fowl, or other domestic animals are corralled, penned, tethered, or otherwise enclosed or held and where feeding is by means other than grazing*."

_____ **2.** This facility *was* considered a confined animal facility operation. The facility is now closed and all materials and waste associated with the business have been removed or cleaned-up.

Date of closure ____/____/____ Date of completed cleanup ____/____/____

_____ **3.** The number of animals within this facility's confined areas is small in relation to the size of the facility and poses no potential for adverse water quality impact.

_____ **4.** The primary means for feeding and containing animals within this facility, is on pasture lands (coverage under a Grazing Waiver may be required).

_____ **5.** The animals within this facility are rarely confined and fed in areas devoid of vegetation, especially during the rainy season (explain and estimate number of days/year confined in Section V.).

_____ **6.** Stormwater does not contact manure or waste materials within the facility's confined areas and all waste is disposed lawfully offsite.

V. EXPLANATION OF BASIS OF NON-APPLICABILITY

Please include an explanation to support the appropriate category checked in Section IV above. A thorough and complete explanation will streamline the review process relative to any requirements of the General WDR. Attach explanatory photos and, additional documentation that supports the basis for non-applicability.

_____

_____

_____

_____

_____

_____

_____

_____

_____

VI. CERTIFICATION

I certify under penalty of law that the identified facility is not required to be covered under Water Board Order R2-2016-0031, or that I am not the owner and/or operator of the facility. I understand that the submittal of this Notice of Non-Applicability does not release an owner and/or operator from liability for any violations of the California Water Code.

Owner or Authorized* Representative Printed Name: _____

Owner or Authorized Representative Signature: _____ Date: _____

Telephone Number: _____ Email: _____

* A duly authorized person designated by the owner of the confined animal facility, as having responsibility for the overall operation of the regulated facility. The authorized representative may be the confined animal facility operator or operator's duly authorized designee.

Mail	FAX	Email
San Francisco Bay Regional Water Quality Control Board ATTN: Confined Animal Facility Program 1515 Clay Street, Suite 1400 Oakland, CA 94612	**San Francisco Bay Regional Water Quality Control Board ATTN: Confined Animal Facility Program (510) 622-2460 (fax)**	**R2ConfinedAnimals@waterboard.ca.gov**

ATTACHMENT J

California Regional Water Quality Control Board - San Francisco Bay Region
General Waste Discharge Requirements

Definitions

25-year, 24-hour rainfall event: precipitation event with a probable recurrence interval of once in twenty five years as defined by the National Weather Service in Technical Paper No. 40, "Rainfall Frequency Atlas of the United States," May 1961, or equivalent regional or State rainfall probability information developed from this source.

Animal Feeding Operation (AFO): a lot or facility where the following conditions are met: 1. Animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and 2. Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility (Federal CAFO regulations).

Agricultural stormwater discharge: where the manure, litter or process wastewater has been applied in accordance with site specific nutrient management practices that ensure appropriate agriculture utilization of the nutrients in the manure, litter, or process wastewater, a precipitation-related discharge of manure, litter, or process wastewater from land application areas is an agricultural stormwater discharge **(40CFR 122.23(e)).**

Agronomic rates: the land application of irrigation water and nutrients (which may include animal manure, bedding, litter, or process wastewater) at rates of application in accordance with a nutrient management plan that will enhance soil productivity and provide the crop or forage with needed nutrients for optimum health and growth.

Aquifer: ground water that occurs in a saturated geologic unit that contains sufficient permeability and thickness to yield significant quantities of water to wells or springs.

Authorized representative: a duly authorized person designated by the owner of the confined animal facility, as having responsibility for the overall operation of the regulated facility. The authorized representative may be the confined animal facility operator or operator's duly authorized designee.

Catastrophic rainfall event: a rainfall event greater than the 25-year, 24-hour rainfall event, and includes events like tornadoes, hurricanes or other catastrophic conditions that would cause an overflow.

Commercial CAF: refers to any non-residential CAF facility that meets the definition of a CAF and conducts activities onsite that require a local business license.

Concentrated Animal Feeding Operation (CAFO), Large, Medium and Small: a facility that is either large (e.g., 700 or more mature dairy cows, 500 or more horses, 10,000 or more sheep/lambs), medium (e.g., 200-699 mature dairy cows, 150-499 horses, 3000-9999 sheep/lambs, and which discharges pollutants to waters of the United States as specified), or small (e.g., less than 200 mature dairy cows, less than 150 horses, less than 3000 sheep/lambs and which has been specifically designated as discharging pollutants to waters of the United States). The size thresholds for all animal sectors are listed in CFR 122.23(b) and (c).

Confined Animal Facility (CAF): is defined in Title 27 of the California Code of Regulations, section 20164, as "… *any place where cattle, calves, sheep, swine, horses, mules, goats, fowl, or other*

domestic animals are corralled, penned, tethered, or otherwise enclosed or held and where feeding is by means other than grazing."

Confined area: the area where cows are confined within the production area.

Cropland: the land application area where dry or solid manure and/or process wastewater is recycled for the purpose of beneficially using the nutrient value of the manure and/or process wastewater for crop production.

Degradation: any measurable adverse change in water quality.

Design volume: includes allowances for the volume of manure, process wastewater, and other wastes accumulated during the storage period; volume of "normal precipitation" minus evaporation; volume of runoff from the facility's drainage area during normal rainfall events; volume of precipitation from the 25-yr, 24-hr storm event on the storage structure area; volume of runoff from the facility's drainage area for the 25-yr, 24-hr storm event; volume of solids; necessary freeboard requirements; and any additional storage requirements, such as to meet management goals, or the minimum treatment volume for anaerobic lagoons.

Discharge: the discharge or release of waste to land, surface water, or ground water. The federal Clean Water Act states that **"discharge"** includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping;

Discharger: the property owner and operator of a confined animal facility subject to these General Waste Discharge Requirements. "Owner" includes the owner of the land underlying the facility and the owner of the CAF business.

Existing facility: a facility that is constructed and operating as of date of adoption, and which has subsequently undergone no expansion in size of its physical facilities. Physical facilities include the roofed structures, such as stall barns, that limit the size of the animal herd.

Fecal coliform: means the bacterial count (Parameter 1) at 40 CFR 136.3 in Table 1A which also cites the approved methods of analysis.

Field moisture capacity: the upper limit of storable water in the soil once free drainage has occurred after irrigation or precipitation.

Freeboard: the elevation difference between the process wastewater (liquid) level in a pond and the lowest point of the pond embankment before it can overflow.

Grazing Operation: are those ranches where animals are fed or maintained on irrigated vegetation or rangeland, animals forage for a total of 45 days or more in any 12-month period, and vegetation forage growth is sustained over the parcel or ranch during the normal growing season. A Grazing Operation includes auxiliary appurtenances such as roads, reservoirs, etc.

Grazing Lands: are lands encompassing an area of 50 acres or more, where Dischargers conduct grazing, such as ranchlands, riparian areas, and pasturelands.

Groundwater: water stored underground in rock crevices and in the pores of geologic materials that make up the earth's crust; and water that flows downward and saturates soil or rock, supplying wells and springs. The upper surface of the saturated zone is called the water table.

Incorporation into soil: the complete infiltration of process wastewater into the soil, the disking or rotary tiller mixing of manure into the soil, shank injection of slurries into soil, or other equally effective methods.

Irrigation return flow: has the same meaning as return flow from irrigated agriculture in section 502 (14) of the federal Clean Water Act, and is defined as surface and subsurface water that leaves a field following application of irrigation water, where the irrigation water is not a wastewater and when such irrigation water has been applied in accordance with a site specific nutrient management plan. "Tailwater" may be considered an irrigation return flow if it meets the conditions in this paragraph.

Irrigation water: water that is applied to fields to grow crops.

Land application: the application of manure, litter, or process wastewater onto or incorporated into the soil.

Land application area: land under control of the confined animal facility owner or operator, whether it is owned, rented, or leased, to which manure or process wastewater from the production area is or may be applied for nutrient recycling.

Liquid manure handling system: a system that collects and transports or moves waste material with the use of water, such as in washing of pens and flushing of confinement facilities. This would include the use of water impoundments for manure and/or wastewater treatment.

Manure: the fecal and urinary excretion of livestock and other commingled materials. Manure may include litter, bedding, compost, raw materials, and waste feed.

Manured solids: manure that has sufficient solids content such that it will stack with little or no seepage.

Method Detection Limit (MDL): the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in: Title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML): is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

New Source: defined in the federal regulations as "*any building, structure, facility, or installation from which there is or may be a 'discharge of pollutants,' the construction of which commenced: (a) After promulgation of standards of performance under section 306 of CWA which are applicable to such source, or (b) After proposal of standards of performance in accordance with section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within 120 days of their proposal*." (40 C.F.R. § 122.2) Further, a facility is a "new source" if (1) the facility is constructed at a site where no other facility is located, (2) the facility totally replaces the process or production equipment that causes the discharge of pollutants at the existing facility, or (3) the facility process is substantially independent of an existing facility at the same site. (40 C.F.R. §122.29 (b)).

Non-Point Source: Diffuse discharges of waste throughout the natural environment which are a major cause of water pollution. Difficult to pinpoint physically, but often classified by type: such as, urban runoff, agriculture, mining, septic tank leach fields, silviculture, construction, etc.

Not Detected (ND): are those sample results less than the laboratory's MDL.

Notice of Intent (NOI): is a form submitted by the owner/operator applying for coverage under a general permit. It requires the applicant to submit the information necessary for adequate program implementation, including, at a minimum, the legal name and address of the owner or operator, the facility name and address, type of facility or discharges, and the receiving stream(s). See Attachment F, G, or H.

Notice of Termination: is a letter or email to the Water Board stating that the facility is no longer operating as a confined animal facility. This notice must contain all information related to facility closure such as dates of closure, any changes in facility ownership or management, tasks performed to remediate manured areas and to prevent erosion, a schedule for animal removal, and a schedule for waste removal, treatment and/or storage. Water Board staff will review the submittal and verify that all manure and animal waste impacted soil has been disposed of appropriately so as not to pose a threat to surface water or groundwater quality or create a condition of nuisance.

Normal Precipitation: the long-term average precipitation based on monthly averages over the time that data has been collected at a particular weather station. Normal precipitation is usually taken from data averaged over a 30-year period (e.g., 1971 to 2000) if such data is available.

Nuisance: is defined in section 13050 of the California Water Code as "… *anything which meets all of the following requirements:*
(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
(3) Occur during, or as a result of, the treatment or disposal of wastes."

Nutrient: is any element taken in by a plant which is essential to its growth and which is used by the plant in elaboration of its food and tissue.

Nutrient Management Plan (NMP): is a description of site-specific nutrient management practices that ensure appropriate agricultural utilization of manure, litter, or process water, as specified in MRP, Appendix 2, NMP.

Nutrient recycling: the application of nutrients at agronomic rates for crop production.

Off-property discharge: the discharge or release of waste beyond the boundaries of the confined animal facility property or to water bodies that run through or adjacent to the property.

Overflow: the discharge of manure or process wastewater resulting from the filling of wastewater or manure storage structures beyond the point at which no more manure, process wastewater, or stormwater can be contained by the structure.

Persistent pollutants: are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Physical facility: is defined as the roofed structure, such as the stall barn, that limits the size of the animal herd. No expansion of the physical facility (roofed structure that houses the cows, such as the stall barn) is allowed under this permit. If roofed structures need replacing/repair during permit coverage, it must be similar size and location. Limited alterations are allowed, such as converting corrals to freestalls, as long as these alterations do not increase the capacity of the physical facilities.

Point-Source: is a discernible, confined and discrete conveyance such as a pipe, ditch or channel, tunnel, conduit, well container, concentrated animal feeding operation or vessel, from which pollutants are or may be discharged. Does not include agricultural stormwater discharges and return flows from irrigated agriculture.

Pollutant: is defined in Title 40 Code of Federal Regulations Section 122.2 as "…*dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.*"

Pollution: is defined in Section 13050(l)(1) of the California Water Code as *"… an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following: (A) The waters for beneficial uses. (B) Facilities which serve these beneficial uses."* "Pollution" may include "contamination".

Pollution Prevention: any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Pond: retention ponds, storage ponds, settling ponds, or any structures used for the treatment, storage, disposal, and recycling of process wastewater. Ponds are differentiated from sumps, which are structures in a conveyance system used for the installation and operation of a pump.

Process water: water directly or indirectly used in the operation of a confined animal facility for any or all of the following: spillage or overflow from animal watering systems; washing, cleaning, or flushing pens, barns, manure pits, or other facilities; washing or spray cooling of animals; onsite slaughtering; or dust control, and includes any water or precipitation and precipitation runoff which comes into contact with any raw materials, products, or byproducts including manure, feed, milk, or bedding. Process water may also include waste water streams from ancillary onsite operations such as cheese-making.

Propose to Discharge: is defined as a confined animal facility that is designed, constructed, operated, or maintained such that a discharge to waters of the United States will occur.

Production area: is that part of a confined animal facility that includes the animal confinement area, the manure storage area, wastewater, litter, waste containment area, the raw materials storage area such as feed, silage, and bedding materials. The animal containment area includes but is not limited to open lots, housed lots, feedlots, confinement houses, stall barns, free stall barns, milkrooms, milking centers, cowyards, barnyards, medication pens, walkers, animal walkways, animal wash areas and

stables. The manure storage area includes but is not limited to lagoons, runoff ponds, storage sheds, stockpiles, under house or pit storages, liquid impoundments, static piles, and composting piles. The waste containment area includes but is not limited to settling basins, and areas within berms and diversions which separate uncontaminated stormwater. The raw materials storage area includes but is not limited to feed silos, silage bunkers, and bedding materials. Also included in the definition of production area is any area used in the storage, handling, treatment, or disposal of mortalities.

Residual Dry Matter (RDM): is a term referring to the accumulation of dead plant material and is used in rangelands as a monitoring tool to indicate watershed health and rangeland productivity.

Retention Pond: means a constructed holding pond for temporary storage of solid and liquid animal manure, prior to cropland application.

Salt: sodium chloride and any added minerals (such as calcium, phosphorus, potassium, sulfur, iron, selenium, copper, zinc, or manganese) in the animal ration. Salts commonly break up into cations (sodium, calcium, etc.) and anions (chloride, sulfate, etc.) when dissolved in water. Total dissolved solids is generally measured as an indication of the amount of salts in a water or wastewater.

Setback: a specified distance from waters of the United States or potential conduits to waters of the United States where manure, litter, and process wastewater may not be land applied. Examples of conduits to surface waters include but are not limited to: Open drainage ditches, tile drainage lines, intake structures, sinkholes, and agricultural well heads.

Significant quantity: the volume, concentrations, or mass of a pollutant that can cause or threaten to cause pollution, contamination, or nuisance; adversely impact human health or the environment; and/or cause or contribute to a violation of any applicable water quality standards for the receiving water.

Significant storm event: a precipitation event that results in continuous runoff of stormwater for a minimum of one hour, or intermittent discharge of runoff for a minimum of three hours in a 12-hour period.

Source of Drinking Water: any water designated or potentially suitable as municipal or domestic supply (MUN) in the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan).

State: the State of California.

State Water Board: the State Water Resources Control Board.

Stormwater: stormwater runoff, snowmelt runoff, and stormwater surface runoff and drainage.

Subsurface (tile) drainage: water generated by installing and operating drainage systems to lower the water table below irrigated lands. Subsurface drainage systems, deep open drainage ditches, or drainage wells can generate this drainage.

Surface water: includes essentially all water that is on the Earth's surface, such as in a stream, lake, river, reservoir, or ocean. Surface waters include waters of the United States and their tributaries such as interstate waters and their tributaries, intrastate waters, all impoundments of these waters, and all wetlands hydrologically connected to lakes, streams, or rivers. Manure ponds are not considered surface waters in the context of these General Waste Discharge Requirements.

Tailwater: the runoff of irrigation water from an irrigated field.

Vegetated buffer: a narrow, permanent strip of dense perennial vegetation established parallel to the contours of and perpendicular to the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants from leaving the field and reaching waters of the United States.

Waste: is set forth in Water Code section 13050(d), and includes manure, leachate, process wastewater and any water, precipitation or rainfall runoff that came into contact with raw materials, products, or byproducts such as manure, compost piles, feed, silage, milk, or bedding. The Basin Plan states that "waste" includes sewage and any and all other substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation of whatever nature, including such waste placed within containers of whatever nature prior to, and for purposes of, disposal.

Wastewater: is the same as "process water" as defined above.

Waters of the State: is defined in section 13050 of the California Water Code as "*…any surface water or groundwater, including saline waters, within the boundaries of the state.*" Note this includes isolated wetlands.

Waters of the United States: is defined in 40 CFR § 122.2 as (a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (b) All interstate waters, including interstate "wetlands;" (c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters: (1) Which are or could be used by interstate or foreign travelers for recreational or other purposes; (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or (3) Which are used or could be used for industrial purposes by industries in interstate commerce; (d) All impoundments of waters otherwise defined as waters of the United States under this definition; (e) Tributaries of waters identified in paragraphs (a) through (d) of this definition; (f) The territorial sea; and (g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act (other than cooling ponds as defined in 40 CFR § 423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland.

Wetland: For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

ATTACHMENT K

California Regional Water Quality Control Board
San Francisco Bay Region

Revised General Waste Discharge Requirements

Statewide Water Quality Regulations for Confined Animal Facilities

Title 27. Environmental Protection; Division 2 - Solid Waste
Subdivision 1. Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste
Chapter 7. Special Treatment, Storage, and Disposal Units
Subchapter 2. Confined Animals
Article 1. SWRCB - Confined Animal Facilities

*[Note: Regulations in this article were promulgated by the State Water Resources Control Board (**SWRCB**), are administered by the appropriate Regional Water Quality Control Board (**RWQCB**) through the issuance of waste discharge requirements (**WDRs**), and are applicable to the owner or operator of a waste management unit (**Unit**) for the treatment, storage, or disposal of animal waste at confined animal facilities.]*

22560. SWRCB - Applicability. (Ch-15: Section 2560)

(a) **General —** This article prescribes statewide minimum standards for discharges of animal waste at confined animal facilities. These standards shall either be implemented in any WDRs issued for a particular animal waste facility or shall be made a condition to the waiver of such requirements.

(b) **ROWD —** A discharger required to submit a report of waste discharge shall provide the following general information and shall report any material changes as defined in Section 2210 of Title 23 of this code:

(1) average daily volume of facility wastewater and volume or weight of manure;

(2) total animal population at the facility, and types of animals;

(3) location and size of use or disposal fields and retention ponds, including animal capacity; and

(4) animal capacity of the facility.

(c) **Regulations Are Minimum Standards —** The RWQCB shall impose additional requirements, if such additional requirements are necessary to prevent degradation of water quality or impairment of beneficial uses of waters of the state.

Note:

Authority cited:
Section 1058, Water Code.

Reference:
Sections 13140-13147, 13260 and 13263, Water Code; Section 43103, Public Resources Code.

22561. SWRCB - General Standard For Surface Water. (Ch-15: Section 2561)

The discharger shall prevent animals at a confined animal facility from entering any surface water within the confined area.

Note:

Authority cited:
Section 1058, Water Code.

Reference:
Sections 13140-13147, 13260 and 13263, Water Code; Section 43103, Public Resources Code.

22562. SWRCB - Wastewater Management. (Ch-15: Section 2562)

(a) **Design Storm (for Run-On/Run-Off Control) —** Confined animal facilities shall be designed and constructed to retain all facility wastewater generated, together with all precipitation on, and drainage through, manured areas during a 25-year, 24-hour storm.

(b) **Manured Area Run-On Exclusion —** All precipitation and surface drainage outside of manured areas, including that collected from roofed areas, and runoff from tributary areas during the storm events described in (a), shall be diverted away from manured areas, unless such drainage is fully retained. RWQCBs can waive application of such requirements only in specific instances where upstream land use changes have altered surface drainage patterns such that retention of flood flows is not feasible.

(c) **Design Storm (for Flood Protection).**

(1) Retention ponds and manured areas at confined animal facilities in operation on or after November 27, 1984, shall be protected from inundation or washout by overflow from any stream channel during 20-year peak stream flows.

(2) Existing facilities that were in operation on-or-before November 27, 1984, and that are protected against 100-year peak stream flows must continue to provide such protection. Facilities, or portions thereof, which begin operating after November 27, 1984, shall be protected against 100-year peak stream flows.

(3) The determination of peak stream flows shall be from data provided by a recognized federal, state, local, or other agency.

(d) **Retention Pond Design —** Retention ponds shall be lined with, or underlain by, soils which contain at least 10 percent clay and not more than 10 percent gravel or artificial materials of equivalent impermeability.

(e) **Discharge To Disposal/Use Fields —** The RWQCB shall allow the discharge of facility wastewater and of collected precipitation and drainage waters to use or disposal fields only if such discharge is in accordance with section 22563. Absent an NPDES permit for discharge to surface waters, the only other allowable discharge is to wastewater treatment facilities approved by the RWQCB.

Note:

Authority cited:
Section 1058, Water Code.

Reference:
Sections 13172, Water Code; Section 43103, Public Resources Code.

22563. SWRCB - Use or Disposal Field Management. (Ch-15: Section 2563)

(a) **Reasonable Soil Amendment Rate —** Application of manure and wastewater to disposal fields or crop lands shall be at rates which are reasonable for the crop, soil, climate, special local situations, management system, and type of manure.

(b) **Run-Off & Percolation —** Discharges of facility wastewater to disposal fields shall not result in surface runoff from disposal fields and shall be managed to minimize percolation to ground water.

Note:

Authority cited:
Section 1058, Water Code.

Reference:
Section 13172, Water Code; Section 43103, Public Resources Code.

22564. SWRCB - Management of Manured Areas. (Ch-15: Section 2564)

Manured areas shall be managed to minimize infiltration of water into underlying soils.

Note:

Authority cited:
Section 1058, Water Code.

Reference:
Section 13172, Water Code; Section 43103, Public Resources Code.

22565. SWRCB - Monitoring. (Ch-15: Section 2565)

The RWQCB can require confined animal facility operations to undertake a monitoring program as a condition to the issuance or waiver of WDRs.

Note:

Authority cited:
Section 1058, Water Code.

Reference:
Sections 13172 and 13267, Water Code.

Source: http://www.calrecycle.ca.gov/laws/regulations/Title27/
8/17/11

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ATTACHMENT L

California Regional Water Quality Control Board - San Francisco Bay Region
General Waste Discharge Requirements

INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

ADOPTION AND IMPLEMENTATION OF GENERAL WASTE DISCHARGE REQUIREMENTS FOR CONFINED ANIMAL FACILITIES INCLUDING THE RE-OPENING OF AN EXISTING DORMANT FACILITY

PREPARED BY:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

June 2016

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SUMMARY

This summary provides a synopsis of the Initial Study and proposed Mitigated Negative Declaration (IS/MND), which have been prepared pursuant to the California Environmental Quality Act of 1970 (CEQA) and State CEQA Guidelines. The Lead Agency for the project, as defined by CEQA, is the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board).

Project Description

The proposed project consists of the San Francisco Bay Regional Water Quality Control Board (Water Board) adopting and implementing General Waste Discharge Requirements (General WDRs) for the management of process water, manure, and other organic materials at confined animal facilities (CAFs), including the application of such materials to land. The General WDRs may be used to regulate a variety of confined animal facility types within the Region.

The General WDRs includes new requirements for nutrient management, grazing management and water quality monitoring. Existing facilities, that are eligible for coverage under the General WDRs, are exempt from CEQA requirements as per Title 14 of the California Code of Regulations, section 15301. However, the scope of coverage in the General WDRs extends to former CAFs that, although currently dormant, may re-open at some point in the future. While this type of facility is not a newly constructed source, the inclusion of such operations in the General WDRs requires separate CEQA analysis, and is thus the focus of this Initial Study and Mitigated Negative Declaration (IS/MND). The General WDRs do not authorize expansions of facilities. Such facilities must demonstrate compliance with CEQA, prior to requesting General WDR coverage.

This project is consistent with the State Water Resources Control Board's *2004 Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (NPS Policy) which requires that all sources of nonpoint source pollution be regulated through Waste Discharge Requirements (WDRs), through waivers of WDRs, or through prohibitions.

Project Objectives

The objectives of the proposed project are to establish General WDRs for CAFs, including any potential, future re-openings of existing dormant facilities, in order to adequately:

- Facilitate a streamlined, fair and consistent approach to regulating and permitting CAF operations located on existing dormant facilities;
- Improve and protect water quality;
- Benefit, enhance, restore and protect biological resources, including fish, wildlife, and rare and endangered species;
- Control and reduce sedimentation in surface waters and improve soil conservation;

- Control and reduce adverse groundwater impacts;
- Promote sustainable agriculture and grazing;
- Trap bacteria and other pathogens that cause waterborne illnesses in people; and
- Monitor water quality trends and changes within CAF watersheds.

Agency Determination

The re-opening of an existing dormant CAF may potentially have a significant effect on the environment. However, potential effects are mitigated by the strict eligibility criteria, discharge prohibitions, waste discharge specifications, monitoring and reporting requirements and other provisions of the General WDRs, such that no significant effects will occur. Existing facilities have up to four (4) years to complete all of the required management plans, while operators re-opening an existing dormant facility must complete these plans prior to start-up. In addition, operators must implement pond liner requirements for replaced or reconstructed retention ponds, which are more protective of groundwater quality than those for existing facility retention ponds.

Public Participation and Review

A public workshop was held on April 18, 2016, at the Natural Resource Conservation Service office in Petaluma, to present the draft documents, answer questions and obtain input from potentially regulated animal producers, local agencies, nearby residents, and other interested parties.

The 45-day public comment period for the proposed General WDRs begins on March 15, 2016. Comment letters must be received by 5:00 p.m. on Friday April 29, 2016. The proposed General WDRs, including this draft environmental document, will be available online beginning March 15, 2016 at:
http://www.waterboards.ca.gov/sanfranciscobay/public_notices/.

INITIAL STUDY / DRAFT MITIGATED NEGATIVE DECLARATION
pursuant to the California Environmental Quality Act, as amended

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A. PROJECT DESCRIPTION

1. Project title:	Adoption and Implementation of General Waste Discharge Requirements for Confined Animal Facilities including the Re-opening of an Existing Dormant Facility
2. Lead agency name & address:	California Regional Water Quality Control Board San Francisco Bay Region 1515 Clay Street, Suite 1400 Oakland, CA 94612
3. Contact person & phone number:	Laurie Taul, Environmental Scientist (510) 622-2508 Laurie.Taul@waterboards.ca.gov
4. Project location:	San Francisco Bay Region
5. Project sponsor's name & address:	California Regional Water Quality Control Board San Francisco Bay Region 1515 Clay Street, Suite 1400 Oakland, CA 94612
6. General plan designation:	Not Applicable
7. Zoning:	Not Applicable

8. Description of project:

The proposed project consists of the San Francisco Bay Regional Water Quality Control Board (Water Board) establishing General Waste Discharge Requirements (General WDRs) for the management of process water, manure, and other organic materials at confined animal facilities (CAFs), including the application of such materials to land. The proposed WDR will rescind and replace Order No. R2-2003-0093, General Waste Discharge Requirements for Confined Animal Facilities (2003 WDRs).

The General WDRs may be used to regulate currently operating CAFs within the San Francisco Bay region (the Region), as well as a small subset of facilities that may reopen within the footprint of a former CAF operation. Although approximately 20 percent of the cow dairies located in Marin and Sonoma counties have closed since 2003, there has been recent public inquiry and interest, mostly focused in Marin and Sonoma counties, in starting specialized CAF operations (such as grass-fed beef, milk for artisan cheeses, organic milk, etc.) with smaller and more diverse herds, in former, now shuttered dairy facilities. Reopened operations that utilize existing facilities, within the designed animal capacity, are the subject of this environmental analysis.

The General WDRs address the following:

a) Various Total Maximum Daily Loads (TMDLs) recently adopted by the Water Board that identify CAFs as sources of pathogens, sediment, and nutrients to surface waters;
b) Increased concerns about the collection and management of waste and its impacts to surface and groundwater; and
c) The need for an efficient approach towards regulating re-opening facilities that are fully constructed but not operating (dormant).

The General WDRs contain conditions, requirements, and new criteria for facility planning, management, and monitoring for those facilities previously regulated by the 2003 WDRs. The General WDRs also broaden the scope of regulated facilities to include additional types of CAF facilities within impaired watersheds or elsewhere within the region should they be identified as posing a threat to water quality.

We anticipate that a limited number of closed confined animal facilities, specifically dairies, may re-open as either dairies of similar size to the original operation, or as smaller, more specialized operations. The existing infrastructure of such facilities may include existing milking parlors, loafing barns, corrals, travel lanes and creek crossings, covered feed storage areas, and retention ponds for solid and liquid waste management. Operators may be required to replace, reconstruct, or make improvements to their waste management systems and/or general facility to ensure proper function and compliance with General WDRs' provisions to control sediment, pathogen, and nutrient discharges to surface and groundwater.

In order to be eligible for General WDRs coverage, those seeking to start-up a new CAF operation utilizing an existing dormant facility must comply with the following conditions:

- Prior to start-up, owner/operators must develop site-specific management plans applicable to each operation, in accordance with technical standards outlined in the General WDRs. Such plans include a Waste Management Plan for confined production areas, a Nutrient Management Plan for lands where manure products are applied, and a Grazing Management Plan for grazing lands totaling 50 acres or more.
- Prior to start-up, retention ponds must comply with Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313 including a maximum specific discharge (unit seepage rate) of 1×10^{-6} cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the liner meets this requirement.
- Operations must not include more animals than the existing infrastructure is designed to accommodate. The Order does not authorize expansions of facilities. Such facilities must demonstrate compliance with CEQA and obtain separate waste discharge requirements.

In addition to eligibility requirements, newly re-opened CAFs will be subject to all provisions of the General WDRs. In general, these provisions require:

- That discharges of waste from confined animal facilities shall not cause surface water or groundwater to be further degraded, to exceed water quality objectives, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. The WDRs also requires monitoring of surface water and groundwater to demonstrate reduced impacts to surface water and groundwater upon compliance with the WDR requirements;

- Daily management and monitoring of waste management facilities and implementation of site-specific pollution prevention practices that result in the "best practicable treatment or control" of discharges; and
- All Dischargers to prepare and implement management plans for the facility's production areas, retention ponds, land application areas and grazing lands, in accordance to specified technical standards.

9. Setting and surrounding land uses:

Bay Area land uses include a mix of residential, commercial, industrial, municipal, agriculture, and open space. The proposed project, adoption and implementation of General WDRs for CAFs, would potentially affect confined animal facilities located throughout the Bay Area. However, the focus of the environmental checklist analysis is on potential environmental impacts from confined animal facility operations that re-open within the footprint of a former facility, utilize former infrastructure, and are expected to be located in predominantly rural areas that are dominated by agriculture.

10. Other public agencies whose approval is required:

No other public agency approvals are required.

B. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Less Than Significant With Mitigation" as indicated by the checklist on the following pages.

[ ] Aesthetics	[ ] Agriculture and Forest Resources	[X] Air Quality
[X] Biological Resources	[ ] Cultural Resources	[X] Geology/Soils
[X] Greenhouse Gas Emissions	[ ] Hazards/Hazardous Materials	[X] Hydrology/Water Quality
[ ] Land Use/Planning	[ ] Mineral Resources	[ ] Noise
[ ] Population/Housing	[ ] Public Services	[ ] Recreation
[ ] Transportation/Traffic	[ ] Utilities/Service Systems	[X] Mandatory Findings of Significance

C. LEAD AGENCY DETERMINATION

On the basis of this initial evaluation:

[ ] I find that the proposed project COULD NOT have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

[X] I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

[ ] I find that the proposed project MAY have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

[ ] I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

[ ] I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an **earlier EIR or NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Digitally signed by Bruce H. Wolfe
DN: cn=Bruce H. Wolfe, o=SWRCB,
ou=Region 2,
email=bwolfe@waterboards.ca.gov, c=US
Date: 2016.06.14 16:38:26 -07'00'

Signature Date

Bruce H. Wolfe, Executive Officer

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D. EVALUATION OF ENVIRONMENTAL EFFECTS

The Environmental Checklist and discussion that follows is based on sample questions provided in the CEQA Guidelines (Appendix G) which focus on various individual concerns within 16 different broad environmental categories, such as air quality, cultural resources, land use, and traffic (and arranged in alphabetical order). The Guidelines also provide specific direction and guidance for preparing responses to the Environmental Checklist. Each question in the Checklist essentially requires a "yes" or "no" reply as to whether or not the project will have a potentially significant environmental impact of a certain type, and, following a Checklist table with all of the questions in each major environmental heading, citations, information and/or discussion that supports that determination. The Checklist table provides, in addition to a clear "yes" reply and a clear "no" reply, two possible "in-between" replies, including one that is equivalent to "yes, but with changes to the project that the proponent and the Lead Agency have agreed to, no", and another "no" reply that requires a greater degree of discussion, supported by citations and analysis of existing conditions, threshold(s) of significance used and project effects than required for a simple "no" reply. Each possible answer to the questions in the Checklist, and the different type of discussion required is discussed below:

Potentially Significant Impact. Checked if a discussion of the existing setting (including relevant regulations or policies pertaining to the subject) and project characteristics with regard to the environmental topic demonstrates, based on substantial evidence, supporting information, previously prepared and adopted environmental documents, and specific criteria or thresholds used to assess significance, that the project will have a potentially significant impact of the type described in the question.

Less Than Significant With Mitigation. Checked if the discussion of existing conditions and specific project characteristics, also adequately supported with citations of relevant research or documents, determine that the project clearly will or is likely to have particular physical impacts that will exceed the given threshold or criteria by which significance is determined, but that with the incorporation of clearly defined mitigation measures into the project, that the project applicant or proponent has agreed to, such impacts will be avoided or reduced to less-than-significant levels.

Less Than Significant Impact. Checked if a more detailed discussion of existing conditions and specific project features, also citing relevant information, reports or studies, demonstrates that, while some effects may be discernible with regard to the individual environmental topic of the question, the effect would not exceed a threshold of significance which has been established by the Lead or a Responsible Agency. The discussion may note that due to the evidence that a given impact would not occur or would be less than significant, no mitigation measures are required.

No Impact. Checked if brief statements (one or two sentences) or cited reference materials (maps, reports or studies) clearly show that the type of impact could not be reasonably expected to occur due to the specific characteristics of the project or its location (e.g. the project falls outside the nearest fault rupture zone, or is several hundred feet from a 100-year flood zone, and relevant citations are provided). The referenced sources or information may also show that the impact simply does not apply to projects like the one involved. A response to the question may also be "No Impact" with a brief explanation that the basis of adequately supported project-specific factors or general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a basic screening of the specific project).

ENVIRONMENTAL CHECKLIST:

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
I. AESTHETICS -- Would the project:				
a) Have a substantial adverse effect on a scenic vista?			X	
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			X	
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			X	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				X

Background:

Newly re-opened CAFs that would be subject to the General WDRs would generally be located in rural areas. These lands are visible from roads and neighboring properties and may also be partially visible from open space areas. Ranchlands tend to consist of large open, grassland areas. Trees may be present, particularly along riparian corridors. Ranch structures typically include one or more residences, barns, equipment sheds, fences, watering and feeding areas, roads, and road crossings.

Discussion of Impacts:

a) Have a substantial adverse effect on a scenic vista.

Less than Significant Impact: CAFs that restart operations within an existing dormant CAF footprint would only be allowed to utilize the existing physical facilities and are prohibited from expanding their facilities. Minor alterations to an existing dormant CAF, in terms of repair and rehabilitation, including the installation of mechanical equipment to milk, contain, or process the milk product, are expected. The only physical change to the landscape would be the addition of animals. Therefore impacts to scenic vistas would be less than significant.

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.

Less than Significant Impact: Permit compliance and pollution prevention actions associated with the General WDRs may affect land adjacent to designated State scenic highways; however these actions would typically be small in scale. Such compliance actions would not require the construction of new facilities, or changes to trees, rock outcroppings,

or historic buildings that could substantially damage scenic resources within these corridors. Therefore, the proposed project would not result in significant impacts to scenic resources.

c) Substantially degrade the existing visual character or quality of the site and its surroundings.

Less than Significant Impact: As described above, the General WDRs would be implemented on existing dormant and operating CAF facilities including grazing lands that are associated with the CAF, in rural areas. The visual character of the area is generally open and grassland is the dominant vegetation. The project could result in local changes in vegetation such as an increase in riparian vegetation and minor changes in topography to modify steep slopes or re-construct eroding roads. Implementation of waste management practices within the confined areas, nutrient management practices within the pasture lands and grazing management practices would generally result in small scale, temporary alteration in views and would not result in the degradation or change in the visual character of ranchland. Therefore, the impacts to scenic resources would be less than significant.

d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

No Impact. The project would not include any lighting or structures. Therefore it would have no impact to light and glare.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined by Public Resources Code section 4526?				X
d) Resulting in the loss of forest land or conversion of forest land to non-forest use?				X
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use.				X

Background:

The General WDRs calls for the implementation of waste, nutrient and grazing management practices and will result in the reduction of erosion, sedimentation and pathogens and in the improvement of water quality and the promotion of sustainable agriculture. Implementation of the General WDRs is consistent with most general plans for rural counties, such as Napa County's agricultural preservation goals and policies (Napa County General Plan) and Sonoma County's Policy and Goals for Reduction of Soil Erosion (Sonoma County General Plan) - i.e. that encourages and supports farms and ranches seeking to implement programs that increase the sustainability of resources, conserve energy, and protect water and soil (refer to Section X, Land Use and Planning).

Discussion of Impacts:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.

No Impact: The project will not result in the conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance to non-agricultural use.

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract.

No Impact: The project will not affect existing agricultural zoning or any aspect of a Williamson Act contract.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)) or timberland (as defined by Public Resources Code section 4526)?

No Impact: The project will not cause rezoning of forest land or timberland.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact: The project would not result in any direct loss of forest land.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use.

No Impact: The project would not result in conversion of Farmland to non-agricultural use.

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	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
III. AIR QUALITY -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?				X
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			X	
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?			X	
d) Expose sensitive receptors to substantial pollutant concentrations?			X	
e) Create objectionable odors affecting a substantial number of people?			X	

Background:

The San Francisco Bay Region is located in the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The Bay Area is currently designated as a nonattainment area for State and national ozone standards and as a nonattainment area for the State particulate matter (PM10 and PM2.5) standards. As required by federal and State air quality laws, the 2001 Bay Area Ozone Attainment Plan and the 2000 Bay Area Clean Air Plan have been prepared to address ozone nonattainment issues. In addition, the BAAQMD, in cooperation with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), prepared the Bay Area 2005 Ozone Strategy. This report describes the Bay Area's strategy for compliance with State one-hour ozone standard planning requirements and how to improve air quality in the region and reduce transport of air emissions to neighboring air basins. No PM10 plan has been prepared nor is one currently required under State air quality planning law.

Discussion of Impacts:

a) Conflict with or obstruct implementation of the applicable air quality plan.

No impact: A project would conflict with or obstruct implementation of the regional air quality plans if it would be inconsistent with the growth assumptions, in terms of population, employment or regional growth in vehicle miles traveled. The growth assumptions used for the regional air quality plans are based upon the growth assumptions provided in local general plans**.** The re-opening of a few CAF facilities within the next 5 years would have a less than significant impact on any of the growth assumptions made in the preparation of the clean air plans (no new housing is proposed), and would not obstruct implementation of any of the proposed control measures contained in these plans.

Implementation of waste, nutrient and/or grazing management actions as required by the General WDRs would not result in new land uses that would generate a significant increase in traffic or other operational air emissions. Temporary increases in traffic could occur at individual CAFs during construction and installation of best management practices (BMPs) to comply with the requirements of the General WDRs, however, these impacts are expected to be limited in numbers and types of vehicles used, miles driven, duration, and air resultant emissions.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Less than significant impact: Reopening of an existing dormant CAF could result in minimal construction including minor alterations to existing structures or restoration or rehabilitation of deteriorated or damaged equipment to meet current standards of public health and safely. Compliance with the provisions of the General WDRs may, in certain circumstances (depending on animal type), require the preparation and implementation of waste, nutrient, and grazing management practices to control and reduce sediment, pathogens, and nutrient discharges to surface and groundwater. As such, some engine emissions from the temporary operation of construction vehicles and equipment used to comply with the provisions of the General WDRs would be both short-term and localized and not will violate any air quality standard or contribute substantially to an existing or projected air quality violation.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

Less than significant impact: In accordance with BAAQMD CEQA Guidelines, for any project that does not individually have significant operational air quality impacts, the determination of significant cumulative impact is based on an evaluation of the project's consistency with the local general plan. The local general plan must also be consistent with the regional air quality plan. The project would not result in, nor authorize, new land uses, and would therefore be consistent with the 2001 Bay Area Ozone Attainment Plan and the 2000 Bay Area Clean Air Plan. Therefore, the project would not result in a cumulatively considerable net increase of any criteria pollutant. This would be a less than significant impact.

d) Expose sensitive receptors to substantial pollutant concentrations.

Less than significant impact: CAF operations regulated by the General WDRs are located in rural areas, away from schools, hospitals, and other sensitive land uses. Residential uses in agriculturally-zoned districts are very low density, typically only a few residences on each of the parcels. Minor construction and/or earth moving undertaken to comply with the General WDRs could result in increases in particulates in the air in the immediate area of grading and construction but would not expose sensitive receptors, likely to be located substantial distances from ranchlands, to substantial pollutant concentrations.

e) Create objectionable odors affecting a substantial number of people.

Less than significant impact: The BAAQMD defines public exposure to offensive odors as a potentially significant impact. In general, the types of land uses that pose potential odor problems include refineries, chemical plants, wastewater treatment plants, landfills, composting facilities, and transfer stations.

The operation and maintenance of any CAF involves the collection and management of manure and materials contacting manure, including storm water. Depending on the animal type, each facility utilizes site-specific management measures including, but not limited to, manure solids separators, anaerobic digestion, composting, manure wastewater spray irrigation, and/or spreading of manure solids in the fall for crop fertilization.

Residential uses in agriculturally-zoned districts are generally of very low density, consisting of only a few residences on each of the parcels. In areas where rural agriculture zone transitions to more dense residential zones, odors may be noticeable to more people than in typical rural areas; however, given that there are only a small number of closed facilities region-wide that may re-open, the potential for a re-opened facility to impact a substantial number of people, is low. The impact of the project with regard to odors is considered to be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES -- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?			X	
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?		X		
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				X

Background

Watersheds throughout the region support a wide diversity of plant and animal species, including a high number of special status species and sensitive natural communities. These communities include mixed evergreen forests, oak woodlands and savanna, native and nonnative grasslands, chaparral, and riparian scrub and woodland. Some watersheds provide habitat for several aquatic species of concern, including steelhead trout (Oncorhynchus mykiss), Chinook salmon (Oncorhynchus tshawytscha), and California freshwater shrimp (Syncaris pacifica).

It is possible that a re-opened CAF that is subject to the proposed General WDRs may be required to undertake specific projects to comply with the General WDRs. These projects may involve manure retention and management, land application of nutrients, minor earthmoving and/or construction, the installation of water wells and associated water routing piping and storage (tanks), property fencing, and rehabilitation of roads and animal crossings, that could potentially affect biological resources either directly or indirectly through habitat modifications.

Discussion of Impacts:

a) **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?**

   Less than significant impact: The General WDRs are designed to benefit, enhance, restore and protect biological resources, including fish, wildlife, and rare and endangered species. The potential for a re-opened facility to impact any species identified as a candidate, sensitive, or special status species is extremely low because the land has already been modified for CAF use, and the owners/operators will only be reconstructing and/or repairing existing facilities.

   If, however, impacts to special status species and their habitats occur outside the Water Board's jurisdiction (e.g., in areas with no proximity or relation to waters of the state), then impacts must be addressed through other local, state, and federal programs. For example, for projects that fill Clean Water Act 404 wetlands, the Army Corps of Engineers explicitly conditions its permits to require that impacts to federally listed species be less than significant. Furthermore, the General WDRs do not authorize expansions of facilities nor the construction of new CAFs. New and expanded CAFs must demonstrate compliance with CEQA and obtain separate waste discharge requirements.

b) **Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or US Fish and Wildlife.**

   Less than significant impact with mitigation: As indicated in section IV a), above, the General WDRs are designed to benefit biological resources, particularly riparian habitat and other sensitive natural communities. Compliance projects proposed to comply with the General WDRs that involve grading or construction in the riparian corridor are subject to review and/or approval by the Water Board.

   The Water Board will work with California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and proponents of specific compliance projects to come up with actions

that not only meet but further the General WDRs' requirements and goals, but also have minimal impacts.

Mitigation Measure IV–1:
Landowners shall apply for permits from the Water Board, USFWS, and/or CDFW for approval. These agencies will either:

a. not approve compliance projects with significant adverse impacts on sensitive/special status species; or,
b. require mitigation measures to reduce impacts to less-than-significant levels.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Less than significant impact with mitigation: Adverse impacts on wetlands would not be significant. Proposed waste, nutrient and/or grazing management actions/ projects that could have the potential to disturb wetlands would be subject to the Water Board's review and approval under Section 401 of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act. The Water Board must, consistent with its Basin Plan, require mitigation measures to avoid, minimize, and mitigate impacts to less-than-significant levels. As specified in the Basin Plan, the Water Board uses the USEPA Section 404(b)(1) Guidelines for dredge and fill material in determining the circumstances under which the filling of wetlands may be permitted. This policy requires that avoidance and minimization be emphasized and demonstrated prior to consideration of mitigation. Wetlands not subject to protection under Sections 404 and 401 of the CWA are still subject to regulation, and protection under the CWC.

Mitigation Measure IV–2:
Landowners shall apply for permits from the Water Board and/ US Army Corps of Engineers for approval. The permits will specify conditions to reduce impact to less than significant levels, including:

a. Demonstrating that avoidance, minimization, and mitigation of impacts has occurred to the maximum extent practicable;
b. for all potential projects where wetland losses would exceed 0.1 acres, responsible parties are required to provide compensatory mitigation at a ratio that is greater than or equal to 1:1 (as determined in consultation with the Water Board); and,
c. For projects where wetland losses are less than 0.1 acre, on a case by case basis, the District Engineer and/or Water Board may require compensatory mitigation.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Less than significant impact with mitigation: Re-opening an existing dormant CAF operation under the General WDR provisions would not substantially interfere with the

movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. Although projects could be proposed to comply with General WDRs that involve minor construction or earthmoving activities (e.g., fencing, road improvements, etc.), these projects involve only minor alteration, rehabilitation, or maintenance of pre-existing facilities, mechanical equipment, or topographic features, involving negligible or no expansion of use beyond what previously existed. The General WDRs do not authorize expansions of facilities, nor do they authorize the construction of new CAFs. New and expanded CAFs must demonstrate compliance with CEQA and obtain separate waste discharge requirements.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

No impact: Re-opening an existing dormant CAF and the implementation of General WDR provisions would be consistent with the goals of the TMDLs to retain riparian vegetation and would not conflict with local policies or ordinance.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

No impact. This project does not conflict with any adopted Habitat Conservation Plan, Natural Community Plan, or other approved local, regional or state habitat conservation plan.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?			X	
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?			X	
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			X	
d) Disturb any human remains, including those interred outside of formal cemeteries?			X	

Background:

Before the European settlement, the agricultural areas of our Region were inhabited by various indigenous tribes. Historic and archaeological remnants of these tribes include sacred sites, burial grounds, cemeteries, ceremonial sites, barns, farmsteads, and walls, among others.

To address effects on tribal cultural resources, specifically, the lead agency must also fulfill the requirements of Assembly Bill 52 (AB 52). AB 52 requires a lead agency to notify tribes traditionally and culturally affiliated with a project area of the details of the proposed project, provided the tribes have requested such notification (Pub. Res. Code § 21080.3.1(d)). If any of the notified tribes requests consultation, then the lead agency must consult with the tribe to discuss avoidance and mitigation of significant impacts to tribal cultural resources (Pub. Res. Code § 21080.3.2).

No tribes traditionally or culturally affiliated with the San Francisco Bay Region have requested to be notified of proposed projects in this area. Therefore, the notification and/or consultation requirements of AB 52 were not triggered, and the agency has satisfied its obligations under the statute.

Discussion of Impacts:

a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

Less than Significant Impact: Implementation of the General WDRs for existing dormant facilities could involve minor grading, repair and reconstruction. This activity would generally

be small in scale, and would be limited to shallow excavation/grading for minor road repair/rehabilitation, and the installation of fence posts, etc. that would be installed in areas already disturbed by recent human activity, not at or in areas containing historical resources as defined by section 15064.5 of the CEQA guidelines. Therefore, impacts to historical resources would not be significant.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Less than Significant Impact: Implementation of the General WDRs for existing dormant facilities could involve minor grading, repair and reconstruction. This activity would generally be small in scale, and would be limited to shallow excavation for minor road repairs, grading, and installation of fence posts, etc. that would be installed in areas already disturbed by recent human activity, not at or in areas containing archaeological resources as defined by section 15064.5 of the CEQA guidelines (Determining the Significance of Impacts on Historical and Unique Archeological Resources). Therefore, impacts to archaeological resources would not be significant.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geological feature?

Less than Significant Impact: Implementation of the General WDRs for existing dormant facilities could involve minor grading and reconstruction. This activity would generally be small in scale and would likely occur in areas already disturbed by recent human activity, not in areas of known paleontological resource or areas containing unique geologic features. Therefore, the project would have less than significant paleontological impacts.

d) Disturb any human remains, including those interred outside of formal cemeteries?

Less than Significant Impact: Implementation of the General WDRs for existing dormant facilities could involve minor grading and reconstruction. This activity would generally be small in scale and would likely occur in areas already disturbed by recent human activity, not at or in areas of human remains as defined by section 15064.5 of the CEQA Guidelines (Determining the Significance of Impacts on Historical and Unique Archeological Resources). Therefore, the project would not adversely affect human remains, and its impacts would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
VI. GEOLOGY AND SOILS -- Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				X
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				X
ii) Strong seismic ground shaking?				X
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?			X	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?				X
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				X
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X

Background:

The San Francisco Bay Area is crossed by as many as eight major active fault lines that run through or adjacent to all nine Bay Area counties. The U.S. Geological Survey estimates a 62% probability

that at least one earthquake of magnitude 6.7 or greater will occur on a known or unknown San Francisco Bay region fault before 2032. After a century of study by geologists, many faults have been mapped in the region, but not all faults are apparent at the surface—some quakes occur on previously unknown faults.

Discussion of Impacts:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

- **i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.**
- **ii) Strong seismic shaking?**
- **iii) Seismic-related ground failure?**
- **iv) Landslides?**

No impact: The project would not involve the construction of habitable structures; therefore, it would not result in any human safety risks related to fault rupture, seismic ground-shaking, ground failure, or landslides.

b) Result in substantial soil erosion or the loss of topsoil?

Less than significant: Specific activities involving earthmoving or construction activities to comply with requirements of the General WDRs are reasonably foreseeable. Such activities would not result in substantial soil erosion or the loss of topsoil because they would involve minor alteration of existing structures, facilities, mechanical equipment, or topographic features.

One of the objectives of the General WDRs is to reduce erosion, not increase it, through managed grazing and maintenance of unpaved, farm roads. To meet the proposed General WDRs conditions, grazing areas devoid of vegetation would be managed and maintained to reduce overall soil erosion through rotational grazing and herd management. Small grading projects that would generally apply to routine maintenance would be subject to non-discretionary requirements of local agency grading ordinances.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

No impact: The General WDRs could result in projects involving improvements to roads and creek crossings, and other projects located on unstable terrain. These projects would be designed to increase stability, both on-site and off-site, to reduce erosion and sedimentation. Grading would be designed to minimize any potential for landslides, lateral spreading, subsidence, liquefaction, or collapse.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

No impact. The project would not involve construction of buildings (as defined in the Uniform Building Code) or any habitable structures. Minor grading and construction could occur in areas with expansive soils, but this activity would not create a substantial risk to life or property.

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No impact: The project only applies to existing CAFs in operation and potential re-opening of existing dormant CAFs. Any septic tanks or alternative water disposal systems would generally be in place and are not permitted by the General WDRs.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
VII. GREENHOUSE GAS EMISSIONS – Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?		X		
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?				X

Background:

In 2006, California passed the California Global Warming Solutions Act of 2006, which requires the California Air Resources Board (CARB) to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide greenhouse gas (GHG) emissions are reduced to 1990 levels by 2020 (representing an approximate 25 percent reduction in emissions).

State law requires local agencies to analyze the environmental impact of GHG emissions under CEQA. The Natural Resources Agency adopted the CEQA Guidelines Amendments in 2009. The BAAQMD adopted CEQA thresholds for GHG emissions in the Bay Area in 2010. BAAQMD evaluates GHG through qualified climate actions plans.

Discussion of Impacts:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less than significant with mitigation. Re-opening an existing dormant CAF and the implementation of General WDR provisions would not result in changes in land use. Construction-related emissions associated with implementation of the General WDRs would be generated by operation of heavy equipment used to construct necessary erosion controls and watering facilities (e.g., ground water wells and piping). These construction-related emissions would be small, temporary in nature, and would not be concentrated in one location, and their total contribution to county-wide greenhouse gas emissions would be less than significant.

BAAQMD has not established greenhouse gas thresholds for construction activities but recommends best management practices to reduce potential impacts.

However, CAFs are regulated by Air District Regulation 2, Rule 10, and may require Air District permits, per Air District Regulation 2, Rule 1.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

No Impact. The project would not conflict with any State, BAAQMD, or county plan, policy or regulation adopted for the purpose of reducing the emissions of GHG and no impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
VIII. HAZARDS AND HAZARDOUS MATERIALS -- Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				X
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				X
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				X
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				X
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				X

Background:

Current CAF operations in the Region currently have some amount of fencing along property borders, fencing to separate livestock paddocks, water troughs, etc., as well as other agricultural management practices implemented on-site.

Facility maintenance, retrofit, and/or improvements associated with implementing waste, nutrient and grazing management practices (e.g., installation of fencing, off-stream watering troughs, groundwater supply wells, and conveyance piping, retention ponds, irrigation, etc.) will not involve the use or transport of any hazardous materials, aside from fuels and lubricants used for construction and/or farm equipment.

Furthermore, groundwater supply well placement, installation and construction is permitted and regulated by the local agencies. Applications are reviewed for setback distances, proximity to Hazmat sites, and proposed use.

Discussion of Impacts:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

No impact: This project would not affect the transportation or potential release of hazardous materials, nor create a significant public safety or environmental hazard beyond any hazards currently in existence. General WDR implementation actions would not interfere with any emergency response plans or emergency evacuation plans and would not affect the potential for wild-land fires.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

No Impact: Refer to response to Item VIII a), above.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact: Refer to response to Item VIII a), above.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact: Refer to response to Item VIII a), above.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

No Impact: Refer to response to Item VIII a), above.

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

No Impact: Refer to response to Item VIII a), above.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

No Impact: Refer to response to Item VIII a), above.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No Impact: Refer to response to Item VIII a), above.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
IX. HYDROLOGY AND WATER QUALITY -- Would the project:				
a) Violate any water quality standards or waste discharge requirements?		X		
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?			X	
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?		X		
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?			X	
e) Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?				X
f) Otherwise substantially degrade water quality?		X		
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				X
h) Place within a 100-year flood hazard				

area structures which would impede or redirect flood flows?	X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	X
j) Inundation by seiche, tsunami, or mudflow?	X

Discussion of Impacts:

a) Violate any water quality standards or waste discharge requirements?

Less than significant with mitigation: Re-opening an existing dormant CAF and the implementation of General WDR provisions would implement recently-adopted TMDLs and the Basin Plan, which articulates applicable water quality standards; therefore, if in compliance with General WDRs, CAF operation would not violate standards or waste discharge requirements. Specifically, prior to start-up, owner/operators must develop site-specific management plans applicable to each operation, in accordance with technical standards outlined in the General WDRs. Such plans include a Waste Management Plan for confined production areas, a Nutrient Management Plan for lands where manure products are applied, and a Grazing Management Plan for grazing lands totaling 50 acres or more.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

Less than significant impact: Implementation of improved waste, nutrient and/or grazing management practices may include installation of off-stream livestock groundwater supply wells, watering troughs, installation of water distribution conveyance piping, etc. Providing off-stream livestock water supply is an important best management practice for protecting riparian corridors from erosion and pathogen impacts resulting from animals entering surface waters.

Groundwater supply well placement, installation and construction is permitted and regulated by the local agencies. Applications are routinely reviewed for setback distances, and proposed use. Given these required county approvals, the project would not include projects that would interfere with local groundwater recharge and supply.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?

Less than significant impact with mitigation Specific projects involving earthmoving or construction activities to comply with General WDR requirements could affect existing drainages patterns and are reasonably foreseeable.

Specific projects to comply with General WDR requirements must comply with standard permit conditions in the U.S. Army Corps of Engineers' Nationwide Permit Nos. 13 (Bank Stabilization) and 27 (Stream and Wetland Restoration Activities). U.S. Army Corps of Engineers' final approval and issuance of a permit is only valid with Clean Water Act 401 certification of the proposed activity, which is made by the Water Board. Section 401 requires the Water Board to certify that such projects comply with water quality standards, and as such, Section 401 certifications often include conditions that are more stringent than the federal requirements.

Mitigation Measure IX–1:
During earthmoving and construction, landowners must implement best management practices as feasible during all construction activities, including the following:

a. Use proper slope grading, temporary/permanent seeding or mulching, erosion control blankets, fiber rolls, etc. and other methods to prevent the movement of soils;
b. Enclose, cover, water twice daily or apply (non–toxic) soil binders to exposed stockpiles (dirt, sand, etc.); and,
c. Replant vegetation in disturbed areas as quickly as possible.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Less than significant impact: As stated in the previous response, this project could involve earthmoving that could affect existing drainage patterns. Furthermore, compliance with General WDRs could contribute to increases in the amount of riparian vegetation in stream channels and thus enhance habitat conditions. These actions should reduce flooding hazards.

Specific projects involving earthmoving or construction activities to comply with General WDRs would be designed to avoid and minimize the alteration of the course of a stream or river, and to reduce the rate or amount of surface runoff. Specific compliance projects involving stream or creek work would be subject to the review and/or approval of the Water Board, which would require implementation of routine and standard erosion control best management practices and proper construction site management. In addition, construction projects over one acre in size would require a general construction National Pollutant Discharge Elimination System permit and implementation of a storm water pollution prevention plan. Actions under taken to comply with the General WDRs would not substantially increase impervious surfaces, or peak flow releases from dams in any part of the watershed.

Also as noted above, specific projects to comply with General WDR requirements must comply with standard permit conditions in the U.S. Army Corps of Engineers' Nationwide Permit Nos. 13 (Bank Stabilization) and 27 (Stream and Wetland Restoration Activities). U.S. Army Corps of Engineers' final approval and issuance of a permit is only valid with Clean Water Act 401 certification of the proposed activity, which is made by the Water Board. Section 401 requires the Water Board to certify that such projects comply with water quality standards, and as such, Section 401 certifications often include conditions that are more stringent than the federal requirements.

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e) **Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?**

No impact: Actions undertaken to comply with the General WDRs are, by design, intended to reduce erosion from upland land uses, as needed to reduce fine sediment inputs from hillslopes to channels and channel erosion. Therefore, compliance with the General WDRs would not increase the rate or amount of runoff or exceed the capacity of storm water drainage system.

f) **Otherwise substantially degrade water quality?**

Less than significant impact with mitigation: The General WDRs require that discharges of waste from CAFs shall not cause surface water or groundwater to be further degraded, to exceed water quality objectives, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. Monitoring of surface water is required of all confined animal facilities subject to the Order. For confined animal facilities that utilize waste ponds, monitoring of groundwater is an additional requirement. Monitoring of surface water and groundwater is intended to demonstrate compliance with the Order.

In addition, prior to start-up, owner/operators must develop site-specific management plans applicable to each operation, in accordance with technical standards outlined in the General WDRs. Such plans include a Waste Management Plan for confined production areas, a Nutrient Management Plan for lands where manure products are applied, and a Grazing Management Plan for grazing lands totaling 50 acres or more.

g) **Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?**

No impact: Re-opening an existing dormant CAF and the implementation of General WDR provisions would not require the construction of new housing.

h) **Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?**

No impact: Re-opening an existing dormant CAF and the implementation of General WDR provisions would not result in construction of new structures that could impede or redirect flood flows within a 100-year flood hazard zone.

i) **Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?**

No impact: Re-opening an existing dormant CAF and the implementation of General WDR provisions would not result in construction or modification of dams or levees or activities that would expose people to significant damage from dam or levee failure and no adverse impacts would occur.

j) **Inundation by seiche, tsunami, or mudflow?**

No impact: Re-opening an existing dormant CAF and the implementation of General WDR provisions would occur upstream of the tidally influenced stream channel and would not be subject to substantial risks due to inundation by seiche, tsunami, or mudflow, and no impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
X. LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				X
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

Background:

Compliance with the General WDRs on existing dormant facilities would potentially affect areas currently zoned for agriculture throughout the Region, however we expect the majority of any facilities would be located in Marin and Sonoma counties (the predominant location of closed dairy sites). Local zoning ordinances generally stipulate requirements for agricultural land uses, including livestock production and grazing. However, since the scope of coverage for the General WDRs is limited to existing CAFs and existing dormant facilities, the location and land use for each should have already been approved under any local programs or policies.

Discussion of Impacts:

a) Physically divide an established community?

No impact. The project would be located on agriculture lands in rural areas and would not change land use or alter an established community. Therefore it would not physically divide an established community.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

No Impact. The project would not affect land use designations or uses and therefore would not conflict with any zoning ordinances.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

No impact. The project would not conflict with any Habitat Conservation Plans or natural community plans.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XI. MINERAL RESOURCES -- Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

Background:

The California Surface Mining and Reclamation Act of 1975 (SMARA) required identification of mineral resources in California. SMARA maps identify and classify mineral resources as to their relative value for extraction.

Discussion of Impacts:

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No impact: Compliance actions driven by the General WDRs may include earthmoving (i.e., excavation), groundwater supply well and conveyance piping installation, and construction (e.g., fence installation, improvement of livestock crossing, etc.). These actions would be relatively small in scale and would not result in the loss of availability or physically preclude future mining activities from occurring.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact: Refer to response to Item XI (a), above.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XII. NOISE -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				X
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			X	
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

Background:

Existing dormant CAFs that would be subject to the general WDRs are located in rural areas and tend to consist of large, open, grassland areas. These land uses are generally located away from schools, hospitals, and other sensitive land uses. Residential uses in agriculturally zoning districts are very low density; typically only a few residences on each of the large grazing land parcels. Minor maintenance and/or construction activity undertaken to comply with the General WDRs, or the use of typical farm equipment/machinery, could result in temporary increases in ambient noise levels in the immediate area; but, would not expose sensitive receptors, likely to be located substantial distances from ranchlands and from harmful levels of noise.

Discussion of Impacts:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

No Impact: The project could involve general maintenance, earthmoving and construction related to compliance projects and/or daily activities, generally small in scale, but could temporarily generate noise. Any facility operating under the General WDRs would have to be consistent with local agency noise standards.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact: The project could involve earthmoving and construction. Construction would generally be small in scale, and in rural areas where the potential for exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels is less than significant. Any proposed facility enrolled under the General WDRs would be required to comply with their respective county standards to keep noise levels to less than significant levels. Therefore, compliance actions or daily activities driven by the General WDRs will not result in substantial noise, and its impacts would be less than significant.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

No Impact: The project would not cause any permanent increase in ambient noise levels. Any noise would be short-term in nature.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact: Existing dormant CAFs may require that minor maintenance and/or construction activities be undertaken to comply with the General WDRs. Those activities will most likely utilize common/typical farm equipment/machinery. These activities would generally be small in scale, but could generate temporary noise. Noise generating activities would, however have to comply with their respective county standards to keep noise levels to less than significant levels. Therefore, the project will not result in substantial noise, and its impacts would be less than significant.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No impact: The project would not cause any permanent increase in ambient noise levels, including aircraft noise. Therefore, it would not expose people living within and area subject to an airport land use plan to excessive noise and thus, no impact would occur.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No impact: The project would not cause any permanent increase in ambient noise levels, including aircraft noise. Therefore, it would not expose people living in the vicinity of a private strip to excessive noise and thus, no impact would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XIII. POPULATION AND HOUSING -- Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

Background

The re-opening of existing dormant CAFs will take place in areas where the dominant land is rural/agricultural. Ranch structures typically include one or more residences, barns, equipment sheds, fences, watering and feeding areas, roads and road crossings.

Discussion of Impacts

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact: The project will not affect population growth in the Region. It will not induce growth through such means as constructing new housing or businesses, or by extending roads or infrastructure. The project will not displace any existing housing or any people that would need replacement housing.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No impact: The project will not induce growth through such means as constructing new housing or businesses, or by extending roads or infrastructure.

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No impact: The project will not displace any existing housing or any people that would need replacement housing.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XIV. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?				X
Police protection?				X
Schools?				X
Parks?				X
Other public facilities				X

Background:

Compliance with the General WDRs on existing dormant facilities could potentially affect areas currently zoned for agriculture throughout the Region. However, since the scope of coverage for the General WDRs is limited to existing CAFs and existing dormant facilities, the public services for these areas are already established. Re-opening an existing dormant CAF will require a limited number of additional people on a property, but not more than the current public services could accommodate.

Discussion of Impacts:

a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

i) Fire protection
ii) Police protection
iii) Schools
iv) Parks
v) Other public services

No Impact: The project will not result in adverse impact on fire protection or police services or on schools and parks since this project is not growth-inducing, nor does it involve the construction of substantial new government facilities or the need for physically-altered government facilities. The project would not affect service ratios, response times, or other performance objectives for any public services.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XV. RECREATION --				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

Background:

The California Department of Parks and Recreation, local park and/open space districts, municipalities, and other private parties own and operation numerous park and recreational facilities in the counties. These facilities provide a variety of outdoor recreational, educational, and sporting opportunities for local residents, Bay Area residents, and visitors for around the world. The ranchlands surrounding these parks and the many vineyards are an integral part of the rural agricultural and open space experience.

Discussion of Impacts:

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact: The project would affect only existing dormant CAFs and associated pasture/crop lands and would have no effect on existing neighborhood and regional parks or other recreational facilities, and no impacts would occur.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact: Refer to response to Item XV a), above.

XVI. TRANSPORTATION/TRAFFIC - - Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a) Exceed the capacity of the existing circulation system, based on applicable measures of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?				X
b) Conflict with an applicable congestion management program, including but not limited to, level of service standards and travel demand measures and other standards established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X
e) Result in inadequate emergency access?				X
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				X

Background:

Compliance with the General WDRs on existing dormant facilities would potentially affect areas currently zoned for agriculture throughout the Region. However, since the scope of coverage for the General WDRs is limited to existing CAF and existing dormant facilities, there would be no substantial increase in traffic or traffic related hazards associated with the re-opening a facility.

Discussion of Impacts:

a) **Exceed the capacity of the existing circulation system, based on applicable measures of effectiveness (as designated in a general plan policy, ordinance, etc.), taking into account all relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?**

No Impact: The project could result in minor construction that would require the use of heavy equipment and trucks to move soil, logs, or other materials needed for road, and/or stream crossings. Any increase in traffic would be temporary and would be limited to local areas in the vicinity of individual projects and would not create substantial traffic in relation to the existing load and capacity of existing street systems.

b) **Conflict with an applicable congestion management program, including but not limited to, level of service standards and travel demand measures and other standards established by the county congestion management agency for designated roads or highways?**

No Impact: See response to Item XVI a), above. Levels of service would be unchanged.

c) **Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?**

No impact: The proposed project would not result in increased air travel or otherwise affect air travel.

d) **Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?**

No impact: Although private roads may require erosion control treatment, the project does not include construction of new roads and no new hazards will exist due to the design or engineering of the road network. No road design or construction hazards would occur.

e) **Result in inadequate emergency access?**

No Impact: The project would result in grading and erosion control actions on unpaved roads that are not typically used for emergency access. Therefore, the project would not result in inadequate emergency access and on impacts would occur.

f) **Result in inadequate parking capacity?**

No Impact: Because the project would be located on private ranches, it would not affect parking demand or supply, and no impacts would occur.

g) **Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?**

No impact. Because the project would not generate ongoing motor vehicle trips, it would not conflict with adopted policies, plans, or programs supporting alternative transportation.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XVII. UTILITIES AND SERVICE SYSTEMS - Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				X
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				X
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				X
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X

Discussion of Impacts:

a) **Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?**

No Impact: The project would implement the Basin Plan, which is the basis for wastewater treatment requirements to improve water quality and the environment in the Bay Area; therefore, the General WDRs would be consistent with such requirements.

b) **Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?**

No Impact: The project does not include changes to wastewater treatment facilities and no impacts would occur.

c) **Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?**

No Impact: The project would not include construction of new or expanded stormwater drainage facilities and no impacts would occur.

d) **Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?**

No Impact: Since the project is for existing dormant CAFs, water supplies have already been established.

e) **Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?**

No Impact: See response to Item XVII d), above.

f) **Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?**

No Impact. The project would not substantially affect municipal solid waste generation or landfill capacities and no impacts would occur.

g) **Comply with federal, state, and local statutes and regulations related to solid waste?**

No Impact. See response to Item XVII d), above.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE --				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		X		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?				X

Discussion of Impacts:

a) **Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?**

Less than significant impact with mitigation: Although it appears that a relatively few existing dormant CAFs may re-open in the near future, there is an increased risk for animal wastes to enter surface and ground waters. In order to be eligible for General WDR coverage, those seeking to start-up/revive an existing dormant CAF operation utilizing an existing facility must comply with the following conditions:

- Prior to start-up, owner/operators must develop site-specific management plans applicable to each operation, in accordance with technical standards outlined in

the General WDRs. Such plans include a Waste Management Plan for confined production areas, a Nutrient Management Plan for lands where manure products are applied, and a Grazing Management Plan for grazing lands totaling 50 acres or more.

- Prior to start-up, retention ponds must comply with Natural Resources Conservation Service (NRCS) Waste Storage Facility Code 313 including a maximum specific discharge (unit seepage rate) of 1×10^{-6} cm/sec. Such ponds may not be used until the Discharger submits a report verifying that the liner meets this requirement.
- Operations must not include more animals than the existing infrastructure is designed to accommodate. The General WDRs do not authorize expansions of facilities. Such facilities must demonstrate compliance with CEQA and obtain separate waste discharge requirements.

In addition to eligibility requirements, existing dormant CAFs will be subject to all provisions of the General WDRs. In general, these provisions require:

- That discharges of waste from CAFs shall not cause surface water or groundwater to be further degraded, to exceed water quality objectives, unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. The WDRs also requires monitoring of surface water and groundwater to demonstrate reduced impacts to surface water and groundwater upon compliance with the WDR requirements;
- Daily management and monitoring of waste management facilities and implementation of site-specific pollution prevention practices that result in the "best practicable treatment or control" of discharges; and
- All Dischargers to prepare and implement management plans for the facility's production areas, retention ponds, land application areas and grazing lands, in accordance to specified technical standards.

As discussed in this study, the addition of these few facilities would result in indirect, less than significant impacts.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

Less than significant impact: Refer to response to Item XVIII a), above.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

No impact: The project would not cause any substantial adverse effects to human beings, either directly or indirectly. General WDRs are intended to benefit human beings through implementation of actions designed to protect surface and groundwater, enhance fish populations, aesthetic attributes, recreational opportunities, and contribute to a reduction in property damage in and/or nearby to stream channels in the Region.

E. REFERENCES, PERSONS CONTACTED, AND REPORT PREPARERS

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Coastal Conservancy, *Draft Environmental Impact Report/ Environmental Impact Statement - Napa River Salt Marsh Restoration Project, Chapter 3. Hydrology*, April 2003.

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15387, *California Environmental Quality Act (CEQA) Guidelines*, 2010.

State Water Resources Control Board (State Board) 2004. *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program, May 20, 2004.* Sacramento, California: California Environmental Protection Agency, State Water Resources Control Board.

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STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2024-0002, Amending Waste Discharge Requirements for Oceanfront and Bayfront Landfills and Industrial Facilities

LONG-TERM FLOOD PROTECTION REQUIREMENTS AT OCEANFRONT AND BAYFRONT MUNICIPAL SOLID WASTE LANDFILLS AND INDUSTRIAL FACILITIES

The California Regional Water Quality Control Board, San Francisco Bay Region (hereafter Regional Water Board), finds that:

1. There are more than 30 landfills, including both closed and operating facilities, located immediately adjacent to San Francisco Bay and the Pacific Ocean. There are also 8 industrial facilities, such as refineries and chemical plants, that have waste management units (WMUs) and/or surface impoundments located on or near the Bayfront. The locations of these facilities make them inherently vulnerable to sea level rise, extreme storm events, king tides, and groundwater rise which can occur when higher sea levels cause shallow water tables to rise.

2. Since 2009, as part of the routine update of Waste Discharge Requirements (WDRs), the Regional Water Board has included a requirement for preparation, submittal, and five-year updates of a Long-Term Flood Protection Report or Plan for Bayfront and other low-elevation facilities recognized as vulnerable to climate change and sea level rise. This Amendment applies to 15 Bayfront landfills and 6 industrial facilities that have already been required to submit at least one Long-Term Flood Protection Report or Plan. These are listed in Table 1 and shown in Figure 1. This Amendment also applies to 4 oceanfront and Bayfront landfills and 2 industrial facilities that have not been required to submit Long-Term Flood Protection Reports or Plans in the past. These facilities are listed in Table 2 and shown in Figure 2.

Table 1. List of Facilities that have WDRs with Existing Long-Term Flood Protection Requirements Amended by this Order

Facility Description	Year(s) Long-Term Flood Protection Report/Plan Submitted	WDRs Order No. (Long-Term Flood Protection Report/Plan Provision No.)	Discharger(s)
Landfills			
1. American Canyon Landfill	2019	R2-2019-0010 (Provision C.7)	Napa-Vallejo Waste Management Authority
2. Berkeley Landfill	2016, 2021	R2-2010-0064 (Provision C.11)	City of Berkeley

Facility Description	Year(s) Long-Term Flood Protection Report/Plan Submitted	WDRs Order No. (Long-Term Flood Protection Report/Plan Provision No.)	Discharger(s)
3. Davis Street Landfill/ Oyster Bay Regional Park	2020	R2-2019-0033 (Provision C.7)	Waste Management of Alameda County and East Bay Regional Park District
4. Mussel Rock Landfill	2017, 2022	R2-2015-0007 (Provision C.9)	City of Daly City
5. Palo Alto Landfill	2017, 2022	R2-2016-0029 (Provision C.9)	City of Palo Alto
6. Redwood Landfill	2008, 2013, 2019	R2-2009-0053 (Provision C.14)	Redwood Landfill, Inc.
7. San Quentin Landfill	2013, 2018, 2023	R2-2012-0064 (Provision C.16)	Cal-Pox Inc. and Glendale, LLC
8. Santa Clara All-Purpose Landfill	2018	R2-2017-0021 (Provision C.21)	City of Santa Clara and Related Santa Clara, LLC
9. Shoreline Landfill/ Regional Park	2022	R2-2020-0029 (Provision C.7)	City of Mountain View
10. Tri-Cities Recycling and Disposal Facility	2015, 2019	R2-2014-0005 (Provision C.8)	Waste Management of Alameda County, Inc.
11. Turk Island Landfill	2013, 2018, 2023	R2-2012-0020 (Provision C.9)	Turk Island Company
12. West Contra Costa Sanitary Landfill	2023	R2-2022-0011 (Provision C.11)	West Contra Costa Landfill, Inc. and West Contra Costa Sanitary Landfill, Inc.
13. Closed West Winton Landfill	2012, 2017	R2-2012-0028 (Provision C.8)	City of Hayward and Waste Management of Alameda County, Inc.
14. Zanker Road Resource Recovery Operation and Landfill	2018	R2-2018-0054 (Provision C.8)	Zanker Road Resource Management, Ltd.
15. Zanker Material Processing Facility	2017	R2-2016-0010 (Provision C.7)	Zanker Road Resource Management, Ltd.
Industrial Facilities			
16. Chevron Chemical Company Pond Site	2015, 2021	R2-2015-0030 (Provision C.6)	Chevron Environmental Management Company

Facility Description	Year(s) Long-Term Flood Protection Report/Plan Submitted	WDRs Order No. (Long-Term Flood Protection Report/Plan Provision No.)	Discharger(s)
17. The Dow Chemical Company Pittsburg Facility	2018	R2-2018-0006 (Provision C.10)	The Dow Chemical Company
18. Ecoservices Martinez Plant	2018	R2-2017-0011 (Provision C.7)	Eco Services Operations Corporation
19. Martinez Refinery/ (formerly Shell Martinez Refinery)	2014, 2019	R2-2013-0034 (Provision C.8)	Martinez Refining Company, LLC (formerly Shell Oil Products, and Equilon Enterprises LLC)
20. Phillips 66 San Francisco Refinery	2016, 2021	R2-2015-0046 (Provision C.5)	Phillips 66 Company
21. Valero Benicia Refinery	2014, 2019	R2-2013-0033 (Provision C.7)	Valero Refining Company – California

Table 2. List of WDRs Without Existing Long-Term Flood Protection Requirements Amended by this Order

Facility Description	WDRs Order No. (Provision No. to be added for Long-Term Flood Protection Plan requirements)†	Discharger(s)
Landfills		
1. Half Moon Bay Landfill	R2-1997-0048 (Provision C.10)	County of San Mateo
2. Galbraith Dredged Sediment Disposal Site	R2-1994-0131 (Provision C.9)	Port of Oakland
3. Pescadero Landfill (older portion only)	R2-2006-0083 (Provision C.5)	County of San Mateo
4. Potrero Hills Landfill	R2-2011-0032 (Provision C.9)	Potrero Hills Landfill, Inc.
Industrial Facilities		
5. Chevron Richmond Refinery*	R2-2011-0036 (Provision 12)	Chevron Environmental Management Company

Facility Description	WDRs Order No. (Provision No. to be added for Long-Term Flood Protection Plan requirements)†	Discharger(s)
6. Former Napa Pipe, Site 1 Waste Management Unit	R2-2005-0012 (Provision C.6)	Napa Redevelopment Partners, LLC

* Chevron voluntarily submitted Long-Term Flood Protection Plans for the Richmond Refinery in 2015 and 2021.

† The subsequent provisions in the respective orders are renumbered accordingly to accommodate the new provisions.

The individual WDRs for the landfills and industrial facilities listed in Table 1 have widely different requirements for flood protection planning and reporting because the available sea level rise predictions and guidance changed significantly between 2009 and 2022. None of the individual WDRs listed in Table 1 require flood protection planning and reporting to address groundwater rise. The individual WDRs listed in Table 2 do not have requirements for flood protection planning and reporting.

This Order would amend the individual WDRs listed in Tables 1 and 2 to make the long-term flood protection planning and reporting requirements, including groundwater rise considerations, consistent among these facilities. This Order would also make the requirements for the listed facilities consistent with the requirements set forth in Order No. R2-2022-0031, which amended the individual WDRs for 16 other Bayfront landfills that did not previously have long-term flood protection planning and reporting requirements.

3. Most of these landfills, WMUs, and surface impoundments were constructed and closed before California Code of Regulations (CCR), title 27 requirements went into effect, and wastes were disposed in direct contact with Bay mud and/or groundwater that is mixed to varying degrees with water from the Bay. Groundwater and leachate are commonly commingled in these types of sites, and as the sea level and groundwater rise, contamination could migrate to other aquifers or to surface waters. Tidal influence from the Bay and ocean may already cause groundwater and leachate levels to fluctuate through the waste mass. Projected climate change-related trends, such as more severe storm events, sea level rise, and shallow groundwater rise are expected to exacerbate this fluctuation, which may contribute to increased leachate production, mobilization of contaminants from the waste mass into leachate and groundwater, and a potential increase in landfill gas generation and/or migration.

4. Flooding risk can also be exacerbated by land subsidence, which is already monitored and accounted for at active landfills through settlement analyses. Landfills, WMUs, and surface impoundments closed prior to title 27 requirements,

and constructed atop highly compressible Bay mud, have likely already experienced substantial land subsidence due to waste settlement and consolidation of Bay mud and artificial fill along the shoreline. Bayfront landfills, WMUs, and surface impoundments, some of which rely on perimeter protection structures from the Bay, will need to consider land subsidence while adaptation planning for future sea level rise.

5. Water Code section 13263 authorizes the Regional Water Board to prescribe waste discharge requirements as to the nature of any existing discharge "with relation to the conditions existing in the disposal area or receiving waters upon, or into which, the discharge is made or proposed" and to review and revise requirements.

   CCR title 27 requires the Regional Water Board to issue WDRs to land disposal sites and authorizes the Regional Water Board to revise these WDRs as necessary to implement title 27 provisions. (CCR, tit. 27, §§ 21720.) Title 27 includes requirements for flood resilience, erosion control, leachate control, and control of infiltration of water into the waste mass. (See e.g., CCR, tit. 27, § 21090.) Title 27 also gives the Regional Water Board broad authority to impose requirements to accommodate regional and site-specific conditions (CCR, tit. 27, § 20080, subd. (a)(1)), such as flood protection due to storm surge, sea level rise, or groundwater rise in the case of the oceanfront and Bayfront facilities listed in Tables 1 and 2.

6. The Ocean Protection Council (OPC), San Francisco Estuary Institute (SFEI), Pathways Climate Institute, and United States Geological Survey (USGS) have developed various guidance documents and tools that are relevant to flood protection planning. The references listed below are based on the most recent climate science on sea level and groundwater rise in the San Francisco Bay Area and are routinely updated.

   a. The 2018 State of California Sea Level Rise Guidance (Sea-Level Rise Guidance), developed by OPC, provides a decision framework for state agencies and local governments to factor climate change and associated impacts into planning decisions. The Sea-Level Rise Guidance summarizes the best available science on sea level rise and encourages agencies to select a sea level rise projection for planning purposes based on multiple factors, such as the location of a facility, its expected lifespan, sea level rise exposure and associated impacts, adaptive capacity, and risk tolerance/aversion. The Sea-Level Rise Guidance is expected to be revised every five years, with the next update scheduled for consideration by OPC's Board for approval in June 2024. Although the Sea-Level Rise Guidance targets state and local entities, the framework can be a useful planning tool for private entities as well.

   b. The San Francisco Bay Shoreline Adaptation Atlas (Adaptation Atlas), prepared by SFEI, is an important science-based tool for developing adaptation strategies for the Bay shoreline as climate change impacts the shoreline. The Adaptation Atlas uses a framework of Operational Landscape Units (OLUs) to identify where it may be possible to use nature-based

approaches, such as beaches, marshes, and subtidal reefs, to create a resilient shoreline with multiple benefits. Nature-based approaches, and hybrid measures that integrate nature with engineered structural approaches, may perform better than traditional engineered infrastructure alone.

c. Pathways Climate Institute and SFEI prepared a report titled Shallow Groundwater Response to Sea-Level Rise: Alameda, Marin, San Francisco, and San Mateo Counties (2022). The report explains the importance of understanding groundwater elevations for more vulnerable coastal communities to develop more comprehensive sea-level rise adaptation strategies. The report also provides maps of existing groundwater conditions and future projections.

d. The Coastal Storm Modeling System (CoSMoS) is a dynamic modeling approach that has been developed by USGS to allow more detailed predictions of coastal flooding due to both future sea-level rise and storms integrated with long-term coastal evolution over large geographic areas. CoSMoS models all the relevant physics of a coastal storm (e.g., tides, waves, and storm surge), which are then scaled down to local flood projections for use in community-level coastal planning and decision-making. Coastal groundwater levels can rise with sea level rise where shallow groundwater floats on underlying seawater. Projections of multiple storm scenarios are provided under a suite of sea-level rise scenarios, allowing users to manage and meet their own planning horizons and specify degrees of risk tolerance. Numerical modeling can also provide insight into coastal areas that may be more or less vulnerable to hazards associated with sea level rise driven groundwater rise and emergence (flooding the ground surface), providing planners with information that can be used to increase public safety, mitigate physical damages, and more effectively manage and allocate resources. The CoSMoS-Groundwater modeling effort seeks to provide initial insight into whether rising seas will intrude into coastal aquifers and raise groundwater table for the entire California coastline, as well as San Francisco Bay.

7. The Regional Water Board has reviewed the existing WDRs for the facilities in Tables 1 and 2 and finds that it is appropriate to revise them through this Order to address potential effects of sea level rise, and other related site-specific vulnerabilities such as groundwater rise due to their waterfront locations as discussed in Findings 2 and 3 above.

8. This Order is a permitting action affecting existing facilities and involving no expansion of use beyond what is already authorized in individual WDRs. It amends these WDRs to require updated flood protection reporting at the existing facilities. This Order is therefore exempt from the provisions of the California Environmental Quality Act in accordance with CCR title 14, section 15301.

9. This Order is consistent with State Water Resources Control Board Resolution 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California). The Order does not allow the degradation of water quality.

10. The Regional Water Board notified the owners and operators of the facilities listed in Tables 1 and 2, agencies and municipalities, and interested persons of its intent to consider adoption of this Order and provided an opportunity to submit written comments.

11. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED, pursuant to the authority in Water Code section 13263, that the Dischargers shall comply with the Regional Water Board orders listed in Tables 1 and 2 as amended by this Order. The changes are shown below in underline for additions. Deletions are not shown because provisions are replaced or added in their entirety.

A. Replace each provision in the corresponding orders listed in the third column of Table 1 in their entirety with the following provision and add the following provision as a new provision to each order in Table 2 in the location identified in the second column of Table 2:

> **Submit a Long-Term Flood Protection Plan**: The Discharger shall submit a long-term flood protection plan acceptable to the Executive Officer. The plan shall identify strategies for the long-term protection of the site from flooding and inundation due to sea level rise, groundwater rise, and extreme climate/weather events. The plan shall:
>
> a. Be prepared by a licensed engineer or geologist and should consider and reference the most current OPC Sea-Level Rise Guidance referenced in Finding 6.a and other science-based climate resources, including but not limited to those references listed in Findings 6.b through 6.d.
>
> b. Be based on providing protection from the estimated 100-year storm event, on top of the 2050 “medium-high” (0.5% probability of exceedance) or “extreme” risk aversion sea level rise scenarios as described in the most recent OPC Sea-Level Rise Guidance. The 100-year storm event shall take into account astronomical tides and storm surge as well as wave run-up, seasonal effects (e.g., El Niño conditions), and discharge from local tributaries (e.g., as modeled by the USGS CoSMoS tool).
>
> c. Describe how vulnerable features and infrastructure (such as landfill caps, monitoring wells, landfill gas wells, flares, levees, etc.), building uses, and public access will be protected from flooding prior to the projected timing of sea level rise, groundwater rise, and extreme storm event impacts (e.g., prior to projected flooding).

d. Propose a phased adaptation strategy that briefly describes the potential future projects that may be necessary to provide for protection from the 2100 “medium-high” or “extreme” sea level rise scenarios as described in the most recent OPC Sea-Level Rise Guidance, as well as potential accompanying changes in groundwater rise and extreme storm events. The strategy shall allow for a range of future actions at different climate change thresholds to address uncertainty and allow for flexibility over the long term.

e. Provide technical justification for the selection of both the 2050 and 2100 sea level rise scenarios.

f. Identify baseline conditions for the site and show at a minimum the following on a map(s): sitewide elevations, vulnerable infrastructure (i.e., waste containment features, wetlands, roads, buildings, remediation systems, piping, wells), existing groundwater levels, the degree of sea level rise, groundwater rise, and/or extreme storm event exposure already noted at the site (if any), sea level elevations at which flooding will impact the site, areas potentially vulnerable to groundwater rise. Data obtained from onsite survey monuments shall be evaluated with respect to land subsidence or settlement and sea level rise risk scenarios.

g. Be updated and submitted every five years with the most recently available and credible information and climate change adaptation guidance at the time of the update, including observed changes in sea levels, groundwater levels, and flooding measured at or as near as possible to the site (e.g., from local tide gauges and monitoring wells), and any observed or potential changes in the adaptive capacity and risk tolerance of vulnerable infrastructure, including an implementation schedule with key milestones that have been or will be met in the future.

When preparing and implementing adaptive management plans, the Discharger shall take into consideration how rising shallow groundwater and any associated flooding may affect long-term cap stability, increase in leachate amounts, leachate and landfill gas migration, contaminant mobility, and post-closure monitoring and maintenance goals at the site (where applicable). Groundwater monitoring data from the site should be used for the most accurate water level onsite; however, if groundwater wells are not present at the site, databases such as GeoTracker can be used to access water table elevations nearby, using USGS, California Department of Water Resources, or other nearby cleanup site well observations.

COMPLIANCE DATE: The Long-Term Flood Protection Plan shall be submitted by November 30, 2024, and shall be updated and submitted every 5 years thereafter

I, Eileen White, Executive Officer, do certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 14, 2024.

Eileen M. White

Eileen M. White, P.E. Executive Officer

Attachments:
Figure 1 - Location of landfills and industrial facilities listed in Table 1
Figure 2 - Location of landfills and industrial facilities listed in Table 2

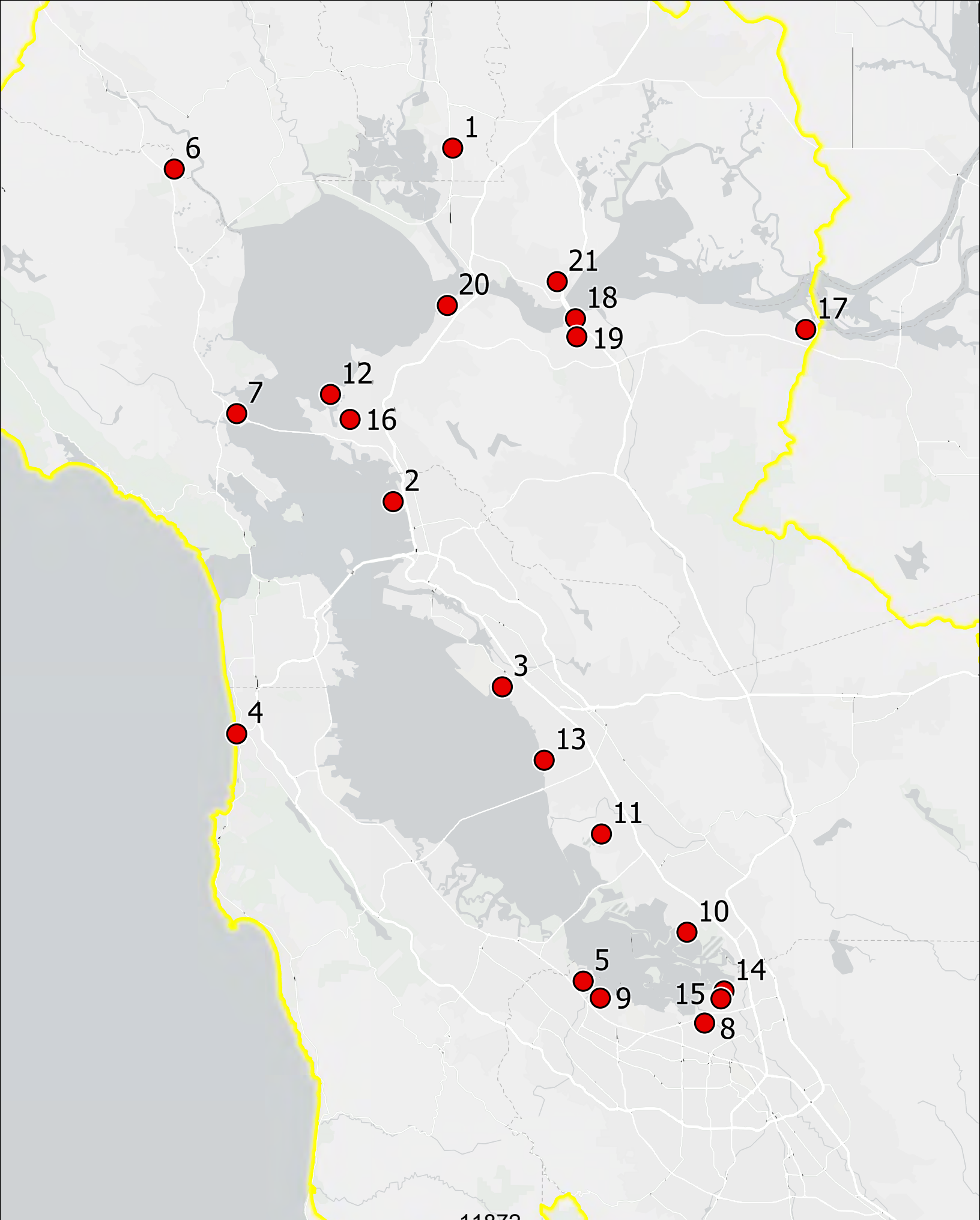

Figure 1 - Location of landfills and industrial facilities listed in Table 1

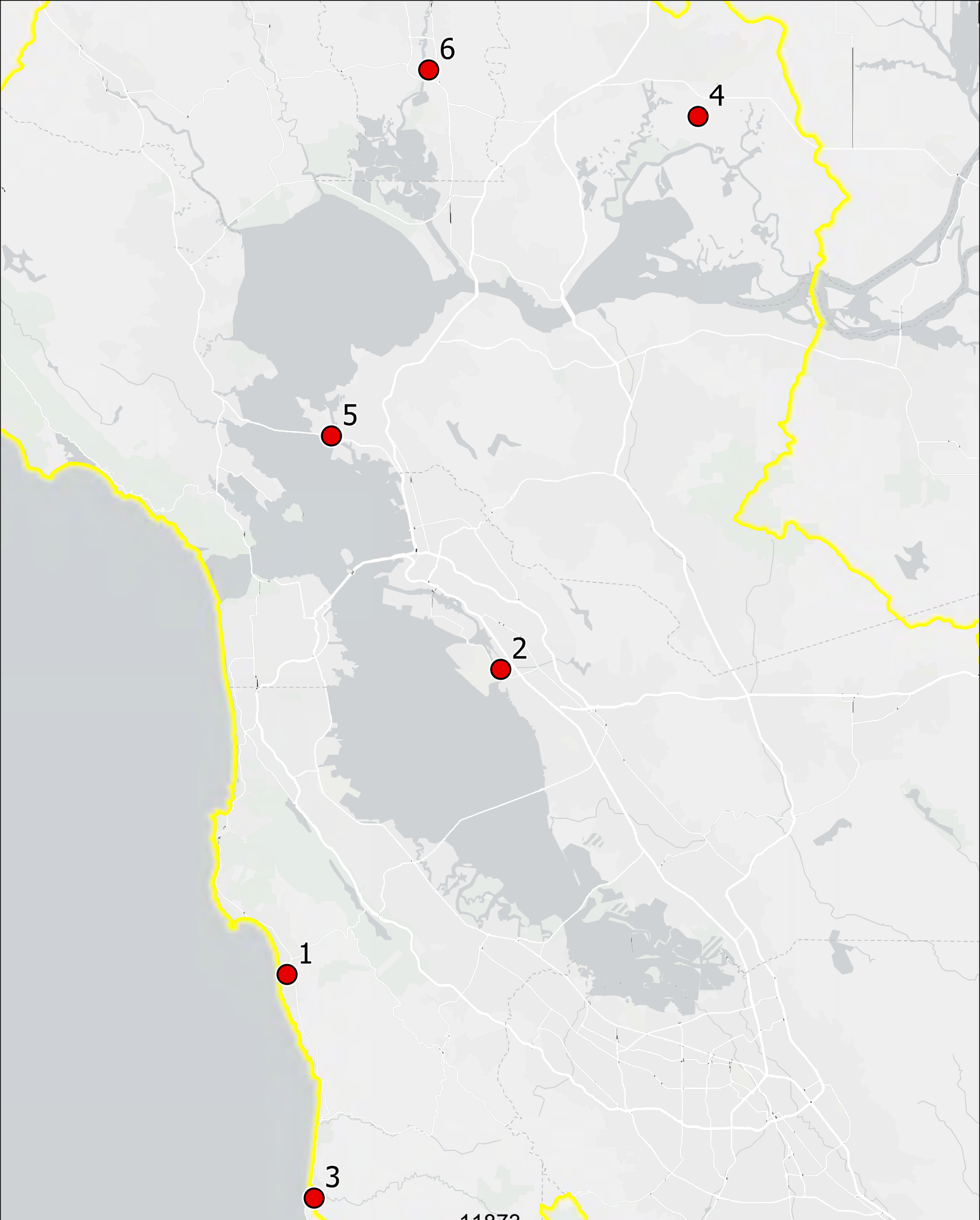

Figure 2 - Location of landfills and industrial facilities listed in Table 2

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On July 18, 2025, I served the:

- **Current Mailing List dated July 11, 2025**
- **Water Boards' Comments on the Test Claim filed July 15, 2025**

  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07
  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-018, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.ii(4), C.3.b.ii(5), C.3.j.ii(1)(a)-(g), C.3.j.ii(4), C.3.j.ii(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b, C.21.b, issued May 11, 2022, effective July 1, 2022
  Union City, Claimant

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on July 18, 2025 at Sacramento, California.

David Chavez
Commission on State Mandates
980 Ninth Street, Suite 300
Sacramento, CA 95814
(916) 323-3562

COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 7/11/25

Claim Number: 22-TC-07

Matter: California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018

Claimant: Union City

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

Each commission mailing list is continuously updated as requests are received to include or remove any party or person on the mailing list. A current mailing list is provided with commission correspondence, and a copy of the current mailing list is available upon request at any time. Except as provided otherwise by commission rule, when a party or interested party files any written material with the commission concerning a claim, it shall simultaneously serve a copy of the written material on the parties and interested parties to the claim identified on the mailing list provided by the commission. (Cal. Code Regs., tit. 2, § 1181.3.)

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Gavin Newsom ▪ Governor

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Exhibit C

Commission on State Mandates
Filed Date
07/21/2025

LATE FILING

July 18, 2025

Juliana Gmur
Executive Director
Commission on State Mandates
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California Regional Water Quality Control Board, San Francisco Bay Region, 22-TC-07
Order No. R2-2022-0018, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.ii(4), C.3.b.ii(5), C.3.j.ii(1)(a)- (g), C.3.j.ii(4), C.3.j.ii(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b, C.21.b, issued May 11, 2022, effective July 1, 2022, Union City, Claimant

San Francisco Bay Regional Water Quality Control Board and State Water Resources Control Board Comments on Test Claim

Dear Director Gmur:

The Department of Finance (Finance) has noted the comments on the Test Claim 22-TC-07 that were submitted by the San Francisco Bay Regional Water Quality Control Board (San Francisco Bay Water Board) and the State Water Resources Control Board (State Water Board) (together, Water Boards). Finance is submitting this letter to express its concurrence with the Water Boards comments.

If you have any questions regarding this letter, please contact Donna Ferebee, Senior Staff Counsel at (916) 628-4894 or Marilyn Munoz, Senior Staff Counsel at (916) 628-6028.

Sincerely,

Marilyn Munoz

MARILYN MUNOZ
Senior Staff Counsel

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On July 21, 2025, I served the:

- **Current Mailing List dated July 11, 2025**
- **Finance's Late Comments on the Test Claim filed July 21, 2025**

  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07
  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-018, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.ii(4), C.3.b.ii(5), C.3.j.ii(1)(a)-(g), C.3.j.ii(4), C.3.j.ii(2)(a)-(j), C.5.f, C.8.d, C.8.e, C.8.f, C.10.a.i, C.10.a.ii, C.10.e, C.11.c, C.12.a, C.12.c, C.15.b.iii, C.17.a, C.20.b, C.21.b, issued May 11, 2022, effective July 1, 2022
  Union City, Claimant

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on July 21, 2025 at Sacramento, California.

David Chavez
Commission on State Mandates
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(916) 323-3562

COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 7/11/25

Claim Number: 22-TC-07

Matter: California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018

Claimant: Union City

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

Each commission mailing list is continuously updated as requests are received to include or remove any party or person on the mailing list. A current mailing list is provided with commission correspondence, and a copy of the current mailing list is available upon request at any time. Except as provided otherwise by commission rule, when a party or interested party files any written material with the commission concerning a claim, it shall simultaneously serve a copy of the written material on the parties and interested parties to the claim identified on the mailing list provided by the commission. (Cal. Code Regs., tit. 2, § 1181.3.)

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Exhibit D

STATE of CALIFORNIA
COMMISSION ON STATE MANDATES

June 29, 2026

Mr. Chris Hill
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Mr. Gegory Newmark
Duane Morris, LLP
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Los Angeles, CA 90017-5450

And Parties, Interested Parties, and Interested Persons (See Mailing List)

Re: Draft Proposed Decision, Schedule for Comments, and Notice of Hearing
California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022
Union City, Claimant

Dear Mr. Hill and Mr. Newmark:

The Draft Proposed Decision for the above-captioned matter is enclosed for your review and comment.

Written Comments: Written comments may be filed on the Draft Proposed Decision **by July 20, 2026**. Please note that all representations of fact submitted to the Commission must be signed under penalty of perjury by persons who are authorized and competent to do so and must be based upon the declarant's personal knowledge, information, or belief. (Cal. Code Regs., tit. 2, § 1187.5.) Hearsay evidence may be used for the purpose of supplementing or explaining other evidence but shall not be sufficient in itself to support a finding unless it would be admissible over an objection in civil actions. (Cal. Code Regs., tit. 2, § 1187.5.) The Commission's ultimate findings of fact must be supported by substantial evidence in the record.[1]

You are advised that comments filed with the Commission are required to be electronically filed (e-filed) in an unlocked legible and searchable PDF file, using the Commission's Dropbox. (Cal. Code Regs., tit. 2, § 1181.3(f).) Refer to https://www.csm.ca.gov/dropbox.shtml on the Commission's website for electronic filing instructions. If e-filing would cause the filer undue hardship or significant prejudice, filing may occur by first class mail, overnight delivery or personal service only upon approval of a request to the executive director. (Cal. Code Regs., tit. 2, § 1181.3(j).)

If you would like to request an extension of time to file comments, please refer to section 1187.9(a) of the Commission's regulations.

[1] Government Code section 17559(b), which provides that a claimant or the state may commence a proceeding in accordance with the provisions of section 1094.5 of the Code of Civil Procedure to set aside a decision of the Commission on the ground that the Commission's decision is not supported by substantial evidence in the record.

Hearing: This matter is set for hearing on **Friday, December 4, 2026** at 10:00 a.m. The Proposed Decision will be issued on or about November 20, 2026.

If you plan to address the Commission on this item, please notify the Commission Office not later than noon on the Tuesday prior to the hearing, **December 1, 2026**. Please also include the names of the people who will be speaking for inclusion on the witness list and the names and emails addresses of the people who will be speaking both in person and remotely to receive a hearing panelist link in Zoom. When calling or emailing, please identify the item you want to testify on and the entity you represent. The Commission Chairperson reserves the right to impose time limits on presentations as may be necessary to complete the agenda.

If you would like to request postponement of the hearing, please refer to section 1187.9(b) of the Commission's regulations.

Very truly yours,

Juliana F. Gmur
Executive Director

Hearing Date: December 4, 2026

ITEM ___

TEST CLAIM

DRAFT PROPOSED DECISION

California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, *as modified by Order No. R2-2023-0019,* NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022

22-TC-07

Union City, Claimant

EXECUTIVE SUMMARY

Overview

This Test Claim alleges reimbursable state mandated activities arising from Order R2-2022-0018, "effective July 1, 2022, and amended in October 2023 by Order No. R2-2023-0019."[1] The claimant states, however, "None of the provisions of the MRP3 at issue in this Test Claim are affected by the October 2023 modifications."[2] The claimant has not requested reimbursement for any activities or requirements imposed by Order R2-2023-0019 and, thus, this Decision does not address the substantive requirements in Order R2-2023-0019.

The claimants have pled the following provisions from Order R2-2022-0018, alleging these provisions impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution:

- Provisions C.3.b.i., C.3.b.ii.4., and C.3.b.ii.5. - Implementation of low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for public and private new or widening road projects and road reconstruction projects of 5,000 square feet or more as required Provisions C.3.b.ii.4. and 5.[3] Provisions C.3.b.ii.4. and C.3.b.ii.5. identify the types of road projects and reconstruction projects that are subject to

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[1] Exhibit A, Test Claim, page 11.

[2] Exhibit A, Test Claim, page 11, footnote 1.

[3] Exhibit A, Test Claim, pages 24-25.

the requirements of Provision C.3.b.i., which imposes the LID source control, site design, and stormwater treatment requirements.[4]

- Provisions C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., and C.3.j.ii.4., which require the permittees to "update" their Green Infrastructure Plans developed under the prior permit[5] to ensure that municipal processes and ordinances allow and encourage green infrastructure; to retrofit projects that are not already defined as regulated projects with green infrastructure so that the impervious surface retrofits listed in Table H-1 of Attachment H are achieved; and to authorize the permittees, together with Water Board staff and science experts, to collectively form a Technical Working Group to discuss long term green infrastructure goals and recommend long term percentage reductions in permittees' impervious surfaces at individual, countywide, and regional scales.[6]
- Provision C.8.d., which requires the permittees to develop and implement LID monitoring plans to investigate pollutant removal benefits, hydrologic performance, and changes over time, and to form a Technical Advisory Group, which includes Water Board staff and science advisors, to review and make recommendations regarding the LID monitoring plans.[7]
- Provision C.5.f., which requires the permittees to develop a plan and schedule for updating the permittee's storm sewer system information and maps and include the plan and schedule in the 2026 Annual Report, make the current MS4 map available to the public, and reporting.[8]
- Provisions C.8.e.ii.1., C.8.e.ii.2., C.10.a.i., C.10.a.ii., and C.10.e., which address trash reduction requirements, including maps, retrofit requirements with full trash capture systems, trash monitoring, monitoring runoff from MS4 outfalls in low trash generation areas, and provide authority to submit a report identifying conditions under which it is impracticable to control trash with full trash capture systems.[9]
- Provision C.8.f. which requires pollutants of concern monitoring.[10]

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[4] Exhibit A, Test Claim, pages 24-25, 562-563, 568-570 (test claim permit, Provisions C.3.b.i., C.3.b.ii.4., and C.3.b.ii.5.).

[5] Exhibit A, Test Claim, page 1576 (Order R2-2015-0049, Provision C.3.j.).

[6] Exhibit A, Test Claim, pages 25-26, 605-610 (test claim permit, Provisions C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., and C.3.j.ii.4.).

[7] Exhibit A, Test Claim, pages 27, 643-647 (test claim permit, Provision C.8.d.).

[8] Exhibit A, Test Claim, pages 27, 629-630 (test claim permit, Provision C.5.f.).

[9] Exhibit A, Test Claim, pages 28-31, 651, 680-682, 689 (test claim permit, Provisions C.8.e.ii.1., C.8.e.ii.2., C.10.a.i., C.10.a.ii., and C.10.e.).

[10] Exhibit A, Test Claim, pages 29, 655-671 (test claim permit, Provision C.8.f.).

- Provision C.12.a., which requires the permittees to assess PCBs load reductions from stormwater in accordance with a previously adopted TMDL, including requirements to implement an assessment methodology and data collection program to quantify reductions and reporting.[11]
- Provisions C.11.c. and C.12.c., which require plans, schedules, and implementation of control measures for the reduction of mercury and PCBs in old industrial areas to achieve load reductions in accordance with the TMDLs.[12]
- Provision C.15.b.iii., which addresses non-stormwater emergency firefighting discharges and requires the permittees to convene a regionwide working group to identify and evaluate opportunities to reduce the adverse impacts of these discharges to the MS4, submit a Firefighting Discharges Report by September 30, 2025, implement the plan and BMPs proposed in the report, and submit reports to the Regional Board.[13]
- Provision C.17.a., which requires the permittees to collectively develop a report to be submitted to the Executive Officer with the 2023 Annual Report that identifies effective practices to address non-stormwater discharges associated with homelessness and specific milestones for reducing such discharges, submit a map of the locations of unsheltered homeless populations in relation to storm drain inlets and existing receiving waters with the 2023 Annual Report; submit an updated map with the 2025 Annual Report; implement BMPs to reduce the discharges associated with homelessness and assess the effectiveness of those BMPs.[14]
- Provision C.20.b., which requires the permittees to develop a cost reporting framework and methodology to perform the annual fiscal analysis required in Provision C.20.a.[15]
- Provision C.21.b., which requires the permittees to develop and implement an Asset Management Plan to ensure the satisfactory condition of hard assets, defined as "structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash

[11] Exhibit A, Test Claim, pages 33, 704-705 (test claim permit, Provision C.12.a.).

[12] Exhibit A, Test Claim, pages 32, 698-700, 707-708 (test claim permit, Provisions C.11.c., C.12.c.).

[13] Exhibit A, Test Claim, pages 33, 748-752 (test claim permit, Provision C.15.b.iii.).

[14] Exhibit A, Test Claim, pages 34, 757-759 (test claim permit, Provision C.17.a.).

[15] Exhibit A, Test Claim, pages 34-35, 777-778 (test claim permit, Provision C.20.a.).

receptacles, and pet waste stations"[16] and to complete a Climate Change Adaptation Report.[17]

For the reasons stated herein, staff recommends that the Commission on State Mandates (Commission) deny this Test Claim.

Commission Responsibilities

Under article XIII B, section 6 of the California Constitution, local agencies and school districts are entitled to reimbursement for the costs of state-mandated new programs or higher levels of service. In order for local government to be eligible for reimbursement, one or more similarly situated local agencies or school districts must file a test claim with the Commission. "Test claim" means the first claim filed with the Commission alleging that a particular statue or executive order imposes costs mandated by the state. Test claims function similarly to class actions and all members of the class have the opportunity to participate in the test claim process and all are bound by the final decision of the Commission for purposes of that test claim.

The Commission is the quasi-judicial body vested with exclusive authority to adjudicate disputes over the existence of state-mandated programs within the meaning of article XIII B, section 6 of the California Constitution and not apply it as an "equitable remedy to cure the perceived unfairness resulting from political decisions on funding priorities."[18]

Claims

The following chart provides a brief summary of the claims and issues raised and staff's recommendation.

Issue	Description	Staff Recommendation
Was the Test Claim timely filed?	Government Code section 17551 provides local government test claims shall be filed "not later than 12 months following the effective date of a statute or executive order or within 12 months of incurring increased costs as a result	*Yes, the Test Claim was timely filed*. Because the Test Claim was filed June 30, 2023 (fiscal year 2022-2023), the potential period of reimbursement under Government Code section 17557 begins on July 1, 2021 (fiscal year 2021-2022). However, since the test claim permit

[16] Exhibit A, Test Claim, page 779, footnote 67.

[17] Exhibit A, Test Claim, pages 35-36, 779-780 (test claim permit, Provision C.21.b.).

[18] *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1264, 1281, citing *City of San Jose v. State of California* (1996) 45 Cal.App.4th 1802, 1817.

Issue	Description	Staff Recommendation
	of a statute or executive order, whichever is later."[19] The test claim permit was adopted by the Regional Board on May 11, 2022, and became effective on July 1, 2022.[20] Government Code section 17557(e) requires a test claim to be "submitted on or before June 30 following a fiscal year in order to establish eligibility for reimbursement for that fiscal year."	(R2-2022-0018) has a later effective date, the potential period of reimbursement for this claim begins on the permit's effective date, or July 1, 2022.
Do the Provisions pled by the claimant impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution.	The purpose of article XIII B, section 6 is to prevent the state from forcing extra programs on local government each year in a manner that negates their careful budgeting of increased expenditures counted against the local government's annual spending limit and, thus, article XIII B, section 6 requires a showing that the test claim statute or executive order mandates *new* activities and associated costs compared	*No, there are no costs mandated by the state.* The test claim permit imposes some new requirements, when compared to prior law. However, since the period of reimbursement for this Test Claim begins July 1, 2022, the permittees have the legal authority during the entire period of reimbursement to impose property-related stormwater fees and regulatory fees[22] sufficient as a matter of law

[19] Government Code section 17551(c) (Stats. 2007, ch. 329).

[20] Exhibit A, Test Claim, page 784 (test claim permit).

[22] California Constitution, article XI, section 7; Health and Safety Code section 5471 (fees for storm drainage maintenance and operation); Government Code sections 38902 (providing for sewer standby charges); 53750 et seq. (Proposition 218 Omnibus Implementation Act, describing procedures for adoption of assessments, fees and charges); 53751 (as amended in 2017, providing that fees for sewer services includes storm sewers).

Issue	Description	Staff Recommendation
	to prior law, forcing them to spend their local proceeds of taxes.[21]	to cover the costs of all the requirements pled in this Test Claim including the new requirements identified herein pursuant to Government Code section 17556(d), and therefore there are no costs mandated by the state.[23] Since reimbursement is required only when all mandate elements are satisfied, including costs mandated by the state,[24] there are no findings on whether the *new* requirements mandate a new program or higher level of service.

Staff Analysis

The purpose of article XIII B, section 6 is to prevent the state from forcing extra programs on local government each year in a manner that negates their careful budgeting of increased expenditures counted against the local government's annual spending limit and, thus, article XIII B, section 6 requires a showing that the test claim

[21] California Constitution, articles XIII B, sections 1, 8(a) and (b); *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56; *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830, 835; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1564, 1595; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1264, 1283; *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 763; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487 (Reimbursement is required only when "the costs in question can be recovered solely from tax revenues).

[23] Government Code sections 17556(d), 53750, 53751; *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195; *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 562-565; and *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 583-586.

[24] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874-875, 878; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1265, 1284; Government Code sections 17514 and 17556.

statute or executive order mandates *new* activities and associated costs compared to prior law, forcing them to spend their local proceeds of taxes.[25]

The Commission finds the test claim permit imposes the following new requirements on the permittees when compared to prior law.

Provision C.8.d., LID Monitoring:

- At the regional or countywide level, develop LID monitoring plans as specified.[26]
- Form a Technical Advisory Group, which includes Water Board staff and science advisors, to review and make recommendations regarding the LID monitoring plans before submission to the Executive Officer. Draft monitoring plans shall be submitted to the advisory group by March 1, 2023. Prior to the Executive Officer's approval or conditional approval of the LID monitoring plans, the advisory group shall be convened at least biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation.[27]
- Submit the LID monitoring plan for Executive Officer approval by May 1, 2023.[28]

Provision C.5.f., MS4 Maps:

- Develop a plan and schedule for updating the Permittee's storm sewer system information, and submitting the plan and schedule with the 2026 Annual Report. Permittees or countywide stormwater programs may work together or with the Oakland Museum of California to develop a plan and schedule for updating existing information, maps, drawings, and databases. The plan will consider the potential to identify storm sewer system component locations, size or specifications, materials of construction, and condition.[29]

Provision C.10.a.ii., trash:

- With the 2024 Annual Report, submit a revised Trash Generation Area Map that includes trash management areas, as well as private land drainage areas (See

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[25] California Constitution, articles XIII B, sections 1, 8(a) and (b); *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56; *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830, 835; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1564, 1595; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1264, 1283; *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 763; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487 (Reimbursement is required only when "the costs in question can be recovered solely from tax revenues).

[26] Exhibit A, Test Claim, pages 643-644.

[27] Exhibit A, Test Claim, page 645.

[28] Exhibit A, Test Claim, page 645.

[29] Exhibit A, Test Claim, pages 629-630.

Provision C.10.a.ii.b.) that will be retrofitted with full trash capture devices, or equivalent, by June 30, 2025. The updated trash generation map(s) shall include GIS layers and appropriate metadata (including tables etc.) that identify locations and associated drainage areas of full trash capture systems, and other trash control actions, and shall highlight any revisions or changes from the previous map(s).[30]

Provision C.11.c.iii.1. and C.12.c.iii.1., control measures for the reduction of mercury and PCBs in old industrial areas:

- By March 31, 2023, permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address mercury and PCB load reduction requirements. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

Provision C.15.b.iii., non-stormwater emergency firefighting discharges:

- Collectively convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff and other stakeholders to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activity.[31]
- The Working Group shall:
  a. Prior to the submittal of the Firefighting Discharges Report, convene the Working Group at least twice per year. Thereafter, convene the Working Group at least annually.
  b. Assess the adequacy of existing BMPs and standard operating procedures (SOPs) to address the potential adverse water quality impacts of firefighting water and foam discharged during emergencies (e.g., containment and cleanup), including coordination within and between municipal departments, districts and jurisdictions, coordination between firefighting personnel and containment and cleanup crews, coordination with contracted staff, and coordination with relevant agencies (e.g., CalFire), as appropriate. If the existing BMPs and SOPs need updates or are otherwise inadequate, suggest changes to those BMPs and SOPs so that they are updated and adequate. If new BMPs and SOPs are needed, recommend model BMPs and SOPs.
  c. Assess the adequacy of existing resources (e.g., MS4 maps and maps that identify environmentally sensitive areas) used to determine if and how firefighting water and foam discharged during emergencies will impact

[30] Exhibit A, Test Claim, page 681 (test claim permit, Provision C.10.a.ii.).

[31] Exhibit A, Test Claim, pages 748-749.

receiving waters, in order to address pollutant discharges (e.g., by facilitating containment and cleanup).

d. Investigate which firefighting foams are the least environmentally harmful (i.e., have the least adverse water quality and beneficial use effects, including those related to biodegradation, biomagnification, bioaccumulation, and acute and chronic toxicity), both for Class A foams and Class B foams. Then, develop SOPs to use the least environmentally harmful firefighting foams (and dispose of the more environmentally harmful foams) and to reduce the use of firefighting foams, without jeopardizing the protection of life or property, during emergencies.

e. Prepare outreach materials on containment and cleanup BMPs and SOPs for contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities within their jurisdictions. Additionally, prepare outreach materials – regarding good housekeeping practices and preventive measures – for sites that are prone to firefighting emergencies. Distribute those outreach materials to all such contractors and sites by September 30, 2025. Subsequently, if it is identified that the outreach materials need to be revised or updated, they shall be revised or updated, and then redistributed.

f. Pursue coordination, information sharing, feedback and Working Group participation, from relevant agencies and organizations such as the California Department of Forestry and Fire Protection (Cal Fire), the California Department of Toxic Substances Control (DTSC), the U.S. Forest Service (USFS), the State and Regional Water Boards, permittees of other NPDES municipal stormwater permits, other state and federal agencies, and external workgroups (such as Petro-Chemical Mutual Aid), regarding interagency coordination and communication, BMPs, SOPs, and the least environmentally harmful firefighting foams.

g. Discuss reporting on emergency discharges of firefighting water and foam. The purpose of this reporting is first to provide transparency about the usage and water quality impacts of firefighting water and foam, and second to track reductions in those impacts over time, which is an anticipated outcome of the implementation of Provision C.15.b.iii. This shall include discussion of the timing of such reporting, and how that reporting will be submitted to the Water Board. This shall additionally include discussion of how reporting is triggered (e.g., if a certain level of discharge enters the MS4 system, if any level of discharge enters a receiving water, and if any level of PFAS foam is used pursuant the exemptions in SB 1044), as well as the content of the reporting (e.g., the date and time of the discharge, Material Safety Data Sheet (MSDS) and any supplemental information for that foam, the quantity of water and foam concentrate used, the quantity and rate of water and foam concentrate

discharged to the MS4 and/or receiving water, the point of discharge to the MS4 and/or receiving water, and impacts).[32]

- Collectively submit a Firefighting Discharges Report by September 30, 2025, that describes progress on, and recommendations regarding, the implementation of the items listed above. The Firefighting Discharges Report shall be updated as needed on an ongoing basis, to incorporate recommendations by the Working Group.[33]

Provision C.17.a., discharges associated with unsheltered homeless populations:

- To encourage ongoing regional, countywide, and municipal coordination efforts, collectively develop a best management practice report to be submitted to the Executive Officer with the 2023 Annual Report that identifies effective practices to address non-stormwater discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges within a given timeframe. The report shall:
  a. Describe practices that may be implemented by permittees, including to address discharges associated with homelessness that are impacting water quality;
  b. Identify regional and countywide efforts and implementation actions to address discharges associated with homelessness (including how those efforts and actions have been affected by unsheltered homeless population growth). Include recommendations for engaging in these efforts and incorporating discharge-reduction strategies that also help meet the unsheltered population's clean water needs; and
  c. Identify actions taken during the COVID-19 pandemic to reduce the spread of the virus in homeless populations, such as temporarily housing homeless people in hotels, that may have reduced discharges associated with homelessness. Permittees shall consider the practicability of such actions for longer-term implementation.[34]
- With the 2023 Annual Report, submit a map identifying, within each permittee's jurisdiction, the approximate location(s) of unsheltered homeless populations, including homeless encampments and other areas where other unsheltered homeless people live. The map shall identify those location(s) in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface water bodies within the Permittee's jurisdiction. The map shall be updated once during the Permit term and submitted with the 2025 Annual Report. Where Permittees are working collaboratively to address discharges associated with

[32] Exhibit A, Test Claim, pages 749-751.

[33] Exhibit A, Test Claim, page 751.

[34] Exhibit A, Test Claim, pages 757-758.

homelessness, they may collaborate to submit a joint map that covers their respective jurisdictions.[35]

C.20.b., cost reporting framework and methodology:

- Develop a cost reporting framework and methodology to perform the fiscal analysis to be submitted to the Executive Office by June 30, 2023. "Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with this Order's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time."[36]

C.21.b., asset management:

- Develop an Asset Management Plan by June 30, 2025, to ensure the satisfactory condition of hard assets.[37]
- Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of permittees' inventoried hard assets over the next 50 years, and identify approaches that permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale.[38]

The remaining requirements imposed by the test claim permit are either not new or do not mandate a new program or higher level of service.

Although there are new requirements imposed by the test claim permit, there are no costs mandated by the state for any of the requirements alleged to impose a reimbursable state-mandated program. The period of reimbursement for this Test Claim begins July 1, 2022, the permit's effective date[39] and, as more fully explained herein, the permittees have the legal authority during the entire period of reimbursement to impose property-related stormwater fees and regulatory fees[40] sufficient as a matter

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[35] Exhibit A, Test Claim, pages 758, 759.

[36] Exhibit A, Test Claim, pages 777-778.

[37] Exhibit A, Test Claim, pages 779-780.

[38] Exhibit A, Test Claim, page 780.

[39] Exhibit A, Test Claim, page 784.

[40] California Constitution, article XI, section 7; Health and Safety Code section 5471 (fees for storm drainage maintenance and operation); Government Code sections 38902 (providing for sewer standby charges); 53750 et seq. (Proposition 218 Omnibus

of law to cover the costs of all the requirements pled in this Test Claim including the new requirements identified above pursuant to Government Code section 17556(d), and therefore there are no costs mandated by the state.[41] Since reimbursement is required only when all mandate elements are satisfied, including costs mandated by the state,[42] there are no findings on whether the *new* requirements mandate a new program or higher level of service.

Conclusion

Based on the forgoing analysis, staff finds that the test claim permit does not impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution and denies this Test Claim.

Staff Recommendation

Staff recommends that the Commission adopt the Proposed Decision to deny the Test Claim and authorize staff to make any technical, non-substantive changes to the Proposed Decision following the hearing.

Implementation Act, describing procedures for adoption of assessments, fees and charges); 53751 (as amended in 2017, providing that fees for sewer services includes storm sewers).

[41] Government Code sections 17556(d), 53750, 53751; *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195; *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 562-565; and *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 583-586.

[42] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874-875, 878; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1265, 1284; Government Code sections 17514 and 17556.

BEFORE THE

COMMISSION ON STATE MANDATES

STATE OF CALIFORNIA

IN RE TEST CLAIM	Case No.: 22-TC-07
California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, as modified by Order No. R2-2023-0019, NPDES Permit No. CAS612008 Provisions C.3.b.i.,[43] C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022 Filed on June 30, 2023 Union City, Claimant	*California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018* DECISION PURSUANT TO GOVERNMENT CODE SECTION 17500 ET SEQ.; CALIFORNIA CODE OF REGULATIONS, TITLE 2, DIVISION 2, CHAPTER 2.5, ARTICLE 7. (*Adopted December 4, 2026*)

DECISION

The Commission on State Mandates (Commission) heard and decided this Test Claim during a regularly scheduled hearing on December 4, 2026. [Witness list will be included in the adopted Decision.]

The law applicable to the Commission's determination of a reimbursable state-mandated program is article XIII B, section 6 of the California Constitution, Government Code sections 17500 et seq., and related case law.

The Commission [adopted/modified] the Proposed Decision to [approve/partially approve/deny] the Test Claim by a vote of [vote will be included in the adopted Decision], as follows:

Member	**Vote**
Lee Adams, County Supervisor	

[43] As explained herein, Provision C.3.b.i. was not expressly identified as a Provision number in the Test Claim pleading. However, the Test Claim narrative and declarations identify the requirements in Provision C.3.b.i. as they relate to the road projects and reconstruction projects in Provisions C.3.b.ii.4. and 5. and the costs associated with those requirements. (Exhibit A, Test Claim, pages 24, 46.) Therefore, this Decision addresses Provision C.3.b.i.

Member	Vote
Deborah Gallegos, Representative of the State Controller	
Karen Greene Ross, Public Member	
William Pahland, Representative of the State Treasurer, Vice Chairperson	
Michele Perrault, Representative of the Director of the Department of Finance, Chairperson	
Alexander Powell, Representative of the Director of the Governor's Office of Land Use and Climate Innovation	

Summary of the Findings

This Test Claim alleges reimbursable state mandated activities arising from Order R2-2022-0018, "effective July 1, 2022, and amended in October 2023 by Order No. R2-2023-0019."[44] Permit amendment R2-2023-0019 added Provision C.3.c.i.2.c.iii. to the permit regarding Alternative Treatment Systems, and amended Provision C.3.e.ii.5., regarding Special Project Criteria (Affordable Housing) and the reporting requirements in Provision C.3.e.v.3.f.[45] The claimant states, however, "None of the provisions of the MRP3 at issue in this Test Claim are affected by the October 2023 modifications."[46] The claimant has not requested reimbursement for any activities or requirements imposed by Order R2-2023-0019 and, thus, this Decision does not address the substantive requirements in Order R2-2023-0019.

The claimants have pled the following provisions from Order R2-2022-0018, alleging these provisions impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution:

- Provisions C.3.b.i., C.3.b.ii.4, and C.3.b.ii.5 - Implementation of low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for public and private new or widening road projects and road reconstruction projects of 5,000 square feet or more as required Provisions C.3.b.ii.4. and 5.[47] Provisions C.3.b.ii.4. and C.3.b.ii.5. identify the types of road projects and reconstruction projects that are subject to the requirements of Provision C.3.b.i., which imposes the LID source control, site design, and stormwater treatment requirements.[48]

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[44] Exhibit A, Test Claim, page 11.

[45] Exhibit X (4), Order R2-2023-0019.

[46] Exhibit A, Test Claim, page 11, footnote 1.

[47] Exhibit A, Test Claim, pages 24-25.

[48] Exhibit A, Test Claim, pages 562-563, 568-570 (test claim permit, Provisions C.3.b.i., C.3.b.ii.4, and C.3.b.ii.5.).

- Provisions C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., and C.3.j.ii.4., which require the permittees to "update" their Green Infrastructure Plans developed under the prior permit[49] to ensure that municipal processes and ordinances allow and encourage green infrastructure; to retrofit projects that are not already defined as regulated projects with green infrastructure so that the impervious surface retrofits listed in Table H-1 of Attachment H are achieved; and to authorize the permittees, together with Water Board staff and science experts, to collectively form a Technical Working Group to discuss long term green infrastructure goals and recommend long term percentage reductions in permittees' impervious surfaces at individual, countywide, and regional scales.[50]
- Provision C.8.d., which requires the permittees to develop and implement LID monitoring plans to investigate pollutant removal benefits, hydrologic performance, and changes over time, and to form a Technical Advisory Group, which includes Water Board staff and science advisors, to review and make recommendations regarding the LID monitoring plans.[51]
- Provision C.5.f., which requires the permittees to develop a plan and schedule for updating the permittee's storm sewer system information and maps and include the plan and schedule in the 2026 Annual Report, make the current MS4 map available to the public, and reporting.[52]
- Provisions C.8.e.ii..1., C.8.e.ii.2., C.10.a.i, C.10.a.ii., and C.10.e. , which address trash reduction requirements, including maps, retrofit requirements with full trash capture systems, trash monitoring, monitoring runoff from MS4 outfalls in low trash generation areas, and provide authority to submit a report identifying conditions under which it is impracticable to control trash with full trash capture systems.[53]
- Provision C.8.f. which requires pollutants of concern monitoring.[54]
- Provision C.12.a., which requires the permittees to assess PCBs load reductions from stormwater in accordance with a previously adopted TMDL, including

[49] Exhibit A, Test Claim, page 1576 (Order R2-2015-0049, Provision C.3.j.).

[50] Exhibit A, Test Claim, pages 25-26, 605-610 (test claim permit, Provisions C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., and C.3.j.ii.4.).

[51] Exhibit A, Test Claim, pages 27, 643-647 (test claim permit, Provision C.8.d.).

[52] Exhibit A, Test Claim, pages 27, 629-630 (test claim permit, Provision C.5.f.).

[53] Exhibit A, Test Claim, pages 29-31, 651, 680-682, 689 (test claim permit, Provisions C.8.e.ii.1., C.8.e.ii.2., C.10.a.i., C.10.a.ii., and C.10.e.).

[54] Exhibit A, Test Claim, pages 29, 655-671 (test claim permit, Provision C.8.f.).

requirements to implement an assessment methodology and data collection program to quantify reductions and reporting.[55]

- Provisions C.11.c. and C.12.c., which require plans, schedules, and implementation of control measures for the reduction of mercury and PCBs in old industrial areas to achieve load reductions in accordance with the TMDLs.[56]
- Provision C.15.b.iii., which addresses non-stormwater emergency firefighting discharges and requires the permittees to convene a regionwide working group to identify and evaluate opportunities to reduce the adverse impacts of these discharges to the MS4, submit a Firefighting Discharges Report by September 30, 2025, implement the plan and BMPs proposed in the report, and submit reports to the Regional Board.[57]
- Provision C.17.a., which requires the permittees to collectively develop a report to be submitted to the Executive Officer with the 2023 Annual Report that identifies effective practices to address non-stormwater discharges associated with homelessness and specific milestones for reducing such discharges, submit a map of the locations of unsheltered homeless populations in relation to storm drain inlets and existing receiving waters with the 2023 Annual Report; submit an updated map with the 2025 Annual Report; implement BMPs to reduce the discharges associated with homelessness and assess the effectiveness of those BMPs.[58]
- Provision C.20.b., which requires the permittees to develop a cost reporting framework and methodology to perform the annual fiscal analysis required in Provision C.20.a.[59]
- Provision C.21.b., which requires the permittees to develop and implement an Asset Management Plan to ensure the satisfactory condition of hard assets, defined as "structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash receptacles, and pet waste stations"[60] and to complete a Climate Change Adaptation Report.[61]

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[55] Exhibit A, Test Claim, pages 33, 704-705 (test claim permit, Provision C.12.a.).

[56] Exhibit A, Test Claim, pages 32, 698-700, 707-708 (test claim permit, Provisions C.11.c., C.12.c.).

[57] Exhibit A, Test Claim, pages 33, 748-752 (test claim permit, Provision C.15.b.iii.).

[58] Exhibit A, Test Claim, pages 34, 757-759 (test claim permit, Provision C.17.a.).

[59] Exhibit A, Test Claim, pages 34-35, 777-778 (test claim permit, Provision C.20.a.).

[60] Exhibit A, Test Claim, page 779, footnote 67.

[61] Exhibit A, Test Claim, pages 35-36, 779-780 (test claim permit, Provision C.21.b.).

The purpose of article XIII B, section 6 is to prevent the state from forcing extra programs on local government each year in a manner that negates their careful budgeting of increased expenditures counted against the local government's annual spending limit and, thus, article XIII B, section 6 requires a showing that the test claim statute or executive order mandates *new* activities and associated costs compared to prior law, forcing them to spend their local proceeds of taxes.[62]

The Commission finds the test claim permit imposes some new requirements on the permittees, as explained herein. However, there are no costs mandated by the state. The period of reimbursement for this Test Claim begins July 1, 2022, the permit's effective date[63] and, as more fully explained below, the permittees have the legal authority during the entire period of reimbursement to impose property-related stormwater fees and regulatory fees[64] sufficient as a matter of law to cover the costs of all the requirements pled in this Test Claim including the new requirements pursuant to Government Code section 17556(d), and therefore there are no costs mandated by the state.[65] Since reimbursement is required only when all mandate elements are satisfied, including costs mandated by the state,[66] there are no findings on whether the *new* requirements mandate a new program or higher level of service.

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[62] California Constitution, articles XIII B, sections 1, 8(a) and (b); *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56; *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830, 835; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1564, 1595; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1264, 1283; *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 763; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487 (Reimbursement is required only when "the costs in question can be recovered solely from tax revenues).

[63] Exhibit A, Test Claim, page 784 (test claim permit).

[64] California Constitution, article XI, section 7; Health and Safety Code section 5471 (fees for storm drainage maintenance and operation); Government Code sections 38902 (providing for sewer standby charges); 53750 et seq. (Proposition 218 Omnibus Implementation Act, describing procedures for adoption of assessments, fees and charges); 53751 (as amended in 2017, providing that fees for sewer services includes storm sewers).

[65] Government Code sections 17556(d), 53750, 53751; *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195; *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 562-565; and *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 583-586.

[66] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874-875, 878; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1265, 1284; Government Code sections 17514 and 17556.

Accordingly, the Commission finds that the test claim permit does not impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution and denies this Test Claim.

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COMMISSION FINDINGS

I. Chronology

07/01/2022	The test claim permit, San Francisco Bay Regional Water Control Board, Order R2-2022-0018, was adopted on May 11, 2022, and became effective July 1, 2022.[67]
06/30/2023	Union City filed the Test Claim.[68]
06/18/2024	Commission staff issued the Notice of Complete Test Claim, Schedule for Comments, and Notice of Tentative Hearing Date
07/08/2024-05/12/2025	The Water Boards and the Department of Finance request several extensions of time to respond to the Test Claim, which were granted for good cause.
03/28/2025	The claimant, the City of Dublin (Interested Party), and Alameda Countywide Clean Water Program (Interested Person) filed a Notice of Change of Representation.
07/15/2025	The Water Boards filed comments on the Test Claim.[69]
07/21/2025	Finance filed late comments on the Test Claim.[70]
08/13/2025-03/20/2026	The claimant requested several extensions of time to file rebuttal comments, which were granted for good cause.
06/29/2026	Commission staff issued the Draft Proposed Decision.[71]

II. Background

A. Federal Clean Water Act.

The federal Clean Water Act was enacted in 1972 and is a comprehensive water quality statute designed to restore and maintain the chemical, physical, and biological integrity of the nation's waters.[72] The Act's national goal was to eliminate "the discharge of pollutants into the navigable waters" of the United States by the year 1985.[73] "To accomplish this goal the Act established 'effluent limitations,' which are restrictions on

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[67] Exhibit A, Test Claim, page 784 (test claim permit).

[68] Exhibit A, Test Claim.

[69] Exhibit B, Water Boards' Comments on the Test Claim, page 1.

[70] Exhibit C, Finance's Late Comments on the Test Claim, page 1.

[71] Exhibit D, Draft Proposed Decision.

[72] United States Code, title 33, section 1251 et seq.; *City of Burbank v. State Water Resources Control Board* (2005) 35 Cal.4th 613, 620; *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 757.

[73] United States Code, title 33, section 1251(a)(1).

the ‘quantities, rates, and concentrations of chemical, physical, biological, and other constituents’; these effluent limitations allow the discharge of pollutants only when the water has been satisfactorily treated to conform with federal water quality standards.”[74]

The Clean Water Act prohibits pollutant discharges unless they comply with: (1) a permit; (2) established effluent limitations or standards; or (3) established national standards of performance.[75] The term “discharge of a pollutant” means “any addition of any pollutant to navigable waters from any point source.”[76] A “point source” is any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.”[77]

The Clean Water Act created the National Pollutant Discharge Elimination System (NPDES), authorizing the Environmental Protection Agency (EPA) to issue a permit for any pollutant discharge that will satisfy all requirements established by the Act or the EPA Administrator, which must be designed to ensure that discharges do not violate applicable water quality standards established by EPA or the state.[78] A state may administer its own permitting system if authorized by EPA, so long as those standards and limitations are not “less stringent” than those in effect under the Clean Water Act [79]

In 1973, EPA adopted regulations to implement the Act which provided exclusions for several types of discharges including “uncontrolled discharges composed entirely of storm runoff when these discharges are uncontaminated by any industrial or commercial activity” and have not been identified “as a significant contributor of pollution.”[80] This particular exclusion applied only to municipal separate storm sewer systems (MS4s). In 1977, however, the Court in *Natural Resources Defense Council v. Costle* held EPA had no authority to exempt point source discharges, including stormwater discharges from MS4s, from the requirements of the Act and doing so

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[74] City of Burbank v. State Water Resources Control Board (2005) 35 Cal.4th 613, 620, citing United States Code, title 33, sections 1311, 1362(11).

[75] United States Code, title 33, sections 1311(a), 1312, 1316, 1317, 1328, 1342, and 1344.

[76] United States Code, title 33, section 1362(12)(A) (emphasis added).

[77] United States Code, title 33, section 1362(14).

[78] United States Code, title 33, section 1342(a)(1), (2).

[79] United States Code, title 33, section 1370.

[80] Code of Federal Regulations, title 40, sections 124.5 and 124.11 (30 FR 18003, July 5, 1973).

contravened Congress' intent.[81] Since the Act prohibits "the discharge of any pollutant by any person" without an NPDES permit, MS4 municipal storm sewer systems are included in the definition of a point source.[82]

Thus, the Clean Water Act was amended by the Water Quality Act of 1987 to require NPDES permits for stormwater discharges from MS4s, stormwater discharges associated with industrial and construction activities, and designated stormwater discharges considered significant contributors of pollutants to waters of the United States.[83] Federal law states that permits for discharges from MS4 municipal storm sewers:

- may be issued on a system- or jurisdiction-wide basis;
- shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and
- shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.[84]

Discharges from MS4s include stormwater runoff, which "…is generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground."[85] Polluted stormwater runoff is commonly transported through MS4s, and then often discharged, untreated, into local water bodies and, thus, stormwater runoff requires "best management practices" (BMPs) and controls to the maximum extent practicable to reduce the discharge of these pollutants as stated above. As the Ninth Circuit Court of Appeal stated:

> Storm water runoff is one of the most significant sources of water pollution in the nation, at times "comparable to, if not greater than, contamination from industrial and sewage sources." [Citation omitted.] Storm sewer waters carry suspended metals, sediments, algae-promoting nutrients (nitrogen and phosphorus), floatable trash, used motor oil, raw sewage, pesticides, and other toxic contaminants into streams, rivers, lakes, and estuaries across the United States. [Citation omitted.] In 1985, three-

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[81] *Natural Res. Def. Council v. Costle* (D.C.Cir.1977) 568 F.2d 1369, 1379 (holding unlawful EPA's exemption of stormwater discharges from NPDES permitting requirements).

[82] United States Code, title 33, section 1311(a).

[83] United States Code, title 33, section 1342(p)(3)(B).

[84] United States Code, title 33, section 1342(p)(3)(B).

[85] See Code of Federal Regulations, title 40, section 122.26(b)(13).

> quarters of the States cited urban storm water runoff as a major cause of waterbody impairment, and forty percent reported construction site runoff as a major cause of impairment. Urban runoff has been named as the foremost cause of impairment of surveyed ocean waters. Among the sources of storm water contamination are urban development, industrial facilities, construction sites, and illicit discharges and connections to storm sewer systems.[86]

A discharge to a MS4 that "is *not* composed entirely of stormwater" is considered an illicit non-stormwater, or dry weather discharge.[87] According to a fact sheet issued by EPA, illicit non-stormwater discharges may contribute to high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies.[88] Examples of illicit non-stormwater discharges include trash, sanitary wastewater, effluent from septic tanks, car wash wastewater, improper oil disposal, radiator flushing disposal, laundry wastewaters, spills from roadway accidents, and improper disposal of automobile and household toxics.[89] As stated above, federal law requires MS4 permits to "include a requirement to effectively prohibit non-stormwater discharges into the storm sewers," except as authorized by an NPDES permit.[90]

On November 16, 1990, EPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s under the Clean Water Act. EPA regulations specify the information to be included in a permit application.[91] Among other things, an applicant must set out a proposed management program that includes management practices; control techniques; and system, design, and engineering methods to reduce the discharge of pollutants to the maximum extent practicable; a program including

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[86] *Environmental Defense Center, Inc. v. EPA* (9th Cir. 2003) 344 F.3d 832, 840-841(citing *Natural Res. Def. Council v. EPA* (9th Cir. 1992) 966 F.2d 1292, 1295, and Regulation for Revision of the Water Pollution Control Program Addressing Storm Water (64 Fed.Reg. 68722, 68724, 68727 (December 8, 1999) codified at Code of Federal Regulations, title 40, parts. 9, 122, 123, and 124)).

[87] Code of Federal Regulations, title 40, section 122.26(b)(2) defines "Illicit discharge" as "any discharge to a municipal separate storm sewer that is *not* composed entirely of storm water except discharges pursuant to a NPDES permit (*other than the NPDES permit for discharges from the municipal separate storm sewer*) and discharges resulting from firefighting activities." Emphasis added.

[88] Exhibit X (5), Stormwater Phase II Final Rule, Illicit Discharge Detection and Elimination, USEPA Fact Sheet 2.5.

[89] Exhibit X (5), Stormwater Phase II Final Rule, Illicit Discharge Detection and Elimination, USEPA Fact Sheet 2.5.

[90] United States Code, title 33, section 1342(p)(3)(B)(ii) (Public Law 100-4); Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(1).

[91] Code of Federal Regulations, title 40, section 122.26(d)(1)(i-viii).

inspections and ordinances to detect and remove prohibited, illicit discharges; a monitoring program to ensure compliance with water quality standards; an assessment of controls and reporting; and a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs.[92] The permit-issuing agency has discretion to determine which practices, whether or not proposed by the applicant, will be imposed as conditions to ensure compliance with water quality standards.[93] The state is required to transmit to EPA a copy of each permit application and permit proposed to be issued.[94]

In addition, the Clean Water Act requires states to develop water quality standards and criteria to protect the beneficial uses of any given waterbody, which are included in the Regional Board's Basin Plans.[95] States are required to adopt water quality standards and criteria based on sound scientific rationale that identifies sufficient parameters or constituents to protect the designated use, and numerical values related to any constituents should be based on the U.S. EPA's guidance documents or other defensible methods.[96] The water quality standard or criteria can be expressed in narrative form, which are broad statements of desirable water quality goals, or in a numeric form, which identifies specific pollutant concentrations.[97] When water quality criteria are met, water quality will generally protect the designated use."[98] Federal regulations state the purpose of a water quality standard as follows:

> A water quality standard defines the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria that protect the designated uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act (the Act). "Serve the purposes of the Act" (as defined in sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of

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[92] Code of Federal Regulations, title 40, section 122.26(d)(2).

[93] *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 757, citing to Code of Federal Regulations, title 40, section 122.26(d)(2).

[94] United States Code, title 33, section 1342(d).

[95] United States Code, title 33, section 1313(a), (c)(1); Code of Federal Regulations, title 40, sections 131.6, 131.10-131.12; Water Code sections 13240, 13241.

[96] Code of Federal Regulations, title 40, section 131.11.

[97] *City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1403.

[98] Code of Federal Regulations, title 40, section 131.3(b).

> fish, shellfish, and wildlife, recreation in and on the water, and agricultural, industrial, and other purposes including navigation.[99]

EPA publishes water quality criteria in receiving waters to reflect the latest scientific knowledge on the kind and extent of all identifiable effects on health and welfare, which may be expected from the presence of pollutants in any body of water.[100] In addition, on May 18, 2000, U.S. EPA also established numeric water quality criteria for priority toxic pollutants and other provisions for water quality standards to be applied to waters in the state of California, which is known as the California Toxics Rule (CTR).[101] As the courts have explained, the CTR is a water quality standard that applies to "'all waters' for 'all purposes and programs under the CWA.'"[102]

States are required to hold public hearings from time to time but "at least once each three year period" for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards:

> Whenever the State revises or adopts a new standard, such revised or new standard shall be submitted to the [US EPA] Administrator. Such revised or new water quality standard shall consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses. Such standards shall protect the public health or welfare, enhance the quality of water and serve the purposes of this chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value for navigation.[103]

When reviewing, revising, or adopting new water quality standards, the state is required to adopt numeric criteria for all toxic pollutants listed in federal law.[104]

The Clean Water Act also requires states to develop a list of "impaired" waters within their jurisdiction, meaning that existing controls of pollutants are not sufficient to meet water quality standards necessary to permit the designated beneficial uses, such as fishing or recreation.[105] States must then rank those impaired waters by priority, and

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[99] Code of Federal Regulations, title 40, section 131.2.

[100] United States Code, title 33, section 1314(a).

[101] Code of Federal Regulations, title 40, section 131.38 (65 Federal Register 31682, 31711, May 18, 2000).

[102] *Santa Monica Baykeeper v. Kramer Metals, Inc.* (2009) 619 F.Supp.2d 914, 927.

[103] United States Code, title 33, section 1313(c)(2)(A).

[104] United States Code, title 33, section 1313(c)(2)(B).

[105] See United States Code, title 33, section 1313(d)(1)(A) (codifying CWA § 303(d) and stating: "Each State shall identify [as impaired] those waters within its boundaries for

establish a TMDL, which includes a calculation of the maximum amount of each constituent pollutant that the water body can assimilate and still meet water quality standards.[106]

B. The California Water Pollution Control Program

California's water pollution control laws were substantially overhauled in 1969 with the Porter-Cologne Water Quality Control Act (Porter-Cologne).[107] Beginning with section 13000, Porter-Cologne provides:

> The Legislature finds and declares that the people of the state have a primary interest in the conservation, control, and utilization of the water resources of the state, and that the quality of all the waters of the state shall be protected for use and enjoyment by all the people of the state.
>
> The Legislature further finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.
>
> The Legislature further finds and declares that the health, safety, and welfare of the people of the state requires that there be a statewide program for the control of the quality of all the waters of the state…and that the statewide program for water quality control can be most effectively administered regionally, within a framework of statewide coordination and policy.[108]

The state water pollution control program was again modified, beginning in 1972, to substantially comply with the Clean Water Act, and "on May 14, 1973, California became the first state to be approved by the EPA to administer the NPDES permit program."[109]

Section 13160 provides the State Water Resources Control Board (State Board) "is designated as the state water pollution control agency for all purposes stated in the Federal Water Pollution Control Act…[and is] authorized to exercise any powers

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which the effluent limitations … are not stringent enough to implement any water quality standard applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.").

[106] United States Code, title 33, section 1313(d); Code of Federal Regulations, title 40, section 130.7(c).

[107] Water Code section 13020.

[108] Water Code section 13000.

[109] *County Sanitation Dist. No. 2 of Los Angeles County v. County of Kern* (2005) 127 Cal.App.4th 1544, 1565-1566. See also Water Code section 13370 *et seq*.

delegated to the state by the Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.) and acts amendatory thereto."[110] Section 13001 describes the state and the nine regional boards as being "the principal state agencies with primary responsibility for the coordination and control of water quality."

To achieve the objectives of conserving and protecting the water resources of the state, and in exercise of the powers delegated, Porter-Cologne, like the Clean Water Act, employs a combination of water quality standards and point source pollution controls.[111]

Under Porter Cologne, the nine regional boards' primary regulatory tools are the water quality control plans, or Basin Plans.[112] These plans fulfill the planning function for the water boards, are regulations adopted under the Administrative Procedure Act with a specialized process,[113] and provide the underlying basis for most of the regional board's actions (e.g., NPDES permit conditions, cleanup levels). Basin plans consist of three elements:

- Determination of beneficial uses;
- Water quality objectives to reasonably protect beneficial uses; and
- An implementation program to achieve water quality objectives.[114]

Water Code sections 13240-13247 address the development and implementation of the basin plans, including "water quality objectives," defined in section 13050 as "the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."[115] Section 13241 provides each regional board "shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance."[116]

Beneficial uses, in turn, are defined in section 13050 as including, but not limited to "domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves."[117] In addition, section 13243 permits a

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[110] Water Code section 13160.

[111] Water Code section 13142.

[112] Water Code sections 13240-13247.

[113] Water Code sections 11352–11354.

[114] Water Code section 13050(j), see also section 13241.

[115] Water Code section 13050.

[116] Water Code section 13241.

[117] Water Code section 13050.

regional board to define "certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."[118]

Sections 13260-13274 address the development of "waste discharge requirements," which section 13374 states "is the equivalent of the term 'permits' as used" in federal law.[119] Section 13263 authorizes the regional boards, after a public hearing, to prescribe waste discharge requirements "as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge, except discharges into a community sewer system." Section 13263 provides "[a]ll discharges of waste into waters of the state are privileges, not rights."[120] Section 13372 states "[t]his chapter shall be construed to ensure consistency with the requirements for state programs implementing the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto." Section 13377 permits a regional board to issue waste discharge requirements "which apply and ensure compliance with all applicable provisions of the [Federal Water Pollution Control Act]."[121] In effect, sections 13263 and 13377 permit the issuance of waste discharge requirements concurrently with an NPDES permit "if a discharge is to waters of both California and the United States."

The California Supreme Court explained the interplay between state and federal law in *Department of Finance v. Commission on State Mandates* as follows:

> California was the first state authorized to issue its own pollutant discharge permits. (Citations omitted.) Shortly after the CWA's enactment, the Legislature amended the Porter–Cologne Act, adding chapter 5.5 (Wat. Code, § 13370 et seq.) to authorize state issuance of permits (Wat. Code, § 13370, subd. (c)). The Legislature explained the amendment was "in the interest of the people of the state, in order to avoid direct regulation by the federal government of persons already subject to regulation under state law pursuant to [the Porter–Cologne Act]." (*Ibid*.) The Legislature provided that Chapter 5.5 be "construed to ensure consistency" with the CWA. (Wat. Code, § 13372, subd. (a).) It directed that state and regional boards issue waste discharge requirements "ensur[ing] compliance with all applicable provisions of the [CWA] ... *together with any more stringent effluent standards or limitations* necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." (Wat. Code, § 13377, italics added.) To align the state and federal permitting systems, the legislation provided that the term " 'waste discharge requirements' " under the Act was equivalent to the term " 'permits' " under the CWA. (Wat. Code, § 13374.) Accordingly, California's

[118] Water Code section 13243.

[119] Water Code section 13374.

[120] Water Code section 13263(a-b); (g).

[121] Water Code section 13377.

permitting system now regulates discharges under both state and federal law. (Citations omitted.)[122]

California has adopted an Ocean Plan in accordance with federal law, applicable to interstate waters, and two other state-wide plans (California Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP)), which establish water quality criteria or objectives for all fresh waters, bays and estuaries in the State.[123] These statewide plans contain narrative and numeric water quality criteria for toxic pollutants, in part to satisfy the Clean Water Act (United States Code, title 33, section 1313(c)(2)(B)). The water quality criteria contained in these statewide plans, together with the designated uses in each of the Basin Plans, create a set of water quality standards for waters within the State of California.[124]

C. The Test Claim Permit

The claimant contends that certain sections of the California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, as modified by Order No. R2-2023-0019, impose a reimbursable state-mandated program. This is the third stormwater permit adopted by the San Francisco Bay Regional Water Quality Control Board the Commission has reviewed to determine if reimbursement is required under article XIII B, section 6.[125] The following local government permittees are subject to this permit:

- The Alameda Permittees. The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program.
- The Contra Costa Permittees. The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole,

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[122] *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 757.

[123] United States Code, title 33, section 1313(c)(3)(A), (B).

[124] See also, Water Code section 13170, which provides that the statewide plans supersede the Basin Plans to the extent any conflict exists.

[125] The prior two permits were R2-2009-0074 at issue in *California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2009-0074*,10-TC-02, 10-TC-03, and 10-TC-05, https://www.csm.ca.gov/decisions/10-TC-02-03-05-012425.pdf (accessed on June 25, 2026 for which the Commission adopted the Statewide Cost Estimate on June 12, 2026, and R2-2015-0049 at issue in *California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2015-0049*, 16-TC-03, https://www.csm.ca.gov/matters/16-TC-03.shtml (accessed on June 25, 2026), which is currently pending.

Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program.

- The Santa Clara Permittees. The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program.
- The San Mateo Permittees. The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program.
- The Solano Permittees. The cities of Fairfield, Suisun City, Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance.[126]

III. Positions of the Parties

A. Claimant's Position

The claimant alleges the following sections of the test claim permit impose reimbursable state-mandated programs within the meaning of article XIII B, section 6 of the California Constitution:

- Implement low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for the following regulated projects: new or widening roads and road reconstruction projects. (Provisions C.3.b.i., and C.3.b.ii.4. and 5.)[127]

  "[T]hese requirements apply to "road projects that create 5,000 square feet or more of newly constructed contiguous impervious surface, that are both public and private road projects." (MPR3 at C.3-8, Section 7 at S7-0029.) Under the MRP2, the requirement applied only to "road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface." . . . 'Road reconstruction projects' was not a regulated category under the MRP2 and, therefore, this is a new program."[128]

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[126] Exhibit A, Test Claim, page 542 (test claim permit).

[127] Exhibit A, Test Claim, pages 24-25.

[128] Exhibit A, Test Claim, page 24

- "[R]e-evaluate, update and/or supplement their Green Infrastructure Plans (completed under the MRP2) as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned. This includes revising implementation mechanisms; continuing to update related municipal plans; developing funding mechanisms; updating guidance, details and specifications as appropriate; implementing tracking/mapping tools; adopting/amending legal mechanisms as necessary; and conducting outreach and education." (Provision C.3.j.ii.1.a.-g.)[129]

  "To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(1)(a)-(g), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with this new requirement. (Mathews Decl., ¶ 9.i.) In Fiscal Year 22/23, the City commenced the process of updating its Green Infrastructure Plan. (Azim. Decl., ¶ 8.b.)"[130]

- Form a regional Technical Working Group to discuss long term GSI [green stormwater infrastructure] goals and recommend long term percentage reductions. (Provision C.3.j.ii.4.)[131]

  "These are new requirements not included in the MRP2. To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(4), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with this new requirement. (Mathews Decl., ¶ 9.i.)"[132]

- Implement, or cause to be implemented, green infrastructure projects within their jurisdictions which are not already defined as Regulated Projects such that impervious surface numeric retrofits are achieved. (Provision C.3.j.ii.2.a.-j.)[133]

  "The imposition of the numeric targets is new and will require Permittees to implement more retrofit projects in the MRP3 term than would have been required in the MRP2. The Permittees may meet the numeric retrofit requirements on a countywide basis. Though Permittees may meet their total individual numeric retrofit requirements on a countywide basis, each Permittee shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction, where that project is not already defined as a regulated project. . . . Alternatively, a Permittee may contribute substantially to such a green

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[129] Exhibit A, Test Claim page 25.

[130] Exhibit A, Test Claim, page 25.

[131] Exhibit A, Test Claim, page 25.

[132] Exhibit A, Test Claim, page 25.

[133] Exhibit A, Test Claim, pages 25-26.

infrastructure project(s) outside of its jurisdiction and within its County. . . . The Fact Sheet acknowledges that these new requirements could cost Permittees up to $181 million of additional costs. . . . To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(2)(a)-(j), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with new requirement. (Mathews Decl., ¶ 9.i.) In Fiscal Year 22/23, the City attended meetings with the Program regarding these Provision C.3 requirements, including municipal staff training. (Azim. Decl., ¶ 8.b. In Fiscal Year 23/24, the City expects to expend approximately $520,000 in implementing bioretention treatment areas in compliance with this increased requirement which would not have been required under the MRP2. (*Id.*)"[134]

- Identify information missing from the current MS4 Maps and develop a plan and schedule to compile additional storm sewer system information, considering the potential to identify component locations, size or specifications, materials of construction and condition. (Provision C.5.f.)[135]
- Develop LID Monitoring Plans to implement the requirements in Provision C.8.d.iii-iv. (Provision C.8.d.)[136]

  "To support this new MRP3 requirement, in Fiscal Year 22/23 the Program collaborated with the other four countywide programs to form and fund the MRP3-required Technical Advisory Group ("TAG") with the necessary expertise related to LID monitoring, developed a regional quality assurance plan, identified monitoring locations, developed a monitoring plan for LID facilities in Alameda County, revised the monitoring and quality assurance plans based on feedback from the TAG, and submitted the plans to the Regional Water Board. (Mathews Decl., ¶ 9.c.)"[137]
- Collect and analyze the amount of trash discharged from MS4 outfalls to answer the questions of whether (1) Permittees' trash management actions effectively prevented trash from their jurisdictions from discharging to receiving waters, and (2) are discharges of trash from within Trash Management Areas controlled to a low trash generation level causing and/or contributing to adverse trash impacts in receiving waters. Specifically, Permittees must:

  (1) [C]ollect and analyze the amount of trash discharged from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system (Provision C.8.e.ii.1.).

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[134] Exhibit A, Test Claim, page 26.

[135] Exhibit A, Test Claim, page 27.

[136] Exhibit A, Test Claim, pages 27-28.

[137] Exhibit A, Test Claim, pages 27-28.

(2) [I]mplement a pilot program to directly (in-stream) sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the Low trash generation level, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system (Provision C.8.e.ii.2.).[138]

"To support this effort, in Fiscal Year 22/23 the Program collaborated with the other four countywide programs to form and fund a separate MRP3-required TAG (with wholly different expertise than the MRP3-required TAG for the new LID monitoring program described above), developed a regional quality assurance plan, identified trash monitoring locations and developed a monitoring plan for the selected sites in Alameda County, revised the monitoring and quality assurance plans based on feedback from the TAG, and submitted the plans to the Regional Water Board. (Mathews Decl., ¶ 9.c.)"[139]

- Conduct Pollutants of Concern ("POC") monitoring to "assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to assess compliance with receiving water limitations, support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants." (Provision C.8.f.)[140]

  "To support its member agencies in complying with this new requirement, in Fiscal Year 22/23 the Program developed and submitted a POC monitoring plan and initiated the required monitoring. (Mathews Decl., ¶ 9.d.)"[141]

- Implement trash load reduction control actions and demonstrate attainment of trash discharge reduction requirements of 90% by June 30, 2023; and 100% trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025 If the 90% benchmark is not attained by June 30, 2023, Permittees must submit revised trash load reduction plan and an implementation schedule of additional trash load reduction control actions to achieve 90% and 100% benchmarks by September 30, 2023. (Provision C.10.a.i).[142]

  "This is a higher level of service than required by the MRP2 which required 70% by July 1, 2017 and 80% by July 1, 2019." "According to the MRP3 Fact Sheet, "Permittees will incur additional costs to proceed from MRP2's required 80 percent reduction in trash discharges to the Permit's required 100 percent reduction, to be achieved using a combination of measures determined by each

[138] Exhibit A, Test Claim. Page 28.

[139] Exhibit A, Test Claim, page 28.

[140] Exhibit A, Test Claim, page 29.

[141] Exhibit A, Test Claim, page 29.

[142] Exhibit A, Test Claim, pages 29-30.

Permittee, and consisting of full trash capture, or implementation of a range of controls equivalent to full trash capture…. Statewide, the economic analysis estimates that between $2.93 and $7.77 more per resident might need to be spent each year for the next ten years to implement the proposed Trash Amendments."[143]

"To support this higher level of service requirement, in Fiscal Year 22/23 the Program held subcommittee meetings and prepared guidance for members on the new requirements, updates and modifications were made to GIS maps to support members, and GIS-based inspection applications were developed. (Mathews Decl., ¶ 9.e.) The City expended costs on predesign and planning in Fiscal Year 22/23 associated with this higher level of service requirements. (Azim Decl., ¶ 8.d.)"[144]

- Ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems by July 1, 2025. (Provision C.10.a.ii.)

  Provision C.10.a.ii of the MRP3 also requires Permittees to submit a revised Trash Generation Area Map by September 30, 2024 that includes trash management areas and private land drainage areas that will be retrofitted with full trash capture devices, or equivalent, by the June 30, 2025 compliance date.[145]

  "To support these Provision C.10.a.ii higher levels of service requirements, in Fiscal Year 22/23 the Program held subcommittee meetings and prepared guidance for members on the new requirements, updates and modifications were made to GIS maps to support members, and GIS-based inspection applications were developed. (Mathews Decl., ¶ 9.e.) In addition, in Fiscal Year 22/23, the City attended the Program's Trash Subcommittee meetings and used a consultant to update its Trash Generation Area Map, an activity that continued into Fiscal Year 23/24. (Azim Decl., ¶ 8.d.)"[146]

- Collectively develop a Trash Impracticability Report that includes a process for both evaluating impracticability and implementing partial benefit actions to the maximum extent practicable by March 31, 2023. "Further, Provisions C.10.d and

[143] Exhibit A, Test Claim, pages 29-30.

[144] Exhibit A, Test Claim, page 30.

[145] Exhibit A, Test Claim, pages 30-31.

[146] Exhibit A, Test Claim, pages 30-31.

C.10.e.iv require Permittees to use an approved Trash Impracticability Report in developing updated Trash Load Reduction Work Plans." (Provision C.10.e.)[147]

The Program worked collaboratively with the four other countywide programs to fund the development of the Trash Impracticability Report. The Trash Impracticability Report was submitted to the Regional Water Board on March 27, 2023. (Mathews Decl., ¶ 9.f.)[148]

- Implement or cause to be implemented stormwater control measures to treat old industrial land use at 70% efficiency, or by demonstrating an equivalent mercury load reduction. In addition, implement or cause to be implemented treatment control measures to treat old industrial land use at 70% efficiency, or by demonstrating an equivalent PCBs load reduction. (Provisions C.11.c., C.12.c.)[149]

  "To support these increased requirements, in Fiscal Year 22/23 the Program developed the Old Industrial Area Control Measure Plan that included plans and schedules for implementing the required control measures. The Plan was submitted in March 2023. Subsequent to submittal, the Program members and consultants met with Regional Water Board staff and planned revisions to the plan, which are due in March 2024. (Mathews Decl., ¶ 9.g.) Additionally, in Fiscal Year 22/23, the City engaged in planning activities with the Program regarding these increased Provision C.11.c and C.12.c requirements. (Azim Decl., ¶ 8.e.)"[150]

- Quantify and report the PCBs load reductions achieved through all the pollution prevention, source control, green stormwater infrastructure, and other treatment control measures and submit documentation annually confirming that all control measures effectuated during the previous Permit term for which PCB load reduction credit was recognized continues to be implemented at an intensity sufficient to maintain the credited load reduction. The test claim permit requires annual assessment of loads reduced with documentation of the implementation level to justify the method (credits). (Provision C.12.a.)[151]

  "To support member agencies' compliance with this increased requirement, the Program consultants tracked and analyzed data on control measure implementation to calculate loads reduced. (Mathews Decl., ¶ 9.h.)"[152]

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[147] Exhibit A, Test Claim, page 31.

[148] Exhibit A, Test Claim, page 31.

[149] Exhibit A, Test Claim, page 32.

[150] Exhibit A, Test Claim, page 32.

[151] Exhibit A, Test Claim, page 33.

[152] Exhibit A, Test Claim, page 33.

- Collectively convene a regionwide Firefighting Discharges Working Group with Water Board staff and other stakeholders to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting water and foam. (Provision C.15.b.iii.)[153]
- Collectively develop and submit a best management practice report that identifies practices to address non-stormwater discharges into MS4s associated with homelessness that impact water quality and specific milestones for reducing such discharges; report on the programmatic efforts being implemented within Permittee's jurisdiction, or at the countywide or regional level, to address MS4 discharges associated with homelessness; and submit a map identifying, the approximate locations of unsheltered homeless populations, including encampments and other areas where other unsheltered homeless people live relative to storm drains, creeks, and flood control channels. (Provision C.17.a.)[154]

  "To meet this new MRP3 requirement, the Program collaborated with the other four countywide programs on a regional project to develop the required best management practice report, which was submitted with each Permittee's Fiscal Year 22/23 annual report. (Mathews Decl., ¶9.j.) Additionally, each Permittee is required to submit a map identifying, the approximate locations of unsheltered homeless populations, including encampments and other areas where other unsheltered homeless people live relative to storm drains, creeks, and flood control channels. To support its members, the Program worked with County officials to obtain the required geo-located point in time count data, developed an approach for creating the maps, and updated its GIS system to produce the required maps for each of its members. (*Id*.) The City submitted the maps with its Fiscal Year 22/23 annual report."[155]
- Develop a cost reporting framework and methodology to perform an annual fiscal analysis. Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost-savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with the Permit's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time. (Provision C.20.b.)[156]

  "To meet this new requirement, the Program collaborated with the other four countywide programs on a regional project to develop the cost reporting

[153] Exhibit A, Test Claim, page 33.

[154] Exhibit A, Test Claim, page 34.

[155] Exhibit A, Test Claim, page 34.

[156] Exhibit A, Test Claim, pages 34-35.

framework and methodology, which was submitted on June 26, 2023. (Mathews Decl., ¶ 9.k.) Updates to the cost reporting framework and methodology based on Regional Water Board comments are in process. The Program will additionally provide training for its members on the use of the cost reporting framework and methodology. (*Id.*)"[157]

- Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of Permittees' inventoried hard assets over the next 50 years and identify approaches that Permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale. (Provision C.21.b.)[158]

  "Permittees are required to develop and implement an asset management plan to ensure the satisfactory condition of all hard assets constructed during MRP3 and the pervious permit terms pursuant to provisions C.2, C.3, C.10, C.11, C.12, C.13, and C.17. Mathews Decl., ¶9.l.) Additionally, Permittees are required to develop and submit a climate change adaptation report to identify potential climate change-related threats to assets and appropriate adaptation strategies. To help Permittees meet these new requirements the Program initiated work on a framework to guide the development of the asset management plans by individual members. (*Id.*)"[159]

The claimant states that it incurred costs of $51,619 in fiscal year 2022-2023 to comply with the new requirements.[160] The claimant estimates statewide costs for fiscal year 2023-2024 of $68,200,880.[161] The claimant is not aware of any dedicated state, federal, or non-local funds available to pay for the new mandated requirements. The claimant has a Clean Water Fund, which obtains revenue from property tax assessments and is supplanted with general funds. Salaries and benefits are paid with general funds and the other costs are paid by the City's General Fund and the Clean Water Fund. The claimant contends it has no fee authority to increase revenue sources without seeking voter approval under Proposition 218.[162]

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[157] Exhibit A, Test Claim, page 35.

[158] Exhibit A, Test Claim, pages 35-36.

[159] Exhibit A, Test Claim, page 36.

[160] Exhibit A, Test Claim, page 36.

[161] Exhibit A, Test Claim, page 40.

[162] Exhibit A, Test Claim, pages 40-41.

B. Water Boards

The Water Boards request that the Commission deny the Test Claim. The Water Boards state the following:

> The challenged provisions are not subject to subvention under Article XIII B, section (6)(a) of the California Constitution. None of the provisions are a new program or higher level of service. Union City also has fee authority to cover the costs of the challenged provisions. Additionally, some of the provisions are subject to the subvention exceptions for offsetting savings and federal mandates. The Commission should deny the Test Claim in its entirety.[163]

The specific comments raised by the Water Boards are summarized in the Decision.

C. Department of Finance

Finance requests that the Commission deny this Test Claim and joins in the comments raised by the Water Boards.[164]

IV. Discussion

Article XIII B, section 6 of the California Constitution provides in relevant part the following:

> Whenever the Legislature or any state agency mandates a new program or higher level of service on any local government, the state shall provide a subvention of funds to reimburse such local government for the costs of such programs or increased level of service…

The purpose of article XIII B, section 6 is to "preclude the state from shifting financial responsibility for carrying out governmental functions to local agencies, which are 'ill equipped' to assume increased financial responsibilities because of the taxing and spending limitations that articles XIII A and XIII B impose."[165] Thus, the subvention requirement of section 6 is "directed to state-mandated increases in the services provided by [local government] …"[166]

Reimbursement under article XIII B, section 6 is required when the following elements are met:

1. A state statute or executive order requires or "mandates" local agencies or school districts to perform an activity.[167]

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[163] Exhibit B, Water Boards' Comments on the Test Claim, page 2.

[164] Exhibit C, Finance's Late Comments on the Test Claim, page 1.

[165] *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 81.

[166] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56.

[167] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874.

2. The mandated activity constitutes a "program" that either:
   a. Carries out the governmental function of providing a service to the public; or
   b. Imposes unique requirements on local agencies or school districts and does not apply generally to all residents and entities in the state.[168]
3. The mandated activity is new when compared with the legal requirements in effect immediately before the enactment of the test claim statute or executive order and it increases the level of service provided to the public.[169]
4. The mandated activity results in the local agency or school district incurring increased costs, within the meaning of section 17514. Increased costs, however, are not reimbursable if an exception identified in Government Code section 17556 applies to the activity.[170]

The Commission is vested with the exclusive authority to adjudicate disputes over the existence of state-mandated programs within the meaning of article XIII B, section 6 of the California Constitution.[171] The determination whether a statute or executive order imposes a reimbursable state-mandated program is a question of law.[172] In making its decisions, the Commission must strictly construe article XIII B, section 6 of the California Constitution, and not apply it as an "equitable remedy to cure the perceived unfairness resulting from political decisions on funding priorities."[173]

A. <u>The Test Claim Was Timely Filed and Has a Potential Period of Reimbursement Beginning July 1, 2022.</u>

Government Code section 17551 provides local government test claims shall be filed "not later than 12 months following the effective date of a statute or executive order or within 12 months of incurring increased costs as a result of a statute or executive order, whichever is later."[174] The test claim permit became effective on July 1, 2022.[175] The

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[168] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874-875 (reaffirming the test set out in *County of Los Angeles* (1987) 43 Cal.3d 46, 56).

[169] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874-875, 878; *Lucia Mar Unified School District v. Honig* (1988) 44 Cal3d 830, 835.

[170] *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1265, 1284; Government Code sections 17514 and 17556.

[171] *Kinlaw v. State of California* (1991) 54 Cal.3d 326, 335.

[172] *County of San Diego v. State of California* (1997) 15 Cal.4th 68, 109.

[173] *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1265, 1280 citing *City of San Jose v. State of California* (1996) 45 Cal.App.4th 1802, 1817.

[174] Government Code section 17551(c).

[175] Exhibit A, Test Claim, page 784 (test claim permit).

claimant filed the Test Claim on June 30, 2023, within 12 months of the effective date of the test claim permit. Therefore, the Test Claim was timely filed.

Government Code section 17557(e) requires a test claim to be "submitted on or before June 30 following a fiscal year in order to establish eligibility for reimbursement for that fiscal year." Because the Test Claim was filed June 30, 2023 (fiscal year 2022-2023), the potential period of reimbursement under Government Code section 17557 begins on July 1, 2021 (fiscal year 2021-2022). However, since the test claim permit (R2-2022-0018) has a later effective date, the potential period of reimbursement for this claim begins on the permit's effective date, or July 1, 2022.

B. The Claimant Has Not Identified Any Activities or Requirements Imposed by Order R2-2023-0019, and Thus the Commission Does Not Take Jurisdiction Over that Order.

Government Code section 17553(b)(1) requires Test Claims to identify the *specific* sections of the executive order alleged to contain a mandate *and* a detailed description of the new activities mandated by the state.

The claimant seeks reimbursement to comply with specific sections of Order R2-2022-0018, "effective July 1, 2022, and amended in October 2023 by Order No. R2-2023-0019."[176] The claimant further states "None of the provisions of the MRP3 at issue in this Test Claim are affected by the October 2023 modifications."[177]

Permit amendment R2-2023-0019 added Provision C.3.c.i.2.c.iii. regarding Alternative Treatment Systems when LID treatment systems are not feasible; and amends Provision C.3.e.ii.5., regarding Special Project Criteria (Affordable Housing) and the reporting requirements in Provision C.3.e.v.3.f.[178] The claimant has not requested reimbursement for any activities or requirements imposed by Provisions C.3.c.i.2..c.iii., C.3.e.ii.5., and C.3.e.v.3.f. The claimant's Test Claim addresses only the following Provisions: C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., and C.21.b.,[179] none of which were affected by the permit amendment R2-2023-0019.

Accordingly, this Decision does not address the amendments adopted by Order R2-2023-0019.

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[176] Exhibit A, Test Claim, page 11.

[177] Exhibit A, Test Claim, page 11, footnote 1.

[178] Exhibit X (4), Order R2-2023-0019.

[179] Exhibit A, Test Claim, pages 2, 22, 24, 42, 46.

C. The Test Claim Permit Imposes Some New Requirements, But There Are No Costs Mandated by the State Pursuant to Government Code Section 17556(d) Because the Claimants Have Fee Authority Sufficient as a Matter of Law to Cover the Costs of the Requirements.

The purpose of article XIII B, section 6 is to prevent the state from forcing extra programs on local government each year in a manner that negates their careful budgeting of increased expenditures counted against the local government's annual spending limit and, thus, article XIII B, section 6 requires a showing that the test claim statute or executive order mandates *new* activities and associated costs compared to the prior law, forcing them to spend their local proceeds of taxes.[180]

As described below, the test claim permit imposes some new requirements on the permittees when compared to prior law. However, there are no costs mandated by the state. The period of reimbursement for this Test Claim begins July 1, 2022, the permit's effective date and, as more fully explained below, the permittees have the legal authority during the entire period of reimbursement to impose stormwater fees and regulatory fees sufficient as a matter of law to cover the costs of all the requirements pursuant to Government Code section 17556(d), and therefore there are no costs mandated by the state.[181] Since reimbursement is required only when all mandate elements are satisfied, including costs mandated by the state,[182] there are no findings on whether the *new* requirements mandate a new program or higher level of service.

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[180] California Constitution, articles XIII B, sections 1, 8(a) and (b); *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56; *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830, 835; *Hayes v. Commission on State Mandates* (1992) 11 Cal.App.4th 1564, 1595; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1264, 1283; *Department of Finance v. Commission on State Mandates* (2016) 1 Cal.5th 749, 763; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487 (Reimbursement is required only when "the costs in question can be recovered solely from tax revenues).

[181] Government Code sections 17556(d), 53750, 53751; *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195; *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 562-565; and *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 583-586.

[182] *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 874-875, 878; *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487; *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1265, 1284; Government Code sections 17514 and 17556.

1. **The Test Claim Permit Imposes Some New Requirements, Which May Mandate a New Program or Higher Level of Service.**

   a. The implementation of LID controls for road projects of 5,000 square feet or more, as required by Provisions C.3.b.i., C.3.b.ii.4., and 5., do not mandate a new program or higher level of service.

Provision C.3. addresses new development and significant redevelopment projects, which are subject to the Clean Water Act.[183] Under federal law, NPDES permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."[184] A permittee's proposed management program shall include a description of structural and source control measures to reduce pollutants from runoff from commercial and residential areas, including "practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems."[185]

i. Provisions C.3.b.i., and C.3.b.ii.4. and 5. require the implementation of low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for public and private new or widening road projects of 5,000 square feet or more and road reconstruction projects of existing streets or roads that create or replace greater than or equal to one contiguous acre of impervious surface.

The claimant requests reimbursement to implement low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for public and private new or widening road projects and road reconstruction projects as required Provisions C.3.b.ii.4. and 5.[186] Provisions C.3.b.ii.4. and C.3.b.ii.5. identify the types of road projects and reconstruction projects that are subject to the requirements of Provision C.3.b.i., which imposes the LID source control, site design, and stormwater treatment requirements.[187] Provision C.3.b.i. was not specifically identified in the Test Claim pleading. However, the Test Claim narrative and declarations identify the requirements in Provision C.3.b.i. as they relate to the road projects and reconstruction projects in Provisions C.3.b.ii.4. and 5. and the costs

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[183] Exhibit A, Test Claim, page 561.

[184] United States Code, title 33, section 1342(p)(3)(B)(iii) (Public Law 100-4).

[185] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(A)(3) (71 FR 33639, June 12, 2006).

[186] Exhibit A, Test Claim, pages 24-25.

[187] Exhibit A, Test Claim, pages 562-563, 568-570.

associated with those requirements.[188] Therefore, this Decision will address Provision C.3.b.i. as it relates to Provisions C.3.b.ii.4. and 5.

Provision C.3.b.i. states "[t]he Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii. below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility in accordance with Provisions C.3.c. and C.3.d., unless the Provision C.3.e. alternate compliance options are invoked."[189] Provision C.3.c. requires that all "regulated projects" implement source control measures onsite that, at a minimum, include the following:

- Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's regulations and standards: Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants; Dumpster drips from covered trash, food waste, and compactor enclosures; Discharges from covered outdoor wash areas for vehicles, equipment, and accessories; Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.
- Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Properly designed trash storage areas.
- Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping.
- Efficient irrigation systems.
- Storm drain system stenciling or signage.[190]

Provision C.3.c. also requires each regulated project to implement the following design strategies:

- Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies.
- Conserve natural areas, including existing trees, other vegetation, and soils.

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[188] Exhibit A, Test Claim, pages 24, 46.

[189] Exhibit A, Test Claim, pages 562-563.

[190] Exhibit A, Test Claim, pages 573-574.

- Minimize impervious surfaces.
- Minimize disturbances to natural drainages.
- Minimize stormwater runoff by directing runoff onto vegetated areas.[191]

In addition, Provision C.3.c. requires regulated projects to treat 100 percent of the runoff with LID treatment measures (harvesting and use, infiltration, evapotranspiration, and biotreatment) onsite or with LID treatment measures at a joint stormwater treatment facility.[192]

Provision C.3.d. governs stormwater treatment systems, and identifies numeric design specifications for regulated projects to treat stormwater runoff, as specified.[193]

Provision C.3.e. addresses alternate compliance options, where a portion of the runoff for the project is treated with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility, and the other portion treated as an offsite project or with the payment of in lieu fees to treat the runoff at a regional project or offsite project.[194]

The goal of the LID provisions is "to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product."[195]

Provisions C.3.b.ii.4. and C.3.b.ii.5. define two of the regulated projects that are subject to the requirements for LID source control, site design, and stormwater treatment, which, the claimant states, now includes for the first time certain new or widening roads and road construction projects as defined below:

- The following types of "public and private" road projects that fall under the building and planning authority of a permittee, which creates 5,000 square feet or more of *newly* constructed contiguous impervious surface:
  - (a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.
  - (b) Widening of existing streets or roads with additional traffic lanes, as specified.
  - (c) Construction of impervious trails that are greater than or equal to 10 feet wide or are creek-side (within 50 feet of the top of bank).

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[191] Exhibit A, Test Claim, pages 574-575.

[192] Exhibit A, Test Claim, page 575.

[193] Exhibit A, Test Claim page 576.

[194] Exhibit A, Test Claim, page 580.

[195] Exhibit A, Test Claim, page 573.

The following are *excluded* from the LID requirements for regulated projects: sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas; bicycle lanes built as part of new streets or roads, but that are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas; impervious trails that direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area; sidewalks, bicycle lanes, or trails constructed as pervious pavement systems; and Caltrans highway projects and associated facilities.[196]

- Road reconstruction projects of existing streets or roads that create or replace greater than or equal to one contiguous acre of impervious surface and that are public road projects or fall under the building and planning authority of a permittee, including sidewalks and bicycle lanes that are built or rebuilt as part of the existing streets or roads.

  This category includes utility trenching projects which "are - on average, over the entire length of the project - greater than or equal to 8 feet wide;" public pavement maintenance practices listed in Provision C.3.b.ii.(1)(b)(iii)(b).

  Excluded projects are listed maintenance projects in Provision C.3.b.ii.1.b.iv. as follows: pothole and square cut patching; overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage; shoulder grading; reshaping/regrading drainage systems; crack sealing; pavement preservation activities that do not expand the road prism; upgrading from a bituminous surface treatment (e.g., chip seal) with an overlay of asphalt or concrete, without expanding the area of coverage; applying a bituminous surface treatment to existing asphalt or concrete pavement, without expanding the area of coverage; vegetation maintenance; and layering gravel over an existing gravel road, without expanding the area of coverage.[197]

Thus, the requirements in Provisions C.3.b.i. as it relates to new or widening road projects identified Provisions C.3.b.ii.4. and 5., apply to: (1) public roads accepted into a permittee's road system of 5,000 square feet or more; and (2) to a permittee under its authority to regulate private road projects.

Under the prior permit, new or widening road projects that created 10,000 square feet or more of newly constructed contiguous impervious surface were also subject to LID source control requirements.[198] Thus, the test claim permit expands the requirement to

[196] Exhibit A, Test Claim, pages 568-569.

[197] Exhibit A, Test Claim, pages 564-565, 569-570.

[198] Exhibit A, Test Claim, pages 1546, 1549 (Order R2-2015-0049, Provision C.3.b.).

smaller projects; those creating between 5,000 and 9,999 square feet of new or reconstructed contiguous impervious surface.

The Water Boards contend that the changes provided in Provisions C.3.b.ii.4. and 5. do not mandate a new program or higher level of service for the following reasons:

> As Union City acknowledges, Permittees were previously required to implement low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for "regulated projects." [Fn. omitted.] Under MRP 2, "regulated projects" included enumerated "road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface that fall under the building and planning authority of a Permittee." [Fn. omitted.] MRP 3 continues to require Permittees to implement LID requirements for the same enumerated road projects, except that it applies to road projects that create 5,000 square feet or more of newly constructed continuous impervious surface. [Fn. omitted.] The change in square footage will increase the number of road projects that are subject to the LID requirements and will increase costs. However, an increase in costs alone is not sufficient to establish a new program or higher level of service. The change does not require Permittees to do anything new or to provide a higher level of service compared to the actions required under MRP 2.[199]

The Commission finds that the requirements in Provisions C.3.b.i., and C.3.b.ii.4. and 5. do not mandate a new program or higher level of service.

ii. Provisions C.3.b.i., and C.3.b.ii.4. and 5. do not mandate a new program or higher level of service with respect to public roads accepted into a permittee's road system.

With respect to public roads accepted into a permittee's road system, the Commission finds that the requirements in Provisions C.3.b.i., and C.3.b.ii.4. and 5. do not mandate a new program or higher level of service.

When determining whether the test claim permit compels compliance and, thus, creates a state-mandated program for purposes of reimbursement under article XIII B, section 6, the courts have identified two distinct theories: legal compulsion and practical compulsion.[200] Activities undertaken at the option or discretion of local government, without legal or practical compulsion, do not trigger a state-mandated program within the meaning or article XIII B, section 6.[201] The California Supreme Court has described legal compulsion as follows:

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[199] Exhibit B, Water Boards' Comments on the Test Claim, page 12.

[200] *Coast Community College Dist. v. Commission on State Mandates* (2022) 13 Cal.5th 800, 815.

[201] *City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 73-76; *Department of Finance v. Commission on State Mandates* (*Kern High School Dist.*) (2003) 30 Cal.4th

> Legal compulsion occurs when a statute or executive action uses mandatory language that require[s] or command[s] a local entity to participate in a program or service… Stated differently, legal compulsion is present when the local entity has a mandatory, legally enforceable duty to obey. This standard is similar to the showing necessary to obtain a traditional writ of mandate, which requires the petitioning party to establish the respondent has a clear, present, and usually ministerial duty to act. ... Mandate will not issue if the duty is ... mixed with discretionary power.
>
> Thus, as a general matter, a local entity's voluntary or discretionary decision to undertake an activity cannot be said to be legally compelled, even if that decision results in certain mandatory actions.[202]

Here, the permittees have the authority, but not the legal requirement, to accept roads into their system, which can only be accomplished by the voluntary action of the governing body.[203] Therefore, because state law permits, but does not legally require, the permittees to accept roads into their system, the downstream requirements imposed by the test claim permit cannot be said to be legally compelled. The courts have made it clear "activities undertaken at the option or discretion of a local government entity … do not trigger a state mandate and hence do not require reimbursement of funds — even if the local entity is obliged to incur costs as a result of its discretionary decision to participate in a particular program or practice."[204]

Nonetheless, even where a local government entity is not legally compelled to perform required activities, it may be practically compelled to do so. As the California Supreme Court recently stated in *Coast Community College Dist. v. Commission on State Mandates*, practical compulsion "arises when a statutory scheme does not command a local entity to engage in conduct, but rather induces compliance through the imposition of severe consequences that leave the local entity no reasonable alternative but to comply."[205] However, substantial evidence is required for a showing of practical

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727; *Department of Finance v. Commission on State Mandates* (POBRA) (2009) 170 Cal.App.4th 1355, 1365-1366.

[202] *Coast Community College Dist. v. Commission on State Mandates* (2022) 13 Cal.5th 800, 815 (internal quotation marks and citations omitted).

[203] Streets and Highways Code sections 941(b) ("No public or private road shall become a county highway until and unless the board of supervisors, or its designee, by appropriate action, has caused the road to be accepted into the county road system."), and 1806(a) ("No city shall be held liable for failure to maintain any road until it has been accepted into the city street system.").

[204] *Department of Finance v. Commission on State Mandates* (*Kern High School Dist.)* (2003) 30 Cal.4th 727, 742; *Coast Community College Dist. v. Commission on State Mandates* (2022) 13 Cal.5th 800, 815.

[205] *Coast Community College Dist. v. Commission on State Mandates* (2022) 13 Cal.5th 800, 816; see also *Department of Finance v. Commission on State Mandates* (*Kern*

compulsion and no evidence has been filed in this case to show that the permittees are practically compelled to create between 5,000 and 9,999 square feet of *newly* constructed contiguous impervious surface or engage in road reconstruction projects of existing streets or roads that create or replace greater than or equal to one contiguous acre of impervious surface.[206] Thus, the requirements imposed by Provisions C.3.b.i., and C.3.b.ii.4. and 5. are not mandated by the state.

Even if there was evidence of practical compulsion, the requirements to implement low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for public new or widening road projects and road reconstruction projects are not new, since the prior permit also required the same activities,[207] which are not unique to government or provide a governmental service to the public and, thus, the requirements do not constitute a new program or higher level of service. "New program or higher level of service" is defined as "programs that carry out the governmental function of providing services to the public, or laws which, to implement a state policy, impose unique requirements on local governments and do not apply generally to all residents and entities in the state."[208]

The California Supreme Court explained in *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, "the intent underlying section 6 was to require reimbursement to local agencies for the costs involved in carrying out functions *peculiar to government*, not for expenses incurred by local agencies as an incidental impact of laws that apply generally to all state residents and entities."[209] The law at issue in the *County of Los Angeles* case addressed increased workers' compensation benefits for government employees, and the court concluded that:

> …section 6 has no application to, and the state need not provide subvention for, the costs incurred by local agencies in providing to their employees the same increase in worker's compensation benefits that employees of private individuals or organizations receive. Workers'

High School Dist.) (2003) 30 Cal.4th 727, 754 (where no "legal" compulsion exists, "practical" compulsion may be found if the local agency faces "certain and severe…penalties" such as "double…taxation" or other "draconian" consequences if they fail to comply with the statute).

[206] *Department of Finance v. Commission on State Mandates* (*POBRA*) (2009) 170 Cal.App.4th 1355, 1368-1369; Government Code section 17559; California Code of Regulations, title 2, section 1187.5.

[207] Exhibit A, Test Claim, pages 1546, 1549 (Order R2-2015-0049, Provision C.3.b.).

[208] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56.

[209] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56-57, emphasis added.

> compensation is *not* a program administered by local agencies to *provide service to the public*.[210]

The court also concluded that the statute did not impose unique requirements on local government:

> Although local agencies must provide benefits to their employees either through insurance or direct payment, they are indistinguishable in this respect from private employers. In no sense can employers, public or private, be considered to be administrators of a program of workers' compensation or to be providing services incidental to administration of the program. Workers' compensation is administered by the state through the Division of Industrial Accidents and the Workers' Compensation Appeals Board. [Citation omitted.] Therefore, although the state requires that employers provide workers' compensation for nonexempt categories of employees, increases in the cost of providing this employee benefit are not subject to reimbursement as state-mandated programs or higher levels of service within the meaning of section 6.[211]

In *City of Sacramento*, the court considered whether a state law extending mandatory unemployment insurance coverage to include local government employees imposed a reimbursable state mandate.[212] The court followed *County of Los Angeles*, holding that "[b]y requiring local governments to provide unemployment compensation protection to their own employees, the state has not compelled provision of new or increased 'service to the public' at the local level…[nor] imposed a state policy 'uniquely' on local governments."[213] Rather, the court observed that most employers were already required to provide unemployment protection to their employers, and "[e]xtension of this requirement to local governments, together with the state government and nonprofit corporations, merely makes the local agencies 'indistinguishable in this respect from private employers.'"[214]

In *County of Los Angeles v. Department of Industrial Relations*, counties sought reimbursement for elevator fire and earthquake safety regulations that applied to all

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[210] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 57-58, emphasis added.

[211] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 56, 58.

[212] *City of Sacramento v. State of California* (1990) 50 Cal.3d 51.

[213] *City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 67.

[214] *City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 67. See also, *City of Richmond v. Commission on State Mandates* (1998) 64 Cal.App.4th 1190 (Finding that statute eliminating local government exemption from liability for worker's compensation death benefits for public safety employees "simply puts local government employers on the same footing as all other nonexempt employers.").

elevators, not just those that were publicly-owned.[215] The court found that the regulations were plainly not unique to government.[216] The court also found that the regulations did not carry out the *governmental* function of providing a service to the public, despite declarations by the county that without those elevators, "no peculiarly governmental functions and no purposes mandated on County by State law could be performed in those County buildings . . . ."[217] The court reasoned:

> In determining whether these regulations are a program, the critical question is whether the mandated program carries out the governmental function of providing services to the public, not whether the elevators can be used to obtain these services. Providing elevators equipped with fire and earthquake safety features simply is not "a governmental function of providing services to the public." This case is therefore unlike *Lucia Mar, supra*, 44 Cal.3d 830, in which the court found the education of handicapped children to be a governmental function (44 Cal.3d at p. 835) and *Carmel Valley, supra*, where the court reached a similar conclusion regarding fire protection services. (190 Cal.App.3d at p. 537.)[218]

Here, the requirements to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for new or widening road projects are not uniquely imposed on government. The requirements equally apply to private roads.[219] The requirements are triggered based on the size and impact of the road project, and not on whether its proponent is a private or government entity. In this respect, the requirements of the test claim permit are not unique to government, but apply only *incidentally* to the copermittees when they are the proponent of a road project subject to the test claim permit's requirements. This is no different from the situation addressed in the *County of Los Angeles* and *City of Sacramento* cases; in

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[215] *County of Los Angeles v. Department of Industrial Relations* (1989) 214 Cal.App.3d 1538.

[216] *County of Los Angeles v. Department of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1545.

[217] *County of Los Angeles v. Department of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1545.

[218] *County of Los Angeles v. Department of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1546, footnote 5.

[219] Exhibit A, Test Claim, pages 568 (Provision C.3.b.ii.4., which states, "Any of the following types of road projects that create 5,000 square feet or more of newly constructed contiguous impervious surface, *that are both public and private road projects*, and that fall under the building and planning authority of a Permittee." Emphasis added) and 569 (Provision C.3.b.ii.5., which states, "Road projects that involve the reconstruction of existing streets or roads, which create and/or replace greater than or equal to one contiguous acre of impervious surface and *that are public road projects and/or fall under the building and planning authority of a Permittee*." Emphasis added.).

each of those cases the alleged mandate applied to the local government as an employer, and applied in substantially the same manner as to all other employers, and for that reason the law at issue was not considered a peculiarly governmental "program" uniquely imposed on local government within the meaning of article XIII B.[220] An even closer analogy is seen in *County of Los Angeles v. Department of Industrial Relations*, in which the regulations complained of applied to publicly- and privately-owned elevators alike, and the court found that this did not constitute a unique requirement imposed on local government and did not carry out the *governmental* function of providing a service to the public, despite declarations by the county that without those elevators, "no peculiarly governmental functions and no purposes mandated on County by State law could be performed in those County buildings . . . ."[221]. The LID requirements apply to both municipal and private road projects.

Accordingly, with respect to public roads accepted into a permittee's road system, the Commission finds that the requirements in Provisions C.3.b.i., and C.3.b.ii.4. and 5. do not mandate a new program or higher level of service.

iii. Provisions C.3.b.i., and C.3.b.ii.4. and 5. do not impose a new program or higher level of service to verify, under the permittees' regulatory authority, the implementation of low impact development (LID) source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility for private new road projects between 5,000 and 9,999 square feet, and even if they did, the costs are not reimbursable as stated in Section IV.C.2.b. of this Decision because the permittees have fee authority to pay for any new requirements imposed by these provisions.

The activity to verify under the permittees' regulatory authority that all private new or widening road projects between 5,000 and 9,999 square feet implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility, does not impose new program or higher level of service. Under the prior permit, the permittees were also required to verify LID compliance for private road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface.[222] Although the permittees may now have to verify additional road projects and incur additional costs with the decrease in the road project size from 10,000 to 5,000 square feet required to comply with the LID requirements, the required activity is the

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[220] *City of Sacramento v. State of California* (1990) 50 Cal.3d 51, 67 citing *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 58.

[221] *County of Los Angeles v. Department of Industrial Relations* (1989) 214 Cal.App.3d 1538, 1545.

[222] Exhibit A, Test Claim, pages 1546, 1549 (Order R2-2015-0049, Provision C.3.b.).

same and the courts have been clear that increased costs alone do not require reimbursement under article XIII B, section 6.[223]

In addition, as more fully described in section IV.C.2.b. of this Decision, reimbursement is not required since the claimants have regulatory fee authority to cover the costs of the new required activities.[224]

b. Green infrastructure planning and implementation requirements imposed by Provisions C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., and C.3.j.ii.4., are not new.

The claimant requests reimbursement for several activities under Provision C.3.j., the "Green Infrastructure and Implementation" provision of the test claim permit. The introductory paragraphs of Provision C.3.j. direct the permittees *to continue to implement* their Green Infrastructure Plans (completed during the prior permit), as necessary to comply with the test claim permit, for the inclusion of LID drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, and building roofs.[225] The stated goals are as follows:

(1) The Plans are intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and PCBs TMDLs and the Urban Creeks Pesticides TMDL) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters.

(2) Over the long term, the Plans are intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.

(3) Green infrastructure project prioritization is described in the Green Infrastructure Plans based on local characteristics and priorities, and therefore green infrastructure projects will typically be designed to achieve multiple benefits in addition to mercury and PCBs load reduction.

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[223] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 54; see also, *Department of Finance v. Commission on State Mandates* (*Kern High School Dist.*) (2003) 30 Cal.4th 727, 735.

[224] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 587-593.

[225] Exhibit A, Test Claim, pages 25-26, 604-605 (Test claim permit, Provision C.3.j.i.).

> Furthermore, this Provision establishes a separate impervious surface retrofit requirement for other-than Regulated Projects.[226]

The Green Infrastructure Plan and implementation requirements were originally required by Provision C.3.j. of the prior permit (Order R2-2015-0049) and identified the same goals described above.[227]

The claimant pleads Provisions C.3.j.ii.1.a.-g. (update green infrastructure plans), C.3.j.ii.2.a.-j. (numeric retrofit requirements for projects), and C.3.j.ii.4. (long-term green infrastructure implementation), of the test claim permit.

i. The requirements in provision C.3.j.ii.1.a.-g. to update the Green Infrastructure Plan are not new.

Provision C.3.j.ii.1.a.-g. requires the permittees to "update" their Green Infrastructure Plans to ensure that municipal processes and ordinances allow and encourage green infrastructure by seeking cooperation with non-municipal entities to implement green infrastructure; update planning documents with green infrastructure implementation; develop funding mechanisms including transportation grants, stormwater fees, and application review fees; review countywide green infrastructure implementation guidance documents and adapt them as necessary to account for local considerations "if this has not already been completed during the Previous Permit term;" continue to implement the tools developed during the previous permit term to track and map completed public and private green infrastructure projects; continue to adopt or amend policies, ordinances, and other appropriate legal mechanisms; and continue to conduct outreach and education, as follows:

> The Permittees shall, individually or in a coordinated manner, update and/or supplement their Green Infrastructure Plans as needed to ensure that municipal processes and ordinances allow and appropriately encourage implementation of green infrastructure, and incorporate lessons learned, by:
>
> (a) Revising implementation mechanisms to include consideration, or reconsideration, of cooperation with non-municipal entities such as schools on green infrastructure implementation, and otherwise updating implementation mechanisms as appropriate.
>
> (b) Following through with the development or updates of general plans, specific plans, urban forestry plans, climate change adaptation plans, complete streets plans and other planning documents with a green infrastructure nexus to include language which is more supportive of green infrastructure implementation, as identified by Permittees in their Green Infrastructure Plans. Upon request by Water Board staff, Permittees shall provide justifications for planning documents that they

[226] Exhibit A, Test Claim, page 605.

[227] Exhibit A, Test Claim, pages 1576-1582 (Order R2-2015-0049, Provision C.3.j.).

assert do not need to be updated to further support green infrastructure implementation.

(c) Developing funding and funding mechanisms identified in the Green Infrastructure Plans, such as by working with the relevant agencies to expand the scope of transportation grants to include allocation for green infrastructure; establishing green infrastructure-based or green infrastructure-incorporating stormwater fees, including work that sets the foundation for additional future stormwater fees; establishing or increasing application review fees, and evaluating other opportunities to leverage municipal approval of private development to fund green infrastructure implementation.

(d) Reviewing countywide green infrastructure implementation guidance documents and adapting them as necessary to account for local considerations if this has not already been completed during the Previous Permit term, and otherwise reviewing and updating general guidelines and standard specifications as appropriate.

(e) Continuing to implement the tools developed during the Previous Permit term to track and map completed public and private green infrastructure projects, and making the information publicly available.

(f) Continuing to adopt or amend policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this Provision, as necessary.

(g) Continuing to conduct outreach and education as follows:

(i) Conduct public outreach on the requirements of this Provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professionals involved in infrastructure planning and design.

(ii) Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this Provision and methods of implementation.

(iii) Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on the requirements of this Provision and methods of implementation.[228]

The Water Boards contend that Provision C.3.j.ii.1.a.-g., does not mandate a new program or higher level of service as follows:

[228] Exhibit A, Test Claim, pages 605-607.

> Under 40 C.F.R. section 122.42(c), Permittees are required [to] submit an annual report that includes the status of implementing components of their stormwater management program that are established as permit conditions and any proposed changes to those controls. Additionally, as part of their permit application, Permittees are required to describe their existing legal authority to control discharges to the MS4 and to demonstrate that they have the legal authority to require compliance with conditions in ordinances, permits, contracts, or orders. [Fn. omitted.] The challenged provision falls within the scope of what was already required under MRP 2 and existing law—it is not new or a higher level of service.[229]

The Commission finds that these requirements are not new. Permittees were required by the prior permit to develop and implement a Green Infrastructure Plan for the inclusion of low impact development (LID) drainage design into storm drain infrastructure on public and private lands.[230] The Plan was intended to serve as an implementation guide and reporting tool for subsequent permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations from mercury and PCBs were met and to set goals for reducing the adverse water quality impacts of urbanization and urban runoff on receiving waters.[231] "Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff."[232] The Green Infrastructure Plan had to contain the following:

- Mechanisms to prioritize and map planned projects to assess load reductions of mercury and PCBs, and specifications to incorporate green infrastructure into development projects in the permittee's jurisdiction.
- Requirements that projects be designed to meet the treatment and hydromodification sizing requirements.
- Summaries of planning documents the permittee had to update or modify to incorporate green infrastructure requirements (i.e., General Plans, Specific Plans, Street Plans, Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control Plans).

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[229] Exhibit B, Water Boards' Comments on the Test Claim, page 14.

[230] Exhibit A, Test Claim, page 1576 (Order R2-2015-0049, Provision C.3.j.).

[231] Exhibit A, Test Claim, page 1576 (Order R2-2015-0049, Provision C.3.j.).

[232] Exhibit A, Test Claim, page 1577 (Order R2-2015-0049, Provision C.3.j.).

- A workplan identifying how the permittee will ensure that green infrastructure and low impact development (LID) measures are appropriately included in future plans.
- An evaluation of prioritized project funding options, including, but not limited to: Alternative Compliance funds; grant monies, including transportation project grants from federal, State, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds.[233]

Permittees were also required by the prior permit to adopt policies, ordinances, and other legal mechanisms to ensure implementation of the Green Infrastructure Plan; conduct public outreach and education public officials on the plan; train appropriate staff; and implement the plan.[234]

The requirements imposed by Provision C.3.j.ii.1.a.-g. to update the plan and to continue to implement the plan, develop funding mechanisms, conduct public outreach and education, and provide training are not new, state-mandated requirements. As indicated above, the Green Infrastructure Plan, which had to include these components, was developed and implemented under the prior permit. Federal law requires a permittee's proposed management program to include an assessment of controls to ensure that water quality standards are met and a fiscal analysis for each fiscal year covered by the permit to accomplish the activities of the program.[235] Federal law also requires permittees to annually submit a report to the Regional Board that includes proposed changes and necessary revisions to the assessment of controls and to the fiscal analysis previously reported.[236] In addition, federal law requires the permittees to have adequate legal authority to control pollutants to the MS4 and to require compliance with the NPDES permit rules.[237]

Thus, Provision C.3.j.ii.1.a.-g. does not mandate a new program or higher level of service.

ii. Provision C.3.j.ii.2.a.-j., which requires the permittees to implement green infrastructure projects in their jurisdictions, is not new.

Provision C.3.j.ii.2.a.-j. (numeric retrofit requirements for projects) requires the permittees, by June 30, 2027, to implement or cause to be implemented green infrastructure projects within their jurisdictions *which are not already defined as "regulated projects"* under Provision C.3.b., so that the impervious surface retrofits listed

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[233] Exhibit A, Test Claim, pages 1577-1579 (Order R2-2015-0049, Provision C.3.j.ii.2.).

[234] Exhibit A, Test Claim, pages 1579-1580 (Order R2-2015-0049, Provision C.3.j.ii.3.-4., C.3.j.iii.).

[235] Code of Federal Regulations, title 40, section 122.26(d)(2)(v-vi).

[236] Code of Federal Regulations, title 40, section 122.42(c).

[237] Code of Federal Regulations, title 40, section 122.26(d)(2)(i).

in Table H-1 of Attachment H are achieved.[238] Table H-1 identifies the number of acres subject to the numeric retrofit requirements for each permittee and a total by county.[239] The bottom of Table H-1 explains: "The retrofit assignment is three acres per 50,000 population, prorated, with a minimum expectation of 0.20 acres and a maximum expectation of five acres. The population data in this table is from the 2019 U.S. Census Bureau Population Estimate."[240] Thus, for example, 4.66 acres in Alameda City (with a population of 77,624) are required to be retrofitted, 5.00 acres in Alameda County (with a population of 147,218) are required to be retrofitted, and 1.18 acres in Albany (with a population of 19,696) are required to be retrofitted, with a total of 58.42 acres for all permittees in Alameda County required to be retrofitted with green infrastructure projects.[241] Provision C.3.j.ii.2.b. states the "Permittees may meet the numeric retrofit requirements listed in Table H-1 of Attachment H on a countywide basis. If Permittees within a given county do not collectively achieve their numeric retrofit requirements, each Permittee within that county shall be separately responsible for achieving its individual retrofit requirement."[242] Provision C.3.j.ii.2.c. states that although the permittees may meet their total individual numeric retrofit requirements on a countywide basis, each permittee "shall implement, or cause to be implemented, a green infrastructure project or projects treating no less than 0.2 acres of impervious surface within its jurisdiction" or "may contribute substantially to such a green infrastructure project(s) outside of its jurisdiction and within its County."[243] The remaining subdivisions in Provision C.3.j.ii.2. discuss ways for the permittees to meet their numeric compliance requirements.[244]

The Water Boards state that the requirement to implement green infrastructure projects that are not classified as "regulated projects" does not impose a new program or higher level of service because under the prior permit, the permittees were required to establish retrofit targets in the Green Infrastructure Plans, citing to Provisions C.3.d., C.3.j., C.11.c., and C.12.c. of the prior permit.[245] The Water Boards acknowledge that while the number of green infrastructure projects may increase, the underlying

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[238] Exhibit A, Test Claim, page 607.

[239] Exhibit A, Test Claim, pages 1247-1250 (Test claim permit, Attachment H, Table H-1).

[240] Exhibit A, Test Claim, page 1250.

[241] Exhibit A, Test Claim, pages 1247-1250 (Test claim permit, Attachment H, Table H-1).

[242] Exhibit A, Test Claim, page 607.

[243] Exhibit A, Test Claim, page 607.

[244] Exhibit A, Test Claim, pages 607-608.

[245] Exhibit B, Water Boards' Comments on the Test Claim, pages 13-14.

requirements are the same and, thus, there is no new program or higher level of service.[246]

The Commission finds that Provision C.3.j.ii.2.a.-j. does not mandate a new program or higher level of service. As indicated above, permittees were required by the prior permit to develop and implement a Green Infrastructure Plan for the inclusion of low impact development (LID) drainage design into storm drain infrastructure on public and private lands, including development projects that were not defined as "regulated projects."[247] The Plan was intended to serve as an implementation guide and reporting tool for subsequent permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations from mercury and PCBs were met and to set goals for reducing the adverse water quality impacts of urbanization and urban runoff on receiving waters.[248] The prior permit further stated that "[o]ver the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff."[249] In this respect, the prior permit required the Green Infrastructure Plan to include targets for the amount of impervious surface from public and private projects within the permittee's jurisdiction to be *retrofitted* over specified time schedules, consistent with the deadlines for load reductions for mercury and PCBs.[250] The permittees were required to achieve load reductions consistent with their share of the county total, based on the proportion of county population in each municipality.[251]

Thus, the requirement in Provision C.3.j.ii.2.a.-j. to implement or cause to be implemented green infrastructure projects within the permittees' jurisdictions which are not already defined as "regulated projects" is not new. Although the test claim permit may require more projects to be retrofitted than under the prior permit, increased costs alone do not establish the right to reimbursement under article XIII B, section 6 of the California Constitution.[252]

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[246] Exhibit B, Water Boards' Comments on the Test Claim, page 14.

[247] Exhibit A, Test Claim, page 1576 (Order R2-2015-0049, Provision C.3.j.).

[248] Exhibit A, Test Claim, page 1576 (Order R2-2015-0049, Provision C.3.j.).

[249] Exhibit A, Test Claim, page 1577 (Order R2-2015-0049, Provision C.3.j., page 50).

[250] Exhibit A, Test Claim, pages 1578, 1642-1644, 1649-1651 (Order R2-2015-0049, Provisions C.3.j.i.2.c., C.11.c., C.12.c.).

[251] Exhibit A, Test Claim, pages 1642-1644, 1650-1651 (Order R2-2015-0049, Provisions C.11.c.ii., C.12.c.ii.).

[252] *County of Los Angeles v. State of California* (1987) 43 Cal.3d 46, 54; *Department of Finance v. Commission on State Mandates* (*Kern High School Dist.*) (2003) 30 Cal.4th

Accordingly, Provision C.3.j.ii.2.a.j. does not mandate a new program or higher level of service.

iii. Provision C.3.j.ii.4., which provides that the permittees "may" form a technical working group to discuss long term green infrastructure goals does not impose a state-mandated requirement.

Provision C.3.j.ii.4. provides that the permittees, together with Water Board staff and science experts, "may" collectively form a Technical Working Group to discuss long term green infrastructure goals and recommend long term percentage reductions in permittees' impervious surfaces at individual, countywide, and regional scales. Discussions should prioritize long term goals for development and redevelopment projects not already defined as "regulated projects" by Provision C.3.b. The group "should meet at a minimum biannually," and subsequent to a report required by another Provision, "should meet annually."[253] The claimant contends that "To support its member agencies implementing the increased requirements under Provision C.3.j.ii.(4), in Fiscal Year 22/23 the Program updated and maintained a GIS platform that allows members to track their green infrastructure projects in order to comply with this new requirement."[254]

The Water Boards contend Provision C.3.j.ii.4., which provides that the permittees, together with Water Board staff and science experts, "may" collectively form a Technical Working Group, does not impose a mandate, but is voluntary.[255]

The Commission finds that Provision C.3.j.ii.4. does not, by its plain language, impose a state-mandated requirement. Nor is there a requirement to update and maintain a GIS platform that allows members to track their green infrastructure projects, as alleged by the claimant. These activities are voluntary and not mandated by the state.

c. <u>The requirements to develop and implement a LID monitoring plan in accordance with Provision C.8.d. and form a Technical Advisory Group to review and make recommendations regarding the LID monitoring plan are new.</u>

Provision C.8.d. addresses the development and implementation of low impact development (LID) monitoring plans to measure compliance and effectiveness of LID controls.

> LID Monitoring is intended to measure compliance and effectiveness of LID implementation. It will improve the understanding of the following two

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727, 735; *San Diego Unified School Dist. v. Commission on State Mandates* (2004) 33 Cal.4th 859, 876-877.

[253] Exhibit A, Test Claim, pages 609-610.

[254] Exhibit A, Test Claim, page 25.

[255] Exhibit B, Water Boards' Comments on the Test Claim, page 15.

management questions (which are repeated in Finding C.8-6 above) related to the implementation of LID controls:

(1) What are the pollutant removal and hydrologic benefits, such as addressing impacts associated with hydromodification, of different types of LID facilities, systems, components, and design variations, and how do they change over time?

(2) What are the minimum levels of O&M necessary to avoid deteriorated LID facilities, systems, and components that reduce pollutant removal and hydrologic benefit performance?[256]

Provision C.8.d. imposes the following requirements on the permittees:

- At the regional or countywide level, develop LID monitoring plans, which shall do the following:

  (a) Explain how the study(s) will address both management questions and propose monitoring questions necessary that will address both management questions.

  (b) Describe the LID facility(s) or system(s) and study area(s), including the characteristics, land use and management actions within the tributary drainage area to the LID facility(s) or system(s) that will be monitored.

  (c) List the monitoring stations, monitoring parameters, and associated measurement, sample and analytical methods that will be utilized.

  (d) Establish a monitoring schedule, including number and type (wet weather and dry weather) of monitoring events for each site, that may result in a greater number of total and/or annual monitoring events than the minimum required in Table 8.d.2, and including a discussion of the allocation of samples between and within sites.

  (e) Describe the data evaluation methods, such as statistical analyses to test whether differences in concentrations are statistically significant.

  (f) Include study-specific Quality Assurance Project Plans (QAPPs), which, at a minimum, are comparable to the "SWAMP QAPrP."

  (g) Provide annual cost estimates for the implementation of the LID Monitoring Plan.

  (h) Explain how sampling and analytical methodologies will be regionally consistent.[257]

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[256] Exhibit A, Test Claim, page 643.

[257] Exhibit A, Test Claim, pages 643-644 (test claim permit, Provision C.8.d.i.1.).

- Implement the LID monitoring plans no later than the start of the 2024 Water Year, which is October 1, 2023.[258] The LID effectiveness monitoring methods listed in Table 8.d.1. shall be implemented and shall investigate pollutant removal benefits, hydrologic performance, and changes over time.[259] LID monitoring shall be consistent with the parameters and intensities in Table 8.d.2., which identify the total number of samples required and the pollutants to be monitored for each countywide stormwater program, as follows:[260], [261]

Countywide Stormwater Program	**Anticipated Type(s) of LID Facilities Monitored**	**Total Minimum Number of Water Quality Sample Events During Permit Term (Annual Minimum)**[Fn. omitted]	**Parameters** [Fns. omitted]
Alameda	High flow rate tree well filters and/or a combination of several LID measures.	25 (3)	**Required:** • Total Hg (mercury); • Total PCBs; • TSS (total suspended solids) • PFAS (forever chemicals; • TPH (total petroleum hydrocarbons); • Total and Dissolved Copper; • Flow; • Total Hardness; and • pH. **Optional:** • Other emerging contaminants; [Fn. omitted] and Other ancillary parameters. [Fn. omitted]
Contra Costa	Bioretention and/or other infiltration-based LID measures.	25 (3)	
San Mateo	Regional multi-benefit stormwater capture facility(s).	25 (3)	
Santa Clara	Bioretention and/or other LID measures.	25 (3)	
Solano	Bioretention and/or other LID measures.	12 (1)	

[258] Exhibit A, Test Claim, pages 643-644 (test claim permit, Provisions C.8.d.i.2., C.8.d.v.).

[259] Exhibit A, Test Claim, pages 645-646.

[260] Exhibit A, Test Claim, page 645. Tables 8.d.1. and 8.d.2. are on pages 646-647.

[261] Exhibit A, Test Claim, page 647 (test claim permit, Table 8.d.2.).

A footnote to Table 8.d.2. states the following: "Samples shall be collected via automated sampler as flow-weighted composite event mean concentrations (EMCs); time-weighted composites are allowed if they have many subsamples and can be closely approximated as flow-weighted composites. In order to assess performance, each sample event must include simultaneous sampling of the influent and effluent. The Permittees are encouraged to additionally collect sediment samples (e.g., to analyze for total PCBs and total mercury), however such sediment sample collection shall not count towards the required water quality samples specified in this column."[262]

The Fact Sheet explains that "Flow- or time-weighted composite EMCs involve the collection of a sample aliquot [or small samples] at a certain increment of flow passing through the monitored orifice, or at a certain increment of time, which is then added to a storage container to form a single composite sample."[263]

- Form a Technical Advisory Group, which includes Water Board staff and science advisors, to review and make recommendations regarding the LID monitoring plans before submission to the Executive Officer. Draft monitoring plans shall be submitted to the advisory group by March 1, 2023. Prior to the Executive Officer's approval or conditional approval of the LID monitoring plans, the advisory group shall be convened at least biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation.[264]
- Submit LID monitoring plans for Executive Officer approval by May 1, 2023.[265]

The Water Boards contend that Provision C.8.d. does not mandate a new program or higher level of service as follows:

> [The prior permit] MRP 2 included monitoring and reporting requirements for LID and trash. Under MRP 2, Permittees were required to submit various LID reports [Fn. omitted, which refers to "MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provisions C.3.b.iv, C.3.c.ii, C.3.h.v, and C.3.j.v."] and to implement an Operation and Maintenance Verification Program that included Permittee inspections of installed LID stormwater treatment systems and reporting on results of inspections, including findings of whether the system was operating properly and whether enforcement action was taken. [Fn. omitted, which refers to "MRP 2, S.F. Bay Water Board Order R2-2015-0049, Provision C.3.h.i, ii, iv."].
>
> The challenged monitoring provisions are not new programs or higher levels of service. Under the Clean Water Act, the Water Boards must

[262] Exhibit A, Test Claim, page 647, footnote 33.

[263] Exhibit A, Test Claim, page 993 (Fact Sheet).

[264] Exhibit A, Test Claim, page 645 (test claim permit, Provision C.8.d.ii.).

[265] Exhibit A, Test Claim, page 645 (test claim permit, Provision C.8.d.v.i.)

> include conditions in NPDES permits to assure compliance with permit limitations, including conditions on data and information collection (i.e., monitoring) and reporting. [Fn. omitted.] Additionally, under the Clean Water Act implementing regulations, a stormwater permit must establish the "type, intervals, and frequency [of monitoring] sufficient to yield data which are representative of the monitored activity." [Fn. omitted.] An NPDES permit is unlawful if a permittee is not required to monitor its discharges in a manner sufficient to comply with the permit. [Fn. omitted.][266]

The Commission finds that the requirement to develop a LID monitoring plan in accordance with Provision C.8.d. and the requirement to form a Technical Advisory Group to review and make recommendations regarding the LID monitoring plan are new requirements. The Water Boards identify a number of provisions from the prior permit to argue that these requirements are not new, but none require the permittees to develop and submit a LID monitoring plan or form a Technical Advisory Group. Provision C.3.b.iv. of the prior permit required the permittees to report on regulated development projects, including the status of the project, the source control measure used, and the operation and maintenance responsibility mechanism for the life of the project.[267] Provision C.3.c.ii. of the prior permit required the permittees to report on the design specifications for pervious pavement systems.[268] Provision C.3.h.v. required the permittees to have an inspection program for LID and hydromodification management source controls to ensure they are maintained.[269] The closest provision from the prior permit is Provision C.3.j.iv., which required the permittees to develop and implement methods to track and report on the implementation of green infrastructure measures on public and private parcels, which had to provide reasonable assurance that the wasteload allocations for PCBs and mercury TMDLs and reductions for trash were being met.[270] However, the requirement to track and report on the implementation of green infrastructure measures is still required by the test claim permit, in Provision C.3.j.v.[271] The requirement in the test claim permit to develop a LID monitoring plan, due to the Executive Officer by May 1, 2023, is a new plan that was not required by the prior permit. Thus, the following requirements are new:

- At the regional or countywide level, develop LID monitoring plans as specified.[272]

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[266] Exhibit B, Water Boards' Comments on the Test Claim, pages 16-17.

[267] Exhibit A, Test Claim, pages 1550-1551 (Order R2-2015-0049, Provision C.3.b.iv.).

[268] Exhibit A, Test Claim, page 1554 (Order R2-2015-0049, Provision C.3.c.ii., p. 27).

[269] Exhibit A, Test Claim, page1575 (Order R2-2015-0049, Provision C.3.h.v.).

[270] Exhibit A, Test Claim, pages 1580-1581 (Order R2-2015-0049, Provision C.3.j.iv.).

[271] Exhibit A, Test Claim, page 611.

[272] Exhibit A, Test Claim, pages 643-644 (test claim permit, Provision C.8.d.i.).

- Form a Technical Advisory Group, which includes Water Board staff and science advisors, to review and make recommendations regarding the LID monitoring plans before submission to the Executive Officer. Draft monitoring plans shall be submitted to the advisory group by March 1, 2023. Prior to the Executive Officer's approval or conditional approval of the LID monitoring plans, the advisory group shall be convened at least biannually. Thereafter, it shall be convened at least annually to provide continued feedback regarding the implementation.[273]
- Submit the LID monitoring plan for Executive Officer approval by May 1, 2023.[274]

In addition, the requirement to implement the LID monitoring plan to measure compliance and effectiveness of LID implementation by collecting samples using flow- or time-weighted composite event mean concentrations (EMCs), is a new requirement. Under federal law, an NPDES permit is unlawful if a permittee is not required to monitor its discharges in a manner sufficient to comply with the permit.[275] The prior permit required the implementation of LID and hydromodification controls on development. However, the prior permit did not specifically require LID monitoring. It required, as the Water Boards contend, inspections of installed LID stormwater treatment systems and reporting on results of inspections, including findings of whether the system was operating properly.[276] The prior permit also required the permittees to monitor for the pollutants at issue under the pollutants of concern monitoring, by collecting and analyzing the pollutants in stormwater runoff or bedded sediments.[277] However, LID monitoring specifically to determine the pollutant removal and hydrologic benefits of different types of LID components and design variations, and the minimum levels of operation and maintenance necessary to avoid deteriorated LID components[278] was not required by the prior permit.

Although these requirements are new, the Commission does not determine if these requirements mandate a new program or higher level of service since the claimants have fee authority sufficient as a matter of law to cover the costs of these requirements within the meaning of Government Code section 17556(d) and, thus, reimbursement is denied.

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[273] Exhibit A, Test Claim, page 645 (test claim permit, Provision C.8.d.ii.).

[274] Exhibit A, Test Claim, page 645 (test claim permit, Provision C.8.d.vi.)

[275] *Natural Resources Defense Council, Inc. v. County of Los Angeles* (2013) 725 F.3d 1194, 1207 ("That is, an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance. See 40 C.F.R. § 122.26(d)(2)(i)(F) . . .").

[276] Exhibit A, Test Claim, pages 1570-1575 (Order R2-2015-0049, Provision C.3.h.i., ii., iv.).

[277] Exhibit A, Test Claim, page 1616 (Order R2-2015-0049, Table 8.2.).

[278] Exhibit A, Test Claim, page 643.

d. The MS4 map requirement in Provision C.5.f. to develop and submit a plan and schedule with the 2026 Annual Report to update existing storm sewer system information, maps, drawings, and databases is new; but all other requirements are not new.

Provision C.5.f. requires the permittees to update their maps of the MS4 and make them available to the public. Provision C.5.f. imposes the following requirements on the permittees:

- Make the current map(s) of its MS4 available to the public either electronically or in hard copy. Public availability shall be made through a single point of contact convenient to the public, such as a staffed counter or web-accessible map. The availability of the map shall be publicized through permittee directories and web pages.
- Update the maps.
    - Determine information missing from the current MS4 map, which may include Oakland Museum watershed maps, existing MS4 maps or drawings in the Permittee files, or other storm sewer system information databases.
    - Identify and make available to the Water Board maps of the storm sewer system and other stormwater controls installed after publication of the Oakland Museum watershed maps within the permittees' jurisdictional area.
    - Develop a plan and schedule for updating the Permittee's storm sewer system information. Permittees or countywide stormwater programs may work together or with the Oakland Museum of California to develop a plan and schedule for updating existing information, maps, drawings, and databases. The plan will consider the potential to identify storm sewer system component locations, size or specifications, materials of construction, and condition.
- Reporting.
    - In the 2024 Annual Report, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.
    - Submit a plan and schedule with the 2026 Annual Report to update existing storm sewer system information.[279]

The Water Boards contend that Provision C.5.f., requiring the permittees to update their maps, does not mandate a new program or higher level of service because updated maps are required by federal regulations as follows:

[279] Exhibit A, Test Claim, pages 629-630.

> As required by 40 C.F.R. section 122.26(d)(1)(iii), the Permittees must include a topographic map in their application identifying the location of known MS4 outfalls that discharge to waters of the U.S., a description of land use activities and population densities within the drainage area, the location of municipal landfills, the location of discharges to the MS4 authorized by an NPDES permit, location of major structural controls for stormwater discharge, and identification of public parks and other open spaces. [Fn. omitted.] The Permittees must also identify the location of any major outfall [Fn. omitted.] that is not identified in the required map. [Fn. omitted.] Requiring Permittees to update maps to include information that is missing is not a new program or higher level of service—it is a requirement to do what is already required by existing law.[280]

The prior permit, in Provision C.5.f. also required each permittee to make a map of its MS4, make it available to the public, and report on that progress in the annual reports as follows:

> **C.5.f. Municipal Separate Storm Sewer System (MS4) Map**
>
> **i. Task Description** – Each Permittee shall make the map(s) of its MS4 available.
>
> **ii. Implementation Level** – Permittees shall make maps of the MS4 publicly available, either electronically or in hard copy. Public availability shall be made through a single point of contact that is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.
>
> **iii. Reporting** – In the 2016 and 2019 Annual Reports, Permittees shall discuss how they make MS4 maps available to the public and how they publicize the availability of the MS4 maps.[281]

Thus, the permittees already had to have a map, make their maps available to the public, report on how the permittee makes their maps available, and federal law in section 122.26(d)(1)(iii) of the title 40 Code of Federal Regulations requires each permittee, when submitting an application to discharge pollutants, to provide a current map of all existing outfalls and land use activities within the drainage area served by the MS4 municipal storm sewer system. Thus, these activities are not new and do not mandate a new program or higher level of service.

However, developing and submitting a plan and schedule with the 2026 Annual Report to update existing storm sewer system information is new. This is consistent with the Fact Sheet, which states that the "[p]revious permits did not require Permittees to submit regular updates to their MS4 system maps" as follows:

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[280] Exhibit B, Water Boards' Comments on the Test Claim, pages 14-15.

[281] Exhibit A, Test Claim, page 1593 (Order R2-2015-0049, Provision C.5.f.).

> . . . this Permit also requires Permittees to identify information missing from the current MS4 maps and develop a plan and schedule to compile additional storm sewer system information. *Previous permits did not require Permittees to submit regular updates to their MS4 system maps*, so the current status of the overall MS4 systems as compared to previous maps is unknown. To effectively manage and respond to illicit discharges, as well as potential impacts from conditionally exempted discharges like emergency firefighting discharges, it is essential for Permittees to understand their current MS4 system layout and conditions, as well as how discharge sources are connected to outfalls that discharge to their system.[282]

The Commission, however, does not reach the issue of whether these requirements mandate a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, reimbursement is not required since the claimants have fee authority to cover the costs of the requirement and, thus, there are no costs mandated by the state pursuant to Government Code section 17556(d).

e. <u>The requirement to submit a revised Trash Generation Area Map with the 2024 annual report, which includes trash management areas and private land drainage areas that will be retrofitted with full trash capture devices or the equivalent by June 30, 2025, pursuant to Provision C.10.a.ii., is new; but the other requirements in Provisions C.8.e.ii..1., C.8.e.ii.2., C.10.a.i, and C.10.e. are not new.</u>

The claimant pleads Provisions C.8.e.ii.1., C.8.e.ii.2., C.10.a.i., C.10.a.ii., and C.10.e. regarding trash.[283]

Provision C.8.e. addresses trash monitoring. Provisions C.8.e.ii.1. and C.8.e.ii.2. impose the following trash monitoring requirements on the permittees:

- Collect and analyze the amount of trash discharged from MS4 outfalls that drain tributary drainage areas controlled to the low trash generation level during storm events that will likely result in discharges of trash through the MS4 system.

  Sampling of MS4 outfalls includes the use of netting devices attached to the end of the outfall pipe (that capture trash discharging through the MS4), or other equivalent end-of-pipe (or in-line) devices and structures, whether existing, modified, or new. The device used to monitor trash shall not be used to control trash.

  Provision C.8.e.iii.1. states "Permittees shall conduct MS4 outfall monitoring annually, starting October 1, 2023, at no less than the number of sites and events specified in the table below, according to the approved or conditionally

[282] Exhibit A, Test Claim, page 966 (Fact Sheet), emphasis added.

[283] Exhibit A, Test Claim, pages 28-31.

approved Trash Monitoring Plan."[284] The table identifies the minimum number of sites and monitoring events for each countywide stormwater program as follows:

County	MS4 Outfall Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	3	3
Contra Costa	2	3
Solano	1	3
San Mateo	2	3
Santa Clara	3	3[285]

- Implement a pilot program to directly sample sections of receiving waters (in-stream) that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the low trash generation level during storm events that will likely result in discharges of trash through the MS4 system.

  Sampling a receiving water directly (in-stream) involves the use of trawls, nets, or other equivalent devices, that are designed to capture as much of the width and depth of the receiving water's cross section (especially the thalweg) as is feasible and safe, during storm events that will (or that Permittees estimate are likely to) result in discharges of trash through the MS4 system.[286]

  Provision C.8.e.iii.2. states "Permittees shall implement a pilot program for direct in-stream monitoring. Permittees shall conduct this monitoring annually, starting October 1, 2024, at no less than the number of sites and events specified in the table below, according to the approved or conditionally approved Trash Monitoring Plan."[287]

[284] Exhibit A, Test Claim, page 651.

[285] Exhibit A, Test Claim, page 651.

[286] Exhibit A, Test Claim, pages 649-650.

[287] Exhibit A, Test Claim, page 651.

County	Direct In-Stream Monitoring	
	Minimum Number of Sites	Minimum Number of Wet Weather Monitoring Events
Alameda	2	3
Contra Costa	1	3
Solano	0	0
San Mateo	1	3
Santa Clara	2	3[288]

Provisions C.10.a.i and C.10.a.ii. address the following trash reduction requirements:

- Implement trash load reduction control actions in accordance with the following schedule and trash generation area management requirements, including mandatory minimum full trash capture systems, to meet the goal of 100 percent trash load reduction or no adverse impact to receiving waters from trash by June 30, 2025.

  Permittees shall reduce trash discharges from 2009 levels, described below, to receiving waters in accordance with the following schedule:

  (1) 90 percent by June 30, 2023; and

  (2) 100 percent by June 30, 2025.[289]

- Permittees that do not attain the 90 percent compliance benchmark by June 30, 2023, shall submit a revised trash load reduction plan as described in Provision C.10.d and a schedule of implementation of additional trash load reduction control actions sufficient to achieve compliance with the 90 percent compliance benchmark within a reasonable timeframe, and the 100 percent compliance benchmark by June 30, 2025.[290]

- Demonstrate attainment of trash discharge percentage reductions by management of Trash Generation Area Maps included with their Long-Term Trash Reduction Plans, submitted in February 2014.[291]

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[288] Exhibit A, Test Claim, page 651.

[289] Exhibit A, Test Claim, page 680 (test claim permit, Provision C.10.a.i.).

[290] Exhibit A, Test Claim, page 680 (test claim permit, Provision C.10.a.i.).

[291] Exhibit A, Test Claim, page 680 (test claim permit, Provision C.10.a.ii.).

- With the 2024 Annual Report, submit a revised Trash Generation Area Map that includes trash management areas, as well as private land drainage areas (See Provision C.10.a.ii.b) that will be retrofitted with full trash capture devices, or equivalent, by June 30, 2025. The updated trash generation map(s) shall include GIS layers and appropriate metadata (including tables etc.) that identify locations and associated drainage areas of full trash capture systems, and other trash control actions, and shall highlight any revisions or changes from the previous map(s).[292]
- Implement trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems, to reduce trash generation to a Low trash generation rate or better.[293]
- By July 1, 2025, ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that Permittees do not own or operate (private), but that are plumbed to Permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems. If there is a full trash capture device downstream of these private lands that is designed, operated, and maintained to control trash discharges from that land area, no other trash control is required.[294]

Provision C.10.e. states in relevant part: "Permittees *may* collectively submit a programmatic report by March 31, 2023, for the approval of the Executive Officer, that describes conditions under which it is impracticable to control trash via full trash capture devices. The impracticability report shall include, but not be limited to, the following:

i. A description of the engineering constraints that prevent the installation of full trash capture devices.

ii. A process for evaluating and determining impracticability of full trash capture devices.

iii. Alternative Controls: The report shall include alternative controls or a combination of controls that may be implemented to reduce trash loads to meet the requirements and deadlines in Provision C.10.a. Examples of alternative controls include, but are not limited to, requiring businesses or property owners to pick up litter, successful implementation of excess trash receptacles and collection services, increased code enforcement or parking enforcement/ticketing/towing, additional trash pick-ups, street sweeping, assessment and execution of cooperative implementation opportunities with Caltrans or neighboring Permittees, curb inlet screens, and long term measures

[292] Exhibit A, Test Claim, page 681 (test claim permit, Provision C.10.a.ii.).

[293] Exhibit A, Test Claim, page 681 (test claim permit, Provision C.10.a.ii.a.).

[294] Exhibit A, Test Claim, page 682 (test claim permit, Provision C.10.a.ii.b.).

such as pump station or storm drain retrofits, implementation of green stormwater infrastructure that controls trash, or changes to the catchment to allow effective implementation of full trash capture measures."[295]

The Water Boards contend that these provisions do not mandate a new program or higher level of service. They contend the prior permit required trash monitoring and specific reductions in trash and, thus, these provisions are not new.[296] Specifically, the permittees were required by the prior permit to perform visual monitoring on land to assess the effectiveness of trash controls and to conduct receiving water monitoring and develop a monitoring plan to determine the presence of trash and whether trash was causing or contributing to adverse trash impacts, and if the permittee's trash control actions effectively prevented trash.[297] The Water Boards further contend the requirement for a plan of additional trash controls that is triggered by failure to meet the 90% reduction deadline is not a new program or higher level of service, since this provision was carried over from the prior permit.[298]

The Commission finds that most of these requirements are not new and do not mandate a new program or higher level of service. The requirements in Provisions C.8.e.iii.1. and 2. of the test claim permit to monitor for trash and to conduct a pilot program to sample sections of receiving waters that receive runoff primarily from MS4 outfalls that drain tributary drainage areas controlled to the low trash generation level during storm events that will likely result in discharges of trash through the MS4 system are not new. The prior permit also required the permittees to conduct receiving water monitoring and to develop receiving monitoring tools and protocols to determine if their trash control actions effectively prevented trash from discharging into receiving waters and to determine sources that were causing or contributing to adverse trash impacts in receiving waters.[299] The prior permit also required the permittees to conduct visual on land assessments of trash to determine or verify the effectiveness of the trash control actions.[300] Federal law also requires monitoring sufficient to determine if the conditions

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[295] Exhibit A, Test Claim, pages 688-689, emphasis added. Provision C.10.e.iv. is not quoted above, but states "Permittees shall use an approved trash impracticability report in developing the updated Trash Load Reduction Workplans required by Provision C.10.d." The claimant did not plead Provision C.10.d. or request reimbursement to update the Trash Load Reduction Workplans, and therefore the language in Provision C.10.e.iv. is not addressed in this Decision.

[296] Exhibit B, Water Boards' Comments on the Test Claim, page 17, 21-22.

[297] Exhibit B, Water Boards' Comments on the Test Claim, page 17.

[298] Exhibit B, Water Boards' Comments on the Test Claim, page 22.

[299] Exhibit A, Test Claim, pages 1634-1635 (Order R2-2015-0049, Provision C.10.b.v.).

[300] Exhibit A, Test Claim, page 1633 (Order R2-2015-0049, Provision C.10.b.ii.b.).

of the permit, including the receiving water limitations and discharge prohibitions, are being met.[301] Thus, these activities are not new.

In addition, the prior permit required a 100 percent reduction in trash discharges from 2009 levels by July 1, 2022 by implementing trash prevention and control actions, including full trash capture systems or other trash management actions, or combinations of actions, with trash discharge control equivalent to or better than full trash capture systems.[302] The test claim permit simply extends that deadline to July 1, 2025, and implementing trash reduction actions required by Provisions C.10.a.i. and C.10.a.ii. to meet the deadline are not new and do not mandate a new program or higher level of service.

The requirement in Provision C.10.a.ii.b. to ensure that private lands that are moderate, high, or very high trash generating, and that drain to storm drain inlets that permittees do not own or operate, but that are plumbed to permittees' storm drain systems are equipped with full trash capture systems or are managed with trash discharge control actions equivalent to or better than full trash capture systems, is not new. The same requirement was imposed by Provision C.10.a.ii.b. of the prior permit.[303]

The requirement in Provision C.10.e., which states that "Permittees *may* collectively submit a programmatic report by March 31, 2023, for the approval of the Executive Officer, that describes conditions under which it is impracticable to control trash via full trash capture devices" is a local discretionary decision and is not mandated by the state.

However, the requirement to submit a revised Trash Generation Area Map with the 2024 annual report, which includes trash management areas and private land drainage areas that will be retrofitted with full trash capture devices or the equivalent by June 30, 2025, pursuant to Provision C.10.a.ii., is new. The prior permit states that the permittees "designated trash management areas on their February 2014 maps encompassing one or more trash generation areas, which they will implement trash control actions" and that the permittees had an opportunity under the prior permit to

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[301] United States Code, title 33, section 1342(a)(2) (Public Law 100-4); Code of Federal Regulations, title 40, section 122.44(i)(1); *Natural Resources Defense Council, Inc. v. County of Los Angeles* (2013) 725 F.3d 1194, 1207 ["[T]he Clean Water Act *requires* every NPDES permittee to monitor its discharges into the navigable waters of the United States in a manner sufficient to determine whether it is in compliance with the relevant NPDES permit. 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1) ("[E]ach NPDES permit shall include conditions meeting the following ...monitoring requirements ... to assure compliance with permit limitations."). That is, an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance. *See* 40 C.F.R. § 122.26(d)(2)(i)(F) ("Permit applications for discharges from large and medium municipal storm sewers ... shall include ...monitoring procedures necessary to determine compliance and noncompliance with permit conditions....")."].

[302] Exhibit A, Test Claim, pages 1630-1631 (Order R2-2015-0049, Provision C.10.a.).

[303] Exhibit A, Test Claim, page 1631 (Order R2-2015-0049, Provision C.10.a.ii.b.).

revise their maps in an annual report submittal.[304] The requirement in Provision C.10.a.ii. of the test claim permit is a new and additional requirement to submit another revised map with new information that was not previously required; namely, the private land drainage areas that will be retrofitted with full trash capture devices or the equivalent by June 30, 2025. In addition, the prior permit did not require the map to include GIS layers. Thus, the requirement to submit a revised map, as specified in Provision C.10.a.ii., is new. The Commission, however, does not reach the issue of whether the requirement mandates a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, the claimants have fee authority to cover the costs of the requirement within the meaning of Government Code section 17556(d) and, thus, there are no costs mandated by the state.

f. <u>The Pollutants of Concern monitoring requirements imposed by Provision C.8.f. are not new.</u>

The claimant requests reimbursement to comply with Provision C.8.f., which addresses pollutants of concern monitoring.[305] The introductory paragraph in Provision C.8.f. states the following:

> Pollutants of Concern (POC) monitoring is intended to assess inputs of select POCs to the Bay from local tributaries and urban runoff, provide information to assess compliance with receiving water limitations, support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving wasteload allocations for TMDLs and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants.
>
> In particular, monitoring required by this provision must be directed toward addressing the following six priority POC management information needs:
>
> (1) **Source Identification** - identifying or confirming which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff;
>
> (2) **Contributions to Bay Impairment** - identifying which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location);
>
> (3) **Management Action Effectiveness** - evaluating the effectiveness or impacts of existing management actions, including compliance with TMDLs and other POC requirements and providing support for planning future management actions;

[304] Exhibit A, Test Claim, page 1630 (Order R2-2015-0049, Provision C.10.a.ii.).

[305] Exhibit A Test Claim, page 29.

(4) **Loads and Status** - providing information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges;

(5) **Trends** - evaluating trends in POC loading to the Bay and POC concentrations in urban stormwater discharges or local tributaries over time; and

(6) **Compliance with Receiving Water Limitations** - providing information to assess whether receiving water limitations (RWLs) are achieved.

Provision C.8.f. then imposes the following requirements on the permittees:

- Implement or cause to be implemented the monitoring components shown in Table 8.1 (analyzing pollutants of concern in a dissolved phase, on suspended sediment, or fish tissue) to address the six POC management information needs described above. To assess compliance with receiving water limitations, permittees are required to collect and analyze analytes during the wet and dry season in receiving waters influenced by urban stormwater and dry season runoff.[306]
- Conduct pollutants of concern monitoring and sampling consistent with Tables 8.2 and 8.3, which identify the pollutants of concern, and the total number of samples required for each countywide stormwater program, the minimum number of samples for each monitoring type addressing the six priority pollutants of concern management information needs, in a Water Year (October 1-September 30), and analytical methods. For the assessment of receiving water limitations, four wet season samples and one dry season sample is required.

  The pollutants of concern are PCBs; total mercury; copper; emerging contaminants including contaminants likely in stormwater associated with vehicles, per and polyfluoroalkyl substances (PFAS), organophosphate, ester plastic additives, flame retardants, bisphenol plastic additives, and ethoxylated surfactants; ancillary parameters, including total organic carbon, suspended sediments, and hardness; and for the receiving water limitation assessment, copper, zinc, fecal indicator bacteria, and analytes determined under Provision C.8.h.iv. [those that may result in levels in receiving waters approaching or exceeding water quality objectives].[307]

  For the emerging contaminants of concern identified above, footnote c. to Table 8.2 requires the permittees to collectively produce or cause to be produced a stormwater monitoring strategy that prioritizes the emerging contaminants based on specific or likely physico-chemical properties, sources, transport pathways, and fate. In addition, the footnote states the monitoring can be satisfied either

[306] Exhibit A, Test Claim, pages 655-657.

[307] Exhibit A, Test Claim, pages 658-659, 661-662, 671.

through sampling and analysis of the number of samples indicated in the table or through augmentation of the San Francisco Bay Regional Monitoring Program Emerging Contaminants Monitoring Strategy in the amount of $100,000 per year for all Permittees combined.[308]

The Water Boards contend that the pollutants of concern monitoring required by Provision C.8.f. does not mandate a new program or higher level of service.[309] "Even if the frequency and analytes may vary, the actions are not new—Permittees were required to monitor for compliance with receiving water limitations under previous permits and existing federal law."[310]

The Commission finds that Provision C.8.f. is not new and does not mandate a new program or higher level of service. Provision C.8.f. of the prior permit also required pollutants of concern monitoring to address five of the six priority management information needs identified in the test claim permit, with only information on compliance with receiving waters missing as a stated information need from the prior permit. Although compliance with receiving waters was not specifically spelled out in Provision C.8.f. of the prior permit, all monitoring was conducted to determine if the permittees were complying with the receiving water limitations. The receiving water limitations of the prior permit prohibited conditions that created a nuisance or adversely affected the beneficial uses of the receiving waters and prohibited conditions that caused or contributed to a violation of water quality standards for the receiving waters.[311] Provision C.1. of the prior permit then stated "[t]he Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions *as specified in Provisions C.2 through C.15*."[312] The pollutants of concern monitoring was required by Provision C.8.f. and, thus, was intended to implement and ensure compliance with the receiving water limitations.[313]

Provision C.8.f. of the prior permit required pollutants of concern monitoring and also identified the parameters and monitoring frequency required for the pollutants identified in the test claim permit and required the permittees to conduct or cause to be conducted a special study that addresses relevant management information needs for emerging contaminants.[314] Although some of the specifics for the pollutants of concern

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[308] Exhibit A, Test Claim, page 660.

[309] Exhibit B, Water Boards' Comments on the Test Claim, pages 19-21.

[310] Exhibit B, Water Boards' Comments on the Test Claim, page 21.

[311] Exhibit A, Test Claim, page 1538 (Order R2-2015-0049, Provision B.).

[312] Exhibit A, Test Claim, page 1539 (Order R2-2015-0049, Provision C.1.).

[313] See also, Code of Federal Regulations, title 40, section 122.44(i)(1) ("each NPDES permit shall include . . . monitoring requirements . . . *To assure compliance with permit limitations.*"), emphasis added.

[314] Exhibit A, Test Claim, pages 1614-1617 (Order R2-2015-0049, Provision C.8.f.).

monitoring in the test claim permit may result in increased costs, those differences do not result in a mandated new program or higher level of service. Existing federal law requires monitoring sufficient to determine if the conditions of the permit, including the receiving water limitations and discharge prohibitions, are being met and are consistent with water quality standards.[315]

Thus, the pollutants of concern monitoring requirements in Provision C.8.f. of the test claim permit are not new.

g. The control measures for PCB reduction in Provision C.12.a. are not new.

The claimant requests reimbursement to comply with Provision C.12.a.,[316] which addresses the requirements to assess PCBs load reductions from stormwater in accordance with a previously adopted TMDL. Provision C.12.a. imposes the following requirements:

- Implement an assessment methodology and data collection program to quantify, in a technically sound manner, PCBs loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the PCBs control program. A technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report and updated through reporting during the last Permit term as part of Reasonable Assurance Analysis reporting submitted by all Programs in September 2020. This accounting system describes calculation methodologies, data requirements, and model parameters used to quantify the load reduction for each type of control measure. The Permittees shall use the assessment methodology to demonstrate the load reductions achieved during this Permit term as well as progress toward achieving the MRP program area PCBs TMDL wasteload allocations. The Permittees shall update this assessment methodology as necessary for use in the subsequent permit term.

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[315] United States Code, title 33, section 1342(a)(2) (Public Law 100-4); Code of Federal Regulations, title 40, section 122.44(i)(1); *Natural Resources Defense Council, Inc. v. County of Los Angeles* (2013) 725 F.3d 1194, 1207 ["[T]he Clean Water Act *requires* every NPDES permittee to monitor its discharges into the navigable waters of the United States in a manner sufficient to determine whether it is in compliance with the relevant NPDES permit. 33 U.S.C. § 1342(a)(2); 40 C.F.R. § 122.44(i)(1) ("[E]ach NPDES permit shall include conditions meeting the following ...monitoring requirements ... to assure compliance with permit limitations."). That is, an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance. *See* 40 C.F.R. § 122.26(d)(2)(i)(F) ("Permit applications for discharges from large and medium municipal storm sewers ... shall include ...monitoring procedures necessary to determine compliance and noncompliance with permit conditions....")."].

[316] Exhibit A, Test Claim, pages 33, 704-705.

"For this Permit term, the Permittees will achieve an estimated regionwide total load reduction of 1.47 kg/yr PCBs if they implement effective PCBs control measures consistent with all requirements of Provisions C.12.b through C.12.g. The Permittee-specific portion of the regionwide PCBs load reduction estimate shall be based on the proportion of county population in each municipality."[317]

- Reporting.

  (1) In each Annual Report, Permittees shall submit documentation confirming that all control measures effectuated during the previous Permit term for which load reduction credit was recognized continue to be implemented at an intensity sufficient to maintain the credited load reduction.

  (2) In the 2026 Annual Report, Permittees shall report the total loads reduced using the assessment methodologies described and cited in the Fact Sheet to demonstrate cumulative PCBs load reduced from each control measure implemented since the beginning of the Permit term. This report shall also include an estimate of load reductions from control measures taking place after the 2026 Annual Report submittal but before the end of the permit term. Permittees shall submit all supporting data and information necessary to substantiate the load reduction estimates.

  (3) In their 2026 Annual Report, the Permittees shall submit, for Executive Officer approval, any refinements, if necessary, to the measurement and estimation methodologies to assess PCBs load reductions from control measures in the subsequent Permit. Any refinements to the methodologies shall be subject to public review.[318]

These requirements are not new. The Regional Board adopted the PCBs TMDL on February 13, 2008; it was approved by the State Board on October 20, 2009; was approved by the Office of Administrative Law on March 1, 2010; and was approved by the U.S. EPA on March 29, 2010.[319] The PCBs TMDL found the baseline of PCBs loads into the San Francisco is 33 kg/yr total from all sources, of which 20 kg/yr came from urban and non-urban stormwater runoff.[320] The TMDL set the wasteload allocation for the entire Bay at 10 kg/yr, of which 2 kg/yr is allotted to stormwater runoff.[321] And

[317] Exhibit A, Test Claim, page 704.

[318] Exhibit A, Test Claim, page 705.

[319] Exhibit X (3), Order R2-2008-0012, PCBs TMDL, page 3; California Code of Regulations, title 23, section 3919.6.

[320] Exhibit X (3), Order R2-2008-0012, PCBs TMDL, pages 6, 7.

[321] Exhibit X (3), Order R2-2008-0012, PCBs TMDL, page 7.

1.6 kg/yr of the wasteload allocation was allocated to permittees, to be achieved by March 2030.[322]

The prior permit, in Provision C.12.b., also required an assessment methodology and data collection program to quantify, in a technically sound manner, PCBs loads reduced through implementation of pollution prevention, source control, and treatment control, green stormwater infrastructure and other measures taken as part of the PCBs TMDL control program, as follows:

> **i. Task Description** – The Permittees shall develop, document, and implement and assessment methodology and data collection program to quantify in a technically sound manner PCBs loads reduced through implementation of pollution prevention, source control, and treatment control measures, including PCBs source control, stormwater treatment, green infrastructure and other measures. The Permittees shall use the assessment methodology to demonstrate progress toward achieving the load reductions required in this Permit term and the program area wasteload allocations.
>
> A reasonable and technically sound load reduction accounting system is described in the Fact Sheet and is based on information submitted by Permittees in the January 2014 Integrated Monitoring Report. This task consists of documenting the method described in the Fact Sheet or any alternative methodology, updating and refining the accounting system to account for new information, justifying assumptions, analytical methods, sampling schemes and parameters used to quantify the load reduction for each type of control measure, and indicating what information will be collected and submitted to confirm the calculated load reduction for each unit of activity.
>
> **ii. Implementation Level** – The Permittees shall adequately quantify the PCBs load reductions achieved through all the pollution prevention, source control, and treatment control measures Permittees will implement in this Permit term, except for measures to manage PCB-containing materials and wastes during building demolitions (C.12.f).[323]

The reporting requirements are also the same as what was required in the prior permit.[324]

Thus, Provision C.12.a. does not impose any new requirements on the permittees and does not mandate a new program or higher level of service.

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[322] Exhibit A, Test Claim, page 704 (Test Claim Permit, Provision C.12.); Exhibit B, Water Boards' Comments on the Test Claim, page 15.

[323] Exhibit A, Test Claim, pages 1648-1649 (Order R2-2015-0049, Provision C.12.b.).

[324] Exhibit A, Test Claim, page 1649 (Order R2-2015-0049, Provision C.12.b.iii.).

h. The requirements to submit plans and schedules for implementing control measures for reductions of Mercury and PCBs in old industrial areas by March 31, 2023, in accordance with Provisions C.11.c.iii.1. and C.12.c.iii.1., are new; but the remaining requirements in Provisions C.11.c. and C.12.c. are not new.

The claimant requests reimbursement to comply with Provisions C.11.c. and C.12.c., which require control measures for the reduction of mercury and PCBs in old industrial areas.[325] The test claim permit explains the permittees have over 33,100 acres of old industrial land use draining to an MS4 that have not been redeveloped or treated with green stormwater infrastructure.[326] Provisions C.11.c. and C.12.c. impose the following requirements:

(a) Implement or cause to be implemented control measures (treatment controls, diversion to wastewater treatment plants, redevelopment (provided GSI implemented in compliance with Provision C.3.b), enhanced operation and maintenance controls, or other controls) for the following mercury and PCB load reductions (for 70% control measure efficiency) in the number of old industrial acres identified below by the end of the permit term:

Mercury:

- Alameda County: 664 acres (28 grams/yr)
- Contra Costa County: 664 acres (28 grams/yr)
- San Mateo County: 445 acres (19 grams/yr)
- Santa Clara County: 664 acres (28 grams/yr)
- Solano County: 142 acres (6 grams/yr)[327]

PCB:

- Alameda County: 664 acres (121 grams/yr)
- Contra Costa County: 664 acres (121 grams/yr)
- San Mateo County: 445 acres (81 grams/yr)
- Santa Clara County: 664 acres (121 grams/yr)
- Solano County: 142 acres (26 grams/yr)[328]

Permittees may comply with this provision element either through implementation of control measures on the following amounts of old industrial land use, based on

[325] Exhibit A, Test Claim, page 32.

[326] Exhibit A, Test Claim, pages 698, 707.

[327] Exhibit A, Test Claim, page 698.

[328] Exhibit A, Test Claim, page 707.

implementation of 70% efficient control measures, or through accounting for the mass reduction of mercury shown in parentheses.[329]

(b) Reporting.

(1) By March 31, 2023, permittees shall submit plans and schedules for implementing control measures and stormwater diversion to wastewater treatment facilities in old industrial areas to address mercury and PCB load reduction requirements. This reporting shall include maps of the areas where control measures are to be implemented, the acreage of these catchments, and a description of design and sizing features all control measures, treatment devices and stormwater diversion facilities implemented for each treated catchment.

(2) Beginning in 2023, in each Annual Report, permittees shall submit an account of control measure and stormwater diversion implementation consistent with the plan submitted in March 2023 and any modifications thereto. Reporting shall include maps of the areas treated, the acreage of catchments addressed, and a description of all control measures, installed treatment devices and routing facilities for each treated catchment.

(3) In their 2026 Annual Report, permittees shall report as part of reporting under Provisions C.11.a.iii.2. and C.12.a.iii.2. on all control measures and stormwater diversion measures implemented during the permit term and provide the total acreage treated and an estimate of the total mercury and PCB mass load reduced resulting from this implementation.[330]

The Water Boards contend these requirements are not new and do not mandate a new program or higher level of service.

> MRP 3 continues the MRP 2 requirement by requiring Permittees to implement control measures in areas where benefits are most likely to accrue (i.e., old industrial areas) to make progress toward achieving the wasteload allocations in the respective TMDLs and report on the control measures in their annual reports. Based on monitoring data, the San Francisco Bay Water Board identified old industrial areas as high PCBs-yielding watersheds and thus areas where load reduction benefits are most likely to accrue. [Fn. Omitted.] The requirement to implement control measures to meet wasteload allocations in the TMDLs is not new and does not provide a higher level of service. The wasteload allocations are the level of service that will be provided by the control measures, and

[329] Exhibit A, Test Claim, pages 698, 707 (test claim permit, Provision C.11.c.i., ii., and C.12.c.i., ii.).

[330] Exhibit A, Test Claim, pages 699-700, 708 (test claim permit, Provisions C.11.c.iii. and C.12.c.iii.).

those allocations were established in the TMDLs and included in MRP 2.[331]

Although Provisions C.11.c. and C.12.c. of the test claim permit focus on old industrial areas, the requirements to implement control measures to implement mercury and PCB load reductions in accordance with the TMDLs and to report on the progress of their reductions, including a list and location of the control measures used, are not new and do not mandate a new program or higher level of service. The prior permit also required the permittees to implement mercury and "sufficient" PCB source and treatment control measures and other pollution prevention strategies to reduce mercury and PCB loads for entire permit area, and to provide similar annual reports.[332]

However, the requirements to submit plans and schedules for implementing the control measures by March 31, 2023, in accordance with Provisions C.11.c.iii.1. and C.12.c.iii.1., are new and require the submittal of new reports. The Commission, however, does not reach the issue of whether the requirement mandates a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, the claimants have fee authority to cover the costs of the requirement within the meaning of Government Code section 17556(d) and, thus, there are no costs mandated by the state.

i. <u>The requirements in Provision C.15.b.iii. to convene a firefighting non-stormwater emergency discharge working group, the work of the working group, and the submittal of a report to the Regional Board's executive officer by September 30, 2025, are new requirements; but the remaining requirements in Provision C.15.b.iii. are not new.</u>

The claimant requests reimbursement to comply with Provision C.15.b.iii., which addresses non-stormwater emergency firefighting discharges and requires the permittees to convene a regionwide working group to identify and evaluate opportunities to reduce the adverse impacts of these discharges to the MS4.[333] The requirements are as follows:

(a) Permittees shall collectively convene a regionwide Firefighting Discharges Working Group (Working Group) together with Water Board staff and other stakeholders to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activity.[334]

The Working Group shall:

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[331] Exhibit B, Water Boards' Comments on the Test Claim, page 25.

[332] Exhibit A, Test Claim, pages 1640-1641, 1646-1647 (Order R2-2015-0049, Provisions C.11.a., C.12.a.).

[333] Exhibit A, Test Claim, pages 33, 748-752.

[334] Exhibit A, Test Claim, pages 748-749.

(i) Prior to the submittal of the Firefighting Discharges Report, convene the Working Group at least twice per year. Thereafter, convene the Working Group at least annually.

(ii) Assess the adequacy of existing BMPs and standard operating procedures (SOPs) to address the potential adverse water quality impacts of firefighting water and foam discharged during emergencies (e.g., containment and cleanup), including coordination within and between municipal departments, districts and jurisdictions, coordination between firefighting personnel and containment and cleanup crews, coordination with contracted staff, and coordination with relevant agencies (e.g., CalFire), as appropriate. If the existing BMPs and SOPs need updates or are otherwise inadequate, suggest changes to those BMPs and SOPs so that they are updated and adequate. If new BMPs and SOPs are needed, recommend model BMPs and SOPs.

(iii) Assess the adequacy of existing resources (e.g., MS4 maps and maps that identify environmentally sensitive areas) used to determine if and how firefighting water and foam discharged during emergencies will impact receiving waters, in order to address pollutant discharges (e.g., by facilitating containment and cleanup).

(iv) Investigate which firefighting foams are the least environmentally harmful (i.e., have the least adverse water quality and beneficial use effects, including those related to biodegradation, biomagnification, bioaccumulation, and acute and chronic toxicity), both for Class A foams and Class B foams. Then, develop SOPs to use the least environmentally harmful firefighting foams (and dispose of the more environmentally harmful foams) and to reduce the use of firefighting foams, without jeopardizing the protection of life or property, during emergencies.

(v) Prepare outreach materials on containment and cleanup BMPs and SOPs for contractors that are hired by private parties to participate in the containment and cleanup of discharges of firefighting water and foam associated with firefighting activities within their jurisdictions. Additionally, prepare outreach materials – regarding good housekeeping practices and preventive measures – for sites that are prone to firefighting emergencies. Distribute those outreach materials to all such contractors and sites by September 30, 2025. Subsequently, if it is identified that the outreach materials need to be revised or updated, they shall be revised or updated, and then redistributed.

(vi) Pursue coordination, information sharing, feedback and Working Group participation, from relevant agencies and organizations such as the California Department of Forestry and Fire Protection (Cal Fire), the California Department of Toxic Substances Control (DTSC), the U.S. Forest Service (USFS), the State and Regional Water Boards, permittees of other NPDES municipal stormwater permits, other state and federal

agencies, and external workgroups (such as Petro-Chemical Mutual Aid), regarding interagency coordination and communication, BMPs, SOPs, and the least environmentally harmful firefighting foams.

(vii) Discuss reporting on emergency discharges of firefighting water and foam. The purpose of this reporting is first to provide transparency about the usage and water quality impacts of firefighting water and foam, and second to track reductions in those impacts over time, which is an anticipated outcome of the implementation of Provision C.15.b.iii. This shall include discussion of the timing of such reporting, and how that reporting will be submitted to the Water Board. This shall additionally include discussion of how reporting is triggered (e.g., if a certain level of discharge enters the MS4 system, if any level of discharge enters a receiving water, and if any level of PFAS foam is used pursuant the exemptions in SB 1044), as well as the content of the reporting (e.g., the date and time of the discharge, Material Safety Data Sheet (MSDS) and any supplemental information for that foam, the quantity of water and foam concentrate used, the quantity and rate of water and foam concentrate discharged to the MS4 and/or receiving water, the point of discharge to the MS4 and/or receiving water, and impacts).[335]

(a) Collectively submit a Firefighting Discharges Report by September 30, 2025, that describes progress on, and recommendations regarding, the implementation of the items listed above. The Firefighting Discharges Report shall be updated as needed on an ongoing basis, to incorporate recommendations by the Working Group.[336]

(3) Ongoing Implementation Practices:

(a) Implement the recommendations in the Firefighting Discharges Report.

(b) Ensure proper BMPs and SOPs are included in contracts for non-municipal (contracted) staff hired by permittees to assist with containment and cleanup, and to assist with prevention and mitigation of adverse impacts, of discharges associated with firefighting emergencies.

(c) For large industrial sites within Permittees' jurisdictions – such as IGP sites, gas plants, gas concentration facilities, and chemical plants – evaluate the adequacy of those sites' BMPs and SOPs for the prevention, containment and cleanup of emergency firefighting discharges into storm drains and receiving waters within Permittees' jurisdictions, and cause those BMPs and SOPs to be improved as appropriate.

(d) By June 30, 2027, require all municipal staff and contracted staff hired by permittees that participate in the containment and cleanup of (and as

[335] Exhibit A, Test Claim, pages 749-751.

[336] Exhibit A, Test Claim, page 751.

appropriate, that assist with any other activities associated with mitigating the adverse environmental impacts of) discharges of firefighting water and foam from firefighting emergencies within their jurisdictions to attend at least one training on containment and cleanup BMPs and SOPs (and other BMPs and SOPs, as appropriate). Trainings may be region-wide, program wide, or Permittee-specific. Permittees are encouraged to make these trainings available to contractors hired by private parties.

(e) Reporting:

(i) Report on the implementation of the above requirements in the Annual Reports.

(ii) In the 2027 Annual Report, report on the required trainings, including the dates of training, topics covered, and the percentage of applicable municipal and contracted staff involved in containment and cleanup activities in attendance.[337]

(4) Required BMPs:

(a) Implement and require firefighting personnel acting within their jurisdictions to implement BMPs and SOPs for emergency discharges – in order to reduce potential and actual water quality impacts – to the extent that the implementation of such BMPs does not interfere with immediate emergency response operations or impact public health and safety.

(b) During emergency firefighting situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). Permittee staff, contractors, or firefighting personnel shall control the pollution threat from their activities during emergency firefighting situations to the extent that time and resources allow.[338]

(5) Reporting

(a) Upon submittal of the Firefighting Discharges Report, Permittees shall implement the reporting recommendations and guidance therein.

(b) Otherwise, reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.[339]

The Water Boards contend that Provision C.15.b.iii. does not mandate a new program or higher level of service as follows:

> Provision C.15.b.iii is not a new program or a higher level of service. In accordance with the Clean Water Act, MRP 2 required Permittees to effectively prohibit the discharge of non-stormwater (i.e., materials other

[337] Exhibit A, Test Claim, page 751.

[338] Exhibit A, Test Claim, page 752.

[339] Exhibit A, Test Claim, page 752.

> than stormwater) into the MS4s and watercourses. [Fn. omitted.] MRP 2 conditionally exempted non-stormwater discharges of potable water from emergency firefighting activities on the condition that Permittees implement (or require firefighting personnel to implement) BMPs for emergency discharges. [Fn. omitted.] MRP 3 continues the conditional exemption and includes discharges of foam in the conditional exemption. [Fn. omitted.] Provision C.15.b.iii(2) requires the Permittees to convene a regionwide Firefighting Discharges Working Group to identify and evaluate opportunities to reduce the impacts of emergency discharges to the MS4 associated with firefighting activities. The provision also requires Permittees to collectively submit a Firefighting Discharges Report by September 30, 2025, containing recommendations regarding the implementation of BMPs, standard operating procedures, and resources used for the containment and cleanup of firefighting water and foam discharged during firefighting emergencies. [Fn. omitted.] The Firefighting Discharges Working Group and Firefighting Discharges Report will help create administrative efficiencies and reduce costs by allowing Permittees to pool resources and avoid the duplication of work that might occur if Permittees studied these issues individually, [fn. omitted] and are necessary to carry out the continuing requirement to implement BMPs for discharges associated with emergency firefighting activities.[340]

The Commission finds that the requirements to implement and require firefighting personnel acting within their jurisdictions to implement BMPs and SOPs for emergency discharges; to ensure those BMPs and SOPs are included in contracts; to evaluate the adequacy of BMPs and SOPs for the prevention, containment and cleanup of emergency firefighting discharges into storm drains and receiving waters within permittees' jurisdictions, and cause those BMPs and SOPs to be improved as appropriate; and report on these actions, are not new requirements but are required by federal law and the prior permit.

Federal law distinguishes between stormwater discharges and non-stormwater discharges. A discharge to a MS4 that "is *not* composed entirely of stormwater" is considered an illicit non-stormwater, or dry weather discharge.[341] Federal law requires that in order to achieve water quality standards and objectives, permits for discharges from MS4s "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers," except as authorized by an NPDES permit or the

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[340] Exhibit B, Water Boards' Comments on the Test Claim, page 26.

[341] Code of Federal Regulations, title 40, section 122.26(b)(2) defines "Illicit discharge" as "any discharge to a municipal separate storm sewer that is *not* composed entirely of storm water except discharges pursuant to a NPDES permit (*other than the NPDES permit for discharges from the municipal separate storm sewer*) and discharges resulting from firefighting activities." Emphasis added.

discharges are conditionally exempted from the prohibition.[342] Those exempted discharge categories that are not prohibited from entering into the MS4 are allowed only if BMPs and control measures are implemented to manage any potential pollution from entering the MS4 and ultimately the receiving waters.[343] The discharge continues to be exempt *unless* the discharge is identified as a source of pollutants to waters of the United States.[344] If a discharge is identified as a pollutant, the municipality is required by federal law to effectively prohibit the illicit discharge from entering the MS4 by implementing a program to detect and remove the discharge.[345]

To "effectively prohibit" non-stormwater discharges requires the implementation of a program by the MS4 permittee to detect and remove illicit discharges, which under federal law shall contain the following:

- A program, including inspections, to implement and enforce an ordinance to prevent illicit non-stormwater discharges to the MS4.[346]

  The program is required to address all types of illicit discharges and federal law identifies the following category of non-stormwater discharges that "shall be addressed" when identified as a source of pollutants to the waters of the United States: "street wash water (program descriptions shall address discharges or flows from fire fighting only where such discharges or flows are identified as significant sources of pollutants to waters of the United States)."[347]
- Procedures to conduct on-going field screening activities during the life of the permit, including areas or locations to be evaluated.[348]
- Procedures to investigate portions of the MS4 that, based on field screening or other information, indicate a reasonable potential for containing illicit discharges or other sources of non-storm water pollution.[349]
- Procedures to prevent, contain, and respond to spills that may discharge into the MS4;

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[342] United States Code, title 33, section 1342(p)(3)(B)(ii) (Public Law 100-4); Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(1).

[343] Code of Federal Regulations, title 40, sections 122.26(d)(2)(iv)(B), 122.44(k).

[344] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(1).

[345] United States Code, title 33, section 1342(p)(3)(B)(ii) (Public Law 100-4); Code of Federal Regulations, title 40, section 122.26(d)(2)(IV)(B)(1).

[346] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(1).

[347] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(1).

[348] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(2).

[349] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(3).

- A program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from MS4s;
- Educational activities, public information activities, and other activities to facilitate the proper management and disposal of oil and toxic materials; and
- Controls to limit infiltration of seepage from municipal sanitary sewers to MS4s where necessary.[350]

Federal law also requires that a permittee have legal authority established by statute, ordinance, or a series of contracts that enables the permittee to perform the following activities to ensure compliance with water quality standards:

- Prohibit illicit discharges to the MS4.
- Control the discharge to the MS4 of spills, dumping, or disposal of materials other than stormwater.
- Require compliance with conditions in ordinances, permits, contracts or orders.
- Carry out all inspections, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions, including the prohibition on illicit discharges to the MS4.[351]

And federal law requires an annual reporting and assessment of the control measures.[352]

The prior permit, in Provision A, prohibited non-stormwater discharges and, in Provision C.15.b.iii., the prior permit conditionally exempted emergency discharges from firefighting activities from the prohibition, provided BMPs (such as plugging the storm drain collection system for temporary storage, proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property) were implemented to control the pollutant threat from their activities.[353] Thus, under the prior permit, the claimants had to ensure that BMPs and other conditions were implemented to prevent all firefighting non-stormwater discharges from entering the MS4 and into the receiving waters. Therefore, the implementation requirements in Provision C.15.b.iii. are not new and do not mandate a new program or higher level of service. And the prior permit required the permittees to submit an annual report certifying they are in compliance with the permit.[354]

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[350] Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B).

[351] Code of Federal Regulations, title 40, section 122.26(d)(2)(i).

[352] Code of Federal Regulations, title 40, section 122.42(c).

[353] Exhibit A, Test Claim, page 1538, 1670-1671 (Order R2-2015-0049, Provisions A, C.15.b.iii.).

[354] Exhibit A, Test Claim, page 1680 (Order R2-2015-0049, Provision C.17.c.).

However, the requirements to convene a regionwide Firefighting Discharges Working Group (Working Group), the work of the working group, and the submittal of a report to the Regional Board's executive officer by September 30, 2025, in accordance with Provision C.15.b.iii. are new requirements. The Commission, however, does not reach the issue of whether these requirements mandate a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, the claimants have fee authority to cover the costs of the requirement within the meaning of Government Code section 17556(d) and, thus, there are no costs mandated by the state.

j. The requirements in Provision C.17.a. to collectively develop a report to be submitted to the Executive Officer with the 2023 Annual Report that identifies effective practices to address non-stormwater discharges associated with homelessness and specific milestones for reducing such discharges, and the requirements to submit a map of the locations of unsheltered homeless populations in relation to storm drain inlets and existing receiving waters with the 2023 Annual Report and submit an updated map with the 2025 Annual Report, are new requirements; but the remaining requirements in Provision C.17.a. are not new.

The claimant requests reimbursement to comply with Provision C.17.a., which addresses discharges associated with unsheltered homeless populations.[355] The goals of Provision C.17.a. are as follows:

> This task's broader goals are to recognize non-stormwater pollutant sources associated with unsheltered homeless populations, reasons for discharges, and means by which they occur, and develop useful information that can be used toward prioritizing individual Permittee and collaborative best management practices for reducing or managing such discharges, while ensuring the protection of public health. Examples of collaborative implementation programs could include collaborative efforts between Permittees, Caltrans, sanitary sewer agencies, railroads, non-governmental organizations (NGOs), social service agencies and organizations, and other agencies.[356]

Provision C.17.a.i.-iii. impose the following requirements:

(1) Permittees shall use results from biennial point-in-time census surveys and related information, such as municipal reports, databases, complaint logs, and other efforts, to gain a better understanding of unsheltered homeless population numbers within the permittee's jurisdiction, the locations of

[355] Exhibit A, Test Claim, page 34.

[356] Exhibit A, Test Claim, page 758.

unsheltered homeless residents, discharges and water quality-related impacts associated with homelessness, and associated sanitation-related needs.[357]

(2) To encourage ongoing regional, countywide, and municipal coordination efforts, collectively develop a best management practice report to be submitted to the Executive Officer with the 2023 Annual Report that identifies effective practices to address non-stormwater discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges within a given timeframe. The report shall:

a. Describe practices that may be implemented by permittees, including to address discharges associated with homelessness that are impacting water quality;

b. Identify regional and countywide efforts and implementation actions to address discharges associated with homelessness (including how those efforts and actions have been affected by unsheltered homeless population growth). Include recommendations for engaging in these efforts and incorporating discharge-reduction strategies that also help meet the unsheltered population's clean water needs; and

c. Identify actions taken during the COVID-19 pandemic to reduce the spread of the virus in homeless populations, such as temporarily housing homeless people in hotels, that may have reduced discharges associated with homelessness. Permittees shall consider the practicability of such actions for longer-term implementation.[358]

(3) With the 2023 Annual Report, submit a map identifying, within each permittee's jurisdiction, the approximate location(s) of unsheltered homeless populations, including homeless encampments and other areas where other unsheltered homeless people live. The map shall identify those location(s) in relation to storm drain inlets and existing streams, rivers, flood control channels, and other surface water bodies within the Permittee's jurisdiction. The map shall be updated once during the Permit term and submitted with the 2025 Annual Report. Where Permittees are working collaboratively to address discharges associated with homelessness, they may collaborate to submit a joint map that covers their respective jurisdictions.[359]

(4) Report on the programmatic efforts being implemented within each permittee's jurisdiction, or at the countywide or regional level, to address MS4 discharges associated with homelessness. "Examples of these efforts may include, but are not limited to: funding initiatives; adoption of ordinances to implement service programs; coordination with social services departments

[357] Exhibit A, Test Claim, page 757.

[358] Exhibit A, Test Claim, pages 757-758.

[359] Exhibit A, Test Claim, pages 758, 759.

and NGOs; efforts to establish relationships with homeless populations; and alternative actions to reduce discharges to surface waters associated with homelessness, such as efforts towards providing housing, jobs, and related services for residents experiencing homelessness."[360]

(5) Identify and implement appropriate best management practices to address MS4 discharges associated with homelessness that impact water quality, including those impacts that can lead to public health impacts.[361]

Evaluate and assess the effectiveness of the BMP practices, specifically by reporting on the BMP control measures being implemented, the approximate portion of the Permittee's unsheltered homeless population and locations being served by those control measures, and the portion and locations of the permittee's unsheltered homeless population not reached, or not fully reached by the implemented control measures.

"Examples of actions that may be implemented include, but are not limited to, access to emergency shelters; the provision of social services and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV "safe parking" areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing trash and waste cleanup or pickup programs within the Permittee's jurisdiction, or at the countywide or regional level."[362]

(6) Use the information generated through the biennial point-in-time census surveys and related information, and the regional coordination tasks to review and update implementation practices.[363]

(7) Reporting

(a) With the 2023 and 2025 Annual Reports, each Permittee shall report on the best management practices being implemented and

(b) Include the effectiveness evaluation reporting required in Provision C.17.a.ii.(3) and additional actions or changes to existing actions that the Permittee will implement to improve existing practices.[364]

The Fact Sheet explains that trash and human waste from homeless encampments are significant water quality and public health concerns and need to be addressed:

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[360] Exhibit A, Test Claim, page 758.

[361] Exhibit A, Test Claim, page 758.

[362] Exhibit A, Test Claim, pages 758-759.

[363] Exhibit A, Test Claim, page 759.

[364] Exhibit A, Test Claim, page 759.

Driven in part by a lack of affordable housing and the high cost of living, a significant number of Bay Area residents are experiencing homelessness. That number increased markedly during MRP 2. For example, according to the latest Point-in-Time counts, between 2017 and 2019, the South Bay, East Bay, and the San Francisco Peninsula saw an approximate 25 percent increase (with individual increases of 17 to 43 percent) in their unsheltered homeless populations. Discharges associated with people experiencing unsheltered homelessness, including human waste and trash, are unauthorized discharges that are prohibited under the MRP. Such discharges are a significant water quality concern because they adversely impact water quality and public health (through the spread of disease). At the same time, these water quality and sanitation issues can be difficult to address because sanitation services can be challenging to provide and homeless populations may not always be receptive to the services being provided. In addition, while longer-term measures to address unsheltered homelessness, such as the provision of housing and supportive services may over time reduce problematic discharges, they do not effectively reduce ongoing discharges over the short term. Thus, actions to reduce and/or eliminate MS4 discharges associated with unsheltered homelessness are necessary to prevent and minimize impacts to water quality and public health. Such actions also can improve overall water quality and sanitary conditions for people experiencing unsheltered homelessness.

In 2015, the Water Board adopted Resolution No. R2-2015-0024, which identified discharges of trash and human waste from homeless encampments as significant water quality and public health concern. The resolution encouraged municipalities to consider water quality issues while addressing the broader social issue of homelessness and undertake efforts to prevent or eliminate discharges from homeless encampments. The resolution further recommended that municipal efforts "…include clear and measurable goals for preventing trash and human waste from discharging" to receiving waters. The resolution also affirmed the Board's authority to issue cleanup and abatement orders or waste discharge requirements to regulate discharges associated with homeless encampments.

Since adoption of the resolution, some Bay Area municipalities have made progress towards controlling discharges associated with unsheltered homelessness under the Provision C.10 Direct Discharge Control Program. Although efforts under that program have provided benefit with respect to reducing discharges of trash and certain other pollutants, they have not fully addressed discharges associated with unsheltered homelessness that impact water quality. Furthermore, only five Permittees have an approved Direct Discharge Control Plan.

A number of Permittees are taking actions that help address problematic discharges. For example, East Palo Alto and Mountain View have established formalized RV encampments or RV safe parking areas where RV waste can be appropriately collected and disposed using mobile services. In Oakland, where the unsheltered homeless population increased to about 4,000 in 2020, an increase of about 63 percent from 2017, [fn. omitted] the city has established formalized encampments and is directing resources into affordable housing with the aim of getting those who are willing into housing. In 2020, Oakland adopted a new ordinance regarding where homeless encampments could be located, and is also working to provide sanitary services and manage sites for RVs, and has been targeting services to encampments that are within 500 feet of waterways. [Fn. omitted.] Similarly, San Jose has a dedicated outreach team that provides emergency shelter, meals, showers, and other basic needs while working to match individuals experiencing homelessness with an appropriate housing program. The City of San Jose also coordinates with Santa Clara Valley Water District to address discharges associated with unsheltered homelessness in and around creeks.

As noted above, the Bay Area population of people experiencing unsheltered homelessness has continued to grow, and is expected to grow further as eviction moratoria implemented during the COVID-19 pandemic expire. Meanwhile, outbreaks of Shigella and Hepatitis A, both spread through fecal-oral contact, among homeless people in California underscore the risks posed by unregulated discharges, particularly of untreated human waste, from encampments. [Fn. omitted.] To encourage Permittees' efforts, gain a better understanding of populations experiencing unsheltered homelessness, the location of encampments in relation to storm drain inlets and receiving waters, water quality related impacts, and associated sanitation-related needs, and to better understand the portion of discharges that are being addressed by Permittee efforts, and the extent to which practices may be effective, Provision C.17 requires that Permittees use results from biennial point-in-time census surveys and related information (e.g., databases, complaint logs) to review and update municipalities' implementation practices.

To encourage regional coordination between cities, Caltrans, sanitary sewer agencies, flood control districts, and other agencies (e.g., railroads, non-governmental organizations), Provision C.17 requires that Permittees collectively develop a BMP report that identifies effective practices to address MS4 discharges associated with unsheltered homelessness that impact water quality. The clearing and abating of homeless encampments, in response to public complaints, can often result in the encampment simply moving to a different location and continuing the discharges in the new location. The intent of this BMP report is therefore to foster (and prioritize) regional collaboration that takes into account the transient

> nature of unsheltered homeless populations, and the inherent benefit to Permittees sharing knowledge and resources on proven and effective strategies to managing the associated discharges from homeless encampments that impact water quality. The three main components of this report include:
>
> (1) Identifying practices (e.g., outreach, cleanup, sanitation) that could be implemented by Permittees to address discharges associated with unsheltered homelessness that are impacting water quality;
>
> (2) Identifying regional and/or countywide efforts and implementation actions towards addressing discharges associated with unsheltered homelessness. Permittees should include recommendations for engaging in such efforts that aim to provide clean water and sanitation needs for the homeless population; and
>
> (3) Identifying practices implemented by municipalities during the COVID-19 pandemic to reduce the spread of the virus in homeless populations (such as providing temporary housing, etc.) that may have contributed towards a water quality benefit.
>
> The tasks identified above are intended to assist Permittees in developing a framework for controlling and eliminating MS4 discharges associated with homeless encampments, and refining individual and collaborative best management practices (associated with unsheltered homelessness) to ensure the protection of water quality and public health. Practices that harm or criminalize unsheltered homeless residents, such as encampment sweeps, are discouraged under this provision. To evaluate BMP effectiveness, Provision C.17 requires that Permittees report on the control measures being implemented, the approximate portion and locations of the unsheltered homeless population being served by those measures, and the portion (number of people) and location not reached, or not fully served by those measures. Examples of control measures include, but are not limited to, access to emergency shelters; the provision of social services, clean drinking water, and sanitation services; voucher programs for proper disposal of RV sanitary sewage; establishment of designated RV "safe parking" areas or formalized encampments with appropriate services; provision of mobile pump-out services; establishing and updating sidewalk/street/plaza cleaning standards for the cleanup and appropriate disposal of human waste; and establishing various cleanup or pickup programs within the Permittees jurisdiction, or at the countywide or regional level.[365]

The Water Boards contend that these requirements are not new and do not impose a state-mandated new program or higher level of service as follows:

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[365] Exhibit A, Test Claim, pages 1124-1127 (Fact Sheet).

> The BMP report required under Provision C.17.a is not a new program or a higher level of service. Consistent with the Clean Water Act, MRP 2 and previous iterations of the permit required Permittees to effectively prohibit the discharge of non-stormwater to the MS4s. [Fn. omitted.] Under MRP 2, if the Permittees or the San Francisco Bay Water Board determined that discharges were causing or contributing to an exceedance of an applicable water quality standard, Permittees were required to submit a report describing controls or BMPs that were being implemented, the level of implementation, and additional controls or BMPs that would be implemented to prevent or reduce the discharge of pollutants that was causing or contributing to the exceedance. [Fn. omitted.] MRP 3 continues to require Permittees to effectively prohibit the discharge of non-stormwater to the MS4s. [Fn. omitted.] Provision C.17.a more specifically addresses non-stormwater discharges into MS4s associated with unsheltered homeless populations. [Fn. omitted.] The unauthorized discharges associated with homelessness impact water quality and public health leading to the need for the BMP report required under Provision C.17.a. [Fn. omitted.] BMP reports are not a new program or a higher level of service. Permittees were already required to effectively prohibit non-stormwater discharges and to prepare BMP reports when their BMPs were not effectively controlling the discharge of pollutants and thus impacting water quality.
>
> The requirement to submit a map of the locations of unsheltered homeless populations is not a new program or higher level of service either. Permittees were required to submit maps under MRP 2 and existing federal law. [Fn. omitted.][366]

The Commission finds that the requirements to identify and implement appropriate BMPs to address MS4 discharges associated with homelessness, evaluate and assess the effectiveness of the BMP practices, review and update implementation practices, and annually report on the BMPs and effectiveness evaluations are not new. Both federal law and the prior permit required permittees to prohibit non-stormwater discharges, such as trash; to comply with receiving water limitations by ensuring compliance with water quality standards; and reduce the discharge of pollutants in stormwater to the maximum extent practicable by implementing control measures, best management practices, and other actions.[367] The prior permit's Fact Sheet expressly identified homeless encampments as a significant source of trash:

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[366] Exhibit B, Water Boards' Comments on the Test Claim, page 27.

[367] United States Code, title 33, section 1342(p)(3)(B)(ii), (iii); Code of Federal Regulations, title 40, section 122.26(d)(2)(iv)(B)(1); Exhibit A, Test Claim, pages 1538-1539 (Order R2-2015-0049, Provisions A, B, C.1.).

> Homeless encampments and creekside litter from a variety of sources is a significant source of trash directly dumped and placed in the riparian zone where it can be swept into receiving waters by storm flows.[368]

And,

> Trash Hot Spot cleanups have an added benefit in that may also remove discharges of trash from non-storm drain sources, e.g., direct dumping or homeless encampments.[369]

The prior permit also required that if exceedances of water quality standards in receiving waters were detected through monitoring and persisted, the permittees were required to submit a report to the Regional Board, which could be provided with the annual report, that "describes controls or best management practices (BMPs) that are currently being implemented, and the current level of implementation, and additional controls or BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of water quality standards. . . . [and the report] shall include an implementation schedule."[370] Thus, the requirements to identify and implement appropriate BMPs to address MS4 discharges associated with homelessness, evaluate and assess the effectiveness of the BMP practices, review and update implementation practices, and annually report on the BMPs and effectiveness evaluations are not new.

However, the requirement to collectively develop a best management practice report to be submitted to the Executive Officer with the 2023 Annual Report that identifies effective practices to address non-stormwater discharges associated with homelessness into MS4s that impact water quality and specific milestones for reducing such discharges is new. The report is required to be submitted in addition to the annual report required by Provision C.22. and in addition to any report required by Provision C.1. when it is determined that discharges are causing or contributing to an exceedance of water quality standards.[371] The report also requires new information to be reported; namely, regional and countywide efforts and implementation actions to address discharges associated with homelessness and actions taken during the COVID-19 pandemic to reduce the spread of virus in homeless populations.[372]

In addition, the requirements to submit a map of the locations of unsheltered homeless populations in relation to storm drain inlets and existing receiving waters with the 2023

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[368] Exhibit A, Test Claim, page 1780 (Order R2-2015-0049, Fact Sheet).

[369] Exhibit A, Test Claim, page 1788 (Order R2-2015-0049, Fact Sheet).

[370] Exhibit A, Test Claim, page 1539 (Order R2-2015-0049, Provision C.1.a.); see also pages 1621, 1623, 1680, (Order R2-2015-0049, Provisions C.8.h.i. (reporting on monitoring), C.8.h.vi. (assessment of compliance with water quality standards in monitoring reports), and C.17.c. (annual reports).).

[371] Exhibit A, Test Claim, pages 551, 782.

[372] Exhibit A, Test Claim, pages 757-758.

annual report and submit an updated map with the 2025 annual report, are new. Federal law requires the submittal of a map with the application for an NPDES permit, which identifies the jurisdiction's outfalls, description of land use, locations of landfills and disposal facilities for waste, locations of known discharges to the MS4, and locations of major structural controls.[373] And under the prior permit, permittees had to submit a map of trash generation areas pursuant to Provision C.10.a. and a map of the full trash capture systems pursuant to Provision C.10.b.[374] However, a map of the locations of unsheltered homeless populations was not previously required by federal law or the prior permit.

The Commission, however, does not reach the issue of whether the requirements to submit the report and maps mandate a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, the claimants have fee authority to cover the costs of the requirement within the meaning of Government Code section 17556(d) and, thus, there are no costs mandated by the state.

k. <u>The requirement in Provision C.20.b. to develop a cost reporting framework and methodology is new.</u>

The claimant requests reimbursement to comply with Provision C.20.b., which requires the permittees to develop a cost reporting framework and methodology to perform the annual fiscal analysis required in Provision C.20.a., which states that permittees "shall annually prepare and submit a fiscal analysis of the capital and operation and maintenance costs incurred to comply with this Order's requirements listed in Provision C.20.b.(iii)."[375]

Provision C.20.b. imposes the following requirements on the permittees:

1. Develop a cost reporting framework and methodology to perform the fiscal analysis. "Permittees are encouraged to collaboratively develop the framework and methodology for purposes of efficiency, cost savings, and regionwide consistency and comparability. The framework shall consider identification of costs incurred solely to comply with this Order's requirements as listed in Provision C.20.b.(iii) as compared to costs shared with other programs or regulatory requirements, provide meaningful data to assess costs of different program areas, and allow for comparisons and to identify trends over time."
2. The analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds, and identify any funding resources shared on a regional or countywide basis. The analysis shall include the costs incurred to comply with this Permit, and an estimate of costs for the upcoming Permit year.

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[373] Code of Federal Regulations, title 40, section 122.26(d)(1)(iii), (iv.D.).

[374] Exhibit A, Test Claim, pages 1630, 1632 (Order R2-2015-0049, Provisions C.10.a., C.10.b.).

[375] Exhibit A, Test Claim, pages 34-35, 777.

3. The analysis shall include the following program areas:
    (1) Program management
    (2) Municipal operations
    (3) New development and redevelopment
    (4) Industrial and commercial site controls
    (5) Illicit discharge detection and elimination
    (6) Construction site controls
    (7) Public information and outreach
    (8) Water quality monitoring
    (9) Pesticides toxicity control
    (10) Trash load reduction
    (11) Mercury controls
    (12) PCBs controls
    (13) Copper controls
    (14) Bacteria controls
    (15) Discharges associated with unsheltered homeless populations
    (16) Asset management plan development and implementation
4. The costs reported for each program area shall address the following categories:
    (1) Total cost
    (2) Capital expenditures
    (3) Land costs
    (4) Personnel costs
    (5) Consultant costs
    (6) Overhead costs
    (7) Construction costs
    (8) Operation and maintenance costs
    (9) Other costs[376]

[376] Exhibit A, Test Claim, pages 777-778.

Provision C.20.c. states that "[t]he Permittees shall submit the cost reporting framework and methodology, acceptable to the Regional Water Board Executive Officer, by June 30, 2023."[377]

The Fact Sheet explains that the purpose of this provision was, in part, to obtain a standardized cost reporting methodology as follows:

> **C.20-1** Fiscal analysis and cost reporting provide a useful tool to evaluate program implementation and effectiveness. U.S. EPA has found that "examining the levels of proposed spending and funding allows the permitting authority to gauge the ability of the applicant to implement the program and predict its effectiveness. The fiscal analysis also will help determine whether the applicant has met the statutory requirement of reducing the discharge of pollutants to the MS4 to the maximum extent practicable. Finally, the estimates help the applicant evaluate the feasibility and cost-effectiveness of its program." [Fn. omitted.]
>
> **C.20-2** Standardization and comparison of cost reporting is supported by the State Water Board-funded NPDES Stormwater Cost Survey, which finds that "standards for reporting costs and stormwater activities are needed to allow accurate cost comparisons to be made between stormwater activities." [Fn. omitted.]
>
> **C.20-3** The State Water Board's Office of Research, Planning, and Performance (ORPP) has also developed guidance for Water Board staff on obtaining MS4 Permit implementation costs from permittees. This guidance describes the benefits from greater detail and more standardization in cost reporting because stormwater issues vary from system to system, often making it difficult to compare compliance costs for individual MS4 permits. Collecting standardized data on what permittees spend to comply with their MS4 permits will allow the Water Boards and stakeholders to broadly compare across regions and systems and to identify trends over time.
>
> **C.20-4** The City of Salinas MS4 Permit provides another example of standardized cost reporting data being used to evaluate the effectiveness of program implementation. It finds that "consistent and reliable cost information is critical for the Permittee to manage its assets, programs, funding strategies, and potential future credit programs and stormwater utility fees."

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[377] Exhibit A, Test Claim, page 778. The Test Claim does not request reimbursement to comply with Provision C.20.c. However, Provision C.20.c. is necessary to understand the requirements of Provision C.20.b.

> **C.20-5** The cost reporting categories were developed considering the ORPP guidance, as well as the cost reporting requirements of the City of Salinas MS4 Permit and the Regional MS4 Permit for Los Angeles and Ventura Counties. [Fn. omitted.]
>
> **C.20-6** To provide additional flexibility to Permittees in developing a reporting methodology that considers the unique aspects of each program, while also allowing for broad comparisons between program components and costs, the Permit allows Permittees to engage in a collaborative approach to developing a consistent framework.[378]

The Water Boards contend the requirements to develop a cost reporting framework and methodology to perform the fiscal analysis are not reimbursable because they implement federal law and the costs are de minimis:

> Here, under existing federal law Permittees are required to report on costs in their permit applications: 40 C.F.R. section 122.26(d)(1)(vi) requires "[for] each fiscal year to be covered by the permit, a description of the financial resources currently available to the municipality to complete part 2 of the permit application. A description of the municipality's budget for existing storm water programs, including an overview of the municipality's financial resources and budget, including overall indebtedness and assets, and sources of funds for storm water programs"; and 40 C.F.R. section 122.26(d)(2)(vi) requires "[for] each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) [characterization data] and (iv) [stormwater management program] of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds." The cost reporting framework and methodology required under Provision C.20.b provides the procedure for reporting costs for the federal requirements and does not significantly increase the cost of compliance. The requirement is intended to implement the federal cost-reporting requirements and part and parcel of them. Thus, any costs associated with Provision C.20.b are de minimis and not subject to subvention.[379]

The Commission finds that the requirements in Provision C.20.b. are new and not required by federal law or the prior permit. Federal law requires the permittees' application for a stormwater permit to include the following:

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[378] Exhibit A, Test Claim, pages 1140-1141 (Fact Sheet).

[379] Exhibit B, Water Boards' Comments on the Test Claim, page 28.

- A description of the municipality's budget for existing stormwater programs, including an overview of financial resources and budget, overall indebtedness and assets, and sources of funds for the stormwater programs.[380]
- *For each fiscal year covered by the permit*, a fiscal analysis of the necessary capital, operation and maintenance expenditures to accomplish the monitoring, analysis, and stormwater programs, including a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds.[381]

Thus, federal law requires a fiscal analysis of the stormwater program each year the permit is in effect, which includes an analysis of the capital, expenditures, source of funds for the program, and any legal restrictions on the use of funds. However, federal law does not require the permittees to develop a cost reporting framework and methodology to perform the annual fiscal analysis, which has to be submitted to the Executive Officer by June 30, 2023.

And while the prior permit had annual reporting requirements,[382] it did not require the permittees to develop a cost reporting framework and methodology to perform the annual fiscal analysis.

Thus, the Commission finds that the requirement in Provision C.20.b. to develop a cost reporting framework and methodology to perform the annual fiscal analysis, which has to be submitted to the Executive Officer by June 30, 2023, is new and not required by prior law. The Commission, however, does not reach the issue of whether this requirement mandates a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, the claimants have fee authority to cover the costs of the requirement within the meaning of Government Code section 17556(d) and, thus, there are no costs mandated by the state.

l. <u>The requirements in Provision C.21.b. to develop and implement an Asset Management Plan and to complete a Climate Change Adaptation Report are new, but the remaining requirements are not new.</u>

The claimant requests reimbursement to comply with Provision C.21.b., which requires the development of an asset management plan to ensure the satisfactory condition of hard assets.[383] "Hard assets" are defined as "structural controls that serve a water quality function, for example: bioretention cells, pervious pavement systems, full trash capture devices, trash receptacles, and pet waste stations."[384]

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[380] Code of Federal Regulations, title 40, section 122.26(d)(1)(vi).

[381] Code of Federal Regulations, title 40, section 122.26(d)(2)(vi), emphasis added.

[382] Exhibit A, Test Claim, page 1680 (Order R2-2015-0049, Provision C.17.).

[383] Exhibit A, Test Claim, pages 35-36.

[384] Exhibit A, Test Claim, page 779, footnote 67.

Provision C.21.b. imposes the following requirements on the permittees:

- Develop an Asset Management Plan by June 30, 2025, which, at a minimum, shall include the following:

  (1) A description of the asset categories to be included.

  (2) An inventory (or link to such an inventory) of permittees' existing hard assets built pursuant to the Provisions cited in Provision C.21.a, including at a minimum all LID/GSI systems and trash capture devices.

  (3) An Operation, Maintenance, Rehabilitation, and Replacement Plan (Asset Management O&M Plan), to evaluate data obtained through asset assessment in order to inform a strategy for prioritizing and scheduling maintenance, rehabilitation, and replacement of inventoried assets, including:

    (a) A process for prioritizing and scheduling operation and maintenance activities.

    (b) A process(es) for evaluating the current condition, and identifying the need for and carrying out, as appropriate, the rehabilitation and replacement of inventoried assets. The process(es) shall account for: (i) The minimum condition necessary to achieve minimum performance levels for each type of hard asset, including an assessment of stormwater volume and pollutant load reduction, necessary to comply with applicable Permit Provisions and TMDLs; (ii) current performance level and effectiveness, as indicated by condition; and (iii) consequence of failure and likelihood of failure.

    (c) An evaluation or forecast of costs necessary for the implementation of (a)-(b) above, at least through the end of the current permit term. On an ongoing basis, the Permittees shall compare these projections with available funding sources to determine the best manner in which to fund the operation, maintenance, rehabilitation, and replacement of inventoried assets. This evaluation or forecasting may supplement Permittees' compliance with Provision C.20 Cost Reporting.

  (4) Recommendations for a reporting strategy, which may have a nexus with the tracking systems referenced in Permittees' Green Infrastructure Plans, to include:

    (a) Municipality-specific reporting;

    (b) Assessment of the programmatic benefit from countywide or regional roll-up of collected information.[385]

[385] Exhibit A, Test Claim, pages 779-780.

- Begin implementation of the Asset Management Plan no later than July 1, 2025.[386]
- Reassess and update the Asset Management Plan on an as-needed basis, to address changing conditions and resources.[387]
- Provide the latest version of the Asset Management Plan to Water Board staff during inspections and audits, or otherwise upon request.[388]
- Complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies. The report shall assess existing, new, and increasing threats from climate change to the condition of permittees' inventoried hard assets over the next 50 years, and identify approaches that permittees may implement to address those threats, such as the modification of design standards and countywide technical guidance documents. The Climate Change Adaptation Report may be developed on an all-Permittee (regional) scale or countywide scale.[389]

The Water Boards contend that the requirements in Provision C.21.b. do not impose a new program or higher level of service as follows:

> The asset management requirements are not a new program or a higher level of service. Under 40 C.F.R. section 122.41(e), NPDES permittees are required to properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with its permit. The Asset Management Plan and the Climate Change Adaptation Report implement the existing federal requirement to ensure Permittees properly operate and maintain their systems of treatment and control. Without proper planning, assets cannot be properly maintained. The San Francisco Bay Water Board expects Permittees to use the information and data they already have about their own maintenance needs and the condition of their hard stormwater assets to prioritize maintenance and repairs. [Fn. omitted.] The intent of this requirement is to ensure that Permittees use their limited resources as efficiently as possible and that improvements or repairs are planned in areas where they are needed most to maintain their treatment and control systems.[390]

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[386] Exhibit A, Test Claim, page 780.

[387] Exhibit A, Test Claim, page 780.

[388] Exhibit A, Test Claim, page 780.

[389] Exhibit A, Test Claim, page 780.

[390] Exhibit B, Water Boards' Comments on the Test Claim, page 29.

Federal law requires permittees to maintain all systems and treatment and control measures to ensure compliance with the permit, including having appropriate quality assurance procedures:

> The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.[391]

The prior permit, in Provision C.3.b.iv.2.k. required the permittees to report on the operation and maintenance responsibility mechanism for the life of a regulated project.[392] Provision C.3.h. of the prior permit required the permittees to implement an "Operation and Maintenance Verification Program" for regulated projects, including agreements for maintenance, inspections, and enforcement provisions, and the permittees had to ensure that all stormwater treatment systems on the project were properly operated and maintained for the life of the project.[393] And, with respect to trash, Provision C.10.b of the prior permit required permittees to maintain Full Trash Capture Systems within their jurisdictions, maintain records of those systems, and certify annually that those systems are operated and maintained to meet the requirements for Full Trash Capture Systems.[394] Thus, implementing and assessing an operation and maintenance plan are not new.

However, the requirements in Provision C.21.b. to develop a new Asset Management Plan by June 30, 2025, and to implement that plan by July 1, 2025, are new requirements. In addition, the requirements that the plan include processes for "evaluating the current condition, and identifying the need for and carrying out, as appropriate, the rehabilitation and replacement of inventoried assets," evaluating or forecasting costs and comparing those projections with available funding sources are new. Furthermore, the permittees were not required under prior law to complete a Climate Change Adaptation Report to identify potential climate change-related threats to assets and appropriate adaptation strategies, and this requirement is new. The Commission, however, does not reach the issue of whether these requirements mandate a new program or higher level of service since, as more fully described in section IV.C.2. of this Decision, the claimants have fee authority to cover the costs of

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[391] Code of Federal Regulations, title 40, section 122.41(e).

[392] Exhibit A, Test Claim, page 1551 (Order R2-2015-0049, Provision C.3.b.iv.2.k.).

[393] Exhibit A, Test Claim, pages 1570-1572 (Order R2-2015-0049, Provision C.3.h.).

[394] Exhibit A, Test Claim, page 1632 (Order R2-2015-0049, Provision C.10.b.).

the requirement within the meaning of Government Code section 17556(d) and, thus, there are no costs mandated by the state.

2. There Are No Costs Mandated by the State for the Requirements Imposed by the Test Claim Permit Pursuant to Government Code Section 17556(d) Since the Claimants Have Fee Authority Sufficient as a Matter of Law During the Entire Period of Reimbursement to Cover the Costs of the Requirements.

Government Code section 17514 defines "costs mandated by the state" as any increased costs a local agency or school district incurs as a result of any statute or executive order that mandates a new program or higher level of service. Government Code section 17564(a) further requires that no claim shall be made nor shall any payment be made unless the claim exceeds $1,000. Here, the claimant has filed declarations identifying the actual costs incurred by the claimant in fiscal year 2022-2023, which exceeds $1,000 ["The annual member contribution level for FY 22/23 was $2,535,000 for all Program costs regarding the MRP3, for which Union City's paid 5.31% or $134,609"][395] and estimates costs of over $852,000 in fiscal year 2023-2024 and statewide costs of $68,200,880.[396] The claimant states that these costs are funded from its general fund and a clean water fund, which obtains revenues from property tax assessments.[397]

However, Government Code section 17556(d) provides the Commission "shall not find costs mandated by the state, as defined in Section 17514" if the Commission finds "the local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the mandated program or increased level of service."

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[395] Exhibit A, Test Claim, page 113 (Declaration of Sandra Mathews).

[396] Exhibit A, Test Claim, pages 40, 46-64 (Declaration of Farooq Azim).

[397] Exhibit A, Test Claim, page 40-41. However, reimbursement is not required to the extent the claimants receive revenues, including but not limited to grant funding, assessment revenue, and federal funds, that are *not* the claimants' proceeds of taxes and use that revenue to pay for any state-mandated costs. When state-mandated activities do not compel the increased expenditure of local "proceeds of taxes," reimbursement under article XIII B, section 6 is not required. *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487 (Reimbursement is required only when "the costs in question can be recovered solely from tax revenues."); *County of Sonoma v. Commission on State Mandates* (2000) 84 Cal.App.4th 1264, 1283; *County of Los Angeles v. Commission on State Mandates* (2003) 110 Cal.App.4th 1176, 1189; *Bell Community Redevelopment Agency v. Woosley* (1985) 169 Cal.App.3d 24, 32; *Redevelopment Agency v. Commission on State Mandates* (1997) 55 Cal.App.4th 976, 986-987; *City of El Monte v. Commission on State Mandates* (2000) 83 Cal.App.4th 266, 281.

The California Supreme Court upheld the constitutionality of Government Code section 17556(d) in *County of Fresno.*[398] The court, in holding that the term "costs" in article XIII B, section 6, excludes expenses recoverable from sources other than taxes, stated:

> Section 6 was included in article XIII B in recognition that article XIII A of the Constitution severely restricted the taxing powers of local governments. (See *County of Los Angeles I, supra,* 43 Cal.3d at p. 61.) The provision was intended to preclude the state from shifting financial responsibility for carrying out governmental functions onto local entities that were ill equipped to handle the task. (*Ibid.*; see *Lucia Mar Unified School Dist. v. Honig* (1988) 44 Cal.3d 830, 836, fn. 6 [244 Cal.Rptr. 677, 750 P.2d 318].) Specifically, it was designed to protect the tax revenues of local governments from state mandates that would require expenditure of such revenues. Thus, although its language broadly declares that the "state shall provide a subvention of funds to reimburse ... local government for the costs [of a state-mandated new] program or higher level of service," read in its textual and historical context section 6 of article XIII B requires subvention only when the costs in question can be recovered *solely from tax revenues.*[399]

Following the logic of *County of Fresno*, the Third District Court of Appeal held in *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, where the claimant has "authority, i.e., the right or power, to levy fees sufficient to cover the costs" of a state mandated program, reimbursement is not required, notwithstanding other factors that may make the exercise of that authority impractical or undesirable.[400]

For example, in *Connell* the court held the Santa Margarita Water District, and other similarly situated districts, had statutory authority to raise rates on water, notwithstanding argument and evidence that the amount by which the district would be forced to raise its rates would render the water unmarketable.[401] The district acknowledged the existence of fee authority, but argued it was not "sufficient," within the meaning of section 17556(d).[402] The court held "[t]he Districts in effect ask us to construe 'authority,' as used in the statute, as a practical ability in light of surrounding economic circumstances. However, this construction cannot be reconciled with the plain language of [section 17556(d)] and would create a vague standard not capable of reasonable adjudication."[403] The court concluded: "Thus, the economic evidence

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[398] *County of Fresno v. State of California* (1990) 53 Cal.3d. 482.

[399] *County of Fresno v. State of California* (1990) 53 Cal.3d. 482, 487.

[400] *County of Fresno v. State of California* (1991) 53 Cal.3d 482, 487; *Connell v. Superior Court* (1997) 59 Cal.App.4th 382.

[401] *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 402.

[402] *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 398.

[403] *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 401.

presented by SMWD to the Board was irrelevant and injected improper factual questions into the inquiry."[404]

More recently, the Third District Court of Appeal endorsed and followed *Connell* in *Paradise Irrigation District*: "[w]e also reject the Water and Irrigation Districts' claim that, as a matter of practical reality, the majority protest procedure allows water customers to defeat the Districts' authority to levy fees."[405] Instead, the court held, "[w]e adhere to our holding in *Connell* that the inquiry into fee authority constitutes an issue of law rather than a question of fact."[406]

And the 2021 decision of the Second District Court of Appeal in *Department of Finance v. Commission on State Mandates* found that "[e]ven if we assume that drafting or enforcing a law that imposes fees to pay for inspections would be difficult, the issue is whether the local governments have the authority to impose such a fee, not how easy it would be to do so."[407]

The claimant alleges it has no authority to impose or increase fees for the costs at issue in this claim: "The City has no fee authority to increase these revenue sources without seeking voter approval under Proposition 218. Thus, the City does not have authority to increase these fees – only the voters have that authority."[408]

As explained below, however, the Commission finds the permittees have fee authority during the entire period of reimbursement to impose stormwater fees on property owners for all requirements at issue in this Test Claim without the voter's approval and regulatory fees for the requirements associated with development and redevelopment, in accordance with Propositions 218 and 26. Thus, there are no costs mandated by the state and reimbursement is denied.

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[404] *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 401.

[405] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195.

[406] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195.

[407] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 564, citing to *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 401.

[408] Exhibit A, Test Claim, page 41.

a. Property-related fees.

The permittees have authority pursuant to their constitutional police powers[409] and other statutory authority[410] to impose property-related fees for the required activities.[411] "[P]revention of water pollution is a legitimate governmental objective, in furtherance of which the police power may be exercised."[412] These fees are subject to procedural and substantive requirements imposed by Propositions 218 and 26, which added and amended article XIII C and XIII D to the California Constitution.

i. Articles XIII C and XIII D (Proposition 218 and 26).

Proposition 218, approved by voters in 1996, added articles XIII C and XIII D to the California Constitution and "is one of a series of voter initiatives restricting the ability of state and local governments to impose taxes and fees."[413] Article XIII D addresses property-based assessments and fees.[414]

Specifically, article XIII D of the California Constitution "imposes certain substantive and procedural restrictions on taxes, assessments, fees, and charges 'assessed by any agency upon any parcel of property or upon any person as an incident of property ownership.'"[415] For example, special assessments and property-related fees are subject to notice and hearing requirements, and must meet a threshold of proportionality with respect to the amount of the exaction and the benefits conferred. Section 4, addressing special assessments, provides:

> An agency which proposes to levy an assessment shall identify all parcels which will have a special benefit conferred upon them and upon which an assessment will be imposed. The proportionate special benefit derived by each identified parcel shall be determined in relationship to the entirety of the capital cost of a public improvement, the maintenance and operation

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[409] California Constitution, article XI, section 7.

[410] See, e.g., Health and Safety Code section 5471 (fees for storm drainage maintenance and operation); Government Code sections 38902 (providing for sewer standby charges); 53750 et seq. (Proposition 218 Omnibus Implementation Act, describing procedures for adoption of assessments, fees and charges); 53751 (as amended in 2017, providing that fees for sewer services includes storm sewers).

[411] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 561.

[412] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 561, citing *Freeman v. Contra Costa County Water Dist*. (1971) 18 Cal.App.3d 404, 408.

[413] *Plantier v. Ramona Municipal Water Dist.* (2019) 7 Cal.5th 372, 380.

[414] *Plantier v. Ramona Municipal Water Dist.* (2019) 7 Cal.5th 372, 381.

[415] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1200 citing California Constitution, article XIII D, section 3.

> expenses of a public improvement, or the cost of the property related service being provided. No assessment shall be imposed on any parcel which exceeds the reasonable cost of the proportional special benefit conferred on that parcel. Only special benefits are assessable, and an agency shall separate the general benefits from the special benefits conferred on a parcel. Parcels within a district that are owned or used by any agency, the State of California or the United States shall not be exempt from assessment unless the agency can demonstrate by clear and convincing evidence that those publicly owned parcels in fact receive no special benefit.[416]

Once the amount of the proposed assessment is identified, notice must be mailed to the record owner of each parcel, stating the amount chargeable to the entire district, to the parcel itself, the reason for the assessment and the basis of the calculation, and the date, time and location of the public hearing on the proposed assessment. The notice must be in the form of a ballot, and at the public hearing the agency "shall consider all protests…and tabulate the ballots." If the majority of the returned ballots oppose the assessment, the agency "shall not impose" the assessment.[417]

Similarly, article XIII D, section 6, which addresses property-related fees, provides for a proportionality requirement with respect to the fees and charges and imposes the following substantive requirements:

> A fee or charge shall not be extended, imposed, or increased by any agency unless it meets all of the following requirements:
>
> (1) Revenues derived from the fee or charge shall not exceed the funds required to provide the property related service.
>
> (2) Revenues derived from the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.
>
> (3) The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.
>
> (4) No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees or charges based on potential or future use of a service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with Section 4.
>
> (5) No fee or charge may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services, where the service is available to the public at large in substantially the

[416] California Constitution, article XIII D, section 4(a).

[417] California Constitution, article XIII D, section 4(c); (d); (e).

> same manner as it is to property owners. Reliance by an agency on any parcel map, including, but not limited to, an assessor's parcel map, may be considered a significant factor in determining whether a fee or charge is imposed as an incident of property ownership for purposes of this article. In any legal action contesting the validity of a fee or charge, the burden shall be on the agency to demonstrate compliance with this article.[418]

And section 6 provides for notice and a public hearing similarly to section 4; but, unlike section 4, section 6 does not expressly require the notice to inform parcel owners of their right to protest the proposed fee, nor is the notice required to be in the form of a ballot to be returned.[419]

Section 6(c) also provides that *voter approval* is required for property-related fees and *charges other than* for water, sewer, and refuse collection services.[420] This section is discussed further below, but for charges for water, sewer, and refuse collection services, voter approval is not required to impose or increase fees. The fees may be adopted, and are subject only to the voter protest provisions of article XIII D.

In 2017, the Legislature enacted SB 231, which amended Government Code sections 53750 and 53751 to expressly overrule a prior court decision (*Howard Jarvis Taxpayers Assn. v. City of Salinas* (2002) 98 Cal.App.4th 1351), which held that stormwater fees were not charges for water, sewer, and refuse collection services and, thus, did not fall under the voter approval exception in article XIII D, section 6(c).[421] Effective January 1, 2018, Government Code section 53750(k) defines the term "sewer" for purposes of article XIII D as including systems that "facilitate sewage collection, treatment, or disposition for . . . drainage purposes, including . . . drains, conduits, outlets for . . . storm waters, and any and all other works, property, or structures necessary or convenient for the collection or disposal of . . . storm waters." Therefore, effective January 1, 2018, Government Code sections 53750 and 53751 defined "sewer" to include stormwater fees subject only to the voter protest provisions of article XIII D.[422]

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[418] California Constitution, article XIII D, section 6(b).

[419] Compare California Constitution, article XIII D, section 6(a)(1)-(2) with article XIII D, section 4(a).

[420] California Constitution, article XIII D, section 6(c).

[421] Government Code sections 53750; 53751 (amended, Stats. 2017, ch. 536 (SB 231)).

[422] Government Code sections 53750; 53751 (amended, Stats. 2017, ch. 536 (SB 231)). The Commission is required to presume the amendments made to the Government Code by SB 231 are constitutional. Article III, section 3.5 of the California Constitution prohibits administrative agencies, such as the Commission, from refusing to enforce a statute or from declaring a statute unconstitutional, unless an appellate court has determined the statute is unconstitutional.

In 2010, the voters approved Proposition 26 to amend article XIII C, section 1 of the California Constitution to define a "tax" subject to the voters' approval as "any levy, charge, or exaction of any kind imposed by a local government, *except*" as stated.[423] An exception to the definition of a tax includes "Assessments and property-related fees imposed in accordance with the provisions of Article XIII D."[424] Thus, as long as local government complies with the substantive and procedural requirements of article XIII D (added by Proposition 218), then the revenues received are not considered proceeds of taxes, but revenue from "nontax" property-related fees and assessments. Article XIII C also makes clear that the burden is on local government to establish that the levy is not a tax, that the fee is reasonably related to the costs to government in the aggregate, and that the fee charged to the payors is reasonably related to the benefits received or burdens created by such payors as a part of the rate setting process.[425]

ii. The permittees have the authority to impose stormwater property-related fees to cover the costs of the alleged requirements, which are subject only to the voter protest provisions of article XIII D, section 6, and therefore there are no costs mandated by the state pursuant to Government Code section 17556(d).

The Commission finds that the permittees' authority to impose stormwater fees for the requirements imposed by the test claim permit satisfies both the substantive and procedural requirements of Propositions 218 and 26 and that since the fees are subject only to the voter protest provisions of article XIII D, section 6, there are no costs mandated by the state pursuant to Government Code section 17556(d).

As indicated above, article XIII D, section 6, imposes the following substantive requirements for property-related fees:

> A fee or charge shall not be extended, imposed, or increased by any agency unless it meets all of the following requirements:
>
> (1) Revenues derived from the fee or charge shall not exceed the funds required to provide the property related service.
>
> (2) Revenues derived from the fee or charge shall not be used for any purpose other than that for which the fee or charge was imposed.
>
> (3) The amount of a fee or charge imposed upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.
>
> (4) No fee or charge may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in

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[423] California Constitution, article XIII C, section 1 (amended by the voters on Nov. 2, 2010, by Prop. 26).

[424] California Constitution, article XIII C, section 1(e)(7).

[425] California Constitution, article XIII C, section 1(e).

> question. Fees or charges based on potential or future use of a service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with Section 4.
>
> (5) No fee or charge may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services, where the service is available to the public at large in substantially the same manner as it is to property owners. Reliance by an agency on any parcel map, including, but not limited to, an assessor's parcel map, may be considered a significant factor in determining whether a fee or charge is imposed as an incident of property ownership for purposes of this article. In any legal action contesting the validity of a fee or charge, the burden shall be on the agency to demonstrate compliance with this article.[426]

In 2021, the Second District Court of Appeal addressed a challenge to the Commission's Decision in *Municipal Storm Water and Urban Runoff Discharges*, 03-TC-04, 03-TC-20, 03-TC-21, which required the local government permittees to install and maintain trash receptacles at public transit stops owned by *other* public entities.[427] The State contended the local governments could impose a fee on private property owners to pay for the cost of these requirements. However, the court determined that the State had not shown the fee would meet article XIII D's substantive requirements for property-related fees (i.e., that no fee or charge may be imposed for general government services that are available to the public at large in substantially the same manner as they are to property owners), and that common sense dictated the vast majority of persons who would use and benefit from trash receptacles at transit stops are not the owners of adjacent properties but rather pedestrians, transit riders, and other members of the general public, as follows.[428]

> The state agencies have not satisfied their burden. Not only have the state agencies failed to cite to the record or authority to support the point that a fee imposed on property owners adjacent to transit stops could satisfy the substantive constitutional requirements, but common sense dictates that the vast majority of persons who would use and benefit from trash receptacles at transit stops are not the owners of adjacent properties but rather pedestrians, transit riders, and other members of the general public; any benefit to property owners in the vicinity of bus stops would be incidental. Even if the state agencies could establish that the need for the trash receptacles is in part attributable to adjacent property owners and

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[426] California Constitution, article XIII D, section 6(b).

[427] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546.

[428] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 567-568.

> that the property owners would use the trash receptacles (see Cal. Const., art. XIII D, § 6, subd. (b)(3)-(4)), the placement of the receptacles at public transit stops makes the "service available to the public at large in substantially the same manner as it is to property owners" (*id.*, art. XIII D, § 6, subd. (b)(3)). The state agencies, therefore, failed to establish that the local governments could impose on property owners adjacent to transit stops a fee that could satisfy these constitutional requirements.[429]

In 2022, the Third District Court of Appeal in *Department of Finance v. Commission on State Mandates* (addressing the Commission's Decision in *Discharge to Stormwater Runoff*, 07-TC-09) revisited the 2021 case and the substantive requirements in article XIII D, section 6(b) regarding property-related fees to cover the costs of street sweeping required by the NPDES permit as part of the receiving water limitations and discharge prohibitions to keep pollutants out of local waters.[430] The State acknowledged the general rule that the party claiming the applicability of an exception bears the burden of demonstrating that it applies. However, the State argued that this typical approach should not apply to the burden of showing fee authority under Government Code section 17556(d). The State argued "the inherent flexibility in permittees' police power means permittees may develop fees in any number of ways. Also, local governments like permittees have significantly more expertise and experience than the State agencies before us in designing, implementing, and defending local government fees. The State asserts that permittees' expertise means they should bear the burden on this point."[431] The court agreed, and held as follows:

> We agree the State has the burden of establishing that permittees have fee authority, but that burden does not require the State also to prove permittees as a matter of law and fact are able to promulgate a fee that satisfies article XIII D's substantive requirements. The sole issue before us is whether permittees have "the authority, i.e., the right or power, to levy fees sufficient to cover the costs of the state-mandated program." (*Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 401, 69 Cal.Rptr.2d 231.) The inquiry is an issue of law, not a question of fact. (*Ibid.*)[432]

The court further held that requiring the State to show affirmatively how permittees can create a fee that meets the substantive requirements *where no fee yet exists* requires the State to effectively engage in the rulemaking process itself and asks the State to do

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[429] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 568-569.

[430] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 583-586.

[431] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 584.

[432] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 584-585.

more than establish permittees have the lawful authority to enact a fee, which is the sole issue under Government Code section 17556(d).[433] The court held that unless there is a showing that a fee cannot meet the substantive requirements of article XIII D, section 6(b) as a matter of law or undisputed fact (as was the case in the 2021 *Department of Finance* case), then the finding that a fee would meet the substantive requirements is *implicit* in the determination that permittees have the right or power to levy a fee, as follows:

> The State has established that permittees have the right or power to levy a fee for the street cleaning condition pursuant to Public Resources Code section 40059. Implicit in that determination is that permittees have the right or power to levy a fee that complies with article XIII D's substantive requirements. Unless it can be shown on undisputed facts in the record or as a matter of law that a fee cannot satisfy article XIII D's substantive requirements, as was found in *Los Angeles Mandates II*, the establishment by the State of the local agencies' power or authority to levy a fee without voter approval or without being subject to other limitations establishes that a local government has sufficient fee authority for purposes of section 17556(d).[434]

The court further explained the following:

> Although the court of appeal in *Los Angeles Mandates II* [i.e., the 2021 *Department of Finance* case] stated the state bore the burden to show that a fee for public trash receptacles could satisfy the substantive requirements, and that the state did not satisfy its burden, the court actually ruled that the local governments could not establish a fee that could meet the substantive requirements as a matter of law or undisputed fact. (*Los Angeles Mandates II, supra*, 59 Cal.App.5th at pp. 568-569, 273 Cal.Rptr.3d 619 ["common sense dictates" that fee would not meet requirements].) To require the State to show affirmatively how permittees

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[433] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 585. This finding is consistent with provisions in articles XIII C and XIII D, which state the burden is on the local agency to demonstrate compliance with the substantive rules *when a fee exists* and is legally challenged. Article XIII D, section 6(b), states that "In any legal action contesting the validity of a fee or charge, the burden shall be on the agency to demonstrate compliance with this article*;"* and article XIII C, section 1(e), states "The local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity."

[434] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 585.

> can create a fee that meets the substantive requirements where no fee yet exists requires the State effectively to engage in the rulemaking process itself. That asks the State to do more than establish permittees have the lawful authority to enact a fee, which is the sole issue. To the extent *Los Angeles Mandates II* requires the State to prove more, we respectively disagree with its interpretation.[435]

Similarly here, there is no showing as a matter of law or fact that a fee cannot meet the substantive requirements of article XIII D, section 6(b). The requirements in this case are *not* like the requirement to place trash receptacles on transit property owned by other entities and not within the regulatory control of the permittees. The requirements at issue here (planning and implementing LID BMPs and control measures for new development and redevelopment road projects, updating the MS4 map, trash requirements to ensure the discharge of zero trash, pollutants of concern monitoring, mercury and PCB requirements, non-stormwater discharges, and cost reporting and asset management planning) address waters and areas within the control of the permittees. Like street sweeping in the 2022 *Department of Finance* case, all of the new requirements implement the receiving water limitations and discharge prohibitions required by the permit to protect the beneficial uses of the local waters enjoyed by property owners in the San Francisco region and to prevent pollutants from causing or contributing to a violation of water quality standards.[436]

As indicated above, the courts have found that local government has the authority (i.e., the right and the power) to levy property-related fees for stormwater services under their police powers.[437] And the California Stormwater Quality Association (CASQA) has provided information to local agencies on how they can properly develop property-related stormwater fees under section XIII D of the California Constitution, including elements incorporated into a stormwater fee for various types of parcels to cover the cost of reducing stormwater pollutant loading and public education.[438] CASQA describes the typical apportionment of costs for stormwater services as follows:

> Proposition 218 requires that property-related fees "shall not exceed the proportional cots of the service attributable to the parcel." Therefore, it is essential to develop an apportionment of costs that best reflects the stormwater services provided by the municipality.
>
> Across the U.S., most stormwater fee structures are based on the amount of impervious surface on a parcel, which is proportional to the amount of rainwater that runs off a parcel. This is a straight forward method, although

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[435] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 585.

[436] Exhibit A, Test Claim, pages 549-552.

[437] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 561.

[438] Exhibit X (1), CASQA, Fee Study and Ordinance.

> impervious surface data may be difficult or expensive to obtain. Rate-setting consultants have experience working around this issue with sampling and statistical approaches, which can satisfy the Proposition 218 "proportionality" test.
>
> The majority of stormwater rate structures utilize an equivalent residential unit (ERU) as a basis for fees. ERUs estimate the average or median characteristics for a residential property. For stormwater, land use, impervious surface cover, or total size are possible metrics. Once established based on a sample of properties, each parcel in a municipality can be assigned an individual number of ERUs, which is multiplied by the base residential rate to establish the individual fee. With the ERUs assigned and totaled, the revenue requirement is divided by the total number of ERUs to establish the base residential rate.
>
> Most municipalities are bound to an NPDES permit requiring them to reduce stormwater pollutant loading as well as other objectives such as green infrastructure development and public education. These elements should be incorporated into the stormwater fees for various types of parcels.
>
> It is worth noting that Propositions 218's strict requirements on a fair apportionment method means that a municipality should create a thorough administrative record of how the rate and studies upon which it relies would need to be clearly referenced.[439]

Therefore, the Commission finds that the permittees have the legal authority to impose stormwater fees for the requirements at issue here, which meet the substantive requirements of article XIII D, section 6.

Moreover, with the amendment by SB 231 to Government Code sections 53750 and 53751, voter approval is not required by the California Constitution to impose or increase property-related fees for stormwater costs beginning January 1, 2018 (and during the period of reimbursement for this claim, which begins July 1, 2022). Instead, any new or increased fee is subject only to the voter protest provisions of article XIII D. The court in *Paradise Irrigation District* (a challenge to the Commission's Decision in *Water Conservation,* 10-TC-12/12-TC-01) held, in the context of water services, the *voter protest* requirements of Proposition 218 do not divest local agencies of their authority to impose fees sufficient as a matter of law pursuant to Government Code section 17556(d) and, thus, even when the voter protest provisions apply, there are no costs mandated by the state.[440] The Court of Appeal observed:

> This case takes up where *Connell* left off, namely with the question of whether the passage of Proposition 218 undermined water and irrigation

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[439] Exhibit X (1), CASQA, Fee Study and Ordinance, pages 2-3.

[440] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 189.

> districts' authority to levy fees so that they are entitled to subvention for state-mandated regulations requiring water infrastructure upgrades. The Water and Irrigation Districts do not argue this court wrongly decided *Connell, supra,* 59 Cal.App.4th 382, 69 Cal.Rptr.2d, but only that the rule of decision was superseded by Proposition 218. Consequently, we proceed to examine the effect of Proposition 218 on the continuing applicability of *Connell.*[441]

Ultimately the court preserved and followed the rule of *Connell*, finding that "Proposition 218 implemented a power-sharing arrangement that does not constitute a revocation of the Water and Irrigation Districts' fee authority."[442] The court held, ". . . we presume local voters will give appropriate consideration and deference to state mandated requirements relating to water conservation measures required by statute."[443] In addition, the court held "[w]e also reject the Water and Irrigation Districts' claim that, as a matter of practical reality, the majority protest procedure allows water customers to defeat the Districts' authority to levy fees."[444] The court concluded, "[w]e adhere to our holding in *Connell* that the inquiry into fee authority constitutes an issue of law rather than a question of fact."[445] The court found water service fees, being expressly exempt from the voter approval provisions of article XIII D, section 6(c), therefore do not require voter preapproval, as would new taxes.[446] In addition, the court followed and relied upon the court's analysis in *Bighorn-Desert View* of a power-sharing relationship between local agencies and their constituents, including the presumption "local voters will give appropriate consideration and deference to a governing board's judgments about the rate structure needed to ensure a public water agency's fiscal solvency…" and the notice and hearing requirements of article XIII D, section 6(a) "will facilitate communications between a public water agency's board and its customers, and the substantive restrictions on property-related charges in subdivision (b) of the same section should allay customers' concerns that the agency's water delivery charges are

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[441] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 189.

[442] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 194-195.

[443] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 194.

[444] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195.

[445] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 195.

[446] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 192.

excessive."[447] Accordingly, the court found that power-sharing arrangement "does not undermine the fee authority that the districts have," and the majority protest procedure of article XIII D, section 6(a) "does not divest the Water and Irrigation Districts of their authority to levy fees."[448] The court noted statutory protest procedures already existed, and "the possibility of a protest under article XIII D, section 6 does not eviscerate the Water and Irrigation Districts' ability to raise fees to comply with the Water Conservation Act."[449] Thus, the court found Government Code section 17556(d) still applies to deny a claim when the fee authority is subject to voter protest under article XIII D, section 6(a).

Accordingly, the permittees have the legal authority to impose stormwater property-related fees to cover the costs of the alleged requirements, which are subject only to the voter protest provisions of article XIII D, section 6, and therefore there are no costs mandated by the state pursuant to Government Code section 17556(d).

b. Regulatory fees

As a separate ground for denial, the Commission finds that the permittees also have the legal authority to impose or increase regulatory fees to pay for the sections in Provision C.3. pled by the claimant, which impose LID (low impact development) and green infrastructure requirements on development and retrofitted real property projects, and Provision C.8.d. addressing LID monitoring to ensure compliance. Thus, there are no costs mandated by the state pursuant to Government Code section 17556(d) for these requirements.

Article XI, section 7 of the California Constitution provides: "A county or city may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws."[450] Interpreting this provision, and its predecessor, the courts have held that a local legislative body with police power "has a wide discretion" and its laws or ordinances "are invested with a strong presumption of validity."[451] The courts have held that "the power to impose valid regulatory fees does not depend on legislatively authorized taxing power but exists pursuant to the direct grant of police power under article XI, section 7, of the California Constitution."[452]

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[447] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 192-193.

[448] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 194.

[449] *Paradise Irrigation District v. Commission on State Mandates* (2019) 33 Cal.App.5th 174, 194.

[450] California Constitution, article XI, section 7.

[451] *Marblehead Land Co. v. City of Los Angeles* (1931) 47 F.2d 528, 532.

[452] *Mills v. County of Trinity* (1980) 108 Cal.App.3d 656, 662 (in which a taxpayer challenged a county ordinance that imposed new and increased fees for county services in processing subdivision, zoning, and other land-use applications that had been adopted without a two-thirds affirmative vote of the county electors).

Accordingly, ordinances or laws regulating legitimate businesses or other activities within a city or county, as well as regulating the development and use of real property, have generally been upheld.[453] In addition, "[t]he services for which a regulatory fee may be charged include those that are "'incident to the issuance of [a] license or permit, investigation, inspection, administration, maintenance of a system of supervision and enforcement.'"[454] The courts also hold that water pollution prevention is a valid exercise of government police power.[455]

Moreover, a number of provisions of the Government Code provide express authority to impose or increase regulatory fees,[456] and fees for development of real property.[457]

Thus, there is no dispute that the copermittees have the legal authority, both statutory and constitutional (recognized in case law), to impose fees, including regulatory and development fees.[458] The issue in dispute is only whether Propositions 26 and 218 impose procedural and substantive restrictions that so weaken that authority as to render it insufficient, within the meaning of Government Code section 17556(d).

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[453] See *Ex parte Junqua* (1909) 10 Cal.App. 602 (police power "embraces the right to regulate any class of business, the operation of which, unless regulated, may, in the judgment of the appropriate local authority, interfere with the rights of others…"); *Sullivan v. City of Los Angeles Dept. of Building & Safety* (1953) 116 Cal.App.2d 807 (recognizing broad power to regulate not only nuisances but things or activities that may become nuisances or injurious to public health); *California Building Industry Assn. v. City of San Jose* (2015) 61 Cal.4th 435 (recognizing broad authority of municipality to regulate land use).

[454] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 562, citing *California Assn. of Prof. Scientists v. Department of Fish & Game* (2000) 79 Cal.App.4th 935, 945.

[455] *Freeman v. Contra Costa County Water Dist.* (1971) 18 Cal.App.3d 404, 408.

[456] See, e.g., Government Code section 37101 ("The legislative body may license, for revenue and regulation, and fix the license tax upon, every kind of lawful business transacted in the city.").

[457] Government Code section 66001 (providing for development fees under the "Mitigation Fee Act," requiring local entities to identify the purpose of the fee and the uses to which revenues will be put, to determine a reasonable relationship between the fee's use and the type of project or projects on which the fee is imposed).

[458] See also, *Ayers v. City Council of City of Los Angeles* (1949) 34 Cal.2d 31 (upholding conditions imposed by the City on subdivision development, in the absence of any clear restriction or limitation on the City's police power); *Associated Home Builders etc. Inc. v. City of Walnut Creek* (1971) 4 Cal.3d 633 (upholding state statute and local ordinance requiring dedication or in-lieu fees for parks and recreation as a condition of subdividing for residential building).

For purposes of background, Proposition 13 (1978) added article XIII A to the California Constitution, with the intent to limit local governments' power to impose or increase *taxes*.[459] Proposition 13 generally limited the rate of any ad valorem tax on real property to one percent; limited increases in the assessed value of real property to two percent annually absent a change in ownership; and required that any changes in state taxes enacted to increase revenues and special taxes imposed by local government must be approved by a two-thirds vote of the electors.[460] Proposition 13, however, did not define "special taxes," and a series of judicial decisions tried to define the difference between fees and taxes, and diminished Proposition 13's import by allowing local governments to generate revenue without a two-thirds vote.[461]

In 1996, Proposition 218 added article XIII C to ensure and reiterate voter approval requirements for general and special taxes, because it was not clear whether Proposition 62, which enacted statutory provisions to ensure that all new local taxes be approved by a vote of the local electorate, bound charter jurisdictions.[462] As added by Proposition 218, article XIII C defined all taxes as general or special, and provided that special districts have no power to impose general taxes; and for any other local government, general taxes require approval by a majority of local voters, and special taxes require a two-thirds majority voter approval.[463]

Interpreting the newly-reiterated limitation on local taxes, the Court in *Sinclair Paint* held that a statute permitting the Department of Health Services to levy fees on manufacturers and other persons contributing to environmental lead contamination, in order to support a program of evaluation and screening of children, imposed bona fide *regulatory fees*, and not, as alleged by plaintiffs, a special tax that would require voter approval under articles XIII A and XIII C.[464] The Court noted with approval *San Diego Gas & Electric*, in which the air district was permitted to recover costs of its operations, which are not reasonably identifiable with specific industrial polluters, against all monitored polluters according to an emissions-based formula, and those fees were not held to constitute a special tax.[465] The *Sinclair Paint* Court cited with approval the court

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[459] See, e.g., *County of Fresno v. State of California* (1991) 53 Cal.3d 482.

[460] *Schmeer v. County of Los Angeles* (2013) 213 Cal.App.4th 1310, 1317.

[461] *Schmeer v. County of Los Angeles* (2013) 213 Cal.App.4th 1310, 1317-1319.

[462] *Jacks v. City of Santa Barbara* (2017) 3 Cal.5th 248, 258-259.

[463] California Constitution, article XIII C, section 2(a) ("All taxes imposed by any local government shall be deemed to be either general taxes or special taxes. Special purpose districts or agencies, including school districts, shall have no power to levy general taxes."). See also, Exhibit X (2), Excerpts from Voter Information Guide, November 1996 General Election.

[464] *Sinclair Paint Co. v. State Board of Equalization* (1997) 15 Cal.4th 866, 870; 877.

[465] *San Diego Gas & Electric Co. v. San Diego County Air Pollution Control Dist.* (1988) 203 Cal.App.3d 1132, 1148.

of appeal's finding that "A reasonable way to achieve Proposition 13's goal of tax relief is to shift the costs of controlling stationary sources of pollution from the tax-paying public to the pollution-causing industries themselves…"[466] The *Sinclair Paint* Court thus held: "In our view, the shifting of costs of providing evaluation, screening, and medically necessary follow-up services for potential child victims of lead poisoning from the public to those persons deemed responsible for that poisoning is likewise a reasonable police power decision."[467]

In 2010, the voters adopted Proposition 26, partly in response to *Sinclair Paint*.[468] Proposition 26 sought to broaden the definition of "tax," (and accordingly narrow the courts' construction of permissible non-tax fees). However, Proposition 26 largely *codifies* the analysis of *Sinclair Paint*, in its articulation of the various types of fees and charges that are *not* deemed "taxes."[469] Thus, while Proposition 13 led a series of increasing restrictions on the imposition of new taxes, after *Sinclair Paint*, and Propositions 218 and 26, local governments have the power, subject to varying limitations, to impose or increase (1) general taxes [with voter approval];[470] (2) special taxes [with *two-thirds* voter approval];[471] and (3) levies, charges, or exactions that are not "taxes," pursuant to the exceptions stated in article XIII C, section 1(e), which include:

> (1) A charge imposed for a specific benefit conferred or privilege granted directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of conferring the benefit or granting the privilege.
>
> (2) A charge imposed for a specific government service or product provided directly to the payor that is not provided to those not charged, and which does not exceed the reasonable costs to the local government of providing the service or product.
>
> (3) A charge imposed for the reasonable regulatory costs to a local government for issuing licenses and permits, performing investigations,

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[466] *Sinclair Paint Co. v. State Board of Equalization* (1997) 15 Cal.4th 866, 879 quoting *San Diego Gas & Electric Co. v. San Diego County Air Pollution Control Dist.* (1988) 203 Cal.App.3d 1132, 1148.

[467] *Sinclair Paint Co. v. State Board of Equalization* (1997) 15 Cal.4th 866, 879.

[468] See Exhibit X (2), Excerpts from Voter Information Guide, November 2010 General Election, page 3.

[469] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1210, footnote 7, citing *Jacks v. City of Santa Barbara* (2017) 3 Cal.5th 248, 262 and footnote 5.

[470] California Constitution, article XIII C, section 2.

[471] California Constitution, article XIII C, section 2.

> inspections, and audits, enforcing agricultural marketing orders, and the administrative enforcement and adjudication thereof.
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> (4) A charge imposed for entrance to or use of local government property, or the purchase, rental, or lease of local government property.
>
> (5) A fine, penalty, or other monetary charge imposed by the judicial branch of government or a local government, as a result of a violation of law.
>
> (6) A charge imposed as a condition of property development.
>
> (7) Assessments and property-related fees imposed in accordance with the provisions of Article XIII D.
>
> The local government bears the burden of proving by a preponderance of the evidence that a levy, charge, or other exaction is not a tax, that the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity.[472]

The plain language of article XIII C, section 1(e) thus describes certain categories of fees or exactions that are not taxes, including fees or charges for a benefit conferred or privilege granted,[473] and fees or charges for a government service or product provided to the payor and not others.[474] Both of these could be described as "user" fees, or otherwise described as fees for a government service or benefit. In addition, section 1(e) provides for regulatory fees (including those for inspections),[475] development fees,[476] and assessments or property-related fees or charges adopted in accordance with article XIII D.[477] In each case, the local government bears the burden to establish that the fee or charge is not a tax, including that "the amount is no more than necessary to cover the reasonable costs of the governmental activity, and that the manner in which those costs are allocated to a payor bear a fair or reasonable relationship to the payor's burdens on, or benefits received from, the governmental activity."[478]

Although the limitations of article XIII C, section 1(e) may be newly expressed in the Constitution (i.e., added in 2010 by Proposition 26), the concepts that regulatory fees must be reasonably related to a legitimate public purpose, and in some way proportional

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[472] California Constitution, article XIII C, section 1(e).

[473] California Constitution, article XIII C, section 1(e)(1).

[474] California Constitution, article XIII C, section 1(e)(2).

[475] California Constitution, article XIII C, section 1(e)(3).

[476] California Constitution, article XIII C, section 1(e)(6).

[477] California Constitution, article XIII C, section 1(e)(7).

[478] California Constitution, article XIII C, section 1(e).

to the activity being regulated, are not at all new. The California Supreme Court described the history of such fees in *United Water Conservation Dist.*, saying, "the language of Proposition 26 is drawn in large part from pre-Proposition 26 case law distinguishing between taxes subject to the requirements of article XIII A, on the one hand, and regulatory and other fees, on the other."[479] The Court also noted: "*Sinclair Paint*, from which the relevant article XIII C requirements are derived, made clear that the aggregate cost inquiry and the allocation inquiry are two separate steps in the analysis."[480] Accordingly, the Court upheld the court of appeal's finding that the conservation charges did not exceed the reasonable cost of the regulatory activity in the aggregate,[481] but presumed "each requirement to have independent effect,"[482] and remanded the matter for consideration of the latter issue.

Similarly, in *San Diego County Water Authority*, the First District Court of Appeal upheld non-property-related rates charged for conveying water from the Colorado River based on a two-part test.[483] The rates were held to satisfy both the express requirements of article XIII C, section 1(e)(2): "a specific service (use of the conveyance system) directly to the payor (a member agency) that is not provided to those not charged and which does not exceed the reasonable costs…of providing the service"; and the more general test of *Sinclair Paint*: "[the volumetric rates] bear a fair and reasonable relationship to the benefits it receives from its use of the conveyance system."[484]

Moreover, the courts have found that regulatory fees are flexible, and the Third District Court of Appeal in *California Assn. of Prof. Scientists v. Department of Fish & Game (Professional Scientists)* has identified the following general rules:

> General principles have emerged. Fees charged for the associated costs of regulatory activities are not special taxes under an article XIII A, section 4 analysis if the " ' "fees do not exceed the reasonable cost of providing services necessary to the activity for which the fee is charged and [they] are not levied for unrelated revenue purposes." ' " (Citation omitted.) "A

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[479] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1210, footnote 7, citing *Jacks v. City of Santa Barbara* (2017) 3 Cal.5th 248, 262 and footnote 5.

[480] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1210.

[481] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1212.

[482] *City of San Buenaventura v. United Water Conservation Dist.* (2017) 3 Cal.5th 1191, 1214 citing *Dix v. Superior Court* (1991) 53 Cal.3d 442, 459.

[483] *San Diego County Water Authority v. Metropolitan Water Dist. of Southern California* (2017) 12 Cal.App.5th 1124, 1153.

[484] *San Diego County Water Authority v. Metropolitan Water Dist. of Southern California* (2017) 12 Cal.App.5th 1124, 1153.

> regulatory fee may be imposed under the police power when the fee constitutes an amount necessary to carry out the purposes and provisions of the regulation." (Citation omitted.) "Such costs ... include all those incident to the issuance of the license or permit, investigation, inspection, administration, maintenance of a system of supervision and enforcement." (Citation omitted.) Regulatory fees are valid despite the absence of any perceived "benefit" accruing to the fee payers. (Citation omitted.) Legislators "need only apply sound judgment and consider 'probabilities according to the best honest viewpoint of informed officials' in determining the amount of the regulatory fee." (Citation omitted).[485]

As indicated by the court in *Professional Scientists,* regulatory fees can include all those costs "incident to the issuance of the license or permit, investigation, inspection, administration, maintenance of a system of supervision and enforcement."[486] In *United Business Commission v. City of San Diego*, the court explained that regulatory fees include "all the incidental consequences that may be likely to subject the public to cost in consequence of the business licensed" and that the following incidental costs are properly included in a regulatory fee: "inspection of hazards, travel time, office supplies, telephone expenses, overhead, and clerk's time"[487]

The 2021 *Department of Finance* decision of the Second District Court of Appeal found that the local agencies subject to an NPDES permit issued by the Los Angeles Regional Water Quality Control Board had the authority under their police powers to charge regulatory fees to periodically inspect commercial and industrial facilities to ensure compliance with various environmental regulatory requirements:

> We agree with the Commission that, based upon the local governments' constitutional police power and their ability to impose a regulatory fee that (1) does not exceed the reasonable cost of the inspections, (2) is not levied for unrelated revenue purposes, and (3) is fairly allocated among the fee payers, the local governments have such authority.[488]

Even though the imposition of the fee may be difficult, the court held that local governments have the authority to impose the fee and, thus, reimbursement under article XIII B, section 6 was not required:

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[485] *California Assn. of Prof. Scientists v. Department of Fish & Game* (2000) 79 Cal.App.4th 935, 945.

[486] *California Assn. of Prof. Scientists v. Department of Fish & Game* (2000) 79 Cal.App.4th 935, 945.

[487] *United Business Commission v. City of San Diego* (1979) 91 Cal.App.3d 156, 166, footnote 2.

[488] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 552, 546, 562-563.

> The local governments also argue that a fee that must be no more than necessary to cover the reasonable costs of the inspections "would be difficult to accomplish." They refer to problems that would arise from a general business license fee on all businesses, including those not subject to inspection, and to charging fees for inspections in years in which no inspection would take place. Even if we assume that drafting or enforcing a law that imposes fees to pay for inspections would be difficult, the issue is whether the local governments have the authority to impose such a fee, not how easy it would be to do so. (*Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 401, 69 Cal.Rptr.2d 231.) As explained above, the police powers provision of the constitution and the judicial authorities we have cited provide that authority.[489]

And the Third District Court of Appeal recently held in *Department of Finance v. Commission on State Mandates* that regulatory fees properly included the costs of creating LID and hydromodification plans, which were "incident to the development permit which permittees will issue to priority development projects and the administration of permittees' pollution abatement program."[490] The court rejected arguments from the County and cities that the costs of creating the plans could not be recovered through regulatory fees, and thus voter approval would be required, since the amount of the fee would exceed the reasonable costs of providing the services for which it is charged, and the amount of the fee would not bear a reasonable relationship to the burdens created by the feepayers' activities or operations, primarily because the costs were incurred before any priority development project was proposed.[491] The court also rejected arguments that the County and cities could not legally levy a fee to recover the cost of preparing the plans because those planning actions benefit the public at large and, thus, would constitute a tax.[492] The court found that local government has fee authority sufficient as a matter of law to cover the costs of the hydromodification management plan and LID requirements within the meaning of Government Code section 17556(d) and, thus, there were no costs mandated by the state for these activities based on the following findings:

- Creating the hydromodification management plans and the LID requirements constitute costs incident to the development permit which permittees will issue to priority development projects and the administration of permittees' pollution

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[489] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 564-565.

[490] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 590 (review denied March 1, 2023).

[491] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 587-590.

[492] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 592-593.

abatement program. "Setting the fee will not require mathematical precision. Permittees' legislative bodies need only "consider 'probabilities according to the best honest viewpoint of [their] informed officials' " to set the amount of the fee."[493]

- There was no evidence that the permittees could not levy a fee that would bear a reasonable relationship to the burdens created by future priority development. "A regulatory fee does not become a tax simply because the fee may be disproportionate to the service rendered to individual payors . . . The question of proportionality is not measured on an individual basis. Rather, it is measured collectively, considering all rate payors." The fee just has to be related to the overall cost of the governmental regulation.[494]
- The court rejected the claimants' argument that they could not legally levy a fee to recover the cost of preparing the plans because those planning actions benefit the public at large, relying *Newhall County Water Dist. v. Castaic Lake Water Agency* (2016) 243 Cal.App.4th 1430, 1451. Proposition 26 states a levy is not a tax where, among other uses, it is imposed "for a specific government service provided directly to the payor *that is not provided to those not charged* ...."[495] However, the court found that the service provided directly to developers of priority development projects was the preparation, implementation, and approval of water pollution mitigations applicable only to their projects. Unlike in *Newhall*, that service was not provided to anyone else, and only affected priority project developers charged for the service. The service would not be provided to those not charged.[496]

Accordingly, there is no reason to believe that article XIII C imposes any greater limitation on local governments' authority under their police power to impose reasonable regulatory fees and other fees than existed under prior law. Article XIII C makes clear that the burden is on the local government to establish that the levy is not a tax, that the fee is reasonably related to the costs to government in the aggregate, and that the fee charged to the payors is reasonably related to the benefits received or burdens created

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[493] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 590.

[494] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 590.

[495] See, for example, *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 569, where the court held that article XIII D prohibits MS4 permittees from charging property owners for the cost of providing trash receptacles at public transit locations in part because service was made available to the public at large.

[496] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 592-593.

by such payors as a part of the rate setting process.[497] It is not the burden of the state to make this showing on behalf of local government.

Here, the activities, including the planning, inspection, and enforcement activities relating to LID and green infrastructure requirements are "incident to the development permit[s] which permittees will issue to . . . development projects and the administration of permittees' pollution abatement program."[498] The proposed fee would be imposed as a condition for approving real property development and based on the developer's application for government approval to proceed with the development. The fees would be not levied for unrelated revenue purpose, can be fairly allocated among the fee payers, and the service is not provided to those not charged.[499] Such fees are not taxes under Proposition 26 when they are charges imposed as a condition of property development.[500]

In addition, there is no evidence in the record indicating that the claimants cannot levy a fee that will bear a reasonable relationship to the burdens created by future priority development. "A regulatory fee does not become a tax simply because the fee may be disproportionate to the service rendered to individual payors.[501] The question of proportionality is not measured on an individual basis. Rather, it is measured collectively, considering all rate payors.[502] Thus, permissible fees must be related to the overall cost of the governmental regulation. They need not be finely calibrated to the precise benefit each individual fee payor might derive, or the precise burden each payer may create. What a fee cannot do is exceed the reasonable cost of regulation with the generated surplus used for general revenue collection. "An excessive fee that is used to generate general revenue becomes a tax."[503] And "No one is suggesting [that the claimants] levy fees that exceed their costs."[504]

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[497] California Constitution, article XIII C, section 1(e).

[498] *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 590.

[499] *Department of Finance v. Commission on State Mandates* (2021) 59 Cal.App.5th 546, 562-563, citing *California Building Industry Assn. v. State Water Resources Control Bd.* (2018) 4 Cal.5th 1032, 1046, which cited *Sinclair Paint Co. v. State Bd. of Equalization* (1997) 15 Cal.4th 866, 881; see also *Department of Finance v. Commission on State Mandates* (2022) 85 Cal.App.5th 535, 588.

[500] California Constitution, article XIII C, section 1(e)(6).

[501] *Brydon v. East Bay Mun. Utility Dist.* (1994) 24 Cal.App.4th 178, 194.

[502] *California Assn. of Prof. Scientists v. Department of Fish & Game* (2000) 79 Cal.App.4th 935, 948.

[503] *California Farm Bureau Federation v. State Water Resources Control Bd.* (2011) 51 Cal.4th 421, 438.

[504] *Connell v. Superior Court* (1997) 59 Cal.App.4th 382, 402.

Based on the foregoing, the Commission finds that article XIII C of the California Constitution does not render local government's authority to impose regulatory fees insufficient as a matter of law within the meaning of Government Code section 17556(d) and, therefore, there are no costs mandated by the state.

V. Conclusion

Based on the foregoing analysis, the Commission denies this Test Claim and finds that the test claim permit does not impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution.

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On June 29, 2026, I served the:

- **Current Mailing List dated June 23, 2026**
- **Draft Proposed Decision, Schedule for Comments, and Notice of Hearing issued June 29, 2026**

  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022
  Union City, Claimant

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on June 29, 2026 at Sacramento, California.

Jill Magee

Jill Magee
Commission on State Mandates
980 Ninth Street, Suite 300
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Mailing List

Last Updated: 6/23/26

Claim Number: 22-TC-07

Matter: California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018

Claimant: Union City

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

Each commission mailing list is continuously updated as requests are received to include or remove any party or person on the mailing list. A current mailing list is provided with commission correspondence, and a copy of the current mailing list is available upon request at any time. Except as provided otherwise by commission rule, when a party or interested party files any written material with the commission concerning a claim, it shall simultaneously serve a copy of the written material on the parties and interested parties to the claim identified on the mailing list provided by the commission. (Cal. Code Regs., tit. 2, § 1181.3.)

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Commission on State Mandates
Filed Date
09/18/26

September 18, 2026

Exhibit E

VIA DROP BOX

Juliana F. Gmur
Executive Director
Commission on State Mandates
980 9th Street, Suite 300
Sacramento, CA 95814

COMMENTS OF THE STATE WATER RESOURCES CONTROL BOARD AND CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SAN FRANCISCO BAY REGION ON THE DRAFT PROPOSED DECISION
California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5.,C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022 (City of Union City, Claimant)

Dear Ms. Gmur:

The State Water Resources Control Board and California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Water Board) (together, Water Boards) have reviewed the Draft Proposed Decision for Test Claim 22-TC-07 issued by the Commission on State Mandates (Commission) on June 29, 2026. The Water Boards appreciate the thorough analysis of Commission staff. We agree with the denial of Test Claim 22-TC-07 as proposed in the draft and the conclusion that San Francisco Bay Water Board Order R2-2022-0018 does not impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution.

The Water Boards, however, do not agree with the conclusions finding that some of the challenged provisions are new. We maintain the arguments that those provisions are not new and the arguments that those provisions are not a program as set forth in the Water Boards' July 15, 2025, comments on the test claim.[1]

[1] See San Francisco Bay Regional Water Quality Control Board and State Water Resources Control Board Comments on Test Claim (22-TC-07), July 15, 2025.

I declare under penalty of perjury that the foregoing is true and correct to the best of my personal knowledge, information, or belief.

Sincerely,

Teresita J. Sablan
Attorney IV

cc: Service List [via Commission Drop Box]

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On September 18, 2026, I served the:

- **Current Mailing List dated September 14, 2026**
- **Finance's Comments on the Draft Proposed Decision filed September 18, 2026**
- **Water Boards' Comments on the Draft Proposed Decision filed September 18, 2026**

  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022
  Union City, Claimant

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on September 18, 2026 at Sacramento, California.

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COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 9/14/26

Claim Number: 22-TC-07

Matter: California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018

Claimant: Union City

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

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Exhibit F

Commission on State Mandates
Filed Date
09/18/26

September 18, 2026

Juliana Gmur
Executive Director
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Comments on the draft proposed decision
California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022 Union City, Claimant

Dear Director Gmur,

The Department of Finance (Finance) has completed its review of the proposed decision by the Commission on State Mandates (Commission) for the above referenced Test Claim. Finance appreciates the careful consideration and effort by staff and agree with the conclusion that the test claim permit does not impose a reimbursable state-mandated program within the meaning of article XIII B, section 6 of the California Constitution.

Further, Finance concurs with and joins in comments submitted by the State Water Resources Control Board and California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Water Board) (together, Water Boards) on the proposed decision.

If you have any questions regarding this letter, please contact Jiwon Jeong, Staff Counsel at (916) 639-3135.

Sincerely,

Jiwon Jeong
Staff Counsel

DECLARATION OF SERVICE BY EMAIL

I, the undersigned, declare as follows:

I am a resident of the County of Sacramento and I am over the age of 18 years, and not a party to the within action. My place of employment is 980 Ninth Street, Suite 300, Sacramento, California 95814.

On September 18, 2026, I served the:

- **Current Mailing List dated September 14, 2026**
- **Finance's Comments on the Draft Proposed Decision filed September 18, 2026**
- **Water Boards' Comments on the Draft Proposed Decision filed September 18, 2026**

  California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018, 22-TC-07, as modified by Order No. R2-2023-0019; NPDES Permit No. CAS612008; Provisions C.3.b.i., C.3.b.ii.4., C.3.b.ii.5., C.3.j.ii.1.a.-g., C.3.j.ii.2.a.-j., C.3.j.ii.4., C.5.f., C.8.d., C.8.e., C.8.f., C.10.a.i., C.10.a.ii., C.10.e., C.11.c., C.12.a., C.12.c., C.15.b.iii., C.17.a., C.20.b., C.21.b., Issued May 11, 2022, Effective July 1, 2022
  Union City, Claimant

by making it available on the Commission's website and providing notice of how to locate it to the email addresses provided on the attached mailing list.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed on September 18, 2026 at Sacramento, California.

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COMMISSION ON STATE MANDATES

Mailing List

Last Updated: 9/14/26

Claim Number: 22-TC-07

Matter: California Regional Water Quality Control Board, San Francisco Bay Region, Order No. R2-2022-0018

Claimant: Union City

TO ALL PARTIES, INTERESTED PARTIES, AND INTERESTED PERSONS:

Each commission mailing list is continuously updated as requests are received to include or remove any party or person on the mailing list. A current mailing list is provided with commission correspondence, and a copy of the current mailing list is available upon request at any time. Except as provided otherwise by commission rule, when a party or interested party files any written material with the commission concerning a claim, it shall simultaneously serve a copy of the written material on the parties and interested parties to the claim identified on the mailing list provided by the commission. (Cal. Code Regs., tit. 2, § 1181.3.)

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California Stormwater Quality Association

Exhibit G

Fee Study and Ordinance

A stormwater fee study is a pivotal document for the entire process of developing a stormwater utility. It will be the basis for the rate ordinance and must comply with Proposition 218, which requires that property-related fees "shall not exceed the proportional cost of the service attributable to the parcel."

This implies two elements: costs (expressed as a revenue requirement) and apportionment (how much of the costs are assigned to various property types and sizes in the form of fees). Accordingly, most fee studies are divided into those two primary elements: Revenue requirements and proposed fees. Revenue requirements may include various cost elements including those for capital projects, operations and maintenance, regulatory requirements, planning, engineering, and administration. Fees are typically broken into several categories of land uses and sizes, along with possible service zones and fee incentives.

Rate smoothing is a goal of most fee studies. While the rate base (number and use of parcels) may increase over time, the biggest variable is the revenue requirement – particularly the capital improvement program, which can often be "spikey." Unlike water and sewer rates that must be revisited and re-set at five-year intervals (but do not have to submit to voters), stormwater rates (which must be approved by voters) are not limited to the five-year interval but must have an identifiable formula or index for yearly increases. Therefore, it is important for stormwater fee studies to create a smooth revenue-versus-expense curve over the long haul, often incorporating a way for revenues to keep pace with inflation, such as using the Consumer Price Index to assign annual increases.

Revenue Requirements

(see Homework/Early Preparation) is key to determining the revenue requirements. Operations and maintenance, as well as other costs, are typically expressed in annual needs. Future needs may simply be escalated using a common index (e.g. Consumer Price Index).

However, if the municipality plans major expansions in infrastructure, planning for these is important. The master plan or other document may identify future capital project needs as lump sum amounts, which must be amortized over a longer period of time. Whether spread over 10, 20, or 30 years, and whether done on a pay-as-you-go basis or funded by long-term debt, will depend on each municipality's specific needs and goals. These must be balanced against the willingness-to-pay limitations found in the community survey.

Apportionment

Proposition 218 requires that property-related fees "shall not exceed the proportional cost of the service attributable to the parcel." Therefore, it is essential to develop an apportionment of costs that best reflects the stormwater services provided by the municipality.

Across the U.S., most stormwater fee structures are based on the amount of impervious surface on a parcel, which is proportional to the amount of rainwater that runs off a parcel. This is a straight forward method, although impervious surface data may be difficult or expensive to obtain. Rate-setting consultants have experience working around this issue with sampling and statistical approaches, which can satisfy the Proposition 218 "proportionality" test.

The majority of stormwater rate structures utilize an equivalent residential unit (ERU) as a basis for fees. ERUs estimate the average or median characteristics for a residential property. For stormwater, land use, impervious surface cover, or total size are possible metrics. Once established based on a sample of properties, each parcel in a municipality can be assigned an individual number of ERUs, which is multiplied by the base residential rate to establish the individual fee. With the ERUs assigned and totaled, the revenue requirement is divided by the total number or ERUs to establish the base residential rate.

Most municipalities are bound to an NPDES permit requiring them to reduce stormwater pollutant loading as well as other objectives such as green infrastructure development and public education. These elements could be incorporated into the stormwater fees for various types of parcels.
It is worth noting that Proposition 218's strict requirements on a fair apportionment method means that a municipality should create a thorough administrative record of how the rate

and studies upon which it relies would need to be clearly referenced.

Other Fee Study Features

In addition to the basic revenue requirements and apportionment, many fee studies include provisions for other features such as fee duration (sunset clause) and future increases (typically based on the CPI or other index).

A sunset clause is always a consideration due to the voter approval process. Voters typically prefer a sunset clause, as it removes the fear of a "forever tax". But it is worth noting that if long-term debt is incurred, the fee structure must be in place for at least as long as the debt repayment term. In other words, a fee cannot "sunset" until all debt obligations are done. Two California municipalities, Palo Alto and San Clemente, have opted to routinely include a sunset of their fees. In both cases, capital projects are completed on a pay-as-you-go basis (as opposed to taking on long-term debt). Voters must approve any renewal or extension of the fees (something that is not guaranteed) and municipalities must spend money and resources to run a new ballot measure each time.

Fee Ordinance

- The right of a property owner to appeal his fee and the process to do so.
- Fiscal controls such as establishing a separate enterprise fund and annual audits.
- Procedures for setting annual rates (including the inflation factor).
- The requirement for citizen oversight (if any).

Most municipalities adopt an ordinance to memorialize the rate setting process as well as include other administrative elements. Along with the duration and future increases discussed in a fee study, the ordinance may also include:

Below are several examples of fee studies and ordinances:

Town of Los Altos Fee Report

Vallejo Sanitation & Flood Control District Rate Report

Rancho Cordova Fee Report

A Technical Note on Structuring Stormwater Utility Rates (part of the Local Government Financing Manual, Environmental Finance Center, University of Maryland)

City of Del Mar Clean Water Ordinance

City of Santa Clarita Storm Drainage Utility Ordinance, Section 15.50

In Creating a Stormwater Utility

Early Preparation →

Community Engagement →

Preliminary Rates & Survey →

Fee Study and Ordinance →

Proposition 218 Proceeding →

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Voter Approval for Local Government Taxes. Limitations on Fees, Assessments, and Charges. Initiative Constitutional Amendment.

Official Title and Summary Prepared by the Attorney General

VOTER APPROVAL FOR LOCAL GOVERNMENT TAXES. LIMITATIONS ON FEES, ASSESSMENTS, AND CHARGES. INITIATIVE CONSTITUTIONAL AMENDMENT.

- Limits authority of local governments to impose taxes and property-related assessments, fees, and charges. Requires majority of voters approve increases in general taxes and reiterates that two-thirds must approve special tax.
- Assessments, fees, and charges must be submitted to property owners for approval or rejection, after notice and public hearing.
- Assessments are limited to the special benefit conferred.
- Fees and charges are limited to the cost of providing the service and may not be imposed for general governmental services available to the public.

Summary of Legislative Analyst's Estimate of Net State and Local Government Fiscal Impact:

- Short-term local government revenue losses of more than $100 million annually.
- Long-term local government revenue losses of potentially hundreds of millions of dollars annually.
- Local government revenue losses generally would result in comparable reductions in spending for local public services.

Analysis by the Legislative Analyst

OVERVIEW

Local governments provide many services to people and businesses in their communities. To pay for these services, local governments raise revenues by imposing fees, assessments, and taxes. This constitutional measure would make it more difficult for local governments to raise these revenues. As a result, this measure would:

- Reduce the amount of fees, assessments, and taxes that individuals and businesses pay.
- Decrease spending for local public services.

PROPOSAL

This measure would constrain local governments' ability to impose fees, assessments, and taxes. The measure would apply to all cities, counties, special districts, redevelopment agencies, and school districts in California.

Fees

Current Practice. Local governments charge fees to pay for many services to their residents. Some of these fees pay for services to property, such as garbage collection and sewer service. Fees are also called "charges."

Local governments often establish several fee amounts for a service, each based on the approximate cost of providing the service to different types of properties (such as commercial, industrial, or residential property). Local governments usually send monthly bills to property owners to collect these fees, although some fees are placed on the property tax bill. Local governments generally hold public hearings before creating or increasing such a fee, but do not hold elections on fees.

Proposed Requirements for Property-Related Fees. This measure would restrict local governments' ability to charge "property-related" fees. (Fees for water, sewer, and refuse collection service probably meet the measure's definition of a property-related fee. Gas and electric fees and fees charged to land developers are specifically exempted.)

Specifically, the measure states that *all* local property-related fees must comply by July 1, 1997, with the following restrictions:

- No property owner's fee may be more than the cost to provide service to that property owner's land.
- No fee may be charged for fire, police, ambulance, library service, or any other service widely available to the public.
- No fee revenue may be used for any purpose other than providing the property-related service.
- Fees may only be charged for services immediately available to property owners.

In addition, the measure specifies that before adopting a *new* property-related fee (or increasing an *existing* one), local governments must: mail information about the fee to every property owner, reject the fee if a majority of the property owners protest in writing, and hold an election on the fee (unless it is for water, sewer, or refuse collection service).

Taken together, these fee restrictions would require local governments to reduce or eliminate some existing fees. Unless local governments increased taxes to replace these lost fee revenues, spending for local public services likely would be decreased. The measure's requirements would also expand local governments' administrative workload. For example, local governments would have to adjust many property-related fees, potentially (1) setting them on a block-by-block or parcel-by-parcel basis and (2) ending programs that allow low-income people to pay reduced property-related fees. Local governments would also have to mail information to every property owner and hold elections.

Assessments

Current Practice. Local governments charge assessments to pay for projects and services that benefit specific properties. For example, home owners may pay assessments for sidewalks, streets, lighting, or recreation programs in their neighborhood. Assessments are also called "benefit assessments," "special assessments," "maintenance assessments," and similar terms. Local governments typically place assessment charges on the property tax bill.

To create an assessment, state laws require local governments to determine which properties would benefit from a project or service, notify the owners, and set assessment amounts based on the approximate benefit property owners would receive. Often, the rest of the community or region also receives some general benefit from the project or service, but does not pay a share of cost. Typical assessments that provide general benefits include fire, park, ambulance, and mosquito control assessments. State laws generally require local governments to reject a proposed assessment if more than 50 percent of the property owners protest in writing.

Some local governments also levy "standby charges," which are similar to assessments. Standby charges commonly finance water and sewer service expansions to new households and businesses. (The measure treats standby charges as assessments.)

Proposed Requirements for Assessments. This measure would place extensive requirements on local governments charging assessments. Specifically, the measure requires all *new* or *increased* assessments—and some *existing* assessments—to meet four conditions.

- First, local governments must estimate the amount of "special benefit" landowners receive—or would receive—from a project or service. Special benefit is defined as a particular benefit to land and buildings, not a general benefit to the public at large or a general increase in property values. If a project provides both special benefits *and* general benefits, a local government may charge landowners only for the cost of providing the special benefit. Local government must use general revenues (such as taxes) to pay the remaining portion of the project or service's cost. In some cases, local government may not have sufficient revenues to pay this cost, or may choose not to pay it. In these cases, a project or service would not be provided.

- Second, local governments must ensure that no property owner's assessment is greater than the cost to provide the improvement or service to the owner's property. This provision would require local governments to examine assessment amounts in detail, potentially setting them on a parcel-by-parcel or block-by-block basis.
- Third, local governments must charge schools and other public agencies their share of assessments. Currently, public agencies generally do not pay assessments.
- Finally, local governments must hold a mail-in election for each assessment. Only property owners and any renters responsible for paying assessments would be eligible to vote. Ballots cast in these elections would be weighted based on the amount of the assessment the property owner or renter would pay. For example, if a business owner would pay twice as much assessment as a homeowner, the business owner's vote would "count" twice as much as the homeowner's vote.

Figure 1 summarizes the existing assessments that would be exempt from the measure's requirements. We estimate that more than half of all existing assessments would qualify for an exemption. All other existing assessments must meet the measure's requirements—including the voter approval requirement—by July 1, 1997.

Figure 1

Existing Assessments Exempt from the Measure's Requirements

- Assessments previously approved by voters—or by all property owners at the time the assessment was created.
- Assessments where all the funds are used to repay bond obligations.
- Assessments where all the funds are used to pay for sidewalks, streets, sewers, water, flood control, drainage systems or, "vector control" (such as mosquito control).

Taxes

Current Practice. Local governments typically use taxes to pay for general government programs, such as police and fire services. Taxes are "general" if their revenues can be used to pay for many government programs, rather than being reserved for specific programs. Proposition 62—a statutory measure approved by the voters in 1986—requires new local general taxes to be approved by a majority vote of the people. Currently, there are lawsuits pending as to whether this provision applies to cities that have adopted a local charter, such as Los Angeles, Long Beach, Sacramento, San Jose, and many others.

Proposed Requirements for Taxes. The measure states that all *future* local general taxes, including those in cities with charters, must be approved by a majority vote of the people. The measure also requires *existin* local general taxes established after December 31, 1994, without a vote of the people to be placed before the voters within two years.

Other Provisions

Burden of Proof. Currently, the courts allow local governments significant flexibility in determining fee and assessment amounts. In lawsuits challenging property fees and assessments, the taxpayer generally has the "burden of proof" to show that they are not legal. This measure shifts the burden of proof in these lawsuits to local government. As a result, it would be easier for taxpayers to win lawsuits, resulting in reduced or repealed fees and assessments.

Initiative Powers. The measure states that Californians have the power to repeal or reduce any local tax, assessment, or fee through the initiative process. This provision broadens the existing initiative powers available under the State Constitution and local charters.

FISCAL IMPACT

Revenue Reductions

Existing Revenues. By July 1, 1997, local governments would be required to reduce or repeal existing property-related fees and assessments that d not meet the measure's restrictions on (1) fee ana assessment amounts or (2) the use of these revenues. The most likely fees and assessments affected by these provisions would be those for: park and recreation programs, fire protection, lighting, ambulance, business improvement programs, library, and water service. Statewide, local government revenue reductions probably would exceed $100 million annually. The actual level of revenue reduction would depend in large part on how the courts interpret various provisions of the measure. In addition, because local governments vary significantly in their reliance upon fees and assessments, the measure's impact on individual communities would differ greatly.

Within two years, local governments also would be required to hold elections on some recently imposed taxes and existing assessments. The total amount of these taxes and assessments is unknown, but probably exceeds $100 million statewide. If voters do not approve these existing taxes and assessments, local governments would lose *additional* existing revenues.

New Revenues. The measure's restrictions and voter-approval requirements would constrain new and increased fees, assessments, and taxes. As a result, local government revenues in the future would be lower than they would be otherwise. The extent of these revenue reductions would depend on court interpretation of the measure's provisions and local government actions to replace lost revenues.

Summary of Revenue Reductions. In the short term, local government revenues probably would be reduced by more than $100 million annually. Over time, cal government revenues would be significantly lower ıan they would otherwise be, potentially by hundreds of millions of dollars annually. Individual and business payments to local government would decline by the same amount. In general, these local government revenue losses would result in comparable reductions in spending for local public services.

Cost Increases

Local governments would have significantly increased costs to hold elections, calculate fees and assessments, notify the public, and defend their fees and assessments in court. These local increased costs are unknown, but could exceed $10 million initially, and lesser amounts annually after that.

School and community college districts, state agencies, cities, counties, and other public agencies would have increased costs to pay their share of assessments. The amount of this cost is not known, but could total over $10 million initially, and increasing amounts in the future.

For text of Proposition 218 see page 108

218 Voter Approval for Local Government Taxes. Limitations on Fees, Assessments, and Charges. Initiative Constitutional Amendment.

Argument in Favor of Proposition 218

VOTE YES ON PROPOSITION 218. IT WILL GIVE YOU THE RIGHT TO VOTE ON TAX INCREASES!

Proposition 218 guarantees your right to vote on local tax increases—even when they are called something else, like "assessments" or "fees" and imposed on homeowners.

Proposition 218 guarantees your right to vote on taxes imposed on your water, gas, electric, and telephone bills.

Proposition 218 does NOT prevent government from raising and spending money for vital services like police, fire and education. If politicians want to raise taxes they need only convince local voters that new taxes are really needed.

Proposition 218 simply extends the long standing constitutional protection against politicians imposing tax increases without voter approval.

After voters passed Proposition 13, politicians created a loophole in the law that allows them to raise taxes without voter approval by calling taxes "assessments" and "fees."

Once this loophole was created, one lawyer working with politicians wrote, assessments "are now limited only by the limits of human imagination."

How imaginative can the politicians be with assessments? Here are a few examples among thousands:

- A view tax in Southern California—the better the view of the ocean you have the more you pay.
- In Los Angeles, a proposal for assessments for a $2-million scoreboard and a $6-million equestrian center to be paid for by property owners.
- In Northern California, taxpayers 27 miles away from a park are assessed because their property supposedly benefits from that park.
- In the Central Valley, homeowners are assessed to refurbish a college football field.

TAXPAYERS HAVE *NO RIGHT TO VOTE* ON THESE TAX INCREASES AND OTHERS LIKE THEM UNLESS PROPOSITION 218 PASSES!

Proposition 218 will significantly tighten the kind of benefit assessments that can be levied.

Here are examples of why fees and assessments and other nonvoted taxes are so unfair:

- The poor pay the same assessments as the rich. An elderly widow pays exactly the same on her modest home as a tycoon with a mansion.
- There are now over 5,000 local districts which can impose fees and assessments without the consent of local voters. Special districts have increased assessments by over 2400% over 15 years. Likewise, cities have increased utility taxes 415% and raised benefit assessments 976%, a ten-fold increase.

Non-voted taxes on electricity, gas, water, and telephone services hit renters and homeowners hard.

And, retired homeowners get hit doubly hard!

To confirm the impact of fees and assessments on you, look at your property tax bill. You will see a growing list of assessments imposed without voter approval. The list will grow even longer unless Proposition 218 passes.

Proposition 218 will allow you and your neighbors—not politicians—to decide how high your taxes will be. It will allow those who pay assessments to decide if what they are being asked to pay for is worth the cost.

FOR THE RIGHT TO VOTE ON TAXES, VOTE YES C PROPOSITION 218.

JOEL FOX
President, Howard Jarvis Taxpayers Association

JIM CONRAN
President, Consumers First

RICHARD GANN
President, Paul Gann's Citizens Committee

Rebuttal to Argument in Favor of Proposition 218

PROPOSITION 218 IS NO FALSE ALARM . . . IT HURTS

Propositions can deceive, so carefully judge who you believe.

Beware of wild claims for new "constitutional rights" and people who pretend concern about widows and orphans.

Read Proposition 218 yourself and see how large corporations, big landowners and foreign interests gain more voting power than YOU.

Promoters say you get "tax reform" . . . you may actually get serious cutbacks in local service and FEWER VOTING RIGHTS for millions of California citizens.

Sometimes we hear hysterical warnings about bad things that never occur . . . Proposition 218 is a REAL threat. On Proposition 218 consider the harm to EXISTING local services, not vague future threats:

- May reduce CURRENT funding for police, fire and emergency medical programs across California.
- Worsens SCHOOL CROWDING by making public schools pay NEW TAXES, cutting classroom teaching.
- Could eliminate LifeLine utility support for SENIORS and disabled citizens.

CONSTITUTIONAL POWER SHIFT.

Proposition 218 etches this into the state Constitution:

- Blocks 3 million Californians from voting on tax assessments. The struggling young couple renting a small home, WILL HAVE NO VOTE on the assessments imposed on the house they rent.
- Grants special land interests more voting power than average homeowners. The "elderly widow" promoters cite will be banned from voting if she is a renter, or her voting power dwarfed by large property owners.
- Gives non-citizens voting rights on your community taxes.

Proposition 218 is a great deal for wealthy special interests. But it's a bad deal for the average taxpayer, homeowner and renter.

HOWARD OWENS
Congress of California Seniors

LOIS TINSON
President, California Teachers Association

RON SNIDER
President, California Association of Highway Patrolmen

Arguments printed on this page are the opinions of the authors and have not been checked for accuracy by any official agency.

Voter Approval for Local Government Taxes. Limitations on Fees, Assessments, and Charges. Initiative Constitutional Amendment.

218

Argument Against Proposition 218

PROPOSITION 218 DILUTES VOTING RIGHTS, HURTS LOCAL SERVICES

In the disguise of tax reform, Proposition 218's Constitutional Amendment REDUCES YOUR VOTING POWER and gives huge voting power to corporations, foreign interests and wealthy land owners.

It cuts police, fire, library, park, senior, and disabled services and diverts funds needed for classroom-size reductions.

Read Proposition 218 carefully—it's a wolf, not a lamb!

YOU LOSE RIGHTS; CORPORATIONS, DEVELOPERS, NON-CITIZENS GAIN VOTING POWER

Section 4(e) of Proposition 218 changes the Constitution to give corporations, wealthy landowners and developers MORE VOTING POWER THAN HOMEOWNERS. It lets large outside interests control community taxes—against the will of local citizens.

EXAMPLE: An oil company owns 1000 acres, you own one acre; the oil corporation gets 1000 times more voting power than you.

While Prop. 218 gives voting power to outside interests, Section 4(g) denies voting rights to more than 3,000,000 California renters.

Reducing American citizens' Constitutional rights, it grants voting rights to corporations and absentee landowners—even foreign citizens.

EXAMPLE: A shopping center owned by a foreign citizen is worth 100 times as much as your home; that person gets 100 imes more voting power than you!

Every citizen should have the right to vote if a community is voting on local assessments for police, fire, emergency medical and library programs. It's unfair to give voting power to non-citizens, big landowners and developers, yet deny it to millions of Californians.

MAY CUT LOCAL POLICE, FIRE PROTECTION

Section 6(b)(5) eliminates vital funding sources for local police, fire, emergency medical and library services.

Proposition 218 goes too far—may forbid emergency assessments for earthquakes, floods and fires.

Don't handcuff police and firefighters. The California Police Chiefs Association, Fire Chiefs Association and California Professional Firefighters ask you to vote NO.

The impartial Legislative Analyst's report shows how Proposition 218 could impede LifeLine support for the elderly and disabled. It prohibits seniors and disabled from receiving needed utility services unless they pay all costs themselves.

Proposition 218 cuts more than $100 million from local services, yet wastes tens of millions each year by changing the Constitution to require 5,000 local elections even if local citizens don't want an election . . . even if the election cost is more than the potential revenue.

MAKES SCHOOL CROWDING WORSE

California teachers oppose Proposition 218 because Section 4(a) imposes a new tax on public school property, diverting millions from classroom programs to pay for non-school expenses.

California already has the most crowded classrooms in America (dead last of 50 states). Proposition 218 makes school crowding worse.

SHELL GAME

This measure takes a few good ideas, but twists and perverts them. It cripples the best local services and puts more power into the hands of special interests and non-citizens.

Proposition 218 goes too far. Assessment laws DO need improvement, but Proposition 218 is the wrong way to do it. It does more harm than good, restricting our voting rights, hurting schools, seniors and public safety programs.

Please vote NO on Proposition 218.

FRAN PACKARD
President, League of Women Voters of California

CHIEF RON LOWENBERG
President, California Police Chiefs' Association

CHIEF JEFF BOWMAN
President, California Fire Chiefs' Association

Rebuttal to Argument Against Proposition 218

Arguments against Proposition 218 are misleading and designed to confuse voters. In truth:

1. Proposition 218 expands your voting rights. It CONSTITUTIONALLY GUARANTEES your right to vote on taxes.
2. Under Proposition 218, only California registered voters, including renters, can vote in tax elections. Corporations and foreigners get no new rights.
3. Current law already allows property owners, including nonresidents, to act on property assessments based on the assessment amount they pay. This is NOT created by Proposition 218.
4. "Lifeline" rates for elderly and disabled for telephone, gas, and electric services are NOT affected.
5. Proposition 218 allows voter approved taxes for police, fire, education.

Proposition 218 simply gives taxpayers the right to vote on axes and stops politicians' end-runs around Proposition 13.

That's why ordinary taxpayers, seniors, parents, homeowners, renters, consumer advocates, support Proposition 218.

Under Proposition 218, officials must convince taxpayers that tax increases are justified. Politicians and special interest groups don't like this idea. But they can't win by saying "taxpayers should not vote on taxes," so they use misleading statements to confuse a simple question.

That question: DO YOU BELIEVE TAXPAYERS SHOULD HAVE THE RIGHT TO VOTE ON TAXES? If you answered "yes", VOTE YES ON PROPOSITION 218.

Read the nonpartisan, independent SUMMARY by the Attorney General, which begins "VOTER APPROVAL FOR LOCAL GOVERNMENT TAXES." And, by all means read your property tax bill, due out now. Then you'll know the truth.

FOR THE RIGHT TO VOTE ON TAXES, VOTE YES ON PROPOSITION 218!

CAROL ROSS EVANS
Vice-President, California Taxpayers Association

FELICIA ELKINSON
Past President, Council of Sacramento Senior Organizations

LEE PHELPS
Founder, Alliance of California Taxpayers and Involved Voters (ACTIV)

AN OVERVIEW OF STATE BOND DEBT

This section of the ballot pamphlet provides an overview of the state's current bond debt. It also provides a discussion of the impact the bond measures on this ballot, if approved, would have on this debt level.

Background

What Is Bond Financing? Bond financing is a type of long-term borrowing used to raise money for specific projects. The state gets money by selling bonds to investors. The state must pay back the amount of the bonds along with interest.

The money raised from bonds primarily funds large capital outlay projects, such as prisons, schools, and colleges. The state uses bond financing mainly because these facilities are used for many years and their large dollar costs are difficult to pay for all at once.

General Fund Bond Debt. Most of the bonds the state issues are *general obligation* bonds. The General Fund makes debt payments on about three-fourths of these bonds. The remaining general obligation bonds (such as veterans' housing bonds) are self-supporting and, therefore, do not require General Fund support. The money in the General Fund comes primarily from state personal and corporate income taxes and sales taxes. General obligation bonds must be approved by the voters, and are placed on the ballot by legislative action or by initiative.

The state also issues bonds known as *lease-payment* bonds. These bonds do not require voter approval. The state has used these bonds to fund capital outlay projects in higher education, to construct prisons, and to build state offices. The General Fund also makes debt payments on these bonds.

What Are the Direct Costs of Using Bonds? The state's cost for using bonds depends primarily on the interest rate that is paid on the bonds and the number of years over which they are paid off. Most general obligation bonds are paid off over a period of 20 to 30 years. Assuming an interest rate of 6 percent, the cost of paying off bonds over 25 years is about $1.78 for each dollar borrowed—$1 for the dollar borrowed and 78 cents for the interest. These payments, however, are spread over the entire period, so the cost after adjusting for inflation is less. This is because future payments are made with cheaper dollars. Assuming a 3 percent future annual inflation rate, the cost of paying off the bonds in today's dollars would be about $1.30 for each $1 borrowed.

The State's Current Debt Situation

The Amount of State Debt. As of July 1, 1996, the state had about $20.2 billion of General Fund bond debt—$14.3 billion of general obligation bonds and $5.9 billion of lease-payment bonds. Also, about $9 billion of authorized bonds had not been sold because the projects to be funded by the bonds had not been undertaken.

Debt Payments. We estimate that payments on the state's General Fund bond debt will be around $2.4 billion during the 1996–97 fiscal year. As currently authorized bonds are sold, bond debt payments will increase to about $2.9 billion in 1999–00 and declin thereafter.

The level of debt payments expressed as a percentage of state General Fund revenues is referred to as the state's "debt ratio." Figure 1 shows actual and projected debt ratios from 1990–91 through 2004–05. The figure shows that as currently authorized bonds are sold, the state's debt ratio will increase to 5.3 percent in 1998–99 and decline thereafter.

Figure 1

State Debt Service Ratios [a]
1990-91 Through 2004-05

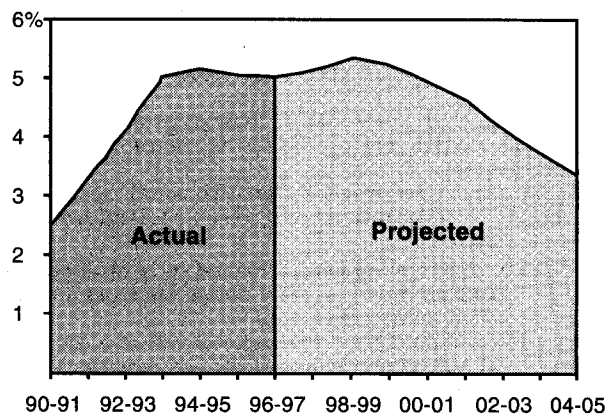

[a] Based on sales of *currently* authorized bonds.

Bond Measures Proposed for the Ballot

There are three general obligation bond measures on this ballot that total $2.1 billion:

- $995 million for water-related programs (Proposition 204).
- $700 million for local jails and juvenile justice facilities (Proposition 205).
- $400 million for veterans' housing loans (Proposition 206). These bonds are self-supporting and do not affect the state's debt ratio.

If these bond measures are approved, we estimate that the state's bond debt payments would remain at about $2.9 billion through 2001–02 and the state's General Fund bond debt would total $21.3 billion (after accounting for the sale of some authorized bonds and the retirement of some debt). The debt ratio would remain at the projected peak of 5.3 percent through 1999–00 and decline thereafter. Voter approval of additional bonds at future elections or legislative authorization of additional lease-payment bonds would increase the state's debt.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

RESOLUTION R2-2008-0012

Amending the Water Quality Control Plan for the San Francisco Bay Region to Establish a Total Maximum Daily Load and Implementation Plan for PCBs in the San Francisco Bay

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

1. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law (OAL) and the United States Environmental Protection Agency (U.S. EPA), where required.
2. The Basin Plan may be amended in accordance with California Water Code § 13240, et seq.
3. The San Francisco Bay has been identified under federal Clean Water Act §303(d) as an impaired waterbody due to polychlorinated biphenyls (PCBs).
4. Under Clean Water Act § 303(d), the Water Board is required and authorized to establish the total maximum daily load (TMDL) for those pollutants identified as causing impairment of waters on the § 303(d) list. Additionally, the Water Board is authorized to develop a implementation program for achieving water quality standards, such as the narrative water quality objective.
5. On May 18, 2000, the U.S. EPA promulgated the California Toxics Rule (CTR) prescribing numeric water quality criteria for priority toxic pollutants, including PCBs, that apply to the San Francisco Bay.
6. A Basin Plan Amendment has been prepared in accordance with California Water Code § 13240 that will establish the TMDL and Implementation Plan to reduce PCBs-related risks to humans, aquatic life and wildlife and restore and protect water quality beneficial uses.
7. The Basin Plan Amendment, including specifications on its physical placement in the Basin Plan, is set forth in Exhibit A hereto.
8. The scientific basis for the regulatory elements of the proposed Basin Plan Amendment was subjected to an independent, external peer review by Professors Kevin J. Farley and Dr. David O. Carpenter, M.D, pursuant to the requirements of Health and Safety Code section 57004.

9. On June 22 and December 3, 2007, the Water Board publicly noticed the proposed Basin Plan Amendment and distributed the proposed Basin Plan Amendment, a draft Staff Report, and Environmental Checklist in accordance with applicable state and federal environmental regulations (CWC § 13244, title 23, California Code of Regulations, § 3775 et seq., and 40 CFR Part 25).

10. On September 12, 2007, the Water Board held a public hearing to consider the Basin Plan Amendment, after a 60-day public comment period.

12. On February 13, 2008, the Water Board held a second public hearing to consider the Basin Plan Amendment, after a second 45-day public comment period on the changes made on December 3, 2007, to the Basin Plan Amendment and supporting Staff Report, including response to public comments on the Amendment.

13. The process of basin planning has been certified by the Secretary for Resources as exempt from the requirement of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) to prepare an Environmental Impact Report or Negative Declaration.

14. The Basin Plan Amendment package includes a Staff Report, an Environmental Checklist, an assessment of the potential environmental impacts of the Basin Plan Amendment, and a discussion of alternatives. The Basin Plan Amendment, Environmental Checklist, Staff Report, and supporting documentation serve as a substitute environmental document under the Water Board's certified regulatory program.

15. The Water Board has duly considered the Environmental Checklist, Staff Report and supporting documentation with respect to environmental impacts and finds that the proposed Basin Plan Amendment will not have a significant impact on the environment. The Water Board further finds, based on consideration of the record as a whole, that there is no potential for adverse effect, either individually or cumulatively, on wildlife as a result of the proposed Basin Plan Amendment.

16. The Water Board has also considered the environmental analysis in the Staff Report and the Environmental Checklist of the reasonably foreseeable methods of the compliance with the Basin Plan Amendment, including economics.

17. The Water Board has carefully considered all comments and testimony received, including responses thereto, on the Basin Plan Amendment, as well as all of the evidence in the administrative record.

18. The Basin Plan Amendment must be submitted for review and approval by the State Water Board, the OAL, and U.S. EPA. Once approved by the State Water Board, the amendment is submitted to OAL and U.S. EPA. The Basin Plan Amendment will become effective upon approval by OAL and U.S. EPA.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Water Board adopts the Basin Plan Amendment as set forth in Exhibit A hereto.
2. The Executive Officer is directed to forward copies of the Basin Plan Amendment to the State Water Board in accordance with the requirement of CWC Section 13245.
3. The Water Board requests that the State Water Board approve the Basin Plan Amendment in accordance with the requirements of CWC Sections 13245 and 13246 and forward it to the OAL and U.S.EPA for approval.
4. If, during the approval process, Water Board staff, the State Water Board or OAL determines that minor, non-substantive corrections to the language of the Amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Water Board of any such changes.
5. Since the Basin Plan Amendment will involve no potential for adverse effect, either individually or cumulatively, on wildlife, the Executive Officer is directed to sign a CEQA Filing Fee No Effect Determination Form.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 13, 2008.

BRUCE H. WOLFE
Executive Officer

Attachment

Exhibit A – Basin Plan Amendment to Amend the Water Quality Control Plan for the San Francisco Bay Region to Establish a Total Maximum Daily Load and Implementation Plan for PCBs in the San Francisco Bay.

Exhibit A

Basin Plan Amendment

Add the following language to Chapter 7, Water Quality Attainment Strategies including Total Maximum Daily Loads, of the Basin Plan:

San Francisco Bay Polychlorinated Biphenyls TMDL

The following sections establish the TMDL for total polychlorinated biphenyls including dioxin-like PCBs congeners (hereinafter referred to as PCBs) for the San Francisco Bay. The associated numeric target, allocations, and implementation plan are designed to ensure attainment of beneficial uses and water quality objectives for the San Francisco Bay.

Problem Statement

All segments of the San Francisco Bay have been identified as impaired due to elevated levels of PCBs in sport fish. Neither the narrative water quality objective, which states that controllable water quality factors shall not cause a detrimental increase in toxic substances found in bottom sediments or aquatic life, nor the numeric water quality objective of 0.00017 µg/L total PCBs in water is attained in the San Francisco Bay. The existing beneficial use ~~s~~ for commercial and sport fishing is not fully supported.

This TMDL addresses impairment of San Francisco Bay segments by PCBs. In the context of this TMDL, "San Francisco Bay" refers to all of the following water bodies:

- Sacramento/San Joaquin Delta (within Region 2)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- San Francisco Bay, Central
- San Francisco Bay, Lower (including)
    - Central Basin, San Francisco
    - Mission Creek
    - Oakland Inner Harbor (Fruitvale site)
    - Oakland Inner Harbor (Pacific Dry-Dock Yard 1 site) San Francisco Bay, South

This TMDL is intended to achieve protection of the commercial and sport fishing beneficial use and to the extent that other beneficial uses are affected by PCBs, the TMDL will also ensure protection of other beneficial uses, specifically, preservation of rare and endangered species, estuarine habitat and wildlife habitat.

Numeric Target

The numeric target (also referred to as the TMDL target) to protect both human health and wildlife is an average fish issue concentration of 10 micrograms total PCBs per kilogram of typically consumed fish, on a wet weight basis (10 µg/kg wet weight). Attainment of the total PCBs fish tissue numeric target will also protect human health and wildlife for dioxin-like PCBs.

Attainment of the fish tissue target for PCBs in San Francisco Bay will be initially evaluated by comparing the average total PCBs concentrations in the edible portion of two fish species, white croaker (size class, 20 to 30 centimeters in length) and shiner surfperch (size class, 10 to 15 centimeters in length) to the target. Comparison of the fish target against these two species of fish is considered to be protective and provides a margin of safety for the TMDL, because PCBs concentrations in these species are the highest of the fish species measured and sport recreational fishers likely consume a variety of fish species, including those species with lower PCBs concentrations. As part of the adaptive implementation of this TMDL, the Water Board will require the collection of additional information regarding recreational and subsistence fishers' patterns of consumption and evaluate if fish species other than white croaker and shiner surfperch should be considered to evaluate attainment of the target.

The number of fish samples collected to determine compliance with the target will be based on guidance described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (EPA 823-B-00-007) and on the statistical power needed to demonstrate trends in total PCBs concentration over time.

Sources

Sources of PCBs to fish and the water column of San Francisco Bay fall into two categories: (1) external sources including atmospheric deposition, Central Valley inflow, municipal and industrial wastewater discharges, and urban and non-urban stormwater runoff; and (2) internal sources, including movement or release of PCBs already in San Francisco Bay sediments, specifically, dredging and in-Bay disposal of dredged sediment, erosion of bay bottom sediment containing PCBs (bed erosion), and in-Bay contaminated sediment sites. These sources and estimates of associated loads are shown in Table A-1. Decreases of PCBs in San Francisco Bay occur via out-of-Bay dredge material disposal, natural attenuation, and outflow through the Golden Gate.

Table A- 1 PCBs Sources and Current Loads to San Francisco Bay

Source Category	PCBs Loads
	Kilograms per year
External	
Direct Atmospheric Deposition	Net Loss
Central Valley Watershed	11
Municipal Wastewater Dischargers	2.3
Industrial Wastewater Dischargers	0.035

Urban and Non Urban-Stormwater Runoff	20
Total	***33[a]***
Internal	
Sediment Dredging and Disposal	Net Loss
Bed Erosion	Not Quantified
In-Bay Contaminated Sediment	Not Quantified

a) Total differs from column sum due to rounding

Total Maximum Daily Load

The TMDL for PCBs in San Francisco Bay is 10 kg/year. Calculation of the TMDL is based on two models: a food-web PCBs bioaccumulation model and a long-term fate mass balance model. The model results predict that attainment of the numeric target will occur when the total PCBs concentration in surface sediments in the Bay declines to one µg/kg, which will be achieved when loads from external sources are reduced to 10 kg/year.

Load and Wasteload Allocations

Load allocations are presented in Table A-2 for source categories.

Individual wasteload allocations for municipal wastewater dischargers and industrial wastewater dischargers are presented in Table A-3 and Table A-4. Individual wasteload allocations for stormwater runoff to county-based watersheds are presented in Table A-5.

Table A- 2 Load and Wasteload Allocations

Source Category	Allocations
	Kilograms per year
External	
Direct Atmospheric Deposition	0 [a]
Central Valley Watershed	5
Municipal Wastewater Dischargers	2
Industrial Wastewater Dischargers	0.035
Stormwater Runoff	2
Stormwater Runoff Treatment by Municipal Wastewater Dischargers	1
Total	***10[b]***

a) Zero allocation reflects overall net loss to the atmosphere

b) Total differs from column sum due to rounding

Table A - 3 Individual Wasteload Allocations For Municipal Wastewater Dischargers

Permitted Entity	NPDES Permit	Allocations
		kilograms per year
American Canyon, City of	CA0038768	0.002
Benicia, City of	CA0038091	0.009
Burlingame, City of	CA0037788	0.01
Calistoga, City of	CA0037966	0.002
Central Contra Costa Sanitary District	CA0037648	0.1
Central Marin Sanitation Agency	CA0038628	0.04
Delta Diablo Sanitation District	CA0038547	0.04
East Bay Dischargers Authority	CA0037869	0.3
Dublin-San Ramon Services District (CA0037613)		
Hayward Shoreline Marsh (CA0037702)		
Livermore, City of (CA0038008)		
Union Sanitary District, Wet Weather (CA0038733)		
East Bay Municipal Utilities District	CA0037702	0.3
East Brother Light Station	CA0038806	0.00030
Fairfield-Suisun Sewer District	CA0038024	0.05
Las Gallinas Valley Sanitary District	CA0037851	0.01
Marin County Sanitary District, Paradise Cove	CA0037427	0.00003
Marin County Sanitary District, Tiburon	CA0037753	0.002
Millbrae, City of	CA0037532	0.007
Mt. View Sanitary District	CA0037770	0.007
Napa Sanitation District	CA0037575	0.04
Novato Sanitary District	CA0037958	0.02
Palo Alto, City of	CA0037834	0.09
Petaluma, City of	CA0037810	0.02
Pinole, City of	CA0037796	0.009
Contra Costa County, Port Costa Wastewater Treatment Plant	CA0037885	0.0001
Rodeo Sanitary District	CA0037826	0.002
Saint Helena, City of	CA0038016	0.001
San Francisco, City and County of, San Francisco International Airport WQCP	CA0038318	0.002
San Francisco, City and County of, Southeast Plant	CA0037664	0.3
San Jose/Santa Clara WPCP	CA0037842	0.4
San Mateo, City of	CA0037541	0.04
Sausalito-Marin City Sanitary District	CA0038067	0.005
Seafirth Estates	CA0038893	0.00001
Sewerage Agency of Southern Marin	CA0037711	0.01
Sonoma Valley County Sanitary District	CA0037800	0.01
South Bayside System Authority	CA0038369	0.06
South San Francisco/San Bruno WQCP	CA0038130	0.03
Sunnyvale, City of	CA0037621	0.05
US Naval Support Activity, Treasure Island WWTP	CA0110116	0.002
Vallejo Sanitation & Flood Control District	CA0037699	0.05
West County Agency, Combined Outfall	CA0038539	0.05
Yountville, Town of	CA0038121	0.001
Total		***2[a]***

a) Total differs from column sum due to rounding

Table A - 4 Individual Wasteload Allocations for Industrial Wastewater Dischargers

Permitted Entity	NPDES Permit	Allocations[a]
		kilograms per year
C&H Sugar and Crockett Community Services District.	CA0005240	0.00006
Chevron Products Company	CA0005134	0.003
ConocoPhillips	CA0005053	0.0006
Crockett Cogeneration LP, and Pacific Crockett Energy, Inc.	CA0029904	0.0006
General Chemical	CA0004979	0.0009
GWF Power Systems, Site I	CA0029106	0.0001
GWF Power Systems, Site V	CA0029122	0.0001
Hanson Aggregates, Amador Street	CA0030139	0.00003
Hanson Aggregates, Olin Jones Dredge Spoils Disposal	CA0028321	0.00003
Hanson Aggregates, Tidewater Ave., Oakland	CA0030147	0.00003
Morton Salt	CA0005185	0.00008
Pacific Gas and Electric, East Shell Pond	CA0030082	0.00003
Rhodia, Inc.	CA0006165	0.0003
San Francisco, City and Co., SF International Airport Industrial WTP	CA0028070	0.002
Shell Oil Products US and Equilon Enterprises LLC	CA0005789	0.002
Mirant Delta LLC, Pittsburg Power Plant	CA0004880	0.0008
Mirant Potrero LLC, Potrero Power Plant	CA0005657	0.0003
Tesoro Refining and Marketing Company	CA0004961	0.002
The Dow Chemical Company	CA0004910	0.0006
USS-Posco	CA0005002	0.02
Valero Refining Company	CA0005550	0.0007
Total		***0.035***[b]

a) Wasteload allocations for industrial wastewater dischargers do not include mass from once-through cooling water. The Water Board will apply intake credits to once-through cooling water as allowed by law.
b) Total differs from column sum due to rounding

Table A- 5 County-Based Watershed Wasteload Allocations for Stormwater Runoff

County[b]	Allocations[a] kilograms per year
Alameda	0.5
Contra Costa	0.3
Marin	0.1
Napa	0.05
San Francisco[c]	0.2
San Mateo	0.2
Santa Clara	0.5
Solano	0.1
Sonoma	0.05
Total	***2***

[a] Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas within the County. Examples of discharges include but are not limited to California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

[b] Includes unincorporated areas and all municipalities in the county that drain to the Bay and are part of the San Francisco Bay Region.

[c] Does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the City and County of San Francisco's Southeast Plant and Northpoint Wet Weather Facility (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

Implementation Plan

The implementation plan includes three general implementation categories: control of external loadings of PCBs to the Bay, control of internal sources of PCBs within the Bay, and actions to manage risks to Bay fish consumers. In addition, the plan includes monitoring to measure attainment of the numeric target and load allocations, and measuring implementation progress. The plan will be implemented in phases via an adaptive implementation strategy founded on requiring actions in each category based on the current state of knowledge of PCBs sources and control measures, while also conducting studies to improve our understanding of PCBs sources, control options, and fate in the environment.

External Sources

This section, organized by source categories, specifies actions required to achieve allocations and implement the TMDL.

Central Valley Watershed

Sediments entering the Bay from the Central Valley have lower concentrations of PCBs than in-Bay sediment. Major mass loading events that occur during episodic high flow conditions generally flow directly out of the Bay through the Golden Gate. It is anticipated that the Central Valley allocation will be attained through natural attenuation.

Municipal and Industrial Wastewater Dischargers

Wasteload allocations shall be implemented through NPDES permits that require implementation of best management practices to maintain optimum treatment performance for solids removal and the identification and management of controllable sources. NPDES permits shall include effluent limits based on current performance and a requirement for quantification of PCBs loads to the Bay in order to determine attainment of the wasteload allocations. Compliance with effluent limits shall be determined using a Title 40, Code of Federal Regulations, Part 136 analytical method. In addition, municipal and industrial wastewater dischargers will be required to support actions to reduce the health risks of people who eat PCBs-contaminated, San Francisco Bay fish and to conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

It is the Water Board's intent to implement individual wasteload allocations via numeric water quality-based effluent limitations for PCBs in NPDES permits. These limits shall represent individual dischargers' PCBs loads, consistent with the underlying assumptions and requirements of the wasteload allocations. In the absence of actual discharge performance data sufficient to calculate such limits, the Water Board will apply appropriate uncertainty factors to the individual wasteload allocations.

Dischargers shall also be required to conduct sufficient monitoring of their effluent, which accounts for discharge variability and blended effluent, to enable calculation of current PCBs loading. These requirements will be implemented via NPDES permits or the Water Board's authority under Section 13267 of the California Water Code, such that monitoring begins no later than January 2009 and is completed in a timely manner.

Stormwater Runoff

Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued, shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on best available technology economically achievable. All permits shall remain consistent with Section 4.8 - Stormwater Discharges.

In the first five-year permit term, stormwater permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Stormwater runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an stormwater runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Urban Stormwater Runoff Treatment by Municipal Wastewater Dischargers

Routing of urban stormwater runoff through municipal wastewater treatment facilities may be an efficient means of reducing PCBs, and other particle-associated contaminant loads to the Bay. This load allocation shall be implemented through a permit. Within five years of adoption of this TMDL, the Water Board will consider issuance of a permit under which municipal wastewater dischargers can apply for a portion of this reserved allocation.

Internal Sources

In-Bay PCB-Contaminated Sites

A number of former industrial and military sites adjacent to PCBs-enriched sediment are found throughout the Bay. This TMDL does not require any specific party to implement new actions for in-Bay PCB-contaminated sites. However, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will maintain an inventory of contaminated sites and continue to set priorities for investigating and remediating the sites. The existing list of in-Bay PCB-contaminated sites referred to in this TMDL is based on data collected under the Bay Protection Toxic Cleanup Program, which identified sites with total PCBs in sediment that exceed 180 µg/kg. This TMDL does not set a cleanup level for total PCBs in

sediment. The fish tissue target of 10 µg/kg and the sediment goal of one ug/kg are not cleanup standards, nor should they be considered appropriate~~,~~ or relevant~~,~~ and applicable requirements (ARARs) or a "to-be-considered" ARAR under the National Contingency Plan, 40 CFR Part 300 et. Seq. or the 1986 Superfund Amendments and Reauthorization Act. An analysis of the feasibility, technical practicability, and potential environmental impacts of individual clean-up actions is currently required prior to conducting cleanup of contaminated in-Bay sediment overseen by the Water Board and the Department of Toxic Substances Control and will continue to be required, not withstanding this TMDL. The Water Board has the authority to approve, disapprove or condition these projects to minimize adverse environmental impacts while achieving the goals of environmental cleanup.

The Water Board will coordinate cleanup actions with the U.S. EPA and the Department of Toxic Substances Control, and advise them that the fish tissue target and sediment goal do not constitute cleanup standards for ARARs. The Water Board will issue cleanup orders as necessary. The Water Board will require responsible parties for each specific Bay margin contaminated site to:

1. Estimate the pre-cleanup and post-cleanup vertical and lateral extent of PCBs in Bay sediments;
2. Estimate the pre-cleanup and post-cleanup mass of PCBs in Bay sediments;
3. Quantify rate(s) of sediment accretion, erosion or natural attenuation;
4. Implement on-land source control measures, if necessary, to ensure that on-land sources of PCBs do not further contaminate in-Bay sediments;
5. Evaluate post-cleanup, the residual risks to humans and wildlife;
6. Support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish;
7. Conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

These requirements shall be incorporated into relevant site investigation plans within five years of the effective date of this TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL or as agreed to in the individual site investigation plan.

Navigational Dredging

The PCBs concentration in dredged material disposed of in the Bay shall not exceed the 99th percentile PCBs concentration of the previous 10 years of Bay sediment samples collected through the RMP (excluding stations outside the Bay like the Sacramento River, San Joaquin River, Guadalupe River and Standish Dam stations). Prior to disposal, the material shall be sampled and analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region." All in-Bay disposal of dredged material shall comply with Section 4.20, entitled Dredging and Disposal of Dredged Sediment, including the Long Term Management Strategy. Additionally, dredged material dischargers will be required to conduct or cause to be

conducted studies to fill critical data needs identified in the Adaptive Implementation section.

Risk Management

Load reductions and attainment of the numeric target to support fishing in the Bay as a beneficial use will take time to achieve. However, there are actions that should be undertaken prior to achievement of the numeric fish tissue target to help manage the risk to consumers of PCBs-contaminated fish. The Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Toxic Substances Control, the California Department of Public Health, dischargers, and interested parties to pursue risk management strategies. The risk management activities will include the following:

- Investigating and implementing actions to address the public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce the actual and potential exposure of, and mitigate health impacts to, people and communities most likely to be consuming PCB-contaminated fish from San Francisco Bay, such as recreational and subsistence fishers and their families;
- Providing multilingual fish-consumption advice to the public to help reduce PCBs exposure through community outreach, broadcast and print media, and signs posted at popular fishing locations;
- Regularly informing the public about monitoring data and findings regarding hazards of eating PCB-contaminated fish; and
- Conducting special studies needed to support health risk assessment and risk communication, including the collection of additional information regarding recreational and subsistence fishers' patterns of consumption.

Critical Data Needs

Additional data and other information will be needed to assess both the progress toward attainment of the fish tissue target and to evaluate the need for modifications to the implementation plan, TMDL, and/or allocations. Dischargers will be required to conduct or cause to be conducted the following studies to fill critical data needs.

- PCBs mass budget modeling and food web model improvements – Model refinements to improve our ability to predict recovery rates of the Bay from impairment by PCBs, to help strategically focus implementation actions on those actions with the most potential for success, and to help better our understanding of the role in-Bay PCBs-contaminated sites play in the Bay's recovery.

- Rate of natural attenuation of PCBs in the Bay environments – A better understanding of local rates of natural attenuation in order to predict with more certainty the recovery time of the Bay.

Monitoring

Monitoring to demonstrate progress toward attainment of the TMDL target shall be conducted by maintaining discharger-funded RMP monitoring of PCBs in San

Francisco Bay fish, sediments, and water at a spatial scale and frequency to track trends in the decline of PCBs in the Bay. Monitoring of load allocations to demonstrate progress towards attainment shall be conducted by municipal and industrial wastewater dischargers and stormwater permittees as discussed in external sources above.

Continued regular monitoring of PCB loads from the Central Valley and other tributaries to the Bay shall be conducted by maintaining discharger-funded RMP monitoring in order to provide information on the long term decline of PCBs to the Bay and to confirm the assumption that Central Valley loads are being reduced due to natural attenuation. Monitoring of loads allocated to other sources will be considered as part of the RMP special studies.

Adaptive Implementation

Adaptive implementation entails taking actions commensurate with the existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Accordingly, this TMDL will be implemented in phases starting with actions described in each source category, risk management, monitoring, and critical data needs section above with subsequent modifications and phases based on improved knowledge of PCBs sources, control measures, and fate in the environment,

The Water Board will adapt the TMDL and implementation plan to incorporate new and relevant scientific information such that effective and efficient measures can be taken to achieve the allocations and numeric fish tissue target. The Water Board staff will present an annual progress report to the Water Board on implementation of the TMDL that includes evaluation of new and relevant information that becomes available through implementation actions, monitoring, special studies, and the scientific literature. Within ten years of the effective date of the TMDL, Water Board will consider a Basin Plan amendment that will reflect and incorporate the data and information that is generated in the intervening years. The Water Board will consider amending the PCBs TMDL and implementation plan as necessary to ensure attainment of water quality standards in a timely manner while considering the financial and environmental consequences of new control measures.

In particular, achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:

- A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;
- Documentation has been prepared that demonstrates that all technically and economically feasible and cost-effective control measures recognized by the

Water Board have been fully implemented, and evaluates and quantifies the PCBs load reduction of such measures;

- A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and
- A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.

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California Regional Water Quality Control Board
San Francisco Bay Region

Order No. R2-2023-0019

Amendment of Order No. R2-2022-0018
(NPDES Permit No. CAS612008)
For Alameda, Contra Costa, Santa Clara, San Mateo, and Solano Permittees

WHEREAS the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds the following:

1. The California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), adopted Order No. R2-2022-0018 to reissue the San Francisco Bay Municipal Regional Stormwater Permit (MRP or Permit) at a public hearing on May 11, 2022. The Permit regulates municipal stormwater discharges by the following jurisdictions and entities, hereafter collectively referred to as the Permittees:

   The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees);

   The cities of Antioch, Brentwood, Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees);

   The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees);

   The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood and Sea Level Rise Resiliency District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees); and

   The cities of Fairfield, Suisun City, and Vallejo, and the Vallejo Flood & Wastewater District, which have joined together to form the Solano Stormwater Alliance (Solano Permittees).

2. At the May 11, 2022, hearing, the Water Board directed Water Board staff to report back to the Board on certain Permit topics such as including alternative treatment or low impact development (LID) measures in Regulated Projects (as that term is defined in the Permit) and the impacts, if any, on the Permit's Category C Special Project (Affordable Housing) LID credits on housing costs.
3. Since the Permit's adoption, Water Board staff convened numerous stakeholder meetings and workgroups related to the Permit, including on alternative treatment systems and Category C Special Projects. Based on new information, this Order amends the Permit. Specifically, this Order adds Provision C.3.c.i.(2)(c)(iii) to the Permit to allow for the implementation of alternative treatment systems upon a demonstration of technical infeasibility of LID treatment systems and a demonstration of commensurate benefit, among other requirements. This Order also amends the Category C Special Projects Provision of the Permit so that it better aligns with affordable housing projects built in the San Francisco Bay Region by modifying Provision C.3.e.ii.(5)'s method for calculating LID Affordable Housing Credits and making related changes. Further, the Order modifies Section C.3.e.ii.(5) of Permit Attachment A (Fact Sheet) to be consistent with the changes to the Category C Special Projects Provision.
4. The Fact Sheet for this Order (Attachment 1) contains background information and the rationale and basis for this Order's requirements. It is hereby incorporated into this Order by reference and constitutes findings for this Order.
5. This Order is exempt from the provisions of the California Environmental Quality Act pursuant to Water Code section 13389. This Order does not cover new sources as defined by the federal Clean Water Act (CWA) (i.e., sources constructed after new source performance standards were published).
6. Pursuant to Water Code section 13149.2, the Water Board has considered readily available information concerning potential water quality impacts in disadvantaged communities and tribal communities that may result from the adoption of this Order. As described in Finding 3, this Order makes modifications to the Permit. The authorization of alternative treatment systems and the modification to the Permit's Category C Special Projects will not result in water quality impacts. The modifications take into account potential water quality impacts and incorporate measures to protect water quality or otherwise provide offsetting water quality benefits (see Attachment 1, pp. A-18 to A-19, Antidegradation).

   There were no environmental justice concerns raised pertaining to water quality impacts within the Water Board's authority. However, interested persons raised other environmental justice concerns regarding potential adverse impacts that the MRP's road reconstruction requirements could have on road safety in disadvantaged communities. The Water Board considered these concerns and determined that the concerns are not supported and changes to the requirements of the Order are not warranted. The requested changes to the MRP's road reconstruction requirements would result in adverse water quality impacts in disadvantaged communities and are not authorized under the NPDES regulations (40 C.F.R. § 122.62).

7. The Water Board notified the Permittees and interested agencies and persons of its intent to adopt this Order and provided an opportunity to submit written comments. The Water Board also notified potentially affected disadvantaged communities and tribal communities of this Order and provided them with an opportunity to engage prior to the public comment period.
8. The Water Board, in a public meeting on October 11, 2023, heard and considered all comments pertaining to this Order. The Fact Sheet for this Order provides details regarding the public hearing.

IT IS HEREBY ORDERED, pursuant to the provisions of California Water Code Division 7 (commencing with §13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, that the Permittees shall comply with the Permit as amended by this Order. Additions are displayed as underline type and deletions are displayed as ~~strikethrough~~ format.

1. Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems is added to Order No. R2-2022-0018, as follows:

   (iii) Alternative Treatment Systems

   Permittees may allow a Regulated Project to comply with the Provision C.3.d design volume and/or flow requirement for the approved portion (Approved Portion)[a] using an alternative treatment system (i.e., onsite non-LID treatment systems (e.g., media filters) in combination with systems providing flow control benefit), as follows:

   a. Alternative treatment systems may be implemented in the following two geographic areas, as identified in a Countywide Hydromodification Applicability Map accepted by the Executive Officer:

      1. Areas draining to channels that are hardened continuously from the point of discharge into the channel to San Francisco Bay or to the Pacific Ocean; and

      2. Areas draining directly into the Bay, the Ocean, or channels that are tidally influenced at the point of discharge into the channel.

   Before a Permittee may implement alternative treatment systems, the Permittee shall, among other requirements in this Provision C.3.c.i.(2)(c)(iii), re-submit the applicable portions of its respective Countywide Hydromodification Applicability Map to accurately identify the two geographic areas described above and the resubmitted applicable

[a] The Approved Portion is the portion of the Provision C.3.d design volume/flow that may be treated using non-LID treatment measures, as substantiated in the Demonstration of Technical Infeasibility and Demonstration of Commensurate Benefit that have been approved by the Executive Officer.

portions of the map must be accepted by the Executive Officer as accurate.

b. Alternative treatment systems in the two geographic areas listed in Provision C.3.c.i.(2)(c)(iii)a must have an active General Use Level Designation certification for Enhanced Treatment from the Washington State Department of Ecology's Technology Assessment Protocol – Ecology (TAPE) Program.[b]

c. Implementation of alternative treatment systems requires a Demonstration of Technical Infeasibility[c] that has been submitted by the Permittee to the Water Board and approved by the Executive Officer for each Regulated Project where an alternative treatment system is proposed. Permittees shall include the following documentation in the Demonstration of Technical Infeasibility:

1. The technical constraints (spatial, utility, or other) to treating 100 percent of the Provision C.3.d design volume and/or flow onsite and offsite using LID and that the Regulated Project maximizes LID treatment within those constraints. This must include an assessment of the technical feasibility of incorporating all potential types and configurations of LID, including, but not limited to, the following: runoff capture and use, suspended pavement systems with the approved biotreatment soil media (e.g., Silva cells), bioretention, green roofs, pervious pavement systems, and infiltration galleries.

   For onsite technical infeasibility, a demonstration that the Regulated Project will implement LID in or on all potential or actual onsite landscaping opportunities[d] and that there are no potential or actual onsite landscaping opportunities in or on which LID will not be implemented.

   For offsite technical infeasibility, demonstration that there are no opportunities to implement[e] an equivalent amount of LID in the adjacent or nearby public right of way (ROW) for the Regulated

[b] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

[c] Examples for the Demonstrations of Technical Infeasibility and Commensurate Benefit are provided in the Fact Sheet.

[d] Landscaping opportunities include, but are not limited to: roofs, terraces, patios, courtyards, plazas, quadrangles, athletics areas, outdoor pool areas, playgrounds, parks, bike-separation strips, and adjacent public sidewalks, roads, and rights of way (ROWs).

[e] "Implement" in this paragraph is defined to include not only direct implementation by the project proponent, but also indirect implementation via contribution of funding and/or resources to another entity which will construct and/or maintain an equivalent amount of LID.

Project; elsewhere in the Permittee's jurisdiction (including opportunities identified in the Permittee's GI Plan); and elsewhere in the same county (including opportunities identified in the GI Plans of other Permittees in the county).

2. How LID was considered by both the project proponent and by the Permittee from the early stages of the project's planning and entitlement processes and how that resulted in the project's final design.

d. Implementation of alternative treatment systems requires a Demonstration of Commensurate Benefit[c] that has been submitted by the Permittee to the Water Board and approved by the Executive Officer for each Regulated Project where an alternative treatment system is proposed. Permittees shall include the following documentation in the Demonstration of Commensurate Benefit:

1. That the alternative treatment system includes TAPE-certified (pursuant to Provision C.3.c.i.(2)(c)(iii)(b)) treatment controls sized to accommodate the Provision C.3.d design volume and/or flow.

2. That the alternative treatment system includes flow controls that, based on monitoring and/or field studies, provide flow control benefit commensurate to the flow control benefit of LID measures had they been implemented for the project.

   At a minimum, this shall include consideration of vertical infiltration into soils (including soils with low infiltration rates), horizontal infiltration, evapotranspiration, and the effect of inter-event periods on antecedent soil conditions. In places where infiltration is not allowed because of permanent high groundwater (i.e., less than 10 feet below the surface) or documented existing significant soil and groundwater contamination, flow control benefits may be compared to those from lined bioretention cells.

e. Implementation – Permittees may implement Provision C.3.c.i.(2)(c)(iii) after they have collectively submitted a Regional Guidance Document to facilitate Permittees' compliance with the Demonstration of Technical Infeasibility and with the Demonstration of Commensurate Benefit and the Executive Officer has approved the Regional Guidance Document.

   At a minimum, the Permittees shall include the following in the Regional Guidance Document:

1. Regional guidance to ensure that Permittees and projects seeking to use alternative treatment systems comply with the requirements for

the Demonstrations of Technical Infeasibility and Commensurate Benefit set forth in Provisions C.3.c.i.(2)(c)(iii)c-d;

2. Review of data from monitoring and/or field studies, and guidance on the use of that data sufficient to demonstrate commensurate benefit;

3. Guidance on how the Demonstrations of Technical Infeasibility and Commensurate Benefit apply to different types of projects; and

4. How Permittees will incorporate assessment of technical infeasibility and commensurate benefit into the early stages of their municipal planning processes.

If the Permittees choose to submit a Regional Guidance Document, they must do so on or before the deadline set forth in Provision C.3.c.i.(2)(c)(iii)f.2. The Regional Guidance Document is subject to the approval of the Executive Officer. If the Executive Officer determines that the Regional Guidance Document is sufficiently detailed to enable Permittee review of Demonstrations of Technical Infeasibility and Commensurate Benefits for Regulated Projects on a consistent, objective, and rigorous basis, the Executive Officer may, in the approval of the Regional Guidance Document, allow Permittee[f] approval of the Demonstration of Technical Infeasibility and of the Demonstration of Commensurate Benefit for Regulated Projects in lieu of the requirement for Executive Officer approval of both demonstrations, contingent on Permittees implementing the approved Regional Guidance Document for those Regulated Projects.

f. Reporting

1. In each Annual Report, Permittees shall provide the following information for each Regulated Project that is implementing Provision C.3.c.i.(2)(c)(iii): the final percentage of LID treatment and non-LID treatment and all other information reported for Regulated Projects pursuant to Provision C.3.b.iv.

2. If the Permittees choose to submit the Regional Guidance Document—which is a prerequisite to their implementation of Provision C.3.c.i.(2)(c)(iii)—it shall be submitted no later than with the 2025 Annual Reports.

2. Provision C.3.e.ii.(5) Category C Special Project Criteria (Affordable Housing) of Order No. R2-2022-0018 is amended, as follows:

(5) Category C Special Project Criteria (Affordable Housing)

[f] The Permittee in whose jurisdiction the project is located.

(a) For the purposes of attributing Affordable Housing Credits, affordable housing is defined as preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the ~~total household income, and which meets the following income levels specified in maximum~~ area median household income (AMI) limits adjusted for household size based on the maximum percentage of AMI for each income category, which are defined by the Federal Department of Housing and Urban Development~~'s~~ (HUD'~~s)~~ ~~definition of~~ for affordable housing in metropolitan areas as follows: ~~For metropolitan areas, HUD defines~~ Acutely Low household incomes as 0-15 percent of AMI, Extremely Low household incomes as ~~0~~16-30 percent of ~~area median household income (~~AMI~~)~~, Very Low household incomes as 31-50 percent of AMI, Low household incomes as 51-80 percent of AMI, and Moderate household incomes as 81-120 percent of AMI.[g]

To be considered a Category C Special Project, a Regulated Project must additionally meet both of the following criteria:

(i) Be primarily a residential development project,[h] and

(ii) Achieve at least a gross density of 40 DU/Ac.

(b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of four different types of credits that the Category C Special Project may qualify for, namely: Affordable Housing, Location, Density, and Minimized Surface Parking Credits. The total maximum LID Treatment Reduction Credit for any Category C Special Project may not exceed 100 percent.

(c) Affordable Housing Credits: A Category C Special Project may qualify for Affordable Housing Credits, according to the following criteria. The income limits that shall be used for these criteria are the most current Official State Income Limits (adjusted for household size, and specific to each county), which are defined on the California Department of

[g] Emergency homeless shelters constructed pursuant to and consistent with Government Code § 8698.4, including the definition of "homeless shelter" in subdivision (c), and that are temporary are not Regulated Projects under Provision C.3.b. As such, they are not subject to Provisions C.3.c (Low Impact Development) and C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) and shall instead comply with Provision C.3.i (Site Design Measures for Small Projects) and implement relevant best management practices developed under Provision C.17 (Discharges Associated with Unsheltered Homeless Populations). Should the homeless shelter become permanent and the impervious surfaces it created or replaced meet the thresholds for a Regulated Project, or if there is a new Regulated Project and/or Special Project at the site, the project shall comply with Provision C.3, including Provisions C.3.c and C.3.d.

[h] At least two-thirds of the square footage of the project must be designated for residential use.

Housing and Community Development's website.[i,j] All qualifying affordable housing DUs must be preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income.

In each Category C Special Project, up to three DUs that are used as building manager's DUs may be exempted from the deed restriction requirement and may be excluded from the calculations described below in Provision C.3.e.ii.(5)(c)(i)-(ii).

The following two steps shall be used to calculate Affordable Housing Credits:

(i) First, the percentage of the project's DUs in each affordability category are multiplied by the respective credit multipliers, according to the table below, and rounded to the nearest whole number.

AMI	Credit Multiplier
Moderate (≤120% of AMI)	0.20
Low (≤ 80% of AMI)	1.00
Very Low (≤ 50% of AMI)	2.00
Extremely Low (≤30% of AMI)	3.00
Acutely Low (≤15% of AMI)[k]	4.00

(ii) Second, the credits generated from the table above in the first step in Provision C.3.e.ii.(5)(c)(i) are summed together to produce a weighted sum and rounded to the nearest whole number. Then Affordable Housing Credit is granted according to which weighted sum range (in the table below) that whole number (X) falls into.

Weighted Sum (whole number)	Affordable Housing Credit
X ≤ 9%	0%

[i] ~~https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits.shtml~~https://www.hcd.ca.gov/grants-and-funding/income-limits/state-and-federal-income-rent-and-loan-value-limits

[j] As of ~~December 31, 2021~~June 6, 2023, they are: ~~https://www.hcd.ca.gov/grants-funding/income-limits/state-and-federal-income-limits/docs/income-limits-2021.pdf~~ https://www.hcd.ca.gov/sites/default/files/docs/grants-and-funding/income-limits-2023.pdf

[k] DUs that are free to tenants, i.e., that do not charge tenants any rent/mortgage, are included in this category.

10% ≤ X ≤ 20%	20%
21% ≤ X ≤ 30%	30%
31% ≤ X ≤ 40%	40%
41% ≤ X ≤ 50%	50%
51% ≤ X ≤ 60%	60%
61% ≤ X ≤ 70%	70%
71% ≤ X ≤ 80%	80%
81% ≤ X ≤ 90%	90%
91% ≤ X	100%

~~To qualify for 70 percent Affordable Housing Credit:~~

~~100 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 75 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 25 percent of the project's DU's must have monthly rent/mortgage rates[k] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).~~

~~To qualify for 50 percent Affordable Housing Credit:~~

~~At least 75 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Moderate household income level (≤ 120 percent of AMI), at least 50 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 15 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).~~

~~To qualify for 25 percent Affordable Housing Credit:~~

~~At least 50 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Moderate~~

~~household income level (≤ 120 percent of AMI), at least 25 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Low household income level (≤ 80 percent of AMI), at least 15 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Very Low household income level (≤ 50 percent of AMI), and at least 5 percent of the project's DUs must have monthly rent/mortgage rates[k] no greater than 30 percent of the Extremely Low household income level (≤ 30 percent of AMI).~~

~~AMI~~	~~Minimum Percentage of DUs~~		
	~~70% credit~~	~~50% credit~~	~~25% credit~~
~~Moderate (≤120% of AMI)~~	~~100~~	~~75~~	~~50~~
~~Low (≤80% of AMI)~~	~~75~~	~~50~~	~~25~~
~~Very Low (≤50% of AMI)~~	~~50~~	~~25~~	~~15~~
~~Extremely Low (≤30% of AMI)~~	~~25~~	~~15~~	~~5~~

3. Provision C.3.e.v.(3)(f) Reporting on Special Projects of Order No. R2-2022-0018 is amended, as follows:

   (f) Category C Projects: Number of DUs in each AMI Category and Number of Manager's DUs: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, ~~and~~ Extremely Low, and Acutely Low area median household income levels specified in Provision C.3.e.ii.(5)(c), and the number of Manager's DUs (up to 3).

4. Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects of Order No. R2-2022-0018 is amended, as follows:

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

Project No.	Permittee	Address	Application Submittal Date	Description	Site Total Acreage	Total Impervious Surface Created/ Replaced	Gross Density DU/Ac	Category C Projects: Number of DUs in each AMI Category & Number of Manager's DUs	FAR	Special Project Category	LID Treatment Reduction Credit	Stormwater Treatment Systems

Project No.: Number of the Special Project as it appears in Table 3.1.

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Total Acreage: Total site area in acres.

Total Impervious Surface Created/Replaced: The total impervious surfaced in acres created or replaced by the project, which is subject to the treatment requirements listed in Provision C.3.e.ii.(1).

Gross Density in DU/Ac: Number of dwelling units per acre.

Category C Projects: Number of DUs in each AMI Category: For Category C Special Projects only, the number of preserved DUs (DUs with deed restrictions running at least 55 years) that have rent/mortgage rates (including utilities) no less than 30 percent of the Moderate, Low, Very Low, ~~and~~ Extremely Low, and Acutely Low area median household income levels specified in Provision C.3.e.ii.(5)(c) , and the number of Manager's DUs (up to 3).

FAR: Floor Area Ratio.

Special Project Category: For each Special Project Category, indicate applicability. If a Category is applicable, list the specific criteria applied to determine applicability.

LID Treatment Reduction Credit: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Affordable Housing, Location, Density, and Minimized Surface Parking Credits available.

Stormwater Treatment Systems: List all proposed stormwater treatment systems and the corresponding percentage of the total amount of runoff identified in Provision C.3.d. for the Project's drainage area that will be treated by each treatment system.

5. Section C.3.e.ii.(5) of Attachment A (Fact Sheet) of Order No. R2-2022-0018 is amended, as follows:

   Provision C.3.e.ii. (Special Projects) . . .

   Category C additionally includes affordable housing criteria for determining the total LID Treatment Reduction Credit available for Category C Special Projects. Affordable housing criteria are included in Category C, for two primary reasons. First, affordable housing projects typically have high DUs/acre (as further incentivized by the Density Credits) and are typically located near public transportation (as further incentivized by the Location Credits), and thus they likely produce less automobile traffic (i.e., less pollutant loading to the MS4) compared to other development and redevelopment projects that do not have those characteristics. Second, affordable housing credited by this Provision will help reduce unsheltered homelessness, which will reduce pollutant discharges (e.g., of trash and sewage) from homeless encampments and other sources (e.g., RVs) into MS4s.[l] The Water Board recognizes that whether to allow for affordable housing is entirely within the Permittees' land use and zoning authority and discretion. The Water Board is not a land use agency and has not established an inclusionary housing policy in the Permit; instead, the Permit recognizes the indirect water quality benefit provided by housing development based on the level of affordability of their DUs, and accordingly provides an amount of non-LID credit proportional to that affordability. Since such development can reduce pollutants from MS4 systems, the Affordable Housing Credits are provided in the Permit~~. It will benefit the unhoused population,~~ as follows: ~~The affordable housing criteria are structured in such a way that~~ greater flexibility is granted to ~~DUs~~projects with greater levels of affordability.~~significant portions of the allowable~~ DUs with rent/mortgage rates ~~are~~capped for Acutely Low income households (0-15% AMI) receive the greatest amount of credit, followed by Extremely Low income households (16-30% of AMI), Very Low income households (31-50% of AMI), ~~and~~ Low income households (51-80% of AMI), and Moderate income households (81-120% of AMI).~~,~~ The Permit takes this approach rather than, for example, granting 100 percent credit to housing projects that have only a small number of DUs affordable to ~~allowing all affordable housing units to qualify even if they only are affordable for~~ Moderate income households, ~~(81-120% of AMI)~~ which limit affordability to a significant portion of the population. The link to water quality improvement is expected to decline as

[l] Batko, Oneto, and Shroyer, Dec. 2020. Unsheltered Homelessness: Trends, Characteristics, and Homeless Histories. Urban Institute, pp. 12-13.

Kushel, Moore, et al., June 2023. Toward a new understanding: The California statewide study of people experiencing homelessness. UCSF. Incl. pp. 83-84.

See also Fact Sheet Sections C.10-5(4) (Attachment A – 234), C.10.f.ii (Attachment A, p. A-247), and C.17 (Attachment A, p. A-326) for discussion of the adverse water quality impacts of unsheltered homelessness.

rent/mortgage rates increase, as rent/mortgage rates as high as the Moderate level are likely to reduce unsheltered homelessness and its associated impacts at a much lower rate.

The other Category C credits (location, density, and parking criteria) are maintained from the Previous Permit but reduced. This is so that Affordable Housing Credits are the dominant credit for Category C projects, while still recognizing the benefits provided by location, density, and parking criteria, and so that the total possible credit available for Category C Special Projects remains 100 percent. Category C of the Previous Permit primarily credited transit-oriented development (via Location Credits) and resulted in the treatment of ~~approximately~~ 414~~324~~ acres of impervious surface by non-LID measures region-wide, most of which is attributable to projects for which the Permittees' reporting did not clearly demonstrate that it would have been infeasible to incorporate onsite LID or contribute to offsite LID.~~as allowed by Provision C.3.e.i.~~

Provision C.3.e.ii.(5) excludes from compliance with Provisions C.3.c (Low Impact Development) and C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) emergency housing projects for people experiencing unsheltered homelessness, when those projects are constructed pursuant to and consistent with Government Code § 8698.4, including the definition of "homeless shelter" in subdivision (c), and that are temporary.[m] It requires those projects instead to comply with Provision C.3.i (Site Design Measures for Small Projects) and to implement relevant best management practices developed under Provision C.17 (Discharges Associated with Unsheltered Homeless Populations), such as provision of appropriate trash collection and sanitary sewage services.[n] This recognizes the projects' water quality benefits from reducing the number of people experiencing unsheltered homelessness, and the discharges associated with unsheltered homelessness, as described elsewhere in this section. As described in the Fact Sheet section for Provision C.17, it further recognizes the urgent need for such projects and the limited resources available to address unsheltered homelessness relative to the identified need. The flexibility is justified by the water quality benefit from reducing unsheltered homelessness and because it is temporary. If the project becomes permanent and if its created or replaced impervious surfaces meet the thresholds for a Regulated Project, or if a new Regulated Project or Special Project

[m] Examples of temporary emergency housing projects are: formal "community cabin" or tent communities; RV safe parking areas; and homeless "navigation centers" with housing, that are temporary and provide housing for people experiencing unsheltered homelessness.

[n] Examples of additional best management practices that could be considered include, but are not limited to, those described in the Bay Area Municipal Stormwater Collaborative report, dated September 30, 2023. "Regional Best Management Practices Report for Addressing Non-Stormwater Discharges Associated with Unsheltered Homeless Populations." At the time of Permit amendment, the Report had been recently submitted and was under review by the Water Board.

is constructed, then it must comply with Provision C.3, including Provisions C.3.c and C.3.d.

Water Board staff convened a Category C Special Projects / Affordable Housing Workgroup, which met seven times between September 2022 and April 2023, to discuss the Provision C.3.e.ii.(5) Category C Special Project Criteria (Affordable Housing). The Workgroup was co-led by Permittee staff and Water Board staff. Workgroup participants included non-profit/affordable housing advocates, for-profit housing advocates, municipal housing authorities, Permittees, MTC/ABAG, engineering consultants, and others. Presentations were given by various Workgroup participants on the following topics: 1) Definitions of affordable housing; 2) The kinds of projects implemented in the region that include affordable housing; 3) Concerns about how those affordable housing projects may be affected by the existing Category C Special Project Criteria; and 4) Recommended changes to Category C Special Projects. The Workgroup and Water Board work identified new information and Water Board review of that information led to modifications of the crediting criteria first adopted by the Water Board to better align the criteria with the range of affordable housing projects being built in the Bay Area and their associated water quality benefits. The projects range from fully affordable projects, typically constructed by public agencies or non-profit entities, to projects with lesser amounts of affordability, typically constructed by for-profit developers. The revised criteria continue to grant the maximum amount of flexibility to fully affordable projects and "sliding scale" flexibility to other projects, with more flexibility granted to projects that are more affordable. This recognizes that more affordable projects have greater water quality benefit and can also be more challenging to construct because of the amount of money required to support the more affordable units. Managers' units, which are usually not income restricted, have been excluded from the calculation to avoid unintended adverse consequences of limiting flexibility for otherwise affordable projects. The definition for "primarily residential projects" in Provision C.3.e.ii.(5)(a)(i) is intended to facilitate implementation of that subprovision and requires at least two-thirds of the square footage to be residential, which aligns with and is the definition of housing developments in California Government Code section 65589.5, subdivision (h)(2)(B).

Therefore, Category C ~~has been revised to~~ solely target~~s~~ affordable housing development and redevelopment projects, as Provision C.3.e.i in this Permit already provides sufficient flexibility for other non-affordable housing development and redevelopments that would have qualified as Category C Special Projects in the Previous Permit.

To be considered a Category C Special Project, the Regulated Project must be primarily a residential development project, achieve at least a gross density of 40 DU/acre, and the project's DUs must comply with the criteria outlined in Provision C.3.e.ii.(5)(c), which ~~are~~ includes two steps. In the first step, the percentage of the

project's DUs in each affordability category are multiplied by the respective credit multipliers (0.20 for Moderate, 1.00 for Low, 2.00 for Very Low, 3.00 for Extremely Low, and 4.00 for Acutely Low) and rounded to the nearest whole number. In the second step, the credits generated by the multiplication in the first step are summed together to produce a weighted sum, and then Affordable Housing Credits are granted according to which range that weighted sum falls into. For example, if the weighted sum is 45 percent, that would fall into the 41-50 percent Affordable Housing Credit Tier range, and therefore the maximum allowable Affordable Housing Credit that the project could qualify for would be 50 percent. The credit multipliers are structured to recognize the increasing benefit provided by increasing levels of affordability. The result is that significantly affordable projects have maximum flexibility. However, less affordable projects are given "sliding scale" flexibility that recognizes their contribution to reductions in polluted discharges associated with unsheltered homelessness. Therefore, the credit multiplier for DUs in the Extremely Low income affordability category is greater than the credit multiplier for DUs in the Very Low income affordability category, and the credit multiplier for DUs in the Acutely Low income affordability category is greater than the credit multiplier for DUs in the Extremely Low income affordability category. The Affordable Housing Credit Tier ranges provide additional flexibility and simplicity by allowing projects to claim additional non-LID credit according to the range that the weighted sum falls into; for example, a project with a weighted sum as low as 21 percent could claim an Affordable Housing Non-LID Credit as high as 30 percent. ~~for 70 percent Affordable Housing Credit, 100 percent of the DUs within a Category C Special Project must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 75 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 50 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 25 percent of the DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). Likewise, for 50 percent Affordable Housing Credit, 75 percent of the affordable housing DUs must have rent/mortgage rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 50 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI). These criteria, when implemented for Category C Special Projects, will reduce pollutant discharges from unhoused peoples into MS4s when they are housed by the newly-provided affordable housing. Finally, for 25 percent Affordable Housing Credit, 50 percent of the affordable housing DUs must have rent/mortgage~~

~~rates (including utilities) no greater than 30 percent of the Moderate household income level (≤120 percent of AMI), 25 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Low household income level (≤80 percent of AMI), 15 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Very Low household income level (≤50 percent of AMI), and 5 percent must have rent/mortgage rates (including utilities) no greater than 30 percent of the Extremely Low household income level (≤30 percent of AMI).~~

Examples for Provision C.3.e.ii.(5) Category C Special Project Criteria (Affordable Housing)

Example #1: A private project consisting of 100 DUs on 1 acre of land, with preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income, with the following affordability for those DUs:

2 market-rate Managers' DUs,

13 market-rate non-Managers' DUs,

40 Moderate DUs (40/98 = 41%),

15 Low DUs (15/98 = 15%),

20 Very Low DUs (20/98 = 20%),

10 Extremely Low DUs (10/98 = 10%), and

0 Acutely Low DUs (0/98 = 0%).

The percentages of DUs in each income category would be multiplied by the respective credit multipliers, and summed together as follows: (0.20)*41% + (1.00)*15% + (2.00)*20% + (3.00)*10% + (4.00)*0% = 93%. That weighted sum of 93% would fall into the following Affordable Housing Credit Tier: 90% < 93% ≤ 100%. Therefore, this project could qualify for an Affordable Housing Credit of up to 100 percent.

Example #2: A private project consisting of 100 DUs on 1 acre of land, with preserved housing with deed restrictions running at least 55 years, at rent/mortgage rates (including utilities) no greater than 30 percent of the total household income, with the following affordability for those DUs:

3 market-rate Managers' DUs,

22 market-rate non-Managers' DUs,

40 Moderate DUs (40/97 = 41%),

20 Low DUs (20/97 = 21%),

10 Very Low DUs (10/97 = 10%),

5 Extremely Low DUs (5/97 = 5%), and

0 Acutely Low DUs (0/97 = 0%).

The percentages of DUs in each income category would be multiplied by the respective credit multipliers, and summed together as follows: (0.20)*41% + (1.00)*20% + (2.00)*10% + (3.00)*5% + (4.00)*0% = 64%. That weighted sum of 64% would fall into the following Affordable Housing Credit Tier: 61% < 64% ≤ 70%. Therefore, this Category C Special Project could qualify for an Affordable Housing credit of up to 70 percent.

If combined with up to 10% Location Credit, 15% Density Credit, and 5% Minimized Surface Parking Credit, this Category C Special Project could qualify for up to 100% non-LID Treatment Reduction Credit (70% + 10% + 15% + 5% = 100%).

6. Order No. R2-2022-0018 is hereby amended as shown in this Order.
7. This Order shall become effective on November 1, 2023.

I, Eileen White, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 11, 2023.

X

Eileen White
Executive Officer

Attachment I – Fact Sheet

ATTACHMENT I – FACT SHEET

This Fact Sheet describes the additional rationale and basis for this Order's requirements beyond those set forth in the Fact Sheet for the San Francisco Bay Municipal Regional Stormwater Permit (MRP or Permit) (Order No. R2-2022-0018, NPDES Permit No. CAS612008).

Background

The Water Board adopted the Permit at a public hearing on May 11, 2022. The Permit regulates municipal stormwater discharges from those dischargers (Permittees) listed on page one of this Order and encompasses Alameda, Contra Costa, San Mateo, Santa Clara, and Solano counties in the San Francisco Bay region. In adopting the Permit, the Water Board asked staff to report back on certain Permit topics, such as the inclusion of low impact development (LID) or alternative treatment measures in Regulated Projects, as that term is defined in the Permit, and a review of Provision C.3.e.ii.(5) Category C Special Project (Affordable Housing) criteria and its potential impacts on housing costs. In response, the Water Board staff convened several workgroups on these and other topics. Through these workgroups, the Water Board received and reviewed new information related to alternative treatment systems and Category C Special Projects that gave cause to modify the Permit.

Specifically, this Order amends the Permit by adding Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems to the Permit to allow certain Regulated Projects to treat runoff using an alternative treatment system. Those Regulated Projects for which it is technically infeasible to treat a portion of the Provision C.3.d design volume and/or flow via LID may use alternative treatment systems for that portion, as long as those systems meet the alternative treatment system requirements of Provision C.3.c.i.(2)(c)(iii). Among other requirements, this includes providing a demonstration of technical infeasibility of LID treatment systems and a demonstration of commensurate benefit. Commensurate benefit includes combining alternative treatment controls with flow controls so that the alternative treatment system's water quality benefits (i.e., improvements to runoff quality and hydrologic benefits that benefit downstream water quality) are consistent with those provided by the Permit's LID standard. To ensure this is the case, the area where alternative treatment systems are allowed is limited to areas where LID's broader water quality benefits are relatively more limited, and the benefits provided by alternative treatment systems are comparable to LID.

This Order also modifies Permit Provision C.3.e.ii.(5) Special Projects: Category C to better align it with how affordable housing projects are planned and built in the region, and to exempt from Provision C.3.c and C.3.d temporary emergency homeless shelters for people experiencing unsheltered homelessness, instead requiring those projects to comply with Provision C.3.i and to implement relevant best management practices developed under Provision C.17. The modification better facilitates the construction of affordable housing, and temporary transitional shelters, that reduce~~s~~ water quality impacts associated with unsheltered homelessness.

Authority to Amend the Permit

The Water Board may amend the Permit with good cause pursuant to 40 C.F.R. §122.62(a)(2), if it receives new information that was not available at the time of the Permit's issuance (other than revised regulations, guidance, or test methods) and would have justified the application of different permit conditions at the time of issuance. After the Permit's May 2022 issuance, the Water Board obtained new information, as described below, that would have justified revised Permit conditions if the information was available at the time of the Permit's issuance. The Water Board developed the amendments to the Permit consistent with the new information and the Permit's existing structure.

New Information Regarding the Equivalency of Alternate Treatment Systems Justifying the Addition of Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems

In August 2022, following the Permit's reissuance in May 2022, Water Board staff convened an Alternative Treatment Systems Workgroup, which met seven times through April 2023. Presentations and discussions in this workgroup produced new information which led to this Order's addition of Provision C.3.c.i.(2)(c)(iii) related to alternative treatment systems. This new information, which we elaborate on below, included the following: (1) analysis of the equivalency of water quality benefits (including flow control) and urban greening benefits provided by LID systems and by alternative treatment systems; (2) identification of geographic areas in which flow control benefits are relatively less significant than in other geographic areas, thereby warranting in those areas allowance of alternative treatment systems in combination with systems providing flow control benefit; and (3) analogous requirements in other relevant MS4 NPDES permits, in particular the Washington State Department of Ecology's (Ecology's) series of MS4 NPDES permits and their use of Ecology's Technology Assessment Protocol – Ecology (TAPE) program,[1] which informed the Order's use of the TAPE certification and, in part, the Order's commensurate benefit approach. This new information resulted in a framework for where and how alternative treatment systems could be considered to provide commensurate water quality benefit as LID. The new information would have justified allowing alternative treatment systems in the manner allowed under this Order when the Permit was issued.

New information showed that alternative treatment systems, in combination with flow controls, have the potential to provide a commensurate water quality benefit as compared to LID systems. For example, the recent analysis of the 2018 San Francisco Estuary Institute (SFEI) study,[2] which looked at performance both by LID systems and

[1] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

[2] Gilbreath, A.; Pearce, S.; Shimabuku, I.; McKee, L. 2018. Bay Area Green Infrastructure Water Quality Synthesis. SFEI Contribution No. 922. San Francisco Estuary Institute: Richmond, CA. https://www.sfei.org/documents/bay-area-green-infrastructure-water-quality-synthesis

by non-LID media filters, supports this.[3] In addition, new information showed that the flow control benefits of LID systems are relatively less significant in certain geographic areas in the region, namely areas draining stormwater to channels that are hardened continuously from the point of discharge to San Francisco Bay or the Pacific Ocean or that drain stormwater directly into San Francisco Bay, the Pacific Ocean, or other tidal waters.[4] Accordingly, the Permit amendment limits alternative treatment systems to these areas.

New information on the analogous requirements in other relevant MS4 NPDES permits included the Western Washington Phase II MS4 Permit (and the Washington State Phase I MS4 Permit),[5] which incorporates the TAPE program, under which Ecology reviews and certifies the performance (with respect to reductions in concentration) of alternative treatment systems. The Water Board received new information that the TAPE program ensures certified systems meet a minimum level of performance that is comparable to the Permit's bioretention media performance in terms of pollutant concentration reductions at specified influent concentration ranges. New information on analogous requirements of other relevant MS4 NPDES permits includes the following: the North Coast Regional Water Quality Control Board's Phase I MS4 Permit, which includes an onsite LID retention requirement and only allows onsite alternative treatment systems when onsite LID is determined to be technically infeasible and requires Executive Officer approval for implementation of offsite treatment measures; the Central Coast Regional Water Quality Control Board's Phase I MS4 Permit, which includes an onsite LID retention requirement for nine out of ten watershed management zones; and the Los Angeles Regional Water Quality Control Board's Phase I MS4 Permit, which includes an onsite LID retention requirement and only allows onsite alternative treatment systems when onsite LID is determined to be technically infeasible, subject to Executive Officer approval. Water Board staff also met with San Diego Regional Water Quality Control Board staff regarding their Phase I municipal regional stormwater permit,[6] including that permit's onsite retention requirement and its

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[3] Water Board review of 2018 SFEI study "Bay Area Green Infrastructure Water Quality Synthesis," May 2023. The Water Board analysis of the 2018 SFEI study indicates that it is not clear that media filters have significantly greater performance than LID systems, given the small sample size of media filters (2) compared to LID facilities (8) in the study, the range of influent concentrations for each monitored system, and the study's self-identified limitations.

[4] While not new information, the Water Board also considered general information regarding potential increases to near-Bay groundwater elevations associated with rising tides, because higher groundwater levels can reduce infiltration from a treatment control into the surrounding ground when they are close to the bottom of the control.

[5] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits The Phase II MS4 Permit thresholds that trigger the requirement to include onsite treatment control measures are significantly lower than the MRP's thresholds, and a baseline expectation that post-construction discharge rates match the pre-development condition (i.e., "make it better"). This contrasts with the MRP's baseline less-stringent expectation that post-construction discharge rates only match the pre-construction condition (i.e., "don't make it worse").

[6] https://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/

allowance of implementation of onsite non-LID only if the project provides offsite mitigation with equivalent retention.

Finally, the Water Board considered other jurisdictions' requirements for onsite retention of a certain quantity of stormwater since onsite retention prevents pollutants in the retained runoff from being discharged to receiving waters and mitigates its hydromodification effects. While some of this information was available at the time of Permit issuance, other information (e.g., Pennsylvania's work to update its stormwater manual) was received after the issuance. All the information was newly contextualized with consideration of the role that alternative treatment systems could play:

1. Anacostia, Washington, D.C.: Retain onsite the first one inch of rainfall and provide water quality treatment for rainfall up to the two-year storm volume; offsite mitigation is allowed when onsite retention is infeasible, but only at a ratio of either 1:1.5 (for physical offsets) or 1:2 (for in-lieu fee payments);[7]
2. Central Coast, California (Regional Water Board, Phase II): Limit effective impervious area (EIA) at development projects to no more than 5 percent of total project area (interim criteria); establish an EIA limitation between 3 and 10 percent in local stormwater management plans (permanent criteria);[8]
3. Federal Buildings over 5,000 square feet (under U.S. EPA's draft guidance for implementation of the Energy Independence and Security Act of 2007): Manage onsite (i.e., prevent the offsite discharge of) the 95th percentile storm through infiltration, harvesting, and/or evapotranspiration;
4. Pennsylvania: Capture at least the first two inches of rainfall from all impervious surfaces and retain onsite at least the first one inch of runoff (through reuse, evaporation, transpiration, and/or infiltration); at least 0.5 inch must be infiltrated;[9]

[7] Anacostia Waterfront Corporation (June 1, 2007) Final Environmental Standards, p. 16; *See also*, State Water Resources Control Board (December 2007) A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption, at 20-21.

[8] Central Coast Regional Water Quality Control Board, Letter from Roger Briggs re: Notification to Traditional, Small MS4s on Process for Enrolling under the State's General NPDES Permit for Storm Water Discharges (Feb. 15, 2008).

[9] Pennsylvania Department of Environmental Protection (December 30, 2006) *Pennsylvania Stormwater Best Management Practices Manual*, Chapter 3, p.7. Additionally, Pennsylvania is currently completing an update to the Manual (in draft as of Dec. 2022) that continues to focus on management of volume as a key component of water quality and recognizes the increased importance of that aspect as the result of climate-change-driven changes in precipitation intensity, depth, and frequency. Furjanic, Traver, Bowen, and Hess, Nov. 2022. PA DEP Stormwater Manual Updates (slide presentation).

5. Philadelphia, Pennsylvania: Infiltrate the first one inch of rainfall from all impervious surfaces; if onsite infiltration is infeasible, the same performance must be achieved offsite;[10] and
6. West Virginia: Retain onsite the first one inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation.[11]

Rationale and Basis for the Addition of Provision C.3.c.i.(2)(c)(iii) Alternative Treatment Systems

The modifications in the Order allow certain Regulated Projects to treat runoff using an alternative treatment system that has a commensurate benefit with LID treatment measures if LID treatment is infeasible and other requirements are met. This is consistent with the requirement in CWA section 402(p)(3)(B)(ii) to reduce the discharge of pollutants to the maximum extent practicable. Among other requirements, alternative treatment systems must be combined with flow controls so that their water quality benefits—improvements to runoff quality and hydrologic benefits that benefit downstream water quality—are consistent with those provided by the Permit's LID standard. To ensure this is the case, the areas where alternative treatment systems are allowed are limited to areas where LID's broader water quality benefits are relatively limited and the benefits provided by alternative treatment systems are relatively comparable to LID.

The modifications provide additional flexibility to ensure that in the rare situation when it is infeasible for a project to fully implement LID, the Regulated Project may provide water quality benefits consistent with the LID standard by completing a combination of other measures.

Provision C.3.c.i.(2)(c)(iii) requires projects to establish the need to implement alternative treatment systems and ensures consistent water quality benefits by requiring the submittal of a Demonstration of Infeasibility and a Demonstration of Comparable Benefit, respectively. In addition, as a prerequisite to the implementation of this provision, Permittees are required to submit a Regional Guidance Document that guides preparation of the demonstrations and facilitates project compliance with the alternative treatment system requirements.

Alternative treatment systems allowed under this provision are non-LID systems, such as high flow rate media filters, that have obtained an active General Use Level Designation certification for Enhanced Treatment from Ecology's TAPE Program. This certification is intended to ensure a level of performance with respect to pollutant-

[10] City of Philadelphia, Philadelphia Stormwater Regulations § 600.5; City of Philadelphia (2006) *Philadelphia Stormwater Management Guidance Manual: Version 2.0*, Section 1-1, Appendix F.4.1.

[11] State of West Virginia (December 11, 2008) Department of Environmental Protection, Division of Water and Waste Management, Draft General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025, pp. 13-14.

concentration reduction, which when combined with flow control commensurate with that which is provided by LID, provides total water quality benefit that is comparable to the Permit's LID standard. It was chosen in part because of the relative robustness of the TAPE Program, the TAPE Program's applicability to urban runoff and controls in California, where removal mechanisms and conditions are similar, and California has not established its own similarly robust certification program and is unlikely to do so in the foreseeable future.

Alternative treatment systems are similar to the Permit's LID standard in that they contain media similar to the bioretention media allowed pursuant to Provision C.3.c.i.(2)(c)(ii) that has similar unit processes for pollutant removal, including filtration, adsorption, and degradation over time of certain pollutants. However, there are differences between the alternative treatment systems and the Permit's LID approach. Alternative treatment system media is typically contained within an impervious or largely impervious vault and is designed to have substantially higher flow rates of water through the media. As compared to bioretention cells, typically the most used water quality control within the LID framework, alternative treatment systems have limited to negligible flow control benefits due to limited storage within the device and minimal time and space for water to be detained prior to infiltration. This reduces pollutant load losses associated with the control because runoff that would infiltrate into the soil, be retained within the control, or evapotranspire in LID systems is, in an alternative treatment system, instead discharged through the media and back into the MS4 or to a receiving water. An additional result is reduced effectiveness of hydromodification management. To provide comparable benefit, alternative treatment systems must be supplemented with systems that provide flow control benefits at least equivalent to those provided by LID systems.

LID systems provide hydromodification management and associated water quality benefits via measures that include retention (e.g., via infiltration, evapotranspiration, and retention in an LID control's media) and detention. Determining a comparable benefit between LID systems and alternative treatment systems is complicated because alternative treatment systems typically have negligible retention. In addition, while the flow control benefits of LID systems have been documented, the range of those benefits—including from infiltration into less infiltrative soils and horizontal infiltration—is not yet well quantified from monitoring data and field studies.[12] Studies have, however,

[12] Geosyntec and Wright Water Engineers, January 2011. International Stormwater BMP Database Technical Summary: Volume Reduction (www.bmpdatabase.org).

Geosyntec and Wright Water Engineers, May 2012. International Stormwater BMP Database Addendum 1 to Volume Reduction Technical Summary (January 2011). Expanded Analysis of Volume Reduction in Bioretention BMPs (www.bmpdatabase.org).

Braswell, et al., Oct. 2018. Hydrologic and water quality performance of permeable pavement with internal water storage over a clay soil in Durham, North Carolina. J. Environmental Mgmt. 224:277-287.

found greater benefit than would be expected from textbook infiltration values.[13] Currently, approaches to quantify the flow control benefits are primarily hydrologic models that are imprecise and can be biased by the use of potentially non-conservative or inaccurate assumptions.

To address the potential consequences of that imprecision, the Permit limits the application of non-LID systems to two geographic areas in which LID systems have relatively less flow control benefit; that is, to areas where there is likely to be relatively less difference in flow control between LID systems and alternative treatment systems. If, in the future, the flow control benefits of LID systems are sufficiently studied and quantified in monitoring and field studies, such that their hydrologic benefits can be more reliably translated into flow control requirements including onsite retention and detention, the Water Board may consider incorporating the results of those studies into a future Permit. This would be done by specifying the required flow control benefits, including retention, that must be provided by flow control systems that are paired with media filters for alternative treatment systems. This could allow consideration of implementing those paired systems in a broader set of geographic areas. Work being done to advance the understanding of the flow control benefits of LID systems includes Provision C.8.d Low Impact Development Monitoring as well as studies elsewhere in the U.S.

The recognition that urban runoff water quality impacts are comprised of both pollutants directly in runoff and hydromodification that results in pollutant discharges and associated impacts is a significant issue and has informed the Permit's design, which uses a three-part approach to address polluted runoff from new and redevelopment projects. The Permit requires: (1) design measures that provide source control of pollutants and reduce impervious surfaces and associated discharges of pollutants and hydromodification, which is the change in flows that can result in pollutant discharges; (2) controls that treat or remove pollutants and that also protect water quality by reducing hydromodification; and (3) specific hydromodification management controls for projects that create or replace an acre or more of impervious surface. Thus, hydromodification management is in two parts: the general benefit from LID systems, which applies to all Regulated Projects, and the controls required in Provision C.3.g, Hydromodification Management, which apply to Regulated Projects that create or replace an acre or more of impervious surface and increase the amount of impervious surface at the project site. This three-part approach was developed in part due to input into past permits from stakeholders, including U.S. EPA, the Natural Resources

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Contra Costa Clean Water Program, September 15, 2013. IMP Monitoring Report, chapters 6-7.

Winston, et al., May 2016. Quantifying volume reduction and peak flow mitigation for three bioretention cells in clay soils in northeast Ohio. Science of the Total Environment 553:83-95.

[13] Ibid.

Defense Council (NRDC), and Baykeeper, who supported the Permit's LID system approach and expressed concern that allowing alternative systems would result in less-effective water quality benefits with respect to direct pollutant reduction and flow control. NRDC and Baykeeper noted, for example:

> …there is substantial history, precedent, and justification for requiring LID as the MEP control for the treatment of stormwater runoff from new and redevelopment projects; deviations from this standard must be carefully scrutinized to ensure the avoidance of unintended adverse impacts. These comments also emphasize the importance of flow control via discharge to vegetated areas, which is provided by LID systems.[14]

Both have noted that where there was a deviation from the LID systems approach, it should be based on the technical infeasibility of both on- and off-site LID systems.

Similarly, U.S. EPA stated:

> EPA is today emphasizing LID (also called "green infrastructure") as a preferable approach to treating and reducing stormwater flow to MS4s[15] and its inclusion in provisions of MS4 permits. EPA believes that LID is an approach to storm water management that is cost-effective, sustainable, and environmentally-sound. The effectiveness of landscape-based treatment for stormwater is generally superior to the "conventional" treatment addressed in section C.3.d of the proposed permit because landscape-based treatment can remove a broader range of pollutants in a more robust and redundant fashion, and can achieve multiple environmental and economic benefits in addition to reducing downstream water quality impacts, such as enhanced water supplies, cleaner air, reduced urban temperatures, increased energy efficiency and other community benefits such as aesthetics, recreation, and wildlife areas.[16]

Additionally, LID measures are likely to be more resilient to failure over time than alternative treatment systems. All urban runoff water quality treatment controls are subject to potential failure due to causes such as improper design, installation, or operation and maintenance. Because alternative treatment systems with high-flow-rate media expose media to higher amounts of flow per unit area and volume, and because some vault-based systems may not be visible without removing a maintenance cover, potential failures (e.g., clogging of media by trash or sediment, breakthrough of pollutants) may be more significant and less likely to be timely addressed. The Permit addresses this by requiring Permittees to ensure appropriate design, installation, and

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[14] NRDC and Baykeeper comment letter on the Revised Tentative Order for MRP 1, April 3, 2009.

[15] EPA et al., Green Infrastructure Statement of Intent, April 19, 2007, available at http://www.msdgc.org/downloads/wetweather/greenreport/Files/Green_Report_Exhibit_A.pdf

[16] U.S. EPA Region 9, comment letter on the Revised Tentative Order for MRP 1, April 3, 2009.

operation and maintenance of all systems. However, this also supports the Permit's continued prioritization of LID systems to provide water quality benefits.

To ensure alternative treatment systems are appropriately comparable to the Permit's LID standard, the implementation of alternative treatment systems is contingent on Permittee submittal of two demonstrations to the Water Board: a Demonstration of Technical Infeasibility and a Demonstration of Commensurate Benefit. The requirements for these demonstrations are in Provisions C.3.c.i.(2)(c)(iii)c and C.3.c.i.(2)(c)(iii)d, respectively. Examples are included at the end of this section in Attachment A. Permittees must also re-submit the applicable portions of their Countywide Hydromodification Applicability Map to accurately identify the two geographic areas in which alternative treatment systems are allowed under the Permit.

Provision C.3.c.i.(2)(c)(iii)c.1. requires Permittees to submit a Demonstration of Technical Infeasibility to evaluate opportunities for implementation of offsite LID. If a Permittee's municipal code precludes implementation of offsite LID elsewhere within its jurisdiction, or outside of its jurisdiction, or both, then that Permittee is encouraged to review its municipal code and consider changes to allow or more-flexibly allow implementation of offsite LID of the given kind(s).

Because guidance for these demonstrations has not yet been prepared, Permittees may implement this Provision only upon Executive Officer acceptance of a Regional Guidance Document submitted collectively by the Permittees to the Water Board. This document will also facilitate Permittee and project compliance with the Demonstration of Technical Infeasibility and the Demonstration of Commensurate Benefit. If the Executive Officer determines that the Regional Guidance Document is sufficiently detailed to enable Permittee review of demonstrations of technical infeasibility and commensurate benefits for Regulated Projects in a consistent, objective, and rigorous manner, the Executive Officer may allow Permittees[17] to approve the Demonstration of Technical Infeasibility and the Demonstration of Commensurate Benefit for those Regulated Projects, in lieu of the requirement to receive Executive Officer approval of both demonstrations, contingent on Permittees implementing the approved Regional Guidance Document for those Regulated Projects. In future Permits, the Water Board may consider increasing flexibility for the implementation of alternative treatment systems depending on the Permittees' success in implementing this Provision and the state of knowledge about the equivalency of alternative treatment systems relative to LID systems.

The level of documentation submitted for each demonstration should reflect the significance and complexity of the proposed project. The Water Board does not anticipate the same level of evaluation will be necessary for each demonstration for all

[17] The Permittee in whose jurisdiction the project is located.

projects, since there is likely a correlation between the scope of the evaluation, demonstrated equivalency, and the potential extent of adverse impacts.

Provision C.3.c.i.(2)(c)(iii)c.2. requires Permittees to show – in the Demonstration of Technical Infeasibility – how LID was considered by both the project proponent and by the Permittee from the early stages of the project's planning and entitlement processes and how that resulted in the project's final design. For example, Permittees could submit the following information: 1) when in the planning and entitlement process LID was considered, 2) the scope and results of that consideration, including the alternatives that were considered and why they were not implemented, and 3) the identification, conclusions, and recommendations of the Permittee's responsible engineer and of the project proponent's responsible engineer.

Reporting requirements have been added in the Order on the use of alternative treatment systems and are required pursuant to Clean Water Act section 308(a) and Water Code section 13383.

Examples of Technical Infeasibility

The following are examples of technical infeasibility which may aid Permittees' preparation of the Demonstration of Technical Infeasibility required by Provision C.3.c.i.(2)(c)(iii).

- Examples of on-site technical infeasibility which are potentially acceptable:
  - The project is a "zero lot line" development with no landscaping at ground level or at any other level; the project includes no open space that could incorporate LID measures; the roof slope is so great (e.g., 50 percent) that it precludes implementation of a green roof; the roof must be covered in solar panels and therefore cannot be designed as a green roof; stormwater runoff can be harvested from the site, but there is no feasible use for the harvested stormwater.
- Examples of on-site technical infeasibility which are likely not acceptable:
  - *It is technically infeasible to treat 100 percent of the C.3.d volume/flow with on-site LID measures; therefore, no on-site LID will be included.* On-site LID must be maximized; it is not a binary option where there is either 100 percent LID treatment or no LID treatment.
  - *The site is too flat to route stormwater runoff to LID treatment measures.* Different areas of the site could be graded as needed to direct stormwater runoff to LID treatment measures. If graded overland/sheet flow cannot provide sufficient hydraulic head, bubblers can be used. If neither graded overland/sheet flow nor bubblers can provide sufficient head, pumping should be considered.
  - *Long lengths of plumbing from the podium/courtyard level within the retail spaces to the frontage are impracticable.* This does not provide enough detail to explain why this is infeasible.

  - *Due to the dynamic nature of retail spaces and limited frontage space, placing ground-level planters in front of retail spaces imposes a heavy constraint on retail door locations.* To the extent that retail door locations may change over time, the constraint of being limited to existing door locations is commensurate with the water quality benefit provided by the LID treatment measures. LID measure locations may also be modified as door locations and their associated entry paths are moved.
  - *This landscaping strip is too narrow to be designed as bioretention.* Because there are many examples of bioretention designed in narrow strips, this does not provide enough detail to explain why this is infeasible, and additional justification is required.

- Examples of off-site technical infeasibility which are potentially acceptable:
  - There are no opportunities in the adjacent public right-of-way (ROW) to implement LID measures that would treat the Provision C.3.d volume/flow from the project; there are no opportunities in the adjacent/nearby public ROW to implement (or contribute to the implementation of) LID measures that would treat the Provision C.3.d volume/flow from the project and potentially also from other projects and portions of the public ROW; there are no opportunities elsewhere within the city or county, including other municipalities within the county, to implement LID systems that would treat an amount of stormwater runoff (from an equally-polluting tributary drainage area) that is no less than the Provision C.3.d volume/flow for the project; there are no opportunities to contribute commensurate funding/resources to a project identified in a city's or county's Green Stormwater Infrastructure Plan.
- Examples of off-site technical infeasibility which are likely not acceptable:
  - *The project proponent does not own or otherwise control land within the same watershed of the project that can accommodate off-site bioretention facilities adequately sized to treat the required Provision C.3.d volume/flow.* The project proponent could contribute to a planned/potential project on land owned or controlled by another party (e.g., the city, county, or other municipalities within the county).
  - *There is no county/regional LID stormwater mitigation program available to the project for in-lieu Provision C.3 compliance.* The project proponent could come to agreement with the city, county, or other municipalities within the county, on a "one-off" project (e.g., in the adjacent/nearby public ROW) as a condition of project approval.
  - *The City does not want to be responsible for a Regulated Project's Provision C.3 compliance on its public ROW, because it restricts what the City can do with that section of ROW*. Municipalities routinely require extensive reconstruction of the adjacent public ROW as a

condition of approval on private redevelopment projects; if such a project did include LID measure(s) in the reconstruction public ROW, it is unlikely that the municipality would want to change the ROW in such a way that would require removal of the LID measure(s) located in that ROW. Regardless, this provision is optional, and municipalities may choose to require project proponents to implement on-site LID treatment in lieu of off-site LID treatment.

Examples of Commensurate Benefit:

The following are examples of types of BMPs and projects that could be used to achieve commensurate flow control benefit (i.e., an equivalent amount of flow control benefit as would have been provided by the project if the project were to implement LID), which may aid Permittees' preparation of the Demonstration of Commensurate Benefit required by Provision C.3.c.i.(2)(c)(iii).

- Examples of flow control systems that could be used to achieve commensurate flow control benefit, that are potentially acceptable:
    - Harvesting and use; systems that provide sufficient retention; systems that provide sufficient infiltration.
- Examples of flow control systems that could be used to achieve commensurate flow control benefit that are likely not acceptable:
    - Systems that inappropriately assume highly infiltrative native soils.

New Information Justifying, and Rationale and Basis for, Amendments to Provision C.3.e.ii.(5) Category C Special Projects

As stated earlier, when the Water Board adopted the Permit, it asked staff to review Provision C.3.e.ii.(5) Category C Special Project (Affordable Housing) criteria and potential impacts on housing costs. Additionally, the Board received comments expressing concern that the criteria were too prescriptive, or otherwise did not mesh well with the range of affordable projects being built and had the potential to conflict with incentive programs that had been established to support affordable housing production. In response, the Water Board staff convened a workgroup to consider those issues and received and reviewed new information to better inform the Water Board's understanding of how the criteria work with the range of affordable housing projects being built. Specifically, in September 2022, Water Board staff convened a Category C Special Projects/Affordable Housing Workgroup, which met seven times between September 2022 and April 2023, to discuss Category C Special Project criteria. The Workgroup was co-led by Permittees' staff and Water Board staff. Workgroup participants included non-profit/affordable housing advocates, for-profit housing advocates, municipal housing authorities, Permittees, Metropolitan Transportation Commission (MTC)/Association of Bay Area Governments (ABAG), engineering consultants, business groups, and others. Workgroup participants gave presentations on the following topics: 1) Definitions of affordable housing; 2) The kinds of projects implemented in the region that include affordable housing; 3) Concerns about how those affordable housing projects may be affected by the Permit's Category C Special Project Criteria; and 4) Recommended changes to Category C Special Projects. The Workgroup additionally considered potential effects of Provision C.3.e.ii.(5) on housing generally, including infill housing.

The new information presented at the Workgroup and reviewed by Water Board staff did not identify a cost impact from the Permit's LID standard that was different from the cost of alternative treatment systems. Additionally, Workgroup discussions and the Water Board's review of incentive programs and related information determined that there was not a conflict with the incentive programs. However, the information demonstrated that the Category C criteria in the Permit, as issued, would in practice apply primarily to fully affordable projects constructed by public or non-profit entities. The criteria had the effect of excluding from potential flexibility certain projects (primarily for-profit projects) that provided affordable housing but were not fully affordable. That was not the intent and, thus, there was an opportunity to better align the Category C criteria with the full range of affordable projects being built in the region and their associated water quality benefits, while still focusing on maximizing flexibility (through credits) for the most affordable housing. The result is that the criteria were modified to provide maximum flexibility for the fully affordable projects being built by public and non-profit entities, and to give sliding-scale flexibility for projects with lesser amounts of affordable housing—more typically projects built by for-profit developers. "Sliding-scale flexibility" means that the more a project that is affordable and the more a project's affordable units are

targeted to residents in lower-income categories, the greater flexibility is provided. This is appropriate because of how costs are apportioned across projects (projects that are more affordable are generally harder to build) and because projects targeted to residents in lower-income categories are more likely to provide a water quality benefit by shifting residents into housing from being unsheltered.

Water Board staff reviewed additional information, including state, regional, and local laws, policies, and programs regarding affordable housing. These included MTC's Housing-Oriented Transit Fund, Housing Incentive Pool, One Bay Area Grant Program, Bay Area Preservation Pilot Fund, and the Regional Housing Needs Allocation (RHNA). They also included Senate Bill 35, which allows developers' applications for housing projects to receive streamlined ministerial review and approval, bypassing the local municipality's requirements for discretionary approval, provided that the local municipality has not achieved its RHNA; Assembly Bill 2011, which allows developers to build residential projects in areas zoned commercial, and allows California Environmental Quality Act exemptions for projects that are 100 percent affordable; Senate Bill 9, which allows homeowners to subdivide single-family residential lots into up to four units; and the California Density Bonus Law, which provides housing developers with a density bonus and additional incentives and concessions based on the amount of affordable dwelling units (DUs) included in housing projects. This review informed how the Permit structures the flexibility criteria to better address the range of affordable projects being built and confirmed that the Order's flexibility criteria, which are consistent with the approach in the California Density Bonus Law, were not in conflict with existing affordable housing laws, policies, or programs.

The Workgroup discussed local-level implementation of affordable housing plans, policies, and guidance. At the local level, many municipalities have established their own definitions of affordable housing and their own ordinances, policies, and programs to incentivize affordable housing. For example, the City of Oakland's Construction Innovation and Expanded Housing Options Ordinance[18] allows residential occupancy of recreational vehicles (RVs) and tiny homes on wheels ("Vehicular Residential Facilities") on private property and allows mobile homes and manufactured homes in all zoning districts where residential uses are permitted.[19] This new information reinforced that public and non-profit entities typically are those who are building fully affordable projects, while private investors typically are building projects for which only a portion of the project's dwelling units are affordable. The new information supported both the need for revised criteria that apply to the range of affordable projects being built in the region and the decision to provide more flexibility to projects that are relatively more affordable.

In addition, staff reviewed the California Tax Credit Allocation Committee's (CTCAC's) database of qualifying projects that have received tax credits through the federal and

[18] https://www.oaklandca.gov/news/2021/oakland-construction-innovation-and-expanded-housing-options-ordinance
[19] https://www.treasurer.ca.gov/ctcac/projects.asp

state Low-Income Housing Tax Credit Programs, which were created to promote private investment in affordable rental housing for low-income Californians. Using the database, data were summarized for qualifying affordable housing projects in Alameda, Contra Costa, San Mateo, Santa Clara, and Solano counties between 1990 and 2022, and the results indicate that nearly 100 percent of those projects that received State or Federal affordable housing tax credits would qualify for the maximum non-LID Affordable Housing Credit in the proposed amendment to Category C. These data are summarized in the figure below; "below-moderate DUs" refers to dwelling units that are restricted to households with incomes less than or equal to 80% of area median household income (AMI). In other words, fully affordable housing projects and nearly-fully affordable housing projects will receive the full flexibility of Category C.

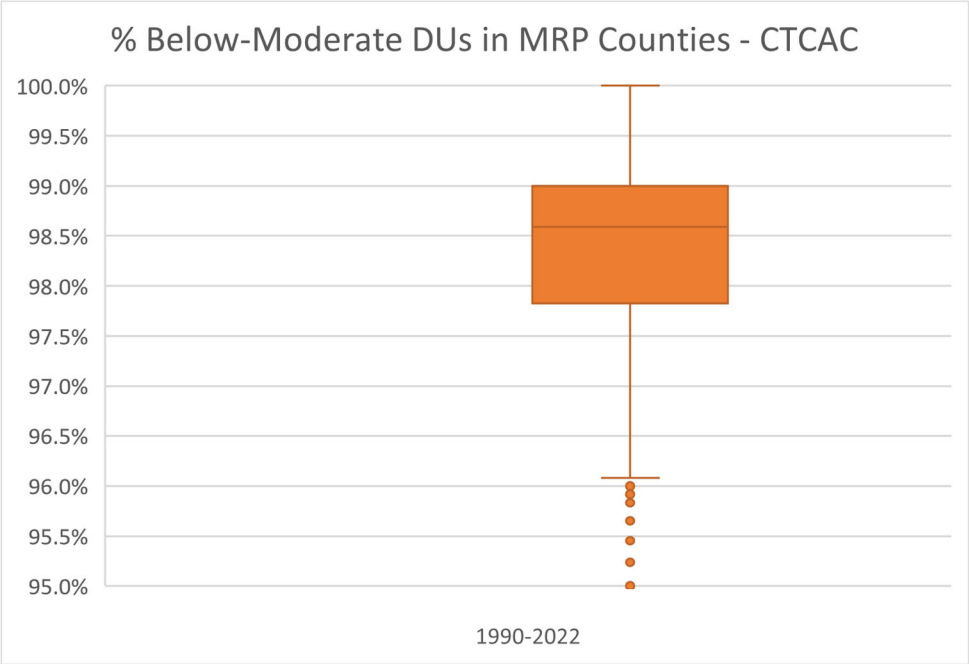

This review of more than thirty years of subsidized projects supports the Order's focus in providing the maximum flexibility to those projects that are most affordable and confirms that the surveyed projects would qualify for that flexibility.

The Workgroup discussed comments on a draft of the Permit that expressed general concern that the approach could conflict with affordable housing expectations in state law or could be perceived as intended to drive state policies on affordable housing. Through the Workgroup, the Water Board received new information about the range of programs on affordable housing, the limited coordination of those programs, and the perception of Sacramento policymakers that a regional stormwater permit provision providing flexibility on clean water requirements relative to a project's affordability could instead be viewed as a driver of housing policy statewide. As a result, revised criteria were developed as described herein, to better align with the range of affordable housing

projects being built in the region. In addition, a statement is added to the Permit's existing Fact Sheet clarifying that the Water Board is not a local land use agency, and that Permit flexibility is intended to be applied to projects as they appear, not to drive housing policy.

Finally, Water Board staff reviewed reports of housing production in Permittee jurisdictions and how it was meeting the Regional Housing Needs Allocation (RHNA) goals, along with information provided by the building industry on average profits for for-profit single-family housing projects during the Great Recession. This was done in part to consider whether Category C should be expanded to include "market-rate" projects that did not have any affordable units.

According to the California Department of Housing and Community Development's Housing Element Implementation and Annual Progress Report Dashboard,[20] for the fifth RHNA cycle (2015-2022), statewide, Bay Area, and countywide RHNA attainment numbers are as shown in the table below. Taken together, these data suggest that MRP Permittees are producing market-rate units significantly in excess of their identified RHNA targets. However, it indicates that there is a shortage of affordable units, with a worse shortage for the lower income brackets, which are the income brackets more likely to experience homelessness.

RHNA 5th Cycle (2015-2022)				
	RHNA Attainment			
County	Above-Moderate Units	Moderate Units	Low Units	Very Low units
Alameda	227%	22%	38%	40%
Contra Costa	218%	68%	58%	23%
San Mateo	194%	48%	85%	44%
Santa Clara	186%	69%	30%	25%
Solano	245%	132%	66%	18%
5-County Total[21]	208%	55%	44%	31%
9-County Total[22]	202%	57%	52%	37%
California Total	143%	55%	30%	20%

[20] https://www.hcd.ca.gov/planning-and-community-development/housing-open-data-tools/housing-element-implementation-and-apr-dashboard
[21] Alameda, Contra Costa, San Mateo, Santa Clara, and Solano Counties.
[22] Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.

Permit Provision C.3.e.ii.(5) allows certain Regulated Projects that provide affordable housing to treat runoff using an alternative treatment system consisting of either a high flow rate tree well filter or a high flow rate media filter. This Order's modifications retain that structure, which continues to allow additional flexibility for a project's density, location near transit, and minimized surface parking. However, the modifications:

(1) align the calculation of affordable housing alternative treatment system flexibility relative to the amount of affordable housing in a project, so that the provision better achieves its intended goal of providing flexibility for the range of affordable housing projects being constructed while still protecting water quality;

(2) maximize the alternative treatment system benefits for projects that are fully affordable to lower-income residents, thus providing the most flexibility to those projects that provide the greatest potential water quality benefit. This is facilitated in part by adding the "acutely low" income category to the criteria and flexibility calculation, which recognizes those projects for which all or a component are targeted to that income category;

(3) recognize that managers' dwelling units typically are not targeted as affordable, but are present in otherwise affordable projects, and so excludes them from deed restriction requirements and for the purposes of considering a project's affordability and the flexibility provided under this provision;

(4) define what a "primarily residential" project is for the purposes of determining whether it qualifies for the affordable housing flexibility in a manner that is consistent with the definition of housing development in Government Code section 65589.5(h);

(5) state that the "…total maximum LID Treatment Reduction Credit for any Category C Special Project may not exceed 100 percent." This is not a substantive change, but rather a clarification made to avoid potential confusion. Since a project must treat 100 percent of the amount of runoff required to be treated under the Permit, the maximum flexibility necessarily is also 100 percent. To have a greater amount would be meaningless; and

(6) correct, pursuant to 40 CFR section 122.62(a)(15), the Fact Sheet with information available after the Permit was reissued regarding the total acreage of projects that used Category C under the previous Permit, changing it to 414 acres from "approximately 324 acres."

The Order also modifies reporting requirements in line with the changes to the Category C Special Projects provision and are required pursuant to CWA section 308(a) and Water Code section 13383.

Provision C.3.e.ii.5.(c) revises the Permit's Affordable Housing Credit calculation to provide greater benefit to projects that are relatively more affordable and are made up

of a relatively greater percentage of affordable housing. It provides the most flexibility to projects that are fully affordable. The modifications continue to be justified based on the water quality benefit provided by housing residents who are unsheltered, and thus reducing the substantial discharges of pollutants, including trash and sewage, from unsheltered residents. The result is that significantly affordable projects, and essentially all public and non-profit projects, have maximum flexibility. However, relatively less-affordable projects are still given flexibility that recognizes their contribution to reductions in polluted discharges associated with unsheltered homelessness. These revisions were made in consultation with Workgroup participants, including Permittees and non-profits providing affordable housing, to better reflect the range of projects constructed in the region and to recognize that the most affordable projects (which provide the greatest potential water quality benefit) may also have the greatest barriers to being built. In addition, the Water Board consulted with Association of Bay Area Governments (ABAG)/Metropolitan Transportation Commission (MTC) staff on Plan Bay Area and the Regional Housing Needs Analysis and considered the California Tax Credit Allocation Committee's (CTCAC's) database of qualifying projects that have received tax credits through the federal and state Low-Income Housing Tax Credit Programs, which were created to promote private investment in affordable rental housing for low-income Californians.[23] The results indicate that for the five Bay Area MRP counties, nearly 100 percent of the projects that received state or federal affordable housing tax credits would qualify for the maximum non-LID Affordable Housing Credit in the amendment. That indicates the revisions are appropriately targeting the maximum flexibility to those projects that provide the maximum potential water quality benefit. Additionally, the Water Board reviewed housing laws including the California Density Bonus Law and retained the provision's sliding scale of benefits for projects that are relatively more affordable, although the scale was simplified to facilitate its use and give flexibility to projects (typically for-profit projects) that have a more modest amount of affordable units, but are still expected to provide water quality benefit. The information regarding affordability needed to use this provision (e.g., number of units, relative affordability, deed restrictions) is already typically used as a part of laws including the Density Bonus Law. As such, it should be readily available to use to calculate the Affordable Housing Credit.

Provision C.3.e.ii.5.(c) allows for up to three managers' dwelling units to be excluded from deed restriction requirements. This is to recognize that while managers' dwelling units are necessary to support larger affordable housing projects, they are typically not deed-restricted affordable units, which is information the Water Board did not have at the time of Permit issuance. It is reasonable to exclude them because they are necessary to the operation of certain affordable housing projects and excluding them supports the measure's intended goal of supporting affordable housing by providing flexibility relative to a project's overall affordability.

[23] https://www.treasurer.ca.gov/ctcac/projects.asp

Provision C.3.e.ii.5.(a)(i) has been revised to clarify the definition of primarily residential projects, based on new information provided during the Workgroup participants that affordable housing projects are facilitated through allowing mixed uses. The modification allows projects that provide affordable housing, and thus associated water quality benefits, to benefit from allowed flexibility, even if up to one-third of their square footage is dedicated to other uses (e.g., commercial). It appropriately recognizes that affordable housing projects are not exclusively single-use (i.e., residential), and sets a reasonable threshold for mixed use to retain the provision's affordable housing focus and ensure water quality remains appropriately protected.

Provision C.3.e.ii.5 has been revised to exempt from Provision C.3.c and C.3.d temporary emergency homeless shelters for people experiencing unsheltered homelessness, instead requiring those projects to comply with Provision C.3.i and to implement relevant best management practices developed under Provision C.17. Should the use become permanent, or if there is a new Regulated Project and/or Special Project at the site, the project shall comply with Provision C.3, including Provisions C.3.c and C.3.d. The revision facilitates the construction of temporary emergency housing for people experiencing unsheltered homelessness, which reduces discharges of trash and sewage associated with unsheltered homelessness. It is limited because the exemption is removed if the use becomes other than temporary, or if a new Regulated Project or Special Project is constructed at the site. It is further limited because it applies only to temporary emergency housing projects that would have otherwise been Regulated Projects. Many temporary emergency housing projects are not Regulated Projects because they do not create or replace impervious surface (e.g., RV safe parking areas and cabin communities constructed on existing paved areas). It has been included because of the ongoing significant populations of residents experiencing unsheltered homelessness within MRP Permittee jurisdictions, because of the increasing recognition of the benefits of temporary transitional housing by Permittees including Oakland and San Jose,[24] and Permittee recognition of temporary transitional housing as a practice that can address unsheltered homelessness and the non-stormwater discharges associated with it.[25] The revision recognizes new information that justifies excluding temporary emergency homeless shelters from

[24] For example: Guy Marzorati, June 14, 2023. "San Jose City Council Approves Modest Shift Toward Temporary Homeless Housing." KQED. https://www.kqed.org/news/11952913/san-jose-council-approves-modest-shift-toward-temporary-homeless-housing.
McKinsey & Company, March 23, 2023. The ongoing crisis of homelessness in the Bay Area: What's working, what's not. https://www.mckinsey.com/industries/public-sector/our-insights/the-ongoing-crisis-of-homelessness-in-the-bay-area-whats-working-whats-not#/
National Alliance to End Homelessness, February 24, 2023. Taking an Equitable Approach to Unsheltered Homelessness. https://endhomelessness.org/blog/taking-an-equitable-approach-to-unsheltered-homelessness/

[25] See the Bay Area Municipal Stormwater Collaborative report, dated September 30, 2023. "Regional Best Management Practices Report for Addressing Non-Stormwater Discharges Associated with Unsheltered Homeless Populations." At the time of this Permit amendment, the Report had been recently submitted and was under review by the Water Board.

compliance with Provisions C.3.c-d. This information includes the Bay Area Municipal Stormwater Collaborative report, dated September 30, 2023, "Regional Best Management Practices Report for Addressing Non-Stormwater Discharges Associated with Unsheltered Homeless Populations." At the time of Permit amendment, the Report had been recently submitted and was under review by the Water Board. The report recognizes temporary emergency homeless shelters, such as managed RV safe parking areas and managed encampment sites like "cabin communities," as tools in transitioning to shelter Bay Area residents experiencing unsheltered homelessness, and thus reducing associated non-stormwater discharges. Similarly, there is new information on the shifts in effort by MRP Permittees, including the cities of Oakland and San Jose, to increase focus on temporary emergency housing as one tool in the toolbox of reducing unsheltered homelessness. This includes the City of San Jose's five-year municipal budget projection (e.g., Expenditure Forecast: "In addition, the City has committed the remaining $56.6 million of federal funding from the American Rescue Plan Act to augment and continue critical pandemic response and recovery programs in 2022-2023, including Emergency Interim Housing Construction and Operation, child and youth services investments, contractual services for Beautify San José Consolidated Model, SOAR Expansion, and Digital Equity, which will also be re-evaluated for continuation in 2023-2024 in consideration of ongoing community needs." p.54 of 184, https://www.sanjoseca.gov/home/showpublisheddocument/95049/638134342380800000). And the Water Board considered newly published references indicating that temporary emergency housing is part of the set of tools needed to address unsheltered homelessness.

Antidegradation

Federal and state antidegradation policies at 40 CFR section 131.12 (federal antidegradation policy) and State Water Board Resolution No. 68-16 (state antidegradation policy) require that high quality waters be maintained unless degradation is justified based on specific findings. The federal antidegradation policy also requires existing instream uses and the level of water quality necessary to protect those uses be maintained and protected. Here, the baseline water quality against which any potential degradation resulting from this Order is measured is the level authorized in the Permit.[26] The modifications in this Order do not authorize any lowering water quality as compared to the Permit such that no antidegradation analysis is required. The Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), provides that no antidegradation analysis is required where the regional water board has no expectation that water quality will be reduced by the permitting action. That is the case here. This Order's modification to allow alternative treatment systems will not result in lower water quality because their use is

[26] See Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004, p. 4 (baseline water quality is the best quality of the receiving water since 1969 considering the state antidegradation policy or 1975 considering the federal antidegradation policy, unless subsequent lowering was authorized consistent with these policies).

limited to situations where LID measures are infeasible and backstopped by a requirement to demonstrate commensurate benefit to LID measures. In addition, their use is limited geographically to stormwater discharges that drain into continuously hardened channels or that drain directly into San Francisco Bay, the Pacific Ocean, or other tidal waters, and includes flow controls commensurate with those provided by LID systems, so that stormwater flows will not cause downstream erosion and mobilize sediments and pollutants. The non-LID component of the alternative treatment system also must be TAPE-certified, which ensures a minimum level of performance that is comparable to the Permit's LID performance in terms of pollutant concentration reductions. Collectively, these requirements prevent lowering of water quality.

This Order's modification to the Permit's Category C Special Projects will similarly not result in lower water quality in receiving waters. Category C Special Projects employing alternative treatment systems will account for a very small footprint, because the systems can only be used after establishing the infeasibility of treating 100 percent of the amount of runoff identified in Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) for the Regulated Project's drainage area with LID treatment measures onsite, offsite, through paying in-lieu fees, or a combination thereof. LID treatment measures are highly achievable and cost-effective such that they can be employed in most instances. The Order changes the method for calculating affordable housing credits from fixed credits to a sliding scale of credits, with the maximum credits granted to affordable housing projects with dwelling units for acutely low household incomes. This revised method will slightly increase allowed drainage area that may be treated with non-LID measures as compared to the area allowed by the original method. However, the allowed non-LID treatment systems are alternative treatment systems, which new information shows are as effective as LID measures in reducing pollutant concentrations. Any potential water quality impacts from the slight increase in the drainage area treated with alternative treatment systems would be minor and offset by the benefits of implementing Category C Special Projects. First, as determined by the Water Board in each of the regional municipal stormwater permits issued to date, when considered on a watershed scale, certain smart growth or high-density projects—like Category C Special Projects—can reduce existing impervious surfaces or create less accessory impervious areas and car-related pollutant impacts, all of which reduce the discharge of stormwater pollutants into waters. Because of this, the Water Board established incentive LID treatment reduction credits for certain special projects like Category C Special Projects. Second, the projects that qualify for Category C credits will provide housing that will reduce unsheltered homelessness and its associated non-stormwater discharges into receiving waters within Permittee jurisdictions, thereby improving water quality. Significant impacts to water quality can occur and has occurred from unsheltered homelessness in the region (e.g., from trash and raw sewage).

Antibacksliding

This Order complies with the anti-backsliding provisions of CWA, which generally requires new effluent limitations to be as stringent as those in the previous order. CWA section 402(o) prohibits revising an existing effluent limitation that was established on a case-by-case basis using best professional judgment under CWA section 402(a)(1)(B) to an effluent limitation that reflects subsequently promulgated, less stringent effluent guidelines. It also prohibits relaxing an existing effluent limitation established pursuant to CWA sections 301(b)(1)(C) or 303(d) or (e). CWA section 402(o) does not apply here because the changes to the Permit in this Order are not based on either revised effluent limitation guidelines or CWA section 301(b)(1)(C) or section 303(d) or (e); rather, they are based on CWA section 402(p)(3)(B).

It is unclear if the regulatory anti-backsliding prohibition at 40 CFR section 122.44(l) applies to municipal stormwater permits. This is unnecessary to resolve because assuming for the sake of argument that it applies, even though this Order's changes are not necessarily less stringent, the changes qualify for an exception to backsliding. Both the CWA and federal regulations contain exceptions to the anti-backsliding requirements where new information is available to the permitting authority that was not available at the time of the issuance of the prior permit and that would have justified the imposition of less stringent effluent limitations at that time. See 33 USC § 1342(o)(2)(B)(i); 40 CFR § 122.44(l)(1) anti-backsliding does not apply if the circumstances on which the previous permit was based have materially and substantially changed and would constitute cause for permit modification under 40 CFR section 122.62 [e.g., where new information that was not available at the time the previous permit was issued and would have justified the different requirements]; see also 40 CFR §122.44(l)(2)(i)(B)(1). As explained elsewhere in this Fact Sheet, there is new information that was not available at the time of the Permit's adoption that would have justified the application of different requirements at that time.

Public Participation

A. **Notification of Interested Parties**. The Water Board notified the Permittees and interested agencies and persons of its intent to amend the Permit with this Order and provided an opportunity to submit written comments. The public had access to the agenda and any changes in dates and locations through the Water Board's website at http://www.waterboards.ca.gov/sanfranciscobay. The Water Board also notified potentially affected disadvantaged communities and tribal communities of this Order and provided them with an opportunity to engage prior to the public comment period.

B. **Written Comments**. Interested persons were invited to submit written comments concerning the draft Order as explained through the notification process. Comments were to be submitted to RB2-MRP@waterboards.ca.gov or to the Water Board at 1515 Clay Street, Suite 1400, Oakland, California, to the attention of Derek Beauduy. For Water Board consideration, the written comments were due via email or at the Water Board office by 5:00 p.m. on August 21, 2023.

C. **Public Hearing**. The Water Board held a public hearing on the Order during its regular meeting at the following date, time, and location:

Date:	October 11, 2023
Time:	9:00 a.m.
Location:	Elihu Harris State Office Building 1515 Clay Street, 1st Floor Auditorium Oakland, CA 94612
Contact:	Derek Beauduy, (510) 622-2348 derek.beauduy@waterboards.ca.gov

Interested persons were invited to attend. At the public hearing, the Water Board heard testimony pertinent to the Order.

The Water Board web address is http://www.waterboards.ca.gov/sanfranciscobay, where one could access the current agenda for changes in dates and locations.

D. **Reconsideration of Amendment**. Any aggrieved person may petition the State Water Board to review the Water Board decision regarding this Order.

For instructions on how to file a petition review, see www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

E. **Information and Copying**. Supporting documents and comments received are on file and may be inspected at the address above between 9:00 a.m. and 5:00 p.m., Monday through Friday. Copying of documents may be arranged by calling (510) 622-2300.

G. **Additional Information**. Requests for additional information or questions regarding this Order should be directed to Derek Beauduy at (510) 622-2348 or derek.beauduy@waterboards.ca.gov.

United States Environmental Protection Agency
Office of Water (4203)
EPA 833-F-00-007
January 2000 (revised December 2005)
Fact Sheet 2.5

Stormwater Phase II Final Rule

Illicit Discharge Detection and Elimination Minimum Control Measure

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Final Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

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2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

This fact sheet profiles the Illicit Discharge Detection and Elimination minimum control measure, one of six measures the operator of a Phase II regulated small municipal separate storm sewer system (MS4) is required to include in its stormwater management program to meet the conditions of its National Pollutant Discharge Elimination System (NPDES) permit. This fact sheet outlines the Phase II Final Rule requirements and offers some general guidance on how to satisfy them. It is important to keep in mind that the small MS4 operator has a great deal of flexibility in choosing exactly how to satisfy the minimum control measure requirements.

What Is An "Illicit Discharge"?

Federal regulations define an illicit discharge as "...any discharge to an MS4 that is not composed entirely of stormwater..." with some exceptions. These exceptions include discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities. Illicit discharges (see Table 1) are considered "illicit" because MS4s are not designed to accept, process, or discharge such non-stormwater wastes.

Table 1

Sources of Illicit Discharges
Sanitary wastewater
Effluent from septic tanks
Car wash wastewaters
Improper oil disposal
Radiator flushing disposal
Laundry wastewaters
Spills from roadway accidents
Improper disposal of auto and household toxics

Why Are Illicit Discharge Detection and Elimination Efforts Necessary?

Discharges from MS4s often include wastes and wastewater from non-stormwater sources. A study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4.

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

What Is Required?

Recognizing the adverse effects illicit discharges can have on receiving waters, the Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement and enforce an illicit discharge detection and elimination program. This program must include the following:

- ❑ A storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;
- ❑ Through an ordinance, or other regulatory mechanism, a prohibition (to the extent allowable under State, Tribal, or local law) on non-stormwater discharges into the MS4, and appropriate enforcement procedures and actions;
- ❑ A plan to detect and address non-stormwater discharges, including illegal dumping, into the MS4;
- ❑ The education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste; and
- ❑ The determination of appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Some program implementation approaches, BMPs (i.e., the program actions/activities), and measurable goals are suggested below.

Does This Measure Need to Address All Illicit Discharges?

No. The illicit discharge detection and elimination program does not need to address the following categories of non-stormwater discharges or flows unless the operator of the regulated small MS4 identifies them as significant contributors of pollutants to its MS4:

- ❑ Water line flushing;
- ❑ Landscape irrigation;
- ❑ Diverted stream flows;
- ❑ Rising ground waters;
- ❑ Uncontaminated ground water infiltration;
- ❑ Uncontaminated pumped ground water;
- ❑ Discharges from potable water sources;
- ❑ Foundation drains;
- ❑ Air conditioning condensation;
- ❑ Irrigation water;
- ❑ Springs;
- ❑ Water from crawl space pumps;
- ❑ Footing drains;
- ❑ Lawn watering;
- ❑ Individual residential car washing;
- ❑ Flows from riparian habitats and wetlands;
- ❑ Dechlorinated swimming pool discharges; and
- ❑ Street wash water.

What Are Some Guidelines for Developing and Implementing This Measure?

The objective of the illicit discharge detection and elimination minimum control measure is to have regulated small MS4 operators gain a thorough awareness of their systems. This awareness allows them to determine the types and sources of illicit discharges entering their system; and establish the legal, technical, and educational means needed to eliminate these discharges. Permittees could meet these objectives in a variety of ways depending on their individual needs and abilities, but some general guidance for each requirement is provided below.

The Map

The storm sewer system map is meant to demonstrate a basic awareness of the intake and discharge areas of the system. It is needed to help determine the extent of discharged dry weather flows, the possible sources of the dry weather flows, and the particular waterbodies these flows may be affecting. An existing map, such as a topographical map, on which the location of major pipes and outfalls can be clearly presented demonstrates such awareness.

EPA recommends collecting all existing information on outfall locations (e.g., review city records, drainage maps, storm drain maps), and then conducting field surveys to verify locations. It probably will be necessary to walk (i.e., wade through small receiving waters or use a boat for larger waters) the streambanks and shorelines for visual observation. More than one trip may be needed to locate all outfalls.

Legal Prohibition and Enforcement

EPA recognizes that some permittees may have limited authority under State, Tribal or local law to establish and enforce an ordinance or other regulatory mechanism prohibiting illicit discharges. In such a case, the permittee is encouraged to obtain the necessary authority, if possible.

The Plan

The plan to detect and address illicit discharges is the central component of this minimum control measure. The plan is dependant upon several factors, including the permittee's available resources, size of staff, and degree and character of its illicit discharges. As guidance only, the four steps of a recommended plan are outlined below:

❶ **Locate Problem Areas**
EPA recommends that priority areas be identified for detailed screening of the system based on the likelihood of illicit connections (e.g., areas with older sanitary sewer lines). Methods that can locate problem areas include: visual screening; water sampling from manholes and outfalls during dry weather; the use of infrared and thermal photography, cross-training field staff to detect illicit discharges, and public complaints.

❷ **Find the Source**
Once a problem area or discharge is found, additional efforts usually are necessary to determine the source of the problem. Methods that can find the source of the illicit discharge include: dye-testing buildings in problem areas; dye- or smoke-testing buildings at the time of sale; tracing the discharge upstream in the storm sewer; employing a certification program that shows that buildings have been checked for illicit connections; implementing an inspection program of existing septic systems; and using video to inspect the storm sewers.

❸ **Remove/Correct Illicit Connections**
Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action.

❹ **Document Actions Taken**
As a final step, all actions taken under the plan should be documented. This illustrates that progress is being made to eliminate illicit connections and discharges. Documented actions should be included in annual reports and include information such as: the number of outfalls screened; any complaints received and corrected; the number of discharges and quantities of flow eliminated; and the number of dye or smoke tests conducted.

Educational Outreach

The Center for Watershed Protection and Robert Pitt (2004) researched the most cost-effective and efficient techniques that can be employed to identify and correct inappropriate discharges. Data from Montgomery County, Maryland, was analyzed and it was determined that staff identify and correct about six inappropriate discharges per year as a result of regular screening. By contrast, over 185 inappropriate discharges are corrected each year in Montgomery County as a direct result of citizen complaints and calls to a storm water compliant hotline. Public education and labeling of outfalls and other storm drain infrastructure is an important element of establishing a successful citizen hotline. Outreach to public employees, businesses, property owners, the general public, and elected officials regarding ways to detect and eliminate illicit discharges is an integral part of this minimum measure.

Suggested educational outreach efforts include:

- Developing ***informative brochures, and guidances*** for specific audiences (e.g., carpet cleaning businesses) and school curricula;
- Designing a program to ***publicize and facilitate public reporting*** of illicit discharges;
- ***Coordinating volunteers*** for locating, and visually inspecting, outfalls or to stencil storm drains; and
- Initiating ***recycling programs*** for commonly dumped wastes, such as motor oil, antifreeze, and pesticides.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure.

EPA has developed a Measurable Goals Guidance for Phase II MS4s that is designed to help program managers comply with the requirement to develop measurable goals. The guidance presents an approach for MS4 operators to develop measurable goals as part of their stormwater management plan. For example, an MS4 could establish a measurable goal of responding to all complaints received by the citizen complaint hotline within 24 hours to minimize water quality impacts or recurrent dumping. A complaint tracking system could be used to log response and enforcement activity.

The educational outreach measurable goals for this minimum control measure could be combined with the measurable goals for the Public Education and Outreach minimum control measure (see Fact Sheet 2.3).

Sources

Center for Watershed Protection and R. Pitt. 2004. Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments. Center for Watershed Protection, Ellicott City, MD, and University of Alabama, Birmingham, AL.

Maryland Department of the Environment, Water Management Administration. 1997. *Dry Weather Flow and Illicit Discharges in Maryland Storm Drain Systems*. Baltimore, Maryland.

U.S. EPA Office of Water. 1993. *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide*. EPA/600/R-92/238. Washington, D.C.

Wayne County Rouge River National Wet Weather Demonstration Project. 1997. *Guidance for Preparing a Program for the Elimination of Illicit Discharges*. Wayne County, Michigan.

For Additional Information

Contacts

☞ U.S. EPA Office of Wastewater Management
http://www.epa.gov/npdes/stormwater
Phone: 202-564-9545

☞ Your NPDES Permitting Authority. Most States and Territories are authorized to administer the NPDES Program, except the following, for which EPA is the permitting authority:

Alaska	Guam
District of Columbia	Johnston Atoll
Idaho	Midway and Wake Islands
Massachusetts	Northern Mariana Islands
New Hampshire	Puerto Rico
New Mexico	Trust Territories
American Samoa	

☞ A list of names and telephone numbers for each EPA Region and State is located at http://www.epa.gov/npdes/stormwater (click on "Contacts").

Reference Documents

☞ EPA's Stormwater Web Site
http://www.epa.gov/npdes/stormwater
- Stormwater Phase II Final Rule Fact Sheet Series
- Stormwater Phase II Final Rule (64 *FR* 68722)
- National Menu of Best Management Practices for Stormwater Phase II
- Measurable Goals Guidance for Phase II Small MS4s
- Stormwater Case Studies
- And many others

☞ Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments
http://www.cwp.org/idde_verify.htm